

REPORT NUMBER: NCAP-MGA-2012-018

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

**GENERAL MOTORS OF CANADA LTD.
2012 Chevrolet Camaro 1LS 2-Dr Coupe
NHTSA No.: MC0106**

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



Test Date: October 26, 2011

Final Report Date: November 21, 2011

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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Approval Date: November 21, 2011

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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16. Abstract A 56.3 km/h NCAP Frontal Impact Test was conducted on the 2012 Chevrolet Camaro 1LS 2-Dr Coupe 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 October 26, 2011. The impact velocity was 56.2 km/h and the ambient temperature at the barrier face at the time of impact was 22.0°C. The target vehicle post-test maximum crush was 535 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>121</td> <td>224</td> </tr> <tr> <td>Maximum Chest Compression</td> <td>mm</td> <td>63</td> <td>52</td> <td>22</td> <td>13</td> </tr> <tr> <td>Nij</td> <td>N/A</td> <td>1</td> <td>1</td> <td>0.24</td> <td>0.31</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>4170</td> <td>2620</td> <td>778</td> <td>742</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>4000</td> <td>2520</td> <td>115</td> <td>444</td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>10008</td> <td>6805</td> <td>3802</td> <td>164</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>10008</td> <td>6805</td> <td>2577</td> <td>208</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	121	224	Maximum Chest Compression	mm	63	52	22	13	Nij	N/A	1	1	0.24	0.31	Neck Tension	N	4170	2620	778	742	Neck Compression	N	4000	2520	115	444	Left Femur Force	N	10008	6805	3802	164	Right Femur Force	N	10008	6805	2577	208
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TABLE OF CONTENTS

<u>Section</u>		<u>Page No.</u>
1	Purpose and Summary of Test	1
2	Occupant and Vehicle Information / Data Sheets	3
<u>Data Sheet No.</u>		<u>Page No.</u>
1	General Test and Vehicle Parameter Data	4
2	Seat Adjustment, Fuel System, and Steering Wheel Data	8
3	Dummy Longitudinal Clearance Dimensions	10
4	Dummy Lateral Clearance Dimensions	11
5	Seat Belt Positioning Data	12
6	High-Speed Camera Locations and Data	13
7	Vehicle Accelerometer Data	15
8	Photographic Reference Target Locations	16
9	Load Cell Locations on Fixed Barrier	17
10	Test Vehicle Summary of Results	18
11	Post-Test Observations	19
12	Vehicle Profile Measurements	20
13	Accident Investigation Division Data	22
14	Vehicle Intrusion Measurements	23
15	Summary of FMVSS 212, 219 (Partial), and 301 Data	26
16	FMVSS 301 Static Rollover Results	28
17	Dummy/Vehicle Temperature Stabilization Data	29
<u>Appendix</u>		
A	Photographs	A
B	Dummy Response Data Traces	B
C	Dummy Calibration and Performance Verification Data	C

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 Camaro 1LS 2-Dr Coupe at a velocity of 56.2 kph. The test was performed at MGA Research Corporation on October 26, 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 and passenger's shoulder 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 535 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 bolster. The passenger's visible contact points were as follows: The passenger's head contacted the airbag. The passenger's head also contacted the headrest. The passenger's knees contacted the glovebox.

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)	121	0.24	778	115	38	22	3802	2577
Passenger (5 th)	224	0.31	742	444	42	13	164	208

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

Left Brake Caliper X

Load Cell 8-2 is questionable data.

Load Cell 7-1 is questionable data.

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 Camaro 1LS 2-Dr Coupe NHTSA No.: MC0106
Test Program: NCAP Frontal Barrier Impact Test Test Date: 10/26/11

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	MC0106	Traction Control System (TCS)	Yes
Model Year	2012	Auto-Leveling System	No
Make	Chevrolet	Automatic Door Locks (ADLs)	Yes
Model	Camaro	Power Window Auto-Reverse	Yes
Body Style	Coupe	Other Optional Feature	N/A
VIN	2G1FE1E31C9115973	Driver Front Airbag	Yes
Body Color	Rally Yellow	Driver Curtain Airbag	Yes
Odometer (km/mi)	56 / 35	Driver Head/Torso Airbag	No
Engine Displacement (L)	3.6	Driver Torso Airbag	No
Type/No. Cylinders	6	Driver Torso/Pelvis Airbag	Yes
Engine Placement	Longitudinal	Driver Pelvis Airbag	No
Transmission Type	Manual	Driver Knee Airbag	No
Transmission Speeds	6	Pass. Curtain Airbag	Yes
Overdrive	No	Pass. Head/Torso Airbag	No
Final Drive	Rear	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	Other Safety Restraint	No
Does owner's manual provide instructions to turn off automatic door locks?			No

DATA FROM CERTIFICATION LABEL

Manufactured By	General Motors of Canada Ltd.	GVWR (kg)	2072
Date of Manufacture	08/11	GAWR Front (kg)	965
Vehicle Type	Passenger Car	GAWR Rear (kg)	1107

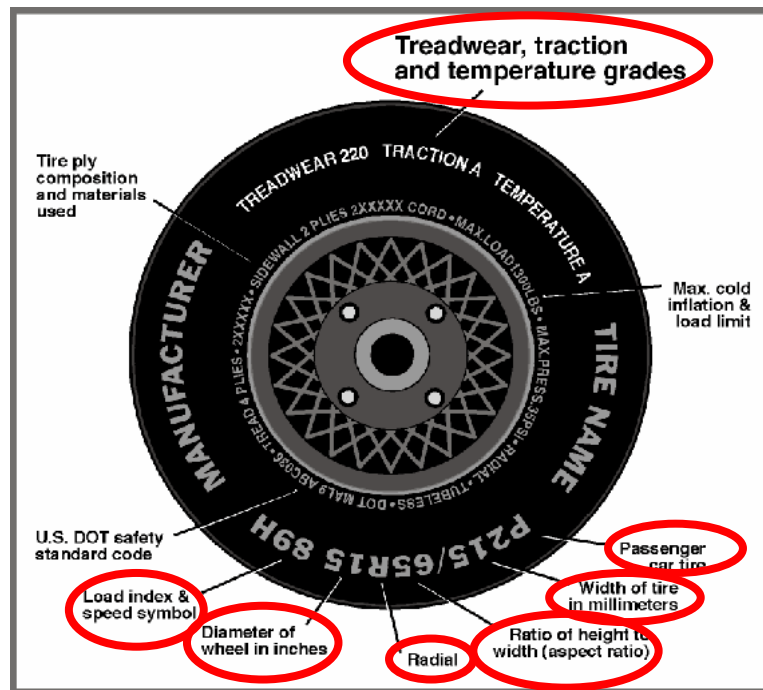
VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench		
Designated Seating Capacity (DSC)	2	2		4
Capacity Weight (VCW) (kg)				332
Cargo Weight (RCLW) (kg)				60

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

Test Vehicle: 2012 Chevrolet Camaro 1LS 2-Dr Coupe
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0106
 Test Date: 10/26/11



TIRE PLACARD INFORMATION

Measured Parameter	Front	Rear
Recommended Cold Tire Pressure (kPa)	240	240
Recommended Tire Size	P245/55R18	P245/55R18

TIRE SIDEWALL INFORMATION

Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	300	300
Tire Size on Vehicle	245/55R18	245/55R18
Tire Manufacturer	B.F. Goodrich	B.F. Goodrich
Tire Name	Radial T/A	Radial T/A
Tire Type	Passenger	Passenger
Tire Width	245	245
Aspect Ratio	55	55
Radial	Yes	Yes
Wheel Diameter	18	18
Load Index/Speed Symbol	102T	102T
Treadwear	620	620
Traction Grade	A	A
Temperature Grade	B	B
Tire Material	Rubber	Rubber

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

Test Vehicle: 2012 Chevrolet Camaro 1LS 2-Dr Coupe NHTSA No.: MC0106
 Test Program: NCAP Frontal Barrier Impact Test Test Date: 10/26/11

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	435.5	431.4		468.6	508.0	
Right	kg	441.8	414.1		453.1	486.7	
Ratio	%	50.9	49.1		48.1	51.9	
Totals	kg	877.3	845.5	1722.8	921.7	994.7	1916.4

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1722.8
Weight of 1 P572E ATD & 1 P572O ATD	kg	140.6
Rated Cargo/Luggage Weight (RCLW)	kg	60
Calculated Vehicle Target Weight (TVTW)	kg	1923.4

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	756	770	766	758	1402
As Tested	mm	769	774	737	741	1482
Post Test	mm	758	734	741	735	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2856
Total Vehicle Length at Left Side	mm	4620
Total Vehicle Length at Centerline	mm	4838
Total Vehicle Length at Right Side	mm	4620
Weight of Ballast in Cargo Area	kg	52.6
Weight of Vehicle Components Removed	kg	9.1
Amount of Stoddard Solvent in Fuel Tank	L	66.9

List of components removed: Trunk carpet, inflate a flat, right rear deck speaker, and trunk plastic.

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

Test Vehicle: 2012 Chevrolet Camaro 1LS 2-Dr Coupe NHTSA No.: MC0106
Test Program: NCAP Frontal Barrier Impact Test Test Date: 10/26/11

TARGET VEHICLE STRUCTURAL MEASUREMENT

	Elements	Pre-Test (mm)
1	Total Length	4838
2	Total Width	1828
3	Bumper Top Height	550
4	Bumper Bottom Height	390
5	Longitudinal Member Top Height	523
6	Distance between Longitudinal Members	815
7	Longitudinal Member Width	91
8	Engine Top Height	904
9	Engine Bottom Height	186
10	Engine and Gearbox Width	1176
11	Front Bumper-Engine Distance	569
12	Front Shock Absorber Fixing Height	911
13	Bonnet Leading Edge Height	827
14	Front Shock Absorber Fixing Width	1225
15	Front Bumper – Front Axle Distance	922
16	Front Axle – A-Pillar Distance	766
17	A-Pillar – B-Pillar Distance	1238
18	B-Pillar – Rear Axle Distance	843
19	B-Pillar – C-Pillar Distance	420
20	Roof Sill Bottom Height	1232
21	Roof Sill Top Height	1337
22	Floor Sill Bottom Height	175
23	Floor Sill Top Height	373

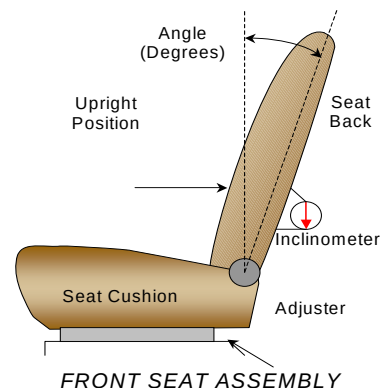
DATA SHEET NO. 2
SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

Test Vehicle: 2012 Chevrolet Camaro 1LS 2-Dr Coupe
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0106
 Test Date: 10/26/11

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	7.3° on headrest post
Passenger Seat Back Angle	3.5° on headrest post

SEAT FORE/AFT POSITIONS

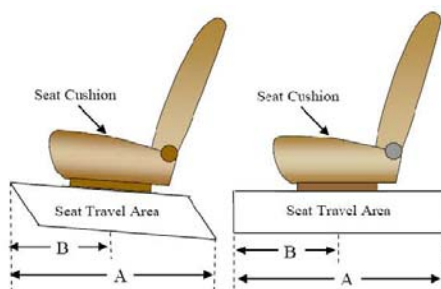
The driver and passenger seat fore/aft positions are adjusted following Appendix F, "Driver & Passenger Dummy Seating & Positioning Procedures" in the NCAP Test Procedure dated January 2010.

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	48 detents (1 st as 0)	18 th detent (foremost as 0)
Passenger Seat	48 detents (1 st as 1)	0 detent (foremost 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	Fixed	Fixed
Passenger Seat	Fixed	Fixed



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

Test Vehicle: 2012 Chevrolet Camaro 1LS 2-Dr Coupe
 Test Program: NCAP Frontal Barrier Impact Test

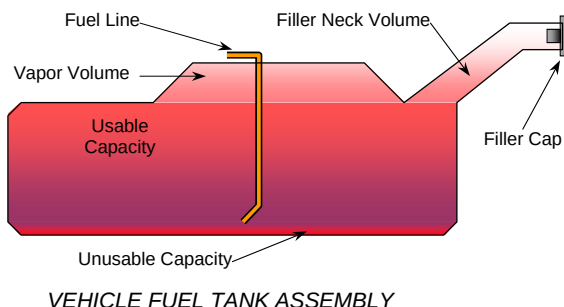
NHTSA No.: MC0106
 Test Date: 10/26/11

FUEL TANK CAPACITY DATA

	Liters
Usable Capacity of "Standard Tank"	71.9
Usable Capacity of "Optional Tank"	
92-94% of Usable Capacity	66.2 to 67.6
Actual Amount of Solvent used	66.9
1/3 of Usable Capacity	24.0

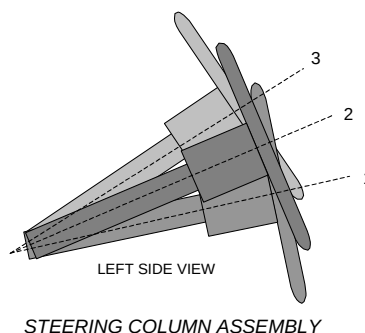
FUEL PUMP

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 is activated during "crank/run" for 2 seconds. If "crank/run" goes off before the 2 seconds is up, the fuel pump will turn off. At the end of 2 seconds, the fuel pump will be "on" whenever the engine is running. 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.



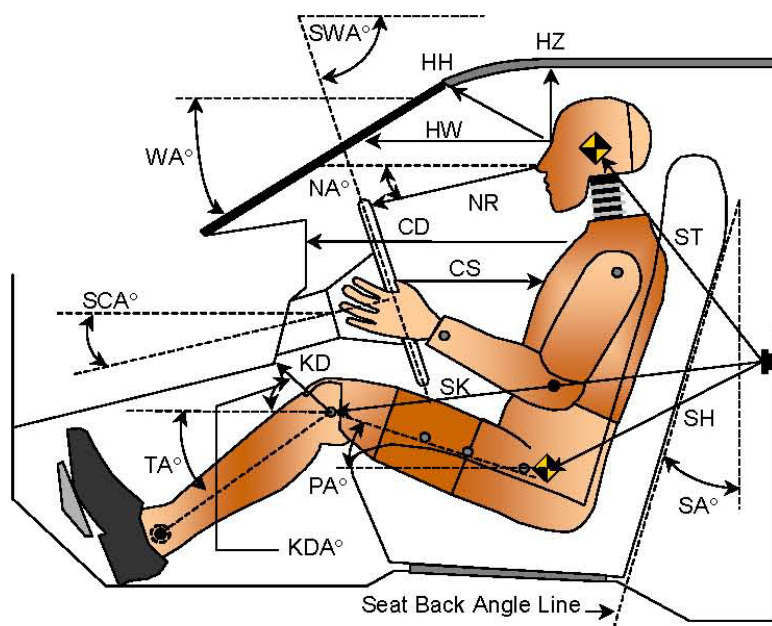
STEERING COLUMN POSITION

	Degrees	Fore/Aft Position (mm)
Lowermost – Position 1	74.0	186
Geometric Center – Position 2	72.0	166
Uppermost – Position 3	70.0	146
Telescoping Steering Wheel Travel		40
Test Position	72.0	166

DATA SHEET NO. 3 DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2012 Chevrolet Camaro 1LS 2-Dr Coupe
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0106
Test Date: 10/26/11

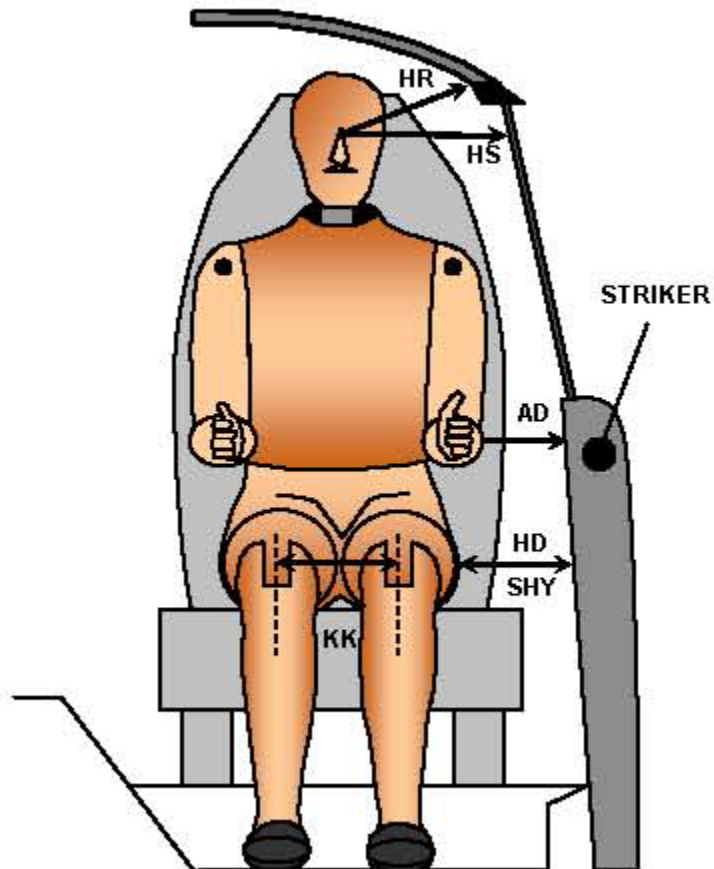


Code	Measurement Description	Driver S/N 036		Passenger S/N 634	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		25.3		
SWA°	Steering Wheel Angle		72.0		
SCA°	Steering Column Angle		18.0		
SA°	Seat Back Angle (on headrest post)		7.3		3.5
HZ	Head to Roof (Z)	166	90	217	90
HH	Head to Header	423	14.4	375	26.0
HW	Head to Windshield	706	0	723	0
NR	Nose to Rim	373	4.8		
CD	Chest to Dash	553		382	
CS	Chest to Steering Hub	320	3.9		
RA	Rim to Abdomen	202	0		
KDL	Left Knee to Dash	162	39.7	147	38.6
KDR	Right Knee to Dash	155	38.6	133	35.6
PA°	Pelvic Angle		24.2		22.1
TA°	Tibia Angle		35.2		38.5
SK	Striker to Knee	930	93.9	1005	94.4
ST	Striker to Head	593	41.5	631	30.7
SH	Striker to H-Point	581	109.9	681	107.8

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2012 Chevrolet Camaro 1LS 2-Dr Coupe
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0106
 Test Date: 10/26/11



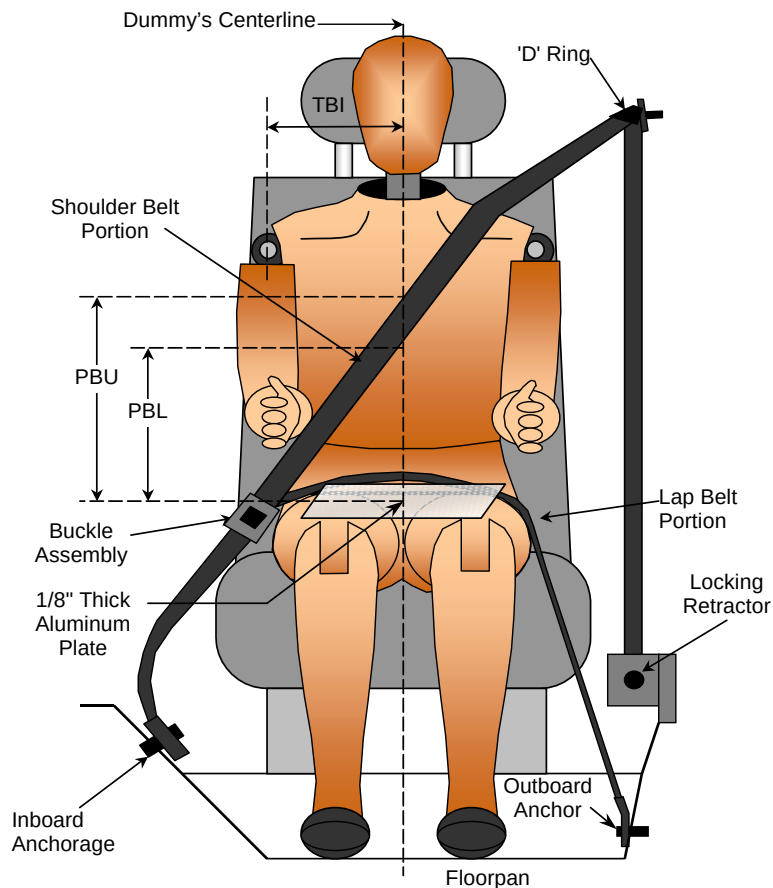
FRONT VIEW OF DUMMY

Code	Measurement Description	Driver S/N 036	Passenger S/N 634
		Length (mm)	
AD	Arm to Door	103	170
HD	H-Point to Door	142	185
HR	Head to Side Header	184	220
HS	Head to Side Window	318	368
KK	Knee to Knee	323	235
SHY	Striker to H-Point (Y Direction)	270	285
AA	Ankle to Ankle	320	170

DATA SHEET NO. 5 SEAT BELT POSITIONING DATA

Test Vehicle: 2012 Chevrolet Camaro 1LS 2-Dr Coupe
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0106
Test Date: 10/26/11



FRONT VIEW OF DUMMY

SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU - Top surface of reference to belt upper edge	mm	340	280
PBL - Top surface of reference to belt lower edge	mm	260	190

BELT LENGTH DATA

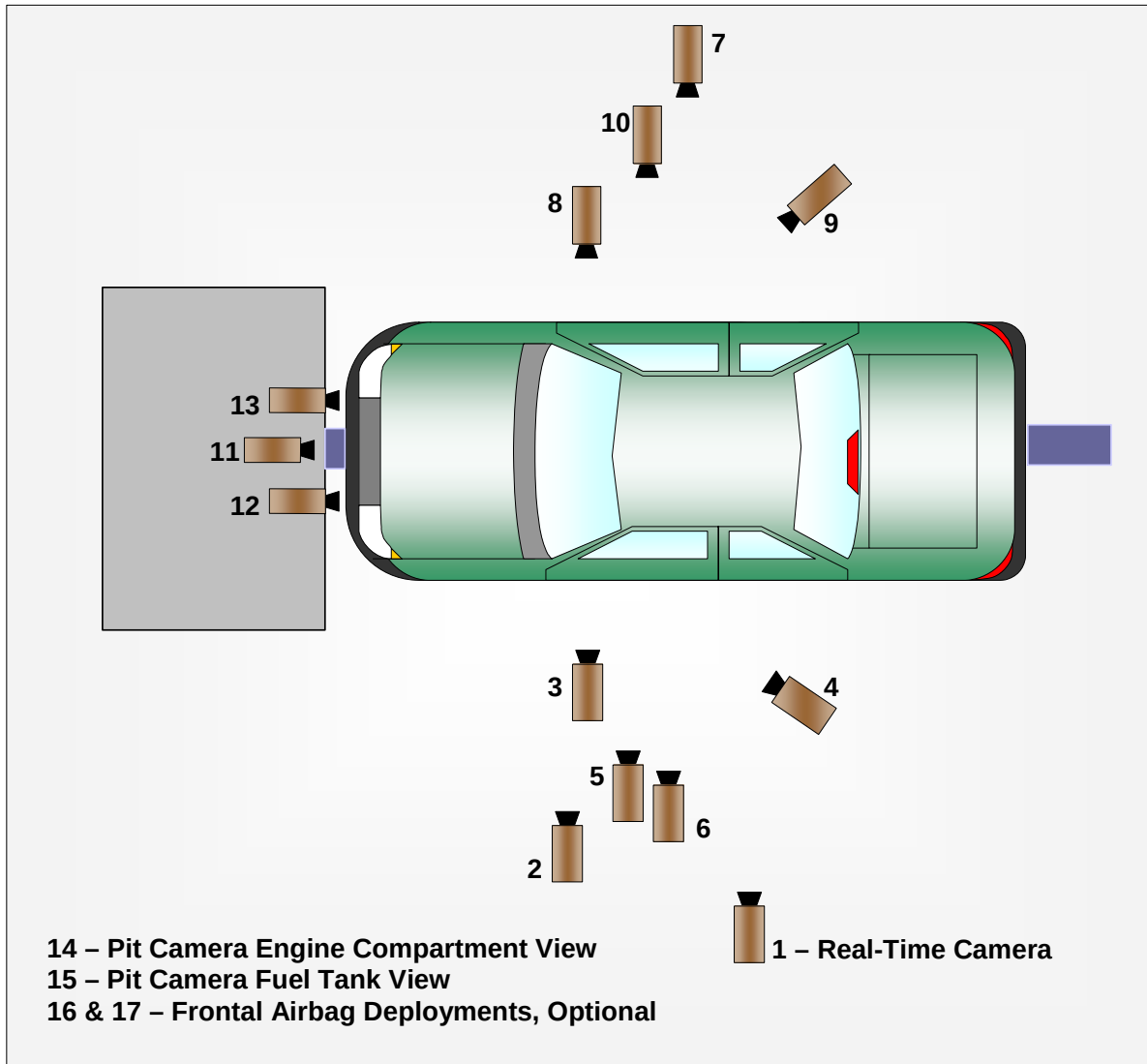
Measurement Description	Units	Driver	Passenger
Shoulder Belt Length as measured on ATD	mm	1090	1175
Lap Belt Length as measured on ATD	mm	870	820
Remainder of belt on reel	mm	1270	1205
Total Belt Length for Continuous Webbing Systems	mm	3230	3200

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

Test Vehicle: 2012 Chevrolet Camaro 1LS 2-Dr Coupe
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0106
Test Date: 10/26/11

CAMERA POSITIONS FOR FRONTAL IMPACTS



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

Test Vehicle: 2012 Chevrolet Camaro 1LS 2-Dr Coupe
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0106
 Test Date: 10/26/11

CAMERA LOCATIONS

No.	Camera View	Coordinates (mm)			Lens (mm)	Speed (fps)
		X*	Y*	Z*		
1	Real-Time Left Overall					30
2	Driver Close-Up	1730	-6980	-1820	35	1000
3	Left Front Half	1190	-5560	-1060	24	1000
4	Left Angle	5630	-5060	-1970	50	1000
5	Steering Column - Top	440	-5260	-1230	24	1000
6	Steering Column - Bottom	410	-5290	-840	24	1000
7	Right Overall	2380	6190	-1260	20	1000
8	Passenger Close-Up	1990	6200	-1800	35	1000
9	Right Front Half	1480	5860	-1190	24	1000
10	Right Angle	5800	5000	-1950	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	1270	0	3150	24	1000
15	Pit Rear	3180	0	3150	24	1000
16	Onboard Driver Side (optional)					
17	Onboard Passenger Side (optional)					
18	Real-Time Pan View					30

***COORDINATES:**

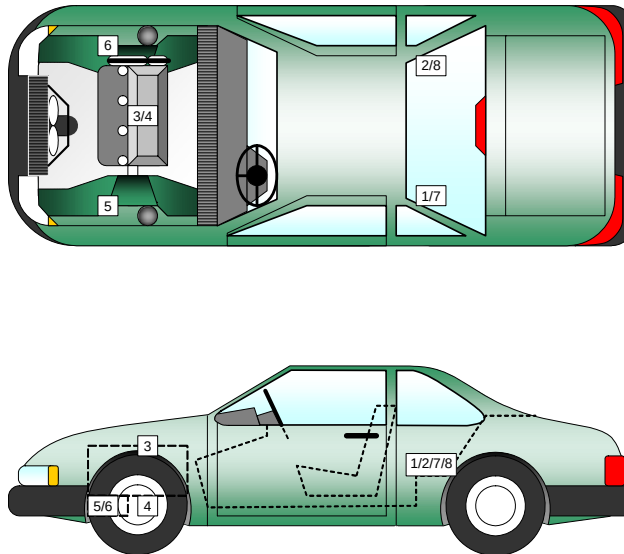
- +X = forward of impact plane
- +Y = right of monorail centerline
- +Z = below ground level

Cameras 16 & 17 were not used for this test.

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

Test Vehicle: 2012 Chevrolet Camaro 1LS 2-Dr Coupe
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0106
 Test Date: 10/26/11



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear Accelerometer – X Direction	1870	-364	-221
2	Right Rear Accelerometer – X Direction	1870	515	-216
3	Engine Top X	3811	0	-904
4	Engine Bottom X	4126	0	-306
5	Left Brake Caliper X	3733	-712	-260
6	Right Brake Caliper X	3733	712	-260
7	Left Rear Accelerometer Redundant – X Direction	1870	-364	-221
8	Right Rear Accelerometer Redundant – X Direction	1870	515	-216

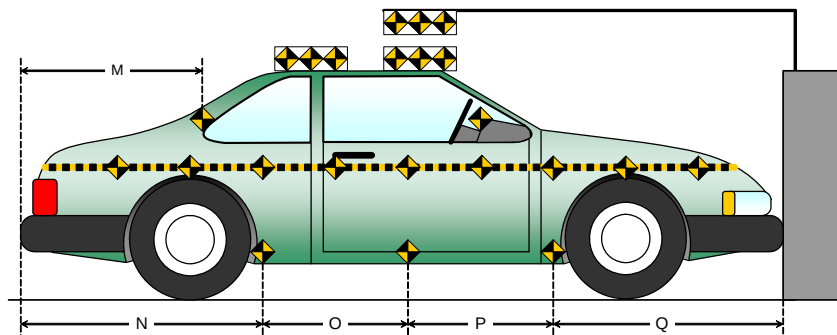
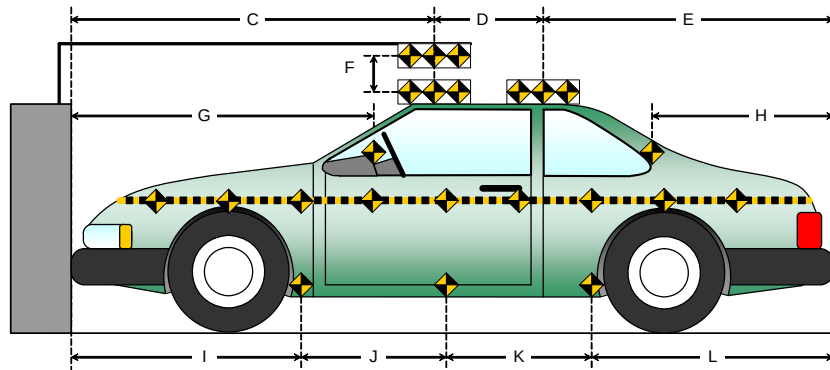
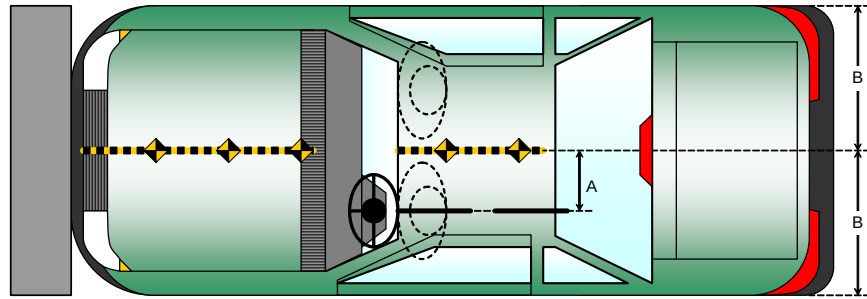
Reference Points: X - Rear Surface of Vehicle (+ forward)
 Y - Vehicle Centerline (+ to right)
 Z - Ground Plane (+ down)

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

Test Vehicle: 2012 Chevrolet Camaro 1LS 2-Dr Coupe
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0106
 Test Date: 10/26/11

Item	Value (mm)
A	410
B	914
C	2576
D	915
E	1347
F	228
G	
H	1290
I	1374
J	968
K	968
L	1528
M	1292
N	1532
O	968
P	968
Q	1370

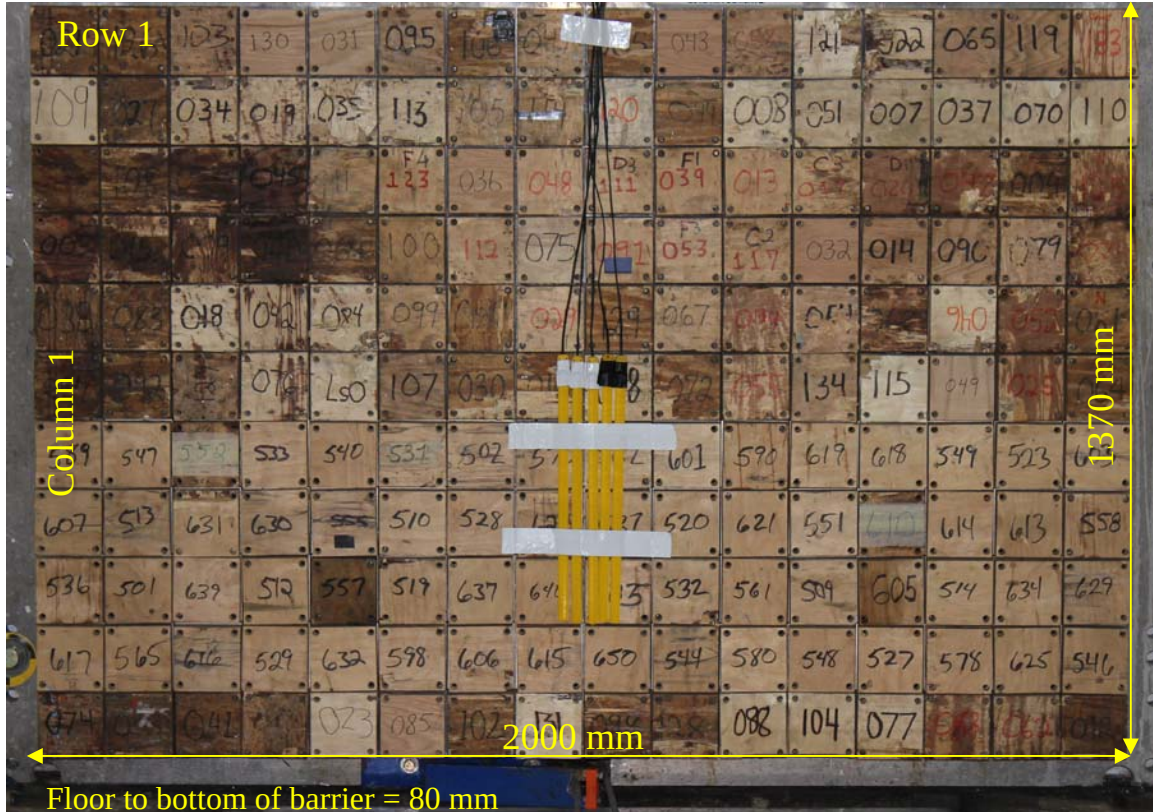


DATA SHEET NO. 9 **LOAD CELL LOCATIONS ON FIXED BARRIER**

Test Vehicle: 2012 Chevrolet Camaro 1LS 2-Dr Coupe
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0106
 Test Date: 10/26/11

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
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: 2012 Chevrolet Camaro 1LS 2-Dr Coupe
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0106
Test Date: 10/26/11

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 Camaro 1LS 2-Dr Coupe
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0106
Test Date: 10/26/11

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 Bolster	Glovebox
Right Knee Contact	Knee Bolster	Glovebox

DOOR OPENING AND SEAT TRACK INFORMATION

Description	Driver	Passenger
Locked/Unlocked Doors	Door was locked	Door was 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		
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	927
Center	mm	886
Right Side	mm	943
Average	mm	919

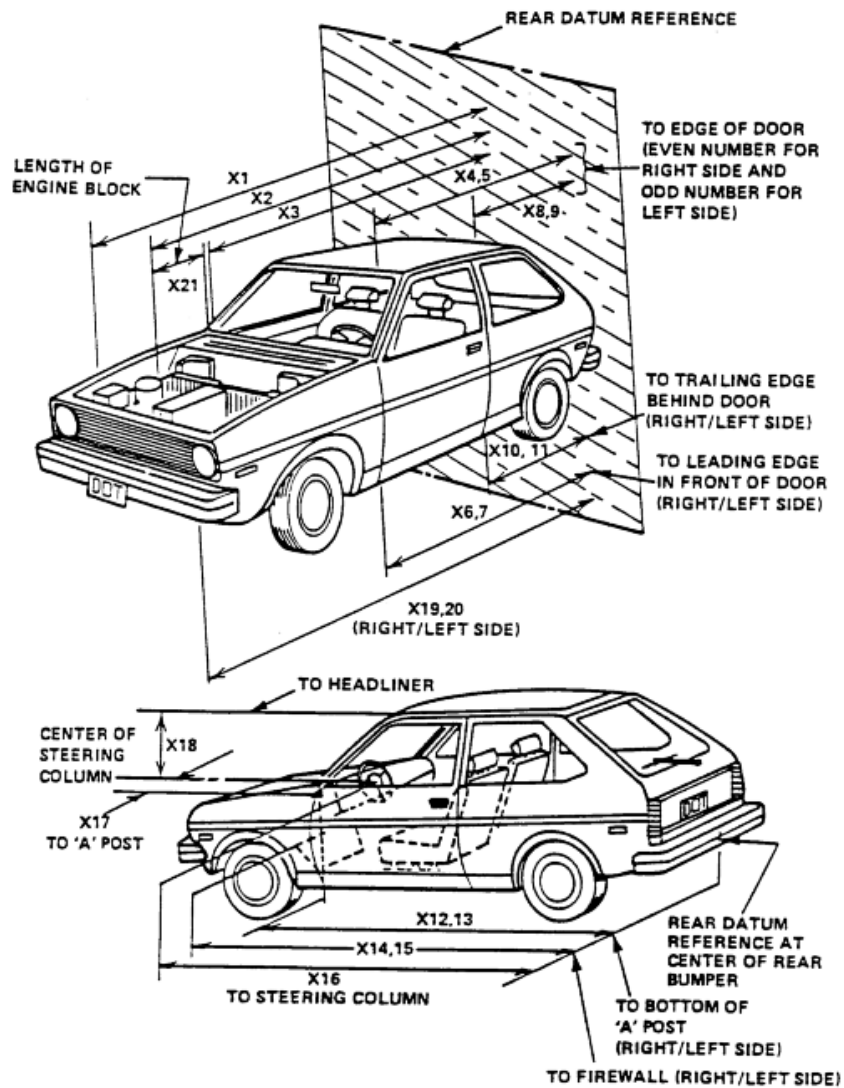
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Left Front (Driver) P1		Right Front (Passenger)	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	Yes	Yes	Yes
Knee Airbag	No		No	
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 Camaro 1LS 2-Dr Coupe
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0106
Test Date: 10/26/11



DATA SHEET NO. 12 (CONTINUED)
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2012 Chevrolet Camaro 1LS 2-Dr Coupe
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0106
 Test Date: 10/26/11

RSOV (Rear Surface of Vehicle)

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	mm	4838	4303	535
2	RSOV to Front of Engine	mm	4000	3095	905
3	RSOV to Firewall	mm	3510	3500	10
4	RSOV to Upper Leading Edge of Right Door	mm	3023	3026	-3
5	RSOV to Upper Leading Edge of Left Door	mm	3025	3030	-5
6	RSOV to Lower Leading Edge of Right Door	mm	3086	3088	-2
7	RSOV to Lower Leading Edge of Left Door	mm	3085	3085	0
8	RSOV to Upper Trailing Edge of Right Door	mm	1745	1748	-3
9	RSOV to Upper Trailing Edge of Left Door	mm	1743	1755	-12
10	RSOV to Lower Trailing Edge of Right Door	mm	1903	1903	0
11	RSOV to Lower Trailing Edge of Left Door	mm	1904	1904	0
12	RSOV to Bottom of "A" Post of Right Side	mm	3099	3083	16
13	RSOV to Bottom of "A" Post of Left Side	mm	3102	3099	3
14	RSOV to Firewall, Right Side	mm	3608	3580	28
15	RSOV to Firewall, Left Side	mm	3520	3510	10
16	RSOV to Steering Column	mm	2640	2676	-36
17	Center of Steering Column to "A" Post	mm	317	343	-26
18	Center of Steering Column to Headliner	mm	355	398	-43
19	RSOV to Right Side of Front Bumper	mm	4620	4198	422
20	RSOV to Left Side of Front Bumper	mm	4620	4199	421
21	Length of Engine Block	mm	500	500	0
RD	RSOV to Right Side of Dash Panel	mm	2802	2790	12
CD	RSOV to Center of Dash Panel	mm	2877	2899	-22
LD	RSOV to Left Side of Dash Panel	mm	2820	2811	9

DATA SHEET NO. 13
ACCIDENT INVESTIGATION DIVISION DATA

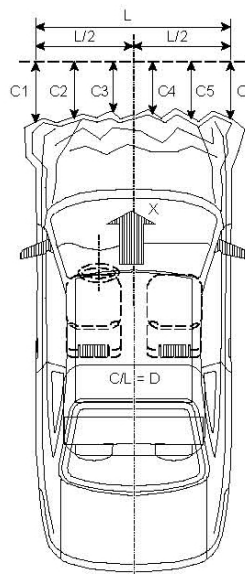
Test Vehicle: 2012 Chevrolet Camaro 1LS 2-Dr Coupe NHTSA No.: MC0106
Test Program: NCAP Frontal Barrier Impact Test Test Date: 10/26/11

VEHICLE INFORMATION

VIN: 2G1FE1E31C9115973 Wheelbase (mm): 2856
Vehicle Size Category: Coupe Test Weight (kg): 1916.4

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): 62.5
Time of Separation (msec): 113.6



CRUSH PROFILE

Collision Deformation Classification: Frontal
Midpoint of Damage: Centerline
Damage Region Length (mm): 1210
Impact Mode: Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	4620	4199	421
C2	Crush zone 2 at left side	mm	4684	4207	477
C3	Crush zone 3 at left side	mm	4733	4225	508
C4	Crush zone 4 at right side	mm	4733	4218	515
C5	Crush zone 5 at right side	mm	4682	4201	481
C6	Crush zone 6 at right side	mm	4618	4196	422
L	C1 TO C6	mm	1210	1198	12

DATA SHEET NO. 14
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2012 Chevrolet Camaro 1LS 2-Dr Coupe
Test Program: NCAP Frontal Barrier Impact Test

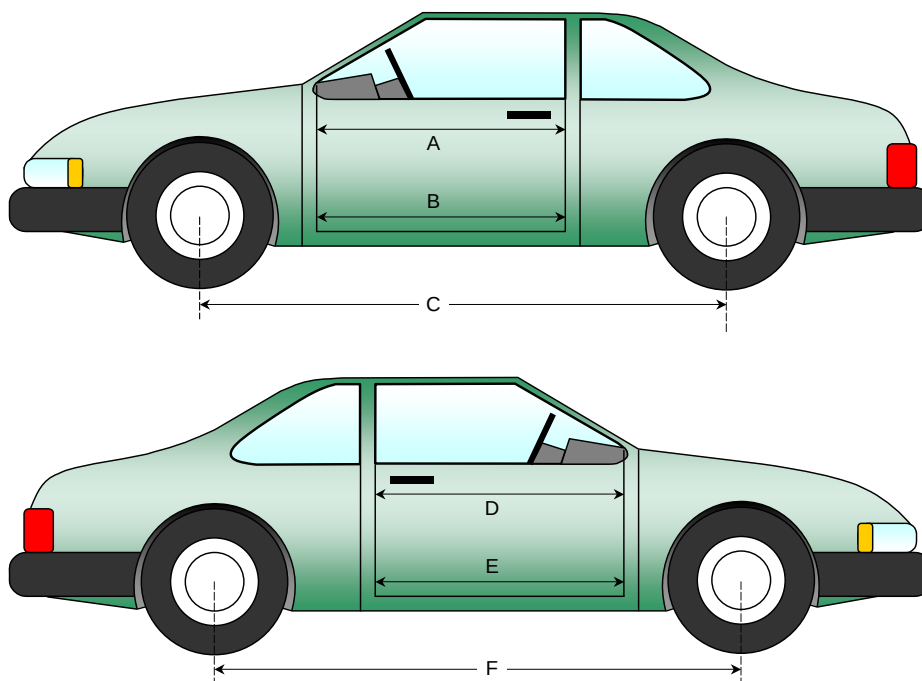
NHTSA No.: MC0106
Test Date: 10/26/11

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	1315	1319	-4
B	Left Side Lower	mm	1160	1160	0
D	Right Side Upper	mm	1315	1322	-7
E	Right Side Lower	mm	1160	1162	-2

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2856	2737	119
F	Right Side Wheelbase	mm	2856	2742	114



DATA SHEET NO. 14 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

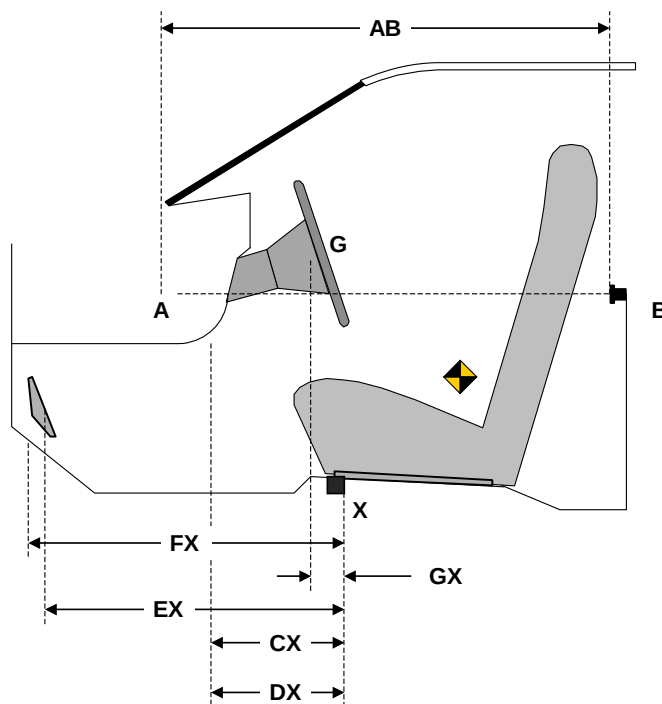
Test Vehicle: 2012 Chevrolet Camaro 1LS 2-Dr Coupe
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0106
 Test Date: 10/26/11

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside window jam)	mm	1055	1055	0
CX	Left Knee Bolster to X	mm	214	216	-2
DX	Right Knee Bolster to X	mm	221	222	-1
EX	Brake Pedal to X	mm	555	554	1
FX	Foot Rest to X	mm	613	611	2
GX	Center of Steering Column Wheel Hub to X	mm	40	95	-55

X = Front of Seat Track (stationary)

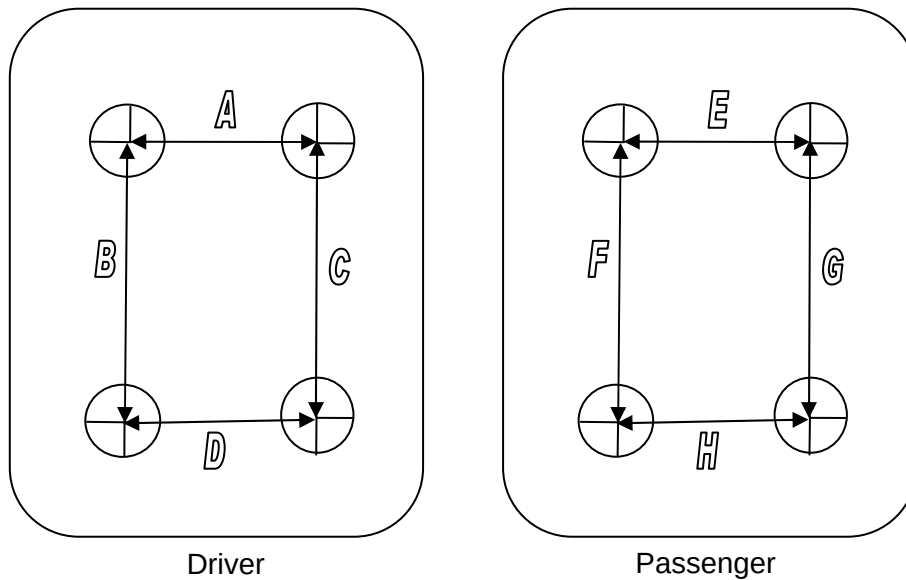


DRIVER COMPARTMENT

DATA SHEET NO. 14 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2012 Chevrolet Camaro 1LS 2-Dr Coupe
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0106
 Test Date: 10/26/11



TOP VIEW THROUGH FLOOR PAN

UNDERBODY FLOORBOARD DEFORMATION

Measurement	Units	Pre-Test	Post-Test	Difference
A	mm	130	128	2
B	mm	400	400	0
C	mm	400	400	0
D	mm	150	150	0
E	mm	130	127	3
F	mm	400	400	0
G	mm	400	398	2
H	mm	150	148	2

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

Test Vehicle: 2012 Chevrolet Camaro 1LS 2-Dr Coupe
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0106
 Test Date: 10/26/11

Windshield Mounting Details:

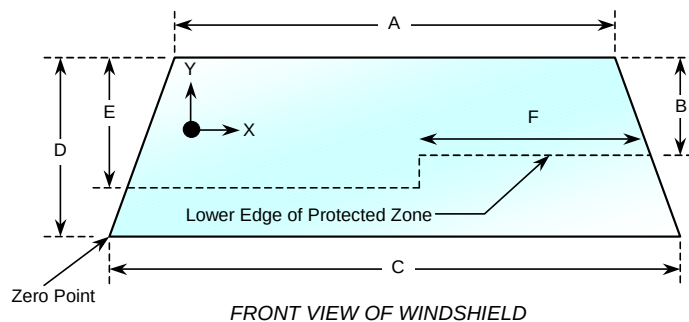
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

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: 22.0°C

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% of Retention
Left Side	2123	2123	100
Right Side	2123	2123	100
Total	4246	4246	100



Item	Units	Value
A	mm	1268
B	mm	262
C	mm	1588
D	mm	695
E	mm	314
F	mm	515

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 Camaro 1LS 2-Dr Coupe NHTSA No.: MC0106
Test Program: NCAP Frontal Barrier Impact Test Test Date: 10/26/11

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Test Time: 11:17 am

Temperature: 22.0° 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

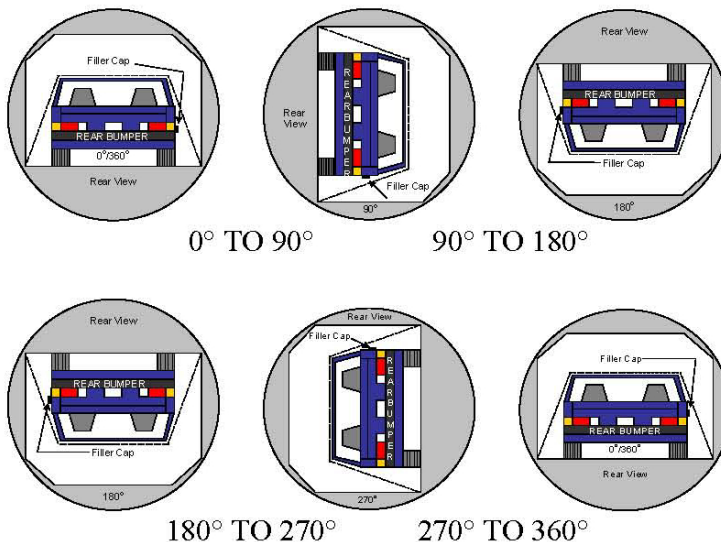
DATA SHEET NO. 16

FMVSS 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2012 Chevrolet Camaro 1LS 2-Dr Coupe
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0106
 Test Date: 10/26/11

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°	125	300	425
90° to 180°	115	300	415
180° to 270°	108	300	408
270° to 360°	120	300	420

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

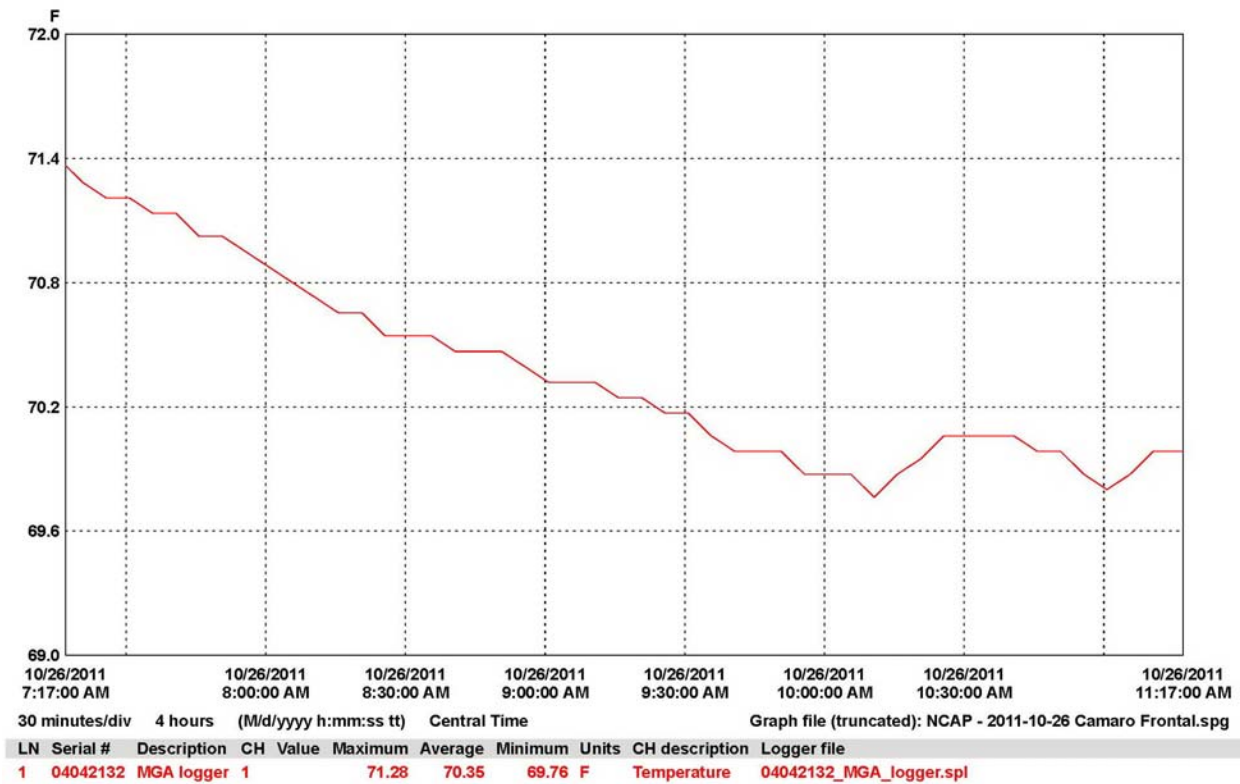
ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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 Camaro 1LS 2-Dr Coupe
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0106
 Test Date: 10/26/11



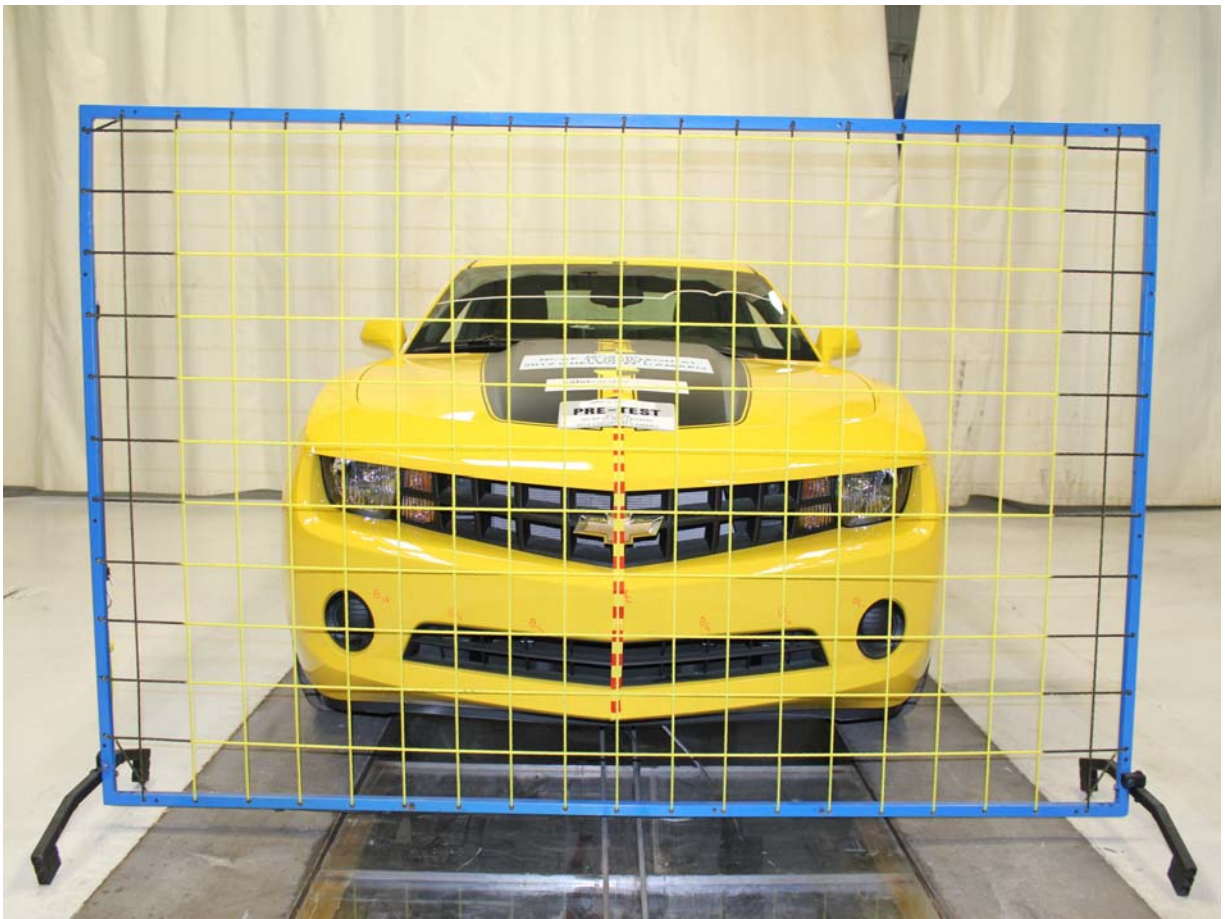
APPENDIX A
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

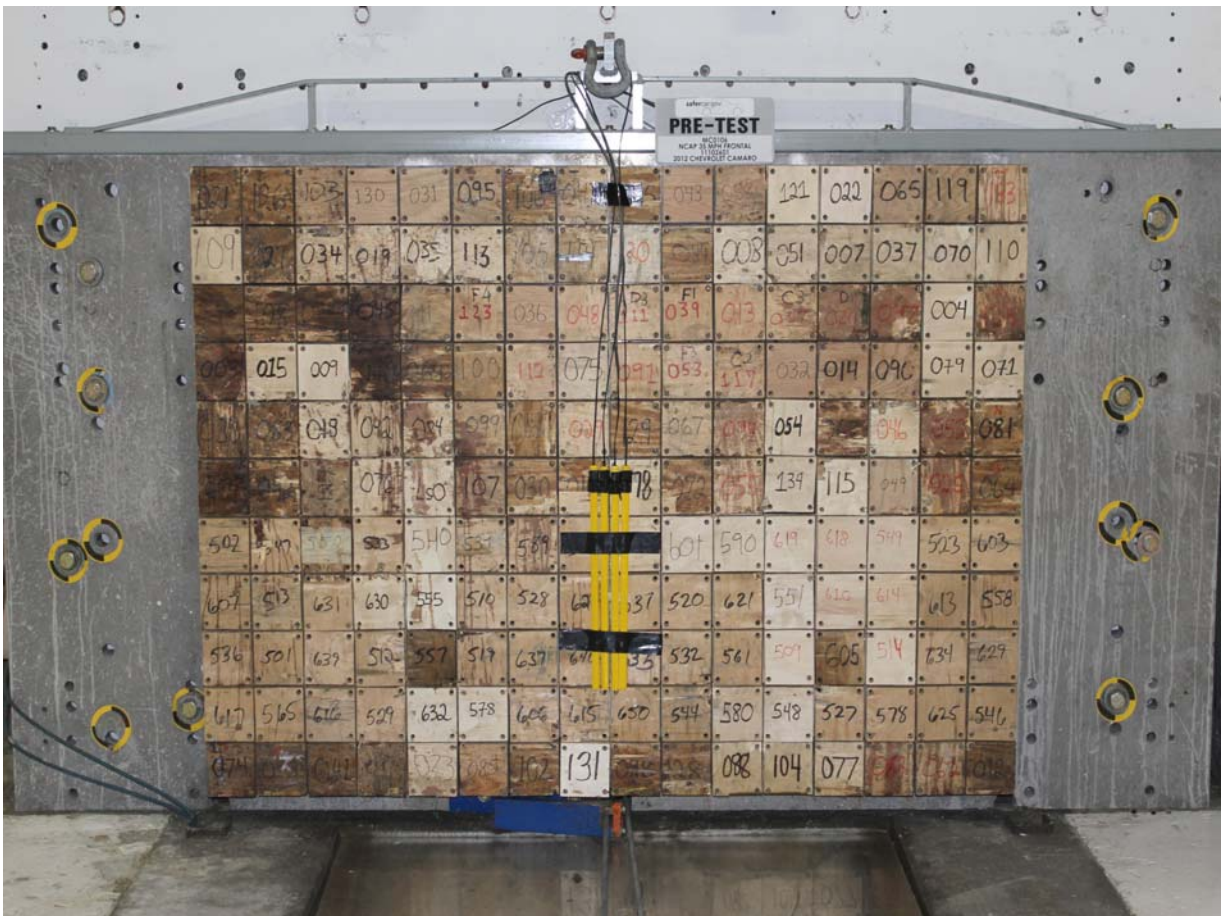
		<u>Page No.</u>
Photo No. 1.	Load Cell Location	A-1
Photo No. 2.	Load Cell Wall	A-1
Photo No. 3.	Manufacturer's Label	A-2
Photo No. 4.	Tire Placard	A-2
Photo No. 5.	2012 Chevrolet Camaro Frontal As Delivered	A-3
Photo No. 6.	Left Rear Three-Quarter View, As Received	A-3
Photo No. 7.	Pre-Test Front View of Test Vehicle	A-4
Photo No. 8.	Post-Test Front View of Test Vehicle	A-4
Photo No. 9.	Pre-Test Left View of Test Vehicle	A-5
Photo No. 10.	Post-Test Left View of Test Vehicle	A-5
Photo No. 11.	Pre-Test Right View of Test Vehicle	A-6
Photo No. 12.	Post-Test Right View of Test Vehicle	A-6
Photo No. 13.	Pre-Test Right Front Three-Quarter View	A-7
Photo No. 14.	Post-Test Right Front Three-Quarter View	A-7
Photo No. 15.	Pre-Test Left Rear Three-Quarter View	A-8
Photo No. 16.	Post-Test Left Rear Three-Quarter View	A-8
Photo No. 17.	Pre-Test Windshield View	A-9
Photo No. 18.	Post-Test Windshield View	A-9
Photo No. 19.	Pre-Test Engine Compartment View	A-10
Photo No. 20.	Post-Test Engine Compartment View	A-10
Photo No. 21.	Pre-Test Fuel Filler Cap View	A-11
Photo No. 22.	Post-Test Fuel Filler Cap View	A-11
Photo No. 23.	Pre-Test Front Underbody View	A-12
Photo No. 24.	Post-Test Front Underbody View	A-12
Photo No. 25.	Pre-Test Mid Front Underbody View	A-13
Photo No. 26.	Post-Test Mid Front Underbody View	A-13

		<u>Page No.</u>
Photo No. 27.	Pre-Test Mid Rear Underbody View	A-14
Photo No. 28.	Post-Test Mid Rear Underbody View	A-14
Photo No. 29.	Pre-Test Rear Underbody View	A-15
Photo No. 30.	Post-Test Rear Underbody View	A-15
Photo No. 31.	Pre-Test Dummy Cable Routing	A-16
Photo No. 32.	Post-Test Dummy Cable Routing	A-16
Photo No. 33.	Pre-Test Driver Dummy Front View	A-17
Photo No. 34.	Post-Test Driver Dummy Front View	A-17
Photo No. 35.	Pre-Test Driver Dummy Window View	A-18
Photo No. 36.	Post-Test Driver Dummy Window View	A-18
Photo No. 37.	Pre-Test Driver Dummy and Vehicle Interior (Door Open)	A-19
Photo No. 38.	Post-Test Driver Dummy and Vehicle Interior (Door Open)	A-19
Photo No. 39.	Pre-Test Driver's Seat Fore-Aft Markings	A-20
Photo No. 40.	Post-Test Driver's Seat Fore-Aft Markings	A-20
Photo No. 41.	Pre-Test Driver Dummy Feet	A-21
Photo No. 42.	Post-Test Driver Dummy Feet	A-21
Photo No. 43.	Pre-Test Driver's Side Knee Bolster (without dummy)	A-22
Photo No. 44.	Post-Test Driver's Side Knee Bolster (without dummy)	A-22
Photo No. 45.	Pre-Test Driver's Side Floorpan	A-23
Photo No. 46.	Post-Test Driver's Side Floorpan	A-23
Photo No. 47.	Post-Test Driver Dummy Face	A-24
Photo No. 48.	Post-Test Driver Dummy Contact with Airbag	A-24
Photo No. 49.	Post-Test Driver Dummy Contact with Headrest	A-25
Photo No. 50.	Pre-Test View of the Steering Wheel	A-25
Photo No. 51.	Post-Test View of the Steering Wheel	A-26
Photo No. 52.	Pre-Test Passenger Dummy Front View	A-26
Photo No. 53.	Post-Test Passenger Dummy Front View	A-27
Photo No. 54.	Pre-Test Passenger Dummy Window View	A-27

		<u>Page No.</u>
Photo No. 55.	Post-Test Passenger Dummy Window View	A-28
Photo No. 56.	Pre-Test Passenger Dummy and Vehicle Interior (Door Open)	A-28
Photo No. 57.	Post-Test Passenger Dummy and Vehicle Interior (Door Open)	A-29
Photo No. 58.	Pre-Test Passenger's Seat Fore-Aft Markings	A-29
Photo No. 59.	Post-Test Passenger's Seat Fore-Aft Markings	A-30
Photo No. 60.	Pre-Test Passenger Dummy Feet	A-30
Photo No. 61.	Post-Test Passenger Dummy Feet	A-31
Photo No. 62.	Pre-Test Passenger's Side Knee Bolster (without dummy)	A-31
Photo No. 63.	Post-Test Passenger's Side Knee Bolster (without dummy)	A-32
Photo No. 64.	Pre-Test Passenger's Side Floorpan	A-32
Photo No. 65.	Post-Test Passenger's Side Floorpan	A-33
Photo No. 66.	Post-Test Passenger Dummy Contact with Airbag	A-33
Photo No. 67.	Post-Test Passenger Dummy Contact with Headrest	A-34
Photo No. 68.	Ballast Installed in Vehicle	A-34
Photo No. 69.	Post-Test Stoddard Solvent Spillage Location View	A-35
Photo No. 70.	Post-Test Speed Trap Read-Out	A-35
Photo No. 71.	Vehicle at 0 Degrees on Static Rollover Device	A-36
Photo No. 72.	Vehicle at 90 Degrees on Static Rollover Device	A-36
Photo No. 73.	Vehicle at 180 Degrees on Static Rollover Device	A-37
Photo No. 74.	Vehicle at 270 Degrees on Static Rollover Device	A-37
Photo No. 75.	Vehicle at 360 Degrees on Static Rollover Device	A-38
Photo No. 76.	2012 Chevrolet Camaro Frontal Impact Event	A-38
Photo No. 77.	Monroney Label	A-39



Load Cell Location



Load Cell Wall



Manufacturer's Label



Tire Placard



2012 Chevrolet Camaro Frontal As Delivered



Left Rear Three-Quarter View, As Received



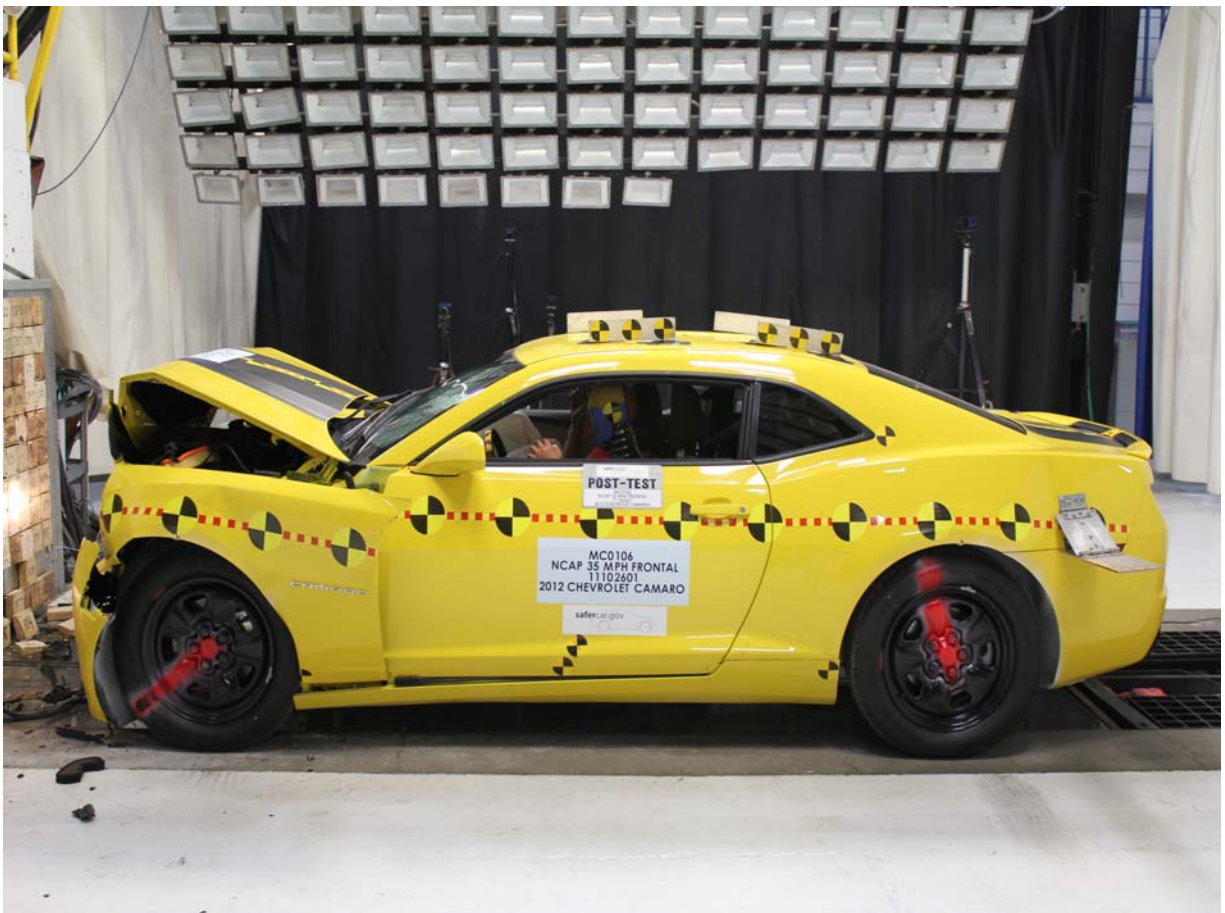
Pre-Test Front View of Test Vehicle



Post-Test Front View of Test Vehicle



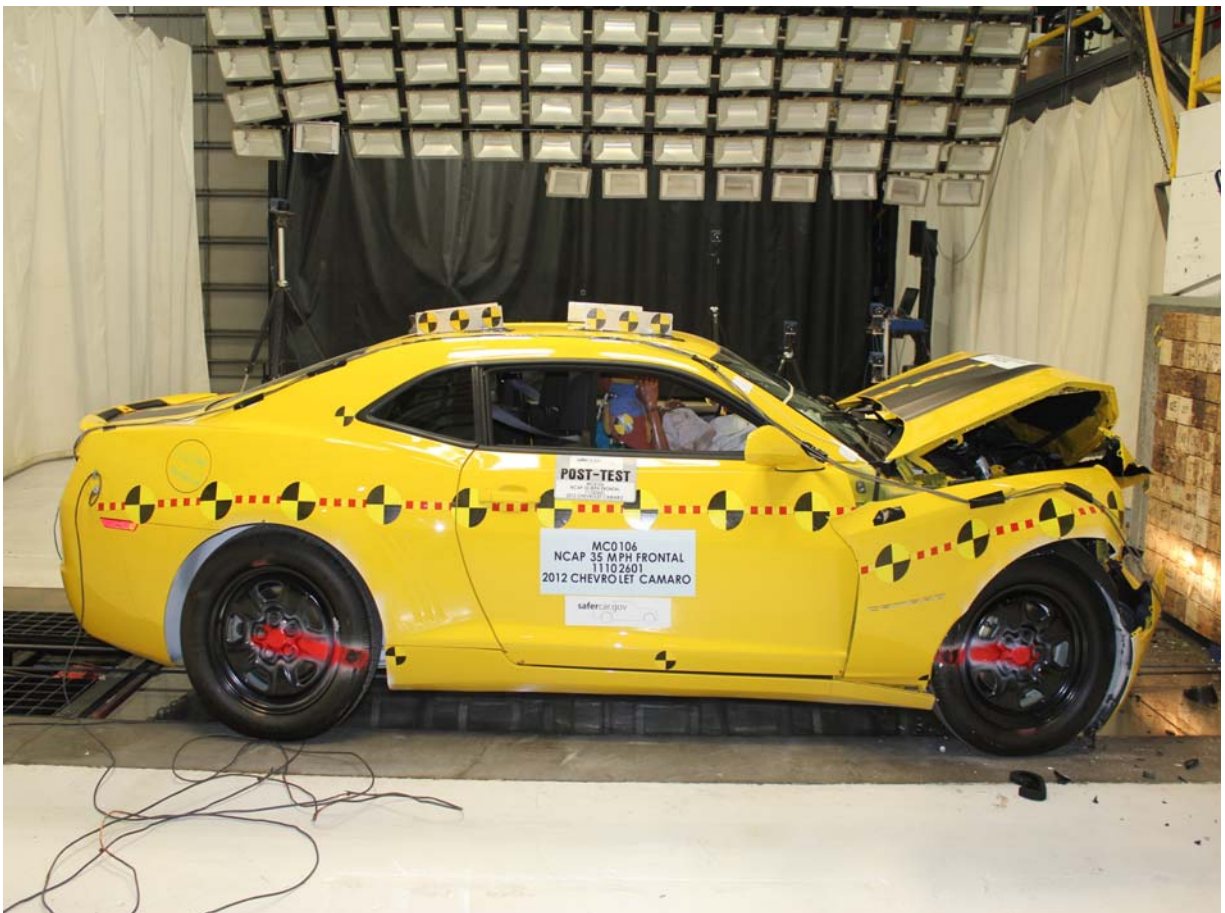
Pre-Test Left View of Test Vehicle



Post-Test Left View of Test Vehicle



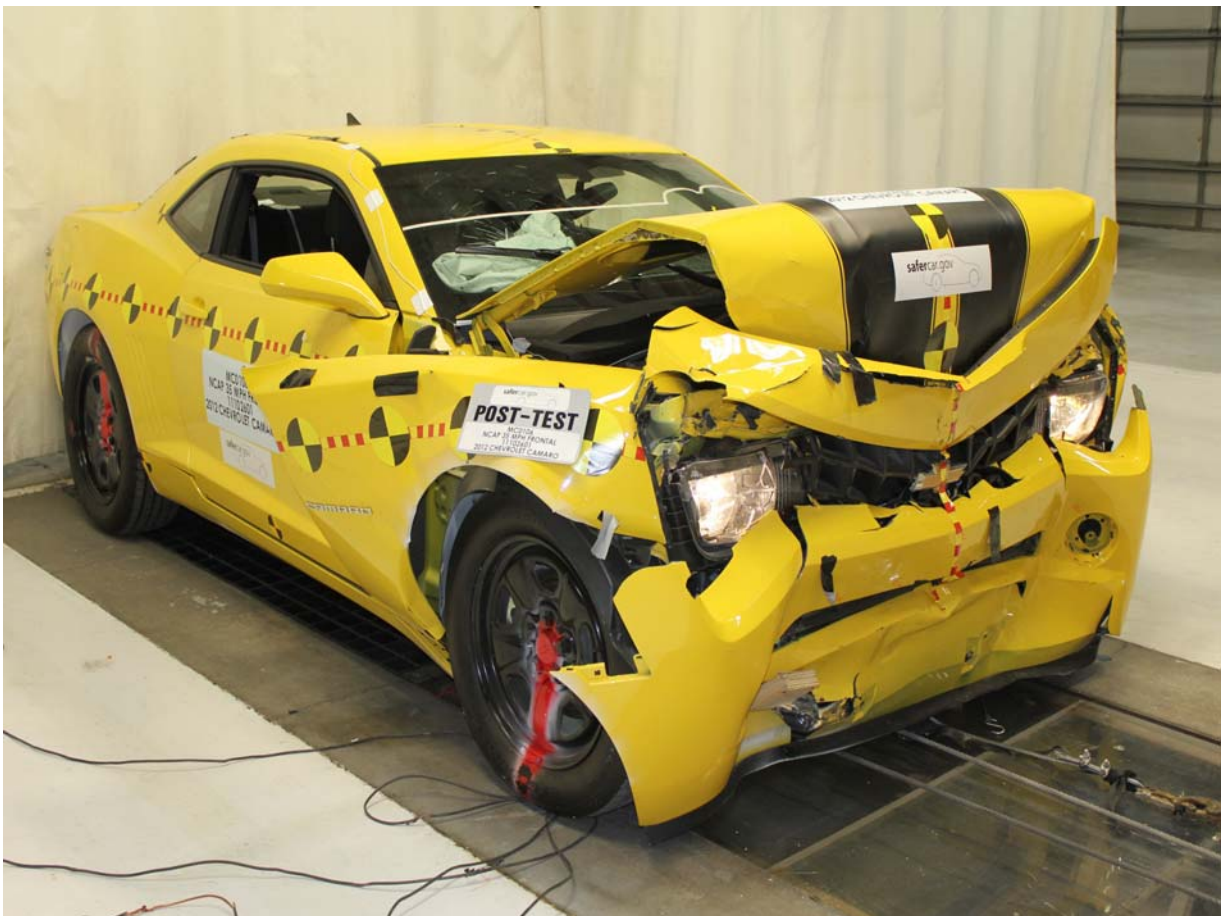
Pre-Test Right View of Test Vehicle



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



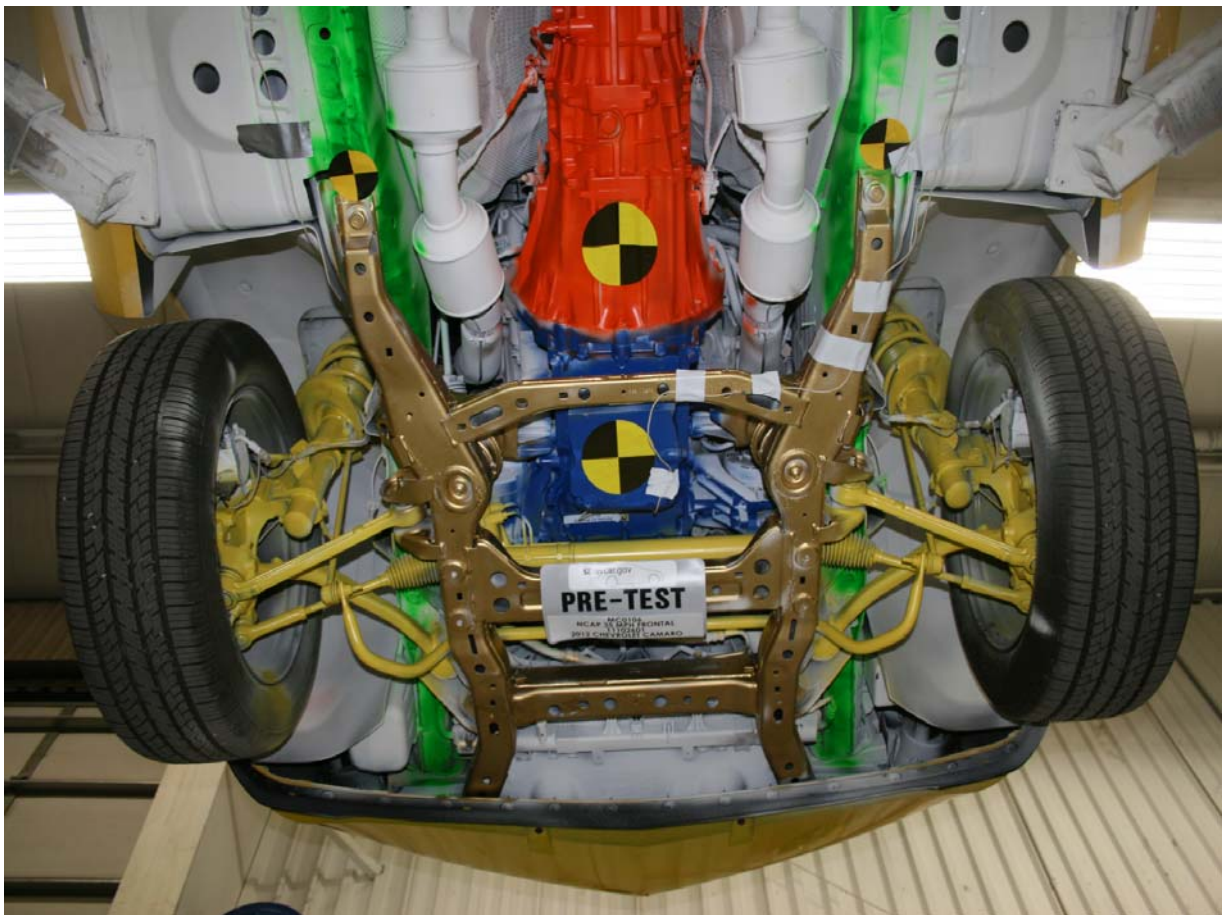
Post-Test Engine Compartment View



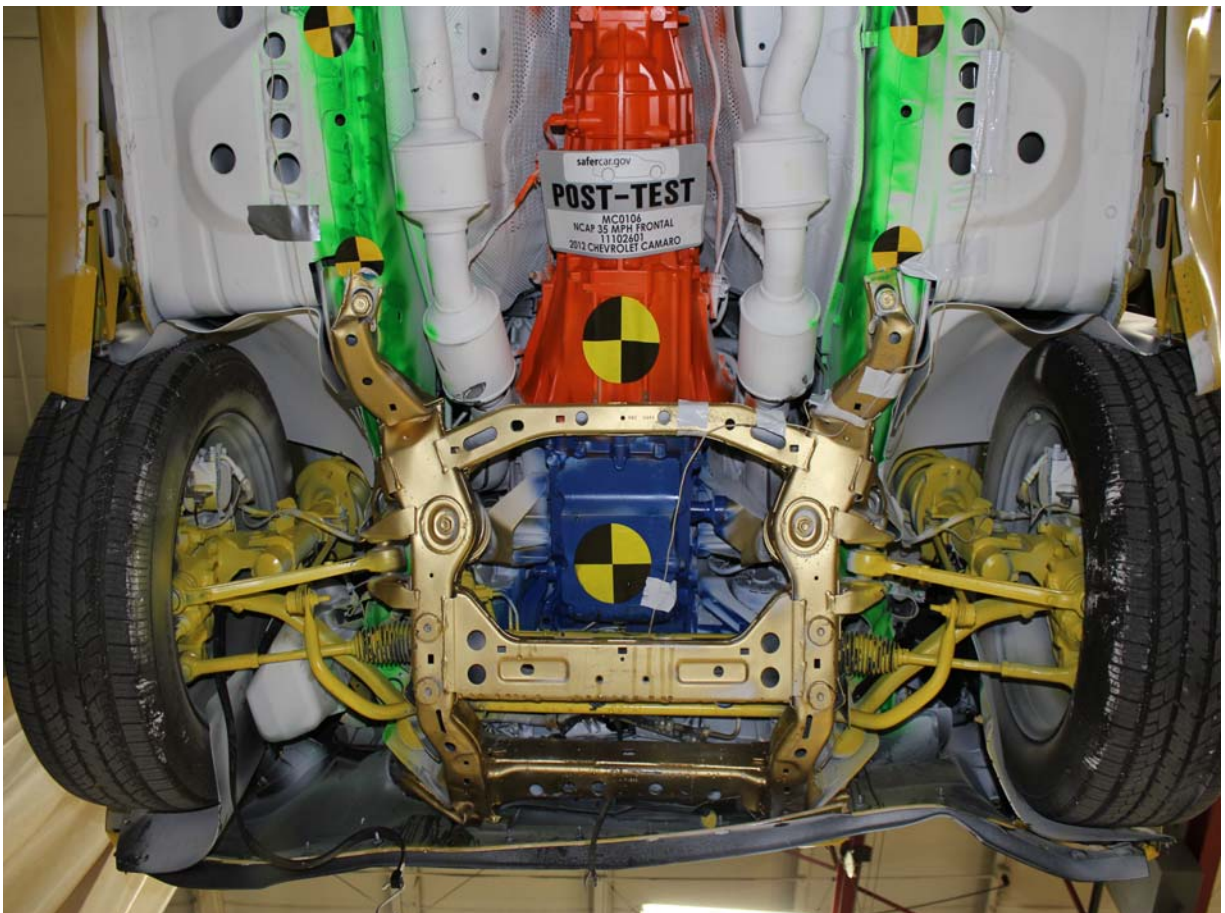
Pre-Test Fuel Filler Cap View



Post-Test Fuel Filler Cap View



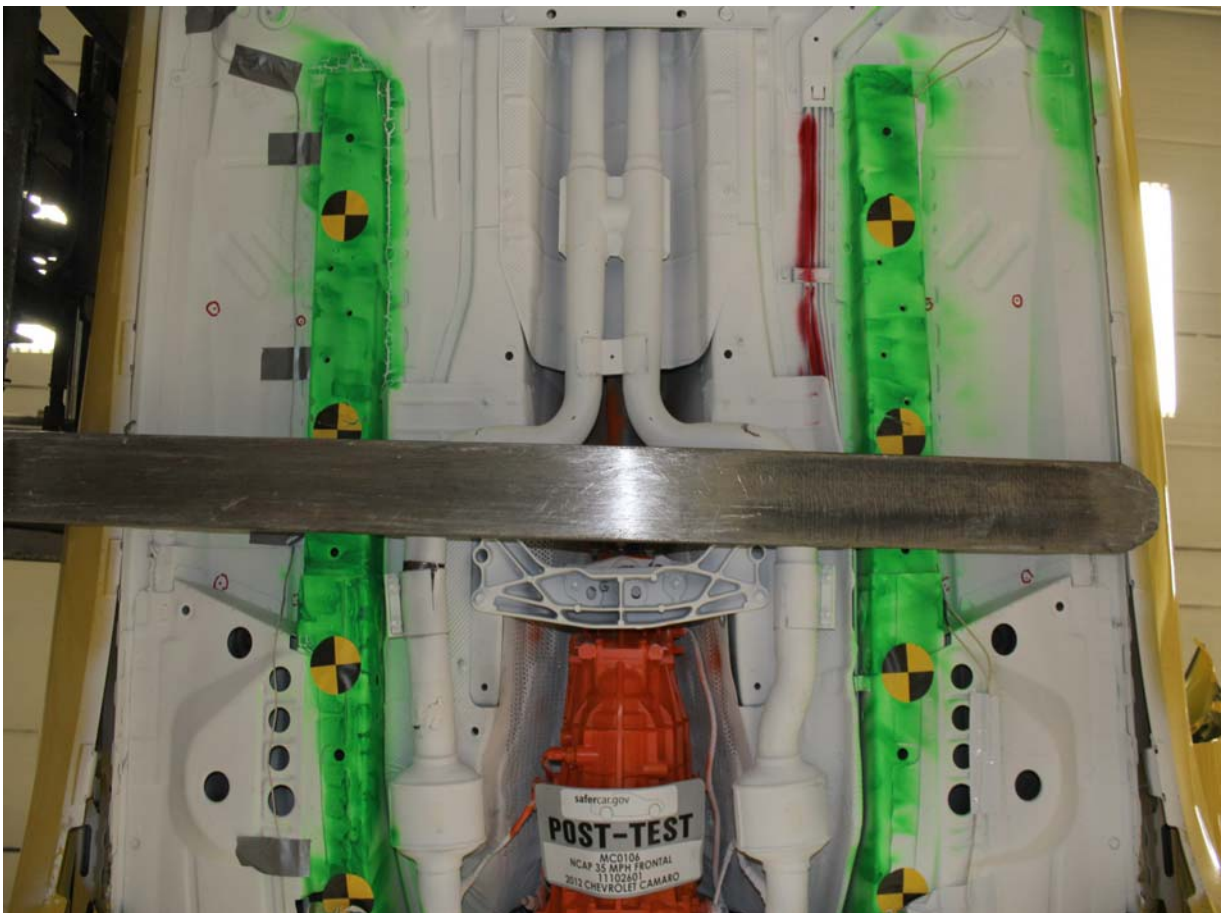
Pre-Test Front Underbody View



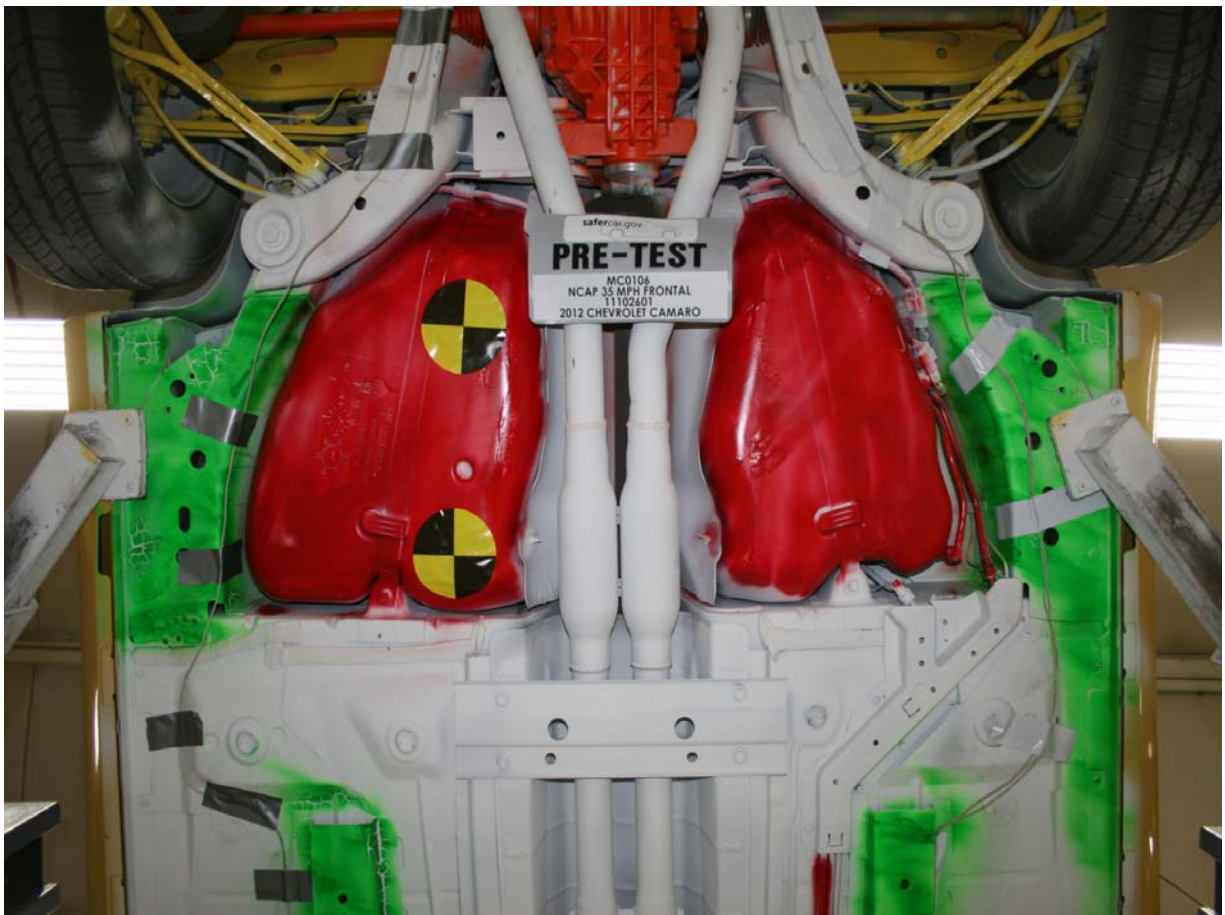
Post-Test Front Underbody View



Pre-Test Mid Front Underbody View



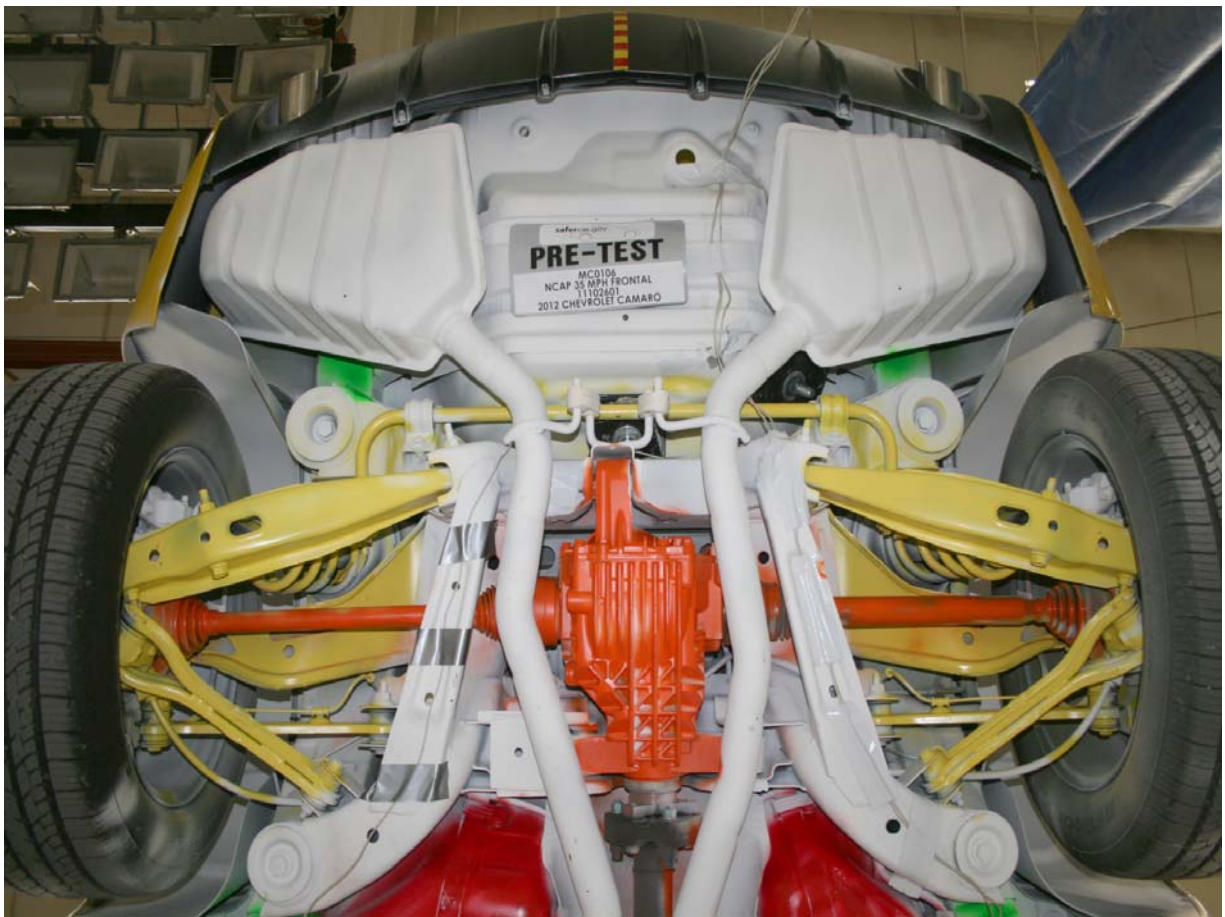
Post-Test Mid Front Underbody View



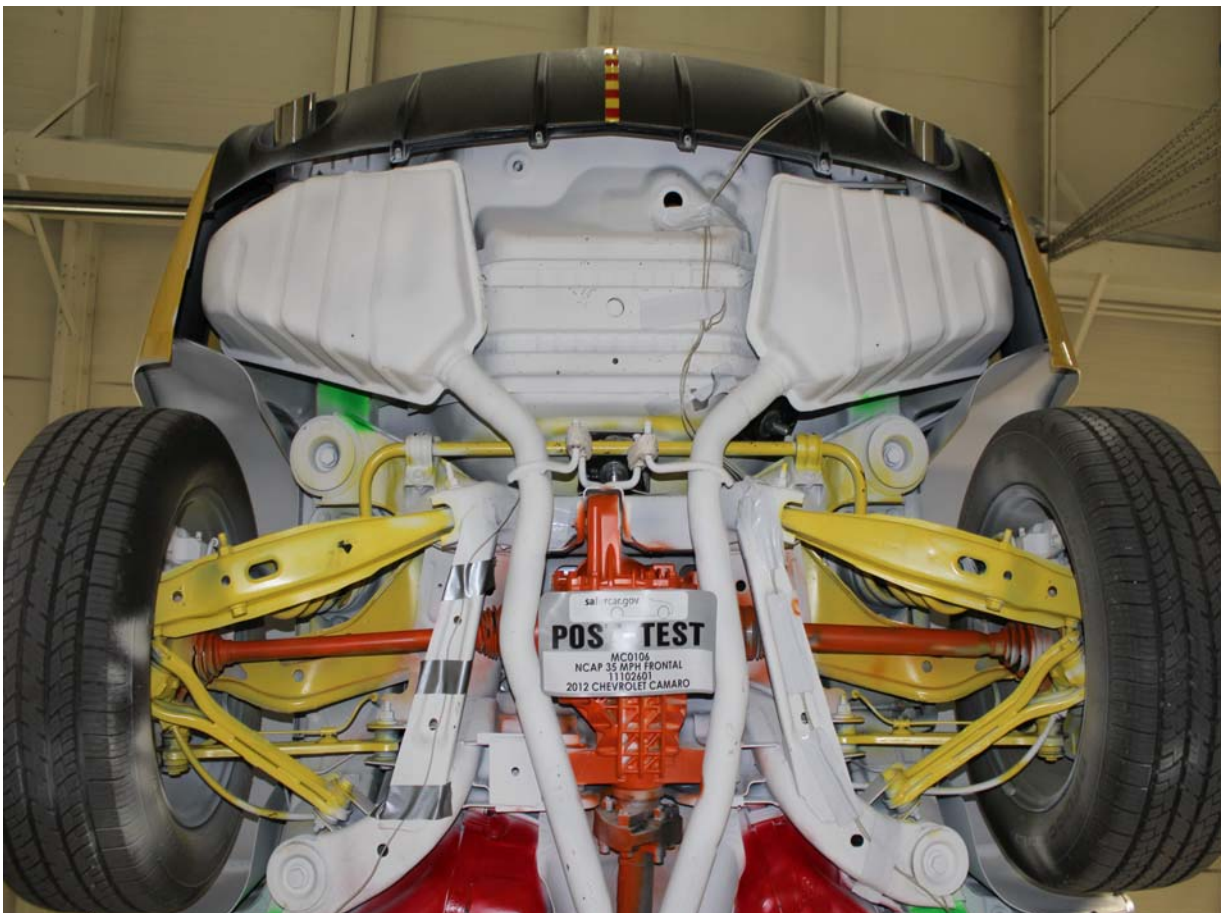
Pre-Test Mid Rear Underbody View



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



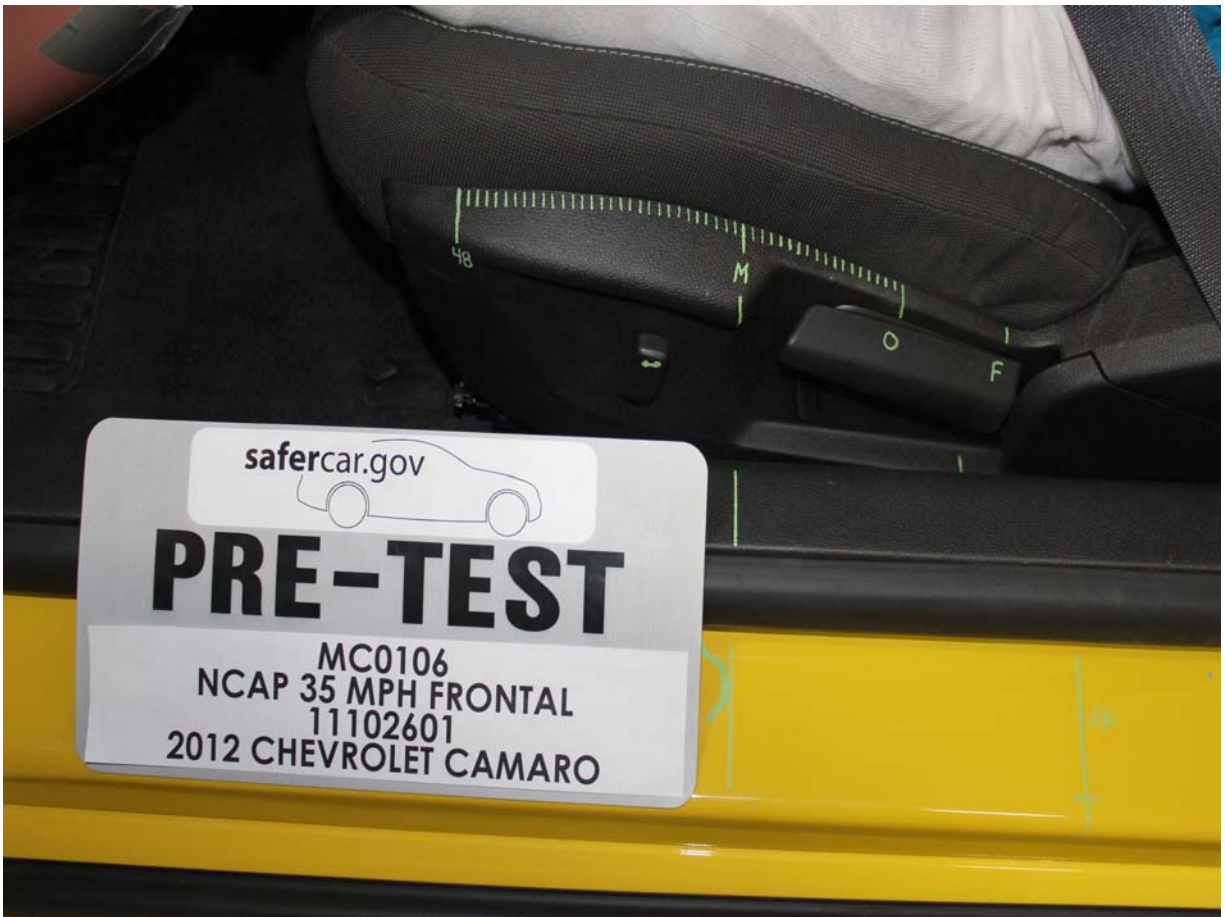
Post-Test Driver Dummy Window View



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



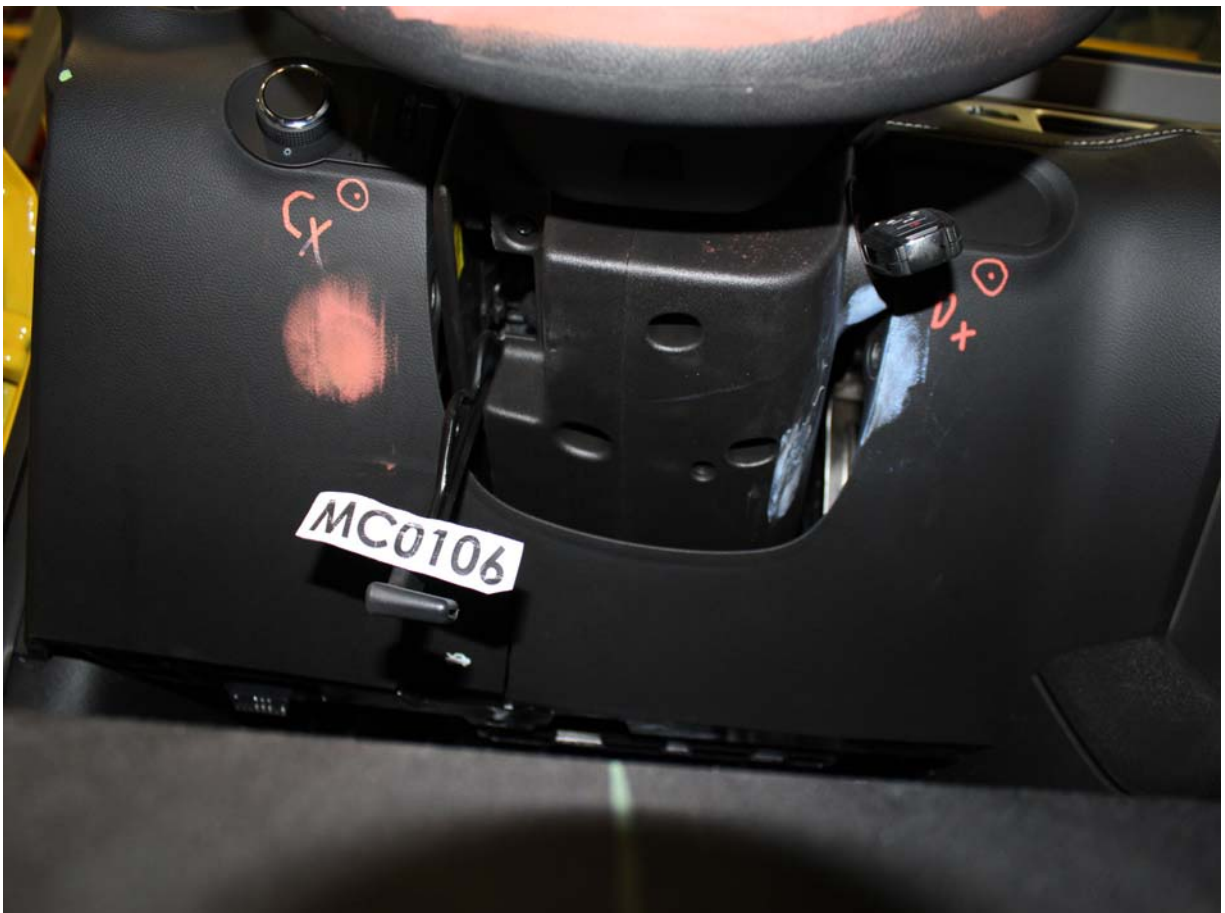
Pre-Test Driver Dummy Feet



Post-Test Driver Dummy Feet



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



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

PHOTOGRAPH NOT APPLICABLE

Pre-Test Driver's Side Floorpan

PHOTOGRAPH NOT APPLICABLE

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



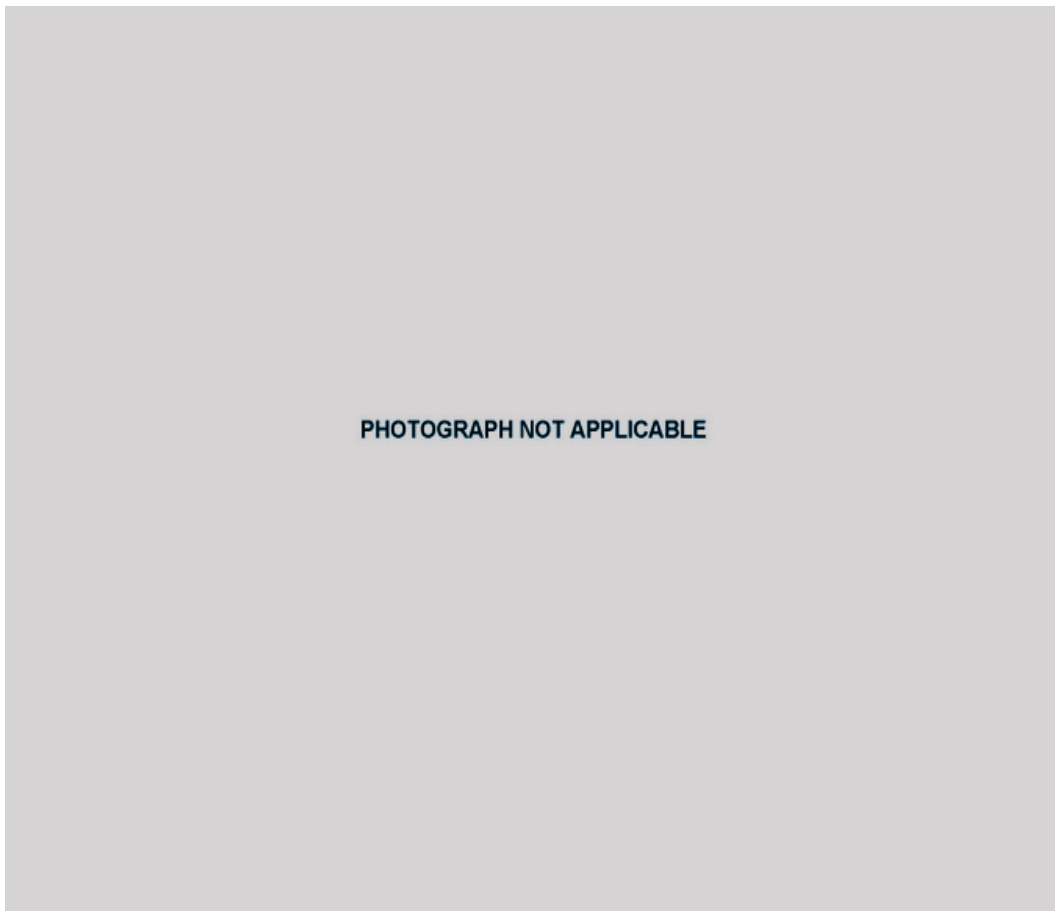
Post-Test Passenger Dummy Feet



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



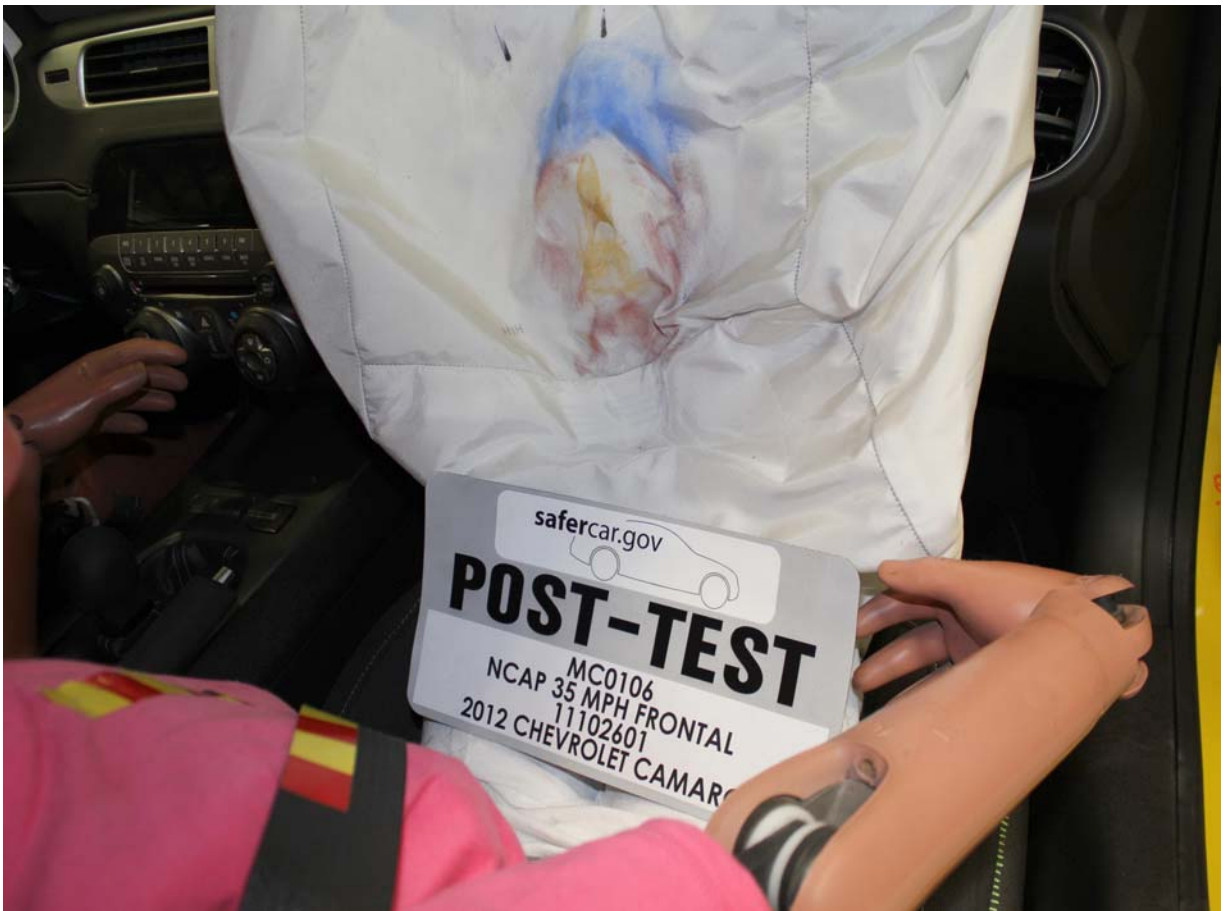
Post-Test Passenger's Side Knee Bolster (without dummy)



Pre-Test Passenger's Side Floorpan

PHOTOGRAPH NOT APPLICABLE

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



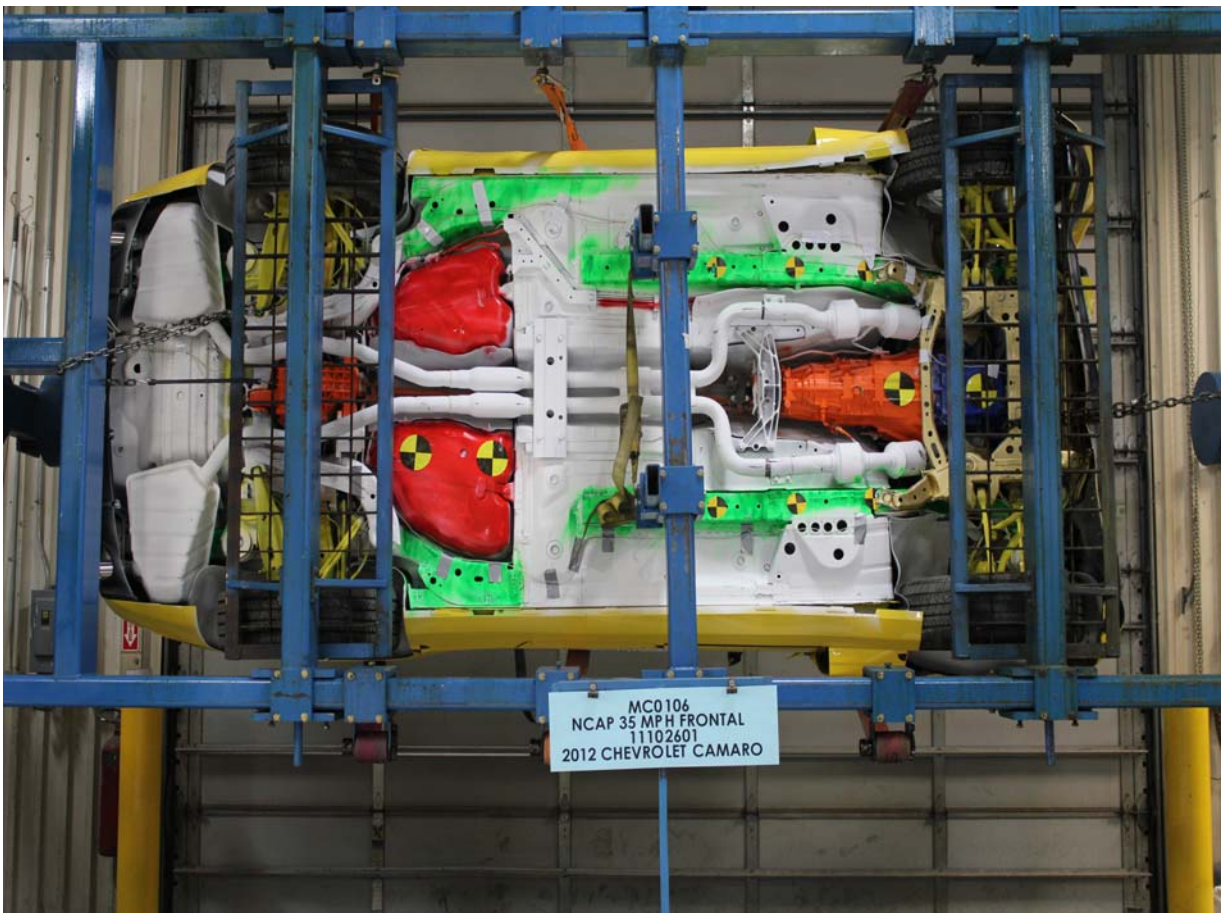
Vehicle at 0 Degrees on Static Rollover Device



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 Camaro Frontal Impact Event



2012 CAMARO 1LS COUPE

EXTERIOR: RALLY YELLOW
INTERIOR: INTERIOR TRIM JET BLACK

ENGINE 3.6L, SIDI V6
TRANSMISSION, 6-SPEED MANUAL

Visit us at 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

MECHANICAL

- TRANSMISSION, 6 SPEED MANUAL
- ENGINE 3.6L, SIDI V6
- POWER STEERING-VARIABLE RATIO

SAFETY & SECURITY

- ANTI LOCK BRAKE SYSTEM, 4 WHEEL DISC
- AIRBAGS, DRIVER & FRONT PASS, FRONT / SIDE IMPACT
- AIRBAGS - SIDE HEAD CURTAIN FRONT AND REAR OCCUPANTS
- REAR CHILD SEAT LATCH ANCHORS
- THEFT DETERRANT SYSTEM
- STABILITRAK-STABILITY CONTROL INCLUDES TRACTION CONTROL
- 6 MTHS ONSTAR DIRECTIONS AND

- CONNECTIONS WITH AUTOMATIC CRASH RESPONSE, TURN-BY-TURN NAVIGATION AND ONSTAR REMOTE LINK (ASK DEALER ABOUT GEOGRAPHIC COVERAGE)
- TIRE PRESSURE MONITOR SYSTEM (EXCL. SPARE TIRE)
- BATTERY RUNDOWN PROTECTION

INTERIOR

- POWER WINDOWS, DRIVER AND PASSENGER EXPRESS DOWN/UP
- TIRE SEALANT AND INFLATOR KIT (IN PLACE OF SPARE TIRE)
- SEAT ADJUSTER DRIVER
- 4-WAY MANUAL W/ POWER RECLINE
- SEAT ADJUSTER, PASSENGER
- 2-WAY MANUAL W/ POWER RECLINE
- TRUNK RELEASE, POWER
- AIR FILTRATION SYSTEM
- POWER OUTLETS, 2 AUXILIARY
- STEERING WHEEL MOUNTED

AUDIO CONTROLS

- XM RADIO + SERVICE SUBSCRIPTION SOLD SEPARATELY BY SIRIUSXM AFTER 3 MTHS
- BLUETOOTH FOR PHONE
- AM/FM STEREO, CD PLAYER

EXTERIOR

- REAR SPOILER
- POWER OUTSIDE MIRRORS
- DAYTIME RUNNING LAMPS
- WHEELS, 18" HERITAGE STEEL

OPTIONS & PRICING

MANUFACTURER'S SUGGESTED RETAIL PRICES

STANDARD VEHICLE PRICE \$23,200.00

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

BLACK STRIPE PACKAGE 470.00
RALLY YELLOW 325.00
WHEEL & TIRE, SPARE, COMPACT 150.00
(REPLACES TIRE SEALANT KIT)

TOTAL OPTIONS \$945.00
TOTAL VEHICLE & OPTIONS \$24,145.00
DESTINATION CHARGE 900.00
TOTAL VEHICLE PRICE \$25,045.00**

EPA Fuel Economy Estimates

CITY MPG

17

Expected range for most drivers
14 to 20 MPG

Estimated Annual Fuel Cost
\$2,775

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

HIGHWAY MPG

28

Expected range for most drivers
23 to 33 MPG

Combined Fuel Economy

This Vehicle

20

14 to 41

ALL COMPACT CARS

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

AGA

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

GOVERNMENT SAFETY RATINGS

Frontal Crash	Driver Passenger	Not Rated Not Rated
Star ratings based on the risk of injury in a frontal impact. Frontal ratings should <u>ONLY</u> be compared to other vehicles of similar size and weight.		
Side Crash	Front seat Rear seat	Not Rated Not Rated
Star ratings based on the risk of injury in a side impact.		
Rollover	★★★★★	
Star ratings based on the risk of rollover in a single vehicle crash.		
Star ratings range from 1 to 5 stars (★★★★★), with 5 being the highest. Source: National Highway Traffic Safety Administration (NHTSA).		

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

PARTS CONTENT INFORMATION

FOR VEHICLES IN THIS CARLINE:
U.S./CANADIAN PARTS CONTENT: 75%

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

FOR THIS VEHICLE:
FINAL ASSEMBLY POINT:
OSHAWA, ON CANADA
COUNTRY OF ORIGIN:
ENGINE: CANADA
TRANSMISSION: JAPAN

This label has been applied pursuant to Federal law. Do not remove prior to delivery to the ultimate purchaser. Vehicles manufactured in Canada. Does not include dealer-installed options and accessories not listed above, local taxes or license fees.

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ORDER NO. (PRINT) SALES CODE 1
SALES CODE, CODE LIST
DEALER NO. (PRINT)
FINAL ASSEMBLY
OSHAWA, ON CANADA

VIN 2G11FE1E31C9119073

DEALER TO WHOM DELIVERED
RAY CHEVROLET, INC.
35 N RTE 12
FOX LAKE, IL 60020-1222



CE
1GA0260839

Monroney Label

APPENDIX B
DUMMY RESPONSE DATA TRACES

TABLE OF DATA PLOTS

Page No.

List of Data Plots Provided in the Test Report

Figure No. 1.	Driver Head X Acceleration vs. Time	B-1
Figure No. 2.	Driver Head Y Acceleration vs. Time	B-1
Figure No. 3.	Driver Head Z Acceleration vs. Time	B-1
Figure No. 4.	Driver Head Resultant Acceleration vs. Time	B-1
Figure No. 5.	Driver Chest Displacement vs. Time	B-2
Figure No. 6.	Driver Chest X Acceleration vs. Time	B-3
Figure No. 7.	Driver Chest Y Acceleration vs. Time	B-3
Figure No. 8.	Driver Chest Z Acceleration vs. Time	B-3
Figure No. 9.	Driver Chest Resultant Acceleration vs. Time	B-3
Figure No. 10.	Driver Neck Force X vs. Time	B-4
Figure No. 11.	Driver Neck Force Z vs. Time	B-4
Figure No. 12.	Driver Neck Moment Y vs. Time	B-4
Figure No. 13.	Driver Nij (NTF) vs. Time	B-5
Figure No. 14.	Driver Nij (NTE) vs. Time	B-5
Figure No. 15.	Driver Nij (NCF) vs. Time	B-5
Figure No. 16.	Driver Nij (NCE) vs. Time	B-5
Figure No. 17.	Driver Left Femur Force vs. Time	B-6
Figure No. 18.	Driver Right Femur Force vs. Time	B-6
Figure No. 19.	Passenger Head X Acceleration vs. Time	B-7
Figure No. 20.	Passenger Head Y Acceleration vs. Time	B-7
Figure No. 21.	Passenger Head Z Acceleration vs. Time	B-7
Figure No. 22.	Passenger Head Resultant Acceleration vs. Time	B-7
Figure No. 23.	Passenger Chest Displacement vs. Time	B-8
Figure No. 24.	Passenger Chest X Acceleration vs. Time	B-9
Figure No. 25.	Passenger Chest Y Acceleration vs. Time	B-9
Figure No. 26.	Passenger Chest Z Acceleration vs. Time	B-9
Figure No. 27.	Passenger Chest Resultant Z Acceleration vs. Time	B-9

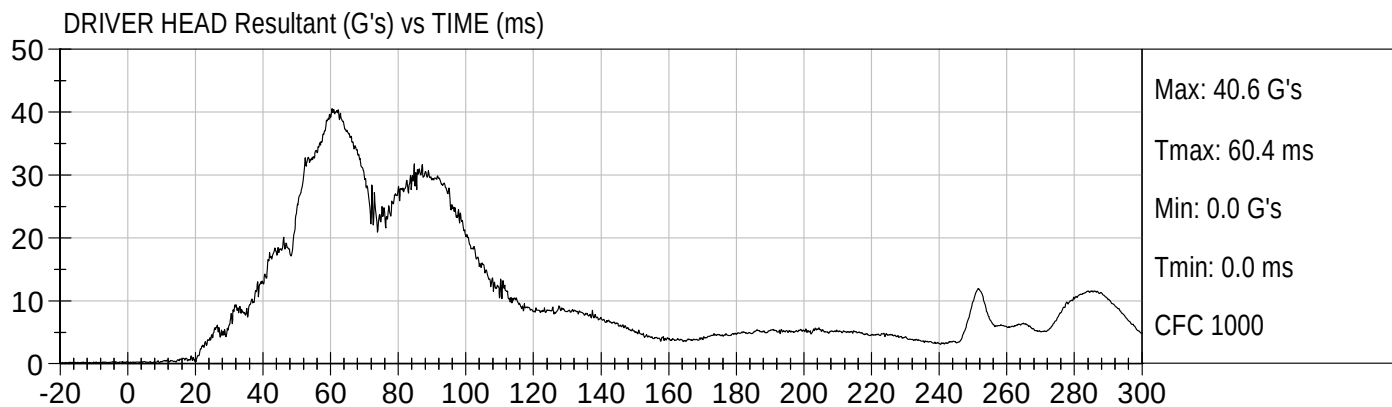
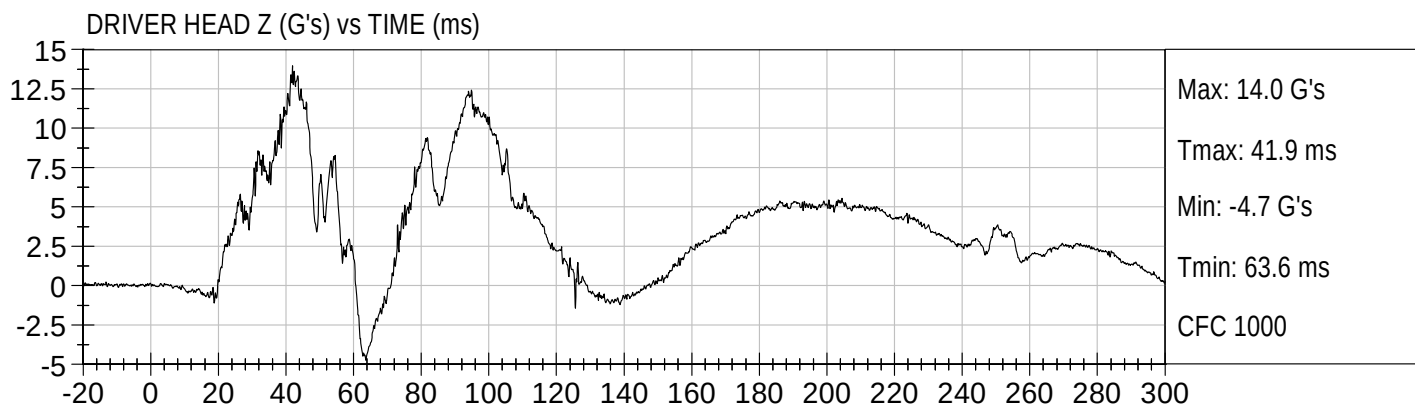
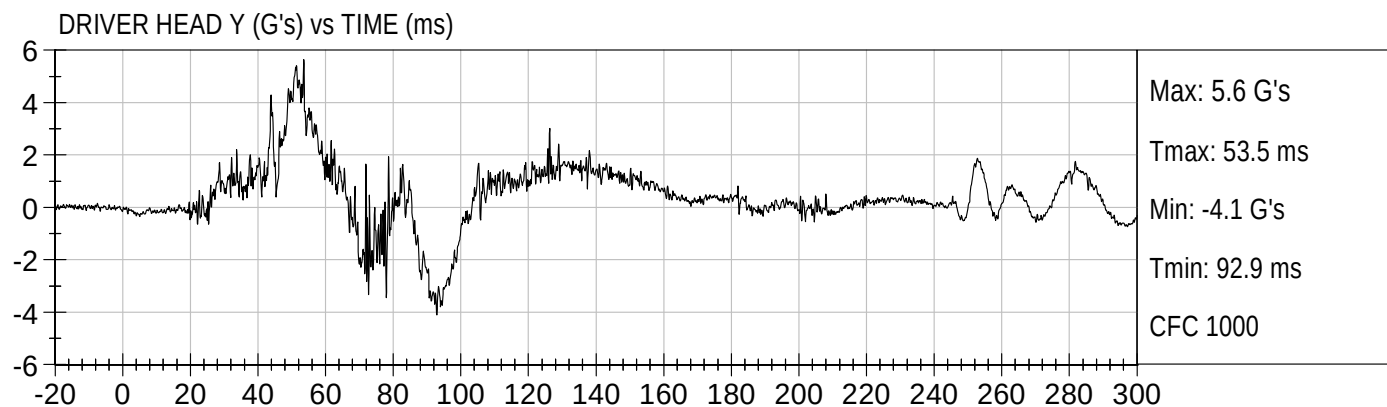
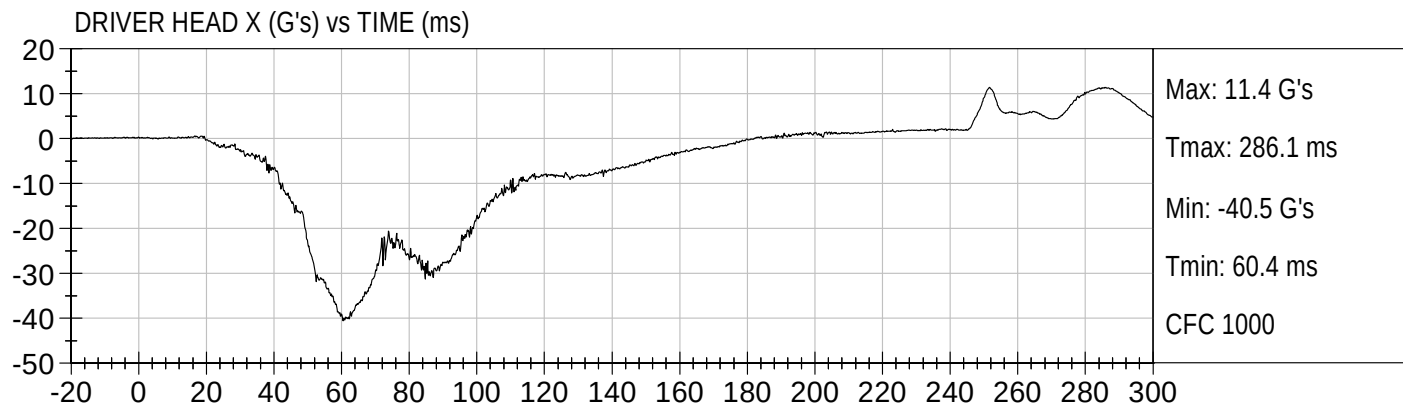
	<u>Page No.</u>
Figure No. 28. Passenger Neck Force X vs. Time	B-10
Figure No. 29. Passenger Neck Force Z vs. Time	B-10
Figure No. 30. Passenger Neck Moment Y vs. Time	B-10
Figure No. 31. Passenger Nij (NTF) vs. Time	B-11
Figure No. 32. Passenger Nij (NTE) vs. Time	B-11
Figure No. 33. Passenger Nij (NCF) vs. Time	B-11
Figure No. 34. Passenger Nij (NCE) vs. Time	B-11
Figure No. 35. Passenger Left Femur Force vs. Time	B-12
Figure No. 36. Passenger Right Femur Force vs. Time	B-12

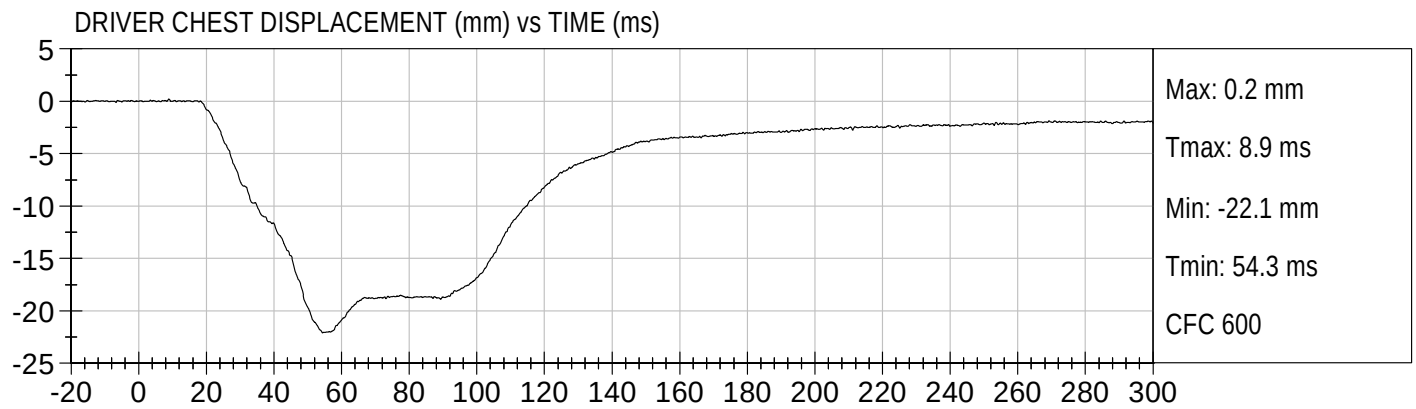
The following additional dummy and vehicle response data can be found in the R&D section of the NHTSA website at www.nhtsa.dot.gov

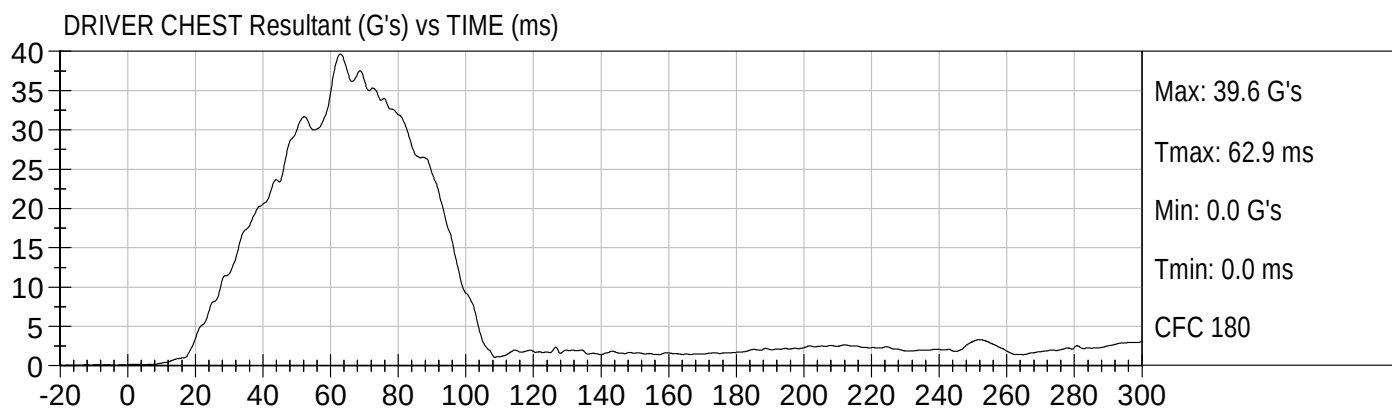
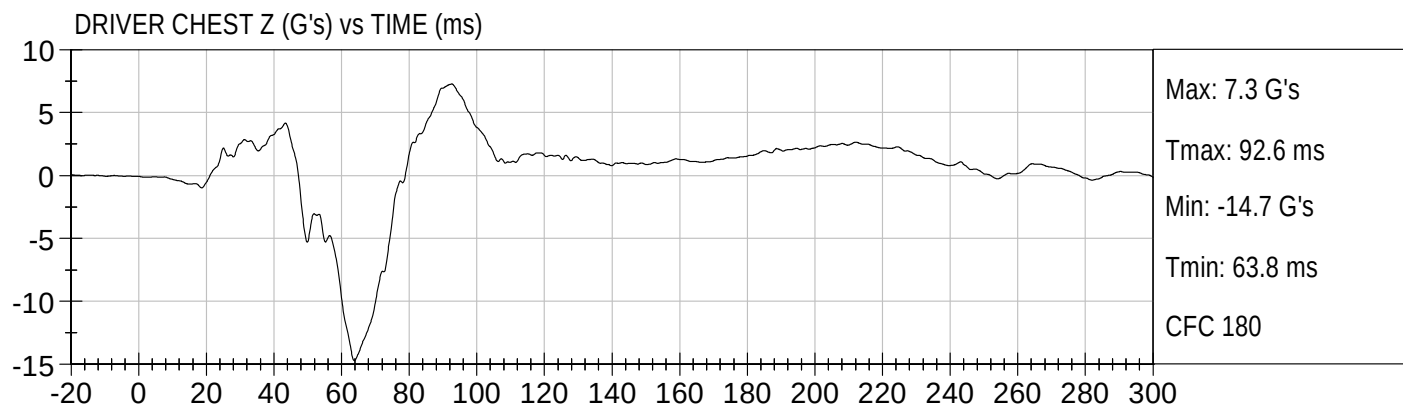
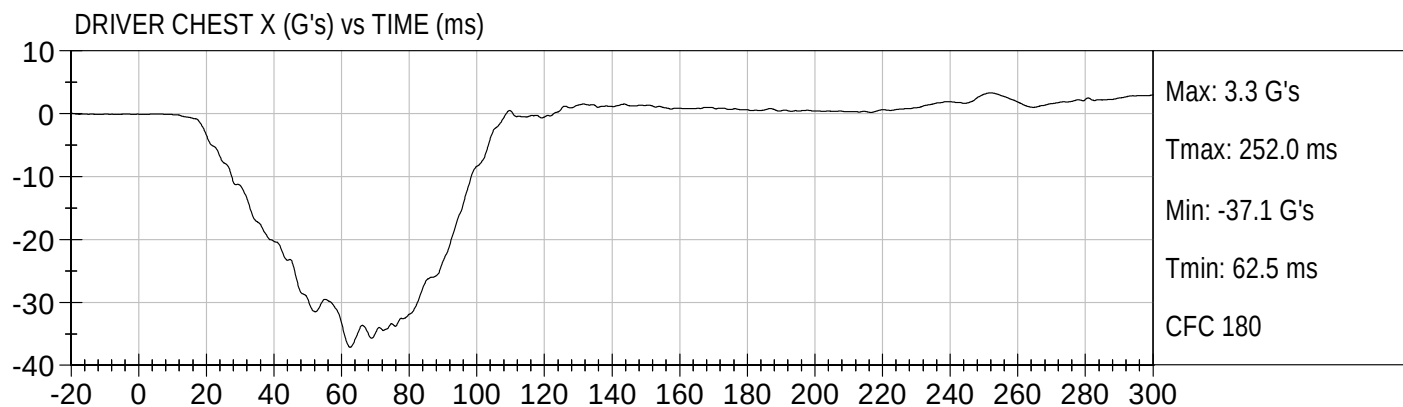
Driver Head X Redundant
 Driver Head Y Redundant
 Driver Head Z Redundant
 Driver Upper Neck Force Y
 Driver Upper Neck Moment X
 Driver Upper Neck Moment Z
 Driver Chest X Redundant
 Driver Chest Y Redundant
 Driver Chest Z Redundant
 Driver Pelvis X
 Driver Pelvis Y
 Driver Pelvis Z
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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

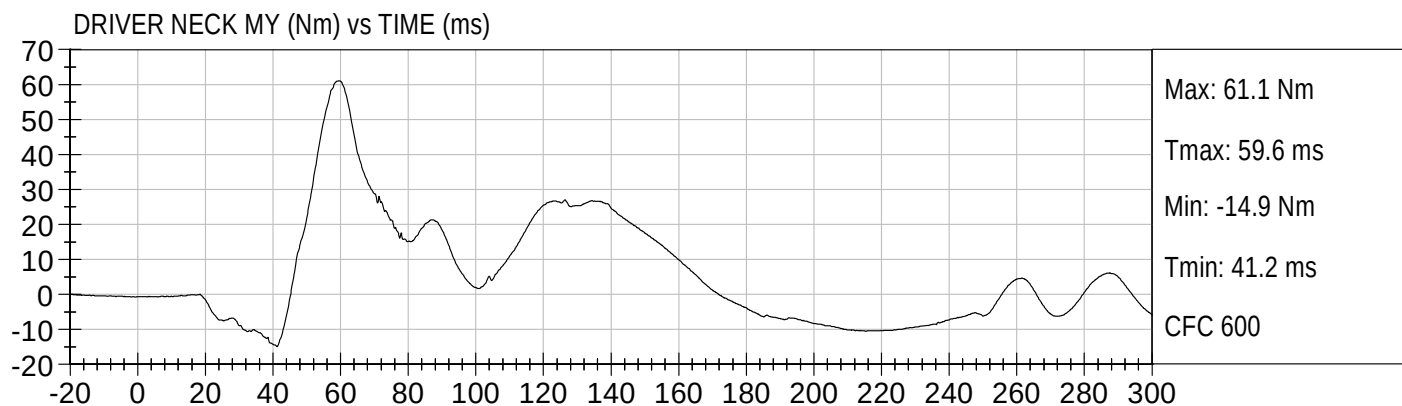
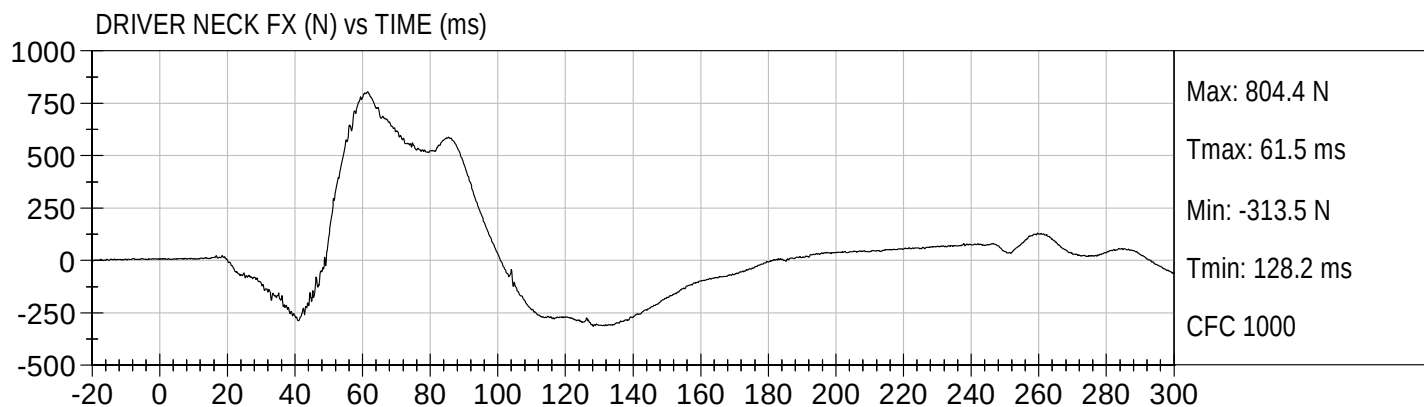
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Driver Left Lower Tibia Force Z
Driver Right Upper Tibia Moment X
Driver Right Upper Tibia Moment Y
Driver Right Upper Tibia Force Z
Driver Right Lower Tibia Moment X
Driver Right Lower Tibia Moment Y
Driver Right Lower Tibia Force Z
Driver Left Foot 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 Left Femur Redundant
Passenger Right Femur Redundant
Passenger Left Upper Tibia Moment X

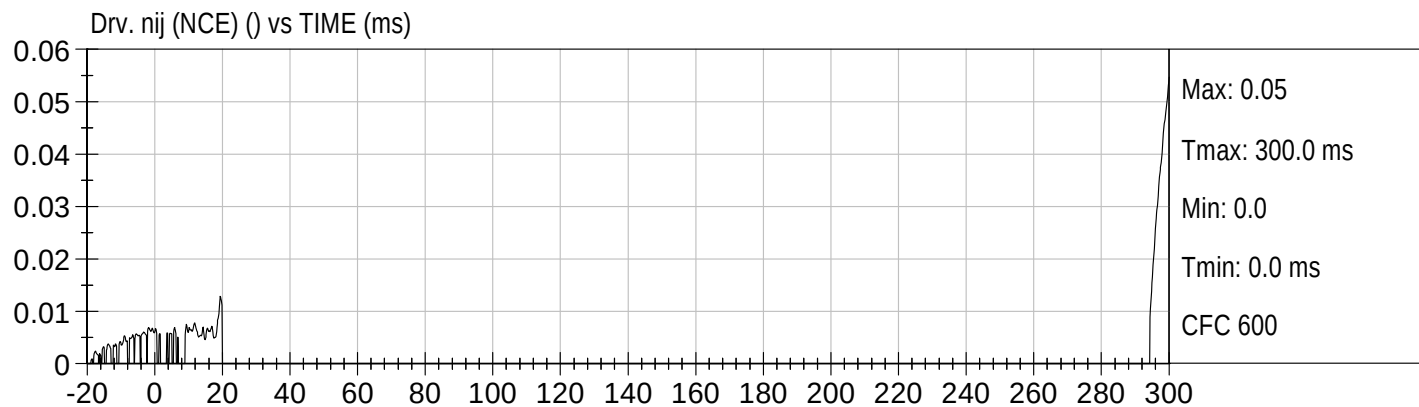
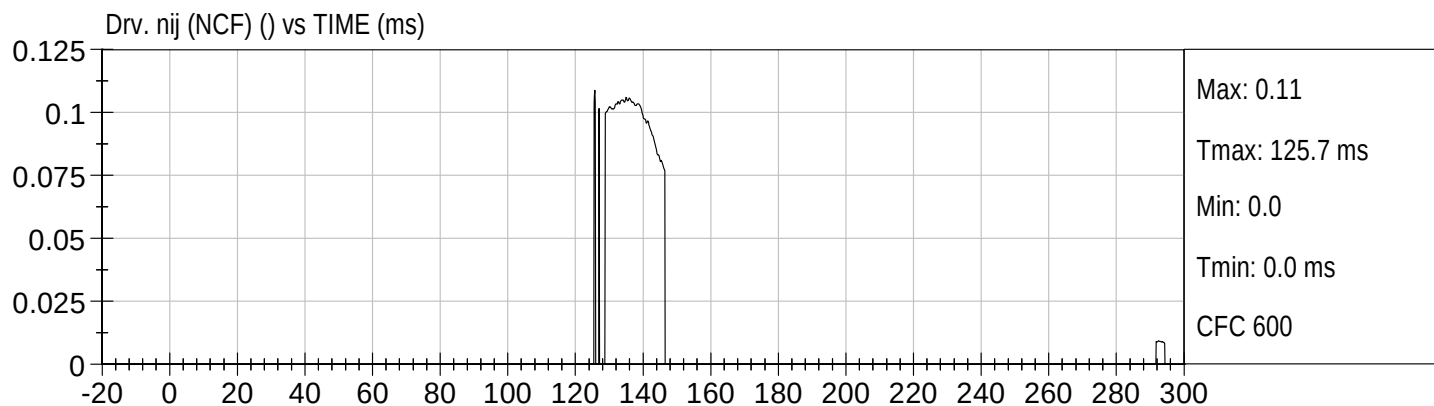
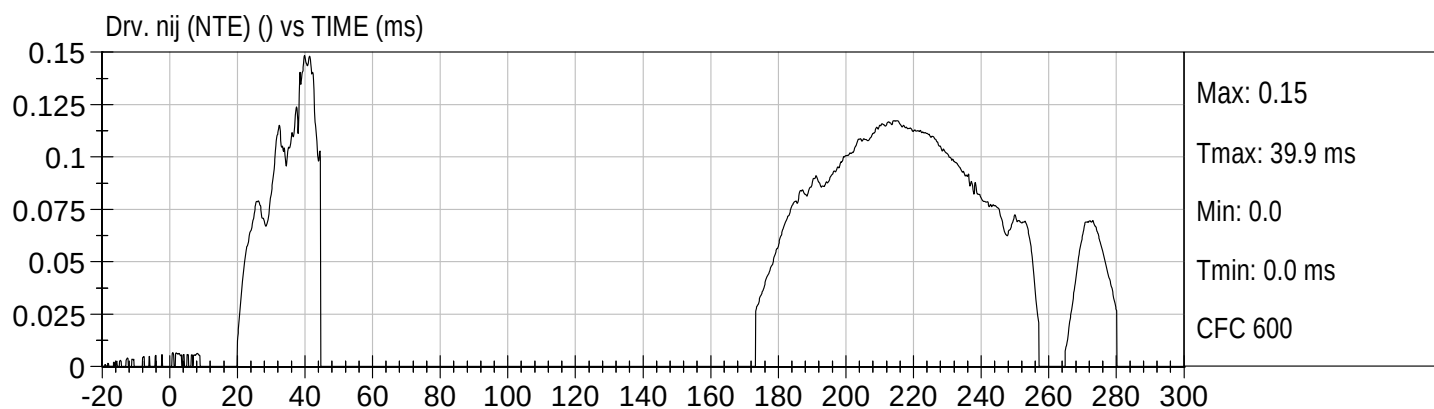
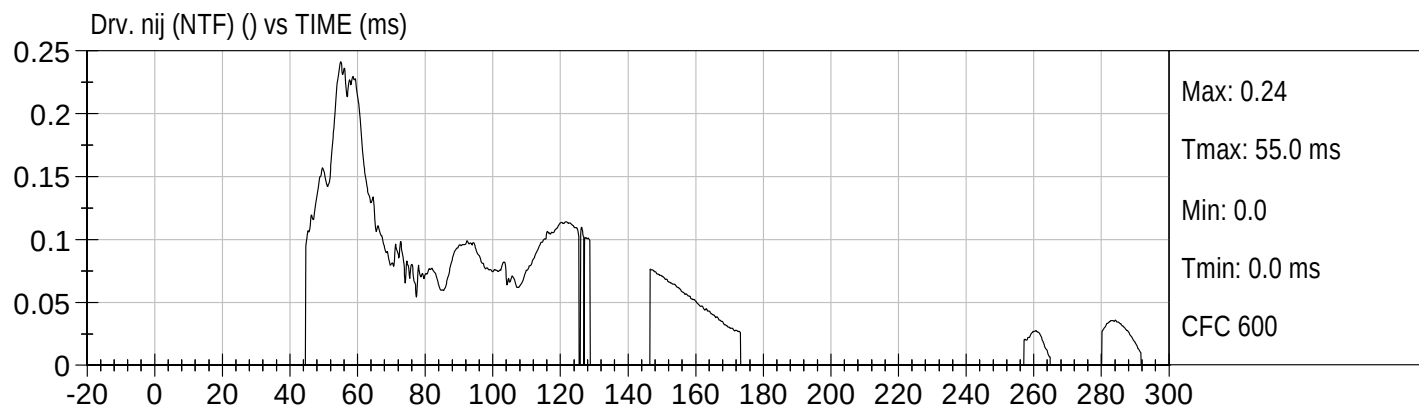
Passenger Left Upper Tibia Moment Y
Passenger Left Upper Tibia Force Z
Passenger Left Lower Tibia Moment X
Passenger Left Lower Tibia Moment Y
Passenger Left Lower Tibia Force Z
Passenger Right Upper Tibia Moment X
Passenger Right Upper Tibia Moment Y
Passenger Right Upper Tibia Force Z
Passenger Right 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

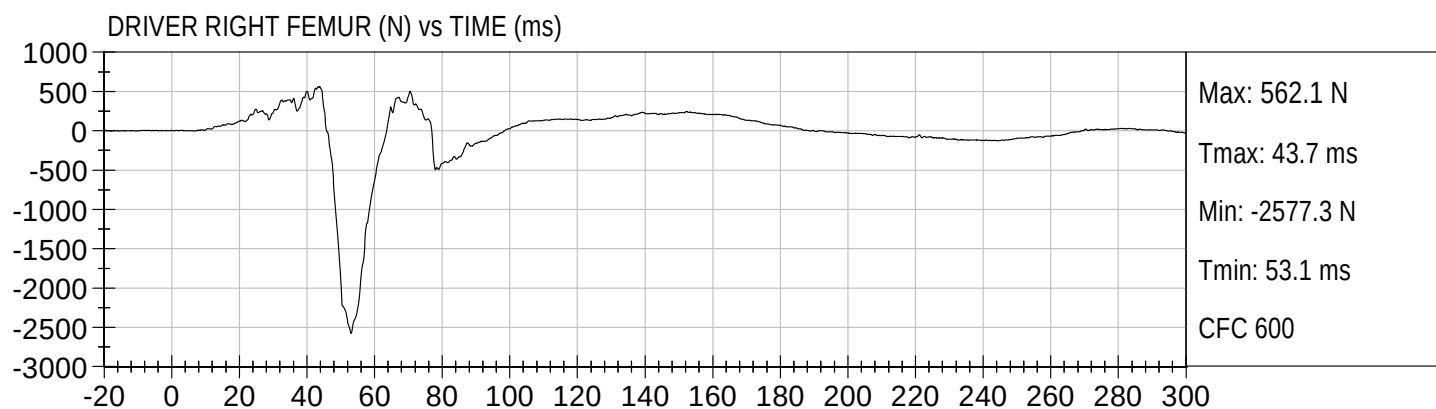
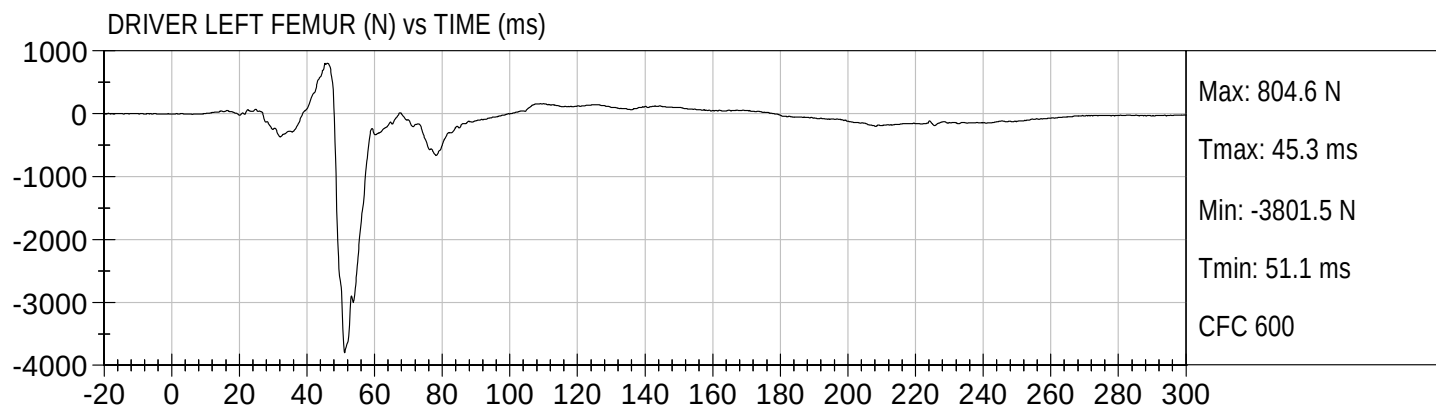


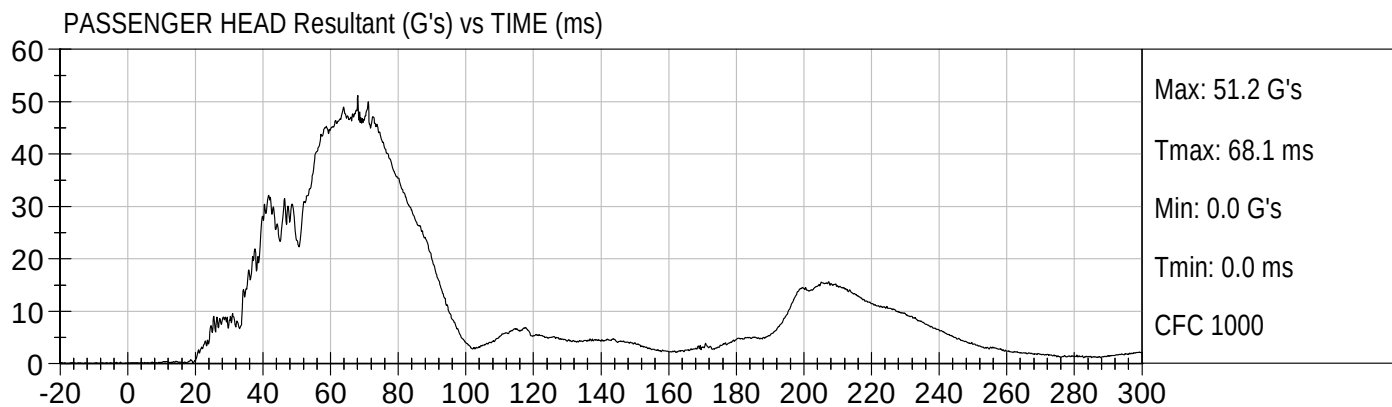
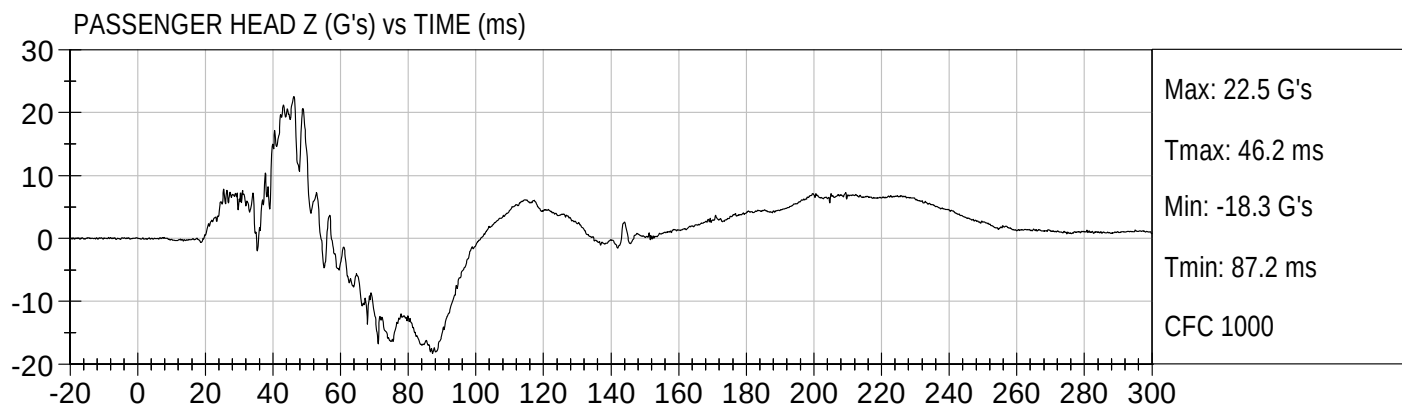
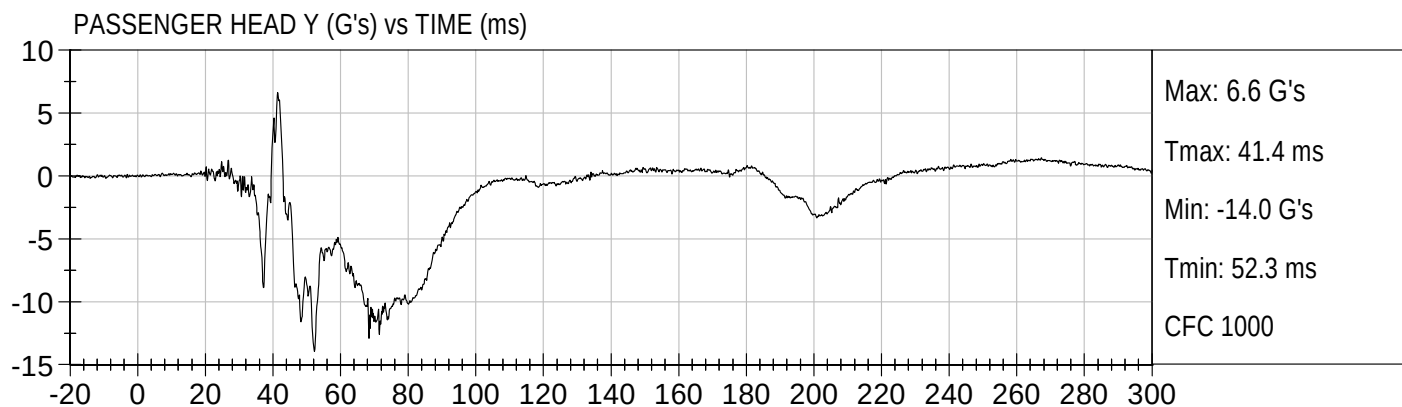
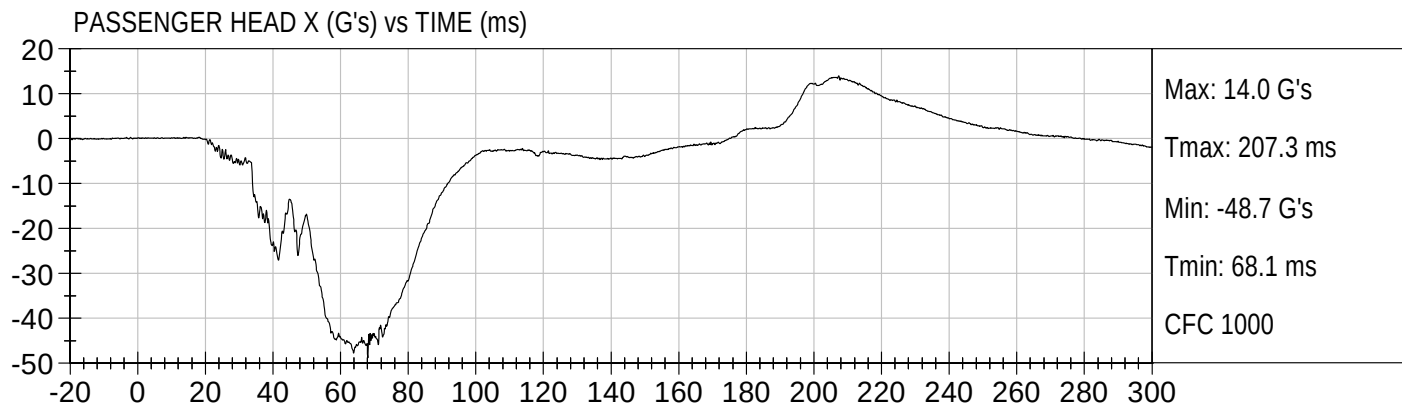


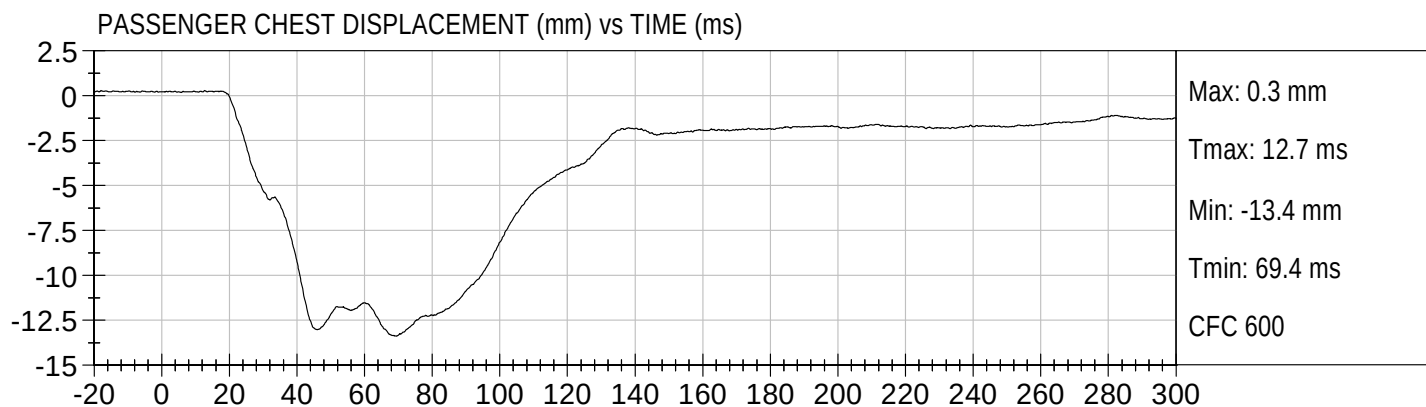


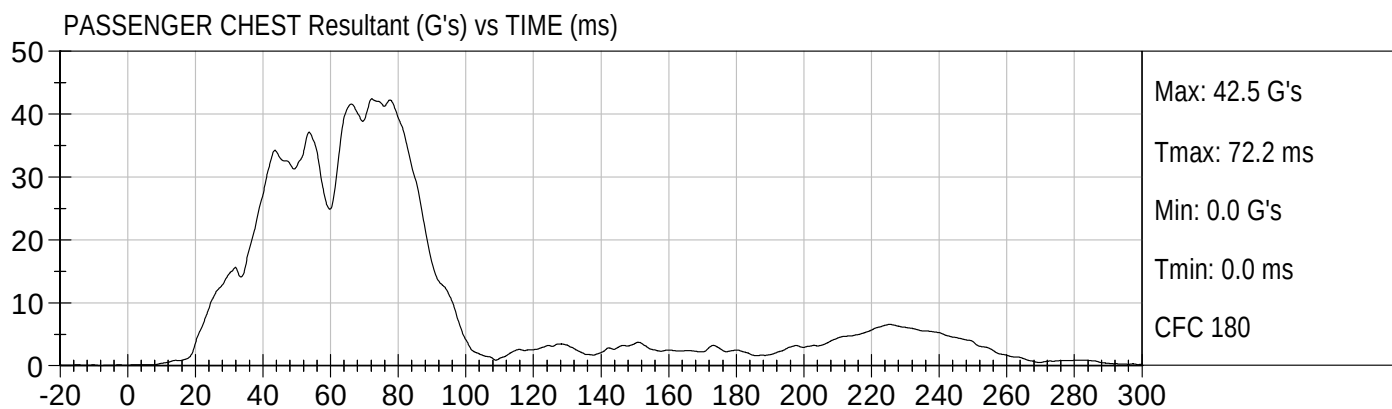
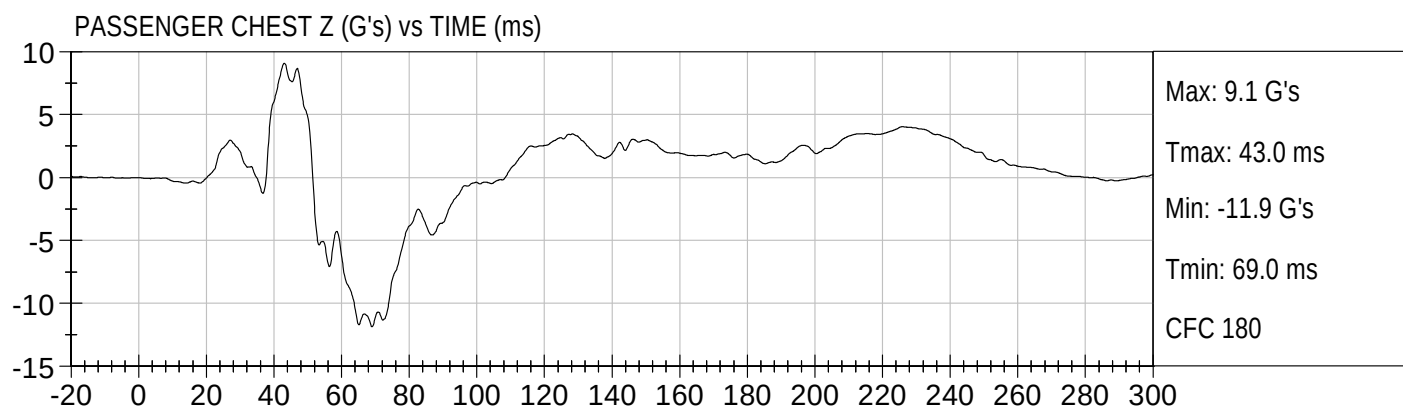
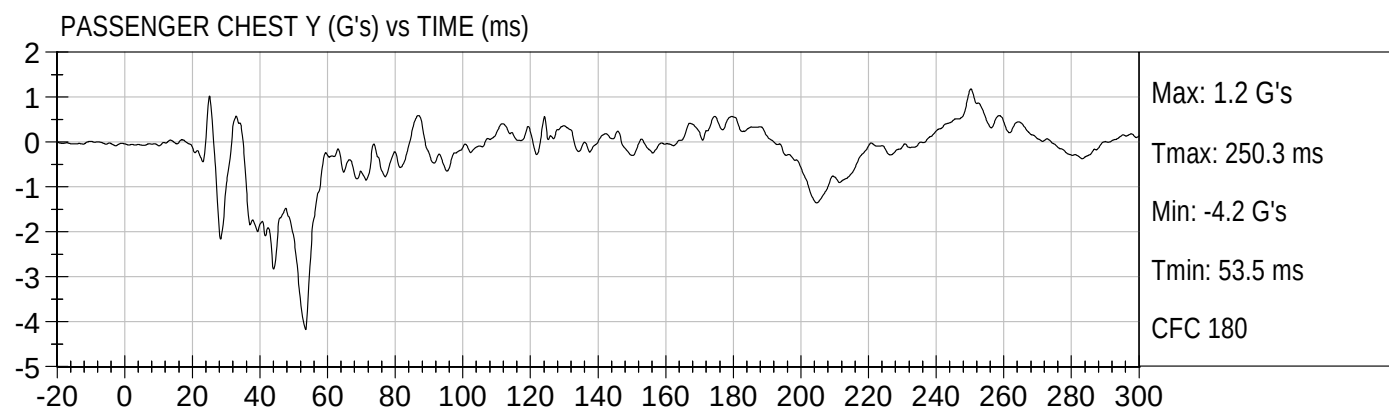
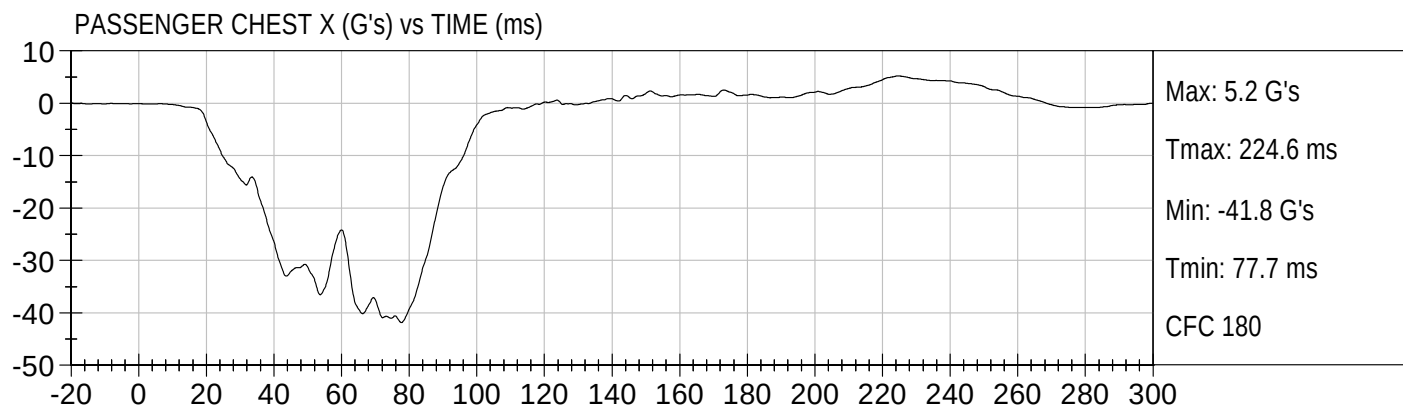


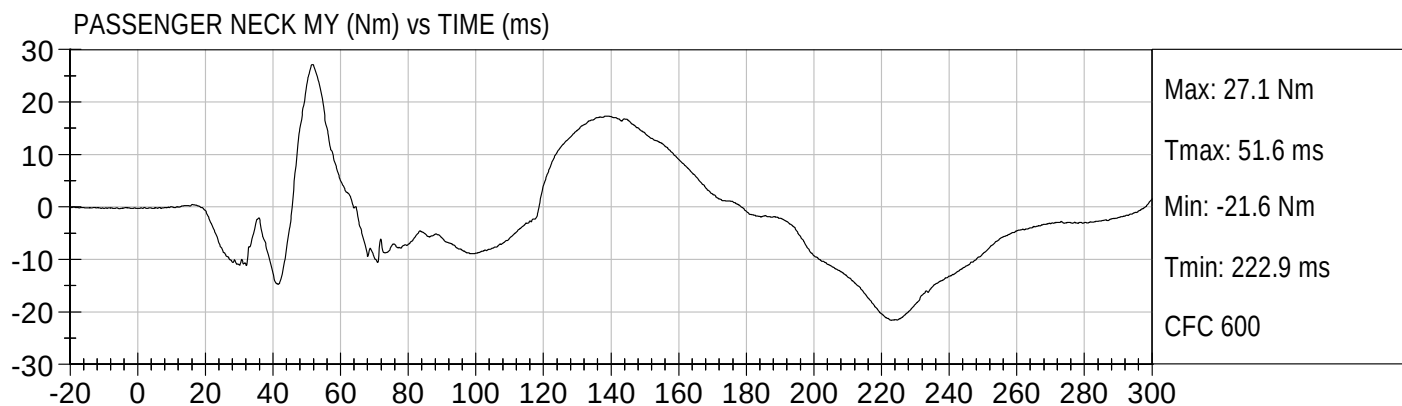
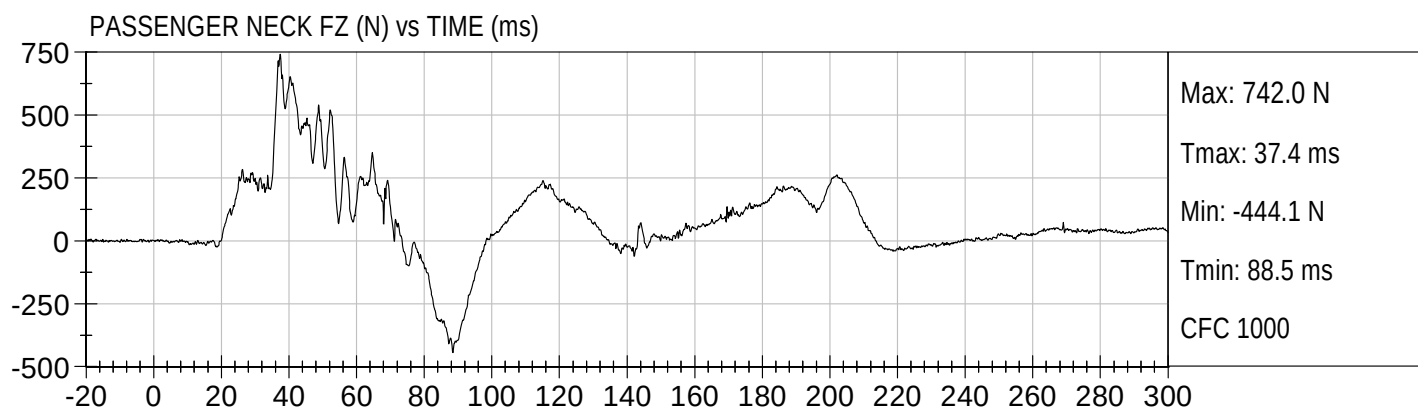
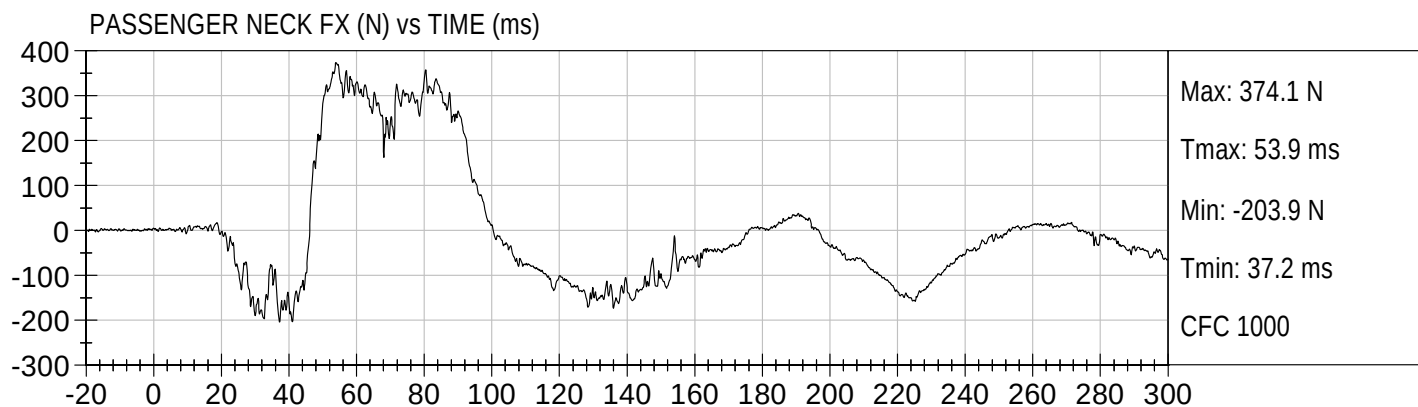


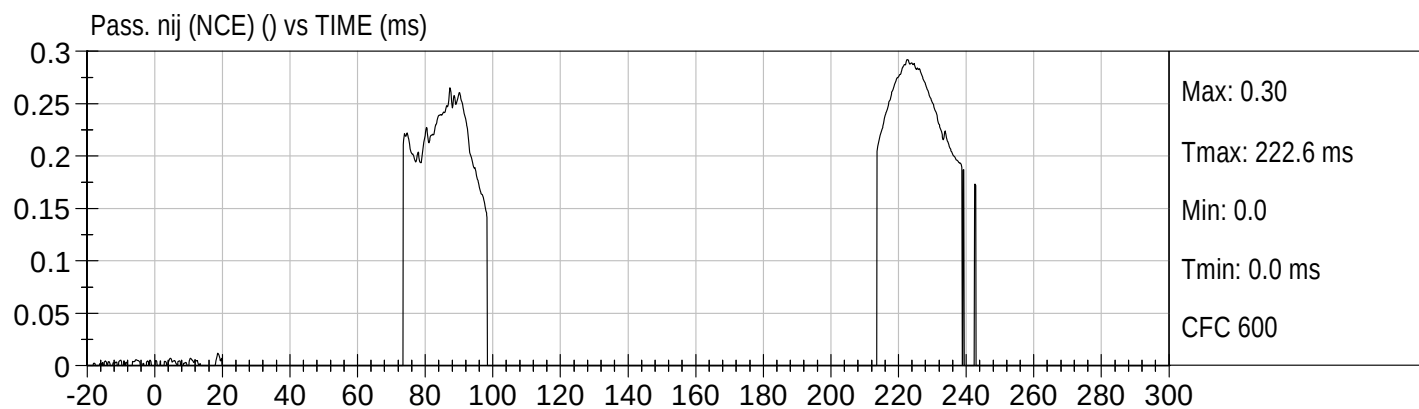
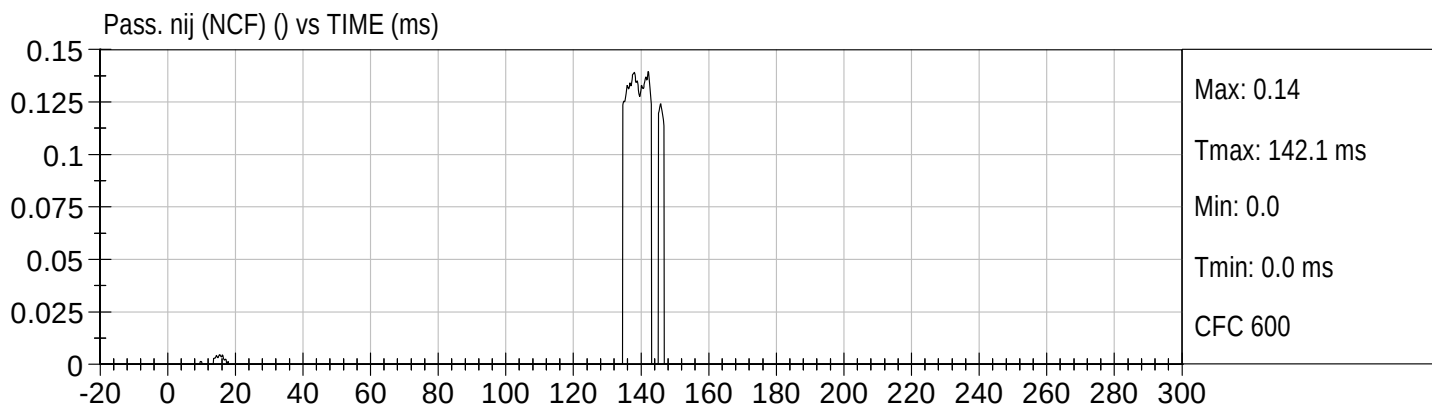
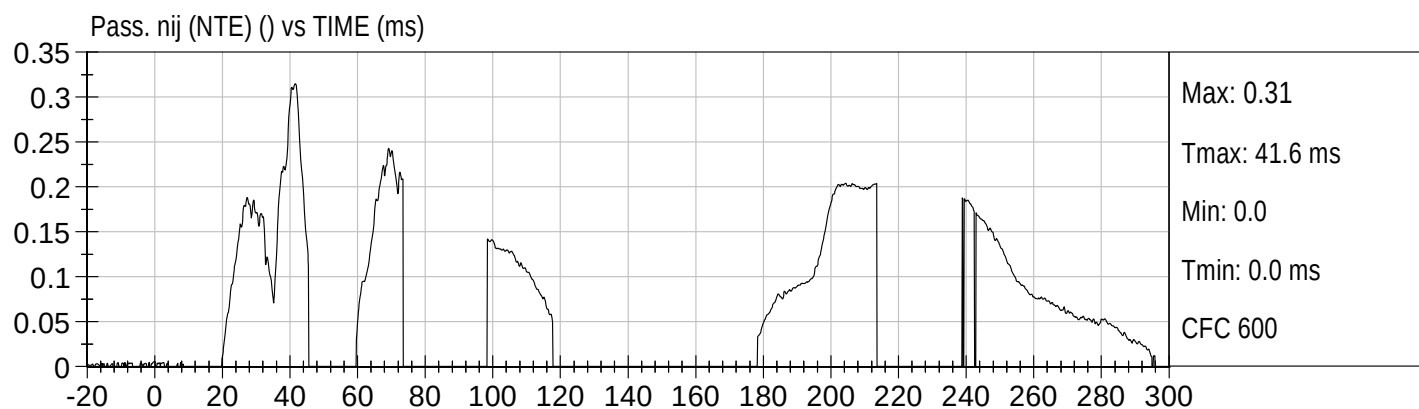
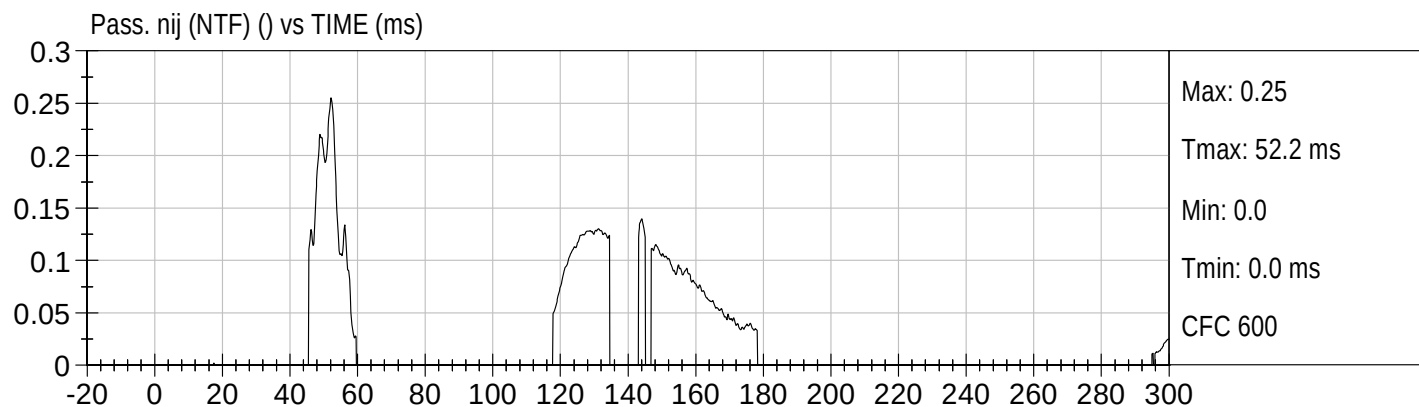


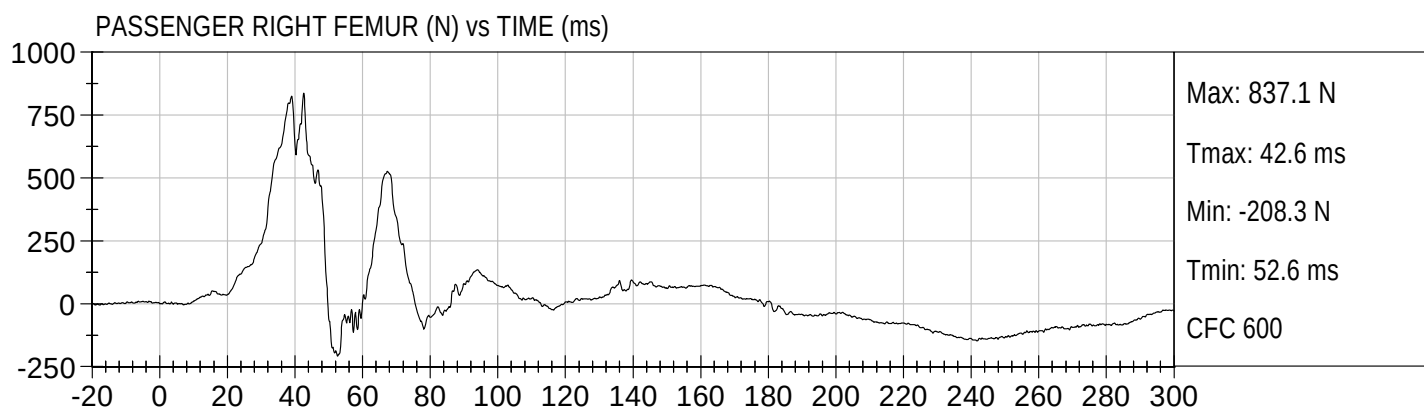
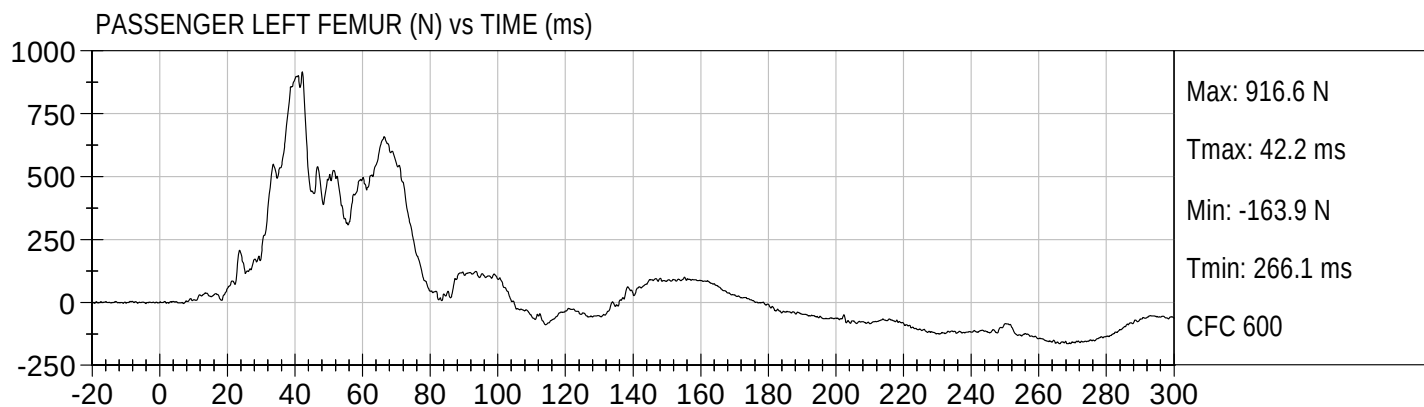












APPENDIX C

DUMMY CALIBRATION AND PERFORMANCE VERIFICATION DATA

Hybrid III, 50th External Measurements
SN: 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: D113461

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	43	Pass
Peak Resultant Acceleration	G's	225 - 275	227	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	7.9	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

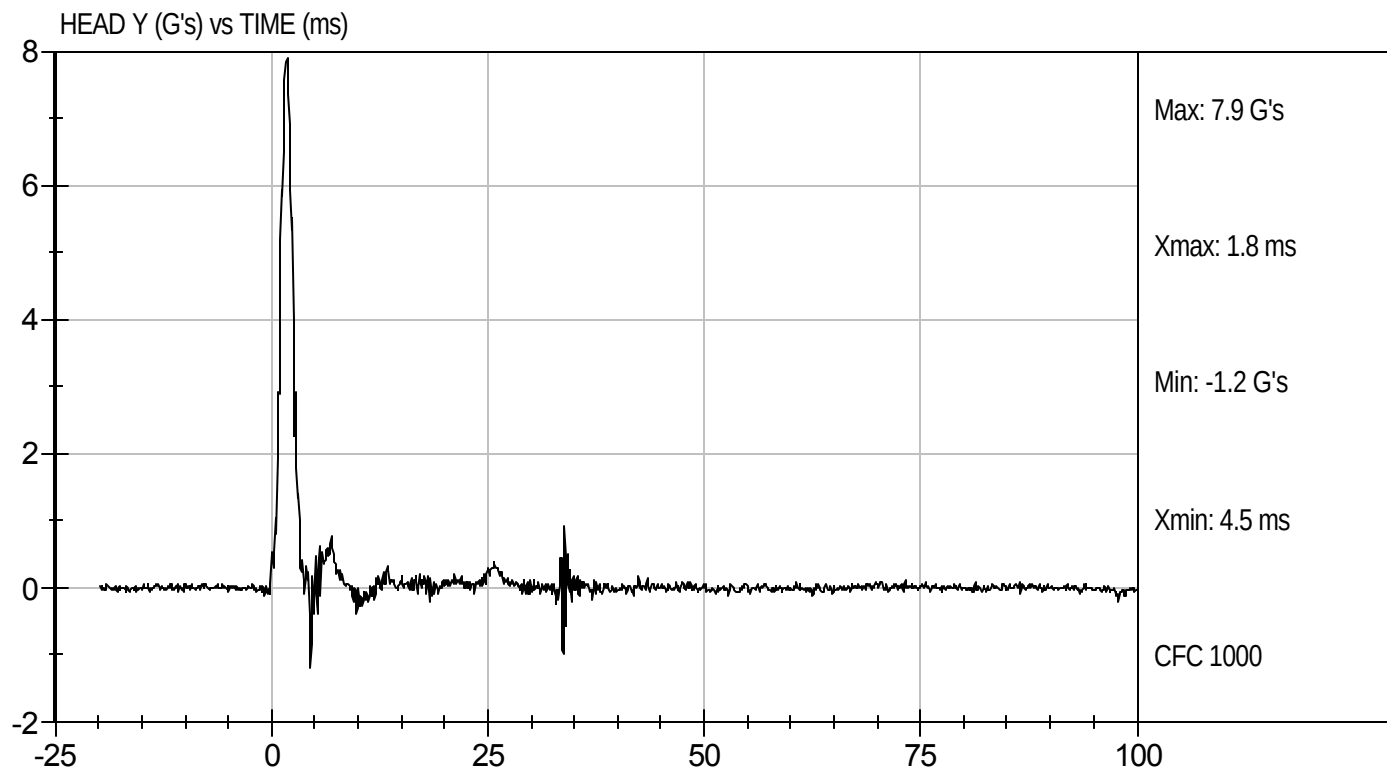
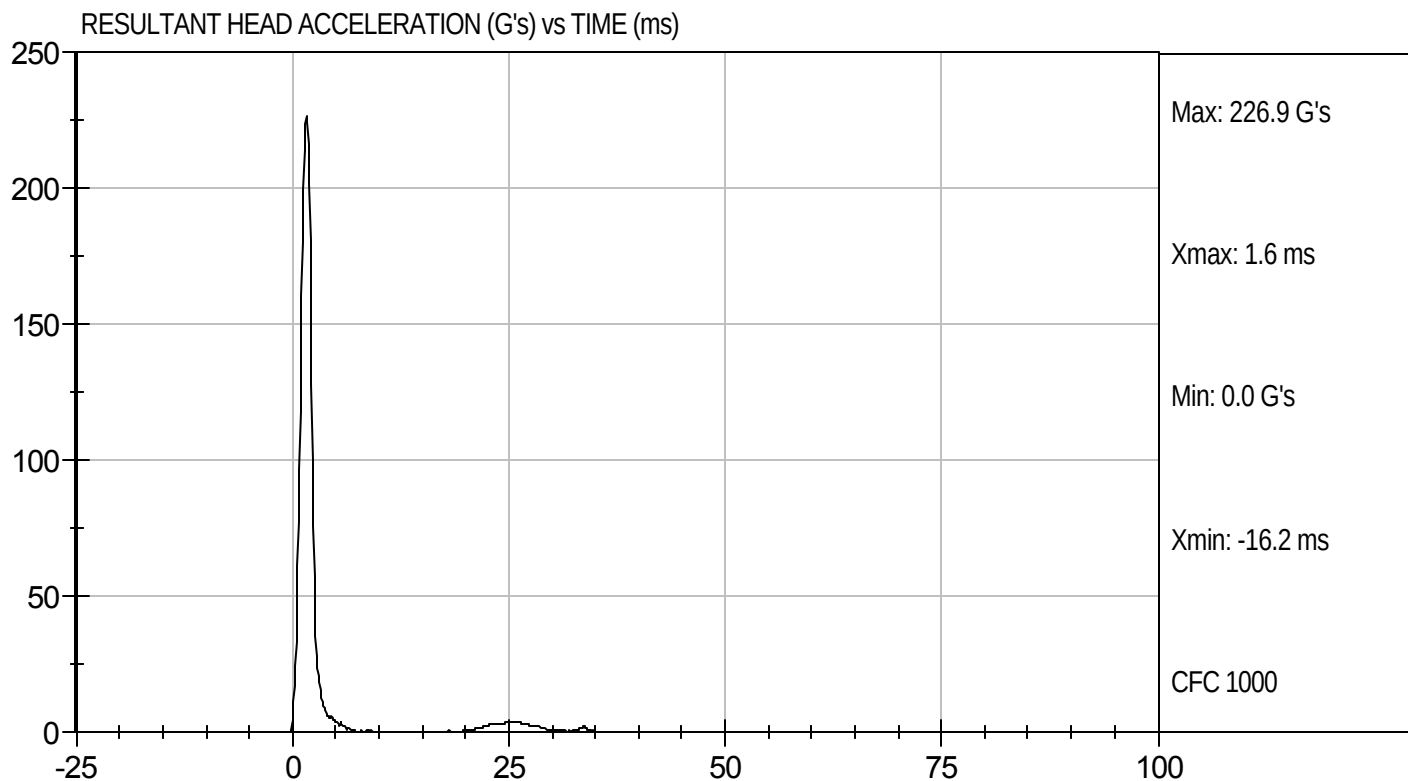
10/12/11
Test Date

David Winkelbauer
Approved By



Test Desc: Head Drop
Component ID: D113461

Test Date: 10/12/11
Velocity: 0 ft/s, 0.00 m/s



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

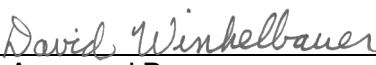
ATD Serial No: 036

Test I.D: D113462

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	43	Pass
Pendulum Velocity		m/s	6.89 to 7.13	6.96	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	23.24	Pass
	20 ms	G's	17.60 to 22.60	18.61	Pass
	30 ms	G's	12.50 to 18.50	13.83	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	13.8	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	35.8	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	69.5	Pass
	Time	ms	57.0 to 64.0	58.8	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	117.4	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	95.7	Pass
	Time	ms	47.0 to 58.0	49.9	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	97.2	Pass
Overall Test Results					Pass


 Laboratory Technician

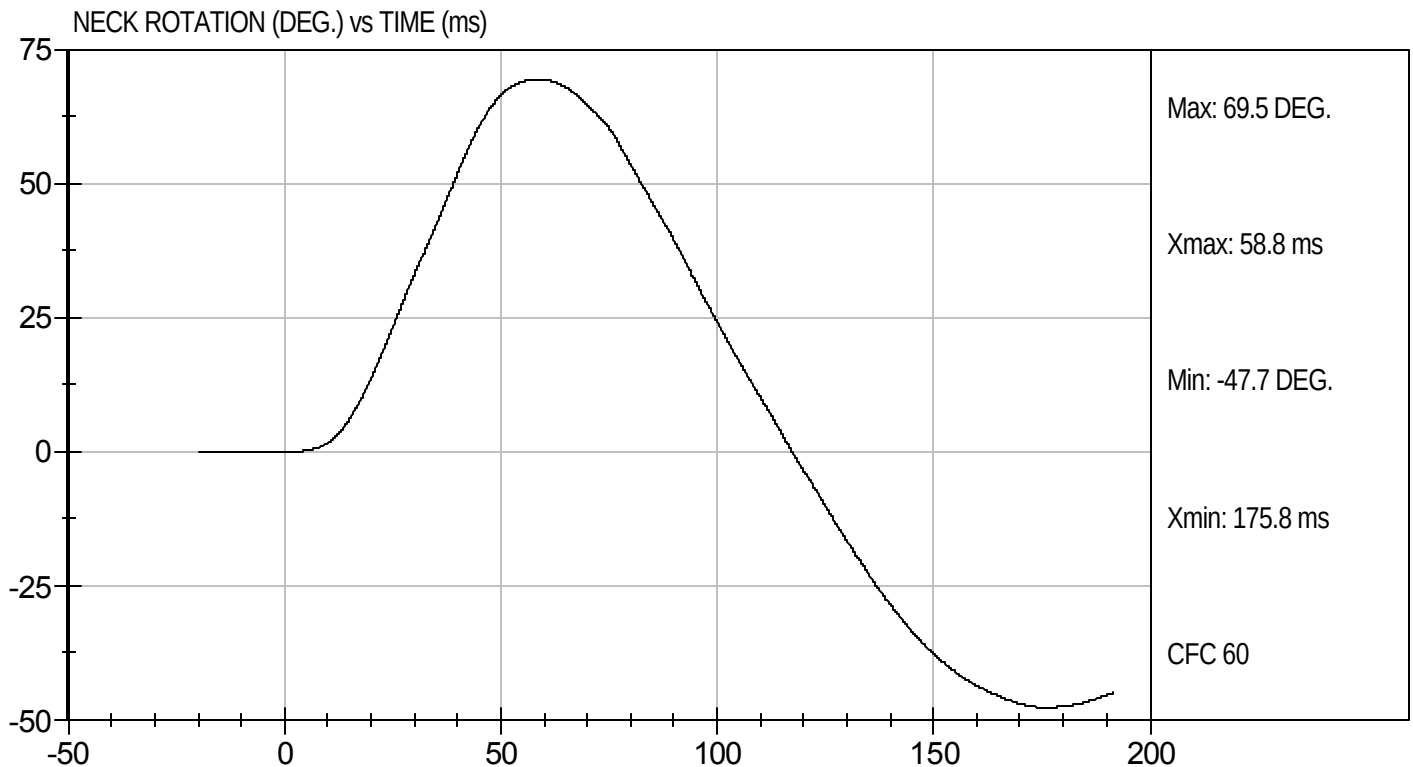
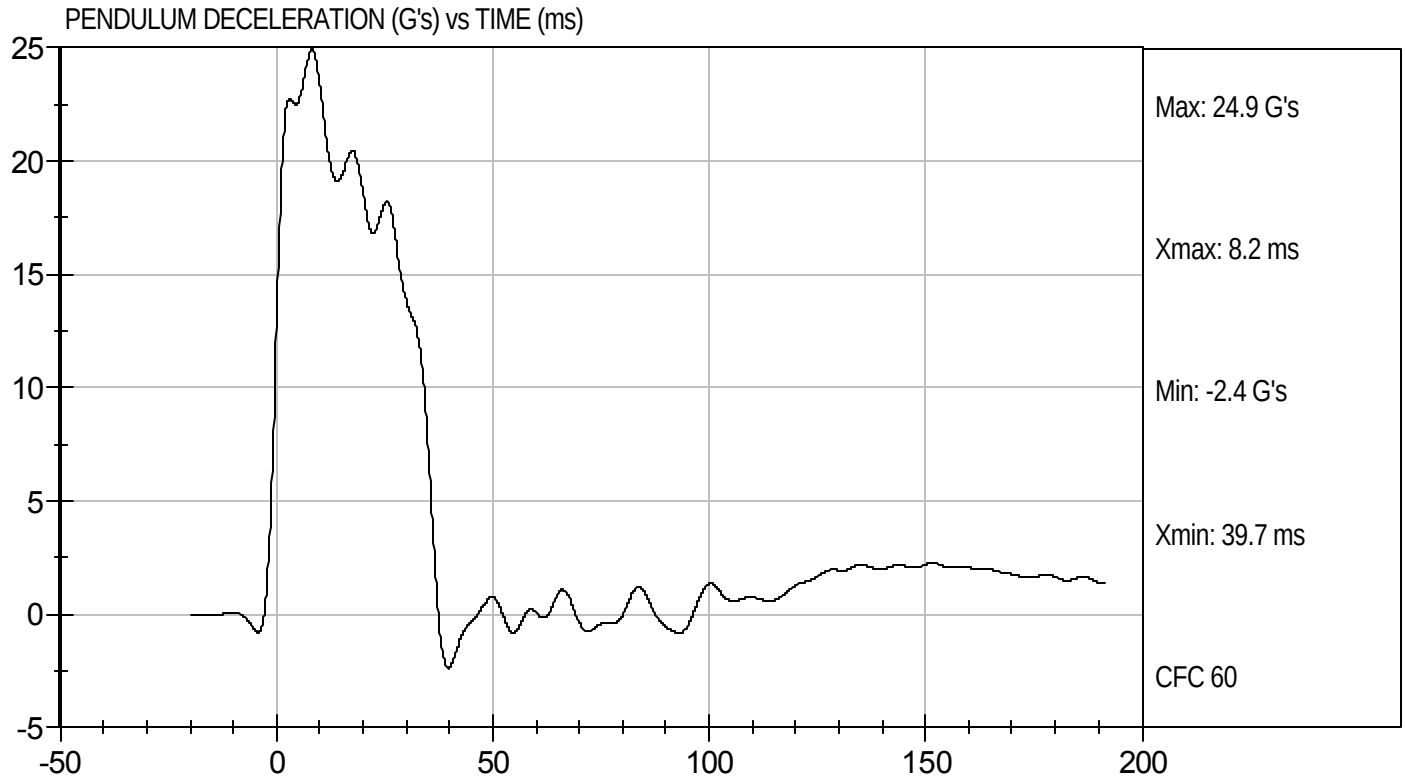
10/12/11
 Test Date


 Approved By



Test Desc: Neck Flexion
Component ID: D113462

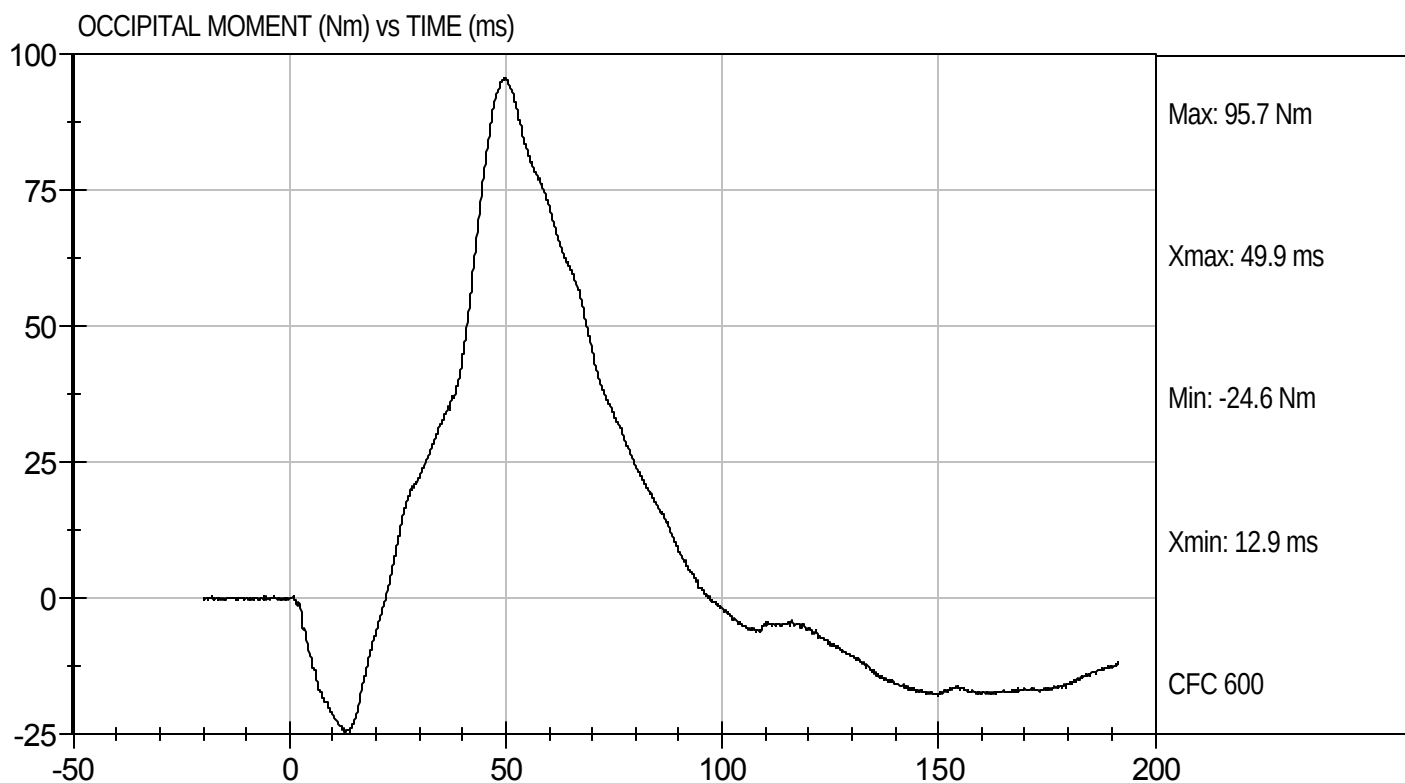
Test Date: 10/12/11
Velocity: 22.83 ft/s, 6.96 m/s





Test Desc: Neck Flexion
Component ID: D113462

Test Date: 10/12/11
Velocity: 22.83 ft/s, 6.96 m/s

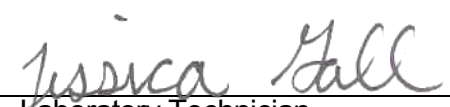


MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036

Test I.D.: D113463

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity		%	10 to 70	43	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.12	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	18.61	Pass
	20 ms	G's	14.00 to 19.00	14.32	Pass
	30 ms	G's	11.00 to 16.00	12.76	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	13.8	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	38.6	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	95.6	Pass
	Time	ms	72.0 to 82.0	80.0	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	160.3	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-64.9	Pass
	Time	ms	65.0 to 79.0	70.4	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	142.0	Pass
Overall Test Results					Pass


 Laboratory Technician

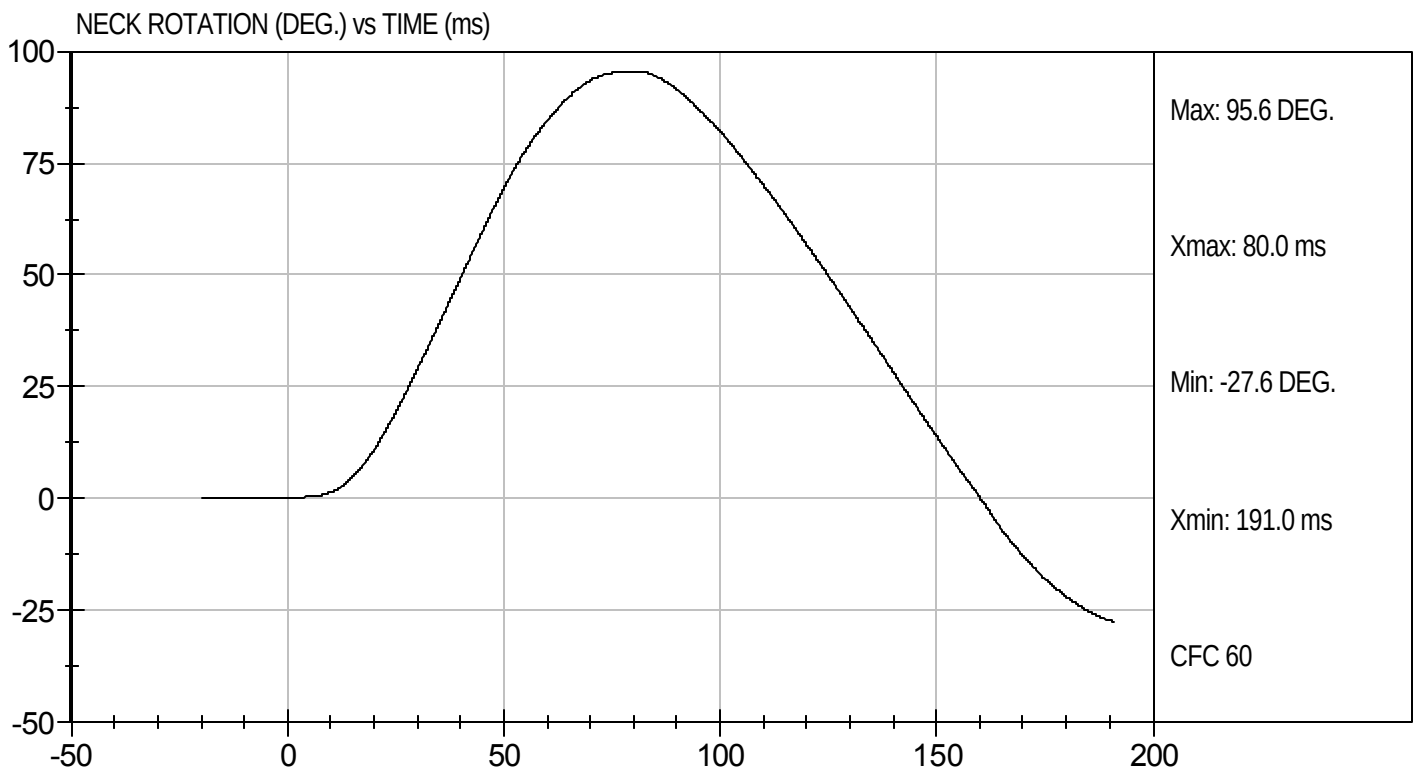
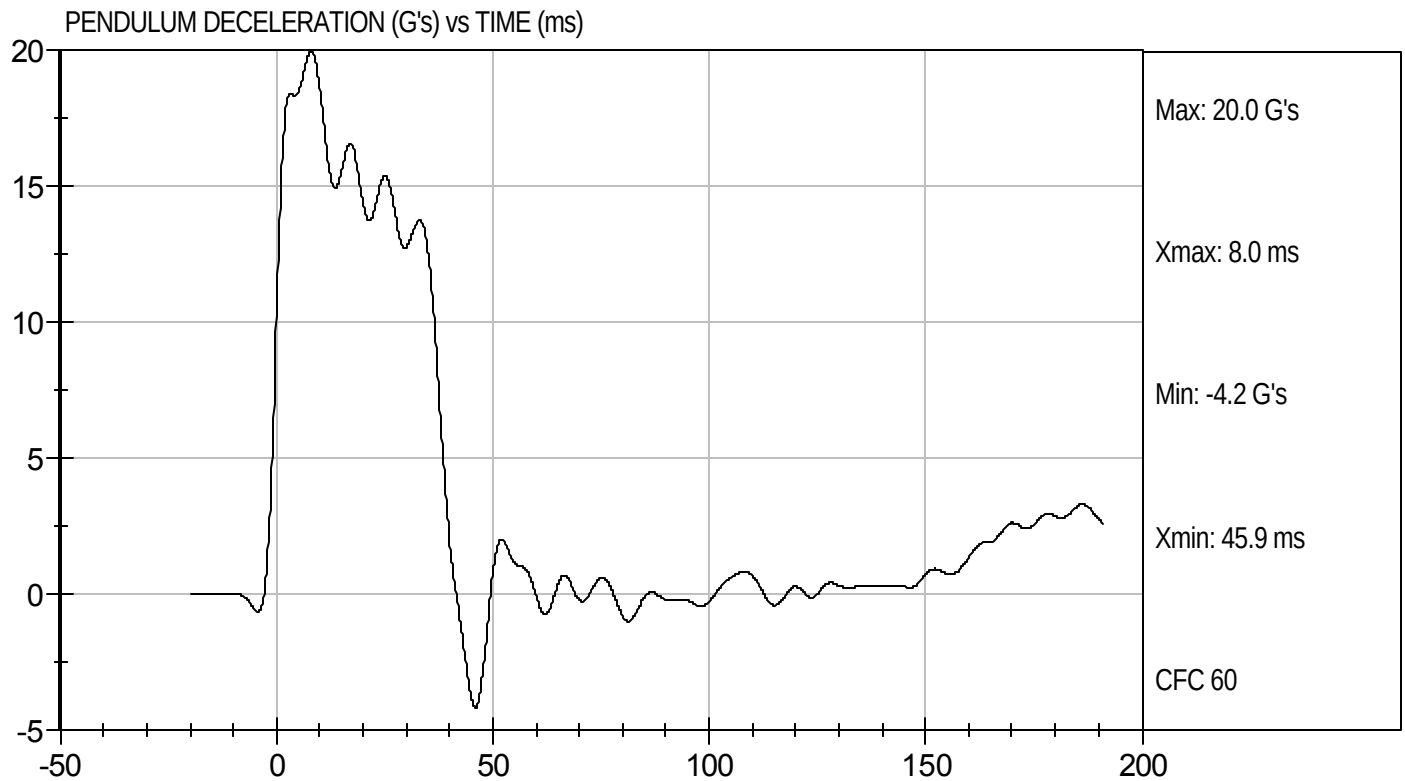
10/12/11
 Test Date


 Approved By



Test Desc: Neck Extension
Component ID: D113463

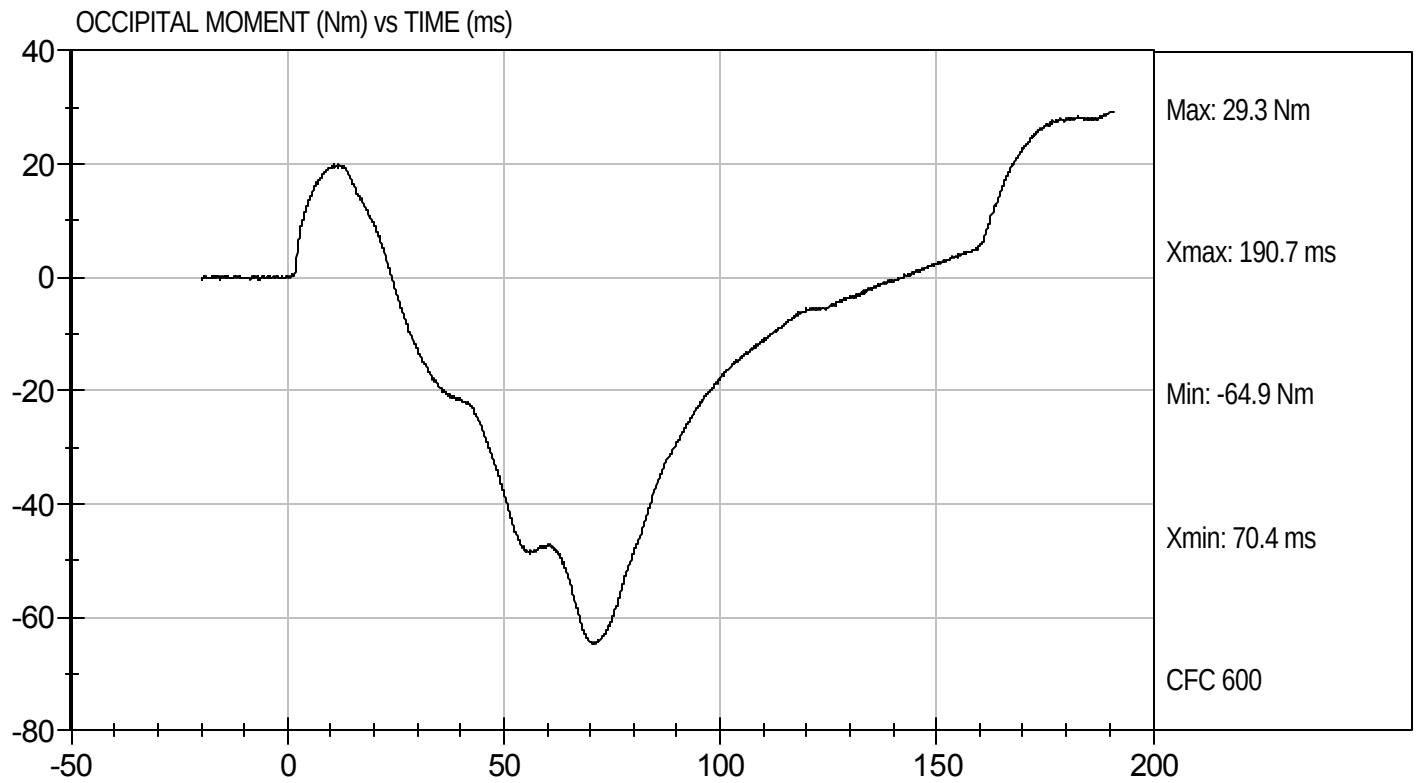
Test Date: 10/12/11
Velocity: 20.08 ft/s, 6.12 m/s





Test Desc: Neck Extension
Component ID: D113463

Test Date: 10/12/11
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: D113464

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	22.0	Pass
Laboratory Relative Humidity	%	10 to 70	46	Pass
Probe Velocity	m/s	6.58 to 6.82	6.77	Pass
Peak Probe Force	N	5159 to 5893	5,323	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.91	Pass
Internal Hysteresis	%	69 to 85	71	Pass
Overall Test Results			Pass	


Laboratory Technician

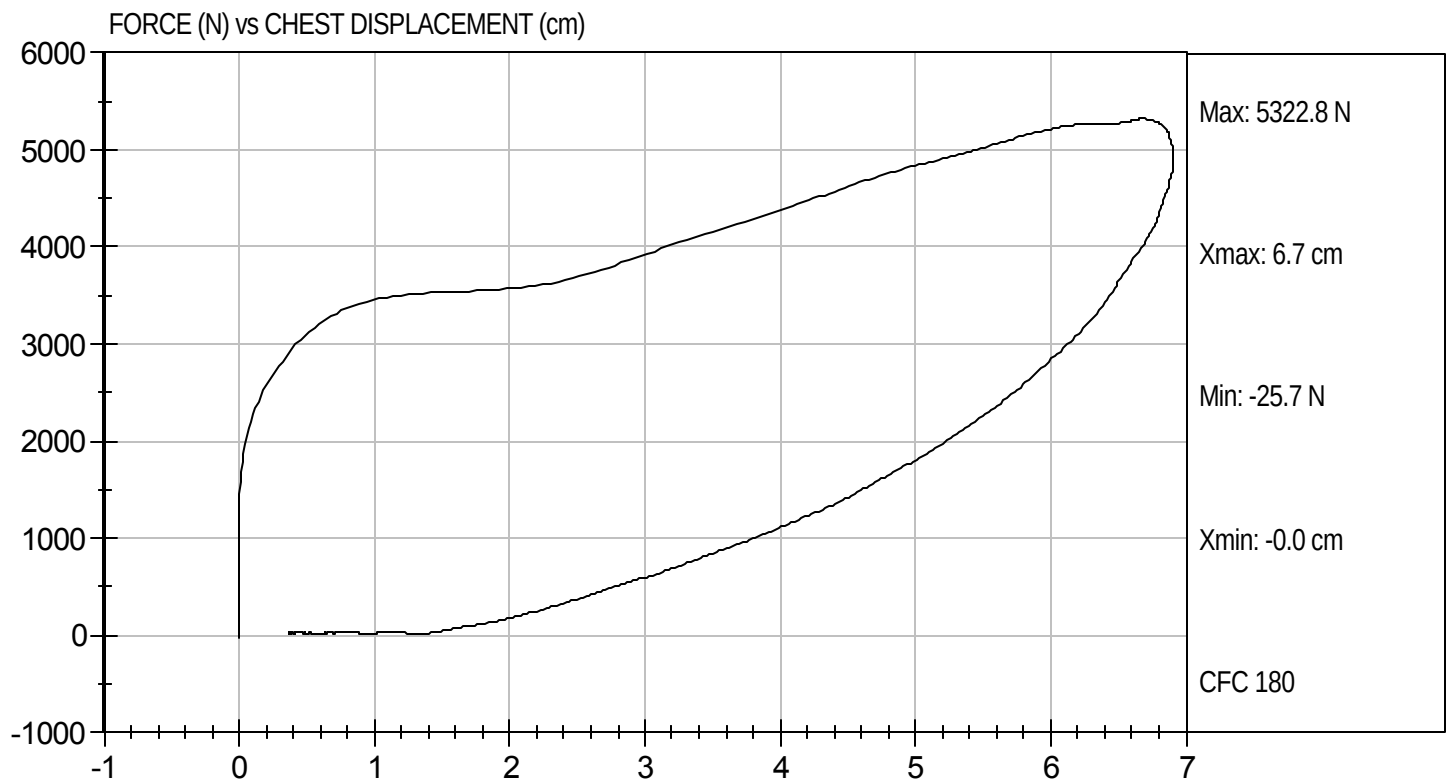
10/13/11
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D113464

Test Date: 10/13/11
Velocity: 22.22 ft/s, 6.77 m/s

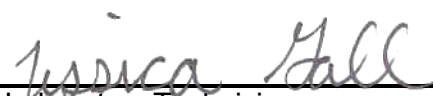


MGA RESEARCH CORPORATION
RIGHT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036

Test I.D: D113465

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	43	Pass
Probe Velocity	m/s	2.07 to 2.13	2.10	Pass
Peak Probe Force	Newtons	4715 to 5782	4,721	Pass
Overall Test Results				Pass



Laboratory Technician

10/12/11
Test Date

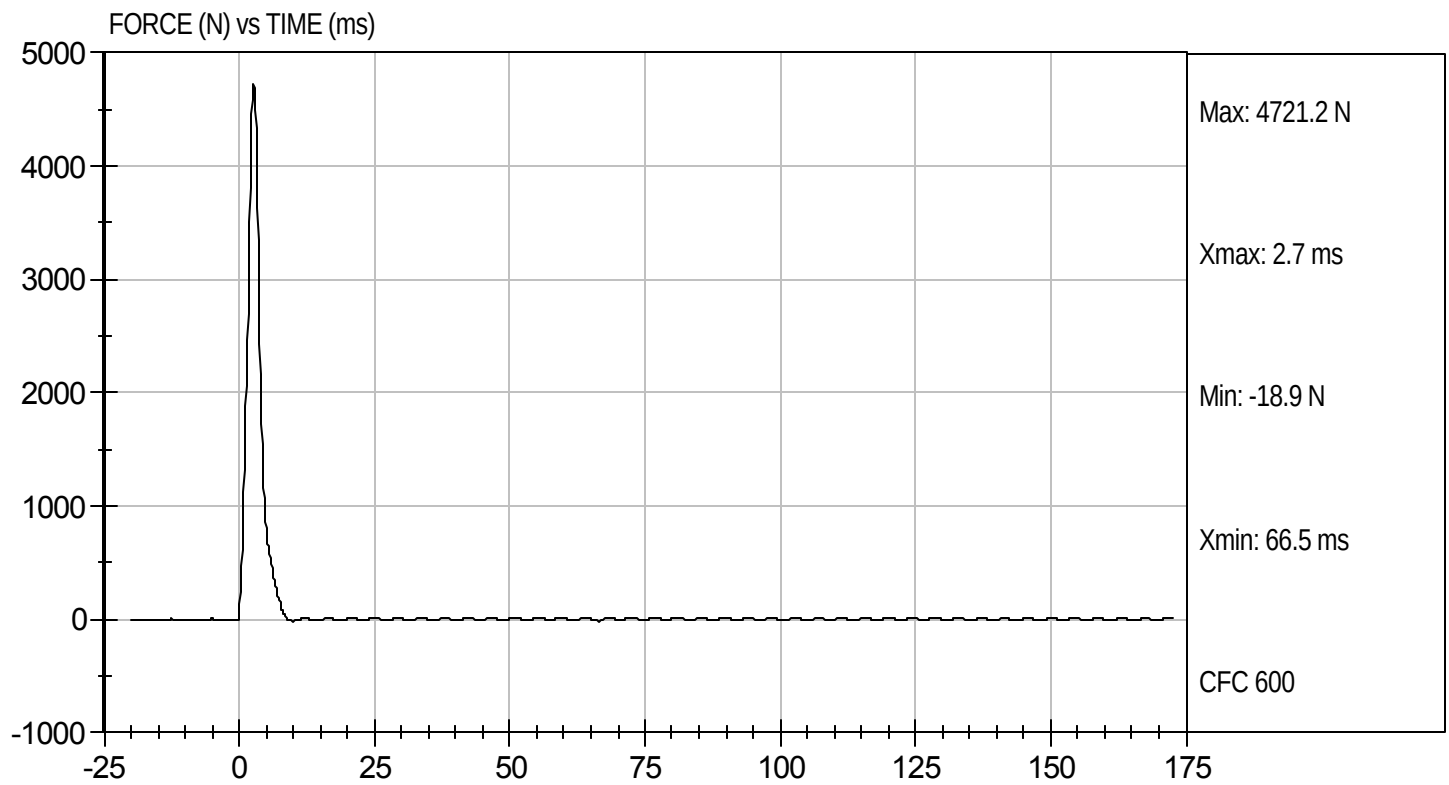


Approved By



Test Desc: Right Knee
Component ID: D113465

Test Date: 10/12/11
Velocity: 6.88 ft/s, 2.10 m/s

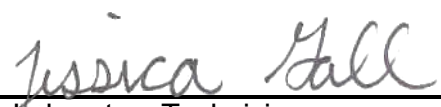


MGA RESEARCH CORPORATION
LEFT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036

Test I.D: D113466

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	43	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	Newtons	4715 to 5782	4,885	Pass
Overall Test Results				Pass



Laboratory Technician

10/12/11
Test Date

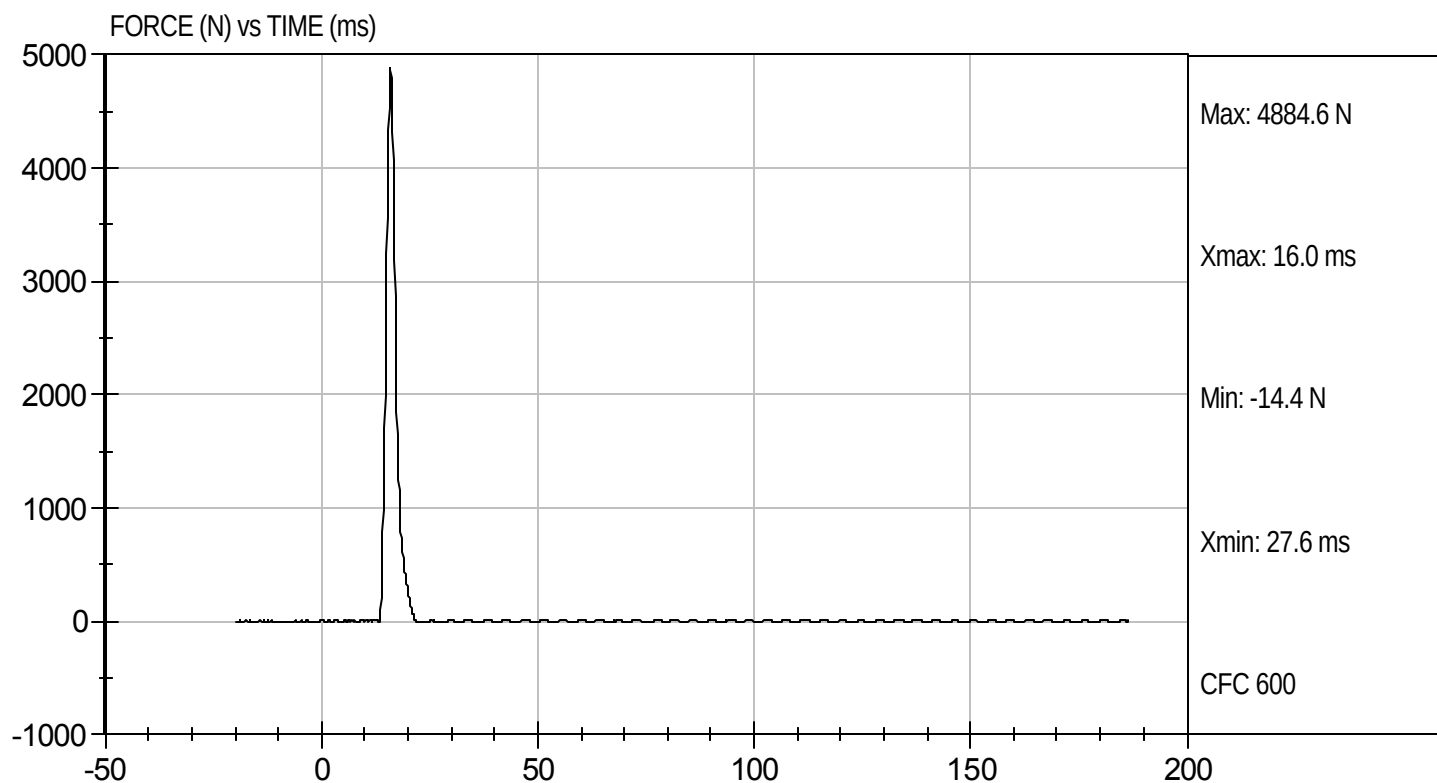


Approved By



Test Desc: Left Knee
Component ID: D113466

Test Date: 10/12/11
Velocity: 6.97 ft/s, 2.12 m/s



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

ATD Serial No: 036

Test I.D: D113460

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	43	43	Pass
Rotation Rate	deg/s	5.0 -10.0	5.7	5.7	Pass
30 Degrees	Nm	94.9 Nm Max	92.5	77.9	Pass
150 ft-lbf / 203.4 Nm	Deg	40.0 - 50.0 Degree Max Rotation	40.1	41.1	Pass
Overall Test Results					Pass

Jessica Hall
Laboratory Technician

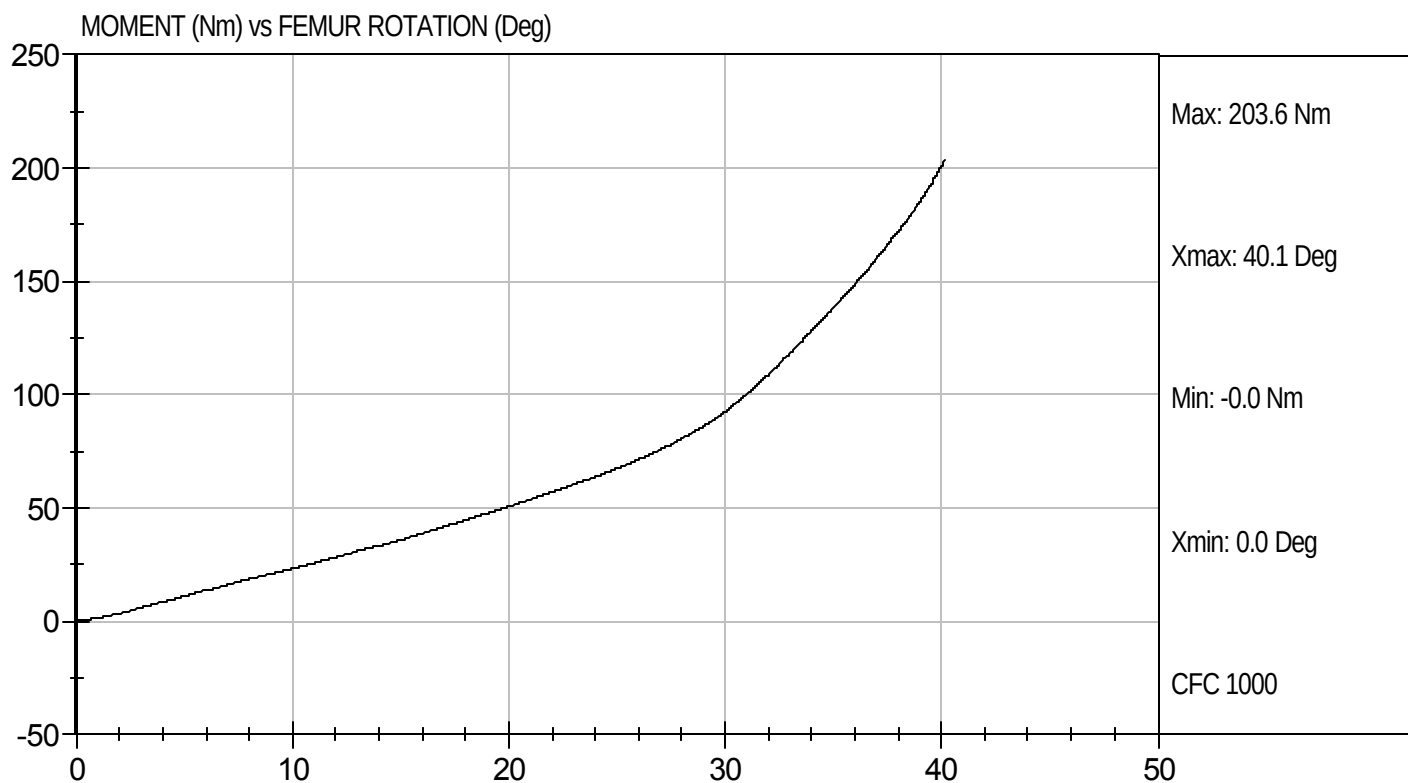
10/12/11
Test Date

David Winkelbauer
Approved By



Test Desc: Hip Femur Flexion
Component ID: D113469

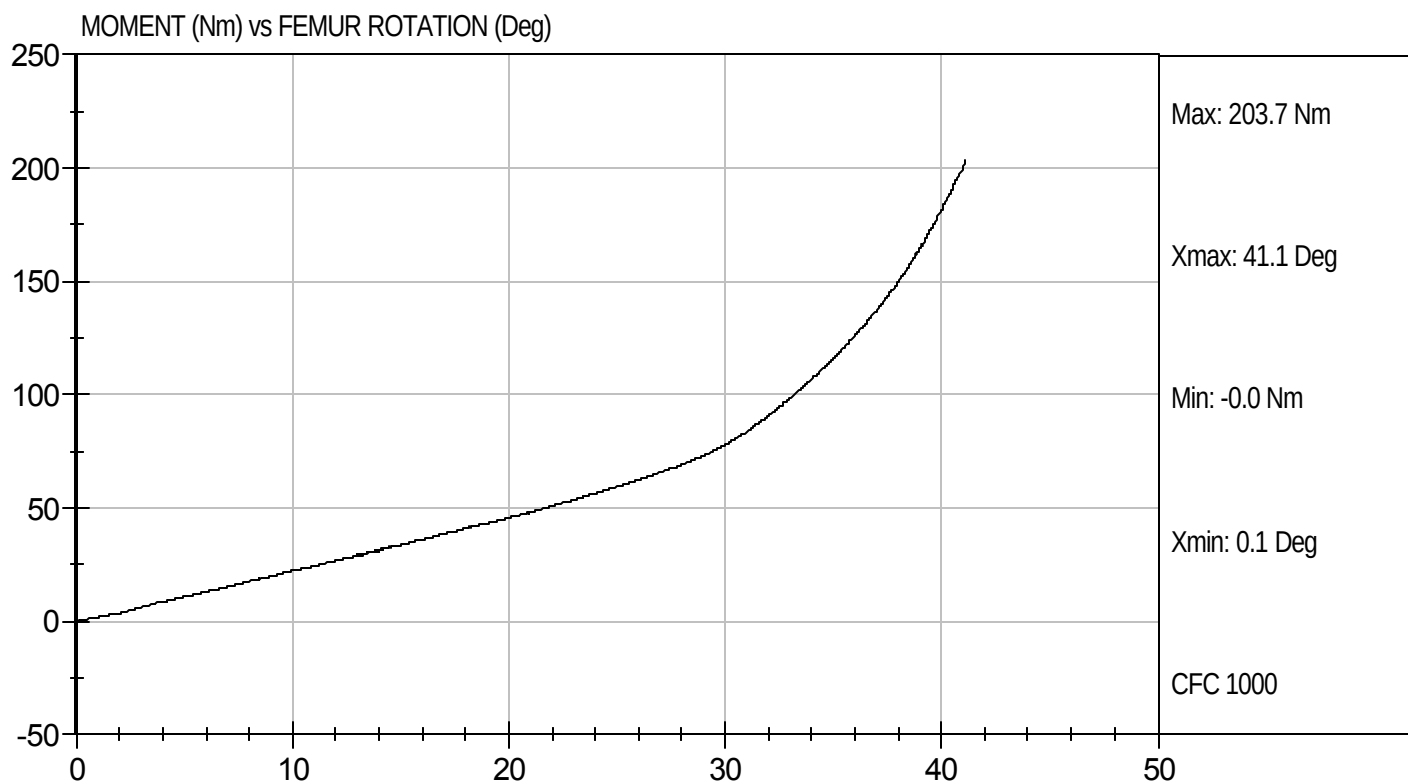
Test Date: 10/12/11
Velocity: 0 ft/s, 0.00 m/s





Test Desc: Hip Femur Flexion
Component ID: D113460

Test Date: 10/12/11
Velocity: 0 ft/s, 0.00 m/s

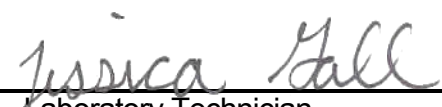


MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036

Test ID: D113591

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	35	Pass
Peak Resultant Acceleration	G's	225 - 275	269	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-6.0	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass



Laboratory Technician

10/26/11
Test Date

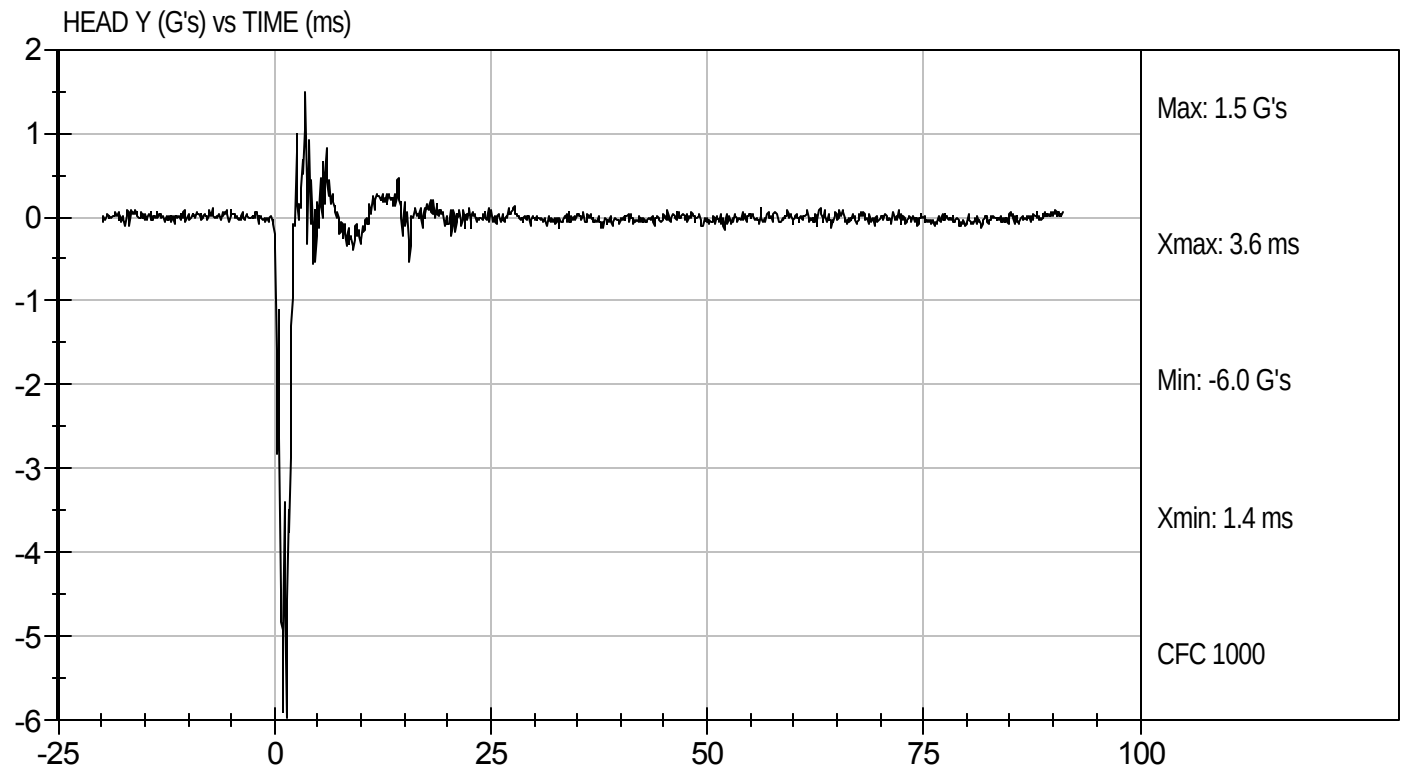
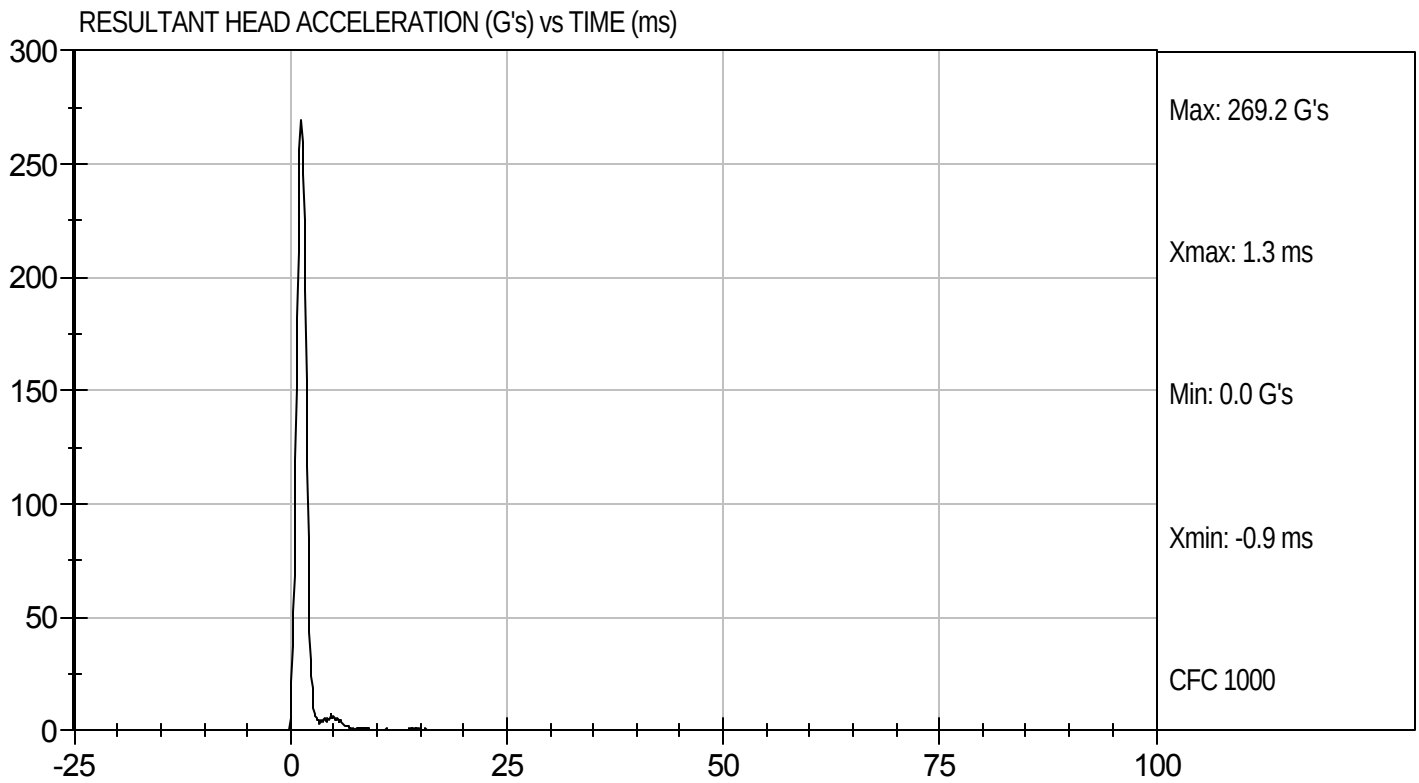


Approved By



Test Desc: Head Drop
Component ID: D113591

Test Date: 10/26/11
Velocity: 0 ft/s, 0.00 m/s



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

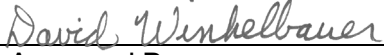
ATD Serial No: 036

Test I.D.: D113592

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	33	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	23.37	Pass
	20 ms	G's	17.60 to 22.60	17.98	Pass
	30 ms	G's	12.50 to 18.50	14.76	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	14.7	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	35.0	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	70.4	Pass
	Time	ms	57.0 to 64.0	59.1	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	117.4	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	97.2	Pass
	Time	ms	47.0 to 58.0	47.5	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	97.3	Pass
Overall Test Results					Pass


 Laboratory Technician

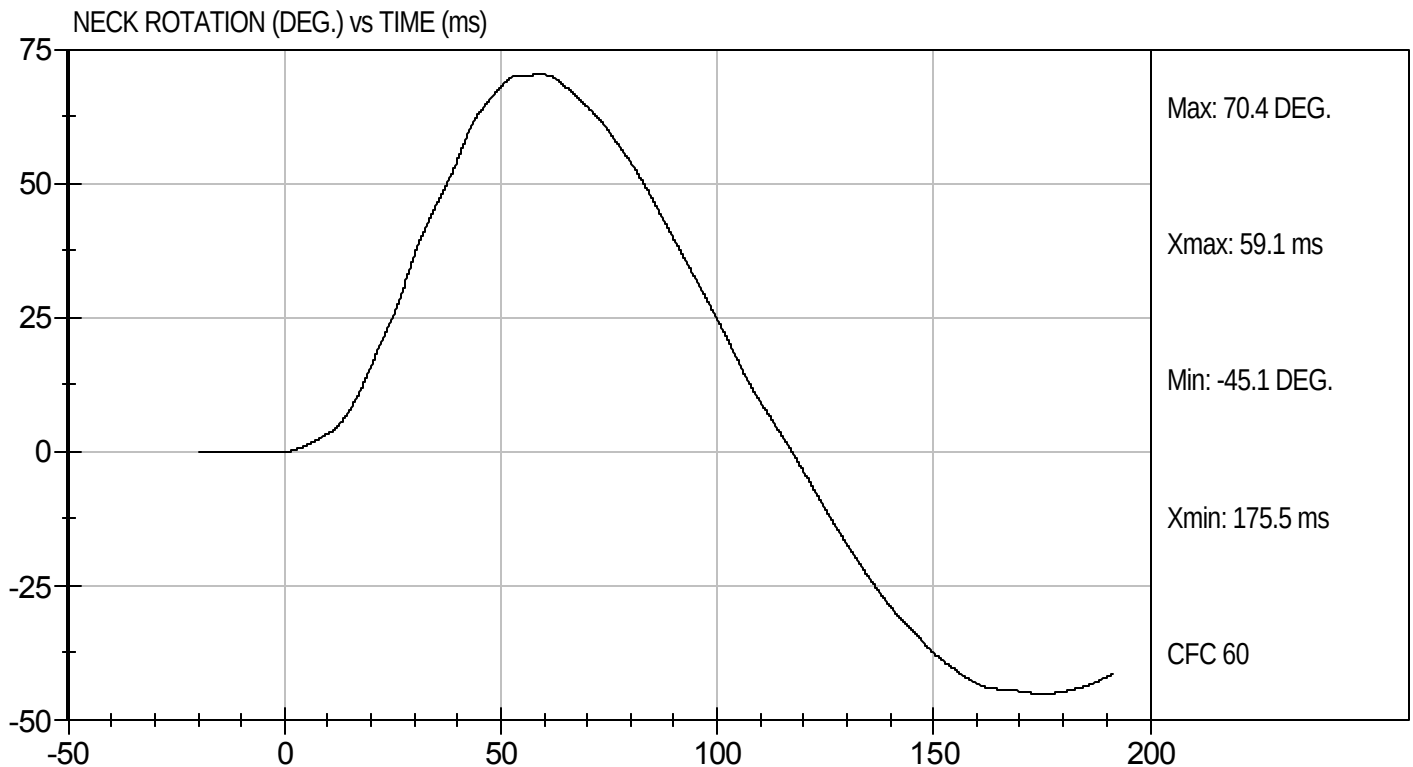
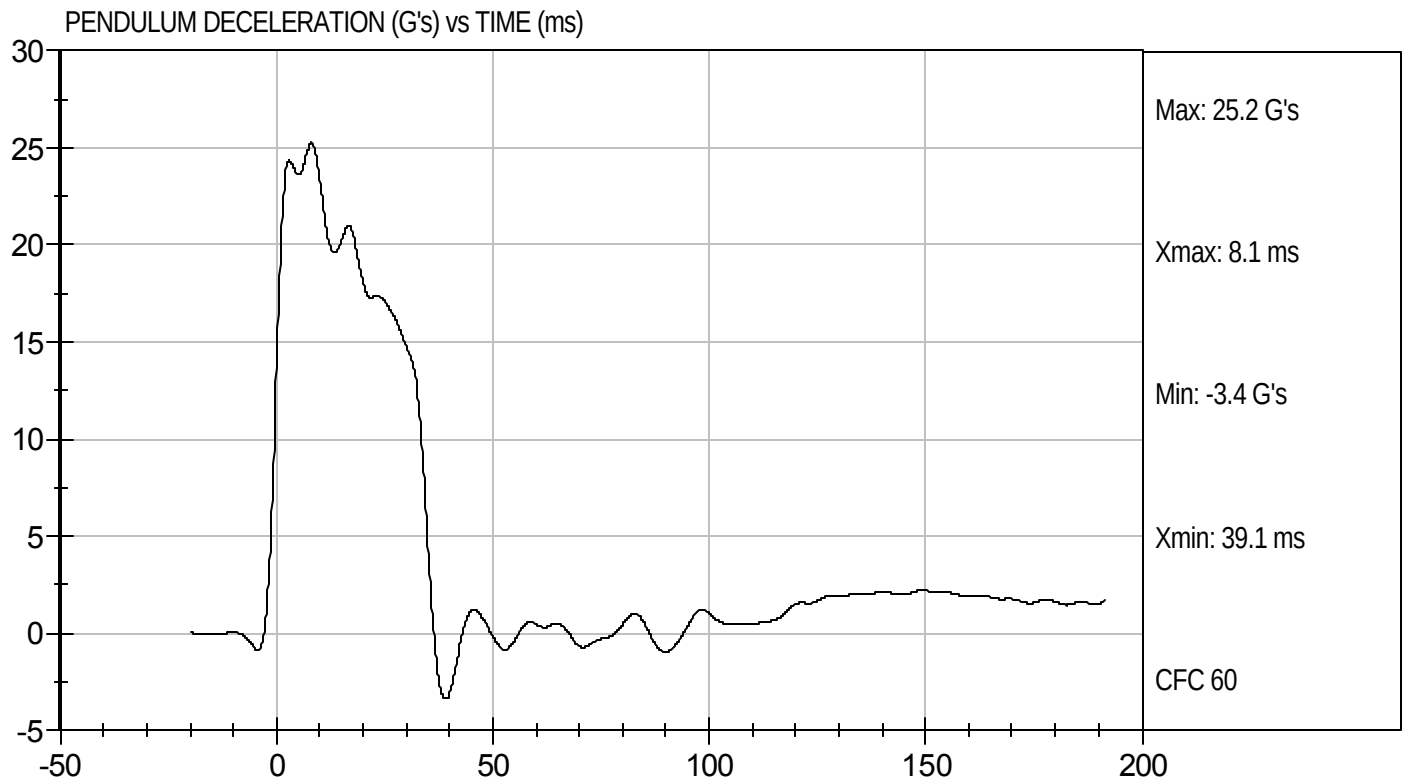
10/27/11
 Test Date


 Approved By



Test Desc: Neck Flexion
Component ID: D113592

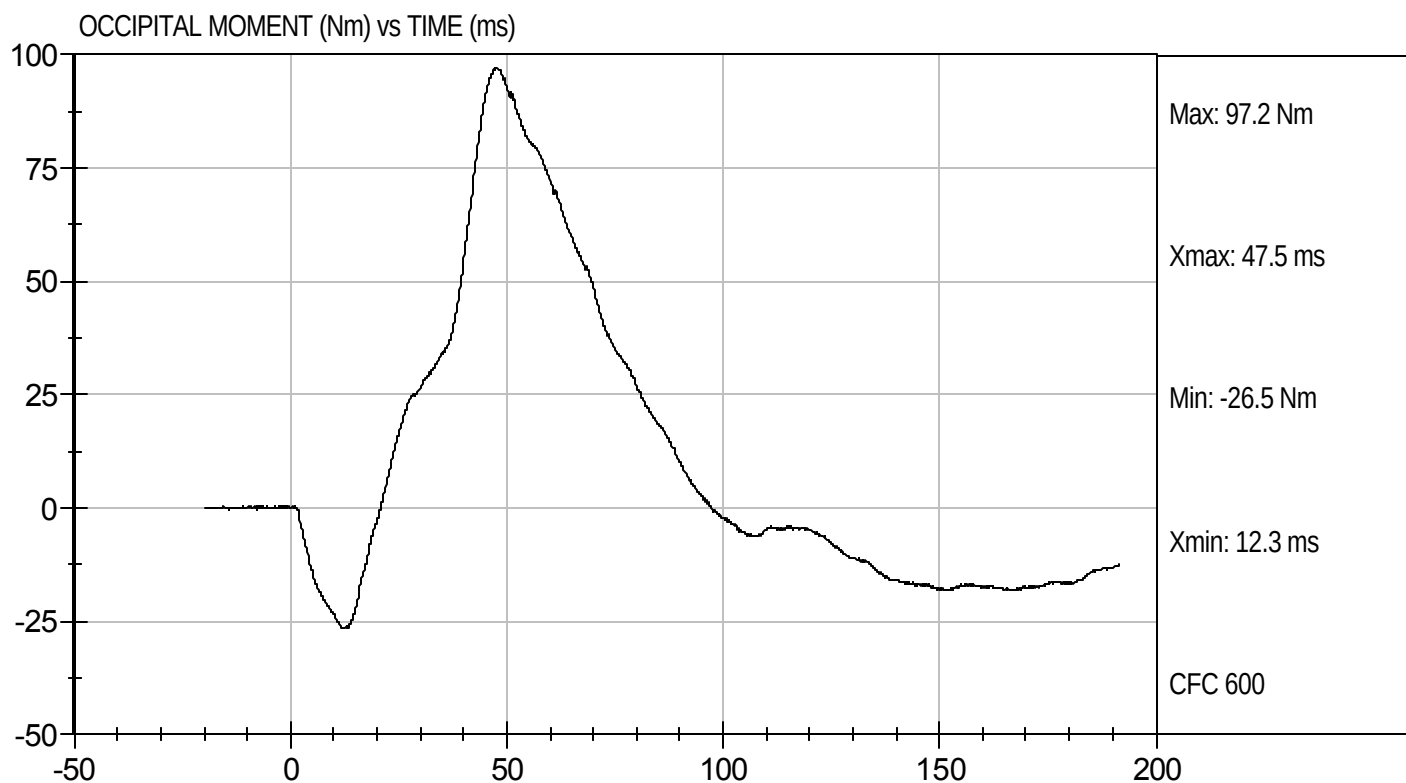
Test Date: 10/27/11
Velocity: 23.15 ft/s, 7.06 m/s





Test Desc: Neck Flexion
Component ID: D113592

Test Date: 10/27/11
Velocity: 23.15 ft/s, 7.06 m/s



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

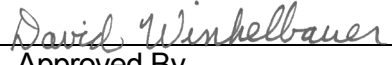
ATD Serial No: 036

Test I.D.: D113593

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	33	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.12	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	17.82	Pass
	20 ms	G's	14.00 to 19.00	14.65	Pass
	30 ms	G's	11.00 to 16.00	12.76	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	41.4	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	94.3	Pass
	Time	ms	72.0 to 82.0	78.9	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	159.0	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-64.3	Pass
	Time	ms	65.0 to 79.0	70.9	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	142.0	Pass
Overall Test Results					Pass


Laboratory Technician

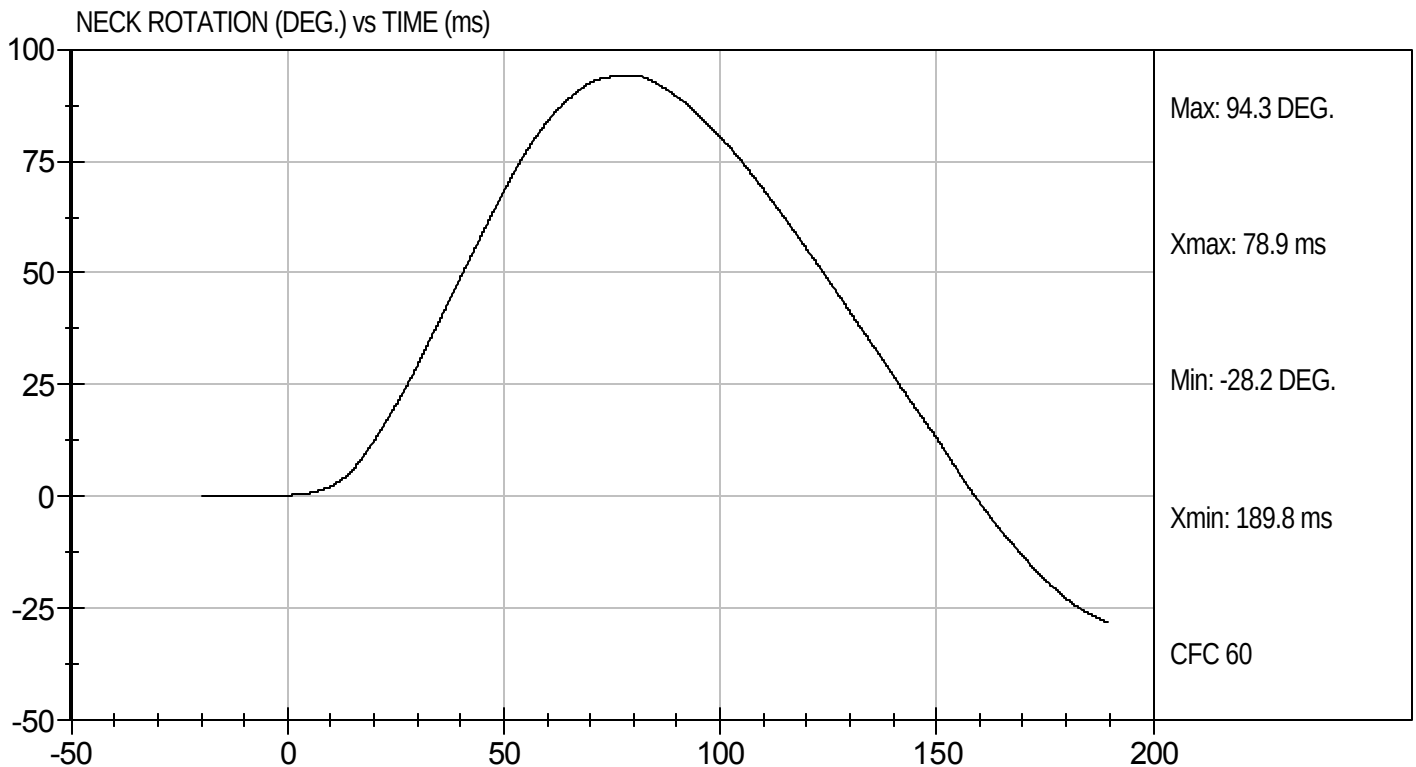
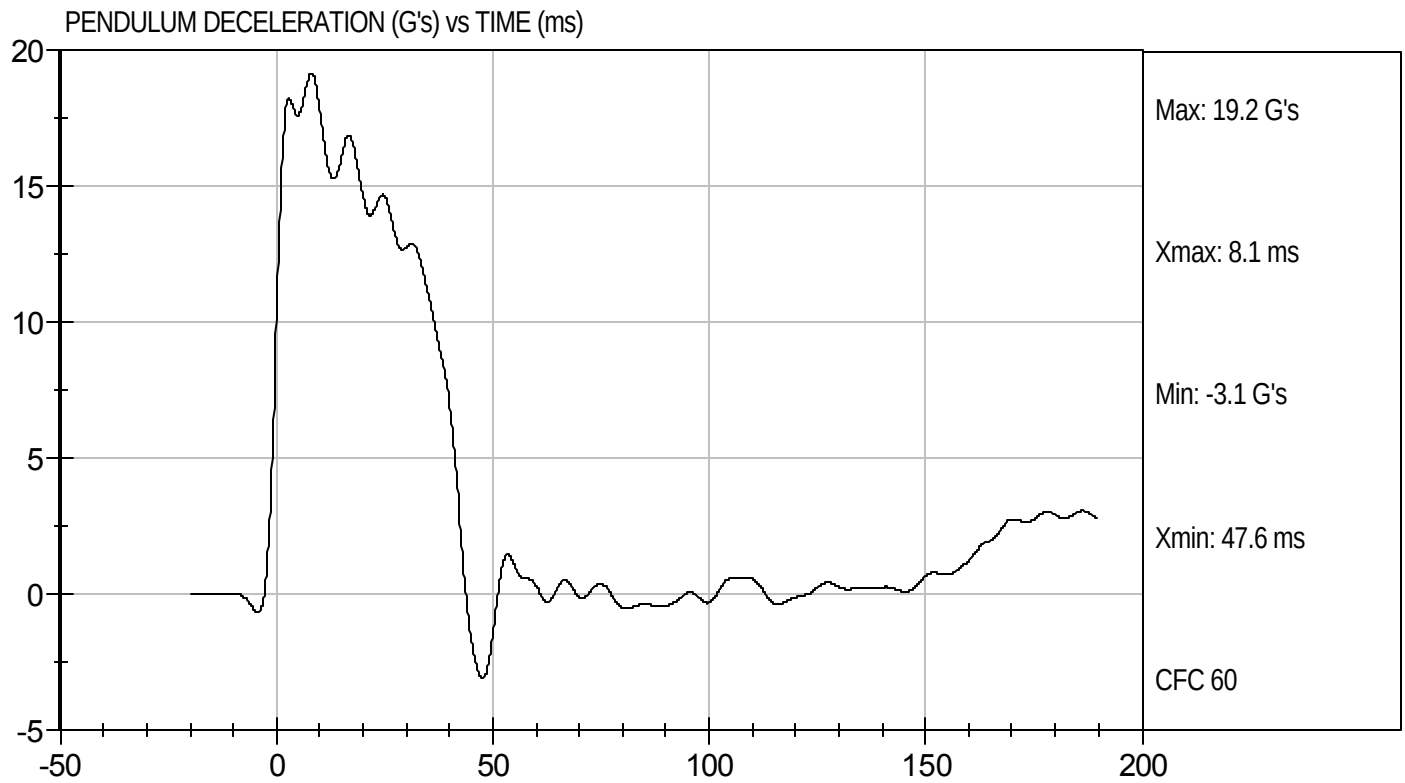
10/27/11
Test Date


Approved By



Test Desc: Neck Extension
Component ID: D113593

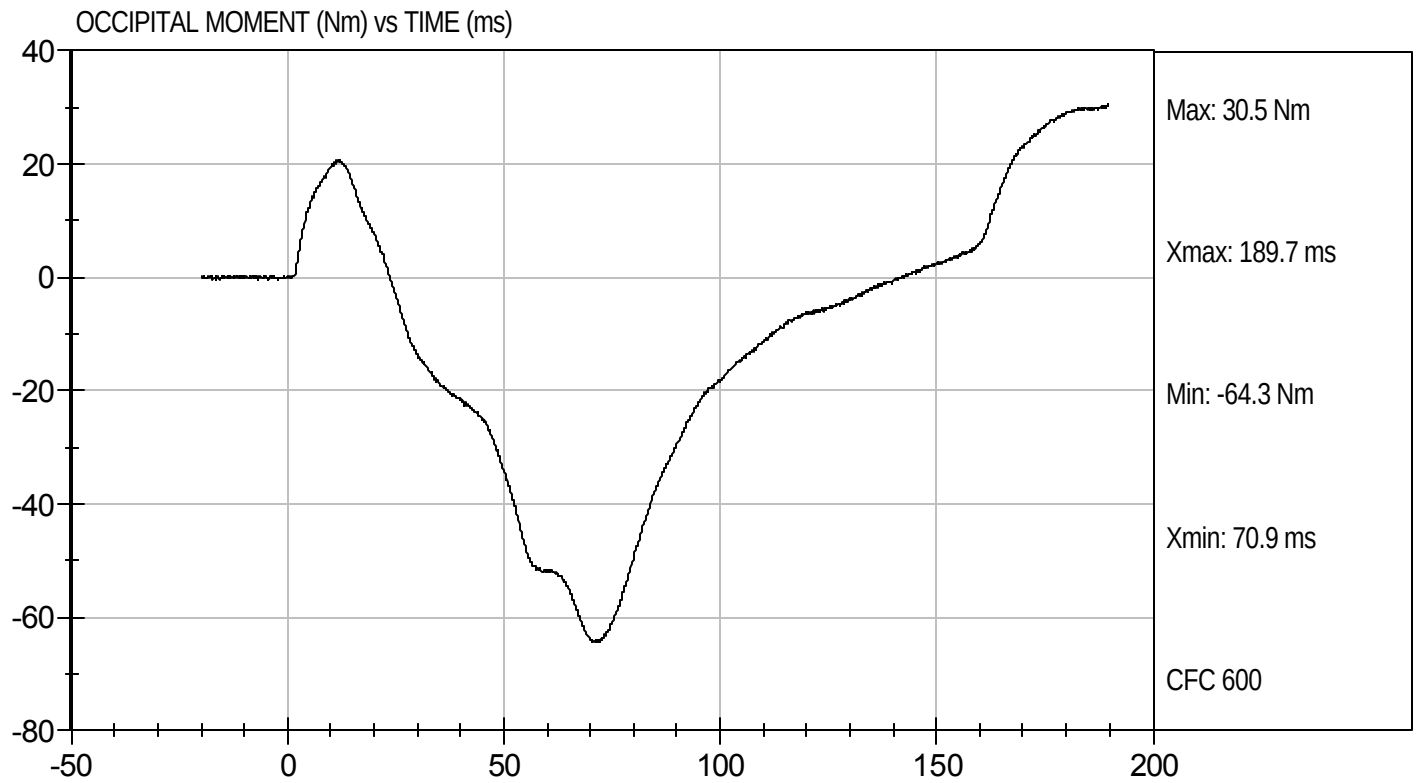
Test Date: 10/27/11
Velocity: 20.08 ft/s, 6.12 m/s





Test Desc: Neck Extension
Component ID: D113593

Test Date: 10/27/11
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: D113594

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	34	Pass
Probe Velocity	m/s	6.58 to 6.82	6.68	Pass
Peak Probe Force	N	5159 to 5893	5,458	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.57	Pass
Internal Hysteresis	%	69 to 85	70	Pass
Overall Test Results			Pass	


Laboratory Technician

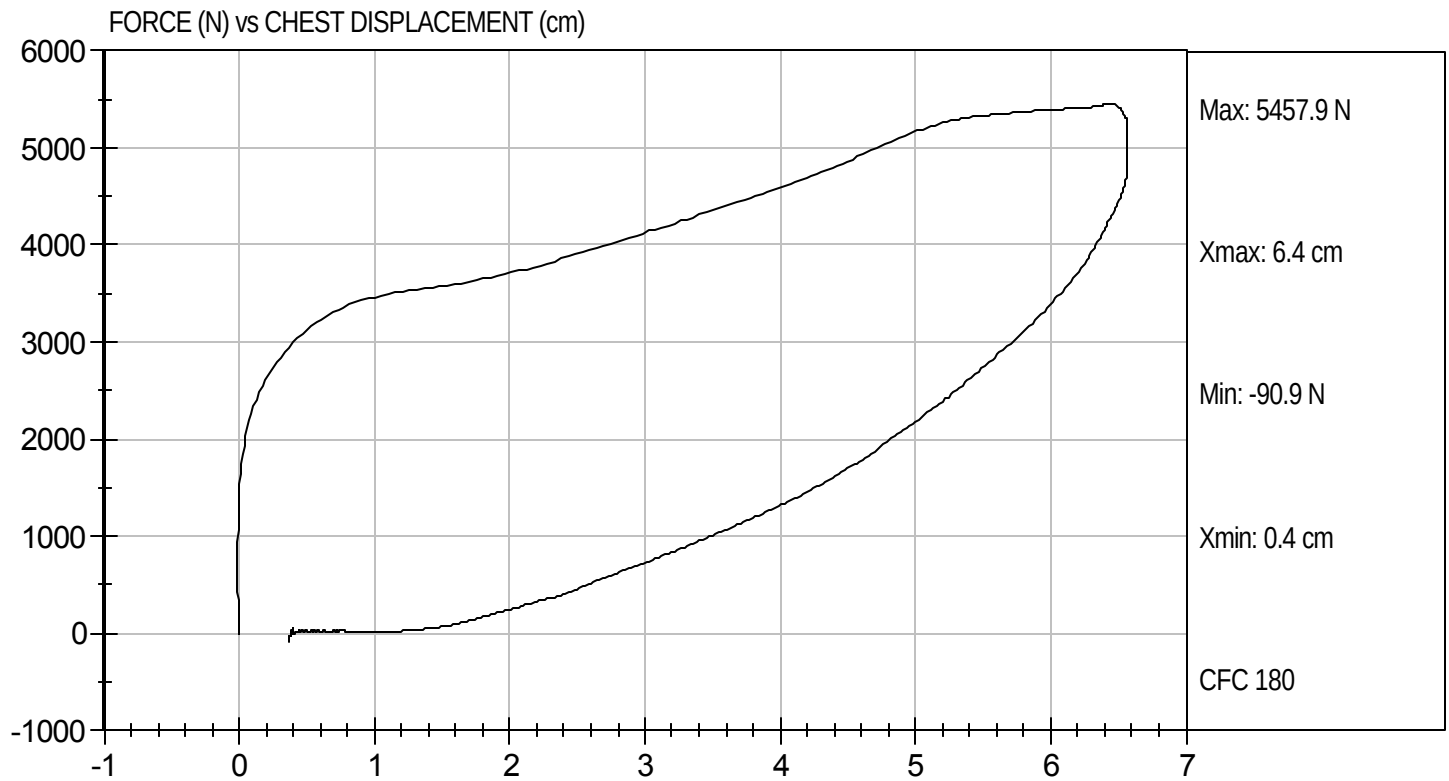
10/26/11
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D113594

Test Date: 10/26/11
Velocity: 21.92 ft/s, 6.68 m/s

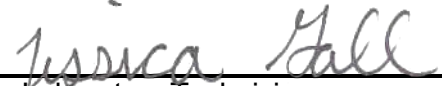


MGA RESEARCH CORPORATION
RIGHT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

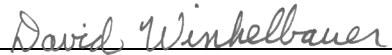
ATD Serial No: 036

Test I.D: D113595

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	35	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	Newtons	4715 to 5782	5,325	Pass
Overall Test Results				Pass


Laboratory Technician

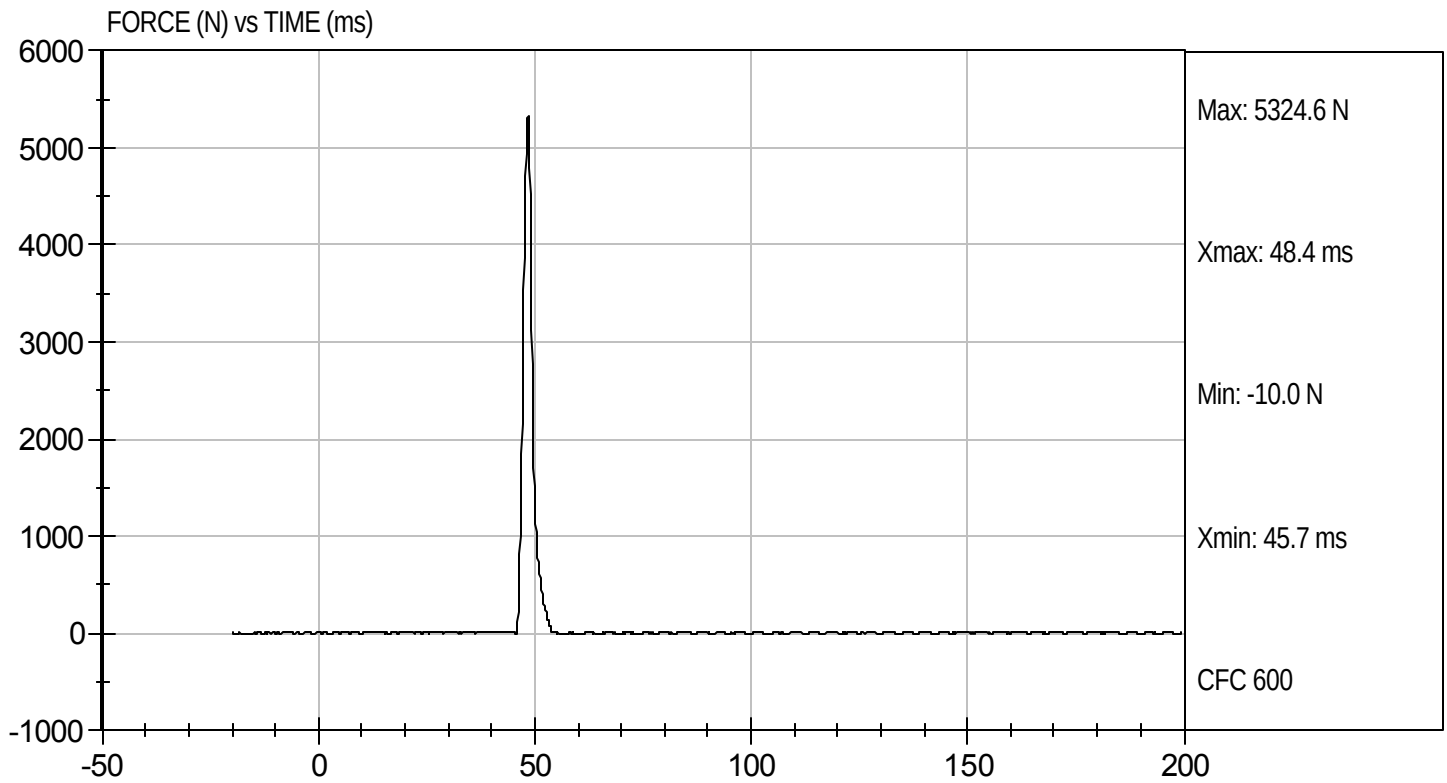
10/26/11
Test Date


Approved By



Test Desc: Right Knee
Component ID: D113595

Test Date: 10/26/11
Velocity: 6.97 ft/s, 2.12 m/s



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

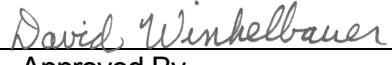
ATD Serial No: 036

Test I.D: D113596

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	35	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	Newtons	4715 to 5782	5,554	Pass
Overall Test Results				Pass


Laboratory Technician

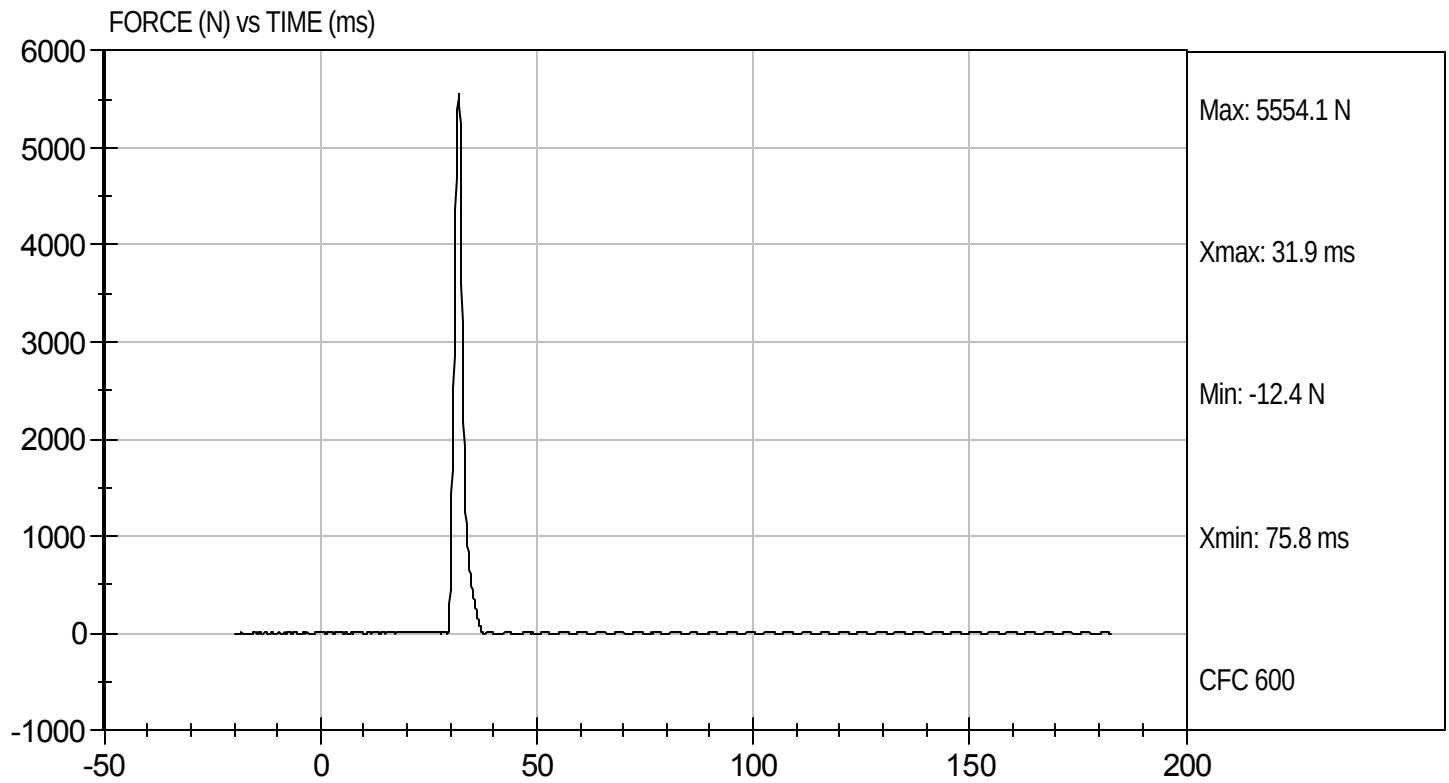
10/26/11
Test Date


Approved By



Test Desc: Left Knee
Component ID: D113596

Test Date: 10/26/11
Velocity: 6.97 ft/s, 2.12 m/s



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

ATD Serial No: 036

Test I.D: D113590

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.4	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	36	36	Pass
Rotation Rate	deg/s	5.0 -10.0	5.7	5.7	Pass
30 Degrees	Nm	94.9 Nm Max	91.7	82.2	Pass
150 ft-lbf / 203.4 Nm	Deg	40.0 - 50.0 Degree Max Rotation	40.1	40.7	Pass
Overall Test Results					Pass


 Laboratory Technician

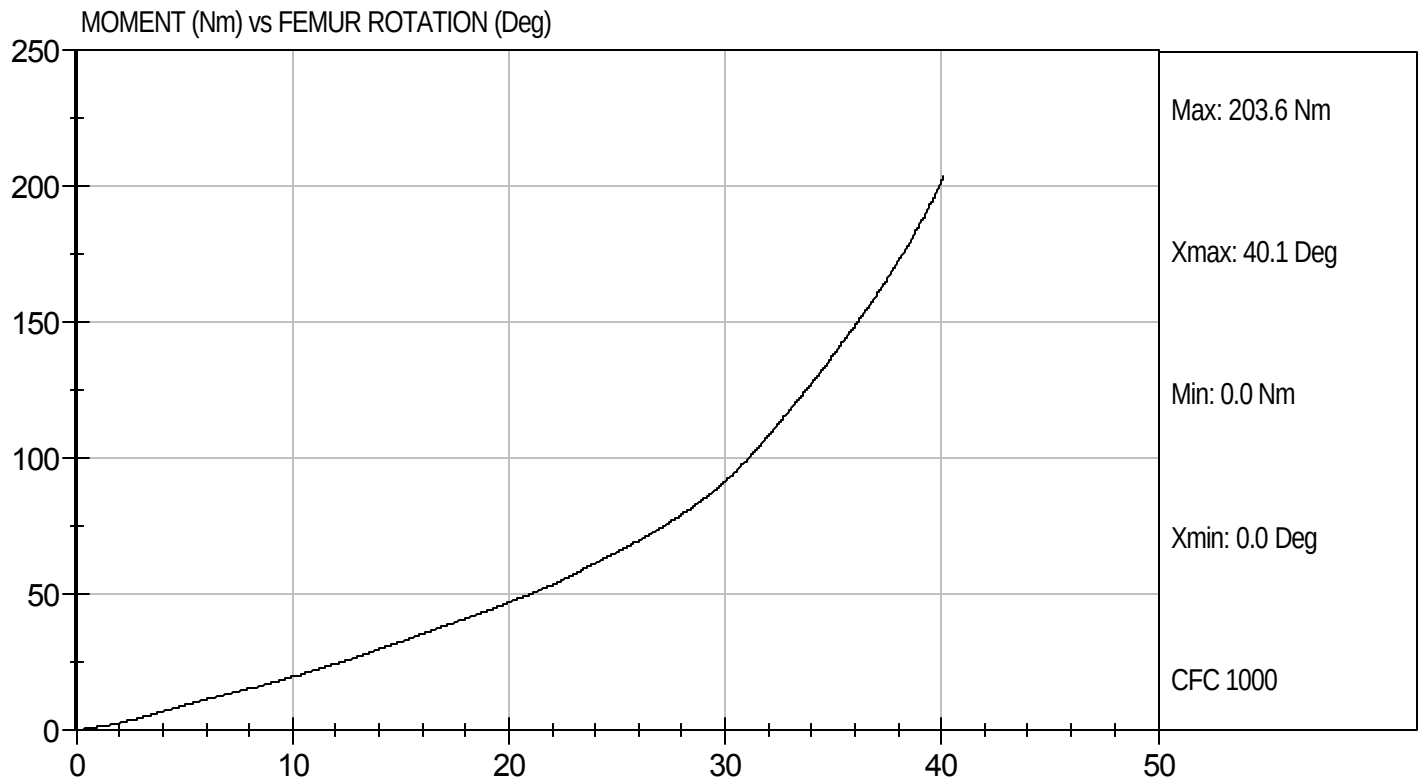
10/26/11
 Test Date


 Approved By



Test Desc: Hip Femur Flexion
Component ID: D113599

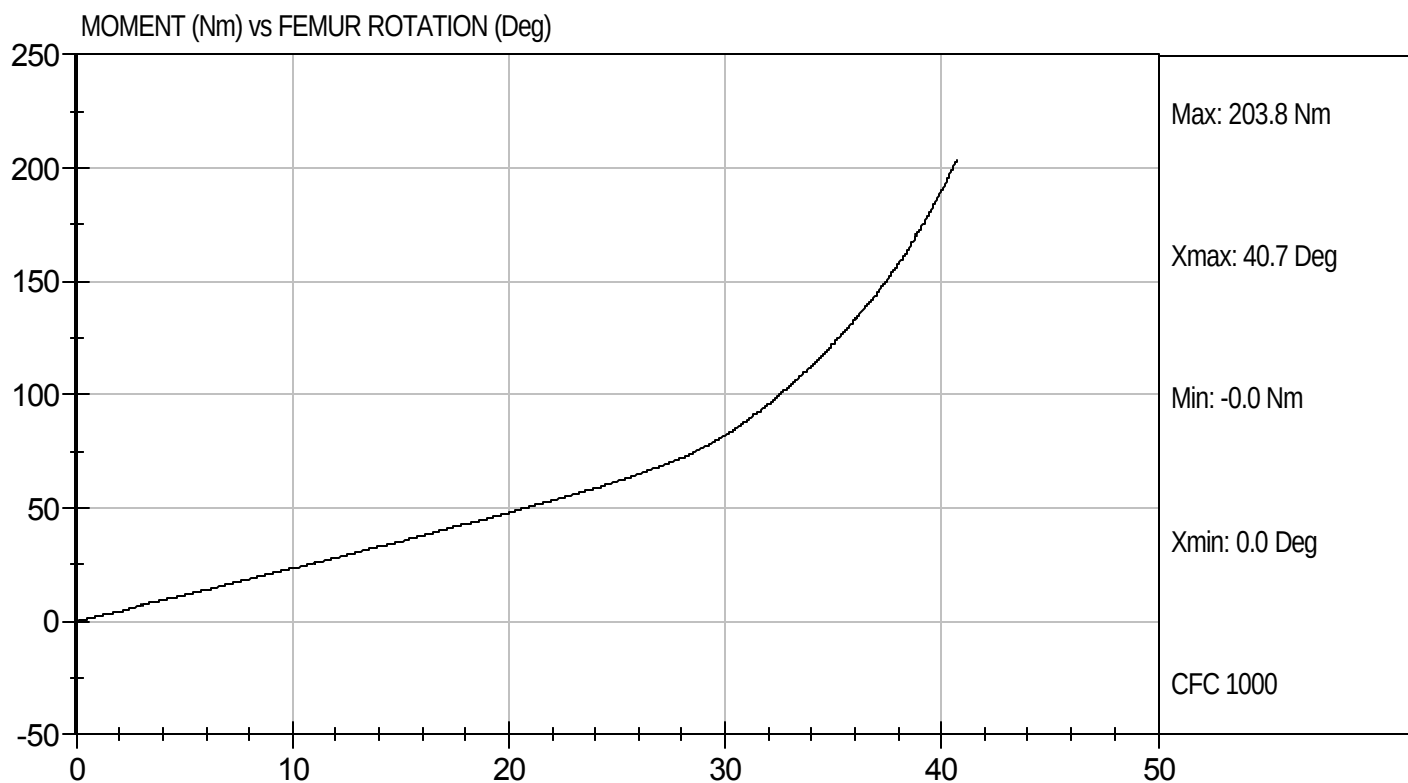
Test Date: 10/26/11
Velocity: 0 ft/s, 0.00 m/s





Test Desc: Hip Femur Flexion
Component ID: D113590

Test Date: 10/26/11
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

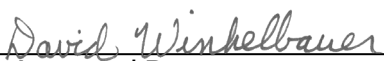
ATD Serial No: 634

Test ID: D113351

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	40	Pass
Peak Resultant Acceleration	G's	250 to 300	276	Pass
Peak Lateral Acceleration	G's	+/- 15	-2.8	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

10/5/11
Test Date

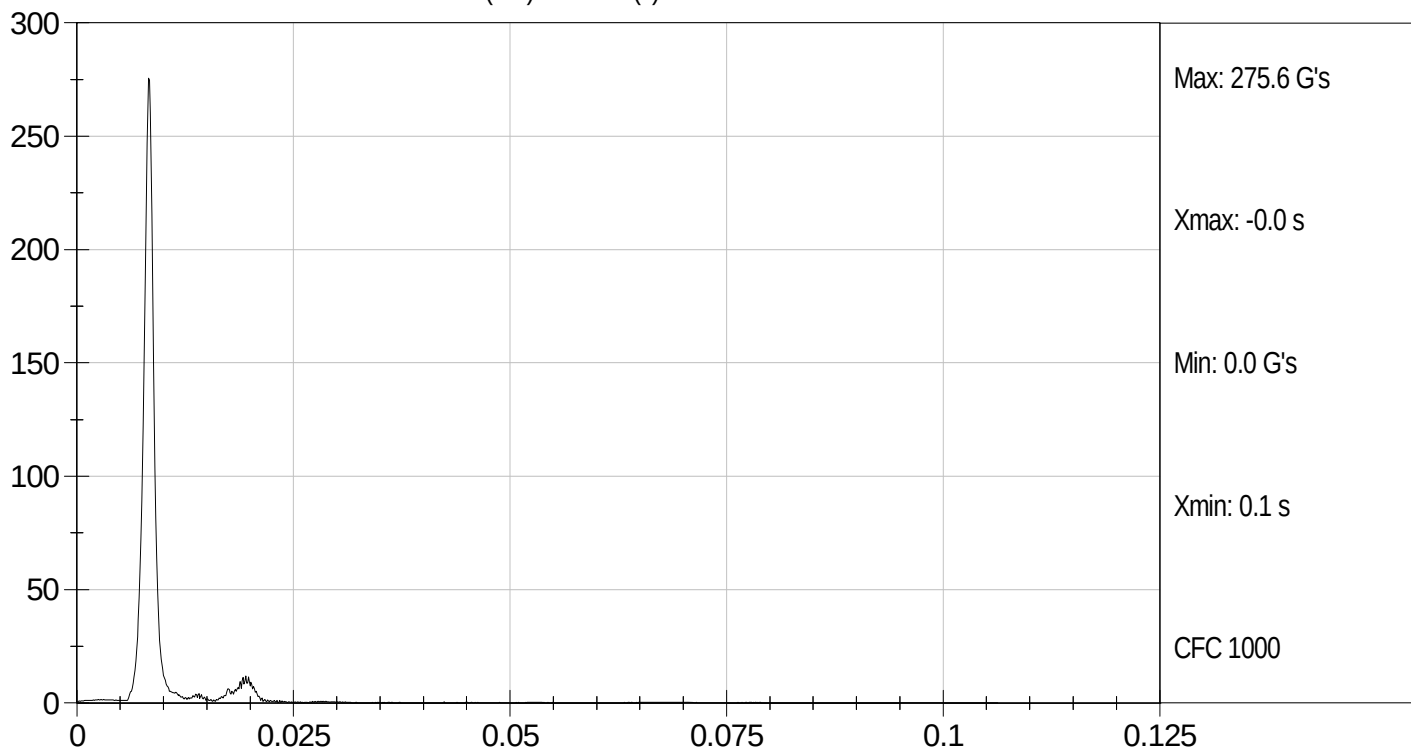

Approved By



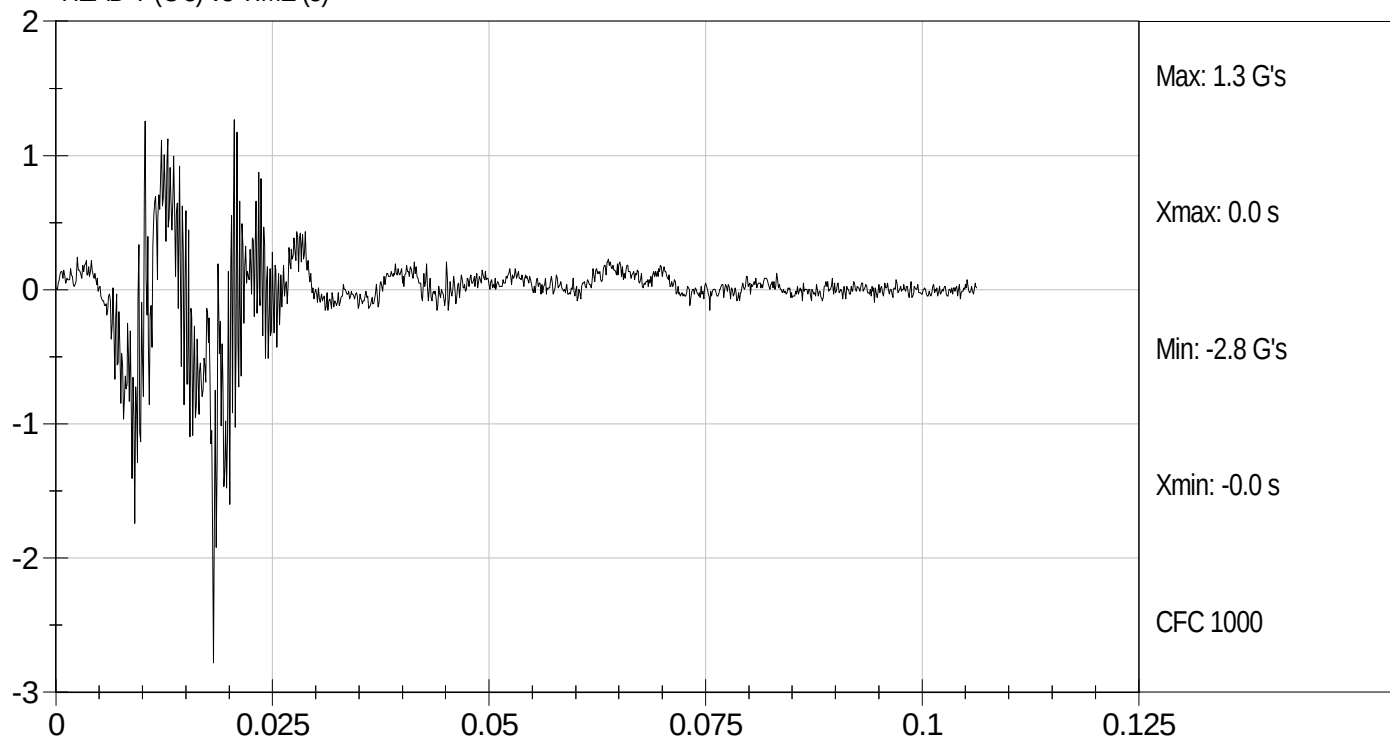
Test Desc: Head Drop
Component ID: D113351

Test Date: 10/5/11
Velocity: 0 ft/s, 0.00 m/s

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



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

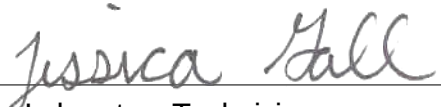


MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test I.D: D113352

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	22.0	Pass
Laboratory Relative Humidity		%	10 to 70	43	Pass
Pendulum Speed		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	m/s	2.1 to 2.5	2.4	Pass
	20 ms	m/s	4.0 to 5.0	4.5	Pass
	30 ms	m/s	5.8 to 7.0	6.2	Pass
D Plane Rotation	Max	deg	77 to 91	77	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	85	Pass
Overall Results					Pass


 Laboratory Technician

10/6/11
 Test Date

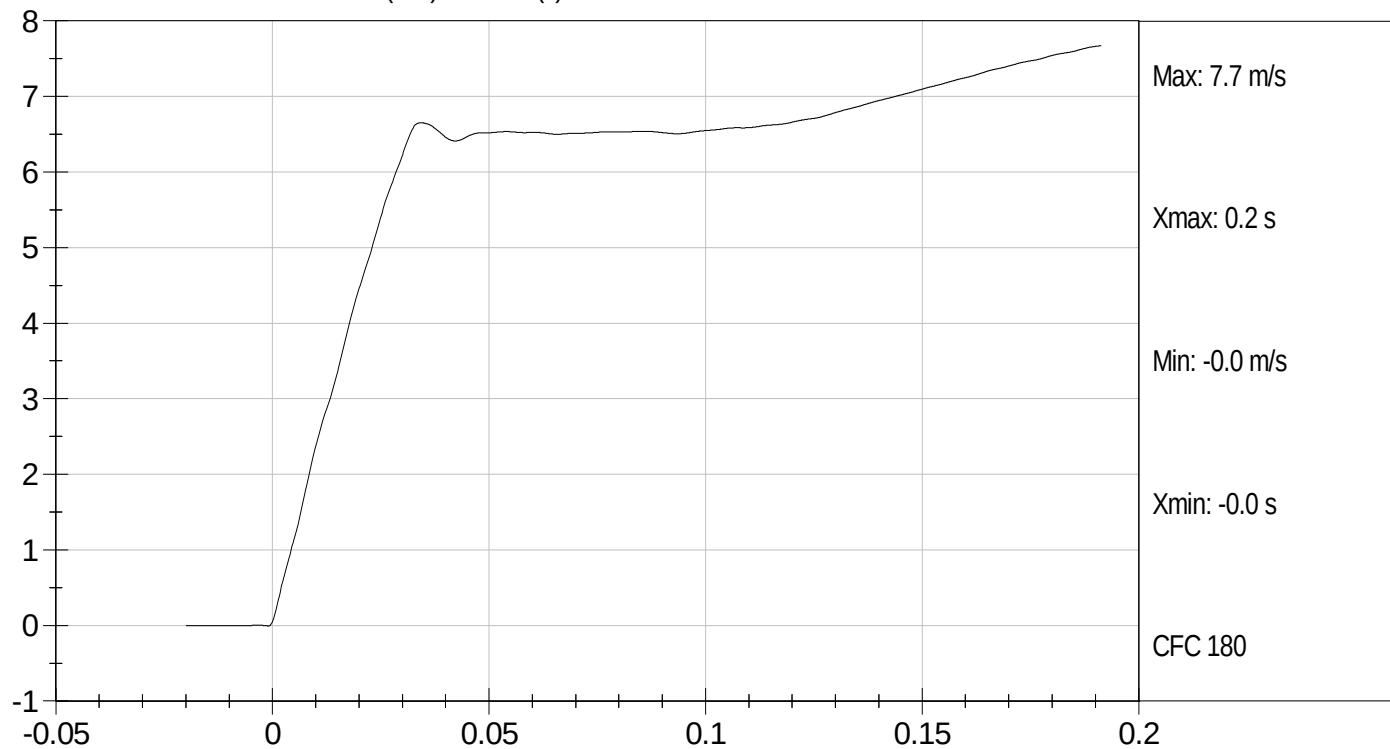

 Approved By



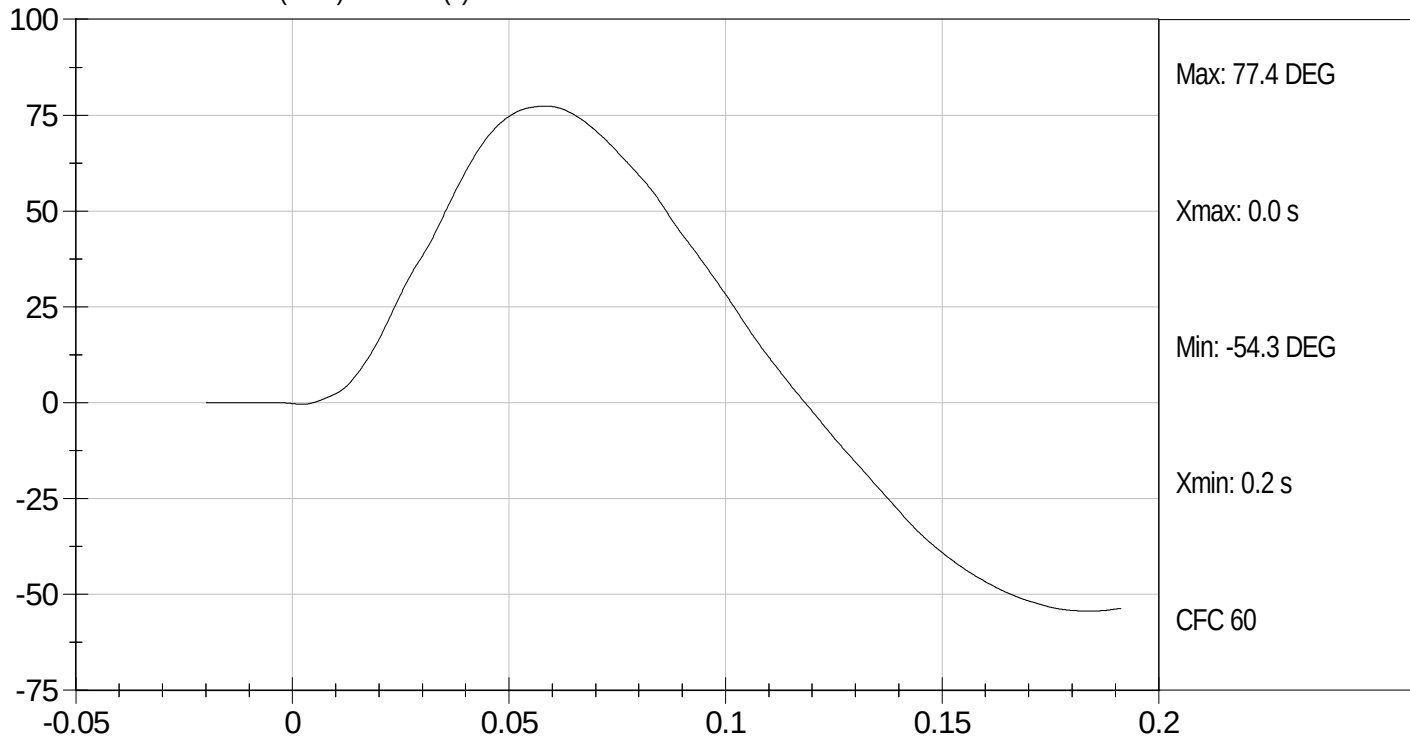
Test Desc: Neck Flexion
Component ID: D113352

Test Date: 10/6/11
Velocity: 23.15 ft/s, 7.06 m/s

PENDULUM DECELERATION (m/s) vs TIME (s)



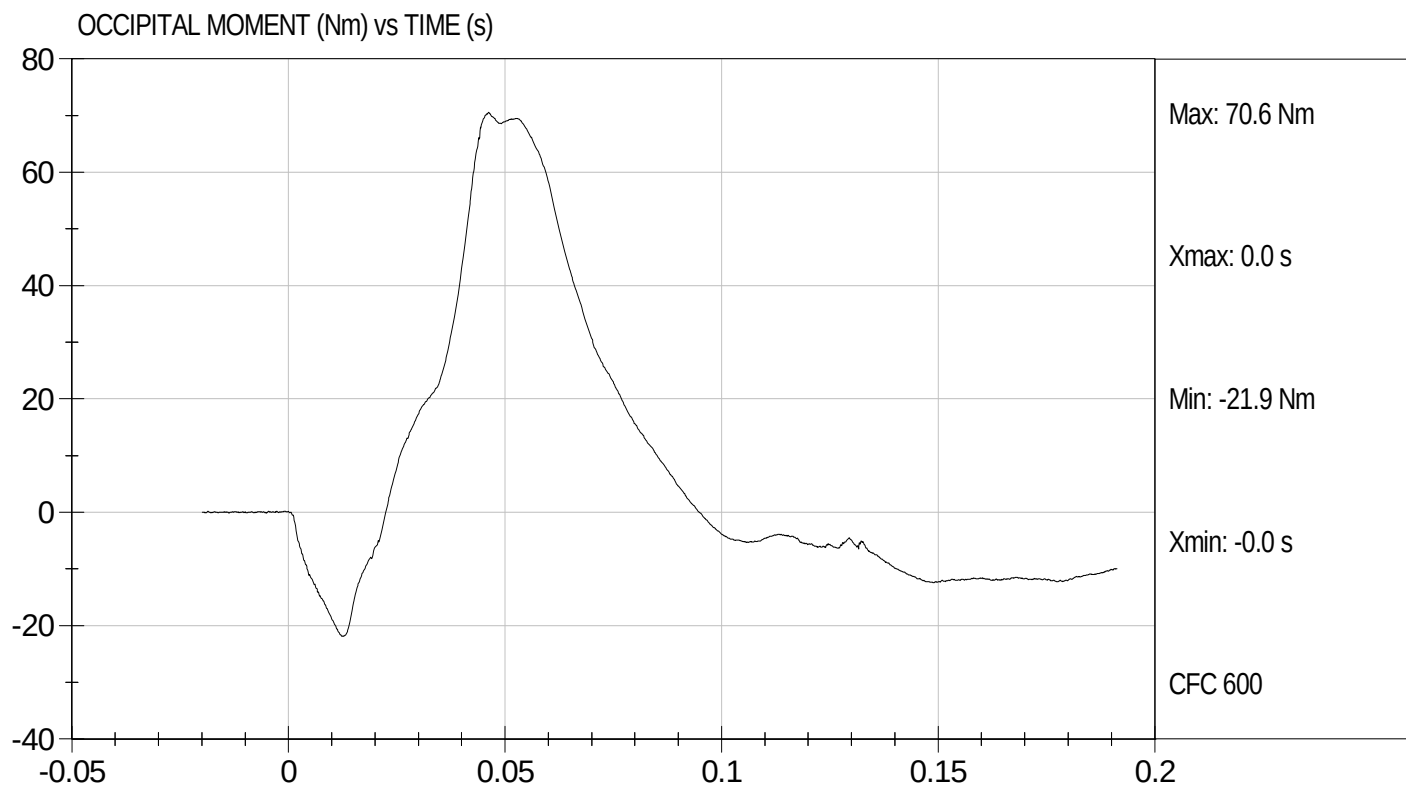
NECK ROTATION (DEG) vs TIME (s)





Test Desc: Neck Flexion
Component ID: D113352

Test Date: 10/6/11
Velocity: 23.15 ft/s, 7.06 m/s



MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 5TH PERCENTILE

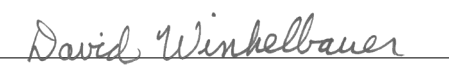
ATD Serial No: 634

Test I.D: D113353

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	22.0	Pass
Laboratory Relative Humidity		%	10 to 70	43	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.12	Pass
Pendulum Deceleration	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	5.0	Pass
D Plane Rotation	Max	deg	99 to 114	104	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	-65 to -53	-53	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	102	Pass
Overall Results					Pass


 Laboratory Technician

10/6/11
 Test Date

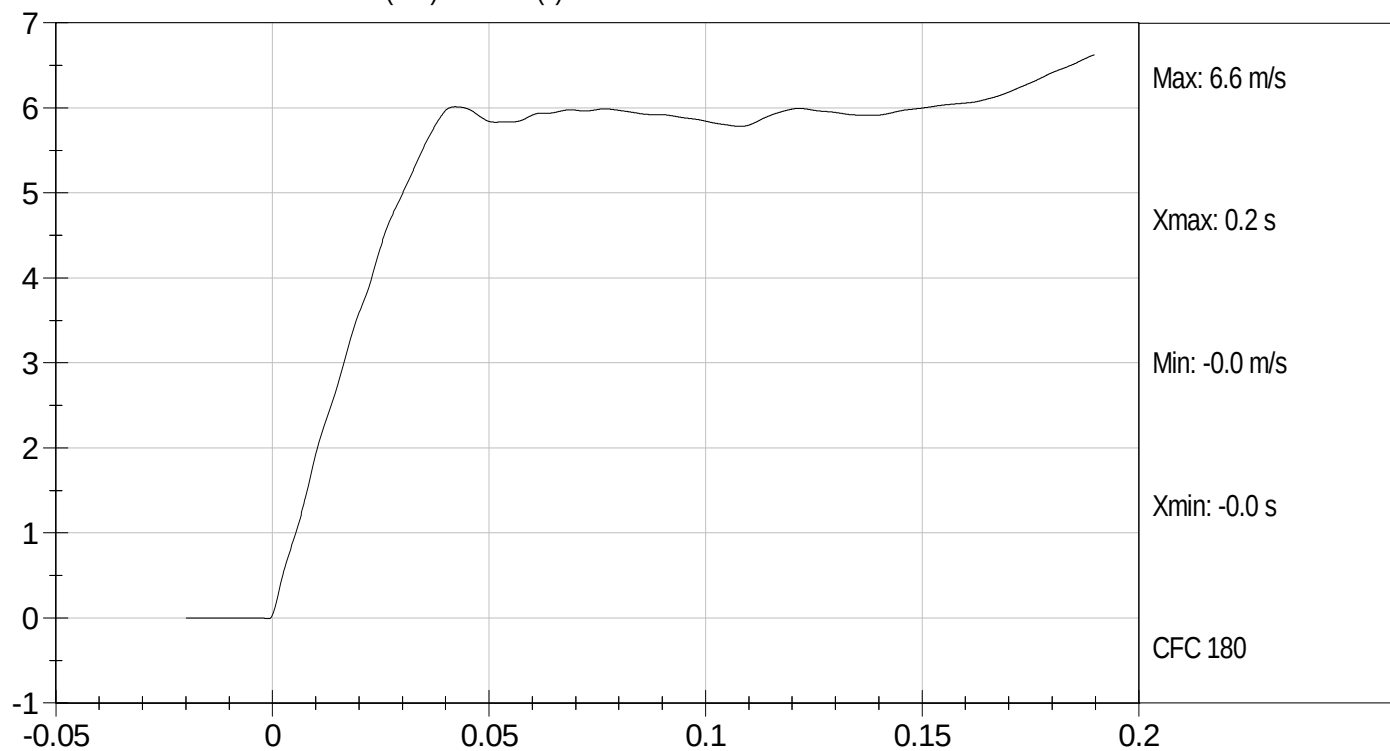

 Approved By



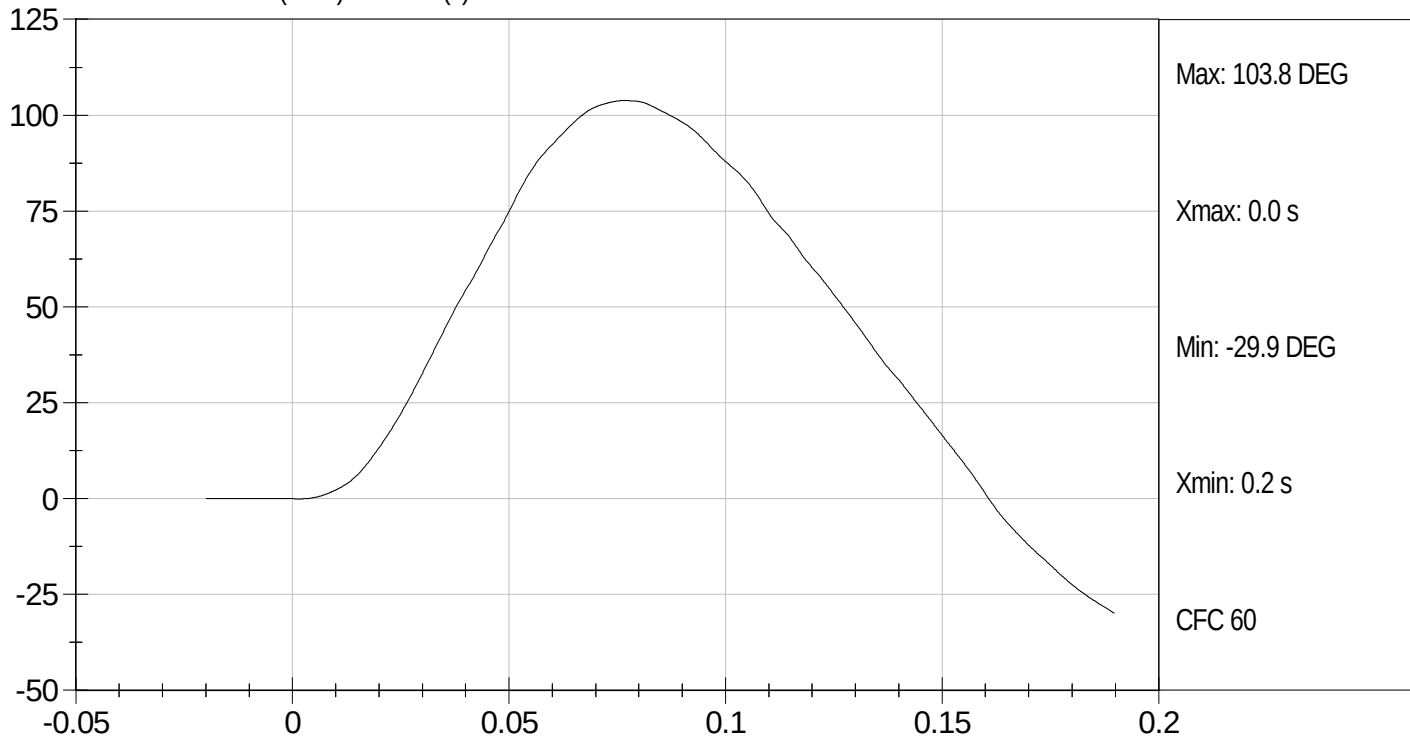
Test Desc: Neck Extension
Component ID: D113353

Test Date: 10/6/11
Velocity: 20.08 ft/s, 6.12 m/s

PENDULUM DECELERATION (m/s) vs TIME (s)



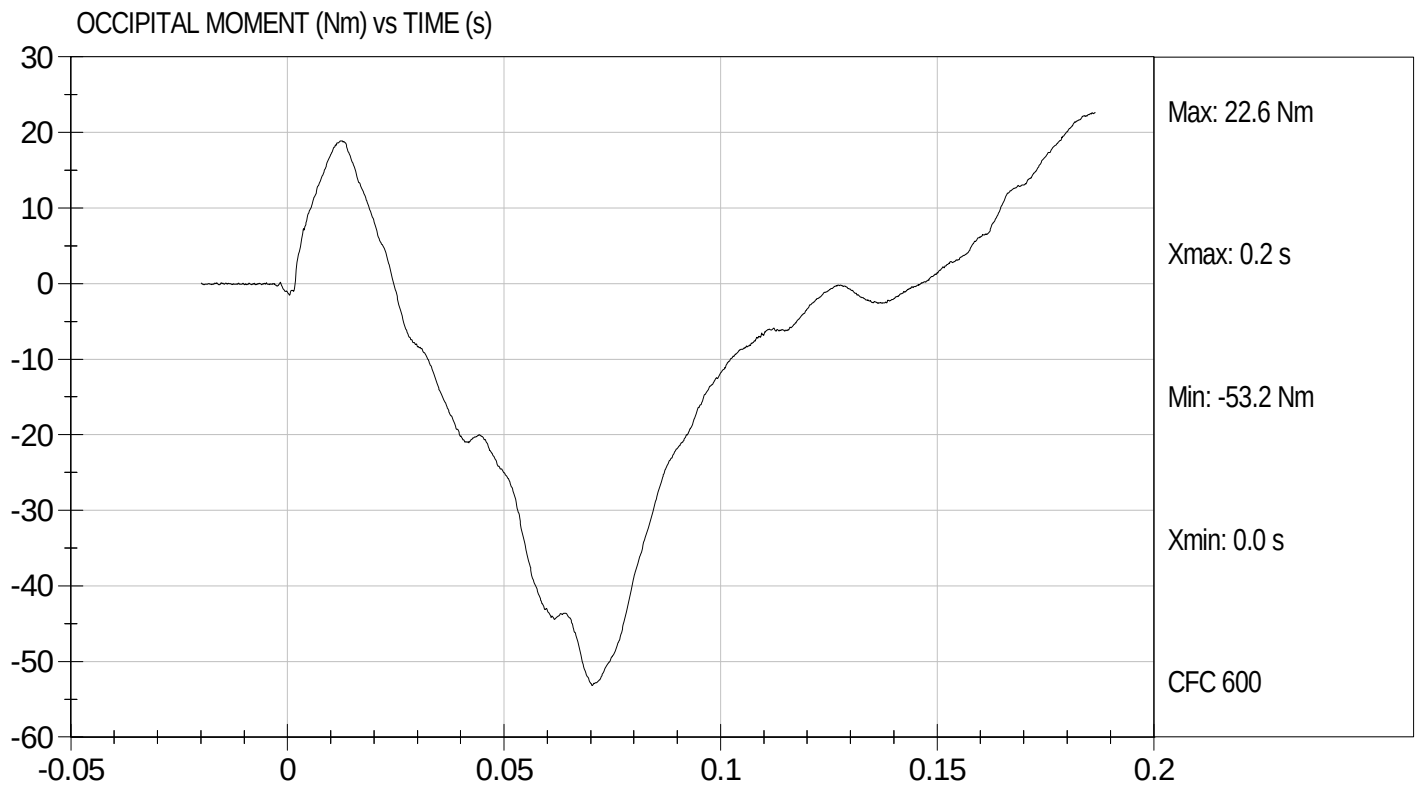
NECK ROTATION (DEG) vs TIME (s)





Test Desc: Neck Extension
Component ID: D113353

Test Date: 10/6/11
Velocity: 20.08 ft/s, 6.12 m/s

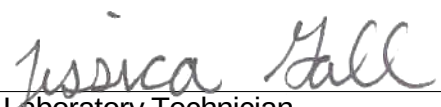


MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 5TH PERCENTILE

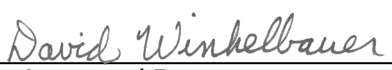
ATD Serial No: 634

Test I.D: D113354

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.5	Pass
Relative Humidity	%	10 to 70	43	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	4.1	Pass
Internal Hysteresis	%	69 to 85	69	Pass
Peak Force 18 mm - 50 mm	N	<= 4,600 N	4170	Pass
Overall Test Results				Pass


Laboratory Technician

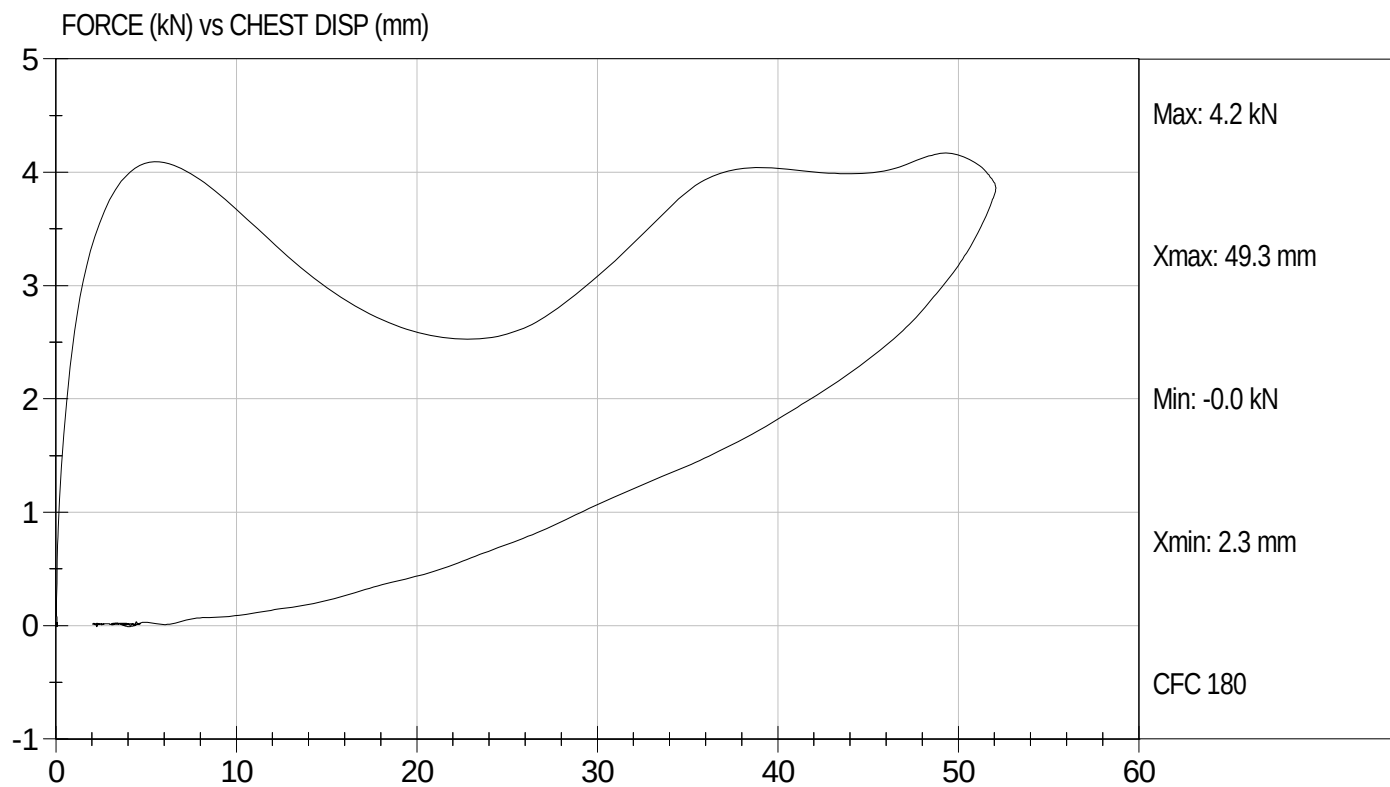
10/6/11
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D113354

Test Date: 10/6/11
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: D113355

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	39	Pass
Probe Speed	m/s	2.07 to 2.13	2.11	Pass
Maximum Force	kN	3.45 to 4.06	3.77	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

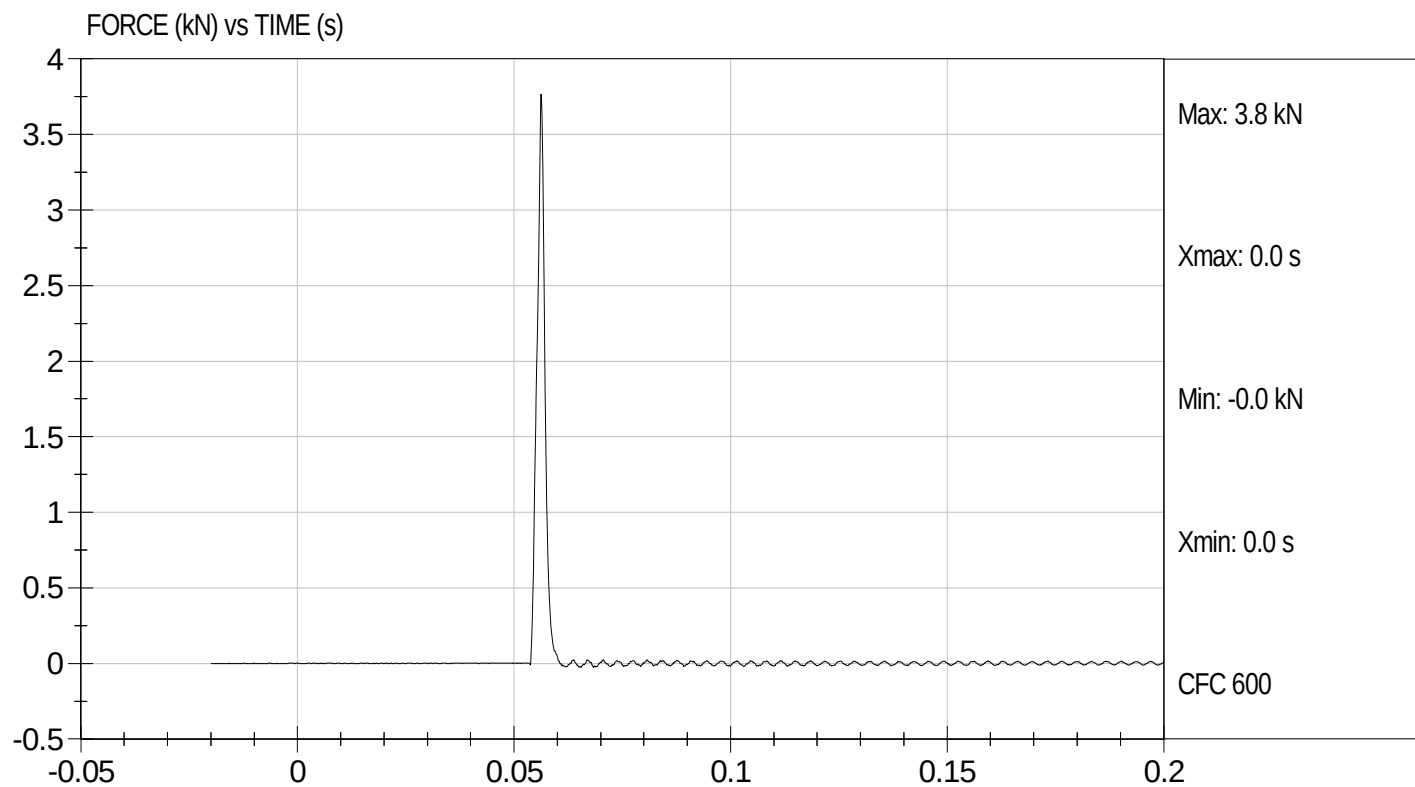
10/5/11
Test Date

David Winkelbauer
Approved By



Test Desc: Right Knee
Component ID: D113355

Test Date: 10/5/11
Velocity: 6.92 ft/s, 2.11 m/s



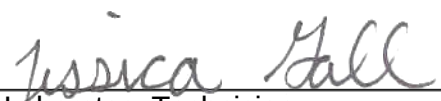
MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test I.D: D113356

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	39	Pass
Probe Speed	m/s	2.07 to 2.13	2.11	Pass
Maximum Force	kN	3.45 to 4.06	3.62	Pass
Overall Test Results				Pass


Laboratory Technician

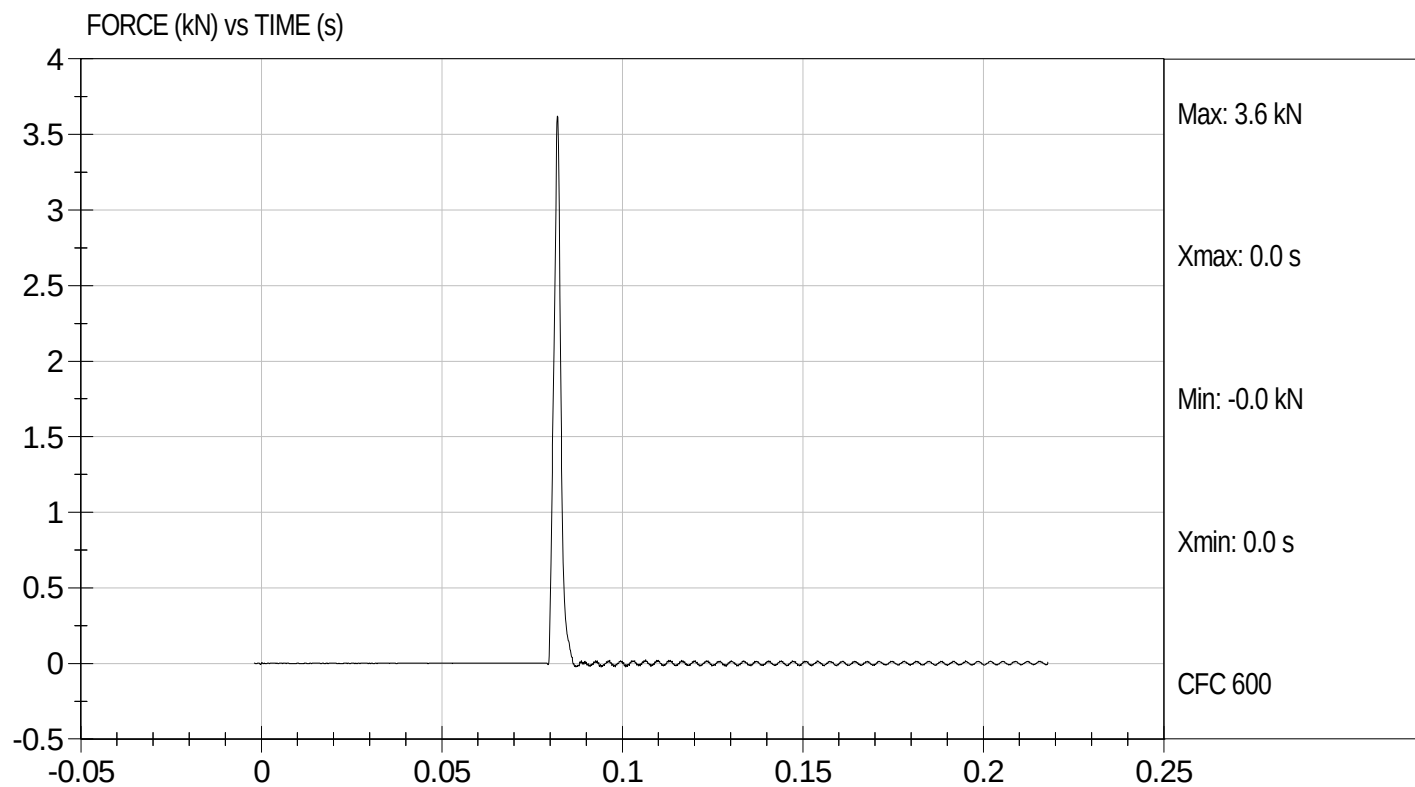
10/5/11
Test Date


Approved By



Test Desc: Left Knee
Component ID: D113356

Test Date: 10/5/11
Velocity: 6.92 ft/s, 2.11 m/s



MGA RESEARCH CORPORATION
TORSO FLEXION TEST
HYBRID III 5TH PERCENTILE

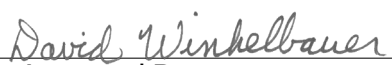
ATD Serial No: 634

Test I.D: D113357

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	40	Pass
Initial Angle	deg	0 to 20	15	Pass
Return Angle	deg	+/- 8	7	Pass
Force at 45 deg	N	320 to 390	383	Pass
Upper Torso Deflection Rate	Deg/sec	0.5 to 1.5	1.0	Pass
Overall Result			Pass	


Laboratory Technician

10/5/11
Test Date


Approved By

MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test ID: D113581

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	35	Pass
Peak Resultant Acceleration	G's	250 to 300	286	Pass
Peak Lateral Acceleration	G's	+/- 15	-5.4	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

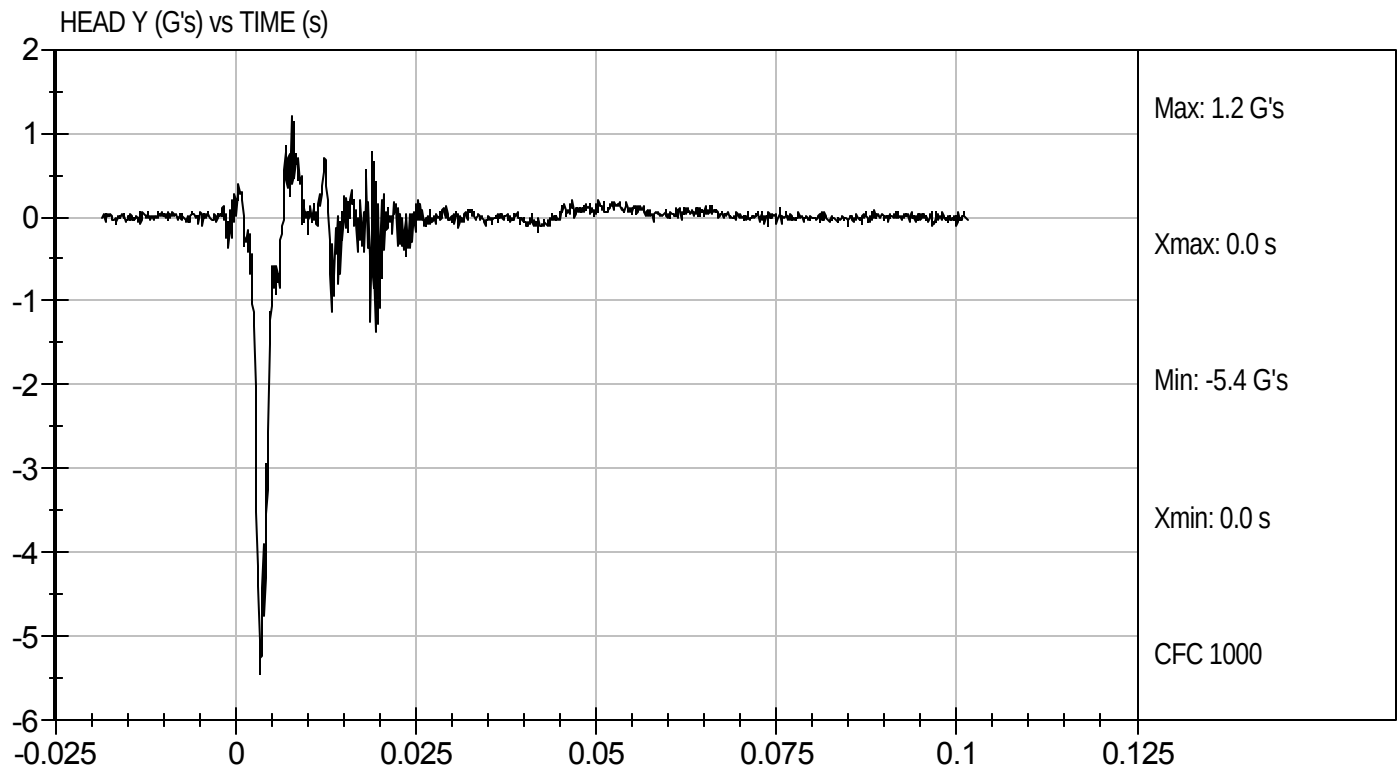
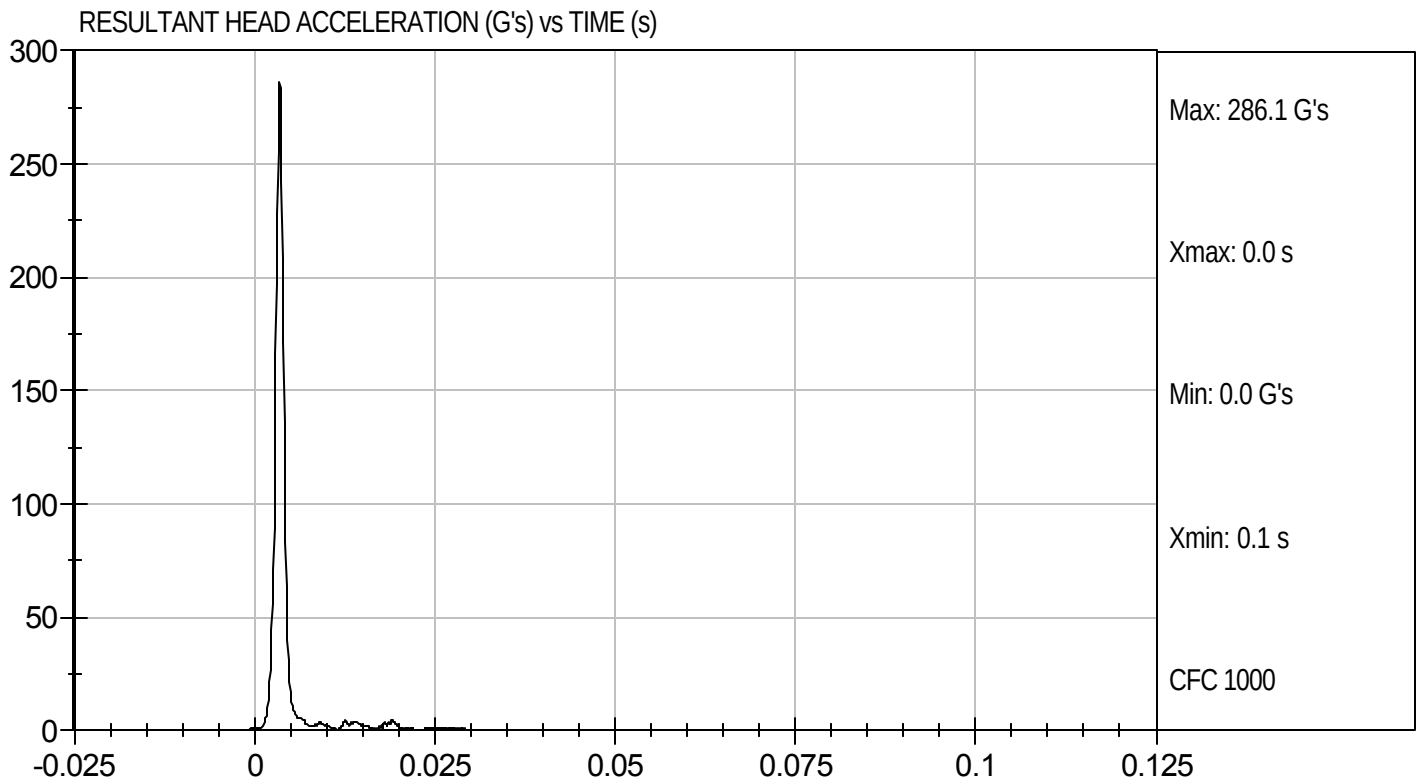
10/26/11
Test Date

David Winkelbauer
Approved By



Test Desc: Head Drop
Component ID: D113581

Test Date: 10/26/11
Velocity: 0 ft/s, 0.00 m/s

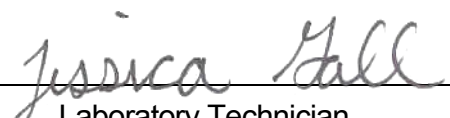


MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test I.D: D113582

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	35	Pass
Pendulum Speed		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	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	77	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	85	Pass
Overall Results					Pass


 Laboratory Technician

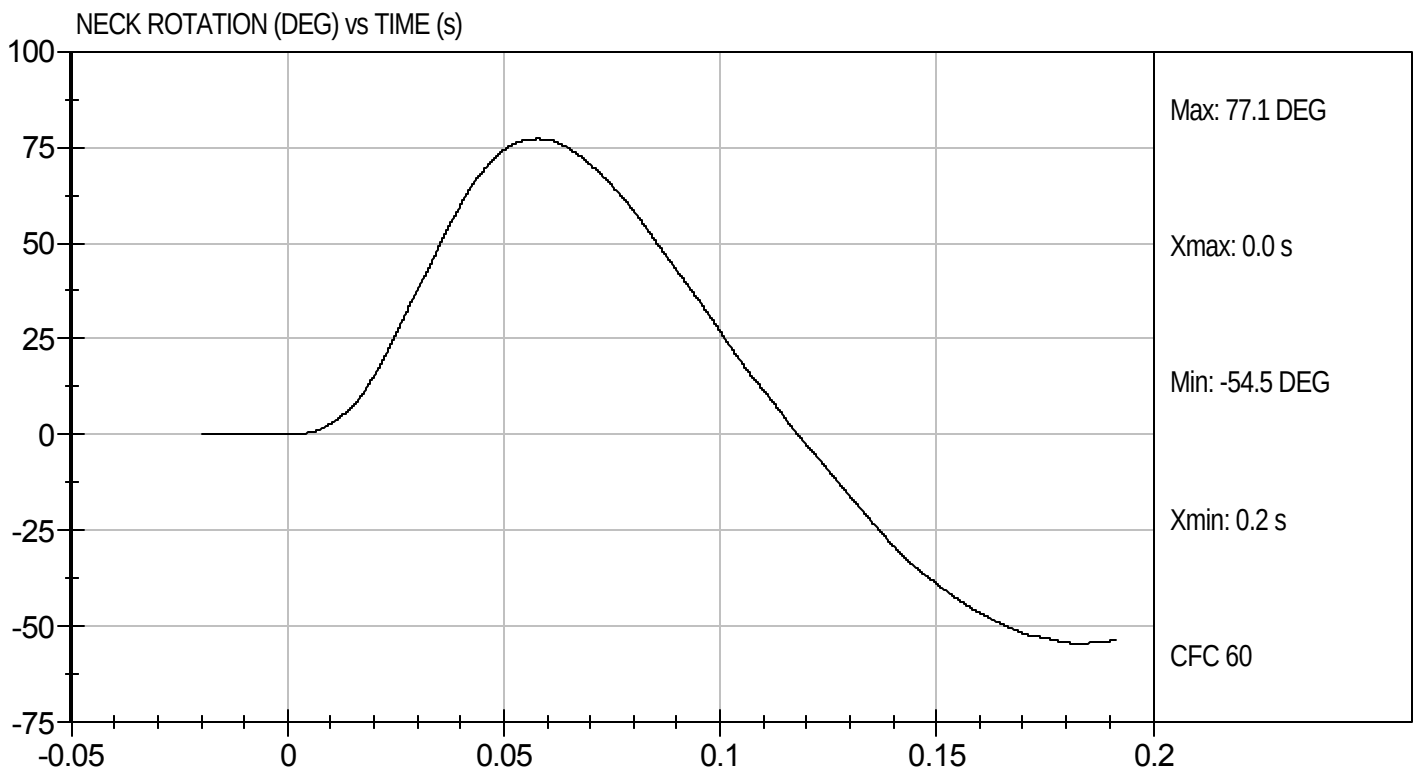
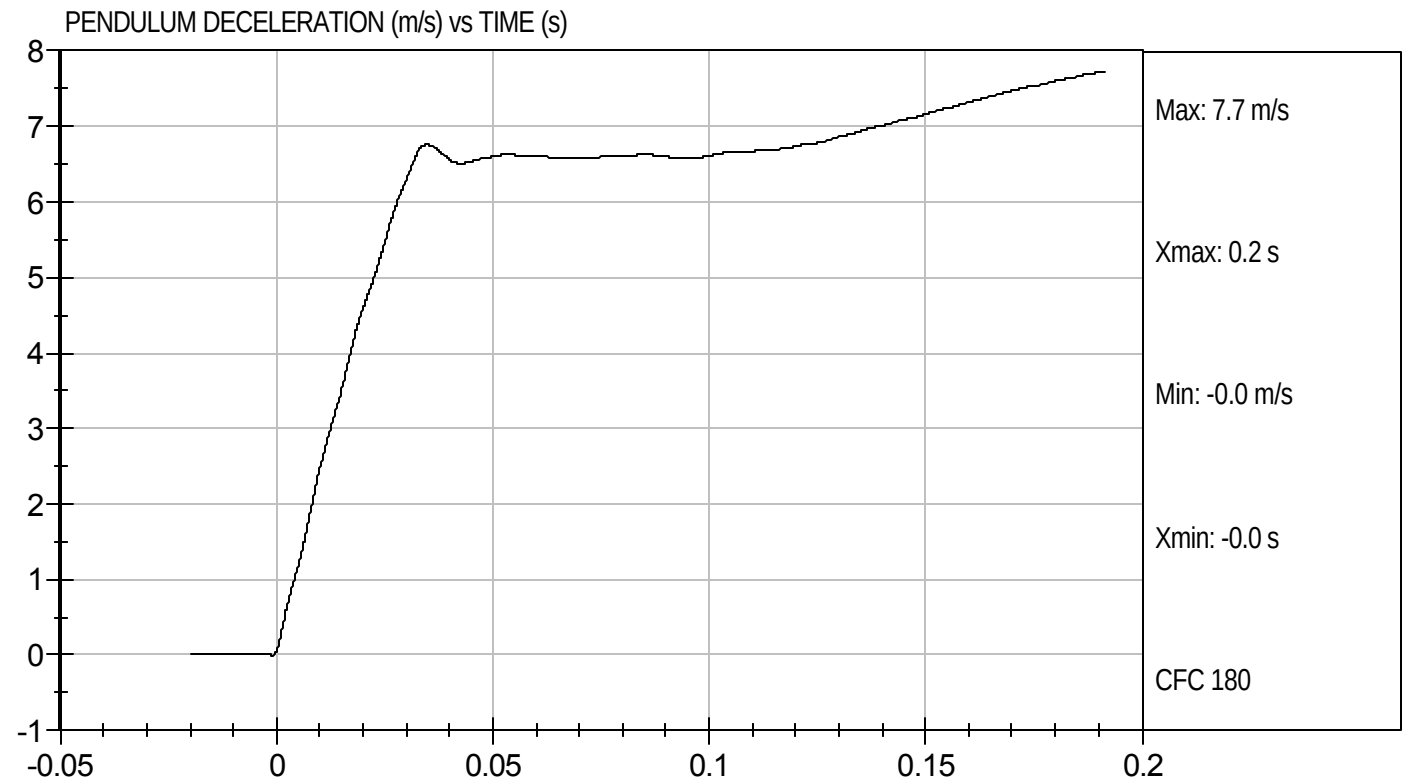
10/27/11
 Test Date


 Approved By



Test Desc: Neck Flexion
Component ID: D113582

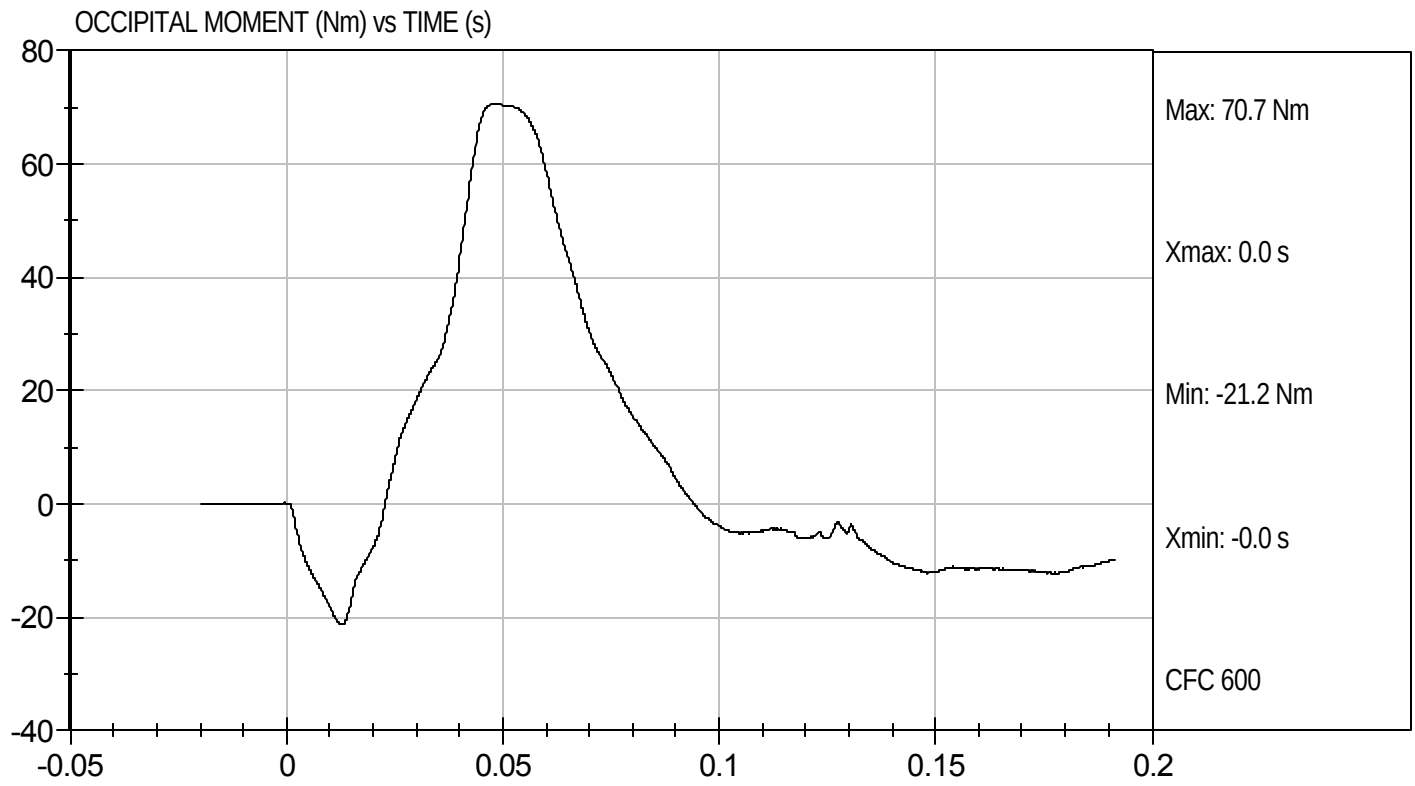
Test Date: 10/27/11
Velocity: 23.15 ft/s, 7.06 m/s





Test Desc: Neck Flexion
Component ID: D113582

Test Date: 10/27/11
Velocity: 23.15 ft/s, 7.06 m/s



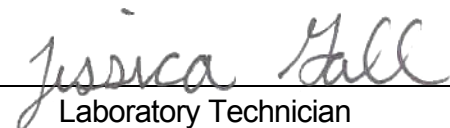
MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634Test I.D: D113583

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	34	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.12	Pass
Pendulum Deceleration	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	5.0	Pass
D Plane Rotation	Max	deg	99 to 114	102	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	-65 to -53	-54	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	102	Pass
Overall Results					Pass


 Laboratory Technician

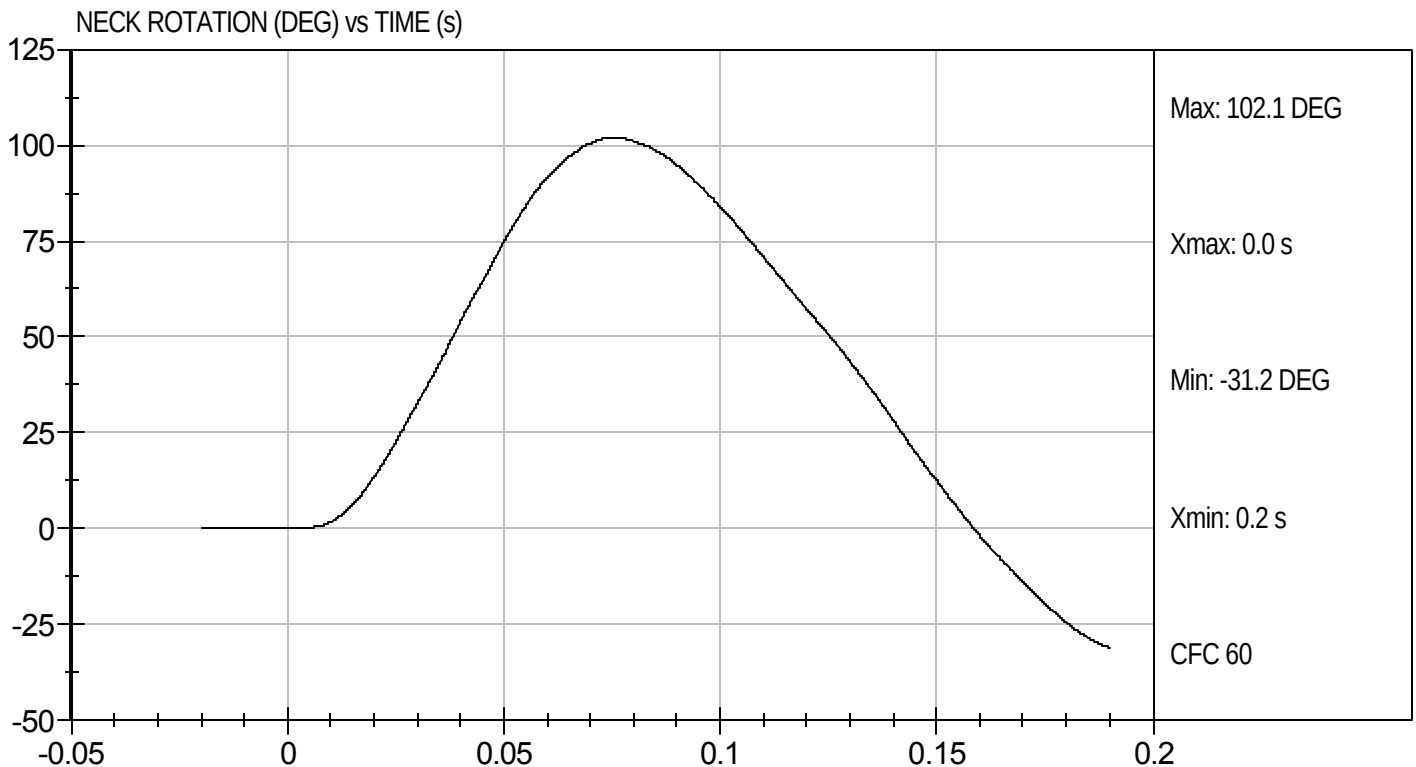
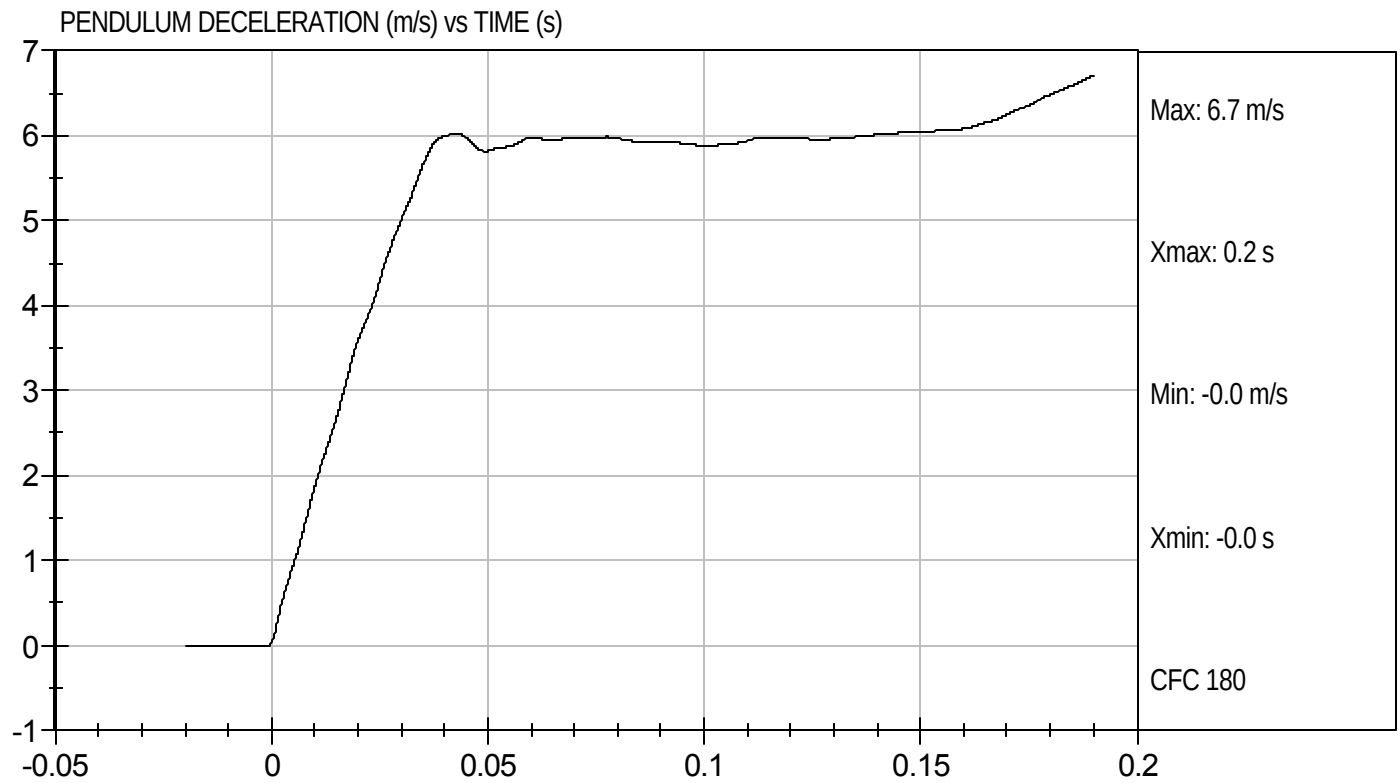
10/27/11
 Test Date


 Approved By



Test Desc: Neck Extension
Component ID: D113583

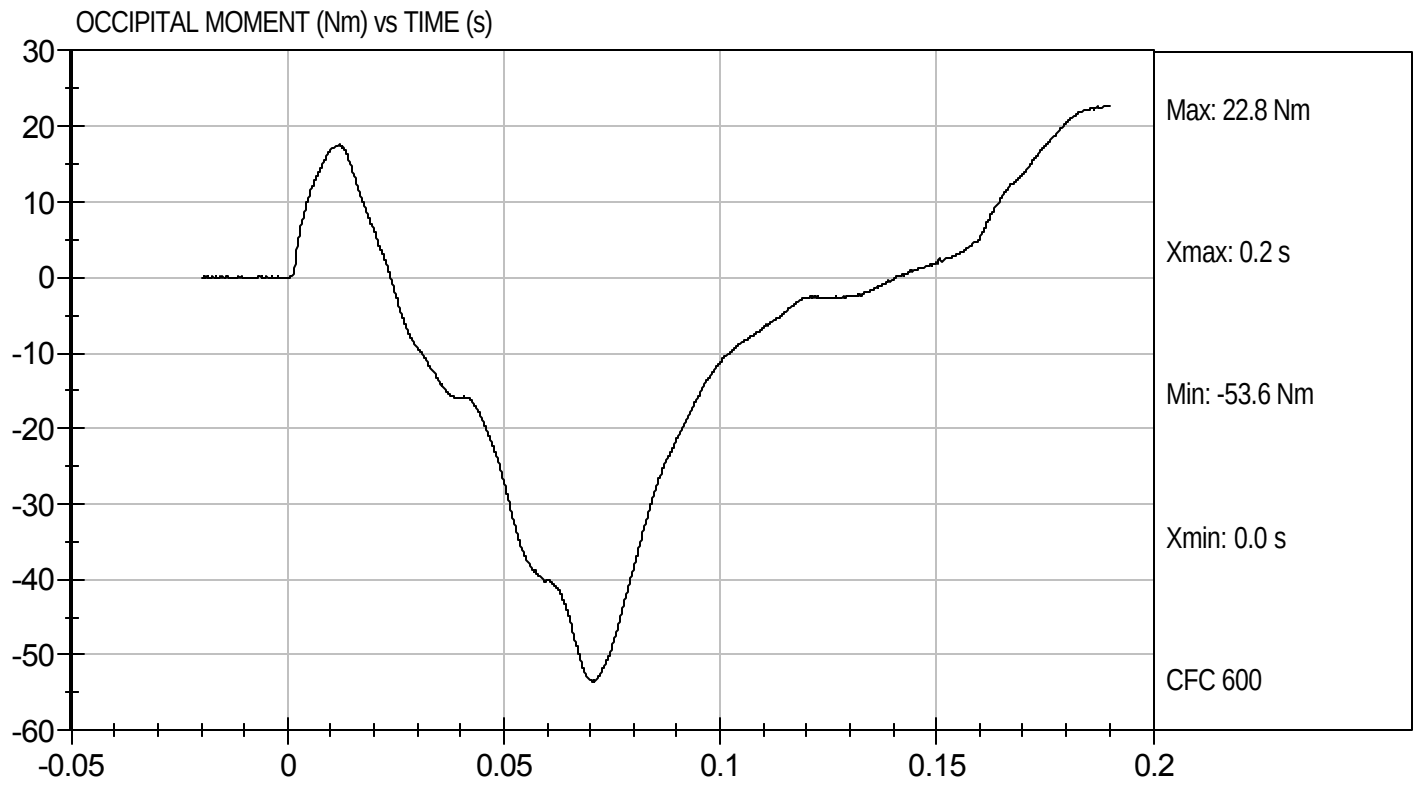
Test Date: 10/27/11
Velocity: 20.08 ft/s, 6.12 m/s





Test Desc: Neck Extension
Component ID: D113583

Test Date: 10/27/11
Velocity: 20.08 ft/s, 6.12 m/s



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 5TH PERCENTILE

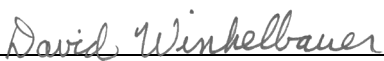
ATD Serial No: 634

Test I.D: D113584

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	22.1	Pass
Relative Humidity	%	10 to 70	34	Pass
Probe Speed	m/s	6.59 to 6.83	6.68	Pass
Peak Deflection	mm	50 to 58	50	Pass
Peak Resistive Force w/in Deflection Corridor	kN	3.9 to 4.4	4.0	Pass
Internal Hysteresis	%	69 to 85	69	Pass
Peak Force 18 mm - 50 mm	N	<= 4,600 N	4221	Pass
Overall Test Results				Pass


Laboratory Technician

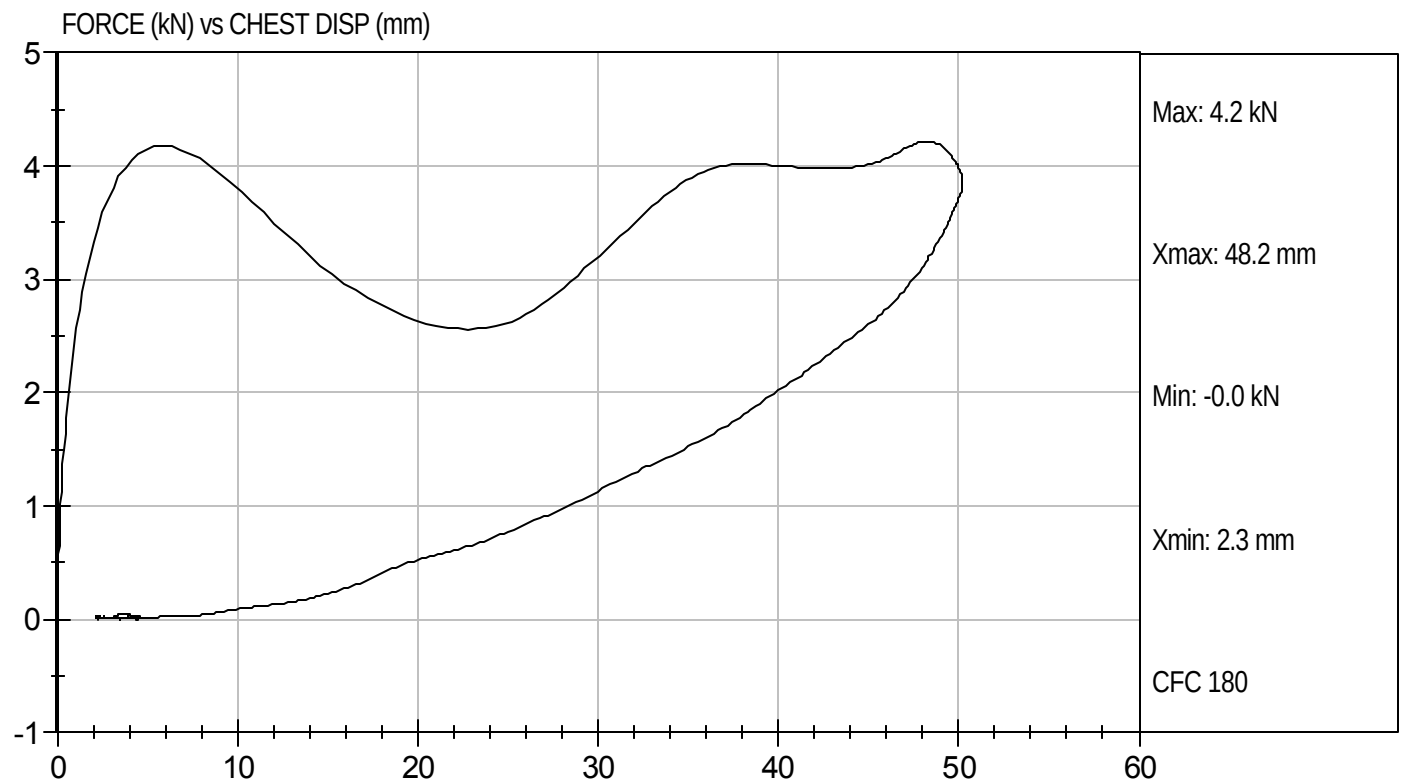
10/26/11
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D113584

Test Date: 10/26/11
Velocity: 21.92 ft/s, 6.68 m/s



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

ATD Serial No: 634

Test I.D: D113585

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	35	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	kN	3.45 to 4.06	3.80	Pass
Overall Test Results				Pass


Laboratory Technician

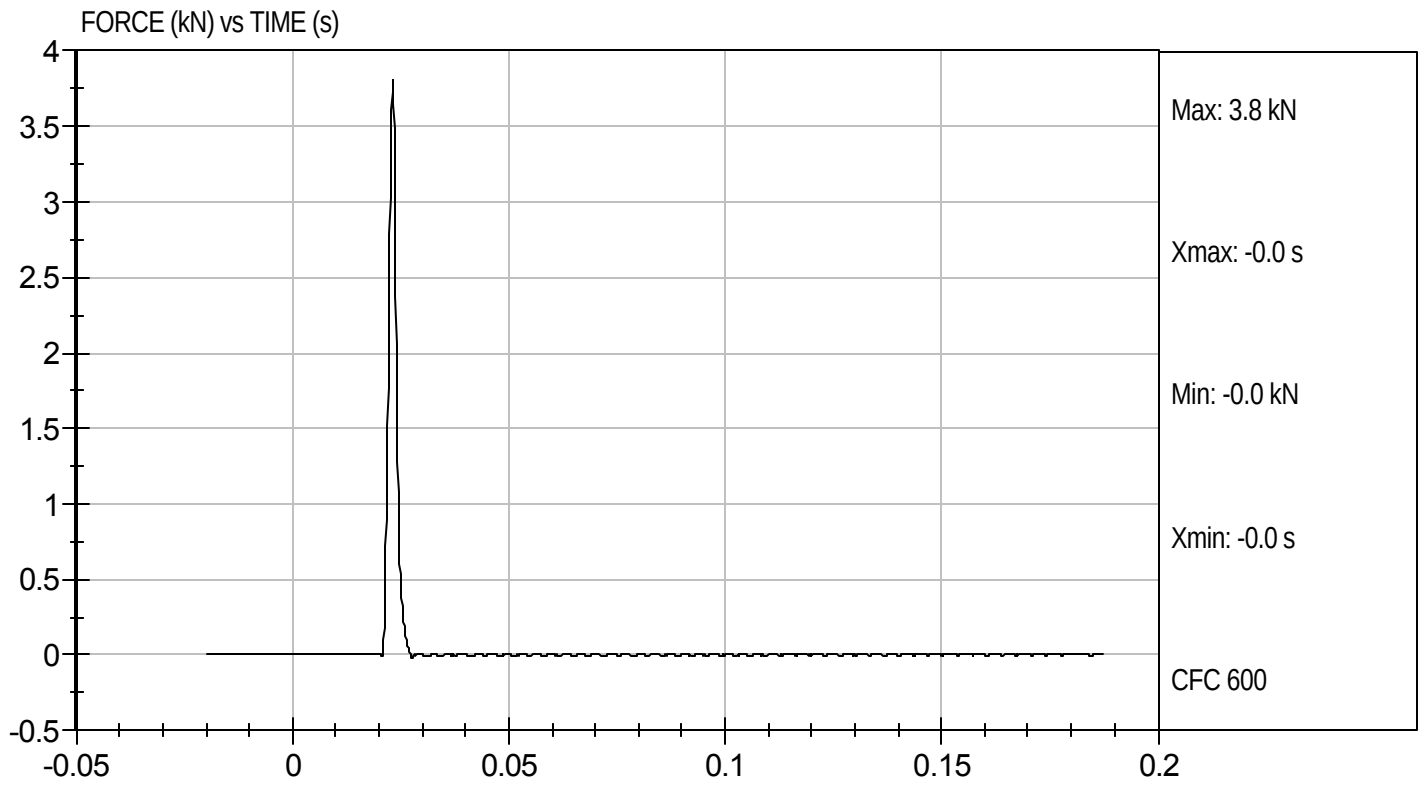
10/27/11
Test Date


Approved By



Test Desc: Right Knee
Component ID: D113585

Test Date: 10/27/11
Velocity: 6.94 ft/s, 2.12 m/s



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test I.D: D113586

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	35	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	kN	3.45 to 4.06	3.79	Pass
Overall Test Results				Pass


Laboratory Technician

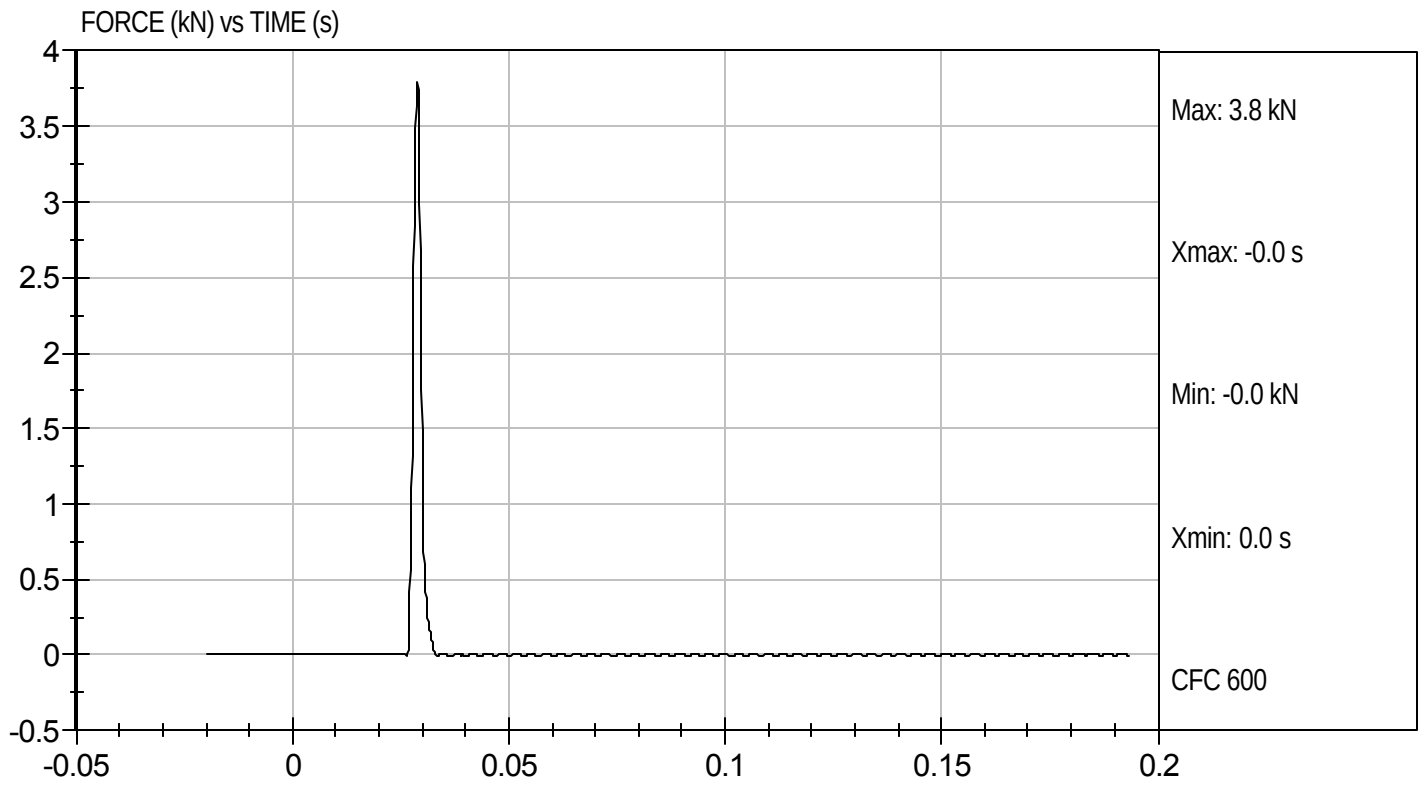
10/27/11
Test Date


Approved By



Test Desc: Left Knee
Component ID: D113586

Test Date: 10/27/11
Velocity: 6.94 ft/s, 2.12 m/s



MGA RESEARCH CORPORATION
TORSO FLEXION TEST
HYBRID III 5TH PERCENTILE

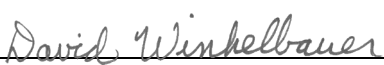
ATD Serial No: 634

Test I.D: D113587

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	34	Pass
Initial Angle	deg	0 to 20	16	Pass
Return Angle	deg	+/- 8	6	Pass
Force at 45 deg	N	320 to 390	389	Pass
Upper Torso Deflection Rate	Deg/sec	0.5 to 1.5	1.0	Pass
Overall Result			Pass	


Laboratory Technician

10/27/11
Test Date


Approved By