

REPORT NUMBER: NCAP-MGA-2012-007

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

**CHRYSLER GROUP LLC
2012 Dodge Avenger SXT 4-Dr Sedan
NHTSA No.: MC0310**

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



Test Date: October 3, 2011

Final Report Date: October 21, 2011

FINAL REPORT

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

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Approval Date: October 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: _____

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16. Abstract A 56.3 km/h NCAP Frontal Impact Test was conducted on the 2012 Dodge Avenger SXT 4-Dr Sedan in accordance with the specifications of the Office of Crashworthiness Standards Frontal NCAP Laboratory Test Procedure. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and foot well intrusion performance. The test was conducted at MGA Research Corporation in Burlington, Wisconsin, on October 3, 2011. The impact velocity was 56.6 km/h and the ambient temperature at the barrier face at the time of impact was 22.2°C. The target vehicle post-test maximum crush was 410 mm located at the vehicle's centerline. The test vehicle's performance was as follows:																																																							
<table border="1" style="width: 100%; border-collapse: collapse; background-color: #ffff00;"> <thead> <tr> <th rowspan="2">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>204</td> <td>510</td> </tr> <tr> <td>Maximum Chest Compression</td> <td>mm</td> <td>63</td> <td>52</td> <td>22</td> <td>16</td> </tr> <tr> <td>Nij</td> <td>N/A</td> <td>1</td> <td>1</td> <td>0.24</td> <td>0.38</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>4170</td> <td>2620</td> <td>703</td> <td>744</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>4000</td> <td>2520</td> <td>279</td> <td>322</td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>10008</td> <td>6805</td> <td>3685</td> <td>1794</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>10008</td> <td>6805</td> <td>3822</td> <td>2723</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	204	510	Maximum Chest Compression	mm	63	52	22	16	Nij	N/A	1	1	0.24	0.38	Neck Tension	N	4170	2620	703	744	Neck Compression	N	4000	2520	279	322	Left Femur Force	N	10008	6805	3685	1794	Right Femur Force	N	10008	6805	3822	2723
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SECTION 1 PURPOSE AND SUMMARY OF TEST

PURPOSE

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

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

SUMMARY

A load cell barrier was impacted by a 2012 Dodge Avenger SXT 4-Dr Sedan at a velocity of 56.6 kph. The test was performed at MGA Research Corporation on October 3, 2011. Pre-and post-test photographs of the vehicle and dummies can be found in Appendix A.

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

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

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

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

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

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

The maximum static crush of the vehicle was 410 mm and both the driver and passenger side doors remained closed during the impact event and were operable after the impact.

The driver's visible contact points were as follows: The driver's head and chest contacted the airbag. The driver's head also contacted the headrest. The driver's knees contacted the knee bolster. The passenger's visible contact points were as follows: The passenger's head 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	Nij	Neck Tension (N)	Neck Comp. (N)	3ms Chest Clip (Gs)	Chest Disp. (mm)	Left Femur (N)	Right Femur (N)
Driver (50 th)	204	0.24	703	279	39	22	3685	3822
Passenger (5 th)	510	0.38	744	322	40	16	1794	2723

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

TEST NOTES

There was no valid data collected for:
Driver Chest Xr

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

SECTION 2
OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2012 Dodge Avenger SXT 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0310
Test Date: 10/03/2011

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	MC0310	Traction Control System (TCS)	Yes
Model Year	2012	Auto-Leveling System	No
Make	Dodge	Automatic Door Locks (ADLs)	Yes
Model	Avenger	Power Window Auto-Reverse	No
Body Style	Sedan	Other Optional Feature	N/A
VIN	1C3CDZEGXCN112490	Driver Front Airbag	Yes
Body Color	Redline 2-Coat Pearl	Driver Curtain Airbag	Yes
Odometer (km/mi)	31 / 19	Driver Head/Torso Airbag	No
Engine Displacement (L)	3.6	Driver Torso Airbag	Yes
Type/No. Cylinders	6	Driver Torso/Pelvis Airbag	No
Engine Placement	Lateral	Driver Pelvis Airbag	No
Transmission Type	Automatic	Driver Knee Airbag	No
Transmission Speeds	6	Pass. Curtain Airbag	Yes
Overdrive	Yes	Pass. Head/Torso Airbag	No
Final Drive	Front	Pass. Torso Airbag	Yes
Roof Rack	No	Pass. Torso/Pelvis Airbag	No
Sunroof/T-Top	No	Pass. Pelvis Airbag	No
Running Boards	No	Driver Seat Belt Pretensioner	Yes
Tilt Steering Wheel	Yes	Pass. Seat Belt Pretensioner	Yes
Power Seats	Yes, Driver Only	Driver Load Limiter	Yes
Anti-Lock Brakes (ABS)	Yes	Pass. Load Limiter	Yes
All-Wheel Drive (AWD)	No	Other Safety Restraint	N/A
Does owner's manual provide instructions to turn off automatic door locks?			No

DATA FROM CERTIFICATION LABEL

Manufactured By	Chrysler Group LLC	GVWR (kg)	2087
Date of Manufacture	8-11	GAWR Front (kg)	1180
Vehicle Type	Passenger Car	GAWR Rear (kg)	1007

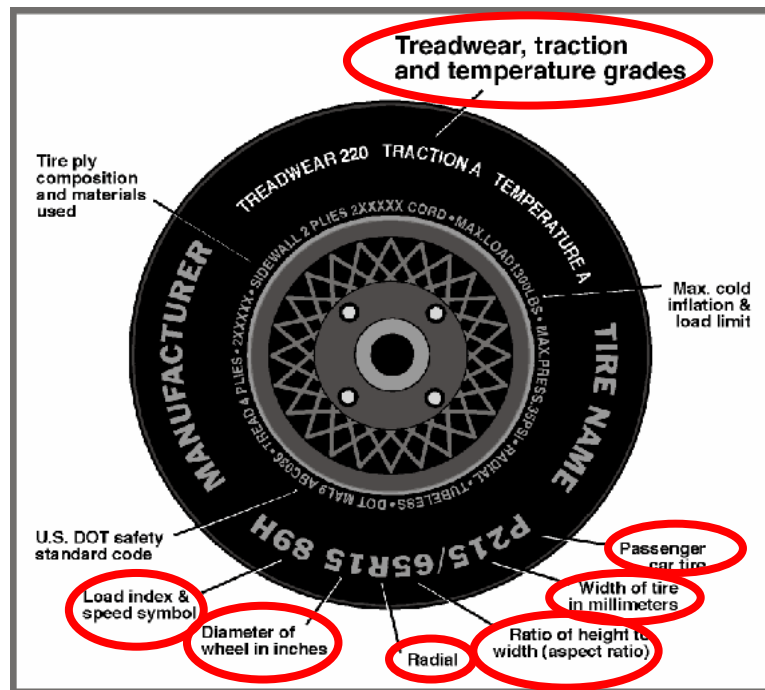
VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Split Bench		
Designated Seating Capacity (DSC)	2	3		5
Capacity Weight (VCW) (kg)				392
Cargo Weight (RCLW) (kg)				52

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

Test Vehicle: 2012 Dodge Avenger SXT 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0310
 Test Date: 10/03/2011



TIRE PLACARD INFORMATION

Measured Parameter	Front	Rear
Recommended Cold Tire Pressure (kPa)	220	220
Recommended Tire Size	225/50R18	225/50R18

TIRE SIDEWALL INFORMATION

Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	300	300
Tire Size on Vehicle	225/50R18	225/50R18
Tire Manufacturer	Goodyear	Goodyear
Tire Name	Eagle LS2	Eagle LS2
Tire Type	Passenger	Passenger
Tire Width	225	225
Aspect Ratio	50	50
Radial	Yes	Yes
Wheel Diameter	18	18
Load Index/Speed Symbol	94T	94T
Treadwear	400	400
Traction Grade	A	A
Temperature Grade	B	B
Tire Material	Rubber	Rubber

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

Test Vehicle: 2012 Dodge Avenger SXT 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0310
 Test Date: 10/03/2011

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	525.7	309.4		559.3	381.9	
Right	kg	483.6	319.7		499.4	383.3	
Ratio	%	61.6	38.4		58.0	42.0	
Totals	kg	1009.3	629.1	1638.4	1058.7	765.2	1823.9

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1638.4
Weight of 1 P572E ATD & 1 P572O ATD	kg	140.6
Rated Cargo/Luggage Weight (RCLW)	kg	52
Calculated Vehicle Target Weight (TVTW)	kg	1831.0

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	728	730	745	742	1062
As Tested	mm	727	727	705	706	1160
Post Test	mm	755	750	710	700	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2765
Total Vehicle Length at Left Side	mm	4714
Total Vehicle Length at Centerline	mm	4895
Total Vehicle Length at Right Side	mm	4714
Weight of Ballast in Cargo Area	kg	44.5
Weight of Vehicle Components Removed	kg	24.5
Amount of Stoddard Solvent in Fuel Tank	L	59.4

List of components removed to meet test weight: None

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

Test Vehicle: 2012 Dodge Avenger SXT 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0310
 Test Date: 10/03/2011

TARGET VEHICLE STRUCTURAL MEASUREMENT

	Elements	Pre-Test (mm)
1	Total Length	4895
2	Total Width	1822
3	Bumper Top Height	518
4	Bumper Bottom Height	406
5	Longitudinal Member Top Height	590
6	Distance between Longitudinal Members	920
7	Longitudinal Member Width	66
8	Engine Top Height	922
9	Engine Bottom Height	190
10	Engine and Gearbox Width	912
11	Front Bumper-Engine Distance	320
12	Front Shock Absorber Fixing Height	915
13	Bonnet Leading Edge Height	791
14	Front Shock Absorber Fixing Width	1125
15	Front Bumper – Front Axle Distance	1035
16	Front Axle – A-Pillar Distance	540
17	A-Pillar – B-Pillar Distance	1075
18	B-Pillar – Rear Axle Distance	1173
19	B-Pillar – C-Pillar Distance	710
20	Roof Sill Bottom Height	1330
21	Roof Sill Top Height	1438
22	Floor Sill Bottom Height	203
23	Floor Sill Top Height	367

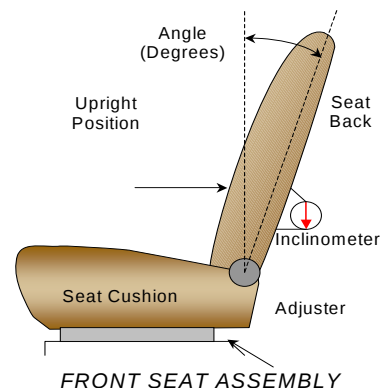
DATA SHEET NO. 2
SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

Test Vehicle: 2012 Dodge Avenger SXT 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0310
 Test Date: 10/03/2011

NOMINAL DESIGN RIDING POSITION

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



SEAT BACK ANGLE	Degrees
Driver Seat Back Angle	12.7° on headrest post
Passenger Seat Back Angle	6.9° on headrest post

SEAT FORE/AFT POSITIONS

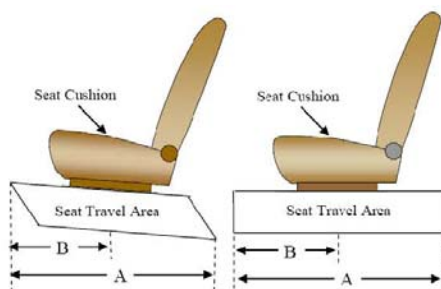
The driver and passenger seat fore/aft positions are adjusted following Appendix F, "Driver & Passenger Dummy Seating & Positioning Procedures" in the NCAP Test Procedure dated January 2010.

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	280 mm	140 mm (forward-most as 0)
Passenger Seat	38 detents	0 detent (forward-most as 0)

SEAT BELT UPPER ANCHORAGES

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

	Total # of Positions	Placed in Position #
Driver Seat	4 (1 st as 0)	0 (uppermost as 0)
Passenger Seat	4 (1 st as 0)	0 (uppermost as 0)



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

Test Vehicle: 2012 Dodge Avenger SXT 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0310
 Test Date: 10/03/2011

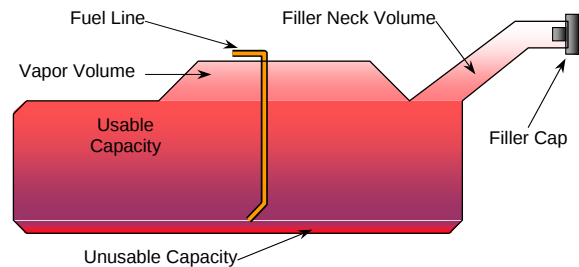
FUEL TANK CAPACITY DATA

	Liters
Usable Capacity of "Standard Tank"	64.0
Usable Capacity of "Optional Tank"	
92-94% of Usable Capacity	58.9 to 60.2
Actual Amount of Solvent used	59.4
1/3 of Usable Capacity	21.3

FUEL PUMP

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

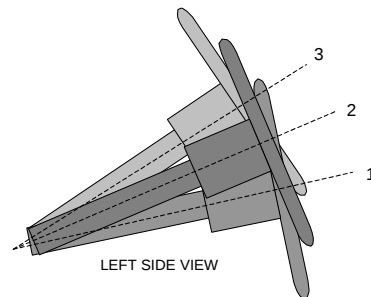
The vehicle is equipped with an electric fuel pump. The pump starts pumping fuel when the key is in the 'on' position. The fuel pipe is on the left side.



VEHICLE FUEL TANK ASSEMBLY

STEERING COLUMN ADJUSTMENT

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



STEERING COLUMN ASSEMBLY

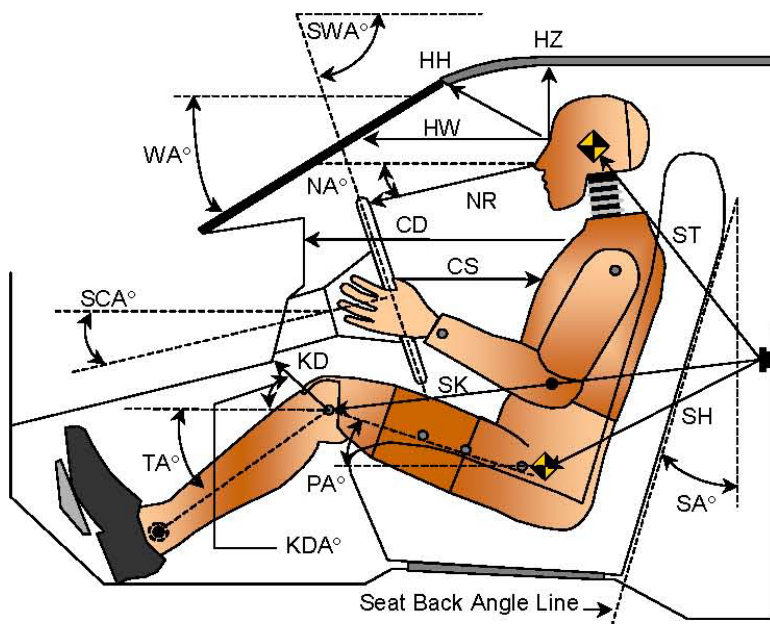
STEERING COLUMN POSITION

	Degrees	Fore/Aft Position (mm)
Lowermost – Position 1	73.4	176
Geometric Center – Position 2	70.6	152
Uppermost – Position 3	67.8	128
Telescoping Steering Wheel Travel		48
Test Position	70.6	152

DATA SHEET NO. 3 DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2012 Dodge Avenger SXT 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0310
Test Date: 10/03/2011

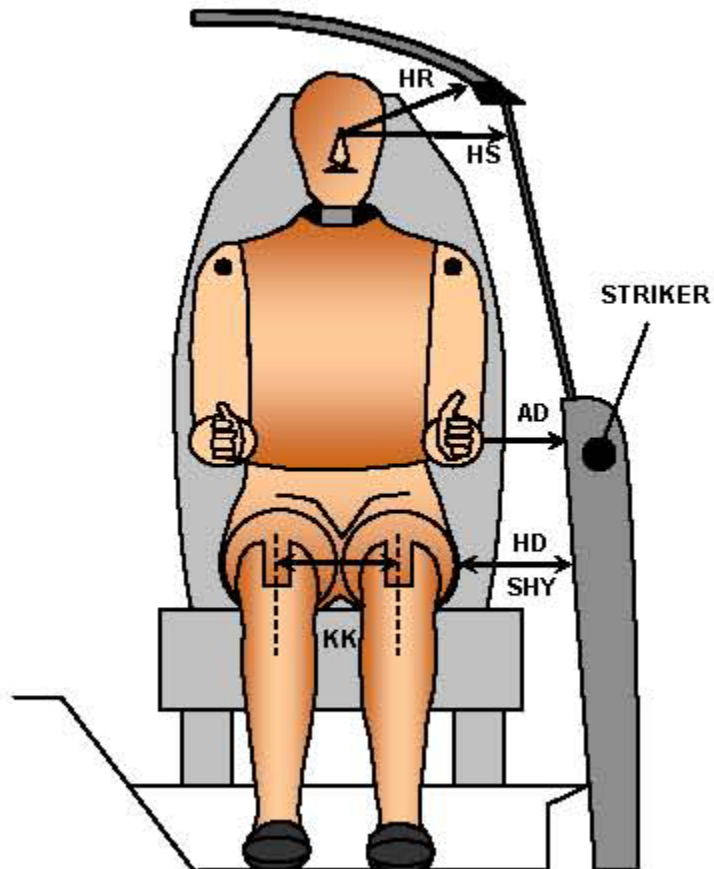


Code	Measurement Description	Driver S/N 036		Passenger S/N 634	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		27.4		
SWA°	Steering Wheel Angle		70.6		
SCA°	Steering Column Angle		29.4		
SA°	Seat Back Angle (on headrest post)		12.7		6.9
HZ	Head to Roof (Z)	180	90	184	90
HH	Head to Header	382	24.6	309	39.0
HW	Head to Windshield	720	0	622	0
NR	Nose to Rim	391	8.1		
CD	Chest to Dash	536		370	
CS	Chest to Steering Hub	305	2.6		
RA	Rim to Abdomen	215	0		
KDL	Left Knee to Dash	158	26.8	85	39.9
KDR	Right Knee to Dash	128	26.2	87	32.5
PA°	Pelvic Angle		23.7		21.7
TA°	Tibia Angle		40.2		46.4
SK	Striker to Knee	577	94.1	695	97.5
ST	Striker to Head	473	10.5	477	28.9
SH	Striker to H-Point	265	128.7	403	118.8

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2012 Dodge Avenger SXT 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0310
 Test Date: 10/03/2011



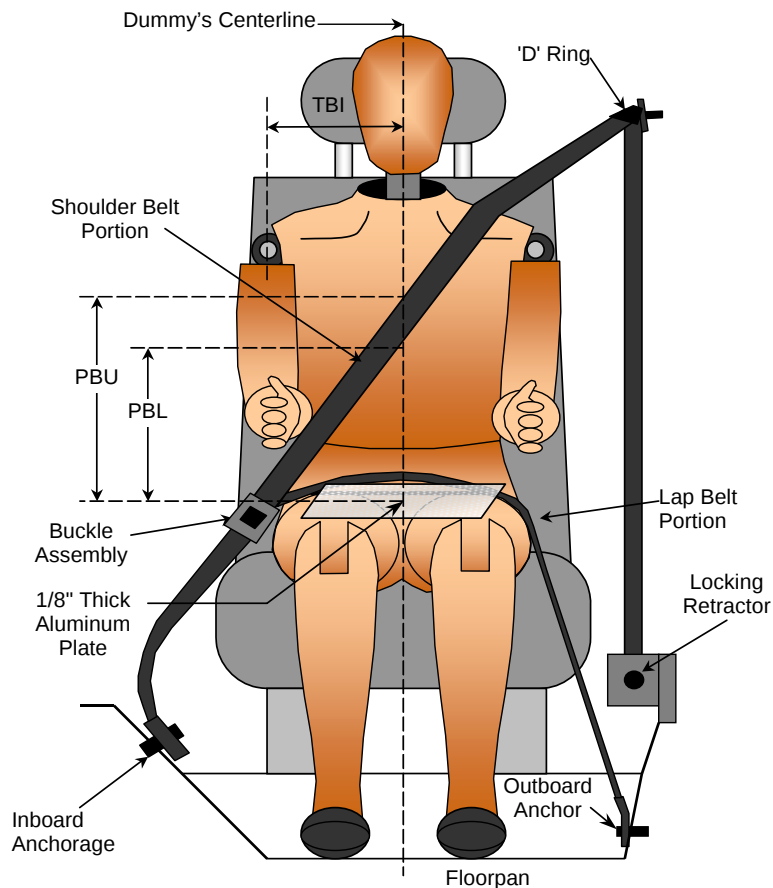
FRONT VIEW OF DUMMY

Code	Measurement Description	Driver S/N 036	Passenger S/N 634
		Length (mm)	
AD	Arm to Door	110	58
HD	H-Point to Door	142	177
HR	Head to Side Header	213	229
HS	Head to Side Window	356	411
KK	Knee to Knee	342	227
SHY	Striker to H-Point (Y Direction)	300	324
AA	Ankle to Ankle	340	163

DATA SHEET NO. 5 SEAT BELT POSITIONING DATA

Test Vehicle: 2012 Dodge Avenger SXT 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0310
Test Date: 10/03/2011



FRONT VIEW OF DUMMY

SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU - Top surface of reference to belt upper edge	mm	360	340
PBL - Top surface of reference to belt lower edge	mm	290	240

BELT LENGTH DATA

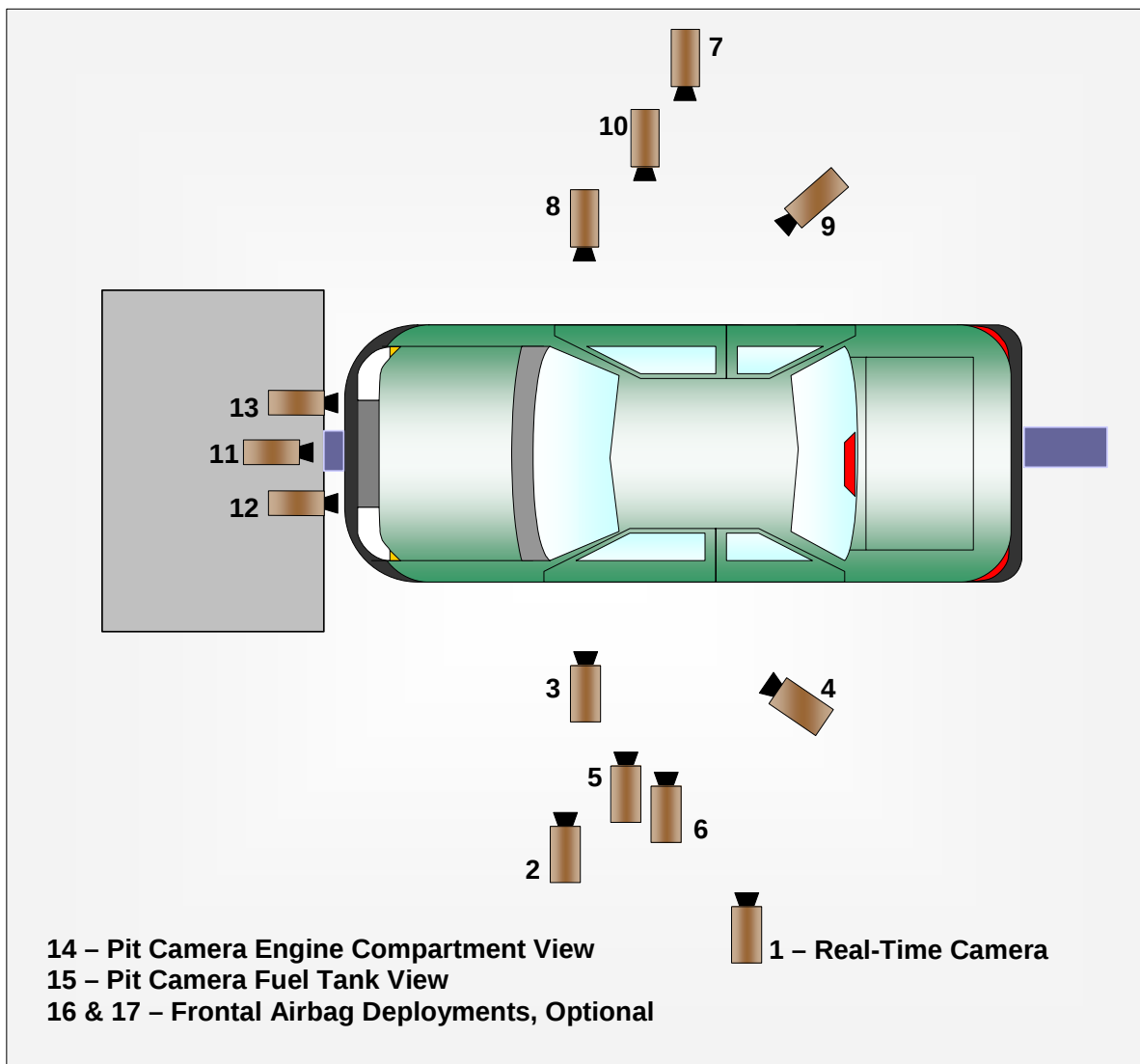
Measurement Description	Units	Driver	Passenger
Shoulder Belt Length as measured on ATD	mm	840	970
Lap Belt Length as measured on ATD	mm	565	590
Remainder of belt on reel	mm	1645	1540
Total Belt Length for Continuous Webbing Systems	mm	3050	3100

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

Test Vehicle: 2012 Dodge Avenger SXT 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0310
Test Date: 10/03/2011

CAMERA POSITIONS FOR FRONTAL IMPACTS



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

Test Vehicle: 2012 Dodge Avenger SXT 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0310
 Test Date: 10/03/2011

CAMERA LOCATIONS

No.	Camera View	Coordinates (mm)			Lens (mm)	Speed (fps)
		X*	Y*	Z*		
1	Real-Time Left Overall					30
2	Driver Close-Up	1370	-6320	-1780	35	1000
3	Left Front Half	1140	-4830	-1080	24	1000
4	Left Angle	5540	-4800	-1900	50	1000
5	Steering Column - Top	540	-5090	-1240	24	1000
6	Steering Column - Bottom	510	-5020	-830	24	1000
7	Right Overall	1920	6050	-1060	20	1000
8	Passenger Close-Up	1380	6510	-1800	35	1000
9	Right Front Half	1190	4910	-1070	24	1000
10	Right Angle	5620	4790	-1920	50	1000
11	Windshield	-130	0	-2810	24	1000
12	Driver Windshield	250	-450	-2030	12.5	1000
13	Passenger Windshield	250	450	-2030	12.5	1000
14	Pit Front	1190	0	3150	24	1000
15	Pit Rear	3160	0	3150	24	1000
16	Onboard Driver Side (optional)					
17	Onboard Passenger Side (optional)					
18	Real-Time Pan View					30

***COORDINATES:**

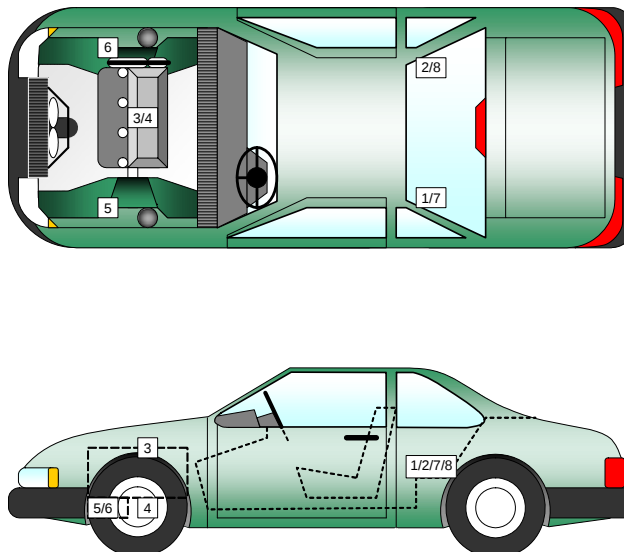
- +X = forward of impact plane
- +Y = right of monorail centerline
- +Z = below ground level

Cameras 16 & 17 were not used for this test.

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

Test Vehicle: 2012 Dodge Avenger SXT 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0310
 Test Date: 10/03/2011



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear Accelerometer – X Direction	1980	-482	-240
2	Right Rear Accelerometer – X Direction	1980	388	-240
3	Engine Top X	4055	0	-930
4	Engine Bottom X	4020	0	-292
5	Left Brake Caliper X	3965	-705	-230
6	Right Brake Caliper X	3965	705	-230
7	Left Rear Accelerometer Redundant – X Direction	1980	-482	-240
8	Right Rear Accelerometer Redundant – X Direction	1980	388	-240

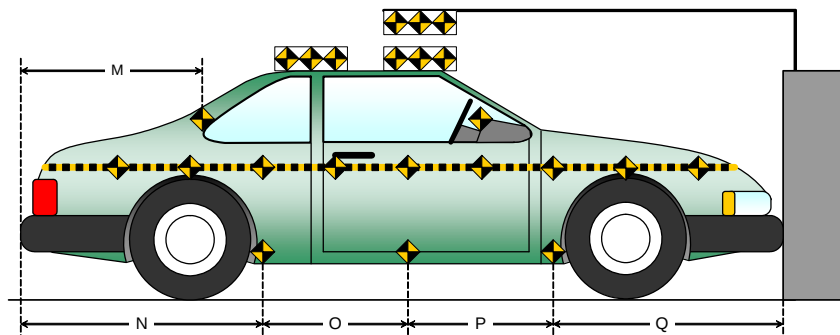
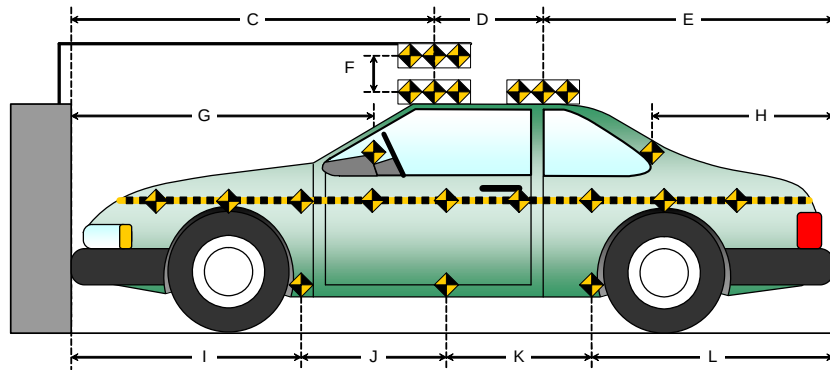
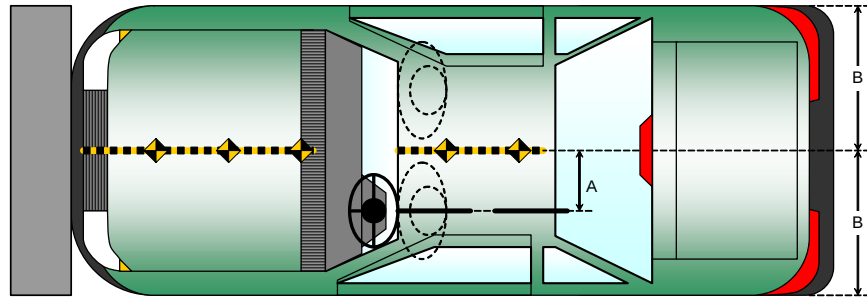
Reference Points: X - Rear Surface of Vehicle (+ forward)
 Y - Vehicle Centerline (+ to right)
 Z - Ground Plane (+ down)

DATA SHEET NO. 8
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2012 Dodge Avenger SXT 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0310
 Test Date: 10/03/2011

Item	Value (mm)
A	360
B	905
C	2475
D	670
E	1750
F	147
G	
H	1225
I	1611
J	865
K	865
L	1554
M	1225
N	1554
O	865
P	865
Q	1611



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

Test Vehicle: 2012 Dodge Avenger SXT 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0310
 Test Date: 10/03/2011

Advanced Research Load Cell Barrier



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

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

DATA SHEET NO. 10
TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle: 2012 Dodge Avenger SXT 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0310
Test Date: 10/03/2011

INSTRUMENTATION

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

CAMERA COVERAGE

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

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

Test Vehicle: 2012 Dodge Avenger SXT 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0310
Test Date: 10/03/2011

TEST DUMMY INFORMATION AND CONTACT LOCATIONS

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

DOOR OPENING AND SEAT TRACK INFORMATION

Description	Driver	Passenger
Locked/Unlocked Doors	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	740
Center	mm	670
Right Side	mm	780
Average	mm	730

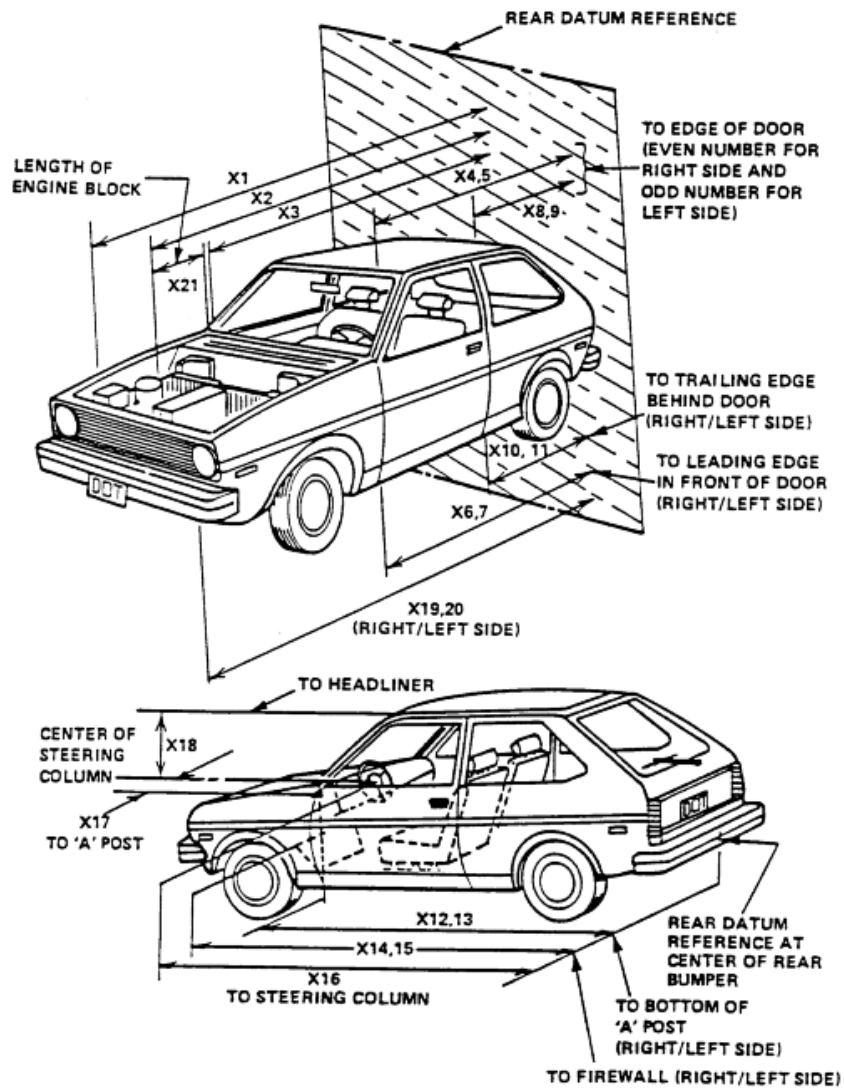
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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 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: 2012 Dodge Avenger SXT 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0310
Test Date: 10/03/2011



DATA SHEET NO. 12 (CONTINUED)
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2012 Dodge Avenger SXT 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0310
 Test Date: 10/03/2011

RSOV (Rear Surface of Vehicle)

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	mm	4895	4485	410
2	RSOV to Front of Engine	mm	4326	4178	148
3	RSOV to Firewall	mm	3777	3772	5
4	RSOV to Upper Leading Edge of Right Door	mm	3310	3310	0
5	RSOV to Upper Leading Edge of Left Door	mm	3310	3310	0
6	RSOV to Lower Leading Edge of Right Door	mm	3307	3307	0
7	RSOV to Lower Leading Edge of Left Door	mm	3307	3305	2
8	RSOV to Upper Trailing Edge of Right Door	mm	2225	2222	3
9	RSOV to Upper Trailing Edge of Left Door	mm	2225	2225	0
10	RSOV to Lower Trailing Edge of Right Door	mm	2245	2245	0
11	RSOV to Lower Trailing Edge of Left Door	mm	2245	2243	2
12	RSOV to Bottom of "A" Post of Right Side	mm	3320	3320	0
13	RSOV to Bottom of "A" Post of Left Side	mm	3315	3315	0
14	RSOV to Firewall, Right Side	mm	3922	3920	2
15	RSOV to Firewall, Left Side	mm	3925	3920	5
16	RSOV to Steering Column	mm	2795	2847	-52
17	Center of Steering Column to "A" Post	mm	396	425	-29
18	Center of Steering Column to Headliner	mm	435	470	-35
19	RSOV to Right Side of Front Bumper	mm	4714	4380	334
20	RSOV to Left Side of Front Bumper	mm	4714	4425	289
21	Length of Engine Block	mm	497	497	0
RD	RSOV to Right Side of Dash Panel	mm	3030	3030	0
CD	RSOV to Center of Dash Panel	mm	2990	2990	0
LD	RSOV to Left Side of Dash Panel	mm	3056	3050	6

DATA SHEET NO. 13
ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2012 Dodge Avenger SXT 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0310
Test Date: 10/03/2011

VEHICLE INFORMATION

VIN: 1C3CDZEGXCN112490 Wheelbase (mm): 2765
Vehicle Size Category: Sedan Test Weight (kg): 1823.9

ACCELEROMETER DATA

Accelerometer Locations: As per measurements on Page 15

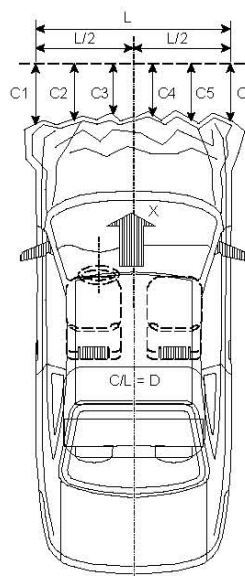
Cal. Procedure/Interval: MGA procedure / 6 month

Integration Algorithm: Trapezoidal Linearity: > 99%

Impact Velocity (km/h): 56.6

Velocity Change (km/h): 63.3

Time of Separation (msec): 93.6



CRUSH PROFILE

Collision Deformation Classification: Frontal

Midpoint of Damage: Centerline

Damage Region Length (mm): 1350

Impact Mode: Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	4714	4425	289
C2	Crush zone 2 at left side	mm	4800	4450	350
C3	Crush zone 3 at left side	mm	4851	4480	371
C4	Crush zone 4 at right side	mm	4851	4465	386
C5	Crush zone 5 at right side	mm	4800	4440	360
C6	Crush zone 6 at right side	mm	4714	4380	334
L	C1 TO C6	mm	1350	1340	10

DATA SHEET NO. 14
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2012 Dodge Avenger SXT 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

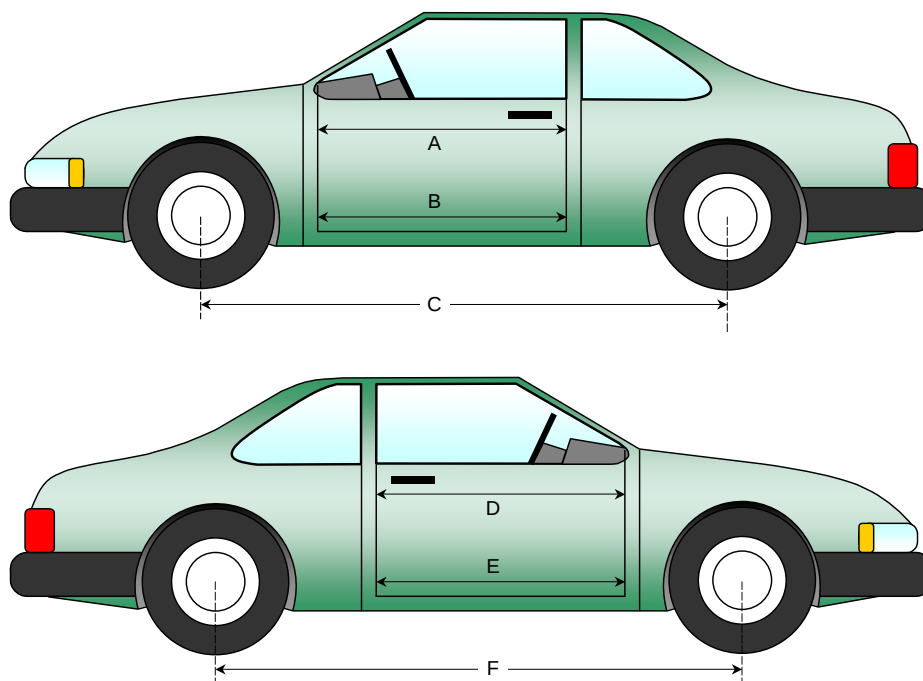
NHTSA No.: MC0310
Test Date: 10/03/2011

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	997	997	0
B	Left Side Lower	mm	945	945	0
D	Right Side Upper	mm	997	997	0
E	Right Side Lower	mm	945	945	0

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2765	2670	95
F	Right Side Wheelbase	mm	2765	2712	53



DATA SHEET NO. 14 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

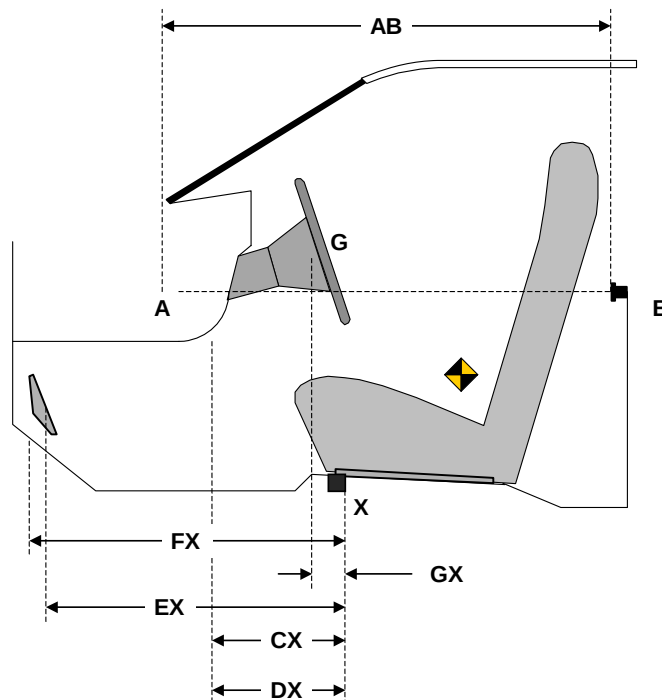
Test Vehicle: 2012 Dodge Avenger SXT 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0310
 Test Date: 10/03/2011

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside window jam)	mm	818	818	0
CX	Left Knee Bolster to X	mm	221	220	1
DX	Right Knee Bolster to X	mm	173	163	10
EX	Brake Pedal to X	mm	520	510	10
FX	Foot Rest to X	mm	582	557	25
GX	Center of Steering Column Wheel Hub to X	mm	16	35	-19

X = Front of Seat Track (stationary)

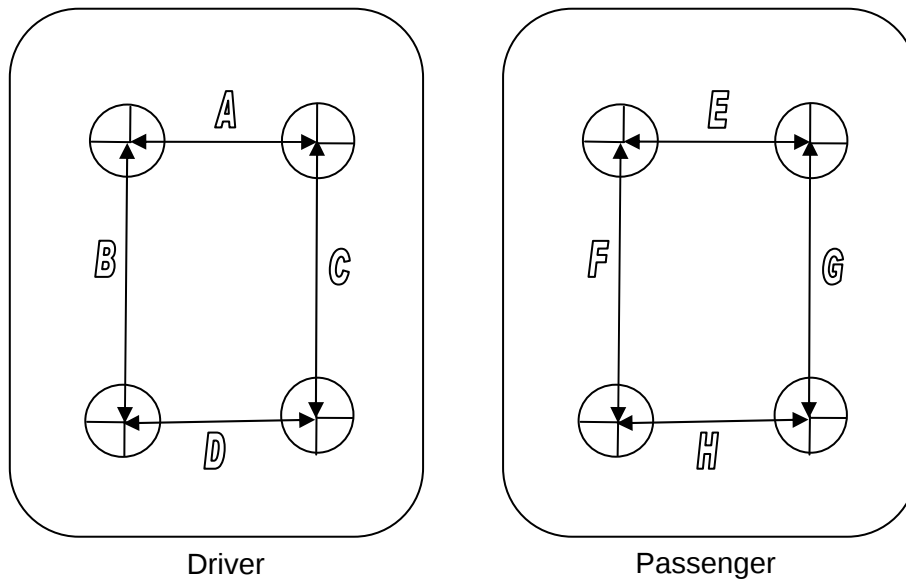


DRIVER COMPARTMENT

DATA SHEET NO. 14 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2012 Dodge Avenger SXT 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0310
 Test Date: 10/03/2011



TOP VIEW THROUGH FLOOR PAN

UNDERBODY FLOORBOARD DEFORMATION

Measurement	Units	Pre-Test	Post-Test	Difference
A	mm	335	335	0
B	mm	335	331	4
C	mm	335	333	2
D	mm	335	335	0
E	mm	325	325	0
F	mm	325	323	2
G	mm	325	322	3
H	mm	325	325	0

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

Test Vehicle: 2012 Dodge Avenger SXT 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0310
 Test Date: 10/03/2011

Windshield Mounting Details:

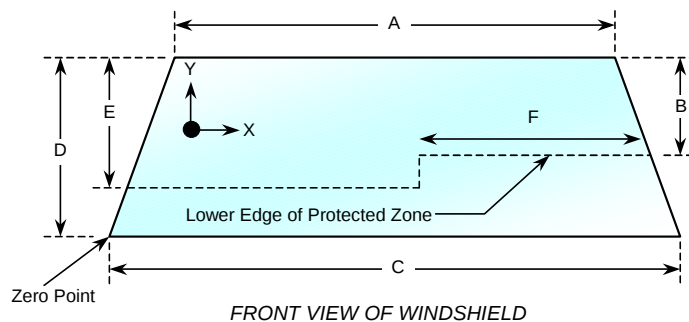
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

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	2133	2133	100
Right Side	2133	2133	100
Total	4266	4266	100



Item	Units	Value
A	mm	1236
B	mm	450
C	mm	1560
D	mm	735
E	mm	456
F	mm	539

AREA OF PROTECTED ZONE FAILURES - NONE

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

X	Y

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

X	Y

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

Test Vehicle:	<u>2012 Dodge Avenger SXT 4-Dr Sedan</u>	NHTSA No.:	<u>MC0310</u>
Test Program:	<u>NCAP Frontal Barrier Impact Test</u>	Test Date:	<u>10/03/2011</u>

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Test Time: 10:39 am

Temperature: 22.2° 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> |

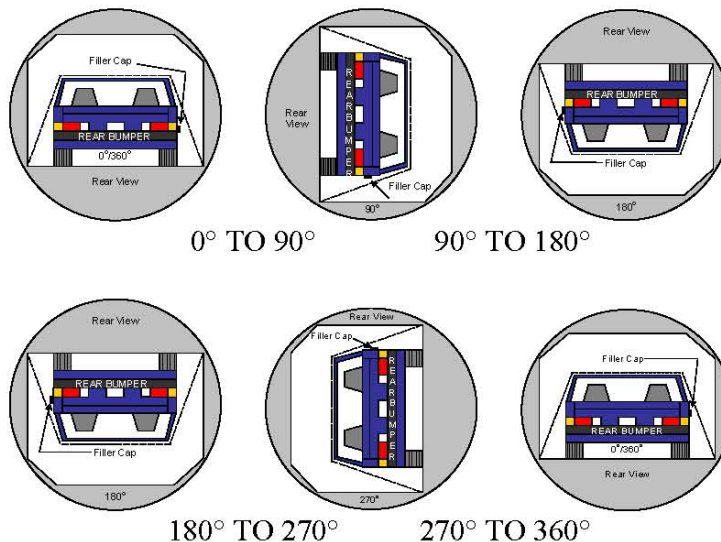
DATA SHEET NO. 16

FMVSS 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2012 Dodge Avenger SXT 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0310
 Test Date: 10/03/2011

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°	117	300	417
90° to 180°	115	300	415
180° to 270°	108	300	408
270° to 360°	115	300	415

FMVSS 301 ROLLOVER SPILLAGE TABLE (units in ounces)

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

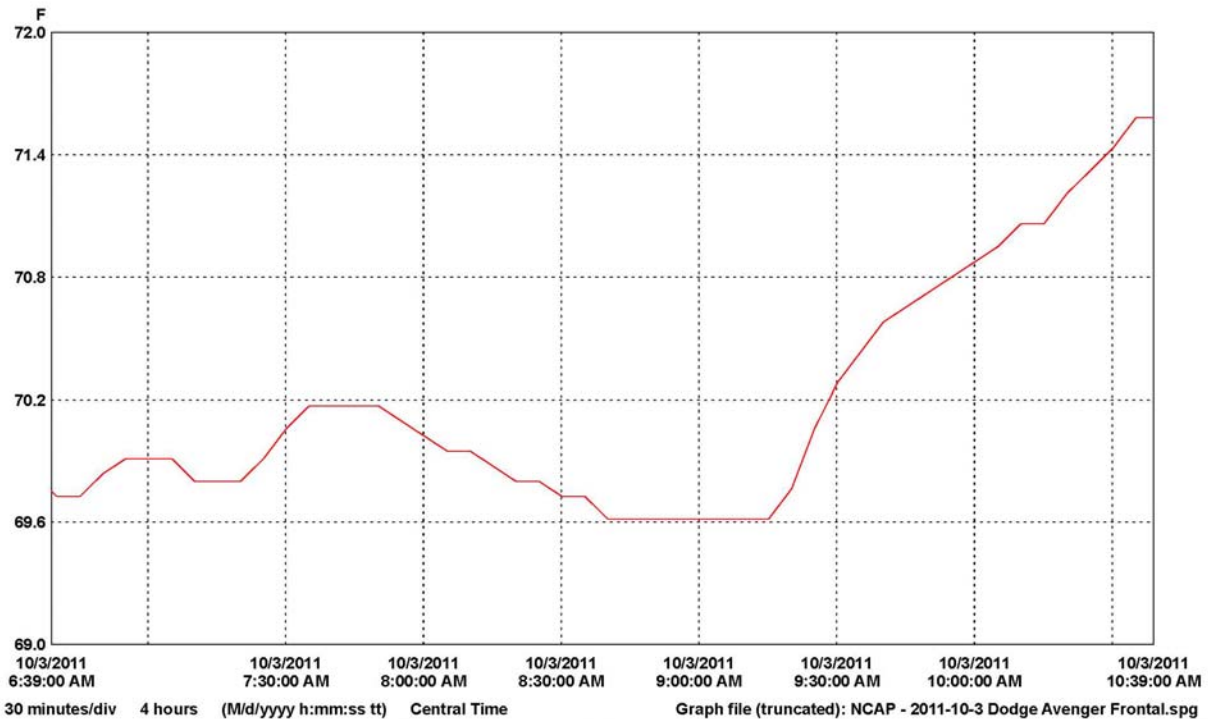
ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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

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

Test Vehicle: 2012 Dodge Avenger SXT 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0310
 Test Date: 10/03/2011



LN	Serial #	Description	CH	Value	Maximum	Average	Minimum	Units	CH description	Logger file
1	04042132	MGA logger	1		71.58	70.16	69.61	F	Temperature	04042132_MGA_logger.spl

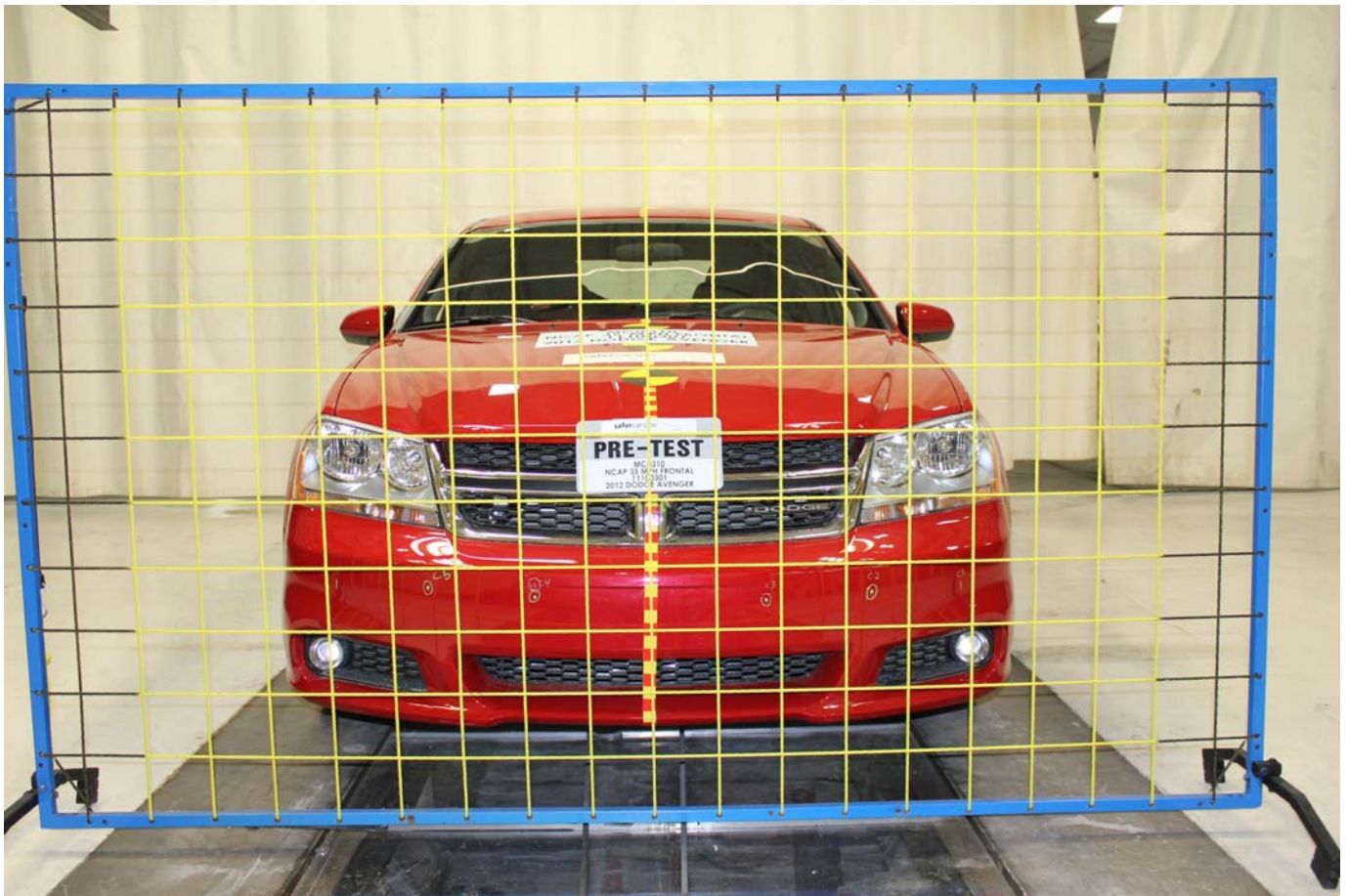
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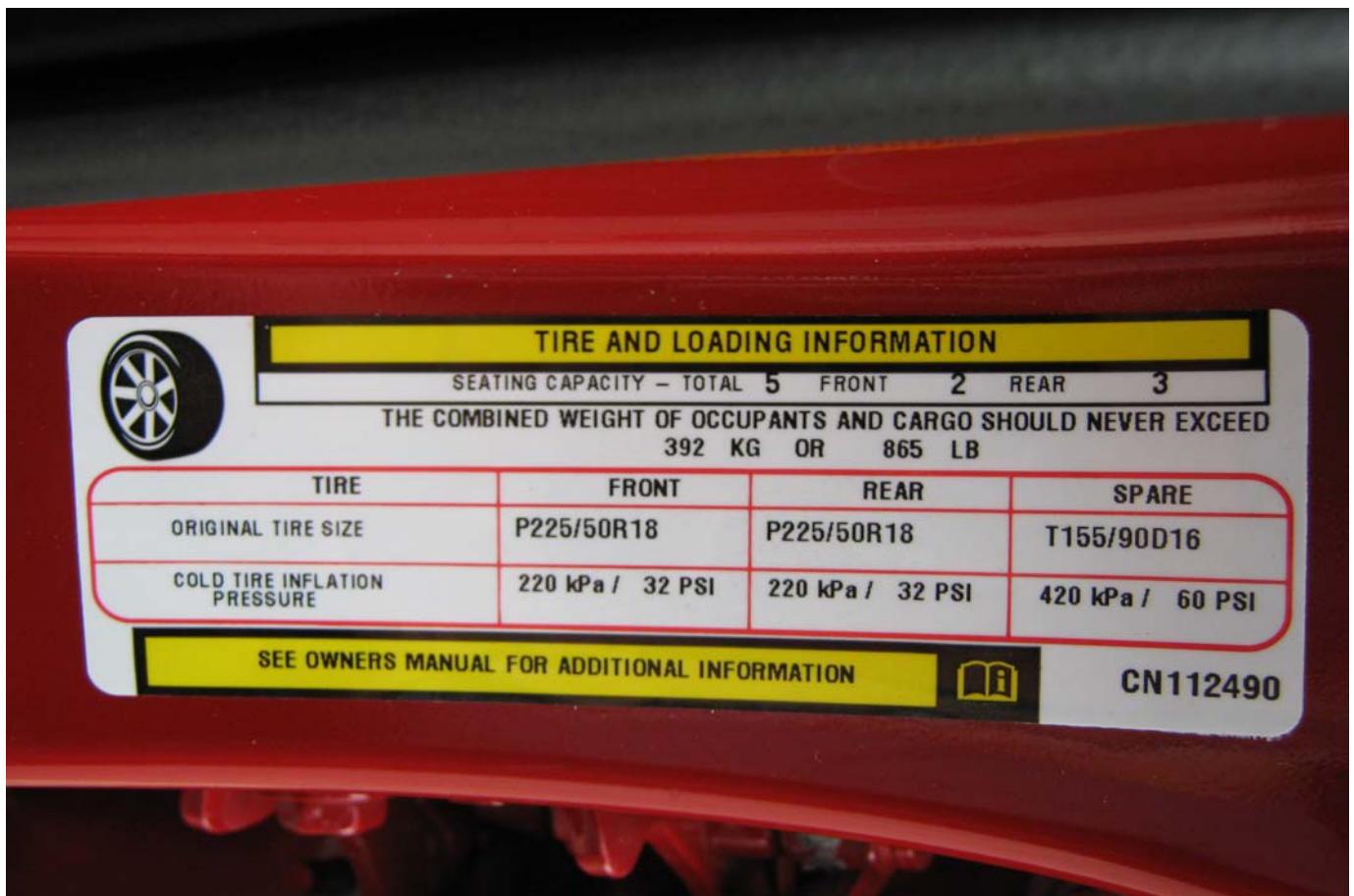
Load Cell Location



Load Cell Wall



Manufacturer's Label



Tire Placard



2012 Dodge Avenger SXT Frontal As Delivered



Left Rear Three-Quarter View, As Received



Pre-Test Front View of Test Vehicle



Post-Test Front View of Test Vehicle



Pre-Test Left View of Test Vehicle



Post-Test Left View of Test Vehicle



Pre-Test Right View of Test Vehicle



Post-Test Right View of Test Vehicle



Pre-Test Right Front Three-Quarter View



Post-Test Right Front Three-Quarter View



Pre-Test Left Rear Three-Quarter View



Post-Test Left Rear Three-Quarter View



Pre-Test Windshield View



Post-Test Windshield View



Pre-Test Engine Compartment View



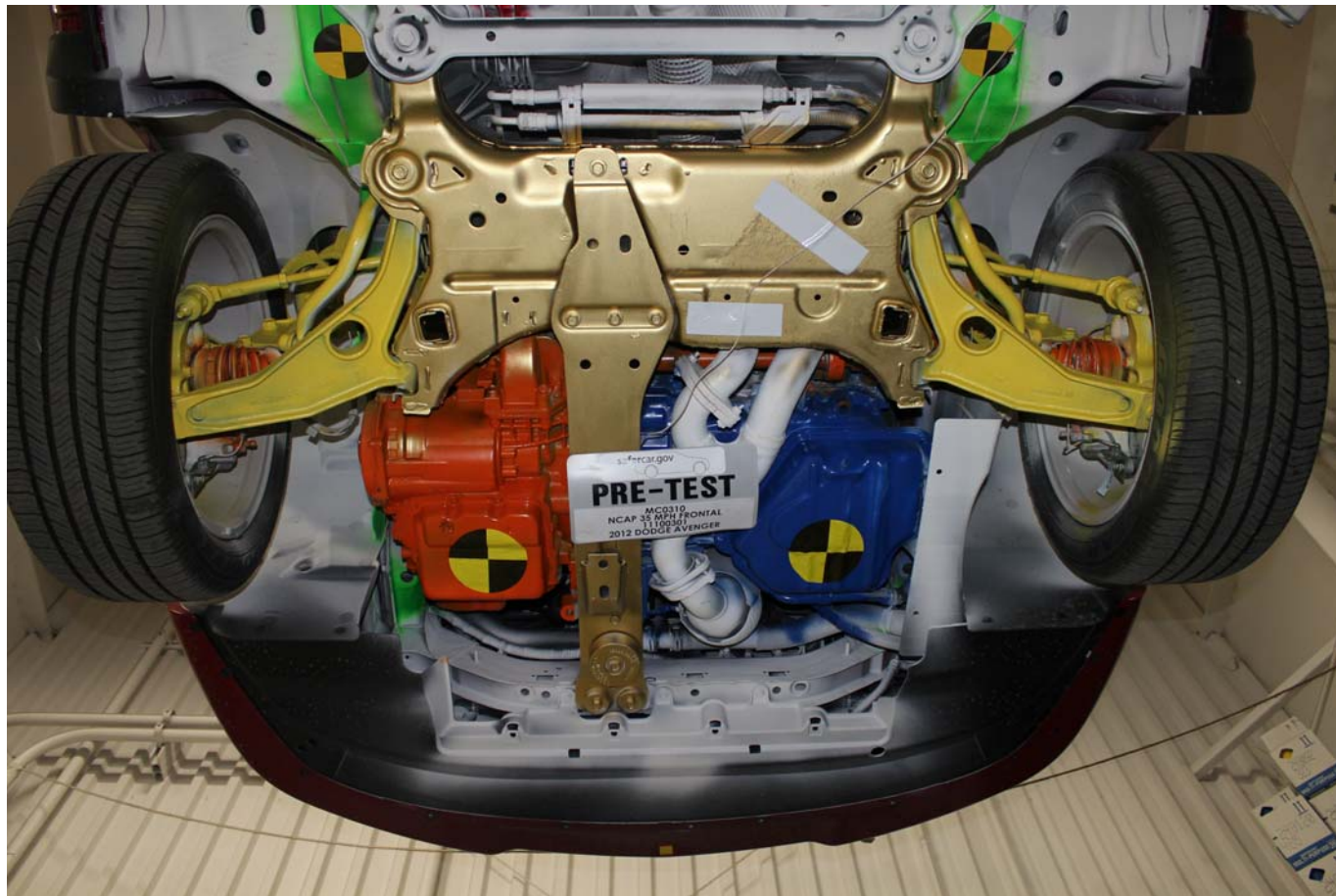
Post-Test Engine Compartment View



Pre-Test Fuel Filler Cap View



Post-Test Fuel Filler Cap View



Pre-Test Front Underbody View



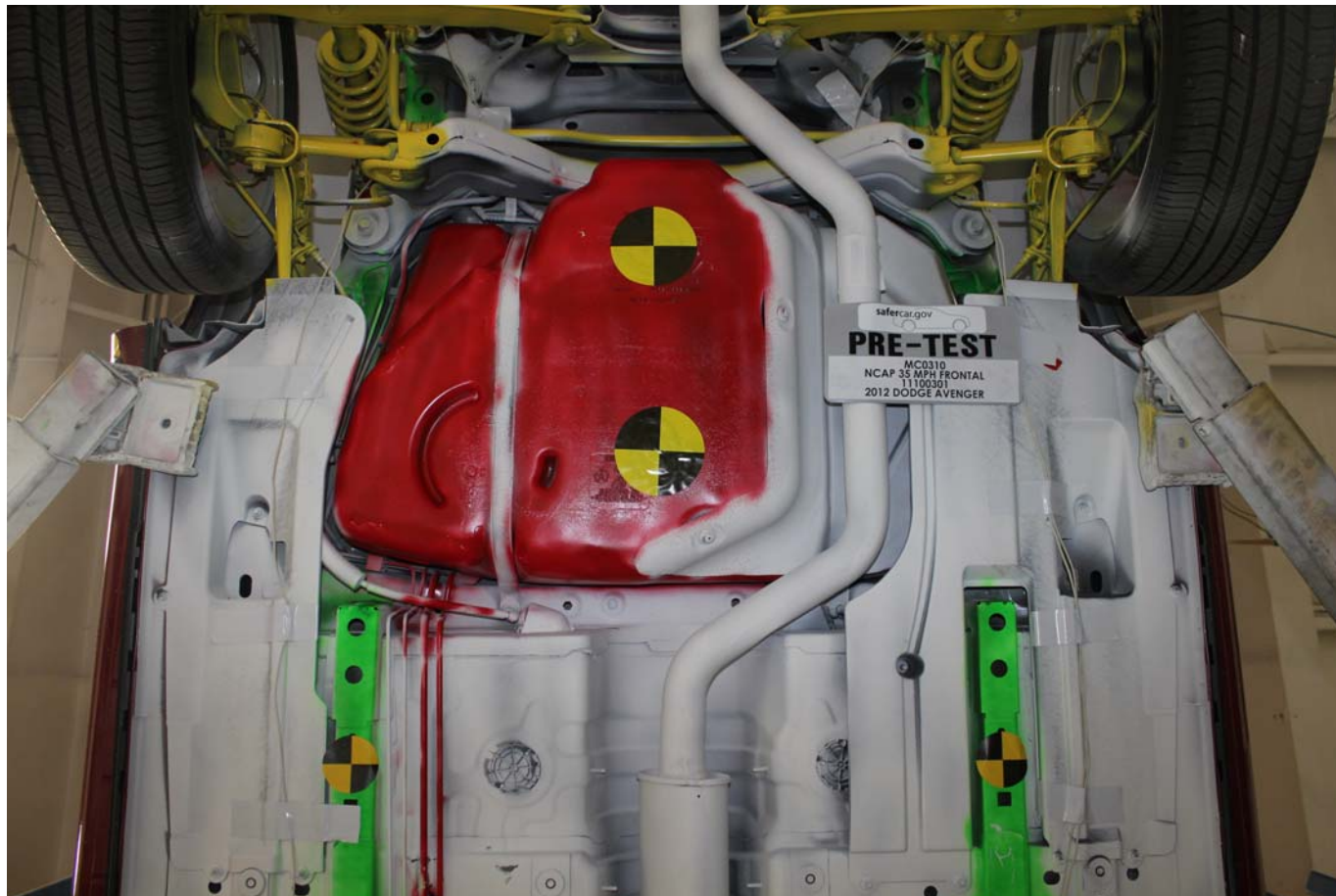
Post-Test Front Underbody View



Pre-Test Mid Front Underbody View



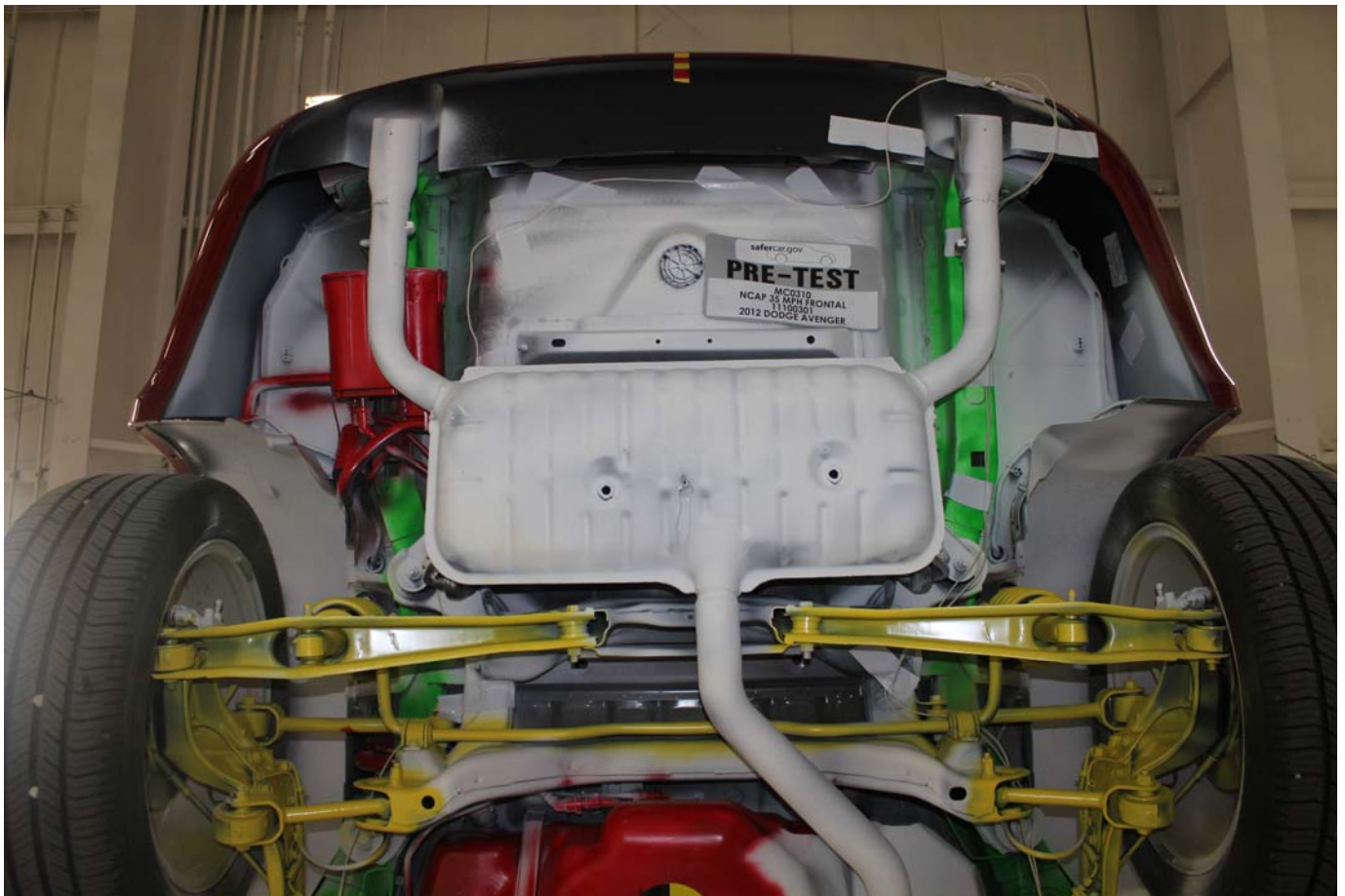
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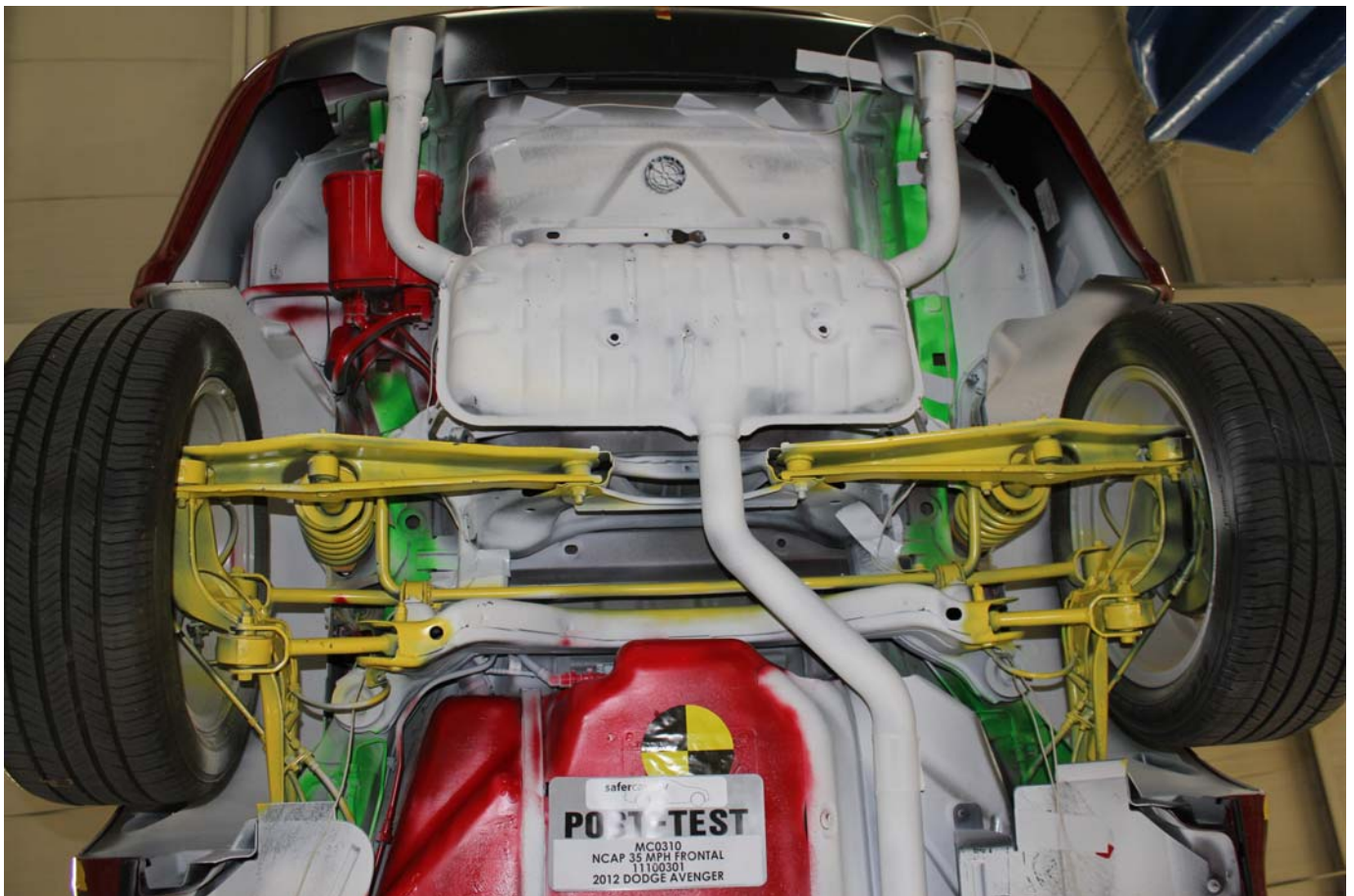
Pre-Test Mid Rear Underbody View



Post-Test Mid Rear Underbody View



Pre-Test Rear Underbody View



Post-Test Rear Underbody View



Pre-Test Dummy Cable Routing



Post-Test Dummy Cable Routing



Pre-Test Driver Dummy Front View



Post-Test Driver Dummy Front View



Pre-Test Driver Dummy Window View



Post-Test Driver Dummy Window View



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



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



Pre-Test Driver's Seat Fore-Aft Markings



Post-Test Driver's Seat Fore-Aft Markings



Pre-Test Driver Dummy Feet



Post-Test Driver Dummy Feet

PHOTOGRAPH NOT AVAILABLE

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



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



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



Pre-Test Driver's Side Floorpan



Post-Test Driver's Side Floorpan



Post-Test Driver Dummy Face



Post-Test Driver Dummy Contact with Airbag



Post-Test Driver Dummy Contact with Headrest



Pre-Test View of the Steering Wheel



Post-Test View of the Steering Wheel



Pre-Test Passenger Dummy Front View



Post-Test Passenger Dummy Front View



Pre-Test Passenger Dummy Window View



Post-Test Passenger Dummy Window View



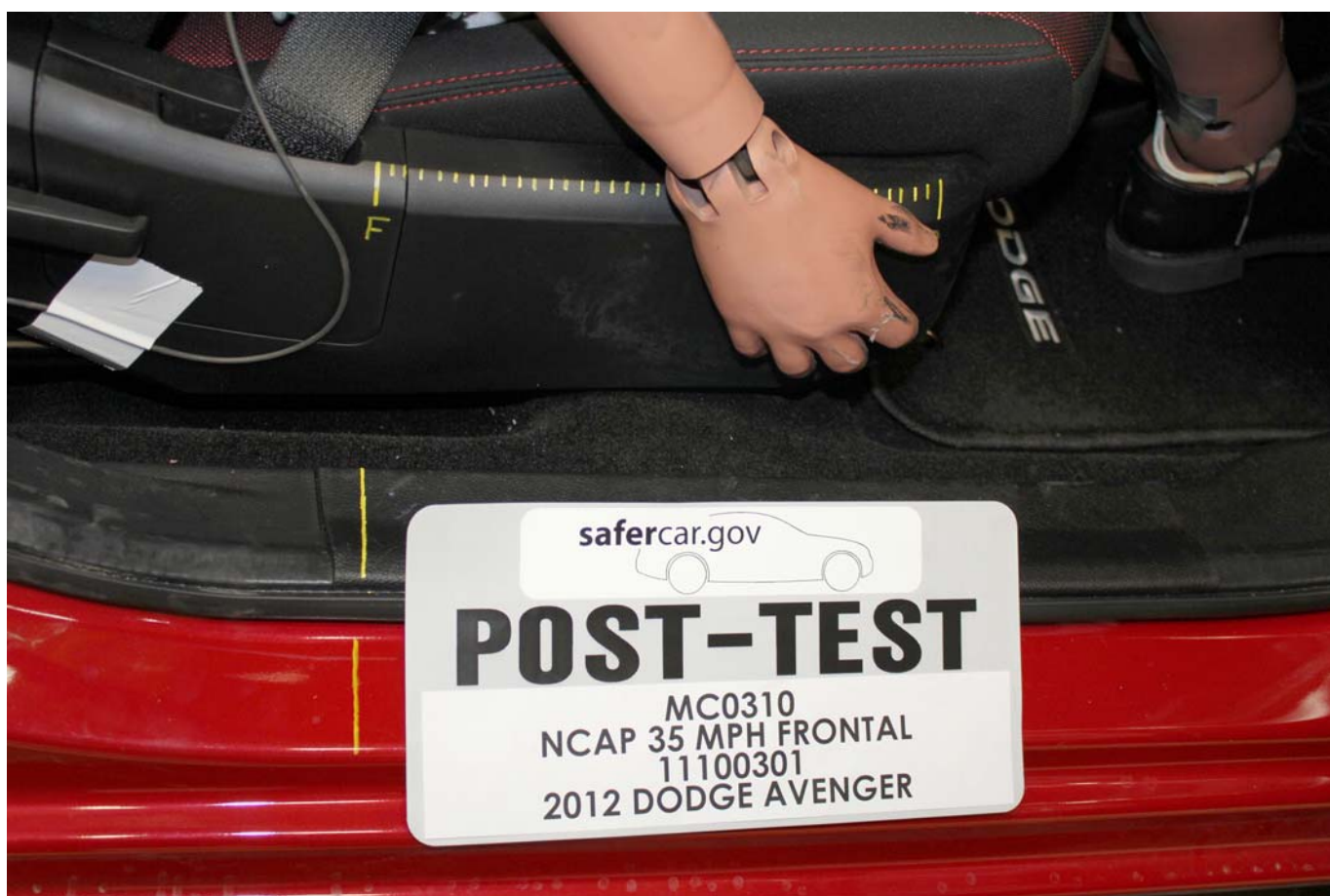
Pre-Test Passenger Dummy and Vehicle Interior (Door Open)



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



Pre-Test Passenger's Seat Fore-Aft Markings



Post-Test Passenger's Seat Fore-Aft Markings



Pre-Test Passenger Dummy Feet



Post-Test Passenger Dummy Feet



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



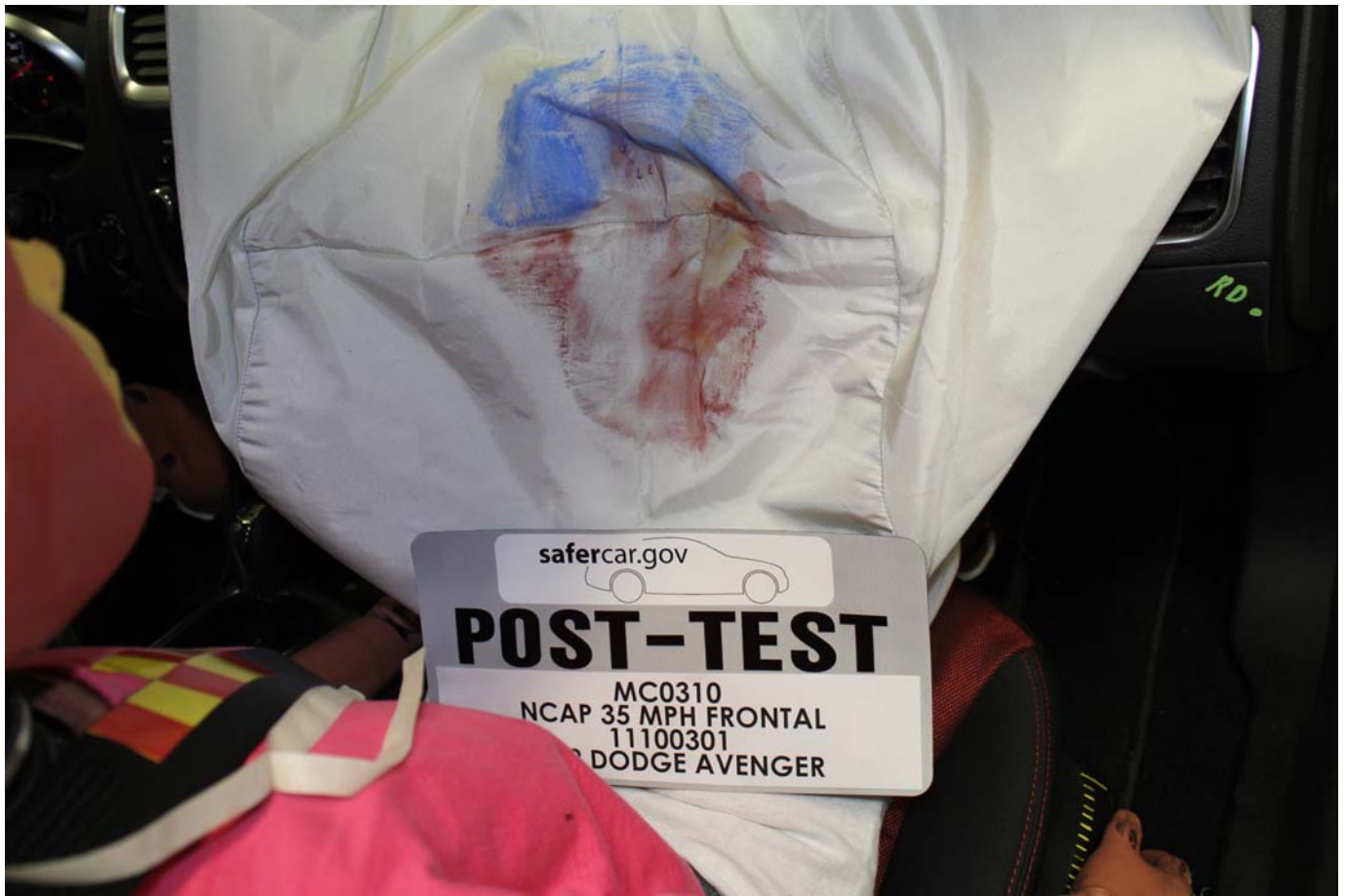
Post-Test Passenger's Side Knee Bolster (without dummy)



Pre-Test Passenger's Side Floorpan



Post-Test Passenger's Side Floorpan



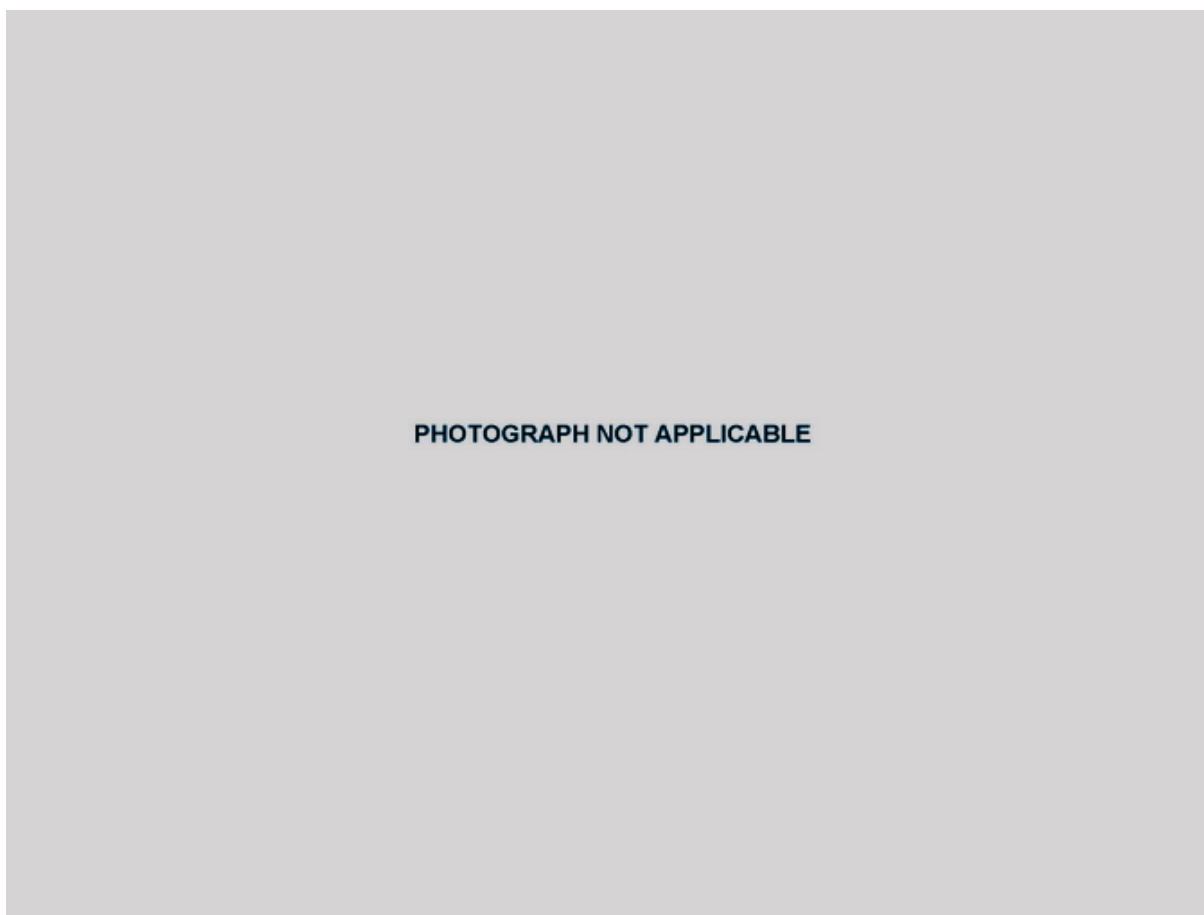
Post-Test Passenger Dummy Contact with Airbag



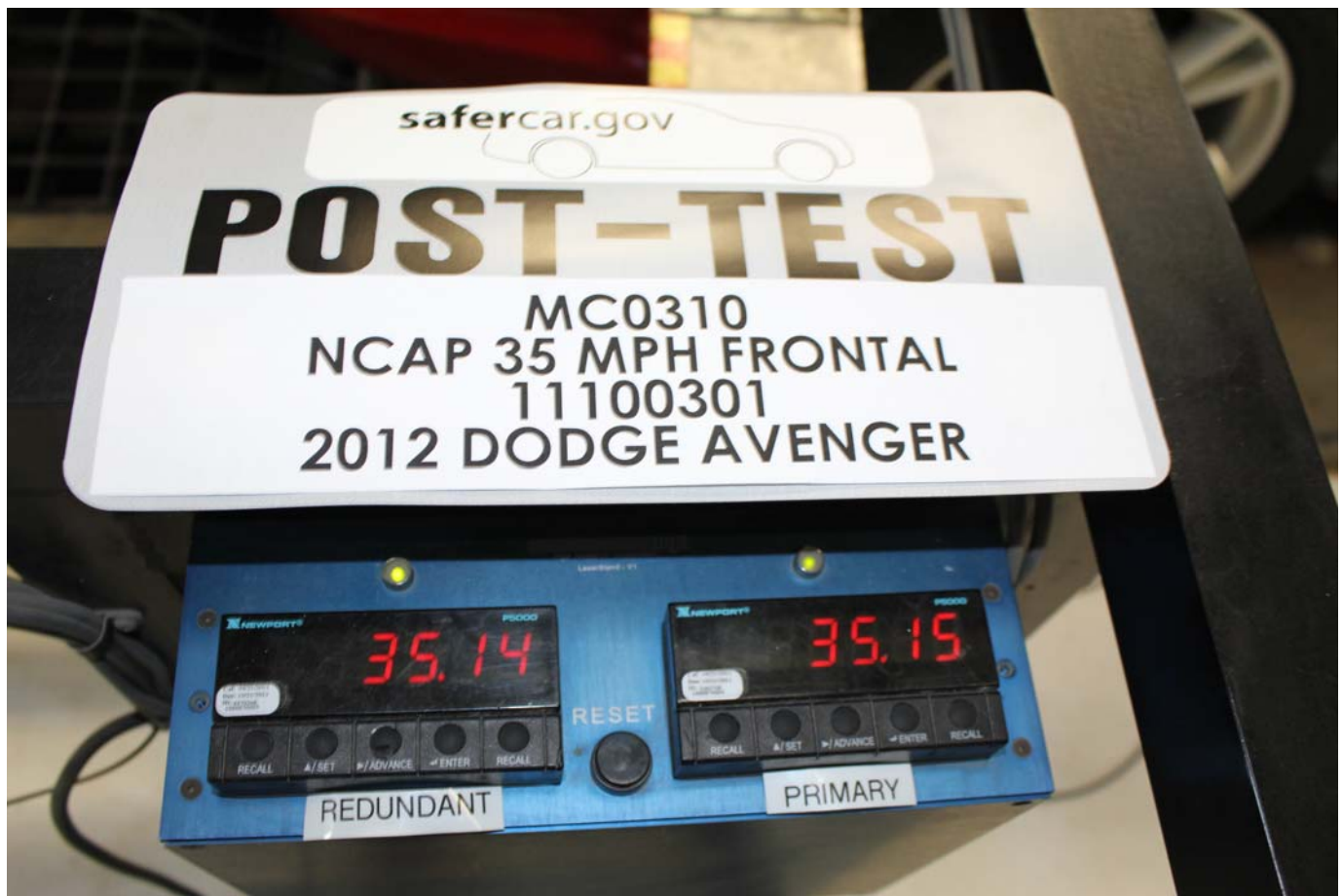
Post-Test Passenger Dummy Contact with Headrest



Ballast Installed in Vehicle



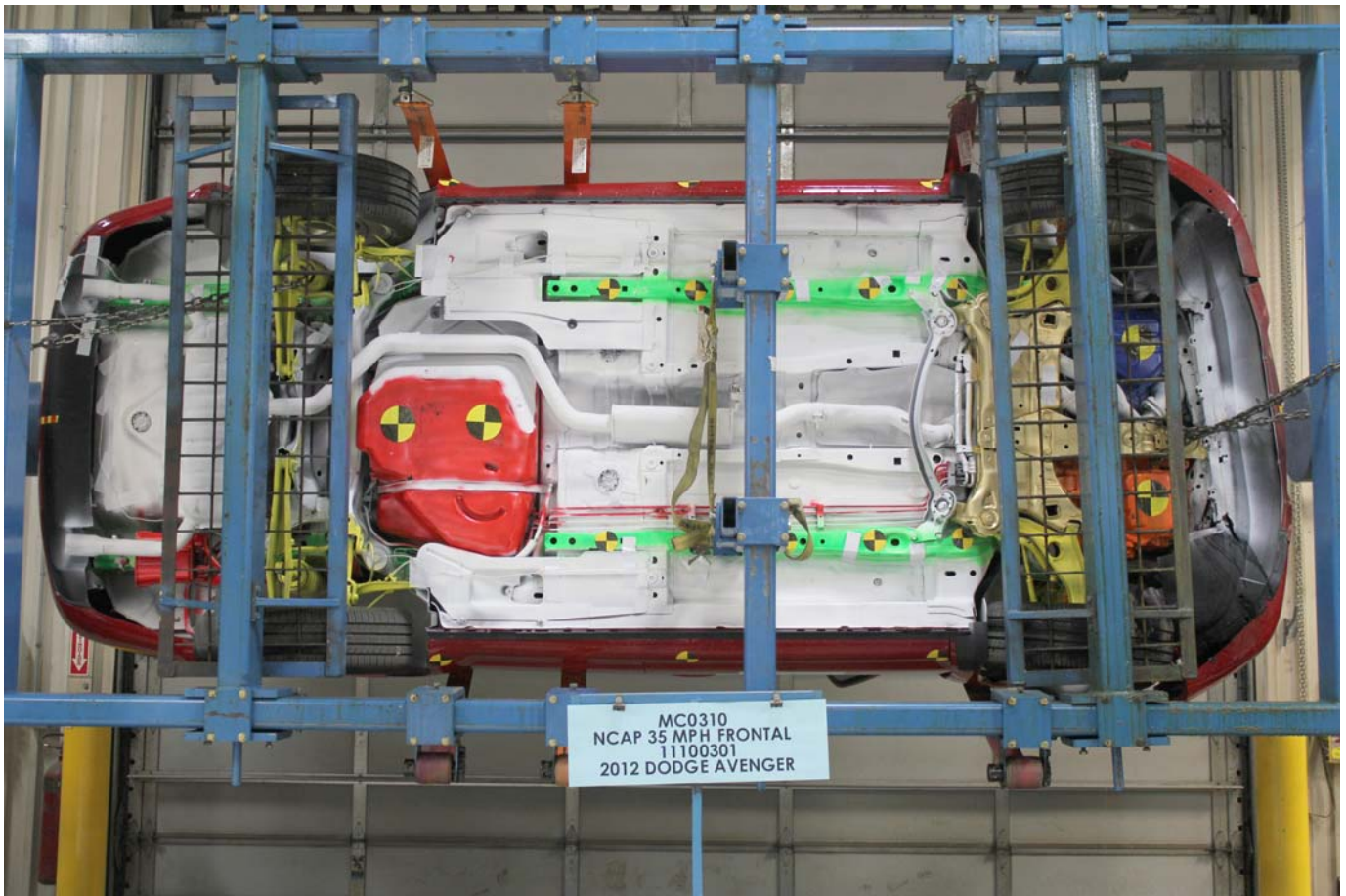
Post-Test Stoddard Solvent Spillage Location View



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

APPENDIX B
DUMMY RESPONSE DATA TRACES

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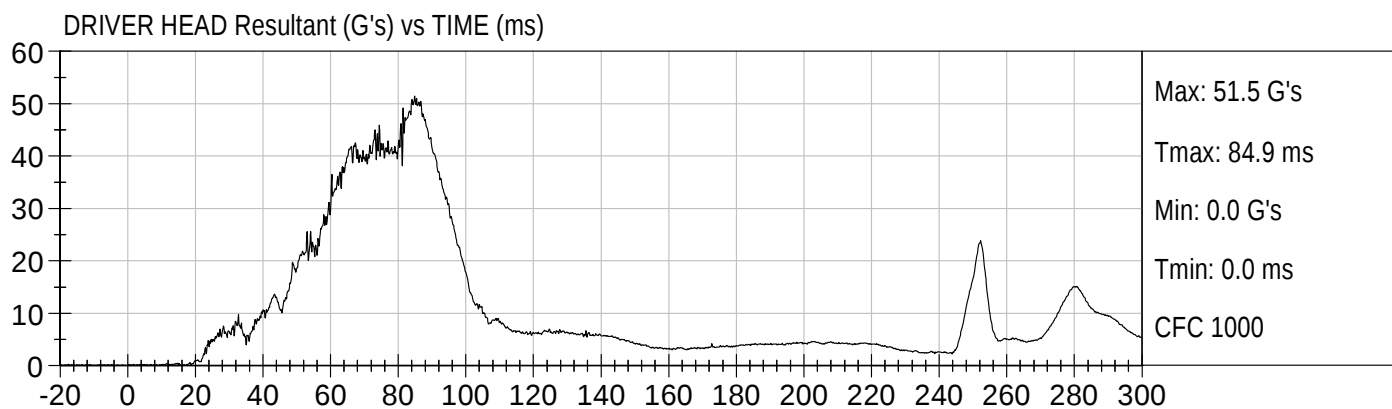
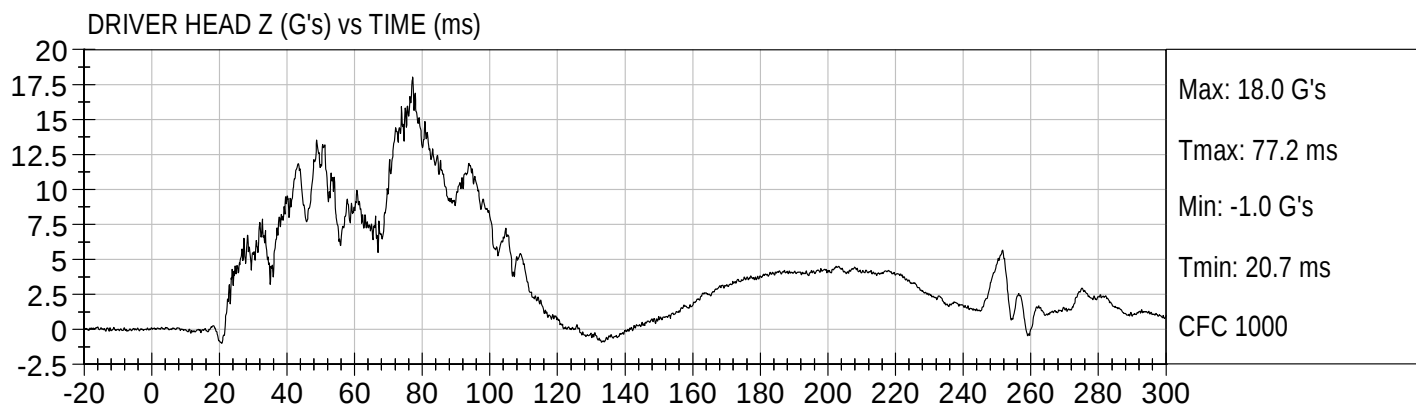
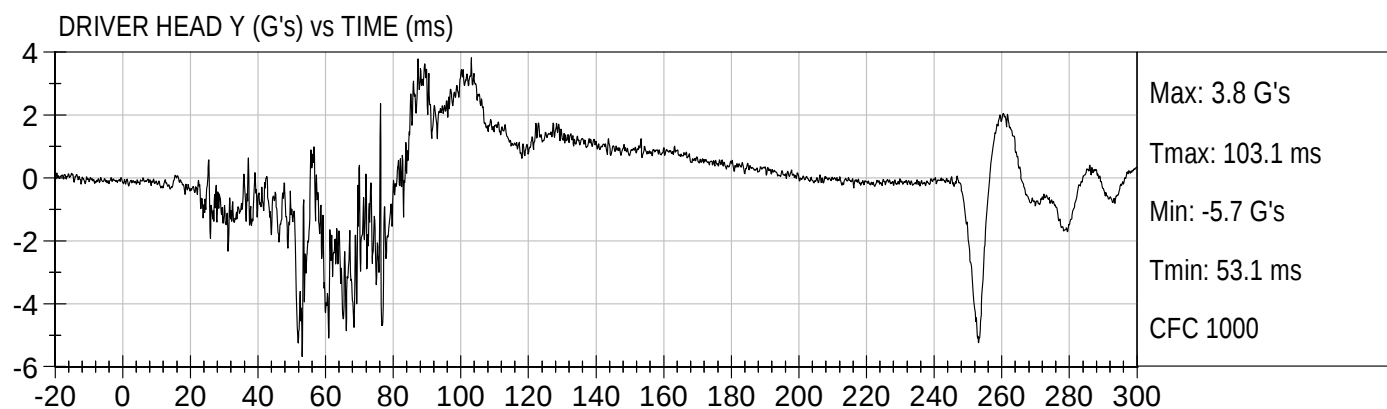
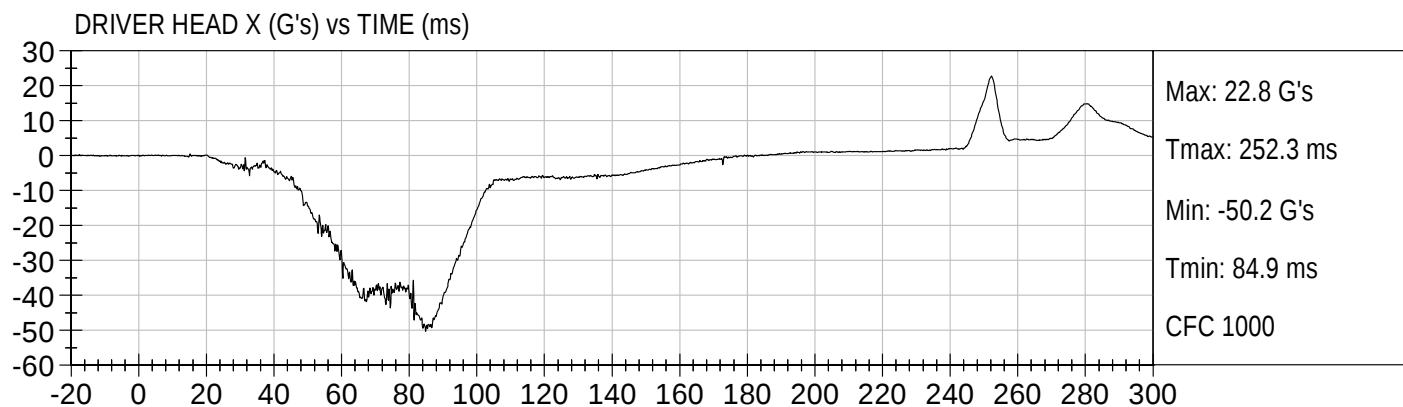
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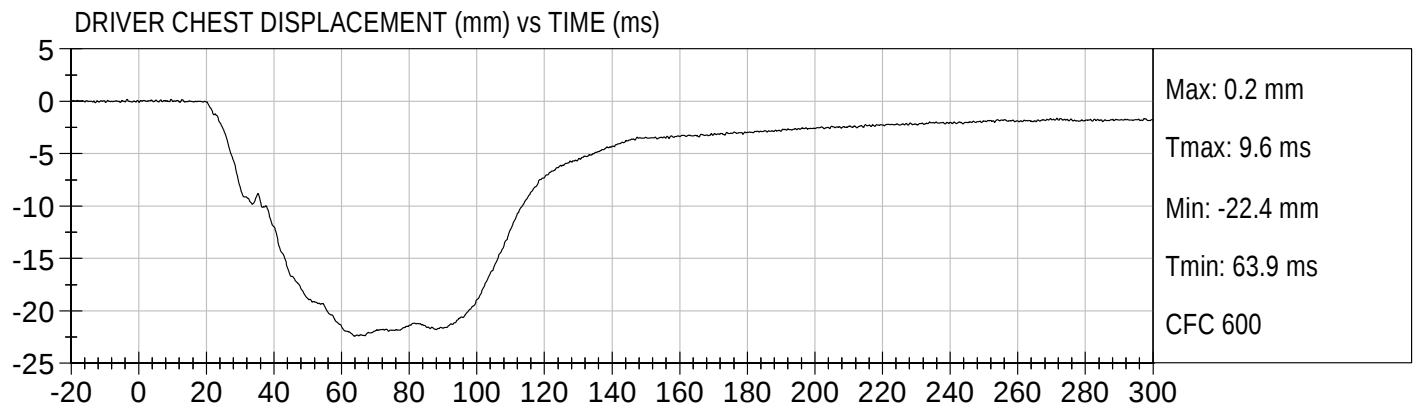
The following additional dummy and vehicle response data can be found in the R&D section of the NHTSA website at www.nhtsa.dot.gov

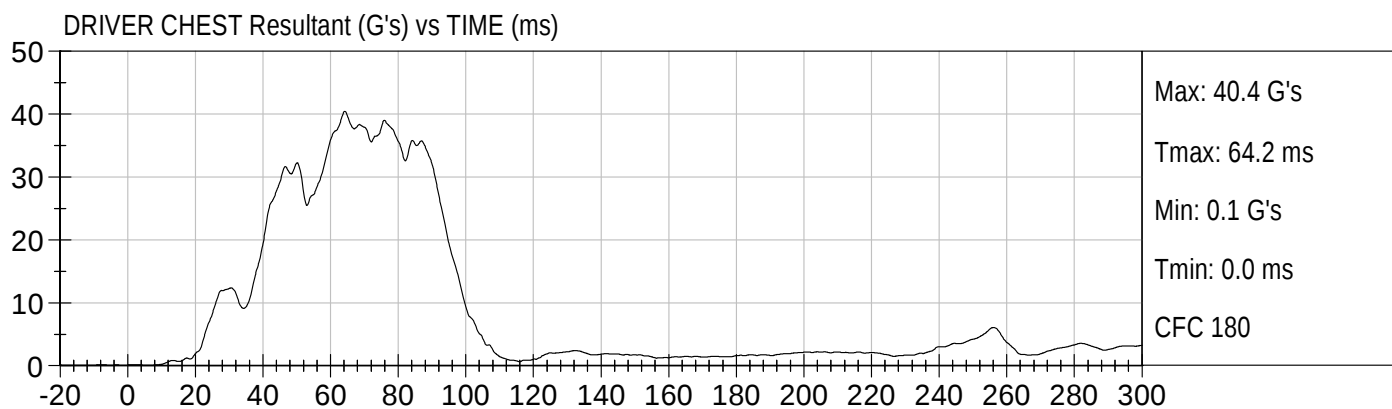
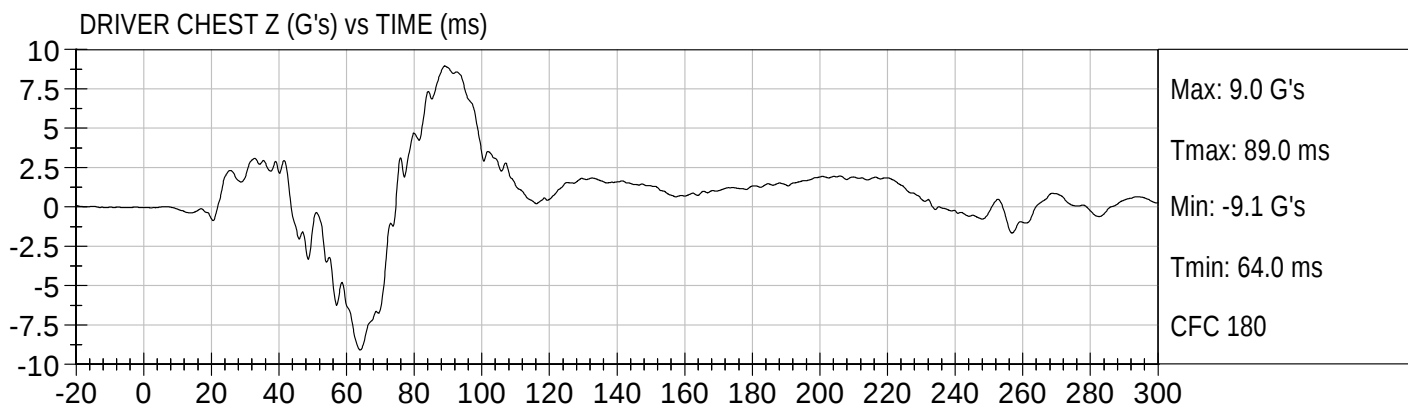
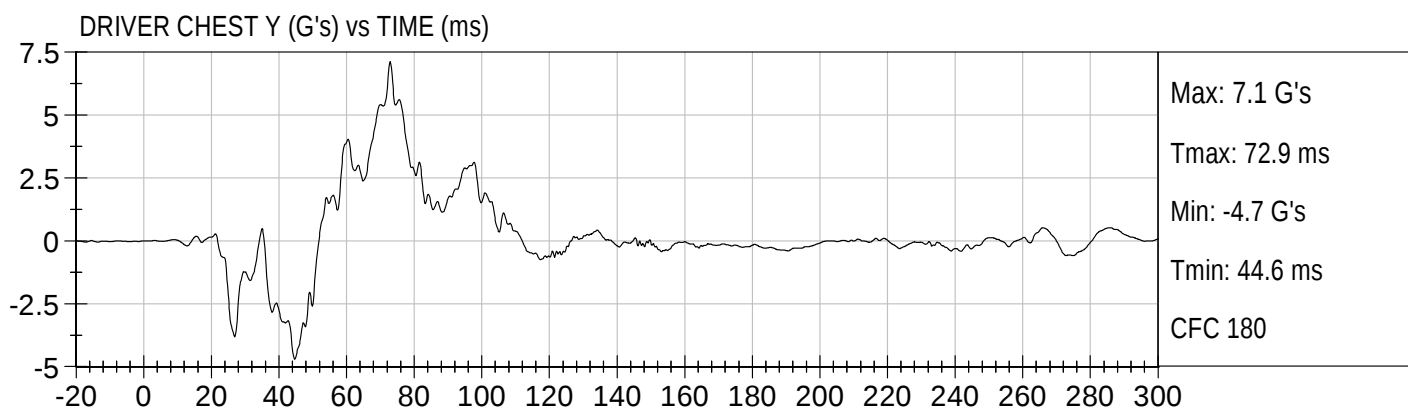
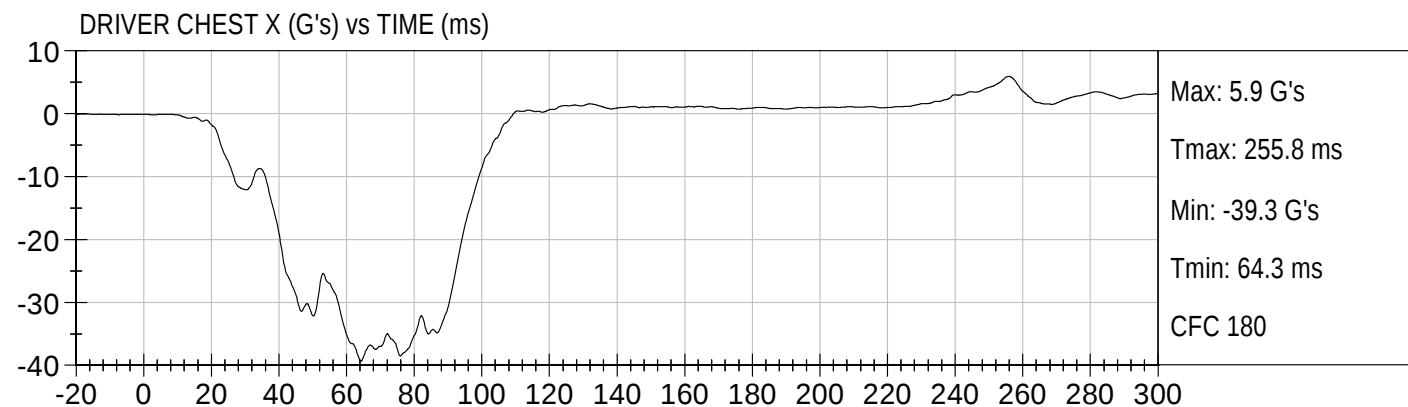
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 Driver Head Y Redundant
 Driver Head Z Redundant
 Driver Upper Neck Force Y
 Driver Upper Neck Moment X
 Driver Upper Neck Moment Z
 Driver Chest X Redundant
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 Driver Chest Z Redundant
 Driver Pelvis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

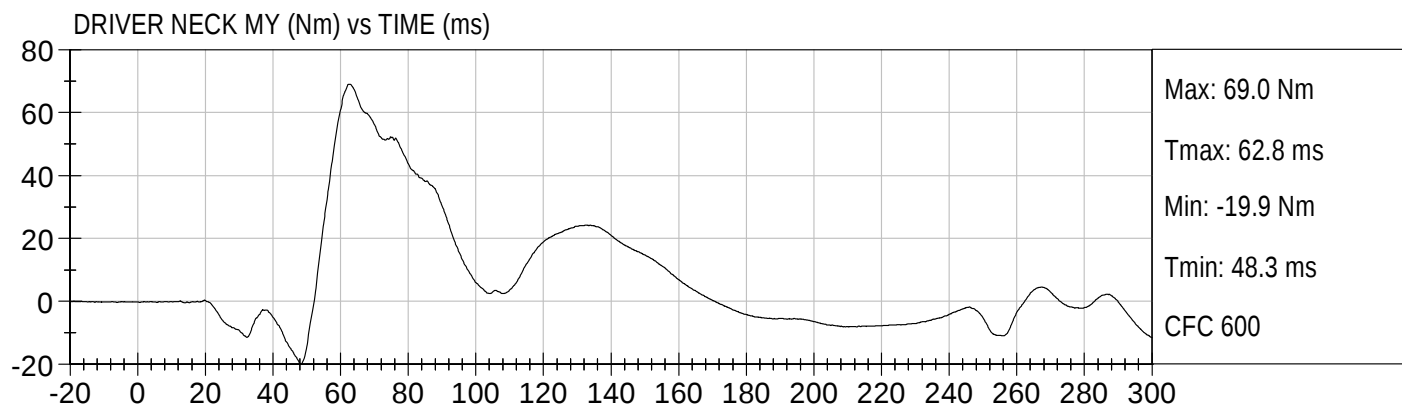
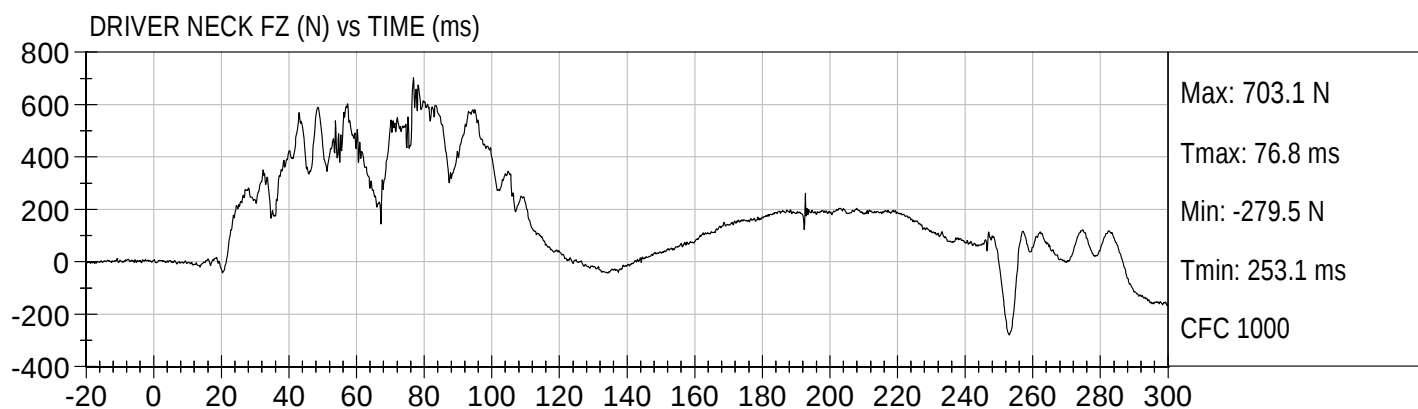
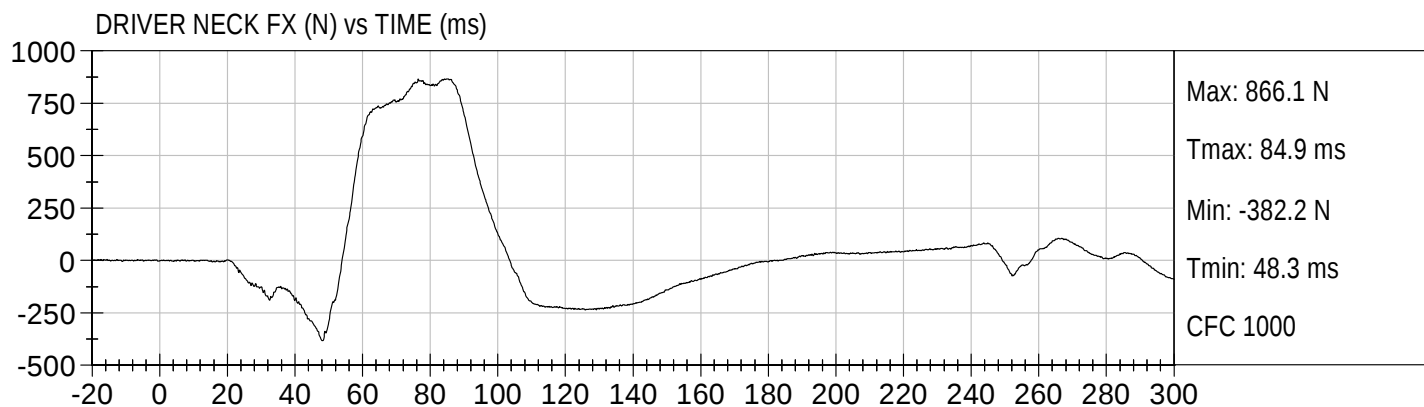
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Driver Left Lower Tibia Force Z
Driver Right Upper Tibia Moment X
Driver Right Upper Tibia Moment Y
Driver Right Upper Tibia Force Z
Driver Right Lower Tibia Moment X
Driver Right Lower Tibia Moment Y
Driver Right Lower Tibia Force Z
Driver Left Foot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

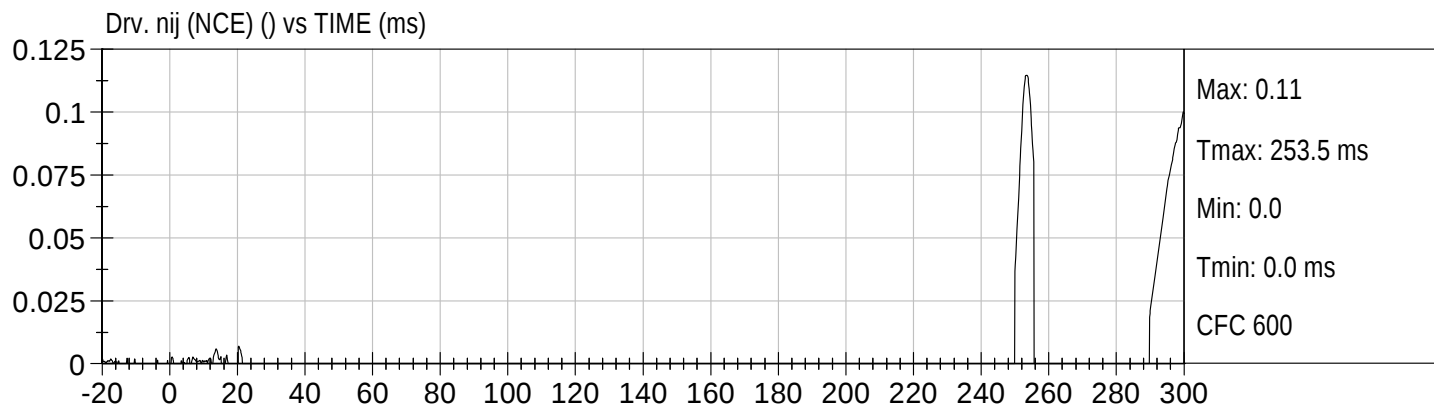
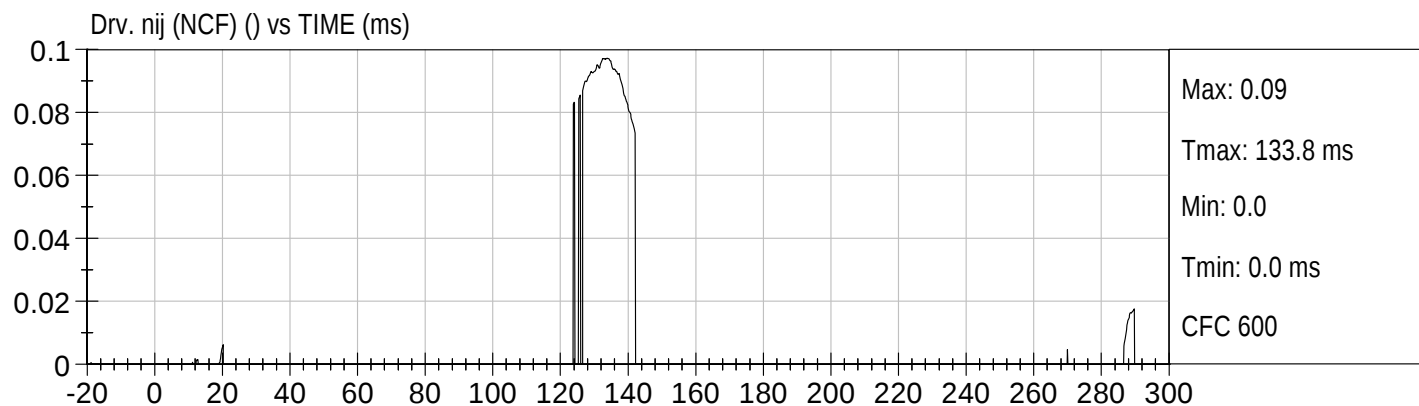
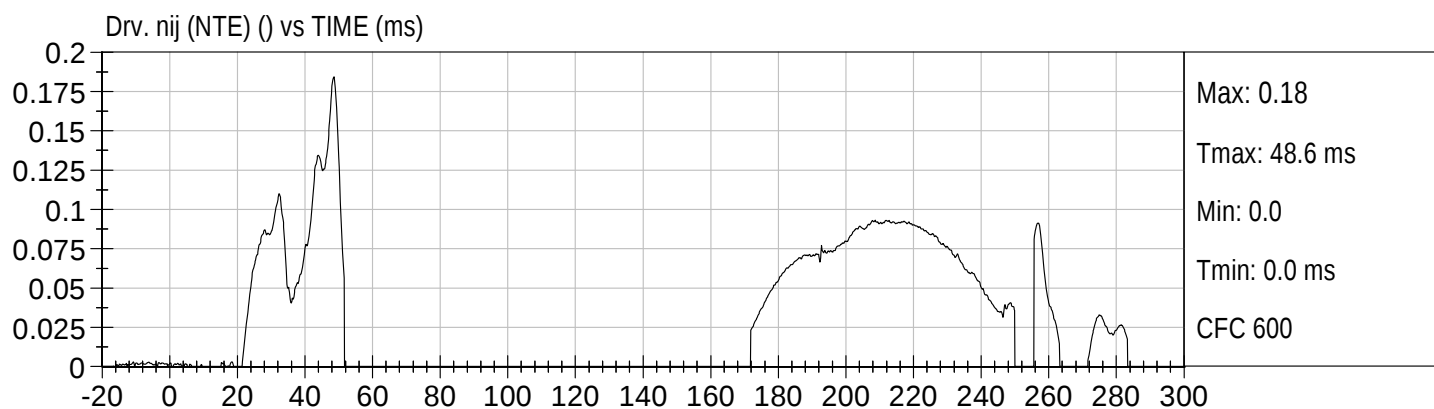
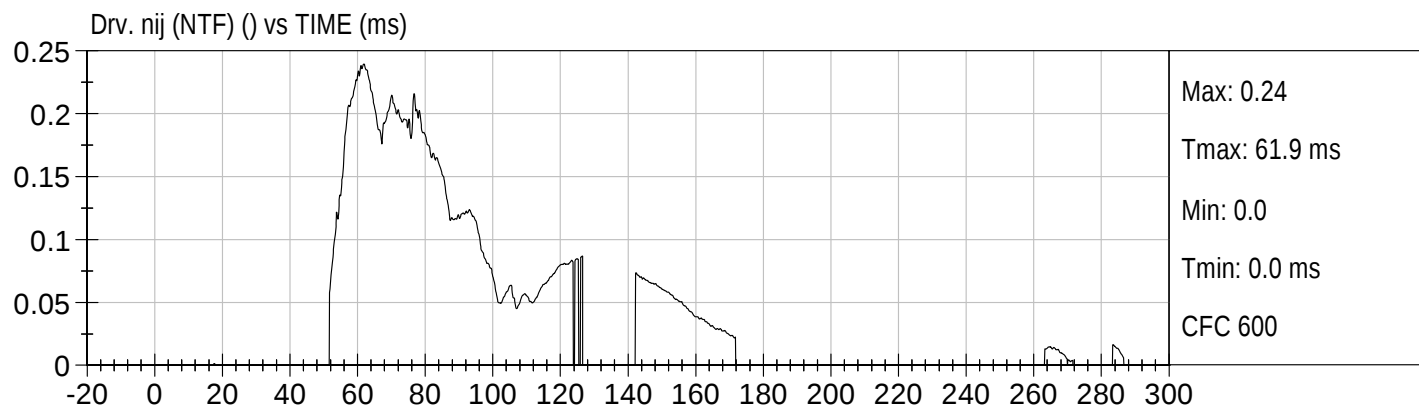
Passenger Left Upper Tibia Moment Y
Passenger Left Upper Tibia Force Z
Passenger Left Lower Tibia Moment X
Passenger Left Lower Tibia Moment Y
Passenger Left Lower Tibia Force Z
Passenger Right Upper Tibia Moment X
Passenger Right Upper Tibia Moment Y
Passenger Right Upper Tibia Force Z
Passenger Right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

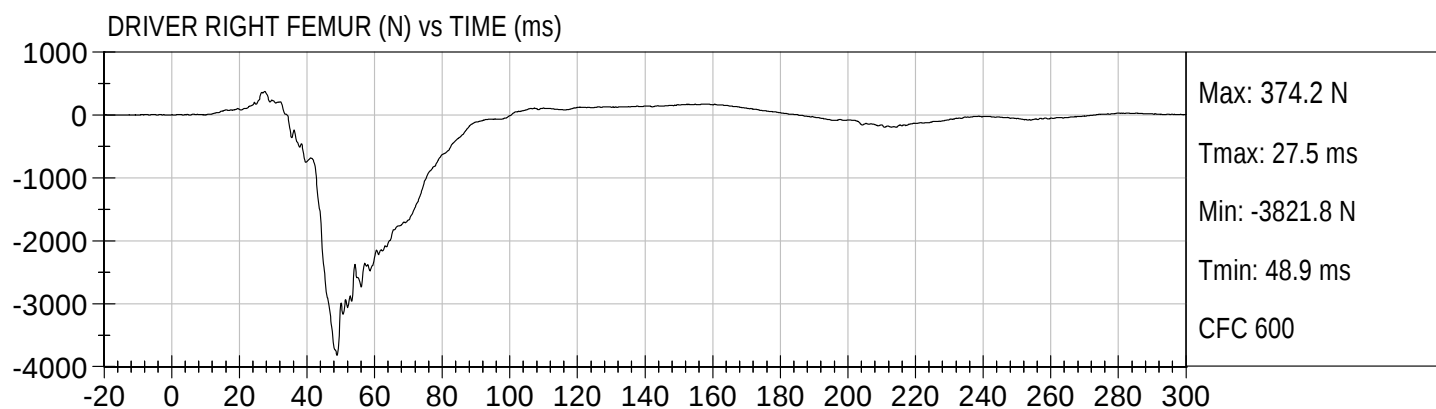
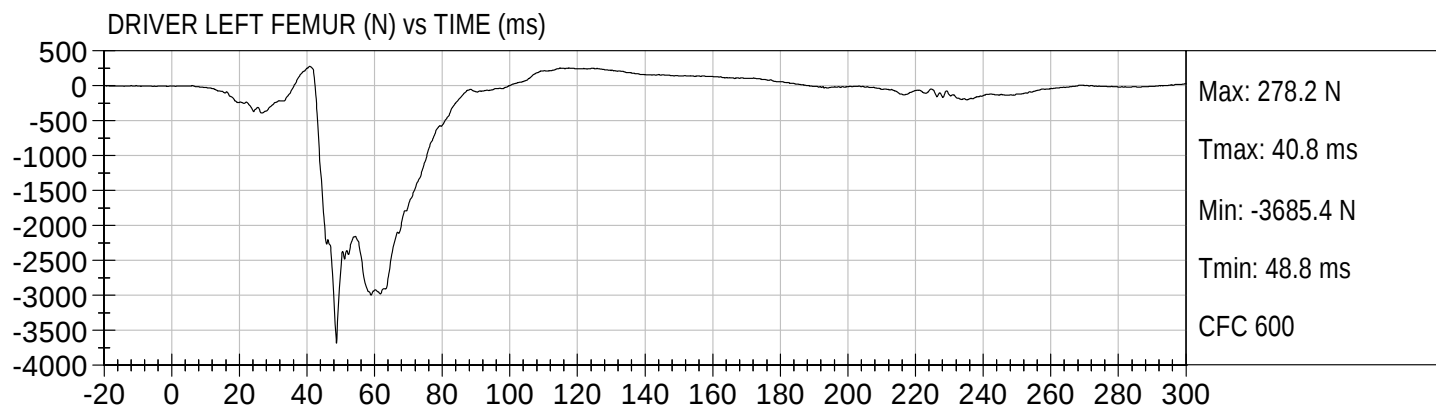


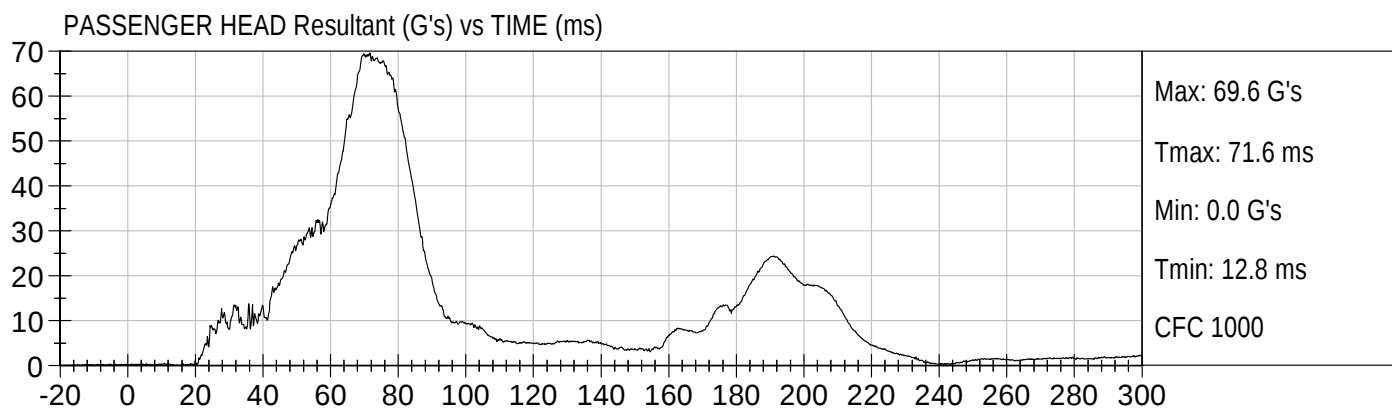
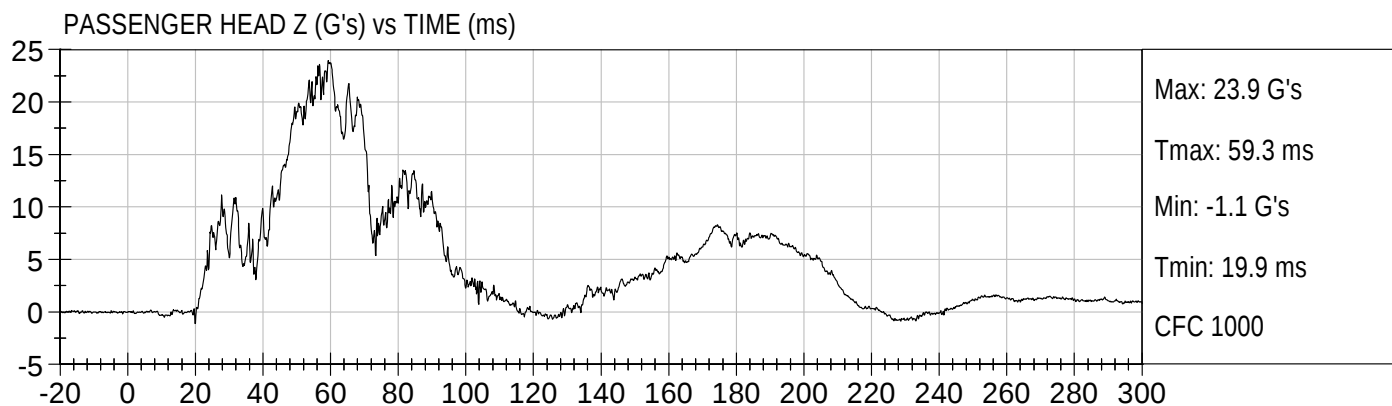
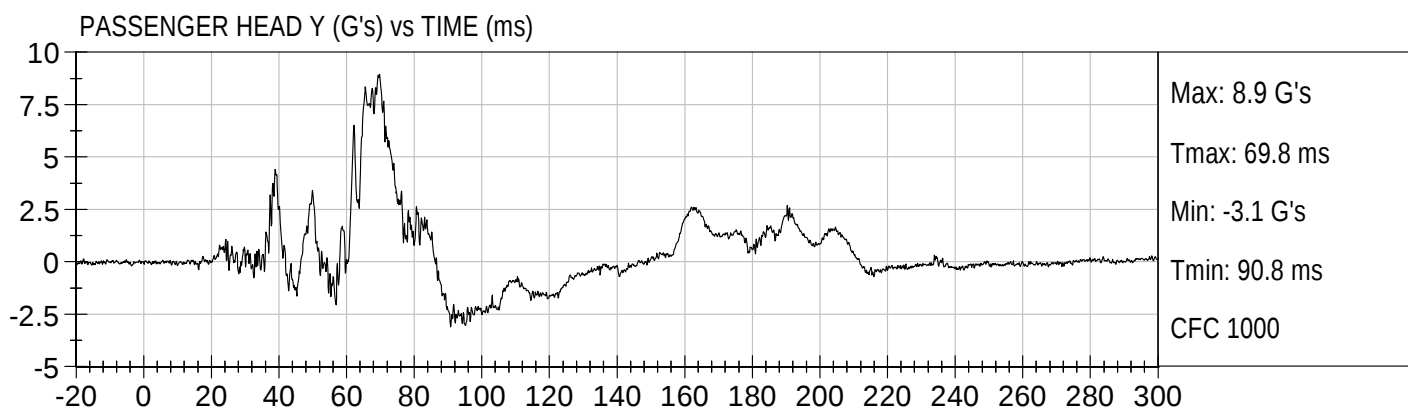
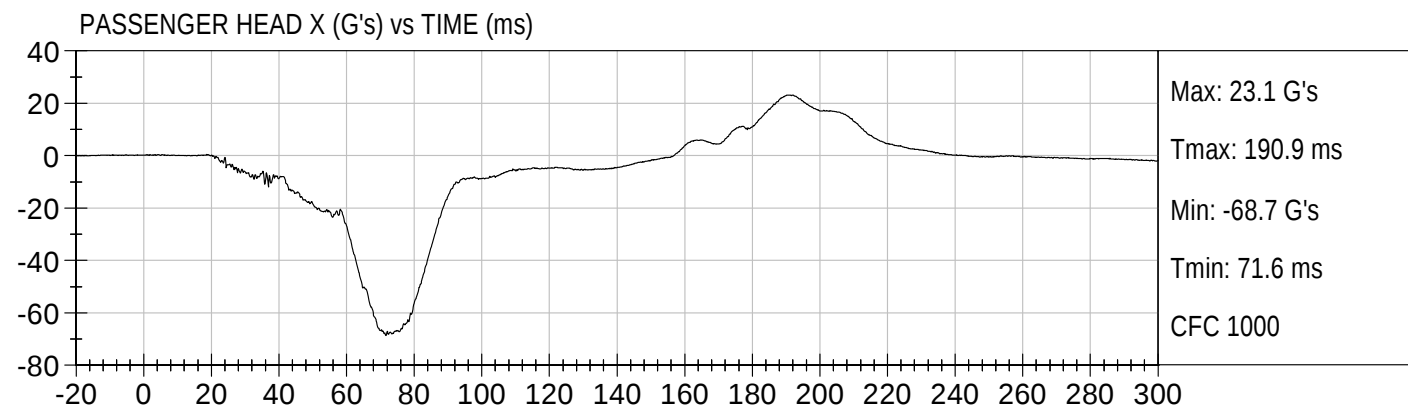


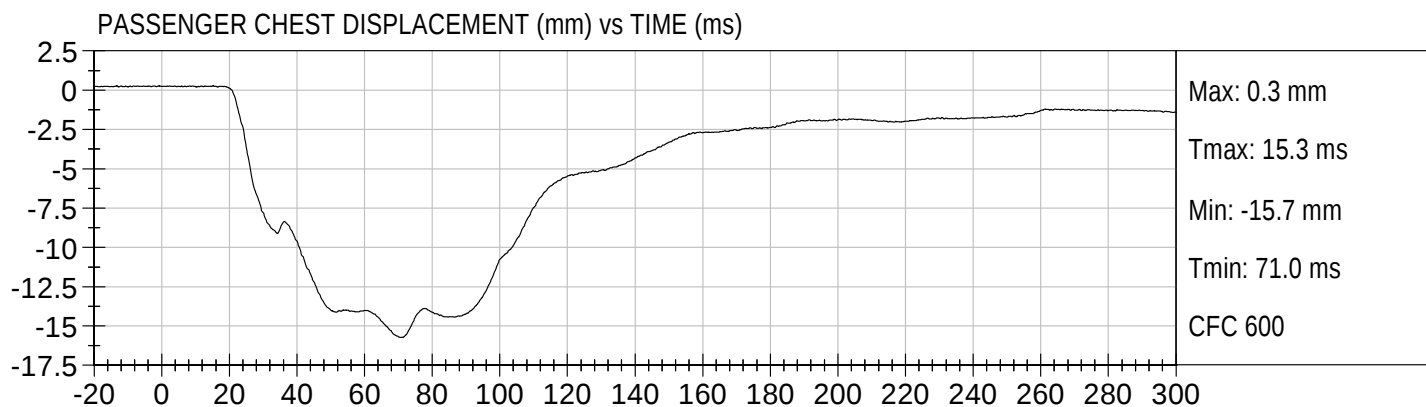


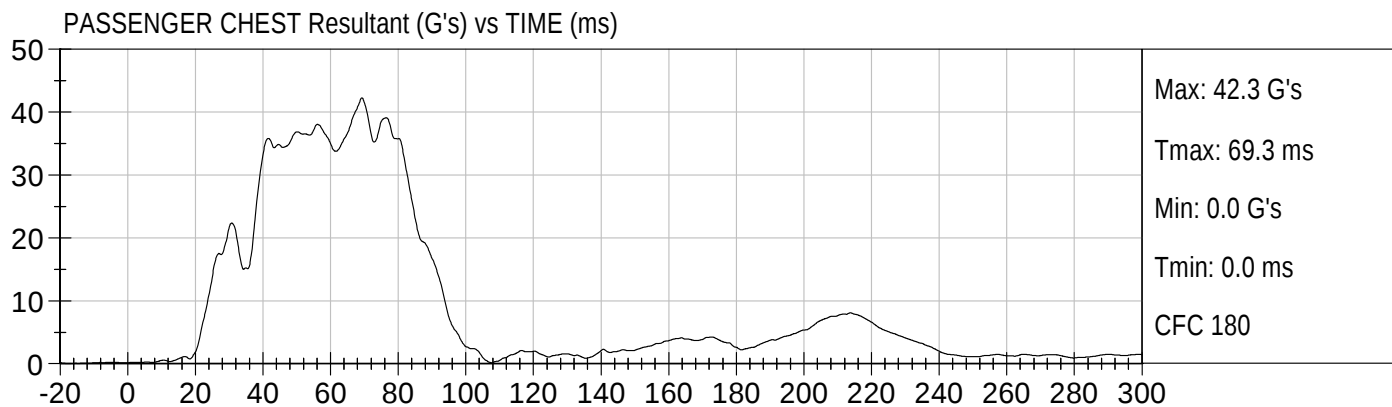
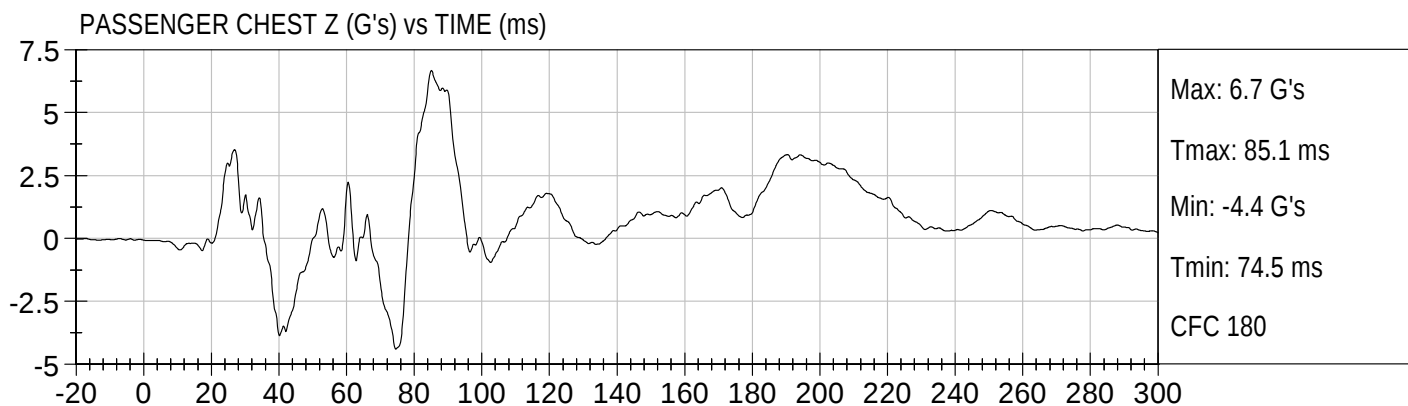
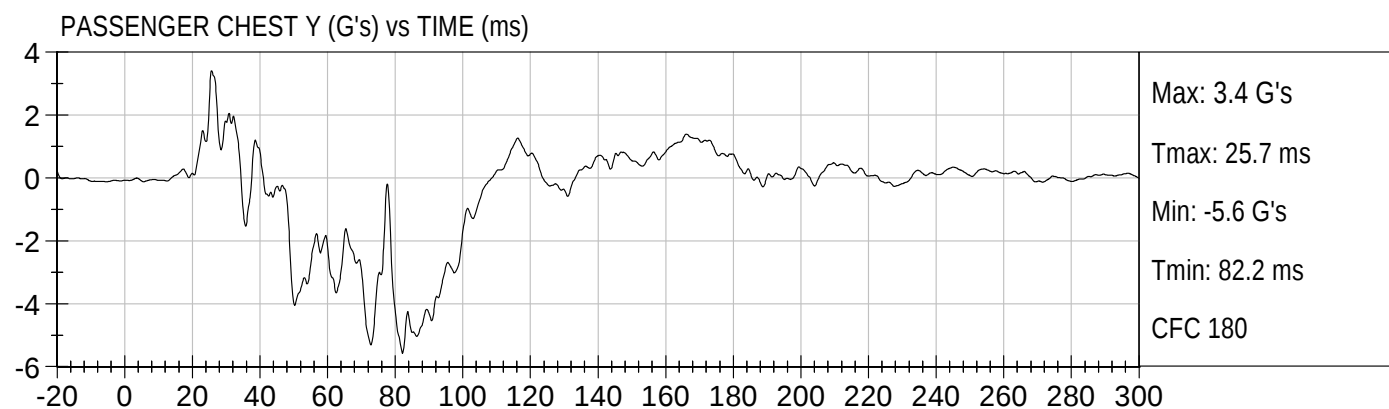
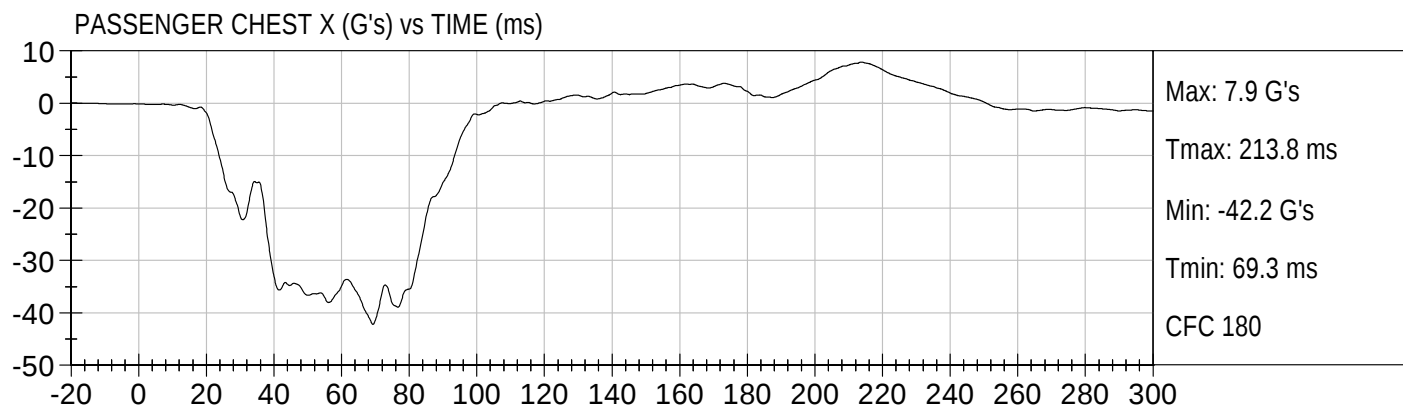


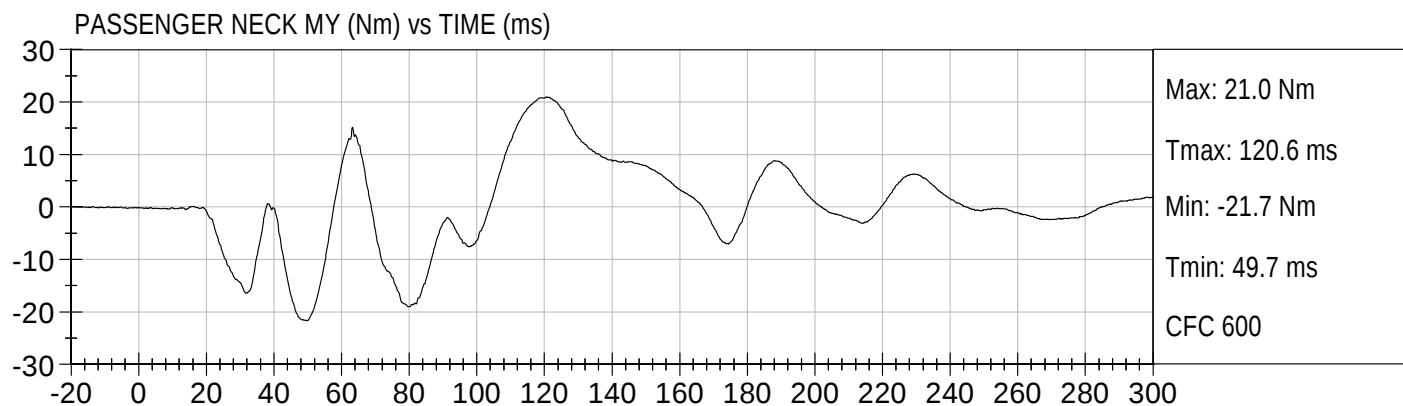
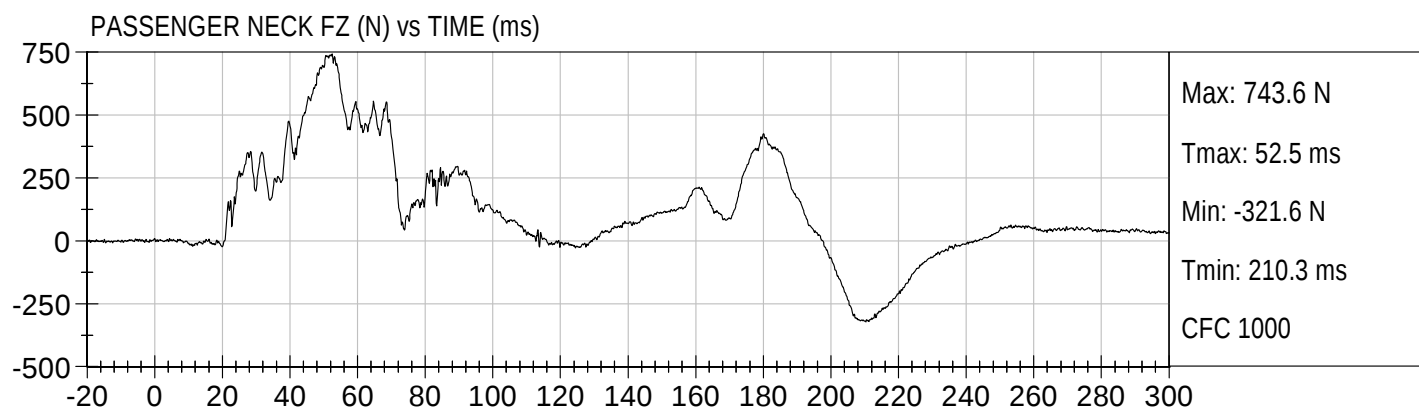
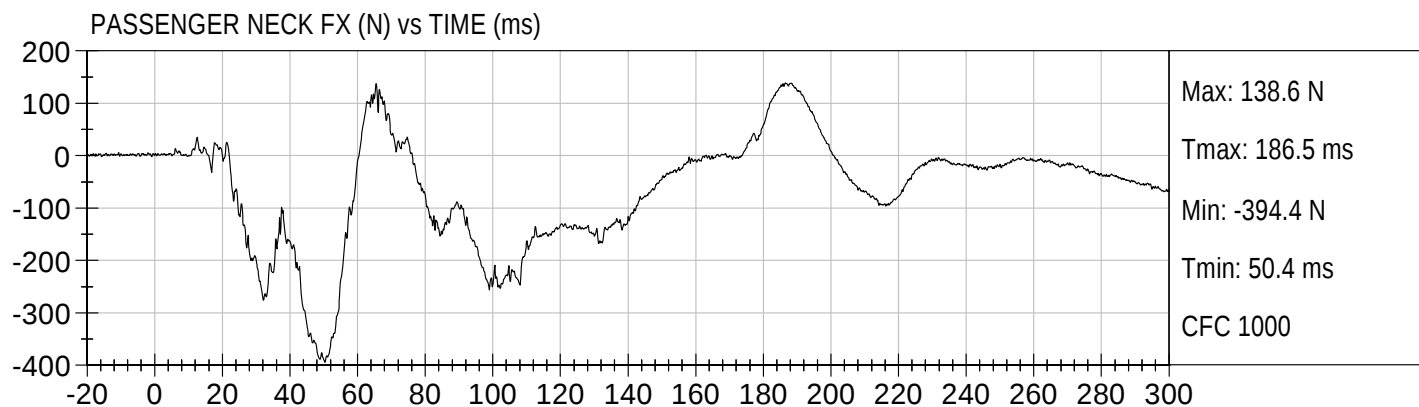


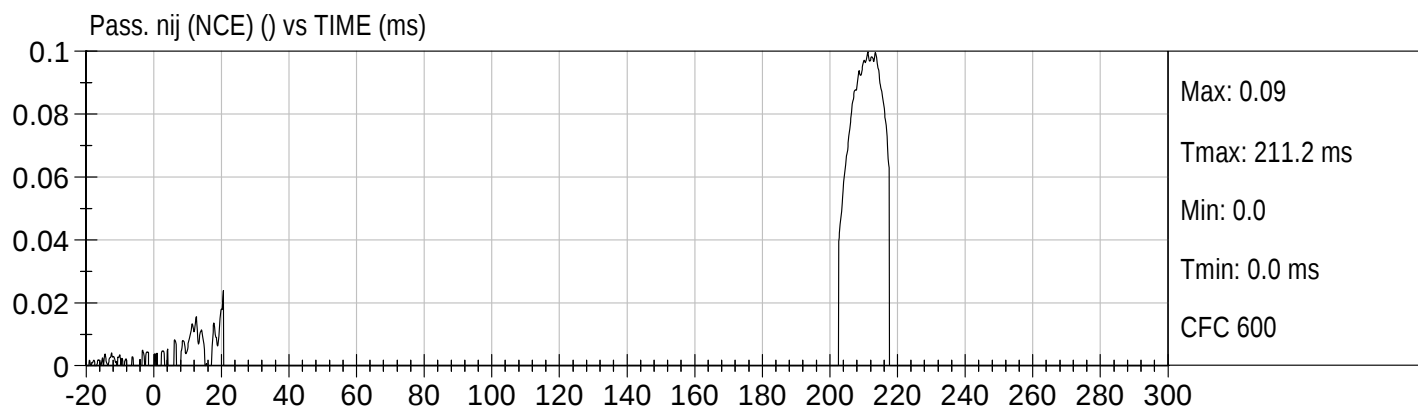
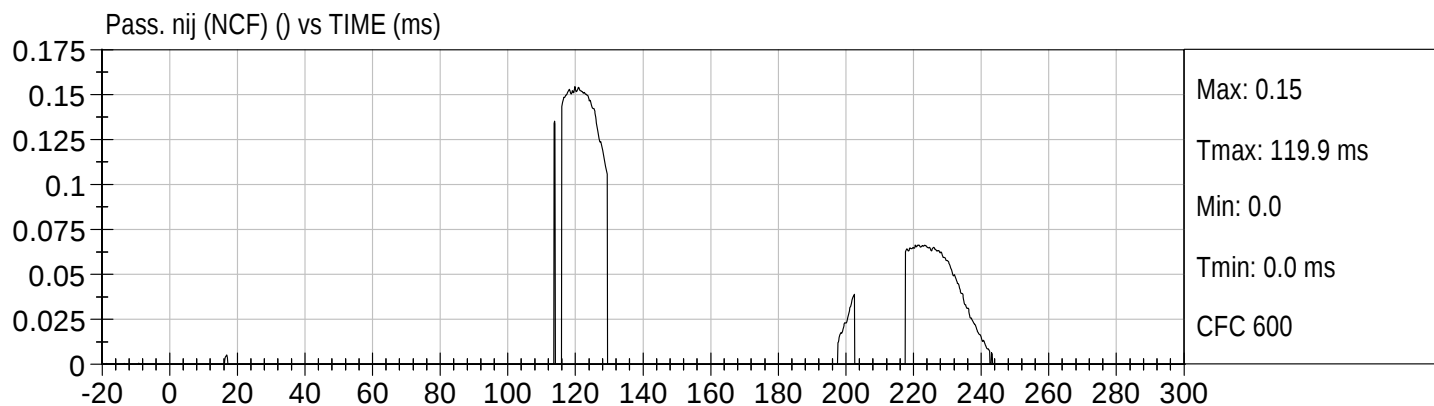
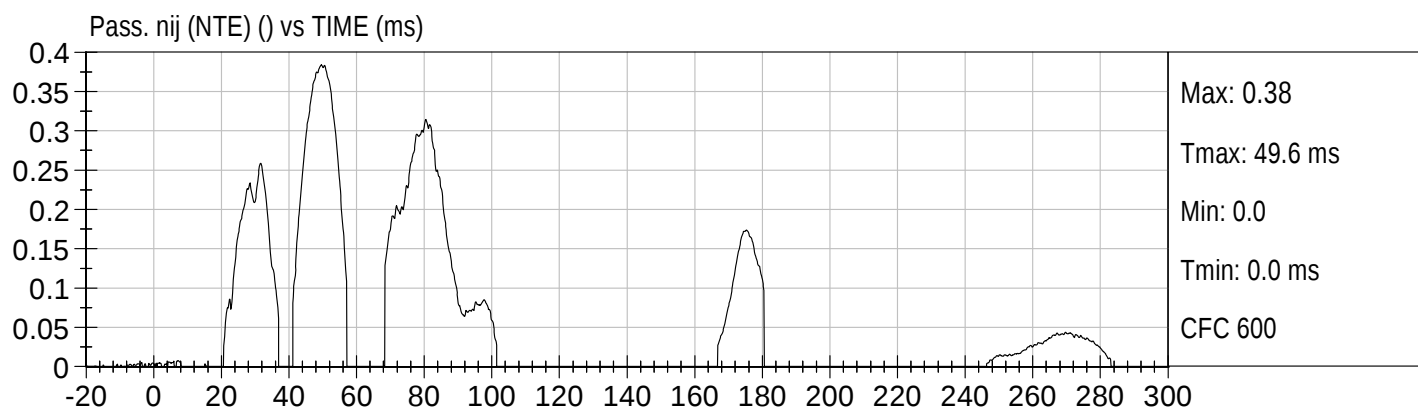
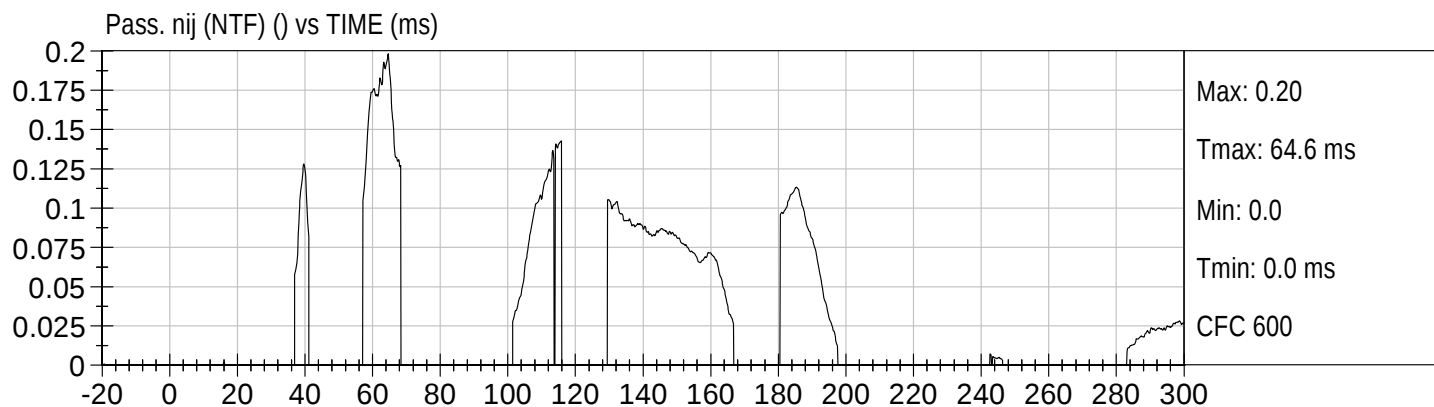


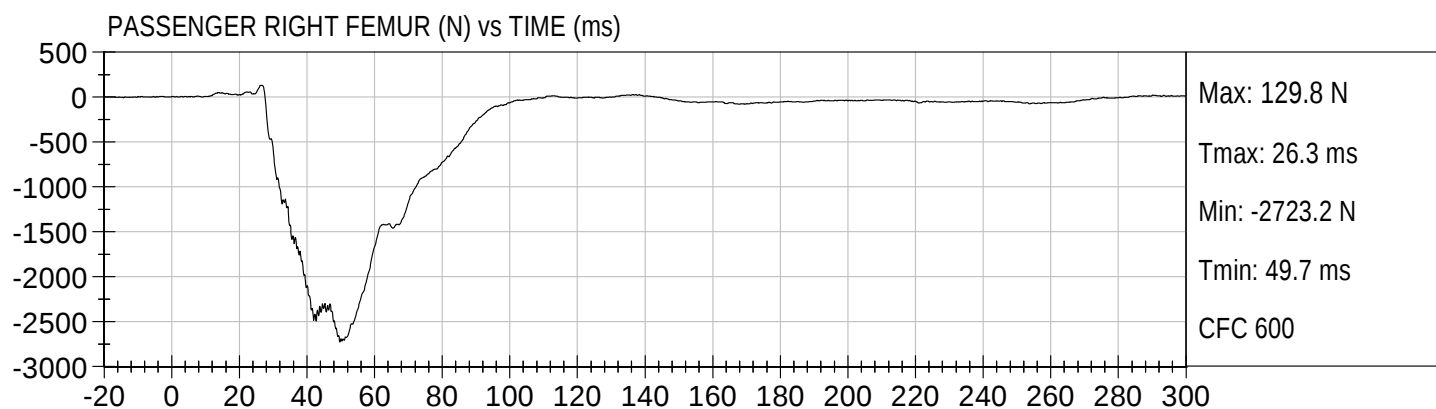
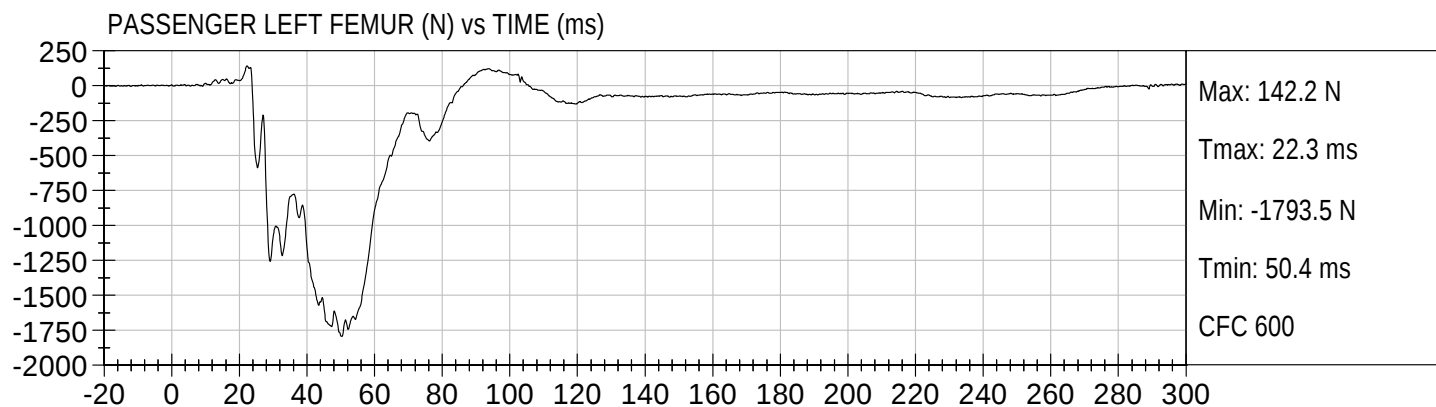












APPENDIX C

DUMMY CALIBRATION AND PERFORMANCE VERIFICATION DATA

Hybrid III, 50th External Measurements
SN: 036

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

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

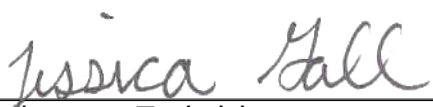
NOTE: THE H-POINT IS LOCATED 1.83 INCHES FORWARD AND 2.57 INCHES DOWN FROM THE CENTER OF THE PELVIS ANGLE REFERENCE HOLE.

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

ATD Serial No: 036

Test ID: D113211

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	49	Pass
Peak Resultant Acceleration	G's	225 - 275	259	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-11.7	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

9/27/11
Test Date

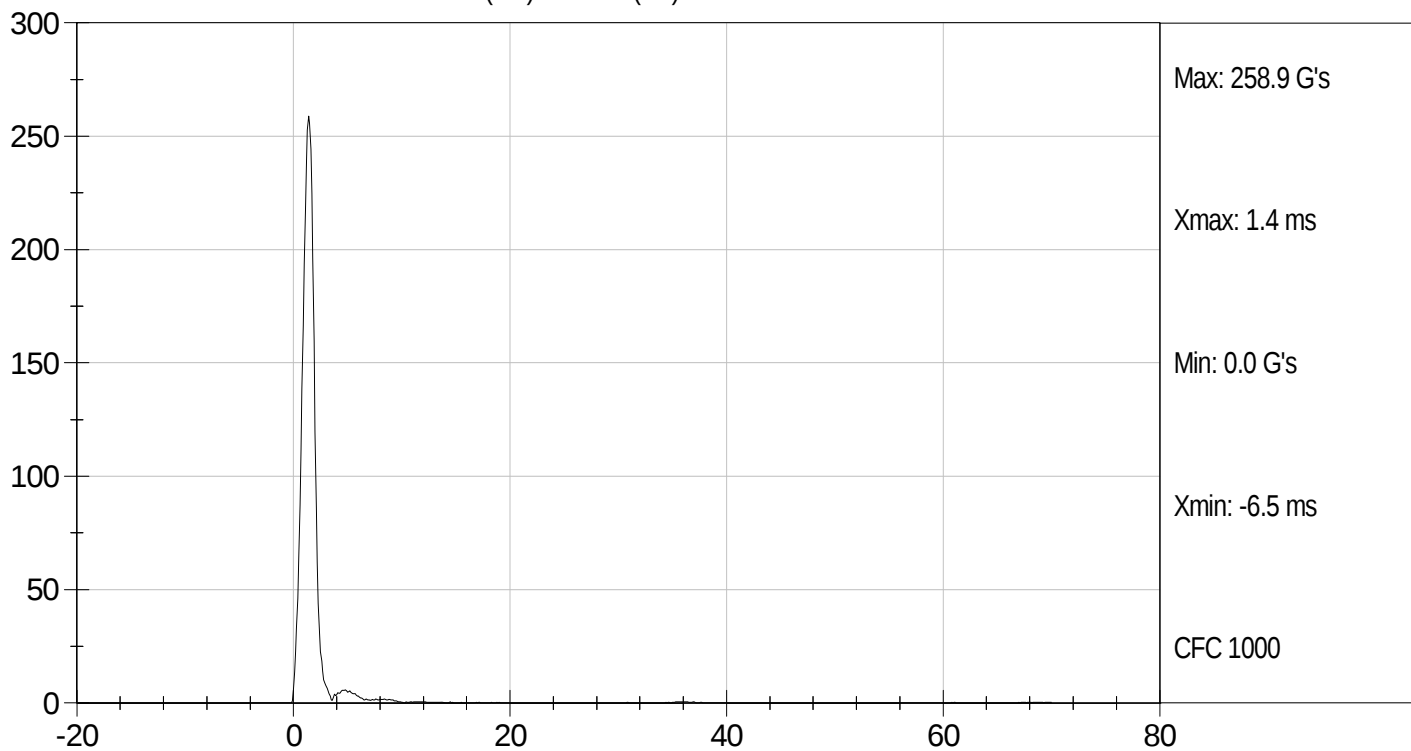

Approved By



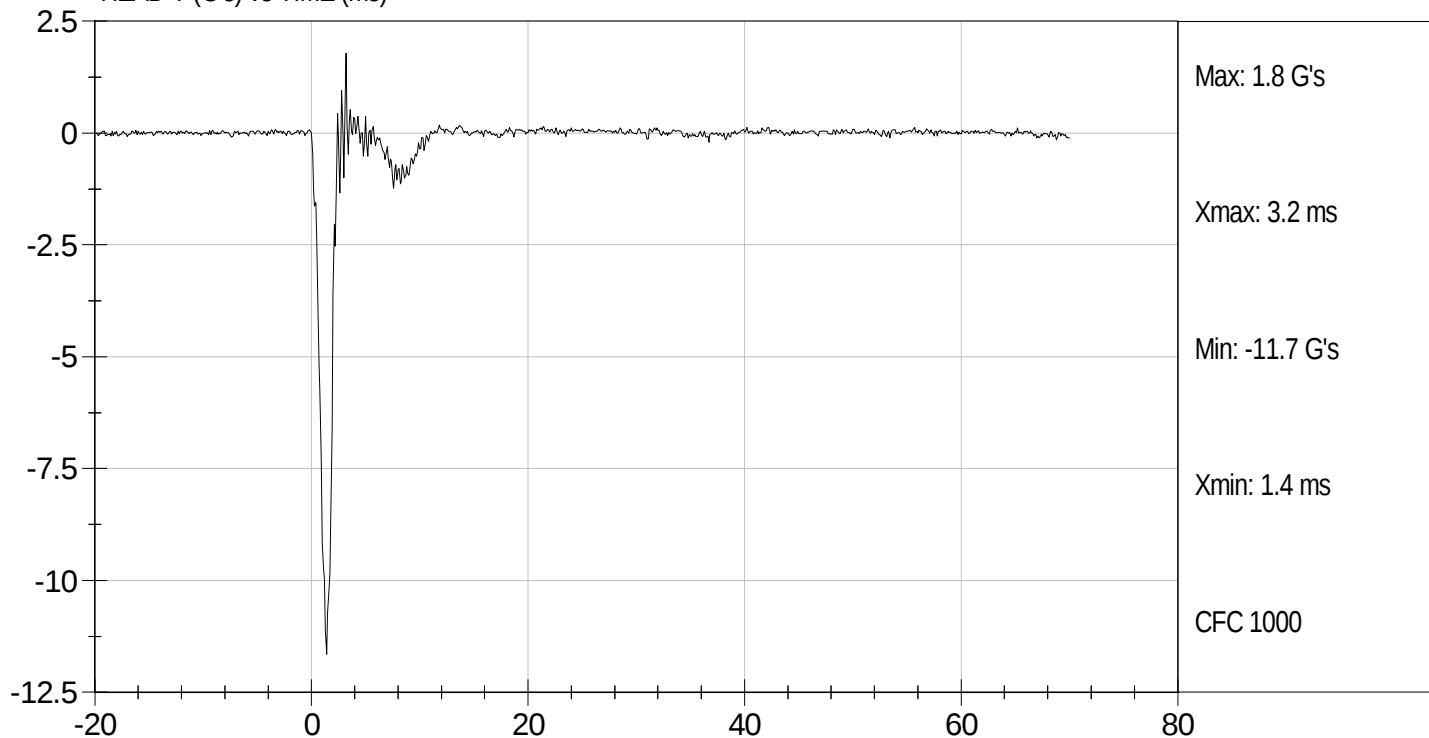
Test Desc: Head Drop
Component ID: D113211

Test Date: 9/27/11
Velocity: 0 ft/s, 0.00 m/s

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



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

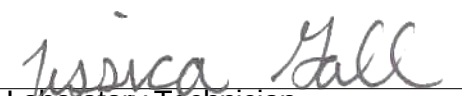


MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036

Test I.D: D113212

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity		%	10 to 70	49	Pass
Pendulum Velocity		m/s	6.89 to 7.13	6.96	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	22.77	Pass
	20 ms	G's	17.60 to 22.60	17.75	Pass
	30 ms	G's	12.50 to 18.50	12.63	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	13.1	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	38.5	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	65.9	Pass
	Time	ms	57.0 to 64.0	59.8	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	117.6	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	96.0	Pass
	Time	ms	47.0 to 58.0	51.2	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	97.4	Pass
Overall Test Results					Pass


 Laboratory Technician

9/27/11
 Test Date

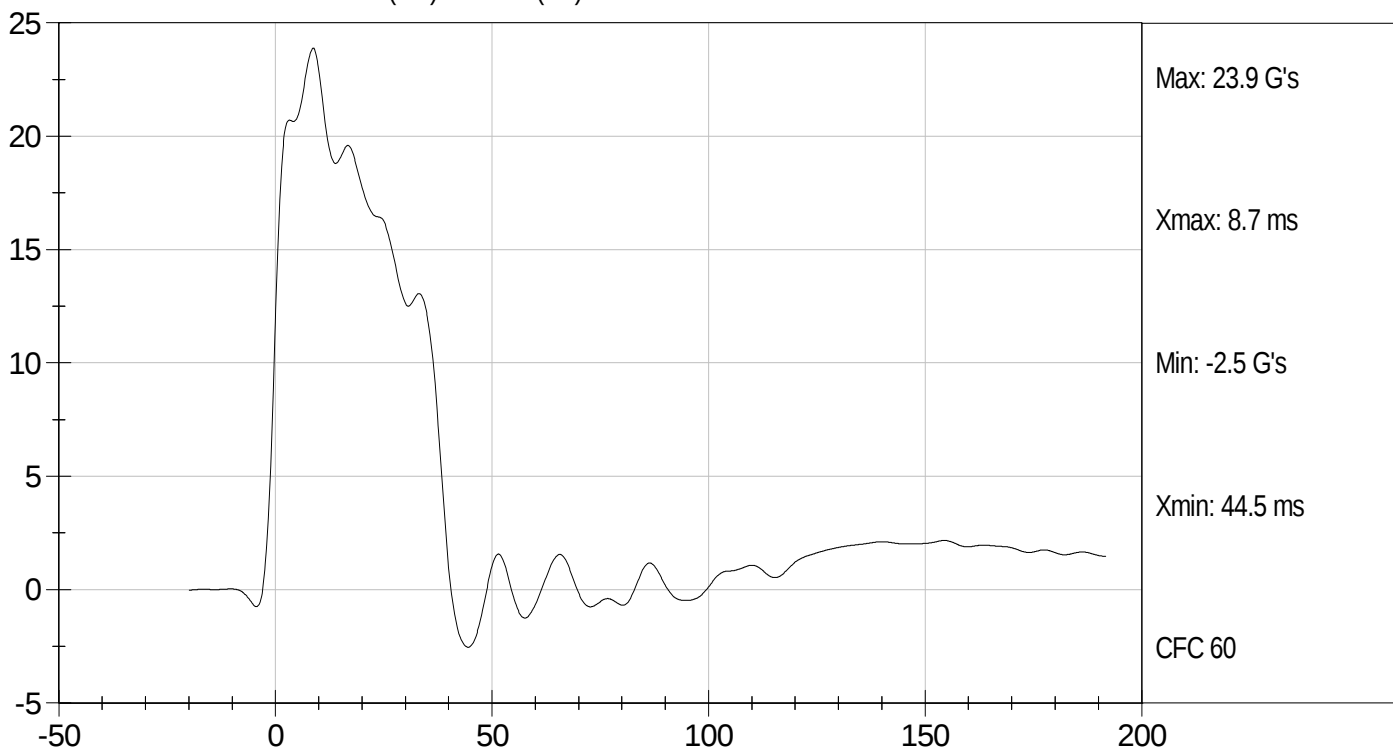

 Approved By



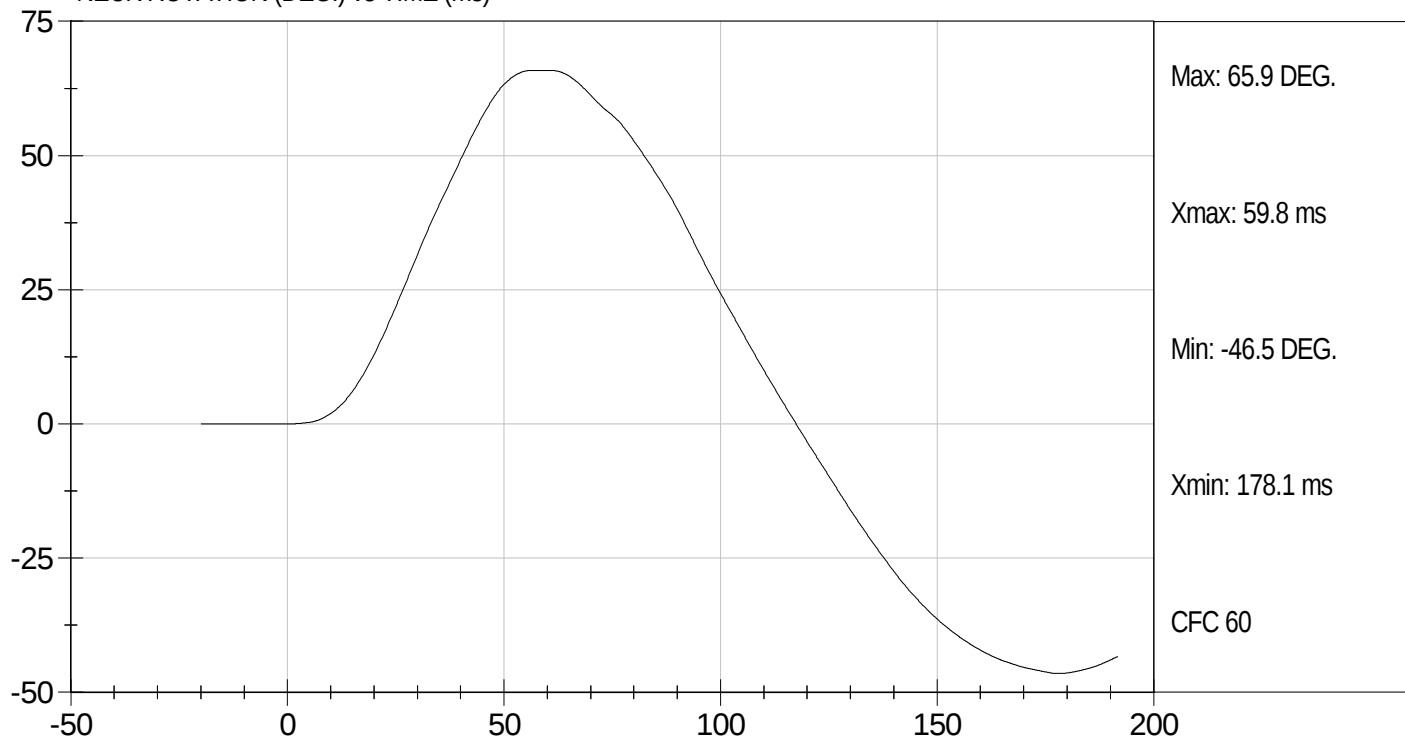
Test Desc: Neck Flexion
Component ID: D113212

Test Date: 9/27/11
Velocity: 22.83 ft/s, 6.96 m/s

PENDULUM DECELERATION (G's) vs TIME (ms)



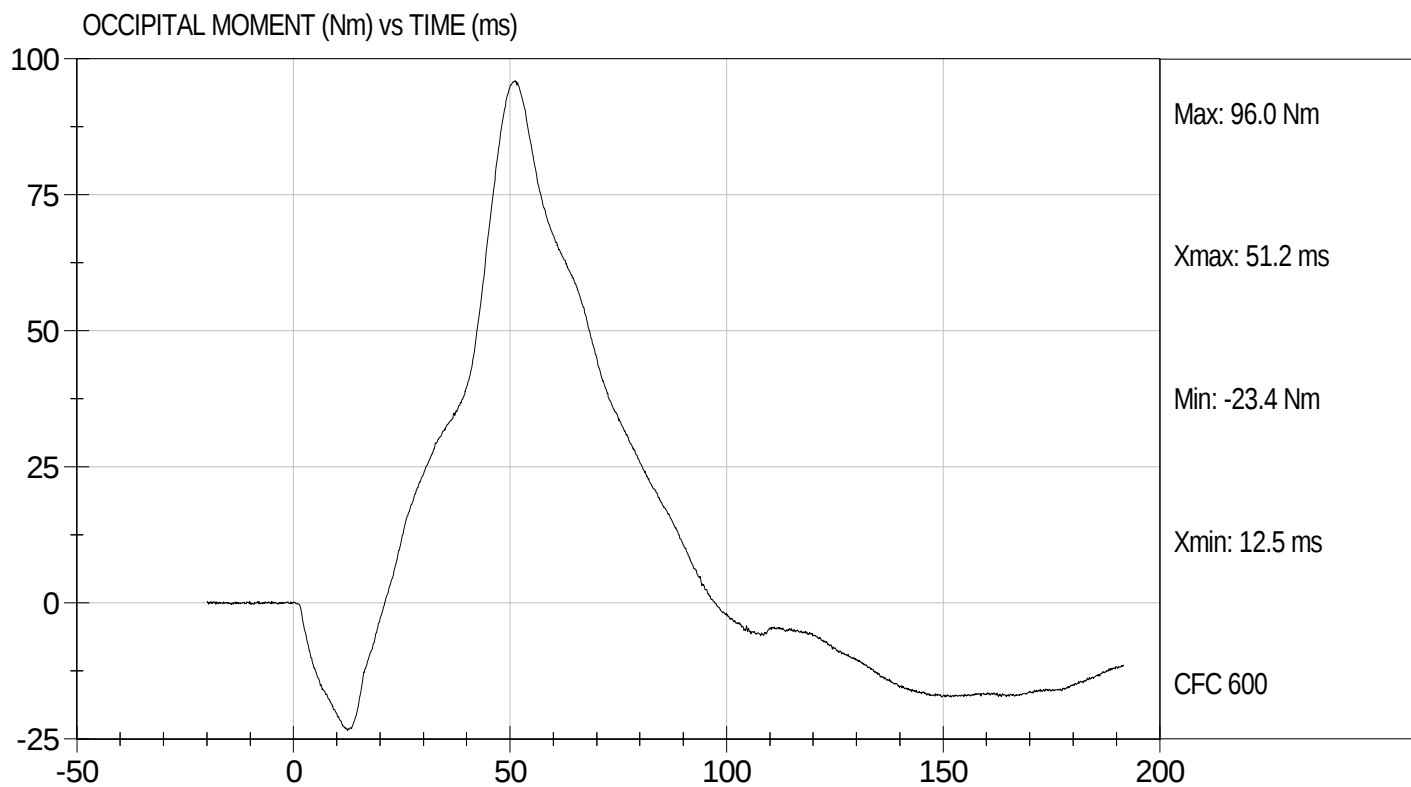
NECK ROTATION (DEG.) vs TIME (ms)





Test Desc: Neck Flexion
Component ID: D113212

Test Date: 9/27/11
Velocity: 22.83 ft/s, 6.96 m/s



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

ATD Serial No: 036

Test I.D: D113213

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity		%	10 to 70	49	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.13	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	17.89	Pass
	20 ms	G's	14.00 to 19.00	14.82	Pass
	30 ms	G's	11.00 to 16.00	11.58	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	11.6	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	40.3	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	95.9	Pass
	Time	ms	72.0 to 82.0	75.7	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	157.4	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-63.8	Pass
	Time	ms	65.0 to 79.0	70.6	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	140.7	Pass
Overall Test Results					Pass


Laboratory Technician

9/27/11
Test Date

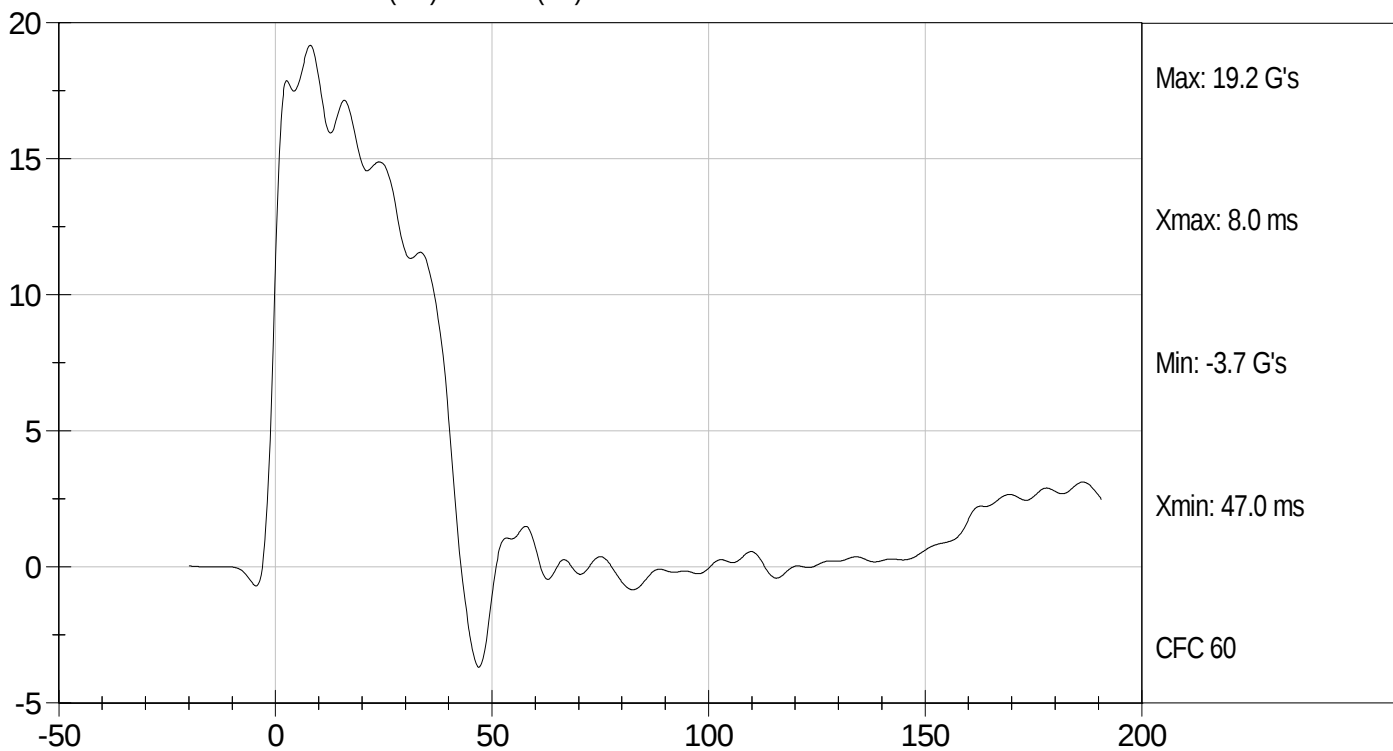

Approved By



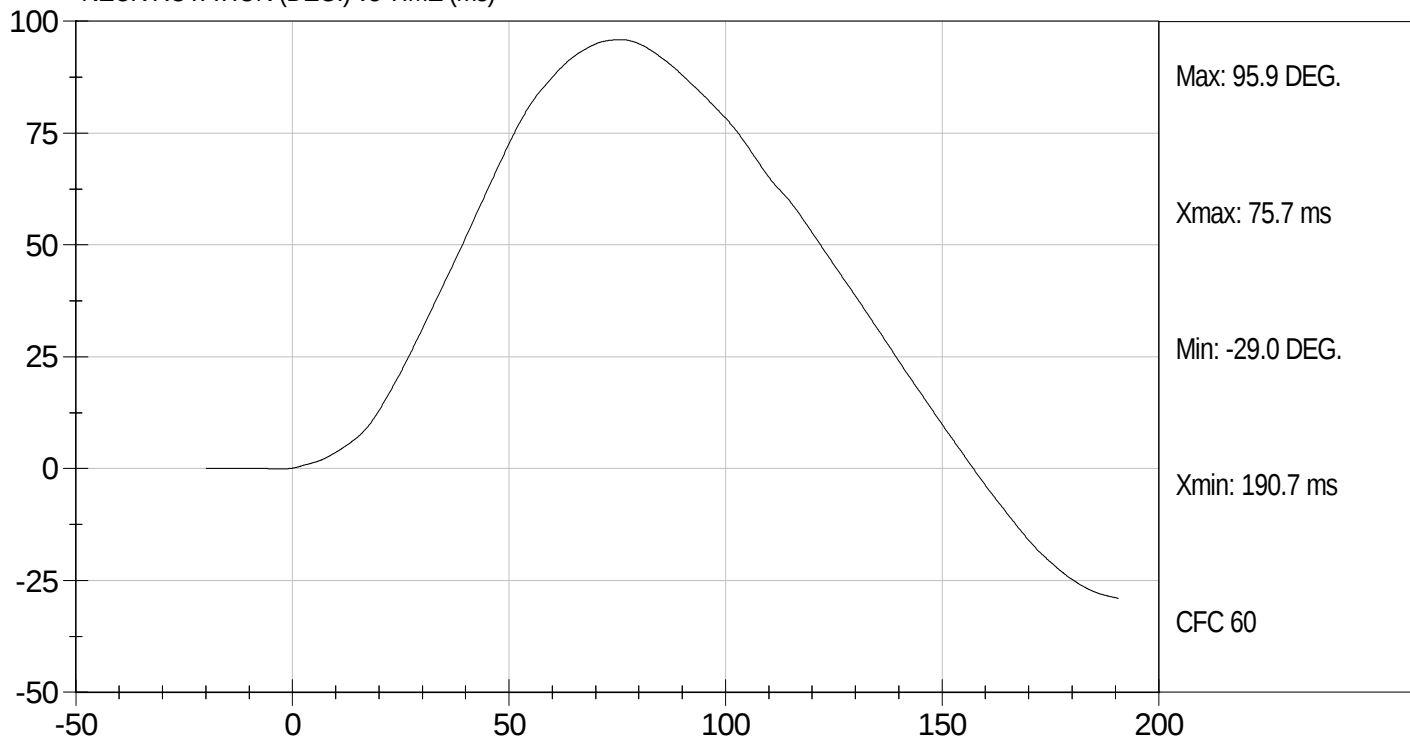
Test Desc: Neck Extension
Component ID: D113213

Test Date: 9/27/11
Velocity: 20.1 ft/s, 6.13 m/s

PENDULUM DECELERATION (G's) vs TIME (ms)



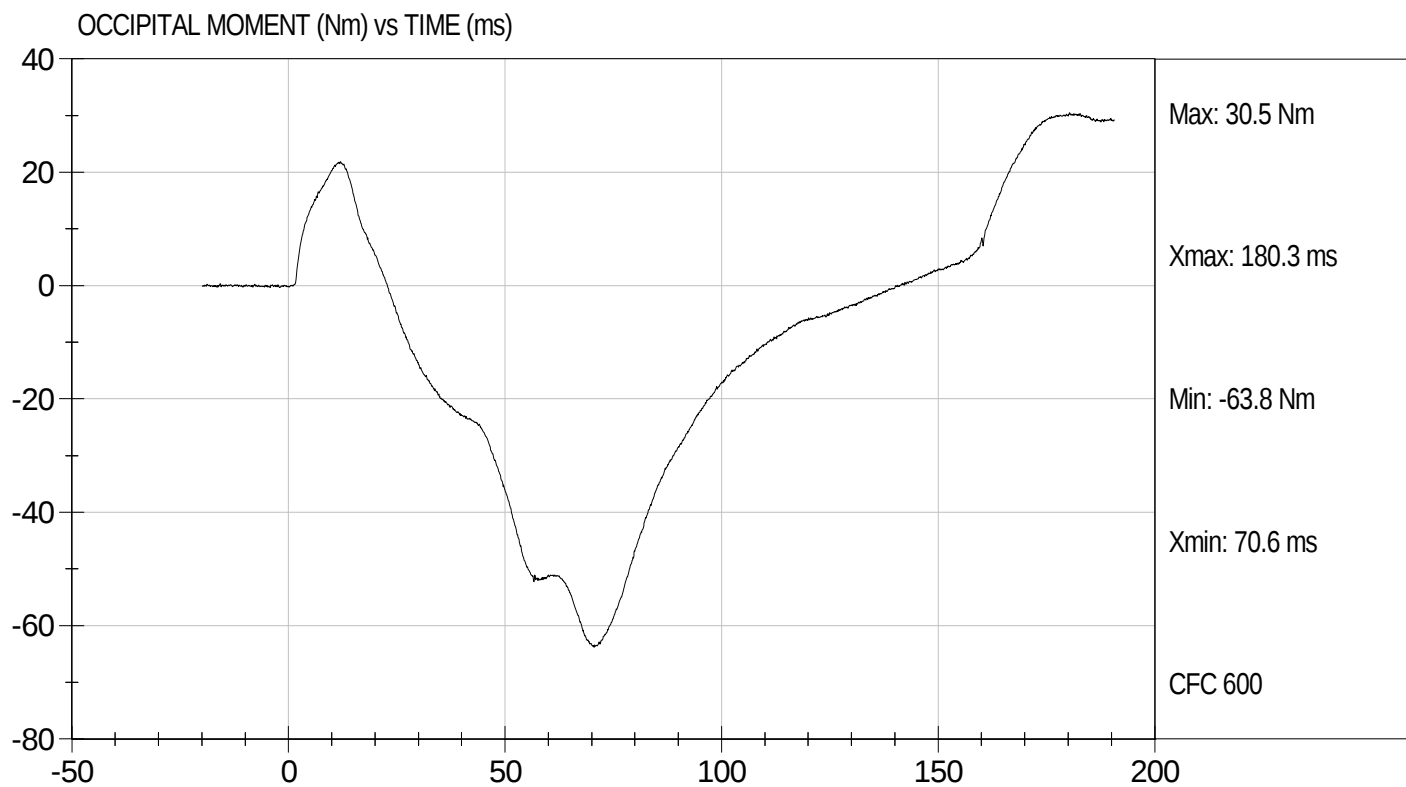
NECK ROTATION (DEG.) vs TIME (ms)





Test Desc: Neck Extension
Component ID: D113213

Test Date: 9/27/11
Velocity: 20.1 ft/s, 6.13 m/s

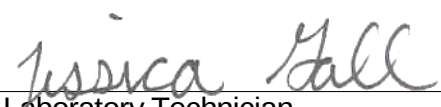


MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036

Test I.D: D113214

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	49	Pass
Probe Velocity	m/s	6.58 to 6.82	6.77	Pass
Peak Probe Force	N	5159 to 5893	5,310	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.98	Pass
Internal Hysteresis	%	69 to 85	72	Pass
			Overall Test Results	Pass


Laboratory Technician

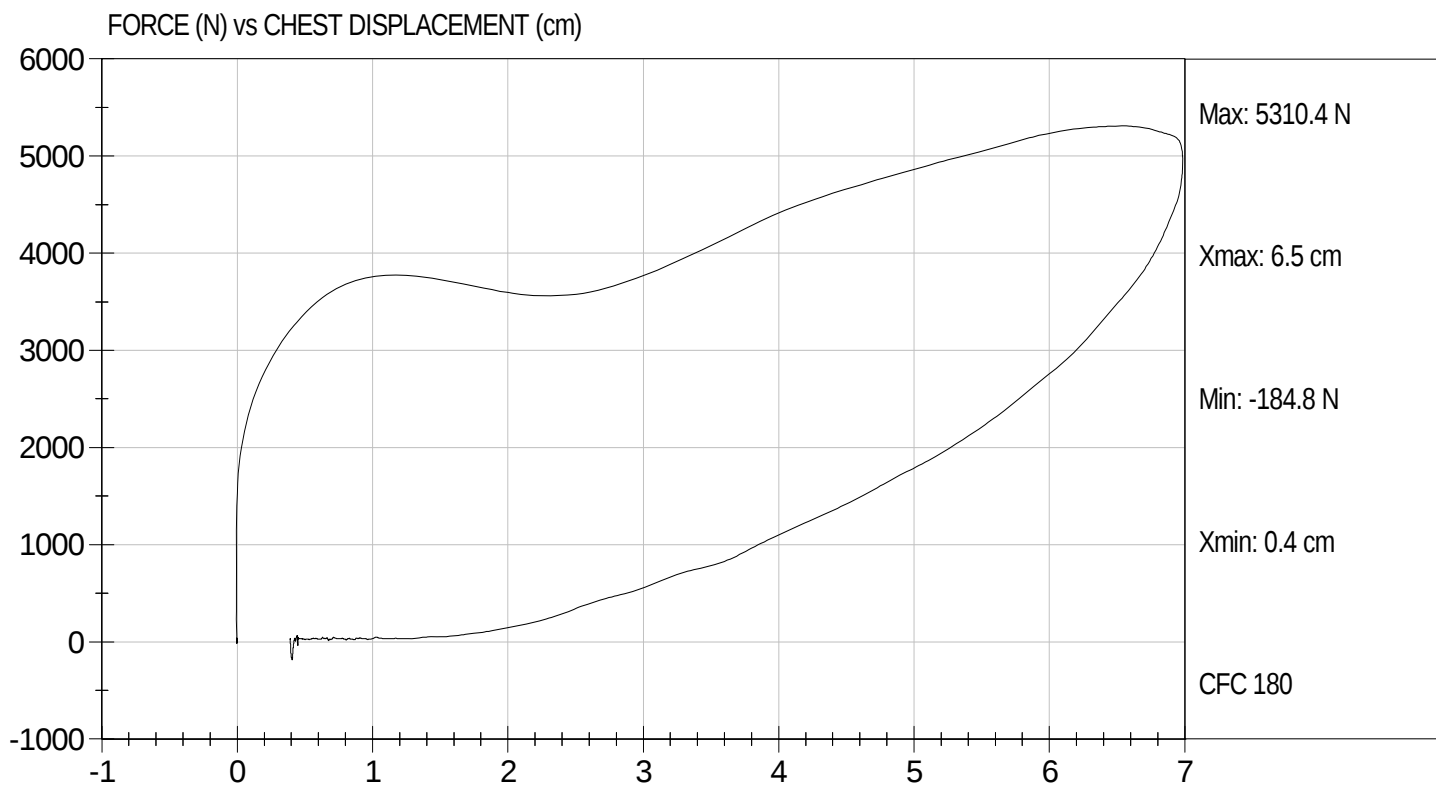
9/27/11
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D113214

Test Date: 9/27/11
Velocity: 22.22 ft/s, 6.77 m/s

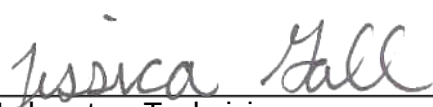


MGA RESEARCH CORPORATION
RIGHT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036

Test I.D: D113215

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	50	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	Newtons	4715 to 5782	5,263	Pass
Overall Test Results				Pass



Laboratory Technician

9/27/11

Test Date

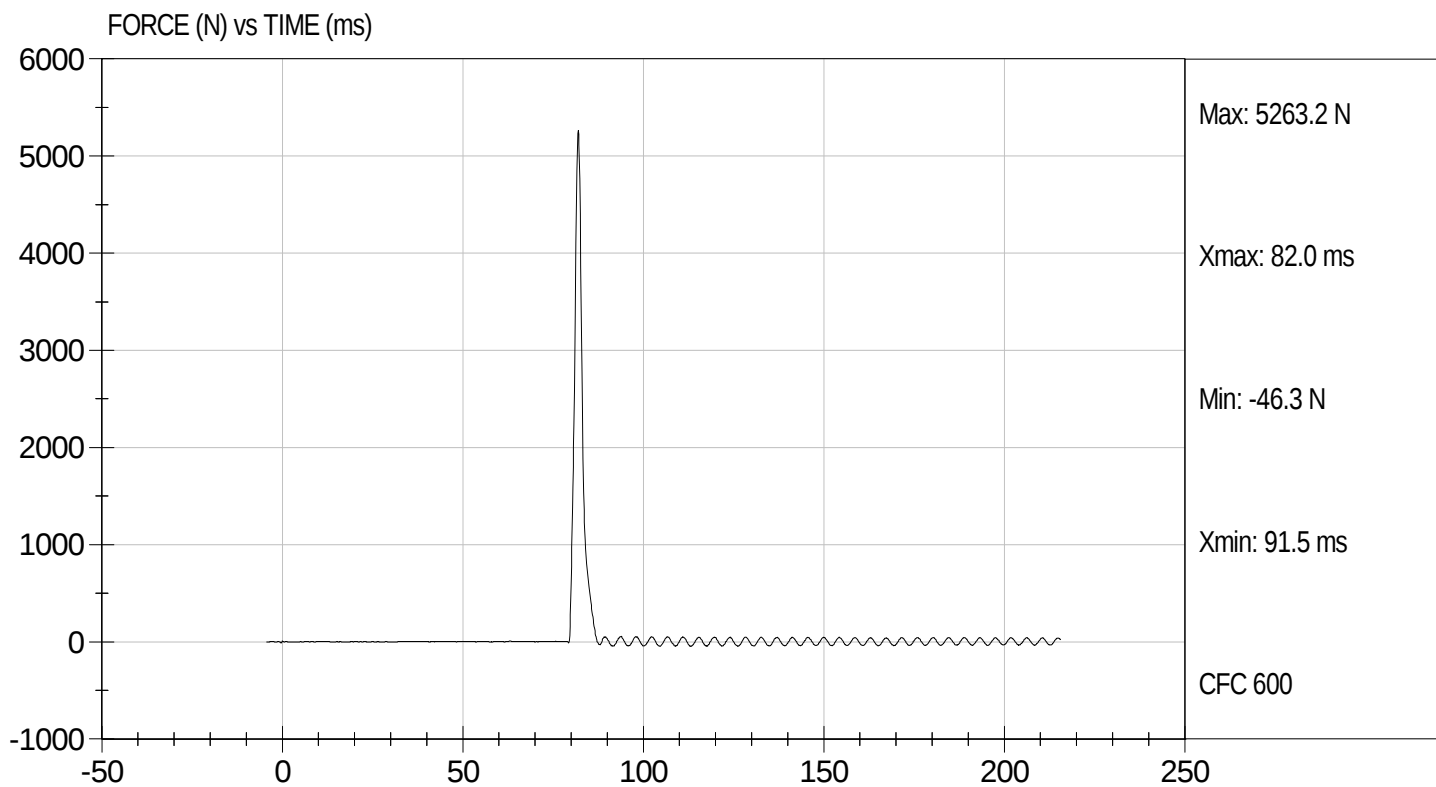


Approved By



Test Desc: Right Knee
Component ID: D113215

Test Date: 9/27/11
Velocity: 6.97 ft/s, 2.12 m/s

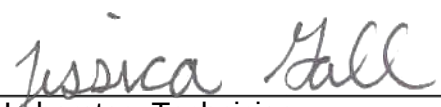


MGA RESEARCH CORPORATION
LEFT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036

Test I.D: D113216

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	50	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	Newtons	4715 to 5782	4,902	Pass
Overall Test Results				Pass



Laboratory Technician

9/27/11

Test Date

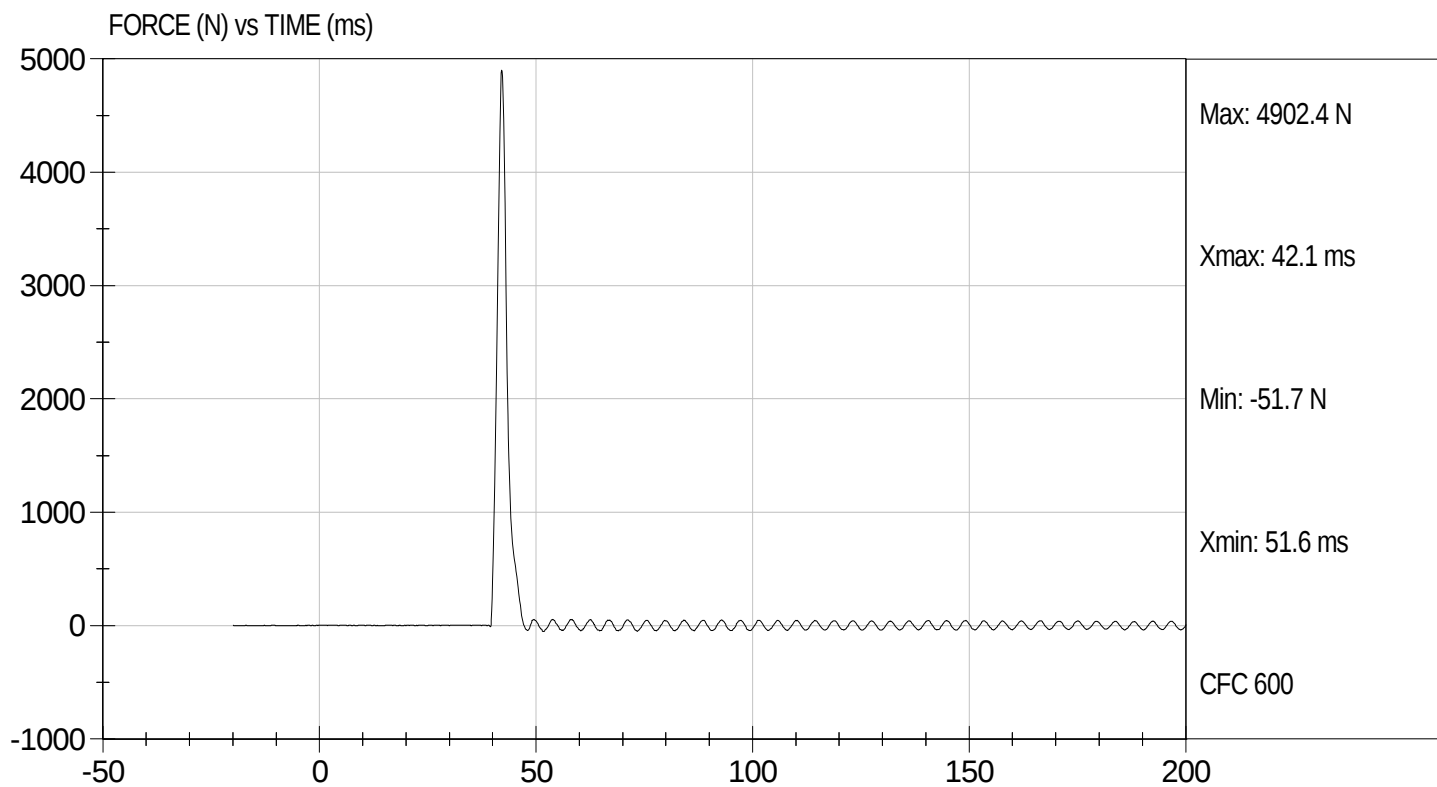


Approved By



Test Desc: Left Knee
Component ID: D113216

Test Date: 9/27/11
Velocity: 6.94 ft/s, 2.12 m/s

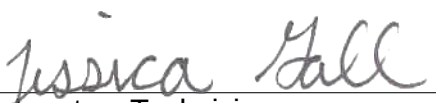


MGA RESEARCH CORPORATION
HIP-FEMUR FLEXION TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036

Test I.D: D113210

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.8	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	49	49	Pass
Rotation Rate	deg/s	5.0 -10.0	5.7	5.7	Pass
30 Degrees	Nm	94.9 Nm Max	92.5	78.1	Pass
150 ft-lbf / 203.4 Nm	Deg	40.0 - 50.0 Degree Max Rotation	40.4	41.0	Pass
Overall Test Results					Pass


 Laboratory Technician

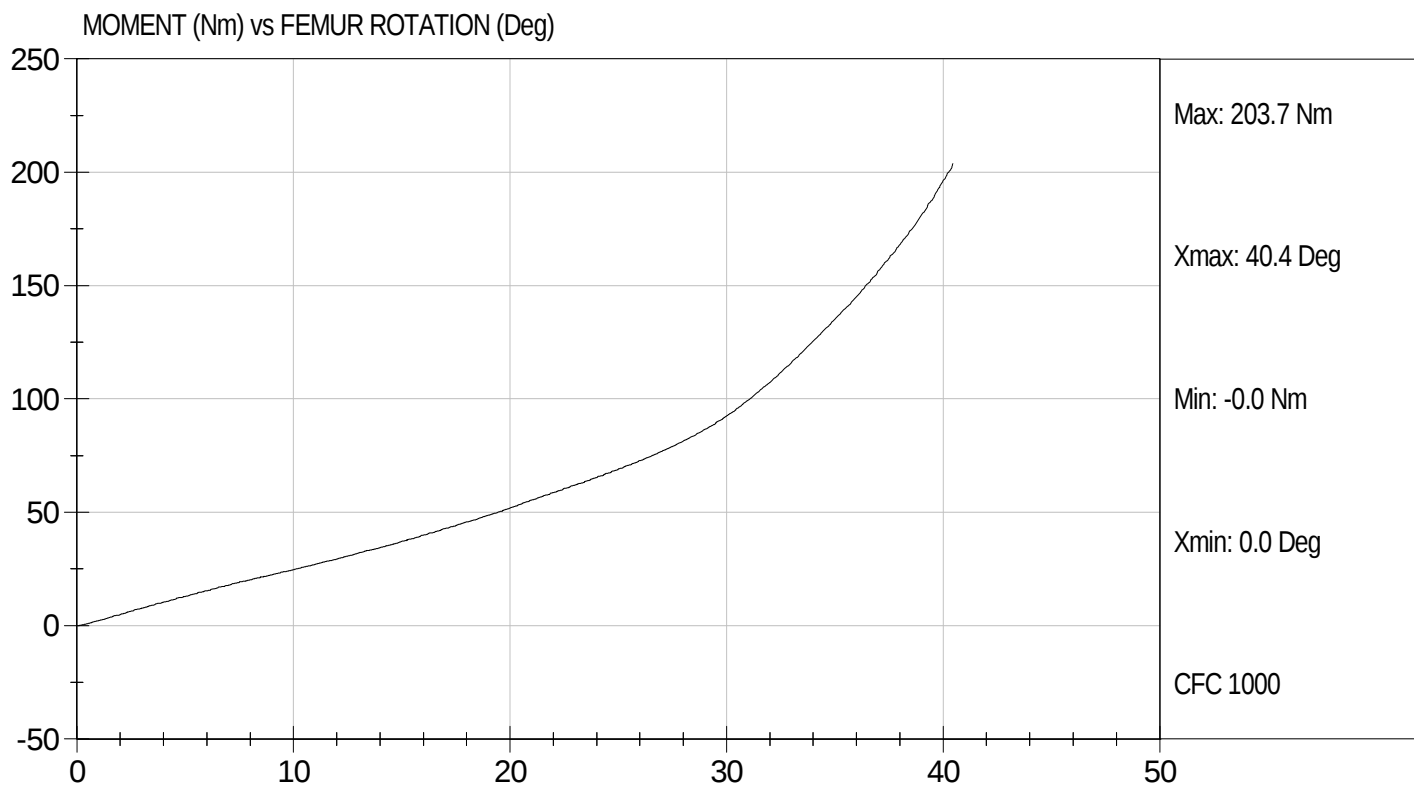
9/27/11
 Test Date


 Approved By



Test Desc: Hip Femur Flexion
Component ID: D113219

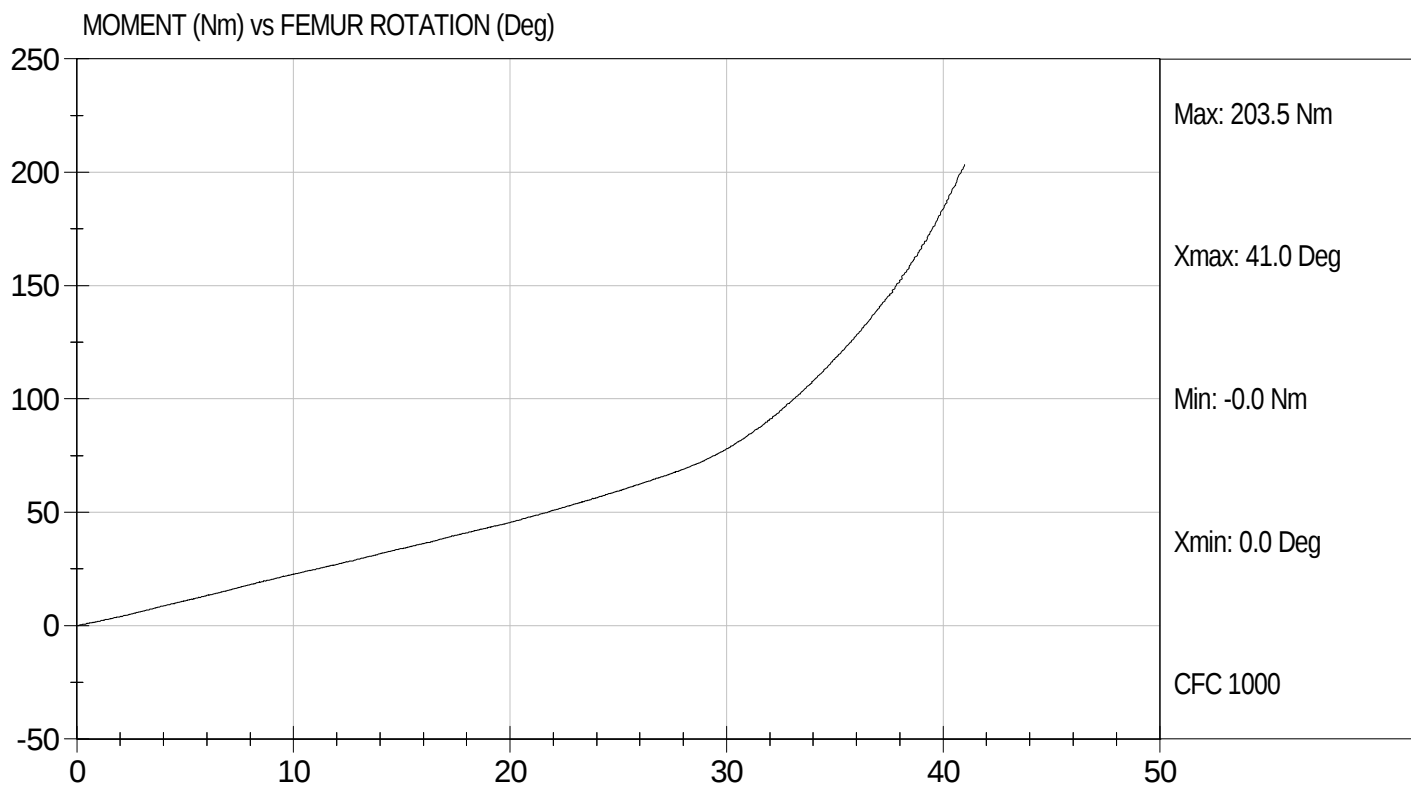
Test Date: 9/27/11
Velocity: 0 ft/s, 0.00 m/s





Test Desc: Hip Femur Flexion
Component ID: D113210

Test Date: 9/27/11
Velocity: 0 ft/s, 0.00 m/s

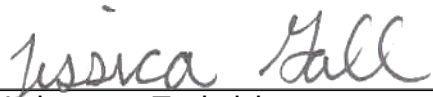


MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036

Test ID: D113271

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	39	Pass
Peak Resultant Acceleration	G's	225 - 275	257	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-9.8	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

10/3/11
Test Date

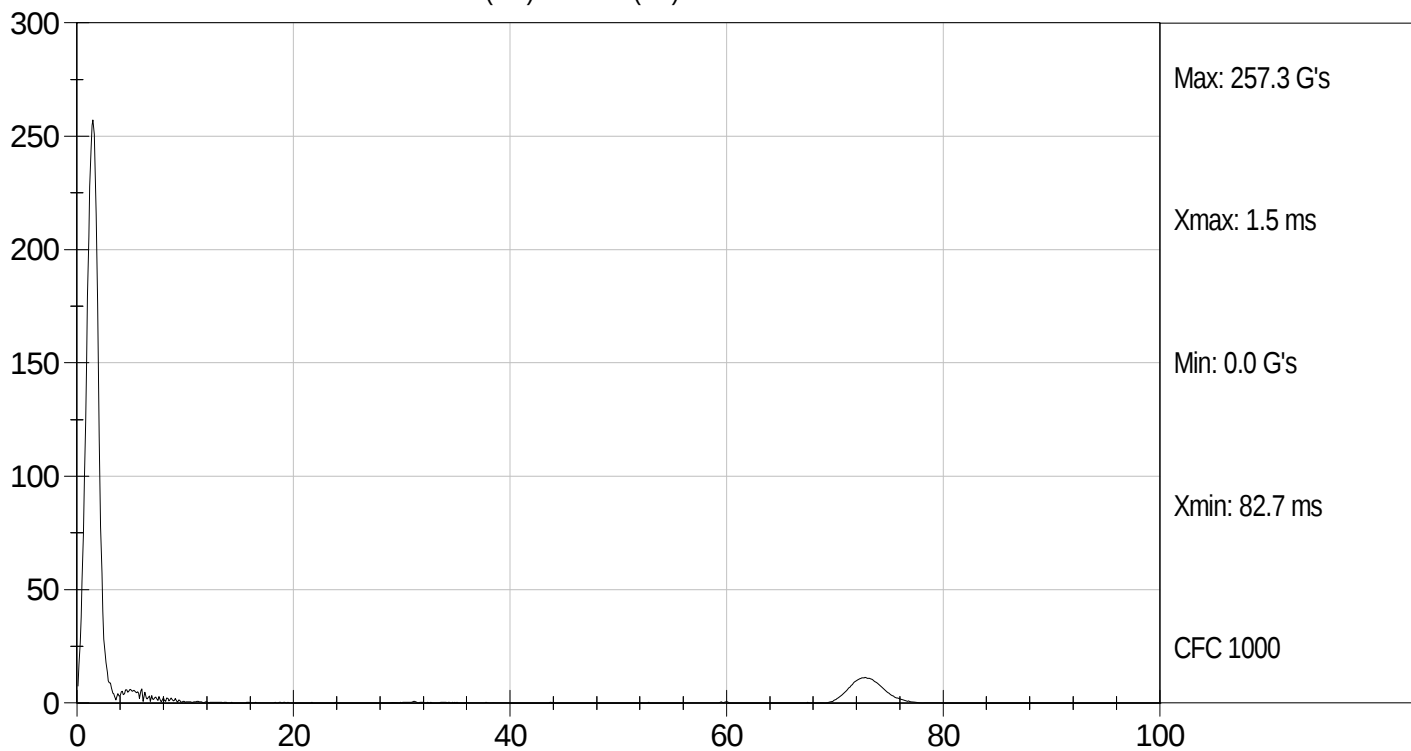

Approved By



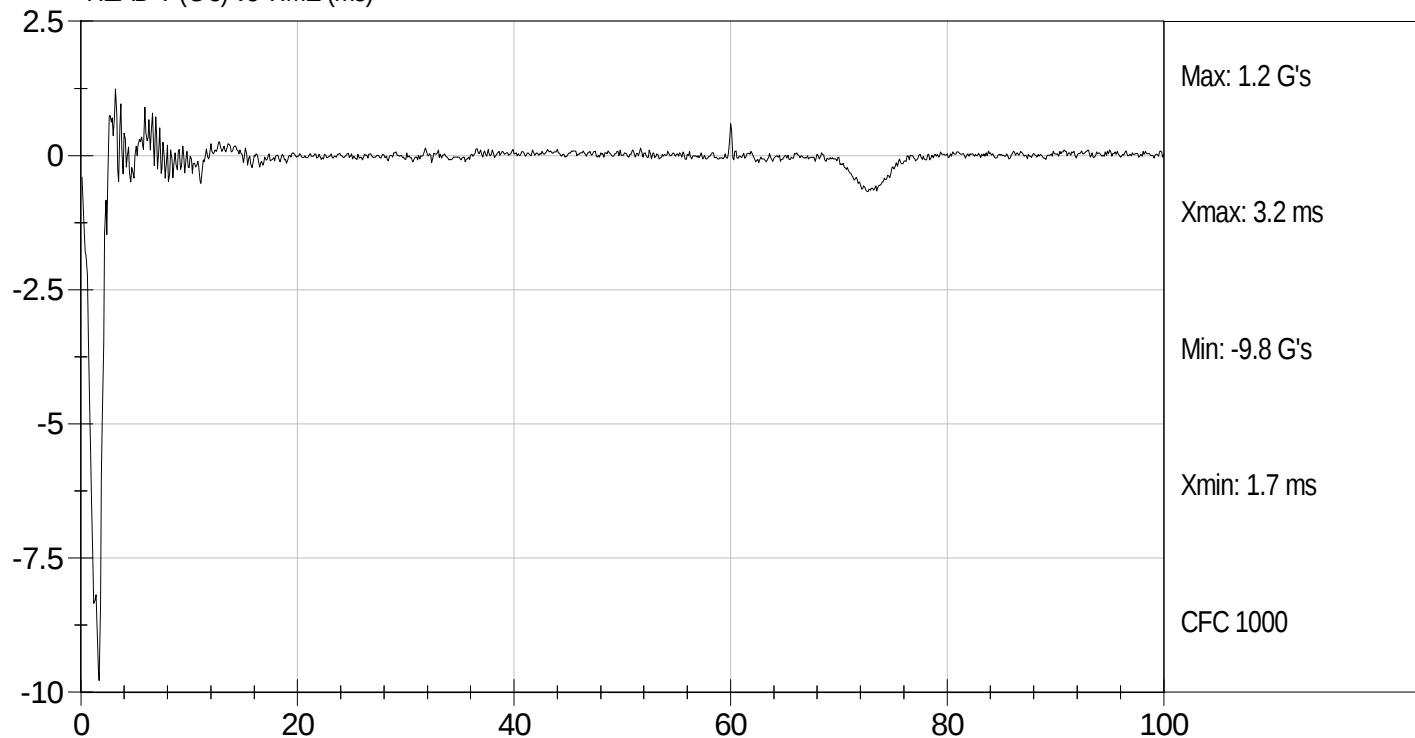
Test Desc: Head Drop
Component ID: D113271

Test Date: 10/3/11
Velocity: 0 ft/s, 0.00 m/s

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



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



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

ATD Serial No: 036

Test I.D: D113272

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	43	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	23.33	Pass
	20 ms	G's	17.60 to 22.60	19.13	Pass
	30 ms	G's	12.50 to 18.50	13.72	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	13.7	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	40.0	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	67.2	Pass
	Time	ms	57.0 to 64.0	57.7	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	117.7	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	98.8	Pass
	Time	ms	47.0 to 58.0	52.3	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	97.8	Pass
Overall Test Results					Pass


 Laboratory Technician

10/3/11
 Test Date

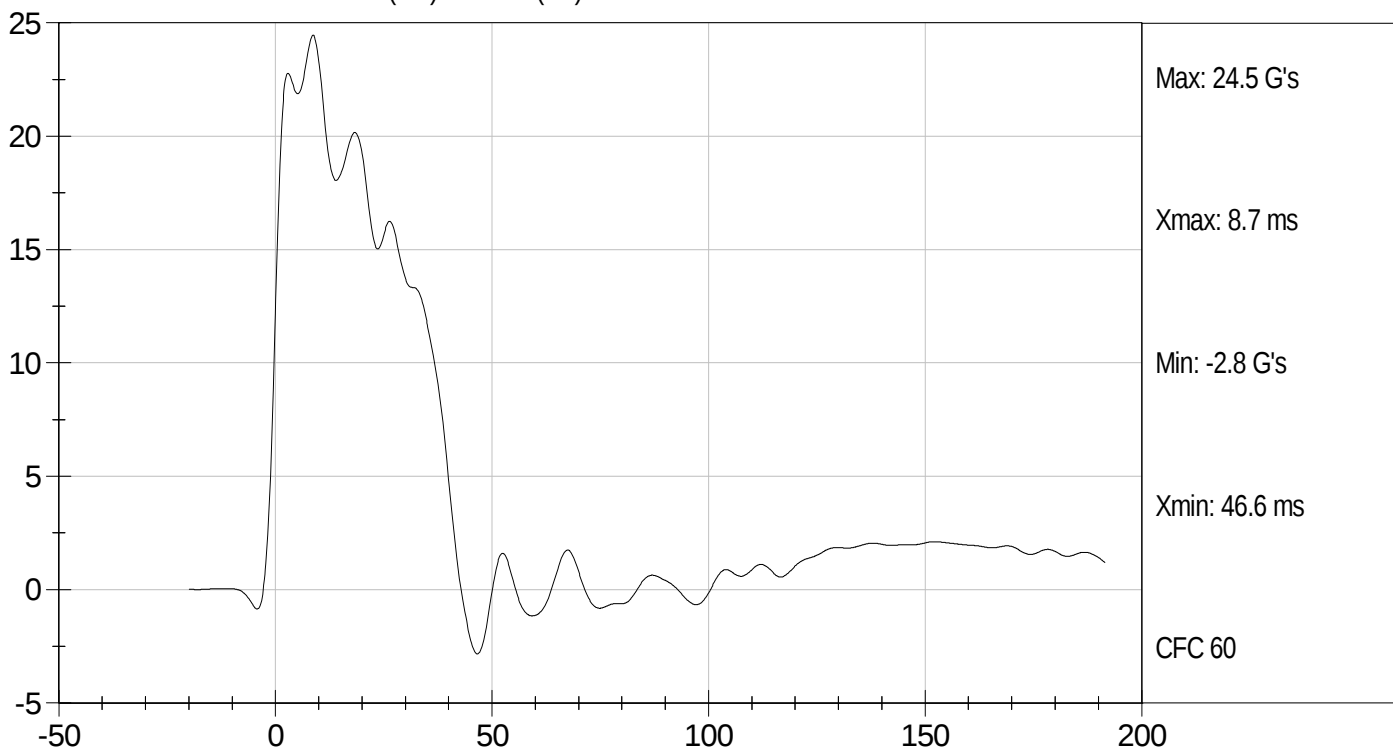

 Approved By



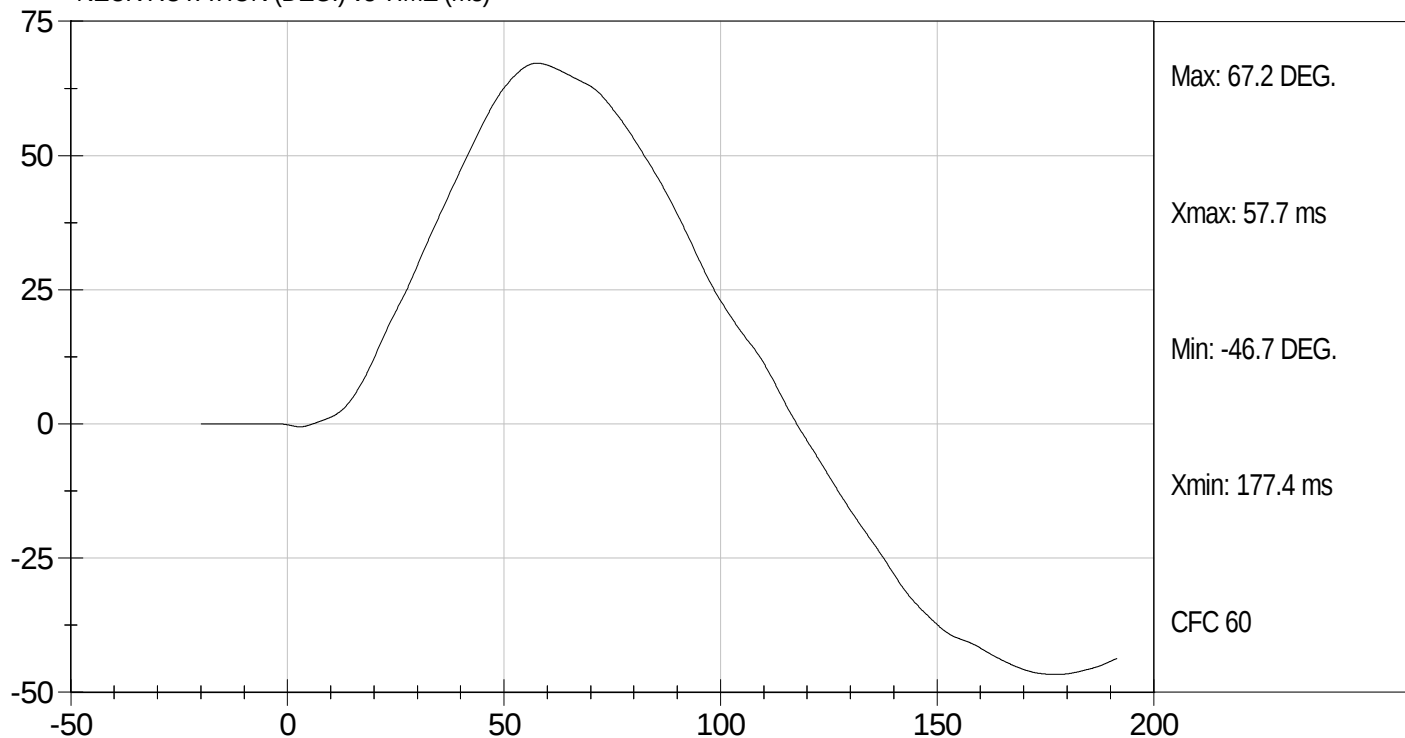
Test Desc: Neck Flexion
Component ID: D113272

Test Date: 10/3/11
Velocity: 23.15 ft/s, 7.06 m/s

PENDULUM DECELERATION (G's) vs TIME (ms)



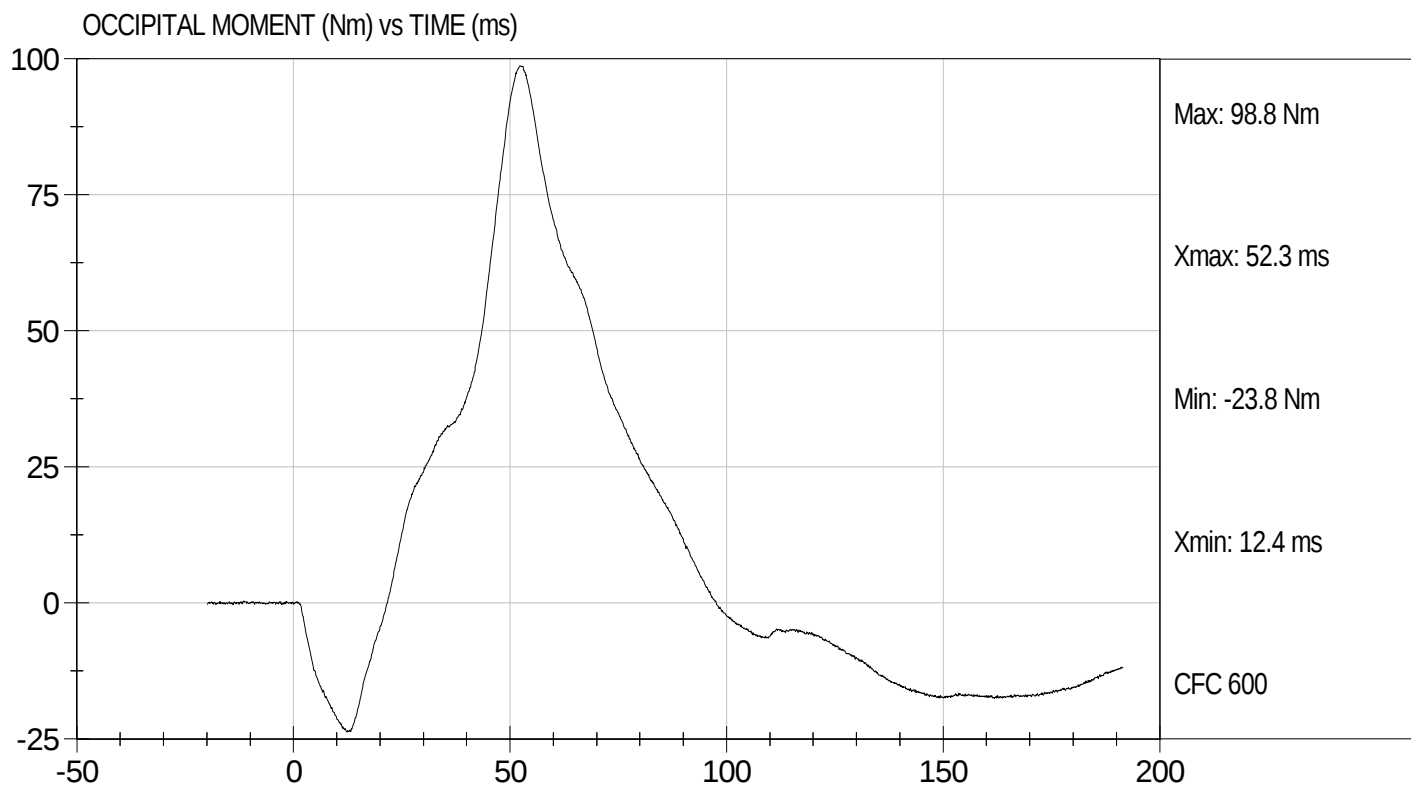
NECK ROTATION (DEG.) vs TIME (ms)





Test Desc: Neck Flexion
Component ID: D113272

Test Date: 10/3/11
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: D113273

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	43	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.12	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	19.64	Pass
	20 ms	G's	14.00 to 19.00	14.04	Pass
	30 ms	G's	11.00 to 16.00	11.18	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	11.3	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	44.8	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	92.3	Pass
	Time	ms	72.0 to 82.0	76.9	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	158.5	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-61.1	Pass
	Time	ms	65.0 to 79.0	73.8	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	140.8	Pass
Overall Test Results					Pass


 Laboratory Technician

10/3/11
 Test Date

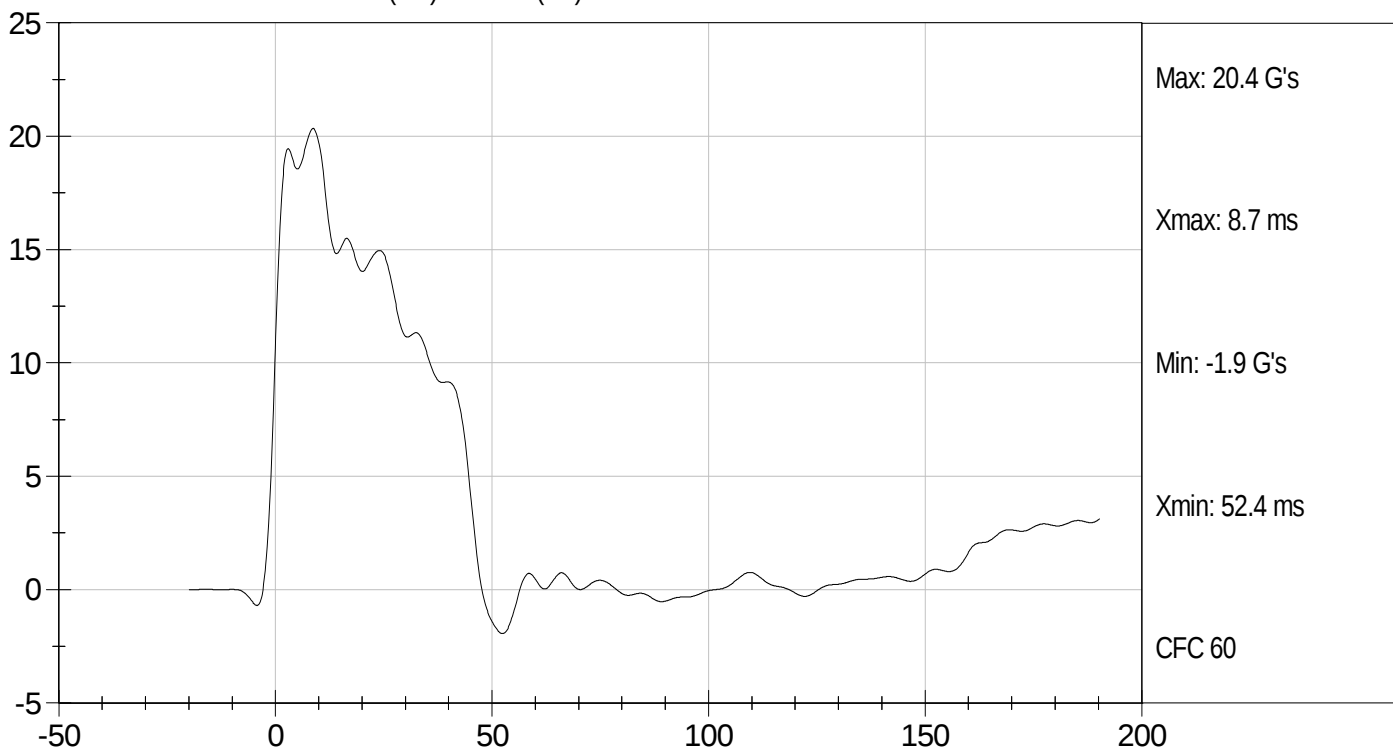

 Approved By



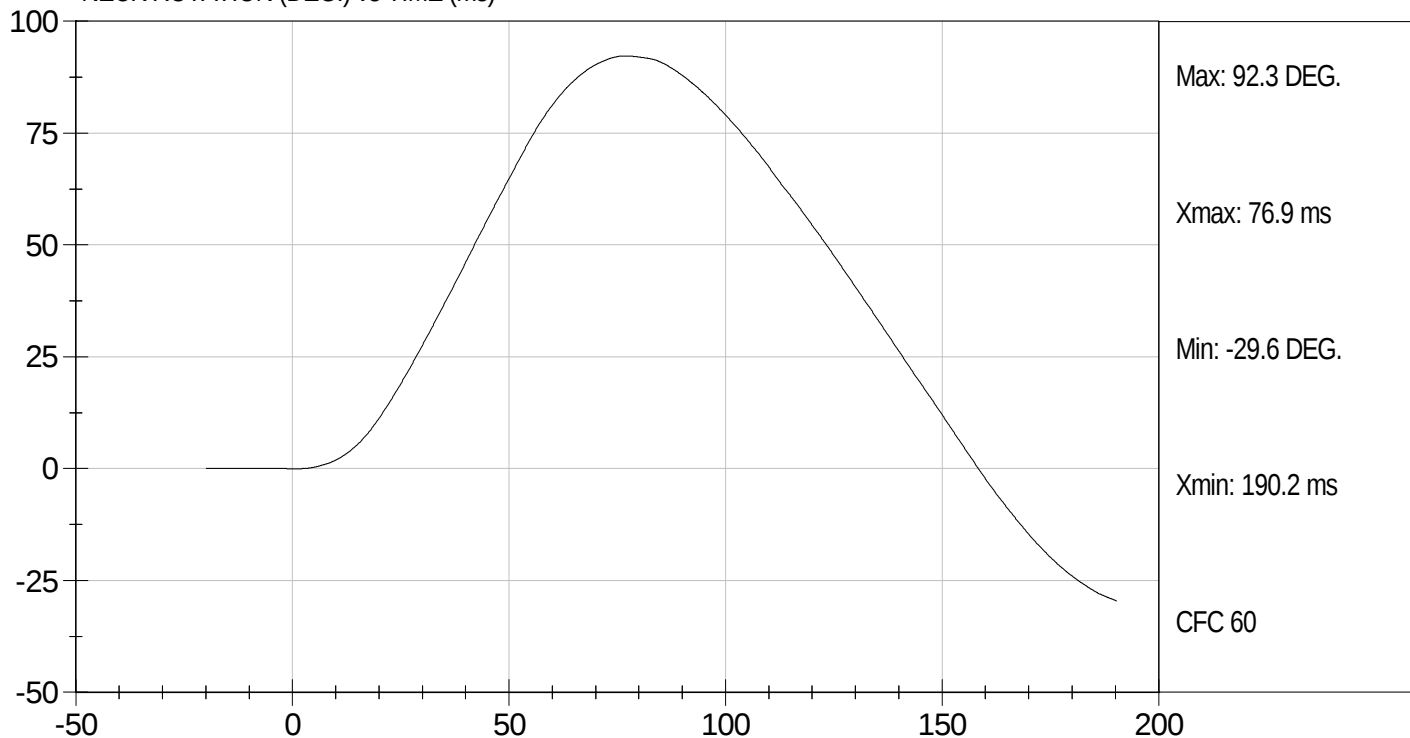
Test Desc: Neck Extension
Component ID: D113273

Test Date: 10/3/11
Velocity: 20.08 ft/s, 6.12 m/s

PENDULUM DECELERATION (G's) vs TIME (ms)



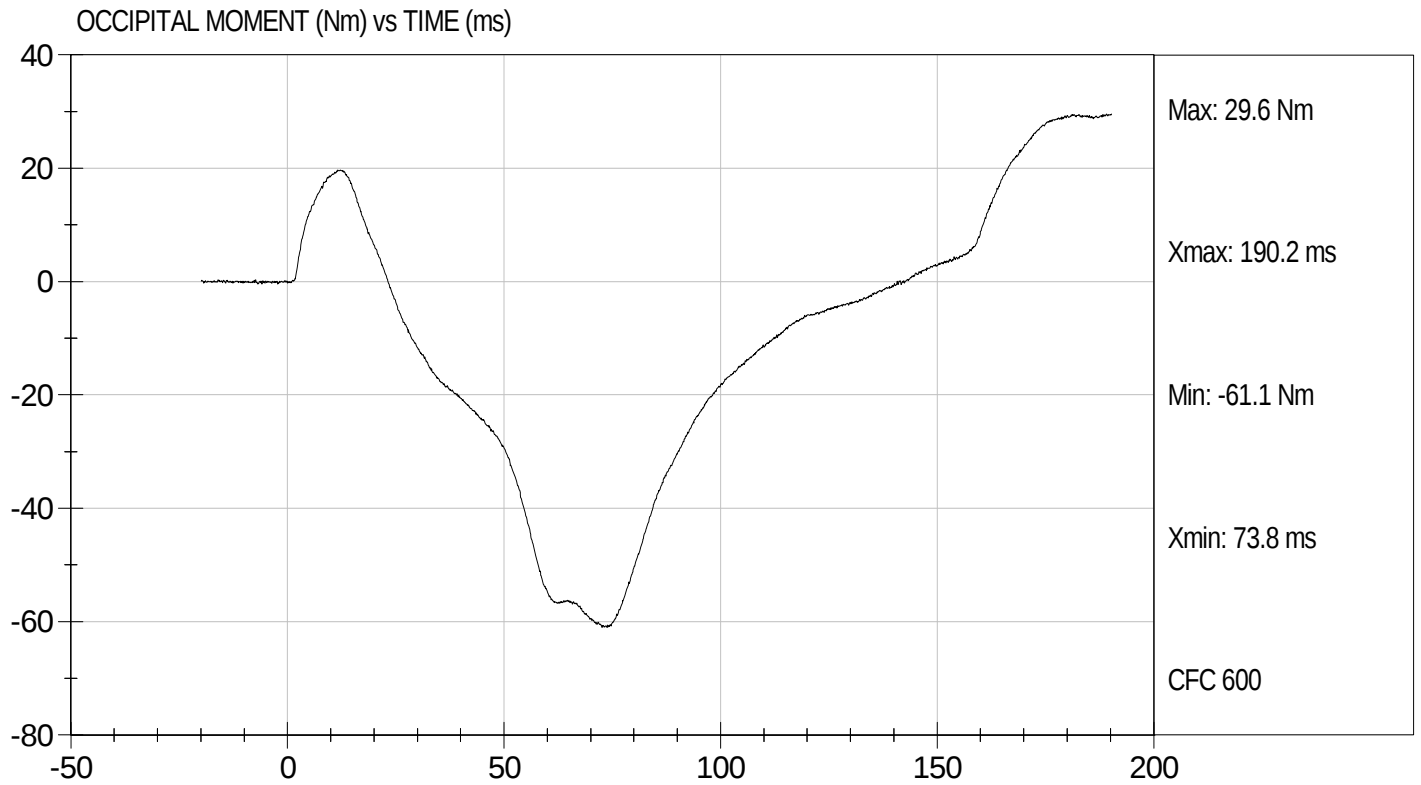
NECK ROTATION (DEG.) vs TIME (ms)





Test Desc: Neck Extension
Component ID: D113273

Test Date: 10/3/11
Velocity: 20.08 ft/s, 6.12 m/s



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036

Test I.D: D113274

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	39	Pass
Probe Velocity	m/s	6.58 to 6.82	6.77	Pass
Peak Probe Force	N	5159 to 5893	5,375	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.93	Pass
Internal Hysteresis	%	69 to 85	71	Pass
Overall Test Results			Pass	


Laboratory Technician

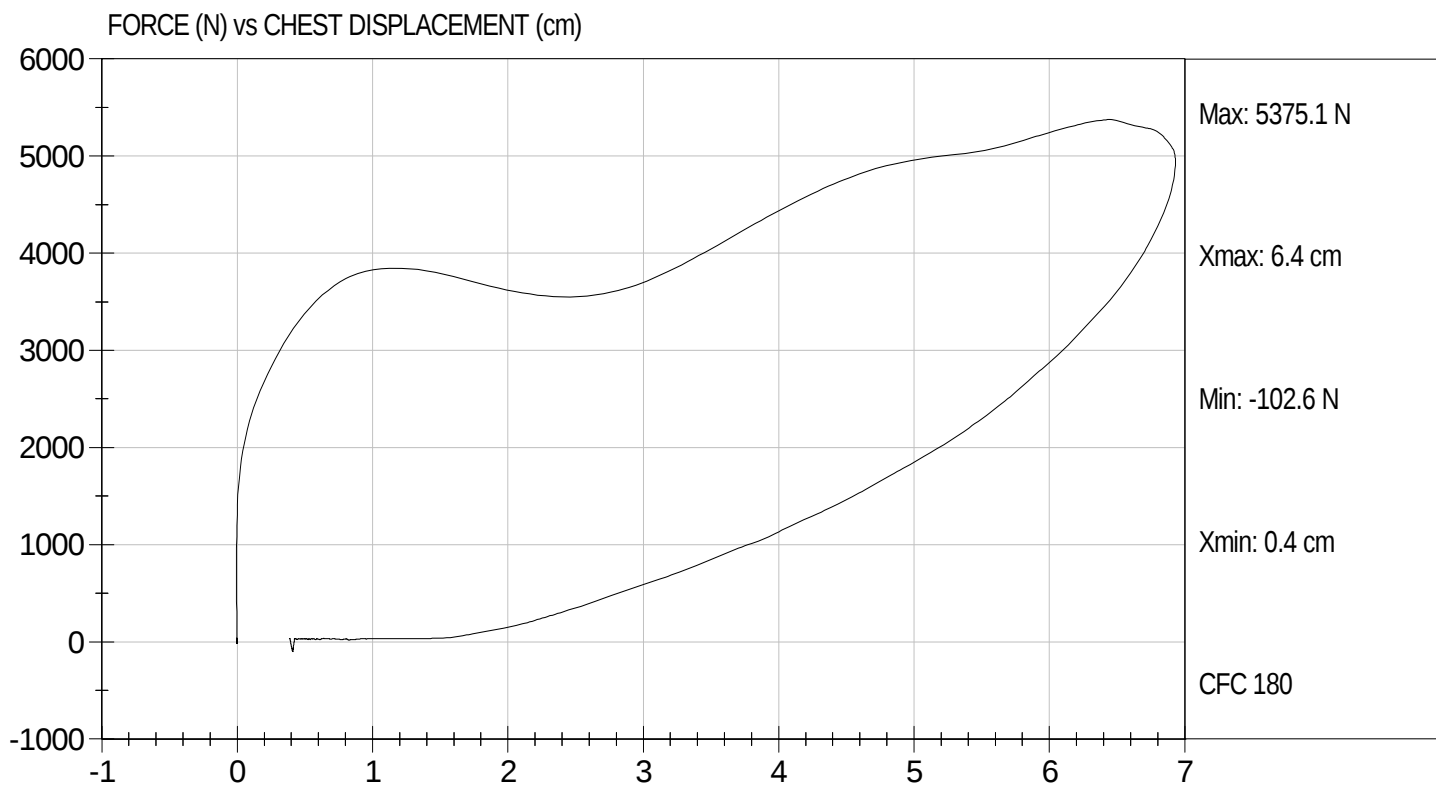
10/3/11
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D113274

Test Date: 10/3/11
Velocity: 22.22 ft/s, 6.77 m/s

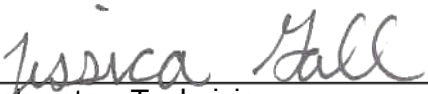


MGA RESEARCH CORPORATION
RIGHT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036

Test I.D: D113275

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	41	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	Newtons	4715 to 5782	4,852	Pass
			Overall Test Results	Pass



Laboratory Technician

10/3/11

Test Date

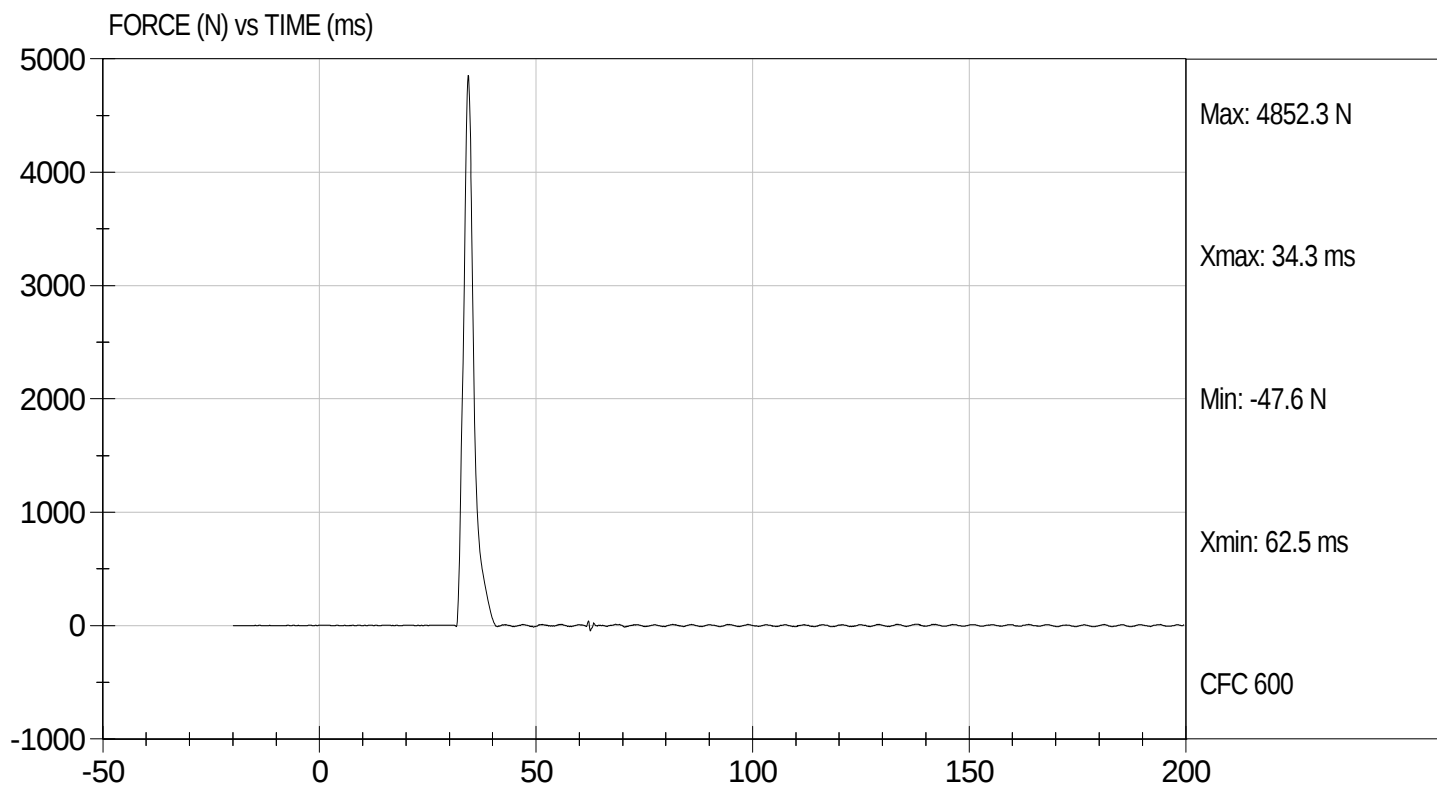


Approved By



Test Desc: Right Knee
Component ID: D113275

Test Date: 10/3/11
Velocity: 6.97 ft/s, 2.12 m/s

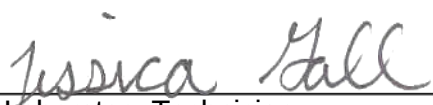


MGA RESEARCH CORPORATION
LEFT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036

Test I.D: D113276

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	41	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	Newtons	4715 to 5782	5,252	Pass
Overall Test Results				Pass



Laboratory Technician

10/3/11
Test Date

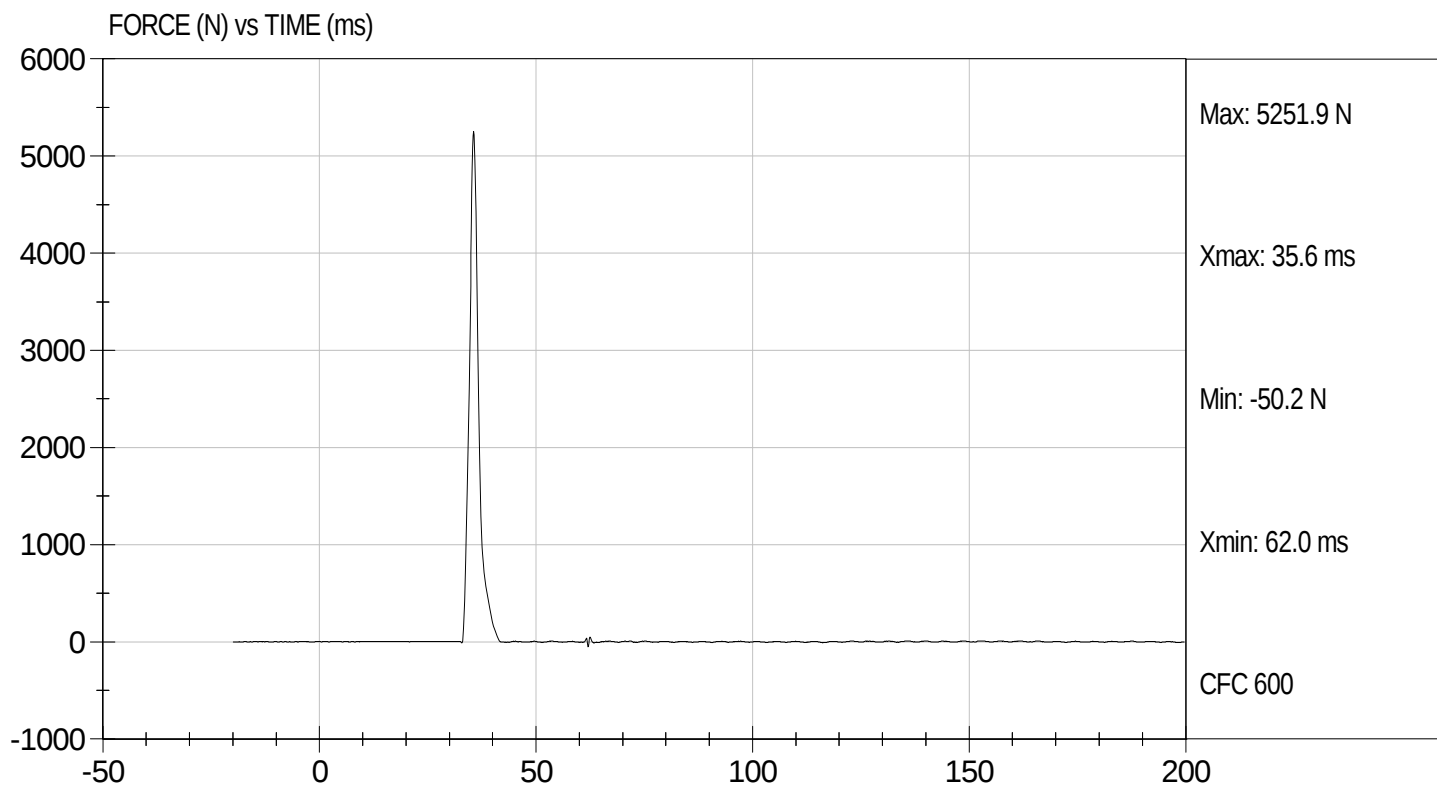


Approved By



Test Desc: Left Knee
Component ID: D113276

Test Date: 10/3/11
Velocity: 6.97 ft/s, 2.12 m/s

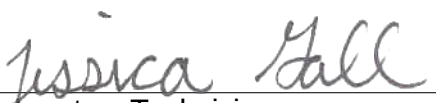


MGA RESEARCH CORPORATION
HIP-FEMUR FLEXION TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036

Test I.D: D113270

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	40	40	Pass
Rotation Rate	deg/s	5.0 -10.0	5.7	5.7	Pass
30 Degrees	Nm	94.9 Nm Max	90.6	77.7	Pass
150 ft-lbf / 203.4 Nm	Deg	40.0 - 50.0 Degree Max Rotation	40.6	41.1	Pass
Overall Test Results					Pass


 Laboratory Technician

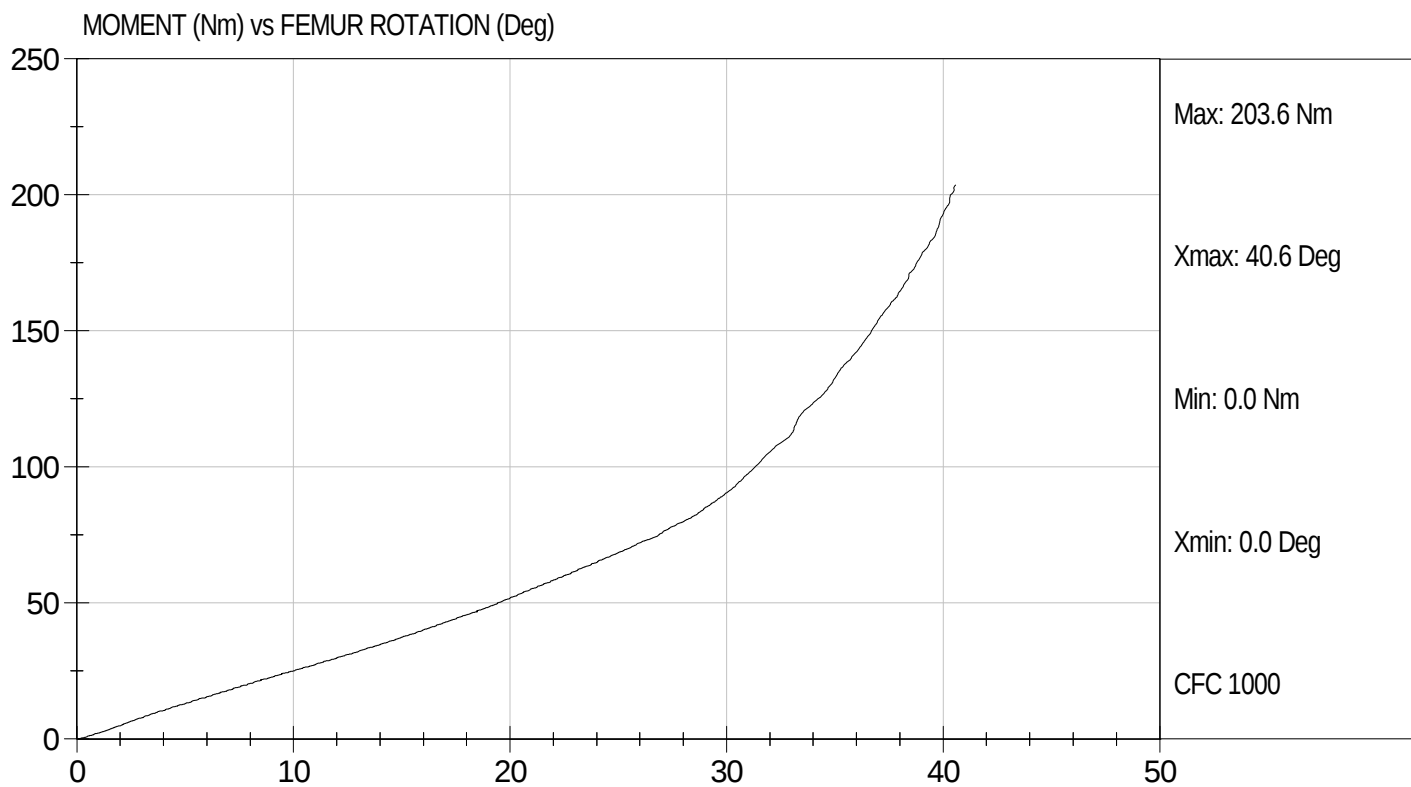
10/3/11
 Test Date


 Approved By



Test Desc: Hip Femur Flexion
Component ID: D113279

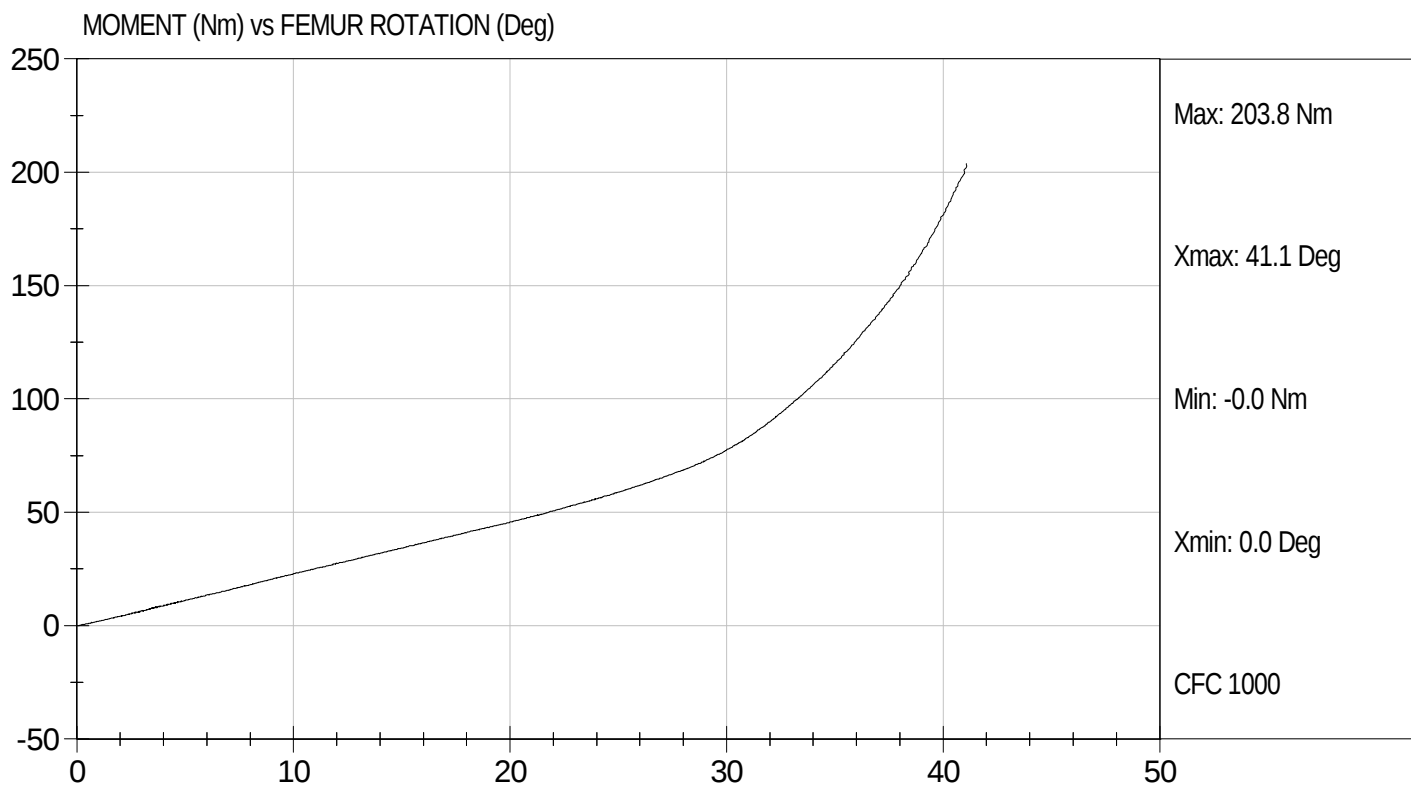
Test Date: 10/3/11
Velocity: 0 ft/s, 0.00 m/s





Test Desc: Hip Femur Flexion
Component ID: D113270

Test Date: 10/3/11
Velocity: 0 ft/s, 0.00 m/s



Hybrid III, 5th External Measurements
SN: 634

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

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

MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test ID: D113201

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	49	Pass
Peak Resultant Acceleration	G's	250 to 300	286	Pass
Peak Lateral Acceleration	G's	+/- 15	10	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

9/27/11
Test Date

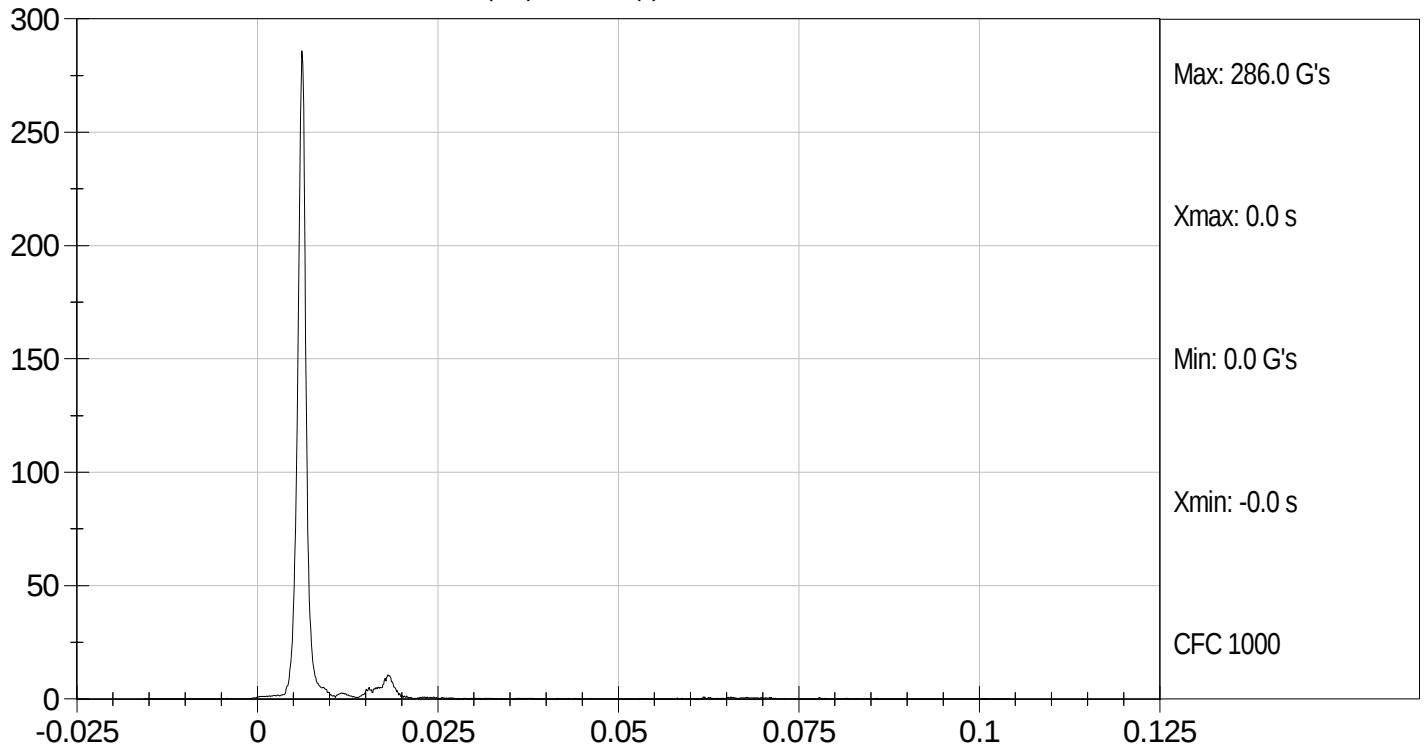
David Winkelbauer
Approved By



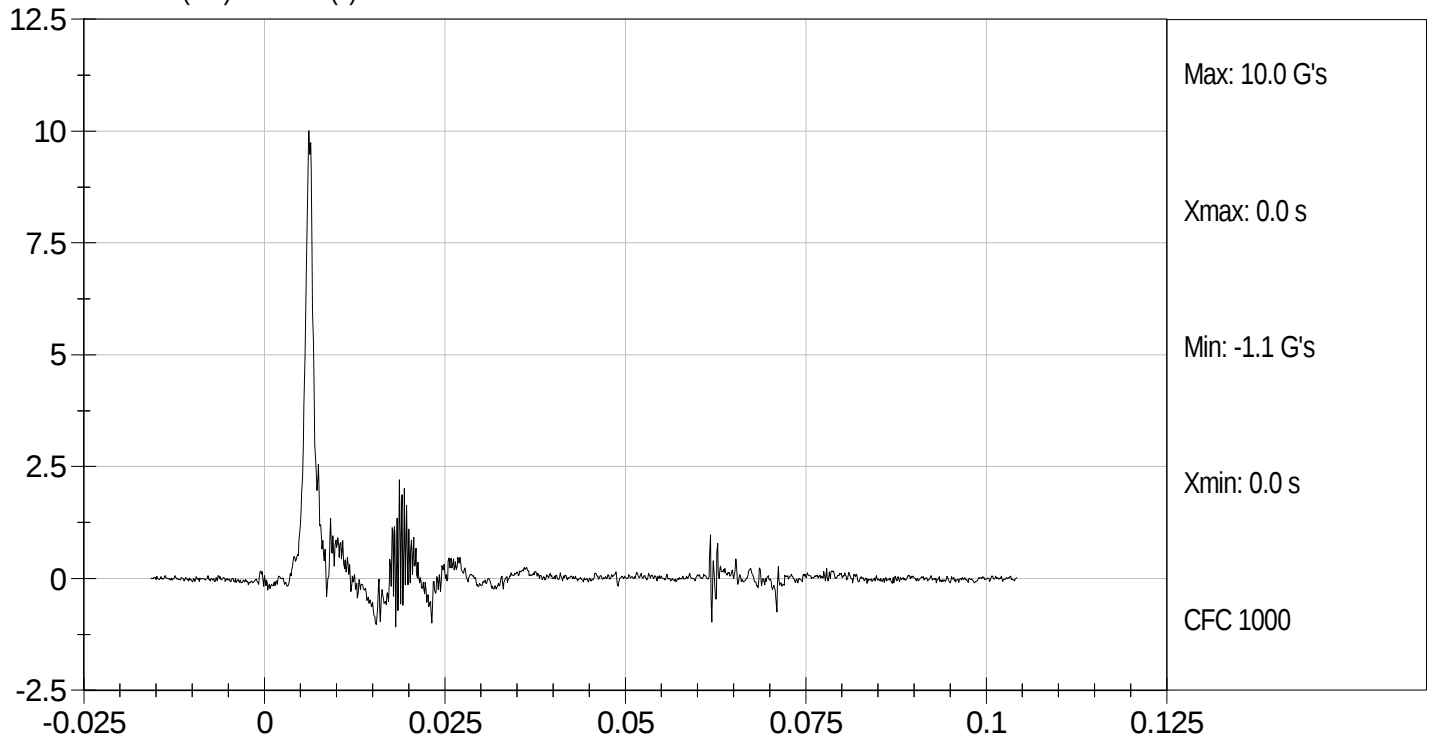
Test Desc: Head Drop
Component ID: D113201

Test Date: 9/27/11
Velocity: 0 ft/s, 0 m/s

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



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

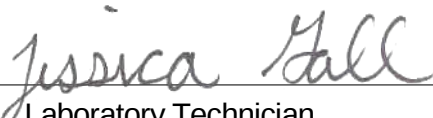


MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test I.D: D113202

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity		%	10 to 70	50	Pass
Pendulum Speed		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	m/s	2.1 to 2.5	2.3	Pass
	20 ms	m/s	4.0 to 5.0	4.4	Pass
	30 ms	m/s	5.8 to 7.0	6.0	Pass
D Plane Rotation	Max	deg	77 to 91	78	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	87	Pass
Overall Results					Pass


 Laboratory Technician

9/28/11
 Test Date

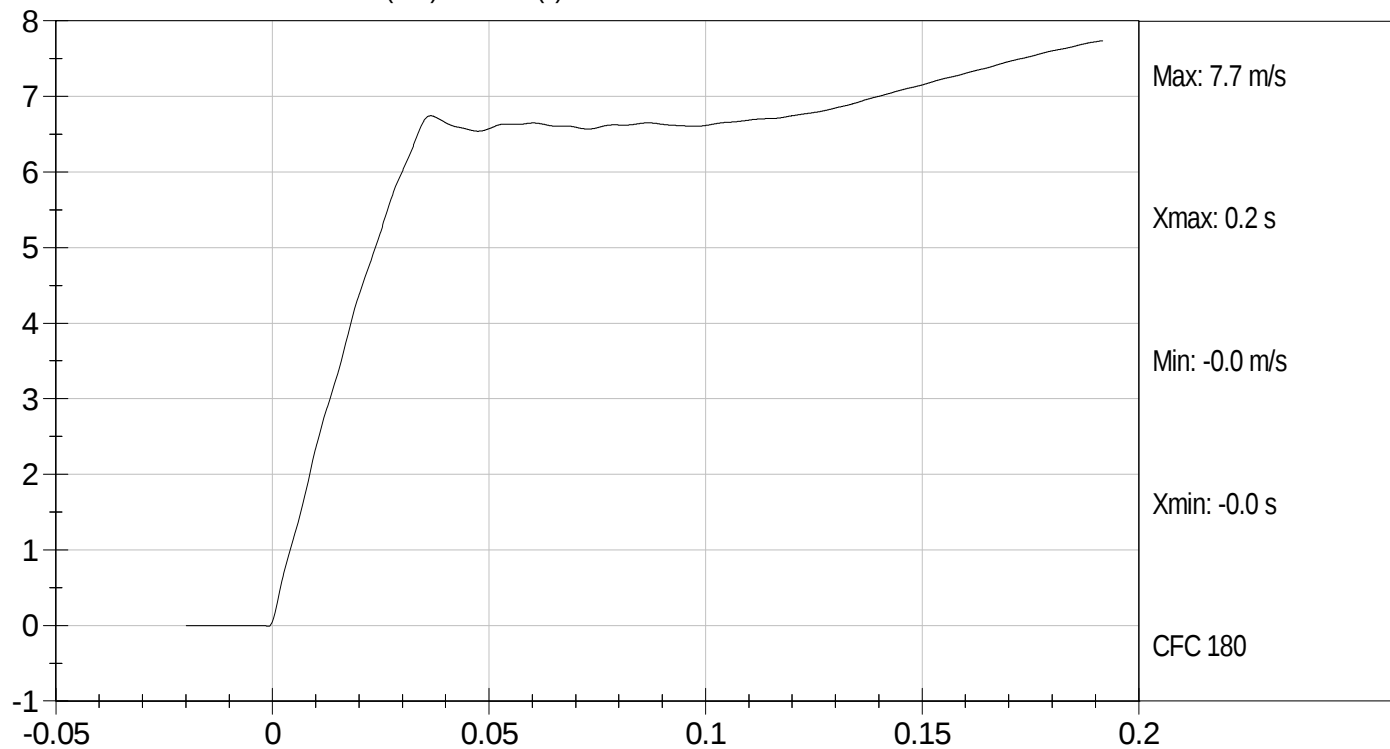

 Approved By



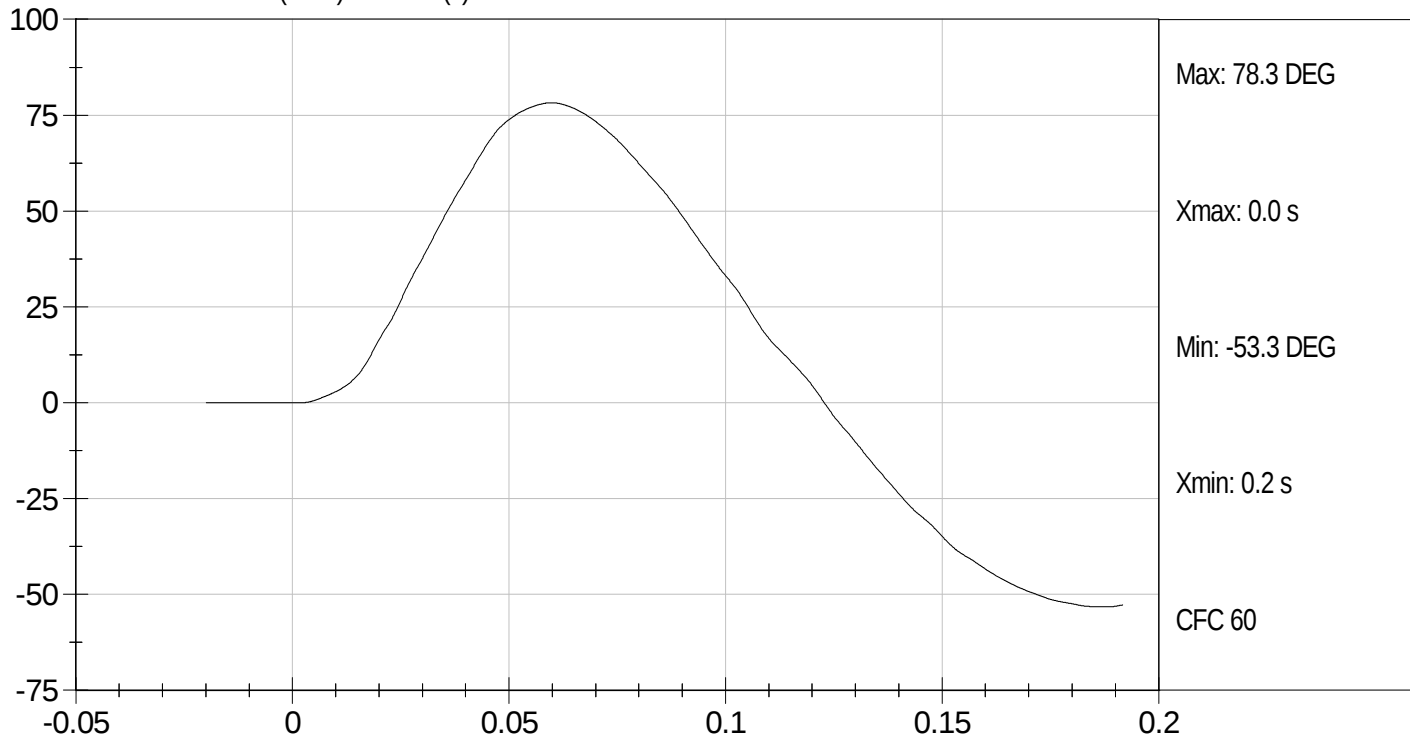
Test Desc: Neck Flexion
Component ID: D113202

Test Date: 9/28/11
Velocity: 23.15 ft/s, 7.06 m/s

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



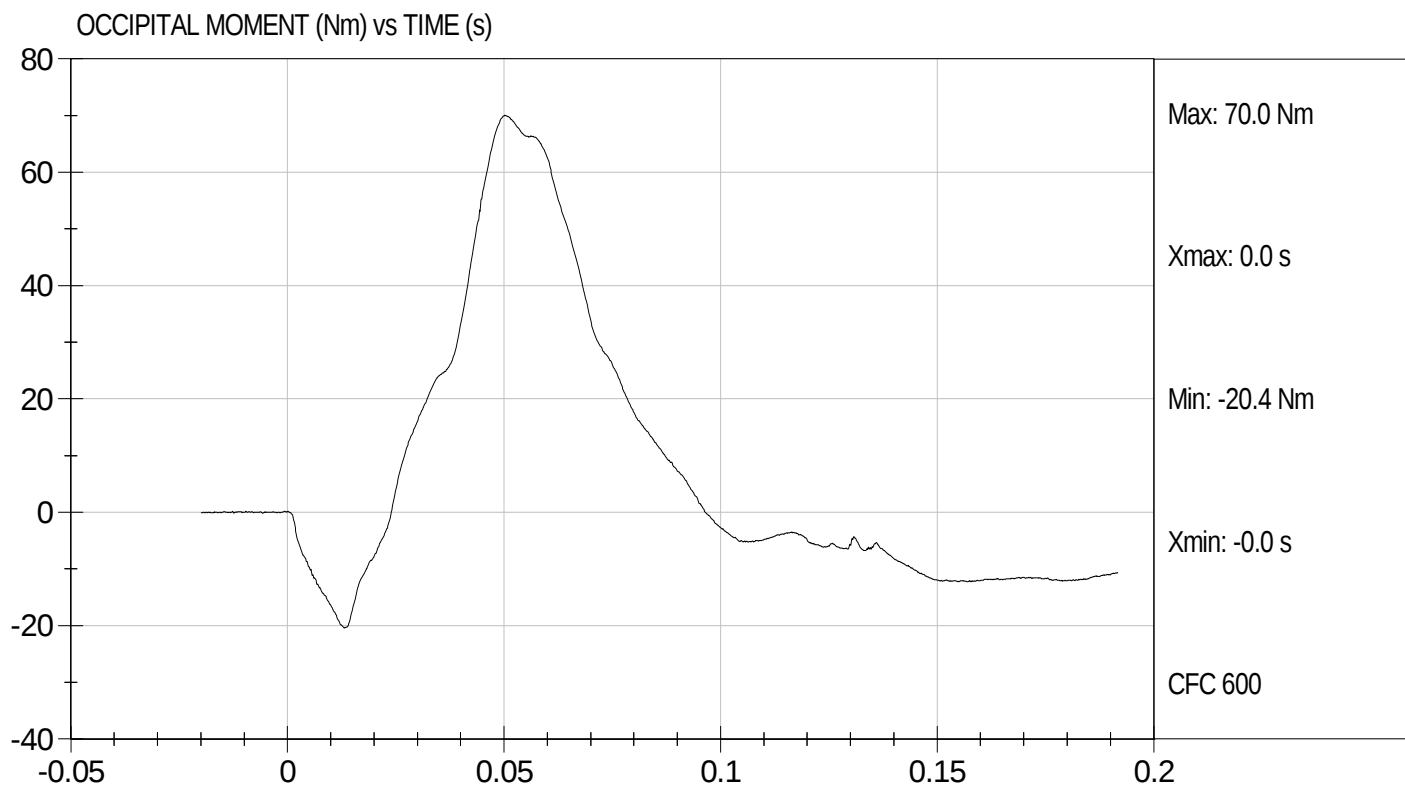
NECK ROTATION (DEG) vs TIME (s)





Test Desc: Neck Flexion
Component ID: D113202

Test Date: 9/28/11
Velocity: 23.15 ft/s, 7.06 m/s

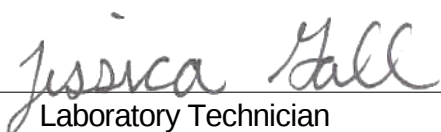


MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test I.D: D113203

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity		%	10 to 70	50	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.13	Pass
Pendulum Deceleration	10 ms	m/s	1.5 to 1.9	1.8	Pass
	20 ms	m/s	3.1 to 3.9	3.5	Pass
	30 ms	m/s	4.6 to 5.6	4.9	Pass
D Plane Rotation	Max	deg	99 to 114	104	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	-65 to -53	-53	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	103	Pass
Overall Results					Pass


Laboratory Technician

9/28/11
Test Date

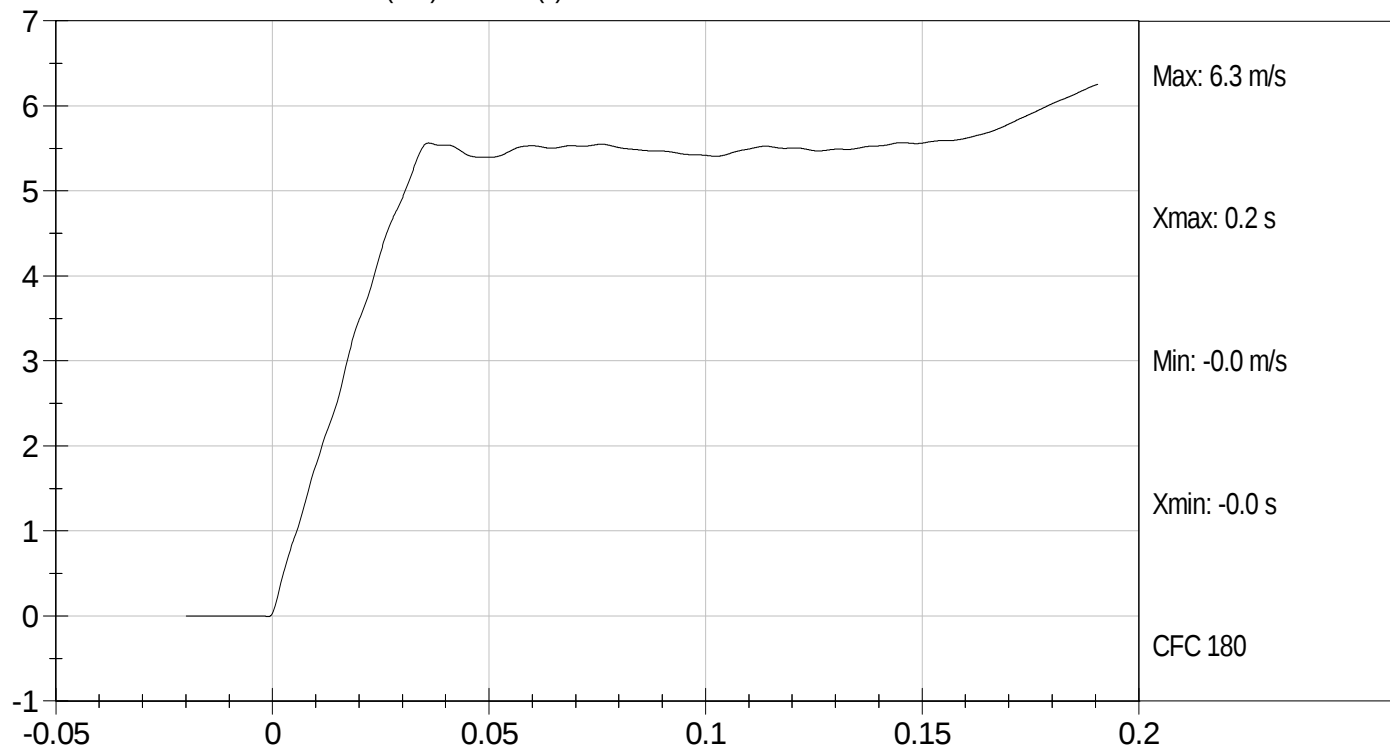

Approved By



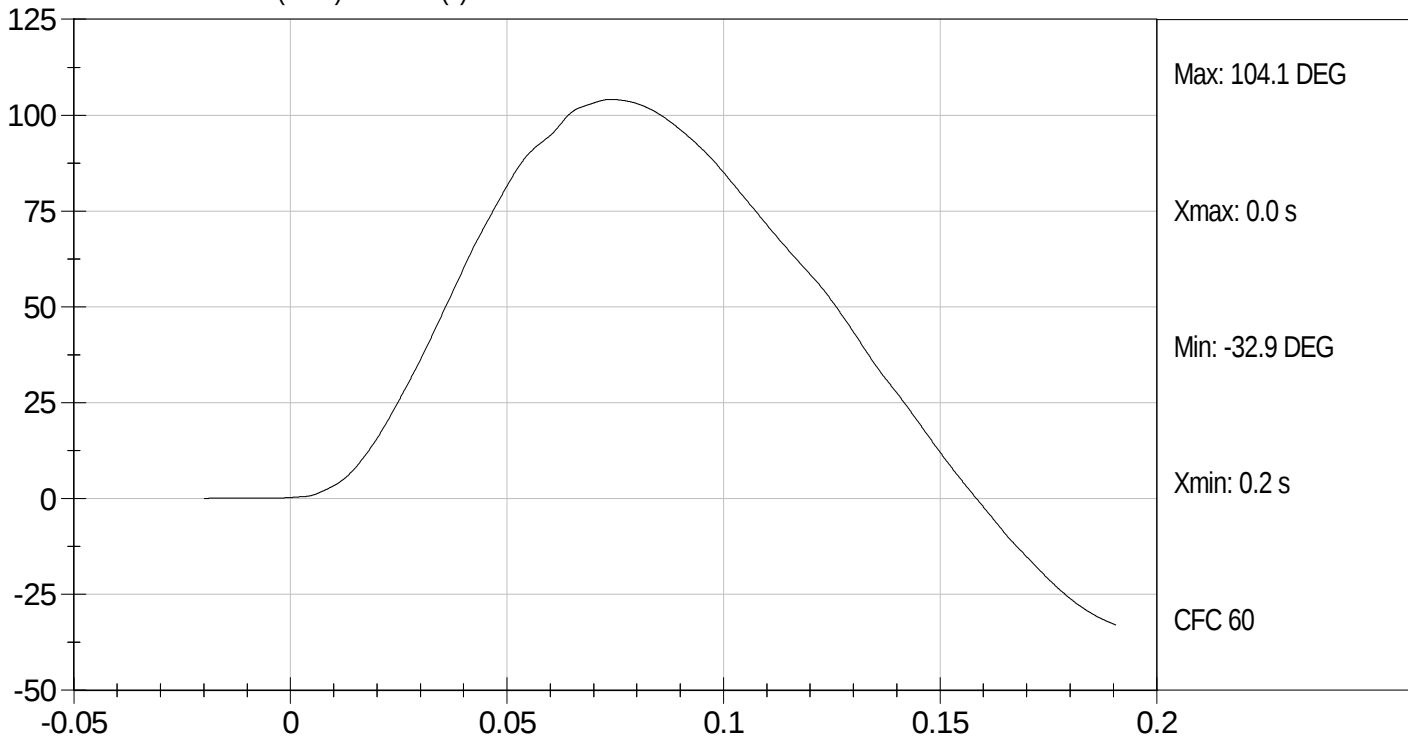
Test Desc: Neck Extension
Component ID: D113203

Test Date: 9/28/11
Velocity: 20.10 ft/s, 6.13 m/s

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



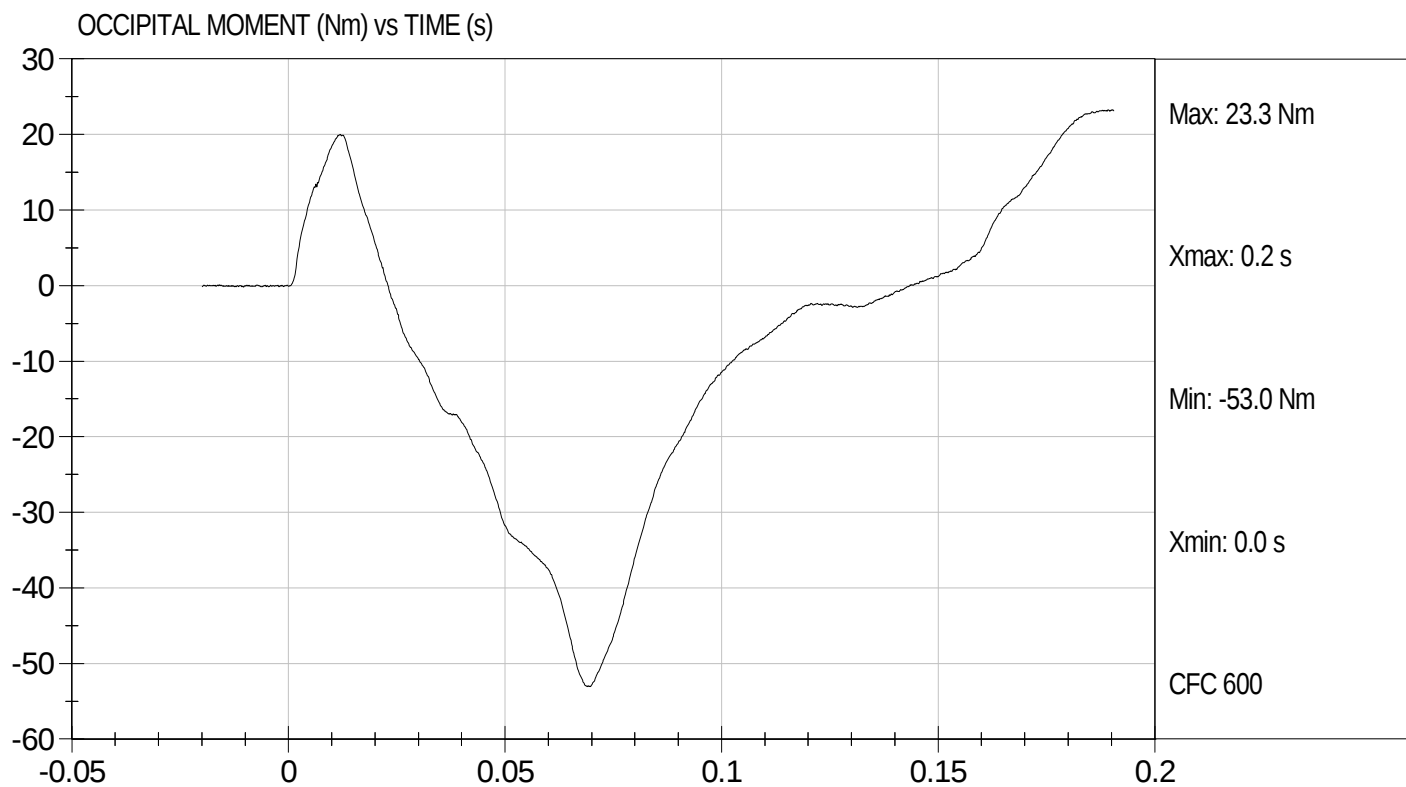
NECK ROTATION (DEG) vs TIME (s)





Test Desc: Neck Extension
Component ID: D113203

Test Date: 9/28/11
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: D113204

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.8	Pass
Relative Humidity	%	10 to 70	47	Pass
Probe Speed	m/s	6.59 to 6.83	6.77	Pass
Peak Deflection	mm	50 to 58	52	Pass
Peak Resistive Force w/in Deflection Corridor	kN	3.9 to 4.4	4.1	Pass
Internal Hysteresis	%	69 to 85	69	Pass
Peak Force 18 mm - 50 mm	N	<= 4,600 N	4045	Pass
			Overall Test Results	Pass


Laboratory Technician

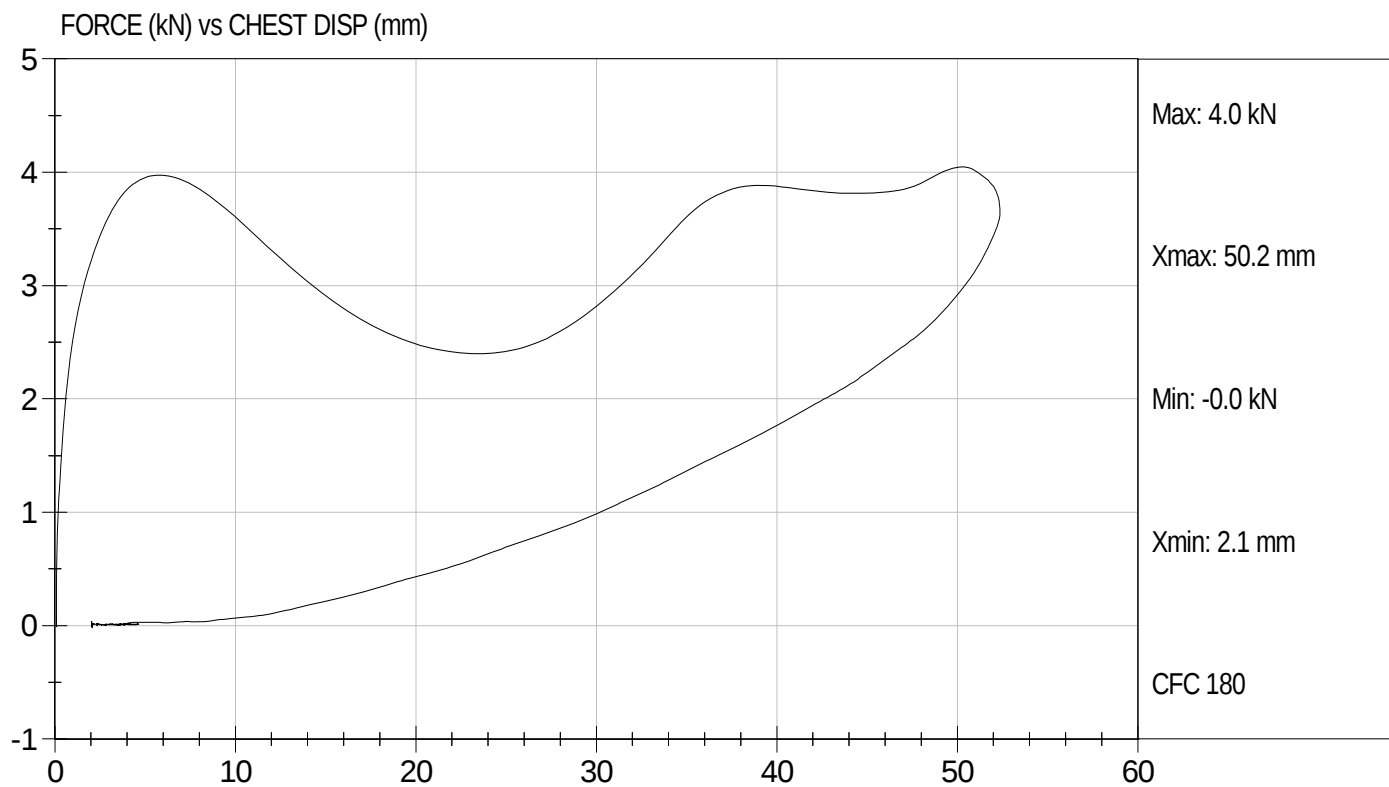
9/28/11
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D113204

Test Date: 9/28/11
Velocity: 22.22 ft/s, 6.77 m/s



MGA RESEARCH CORPORATION

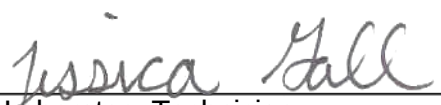
RIGHT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test I.D: D113205

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	49	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	kN	3.45 to 4.06	3.57	Pass
Overall Test Results				Pass


Laboratory Technician

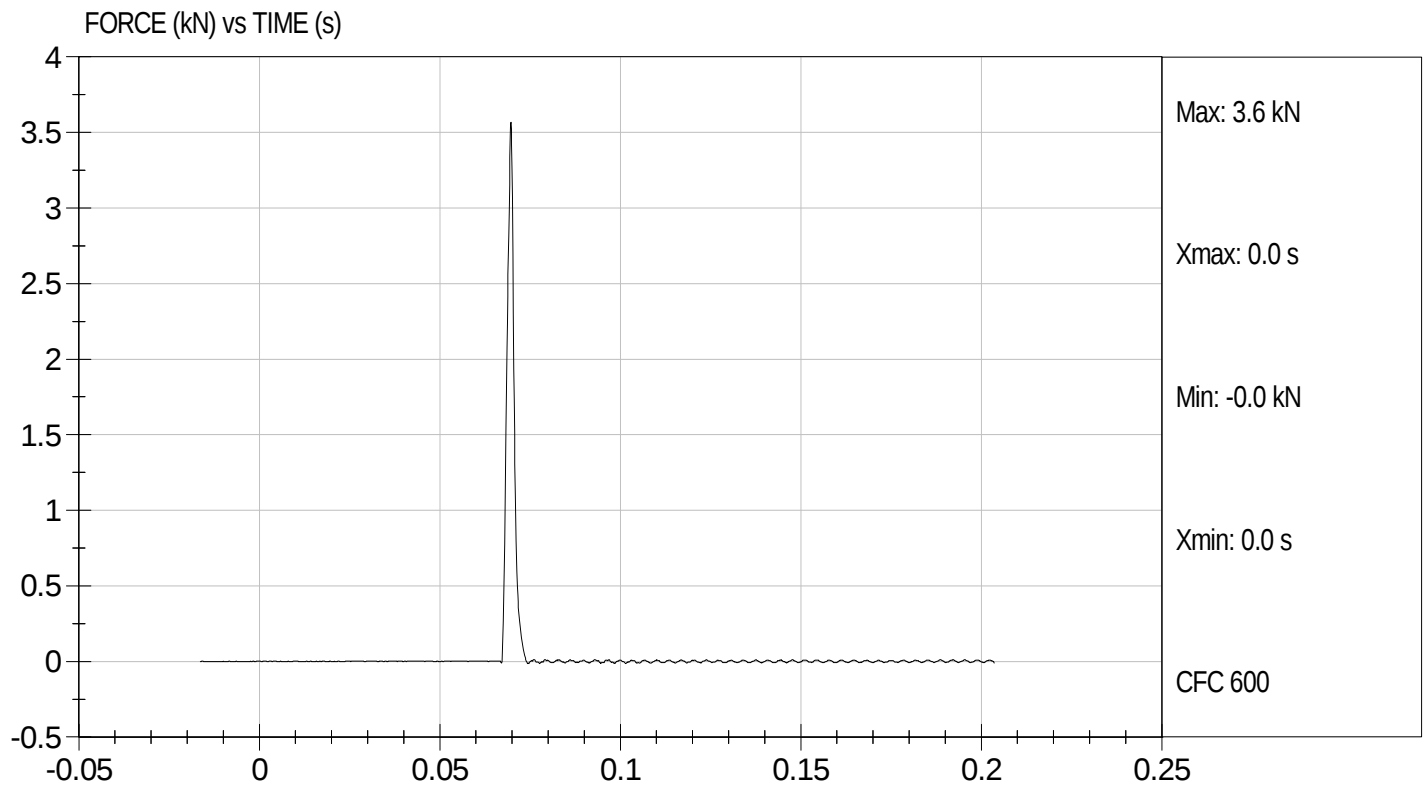
9/27/11
Test Date


Approved By



Test Desc: Right Knee
Component ID: D113205

Test Date: 9/27/11
Velocity: 6.94 ft/s, 2.12 m/s



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test I.D: D113206

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	49	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	kN	3.45 to 4.06	3.53	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

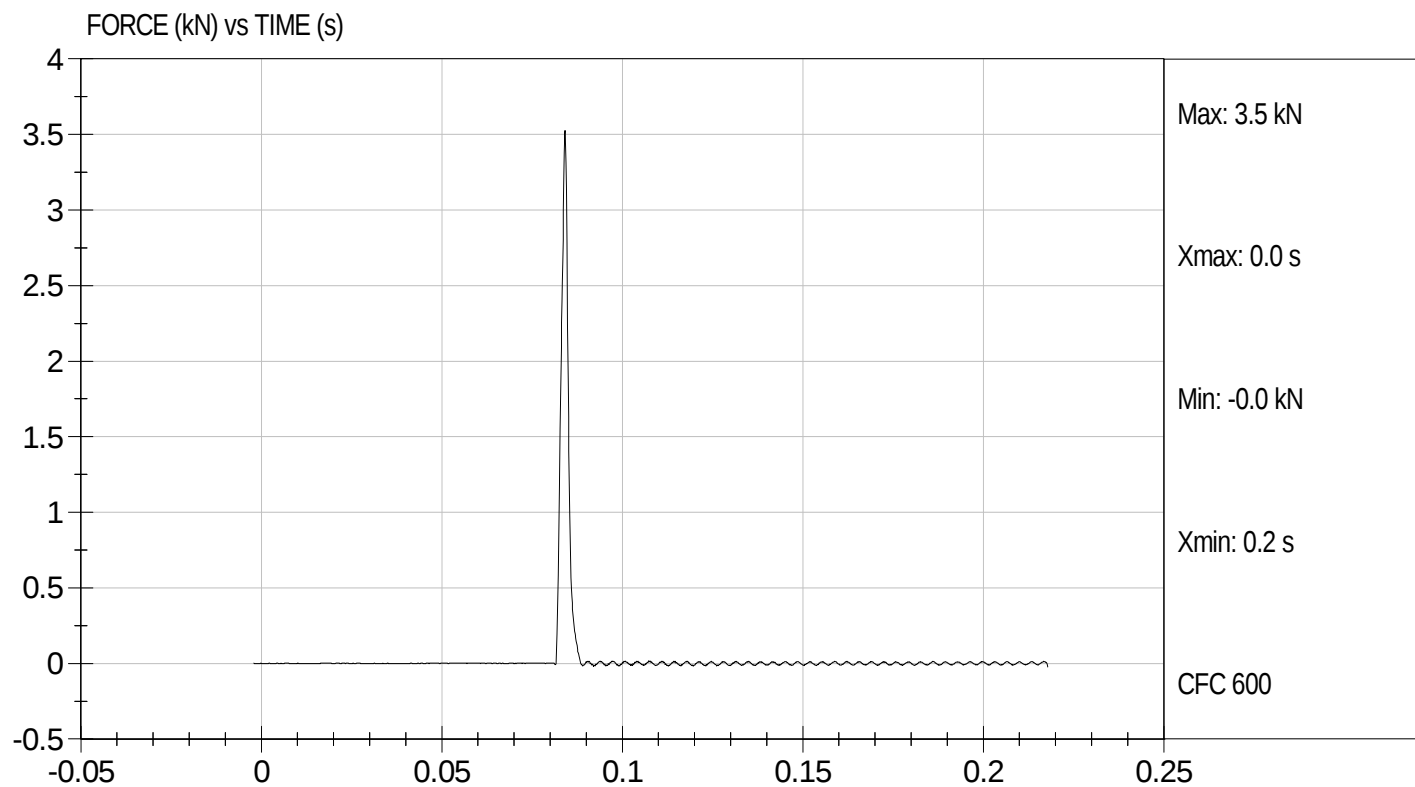
9/27/11
Test Date

David Winkelbauer
Approved By



Test Desc: Left Knee
Component ID: D113206

Test Date: 9/27/11
Velocity: 6.94 ft/s, 2.12 m/s



MGA RESEARCH CORPORATION
TORSO FLEXION TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test I.D: D113207

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	49	Pass
Initial Angle	deg	0 to 20	19	Pass
Return Angle	deg	+/- 8	6	Pass
Force at 45 deg	N	320 to 390	323	Pass
Upper Torso Deflection Rate	Deg/sec	0.5 - 1.5	1.0	Pass
			Overall Result	Pass


Laboratory Technician

9/27/11
Test Date

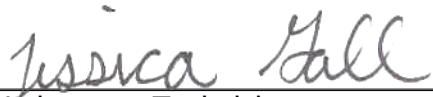

Approved By

MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test ID: D113281

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	40	Pass
Peak Resultant Acceleration	G's	250 to 300	296	Pass
Peak Lateral Acceleration	G's	+/- 15	-2.6	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

10/3/11
Test Date

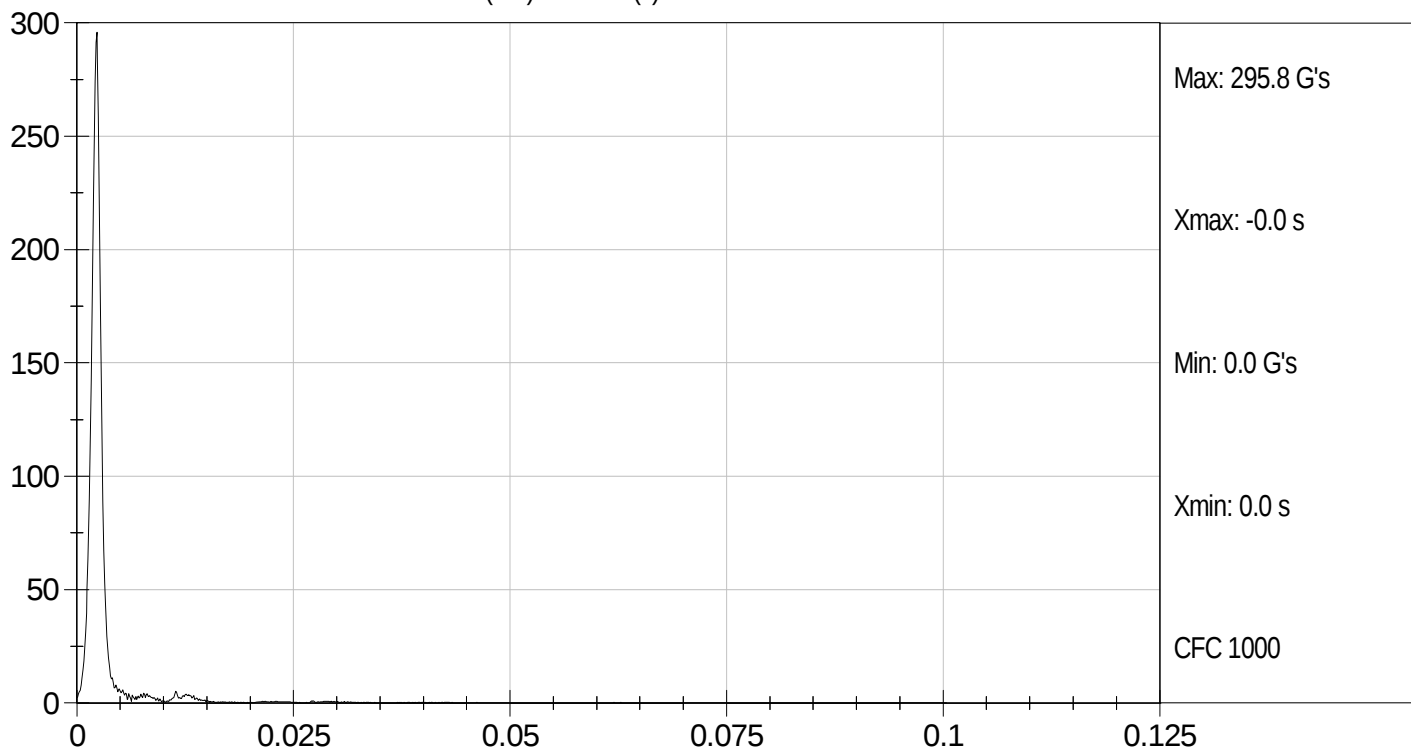

Approved By



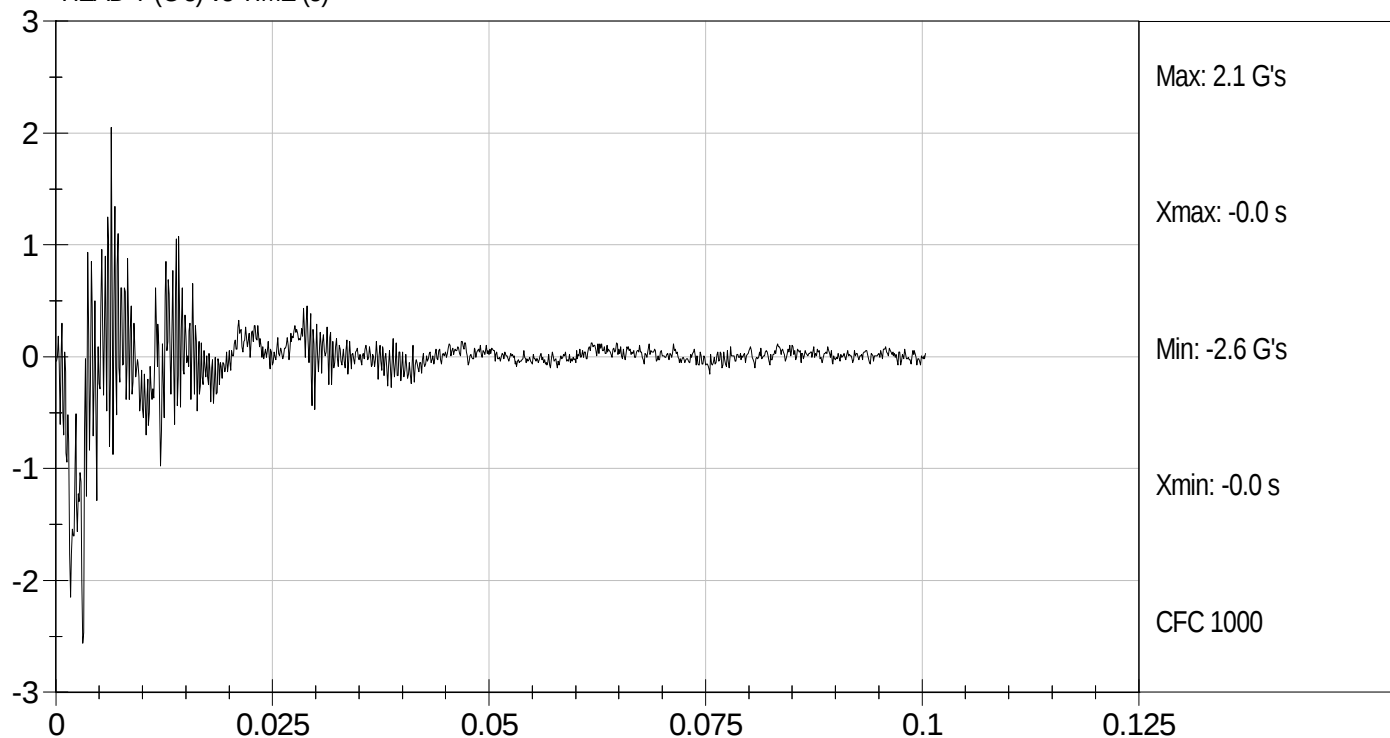
Test Desc: Head Drop
Component ID: D113281

Test Date: 10/3/11
Velocity: 0 ft/s, 0.00 m/s

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



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

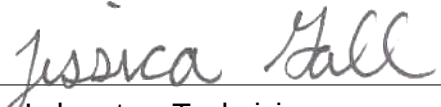


MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test I.D: D113282

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	40	Pass
Pendulum Speed		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	m/s	2.1 to 2.5	2.38	Pass
	20 ms	m/s	4.0 to 5.0	4.4	Pass
	30 ms	m/s	5.8 to 7.0	6.1	Pass
D Plane Rotation	Max	deg	77 to 91	78	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	69 to 83	71	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	85	Pass
Overall Results					Pass


 Laboratory Technician

10/3/11
 Test Date

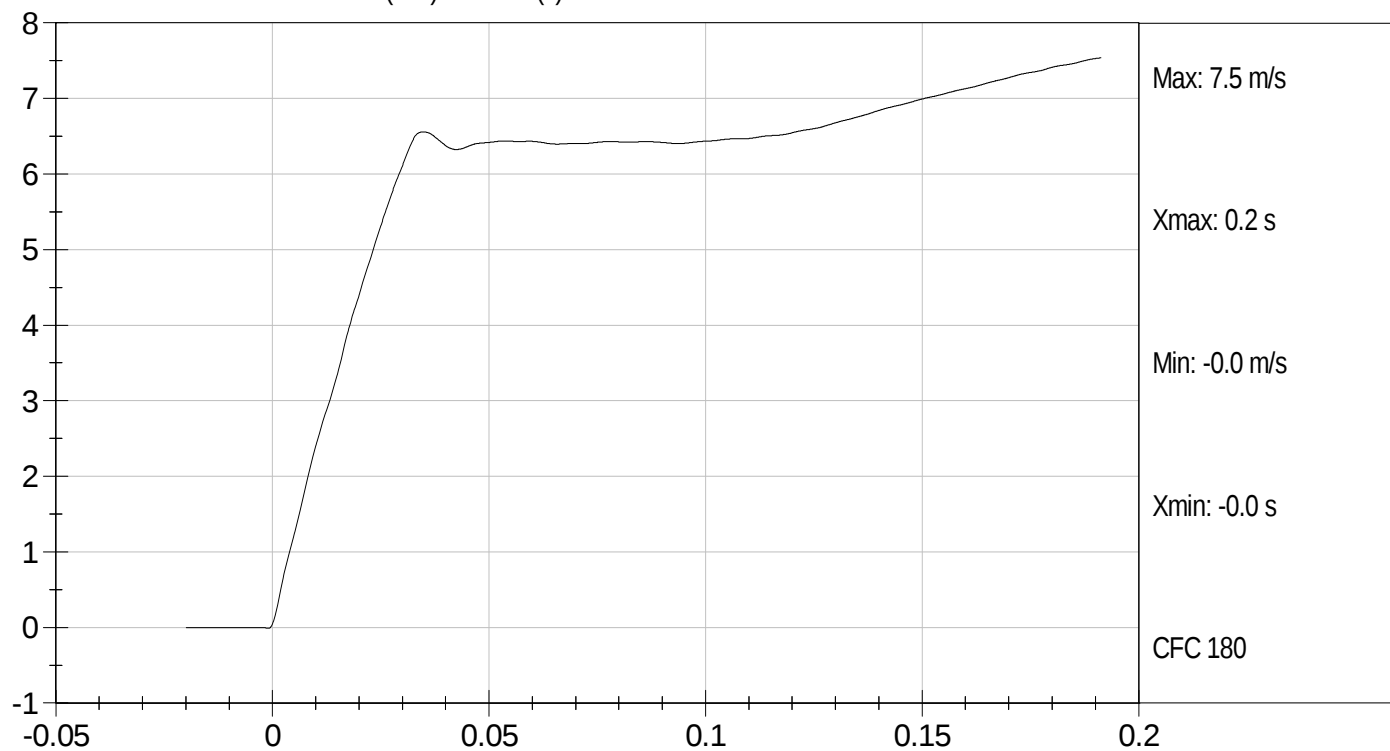

 Approved By



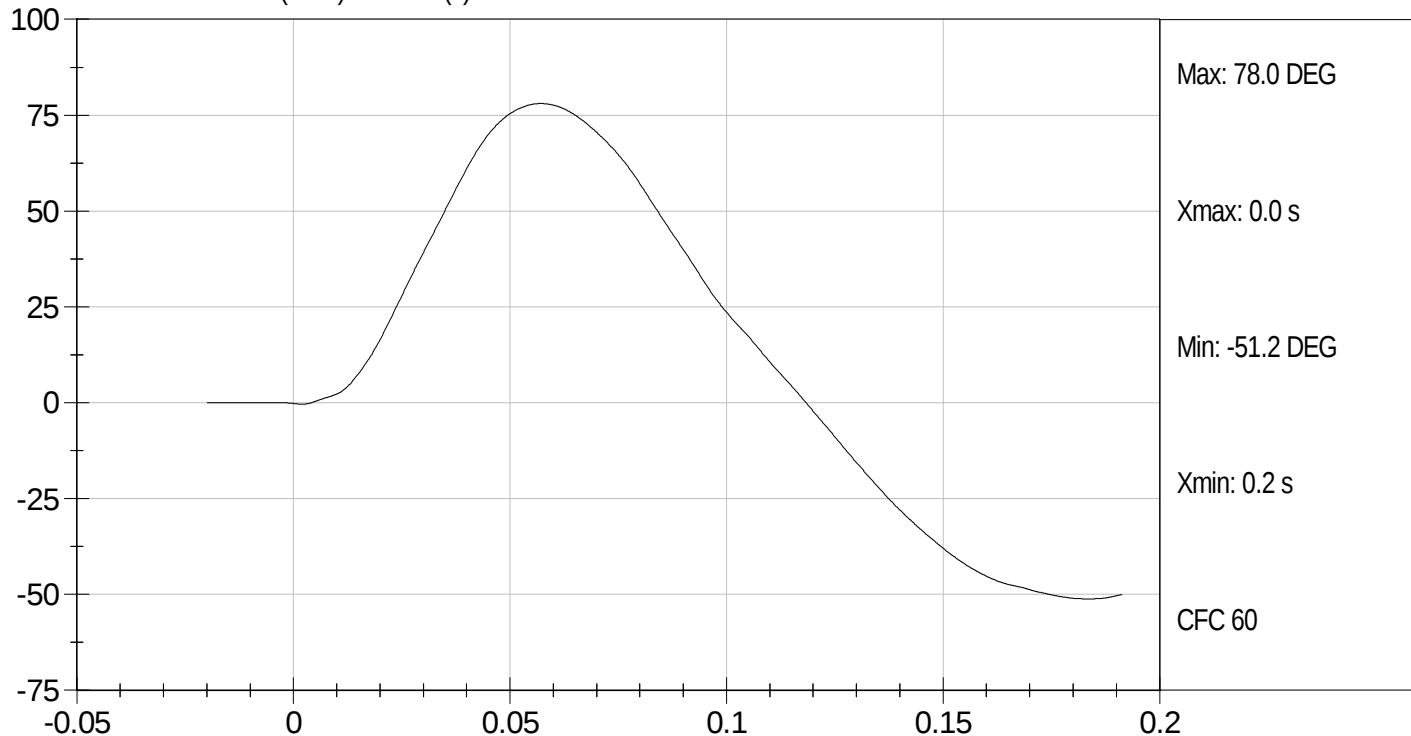
Test Desc: Neck Flexion
Component ID: D113282

Test Date: 10/3/11
Velocity: 23.15 ft/s, 7.06 m/s

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



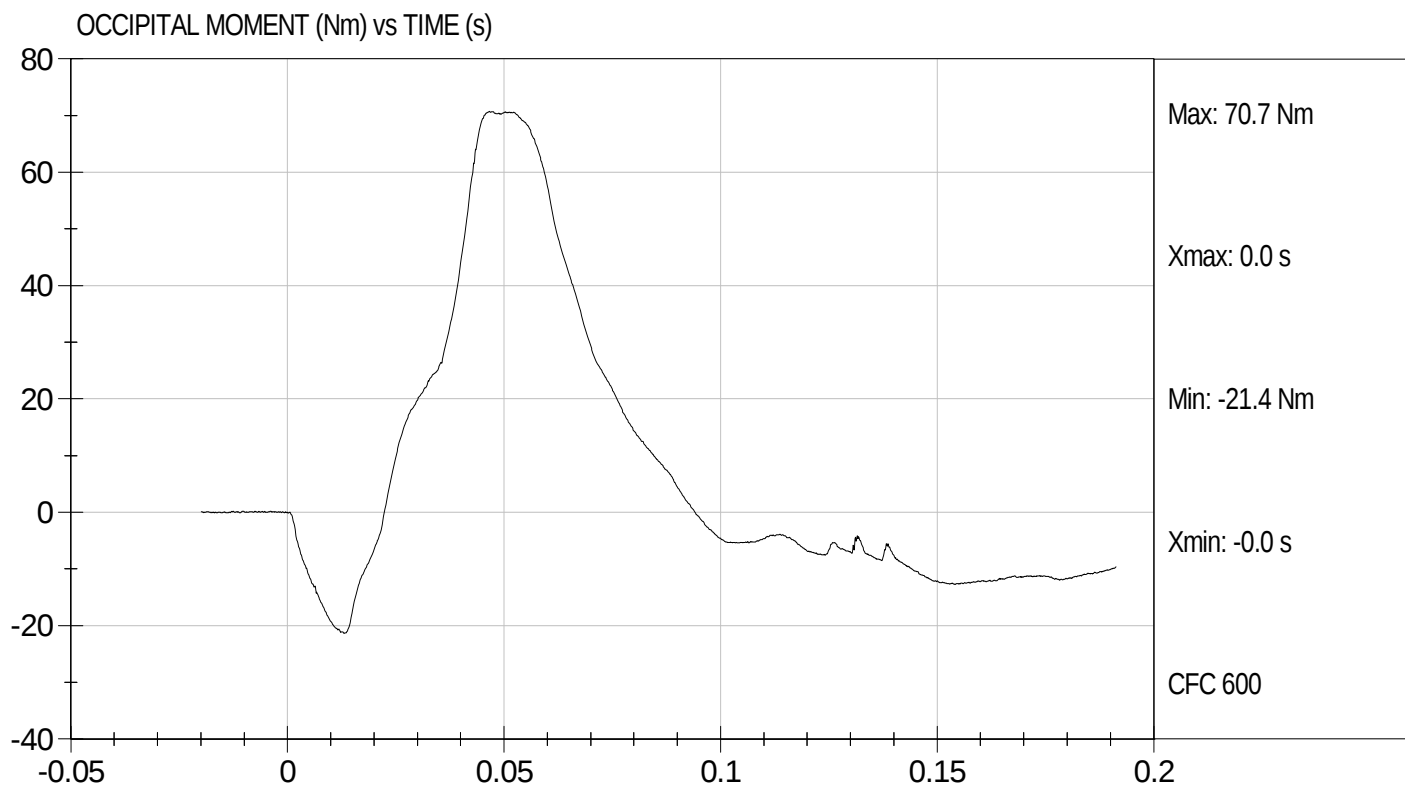
NECK ROTATION (DEG) vs TIME (s)





Test Desc: Neck Flexion
Component ID: D113282

Test Date: 10/3/11
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: D113283

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	40	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.12	Pass
Pendulum Deceleration	10 ms	m/s	1.5 to 1.9	1.8	Pass
	20 ms	m/s	3.1 to 3.9	3.5	Pass
	30 ms	m/s	4.6 to 5.6	4.9	Pass
D Plane Rotation	Max	deg	99 to 114	103	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	-65 to -53	-55	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	103	Pass
Overall Results					Pass


Laboratory Technician

10/3/11
Test Date

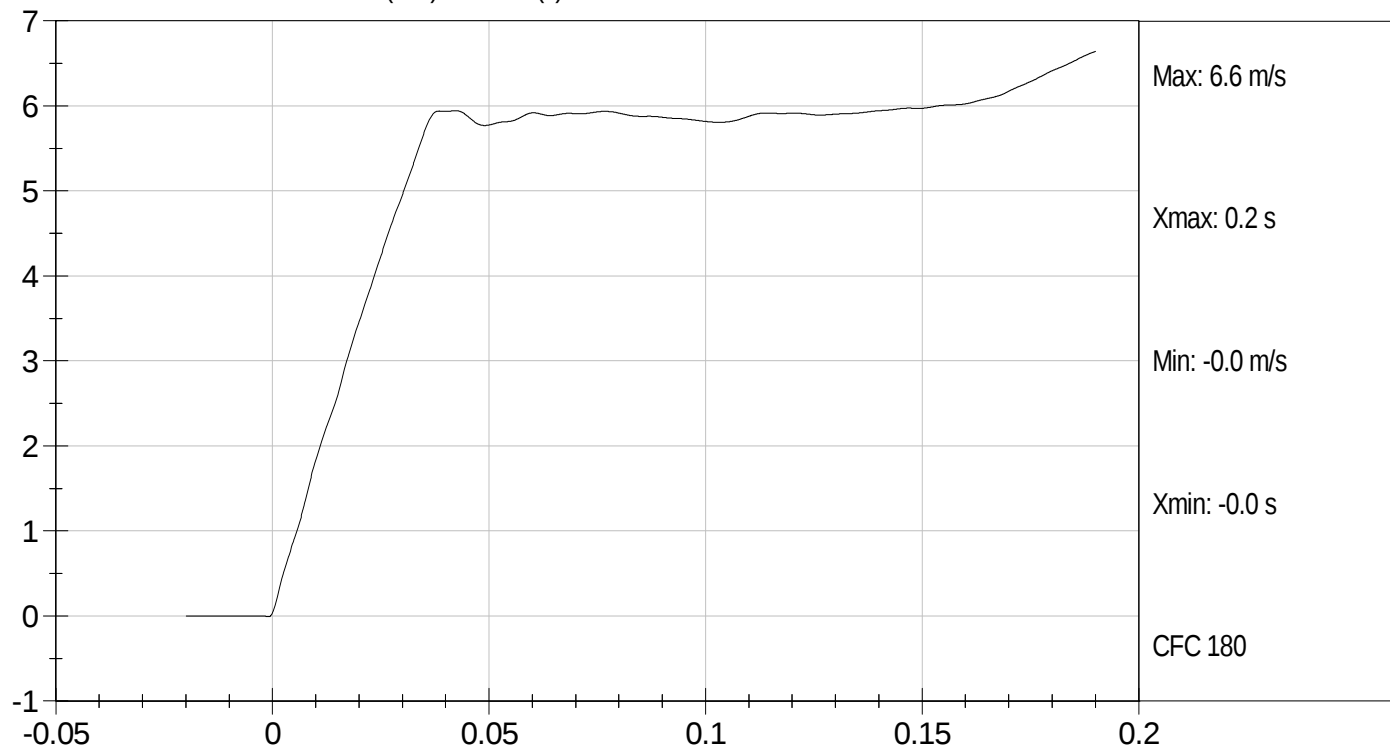

Approved By



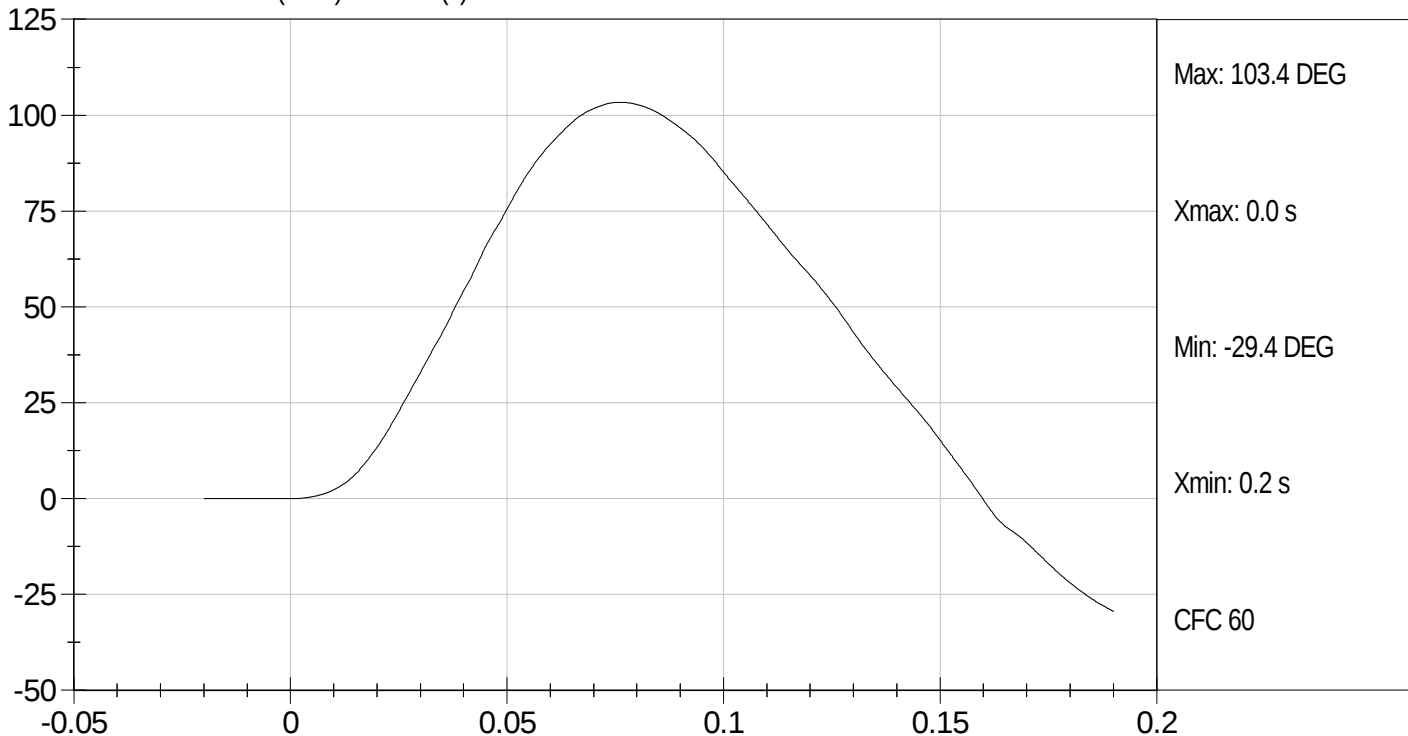
Test Desc: Neck Extension
Component ID: D113283

Test Date: 10/3/11
Velocity: 20.08 ft/s, 6.12 m/s

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



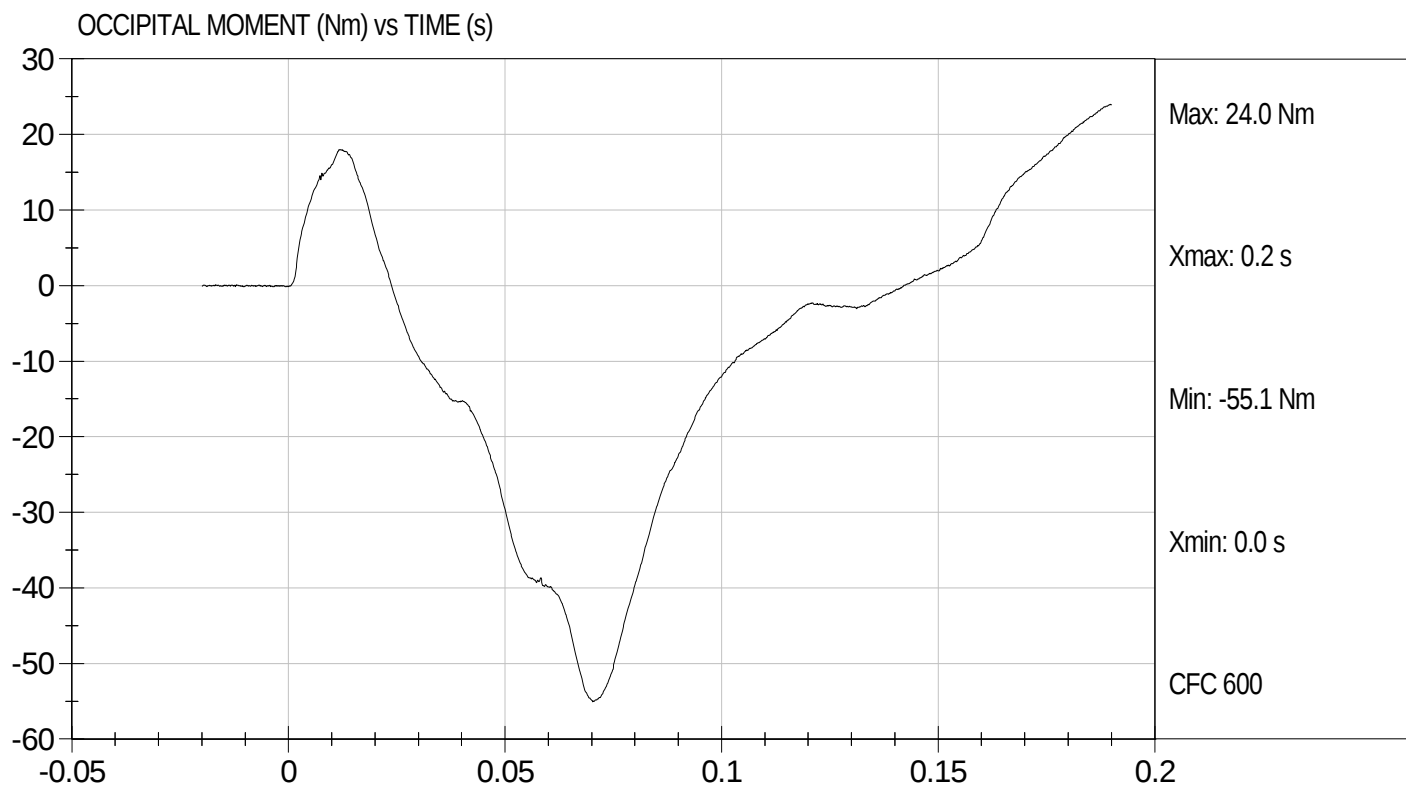
NECK ROTATION (DEG) vs TIME (s)





Test Desc: Neck Extension
Component ID: D113283

Test Date: 10/3/11
Velocity: 20.08 ft/s, 6.12 m/s



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test I.D: D113284

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.6	Pass
Relative Humidity	%	10 to 70	40	Pass
Probe Speed	m/s	6.59 to 6.83	6.77	Pass
Peak Deflection	mm	50 to 58	55	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	4004	Pass
			Overall Test Results	Pass


Laboratory Technician

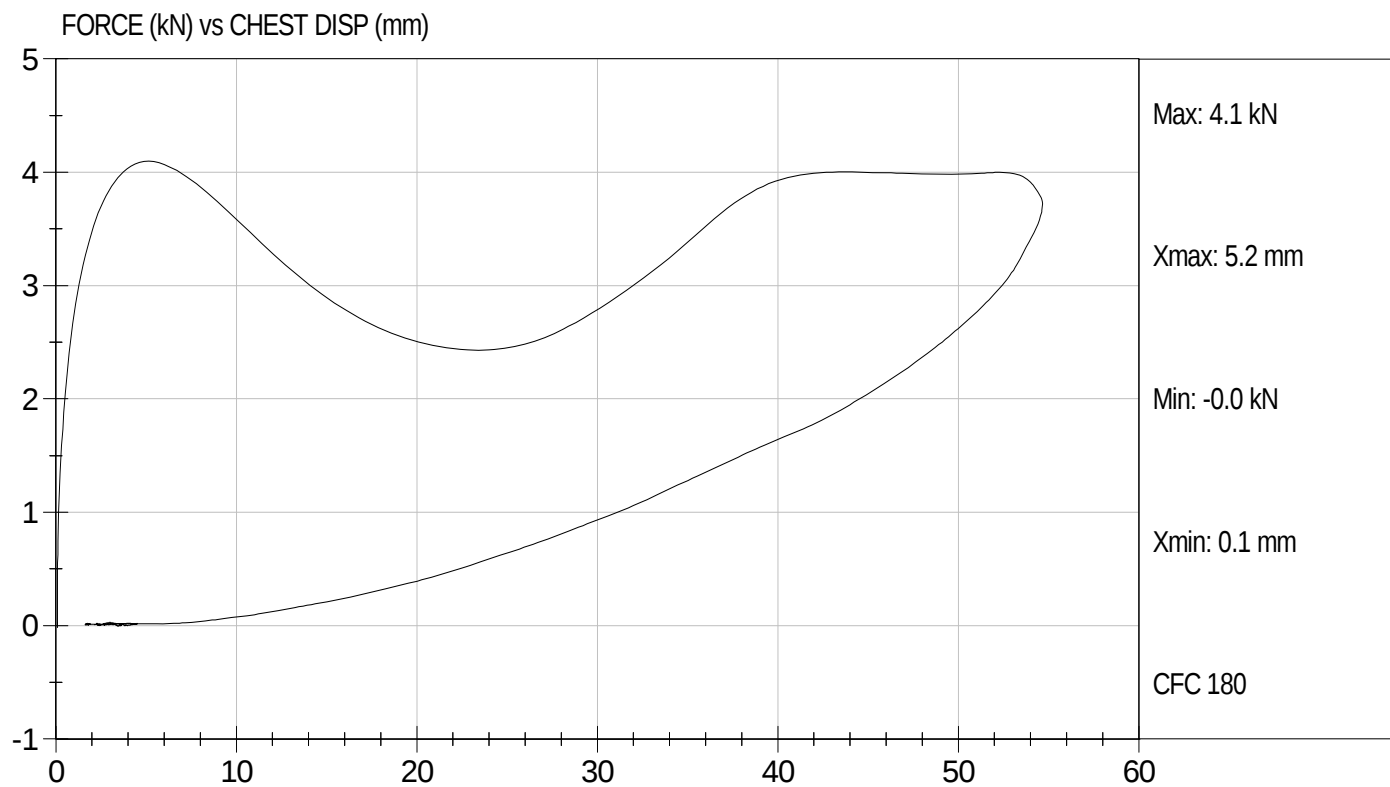
10/3/11
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D113284

Test Date: 10/3/11
Velocity: 22.2 ft/s, 6.77 m/s

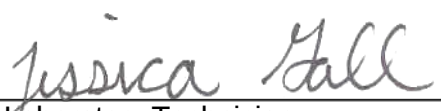


MGA RESEARCH CORPORATION
RIGHT KNEE IMPACT TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test I.D: D113285

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	41	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	kN	3.45 to 4.06	3.75	Pass
Overall Test Results				Pass



Laboratory Technician

10/3/11

Test Date

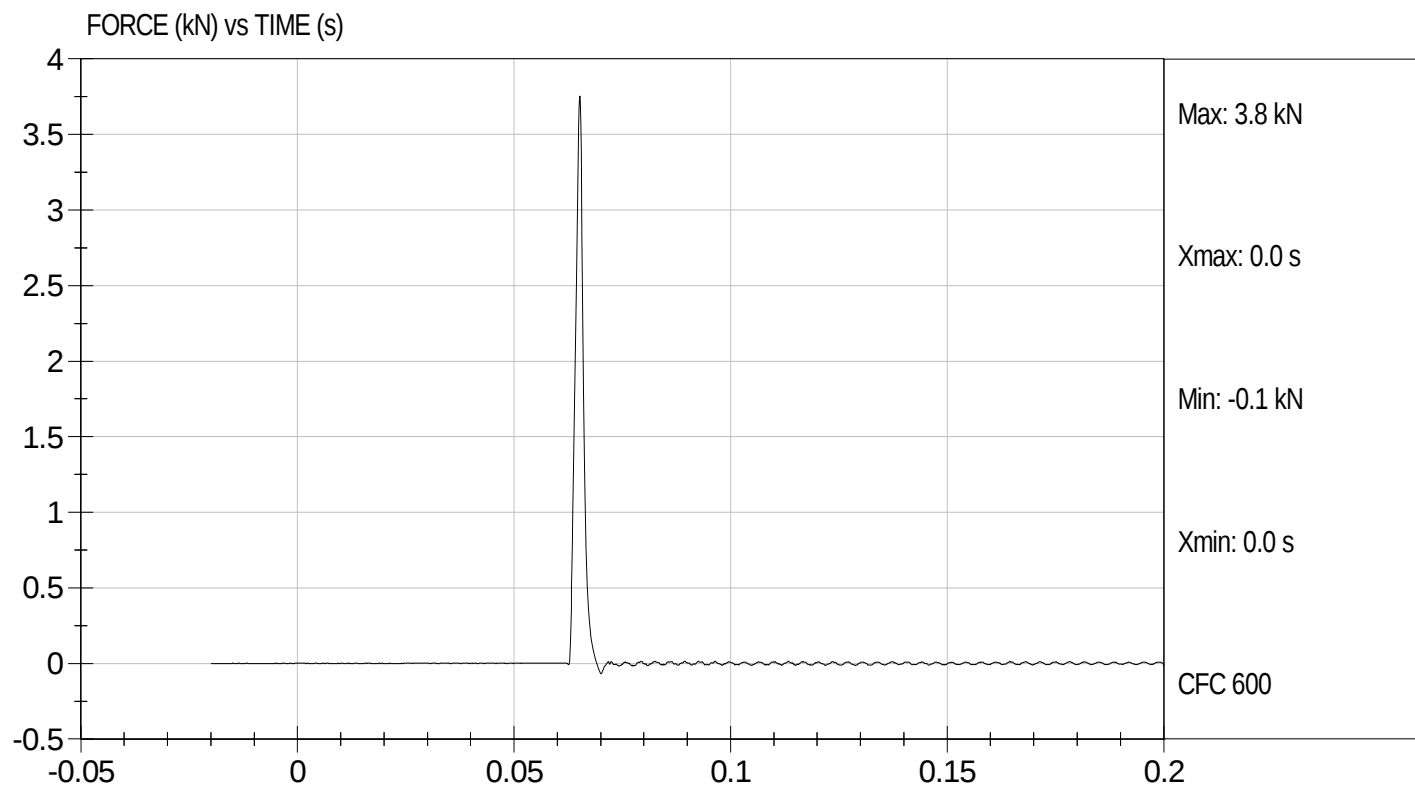


Approved By



Test Desc: Right Knee
Component ID: D113285

Test Date: 10/3/11
Velocity: 6.97 ft/s, 2.12 m/s



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test I.D: D113286

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	41	Pass
Probe Speed	m/s	2.07 to 2.13	2.11	Pass
Maximum Force	kN	3.45 to 4.06	3.47	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

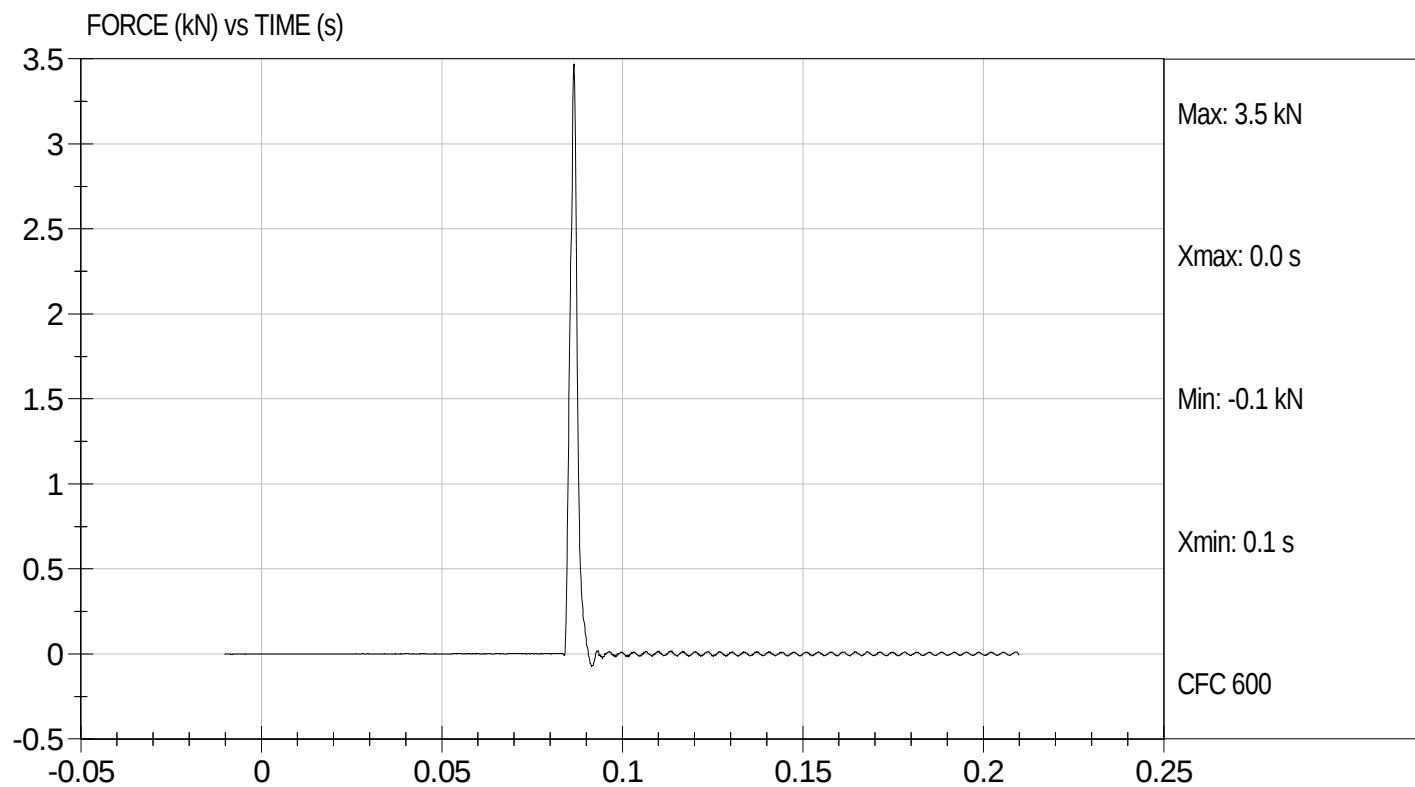
10/3/11
Test Date

David Winkelbauer
Approved By



Test Desc: Left Knee
Component ID: D113286

Test Date: 10/3/11
Velocity: 6.92 ft/s, 2.11 m/s

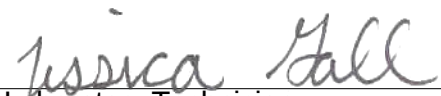


MGA RESEARCH CORPORATION
TORSO FLEXION TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test I.D: D113287

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	40	Pass
Initial Angle	deg	0 to 20	17	Pass
Return Angle	deg	+/- 8	7	Pass
Force at 45 deg	N	320 to 390	345	Pass
Upper Torso Deflection Rate	Deg/sec	0.5 to 1.5	1.0	Pass
Overall Result				Pass


Laboratory Technician

10/3/11
Test Date


Approved By