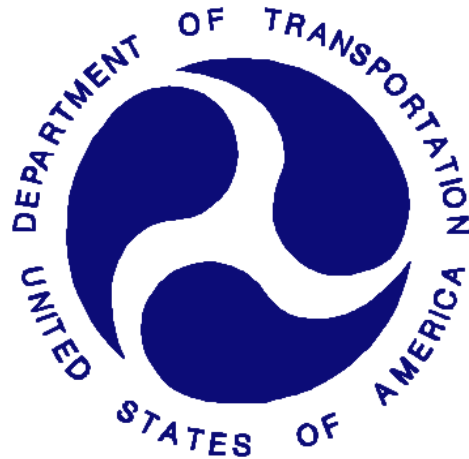


REPORT NUMBER: NCAP-MGA-2012-036

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

**GENERAL MOTORS LLC
2012 Chevrolet Sonic 2LT 4-Dr Sedan
NHTSA No.: MC0109**

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



Test Date: December 7, 2011

Final Report Date: January 16, 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: January 16, 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: _____

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				15. Supplementary Notes																																																			
16. Abstract A 56.3 km/h NCAP Frontal Impact Test was conducted on the 2012 Chevrolet Sonic 2LT 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 December 7, 2011. The impact velocity was 56.2 km/h and the ambient temperature at the barrier face at the time of impact was 21.7°C. The target vehicle post-test maximum crush was 431 mm located at the vehicle's centerline. The test vehicle's performance was as follows: <table border="1" style="margin: 10px auto; border-collapse: collapse; text-align: center;"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th rowspan="2">Units</th> <th colspan="2">Threshold</th> <th rowspan="2">Driver ATD</th> <th rowspan="2">Passenger ATD</th> </tr> <tr> <th>50th</th> <th>5th</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₁₅)</td> <td>N/A</td> <td>700</td> <td>700</td> <td>152</td> <td>273</td> </tr> <tr> <td>Maximum Chest Compression</td> <td>mm</td> <td>63</td> <td>52</td> <td>18</td> <td>7</td> </tr> <tr> <td>Nij</td> <td>N/A</td> <td>1</td> <td>1</td> <td>0.31</td> <td>0.36</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>4170</td> <td>2620</td> <td>1165</td> <td>740</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>4000</td> <td>2520</td> <td>265</td> <td>329</td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>10008</td> <td>6805</td> <td>1458</td> <td>889</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>10008</td> <td>6805</td> <td>1807</td> <td>974</td> </tr> </tbody> </table>						Measurement Description	Units	Threshold		Driver ATD	Passenger ATD	50 th	5 th	Head Injury Criteria (HIC ₁₅)	N/A	700	700	152	273	Maximum Chest Compression	mm	63	52	18	7	Nij	N/A	1	1	0.31	0.36	Neck Tension	N	4170	2620	1165	740	Neck Compression	N	4000	2520	265	329	Left Femur Force	N	10008	6805	1458	889	Right Femur Force	N	10008	6805	1807	974
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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 2012 Chevrolet Sonic 2LT 4-Dr Sedan at a velocity of 56.2 kph. The test was performed at MGA Research Corporation on December 7, 2011. 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, 50th percentile male anthropomorphic test device (ATD), was placed in the driver seating position and one Part 572O 5th 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 on the driver's lap and shoulder belts and the passenger's lap belt to measure dummy torso and pelvic section loading.

The driver (position 1) ATD (Serial No. 351) 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 431 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. 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 ₁₅	Nij	Neck Tension (N)	Neck Comp. (N)	3ms Chest Clip (Gs)	Chest Disp. (mm)	Left Femur (N)	Right Femur (N)
Driver (50 th)	152	0.31	1165	265	43	18	1458	1807
Passenger (5 th)	273	0.36	740	329	42	7	889	974

The test data can be found on the NHTSA website at www.nhtsa.dot.gov.

TEST NOTES

There was no valid data collected for:
Bottom of Engine X after 37 msec.

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: 2012 Chevrolet Sonic 2LT 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0109
 Test Date: 12/07/2011

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	MC0109	Traction Control System (TCS)	Yes
Model Year	2012	Auto-Leveling System	No
Make	Chevrolet	Automatic Door Locks (ADLs)	Yes
Model	Sonic	Power Window Auto-Reverse	Yes
Body Style	Sedan	Other Optional Feature	N/A
VIN	1G1JC5SH3C4107917	Driver Front Airbag	Yes
Body Color	Victory Red	Driver Curtain Airbag	Yes
Odometer (km/mi)	43 / 27	Driver Head/Torso Airbag	No
Engine Displacement (L)	1.8	Driver Torso Airbag	No
Type/No. Cylinders	4	Driver Torso/Pelvis Airbag	Yes
Engine Placement	Lateral	Driver Pelvis Airbag	No
Transmission Type	Automatic	Driver Knee Airbag	Yes
Transmission Speeds	6	Pass. Curtain Airbag	Yes
Overdrive	Yes	Pass. Head/Torso Airbag	No
Final Drive	FWD	Pass. Torso Airbag	No
Roof Rack	No	Pass. Torso/Pelvis Airbag	Yes
Sunroof/T-Top	No	Pass. Pelvis Airbag	No
Running Boards	No	Driver Seat Belt Pretensioner	Yes
Tilt Steering Wheel	Yes	Pass. Seat Belt Pretensioner	Yes
Power Seats	No	Driver Load Limiter	Yes
Anti-Lock Brakes (ABS)	Yes	Pass. Load Limiter	Yes
All-Wheel Drive (AWD)	No	Pass. Knee Airbag	Yes
Does owner's manual provide instructions to turn off automatic door locks?			No

DATA FROM CERTIFICATION LABEL

Manufactured By	General Motors LLC	GVWR (kg)	1702
Date of Manufacture	09/11	GAWR Front (kg)	893
Vehicle Type	Pass Car	GAWR Rear (kg)	809

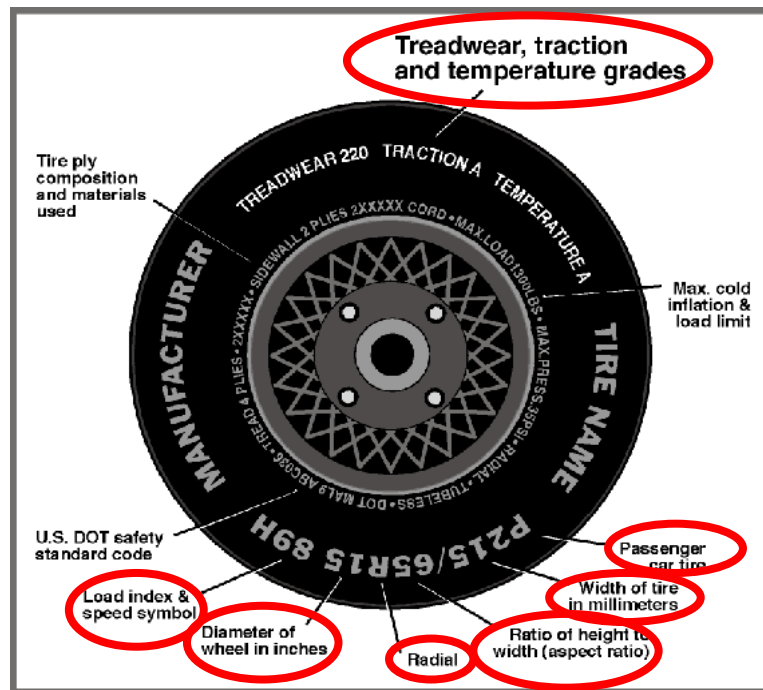
VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Split Bench		
Designated Seating Capacity (DSC)	2	3		5
Capacity Weight (VCW) (kg)				406
Cargo Weight (RCLW) (kg)				66

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

Test Vehicle: 2012 Chevrolet Sonic 2LT 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0109
 Test Date: 12/07/2011



TIRE PLACARD INFORMATION

Measured Parameter	Front	Rear
Recommended Cold Tire Pressure (kPa)	240	240
Recommended Tire Size	P205/55R16	P205/55R16

TIRE SIDEWALL INFORMATION

Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	240	240
Tire Size on Vehicle	P205/55R16	P205/55R16
Tire Manufacturer	Hankook	Hankook
Tire Name	Optimo H428	Optimo H428
Tire Type	Passenger	Passenger
Tire Width	205	205
Aspect Ratio	55	55
Radial	Yes	Yes
Wheel Diameter	16	16
Load Index/Speed Symbol	89H	89H
Treadwear	500	500
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: 2012 Chevrolet Sonic 2LT 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0109
 Test Date: 12/07/2011

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	400.5	253.1		429.1	332.0	
Right	kg	388.7	240.0		413.7	307.1	
Ratio	%	61.5	38.5		56.9	43.1	
Totals	kg	789.2	493.1	1282.3	842.8	639.1	1481.9

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1282.3
Weight of 1 P572E ATD & 1 P572O ATD	kg	140.6
Rated Cargo/Luggage Weight (RCLW)	kg	66
Calculated Vehicle Target Weight (TVTW)	kg	1488.9

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	670	677	690	685	973
As Tested	mm	660	665	653	656	1091
Post Test	mm	726	678	657	639	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2530
Total Vehicle Length at Left Side	mm	4195
Total Vehicle Length at Centerline	mm	4421
Total Vehicle Length at Right Side	mm	4195
Weight of Ballast in Cargo Area	kg	51.7
Weight of Vehicle Components Removed	kg	18.6
Amount of Stoddard Solvent in Fuel Tank	L	43.0

List of components removed: Spare tire, jack/tools, right taillight, and trunk carpet.

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

Test Vehicle: 2012 Chevrolet Sonic 2LT 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0109
 Test Date: 12/07/2011

TARGET VEHICLE STRUCTURAL MEASUREMENT

	Elements	Pre-Test (mm)
1	Total Length	4421
2	Total Width	1691
3	Bumper Top Height	515
4	Bumper Bottom Height	410
5	Longitudinal Member Top Height	520
6	Distance between Longitudinal Members	871
7	Longitudinal Member Width	80
8	Engine Top Height	845
9	Engine Bottom Height	171
10	Engine and Gearbox Width	780
11	Front Bumper-Engine Distance	255
12	Front Shock Absorber Fixing Height	839
13	Bonnet Leading Edge Height	764
14	Front Shock Absorber Fixing Width	1190
15	Front Bumper – Front Axle Distance	1325
16	Front Axle – A-Pillar Distance	420
17	A-Pillar – B-Pillar Distance	1065
18	B-Pillar – Rear Axle Distance	1045
19	B-Pillar – C-Pillar Distance	618
20	Roof Sill Bottom Height	1347
21	Roof Sill Top Height	1463
22	Floor Sill Bottom Height	224
23	Floor Sill Top Height	355

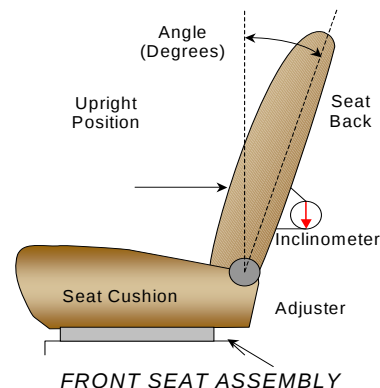
DATA SHEET NO. 2
SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

Test Vehicle: 2012 Chevrolet Sonic 2LT 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0109
 Test Date: 12/07/2011

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	7.2° on headrest post
Passenger Seat Back Angle	4.8° on headrest post

SEAT FORE/AFT POSITIONS

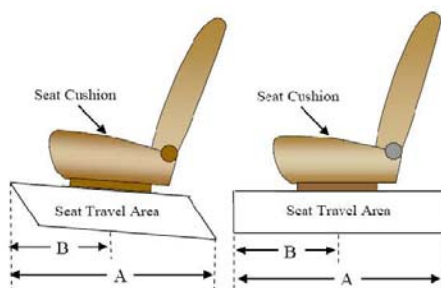
The driver and passenger seat fore/aft positions are adjusted following Appendix F, "Driver & Passenger Dummy Seating & Positioning Procedures" in the NCAP Test Procedure dated January 2010.

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	54 detents	20 th detent (forward-most as 0)
Passenger Seat	54 detents	0 detent (forward-most 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 st as 0)	0 (uppermost as 0)
Passenger Seat	5 (1 st as 0)	0 (uppermost as 0)



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

Test Vehicle: 2012 Chevrolet Sonic 2LT 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0109
 Test Date: 12/07/2011

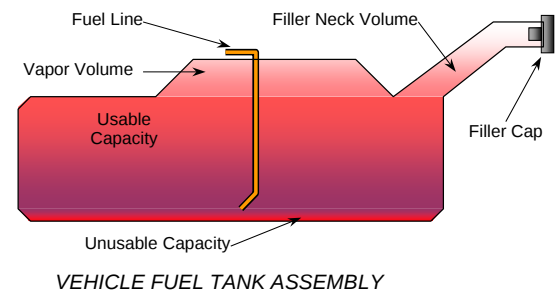
FUEL TANK CAPACITY DATA

	Liters
Usable Capacity of "Standard Tank"	46.2
Usable Capacity of "Optional Tank"	
92-94% of Usable Capacity	42.5 to 43.4
Actual Amount of Solvent used	43.0
1/3 of Usable Capacity	15.4

FUEL PUMP

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

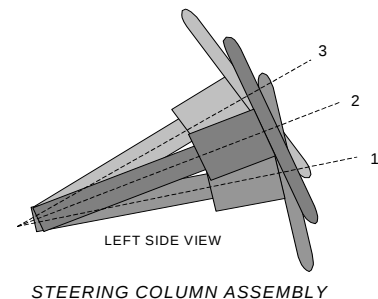
The vehicle is equipped with an electric fuel pump. The fuel pump will activate when the ignition key is turned to the 'Run' position. When the working fuel system pressure is achieved; the pump will turn OFF. The fuel pipe is on the right side.



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 POSITION

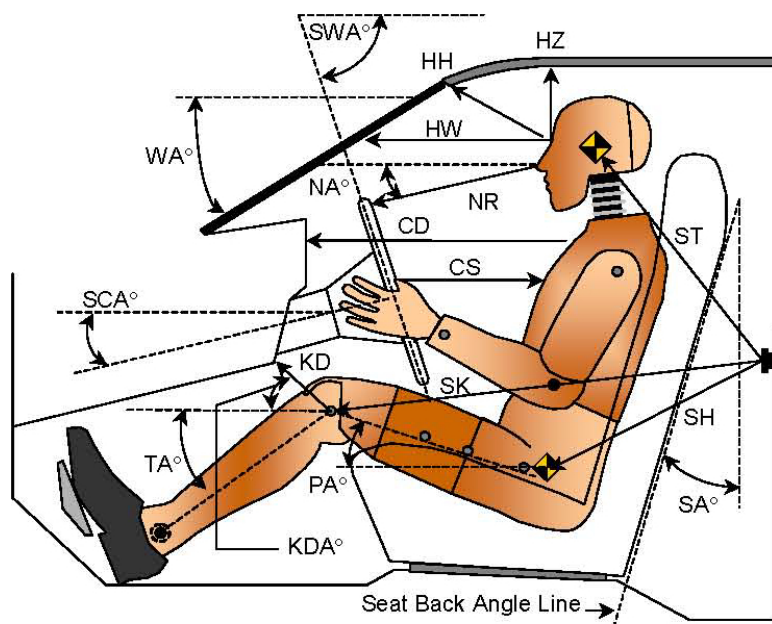


	Degrees	Fore/Aft Position (mm)
Lowermost – Position 1	68.4	
Geometric Center – Position 2	67.0	
Uppermost – Position 3	65.6	
Telescoping Steering Wheel Travel		
Test Position	67.0	

DATA SHEET NO. 3 DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2012 Chevrolet Sonic 2LT 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0109
Test Date: 12/07/2011



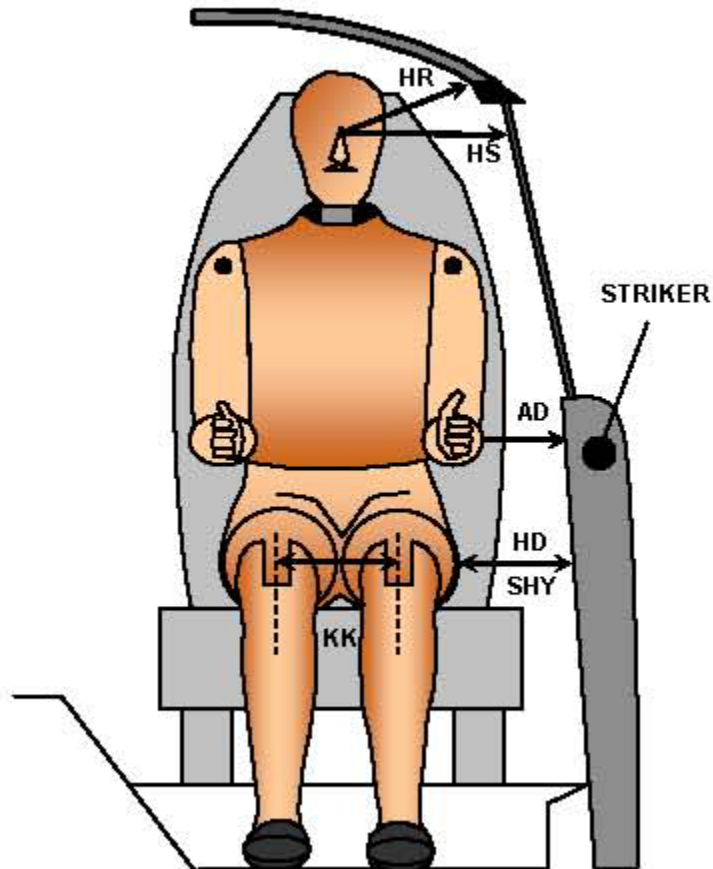
LEFT SIDE VIEW

Code	Measurement Description	Driver S/N 351		Passenger S/N 634	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		24.2		
SWA°	Steering Wheel Angle		67.0		
SCA°	Steering Column Angle		23.0		
SA°	Seat Back Angle (on headrest post)		7.2		4.8
HZ	Head to Roof (Z)	209	90	266	90
HH	Head to Header	446	15.9	340	35.8
HW	Head to Windshield	782	0	739	0
NR	Nose to Rim	410	13.6		
CD	Chest to Dash	544		466	
CS	Chest to Steering Hub	335	6.1		
RA	Rim to Abdomen	208	0		
KDL	Left Knee to Dash	197	20.8	128	27.4
KDR	Right Knee to Dash	190	21.9	129	29.0
PA°	Pelvic Angle		24.2		21.2
TA°	Tibia Angle		44.4		51.8
SK	Striker to Knee	556	95.7	634	95.0
ST	Striker to Head	471	7.4	450	26.4
SH	Striker to H-Point	257	138.2	349	113.8

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2012 Chevrolet Sonic 2LT 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0109
 Test Date: 12/07/2011



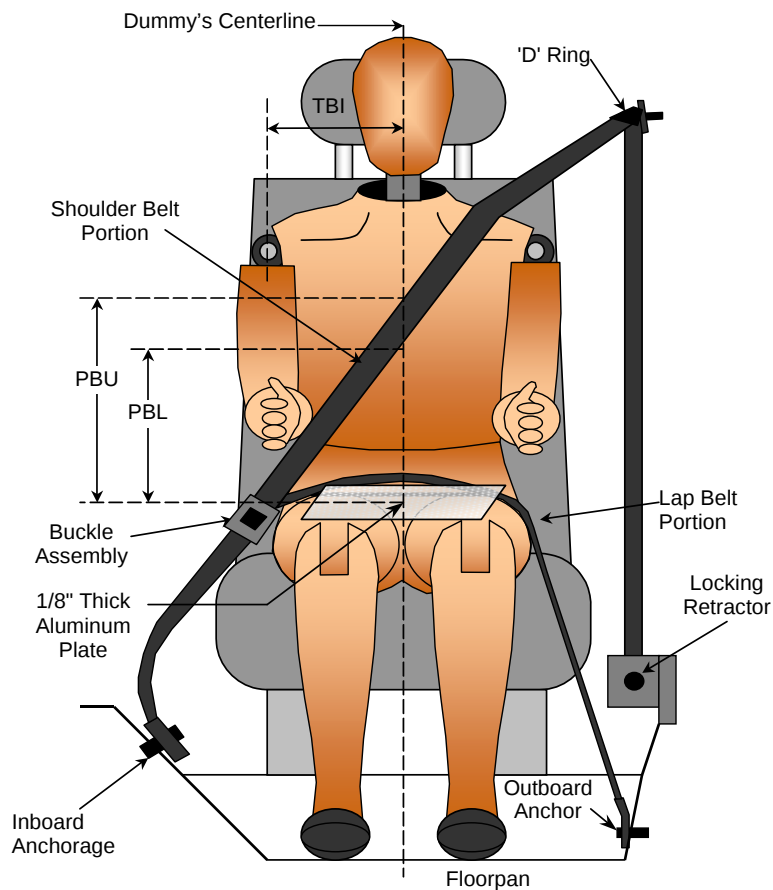
FRONT VIEW OF DUMMY

Code	Measurement Description	Driver S/N 351	Passenger S/N 634
		Length (mm)	
AD	Arm to Door	95	90
HD	H-Point to Door	128	179
HR	Head to Side Header	212	245
HS	Head to Side Window	325	378
KK	Knee to Knee	310	233
SHY	Striker to H-Point (Y Direction)	223	289
AA	Ankle to Ankle	315	182

DATA SHEET NO. 5 SEAT BELT POSITIONING DATA

Test Vehicle: 2012 Chevrolet Sonic 2LT 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0109
Test Date: 12/07/2011



FRONT VIEW OF DUMMY

SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU - Top surface of reference to belt upper edge	mm	330	350
PBL - Top surface of reference to belt lower edge	mm	240	250

BELT LENGTH DATA

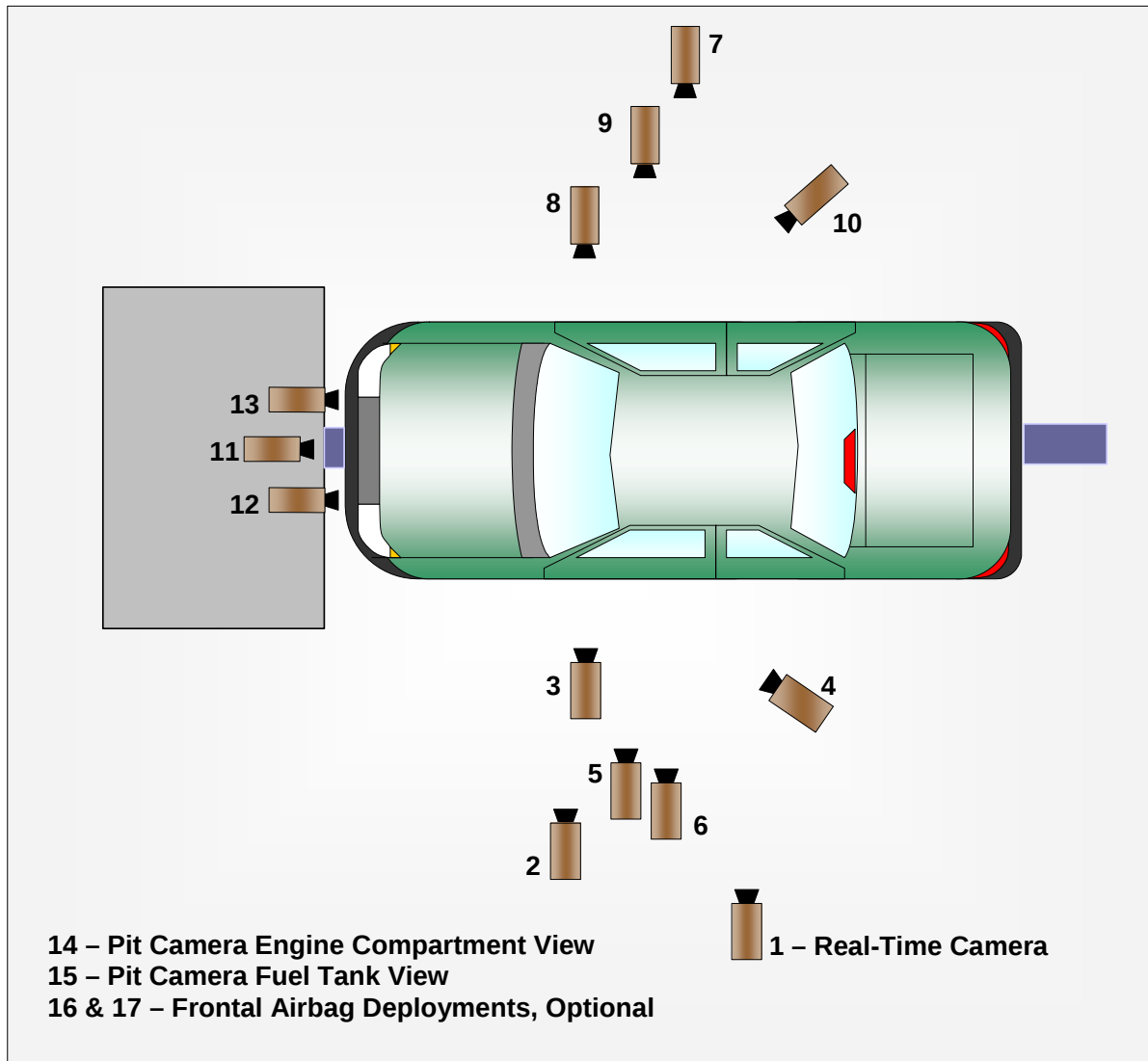
Measurement Description	Units	Driver	Passenger
Shoulder Belt Length as measured on ATD	mm	790	910
Lap Belt Length as measured on ATD	mm	455	535
Remainder of belt on reel	mm	1770	1615
Total Belt Length for Continuous Webbing Systems	mm	3015	3060

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

Test Vehicle: 2012 Chevrolet Sonic 2LT 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0109
Test Date: 12/07/2011

CAMERA POSITIONS FOR FRONTAL IMPACTS



DATA SHEET NO. 6 (CONTINUED)

CAMERA LOCATIONS AND DATA

Test Vehicle: 2012 Chevrolet Sonic 2LT 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0109
 Test Date: 12/07/2011

CAMERA LOCATIONS

No.	Camera View	Coordinates (mm)			Lens (mm)	Speed (fps)
		X*	Y*	Z*		
1	Real-Time Left Overall					30
2	Driver Close-Up	1320	-6670	-1820	35	1000
3	Left Front Half	1050	-4760	-1080	24	1000
4	Left Angle	5670	-5100	-1940	50	1000
5	Steering Column - Top	620	-5310	-1230	24	1000
6	Steering Column - Bottom	580	-5350	-830	24	1000
7	Right Overall	2000	6420	-1060	20	1000
8	Passenger Close-Up	1480	6890	-1830	35	1000
9	Right Front Half	1180	4780	-1040	24	1000
10	Right Angle	5820	4880	-1930	50	1000
11	Windshield	-130	0	-2810	24	1000
12	Driver Windshield	-250	-450	-2030	12.5	1000
13	Passenger Windshield	-250	450	-2030	12.5	1000
14	Pit Front	1230	0	3150	24	1000
15	Pit Rear	2870	0	3150	24	1000
16	Onboard Driver Side (optional)					
17	Onboard Passenger Side (optional)					
18	Real-Time Pan View					30

***COORDINATES:**

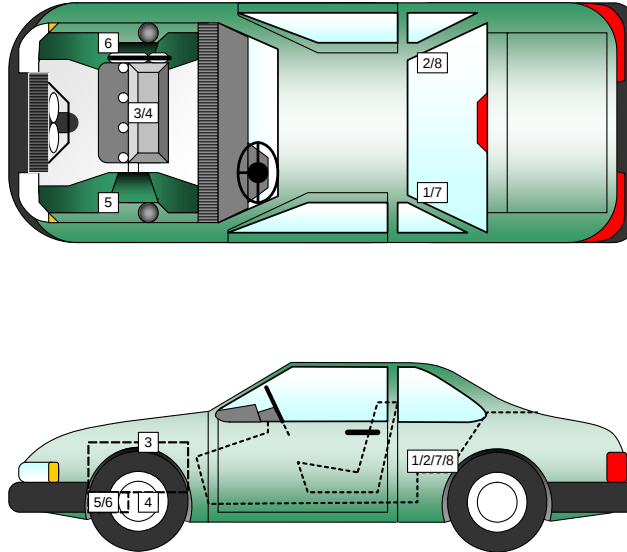
+X = forward of impact plane
 +Y = right of monorail centerline
 +Z = below ground level

Cameras 16 & 17 were not used for this test.

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

Test Vehicle: 2012 Chevrolet Sonic 2LT 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0109
 Test Date: 12/07/2011



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear Accelerometer – X Direction	1617	-410	-130
2	Right Rear Accelerometer – X Direction	1617	390	-130
3	Engine Top X	3678	50	-784
4	Engine Bottom X	3628	-80	-237
5	Left Brake Caliper X	3598	-650	-222
6	Right Brake Caliper X	3598	650	-246
7	Left Rear Accelerometer Redundant – X Direction	1617	-410	-130
8	Right Rear Accelerometer Redundant – X Direction	1617	390	-130

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

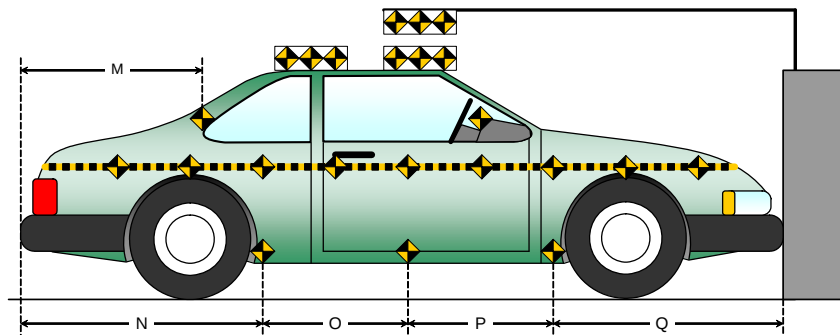
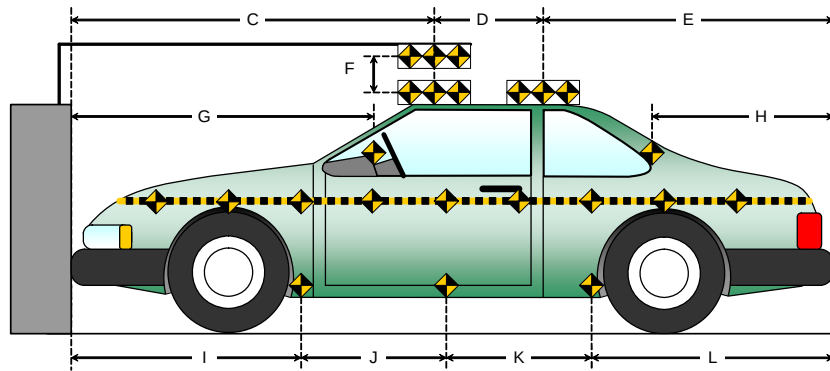
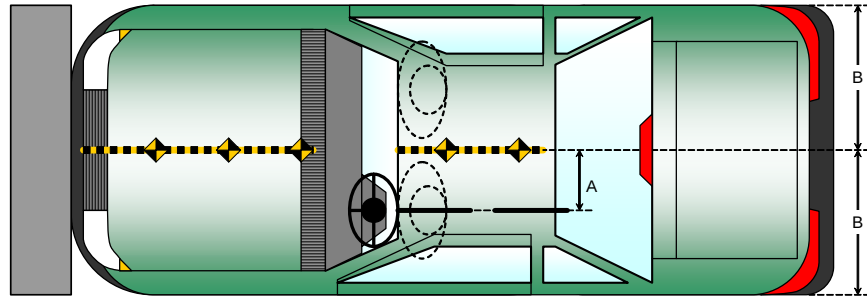
DATA SHEET NO. 8

PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2012 Chevrolet Sonic 2LT 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0109
 Test Date: 12/07/2011

Item	Value (mm)
A	330
B	846
C	2276
D	670
E	1475
F	153
G	
H	1204
I	1330
J	841
K	841
L	1409
M	1204
N	1409
O	841
P	841
Q	1330

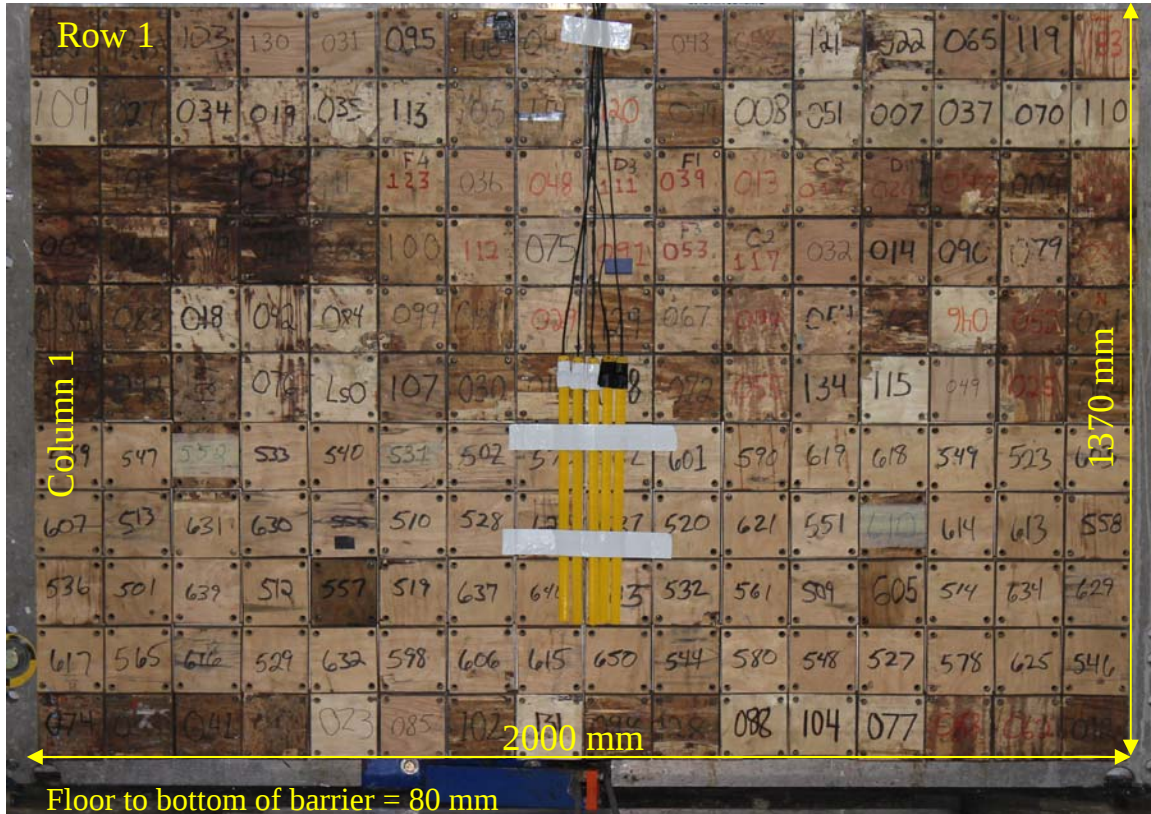


DATA SHEET NO. 9 **LOAD CELL LOCATIONS ON FIXED BARRIER**

Test Vehicle: 2012 Chevrolet Sonic 2LT 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0109
 Test Date: 12/07/2011

Advanced Research Load Cell Barrier



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
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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: 2012 Chevrolet Sonic 2LT 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0109
Test Date: 12/07/2011

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: 2012 Chevrolet Sonic 2LT 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0109
Test Date: 12/07/2011

TEST DUMMY INFORMATION AND CONTACT LOCATIONS

Description	Driver	Passenger
Dummy Type / Serial No.	HIII 50% / 351	HIII 5% / 634
Head Contact	Airbag, Headrest	Airbag, Headrest
Upper Torso Contact	Airbag	Airbag
Lower Torso Contact	None	None
Left Knee Contact	Airbag	Airbag
Right Knee Contact	Airbag	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 had to be opened with 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	1413
Center	mm	1605
Right Side	mm	1645
Average	mm	1554

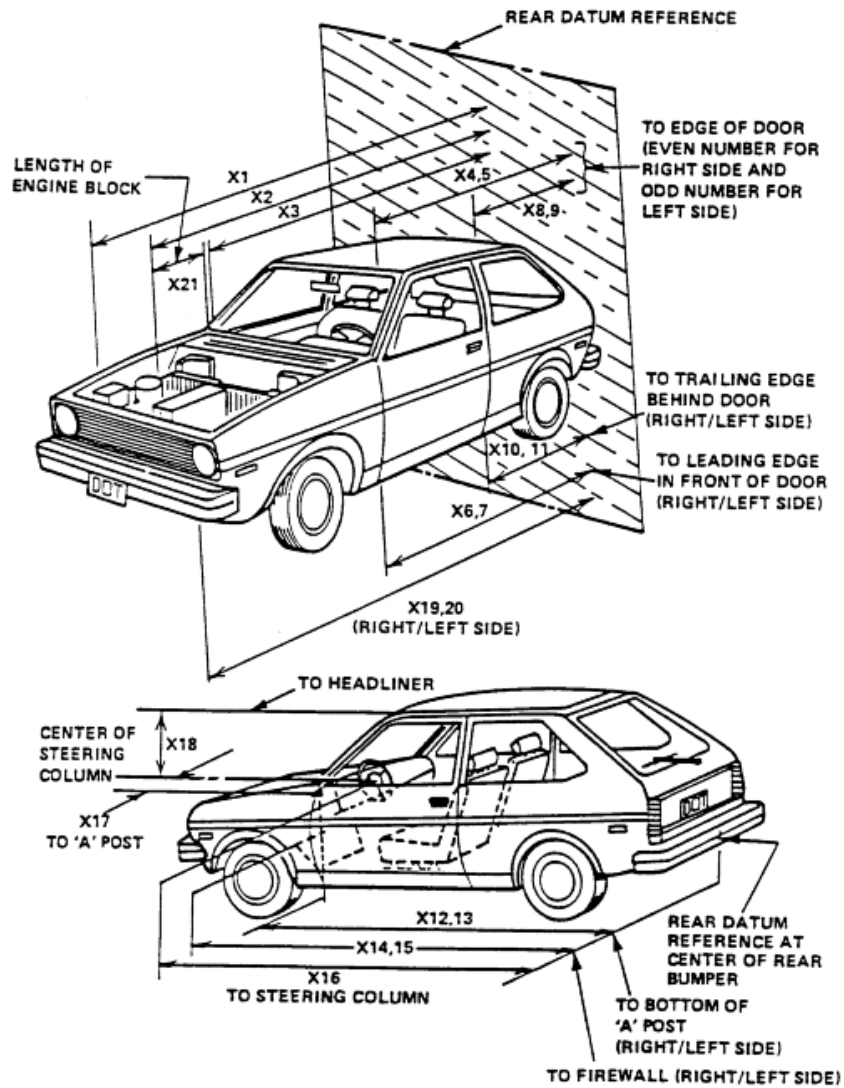
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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
Side Torso/Abdomen/Pelvis 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: 2012 Chevrolet Sonic 2LT 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0109
Test Date: 12/07/2011



DATA SHEET NO. 12 (CONTINUED)
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2012 Chevrolet Sonic 2LT 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0109
 Test Date: 12/07/2011

RSOV (Rear Surface of Vehicle)

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	mm	4421	3990	431
2	RSOV to Front of Engine	mm	3862	3710	152
3	RSOV to Firewall	mm	3533	3530	3
4	RSOV to Upper Leading Edge of Right Door	mm	3070	3072	-2
5	RSOV to Upper Leading Edge of Left Door	mm	3070	3070	0
6	RSOV to Lower Leading Edge of Right Door	mm	3025	3025	0
7	RSOV to Lower Leading Edge of Left Door	mm	3025	3024	1
8	RSOV to Upper Trailing Edge of Right Door	mm	1995	1994	1
9	RSOV to Upper Trailing Edge of Left Door	mm	1995	1995	0
10	RSOV to Lower Trailing Edge of Right Door	mm	2010	2010	0
11	RSOV to Lower Trailing Edge of Left Door	mm	2010	2010	0
12	RSOV to Bottom of "A" Post of Right Side	mm	3042	3045	-3
13	RSOV to Bottom of "A" Post of Left Side	mm	3042	3040	2
14	RSOV to Firewall, Right Side	mm	3550	3536	14
15	RSOV to Firewall, Left Side	mm	3550	3545	5
16	RSOV to Steering Column	mm	2619	2625	-6
17	Center of Steering Column to "A" Post	mm	375	382	-7
18	Center of Steering Column to Headliner	mm	424	440	-16
19	RSOV to Right Side of Front Bumper	mm	4195	3960	235
20	RSOV to Left Side of Front Bumper	mm	4195	4032	163
21	Length of Engine Block	mm	461	461	0
RD	RSOV to Right Side of Dash Panel	mm	2780	2785	-5
CD	RSOV to Center of Dash Panel	mm	2844	2843	1
LD	RSOV to Left Side of Dash Panel	mm	2779	2782	-3

DATA SHEET NO. 13
ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2012 Chevrolet Sonic 2LT 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0109
Test Date: 12/07/2011

VEHICLE INFORMATION

VIN: 1G1JC5SH3C4107917 Wheelbase (mm): 2530
Vehicle Size Category: Sedan Test Weight (kg): 1481.9

ACCELEROMETER DATA

Accelerometer Locations: As per measurements on Page 15

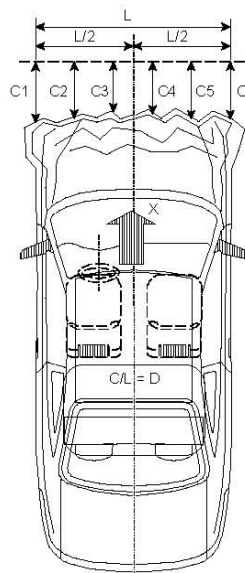
Cal. Procedure/Interval: MGA procedure / 6 month

Integration Algorithm: Trapezoidal Linearity: > 99%

Impact Velocity (km/h): 56.2

Velocity Change (km/h): 61.2

Time of Separation (msec): 89.8



CRUSH PROFILE

Collision Deformation Classification: Frontal

Midpoint of Damage: Centerline

Damage Region Length (mm): 1269

Impact Mode: Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	4195	4032	163
C2	Crush zone 2 at left side	mm	4318	3968	350
C3	Crush zone 3 at left side	mm	4370	3975	395
C4	Crush zone 4 at right side	mm	4370	3966	404
C5	Crush zone 5 at right side	mm	4318	3939	379
C6	Crush zone 6 at right side	mm	4195	3960	235
L	C1 TO C6	mm	1269	1274	-5

DATA SHEET NO. 14
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2012 Chevrolet Sonic 2LT 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

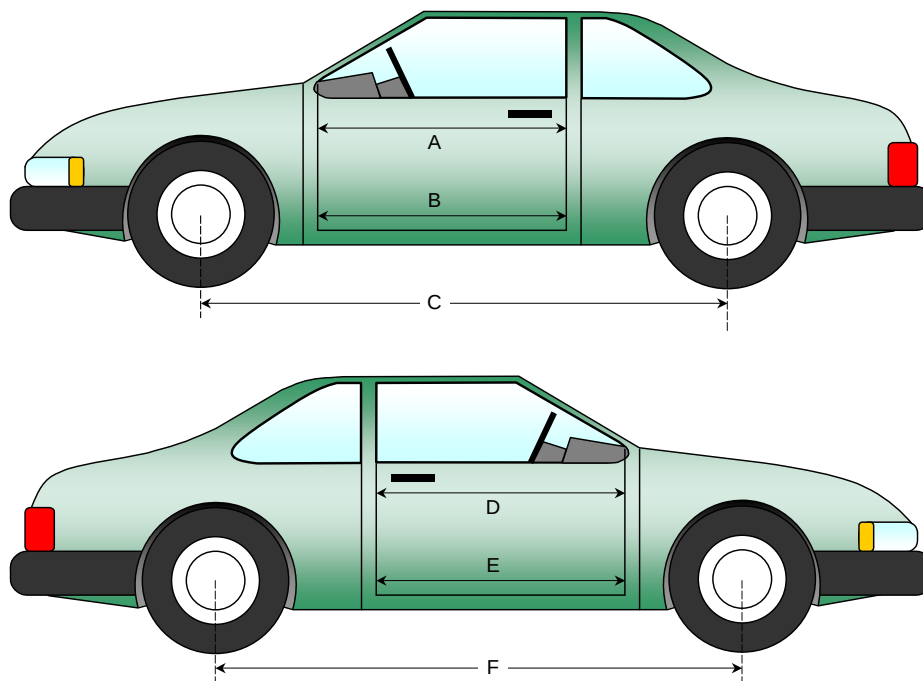
NHTSA No.: MC0109
Test Date: 12/07/2011

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	957	957	0
B	Left Side Lower	mm	905	905	0
D	Right Side Upper	mm	957	957	0
E	Right Side Lower	mm	905	905	0

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2530	2518	12
F	Right Side Wheelbase	mm	2530	2560	-30



DATA SHEET NO. 14 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

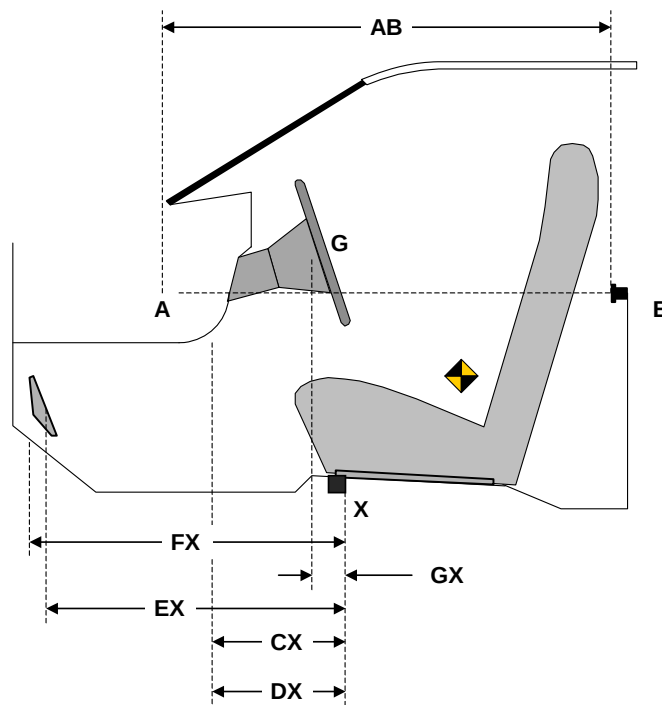
Test Vehicle: 2012 Chevrolet Sonic 2LT 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0109
 Test Date: 12/07/2011

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside window jam)	mm	830	830	0
CX	Left Knee Bolster to X	mm	304	307	-3
DX	Right Knee Bolster to X	mm	304	308	-4
EX	Brake Pedal to X	mm	565	540	25
FX	Foot Rest to X	mm	600	595	5
GX	Center of Steering Column Wheel Hub to X	mm	100	150	-50

X = Front of Seat Track (stationary)

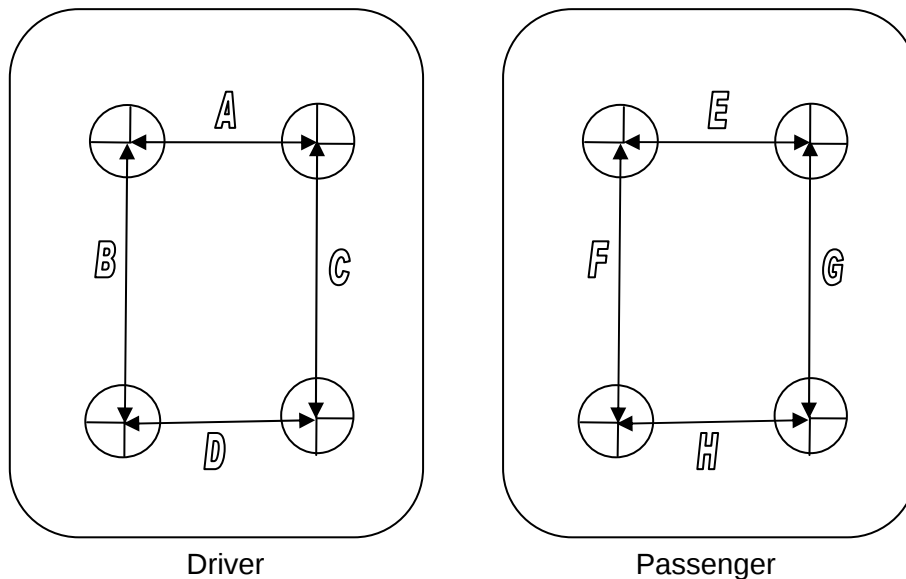


DRIVER COMPARTMENT

DATA SHEET NO. 14 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2012 Chevrolet Sonic 2LT 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0109
 Test Date: 12/07/2011



TOP VIEW THROUGH FLOOR PAN

UNDERBODY FLOORBOARD DEFORMATION

Measurement	Units	Pre-Test	Post-Test	Difference
A	mm	300	300	0
B	mm	300	300	0
C	mm	300	300	0
D	mm	300	300	0
E	mm	300	300	0
F	mm	300	300	0
G	mm	300	300	0
H	mm	300	300	0

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

Test Vehicle: 2012 Chevrolet Sonic 2LT 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0109
 Test Date: 12/07/2011

Windshield Mounting Details:

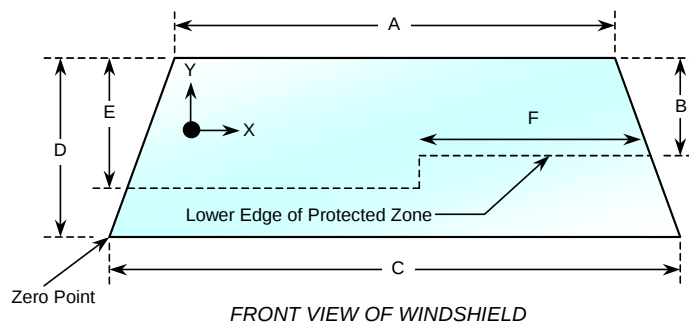
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

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: 21.7°C

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% of Retention
Left Side	2081	2081	100
Right Side	2081	2081	100
Total	4162	4162	100



Item	Units	Value
A	mm	1104
B	mm	531
C	mm	1396
D	mm	831
E	mm	541
F	mm	602

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: 2012 Chevrolet Sonic 2LT 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0109
Test Date: 12/07/2011

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Test Time: 10:29 am

Temperature: 21.7° C

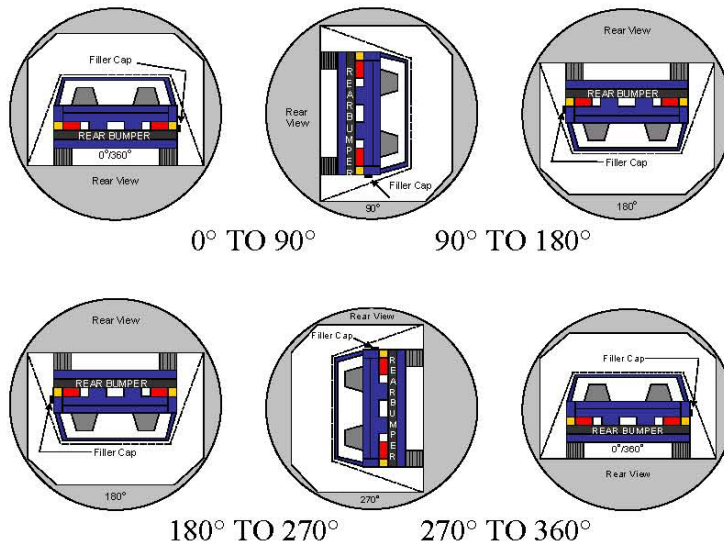
- A. From impact until vehicle motion ceases: 0 oz.
(Maximum Allowable = 1 ounce)
- B. For the 5 minute period after motion ceases: None
(Maximum allowable = 5 ounces)
- C. For the following 25 minutes: None
(Maximum allowable = 1 oz./minute)
- D. Spillage Details: None

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

Test Vehicle: 2012 Chevrolet Sonic 2LT 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0109
 Test Date: 12/07/2011

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°	118	300	418
90° to 180°	112	300	412
180° to 270°	108	300	408
270° to 360°	115	300	415

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

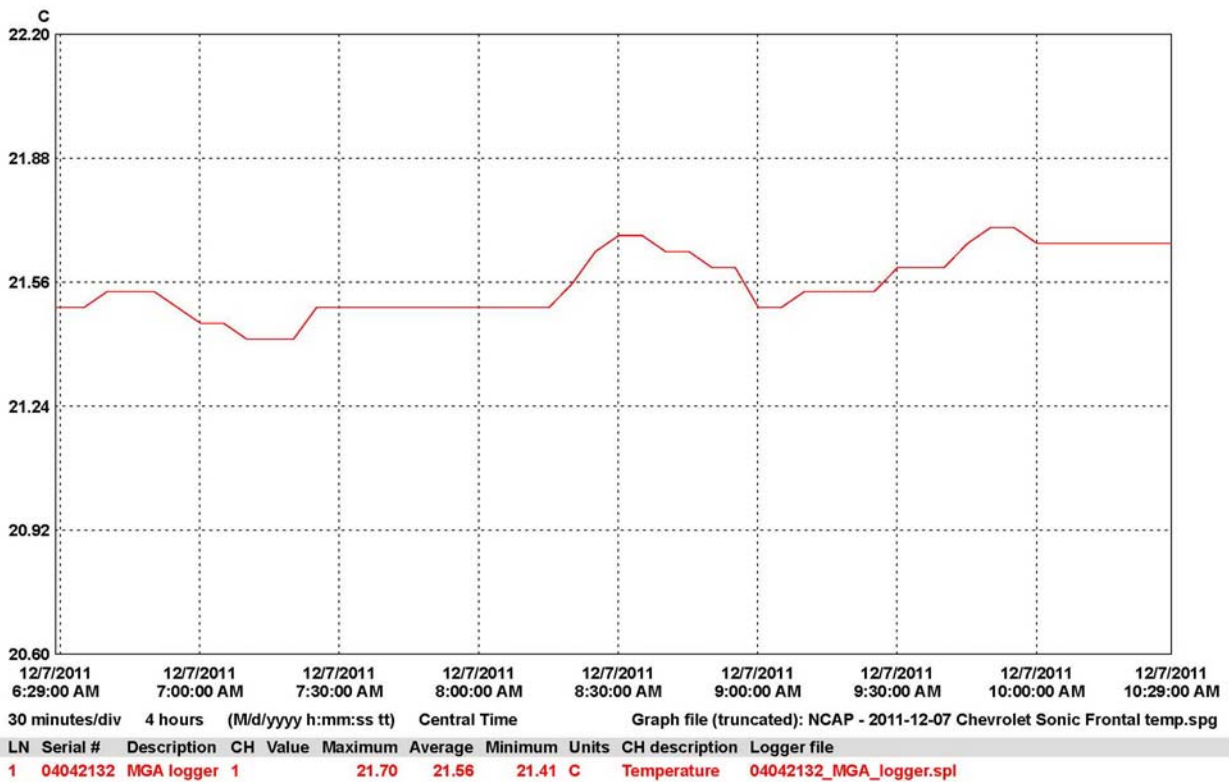
ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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: 2012 Chevrolet Sonic 2LT 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0109
 Test Date: 12/07/2011



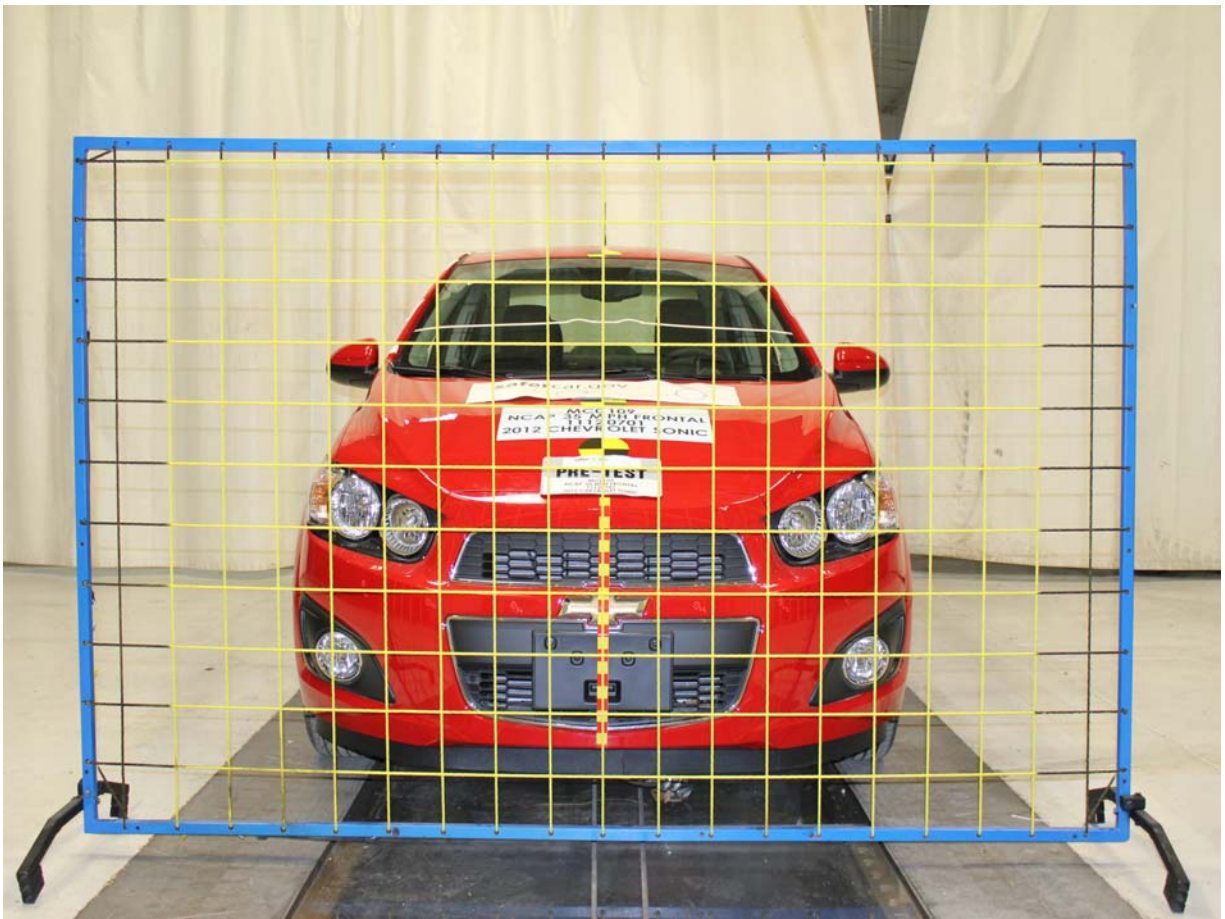
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Photo No. 81.	Monroney Label	A-41



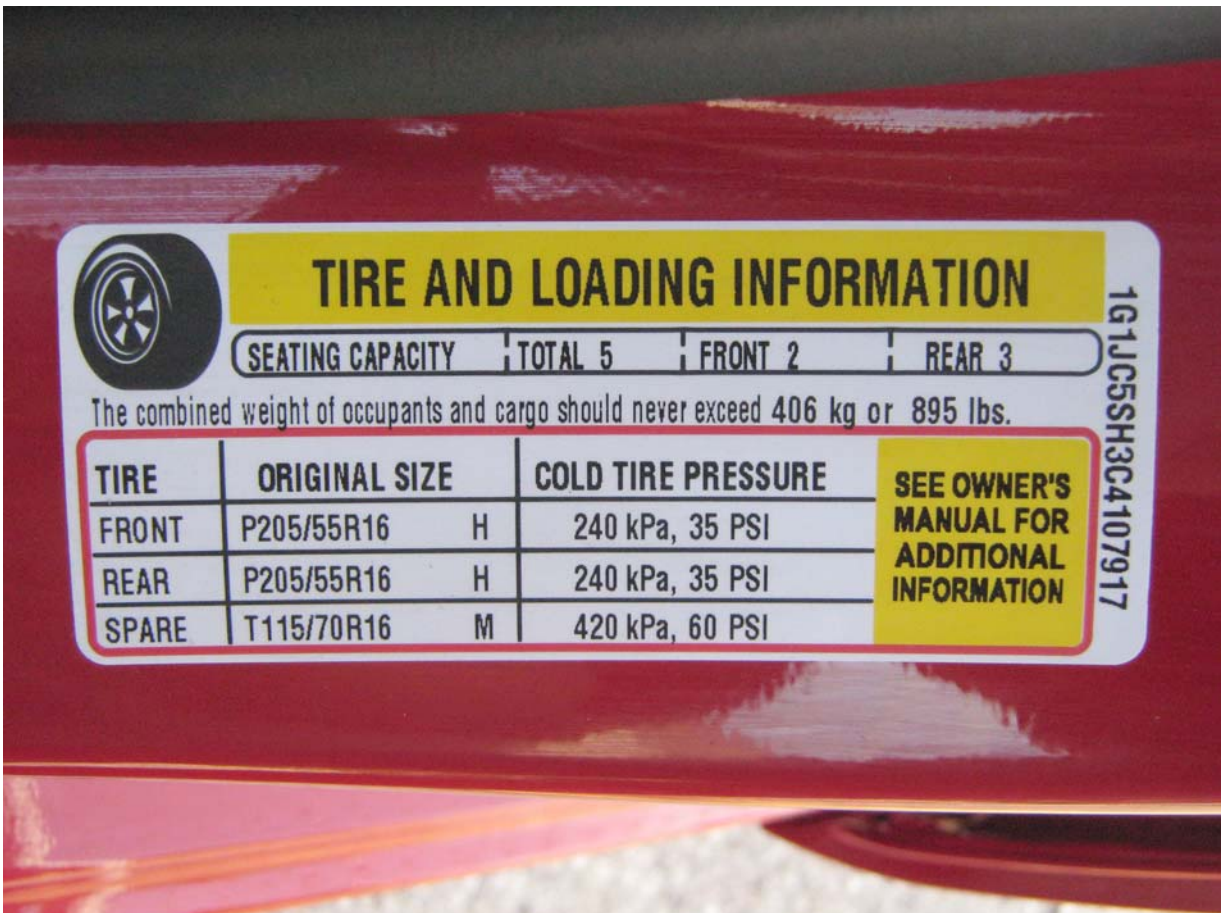
Load Cell Location



Load Cell Wall



Manufacturer's Label



Tire Placard



2012 Chevrolet Sonic 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



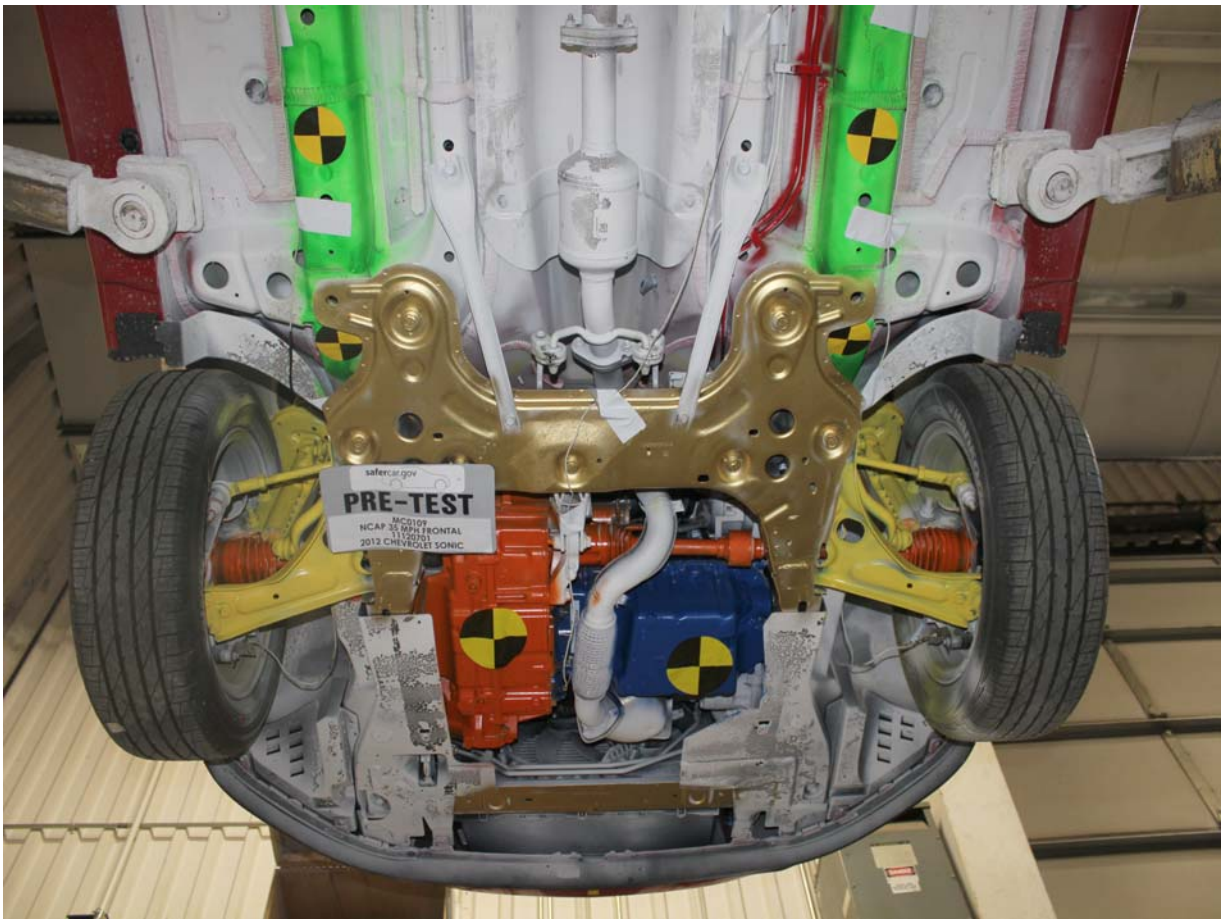
Post-Test Engine Compartment View



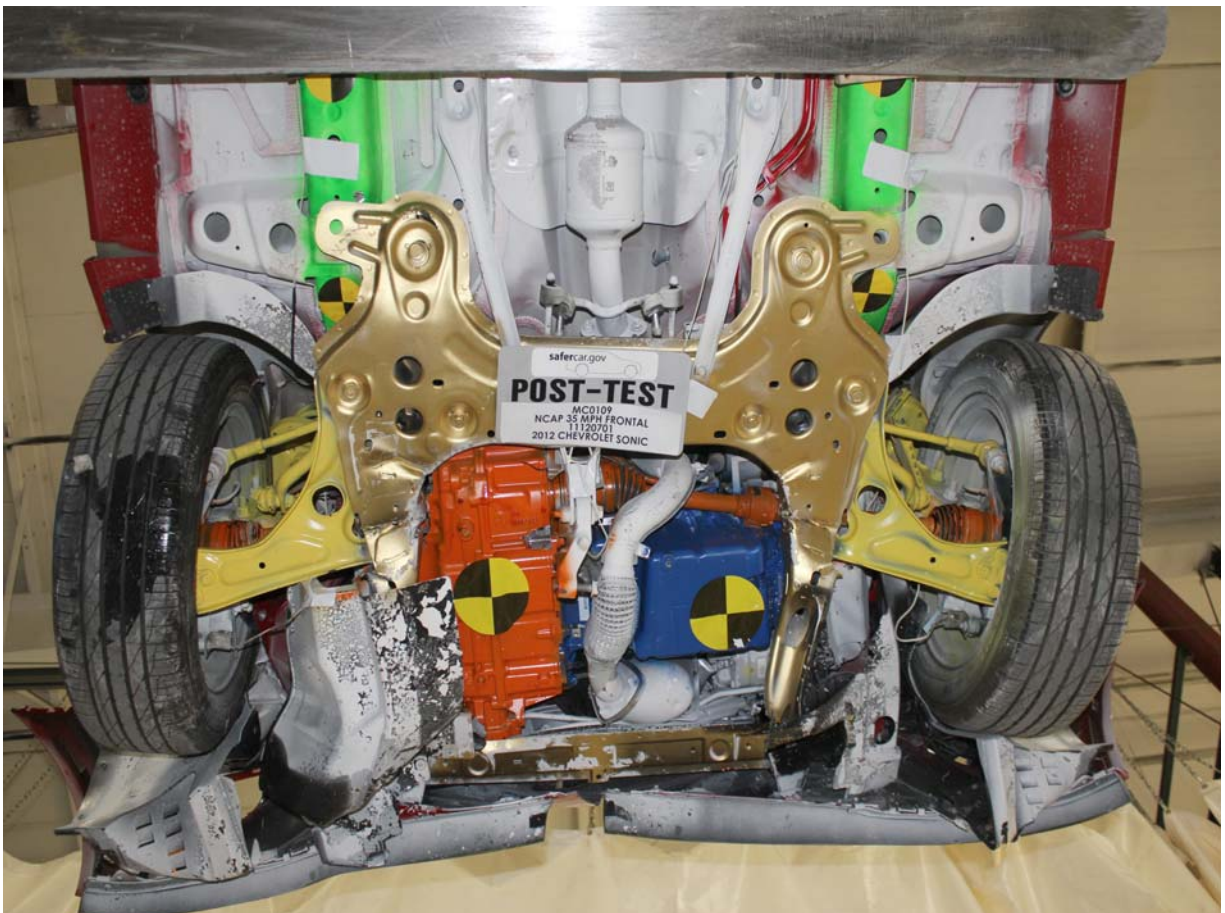
Pre-Test Fuel Filler Cap View



Post-Test Fuel Filler Cap View



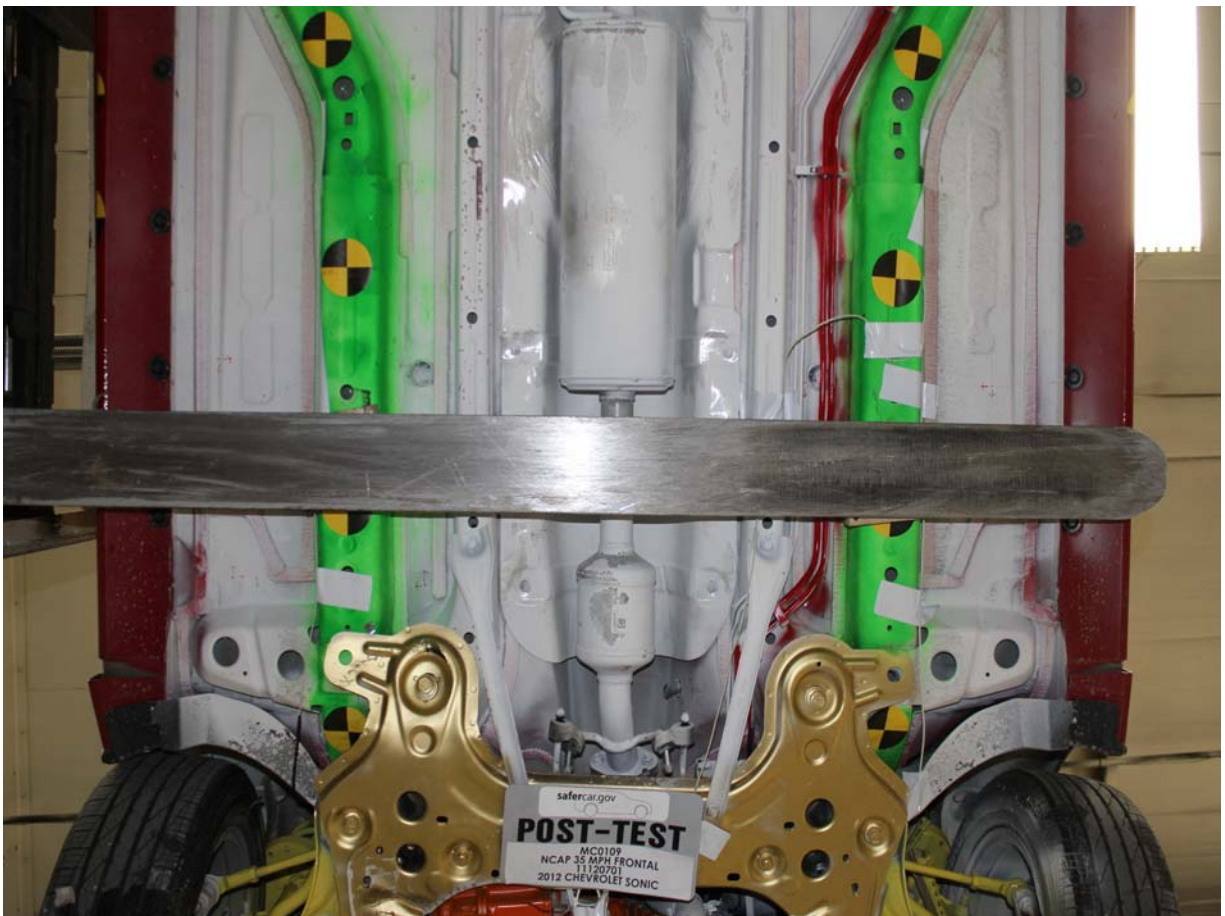
Pre-Test Front Underbody View



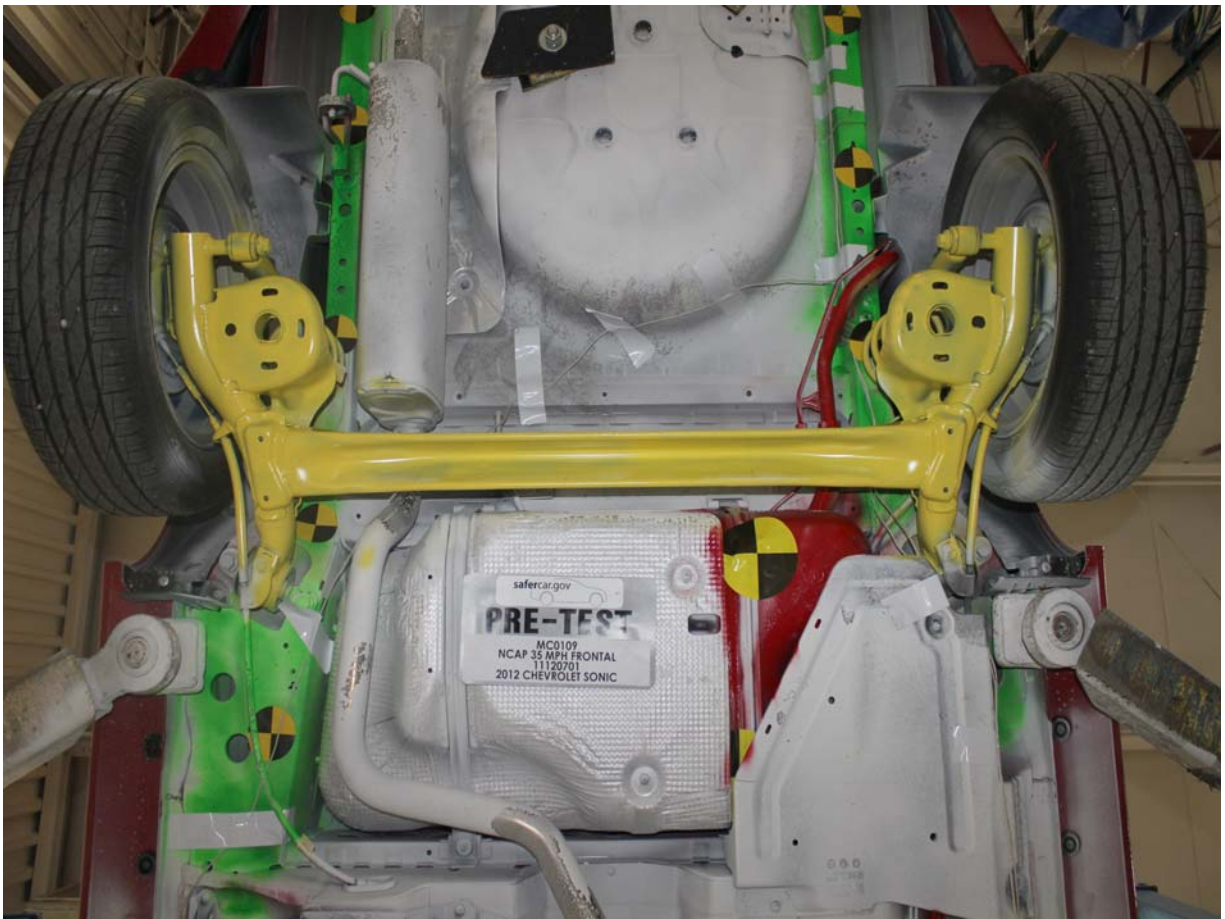
Post-Test Front Underbody View



Pre-Test Mid Front Underbody View



Post-Test Mid Front Underbody View



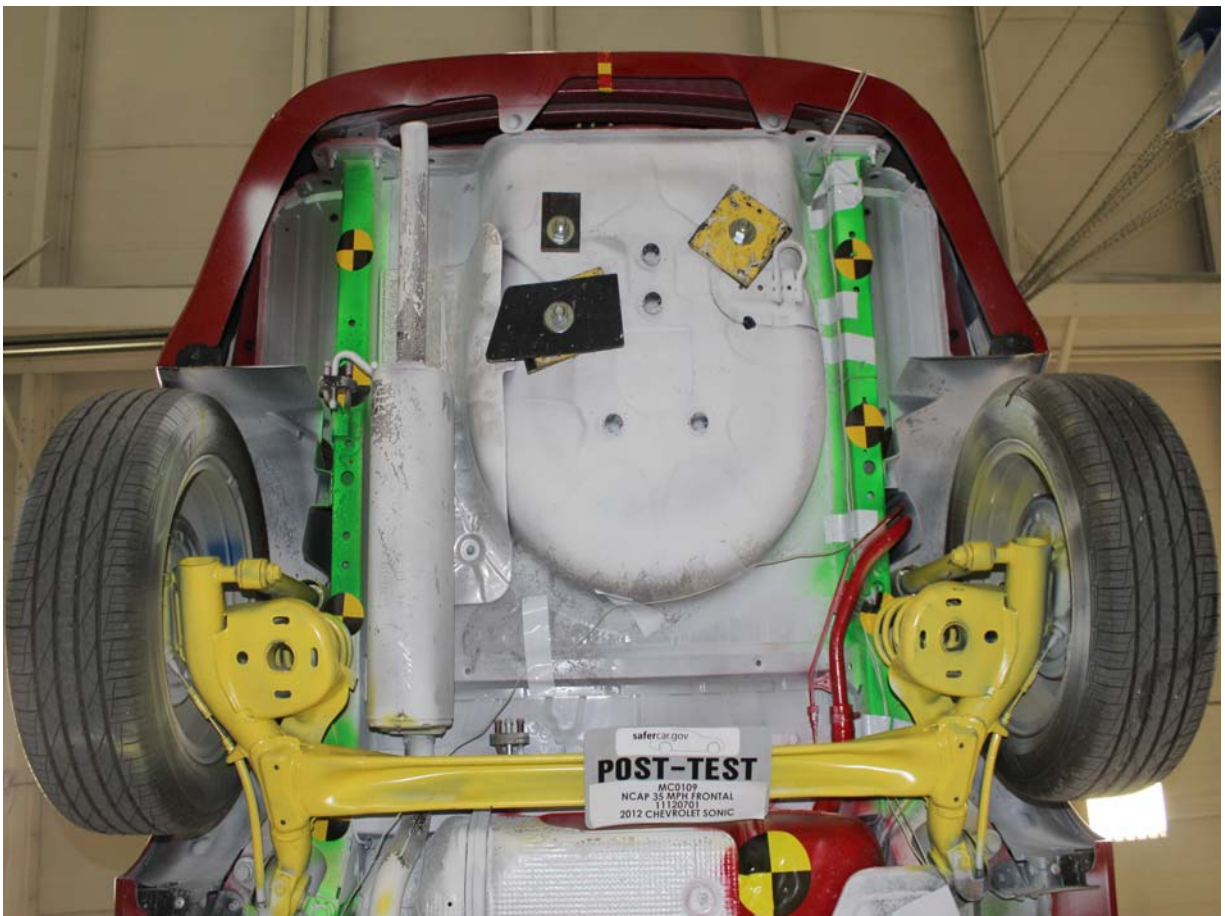
Pre-Test Mid Rear Underbody View



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



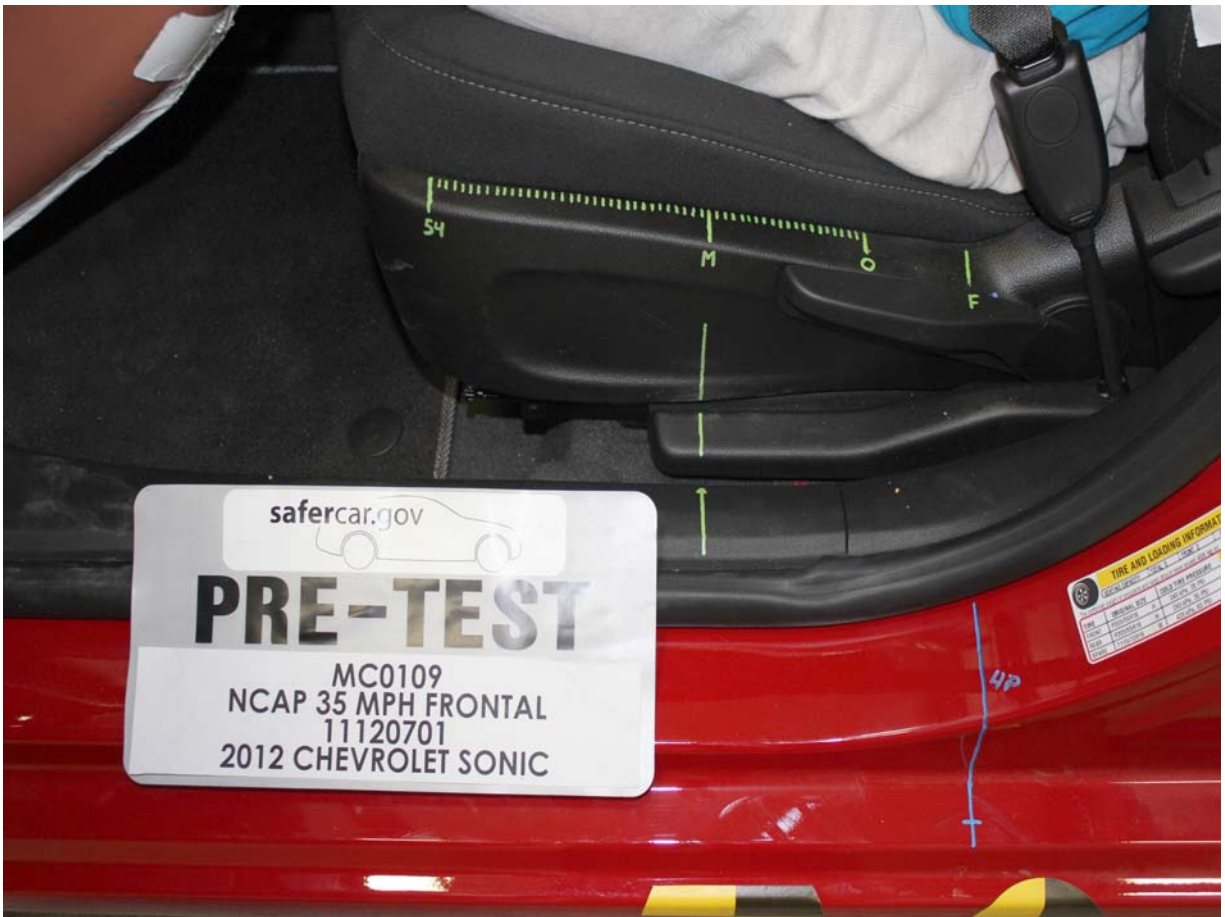
Post-Test Driver Dummy Window View



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



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



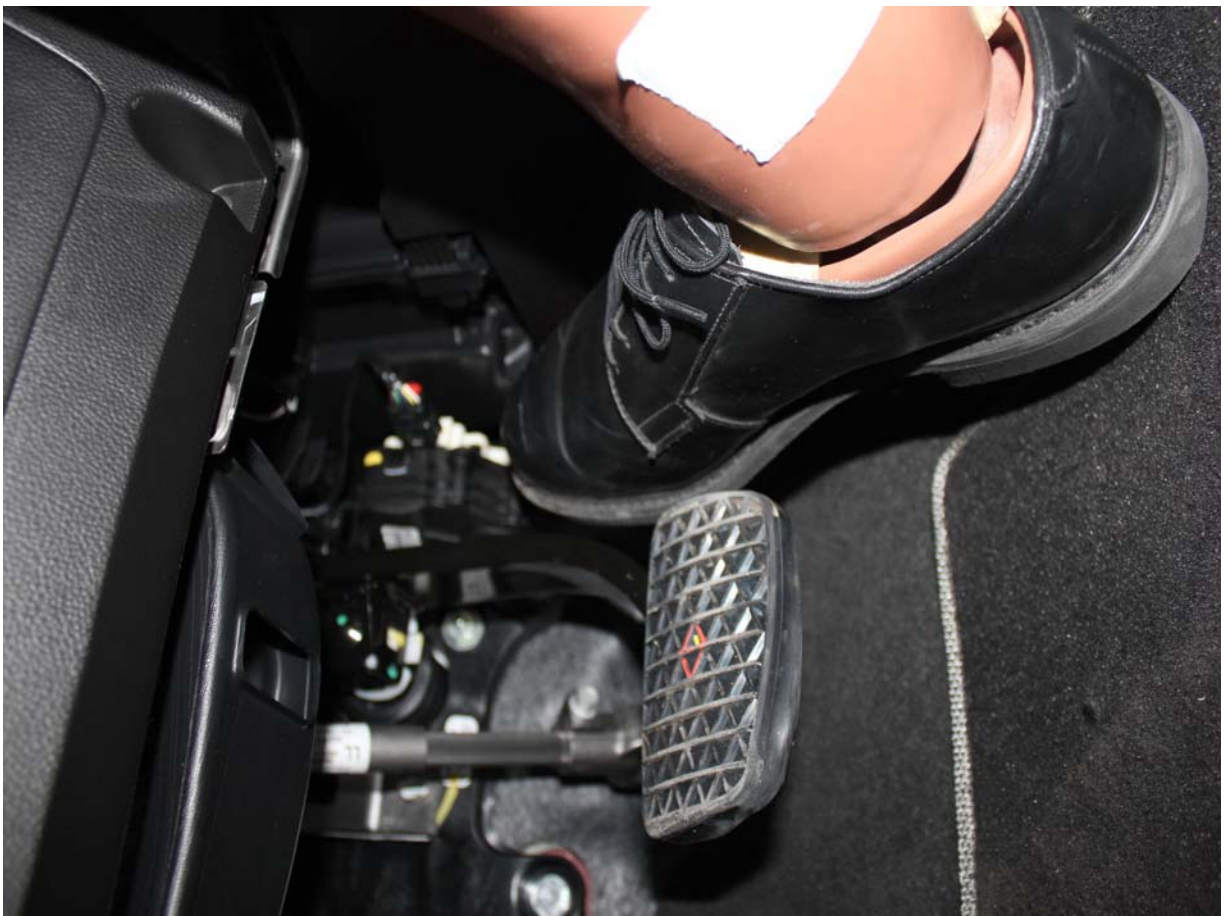
Pre-Test Driver's Seat Fore-Aft Markings



Post-Test Driver's Seat Fore-Aft Markings



Pre-Test Driver Dummy Feet



Pre-Test Driver Dummy Feet



Post-Test Driver Dummy Feet



Post-Test Driver Dummy Feet



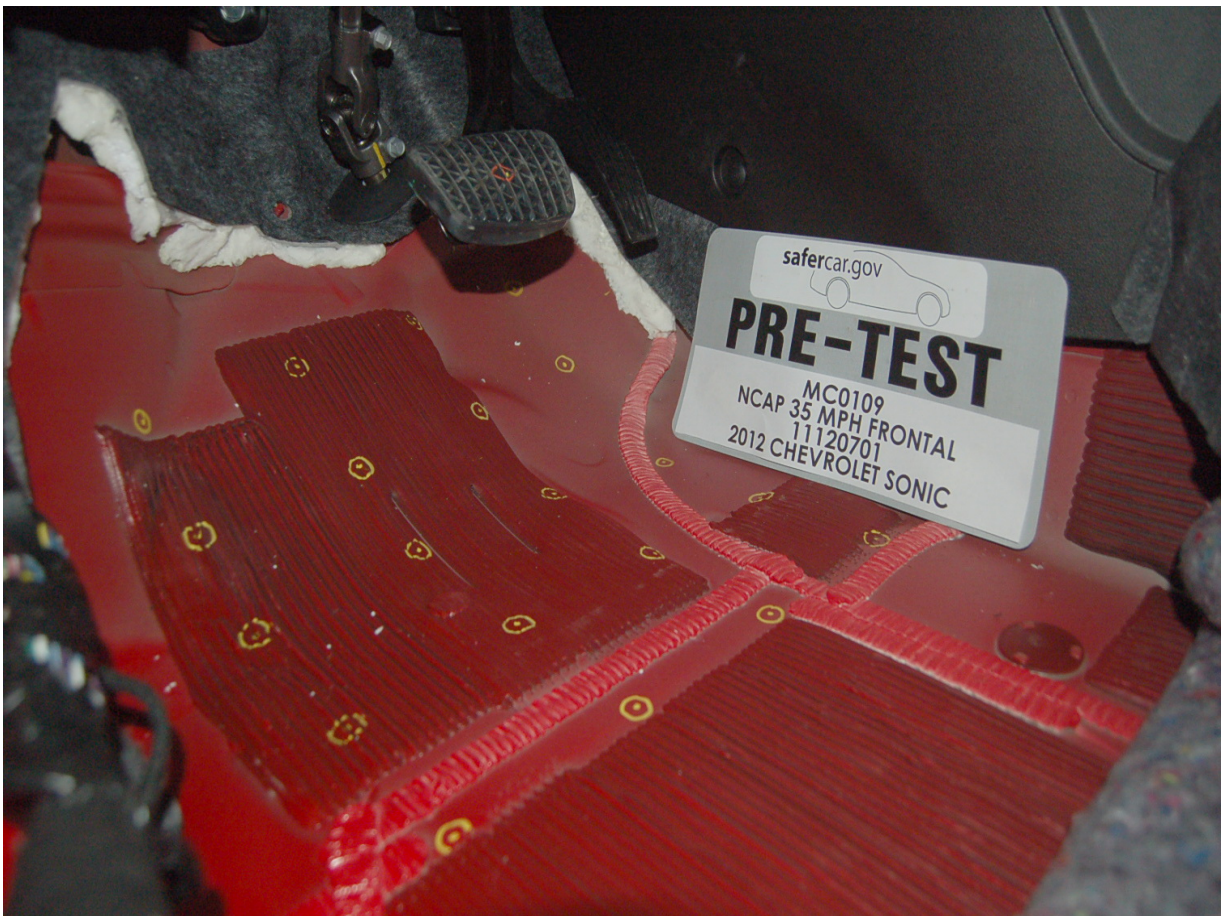
Pre-Test Driver's Side Knee Bolster (without dummy)



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



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



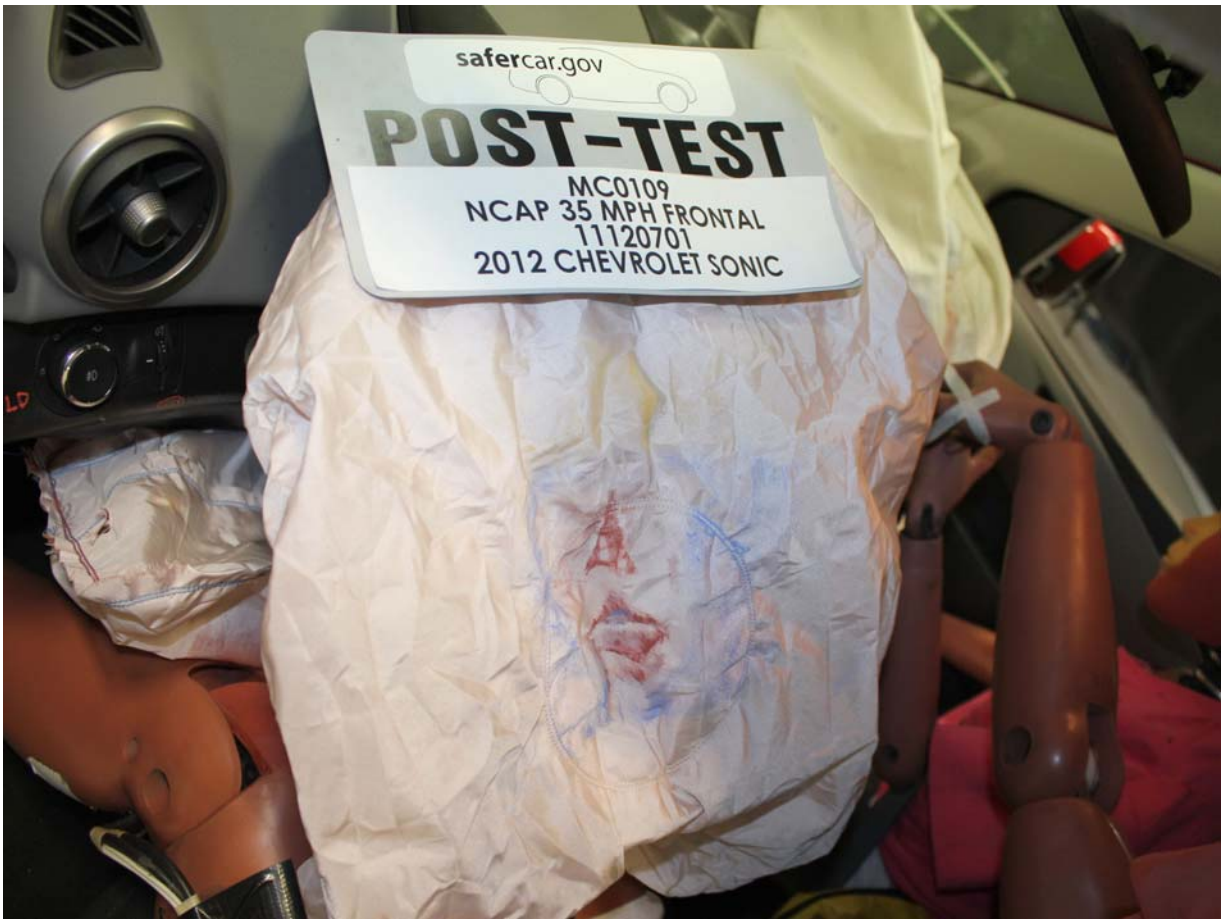
Pre-Test Driver's Side Floorpan



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



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



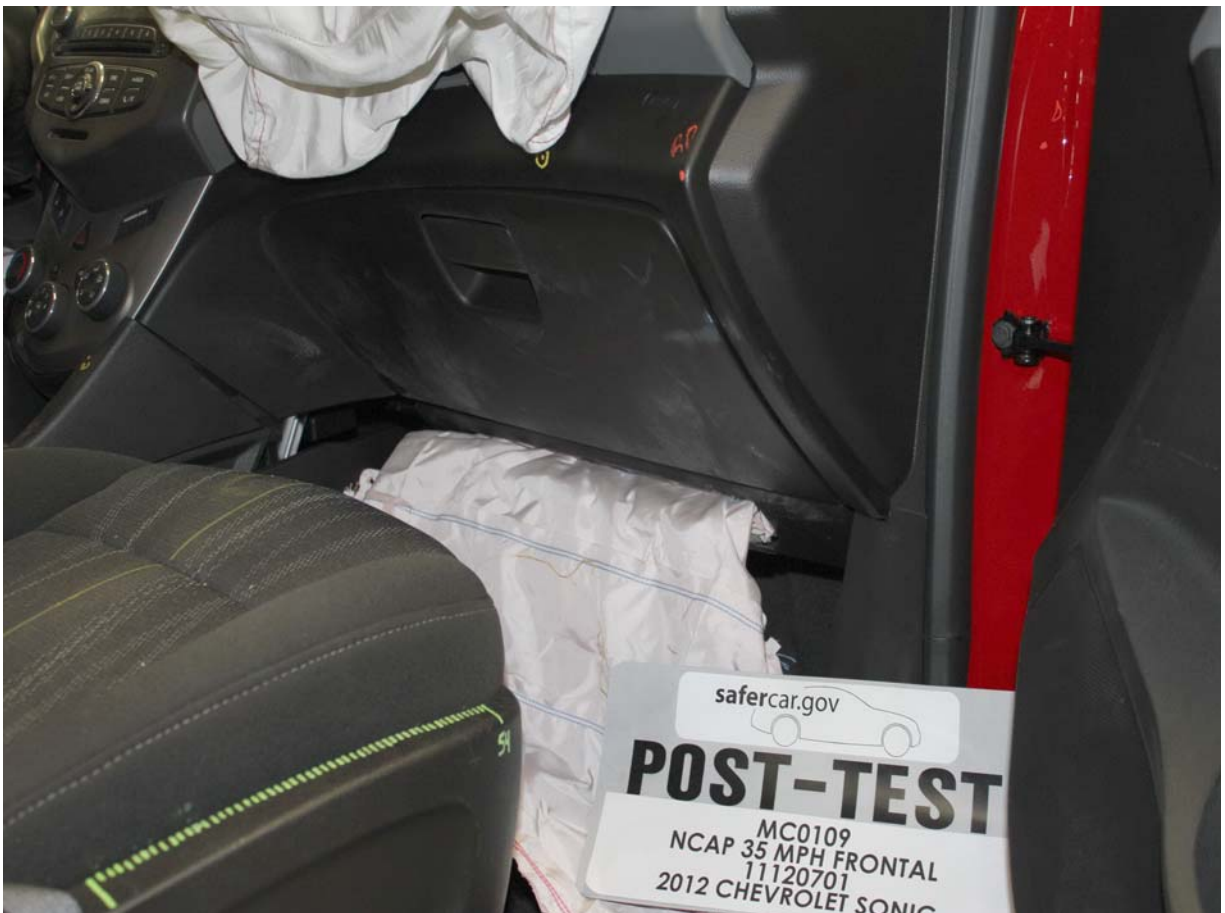
Pre-Test Passenger Dummy Feet



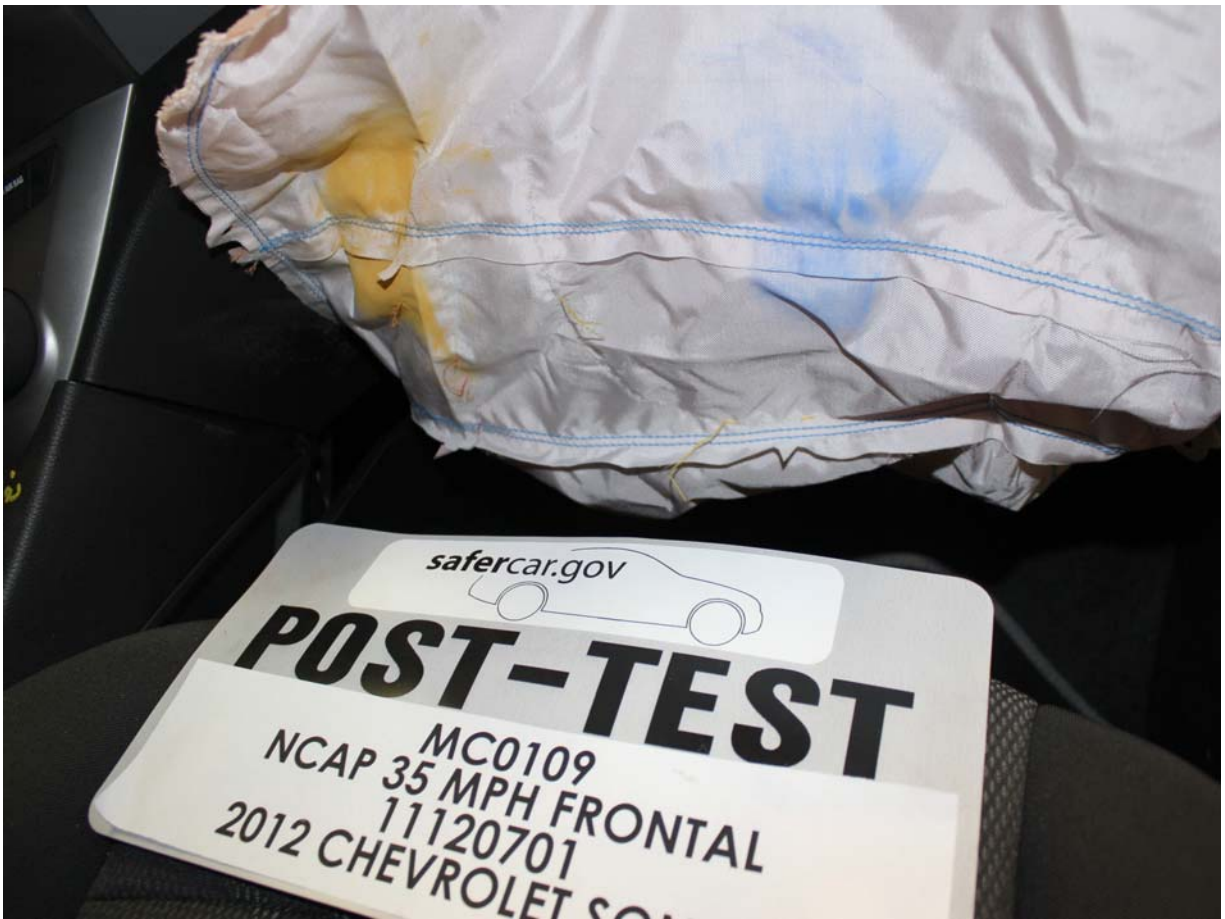
Post-Test Passenger Dummy Feet



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



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



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



Ballast Installed in Vehicle

PHOTOGRAPH NOT APPLICABLE

Post-Test Stoddard Solvent Spillage Location View



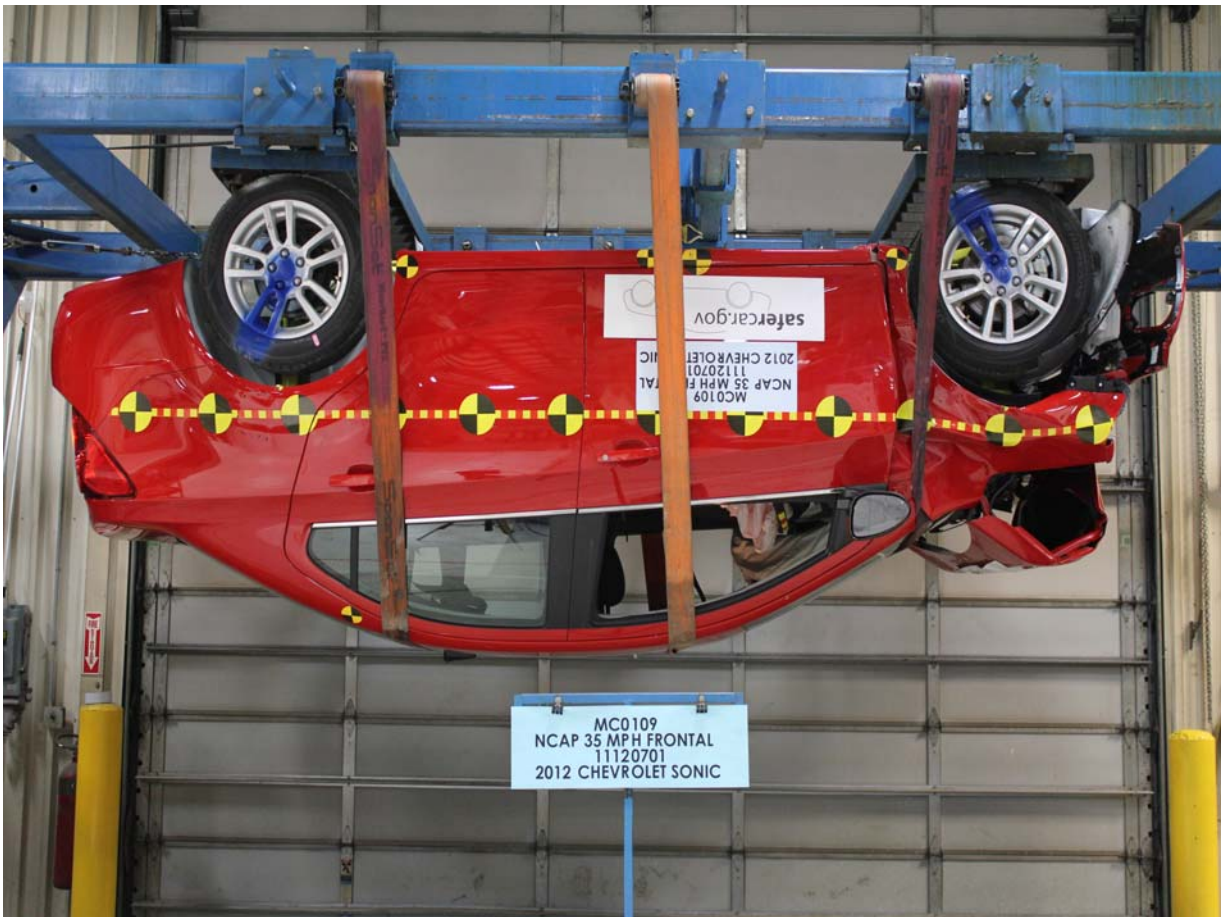
Post-Test Speed Trap Read-Out



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



2012 Chevrolet Sonic Frontal Impact Event



2012 SONIC 2LT

EXTERIOR: VICTORY RED
INTERIOR: JET BLACK/DARK TITANIUM

ENGINE: 1.8L ECOTEC VVT DONG
TRANSMISSION: 6-SPD AUTOMATIC

Visit us at www.chevy.com

STANDARD EQUIPMENT

(Some features 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

MECHANICAL

- TRANSMISSION: 6-SPD AUTOMATIC
- ENGINE: 1.8L ECOTEC VVT DONG 4 CYL
- HILL HOLD FEATURE
- OIL LIFE MONITORING SYSTEM
- DRIVER INFORMATION CENTER
- POWER STEERING, ELECTRIC

SAFETY & SECURITY

- AIR BAGS, DUAL STAGE FRONTAL, DRIVER & RIGHT FRONT PASSENGER
- AIR BAGS, THORAX SIDE-IMPACT SEAT-MOUNTED, SIDE-FRONT AND REAR OUTBOARD SEAT POSITIONS
- AIR BAGS, HEAD CURTAIN, SIDE-FRONT AND REAR OUTBOARD

SEATING POSITIONS WITH ROLLOVER PROTECTION

- AIR BAGS, KNEE, DRIVER & FRONT PASSENGER
- REAR DOOR LOCKS, POWER, CHILD SECURITY

- 6 MTHS ONSTAR DIRECTIONS AND CONNECTIONS W/ AUTOMATIC CRASH RESPONSE, TURN-BY-TURN NAVIGATION, AND ONSTAR REMOTE LINK (ASK DEALER ABOUT GEOGRAPHIC COVERAGE)
- TIRE PRESSURE MONITOR (DCL, SPARE TIRE)
- CONTENT THEFT ALARM, THEFT DETECTION SYSTEM

- STABILTRAK STABILITY CONTROL SYSTEM W/ TRACTION CONTROL
- REMOTE KEYLESS ENTRY
- ANTILOCK BRAKES, FRONT DISC/REAR DRUM
- BRAKE PANK ASSIST
- WINDSHIELD WIPERS

FRONT INTERMITTENT

- REAR WINDOW DEFROSTER
- L.A.T.C.H. SYSTEM

INTERIOR

- POWER WINDOW W/ EXPRESS DRIVER UP/DOWN
- SEATS, FRONT BUCKET
- SEAT TUNA, DELUXE CLOTH
- SEAT ADJUSTER, FRONT PASSENGER 2-WAY MANUAL
- SEAT ADJUSTER DRIVER 4-WAY MANUAL
- REAR SEAT, SPLIT BACK FOLDING
- POWER DOOR LOCKS
- FLOOR MATS FRONT & REAR
- AIR CONDITIONING
- AIR FILTRATION SYSTEM
- FRONT, DRIVER SEAT
- STEERING COLUMN, TILT AND TELESCOPIC
- XM RADIO + SERVICE SUBSCRIPTION SOLD SEPARATELY

BY SIRIUSXM AFTER 3 MTHS

- AM/FM STEREO CD PLAYER
- W/ AUX JACK
- ASSIST HANDLES, FRONT AND REAR
- AUDIO SYSTEM PREMIUM SOUND WITH 6 SPEAKERS

EXTERIOR

- MIRRORS, OUTSIDE HEATED, POWER-ADJUSTABLE, BODY-COLOR
- MANUAL FOLDING
- WHEELS, 15" PAINTED ALUMINUM
- TIRE, COMPACT SPARE

OPTIONS & PRICING

MANUFACTURER'S SUGGESTED RETAIL PRICE

STANDARD VEHICLE PRICE \$16,005.00

OPTIONAL EQUIPMENT BY THE MANUFACTURER (ANY REPAIRS, STANDARD EQUIPMENT 2011)

CONNECTIVITY PLUS CRUISE PKG: \$25.00
• REMOTE VEHICLE START

- CRUISE CONTROL
- STEERING WHEEL CONTROLS
- BLUECLOTH FOR PHONE
- USB PORT
- WHEELS AND FOG LAMP PACKAGE: 295.00
- TIRES, ALL SEASON BLACKWALL
- WHEELS, 16" PAINTED ALUMINUM
- FRONT FOG LAMPS

TOTAL OPTIONS \$820.00

TOTAL VEHICLE & OPTIONS \$16,825.00

DESTINATION CHARGE 760.00

TOTAL VEHICLE PRICE* \$17,585.00

EPA Fuel Economy Estimates

CITY MPG

25

Expected range for most drivers
20 to 30 MPG

Estimated Annual Fuel Cost
\$1,981

based on 15,000 miles at \$3.70 per gallon

Combined Fuel Economy

This Vehicle

28

14 to 41

IN COMPACT CARS

HIGHWAY MPG

35

Expected range for most drivers
29 to 41 MPG

Your actual mileage will vary depending on how you drive and maintain your vehicle.

ADP

See the FREE Fuel Economy Guide at dealers or www.fueleconomy.gov

GOVERNMENT SAFETY RATINGS

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

Source: National Highway Traffic Safety Administration (NHTSA).

www.safercar.gov or 1-888-327-4236

PARTS CONTENT INFORMATION

FOR VEHICLES IN THIS COUNTRY:
U.S./CANADIAN PARTS CONTENT: 47%
MAJOR SOURCES OF FOREIGN PARTS CONTENT: KOREA 20%

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

FOR THIS VEHICLE:
FINAL ASSEMBLY POINT:
LAKE ORION, MI U.S.A.
COUNTRY OF ORIGIN:
ENGINE: KOREA
TRANSMISSION: UNITED STATES

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ORDER NO. PROGS. SALES CODE E

SALES CODE CODE 1308

TRAILER NO. 1308

FINAL ASSEMBLY

LAKE ORION, MI U.S.A.

VIN 1G1JC58H3C4107917

DEALER TO WHOM DELIVERED

RAY CHEVROLET, INC.

30 N RITE 12

FOX LAKE, IL 60020-1222



LR

1GA0006054

Monroney Label

APPENDIX B
DUMMY RESPONSE DATA TRACES

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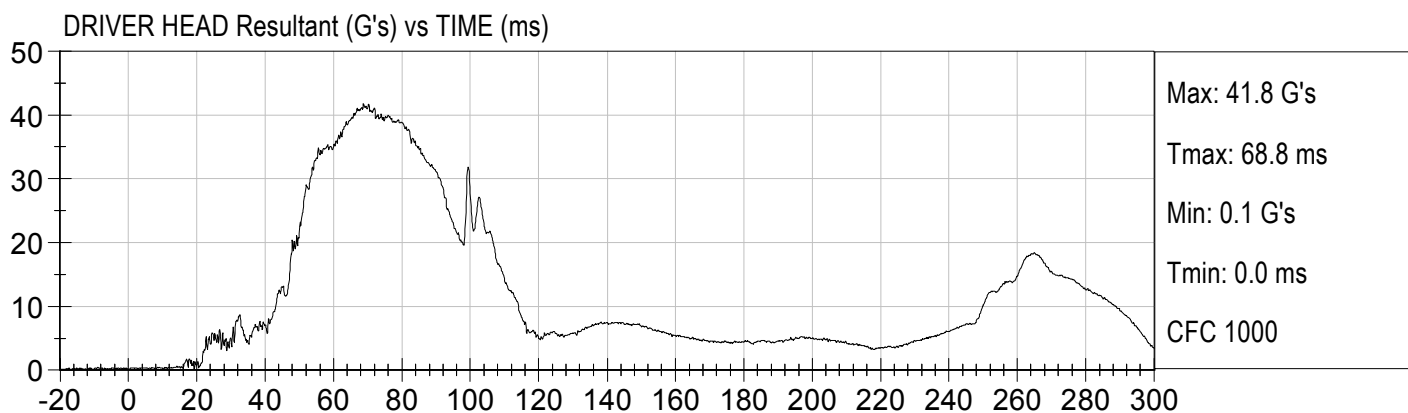
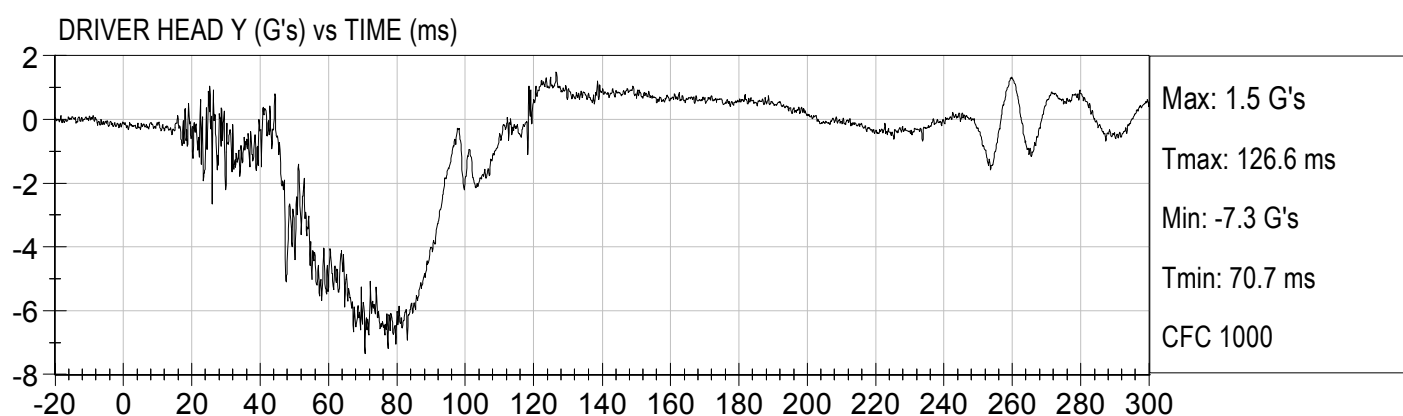
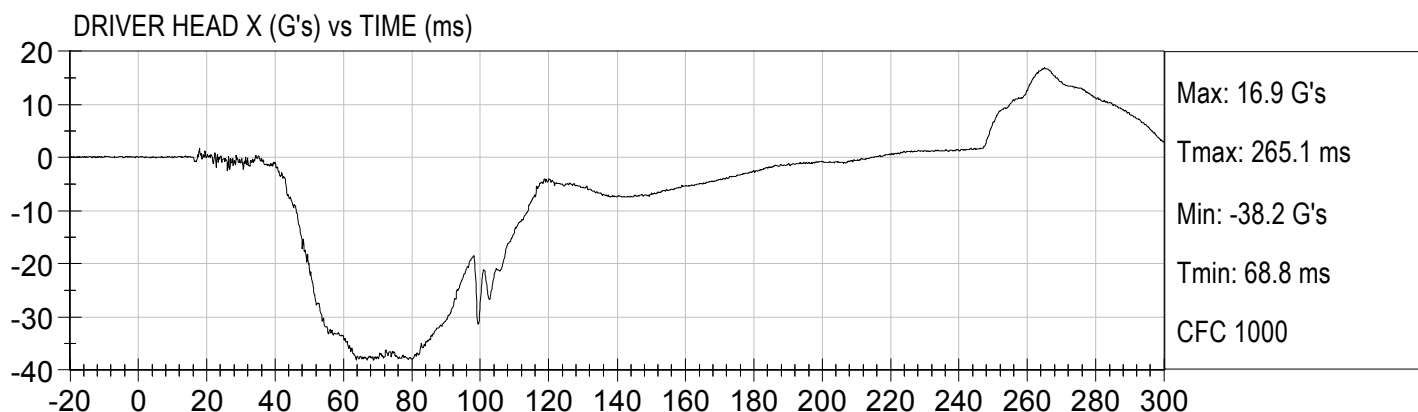
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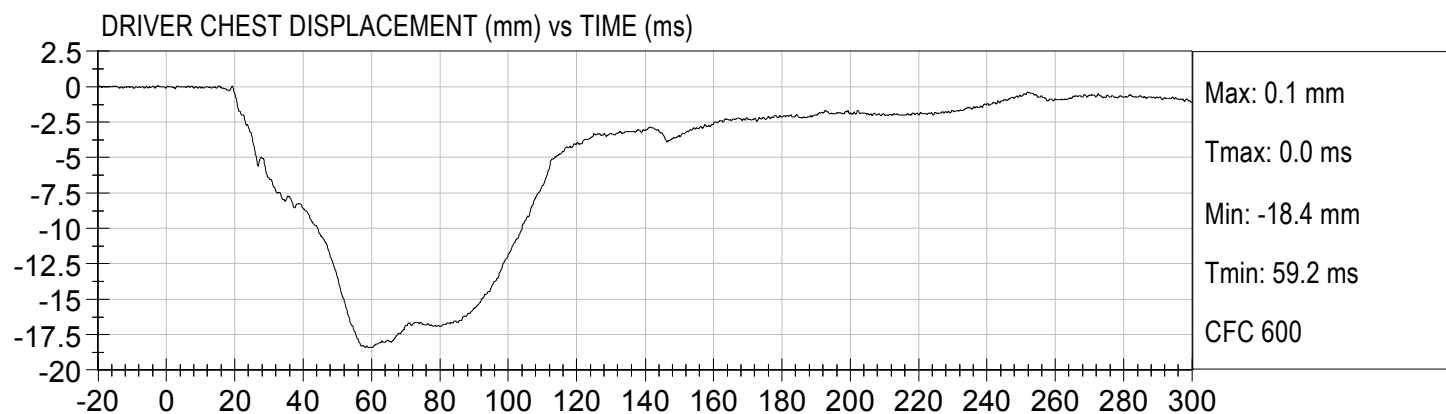
The following additional dummy and vehicle response data can be found in the R&D section of the NHTSA website at www.nhtsa.dot.gov

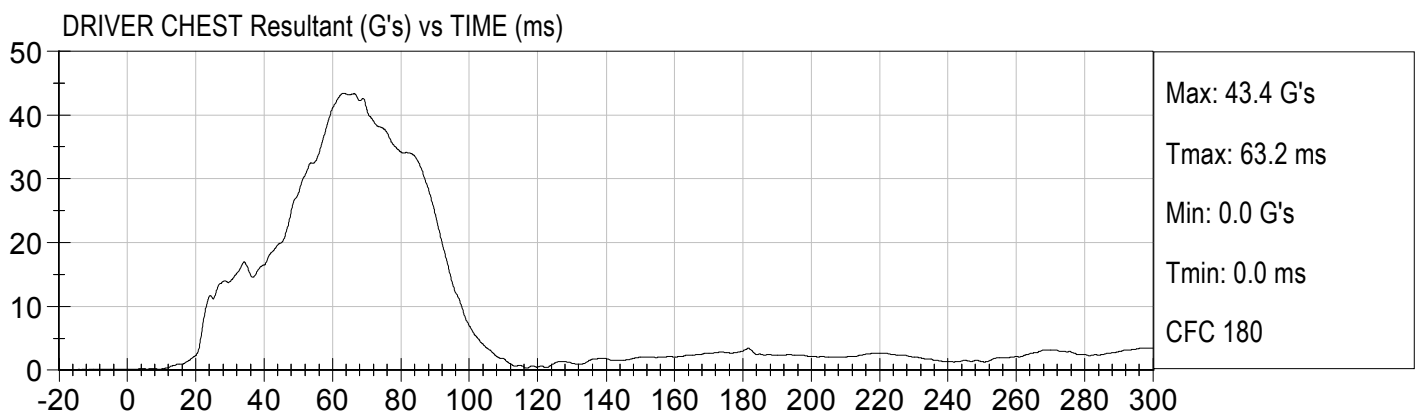
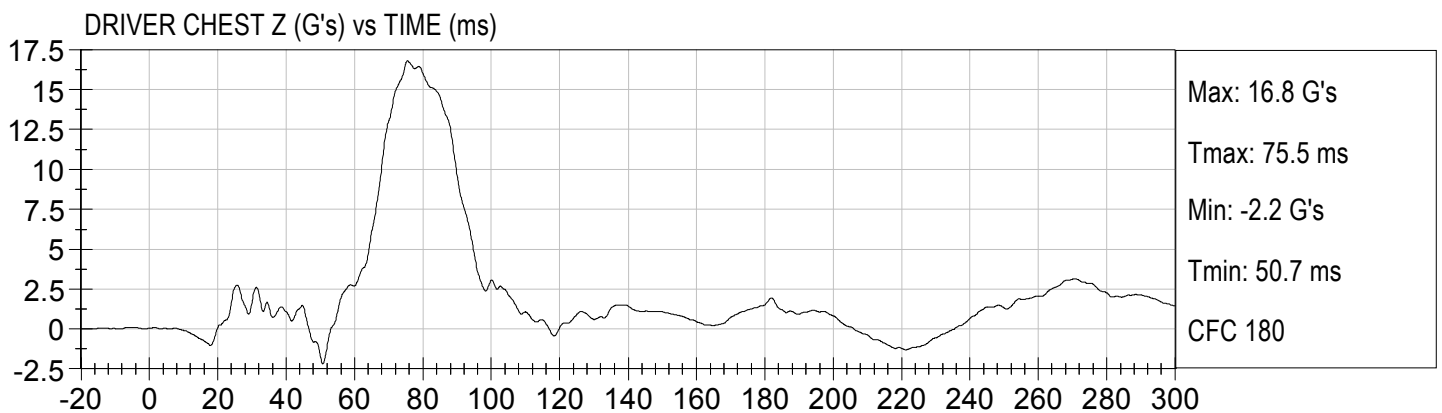
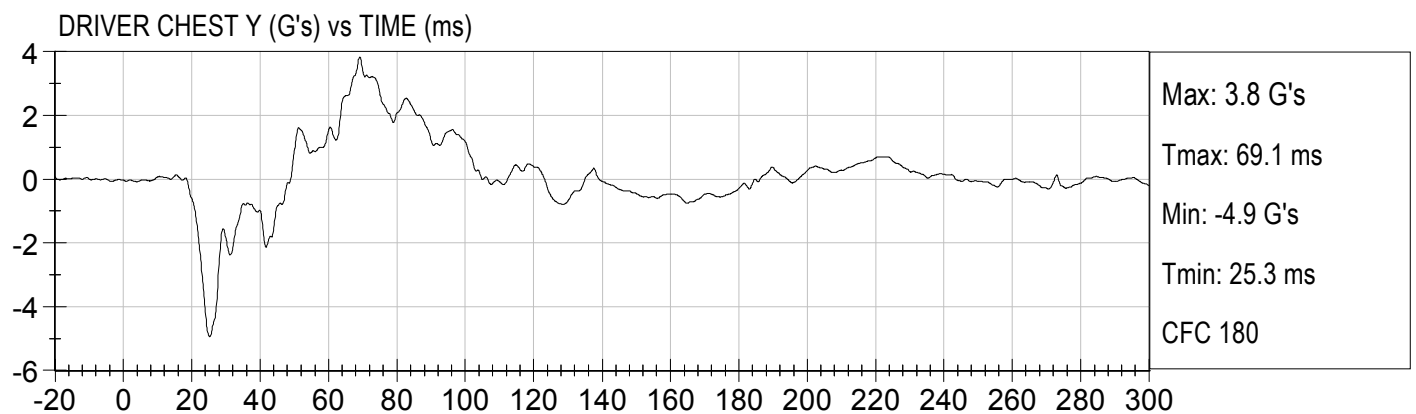
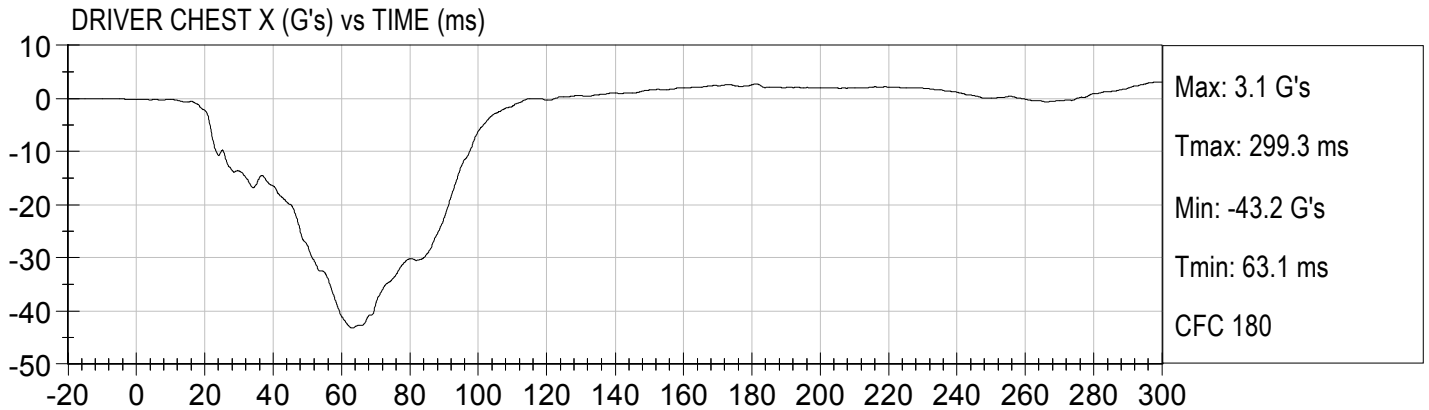
Driver Head X Redundant
 Driver Head Y Redundant
 Driver Head Z Redundant
 Driver Upper Neck Force Y
 Driver Upper Neck Moment X
 Driver Upper Neck Moment Z
 Driver Chest X Redundant
 Driver Chest Y Redundant
 Driver Chest Z Redundant
 Driver Pelvis X
 Driver Pelvis Y
 Driver Pelvis Z
 Driver Left Femur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

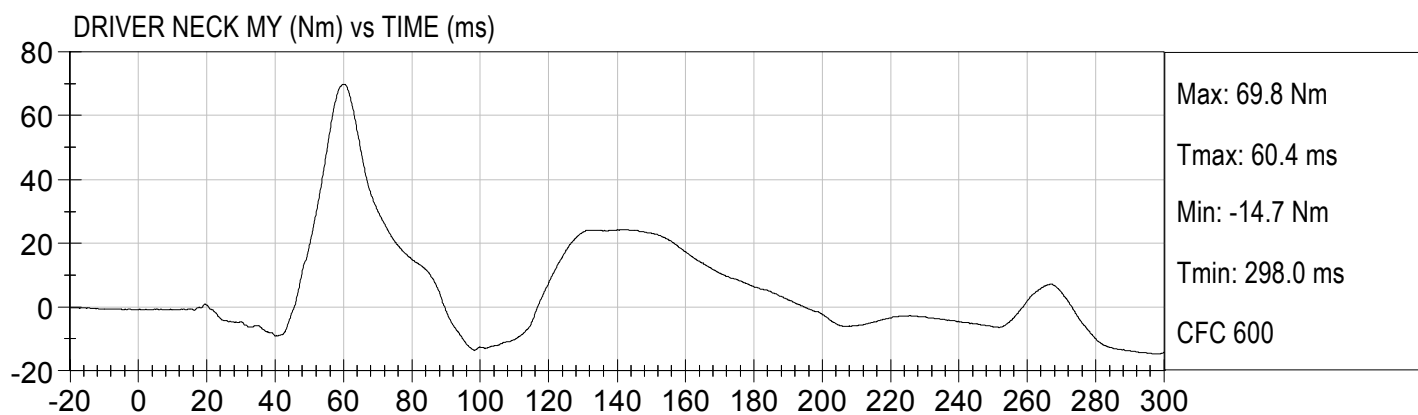
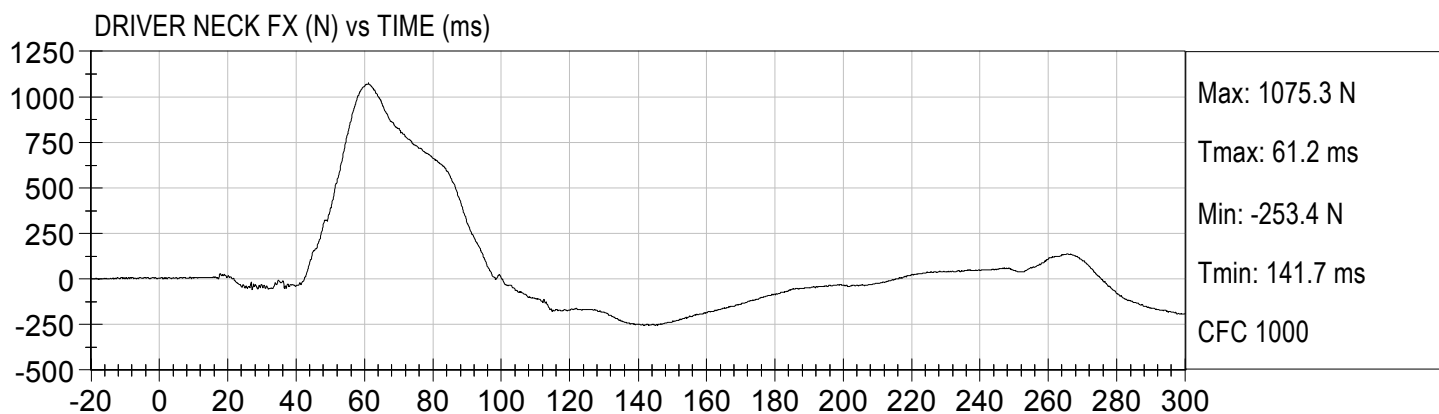
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Driver Left Lower Tibia Force Z
Driver Right Upper Tibia Moment X
Driver Right Upper Tibia Moment Y
Driver Right Upper Tibia Force Z
Driver Right Lower Tibia Moment X
Driver Right Lower Tibia Moment Y
Driver Right Lower Tibia Force Z
Driver Left Foot 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 Lap Belt Force – Not Installed
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
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Passenger Pelvis X
Passenger Pelvis Y
Passenger Pelvis Z
Passenger Left Femur Redundant
Passenger Right Femur Redundant
Passenger Left Upper Tibia Moment X

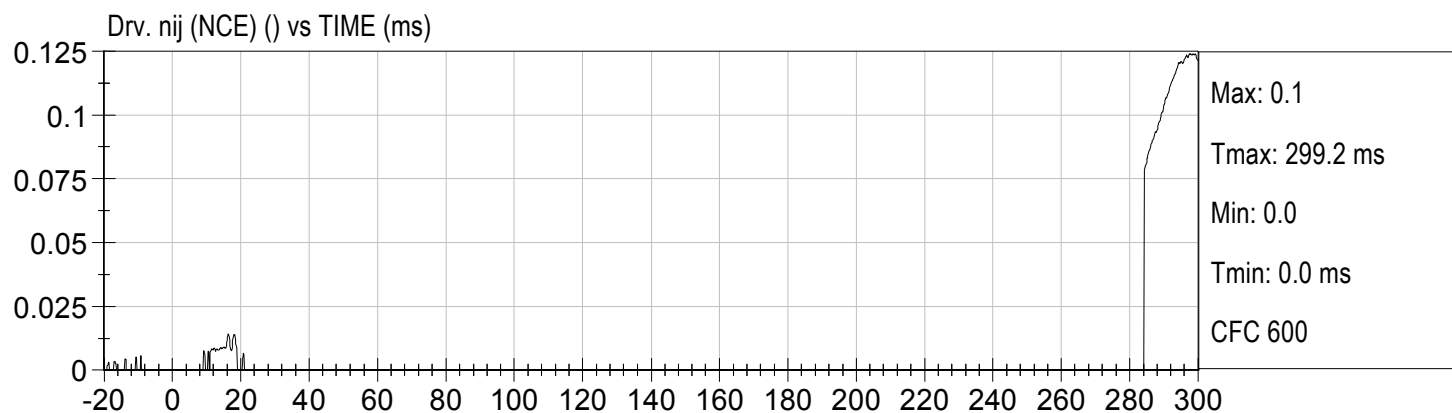
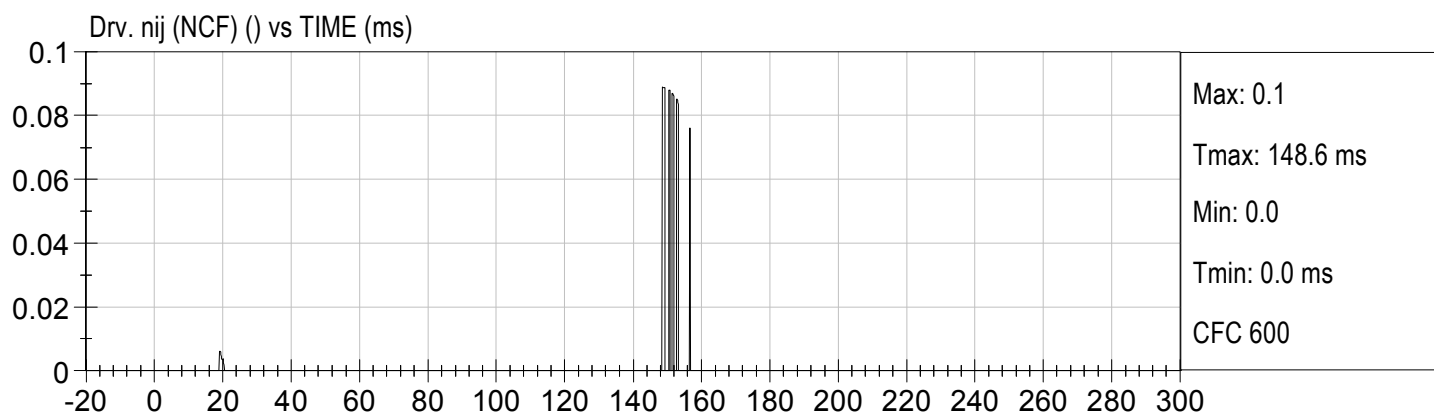
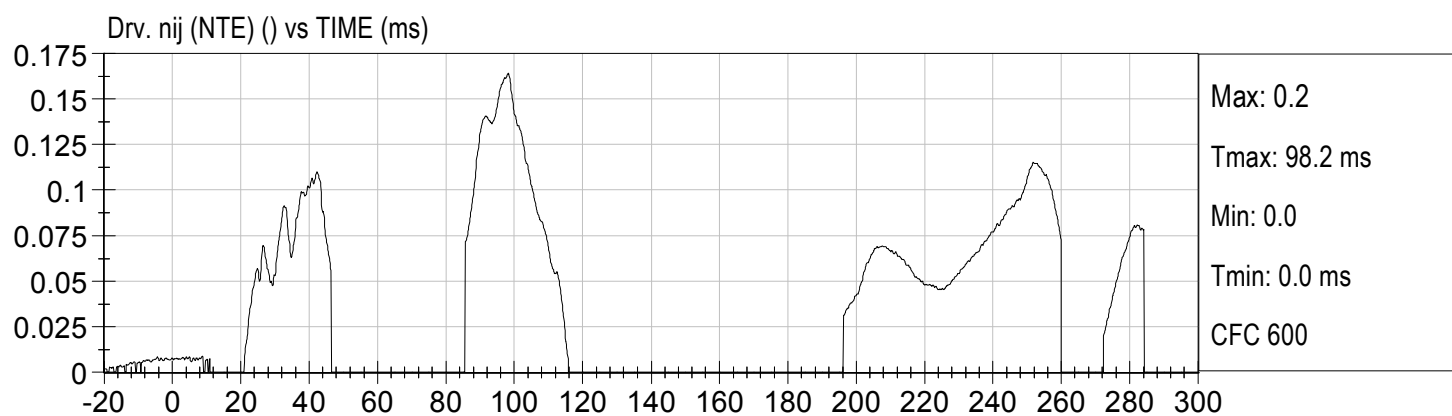
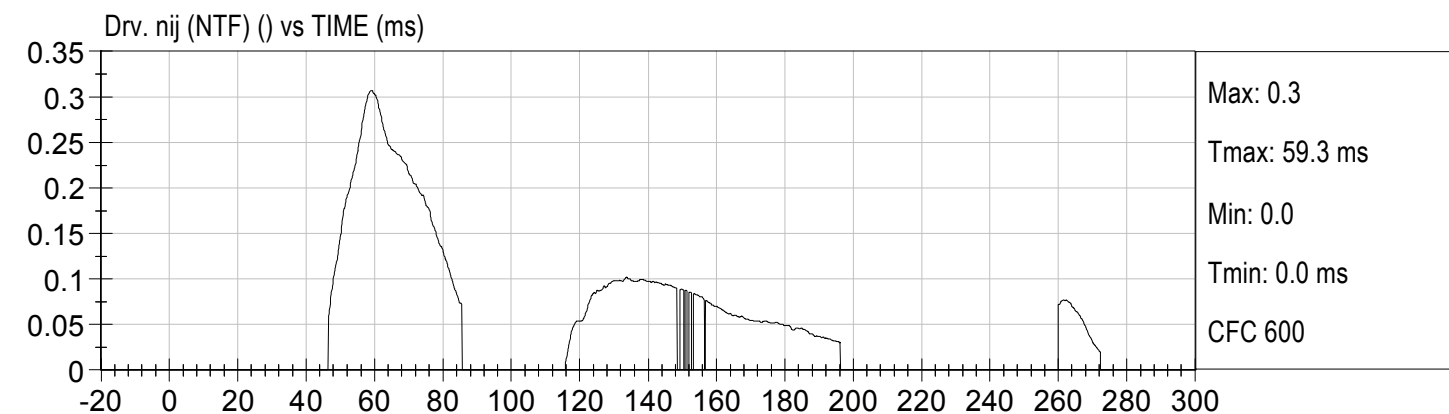
Passenger Left Upper Tibia Moment Y
Passenger Left Upper Tibia Force Z
Passenger Left Lower Tibia Moment X
Passenger Left Lower Tibia Moment Y
Passenger Left Lower Tibia Force Z
Passenger Right Upper Tibia Moment X
Passenger Right Upper Tibia Moment Y
Passenger Right Upper Tibia Force Z
Passenger Right 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 Lap Belt Force – Not Installed
Passenger Shoulder Belt Force
Left Rear Seat Crossmember X
Right Rear Seat Crossmember X
Vehicle Engine Top X
Vehicle Engine Bottom X
Vehicle Left Brake Caliper X
Vehicle Right Brake Caliper X
Left Rear Seat Crossmember Xr
Right Rear Seat Crossmember Xr
Advanced Research Load Cell Barrier – 128 channels

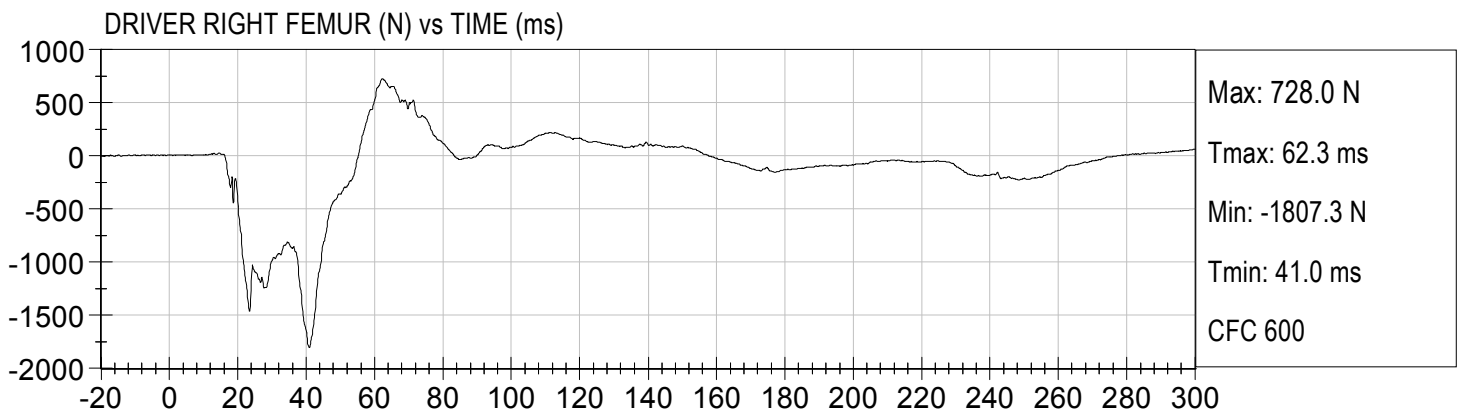
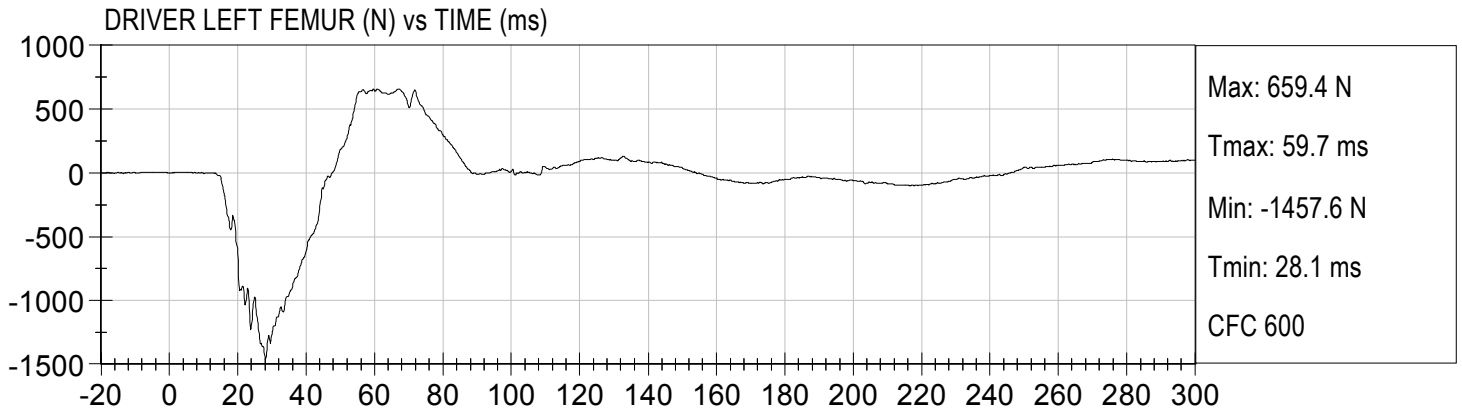


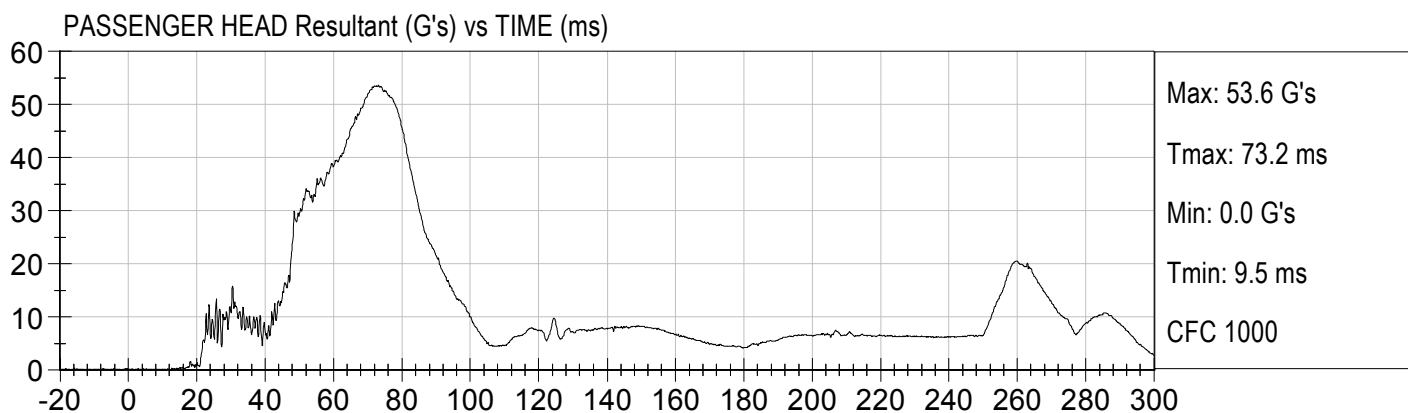
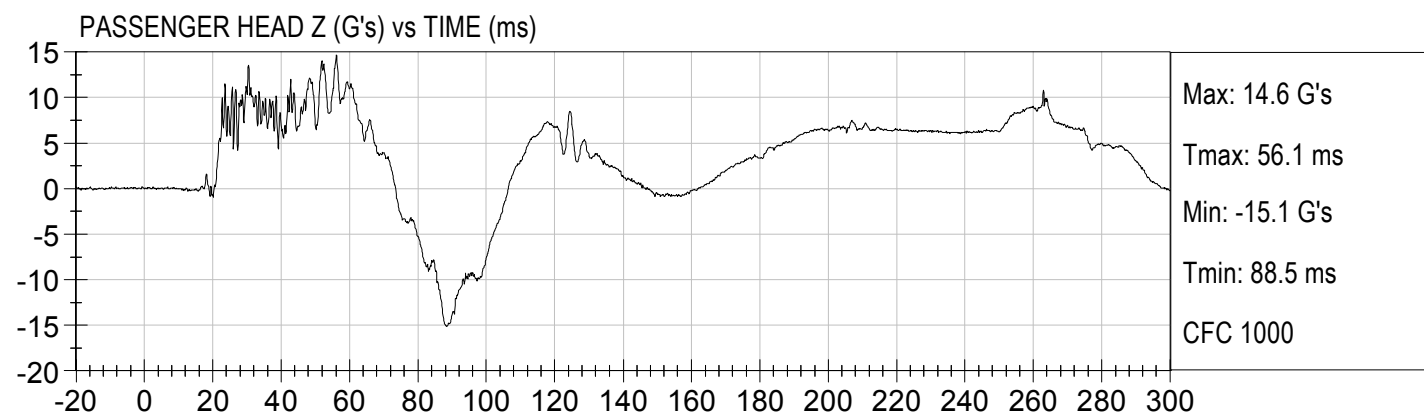
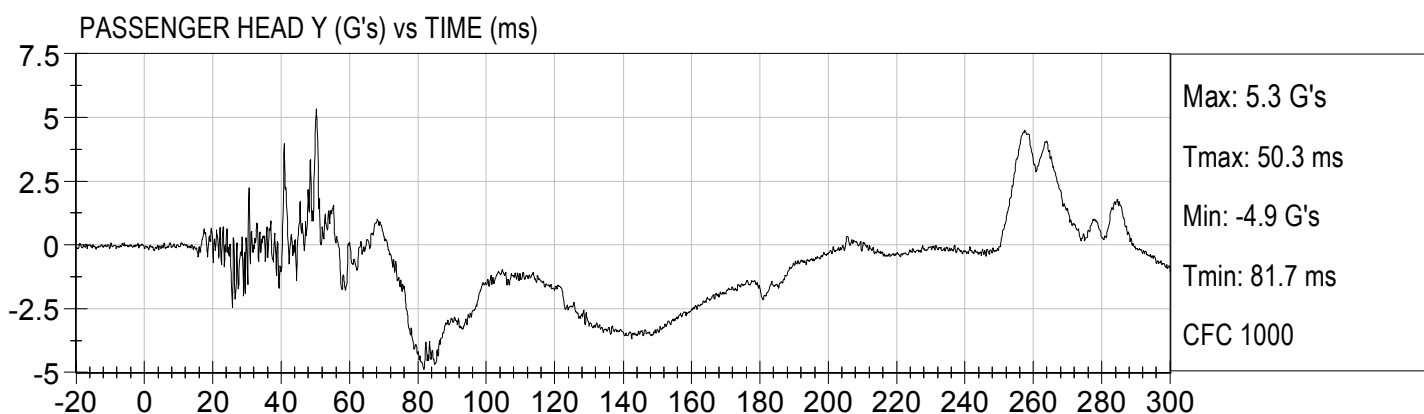
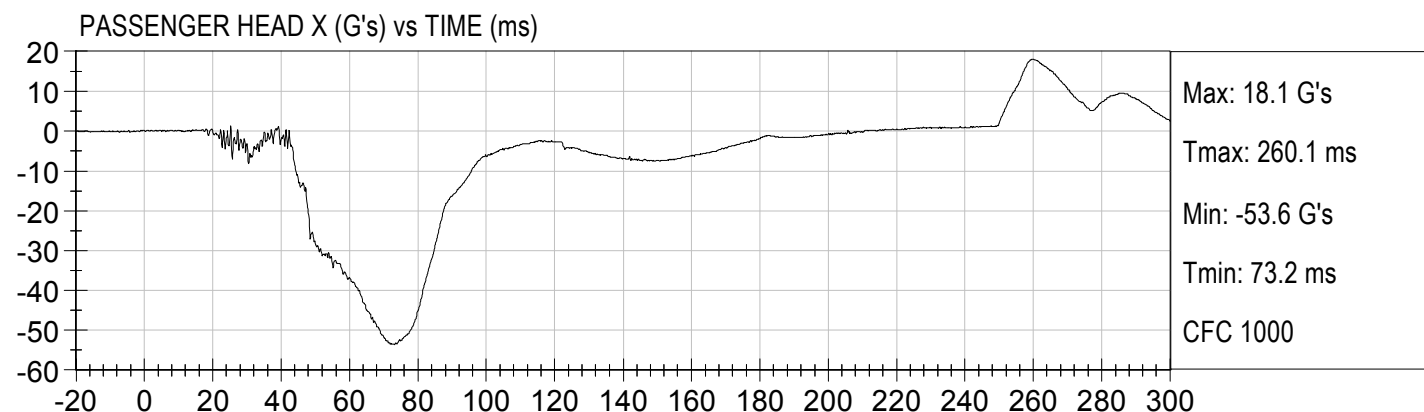


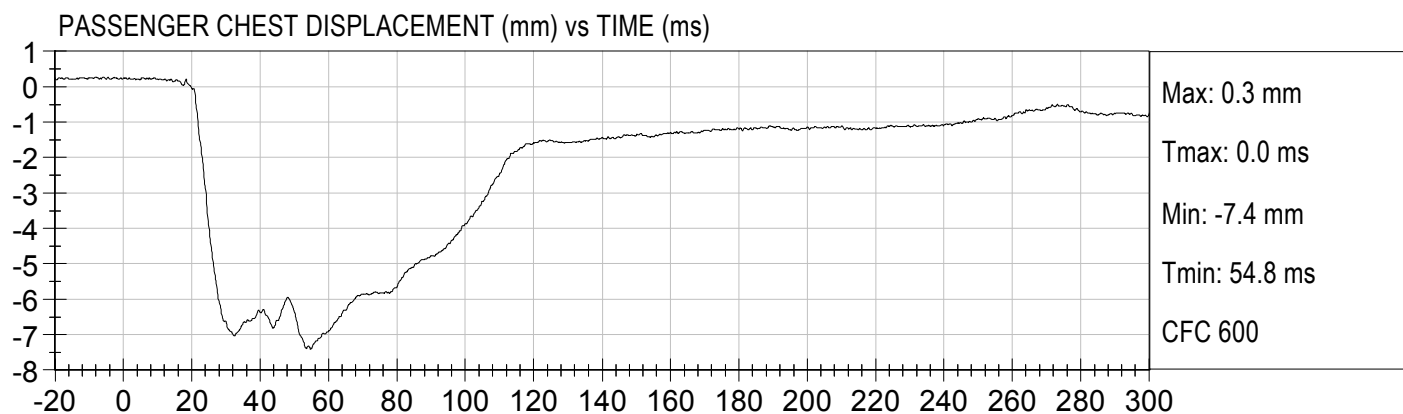


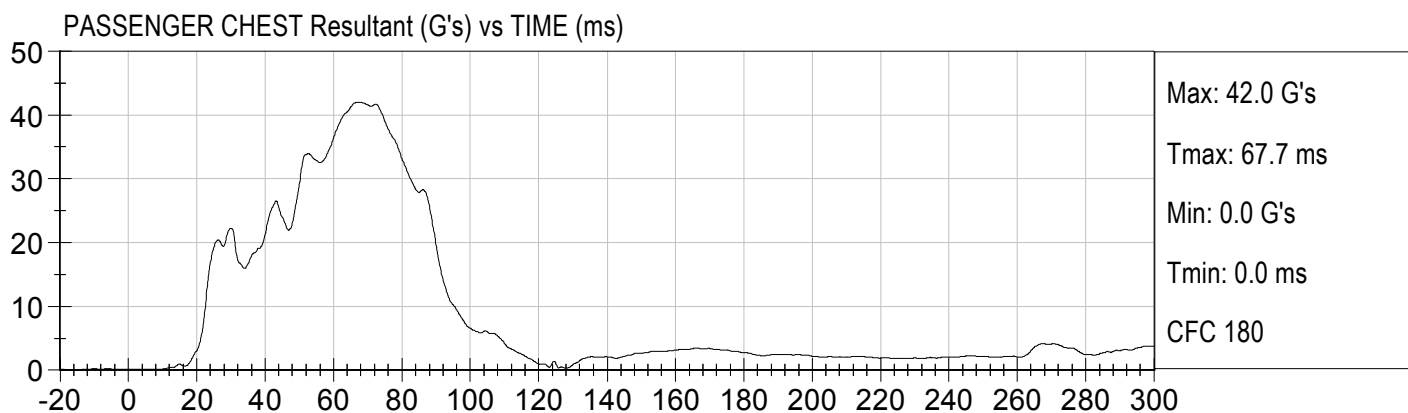
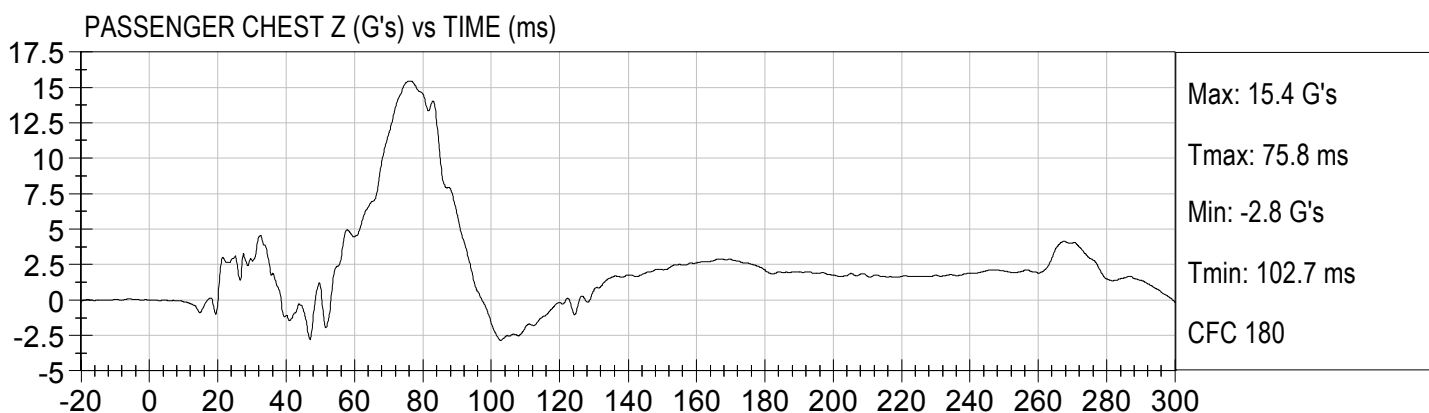
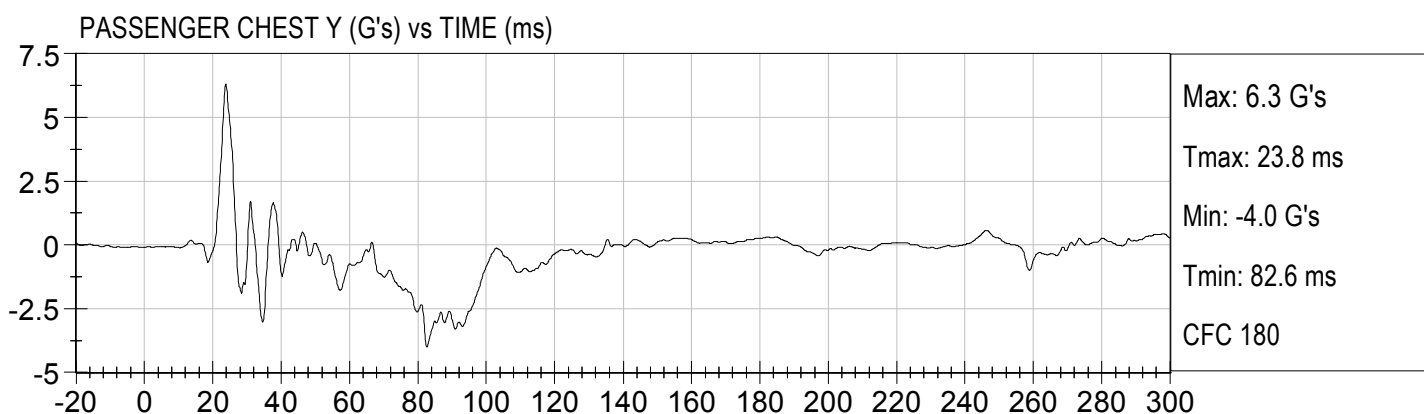
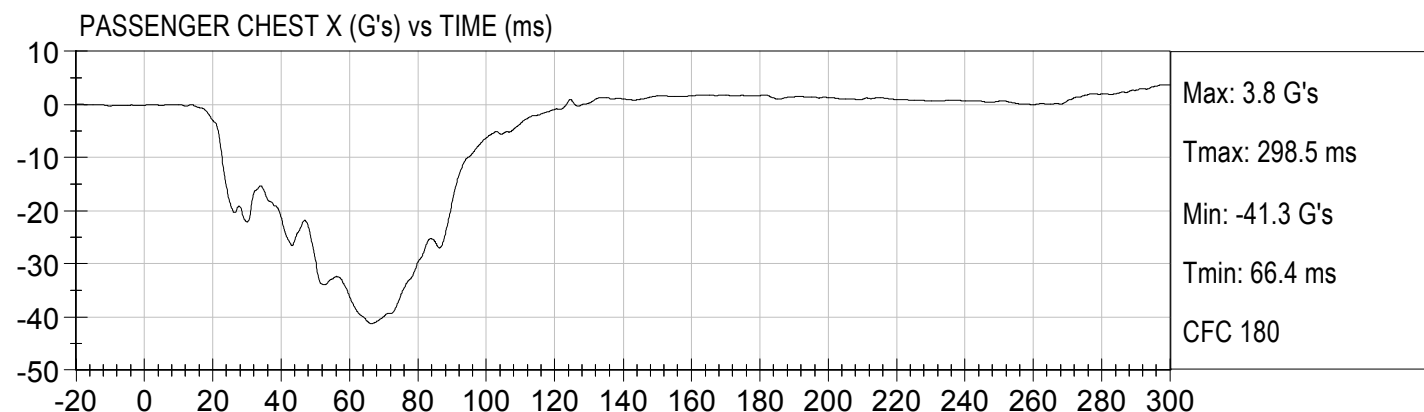


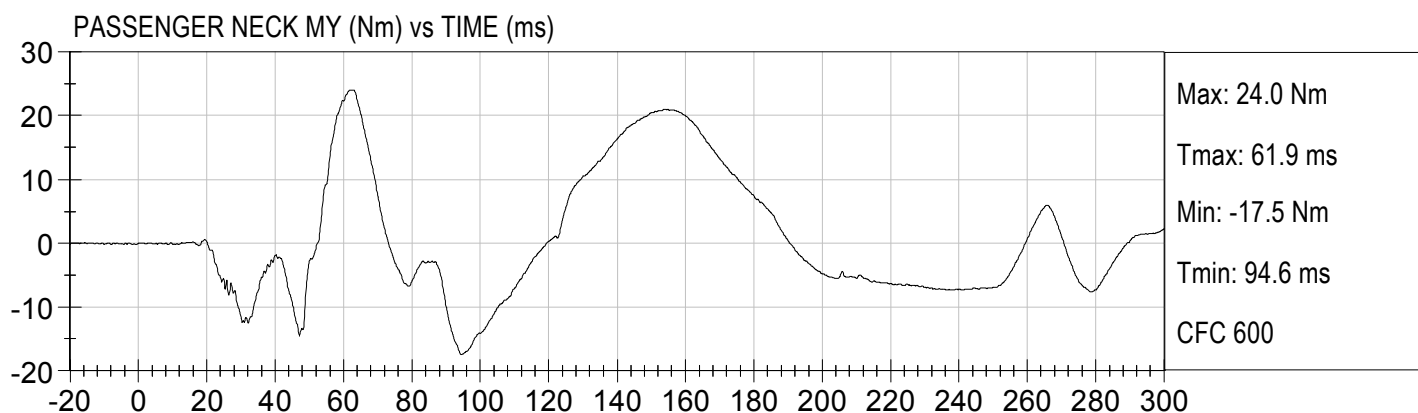
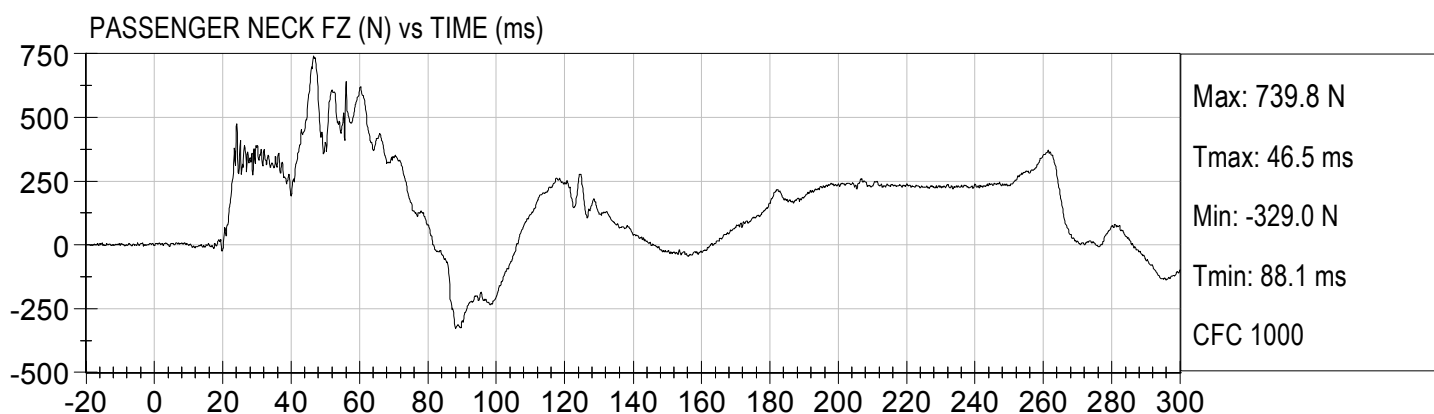
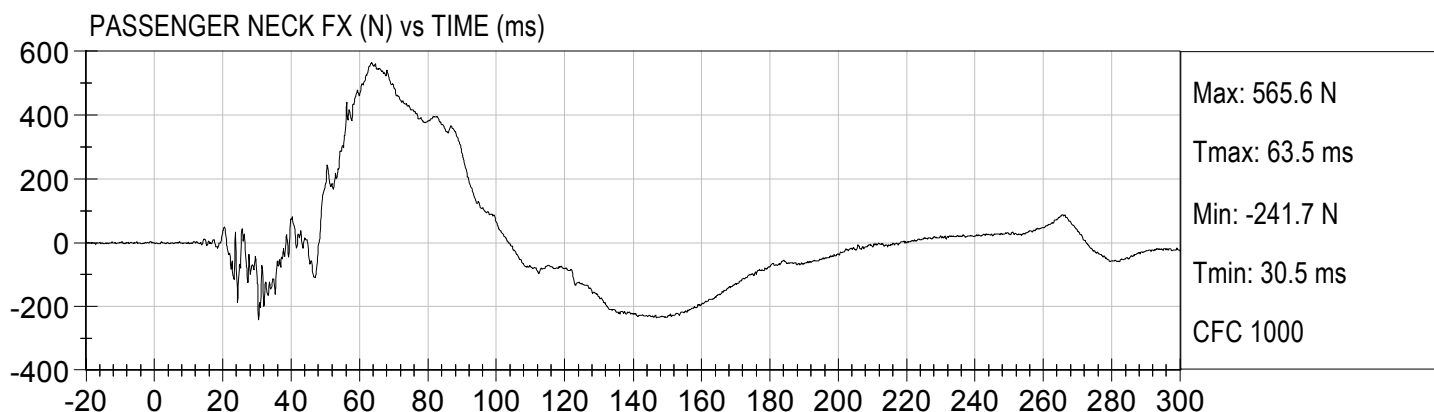


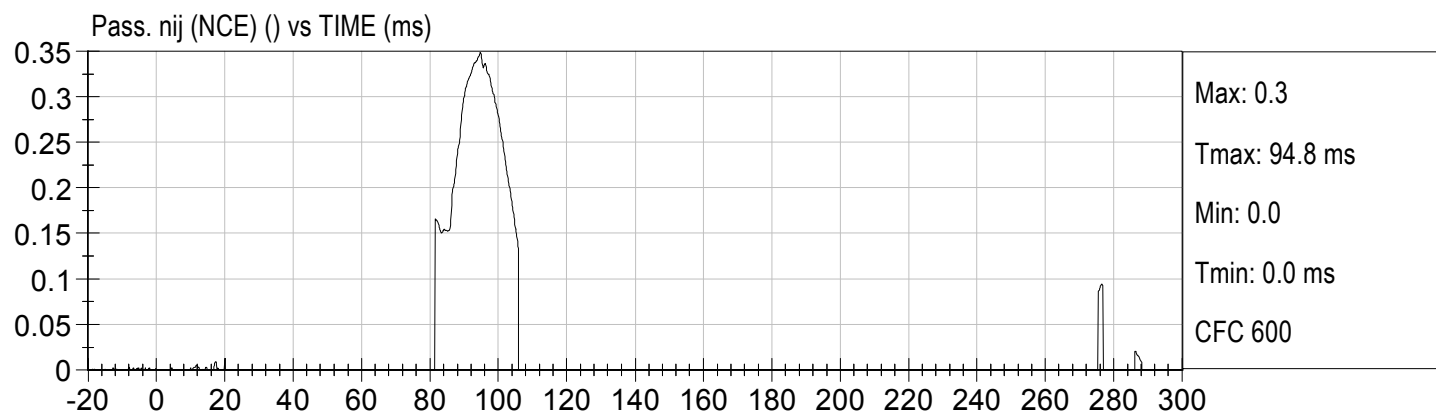
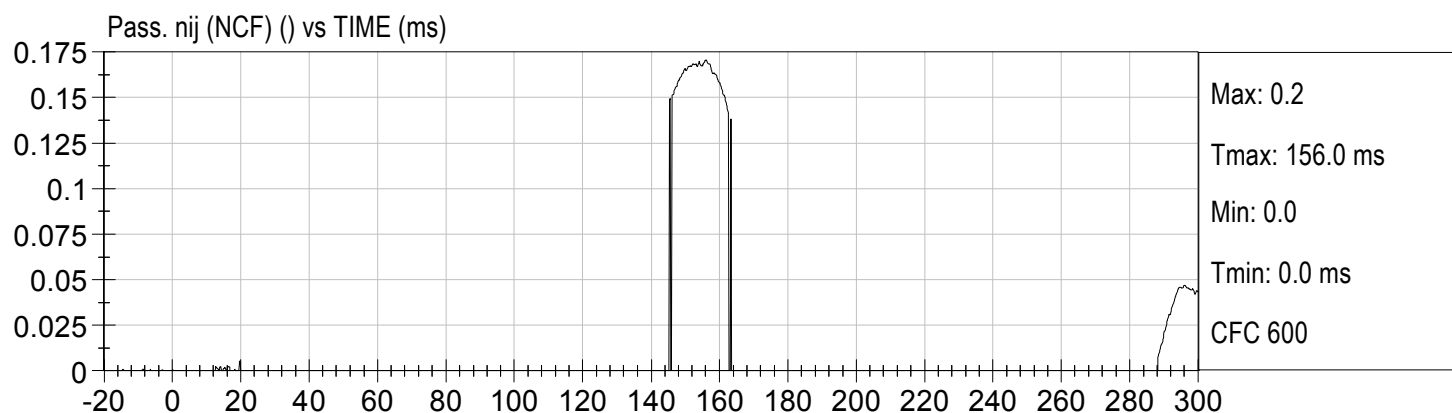
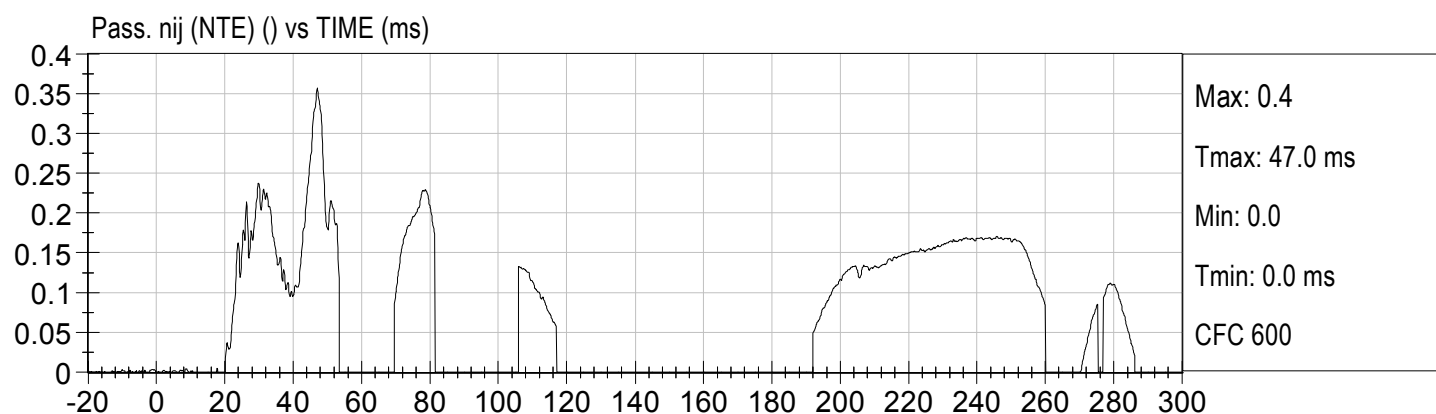
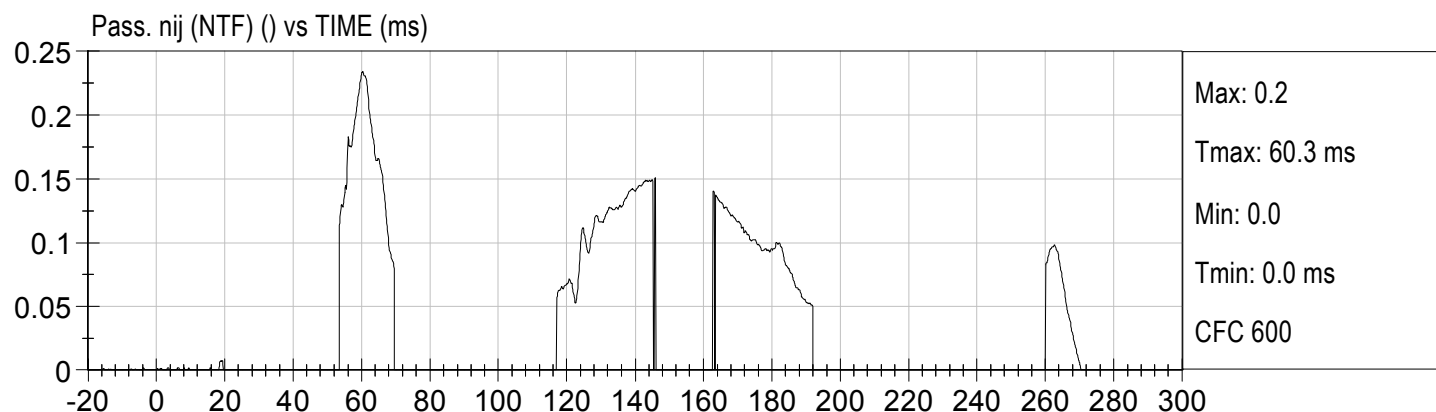


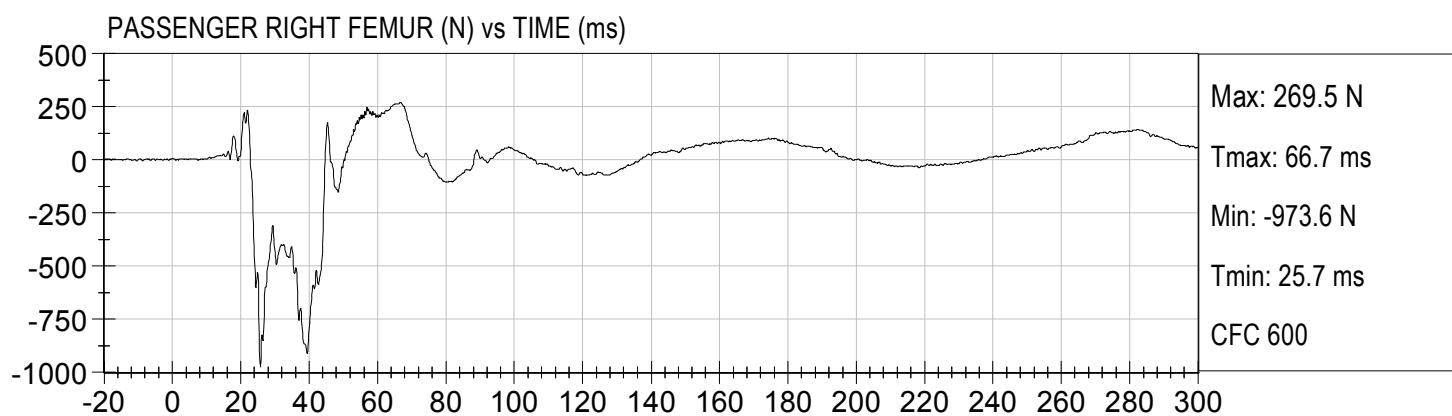
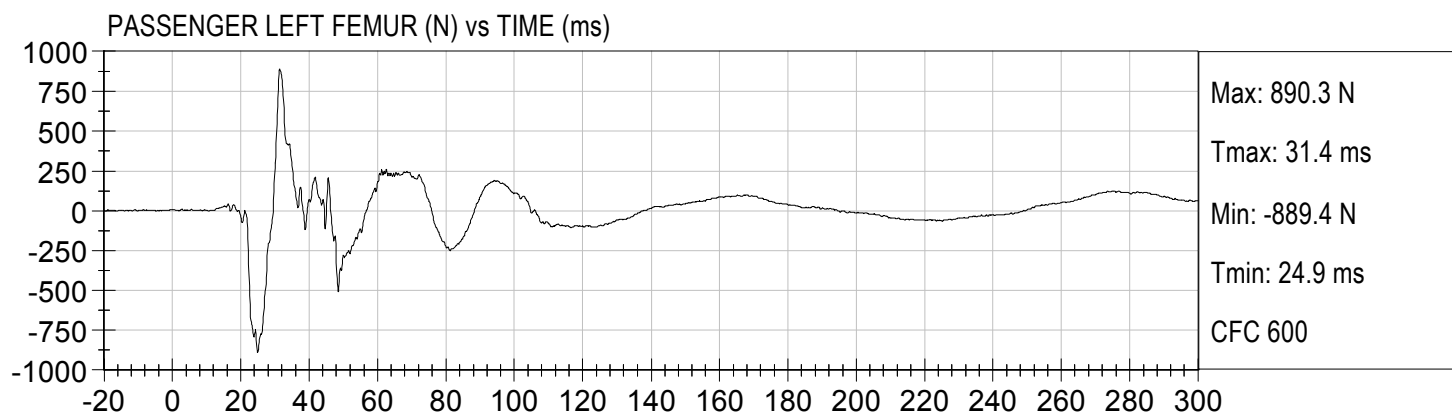












APPENDIX C

DUMMY CALIBRATION AND PERFORMANCE VERIFICATION DATA

Hybrid III, 50th External Measurements
SN: 351

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	34.8
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	5.5
E	SHOULDER PIVOT FROM BACKLINE	Center of the shoulder clevis to the rear vertical surface of the fixture.	3.3-3.7	3.5
F	THIGH CLEARANCE	Measured at the highest point on the upper femur segment.	5.5-6.1	6.0
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	11.8
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	13.3
J	ELBOW REST HEIGHT	Measure from the flesh below the elbow pivot bolt to the seat surface.	7.5-8.3	7.8
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	17.0
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	18.8

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	8.5
P	FOOT LENGTH	Tip of toe to rear of heel	9.9-10.5	10.3
V	SHOULDER BREADTH	Outside edges of right and left shoulder clevises	16.3-17.2	16.5
W	FOOT BREADTH	The widest part of the foot	3.6-4.2	4.0
Y	CHEST CIRCUMFERENCE (WITH CHEST JACKET)	Measured 16.9-17.1 in. above seat surface	38.2-39.4	39.2
Z	WAIST CIRCUMFERENCE	Measured 8.9-9.1 in. above seat surface	32.9-34.1	33.7
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

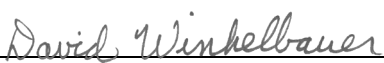
ATD Serial No: 351

Test ID: D114011

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	17	Pass
Peak Resultant Acceleration	G's	225 - 275	248	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-2.8	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

11/30/11
Test Date

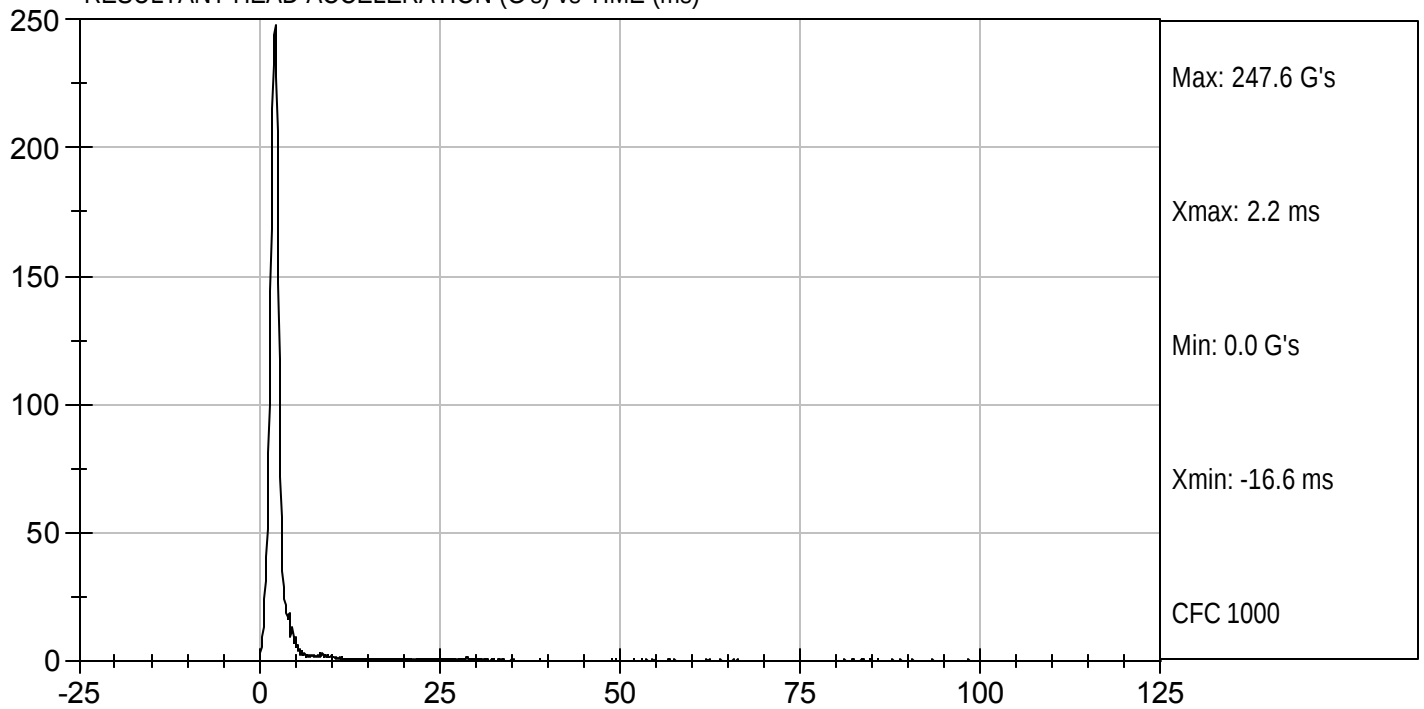

Approved By



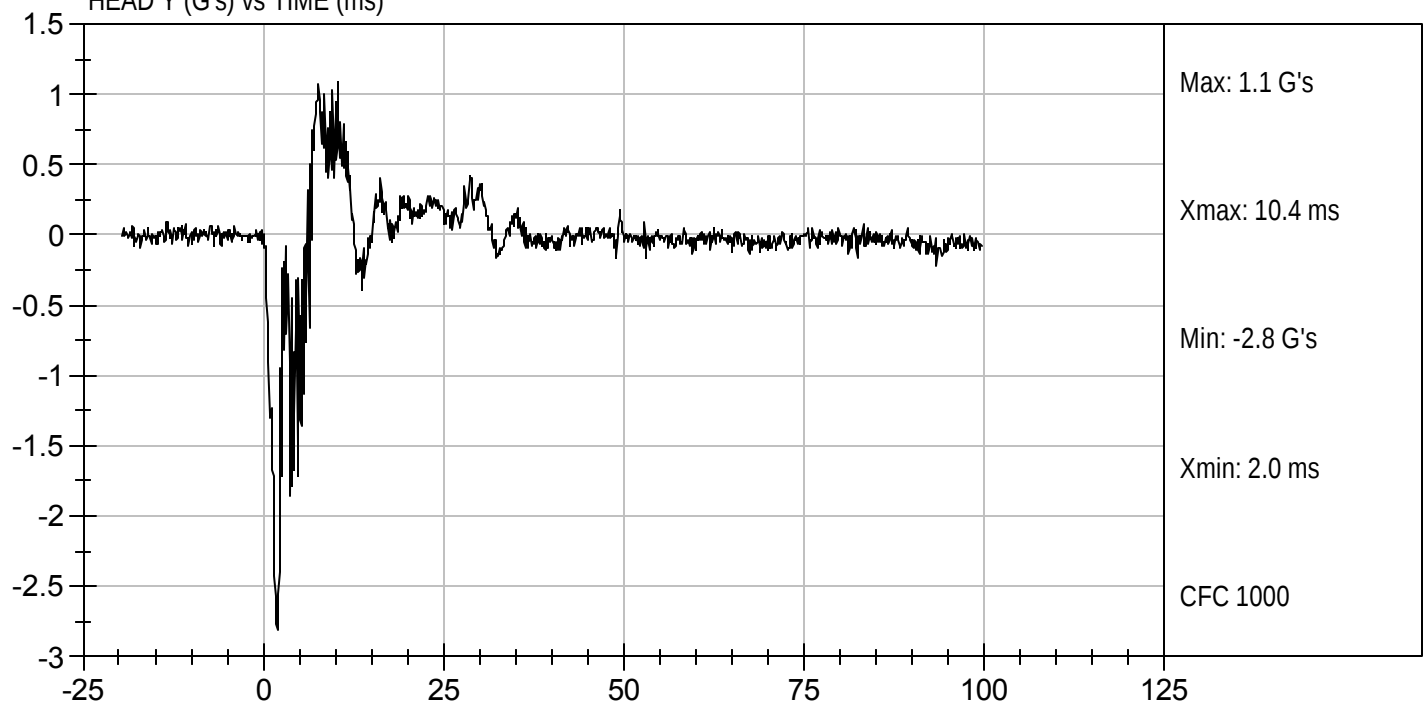
Test Desc: Head Drop
Component ID: D114011

Test Date: 11/30/11
Velocity: 0 ft/s, 0.00 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

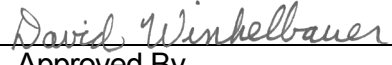
ATD Serial No: 351

Test I.D: D114012

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity		%	10 to 70	16	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	23.43	Pass
	20 ms	G's	17.60 to 22.60	19.41	Pass
	30 ms	G's	12.50 to 18.50	14.34	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	14.3	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	37.1	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	68.2	Pass
	Time	ms	57.0 to 64.0	58.3	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	114.5	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	90.1	Pass
	Time	ms	47.0 to 58.0	50.2	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	100.2	Pass
Overall Test Results					Pass


Laboratory Technician

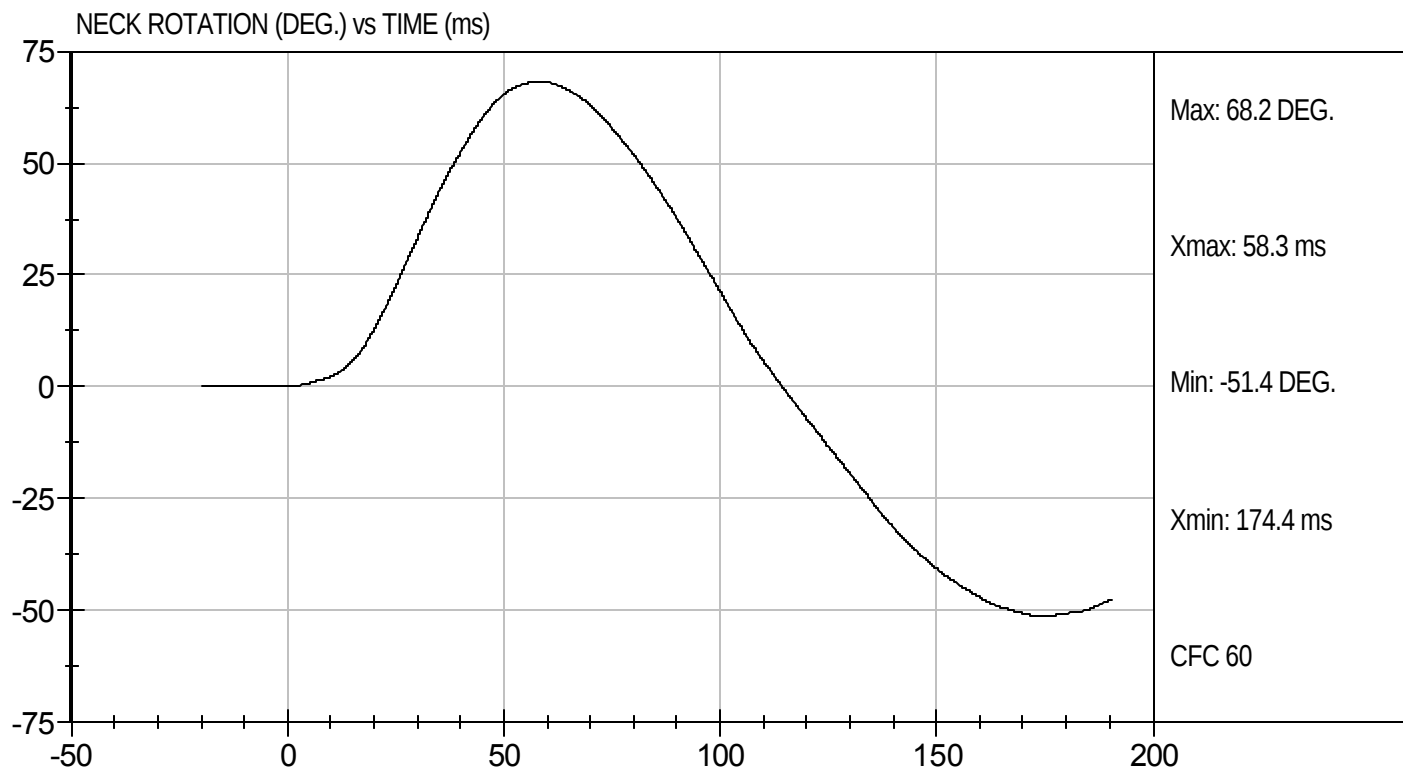
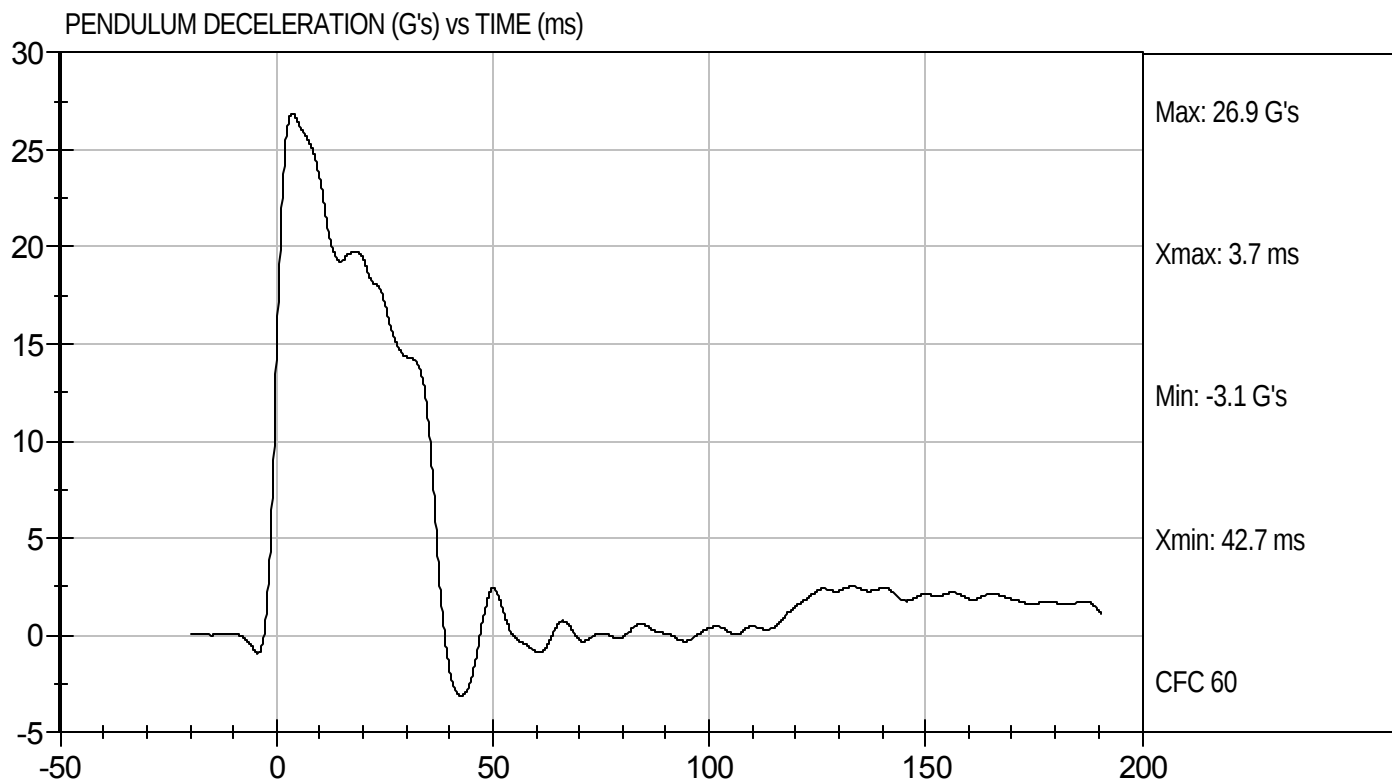
11/30/11
Test Date


Approved By



Test Desc: Neck Flexion
Component ID: D114012

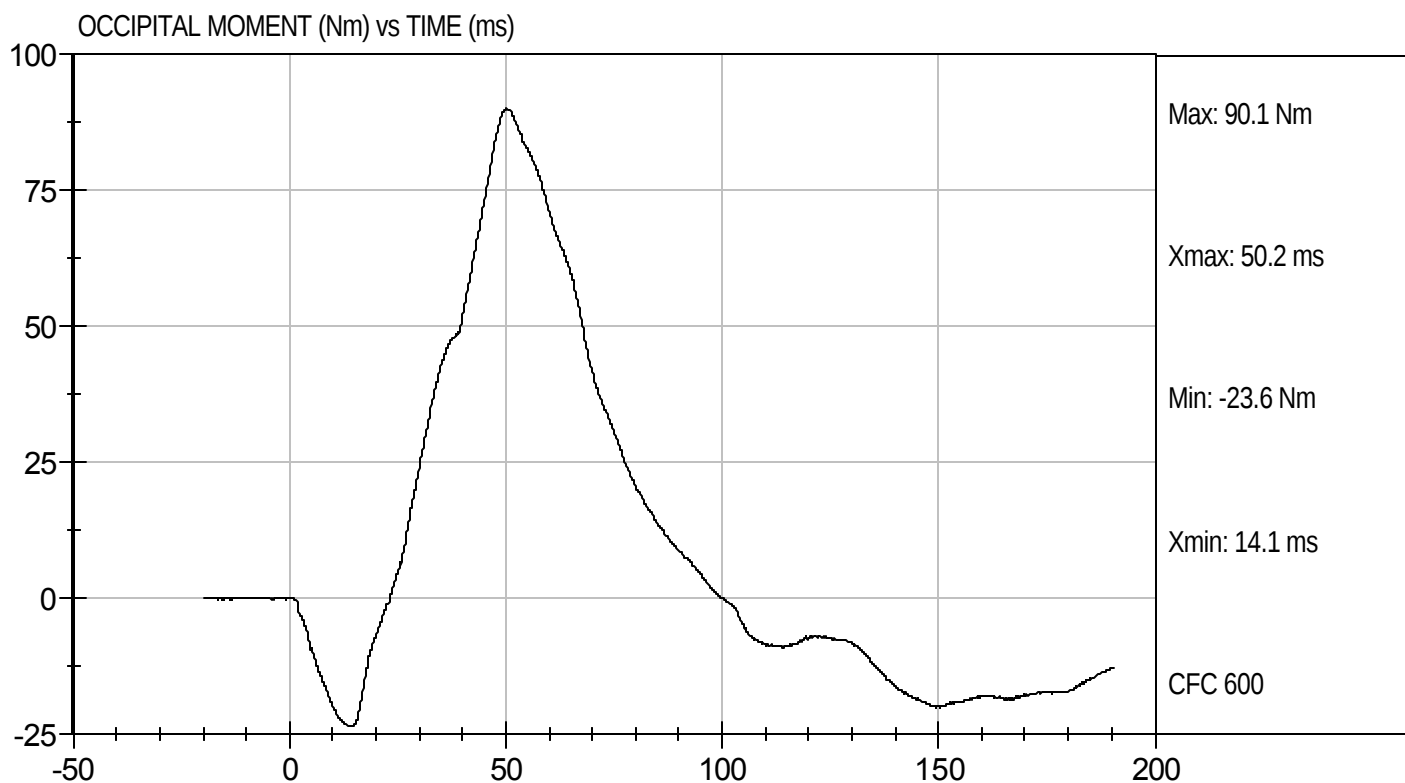
Test Date: 11/30/11
Velocity: 23.15 ft/s, 7.06 m/s





Test Desc: Neck Flexion
Component ID: D114012

Test Date: 11/30/11
Velocity: 23.15 ft/s, 7.06 m/s



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

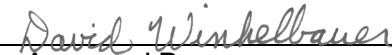
ATD Serial No: 351

Test I.D.: D114013

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity		%	10 to 70	16	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.12	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	17.24	Pass
	20 ms	G's	14.00 to 19.00	15.90	Pass
	30 ms	G's	11.00 to 16.00	11.92	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	12.9	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	38.5	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	97.5	Pass
	Time	ms	72.0 to 82.0	76.8	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	156.3	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-61.7	Pass
	Time	ms	65.0 to 79.0	71.0	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	143.2	Pass
Overall Test Results					Pass


 Laboratory Technician

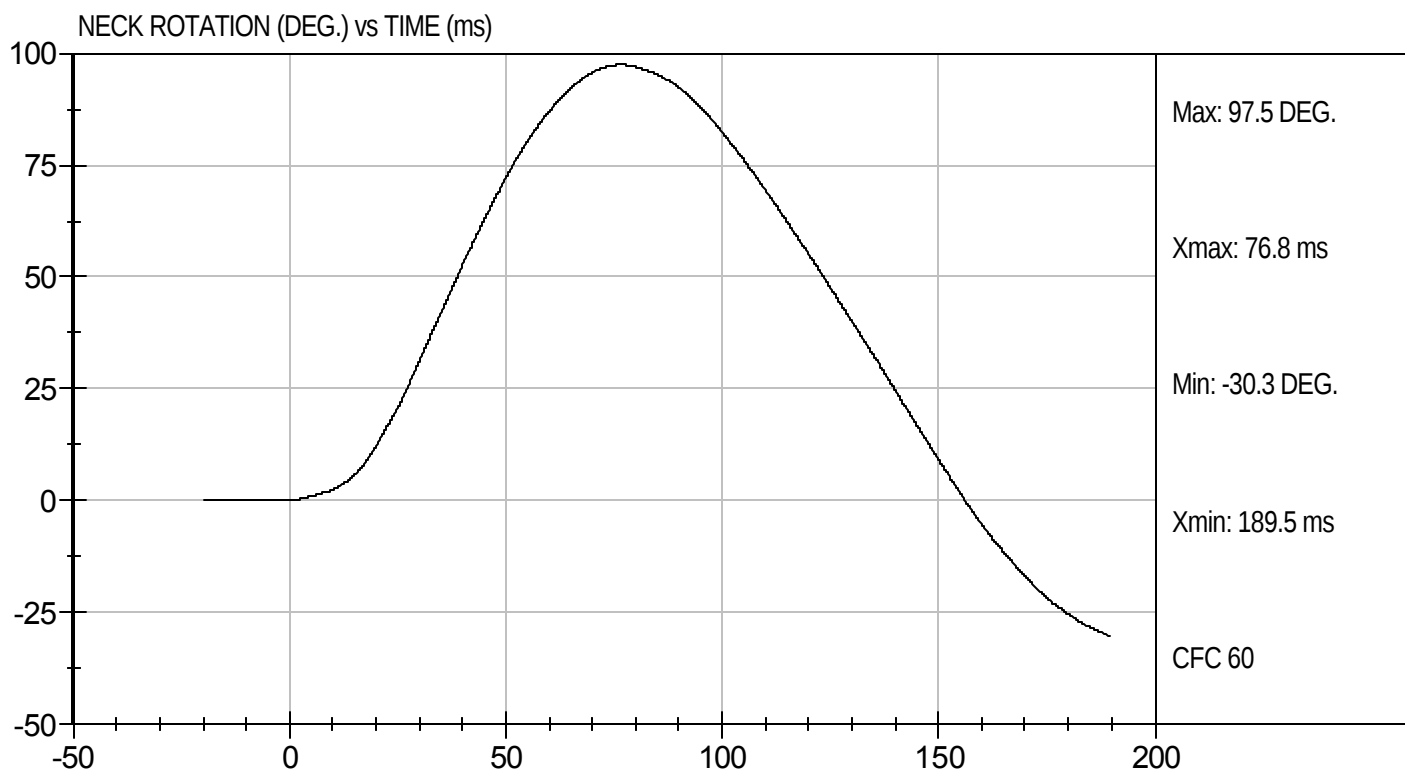
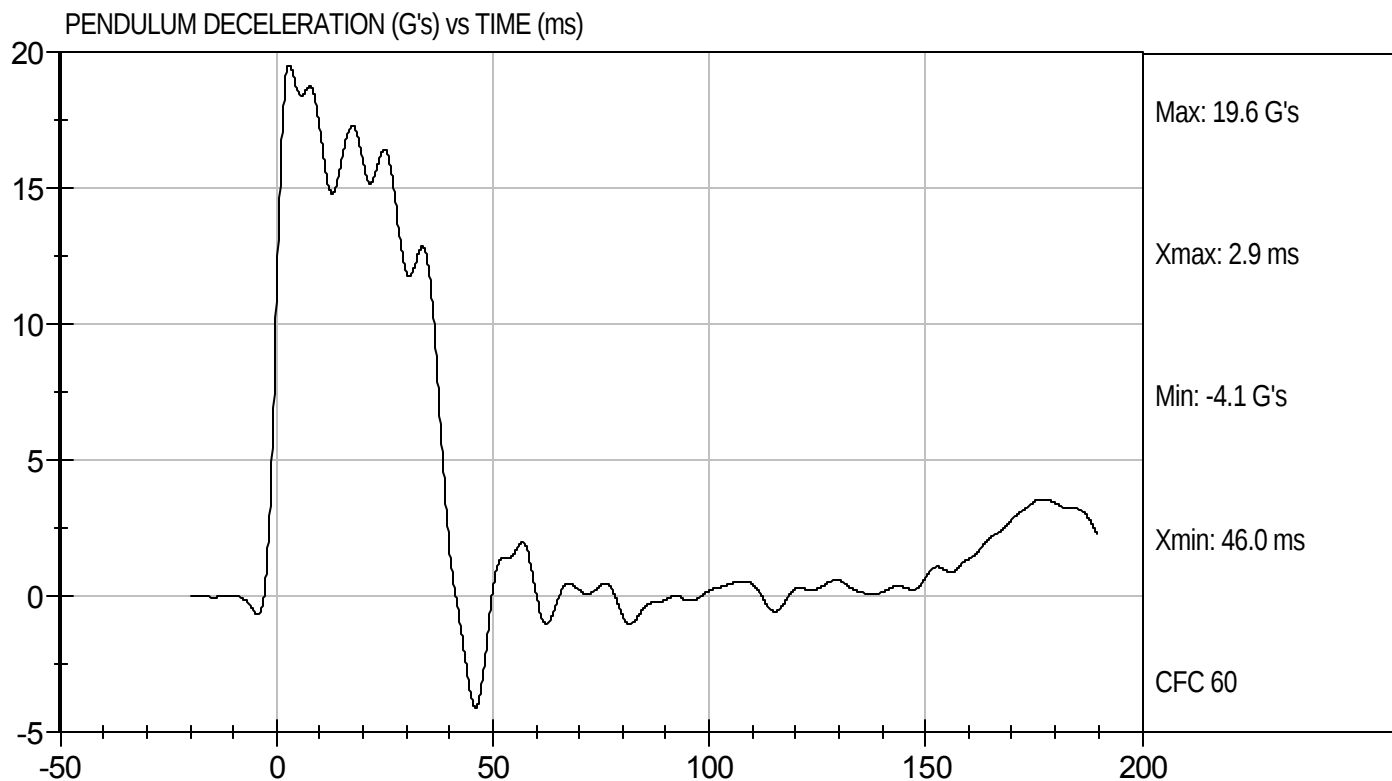
11/30/11
 Test Date


 Approved By



Test Desc: Neck Extension
Component ID: D114013

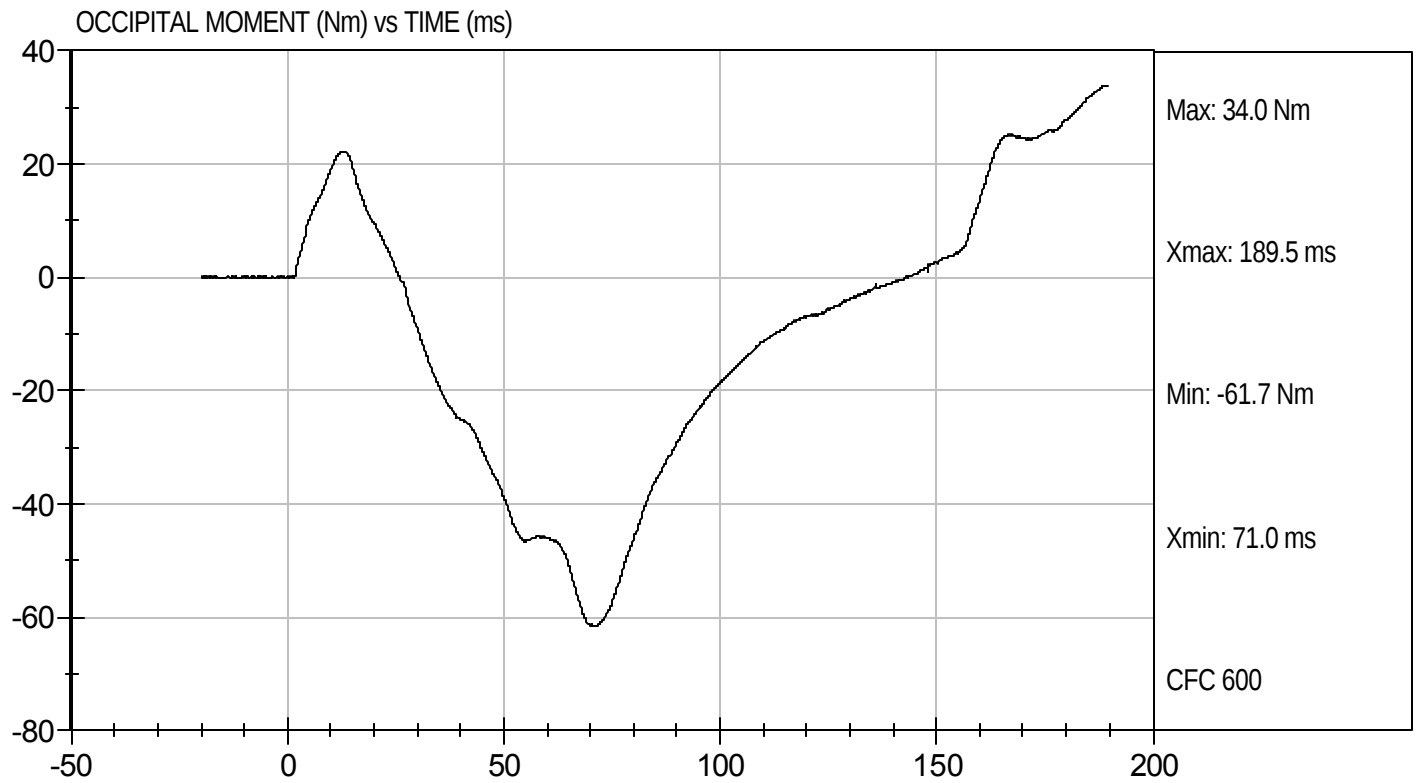
Test Date: 11/30/11
Velocity: 20.08 ft/s, 6.12 m/s





Test Desc: Neck Extension
Component ID: D114013

Test Date: 11/30/11
Velocity: 20.08 ft/s, 6.12 m/s

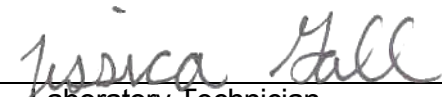


MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE

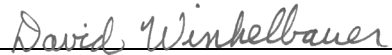
ATD Serial No: 351

Test I.D: D114014

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	20	Pass
Probe Velocity	m/s	6.58 to 6.82	6.77	Pass
Peak Probe Force	N	5159 to 5893	5,187	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.78	Pass
Internal Hysteresis	%	69 to 85	70	Pass
			Overall Test Results	Pass


Laboratory Technician

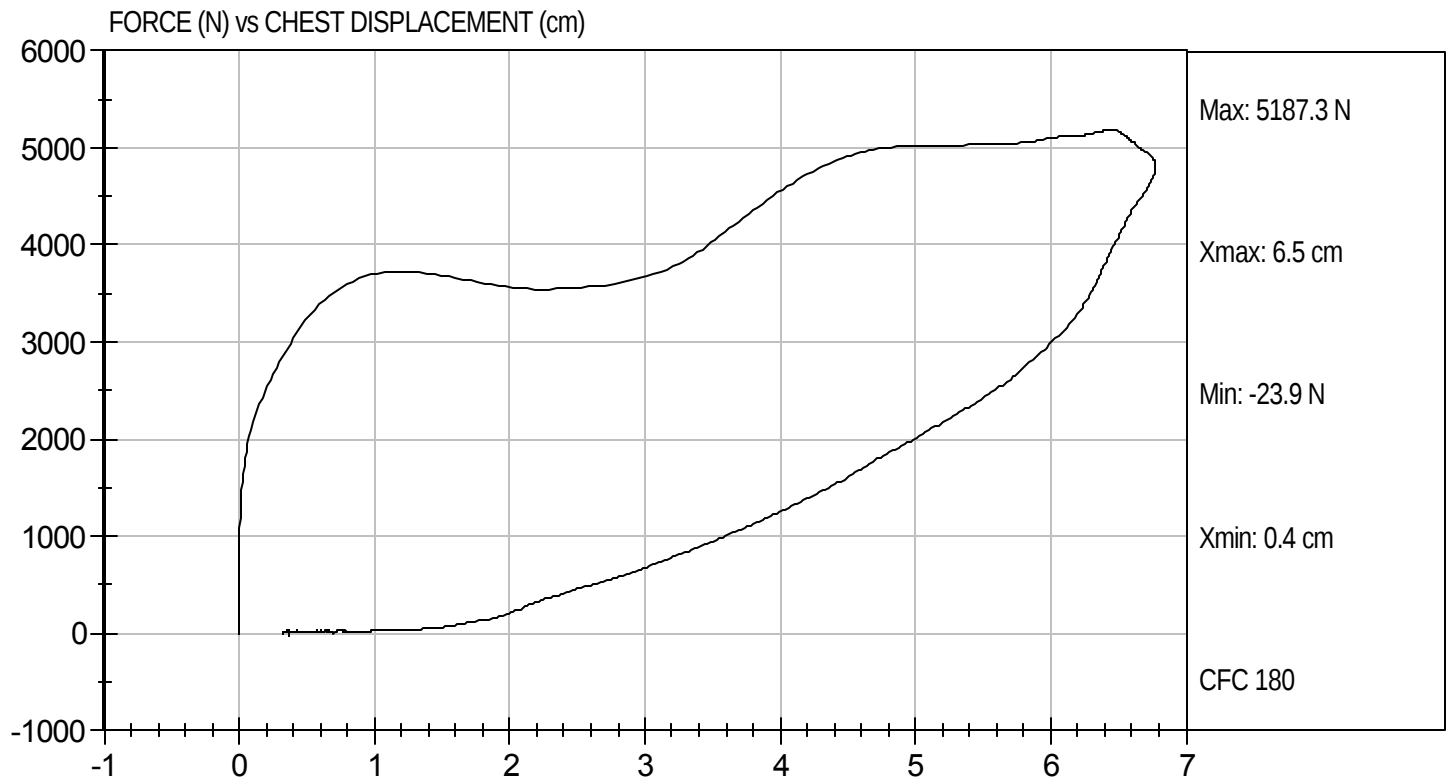
12/1/11
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D114014

Test Date: 12/1/11
Velocity: 22.2 ft/s, 6.77 m/s



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

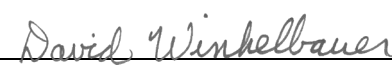
ATD Serial No: 351

Test I.D: D114015

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	17	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	Newtons	4715 to 5782	5,411	Pass
Overall Test Results				Pass


Laboratory Technician

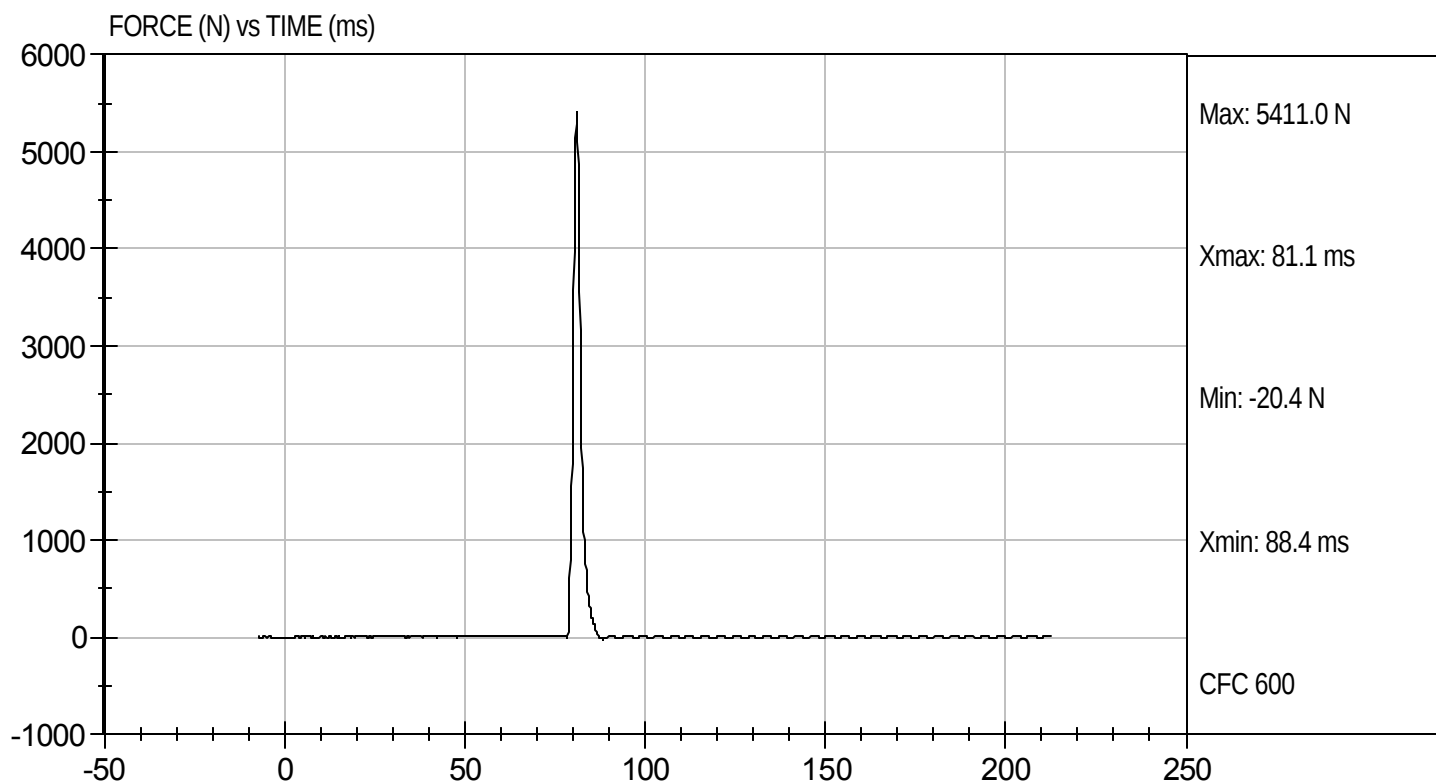
11/30/11
Test Date


Approved By



Test Desc: Right Knee
Component ID: D114015

Test Date: 11/30/11
Velocity: 6.97 ft/s, 2.12 m/s



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

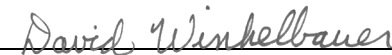
ATD Serial No: 351

Test I.D: D114016

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	17	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	Newtons	4715 to 5782	4,973	Pass
Overall Test Results				Pass


Laboratory Technician

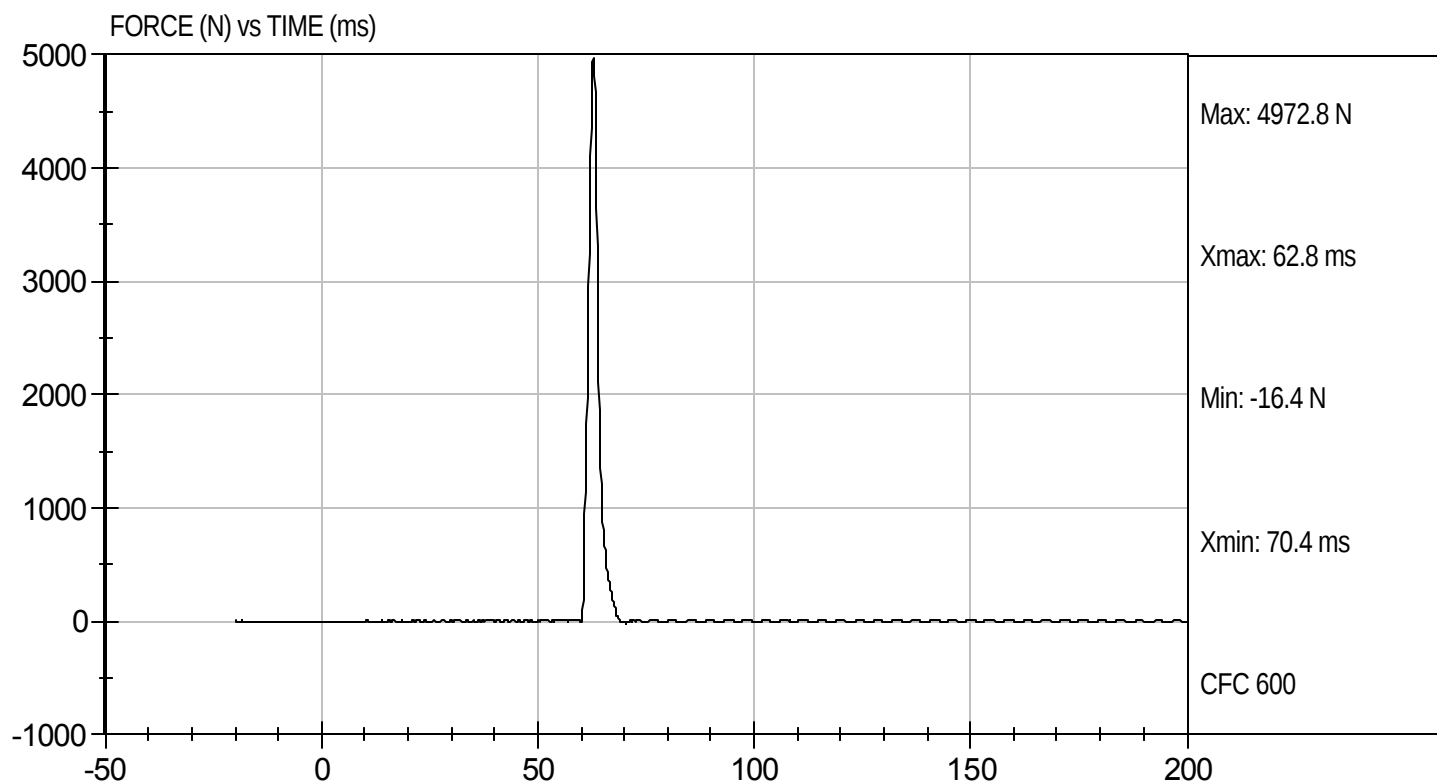
11/30/11
Test Date


Approved By



Test Desc: Left Knee
Component ID: D114016

Test Date: 11/30/11
Velocity: 6.97 ft/s, 2.12 m/s



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

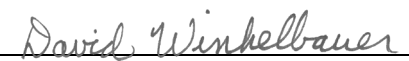
ATD Serial No: 351

Test I.D: D114010

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	21	21	Pass
Rotation Rate	deg/s	5.0 -10.0	5.7	5.7	Pass
30 Degrees	Nm	94.9 Nm Max	56.9	59.7	Pass
150 ft-lbf / 203.4 Nm	Deg	40.0 - 50.0 Degree Max Rotation	43.2	42.3	Pass
Overall Test Results					Pass


 Laboratory Technician

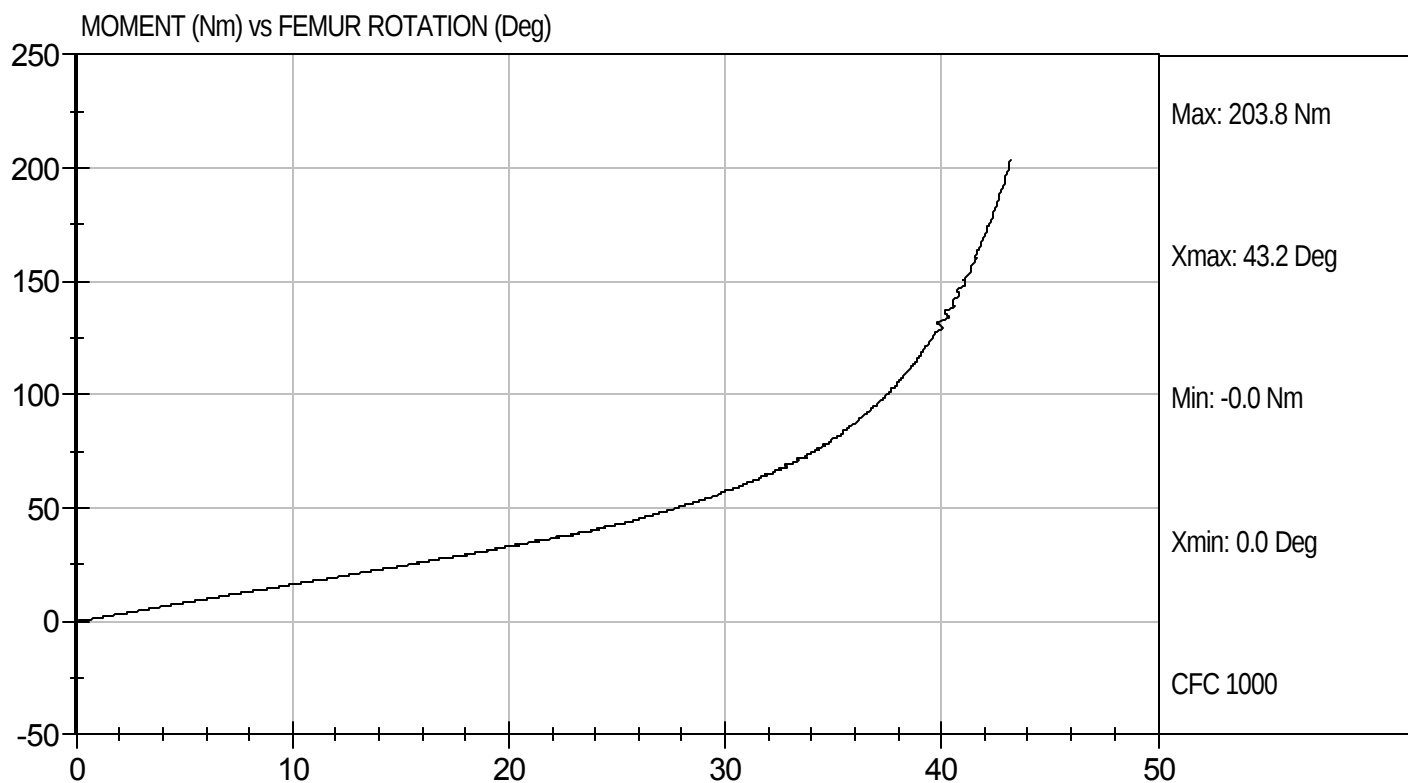
11/30/11
 Test Date


 Approved By



Test Desc: Hip Femur Flexion
Component ID: D114019

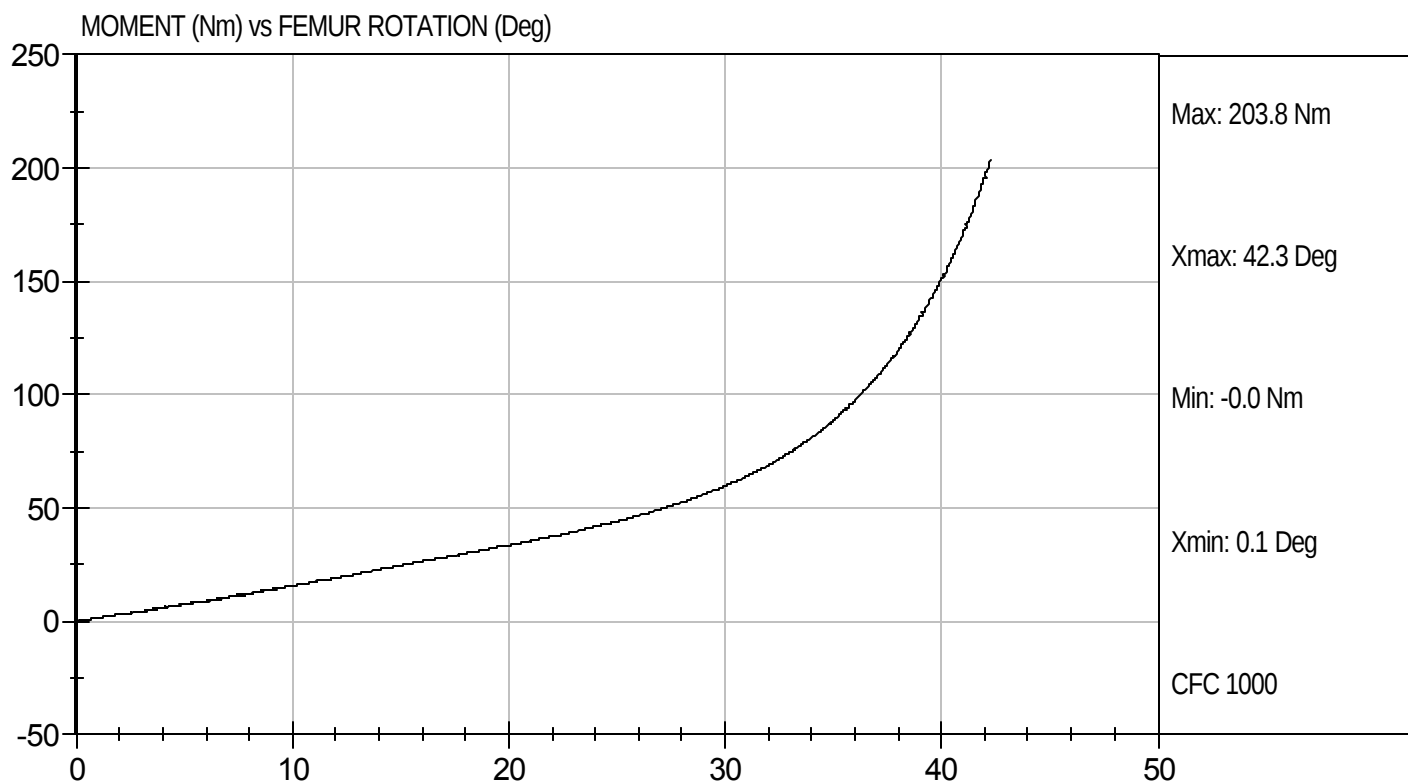
Test Date: 11/30/11
Velocity: 0 ft/s, 0.00 m/s





Test Desc: Hip Femur Flexion
Component ID: D114010

Test Date: 11/30/11
Velocity: 0 ft/s, 0.00 m/s



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

ATD Serial No: 351

Test ID: D114111

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	19	Pass
Peak Resultant Acceleration	G's	225 - 275	254	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-8.9	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

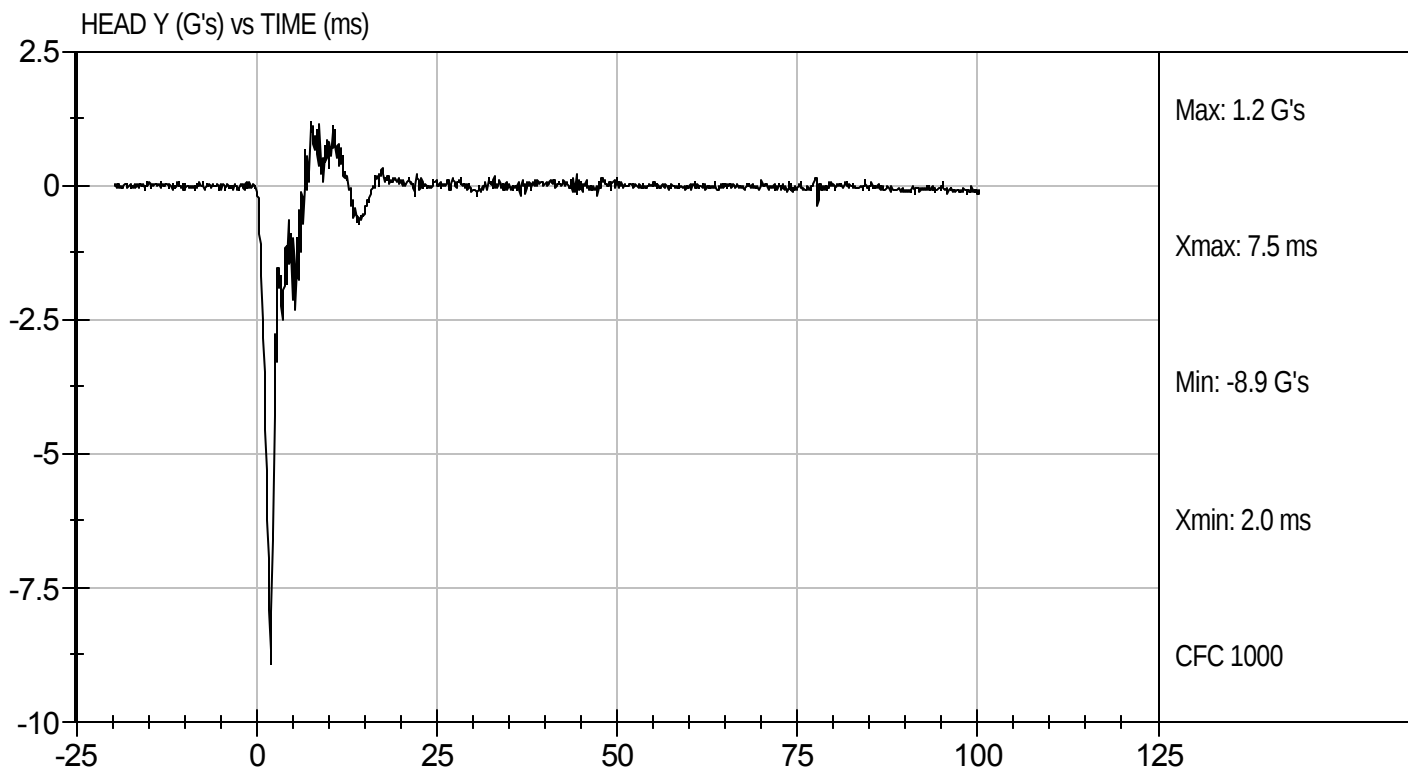
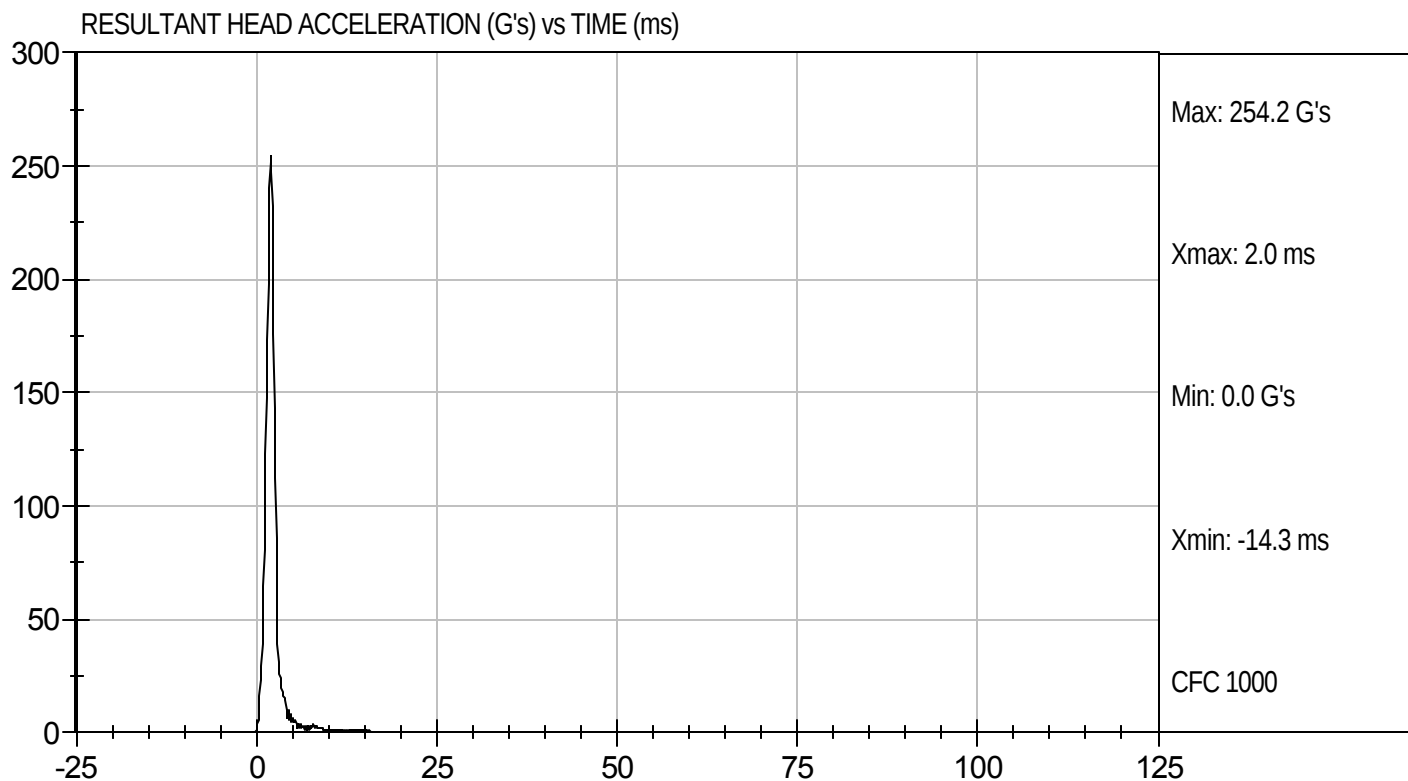
12/8/11
Test Date


Approved By



Test Desc: Head Drop
Component ID: D114111

Test Date: 12/8/11
Velocity: 0 ft/s, 0.00 m/s



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

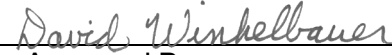
ATD Serial No: 351

Test I.D.: D114112

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	20	Pass
Pendulum Velocity		m/s	6.89 to 7.13	6.96	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	24.09	Pass
	20 ms	G's	17.60 to 22.60	17.97	Pass
	30 ms	G's	12.50 to 18.50	14.60	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	14.5	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	35.9	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	69.1	Pass
	Time	ms	57.0 to 64.0	58.2	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	113.2	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	91.9	Pass
	Time	ms	47.0 to 58.0	49.3	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	98.5	Pass
Overall Test Results					Pass


 Laboratory Technician

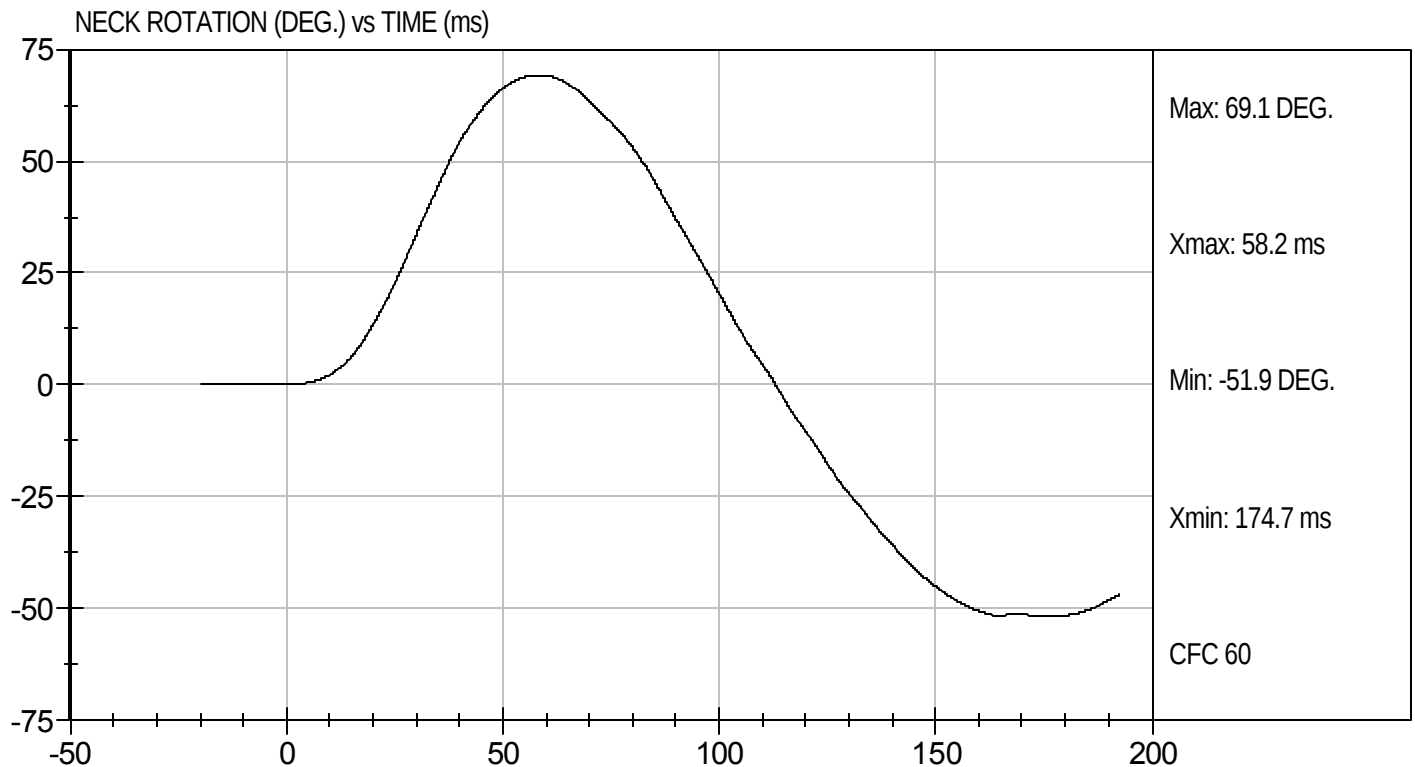
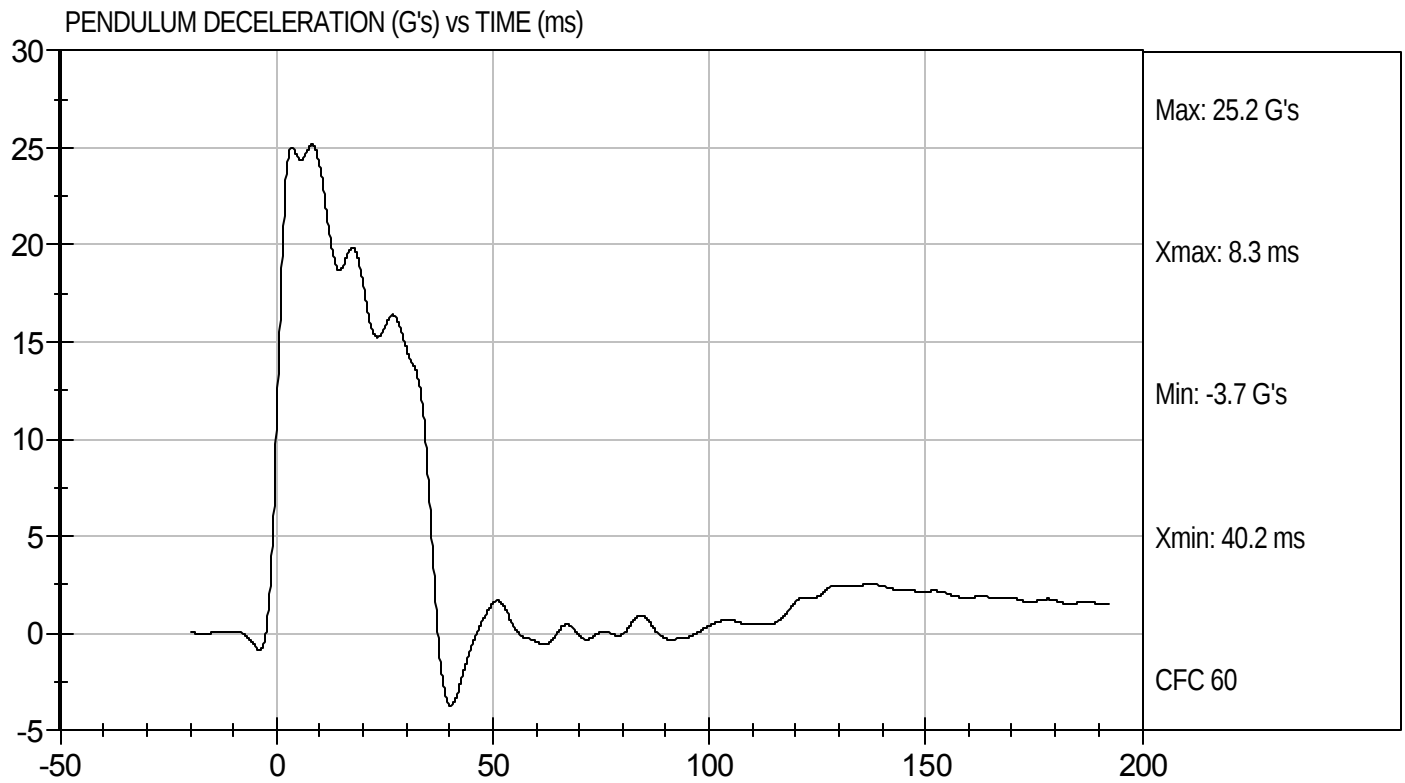
12/8/11
 Test Date


 Approved By



Test Desc: Neck Flexion
Component ID: D114112

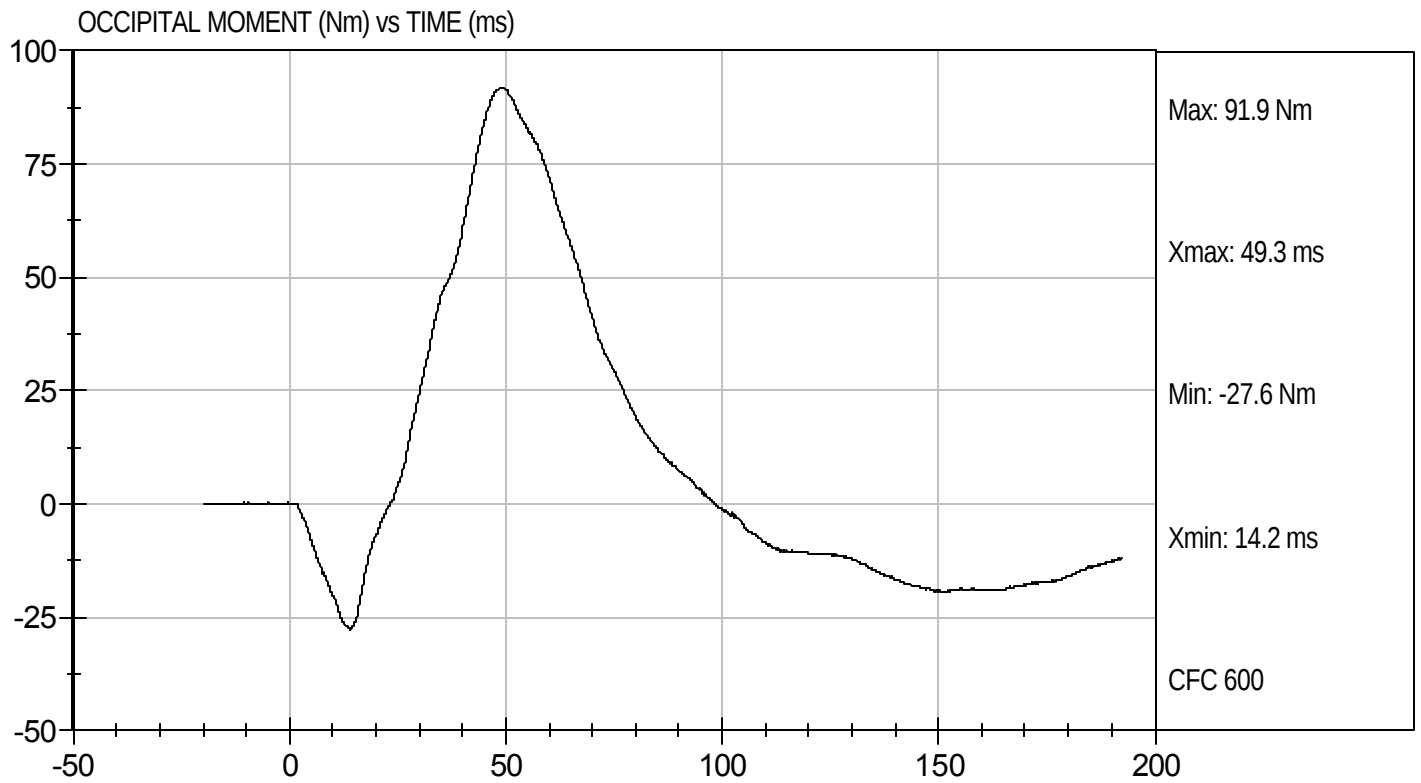
Test Date: 12/8/11
Velocity: 2.83 ft/s, 6.96 m/s





Test Desc: Neck Flexion
Component ID: D114112

Test Date: 12/8/11
Velocity: 22.83 ft/s, 6.96 m/s



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

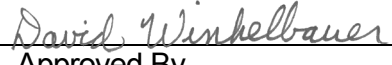
ATD Serial No: 351

Test I.D.: D114113

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity		%	10 to 70	20	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.13	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	18.22	Pass
	20 ms	G's	14.00 to 19.00	16.01	Pass
	30 ms	G's	11.00 to 16.00	12.67	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	12.9	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	38.5	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	96.4	Pass
	Time	ms	72.0 to 82.0	75.9	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	156.6	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-59.9	Pass
	Time	ms	65.0 to 79.0	70.0	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	143.5	Pass
Overall Test Results					Pass


 Laboratory Technician

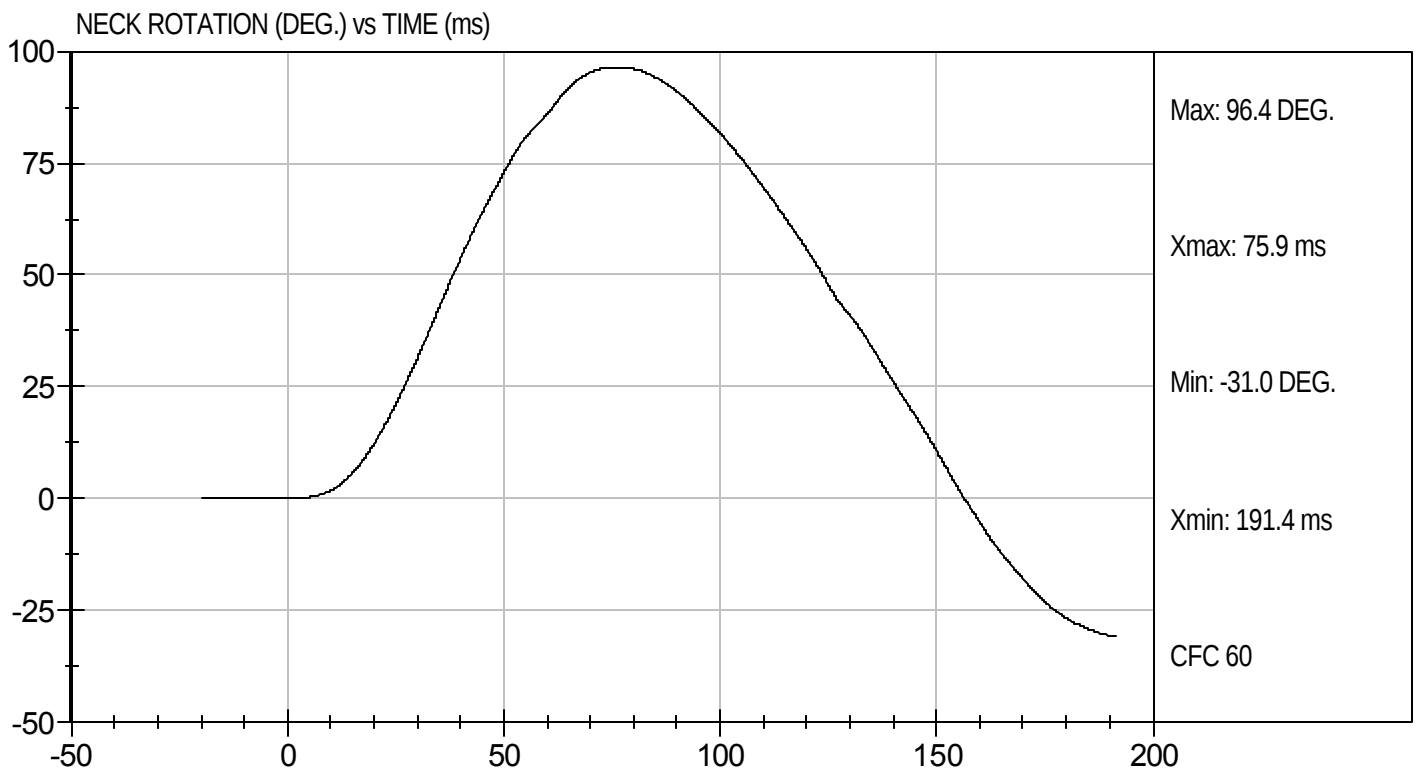
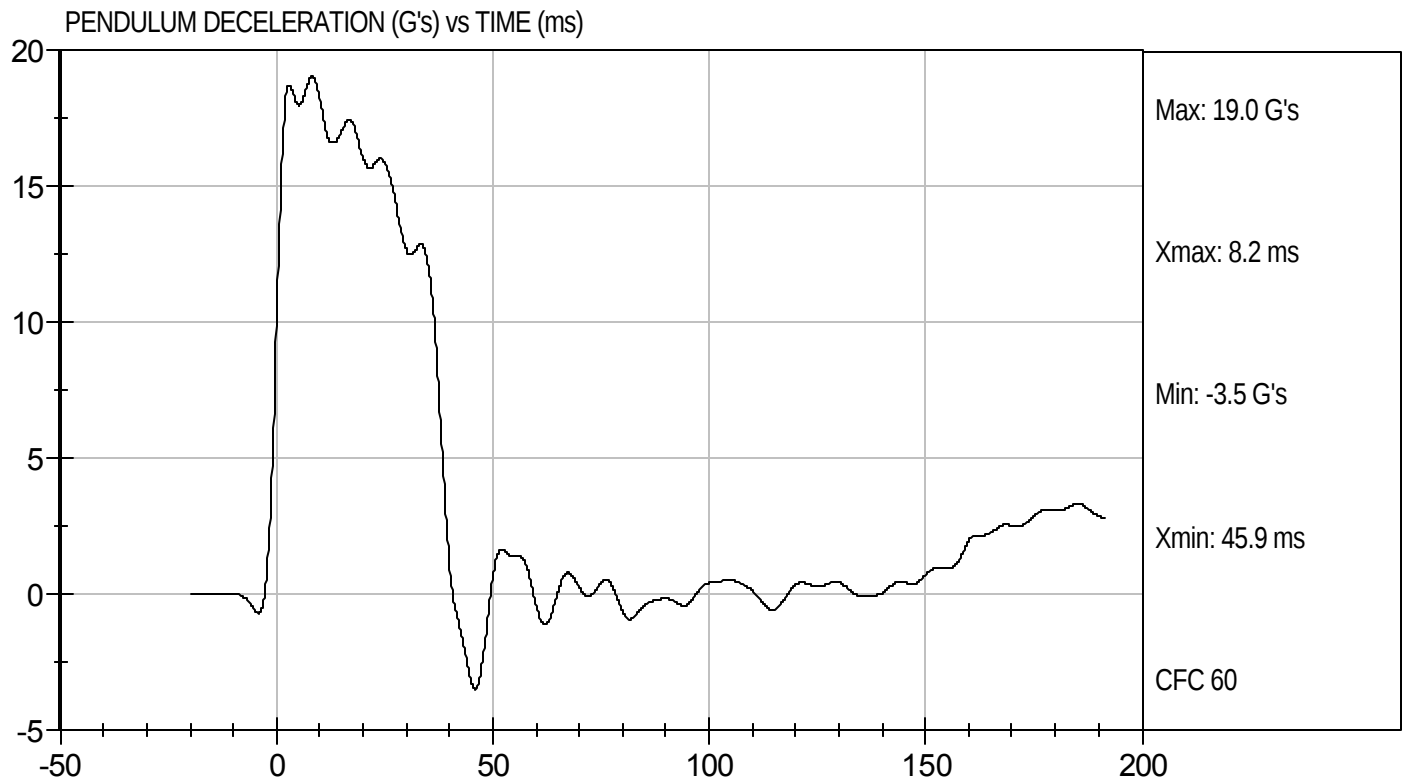
12/8/11
 Test Date


 Approved By



Test Desc: Neck Extension
Component ID: D114113

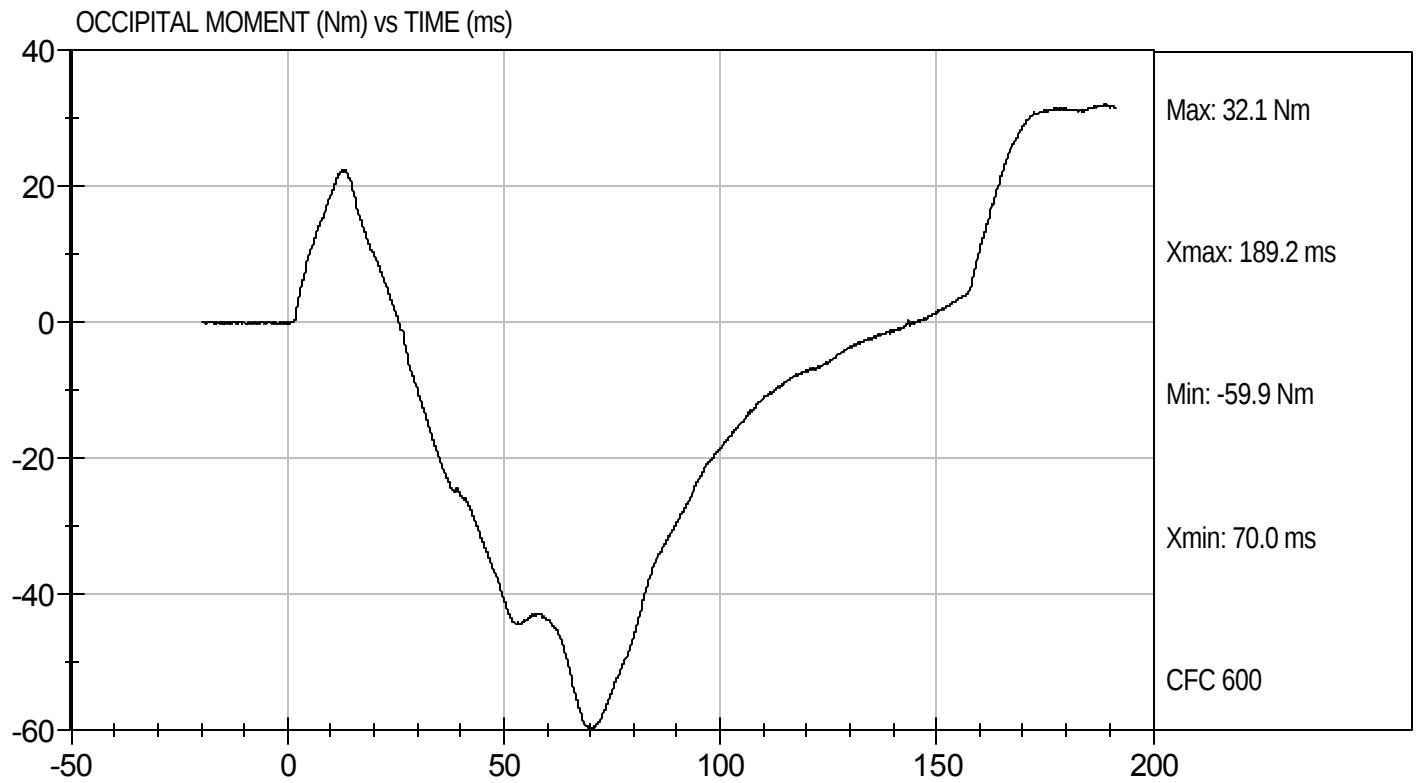
Test Date: 12/8/11
Velocity: 20.10 ft/s, 6.13 m/s





Test Desc: Neck Extension
Component ID: D114113

Test Date: 12/8/11
Velocity: 20.10 ft/s, 6.13 m/s



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351

Test I.D: D114114

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	19	Pass
Probe Velocity	m/s	6.58 to 6.82	6.77	Pass
Peak Probe Force	N	5159 to 5893	5,192	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.53	Pass
Internal Hysteresis	%	69 to 85	72	Pass
			Overall Test Results	Pass


Laboratory Technician

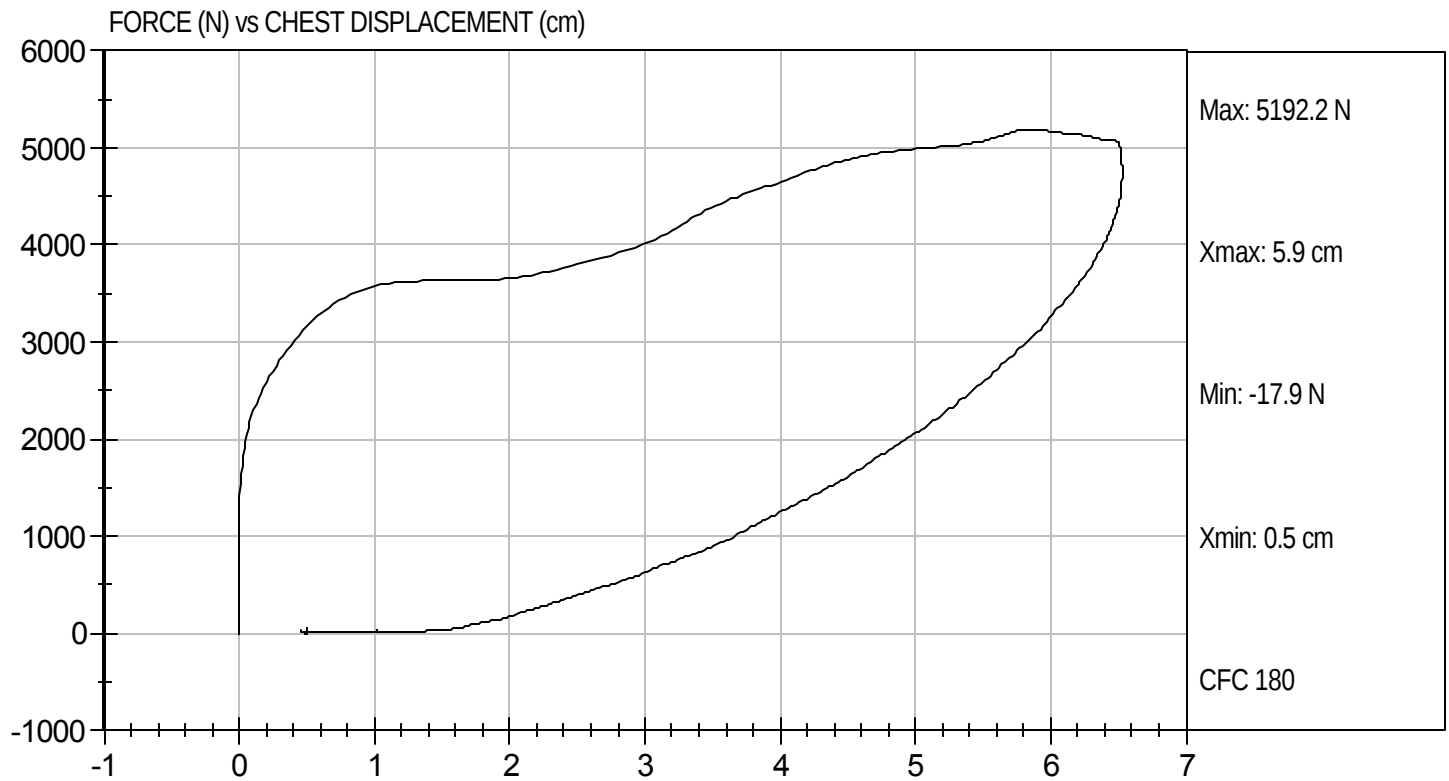
12/7/11
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D114114

Test Date: 12/7/11
Velocity: 22.22 ft/s, 6.77 m/s

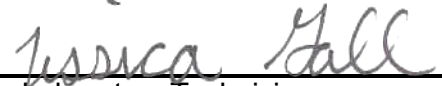


MGA RESEARCH CORPORATION
RIGHT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351

Test I.D: D114115

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	Newtons	4715 to 5782	5,214	Pass
Overall Test Results				Pass



Laboratory Technician

12/8/11
Test Date

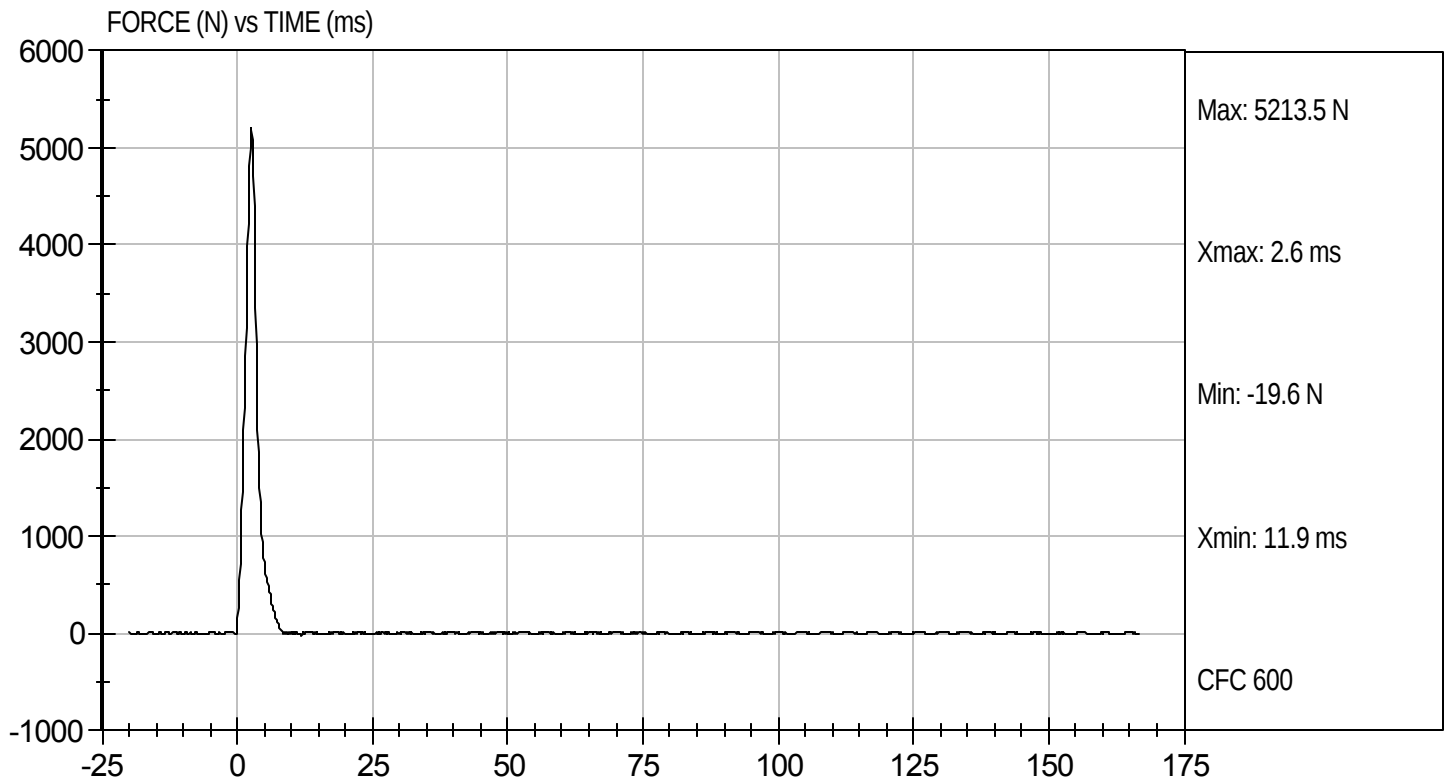


Approved By



Test Desc: Right Knee
Component ID: D114115

Test Date: 12/8/11
Velocity: 6.97 ft/s, 2.12 m/s

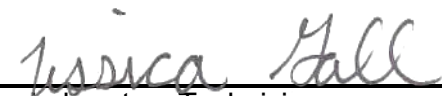


MGA RESEARCH CORPORATION
LEFT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

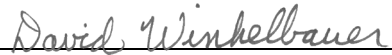
ATD Serial No: 351

Test I.D: D114116

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	Newtons	4715 to 5782	4,744	Pass
Overall Test Results				Pass


Laboratory Technician

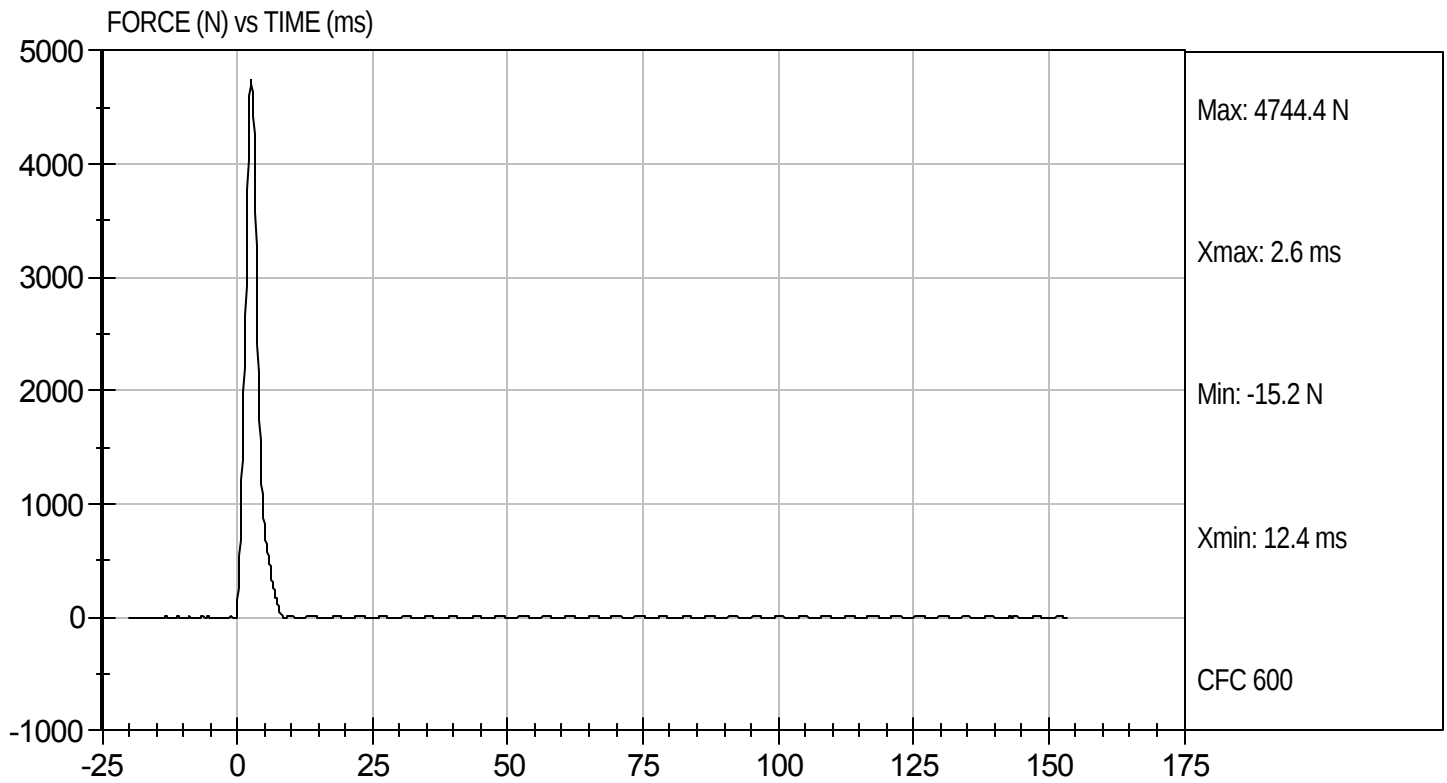
12/8/11
Test Date


Approved By



Test Desc: Left Knee
Component ID: D114116

Test Date: 12/8/11
Velocity: 6.97 ft/s, 2.12 m/s



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

ATD Serial No: 351

Test I.D: D114110

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.0	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	20	20	Pass
Rotation Rate	deg/s	5.0 -10.0	5.7	5.7	Pass
30 Degrees	Nm	94.9 Nm Max	61.5	61.9	Pass
150 ft-lbf / 203.4 Nm	Deg	40.0 - 50.0 Degree Max Rotation	42.7	42.0	Pass
Overall Test Results					Pass


 Laboratory Technician

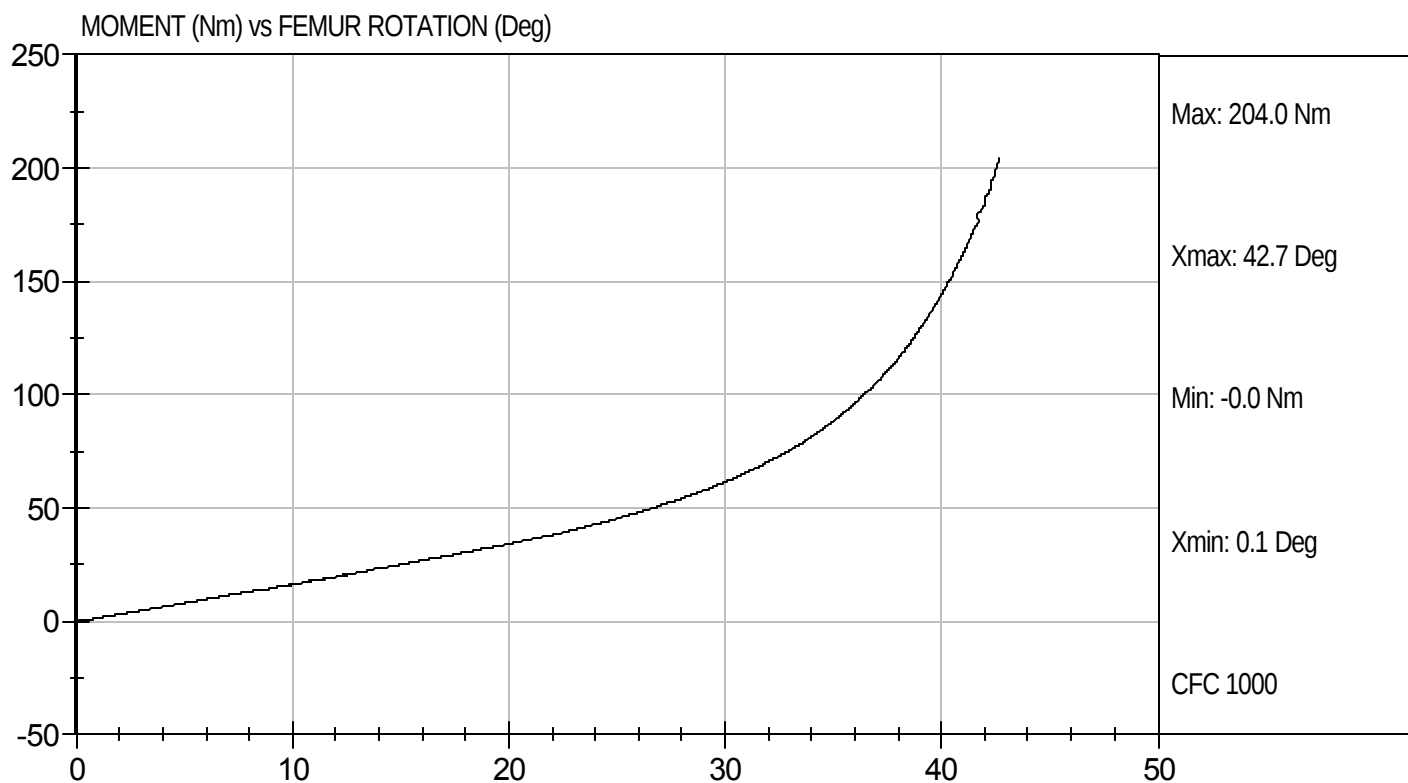
12/8/11
 Test Date


 Approved By



Test Desc: Hip Femur Flexion
Component ID: D114119

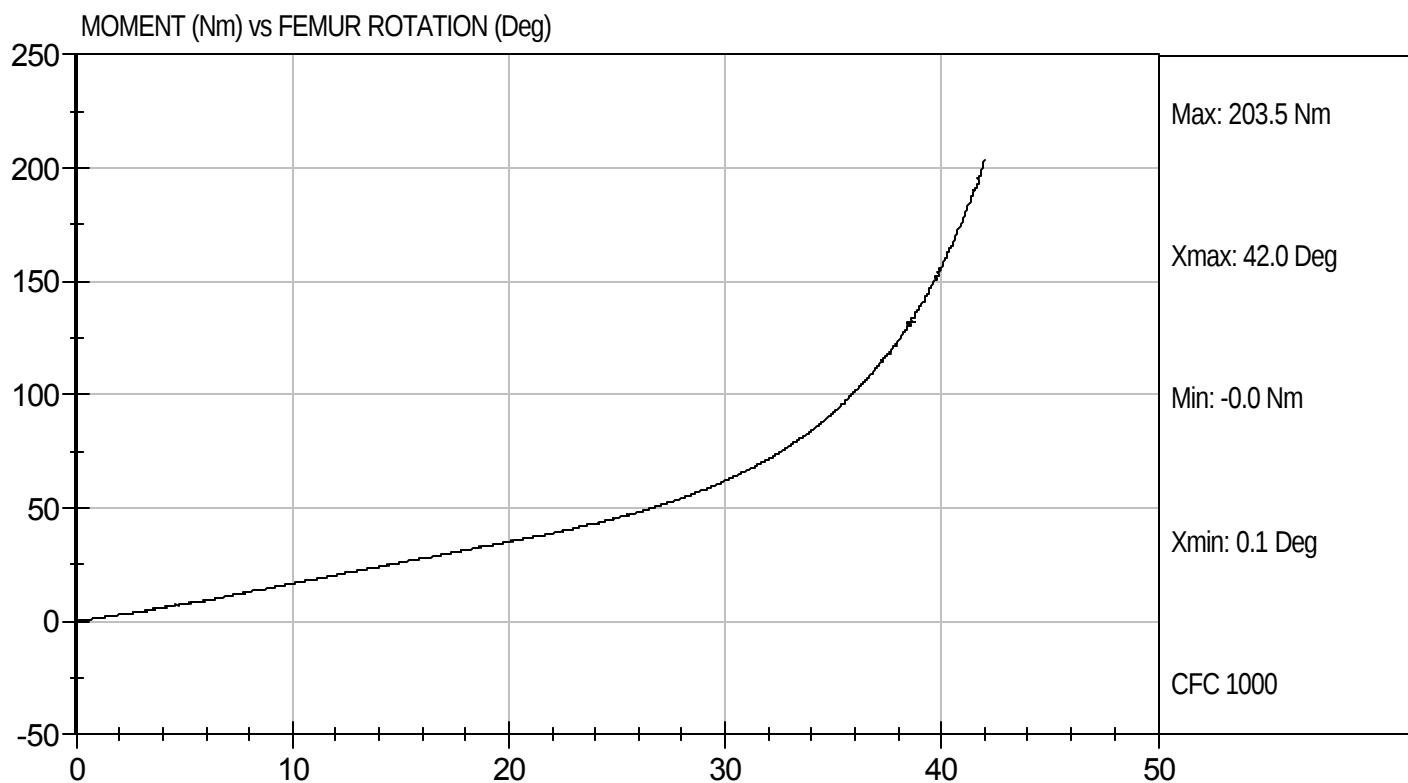
Test Date: 12/8/11
Velocity: 0 ft/s, 0.00 m/s





Test Desc: Hip Femur Flexion
Component ID: D114110

Test Date: 12/8/11
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: D113901

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Peak Resultant Acceleration	G's	250 to 300	280	Pass
Peak Lateral Acceleration	G's	+/- 15	-4.1	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

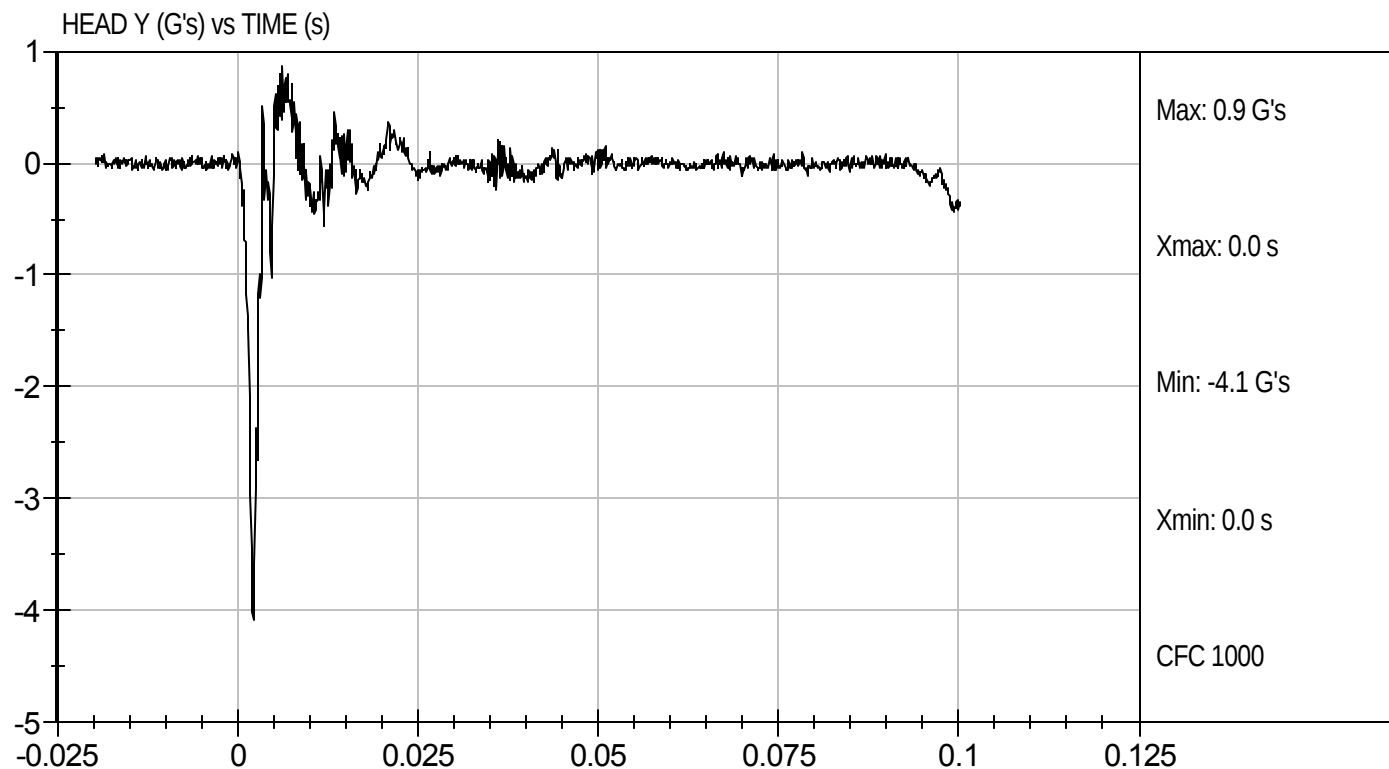
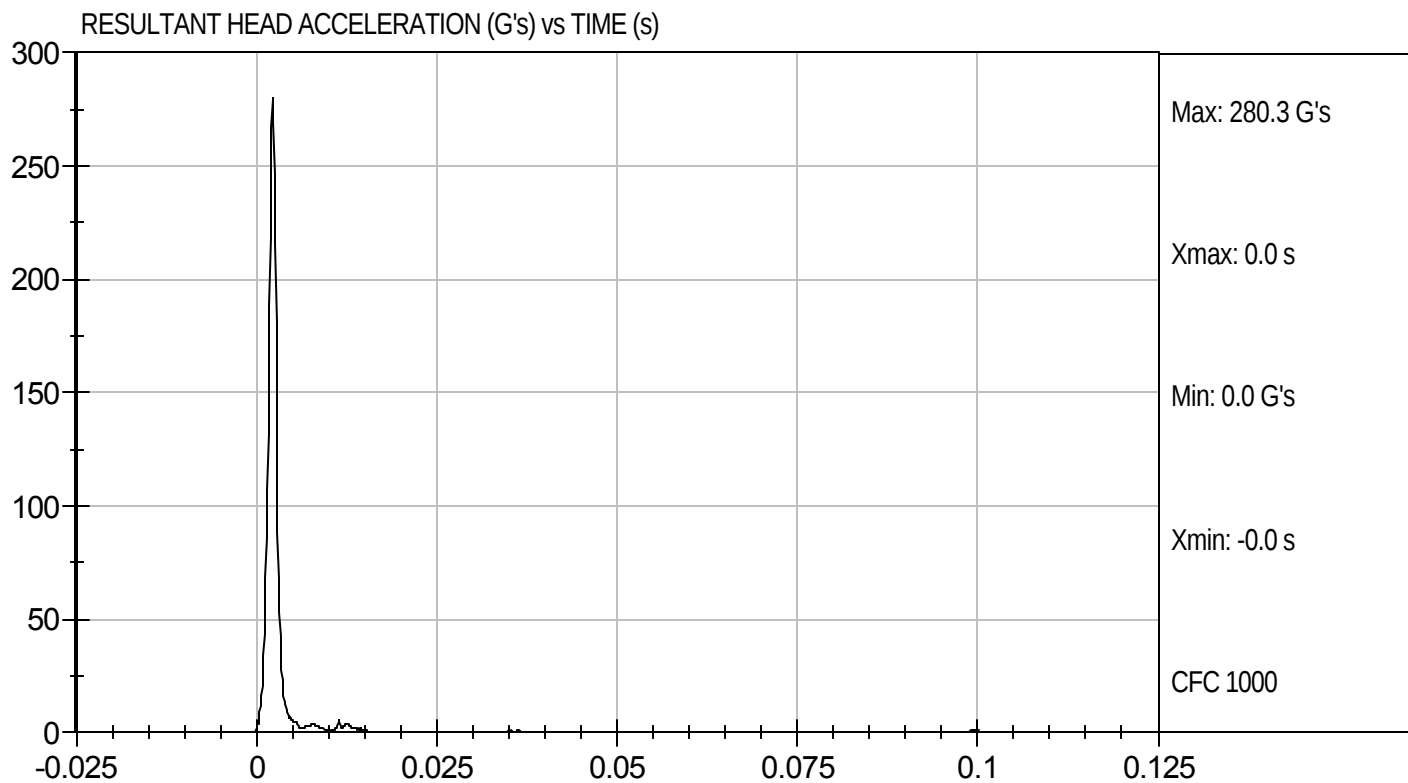
11/22/11
Test Date

David Winkelbauer
Approved By



Test Desc: Head Drop
Component ID: D113901

Test Date: 11/22/11
Velocity: 0 ft/s, 0 m/s



MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test I.D: D113902

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Speed		m/s	6.89 to 7.13	7.05	Pass
Pendulum Pulse	10 ms	m/s	2.1 to 2.5	2.3	Pass
	20 ms	m/s	4.0 to 5.0	4.4	Pass
	30 ms	m/s	5.8 to 7.0	6.0	Pass
D Plane Rotation	Max	deg	77 to 91	82	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	69 to 83	71	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	88	Pass
Overall Results				Pass	

Jessica Hall
Laboratory Technician

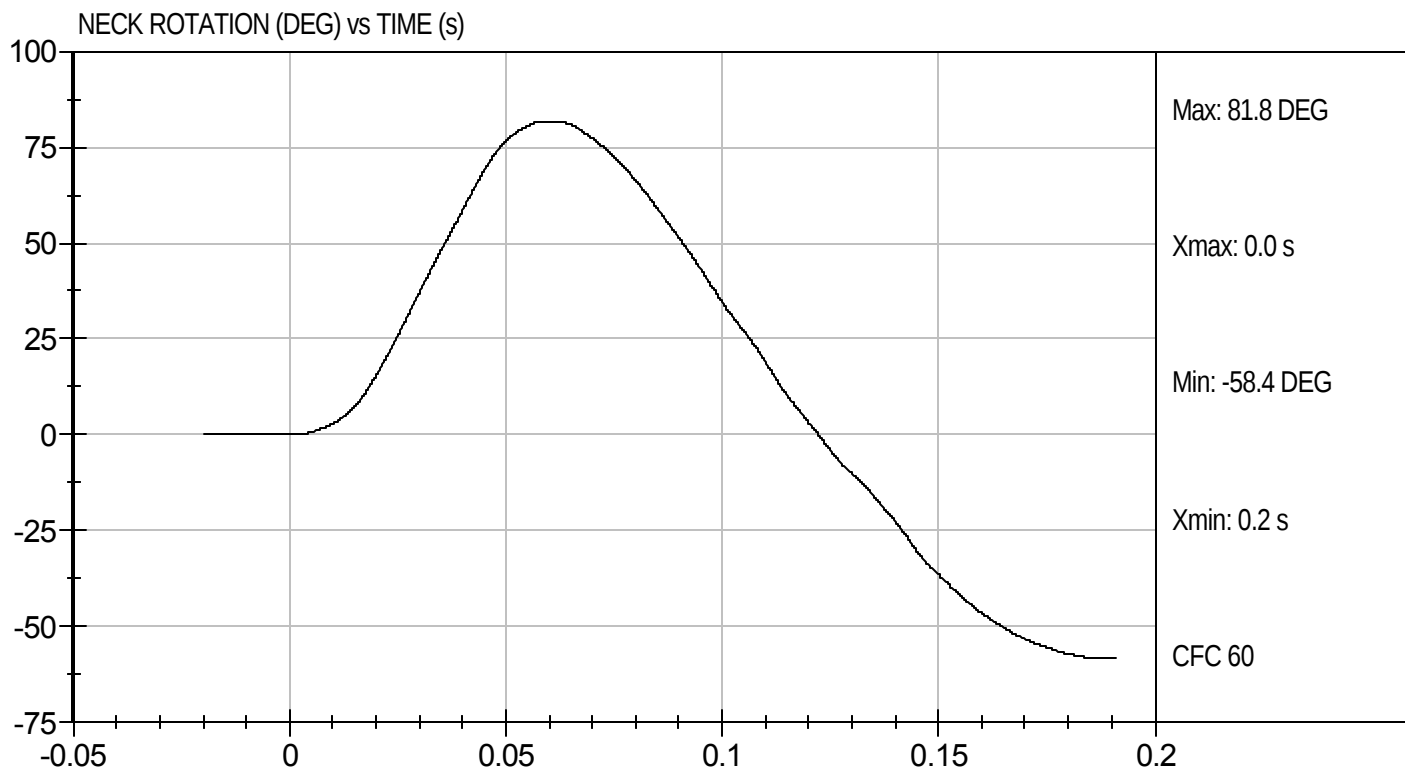
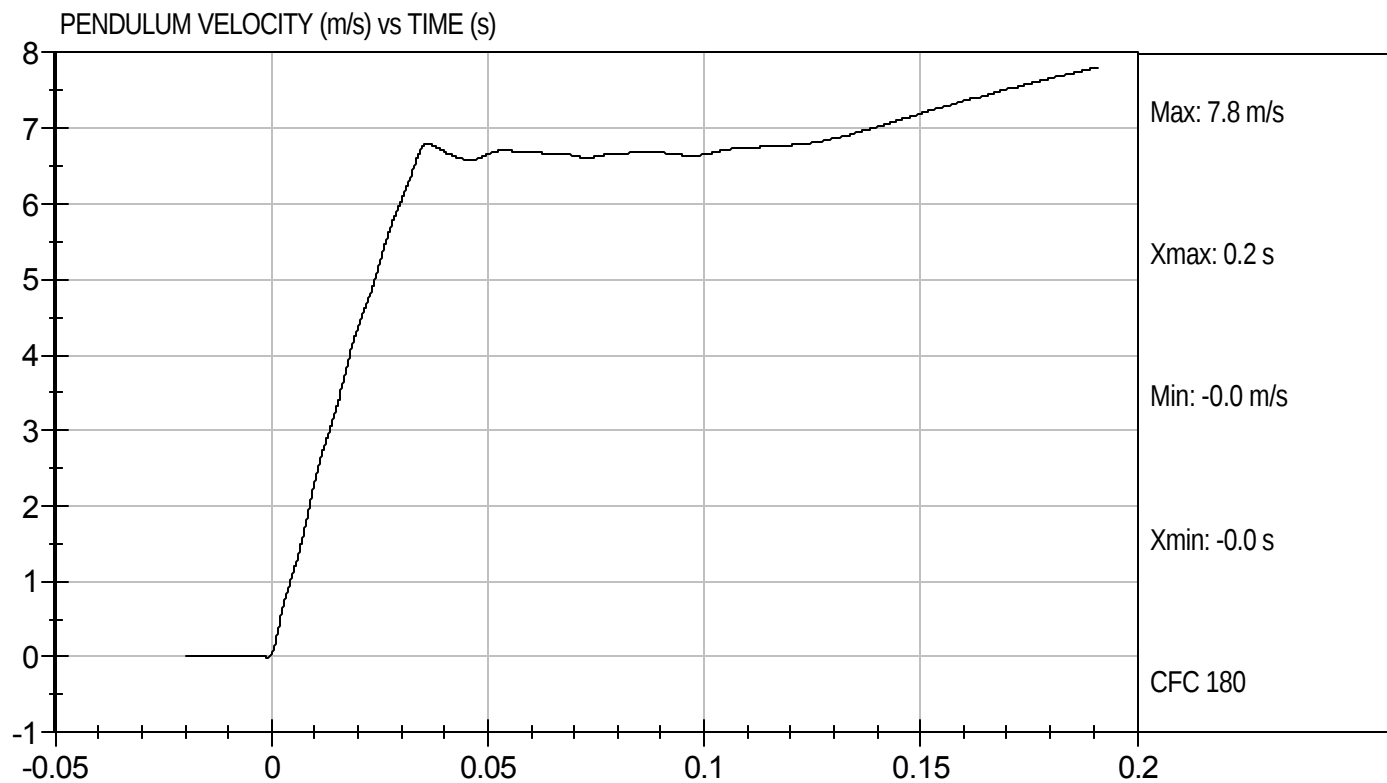
11/22/11
Test Date

David Winkelbauer
Approved By



Test Desc: Neck Flexion
Component ID: D113902

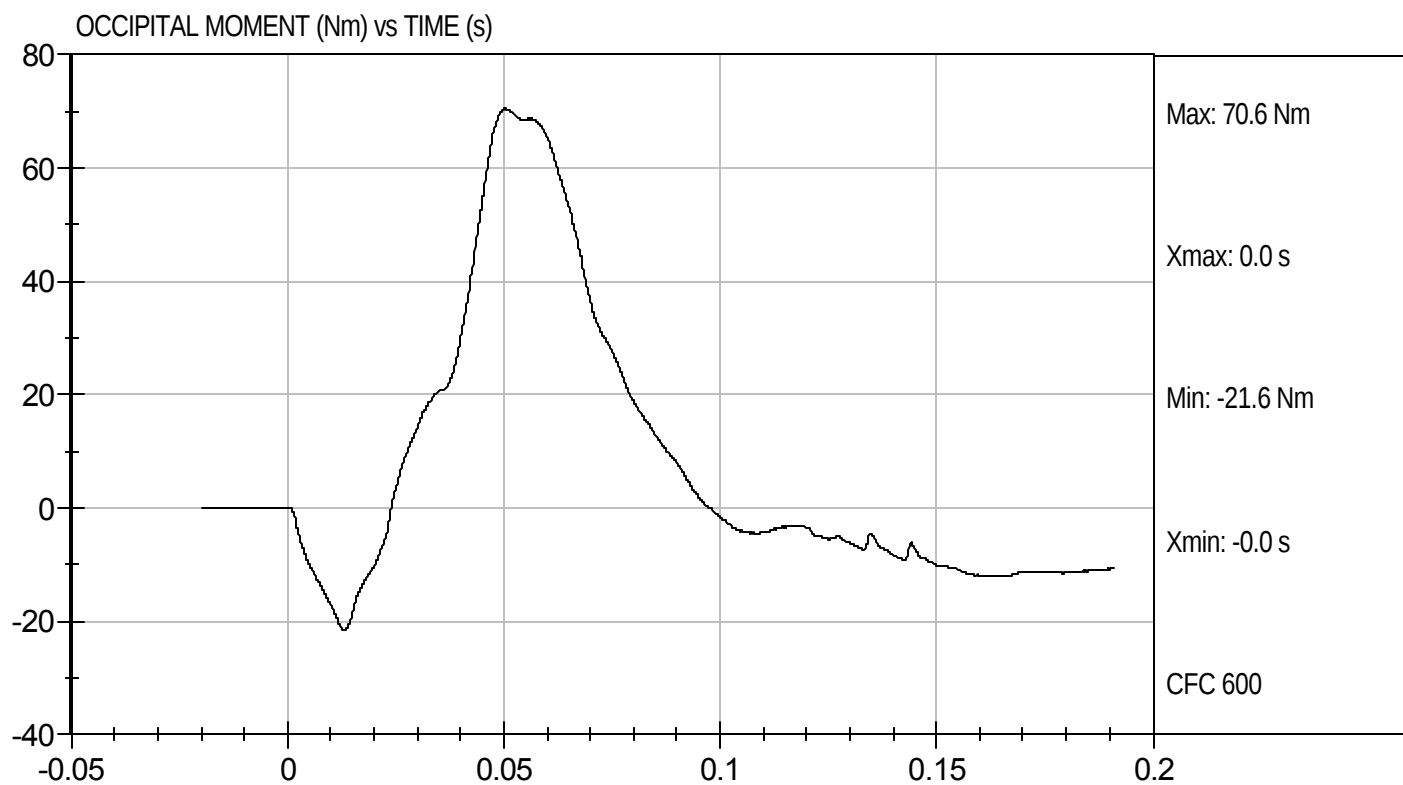
Test Date: 11/22/11
Velocity: 23.14 ft/s, 7.05 m/s





Test Desc: Neck Flexion
Component ID: D113902

Test Date: 11/22/11
Velocity: 23.14 ft/s, 7.05 m/s

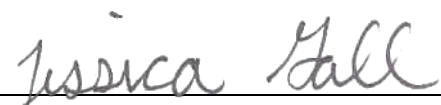


MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test I.D: D113903

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.12	Pass
Pendulum Pulse	10 ms	m/s	1.5 to 1.9	1.8	Pass
	20 ms	m/s	3.1 to 3.9	3.6	Pass
	30 ms	m/s	4.6 to 5.6	5.1	Pass
D Plane Rotation	Max	deg	99 to 114	111	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	-65 to -53	-55	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	103	Pass
Overall Results					Pass


 Laboratory Technician

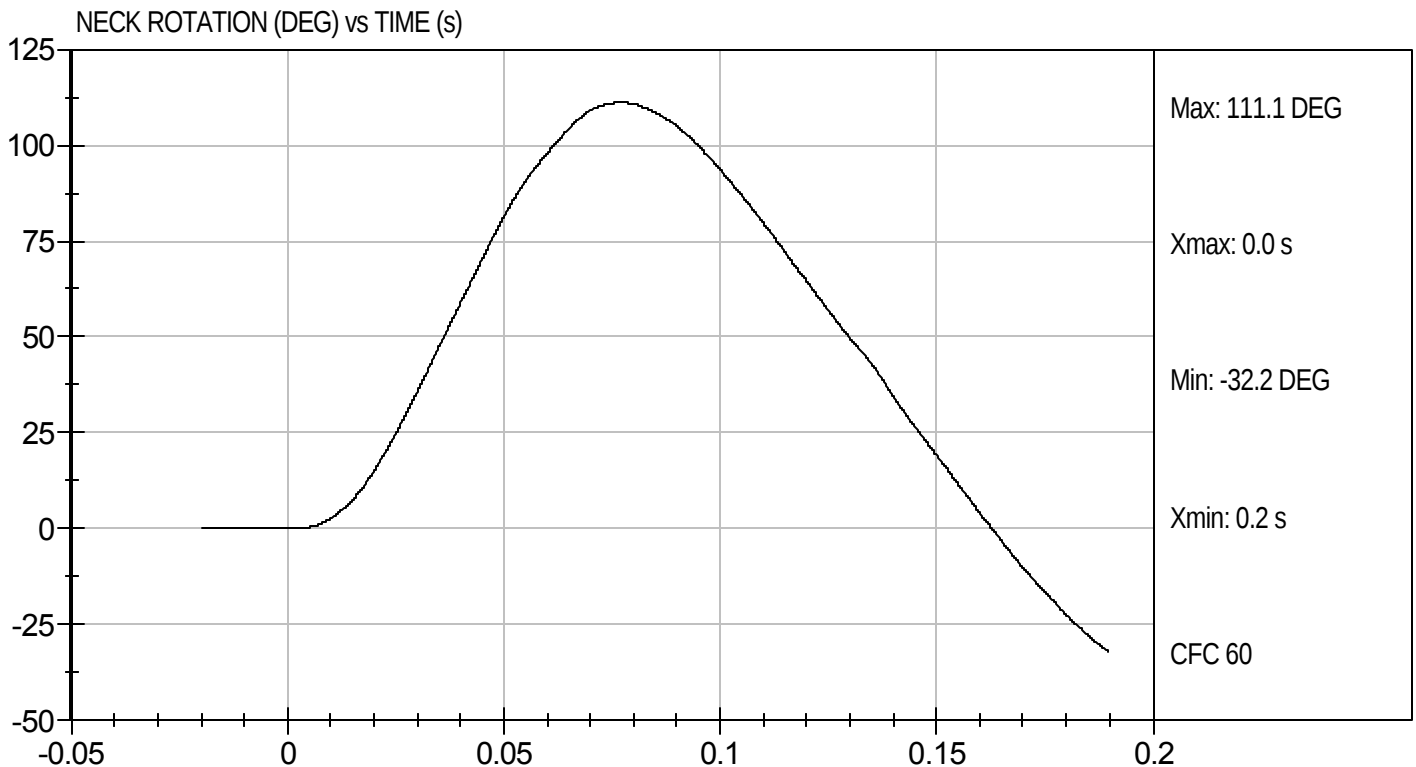
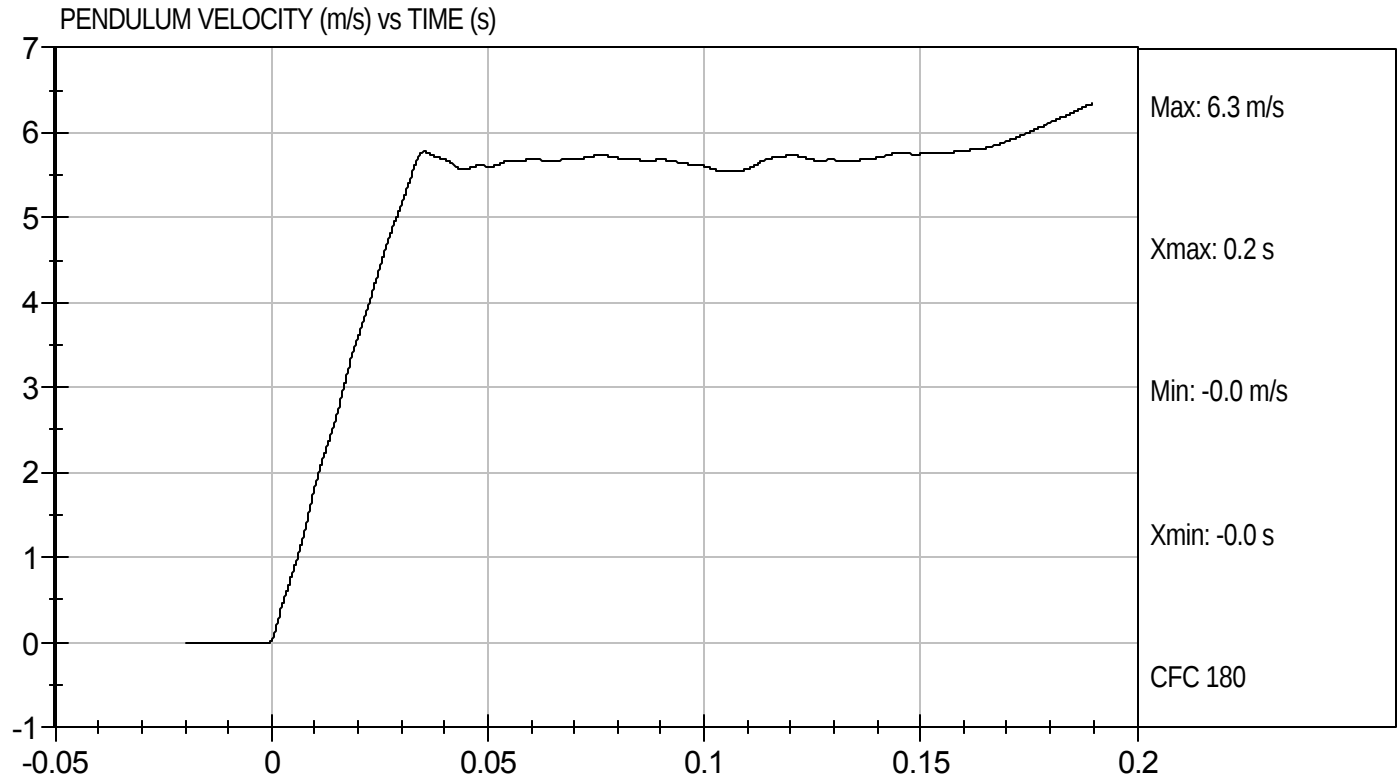
11/22/11
 Test Date


 Approved By



Test Desc: Neck Extension
Component ID: D113903

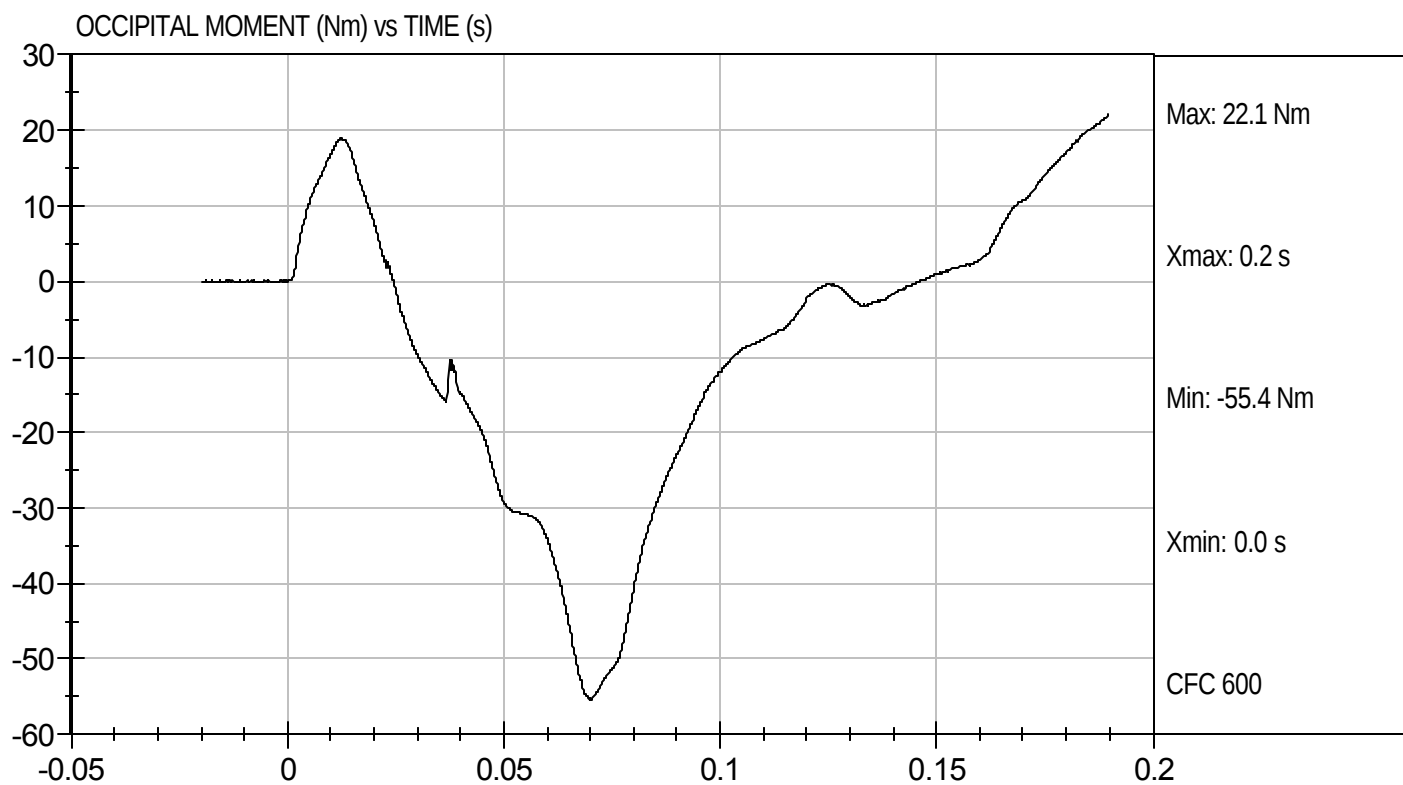
Test Date: 11/22/11
Velocity: 20.08 ft/s, 6.12 m/s





Test Desc: Neck Extension
Component ID: D113903

Test Date: 11/22/11
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: D113904

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.5	Pass
Relative Humidity	%	10 to 70	29	Pass
Probe Speed	m/s	6.59 to 6.83	6.77	Pass
Peak Deflection	mm	50 to 58	54	Pass
Peak Resistive Force w/in Deflection Corridor	kN	3.9 to 4.4	4.1	Pass
Internal Hysteresis	%	69 to 85	69	Pass
Peak Force 18 mm - 50 mm	N	<= 4,600 N	4101	Pass
Overall Test Results				Pass


Laboratory Technician

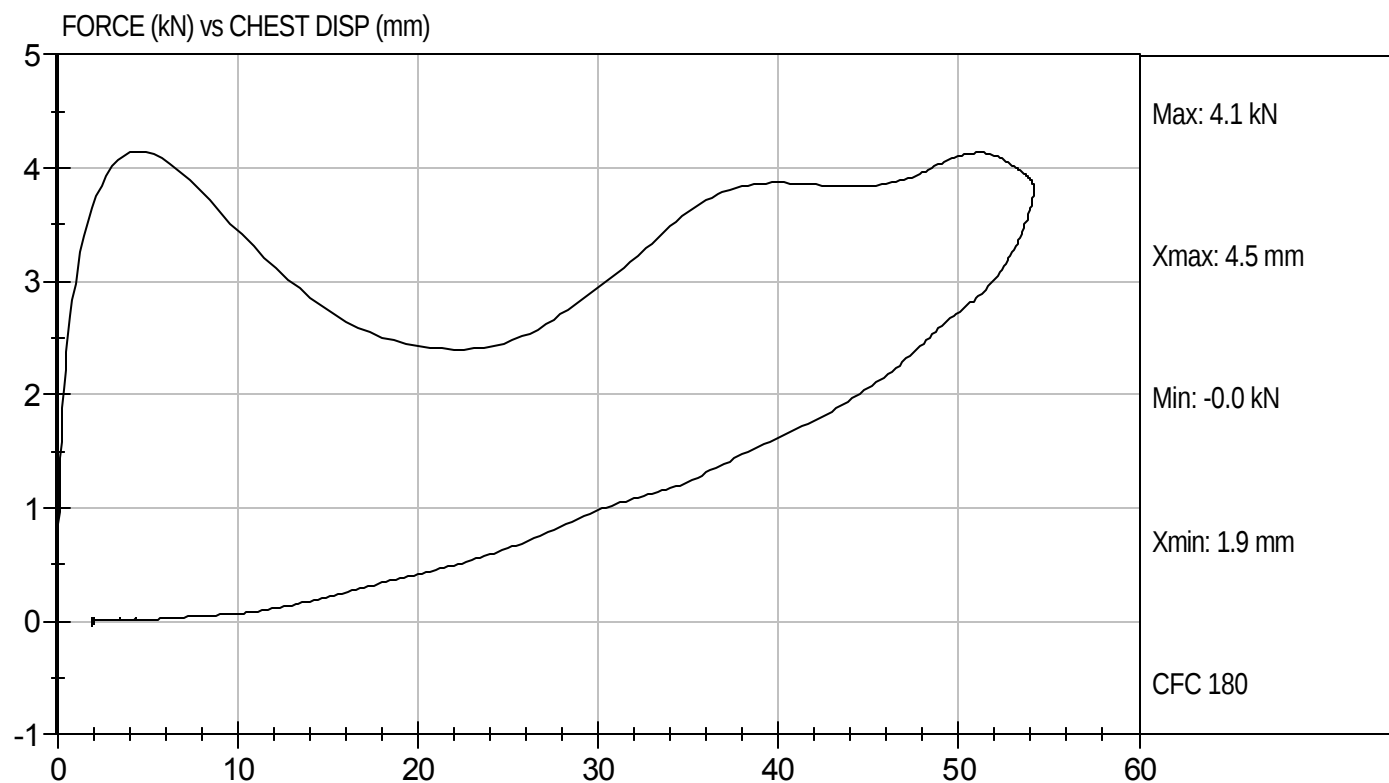
11/22/11
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D113904

Test Date: 11/22/11
Velocity: 22.2 ft/s, 6.77 m/s

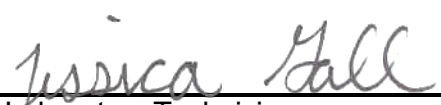


MGA RESEARCH CORPORATION
RIGHT KNEE IMPACT TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test I.D: D113905

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	29	Pass
Probe Speed	m/s	2.07 to 2.13	2.09	Pass
Maximum Force	kN	3.45 to 4.06	3.96	Pass
Overall Test Results				Pass



Laboratory Technician

11/22/11
Test Date

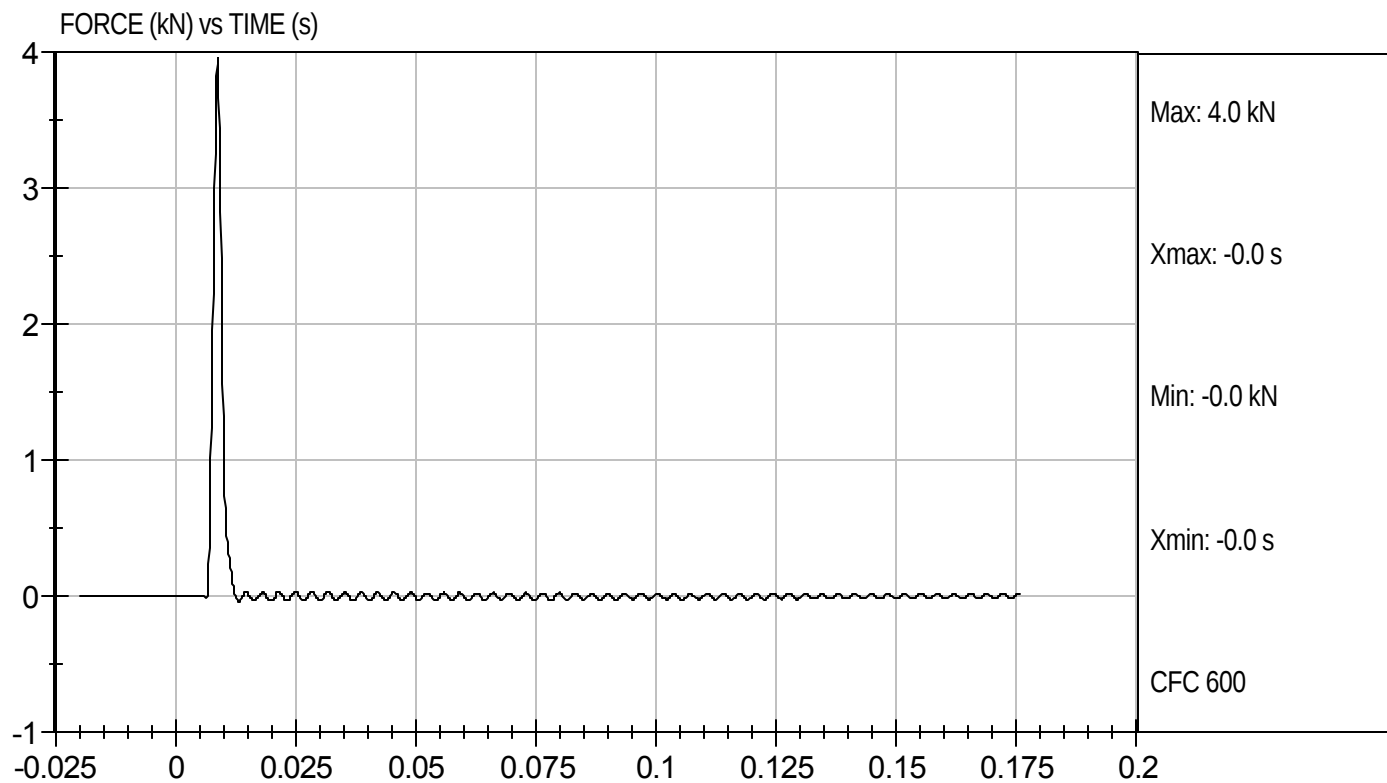


Approved By



Test Desc: Right Knee
Component ID: D113905

Test Date: 11/22/11
Velocity: 6.85 ft/s, 2.09 m/s



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test I.D: D113906

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	29	Pass
Probe Speed	m/s	2.07 to 2.13	2.09	Pass
Maximum Force	kN	3.45 to 4.06	4.02	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

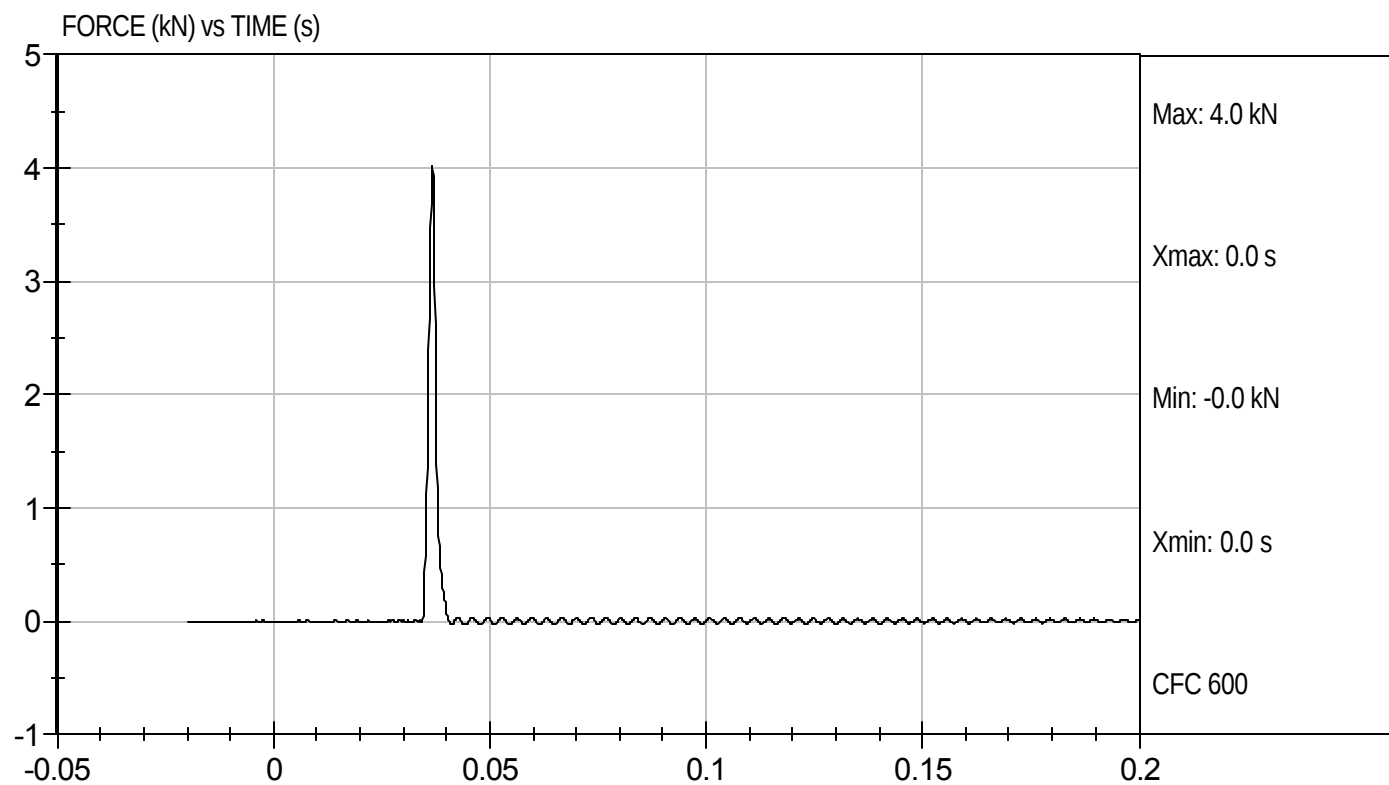
11/22/11
Test Date

David Winkelbauer
Approved By



Test Desc: Left Knee
Component ID: D113906

Test Date: 11/22/11
Velocity: 6.85 ft/s, 2.09 m/s



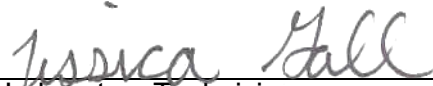
MGA RESEARCH CORPORATION

TORSO FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634Test I.D: D113907

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	22.0	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Initial Angle	deg	0 to 20	16	Pass
Return Angle	deg	+/- 8	7	Pass
Force at 45 deg	N	320 to 390	346	Pass
Upper Torso Deflection Rate	Deg/sec	0.5 to 1.5	1.0	Pass
Overall Result				Pass


Laboratory Technician

11/22/11
Test Date


Approved By

MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test ID: D114121

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	20	Pass
Peak Resultant Acceleration	G's	250 to 300	273	Pass
Peak Lateral Acceleration	G's	+/- 15	6.8	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

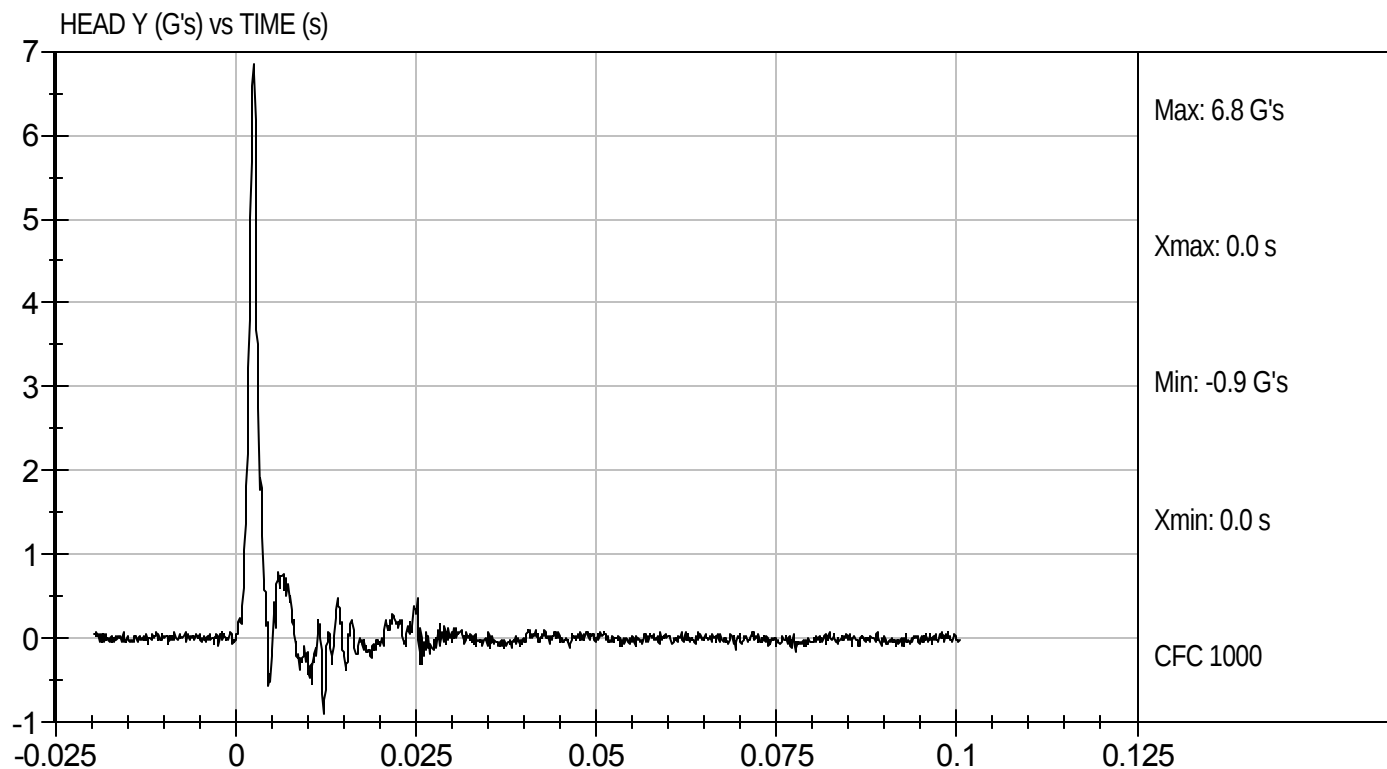
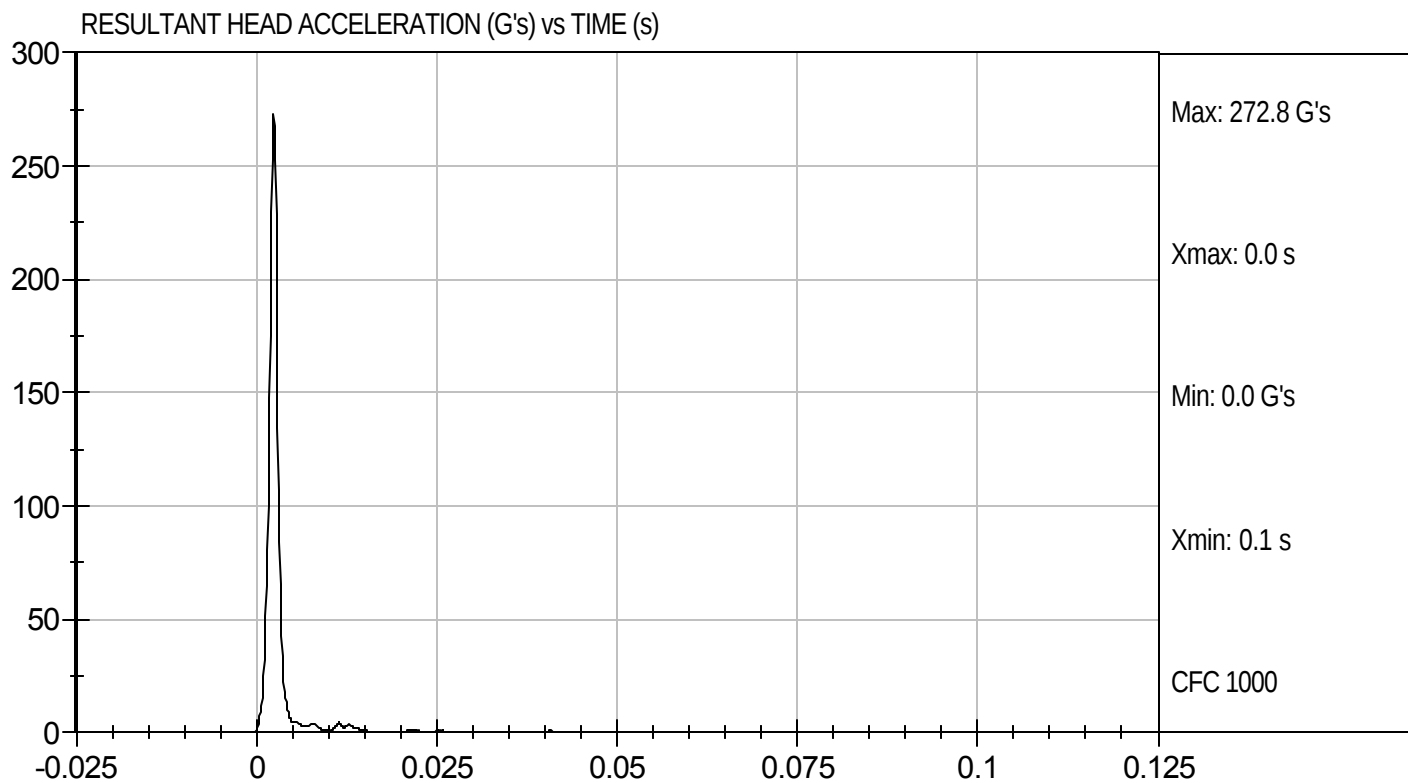
12/8/11
Test Date

David Winkelbauer
Approved By



Test Desc: Head Drop
Component ID: D114121

Test Date: 12/8/11
Velocity: 0 ft/s, 0 m/s



MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 5TH PERCENTILE

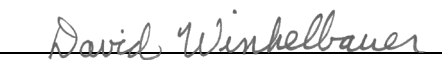
ATD Serial No: 634

Test I.D: D114122

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.9	Pass
Laboratory Relative Humidity		%	10 to 70	18	Pass
Pendulum Speed		m/s	6.89 to 7.13	7.06	Pass
Pendulum Pulse	10 ms	m/s	2.1 to 2.5	2.4	Pass
	20 ms	m/s	4.0 to 5.0	4.4	Pass
	30 ms	m/s	5.8 to 7.0	6.0	Pass
D Plane Rotation	Max	deg	77 to 91	78	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	


 Laboratory Technician

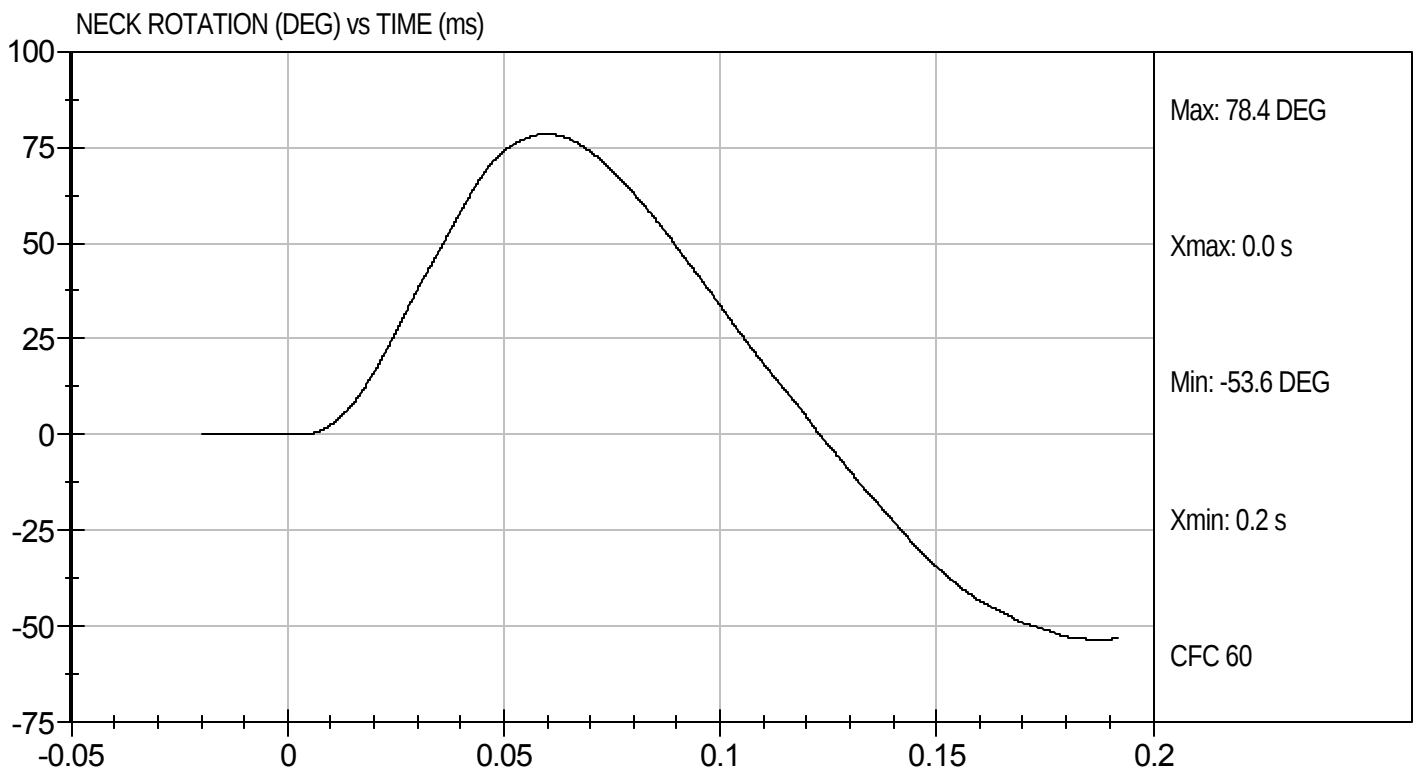
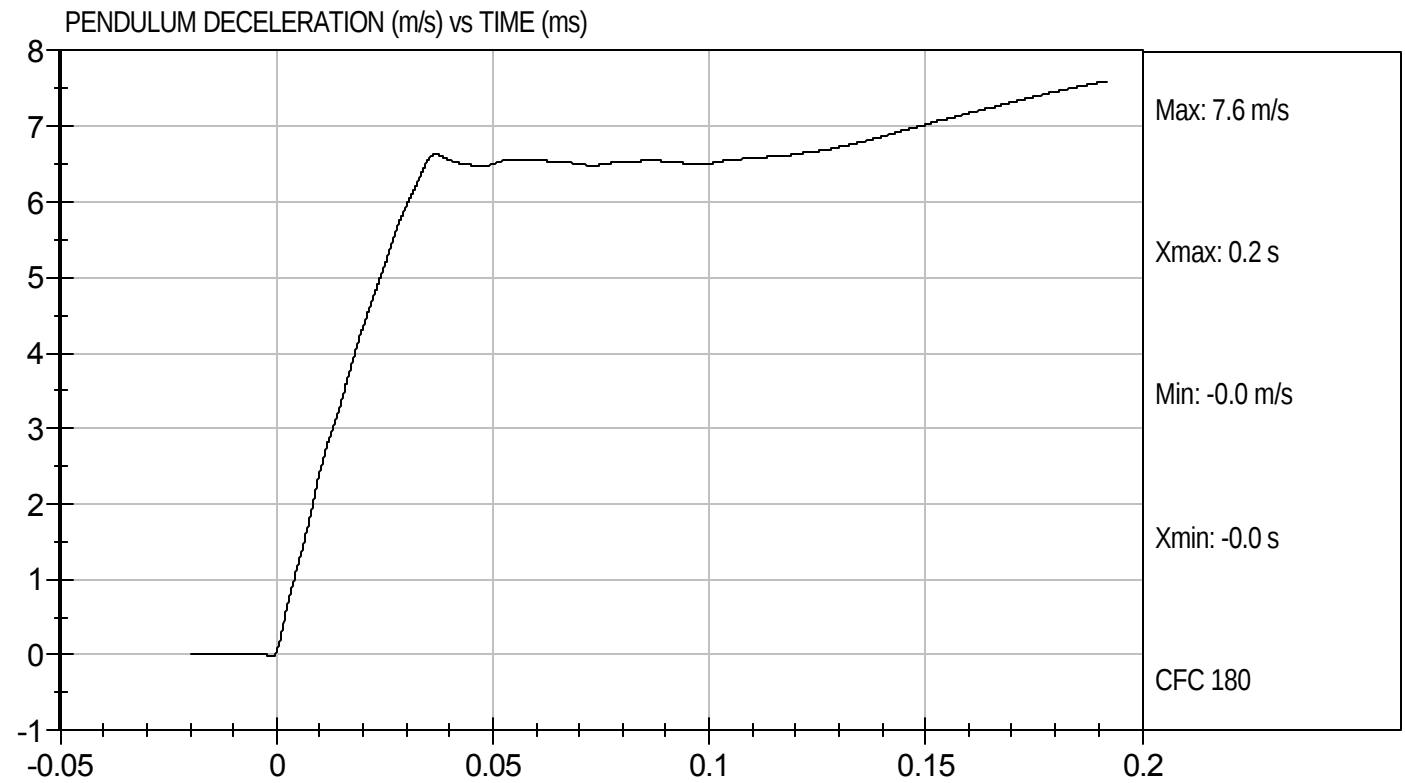
12/8/11
 Test Date


 Approved By



Test Desc: Neck Flexion
Component ID: D114122

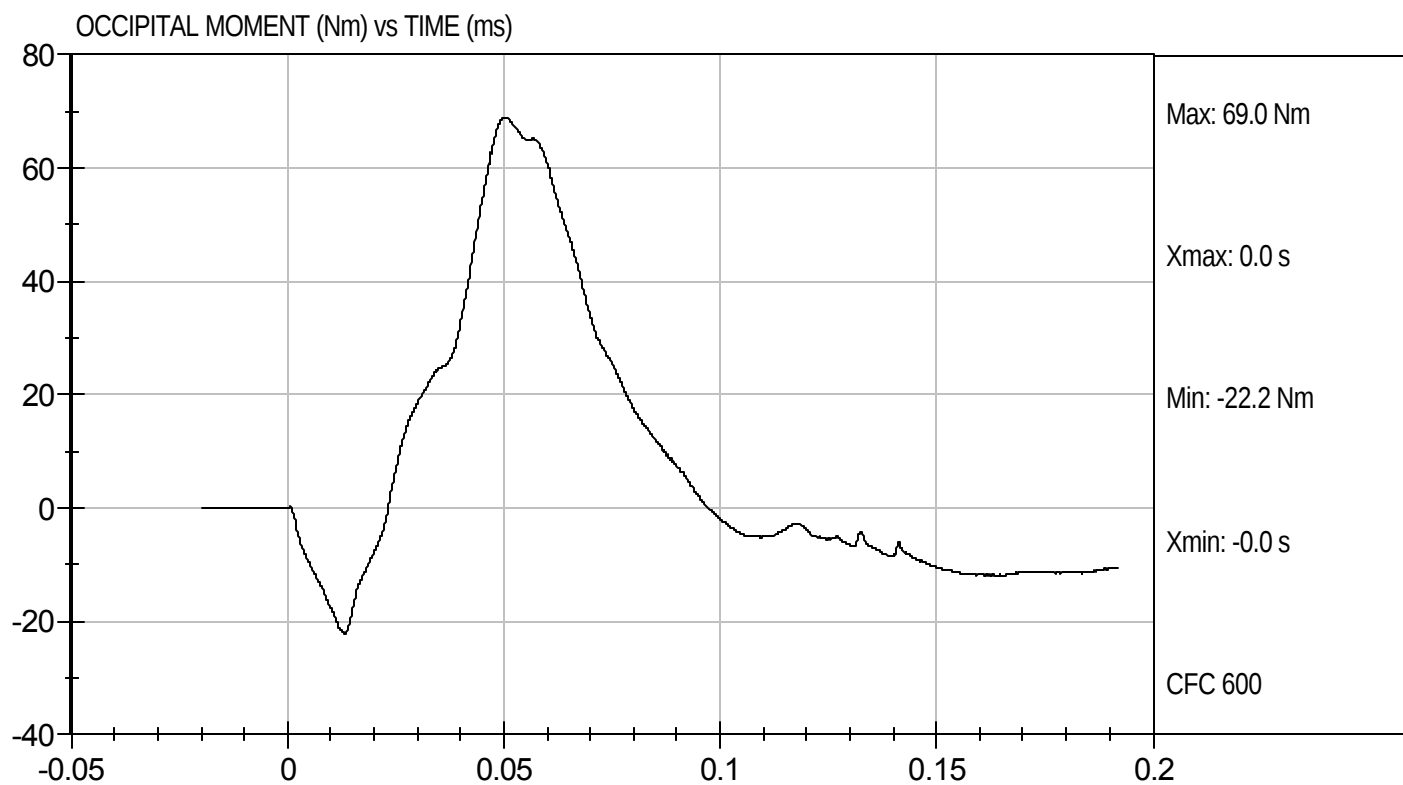
Test Date: 12/8/11
Velocity: 23.15 ft/s, 7.06 m/s





Test Desc: Neck Flexion
Component ID: D114122

Test Date: 12/8/11
Velocity: 23.15 ft/s, 7.06 m/s



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634Test I.D: D114123

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity		%	10 to 70	18	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.16	Pass
Pendulum Pulse	10 ms	m/s	1.5 to 1.9	1.9	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	106	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	-65 to -53	-55	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	102	Pass
Overall Results					Pass

Jessica Hall
Laboratory Technician

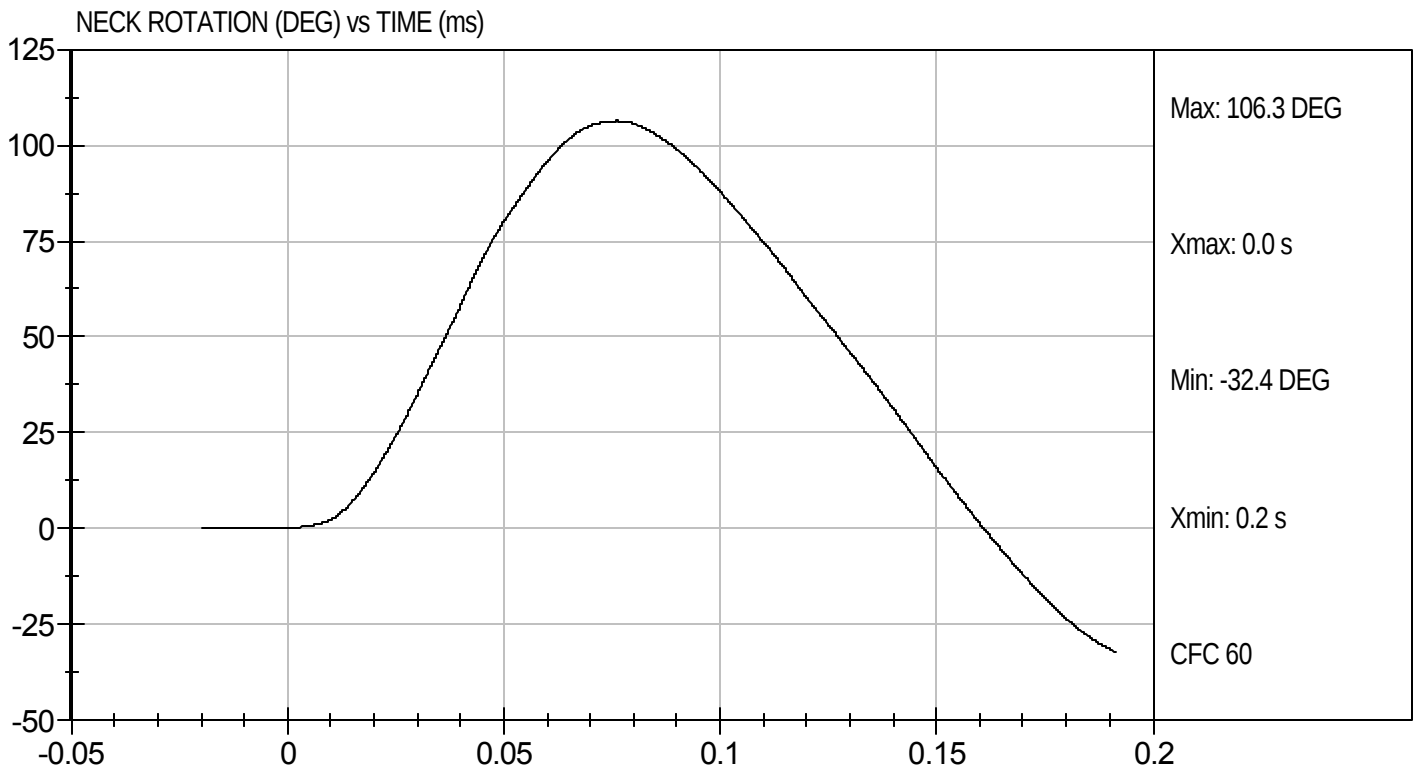
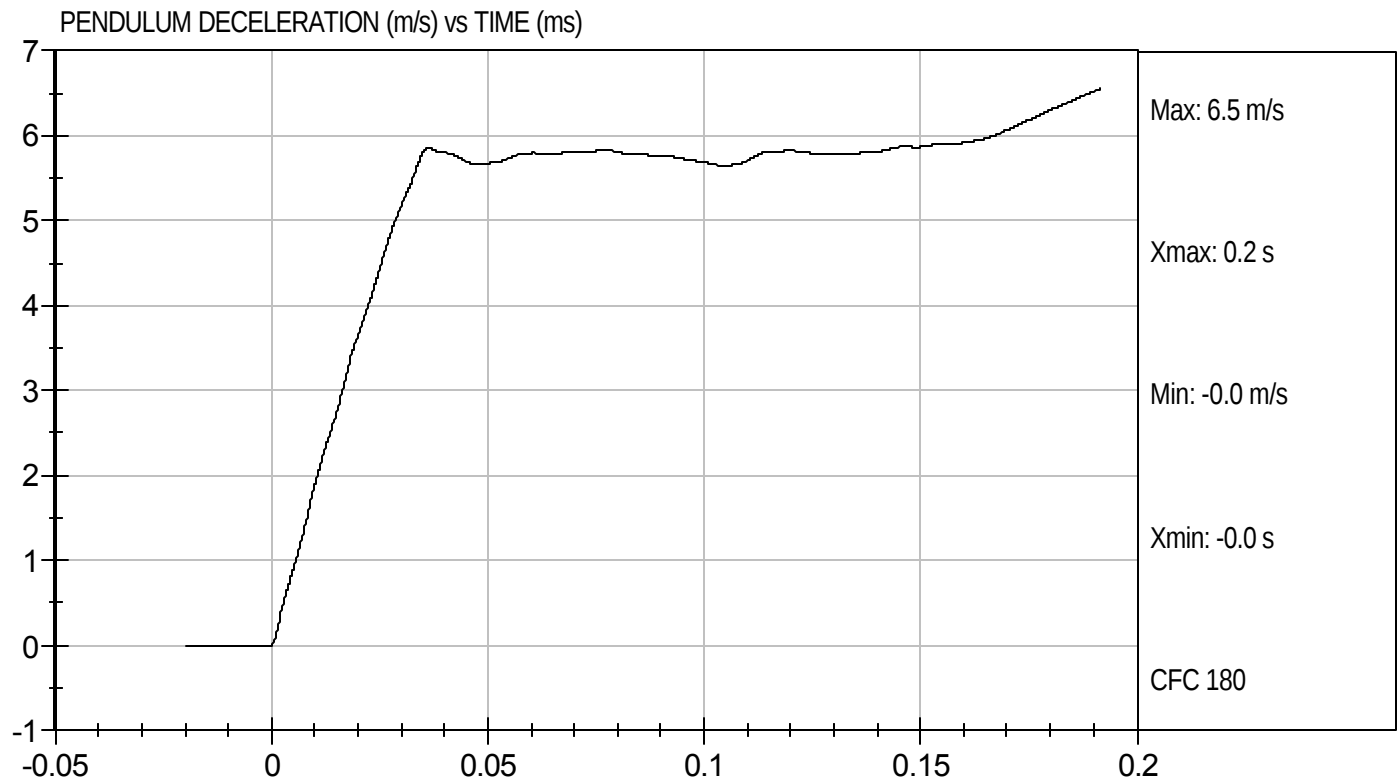
12/8/11
Test Date

David Winkelbauer
Approved By



Test Desc: Neck Extension
Component ID: D114123

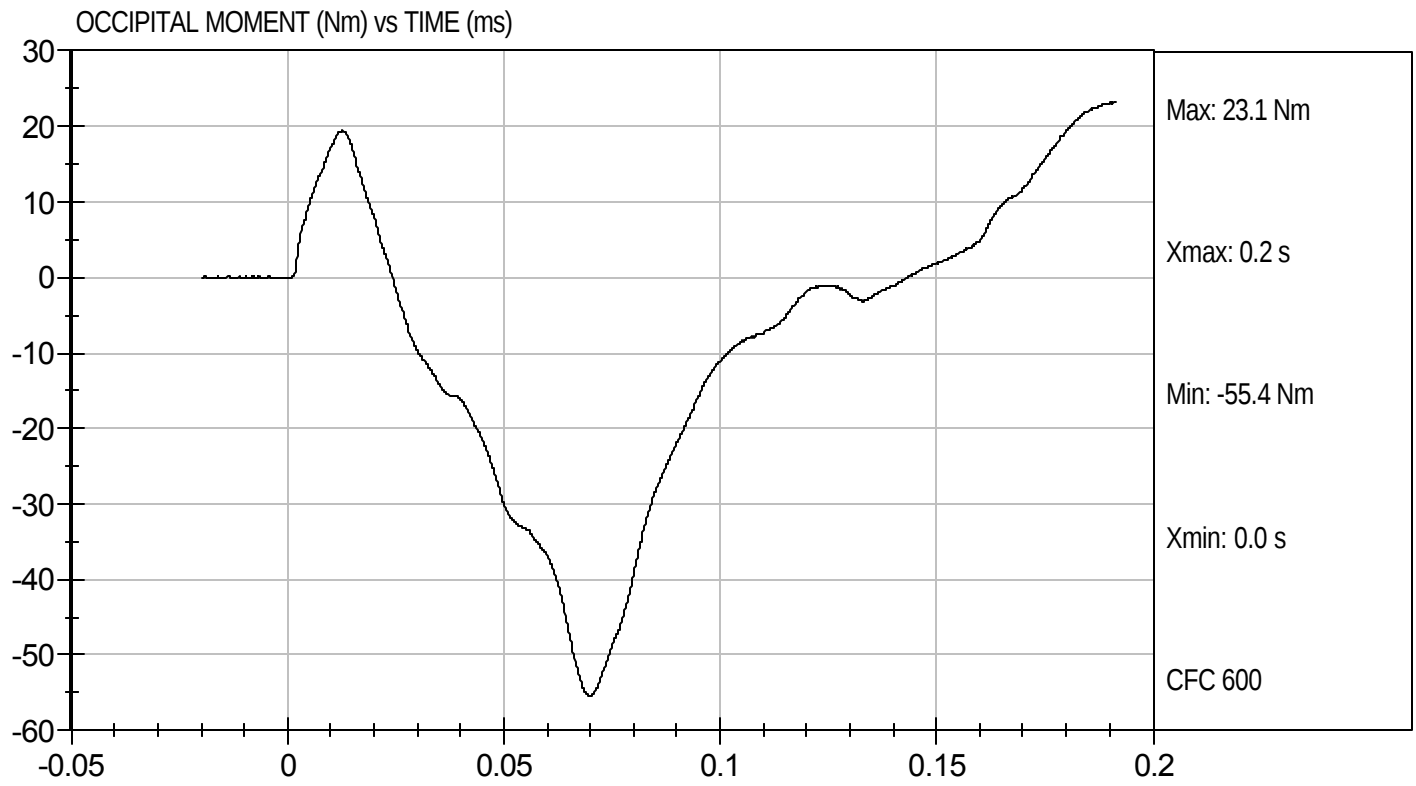
Test Date: 12/8/11
Velocity: 20.2 ft/s, 6.16 m/s





Test Desc: Neck Extension
Component ID: D114123

Test Date: 12/8/11
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: D114124

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.0	Pass
Relative Humidity	%	10 to 70	20	Pass
Probe Speed	m/s	6.59 to 6.83	6.77	Pass
Peak Deflection	mm	50 to 58	52	Pass
Peak Resistive Force w/in Deflection Corridor	kN	3.9 to 4.4	4.3	Pass
Internal Hysteresis	%	69 to 85	69	Pass
Peak Force 18 mm - 50 mm	N	<= 4,600 N	4330	Pass
			Overall Test Results	Pass


Laboratory Technician

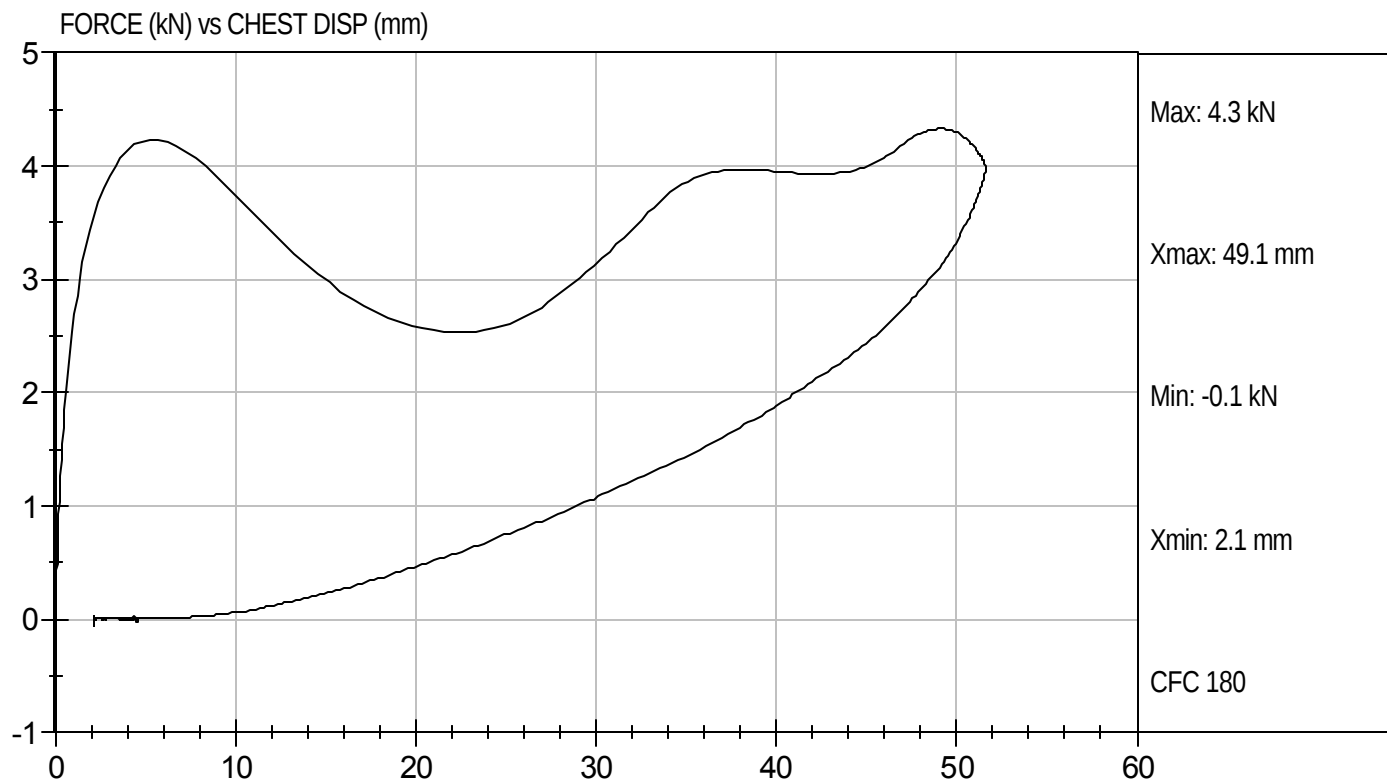
12/8/11
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D114124

Test Date: 12/8/11
Velocity: 22.2 ft/s, 6.77 m/s

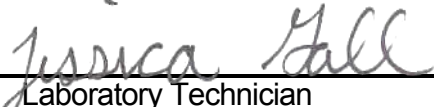


MGA RESEARCH CORPORATION
RIGHT KNEE IMPACT TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test I.D: D114125

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	21	Pass
Probe Speed	m/s	2.07 to 2.13	2.07	Pass
Maximum Force	kN	3.45 to 4.06	3.63	Pass
Overall Test Results				Pass


Laboratory Technician

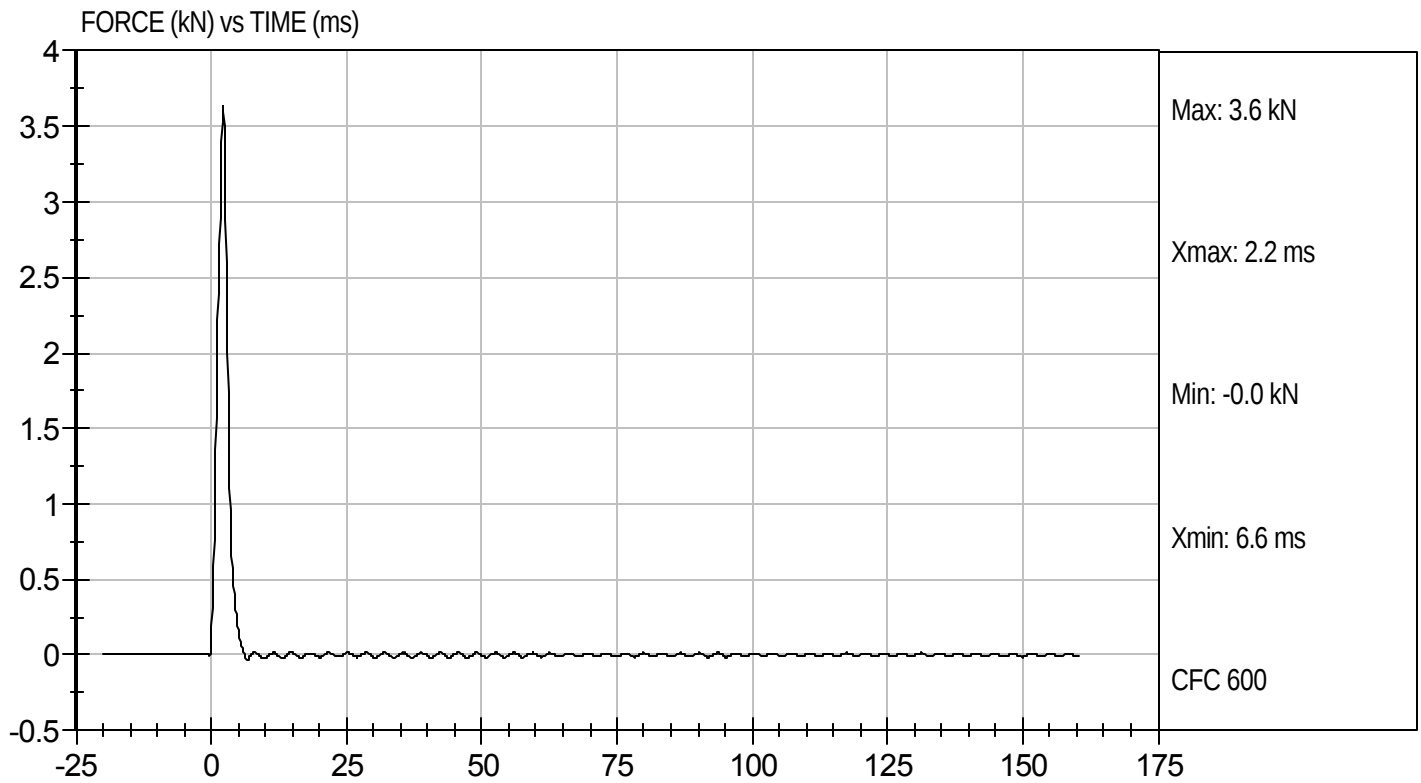
12/8/11
Test Date


Approved By



Test Desc: Right Knee
Component ID: D114125

Test Date: 12/8/11
Velocity: 6.80 ft/s, 2.07 m/s



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test I.D: D114126

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	20	Pass
Probe Speed	m/s	2.07 to 2.13	2.08	Pass
Maximum Force	kN	3.45 to 4.06	4.02	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

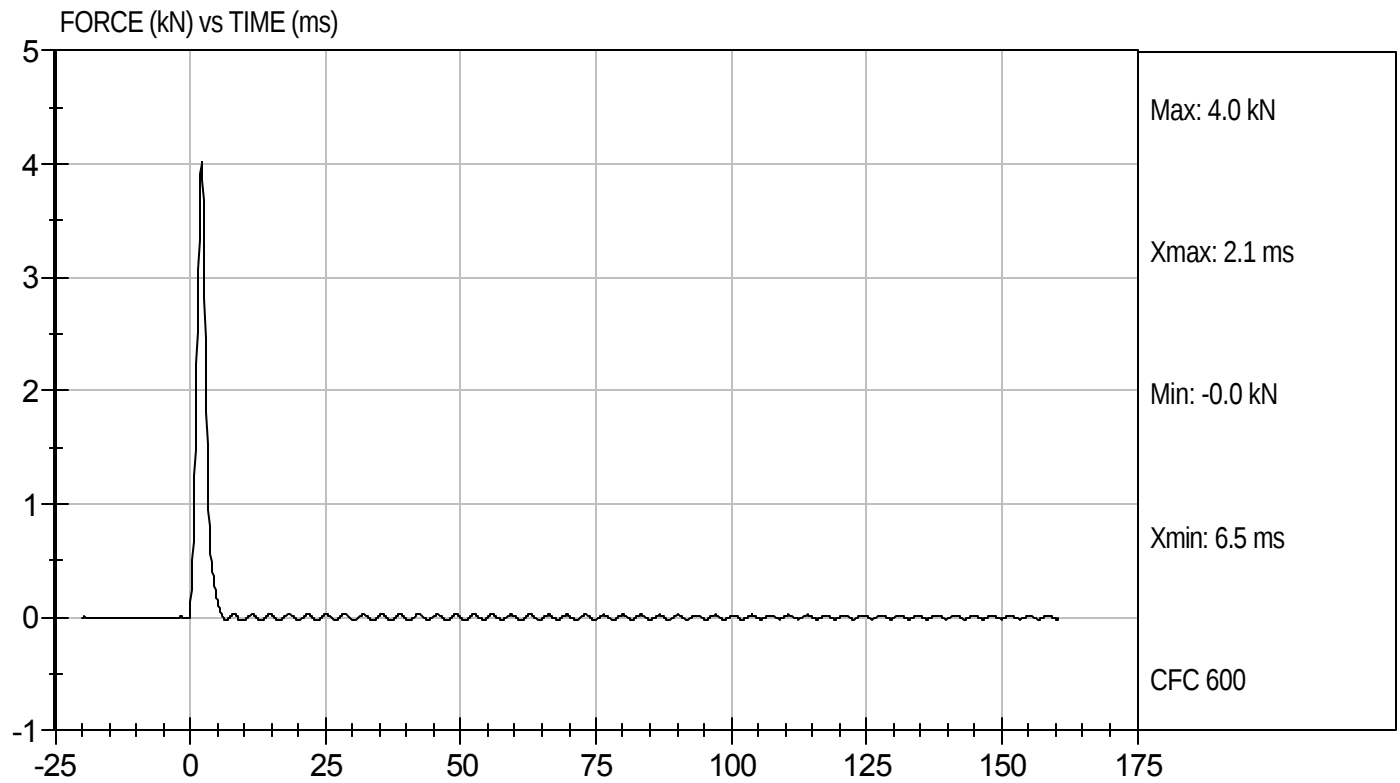
12/8/11
Test Date

David Winkelbauer
Approved By



Test Desc: Left Knee
Component ID: D114126

Test Date: 12/8/11
Velocity: 6.83 ft/s, 2.08 m/s



MGA RESEARCH CORPORATION
TORSO FLEXION TEST
HYBRID III 5TH PERCENTILE

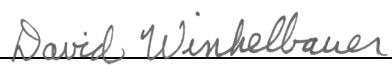
ATD Serial No: 634

Test I.D: D114127

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Initial Angle	deg	0 to 20	15	Pass
Return Angle	deg	+/- 8	7	Pass
Force at 45 deg	N	320 to 390	372	Pass
Upper Torso Deflection Rate	Deg/sec	0.5 to 1.5	1.0	Pass
Overall Result				Pass


Laboratory Technician

12/8/11
Test Date


Approved By