

REPORT NUMBER: NCAP-MGA-2011-077

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

**GENERAL MOTORS LLC
2011 Buick Lacrosse CXL 4-Dr Sedan
NHTSA No.: GB0104**

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



Test Date: March 2, 2011

Final Report Date: March 21, 2011

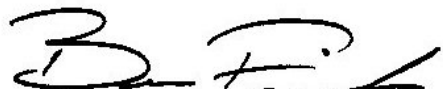
FINAL REPORT

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

This final test report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, in response to Contract Number DTNH22-06-D-00028.

This publication is distributed by the U.S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration. The United States Government assumes no liability for its contents or use thereof. If trade or manufacturers' names or products are mentioned it is only because they are considered essential to the object of the publication and should not be construed as an endorsement. The United States Government does not endorse products or manufacturers.

Prepared by: 
Donna Janovicz, Project Manager

Approved by: 
Ben Fischer, Project Engineer

Approval Date: March 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

1. Report No. NCAP-MGA-2011-077	2. Government Accession No.	3. Recipient's Catalog No.																																																			
4. Title and Subtitle Final Report of New Car Assessment Program Frontal Impact Testing of 2011 Buick Lacrosse CXL 4-Dr Sedan NHTSA No.: GB0104		5. Report Date March 21, 2011																																																			
		6. Performing Organization Code MGA																																																			
7. Author(s) Donna Janovicz, Project Manager Ben Fischer, Project Engineer		8. Performing Organization Report No. NCAP-MGA-2011-077																																																			
		10. Work Unit No.																																																			
9. Performing Organization Name and Address MGA Research Corporation 5000 Warren Road Burlington, WI 53105		11. Contract or Grant No. DTNH22-06-D-00028																																																			
		13. Type of Report and Period Covered Final Test Report March 2, 2011 to March 21, 2011																																																			
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards 1200 New Jersey Ave, SE, Room W43-410 Washington, D.C. 20590		14. Sponsoring Agency Code NVS-111																																																			
		15. Supplementary Notes																																																			
16. Abstract A 56.3 km/h NCAP Frontal Impact Test was conducted on the 2011 Buick Lacrosse CXL 4-Dr Sedan in accordance with the specifications of the Office of Crashworthiness Standards Frontal NCAP Laboratory Test Procedure for the generation of consumer information on vehicle frontal crash protection. 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 March 2, 2011. The impact velocity was 56.1 km/h and the ambient temperature at the barrier face at the time of impact was 21°C. The target vehicle post-test maximum crush was 504 mm located at the vehicle's centerline. The test vehicle's performance was as follows: <table border="1" style="width: 100%; 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>125</td> <td>165</td> </tr> <tr> <td>Maximum Chest Compression</td> <td>mm</td> <td>63</td> <td>52</td> <td>16</td> <td>10</td> </tr> <tr> <td>Nij</td> <td>N/A</td> <td>1</td> <td>1</td> <td>0.30</td> <td>0.37</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>4170</td> <td>2620</td> <td>878</td> <td>436</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>4000</td> <td>2520</td> <td>53</td> <td>368</td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>10008</td> <td>6805</td> <td>1344</td> <td>862</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>10008</td> <td>6805</td> <td>377</td> <td>2436</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	125	165	Maximum Chest Compression	mm	63	52	16	10	Nij	N/A	1	1	0.30	0.37	Neck Tension	N	4170	2620	878	436	Neck Compression	N	4000	2520	53	368	Left Femur Force	N	10008	6805	1344	862	Right Femur Force	N	10008	6805	377	2436
Measurement Description	Units	Threshold				Driver ATD	Passenger ATD																																														
		50 th	5 th																																																		
Head Injury Criteria (HIC ₁₅)	N/A	700	700	125	165																																																
Maximum Chest Compression	mm	63	52	16	10																																																
Nij	N/A	1	1	0.30	0.37																																																
Neck Tension	N	4170	2620	878	436																																																
Neck Compression	N	4000	2520	53	368																																																
Left Femur Force	N	10008	6805	1344	862																																																
Right Femur Force	N	10008	6805	377	2436																																																
17. Key Words 35 mph Frontal Barrier Impact Test New Car Assessment Program (NCAP)		18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Adm. Technical Reference Division 1200 New Jersey Ave, SE Washington, D.C. 20590																																																			
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 159	22. Price																																																		

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	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 Standard's NCAP Frontal Laboratory Test Procedure dated January 2010.

SUMMARY

A load cell barrier was impacted by a 2011 Buick Lacrosse CXL 4-Dr Sedan at a velocity of 56.1 kph. The test was performed at MGA Research Corporation on March 2, 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 on the driver's lap and shoulder belts and the passenger's lap belt to measure dummy torso and pelvic section loading. The driver (position 1) ATD (Serial No. 036) and the right-front passenger (position 2) ATD (Serial No. 634) were calibrated previous to this test. Certification details, along with verification data, are found in Appendix C of this report.

The 227 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 504 mm and both the driver and passenger side doors remained closed during the impact event and were operable after the impact.

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 head and chest 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	T ¹	T ²	Chest Disp. (mm)	Nij	Neck Tension (N)	Neck Comp. (N)	Left Femur (N)	Right Femur (N)
Driver (50 th)	125	73.0	88.0	16	0.30	878	53	1344	377
Passenger (5 th)	165	69.3	84.3	10	0.37	436	368	862	2436

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

TEST NOTES

None

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: 2011 Buick Lacrosse CXL 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: GB0104
 Test Date: 3/02/2011

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	GB0104	Anti-Lock Brakes	Yes
Model Year	2011	All Wheel Drive	Yes
Make	Buick	Power Steering	Yes
Model	Lacrosse	Driver Front Airbag	Yes
Body Style	Sedan	Driver Curtain Airbag	Yes
VIN	1G4GD5ED9BF120564	Driver Head/Torso Airbag	No
Body Color	Midnight Blue Metallic	Driver Torso Airbag	No
Delivery Date	2/03/2011	Driver Torso/Pelvis Airbag	Yes
Odometer (mi)	163	Driver Pelvis Airbag	No
Odometer (km)	262	Driver Knee Airbag	No
Dealer	Boucher Fleet Group	Pass. Front Airbag	Yes
Transmission	Automatic	Pass. Curtain Airbag	Yes
Final Drive	AWD	Pass. Head/Torso Airbag	No
Type/No. Cylinders	6	Pass. Torso Airbag	No
Engine Displacement (L)	3.6	Pass. Torso/Pelvis Airbag	Yes
Engine Placement	Lateral	Pass. Pelvis Airbag	No
Roof Rack	No	Pass. Knee Airbag	No
Sunroof/T-Top	Yes	Pretensioners	Yes
Tinted Glass	No	Load Limiters	Yes
Traction Control	Yes	Automatic Door Locks	Yes
Power Brakes	Yes	Bucket Seats	Yes
Front Disc	Yes	Tilt Steering	Yes
Rear Disc	Yes	Other	
Does owner's manual provide instructions to turn off automatic door locks?	Yes		

DATA FROM CERTIFICATION LABEL

Manufactured By	General Motors LLC	GVWR (kg)	2359
Date of Manufacture	07/10	GAWR Front (kg)	1211
		GAWR Rear (kg)	1148

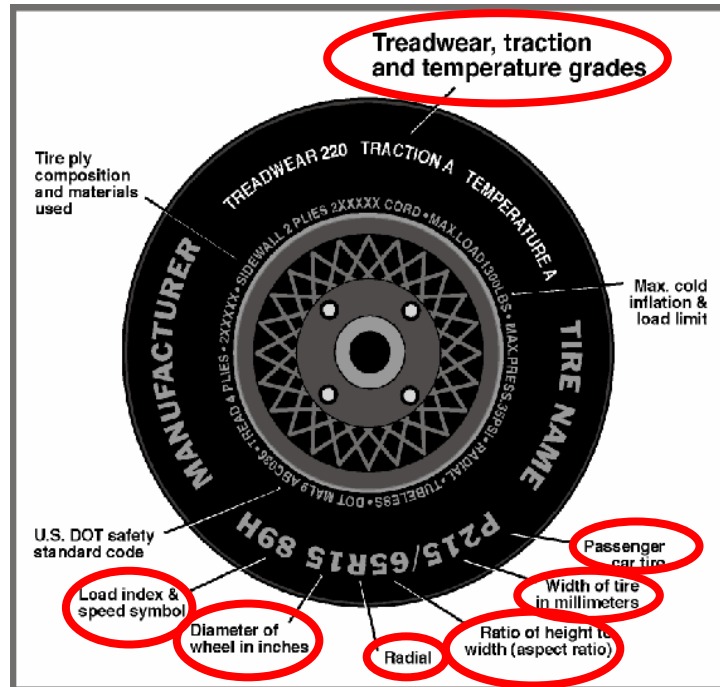
VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Split Bench		
Designated Seating Capacity (DSC)	2	3		5
Capacity Weight (VCW) (kg)				420
Cargo Weight (RCLW) (kg)				80

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

Test Vehicle: 2011 Buick Lacrosse CXL 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: GB0104
 Test Date: 3/02/2011



Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	240	240
Recommended Tire Size	P235/50R18	P235/50R18
Tire Size on Vehicle	P235/50R18	P235/50R18
Tire Manufacturer	Michelin	Michelin
Tire Model	Pilot	Pilot
Treadwear	300	300
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	2	2
Tire Plies Body	4	4
Load Index & Speed Symbol	97V	97V
Tire Material	Rubber	Rubber
DOT Safety Code Right	B9NP 1J9X 2110	B9NP 1J9X 2110
DOT Safety Code Left	B9NP 1J9X 2110	B9NP 1J9X 2110

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

Test Vehicle: 2011 Buick Lacrosse CXL 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: GB0104
 Test Date: 3/02/2011

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	563.8	418.2		588.3	507.1	
Right	kg	544.3	407.8		565.7	487.6	
Ratio	%	57.3	42.7		53.7	46.3	
Totals	kg	1108.1	826.0	1934.1	1154.0	994.7	2148.7

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1934.1
Weight of 1 P572E ATD & 1 P572O ATD	kg	140.6
Rated Cargo/Luggage Weight (RCLW)	kg	80
Calculated Target Vehicle Target Weight (TVTW)	kg	2154.7

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	732	743	750	755	1213
As Tested	mm	728	735	723	724	1315
Post Test	mm	764	764	722	708	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2840
Total Vehicle Length at Left Side	mm	4720
Total Vehicle Length at Centerline	mm	5014
Total Vehicle Length at Right Side	mm	4720
Weight of Ballast in Cargo Area	kg	65.8
Weight of Vehicle Components Removed	kg	25.4
Amount of Stoddard Solvent in Fuel Tank	L	65.5

List of components removed to meet test weight: Spare tire, jack & tools, right tail light, rear floor mats.

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

Test Vehicle: 2011 Buick Lacrosse CXL 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: GB0104
 Test Date: 3/02/2011

TARGET VEHICLE STRUCTURAL MEASUREMENT

	Elements	Pre-Test (mm)
1	Total Length	5014
2	Total Width	1816
3	Bumper Top Height	550
4	Bumper Bottom Height	430
5	Longitudinal Member Top Height	540
6	Distance between Longitudinal Members	900
7	Longitudinal Member Width	80
8	Engine Top Height	890
9	Engine Bottom Height	200
10	Engine and Gearbox Width	610
11	Front Bumper-Engine Distance	530
12	Front Shock Absorber Fixing Height	920
13	Bonnet Leading Edge Height	845
14	Front Shock Absorber Fixing Width	1190
15	Front Bumper – Front Axle Distance	1030
16	Front Axle – A-Pillar Distance	445
17	A-Pillar – B-Pillar Distance	1135
18	B-Pillar – Rear Axle Distance	1265
19	B-Pillar – C-Pillar Distance	815
20	Roof Sill Bottom Height	1348
21	Roof Sill Top Height	1545
22	Floor Sill bottom Height	215
23	Floor Sill Top Height	390

DATA SHEET NO. 2

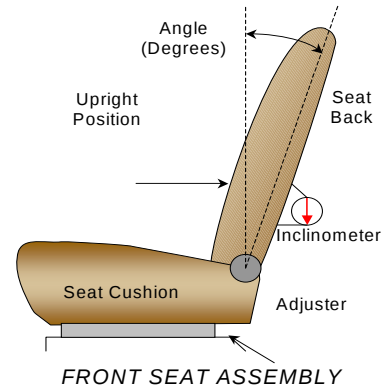
SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

Test Vehicle: 2011 Buick Lacrosse CXL 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: GB0104
 Test Date: 3/02/2011

NOMINAL DESIGN RIDING POSITION

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



SEAT BACK ANGLE	Degrees
Driver Seat Back Angle	-13.9° on headrest post
Passenger Seat Back Angle	-18.1° on headrest post

SEAT FORE/AFT POSITIONS

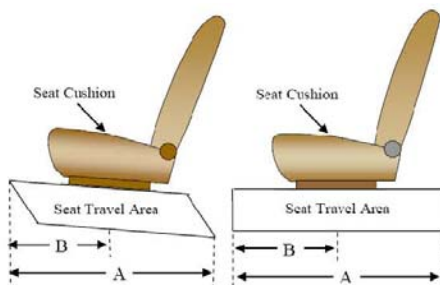
The driver and passenger seat fore/aft positions are adjusted following Appendix F, "Driver & Passenger Seating & Positioning Procedures" in the NCAP Test Procedure dated January 2010.

SEAT FORE/AFT POSITIONS	Total Fore/Aft Travel	Placed in Position #
Driver Seat	306 mm	153 mm (forward-most as 0)
Passenger Seat	242 mm	0 mm (forward-most as 0)

SEAT BELT UPPER ANCHORAGES

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

SEAT BELT UPPER ANCHORAGES	Total # of Positions	Placed in Position #
Driver Seat	5 (1 st as 1)	0 (uppermost as 0)
Passenger Seat	5 (1 st as 1)	0 (uppermost as 0)



DATA SHEET NO. 2 (CONTINUED)

SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

Test Vehicle: 2011 Buick Lacrosse CXL 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: GB0104
 Test Date: 3/02/2011

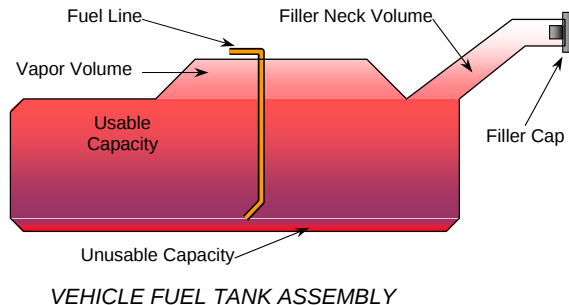
FUEL TANK CAPACITY DATA

	Liters
Usable Capacity of "Standard Tank"	70.5
Usable Capacity of "Optional" Tank	
92-94% of Usable Capacity	64.9 to 66.3
Actual Amount of Solvent used	65.5
1/3 of Usable Capacity	23.5

FUEL PUMP

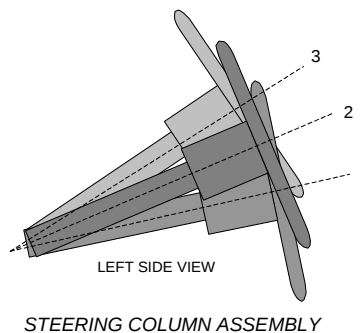
Describe the fuel pump type, its behavior, and the location of the fuel filler pipe.

The vehicle is equipped with an electric fuel pump. If ignition key is at "On" position and engine is not running, the fuel pump only operates for a short duration to prime the fuel system. If the engine is running, the fuel pump operates continuously. 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.



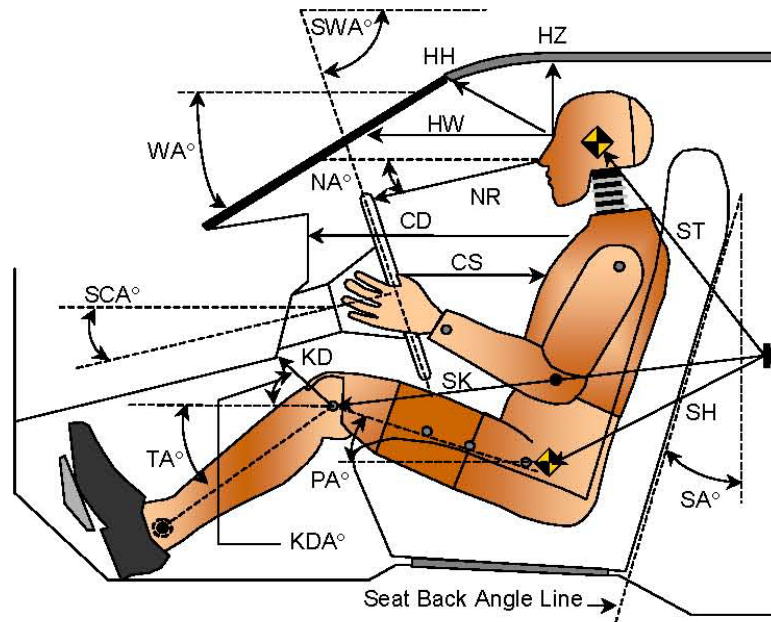
STEERING COLUMN POSITION

	Degrees	Fore/Aft Position (mm)
Lowermost – Position 1	69.8	210
Geometric Center – Position 2	67.8	183
Uppermost – Position 3	65.8	155
Telescoping Steering Wheel Travel		55
Test Position	67.8	183

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2011 Buick Lacrosse CXL 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: GB0104
 Test Date: 3/02/2011

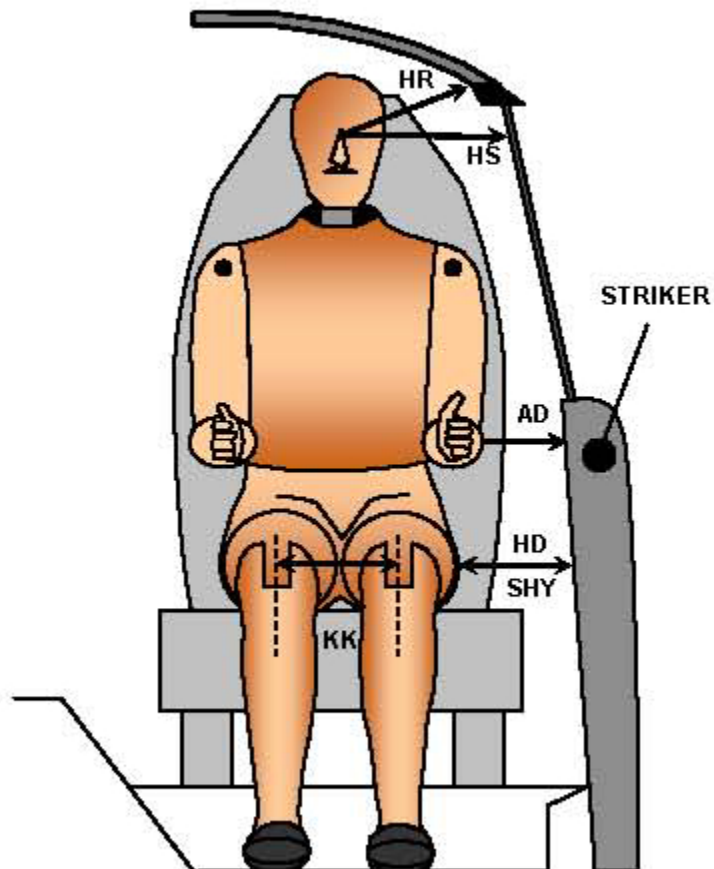


Code	Measurement Description	Driver S/N 036		Passenger S/N 634	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA	Windshield Angle		25.5		
SWA	Steering Wheel Angle		67.8		
SCA	Steering Column Angle		22.2		
SA	Seat Back Angle		-13.9		-18.1
HZ	Head to Roof (Z)	166	90	185	90
HH	Head to Header	447	18.9	346	23.5
HW	Head to Windshield	796	0	710	0
NR	Nose to Rim	435	14.6		
CD	Chest to Dash	562		462	
CS	Chest to Steering Hub	358	0.5		
RA	Rim to Abdomen	242	0		
KDL	Left Knee to Dash	196	27.7	145	26.3
KDR	Right Knee to Dash	190	30.6	131	28.1
PA	Pelvic Angle		23.2		20.3
TA	Tibia Angle		37.3		45.6
SK	Striker to Knee	538	99.5	617	95.9
ST	Striker to Head	492	5.3	480	16.3
SH	Striker to H-Point	206	134.2	300	110.8

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2011 Buick Lacrosse CXL 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: GB0104
 Test Date: 3/02/2011



FRONT VIEW OF DUMMY

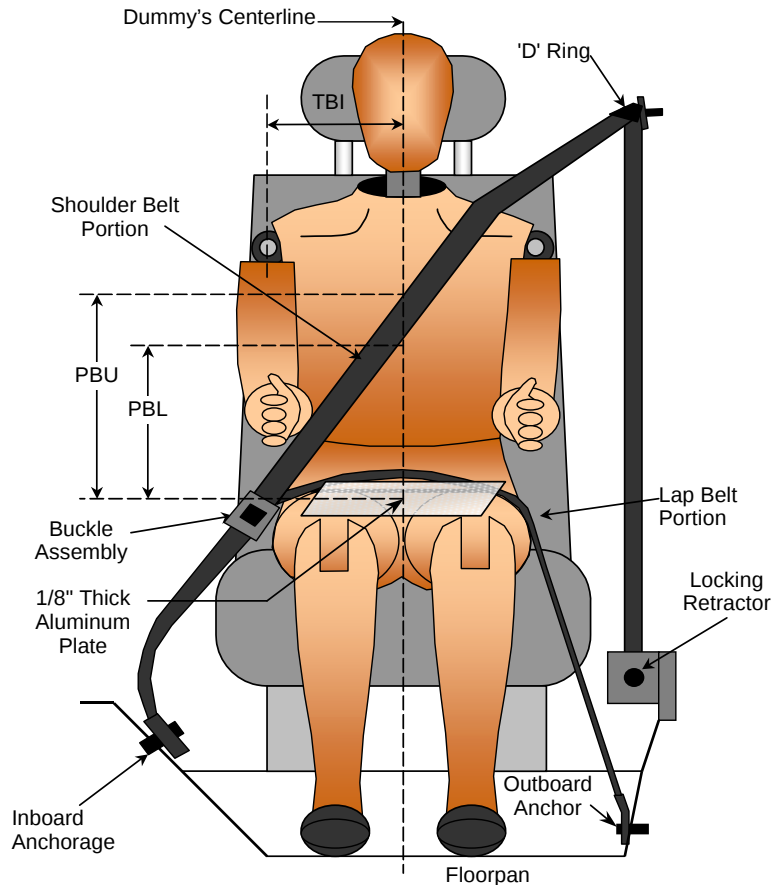
Code	Measurement Description	Driver S/N 036	Passenger S/N 634
		Length (mm)	
AD	Arm to Door	131	160
HD	H-Point to Door	157	183
HR	Head to Side Header	219	227
HS	Head to Side Window	336	346
KK	Knee to Knee	310	217
SHY	Striker to H-Point (Y Direction)	285	295
AA	Ankle to Ankle	306	163

DATA SHEET NO. 5

SEAT BELT POSITIONING DATA

Test Vehicle: 2011 Buick Lacrosse CXL 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: GB0104
 Test Date: 3/02/2011



FRONT VIEW OF DUMMY

SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU - Top surface of reference to belt upper edge	mm	340	315
PBL - Top surface of reference to belt lower edge	mm	260	230

BELT LENGTH DATA

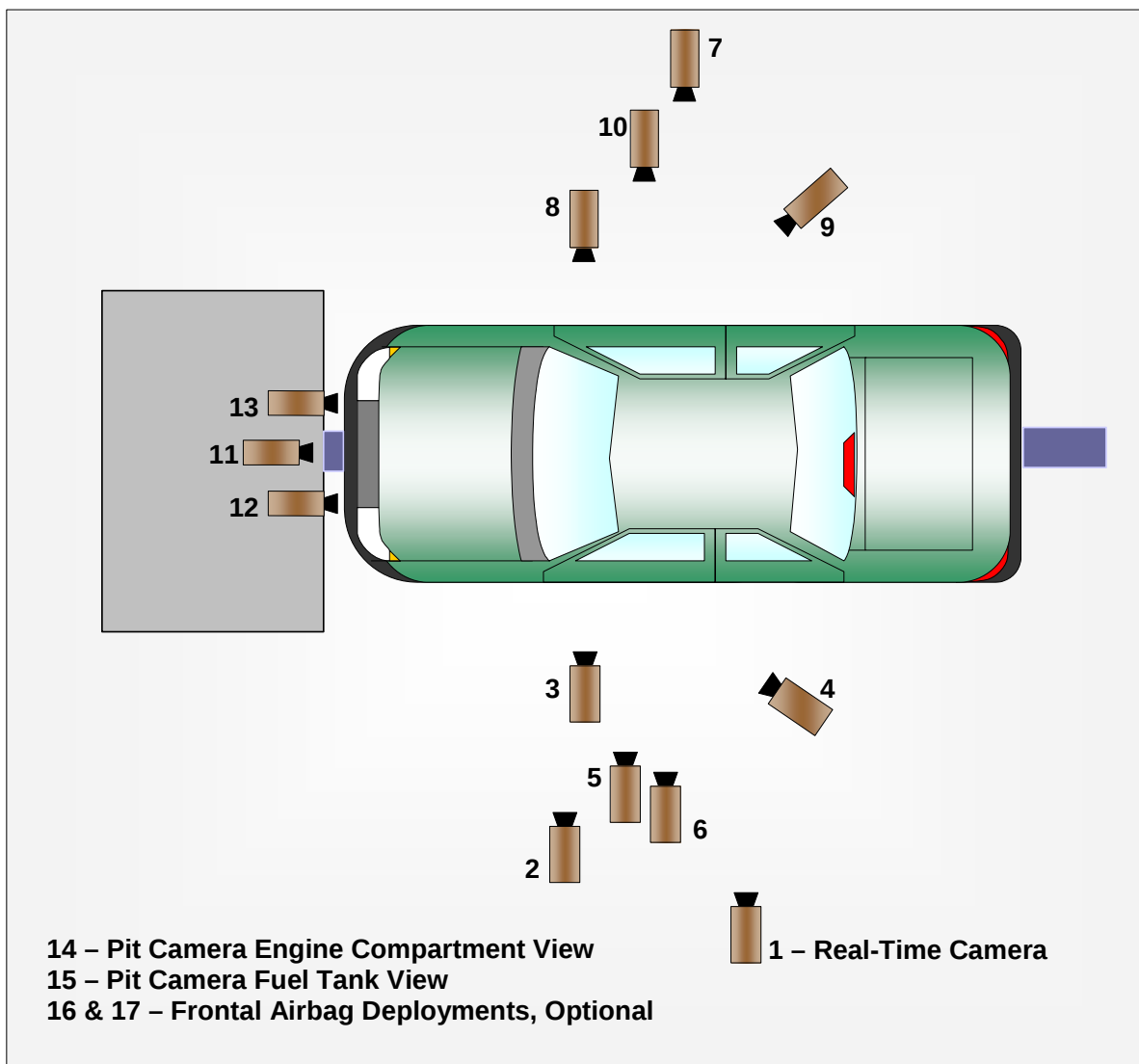
Measurement Description	Units	Driver	Passenger
Shoulder Belt Length as measured on ATD	mm	810	905
Lap Belt Length as measured on ATD	mm	490	552
Remainder of belt on reel	mm	1830	1743
Total Belt Length for Continuous Webbing Systems	mm	3130	3200

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

Test Vehicle: 2011 Buick Lacrosse CXL 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: GB0104
Test Date: 3/02/2011

CAMERA POSITIONS FOR FRONTAL IMPACTS



DATA SHEET NO. 6 (CONTINUED)

CAMERA LOCATIONS AND DATA

Test Vehicle: 2011 Buick Lacrosse CXL 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: GB0104
 Test Date: 3/02/2011

CAMERA LOCATIONS

No.	Camera View	Coordinates (mm)			Lens (mm)	Speed (fps)
		X*	Y*	Z*		
1	Real-Time Left Side View					30
2	Left Front Half	1180	-5050	-1080	24	1000
3	Driver Close-Up	1360	-6490	-1740	35	1000
4	Driver Angle	5580	-4780	-1840	50	1000
5	Steering Column Top	640	-4970	-1220	24	1000
6	Steering Column Bottom	610	-4940	-850	24	1000
7	Right Overall	2230	6530	-1120	20	1000
8	Passenger Close-Up	1380	6500	-1790	35	1000
9	Passenger Angle	5590	4780	-1870	50	1000
10	Right Front Half	1190	5030	-1090	24	1000
11	Windshield	-260	0	-2860	24	1000
12	Top Driver	-20	-470	-2030	12.5	1000
13	Top Passenger	-20	470	-2030	12.5	1000
14	Pit Front	1230	0	3150	24	1000
15	Pit Rear	3260	0	3150	24	1000
16	Onboard Driver Side (optional)					
17	Onboard Passenger Side (optional)					
18	Real-Time Pan View					30

***COORDINATES:**

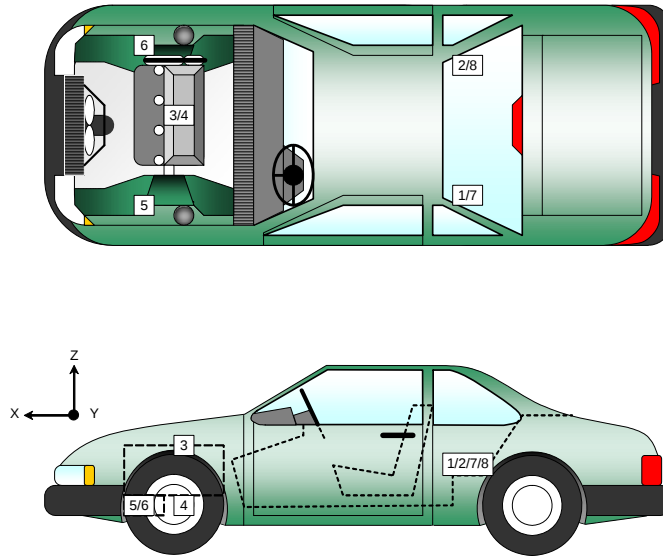
- +X = forward of impact plane
- +Y = right of monorail centerline
- +Z = below ground level

Cameras 16 & 17 were not used for this test.

DATA SHEET NO. 7
VEHICLE ACCELEROMETER DATA

Test Vehicle: 2011 Buick Lacrosse CXL 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: GB0104
 Test Date: 3/02/2011



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

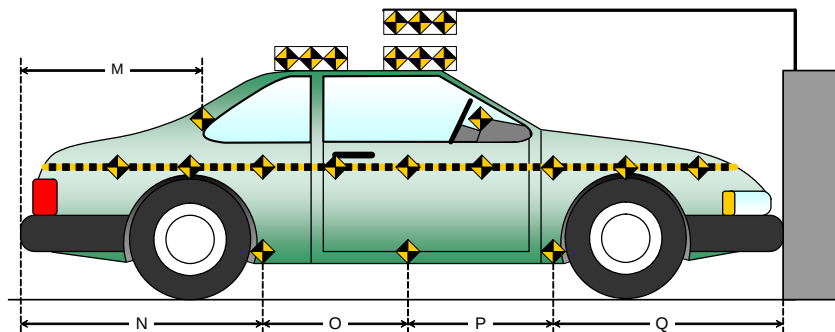
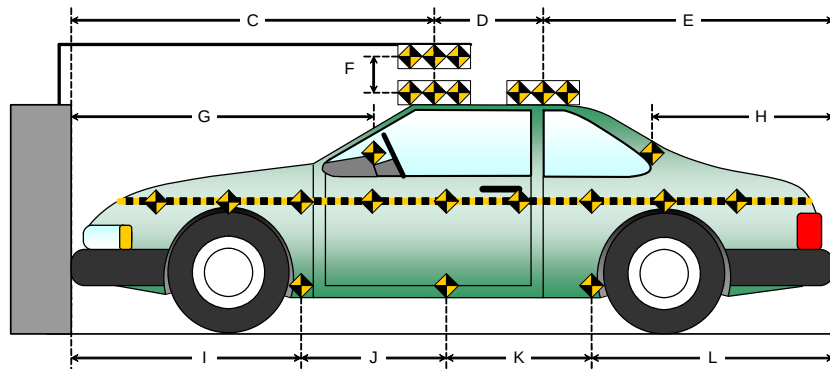
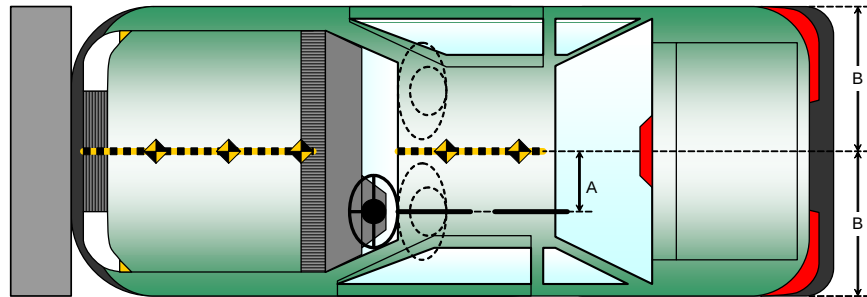
No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear X-Member X	2035	-350	-275
2	Right Rear X-Member X	2035	350	-275
3	Engine Top X	4175	0	-900
4	Engine Bottom X	4155	0	-195
5	Left Brake Caliper X	4090	-690	-300
6	Right Brake Caliper X	4090	690	-300
7	Left Rear X-Member Z	2035	-350	-275
8	Right Rear X-Member Z	2035	350	-275

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

PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

NHTSA No.: GB0104
Test Date: 3/02/2011

Item	Value (mm)
A	375
B	908
C	1744
D	670
E	2600
F	138
G	
H	1130
I	1030
J	975
K	975
L	2034
M	1130
N	2034
O	975
P	975
Q	1030



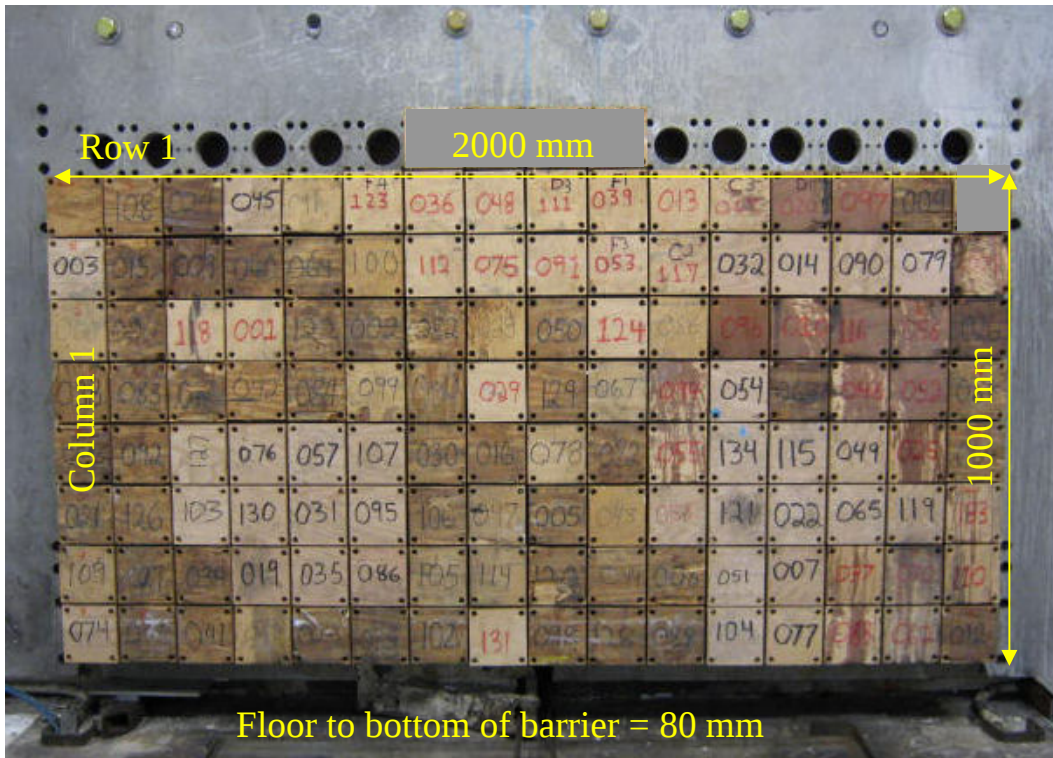
DATA SHEET NO. 9

LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle: 2011 Buick Lacrosse CXL 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: GB0104
 Test Date: 3/02/2011

Advanced Research Load Cell Barrier



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

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: 2011 Buick Lacrosse CXL 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: GB0104
Test Date: 3/02/2011

INSTRUMENTATION

Driver Dummy Data Channels	46
Passenger Dummy Data Channels	46
Vehicle Structure Accelerometers	8
Barrier Channels	127
Total	227

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: 2011 Buick Lacrosse CXL 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: GB0104
 Test Date: 3/02/2011

TEST DUMMY INFORMATION AND CONTACT

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

POST TEST STRUCTURAL OBSERVATIONS

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

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	1040
Center	mm	942
Right Side	mm	1025
Average	mm	1002

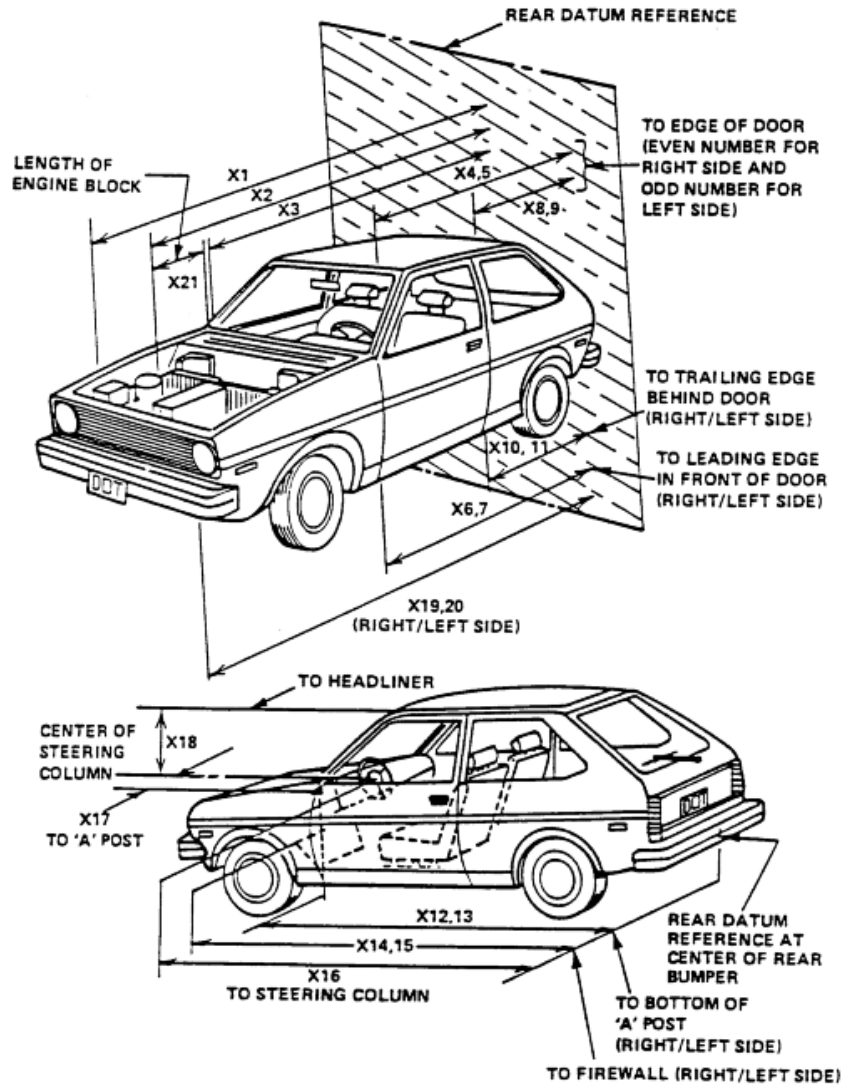
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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
Torso/Pelvis Side Airbag	Yes	No	Yes	No
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load Limiter	Yes		Yes	

DATA SHEET NO. 12 **VEHICLE PROFILE MEASUREMENTS**

Test Vehicle: 2011 Buick Lacrosse CXL 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: GB0104
 Test Date: 3/02/2011



DATA SHEET NO. 12 (CONTINUED)
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2011 Buick Lacrosse CXL 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: GB0104
 Test Date: 3/02/2011

RSOV (Rear Surface of Vehicle)

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	mm	5014	4510	504
2	RSOV to Front of Engine	mm	4335	4181	154
3	RSOV to Firewall	mm	3845	3785	60
4	RSOV to Upper Leading Edge of Right Door	mm	3445	3444	1
5	RSOV to Upper Leading Edge of Left Door	mm	3445	3440	5
6	RSOV to Lower Leading Edge of Right Door	mm	3438	3438	0
7	RSOV to Lower Leading Edge of Left Door	mm	3438	3438	0
8	RSOV to Upper Trailing Edge of Right Door	mm	2325	2325	0
9	RSOV to Upper Trailing Edge of Left Door	mm	2325	2323	2
10	RSOV to Lower Trailing Edge of Right Door	mm	2360	2356	4
11	RSOV to Lower Trailing Edge of Left Door	mm	2360	2358	2
12	RSOV to Bottom of "A" Post of Right Side	mm	3390	3390	0
13	RSOV to Bottom of "A" Post of Left Side	mm	3390	3390	0
14	RSOV to Firewall, Right Side	mm	3825	3808	17
15	RSOV to Firewall, Left Side	mm	3815	3810	5
16	RSOV to Steering Column	mm	2960	2955	5
17	Center of Steering Column to "A" Post	mm	365	370	-5
18	Center of Steering Column to Headliner	mm	415	435	-20
19	RSOV to Right Side of Front Bumper	mm	4720	4463	257
20	RSOV to Left Side of Front Bumper	mm	4720	4459	261
21	Length of Engine Block	mm	450	450	0
RD	RSOV to Right Side of Dash Panel	mm	3210	3212	-2
CD	RSOV to Center of Dash Panel	mm	3290	3288	2
LD	RSOV to Left Side of Dash Panel	mm	3205	3201	4

DATA SHEET NO. 13

ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2011 Buick Lacrosse CXL 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: GB0104
Test Date: 3/02/2011

VEHICLE INFORMATION

VIN: 1G4GD5ED9BF120564 Wheelbase (mm): 2840
Vehicle Size Category: Sedan Test Weight (kg): 2148.7

ACCELEROMETER DATA

Accelerometer Locations: As per measurements on Page 15

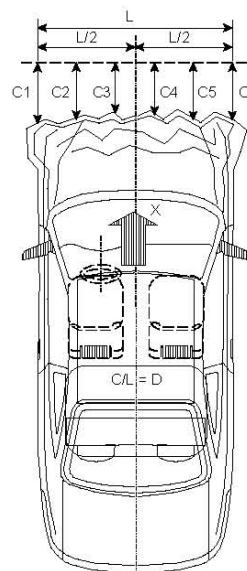
Cal. Procedure/Interval: MGA procedure / 6 month

Integration Algorithm: Trapezoidal Linearity: > 99%

Impact Velocity (km/h): 56.1

Velocity Change (km/h): 63.9

Time of Separation (msec): 120.9



CRUSH PROFILE

Collision Deformation Classification: Frontal

Midpoint of Damage: Centerline

Damage Region Length (mm): 1520

Impact Mode: Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	4720	4459	261
C2	Crush zone 2 at left side	mm	4845	4410	435
C3	Crush zone 3 at left side	mm	4915	4461	454
C4	Crush zone 4 at right side	mm	4915	4497	418
C5	Crush zone 5 at right side	mm	4845	4495	350
C6	Crush zone 6 at right side	mm	4720	4463	257
L	C1 TO C6	mm	1520	1495	25

DATA SHEET NO. 14
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2011 Buick Lacrosse CXL 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

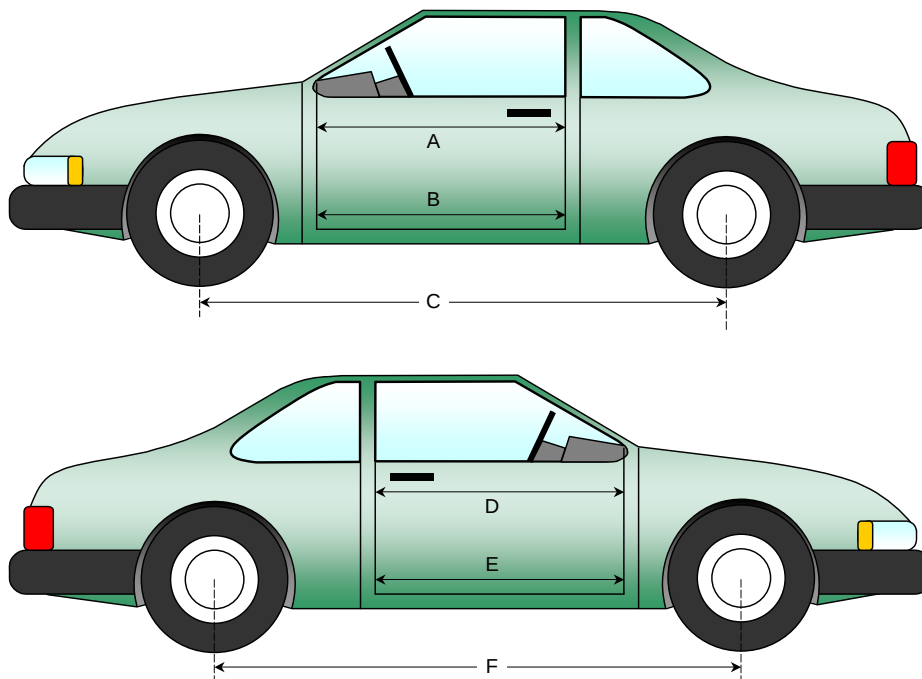
NHTSA No.: GB0104
 Test Date: 3/02/2011

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	980	980	0
B	Left Side Lower	mm	900	900	0
D	Right Side Upper	mm	980	980	0
E	Right Side Lower	mm	900	900	0

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2840	2775	65
F	Right Side Wheelbase	mm	2840	2775	65



DATA SHEET NO. 14 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

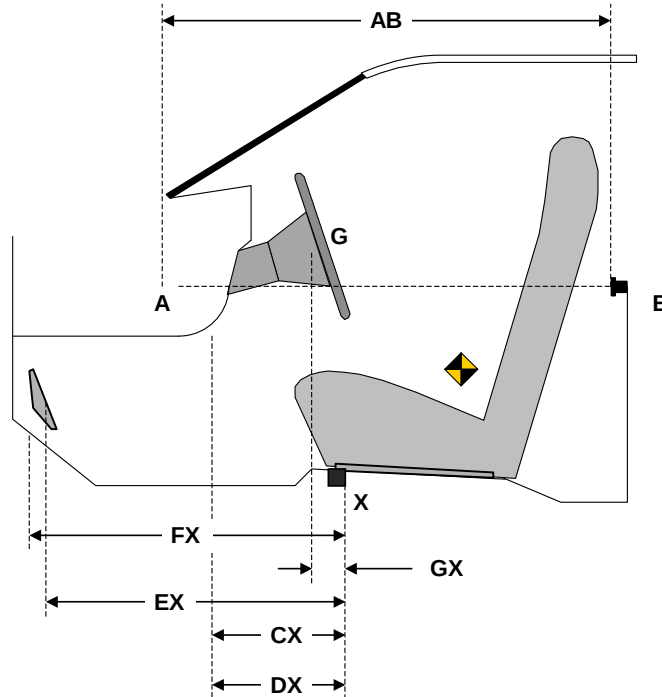
Test Vehicle: 2011 Buick Lacrosse CXL 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: GB0104
 Test Date: 3/02/2011

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside window jam)	mm	835	835	0
CX	Left Knee Bolster to X	mm	380	340	40
DX	Right Knee Bolster to X	mm	390	351	39
EX	Brake Pedal to X	mm	660	690	-30
FX	Foot Rest to X	mm	649	640	9
GX	Center of Steering Column Wheel Hub to X	mm	160	145	15

X = Front of Seat Track (stationary)

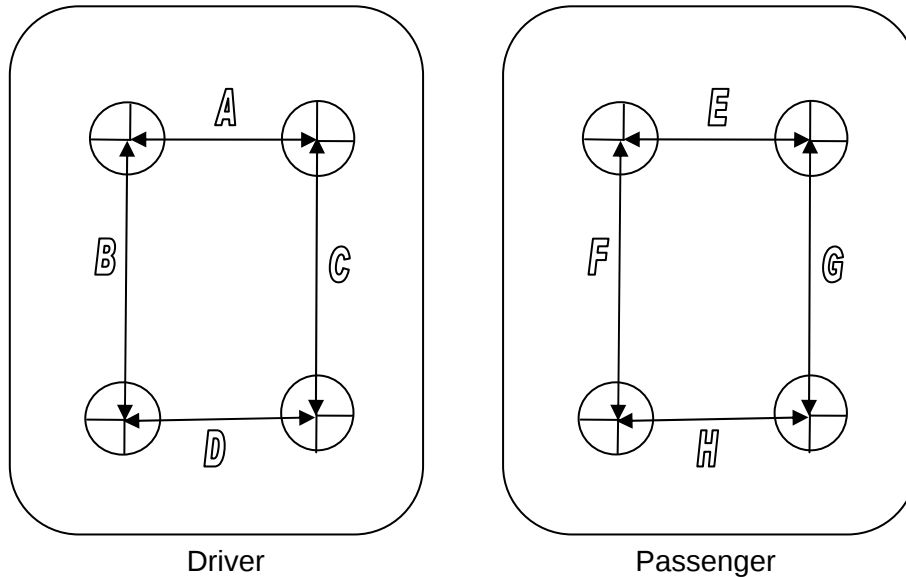


DRIVER COMPARTMENT

DATA SHEET NO. 14 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2011 Buick Lacrosse CXL 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: GB0104
 Test Date: 3/02/2011



TOP VIEW THROUGH FLOOR PAN

UNDERBODY FLOORBOARD DEFORMATION

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

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

Test Vehicle: 2011 Buick Lacrosse CXL 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: GB0104
 Test Date: 3/02/2011

Windshield Mounting Details:

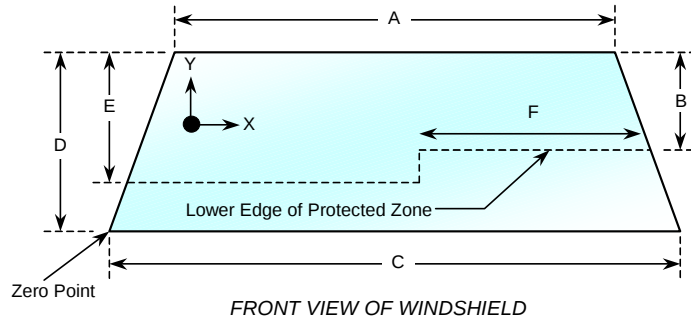
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

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

Temperature of windshield molding during test: 21°C

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% of Retention
Left Side	2204	2204	100
Right Side	2204	2204	100
Total	4408	4408	100



Item	Units	Value
A	mm	1204
B	mm	512
C	mm	1431
D	mm	875
E	mm	498
F	mm	475

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:	<u>2011 Buick Lacrosse CXL 4-Dr Sedan</u>	NHTSA No.:	<u>GB0104</u>
Test Program:	<u>NCAP Frontal Barrier Impact Test</u>	Test Date:	<u>3/02/2011</u>

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Test Time: 11:02 am

Temperature: 21° C

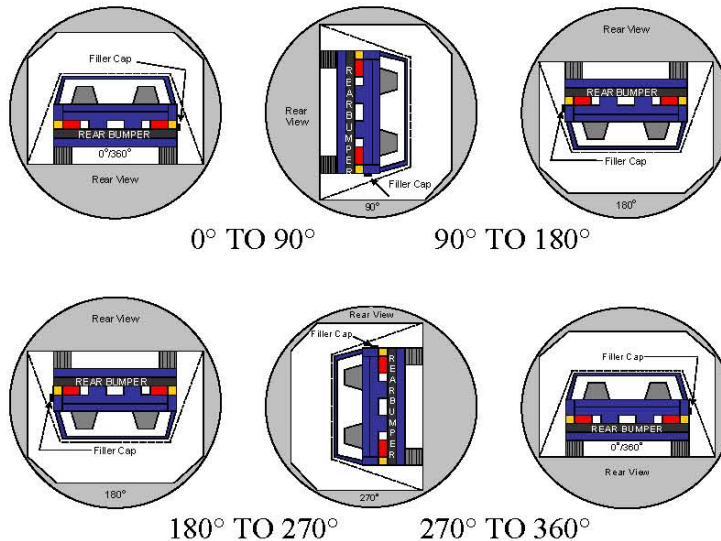
- | | |
|---|--------------|
| A. From impact until vehicle motion ceases:
(Maximum Allowable = 1 ounce) | <u>0</u> oz. |
| B. For the 5 minute period after motion ceases:
(Maximum allowable = 5 ounces) | <u>None</u> |
| C. For the following 25 minutes:
(Maximum allowable = 1 oz./minute) | <u>None</u>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

DATA SHEET NO. 16
FMVSS 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2011 Buick Lacrosse CXL 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: GB0104
 Test Date: 3/02/2011

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



SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	112	300	412
90° to 180°	110	300	410
180° to 270°	105	300	405
270° to 360°	116	300	416

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

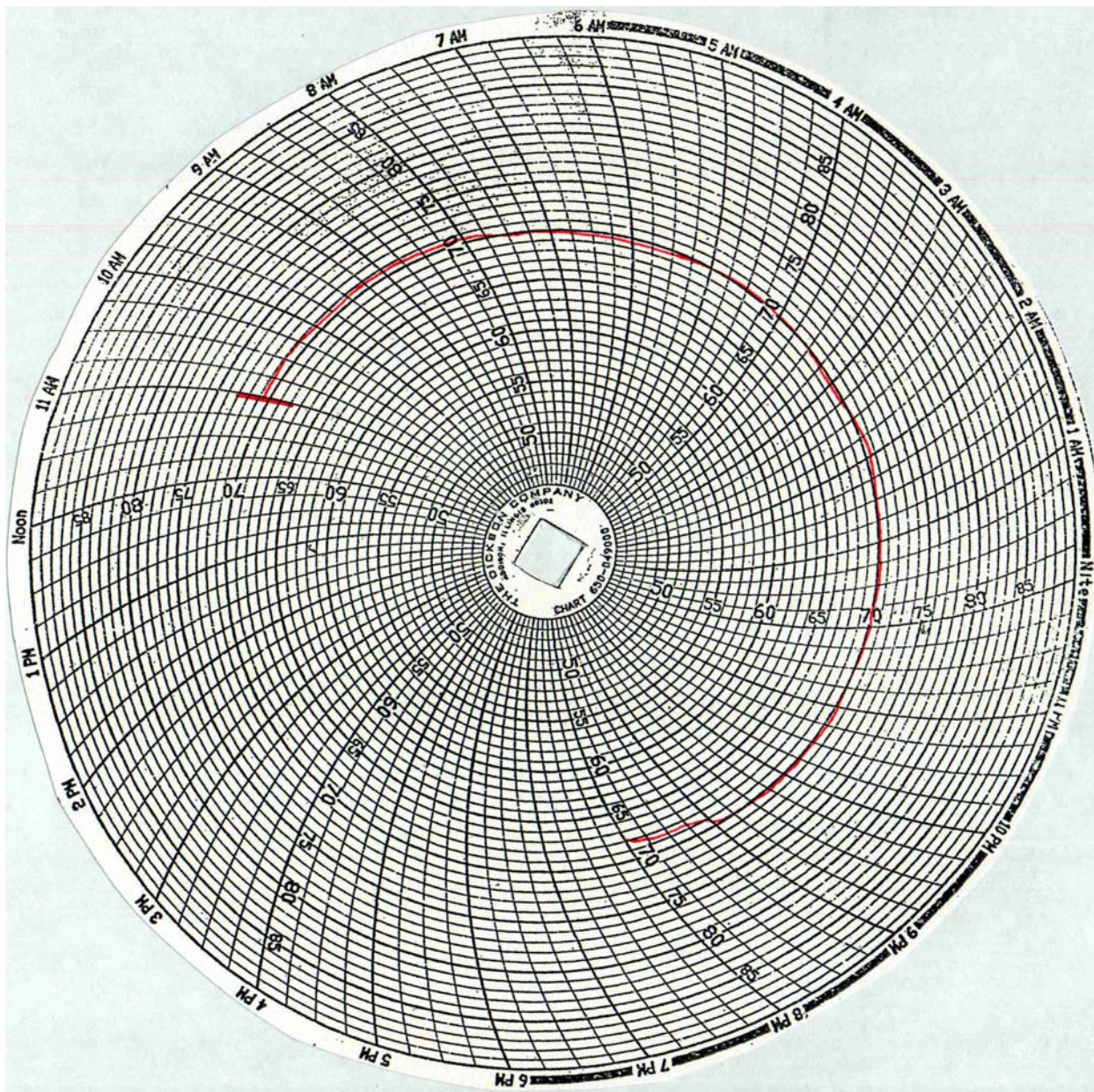
ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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: 2011 Buick Lacrosse CXL 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: GB0104
Test Date: 3/02/2011



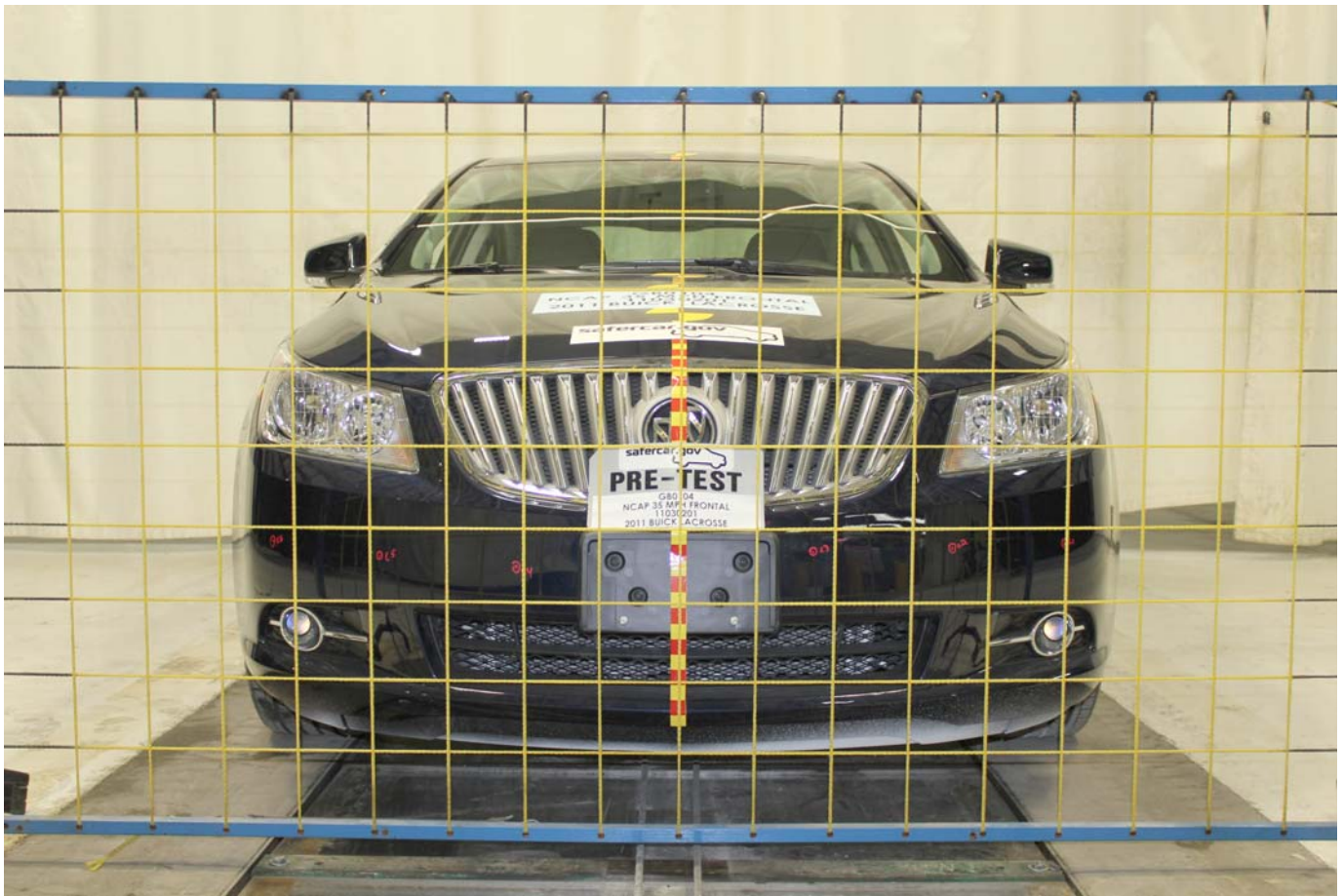
APPENDIX A
PHOTOGRAPHS

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.	Right Front Three-Quarter View, As Received	A-3
Photo No. 6.	Left Rear Three-Quarter View, As Received	A-3
Photo No. 7.	Pre-Test Front View	A-4
Photo No. 8.	Post-Test Front View	A-4
Photo No. 9.	Pre-Test Left Side View (with vehicle at barrier)	A-5
Photo No. 10.	Post-Test Left Side View	A-5
Photo No. 11.	Pre-Test Right Side View (with vehicle at barrier)	A-6
Photo No. 12.	Post-Test Right Side View	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 (with vehicle at barrier)	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 Cap View	A-11
Photo No. 22.	Post-Test Fuel 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 Underbody View	A-13
Photo No. 26.	Post-Test Mid Front Underbody View	A-14
Photo No. 27.	Post-Test Mid Rear Underbody View	A-14

		<u>Page No.</u>
Photo No. 28.	Pre-Test Rear Underbody View	A-15
Photo No. 29.	Post-Test Rear Underbody View	A-15
Photo No. 30.	Pre-Test Dummy Cable Routing	A-16
Photo No. 31.	Post-Test Dummy Cable Routing	A-16
Photo No. 32.	Pre-Test Driver Dummy Front View	A-17
Photo No. 33.	Post-Test Driver Dummy Front View	A-17
Photo No. 34.	Pre-Test Driver Dummy Window View	A-18
Photo No. 35.	Post-Test Driver Dummy Window View	A-18
Photo No. 36.	Pre-Test Driver Dummy and Vehicle Interior (Door Open)	A-19
Photo No. 37.	Post-Test Driver Dummy and Vehicle Interior (Door Open)	A-19
Photo No. 38.	Pre-Test Driver's Seat Fore-Aft Markings	A-20
Photo No. 39.	Post-Test Driver's Seat Fore-Aft Markings	A-20
Photo No. 40.	Pre-Test Driver Dummy Feet	A-21
Photo No. 41.	Post-Test Driver Dummy Feet	A-21
Photo No. 42.	Pre-Test Driver's Side Knee Bolster (without dummy)	A-22
Photo No. 43.	Post-Test Driver's Side Knee Bolster (without dummy)	A-22
Photo No. 44.	Pre-Test Driver's Side Floorpan	A-23
Photo No. 45.	Post-Test Driver's Side Floorpan	A-23
Photo No. 46.	Post-Test Driver Dummy Contact with Airbag	A-24
Photo No. 47.	Post-Test Driver Dummy Contact with Headrest	A-25
Photo No. 48.	Post-Test Driver Dummy Contact with Knee Bolster	A-25
Photo No. 49.	Pre-Test View of Steering Column Shear Capsule	A-26
Photo No. 50.	Post-Test View of Steering Column Shear Capsule	A-26
Photo No. 51.	Pre-Test Passenger Dummy Front View	A-27
Photo No. 52.	Post-Test Passenger Dummy Front View	A-27
Photo No. 53.	Pre-Test Passenger Dummy Window View	A-28
Photo No. 54.	Post-Test Passenger Dummy Window View	A-28
Photo No. 55.	Pre-Test Passenger Dummy and Vehicle Interior (Door Open)	A-29

		<u>Page No.</u>
Photo No. 56.	Post-Test Passenger Dummy and Vehicle Interior (Door Open)	A-29
Photo No. 57.	Pre-Test Passenger's Seat Fore-Aft Markings	A-30
Photo No. 58.	Post-Test Passenger's Seat Fore-Aft Markings	A-30
Photo No. 59.	Pre-Test Passenger Dummy Feet	A-31
Photo No. 60.	Post-Test Passenger Dummy Feet	A-31
Photo No. 61.	Pre-Test Passenger's Side Knee Bolster (without dummy)	A-32
Photo No. 62.	Post-Test Passenger's Side Knee Bolster (without dummy)	A-32
Photo No. 63.	Pre-Test Passenger's Side Floorpan	A-33
Photo No. 64.	Post-Test Passenger's Side Floorpan	A-33
Photo No. 65.	Post-Test Passenger Dummy Contact with Airbag	A-34
Photo No. 66.	Post-Test Passenger Dummy Contact with Headrest	A-34
Photo No. 67.	Post-Test Passenger Dummy Contact with Glovebox	A-35
Photo No. 68.	Ballast Installed in Vehicle	A-35
Photo No. 69.	Post-Test Stoddard Solvent Spillage Location View	A-36
Photo No. 70.	Post-Test Speed Trap Read-Out	A-36
Photo No. 71.	Vehicle at 0 Degrees on Static Rollover Device	A-37
Photo No. 72.	Vehicle at 90 Degrees on Static Rollover Device	A-37
Photo No. 73.	Vehicle at 180 Degrees on Static Rollover Device	A-38
Photo No. 74.	Vehicle at 270 Degrees on Static Rollover Device	A-38
Photo No. 75.	Vehicle at 360 Degrees on Static Rollover Device	A-39
Photo No. 76.	Vehicle Impact	A-39
Photo No. 77.	Monroney Label	A-40



Load Cell Location



Load Cell Wall



Manufacturer's Label



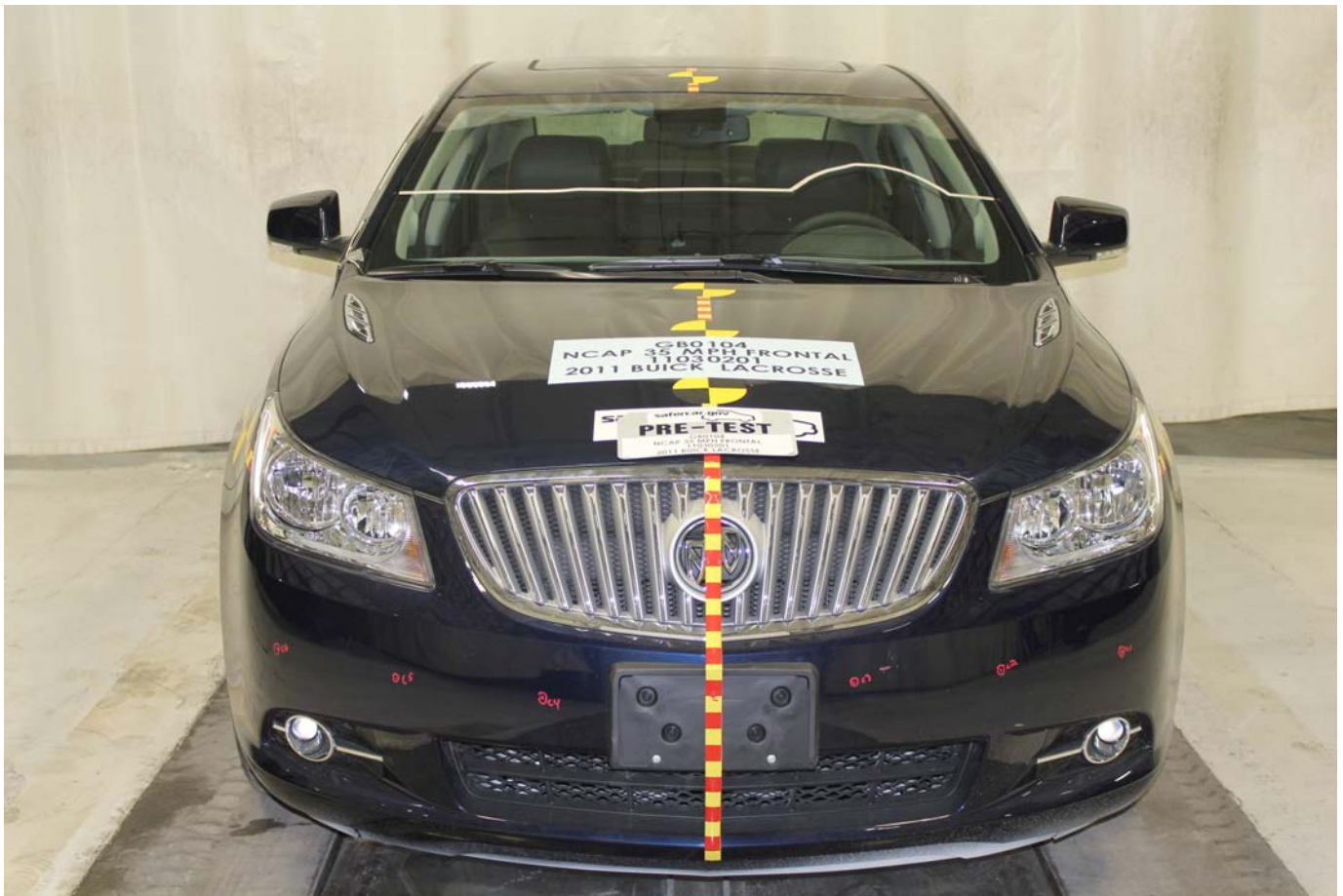
Tire Placard



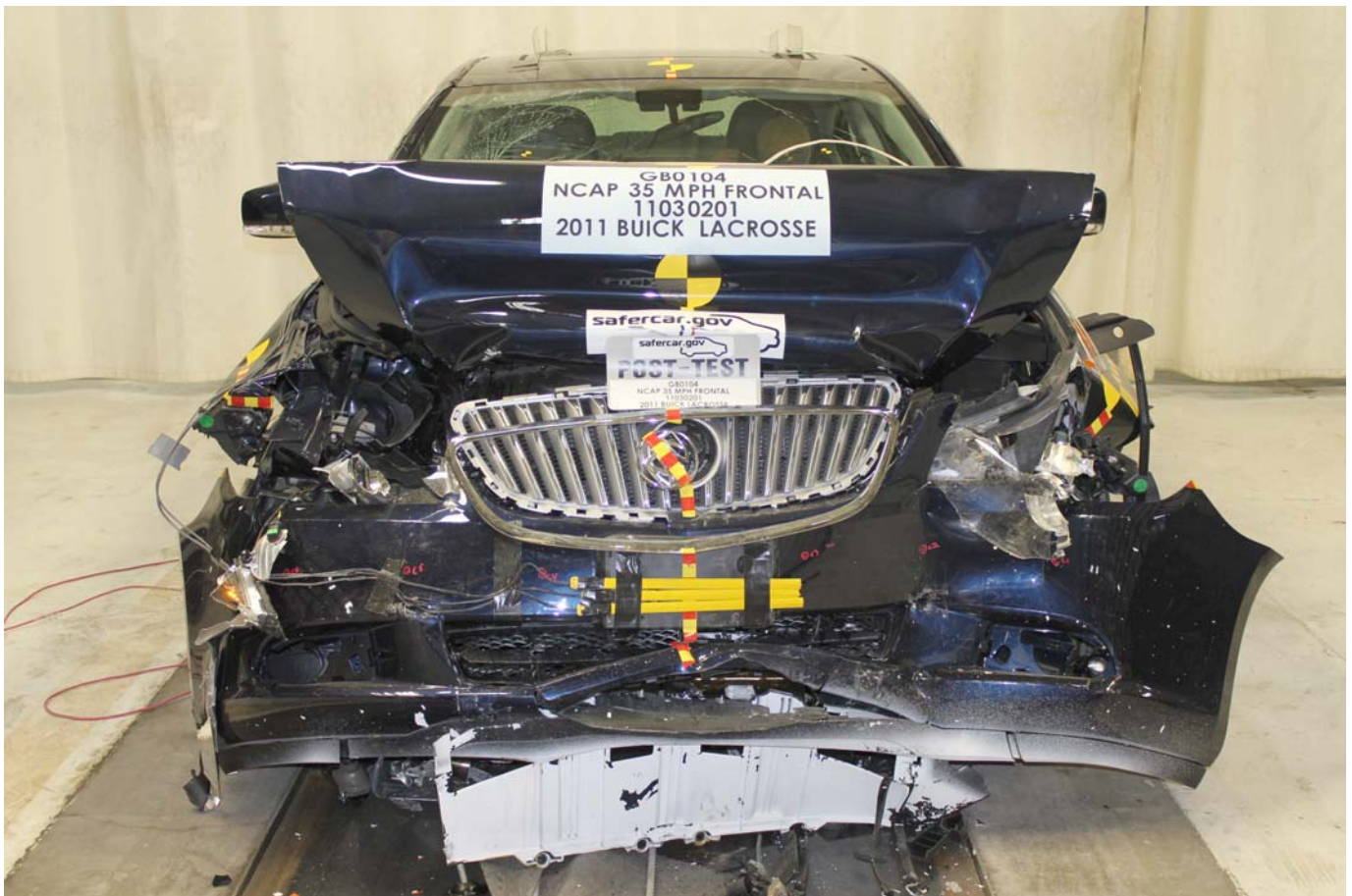
Right Front Three-Quarter View, As Received



Left Rear Three-Quarter View, As Received



Pre-Test Front View



Post-Test Front View



Pre-Test Left Side View (with vehicle at barrier)



Post-Test Left Side View



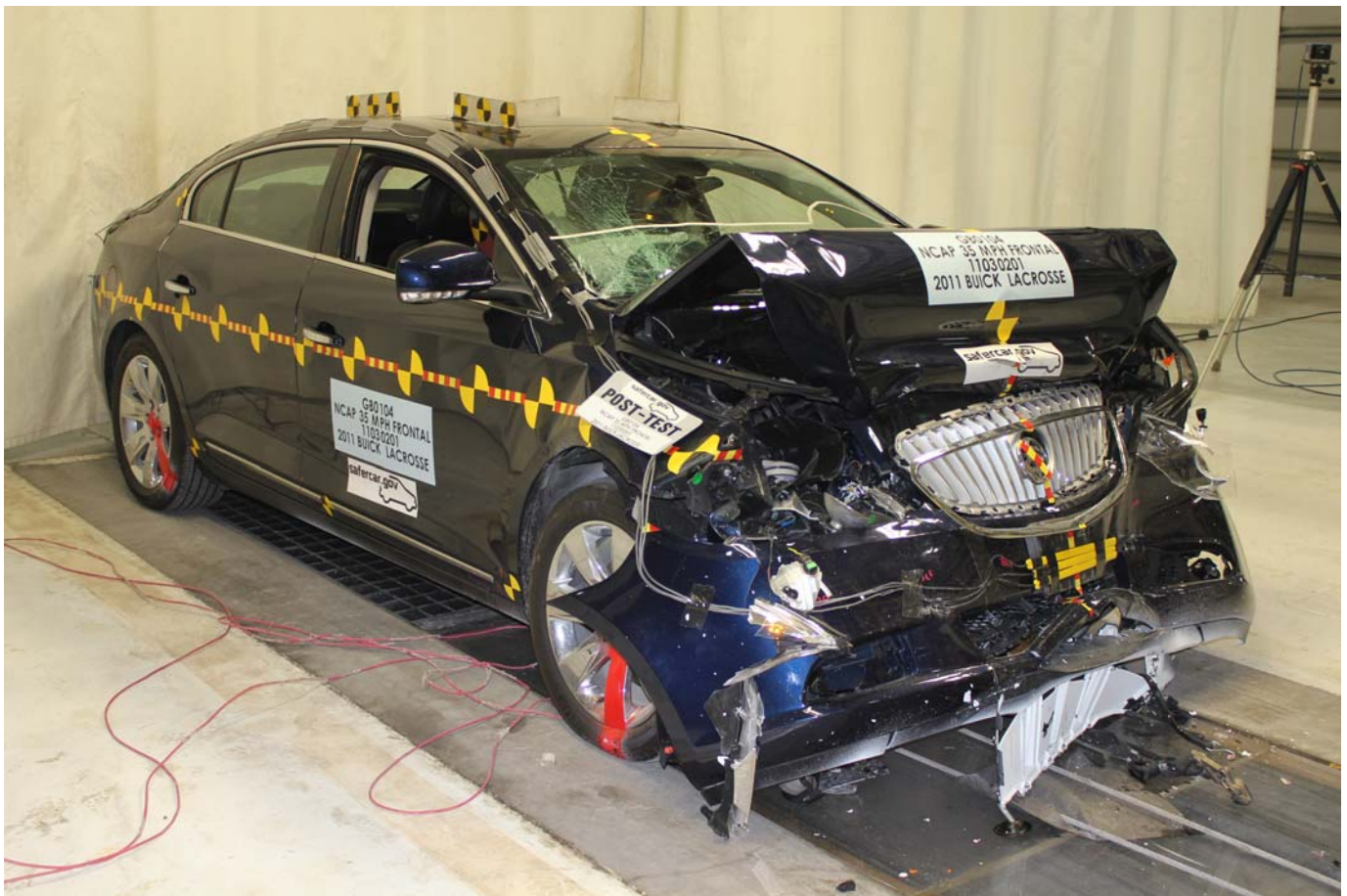
Pre-Test Right Side View (with vehicle at barrier)



Post-Test Right Side View



Pre-Test Right Front Three-Quarter View



Post-Test Right Front Three-Quarter View



Pre-Test Left Rear Three-Quarter View (with vehicle at barrier)



Post-Test Left Rear Three-Quarter View



Pre-Test Windshield View



Post-Test Windshield View



Pre-Test Engine Compartment View



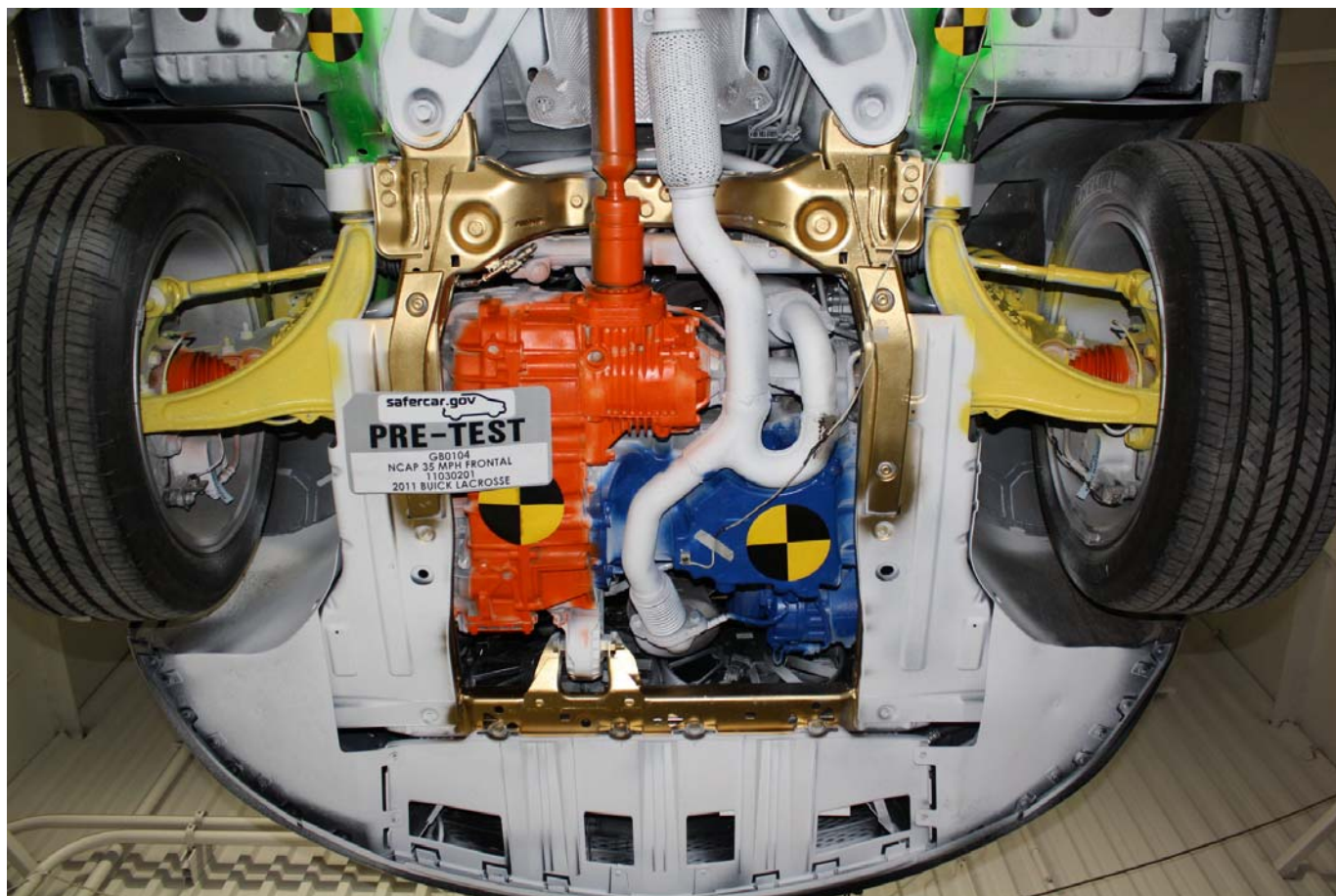
Post-Test Engine Compartment View



Pre-Test Fuel Cap View



Post-Test Fuel Cap View



Pre-Test Front Underbody View



Post-Test Front Underbody View



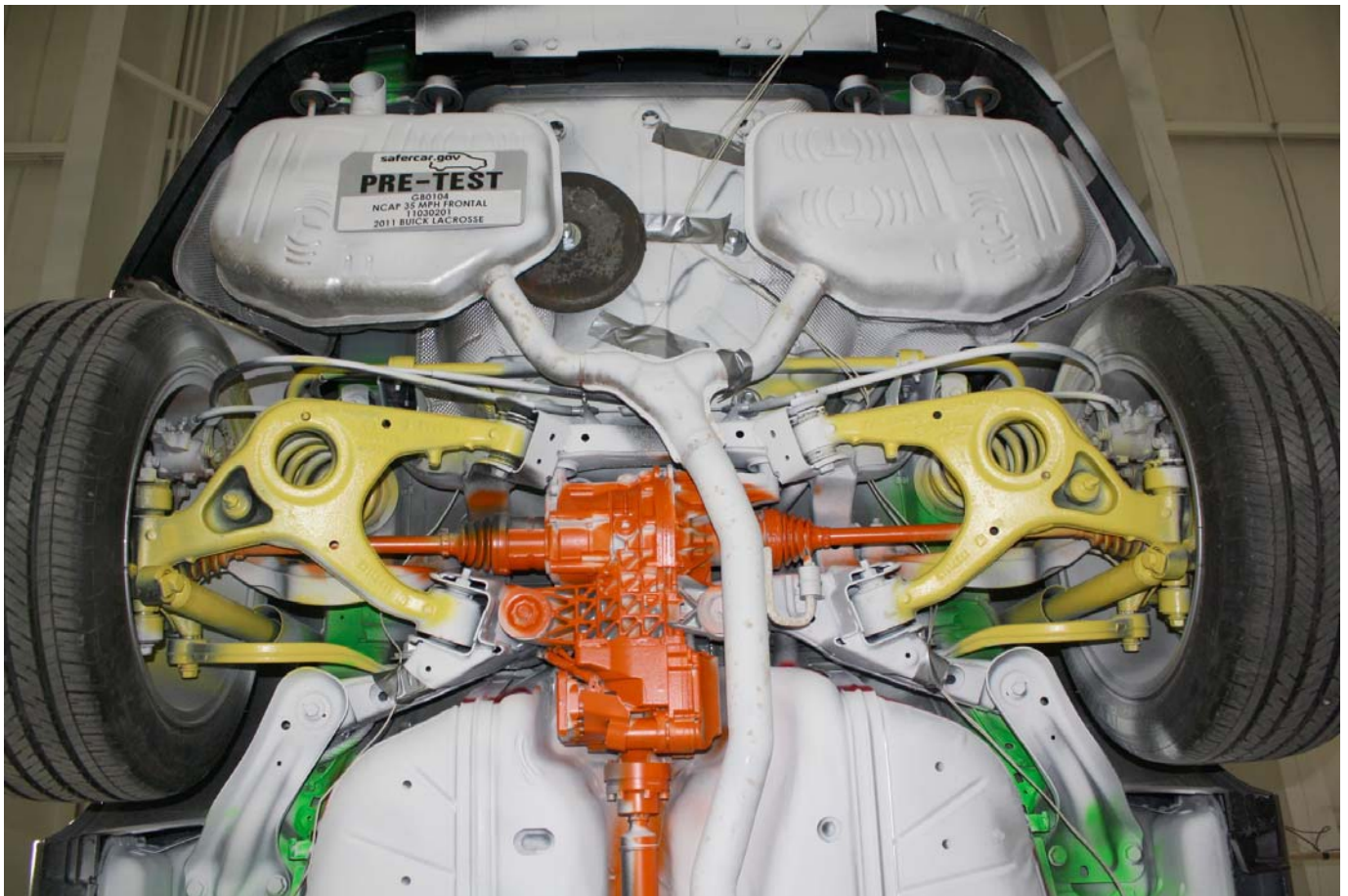
Pre-Test Mid Underbody View



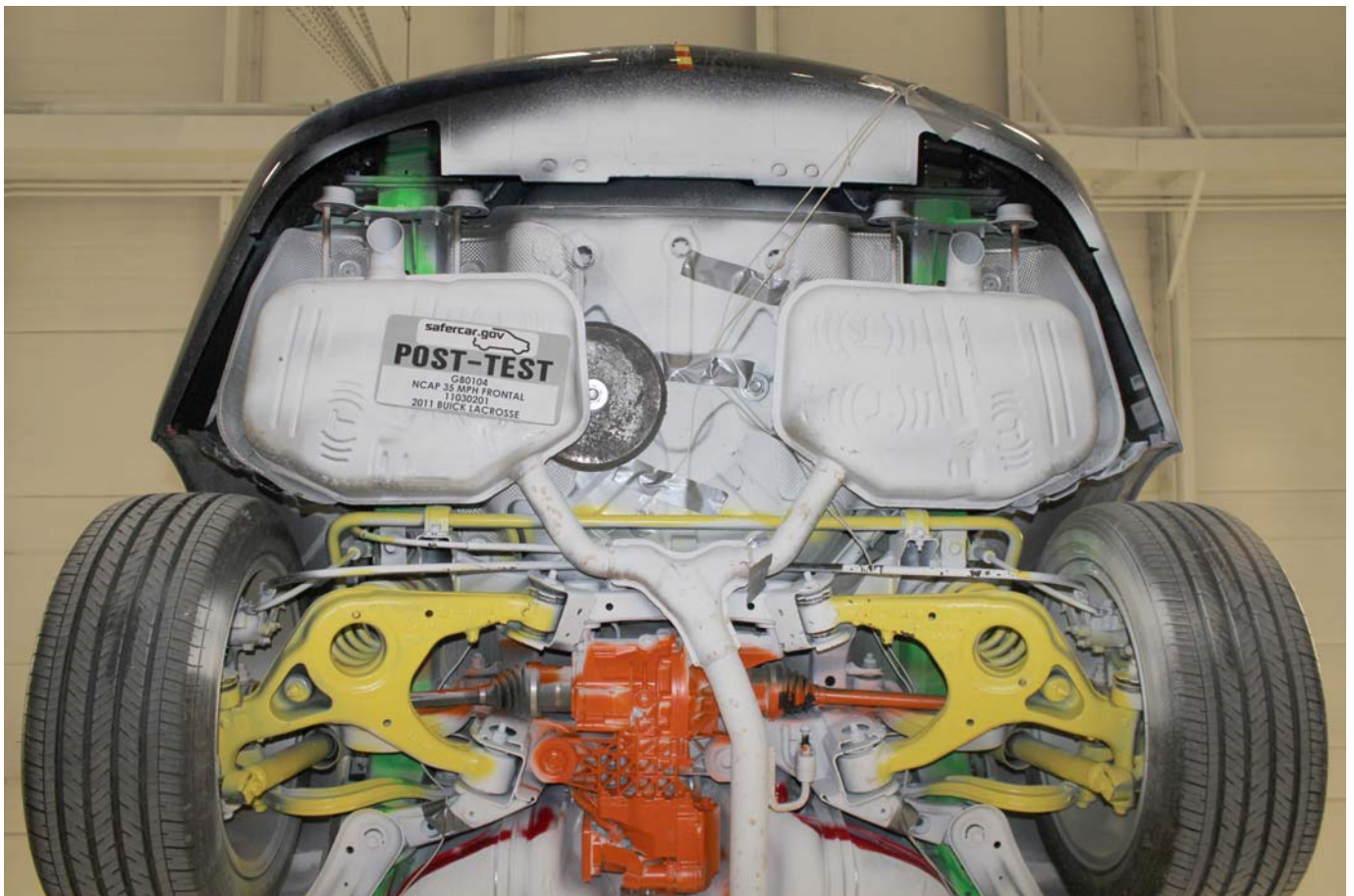
Post-Test Mid Front Underbody View



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)



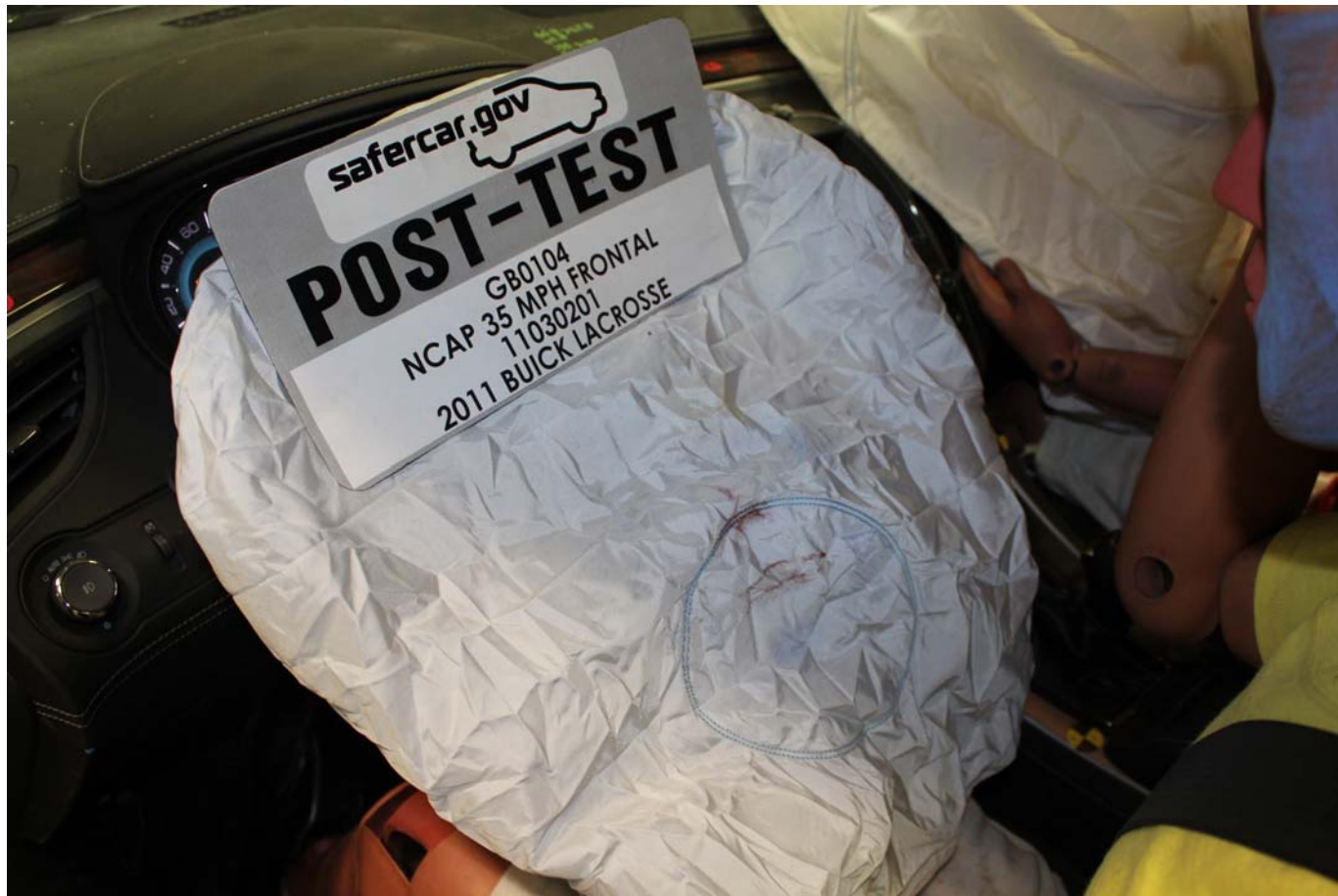
Post-Test Driver's Side Knee Bolster (without dummy)



Pre-Test Driver's Side Floorpan



Post-Test Driver's Side Floorpan



Post-Test Driver Dummy Contact with Airbag



Post-Test Driver Dummy Contact with Headrest



Post-Test Driver Dummy Contact with Knee Bolster



Pre-Test View of Steering Column Shear Capsule



Post-Test View of Steering Column Shear Capsule



Pre-Test Passenger Dummy Front View



Post-Test Passenger Dummy Front View



Pre-Test Passenger Dummy Window View



Post-Test Passenger Dummy Window View



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



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



Pre-Test Passenger's Seat Fore-Aft Markings



Post-Test Passenger's Seat Fore-Aft Markings



Pre-Test Passenger Dummy Feet



Post-Test Passenger Dummy Feet



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



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



Pre-Test Passenger's Side Floorpan



Post-Test Passenger's Side Floorpan



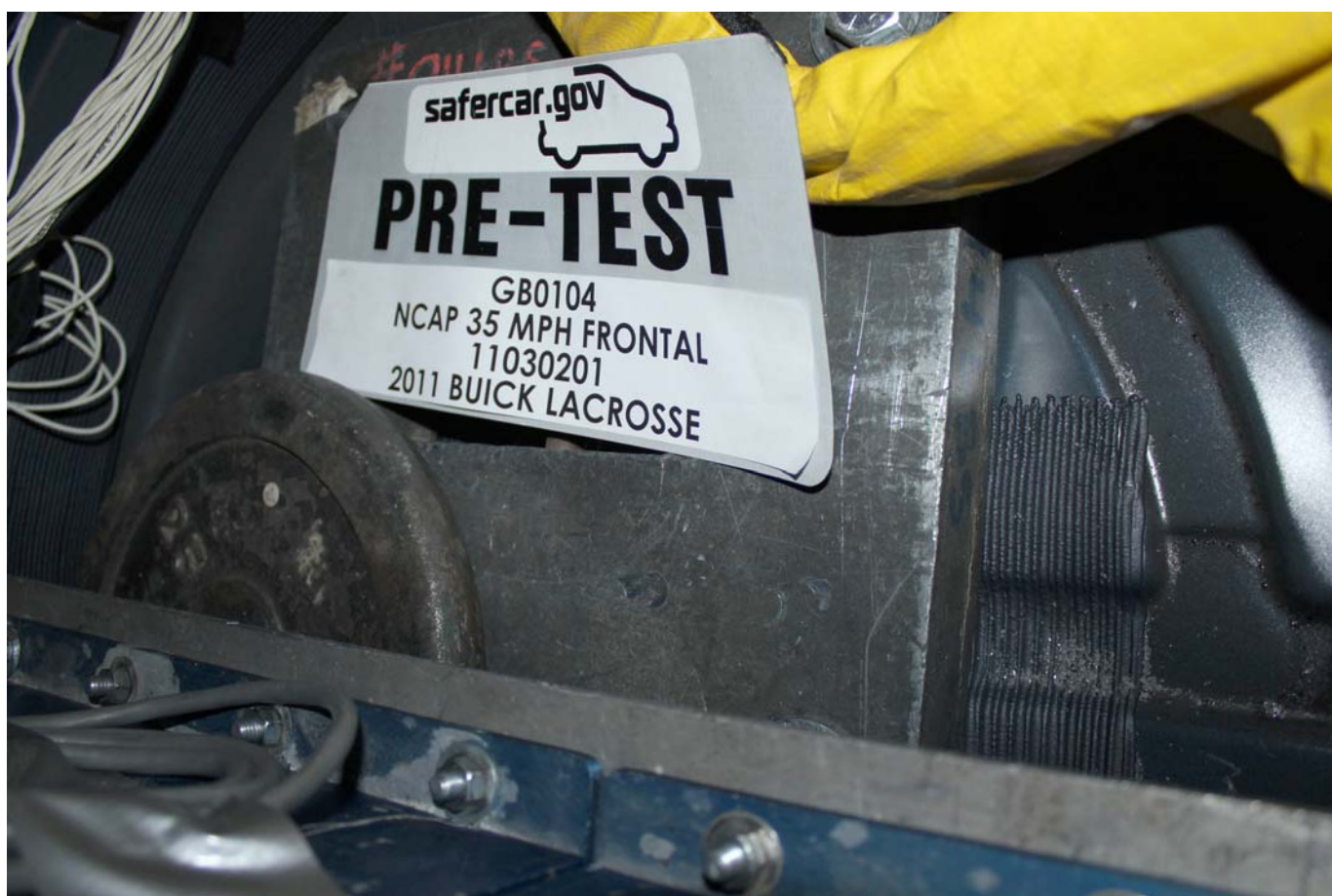
Post-Test Passenger Dummy Contact with Airbag



Post-Test Passenger Dummy Contact with Headrest



Post-Test Passenger Dummy Contact with Glovebox



Ballast Installed in Vehicle

PHOTOGRAPH NOT APPLICABLE

Post-Test Stoddard Solvent Spillage Location View



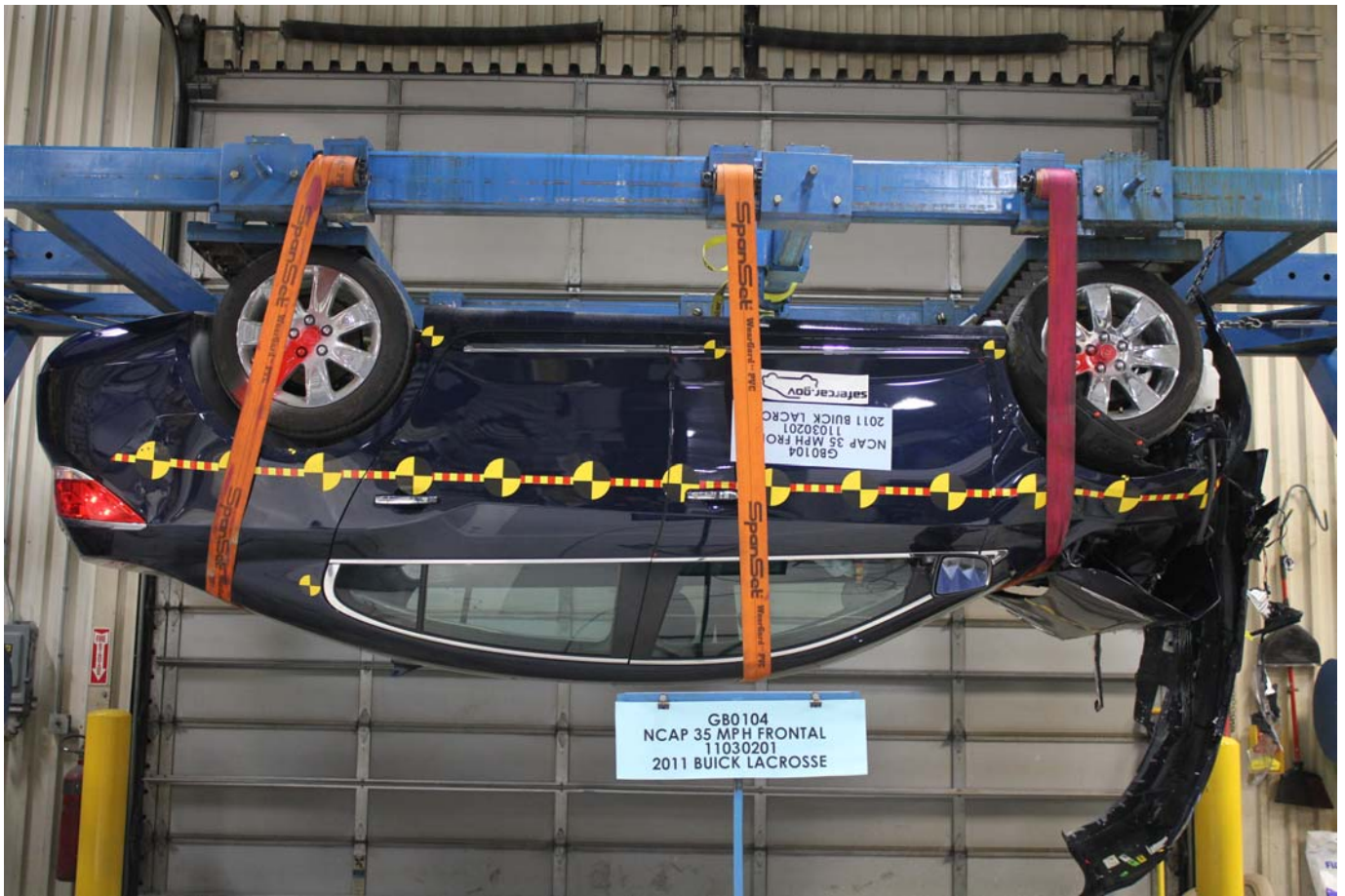
Post-Test Speed Trap Read-Out



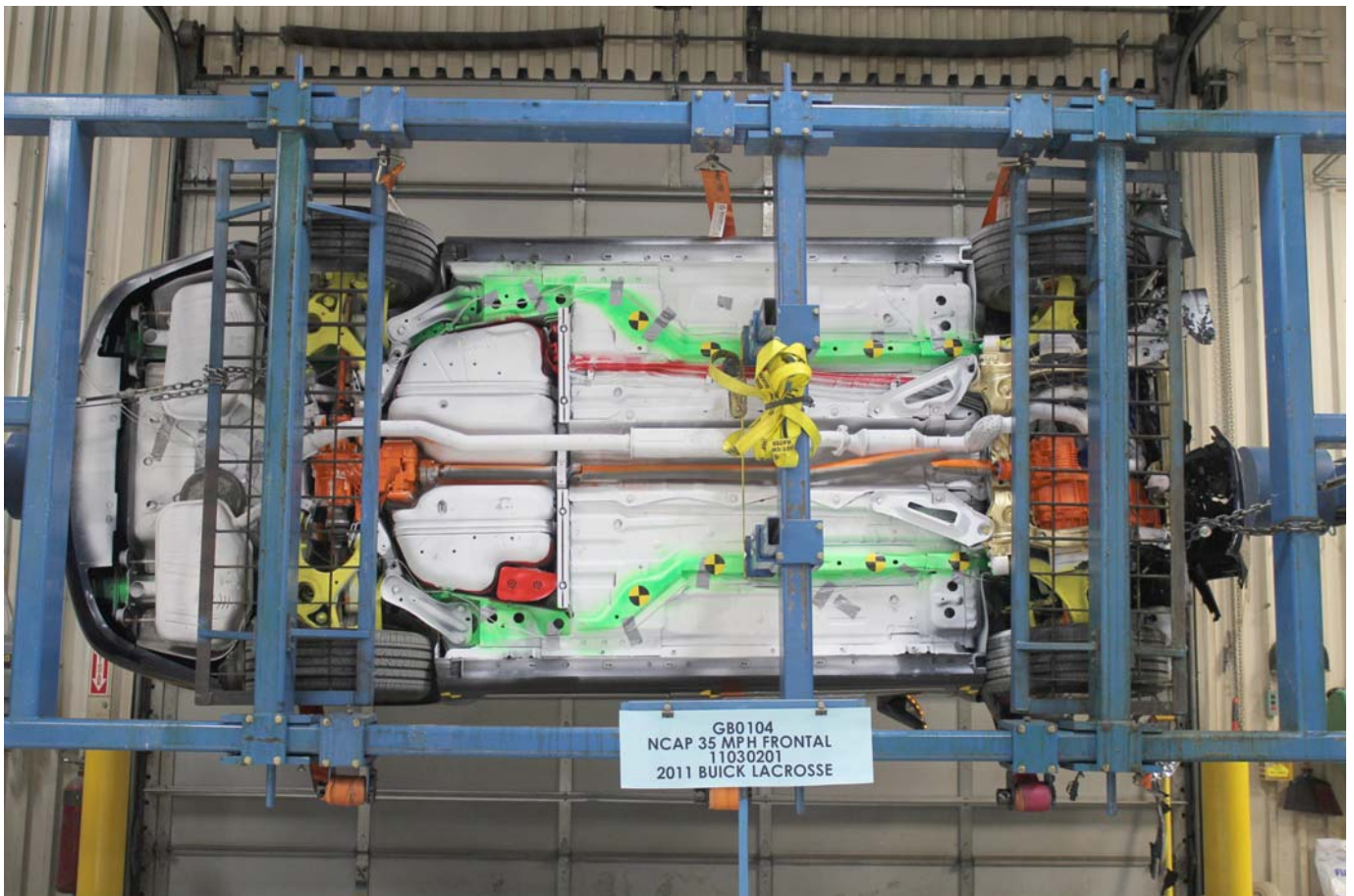
Vehicle at 0 Degrees on Static Rollover Device



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



Vehicle Impact



2011 LACROSSE CXL AWD

EXTERIOR: MIDNIGHT BLUE METALLIC
INTERIOR: EBONY

ENGINE: 3.6L V6 VVT SIDI

TRANSMISSION: 6-SPEED AUTOMATIC

Visit us at www.buick.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
- 4 YEAR/50,000 MILE BUMPER-TO-BUMPER WARRANTY
- SEE DEALER FOR DETAILS

MECHANICAL

- ENGINE - 3.6L V6
- TRANSMISSION, 6 SPD AUTOMATIC
- ANTILOCK BRAKE SYSTEM, 4 WHEEL
- DISC W/INTELLIGENT ASSIST
- 4 WHEEL INDEPENDENT SUSPENSION
- SUSPENSION, FRONT MACPHERSON
- MAGNETIC VAR ASSIST STEERING
- DRIVETRAIN, ALL-WHEEL DRIVE
- ELECTRONIC LIMITED SLIP DIFFERENTIAL

SAFETY & SECURITY

- STABILITRAK-STABILITY CONTROL SYSTEM WITH TRACTION CONTROL

- AIR BAGS: DRIVER, PASSENGER, FRONT SIDE THORAX, HEAD SIDE CURTAIN, ALL ROWS
- 6 MTHS ONSTAR DIRECTIONS & CONNECTIONS WITH AUTOMATIC CRASH RESPONSE AND TURN-BY-TURN/ASK DEALER ABOUT GEOGRAPHIC COVERAGE
- LATCH SYSTEM, ELECTRONIC REAR DOOR LOCKOUT
- REMOTE KEYLESS ENTRY EXT RANGE
- THEFT DETERRANT SYSTEM
- CONTENT THEFT ALARM
- TIRE PRESSURE MONITOR SYSTEM

EXTERIOR

- POWER HEATED O/S REAR VIEW MIRRORS WITH TURN SIGNAL
- FOG LAMPS, FRONT HALOGEN
- 18" MACHINE-FACED ALLOY WHEELS

INTERIOR

- LEATHER APPOINTED SEATING
- HEATED FRONT SEATS

- POWER SEAT ADJUST-DRIVER, 8 WAY
- POWER LUMBAR ADJUSTER, DRIVER
- PWR SEAT ADJUST, FR PASS, 8-WAY
- DUAL ZONE AUTO CLIMATE CONTROL
- AM/FM/XM STEREO, CD, AUTOTONE CONTROL, 7 SPEAKERS
- XM RADIO - SERVICE SUBSCRIPTION SOLD SEPARATELY BY SIRIUS/XM AFTER 3 MONTHS
- PWR DOOR LOCKS, PWR WINDOWS
- CRUISE CONTROL
- DRIVER INFORMATION CENTER WITH COMPASS AND TRIP COMPUTER
- 1 THR WRAP STEERING WHL, BAKE & TELESCOPE WITH AUDIO CONTROLS
- CUSTOM INTERIOR LIGHTING
- AUTO DIMMING INSIDE REARVIEW MIRROR
- UNIVERSAL HOME REMOTE
- BLUETOOTH FOR PHONE
- POWER OUTLETS, AUXILIARY (2)
- CONVENIENCE NET, CARGO

OPTIONS & PRICING

MANUFACTURER'S SUGGESTED RETAIL PRICE

STANDARD VEHICLE PRICE

\$32,570.00

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

CONFORT & CONVENIENCE PKG #2, 550.00

•ULTRASONIC REAR PARKING ASSIST

•OUTSIDE REAR VIEW MIRRORS WITH DRIVER AUTO DIMMING

•MEMORY SEATS AND MIRRORS

SUNROOF, POWER, OVERSIZED

WHEELS, 18" CHROME-PLATED

ENGINE BLOCK HEATER

2.7T AXLE RATIO

1,195.00

650.00

50.00

INC.

TOTAL OPTIONS

\$2,445.00

TOTAL VEHICLE & OPTIONS

\$35,015.00

DESTINATION CHARGE

750.00

TOTAL VEHICLE PRICE*

\$35,765.00

EPA Fuel Economy Estimates

CITY MPG

16

Expected range for most drivers 13 to 19 MPG

HIGHWAY MPG

26

Expected range for most drivers 21 to 31 MPG

Estimated Annual Fuel Cost \$1,950

based on 15,000 miles at \$2.60 per gallon

Combined Fuel Economy

This Vehicle

20

12 50

ALL MID-SIZE CARS

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



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

GOVERNMENT SAFETY RATINGS

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

Source: National Highway Traffic Safety Administration (NHTSA).

PARTS CONTENT INFORMATION

FOR VEHICLES IN THIS CARLINE:
U.S./CANADIAN PARTS CONTENT: 57%
MAJOR SOURCES OF FOREIGN PARTS CONTENT: MEXICO 19%

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

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

This label has been reported to not remove prior to delivery to the dealer. If you have a problem with this label, please contact the Manufacturer's Recommended Service Center. This label does not include dealer installed options and accessories not listed above, and those at dealer's discretion.

© 2010 General Motors LLC
G.M. 1000 2010-10-27 02:00

POWERTRAIN LIMITED WARRANTY

SALES MODEL CODE J0224

DEALER NO 47403

FINANCIAL SERVICES

U.S.A.

VIN 1G4G5D5D9B120564

DEALER TO WHOM DELIVERED

DON LARSON CHEVROLET-PONTIAC-BUICK-CADILLA

CHRYSLER 30

BAYBROOK, WI 53913-0030

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



1AG1420596

APPENDIX B
DUMMY RESPONSE DATA

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

Driver Head X Redundant

Driver Head Y Redundant

Driver Head Z Redundant

Driver Upper Neck Force Y

Driver Upper Neck Moment X

Driver Upper Neck Moment Z

Driver Chest X Redundant

Driver Chest Y Redundant

Driver Chest Z Redundant

Driver Pelvis X

Driver Pelvis Y

Driver Pelvis Z

Driver Left Femur Redundant

Driver Right Femur Redundant

Driver Shoulder Belt Force

Driver Lap Belt Force

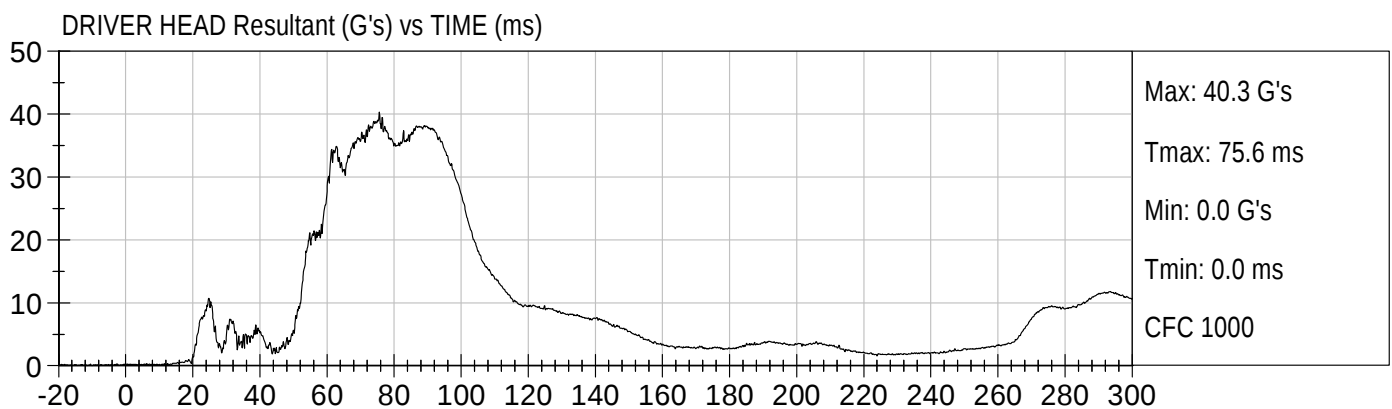
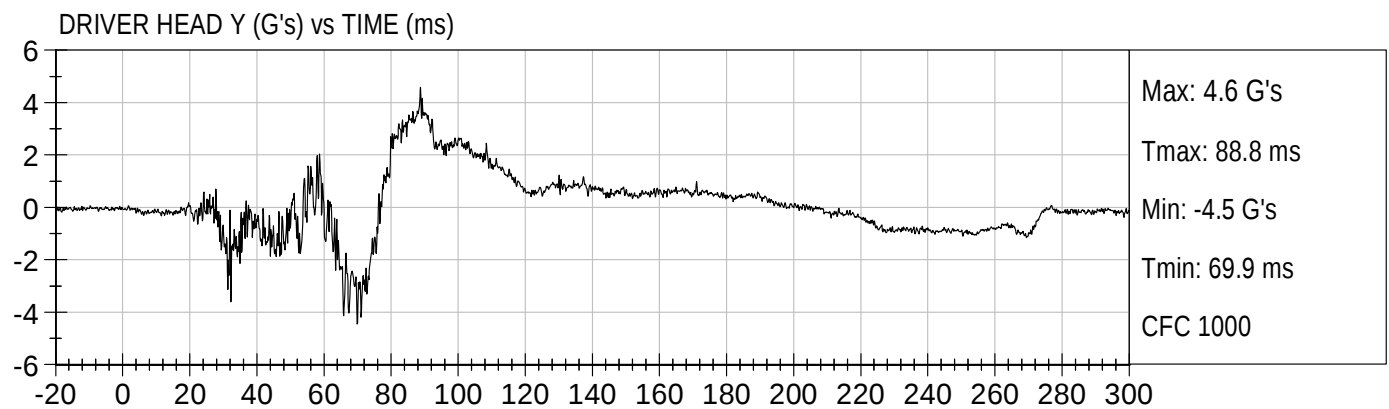
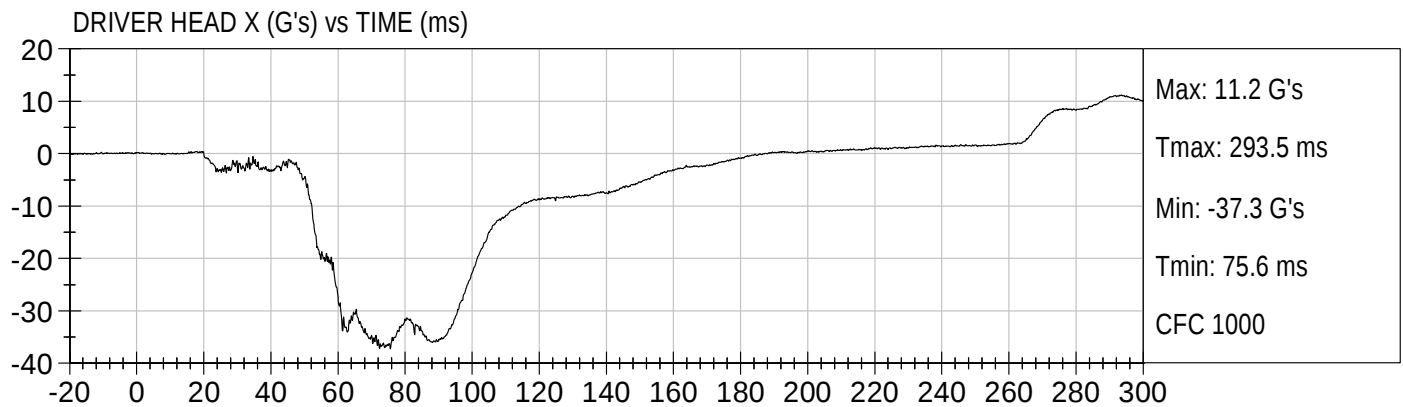
Driver Left Upper Tibia Moment X

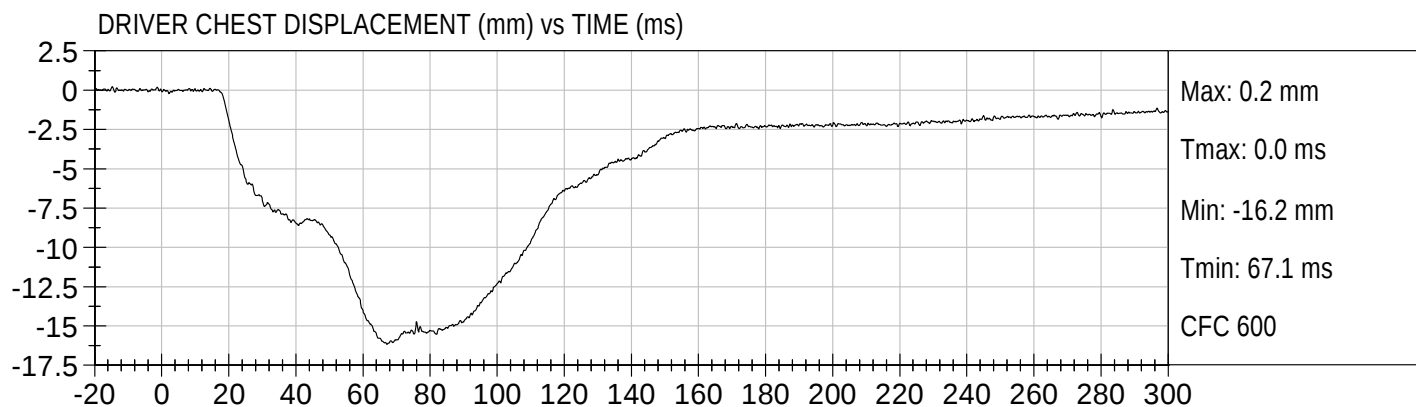
Driver Left Upper Tibia Moment Y

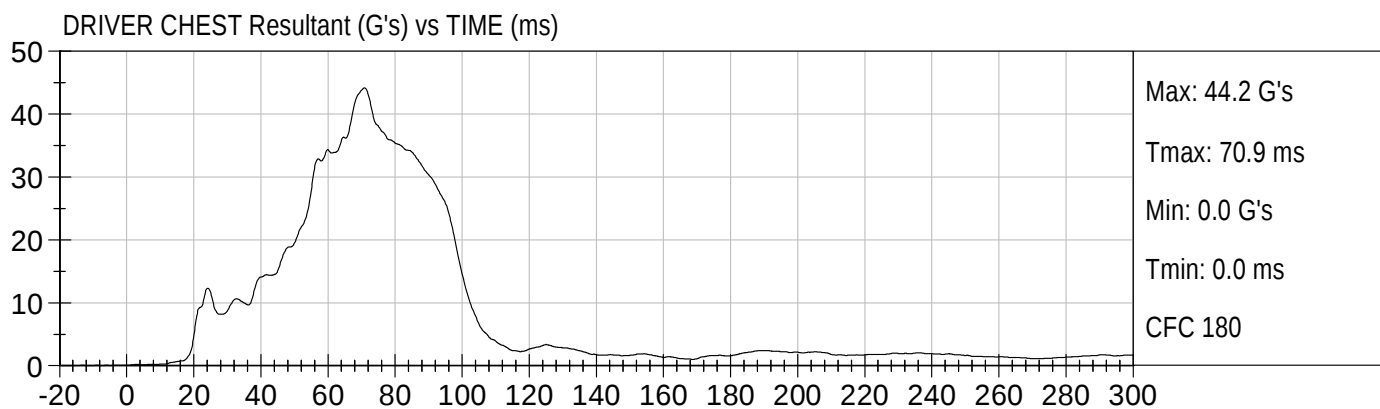
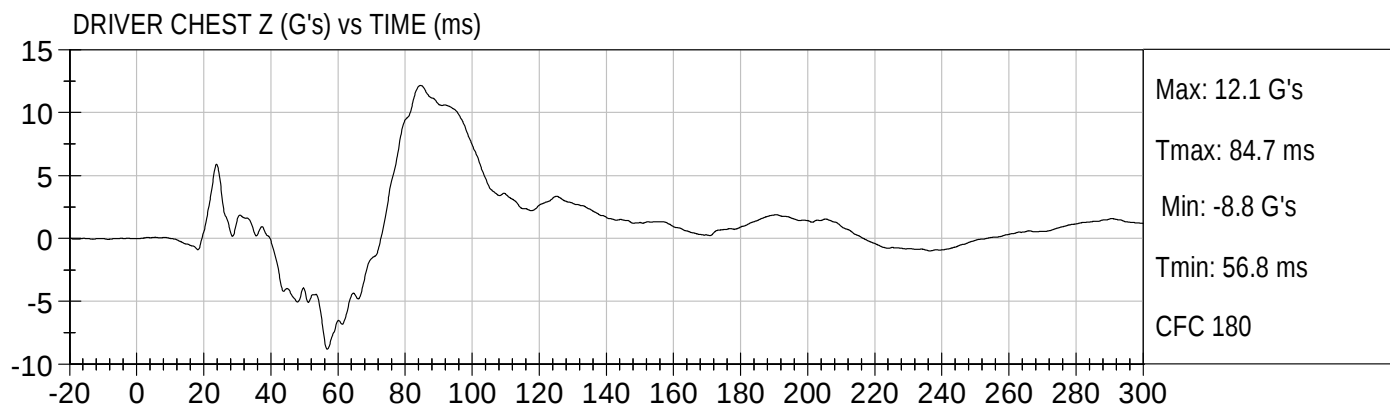
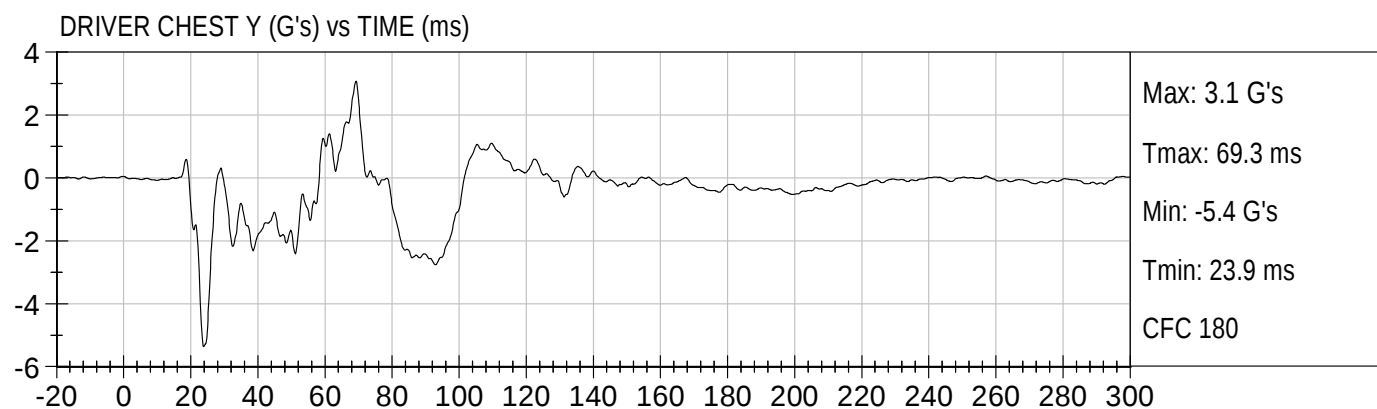
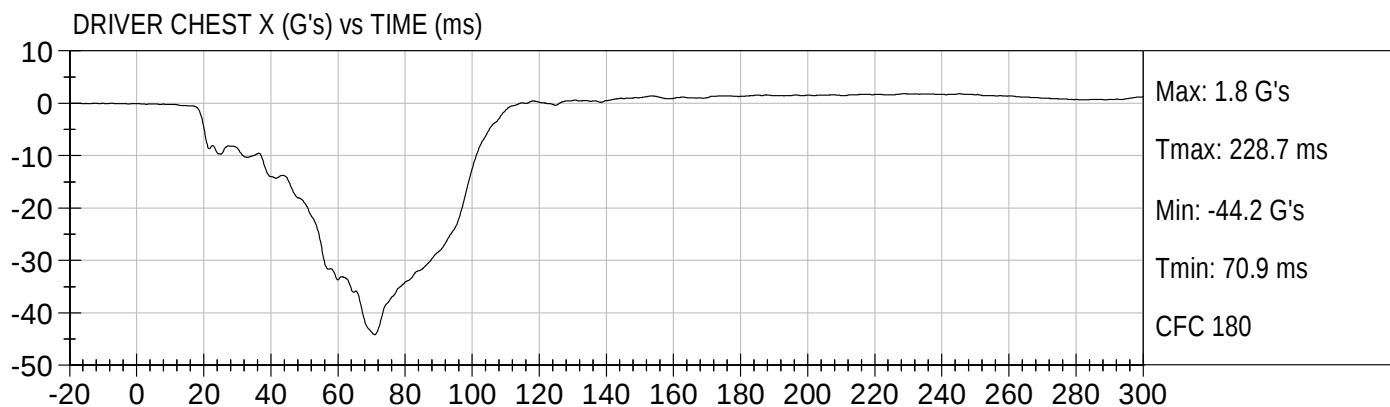
Driver Left Upper Tibia Force Z

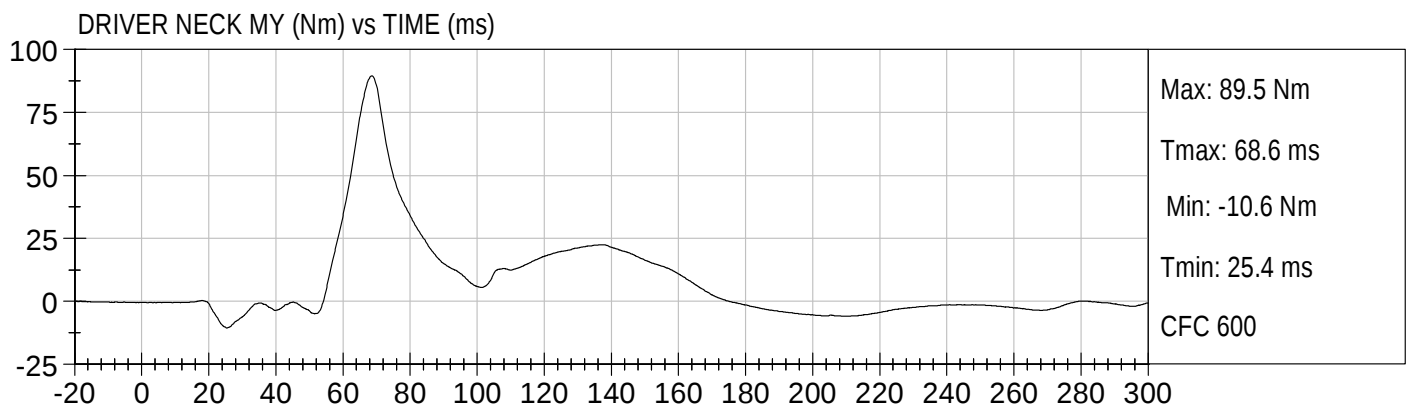
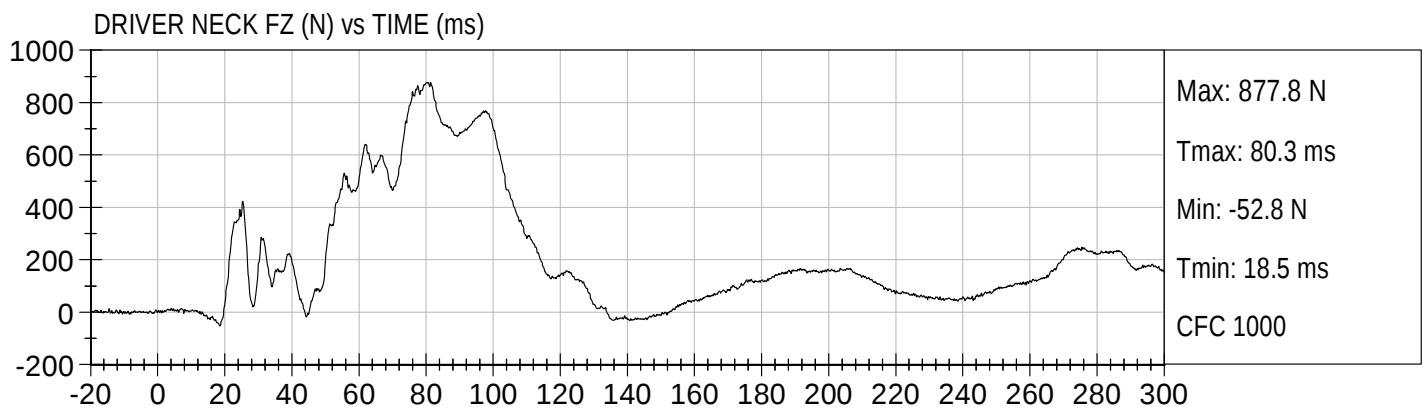
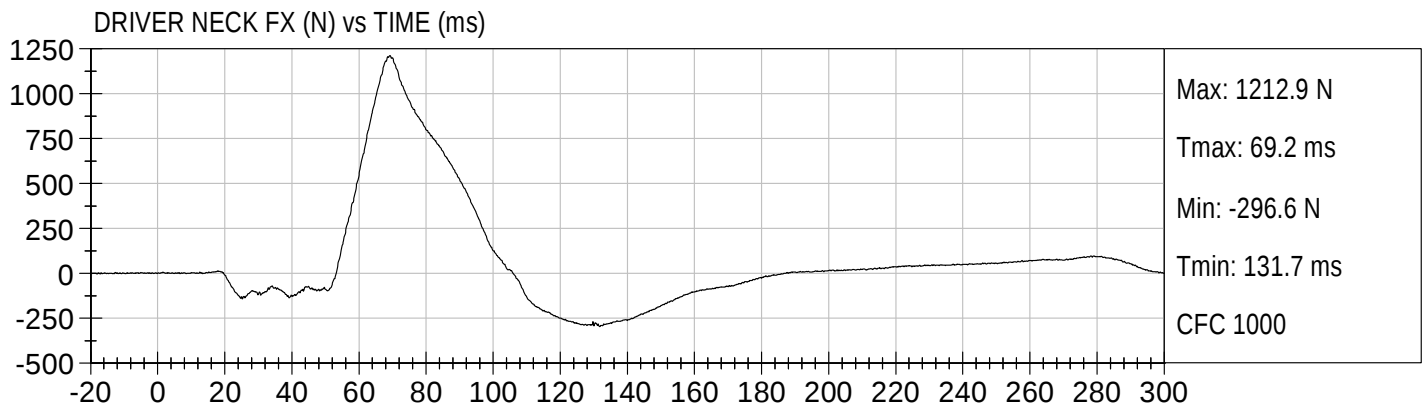
Driver Left Lower Tibia Moment X
Driver Left Lower Tibia Moment Y
Driver Left Lower Tibia Force Z
Driver Right Upper Tibia Moment X
Driver Right Upper Tibia Moment Y
Driver Right Upper Tibia Force Z
Driver Right Lower Tibia Moment X
Driver Right Lower Tibia Moment Y
Driver Right Lower Tibia Force Z
Driver 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
Passenger Head X Redundant
Passenger Head Y Redundant
Passenger Head Z Redundant
Passenger Upper Neck Force Y
Passenger Upper Neck Moment X
Passenger Upper Neck Moment Z
Passenger Chest X Redundant
Passenger Chest Y Redundant
Passenger Chest Z Redundant
Passenger Pelvis X
Passenger Pelvis Y
Passenger Pelvis Z
Passenger Left Femur Redundant
Passenger Right Femur Redundant
Passenger Lap Belt Force
Passenger Shoulder Belt Force – not installed

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
Left Rear Seat Crossmember X
Left Rear Seat Crossmember Z
Right Rear Seat Crossmember X
Right Rear Seat Crossmember Z
Vehicle Engine Top X
Vehicle Engine Bottom X
Vehicle Left Brake Caliper X
Vehicle Right Brake Caliper X
Advanced Research Load Cell Barrier – 127 channels



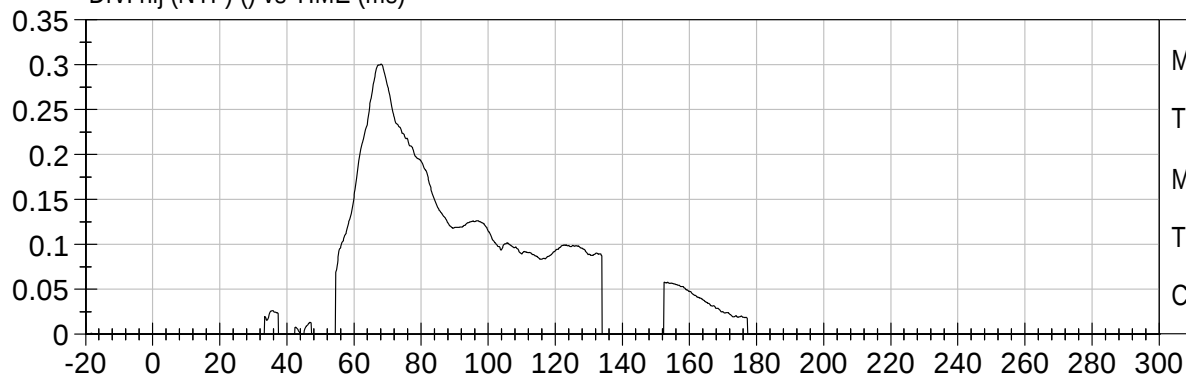






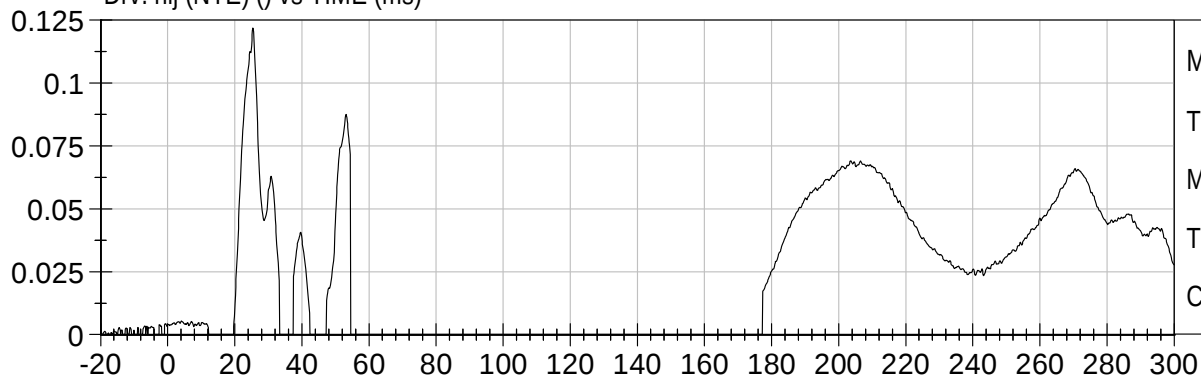


Drv. nij (NTF) () vs TIME (ms)



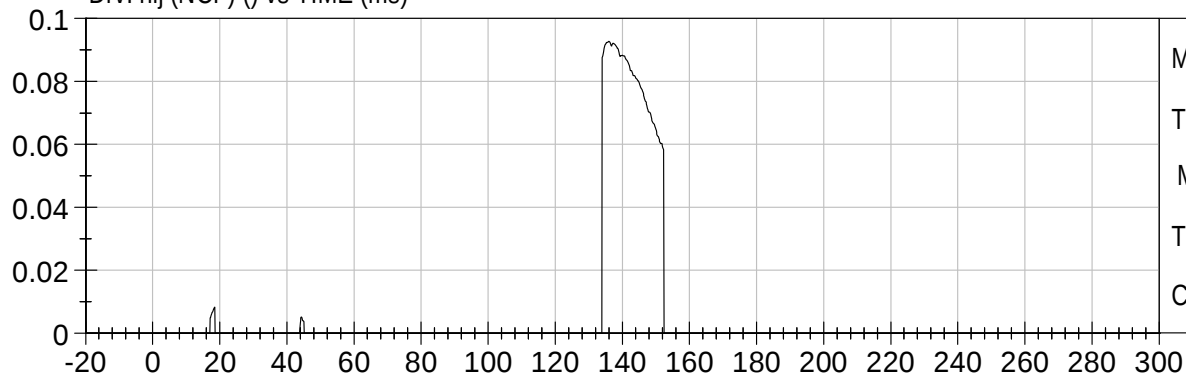
Max: 0.30
Tmax: 68.1 ms
Min: 0.0
Tmin: 0.0 ms
CFC 600

Drv. nij (NTE) () vs TIME (ms)



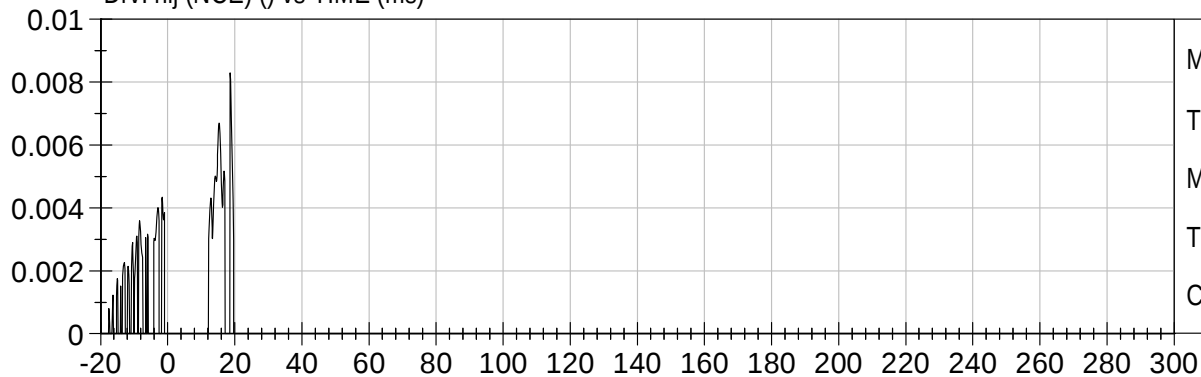
Max: 0.12
Tmax: 25.4 ms
Min: 0.0
Tmin: 0.0 ms
CFC 600

Drv. nij (NCF) () vs TIME (ms)

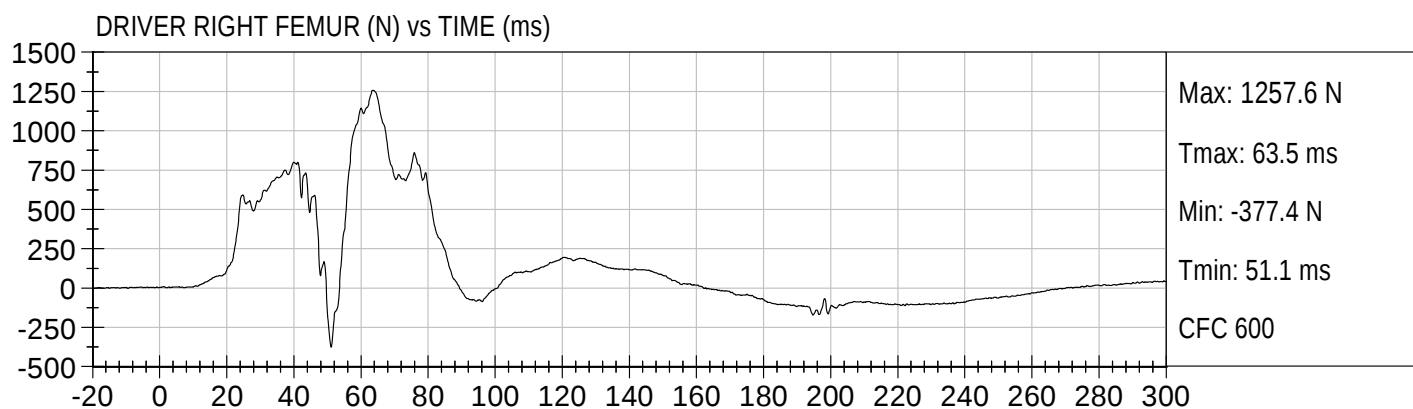
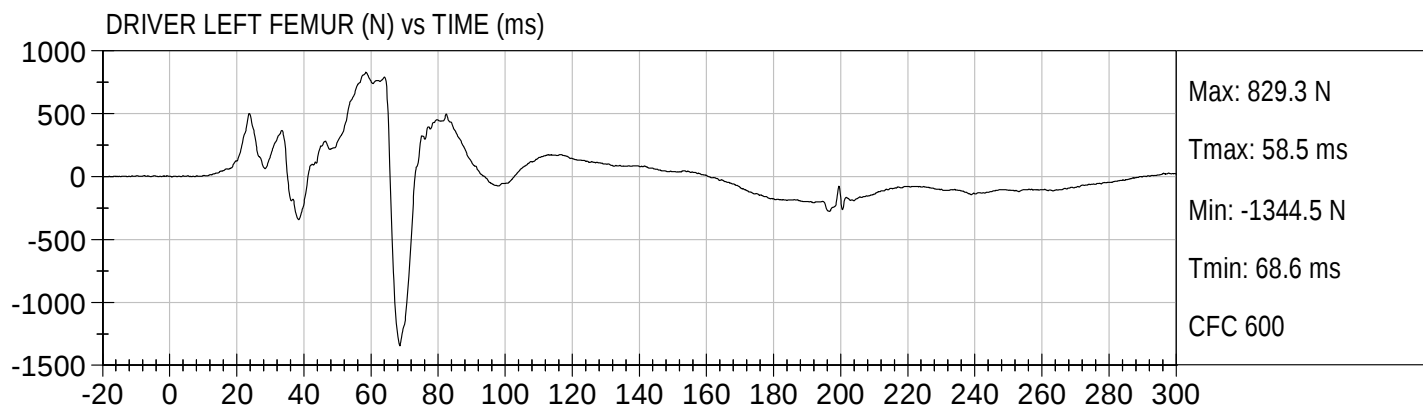


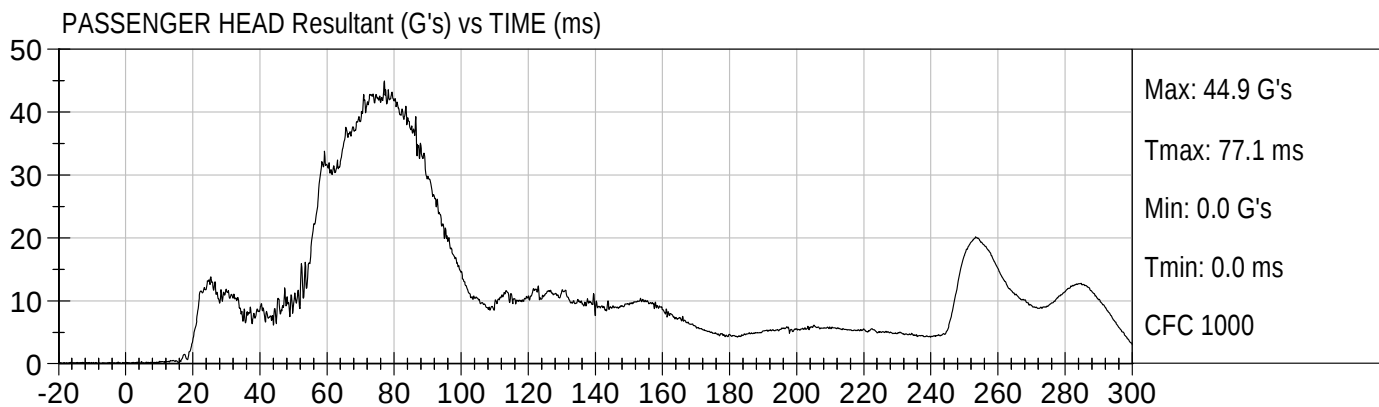
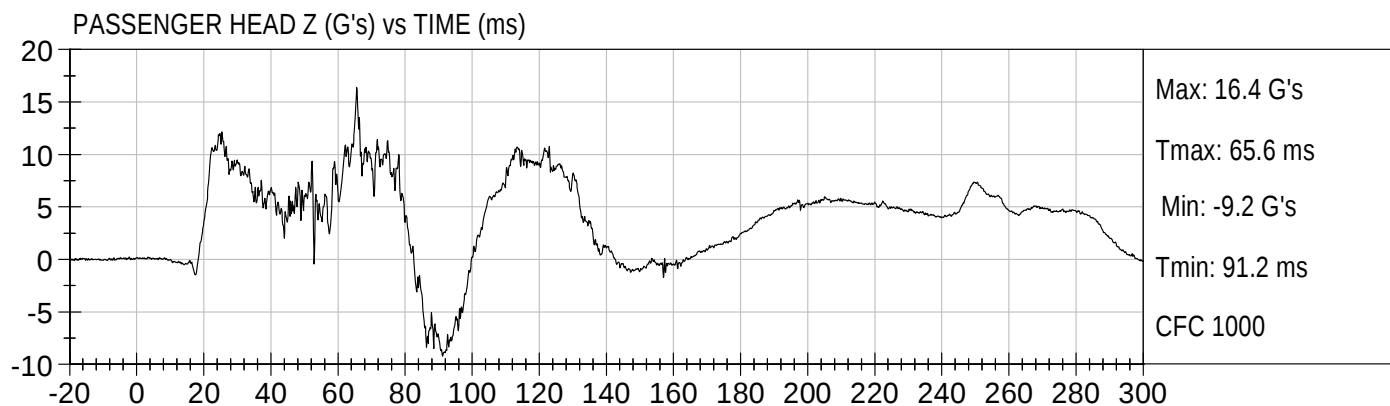
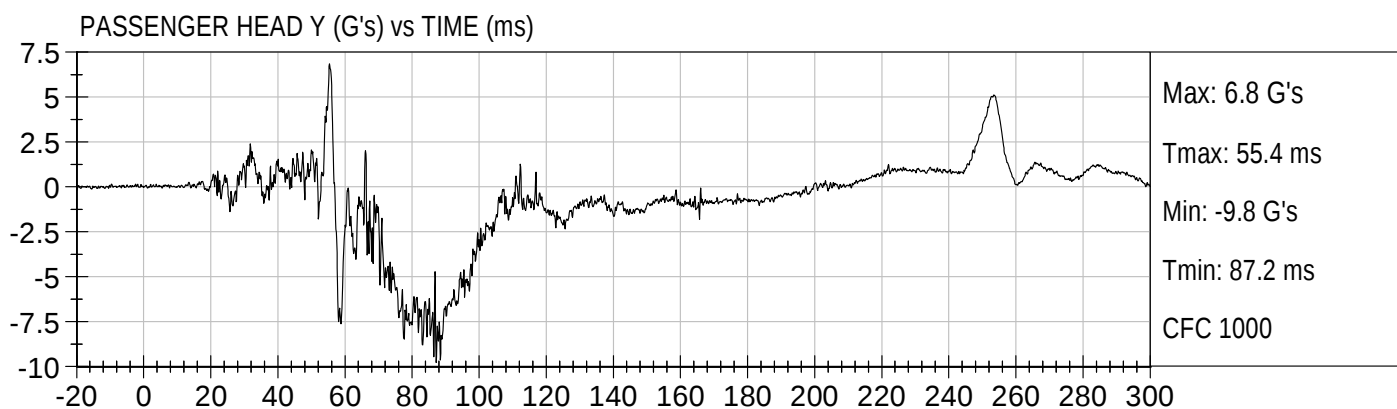
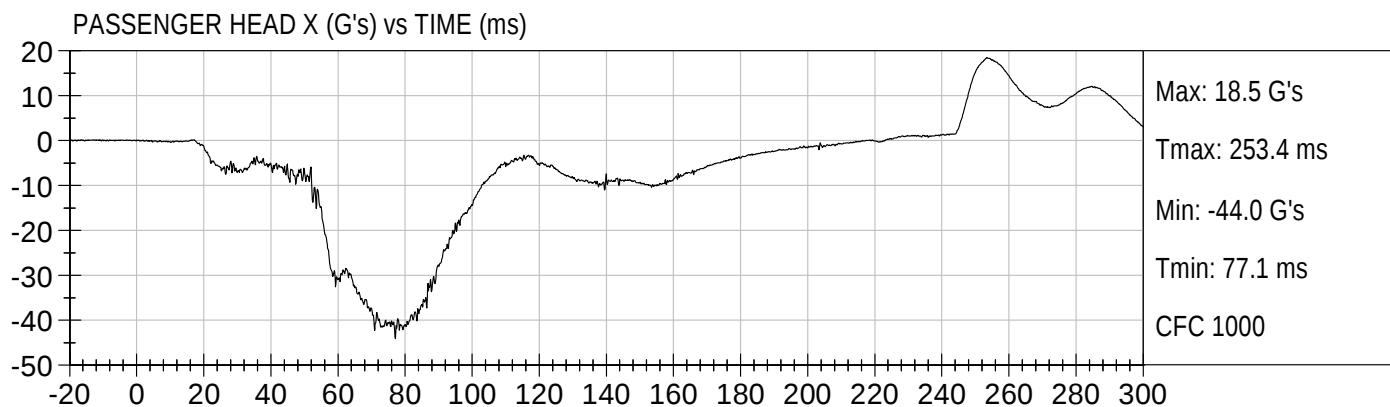
Max: 0.09
Tmax: 136.0 ms
Min: 0.0
Tmin: 0.0 ms
CFC 600

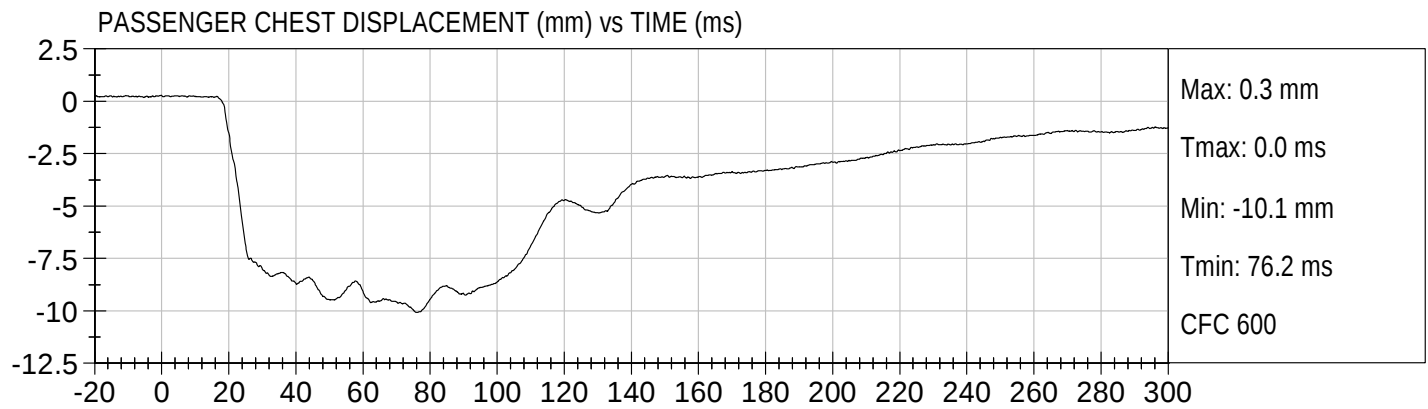
Drv. nij (NCE) () vs TIME (ms)

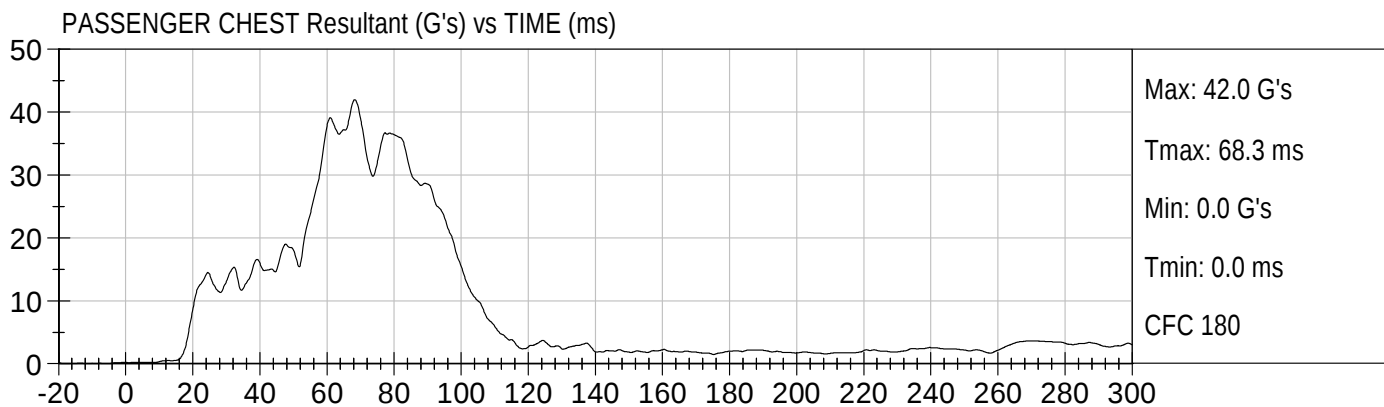
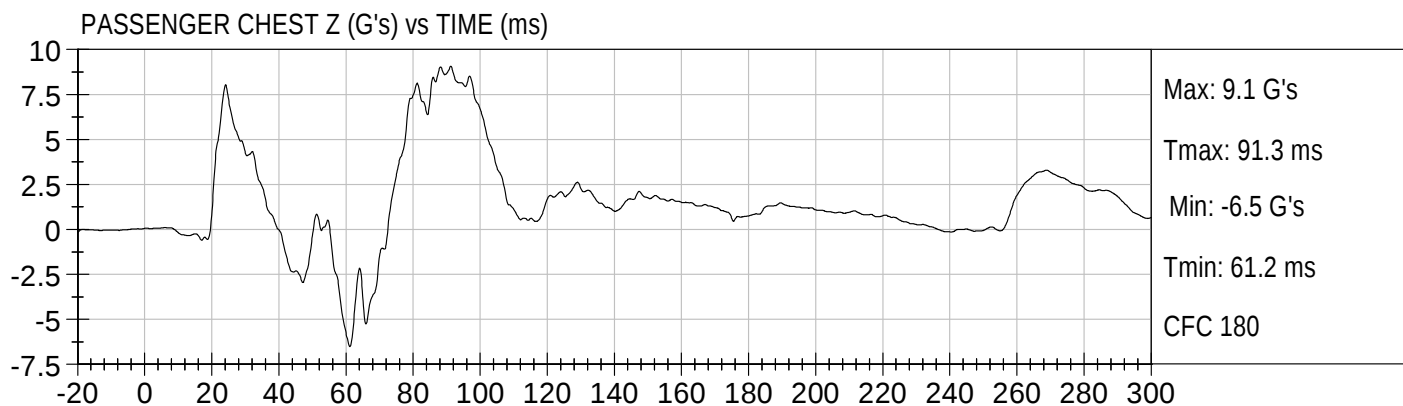
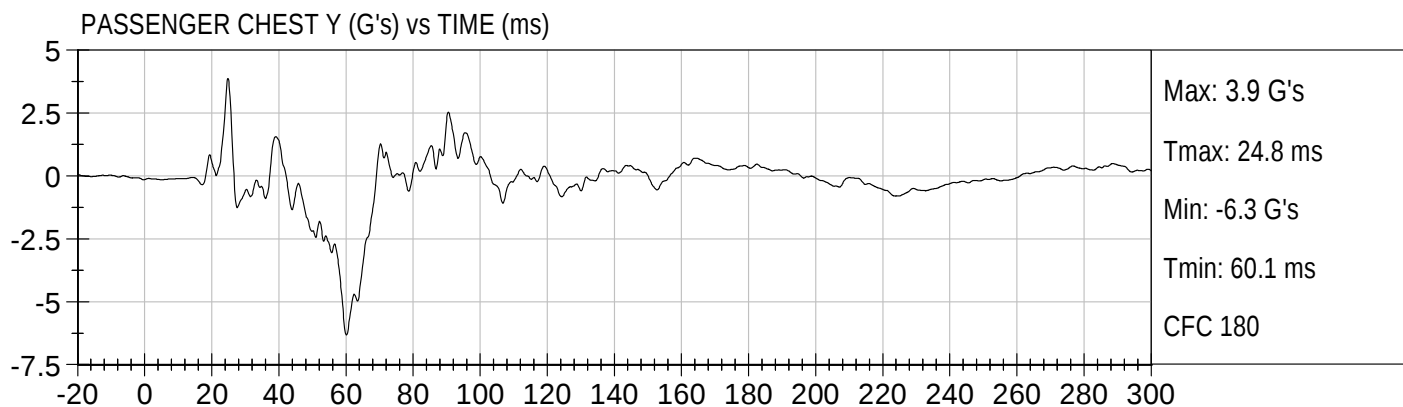
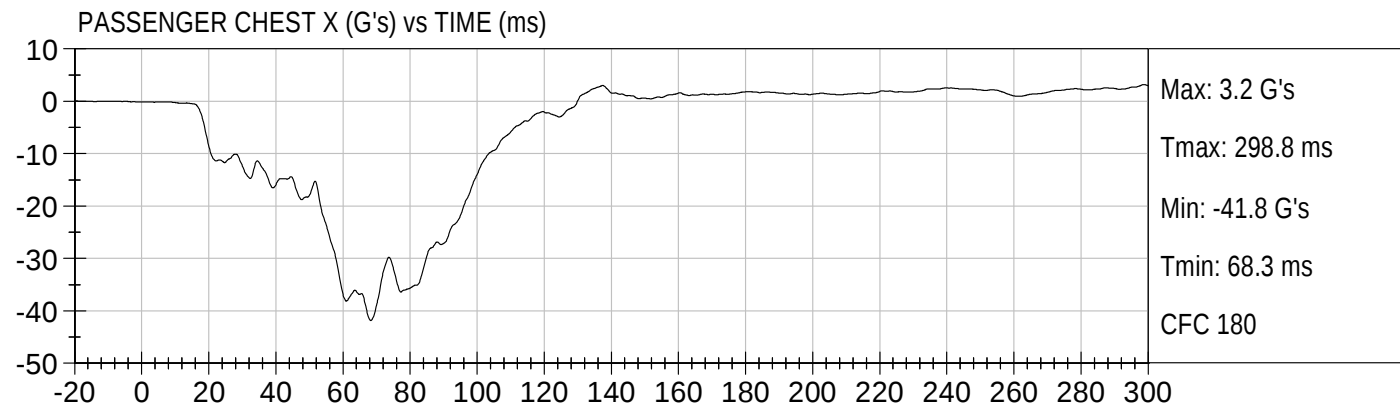


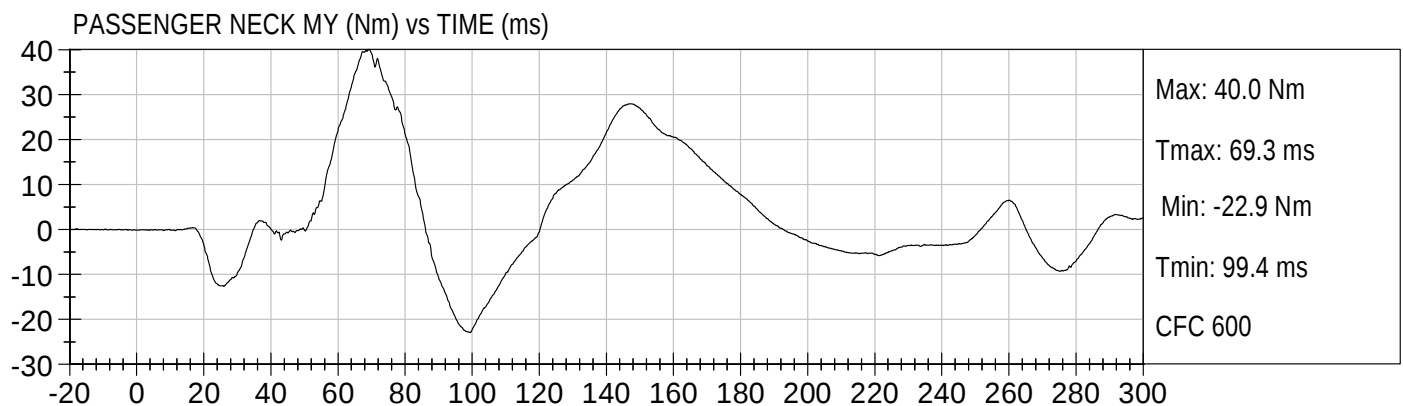
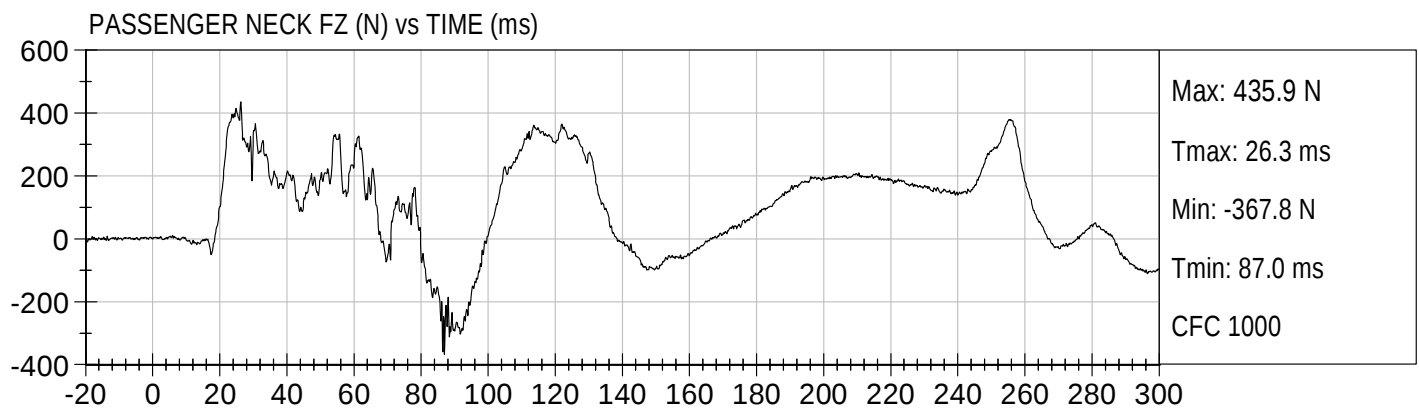
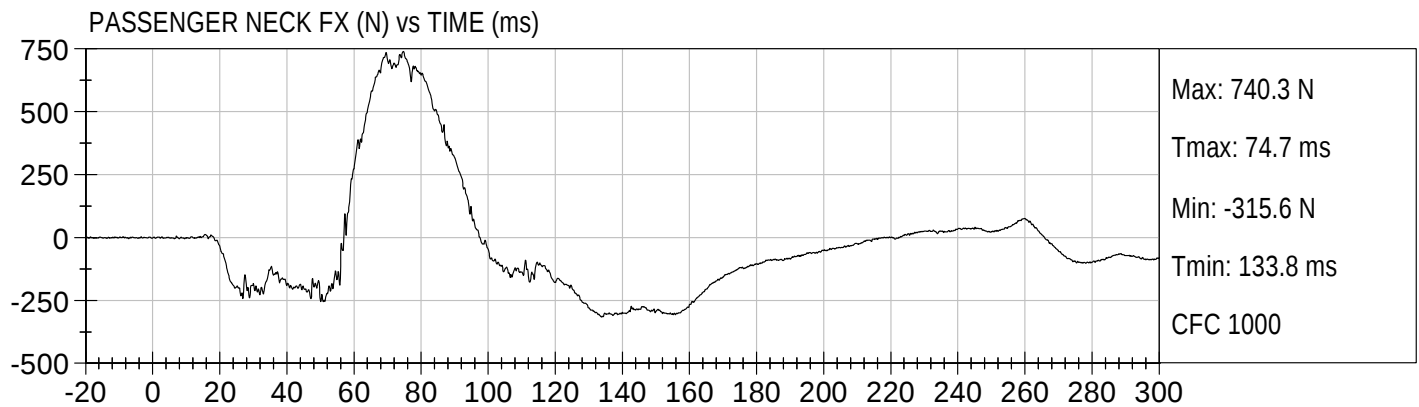
Max: 0.01
Tmax: 18.6 ms
Min: 0.0
Tmin: 0.0 ms
CFC 600

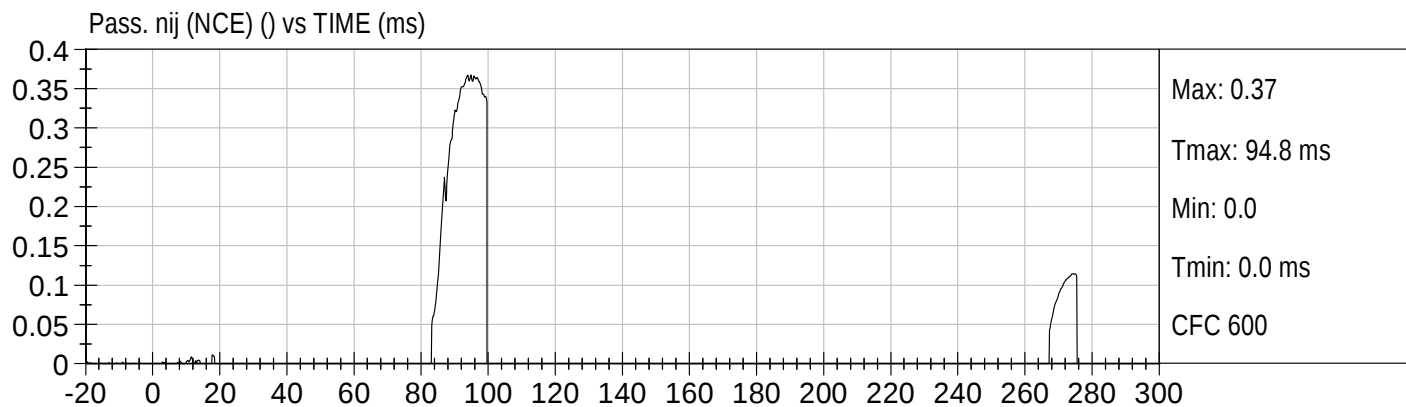
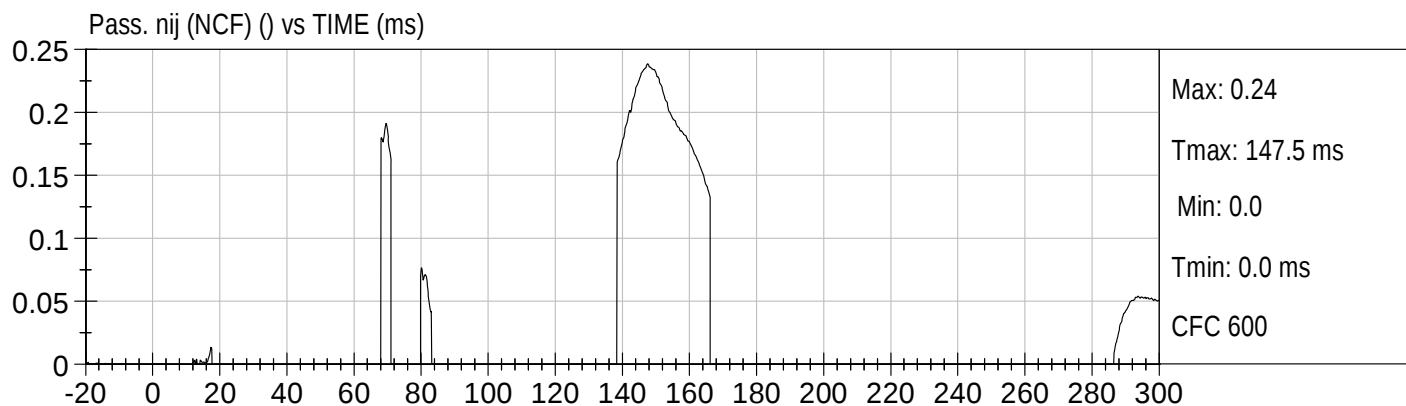
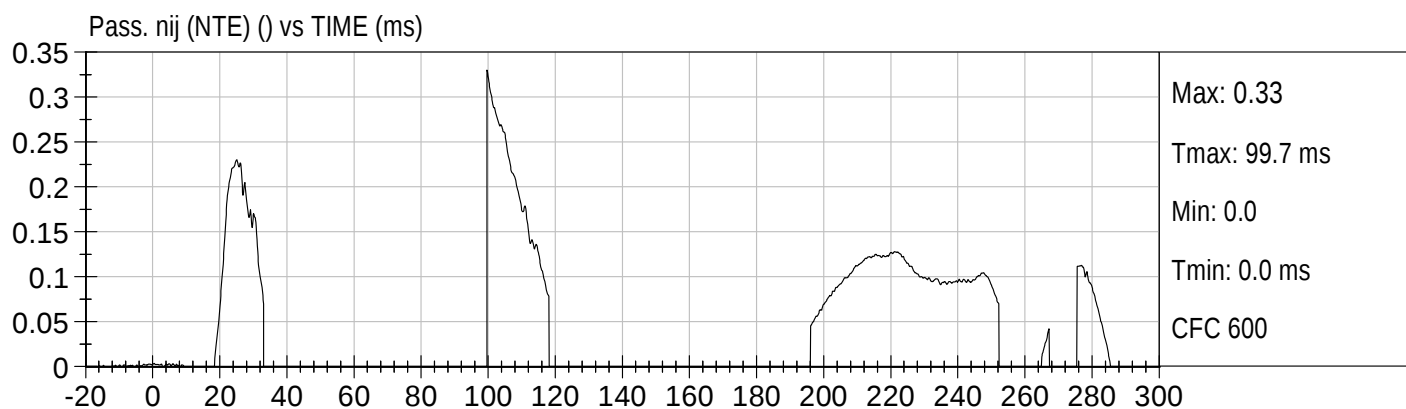
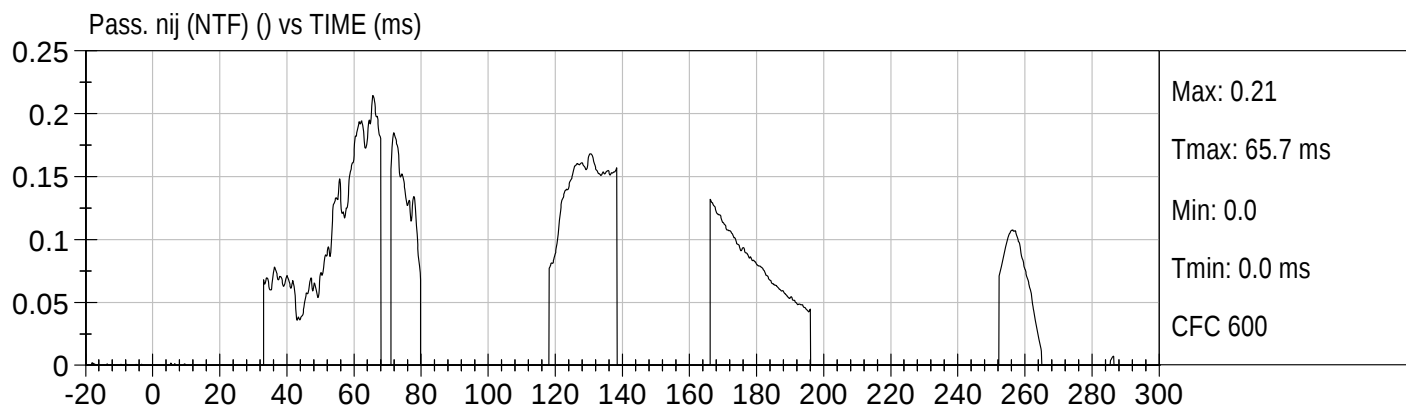


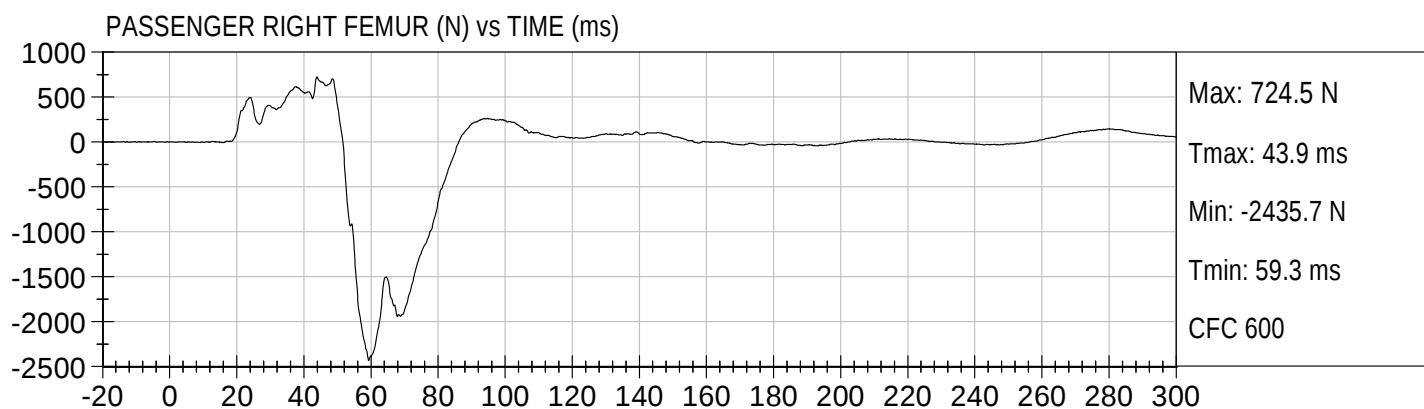
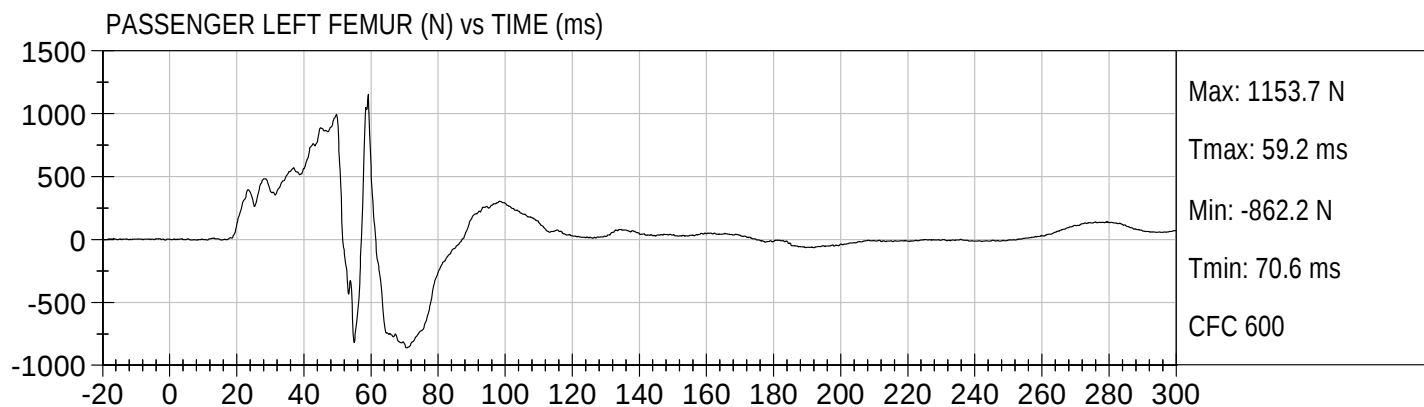












APPENDIX C
DUMMY CALIBRATION DATA

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

ATD Serial No: 036

Test ID: D11641

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	22	Pass
Peak Resultant Acceleration	G's	225 - 275	231	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-11.6	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

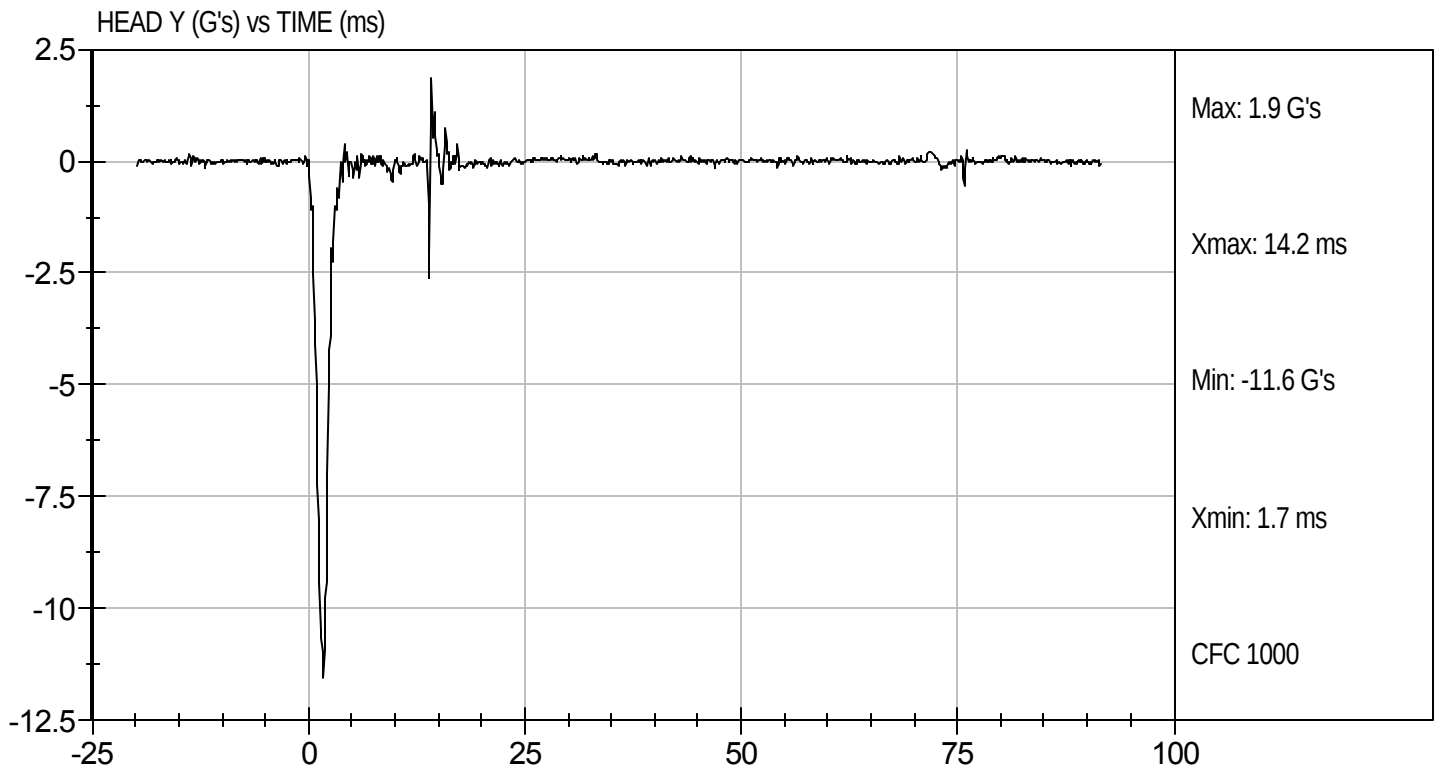
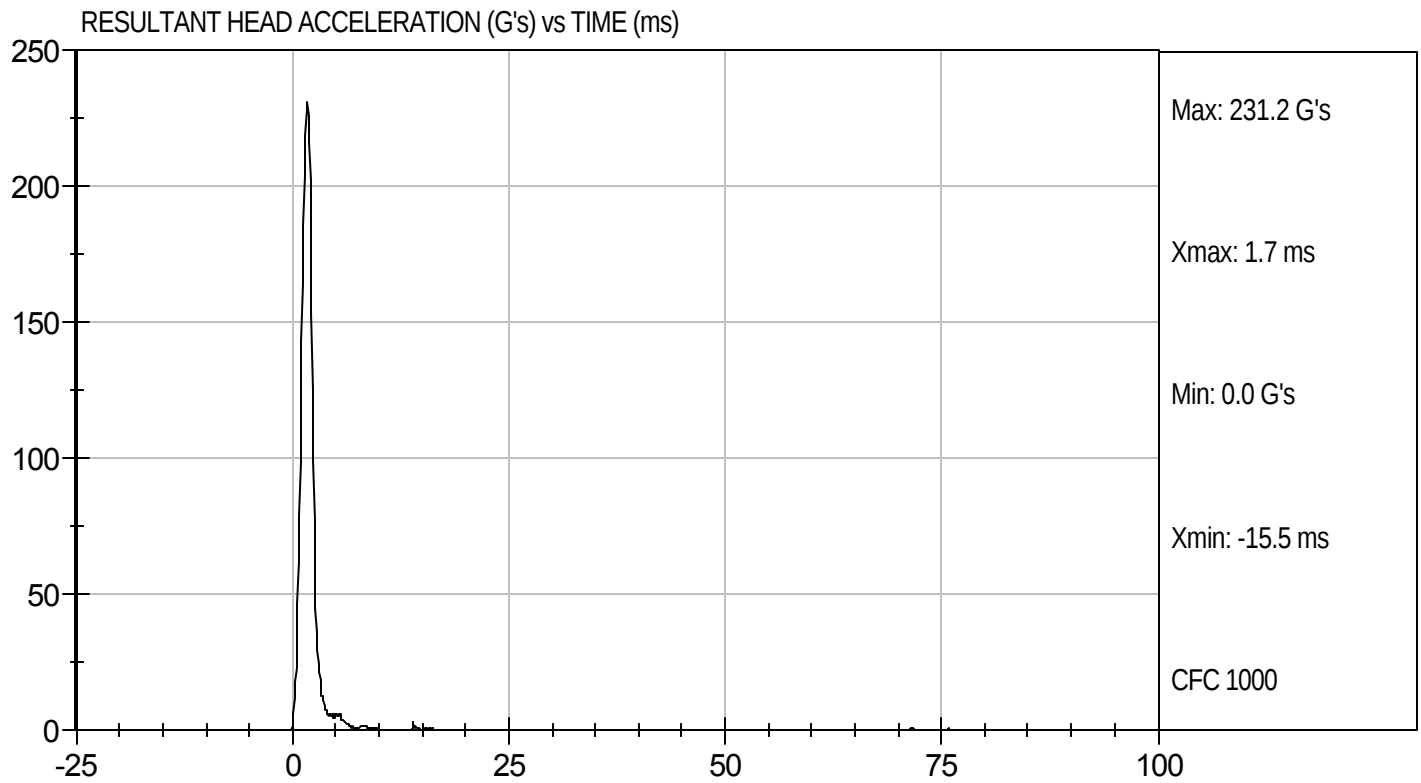
2/22/11
Test Date


Approved By



Test Desc: Head Drop
Component ID: D11641

Test Date: 2/22/11
Velocity: 0 ft/s, 0.00 m/s

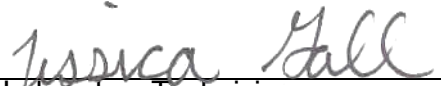


MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036

Test I.D: D11642

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	20.7	Pass
Laboratory Relative Humidity		%	10 to 70	22	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	23.30	Pass
	20 ms	G's	17.60 to 22.60	17.85	Pass
	30 ms	G's	12.50 to 18.50	13.18	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	37.1	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	68.5	Pass
	Time	ms	57.0 to 64.0	57.4	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	119.7	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	94.0	Pass
	Time	ms	47.0 to 58.0	49.5	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	97.0	Pass
Overall Test Results					Pass


Laboratory Technician

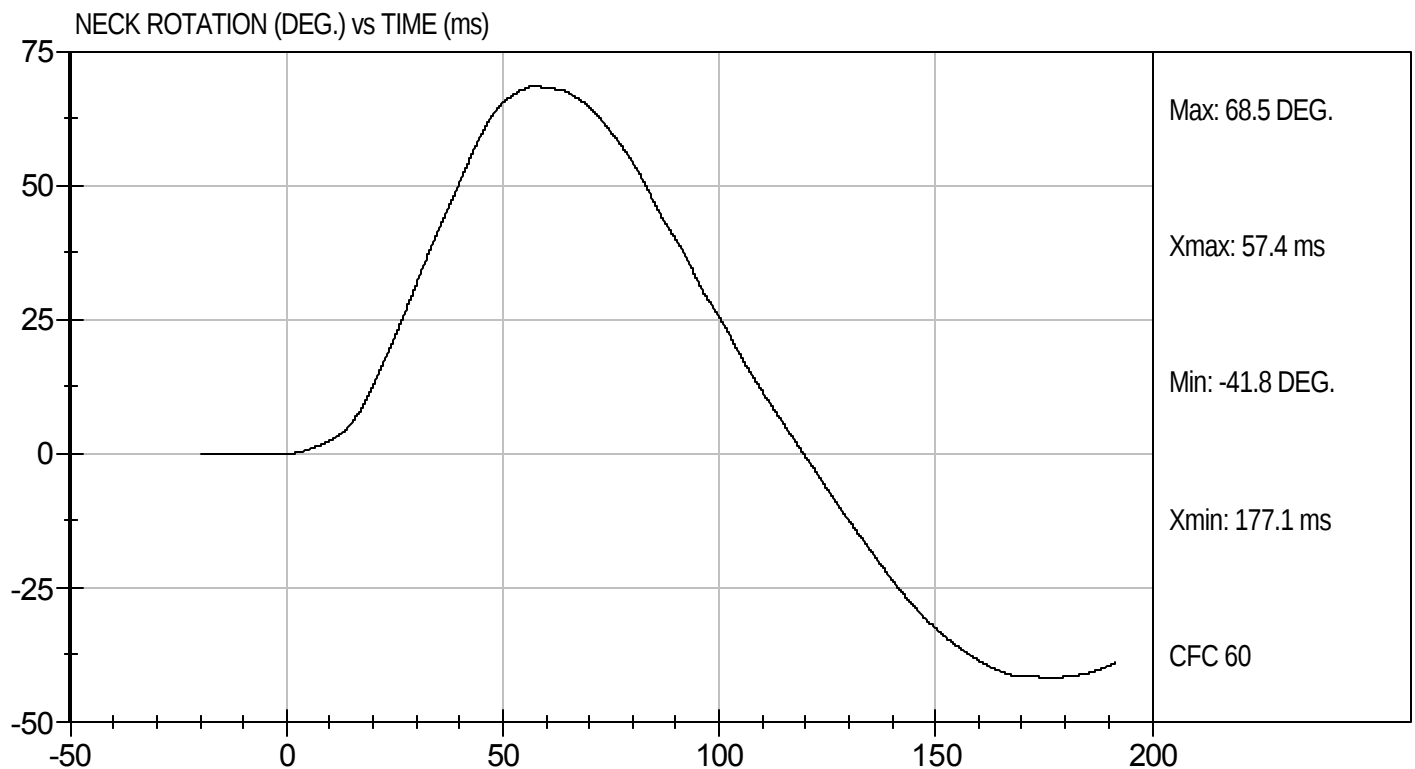
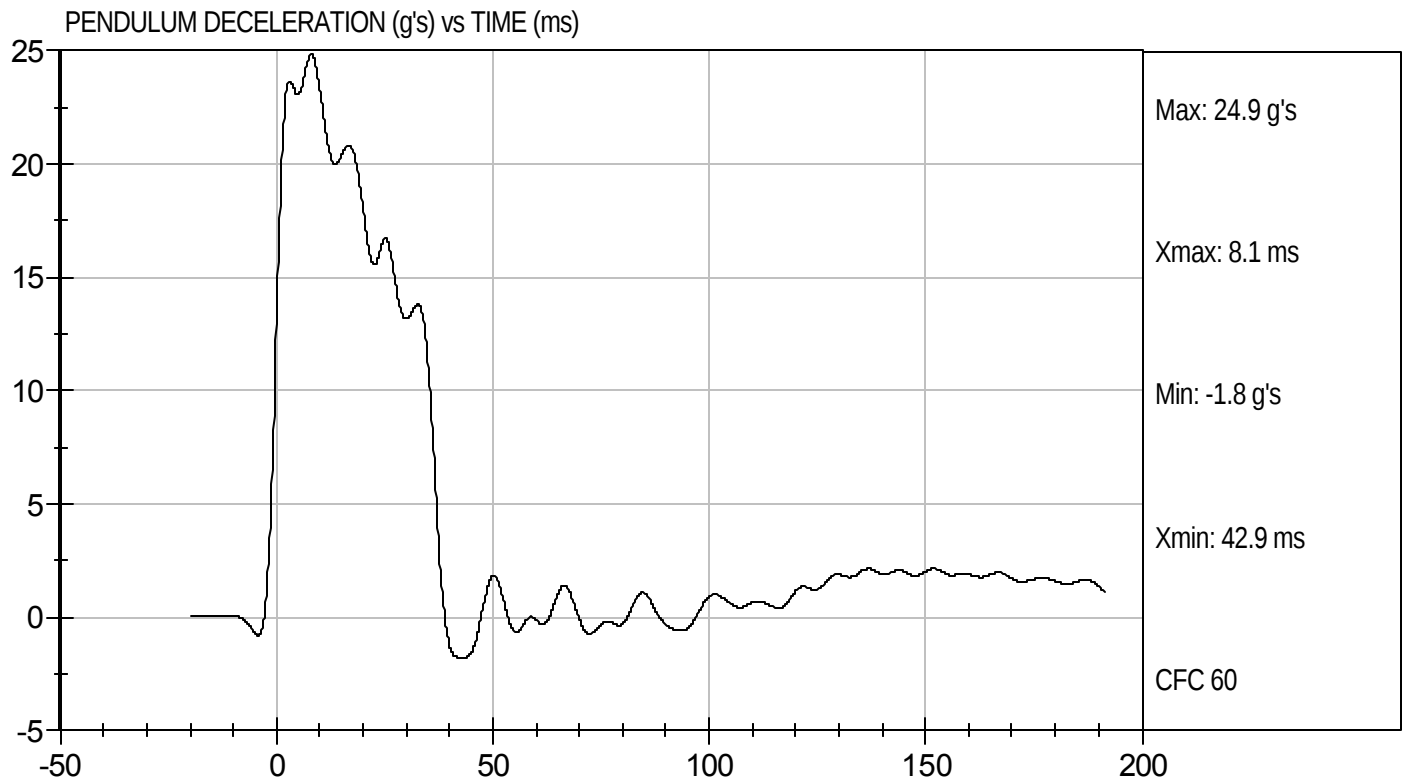
2/23/11
Test Date


Approved By



Test Desc: Neck Flexion
Component ID: D11642

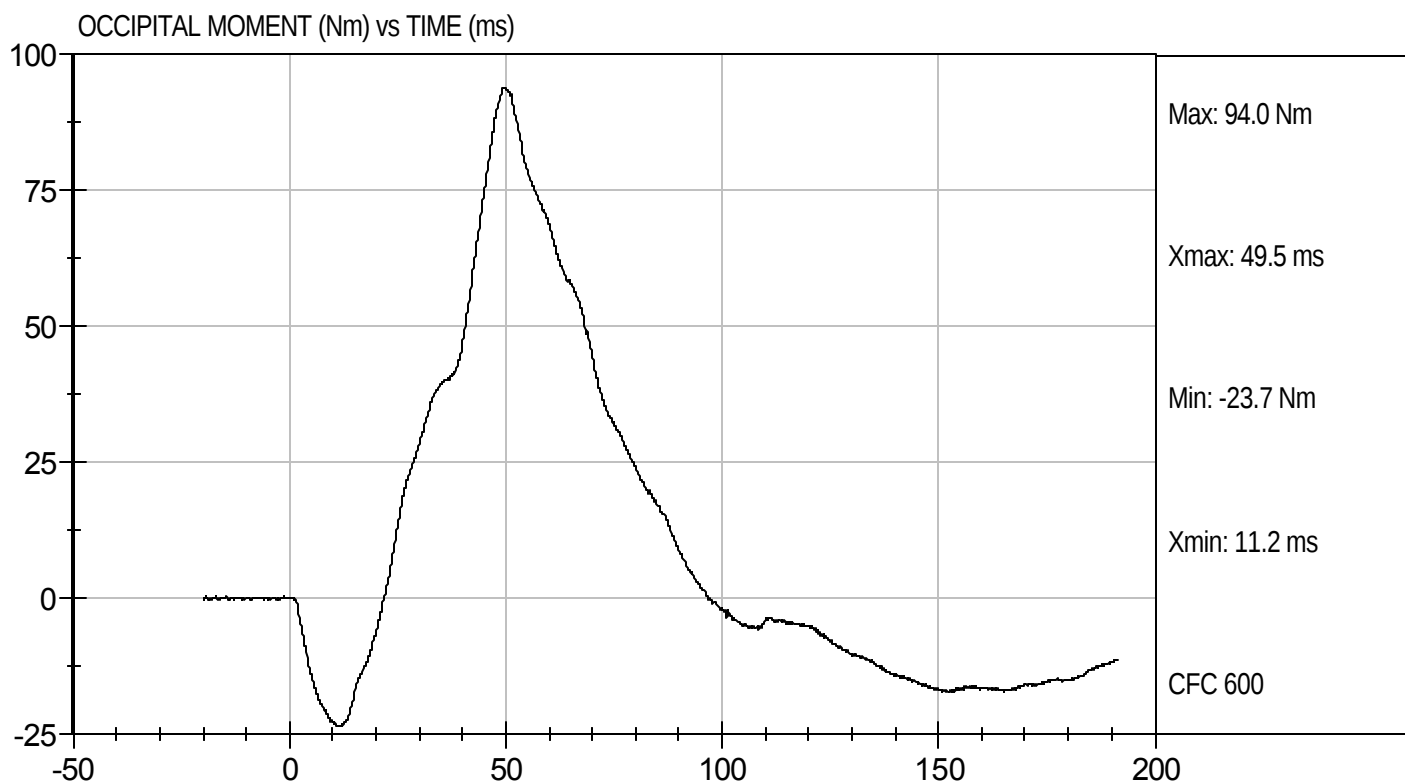
Test Date: 2/23/11
Velocity: 23.15 ft/s, 7.06 m/s





Test Desc: Neck Flexion
Component ID: D11642

Test Date: 2/23/11
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.: D11643

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	20.7	Pass
Laboratory Relative Humidity		%	10 to 70	22	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.16	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	20.39	Pass
	20 ms	G's	14.00 to 19.00	16.43	Pass
	30 ms	G's	11.00 to 16.00	13.31	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	14.82	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	38.3	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	92.1	Pass
	Time	ms	72.0 to 82.0	73.2	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	153.5	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-67.1	Pass
	Time	ms	65.0 to 79.0	67.5	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	138.1	Pass
Overall Test Results					Pass


 Laboratory Technician

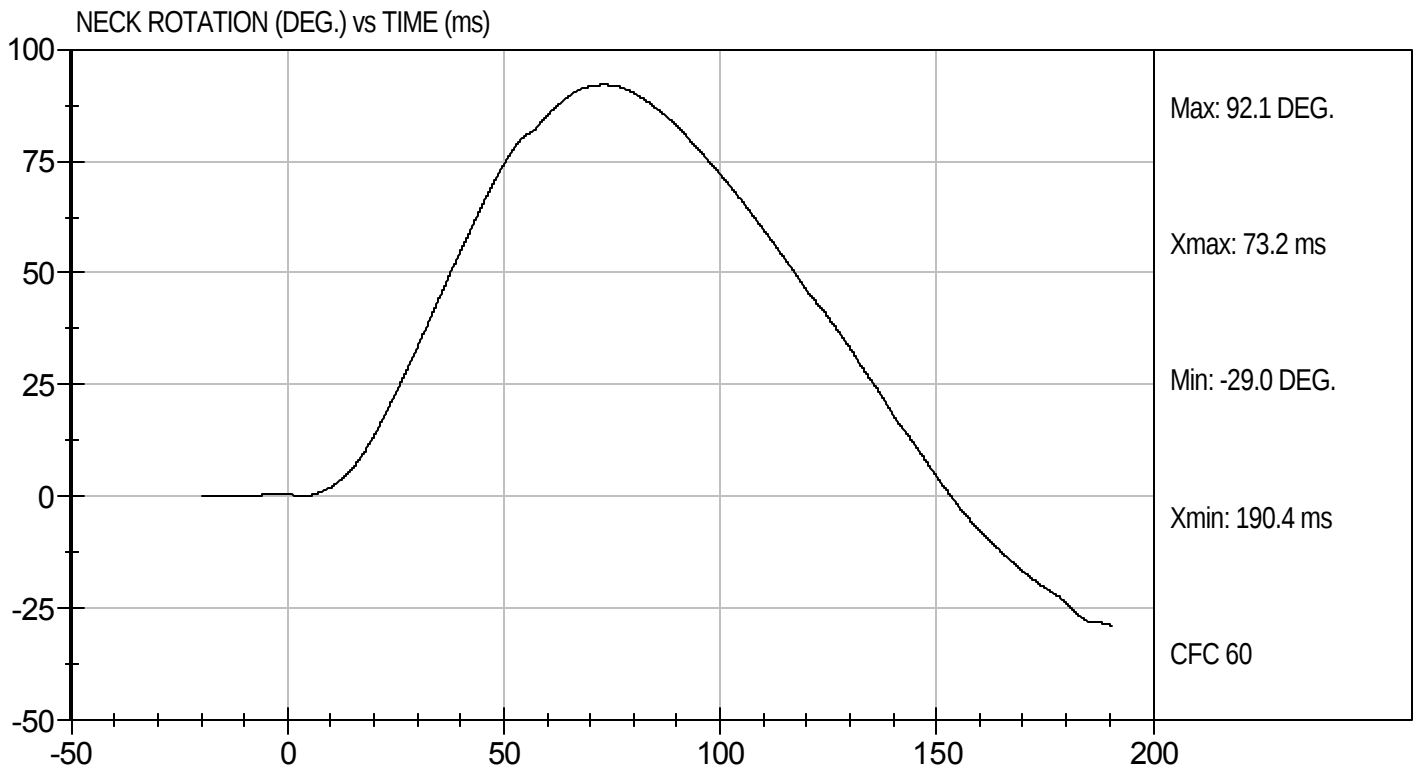
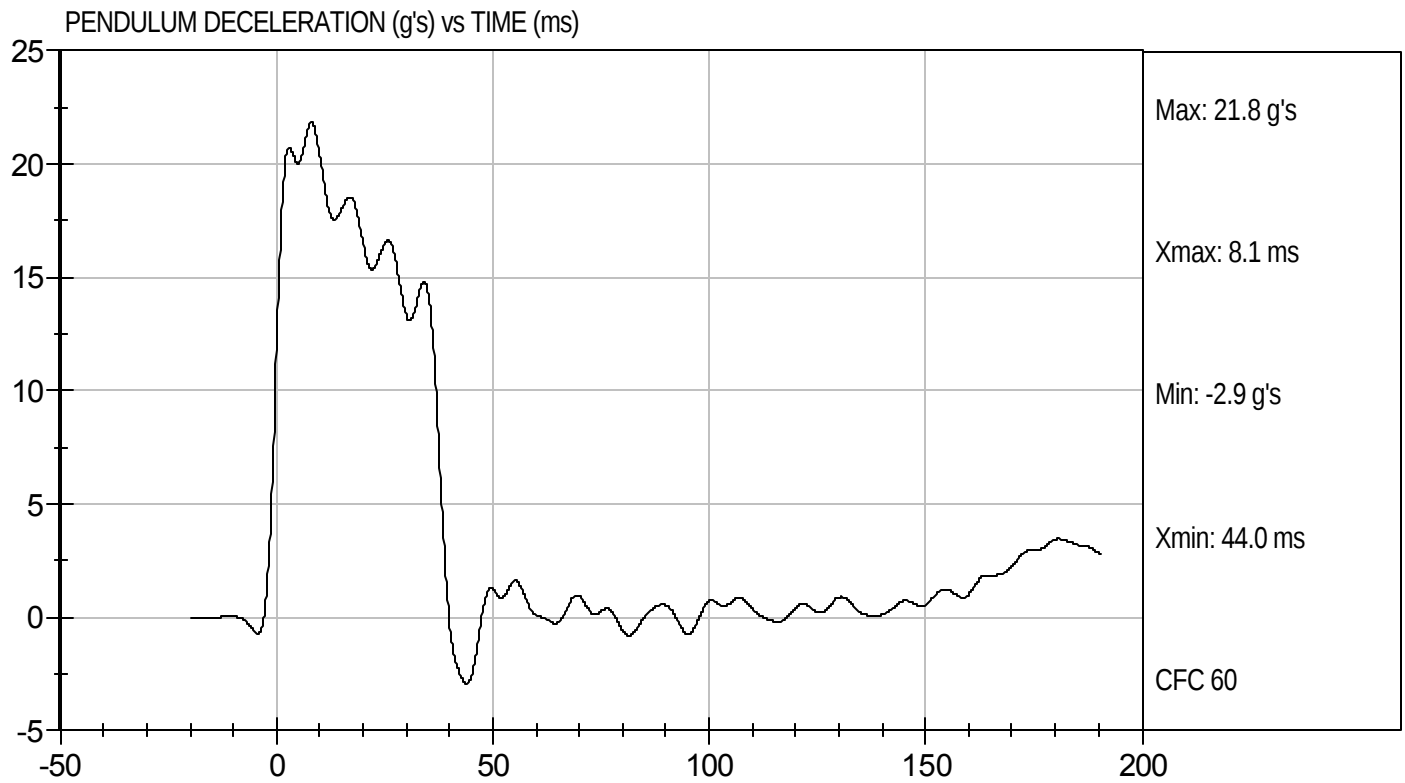
2/23/11
 Test Date


 Approved By



Test Desc: Neck Extension
Component ID: D11643

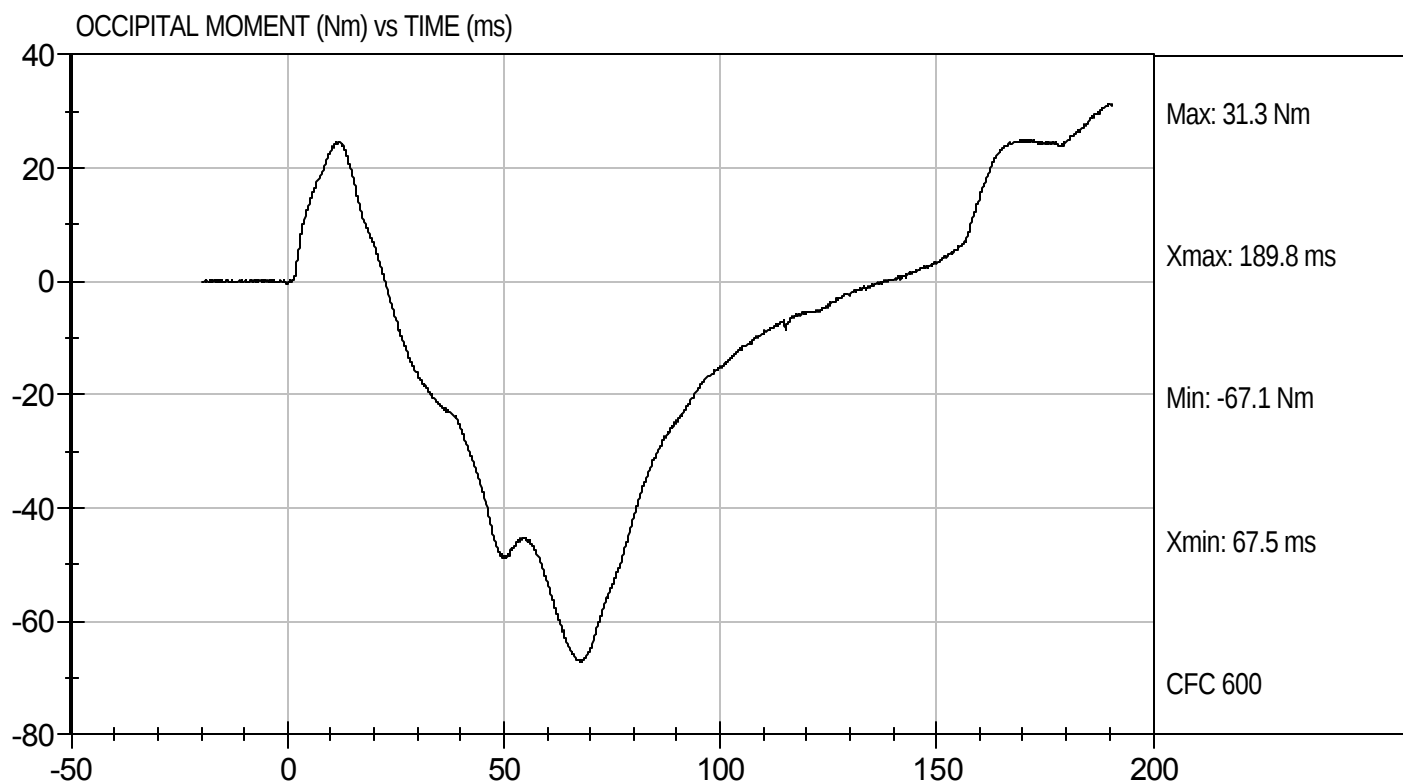
Test Date: 2/23/11
Velocity: 20.20 ft/s, 6.16 m/s





Test Desc: Neck Extension
Component ID: D11643

Test Date: 2/23/11
Velocity: 20.20 ft/s, 6.16 m/s



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036

Test I.D: D11644

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	23	Pass
Probe Velocity	m/s	6.58 to 6.82	6.77	Pass
Peak Probe Force	N	5159 to 5893	5,514	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.40	Pass
Internal Hysteresis	%	69 to 85	73	Pass
Overall Test Results			Pass	


Laboratory Technician

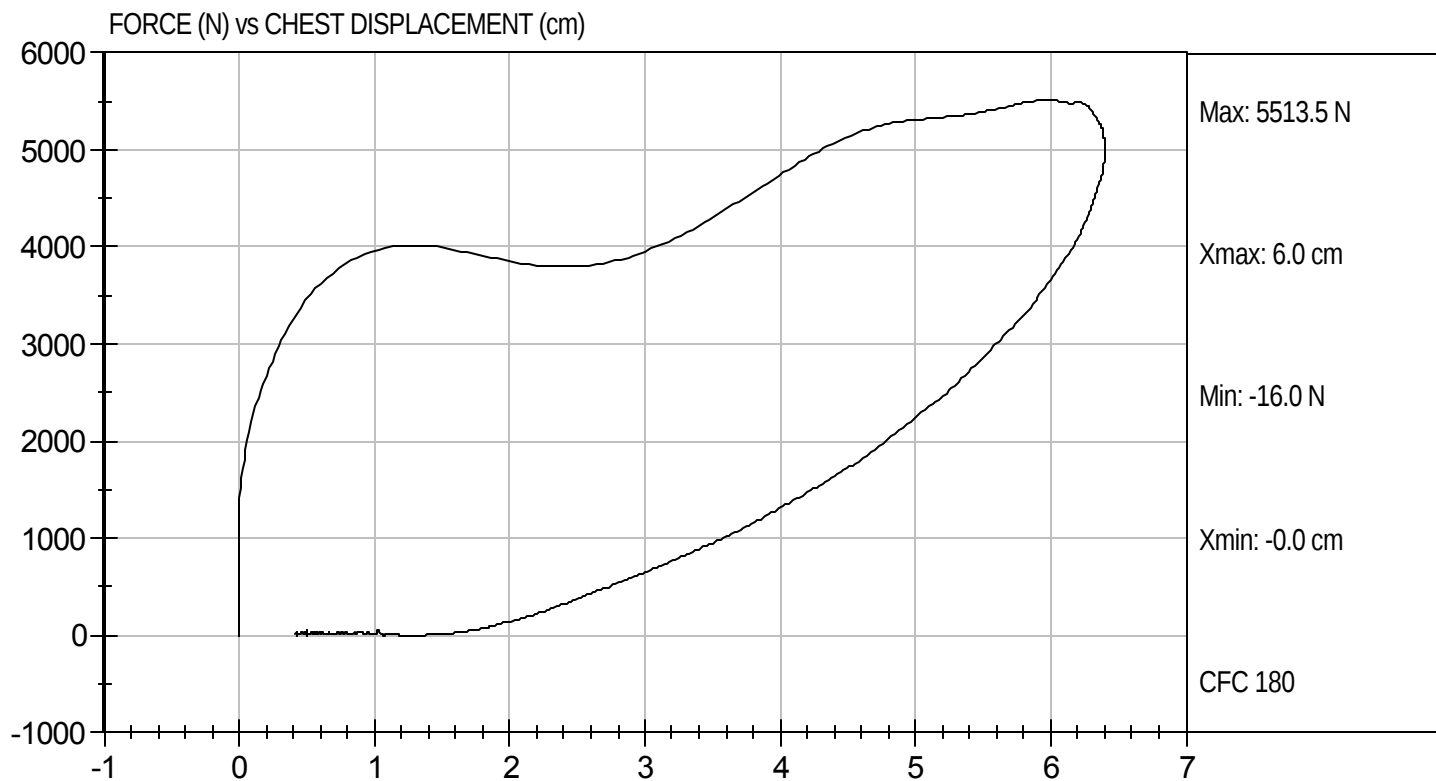
2/23/11
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D11644

Test Date: 2/23/11
Velocity: 22.2 ft/s, 6.77 m/s

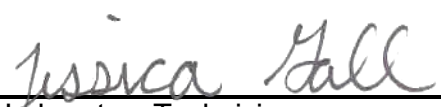


MGA RESEARCH CORPORATION
RIGHT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036

Test I.D: D11645

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	23	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	Newtons	4715 to 5782	5,012	Pass
Overall Test Results				Pass


Laboratory Technician

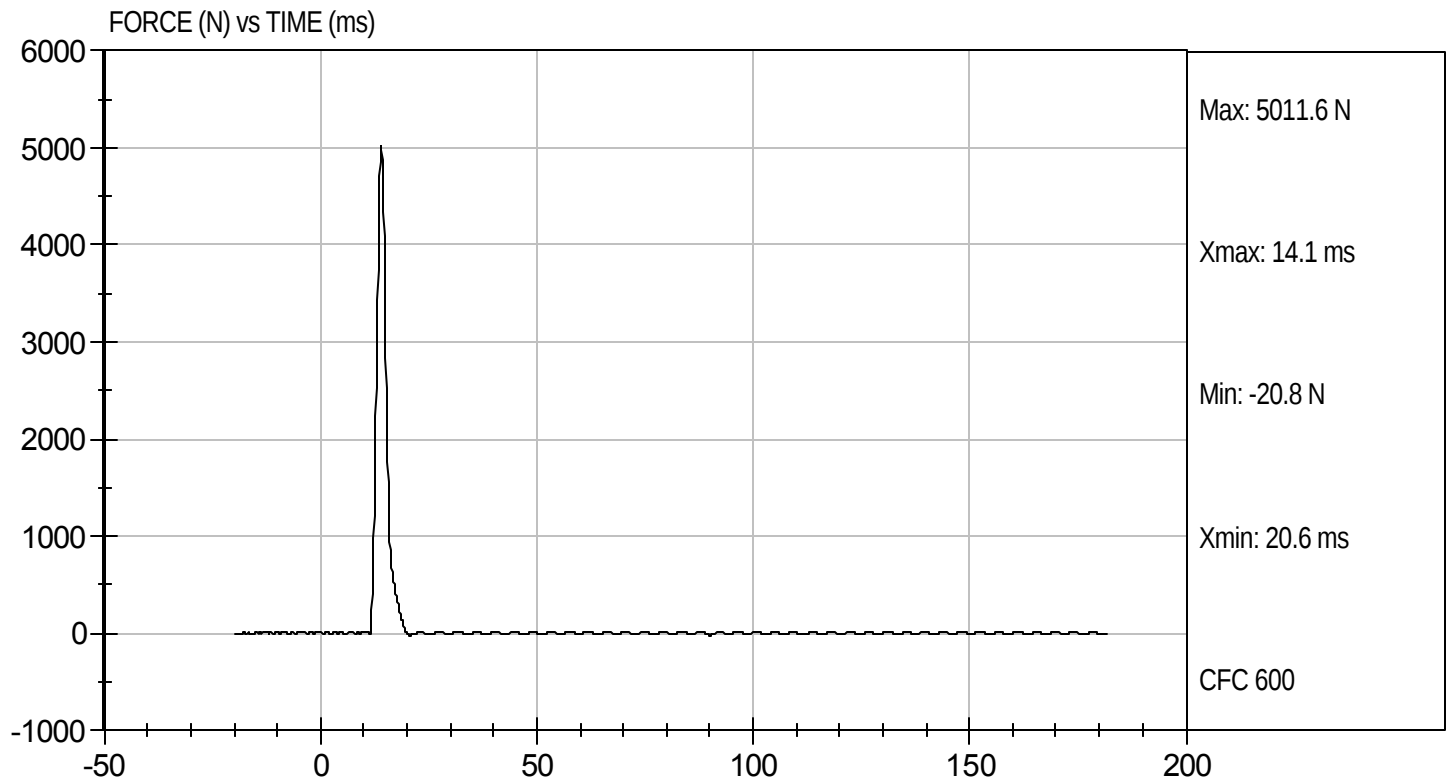
2/22/11
Test Date


Approved By



Test Desc: Right Knee
Component ID: D11645

Test Date: 2/22/11
Velocity: 6.94 ft/s, 2.12 m/s

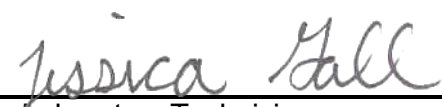


MGA RESEARCH CORPORATION
LEFT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036

Test I.D: D11646

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	23	Pass
Probe Velocity	m/s	2.07 to 2.13	2.11	Pass
Peak Probe Force	Newtons	4715 to 5782	5,640	Pass
Overall Test Results				Pass


Laboratory Technician

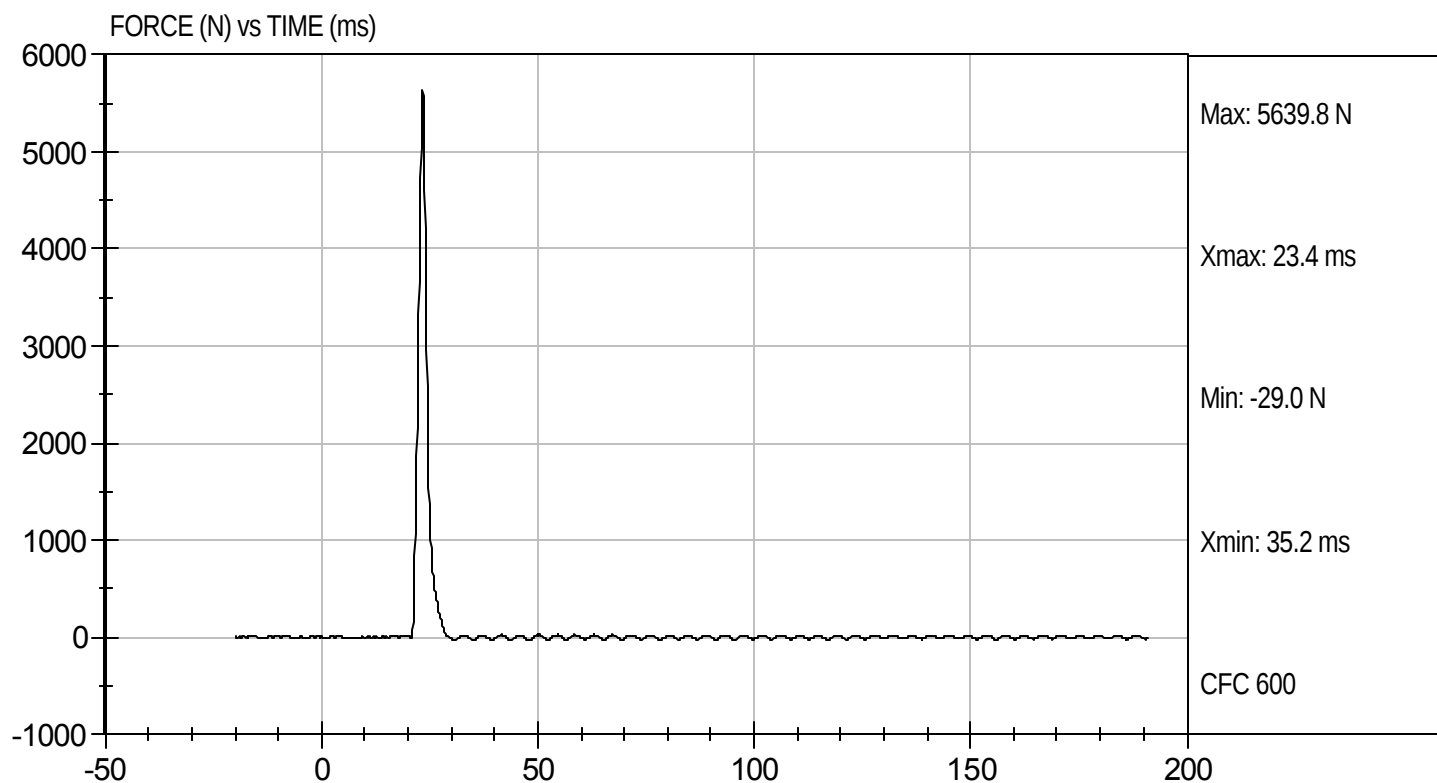
2/22/11
Test Date


Approved By



Test Desc: Left Knee
Component ID: D11646

Test Date: 2/22/11
Velocity: 6.91 ft/s, 2.11 m/s



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

ATD Serial No: 036

Test I.D: D11640

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	20.9	20.9	Pass
Laboratory Relative Humidity	%	10 to 70	21	21	Pass
Rotation Rate	deg/s	5 -10	8	8	Pass
30 Degrees	Nm	94.9 Nm Max	63.5	52.5	Pass
150 ft-lbf / 203.4 Nm	Deg	40- 50 Degree Max Rotation	48	48	Pass
Overall Test Results					Pass


 Laboratory Technician

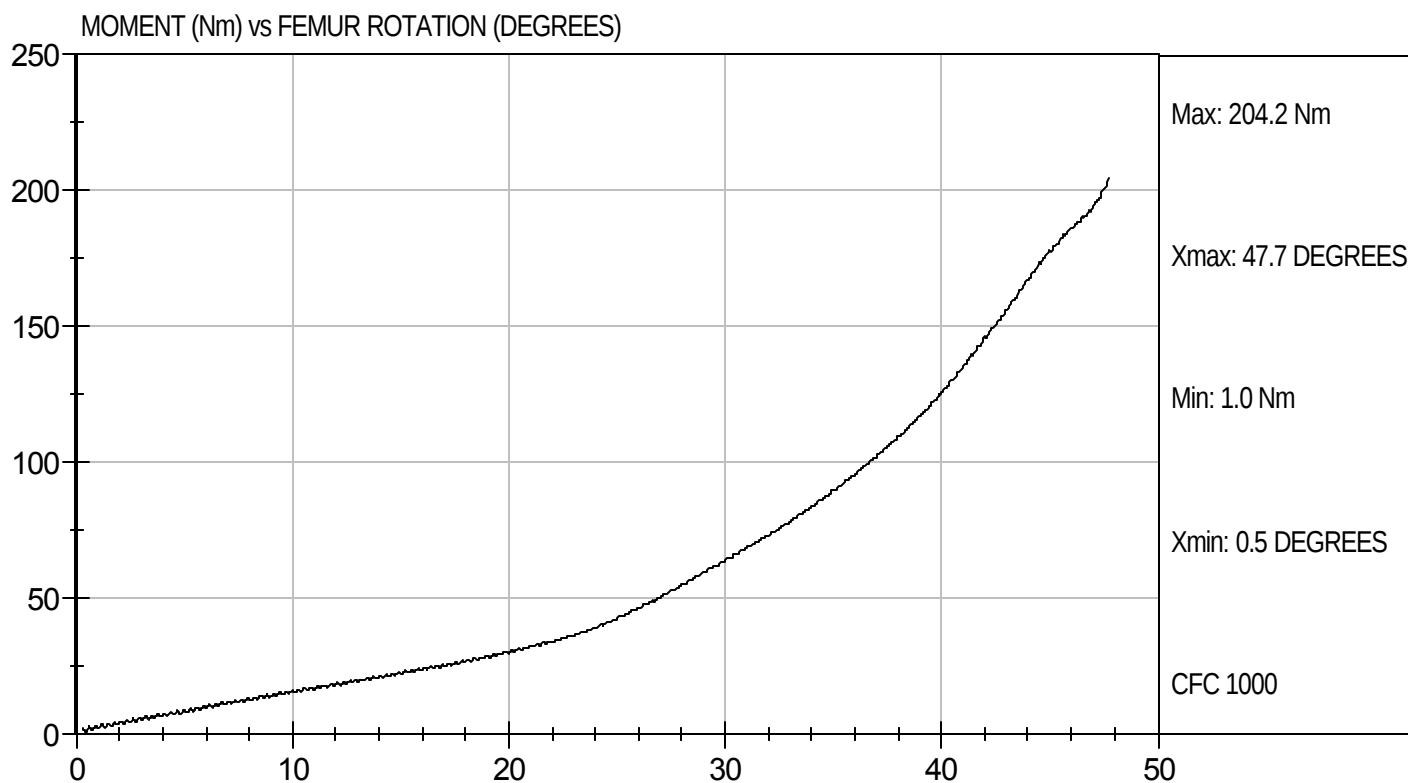
2/22/11
 Test Date


 Approved By



Test Desc: Hip Femur Flexion
Component ID: D11649

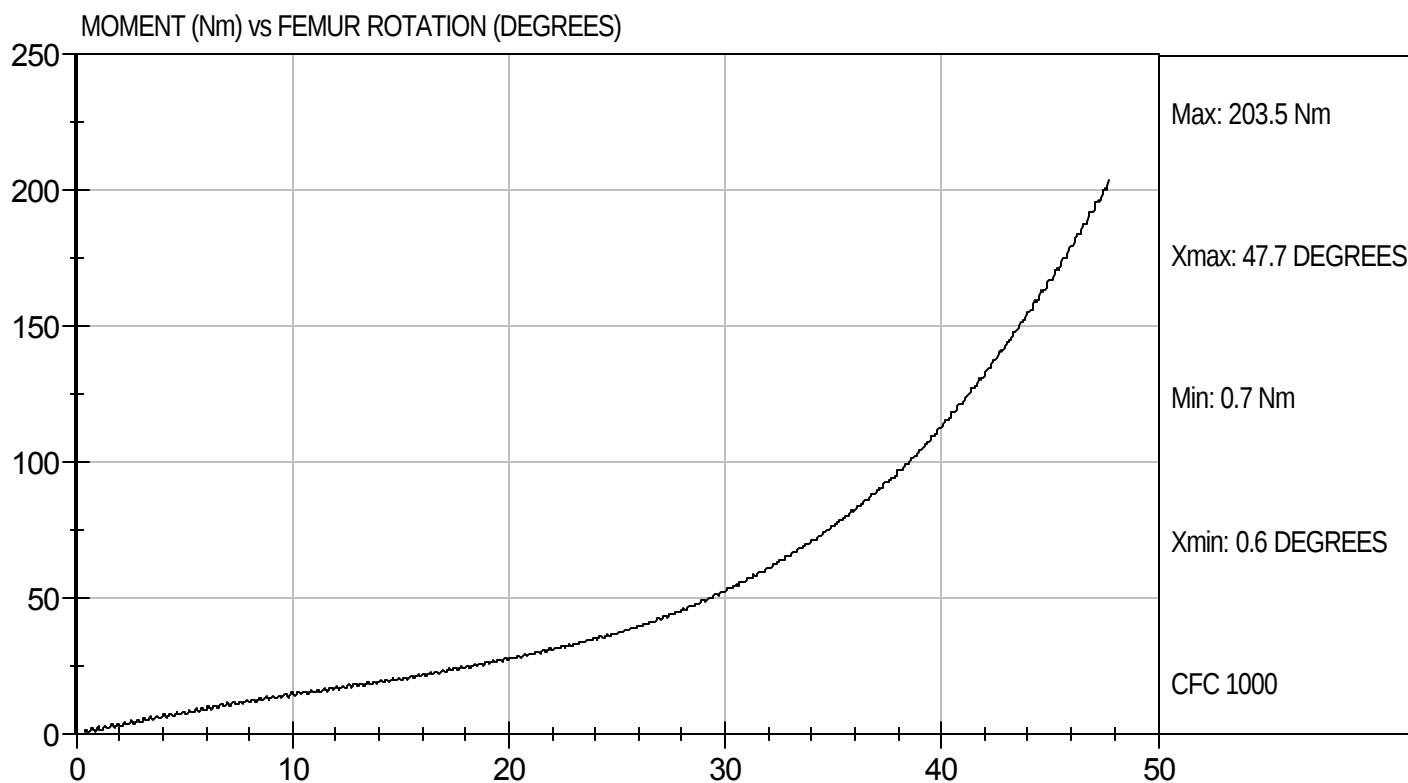
Test Date: 2/22/11
Velocity: 0 ft/s, 0.00 m/s





Test Desc: Hip Femur Flexion
Component ID: D11640

Test Date: 2/22/11
Velocity: 0 ft/s, 0.00 m/s

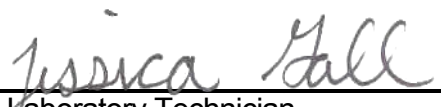


MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036

Test ID: D11801

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	20.6	Pass
Laboratory Relative Humidity	%	10 to 70	17	Pass
Peak Resultant Acceleration	G's	225 - 275	248	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-7.4	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

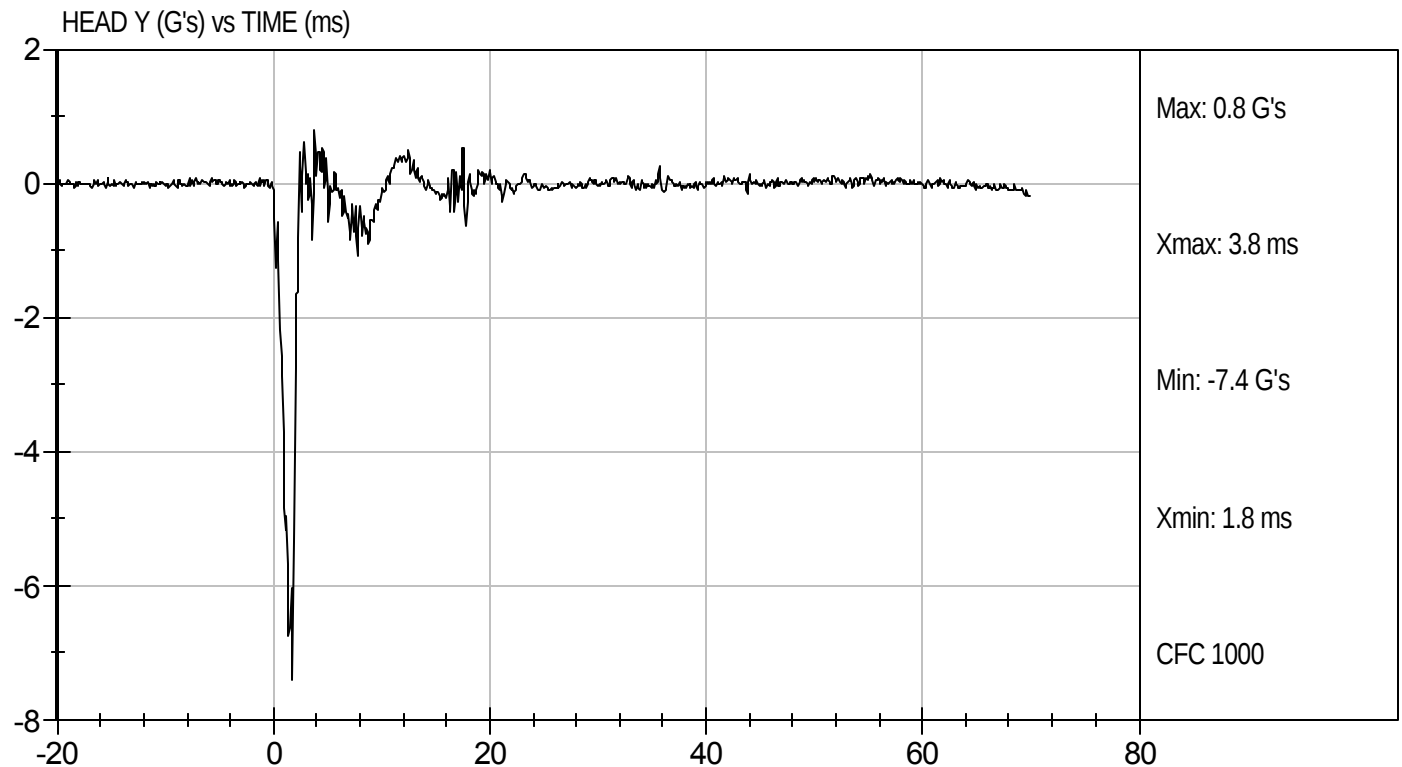
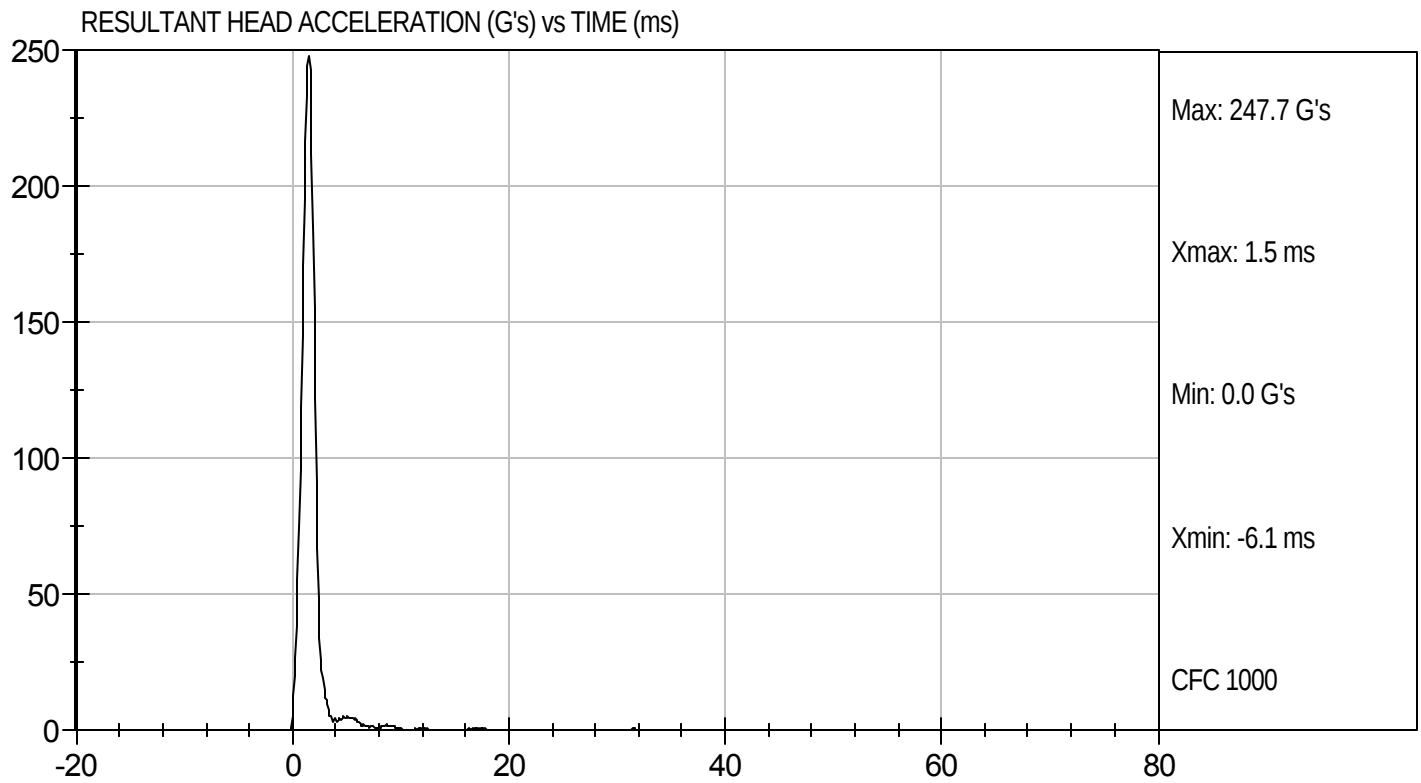
3/2/11
Test Date


Approved By



Test Desc: Head Drop
Component ID: D11801

Test Date: 3/2/11
Velocity: 0 ft/s, 0.00 m/s

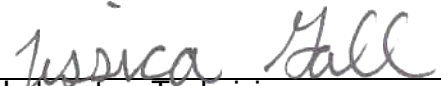


MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036

Test I.D.: D11802

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	15	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	25.85	Pass
	20 ms	G's	17.60 to 22.60	19.39	Pass
	30 ms	G's	12.50 to 18.50	14.55	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	14.5	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	34.9	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	72.2	Pass
	Time	ms	57.0 to 64.0	57.0	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	117.1	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	93.1	Pass
	Time	ms	47.0 to 58.0	47.5	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	97.7	Pass
Overall Test Results					Pass


 Laboratory Technician

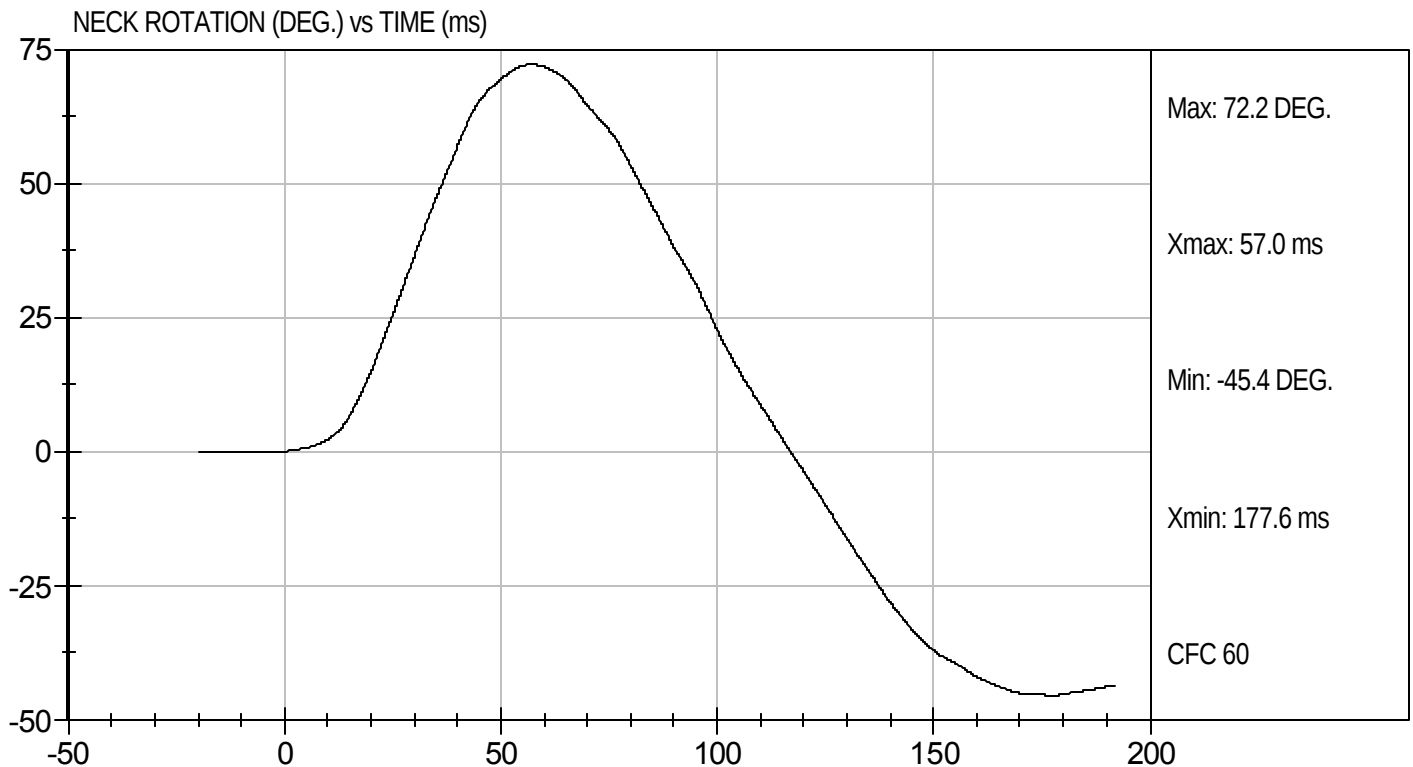
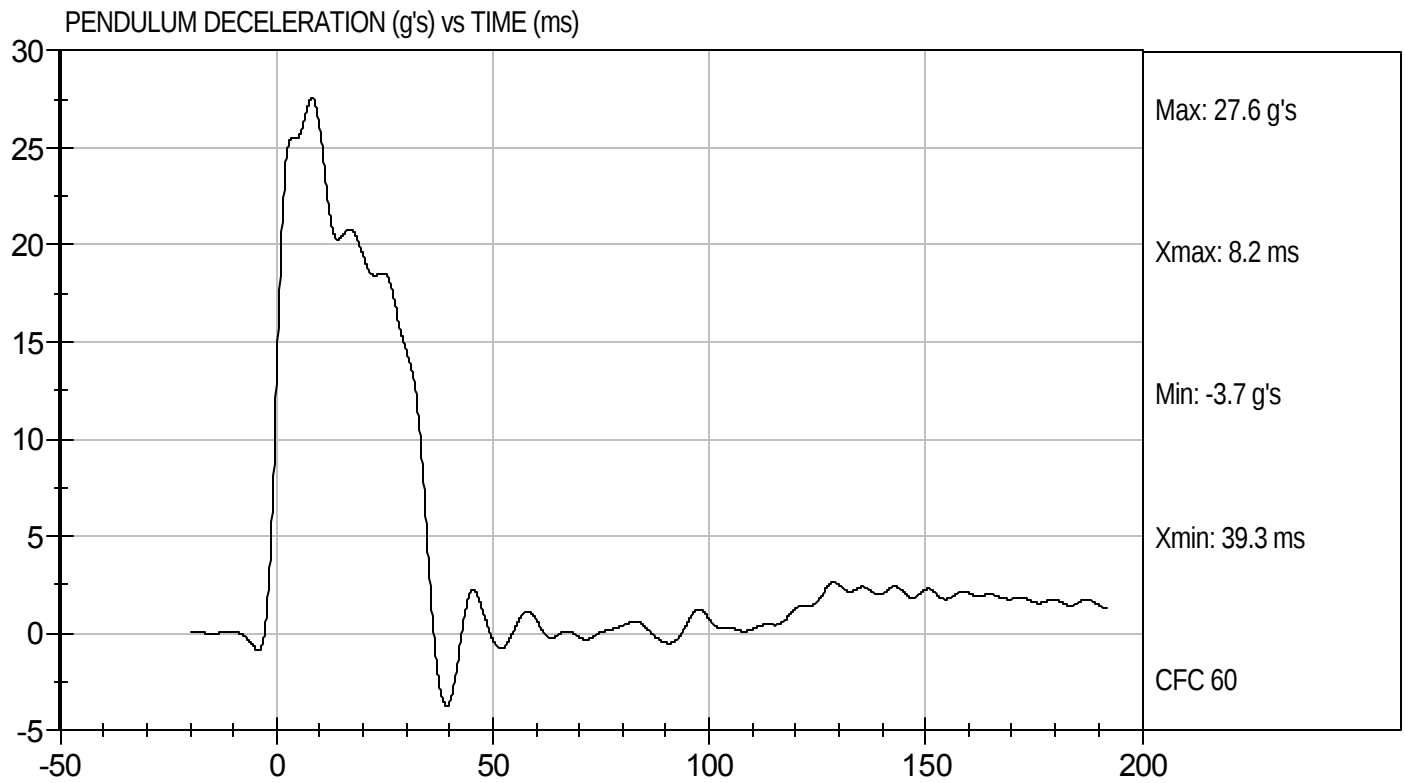
3/2/11
 Test Date


 Approved By



Test Desc: Neck Flexion
Component ID: D11802

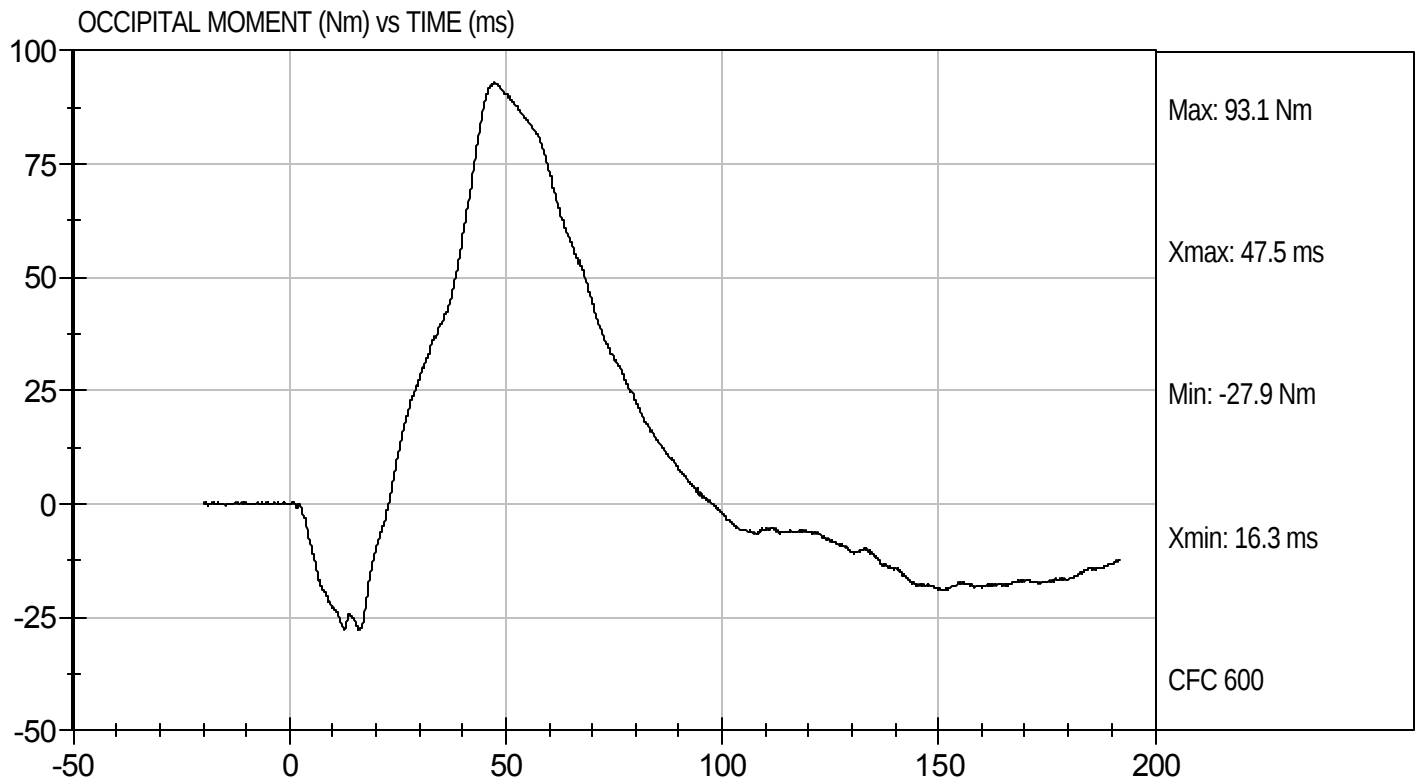
Test Date: 3/2/11
Velocity: 23.15 ft/s, 7.06 m/s





Test Desc: Neck Flexion
Component ID: D11802

Test Date: 3/2/11
Velocity: 23.15 ft/s, 7.06 m/s

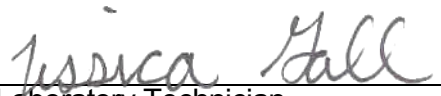


MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 50TH PERCENTILE MALE

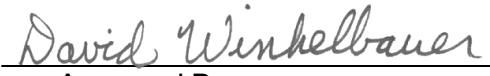
ATD Serial No: 036

Test I.D.: D11803

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	19	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.16	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	19.78	Pass
	20 ms	G's	14.00 to 19.00	17.76	Pass
	30 ms	G's	11.00 to 16.00	13.61	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	13.5	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	38.2	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	95.3	Pass
	Time	ms	72.0 to 82.0	74.5	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	156.5	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-68.1	Pass
	Time	ms	65.0 to 79.0	69.3	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	141.6	Pass
Overall Test Results					Pass


 Laboratory Technician

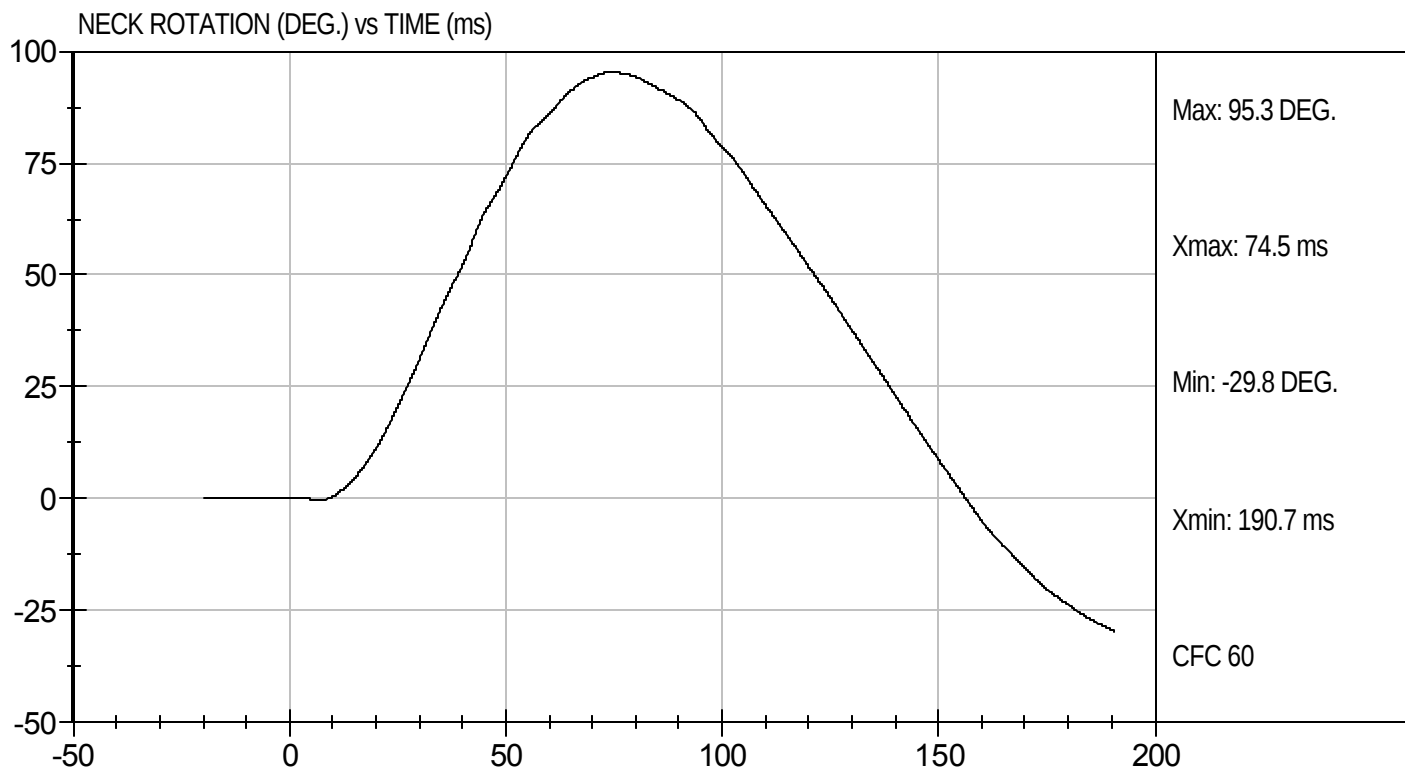
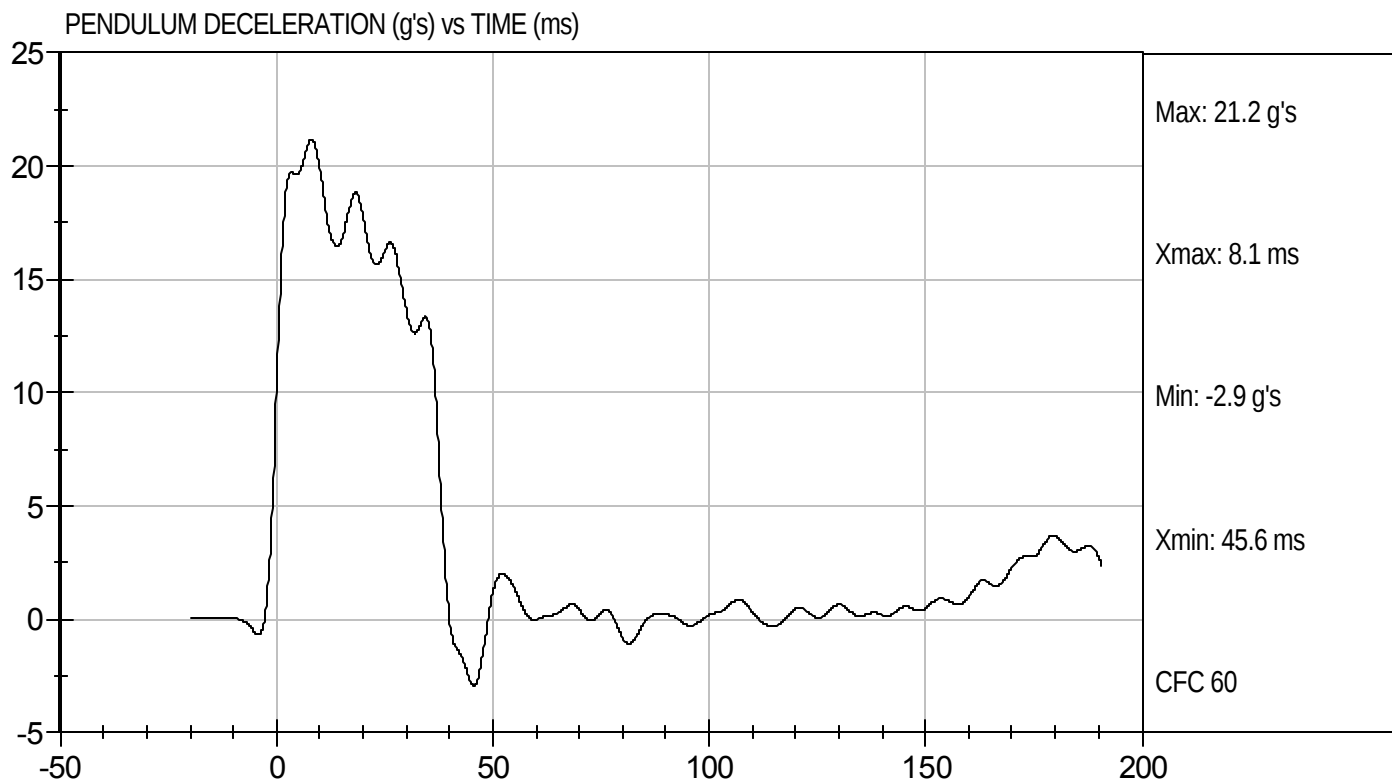
3/2/11
 Test Date


 Approved By



Test Desc: Neck Extension
Component ID: D11803

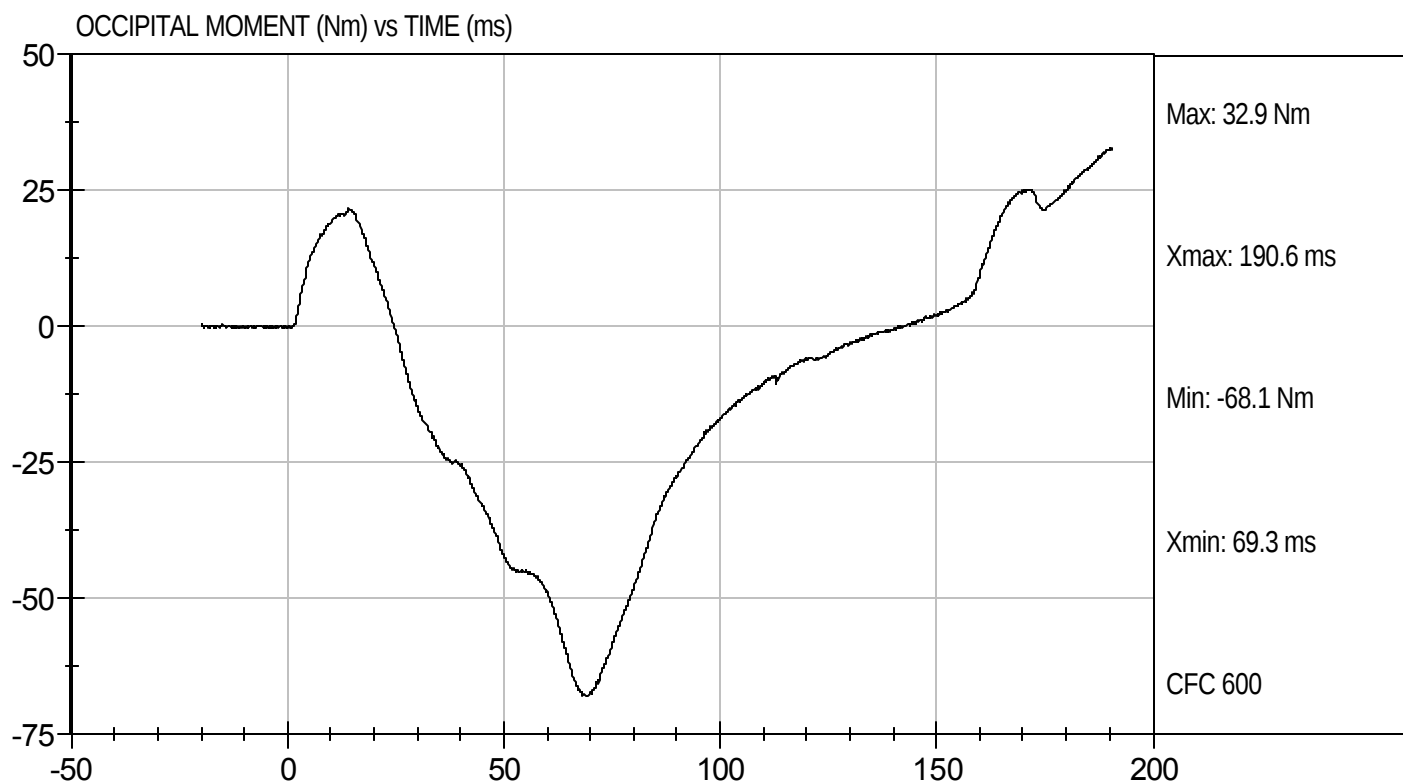
Test Date: 3/2/11
Velocity: 20.20 ft/s, 6.16 m/s





Test Desc: Neck Extension
Component ID: D11803

Test Date: 3/2/11
Velocity: 20.20 ft/s, 6.16 m/s



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036

Test I.D: D11804

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	17	Pass
Probe Velocity	m/s	6.58 to 6.82	6.68	Pass
Peak Probe Force	N	5159 to 5893	5,283	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	7.20	Pass
Internal Hysteresis	%	69 to 85	69	Pass
Overall Test Results			Pass	


Laboratory Technician

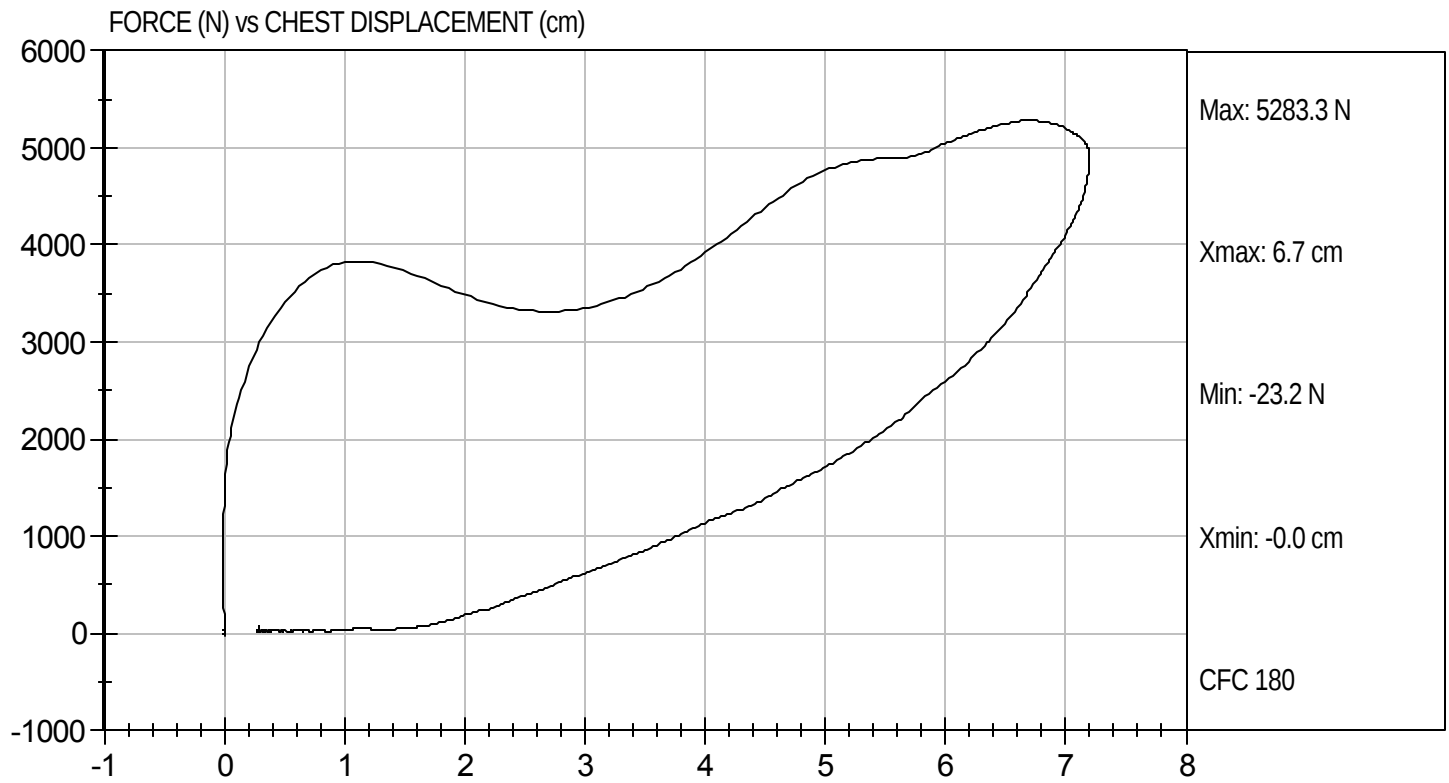
3/2/11
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D11804

Test Date: 3/2/11
Velocity: 21.9 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: D11805

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	19	Pass
Probe Velocity	m/s	2.07 to 2.13	2.10	Pass
Peak Probe Force	Newtons	4715 to 5782	4,917	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

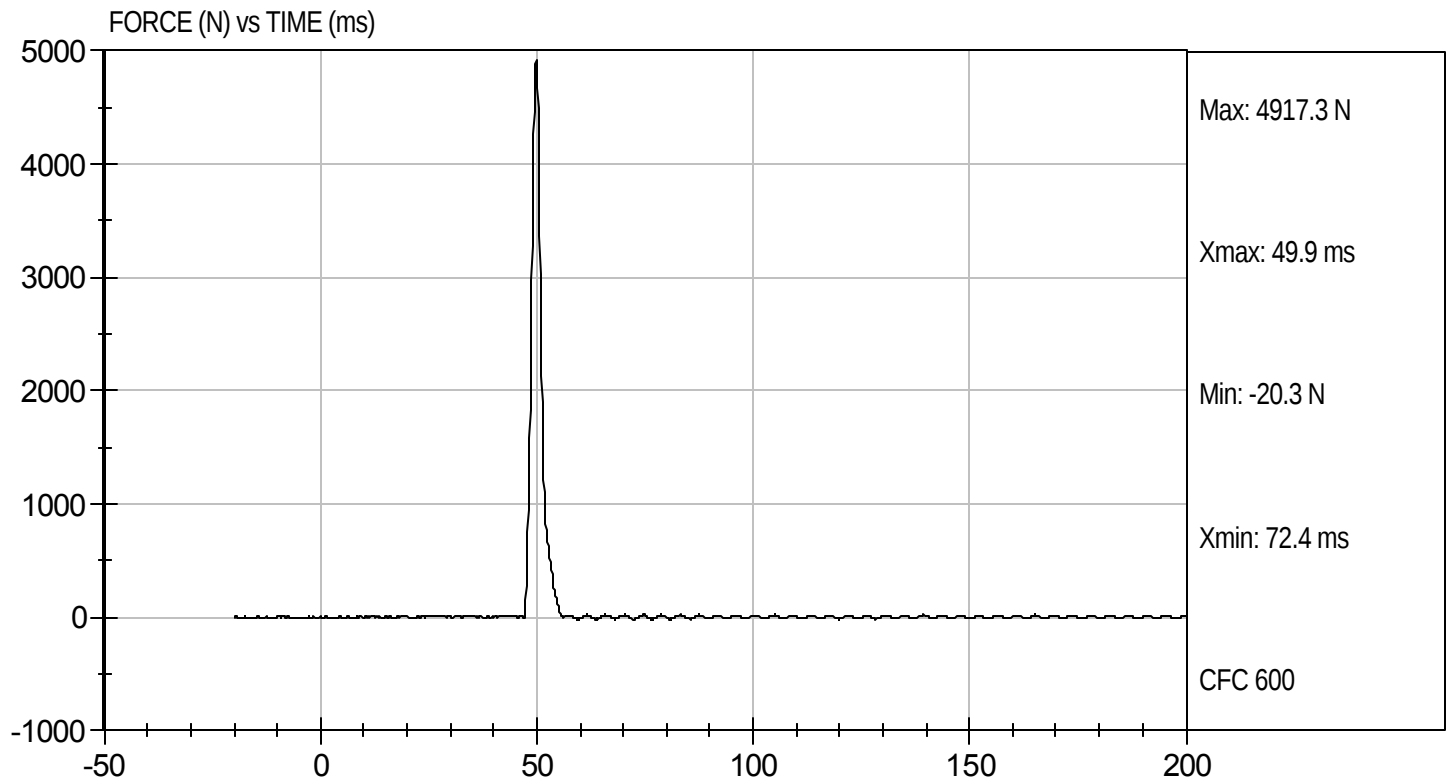
3/3/11
Test Date

David Winkelbauer
Approved By



Test Desc: Right Knee
Component ID: D11805

Test Date: 3/3/11
Velocity: 6.9 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: D11806

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	19	Pass
Probe Velocity	m/s	2.07 to 2.13	2.13	Pass
Peak Probe Force	Newtons	4715 to 5782	5,309	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

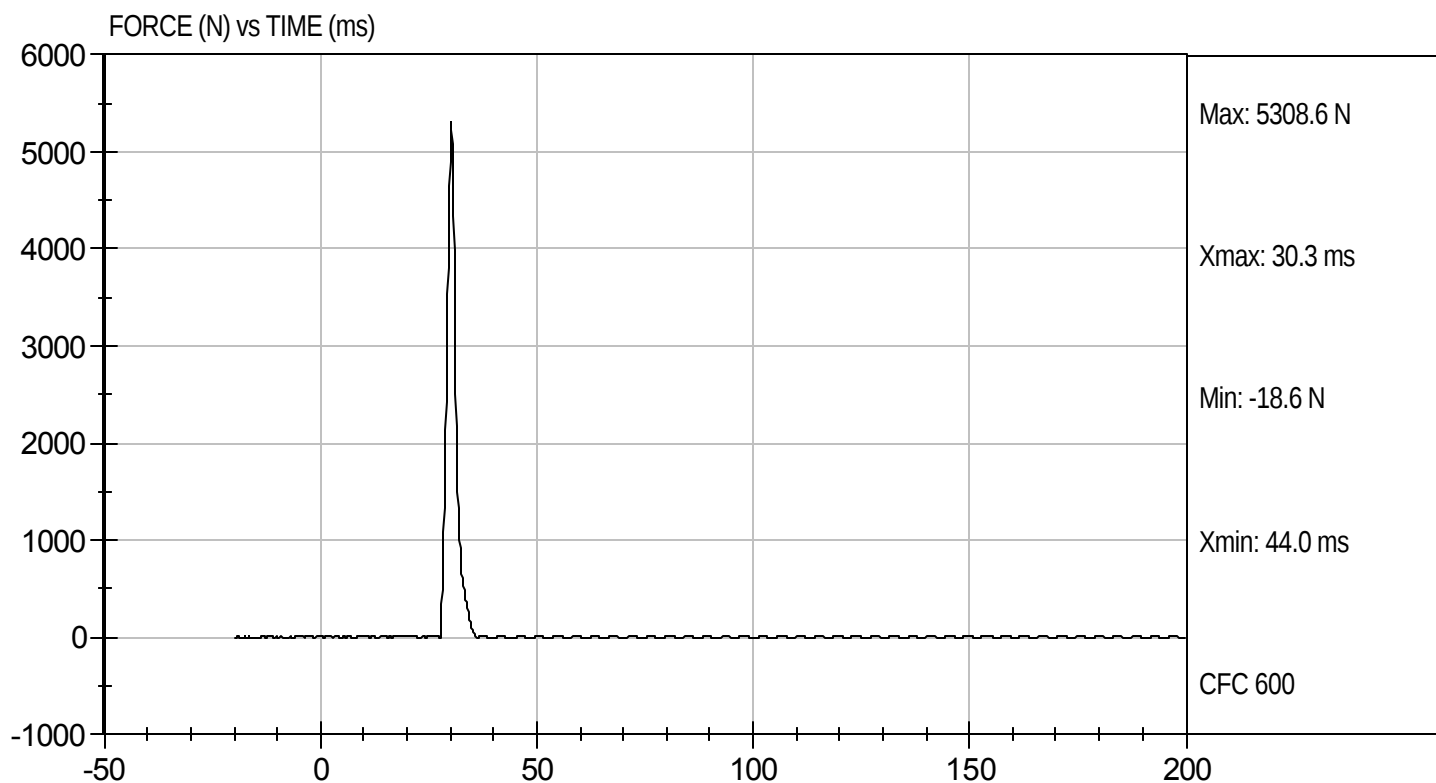
3/3/11
Test Date

David Winkelbauer
Approved By



Test Desc: Left Knee
Component ID: D11806

Test Date: 3/3/11
Velocity: 6.99 ft/s, 2.13 m/s



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

ATD Serial No: 036

Test I.D: D11800

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	15	15	Pass
Rotation Rate	deg/s	5 -10	8	8	Pass
30 Degrees	Nm	94.9 Nm Max	59.4	53.3	Pass
150 ft-lbf / 203.4 Nm	Deg	40- 50 Degree Max Rotation	48	48	Pass
Overall Test Results					Pass

Jessica Hall
Laboratory Technician

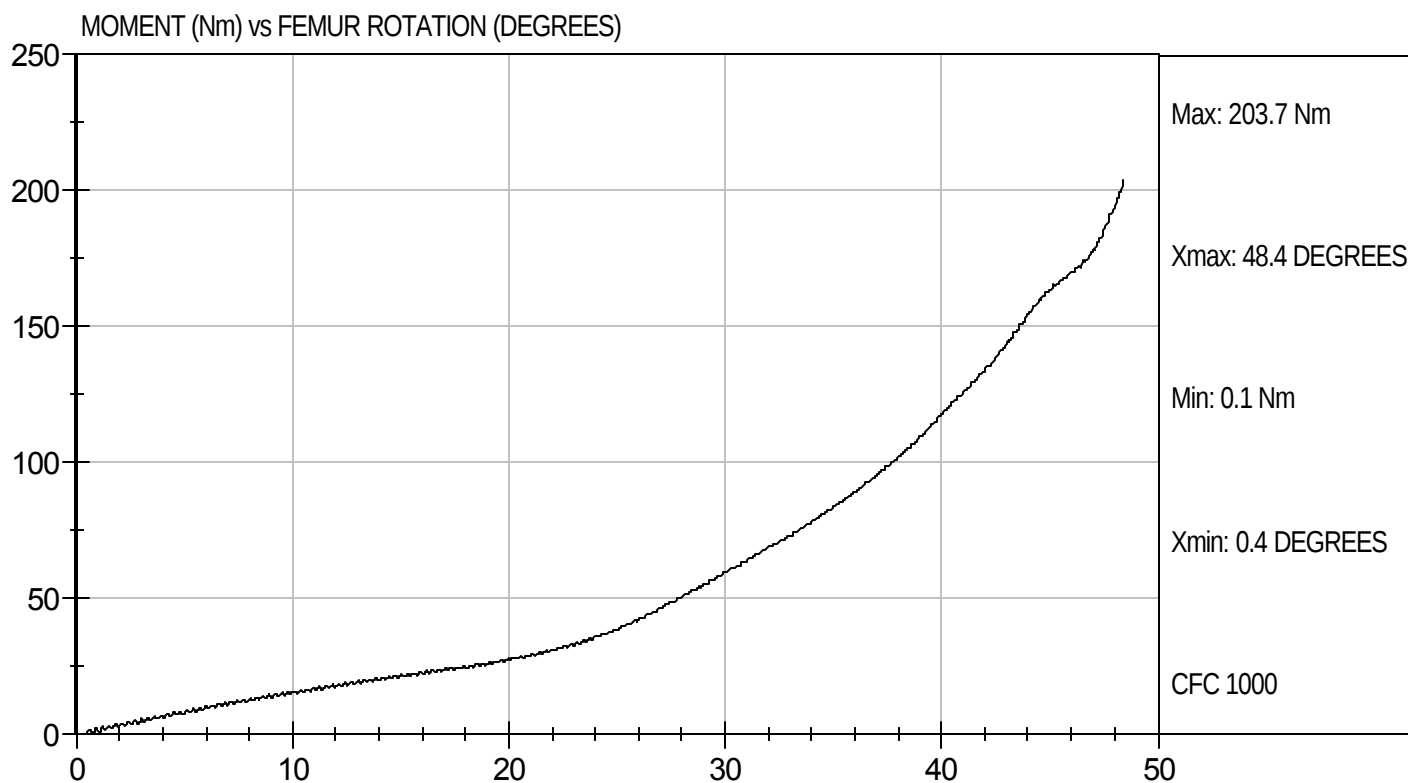
3/2/11
Test Date

David Winkelbauer
Approved By



Test Desc: Hip Femur Flexion
Component ID: D11809

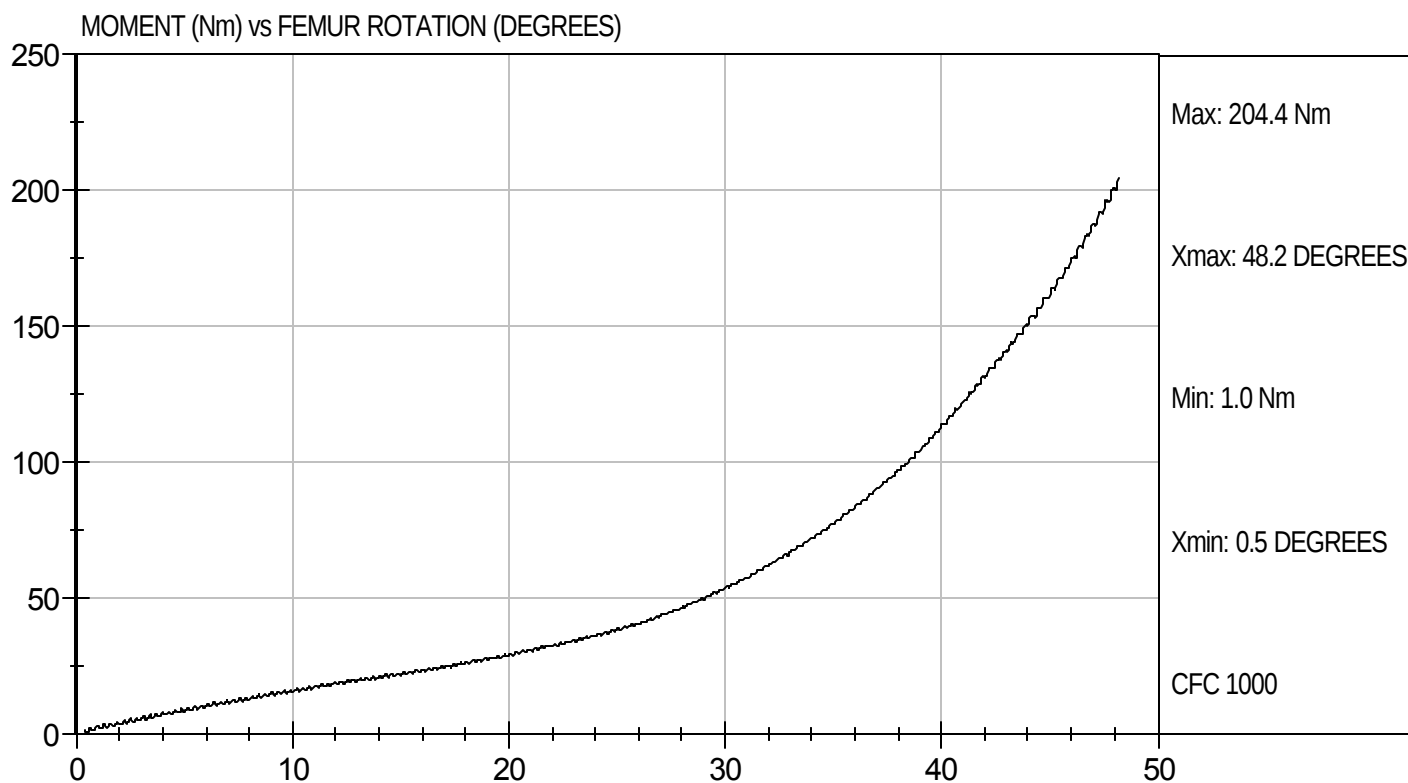
Test Date: 3/2/11
Velocity: 0 ft/s, 0.00 m/s





Test Desc: Hip Femur Flexion
Component ID: D11800

Test Date: 3/2/11
Velocity: 0 ft/s, 0.00 m/s

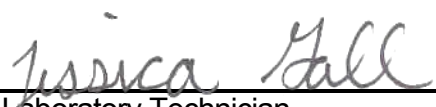


MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test ID: D11031

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	21	Pass
Peak Resultant Acceleration	G's	250 to 300	252	Pass
Peak Lateral Acceleration	G's	+/- 15	4.6	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

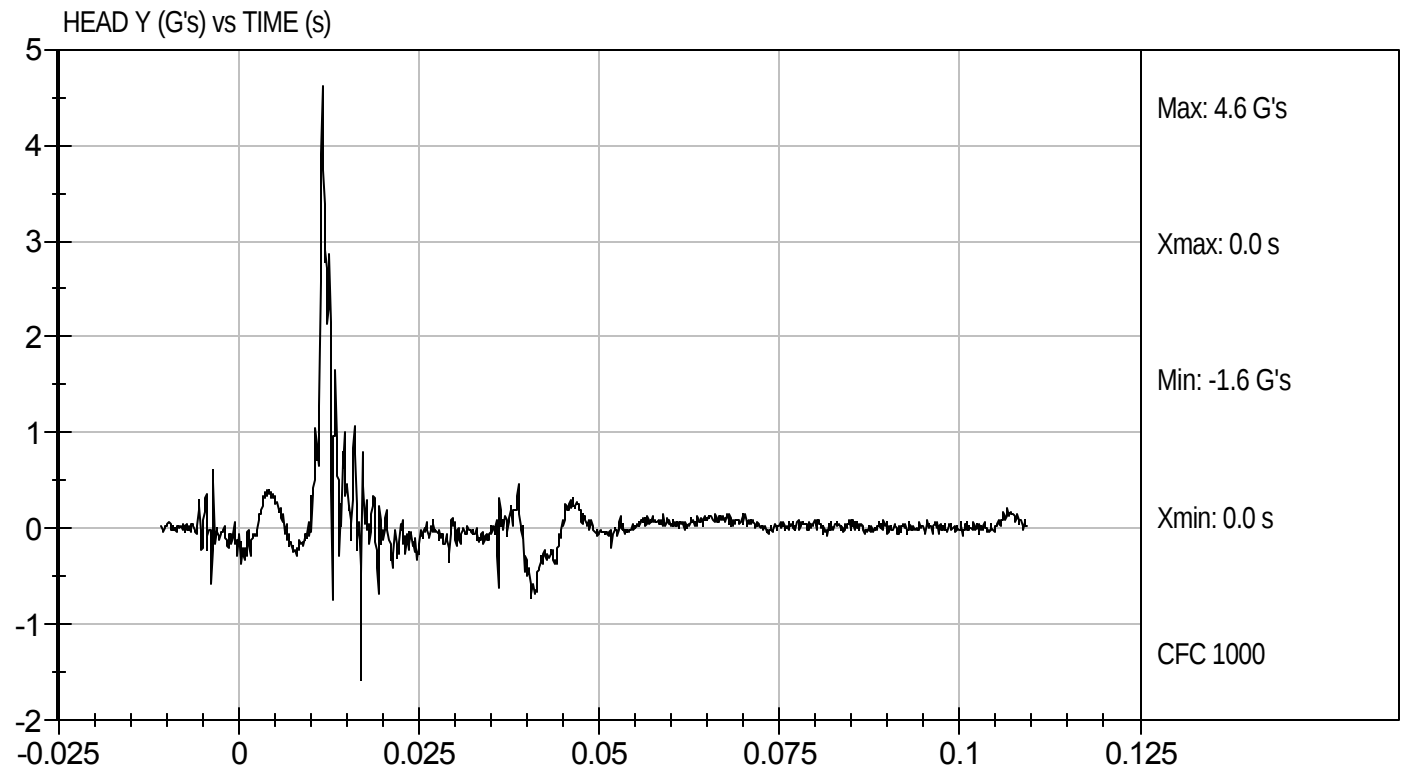
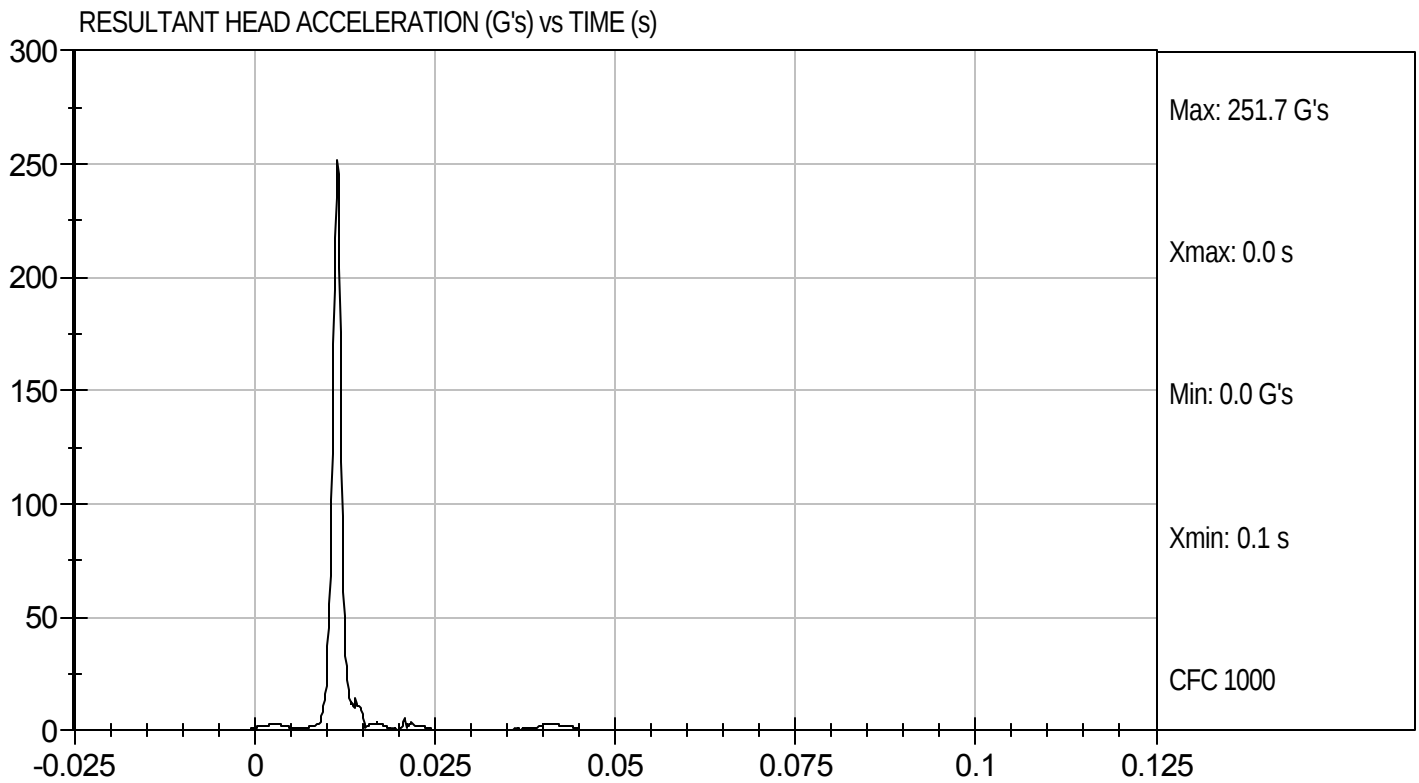
1/4/11
Test Date


Approved By



Test Desc: Head Drop
Component ID: D11031

Test Date: 1/4/11
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: D11032

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	20.9	Pass
Laboratory Relative Humidity		%	10 to 70	17	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	4.6	Pass
	30 ms	m/s	5.8 to 7.0	6.5	Pass
D Plane Rotation	Max	deg	77 to 91	78	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	69 to 83	72	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	84	Pass
Overall Results					Pass

Jessica Hall
Laboratory Technician

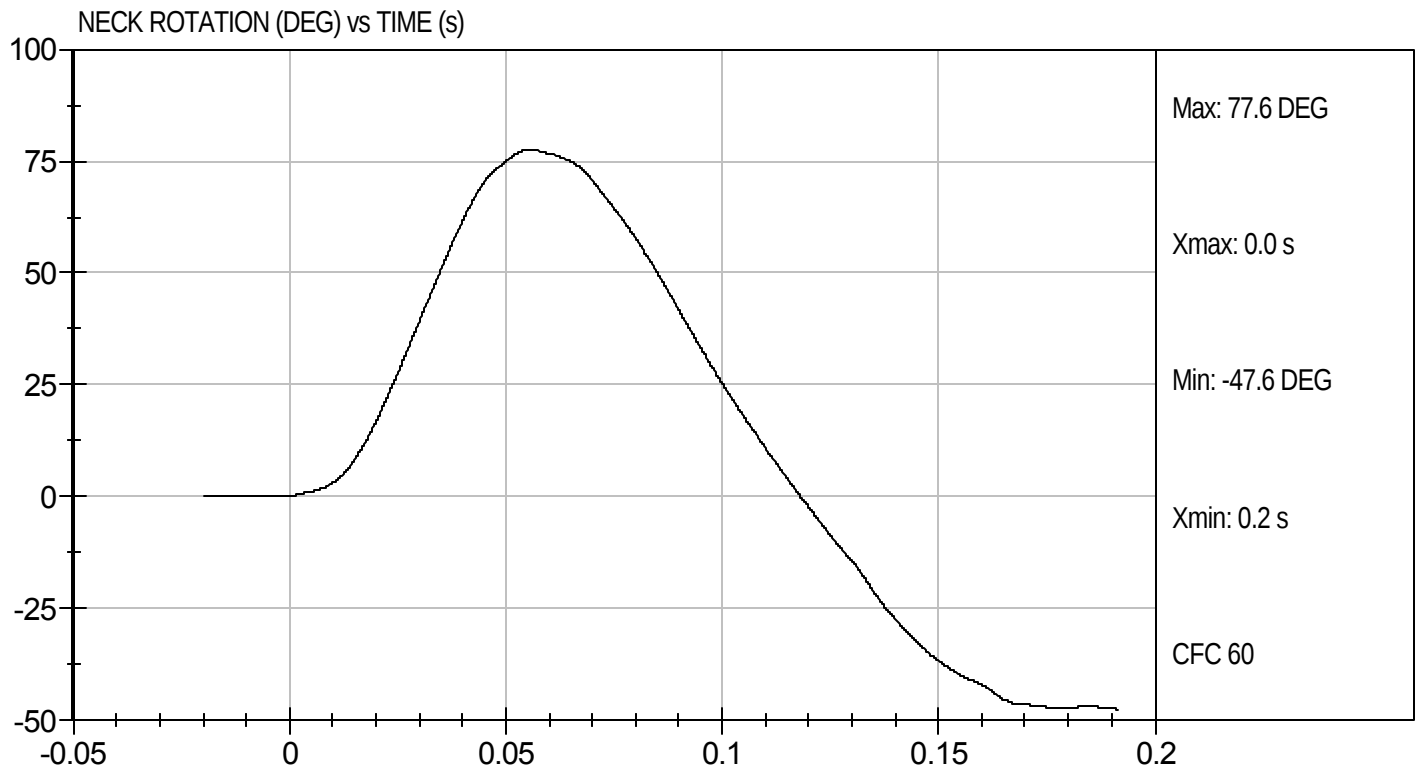
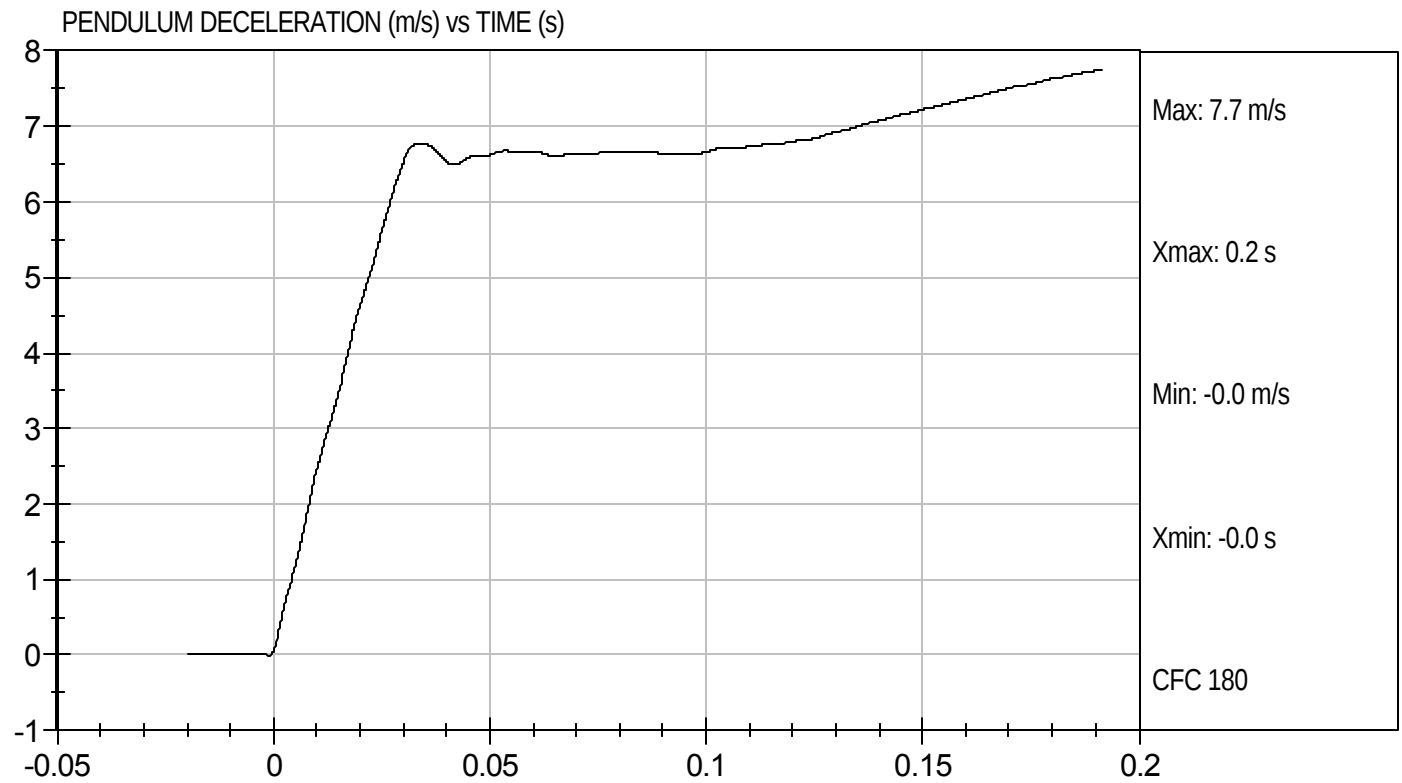
1/3/11
Test Date

David Winkelbauer
Approved By



Test Desc: Neck Flexion
Component ID: D11032

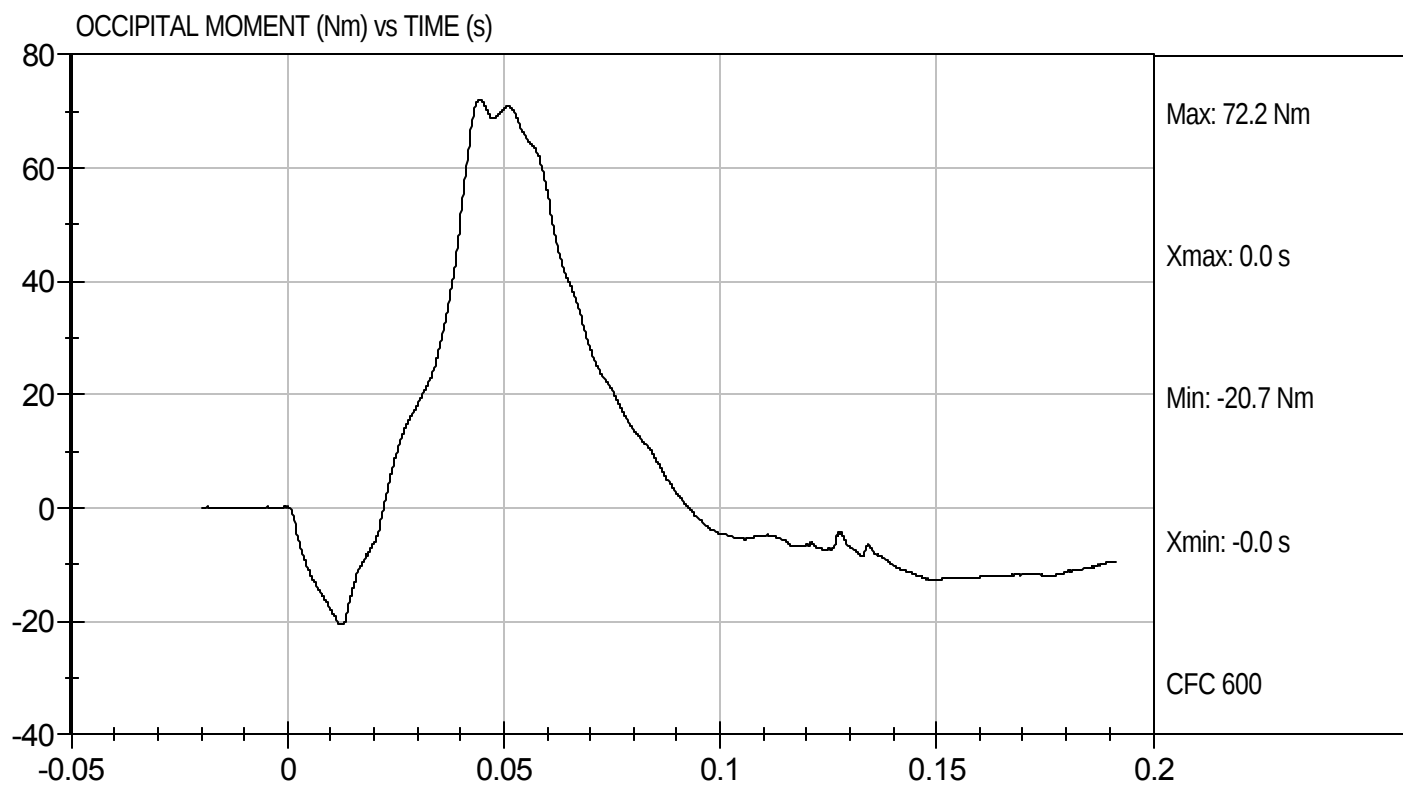
Test Date: 1/3/11
Velocity: 23.15 ft/s, 7.06 m/s





Test Desc: Neck Flexion
Component ID: D11032

Test Date: 1/3/11
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: D11033

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	20.9	Pass
Laboratory Relative Humidity		%	10 to 70	17	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.16	Pass
Pendulum Deceleration	10 ms	m/s	1.5 to 1.9	1.8	Pass
	20 ms	m/s	3.1 to 3.9	3.5	Pass
	30 ms	m/s	4.6 to 5.6	5.0	Pass
D Plane Rotation	Max	deg	99 to 114	100	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

Jessica Hall
Laboratory Technician

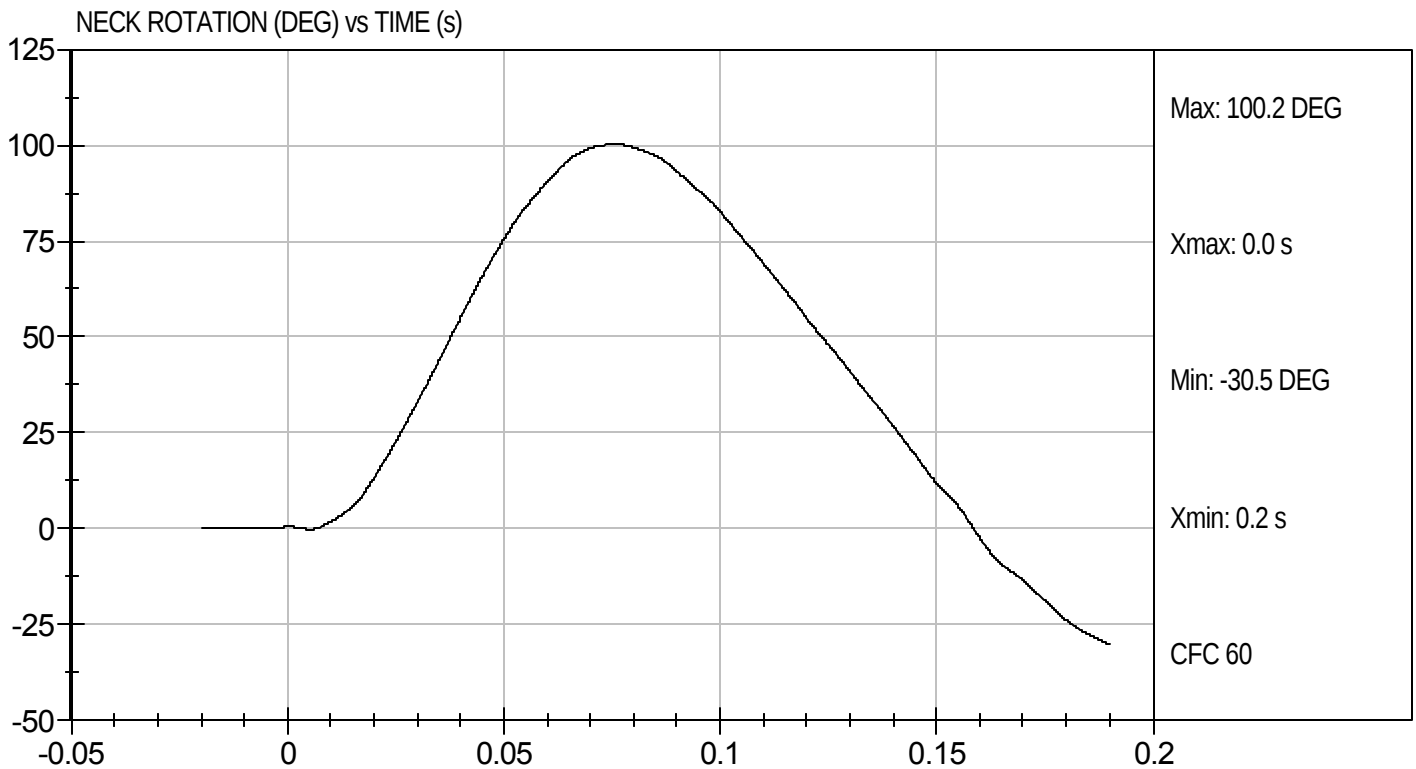
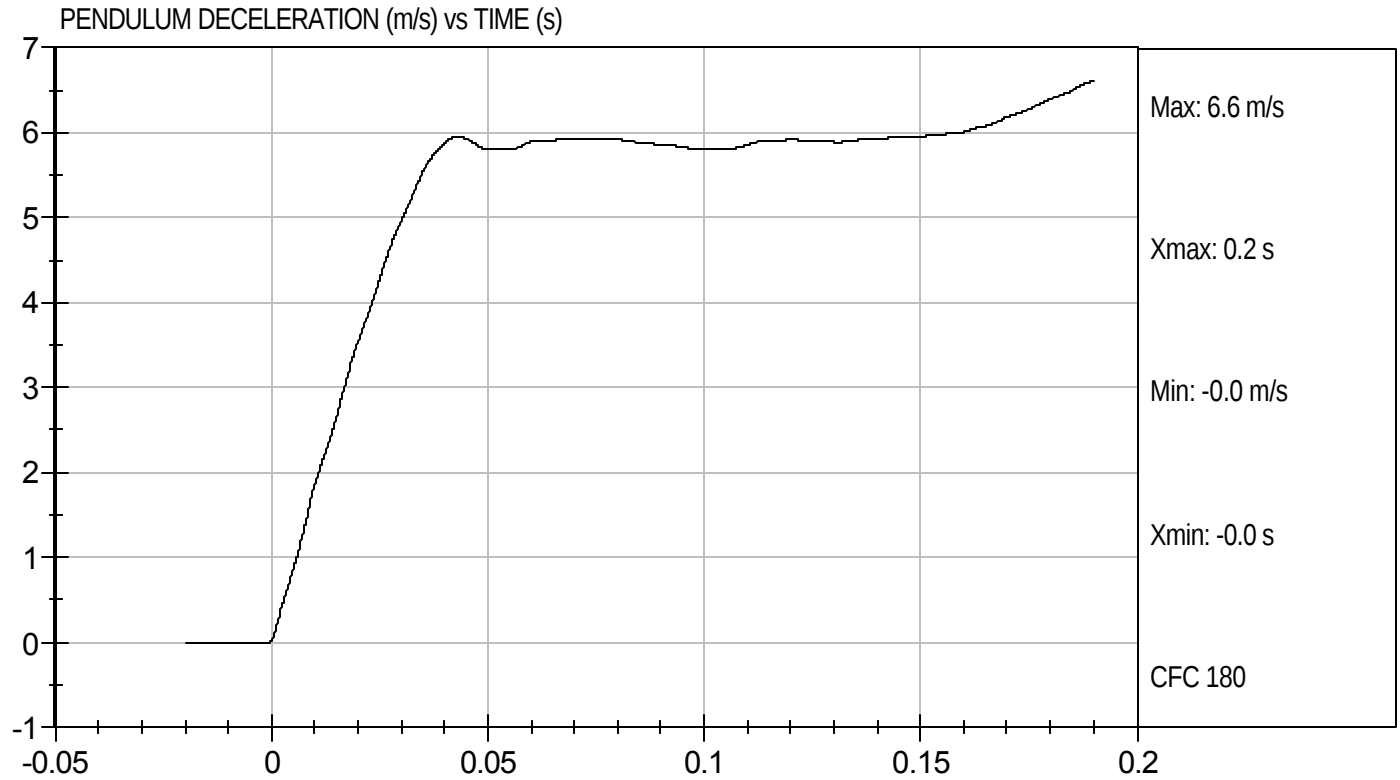
1/3/11
Test Date

David Winkelbauer
Approved By



Test Desc: Neck Extension
Component ID: D11033

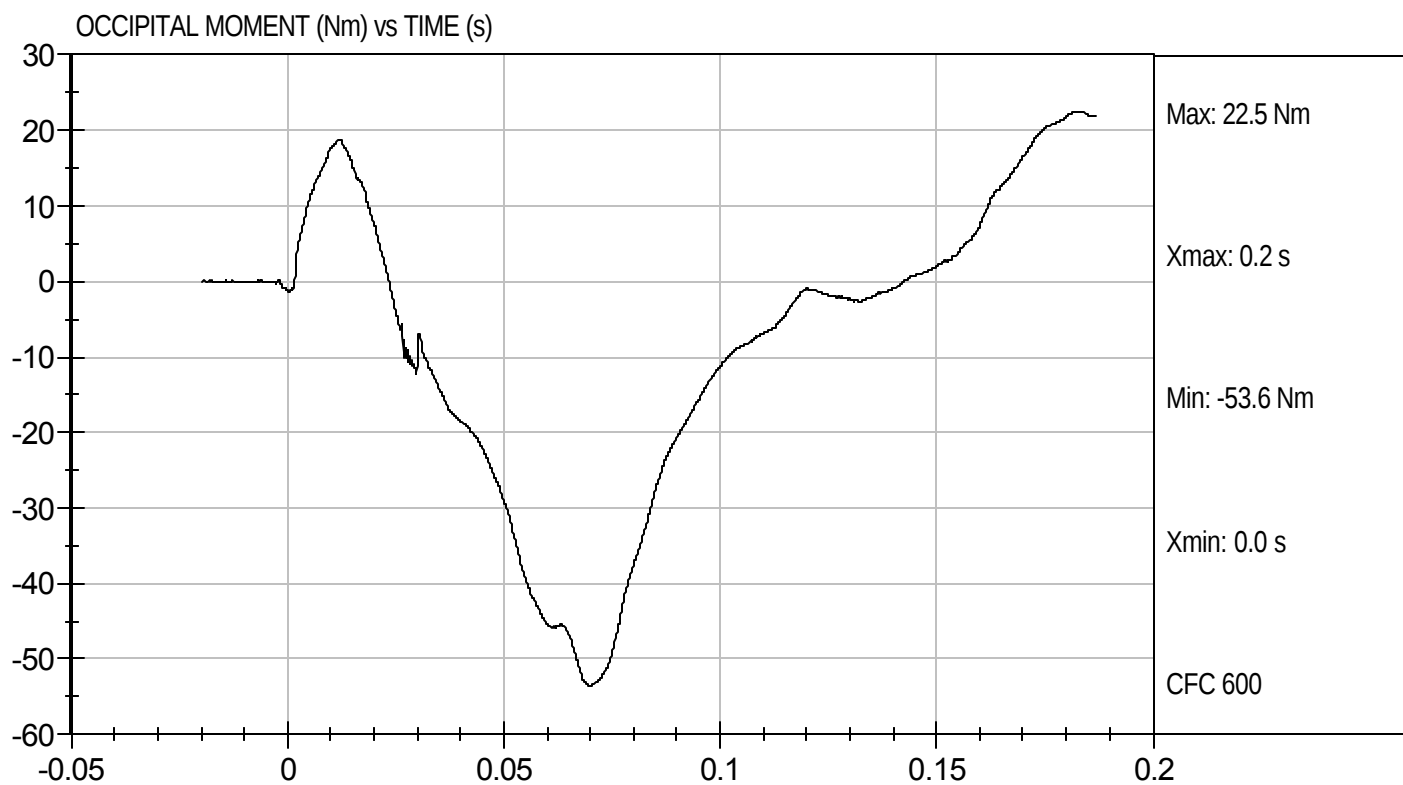
Test Date: 1/3/11
Velocity: 20.20 ft/s, 6.16 m/s





Test Desc: Neck Extension
Component ID: D11033

Test Date: 1/3/11
Velocity: 20.20 ft/s, 6.16 m/s



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test I.D: D11034

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.6	Pass
Relative Humidity	%	10 to 70	22	Pass
Probe Speed	m/s	6.59 to 6.83	6.77	Pass
Peak Deflection	mm	50 to 58	51	Pass
Peak Resistive Force w/in Deflection Corridor	kN	3.9 to 4.4	4.2	Pass
Internal Hysteresis	%	69 to 85	69	Pass
Peak Force 18 mm - 50 mm	N	<= 4,600 N	4251	Pass
Overall Test Results				Pass


Laboratory Technician

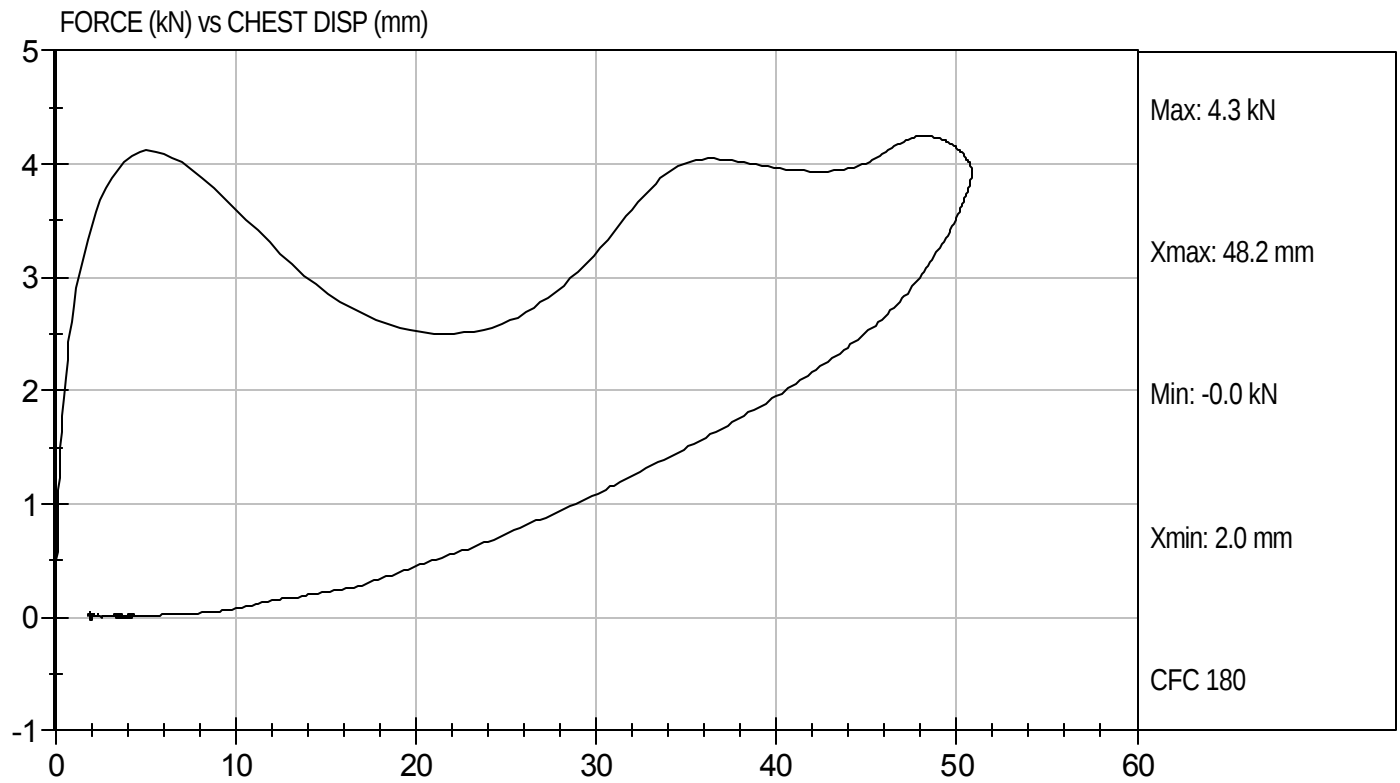
1/4/11
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D11034

Test Date: 1/4/11
Velocity: 22.22 ft/s, 6.77 m/s



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

ATD Serial No: 634

Test I.D: D11035

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	22	Pass
Probe Speed	m/s	2.07 to 2.13	2.10	Pass
Maximum Force	kN	3.45 to 4.06	3.51	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

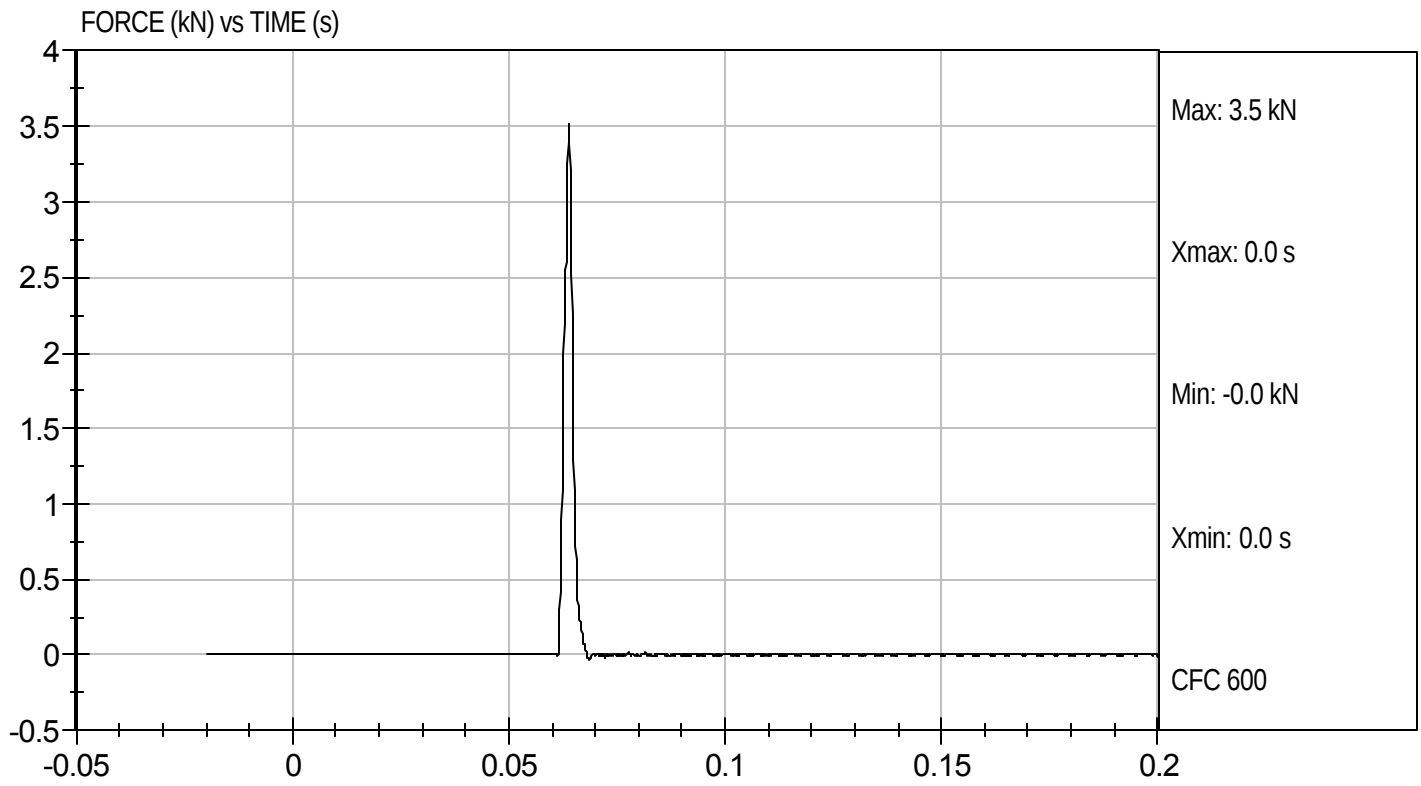
1/4/11
Test Date

David Winkelbauer
Approved By



Test Desc: Right Knee
Component ID: D11035

Test Date: 1/4/11
Velocity: 6.89 ft/s, 2.10 m/s



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634Test I.D: D11036

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	22	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	kN	3.45 to 4.06	3.88	Pass
Overall Test Results				Pass

Jessica Galt
Laboratory Technician

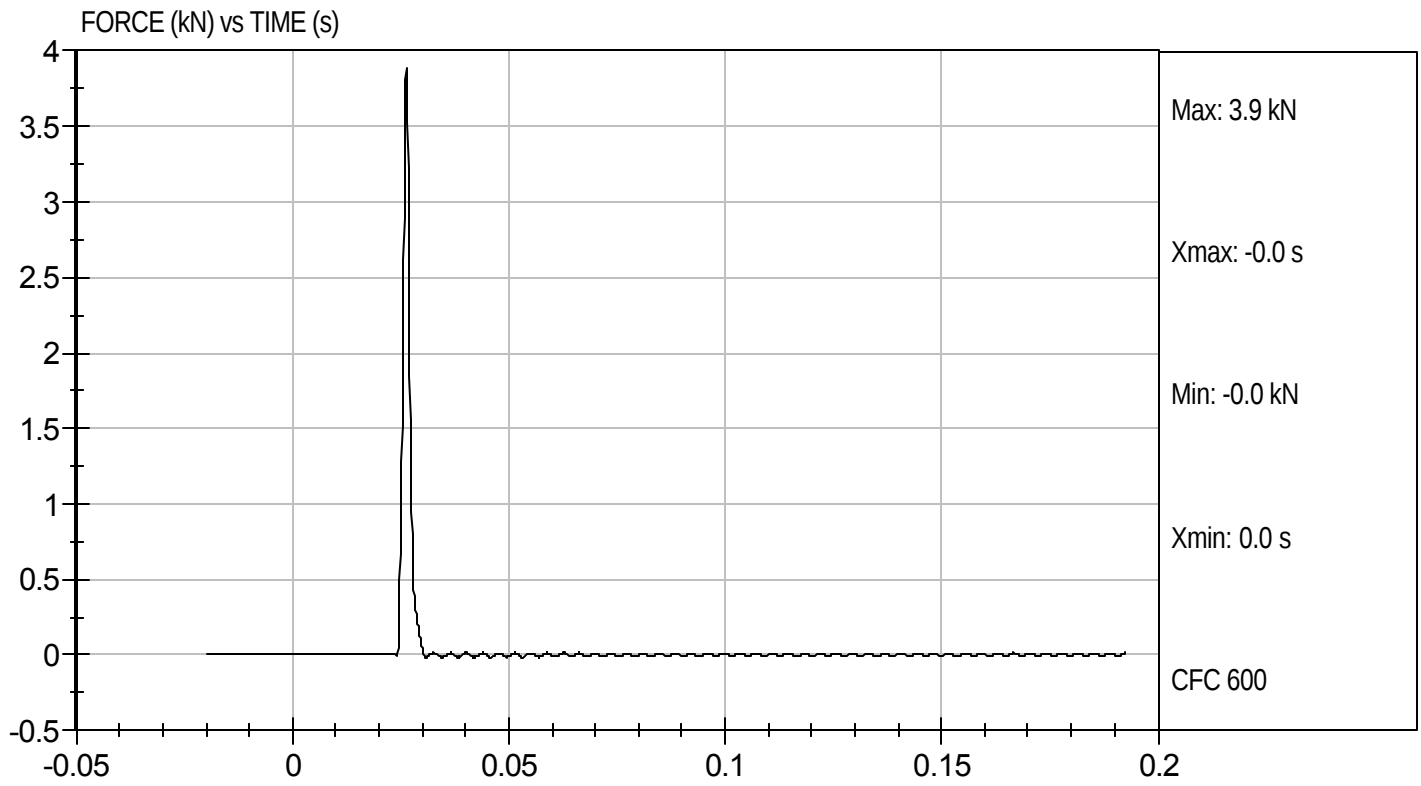
1/4/11
Test Date

David Winkelbauer
Approved By



Test Desc: Left Knee
Component ID: D11036

Test Date: 1/4/11
Velocity: 6.97 ft/s, 2.12 m/s



MGA RESEARCH CORPORATION
TORSO FLEXION TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test I.D: D11037

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	20.9	Pass
Laboratory Relative Humidity	%	10 to 70	21	Pass
Initial Angle	deg	0 to 20	18	Pass
Return Angle	deg	+/- 8	5	Pass
Force at 45 deg	N	320 to 390	375	Pass
Upper Torso Deflection Rate	Deg/sec	0.5 to 1.5	1.0	Pass
Overall Result			Pass	


Laboratory Technician

1/4/11
Test Date


Approved By

MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test ID: D11811

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	20.6	Pass
Laboratory Relative Humidity	%	10 to 70	17	Pass
Peak Resultant Acceleration	G's	250 to 300	260	Pass
Peak Lateral Acceleration	G's	+/- 15	8.2	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

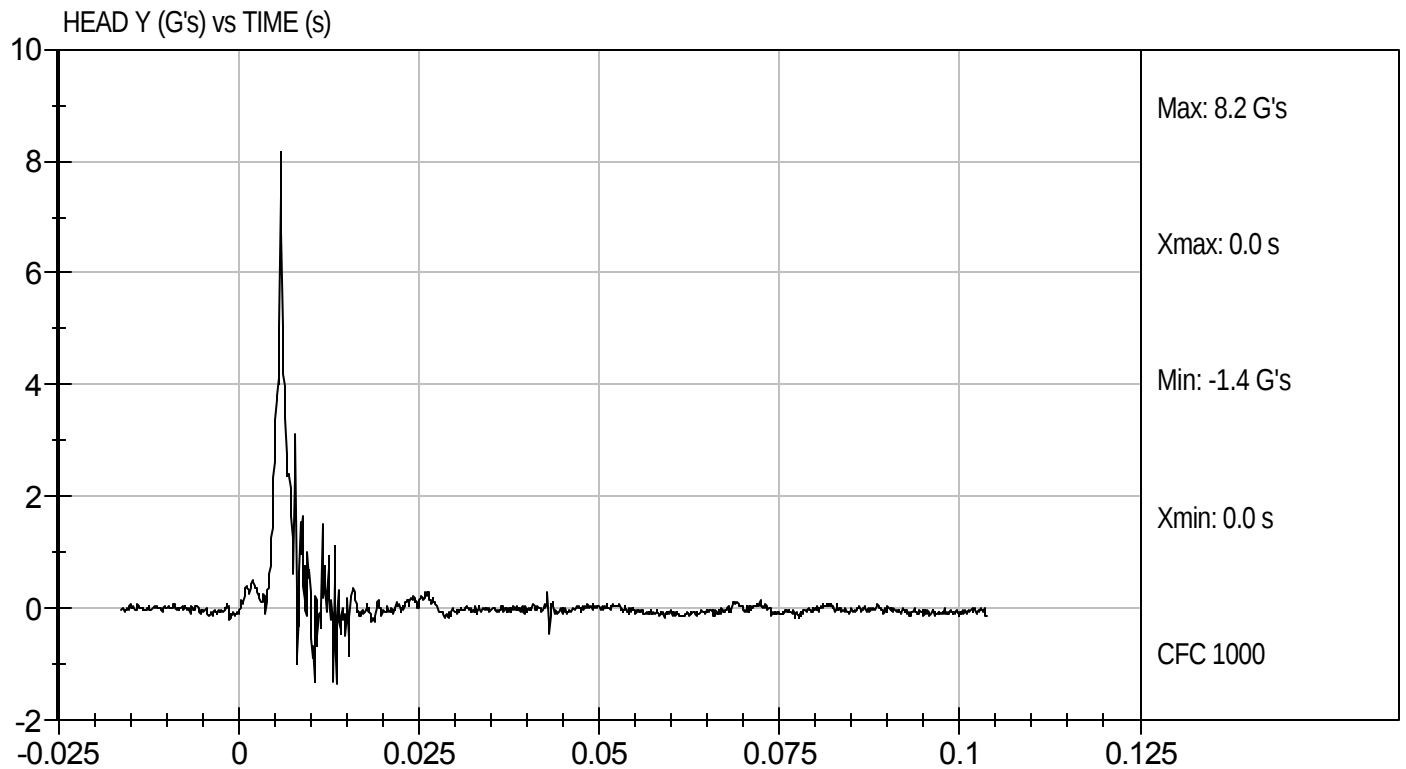
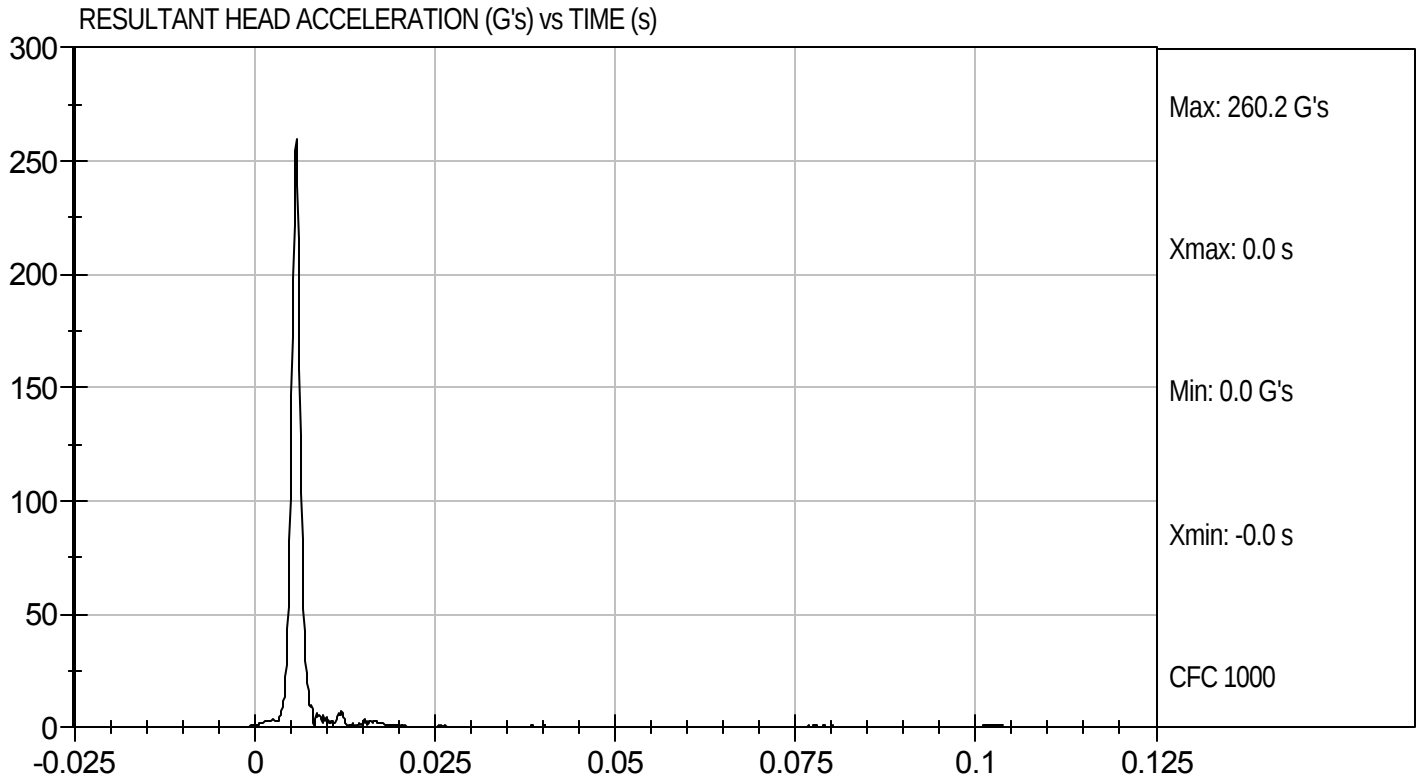
3/2/11
Test Date

David Winkelbauer
Approved By



Test Desc: Head Drop
Component ID: D11811

Test Date: 3/2/11
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.: D11812

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	15	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	80	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	69 to 83	70	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	86	Pass
Overall Results					Pass

Jessica Hall
Laboratory Technician

3/2/11
Test Date

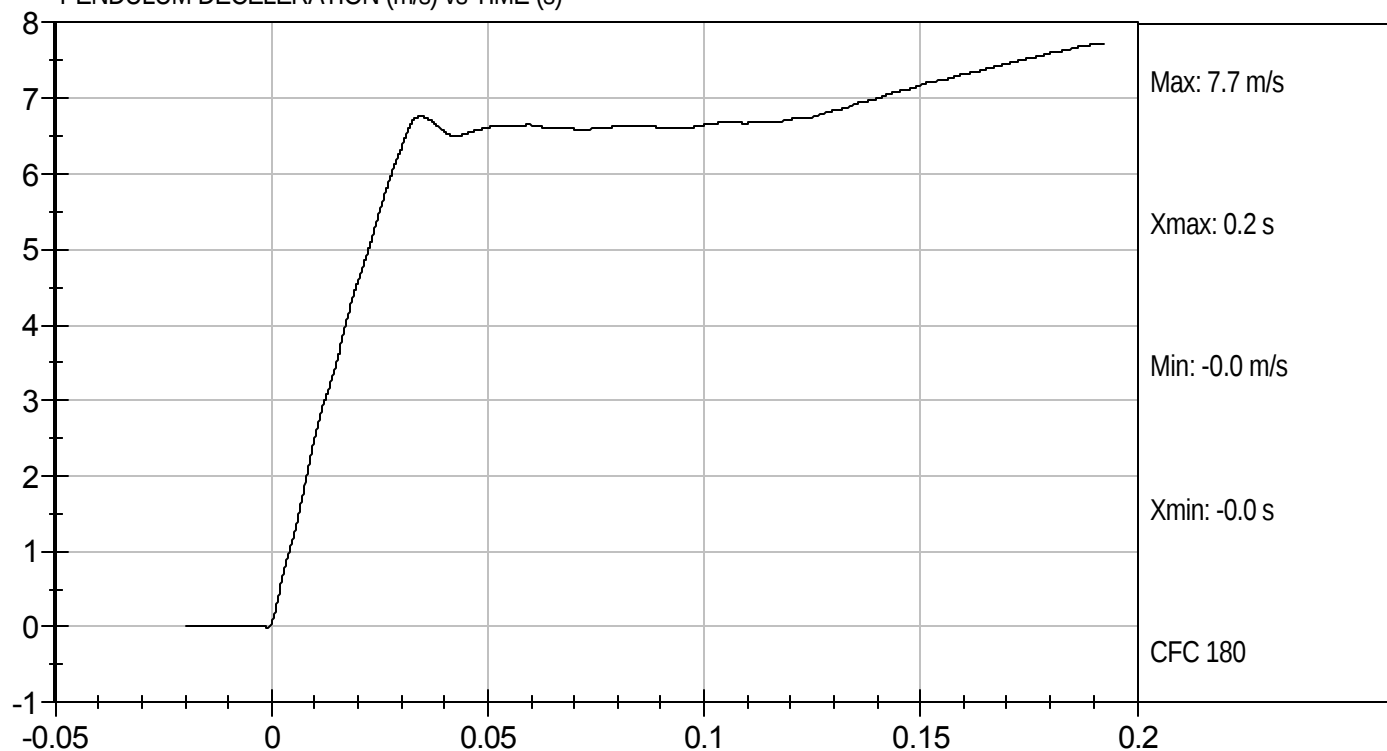
David Winkelbauer
Approved By



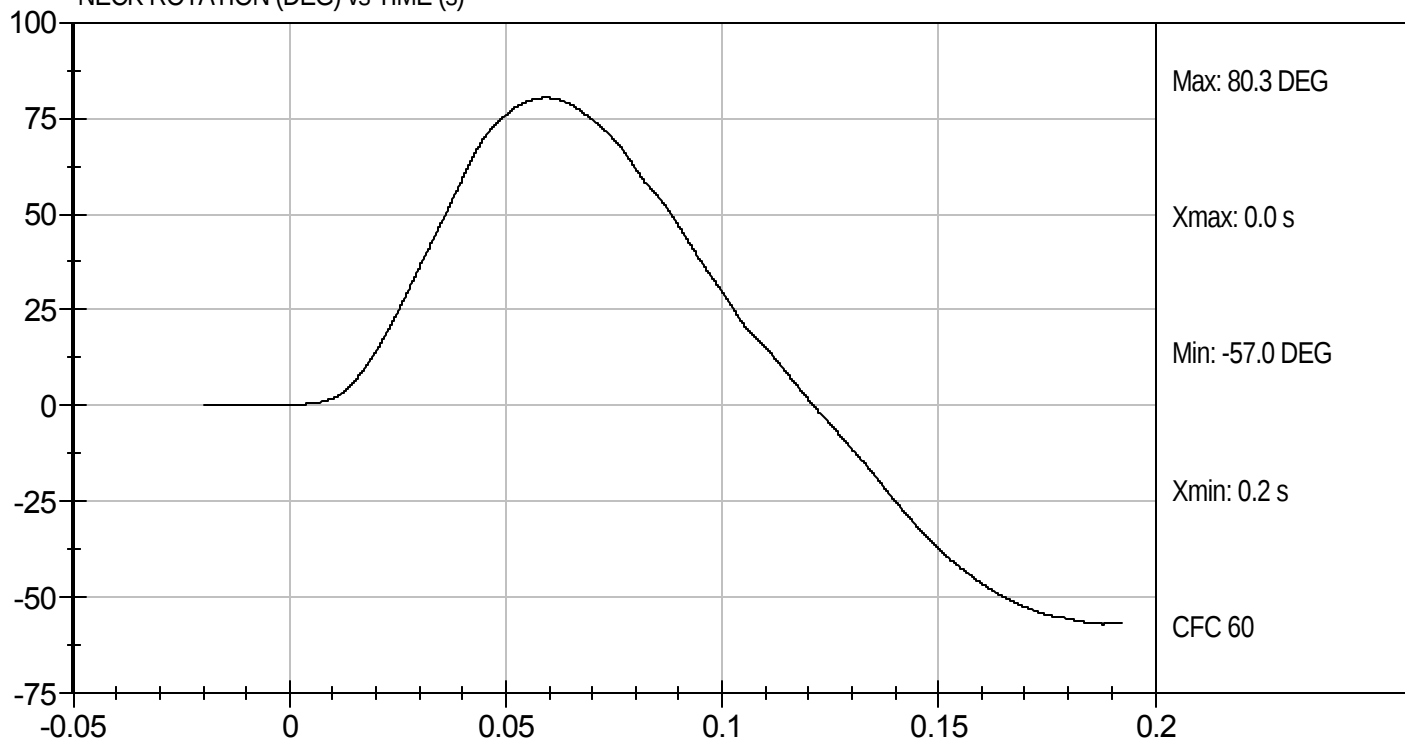
Test Desc: Neck Flexion
Component ID: D11812

Test Date: 3/2/11
Velocity: 23.15 ft/s, 7.06 m/s

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



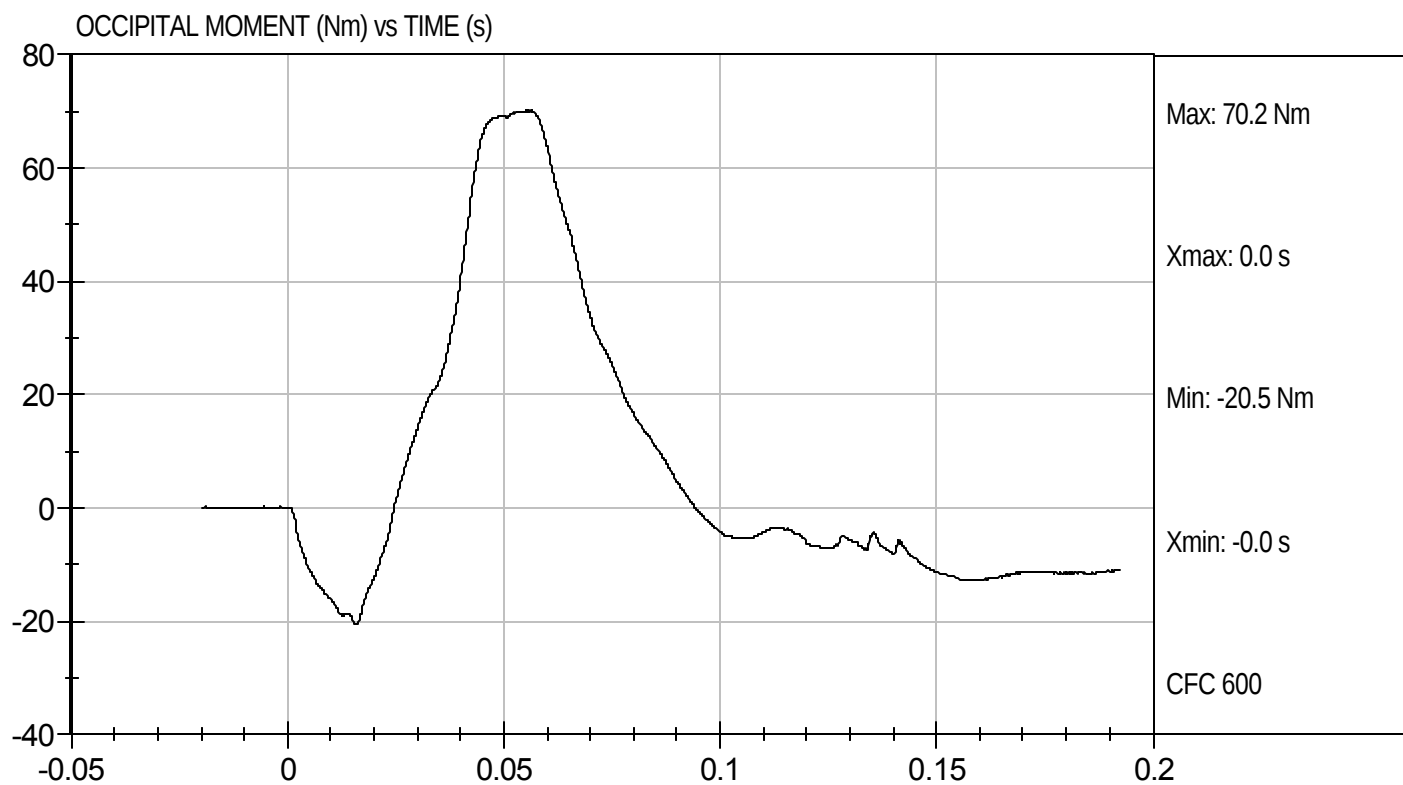
NECK ROTATION (DEG) vs TIME (s)





Test Desc: Neck Flexion
Component ID: D11812

Test Date: 3/2/11
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: D11813

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity		%	10 to 70	16	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.13	Pass
Pendulum Deceleration	10 ms	m/s	1.5 to 1.9	1.7	Pass
	20 ms	m/s	3.1 to 3.9	3.3	Pass
	30 ms	m/s	4.6 to 5.6	4.9	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

Jessica Hall
Laboratory Technician

3/2/11

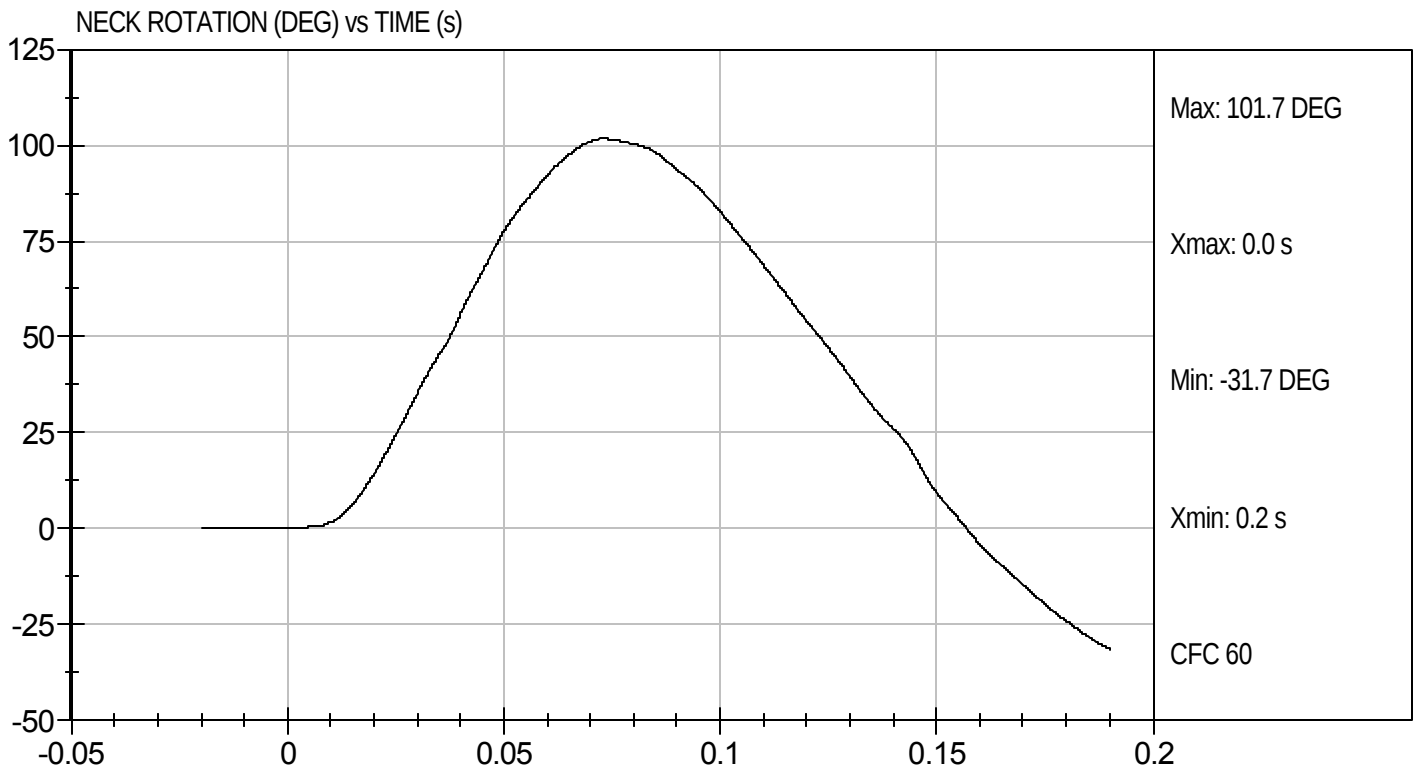
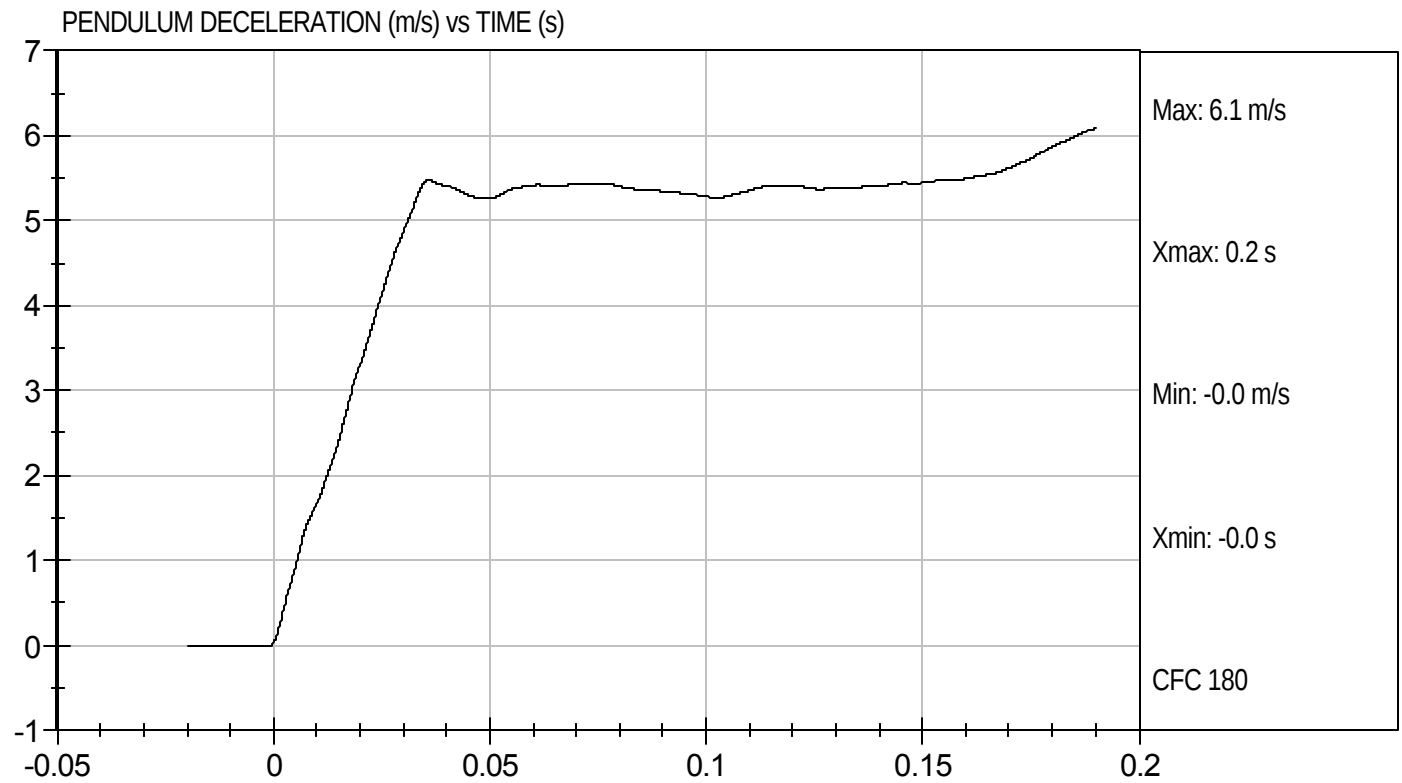
Test Date

David Winkelbauer
Approved By



Test Desc: Neck Extension
Component ID: D11813

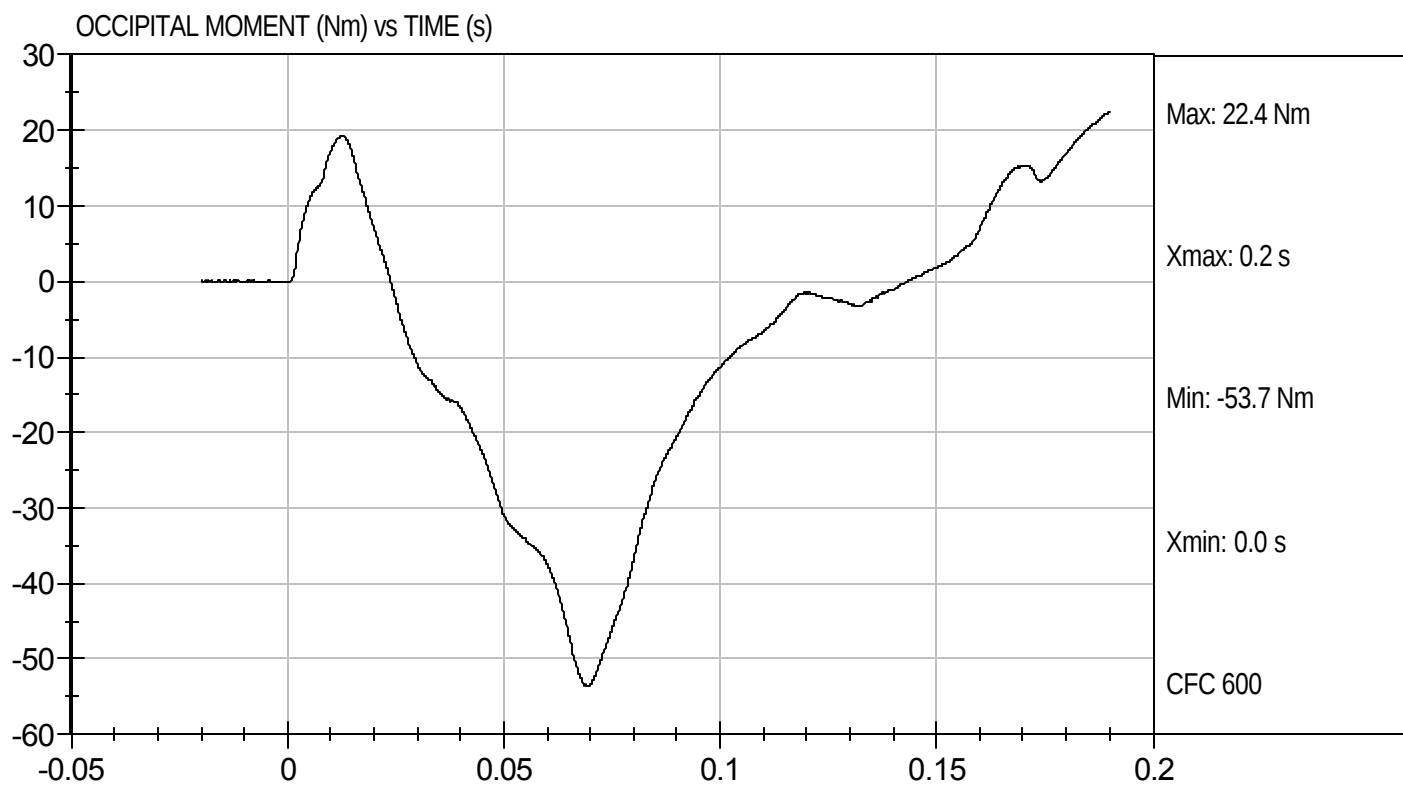
Test Date: 3/2/11
Velocity: 20.10 ft/s, 6.13 m/s





Test Desc: Neck Extension
Component ID: D11813

Test Date: 3/2/11
Velocity: 20.10 ft/s, 6.13 m/s



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test I.D: D11814

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	20.8	Pass
Relative Humidity	%	10 to 70	17	Pass
Probe Speed	m/s	6.59 to 6.83	6.77	Pass
Peak Deflection	mm	50 to 58	56	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	3868	Pass
			Overall Test Results	Pass


Laboratory Technician

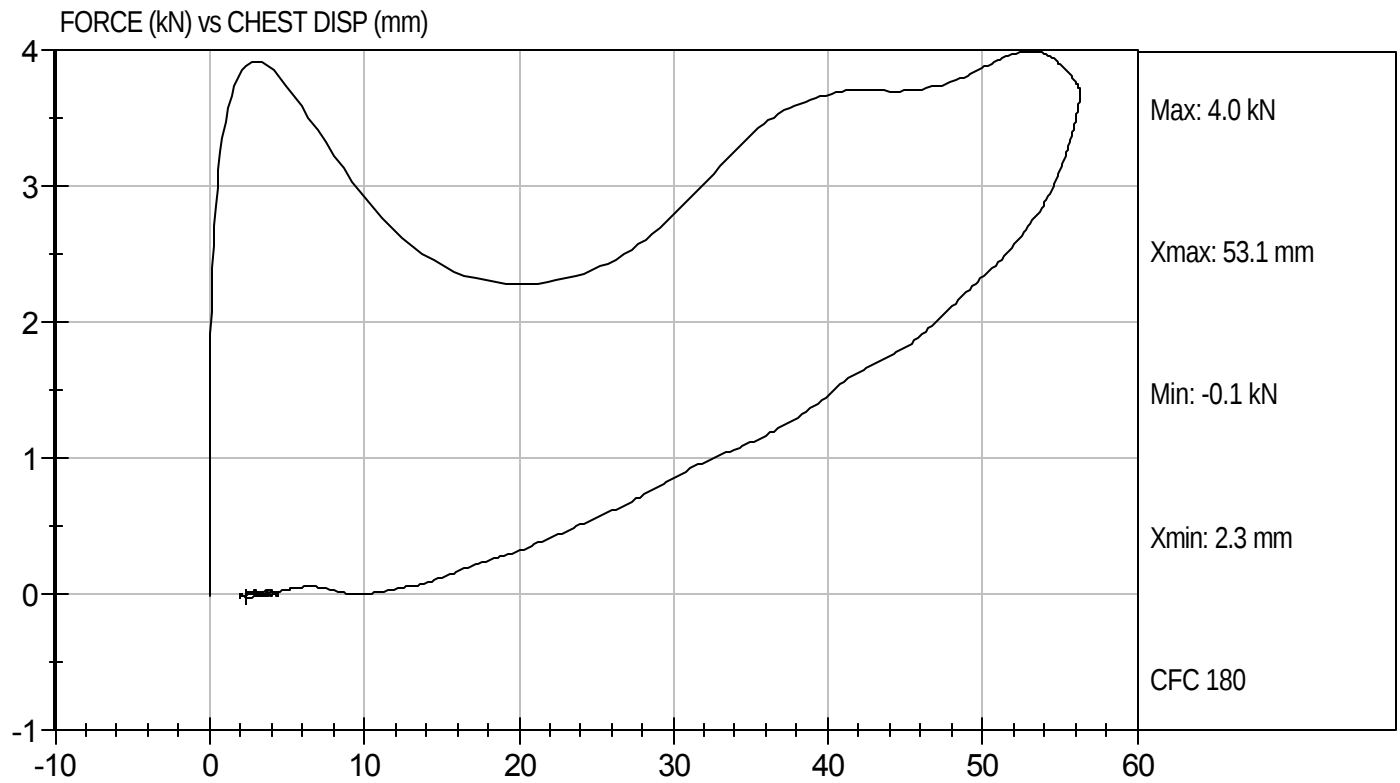
3/3/11
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D11814

Test Date: 3/3/11
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: D11815

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	16	Pass
Probe Speed	m/s	2.07 to 2.13	2.10	Pass
Maximum Force	kN	3.45 to 4.06	3.77	Pass
Overall Test Results				Pass

Jessica Gall
Laboratory Technician

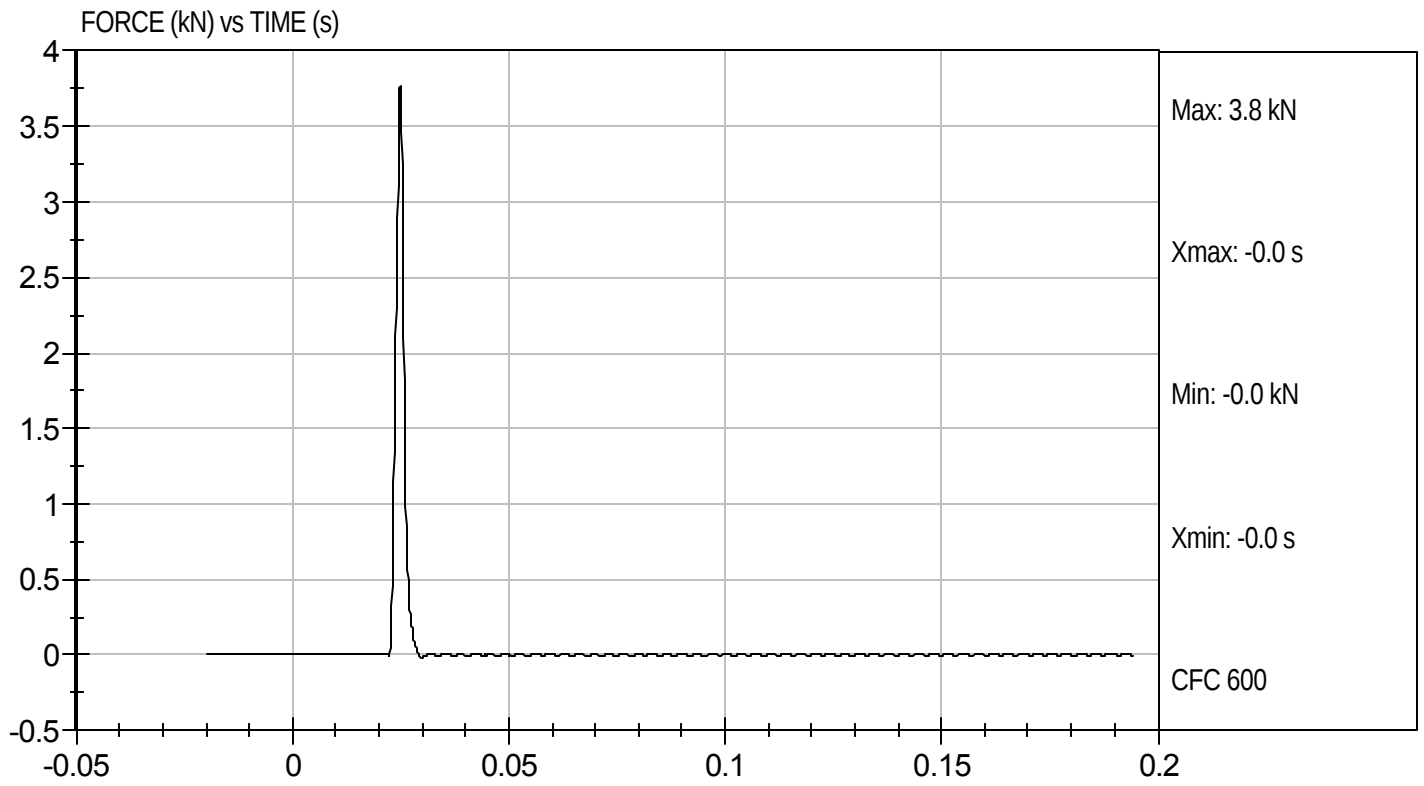
3/2/11
Test Date

David Winkelbauer
Approved By



Test Desc: Right Knee
Component ID: D11815

Test Date: 3/2/11
Velocity: 6.89 ft/s, 2.10 m/s



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test I.D: D11816

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	16	Pass
Probe Speed	m/s	2.07 to 2.13	2.11	Pass
Maximum Force	kN	3.45 to 4.06	3.78	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

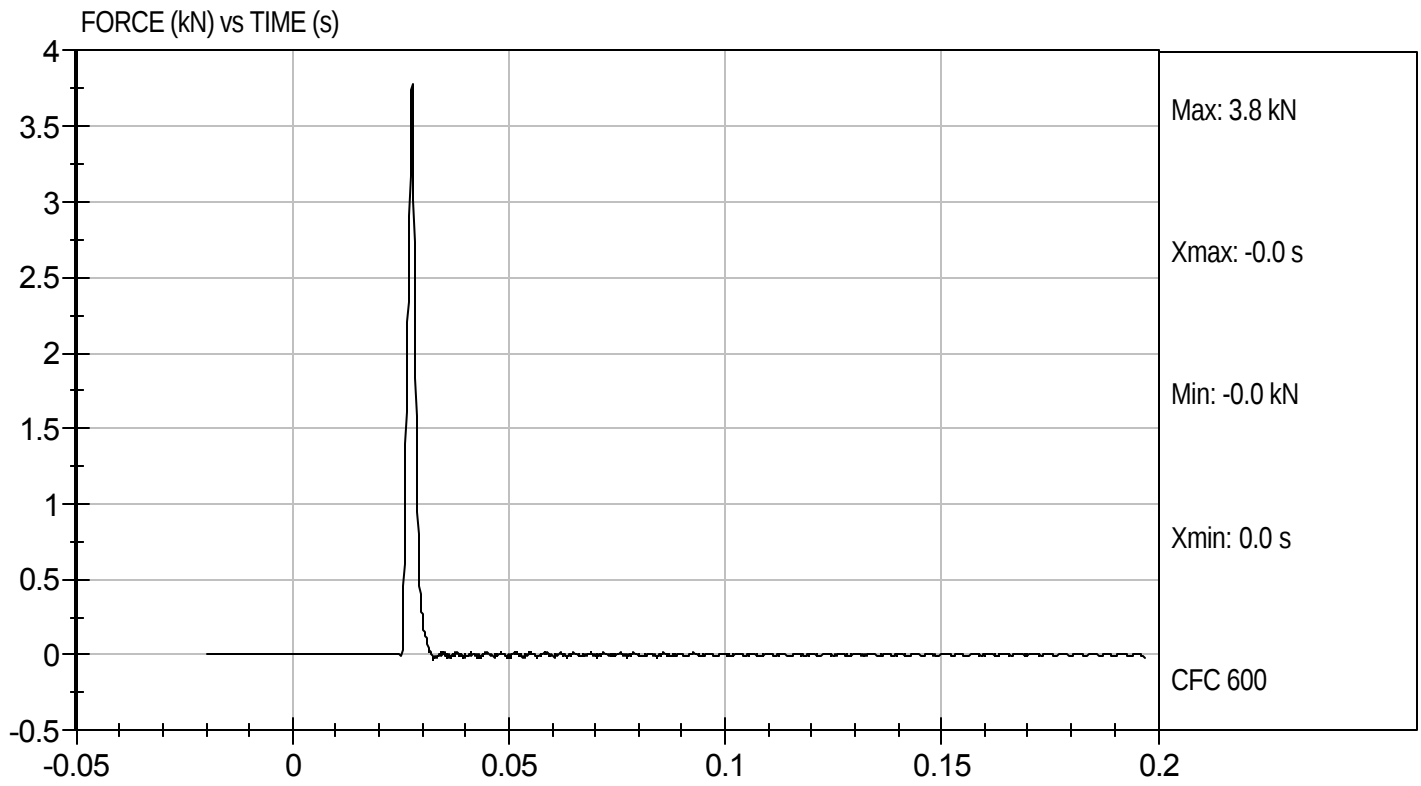
3/2/11
Test Date

David Winkelbauer
Approved By



Test Desc: Left Knee
Component ID: D11816

Test Date: 3/2/11
Velocity: 6.92 ft/s, 2.11 m/s



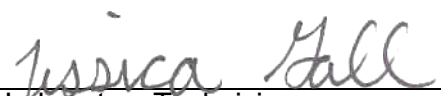
MGA RESEARCH CORPORATION

TORSO FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634Test I.D: D11817

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	15	Pass
Initial Angle	deg	0 to 20	19	Pass
Return Angle	deg	+/- 8	5	Pass
Force at 45 deg	N	320 to 390	346	Pass
Upper Torso Deflection Rate	Deg/sec	0.5 to 1.5	1.0	Pass
Overall Result				Pass


Laboratory Technician

3/2/11
Test Date


Approved By