

REPORT NUMBER: NCAP-MGA-2011-050

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

**DAIMLER AG STUTTGART
2011 Mercedes-Benz C300 4-Dr Sedan
NHTSA No.: MB0518**

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



Test Date: December 6, 2010

Final Report Date: December 30, 2010

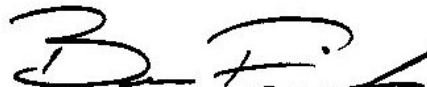
FINAL REPORT

**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: December 30, 2010

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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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 Mercedes-Benz C300 4-Dr Sedan in accordance with the specifications of the Office of Crashworthiness Standards Frontal NCAP Laboratory Test Procedure for the generation of consumer information on vehicle frontal crash protection. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and foot well intrusion performance. The test was conducted at MGA Research Corporation in Burlington, Wisconsin, on December 6, 2010. The impact velocity was 56.2 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 522 mm located at the vehicle's centerline. The test vehicle's performance was as follows: <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th rowspan="2">Units</th> <th colspan="2">Threshold</th> <th rowspan="2">Driver ATD</th> <th rowspan="2">Passenger ATD</th> </tr> <tr> <th>50th</th> <th>5th</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₁₅)</td> <td>N/A</td> <td>700</td> <td>700</td> <td>335</td> <td>351</td> </tr> <tr> <td>Maximum Chest Compression</td> <td>mm</td> <td>63</td> <td>52</td> <td>25</td> <td>13</td> </tr> <tr> <td>Nij</td> <td>N/A</td> <td>1</td> <td>1</td> <td>0.35</td> <td>0.68</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>4170</td> <td>2620</td> <td>1197</td> <td>643</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>4000</td> <td>2520</td> <td>294</td> <td>1222</td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>10008</td> <td>6805</td> <td>3653</td> <td>3964</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>10008</td> <td>6805</td> <td>3562</td> <td>3293</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	335	351	Maximum Chest Compression	mm	63	52	25	13	Nij	N/A	1	1	0.35	0.68	Neck Tension	N	4170	2620	1197	643	Neck Compression	N	4000	2520	294	1222	Left Femur Force	N	10008	6805	3653	3964	Right Femur Force	N	10008	6805	3562	3293
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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 Mercedes-Benz C300 4-Dr Sedan at a velocity of 56.2 kph. The test was performed at MGA Research Corporation on December 6, 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. 036) and the right-front passenger (position 2) ATD (Serial No. 634) were calibrated previous to this test. Certification details, along with verification data, are found in Appendix C of this report.

The 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 522 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 and side header. The driver's knees contacted the knee airbag. The passenger's head and chest contacted the airbag. The passenger's head also contacted the headrest and side header. 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)	335	71.8	86.8	25	0.35	1197	294	3653	3562
Passenger (5 th)	351	62.2	77.2	13	0.68	643	1222	3964	3293

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

TEST NOTES

There was no valid data collected for:
Top of Engine X

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 Mercedes-Benz C300 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0518
 Test Date: 12/06/2010

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	MB0518	Anti-Lock Brakes	Yes
Model Year	2011	All Wheel Drive	Yes
Make	Mercedes-Benz	Power Steering	Yes
Model	C300	Driver Front Airbag	Yes
Body Style	Sedan	Driver Curtain Airbag	Yes
VIN	WDDGF8BB1BR139441	Driver Head/Torso Airbag	No
Body Color	Arctic White	Driver Torso Airbag	Yes
Delivery Date	11/11/2010	Driver Torso/Pelvis Airbag	No
Odometer (mi)	189	Driver Pelvis Airbag	Yes
Odometer (km)	304	Driver Knee Airbag	Yes
Dealer	Sears Imported Autos	Pass. Front Airbag	Yes
Transmission	Automatic	Pass. Curtain Airbag	Yes
Final Drive	AWD	Pass. Head/Torso Airbag	No
Type/No. Cylinders	6	Pass. Torso Airbag	Yes
Engine Displacement (L)	3.0	Pass. Torso/Pelvis Airbag	No
Engine Placement	Longitudinal	Pass. Pelvis Airbag	Yes
Roof Rack	No	Pass. Knee Airbag	No
Sunroof/T-Top	Yes	Pretensioners	Yes
Tinted Glass	No	Load Limiters	Yes
Traction Control	Yes	Automatic Door Locks	Yes
Power Brakes	Yes	Bucket Seats	Yes
Front Disc	Yes	Tilt Steering	Yes
Rear Disc	Yes	Other	
Does owner's manual provide instructions to turn off automatic door locks?	Yes		

DATA FROM CERTIFICATION LABEL

Manufactured By	Daimler AG Stuttgart	GVWR (kg)	2120
Date of Manufacture	07/10	GAWR Front (kg)	1070
		GAWR Rear (kg)	1085

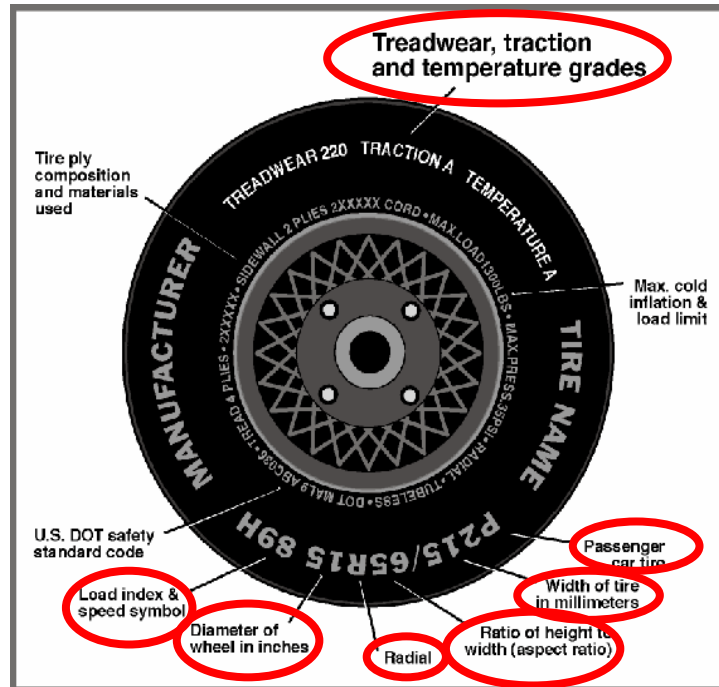
VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	60/40 Bench		
Designated Seating Capacity (DSC)	2	3		5
Capacity Weight (VCW) (kg)				370
Cargo Weight (RCLW) (kg)				30

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

Test Vehicle: 2011 Mercedes-Benz C300 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0518
 Test Date: 12/06/2010



Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	210	240
Recommended Tire Size	225/45R17	245/40R17
Tire Size on Vehicle	225/45R17	245/40R17
Tire Manufacturer	Continental	Continental
Tire Model	Conti Pro Contact	Conti Pro Contact
Treadwear	500	500
Traction	AA	AA
Temperature Grades	A	A
Tire Plies Sidewall	1	1
Tire Plies Body	4	4
Load Index & Speed Symbol	91H	91H
Tire Material	Rubber	Rubber
DOT Safety Code Right	1L7R PXH6	1L8N PXH6
DOT Safety Code Left	1L7R PXH6	1L8N PXH6

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

Test Vehicle: 2011 Mercedes-Benz C300 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0518
 Test Date: 12/06/2010

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	471.7	374.7		497.6	432.7	
Right	kg	461.3	389.6		483.1	446.3	
Ratio	%	55.0	45.0		52.7	47.3	
Totals	kg	933.0	764.3	1697.3	980.7	879.0	1859.7

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1697.3
Weight of 1 P572E ATD & 1 P572O ATD	kg	140.6
Rated Cargo/Luggage Weight (RCLW)	kg	30
Calculated Target Vehicle Target Weight (TVTW)	kg	1867.9

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	645	649	658	645	1244
As Tested	mm	652	649	631	638	1305
Post Test	mm	644	635	638	628	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2762
Total Vehicle Length at Left Side	mm	4419
Total Vehicle Length at Centerline	mm	4634
Total Vehicle Length at Right Side	mm	4419
Weight of Ballast in Cargo Area	kg	20.4
Weight of Vehicle Components Removed	kg	20.0
Amount of Stoddard Solvent in Fuel Tank	L	61.3

List of components removed to meet test weight: Right tail light, spare tire, jack & tools.

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

Test Vehicle: 2011 Mercedes-Benz C300 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0518
 Test Date: 12/06/2010

TARGET VEHICLE STRUCTURAL MEASUREMENT

	Elements	Pre-Test (mm)
1	Total Length	4634
2	Total Width	1773
3	Bumper Top Height	541
4	Bumper Bottom Height	391
5	Longitudinal Member Top Height	548
6	Distance between Longitudinal Members	780
7	Longitudinal Member Width	170
8	Engine Top Height	818
9	Engine Bottom Height	170
10	Engine and Gearbox Width	1314
11	Front Bumper-Engine Distance	470
12	Front Shock Absorber Fixing Height	832
13	Bonnet Leading Edge Height	731
14	Front Shock Absorber Fixing Width	1160
15	Front Bumper – Front Axle Distance	745
16	Front Axle – A-Pillar Distance	615
17	A-Pillar – B-Pillar Distance	1083
18	B-Pillar – Rear Axle Distance	1053
19	B-Pillar – C-Pillar Distance	623
20	Roof Sill Bottom Height	1267
21	Roof Sill Top Height	1387
22	Floor Sill bottom Height	175
23	Floor Sill Top Height	376

DATA SHEET NO. 2

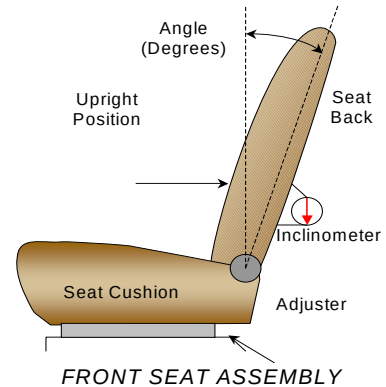
SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

Test Vehicle: 2011 Mercedes-Benz C300 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0518
 Test Date: 12/06/2010

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	21.0° on headrest post
Passenger Seat Back Angle	17.0° on headrest post

SEAT FORE/AFT POSITIONS

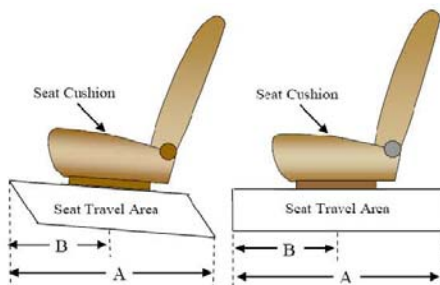
The driver and passenger seat fore/aft positions are adjusted following Appendix F, "Driver & Passenger Seating & Positioning Procedures" in the NCAP Test Procedure dated January 2010.

SEAT FORE/AFT POSITIONS	Total Fore/Aft Travel	Placed in Position #
Driver Seat	276 mm	138 mm (forward-most as 0)
Passenger Seat	220 mm	0 mm (forward-most as 0)

SEAT BELT UPPER ANCHORAGES

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

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



DATA SHEET NO. 2 (CONTINUED)

SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

Test Vehicle: 2011 Mercedes-Benz C300 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0518
 Test Date: 12/06/2010

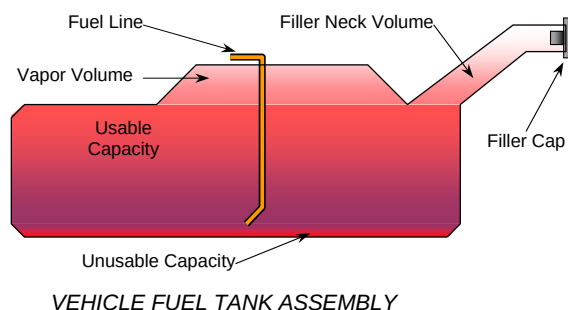
FUEL TANK CAPACITY DATA

	Liters
Usable Capacity of "Standard Tank"	66.2
Usable Capacity of "Optional" Tank	
92-94% of Usable Capacity	60.9 to 62.2
Actual Amount of Solvent used	61.3
1/3 of Usable Capacity	22.1

FUEL PUMP

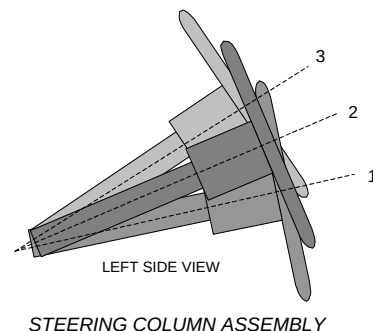
Describe the fuel pump type, its behavior, and the location of the fuel filler pipe.

The vehicle is equipped with an electric fuel pump. The fuel pump is in operation if the ignition is switched to the "ON" position. After about 15 seconds, the pump switches back to standby mode, if the engine is not started. The fuel filler pipe is located on the right side.



STEERING COLUMN ADJUSTMENT

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



STEERING COLUMN POSITION

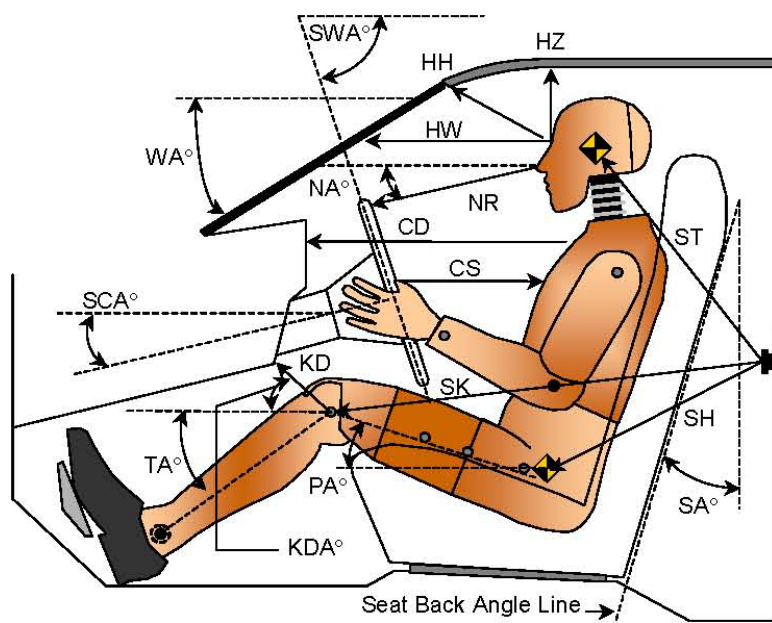
	Degrees	Fore/Aft Position (mm)
Lowermost – Position 1	68.8	248
Geometric Center – Position 2	66.8	219
Uppermost – Position 3	64.8	190
Telescoping Steering Wheel Travel		58
Test Position	66.8	219

DATA SHEET NO. 3

DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2011 Mercedes-Benz C300 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0518
 Test Date: 12/06/2010

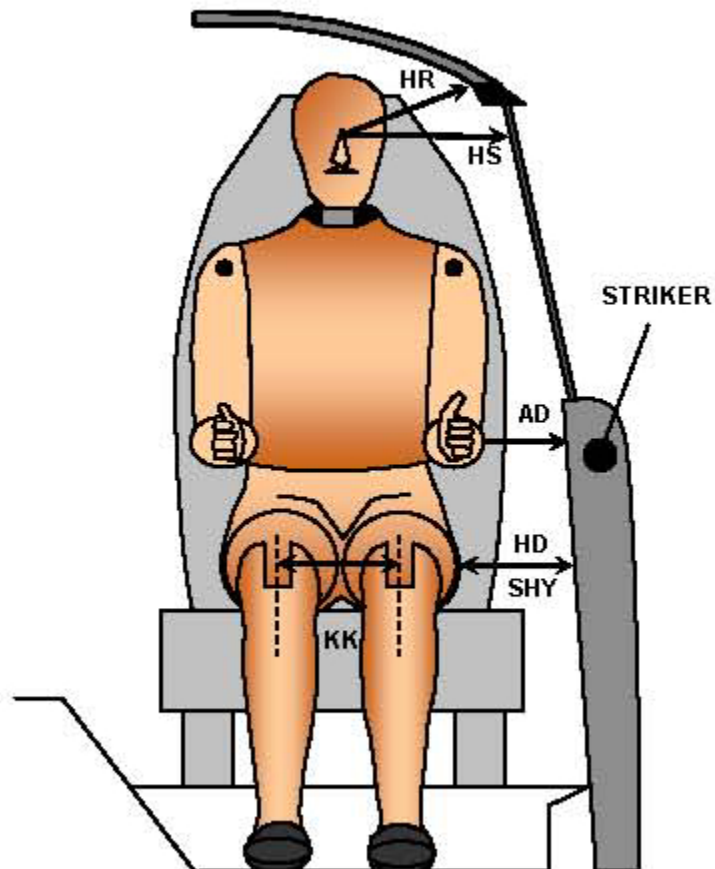


Code	Measurement Description	Driver S/N 036		Passenger S/N 634	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA	Windshield Angle		28.2		
SWA	Steering Wheel Angle		66.8		
SCA	Steering Column Angle		23.2		
SA	Seat Back Angle (headrest bezel)		21.0		17.0
HZ	Head to Roof (Z)	155	90	170	90
HH	Head to Header	328	26.3	251	44.1
HW	Head to Windshield	590	0	544	0
NR	Nose to Rim	384	8.6		
CD	Chest to Dash	508		390	
CS	Chest to Steering Hub	287	1.9		
RA	Rim to Abdomen	176	0		
KDL	Left Knee to Dash	145	34.1	106	36.1
KDR	Right Knee to Dash	127	40.6	100	31.3
PA	Pelvic Angle		24.0		22.2
TA	Tibia Angle		41.7		43.2
SK	Striker to Knee	563	101.2	625	95.2
ST	Striker to Head	415	11.6	403	23.4
SH	Striker to H-Point	290	141.7	359	123.7

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2011 Mercedes-Benz C300 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0518
 Test Date: 12/06/2010

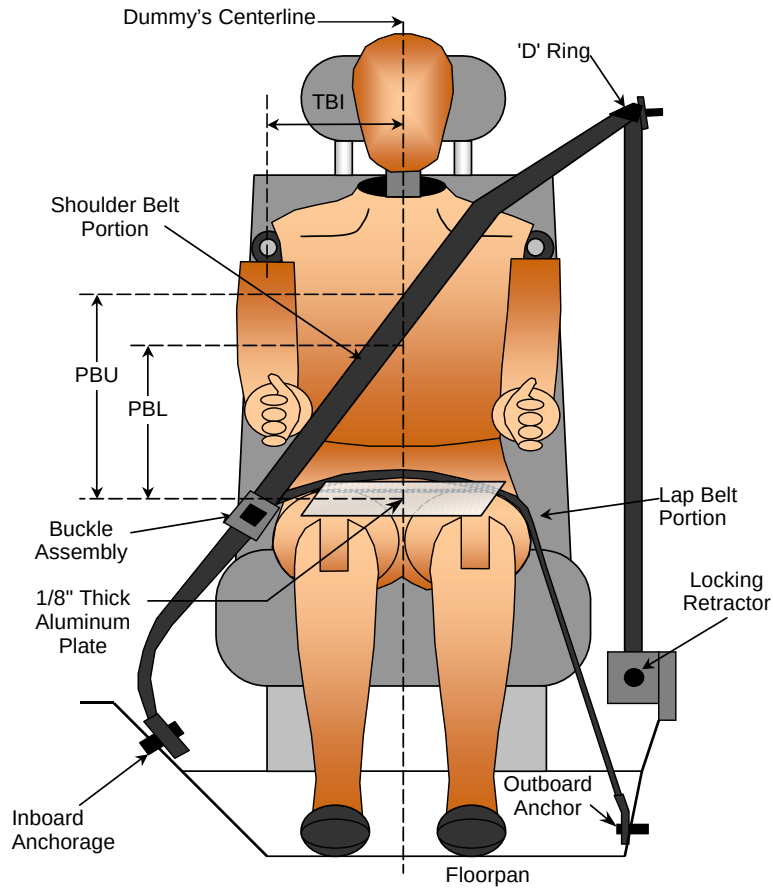


Code	Measurement Description	Driver S/N 036	Passenger S/N 634
		Length (mm)	
AD	Arm to Door	109	63
HD	H-Point to Door	150	151
HR	Head to Side Header	196	220
HS	Head to Side Window	320	326
KK	Knee to Knee	320	220
SHY	Striker to H-Point (Y Direction)	281	280
AA	Ankle to Ankle	305	166

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

Test Vehicle: 2011 Mercedes-Benz C300 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0518
 Test Date: 12/06/2010



FRONT VIEW OF DUMMY

SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU - Top surface of reference to belt upper edge	mm	340	325
PBL - To surface of reference to belt lower edge	mm	260	225

BELT LENGTH DATA

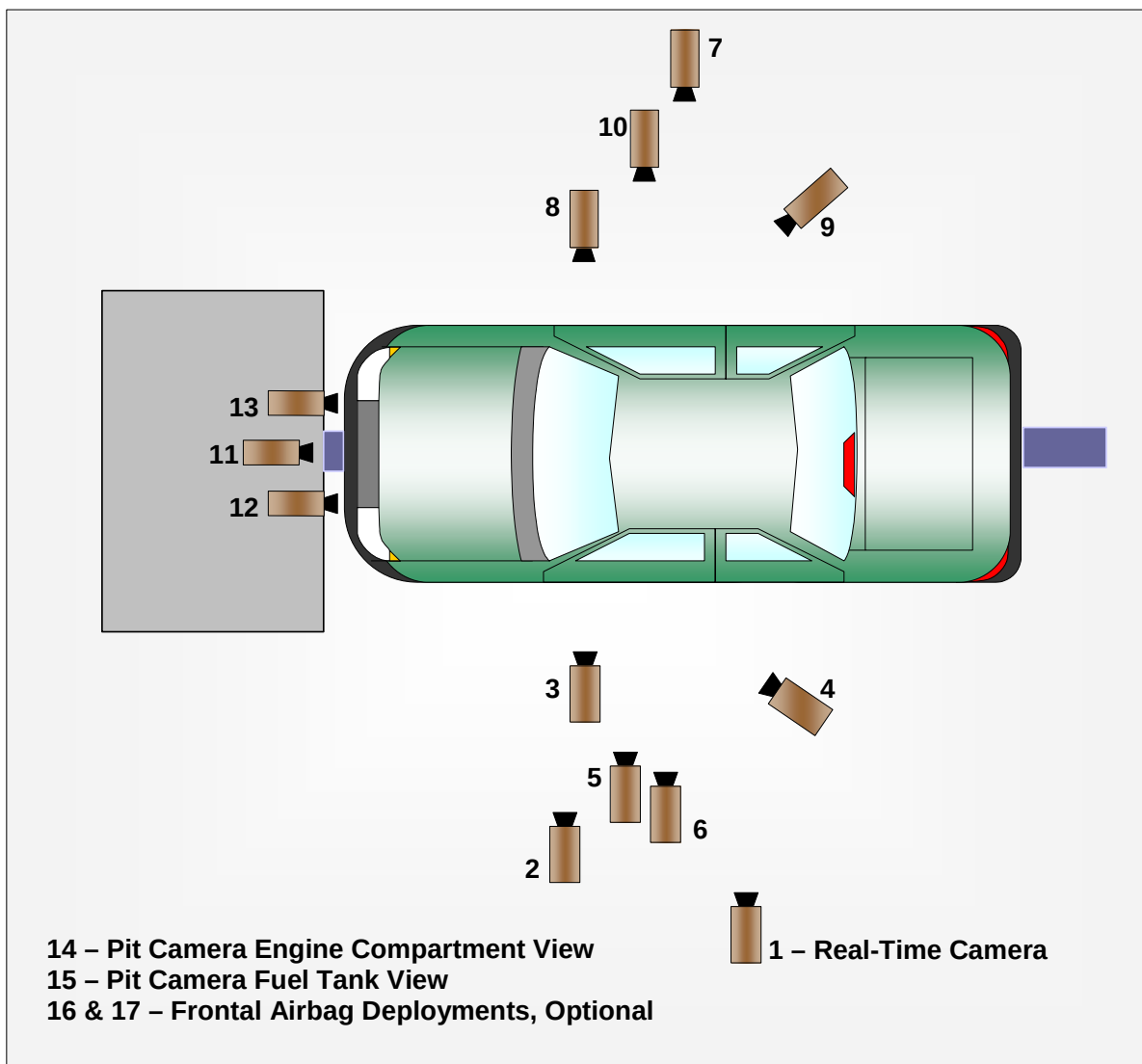
Measurement Description	Units	Driver	Passenger
Shoulder Belt Length as measured on ATD	mm	880	915
Lap Belt Length as measured on ATD	mm	625	560
Remainder of belt of reel	mm	1495	1665
Total Belt Length for Continuous Webbing Systems	mm	3000	3140

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

Test Vehicle: 2011 Mercedes-Benz C300 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0518
Test Date: 12/06/2010

CAMERA POSITIONS FOR FRONTAL IMPACTS



DATA SHEET NO. 6 (CONTINUED)

CAMERA LOCATIONS AND DATA

Test Vehicle: 2011 Mercedes-Benz C300 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0518
 Test Date: 12/06/2010

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	1120	-4920	-1260	24	1000
3	Driver Close-Up	1550	-6270	-1670	35	1000
4	Driver Angle	5570	-4800	-1910	50	1000
5	Steering Column Top	730	-5130	-1240	25	1000
6	Steering Column Bottom	700	-5090	-850	25	1000
7	Right Overall	2220	6570	-1210	20	1000
8	Passenger Close-Up	1560	6380	-1690	35	1000
9	Passenger Angle	5500	4790	-1890	50	1000
10	Right Front Half	1240	5000	-1230	24	1000
11	Windshield	-260	0	-2860	24	1000
12	Top Driver	50	-360	-2090	12.5	1000
13	Top Passenger	50	370	-2090	12.5	1000
14	Pit Front	1370	0	3150	24	1000
15	Pit Rear	3420	0	3150	24	1000
16	Onboard Driver Side (optional)					
17	Onboard Passenger Side (optional)					
18	Real-Time Pan View					30

***COORDINATES:**

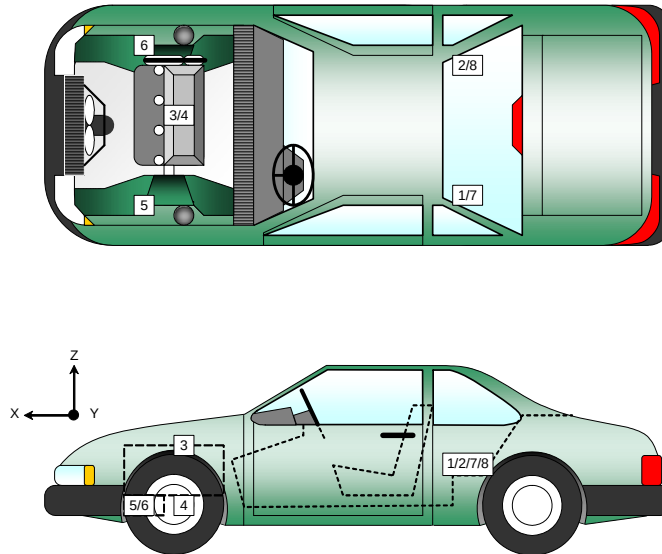
- +X = forward of impact plane
- +Y = right of monorail centerline
- +Z = below ground level

Cameras 16 & 17 were not used for this test.

DATA SHEET NO. 7
VEHICLE ACCELEROMETER DATA

Test Vehicle: 2011 Mercedes-Benz C300 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0518
 Test Date: 12/06/2010



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear X-Member X	1920	-408	-198
2	Right Rear X-Member X	1920	408	-198
3	Engine Top X	3934	0	-789
4	Engine Bottom X	3712	0	-145
5	Left Brake Caliper X	3676	-660	-179
6	Right Brake Caliper X	3676	660	-179
7	Left Rear X-Member Z	1920	-408	-198
8	Right Rear X-Member Z	1920	408	-198

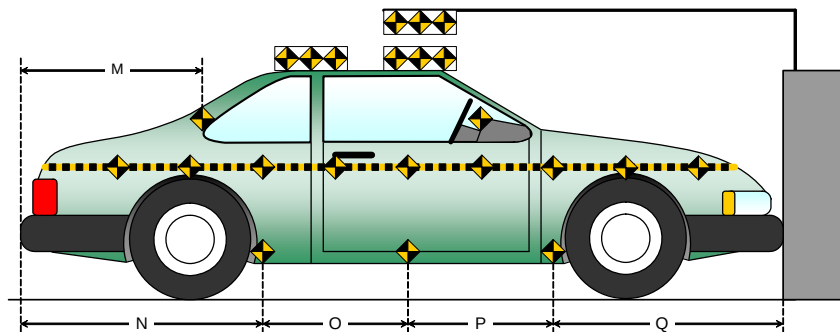
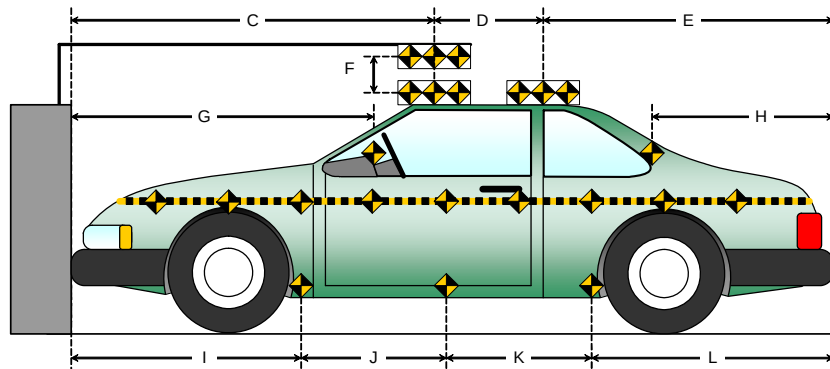
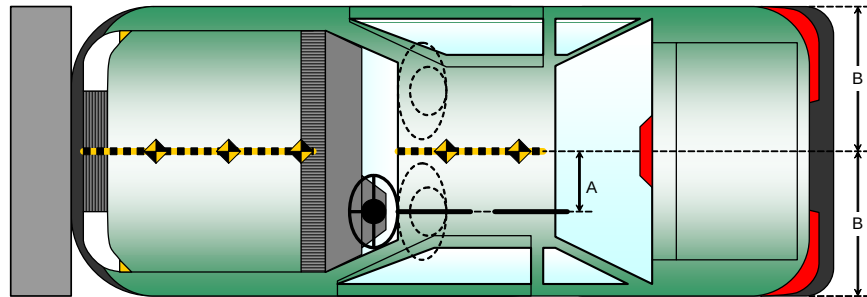
Reference Points: X - Rear Surface of Vehicle (+ forward)
 Y - Vehicle Centerline (+ to right)
 Z - Ground Plane (+ down)

DATA SHEET NO. 8
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2011 Mercedes-Benz C300 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0518
 Test Date: 12/06/2010

Item	Value (mm)
A	370
B	886
C	2340
D	665
E	1629
F	110
G	
H	1046
I	1242
J	967
K	967
L	1458
M	1046
N	1458
O	967
P	967
Q	1242



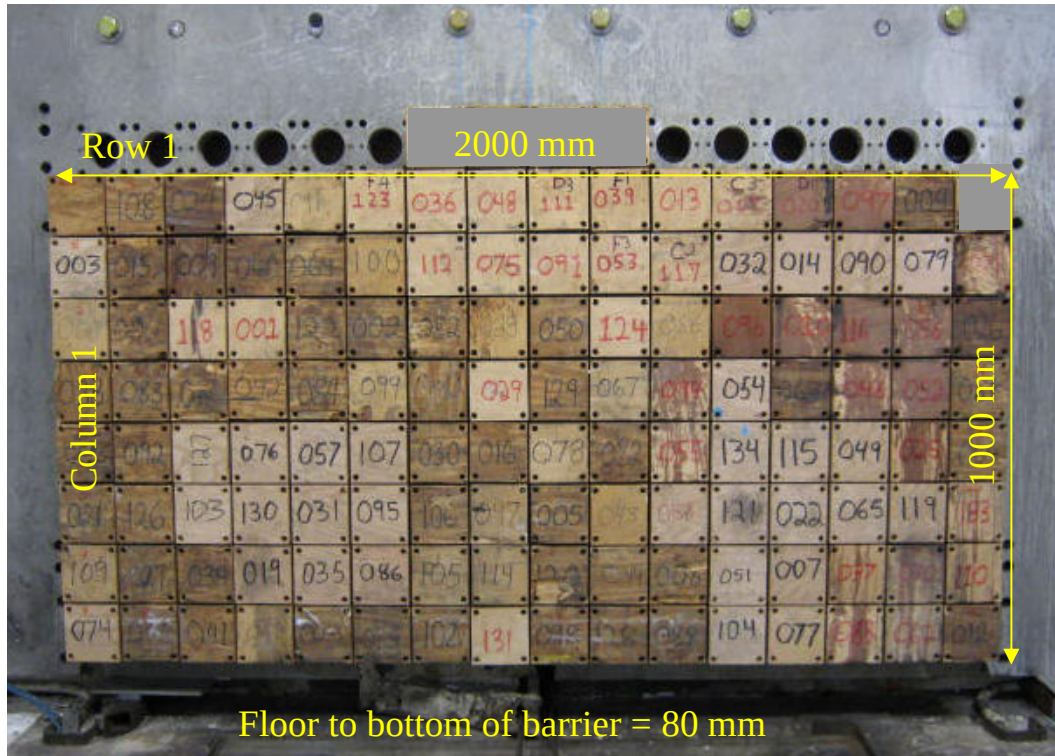
DATA SHEET NO. 9

LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle: 2011 Mercedes-Benz C300 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0518
 Test Date: 12/06/2010

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 Mercedes-Benz C300 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0518
Test Date: 12/06/2010

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 Mercedes-Benz C300 4-Dr Sedan

NHTSA No.: MB0518

Test Program: NCAP Frontal Barrier Impact Test

Test Date: 12/06/2010

TEST DUMMY INFORMATION AND CONTACT

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

DOOR OPENING AND SEAT TRACK INFORMATION

Description	Driver	Passenger
Locked/Unlocked Doors	Doors were 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	948
Center	mm	975
Right Side	mm	890
Average	mm	938

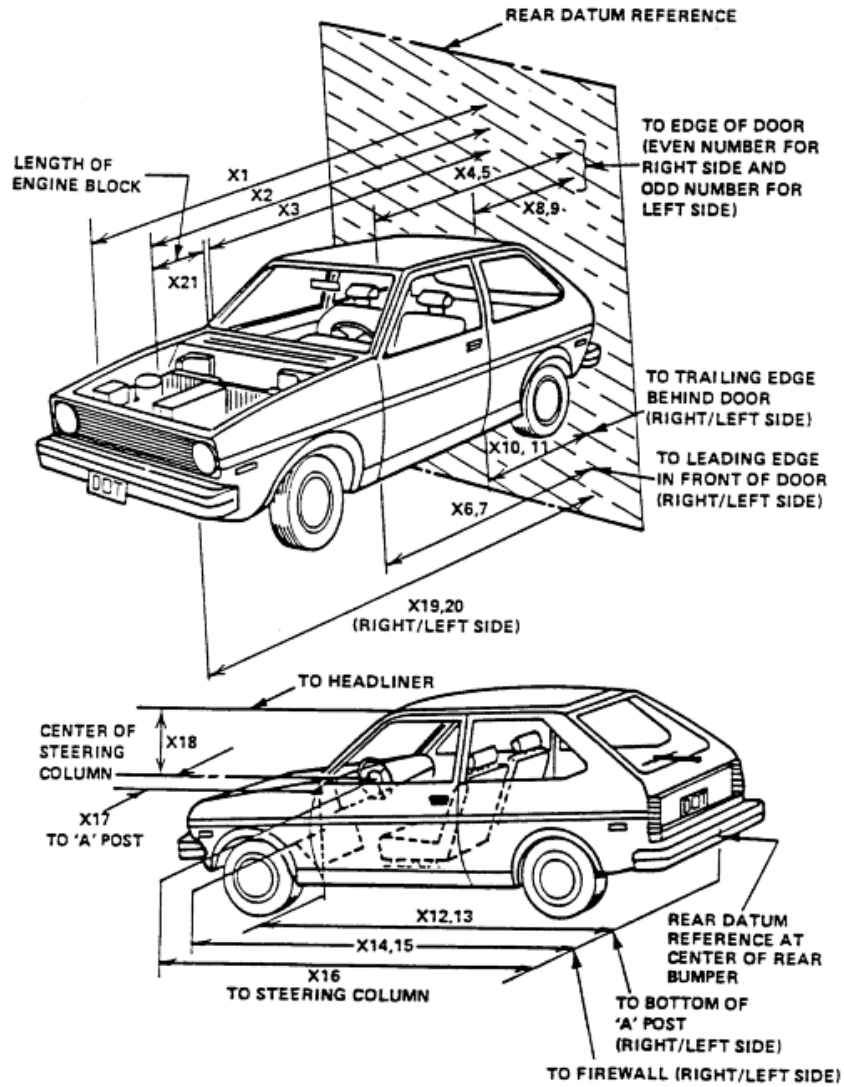
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Left Front (Driver) P1		Left Front (Passenger) P2	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	Yes	Yes	Yes
Knee Airbag	Yes	Yes	No	
Curtain Side Airbag	Yes	No	Yes	No
Torso Side Airbag	Yes	No	Yes	No
Pelvis Side Airbag	Yes	No	Yes	No
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load Limiter	Yes		Yes	

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

Test Vehicle: 2011 Mercedes-Benz C300 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0518
 Test Date: 12/06/2010



DATA SHEET NO. 12 (CONTINUED)
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2011 Mercedes-Benz C300 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0518
 Test Date: 12/06/2010

RSOV (Rear Surface of Vehicle)

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	mm	4634	4112	522
2	RSOV to Front of Engine	mm	3982	3863	119
3	RSOV to Firewall	mm	3514	3495	19
4	RSOV to Upper Leading Edge of Right Door	mm	3196	3200	-4
5	RSOV to Upper Leading Edge of Left Door	mm	3195	3194	1
6	RSOV to Lower Leading Edge of Right Door	mm	3200	3186	14
7	RSOV to Lower Leading Edge of Left Door	mm	3200	3199	1
8	RSOV to Upper Trailing Edge of Right Door	mm	2111	2109	2
9	RSOV to Upper Trailing Edge of Left Door	mm	2110	2107	3
10	RSOV to Lower Trailing Edge of Right Door	mm	2120	2115	5
11	RSOV to Lower Trailing Edge of Left Door	mm	2122	2121	1
12	RSOV to Bottom of "A" Post of Right Side	mm	3203	3190	13
13	RSOV to Bottom of "A" Post of Left Side	mm	3203	3200	3
14	RSOV to Firewall, Right Side	mm	3282	3255	27
15	RSOV to Firewall, Left Side	mm	3280	3280	0
16	RSOV to Steering Column	mm	2630	2722	-92
17	Center of Steering Column to "A" Post	mm	358	358	0
18	Center of Steering Column to Headliner	mm	420	450	-30
19	RSOV to Right Side of Front Bumper	mm	4419	4170	249
20	RSOV to Left Side of Front Bumper	mm	4419	4173	246
21	Length of Engine Block	mm	470	470	0
RD	RSOV to Right Side of Dash Panel	mm	2862	2860	2
CD	RSOV to Center of Dash Panel	mm	2882	2878	4
LD	RSOV to Left Side of Dash Panel	mm	2860	2860	0

DATA SHEET NO. 13
ACCIDENT INVESTIGATION DIVISION DATA

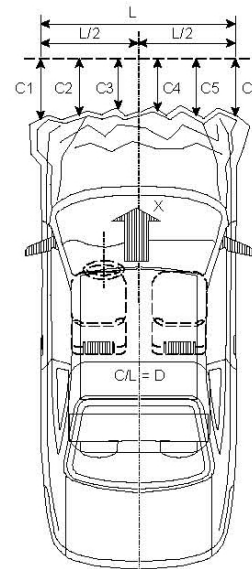
Test Vehicle: 2011 Mercedes-Benz C300 4-Dr Sedan NHTSA No.: MB0518
 Test Program: NCAP Frontal Barrier Impact Test Test Date: 12/06/2010

VEHICLE INFORMATION

VIN: WDDGF8BB1BR139441 Wheelbase (mm): 2762
 Vehicle Size Category: Sedan Test Weight (kg): 1859.7

ACCELEROMETER DATA

Accelerometer Locations: As per measurements on Page 15
 Cal. Procedure/Interval: MGA procedure / 6 month
 Integration Algorithm: Trapezoidal Linearity: > 99%
 Impact Velocity (km/h): 56.2
 Velocity Change (km/h): 60.2
 Time of Separation (msec): 88



CRUSH PROFILE

Collision Deformation Classification: Frontal
 Midpoint of Damage: Centerline
 Damage Region Length (mm): 1516
 Impact Mode: Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	4419	4173	246
C2	Crush zone 2 at left side	mm	4522	4138	384
C3	Crush zone 3 at left side	mm	4564	4108	456
C4	Crush zone 4 at right side	mm	4564	4162	402
C5	Crush zone 5 at right side	mm	4522	4157	365
C6	Crush zone 6 at right side	mm	4419	4170	249
L	C1 TO C6	mm	1516	1500	16

DATA SHEET NO. 14
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2011 Mercedes-Benz C300 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

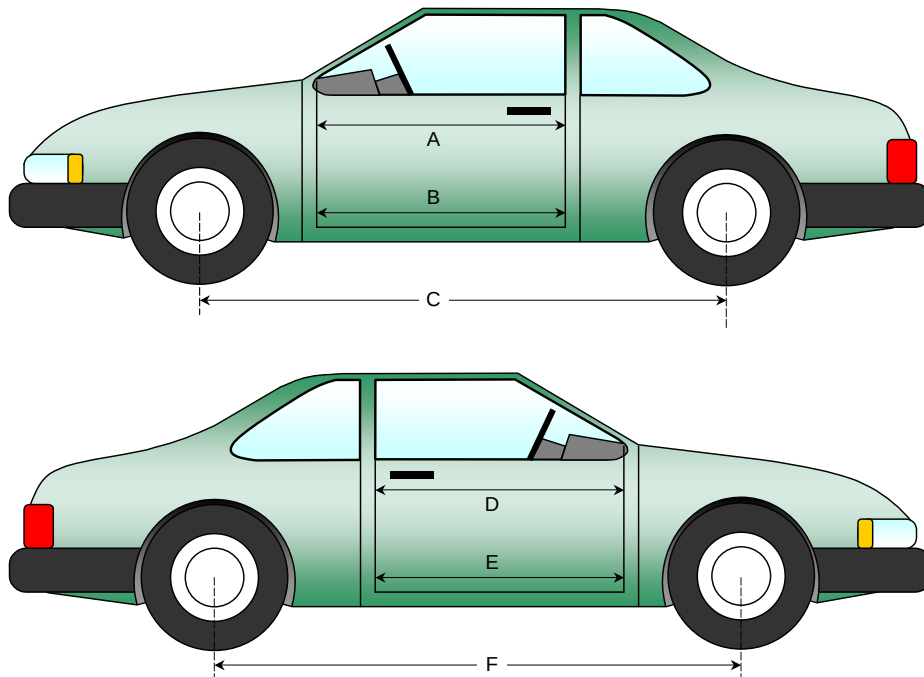
NHTSA No.: MB0518
 Test Date: 12/06/2010

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	919	919	0
B	Left Side Lower	mm	810	810	0
D	Right Side Upper	mm	919	919	0
E	Right Side Lower	mm	810	810	0

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2762	2642	120
F	Right Side Wheelbase	mm	2762	2650	112



DATA SHEET NO. 14 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

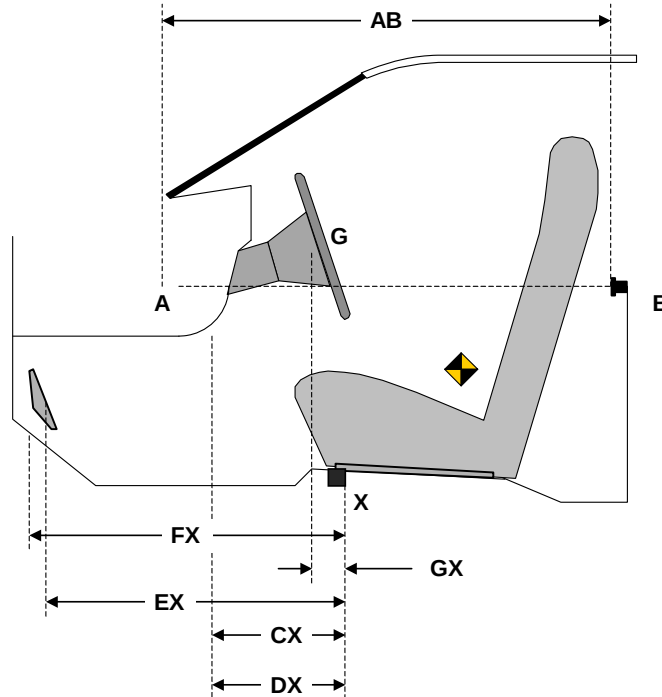
Test Vehicle: 2011 Mercedes-Benz C300 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0518
 Test Date: 12/06/2010

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside window jam)	mm	719	719	0
CX	Left Knee Bolster to X	mm	370	400	-30
DX	Right Knee Bolster to X	mm	364	396	-32
EX	Brake Pedal to X	mm	640	595	45
FX	Foot Rest to X	mm	669	662	7
GX	Center of Steering Column Wheel Hub to X	mm	97	165	-68

X = Front of Seat Track (stationary)

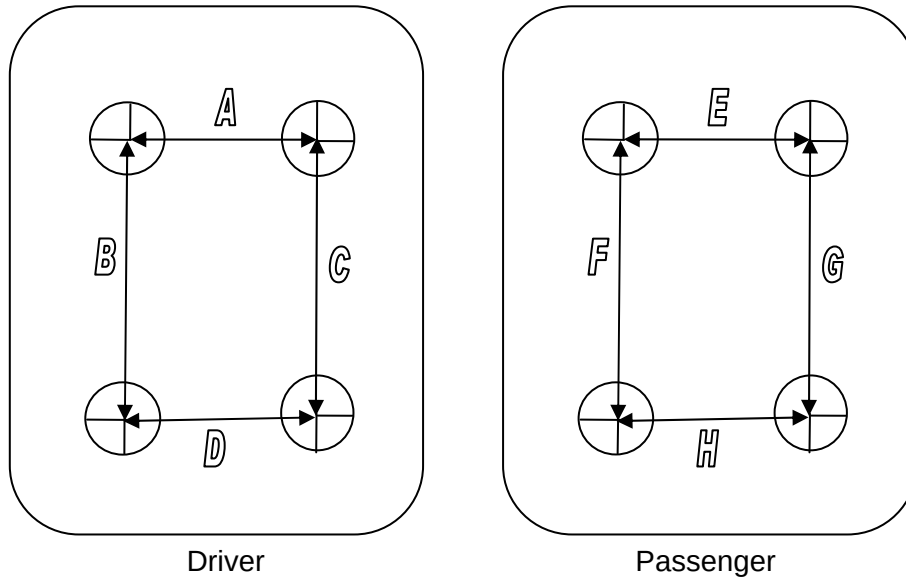


DRIVER COMPARTMENT

DATA SHEET NO. 14 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2011 Mercedes-Benz C300 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0518
 Test Date: 12/06/2010



TOP VIEW THROUGH FLOOR PAN

UNDERBODY FLOORBOARD DEFORMATION

Measurement	Units	Pre-Test	Post-Test	Difference
A	mm	179	179	0
B	mm	179	179	0
C	mm	179	179	0
D	mm	179	179	0
E	mm	166	163	3
F	mm	166	166	0
G	mm	166	166	0
H	mm	166	163	3

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

Test Vehicle: 2011 Mercedes-Benz C300 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0518
 Test Date: 12/06/2010

Windshield Mounting Details:

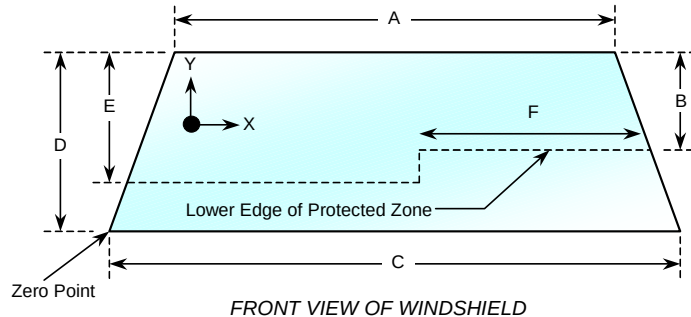
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

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	2067	2067	100
Right Side	2067	2067	100
Total	4134	4134	100



Item	Units	Value
A	mm	1154
B	mm	416
C	mm	1422
D	mm	779
E	mm	501
F	mm	535

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: 2011 Mercedes-Benz C300 4-Dr Sedan NHTSA No.: MB0518
Test Program: NCAP Frontal Barrier Impact Test Test Date: 12/06/2010

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Test Time: 10:44 am Temperature: 21° C

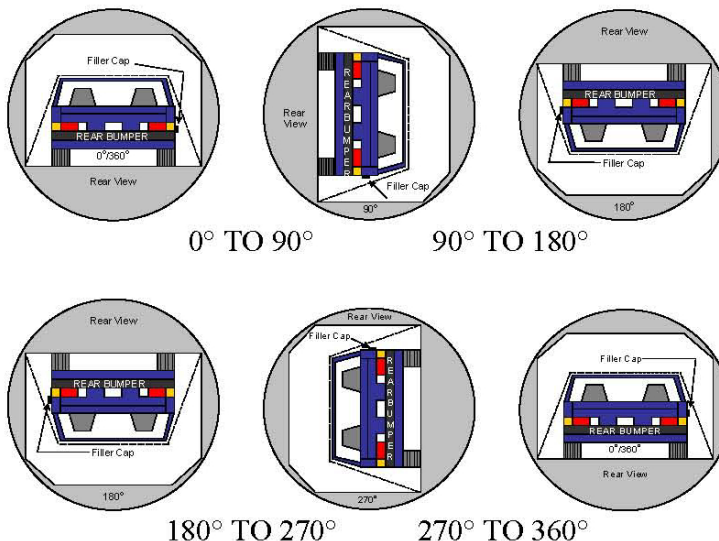
- A. From impact until vehicle motion ceases: 0 oz.
(Maximum Allowable = 1 ounce)
- B. For the 5 minute period after motion ceases: None
(Maximum allowable = 5 ounces)
- C. For the following 25 minutes: None
(Maximum allowable = 1 oz./minute)
- D. Spillage Details: None

DATA SHEET NO. 16
FMVSS 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2011 Mercedes-Benz C300 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0518
 Test Date: 12/06/2010

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°	112	300	412
90° to 180°	109	300	409
180° to 270°	103	300	403
270° to 360°	117	300	417

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

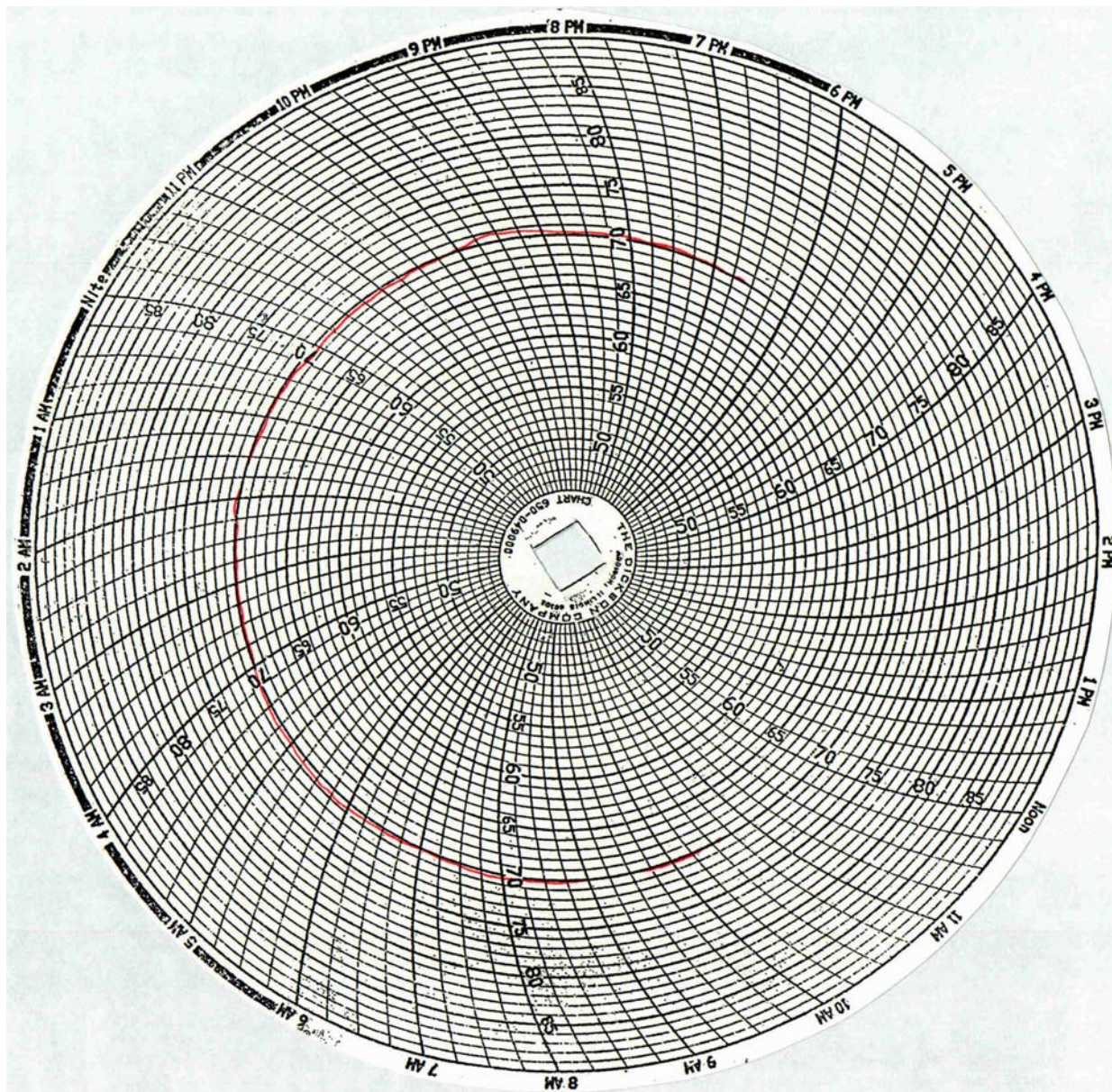
ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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 Mercedes-Benz C300 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0518
Test Date: 12/06/2010



APPENDIX A
PHOTOGRAPHS

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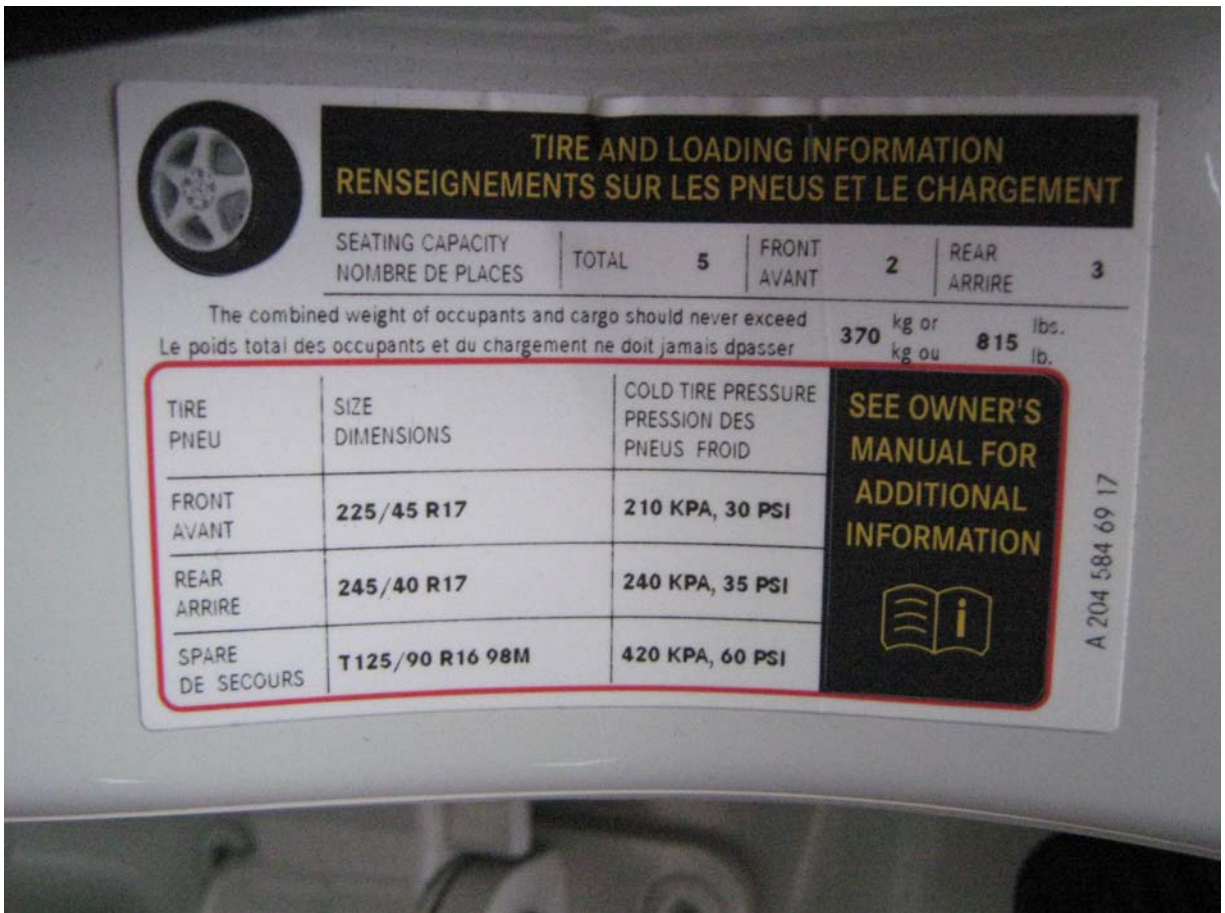
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Manufacturer's Label



Tire Placard



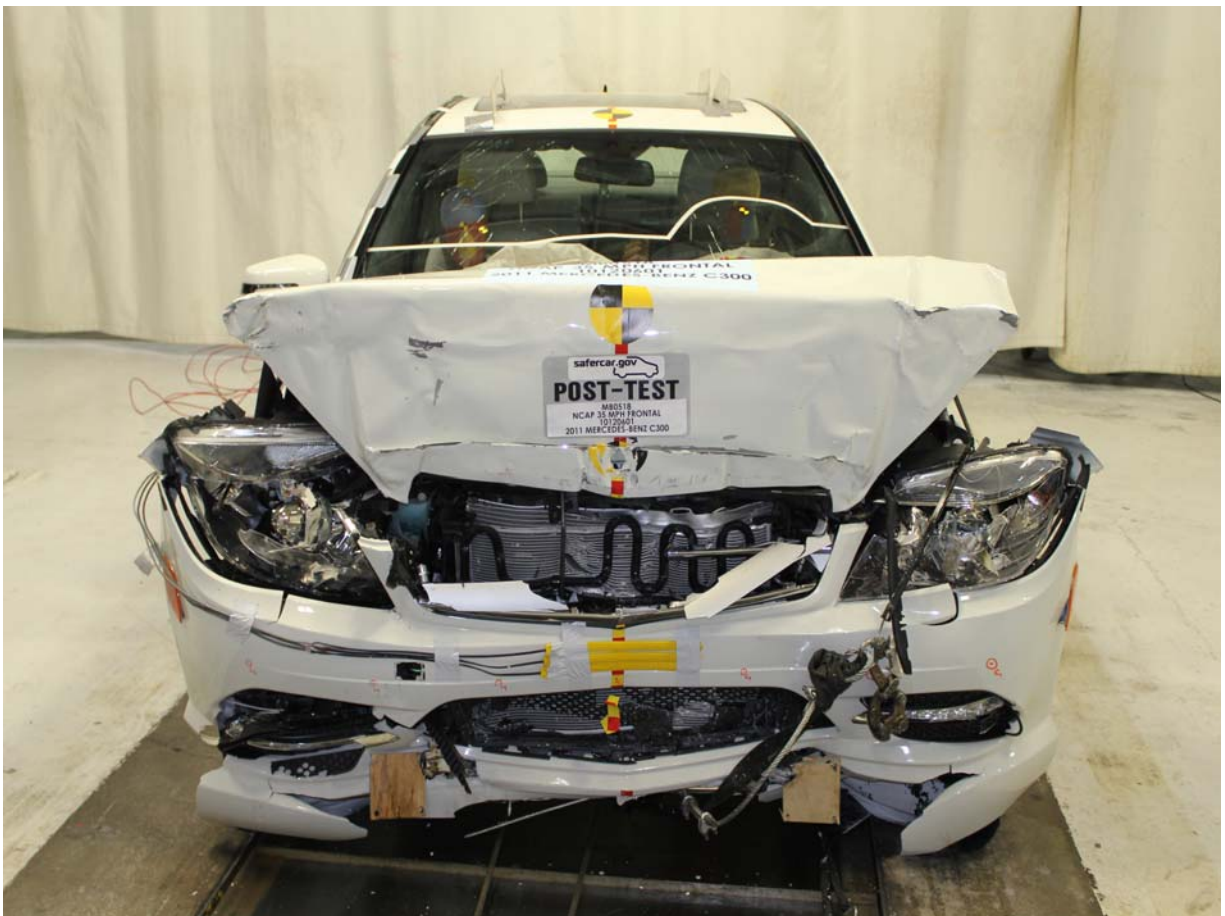
Right Front Three-Quarter View, As Received



Left Rear Three-Quarter View, As Received



Pre-Test Front View



Post-Test Front View



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



Post-Test Left Side View



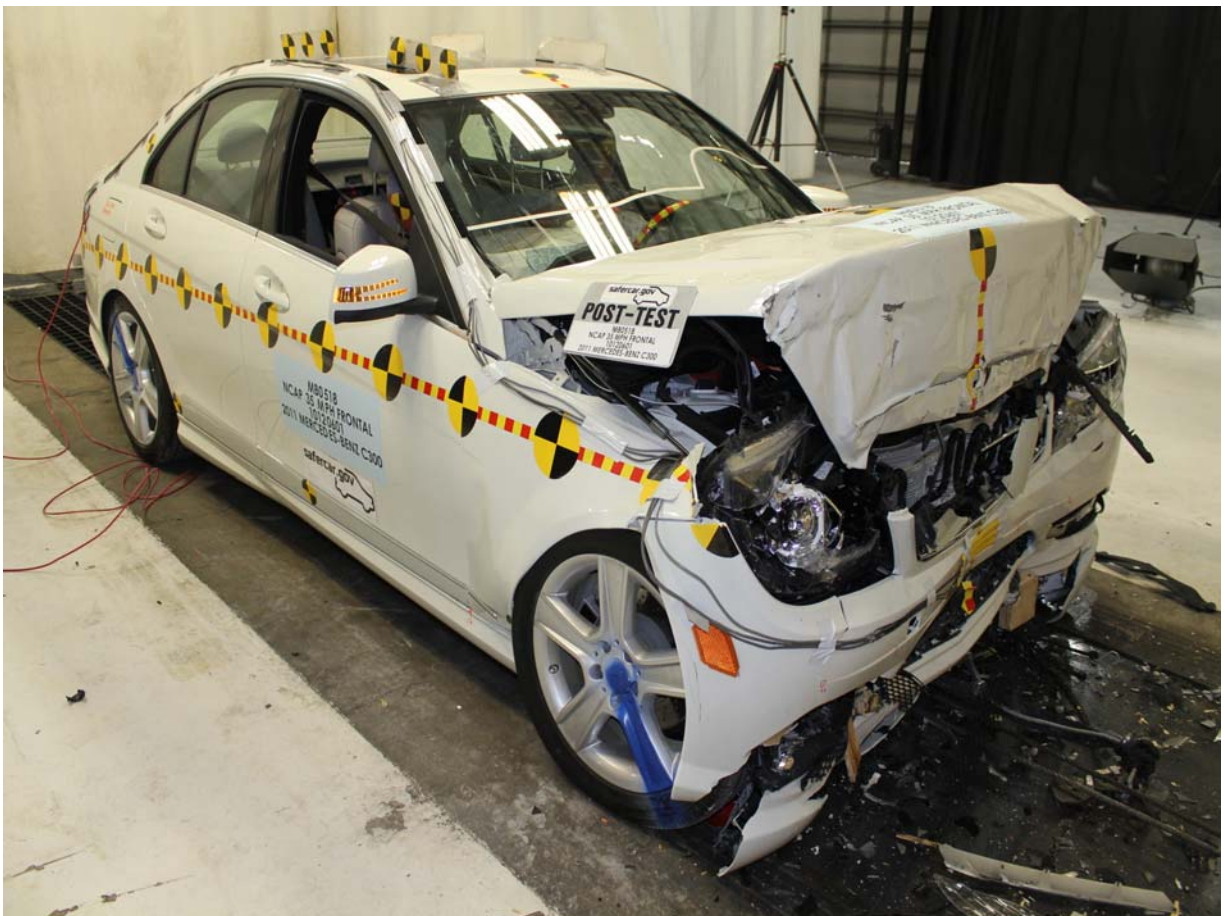
Pre-Test Right Side View (with vehicle at barrier)



Post-Test Right Side View



Pre-Test Right Front Three-Quarter View



Post-Test Right Front Three-Quarter View



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



Post-Test Left Rear Three-Quarter View



Pre-Test Windshield View



Post-Test Windshield View



Pre-Test Engine Compartment View



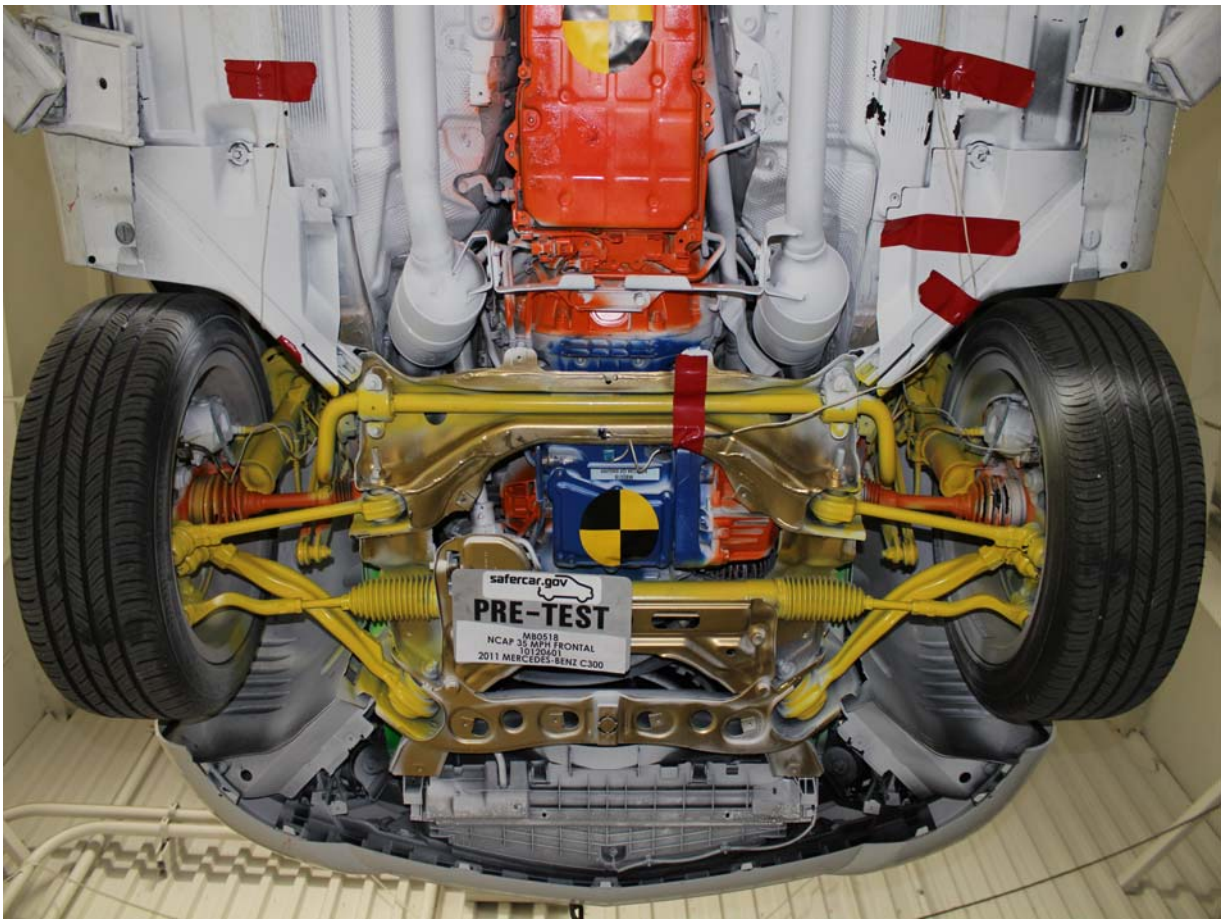
Post-Test Engine Compartment View



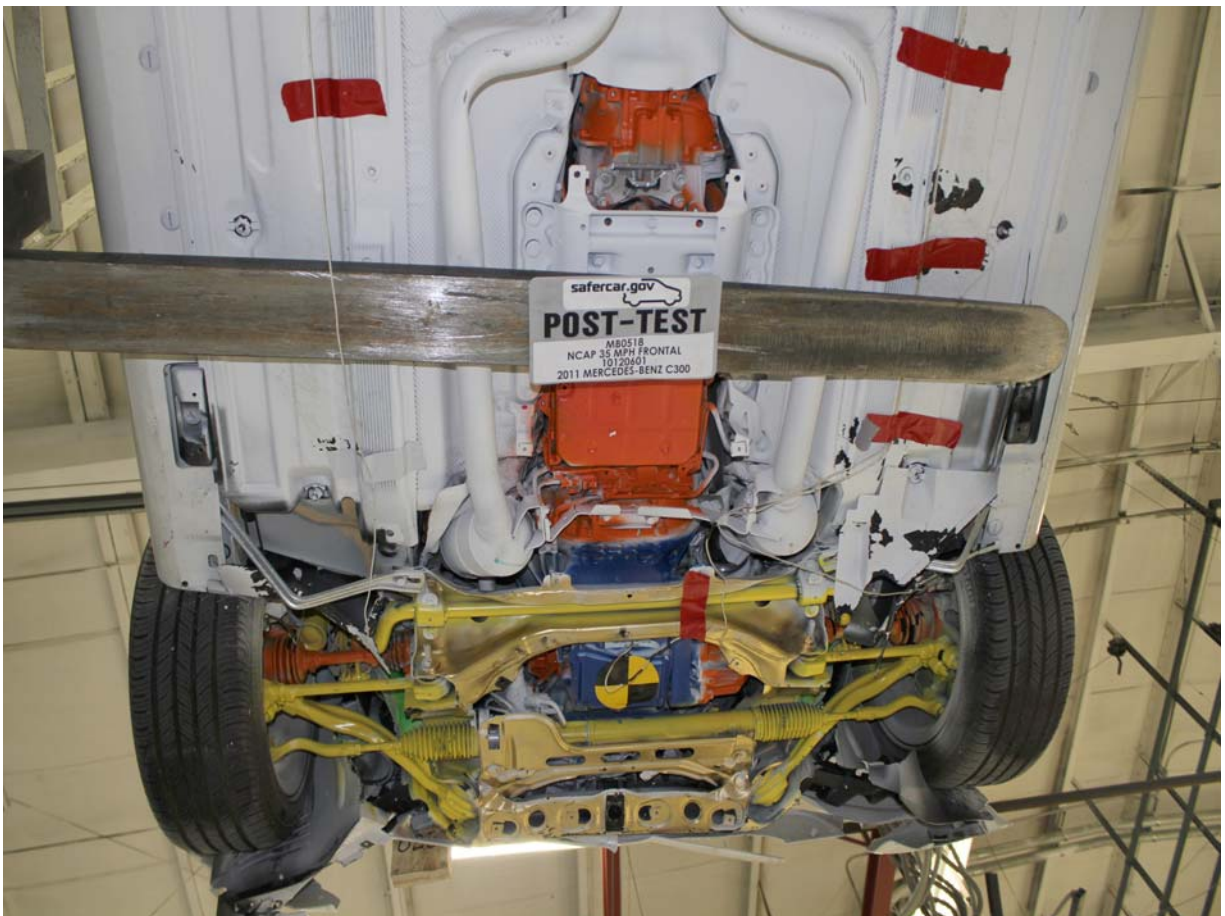
Pre-Test Fuel Cap View



Post-Test Fuel Cap View



Pre-Test Front Underbody View



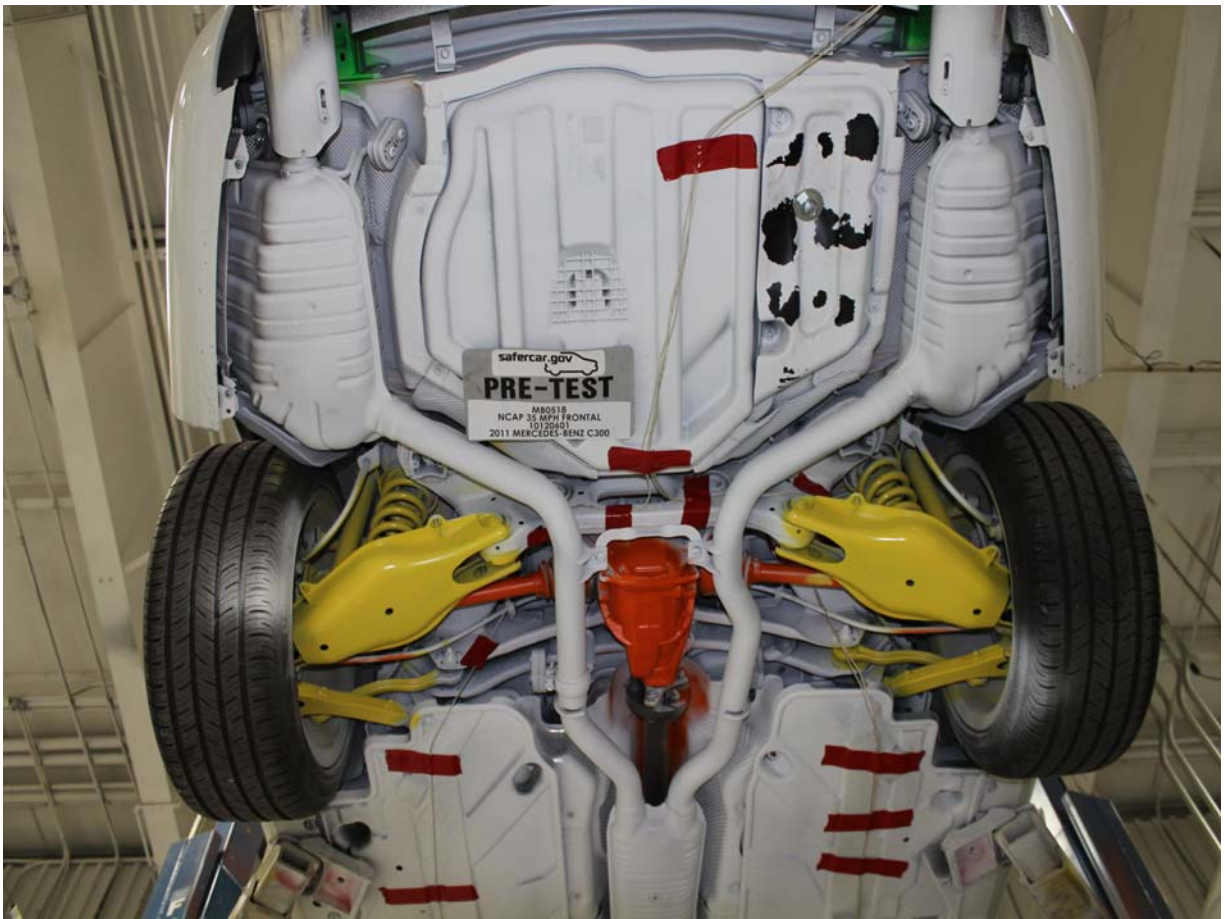
Post-Test Front Underbody View



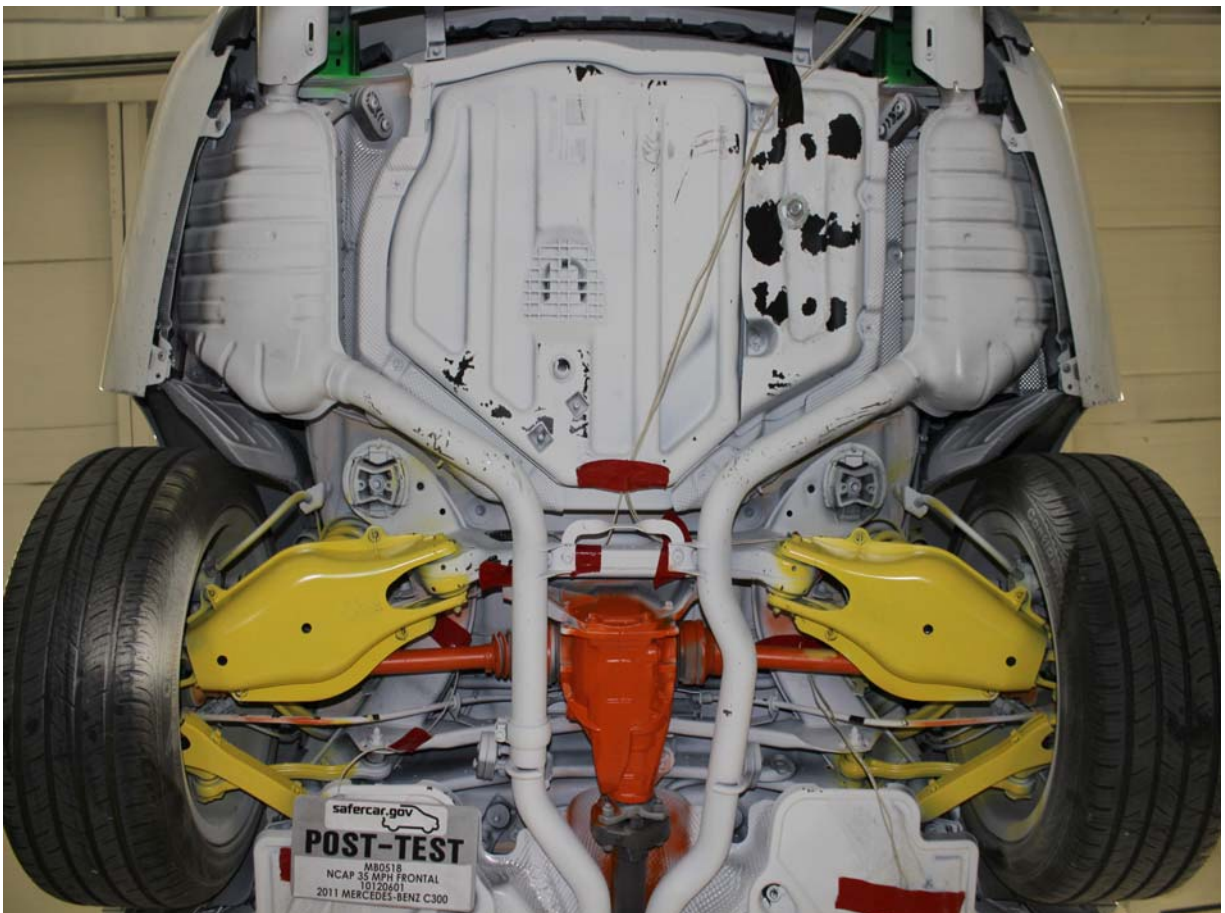
Pre-Test Mid Underbody View



Post-Test Mid Underbody View



Pre-Test Rear Underbody View



Post-Test Rear Underbody View



Pre-Test Dummy Cable Routing



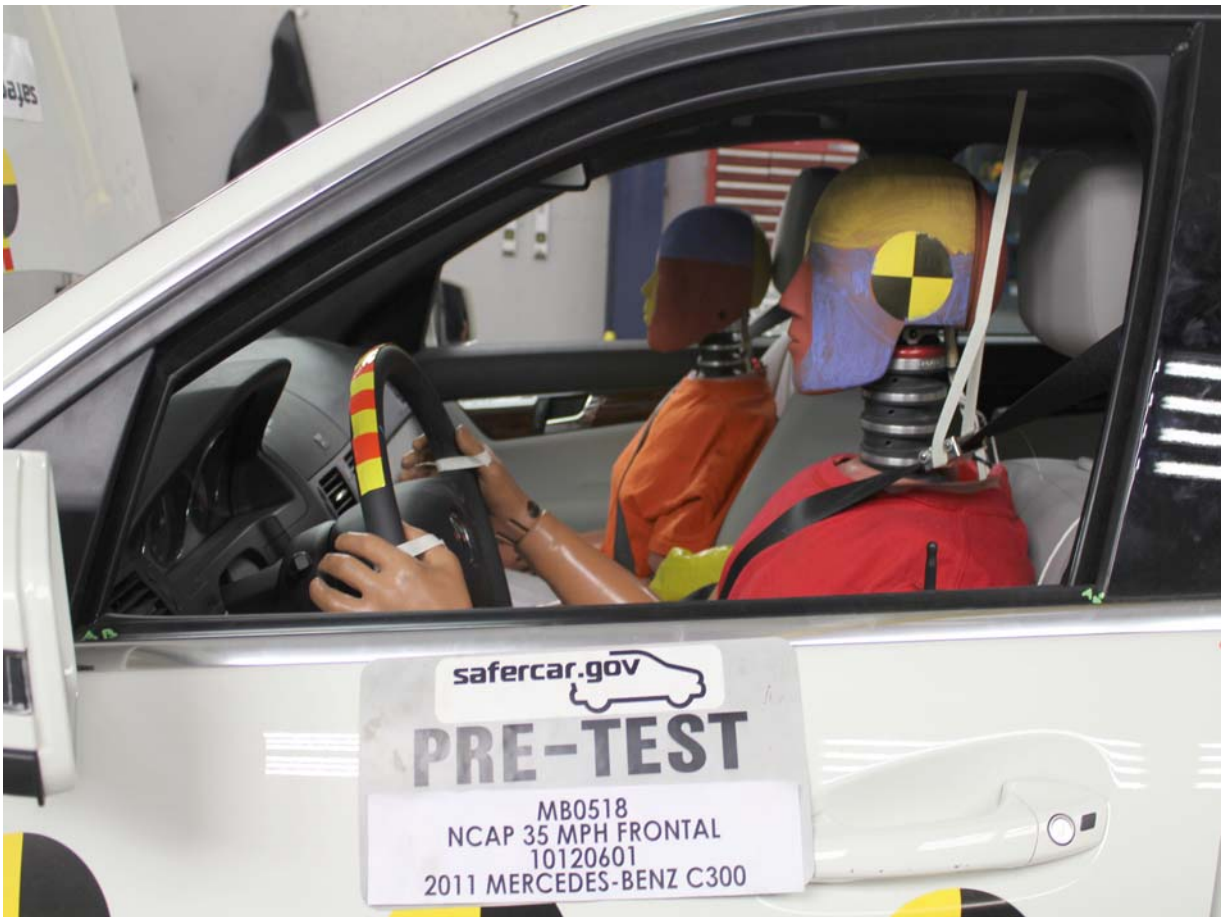
Post-Test Dummy Cable Routing



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)



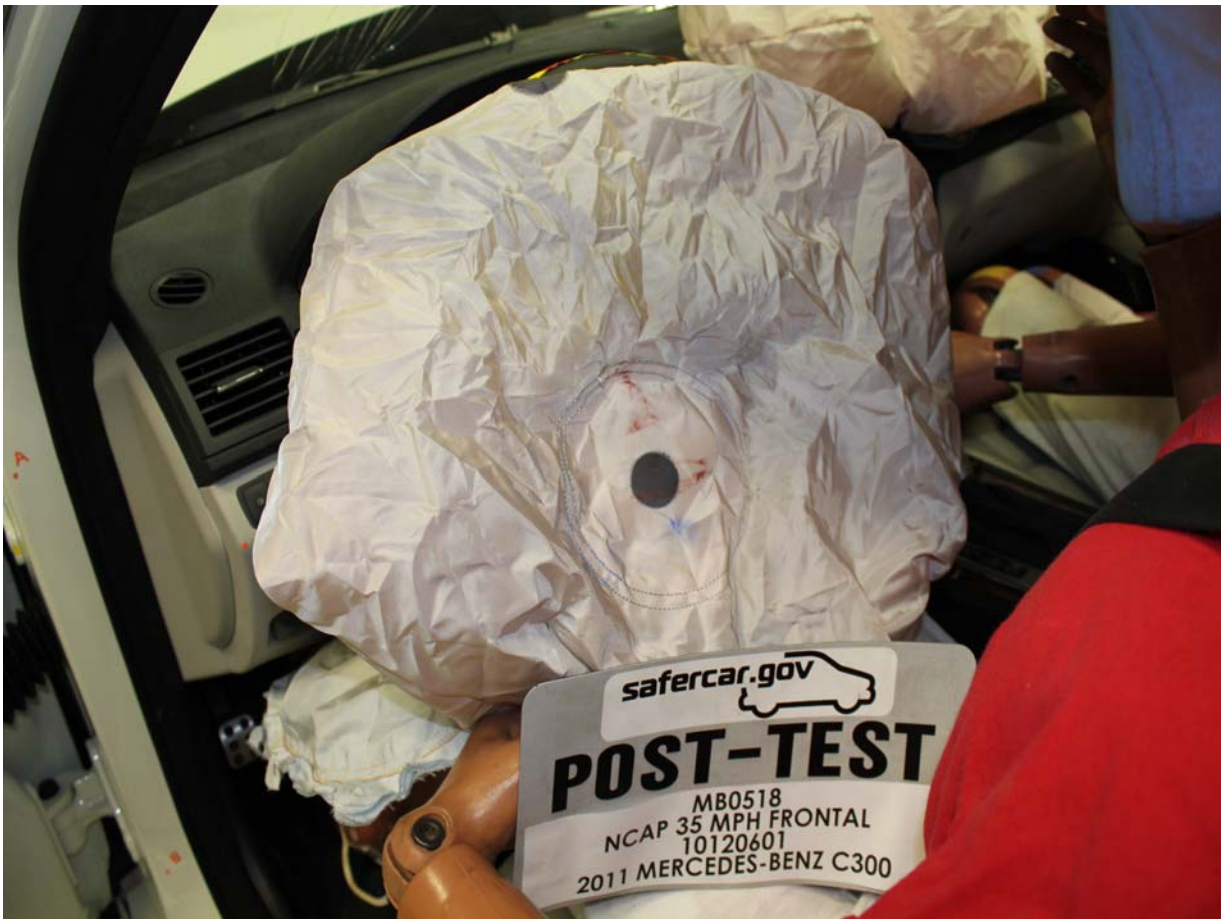
Post-Test Driver's Side Knee Bolster (without dummy)



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 Side Header



Post-Test Driver Dummy Contact with Knee Airbag



Post-Test Driver Dummy Contact with Knee Airbag



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



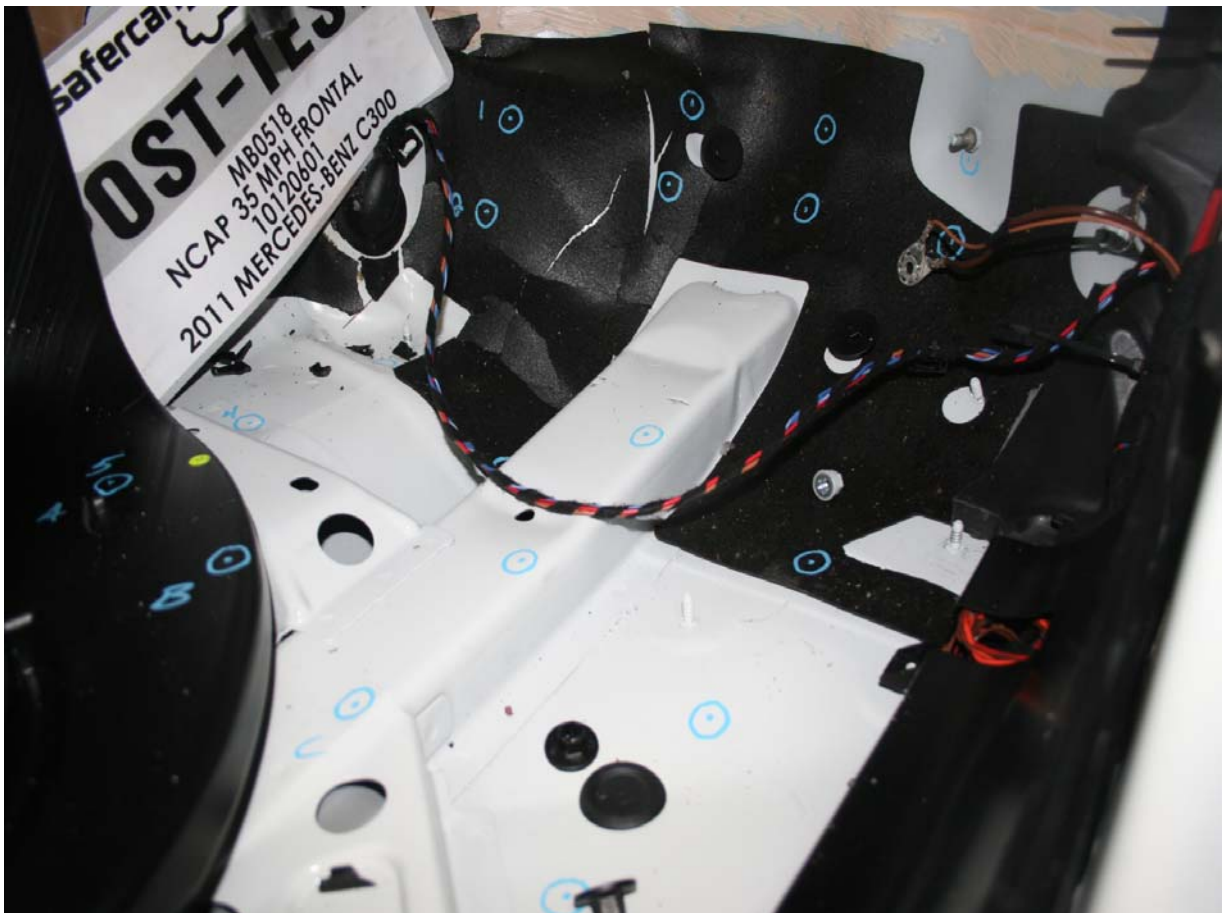
Pre-Test Passenger's Side Knee Bolster (without dummy)



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



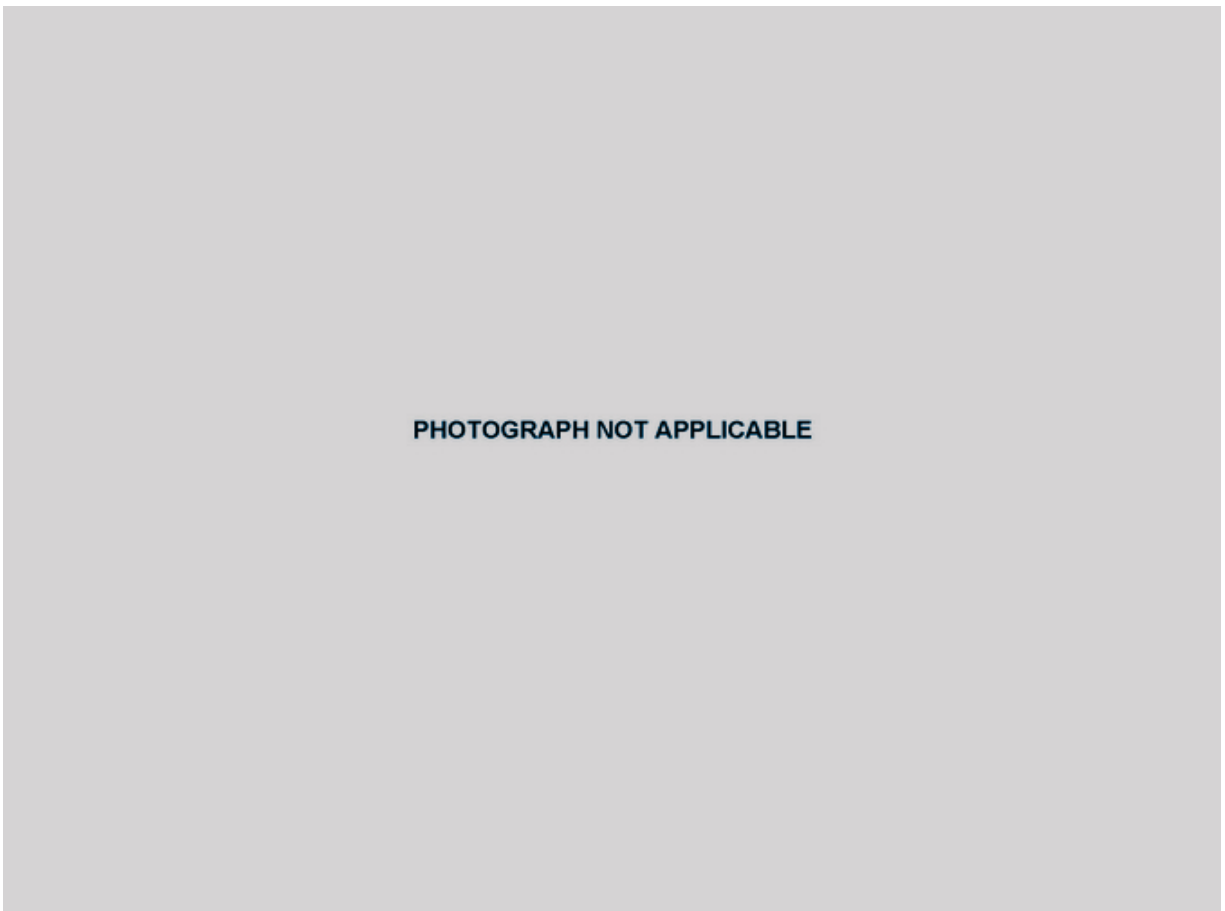
Post-Test Passenger Dummy Contact with Side Header



Post-Test Passenger Dummy Contact with Glovebox



Ballast Installed in Vehicle



PHOTOGRAPH NOT APPLICABLE

Post-Test Stoddard Solvent Spillage Location View



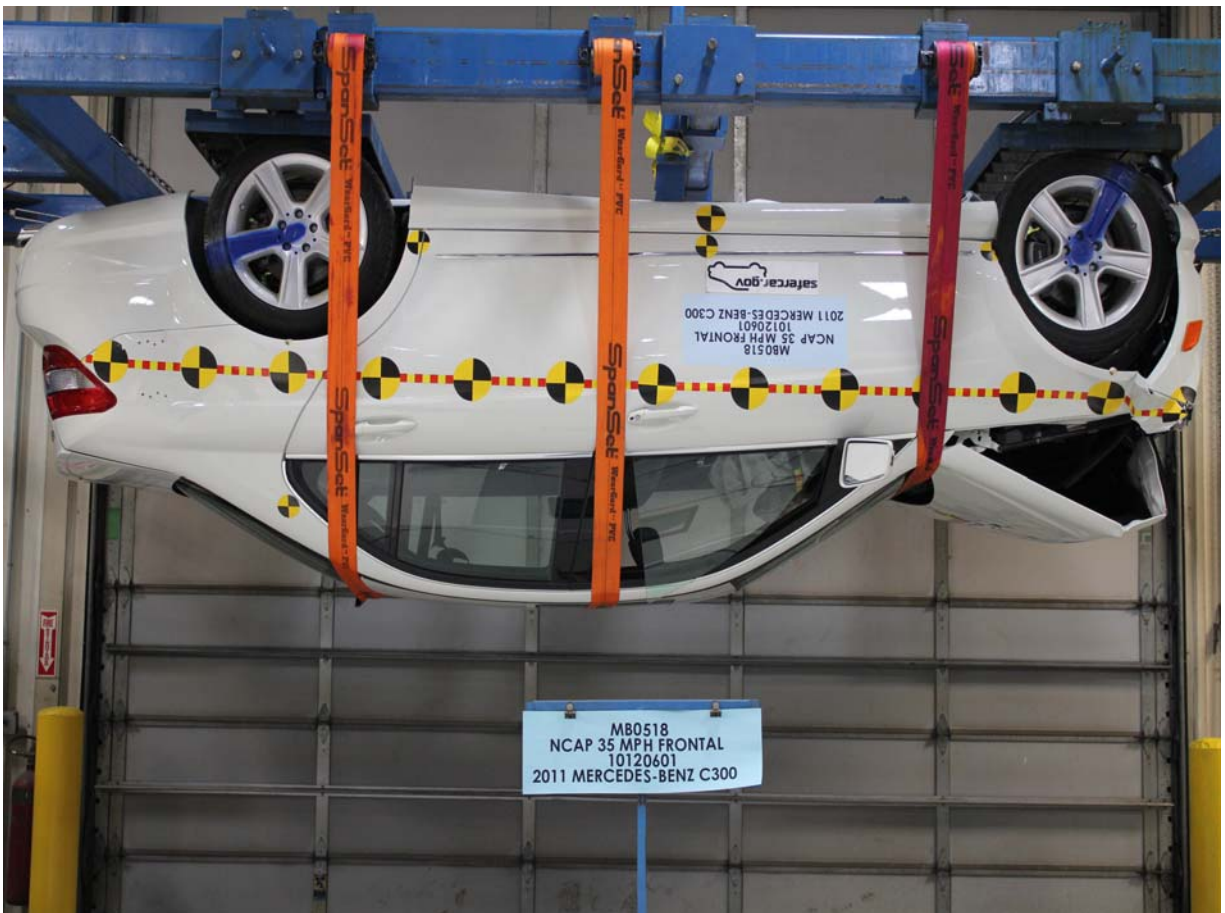
Post-Test Speed Trap Read-Out



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



Mercedes-Benz

2011 **C300** 4MATIC

3.0 Liter Dual Overhead Cam 24V V-6

PO#: 0170444623

VIN: WDDGF8B81BR139441

SOLD TO:
STARS IMPORTED AUTOS, INC.
13500 WATZATA BLVD.
MINNETONKA, MN 55305
EB004 Baltimore
372A

SOLD TO:
STARS IMPORTED AUTOS, INC.
13500 WATZATA BLVD.
MINNETONKA, MN 55305
EB004 Baltimore
372A

PERFORMANCE/HANDLING

- 228 Horsepower @ 6,000 RPM
- 221 lb-ft of Torque @ 2,700-5,000 RPM
- 7-Speed Automatic Transmission
- Front Suspension: 3-link Independent
- Rear Suspension: Multi-link Independent
- Dual Exhaust with Two Chrome Outlets
- 4MATIC All Wheel Drive System

COMFORT/CONVENIENCE

- Power Sunroof with Express Open and Close
- Dual-Zone Automatic Climate Control with Dust Filter
- 8-Way Power Front Seats with Lumbar Support
- Single Disc CD/MP3/AM/FM/Weatherband Radio
- 8-Speaker Sound System with Auxiliary Input
- Bluetooth Connectivity for Hands-free Phone Use
- Central Controller with 5" Display
- Multi-Function Leather Steering Wheel
- 4.5" Instrument Cluster Display
- Front and Rear Cupholders
- Tilt & Telescoping Steering Column
- Cruise Control
- Intelligent Wipers
- Power Windows with Express Up and Down
- Automatic Headlamps with Twilight Sensor & Locator Lighting
- Trip Computer

SAFETY/SECURITY

- New Vehicle 4 Year/50,000 Mile Warranty
- 24 hr. Roadside Assistance Program
- Owner Information Kit
- Mercedes-Benz Maintenance System
- Steel Reinforced Cabin w/ Front & Rear Crumple Zones
- Front & Rear Outboard Seatbelts
- Side Curtain & Head Protection
- Dual Side Airbags
- Side Airbags Mounted in Front Seat Backrests
- Head Protection Curtains
- Dual Front Pelvic Airbags
- Driver's Side Knee Airbag
- Active Front Head Restraints
- 4-Wheel ABS Disc Brakes with Brake Assist System
- Electronic Stability Program (ESP)
- Anti-Slip Regulation (ASR)
- LATCH-Lower Anchors and Tethers for Children
- Child Lock with Engine Immobilizer
- SmartKey with Panic Button
- Tire Pressure Monitoring System

SUGGESTED RETAIL PRICE

\$37,490

PAINT/UPHOLSTERY & TRIM
650 Arctic White
118 Grey/Black MB Tex

OPTIONAL EQUIPMENT AND VALUE ADDED PACKAGES

- R22 17" 5-Spoke Alloy Wheels
- 218 Dynamic Rear View Monitor
- 293 Rear Side Airbags
- 321 Burl Walnut Wood Trim
- 104 Rear Deck Spoiler
- P01 Premium 1 Package: SIRIUS Satellite Radio, Garage Door Opener, Rain Sensing Wipers, Autodimming Mirrors, 10-Way Power Driver's Seat with Memory and Power-Adjustable Steering Column, 4-Way Power Lumbar Support, Split Folding Rear Seats, Power Rear-Window Sunshade, Integrated Compass in Rearview Mirror
- MSRP value of options if available separately: \$3,295
- 320 Multimedia Package: 7" Power Retractable Color Display, COMAND Hard Drive Based Navigation System, 6-Disc CD/DVD Changer, Voice Control, Music Register, PCM/CA Slot, iPod/iMP3 Media Interface
- 333 Sport Sedan: Sport Body Styling, Mercedes-Benz Star in Grille, 17" Spoked Alloy Wheels with All-Season Tires, LED Daytime Running Lamps, Sport Suspension and Braking System, Sport Interior, Aluminum Trim

Destination and Delivery

\$875.00

\$45,315.00

EPA Fuel Economy Estimates

These estimates reflect new EPA methods beginning with 2008 models.

**GASOLINE
CITY MPG**

18

Expected range
for most drivers
14 to 22 MPG

*Fuel economy when
operating on E85 will
yield different values
than gasoline. See Fuel
Economy Guide for more
information.

Dual Fuel Vehicle*
Gasoline-Ethanol(E85)

**Estimated
Annual Fuel Cost**

\$2,400

based on 15,000 miles
at \$3.20 per gallon

**Combined Gasoline
Fuel Economy
This Vehicle**

20

All Compacts

**GASOLINE
HIGHWAY MPG**

25

Expected range
for most drivers
20 to 30 MPG

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



www.MBUSA.com

GOVERNMENT SAFETY RATINGS

**Frontal
Crash** Driver **Not Rated**
Passenger **Not Rated**

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

**Side
Crash** Front seat **Not Rated**
Rear seat **Not Rated**

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

Rollover ★ ★ ★ ★

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

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

VISIT www.safercar.gov

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

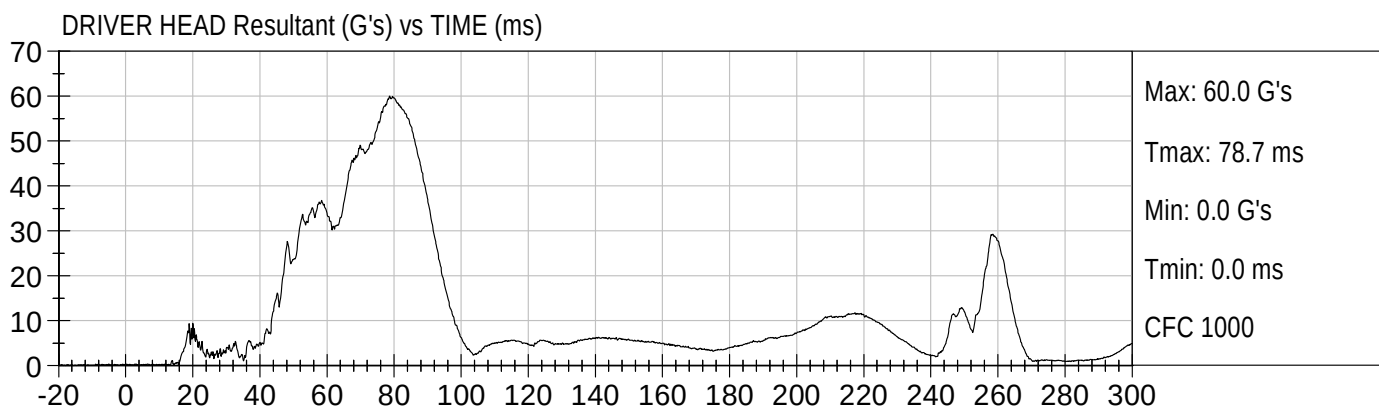
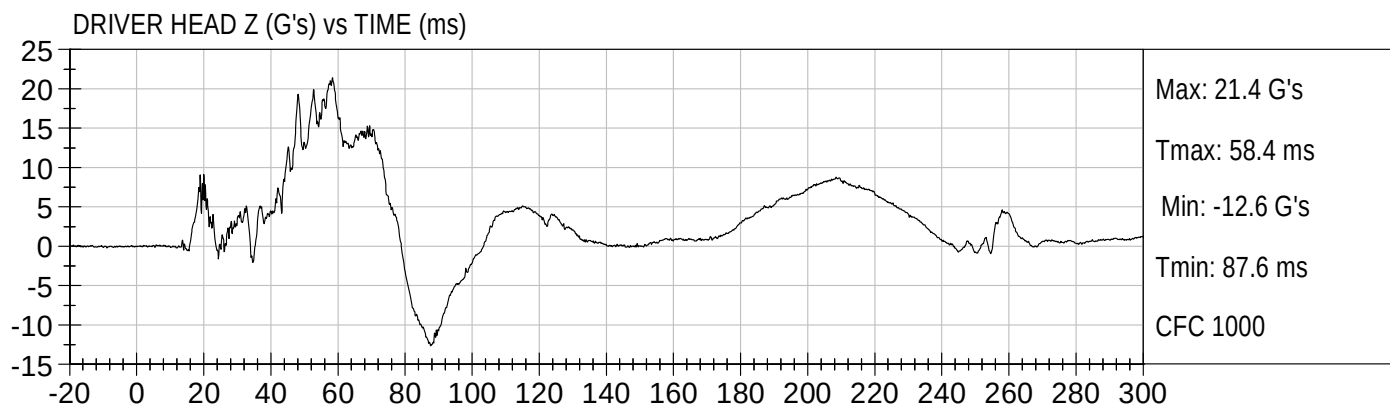
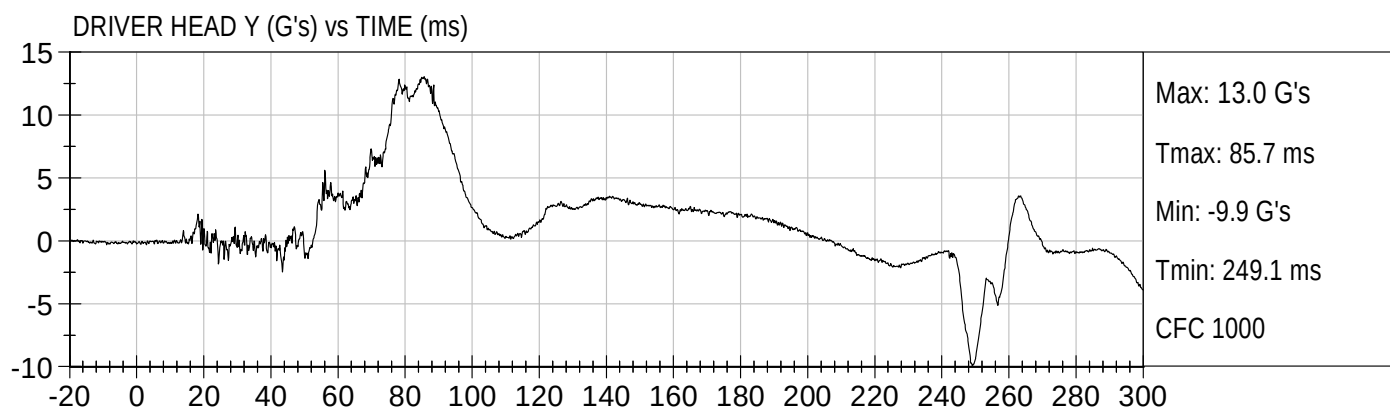
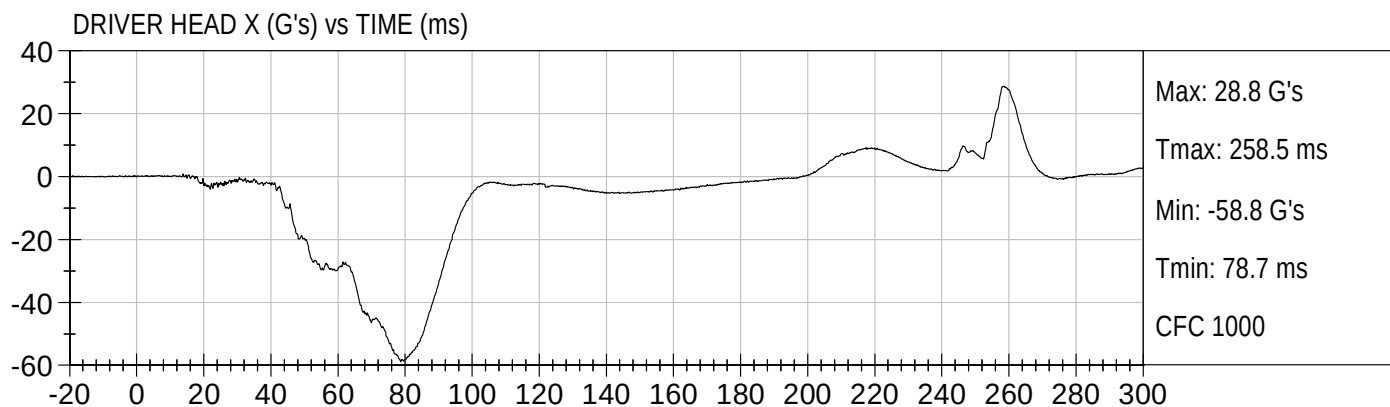
Driver Left Upper Tibia Force Z

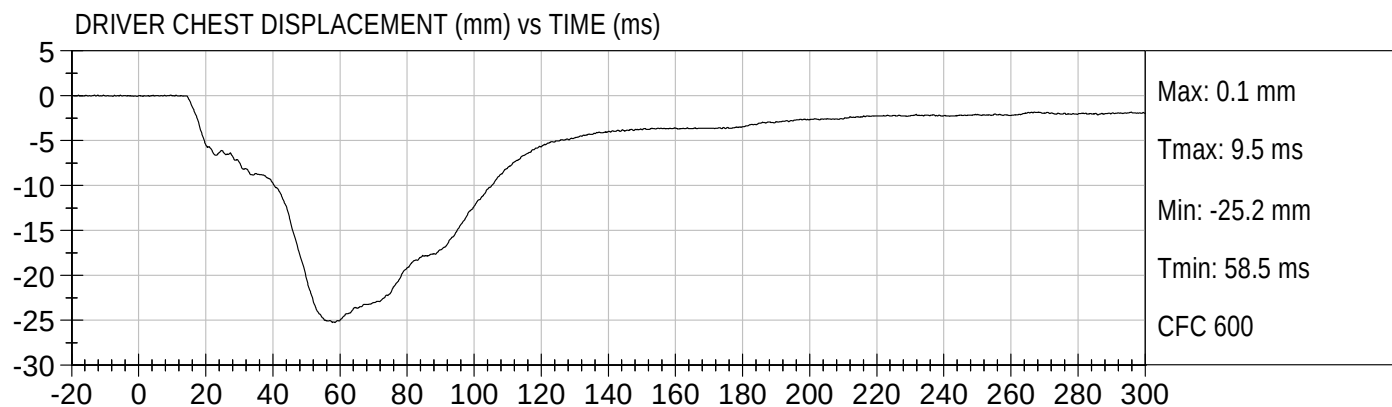
Driver Left Lower Tibia Moment X

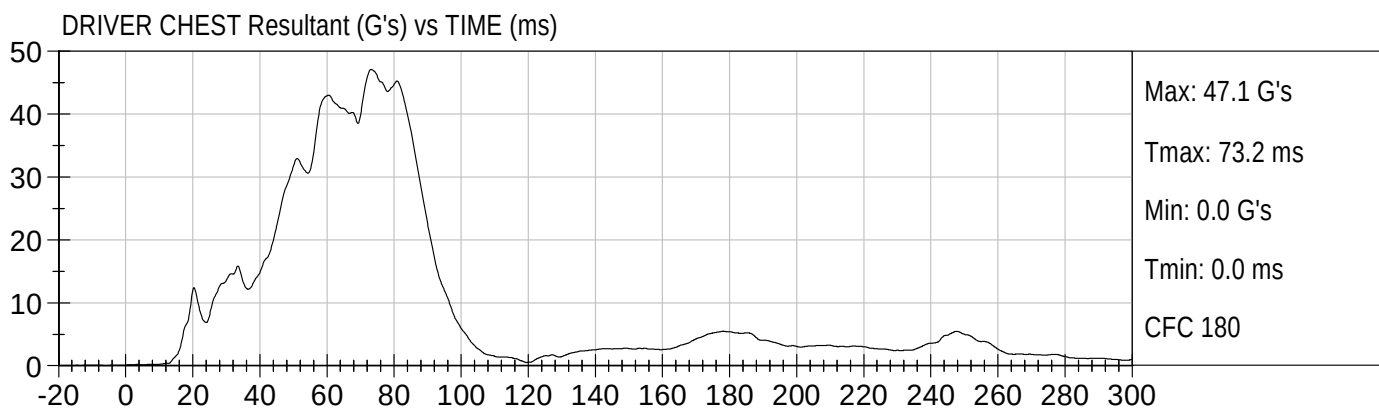
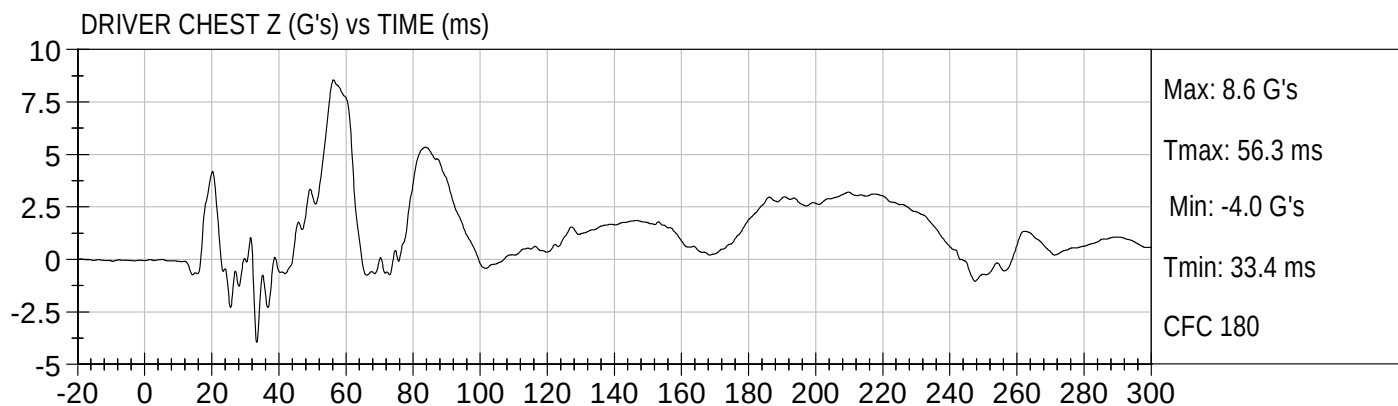
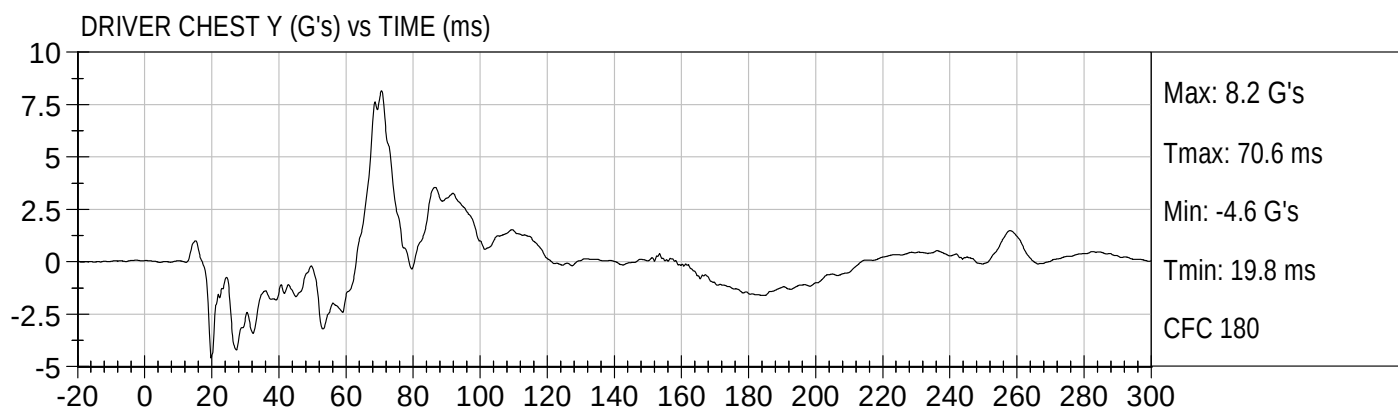
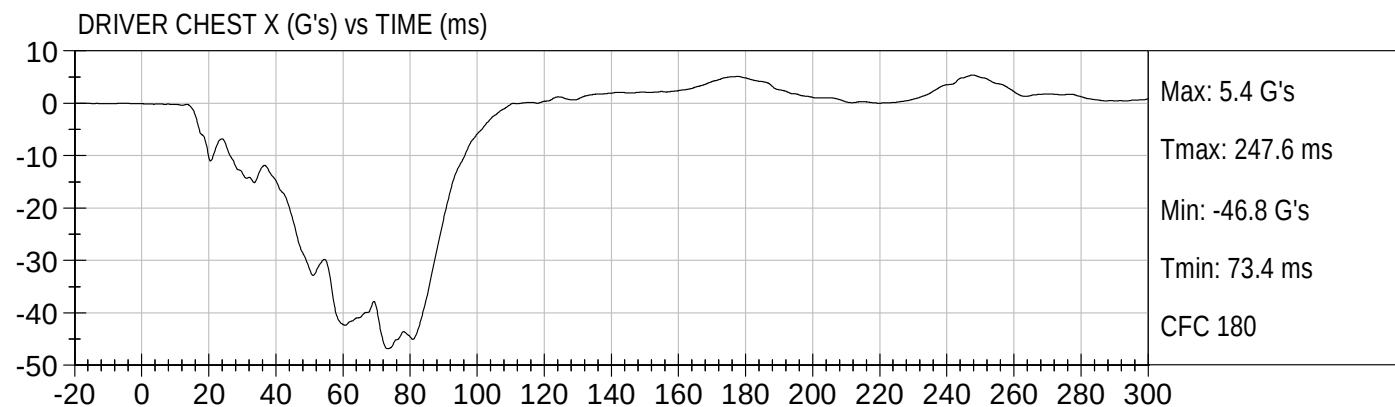
Driver Left Lower Tibia Moment Y

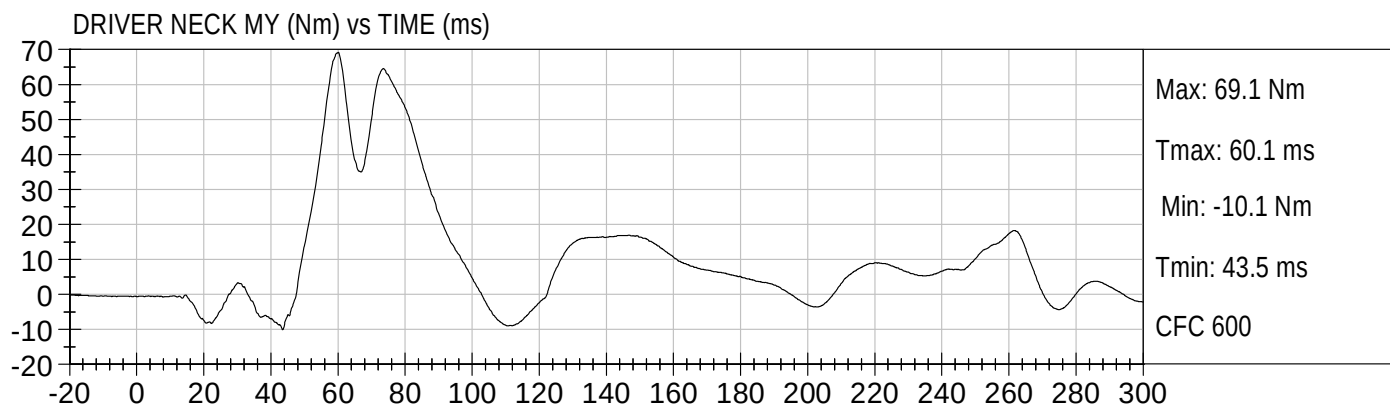
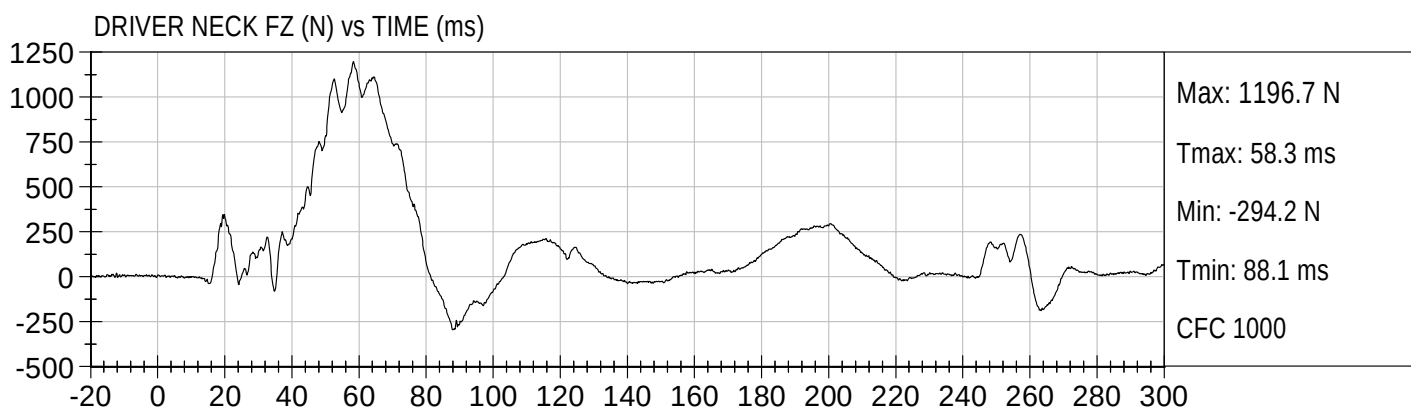
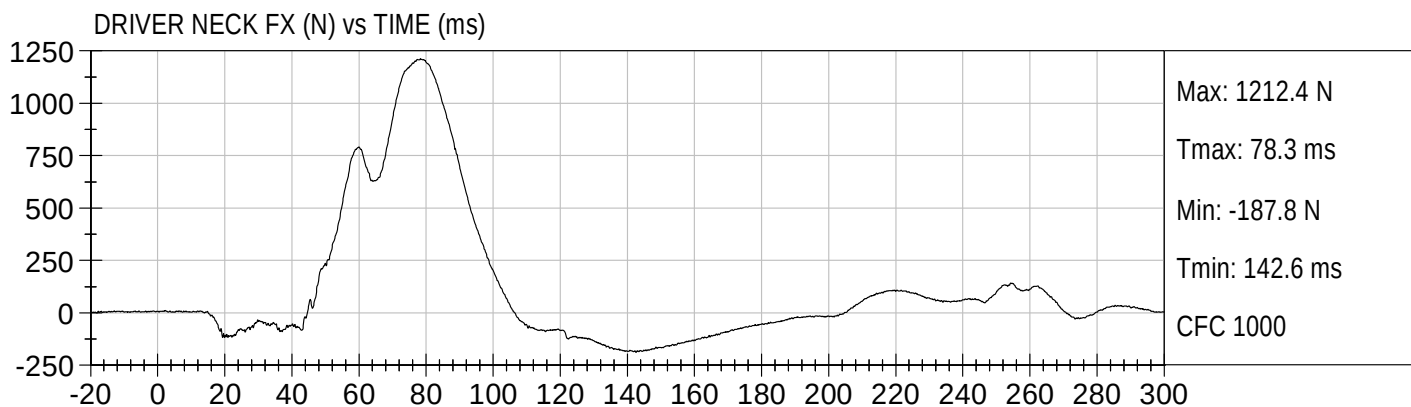
Driver Left Lower Tibia Force Z
Driver Right Upper Tibia Moment X
Driver Right Upper Tibia Moment Y
Driver Right Upper Tibia Force Z
Driver Right Lower Tibia Moment X
Driver Right Lower Tibia Moment Y
Driver Right Lower Tibia Force Z
Driver Left Foot Fore Z
Driver Left Foot Aft X
Driver Left Foot Aft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

Passenger Left Lower Tibia Moment Y
Passenger Left Lower Tibia Force Z
Passenger Right Upper Tibia Moment X
Passenger Right Upper Tibia Moment Y
Passenger Right Upper Tibia Force Z
Passenger Right Lower Tibia Moment X
Passenger Right Lower Tibia Moment Y
Passenger Right Lower Tibia Force Z
Passenger Left Foot Fore Z
Passenger Left Foot Aft X
Passenger Left Foot Aft Z
Passenger Right Foot Fore Z
Passenger Right Foot Aft X
Passenger Right Foot Aft Z
Left Rear Seat Crossmember X
Left Rear Seat Crossmember Z
Right Rear Seat Crossmember X
Right Rear Seat Crossmember Z
Vehicle Engine Top X
Vehicle Engine Bottom X
Vehicle Left Brake Caliper X
Vehicle Right Brake Caliper X
Advanced Research Load Cell Barrier – 127 channels



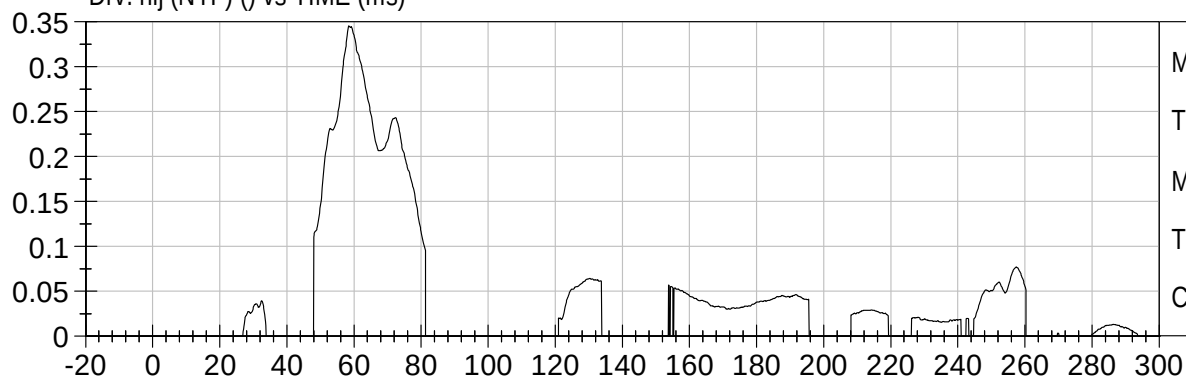






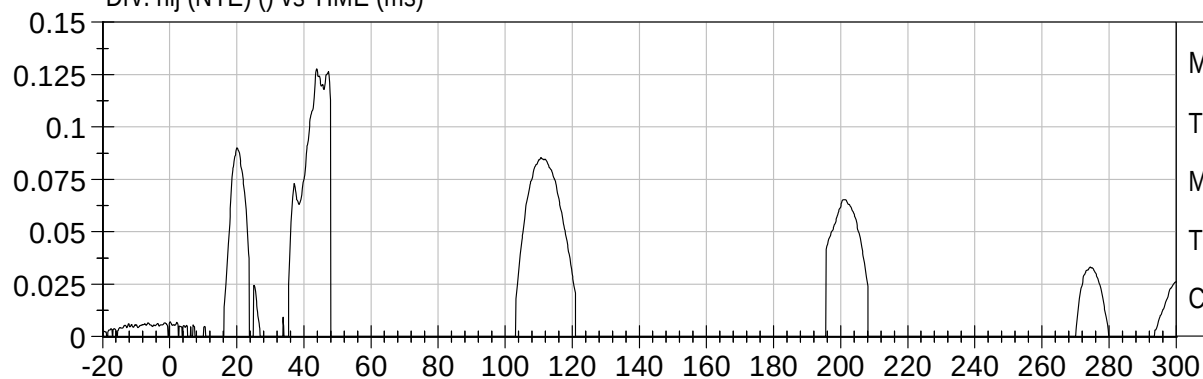


Drv. nij (NTF) () vs TIME (ms)



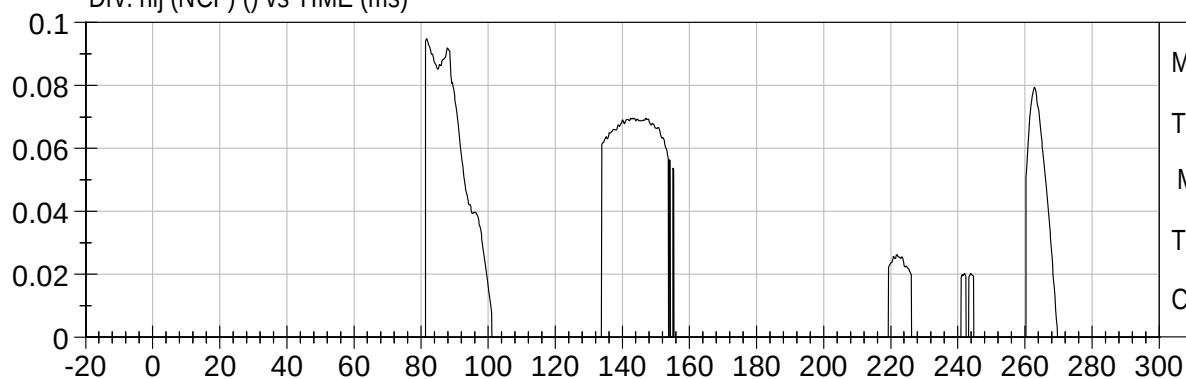
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CFC 600

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



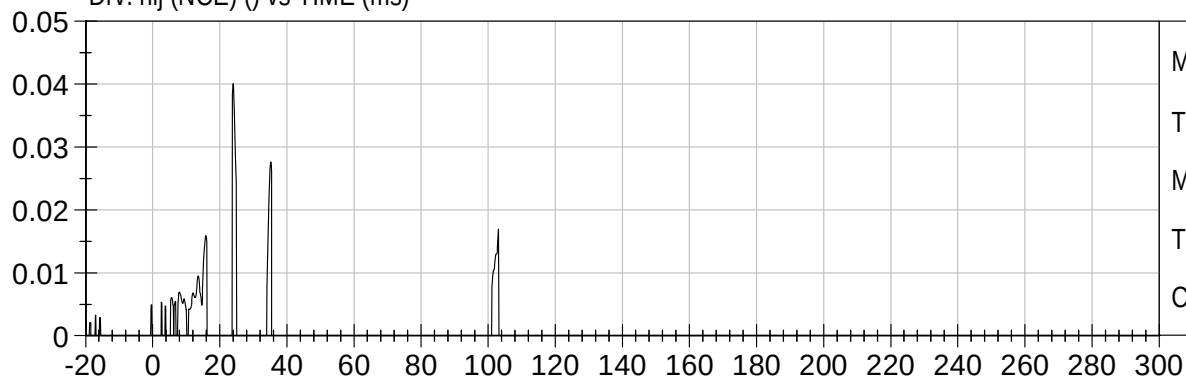
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Drv. nij (NCF) () vs TIME (ms)

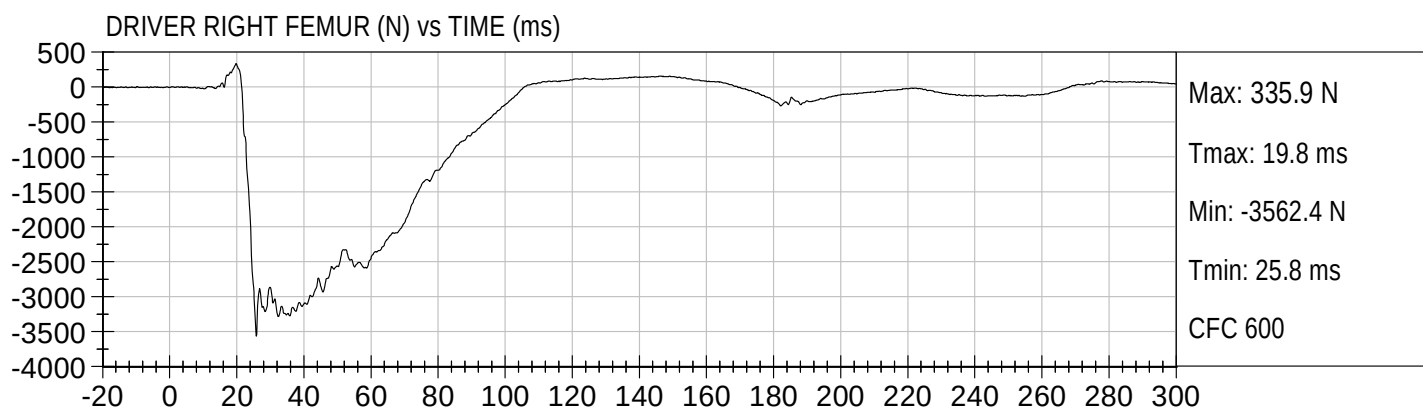
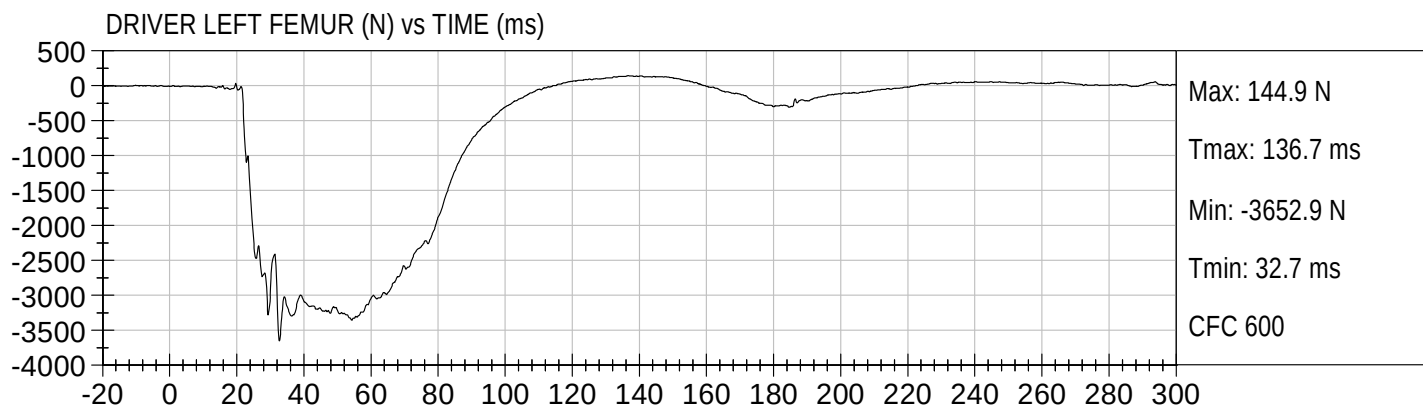


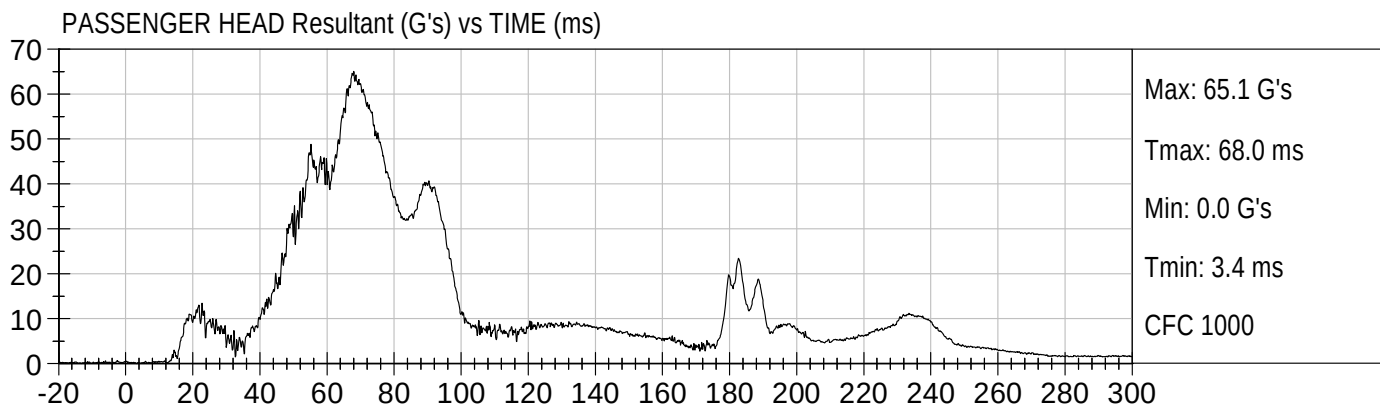
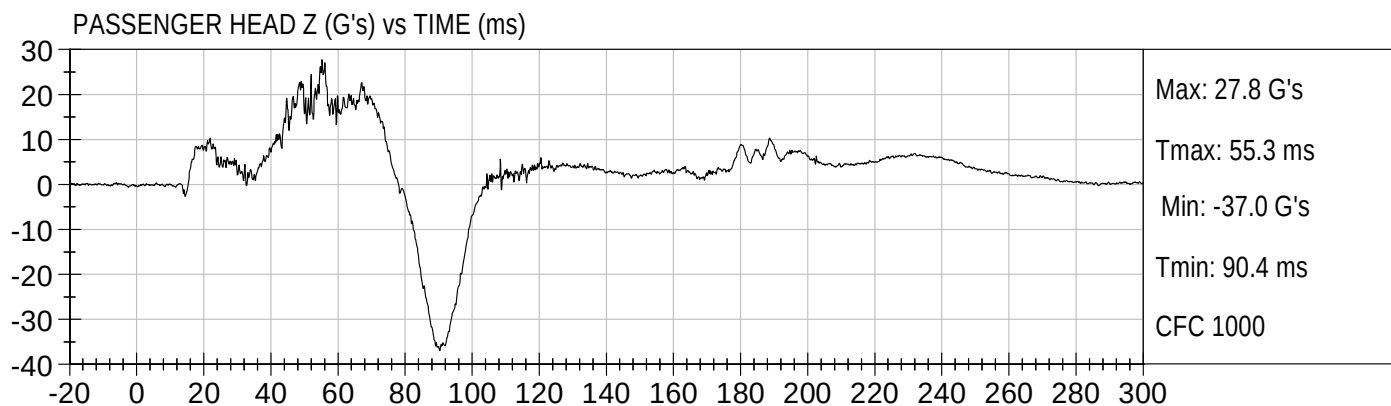
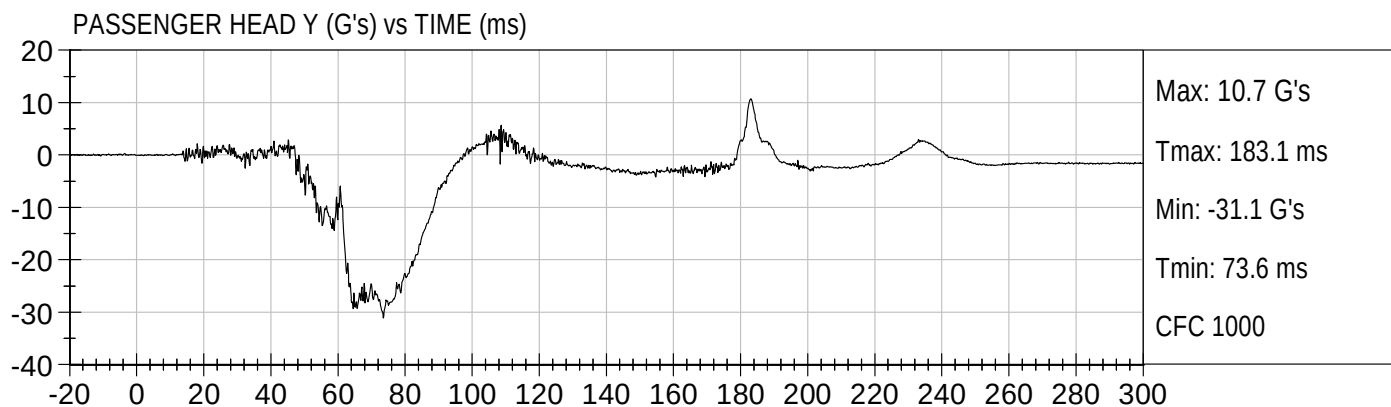
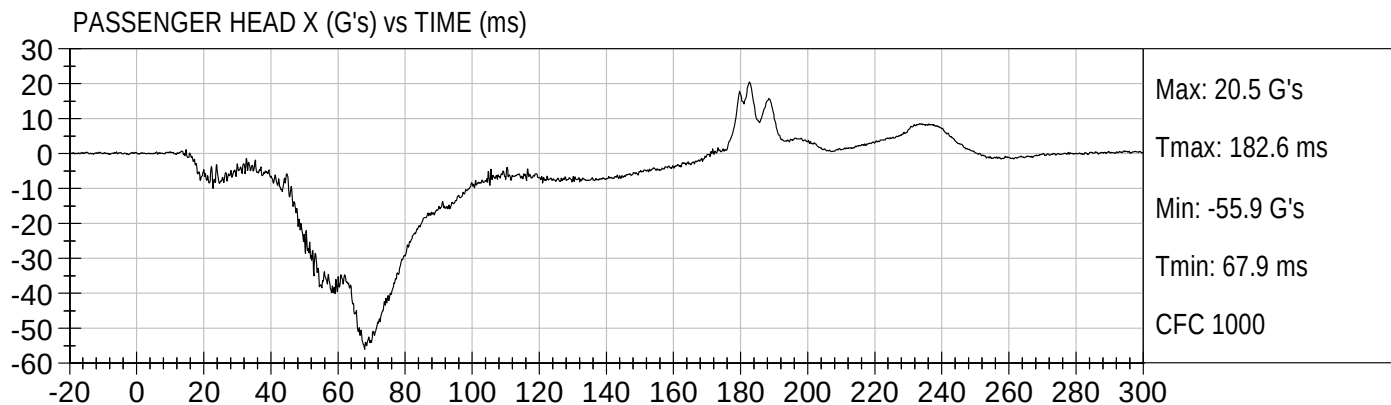
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CFC 600

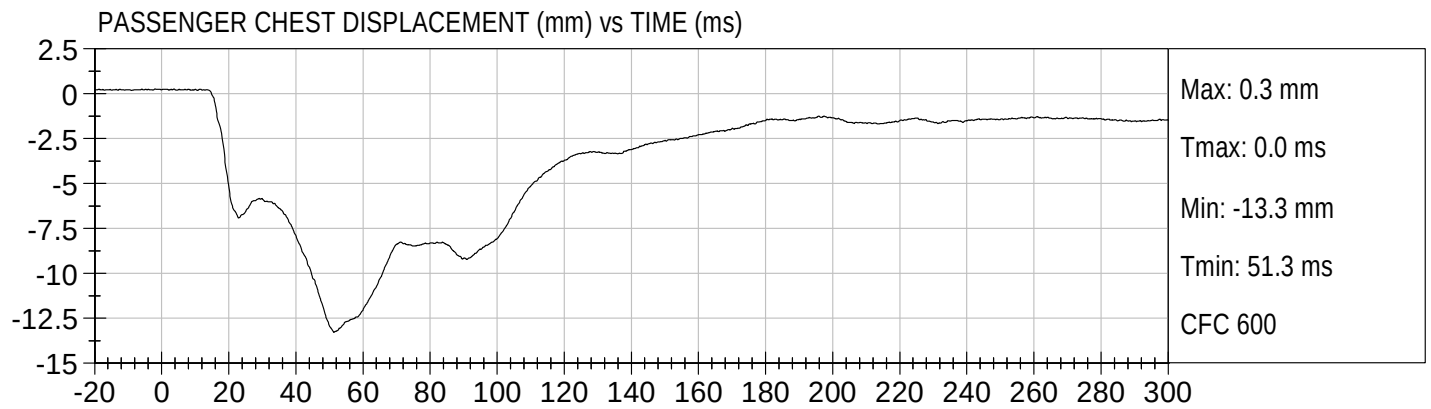
Drv. nij (NCE) () vs TIME (ms)



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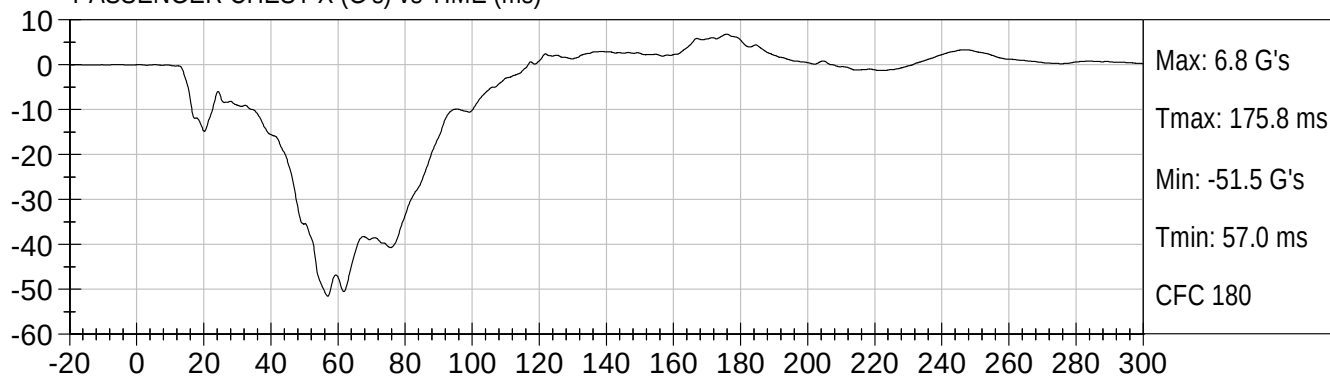




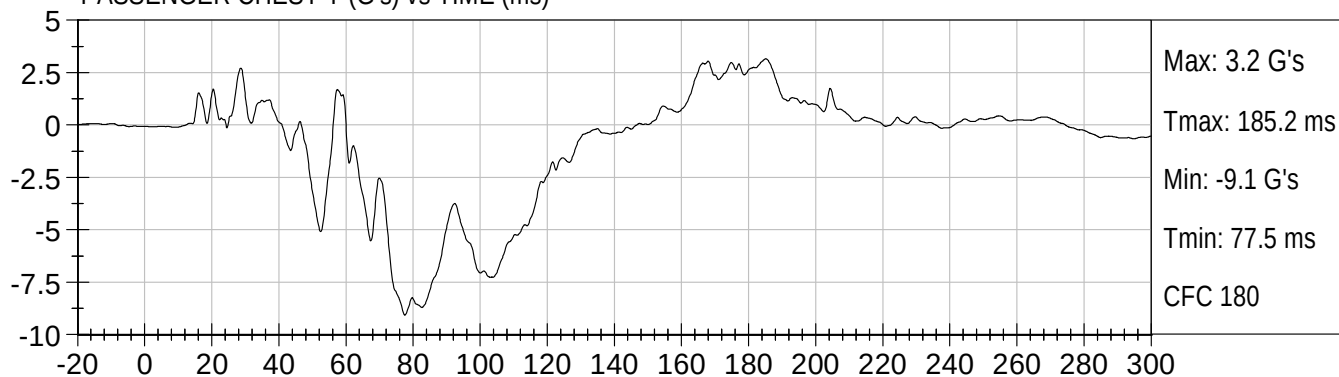




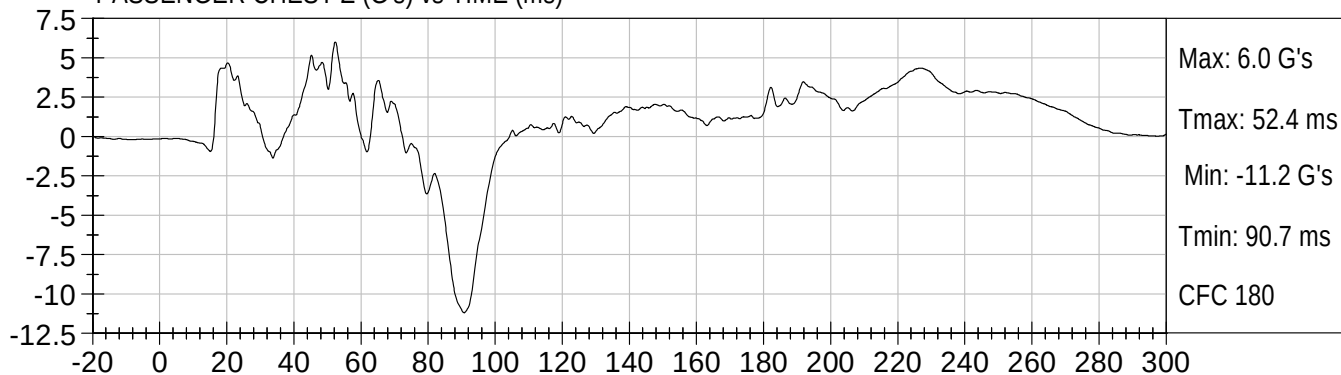
PASSENGER CHEST X (G's) vs TIME (ms)



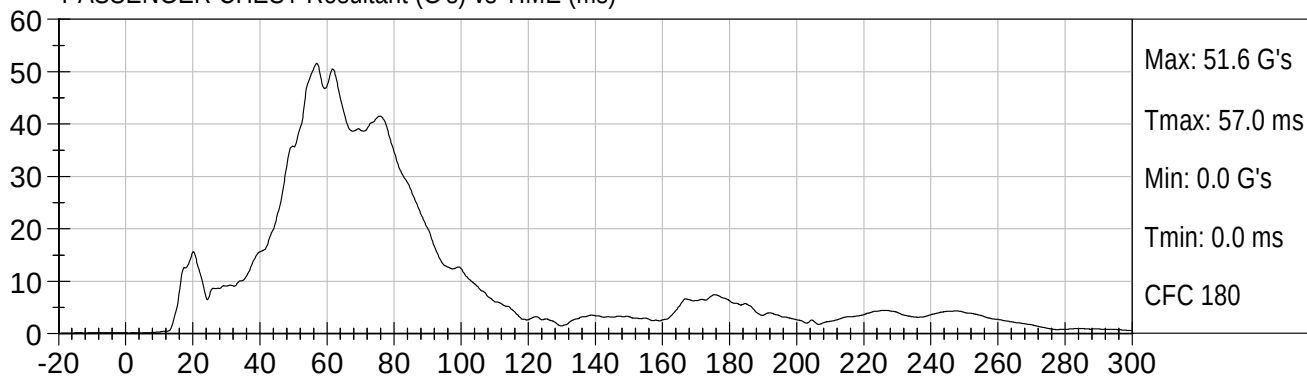
PASSENGER CHEST Y (G's) vs TIME (ms)



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

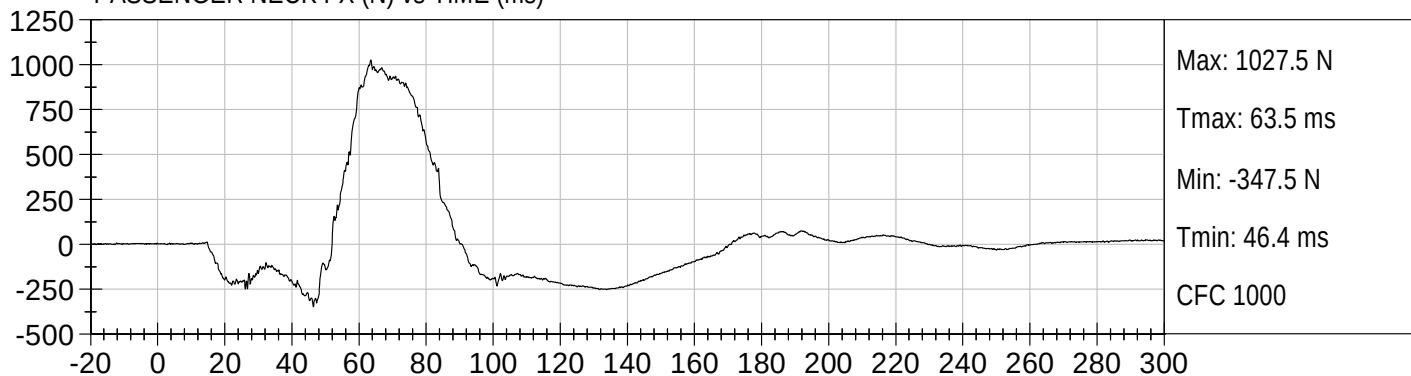


PASSENGER CHEST Resultant (G's) vs TIME (ms)

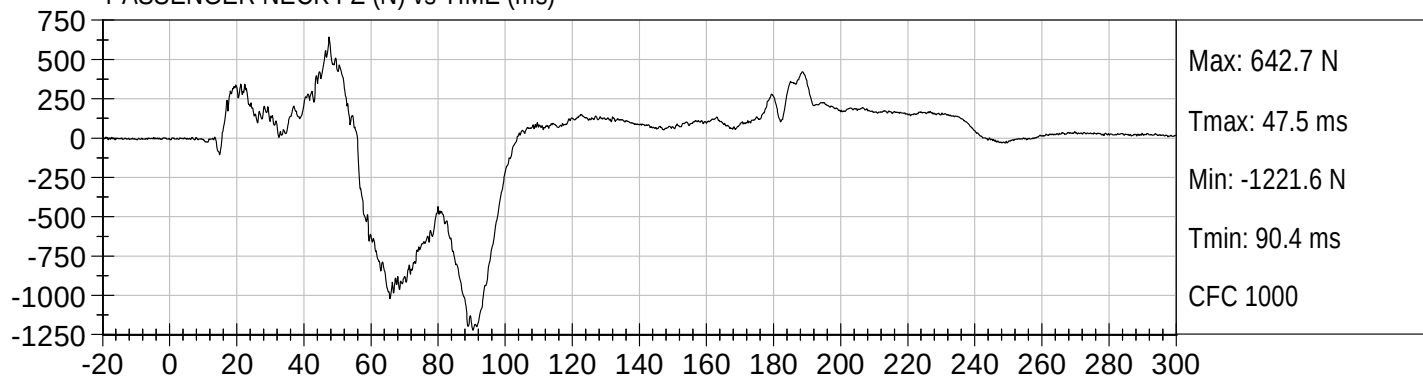




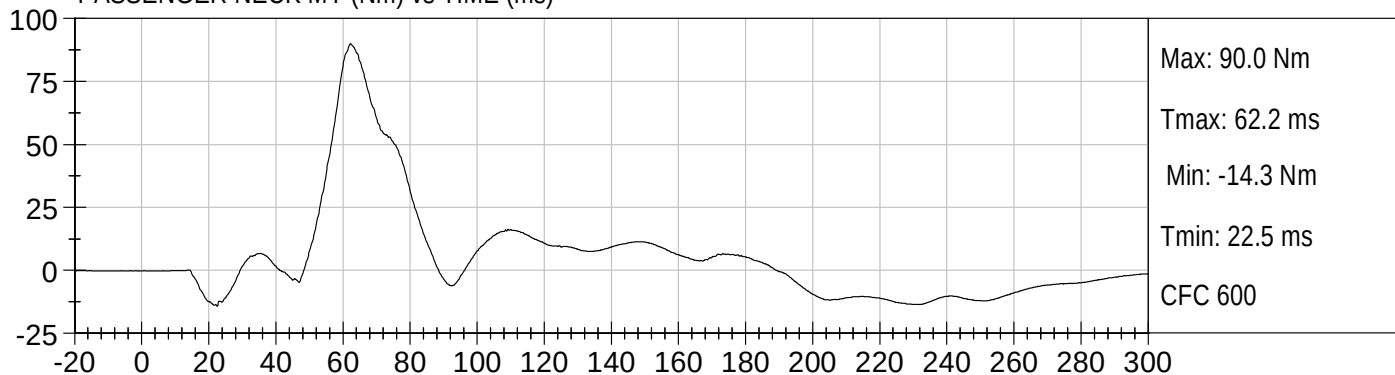
PASSENGER NECK FX (N) vs TIME (ms)

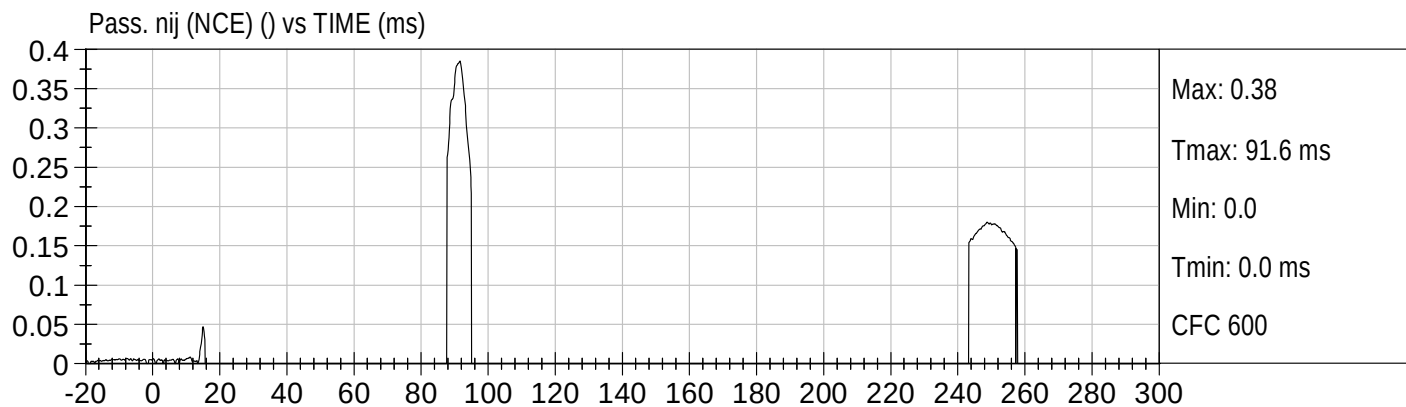
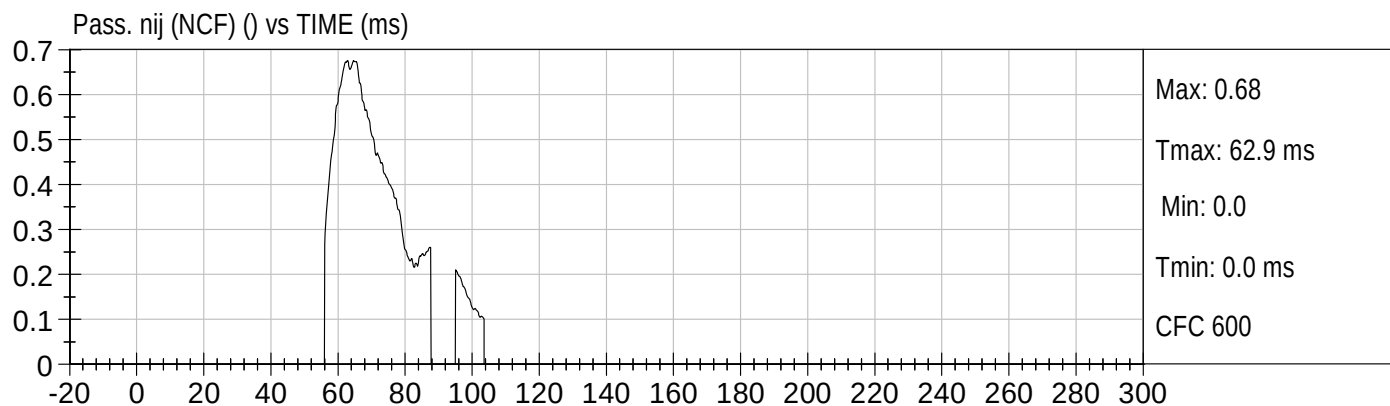
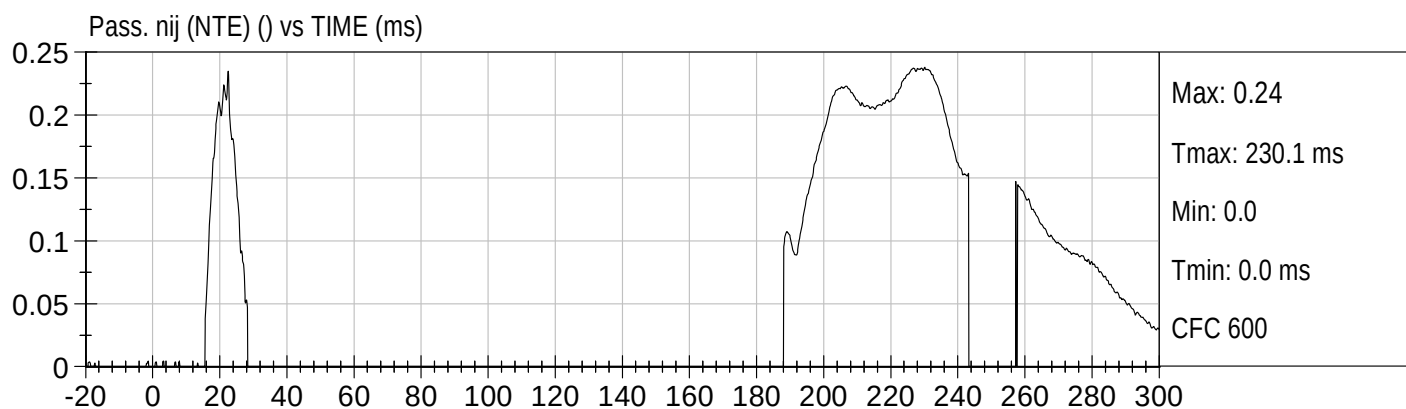
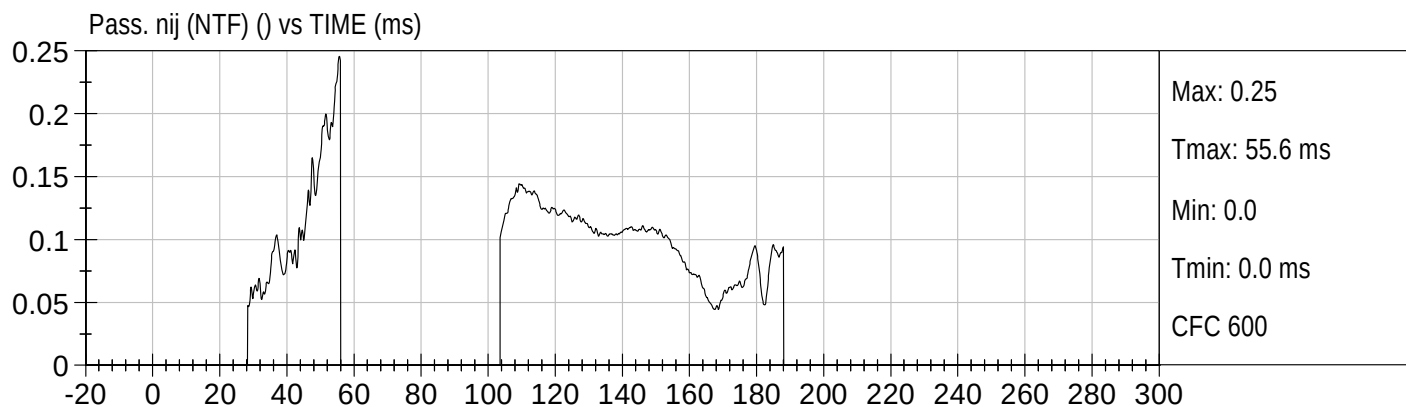


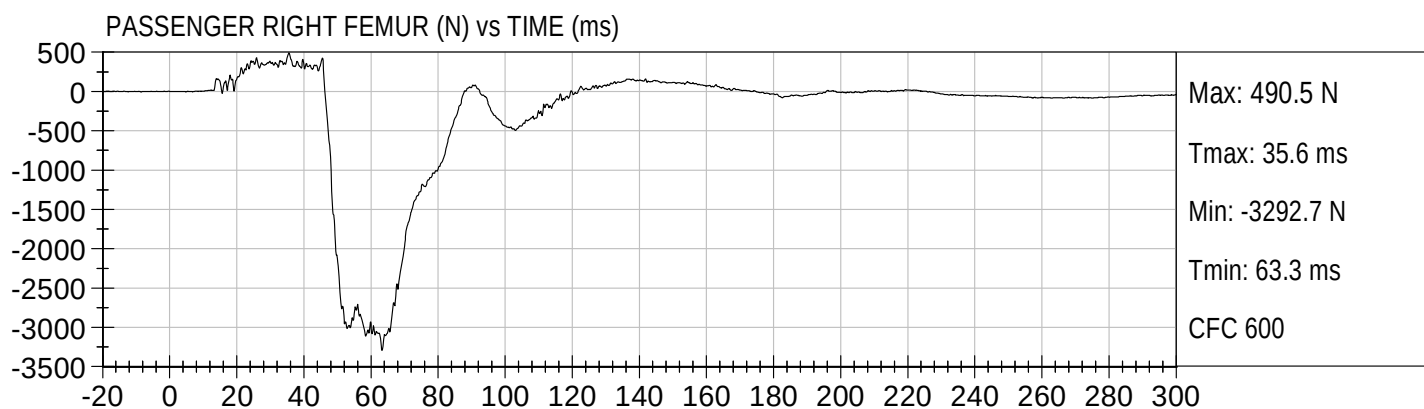
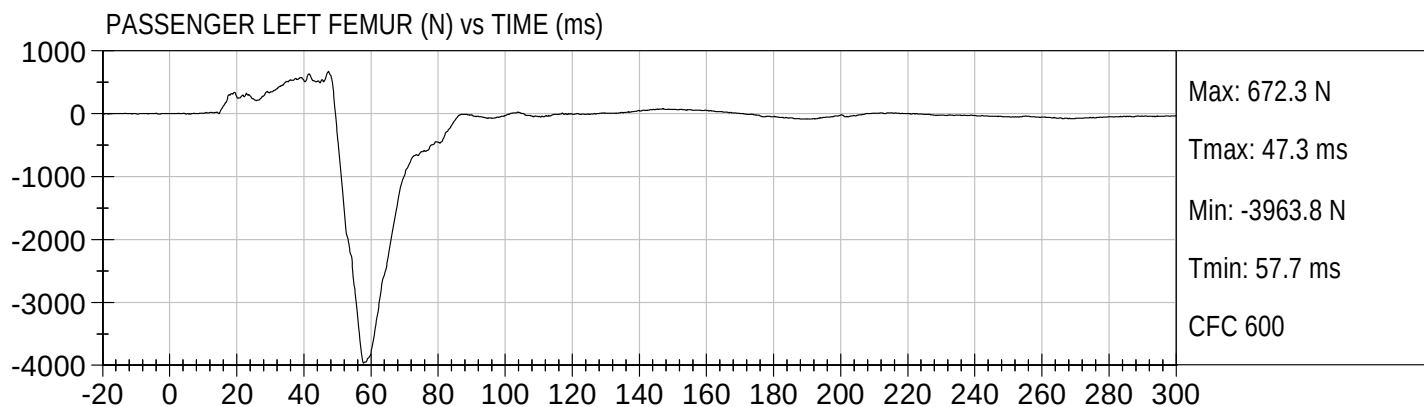
PASSENGER NECK FZ (N) vs TIME (ms)



PASSENGER NECK MY (Nm) vs TIME (ms)







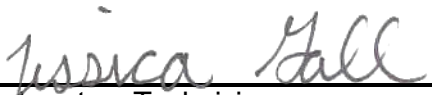
APPENDIX C
DUMMY CALIBRATION DATA

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

ATD Serial No: 036

Test ID: D104071

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	22.1	Pass
Laboratory Relative Humidity	%	10 to 70	25	Pass
Peak Resultant Acceleration	G's	225 - 275	249	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-12.6	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

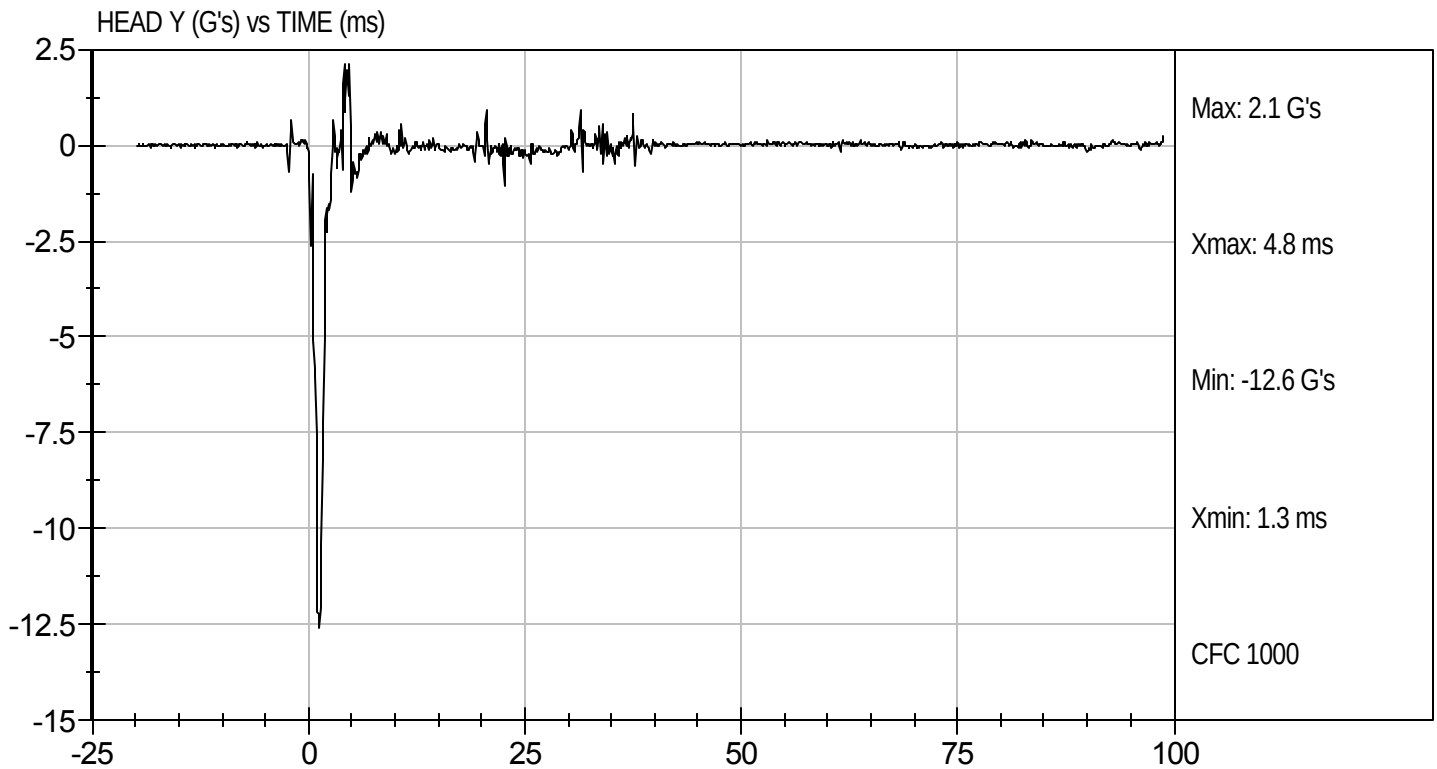
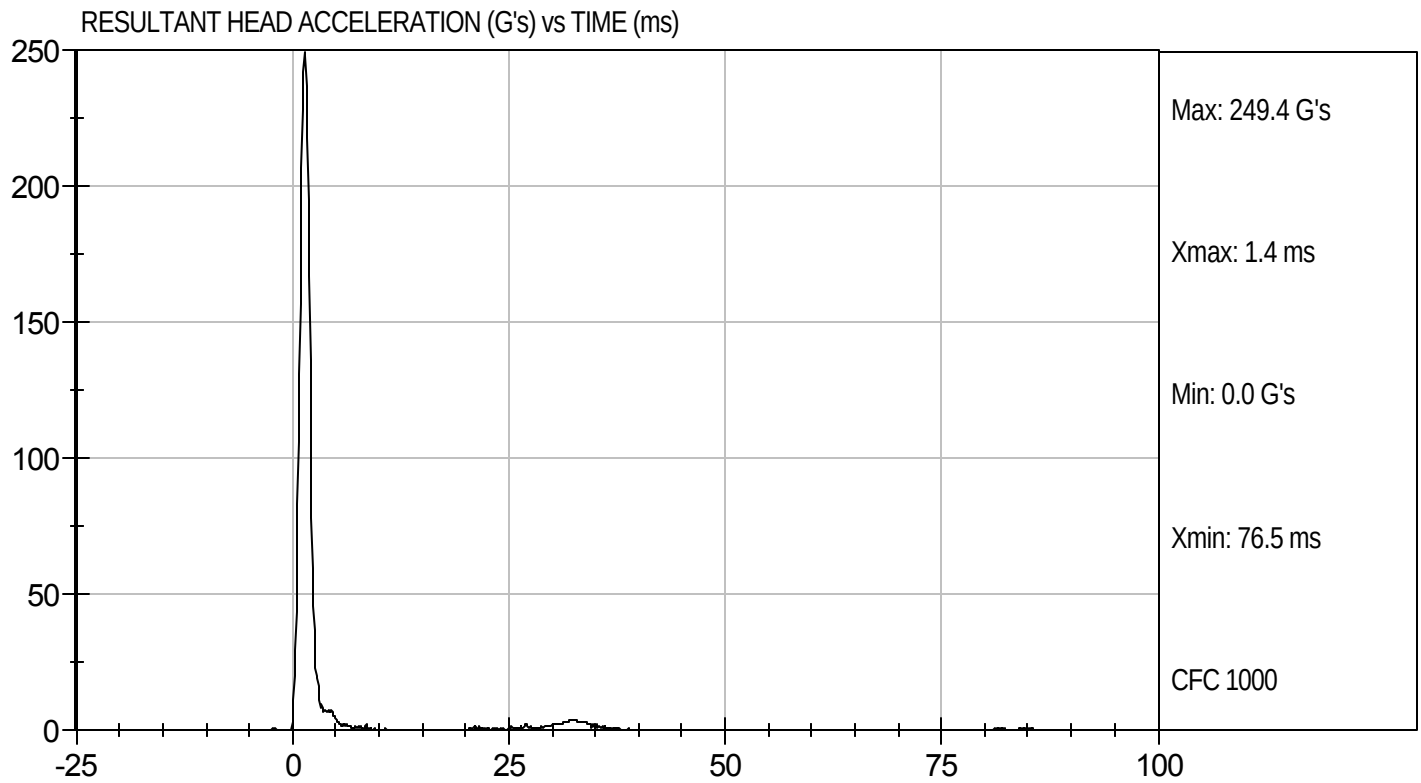
11/18/10
Test Date


Approved By



Test Desc: Head Drop
Component ID: D104071

Test Date: 11/18/10
Velocity: 0 ft/s, 0.00 m/s

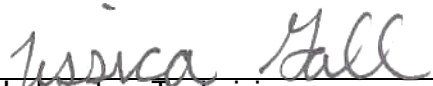


MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036

Test I.D: D104072

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	26	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	23.01	Pass
	20 ms	G's	17.60 to 22.60	20.41	Pass
	30 ms	G's	12.50 to 18.50	16.24	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	16.16	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	35.1	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	70.6	Pass
	Time	ms	57.0 to 64.0	58.0	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	118.0	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	90.5	Pass
	Time	ms	47.0 to 58.0	48.4	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	97.7	Pass
Overall Test Results					Pass


 Laboratory Technician

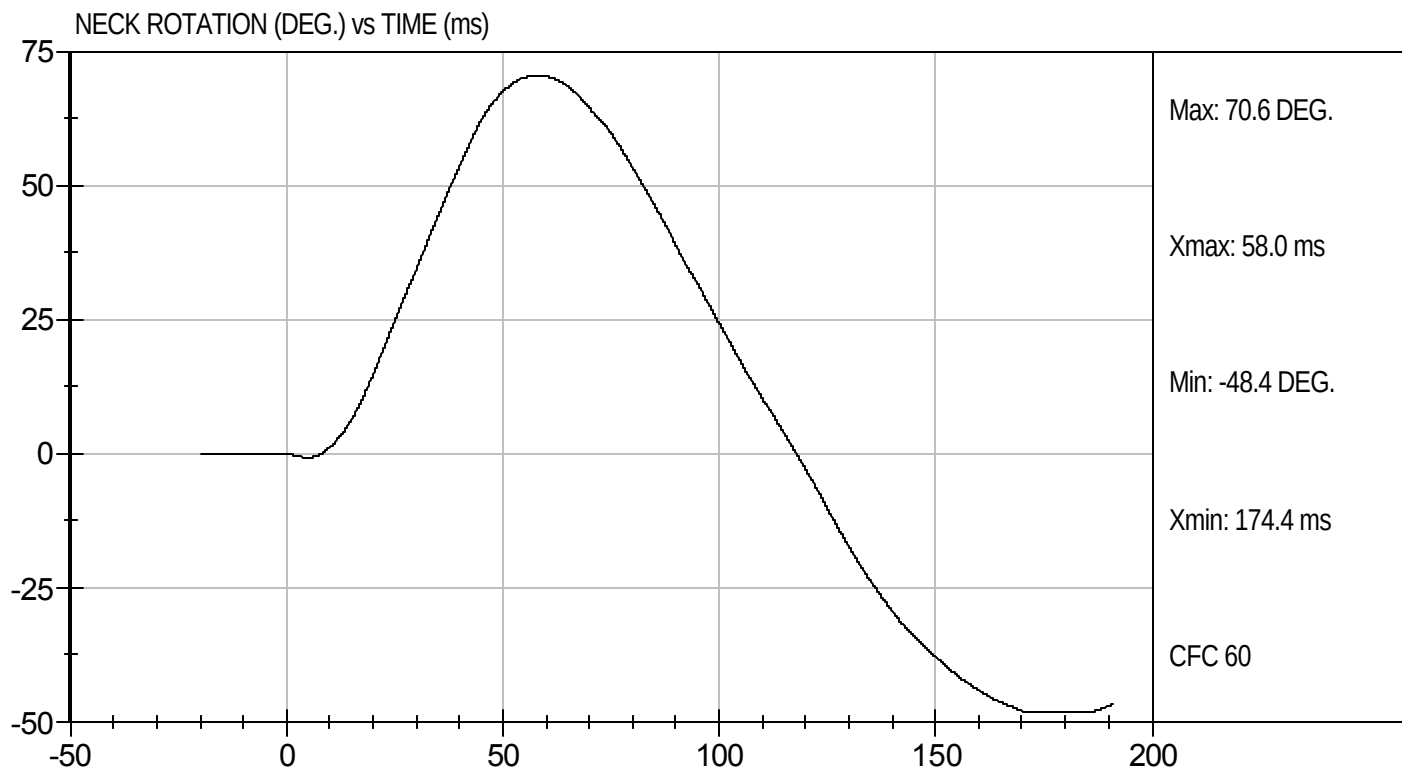
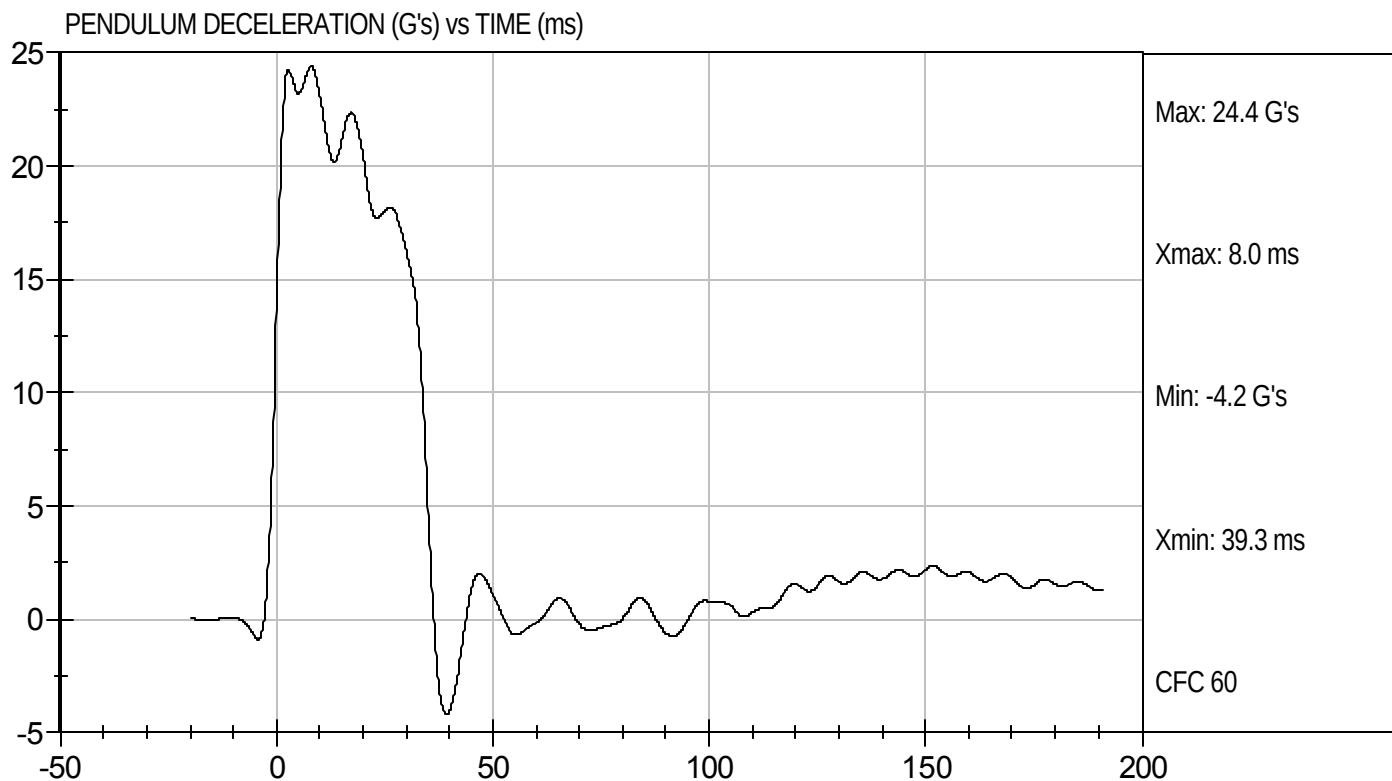
11/18/10
 Test Date


 Approved By



Test Desc: Neck Flexion
Component ID: D104072

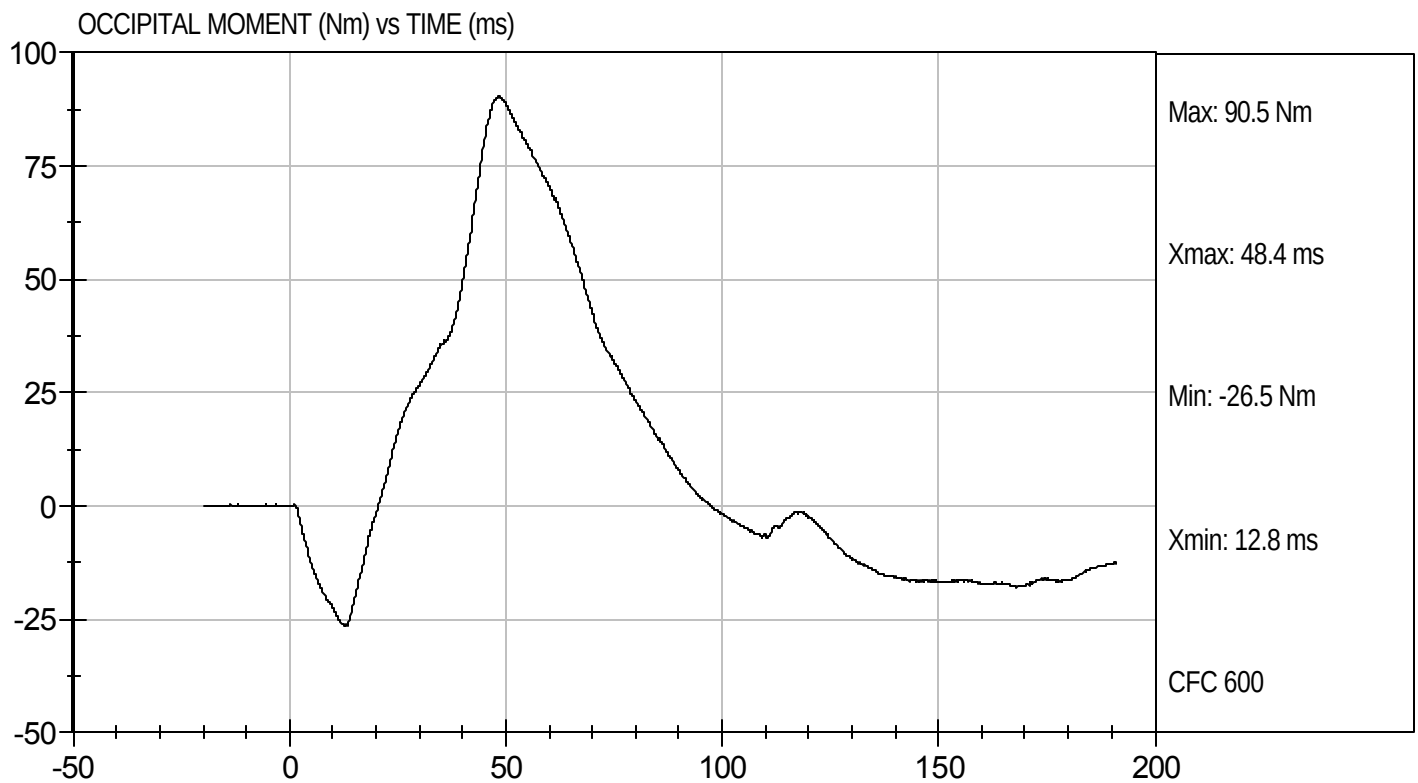
Test Date: 11/18/10
Velocity: 23.15 ft/s, 7.06 m/s





Test Desc: Neck Flexion
Component ID: D104072

Test Date: 11/18/10
Velocity: 23.15 ft/s, 7.06 m/s

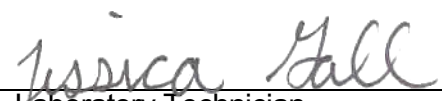


MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036

Test I.D.: D104073

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	26	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.16	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	18.76	Pass
	20 ms	G's	14.00 to 19.00	16.10	Pass
	30 ms	G's	11.00 to 16.00	13.82	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	13.8	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	38.4	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	97.9	Pass
	Time	ms	72.0 to 82.0	75.0	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	156.5	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-65.9	Pass
	Time	ms	65.0 to 79.0	69.4	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	140.7	Pass
Overall Test Results					Pass


Laboratory Technician

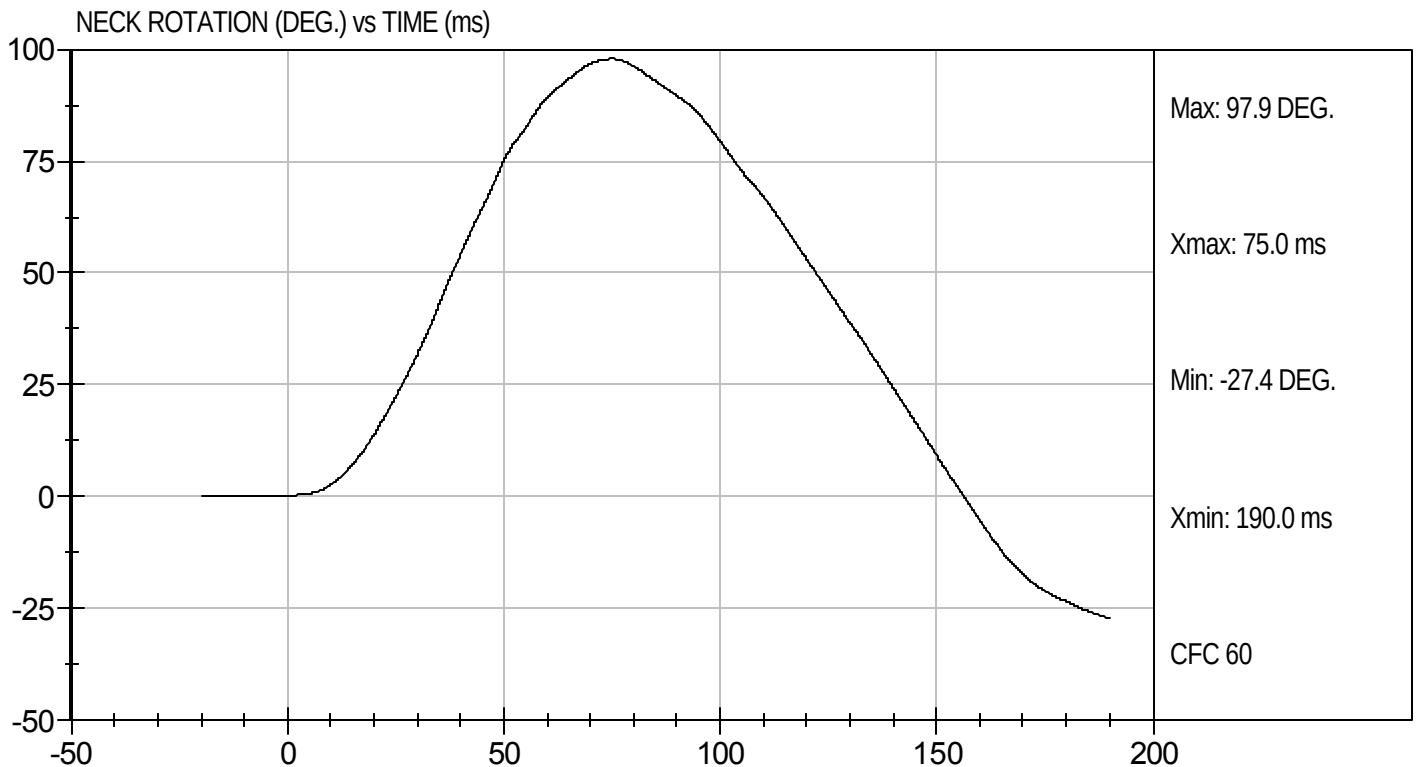
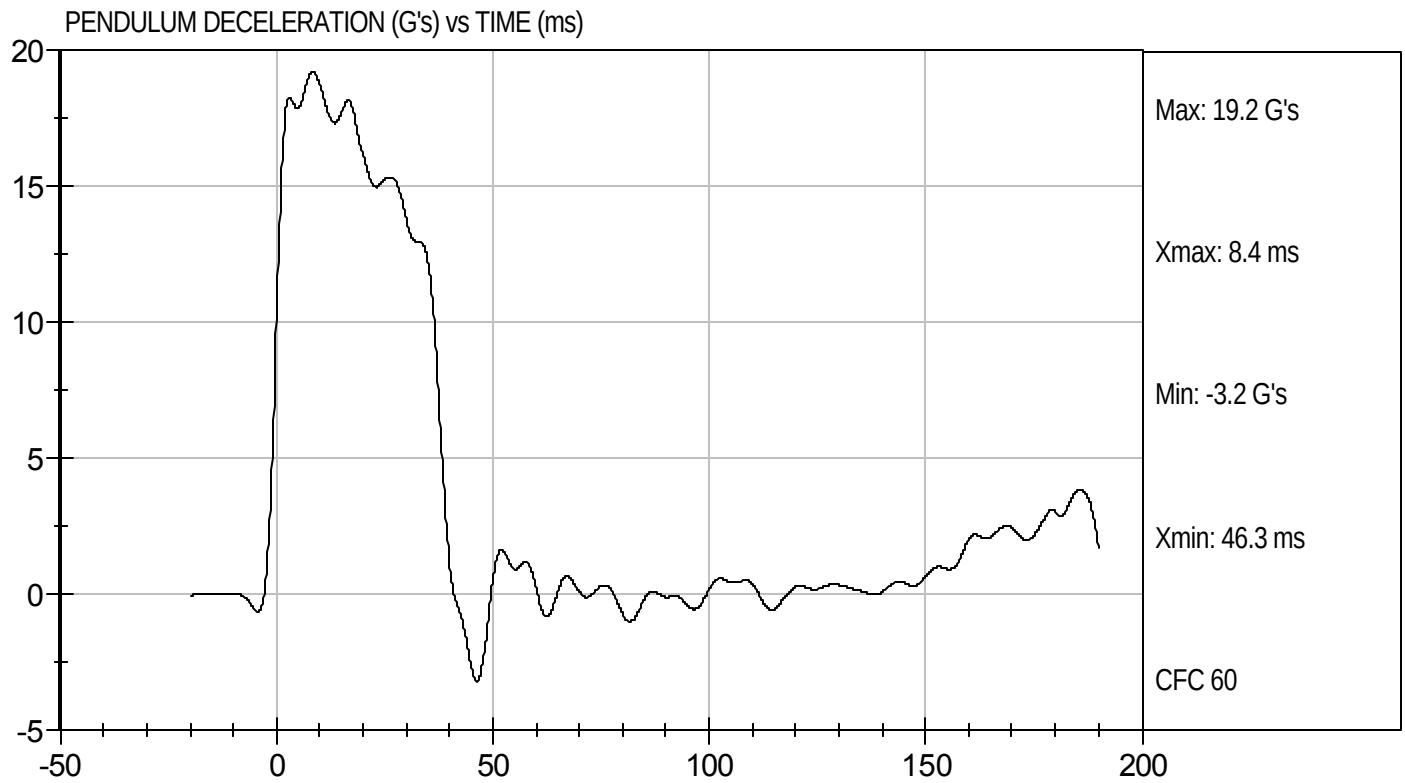
11/18/10
Test Date


Approved By



Test Desc: Neck Extension
Component ID: D104073

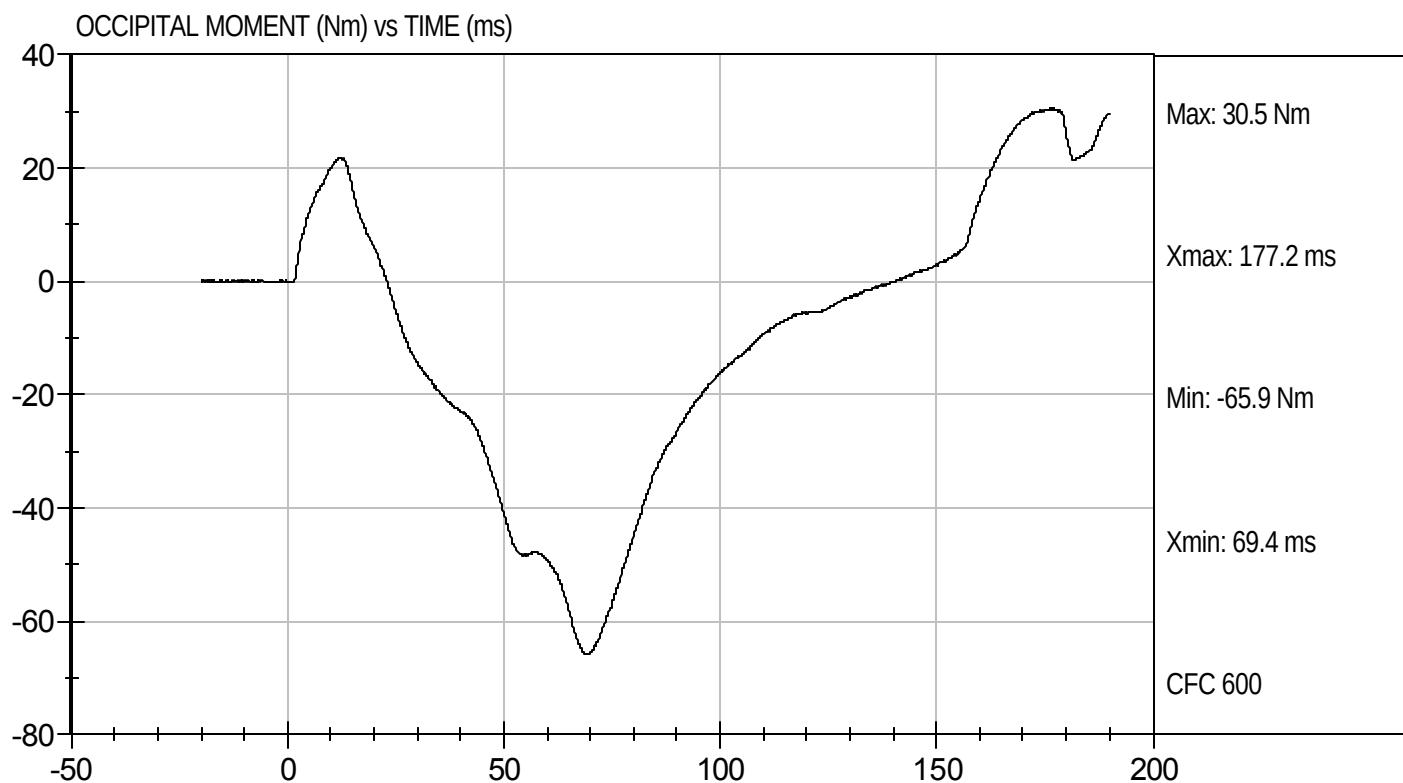
Test Date: 11/18/10
Velocity: 20.20 ft/s, 6.16 m/s





Test Desc: Neck Extension
Component ID: D104073

Test Date: 11/18/10
Velocity: 20.20 ft/s, 6.16 m/s

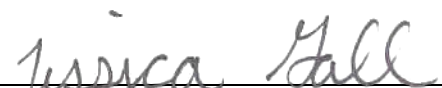


MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036

Test I.D: D104074

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	25	Pass
Probe Velocity	m/s	6.58 to 6.82	6.60	Pass
Peak Probe Force	N	5159 to 5893	5,475	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.36	Pass
Internal Hysteresis	%	69 to 85	73	Pass
			Overall Test Results	Pass


Laboratory Technician

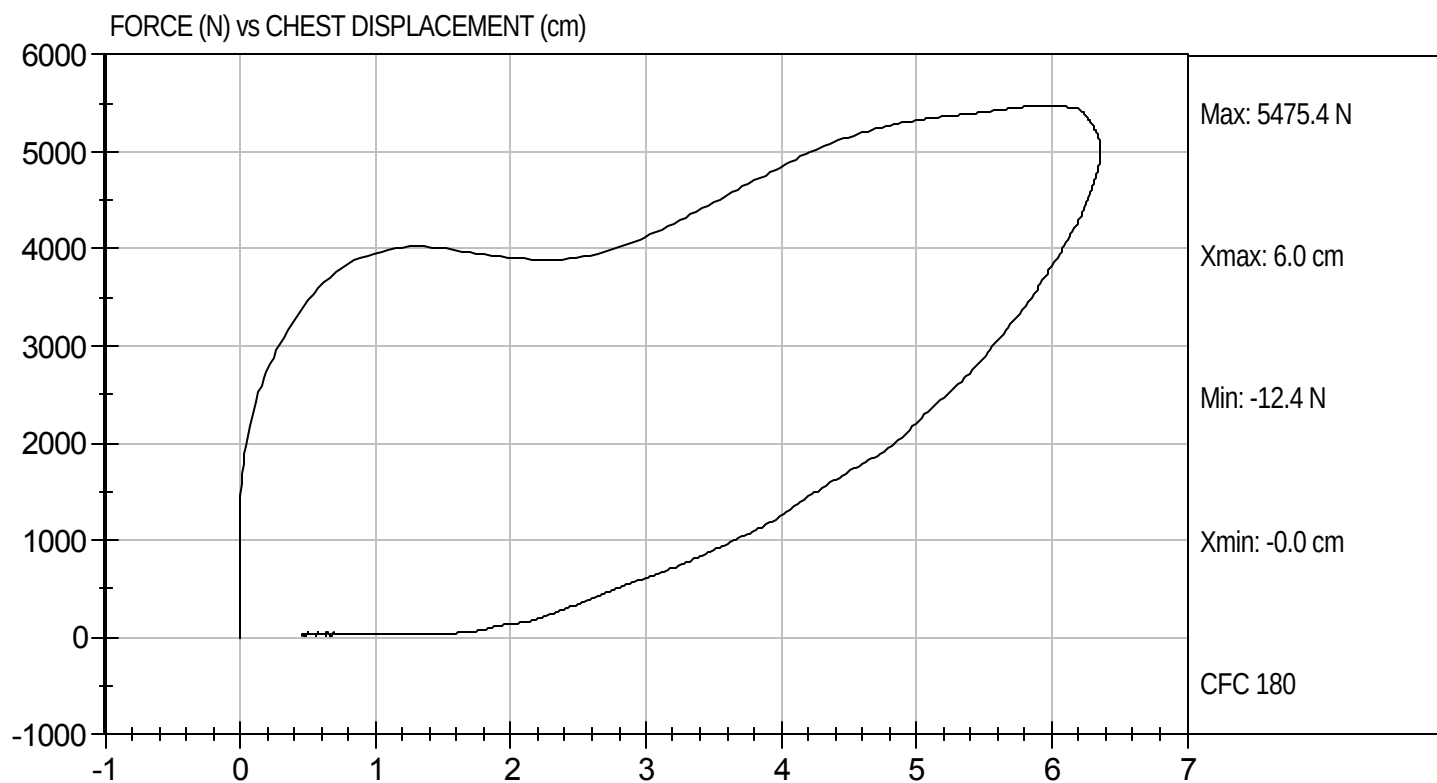
11/19/10
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D104074

Test Date: 11/19/10
Velocity: 21.65 ft/s, 6.60 m/s

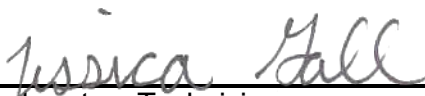


MGA RESEARCH CORPORATION
RIGHT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036

Test I.D: D104075

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	26	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	Newtons	4715 to 5782	4,731	Pass
Overall Test Results				Pass


Laboratory Technician

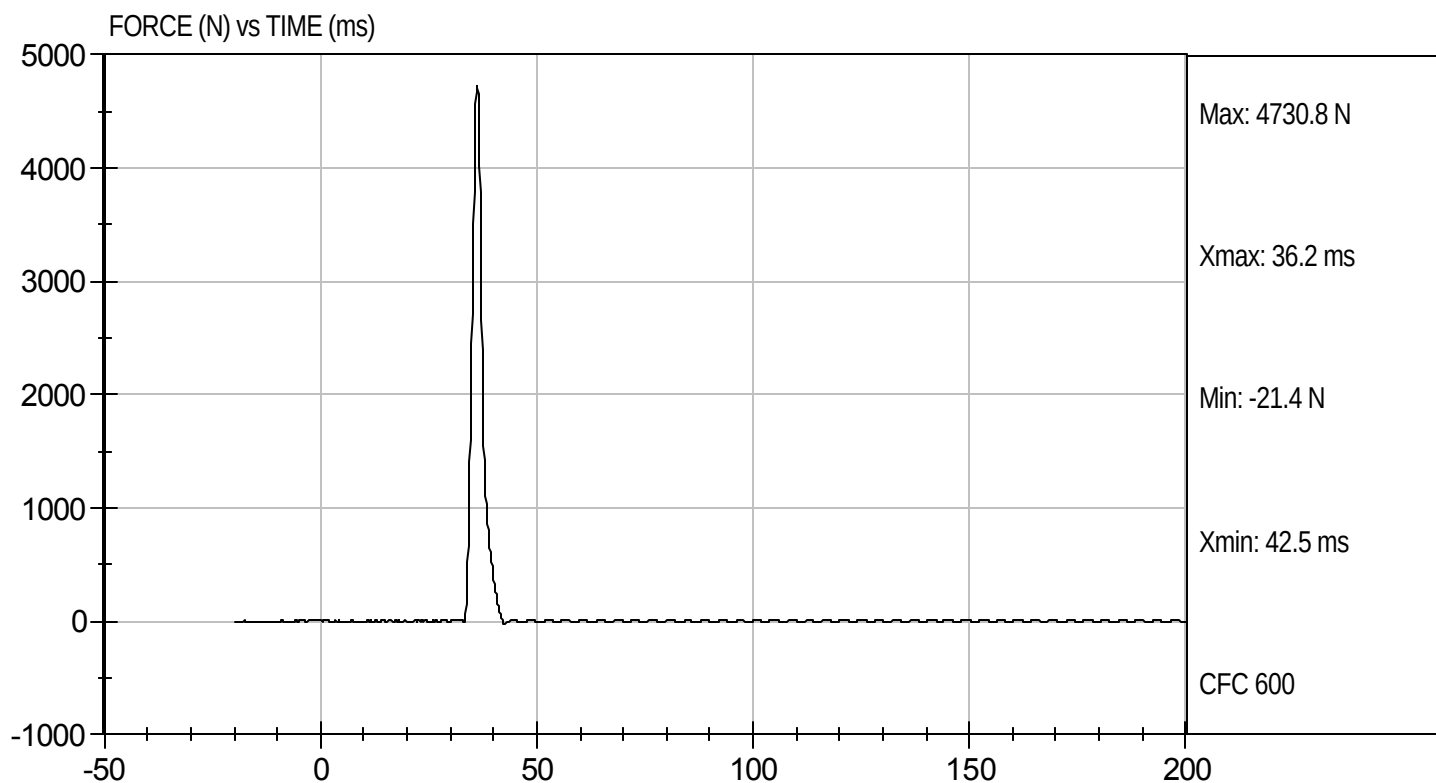
11/18/10
Test Date


Approved By



Test Desc: Right Knee
Component ID: D104075

Test Date: 11/18/10
Velocity: 6.97 ft/s, 2.12 m/s



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

ATD Serial No: 036

Test I.D: D104076

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	26	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	Newtons	4715 to 5782	5,085	Pass
Overall Test Results				Pass

Jessica Gall
Laboratory Technician

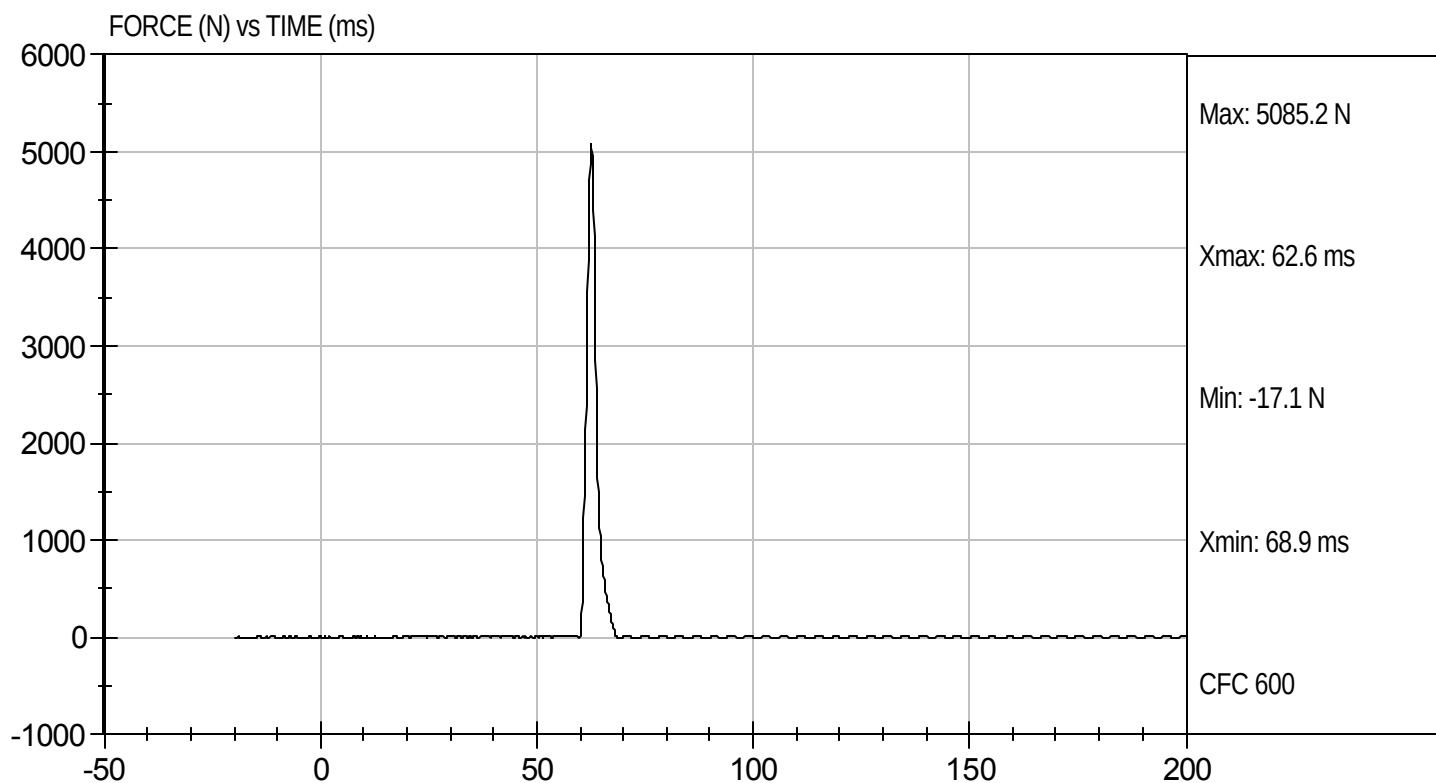
11/18/10
Test Date

David Winkelbauer
Approved By



Test Desc: Left Knee
Component ID: D104076

Test Date: 11/18/10
Velocity: 6.97 ft/s, 2.12 m/s



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

ATD Serial No: 036

Test I.D: D104070

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.1	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	24	24	Pass
Rotation Rate	deg/s	5 -10	8	8	Pass
30 Degrees	Nm	94.9 Nm Max	61.2	62.3	Pass
150 ft-lbf / 203.4 Nm	Deg	40- 50 Degree Max Rotation	48	46	Pass
Overall Test Results					Pass

Jessica Hall
Laboratory Technician

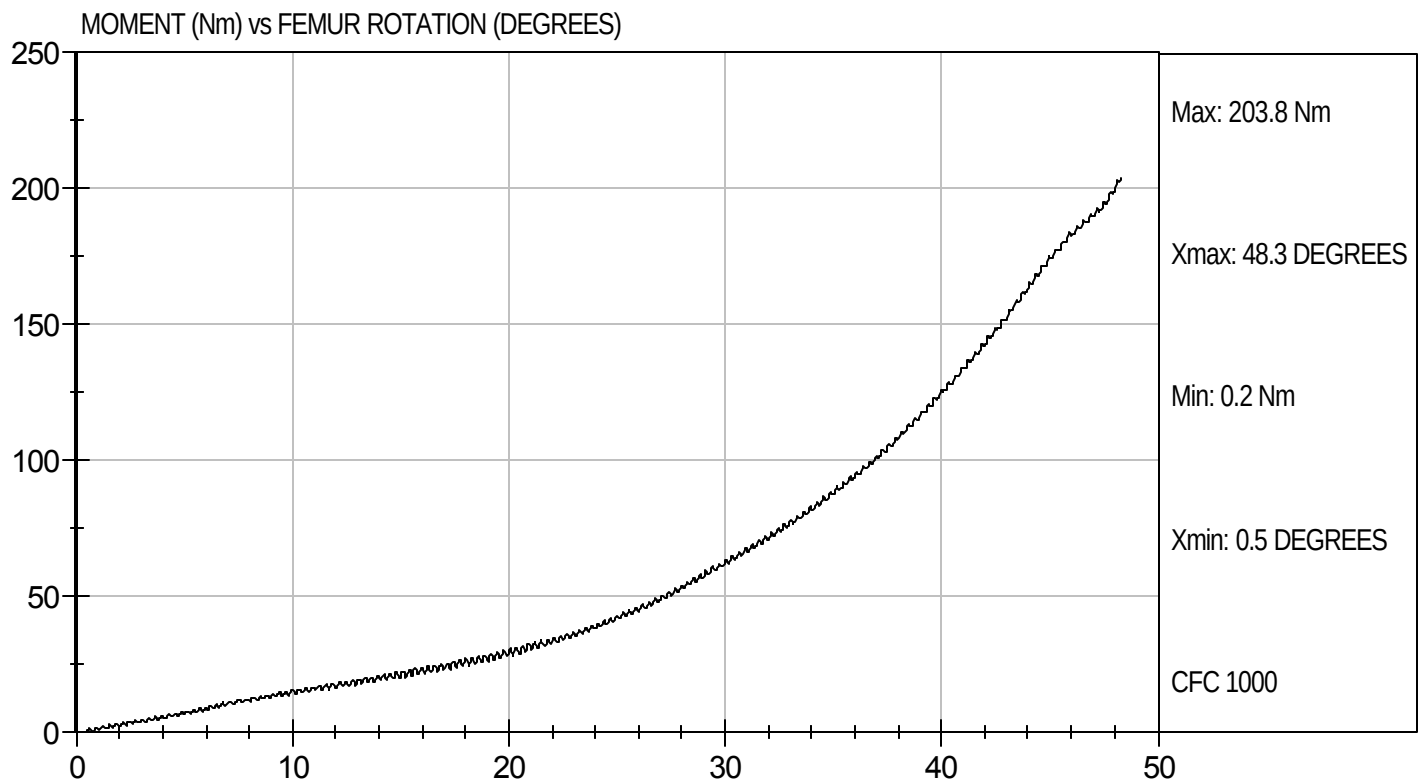
11/19/10
Test Date

David Winkelbauer
Approved By



Test Desc: Hip Femur Flexion
Component ID: D104079

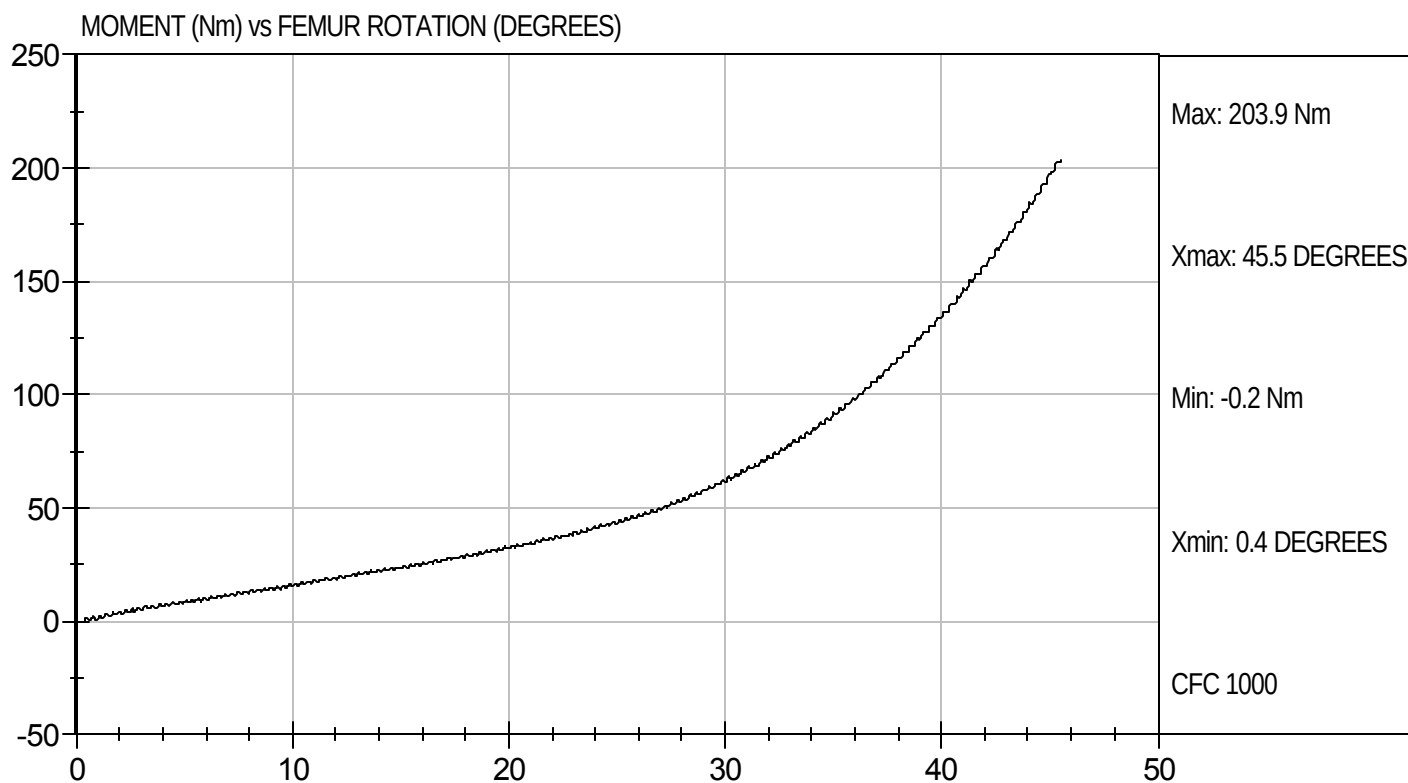
Test Date: 11/19/10
Velocity: 0 ft/s, 0.00 m/s





Test Desc: Hip Femur Flexion
Component ID: D104070

Test Date: 11/19/10
Velocity: 0 ft/s, 0.00 m/s

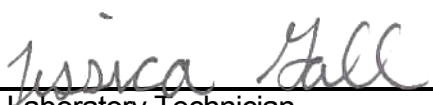


MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036

Test ID: D104291

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	15	Pass
Peak Resultant Acceleration	G's	225 - 275	240	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-3.8	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass



Laboratory Technician

12/6/10
Test Date

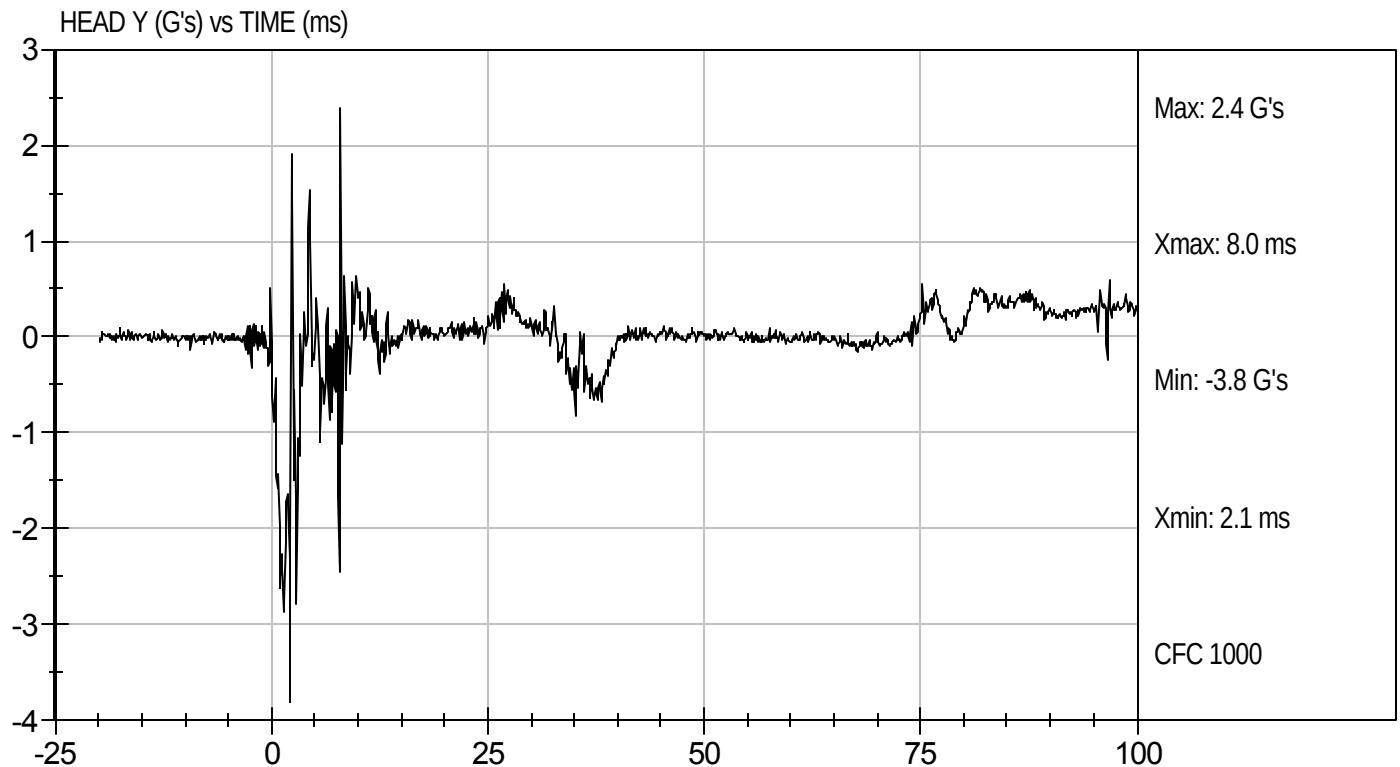
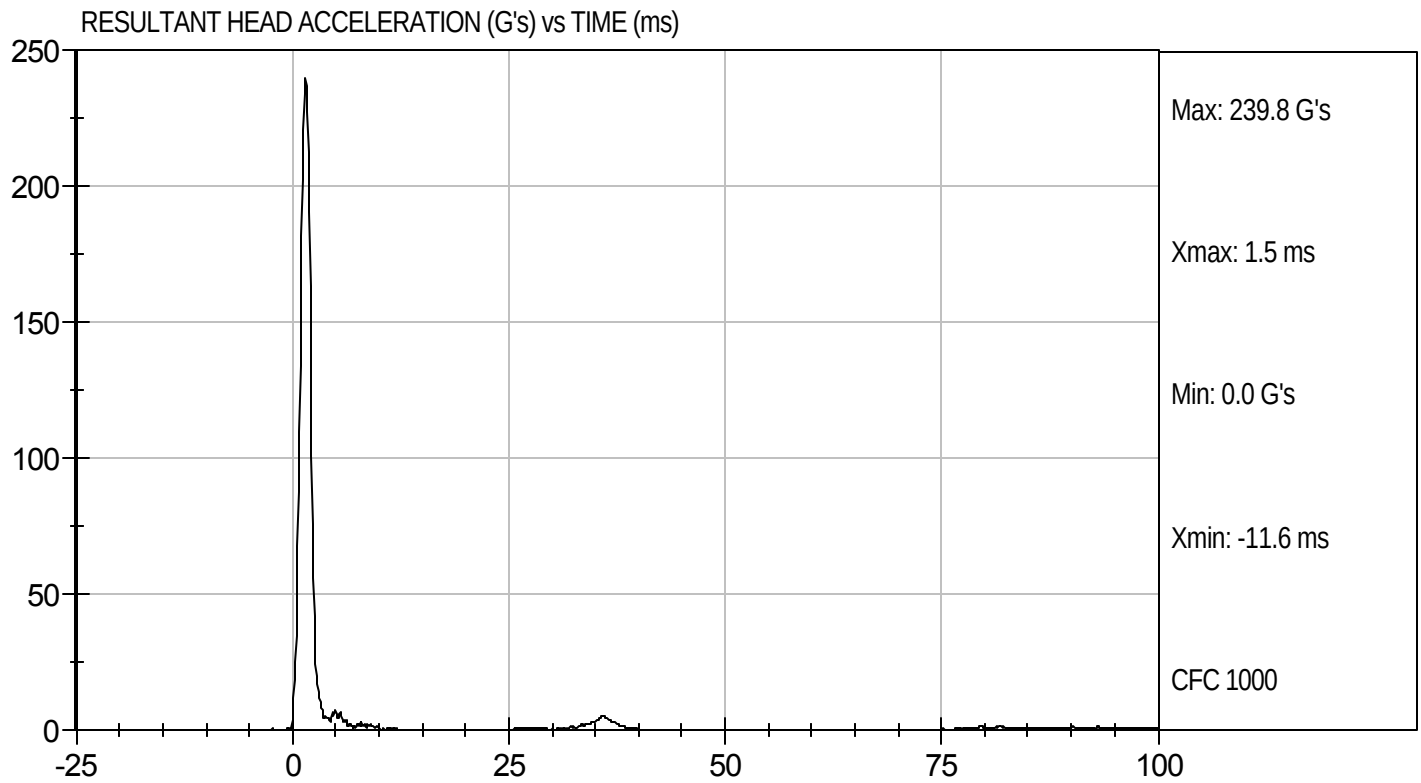


Approved By



Test Desc: Head Drop
Component ID: D104291

Test Date: 12/6/10
Velocity: 0 ft/s, 0.00 m/s

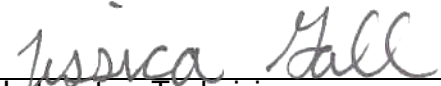


MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036

Test I.D.: D104292

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.9	Pass
Laboratory Relative Humidity		%	10 to 70	12	Pass
Pendulum Velocity		m/s	6.89 to 7.13	6.95	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	22.50	Pass
	20 ms	G's	17.60 to 22.60	21.26	Pass
	30 ms	G's	12.50 to 18.50	15.57	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	15.4	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	34.2	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	71.3	Pass
	Time	ms	57.0 to 64.0	58.9	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	115.7	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	97.2	Pass
	Time	ms	47.0 to 58.0	47.8	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	98.5	Pass
Overall Test Results					Pass


 Laboratory Technician

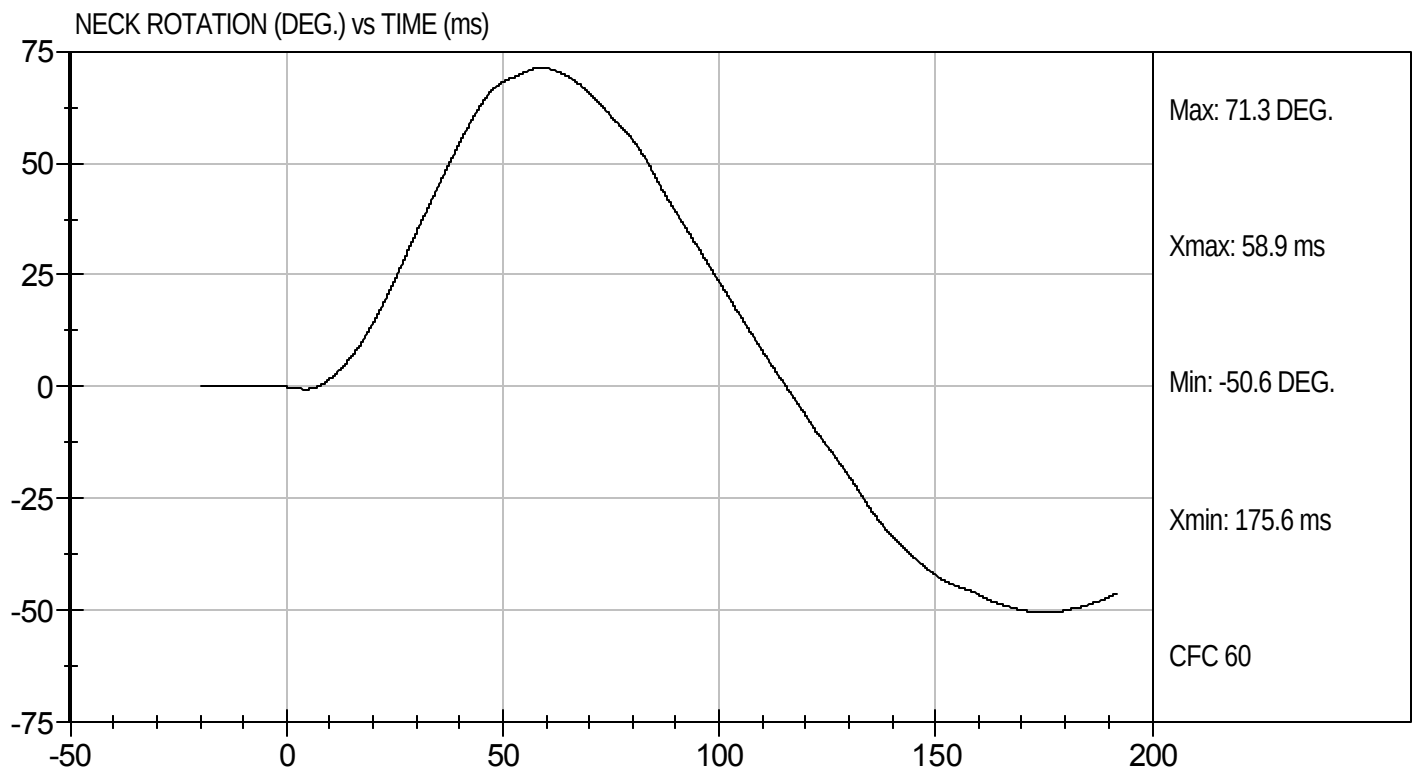
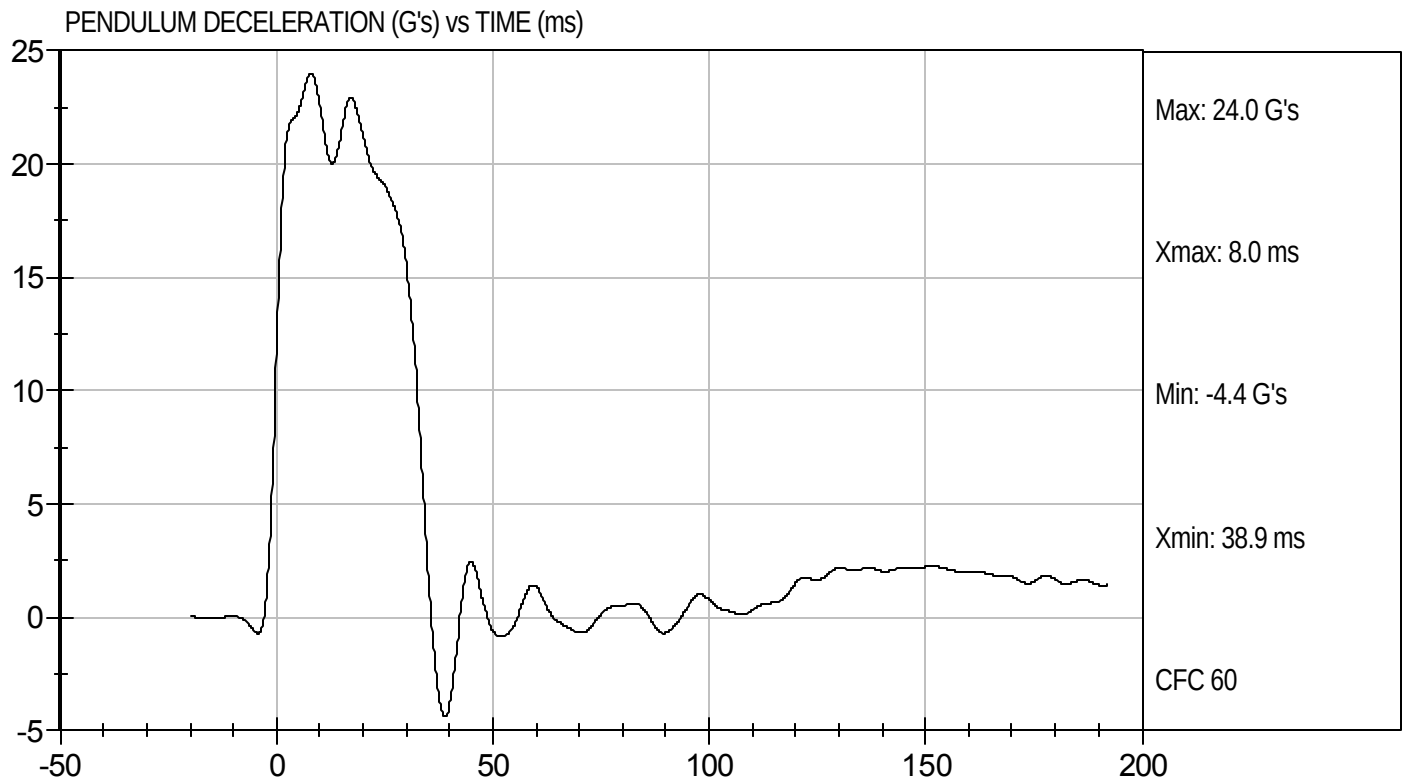
12/7/10
 Test Date


 Approved By



Test Desc: Neck Flexion
Component ID: D104292

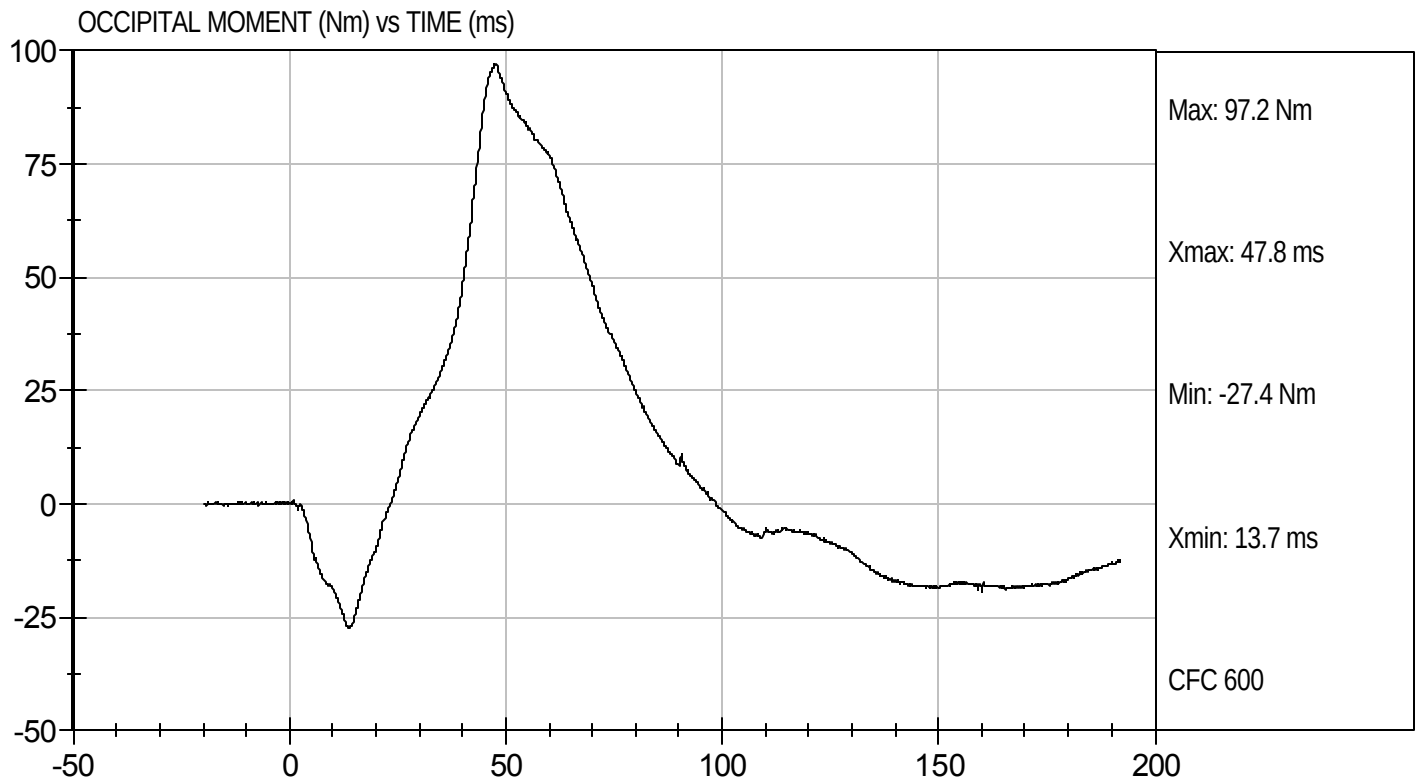
Test Date: 12/7/10
Velocity: 22.8 ft/s, 6.95 m/s





Test Desc: Neck Flexion
Component ID: D104292

Test Date: 12/7/10
Velocity: 22.8 ft/s, 6.95 m/s



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

ATD Serial No: 036

Test I.D.: D104293

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.9	Pass
Laboratory Relative Humidity		%	10 to 70	12	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.10	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	17.84	Pass
	20 ms	G's	14.00 to 19.00	16.64	Pass
	30 ms	G's	11.00 to 16.00	12.95	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	12.9	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	38.0	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	94.5	Pass
	Time	ms	72.0 to 82.0	75.1	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	156.1	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-68.2	Pass
	Time	ms	65.0 to 79.0	70.1	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	142.2	Pass
Overall Test Results					Pass


 Laboratory Technician

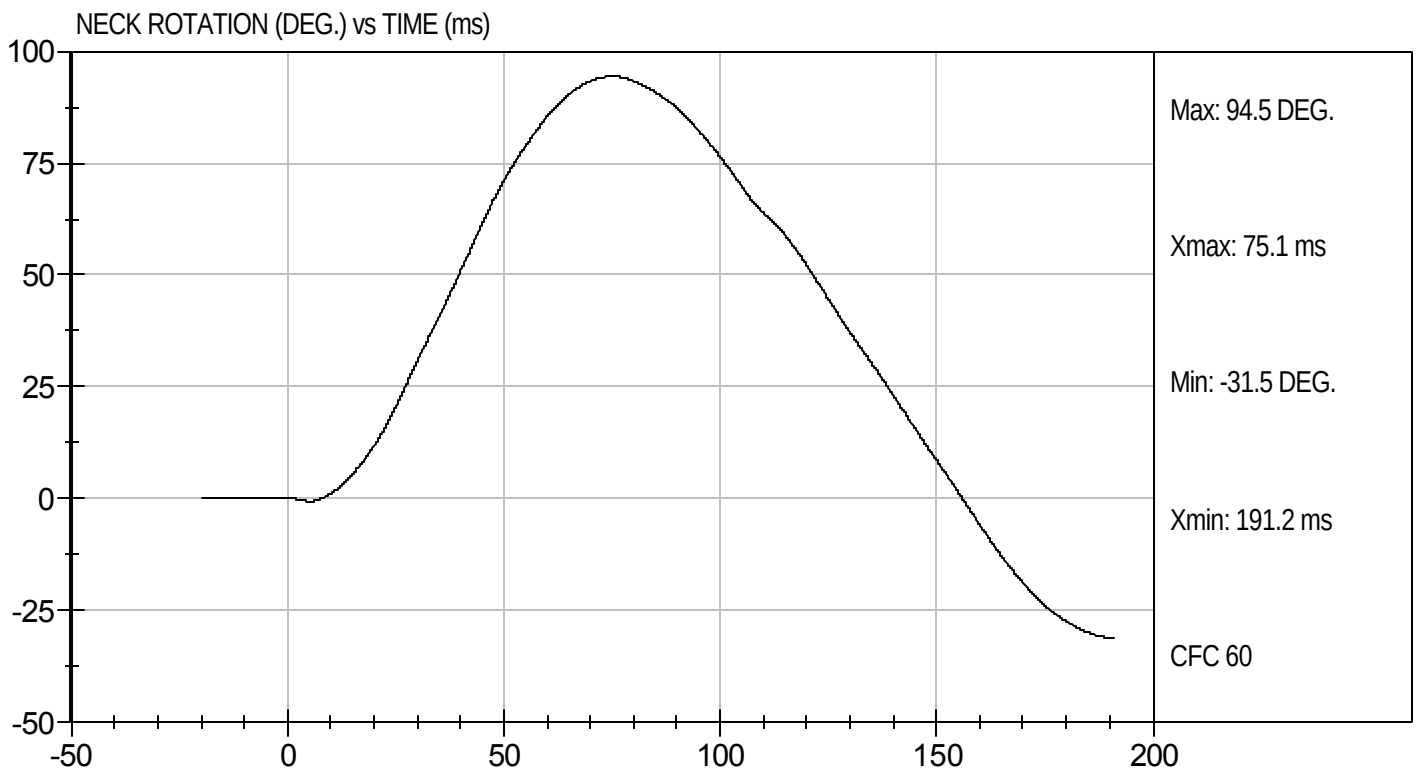
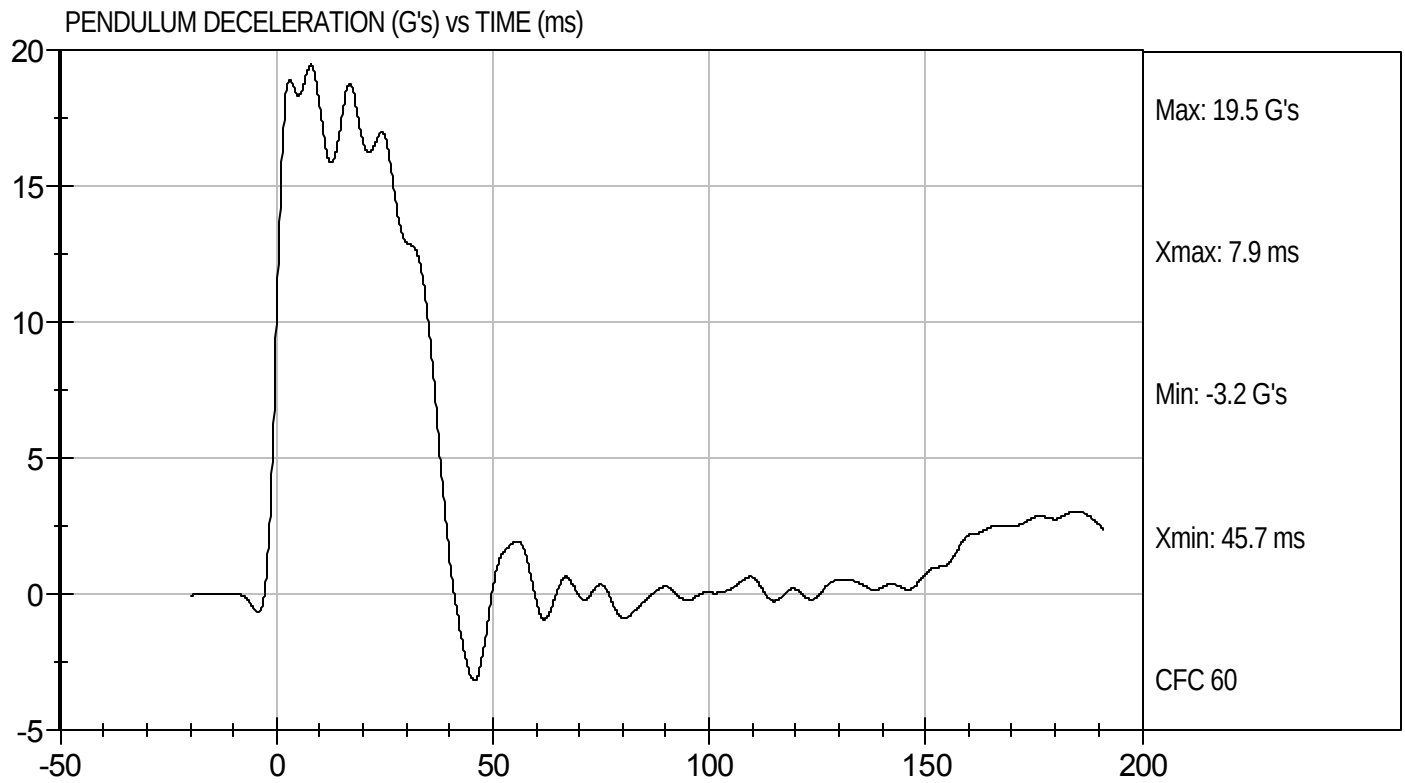
12/7/10
 Test Date


 Approved By



Test Desc: Neck Extension
Component ID: D104293

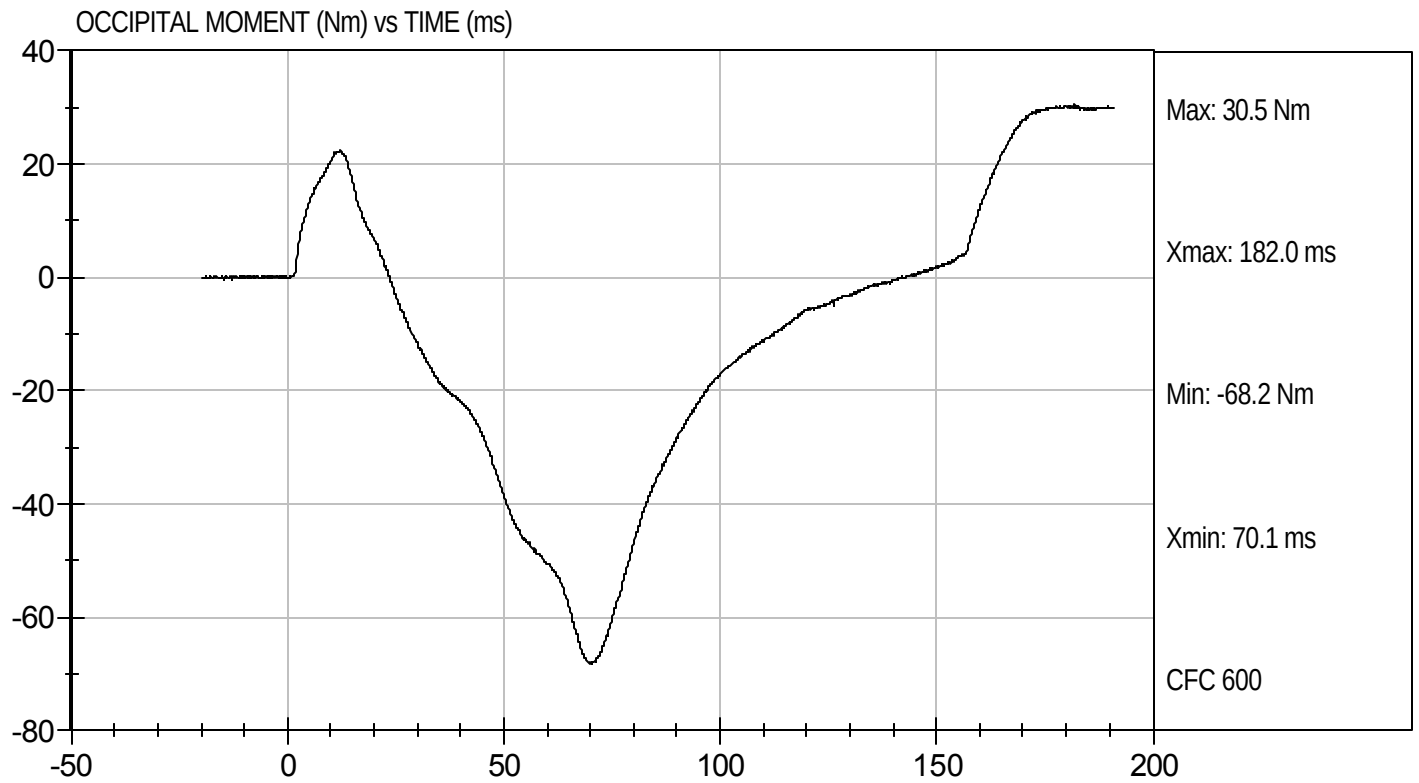
Test Date: 12/7/10
Velocity: 20.0 ft/s, 6.10 m/s





Test Desc: Neck Extension
Component ID: D104293

Test Date: 12/7/10
Velocity: 20.0 ft/s, 6.10 m/s

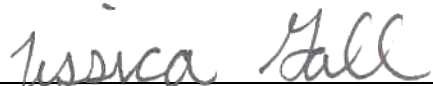


MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036

Test I.D: D104294

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	15	Pass
Probe Velocity	m/s	6.58 to 6.82	6.68	Pass
Peak Probe Force	N	5159 to 5893	5,423	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.62	Pass
Internal Hysteresis	%	69 to 85	72	Pass
			Overall Test Results	Pass


Laboratory Technician

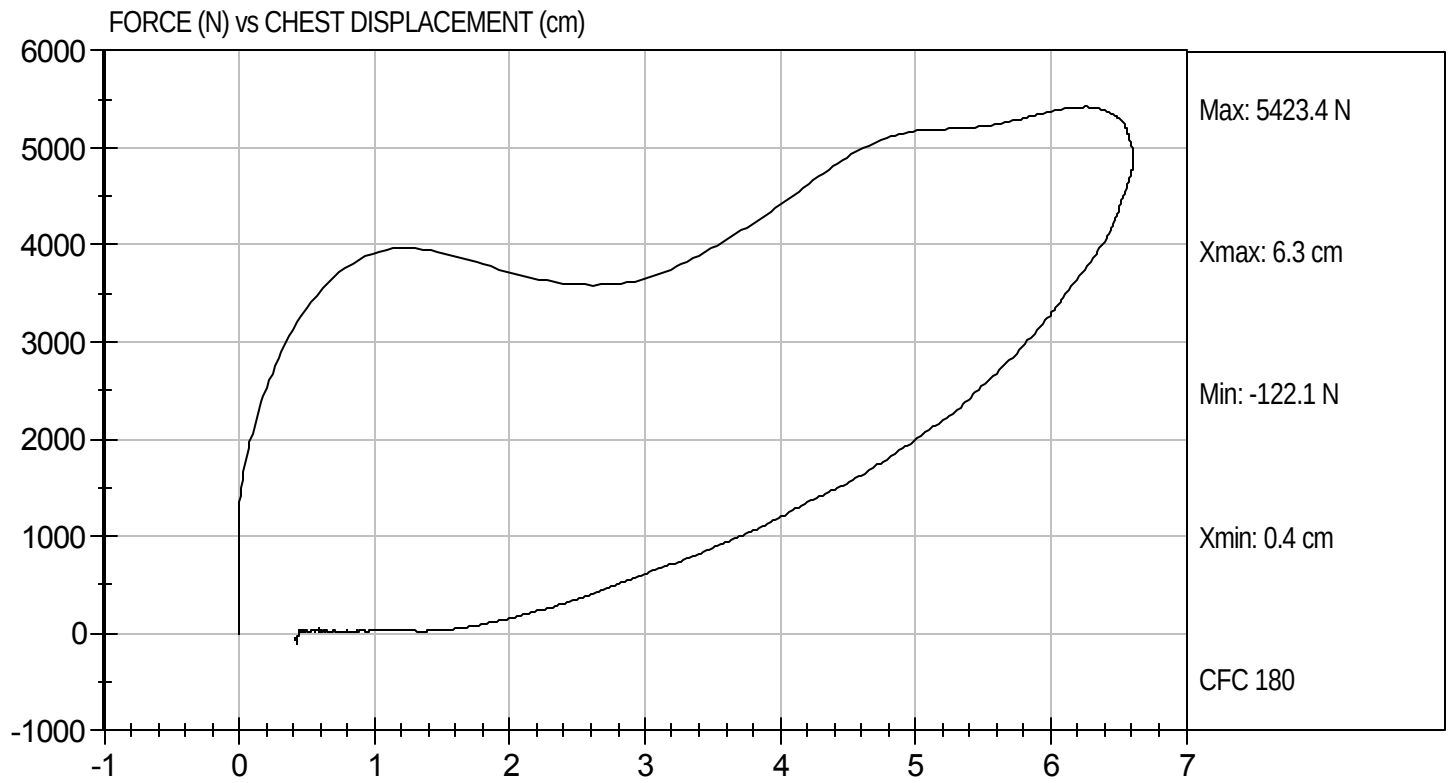
12/7/10
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D104294

Test Date: 12/7/10
Velocity: 21.93 ft/s, 6.68 m/s



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

ATD Serial No: 036

Test I.D: D104295

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	13	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	Newtons	4715 to 5782	4,933	Pass
Overall Test Results				Pass

Jessica Gall
Laboratory Technician

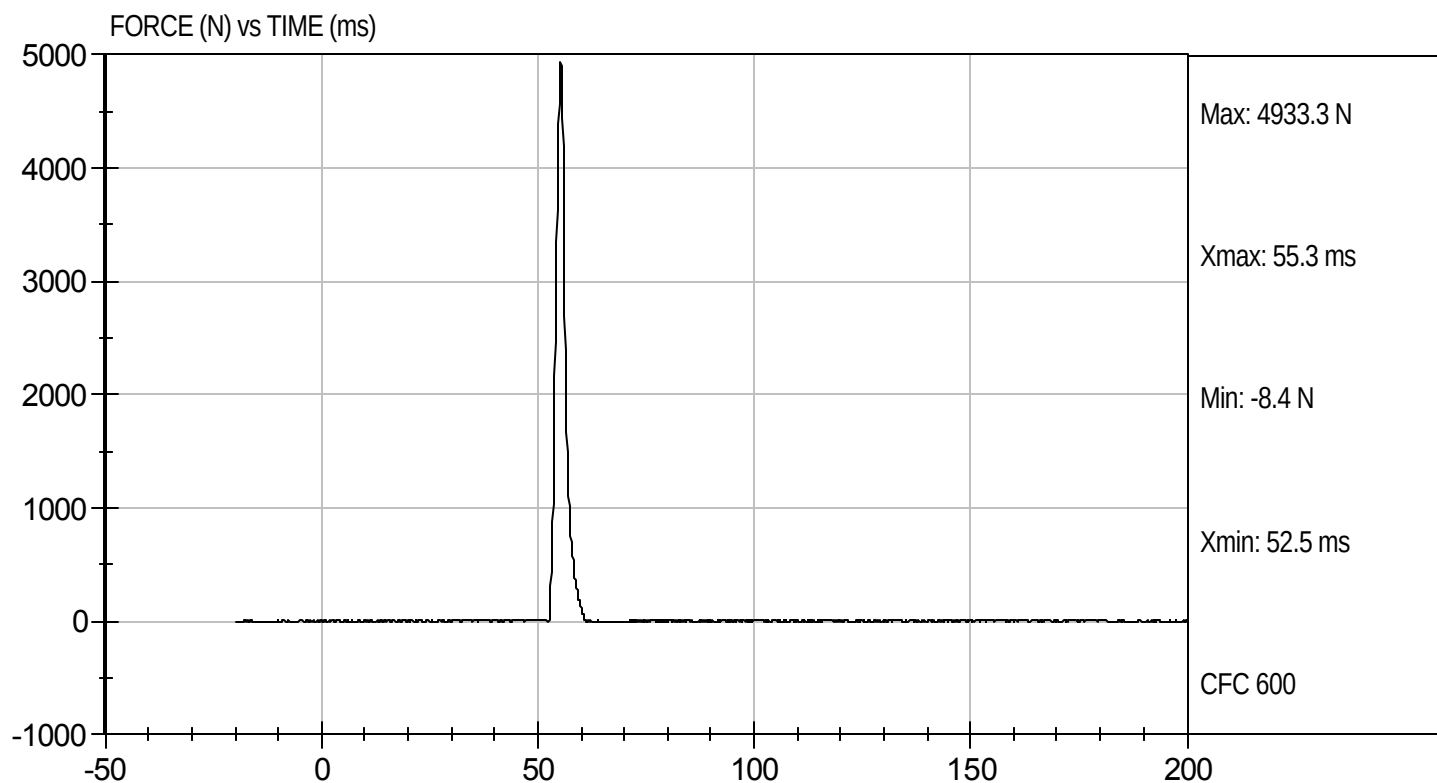
12/7/10
Test Date

David Winkelbauer
Approved By



Test Desc: Right Knee
Component ID: D104295

Test Date: 12/7/10
Velocity: 6.94 ft/s, 2.12 m/s

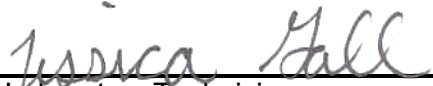


MGA RESEARCH CORPORATION
LEFT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036

Test I.D: D104296

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	13	Pass
Probe Velocity	m/s	2.07 to 2.13	2.11	Pass
Peak Probe Force	Newtons	4715 to 5782	5,180	Pass
Overall Test Results				Pass


Laboratory Technician

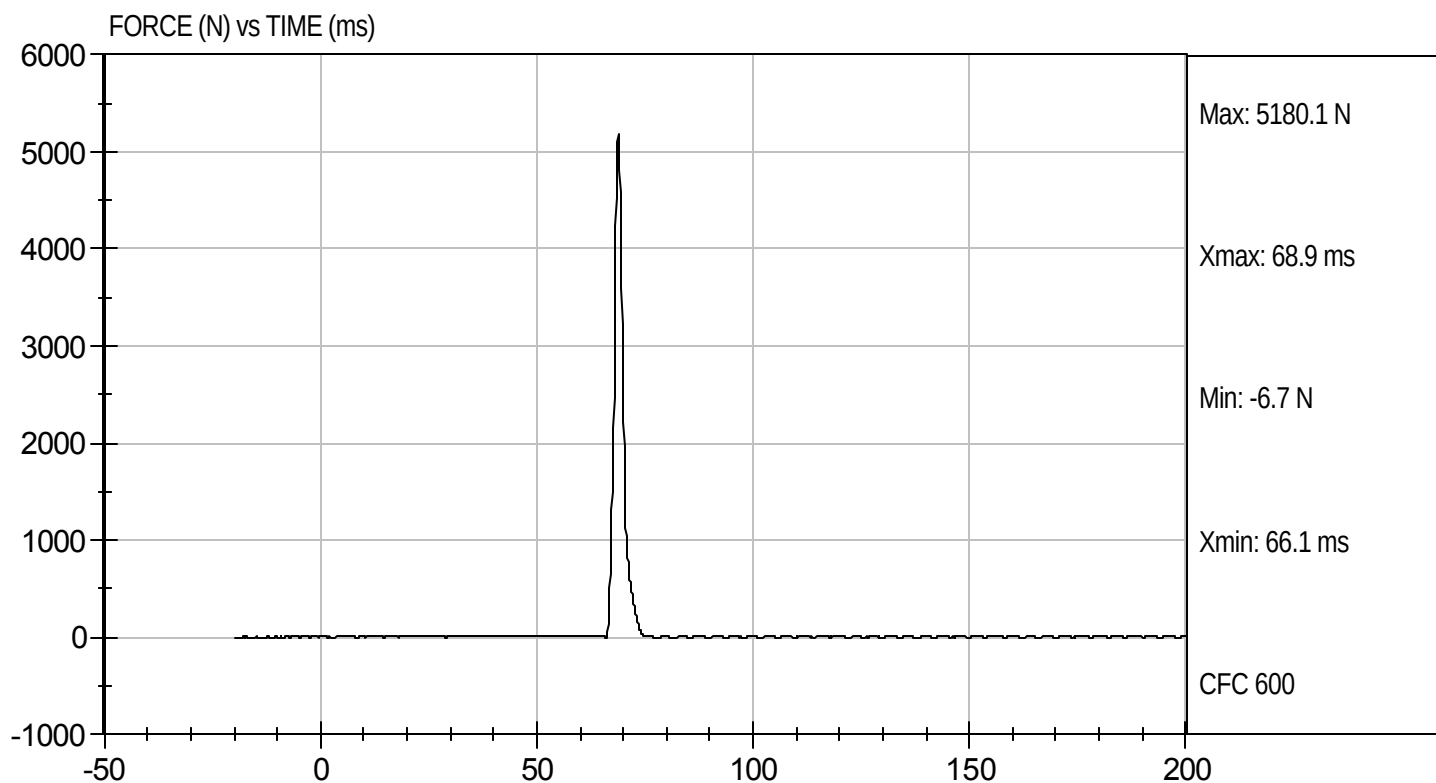
12/7/10
Test Date


Approved By



Test Desc: Left Knee
Component ID: D104296

Test Date: 12/7/10
Velocity: 6.92 ft/s, 2.11 m/s

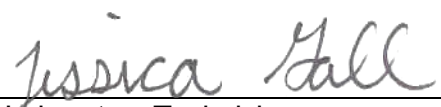


MGA RESEARCH CORPORATION
HIP-FEMUR FLEXION TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036

Test I.D: D104290

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	22.0	22.0	Pass
Laboratory Relative Humidity	%	10 to 70	13	13	Pass
Rotation Rate	deg/s	5 -10	8	8	Pass
30 Degrees	Nm	94.9 Nm Max	57.8	54.8	Pass
150 ft-lbf / 203.4 Nm	Deg	40- 50 Degree Max Rotation	49	48	Pass
Overall Test Results					Pass


 Laboratory Technician

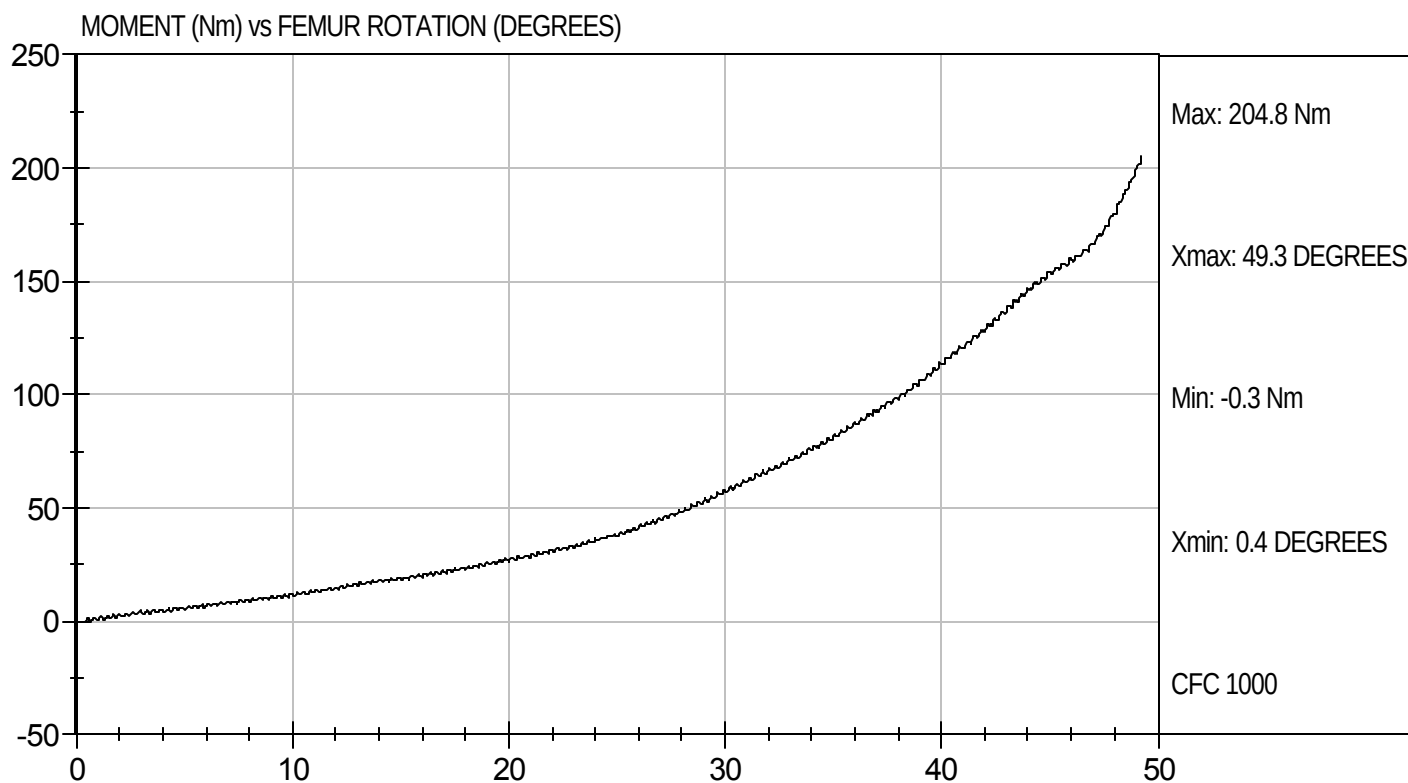
12/7/10
 Test Date


 Approved By



Test Desc: Hip Femur Flexion
Component ID: D104299

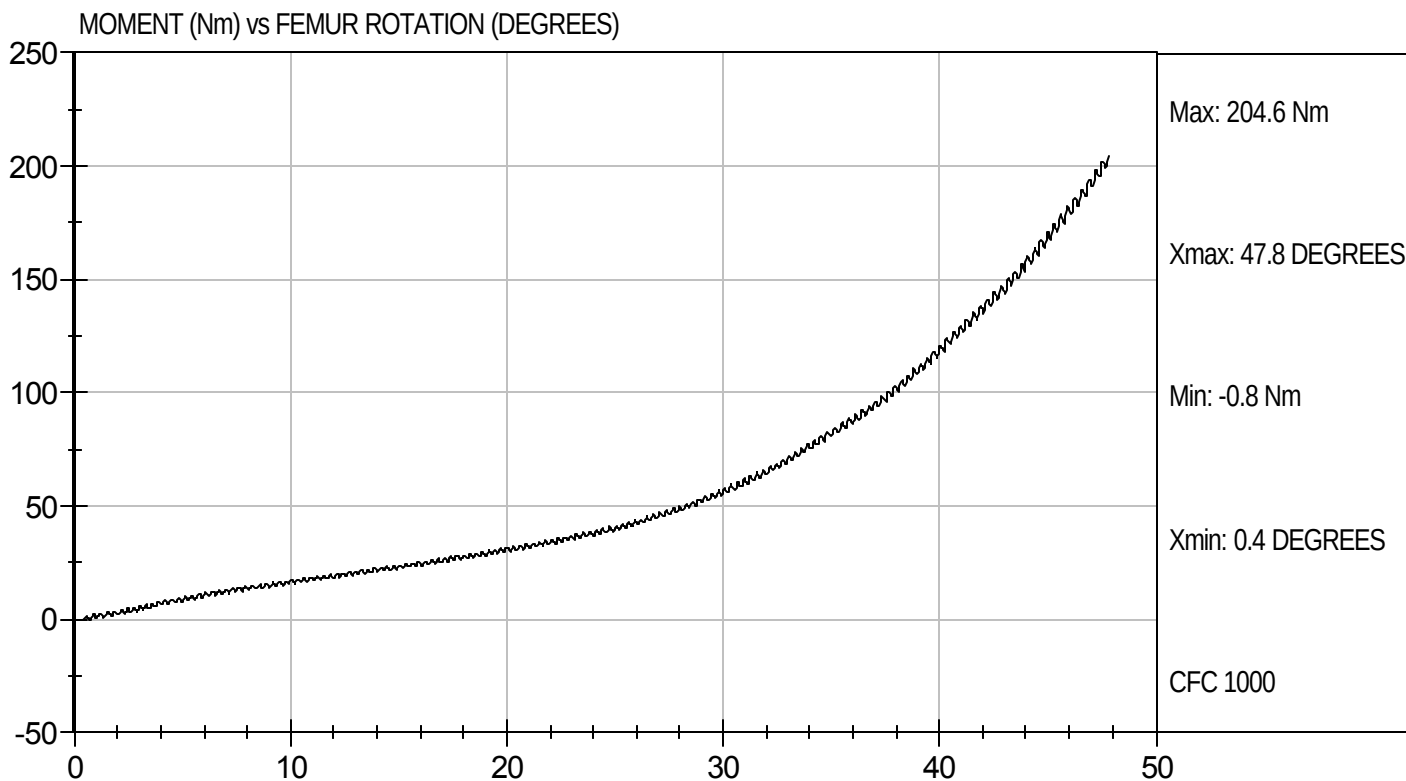
Test Date: 12/7/10
Velocity: 0 ft/s, 0.00 m/s





Test Desc: Hip Femur Flexion
Component ID: D104290

Test Date: 12/7/10
Velocity: 0 ft/s, 0.00 m/s



MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test ID: D104251

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	16	Pass
Peak Resultant Acceleration	G's	250 to 300	284	Pass
Peak Lateral Acceleration	G's	+/- 15	11.5	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

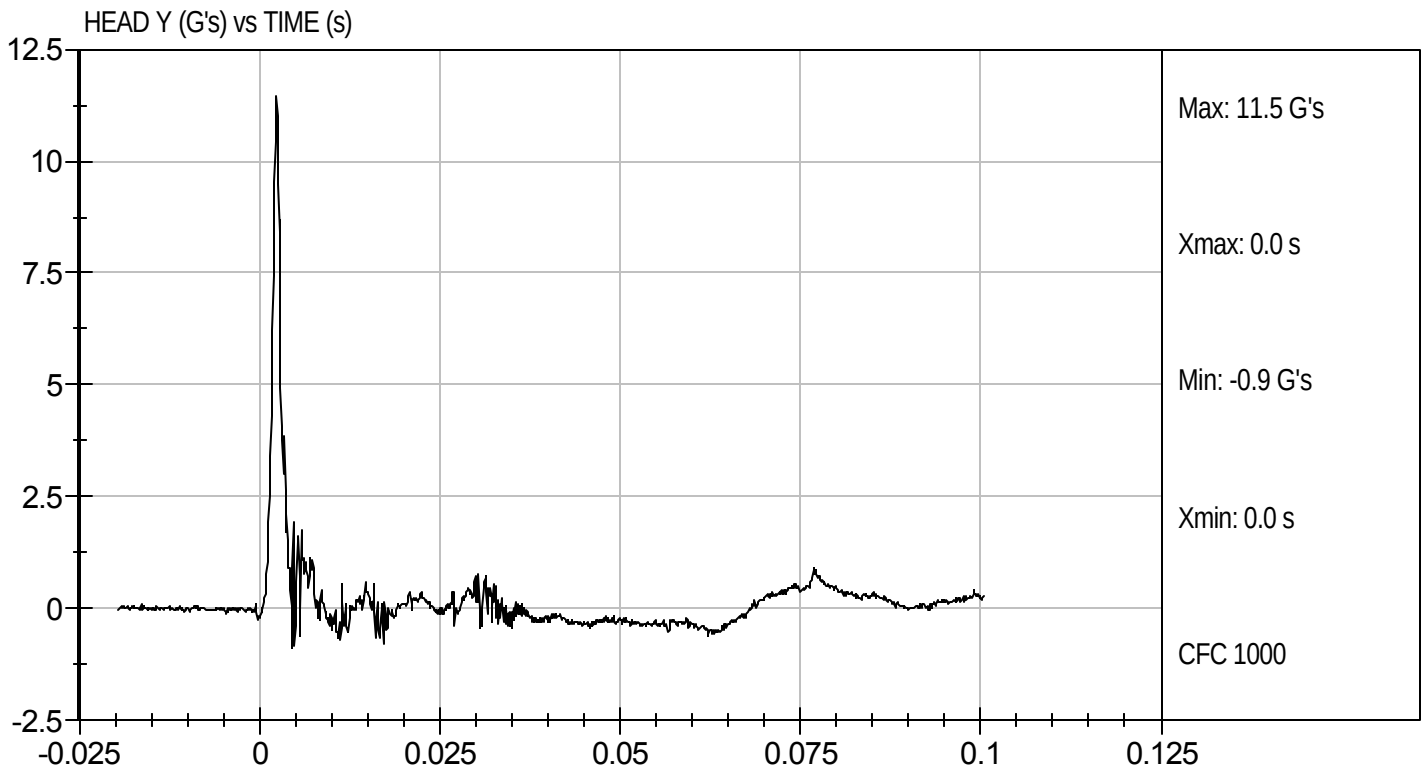
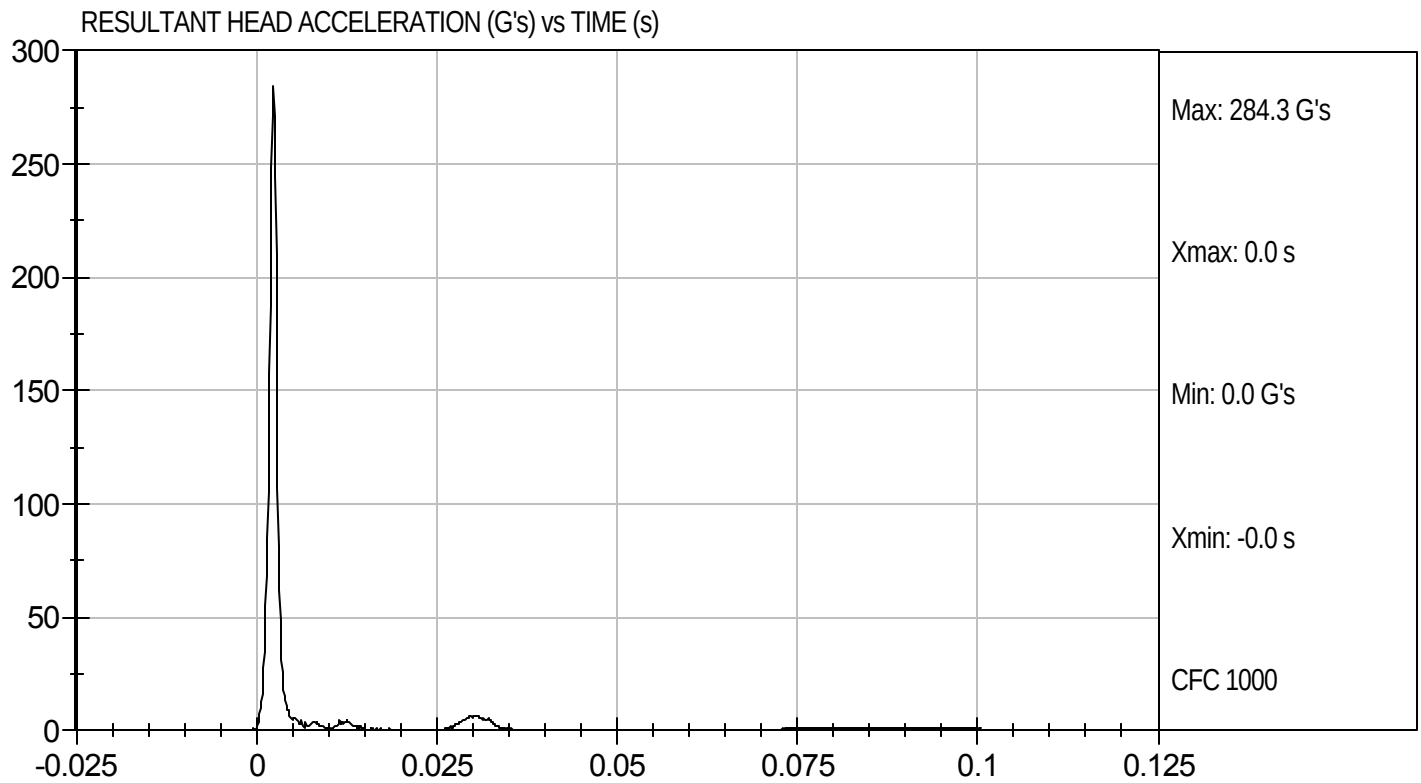
12/3/10
Test Date


Approved By



Test Desc: Head Drop
Component ID: D104251

Test Date: 12/3/10
Velocity: 0 ft/s, 0 m/s



MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test I.D: D104252

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	20.7	Pass
Laboratory Relative Humidity		%	10 to 70	16	Pass
Pendulum Speed		m/s	6.89 to 7.13	7.11	Pass
Pendulum Deceleration	10 ms	m/s	2.1 to 2.5	2.4	Pass
	20 ms	m/s	4.0 to 5.0	4.5	Pass
	30 ms	m/s	5.8 to 7.0	6.2	Pass
D Plane Rotation	Max	deg	77 to 91	81	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	69 to 83	74	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	86	Pass
Overall Results					Pass

Jessica Hall
Laboratory Technician

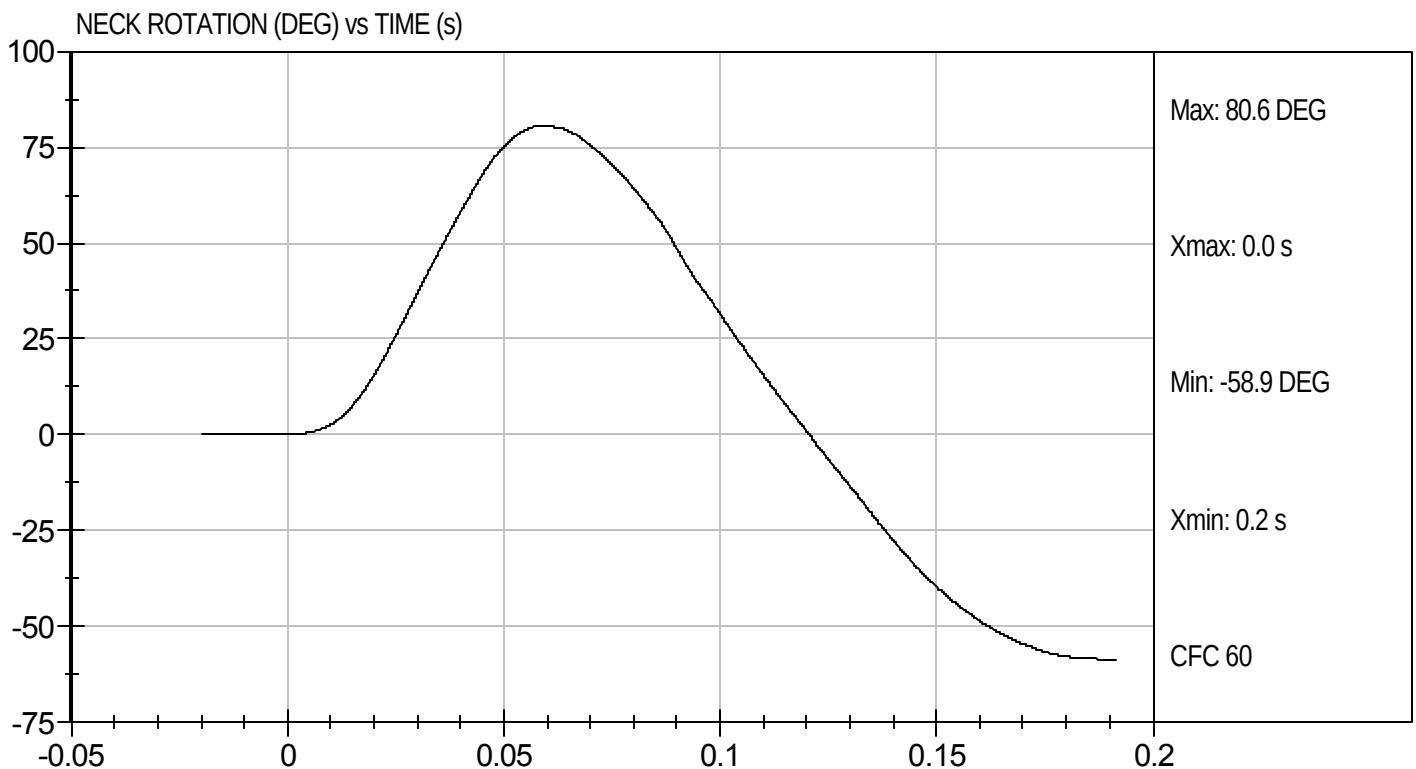
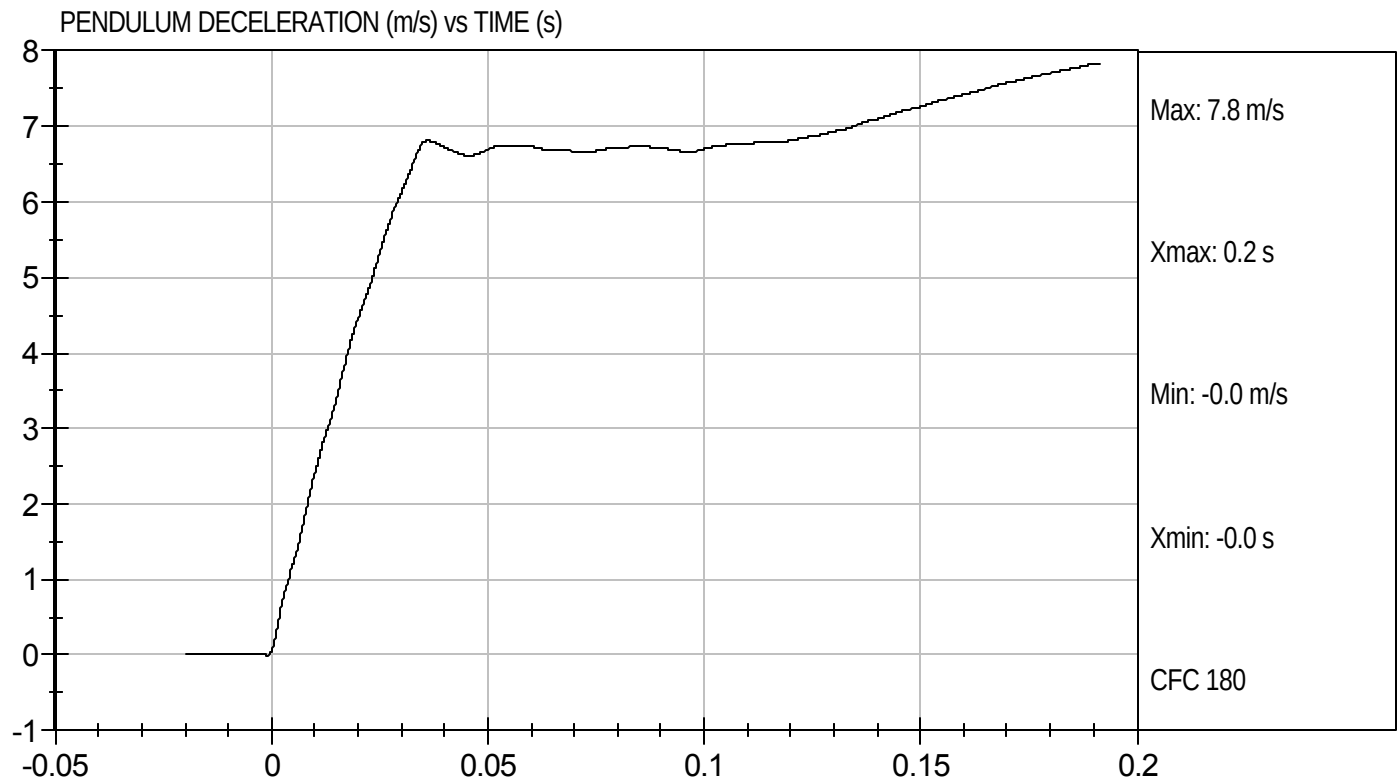
12/3/10
Test Date

David Winkelbauer
Approved By



Test Desc: Neck Flexion
Component ID: D104252

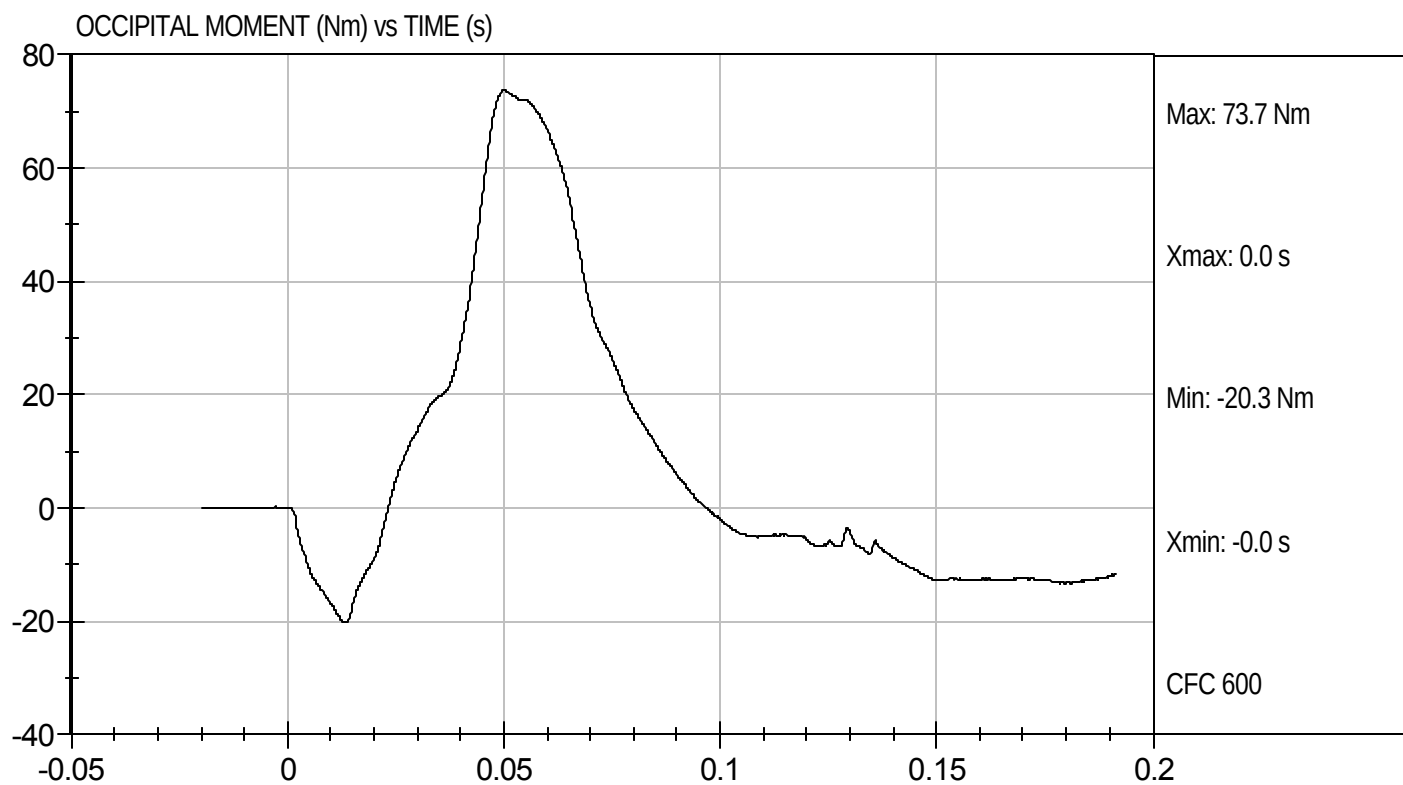
Test Date: 12/3/10
Velocity: 23.32 ft/s, 7.11 m/s





Test Desc: Neck Flexion
Component ID: D104252

Test Date: 12/3/10
Velocity: 23.32 ft/s, 7.11 m/s



MGA RESEARCH CORPORATION

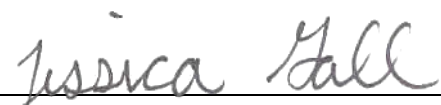
NECK EXTENSION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test I.D: D104253

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	20.7	Pass
Laboratory Relative Humidity		%	10 to 70	16	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.16	Pass
Pendulum Deceleration	10 ms	m/s	1.5 to 1.9	1.8	Pass
	20 ms	m/s	3.1 to 3.9	3.5	Pass
	30 ms	m/s	4.6 to 5.6	5.0	Pass
D Plane Rotation	Max	deg	99 to 114	104	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	-65 to -53	-53	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	103	Pass
Overall Results					Pass


 Laboratory Technician

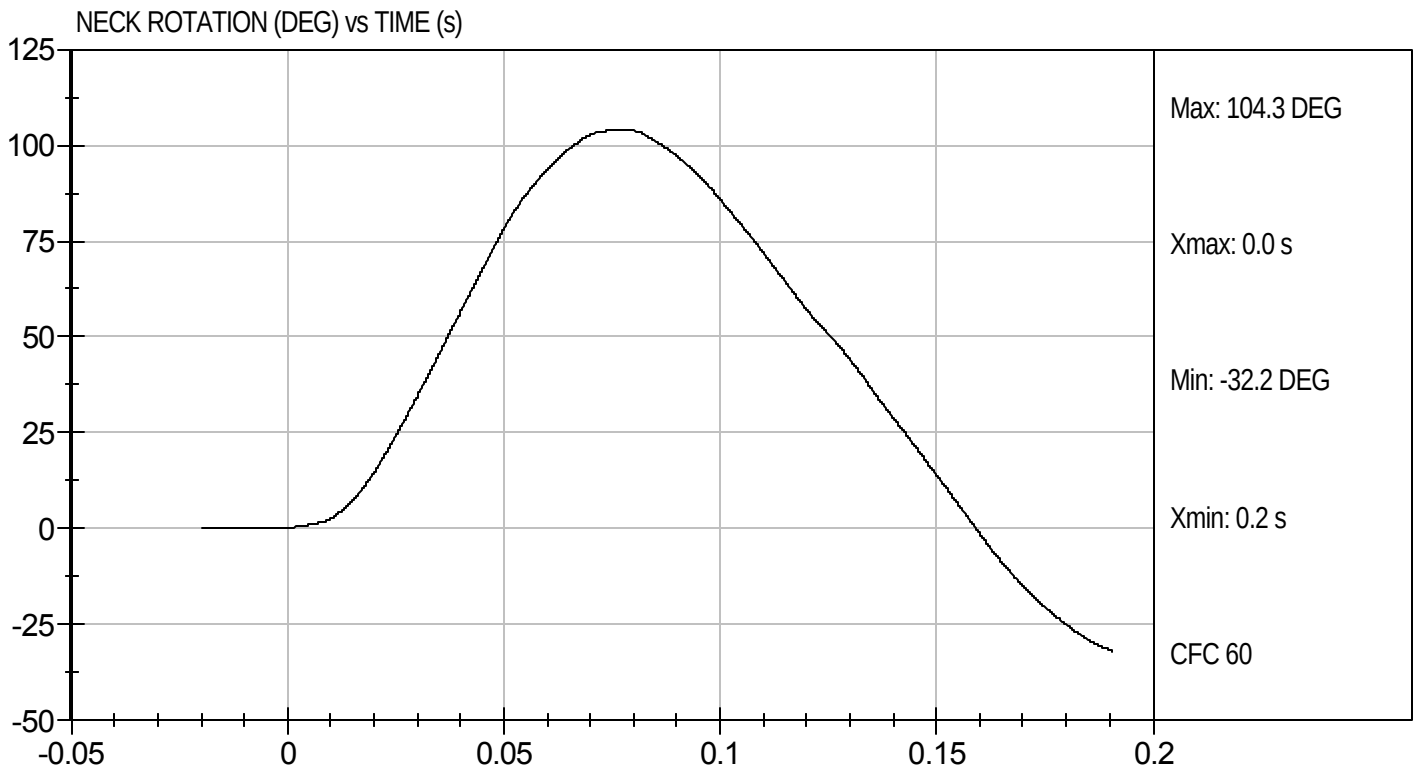
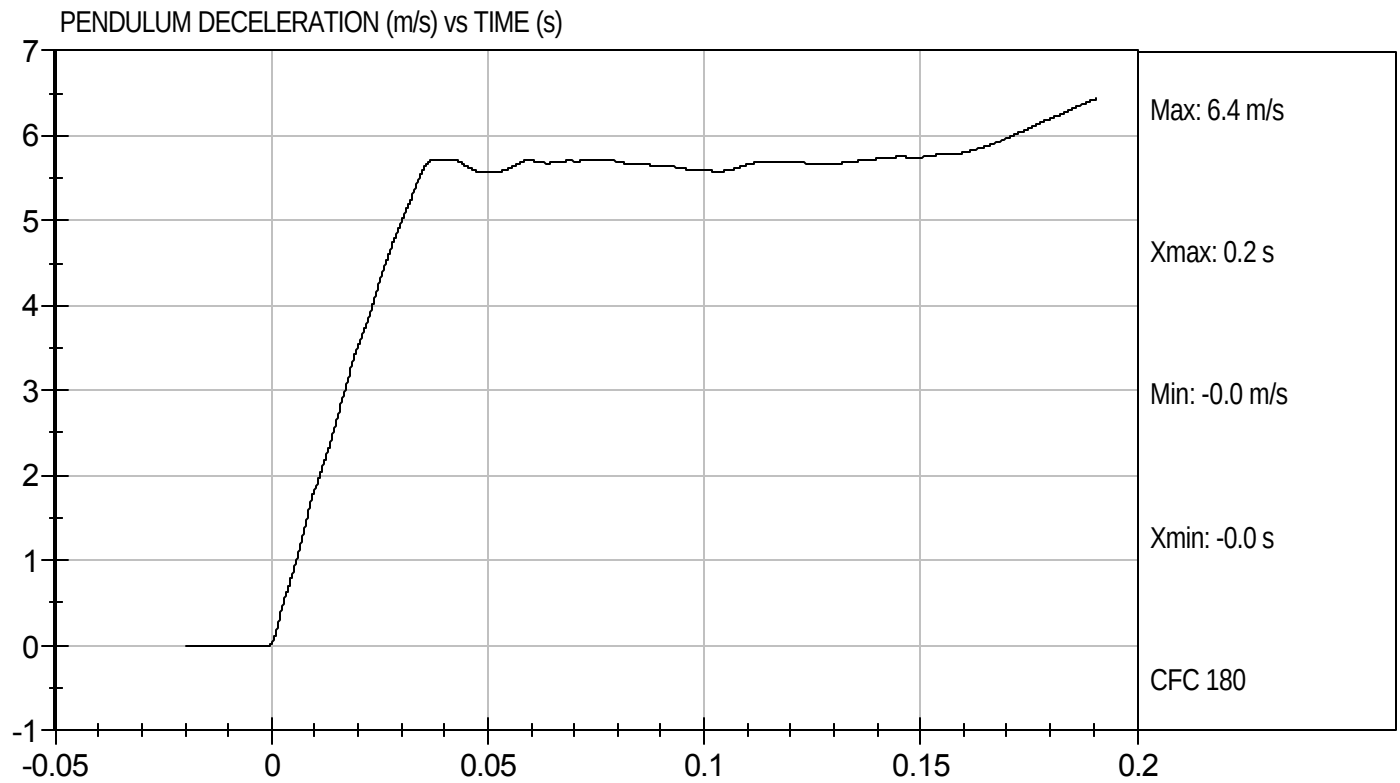
12/3/10
 Test Date


 Approved By



Test Desc: Neck Extension
Component ID: D104253

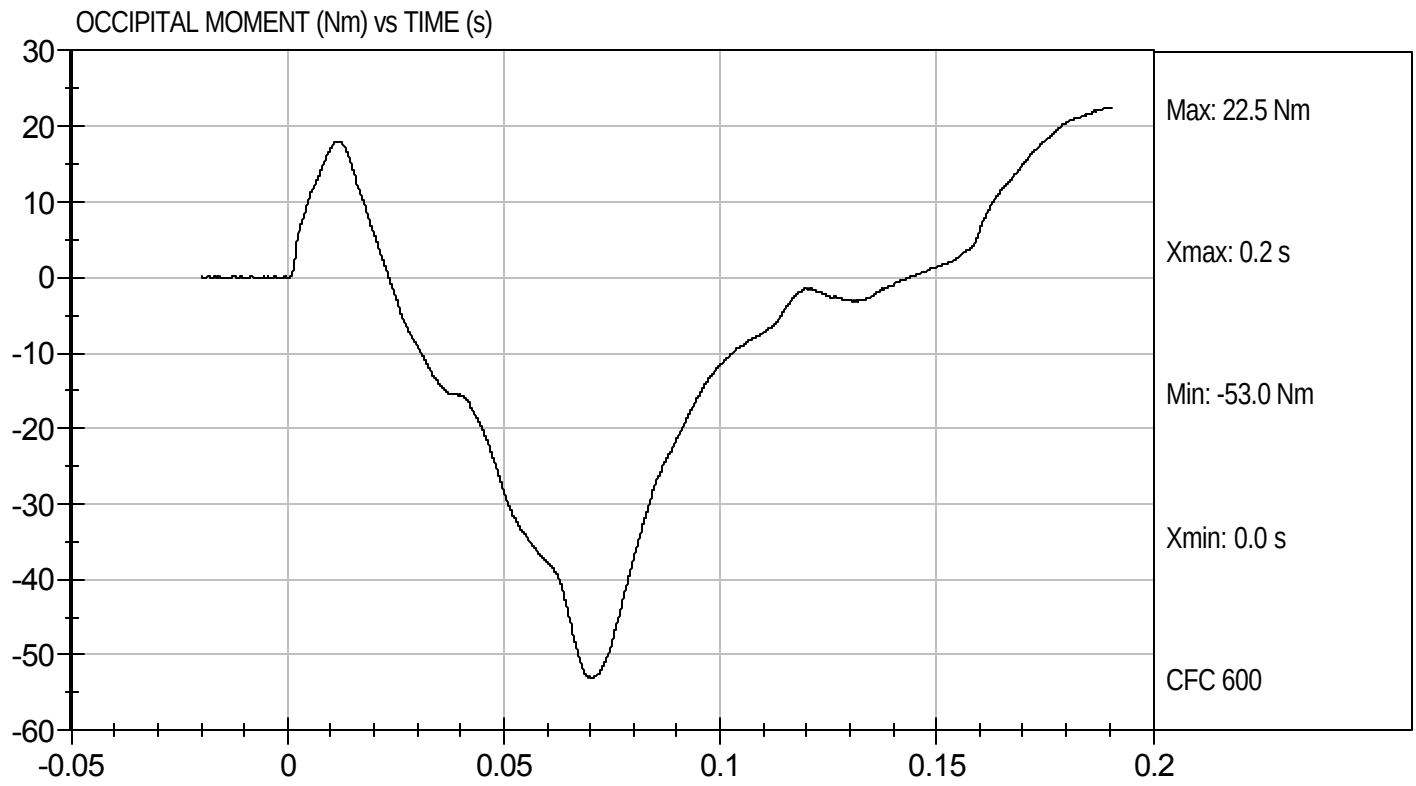
Test Date: 12/3/10
Velocity: 20.21 ft/s, 6.16 m/s





Test Desc: Neck Extension
Component ID: D104253

Test Date: 12/3/10
Velocity: 20.21 ft/s, 6.16 m/s



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THORAX IMPACT
HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test I.D: D104254

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	20.6	Pass
Relative Humidity	%	10 to 70	17	Pass
Probe Speed	m/s	6.59 to 6.83	6.68	Pass
Peak Deflection	mm	50 to 58	52	Pass
Peak Resistive Force w/in Deflection Corridor	kN	3.9 to 4.4	4.26	Pass
Internal Hysteresis	%	69 to 85	69	Pass
Peak Force 18 mm - 50 mm	N	<= 4,600 N	4256	Pass
Overall Test Results				Pass


Laboratory Technician

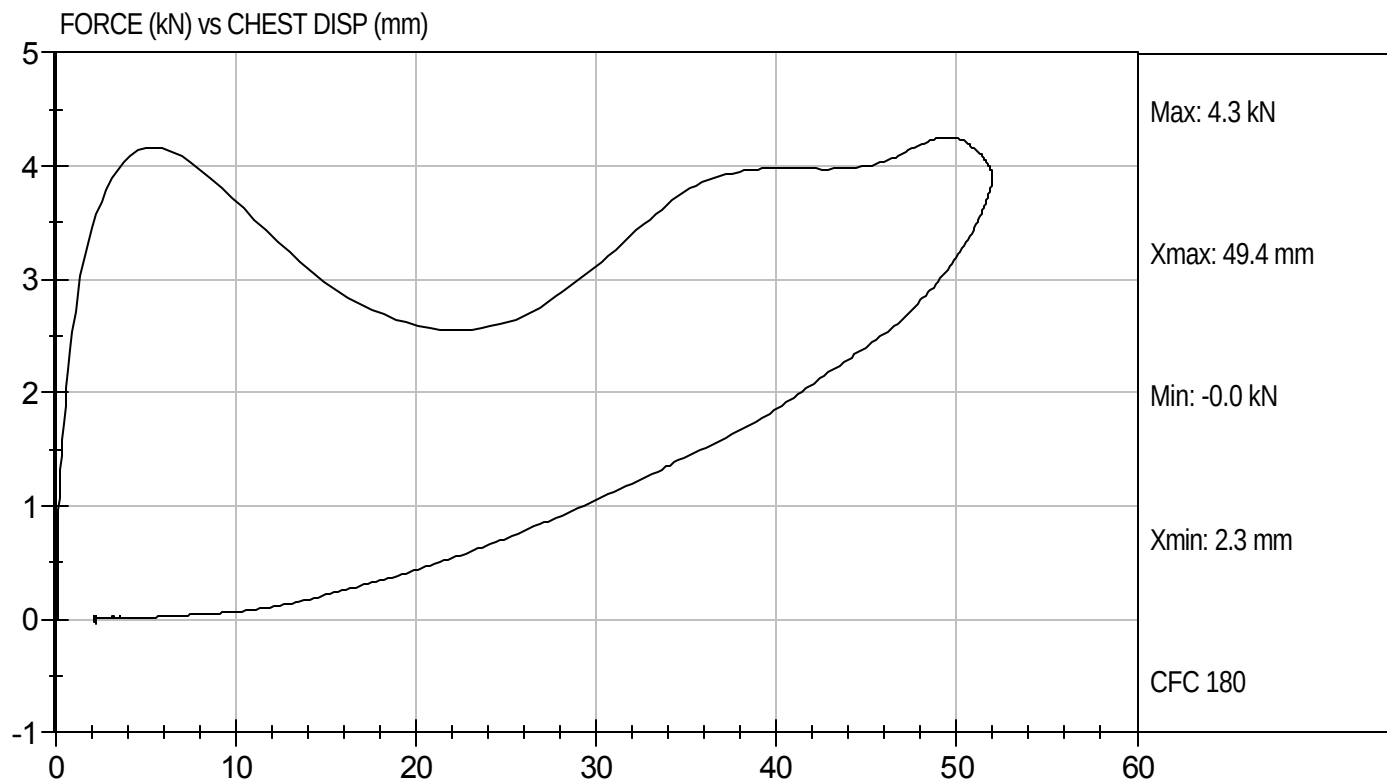
12/3/10
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D104254

Test Date: 12/3/10
Velocity: 21.93 ft/s, 6.68 m/s

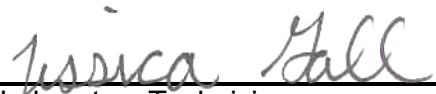


MGA RESEARCH CORPORATION
RIGHT KNEE IMPACT TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test I.D: D104255

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	16	Pass
Probe Speed	m/s	2.07 to 2.13	2.08	Pass
Maximum Force	kN	3.45 to 4.06	3.73	Pass
Overall Test Results				Pass


Laboratory Technician

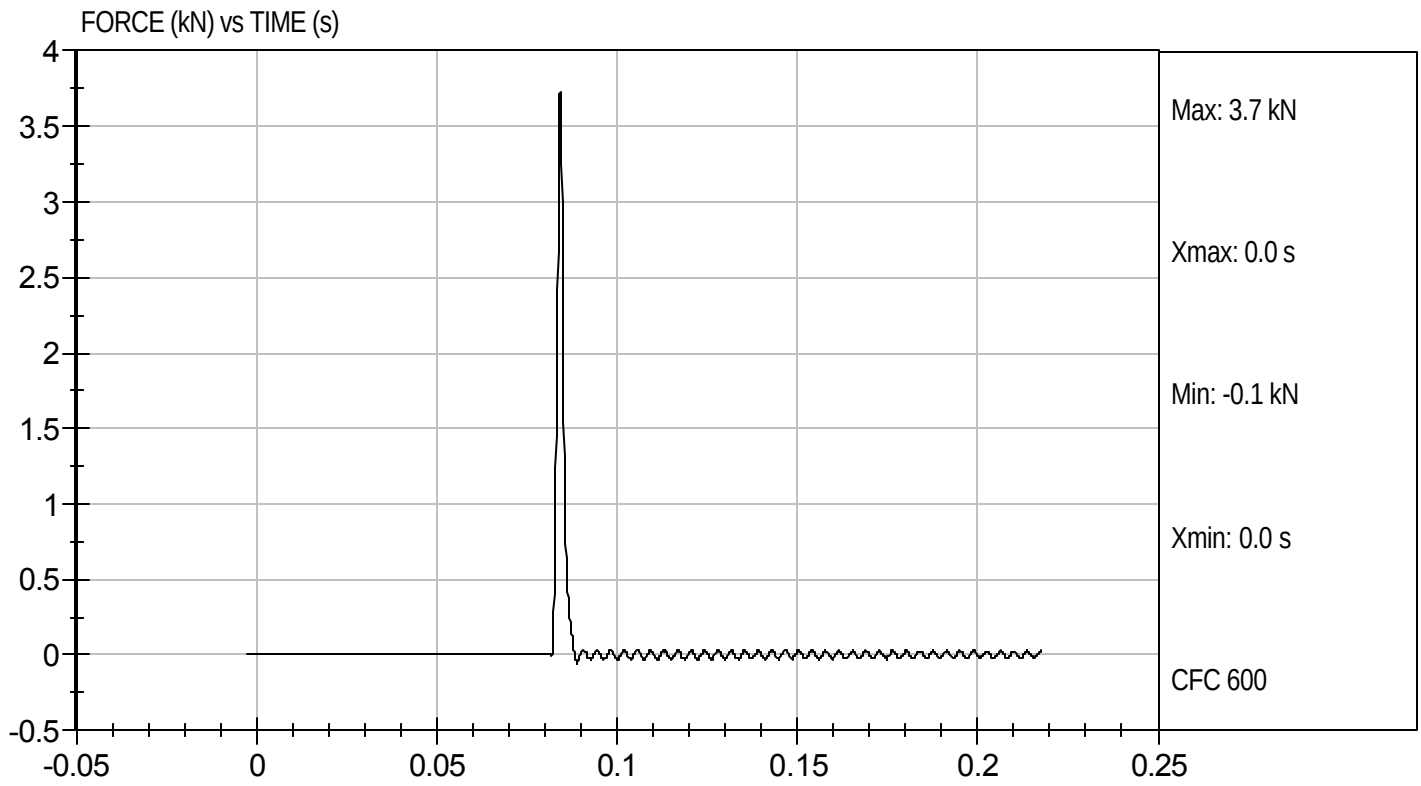
12/3/10
Test Date


Approved By



Test Desc: Right Knee
Component ID: D104255

Test Date: 12/3/10
Velocity: 6.83 ft/s, 2.08 m/s



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test I.D: D104256

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	16	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	kN	3.45 to 4.06	3.78	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

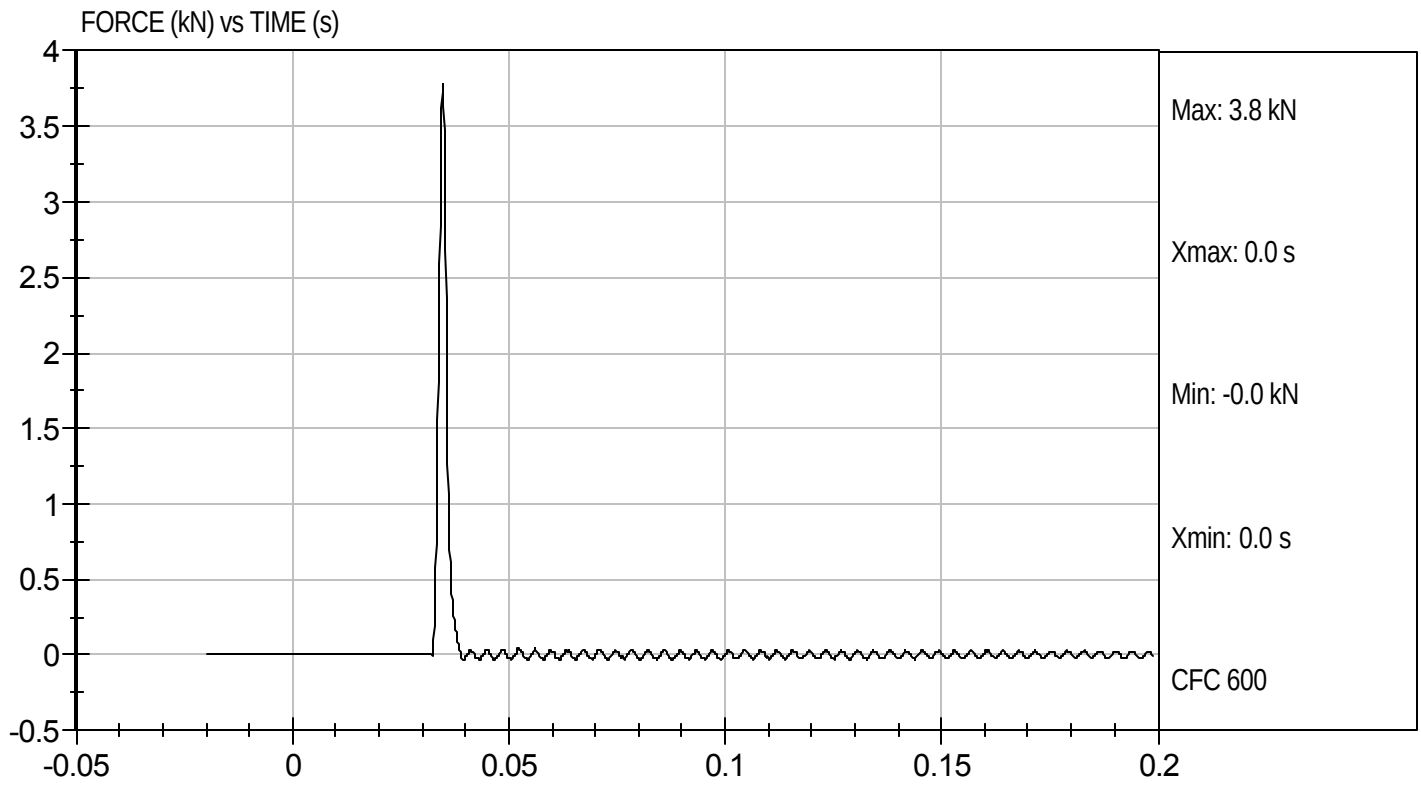
12/3/10
Test Date

David Winkelbauer
Approved By



Test Desc: Left Knee
Component ID: D104256

Test Date: 12/3/10
Velocity: 6.94 ft/s, 2.12 m/s



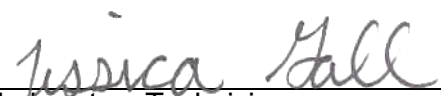
MGA RESEARCH CORPORATION

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

ATD Serial No: 634

Test I.D: D104257

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	17	Pass
Initial Angle	deg	0 to 20	17	Pass
Return Angle	deg	+/- 8	4	Pass
Force at 45 deg	N	320 to 390	369	Pass
Upper Torso Deflection Rate	Deg/sec	0.5 to 1.5	1.0	Pass
Overall Result				Pass


Laboratory Technician

12/3/10
Test Date


Approved By

MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test ID: D104281

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	14	Pass
Peak Resultant Acceleration	G's	250 to 300	287	Pass
Peak Lateral Acceleration	G's	+/- 15	-11.6	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass



Laboratory Technician

12/6/10
Test Date

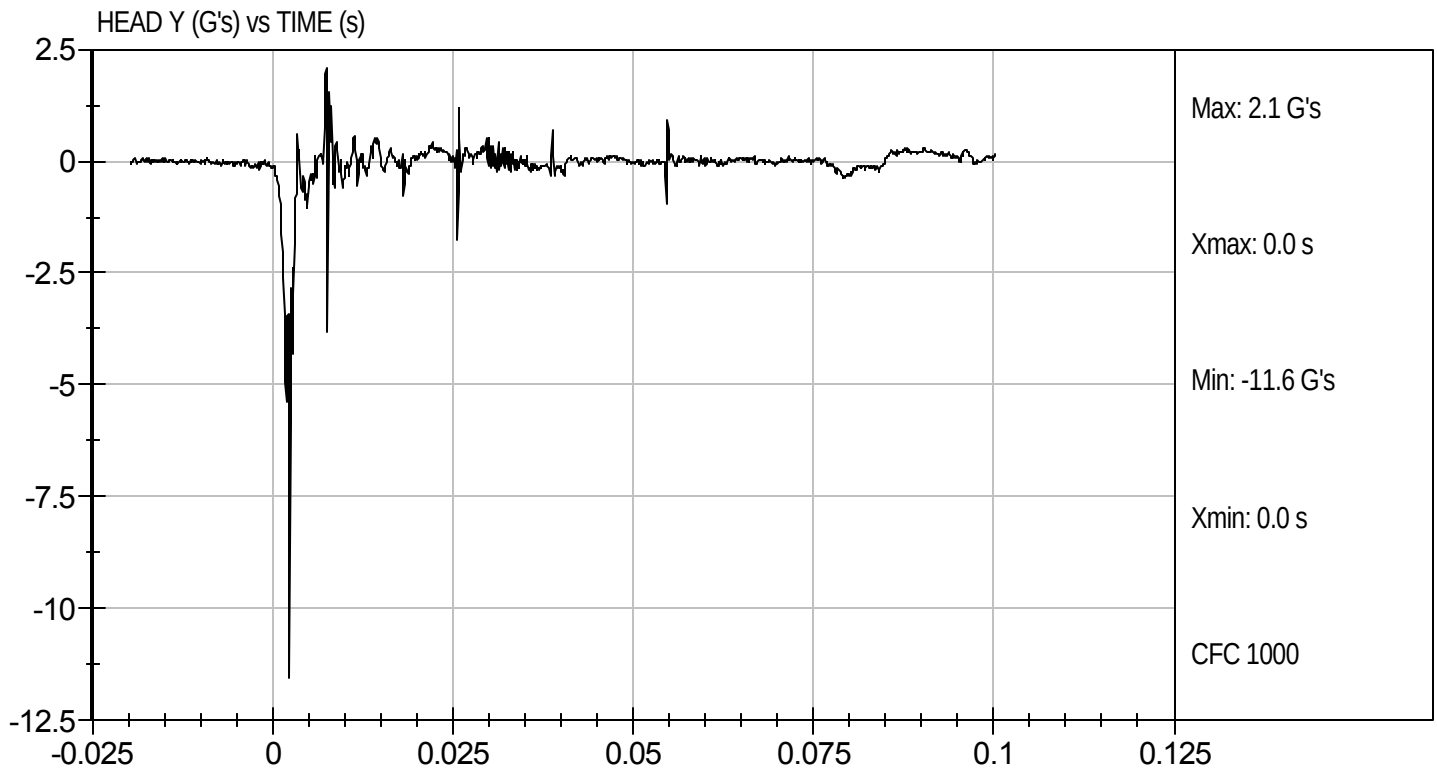
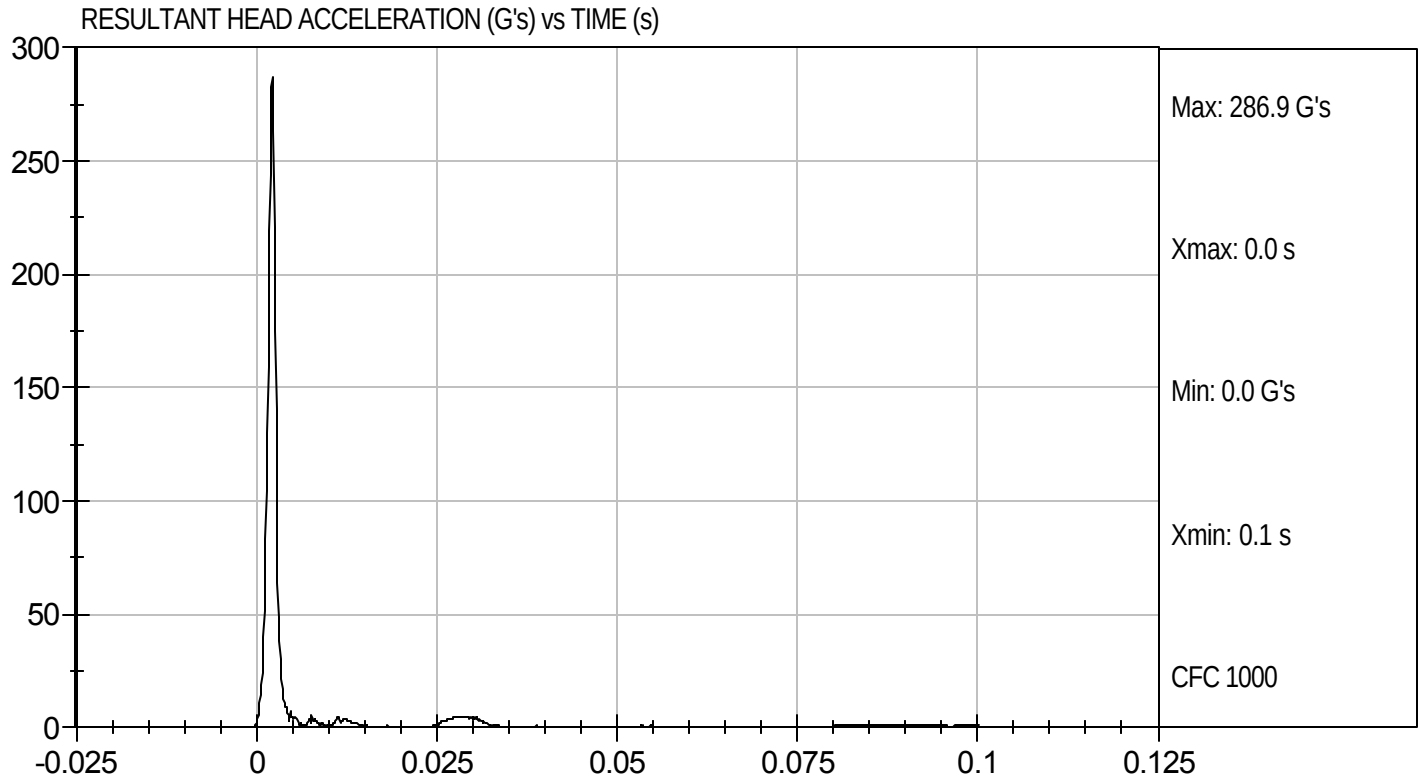


Approved By



Test Desc: Head Drop
Component ID: D104281

Test Date: 12/6/10
Velocity: 0 ft/s, 0 m/s



MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test I.D: D104282

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	15	Pass
Pendulum Speed		m/s	6.89 to 7.13	7.04	Pass
Pendulum Deceleration	10 ms	m/s	2.1 to 2.5	2.4	Pass
	20 ms	m/s	4.0 to 5.0	4.5	Pass
	30 ms	m/s	5.8 to 7.0	6.2	Pass
D Plane Rotation	Max	deg	77 to 91	81	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	69 to 83	72	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	87	Pass
Overall Results					Pass

Jessica Hall
Laboratory Technician

12/6/10
Test Date

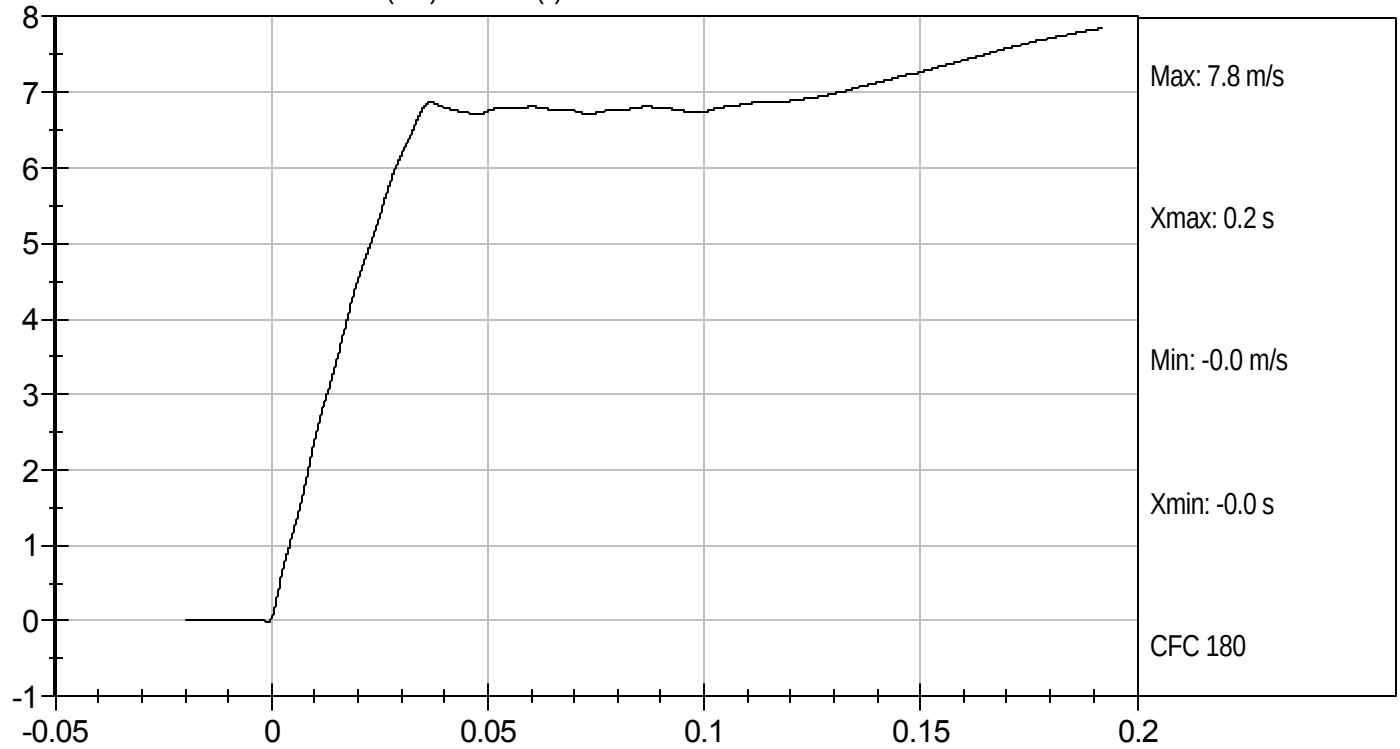
David Winkelbauer
Approved By



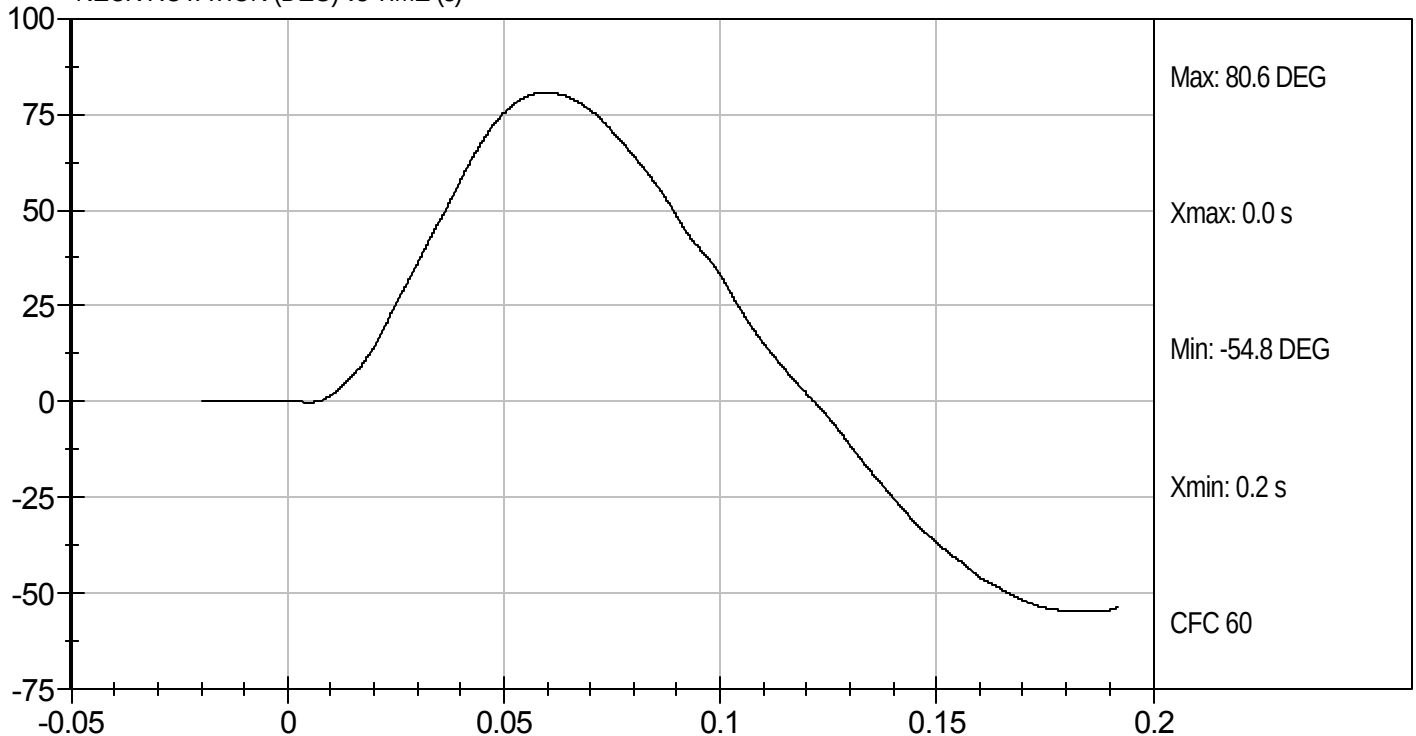
Test Desc: Neck Flexion
Component ID: D104282

Test Date: 12/6/10
Velocity: 23.1 ft/s, 7.04 m/s

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



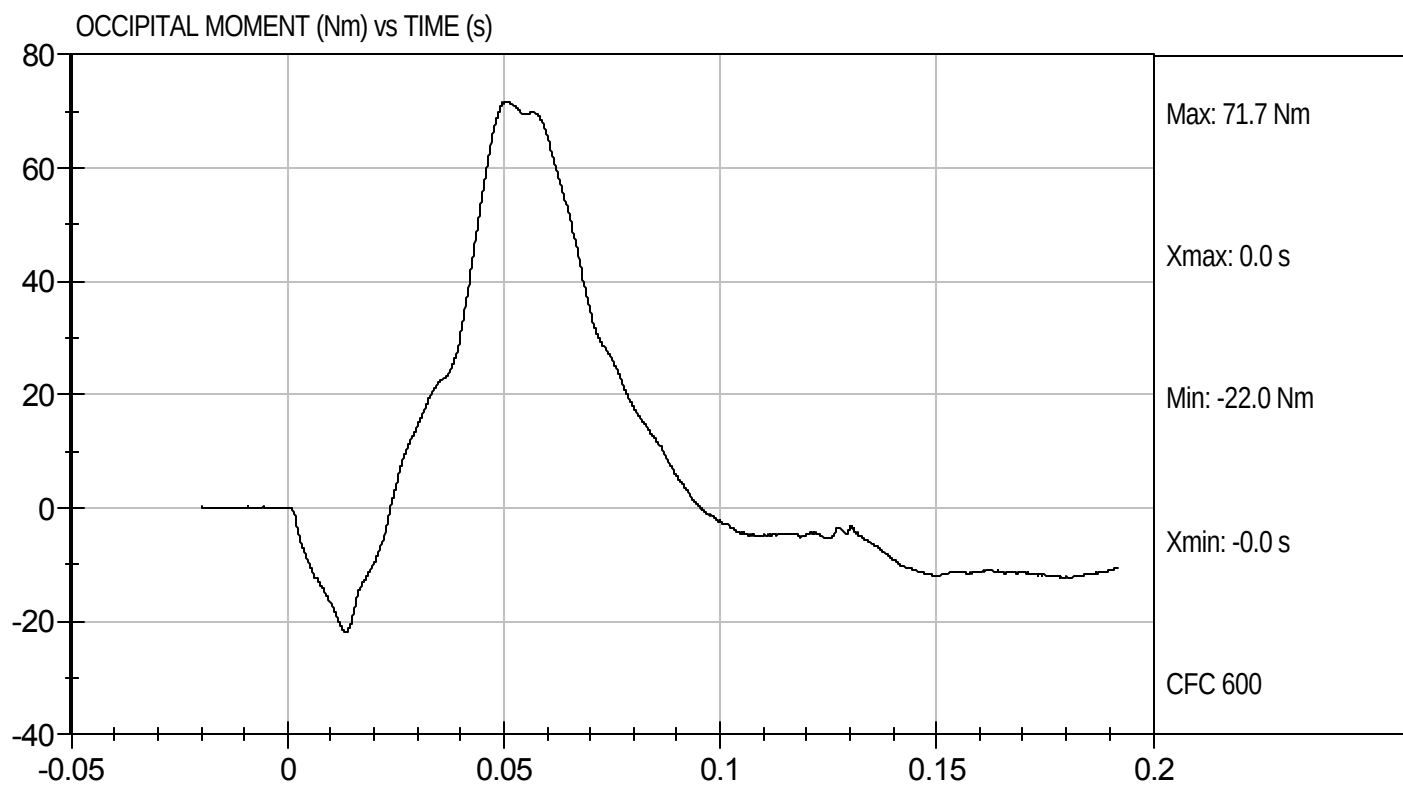
NECK ROTATION (DEG) vs TIME (s)





Test Desc: Neck Flexion
Component ID: D104282

Test Date: 12/6/10
Velocity: 23.1 ft/s, 7.04 m/s



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634Test I.D: D104283

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	15	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.12	Pass
Pendulum Deceleration	10 ms	m/s	1.5 to 1.9	1.9	Pass
	20 ms	m/s	3.1 to 3.9	3.6	Pass
	30 ms	m/s	4.6 to 5.6	5.1	Pass
D Plane Rotation	Max	deg	99 to 114	100	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	-65 to -53	-54	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	102	Pass
Overall Results					Pass

Jessica Hall
Laboratory Technician

12/6/10

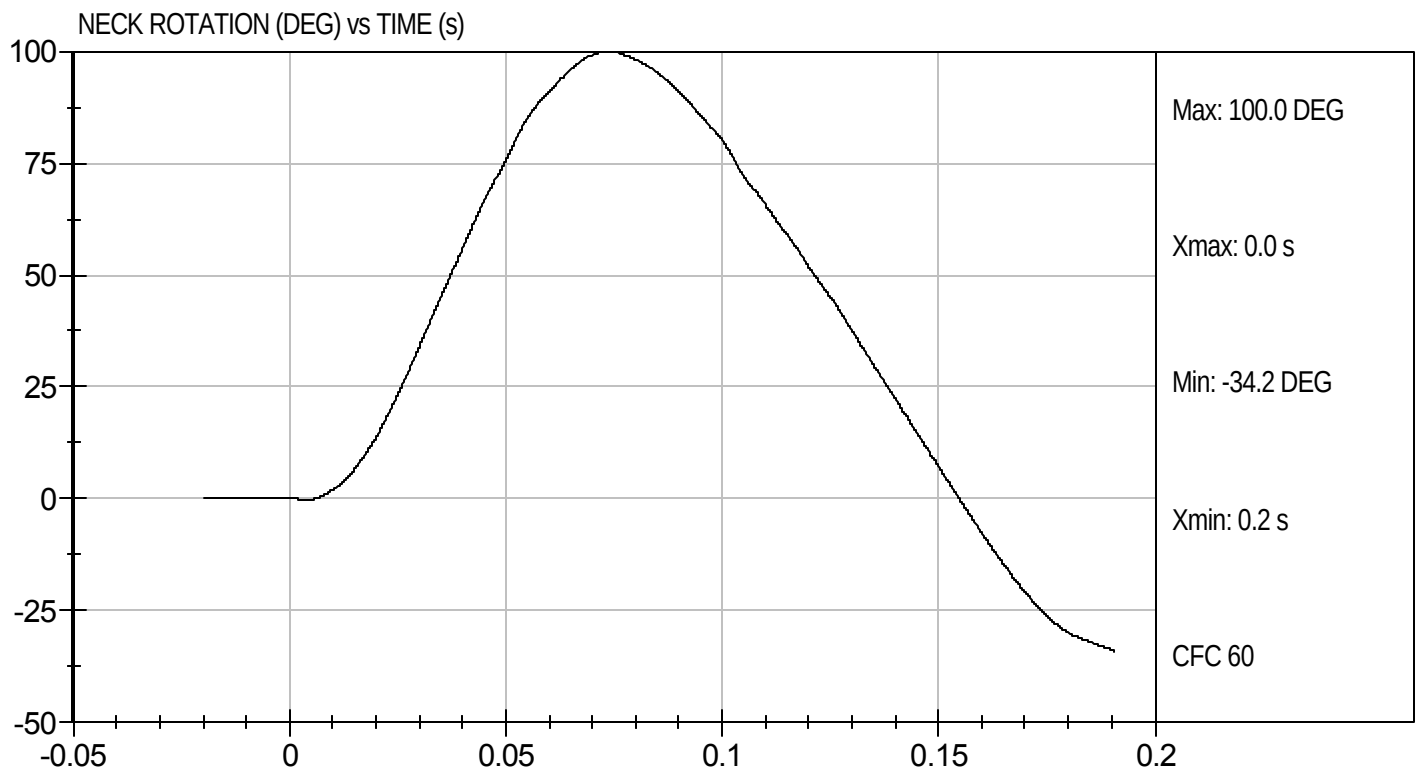
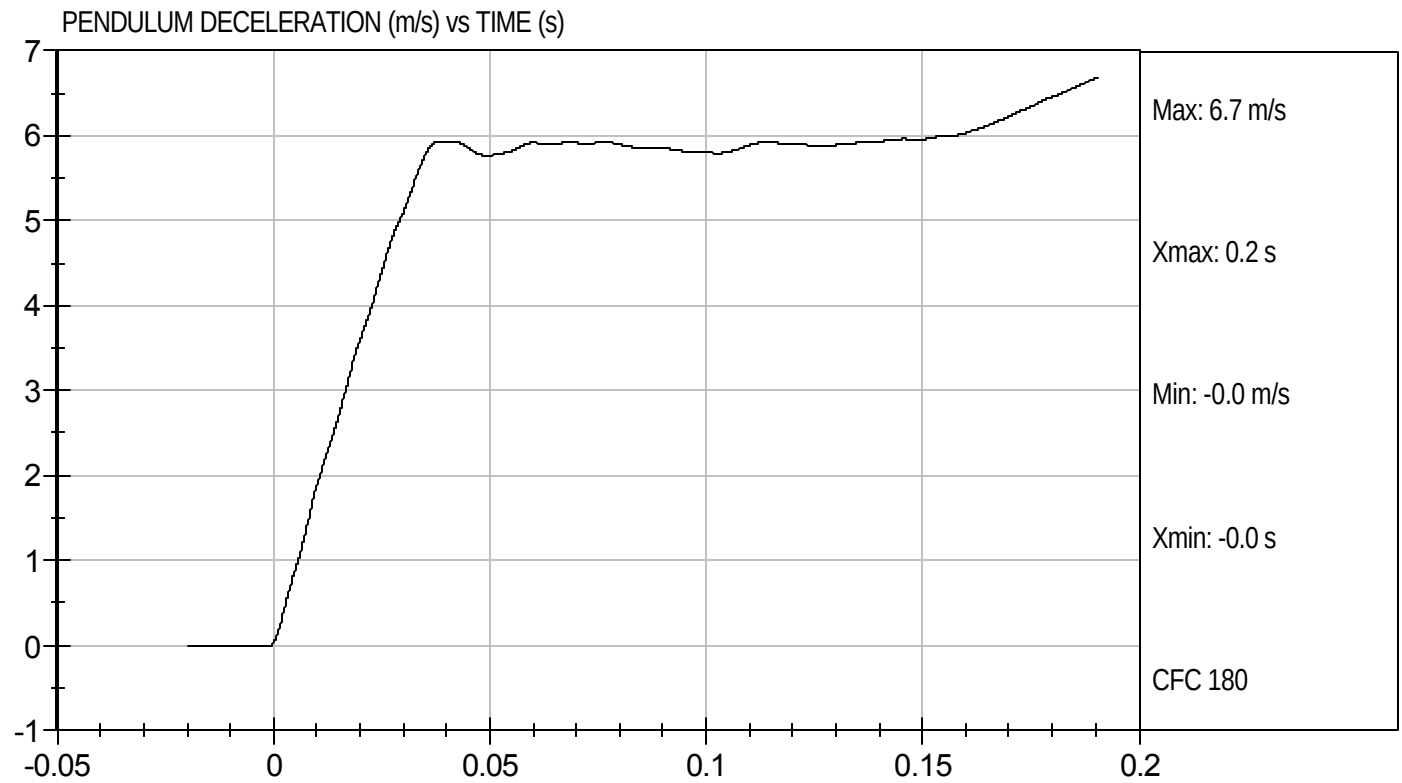
Test Date

David Winkelbauer
Approved By



Test Desc: Neck Extension
Component ID: D104283

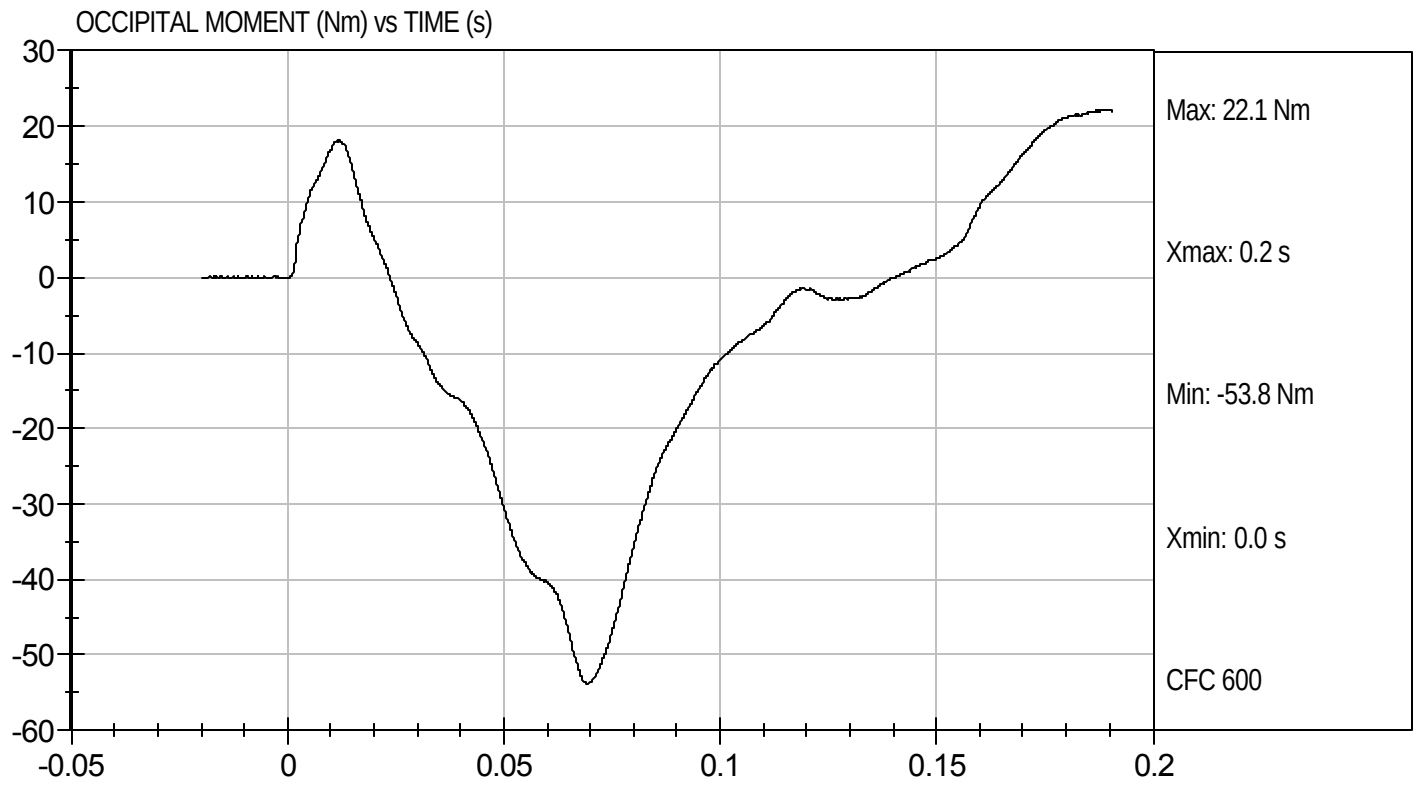
Test Date: 12/6/10
Velocity: 20.08 ft/s, 6.12 m/s





Test Desc: Neck Extension
Component ID: D104283

Test Date: 12/6/10
Velocity: 20.08 ft/s, 6.12 m/s



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test I.D: D104284

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	22.0	Pass
Relative Humidity	%	10 to 70	14	Pass
Probe Speed	m/s	6.59 to 6.83	6.68	Pass
Peak Deflection	mm	50 to 58	55	Pass
Peak Resistive Force w/in Deflection Corridor	kN	3.9 to 4.4	4.0	Pass
Internal Hysteresis	%	69 to 85	69	Pass
Peak Force 18 mm - 50 mm	N	<= 4,600 N	3974	Pass
Overall Test Results				Pass


Laboratory Technician

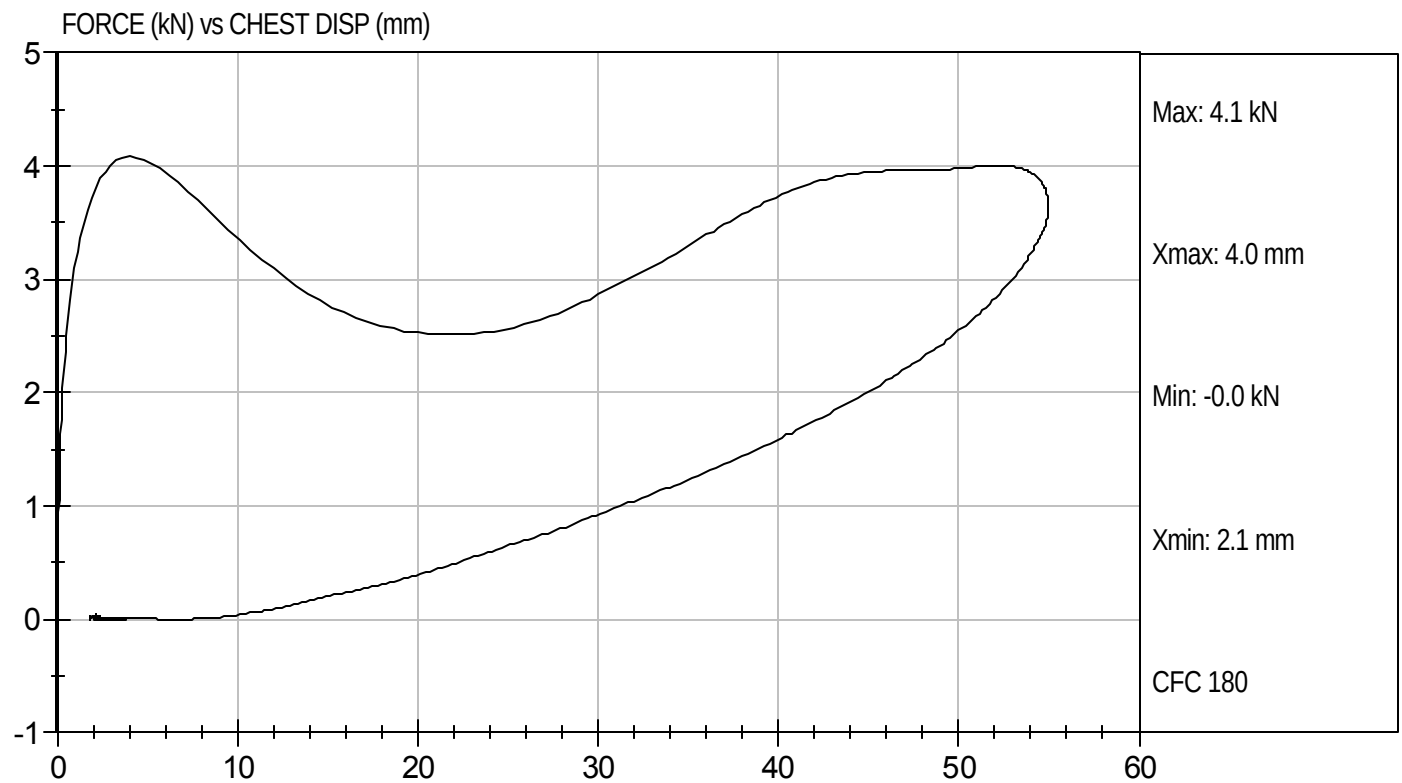
12/7/10
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D104284

Test Date: 12/7/10
Velocity: 21.93 ft/s, 6.68 m/s

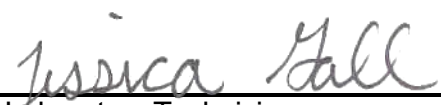


MGA RESEARCH CORPORATION
RIGHT KNEE IMPACT TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test I.D: D104285

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	14	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	kN	3.45 to 4.06	3.57	Pass
Overall Test Results				Pass


Laboratory Technician

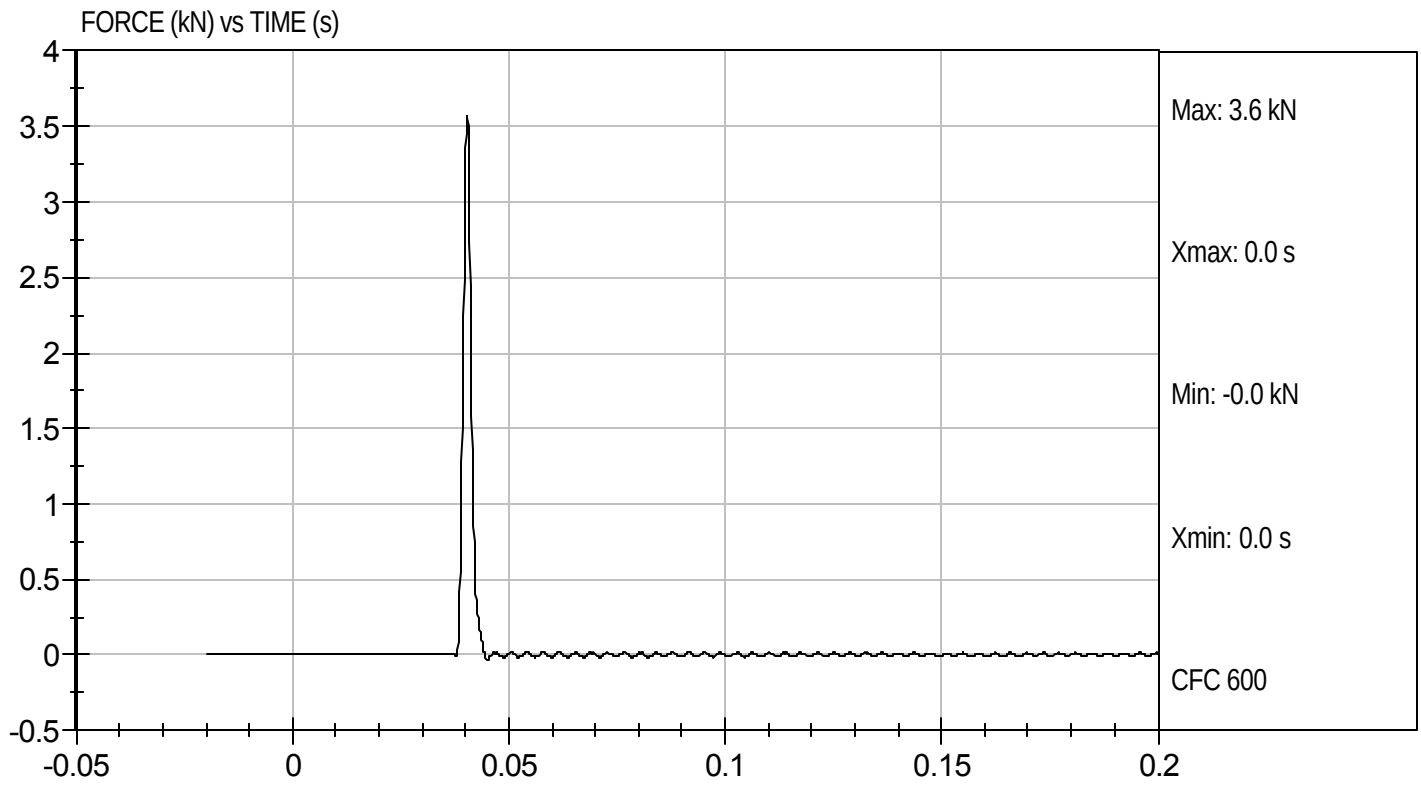
12/7/10
Test Date


Approved By



Test Desc: Right Knee
Component ID: D104285

Test Date: 12/7/10
Velocity: 6.97 ft/s, 2.12 m/s



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test I.D: D104286

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	14	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

Jessica Hall
Laboratory Technician

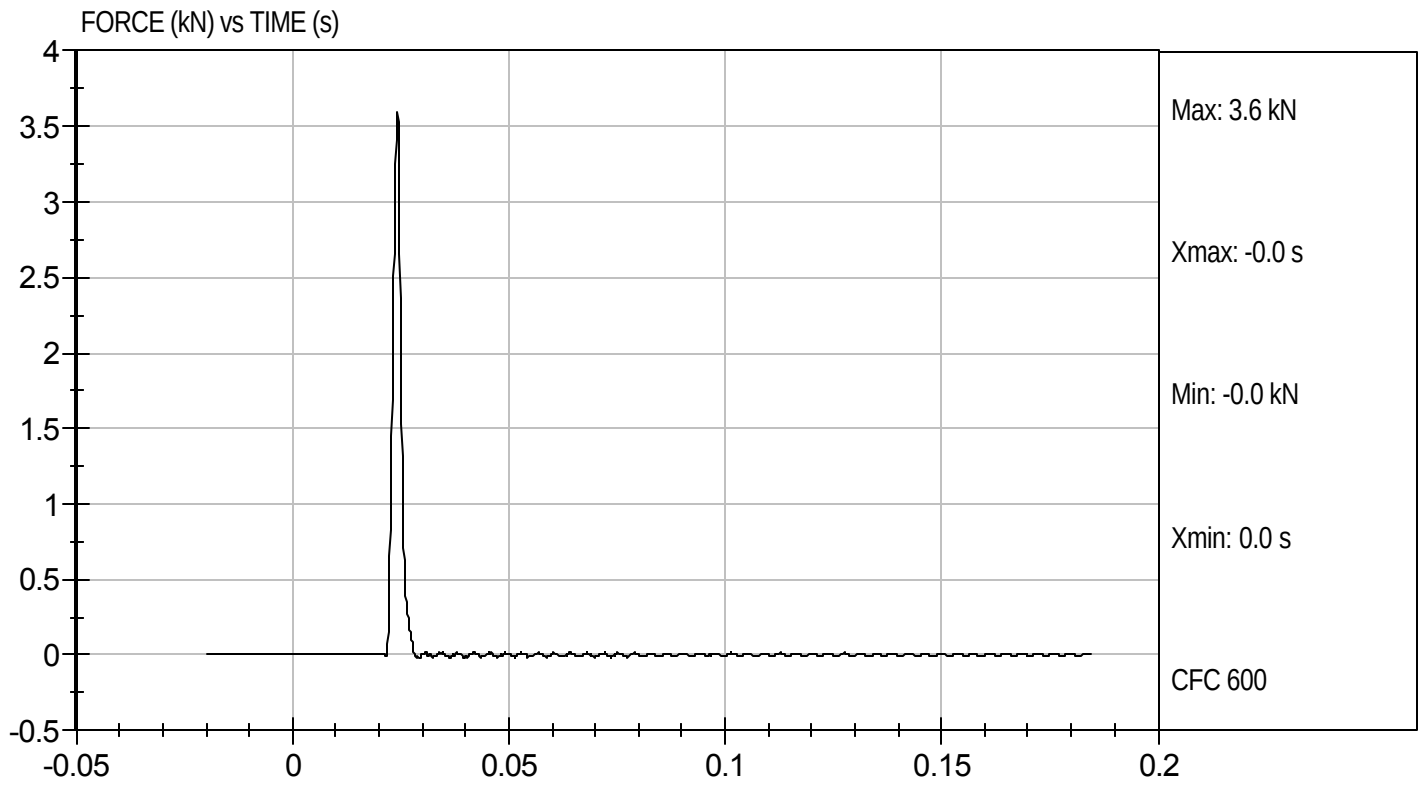
12/7/10
Test Date

David Winkelbauer
Approved By



Test Desc: Left Knee
Component ID: D104286

Test Date: 12/7/10
Velocity: 6.97 ft/s, 2.12 m/s

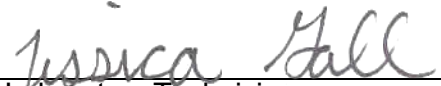


MGA RESEARCH CORPORATION
TORSO FLEXION TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test I.D: D104287

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	20.0	Pass
Laboratory Relative Humidity	%	10 to 70	14	Pass
Initial Angle	deg	0 to 20	17	Pass
Return Angle	deg	+/- 8	6	Pass
Force at 45 deg	N	320 to 390	372	Pass
Upper Torso Deflection Rate	Deg/sec	0.5 to 1.5	1.0	Pass
Overall Result				Pass


Laboratory Technician

12/6/10
Test Date


Approved By