REPORT NUMBER: NCAP-MGA-2011-019

NEW CAR ASSESSMENT PROGRAM (NCAP)
Frontal Barrier Impact Test

DAIMLER AG STUTTGART
2011 Mercedes-Benz C300 4-Dr Sedan
NHTSA No.: MB0502

MGA RESEARCH CORPORATION
5000 Warren Road
Burlington, WI 53105

Test Date: September 9, 2010

Final Report Date: April 26, 2011

FINAL REPORT

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

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

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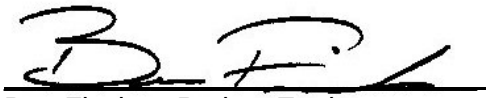
Approved by: 
Ben Fischer, Project Engineer

Approval Date: April 26, 2011

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

Technical Report Documentation Page

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16. Abstract

A 56.3 km/h Experimental 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 September 9, 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 619 mm located at the vehicle's centerline. The test vehicle's performance was as follows:

Measurement Description	Units	Threshold		Driver ATD	Passenger ATD
		50th	5th		
Head Injury Criteria (HIC_{15})	N/A	700	700	441	482
Maximum Chest Compression	mm	63	52	26	18
Nij	N/A	1	1	0.3	0.6
Neck Tension	N	4170	2620	1459	848
Neck Compression	N	4000	2520	124	1101
Left Femur Force	N	10008	6805	2502	3424
Right Femur Force	N	10008	6805	3646	3706

17. Key Words 35 mph Frontal Barrier Impact Test New Car Assessment Program (NCAP)		*18. Distribution Statement* Copies of this report are available from: National Highway Traffic Safety Adm. Technical Reference Division 1200 New Jersey Ave, SE Washington, D.C. 20590	
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TABLE OF CONTENTS

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 September 9, 2010. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

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

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

Both ATDs were fully instrumented with head, chest and pelvis tri-axial accelerometers, chest displacement potentiometers, upper neck transducers, right/left femur load cells, and lower leg instrumentation. Seat belt load cells were on the driver's lap and shoulder belts and the passenger's lap belt to measure dummy torso and pelvic section loading. The driver (position 1) ATD (Serial No. 351) and the right-front passenger (position 2) ATD (Serial No. 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 619 mm and both the driver and passenger side doors remained closed during the impact event and were operable after the impact.

The driver's head and chest contacted the airbag. The driver's head also contacted headrest. The driver's knees contacted the knee bolster and driver door. The passenger's head and chest contacted the airbag. The passenger's head also contacted the headrest. The passenger's knees contacted the glovebox.

The occupant data is summarized below:

ATD position	HIC_{15}	T^1	T^2	Chest Disp. (mm)	Nij	Neck Tension (N)	Neck Comp. (N)	Left Femur (N)	Right Femur (N)
Driver (50^{th})	441	70.7	85.7	26	0.3	1459	124	2502	3646
Passenger (5^{th})	482	58.6	73.6	18	0.6	848	1101	3424	3706

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 Left Upper Tibia MX after 40 msec.
Bottom of Engine X
Right Brake Caliper X after 25 msec.

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 NHTSA No.: MB0502
Test Program: NCAP Frontal Barrier Impact Test Test Date: 9/09/2010

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	MB0502
Model Year	2011
Make	Mercedes-Benz
Model	C300
Body Style	Sedan
VIN	WDDGF8BB0BR133324
Body Color	Mars Red
Delivery Date	9/02/2010
Odometer (mi)	102
Odometer (km)	164
Dealer	Concours Motors
Transmission	Automatic
Final Drive	AWD
Type/No. Cylinders	6
Engine Displacement (L)	3.0
Engine Placement	Longitudinal
Roof Rack	No
Sunroof/T-Top	Yes
Tinted Glass	No
Traction Control	Yes
Power Brakes	Yes
Front Disc	Yes
Rear Disc	Yes
Does owner's manual provide instructions to turn off automatic door locks?	Yes

Anti-Lock Brakes	Yes
All Wheel Drive	Yes
Power Steering	Yes
Driver Front Airbag	Yes
Driver Curtain Airbag	Yes
Driver Head/Torso Airbag	No
Driver Torso Airbag	Yes
Driver Torso/Pelvis Airbag	No
Driver Pelvis Airbag	Yes
Driver Knee Airbag	Yes
Pass. Front Airbag	Yes
Pass. Curtain Airbag	Yes
Pass. Head/Torso Airbag	No
Pass. Torso Airbag	Yes
Pass. Torso/Pelvis Airbag	No
Pass. Pelvis Airbag	Yes
Pass. Knee Airbag	No
Pretensioners	Yes
Load Limiters	Yes
Automatic Door Locks	Yes
Bucket Seats	Yes
Tilt Steering	Yes
Other	

DATA FROM CERTIFICATION LABEL

Manufactured By	Daimler AG Stuttgart
Date of Manufacture	06/10

GVWR (kg)	2120
GAWR Front (kg)	1070
GAWR Rear (kg)	1085

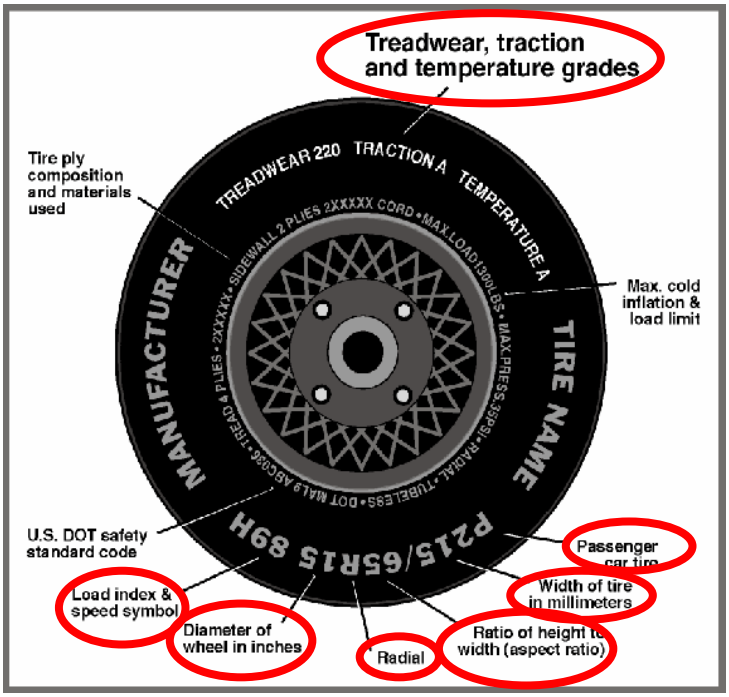
VEHICLE SEATING AND WEIGHT CAPACITY DATA

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 NHTSA No.: MB0502
Test Program: NCAP Frontal Barrier Impact Test Test Date: 9/09/2010



Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	240	260
Recommended Tire Size	225/40R18	255/35R18
Tire Size on Vehicle	225/45R17	245/40R17
Tire Manufacturer	Michelin	Michelin
Tire Model	PILOT	PILOT
Treadwear	300	300
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	2	2
Tire Plies Body	2	2
Load Index & Speed Symbol	91H	91H
Tire Material	Rubber	Rubber
DOT Safety Code Right	B98A	B96C
DOT Safety Code Left	B98A	B96C

DATA SHEET NO. 1 (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2011 Mercedes-Benz C300 4-Dr Sedan NHTSA No.: MB0502
Test Program: NCAP Frontal Barrier Impact Test Test Date: 9/09/2010

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	459.0	393.3		488.5	450.4	
Right	kg	472.7	391.4		495.3	445.5	
Ratio	%	54.3	45.7		52.3	47.7	
Totals	kg	931.7	784.7	1716.4	983.8	895.9	1879.7

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1716.4
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	1887.0

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	644	642	657	660	1263
As Tested	mm	640	639	640	646	1316
Post Test	mm	654	652	650	636	

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	11.3
Weight of Vehicle Components Removed	kg	22.7
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, trunk carpet, rear floor mats, front splash guard.

DATA SHEET NO. 1 (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2011 Mercedes-Benz C300 4-Dr Sedan NHTSA No.: MB0502
Test Program: NCAP Frontal Barrier Impact Test Test Date: 9/09/2010

TARGET VEHICLE STRUCTURAL MEASUREMENT

	Elements	Pre-Test (mm)
1	Total Length	4634
2	Total Width	2008
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

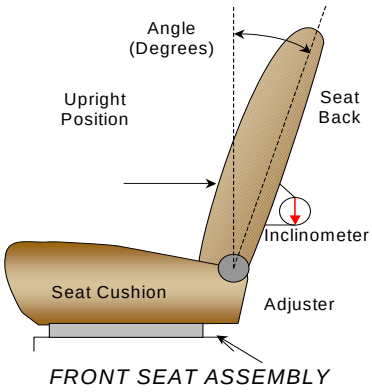
DATA SHEET NO. 2

SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

Test Vehicle: 2011 Mercedes-Benz C300 4-Dr Sedan NHTSA No.: MB0502
Test Program: NCAP Frontal Barrier Impact Test Test Date: 9/09/2010

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	16.2° on headrest post

SEAT FORE/AFT POSITIONS

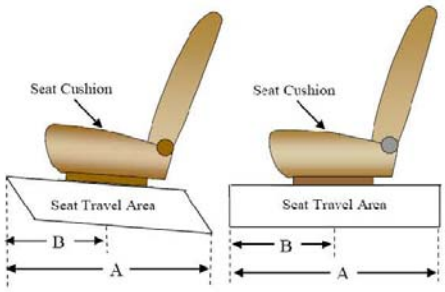
The driver and passenger seat fore/aft positions are adjusted following Appendix F, "Driver & Passenger Seating & Positioning Procedures" in the NCAP Test Procedure dated January 2010.

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 NHTSA No.: MB0502
Test Program: NCAP Frontal Barrier Impact Test Test Date: 9/09/2010

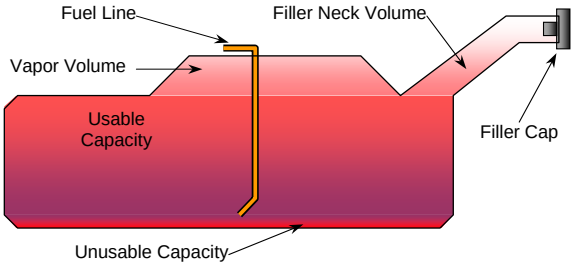
FUEL TANK CAPACITY DATA

	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.

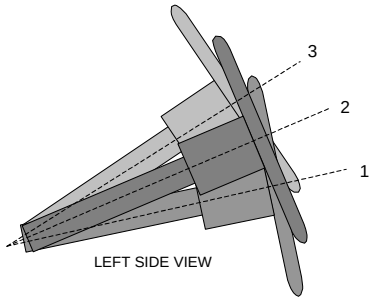
The vehicle is equipped with an electric fuel pump. The fuel pump is in operation if the ignition is switched to the "ON" position. After about 15 seconds, the pump switches back to standby mode, if the engine is not started. The fuel filler pipe is located on the right side.



VEHICLE FUEL TANK ASSEMBLY

STEERING COLUMN ADJUSTMENT

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



STEERING COLUMN ASSEMBLY

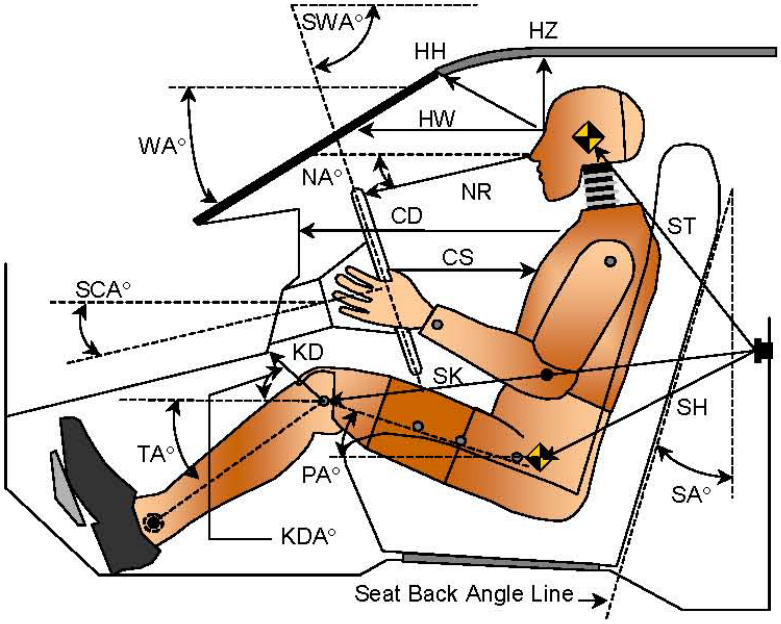
STEERING COLUMN POSITION

	Degrees	Fore/Aft Position (mm)
Lowermost – Position 1	69.0	240
Geometric Center – Position 2	66.8	215
Uppermost – Position 3	64.5	190
Telescoping Steering Wheel Travel		50
Test Position	66.8	215

DATA SHEET NO. 3

DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2011 Mercedes-Benz C300 4-Dr Sedan NHTSA No.: MB0502
Test Program: NCAP Frontal Barrier Impact Test Test Date: 9/09/2010

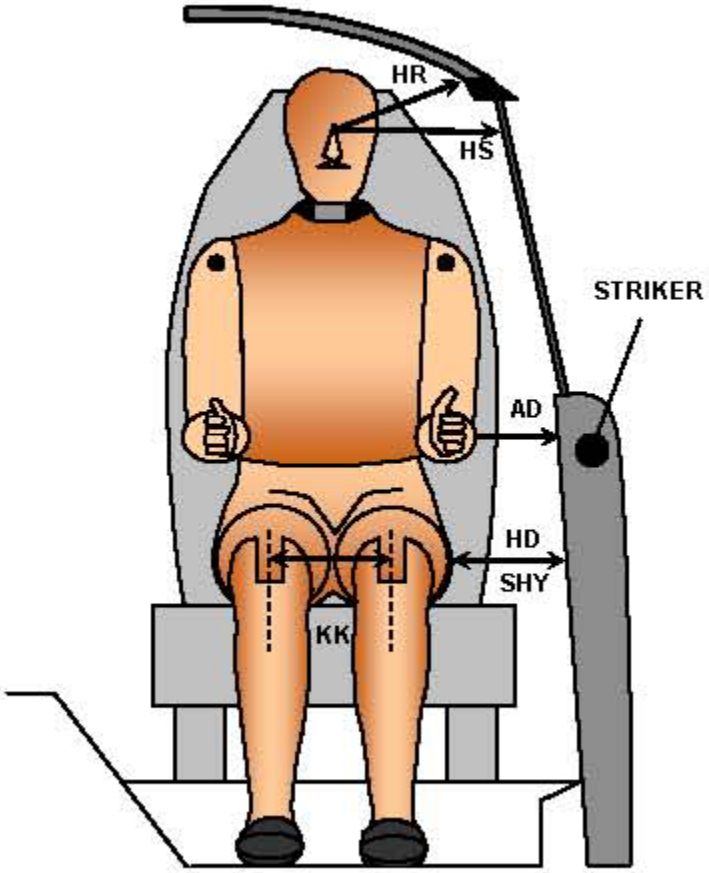


Code	Measurement Description	Driver S/N 351		Passenger S/N 634	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA	Windshield Angle		29.8		
SWA	Steering Wheel Angle		66.8		
SCA	Steering Column Angle		23.2		
SA	Seat Back Angle (headrest bezel)		21.0		16.2
HZ	Head to Roof (Z)	146	90	157	90
HH	Head to Header	320	25.4	250	43.8
HW	Head to Windshield	570	0	518	0
NR	Nose to Rim	374	10.5		
CD	Chest to Dash	500		378	
CS	Chest to Steering Hub	282	2.8		
RA	Rim to Abdomen	171	0		
KDL	Left Knee to Dash	140	33.8	95	35.0
KDR	Right Knee to Dash	121	41.2	85	30.4
PA	Pelvic Angle		24.2		21.4
TA	Tibia Angle		40.9		44.7
SK	Striker to Knee	558	99.5	636	99.5
ST	Striker to Head	402	9.5	403	26.4
SH	Striker to H-Point	280	138.5	354	119.5

DATA SHEET NO. 4

DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2011 Mercedes-Benz C300 4-Dr Sedan NHTSA No.: MB0502
Test Program: NCAP Frontal Barrier Impact Test Test Date: 9/09/2010



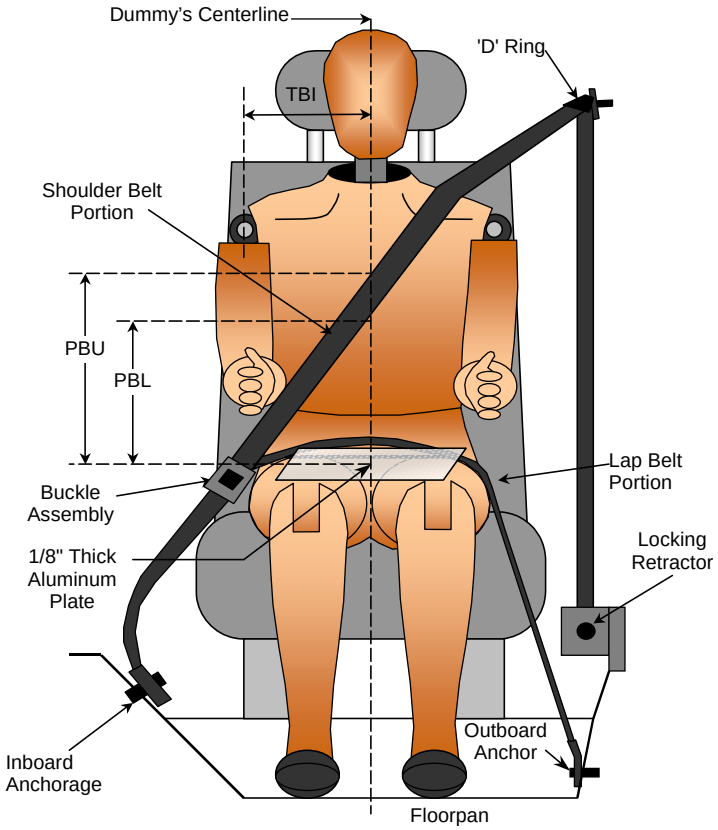
FRONT VIEW OF DUMMY

Code	Measurement Description	Driver S/N 351	Passenger S/N 634
		Length (mm)	
AD	Arm to Door	114	68
HD	H-Point to Door	146	152
HR	Head to Side Header	205	212
HS	Head to Side Window	318	330
KK	Knee to Knee	320	215
SHY	Striker to H-Point (Y Direction)	275	280
AA	Ankle to Ankle	305	175

DATA SHEET NO. 5

SEAT BELT POSITIONING DATA

Test Vehicle: 2011 Mercedes-Benz C300 4-Dr Sedan NHTSA No.: MB0502
Test Program: NCAP Frontal Barrier Impact Test Test Date: 9/09/2010



FRONT VIEW OF DUMMY

SEAT BELT POSITIONING MEASUREMENTS

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

BELT LENGTH DATA

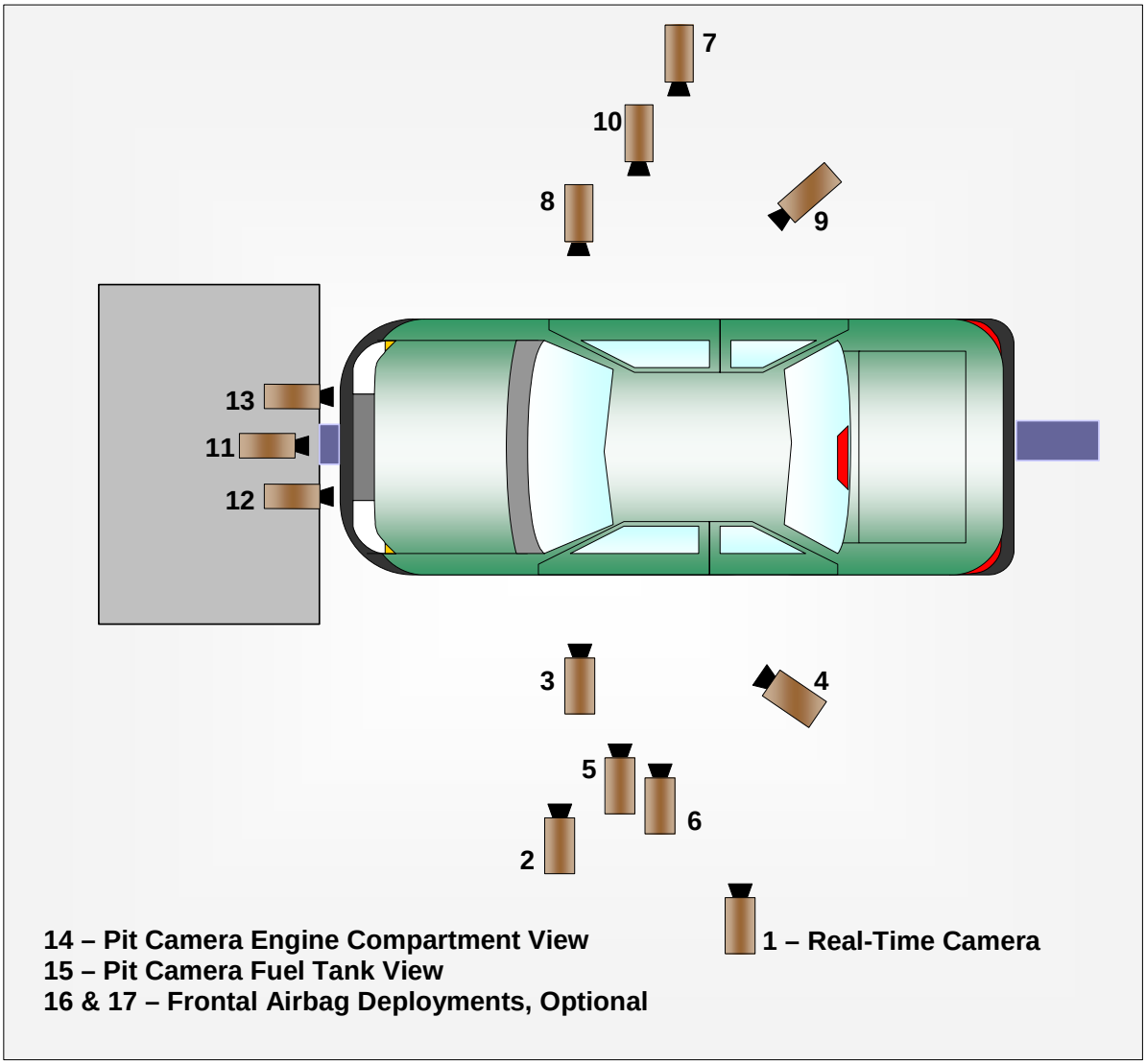
Measurement Description	Units	Driver	Passenger
Shoulder Belt Length as measured on ATD	mm	900	900
Lap Belt Length as measured on ATD	mm	660	595
Remainder of belt on reel	mm	1490	1505
Total Belt Length for Continuous Webbing Systems	mm	3050	3000

DATA SHEET NO. 6

HIGH-SPEED CAMERA LOCATIONS AND DATA

Test Vehicle:	2011 Mercedes-Benz C300 4-Dr Sedan	NHTSA No.:	MB0502
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	9/09/2010

CAMERA POSITIONS FOR FRONTAL IMPACTS



14 – Pit Camera Engine Compartment View
15 – Pit Camera Fuel Tank View
16 & 17 – Frontal Airbag Deployments, Optional

1 – Real-Time Camera

DATA SHEET NO. 6 (CONTINUED)

CAMERA LOCATIONS AND DATA

Test Vehicle: 2011 Mercedes-Benz C300 4-Dr Sedan NHTSA No.: MB0502
Test Program: NCAP Frontal Barrier Impact Test Test Date: 9/09/2010

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	-4820	-1240	24	1000
3	Driver Close-Up	1520	-6230	-1740	35	1000
4	Driver Angle	5530	-4720	-1940	50	1000
5	Steering Column Top	600	-5190	-1240	25	1000
6	Steering Column Bottom	580	-5100	-850	25	1000
7	Right Overall	2210	6640	-1170	20	1000
8	Passenger Close-Up	1560	6410	-1700	35	1000
9	Passenger Angle	5550	4790	-1880	50	1000
10	Right Front Half	1160	5000	-1160	24	1000
11	Windshield	-260	0	-2860	24	1000
12	Top Driver	-30	-360	-2270	16	1000
13	Top Passenger	-30	360	-2270	16	1000
14	Pit Front	1160	0	3150	24	1000
15	Pit Rear	3250	0	3150	24	1000
16	Onboard Driver Side (optional)					
17	Onboard Passenger Side (optional)					
18	Real-Time Pan View					30

*COORDINATES:

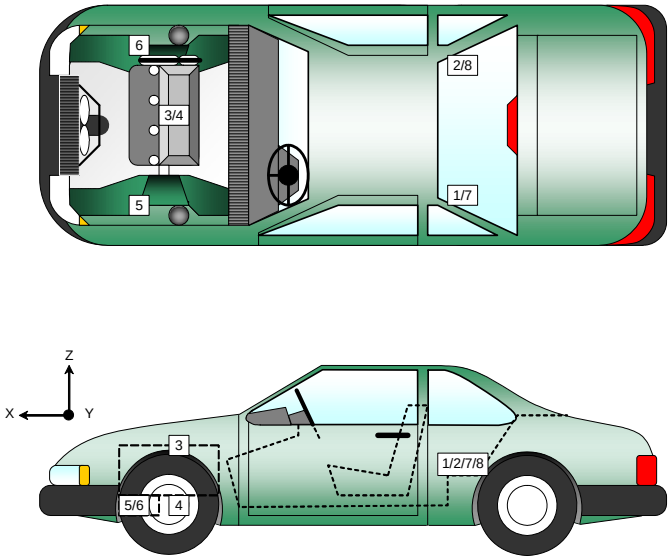
+X = forward of impact plane
+Y = right of monorail centerline
+Z = below ground level

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 NHTSA No.: MB0502
Test Program: NCAP Frontal Barrier Impact Test Test Date: 9/09/2010



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

ACCELEROMETER LOCATION				
No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear X-Member X	1905	-362	-218
2	Right Rear X-Member X	1905	362	-218
3	Engine Top X	3881	0	-770
4	Engine Bottom X	3835	0	-148
5	Left Brake Caliper X	3676	-655	-179
6	Right Brake Caliper X	3676	655	-179
7	Left Rear X-Member Z	1905	-362	-218
8	Right Rear X-Member Z	1905	362	-218

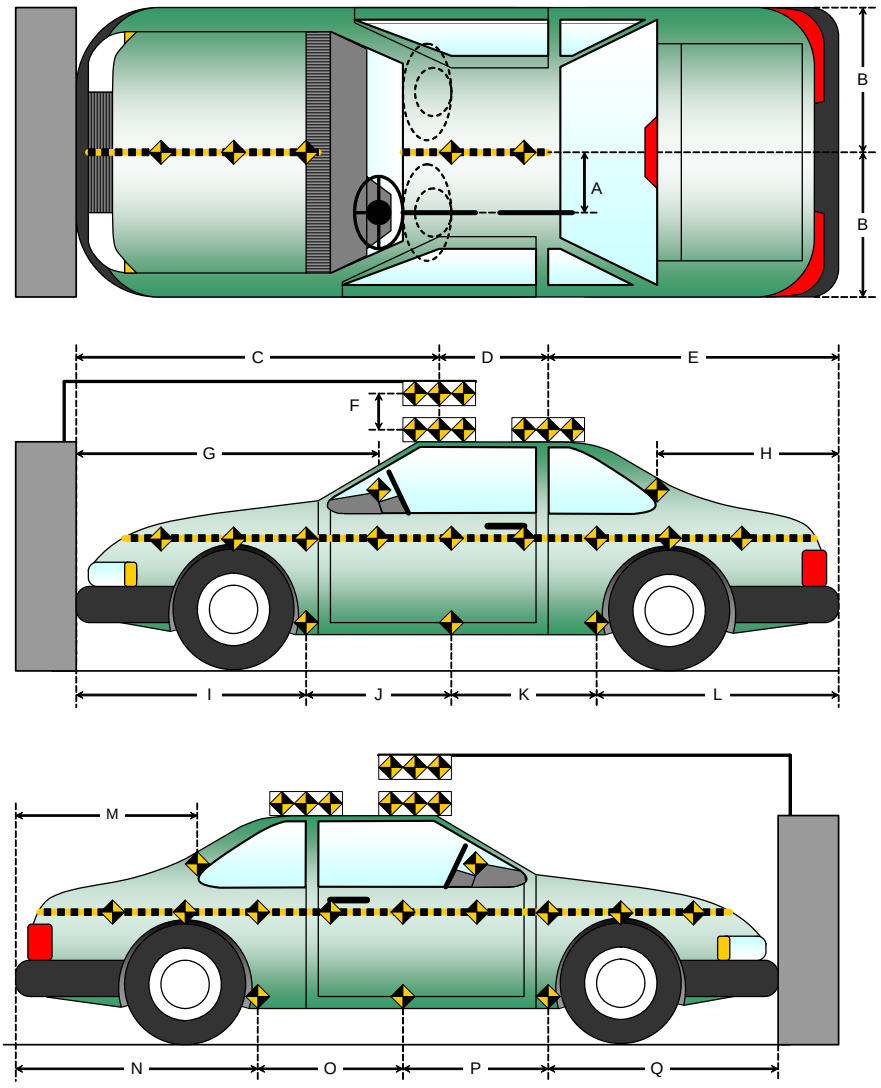
Reference Points: X - Rear Surface of Vehicle (+ forward)
Y - Vehicle Centerline (+ to right)
Z - Ground Plane (+ down)

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.: MB0502
Test Date: 9/09/2010

Item	Value (mm)
A	350
B	1004
C	2159
D	670
E	1805
F	110
G	
H	1008
I	1262
J	957
K	957
L	1458
M	1018
N	1458
O	957
P	957
Q	1262

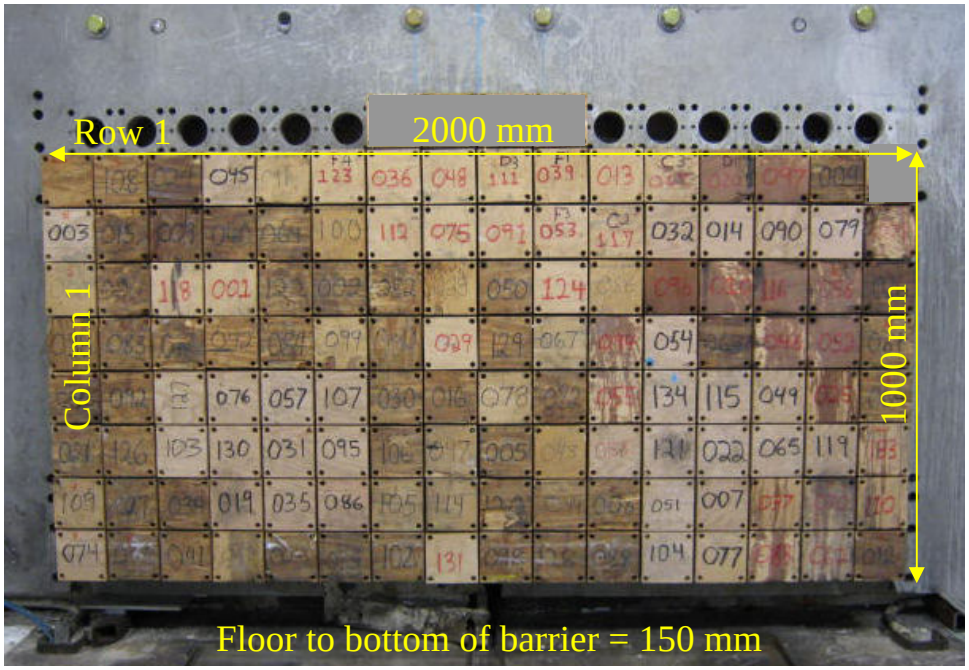


DATA SHEET NO. 9

LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle: 2011 Mercedes-Benz C300 4-Dr Sedan NHTSA No.: MB0502
Test Program: NCAP Frontal Barrier Impact Test Test Date: 9/09/2010

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 NHTSA No.: MB0502
Test Program: NCAP Frontal Barrier Impact Test Test Date: 9/09/2010

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.: MB0502
Test Program: NCAP Frontal Barrier Impact Test Test Date: 9/09/2010

TEST DUMMY INFORMATION AND CONTACT

Description	Driver	Passenger
Dummy Type / Serial No.	HIII 50% / 351	HIII 5% / 634
Head Contact	Airbag, Headrest	Airbag, Headrest
Upper Torso Contact	Airbag	Airbag
Lower Torso Contact	None	None
Left Knee Contact	Knee Bolster, Driver Door	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	None
Window Damage	None
Other Notable Effects	None

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	768
Center	mm	730
Right Side	mm	774
Average	mm	757

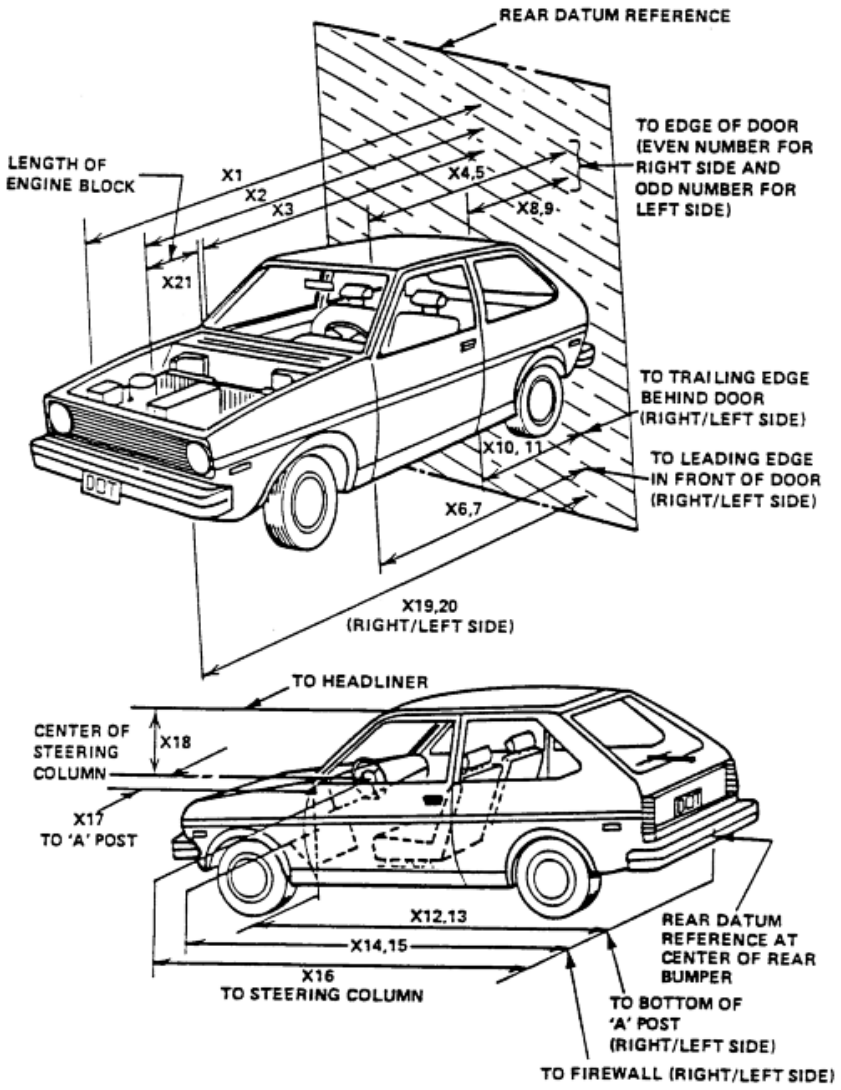
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Left Front (Driver) P1		Right Front (Passenger)	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	Yes	Yes	Yes
Knee Airbag	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 NHTSA No.: MB0502
Test Program: NCAP Frontal Barrier Impact Test Test Date: 9/09/2010



DATA SHEET NO. 12 (CONTINUED)

VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2011 Mercedes-Benz C300 4-Dr Sedan NHTSA No.: MB0502
Test Program: NCAP Frontal Barrier Impact Test Test Date: 9/09/2010

RSOV (Rear Surface of Vehicle)

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	mm	4634	4015	619
2	RSOV to Front of Engine	mm	3985	3971	14
3	RSOV to Firewall	mm	3464	3408	56
4	RSOV to Upper Leading Edge of Right Door	mm	3184	3185	-1
5	RSOV to Upper Leading Edge of Left Door	mm	3187	3194	-7
6	RSOV to Lower Leading Edge of Right Door	mm	3195	3193	2
7	RSOV to Lower Leading Edge of Left Door	mm	3200	3195	5
8	RSOV to Upper Trailing Edge of Right Door	mm	2088	2091	-3
9	RSOV to Upper Trailing Edge of Left Door	mm	2095	2098	-3
10	RSOV to Lower Trailing Edge of Right Door	mm	2120	2120	0
11	RSOV to Lower Trailing Edge of Left Door	mm	2125	2126	-1
12	RSOV to Bottom of “A” Post of Right Side	mm	3210	3204	6
13	RSOV to Bottom of “A” Post of Left Side	mm	3215	3184	31
14	RSOV to Firewall, Right Side	mm	3414	3368	46
15	RSOV to Firewall, Left Side	mm	3408	3351	57
16	RSOV to Steering Column	mm	2669	2751	-82
17	Center of Steering Column to “A” Post	mm	382	377	5
18	Center of Steering Column to Headliner	mm	433	456	-23
19	RSOV to Right Side of Front Bumper	mm	4419	4003	416
20	RSOV to Left Side of Front Bumper	mm	4419	4020	399
21	Length of Engine Block	mm	536	536	0
RD	RSOV to Right Side of Dash Panel	mm	2930	2930	0
CD	RSOV to Center of Dash Panel	mm	2999	2990	9
LD	RSOV to Left Side of Dash Panel	mm	2946	2937	9

DATA SHEET NO. 13

ACCIDENT INVESTIGATION DIVISION DATA

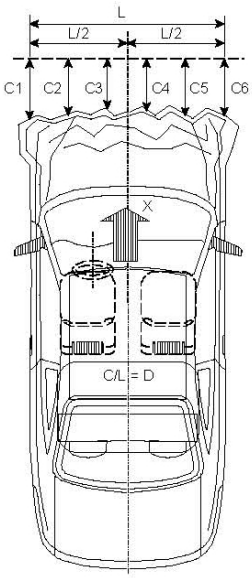
Test Vehicle: 2011 Mercedes-Benz C300 4-Dr Sedan NHTSA No.: MB0502
Test Program: NCAP Frontal Barrier Impact Test Test Date: 9/09/2010

VEHICLE INFORMATION

VIN: WDDGF8BB0BR133324 Wheelbase (mm): 2762
Vehicle Size Category: Sedan Test Weight (kg): 1879.7

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): 59.2
Time of Separation (msec): 97.7



CRUSH PROFILE

Collision Deformation Classification: Frontal
Midpoint of Damage: Centerline
Damage Region Length (mm): 1506
Impact Mode: Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	4419	4020	399
C2	Crush zone 2 at left side	mm	4525	4025	500
C3	Crush zone 3 at left side	mm	4562	4005	557
C4	Crush zone 4 at right side	mm	4562	4005	557
C5	Crush zone 5 at right side	mm	4525	4020	505
C6	Crush zone 6 at right side	mm	4419	4003	416
L	C1 TO C6	mm	1506	1505	1

DATA SHEET NO. 14

VEHICLE INTRUSION MEASUREMENTS

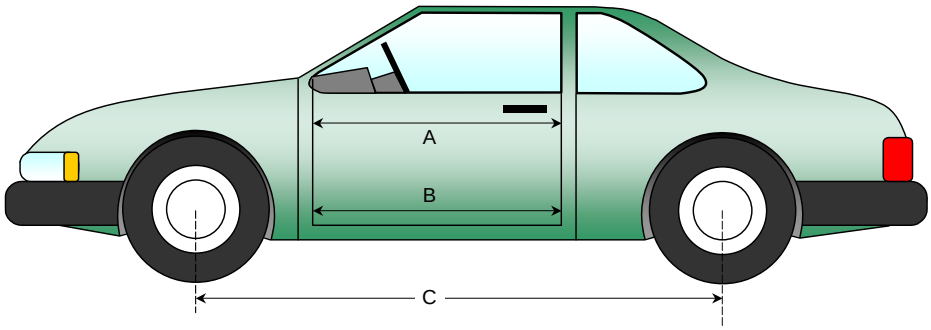
Test Vehicle: 2011 Mercedes-Benz C300 4-Dr Sedan NHTSA No.: MB0502
Test Program: NCAP Frontal Barrier Impact Test Test Date: 9/09/2010

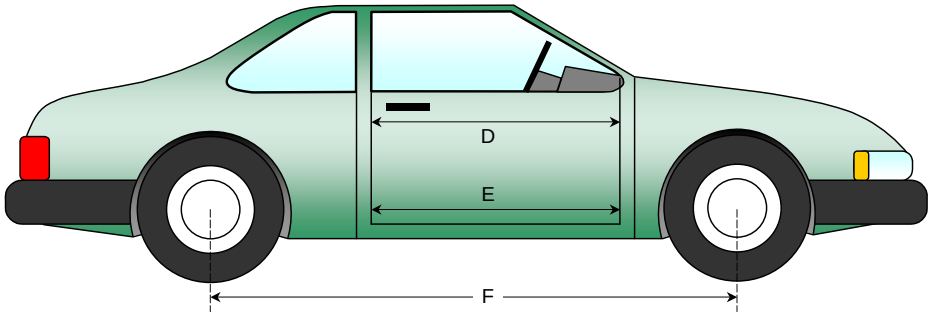
DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	909	906	3
B	Left Side Lower	mm	819	817	2
D	Right Side Upper	mm	909	909	0
E	Right Side Lower	mm	819	819	0

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2762	2639	123
F	Right Side Wheelbase	mm	2762	2645	117





DATA SHEET NO. 14 (CONTINUED)

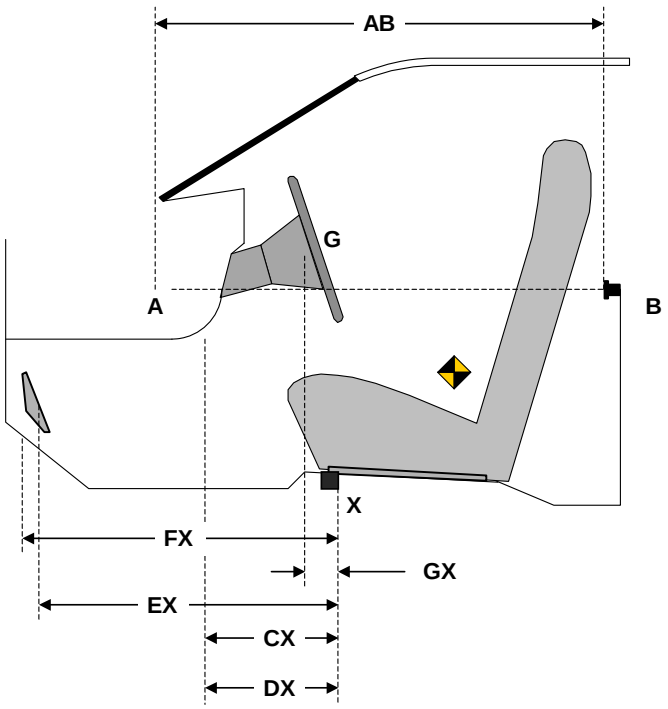
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2011 Mercedes-Benz C300 4-Dr Sedan NHTSA No.: MB0502
Test Program: NCAP Frontal Barrier Impact Test Test Date: 9/09/2010

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside window jam)	mm	723	723	0
CX	Left Knee Bolster to X	mm	279	285	-6
DX	Right Knee Bolster to X	mm	264	268	-4
EX	Brake Pedal to X	mm	614	566	48
FX	Foot Rest to X	mm	635	643	-8
GX	Center of Steering Column Wheel Hub to X	mm	85	135	-50

X = Front of Seat Track (stationary)

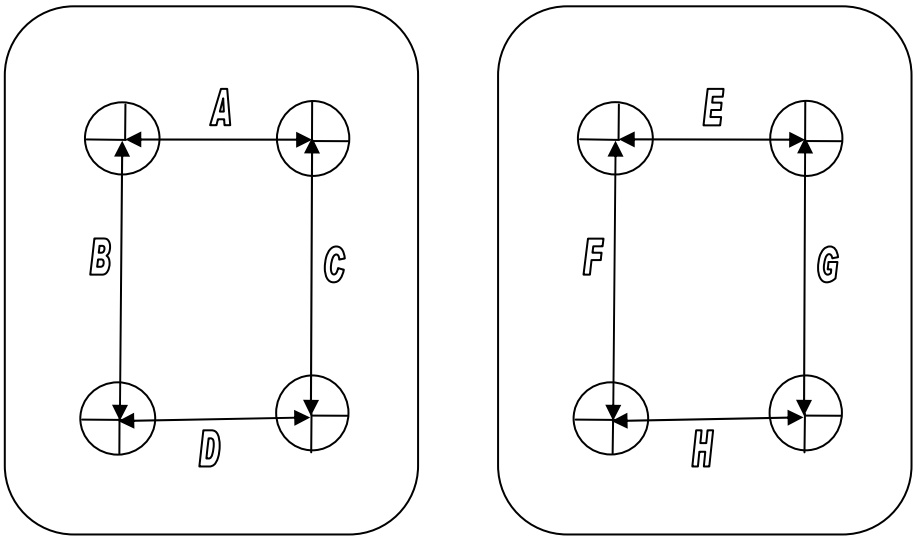


DRIVER COMPARTMENT

DATA SHEET NO. 14 (CONTINUED)

VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2011 Mercedes-Benz C300 4-Dr Sedan NHTSA No.: MB0502
Test Program: NCAP Frontal Barrier Impact Test Test Date: 9/09/2010



Driver Passenger

TOP VIEW THROUGH FLOOR PAN

UNDERBODY FLOORBOARD DEFORMATION

Measurement	Units	Pre-Test	Post-Test	Difference
A	mm	174	171	3
B	mm	174	158	16
C	mm	174	172	2
D	mm	174	171	3
E	mm	174	174	0
F	mm	202	202	0
G	mm	174	170	4
H	mm	174	166	8

DATA SHEET NO. 15

SUMMARY OF FMVSS 212, 219 (PARTIAL), AND 301 DATA

Test Vehicle: 2011 Mercedes-Benz C300 4-Dr Sedan NHTSA No.: MB0502
Test Program: NCAP Frontal Barrier Impact Test Test Date: 9/09/2010

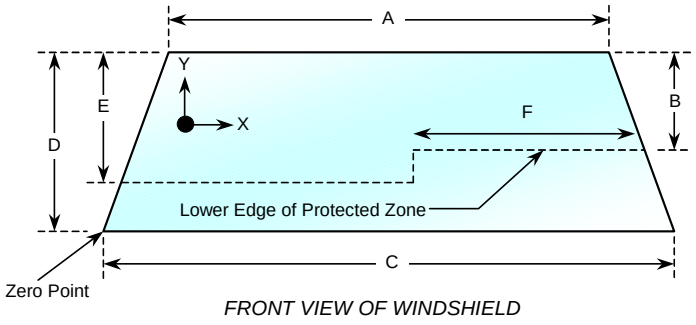
Windshield Mounting Details:
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

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



FRONT VIEW OF WINDSHIELD

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.:	MB0502
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	9/09/2010

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Test Time: 11:10 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)

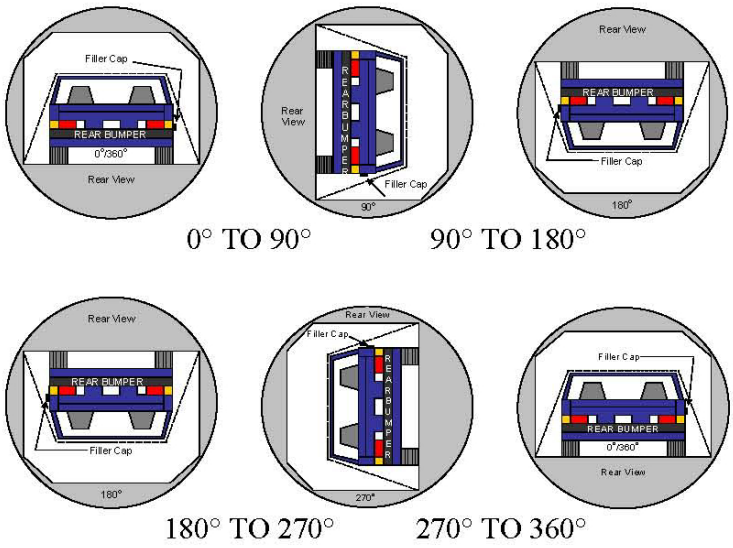
D. Spillage Details: None

DATA SHEET NO. 16

FMVSS 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2011 Mercedes-Benz C300 4-Dr Sedan NHTSA No.: MB0502
Test Program: NCAP Frontal Barrier Impact Test Test Date: 9/09/2010

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°	113	300	413
90° to 180°	111	300	411
180° to 270°	102	300	402
270° to 360°	113	300	413

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

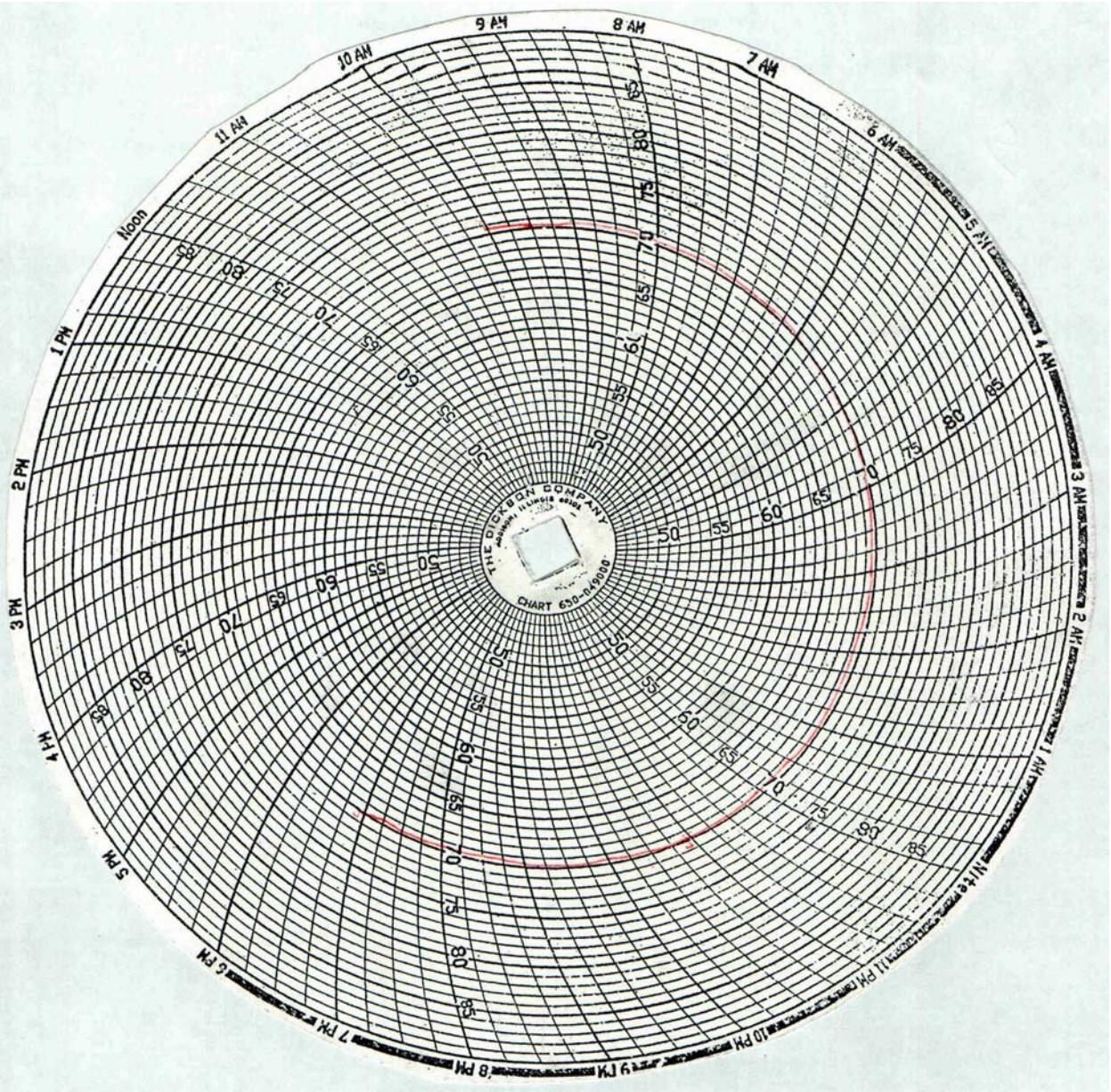
ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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

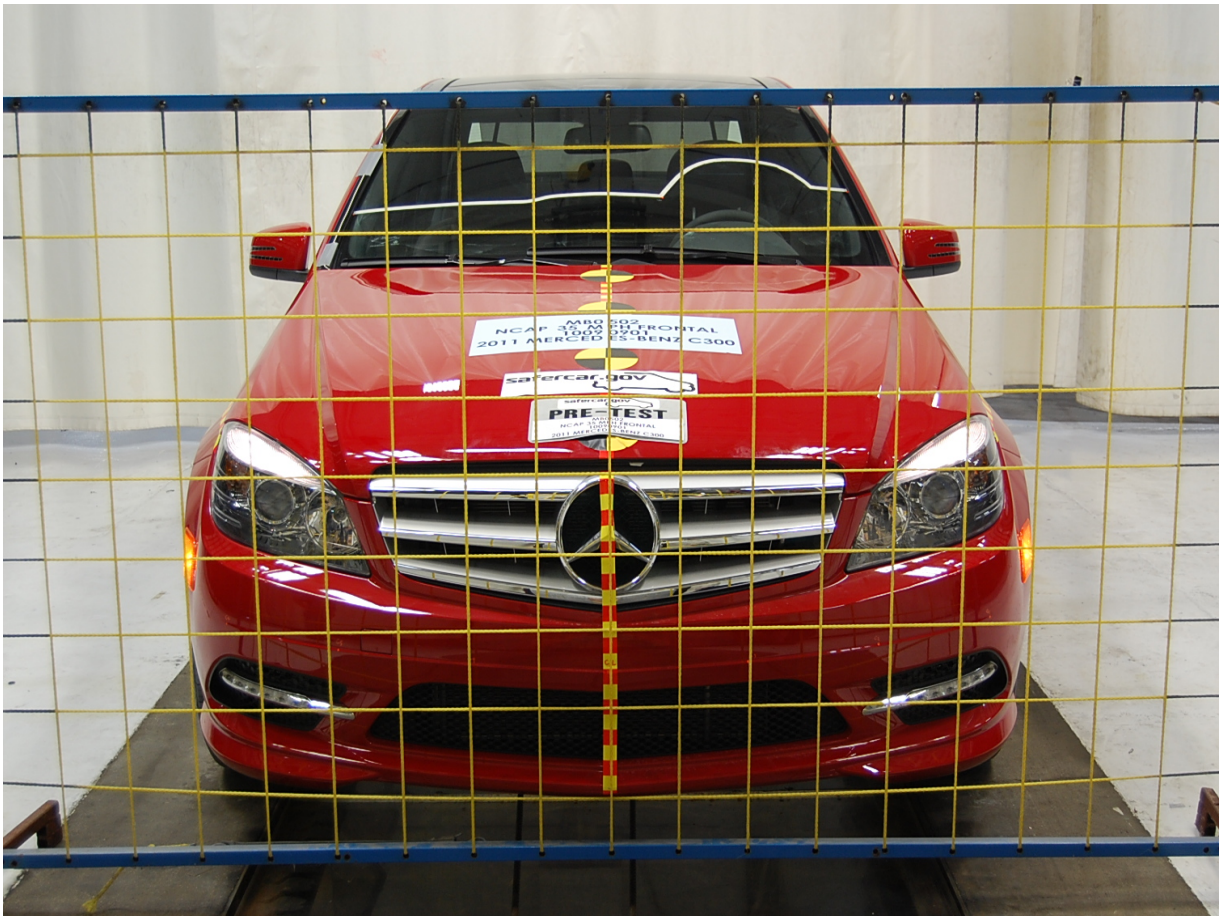
Test Vehicle: 2011 Mercedes-Benz C300 4-Dr Sedan NHTSA No.: MB0502
Test Program: NCAP Frontal Barrier Impact Test Test Date: 9/09/2010



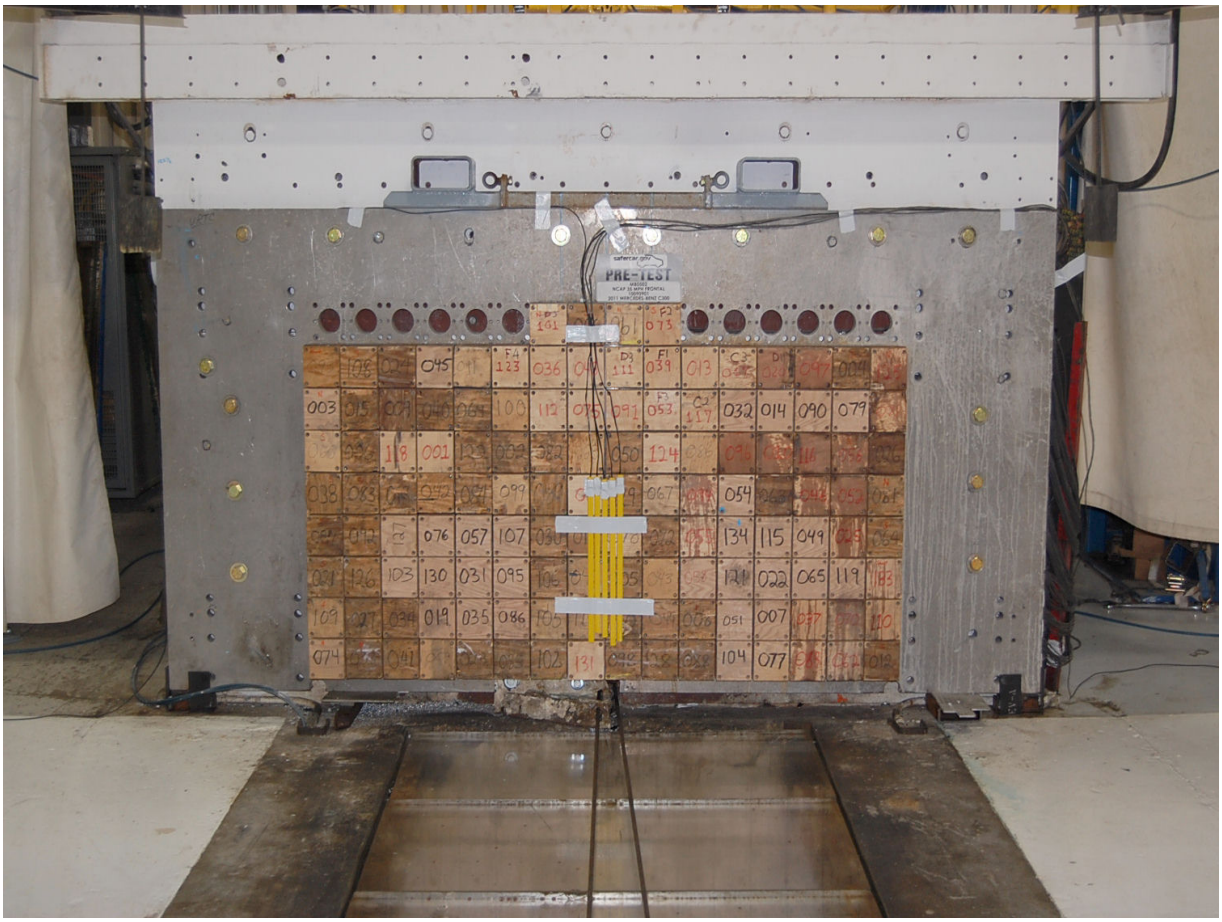
APPENDIX A

PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

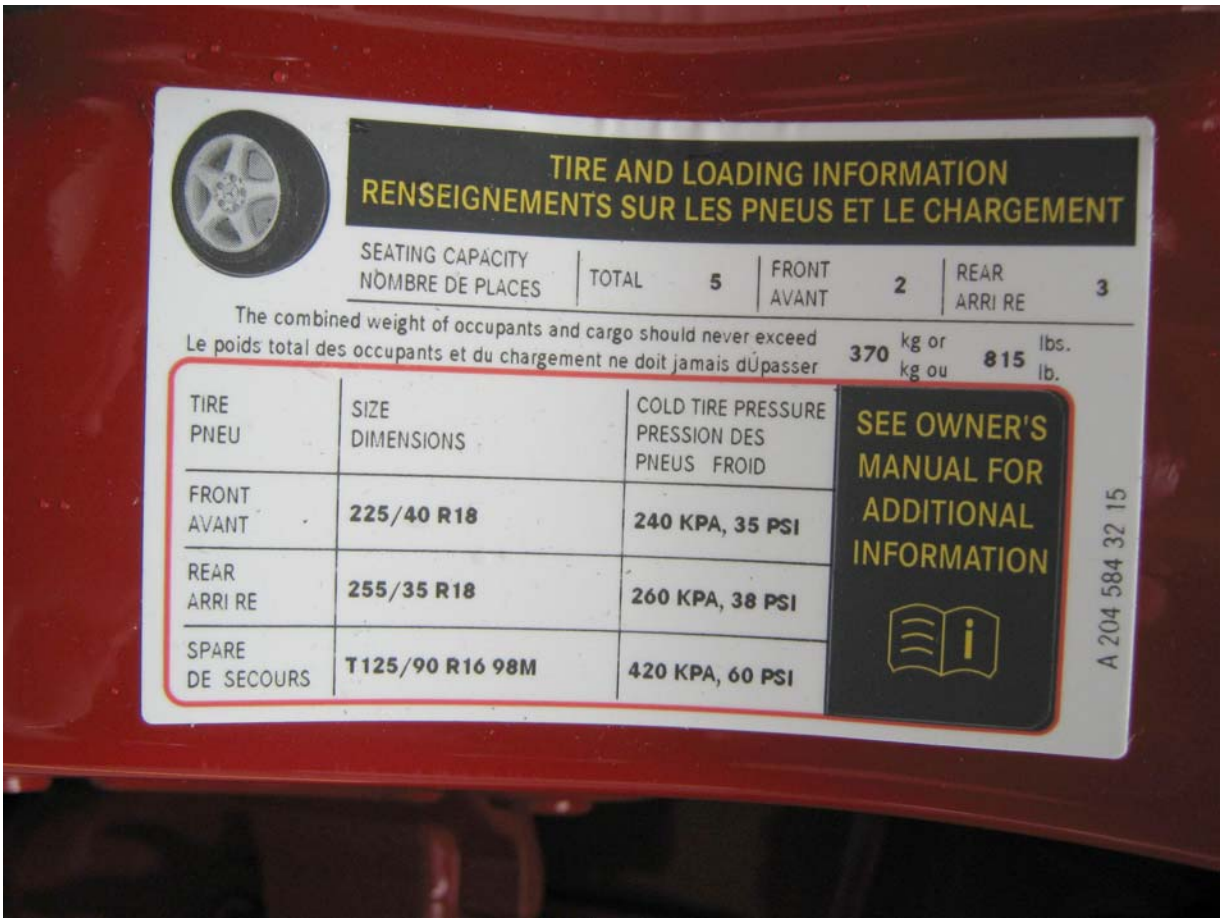


Load Cell Location



Load Cell Wall

Manufacturer's Label



Tire Placard

Right Front Three-Quarter View, As Received

Left Rear Three-Quarter View, As Received

Pre-Test Front View

Post-Test Front View

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

Post-Test Left Side View

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

Post-Test Right Side View

Pre-Test Right Front Three-Quarter View

Post-Test Right Front Three-Quarter View

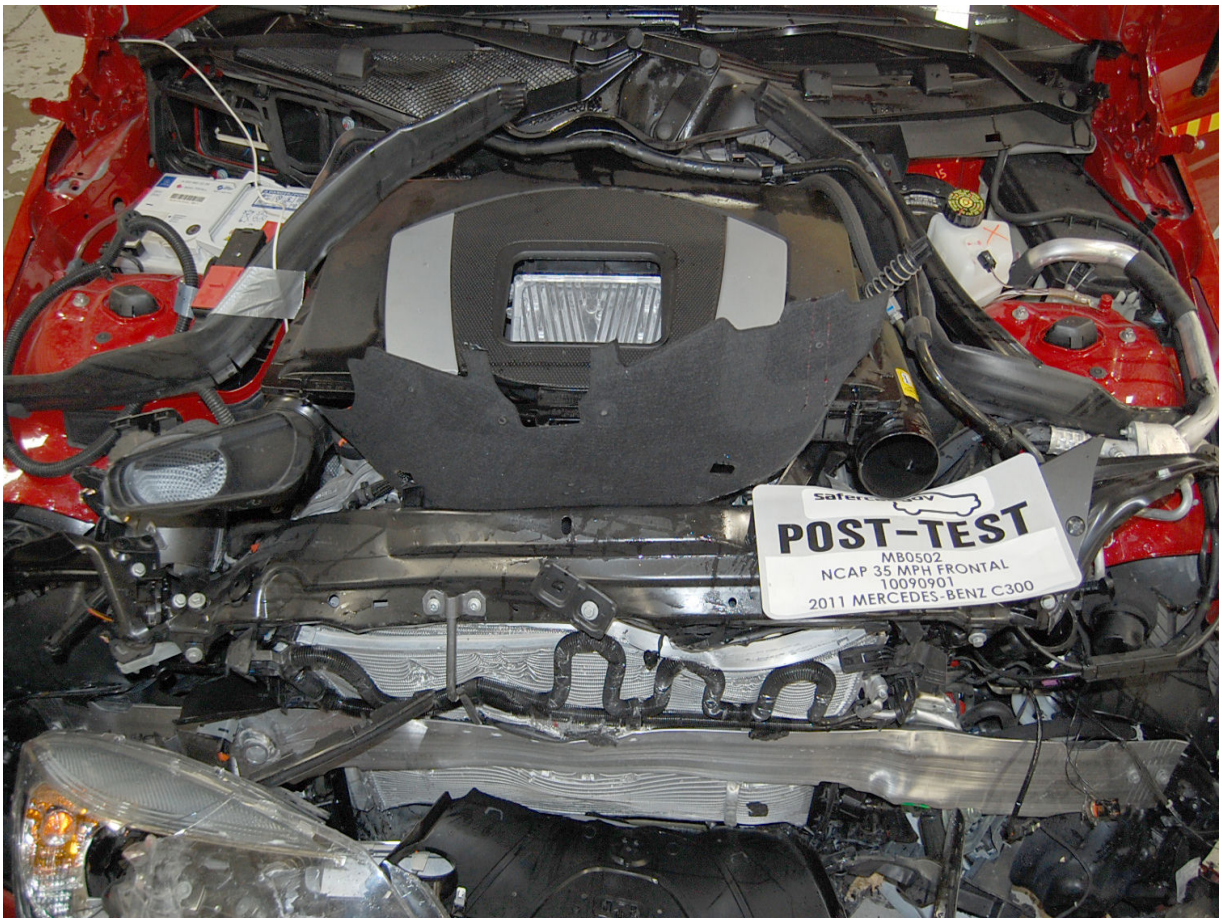
Pre-Test Left Rear Three-Quarter View (with vehicle at barrier)

Post-Test Left Rear Three-Quarter View

Pre-Test Windshield View

Post-Test Windshield View

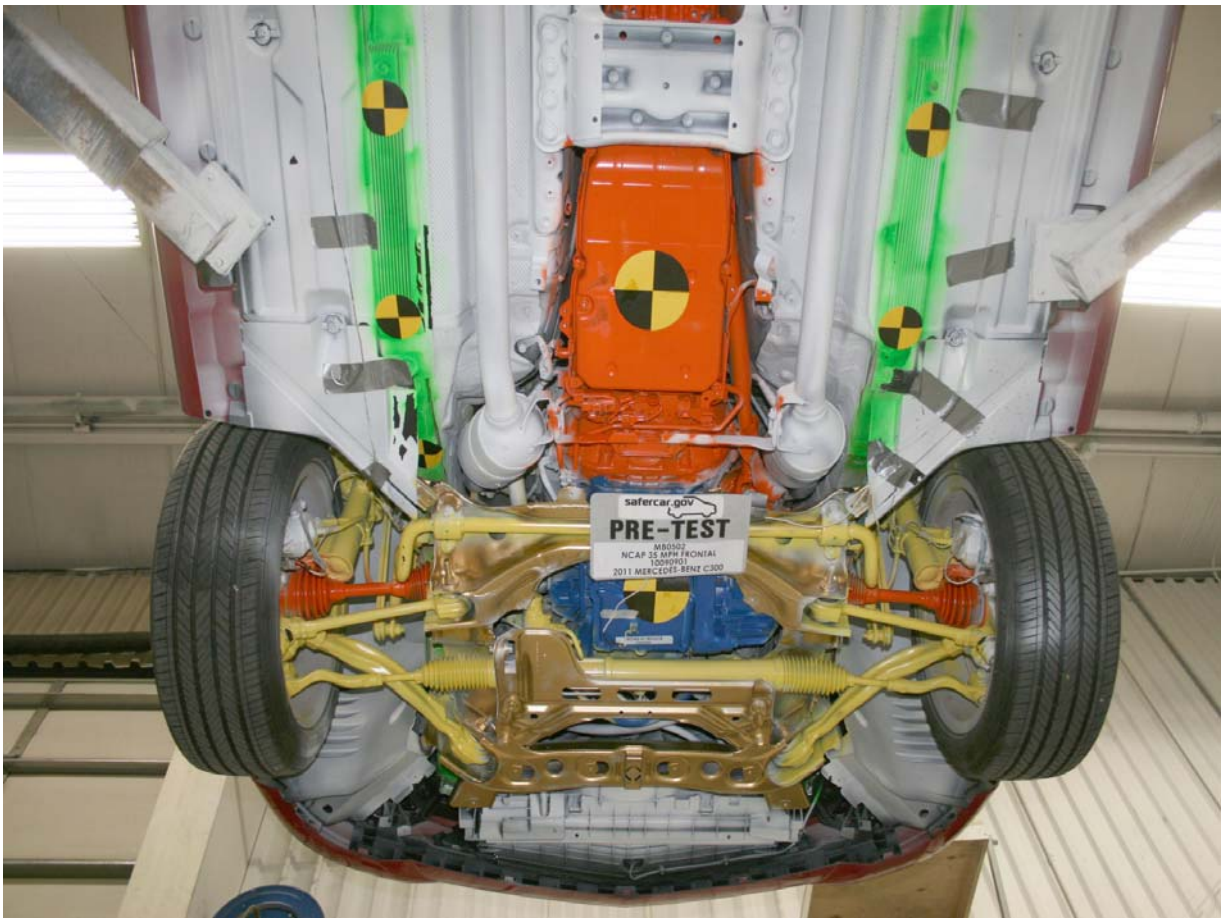
Pre-Test Engine Compartment View



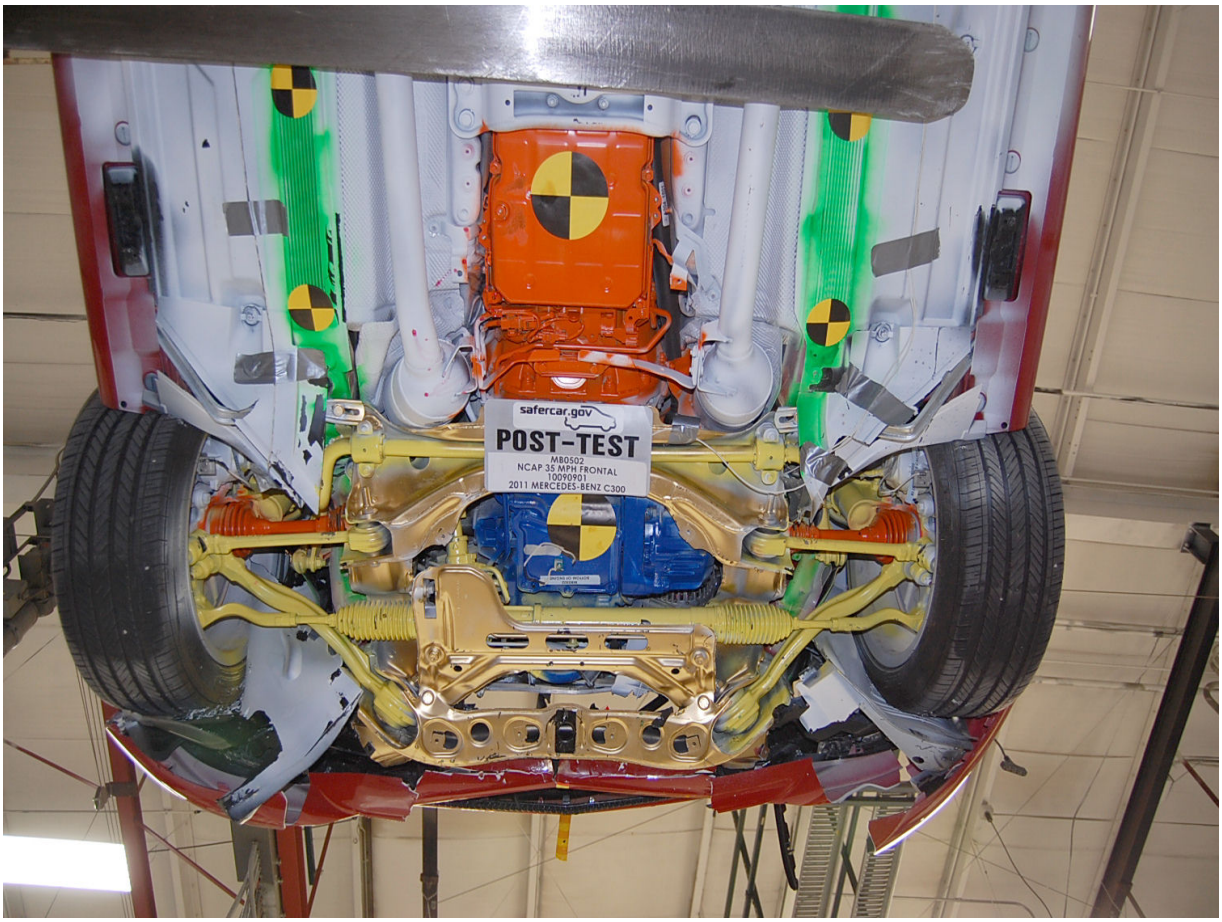
Post-Test Engine Compartment View

Pre-Test Fuel Cap View

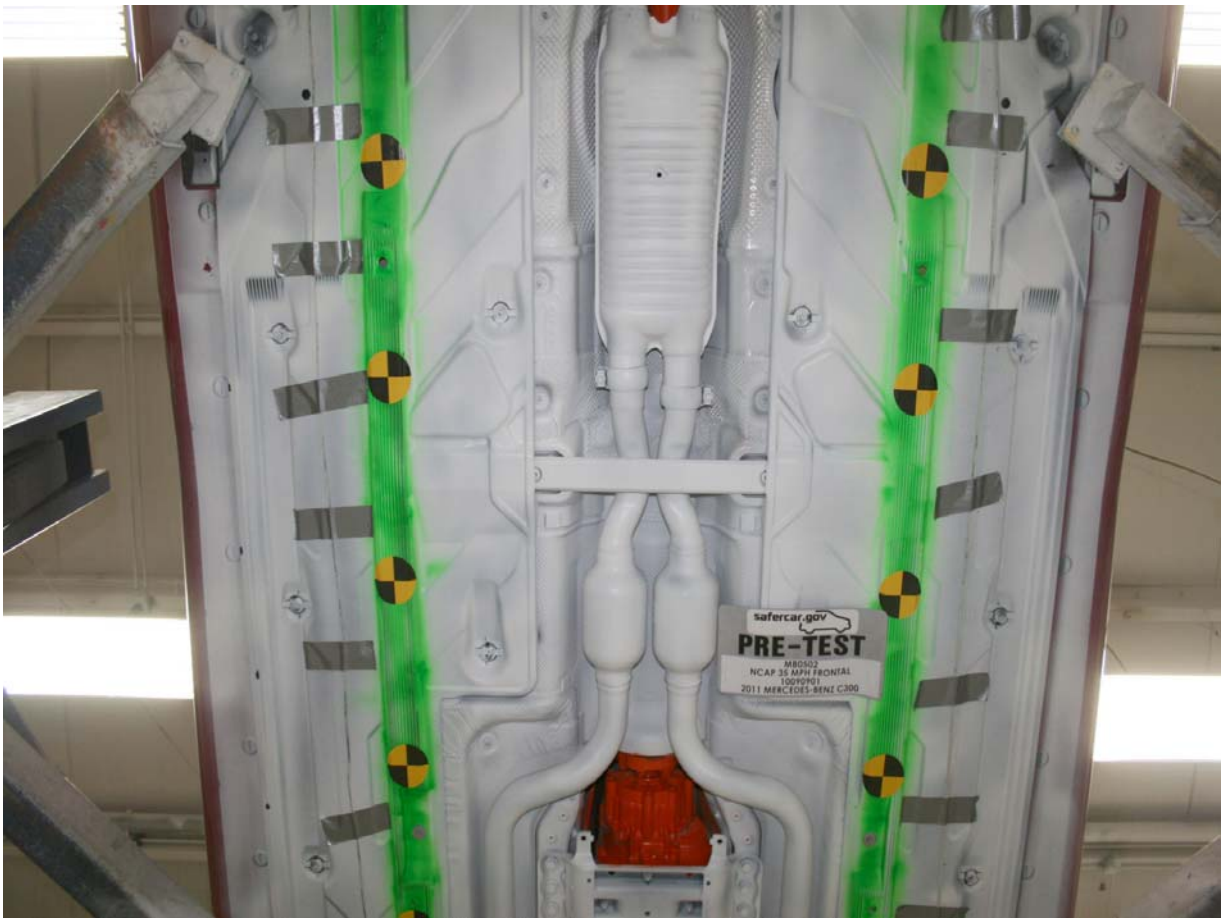
Post-Test Fuel Cap View



Pre-Test Front Underbody View

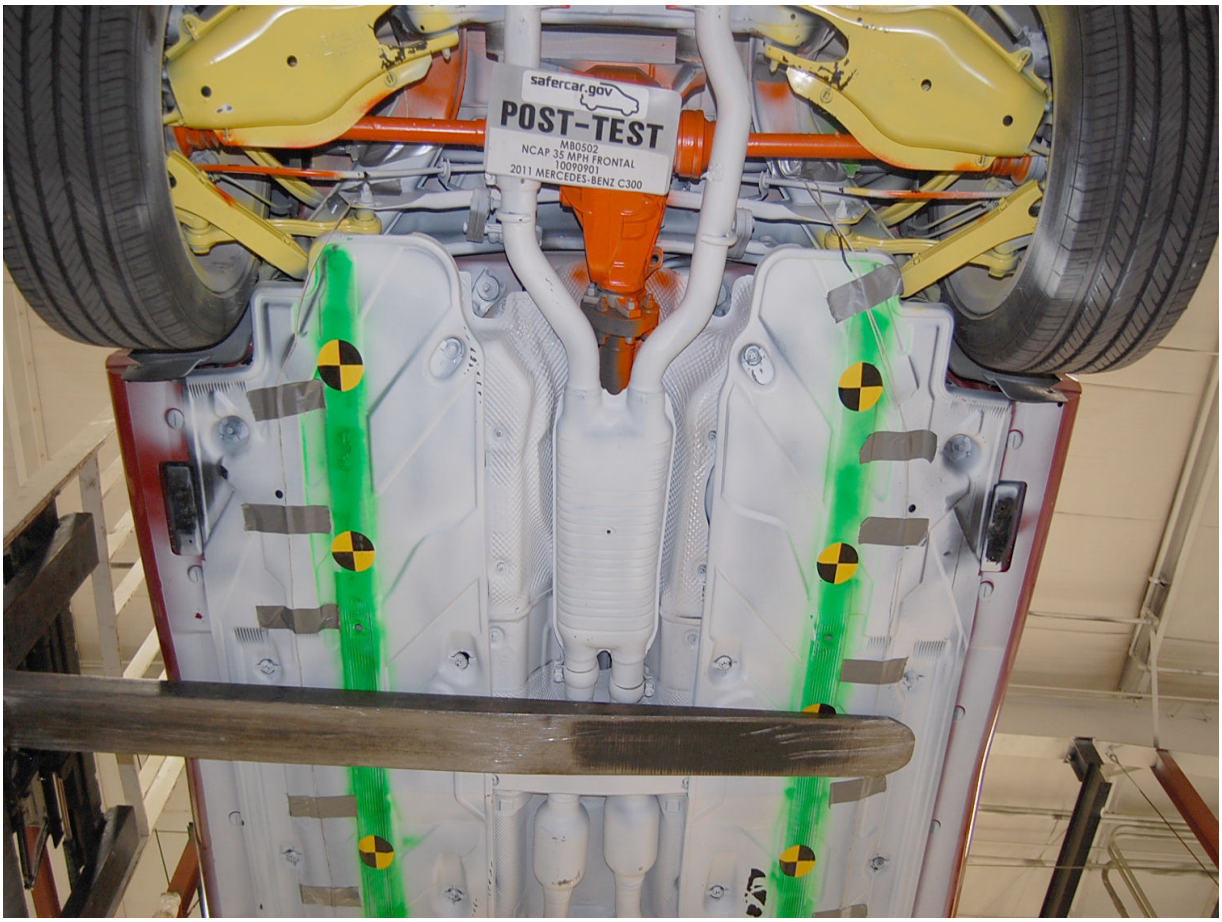


Post-Test Front Underbody View

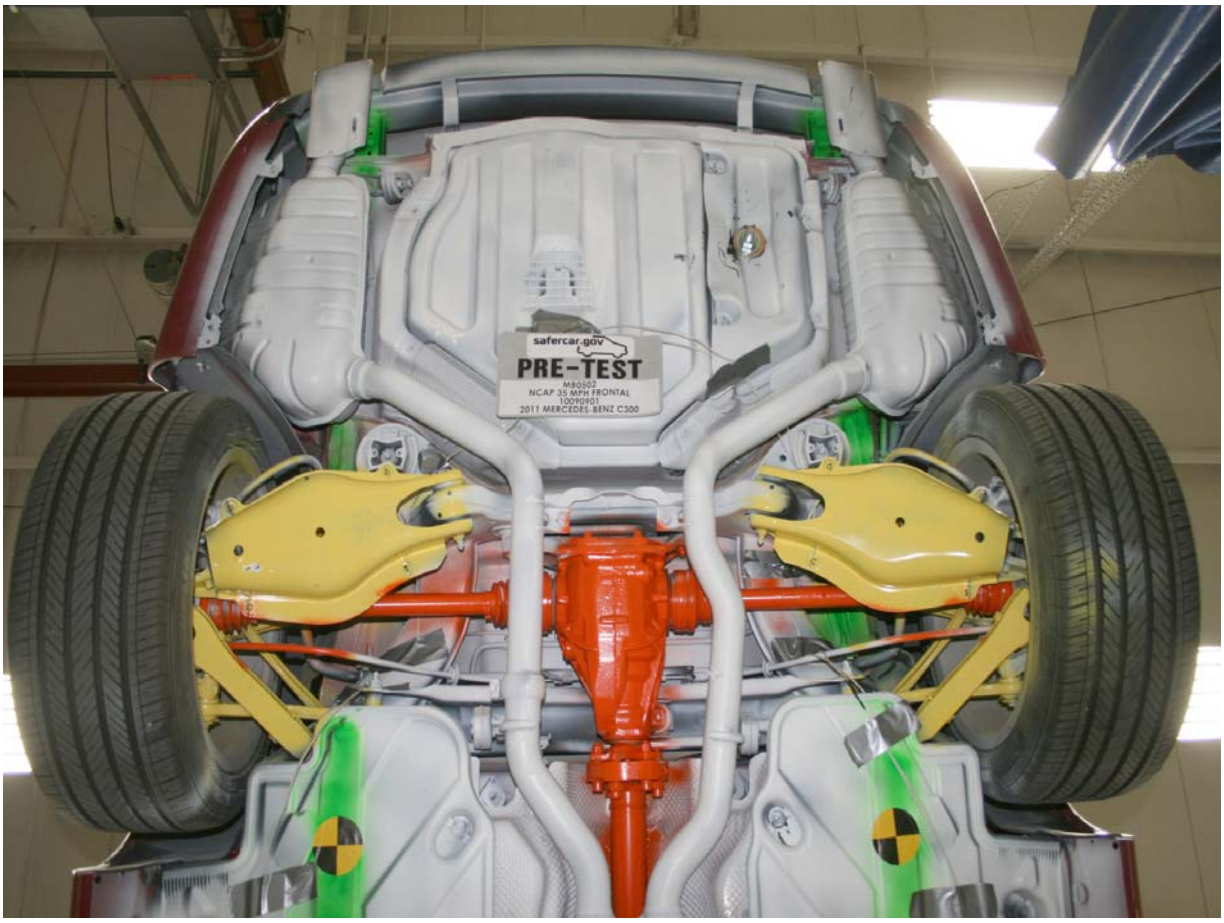


Pre-Test Mid Underbody View

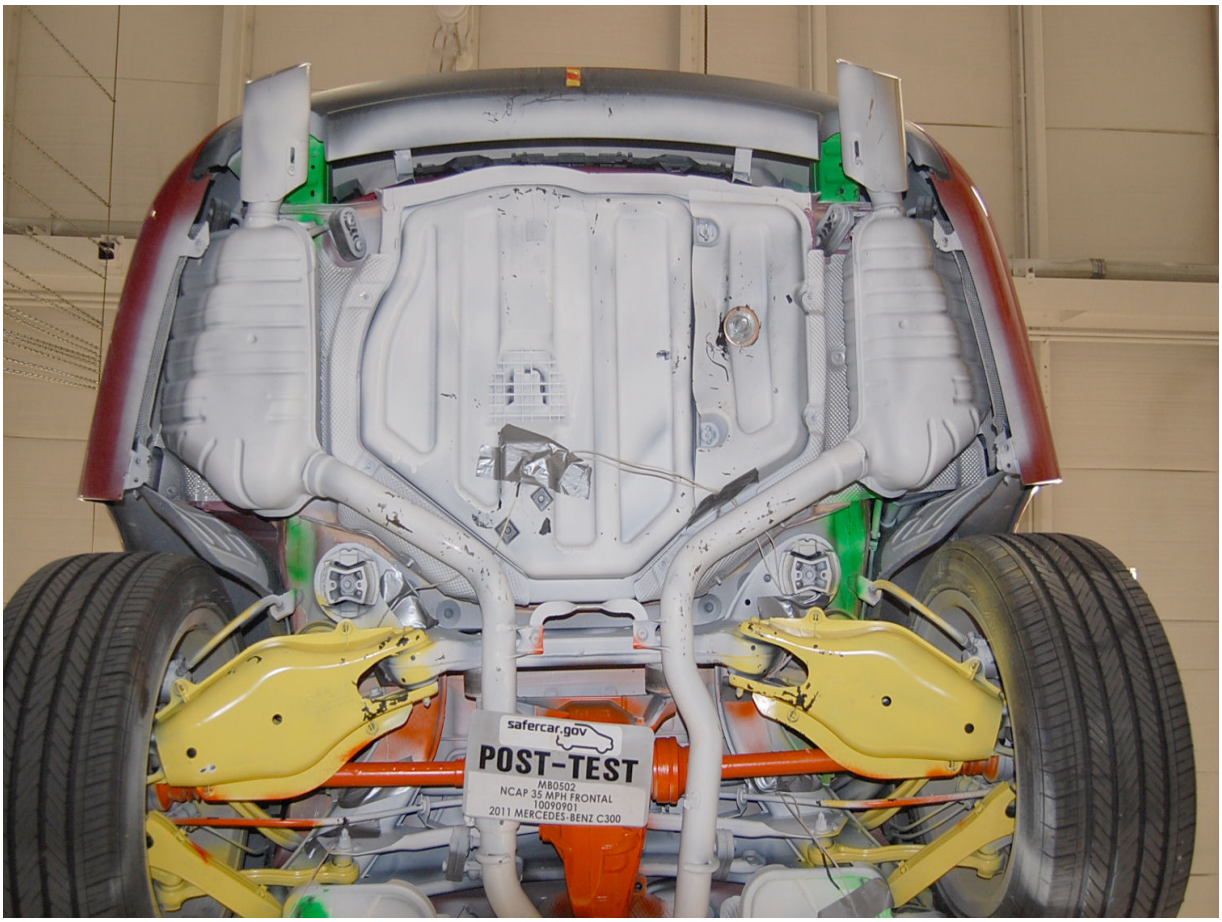
Post-Test Mid Front Underbody View



Post-Test Mid Rear Underbody View



Pre-Test Rear Underbody View



Post-Test Rear Underbody View

Pre-Test Dummy Cable Routing

Post-Test Dummy Cable Routing

Pre-Test Driver Dummy Front View

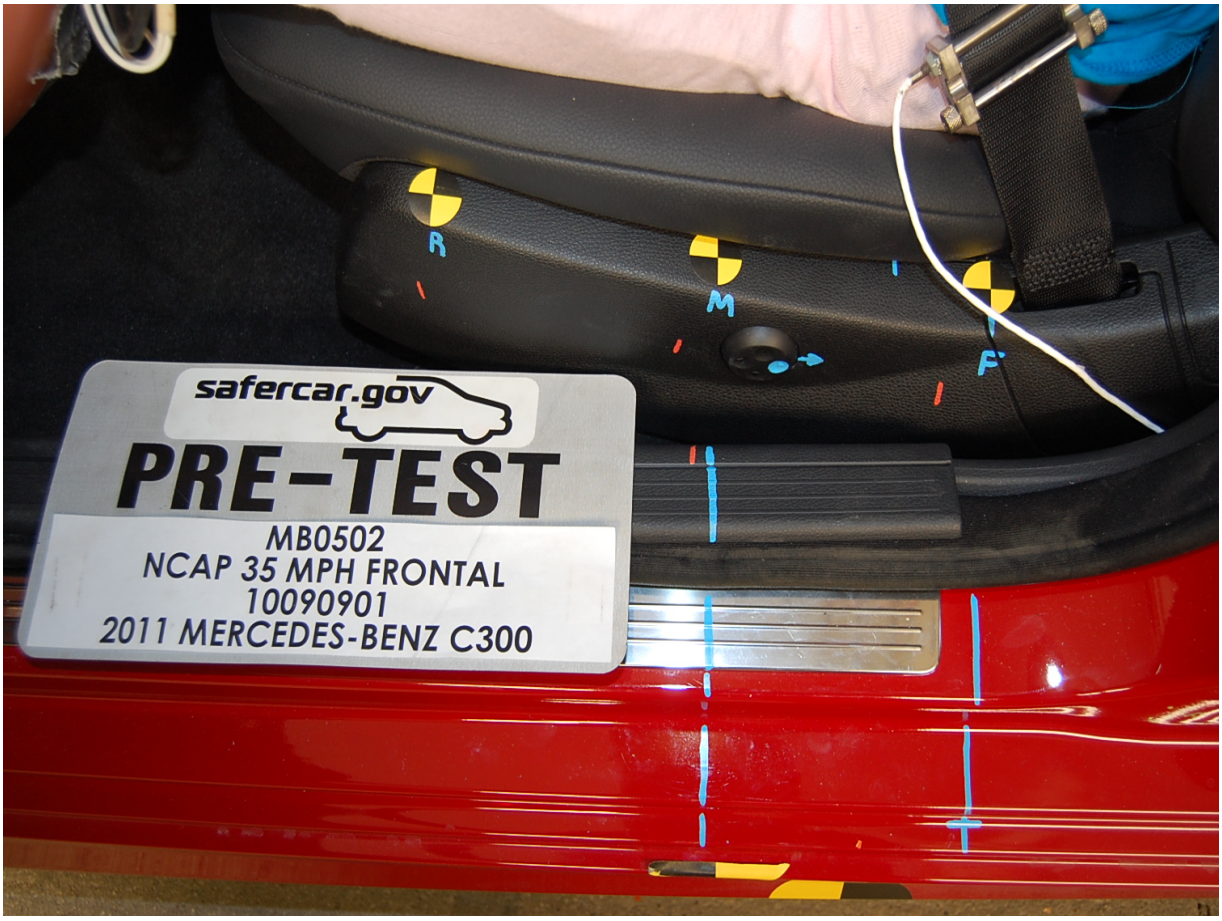
Post-Test Driver Dummy Front View

Pre-Test Driver Dummy Window View

Post-Test Driver Dummy Window View

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

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



Pre-Test Driver's Seat Fore-Aft Markings

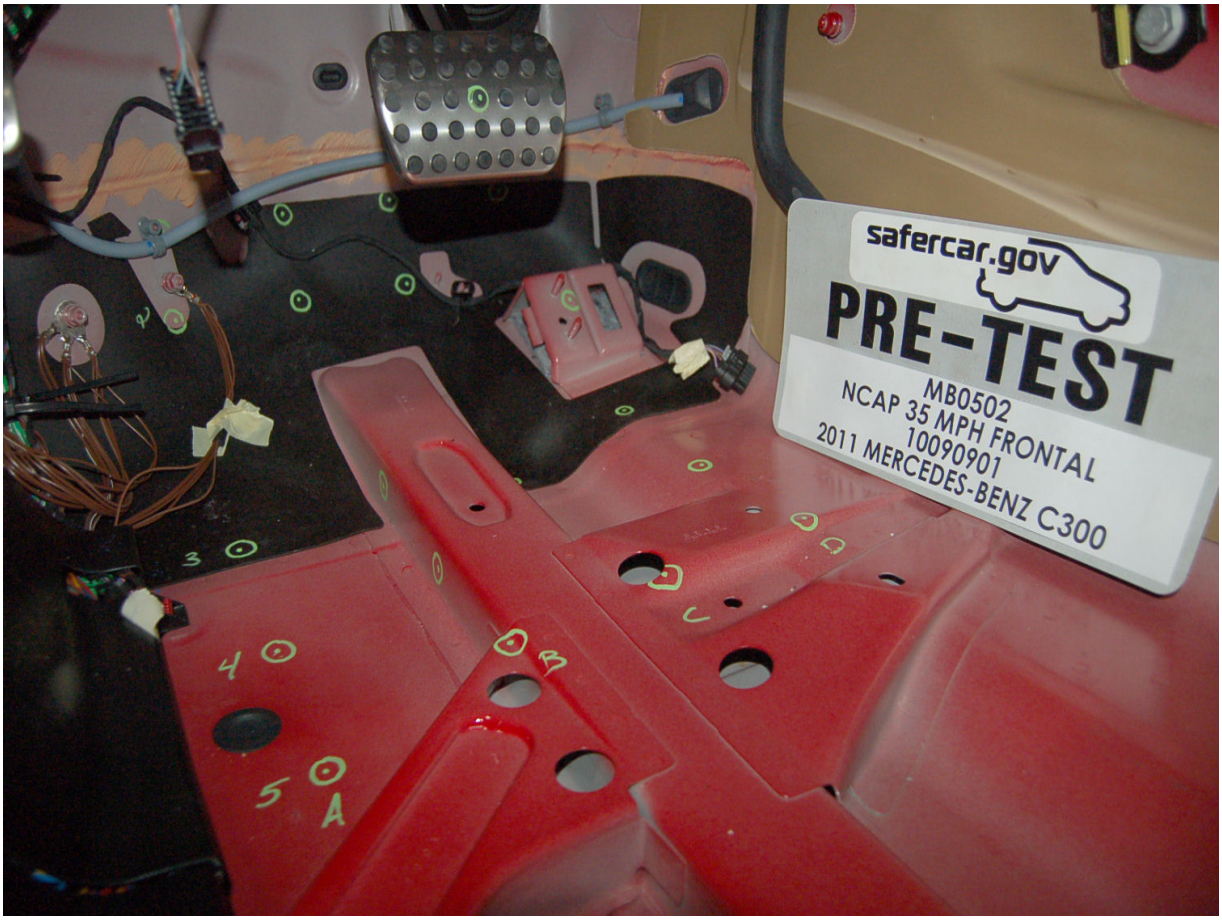
Post-Test Driver's Seat Fore-Aft Markings

Pre-Test Driver Dummy Feet

Post-Test Driver Dummy Feet

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

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



Pre-Test Driver's Side Floorpan

Post-Test Driver's Side Floorpan

Post-Test Driver Dummy Contact with Airbag


Post-Test Driver Dummy Contact with Headrest

Post-Test Driver Dummy Contact with Knee Bolster

Post-Test Driver Dummy Contact with Driver Door

Pre-Test View of Steering Column Shear Capsule

Post-Test View of Steering Column Shear Capsule

Pre-Test Passenger Dummy Front View

Post-Test Passenger Dummy Front View

Pre-Test Passenger Dummy Window View

Post-Test Passenger Dummy Window View

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

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

Pre-Test Passenger's Seat Fore-Aft Markings

Post-Test Passenger's Seat Fore-Aft Markings

Pre-Test Passenger Dummy Feet

Post-Test Passenger Dummy Feet

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

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

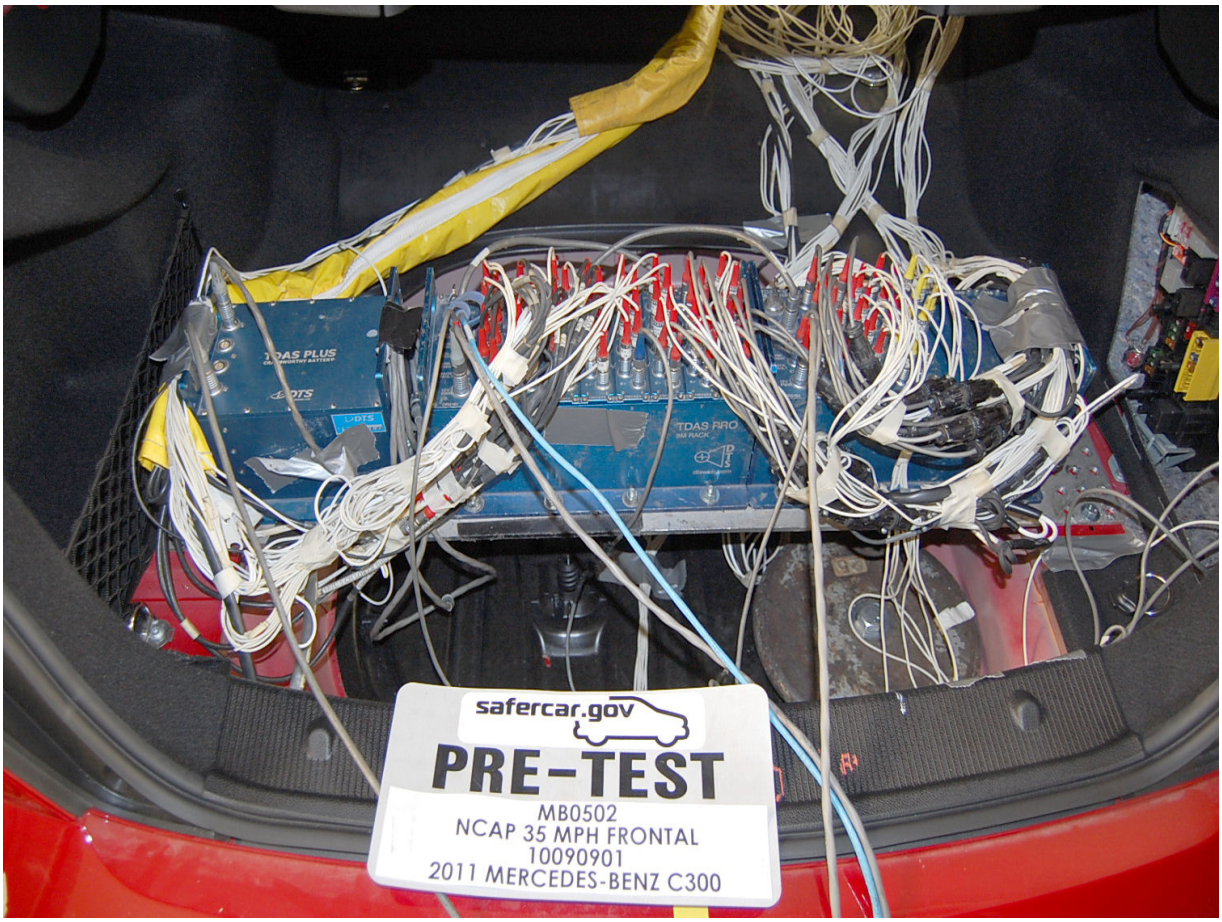
Pre-Test Passenger's Side Floorpan

Post-Test Passenger's Side Floorpan

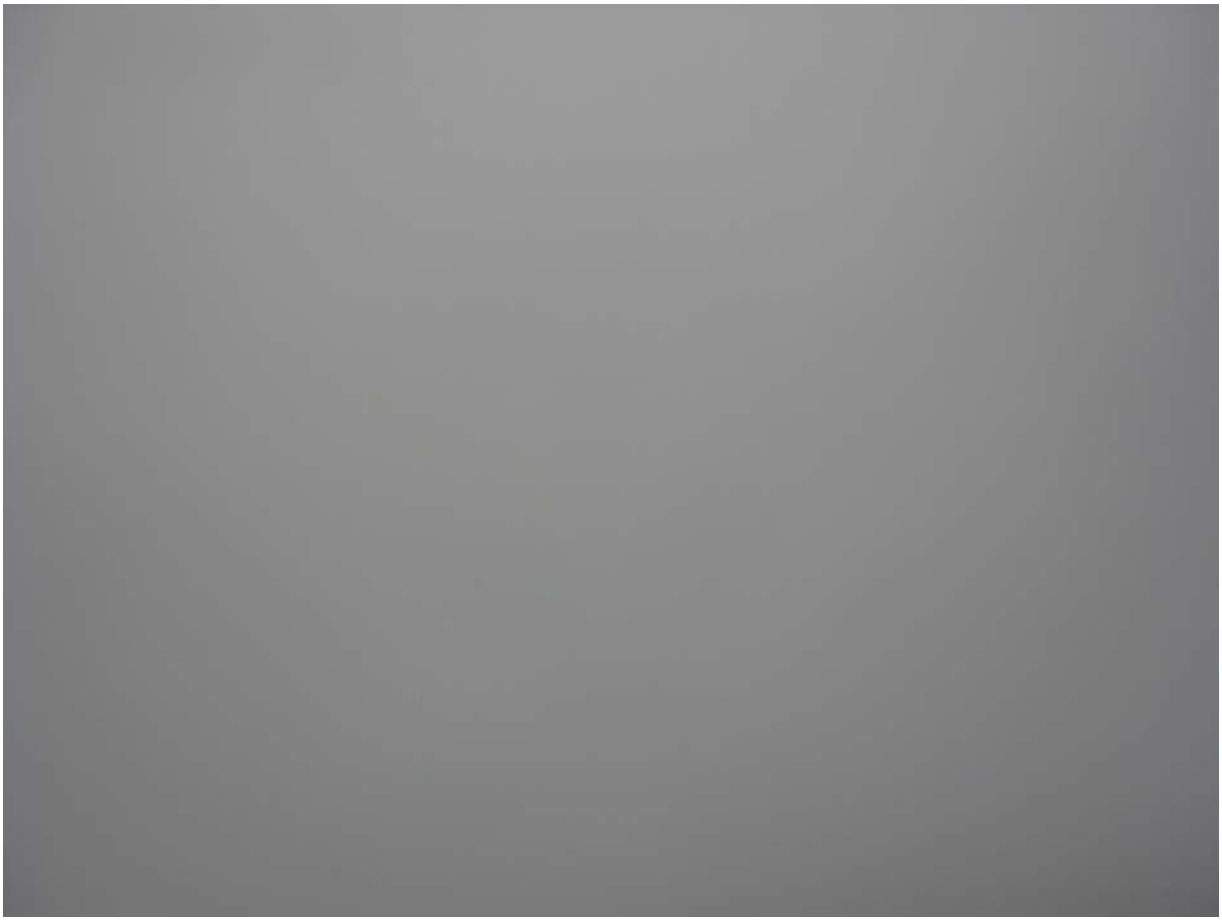
Post-Test Passenger Dummy Contact with Airbag

Post-Test Passenger Dummy Contact with Headrest

Post-Test Passenger Dummy Contact with Glovebox



Ballast Installed in Vehicle

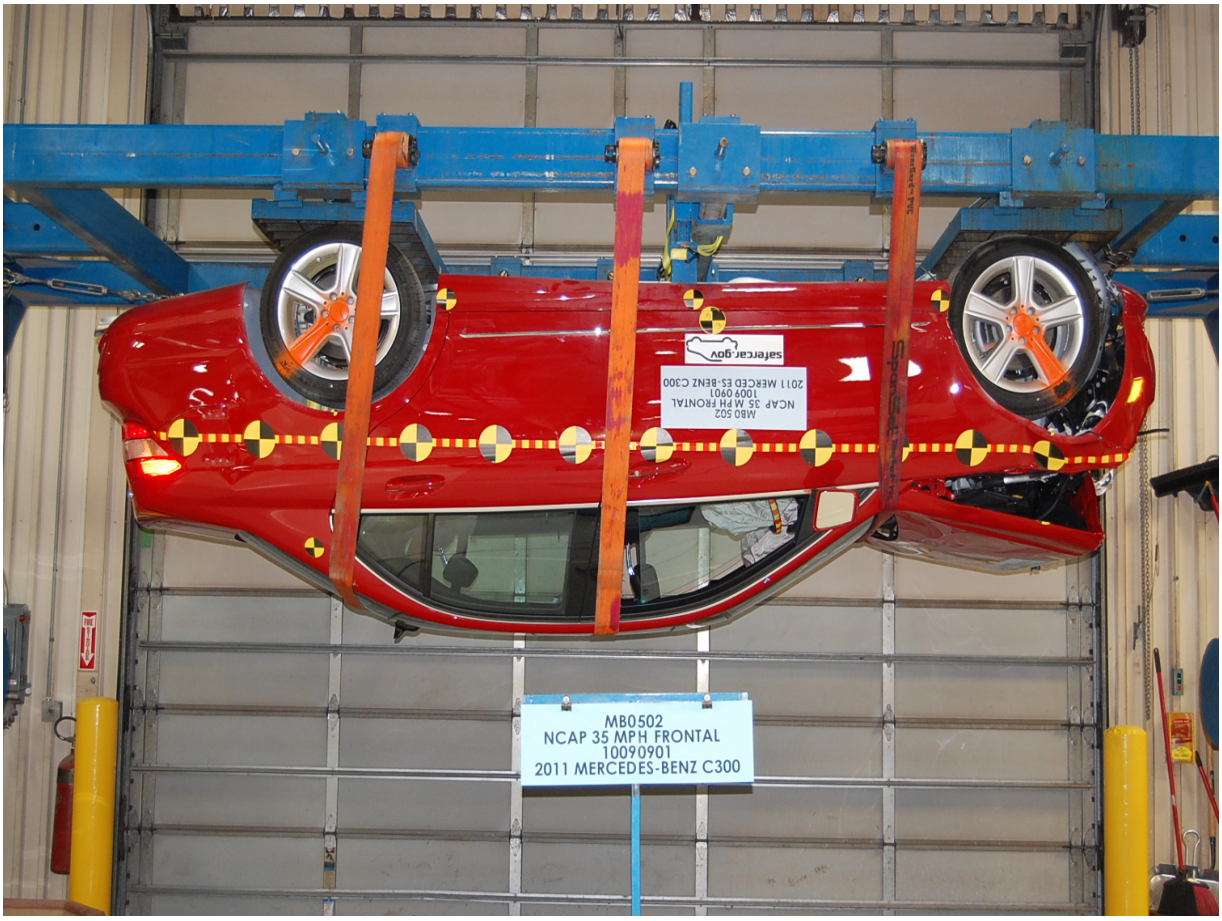


Post-Test Stoddard Solvent Spillage Location View (Not Applicable)

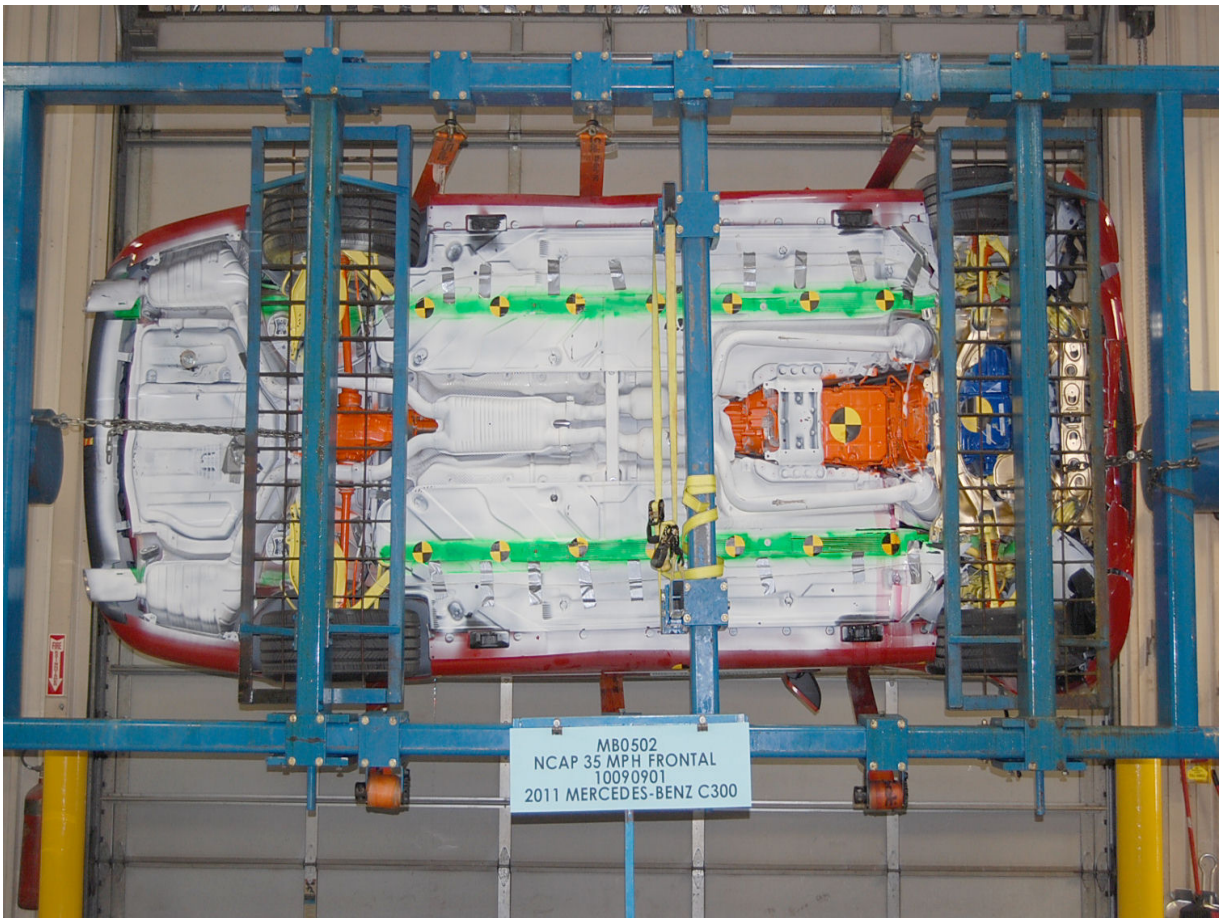
Post-Test Speed Trap Read-Out

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

Monroney Label

A-40

2011 C300 4MATIC

Mercedes-Benz

3.0 Liter Dual Overhead Cam 24V V-6

MB 11-137
Burlington

PO#: 0170426593
VIN: WDDGF8BB0BR133324

SOLD TO:
FELDMANN IMPORTS, INC.
4901 AMERICAN BOULEVARD WEST
BLOOMINGTON
MN 55437
FROM: Baltimore
VIA:

SHIP TO:
FELDMANN IMPORTS, INC.
4901 AMERICAN BOULEVARD WEST
BLOOMINGTON
MN 55437

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 Strut-type with Stabilizer Bar
- Rear Suspension: Multi-link Independent with Stabilizer Bar
- 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
- Intermittent 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 w/Pre-Tensioners & Force Limiters
- Dual Two Stage Front 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
- Antitheft Alarm with Engine Immobilizer
- SmartKey with Panic Button
- Tire Pressure Monitoring System

*** Prepaid Maintenance Plan available for this vehicle, see dealer for details.***

SUGGESTED RETAIL PRICE	$37,490
PAINT/UPHOLSTERY & TRIM	
590 Mars Red	N/C
101 Black Interior	N/C
OPTIONAL EQUIPMENT AND VALUE ADDED PACKAGES	
293 Rear Side Airbags	420.00
413 Panorama Sunroof	1,090.00
731 Burl Walnut Wood Trim	325.00
786 18" AMG Twin 5-Spoke Alloy Wheel	1,040.00
873 Heated Front Seats	750.00
889 KEYLESS-GO	1,140.00
057 iPod Integration Kit	375.00
P01 Premium I 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	1,995.00
333 Sport Sedan: Sport Body Styling, Mercedes-Benz Star in Grille, 17" Staggered-width Alloy Wheels with All-Season Tires, LED Daytime Running Lamps, Sport Suspension and Braking System, Sport Interior, Aluminum Trim	N/C
Destination and Delivery	875.00
Total Retail Price	**$45,500.00**

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

$2,100

based on 15,000 miles at $2.80 per gallon

Combined Gasoline Fuel Economy

This Vehicle

20

11 — 42

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. Frontal ratings should ONLY 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

TABLE OF DATA PLOTS

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

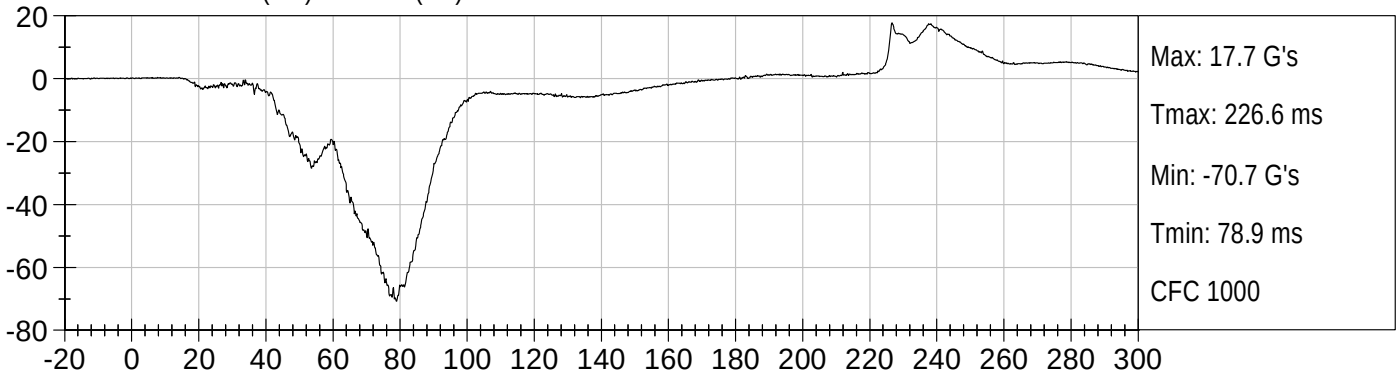
Vehicle Right Brake Caliper X

Advanced Research Load Cell Barrier – 127 channels

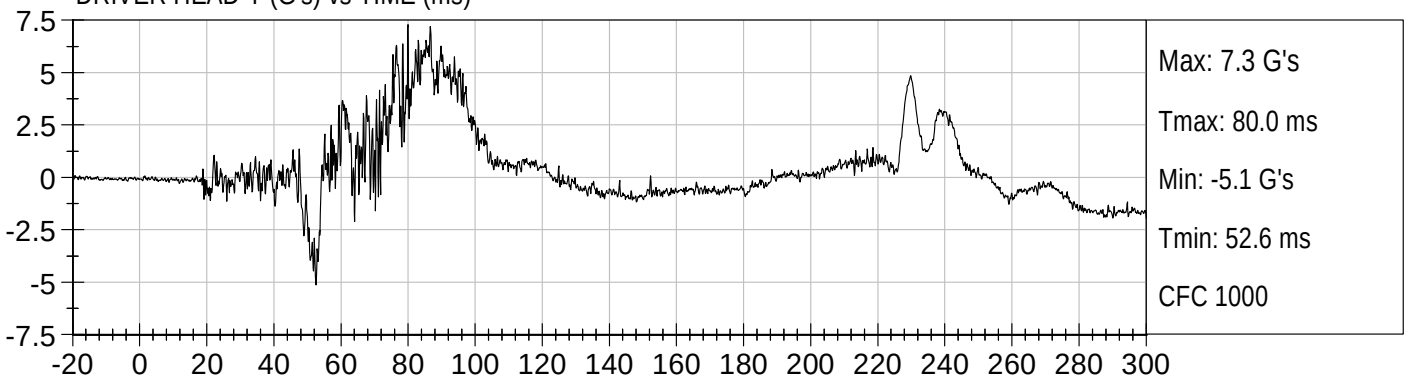
NCAP 35mph Frontal
2011 Mercedes-Benz C300 - MB0502

Test Date: 09/09/2010
Speed: 34.9 mph (56.2 km/h)

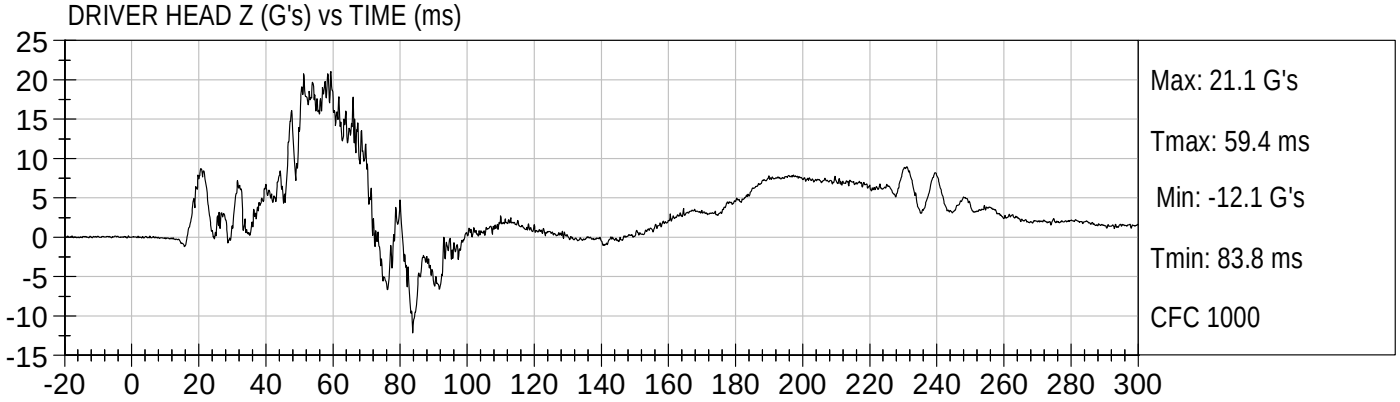
DRIVER HEAD X (G's) vs TIME (ms)



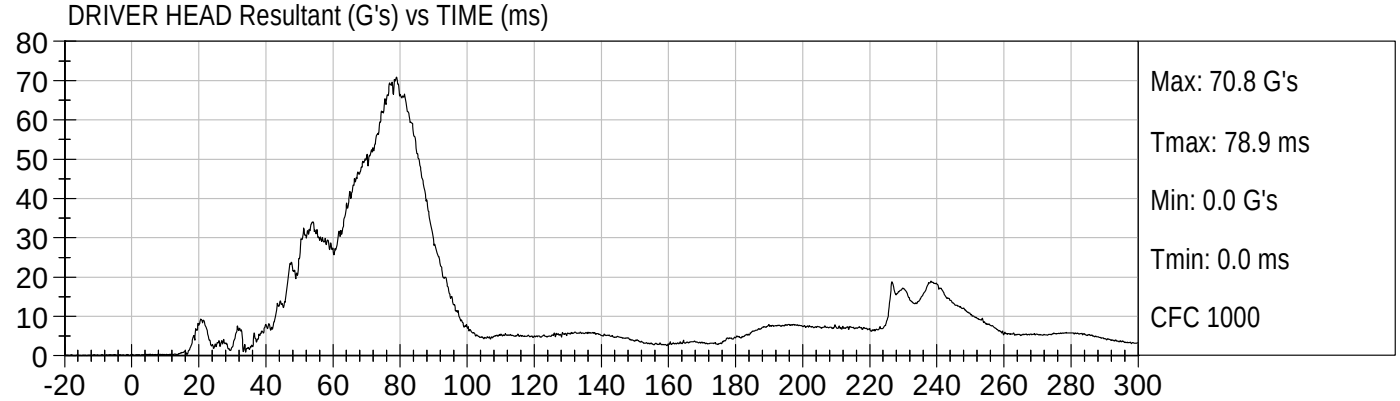
DRIVER HEAD Y (G's) vs TIME (ms)



DRIVER HEAD Z (G's) vs TIME (ms)



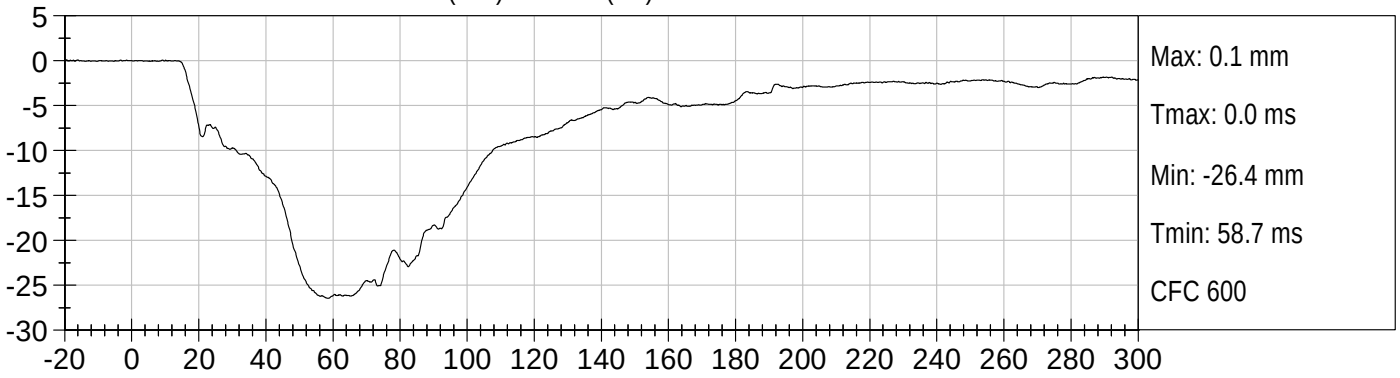
DRIVER HEAD Resultant (G's) vs TIME (ms)



NCAP 35mph Frontal
2011 Mercedes-Benz C300 - MB0502

Test Date: 09/09/2010
Speed: 34.9 mph (56.2 km/h)

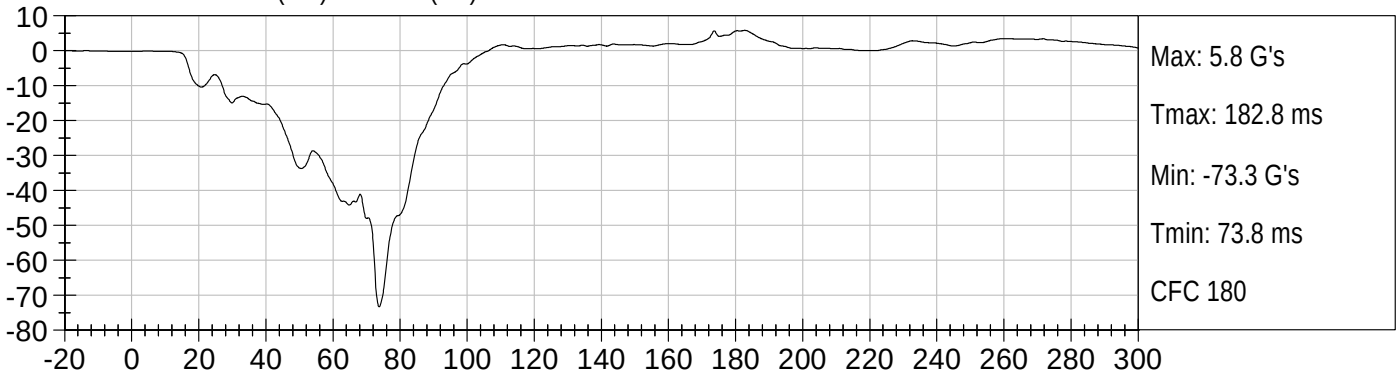
DRIVER CHEST DISPLACEMENT (mm) vs TIME (ms)



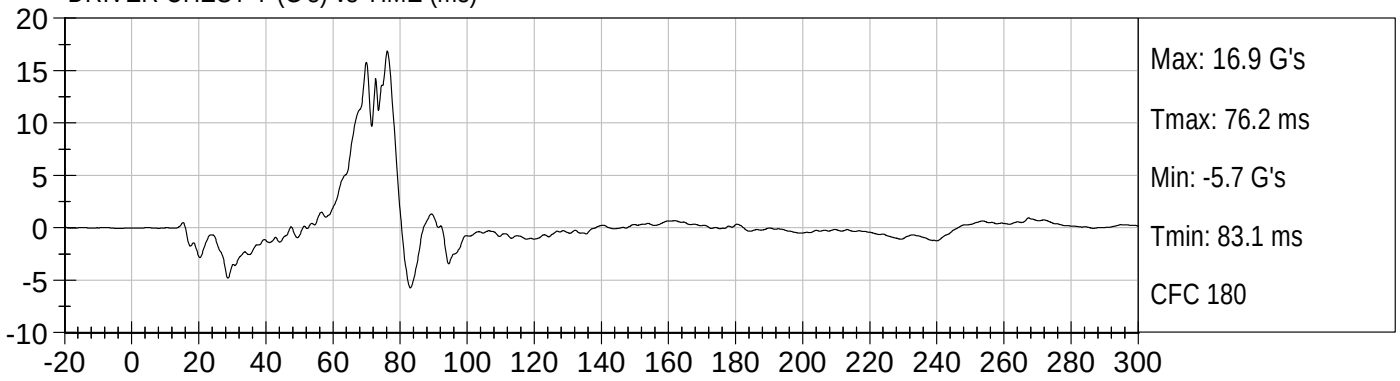
NCAP 35mph Frontal
2011 Mercedes-Benz C300 - MB0502

Test Date: 09/09/2010
Speed: 34.9 mph (56.2 km/h)

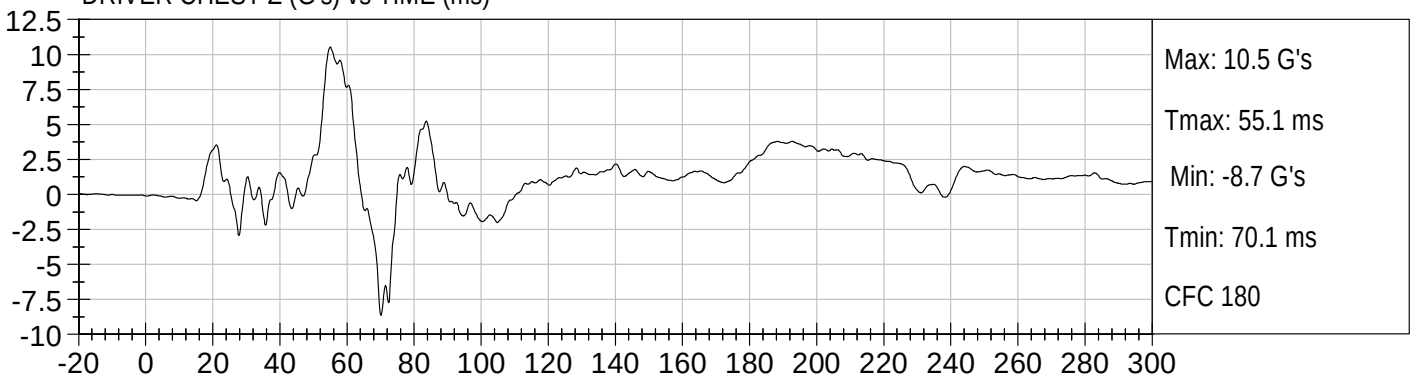
DRIVER CHEST X (G's) vs TIME (ms)



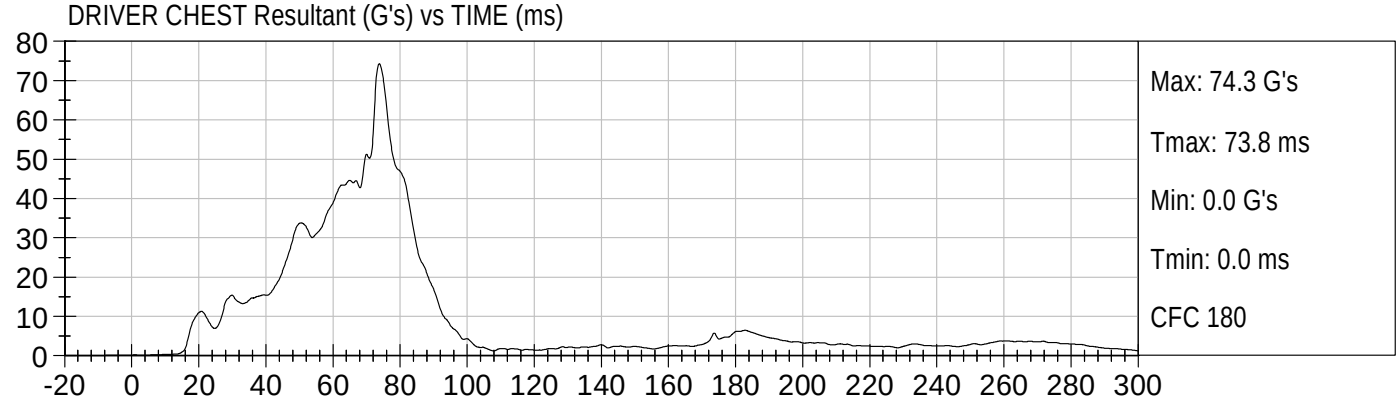
DRIVER CHEST Y (G's) vs TIME (ms)



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



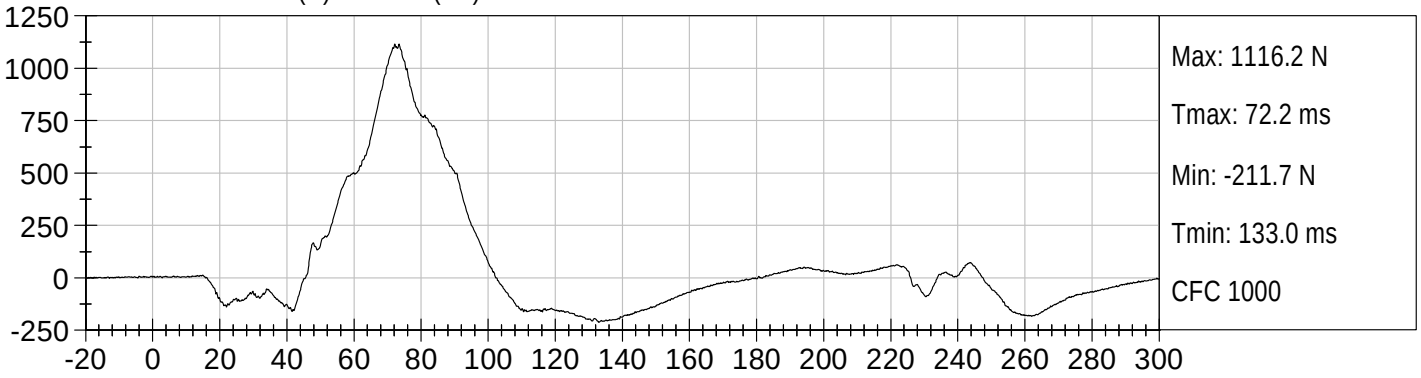
DRIVER CHEST Resultant (G's) vs TIME (ms)



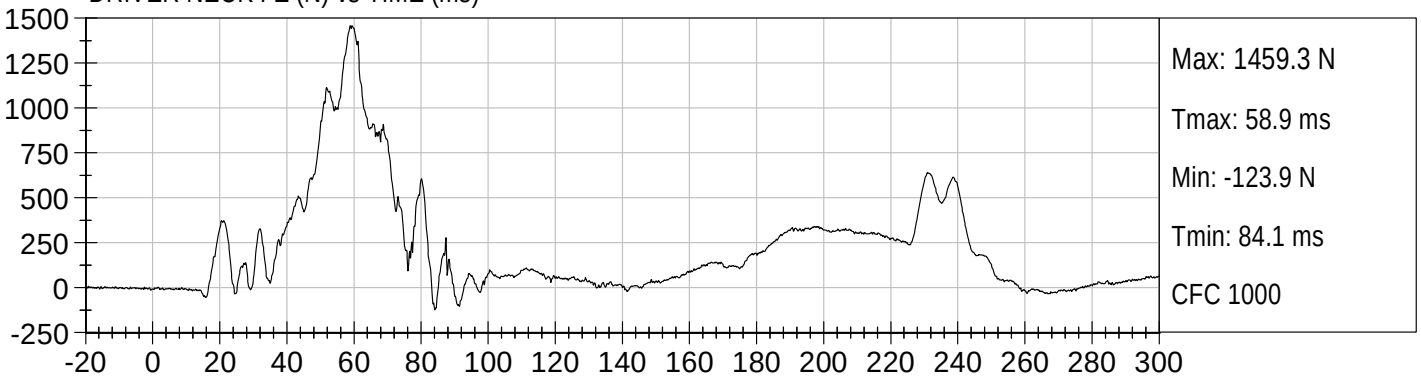
NCAP 35mph Frontal
2011 Mercedes-Benz C300 - MB0502

Test Date: 09/09/2010
Speed: 34.9 mph (56.2 km/h)

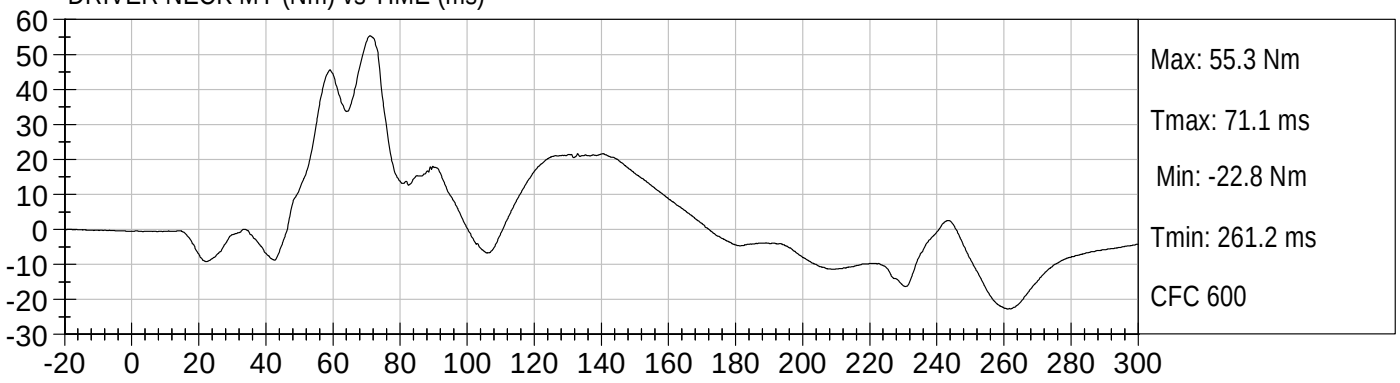
DRIVER NECK FX (N) vs TIME (ms)

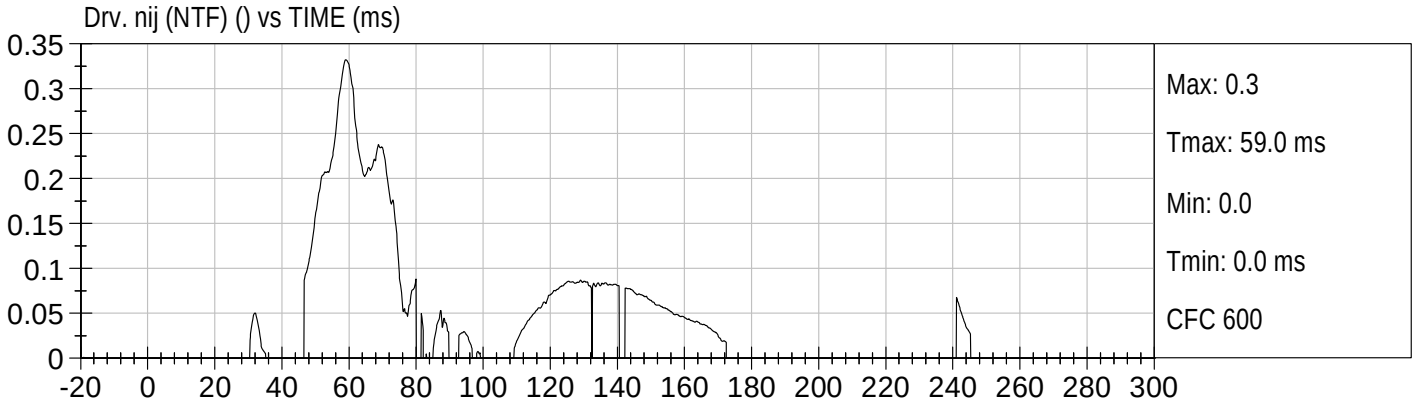


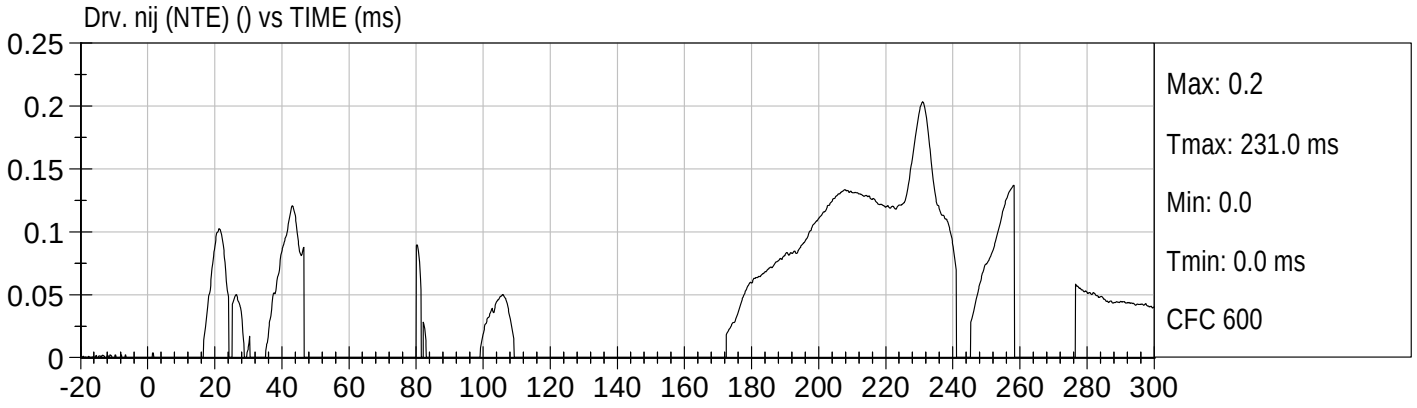
DRIVER NECK FZ (N) vs TIME (ms)

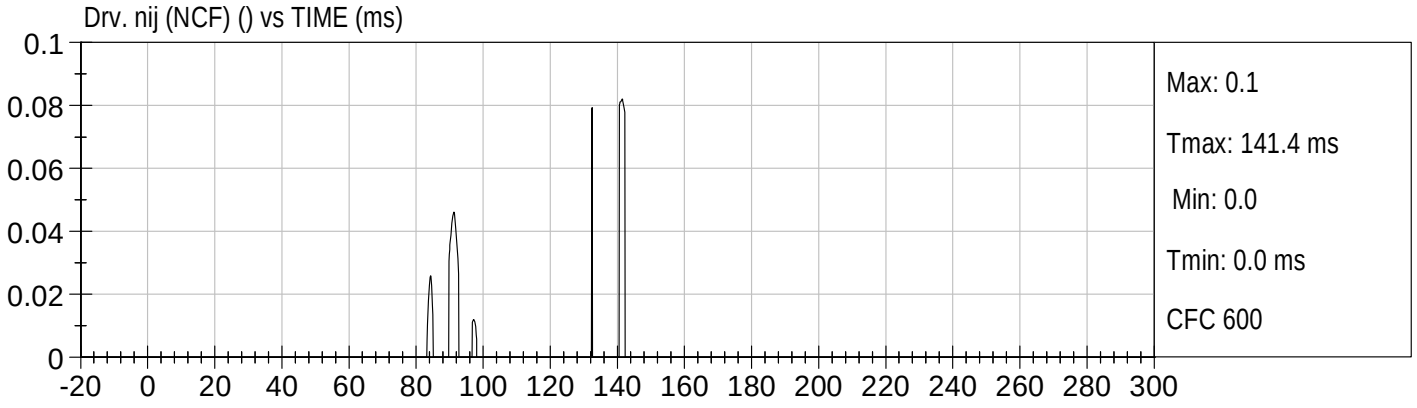


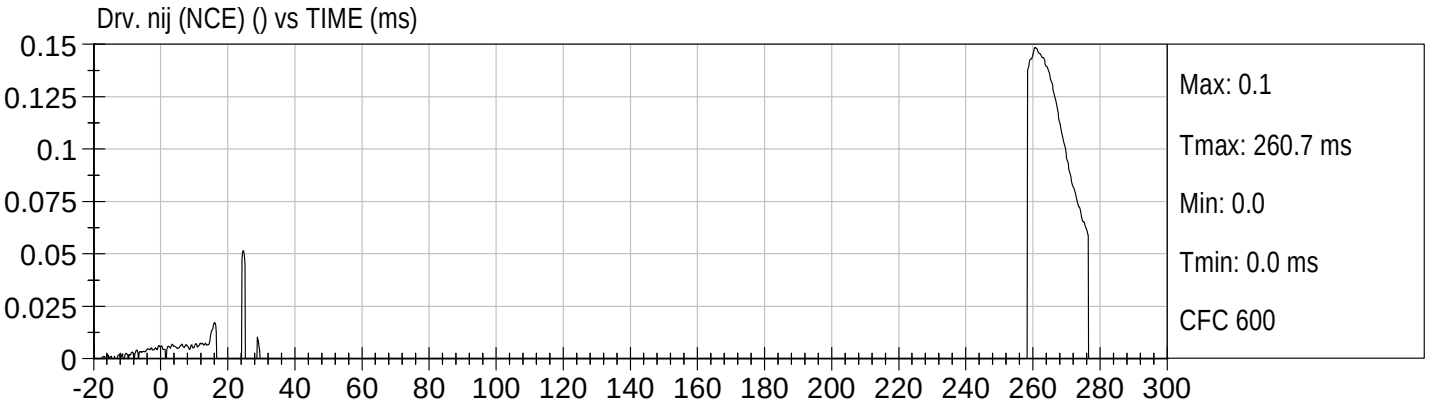
DRIVER NECK MY (Nm) vs TIME (ms)




Drv. nij (NTF) () vs TIME (ms)
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.3
Tmax: 59.0 ms
Min: 0.0
Tmin: 0.0 ms
CFC 600


Drv. nij (NTE) () vs TIME (ms)
0.25
0.2
0.15
0.1
0.05
0
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.2
Tmax: 231.0 ms
Min: 0.0
Tmin: 0.0 ms
CFC 600

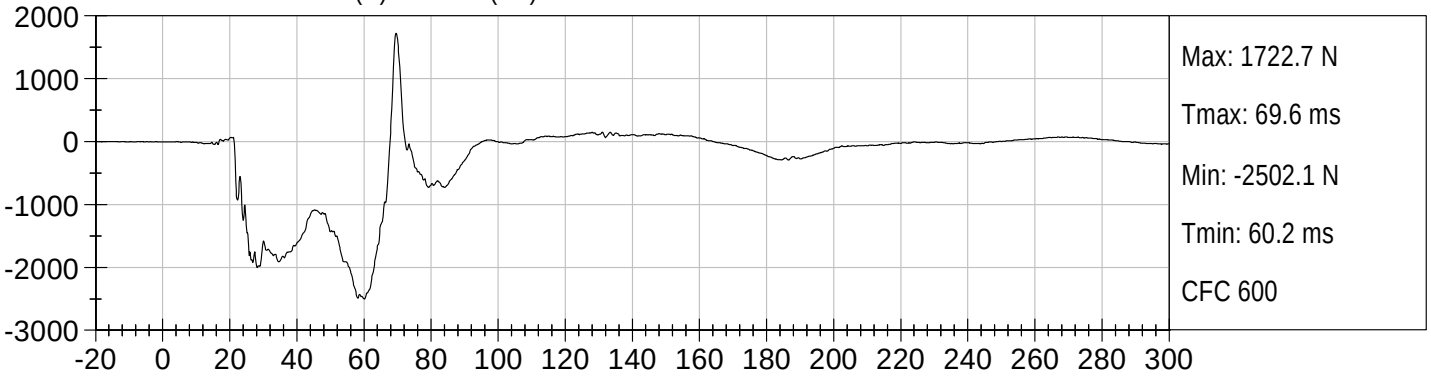

Drv. nij (NCF) () vs TIME (ms)
0.1
0.08
0.06
0.04
0.02
0
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.1
Tmax: 141.4 ms
Min: 0.0
Tmin: 0.0 ms
CFC 600


Drv. nij (NCE) () vs TIME (ms)
0.15
0.125
0.1
0.075
0.05
0.025
0
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.1
Tmax: 260.7 ms
Min: 0.0
Tmin: 0.0 ms
CFC 600

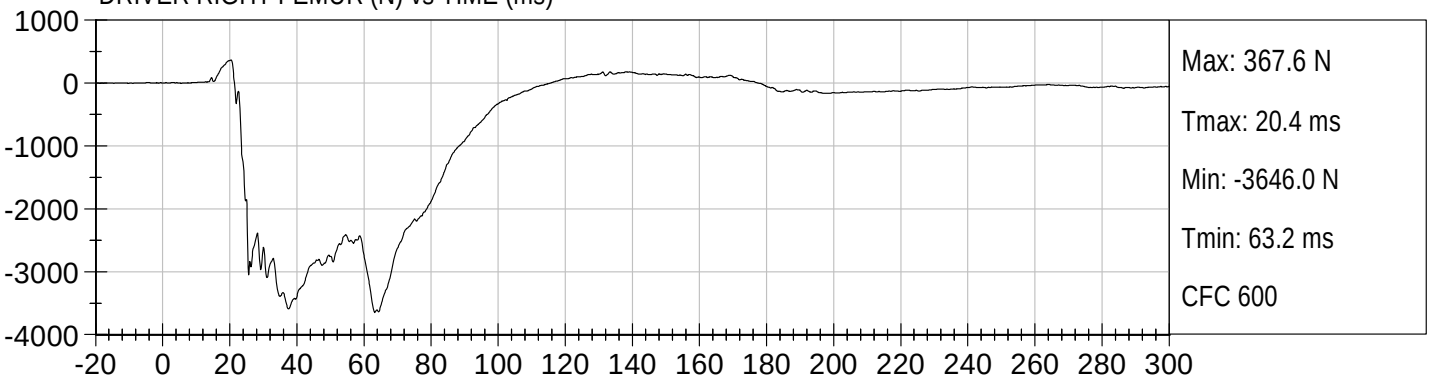
NCAP 35mph Frontal
2011 Mercedes-Benz C300 - MB0502

Test Date: 09/09/2010
Speed: 34.9 mph (56.2 km/h)

DRIVER LEFT FEMUR (N) vs TIME (ms)



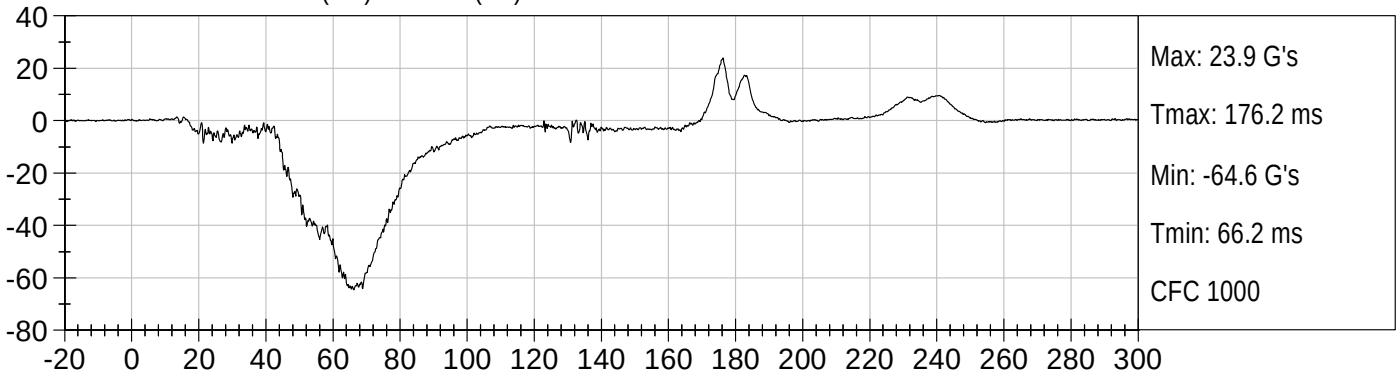
DRIVER RIGHT FEMUR (N) vs TIME (ms)



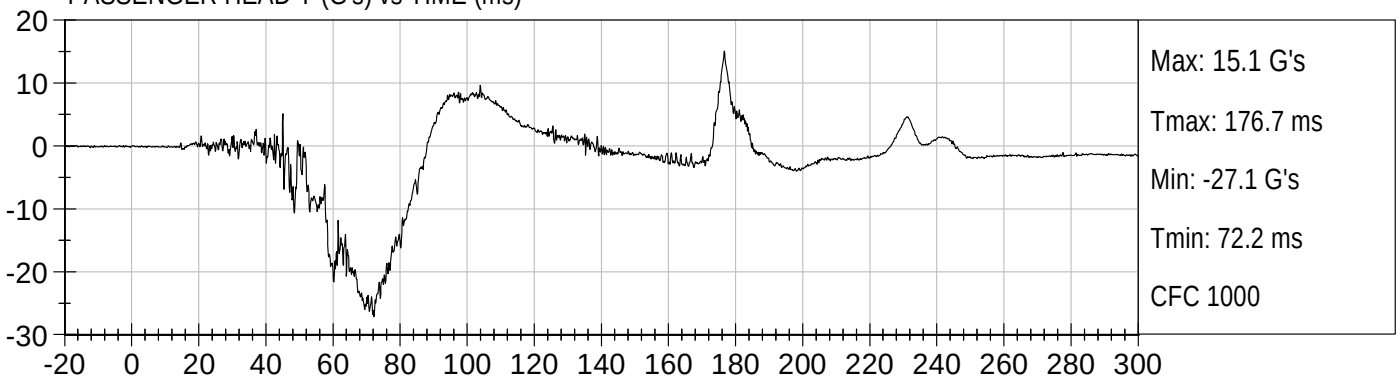
NCAP 35mph Frontal
2011 Mercedes-Benz C300 - MB0502

Test Date: 09/09/2010
Speed: 34.9 mph (56.2 km/h)

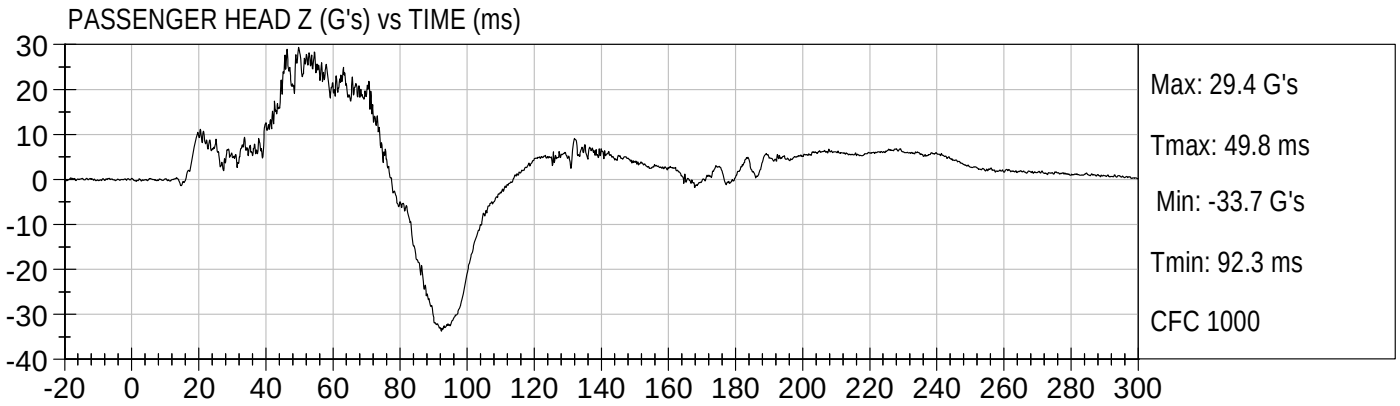
PASSENGER HEAD X (G's) vs TIME (ms)



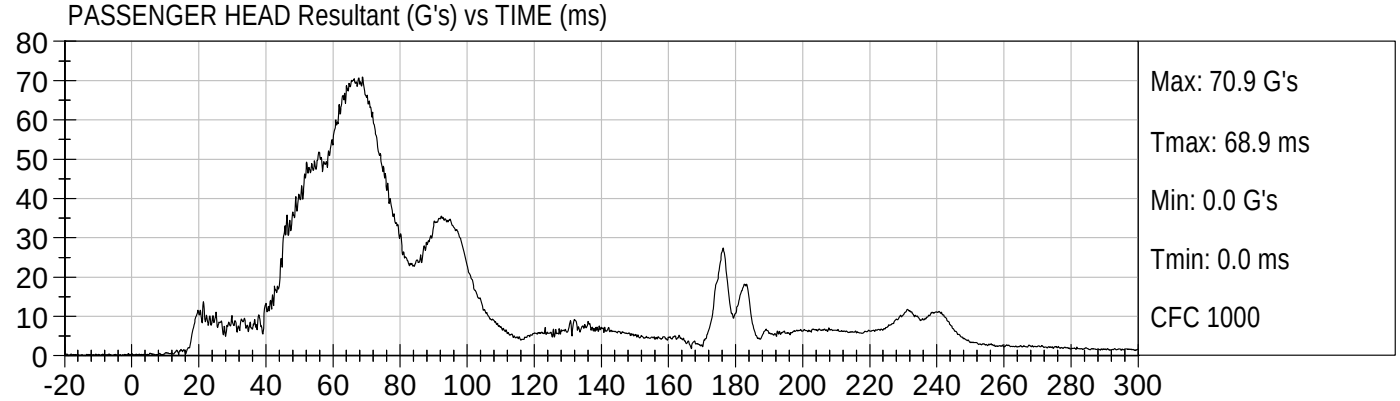
PASSENGER HEAD Y (G's) vs TIME (ms)



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

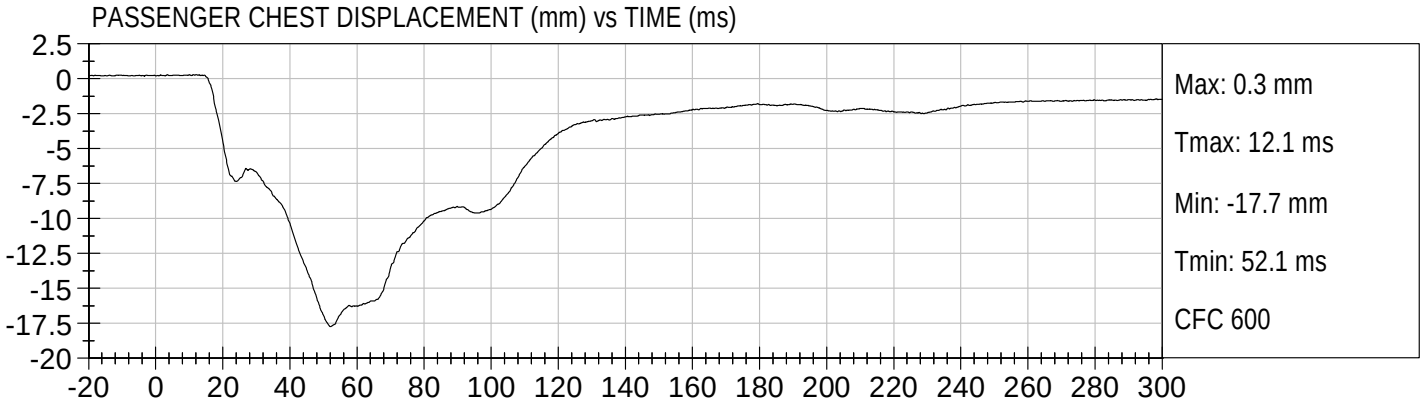


PASSENGER HEAD Resultant (G's) vs TIME (ms)



NCAP 35mph Frontal
2011 Mercedes-Benz C300 - MB0502

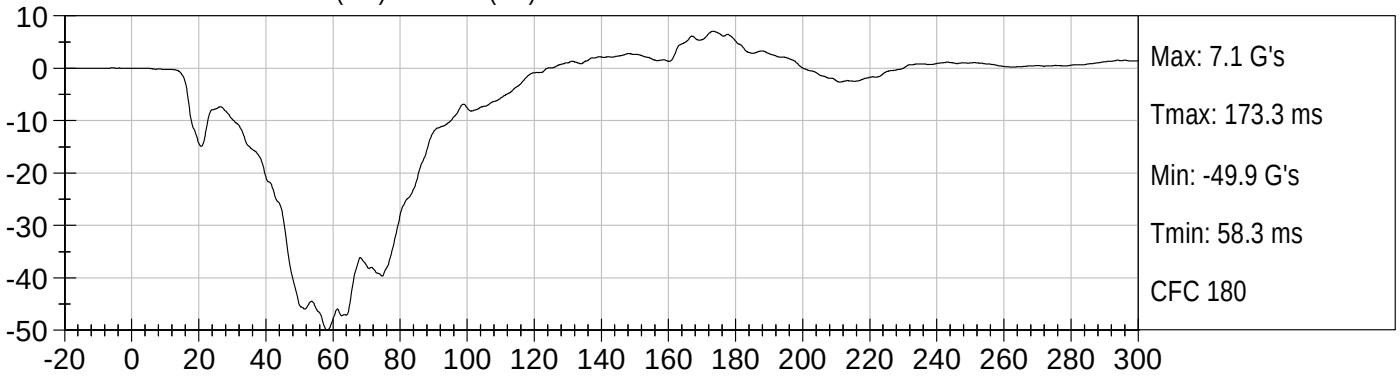
Test Date: 09/09/2010
Speed: 34.9 mph (56.2 km/h)



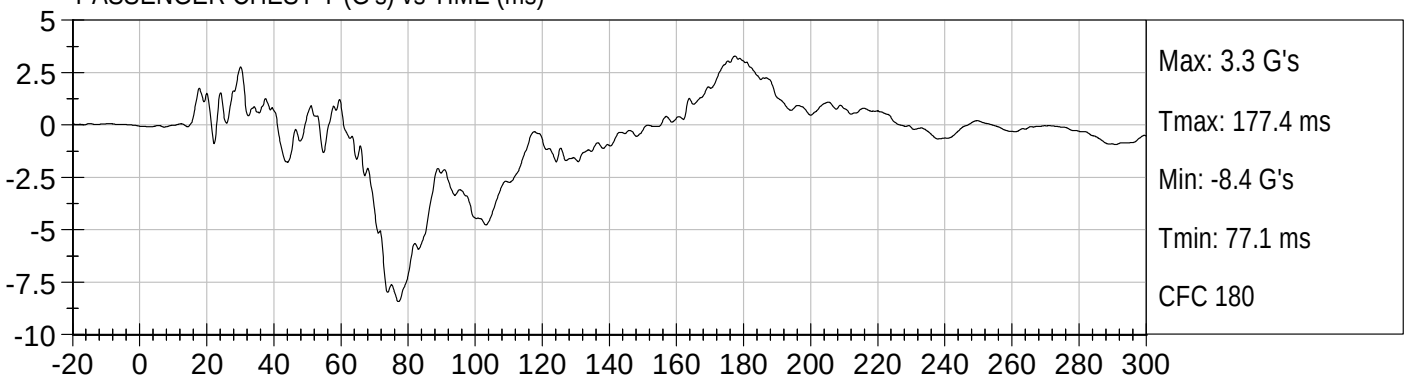
NCAP 35mph Frontal
2011 Mercedes-Benz C300 - MB0502

Test Date: 09/09/2010
Speed: 34.9 mph (56.2 km/h)

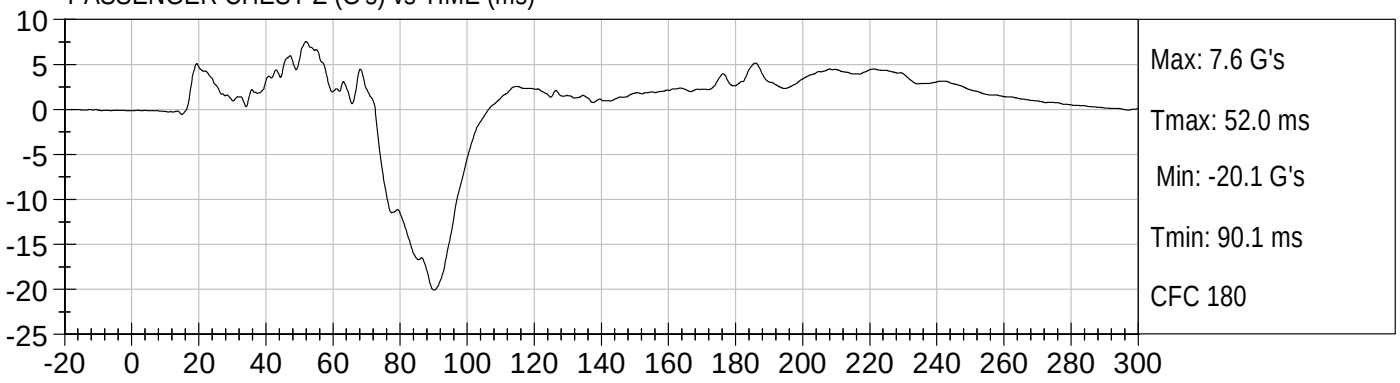
PASSENGER CHEST X (G's) vs TIME (ms)



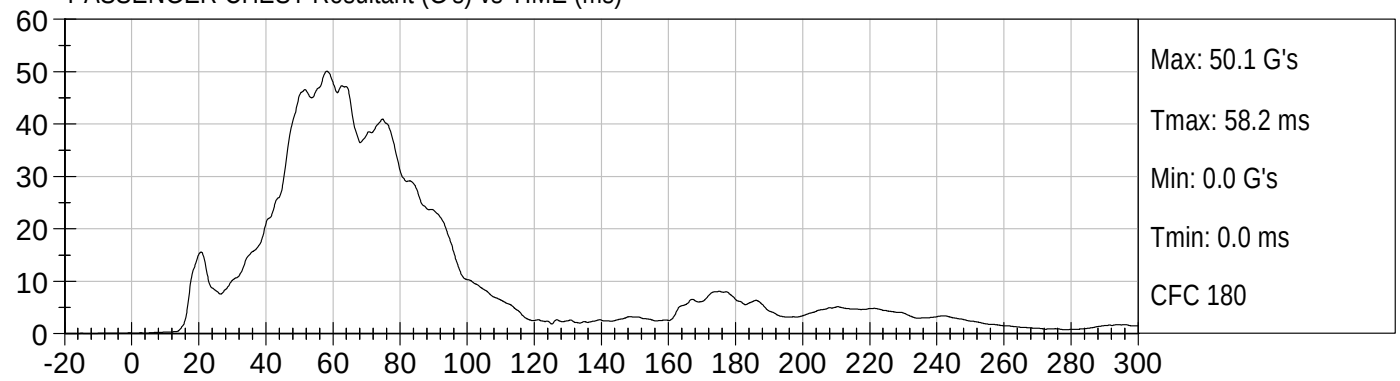
PASSENGER CHEST Y (G's) vs TIME (ms)



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



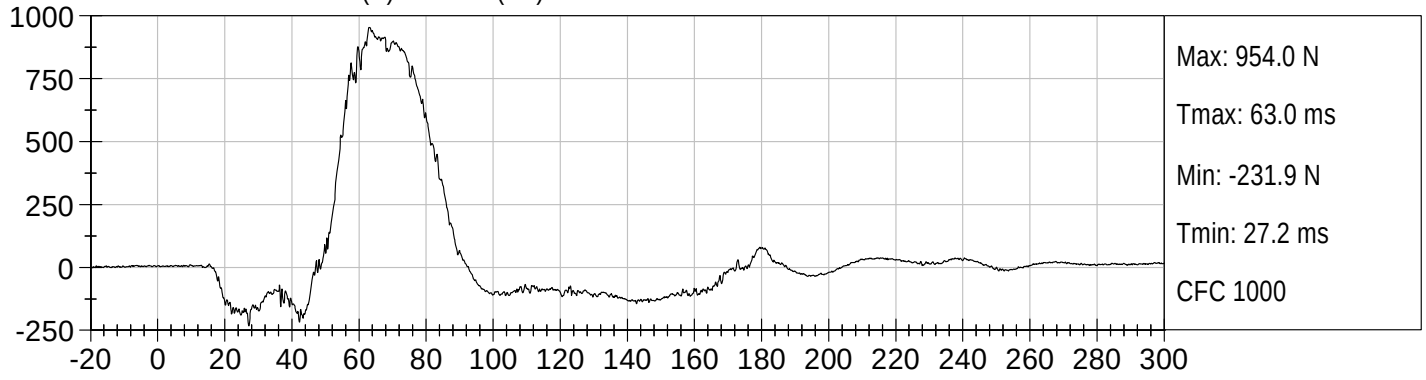
PASSENGER CHEST Resultant (G's) vs TIME (ms)



NCAP 35mph Frontal
2011 Mercedes-Benz C300 - MB0502

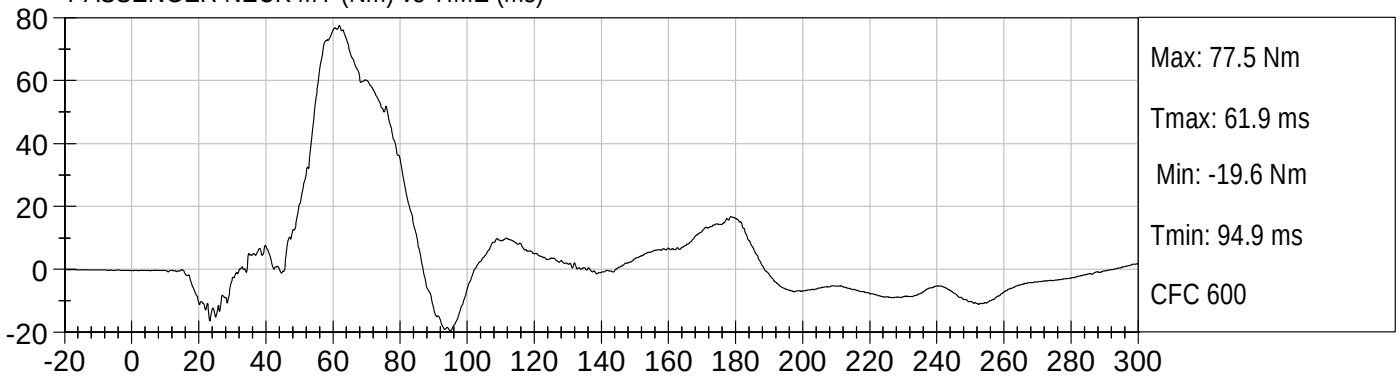
Test Date: 09/09/2010
Speed: 34.9 mph (56.2 km/h)

PASSENGER NECK FX (N) vs TIME (ms)



PASSENGER NECK FZ (N) vs TIME (ms)

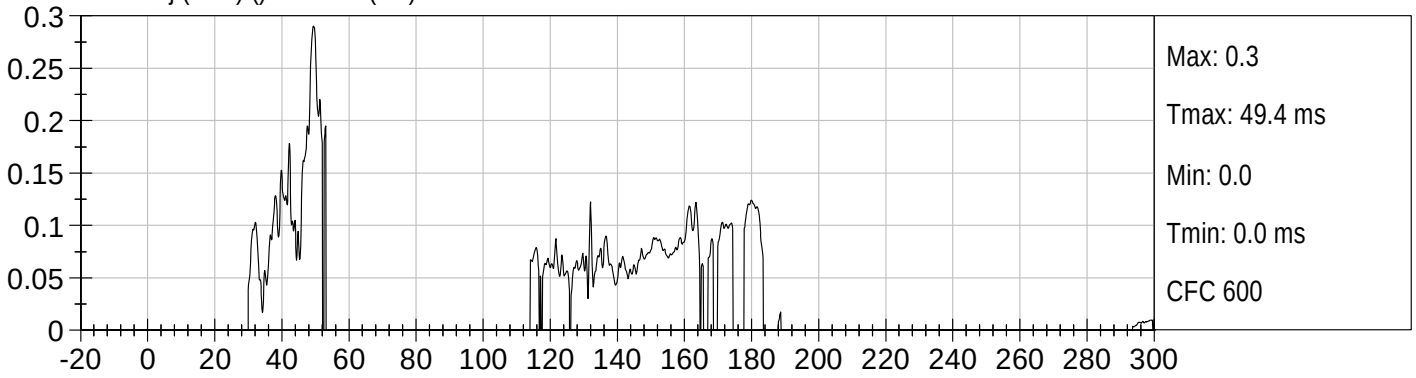
PASSENGER NECK MY (Nm) vs TIME (ms)



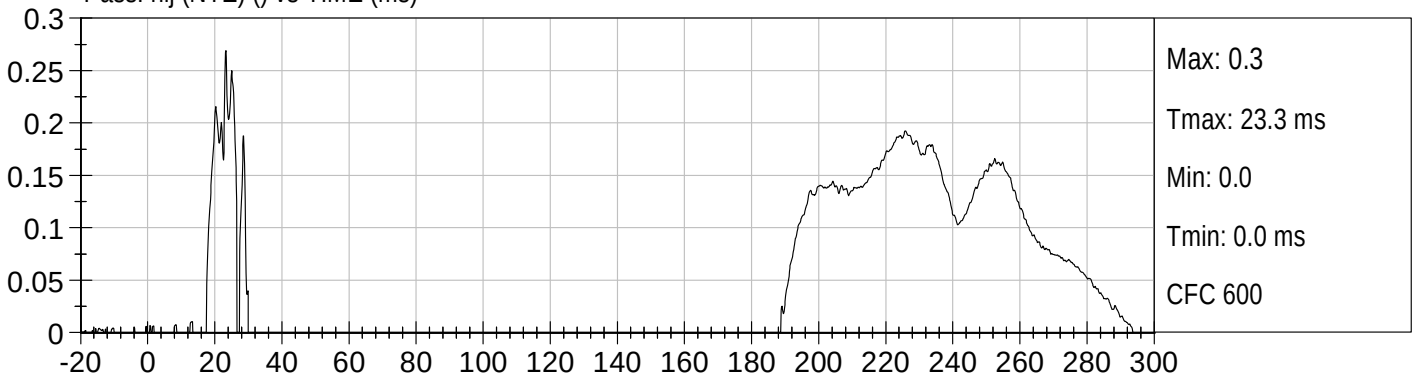
NCAP 35mph Frontal
2011 Mercedes-Benz C300 - MB0502

Test Date: 09/09/2010
Speed: 34.9 mph (56.2 km/h)

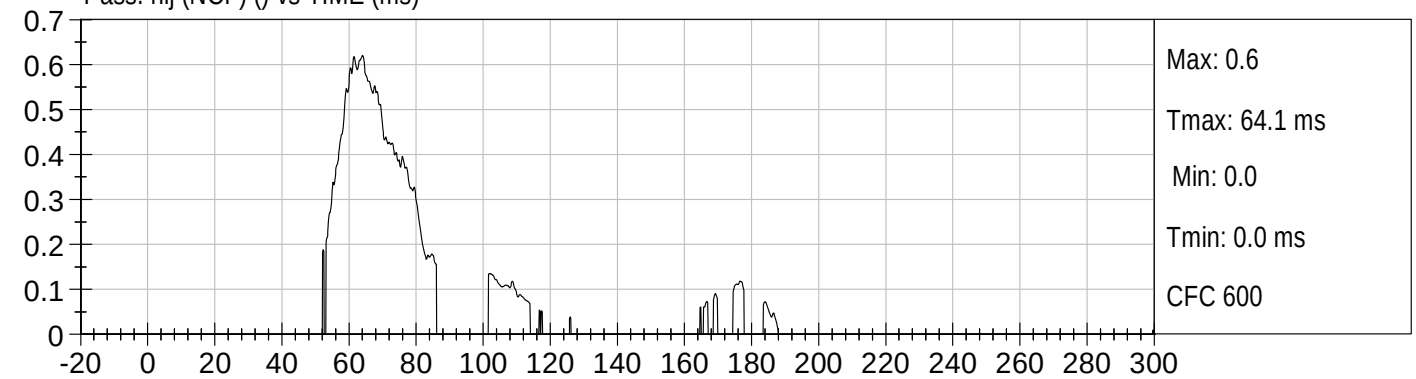
Pass. nij (NTF) () vs TIME (ms)



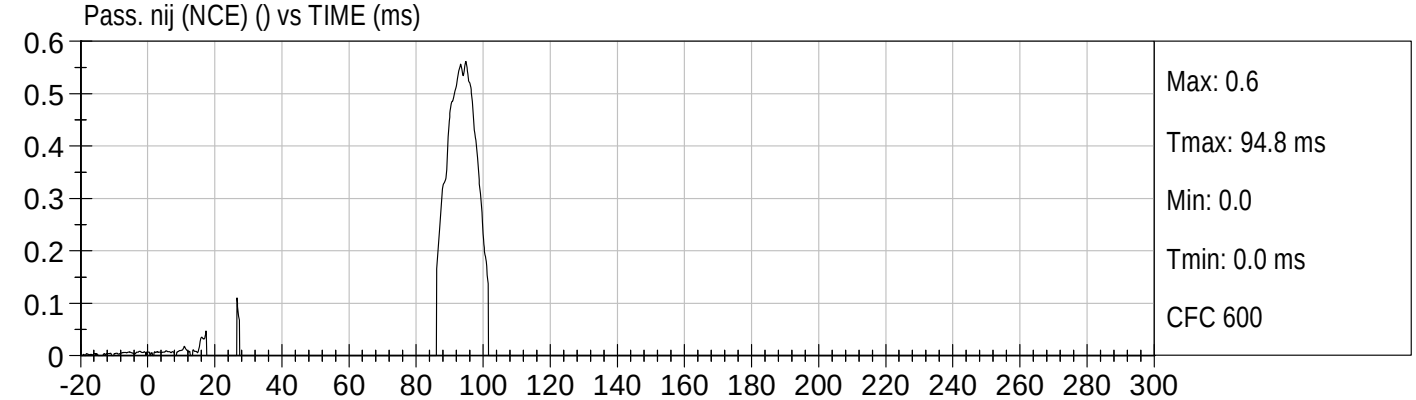
Pass. nij (NTE) () vs TIME (ms)



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



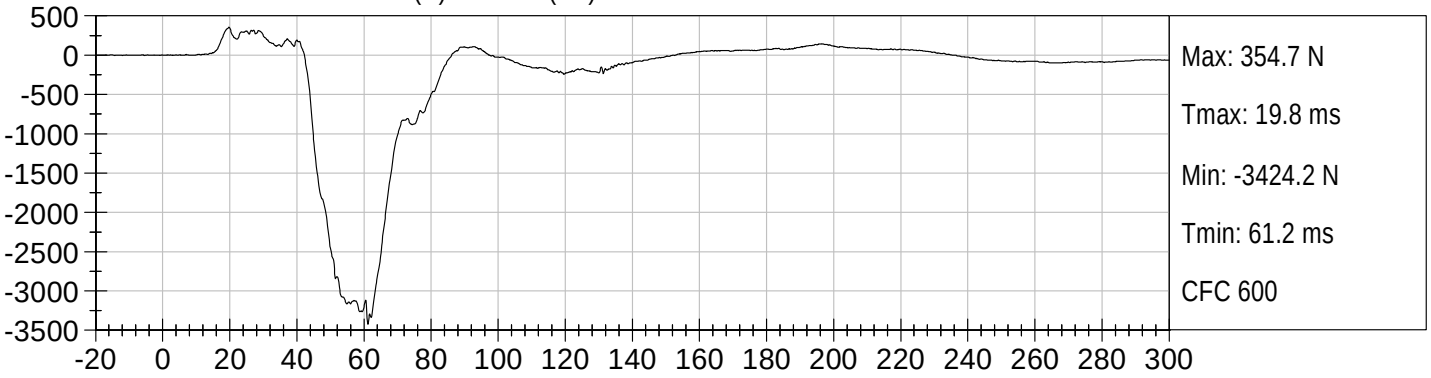
Pass. nij (NCE) () vs TIME (ms)



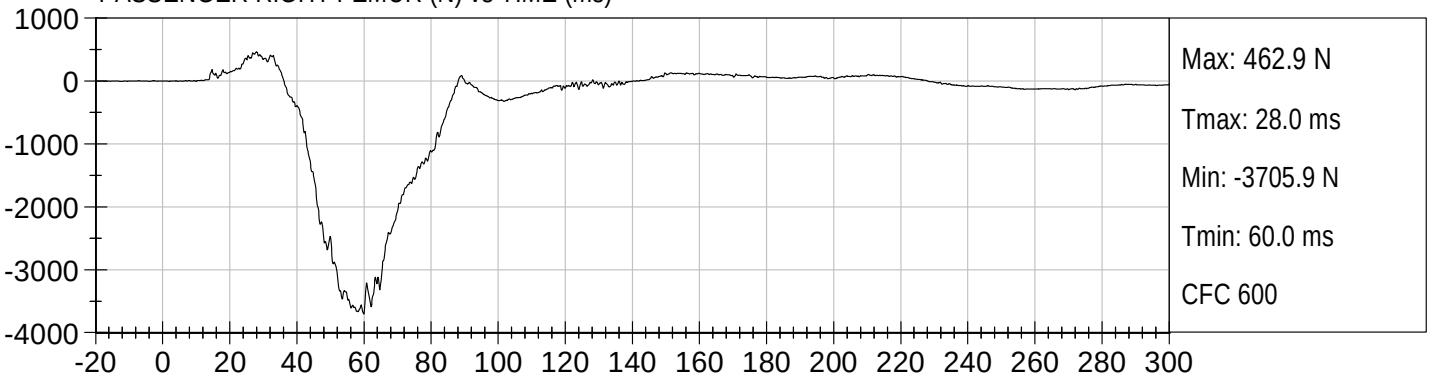
NCAP 35mph Frontal
2011 Mercedes-Benz C300 - MB0502

Test Date: 09/09/2010
Speed: 34.9 mph (56.2 km/h)

PASSENGER LEFT FEMUR (N) vs TIME (ms)



PASSENGER RIGHT FEMUR (N) vs TIME (ms)



APPENDIX C

DUMMY CALIBRATION DATA

MGA RESEARCH CORPORATION

HEAD DROP TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test ID:** D102891

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	20.6	Pass
Laboratory Relative Humidity	%	10 to 70	47	Pass
Peak Resultant Acceleration	G's	225 - 275	258	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

Jessica Hall
Laboratory Technician

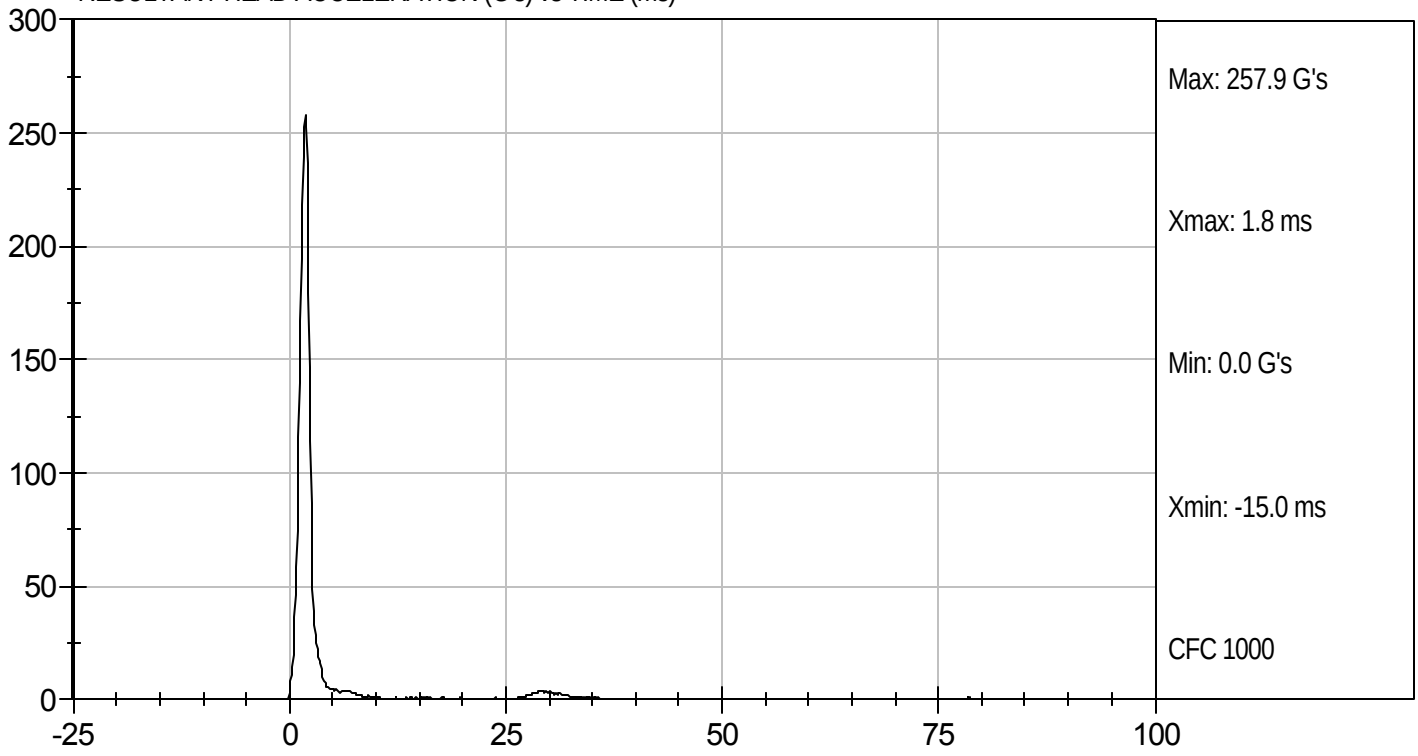
9/7/10
Test Date

David Winkelbauer
Approved By

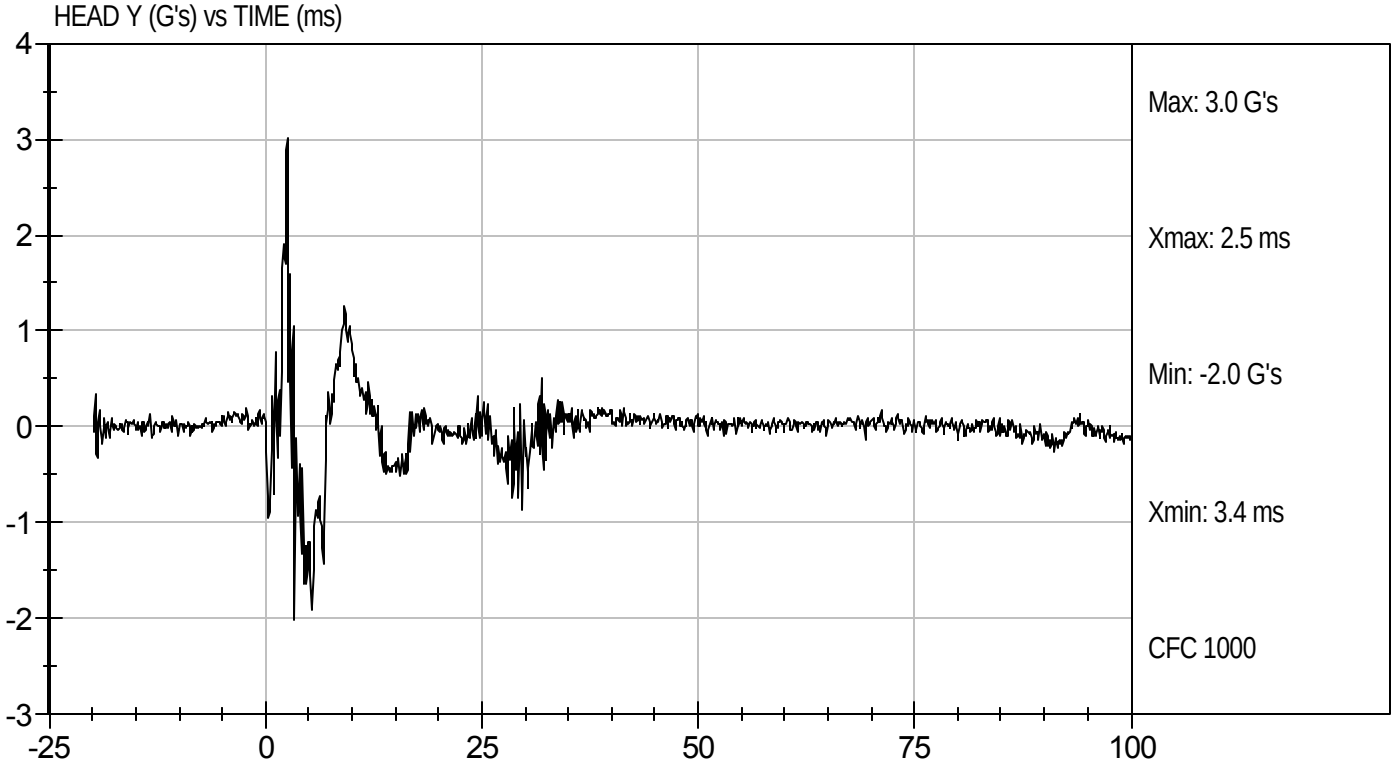
Test Desc: Head Drop
Component ID: D102891

Test Date: 9/7/10
Velocity: 0 ft/s, 0.00 m/s

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



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



MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D102892

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	44	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	22.88	Pass
	20 ms	G's	17.60 to 22.60	19.36	Pass
	30 ms	G's	12.50 to 18.50	14.82	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	14.75	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	34.9	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	67.6	Pass
	Time	ms	57.0 to 64.0	57.8	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	113.4	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	95.9	Pass
	Time	ms	47.0 to 58.0	47.1	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	98.6	Pass
			Overall Test Results		Pass

Jessica Hall
Laboratory Technician

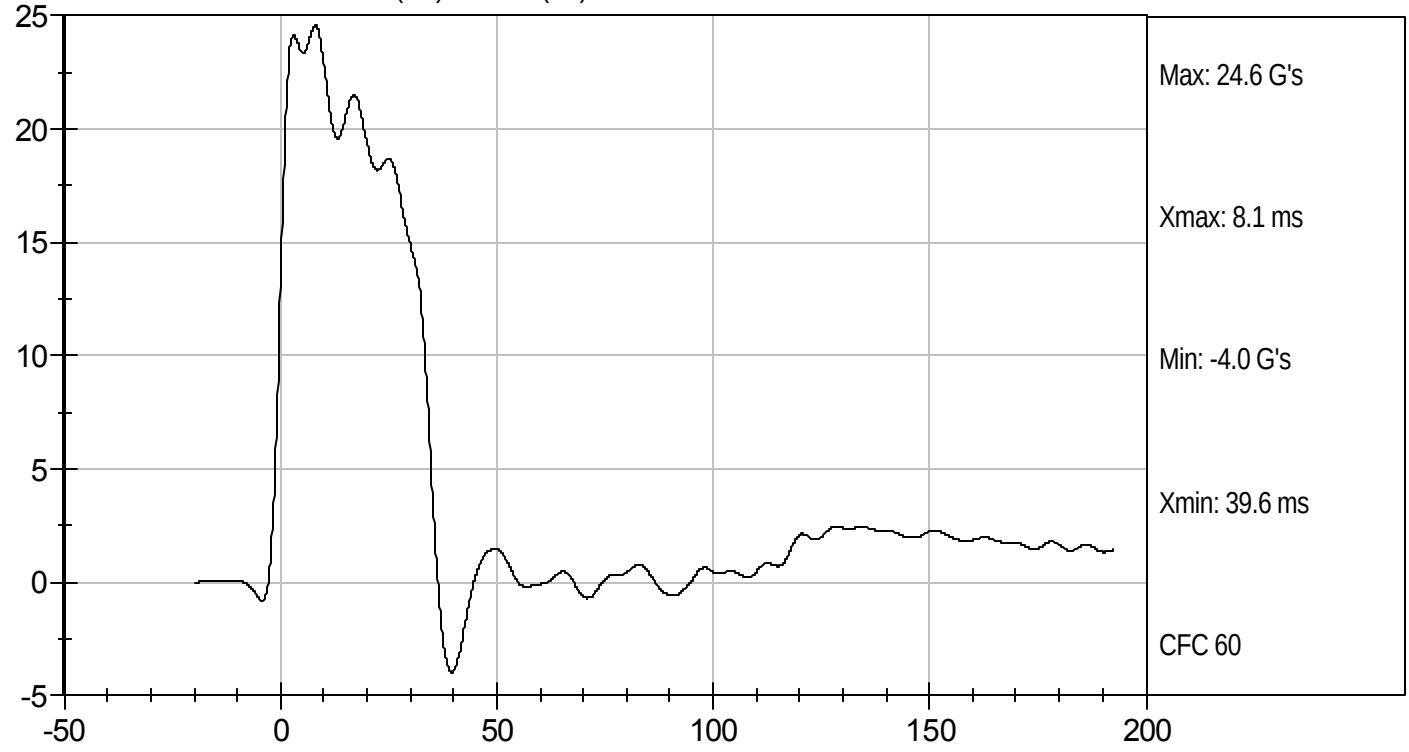
9/7/10
Test Date

David Winkelbauer
Approved By

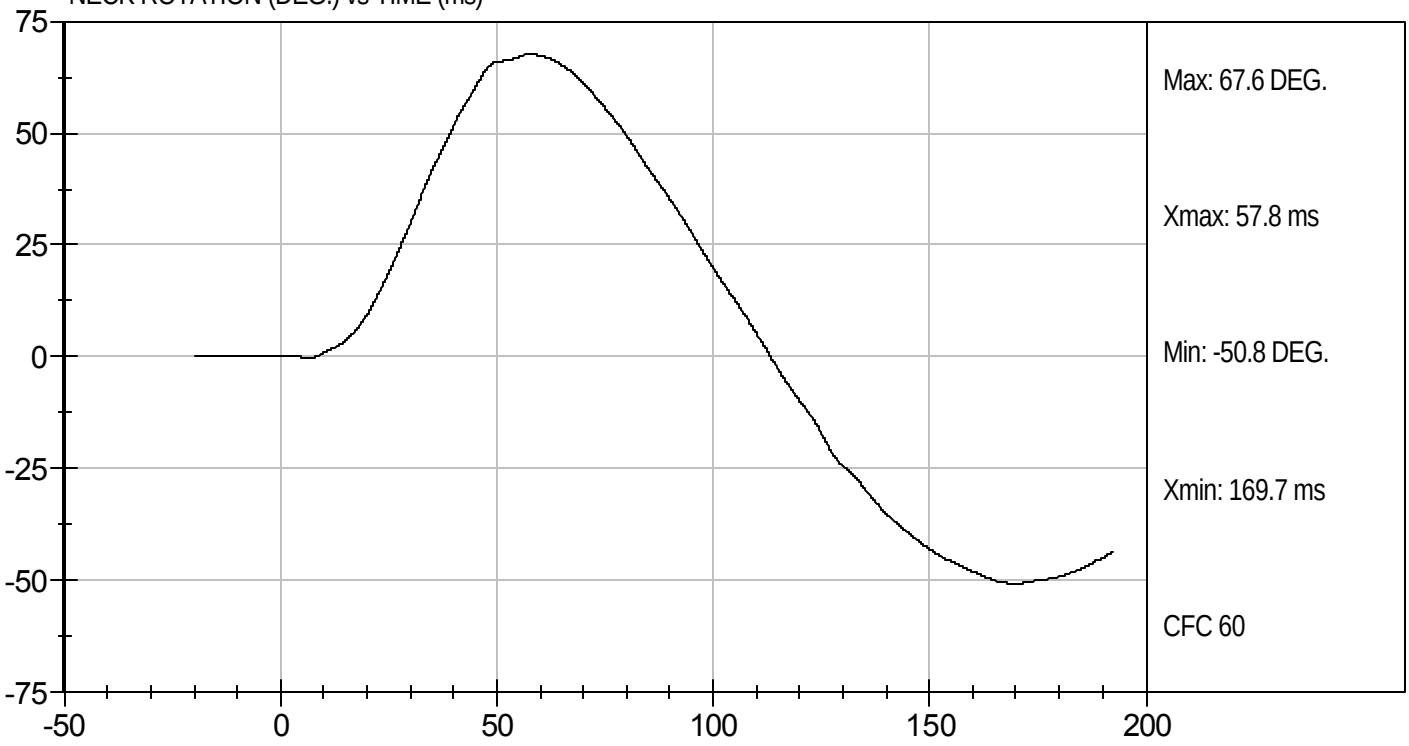
Test Desc: Neck Flexion
Component ID: D102892

Test Date: 9/7/10
Velocity: 23.15 ft/s, 7.06 m/s

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

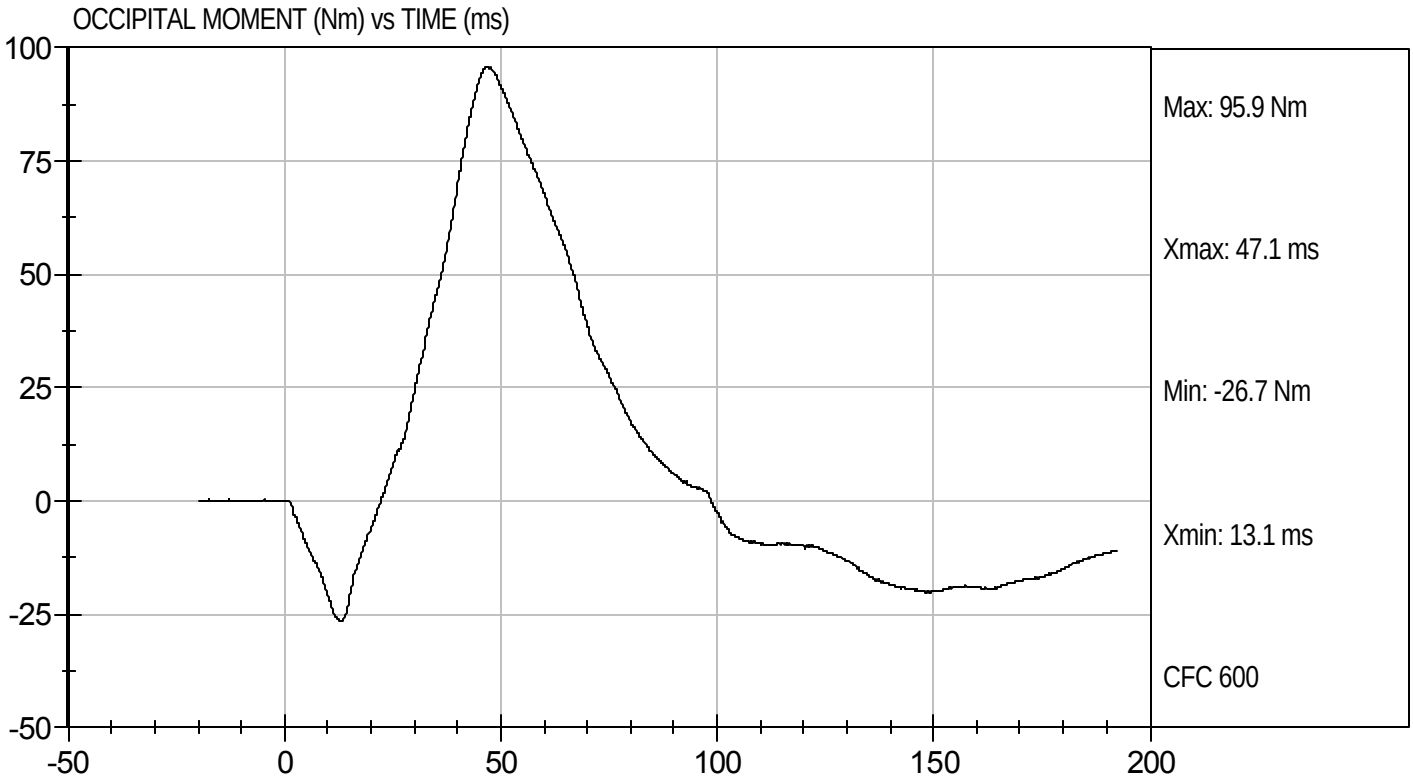


NECK ROTATION (DEG.) vs TIME (ms)



Test Desc: Neck Flexion
Component ID: D102892

Test Date: 9/7/10
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:** D102893

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	20.9	Pass
Laboratory Relative Humidity		%	10 to 70	46	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.04	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	17.32	Pass
	20 ms	G's	14.00 to 19.00	15.44	Pass
	30 ms	G's	11.00 to 16.00	12.70	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	12.72	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	38.9	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	90.1	Pass
	Time	ms	72.0 to 82.0	74.5	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	153.2	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-57.9	Pass
	Time	ms	65.0 to 79.0	69.9	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	139.7	Pass
			Overall Test Results		Pass

Jessica Hall
Laboratory Technician

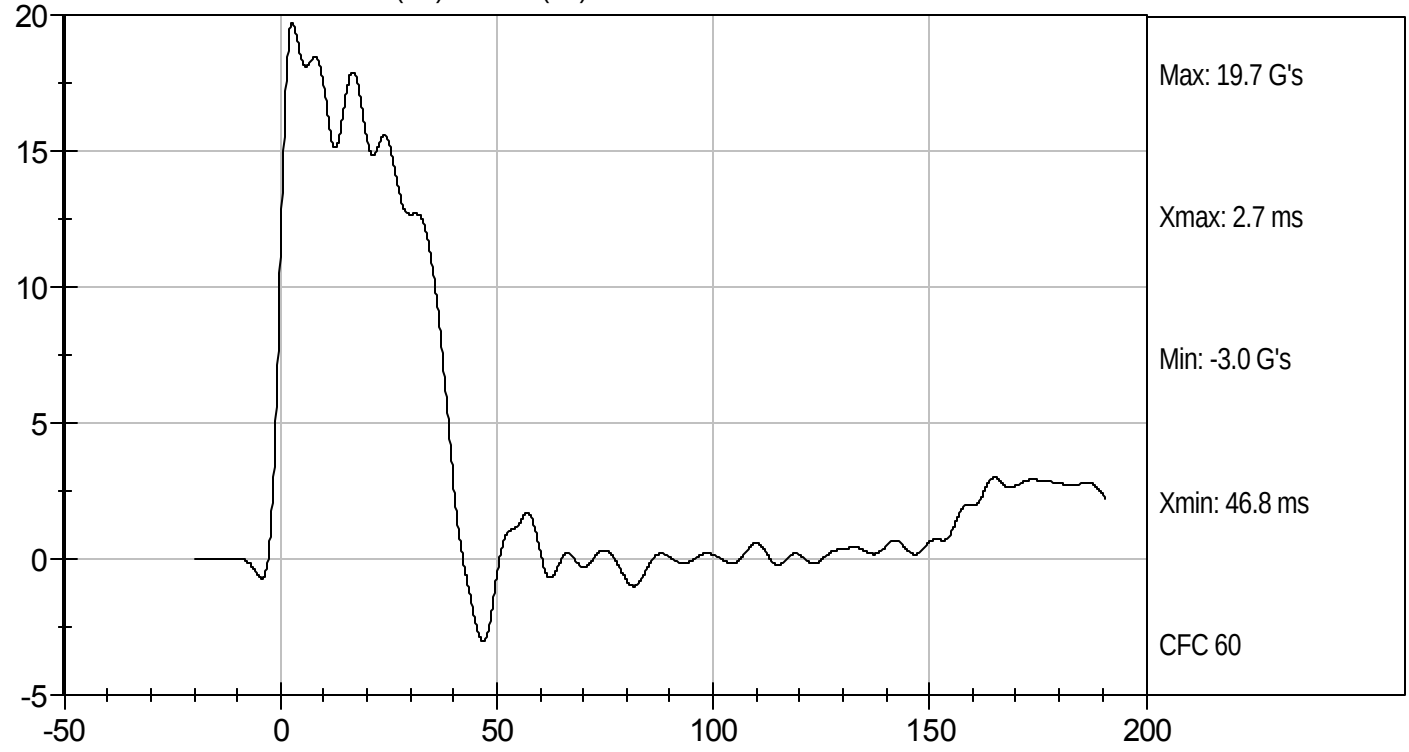
9/7/10
Test Date

David Winkelbauer
Approved By

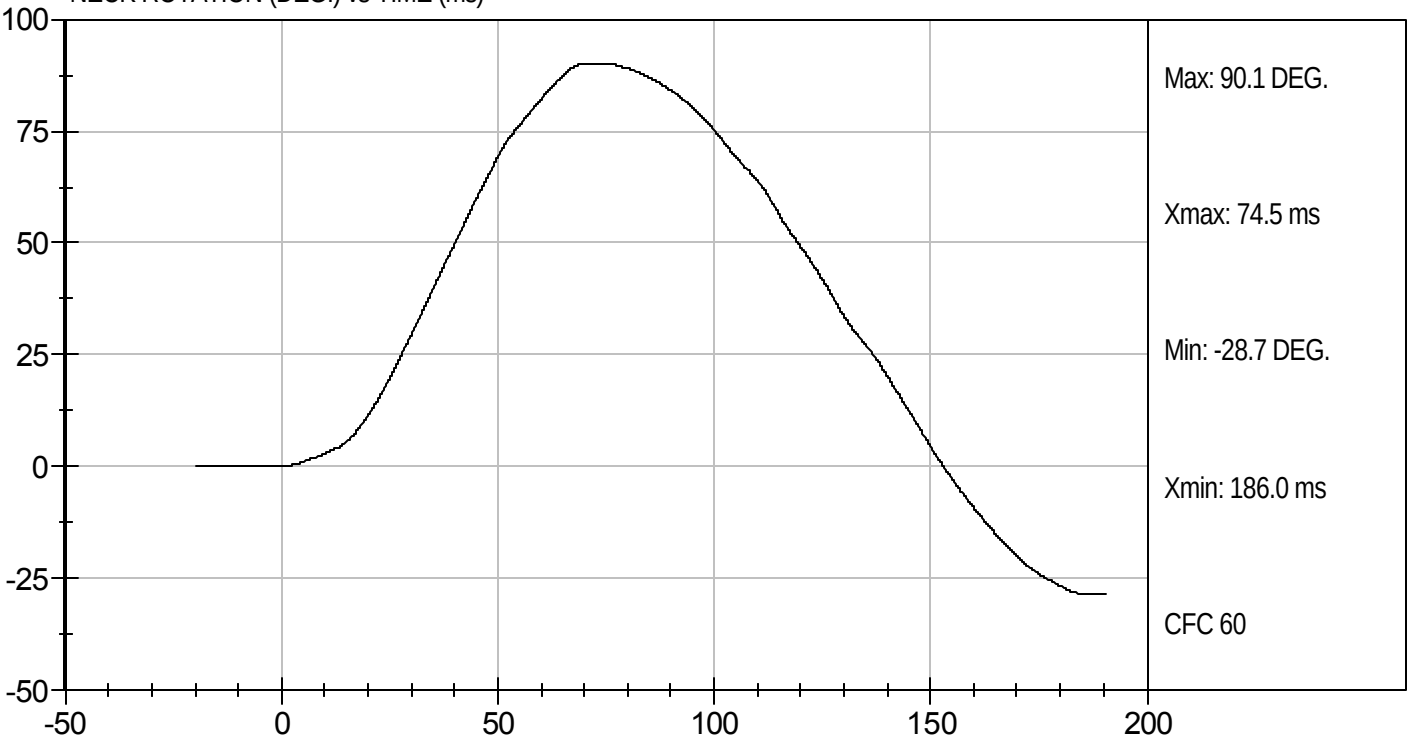
Test Desc: Neck Extension
Component ID: D102893

Test Date: 9/7/10
Velocity: 19.8 ft/s, 6.04 m/s

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

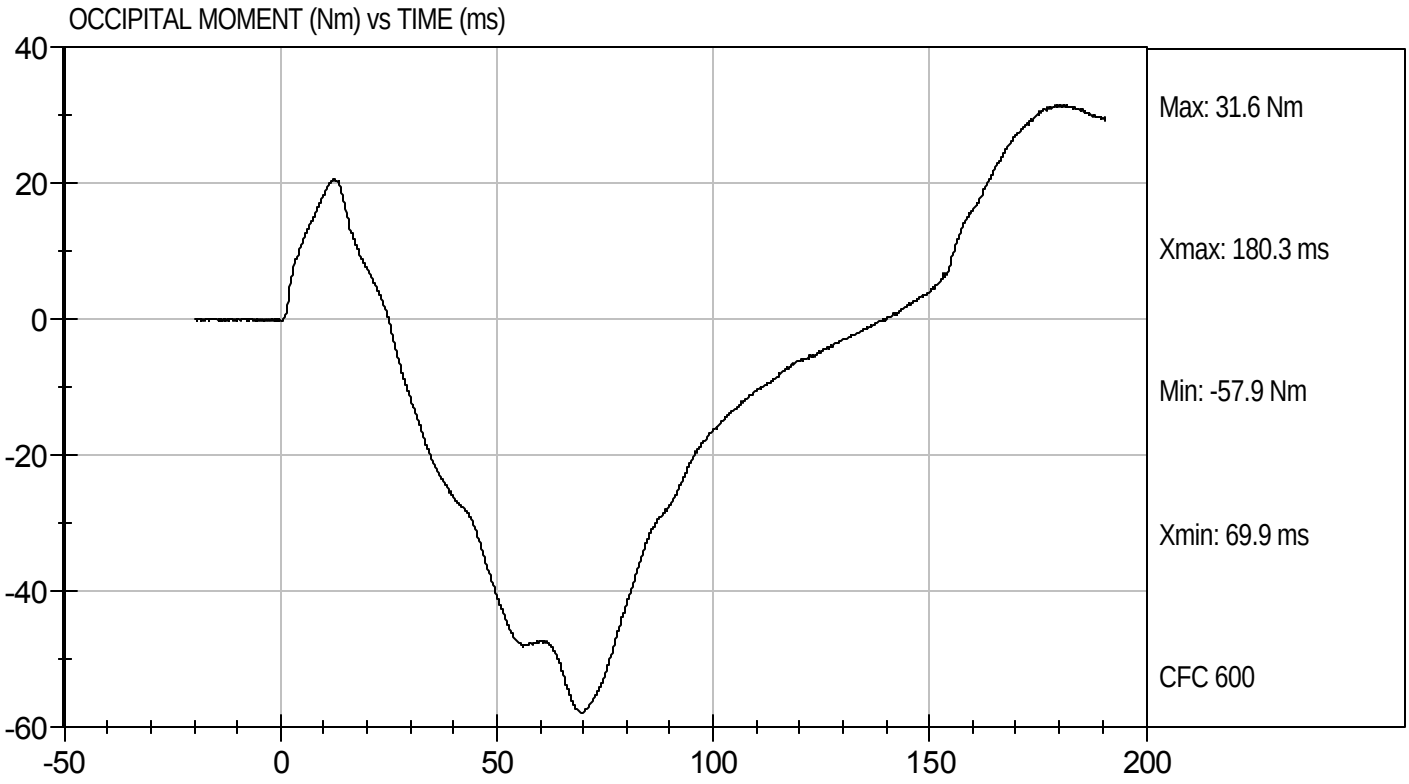


NECK ROTATION (DEG.) vs TIME (ms)



Test Desc: Neck Extension
Component ID: D102893

Test Date: 9/7/10
Velocity: 19.8 ft/s, 6.04 m/s



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D102894

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	44	Pass
Probe Velocity	m/s	6.58 to 6.82	6.77	Pass
Peak Probe Force	N	5159 to 5893	5,357	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.36	Pass
Internal Hysteresis	%	69 to 85	72	Pass
		Overall Test Results		Pass

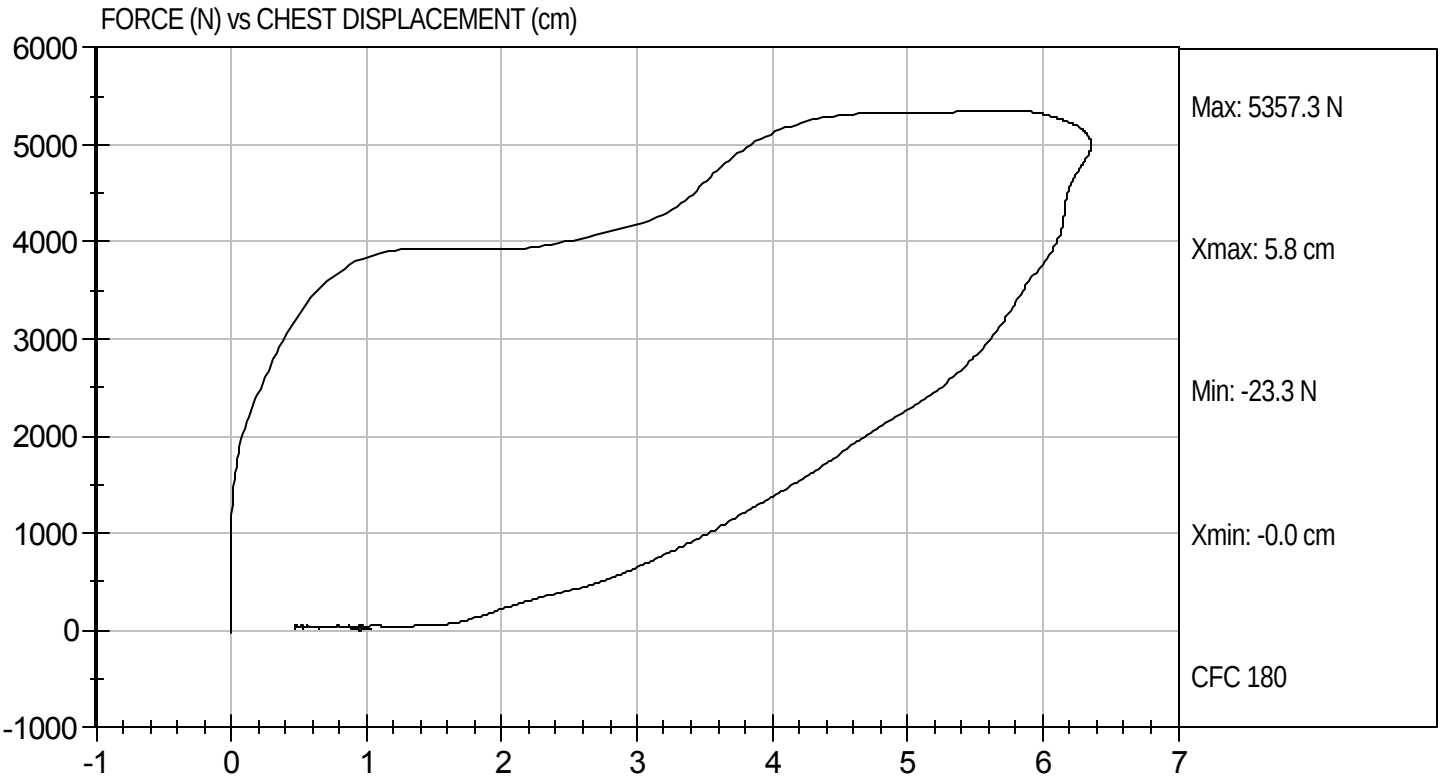
Jessica Hall
Laboratory Technician

9/8/10
Test Date

David Winkelbauer
Approved By

Test Desc: Thorax Impact
Component ID: D102894

Test Date: 9/8/10
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:** D102895

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	20.9	Pass
Laboratory Relative Humidity	%	10 to 70	46	Pass
Probe Velocity	m/s	2.07 to 2.13	2.08	Pass
Peak Probe Force	Newtons	4715 to 5782	5,580	Pass
		Overall Test Results		Pass

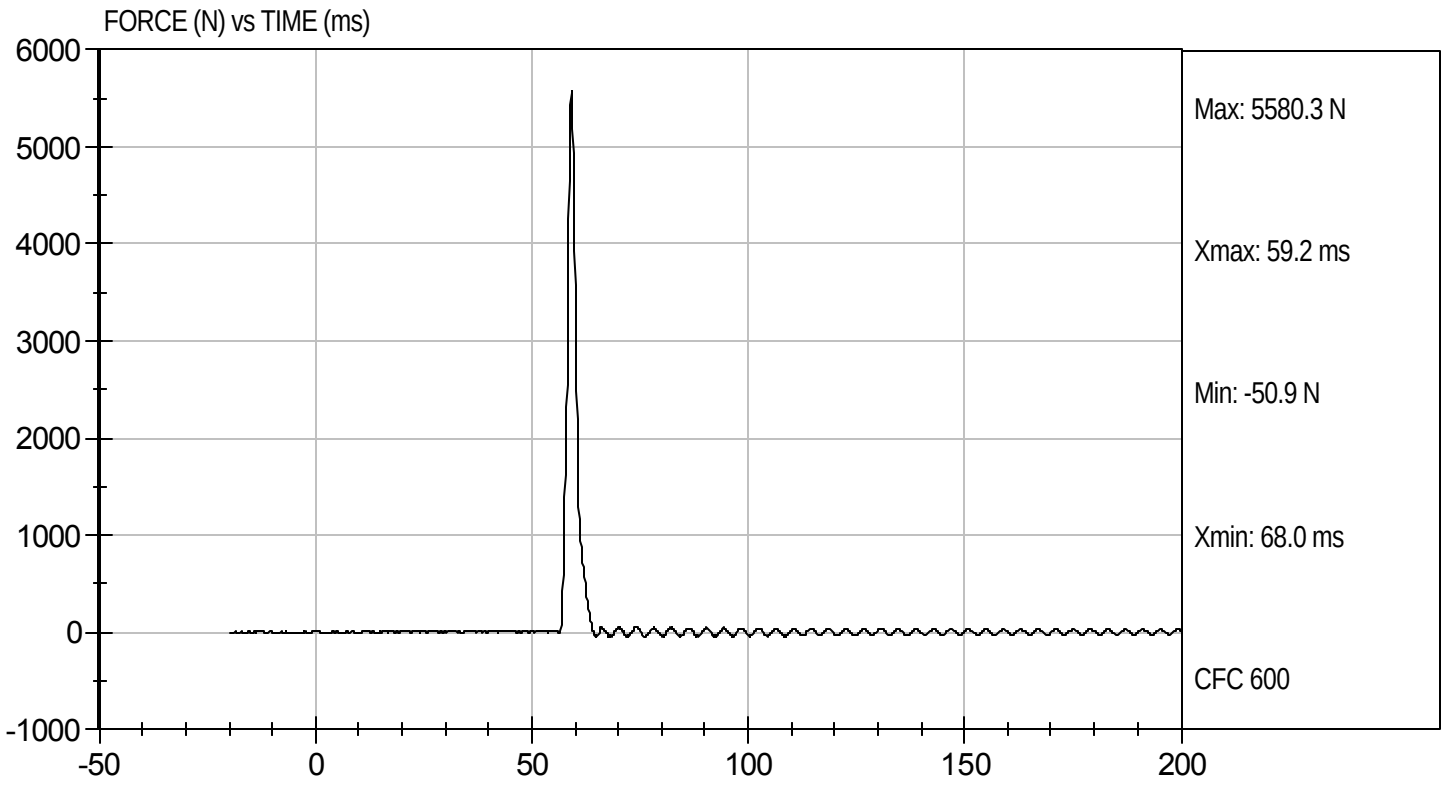
Jessica Hall
Laboratory Technician

9/7/10
Test Date

David Winkelbauer
Approved By

Test Desc: Right Knee
Component ID: D102895

Test Date: 9/7/10
Velocity: 6.83 ft/s, 2.08 m/s



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D102896

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	20.9	Pass
Laboratory Relative Humidity	%	10 to 70	46	Pass
Probe Velocity	m/s	2.07 to 2.13	2.10	Pass
Peak Probe Force	Newtons	4715 to 5782	5,215	Pass
		Overall Test Results		Pass

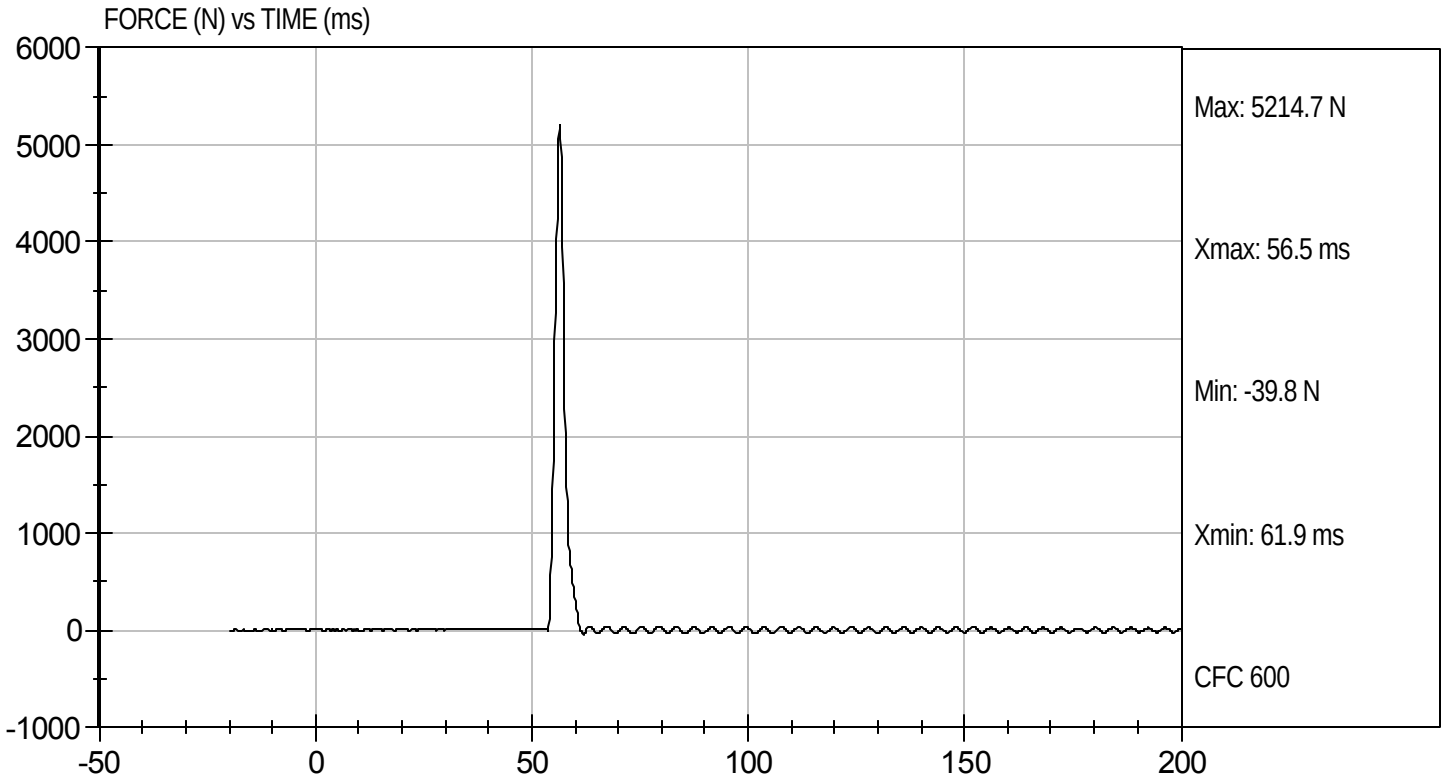
Jessica Hall
Laboratory Technician

9/7/10
Test Date

David Winkelbauer
Approved By

Test Desc: Left Knee
Component ID: D102896

Test Date: 9/7/10
Velocity: 6.88 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:** D102890

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	20.8	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	46	46	Pass
Rotation Rate	deg/s	5 -10	8	8	Pass
30 Degrees	Nm	94.9 Nm Max	62.7	52.9	Pass
150 ft-lbf / 203.4 Nm	Deg	40- 50 Degree Max Rotation	45	47	Pass
		Overall Test Results			Pass

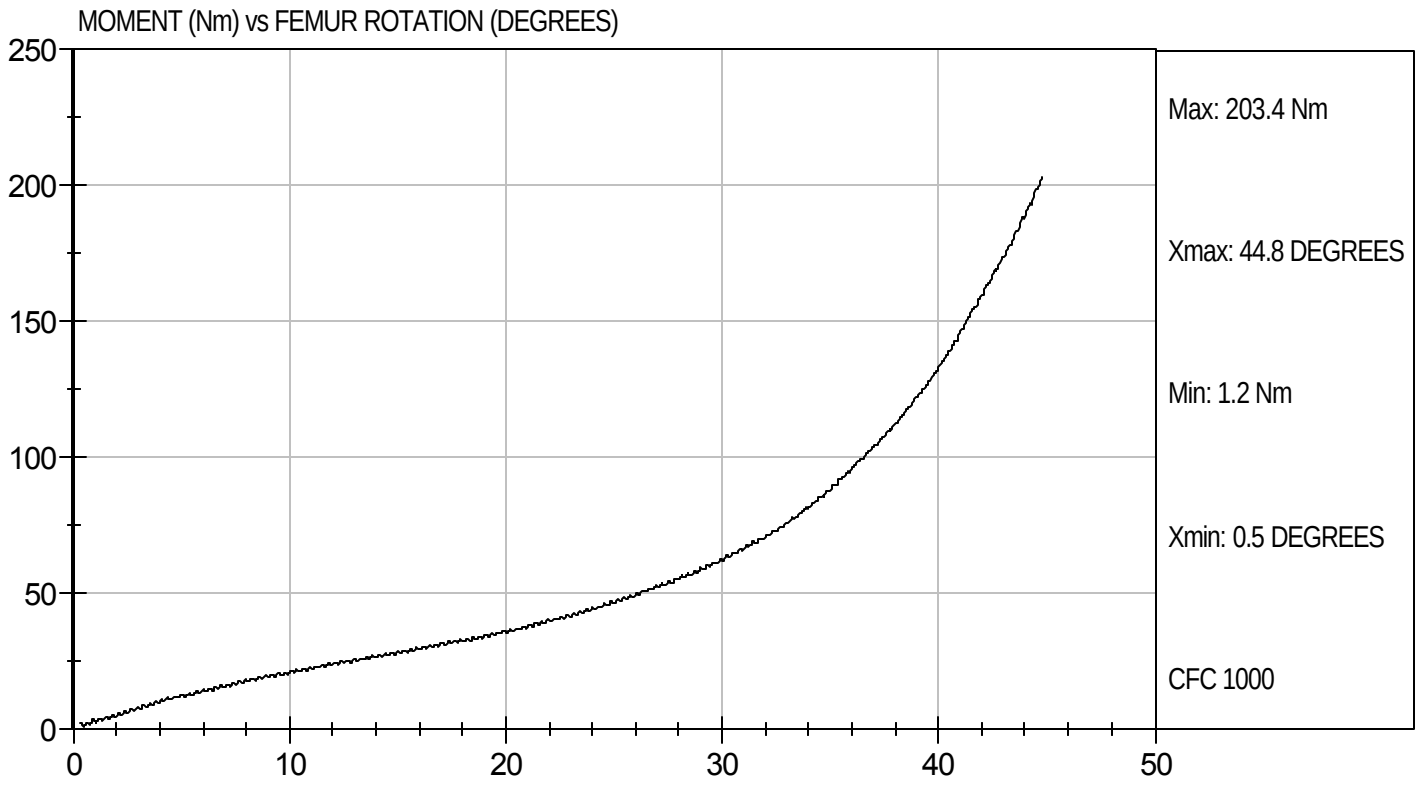
Jessica Hall
Laboratory Technician

9/7/10
Test Date

David Winkelbauer
Approved By

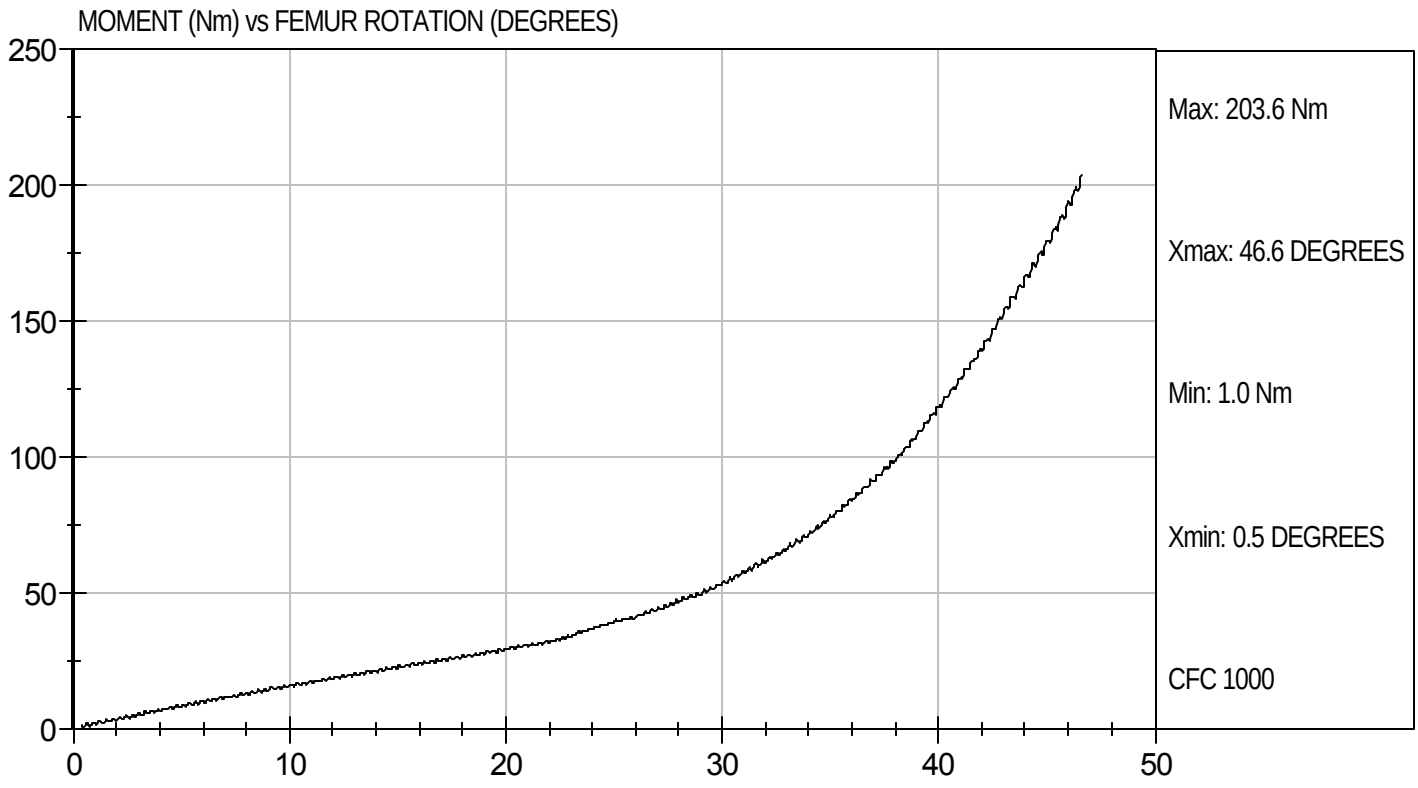
Test Desc: Hip Femur Flexion
Component ID: D102899

Test Date: 18/16/21
Velocity: 0 ft/s, 0.00 m/s



Test Desc: Hip Femur Flexion
Component ID: D102890

Test Date: 9/7/10
Velocity: 0 ft/s, 0.00 m/s



MGA RESEARCH CORPORATION

HEAD DROP TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test ID:** D102971

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	45	Pass
Peak Resultant Acceleration	G's	225 - 275	264	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-4.1	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
		Overall Test Results		Pass

Jessica Gall
Laboratory Technician

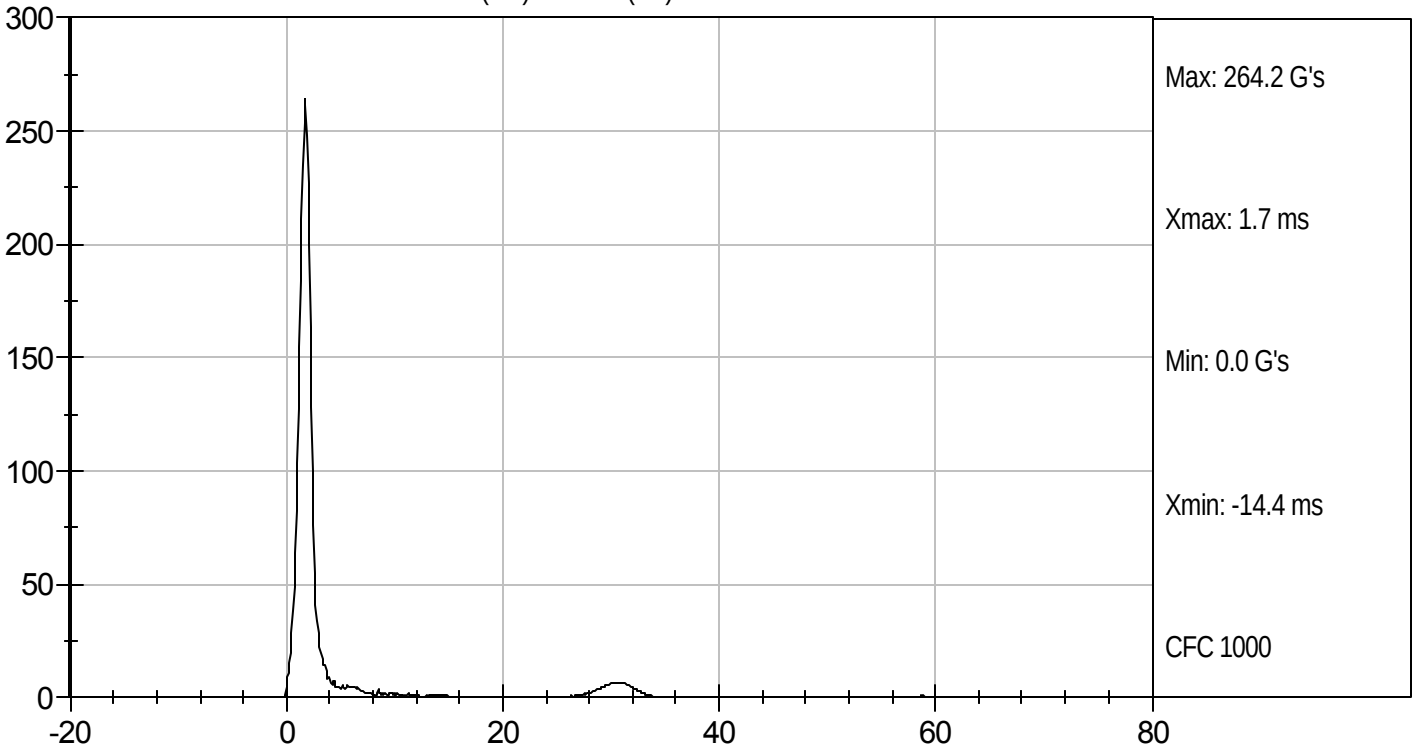
9/9/10
Test Date

David Winkelbauer
Approved By

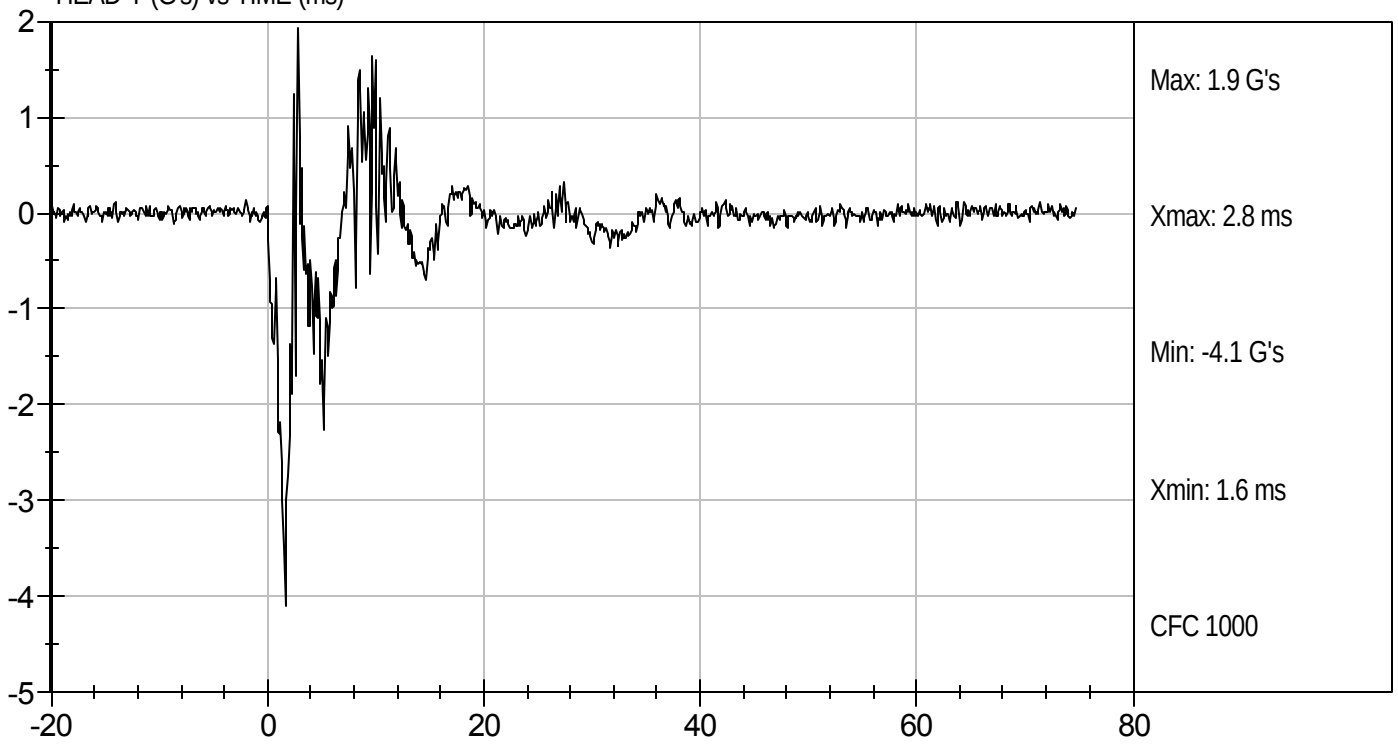
Test Desc: Head Drop
Component ID: D102971

Test Date: 9/9/10
Velocity: 0 ft/s, 0.00 m/s

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



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



MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D102972

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity		%	10 to 70	55	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	23.55	Pass
	20 ms	G's	17.60 to 22.60	19.94	Pass
	30 ms	G's	12.50 to 18.50	15.07	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	15.00	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	34.6	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	66.9	Pass
	Time	ms	57.0 to 64.0	57.4	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	115.6	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	94.1	Pass
	Time	ms	47.0 to 58.0	47.4	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	101.7	Pass
			Overall Test Results		Pass

Jessica Hall
Laboratory Technician

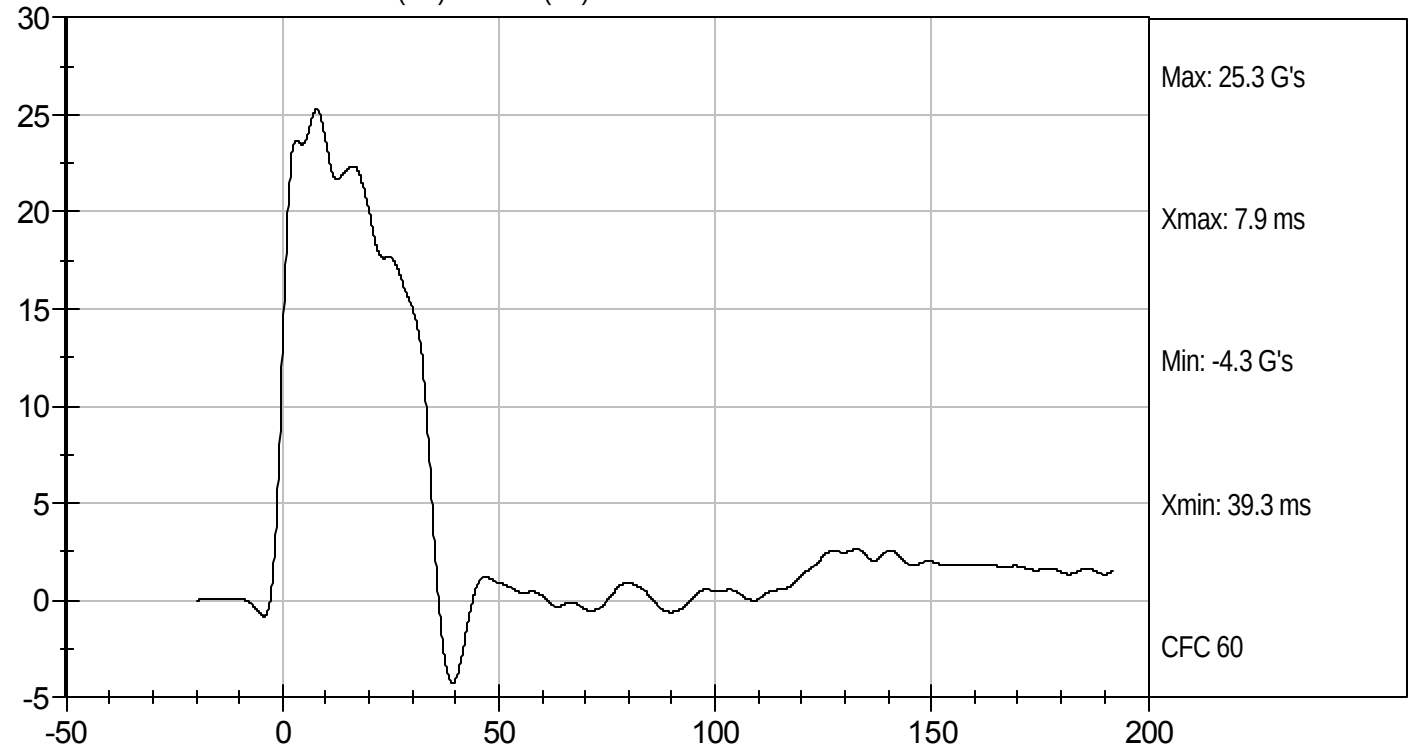
9/10/10
Test Date

David Winkelbauer
Approved By

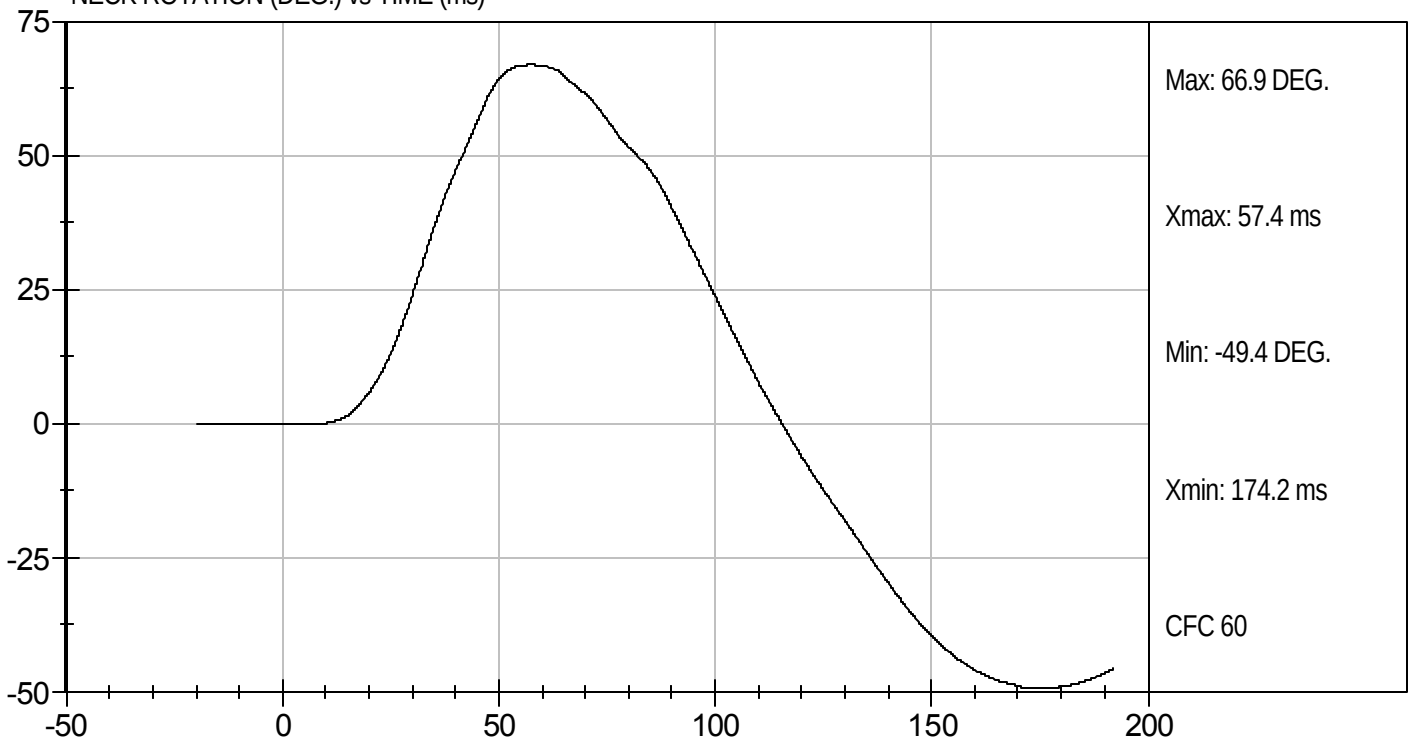
Test Desc: Neck Flexion
Component ID: D102972

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

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

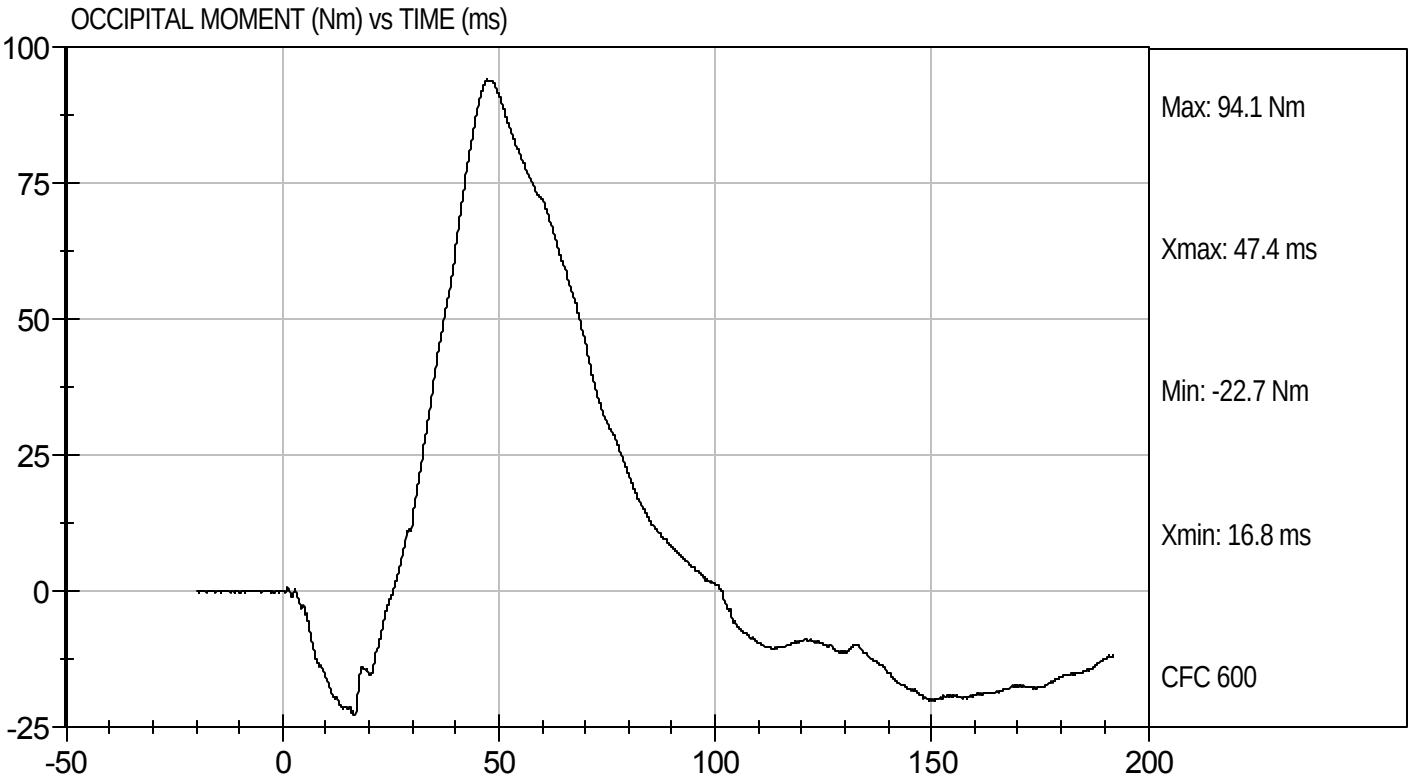


NECK ROTATION (DEG.) vs TIME (ms)



Test Desc: Neck Flexion
Component ID: D102972

Test Date: 9/10/10
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:** D102973

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity		%	10 to 70	55	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.12	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	19.14	Pass
	20 ms	G's	14.00 to 19.00	16.78	Pass
	30 ms	G's	11.00 to 16.00	14.01	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	13.88	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	38.6	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	96.7	Pass
	Time	ms	72.0 to 82.0	79.6	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	156.2	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-60.5	Pass
	Time	ms	65.0 to 79.0	70.3	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	142.6	Pass
			Overall Test Results		Pass

Jessica Gall
Laboratory Technician

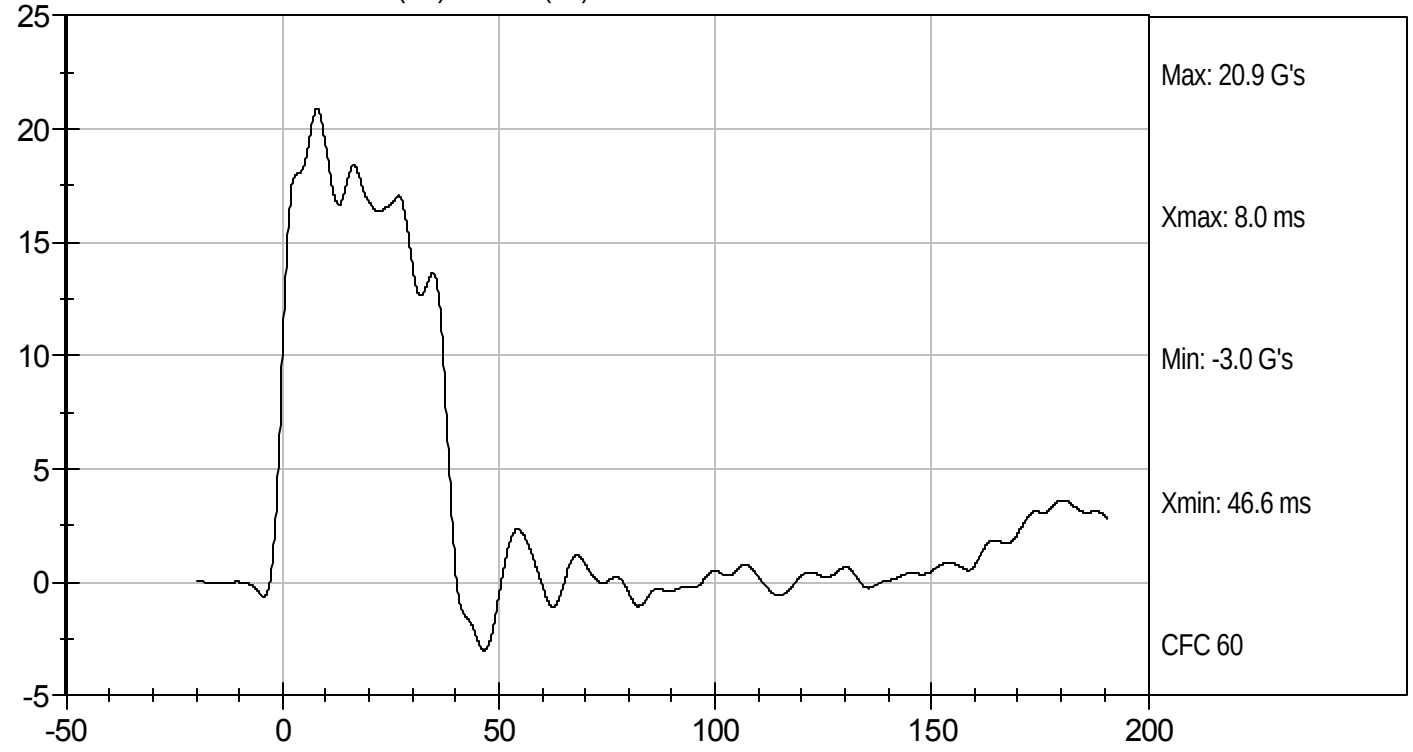
9/10/10
Test Date

David Winkelbauer
Approved By

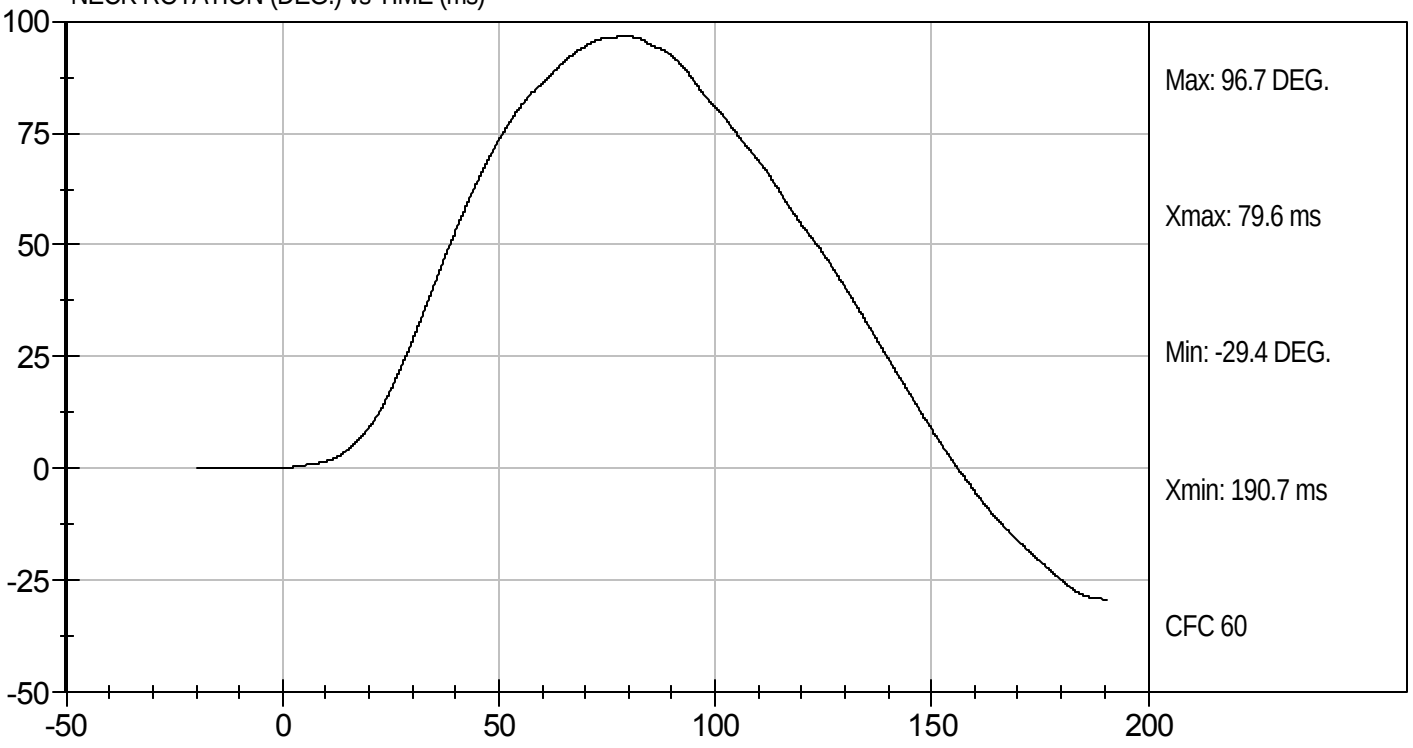
Test Desc: Neck Extension
Component ID: D102973

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

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

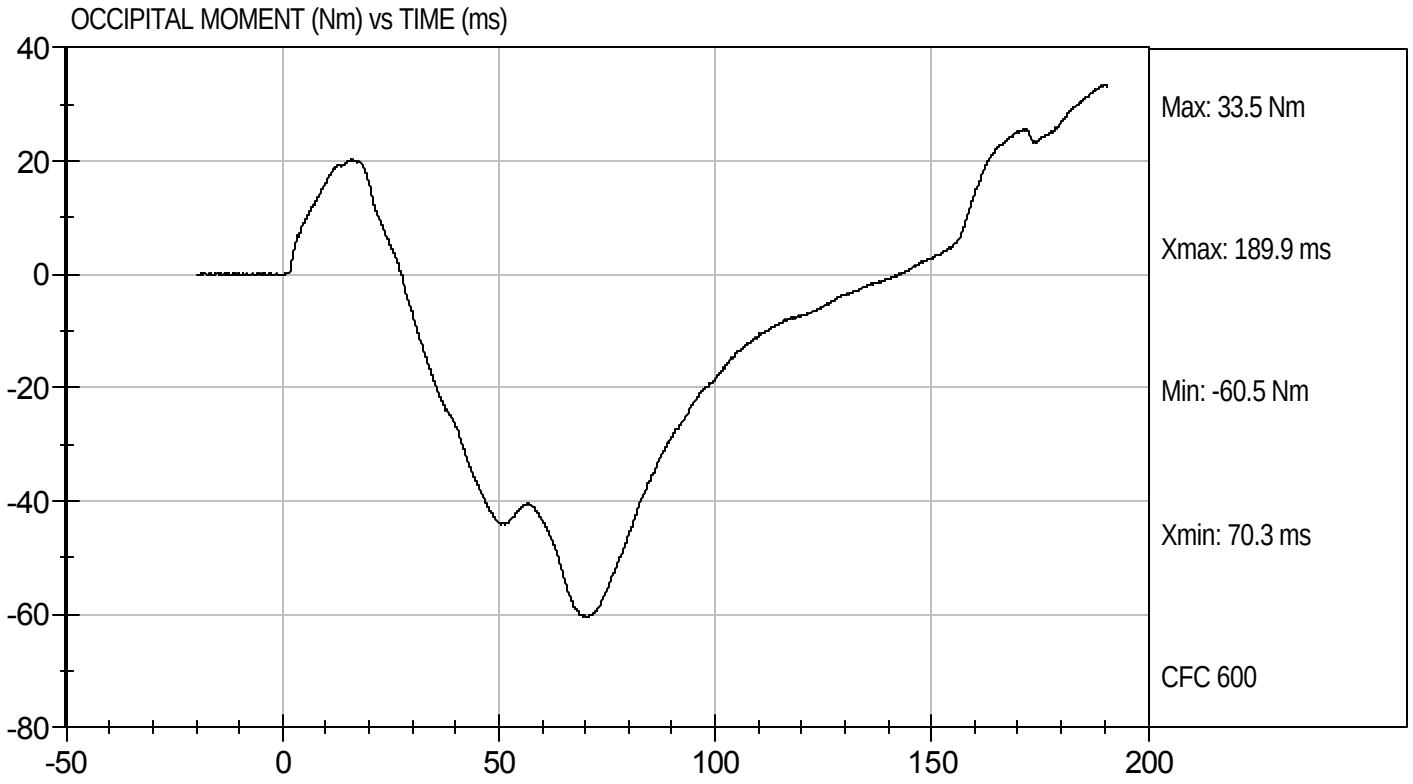


NECK ROTATION (DEG.) vs TIME (ms)



Test Desc: Neck Extension
Component ID: D102973

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



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D102974

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	53	Pass
Probe Velocity	m/s	6.58 to 6.82	6.77	Pass
Peak Probe Force	N	5159 to 5893	5,374	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.42	Pass
Internal Hysteresis	%	69 to 85	72	Pass
		Overall Test Results		Pass

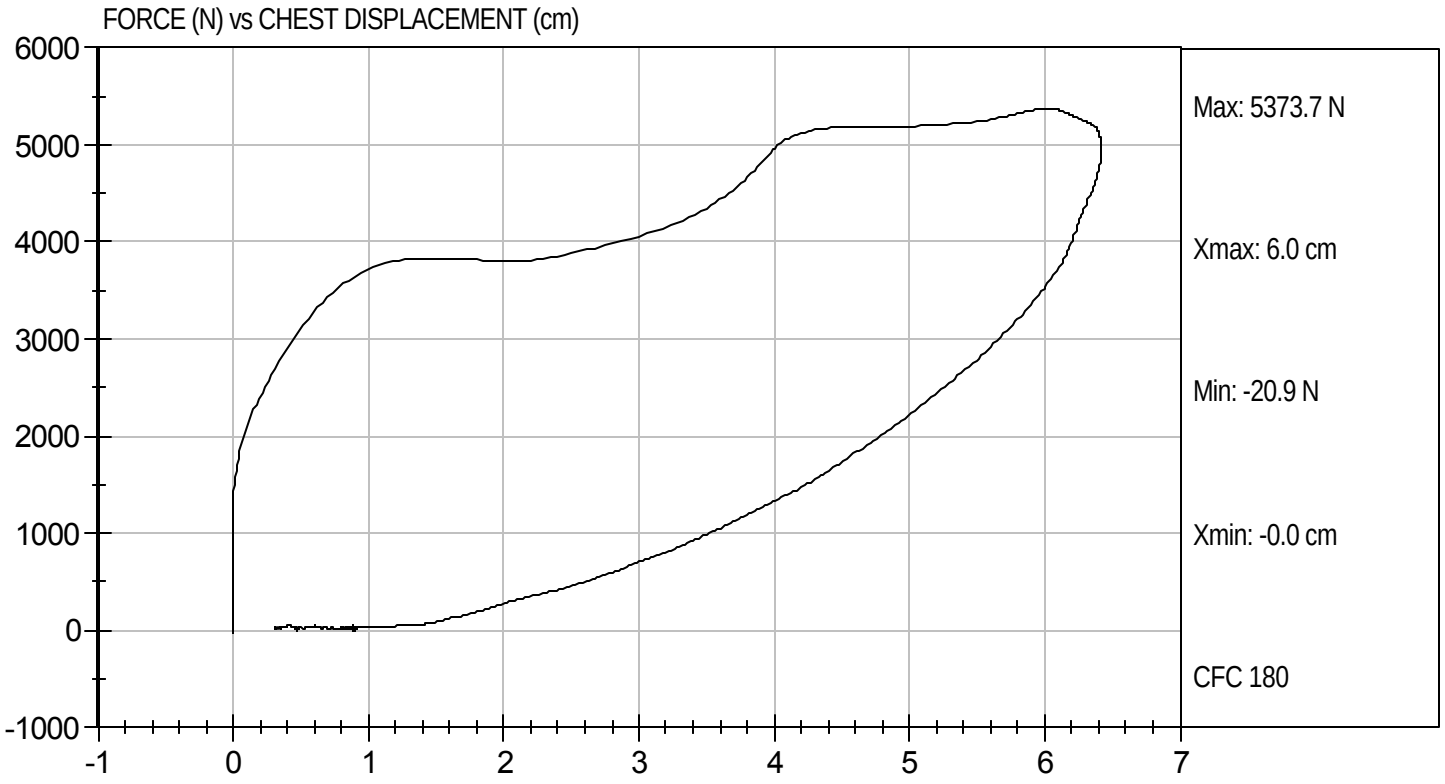
Jessica Hall
Laboratory Technician

9/10/10
Test Date

David Winkelbauer
Approved By

Test Desc: Thorax Impact
Component ID: D102974

Test Date: 9/10/10
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:** D102975

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	54	Pass
Probe Velocity	m/s	2.07 to 2.13	2.10	Pass
Peak Probe Force	Newtons	4715 to 5782	5,458	Pass
		Overall Test Results		Pass

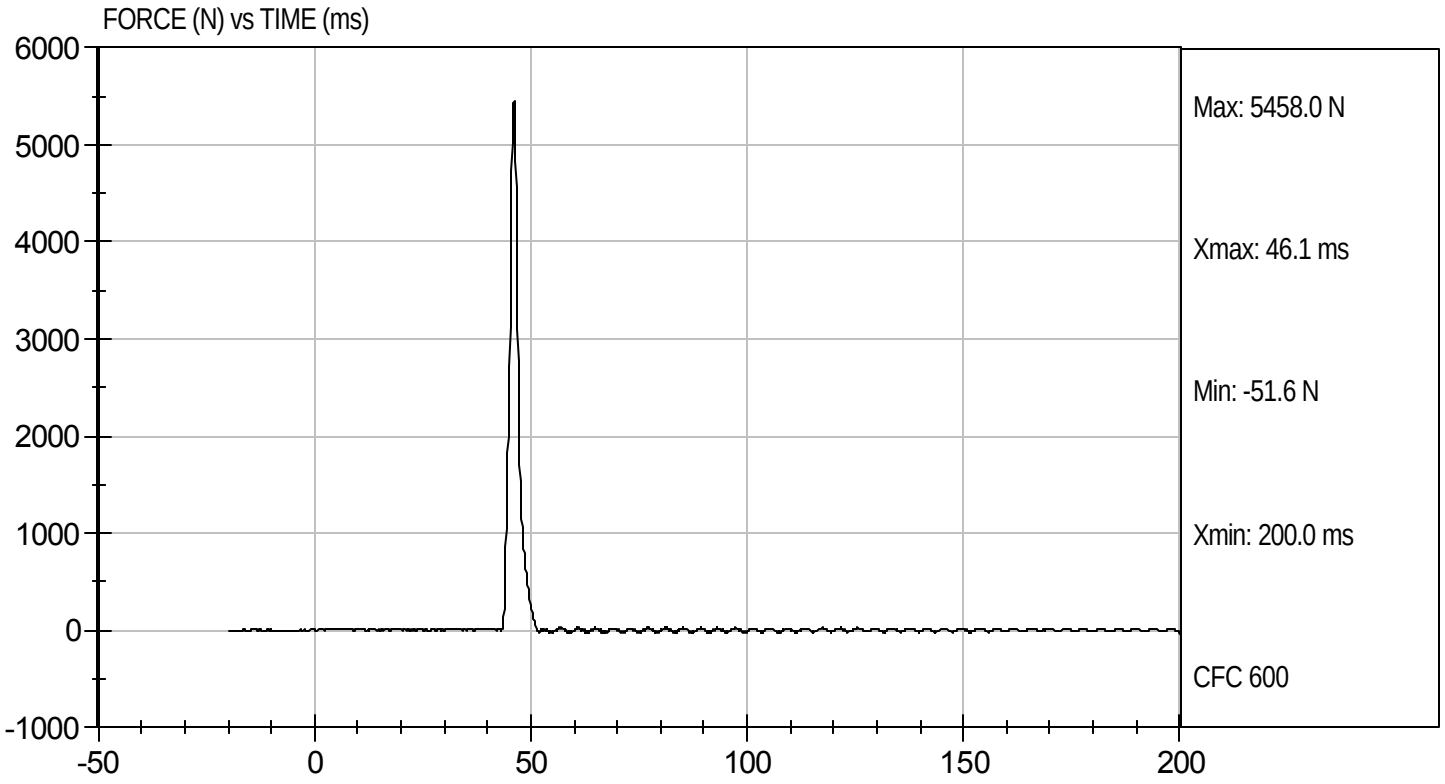
Jessica Gall
Laboratory Technician

9/10/10
Test Date

David Winkelbauer
Approved By

Test Desc: Right Knee
Component ID: D102975

Test Date: 9/10/10
Velocity: 6.89 ft/s, 2.10 m/s



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D102976

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	54	Pass
Probe Velocity	m/s	2.07 to 2.13	2.07	Pass
Peak Probe Force	Newtons	4715 to 5782	5,240	Pass
		Overall Test Results		Pass

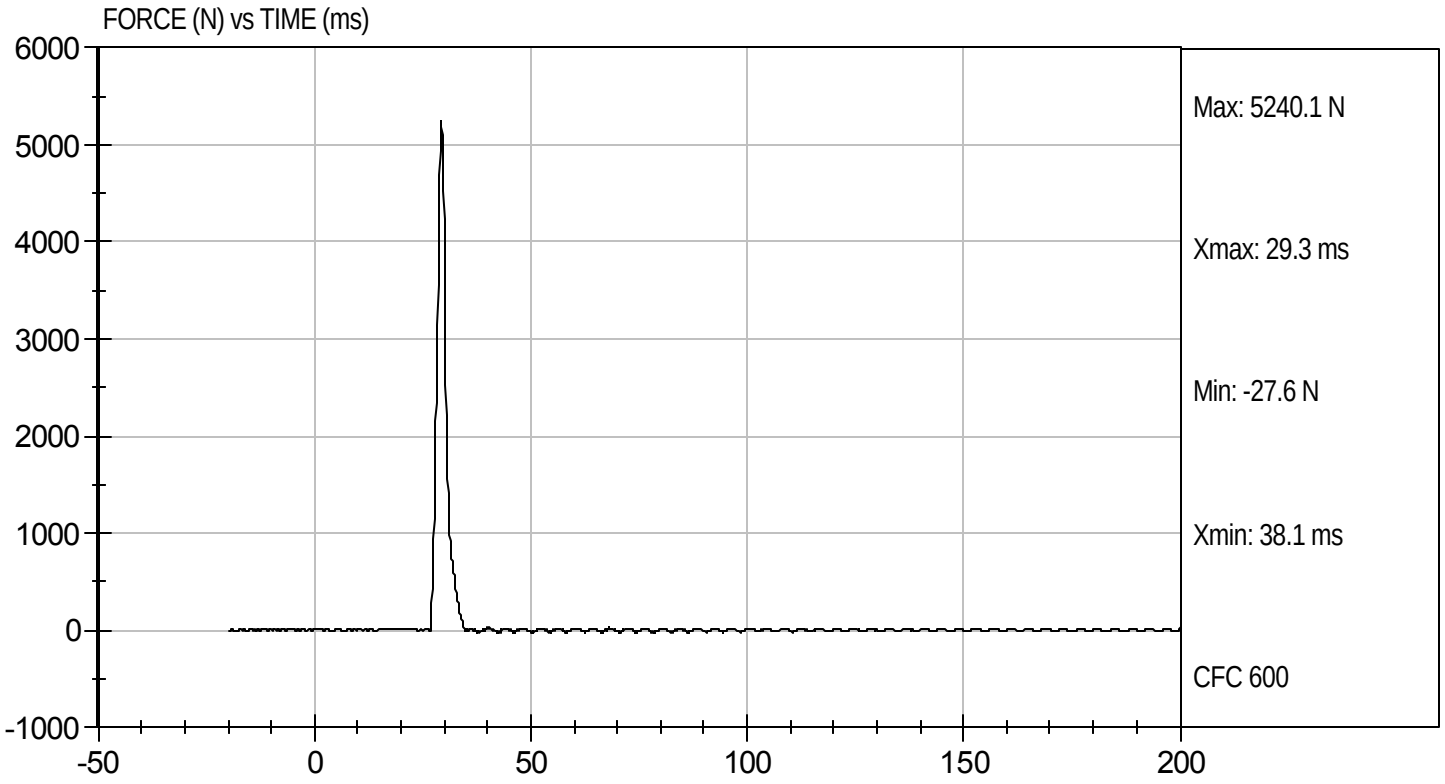
Jessica Hall
Laboratory Technician

9/10/10
Test Date

David Winkelbauer
Approved By

Test Desc: Left Knee
Component ID: D102976

Test Date: 9/10/10
Velocity: 6.80 ft/s, 2.07 m/s



MGA RESEARCH CORPORATION

HIP-FEMUR FLEXION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D102970

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	54	54	Pass
Rotation Rate	deg/s	5 -10	8	8	Pass
30 Degrees	Nm	94.9 Nm Max	55.1	49.5	Pass
150 ft-lbf / 203.4 Nm	Deg	40- 50 Degree Max Rotation	46	48	Pass
		Overall Test Results			Pass

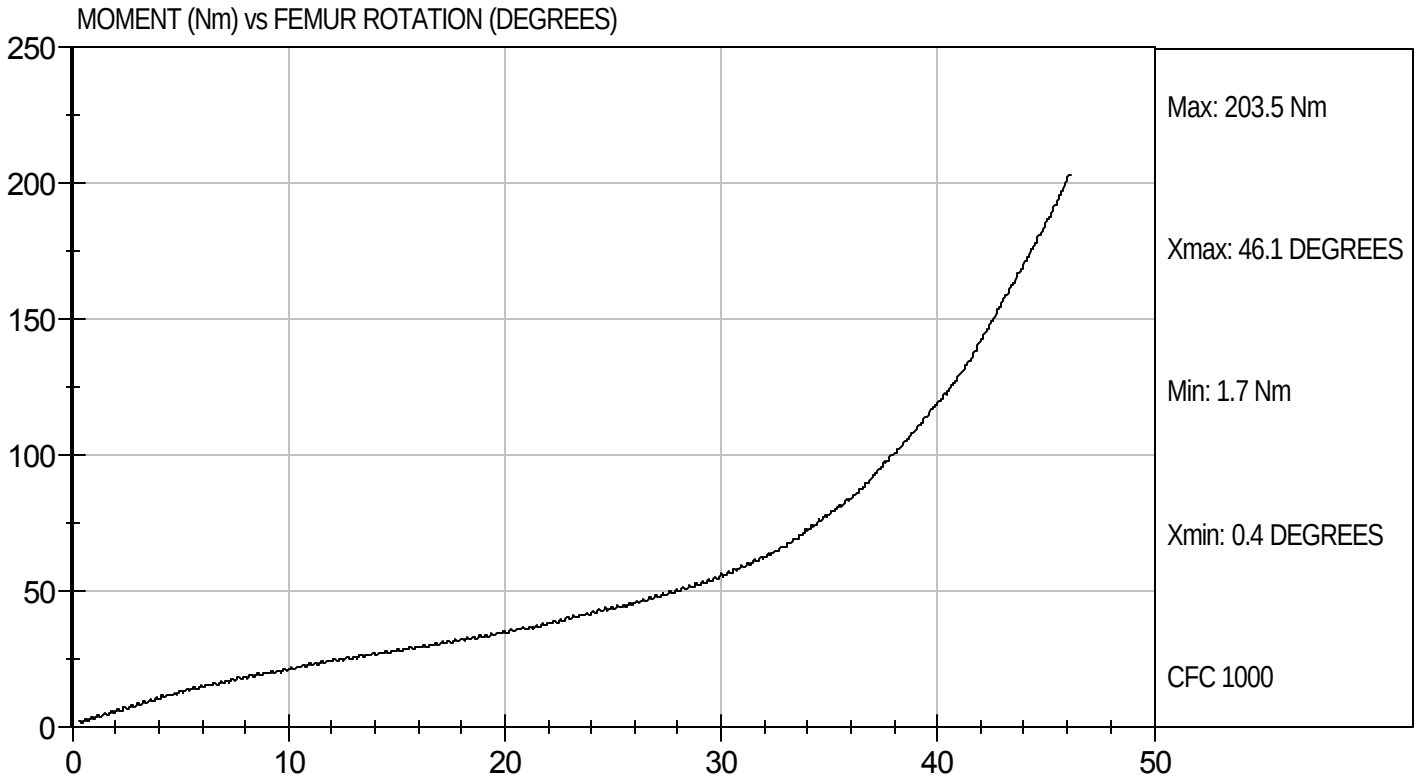
Jessica Gall
Laboratory Technician

9/10/10
Test Date

David Winkelbauer
Approved By

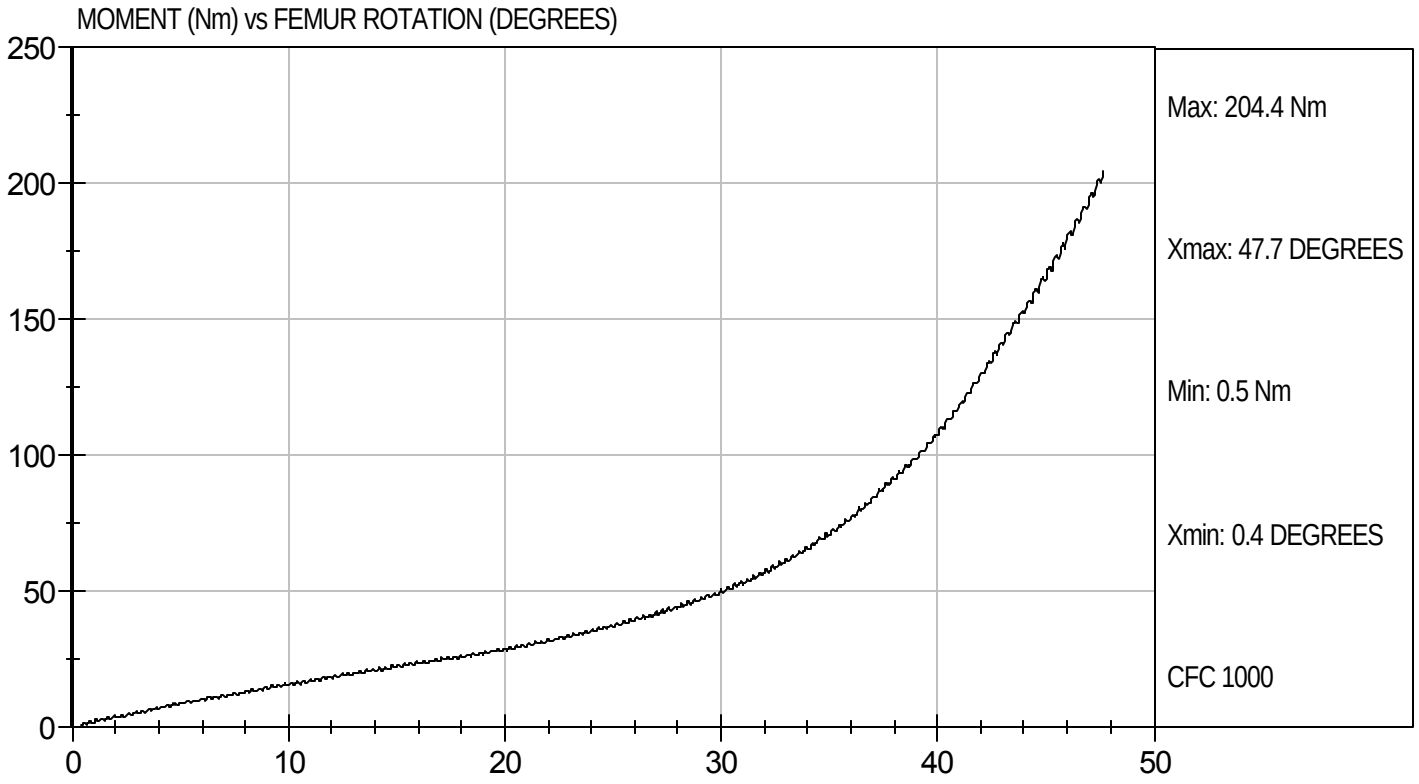
Test Desc: Hip Femur Flexion
Component ID: D102979

Test Date: 9/10/10
Velocity: 0 ft/s, 0.00 m/s



Test Desc: Hip Femur Flexion
Component ID: D102970

Test Date: 9/10/10
Velocity: 0 ft/s, 0.00 m/s



MGA RESEARCH CORPORATION

HEAD DROP TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test ID:** D102901

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	20.6	Pass
Laboratory Relative Humidity	%	10 to 70	47	Pass
Peak Resultant Acceleration	G's	250 to 300	287	Pass
Peak Lateral Acceleration	G's	+/- 15	-13.5	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
		Overall Test Results		Pass

Jessica Hall
Laboratory Technician

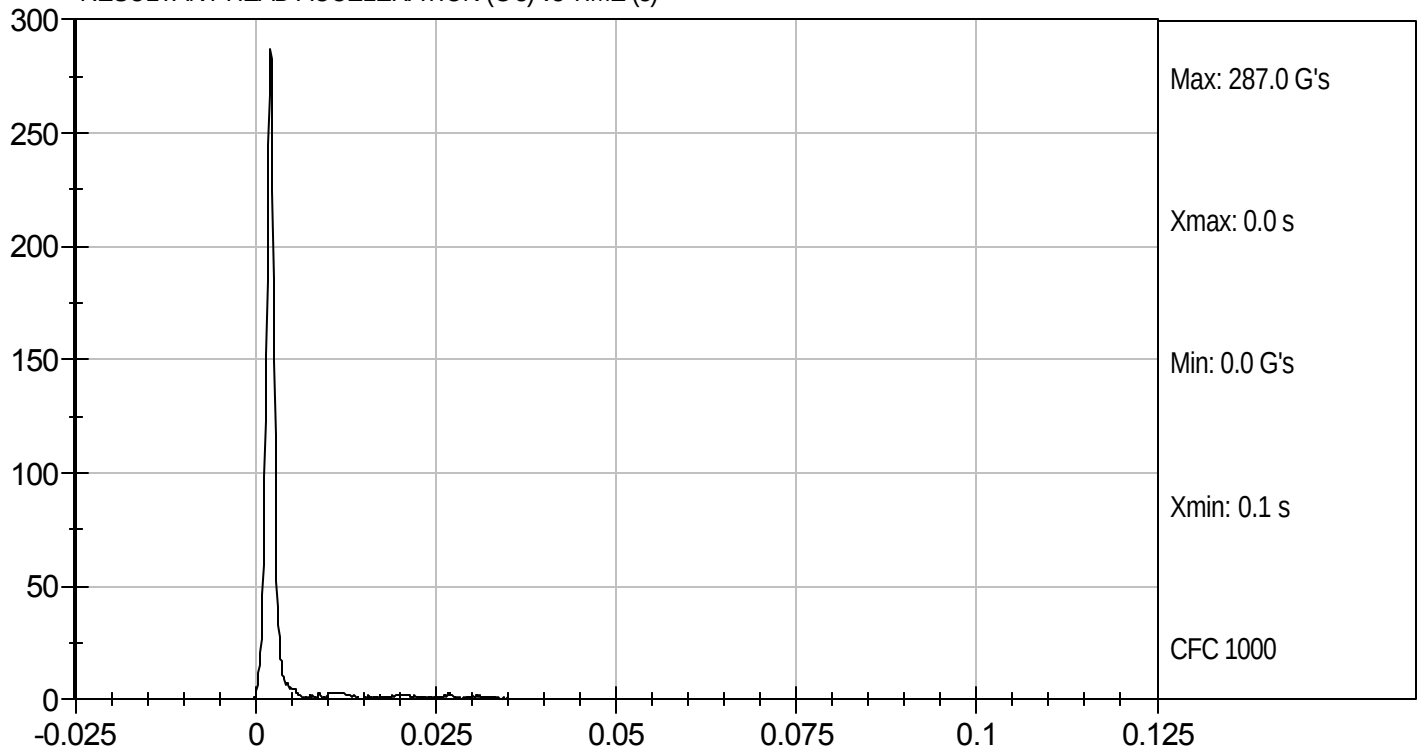
9/7/10
Test Date

David Winkelbauer
Approved By

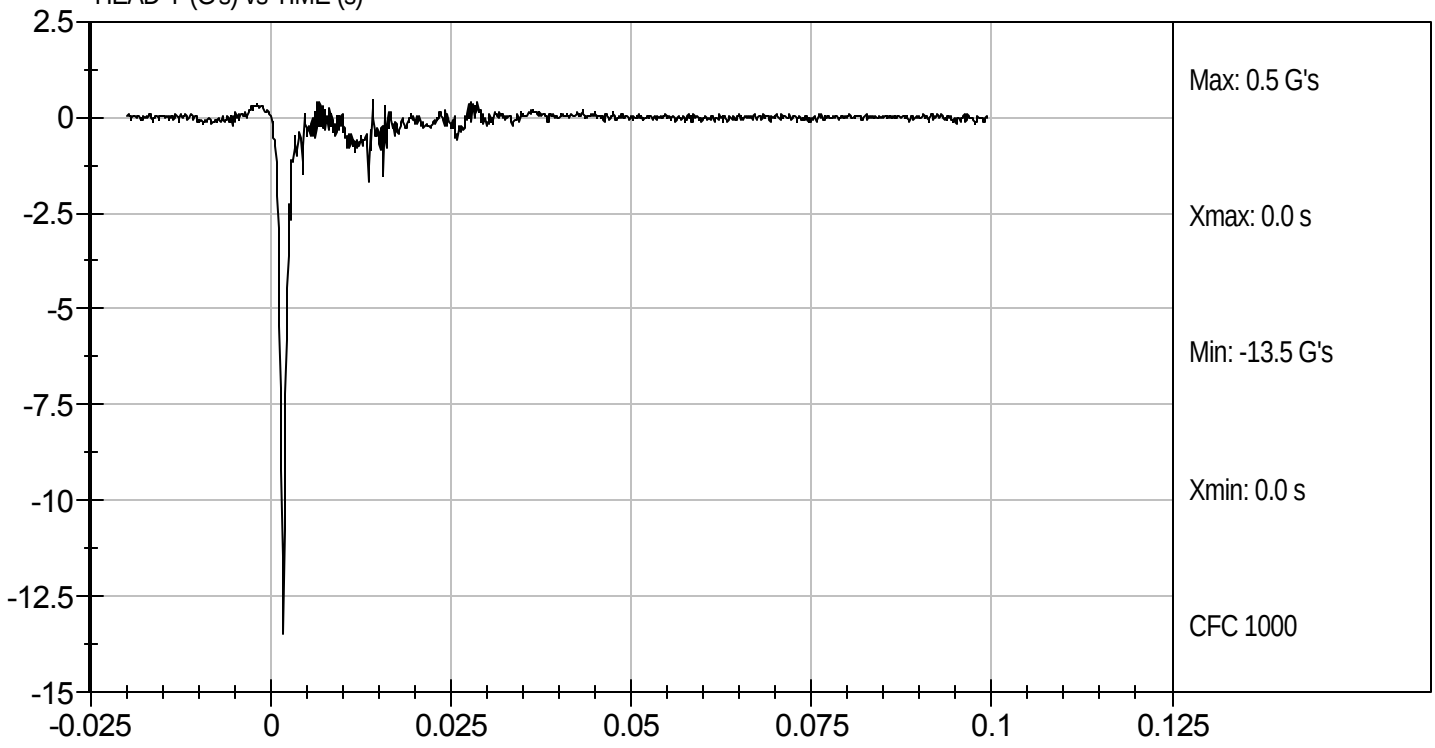
Test Desc: Head Drop
Component ID: D102901

Test Date: 9/7/10
Velocity: 0 ft/s, 0.00 m/s

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



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



MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D102902

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity		%	10 to 70	50	Pass
Pendulum Speed		m/s	6.89 to 7.13	7.04	Pass
Pendulum Deceleration	10 ms	m/s	2.1 to 2.5	2.5	Pass
	20 ms	m/s	4.0 to 5.0	4.7	Pass
	30 ms	m/s	5.8 to 7.0	6.6	Pass
D Plane Rotation	Max	deg	77 to 91	79	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	69 to 83	69	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	85	Pass
			Overall Results		Pass

Jessica Hall
Laboratory Technician

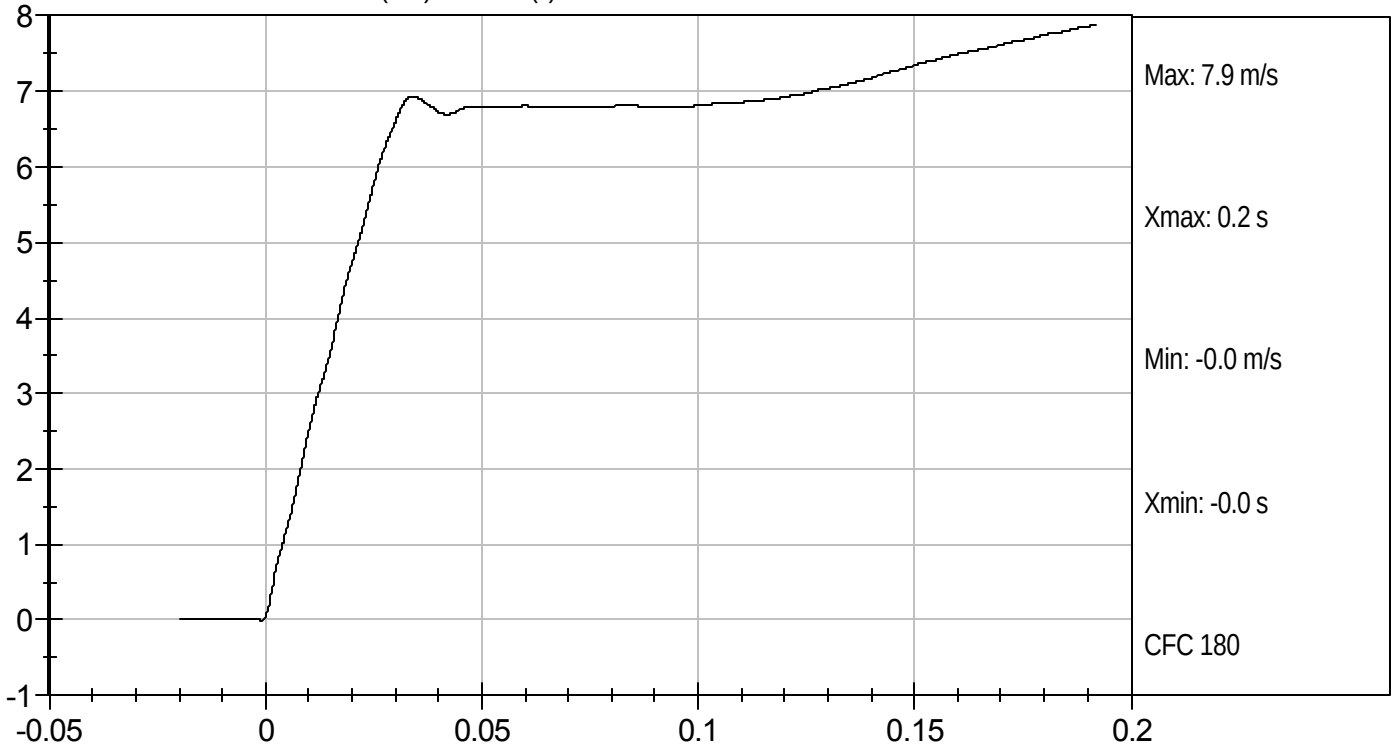
9/7/10
Test Date

David Winkelbauer
Approved By

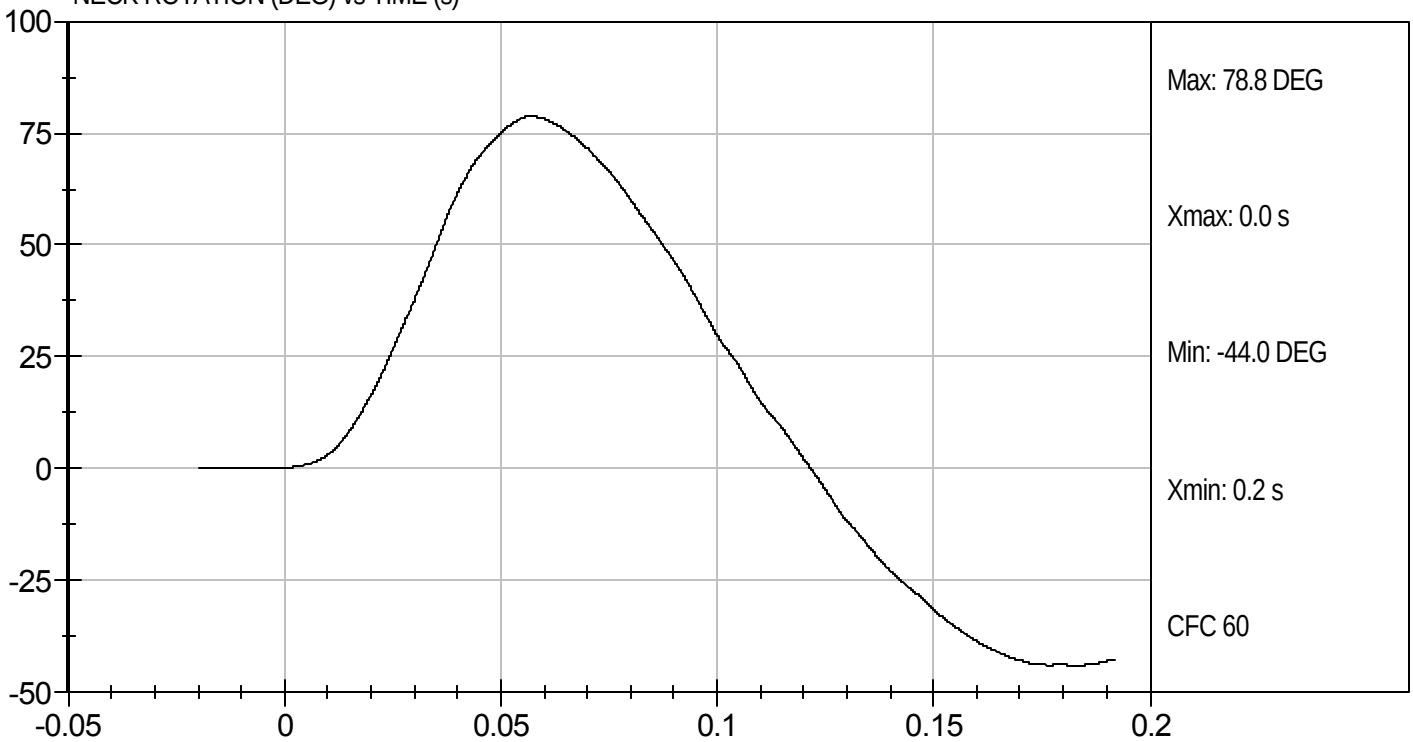
Test Desc: Neck Flexion
Component ID: D102902

Test Date: 9/7/10
Velocity: 23.1 ft/s, 7.04 m/s

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

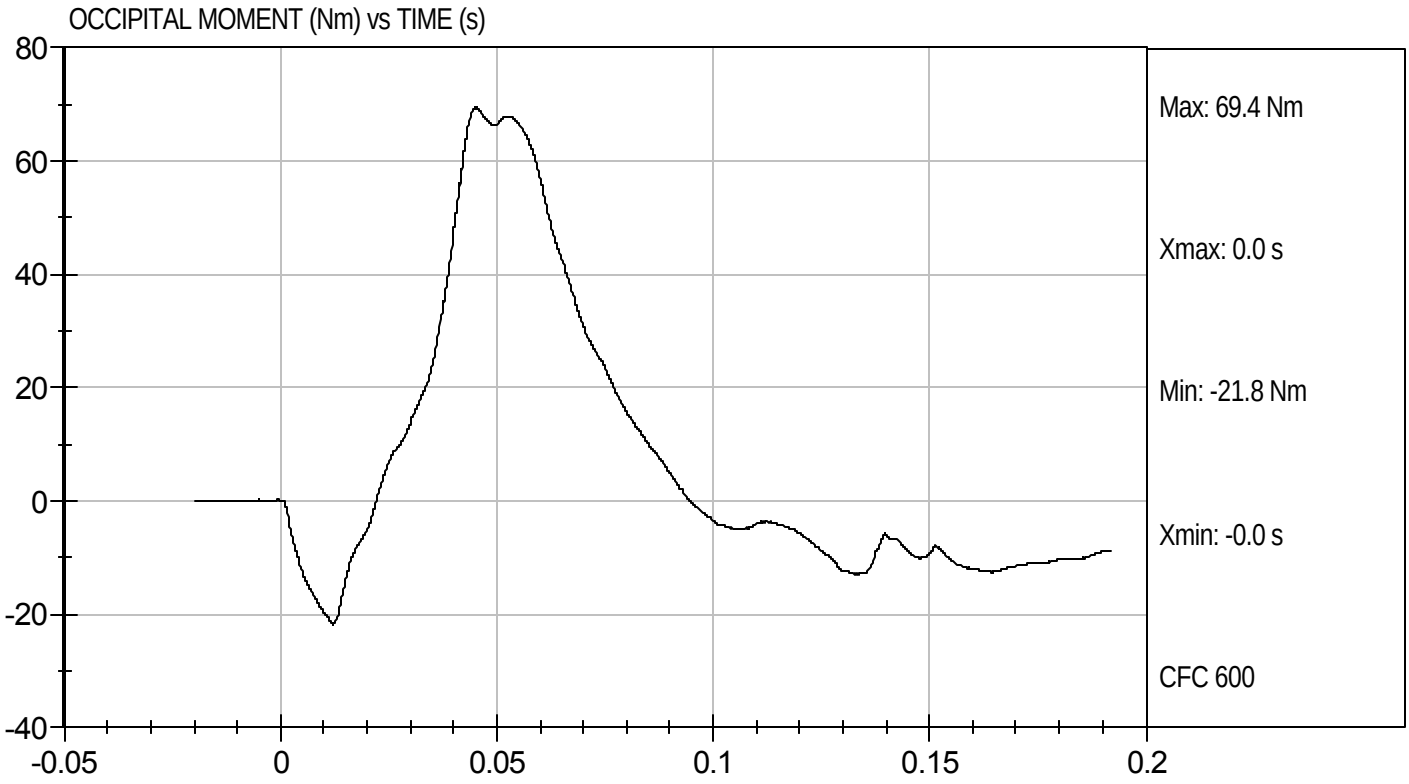


NECK ROTATION (DEG) vs TIME (s)



Test Desc: Neck Flexion
Component ID: D102902

Test Date: 9/7/10
Velocity: 23.1 ft/s, 7.04 m/s



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D102903

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity		%	10 to 70	50	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.10	Pass
Pendulum Deceleration	10 ms	m/s	1.5 to 1.9	1.9	Pass
	20 ms	m/s	3.1 to 3.9	3.7	Pass
	30 ms	m/s	4.6 to 5.6	5.3	Pass
D Plane Rotation	Max	deg	99 to 114	101	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	98	Pass
			Overall Results		Pass

Jessica Hall
Laboratory Technician

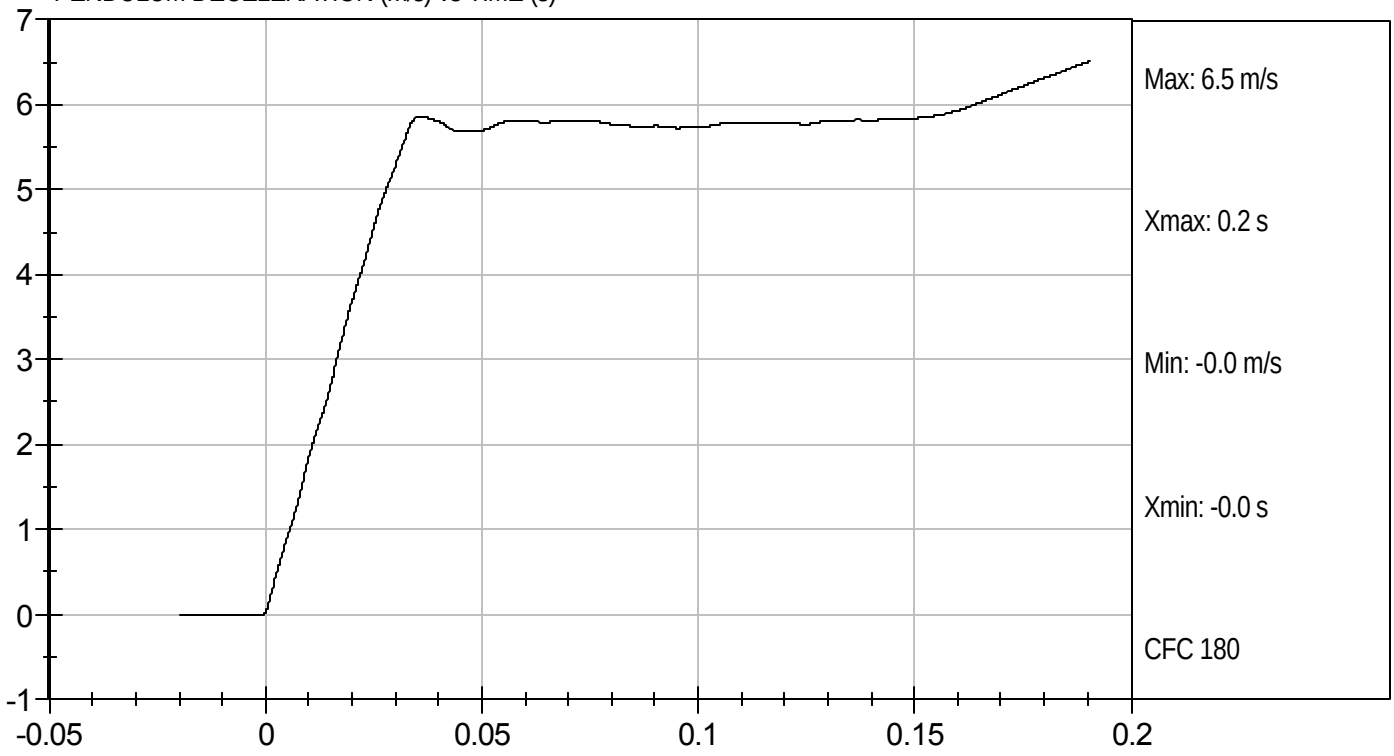
9/7/10
Test Date

David Winkelbauer
Approved By

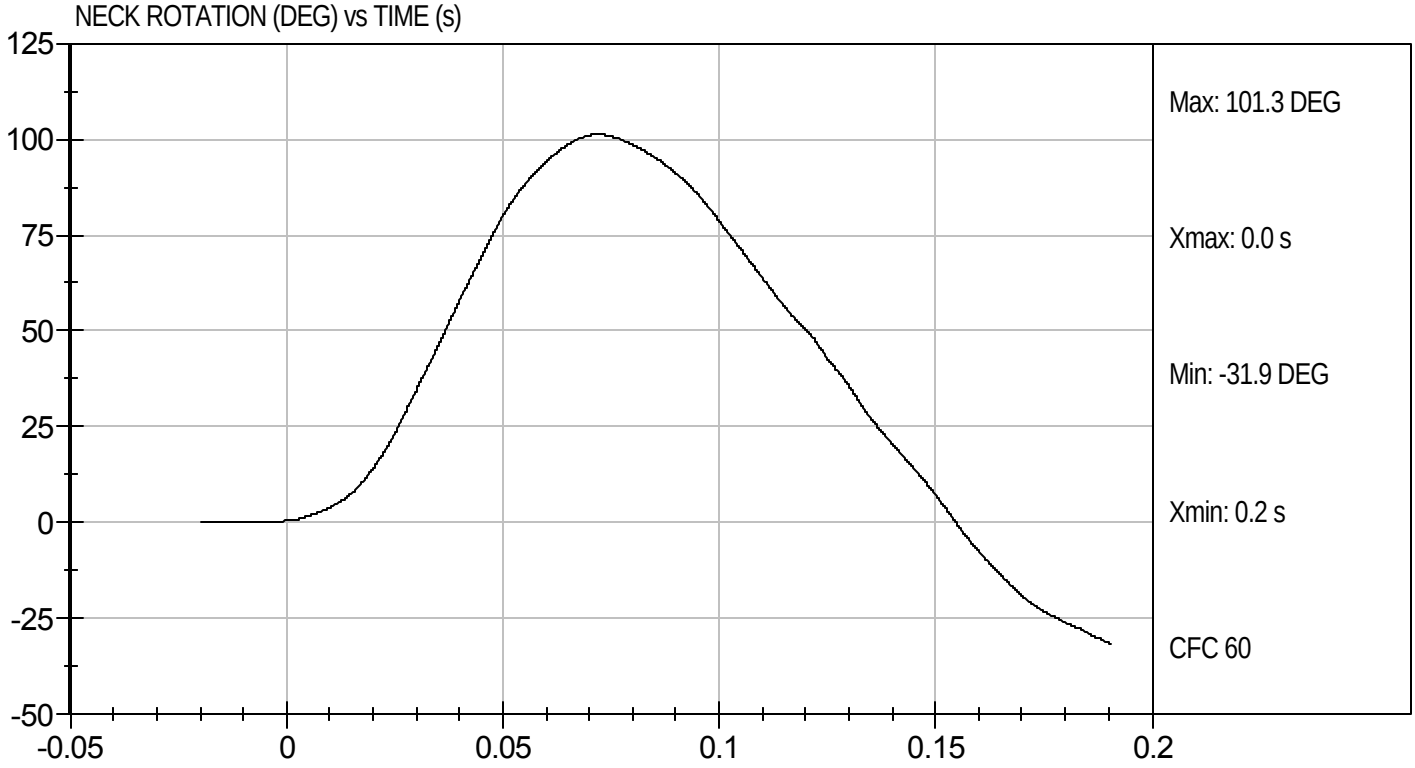
Test Desc: Neck Extension
Component ID: D102903

Test Date: 9/7/10
Velocity: 20.0 ft/s, 6.10 m/s

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

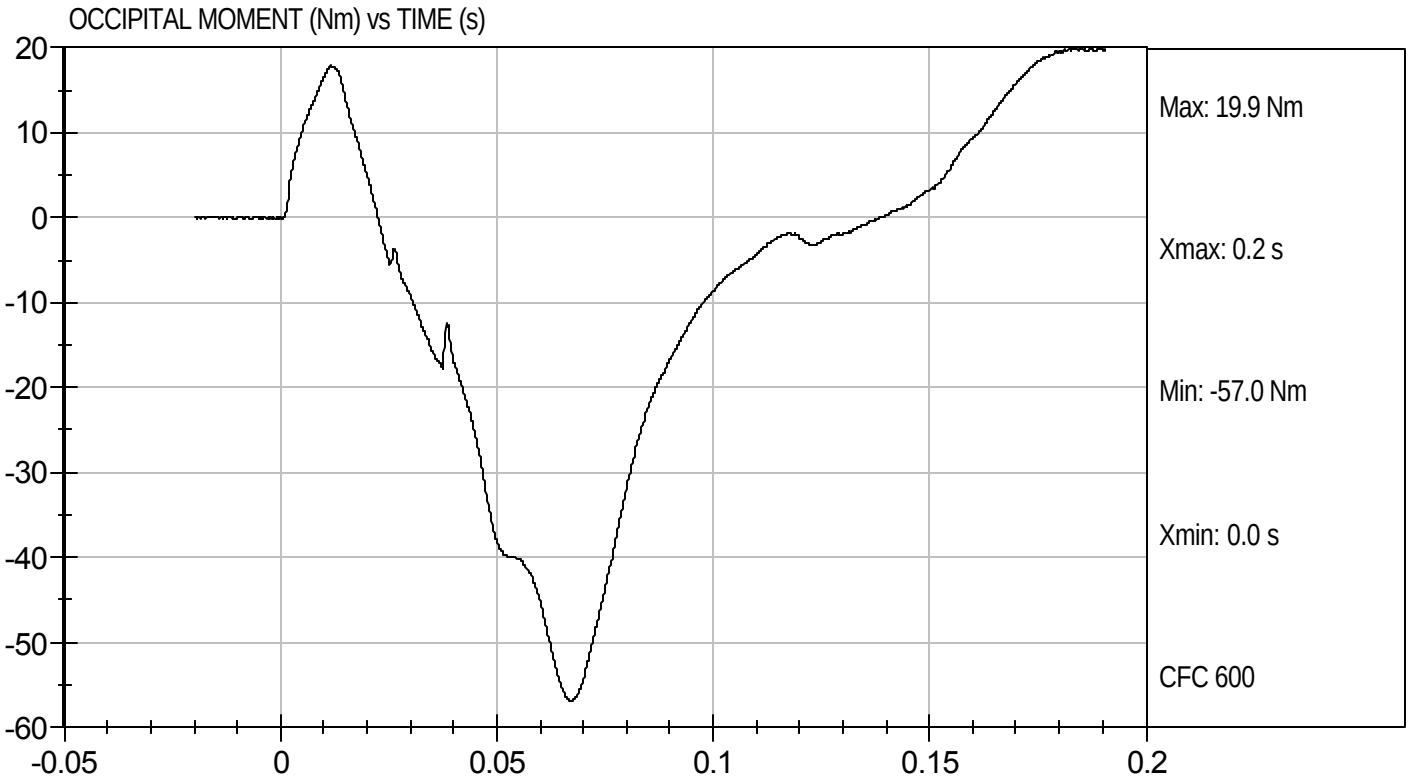


NECK ROTATION (DEG) vs TIME (s)



Test Desc: Neck Extension
Component ID: D102903

Test Date: 9/7/10
Velocity: 20.0 ft/s, 6.10 m/s



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D102904

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.8	Pass
Relative Humidity	%	10 to 70	47	Pass
Probe Speed	m/s	6.59 to 6.83	6.77	Pass
Peak Deflection	mm	50 to 58	54	Pass
Peak Resistive Force w/in Deflection Corridor	kN	3.9 to 4.4	4.32	Pass
Internal Hysteresis	%	69 to 85	69	Pass
Peak Force 18 mm - 50 mm	N	<= 4,600 N	4213	Pass
		Overall Test Results		Pass

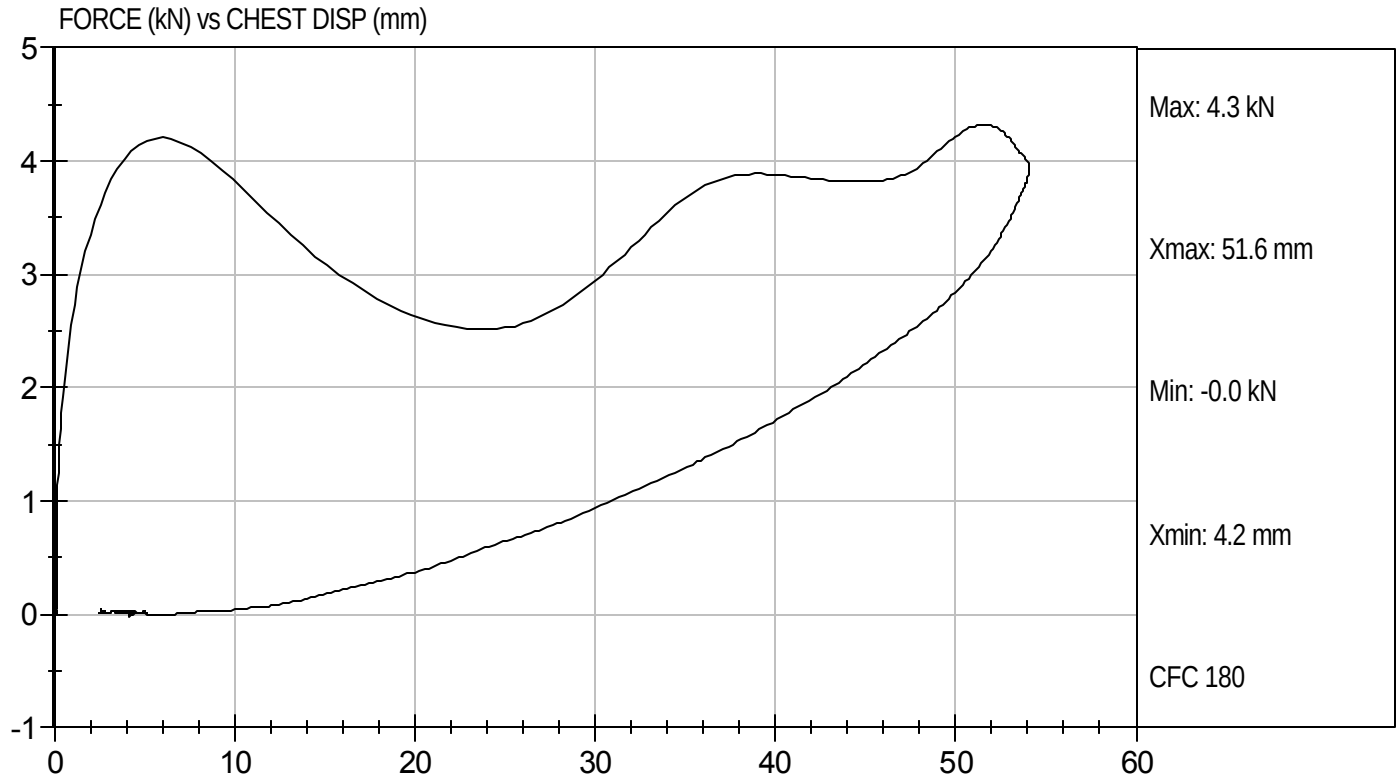
Jessica Hall
Laboratory Technician

9/8/10
Test Date

David Winkelbauer
Approved By

Test Desc: Thorax Impact
Component ID: D102904

Test Date: 9/8/10
Velocity: 22.22 ft/s, 6.77 m/s



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D102905

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	20.9	Pass
Laboratory Relative Humidity	%	10 to 70	46	Pass
Probe Speed	m/s	2.07 to 2.13	2.10	Pass
Maximum Force	kN	3.45 to 4.06	3.79	Pass
		Overall Test Results		Pass

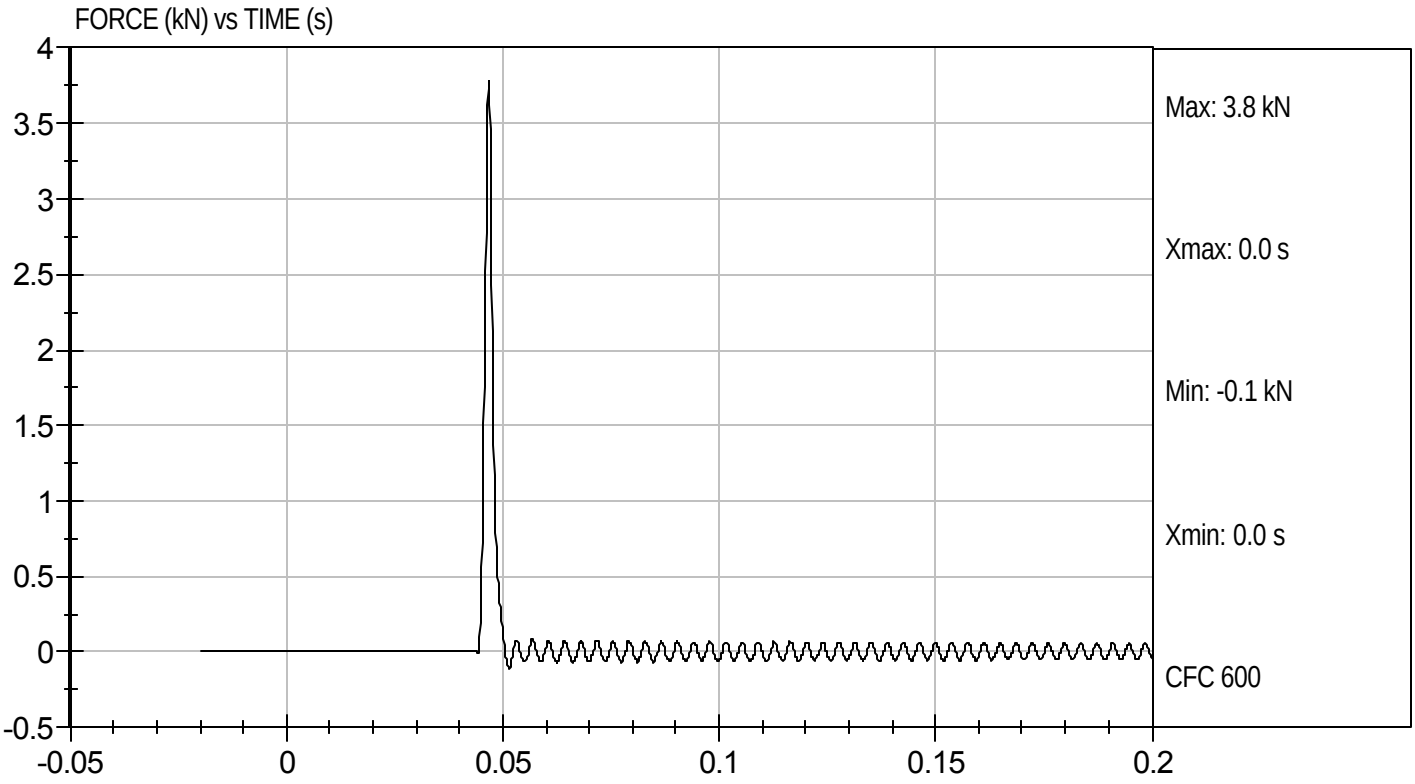
Jessica Gall
Laboratory Technician

9/7/10
Test Date

David Winkelbauer
Approved By

Test Desc: Right Knee
Component ID: D102905

Test Date: 9/7/10
Velocity: 6.88 ft/s, 2.10 m/s



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D102906

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	20.9	Pass
Laboratory Relative Humidity	%	10 to 70	46	Pass
Probe Speed	m/s	2.07 to 2.13	2.11	Pass
Maximum Force	kN	3.45 to 4.06	3.99	Pass
		Overall Test Results		Pass

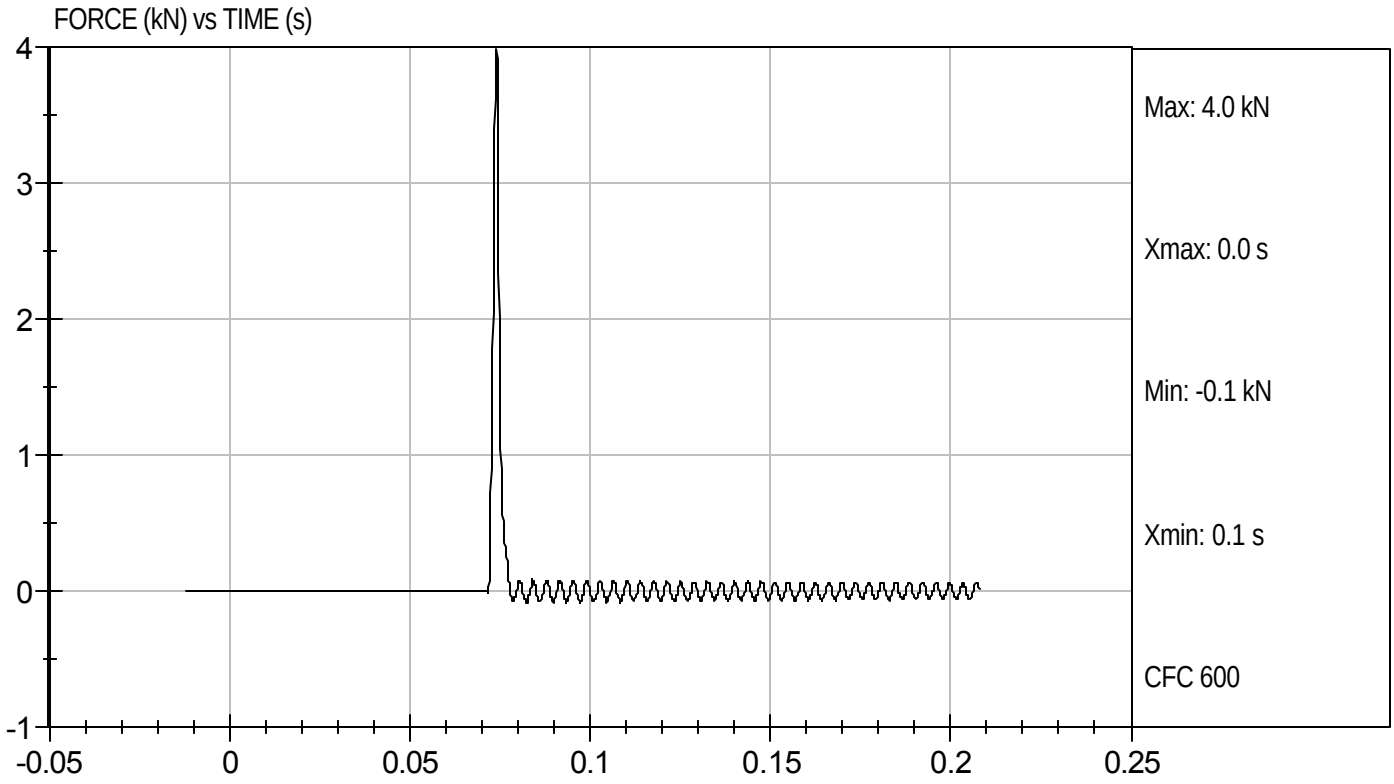
Jessica Gall
Laboratory Technician

9/7/10
Test Date

David Winkelbauer
Approved By

Test Desc: Left Knee
Component ID: D102906

Test Date: 9/7/10
Velocity: 6.91 ft/s, 2.11 m/s



MGA RESEARCH CORPORATION

TORSO FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D102907

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	20.6	Pass
Laboratory Relative Humidity	%	10 to 70	46	Pass
Initial Angle	deg	0 to 20	16	Pass
Return Angle	deg	+/- 8	6	Pass
Force at 45 deg	N	320 to 390	374	Pass
Upper Torso Deflection Rate	Deg/sec	0.5 to 1.5	1.0	Pass
		Overall Result		Pass

Jessica Hall
Laboratory Technician

9/7/10
Test Date

David Winkelbauer
Approved By

MGA RESEARCH CORPORATION

HEAD DROP TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test ID:** D102981

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	45	Pass
Peak Resultant Acceleration	G's	250 to 300	293	Pass
Peak Lateral Acceleration	G's	+/- 15	-9.3	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
		Overall Test Results		Pass

Jessica Hall
Laboratory Technician

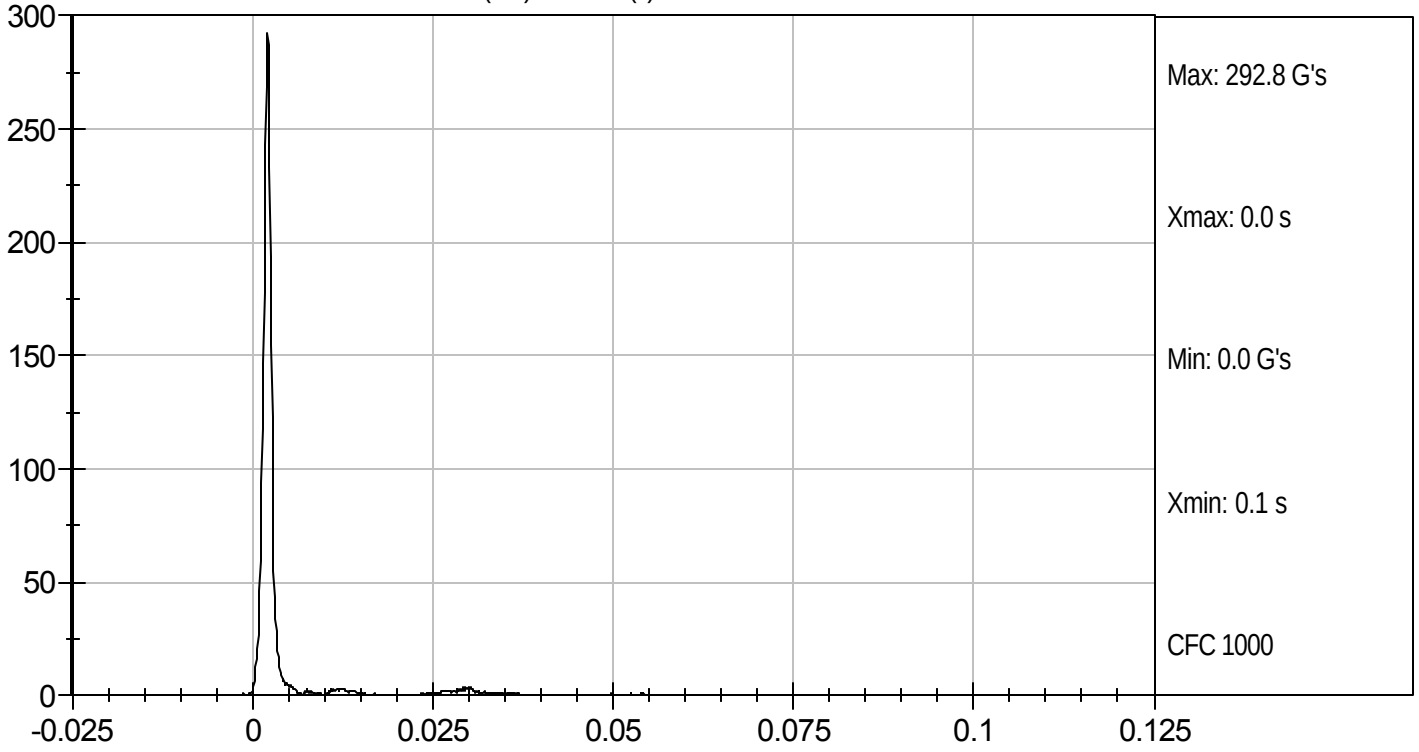
9/9/10
Test Date

David Winkelbauer
Approved By

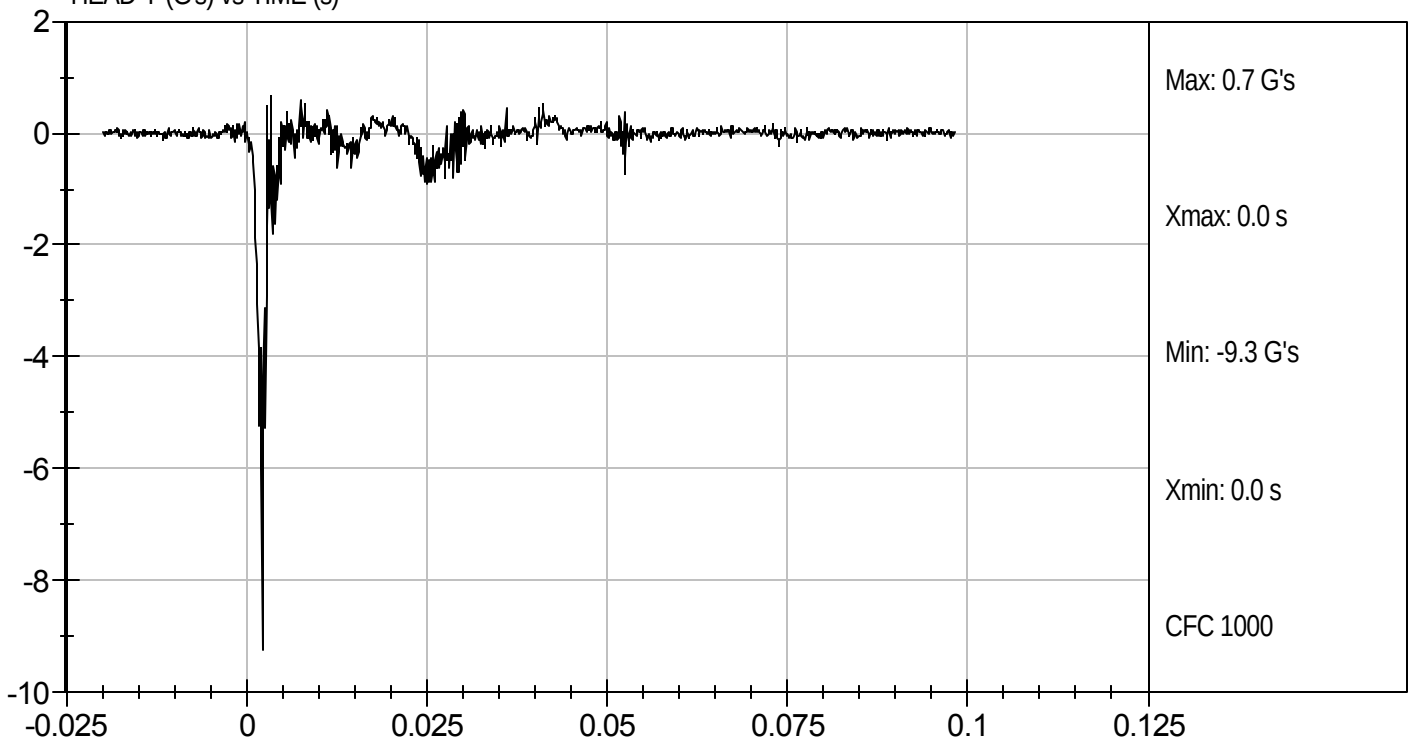
Test Desc: Head Drop
Component ID: D102981

Test Date: 9/9/10
Velocity: 0 ft/s, 0.00 m/s

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



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



MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D102982

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.5	Pass
Laboratory Relative Humidity		%	10 to 70	56	Pass
Pendulum Speed		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	m/s	2.1 to 2.5	2.4	Pass
	20 ms	m/s	4.0 to 5.0	4.6	Pass
	30 ms	m/s	5.8 to 7.0	6.4	Pass
D Plane Rotation	Max	deg	77 to 91	81	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	69 to 83	70	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	86	Pass
			Overall Results		Pass

Jessica Hall
Laboratory Technician

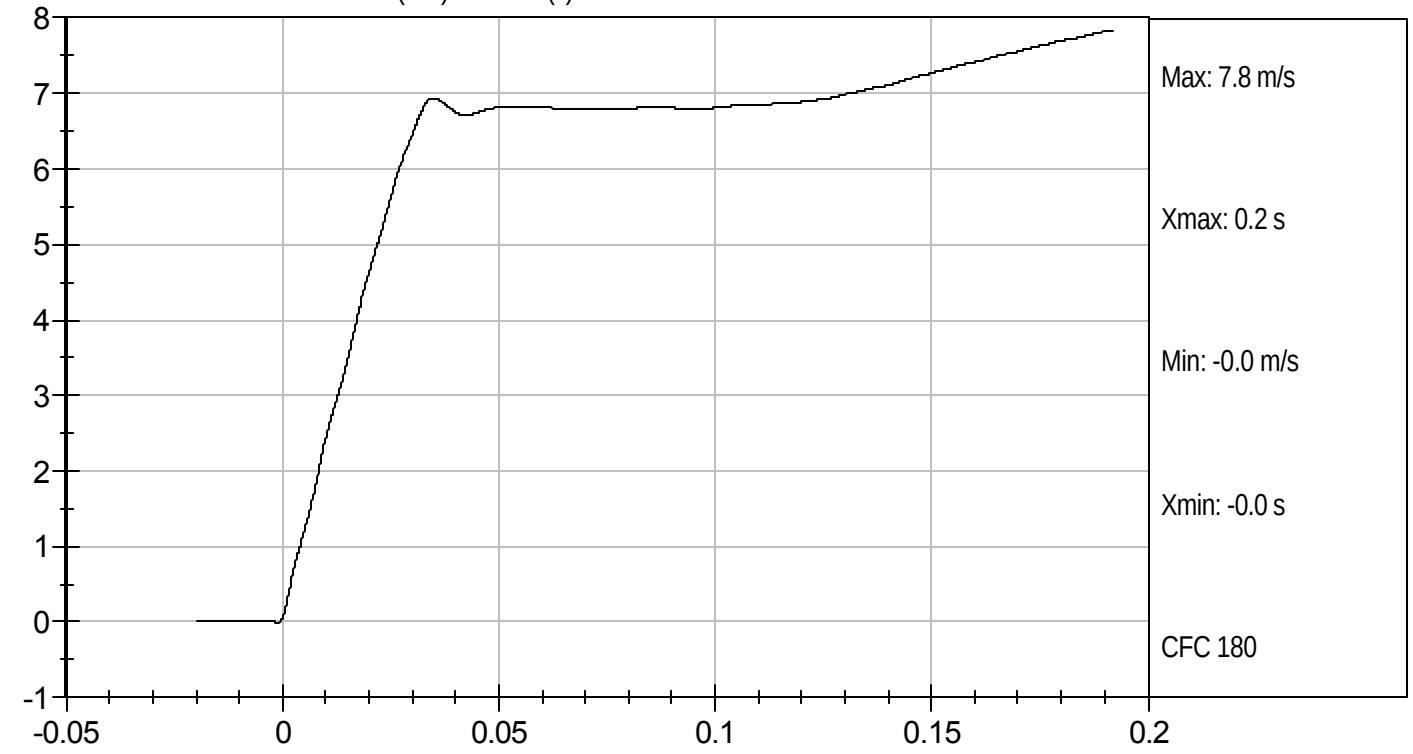
9/10/10
Test Date

David Winkelbauer
Approved By

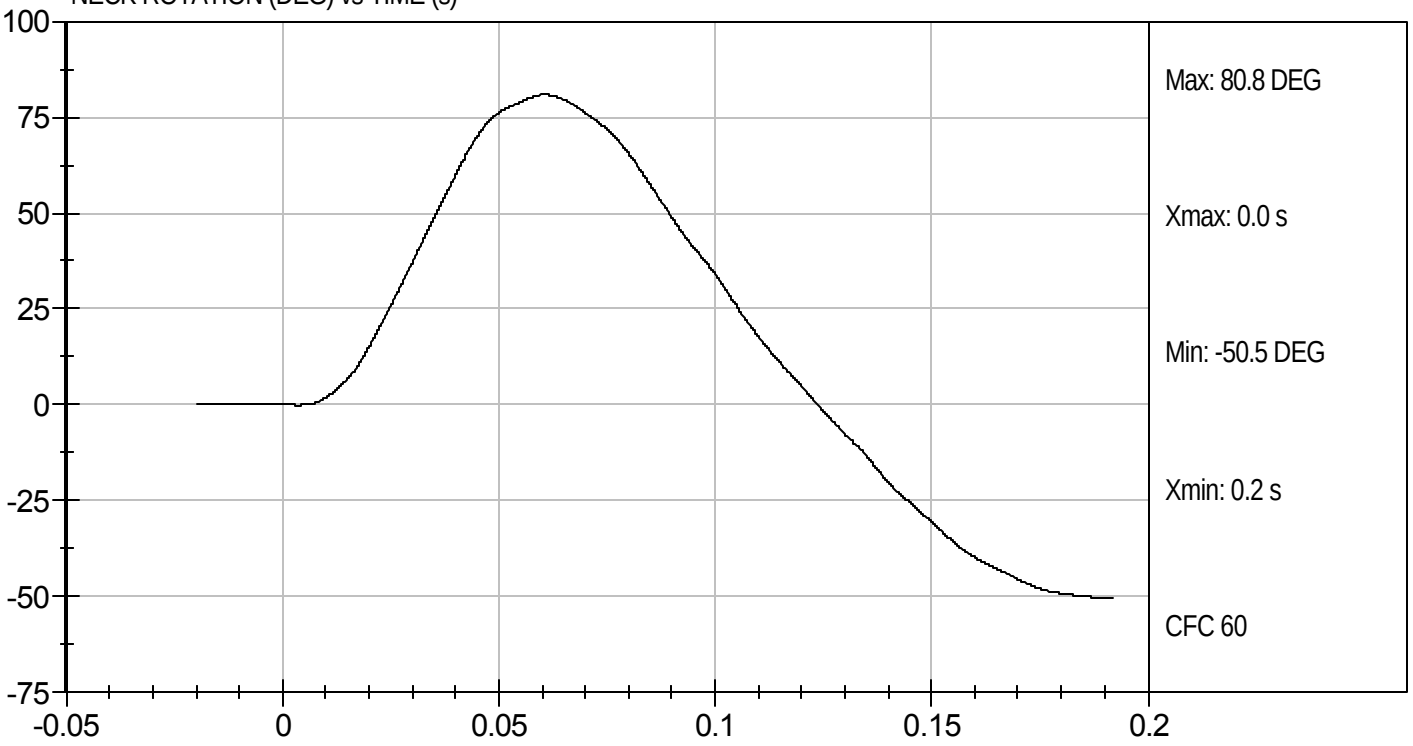
Test Desc: Neck Flexion
Component ID: D102982

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

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

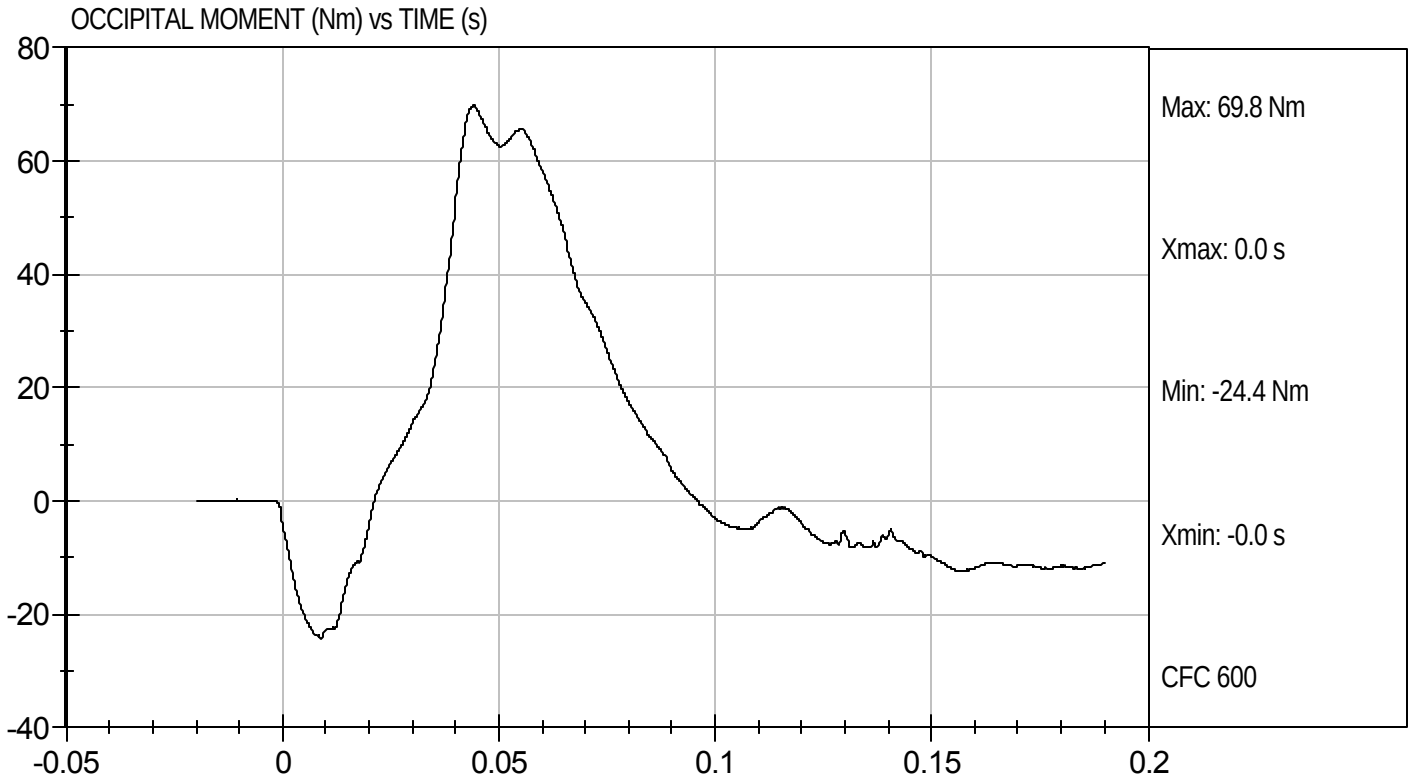


NECK ROTATION (DEG) vs TIME (s)



Test Desc: Neck Flexion
Component ID: D102982

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



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D102983

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.5	Pass
Laboratory Relative Humidity		%	10 to 70	56	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	3.7	Pass
	30 ms	m/s	4.6 to 5.6	5.3	Pass
D Plane Rotation	Max	deg	99 to 114	100	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	97	Pass
			Overall Results		Pass

Jessica Hall
Laboratory Technician

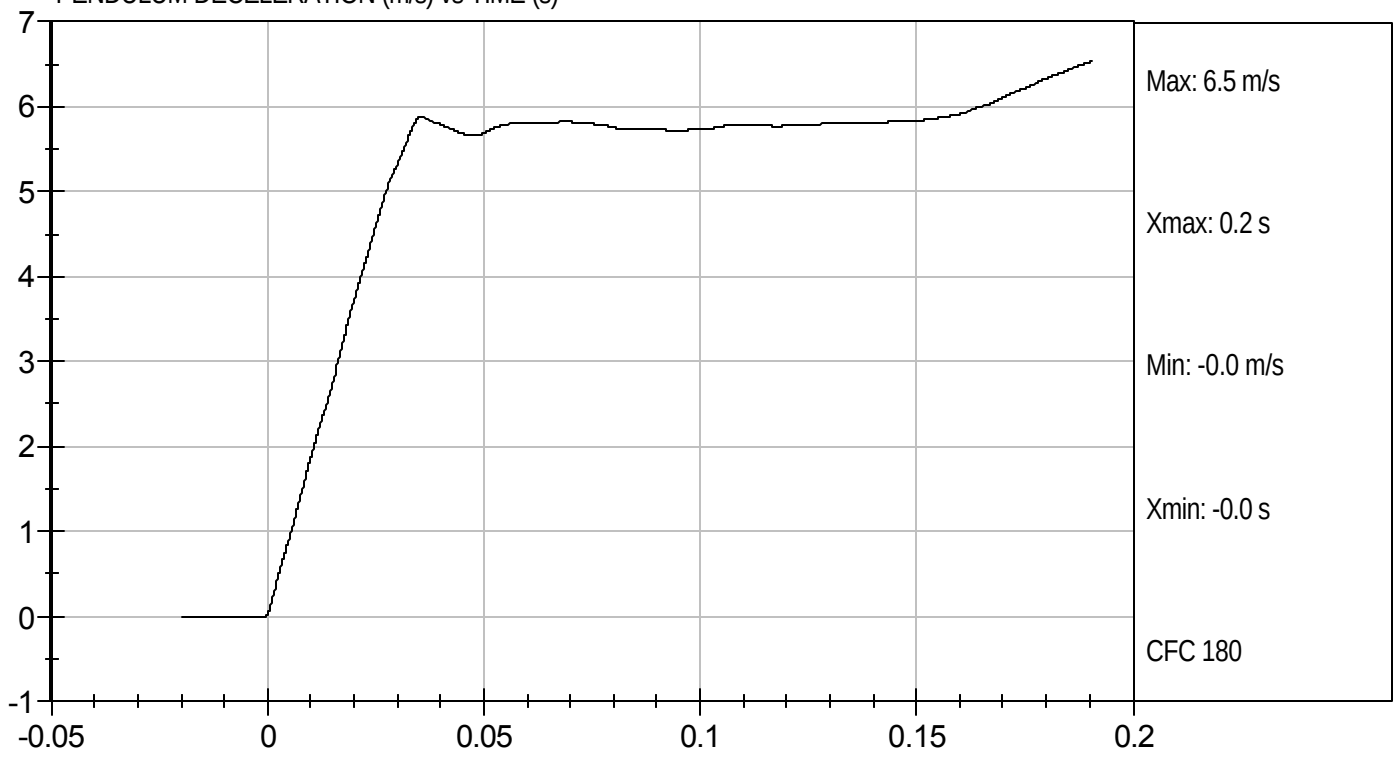
9/10/10
Test Date

David Winkelbauer
Approved By

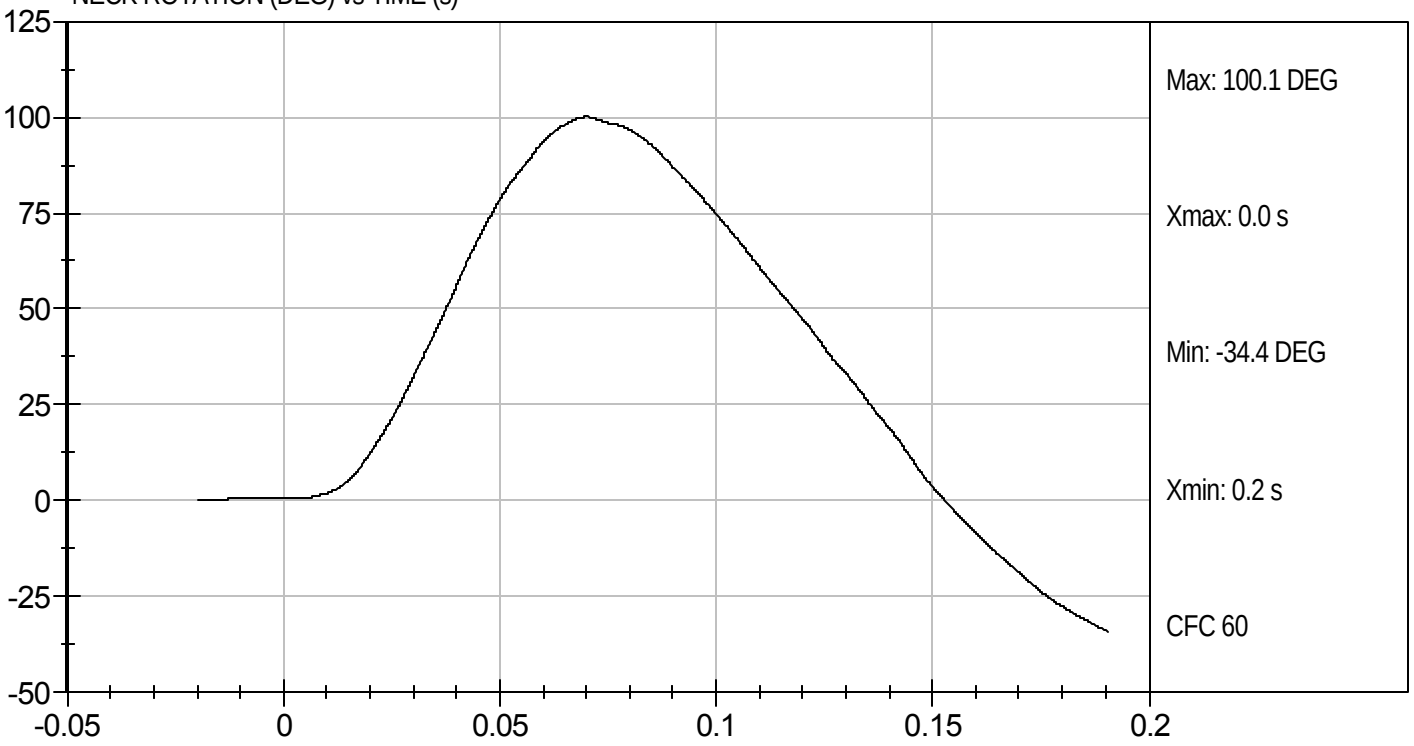
Test Desc: Neck Extension
Component ID: D102983

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

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

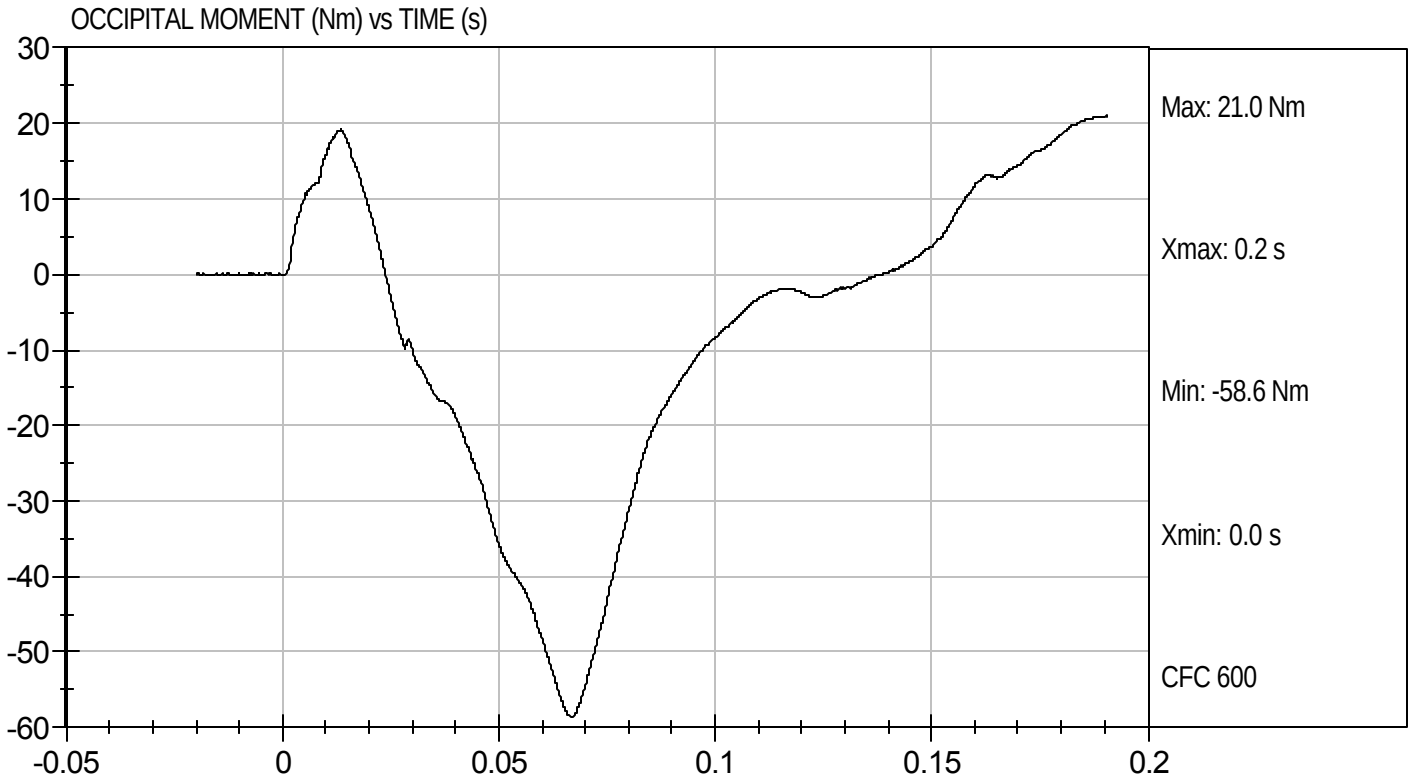


NECK ROTATION (DEG) vs TIME (s)



Test Desc: Neck Extension
Component ID: D102983

Test Date: 9/10/10
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:** D102984

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Relative Humidity	%	10 to 70	51	Pass
Probe Speed	m/s	6.59 to 6.83	6.77	Pass
Peak Deflection	mm	50 to 58	55	Pass
Peak Resistive Force w/in Deflection Corridor	kN	3.9 to 4.4	4.39	Pass
Internal Hysteresis	%	69 to 85	69	Pass
Peak Force 18 mm - 50 mm	N	<= 4,600 N	4202	Pass
		Overall Test Results		Pass

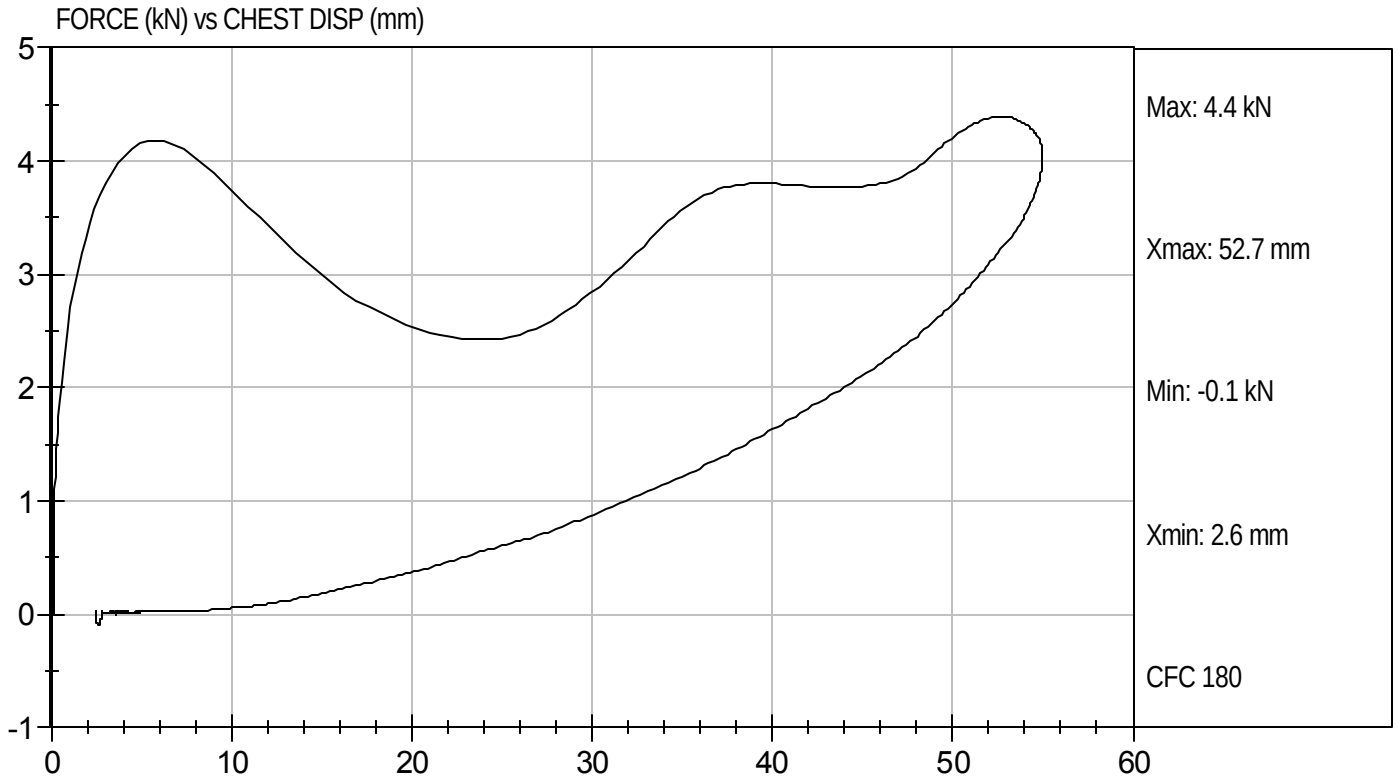
Jessica Hall
Laboratory Technician

9/10/10
Test Date

David Winkelbauer
Approved By

Test Desc: Thorax Impact
Component ID: D102984

Test Date: 9/10/10
Velocity: 22.22 ft/s, 6.77 m/s



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D102985

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	55	Pass
Probe Speed	m/s	2.07 to 2.13	2.08	Pass
Maximum Force	kN	3.45 to 4.06	3.57	Pass
		Overall Test Results		Pass

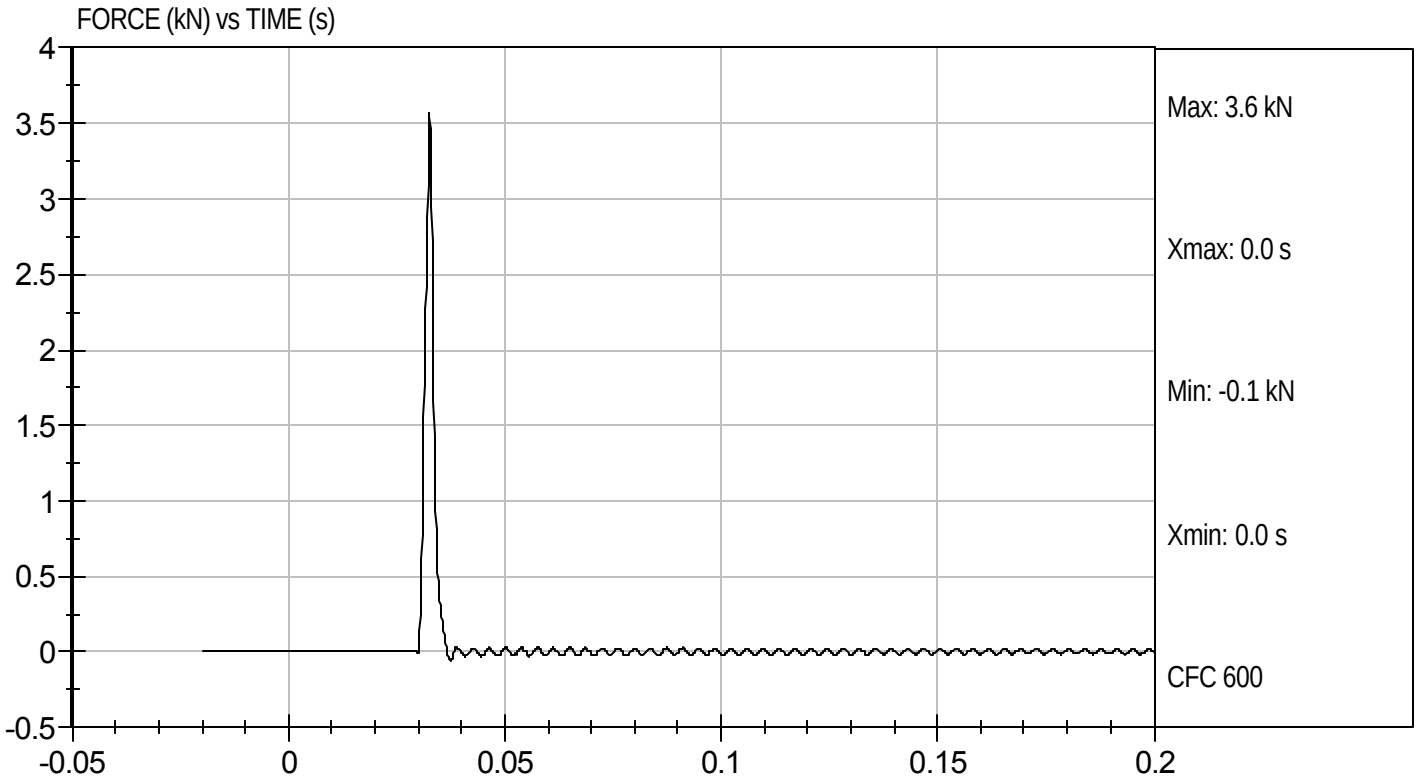
Jessica Gall
Laboratory Technician

9/10/10
Test Date

David Winkelbauer
Approved By

Test Desc: Right Knee
Component ID: D102985

Test Date: 9/10/10
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:** D102986

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	55	Pass
Probe Speed	m/s	2.07 to 2.13	2.08	Pass
Maximum Force	kN	3.45 to 4.06	3.92	Pass
		Overall Test Results		Pass

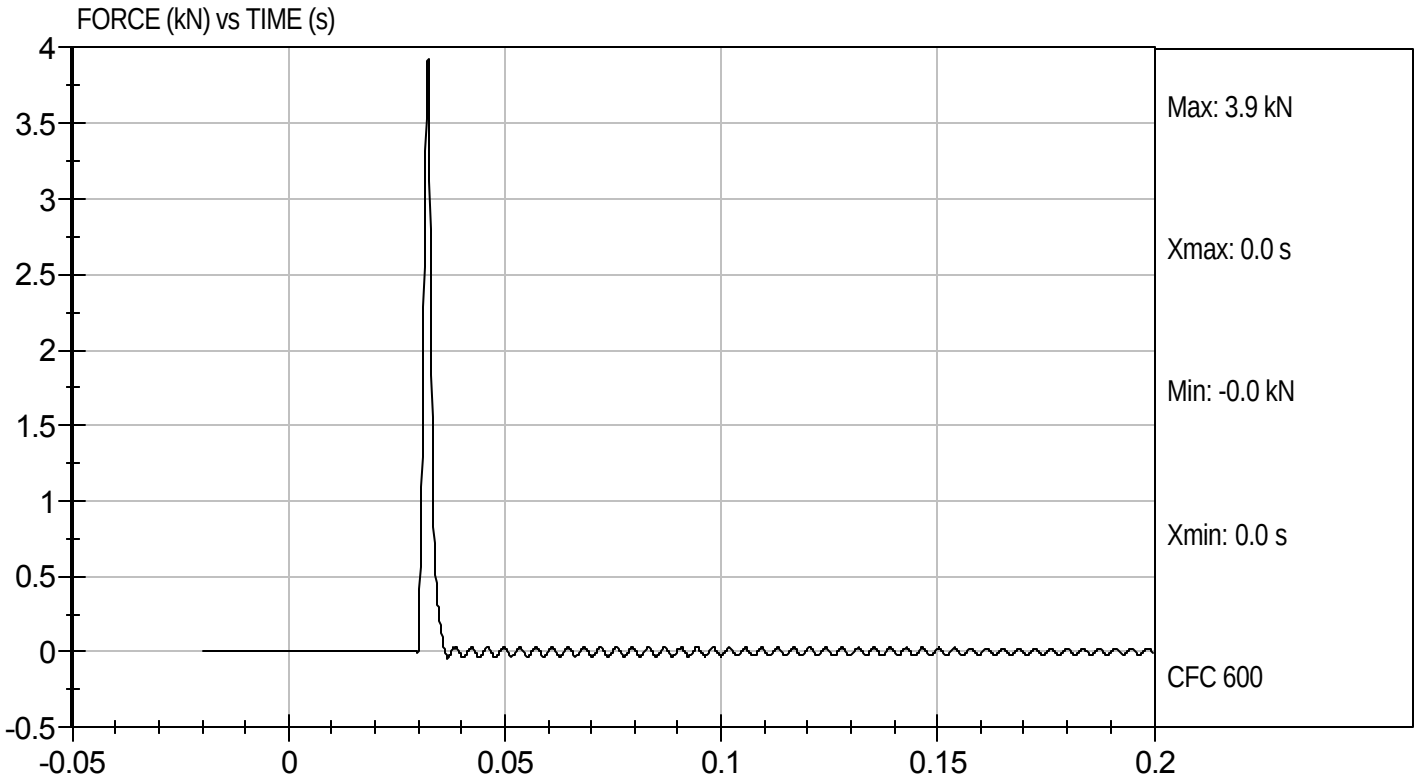
Jessica Gall
Laboratory Technician

9/10/10
Test Date

David Winkelbauer
Approved By

Test Desc: Left Knee
Component ID: D102986

Test Date: 9/10/10
Velocity: 6.83 ft/s, 2.08 m/s



MGA RESEARCH CORPORATION

TORSO FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D102987

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	22.1	Pass
Laboratory Relative Humidity	%	10 to 70	49	Pass
Initial Angle	deg	0 to 20	19	Pass
Return Angle	deg	+/- 8	7	Pass
Force at 45 deg	N	320 to 390	384	Pass
Upper Torso Deflection Rate	Deg/sec	0.5 to 1.5	1.0	Pass
		Overall Result		Pass

Jessica Hall
Laboratory Technician

9/10/10
Test Date

David Winkelbauer
Approved By