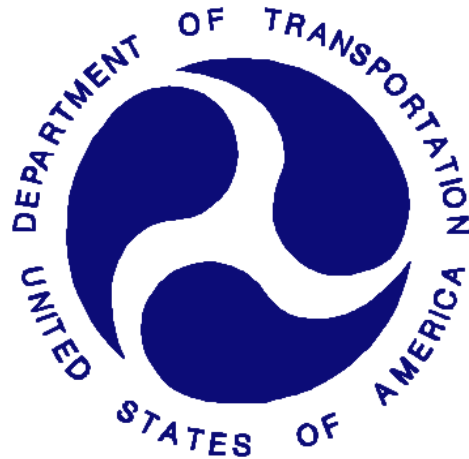


REPORT NUMBER: NCAP-MGA-2012-053

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

**SUZUKI MOTOR CORPORATION
2012 Suzuki SX4 LE 4-Dr Sedan
NHTSA No.: MC0524**

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



Test Date: January 11, 2012

Final Report Date: March 1, 2012

FINAL REPORT

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

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Prepared by: 
Donna Janovicz, Project Manager

Approved by: 
Ben Fischer, Project Engineer

Approval Date: March 1, 2012

FINAL REPORT ACCEPTANCE BY OCWS:

Division Chief, New Car Assessment Program
NHTSA, Office of Crashworthiness Standards

Date: _____

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

Date: _____

Technical Report Documentation Page

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14. <i>Sponsoring Agency Code</i> NVS-111																																																							
15. <i>Supplementary Notes</i>																																																							
16. <i>Abstract</i> A 56.3 km/h NCAP Frontal Impact Test was conducted on the 2012 Suzuki SX4 LE 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 January 11, 2012. The impact velocity was 56.2 km/h and the ambient temperature at the barrier face at the time of impact was 21.3°C. The target vehicle post-test maximum crush was 465 mm located at the vehicle's centerline. The test vehicle's performance was as follows: <table border="1" style="margin: 10px auto; width: 80%; 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>183</td> <td>146</td> </tr> <tr> <td>Maximum Chest Compression</td> <td>mm</td> <td>63</td> <td>52</td> <td>24</td> <td>18</td> </tr> <tr> <td>Nij</td> <td>N/A</td> <td>1</td> <td>1</td> <td>0.40</td> <td>0.65</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>4170</td> <td>2620</td> <td>1537</td> <td>1207</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>4000</td> <td>2520</td> <td>149</td> <td>166</td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>10008</td> <td>6805</td> <td>3059</td> <td>1779</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>10008</td> <td>6805</td> <td>3670</td> <td>1241</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	183	146	Maximum Chest Compression	mm	63	52	24	18	Nij	N/A	1	1	0.40	0.65	Neck Tension	N	4170	2620	1537	1207	Neck Compression	N	4000	2520	149	166	Left Femur Force	N	10008	6805	3059	1779	Right Femur Force	N	10008	6805	3670	1241
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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 Suzuki SX4 LE 4-Dr Sedan at a velocity of 56.2 kph. The test was performed at MGA Research Corporation on January 11, 2012. Pre-and post-test photographs of the vehicle and dummies can be found in Appendix A.

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

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

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

The driver (position 1) ATD (Serial No. 351) and the right-front passenger (position 2) ATD (Serial No. 138) 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 465 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 driver's right knee contacted the steering wheel. 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 glove box.

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)	183	0.40	1537	149	43	24	3059	3670
Passenger (5 th)	146	0.65	1207	166	50	18	1779	1241

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 Head XR after 38 ms.

Passenger Head YR after 51 ms.

Bottom of Engine X.

Barrier 6-13 data is questionable after 65 ms.

Barrier 5-9 data is questionable from 200-250 ms.

Passenger shoulder belt load cell was not installed.

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

SECTION 2
OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2012 Suzuki SX4 LE 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0524
Test Date: 01/11/2012

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	MC0524	Traction Control System (TCS)	Yes
Model Year	2012	Auto-Leveling System	No
Make	Suzuki	Automatic Door Locks (ADLs)	No
Model	SX4	Power Window Auto-Reverse	No
Body Style	Sedan	Other Optional Feature	N/A
VIN	JS2YC5A30C6300337	Driver Front Airbag	Yes
Body Color	Crimson Red Metallic	Driver Curtain Airbag	Yes
Odometer (km/mi)	58 / 36	Driver Head/Torso Airbag	No
Engine Displacement (L)	2.0	Driver Torso Airbag	No
Type/No. Cylinders	4	Driver Torso/Pelvis Airbag	Yes
Engine Placement	Lateral	Driver Pelvis Airbag	No
Transmission Type	Manual	Driver Knee Airbag	No
Transmission Speeds	6	Pass. Curtain Airbag	Yes
Overdrive	No	Pass. Head/Torso Airbag	No
Final Drive	Front	Pass. Torso Airbag	No
Roof Rack	No	Pass. Torso/Pelvis Airbag	Yes
Sunroof/T-Top	No	Pass. Pelvis Airbag	No
Running Boards	No	Driver Seat Belt Pretensioner	Yes
Tilt Steering Wheel	Yes	Pass. Seat Belt Pretensioner	Yes
Power Seats	No	Driver Load Limiter	Yes
Anti-Lock Brakes (ABS)	Yes	Pass. Load Limiter	Yes
All-Wheel Drive (AWD)	No	Other Safety Restraints	N/A
Does owner's manual provide instructions to turn off automatic door locks?			No

DATA FROM CERTIFICATION LABEL

Manufactured By	Suzuki Motor Corporation	GVWR (kg)	1715
Date of Manufacture	06/11	GAWR Front (kg)	960
Vehicle Type	Pass Car	GAWR Rear (kg)	870

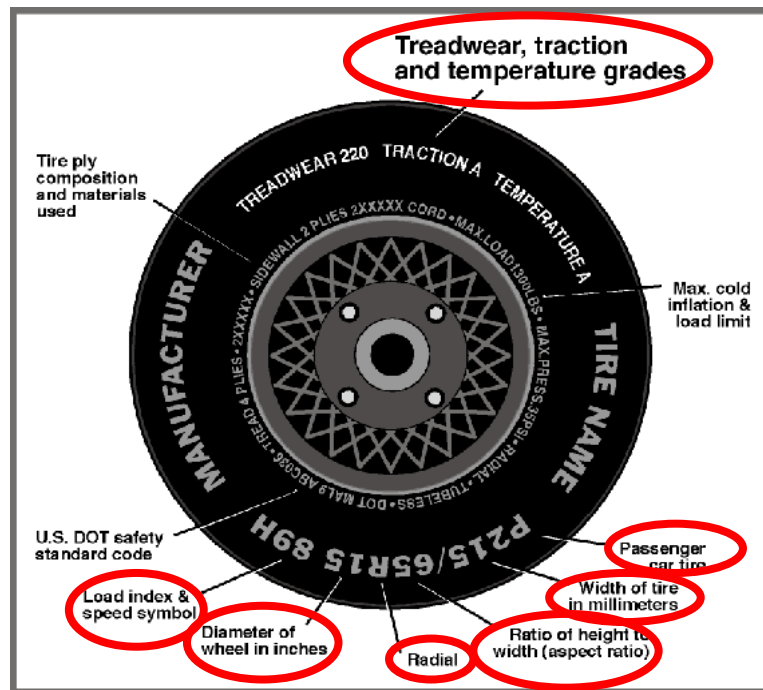
VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Split Bench		
Designated Seating Capacity (DSC)	2	3		5
Capacity Weight (VCW) (kg)				385
Cargo Weight (RCLW) (kg)				45

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

Test Vehicle: 2012 Suzuki SX4 LE 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0524
 Test Date: 01/11/2012



TIRE PLACARD INFORMATION

Measured Parameter	Front	Rear
Recommended Cold Tire Pressure (kPa)	230	230
Recommended Tire Size	P195/65R15	P195/65R15

TIRE SIDEWALL INFORMATION

Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	300	300
Tire Size on Vehicle	P195/65R15	P195/65R15
Tire Manufacturer	YOKOHAMA	YOKOHAMA
Tire Name	Avid	Avid
Tire Type	Passenger	Passenger
Tire Width	195	195
Aspect Ratio	65	65
Radial	Yes	Yes
Wheel Diameter	15	15
Load Index/Speed Symbol	89H	89H
Treadwear	200	200
Traction Grade	A	A
Temperature Grade	A	A
Tire Material	Rubber	Rubber

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

Test Vehicle: 2012 Suzuki SX4 LE 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0524
 Test Date: 01/11/2012

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	372.9	255.8		411.9	323.8	
Right	kg	381.4	246.8		396.4	303.5	
Ratio	%	60.0	40.0		56.3	43.7	
Totals	kg	754.3	502.6	1256.9	808.3	627.3	1435.6

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1256.9
Weight of 1 P572E ATD & 1 P572O ATD	kg	140.6
Rated Cargo/Luggage Weight (RCLW)	kg	45
Calculated Vehicle Target Weight (TVTW)	kg	1442.5

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	702	703	704	705	1002
As Tested	mm	694	697	669	674	1095
Post Test	mm	717	713	670	668	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2506
Total Vehicle Length at Left Side	mm	4275
Total Vehicle Length at Centerline	mm	4488
Total Vehicle Length at Right Side	mm	4275
Weight of Ballast in Cargo Area	kg	29.9
Weight of Vehicle Components Removed	kg	18.6
Amount of Stoddard Solvent in Fuel Tank	L	46.5

List of components removed: Spare tire, tools, right taillight, rear floor mats, and trunk carpet.

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

Test Vehicle: 2012 Suzuki SX4 LE 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0524
 Test Date: 01/11/2012

TARGET VEHICLE STRUCTURAL MEASUREMENT

	Elements	Pre-Test (mm)
1	Total Length	4488
2	Total Width	1706
3	Bumper Top Height	547
4	Bumper Bottom Height	447
5	Longitudinal Member Top Height	468
6	Distance between Longitudinal Members	895
7	Longitudinal Member Width	60
8	Engine Top Height	823
9	Engine Bottom Height	182
10	Engine and Gearbox Width	901
11	Front Bumper-Engine Distance	340
12	Front Shock Absorber Fixing Height	836
13	Bonnet Leading Edge Height	750
14	Front Shock Absorber Fixing Width	1132
15	Front Bumper – Front Axle Distance	888
16	Front Axle – A-Pillar Distance	435
17	A-Pillar – B-Pillar Distance	1033
18	B-Pillar – Rear Axle Distance	1035
19	B-Pillar – C-Pillar Distance	605
20	Roof Sill Bottom Height	1456
21	Roof Sill Top Height	1544
22	Floor Sill Bottom Height	183
23	Floor Sill Top Height	380

DATA SHEET NO. 2

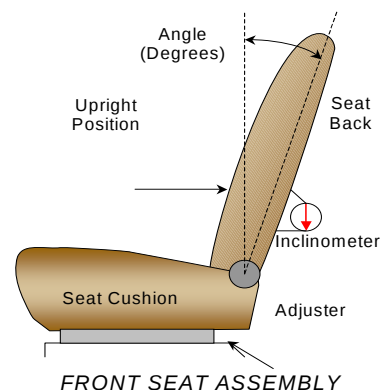
SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

Test Vehicle: 2012 Suzuki SX4 LE 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0524
 Test Date: 01/11/2012

NOMINAL DESIGN RIDING POSITION

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



SEAT BACK ANGLE	Degrees
Driver Seat Back Angle	7.0° on headrest post
Passenger Seat Back Angle	6.5° on headrest post

SEAT FORE/AFT POSITIONS

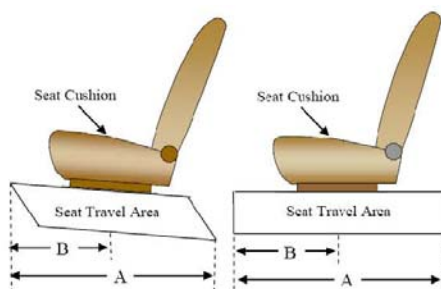
The driver and passenger seat fore/aft positions are adjusted following Appendix F, "Driver & Passenger Dummy Seating & Positioning Procedures" in the NCAP Test Procedure dated January 2010.

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	15 detents (first as 1)	6 th detent (forward-most as 0)
Passenger Seat	15 detents (first as 1)	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)	1 (uppermost as 0)
Passenger Seat	4 (1 st as 0)	1 (uppermost as 0)



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

Test Vehicle: 2012 Suzuki SX4 LE 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0524
 Test Date: 01/11/2012

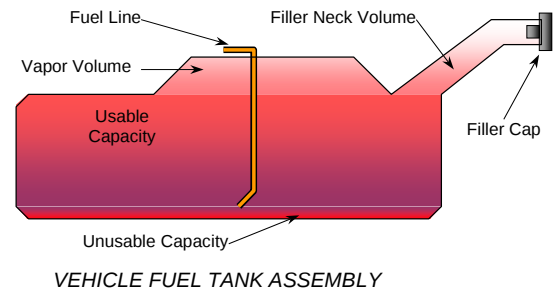
FUEL TANK CAPACITY DATA

	Liters
Usable Capacity of "Standard Tank"	50.0
Usable Capacity of "Optional Tank"	
92-94% of Usable Capacity	45.9 to 47.0
Actual Amount of Solvent used	46.5
1/3 of Usable Capacity	16.7

FUEL PUMP

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

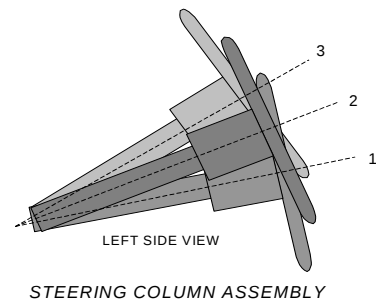
The vehicle is equipped with an electric fuel pump. Turn the vehicle ignition key to the ON position. The fuel pipe is on the left side.



STEERING COLUMN ADJUSTMENT

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

STEERING COLUMN POSITION

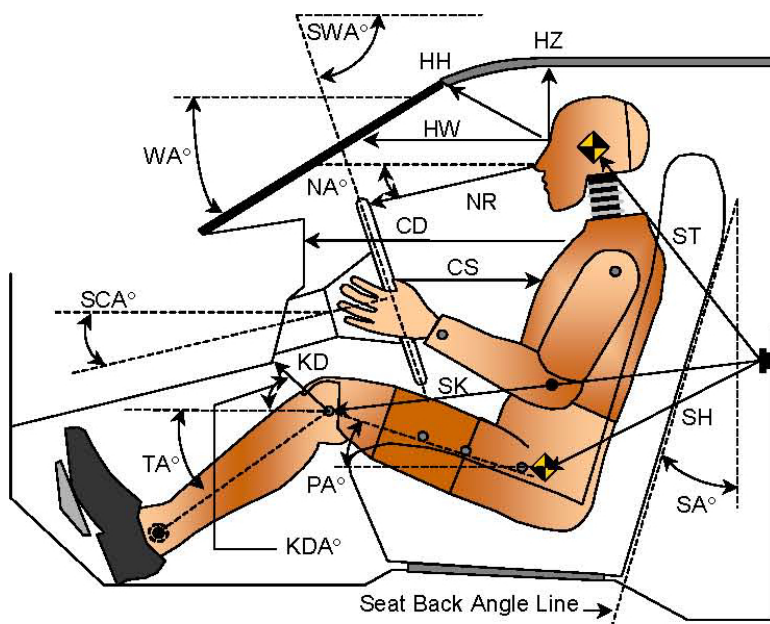


	Degrees	Fore/Aft Position (mm)
Lowermost – Position 1	67.4	
Geometric Center – Position 2	64.4	
Uppermost – Position 3	61.4	
Telescoping Steering Wheel Travel		
Test Position	64.4	

DATA SHEET NO. 3 DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2012 Suzuki SX4 LE 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0524
Test Date: 01/11/2012



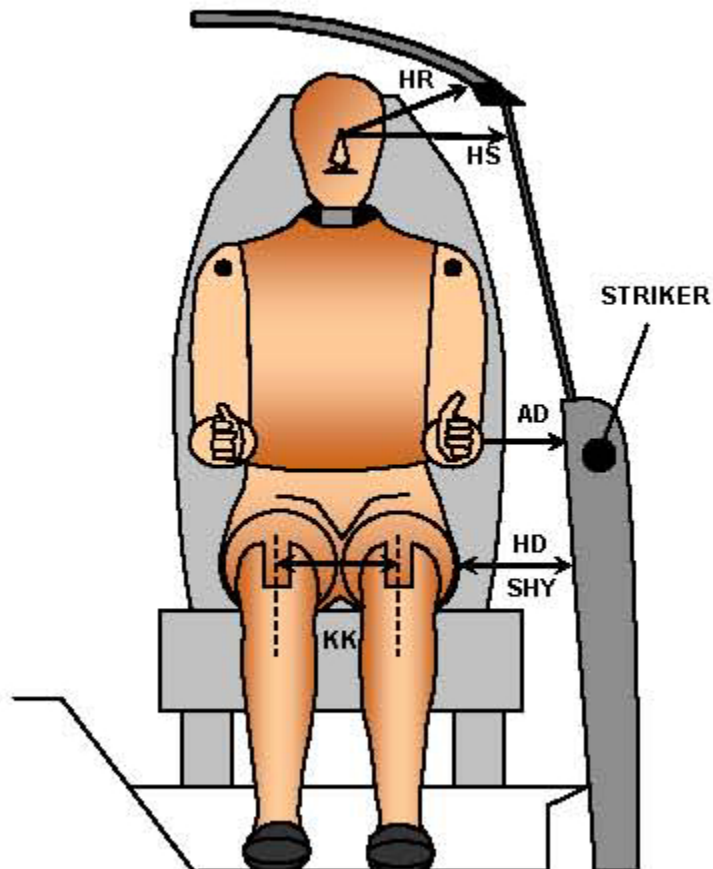
LEFT SIDE VIEW

Code	Measurement Description	Driver S/N 351		Passenger S/N 138	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		27.7		
SWA°	Steering Wheel Angle		64.4		
SCA°	Steering Column Angle		25.6		
SA°	Seat Back Angle (on headrest post)		7.0		6.5
HZ	Head to Roof (Z)	217	90	274	90
HH	Head to Header	340	26.3	304	45.2
HW	Head to Windshield	648	0	683	0
NR	Nose to Rim	402	13.6		
CD	Chest to Dash	525		426	
CS	Chest to Steering Hub	314	7.9		
RA	Rim to Abdomen	185	0		
KDL	Left Knee to Dash	153	33.0	94	35.3
KDR	Right Knee to Dash	132	29.5	99	38.1
PA°	Pelvic Angle		23.8		21.0
TA°	Tibia Angle		56.4		57.9
SK	Striker to Knee	536	89.5	626	96.5
ST	Striker to Head	490	8.7	446	23.5
SH	Striker to H-Point	225	132.6	350	112.4

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2012 Suzuki SX4 LE 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0524
 Test Date: 01/11/2012



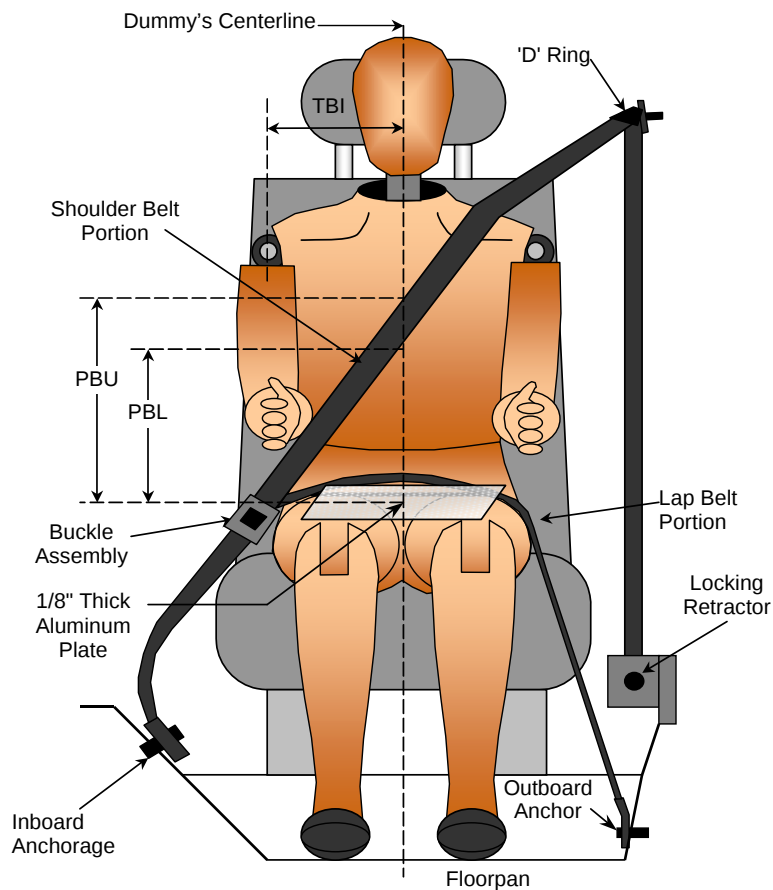
FRONT VIEW OF DUMMY

Code	Measurement Description	Driver S/N 351	Passenger S/N 138
		Length (mm)	
AD	Arm to Door	128	97
HD	H-Point to Door	142	172
HR	Head to Side Header	202	256
HS	Head to Side Window	306	394
KK	Knee to Knee	355	231
SHY	Striker to H-Point (Y Direction)	270	318
AA	Ankle to Ankle	370	179

DATA SHEET NO. 5 SEAT BELT POSITIONING DATA

Test Vehicle: 2012 Suzuki SX4 LE 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0524
Test Date: 01/11/2012



FRONT VIEW OF DUMMY

SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU - Top surface of reference to belt upper edge	mm	370	345
PBL - Top surface of reference to belt lower edge	mm	290	235

BELT LENGTH DATA

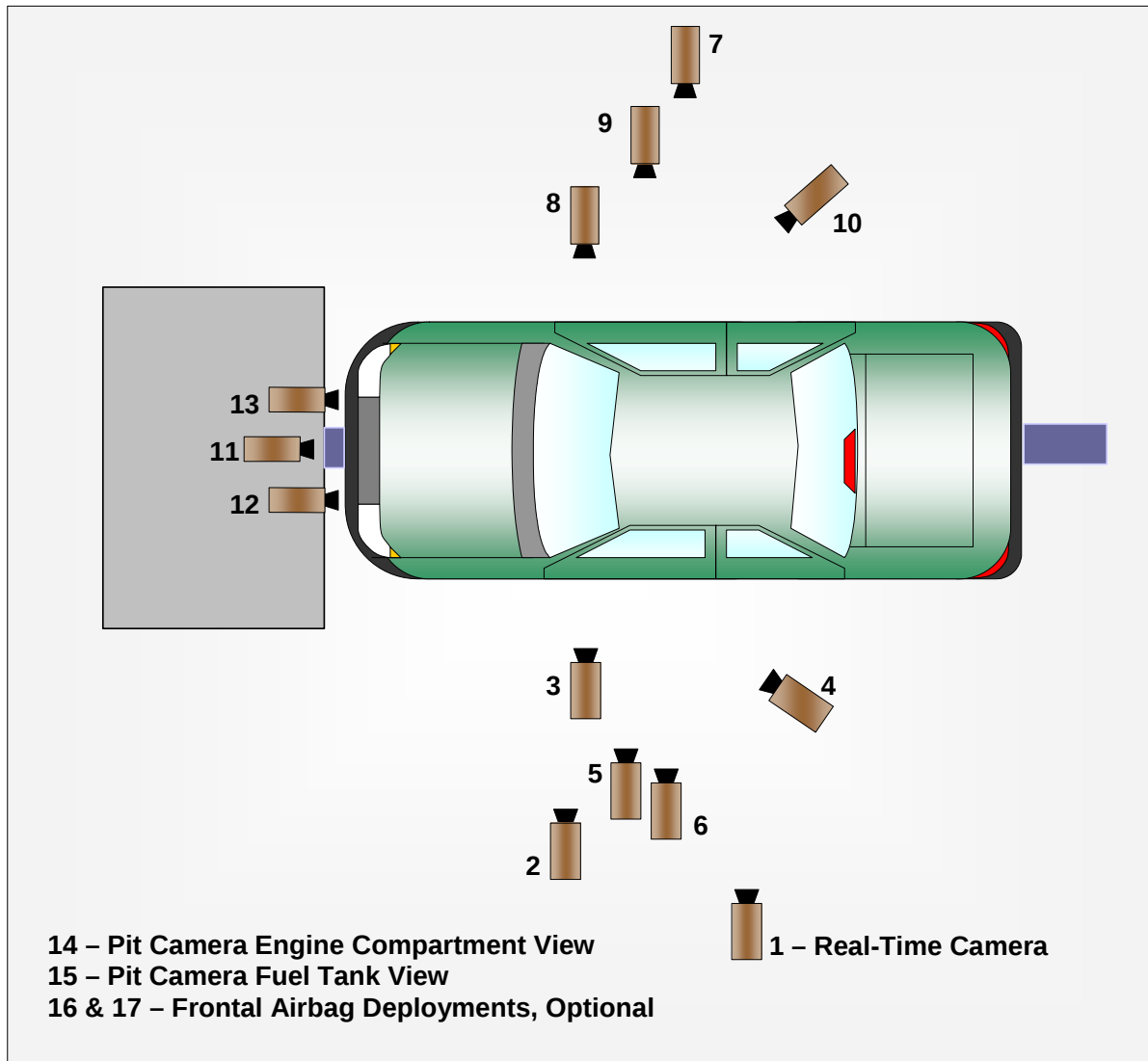
Measurement Description	Units	Driver	Passenger
Shoulder Belt Length as measured on ATD	mm	850	860
Lap Belt Length as measured on ATD	mm	830	900
Remainder of belt on reel	mm	1590	1510
Total Belt Length for Continuous Webbing Systems	mm	3270	3270

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

Test Vehicle: 2012 Suzuki SX4 LE 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0524
Test Date: 01/11/2012

CAMERA POSITIONS FOR FRONTAL IMPACTS



DATA SHEET NO. 6 (CONTINUED)

CAMERA LOCATIONS AND DATA

Test Vehicle: 2012 Suzuki SX4 LE 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0524
 Test Date: 01/11/2012

CAMERA LOCATIONS

No.	Camera View	Coordinates (mm)			Lens (mm)	Speed (fps)
		X*	Y*	Z*		
1	Real-Time Left Overall					30
2	Driver Close-Up	1390	-6780	-1820	35	1000
3	Left Front Half	1090	-4790	-1060	24	1000
4	Left Angle	5250	-4710	-1910	50	1000
5	Steering Column - Top	560	-5300	-1220	24	1000
6	Steering Column - Bottom	540	-5260	-830	24	1000
7	Right Overall	2170	6400	-1090	20	1000
8	Passenger Close-Up	1630	6640	-1840	35	1000
9	Right Front Half	1130	4900	-1070	24	1000
10	Right Angle	5530	4670	-1930	50	1000
11	Windshield	-130	0	-2810	24	1000
12	Driver Windshield	-250	-450	-2030	12.5	1000
13	Passenger Windshield	-250	450	-2030	12.5	1000
14	Pit Front	1110	0	3150	24	1000
15	Pit Rear	2940	0	3150	24	1000
16	Onboard Driver Side (optional)					
17	Onboard Passenger Side (optional)					
18	Real-Time Pan View					30

***COORDINATES:**

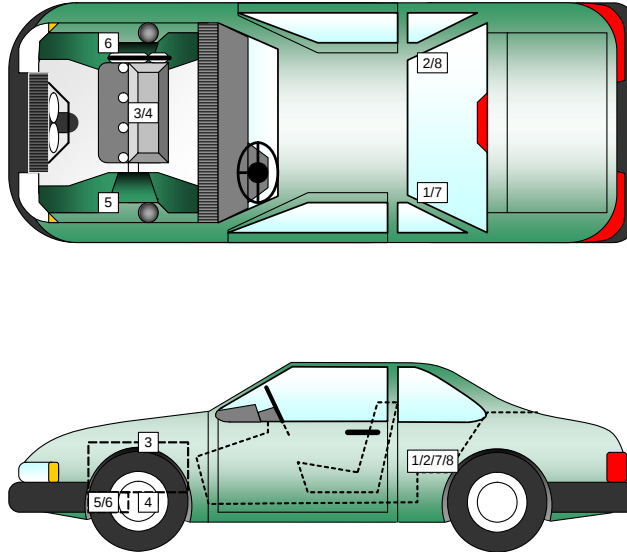
+X = forward of impact plane
 +Y = right of monorail centerline
 +Z = below ground level

Cameras 16 & 17 were not used for this test.

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

Test Vehicle: 2012 Suzuki SX4 LE 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0524
 Test Date: 01/11/2012



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear Accelerometer – X Direction	1835	-335	-246
2	Right Rear Accelerometer – X Direction	1835	325	-246
3	Engine Top X	3602	20	-785
4	Engine Bottom X	3759	0	-247
5	Left Brake Caliper X	3718	-667	-247
6	Right Brake Caliper X	3718	667	-247
7	Left Rear Accelerometer Redundant – X Direction			
8	Right Rear Accelerometer Redundant – X Direction			

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

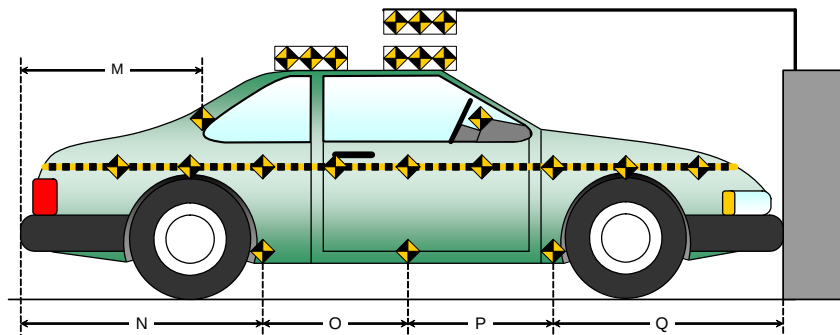
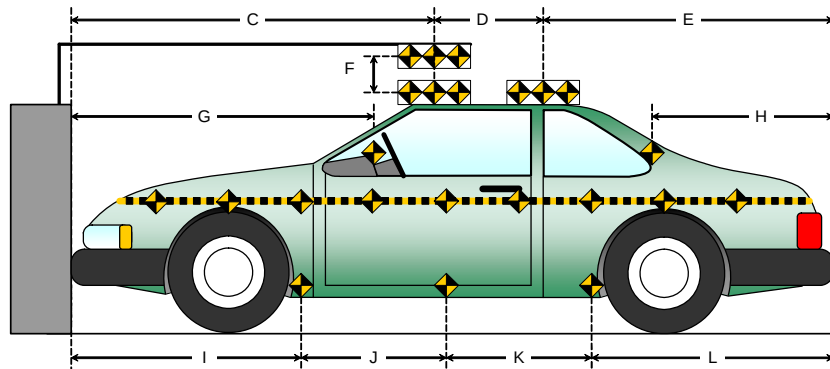
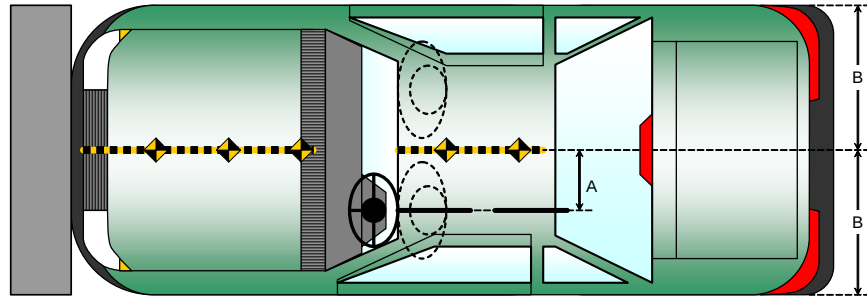
DATA SHEET NO. 8

PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2012 Suzuki SX4 LE 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0524
 Test Date: 01/11/2012

Item	Value (mm)
A	350
B	853
C	2220
D	670
E	1598
F	178
G	
H	1165
I	1327
J	817
K	817
L	1527
M	1161
N	1527
O	817
P	817
Q	1327

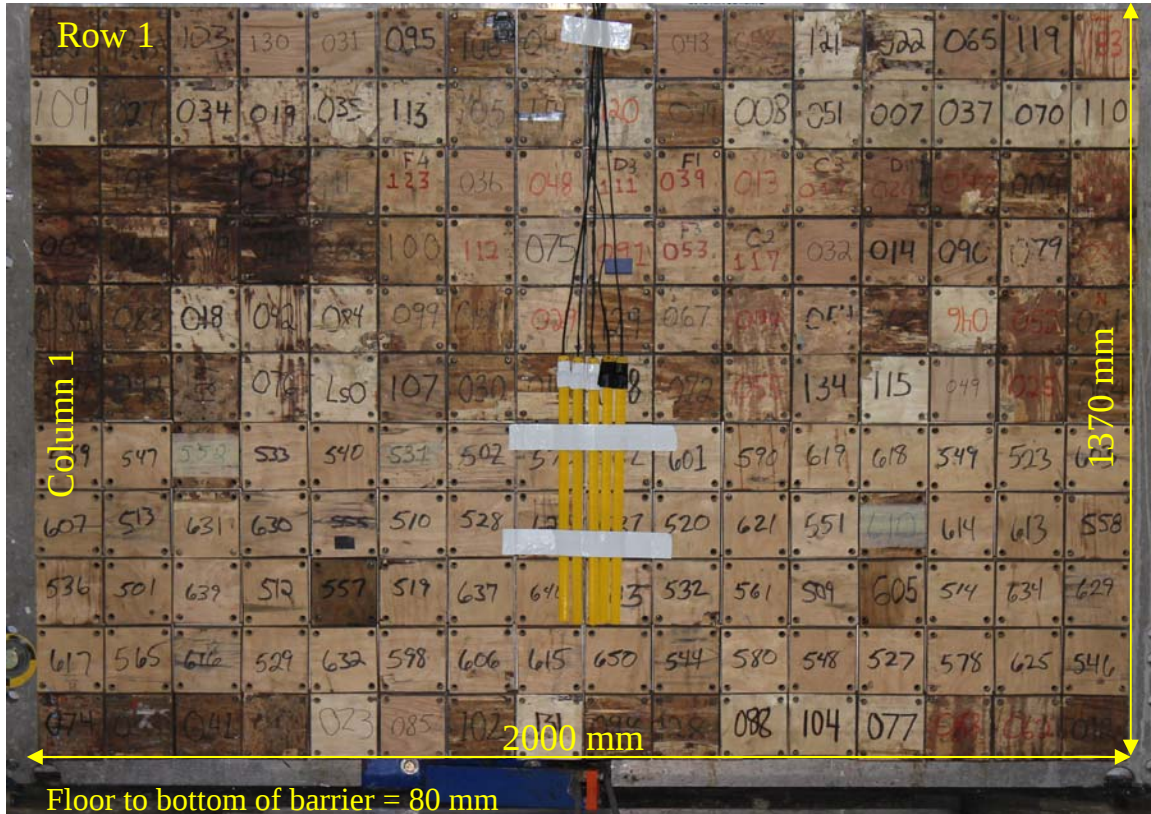


DATA SHEET NO. 9 **LOAD CELL LOCATIONS ON FIXED BARRIER**

Test Vehicle: 2012 Suzuki SX4 LE 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0524
 Test Date: 01/11/2012

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 Suzuki SX4 LE 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0524
Test Date: 01/11/2012

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 Suzuki SX4 LE 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0524
Test Date: 01/11/2012

TEST DUMMY INFORMATION AND CONTACT LOCATIONS

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	None	None
Left Knee Contact	Knee Bolster	Glove Box
Right Knee Contact	Knee Bolster, Steering Wheel	Glove Box

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 had to be opened with tools	Door remained closed and latched; Door opened without tools
Rear Door Opening	Door remained closed and latched; Door opened without tools	Door remained closed and latched; Door opened without tools
Seat Track Shift (mm)	0	0
Seat Back Failure	None	None

POST TEST STRUCTURAL OBSERVATIONS

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

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	3075
Center	mm	3057
Right Side	mm	3050
Average	mm	3061

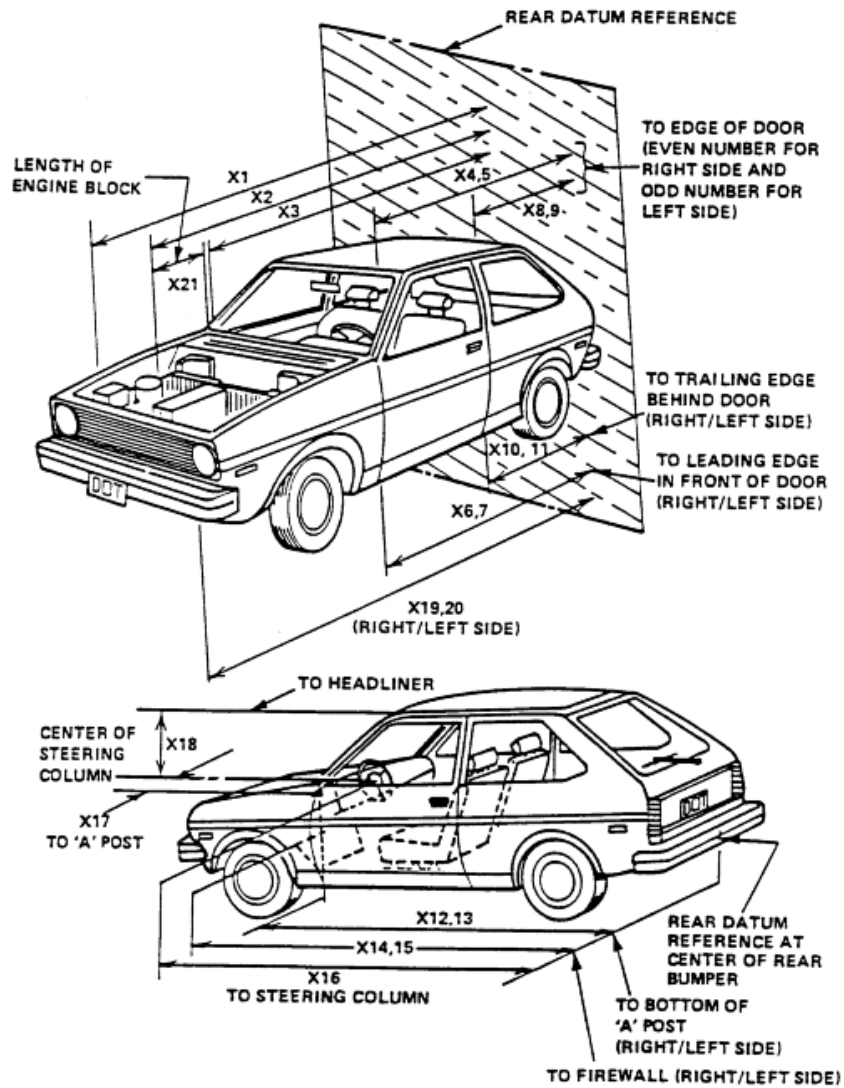
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

DATA SHEET NO. 12 VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2012 Suzuki SX4 LE 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0524
Test Date: 01/11/2012



DATA SHEET NO. 12 (CONTINUED)
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2012 Suzuki SX4 LE 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0524
 Test Date: 01/11/2012

RSOV (Rear Surface of Vehicle)

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	mm	4488	4023	465
2	RSOV to Front of Engine	mm	3947	3735	212
3	RSOV to Firewall	mm	3494	3494	0
4	RSOV to Upper Leading Edge of Right Door	mm	3061	3060	1
5	RSOV to Upper Leading Edge of Left Door	mm	3065	3065	0
6	RSOV to Lower Leading Edge of Right Door	mm	3066	3066	0
7	RSOV to Lower Leading Edge of Left Door	mm	3075	3075	0
8	RSOV to Upper Trailing Edge of Right Door	mm	2065	2065	0
9	RSOV to Upper Trailing Edge of Left Door	mm	2070	2070	0
10	RSOV to Lower Trailing Edge of Right Door	mm	2100	2100	0
11	RSOV to Lower Trailing Edge of Left Door	mm	2102	2102	0
12	RSOV to Bottom of "A" Post of Right Side	mm	3071	3071	0
13	RSOV to Bottom of "A" Post of Left Side	mm	3075	3075	0
14	RSOV to Firewall, Right Side	mm	3455	3450	5
15	RSOV to Firewall, Left Side	mm	3470	3465	5
16	RSOV to Steering Column	mm	2663	2693	-30
17	Center of Steering Column to "A" Post	mm	364	359	5
18	Center of Steering Column to Headliner	mm	449	480	-31
19	RSOV to Right Side of Front Bumper	mm	4275	4062	213
20	RSOV to Left Side of Front Bumper	mm	4275	3957	318
21	Length of Engine Block	mm	465	465	0
RD	RSOV to Right Side of Dash Panel	mm	2839	2836	3
CD	RSOV to Center of Dash Panel	mm	2872	2872	0
LD	RSOV to Left Side of Dash Panel	mm	2840	2836	4

DATA SHEET NO. 13
ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2012 Suzuki SX4 LE 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0524
Test Date: 01/11/2012

VEHICLE INFORMATION

VIN: JS2YC5A30C6300337 Wheelbase (mm): 2506
Vehicle Size Category: Sedan Test Weight (kg): 1435.6

ACCELEROMETER DATA

Accelerometer Locations: As per measurements on Page 15

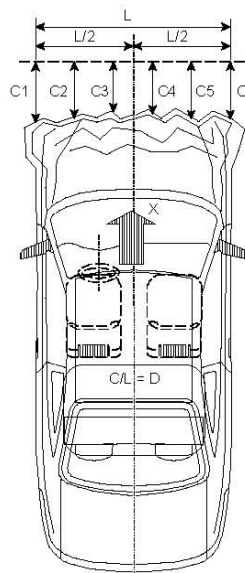
Cal. Procedure/Interval: MGA procedure / 6 month

Integration Algorithm: Trapezoidal Linearity: > 99%

Impact Velocity (km/h): 56.2

Velocity Change (km/h): 64.3

Time of Separation (msec): 82.9



CRUSH PROFILE

Collision Deformation Classification: Frontal

Midpoint of Damage: Centerline

Damage Region Length (mm): 1380

Impact Mode: Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	4275	3957	318
C2	Crush zone 2 at left side	mm	4400	4008	392
C3	Crush zone 3 at left side	mm	4445	4022	423
C4	Crush zone 4 at right side	mm	4445	3993	452
C5	Crush zone 5 at right side	mm	4400	3998	402
C6	Crush zone 6 at right side	mm	4275	4062	213
L	C1 TO C6	mm	1380	1424	-44

DATA SHEET NO. 14
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2012 Suzuki SX4 LE 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

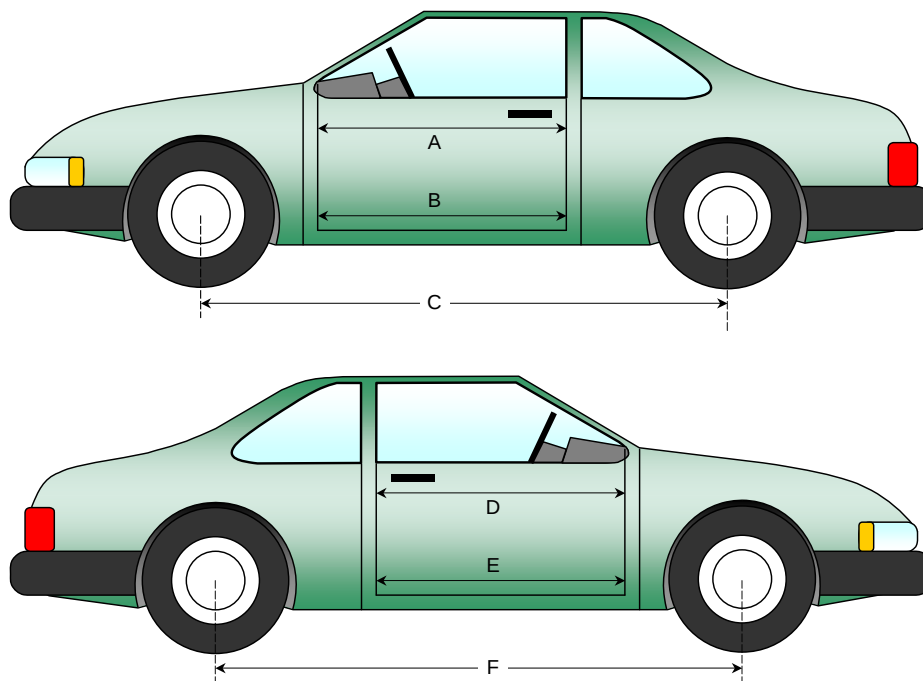
NHTSA No.: MC0524
Test Date: 01/11/2012

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	866	866	0
B	Left Side Lower	mm	837	837	0
D	Right Side Upper	mm	866	866	0
E	Right Side Lower	mm	837	837	0

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2506	2427	79
F	Right Side Wheelbase	mm	2506	2429	77



DATA SHEET NO. 14 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

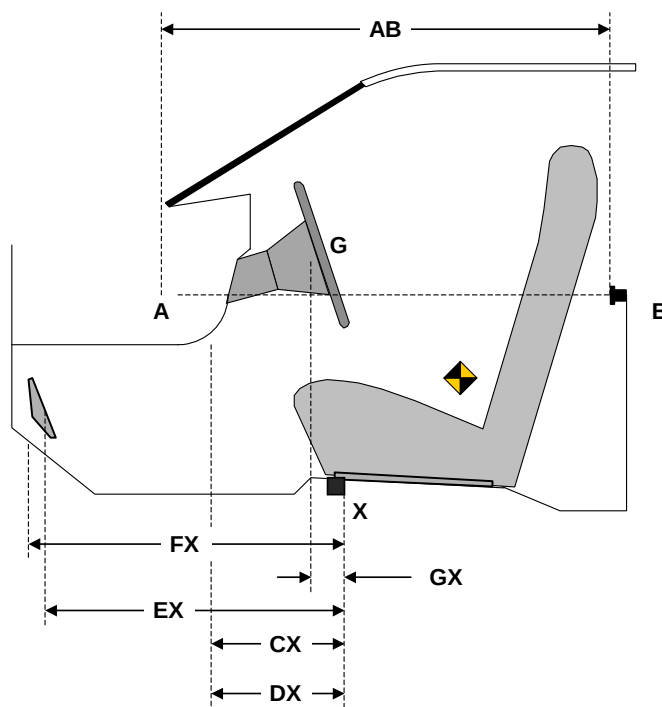
Test Vehicle: 2012 Suzuki SX4 LE 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0524
 Test Date: 01/11/2012

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside window jam)	mm	661	661	0
CX	Left Knee Bolster to X	mm	240	254	-14
DX	Right Knee Bolster to X	mm	245	260	-15
EX	Brake Pedal to X	mm	517	460	57
FX	Foot Rest to X	mm	516	505	11
GX	Center of Steering Column Wheel Hub to X	mm	51	157	-106

X = Front of Seat Track (stationary)

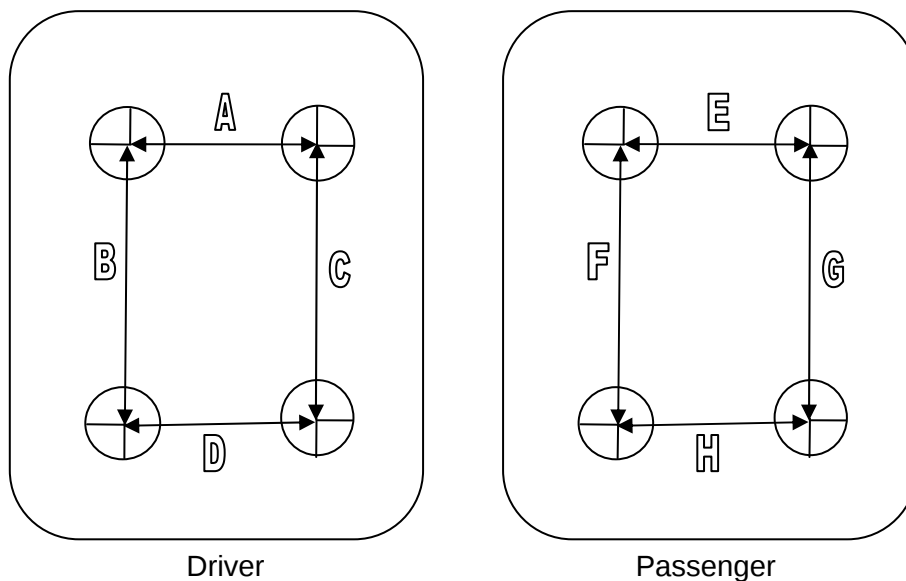


DRIVER COMPARTMENT

DATA SHEET NO. 14 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2012 Suzuki SX4 LE 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0524
 Test Date: 01/11/2012



TOP VIEW THROUGH FLOOR PAN

UNDERBODY FLOORBOARD DEFORMATION

Measurement	Units	Pre-Test	Post-Test	Difference
A	mm	320	320	0
B	mm	320	320	0
C	mm	320	320	0
D	mm	320	320	0
E	mm	320	320	0
F	mm	320	320	0
G	mm	320	320	0
H	mm	320	320	0

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

Test Vehicle: 2012 Suzuki SX4 LE 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0524
 Test Date: 01/11/2012

Windshield Mounting Details:

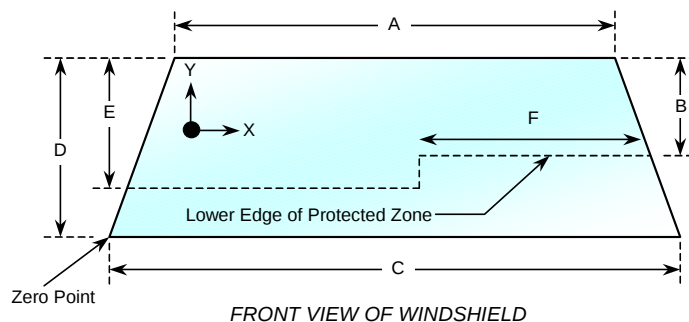
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

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: 21.3°C

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% of Retention
Left Side	2117	2117	100
Right Side	2117	2117	100
Total	4234	4234	100



Item	Units	Value
A	mm	1072
B	mm	566
C	mm	1410
D	mm	876
E	mm	565
F	mm	478

AREA OF PROTECTED ZONE FAILURES - NONE

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

X	Y

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

X	Y

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

Test Vehicle: 2012 Suzuki SX4 LE 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0524
Test Date: 01/11/2012

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Test Time: 10:19 am

Temperature: 21.3° C

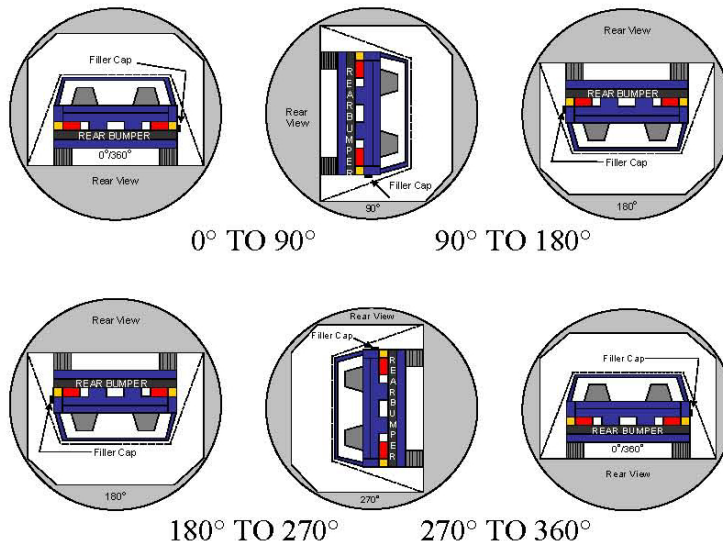
- A. From impact until vehicle motion ceases: 0 oz.
(Maximum Allowable = 1 ounce)
- B. For the 5 minute period after motion ceases: None
(Maximum allowable = 5 ounces)
- C. For the following 25 minutes: None
(Maximum allowable = 1 oz./minute)
- D. Spillage Details: None

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

Test Vehicle: 2012 Suzuki SX4 LE 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0524
 Test Date: 01/11/2012

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°	111	300	411
180° to 270°	105	300	405
270° to 360°	111	300	411

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

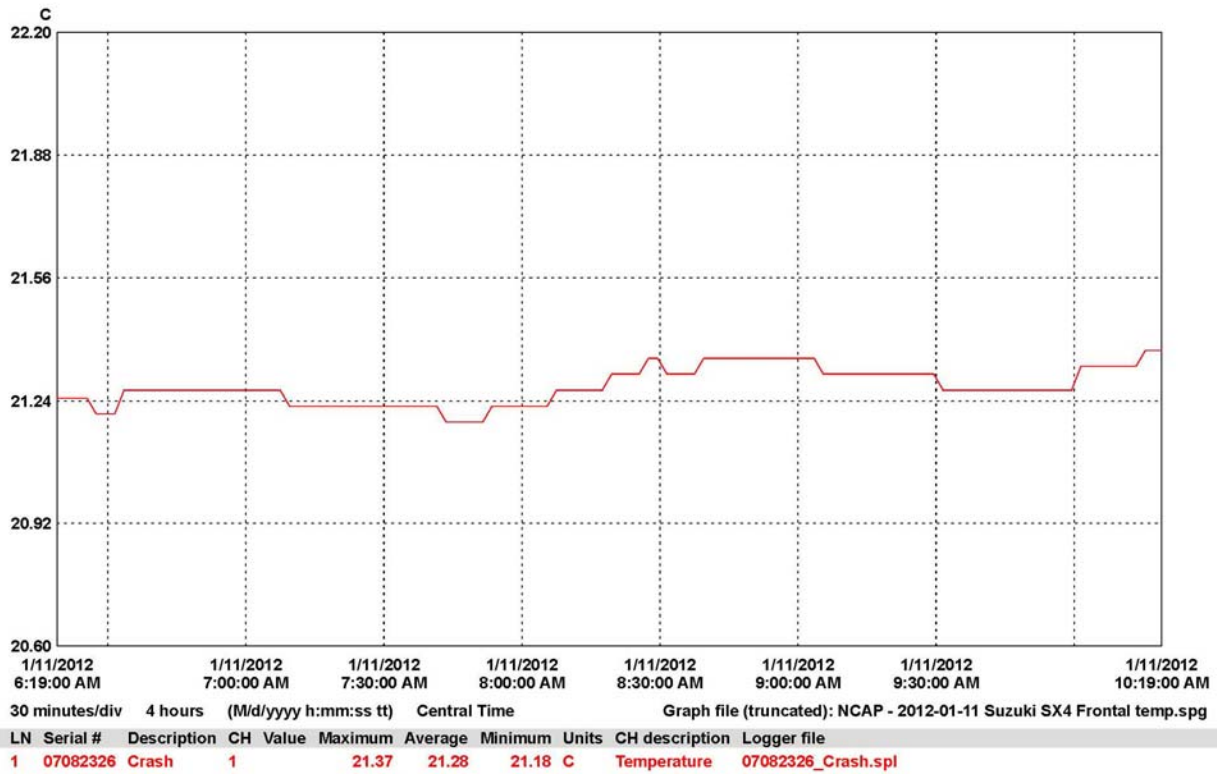
ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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 Suzuki SX4 LE 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MC0524
 Test Date: 01/11/2012



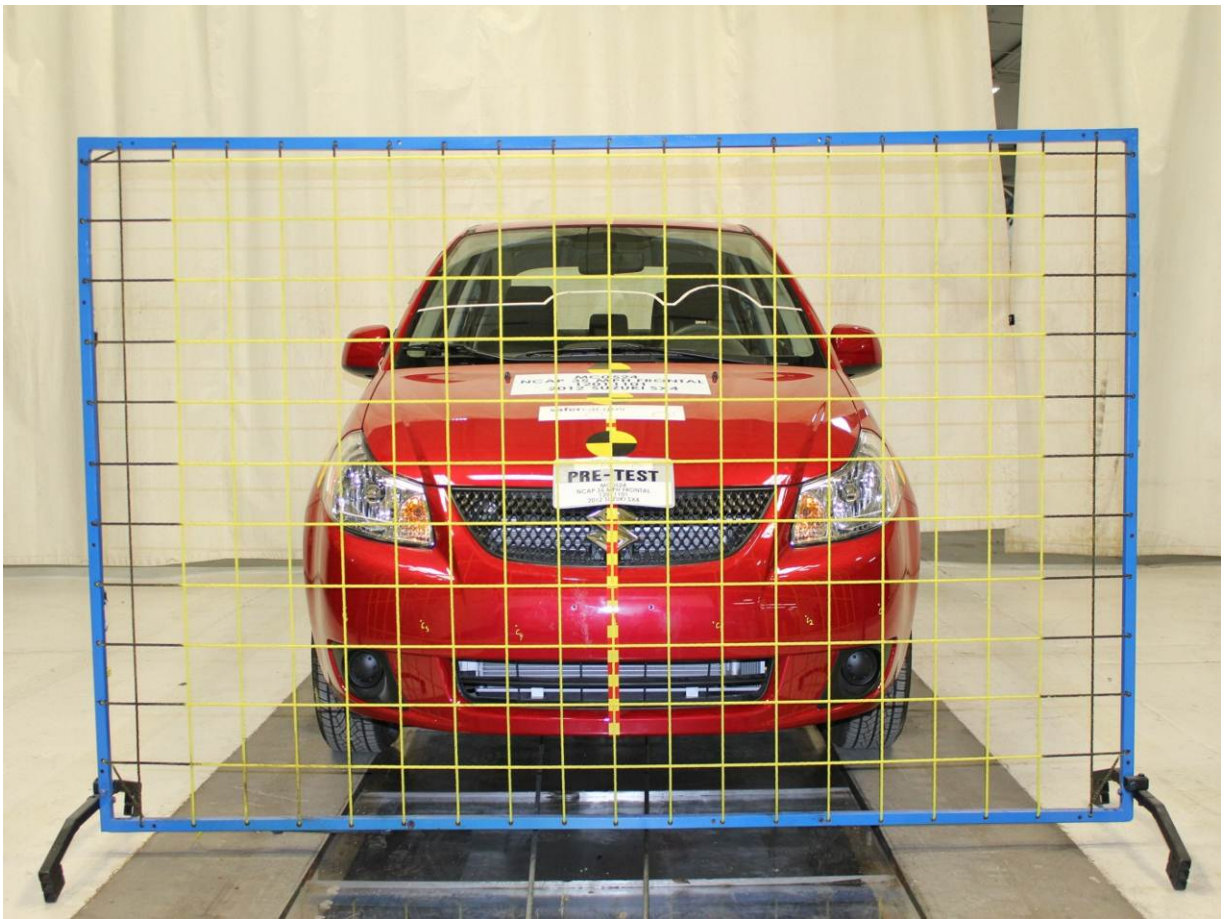
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Load Cell Location



Load Cell Wall



Manufacturer's Label



Tire Placard



2012 Suzuki SX4 LE Frontal As Delivered



Left Rear Three-Quarter View, As Received



Pre-Test Front View of Test Vehicle



Post-Test Front View of Test Vehicle



Pre-Test Left View of Test Vehicle



Post-Test Left View of Test Vehicle



Pre-Test Right View of Test Vehicle



Post-Test Right View of Test Vehicle



Pre-Test Right Front Three-Quarter View



Post-Test Right Front Three-Quarter View



Pre-Test Left Rear Three-Quarter View



Post-Test Left Rear Three-Quarter View



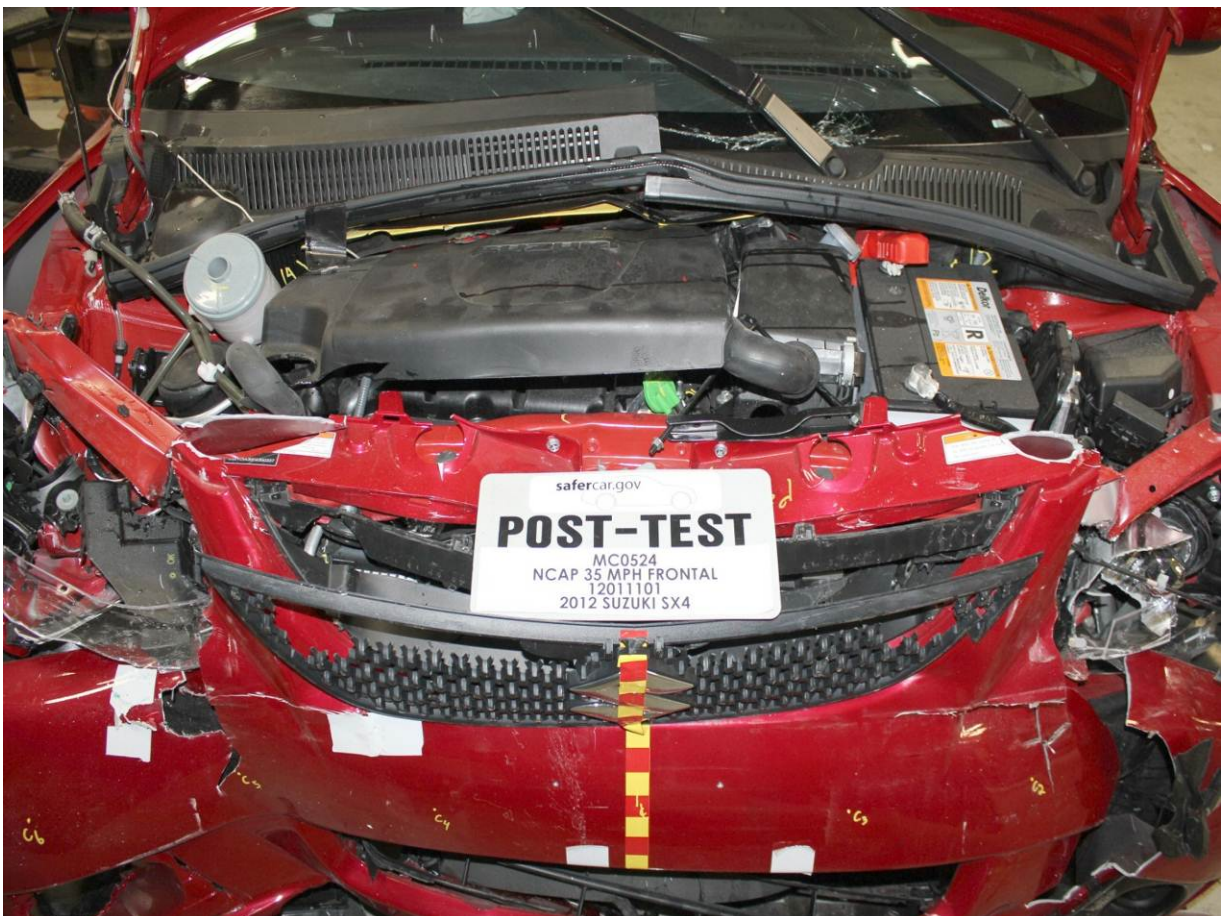
Pre-Test Windshield View



Post-Test Windshield View



Pre-Test Engine Compartment View



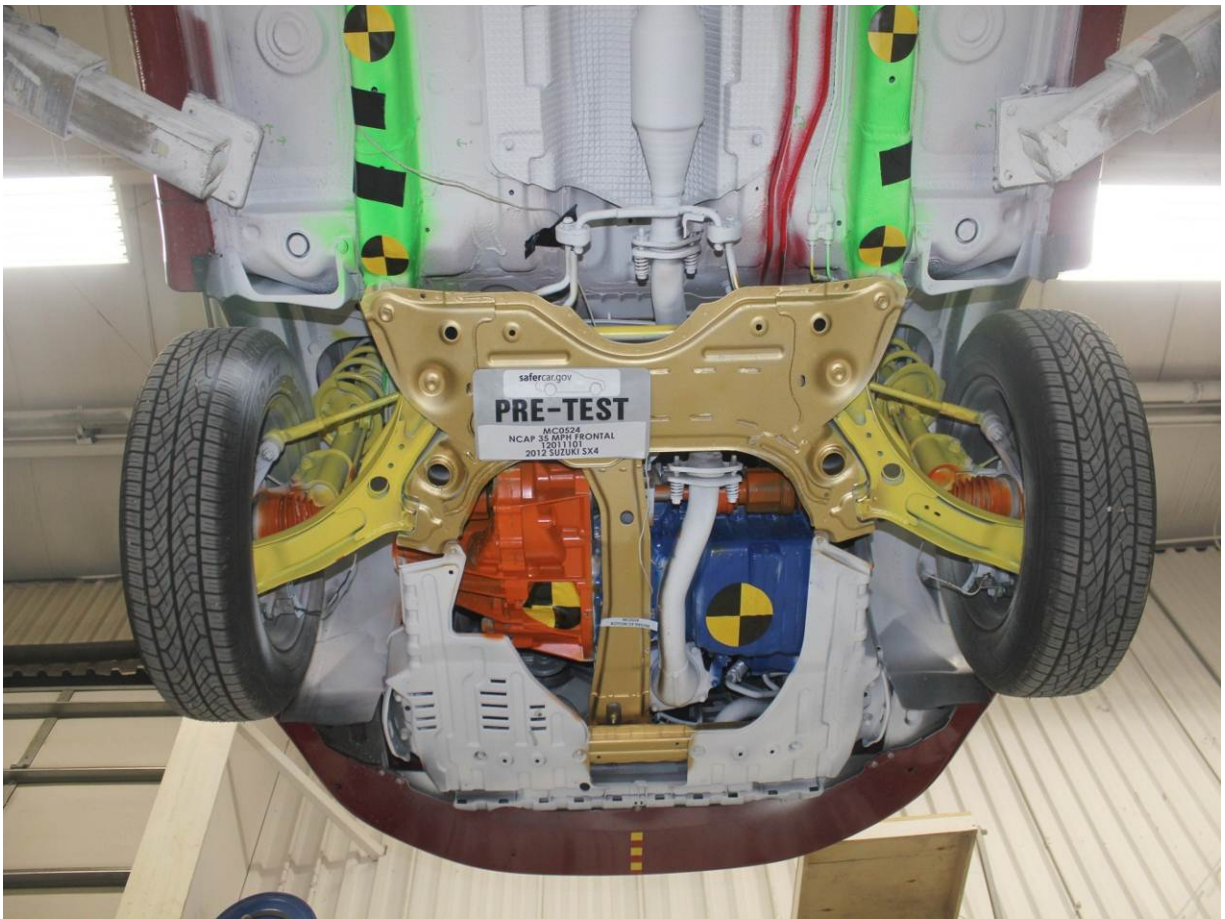
Post-Test Engine Compartment View



Pre-Test Fuel Filler Cap View



Post-Test Fuel Filler Cap View



Pre-Test Front Underbody View



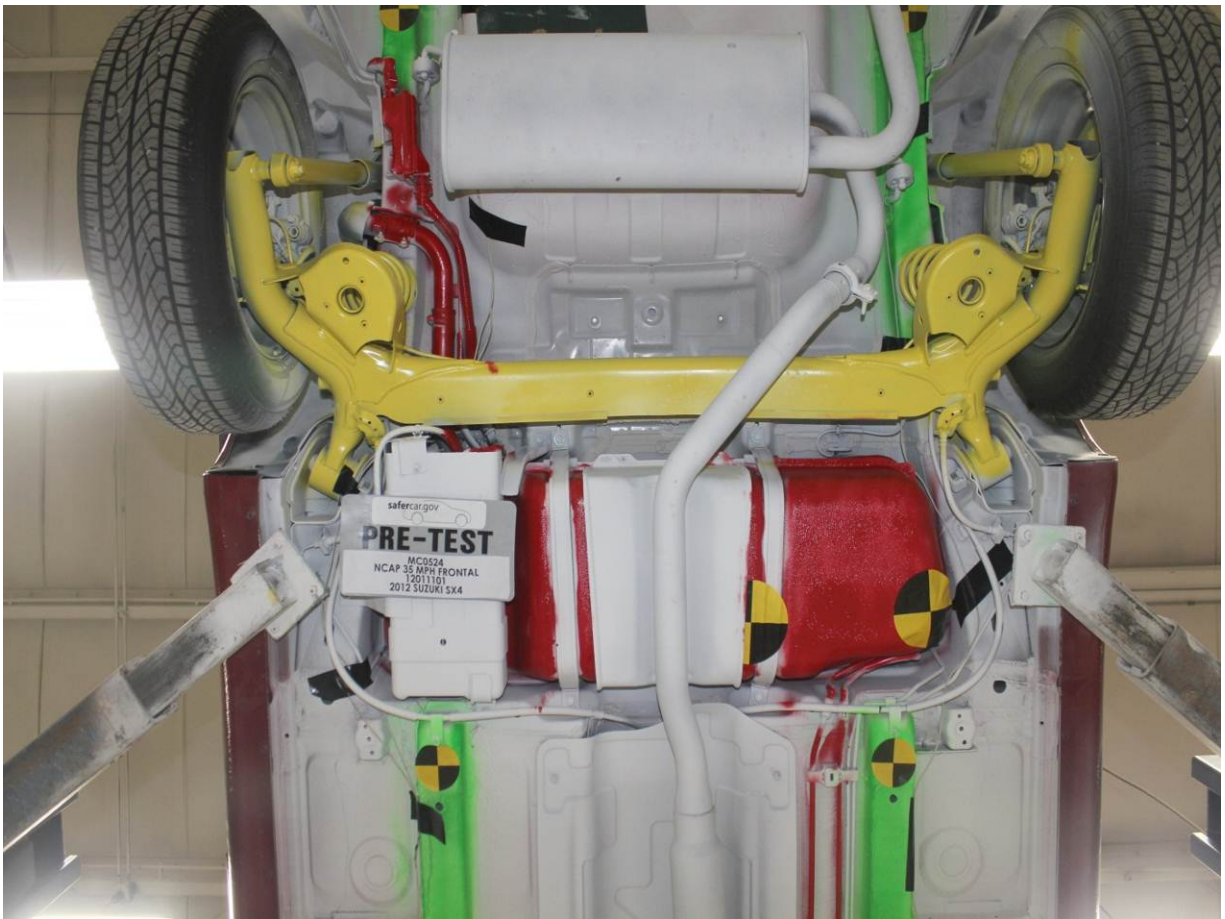
Post-Test Front Underbody View



Pre-Test Mid Front Underbody View



Post-Test Mid Front Underbody View



Pre-Test Mid Rear Underbody View



Post-Test Mid Rear Underbody View



Pre-Test Rear Underbody View



Post-Test Rear Underbody View



Pre-Test Dummy Cable Routing



Post-Test Dummy Cable Routing



Pre-Test Driver Dummy Front View



Post-Test Driver Dummy Front View



Pre-Test Driver Dummy Window View



Post-Test Driver Dummy Window View



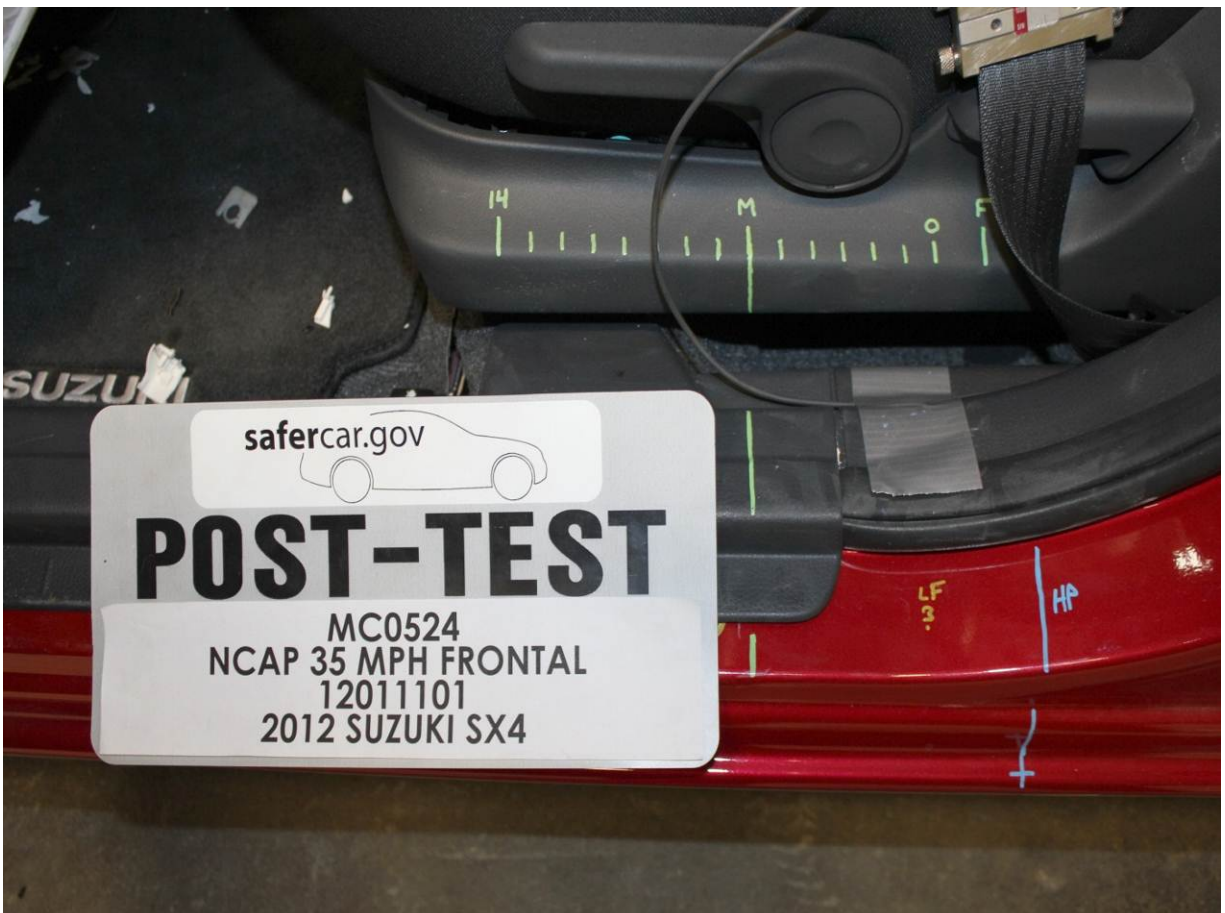
Pre-Test Driver Dummy and Vehicle Interior (Door Open)



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



Pre-Test Driver's Seat Fore-Aft Markings



Post-Test Driver's Seat Fore-Aft Markings



Pre-Test Driver Dummy Feet



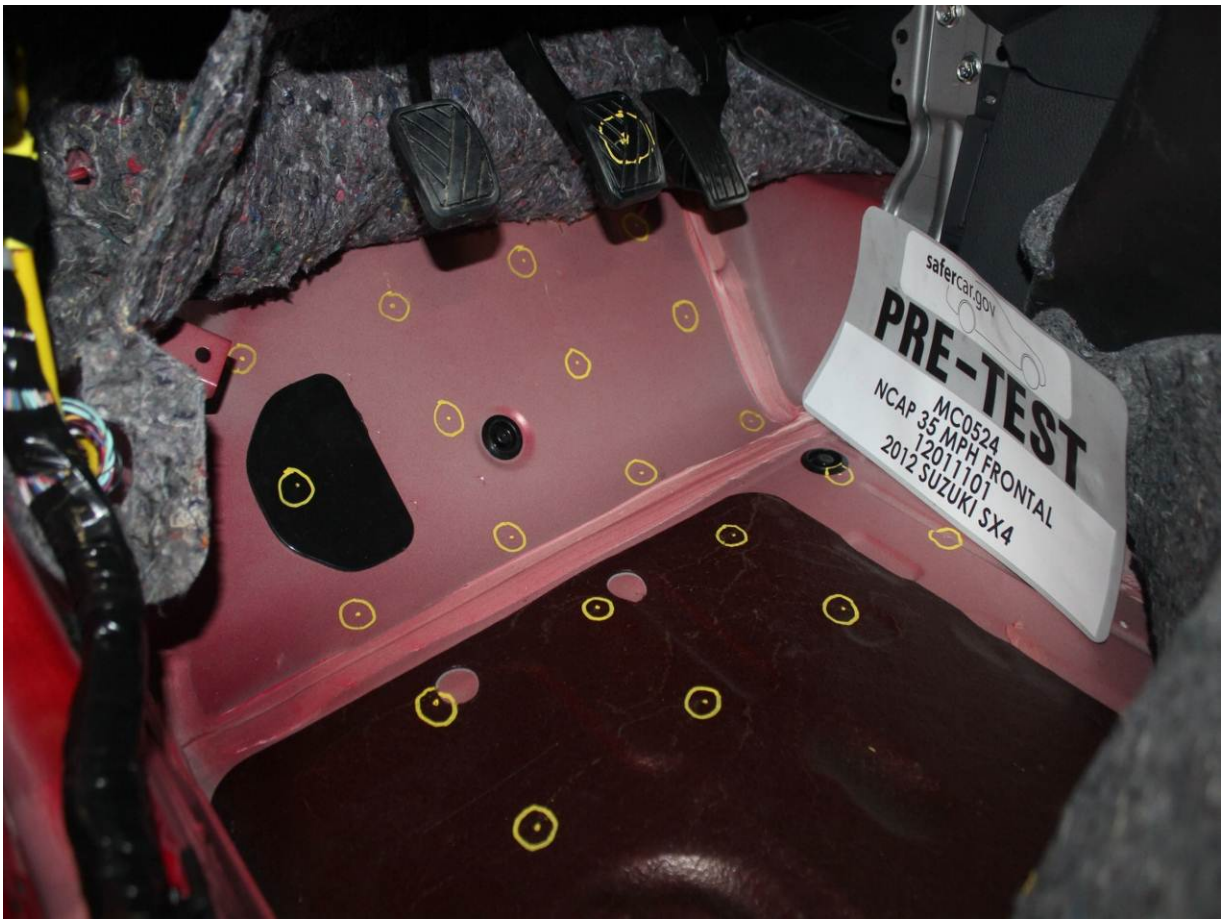
Post-Test Driver Dummy Feet



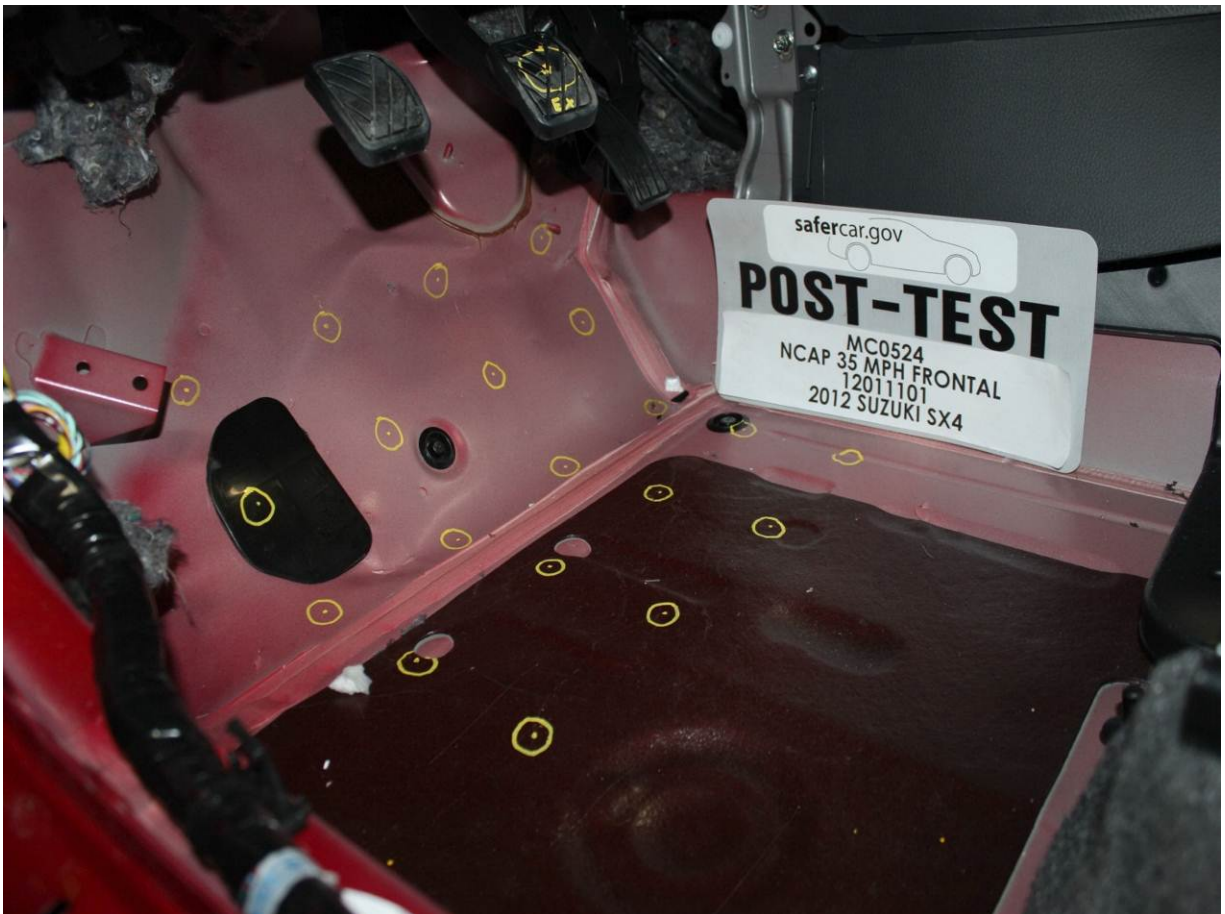
Pre-Test Driver's Side Knee Bolster (without dummy)



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



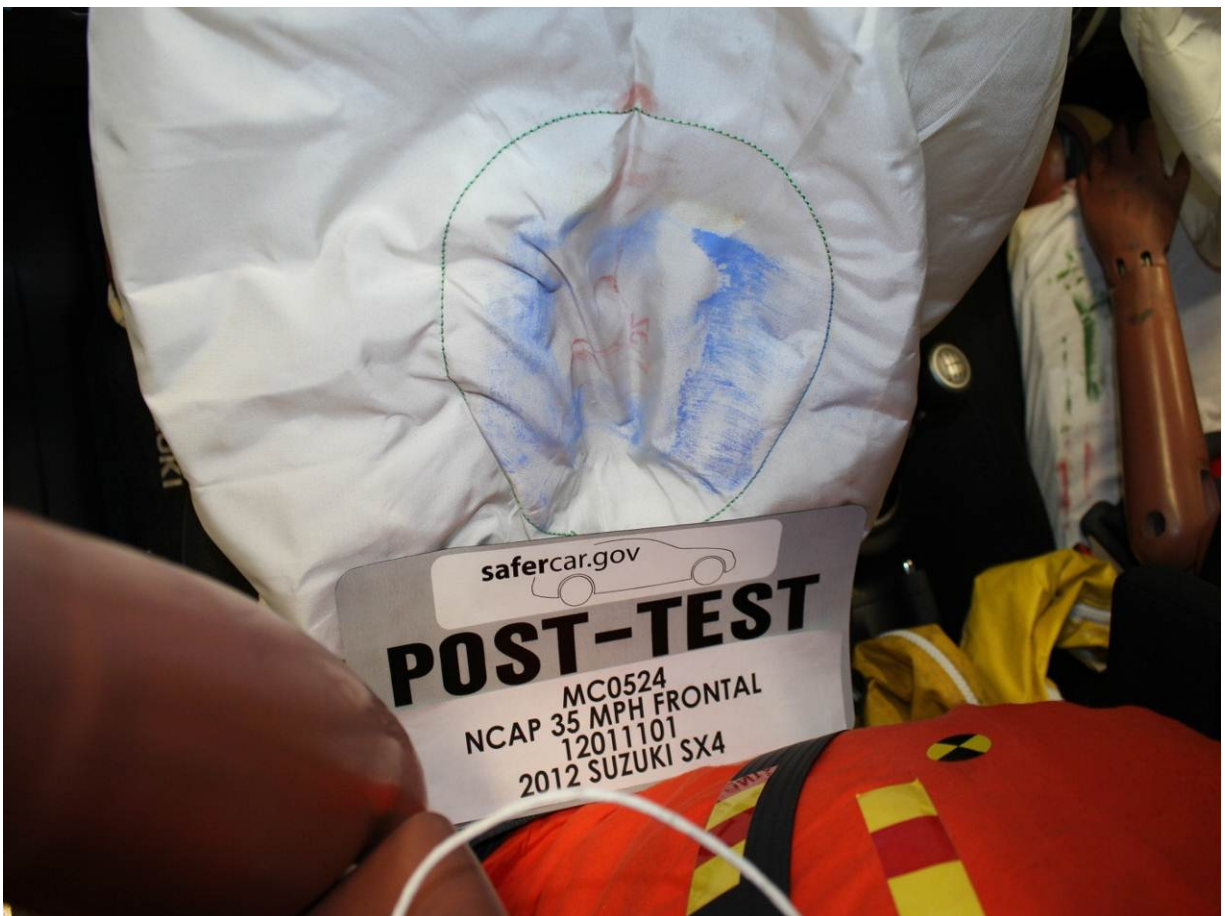
Pre-Test Driver's Side Floorpan



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



Post-Test Driver Dummy Contact with Knee Bolster



Post-Test Driver Dummy Contact with Steering Wheel



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



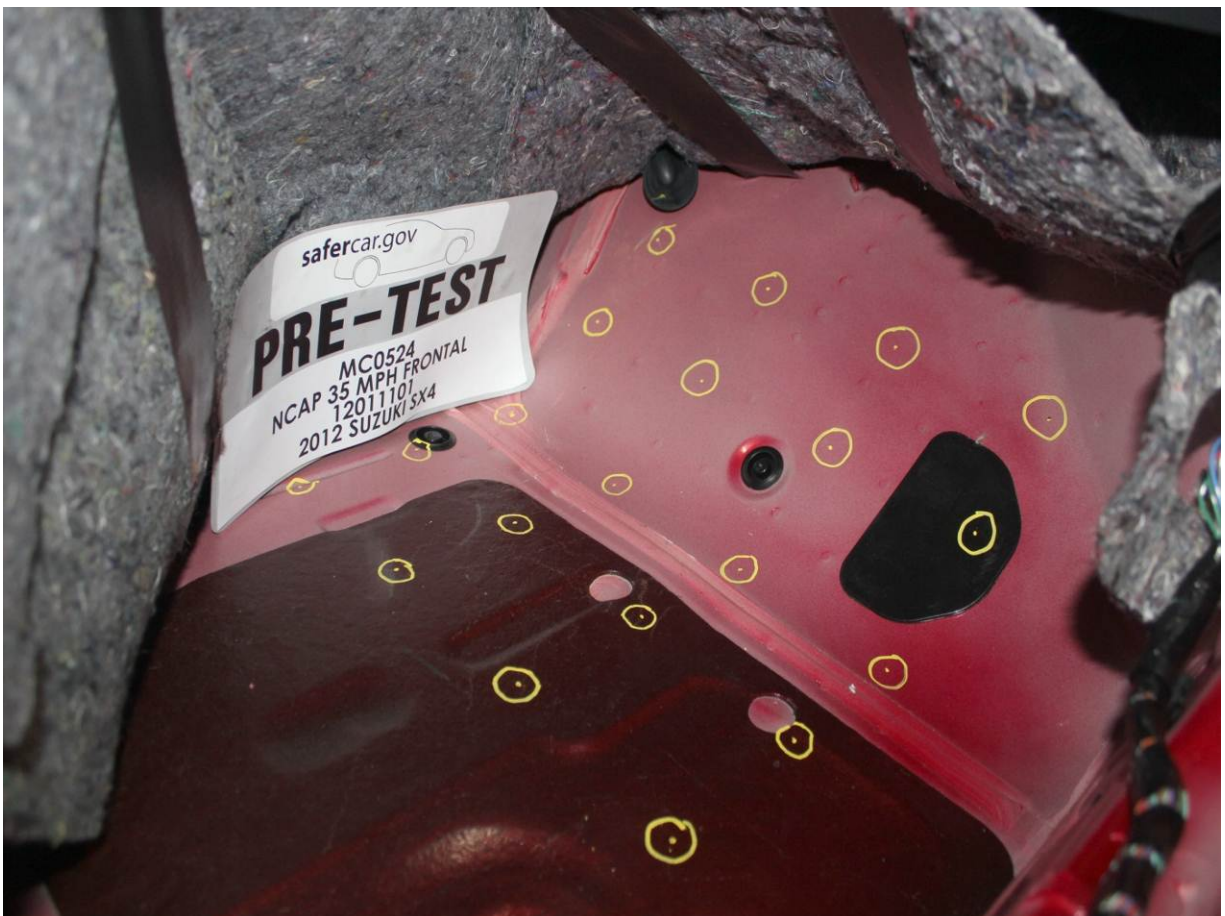
Post-Test Passenger Dummy Feet



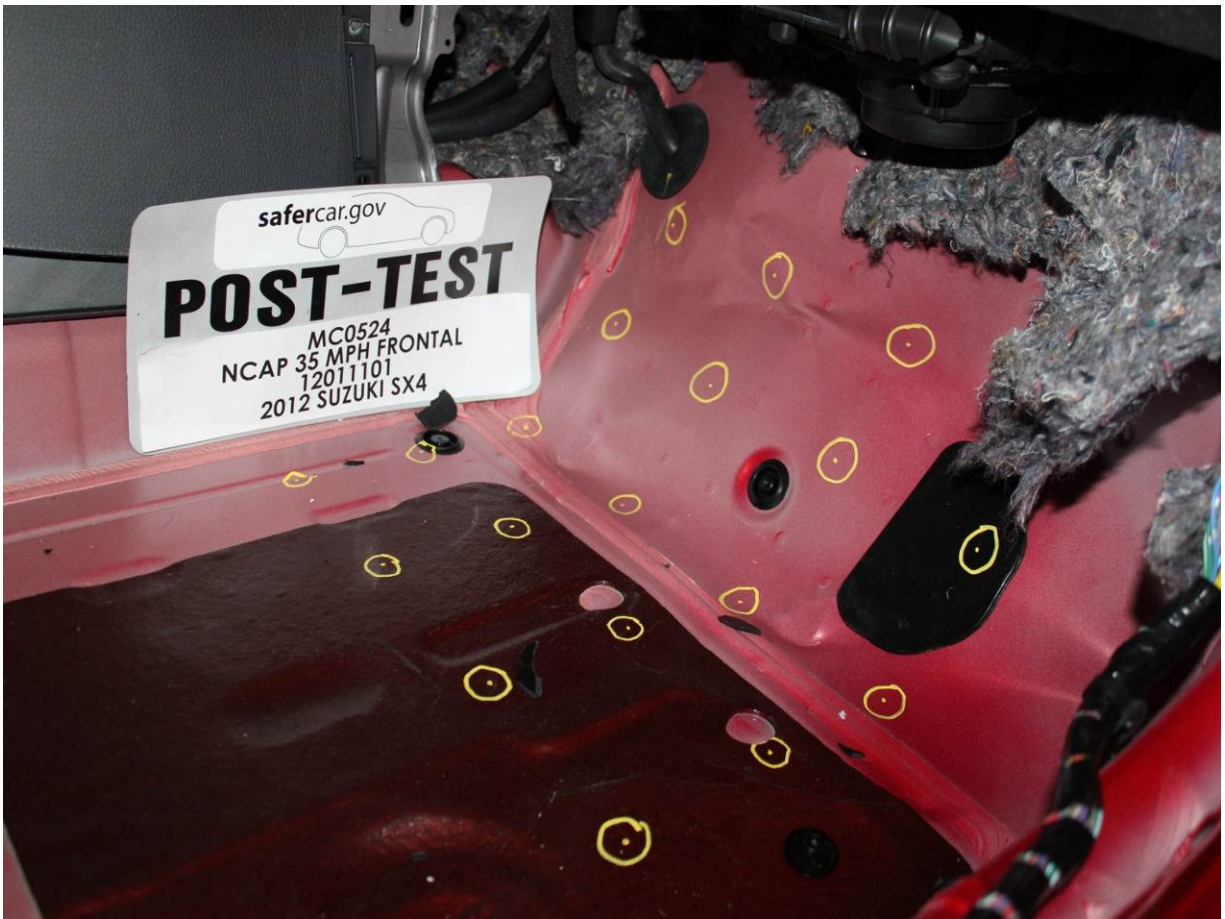
Pre-Test Passenger's Side Knee Bolster (without dummy)



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



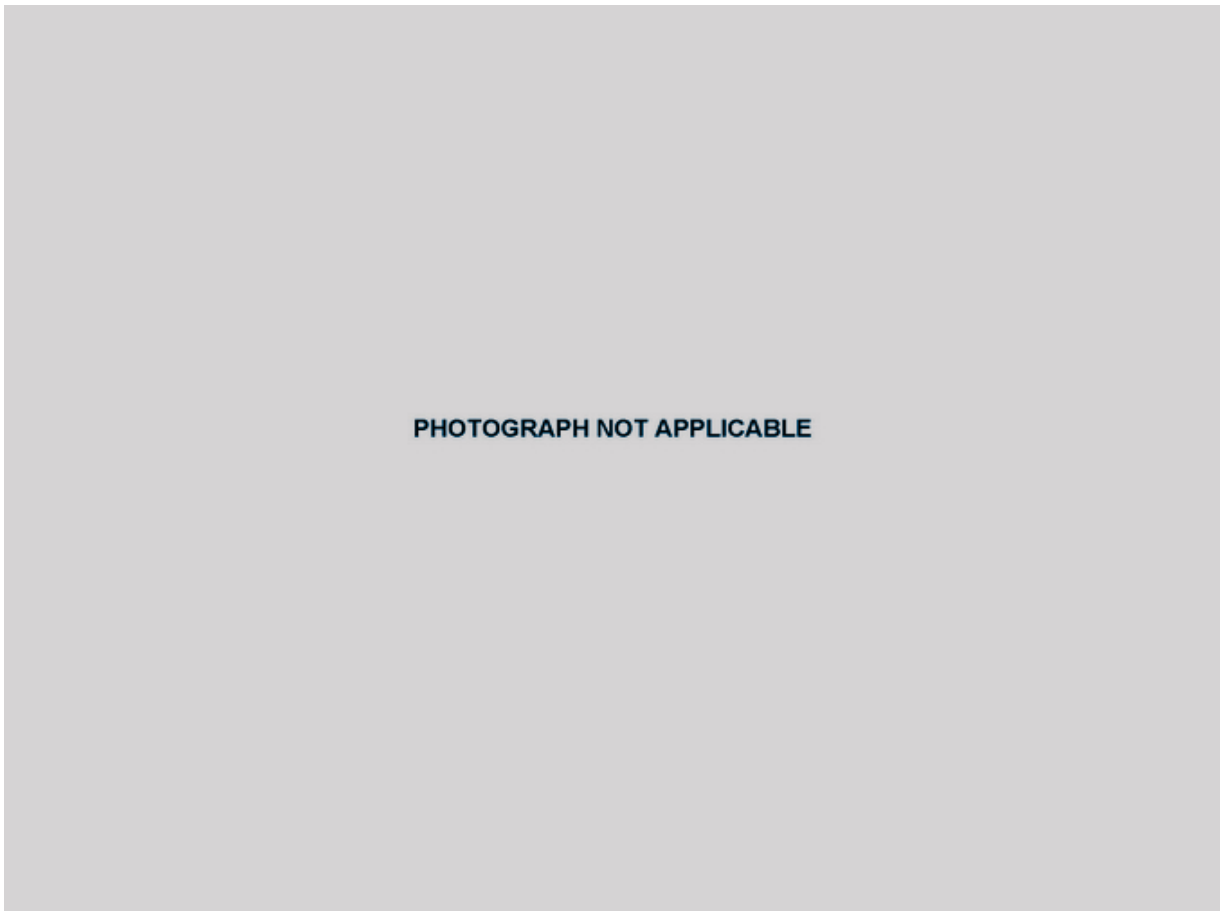
Post-Test Passenger Dummy Contact with Headrest



Post-Test Passenger Dummy Contact with Knee Bolster



Ballast Installed in Vehicle



Post-Test Stoddard Solvent Spillage Location View



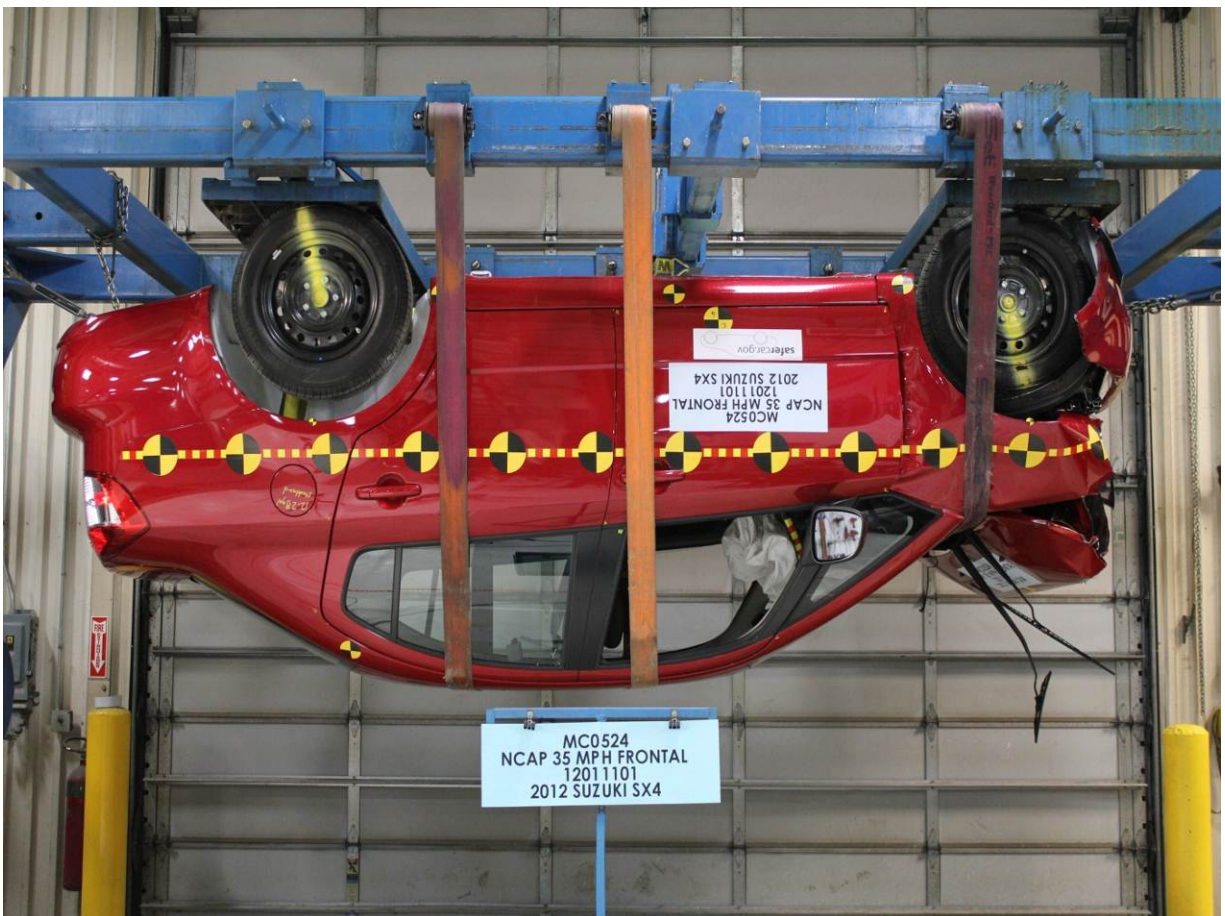
Post-Test Speed Trap Read-Out



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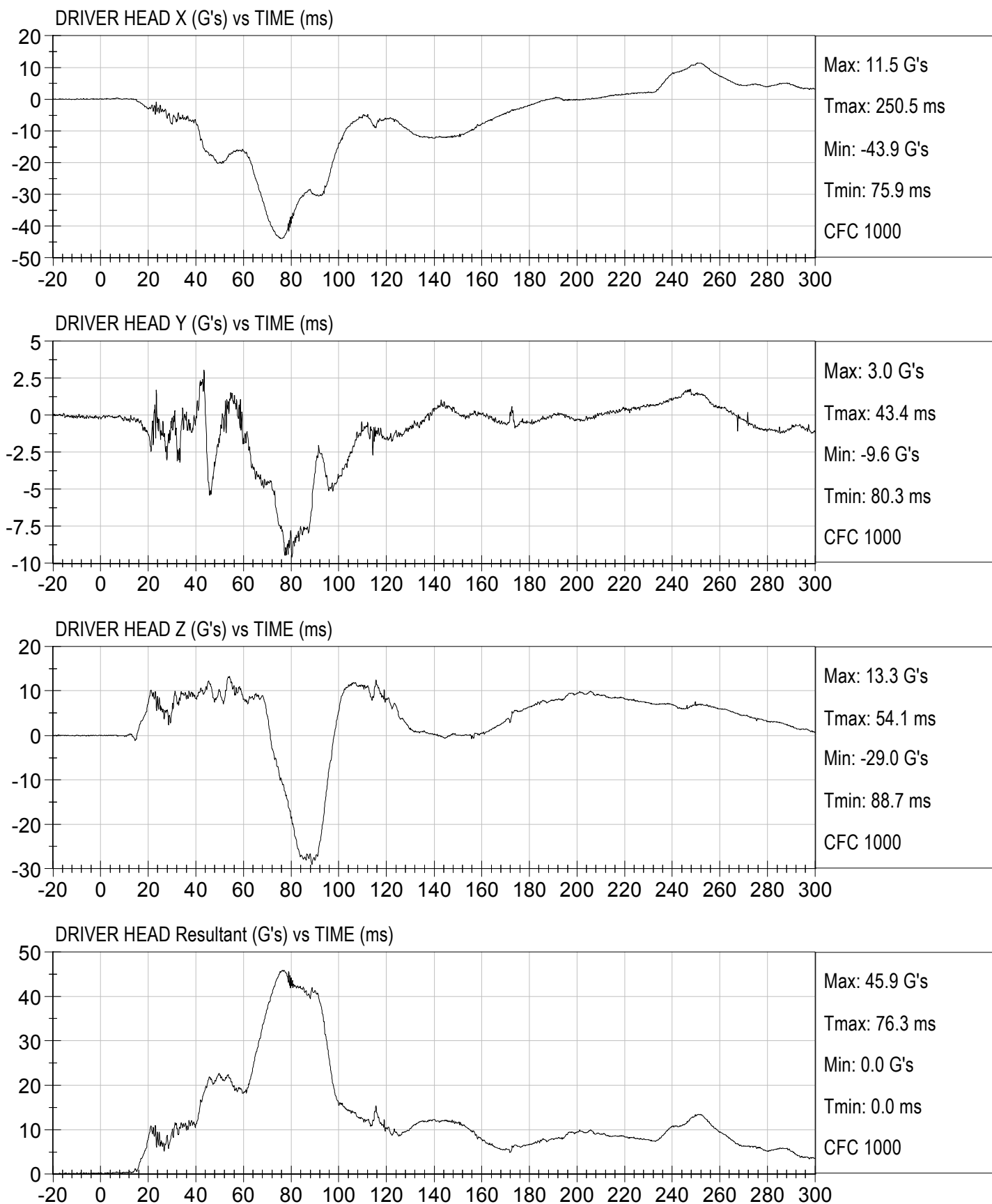
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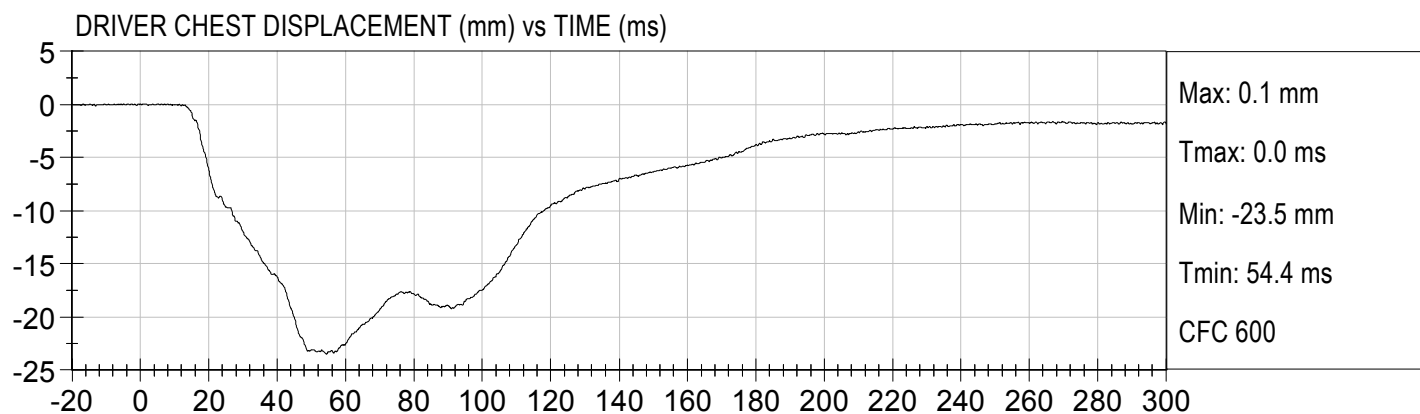
The following additional dummy and vehicle response data can be found in the R&D section of the NHTSA website at www.nhtsa.dot.gov

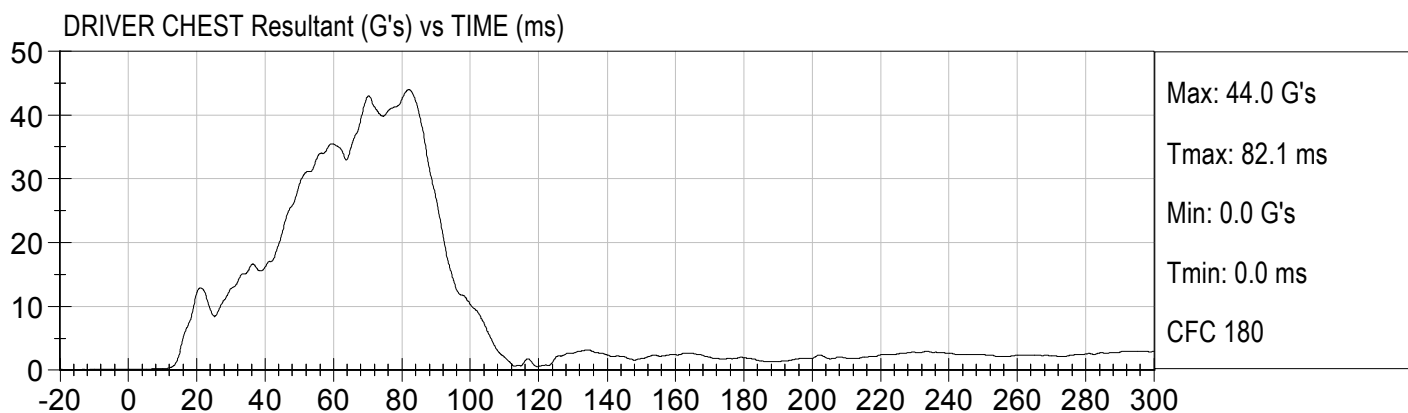
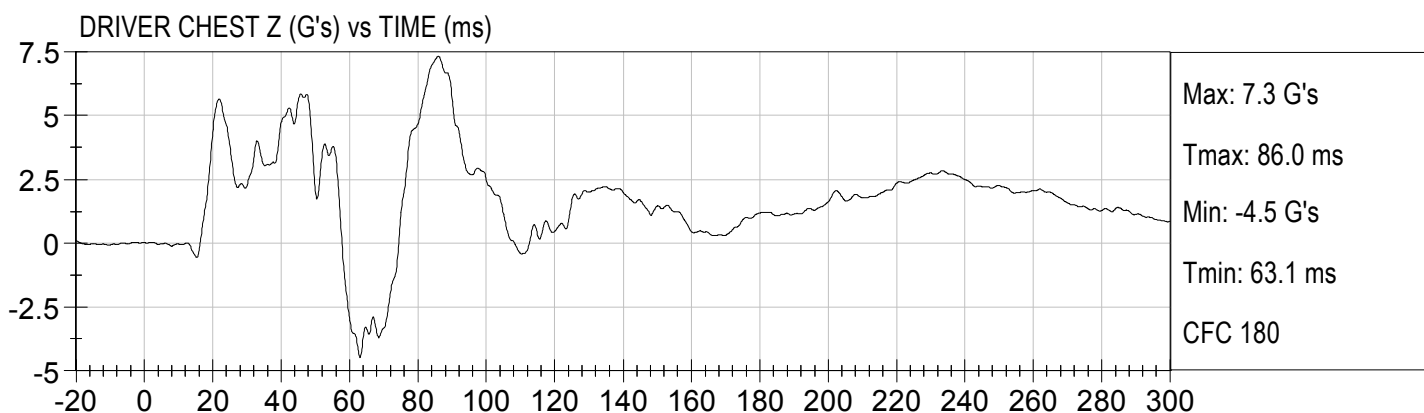
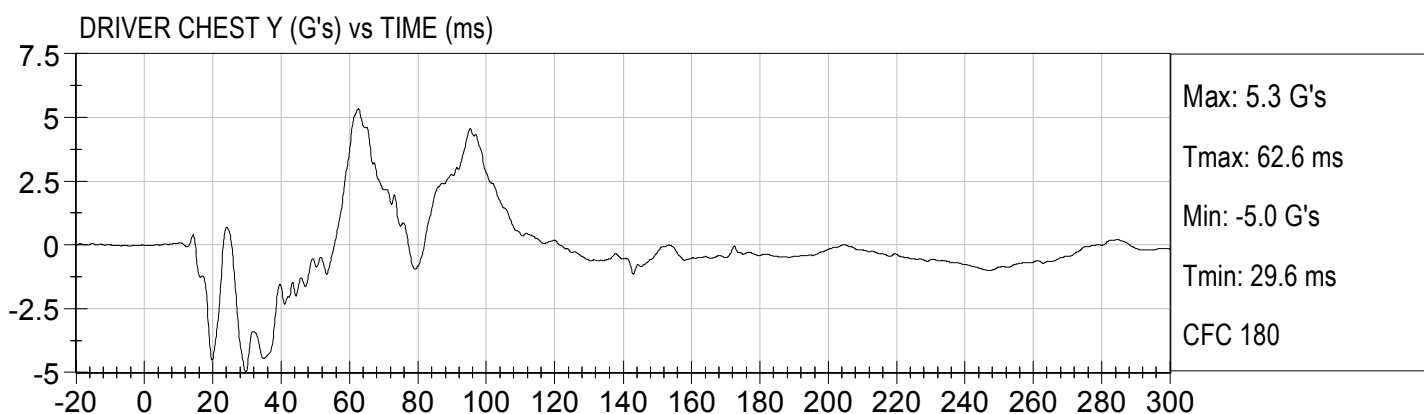
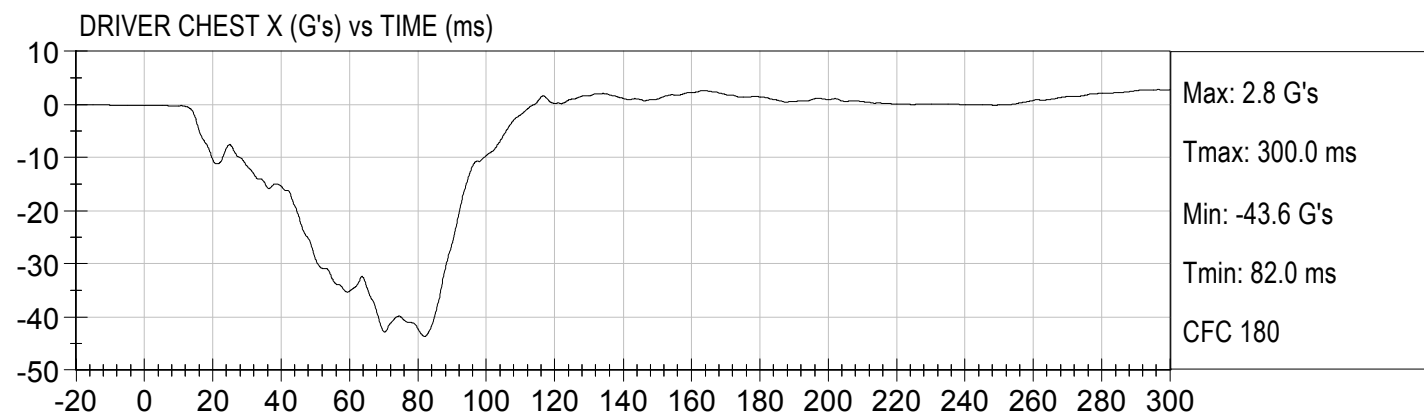
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 Driver Head Y Redundant
 Driver Head Z Redundant
 Driver Upper Neck Force Y
 Driver Upper Neck Moment X
 Driver Upper Neck Moment Z
 Driver Chest X Redundant
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 Driver Chest Z Redundant
 Driver Pelvis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

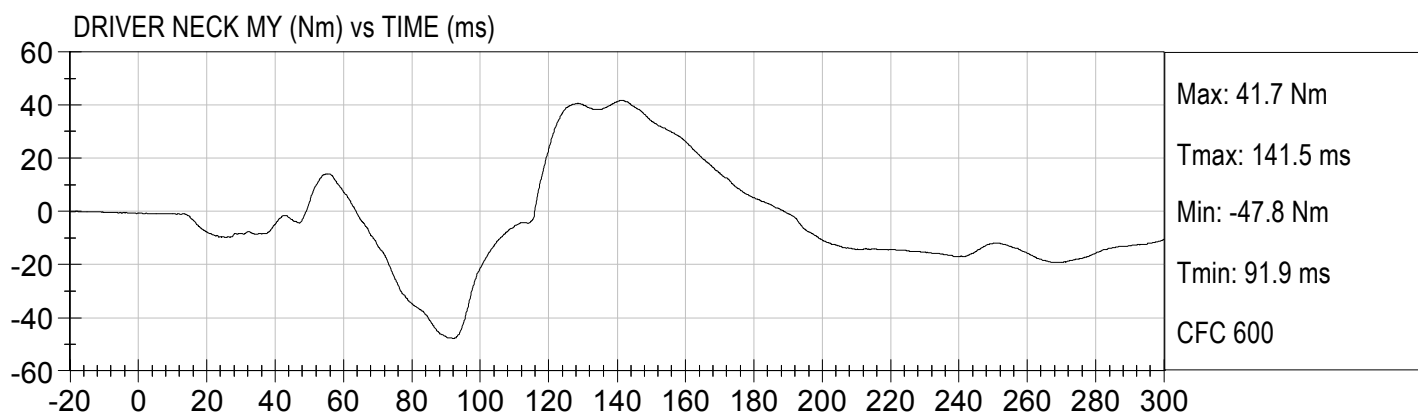
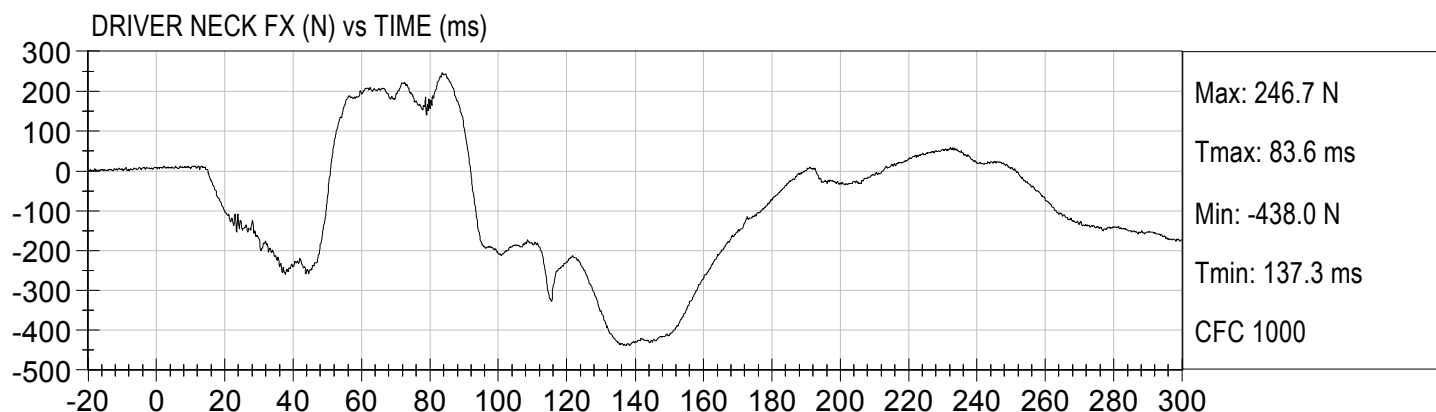
Driver Left Lower Tibia Moment Y
Driver Left Lower Tibia Force Z
Driver Right Upper Tibia Moment X
Driver Right Upper Tibia Moment Y
Driver Right Upper Tibia Force Z
Driver Right Lower Tibia Moment X
Driver Right Lower Tibia Moment Y
Driver Right Lower Tibia Force Z
Driver Left Foot Fore Z
Driver Left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

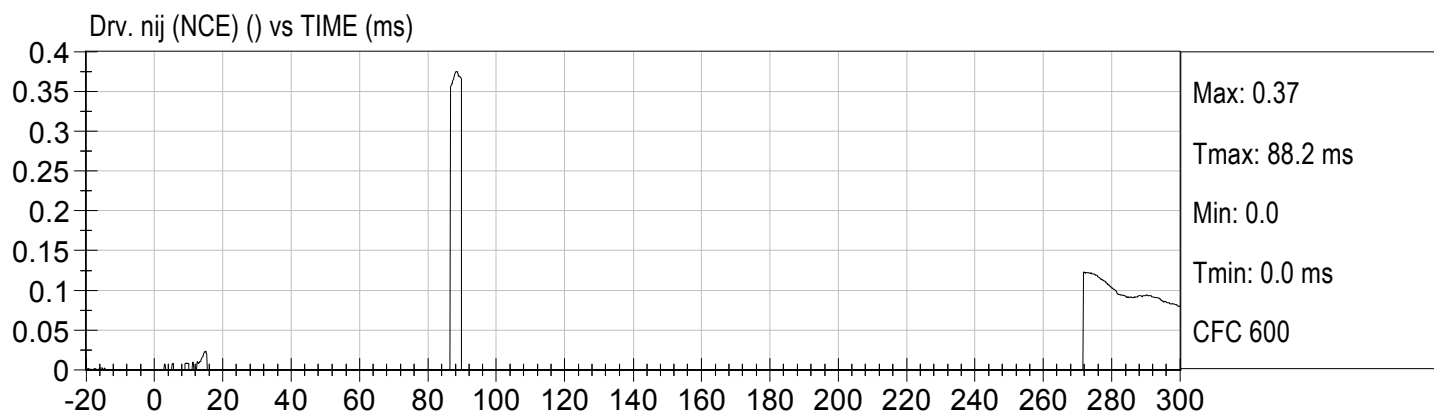
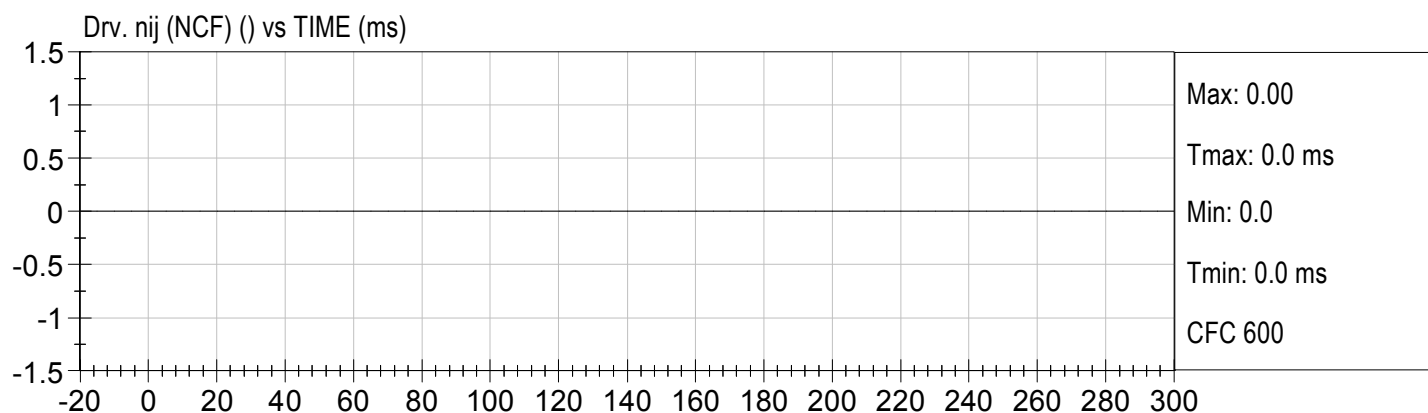
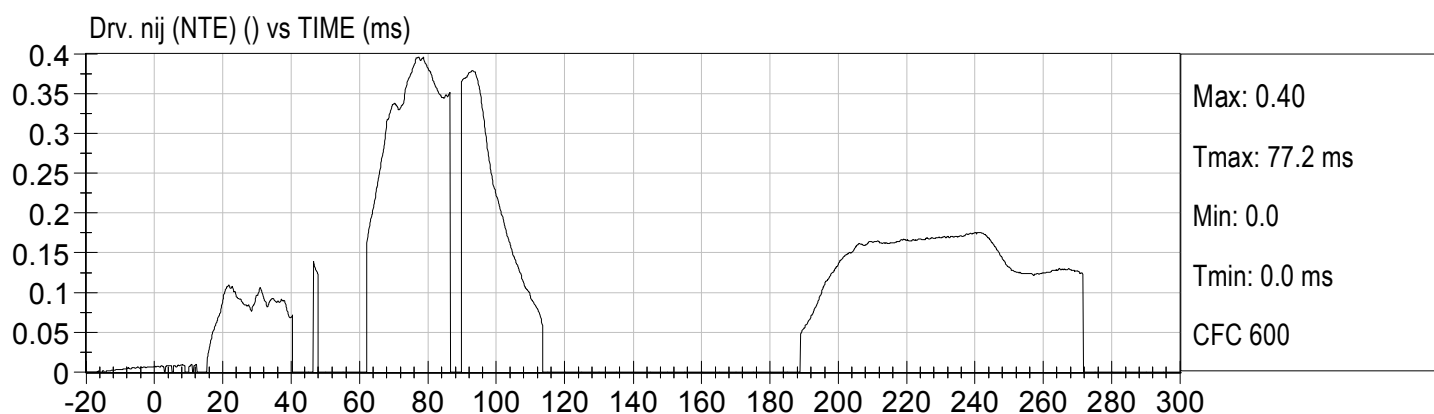
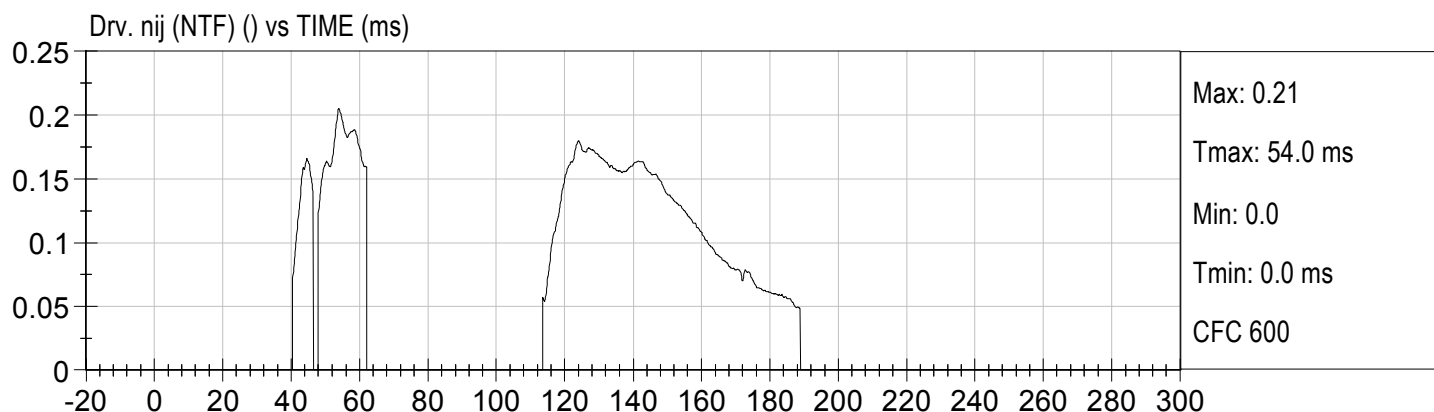
Passenger Left Upper Tibia Moment Y
Passenger Left Upper Tibia Force Z
Passenger Left Lower Tibia Moment X
Passenger Left Lower Tibia Moment Y
Passenger Left Lower Tibia Force Z
Passenger Right Upper Tibia Moment X
Passenger Right Upper Tibia Moment Y
Passenger Right Upper Tibia Force Z
Passenger Right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

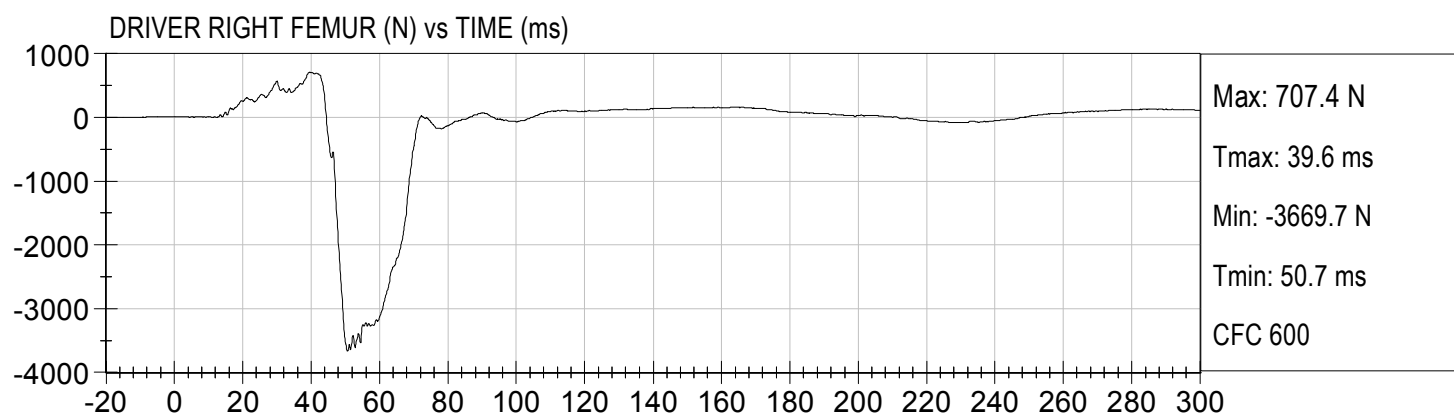
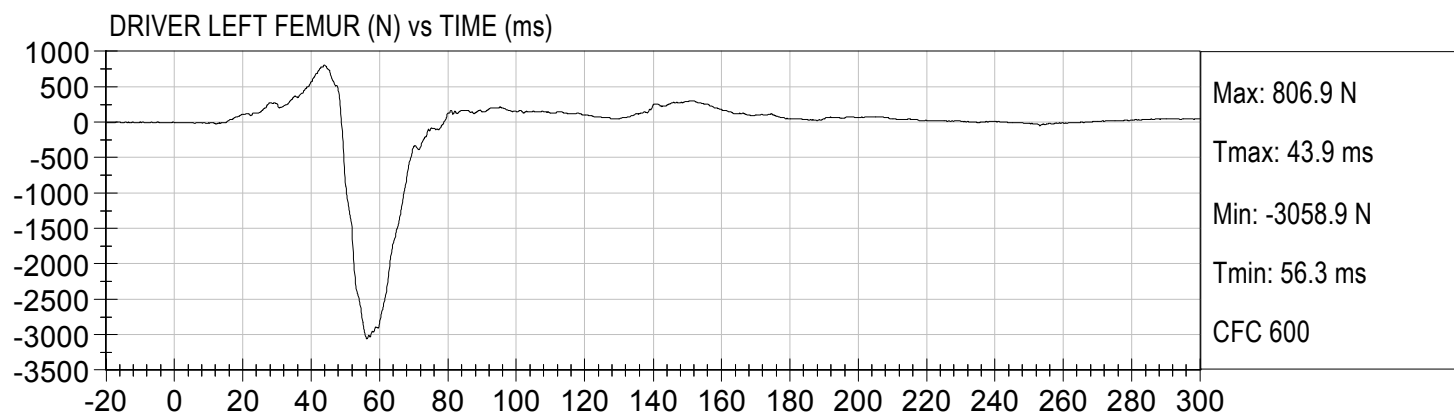


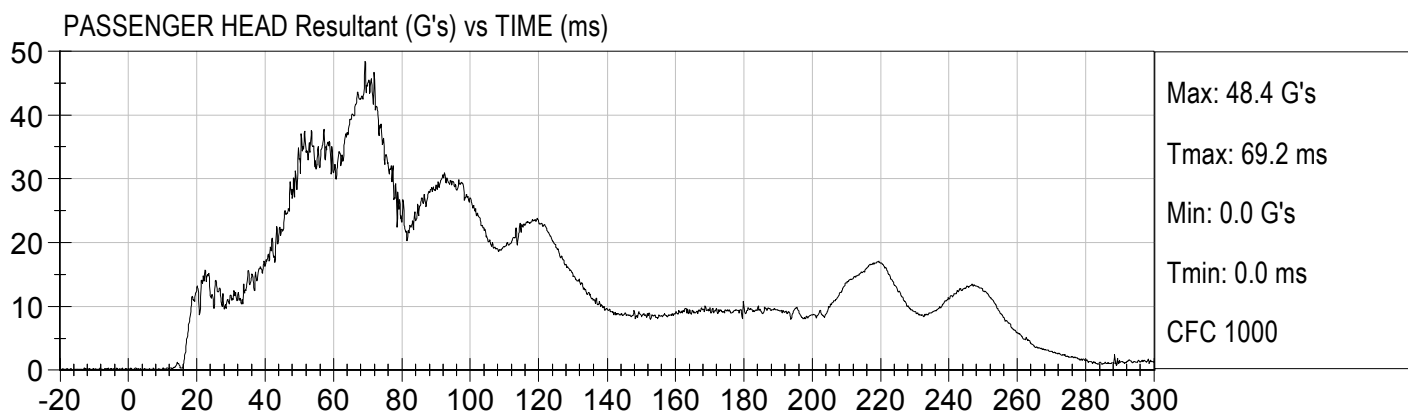
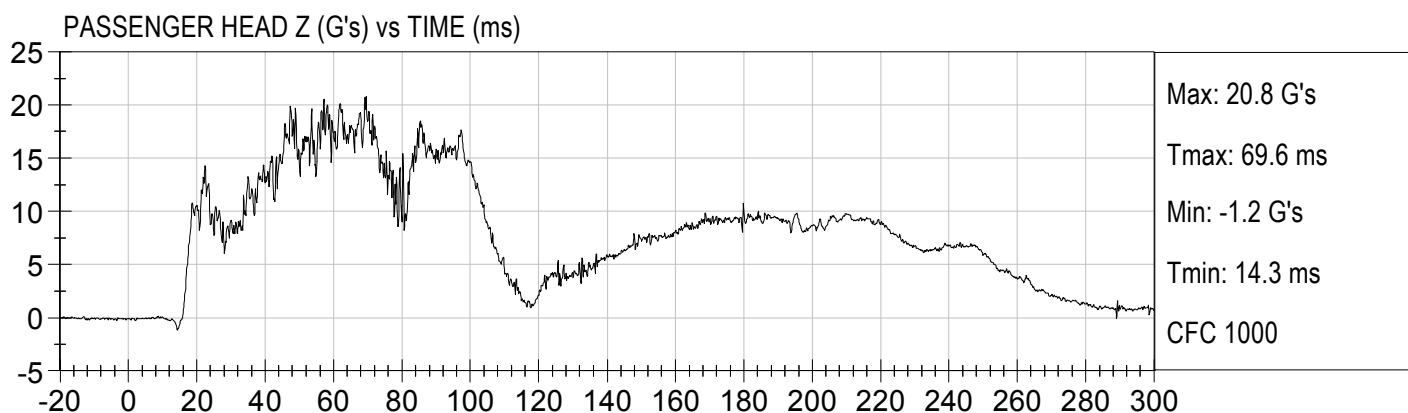
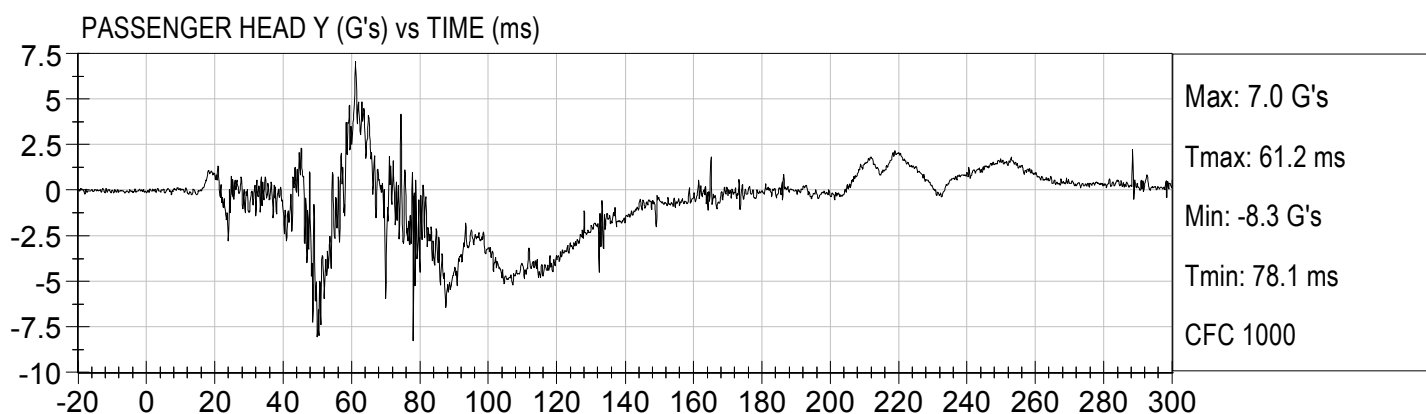
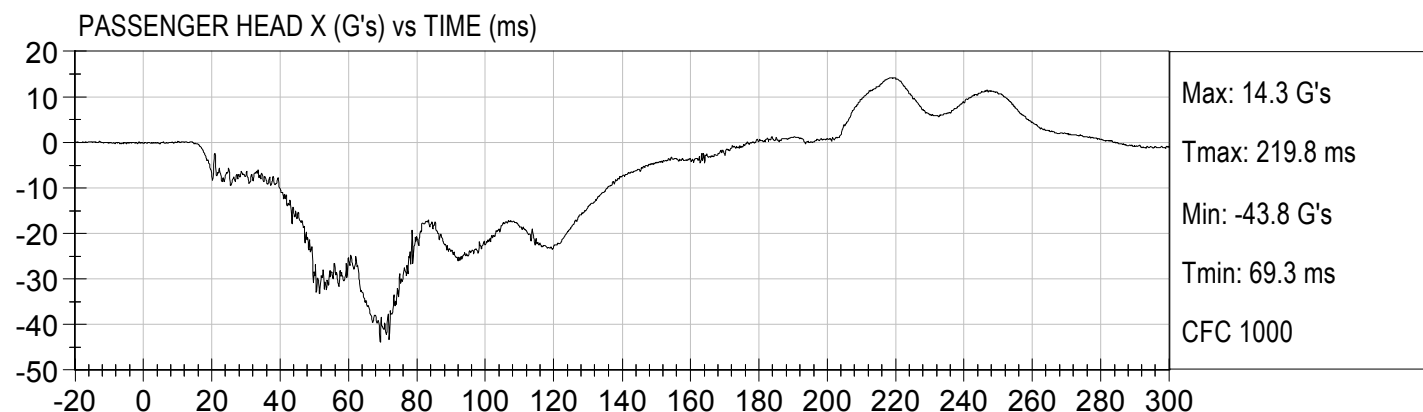


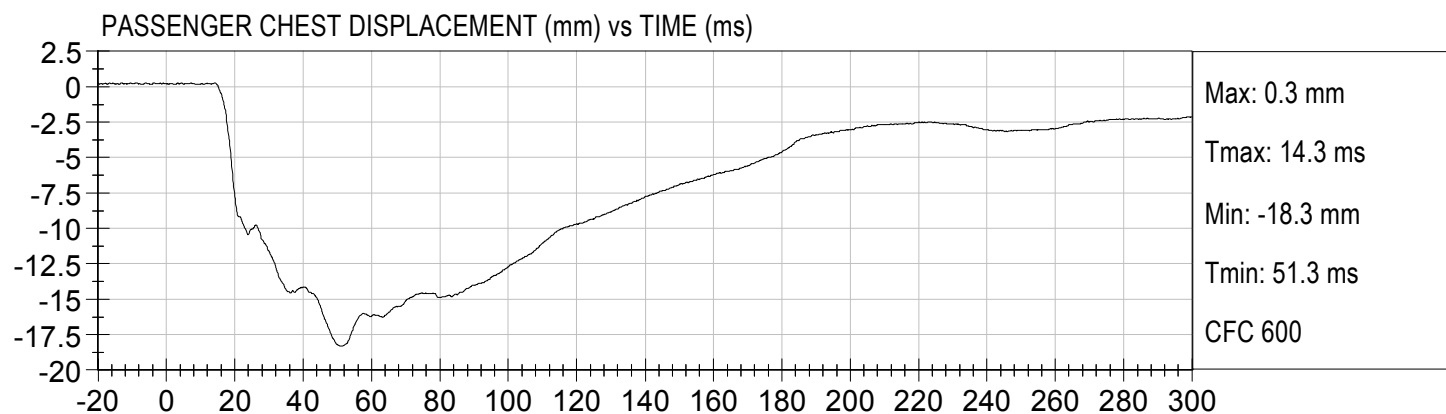






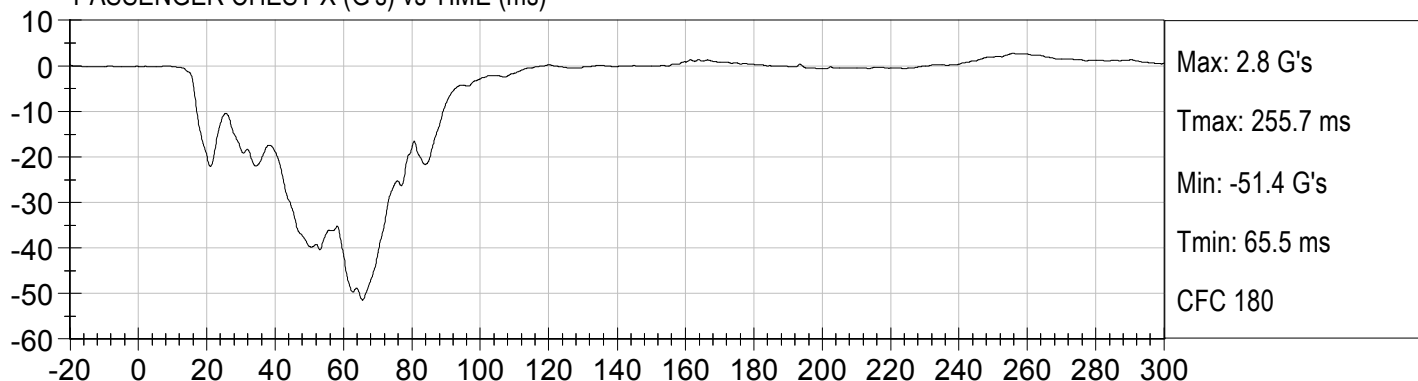




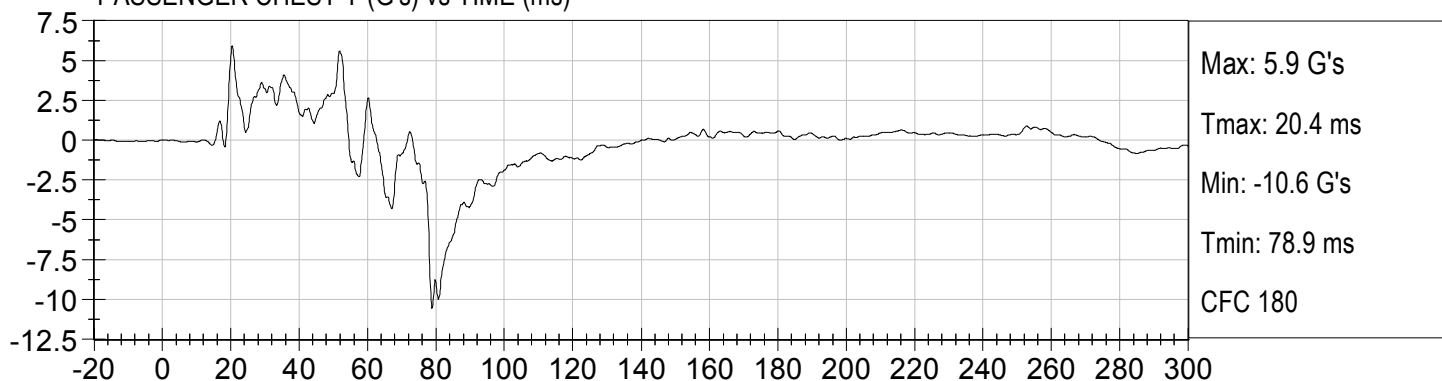




PASSENGER CHEST X (G's) vs TIME (ms)



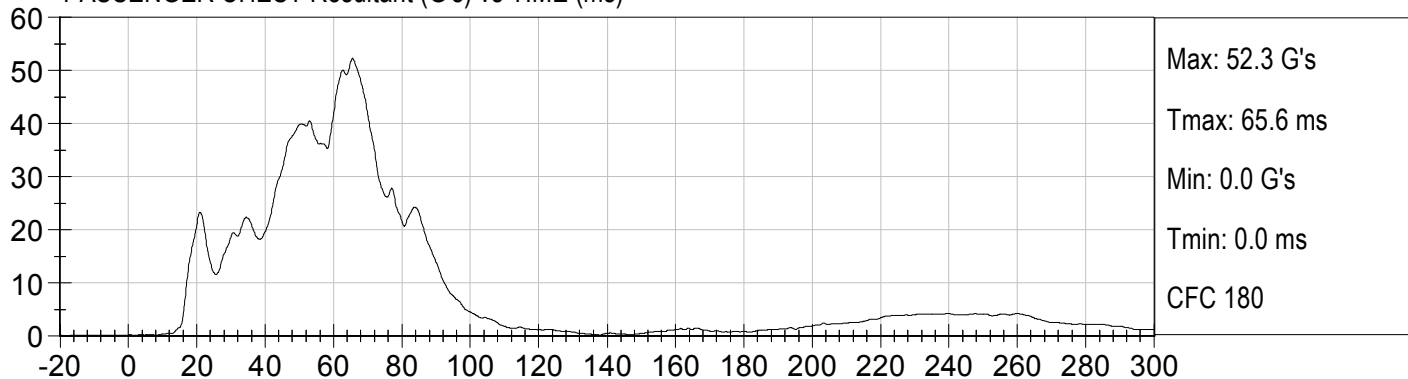
PASSENGER CHEST Y (G's) vs TIME (ms)

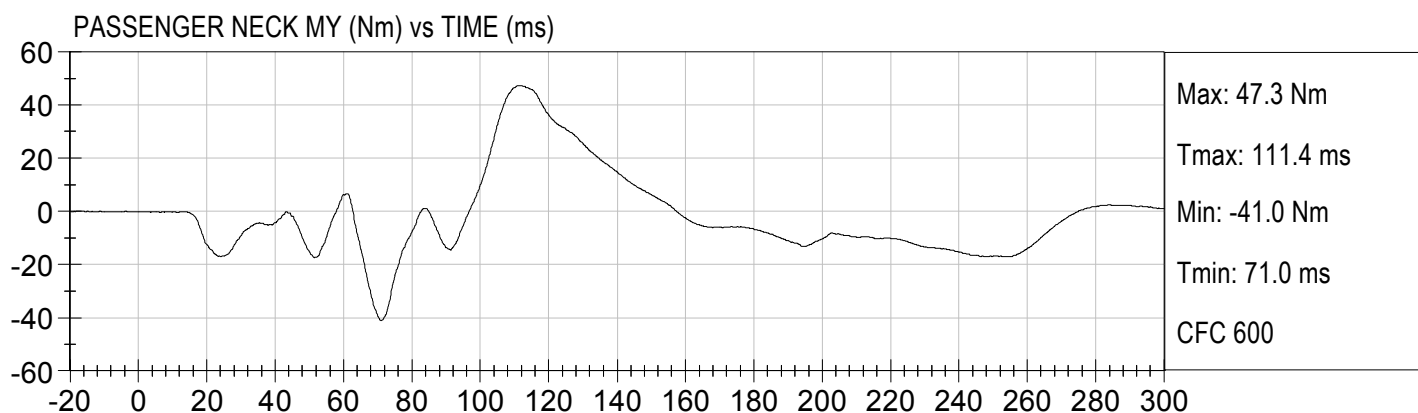
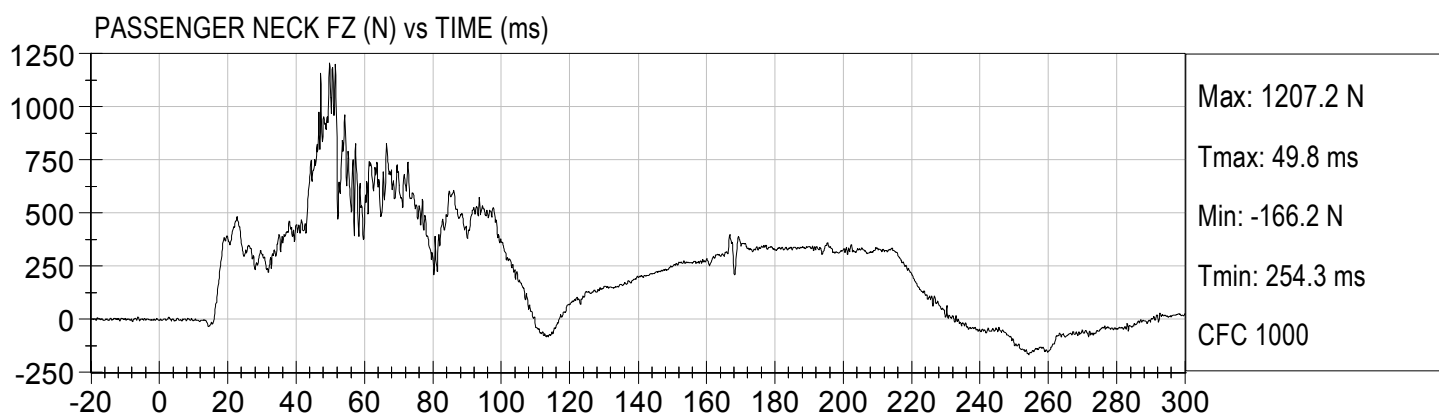
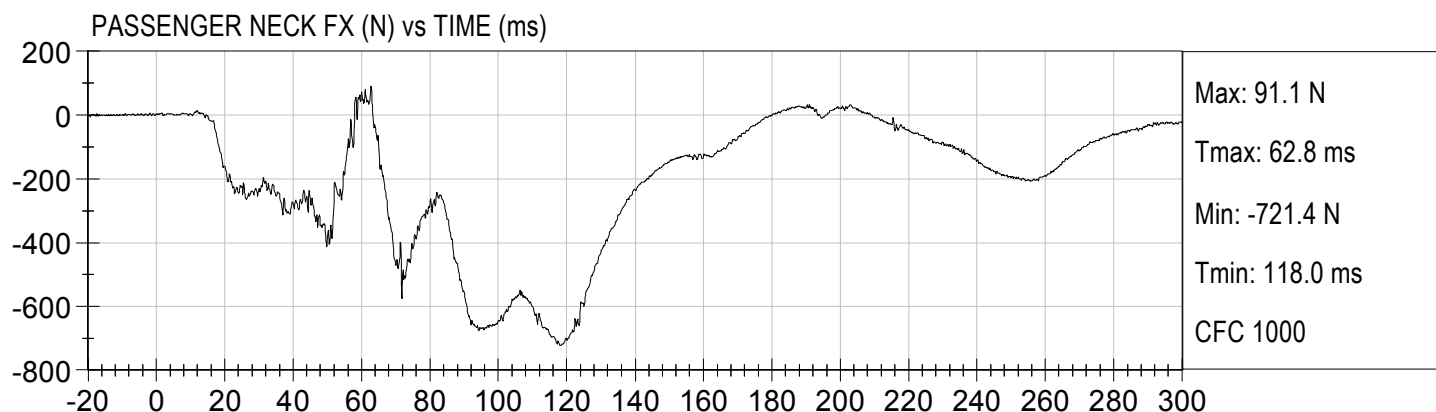


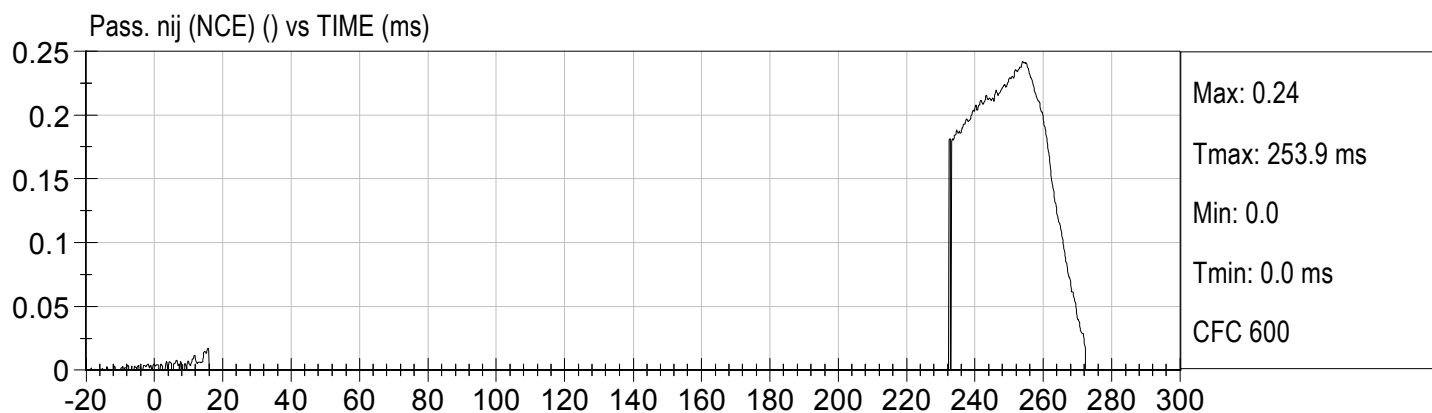
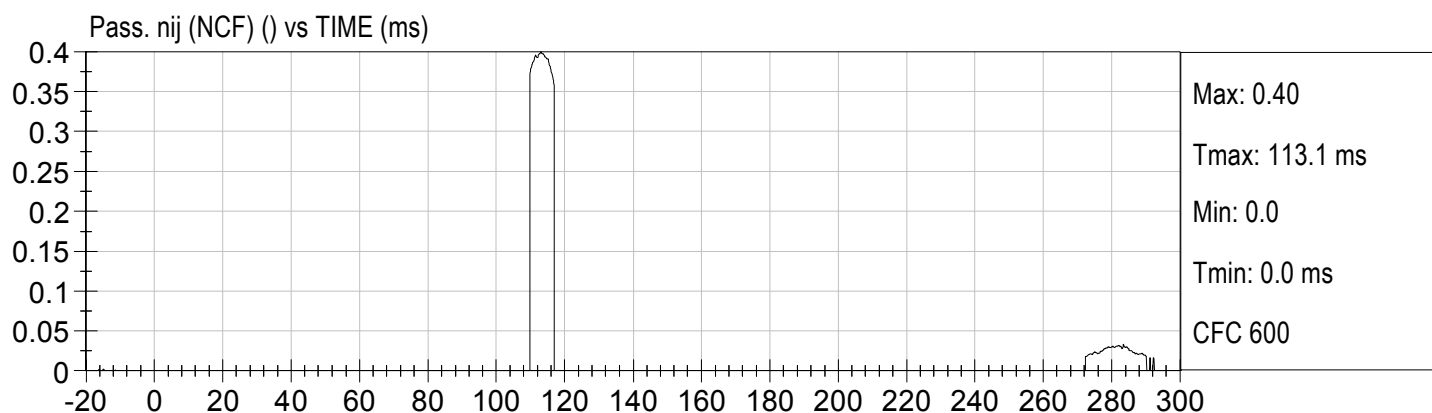
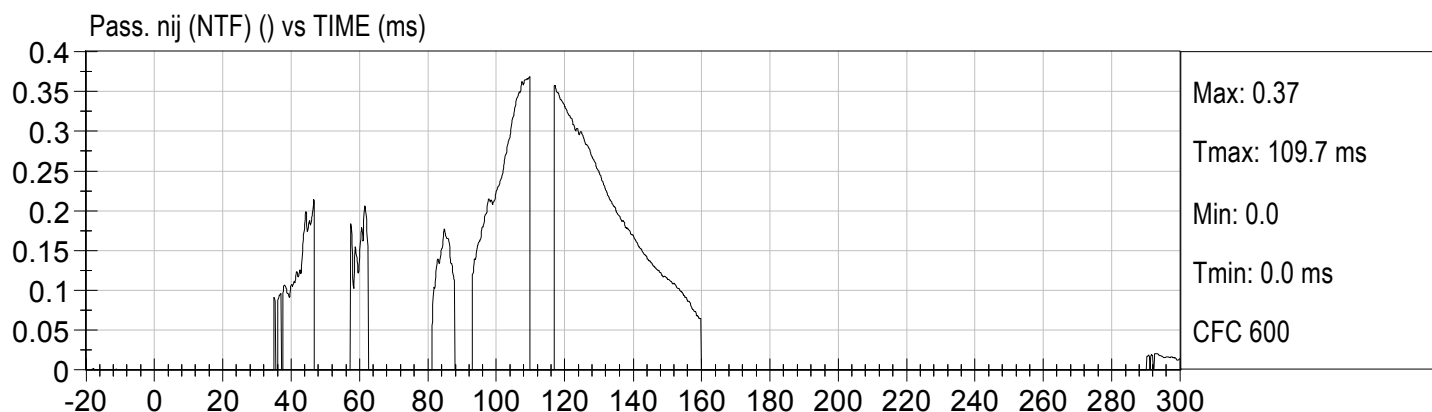
PASSENGER CHEST Z (G's) vs TIME (ms)

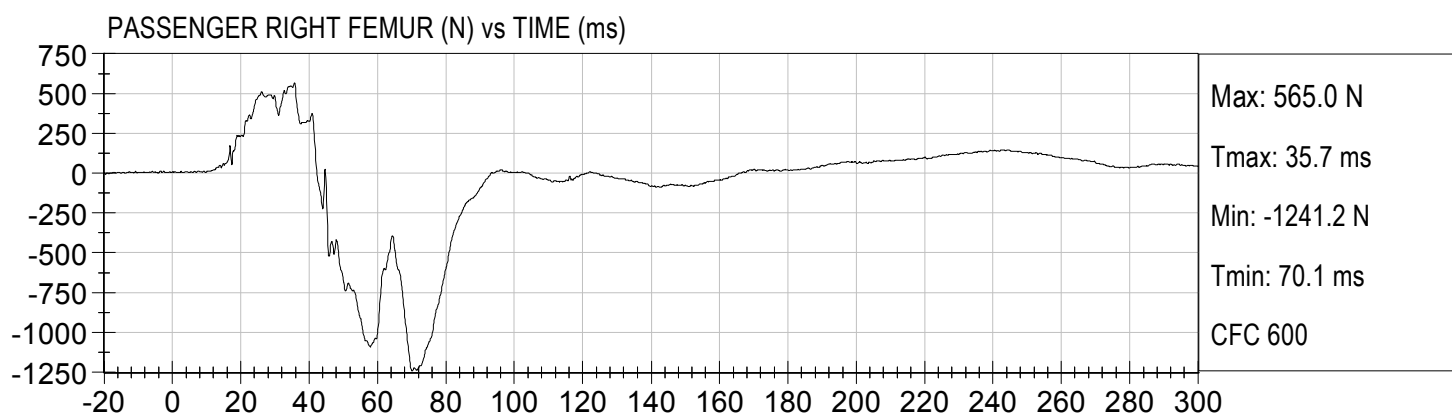
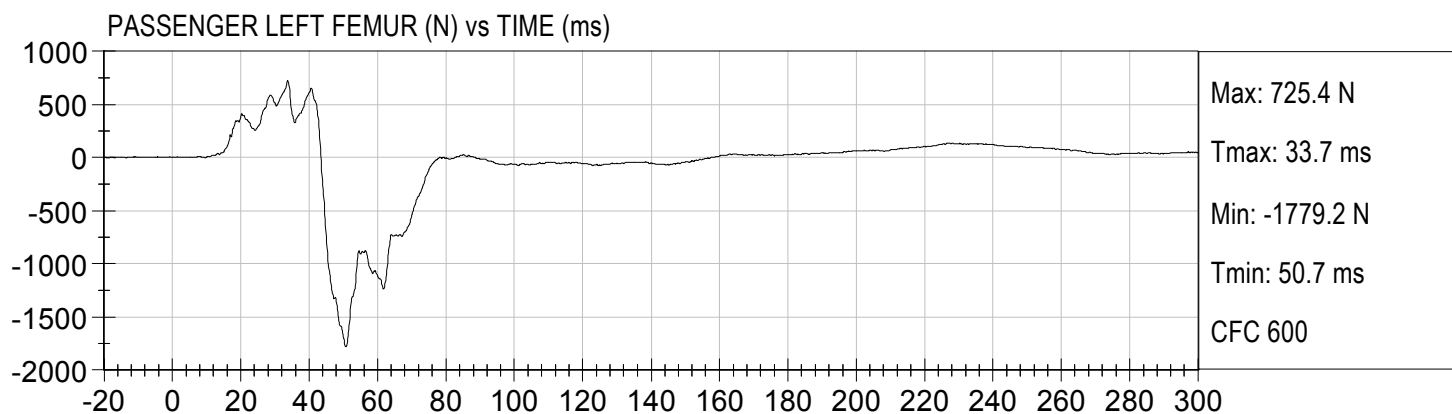


PASSENGER CHEST Resultant (G's) vs TIME (ms)









APPENDIX C

DUMMY CALIBRATION AND PERFORMANCE VERIFICATION DATA

Hybrid III, 50th External Measurements
SN: 351

HYBRID III, PART 572, SUBPART E EXTERNAL DIMENSIONS				
DIMENSION	DESCRIPTION	DETAILS	ASSEMBLY DIMENSION (inches)	ACTUAL MEASUREMENT
A	TOTAL SITTING HEIGHT	Seat surface to highest point on top of the head.	34.6–35.0	34.8
B	SHOULDER PIVOT HEIGHT	Centerline of shoulder pivot bolt to the seat surface.	19.9-20.5	20.0
C	H-POINT HEIGHT	Reference	3.3-3.5	3.4
D	H-POINT LOCATION FROM BACKLINE	Reference	5.3-5.5	5.5
E	SHOULDER PIVOT FROM BACKLINE	Center of the shoulder clevis to the rear vertical surface of the fixture.	3.3-3.7	3.5
F	THIGH CLEARANCE	Measured at the highest point on the upper femur segment.	5.5-6.1	6.0
G	BACK OF ELBOW TO WRIST PIVOT	back of the elbow flesh to the wrist pivot in line with the elbow and wrist pivots	11.4-12.0	11.8
H	HEAD BACK TO BACKLINE	Back of Skull cap skin to seat rear vertical surface (Reference)	1.6-1.8	1.7
I	SHOULDER TO- ELBOW LENGTH	Measure from the highest point on top of the shoulder clevis to the lowest part of the flesh on the elbow in line with the elbow pivot bolt.	13.0-13.6	13.3
J	ELBOW REST HEIGHT	Measure from the flesh below the elbow pivot bolt to the seat surface.	7.5-8.3	7.8
K	BUTTOCK TO KNEE LENGTH	The forward most part of the knee flesh to the rear vertical surface of the fixture.	22.8-23.8	23.8
L	POPLITEAL HEIGHT	Seat surface to the plane of the horizontal plane of the bottom of the feet.	16.9-17.9	17.0
M	KNEE PIVOT HEIGHT	Centerline of knee pivot bolt to the horizontal plane of the bottom of the feet.	19.1-19.7	19.5
N	BUTTOCK POPLITEAL LENGTH	The rearmost surface of the lower leg to the same point on the rear surface of the buttocks used for dim. "K".	17.8-18.8	18.8

HYBRID III, SUBPART E EXTERIOR DIMENSIONS, continued				
DIMENSION	DESCRIPTION	DETAILS		ACTUAL MEASUREMENT
O	CHEST DEPTH WITHOUT JACKET	Measured 16.9-17.1 in. above seat surface	8.4-9.0	8.5
P	FOOT LENGTH	Tip of toe to rear of heel	9.9-10.5	10.3
V	SHOULDER BREADTH	Outside edges of right and left shoulder clevises	16.3-17.2	16.5
W	FOOT BREADTH	The widest part of the foot	3.6-4.2	4.0
Y	CHEST CIRCUMFERENCE (WITH CHEST JACKET)	Measured 16.9-17.1 in. above seat surface	38.2-39.4	39.2
Z	WAIST CIRCUMFERENCE	Measured 8.9-9.1 in. above seat surface	32.9-34.1	33.7
AA	REFERENCE LOCATION FOR MEASUREMENT OF CHEST CIRCUMFERENCE	Reference	16.9-17.1	17.0
BB	REFERENCE LOCATION FOR MEASUREMENT OF WAIST CIRCUMFERENCE	Reference	8.9-9.1	9.0

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

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

ATD Serial No: 351

Test ID: D12051

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	22.0	Pass
Laboratory Relative Humidity	%	10 to 70	24	Pass
Peak Resultant Acceleration	G's	225 - 275	257	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	7.7	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

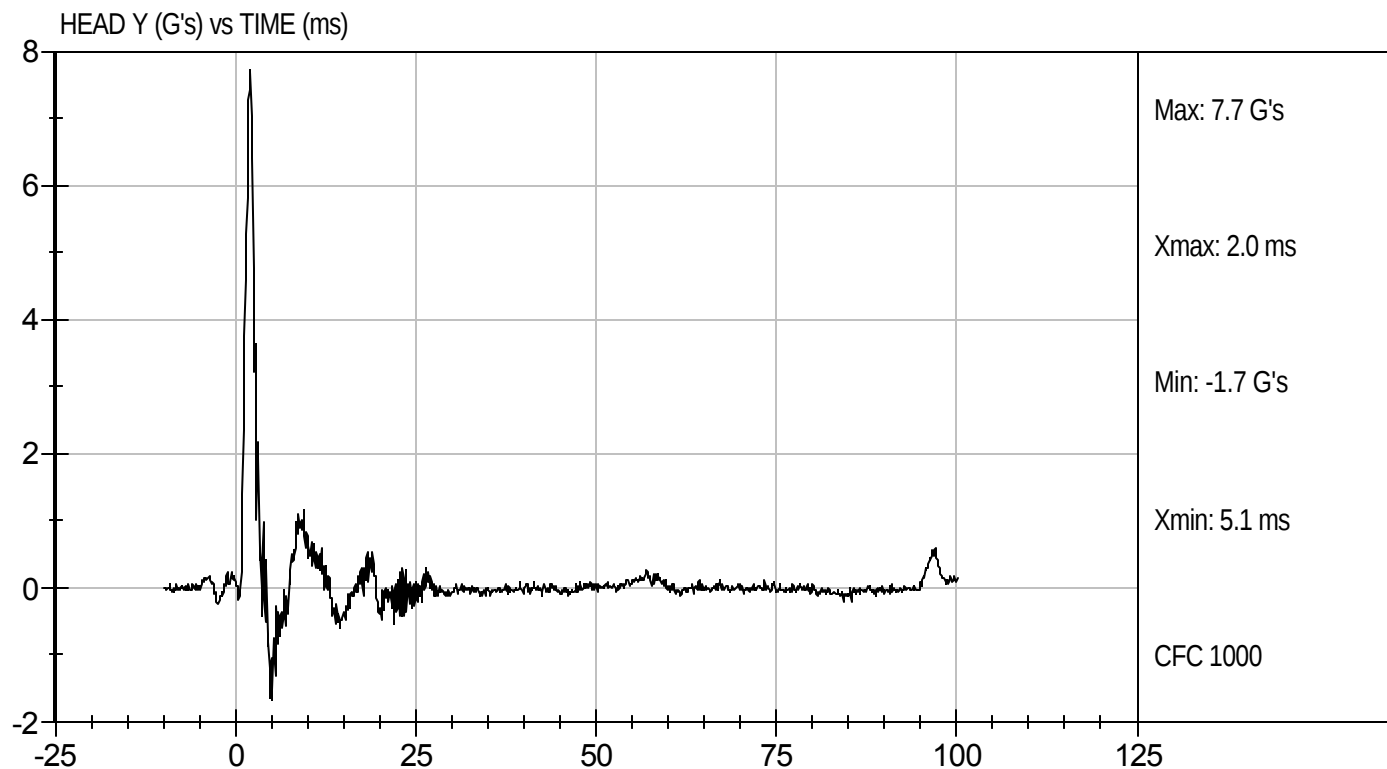
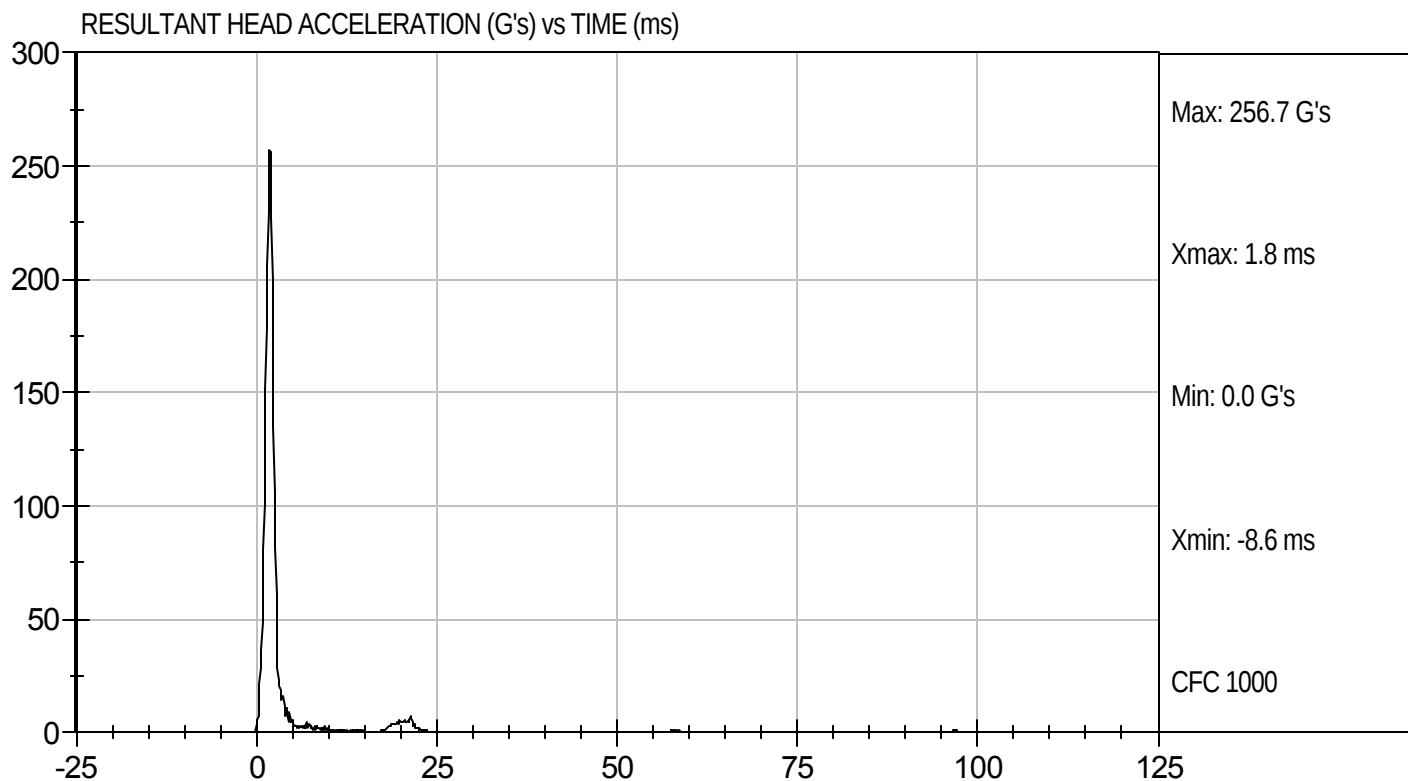
1/6/12
Test Date

David Winkelbauer
Approved By



Test Desc: Head Drop
Component ID: D12051

Test Date: 1/6/12
Velocity: 0 ft/s, 0 m/s



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

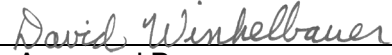
ATD Serial No: 351

Test I.D.: D12052

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	20	Pass
Pendulum Velocity		m/s	6.89 to 7.13	6.96	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	24.31	Pass
	20 ms	G's	17.60 to 22.60	19.27	Pass
	30 ms	G's	12.50 to 18.50	14.42	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	14.3	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	34.5	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	69.6	Pass
	Time	ms	57.0 to 64.0	58.7	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	93.7	Pass
	Time	ms	47.0 to 58.0	48.5	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	100.9	Pass
Overall Test Results					Pass


Laboratory Technician

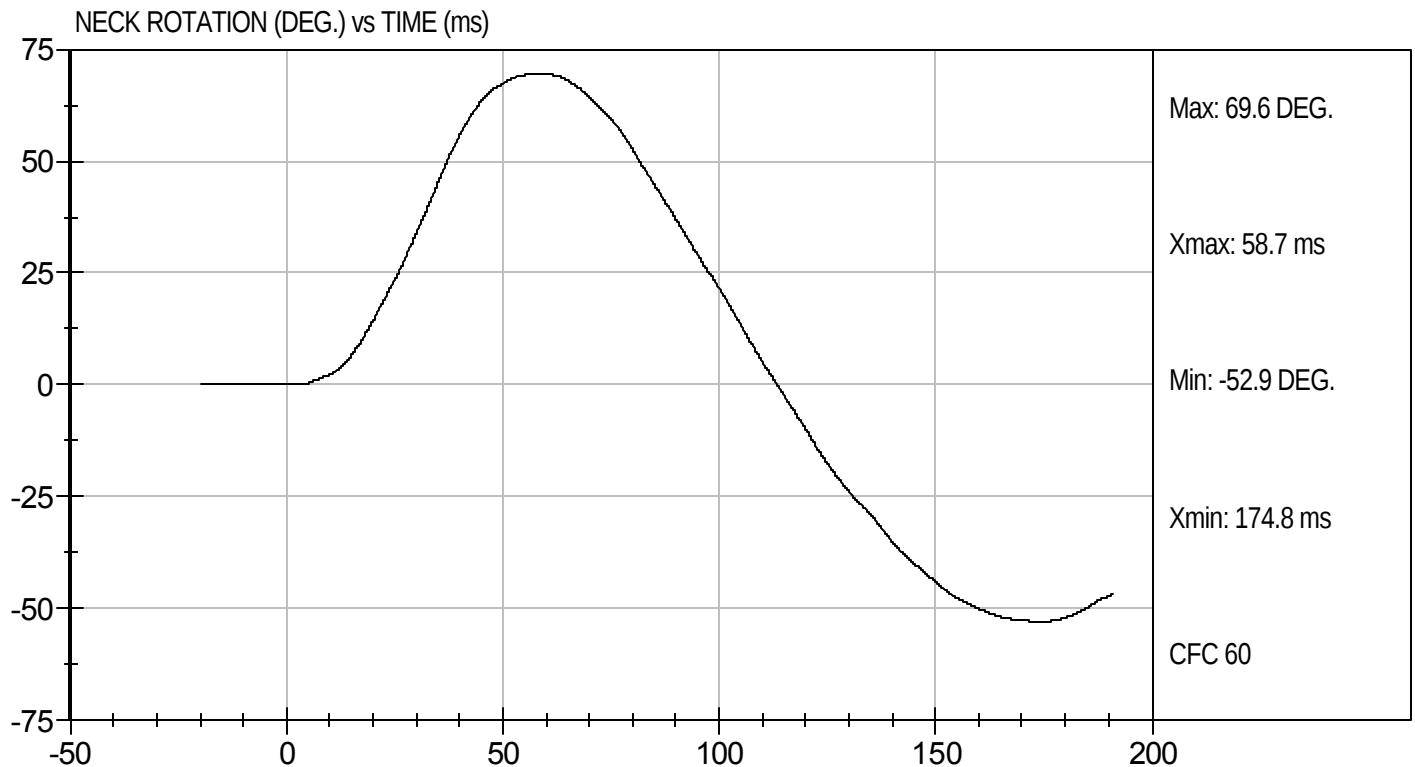
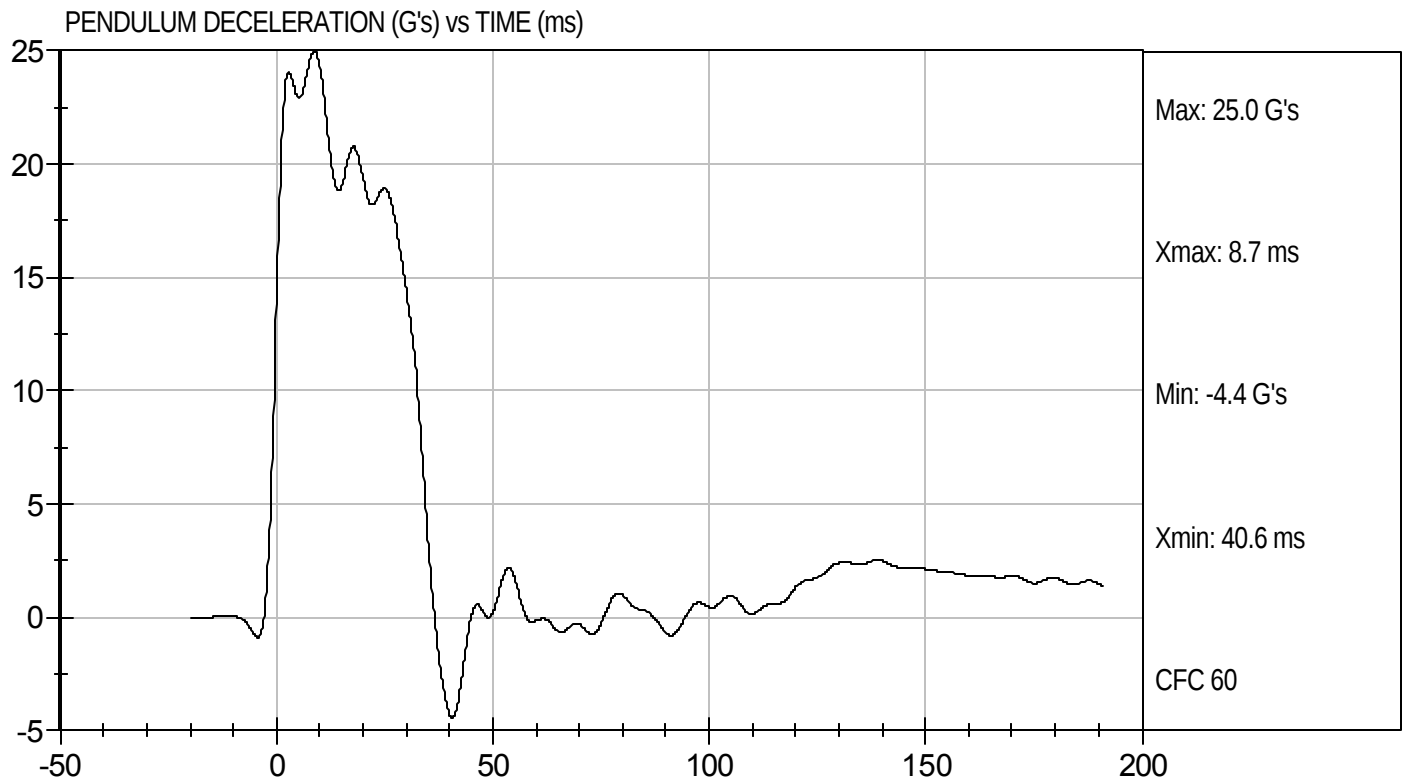
1/9/12
Test Date


Approved By



Test Desc: Neck Flexion
Component ID: D12052

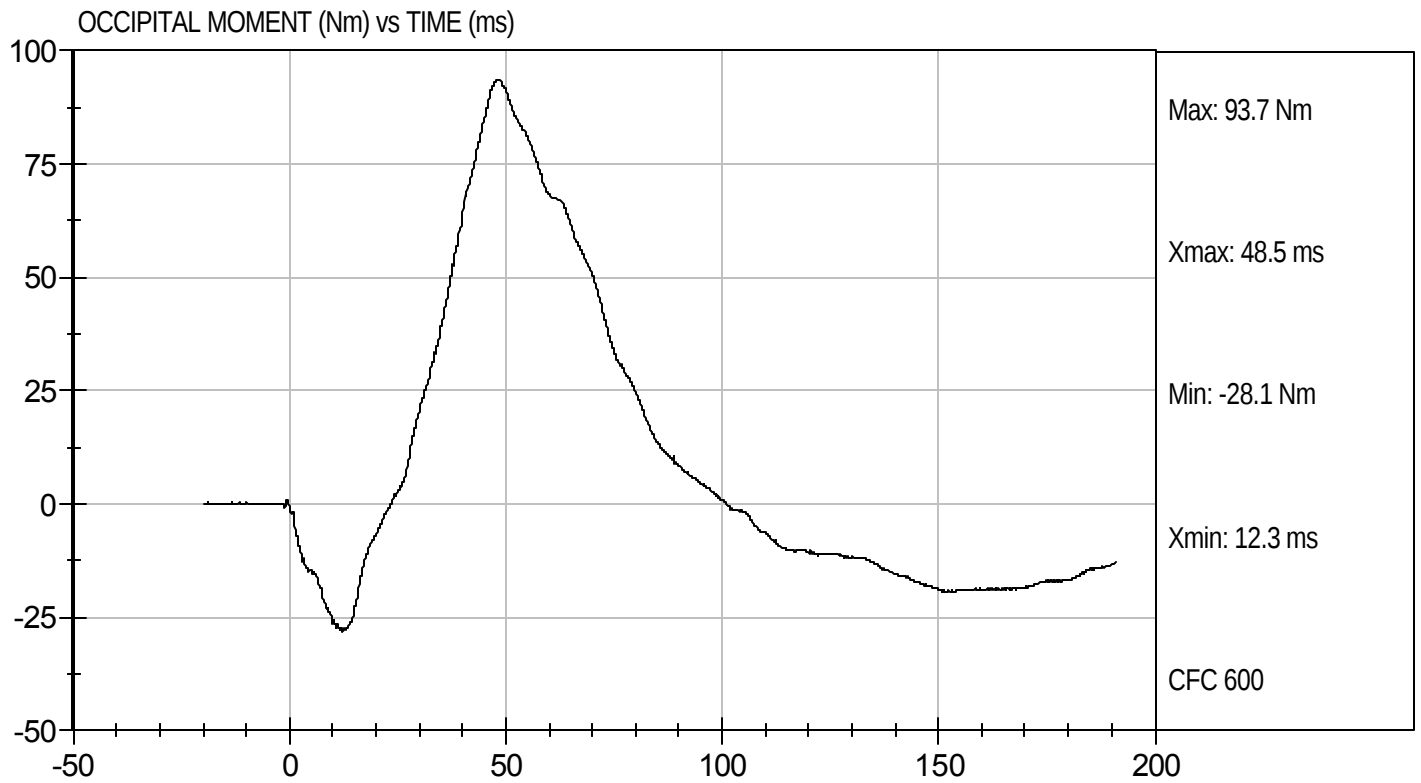
Test Date: 1/9/12
Velocity: 22.83 ft/s, 6.96 m/s





Test Desc: Neck Flexion
Component ID: D12052

Test Date: 1/9/12
Velocity: 22.83 ft/s, 6.96 m/s



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

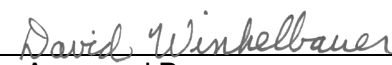
ATD Serial No: 351

Test I.D.: D12053

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity		%	10 to 70	20	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.13	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	19.51	Pass
	20 ms	G's	14.00 to 19.00	17.36	Pass
	30 ms	G's	11.00 to 16.00	12.27	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	12.8	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	38.2	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	98.8	Pass
	Time	ms	72.0 to 82.0	76.3	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	156.0	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-62.5	Pass
	Time	ms	65.0 to 79.0	69.0	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	142.5	Pass
Overall Test Results					Pass


 Laboratory Technician

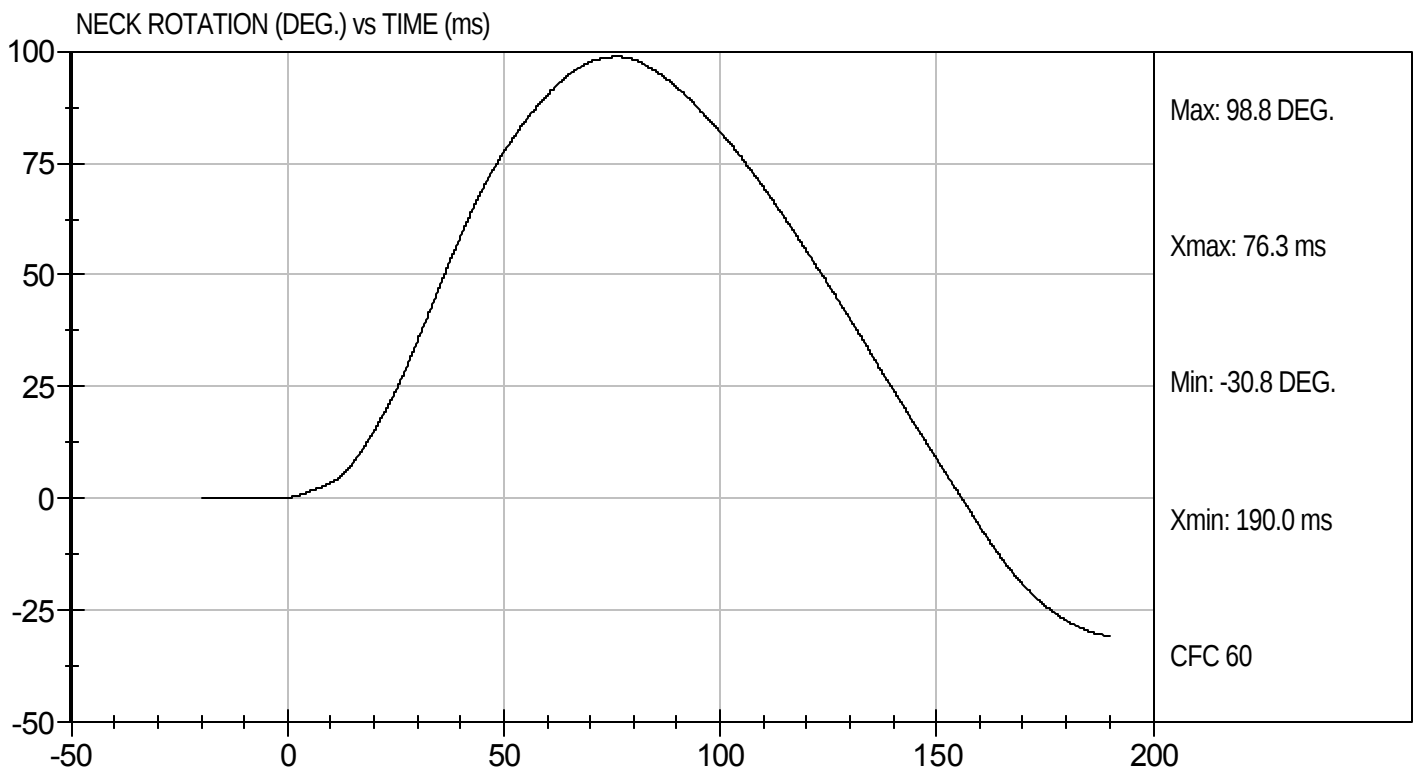
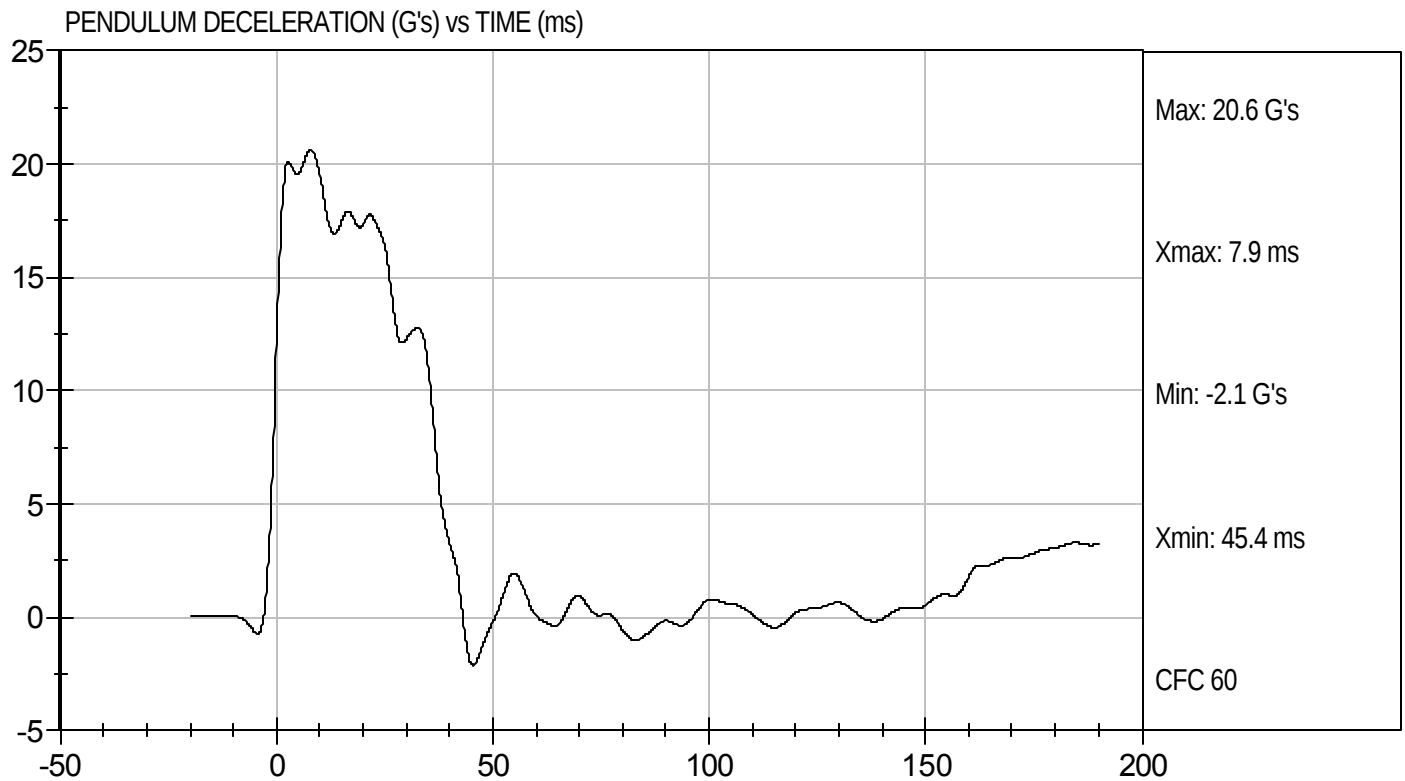
1/9/12
 Test Date


 Approved By



Test Desc: Neck Extension
Component ID: D12053

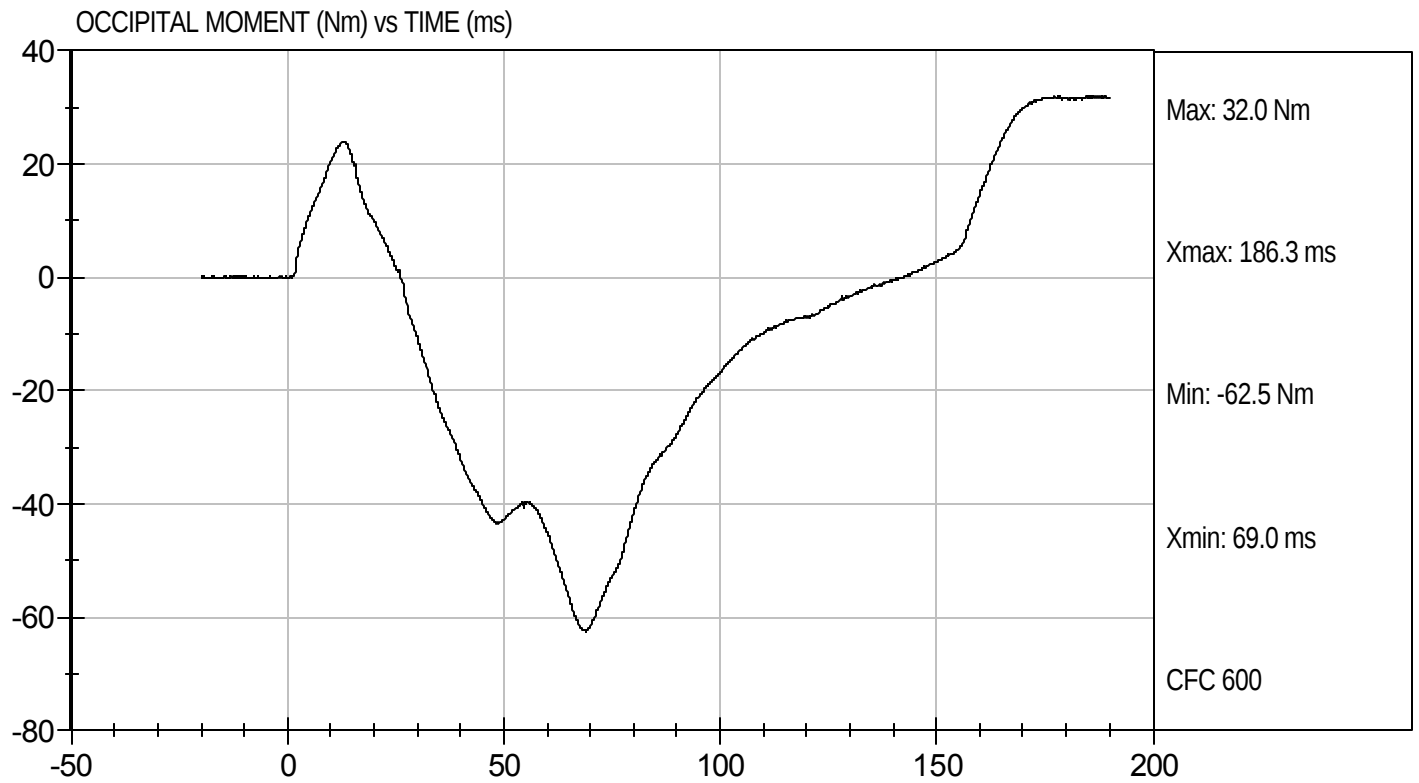
Test Date: 1/9/12
Velocity: 20.10 ft/s, 6.13 m/s





Test Desc: Neck Extension
Component ID: D12053

Test Date: 1/9/12
Velocity: 20.10 ft/s, 6.13 m/s



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE

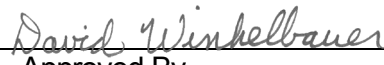
ATD Serial No: 351

Test I.D: D12054

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	21	Pass
Probe Velocity	m/s	6.58 to 6.82	6.77	Pass
Peak Probe Force	N	5159 to 5893	5,398	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.37	Pass
Internal Hysteresis	%	69 to 85	71	Pass
Overall Test Results			Pass	


Laboratory Technician

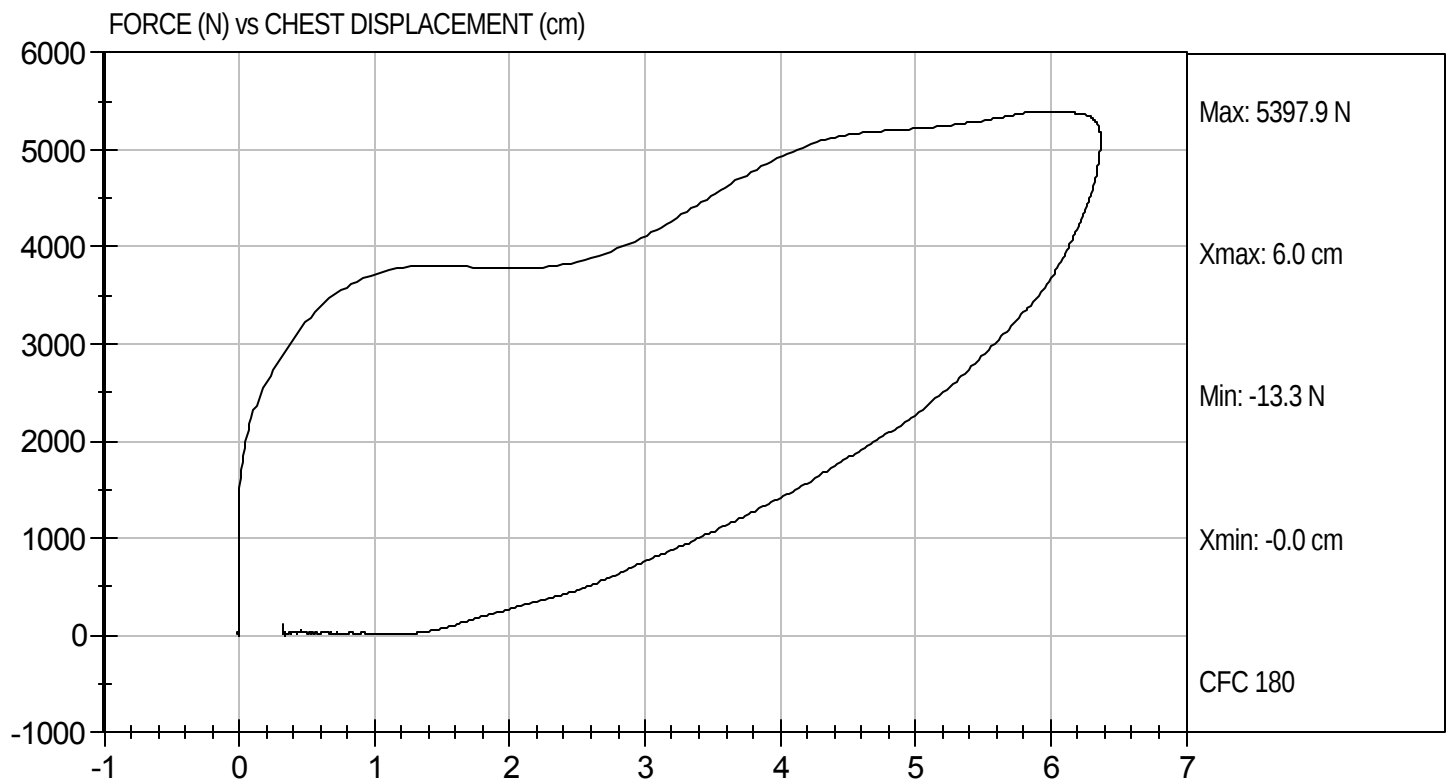
1/9/12
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D12054

Test Date: 1/9/12
Velocity: 22.22 ft/s, 6.77 m/s

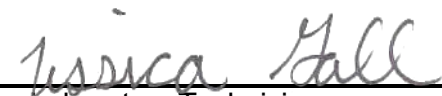


MGA RESEARCH CORPORATION
RIGHT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

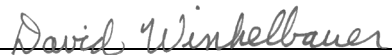
ATD Serial No: 351

Test I.D: D12055

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	22.1	Pass
Laboratory Relative Humidity	%	10 to 70	25	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	Newtons	4715 to 5782	5,413	Pass
Overall Test Results				Pass


Laboratory Technician

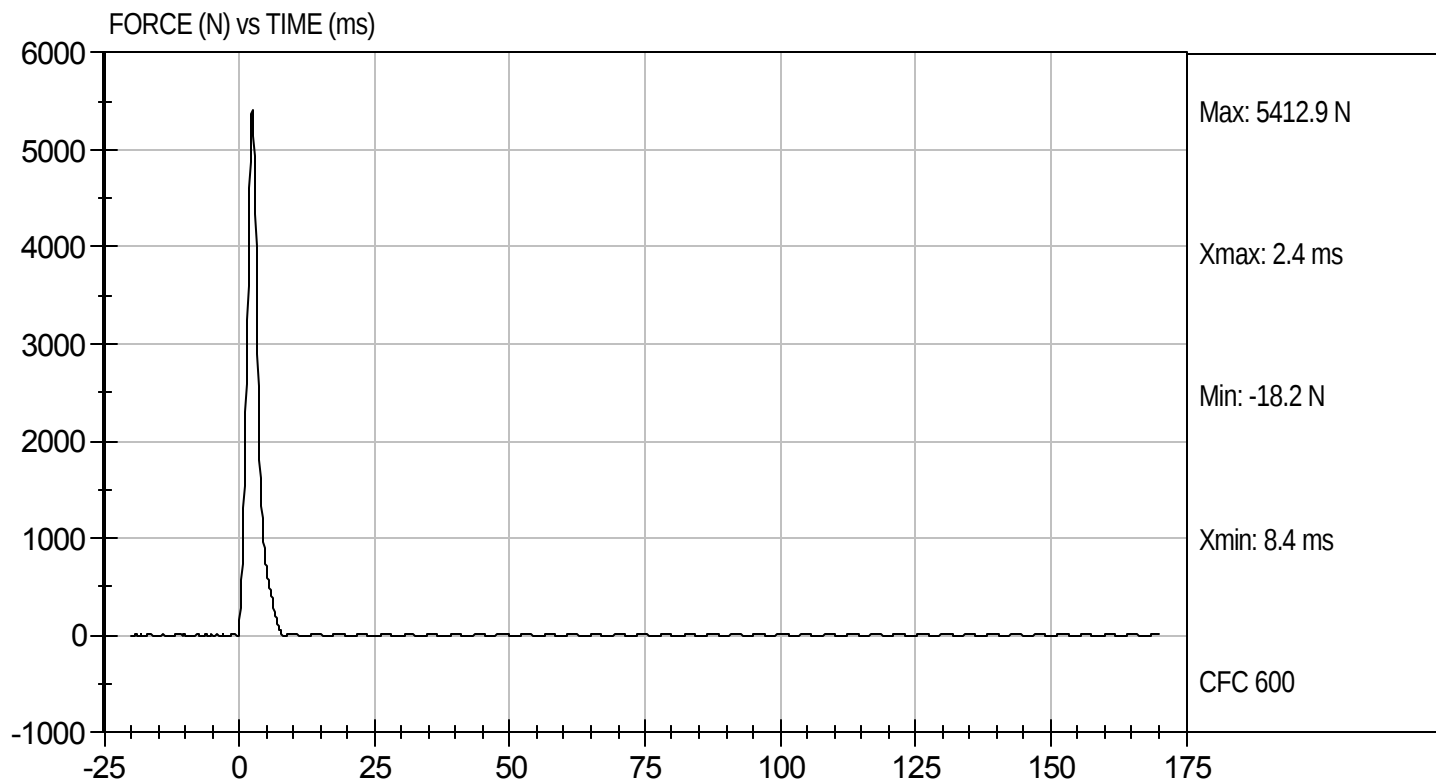
1/6/12
Test Date


Approved By



Test Desc: Right Knee
Component ID: D12055

Test Date: 1/6/12
Velocity: 6.97 ft/s, 2.12 m/s

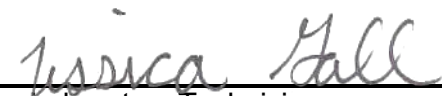


MGA RESEARCH CORPORATION
LEFT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

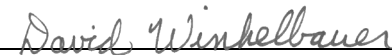
ATD Serial No: 351

Test I.D: D12056

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	22.1	Pass
Laboratory Relative Humidity	%	10 to 70	25	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	Newtons	4715 to 5782	5,407	Pass
Overall Test Results				Pass


Laboratory Technician

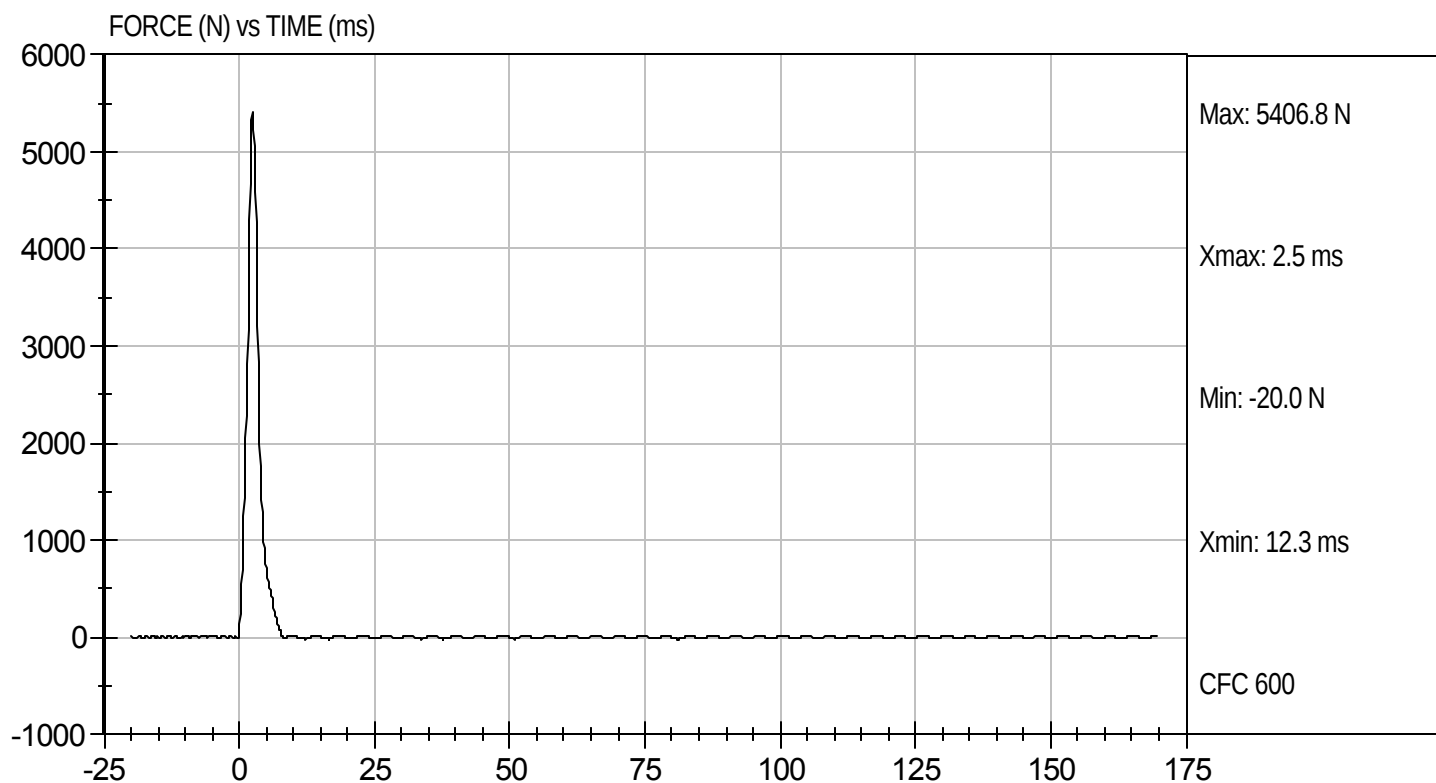
1/6/12
Test Date


Approved By



Test Desc: Left Knee
Component ID: D12056

Test Date: 1/6/12
Velocity: 6.94 ft/s, 2.12 m/s



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

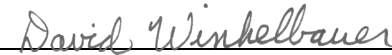
ATD Serial No: 351

Test I.D: D12050

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	22.1	22.1	Pass
Laboratory Relative Humidity	%	10 to 70	22	22	Pass
Rotation Rate	deg/s	5.0 -10.0	5.7	5.7	Pass
30 Degrees	Nm	94.9 Nm Max	60.4	60.6	Pass
150 ft-lbf / 203.4 Nm	Deg	40.0 - 50.0 Degree Max Rotation	43.2	42.0	Pass
Overall Test Results					Pass


 Laboratory Technician

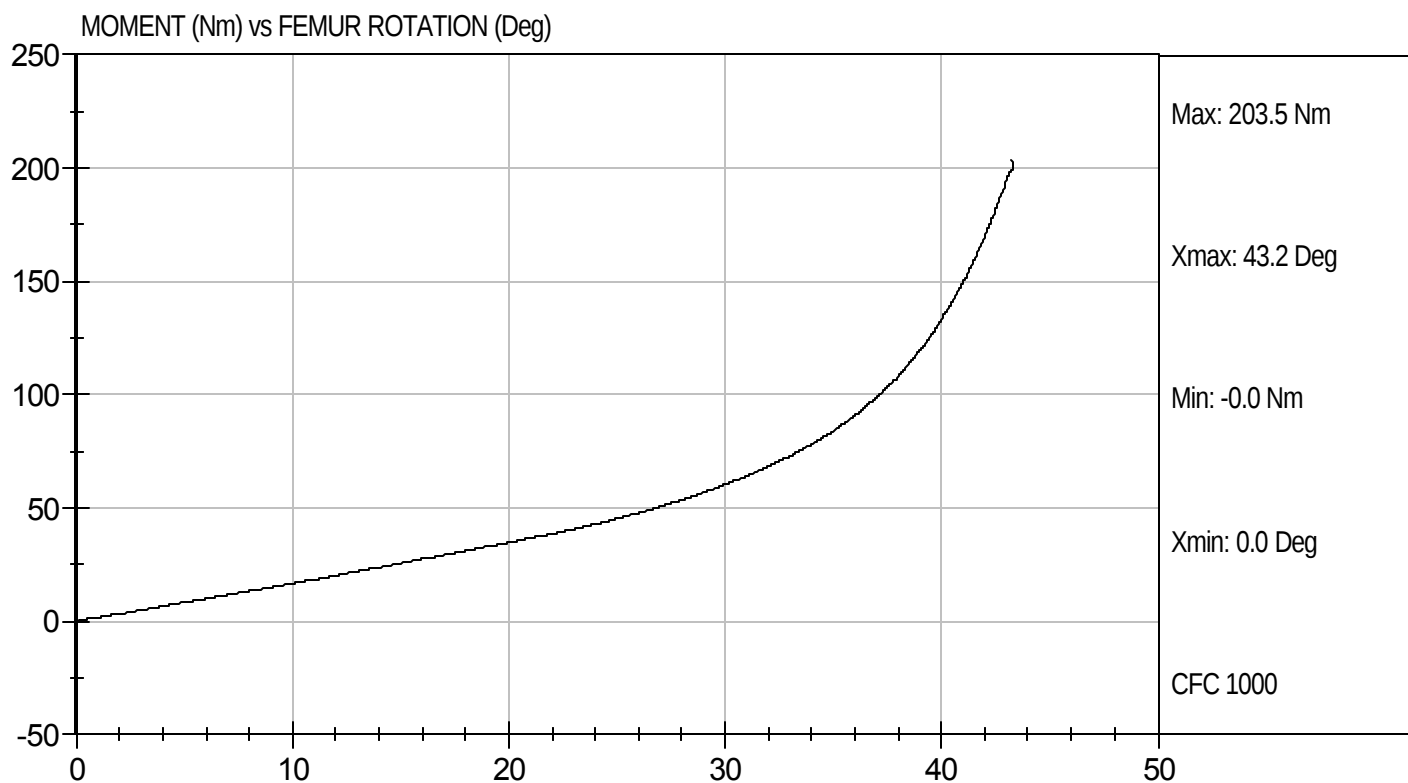
1/6/12
 Test Date


 Approved By



Test Desc: Hip Femur Flexion
Component ID: D12059

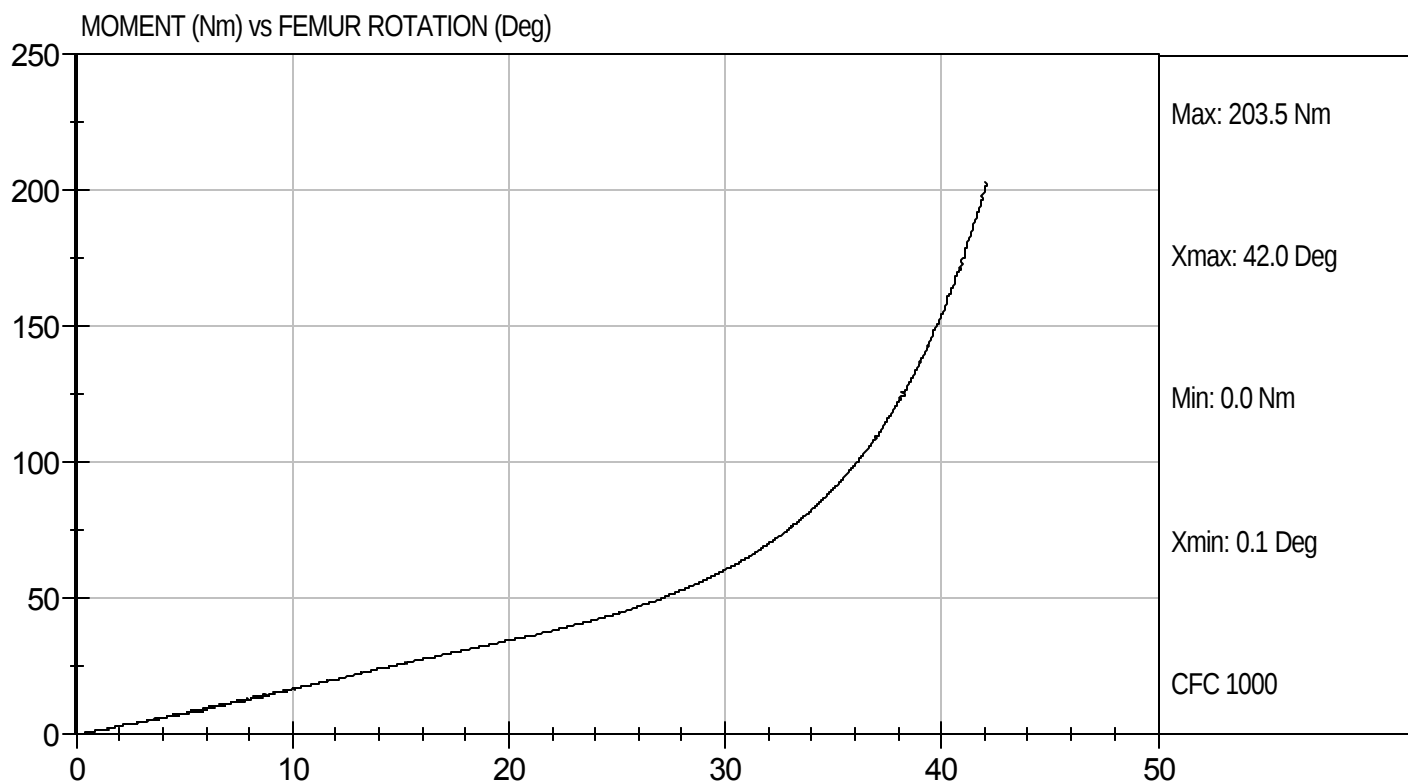
Test Date: 1/6/12
Velocity: 0 ft/s, 0.00 m/s





Test Desc: Hip Femur Flexion
Component ID: D12050

Test Date: 1/6/12
Velocity: 0 ft/s, 0.00 m/s



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

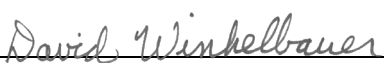
ATD Serial No: 351

Test ID: D12111

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	23	Pass
Peak Resultant Acceleration	G's	225 - 275	267	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	3.0	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

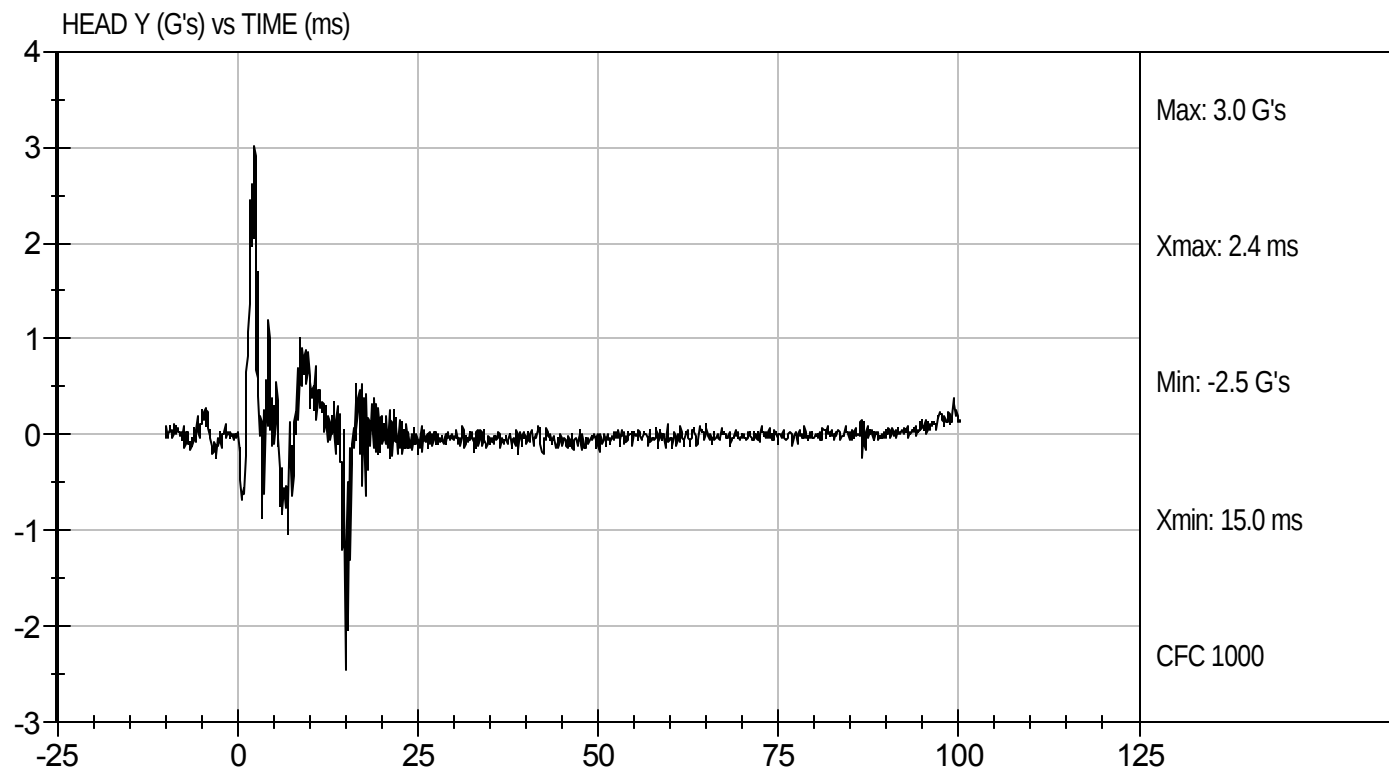
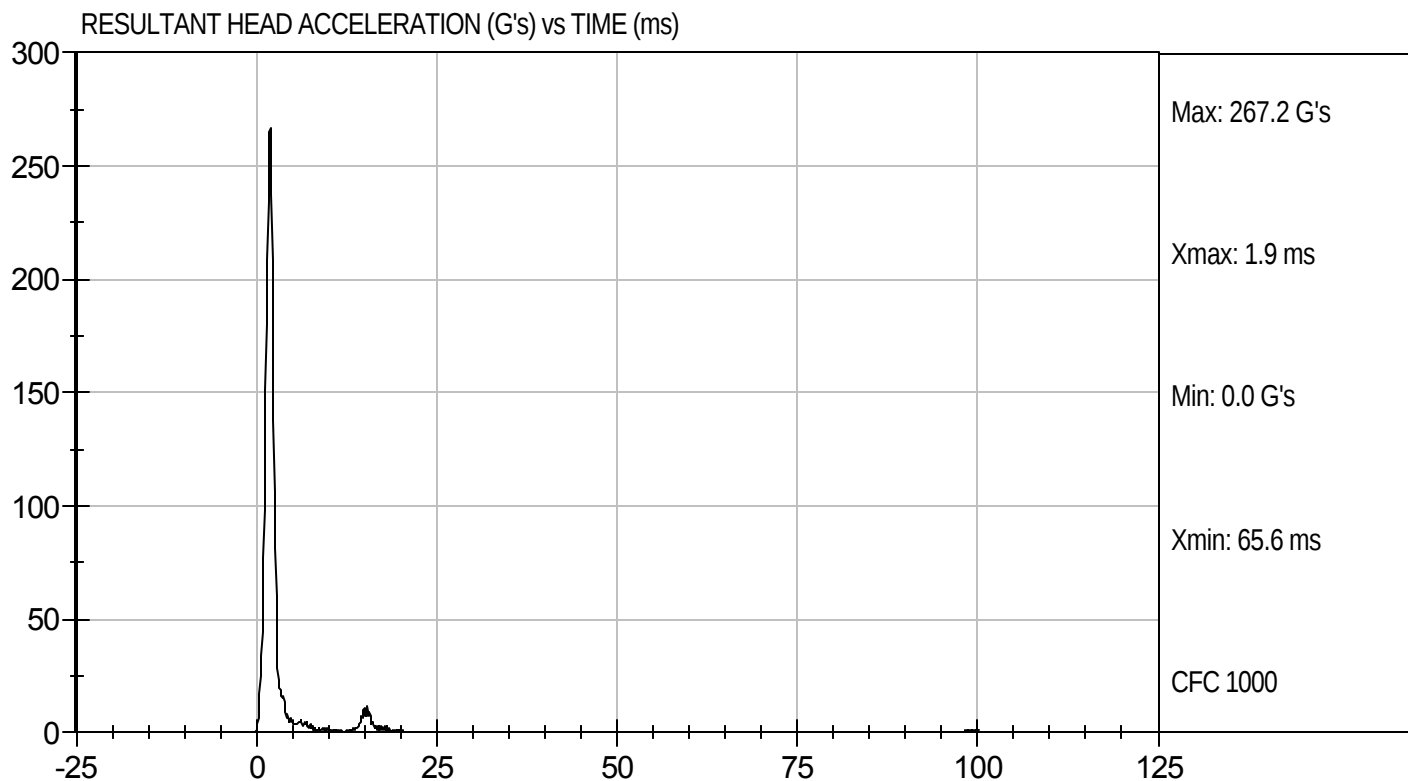
1/11/12
Test Date


Approved By



Test Desc: Head Drop
Component ID: D12111

Test Date: 1/11/12
Velocity: 0 ft/s, 0 m/s



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

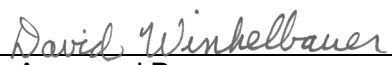
ATD Serial No: 351

Test I.D.: D12112

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	22.1	Pass
Laboratory Relative Humidity		%	10 to 70	23	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	24.89	Pass
	20 ms	G's	17.60 to 22.60	18.78	Pass
	30 ms	G's	12.50 to 18.50	13.21	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	13.2	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	34.8	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	69.5	Pass
	Time	ms	57.0 to 64.0	57.3	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	113.3	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	91.3	Pass
	Time	ms	47.0 to 58.0	47.4	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	97.3	Pass
Overall Test Results					Pass


 Laboratory Technician

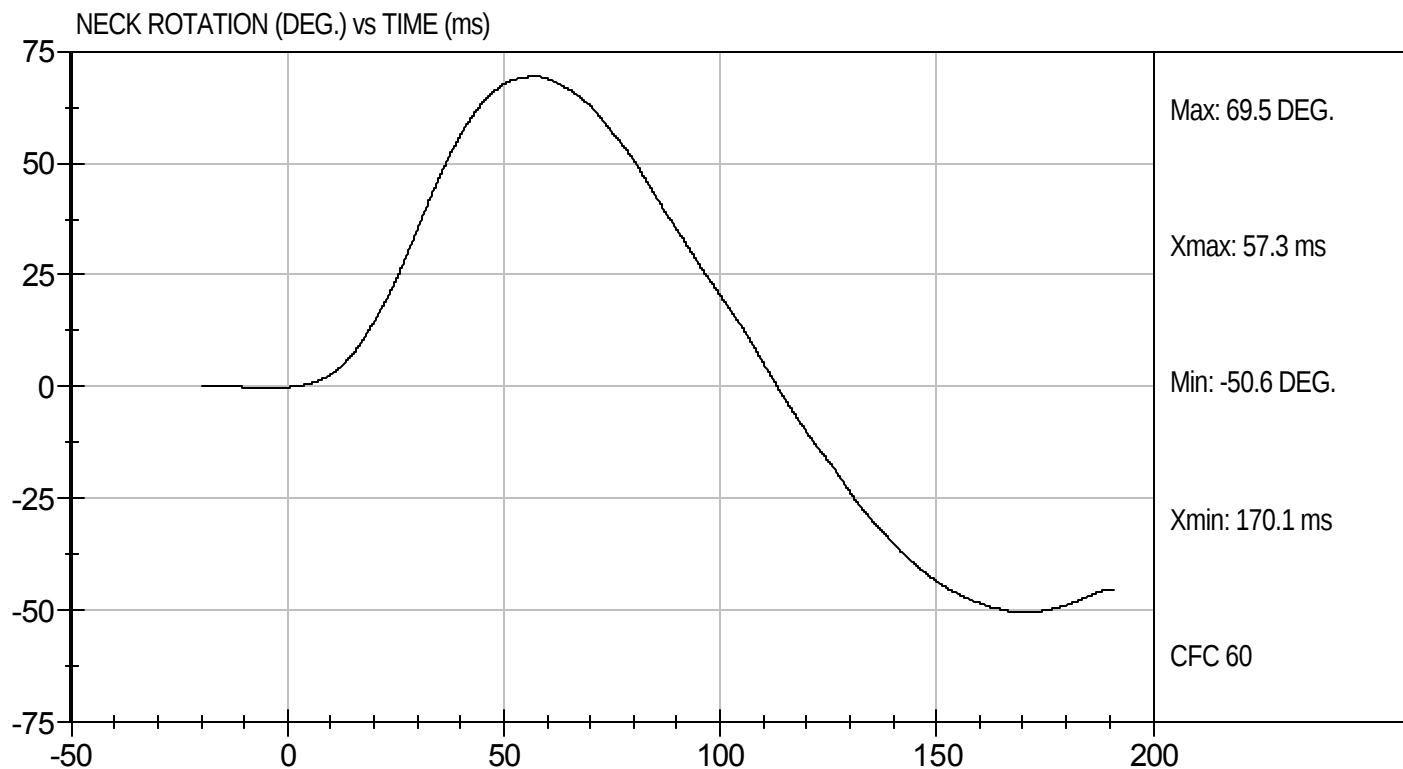
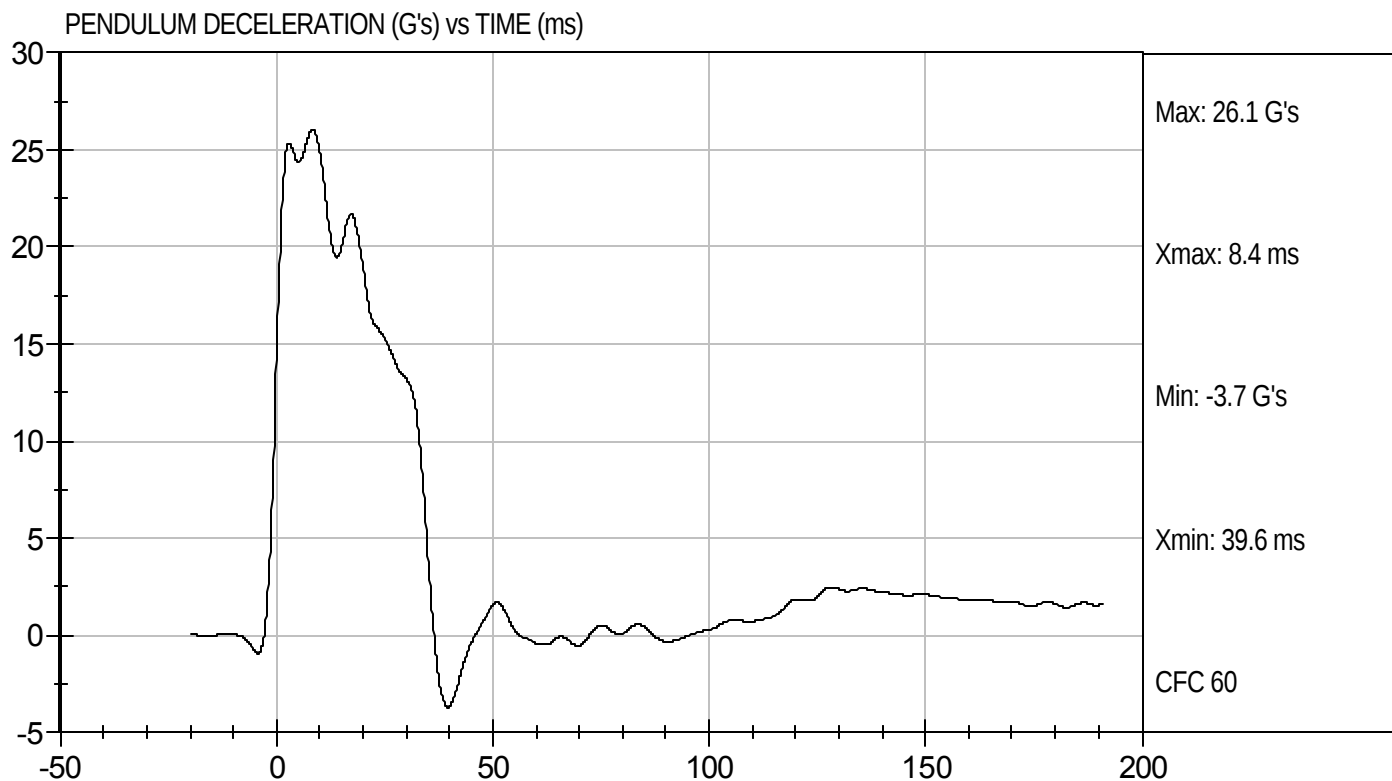
1/11/12
 Test Date


 Approved By



Test Desc: Neck Flexion
Component ID: D12112

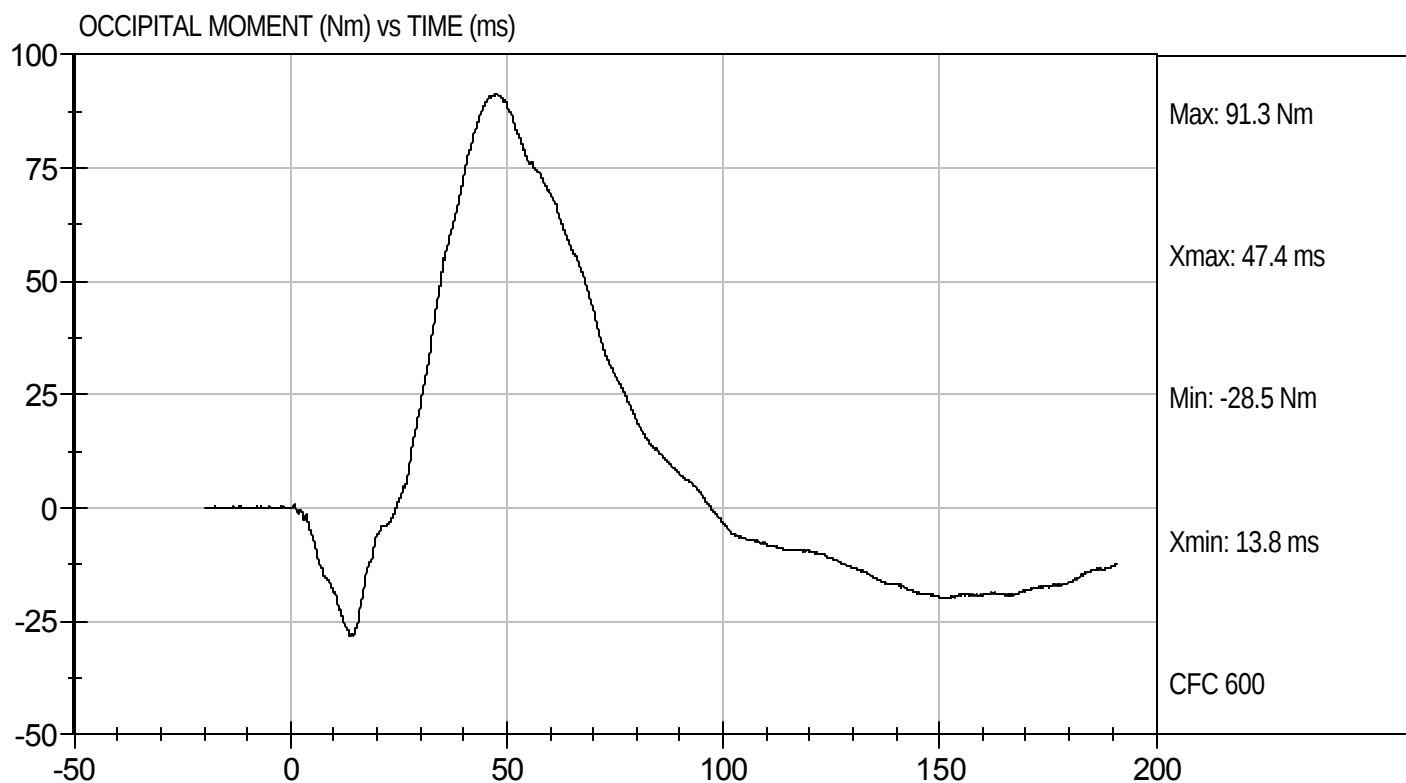
Test Date: 1/11/12
Velocity: 23.15 ft/s, 7.06 m/s





Test Desc: Neck Flexion
Component ID: D12112

Test Date: 1/11/12
Velocity: 23.15 ft/s, 7.06 m/s



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

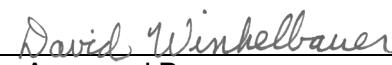
ATD Serial No: 351

Test I.D.: D12113

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	23	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.12	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	20.50	Pass
	20 ms	G's	14.00 to 19.00	18.16	Pass
	30 ms	G's	11.00 to 16.00	15.81	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	16.2	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	38.3	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	97.3	Pass
	Time	ms	72.0 to 82.0	75.8	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	154.9	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-62.5	Pass
	Time	ms	65.0 to 79.0	69.3	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	142.1	Pass
Overall Test Results					Pass


 Laboratory Technician

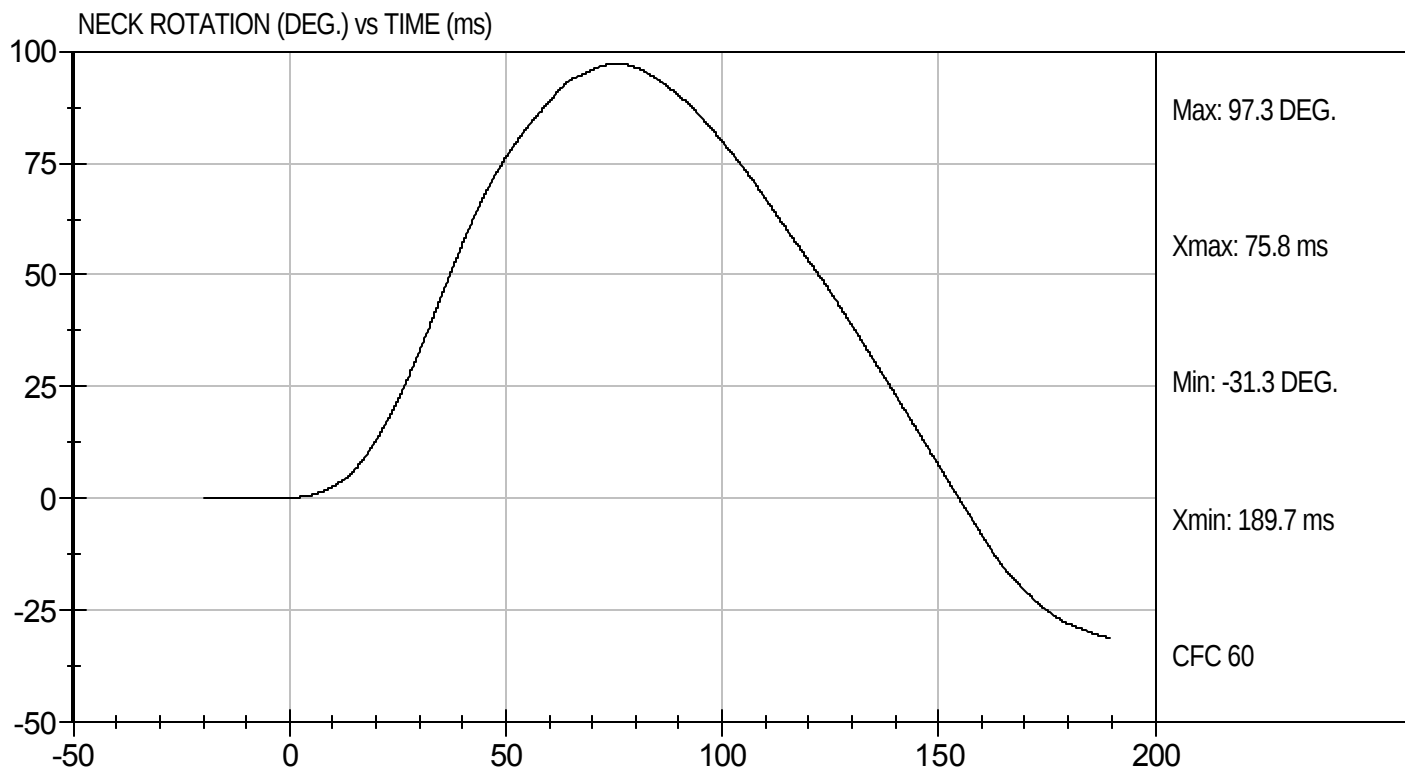
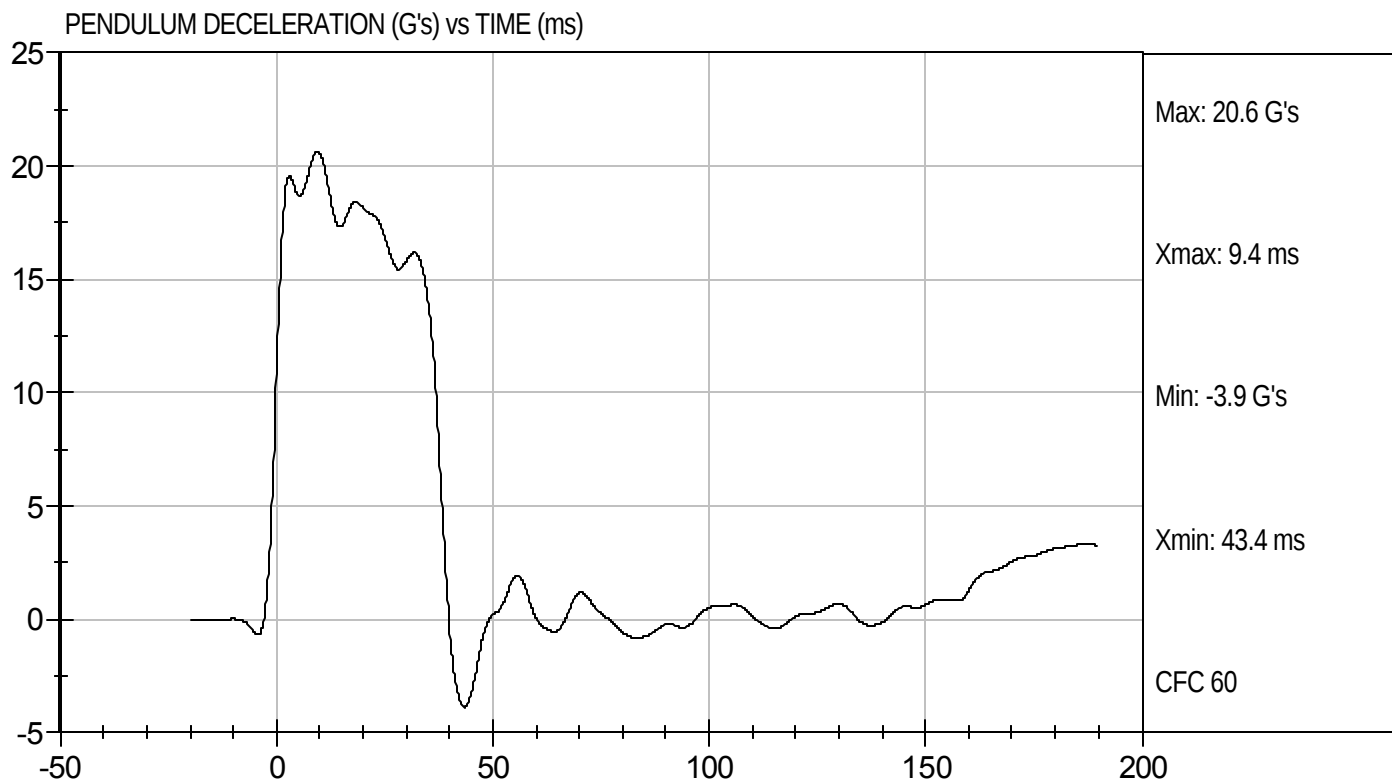
1/11/12
 Test Date


 Approved By



Test Desc: Neck Extension
Component ID: D12113

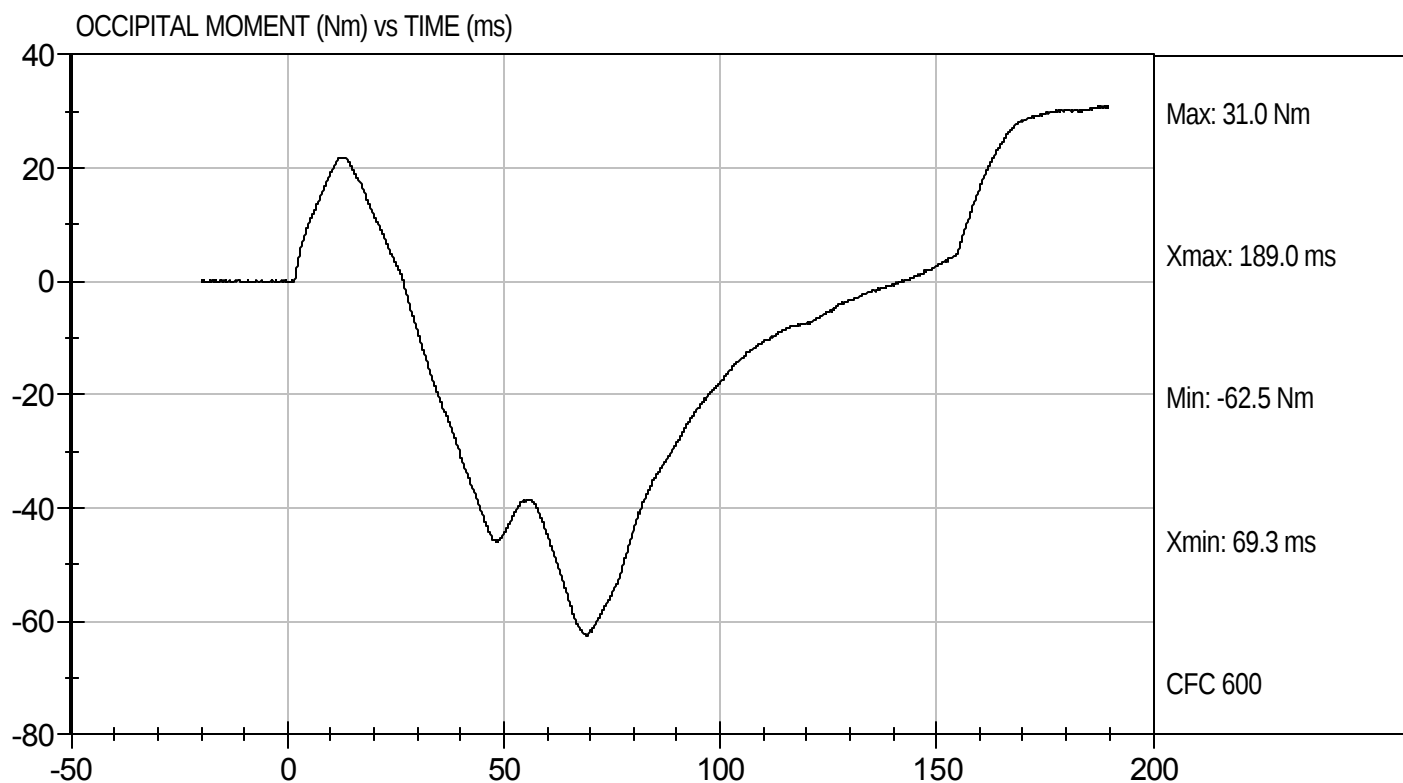
Test Date: 1/11/12
Velocity: 20.08 ft/s, 6.12 m/s





Test Desc: Neck Extension
Component ID: D12113

Test Date: 1/11/12
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: D12114

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	24	Pass
Probe Velocity	m/s	6.58 to 6.82	6.77	Pass
Peak Probe Force	N	5159 to 5893	5,265	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.37	Pass
Internal Hysteresis	%	69 to 85	71	Pass
Overall Test Results			Pass	


Laboratory Technician

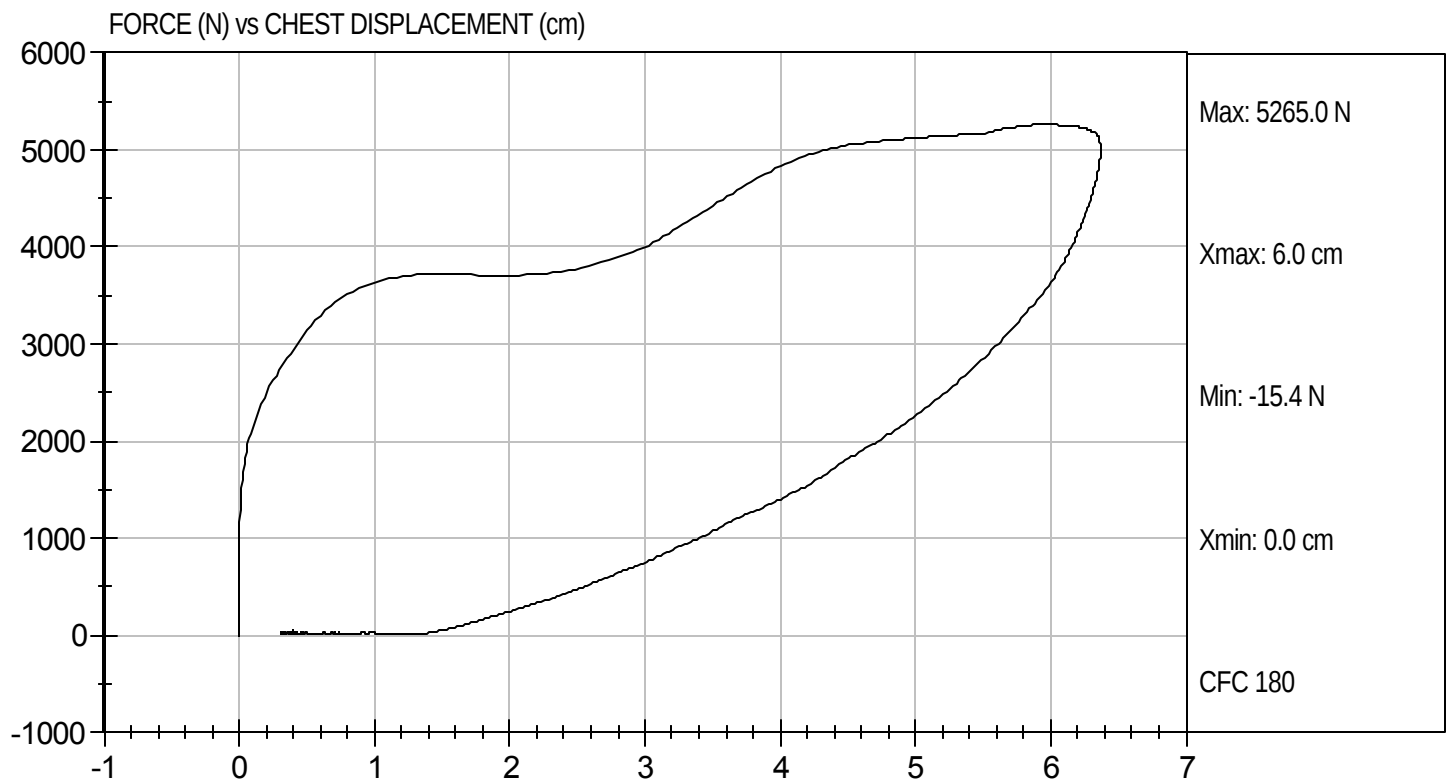
1/11/12
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D12114

Test Date: 1/11/12
Velocity: 22.22 ft/s, 6.77 m/s

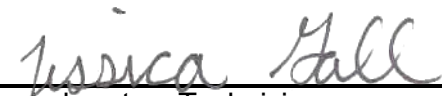


MGA RESEARCH CORPORATION
RIGHT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

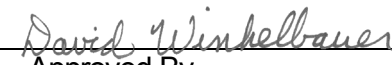
ATD Serial No: 351

Test I.D: D12115

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	22.0	Pass
Laboratory Relative Humidity	%	10 to 70	19	Pass
Probe Velocity	m/s	2.07 to 2.13	2.07	Pass
Peak Probe Force	Newtons	4715 to 5782	5,482	Pass
Overall Test Results				Pass


Laboratory Technician

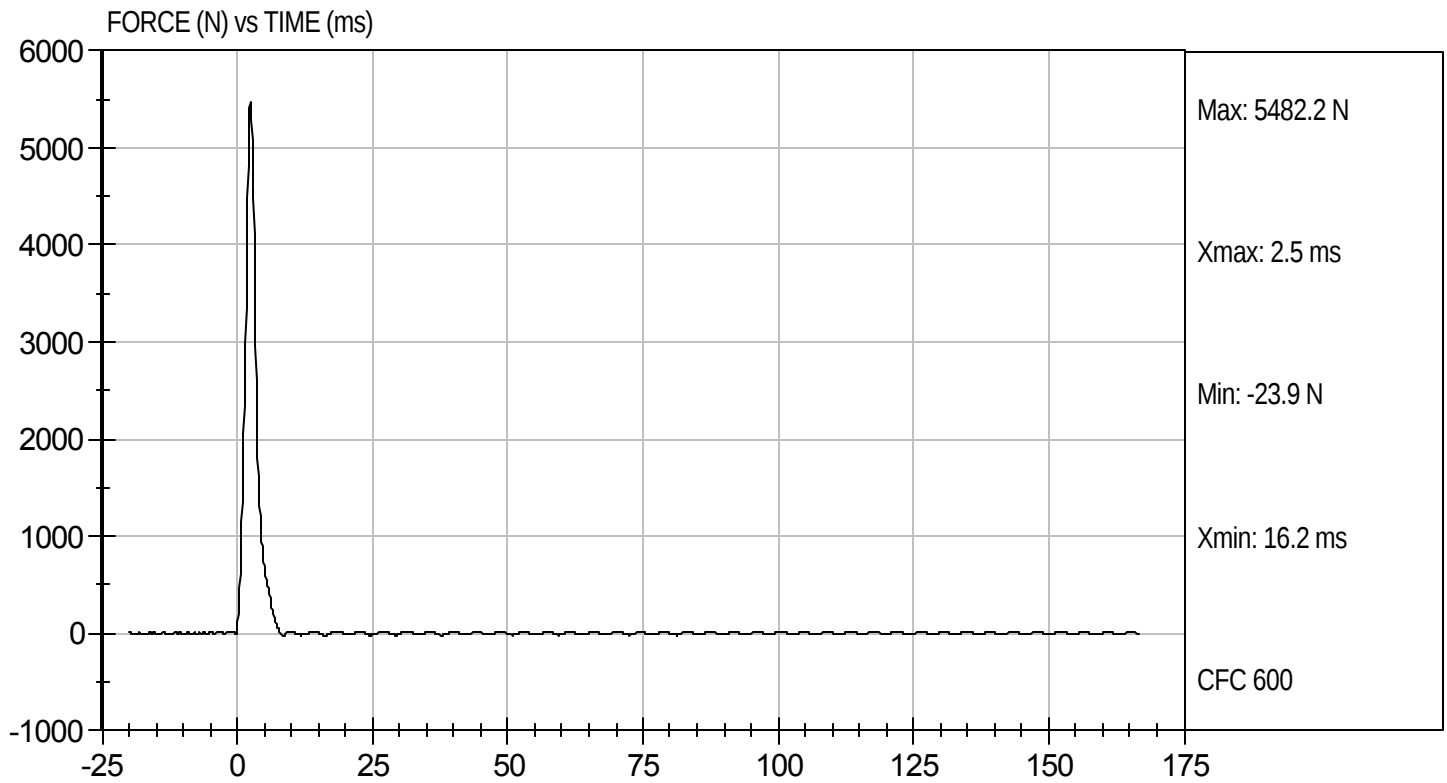
1/11/12
Test Date


Approved By



Test Desc: Right Knee
Component ID: D12115

Test Date: 1/11/12
Velocity: 6.80 ft/s, 2.07 m/s



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

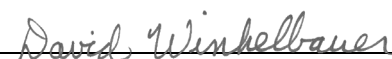
ATD Serial No: 351

Test I.D: D12116

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	22.0	Pass
Laboratory Relative Humidity	%	10 to 70	19	Pass
Probe Velocity	m/s	2.07 to 2.13	2.10	Pass
Peak Probe Force	Newtons	4715 to 5782	4,900	Pass
Overall Test Results				Pass


Laboratory Technician

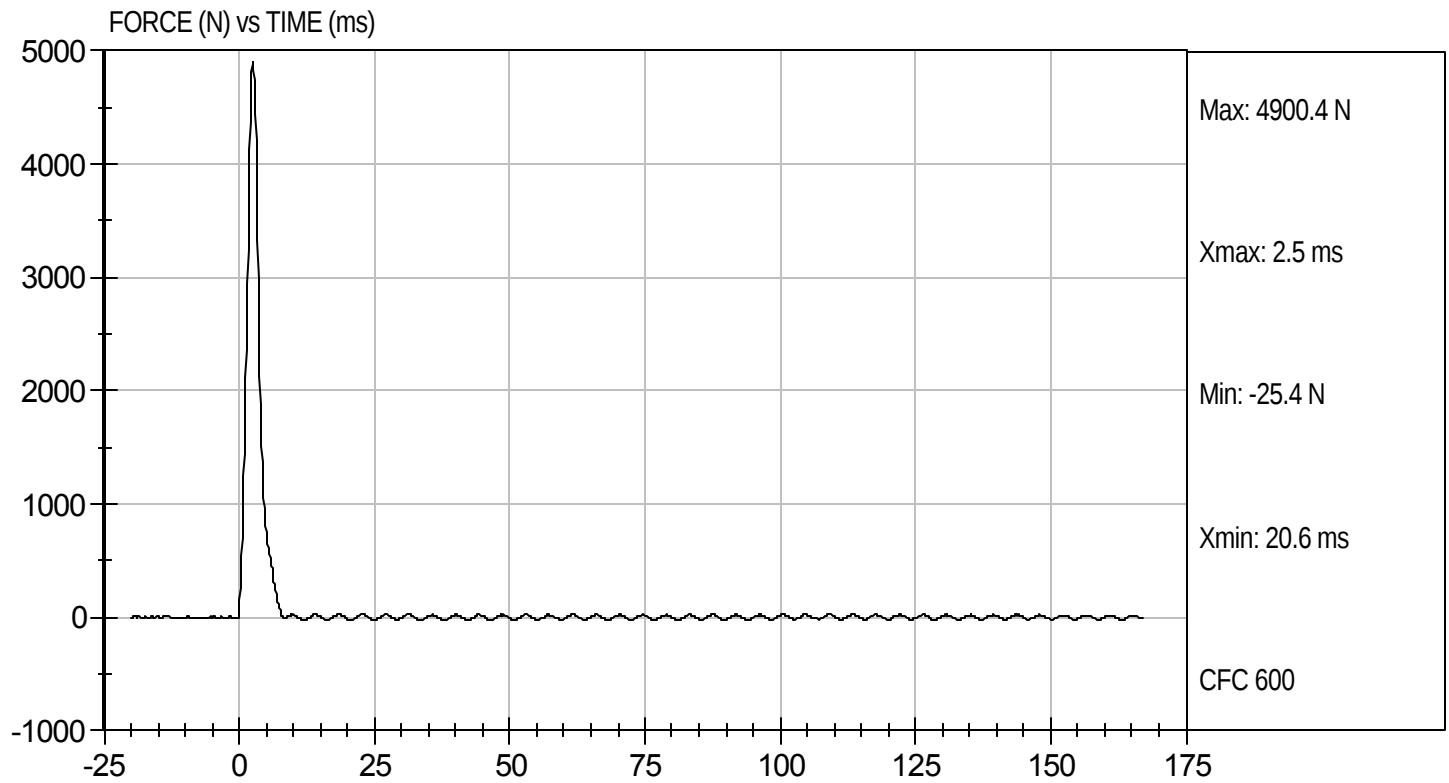
1/11/12
Test Date


Approved By



Test Desc: Left Knee
Component ID: D12116

Test Date: 1/11/12
Velocity: 6.89 ft/s, 2.10 m/s



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

ATD Serial No: 351

Test I.D: D12110

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.9	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	18	18	Pass
Rotation Rate	deg/s	5.0 -10.0	5.7	5.7	Pass
30 Degrees	Nm	94.9 Nm Max	61.4	60.7	Pass
150 ft-lbf / 203.4 Nm	Deg	40.0 - 50.0 Degree Max Rotation	43.3	42.2	Pass
Overall Test Results					Pass


 Laboratory Technician

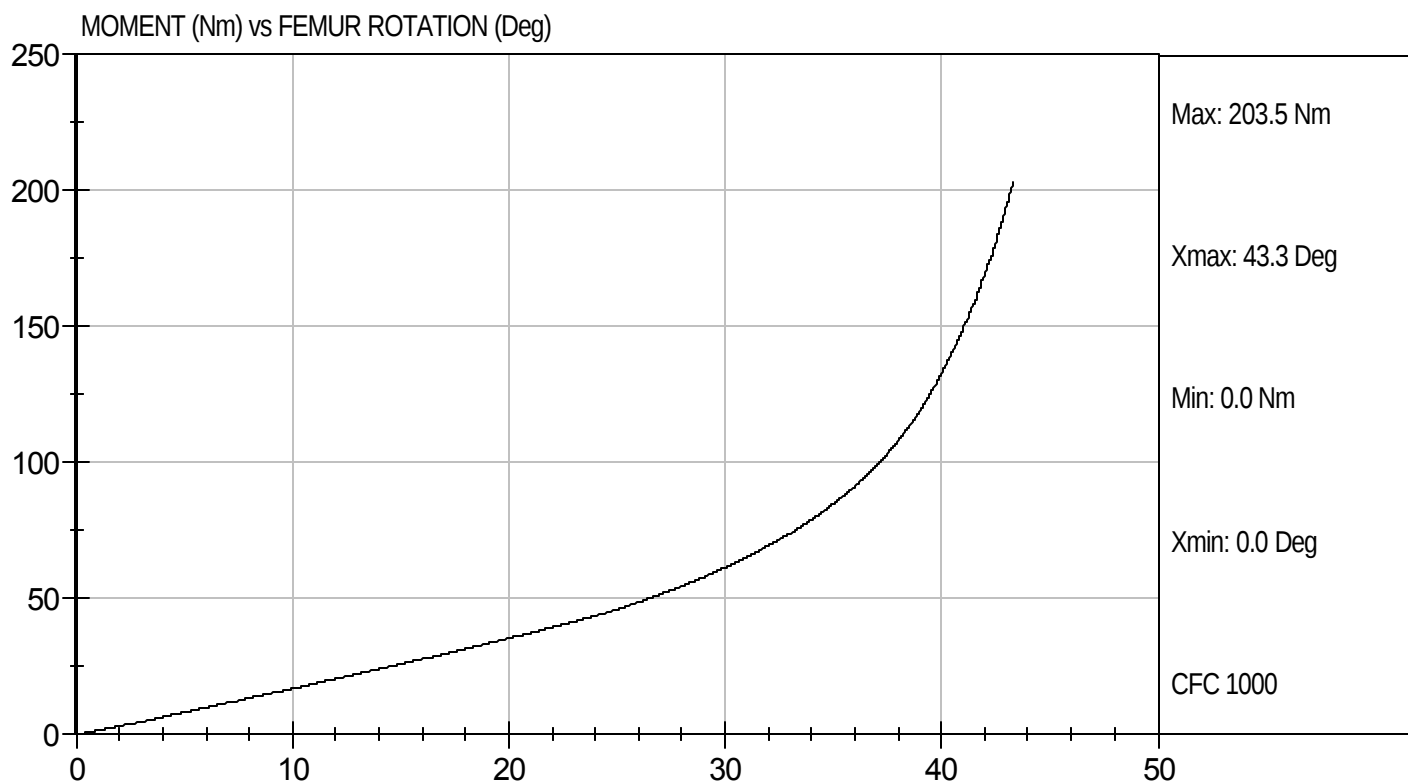
1/11/12
 Test Date


 Approved By



Test Desc: Hip Femur Flexion
Component ID: D12119

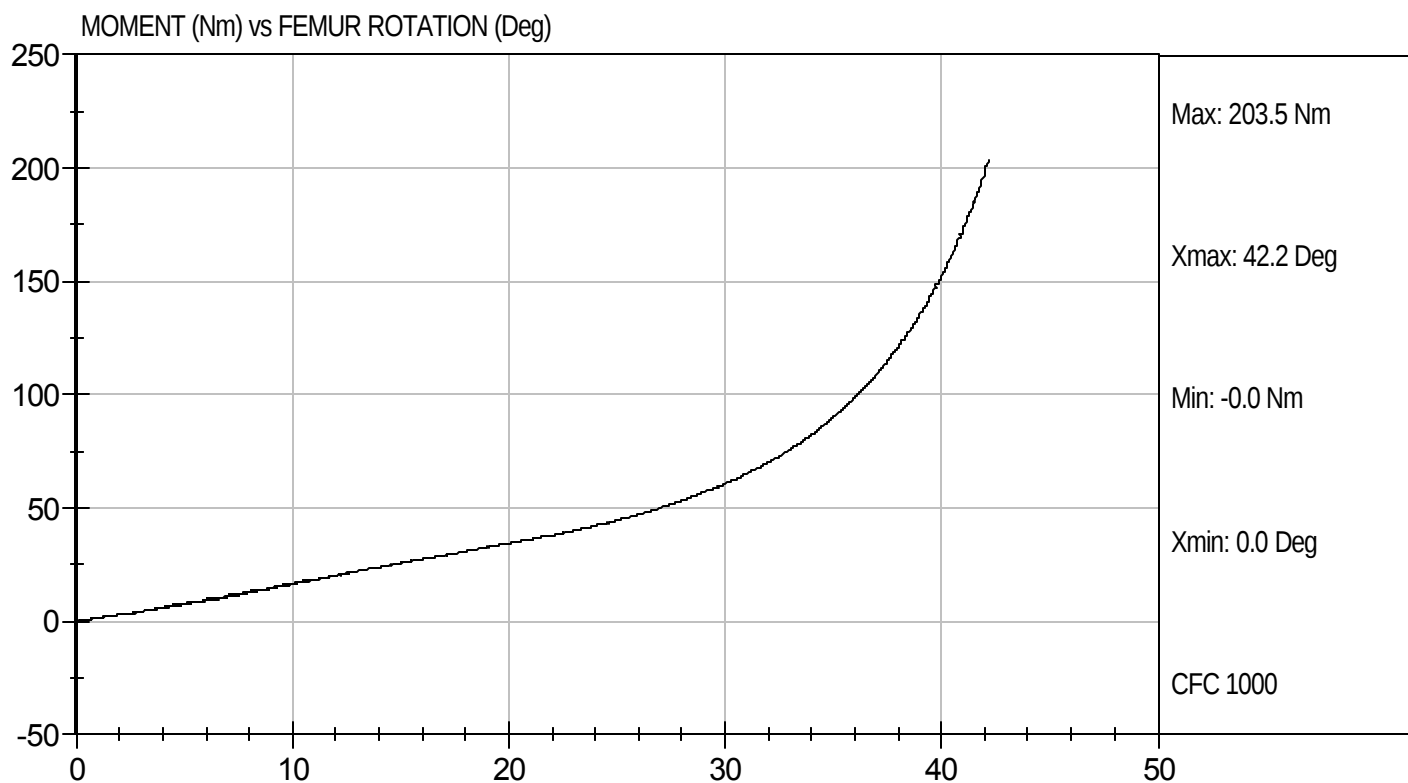
Test Date: 1/11/12
Velocity: 0 ft/s, 0.00 m/s





Test Desc: Hip Femur Flexion
Component ID: D12110

Test Date: 1/11/12
Velocity: 0 ft/s, 0.00 m/s



Hybrid III, 5th External Measurements
SN: 138

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	785.1
B	SHOULDER PIVOT HEIGHT	Centerline of shoulder pivot bolt to the seat surface.	431.8-457.2	456.8
C	H-POINT HEIGHT	Reference	81.3-86.3	84.0
D	H-POINT LOCATION FROM BACKLINE	Reference	144.8-149.8	146.2
E	SHOULDER PIVOT FROM BACKLINE	Center of the shoulder clevis to the rear vertical surface of the fixture.	68.6-83.8	78.0
F	THIGH CLEARANCE	Measured at the highest point on the upper femur segment.	119.4-134.6	127.5
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	249.6
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	280.2
J	ELBOW REST HEIGHT	Measure from the flesh below the elbow pivot bolt to the seat surface.	182.8-203.2	201.9
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	526.7
L	POPLITEAL HEIGHT	Seat surface to the plane of the horizontal plane of the bottom of the feet.	355.6-376.0	362.3
M	KNEE PIVOT HEIGHT	Centerline of knee pivot bolt to the horizontal plane of the bottom of the feet.	393.7-419.1	398.0
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	430.5

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	184.6
P	FOOT LENGTH	Tip of toe to rear of heel	218.5-233.7	221.0
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	472.6
S	HEAD BREADTH	The widest part of the head	137.1-147.3	141.9
T	HEAD DEPTH	Back of the head to the forehead	177.8-188.0	184.2
U	HIP BREADTH	The widest part of the hip	299.7-314.9	307.4
V	SHOULDER BREADTH	Outside edges of right and left shoulder clevises	350.5-365.7	360.5
W	FOOT BREADTH	The widest part of the foot	78.8-94.0	85.0
X	HEAD CIRCUMFERENCE	Measured at the point as in dim. "T"	528.3-548.7	546.2
Y	CHEST CIRCUMFERENCE (WITH CHEST JACKET)	Measured 345.4 ± 12.7 mm above seat surface	850.9-881.3	875.1
Z	WAIST CIRCUMFERENCE	Measured 165.1 ± 5.1 mm above seat surface	759.5-789.9	785.4
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: 138

Test ID: D114211

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	42	Pass
Peak Resultant Acceleration	G's	250 to 300	266	Pass
Peak Lateral Acceleration	G's	+/- 15	8.1	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

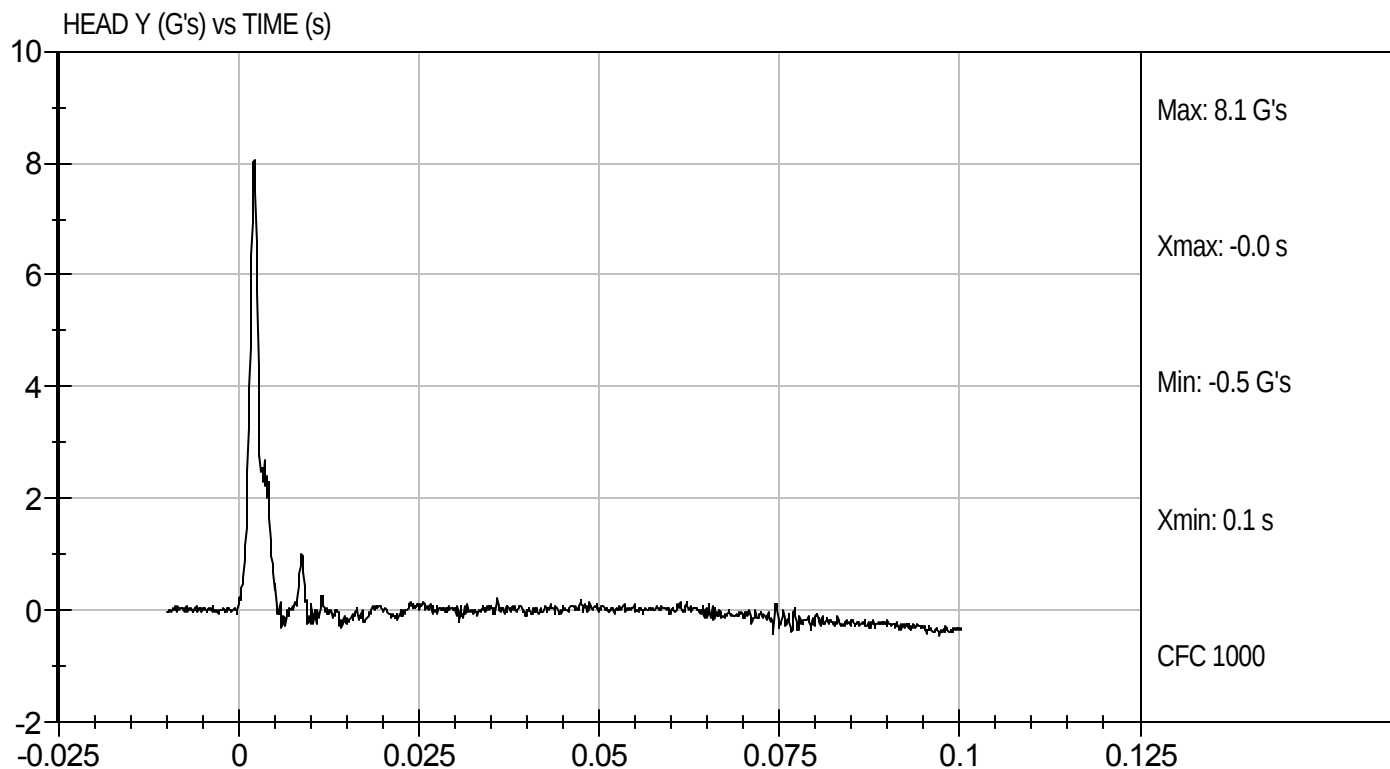
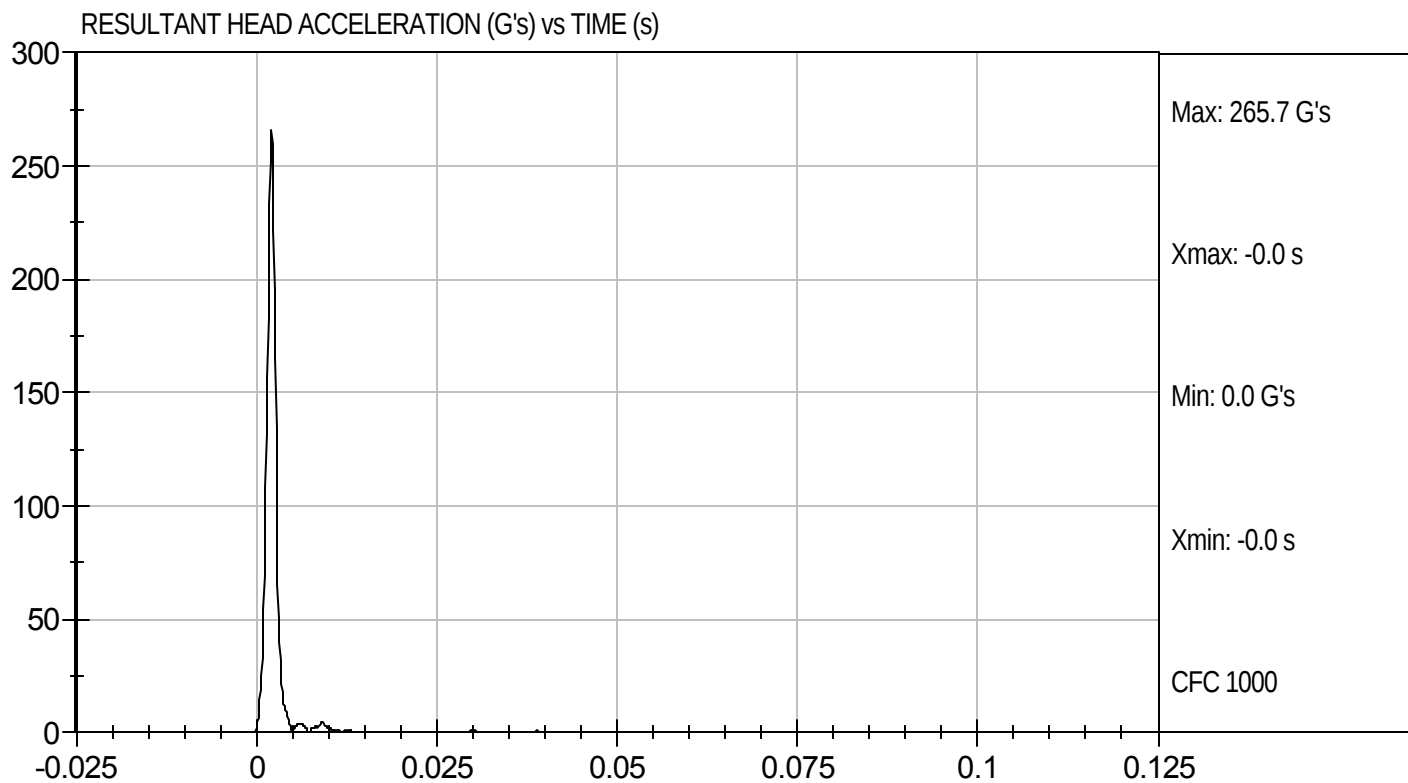
12/14/11
Test Date


Approved By



Test Desc: Head Drop
Component ID: D114211

Test Date: 12/14/11
Velocity: 0 ft/s, 0 m/s



MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 5TH PERCENTILE

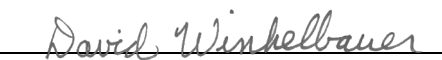
ATD Serial No: 138

Test I.D: D114212

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	38	Pass
Pendulum Speed		m/s	6.89 to 7.13	7.05	Pass
Pendulum Pulse	10 ms	m/s	2.1 to 2.5	2.3	Pass
	20 ms	m/s	4.0 to 5.0	4.2	Pass
	30 ms	m/s	5.8 to 7.0	5.9	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	87	Pass
Overall Results				Pass	


 Laboratory Technician

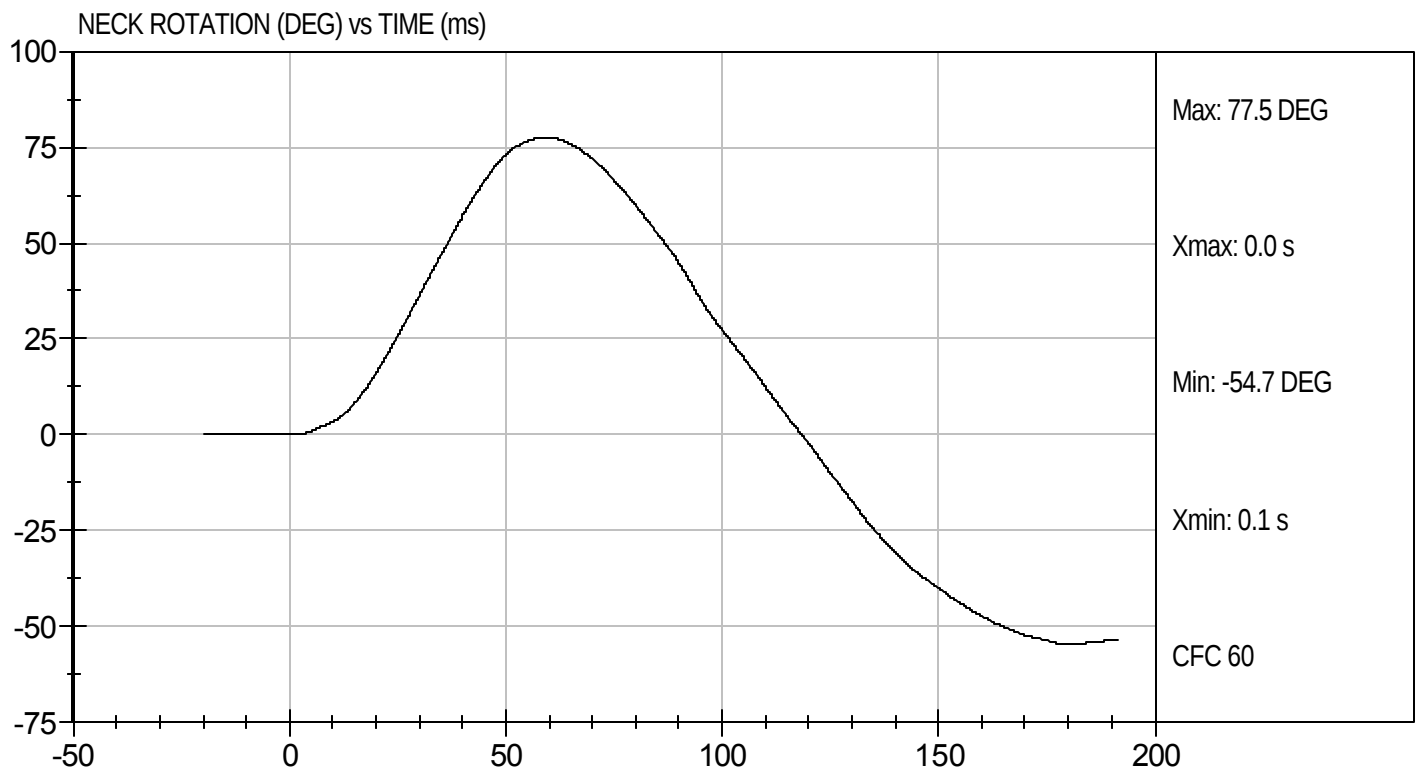
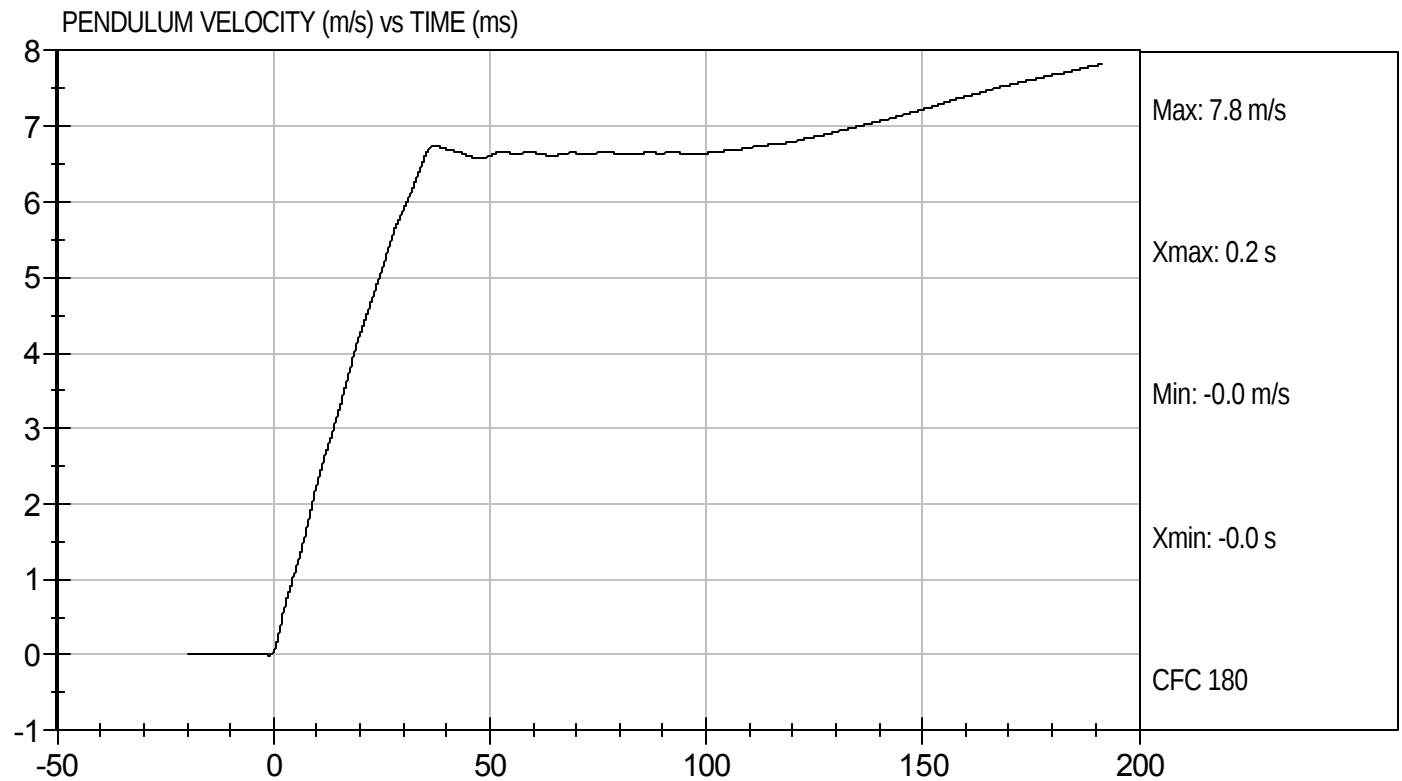
12/15/11
 Test Date


 Approved By



Test Desc: Neck Flexion
Component ID: D114212

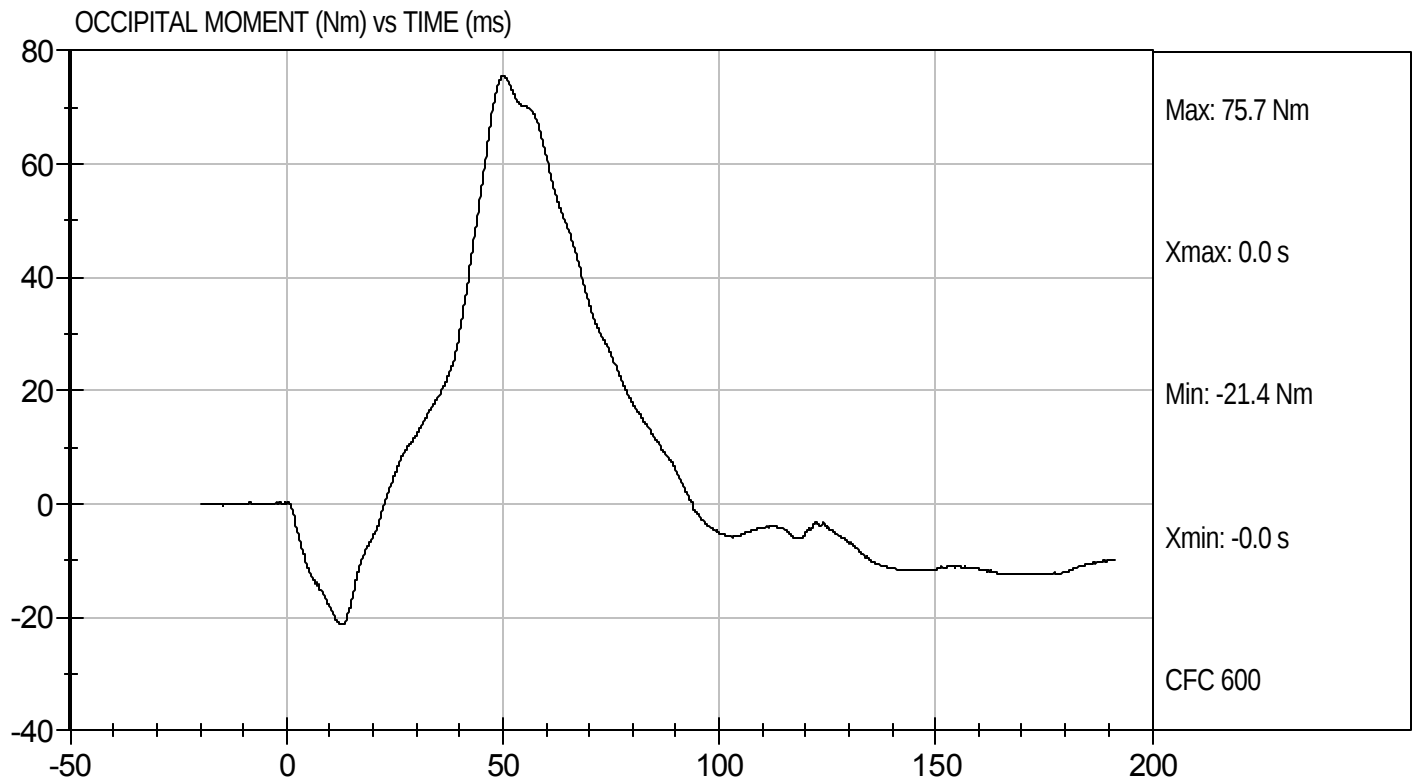
Test Date: 12/15/11
Velocity: 23.14 ft/s, 7.05 m/s





Test Desc: Neck Flexion
Component ID: D114212

Test Date: 12/15/11
Velocity: 23.14 ft/s, 7.05 m/s



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 138Test I.D: D114213

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	38	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.12	Pass
Pendulum Pulse	10 ms	m/s	1.5 to 1.9	1.9	Pass
	20 ms	m/s	3.1 to 3.9	3.6	Pass
	30 ms	m/s	4.6 to 5.6	5.1	Pass
D Plane Rotation	Max	deg	99 to 114	104	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	-65 to -53	-57	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	102	Pass
Overall Results					Pass

Jessica Hall
Laboratory Technician

12/15/11

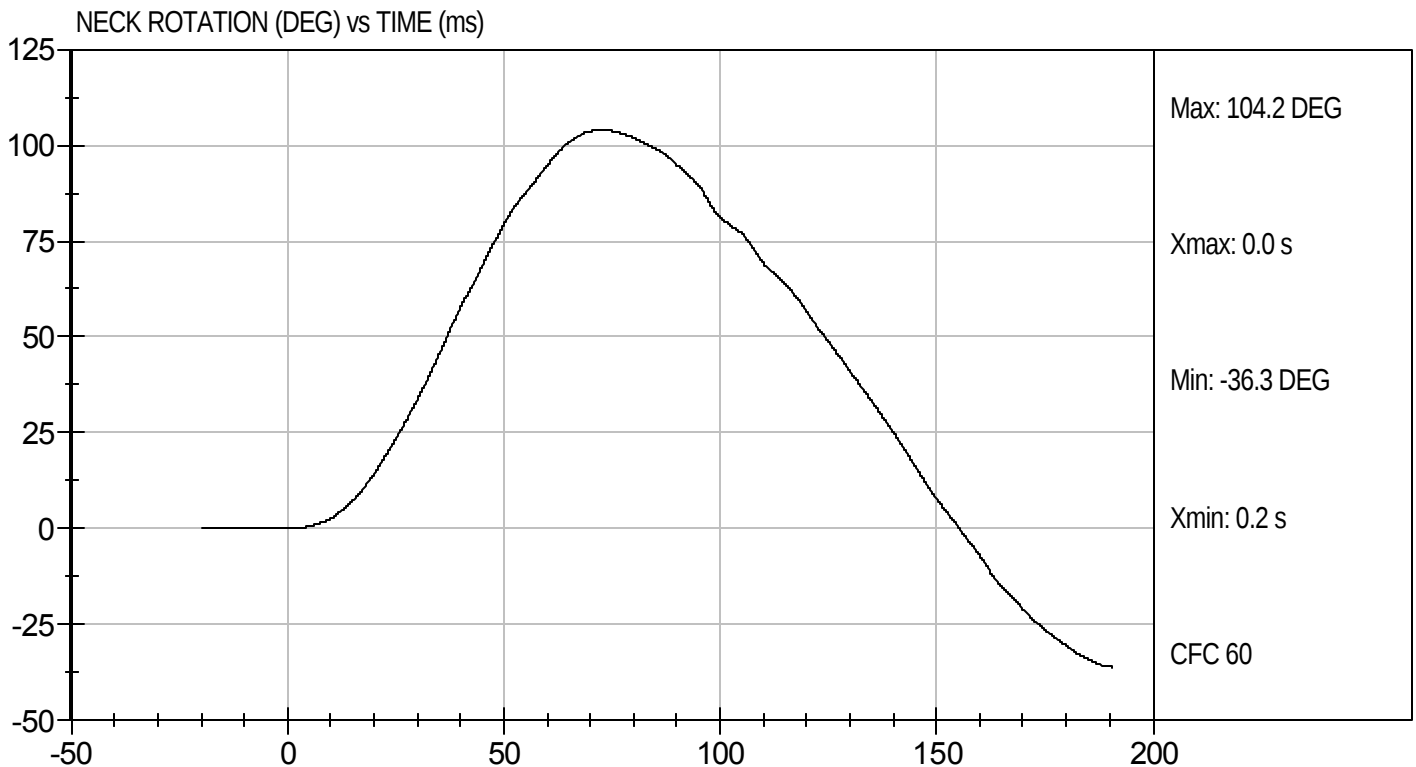
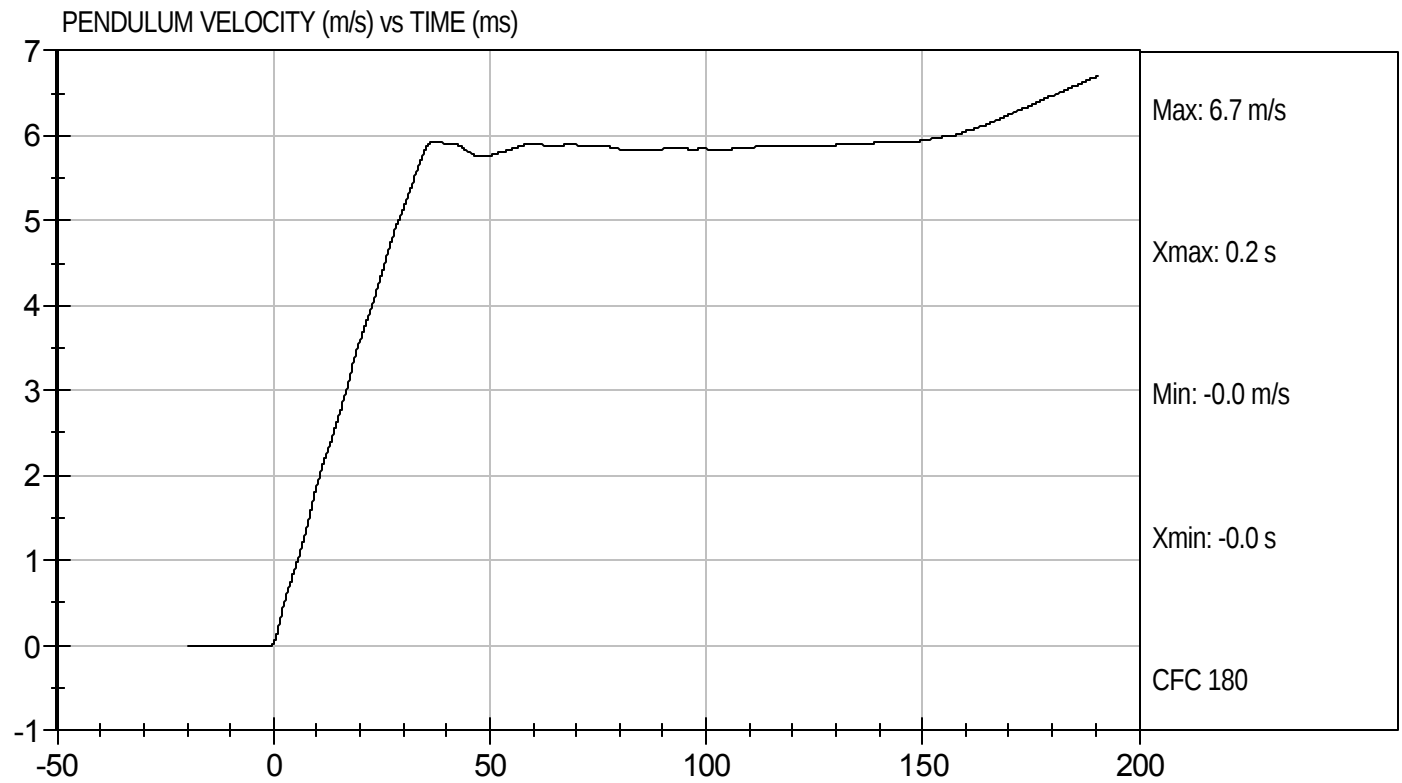
Test Date

David Winkelbauer
Approved By



Test Desc: Neck Extension
Component ID: D114213

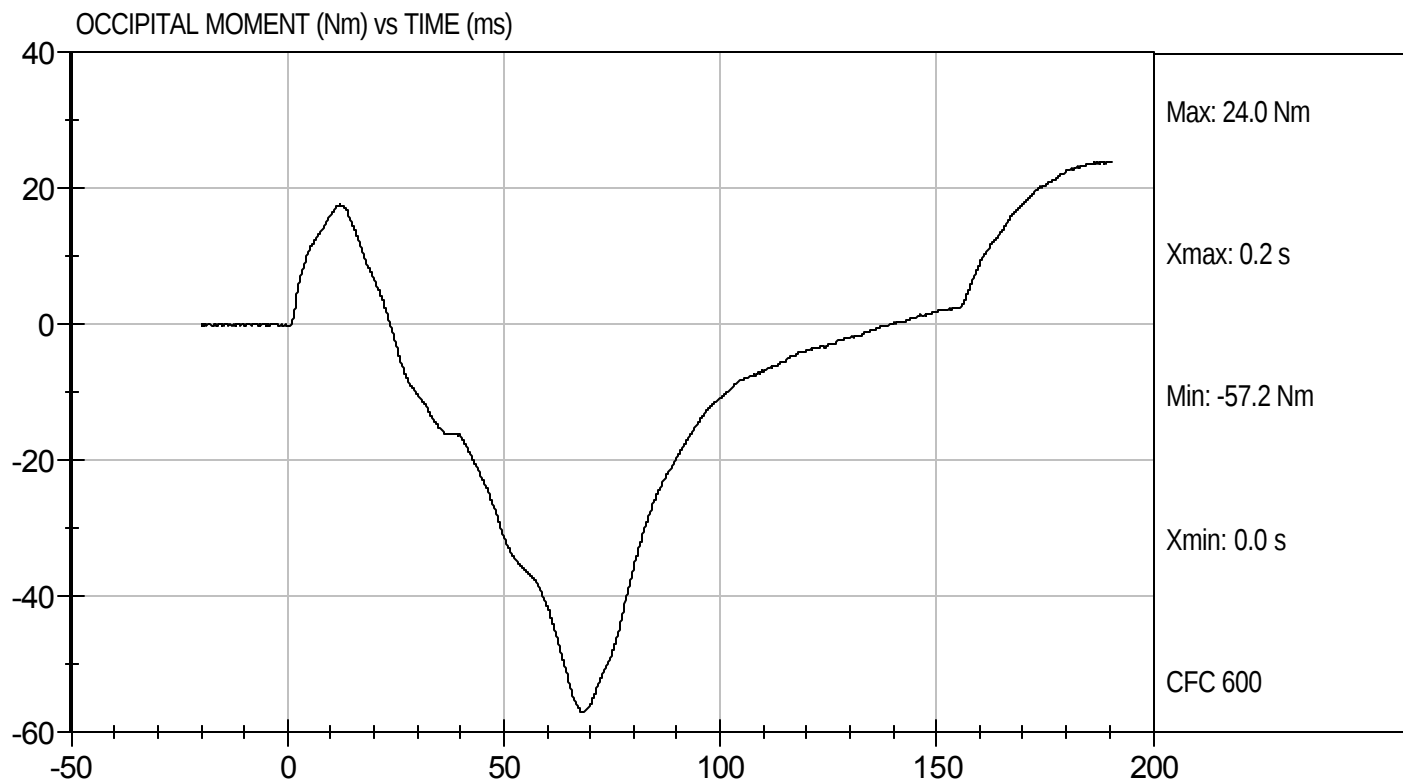
Test Date: 12/15/11
Velocity: 0 ft/s, 0 m/s





Test Desc: Neck Extension
Component ID: D114213

Test Date: 12/15/11
Velocity: 20.08 ft/s, 6.12 m/s

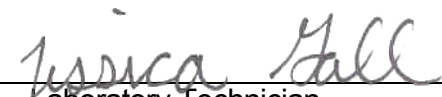


MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D: D114214

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	22.0	Pass
Relative Humidity	%	10 to 70	35	Pass
Probe Speed	m/s	6.59 to 6.83	6.77	Pass
Peak Deflection	mm	50 to 58	53	Pass
Peak Resistive Force w/in Deflection Corridor	kN	3.9 to 4.4	4.1	Pass
Internal Hysteresis	%	69 to 85	70	Pass
Peak Force 18 mm - 50 mm	N	<= 4,600 N	4084	Pass
Overall Test Results				Pass


Laboratory Technician

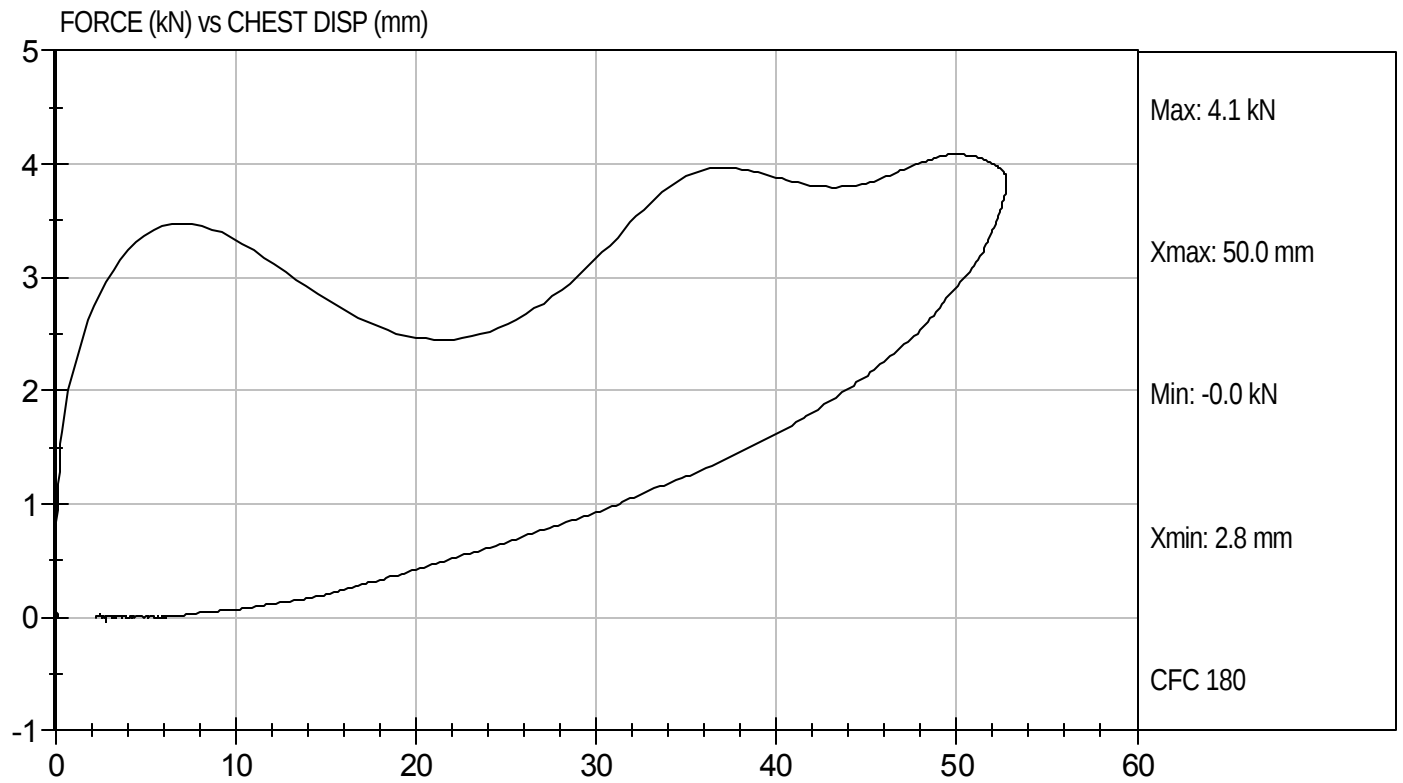
12/15/11
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D114214

Test Date: 12/15/11
Velocity: 22.22 ft/s, 6.77 m/s



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

ATD Serial No: 138

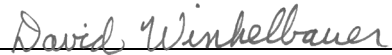
Test I.D: D114215

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	22.1	Pass
Laboratory Relative Humidity	%	10 to 70	39	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


Laboratory Technician

12/14/11

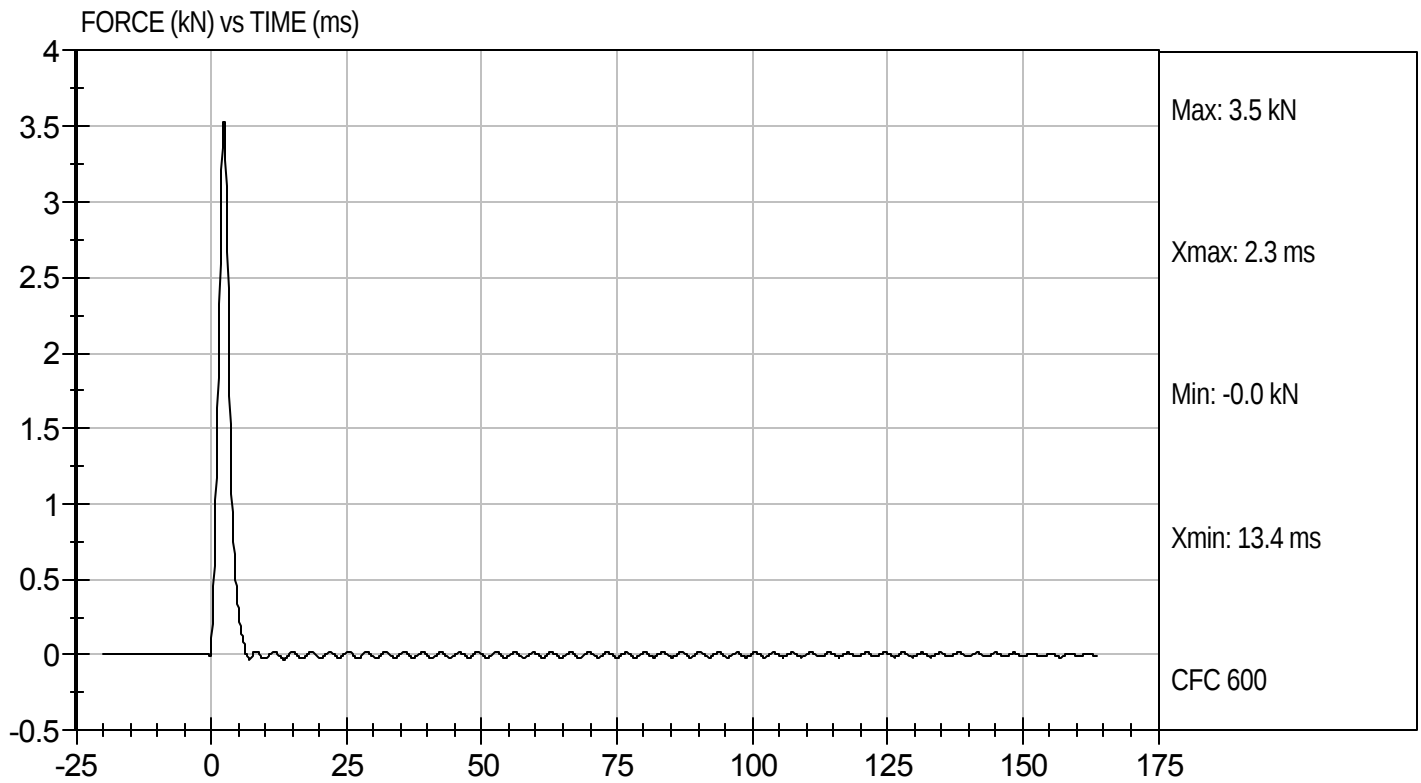
Test Date


Approved By



Test Desc: Right Knee
Component ID: D114215

Test Date: 12/14/11
Velocity: 6.97 ft/s, 2.12 m/s



MGA RESEARCH CORPORATION

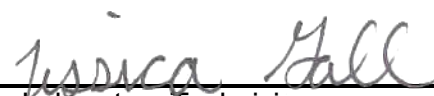
LEFT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D: D114216

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	22.0	Pass
Laboratory Relative Humidity	%	10 to 70	38	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	kN	3.45 to 4.06	3.49	Pass
Overall Test Results				Pass


Laboratory Technician

12/14/11

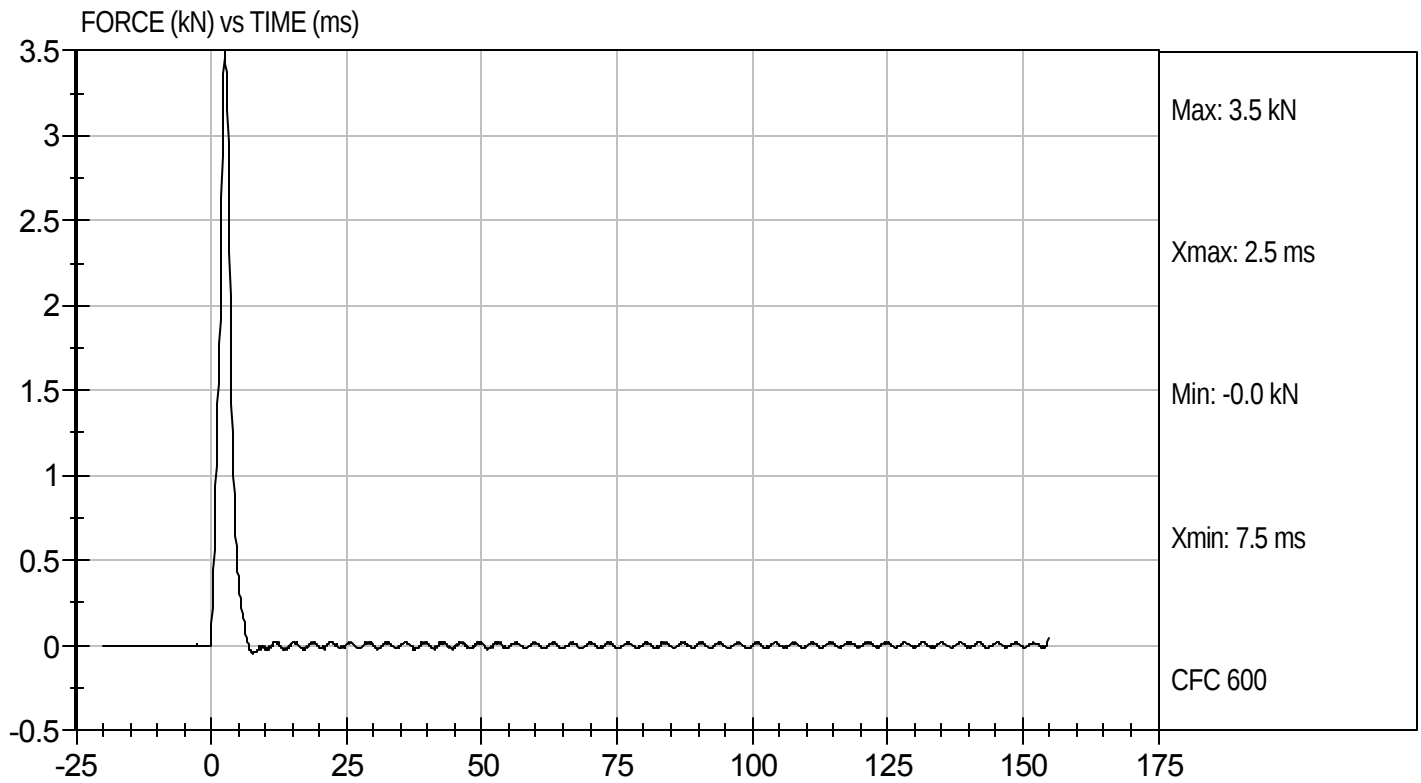
Test Date


Approved By



Test Desc: Left Knee
Component ID: D114216

Test Date: 12/14/11
Velocity: 6.97 ft/s, 2.12 m/s



MGA RESEARCH CORPORATION

TORSO FLEXION TEST

HYBRID III 5TH PERCENTILE

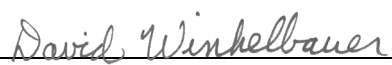
ATD Serial No: 138

Test I.D: D114217

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	43	Pass
Initial Angle	deg	0 to 20	14	Pass
Return Angle	deg	+/- 8	7	Pass
Force at 45 deg	N	320 to 390	382	Pass
Upper Torso Deflection Rate	Deg/sec	0.5 to 1.5	1.0	Pass
Overall Result				Pass


Laboratory Technician

12/14/11
Test Date


Approved By

MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 5TH PERCENTILE

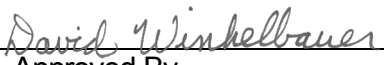
ATD Serial No: 138

Test ID: D12121

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	21	Pass
Peak Resultant Acceleration	G's	250 to 300	272	Pass
Peak Lateral Acceleration	G's	+/- 15	2.5	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

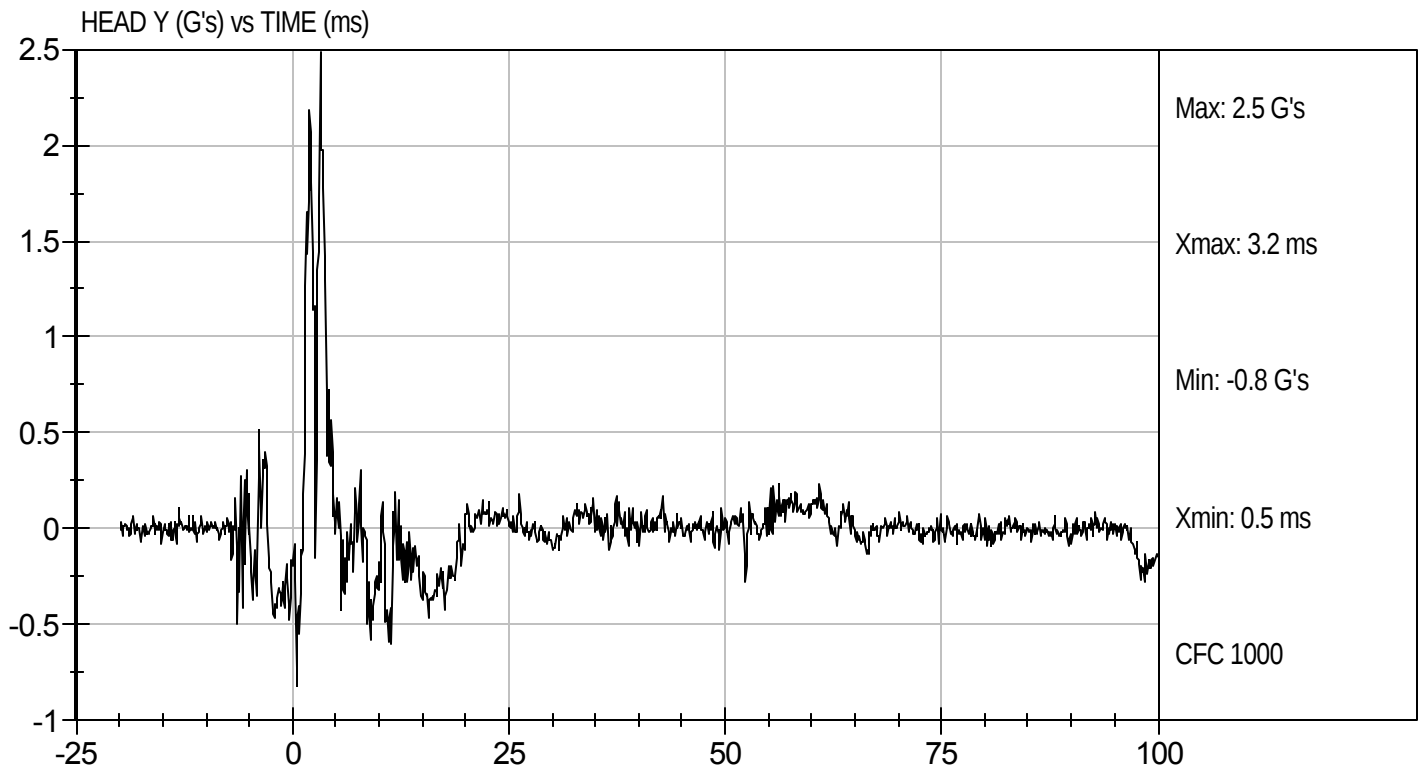
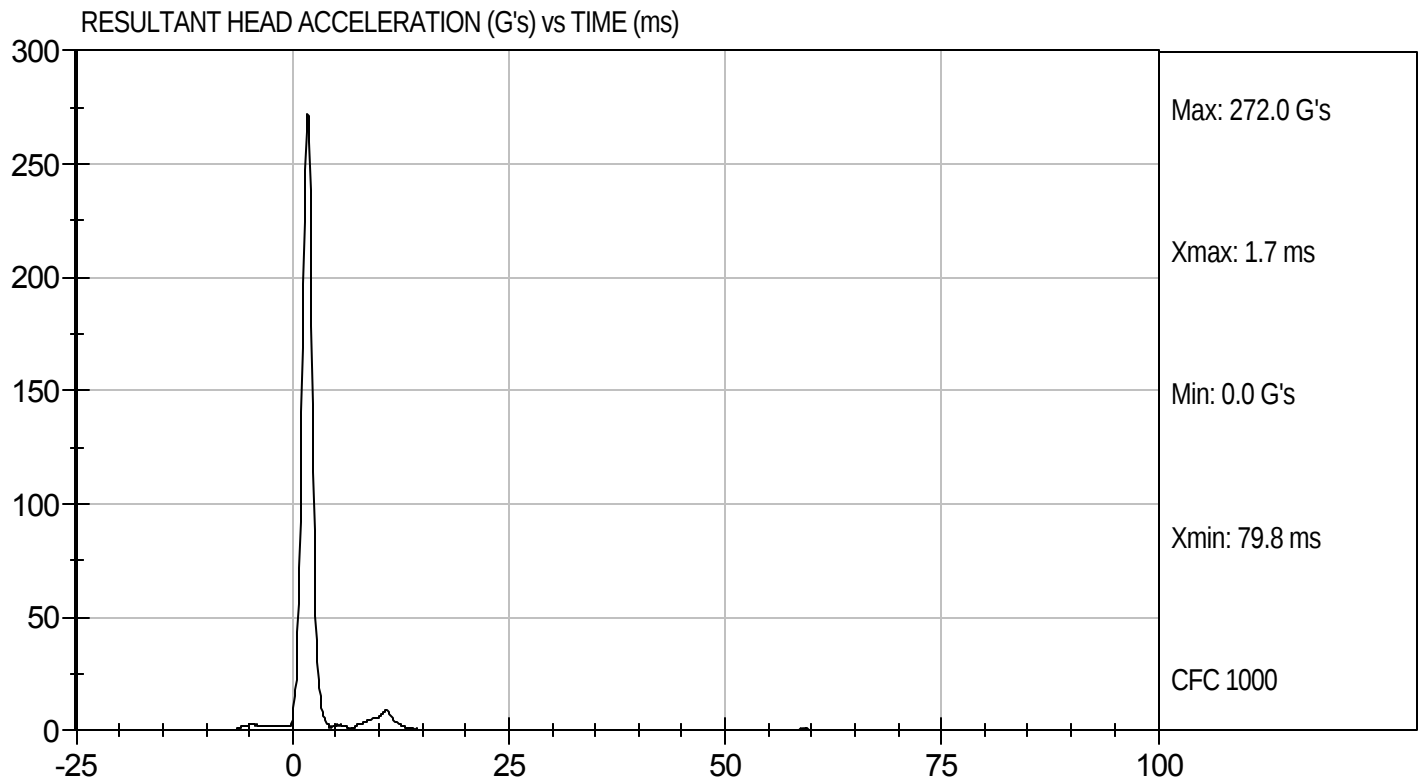
1/11/12
Test Date


Approved By



Test Desc: Head Drop
Component ID: D12121

Test Date: 1/11/12
Velocity: 0 ft/s, 0 m/s



MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 5TH PERCENTILE

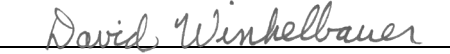
ATD Serial No: 138

Test I.D: D12122

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	22	Pass
Pendulum Speed		m/s	6.89 to 7.13	7.06	Pass
Pendulum Pulse	10 ms	m/s	2.1 to 2.5	2.3	Pass
	20 ms	m/s	4.0 to 5.0	4.6	Pass
	30 ms	m/s	5.8 to 7.0	5.8	Pass
D Plane Rotation	Max	deg	77 to 91	82	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	69 to 83	73	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	82	Pass
Overall Results				Pass	


Laboratory Technician

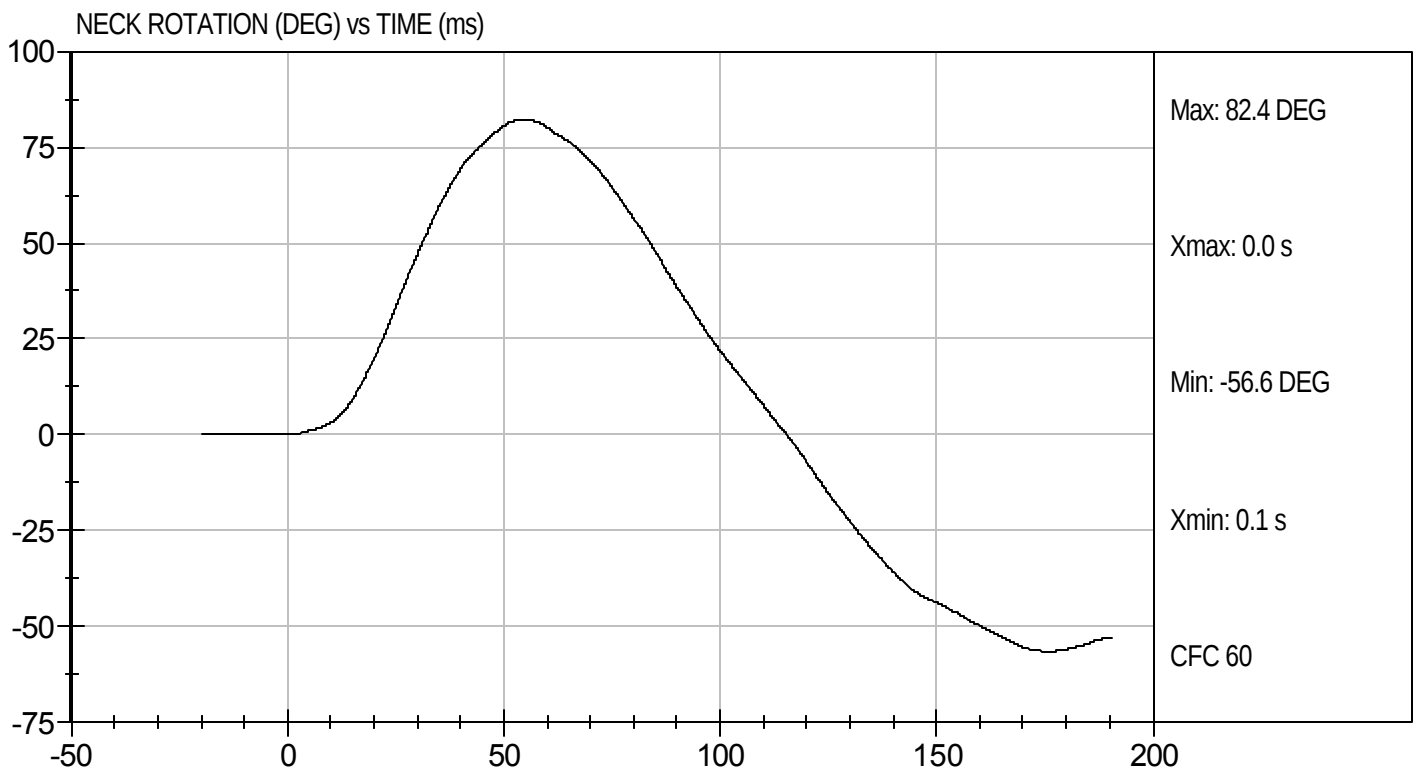
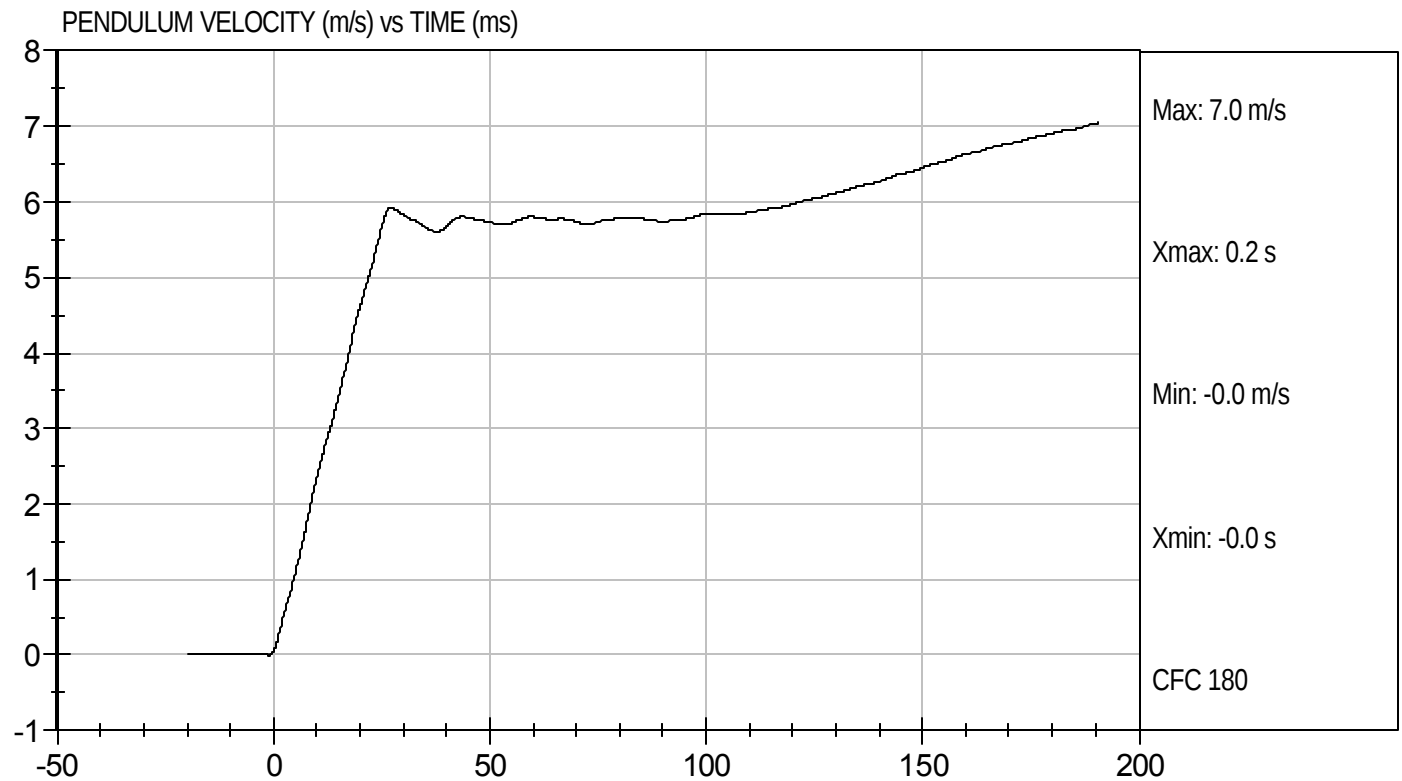
1/11/12
Test Date


Approved By



Test Desc: Neck Flexion
Component ID: D12122

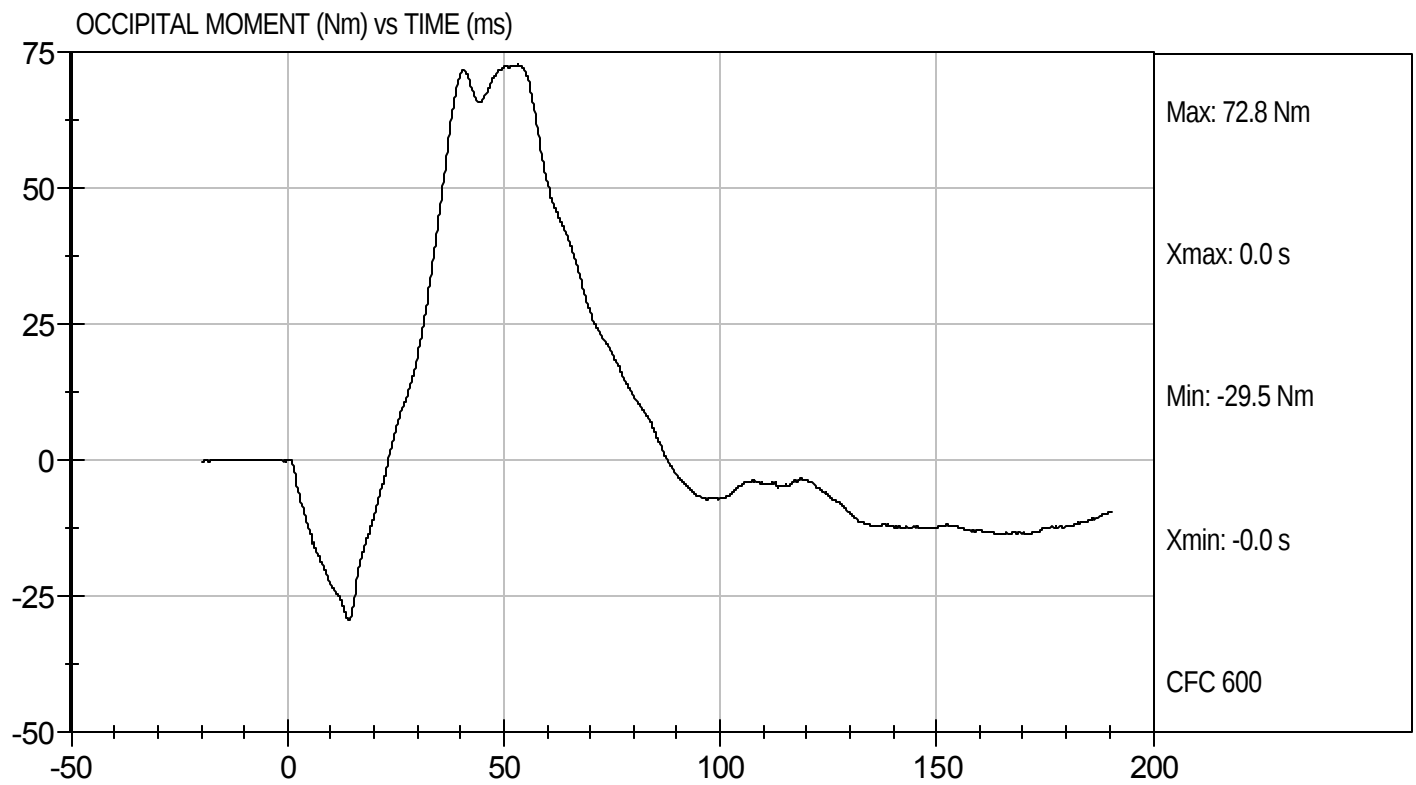
Test Date: 1/11/12
Velocity: 23.15 ft/s, 7.06 m/s





Test Desc: Neck Flexion
Component ID: D12122

Test Date: 1/11/12
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: D12123

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	22	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.12	Pass
Pendulum Pulse	10 ms	m/s	1.5 to 1.9	1.9	Pass
	20 ms	m/s	3.1 to 3.9	3.8	Pass
	30 ms	m/s	4.6 to 5.6	5.4	Pass
D Plane Rotation	Max	deg	99 to 114	104	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	-65 to -53	-59	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	98	Pass
Overall Results					Pass

Jessica Hall
Laboratory Technician

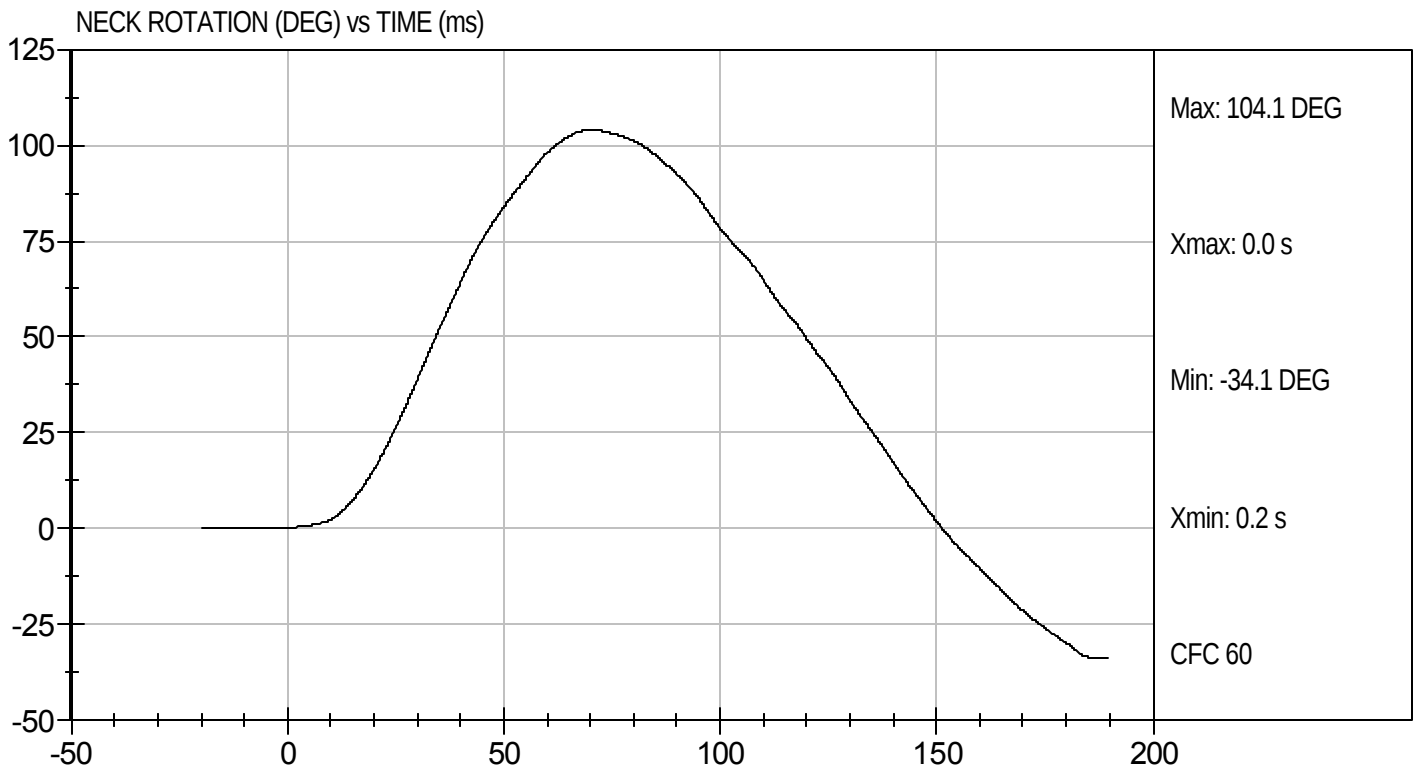
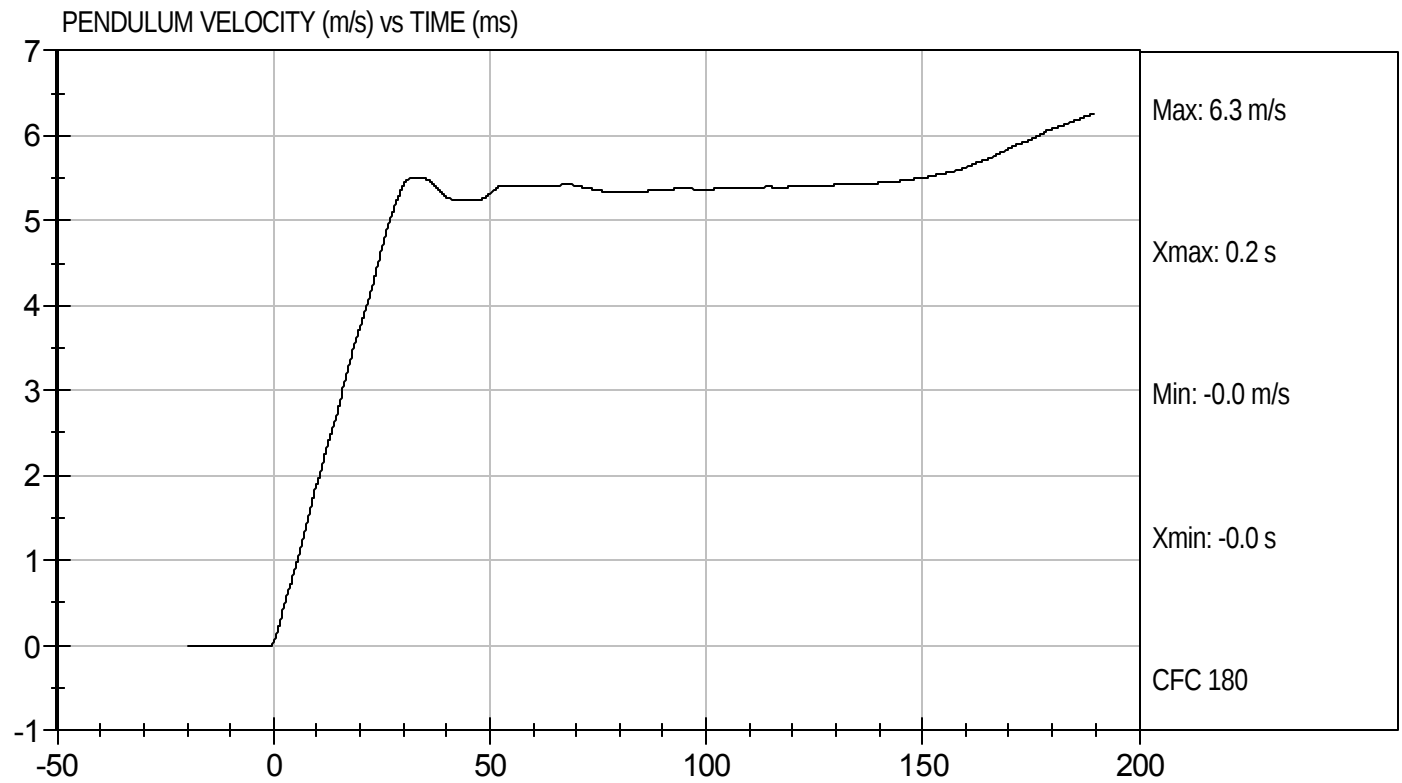
1/11/12
Test Date

David Winkelbauer
Approved By



Test Desc: Neck Extension
Component ID: D12123

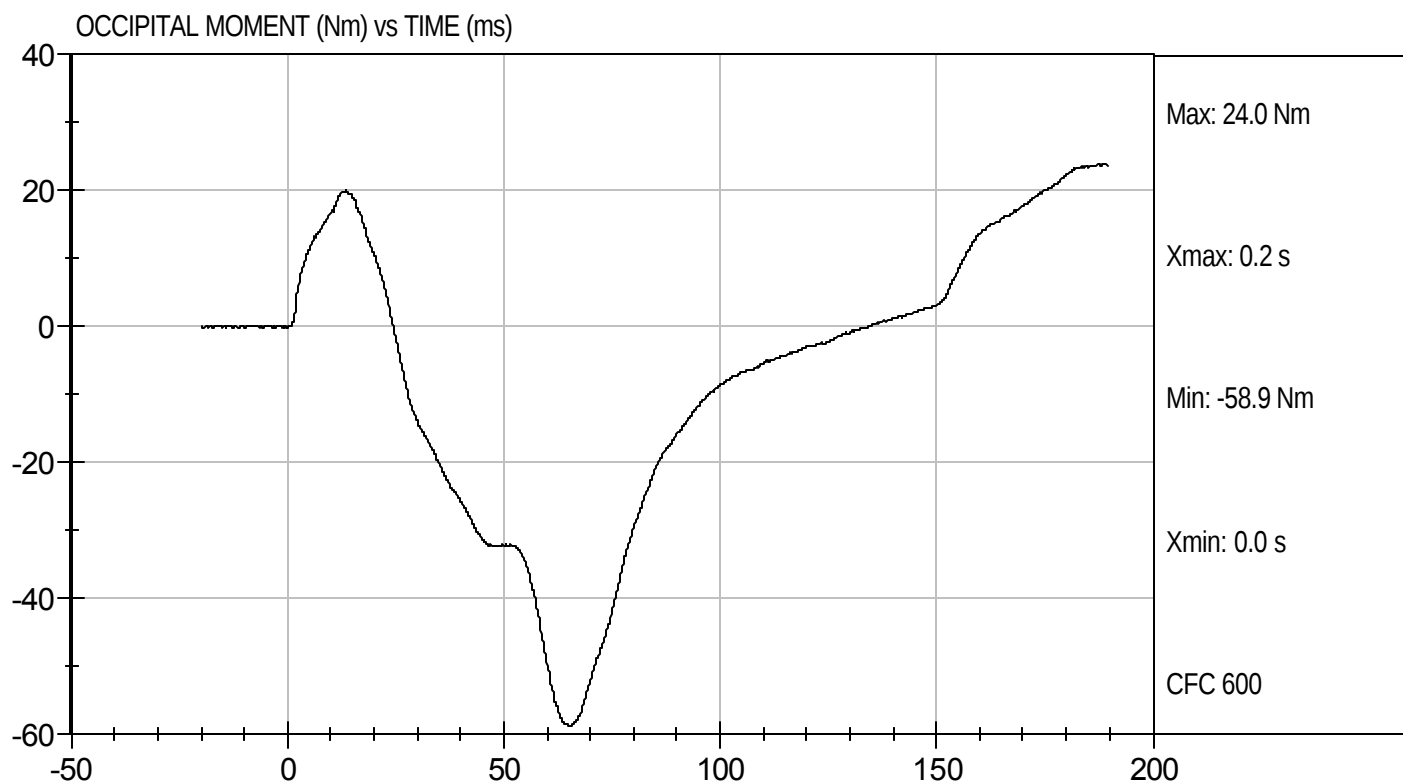
Test Date: 1/11/12
Velocity: 20.08 ft/s, 6.12 m/s





Test Desc: Neck Extension
Component ID: D12123

Test Date: 1/11/12
Velocity: 20.08 ft/s, 6.12 m/s



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 5TH PERCENTILE

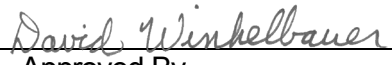
ATD Serial No: 138

Test I.D: D12124

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.8	Pass
Relative Humidity	%	10 to 70	22	Pass
Probe Speed	m/s	6.59 to 6.83	6.77	Pass
Peak Deflection	mm	50 to 58	54	Pass
Peak Resistive Force w/in Deflection Corridor	kN	3.9 to 4.4	4.15	Pass
Internal Hysteresis	%	69 to 85	70	Pass
Peak Force 18 mm - 50 mm	N	<= 4,600 N	4070	Pass
			Overall Test Results	Pass


Laboratory Technician

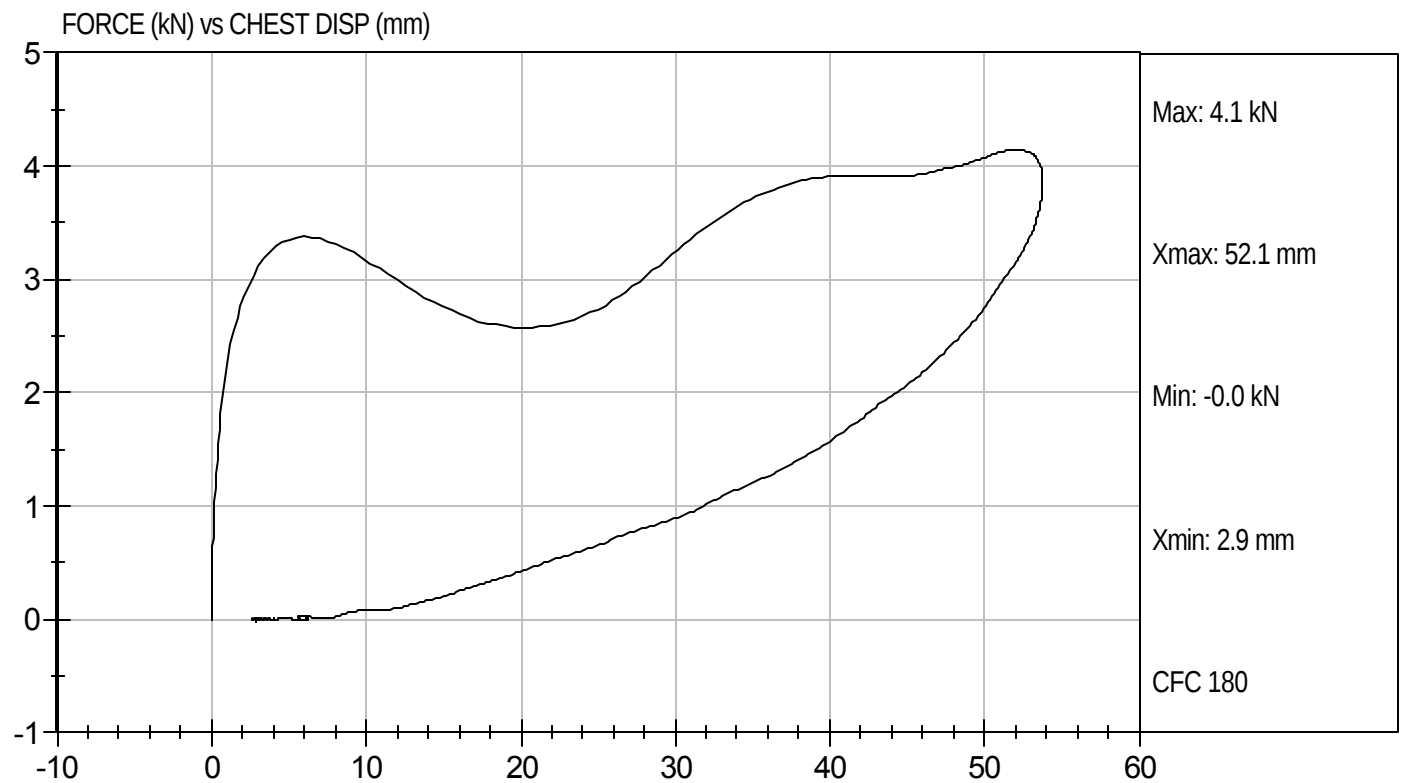
1/12/12
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D12124

Test Date: 1/12/12
Velocity: 22.22 ft/s, 6.77 m/s



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

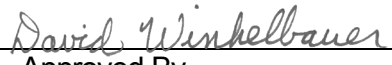
ATD Serial No: 138

Test I.D: D12125

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	21	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	kN	3.45 to 4.06	3.47	Pass
Overall Test Results				Pass


Laboratory Technician

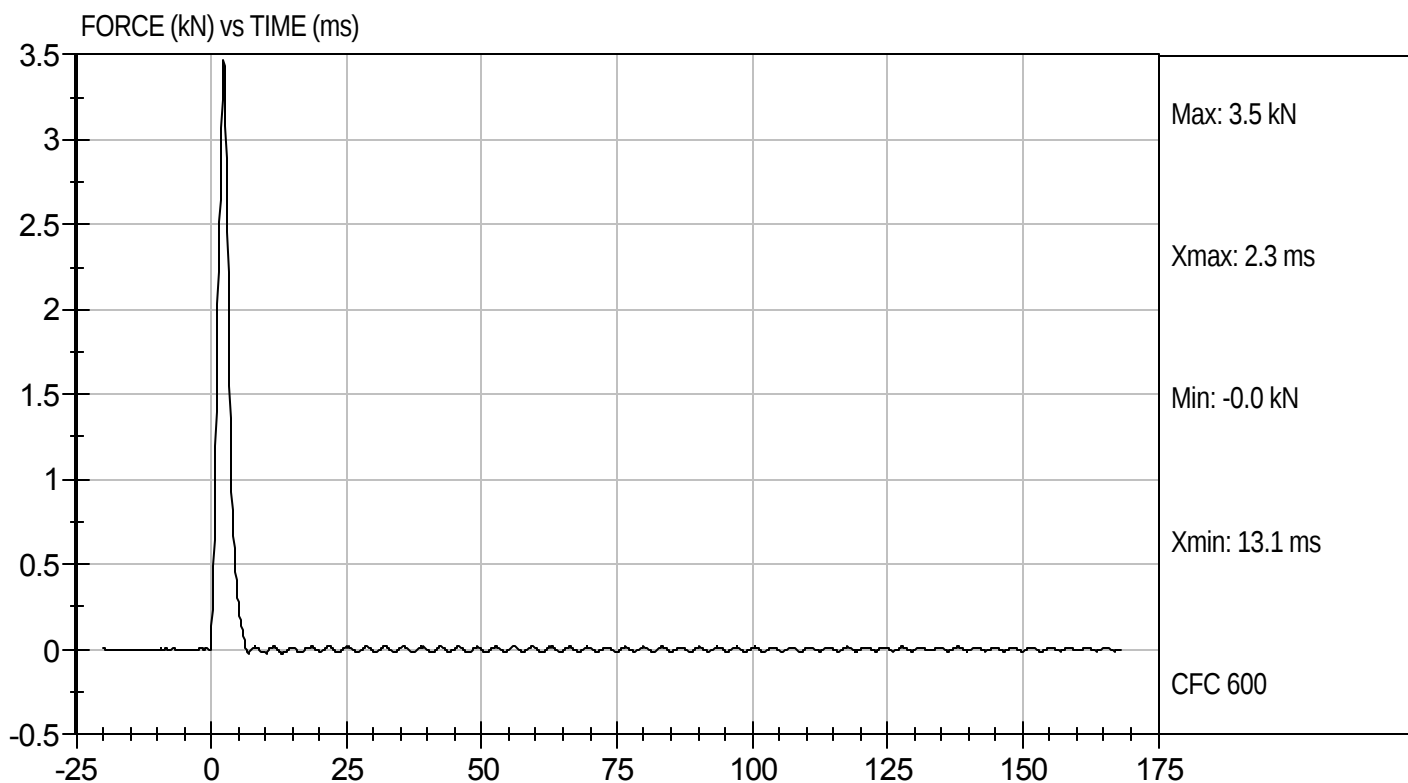
1/11/12
Test Date


Approved By



Test Desc: Right Knee
Component ID: D12125

Test Date: 1/11/12
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: D12126

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	21	Pass
Probe Speed	m/s	2.07 to 2.13	2.10	Pass
Maximum Force	kN	3.45 to 4.06	3.57	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

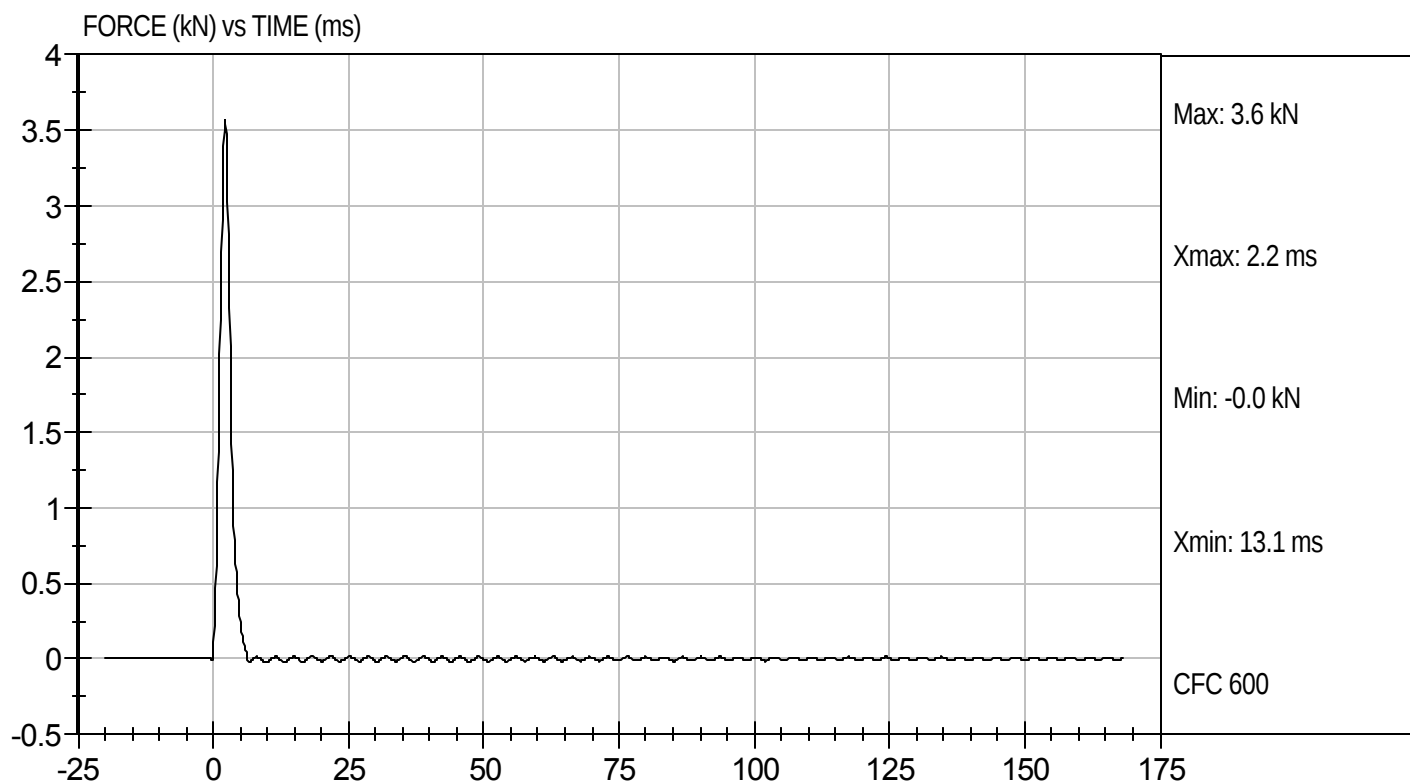
1/11/12
Test Date

David Winkelbauer
Approved By



Test Desc: Left Knee
Component ID: D12126

Test Date: 1/11/12
Velocity: 6.89 ft/s, 2.10 m/s



MGA RESEARCH CORPORATION

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

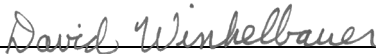
ATD Serial No: 138

Test I.D: D12127

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	21	Pass
Initial Angle	deg	0 to 20	17	Pass
Return Angle	deg	+/- 8	4	Pass
Force at 45 deg	N	320 to 390	359	Pass
Upper Torso Deflection Rate	Deg/sec	0.5 to 1.5	1.0	Pass
Overall Result				Pass


Laboratory Technician

1/11/12
Test Date


Approved By