

REPORT NUMBER: NCAP-MGA-2011-034

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

**FORD MOTOR COMPANY
2011 Ford Escape XLT 4WD SUV
NHTSA No.: MB0205**

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



Test Date: October 20, 2010

Final Report Date: March 7, 2011

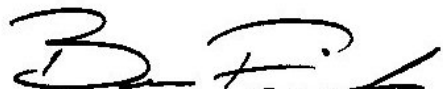
FINAL REPORT

**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.

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Approval Date: March 7, 2011

FINAL REPORT ACCEPTANCE BY OCWS:

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NHTSA, Office of Crashworthiness Standards

Date: _____

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

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16. Abstract A 56.3 km/h NCAP Frontal Impact Test was conducted on the 2011 Ford Escape XLT 4WD SUV 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 October 20, 2010. The impact velocity was 56.5 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 568 mm located to the right of 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>206</td> <td>198</td> </tr> <tr> <td>Maximum Chest Compression</td> <td>mm</td> <td>63</td> <td>52</td> <td>29</td> <td>17</td> </tr> <tr> <td>Nij</td> <td>N/A</td> <td>1</td> <td>1</td> <td>0.53</td> <td>0.38</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>4170</td> <td>2620</td> <td>2423</td> <td>828</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>4000</td> <td>2520</td> <td>413</td> <td>480</td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>10008</td> <td>6805</td> <td>4604</td> <td>2660</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>10008</td> <td>6805</td> <td>6266</td> <td>1874</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	206	198	Maximum Chest Compression	mm	63	52	29	17	Nij	N/A	1	1	0.53	0.38	Neck Tension	N	4170	2620	2423	828	Neck Compression	N	4000	2520	413	480	Left Femur Force	N	10008	6805	4604	2660	Right Femur Force	N	10008	6805	6266	1874
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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 Standard's NCAP Frontal Laboratory Test Procedure dated January 2010.

SUMMARY

A load cell barrier was impacted by a 2011 Ford Escape XLT 4WD SUV at a velocity of 56.5 kph. The test was performed at MGA Research Corporation on October 20, 2010. 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. 351) and the right-front passenger (position 2) ATD (Serial No. 138) were calibrated previous to this test. Certification details, along with verification data, are found in Appendix C of this report.

The 223 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 568 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 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)	206	69.3	84.3	29	0.53	2423	413	4604	6266
Passenger (5 th)	198	60.5	75.5	17	0.38	828	480	2660	1874

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

TEST NOTES

There was no valid data collected for:
Passenger Right Ankle Z

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 Ford Escape XLT 4WD SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0205
 Test Date: 10/20/2010

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	MB0205	Anti-Lock Brakes	Yes
Model Year	2011	All Wheel Drive	Yes
Make	Ford	Power Steering	Yes
Model	Escape	Driver Front Airbag	Yes
Body Style	MPV	Driver Curtain Airbag	Yes
VIN	1FMCU9D72BKA26048	Driver Head/Torso Airbag	No
Body Color	Sangria Red Metallic	Driver Torso Airbag	Yes
Delivery Date	9/28/2010	Driver Torso/Pelvis Airbag	No
Odometer (mi)	40	Driver Pelvis Airbag	No
Odometer (km)	64	Driver Knee Airbag	No
Dealer	Griffin Ford	Pass. Front Airbag	Yes
Transmission	Automatic	Pass. Curtain Airbag	Yes
Final Drive	4WD	Pass. Head/Torso Airbag	No
Type/No. Cylinders	4	Pass. Torso Airbag	Yes
Engine Displacement (L)	2.5	Pass. Torso/Pelvis Airbag	No
Engine Placement	Lateral	Pass. Pelvis Airbag	No
Roof Rack	Yes	Pass. Knee Airbag	No
Sunroof/T-Top	No	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	No	Other	
Does owner's manual provide instructions to turn off automatic door locks?	Yes		

DATA FROM CERTIFICATION LABEL

Manufactured By	Ford Motor Company	GVWR (kg)	2087
Date of Manufacture	08/10	GAWR Front (kg)	1080
		GAWR Rear (kg)	1061

VEHICLE SEATING AND WEIGHT CAPACITY DATA

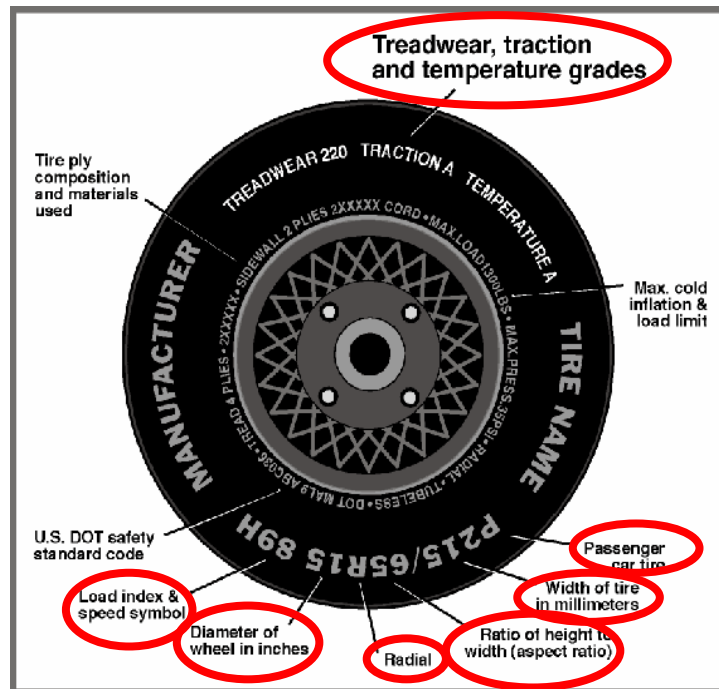
Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Split Bench		
Designated Seating Capacity (DSC)	2	3		5
Capacity Weight (VCW) (kg)				489
Cargo Weight (RCLW) (kg)				136

DATA SHEET NO. 1 (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2011 Ford Escape XLT 4WD SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0205
Test Date: 10/20/2010



Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	220	220
Recommended Tire Size	P235/70R16	P235/70R16
Tire Size on Vehicle	P235/70R16	P235/70R16
Tire Manufacturer	Michelin	Michelin
Tire Model	Latitude	Latitude
Treadwear	720	720
Traction	A	A
Temperature Grades	B	B
Tire Plies Sidewall	2	2
Tire Plies Body	5	5
Load Index & Speed Symbol	104T	104T
Tire Material	Rubber	Rubber
DOT Safety Code Right	B37P 7PMX	B37P 7PMX
DOT Safety Code Left	B37P 7PMX	B37P 7PMX

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

Test Vehicle: 2011 Ford Escape XLT 4WD SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0205
 Test Date: 10/20/2010

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	472.6	339.3		499.0	469.0	
Right	kg	444.1	330.7		448.1	441.4	
Ratio	%	57.8	42.2		51.0	49.0	
Totals	kg	916.7	670.0	1586.7	947.1	910.4	1857.5

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1586.7
Weight of 1 P572E ATD & 1 P572O ATD	kg	140.6
Rated Cargo/Luggage Weight (RCLW)	kg	136
Calculated Target Vehicle Target Weight (TVTW)	kg	1863.3

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	808	812	848	853	1111
As Tested	mm	798	805	806	815	1289
Post Test	mm	762	698	817	796	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2630
Total Vehicle Length at Left Side	mm	4340
Total Vehicle Length at Centerline	mm	4433
Total Vehicle Length at Right Side	mm	4340
Weight of Ballast in Cargo Area	kg	117.9
Weight of Vehicle Components Removed	kg	13.2
Amount of Stoddard Solvent in Fuel Tank	L	63.2

List of components removed to meet test weight: Trunk carpet and plastic, right tail light, jack & tools.

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

Test Vehicle: 2011 Ford Escape XLT 4WD SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0205
 Test Date: 10/20/2010

TARGET VEHICLE STRUCTURAL MEASUREMENT

	Elements	Pre-Test (mm)
1	Total Length	4433
2	Total Width	1745
3	Bumper Top Height	680
4	Bumper Bottom Height	542
5	Longitudinal Member Top Height	635
6	Distance between Longitudinal Members	992
7	Longitudinal Member Width	55
8	Engine Top Height	864
9	Engine Bottom Height	240
10	Engine and Gearbox Width	910
11	Front Bumper-Engine Distance	205
12	Front Shock Absorber Fixing Height	1034
13	Bonnet Leading Edge Height	960
14	Front Shock Absorber Fixing Width	103
15	Front Bumper – Front Axle Distance	872
16	Front Axle – A-Pillar Distance	440
17	A-Pillar – B-Pillar Distance	1084
18	B-Pillar – Rear Axle Distance	1086
19	B-Pillar – C-Pillar Distance	590
20	Roof Sill Bottom Height	1531
21	Roof Sill Top Height	1628
22	Floor Sill bottom Height	300
23	Floor Sill Top Height	468

DATA SHEET NO. 2

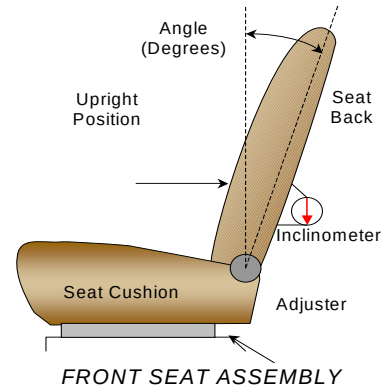
SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

Test Vehicle: 2011 Ford Escape XLT 4WD SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0205
 Test Date: 10/20/2010

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	8.0° on headrest post
Passenger Seat Back Angle	4.0° on headrest post

SEAT FORE/AFT POSITIONS

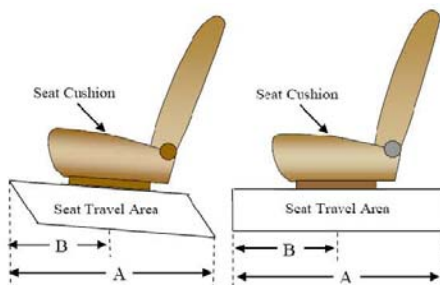
The driver and passenger seat fore/aft positions are adjusted following Appendix F, "Driver & Passenger Seating & Positioning Procedures" in the NCAP Test Procedure dated January 2010.

SEAT FORE/AFT POSITIONS	Total Fore/Aft Travel	Placed in Position #
Driver Seat	295 mm	148 mm (forward-most as 0)
Passenger Seat	24 detents	1 st 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.

SEAT BELT UPPER ANCHORAGES	Total # of Positions	Placed in Position #
Driver Seat	4	2 (uppermost as 0)
Passenger Seat	4	2 (uppermost as 0)



DATA SHEET NO. 2 (CONTINUED)

SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

Test Vehicle: 2011 Ford Escape XLT 4WD SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0205
 Test Date: 10/20/2010

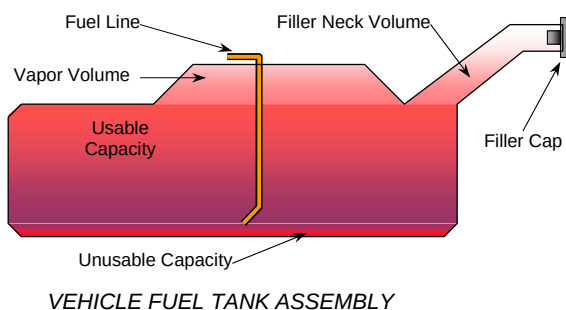
FUEL TANK CAPACITY DATA

	Liters
Usable Capacity of "Standard Tank"	68.1
Usable Capacity of "Optional" Tank	
92-94% of Usable Capacity	62.7 to 64.0
Actual Amount of Solvent used	63.2
1/3 of Usable Capacity	22.7

FUEL PUMP

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

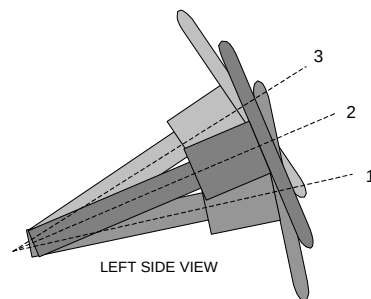
The vehicle is equipped with an electric fuel pump. The electric fuel pump operates for 2 seconds to pressurize the fuel system following the actuation of the ignition. If no attempt has been made to start the engine within 2 seconds following ignition actuation, the fuel pump will shut off. The fuel pump operates continuously while the engine is running. If the engine stalls, the fuel pump is deactivated. Also, a fuel pump shut-off switch is provided, designed to stop fuel flow to the engine if the vehicle sustains an impact above a certain magnitude. 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

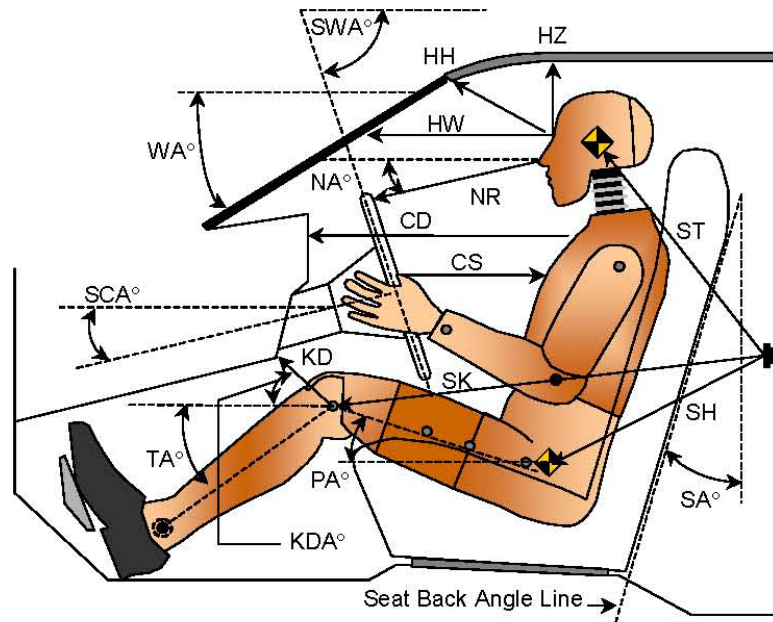
STEERING COLUMN POSITION

	Degrees	Fore/Aft Position (mm)
Lowermost – Position 1	68.4	
Geometric Center – Position 2	66.1	
Uppermost – Position 3	63.8	
Telescoping Steering Wheel Travel		
Test Position	66.1	

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2011 Ford Escape XLT 4WD SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0205
 Test Date: 10/20/2010

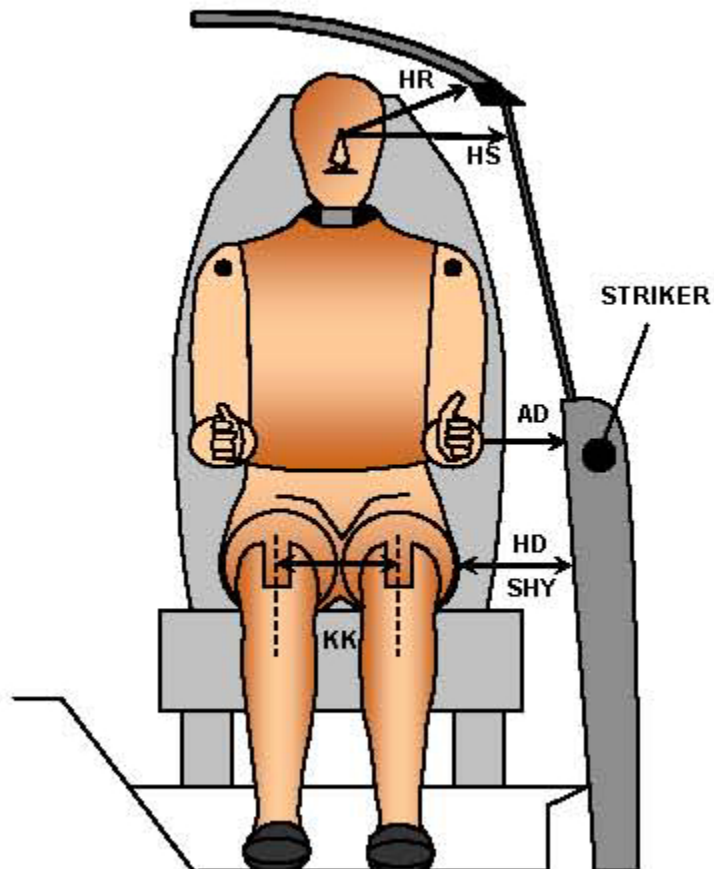


Code	Measurement Description	Driver S/N 351		Passenger S/N 138	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA	Windshield Angle		34.0		
SWA	Steering Wheel Angle		66.1		
SCA	Steering Column Angle		23.9		
SA	Seat Back Angle (headrest bezel)		8.0		4.0
HZ	Head to Roof (Z)	222	90	250	90
HH	Head to Header	366	26.6	326	44.8
HW	Head to Windshield	564	0	552	0
NR	Nose to Rim	384	12.9		
CD	Chest to Dash	520		422	
CS	Chest to Steering Hub	305	2.2		
RA	Rim to Abdomen	182	0		
KDL	Left Knee to Dash	136	18.5	63	42.6
KDR	Right Knee to Dash	127	22.4	68	41.4
PA	Pelvic Angle		24.9		20.6
TA	Tibia Angle		46.9		54.5
SK	Striker to Knee	587	91.7	695	104.8
ST	Striker to Head	535	13.6	521	23.3
SH	Striker to H-Point	250	115.6	357	105.5

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2011 Ford Escape XLT 4WD SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0205
 Test Date: 10/20/2010



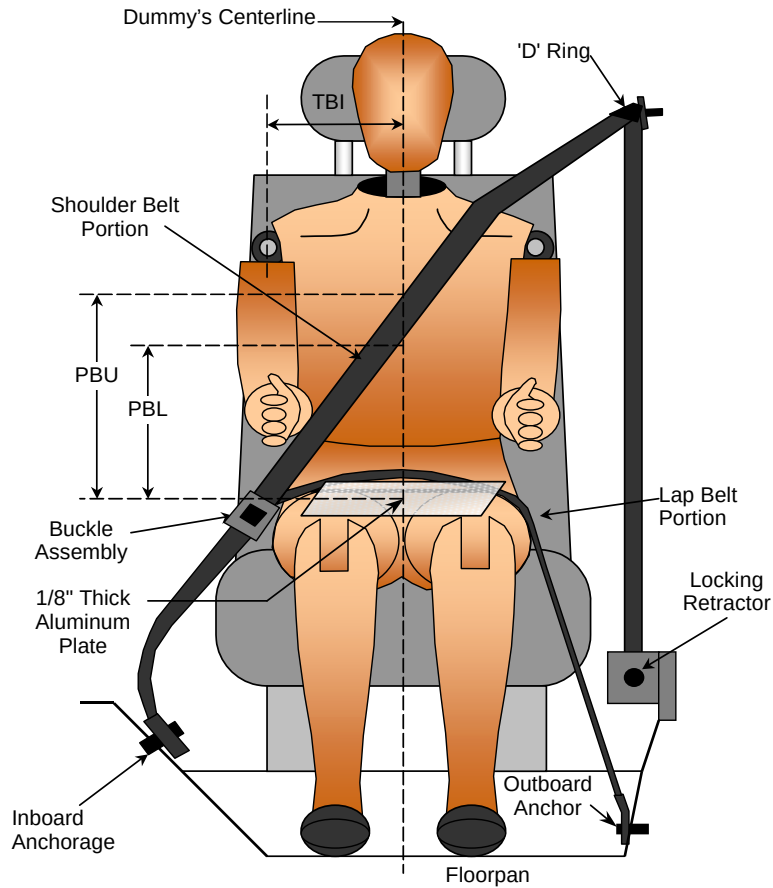
FRONT VIEW OF DUMMY

Code	Measurement Description	Driver S/N 351	Passenger S/N 138
		Length (mm)	
AD	Arm to Door	129	88
HD	H-Point to Door	149	161
HR	Head to Side Header	243	262
HS	Head to Side Window	315	349
KK	Knee to Knee	358	213
SHY	Striker to H-Point (Y Direction)	235	285
AA	Ankle to Ankle	329	165

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

Test Vehicle: 2011 Ford Escape XLT 4WD SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0205
 Test Date: 10/20/2010



FRONT VIEW OF DUMMY

SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU - Top surface of reference to belt upper edge	mm	375	305
PBL - Top surface of reference to belt lower edge	mm	300	215

BELT LENGTH DATA

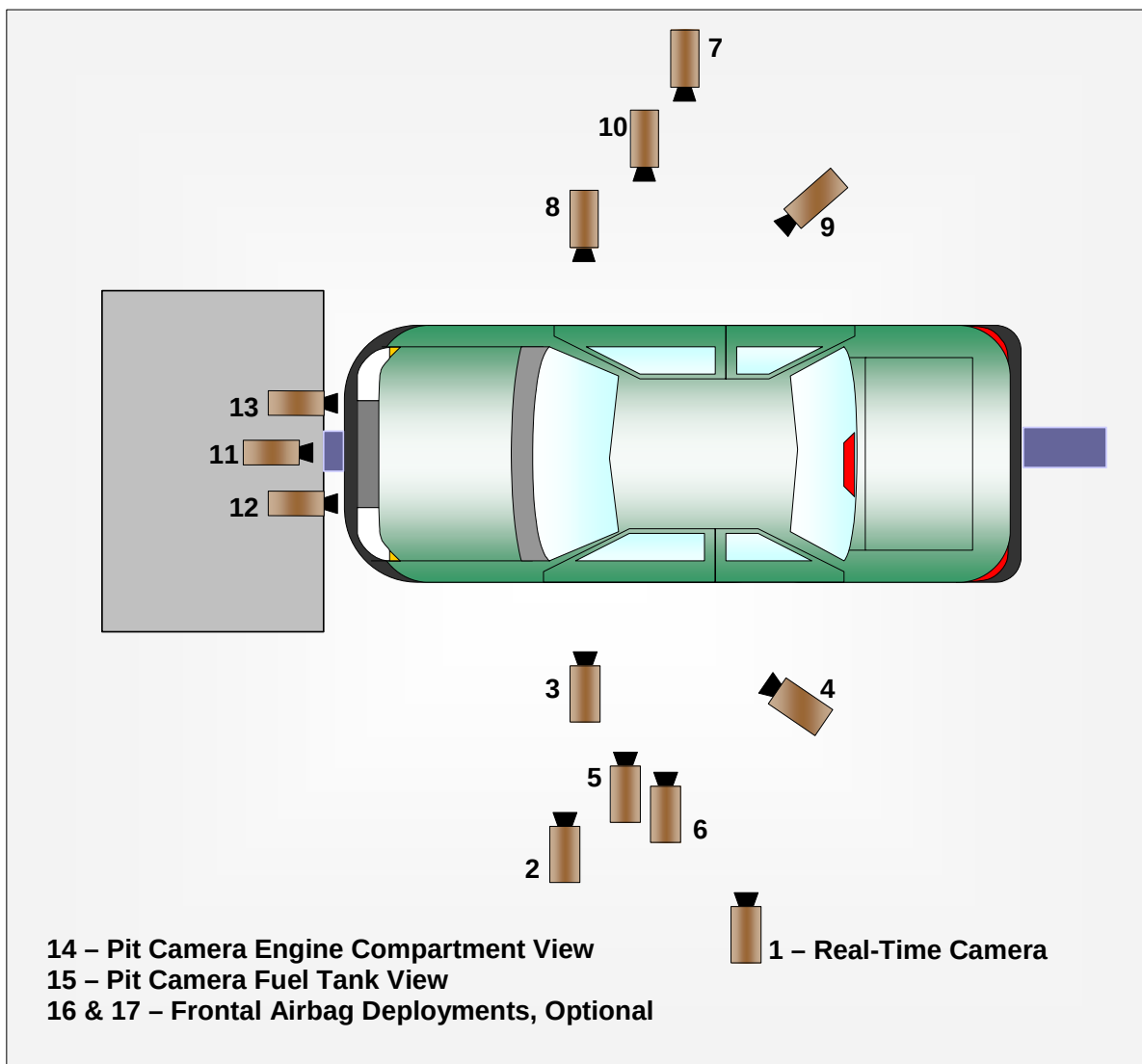
Measurement Description	Units	Driver	Passenger
Shoulder Belt Length as measured on ATD	mm	805	857
Lap Belt Length as measured on ATD	mm	835	850
Remainder of belt on reel	mm	1460	1373
Total Belt Length for Continuous Webbing Systems	mm	3100	3080

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

Test Vehicle: 2011 Ford Escape XLT 4WD SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0205
Test Date: 10/20/2010

CAMERA POSITIONS FOR FRONTAL IMPACTS



DATA SHEET NO. 6 (CONTINUED)

CAMERA LOCATIONS AND DATA

Test Vehicle: 2011 Ford Escape XLT 4WD SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0205
 Test Date: 10/20/2010

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	1290	-5190	-1340	24	1000
3	Driver Close-Up	1310	-6230	-1640	35	1000
4	Driver Angle	5630	-4880	-1890	50	1000
5	Steering Column Top	580	-5360	-1220	25	1000
6	Steering Column Bottom	560	-5290	-840	25	1000
7	Right Overall	2120	6350	-1250	20	1000
8	Passenger Close-Up	1390	6270	-1690	35	1000
9	Passenger Angle	5680	4780	-1810	50	1000
10	Right Front Half	1260	5210	-1320	24	1000
11	Windshield	-260	0	-2860	24	1000
12	Top Driver	-30	-360	-2270	16	1000
13	Top Passenger	-30	360	-2270	16	1000
14	Pit Front	1310	0	3150	24	1000
15	Pit Rear	3340	0	3150	24	1000
16	Onboard Driver Side (optional)					
17	Onboard Passenger Side (optional)					
18	Real-Time Pan View					30

***COORDINATES:**

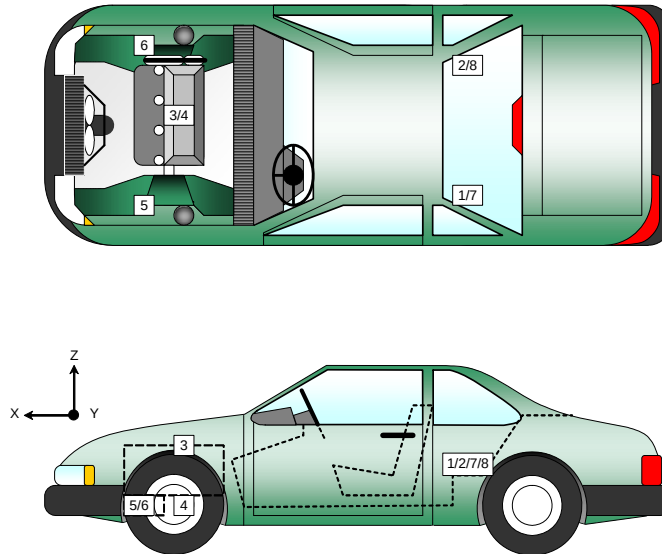
- +X = forward of impact plane
- +Y = right of monorail centerline
- +Z = below ground level

Cameras 16 & 17 were not used for this test.

DATA SHEET NO. 7
VEHICLE ACCELEROMETER DATA

Test Vehicle: 2011 Ford Escape XLT 4WD SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0205
 Test Date: 10/20/2010



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear X-Member X	1698	-348	-420
2	Right Rear X-Member X	1698	348	-420
3	Engine Top X	3775	0	-854
4	Engine Bottom X	3785	0	-255
5	Left Brake Caliper X	3674	-700	-310
6	Right Brake Caliper X	3674	700	-310
7	Left Rear X-Member Z	1698	-348	-420
8	Right Rear X-Member Z	1698	348	-420

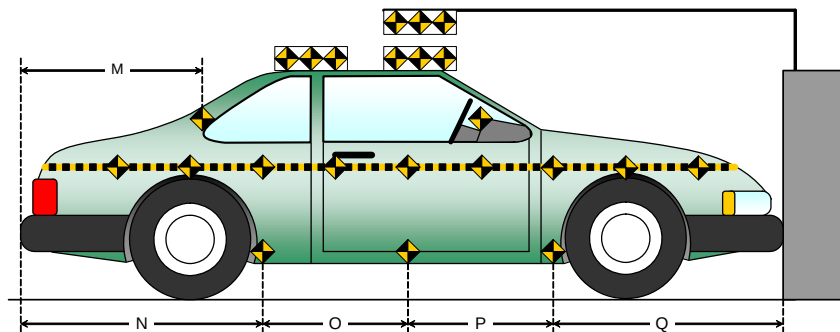
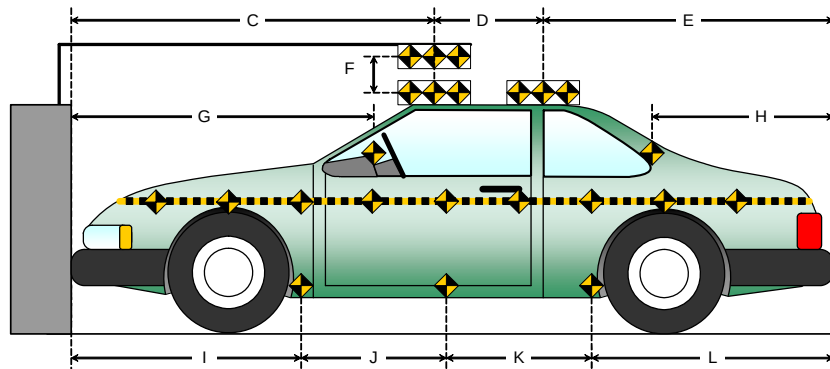
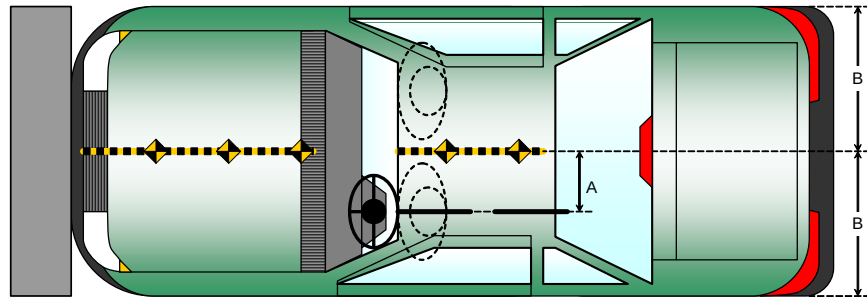
Reference Points: X - Rear Surface of Vehicle (+ forward)
 Y - Vehicle Centerline (+ to right)
 Z - Ground Plane (+ down)

DATA SHEET NO. 8
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2011 Ford Escape XLT 4WD SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0205
 Test Date: 10/20/2010

Item	Value (mm)
A	370
B	873
C	2250
D	680
E	1503
F	95
G	
H	1187
I	1235
J	830
K	830
L	1538
M	1187
N	1538
O	830
P	830
Q	1235



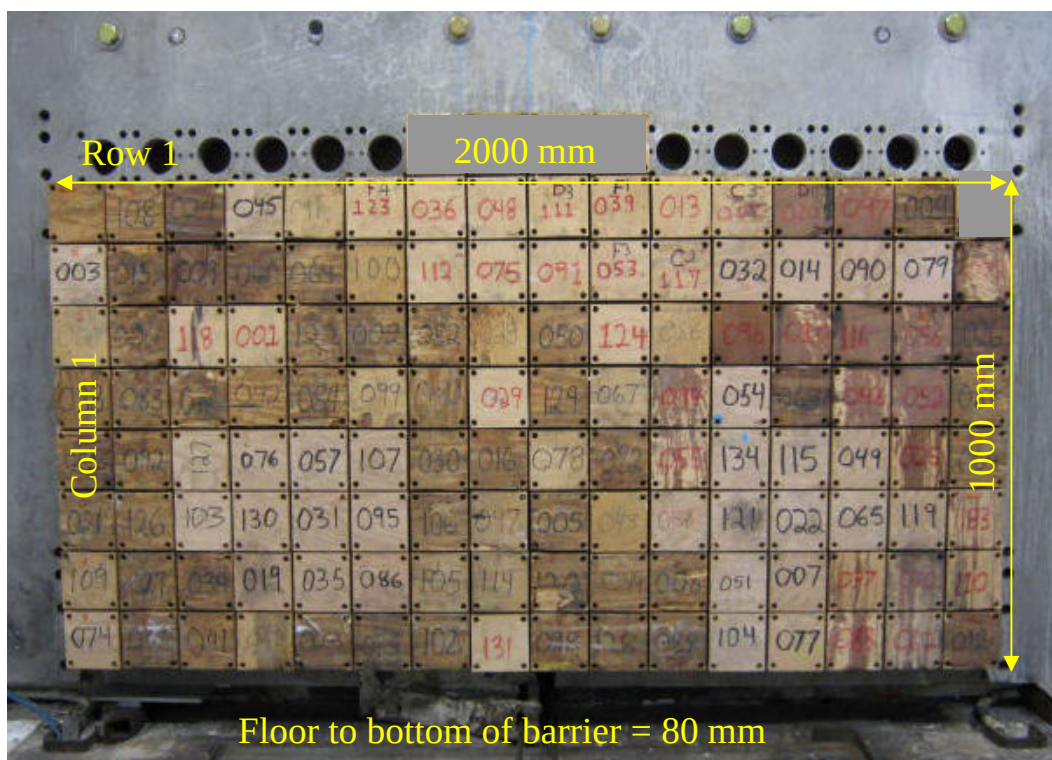
DATA SHEET NO. 9

LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle: 2011 Ford Escape XLT 4WD SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0205
 Test Date: 10/20/2010

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 Ford Escape XLT 4WD SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0205
Test Date: 10/20/2010

INSTRUMENTATION

Driver Dummy Data Channels	44
Passenger Dummy Data Channels	44
Vehicle Structure Accelerometers	8
Barrier Channels	127
Total	223

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 Ford Escape XLT 4WD SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0205
 Test Date: 10/20/2010

TEST DUMMY INFORMATION AND CONTACT

Description	Driver	Passenger
Dummy Type / Serial No.	HIII 50% / 351	HIII 5% / 138
Head Contact	Airbag, Headrest	Airbag, Headrest
Upper Torso Contact	Airbag	Airbag
Lower Torso Contact	Airbag	Airbag
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 unlocked	Doors were unlocked
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	795
Center	mm	770
Right Side	mm	782
Average	mm	782

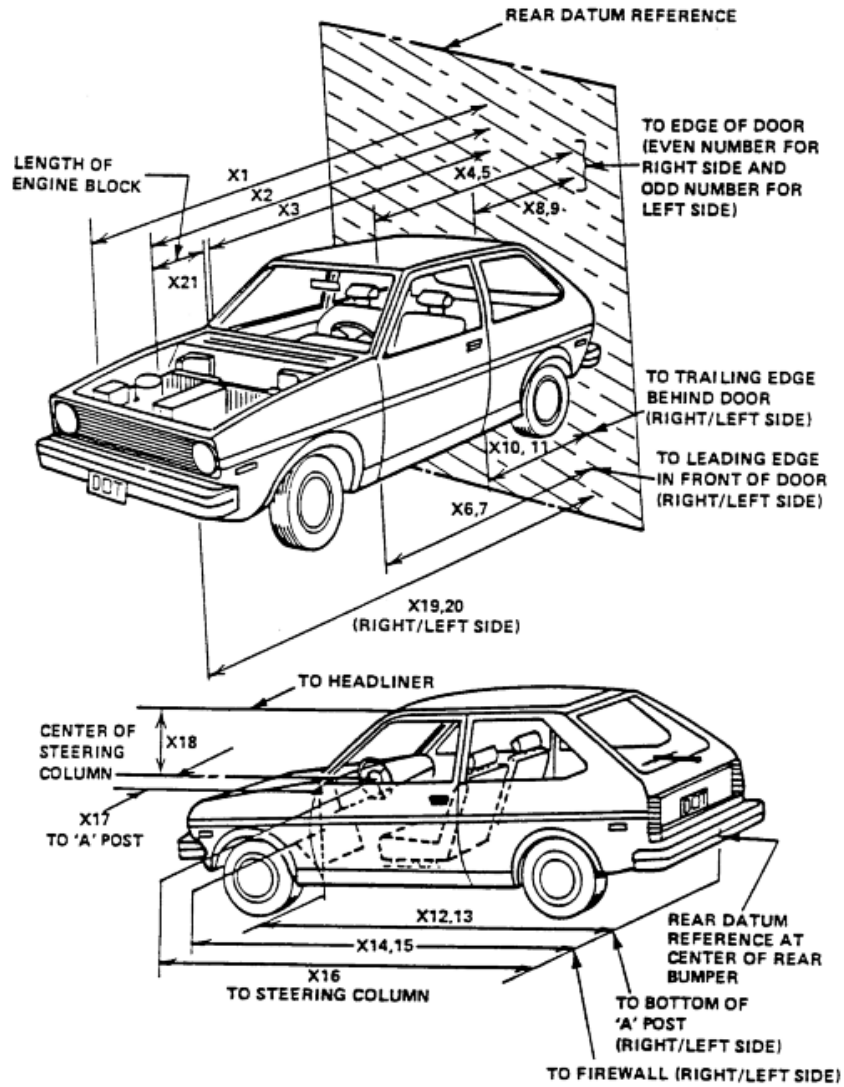
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Left Front (Driver) P1		Right Front (Passenger) P2	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	Yes	Yes	Yes
Knee Airbag	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: 2011 Ford Escape XLT 4WD SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0205
Test Date: 10/20/2010



DATA SHEET NO. 12 (CONTINUED)
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2011 Ford Escape XLT 4WD SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0205
 Test Date: 10/20/2010

RSOV (Rear Surface of Vehicle)

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	mm	4433	3869	564
2	RSOV to Front of Engine	mm	4080	3652	428
3	RSOV to Firewall	mm	3450	3418	32
4	RSOV to Upper Leading Edge of Right Door	mm	3040	3055	-15
5	RSOV to Upper Leading Edge of Left Door	mm	3041	3041	0
6	RSOV to Lower Leading Edge of Right Door	mm	3005	2995	10
7	RSOV to Lower Leading Edge of Left Door	mm	3002	2976	26
8	RSOV to Upper Trailing Edge of Right Door	mm	1993	2017	-24
9	RSOV to Upper Trailing Edge of Left Door	mm	1995	2002	-7
10	RSOV to Lower Trailing Edge of Right Door	mm	2004	1997	7
11	RSOV to Lower Trailing Edge of Left Door	mm	2010	1984	26
12	RSOV to Bottom of "A" Post of Right Side	mm	3007	3007	0
13	RSOV to Bottom of "A" Post of Left Side	mm	3005	2992	13
14	RSOV to Firewall, Right Side	mm	3460	3315	145
15	RSOV to Firewall, Left Side	mm	3462	3375	87
16	RSOV to Steering Column	mm	2585	2625	-40
17	Center of Steering Column to "A" Post	mm	395	396	-1
18	Center of Steering Column to Headliner	mm	508	521	-13
19	RSOV to Right Side of Front Bumper	mm	4340	3809	531
20	RSOV to Left Side of Front Bumper	mm	4340	3831	509
21	Length of Engine Block	mm	303	303	0
RD	RSOV to Right Side of Dash Panel	mm	2805	2885	-80
CD	RSOV to Center of Dash Panel	mm	2805	2860	-55
LD	RSOV to Left Side of Dash Panel	mm	2812	2880	-68

DATA SHEET NO. 13
ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2011 Ford Escape XLT 4WD SUV
 Test Program: NCAP Frontal Barrier Impact Test

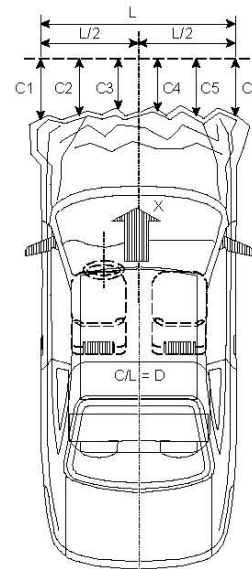
NHTSA No.: MB0205
 Test Date: 10/20/2010

VEHICLE INFORMATION

VIN: 1FMCU9D72BKA26048 Wheelbase (mm): 2630
 Vehicle Size Category: MPV Test Weight (kg): 1857.5

ACCELEROMETER DATA

Accelerometer Locations: As per measurements on Page 15
 Cal. Procedure/Interval: MGA procedure / 6 month
 Integration Algorithm: Trapezoidal Linearity: > 99%
 Impact Velocity (km/h): 56.5
 Velocity Change (km/h): 63.1
 Time of Separation (msec): 94.4



CRUSH PROFILE

Collision Deformation Classification: Frontal
 Midpoint of Damage: Centerline
 Damage Region Length (mm): 1198
 Impact Mode: Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	4340	3831	509
C2	Crush zone 2 at left side	mm	4388	3860	528
C3	Crush zone 3 at left side	mm	4406	3862	544
C4	Crush zone 4 at right side	mm	4406	3838	568
C5	Crush zone 5 at right side	mm	4388	3845	543
C6	Crush zone 6 at right side	mm	4340	3809	531
L	C1 TO C6	mm	1198	1220	-22

DATA SHEET NO. 14
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2011 Ford Escape XLT 4WD SUV
 Test Program: NCAP Frontal Barrier Impact Test

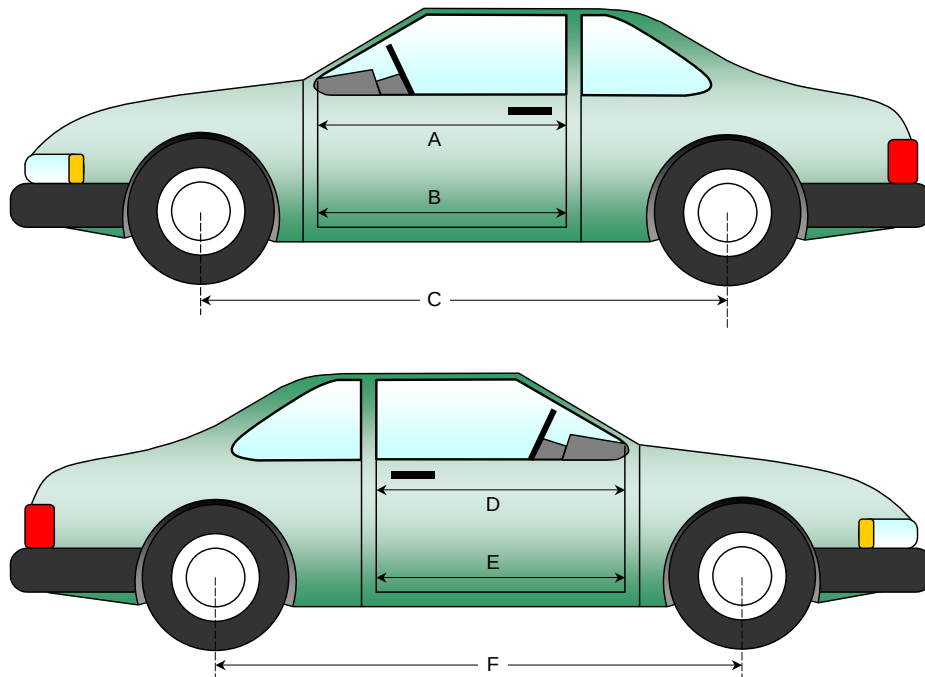
NHTSA No.: MB0205
 Test Date: 10/20/2010

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	935	933	2
B	Left Side Lower	mm	905	896	9
D	Right Side Upper	mm	935	925	10
E	Right Side Lower	mm	895	891	4

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2630	2565	65
F	Right Side Wheelbase	mm	2630	2574	56



DATA SHEET NO. 14 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

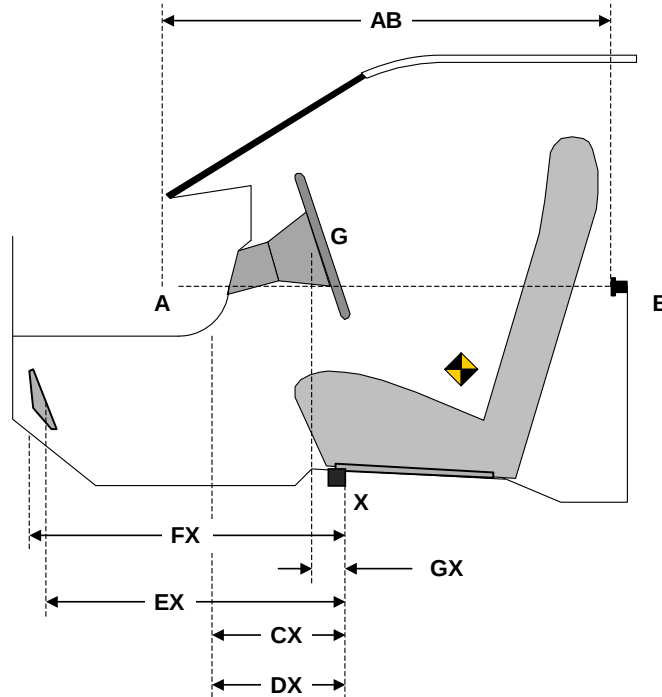
Test Vehicle: 2011 Ford Escape XLT 4WD SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0205
 Test Date: 10/20/2010

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside window jam)	mm	748	748	0
CX	Left Knee Bolster to X	mm	337	313	24
DX	Right Knee Bolster to X	mm	335	305	30
EX	Brake Pedal to X	mm	570	510	60
FX	Foot Rest to X	mm	589	595	-6
GX	Center of Steering Column Wheel Hub to X	mm	80	135	-55

X = Front of Seat Track (stationary)

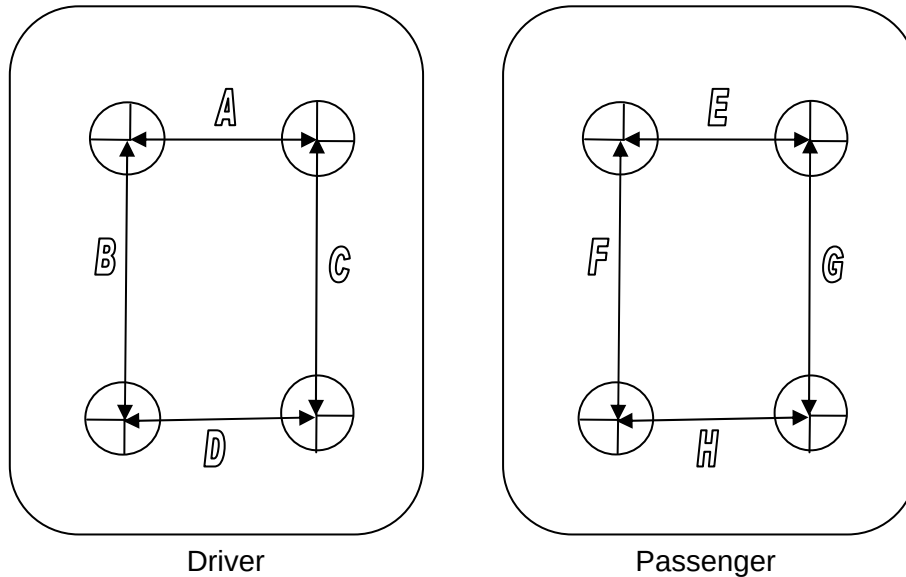


DRIVER COMPARTMENT

DATA SHEET NO. 14 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2011 Ford Escape XLT 4WD SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0205
 Test Date: 10/20/2010



TOP VIEW THROUGH FLOOR PAN

UNDERBODY FLOORBOARD DEFORMATION

Measurement	Units	Pre-Test	Post-Test	Difference
A	mm	181	186	-5
B	mm	181	180	1
C	mm	181	183	-2
D	mm	174	173	1
E	mm	181	182	-1
F	mm	181	177	4
G	mm	181	185	-4
H	mm	170	170	0

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

Test Vehicle: 2011 Ford Escape XLT 4WD SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0205
 Test Date: 10/20/2010

Windshield Mounting Details:

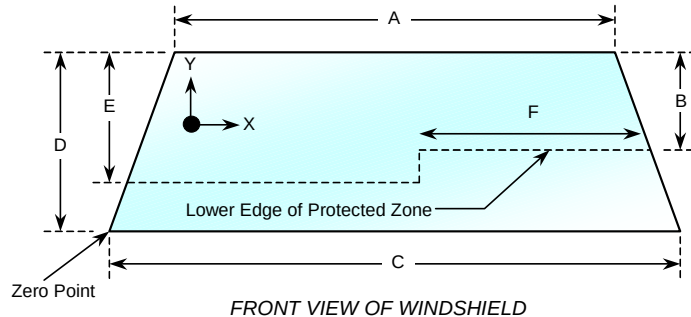
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

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	2024	2024	100
Right Side	2024	2024	100
Total	4048	4048	100



Item	Units	Value
A	mm	1166
B	mm	437
C	mm	1470
D	mm	706
E	mm	475
F	mm	485

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 Ford Escape XLT 4WD SUV</u>	NHTSA No.:	<u>MB0205</u>
Test Program:	<u>NCAP Frontal Barrier Impact Test</u>	Test Date:	<u>10/20/2010</u>

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Test Time:	<u>10:22 am</u>	Temperature:	<u>21° C</u>
------------	-----------------	--------------	--------------

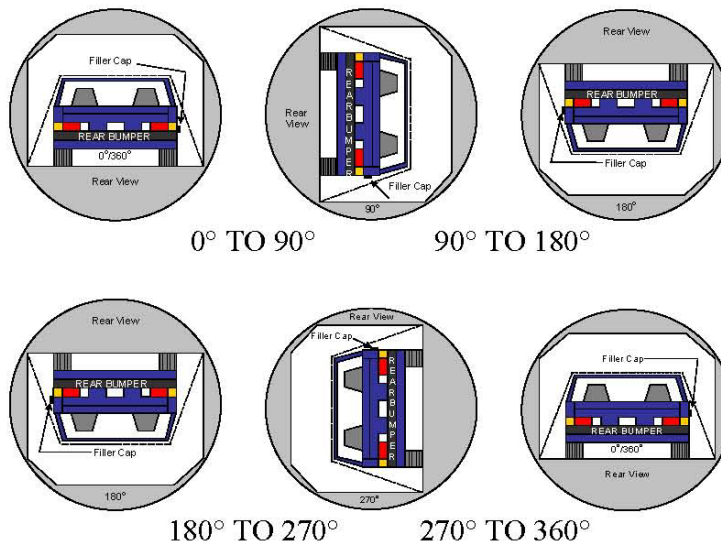
- | | |
|---|--------------|
| A. From impact until vehicle motion ceases:
(Maximum Allowable = 1 ounce) | <u>0</u> oz. |
| B. For the 5 minute period after motion ceases:
(Maximum allowable = 5 ounces) | <u>None</u> |
| C. For the following 25 minutes:
(Maximum allowable = 1 oz./minute) | <u>None</u>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

DATA SHEET NO. 16
FMVSS 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2011 Ford Escape XLT 4WD SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0205
 Test Date: 10/20/2010

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°	107	300	407
90° to 180°	117	300	417
180° to 270°	107	300	407
270° to 360°	120	300	420

FMVSS 301 ROLLOVER SPILLAGE TABLE (units in ounces)

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

ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

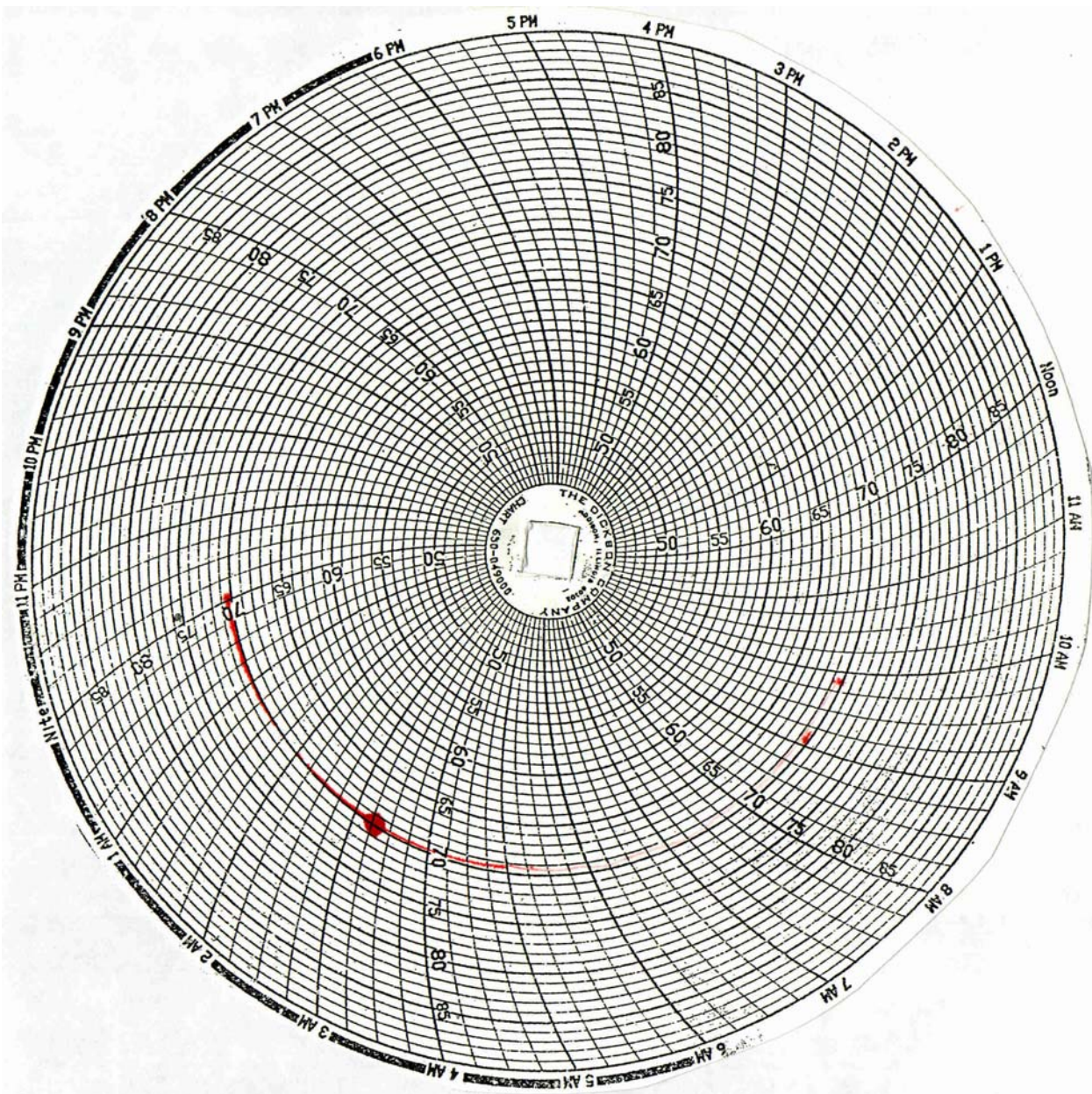
Test Phase	Spillage Location
0° to 90°	
90° to 180°	
180° to 270°	
270° to 360°	

DATA SHEET NO. 17

DUMMY/VEHICLE TEMPERATURE STABILIZATION DATA

Test Vehicle: 2011 Ford Escape XLT 4WD SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0205
Test Date: 10/20/2010



APPENDIX A
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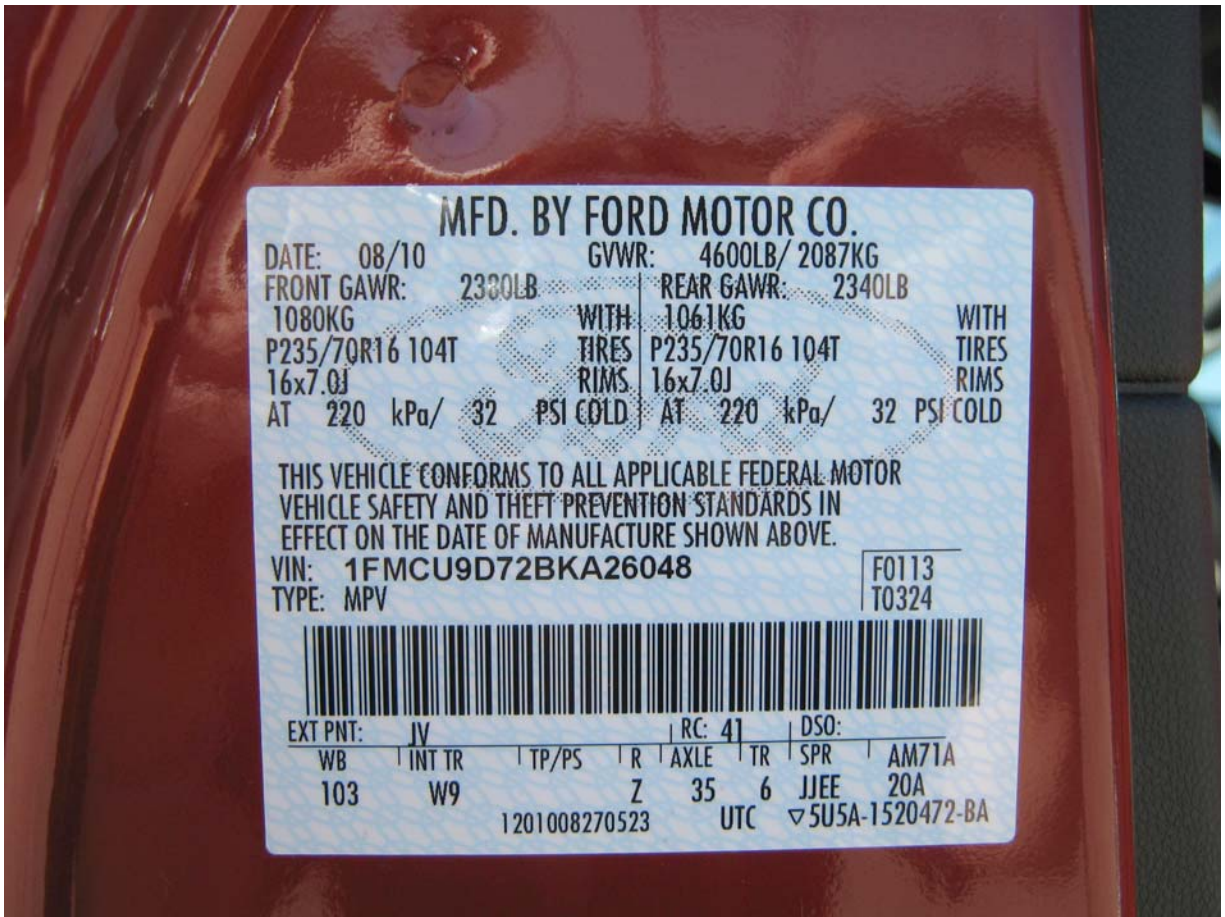
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PHOTOGRAPH NOT AVAILABLE

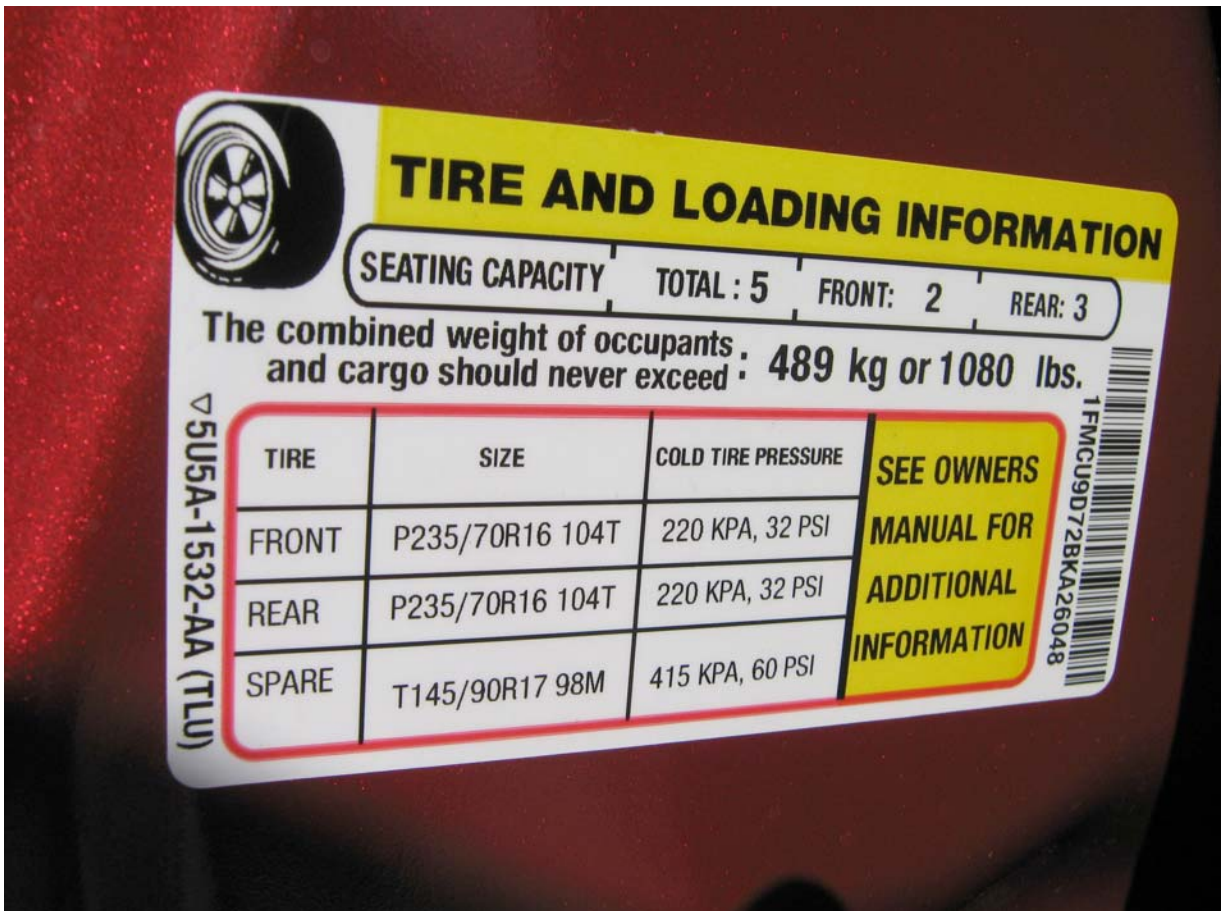
Load Cell Location



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

PHOTOGRAPH NOT AVAILABLE

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



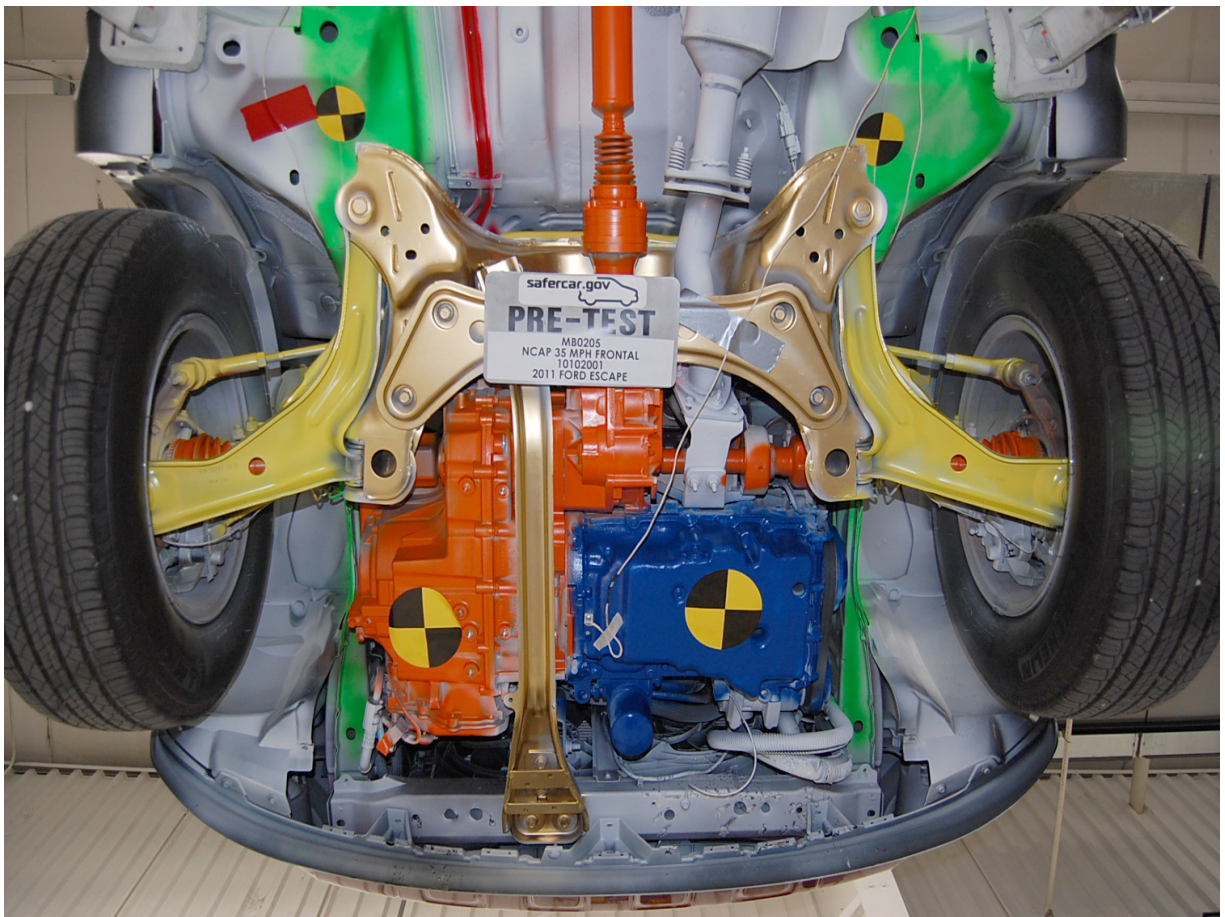
Post-Test Engine Compartment View



Pre-Test Fuel Cap View



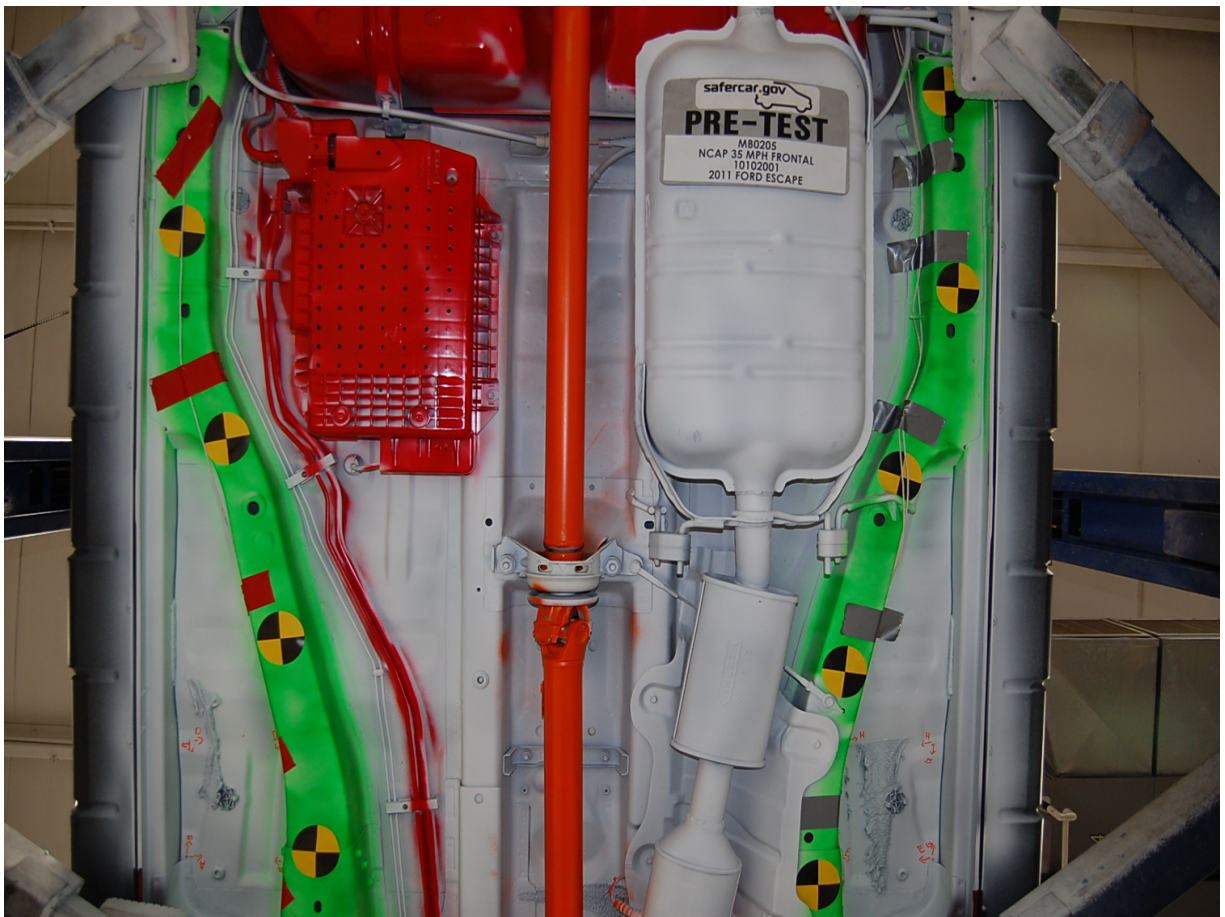
Post-Test Fuel Cap View



Pre-Test Front Underbody View



Post-Test Front Underbody View



Pre-Test Mid Underbody View



Post-Test Mid 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)



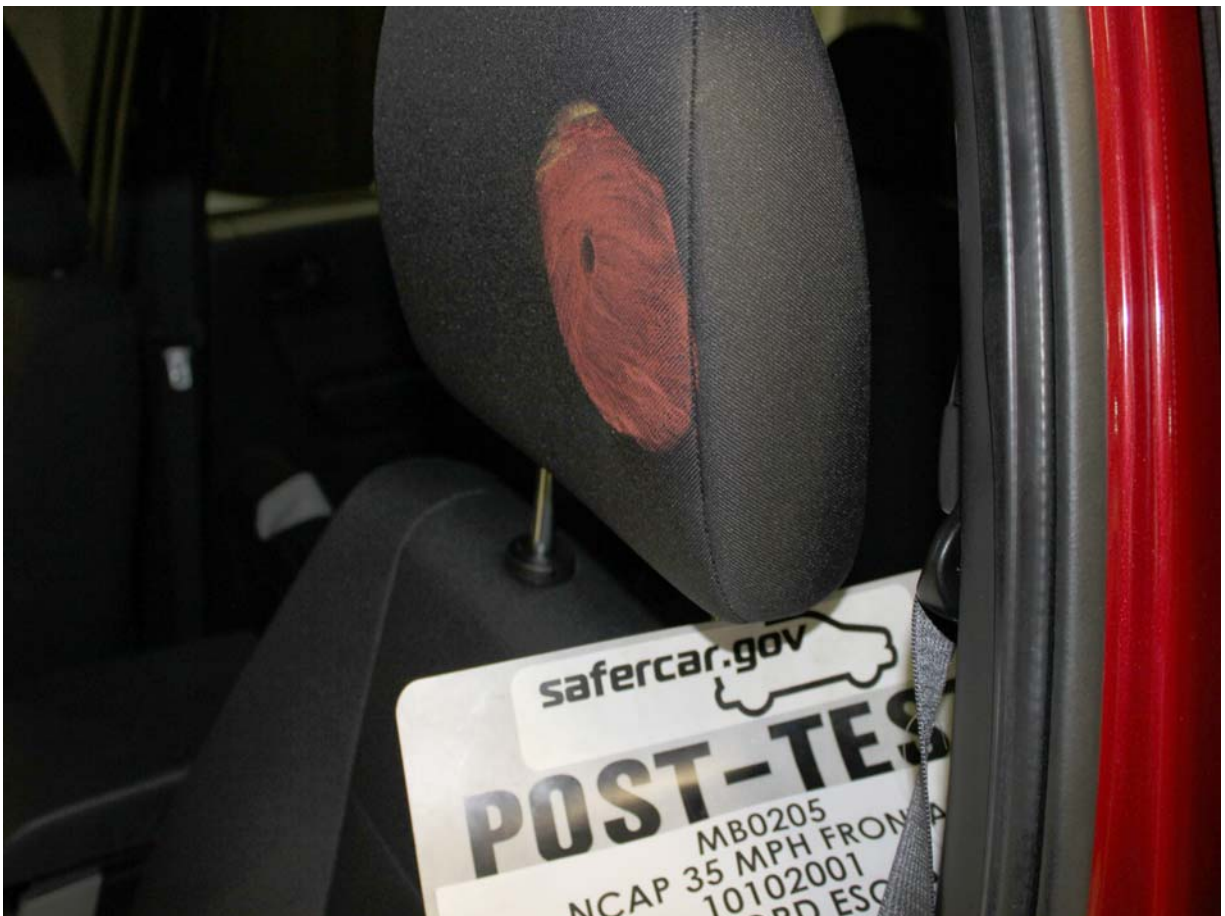
Pre-Test Driver's Side Floorpan



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 - Left Knee



Post-Test Driver Dummy Contact with Knee Bolster - Right Knee



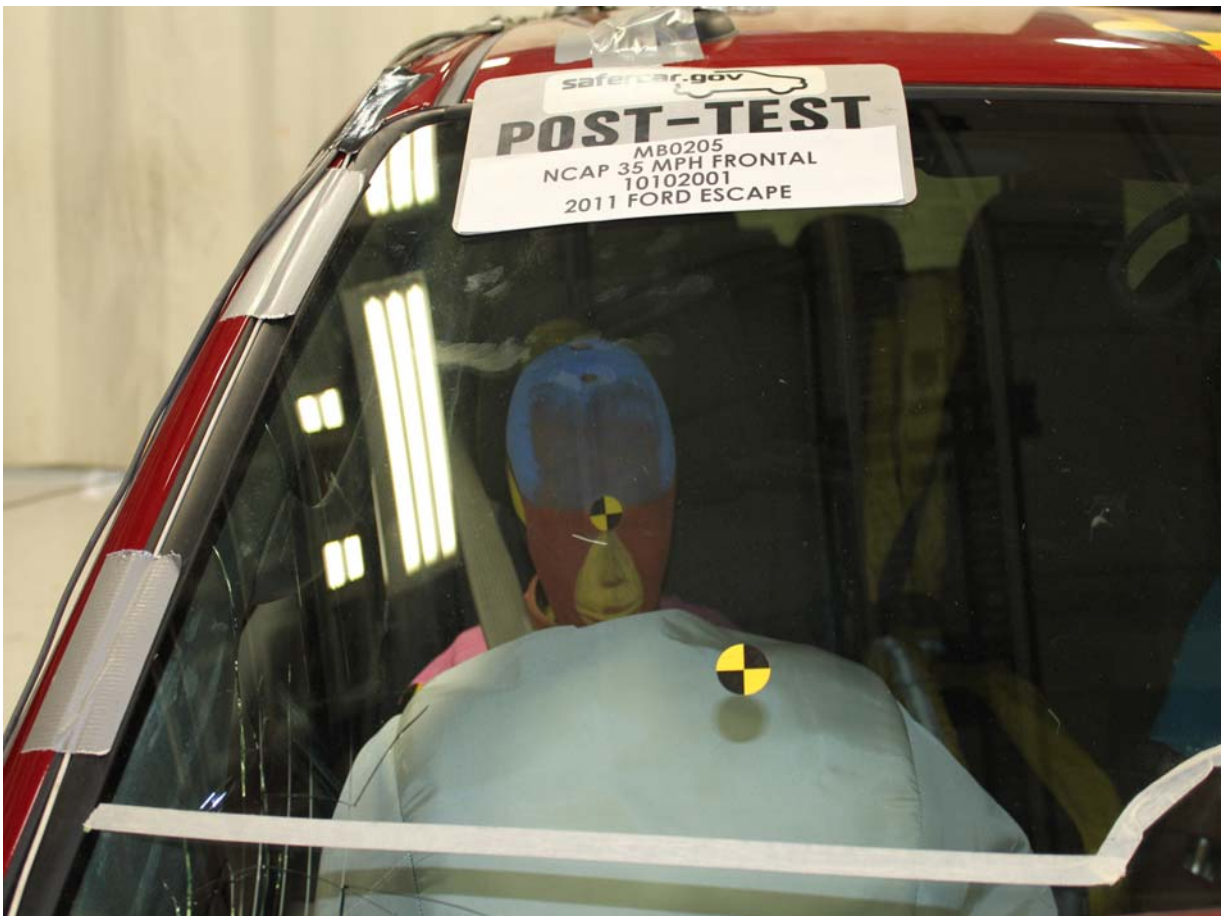
Pre-Test View of Steering Column Shear Capsule



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)



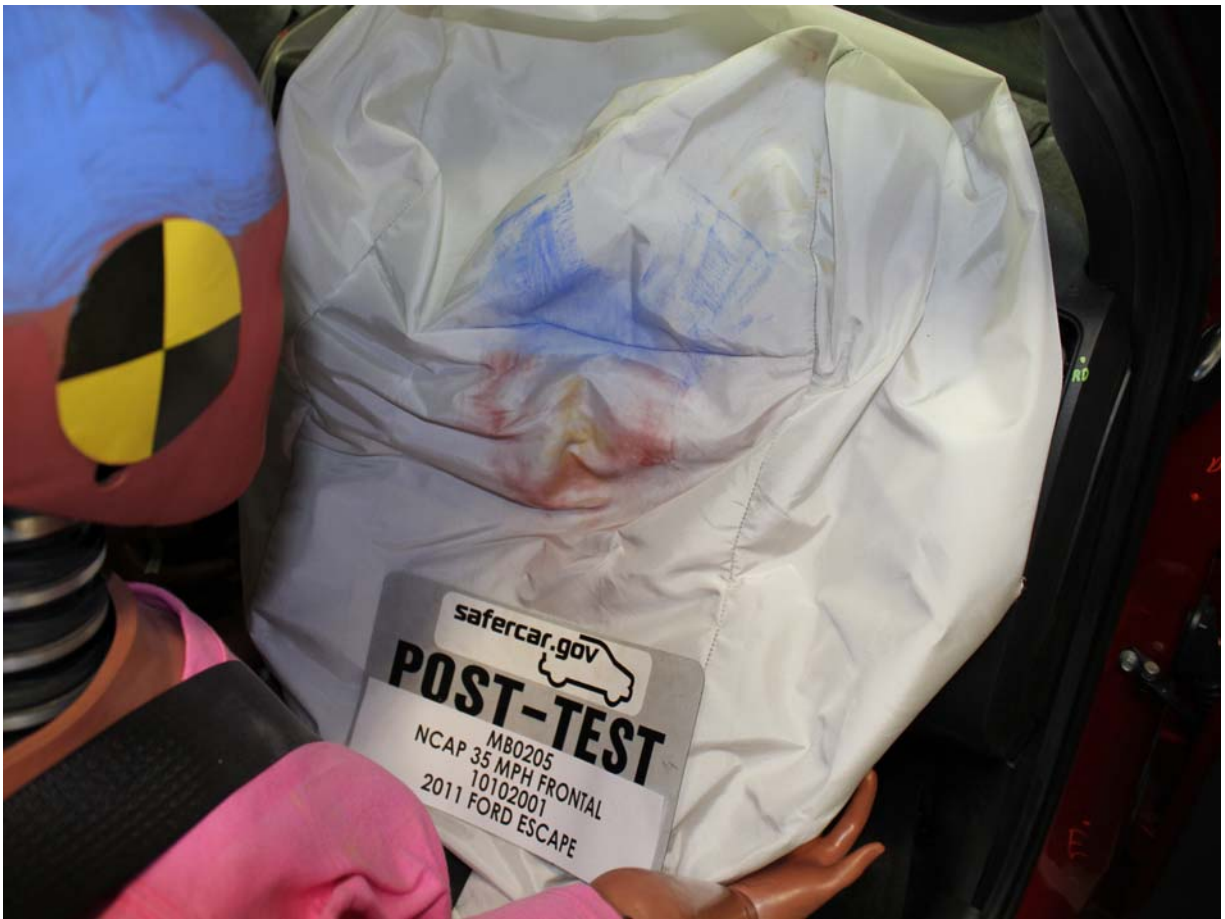
Post-Test Passenger's Side Knee Bolster (without dummy)



Pre-Test Passenger's Side Floorpan



Post-Test Passenger's Side Floorpan



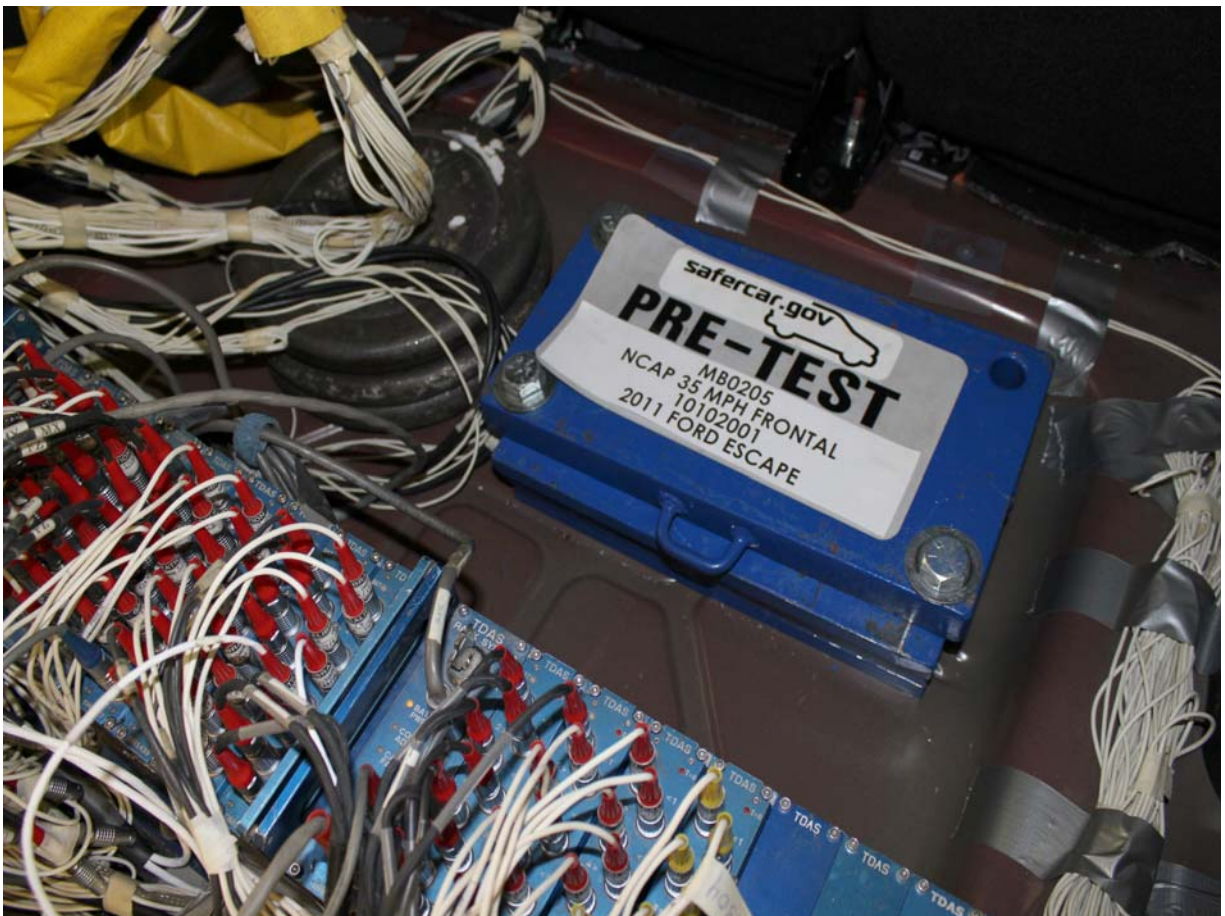
Post-Test Passenger Dummy Contact with Airbag



Post-Test Passenger Dummy Contact with Headrest



Post-Test Passenger Dummy Contact with Glovebox



Ballast Installed in Vehicle

PHOTOGRAPH NOT APPLICABLE

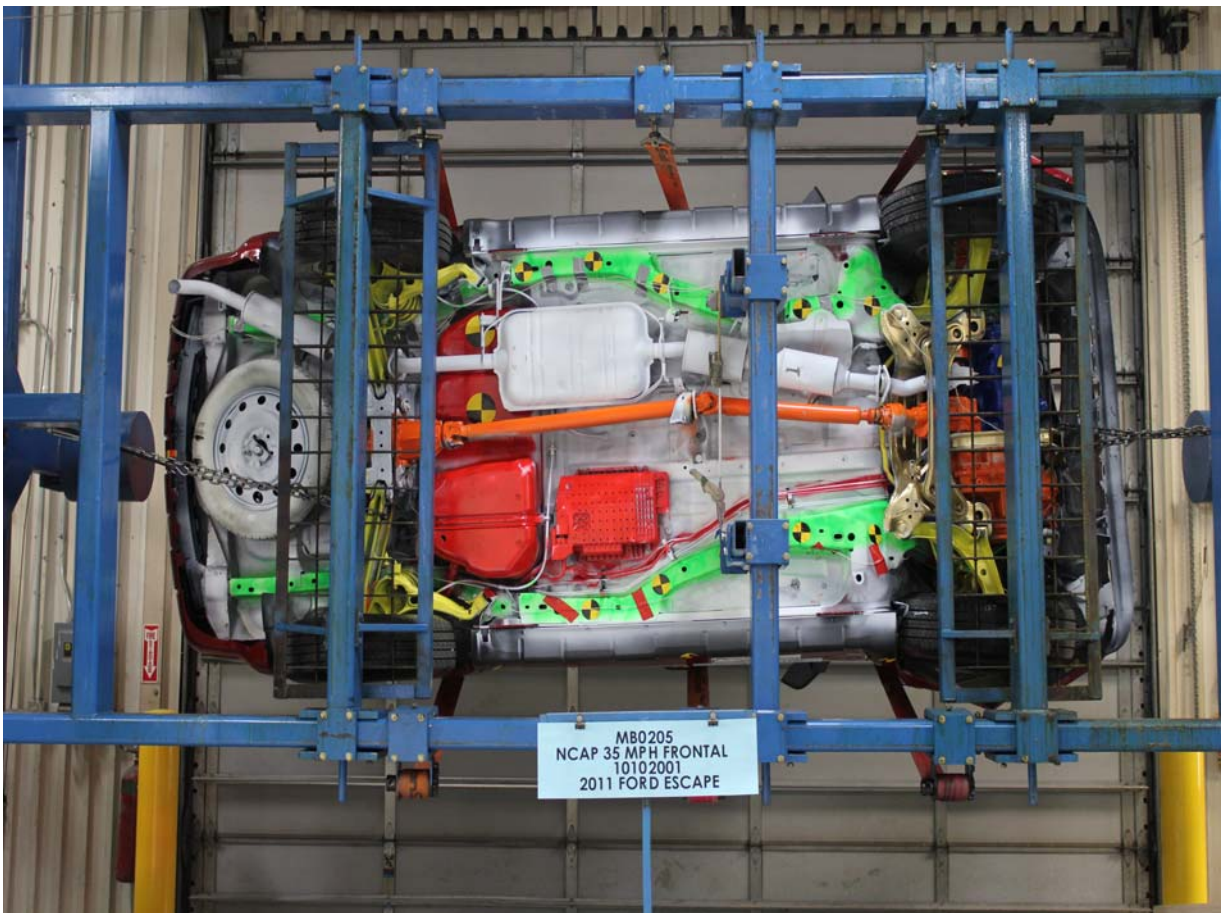
Post-Test Stoddard Solvent Spillage Location View



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



www.fordvehicles.com

VEHICLE DESCRIPTION

ESCAPE

2011 ESCAPE XLT AUTO 4WD
103" WHEELBASE
2.5L I4 ENGINE
6-SPEED AUTO TRANSMISSION

EXTERIOR
SANGRIA RED METALLIC
INTERIOR
CHARCOAL PREM CLOTH SEATS

BR A26048

STANDARD EQUIPMENT INCLUDED AT NO EXTRA CHARGE

EXTERIOR

- 16" ALUMINUM WHEELS
- AUTO HEADLAMPS
- CHROME GRILLE
- EASYFUEL CAPLESS FILLER
- FOG LAMPS
- MANUAL FOLD POWER MIRRORS
- BLIND SPOT MIRRORS

INTERIOR

- 1-TOUCH DOWN DRIVER WINDOW
- 6-WAY POWER DRIVER'S SEAT
- AM/FM CD/MP3/SAT CAPABL W/ AUD INPUT JACK
- ELECTROCHROMIC MIRROR
- LEATHER WRAPPED STR WHEEL W/CRUISE & AUDIO CONTROLS
- MESSAGE CENTER
- PREM CLOTH BCKT FRT SEATS
- SIRIUS SAT RADIO W/A AK&HI
- TIP FOLD FLAT REAR SEATS

FUNCTIONAL

- KEYKEY
- REMOTE KEYLESS ENTRY
- PWR WIN, LOC, MIRRORS, RKE
- ELECTRONIC PWR ASST STEER
- SAFETY/SECURITY
- SECURICODE KEYLESS KEYPAD
- 4-WHEEL ANTILOCK BRAKE SYS
- ADVANCETRAIC W/RSC
- DRIVER/PASSENGER AIR BAGS
- ILLUMINATED ENTRY
- SAFETY CANOPY
- SECURILOCK PASS ANTI THEFT
- SIDE AIR CURTAINS
- WARRANTY
- 3YR/36,000 BUMPER / BUMPER
- 5YR/60,000 POWERTRAIN
- 5YR/60,000 ROADSIDE ASSIST

PRICE INFORMATION

Manufacturer's
Suggested Retail Price

STANDARD VEHICLE PRICE

\$25,800.00

INCLUDED ON THIS VEHICLE

RAPID SPEC 200A - 4WD

OPTIONAL EQUIPMENT

FRONT LICENSE PLATE BRACKET
ENGINE BLOCK HEATER

NO CHARGE
NO CHARGE
00

TOTAL VEHICLE & OPTIONS

25,800.00

DESTINATION & DELIVERY

725.00

EPA Fuel Economy Estimates

CITY MPG

20

Expected range
for most drivers
16 to 24 MPG

HIGHWAY MPG

26

Expected range
for most drivers
21 to 31 MPG

Estimated
Annual Fuel Cost
\$2,048

based on 15,000 miles
at \$3.00 per gallon

Combined Fuel Economy

This Vehicle

22

10 32

All SUVs

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

SOLD TO 41E 343

Griffin Ford Lincoln Mercury
1940 E Main Street
Waukesha WI 53186

ONE

CU79

DEALER NO.

41E 343

METHOD OF TRANSP.

CONVOY

ITEM #:

41-4205 O/T 2

SHIP TO (PREVIOUS OWNER)

Griffin Ford Lincoln Mercury 41 343
1706 Pearl Street
Waukesha WI

TWO

1FMCU9D72BKA26048



SHIP THROUGH

FINAL ASSEMBLY POINT

KANSAS CITY

This label is affixed pursuant to the Federal Automobile Information Disclosure Act. Gasoline, Licenses, and Title Fees, State and Local taxes are not included. Dealer installed options or accessories are not included unless listed above.

AH191 N RB 2X 115 004470 08 19 10

EXTENDED SERVICE PLAN

Ford Extended Service Plan is the only service contract backed by Ford and honored at all Ford and Lincoln Mercury Dealers. Ask your dealer for prices and additional details or see our website at www.ford-esep.com.

TOTAL MSRP

\$26,525.00

GOVERNMENT SAFETY RATINGS

Frontal Crash

Driver Passenger

To Be Rated To Be Rated

Star ratings based on the risk of injury in a frontal impact. Frontal ratings should ONLY be compared to other vehicles of similar size and weight.

Side Crash

Front seat Rear seat

To Be Rated To Be Rated

Star ratings based on the risk of injury in a side impact.

Rollover

★ ★ ★

Star ratings based on the risk of rollover in a single vehicle crash.

Star ratings range from 1 to 5 stars (*****), with 5 being the highest. Source: National Highway Traffic Safety Administration (NHTSA).

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

APPENDIX B
DUMMY RESPONSE DATA

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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 Shoulder Belt Force

Driver Lap Belt Force

Driver Left Upper Tibia Moment X

Driver Left Upper Tibia Moment Y

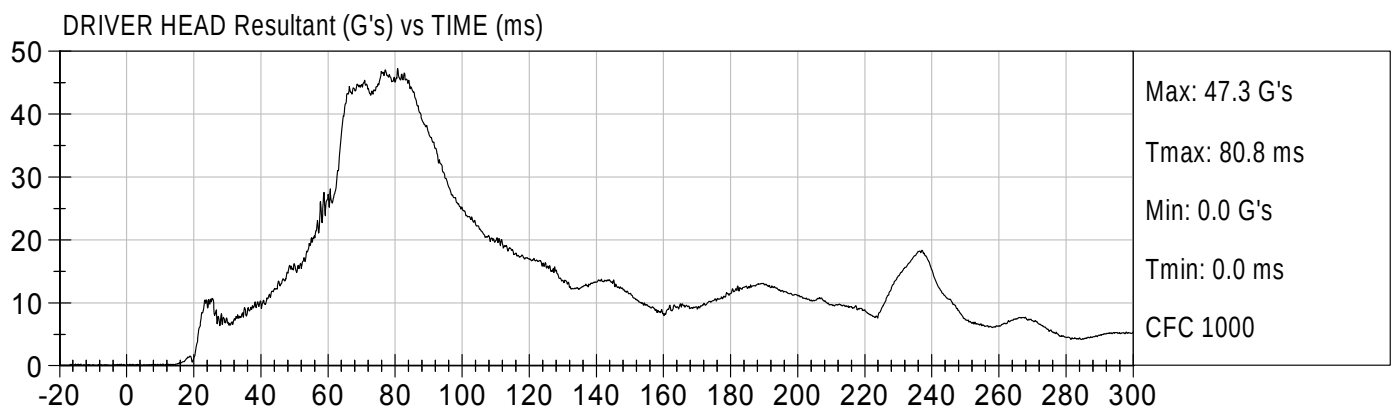
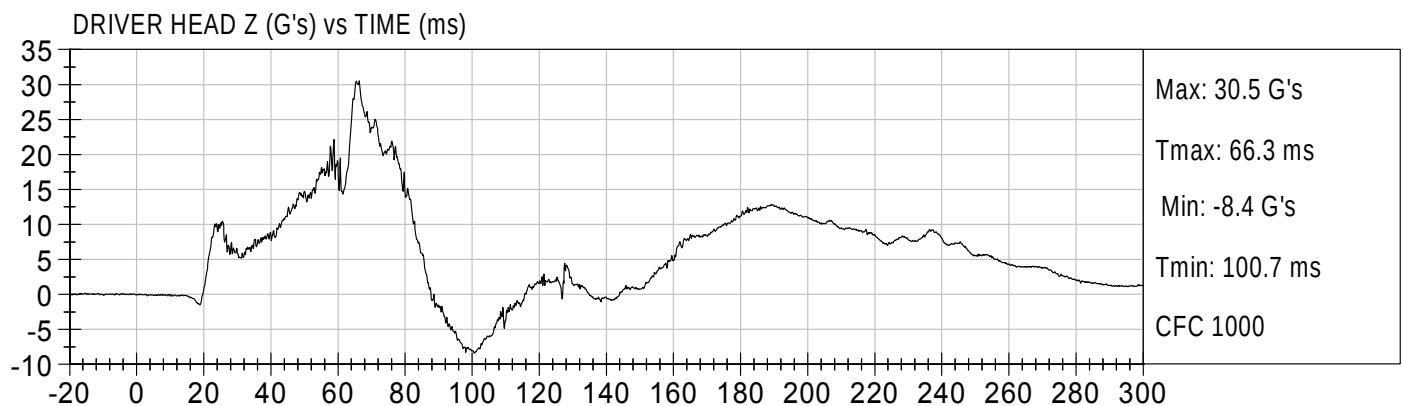
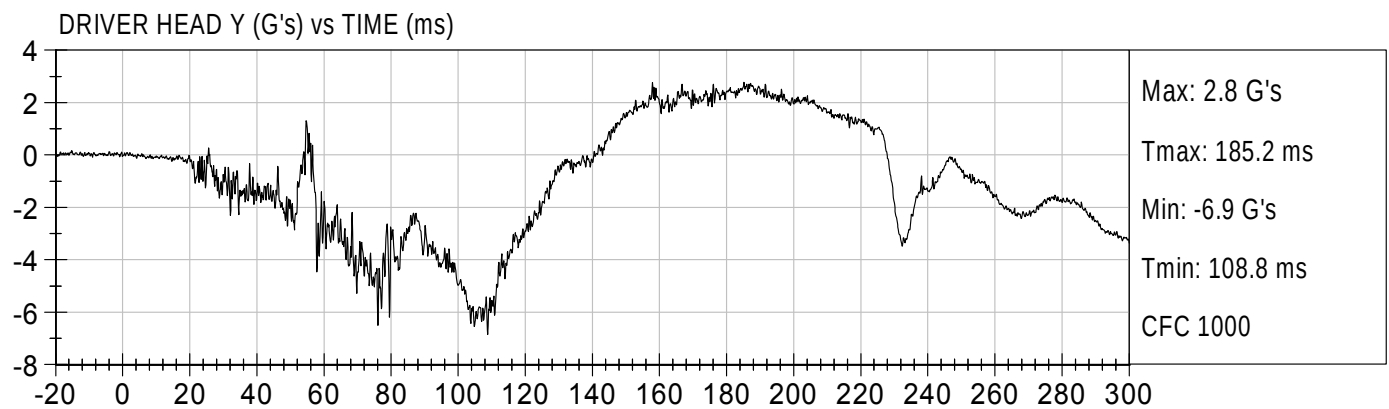
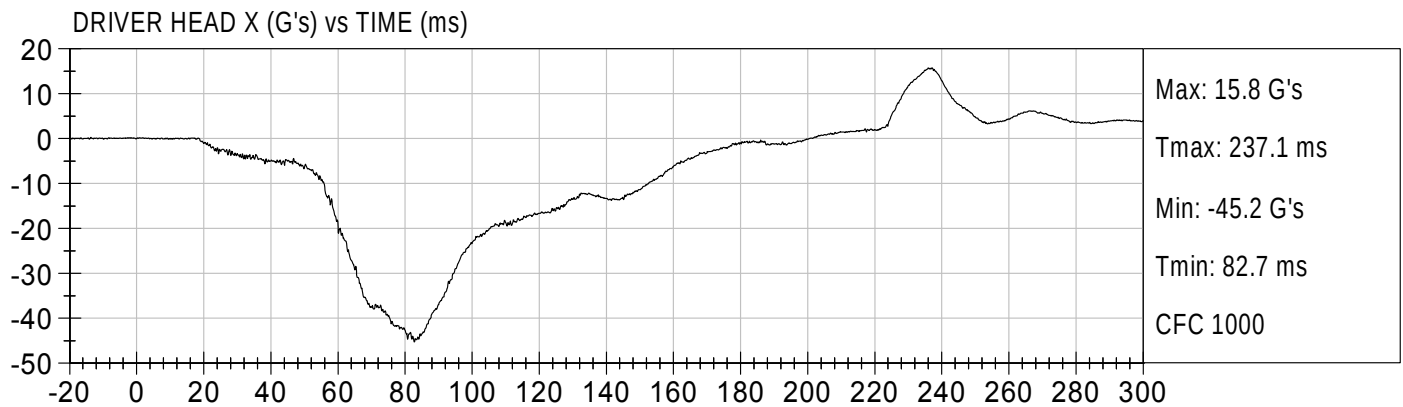
Driver Left Upper Tibia Force Z

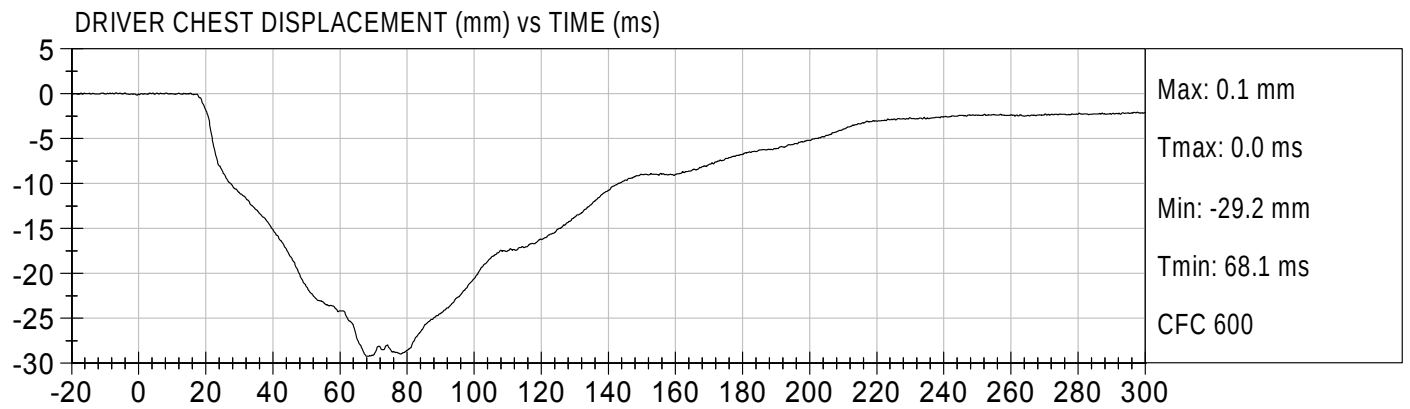
Driver Left Lower Tibia Moment X

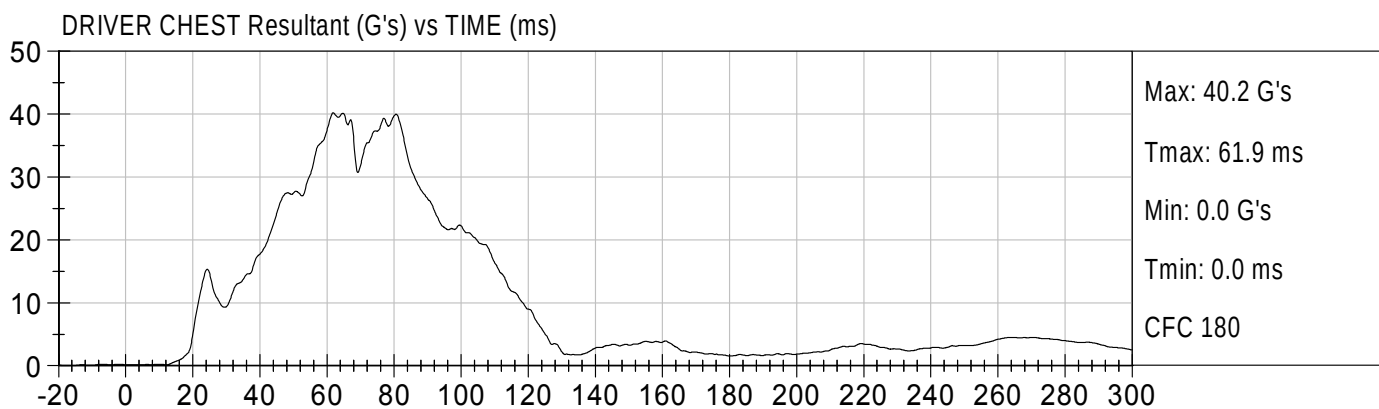
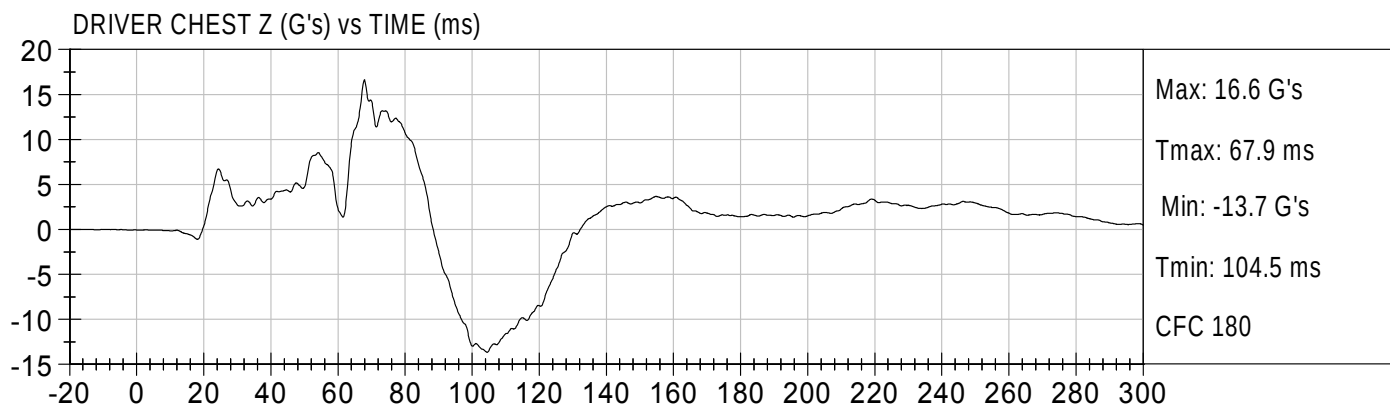
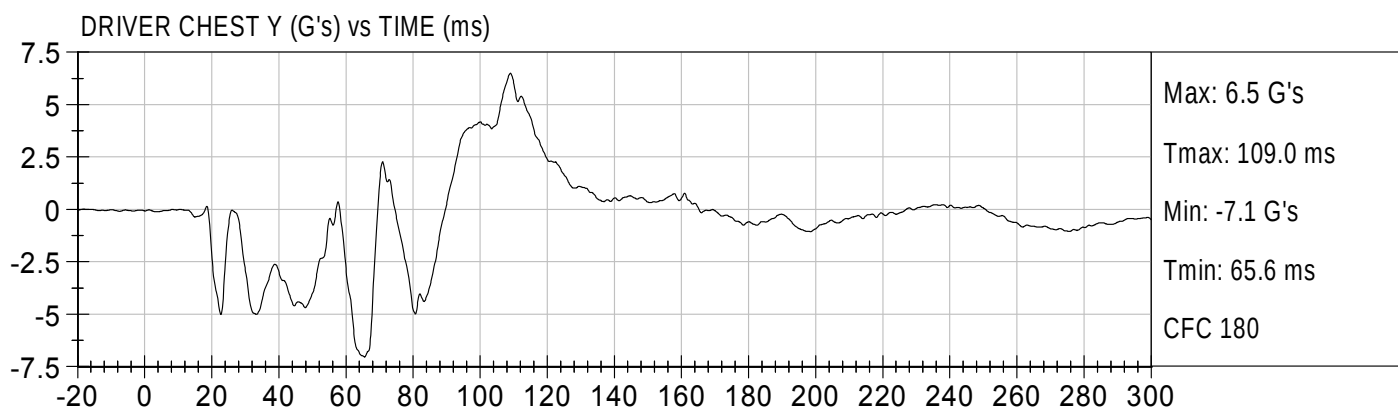
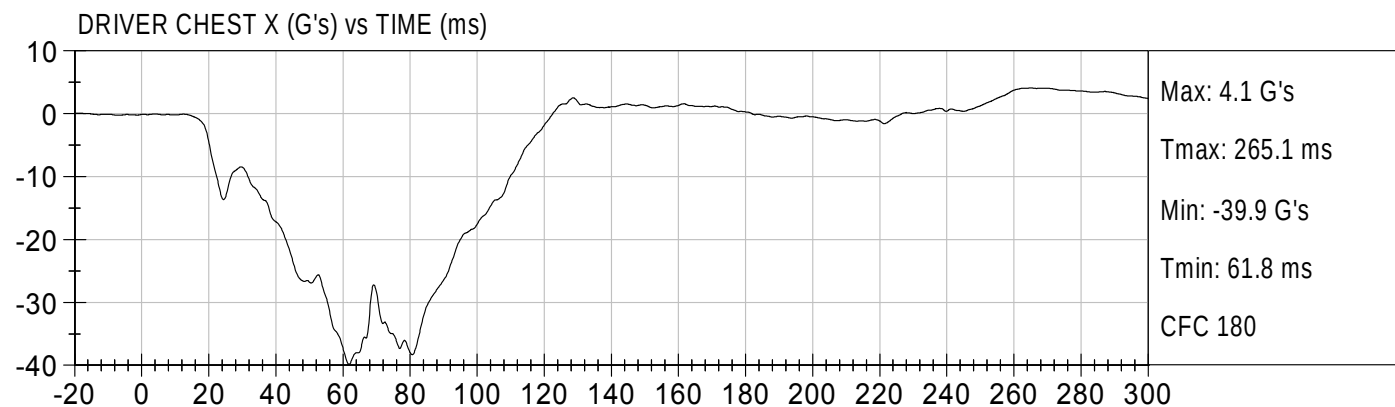
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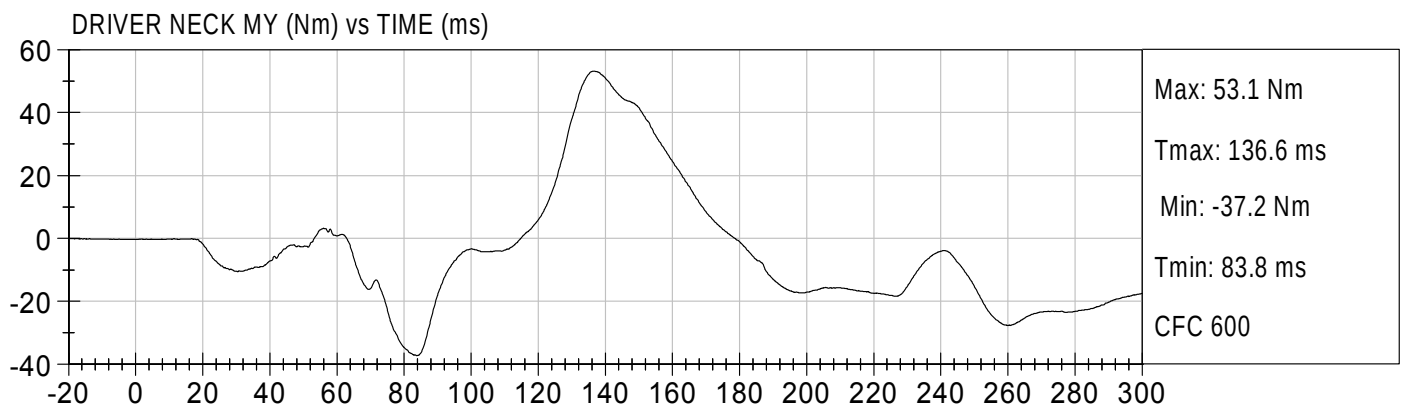
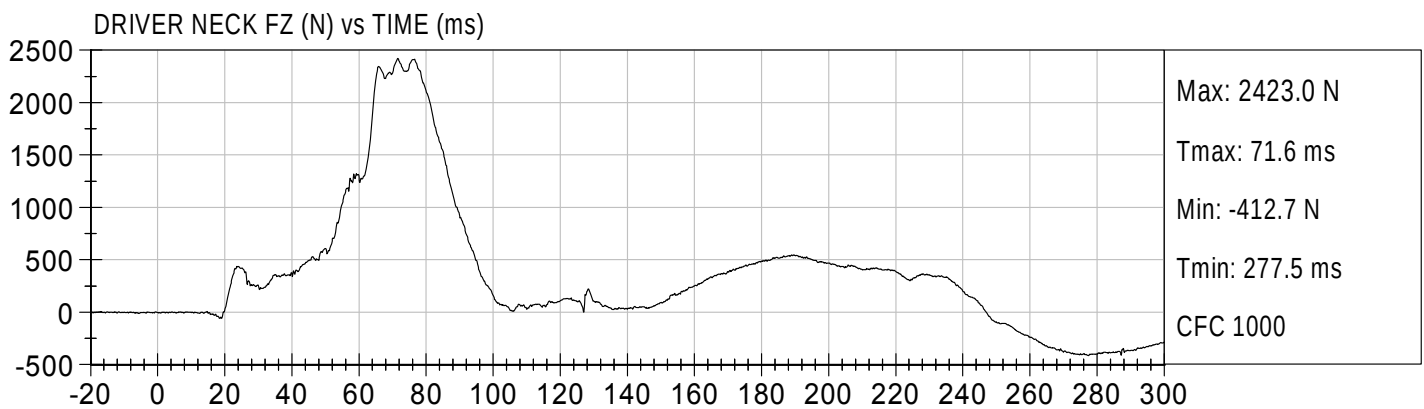
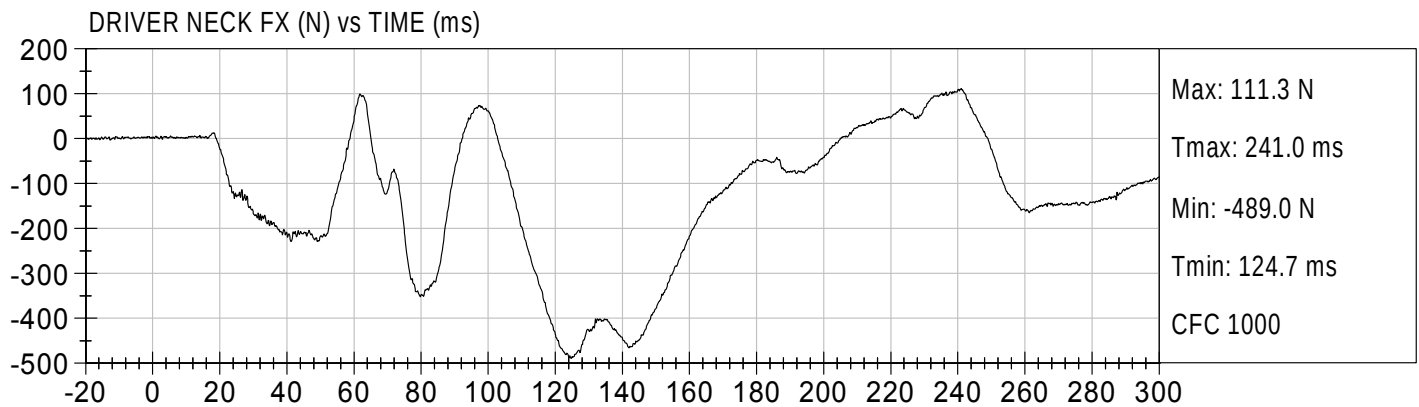
Driver Left Lower Tibia Force Z
Driver Right Upper Tibia Moment X
Driver Right Upper Tibia Moment Y
Driver Right Upper Tibia Force Z
Driver Right Lower Tibia Moment X
Driver Right Lower Tibia Moment Y
Driver Right Lower Tibia Force Z
Driver Left Foot Fore Z
Driver Left Foot Aft X
Driver Left Foot Aft Z
Driver Right Foot Fore Z
Driver Right Foot Aft X
Driver Right Foot Aft Z
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 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

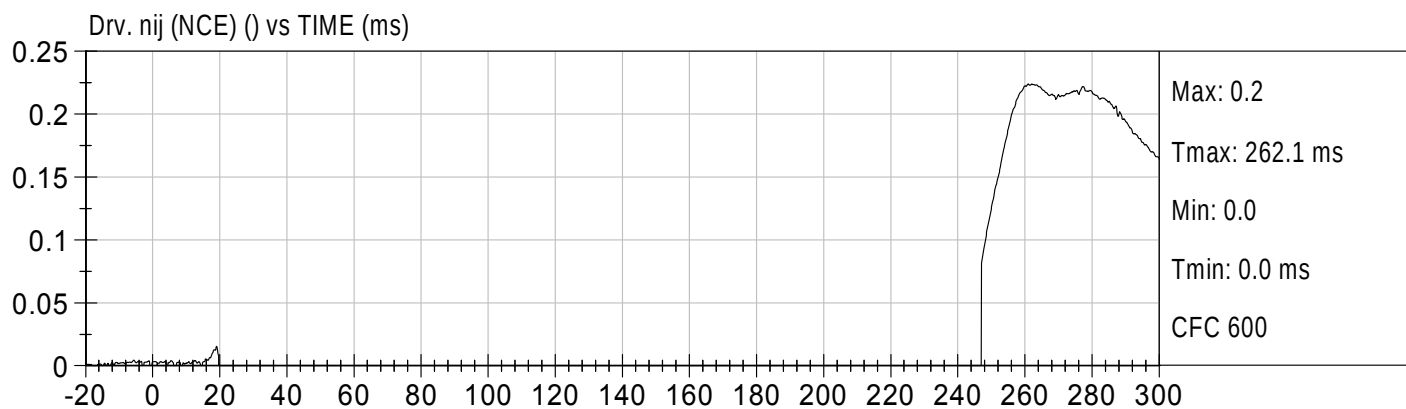
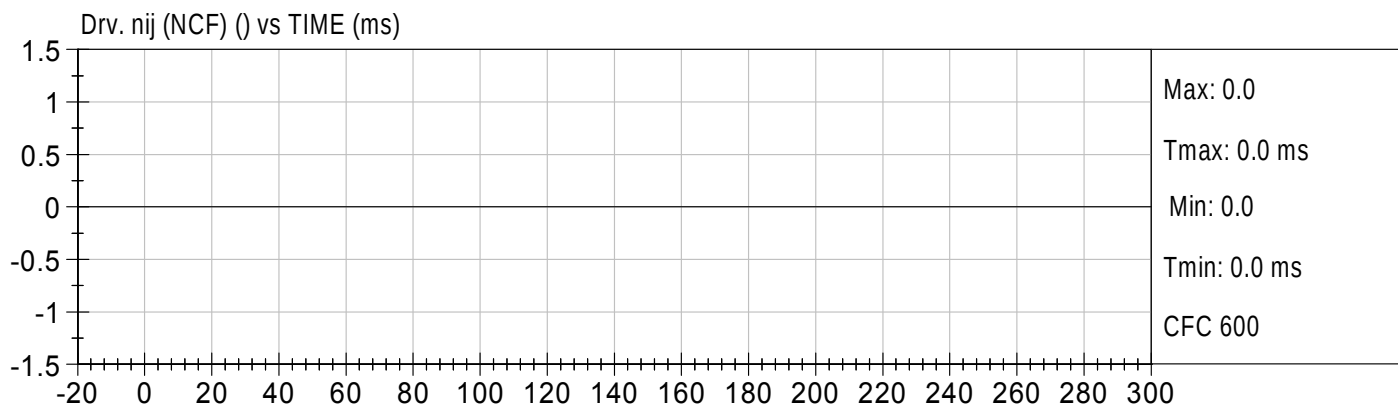
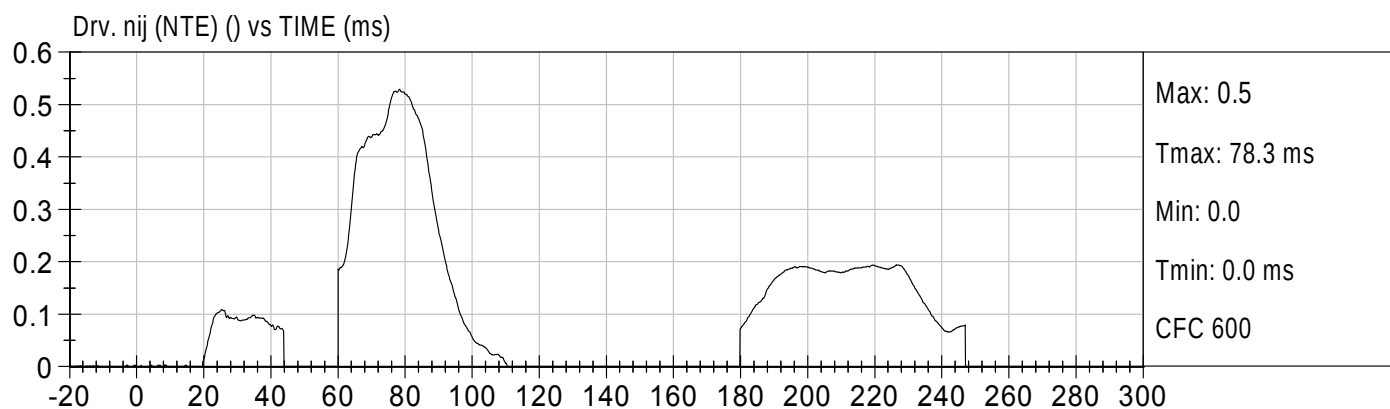
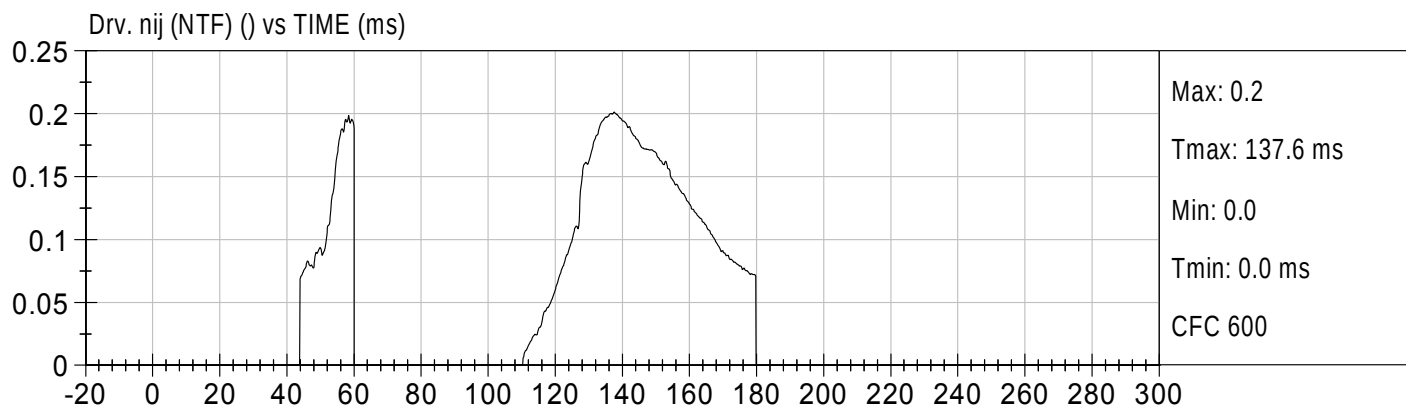
Passenger Left Lower Tibia Moment Y
Passenger Left Lower Tibia Force Z
Passenger Right Upper Tibia Moment X
Passenger Right Upper Tibia Moment Y
Passenger Right Upper Tibia Force Z
Passenger Right Lower Tibia Moment X
Passenger Right Lower Tibia Moment Y
Passenger Right Lower Tibia Force Z
Passenger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

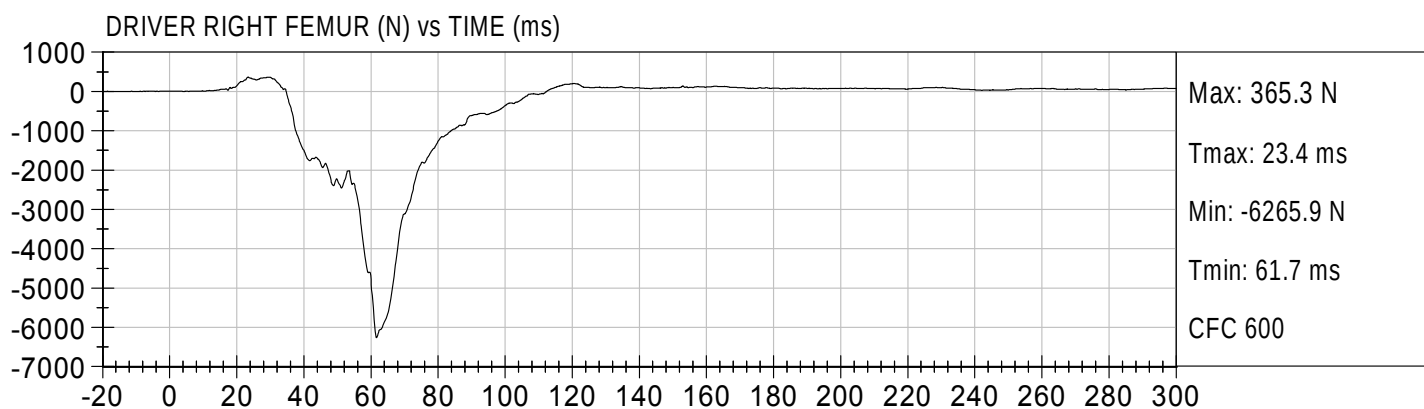
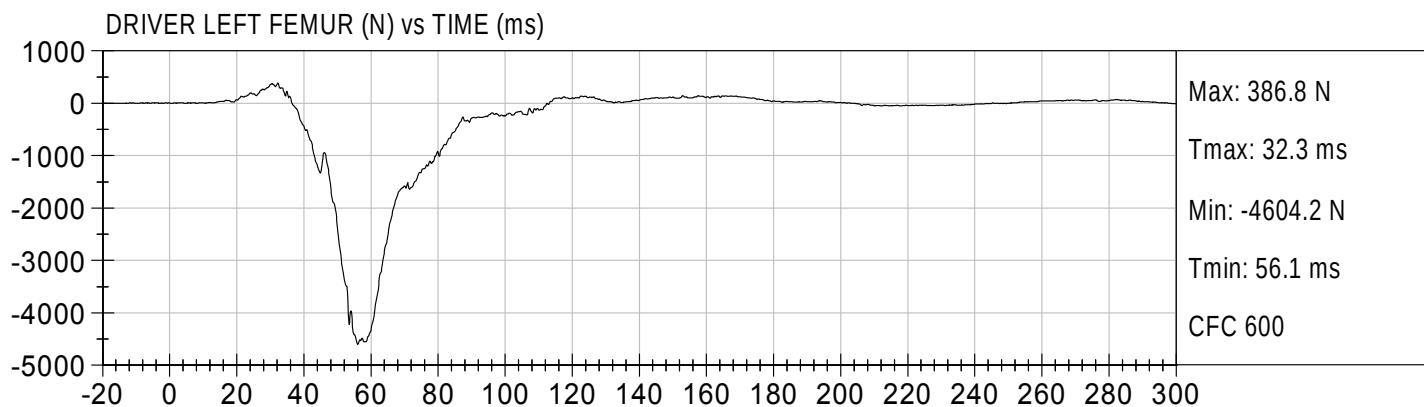


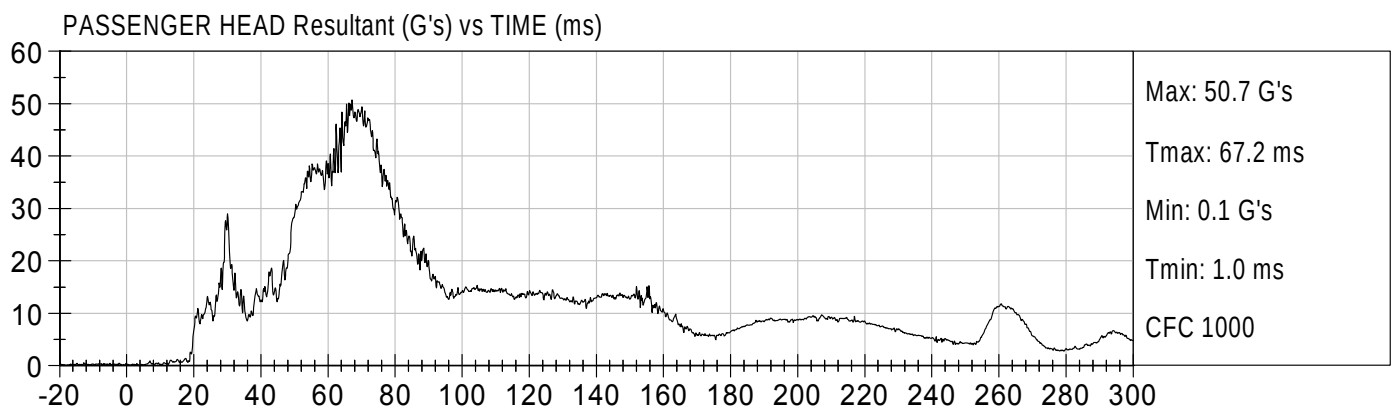
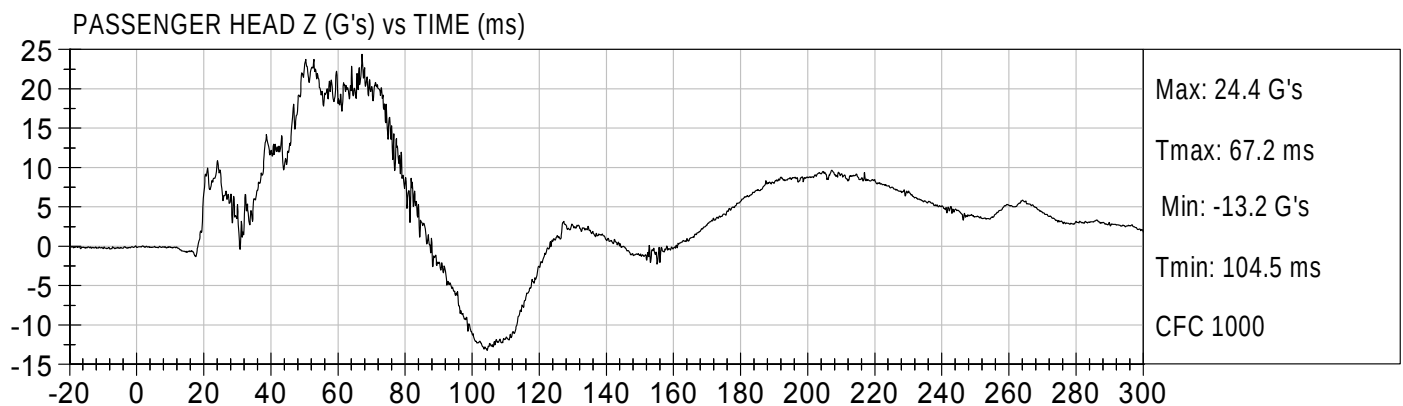
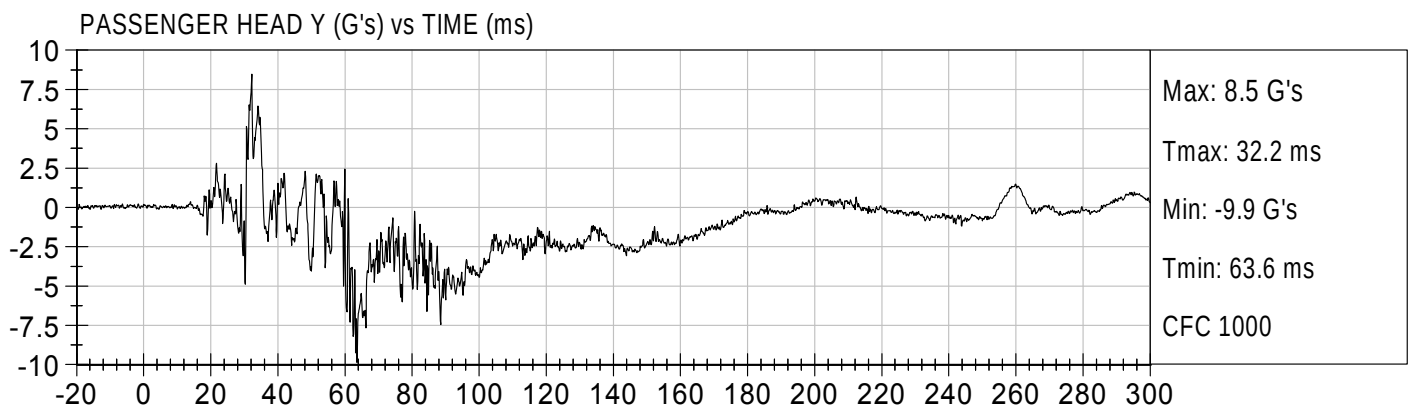
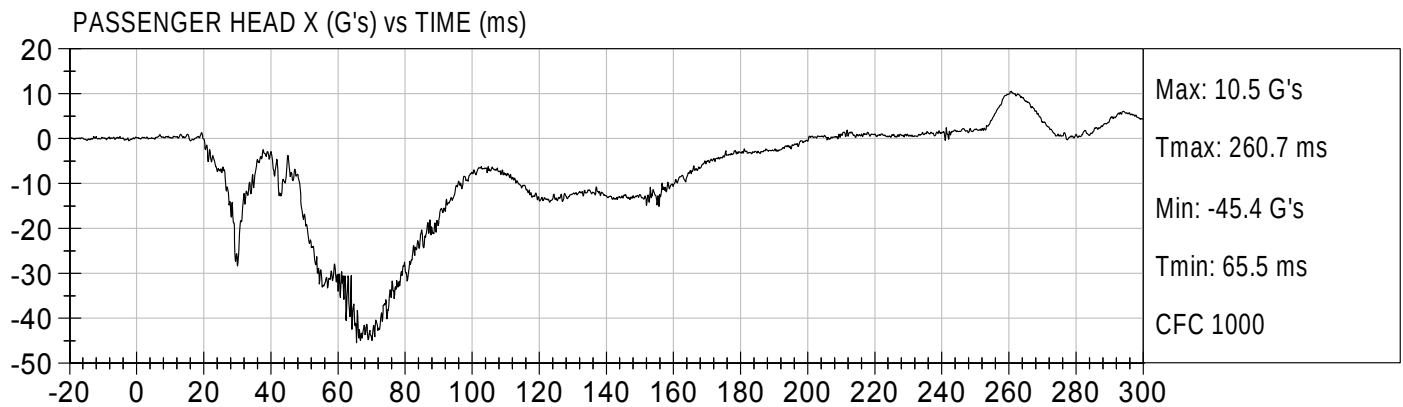


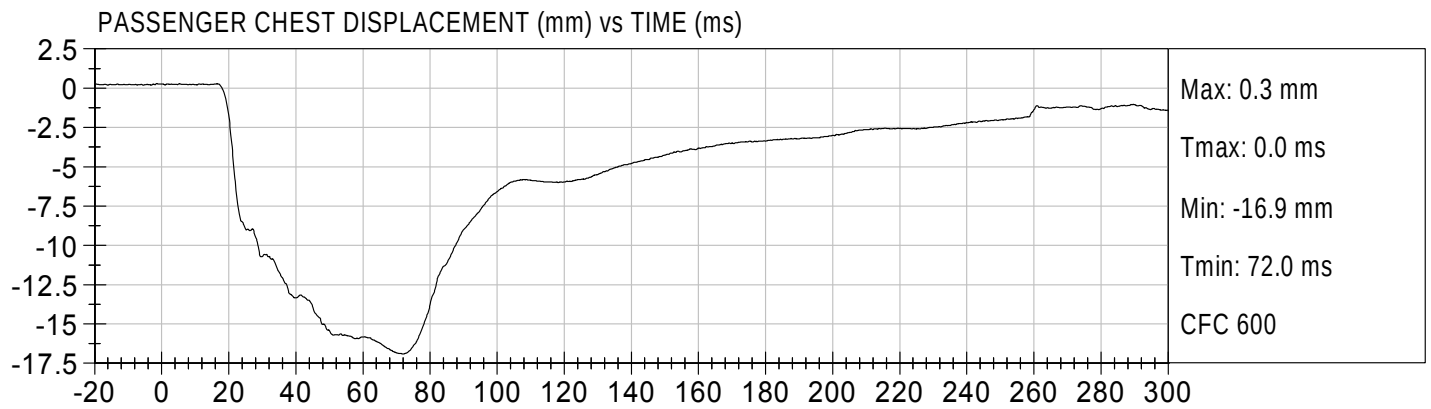


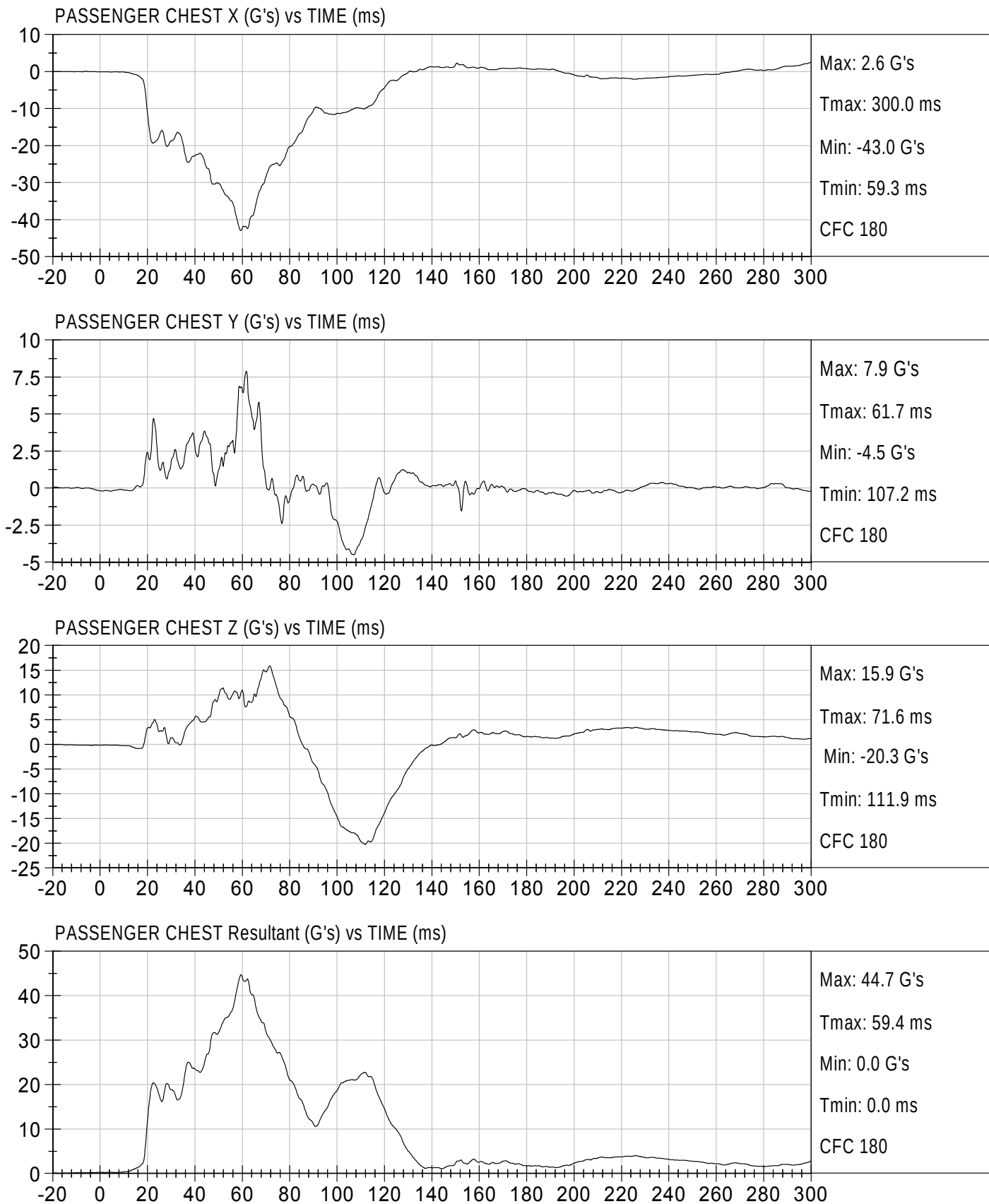


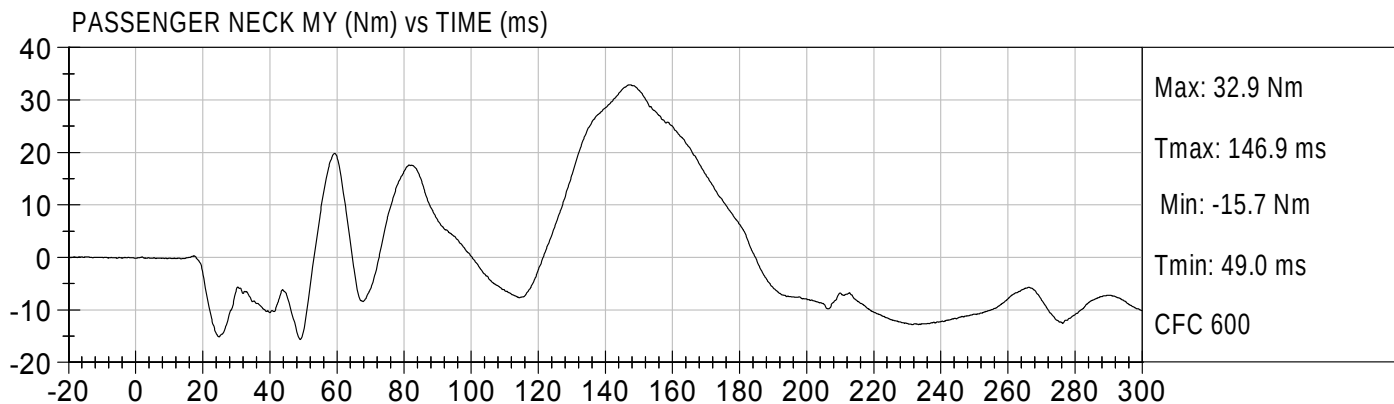
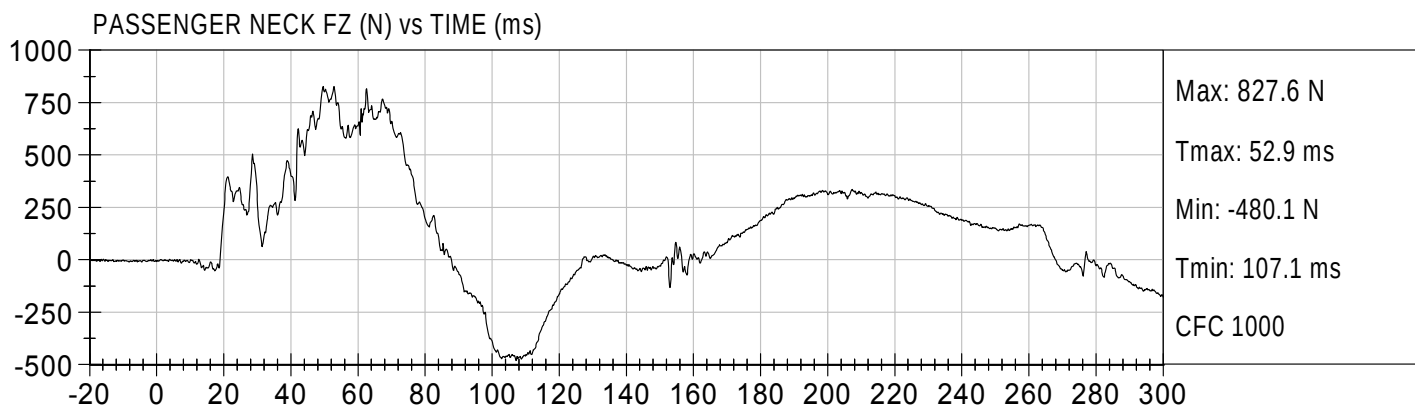
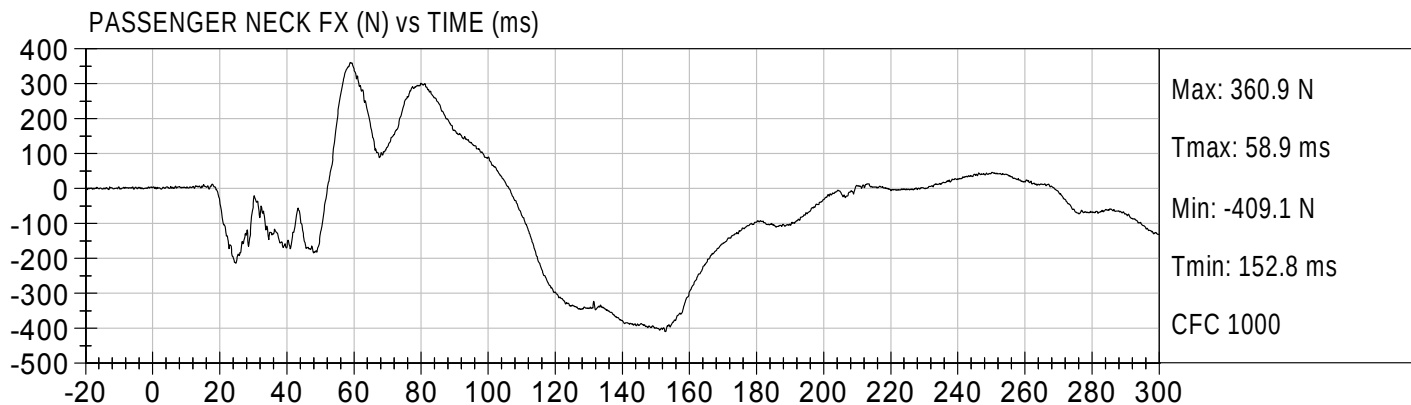






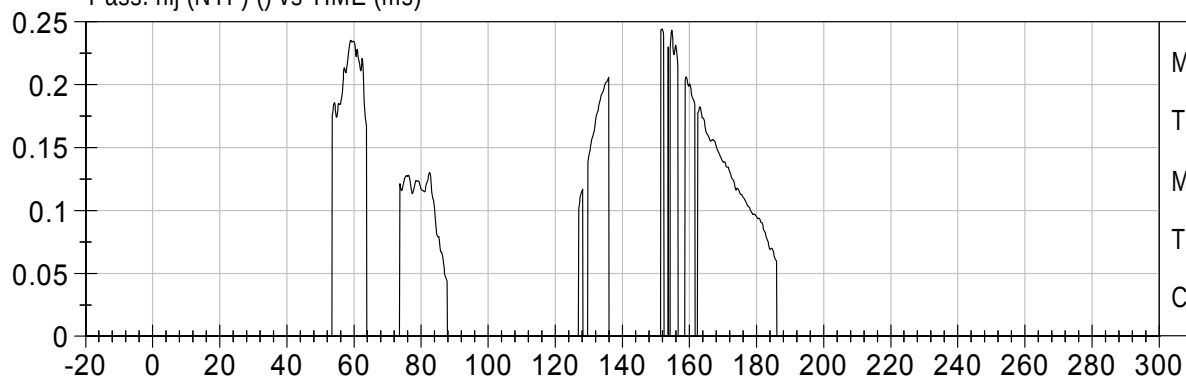






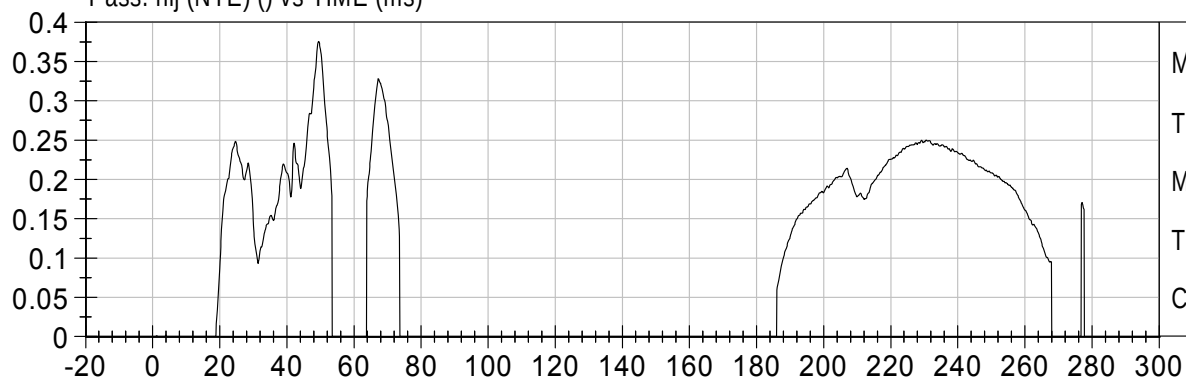


Pass. nij (NTF) () vs TIME (ms)



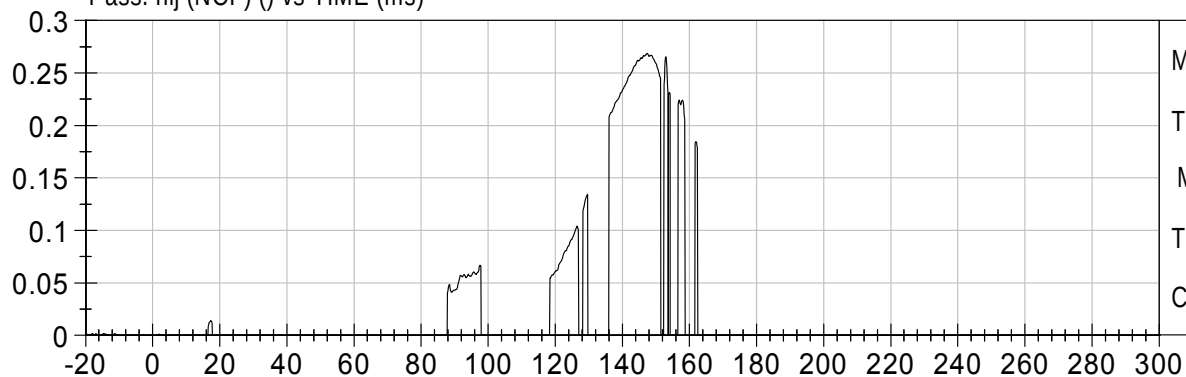
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Min: 0.0
Tmin: 0.0 ms
CFC 600

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



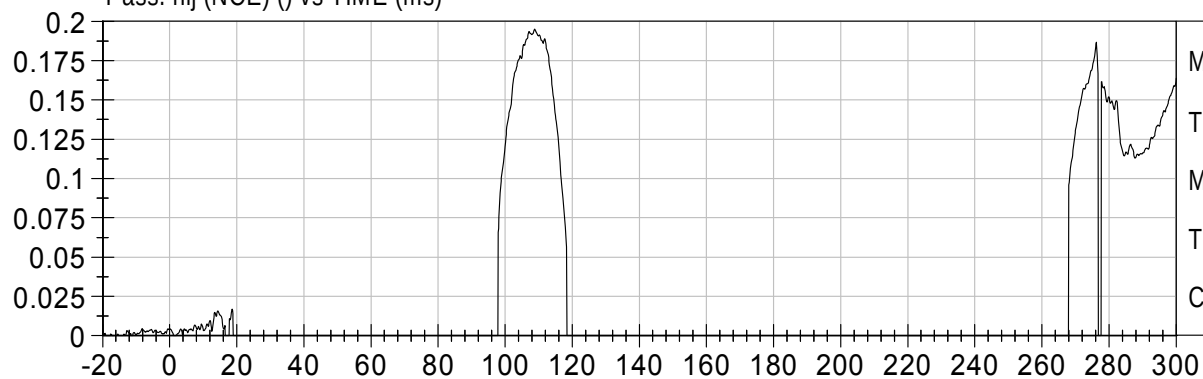
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Pass. nij (NCF) () vs TIME (ms)

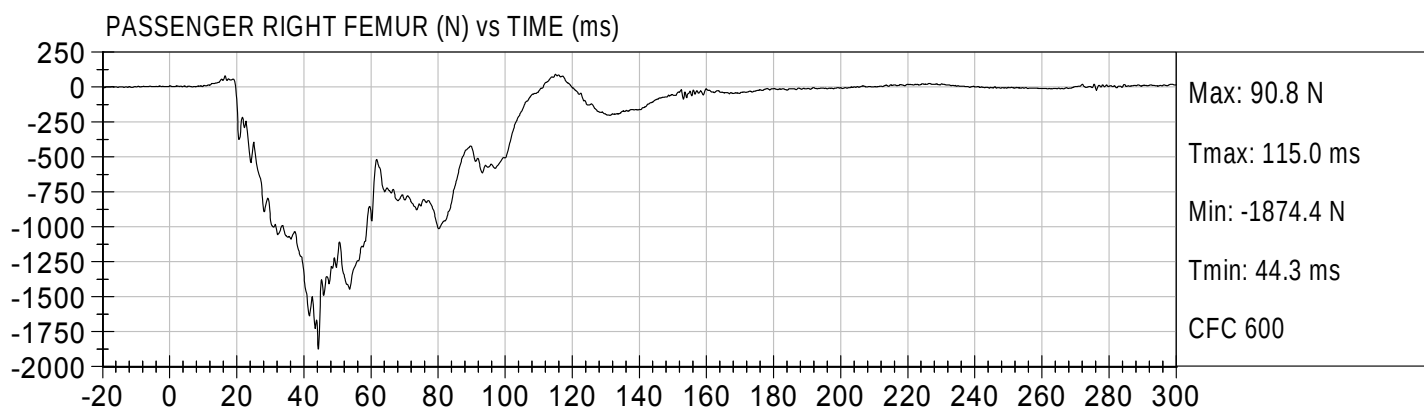
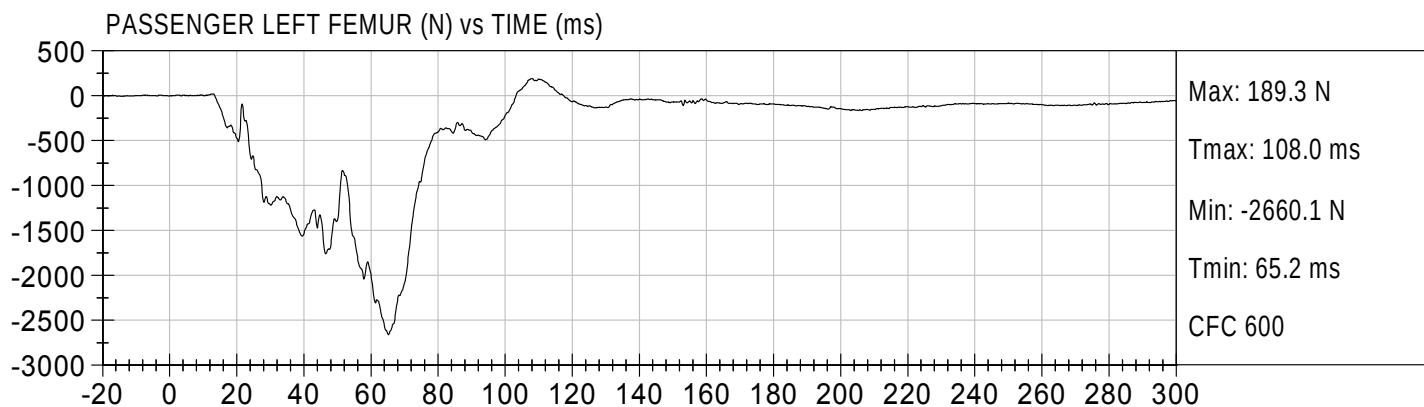


Max: 0.3
Tmax: 147.4 ms
Min: 0.0
Tmin: 0.0 ms
CFC 600

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



Max: 0.2
Tmax: 108.8 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: 351

Test ID: D103541

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Peak Resultant Acceleration	G's	225 - 275	275	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-5.4	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

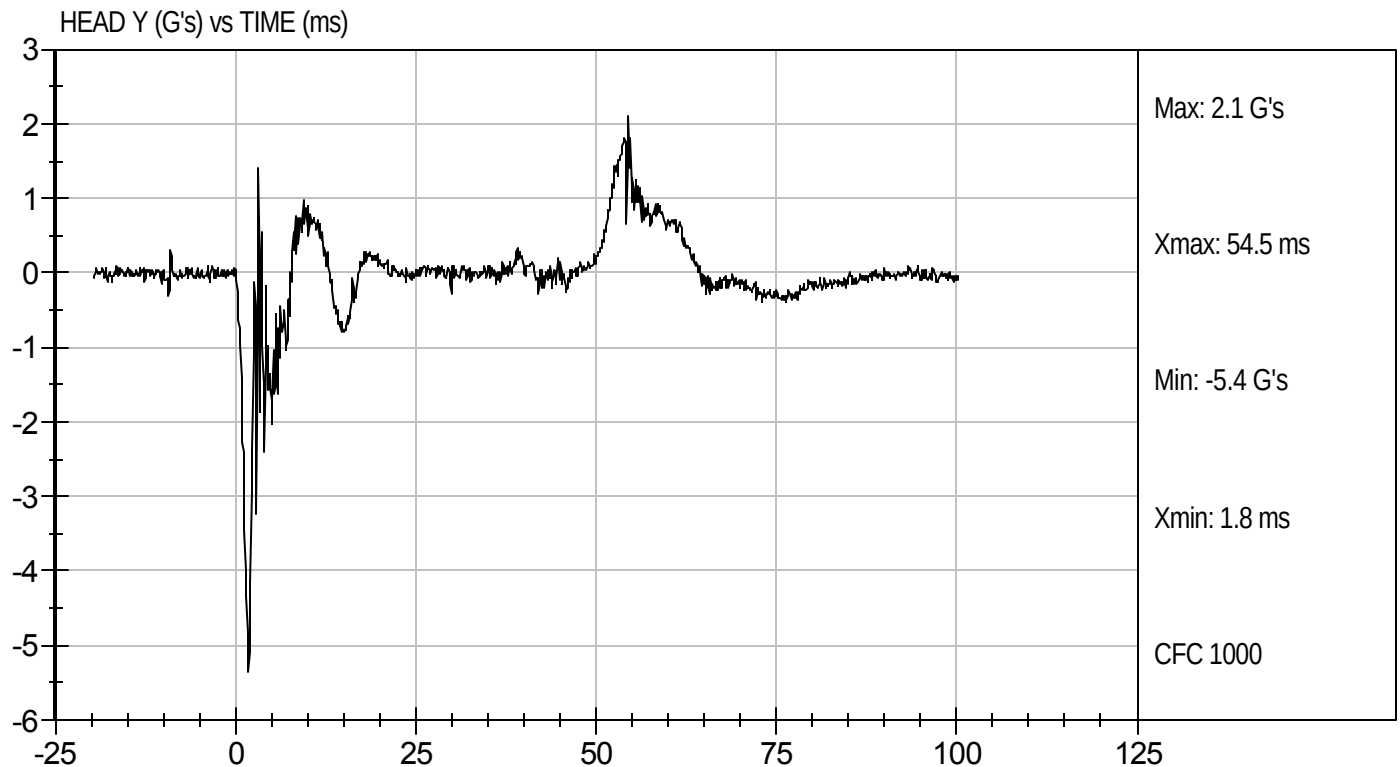
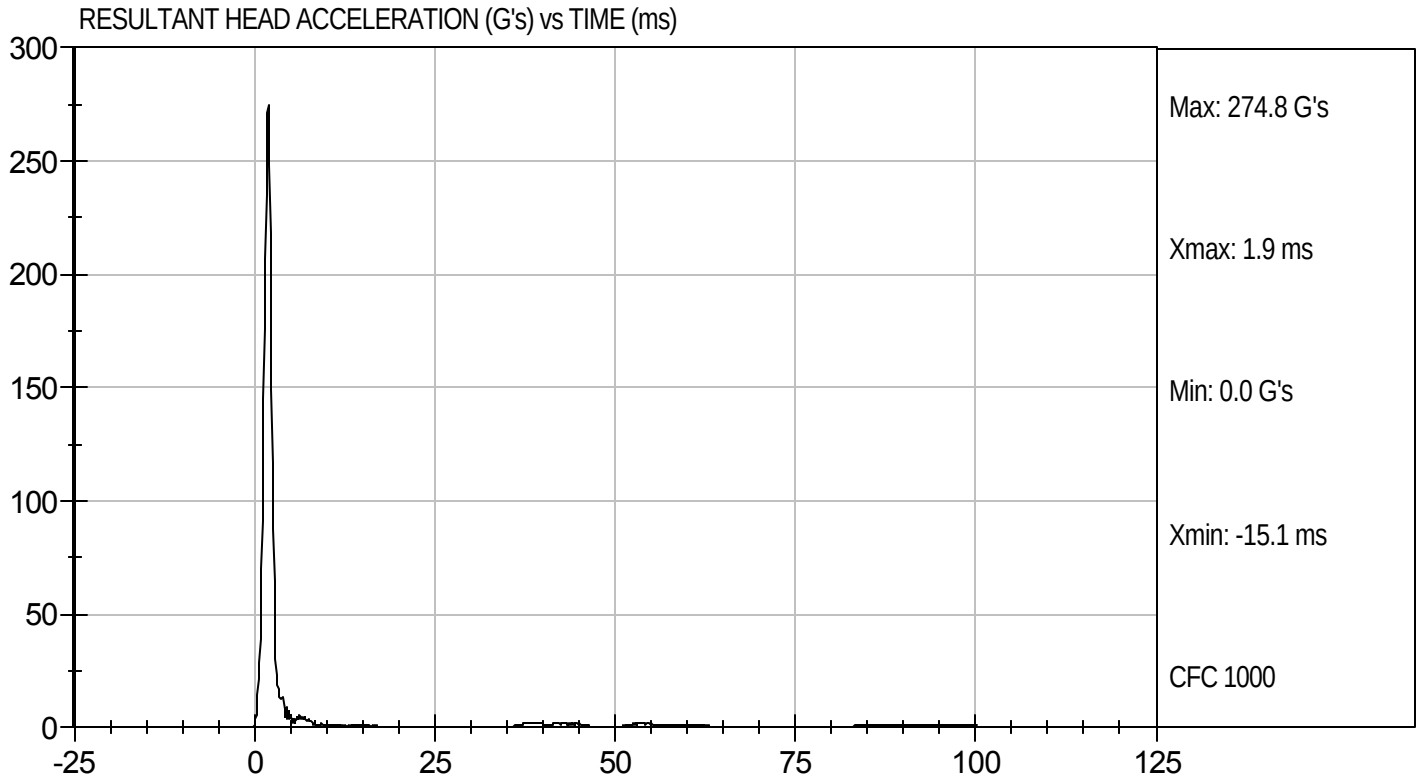
10/18/10
Test Date

David Winkelbauer
Approved By



Test Desc: Head Drop
Component ID: D103541

Test Date: 10/18/10
Velocity: 0 ft/s, 0.00 m/s

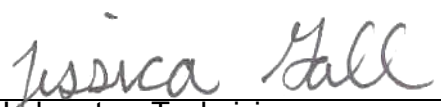


MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351

Test I.D: D103542

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	32	Pass
Pendulum Velocity		m/s	6.89 to 7.13	6.95	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	22.65	Pass
	20 ms	G's	17.60 to 22.60	18.41	Pass
	30 ms	G's	12.50 to 18.50	13.62	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	13.92	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	37.7	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	69.0	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	113.6	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	94.1	Pass
	Time	ms	47.0 to 58.0	50.3	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	100.9	Pass
Overall Test Results					Pass


 Laboratory Technician

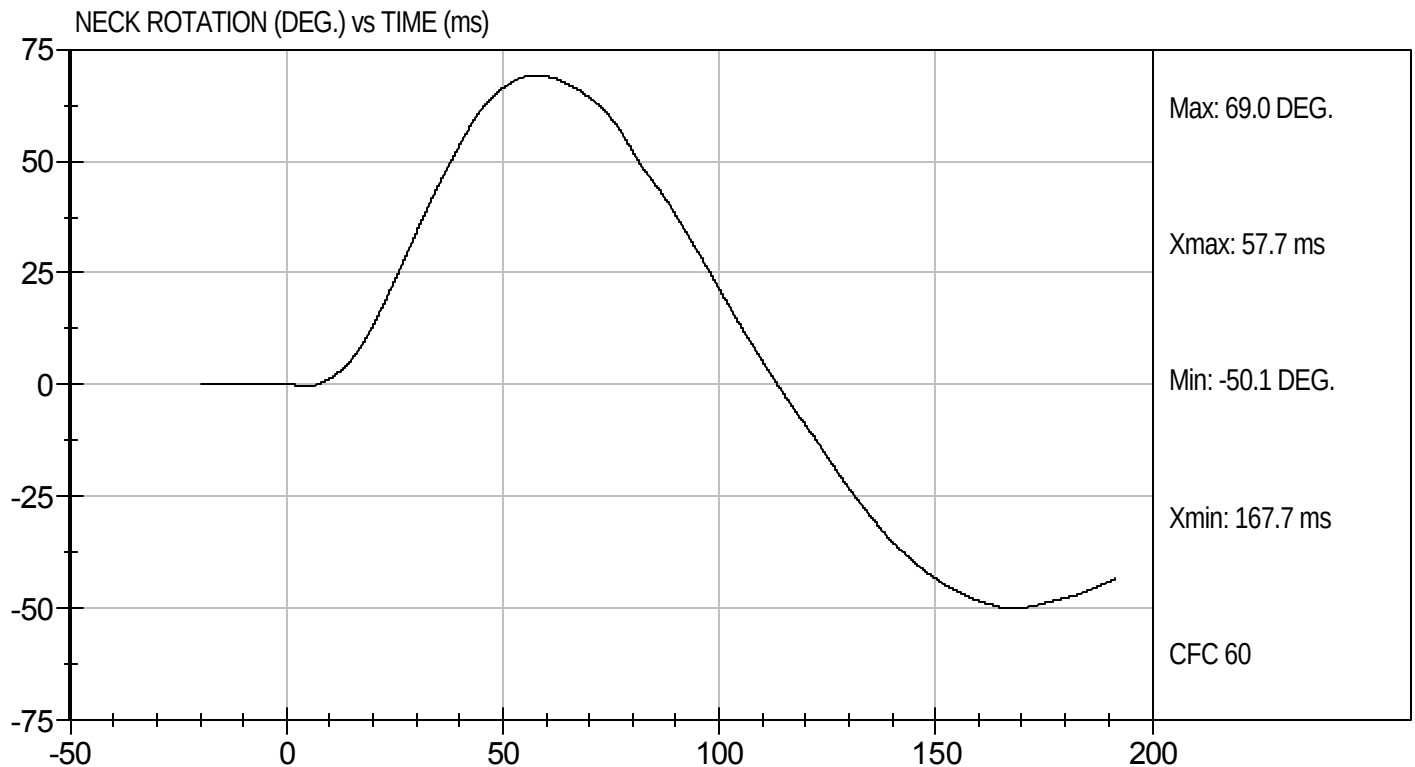
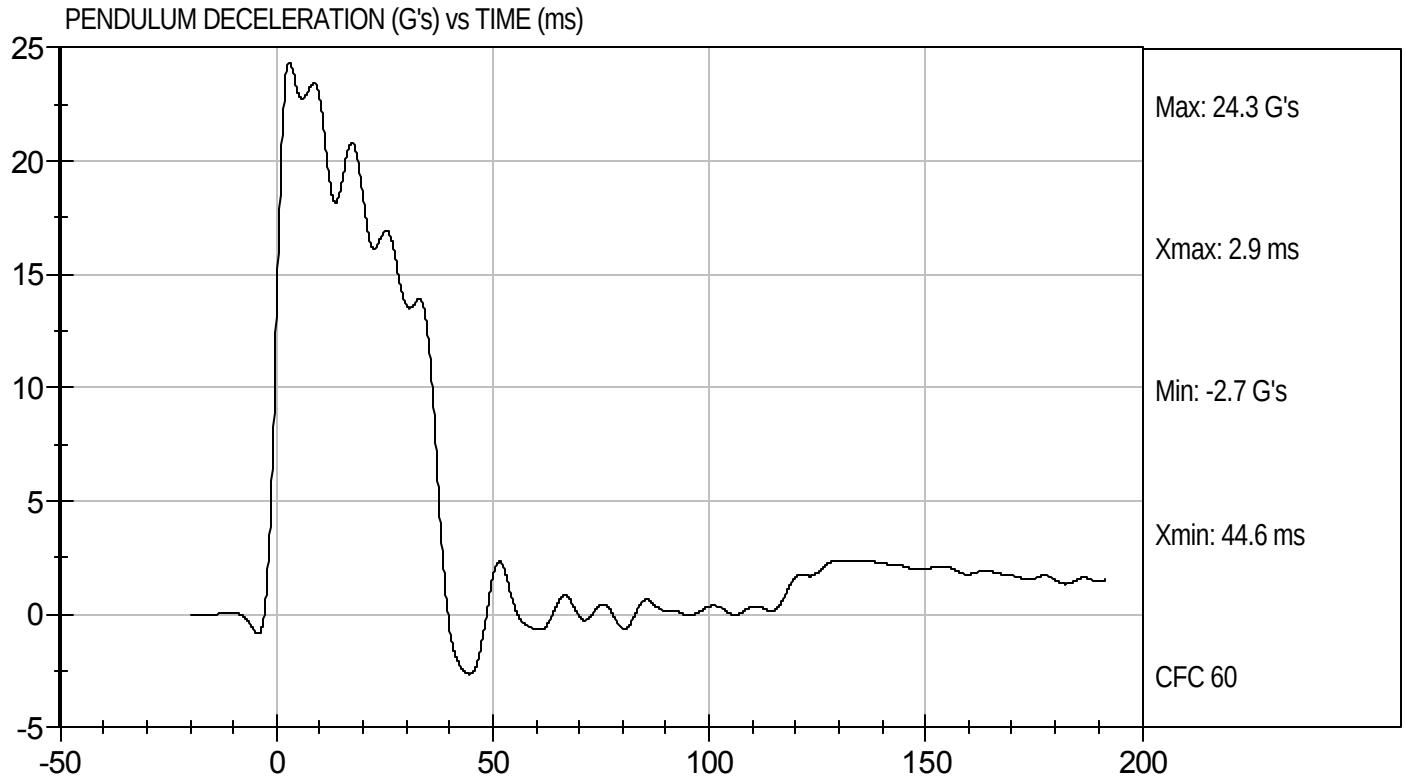
10/19/10
 Test Date


 Approved By



Test Desc: Neck Flexion
Component ID: D103542

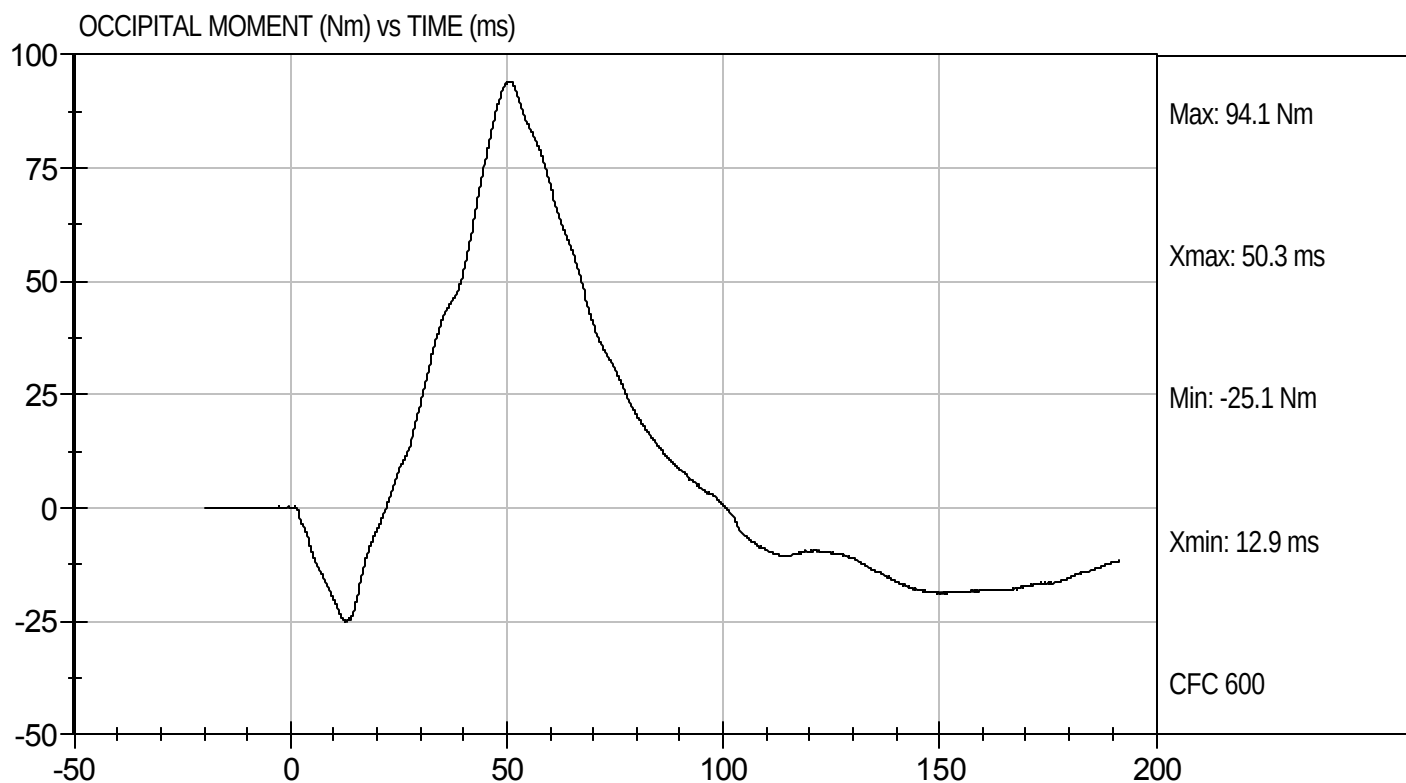
Test Date: 10/19/10
Velocity: 22.8 ft/s, 6.95 m/s





Test Desc: Neck Flexion
Component ID: D103542

Test Date: 10/19/10
Velocity: 22.8 ft/s, 6.95 m/s

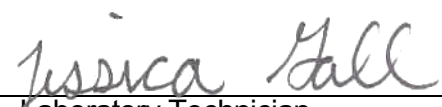


MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351

Test I.D.: D103543

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	32	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.12	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	17.89	Pass
	20 ms	G's	14.00 to 19.00	14.84	Pass
	30 ms	G's	11.00 to 16.00	11.95	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	12.17	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	43.5	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	97.3	Pass
	Time	ms	72.0 to 82.0	80.0	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	156.9	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-60.6	Pass
	Time	ms	65.0 to 79.0	74.7	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	146.9	Pass
Overall Test Results					Pass


 Laboratory Technician

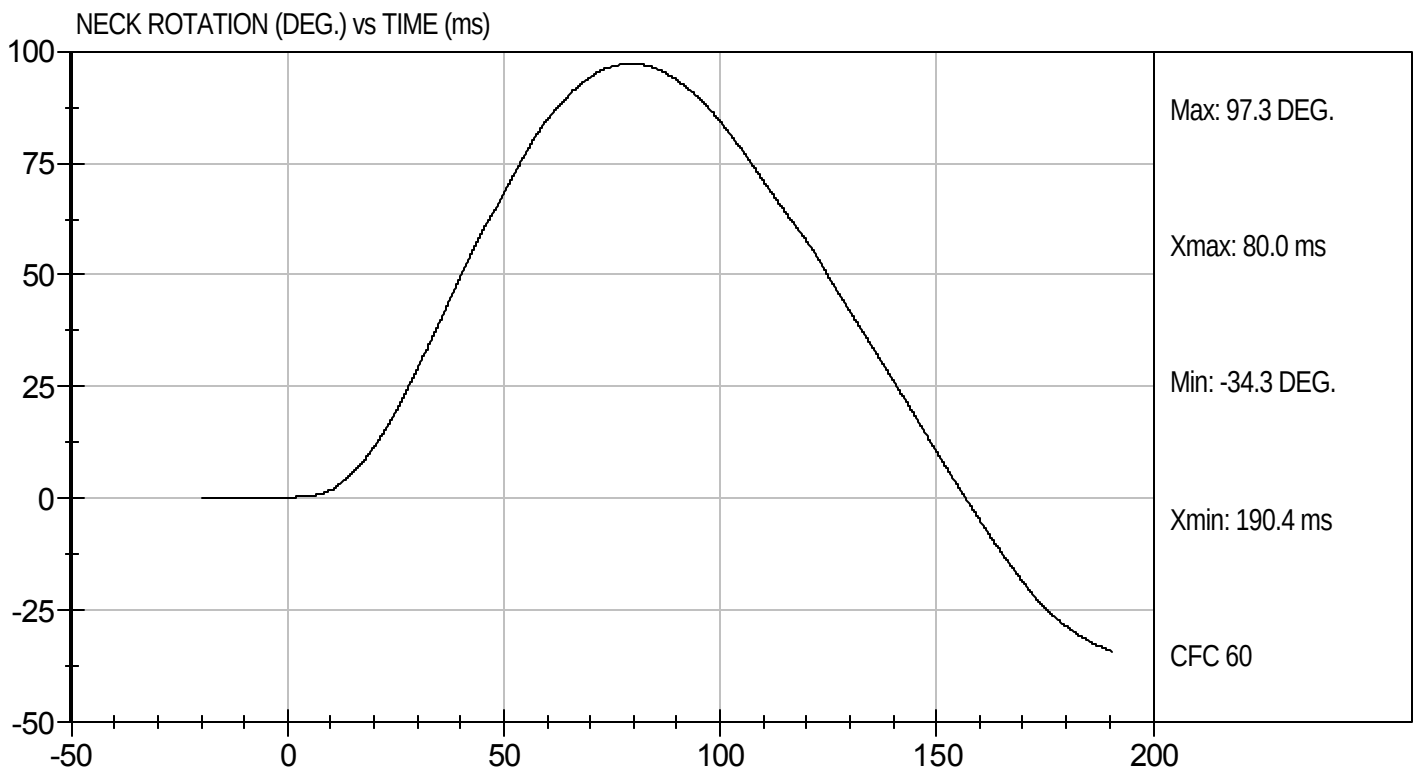
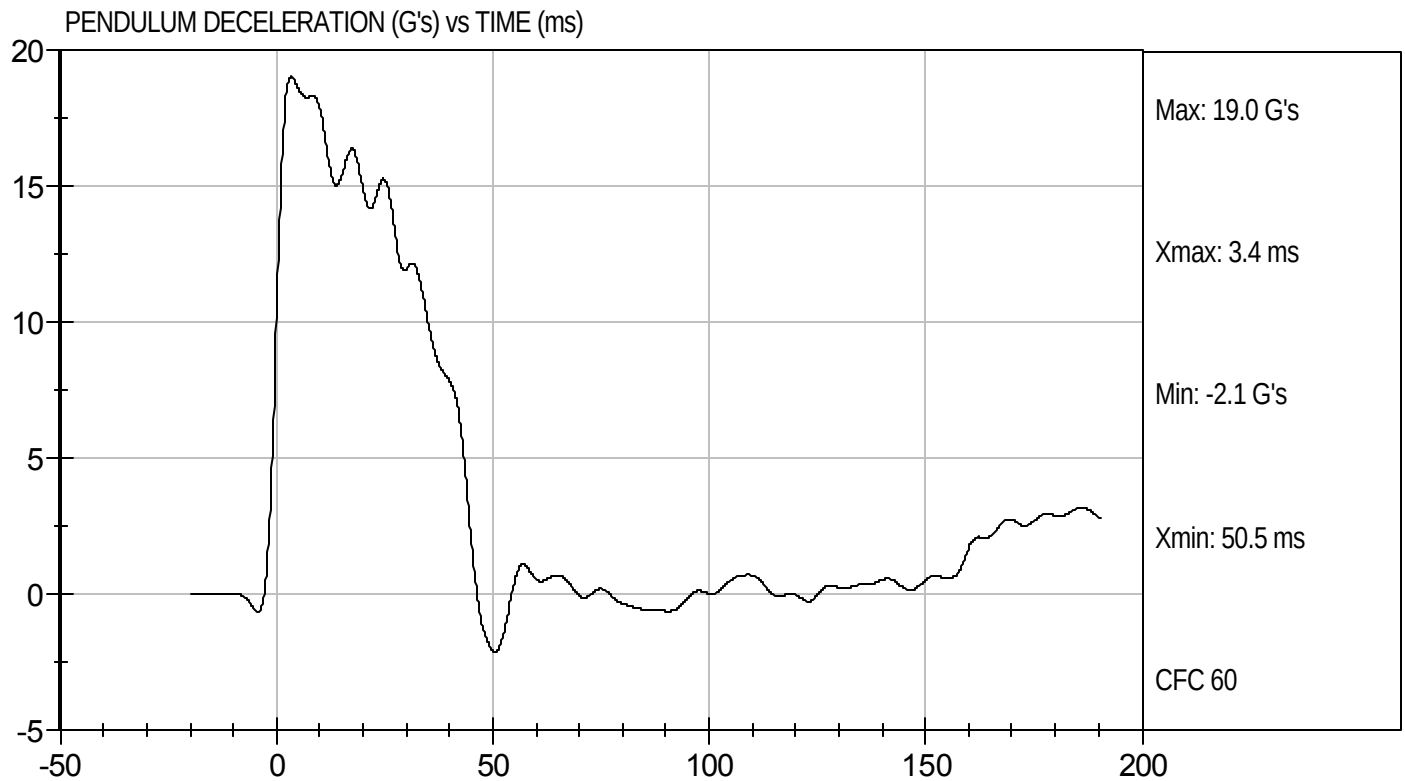
10/19/10
 Test Date


 Approved By



Test Desc: Neck Extension
Component ID: D103543

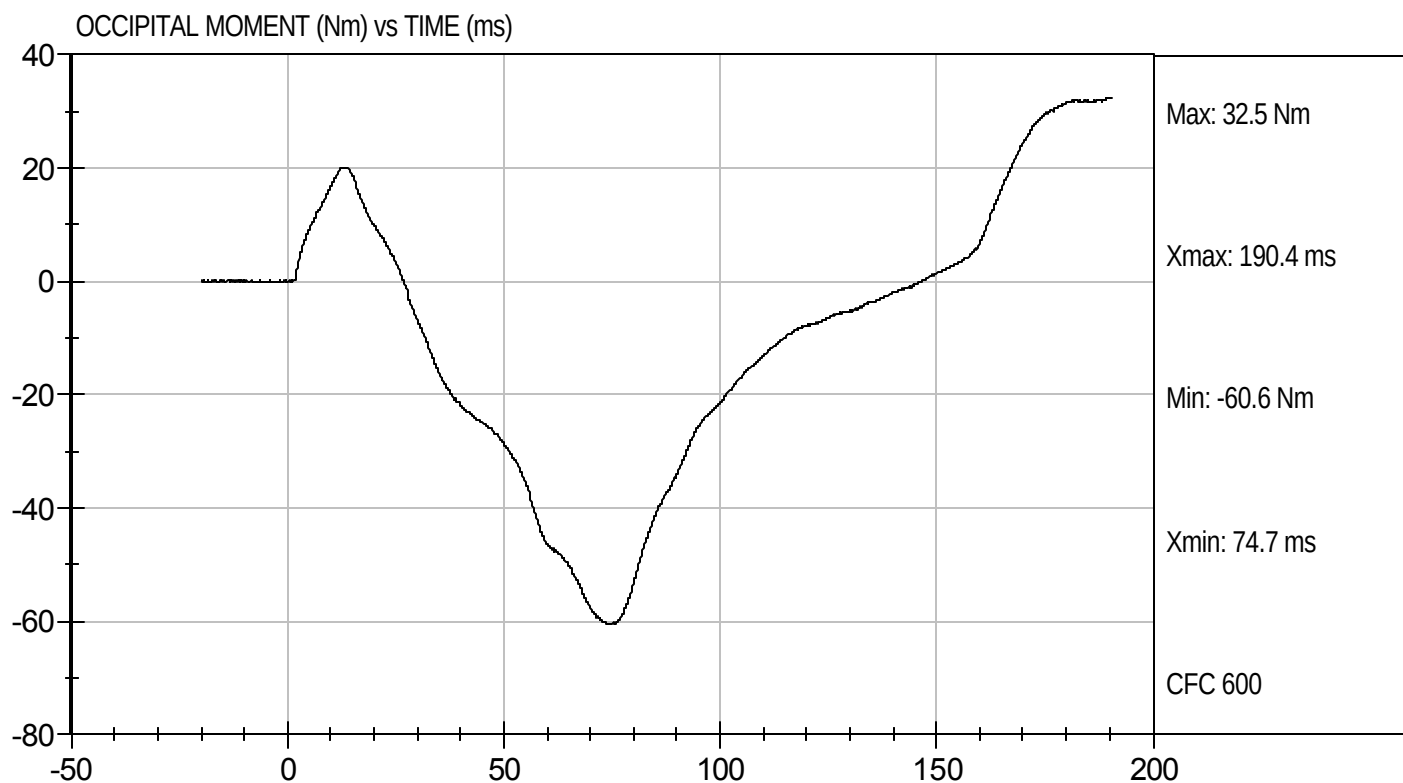
Test Date: 10/19/10
Velocity: 20.08 ft/s, 6.12 m/s





Test Desc: Neck Extension
Component ID: D103543

Test Date: 10/19/10
Velocity: 20.08 ft/s, 6.12 m/s



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351

Test I.D: D103544

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	33	Pass
Probe Velocity	m/s	6.58 to 6.82	6.68	Pass
Peak Probe Force	N	5159 to 5893	5,251	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.56	Pass
Internal Hysteresis	%	69 to 85	71	Pass
			Overall Test Results	Pass

Jessica Hall
Laboratory Technician

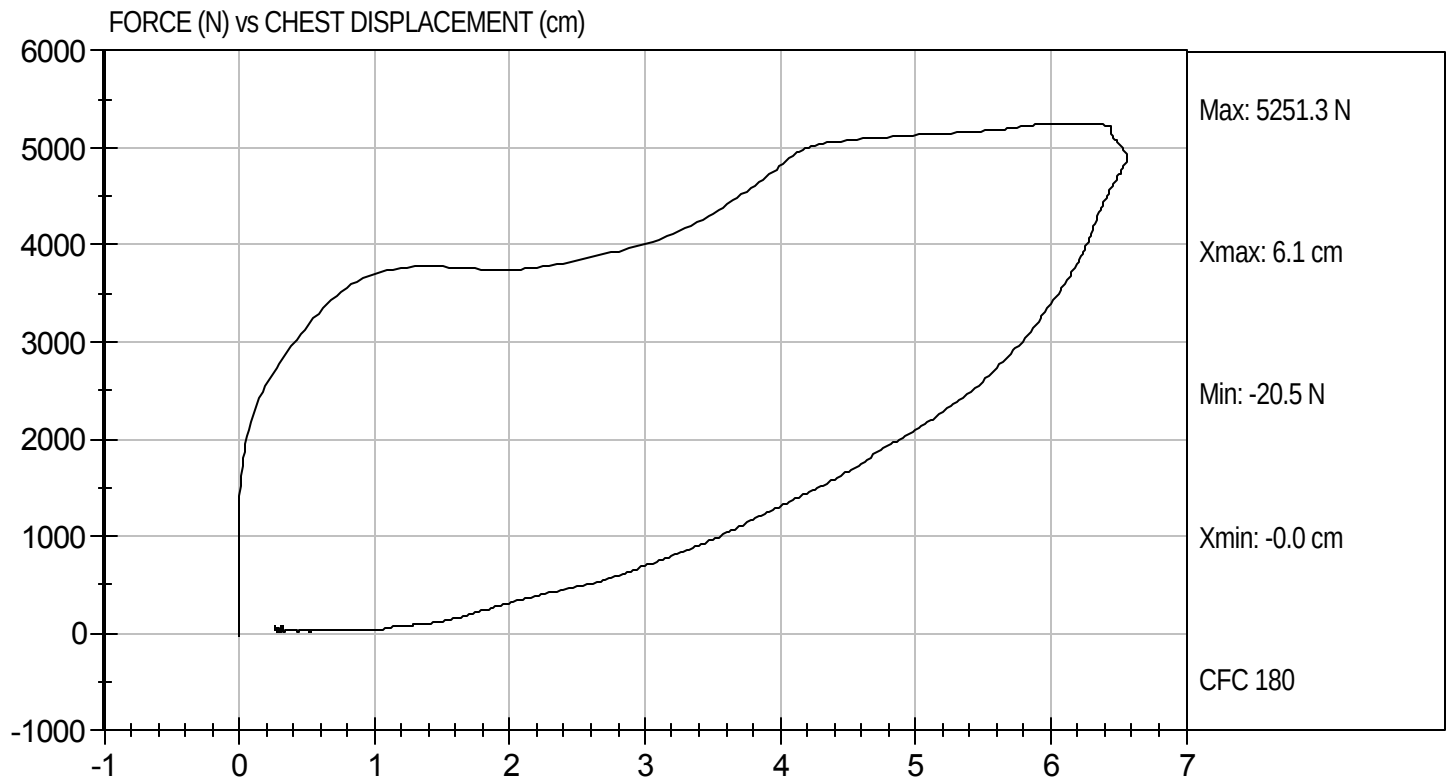
10/18/10
Test Date

David Winkelbauer
Approved By



Test Desc: Thorax Impact
Component ID: D103544

Test Date: 10/18/10
Velocity: 21.93 ft/s, 6.68 m/s



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

ATD Serial No: 351

Test I.D: D103545

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	32	Pass
Probe Velocity	m/s	2.07 to 2.13	2.11	Pass
Peak Probe Force	Newtons	4715 to 5782	5,238	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

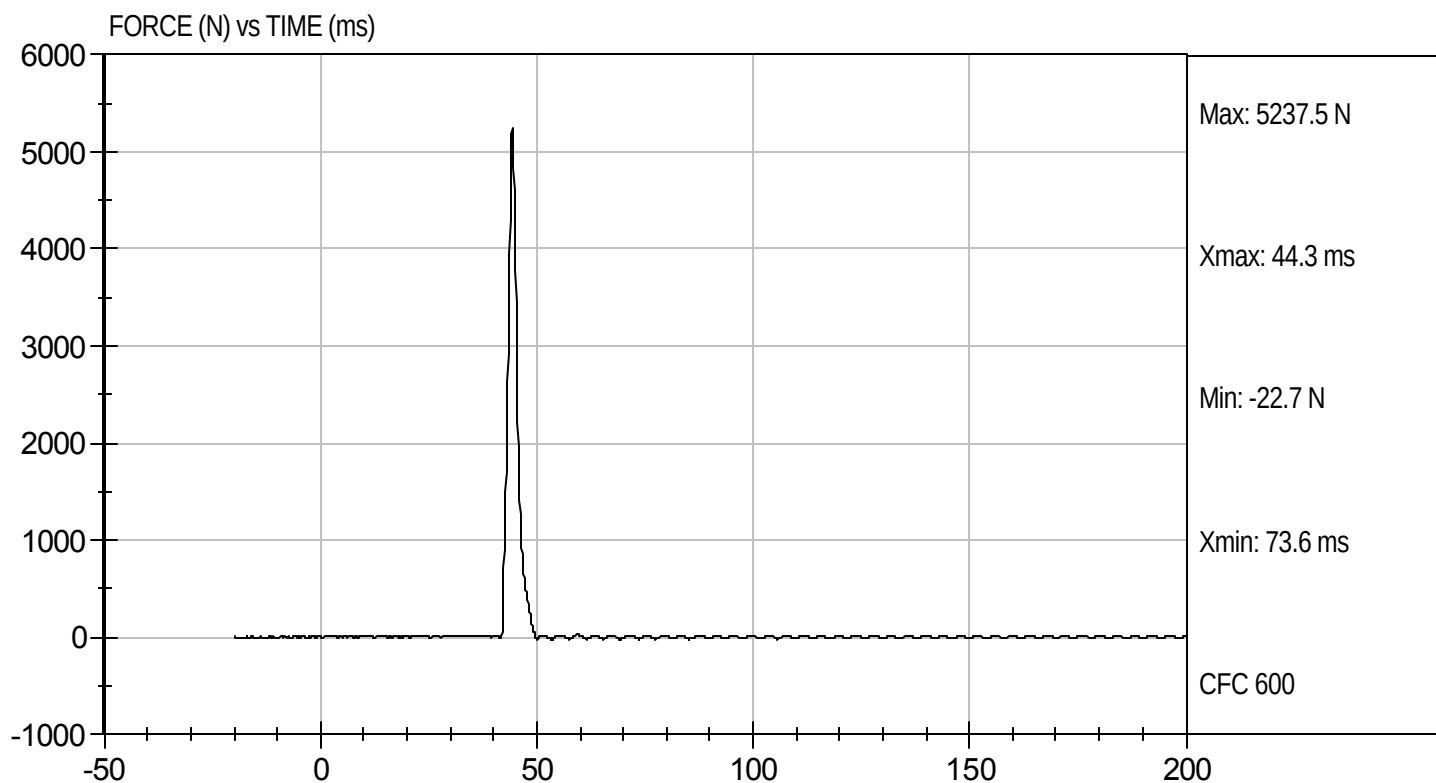
10/18/10
Test Date

David Winkelbauer
Approved By



Test Desc: Right Knee
Component ID: D103545

Test Date: 10/18/10
Velocity: 6.92 ft/s, 2.11 m/s



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

ATD Serial No: 351

Test I.D: D103546

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	32	Pass
Probe Velocity	m/s	2.07 to 2.13	2.07	Pass
Peak Probe Force	Newtons	4715 to 5782	5,320	Pass
Overall Test Results				Pass

Jessica Gall
Laboratory Technician

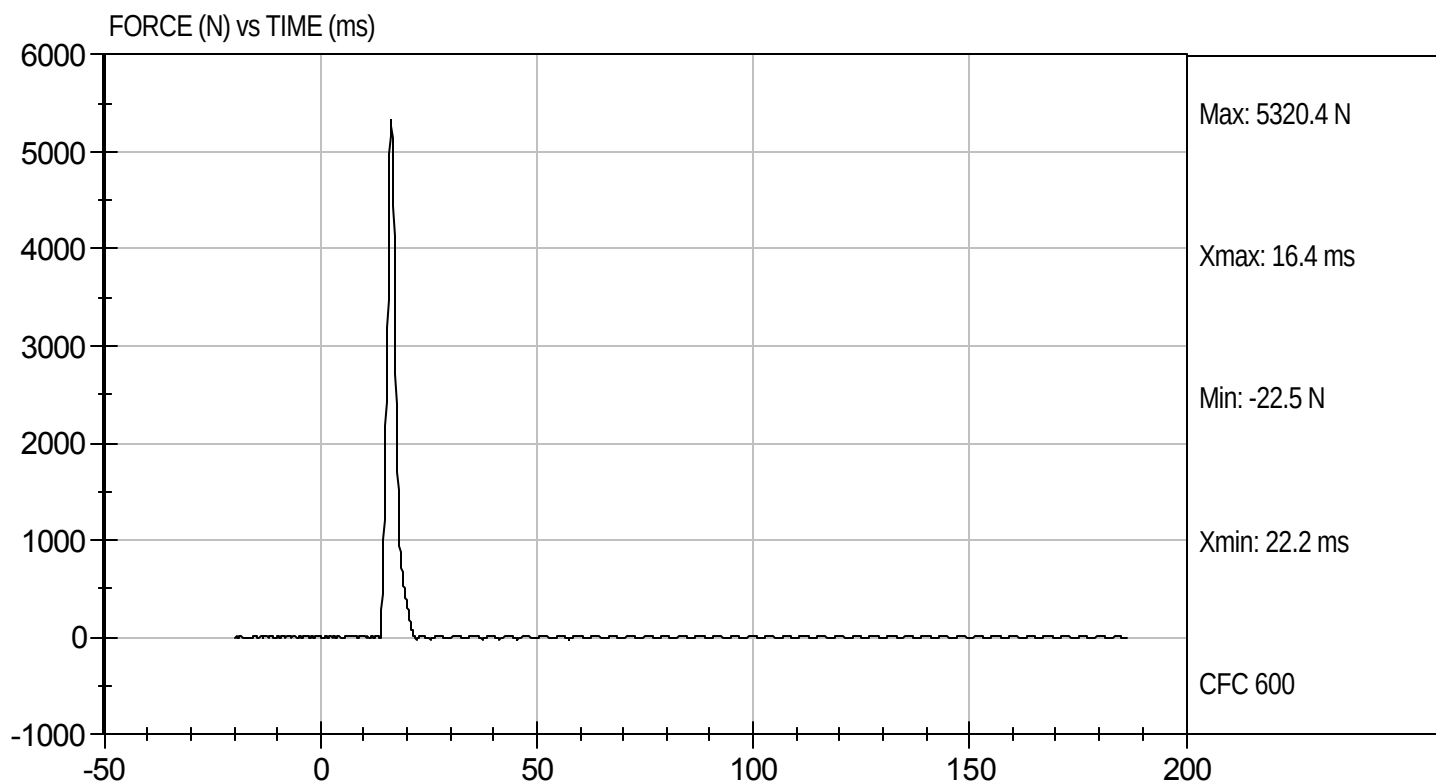
10/18/10
Test Date

David Winkelbauer
Approved By



Test Desc: Left Knee
Component ID: D103546

Test Date: 10/18/10
Velocity: 6.80 ft/s, 2.07 m/s



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

ATD Serial No: 351

Test I.D: D103540

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	32	32	Pass
Rotation Rate	deg/s	5 -10	8	8	Pass
30 Degrees	Nm	94.9 Nm Max	44.7	48.1	Pass
150 ft-lbf / 203.4 Nm	Deg	40- 50 Degree Max Rotation	47	48	Pass
Overall Test Results					Pass

Jessica Hall
Laboratory Technician

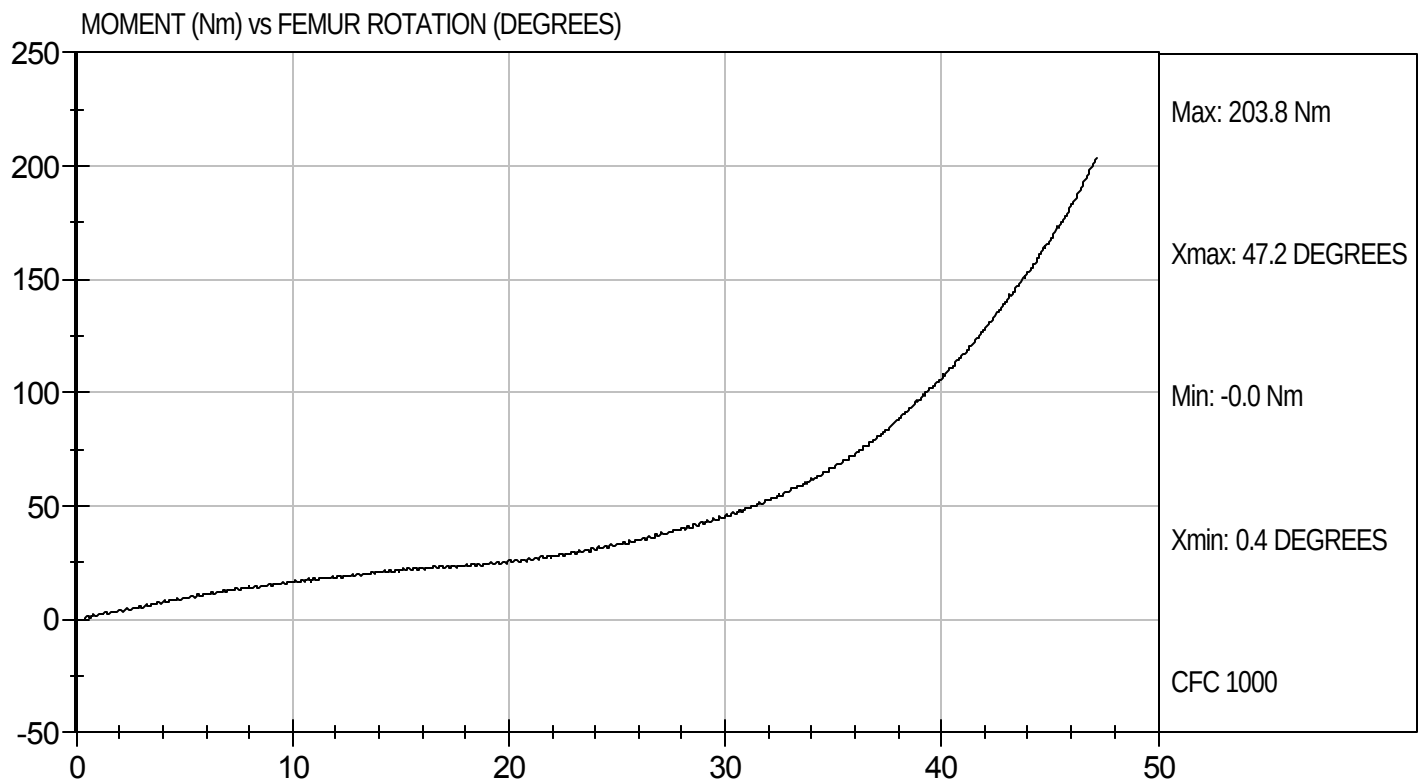
10/18/10
Test Date

David Winkelbauer
Approved By



Test Desc: Hip Femur Flexion
Component ID: D103549

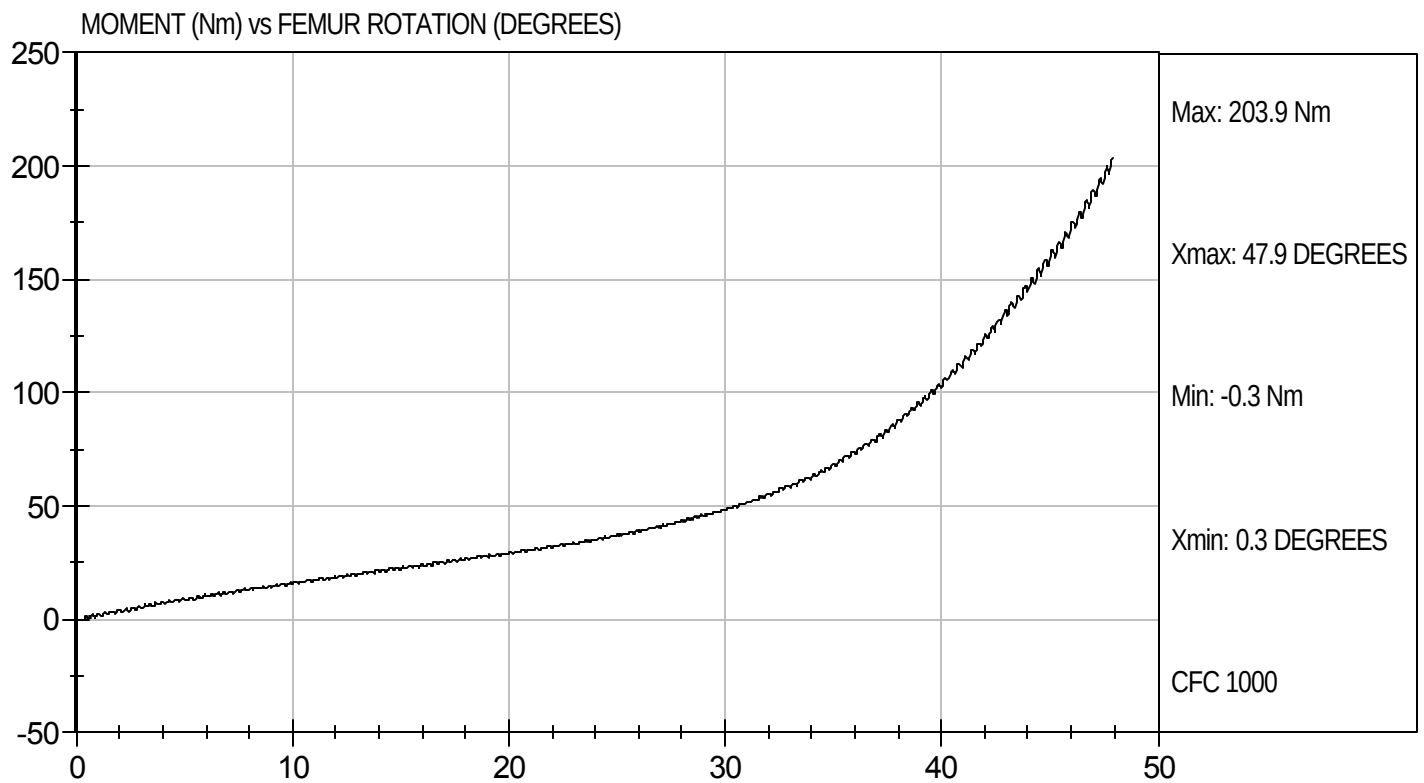
Test Date: 10/18/10
Velocity: 0 ft/s, 0.00 m/s





Test Desc: Hip Femur Flexion
Component ID: D103540

Test Date: 10/18/10
Velocity: 0 ft/s, 0.00 m/s



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

ATD Serial No: 351

Test ID: D103601

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	33	Pass
Peak Resultant Acceleration	G's	225 - 275	252	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-1.9	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

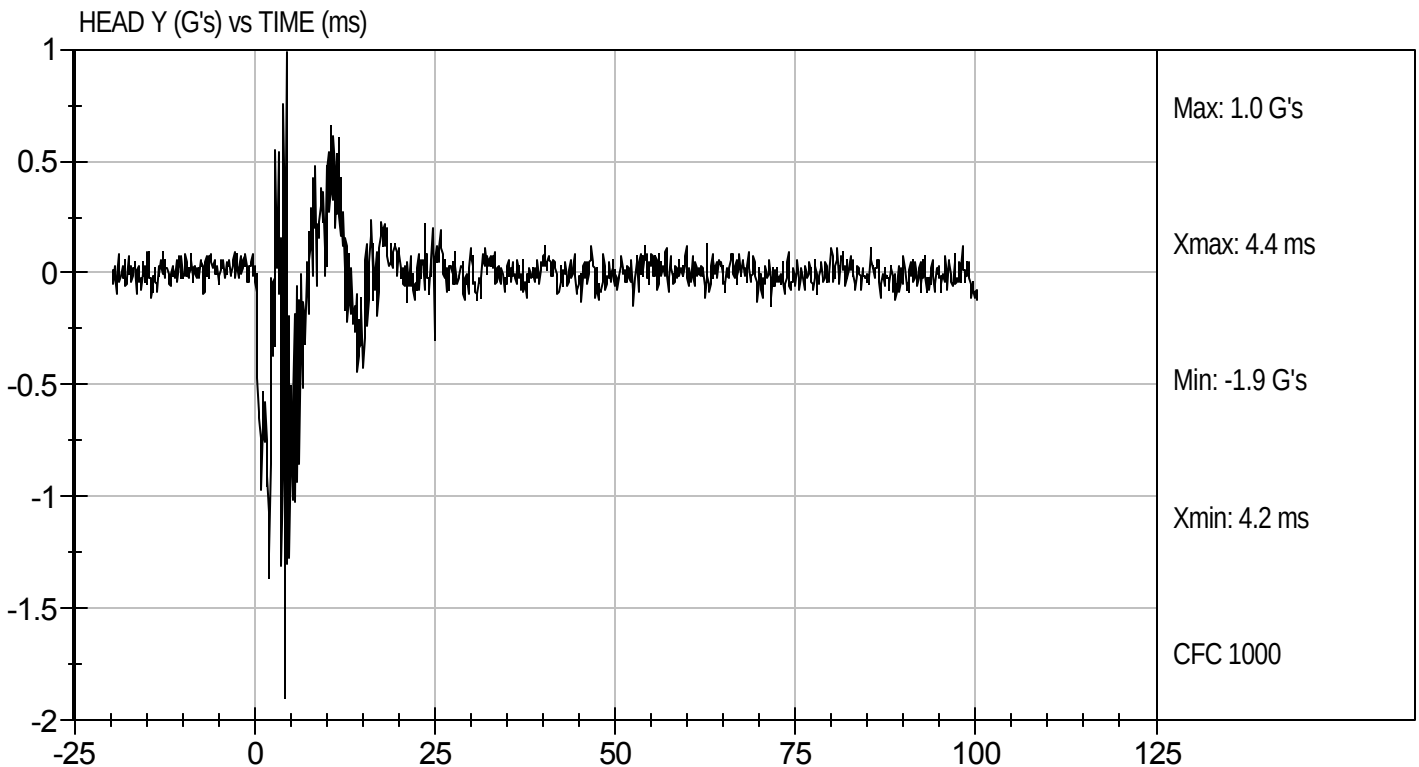
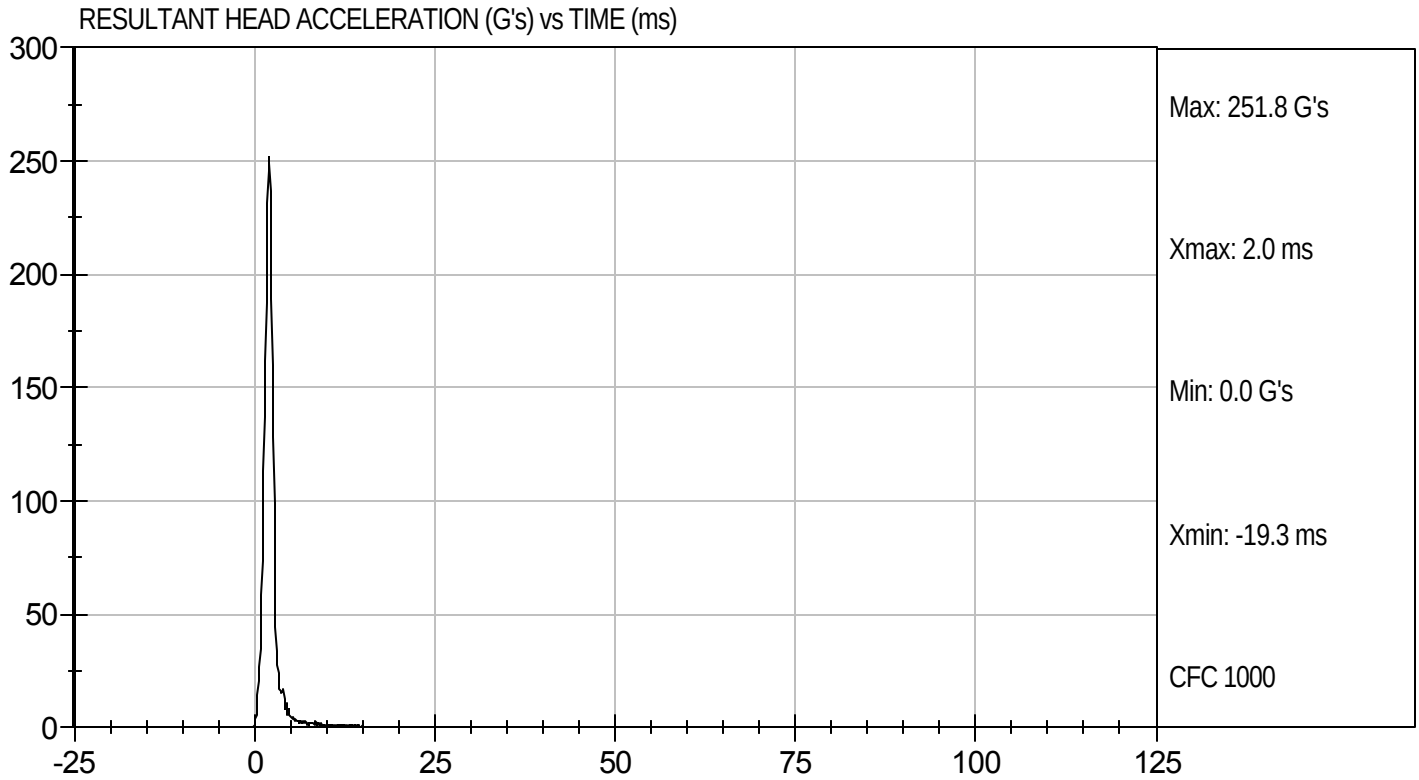
10/21/10
Test Date


Approved By



Test Desc: Head Drop
Component ID: D103601

Test Date: 10/21/10
Velocity: 0 ft/s, 0.00 m/s

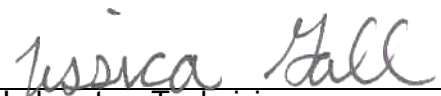


MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351

Test I.D.: D103602

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	33	Pass
Pendulum Velocity		m/s	6.89 to 7.13	6.96	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	22.65	Pass
	20 ms	G's	17.60 to 22.60	20.15	Pass
	30 ms	G's	12.50 to 18.50	12.78	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	13.29	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	36.2	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	68.2	Pass
	Time	ms	57.0 to 64.0	60.6	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	113.2	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	95.9	Pass
	Time	ms	47.0 to 58.0	49.7	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	100.1	Pass
Overall Test Results					Pass


 Laboratory Technician

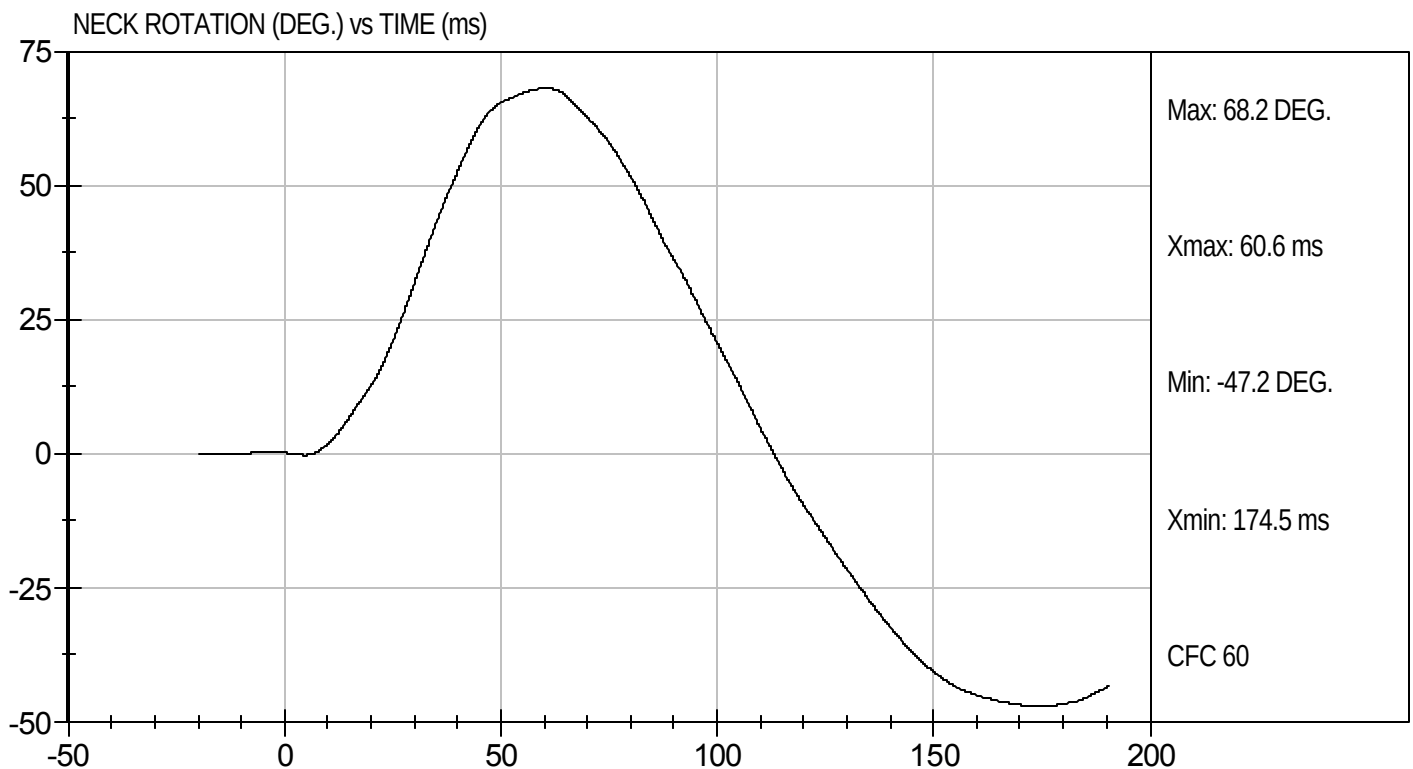
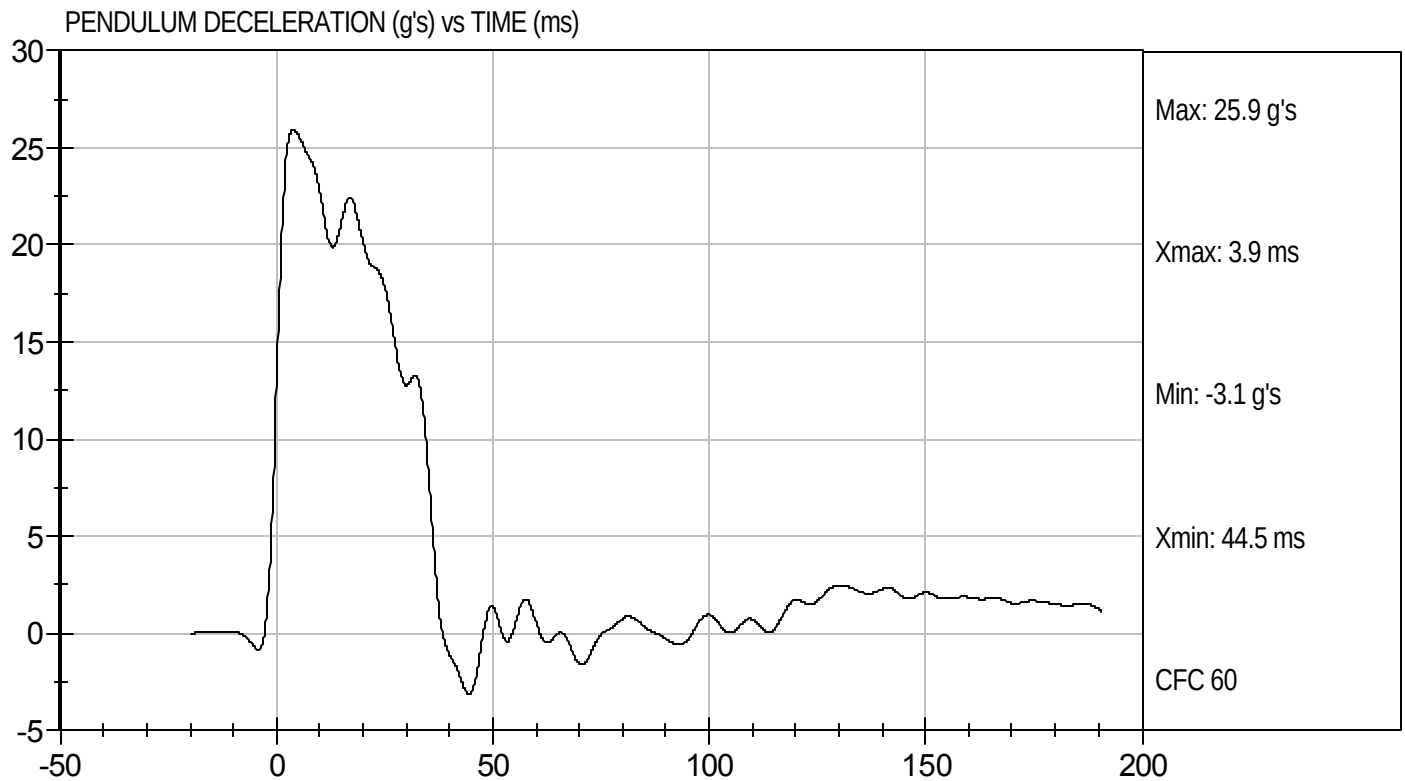
10/21/10
 Test Date


 Approved By



Test Desc: Neck Flexion
Component ID: D103602

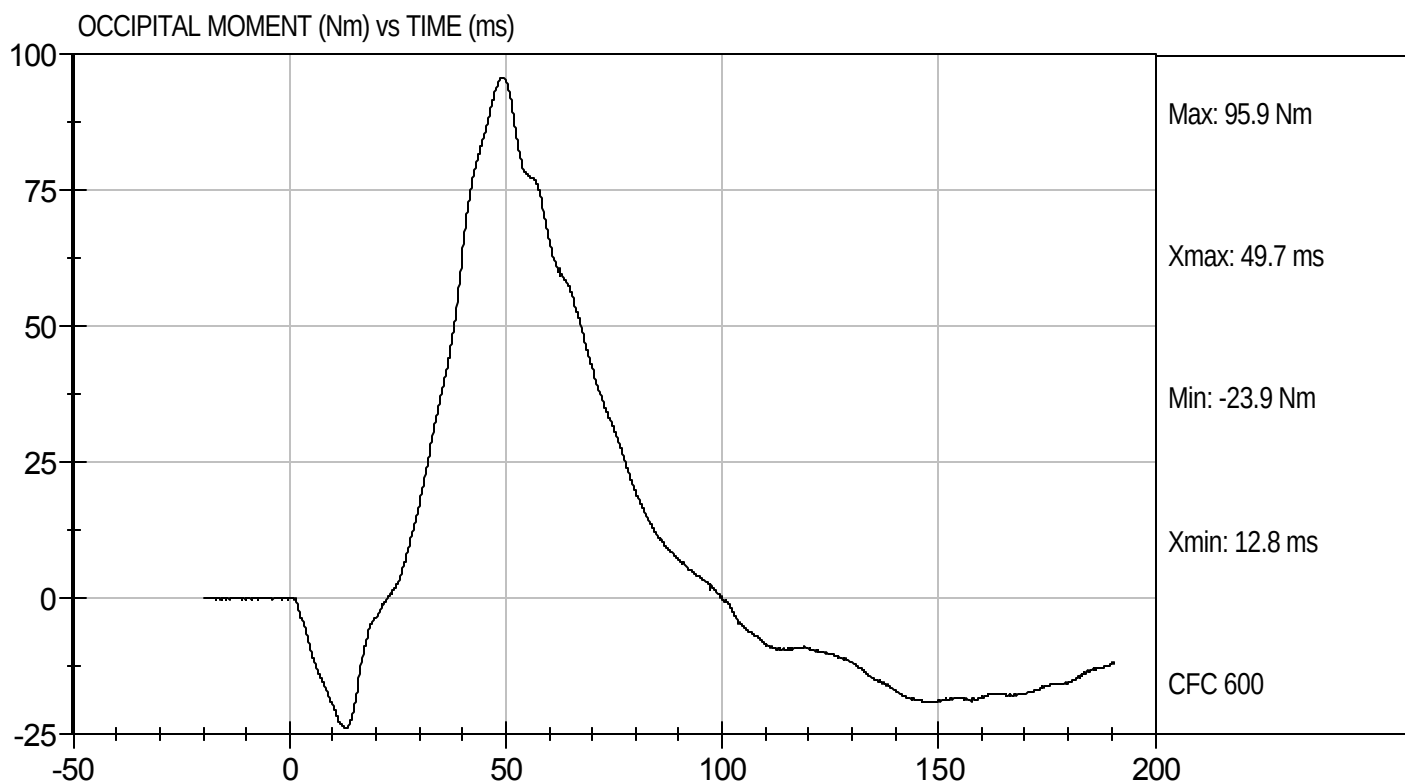
Test Date: 10/21/10
Velocity: 22.83 ft/s, 6.96 m/s





Test Desc: Neck Flexion
Component ID: D103602

Test Date: 10/21/10
Velocity: 22.83 ft/s, 6.96 m/s



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

ATD Serial No: 351

Test I.D.: D103603

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	33	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.12	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	18.70	Pass
	20 ms	G's	14.00 to 19.00	16.44	Pass
	30 ms	G's	11.00 to 16.00	12.96	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	13.50	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	38.4	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	96.4	Pass
	Time	ms	72.0 to 82.0	74.8	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	154.7	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-60.9	Pass
	Time	ms	65.0 to 79.0	69.9	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	139.8	Pass
Overall Test Results					Pass


 Laboratory Technician

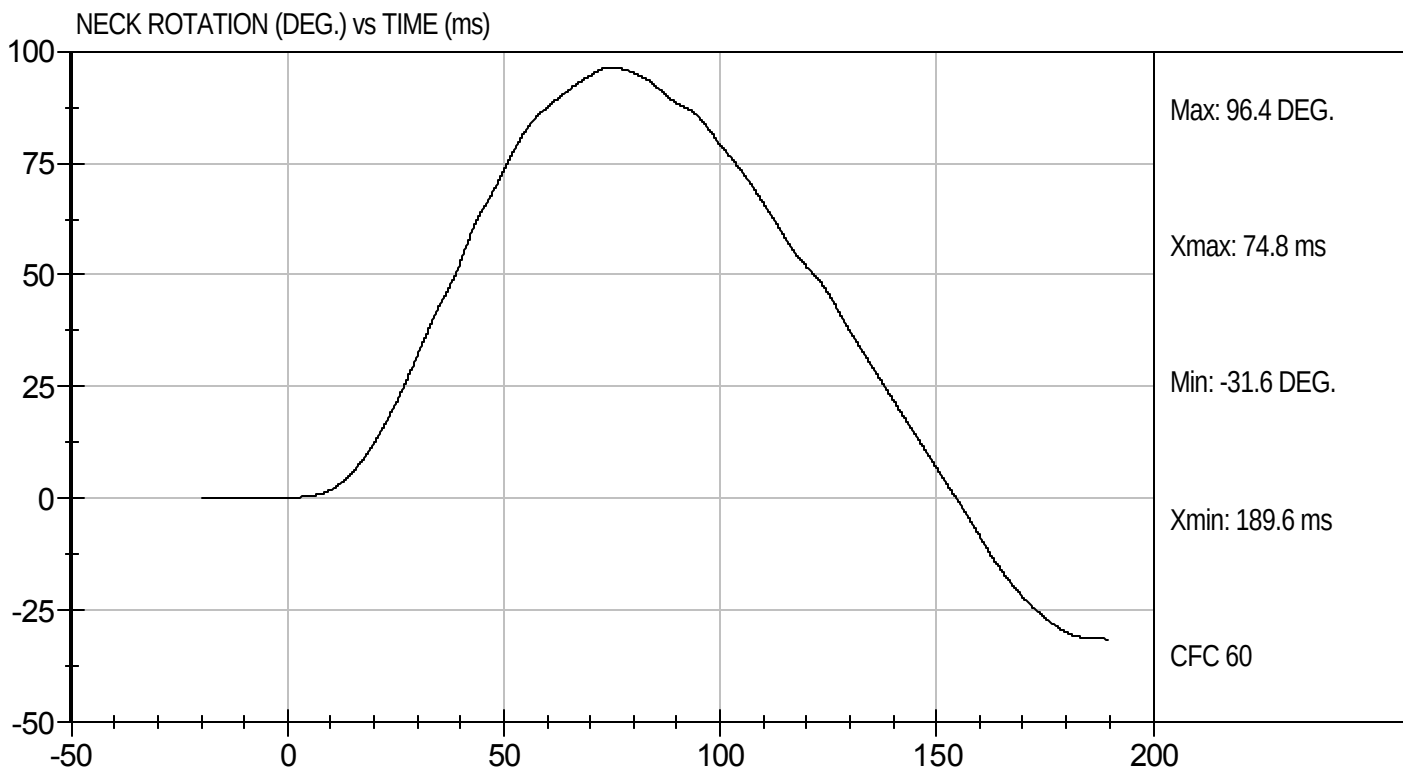
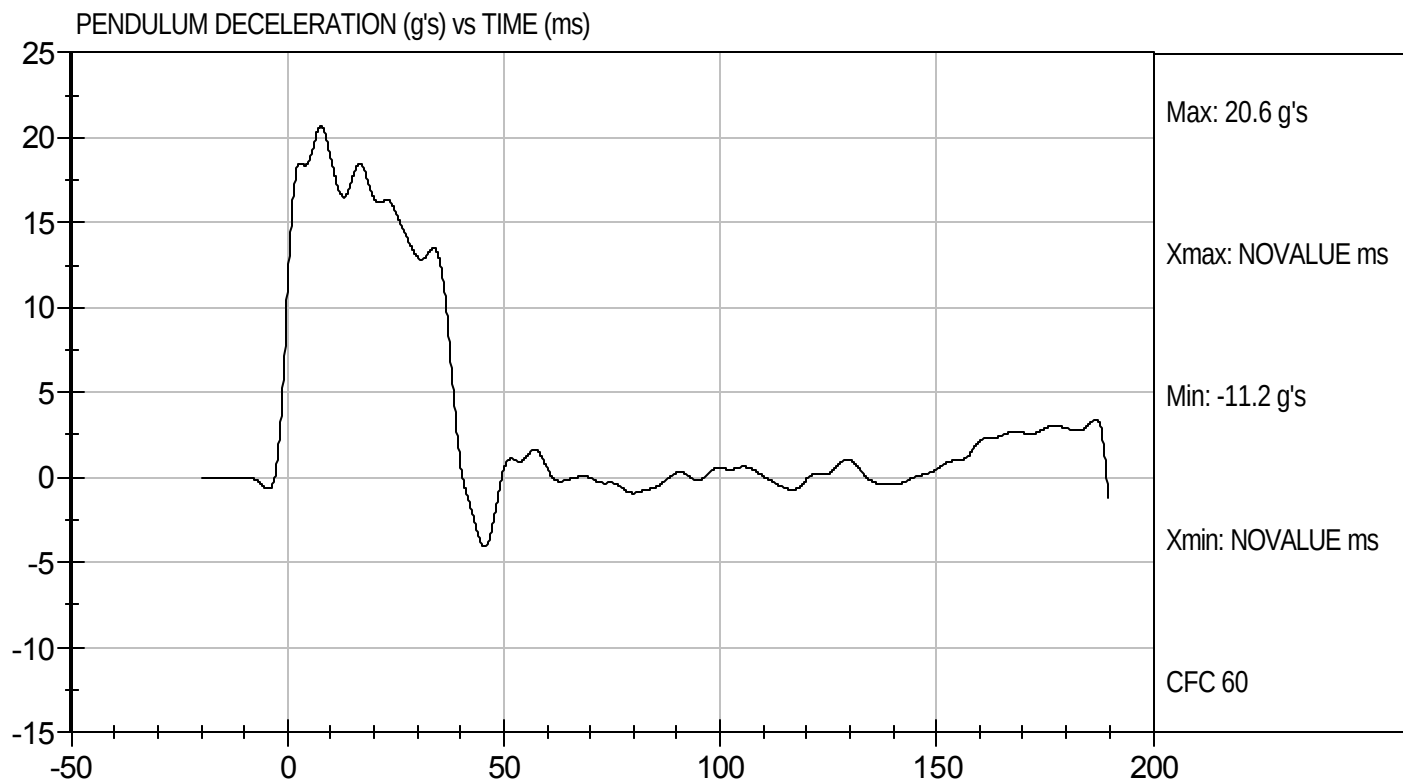
10/21/10
 Test Date


 Approved By



Test Desc: Neck Extension
Component ID: D103603

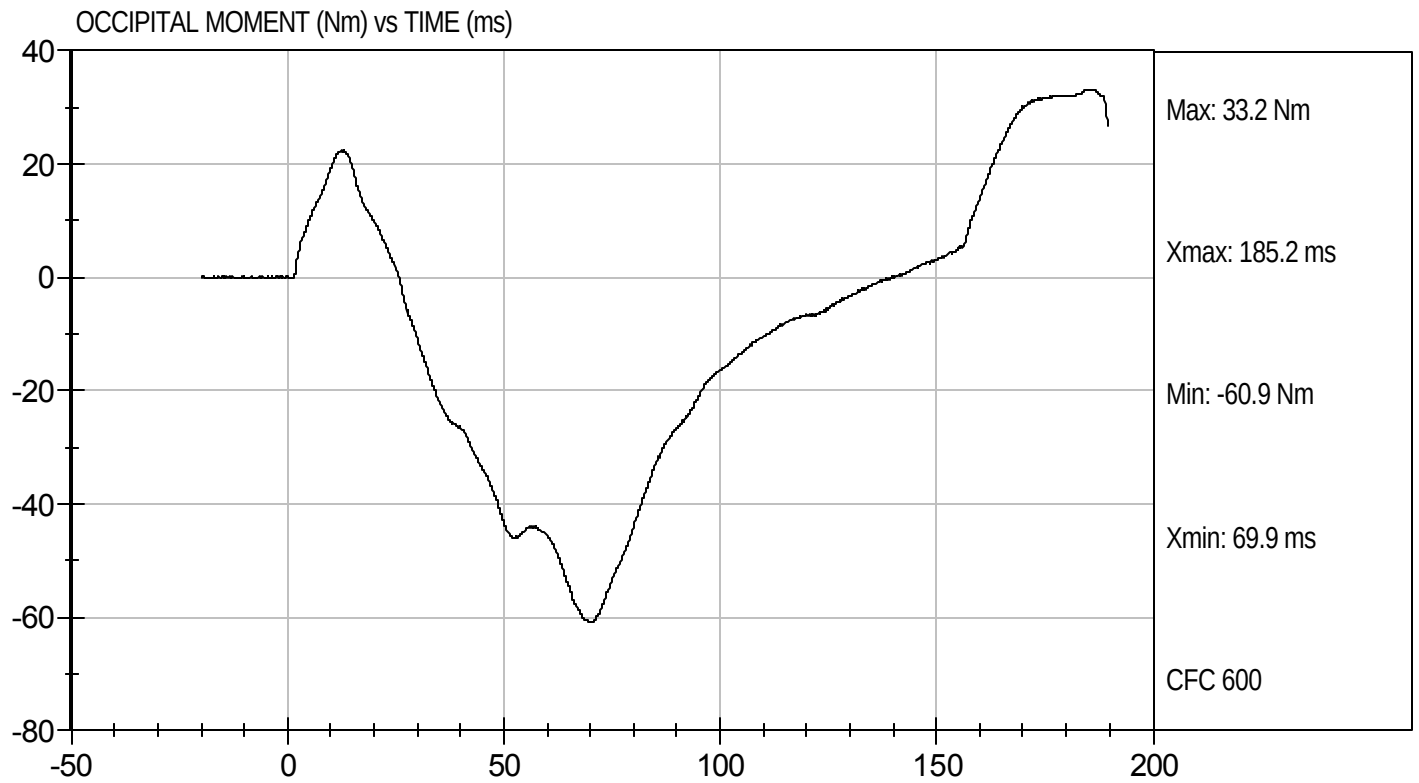
Test Date: 10/21/10
Velocity: 20.08 ft/s, 6.12 m/s





Test Desc: Neck Extension
Component ID: D103603

Test Date: 10/21/10
Velocity: 20.08 ft/s, 6.12 m/s



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351

Test I.D: D103604

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	32	Pass
Probe Velocity	m/s	6.58 to 6.82	6.60	Pass
Peak Probe Force	N	5159 to 5893	5,348	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.48	Pass
Internal Hysteresis	%	69 to 85	71	Pass
Overall Test Results			Pass	


Laboratory Technician

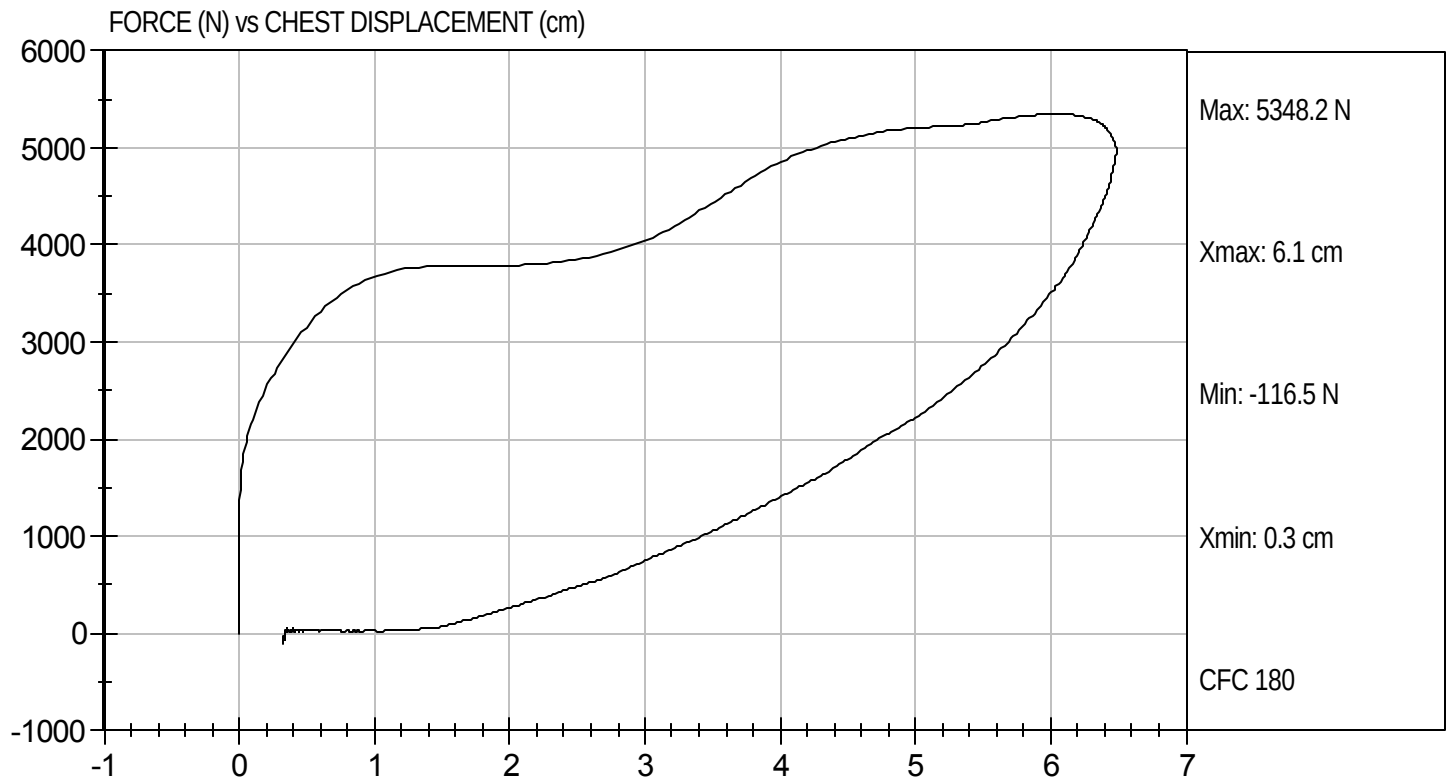
10/20/10
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D103604

Test Date: 10/20/10
Velocity: 21.64 ft/s, 6.60 m/s



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

ATD Serial No: 351

Test I.D: D103605

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	33	Pass
Probe Velocity	m/s	2.07 to 2.13	2.07	Pass
Peak Probe Force	Newtons	4715 to 5782	5,417	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

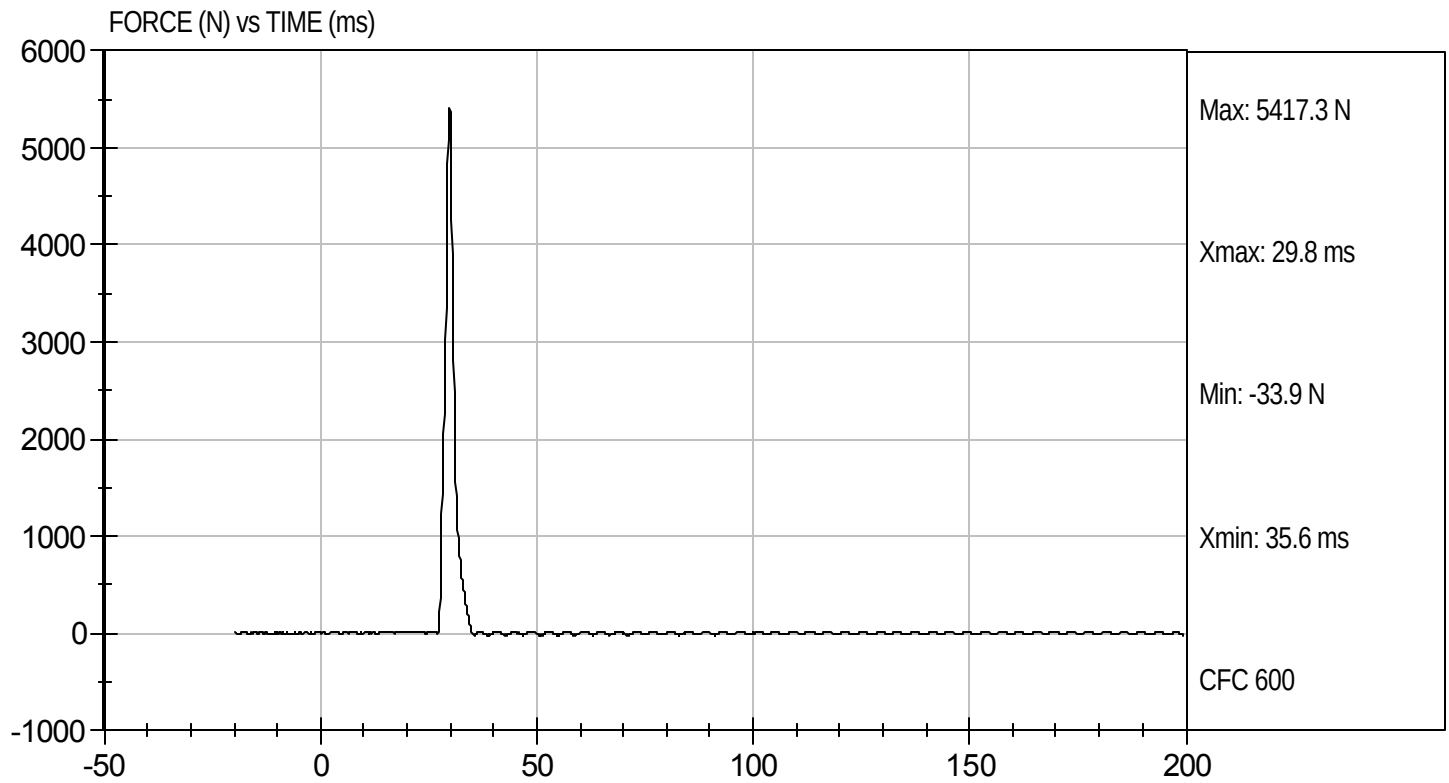
10/20/10
Test Date

David Winkelbauer
Approved By



Test Desc: Right Knee
Component ID: D103605

Test Date: 10/20/10
Velocity: 6.80 ft/s, 2.07 m/s



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

ATD Serial No: 351

Test I.D: D103606

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	33	Pass
Probe Velocity	m/s	2.07 to 2.13	2.07	Pass
Peak Probe Force	Newtons	4715 to 5782	5,410	Pass
Overall Test Results				Pass

Jessica Gall
Laboratory Technician

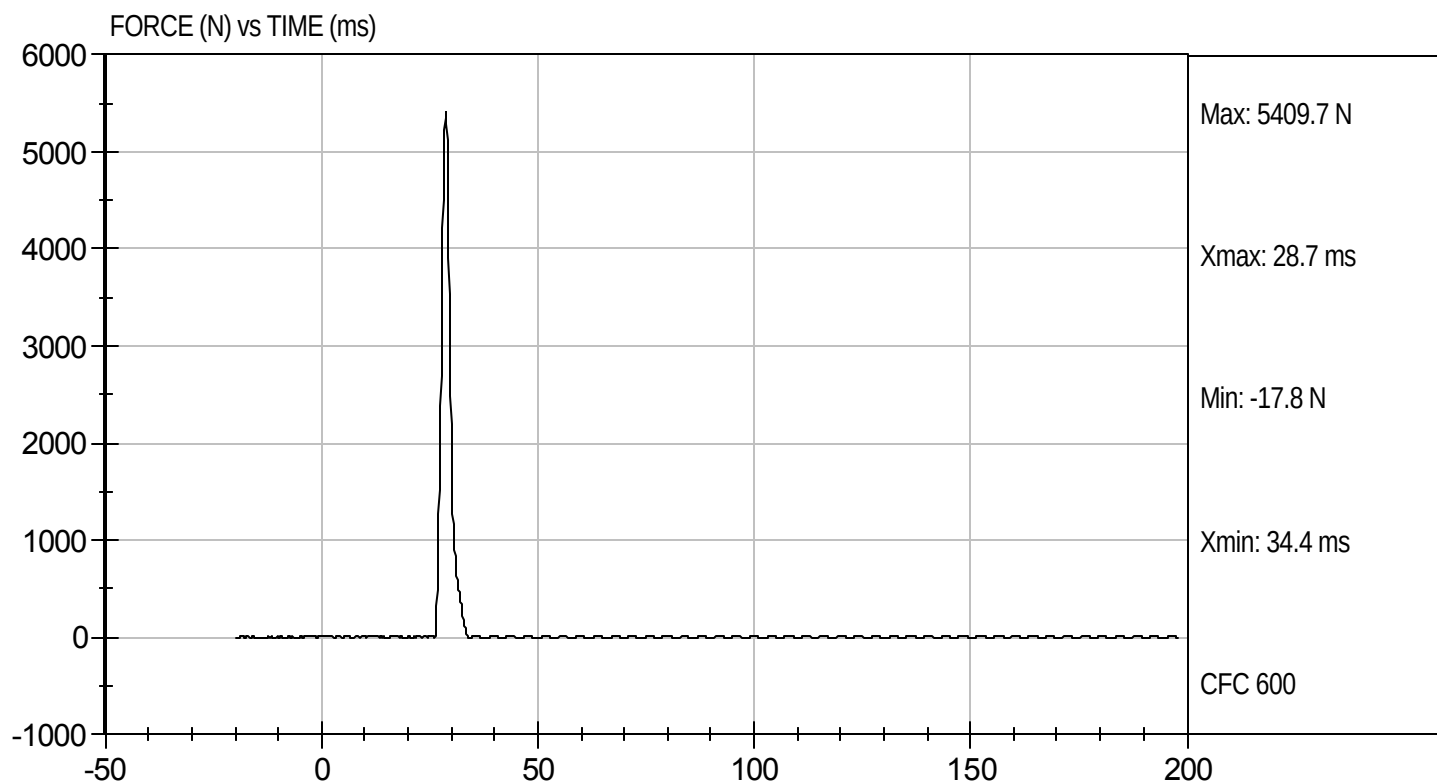
10/20/10
Test Date

David Winkelbauer
Approved By



Test Desc: Left Knee
Component ID: D103606

Test Date: 10/20/10
Velocity: 6.80 ft/s, 2.07 m/s



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

ATD Serial No: 351

Test I.D: D103600

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.4	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	31	31	Pass
Rotation Rate	deg/s	5 -10	8	8	Pass
30 Degrees	Nm	94.9 Nm Max	45.6	52.2	Pass
150 ft-lbf / 203.4 Nm	Deg	40- 50 Degree Max Rotation	47	48	Pass
Overall Test Results					Pass

Jessica Hall
Laboratory Technician

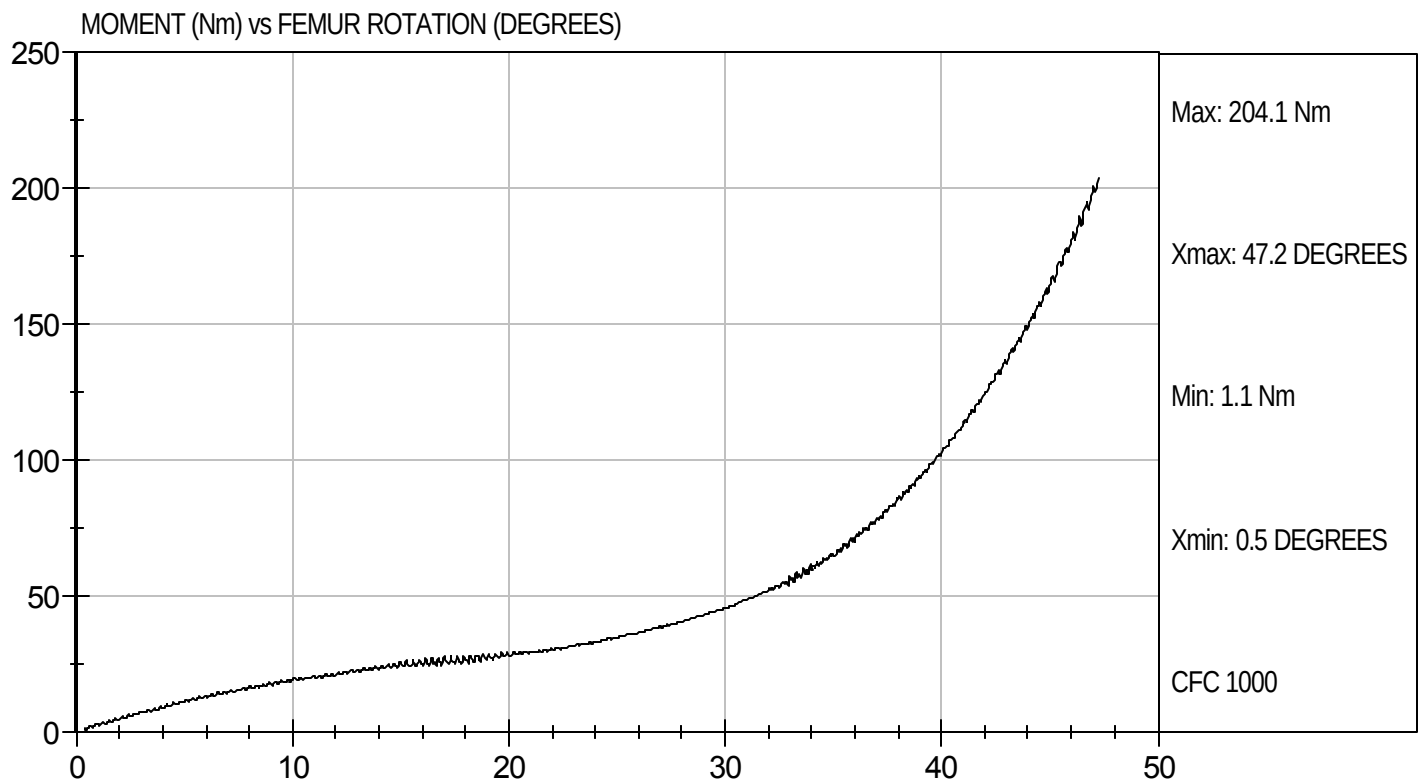
10/21/10
Test Date

David Winkelbauer
Approved By



Test Desc: Hip Femur Flexion
Component ID: D103609

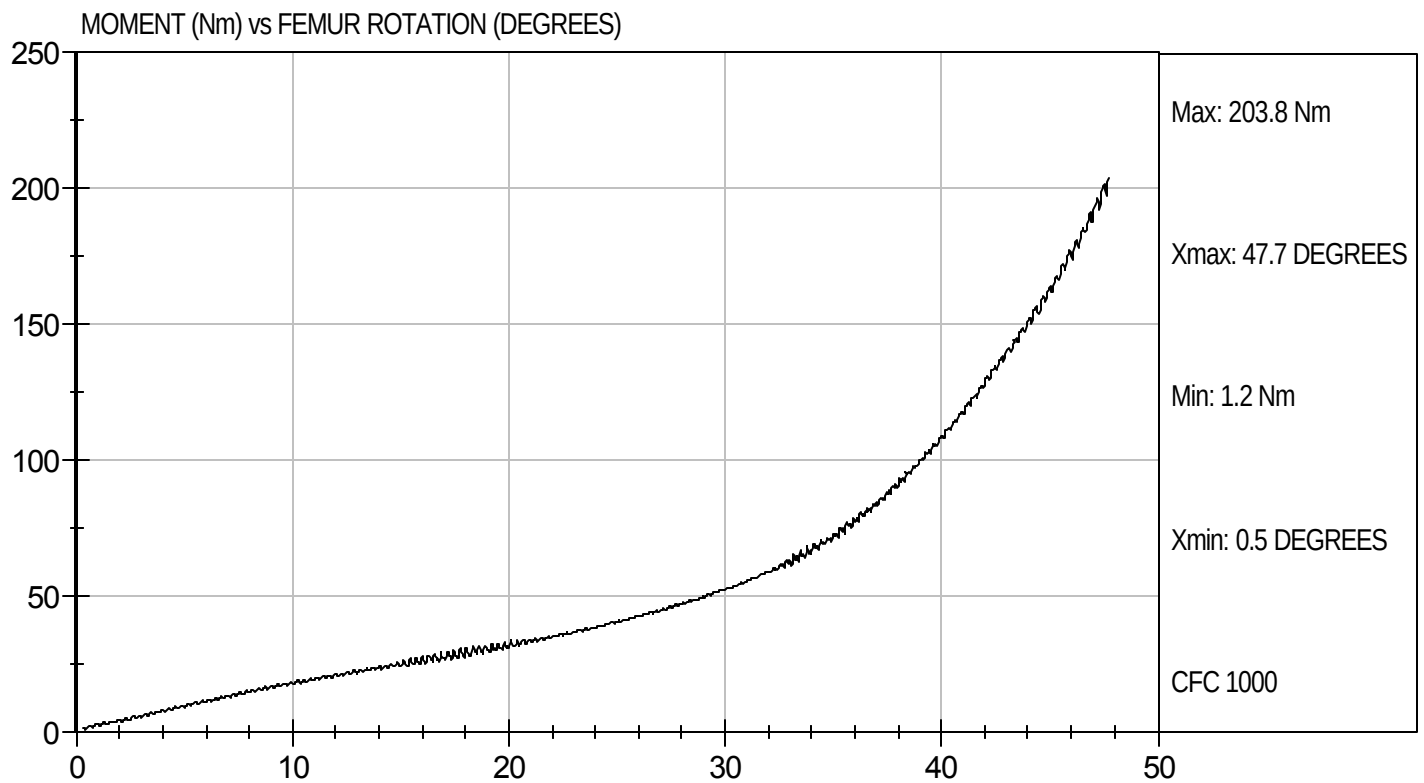
Test Date: 10/21/10
Velocity: 0 ft/s, 0.00 m/s





Test Desc: Hip Femur Flexion
Component ID: D103600

Test Date: 10/21/10
Velocity: 0 ft/s, 0.00 m/s

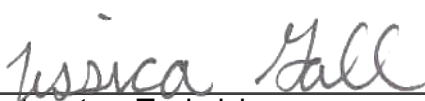


MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test ID: D102811

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	52	Pass
Peak Resultant Acceleration	G's	250 to 300	264	Pass
Peak Lateral Acceleration	G's	+/- 15	-1.5	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

8/31/10
Test Date

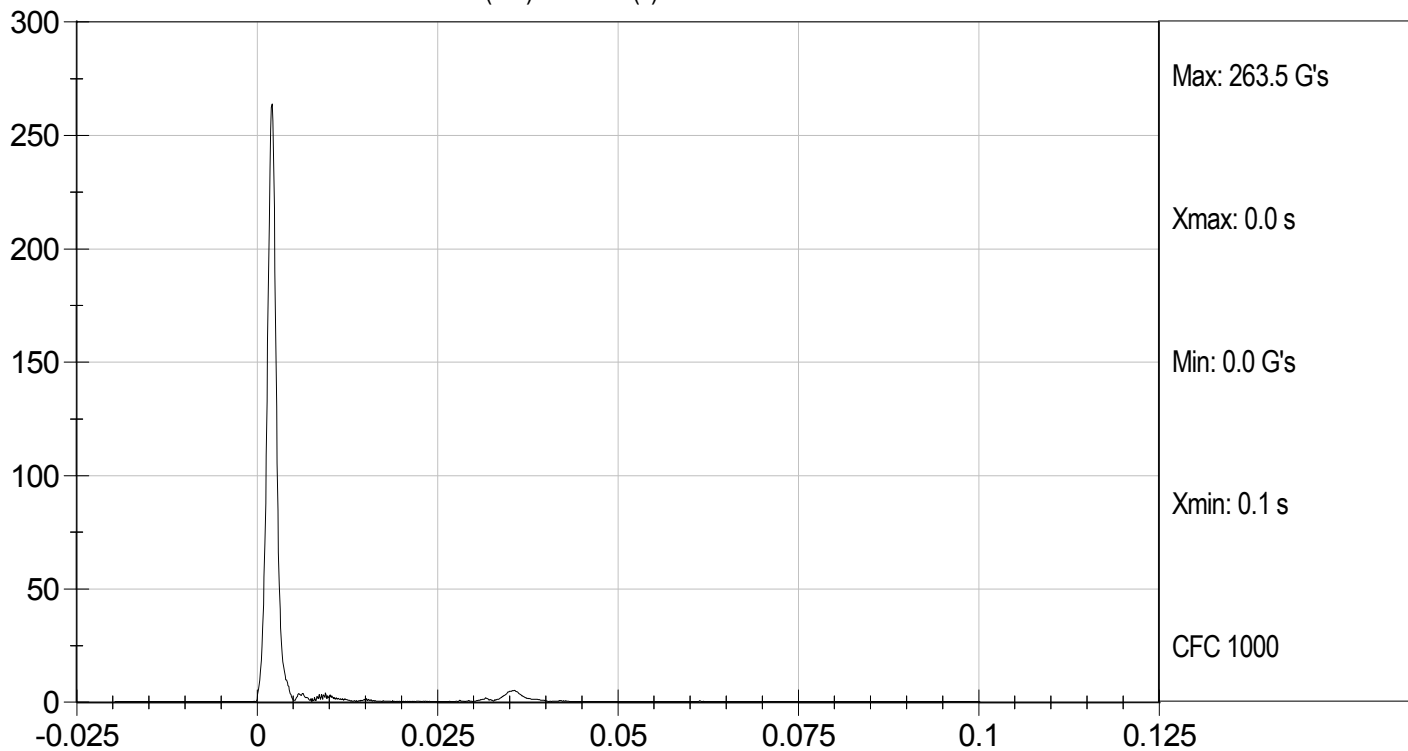

Approved By



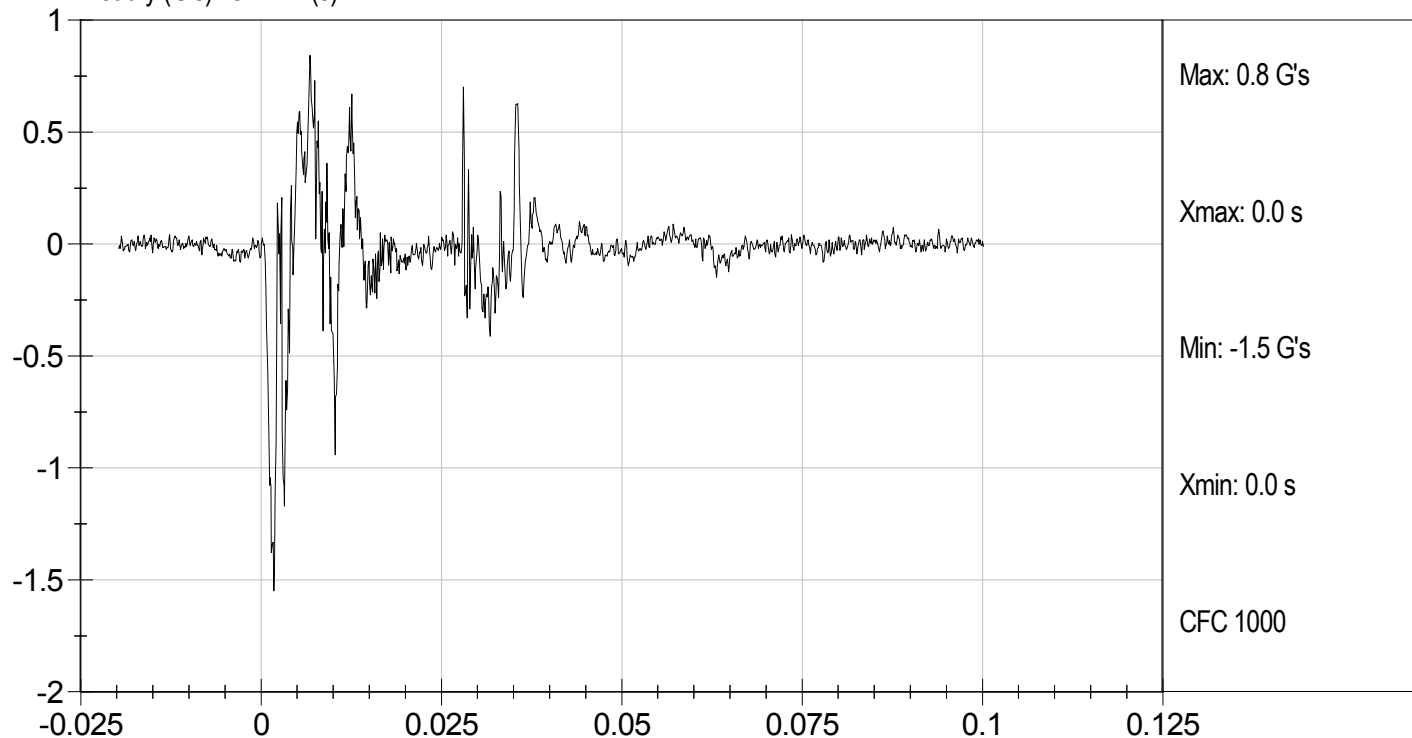
Test Desc: Head Drop
Component ID: D102811

Test Date: 8/31/10
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: 138

Test I.D: D102812

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	6.1	Pass
D Plane Rotation	Max	deg	77 to 91	78	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	69 to 83	76	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	86	Pass
Overall Results					Pass

Jessica Hall
Laboratory Technician

9/1/10
Test Date

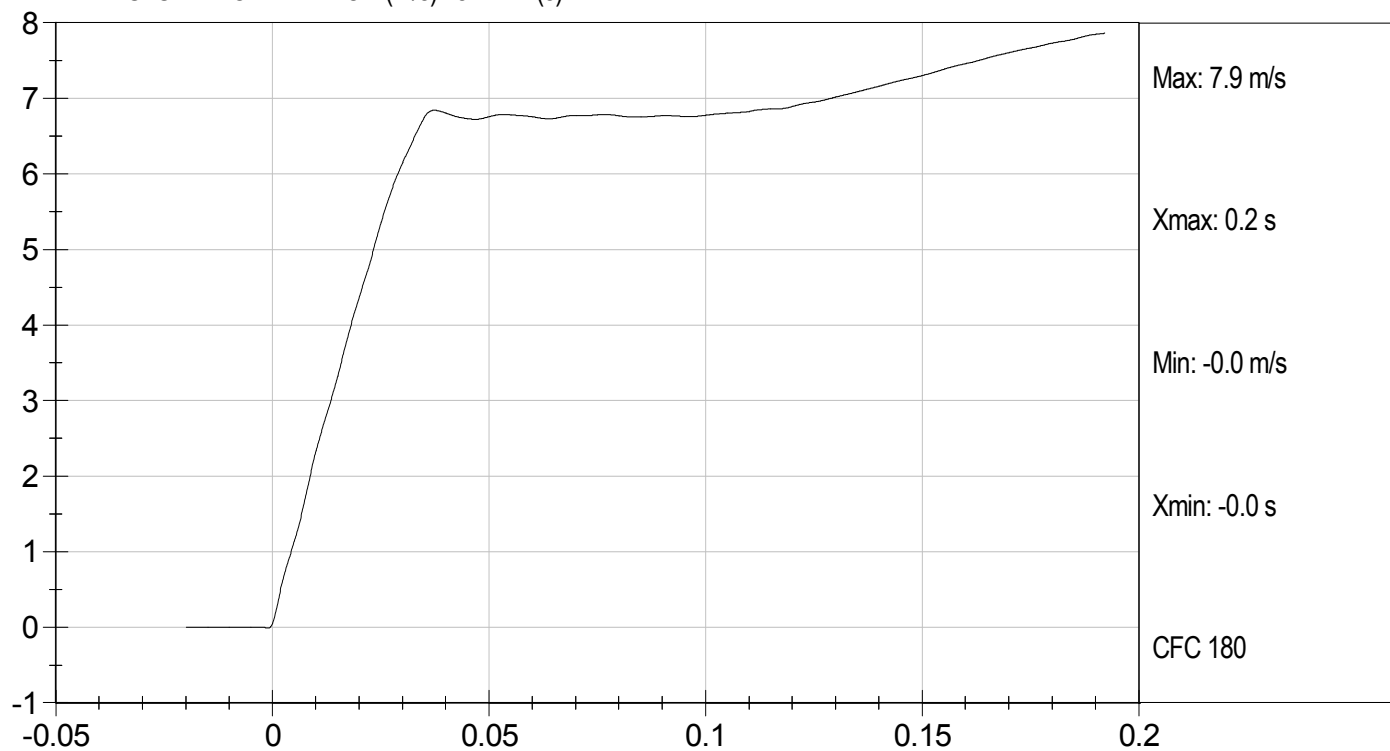
David Winkelbauer
Approved By



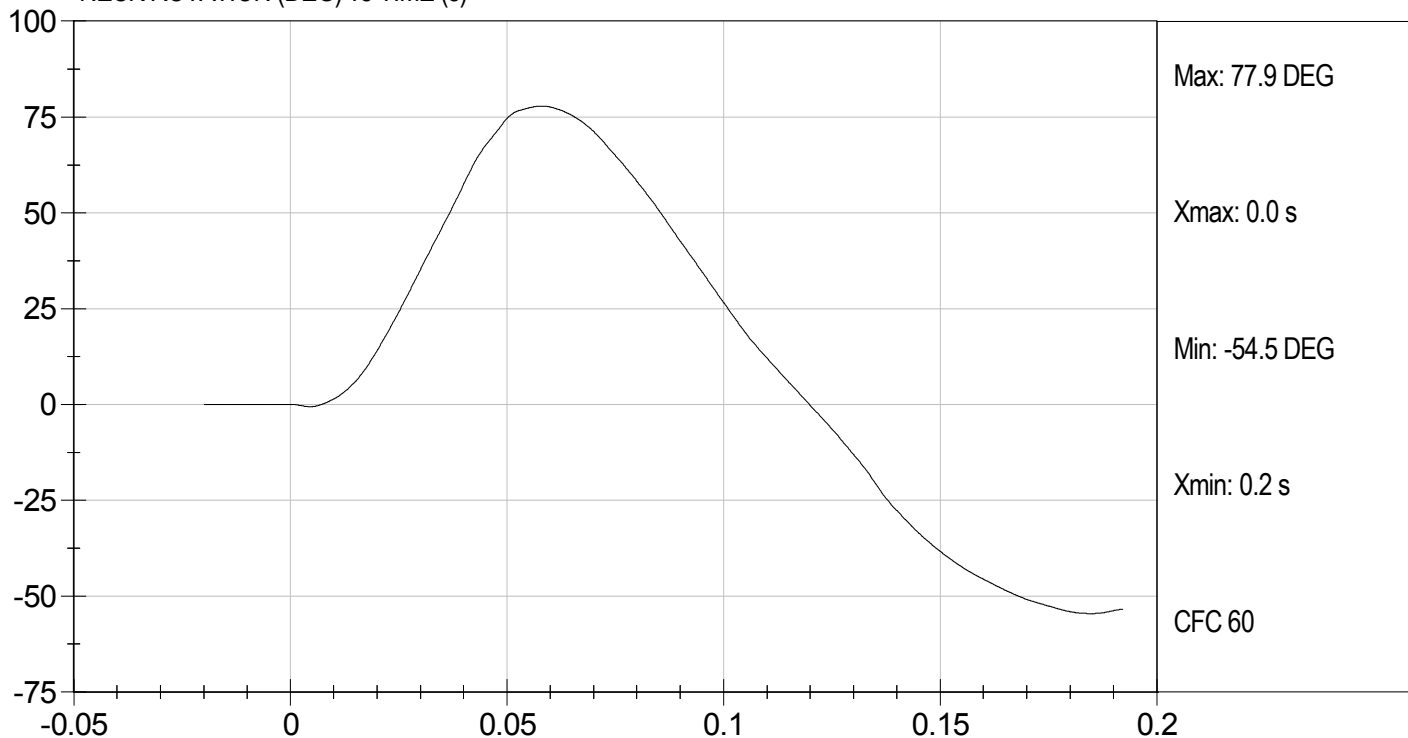
Test Desc: Neck Flexion
Component ID: D102812

Test Date: 9/1/10
Velocity: 23.15 ft/s, 7.06 m/s

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



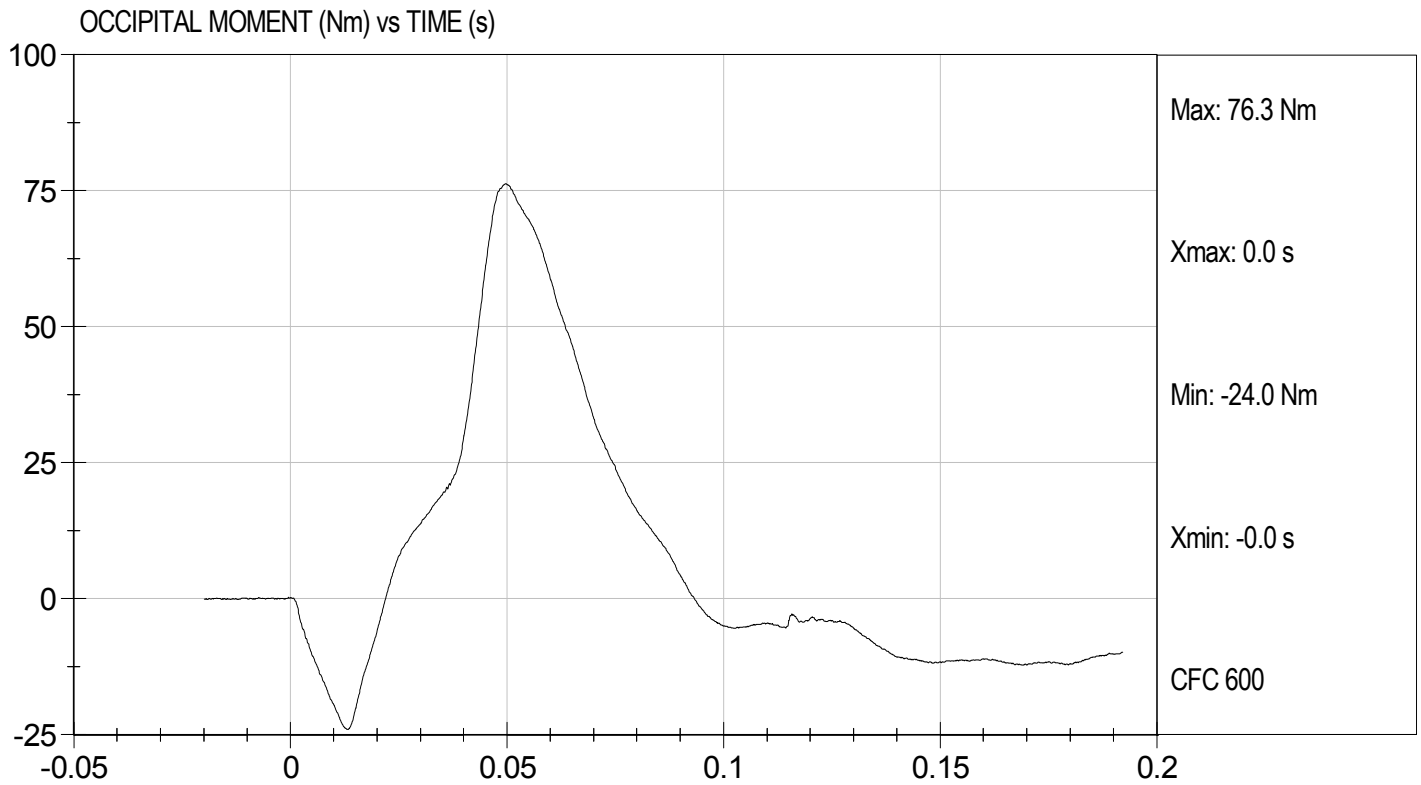
NECK ROTATION (DEG) vs TIME (s)





Test Desc: Neck Flexion
Component ID: D102812

Test Date: 9/1/10
Velocity: 23.15 ft/s, 7.06 m/s



MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D: D102813

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	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	3.6	Pass
	30 ms	m/s	4.6 to 5.6	5.2	Pass
D Plane Rotation	Max	deg	99 to 114	105	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	101	Pass
Overall Results					Pass

Jessica Hall
Laboratory Technician

9/1/10
Test Date

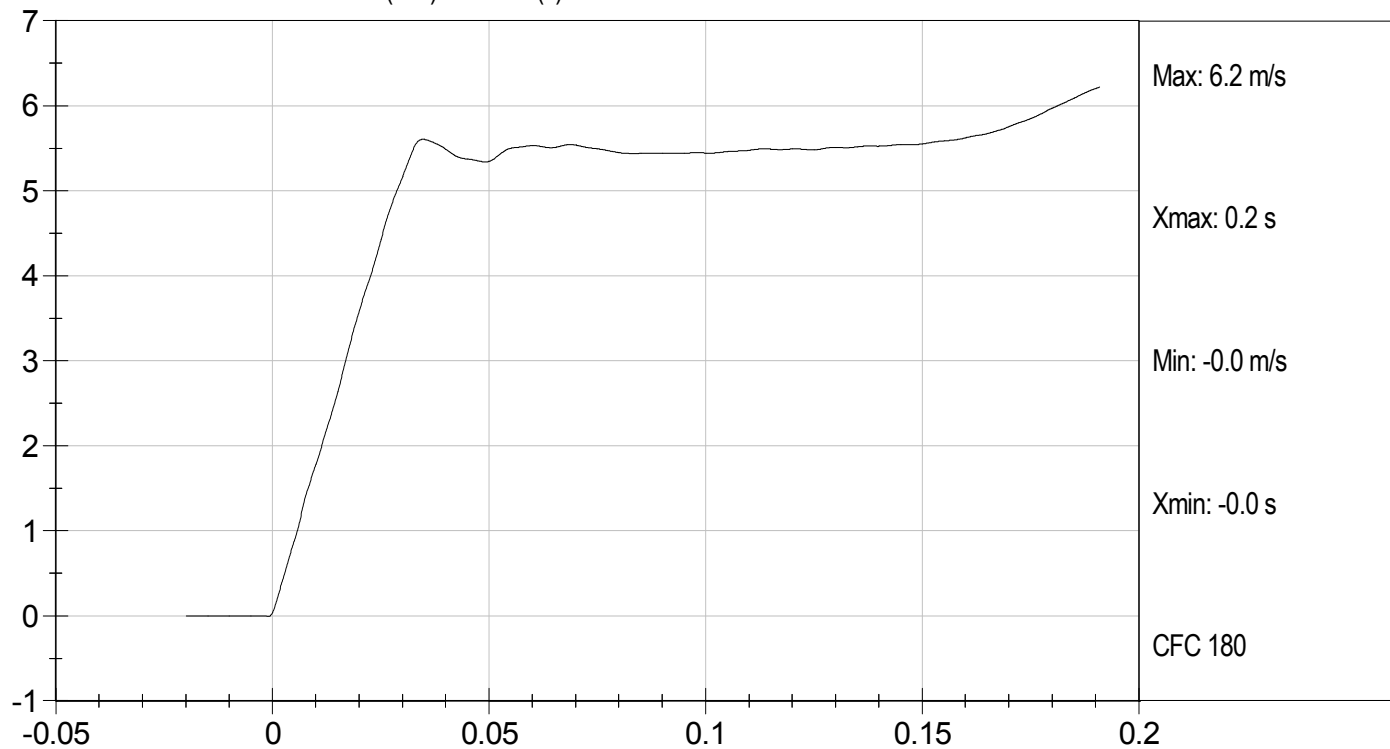
David Winkelbauer
Approved By



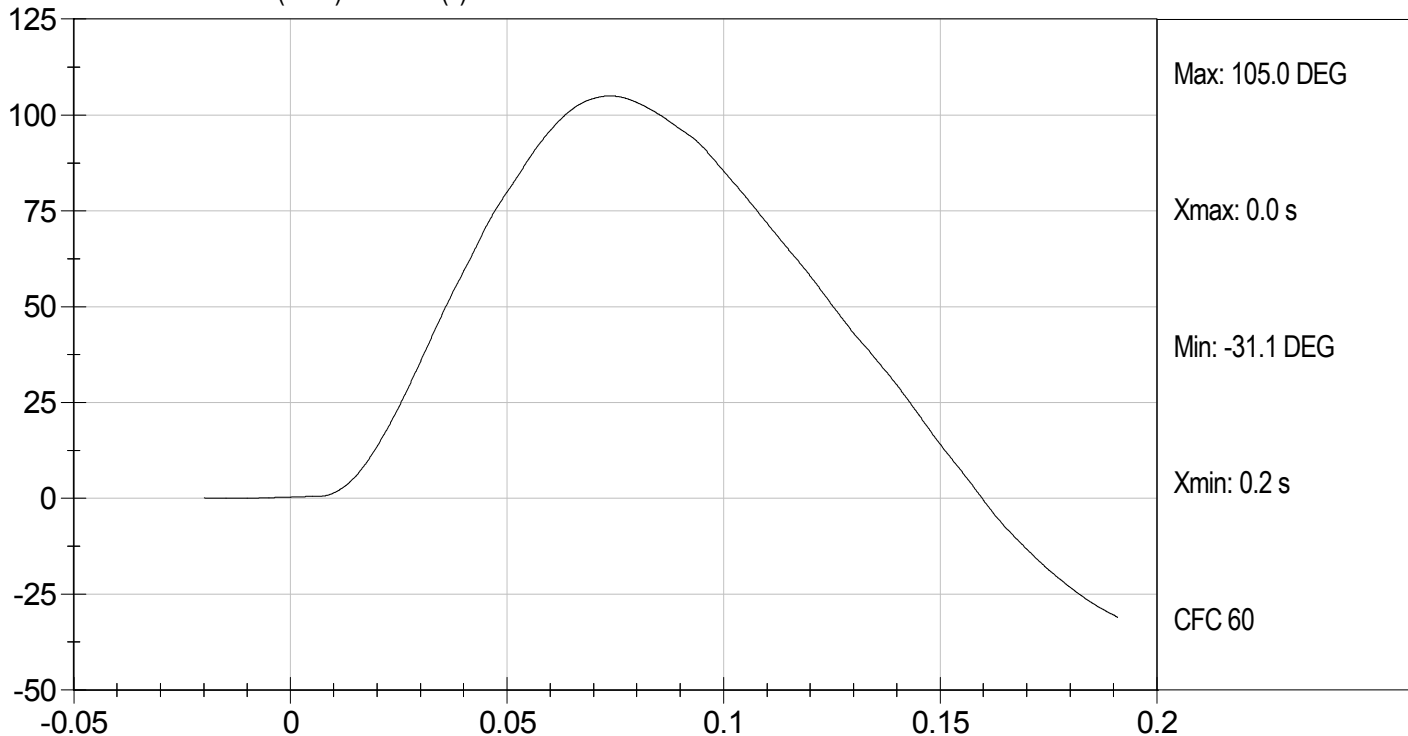
Test Desc: Neck Extension
Component ID: D102813

Test Date: 9/1/10
Velocity: 20.08 ft/s, 6.12 m/s

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



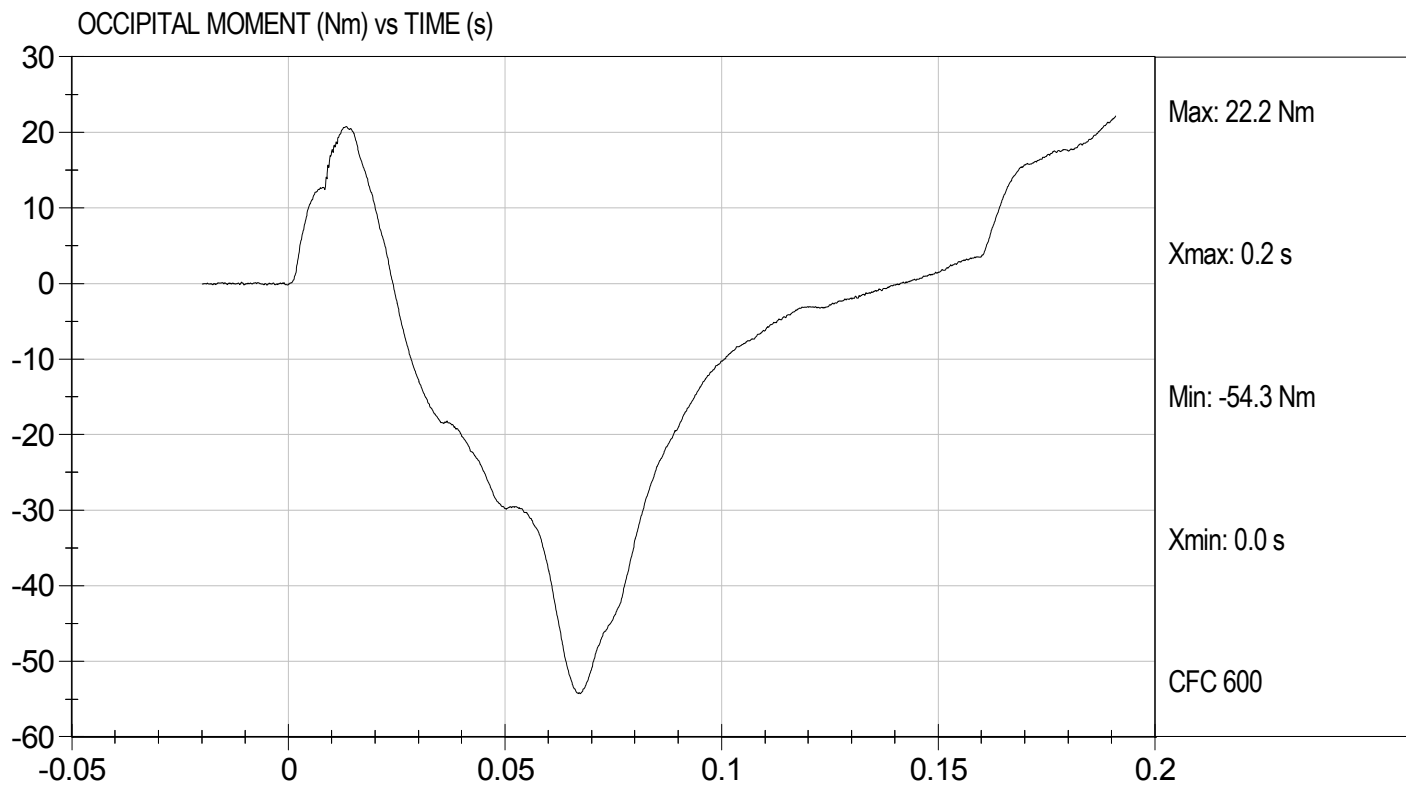
NECK ROTATION (DEG) vs TIME (s)





Test Desc: Neck Extension
Component ID: D102813

Test Date: 9/1/10
Velocity: 20.08 ft/s, 6.12 m/s

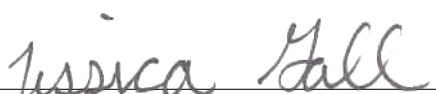


MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D: D102814

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.4	Pass
Relative Humidity	%	10 to 70	53	Pass
Probe Speed	m/s	6.59 to 6.83	6.77	Pass
Peak Deflection	mm	50 to 58	54	Pass
Peak Resistive Force w/in Deflection Corridor	kN	3.9 to 4.4	4.10	Pass
Internal Hysteresis	%	69 to 85	71	Pass
Peak Force 18 mm - 50 mm	N	<= 4,600 N	4051	Pass
Overall Test Results				Pass


Laboratory Technician

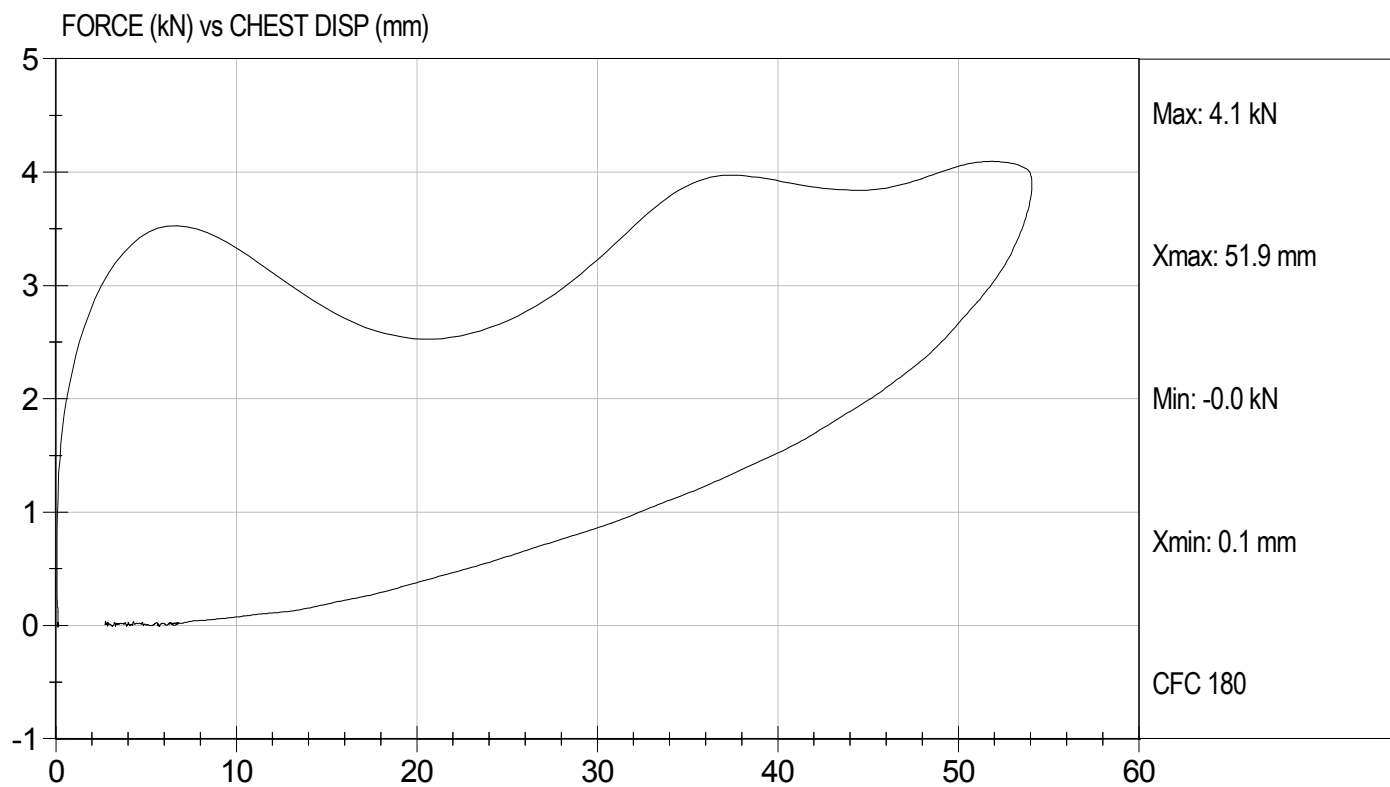
8/31/10
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D102814

Test Date: 8/31/10
Velocity: 22.22 ft/s, 6.77 m/s

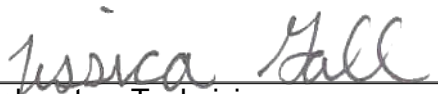


MGA RESEARCH CORPORATION
RIGHT KNEE IMPACT TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D: D102815

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	52	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	kN	3.45 to 4.06	3.59	Pass
Overall Test Results			Pass	


Laboratory Technician

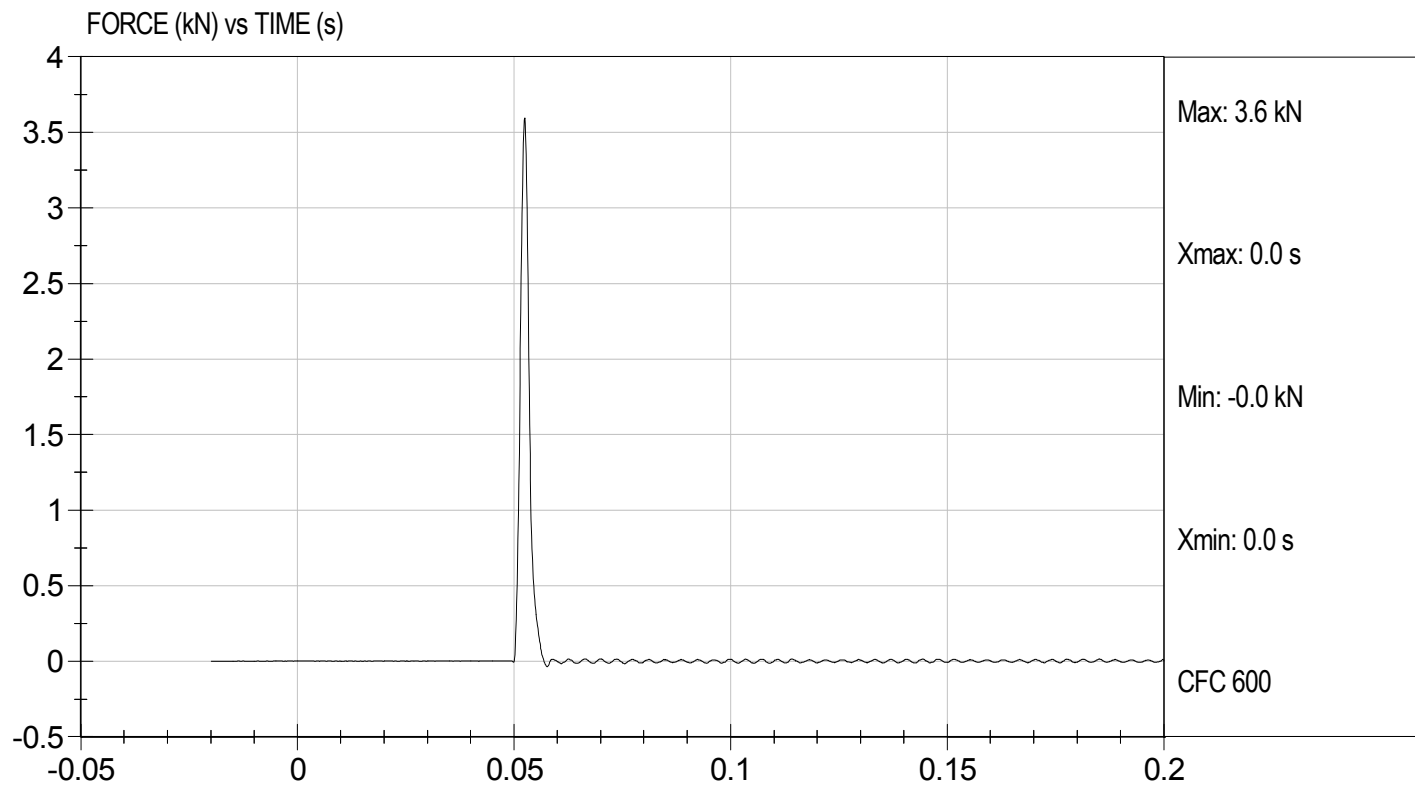
8/31/10
Test Date


Approved By



Test Desc: Right Knee
Component ID: D102815

Test Date: 8/31/10
Velocity: 6.97 ft/s, 2.12 m/s



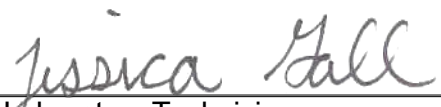
MGA RESEARCH CORPORATION

**LEFT KNEE IMPACT TEST
HYBRID III 5TH PERCENTILE**

ATD Serial No: 138

Test I.D: D102816

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	52	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	kN	3.45 to 4.06	3.68	Pass
Overall Test Results				Pass


Laboratory Technician

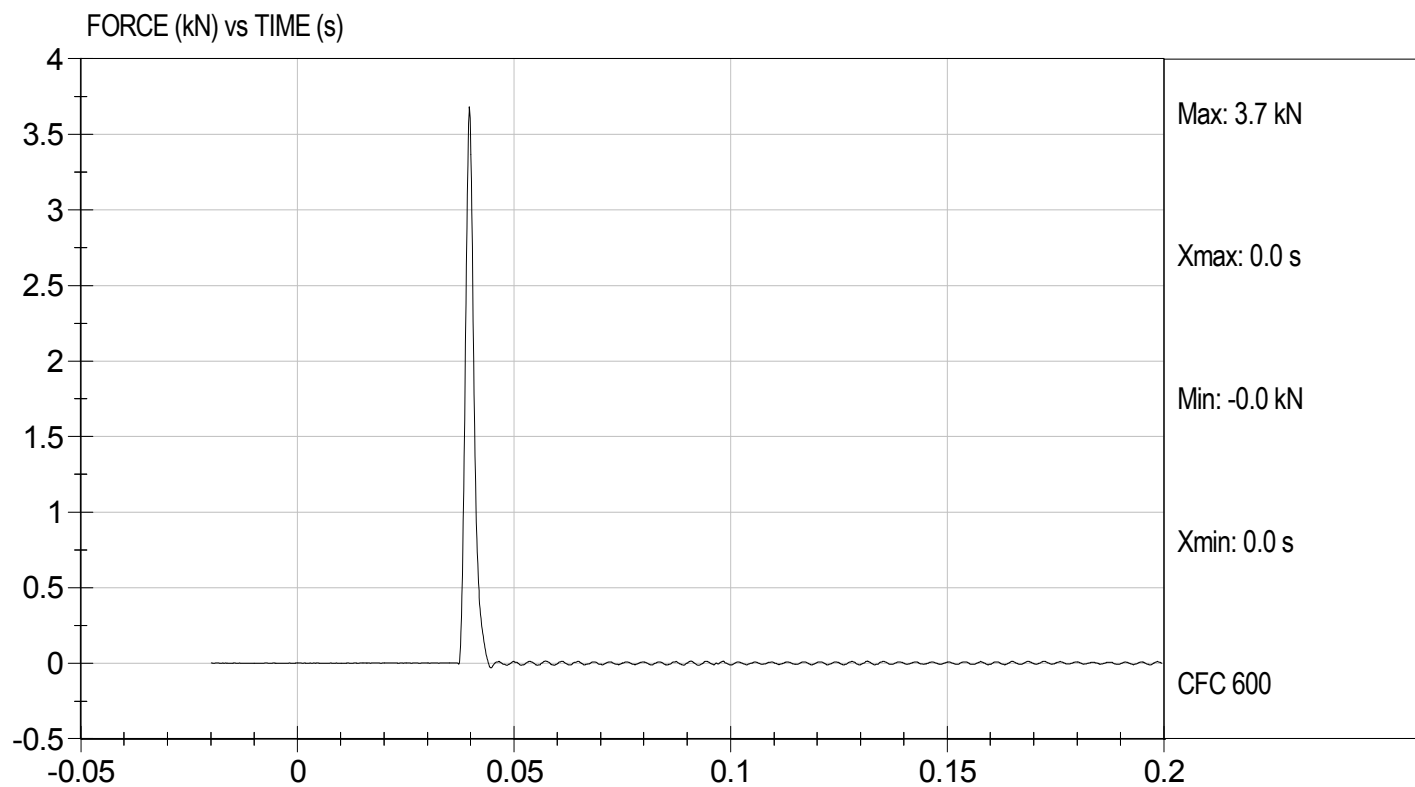
8/31/10
Test Date


Approved By



Test Desc: Left Knee
Component ID: D102816

Test Date: 8/31/10
Velocity: 6.97 ft/s, 2.12 m/s



MGA RESEARCH CORPORATION
TORSO FLEXION TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D: D102817

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	52	Pass
Initial Angle	deg	0 to 20	16	Pass
Return Angle	deg	+/- 8	4	Pass
Force at 45 deg	N	320 to 390	347	Pass
Upper Torso Deflection Rate	Deg/sec	0.5 to 1.5	1.0	Pass
Overall Result				Pass


Laboratory Technician

8/31/10
Test Date

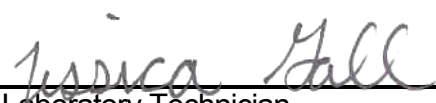

Approved By

MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test ID: D103611

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	22.0	Pass
Laboratory Relative Humidity	%	10 to 70	31	Pass
Peak Resultant Acceleration	G's	250 to 300	295	Pass
Peak Lateral Acceleration	G's	+/- 15	-6.1	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass



Laboratory Technician

10/21/10
Test Date

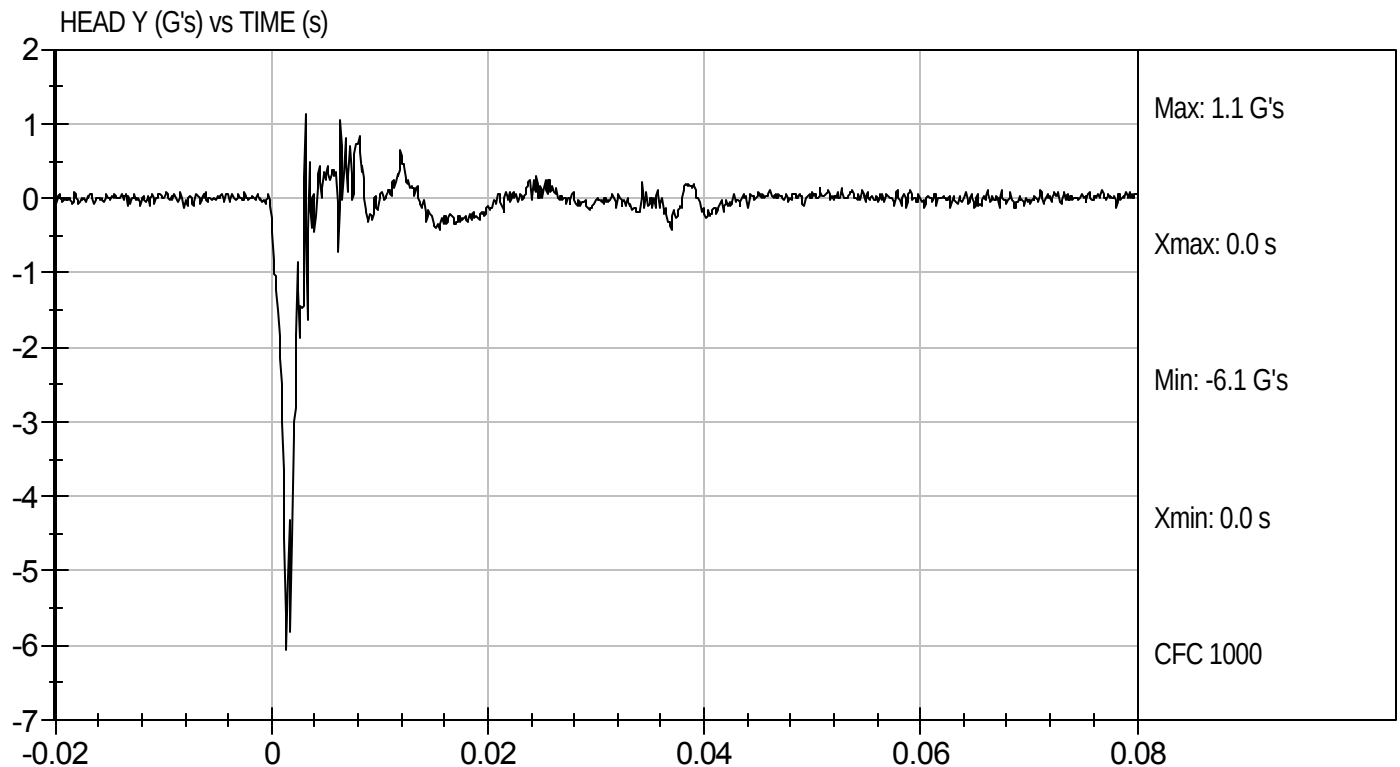
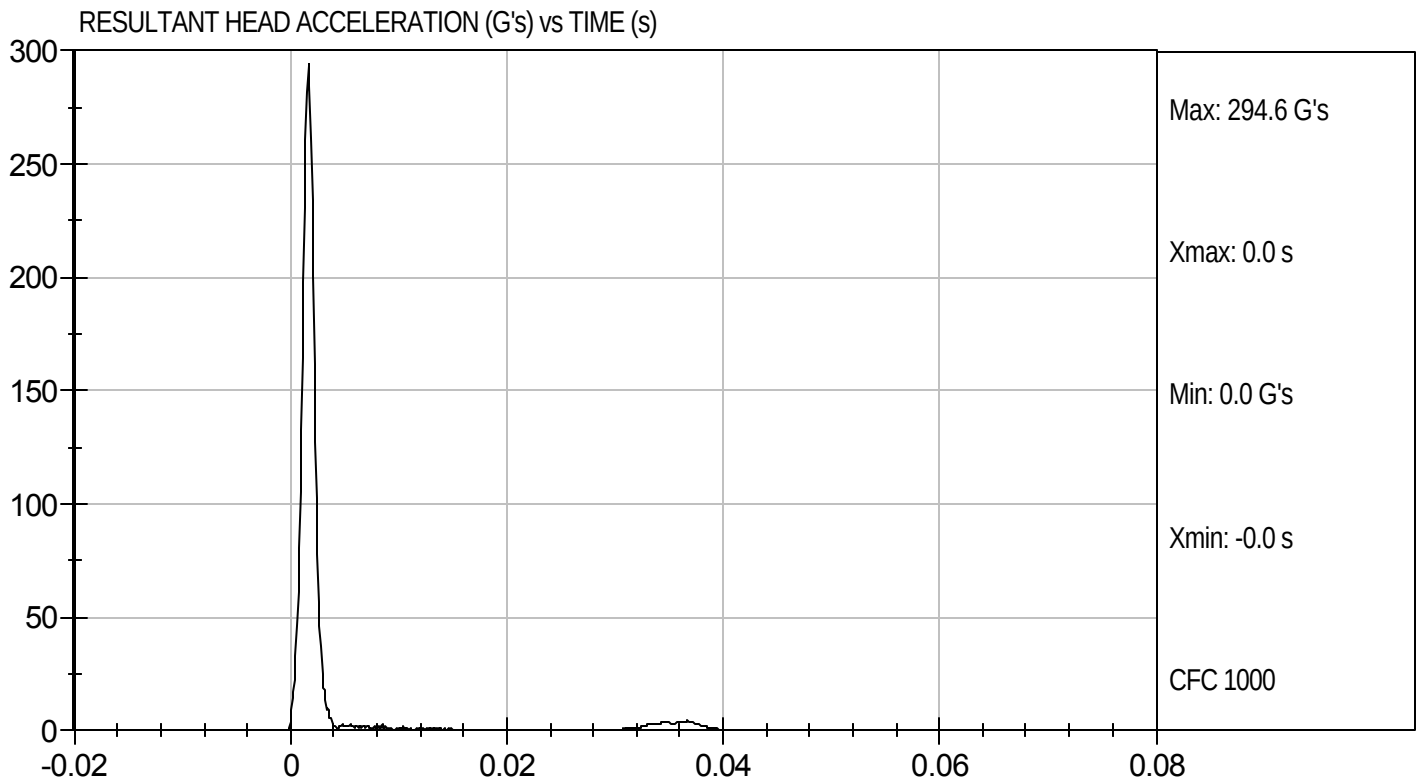


Approved By



Test Desc: Head Drop
Component ID: D103611

Test Date: 10/21/10
Velocity: 0 ft/s, 0.00 m/s



MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D: D103612

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	33	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	4.7	Pass
	30 ms	m/s	5.8 to 7.0	6.6	Pass
D Plane Rotation	Max	deg	77 to 91	78	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	69 to 83	77	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	83	Pass
Overall Results					Pass

Jessica Gall
Laboratory Technician

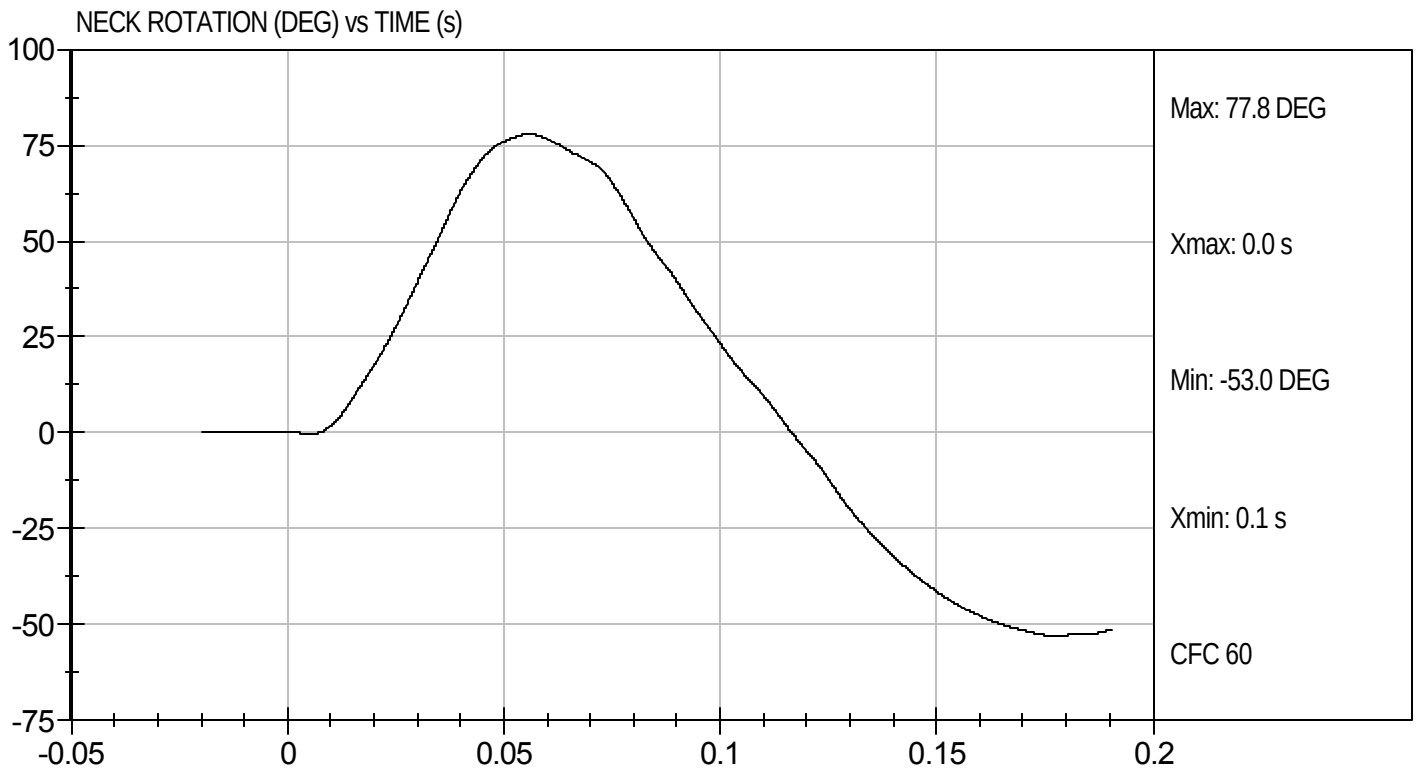
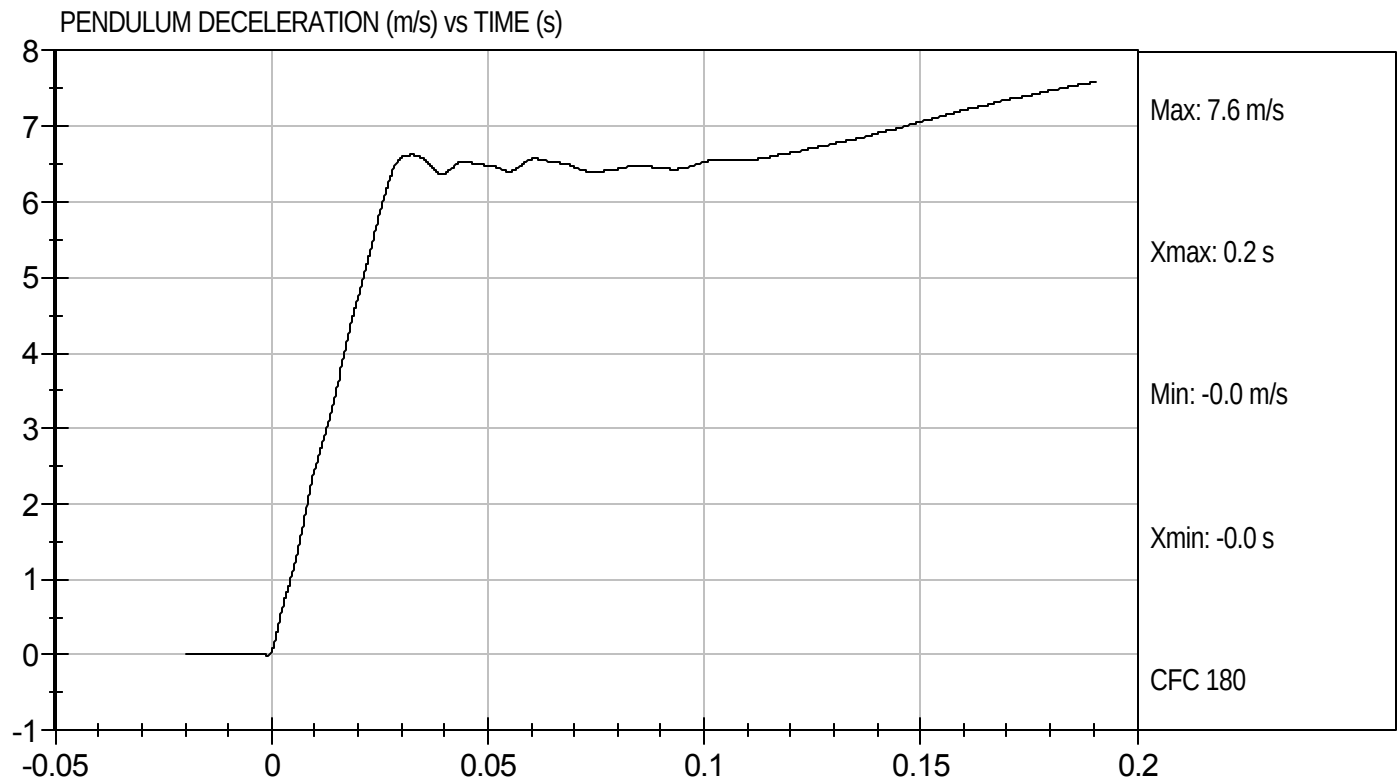
10/21/10
Test Date

David Winkelbauer
Approved By



Test Desc: Neck Flexion
Component ID: D103612

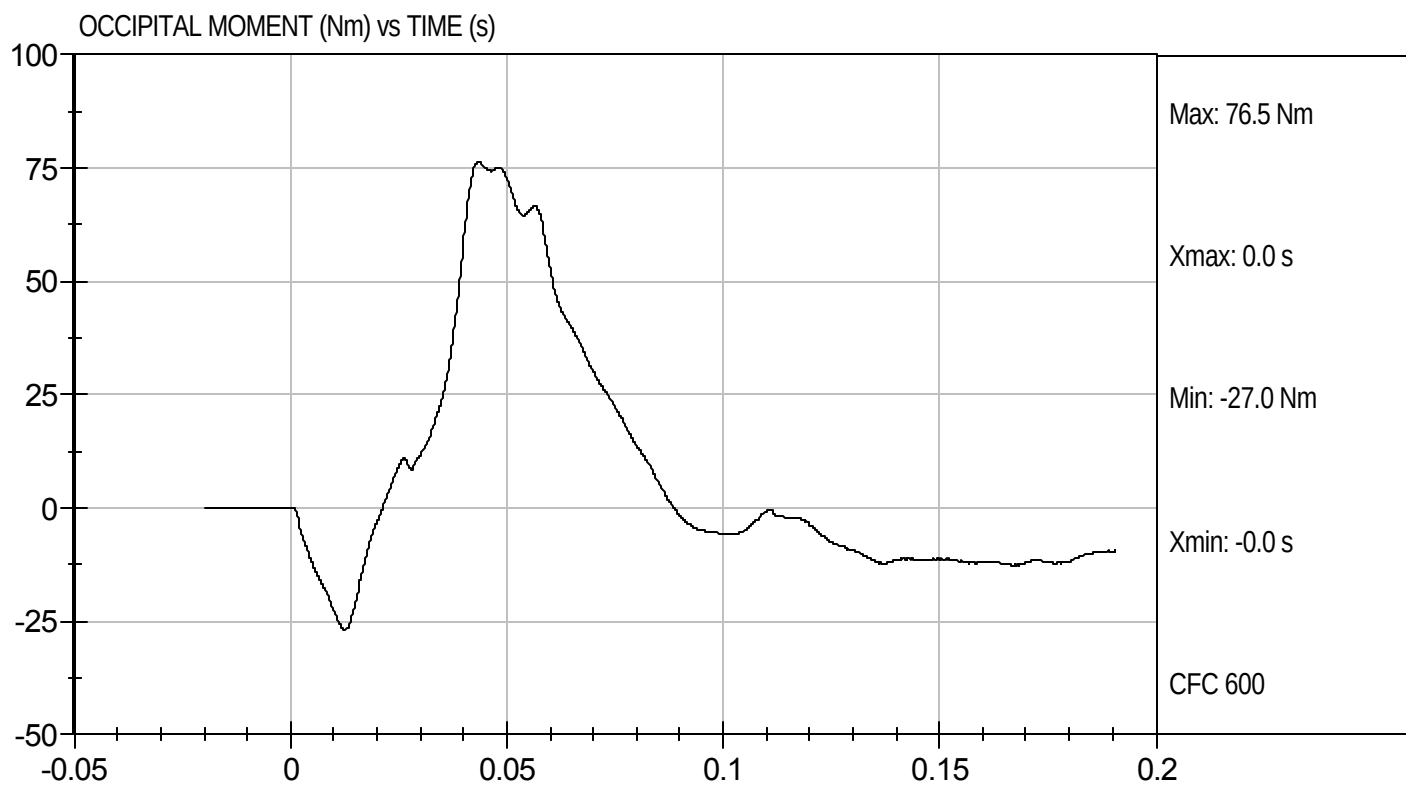
Test Date: 10/21/10
Velocity: 23.15 ft/s, 7.06 m/s





Test Desc: Neck Flexion
Component ID: D103612

Test Date: 10/21/10
Velocity: 23.15 ft/s, 7.06 m/s



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 138Test I.D: D103613

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	22.0	Pass
Laboratory Relative Humidity		%	10 to 70	31	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.12	Pass
Pendulum Deceleration	10 ms	m/s	1.5 to 1.9	1.9	Pass
	20 ms	m/s	3.1 to 3.9	3.8	Pass
	30 ms	m/s	4.6 to 5.6	5.3	Pass
D Plane Rotation	Max	deg	99 to 114	108	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

10/21/10

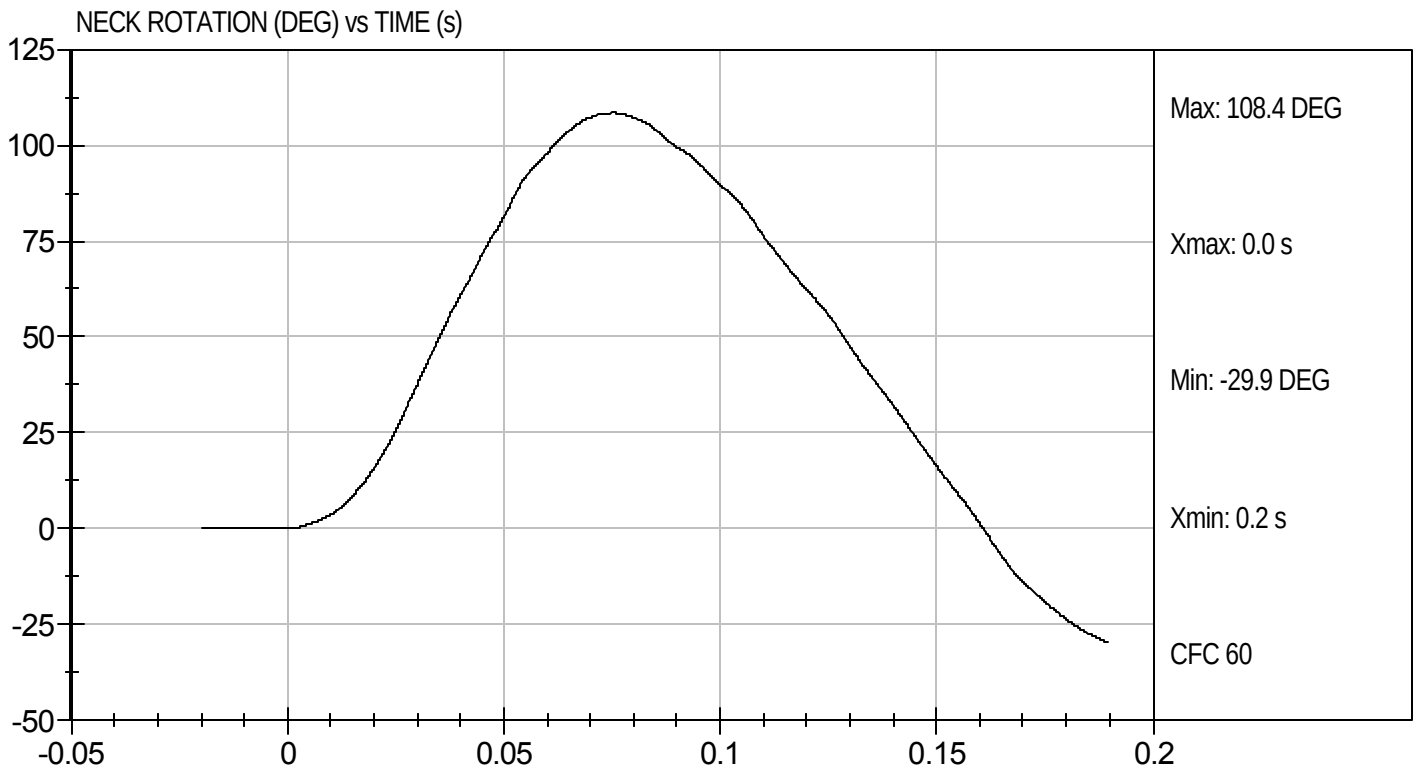
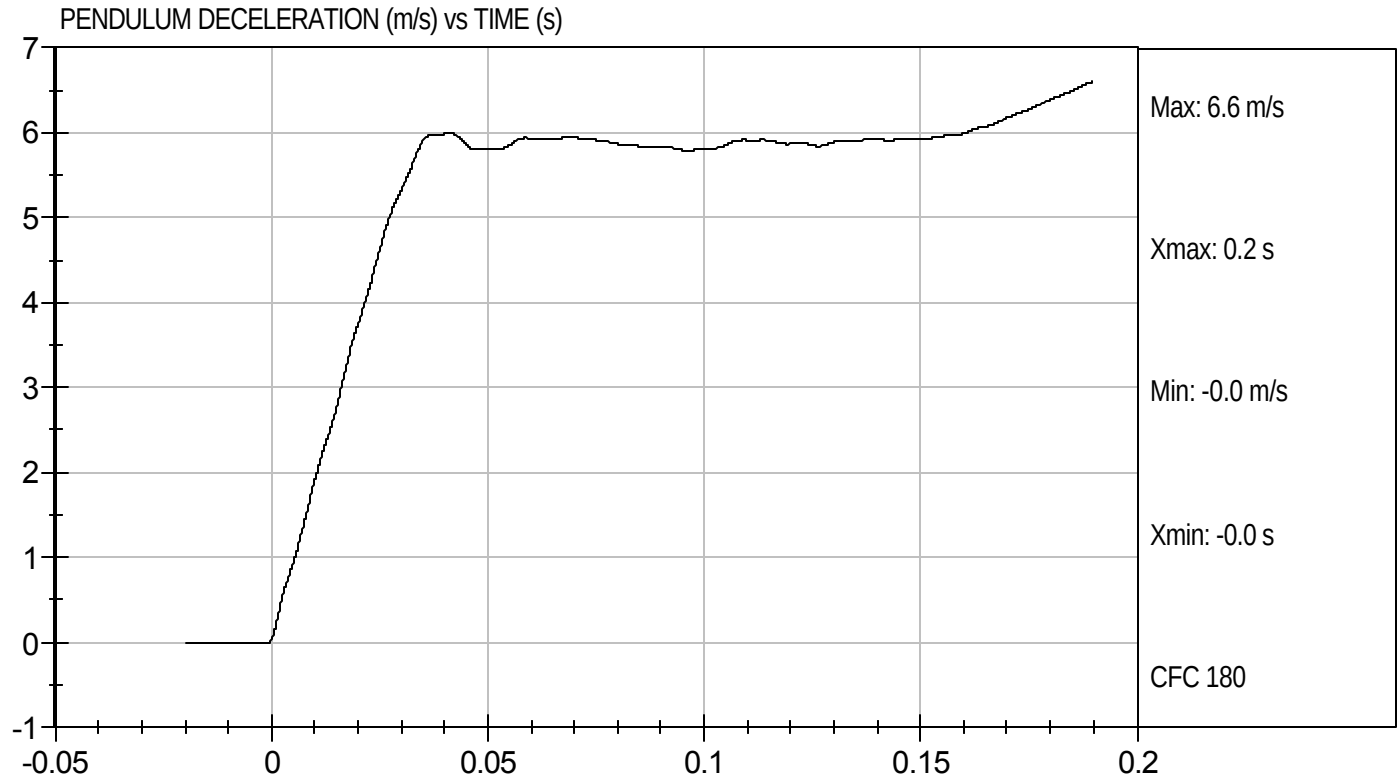
Test Date

David Winkelbauer
Approved By



Test Desc: Neck Extension
Component ID: D103613

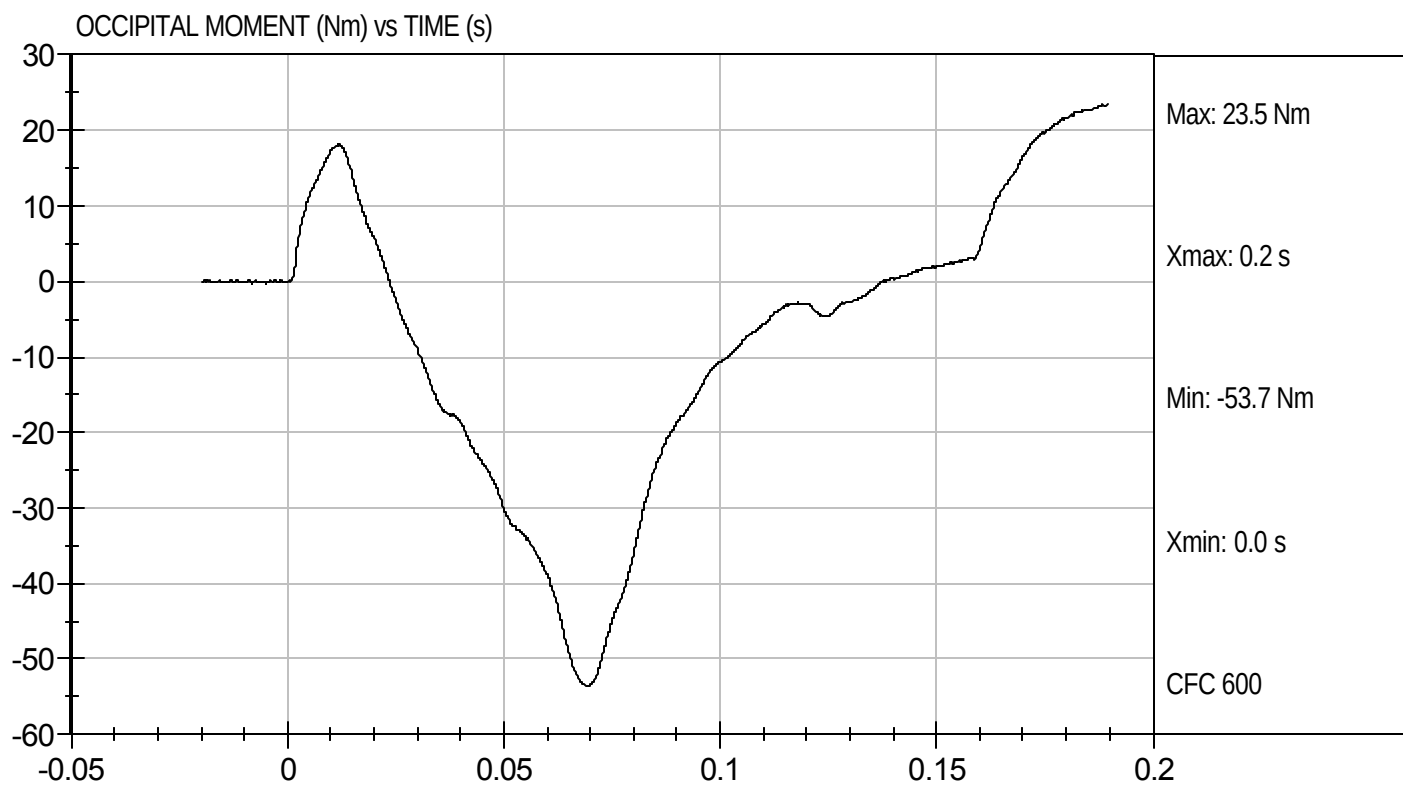
Test Date: 10/21/10
Velocity: 20.08 ft/s, 6.12 m/s





Test Desc: Neck Extension
Component ID: D103613

Test Date: 10/21/10
Velocity: 20.08 ft/s, 6.12 m/s



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D: D103614

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.5	Pass
Relative Humidity	%	10 to 70	32	Pass
Probe Speed	m/s	6.59 to 6.83	6.77	Pass
Peak Deflection	mm	50 to 58	54	Pass
Peak Resistive Force w/in Deflection Corridor	kN	3.9 to 4.4	4.05	Pass
Internal Hysteresis	%	69 to 85	70	Pass
Peak Force 18 mm - 50 mm	N	<= 4,600 N	4011	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

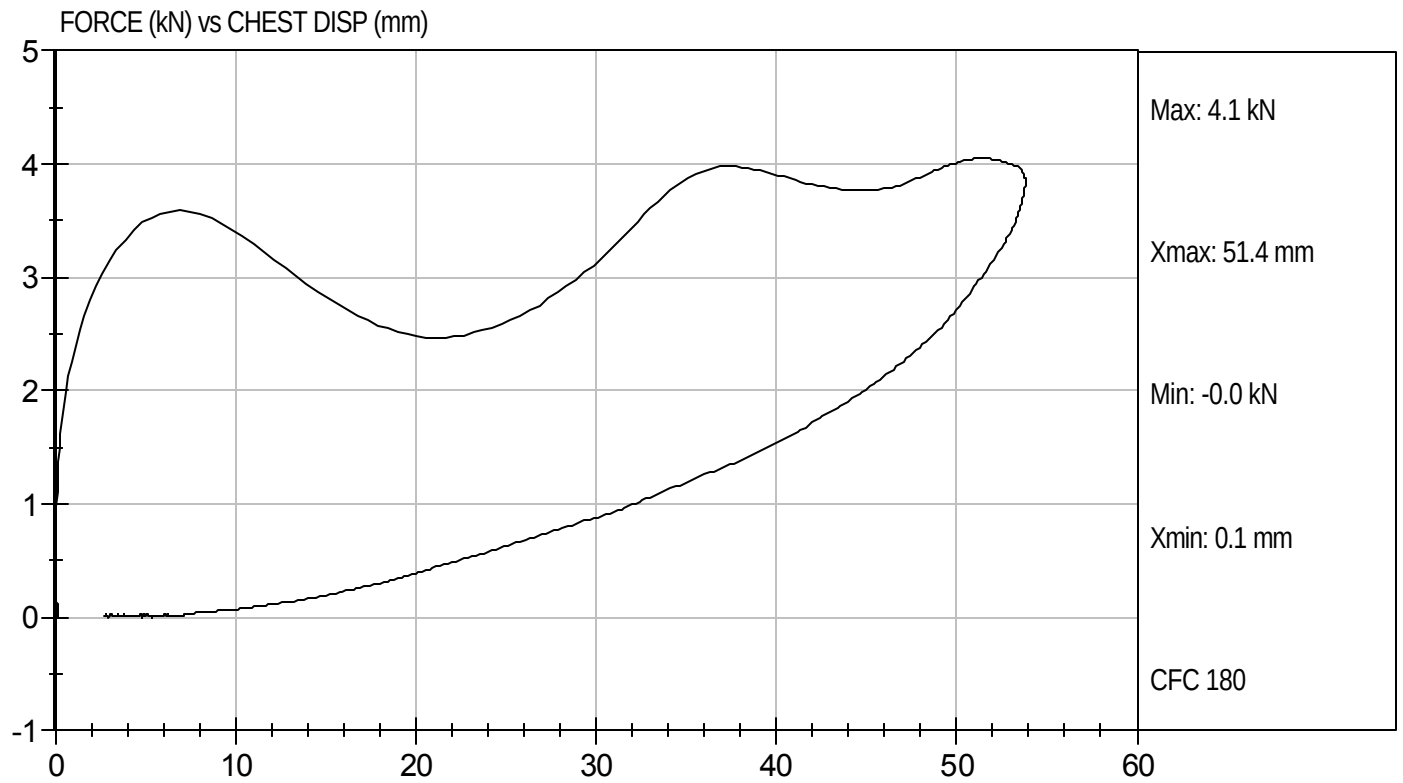
10/20/10
Test Date

David Winkelbauer
Approved By



Test Desc: Thorax Impact
Component ID: D103614

Test Date: 10/20/10
Velocity: 22.22 ft/s, 6.77 m/s



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D: D103615

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	33	Pass
Probe Speed	m/s	2.07 to 2.13	2.13	Pass
Maximum Force	kN	3.45 to 4.06	3.55	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

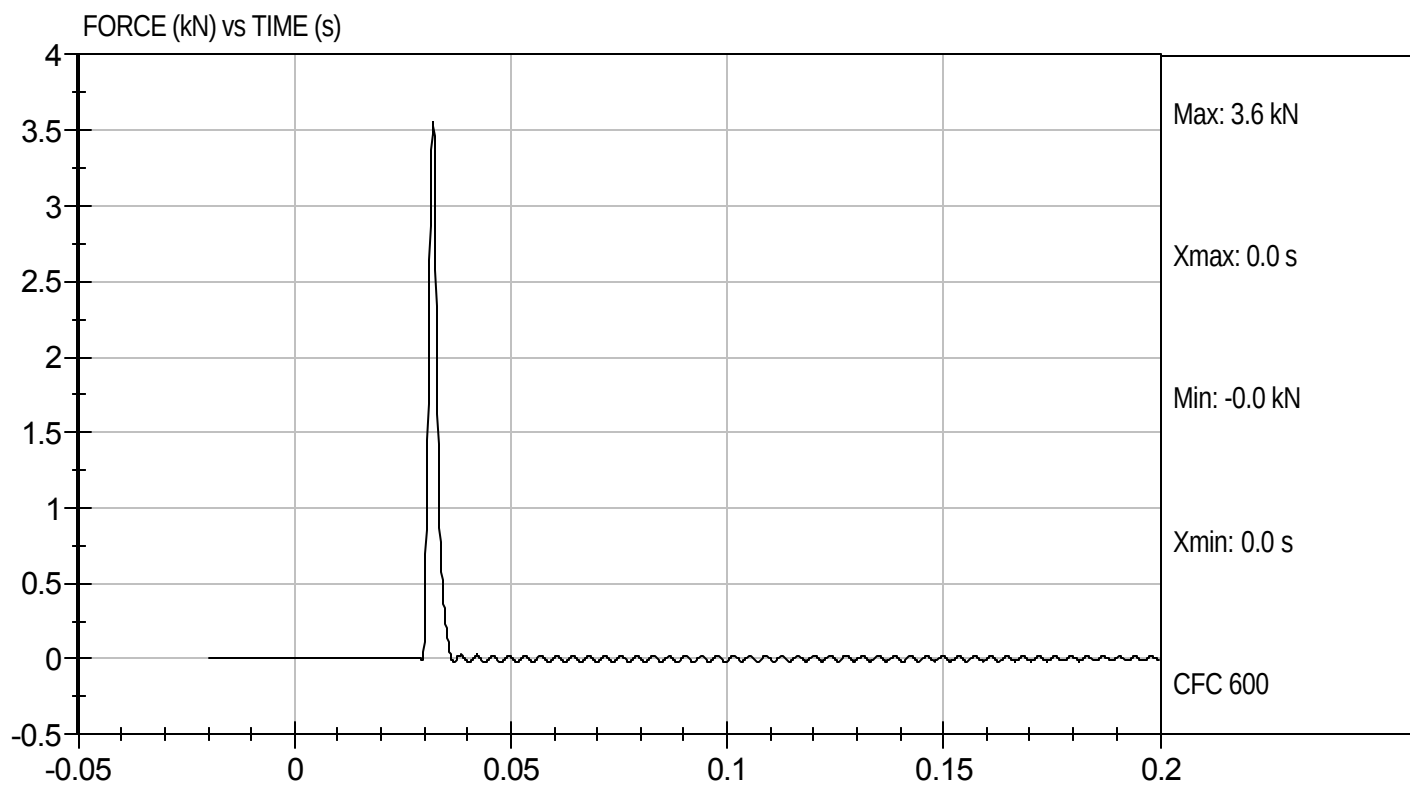
10/21/10
Test Date

David Winkelbauer
Approved By



Test Desc: Left Knee
Component ID: D103615

Test Date: 10/21/10
Velocity: 6.98 ft/s, 2.13 m/s



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D: D103616

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	33	Pass
Probe Speed	m/s	2.07 to 2.13	2.13	Pass
Maximum Force	kN	3.45 to 4.06	3.90	Pass
Overall Test Results				Pass

Jessica Gall
Laboratory Technician

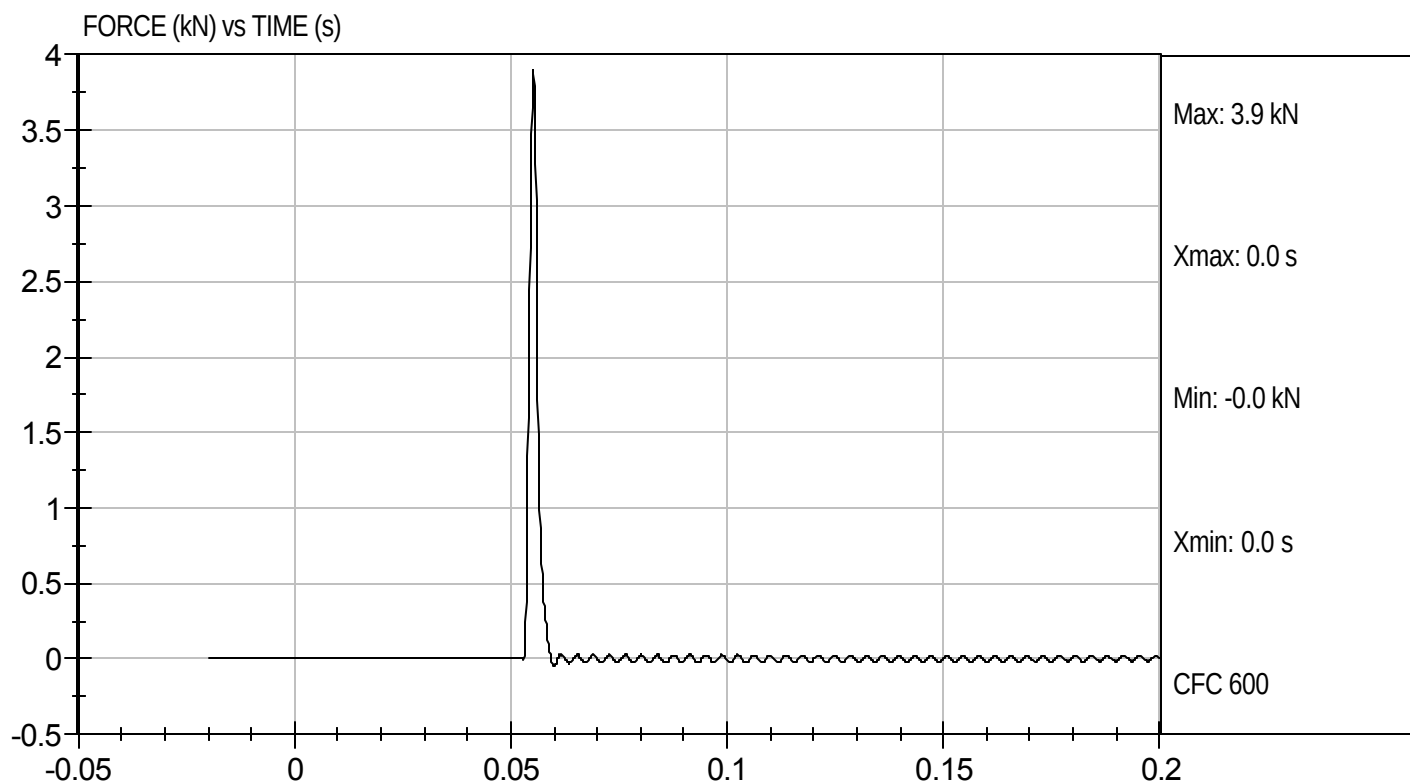
10/21/10
Test Date

David Winkelbauer
Approved By



Test Desc: Left Knee
Component ID: D103616

Test Date: 10/21/10
Velocity: 6.98 ft/s, 2.13 m/s



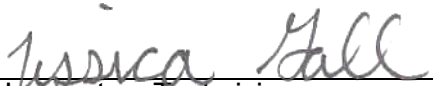
MGA RESEARCH CORPORATION

**TORSO FLEXION TEST
HYBRID III 5TH PERCENTILE**

ATD Serial No: 138

Test I.D: D103617

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	32	Pass
Initial Angle	deg	0 to 20	18	Pass
Return Angle	deg	+/- 8	4	Pass
Force at 45 deg	N	320 to 390	334	Pass
Upper Torso Deflection Rate	Deg/sec	0.5 to 1.5	1.0	Pass
Overall Result				Pass


Laboratory Technician

10/21/10
Test Date


Approved By