REPORT NUMBER: NCAP-MGA-2011-037

NEW CAR ASSESSMENT PROGRAM (NCAP)
Frontal Barrier Impact Test

HONDA OF CANADA MFG.
2011 Acura MDX AWD SUV
NHTSA No.: MB5317

MGA RESEARCH CORPORATION
5000 Warren Road
Burlington, WI 53105

Test Date: November 1, 2010

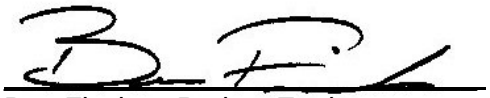
Final Report Date: December 28, 2010

FINAL REPORT

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

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

Prepared by: 
Donna Janovicz, Project Manager

Approved by: 
Ben Fischer, Project Engineer

Approval Date: December 28, 2010

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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4. Title and Subtitle Final Report of New Car Assessment Program Frontal Impact Testing of 2011 Acura MDX AWD SUV NHTSA No.: MB5317		*5. Report Date* December 28, 2010 *6. Performing Organization Code* MGA
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9. Performing Organization Name and Address MGA Research Corporation 5000 Warren Road Burlington, WI 53105		*10. Work Unit No.* *11. Contract or Grant No.* DTNH22-06-D-00028
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards 1200 New Jersey Ave, SE, Room W43-410 Washington, D.C. 20590		*13. Type of Report and Period Covered* Final Test Report November 1 to December 28, 2010 *14. Sponsoring Agency Code* NVS-111
15. Supplementary Notes		

16. Abstract

A 56.3 km/h NCAP Frontal Impact Test was conducted on the 2011 Acura MDX AWD SUV in accordance with the specifications of the Office of Crashworthiness Standards Frontal NCAP Laboratory Test Procedure for the generation of consumer information on vehicle frontal crash protection. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and foot well intrusion performance. The test was conducted at MGA Research Corporation in Burlington, Wisconsin, on November 1, 2010.

The impact velocity was 56.3 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 593 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	187	468
Maximum Chest Compression	mm	63	52	24	12
Nij	N/A	1	1	0.22	0.25
Neck Tension	N	4170	2620	765	872
Neck Compression	N	4000	2520	175	156
Left Femur Force	N	10008	6805	2845	3611
Right Femur Force	N	10008	6805	2596	3728

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 Acura AWD SUV at a velocity of 56.3 kph. The test was performed at MGA Research Corporation on November 1, 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 593 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 the headrest. The driver's knees contacted the knee bolster. The passenger's head and chest contacted the airbag. The passenger's head also contacted the headrest. The passenger's knees contacted the glovebox.

The occupant data is summarized below:

ATD position	HIC_{15}	T^1	T^2	Chest Disp. (mm)	Nij	Neck Tension (N)	Neck Comp. (N)	Left Femur (N)	Right Femur (N)
Driver (50^{th})	187	72.8	87.8	24	0.22	765	175	2845	2596
Passenger (5^{th})	468	73.3	88.3	12	0.25	872	156	3611	3728

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

TEST NOTES

There was no valid data collected for:

Left Rear Seat Crossmember X after 40 msec.
Right Rear Seat Crossmember X after 80 msec.
Bottom of Engine X after 60 msec.
Left Brake Caliper X after 40 msec.
Left Rear Seat Crossmember Z after 40 msec.
Driver Shoulder Belt after 60 msec.

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

SECTION 2

OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

DATA SHEET NO. 1

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2011 Acura MDX AWD SUV
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: MB5317
Test Date: 11/01/2010

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	MB5317
Model Year	2011
Make	Acura
Model	MDX
Body Style	MPV
VIN	2HNYD2H23BH503734
Body Color	Grigio M.
Delivery Date	10/14/2010
Odometer (mi)	100
Odometer (km)	161
Dealer	Continental Acura
Transmission	Automatic
Final Drive	AWD
Type/No. Cylinders	6
Engine Displacement (L)	3.7
Engine Placement	Longitudinal
Roof Rack	No
Sunroof/T-Top	Yes
Tinted Glass	Yes
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	No
Driver Torso/Pelvis Airbag	Yes
Driver Pelvis Airbag	No
Driver Knee Airbag	No
Pass. Front Airbag	Yes
Pass. Curtain Airbag	Yes
Pass. Head/Torso Airbag	No
Pass. Torso Airbag	No
Pass. Torso/Pelvis Airbag	Yes
Pass. Pelvis Airbag	No
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	Honda of Canada Mfg.
Date of Manufacture	09/'10

GVWR (kg)	2700
GAWR Front (kg)	1310
GAWR Rear (kg)	1440

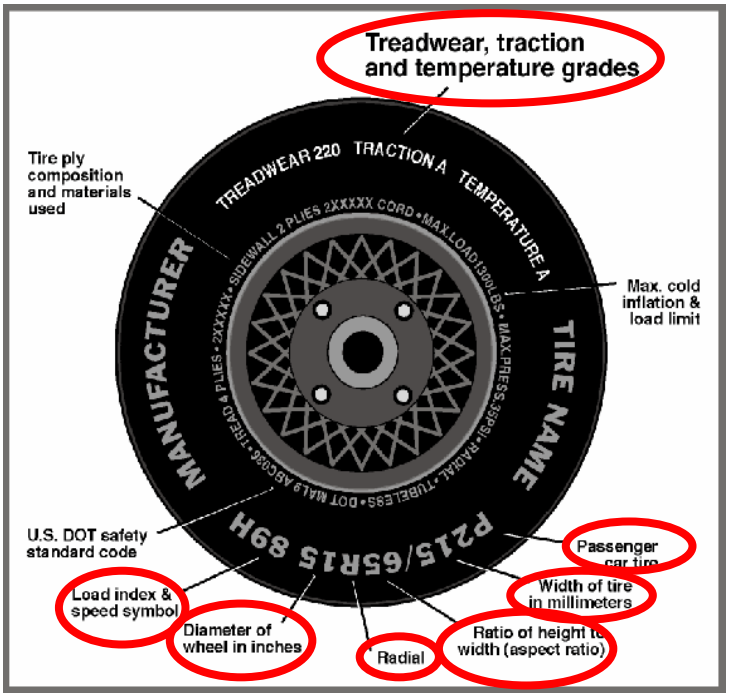
VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Split Bench	Split Bench	
Designated Seating Capacity (DSC)	2	3	2	7
Capacity Weight (VCW) (kg)				525
Cargo Weight (RCLW) (kg)				49

DATA SHEET NO. 1 (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2011 Acura MDX AWD SUV NHTSA No.: MB5317
Test Program: NCAP Frontal Barrier Impact Test Test Date: 11/01/2010



Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	220	220
Recommended Tire Size	P255/55R18	P255/55R18
Tire Size on Vehicle	P255/55R18	P255/55R18
Tire Manufacturer	Bridgestone	Bridgestone
Tire Model	Dueler H/L	Dueler H/L
Treadwear	400	400
Traction	B	B
Temperature Grades	B	B
Tire Plies Sidewall	2	2
Tire Plies Body	5	5
Load Index & Speed Symbol	104T	104T
Tire Material	Rubber	Rubber
DOT Safety Code Right	OB7K 402	OB7K 402
DOT Safety Code Left	OB7K 402	OB7K 402

DATA SHEET NO. 1 (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2011 Acura MDX AWD SUV NHTSA No.: MB5317
Test Program: NCAP Frontal Barrier Impact Test Test Date: 11/01/2010

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	585.1	470.3		619.2	539.8	
Right	kg	565.1	454.0		590.1	506.2	
Ratio	%	55.4	44.6		53.6	46.4	
Totals	kg	1150.2	924.3	2074.5	1209.3	1046.0	2255.3

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	2074.5
Weight of 1 P572E ATD & 1 P572O ATD	kg	140.6
Rated Cargo/Luggage Weight (RCLW)	kg	49
Calculated Target Vehicle Target Weight (TVTW)	kg	2264.1

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	809	811	824	830	1228
As Tested	mm	800	803	799	805	1278
Post Test	mm	876	875	845	810	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2756
Total Vehicle Length at Left Side	mm	4440
Total Vehicle Length at Centerline	mm	4878
Total Vehicle Length at Right Side	mm	4440
Weight of Ballast in Cargo Area	kg	51.7
Weight of Vehicle Components Removed	kg	36.7
Amount of Stoddard Solvent in Fuel Tank	L	73.9

List of components removed to meet test weight: Third row seat, trunk carpet, right tail light, jack & tools.

DATA SHEET NO. 1 (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2011 Acura MDX AWD SUV NHTSA No.: MB5317
Test Program: NCAP Frontal Barrier Impact Test Test Date: 11/01/2010

TARGET VEHICLE STRUCTURAL MEASUREMENT

	Elements	Pre-Test (mm)
1	Total Length	4878
2	Total Width	1973
3	Bumper Top Height	574
4	Bumper Bottom Height	466
5	Longitudinal Member Top Height	606
6	Distance between Longitudinal Members	1020
7	Longitudinal Member Width	65
8	Engine Top Height	910
9	Engine Bottom Height	250
10	Engine and Gearbox Width	800
11	Front Bumper-Engine Distance	415
12	Front Shock Absorber Fixing Height	1018
13	Bonnet Leading Edge Height	941
14	Front Shock Absorber Fixing Width	1233
15	Front Bumper – Front Axle Distance	970
16	Front Axle – A-Pillar Distance	560
17	A-Pillar – B-Pillar Distance	993
18	B-Pillar – Rear Axle Distance	1220
19	B-Pillar – C-Pillar Distance	684
20	Roof Sill Bottom Height	1555
21	Roof Sill Top Height	1685
22	Floor Sill bottom Height	325
23	Floor Sill Top Height	480

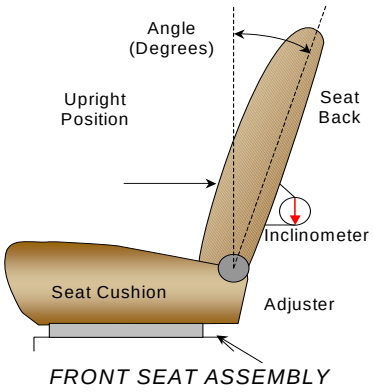
DATA SHEET NO. 2

SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

Test Vehicle: 2011 Acura MDX AWD SUV NHTSA No.: MB5317
Test Program: NCAP Frontal Barrier Impact Test Test Date: 11/01/2010

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	12.9° on headrest post guide
Passenger Seat Back Angle	9.5° on headrest post guide

SEAT FORE/AFT POSITIONS

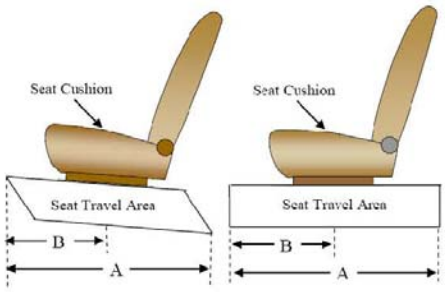
The driver and passenger seat fore/aft positions are adjusted following Appendix F, "Driver & Passenger Seating & Positioning Procedures" in the NCAP Test Procedure dated January 2010.

SEAT FORE/AFT POSITIONS	Total Fore/Aft Travel	Placed in Position #
Driver Seat	290 mm	145 mm (forward-most as 0)
Passenger Seat	240 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 Acura MDX AWD SUV NHTSA No.: MB5317
Test Program: NCAP Frontal Barrier Impact Test Test Date: 11/01/2010

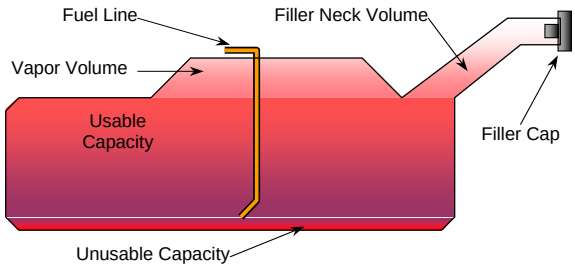
FUEL TANK CAPACITY DATA

	Liters
Usable Capacity of "Standard Tank"	79.5
Usable Capacity of "Optional" Tank	
92-94% of Usable Capacity	73.1 to 74.7
Actual Amount of Solvent used	73.9
1/3 of Usable Capacity	26.5

FUEL PUMP

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

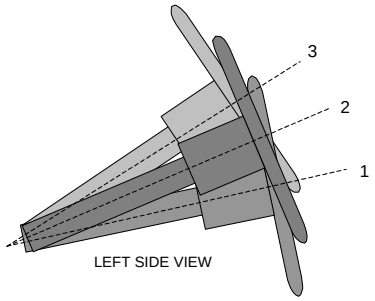
The vehicle is equipped with an electric fuel pump. After the ignition key is turned from LOCK (0) to ON (II) position, the pump will be filled up for two seconds, and then the pressure is maintained. The fuel pipe is on the left side.



VEHICLE FUEL TANK ASSEMBLY

STEERING COLUMN ADJUSTMENT

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



STEERING COLUMN ASSEMBLY

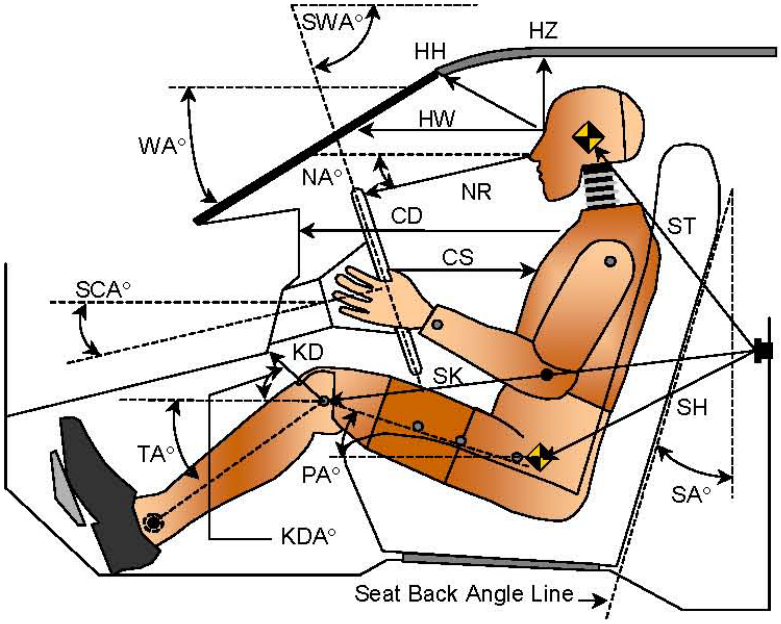
STEERING COLUMN POSITION

	Degrees	Fore/Aft Position (mm)
Lowermost – Position 1	69.5	216
Geometric Center – Position 2	66.5	193
Uppermost – Position 3	63.5	170
Telescoping Steering Wheel Travel		46
Test Position	66.5	193

DATA SHEET NO. 3

DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2011 Acura MDX AWD SUV NHTSA No.: MB5317
Test Program: NCAP Frontal Barrier Impact Test Test Date: 11/01/2010

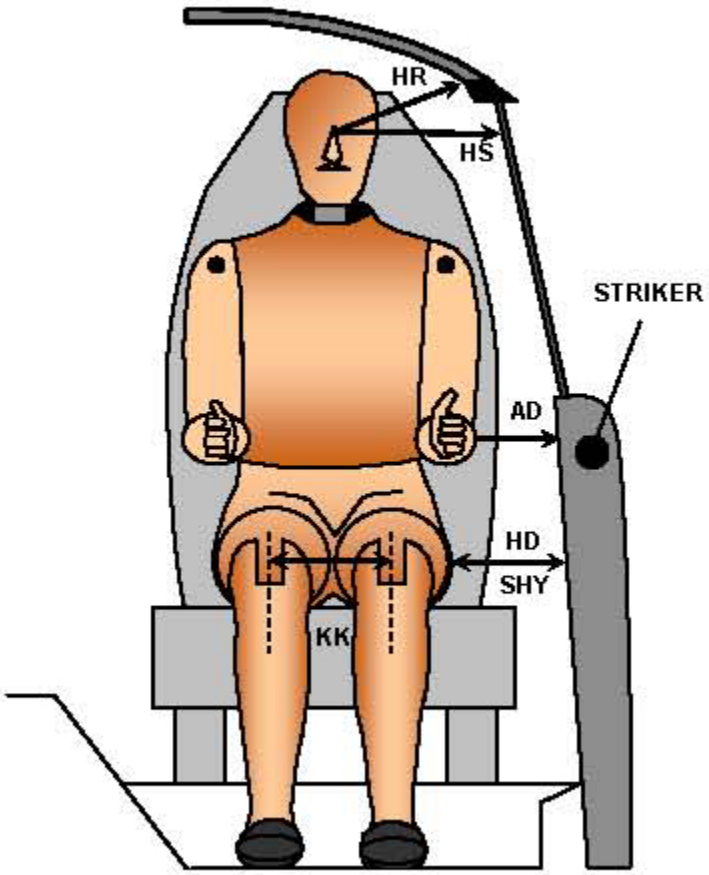


Code	Measurement Description	Driver S/N 351		Passenger S/N 634	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA	Windshield Angle		28.7		
SWA	Steering Wheel Angle		66.5		
SCA	Steering Column Angle		23.5		
SA	Seat Back Angle (headrest bezel)		12.9		9.5
HZ	Head to Roof (Z)	236	90	219	90
HH	Head to Header	390	24.8	318	40.6
HW	Head to Windshield	681	0	660	0
NR	Nose to Rim	403	8.3		
CD	Chest to Dash	555		413	
CS	Chest to Steering Hub	330	0.9		
RA	Rim to Abdomen	198	0		
KDL	Left Knee to Dash	151	36.5	71	38.3
KDR	Right Knee to Dash	115	38.1	70	36.2
PA	Pelvic Angle		23.6		20.8
TA	Tibia Angle		51.8		57.2
SK	Striker to Knee	569	94.3	670	93.2
ST	Striker to Head	513	6.4	500	25.1
SH	Striker to H-Point	241	126.9	358	109.7

DATA SHEET NO. 4

DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2011 Acura MDX AWD SUV NHTSA No.: MB5317
Test Program: NCAP Frontal Barrier Impact Test Test Date: 11/01/2010



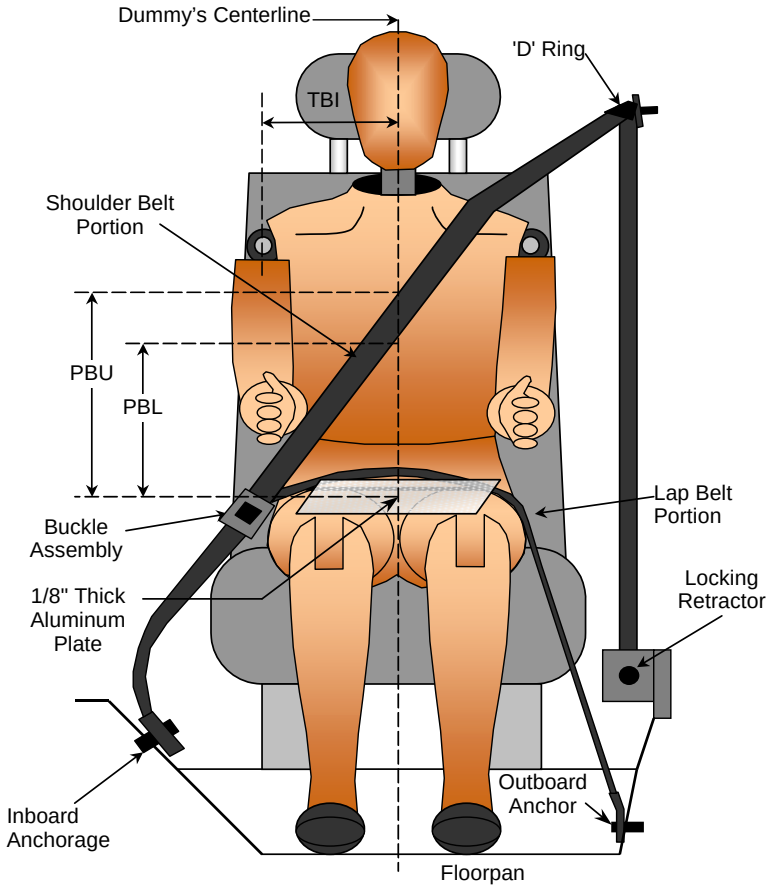
FRONT VIEW OF DUMMY

Code	Measurement Description	Driver S/N 351	Passenger S/N 634
		Length (mm)	
AD	Arm to Door	152	188
HD	H-Point to Door	155	252
HR	Head to Side Header	240	260
HS	Head to Side Window	363	372
KK	Knee to Knee	335	213
SHY	Striker to H-Point (Y Direction)	315	320
AA	Ankle to Ankle	340	170

DATA SHEET NO. 5

SEAT BELT POSITIONING DATA

Test Vehicle: 2011 Acura MDX AWD SUV
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: MB5317
Test Date: 11/01/2010



FRONT VIEW OF DUMMY

SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU - Top surface of reference to belt upper edge	mm	355	310
PBL - To surface of reference to belt lower edge	mm	275	220

BELT LENGTH DATA

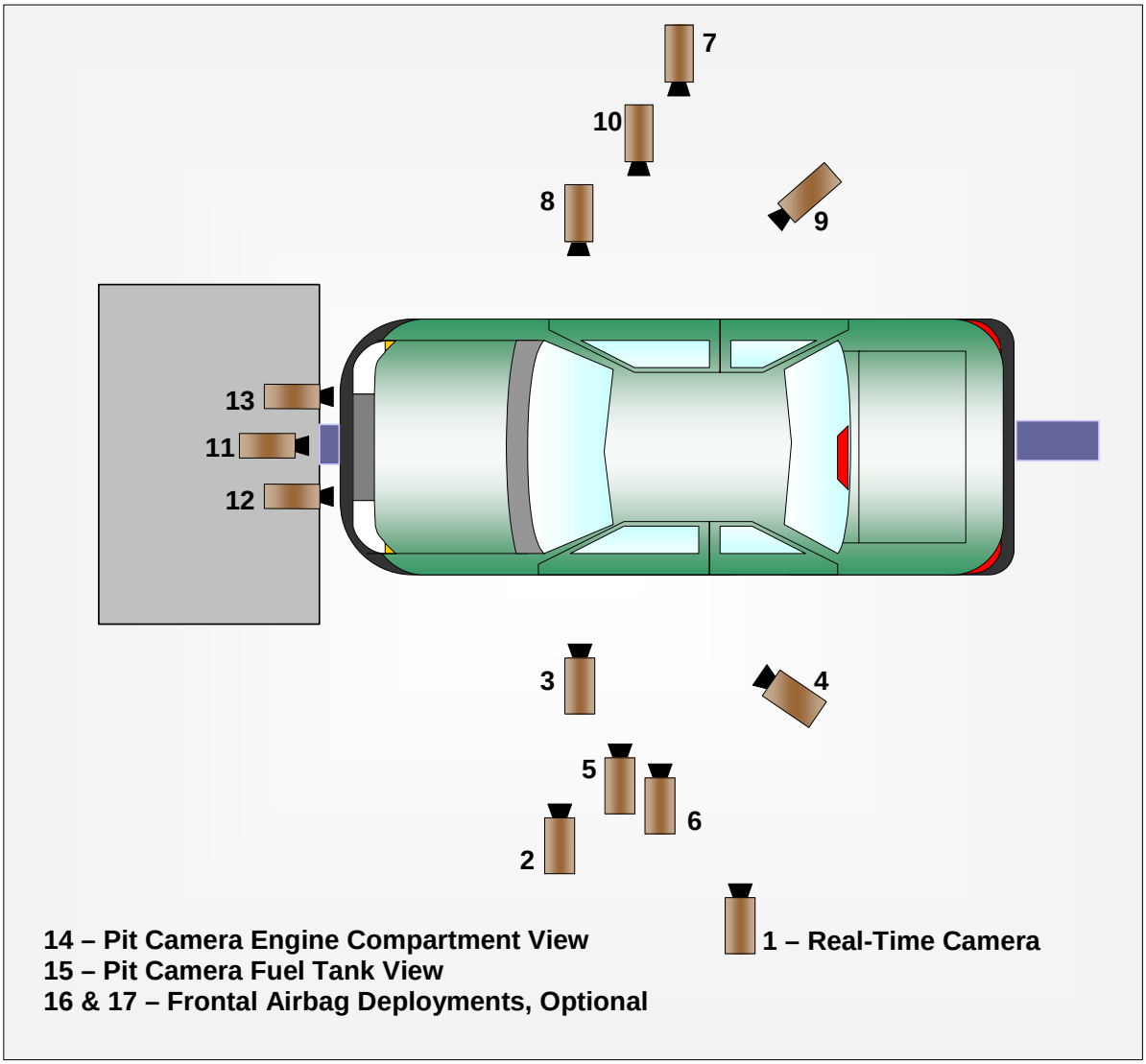
Measurement Description	Units	Driver	Passenger
Shoulder Belt Length as measured on ATD	mm	880	910
Lap Belt Length as measured on ATD	mm	560	520
Remainder of belt of reel	mm	1810	1880
Total Belt Length for Continuous Webbing Systems	mm	3250	3310

DATA SHEET NO. 6

HIGH-SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2011 Acura MDX AWD SUV
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: MB5317
Test Date: 11/01/2010

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 Acura MDX AWD SUV NHTSA No.: MB5317
Test Program: NCAP Frontal Barrier Impact Test Test Date: 11/01/2010

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	1260	-5140	-1310	24	1000
3	Driver Close-Up	1350	-6230	-1670	35	1000
4	Driver Angle	5670	-4810	-1860	50	1000
5	Steering Column Top	520	-5390	-1220	25	1000
6	Steering Column Bottom	500	-5270	-840	25	1000
7	Right Overall	2140	6380	-1230	20	1000
8	Passenger Close-Up	1370	6260	-1670	35	1000
9	Passenger Angle	5600	4730	-1870	50	1000
10	Right Front Half	1290	5270	-1300	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	1420	0	3150	24	1000
15	Pit Rear	3310	0	3150	24	1000
16	Onboard Driver Side (optional)					
17	Onboard Passenger Side (optional)					
18	Real-Time Pan View					30

*COORDINATES:

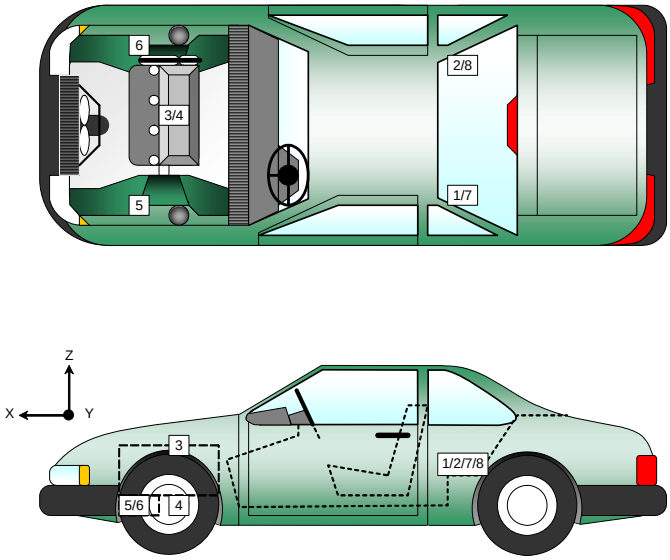
+X = forward of impact plane
+Y = right of monorail centerline
+Z = below ground level

Cameras 16 & 17 were not used for this test.

DATA SHEET NO. 7

VEHICLE ACCELEROMETER DATA

Test Vehicle: 2011 Acura MDX AWD SUV
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: MB5317
Test Date: 11/01/2010



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear X-Member X	2090	-415	-470
2	Right Rear X-Member X	2090	415	-470
3	Engine Top X	4035	0	-935
4	Engine Bottom X	4035	0	-300
5	Left Brake Caliper X	3950	-765	-220
6	Right Brake Caliper X	3950	765	-220
7	Left Rear X-Member Z	2090	-415	-470
8	Right Rear X-Member Z	2090	415	-470

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

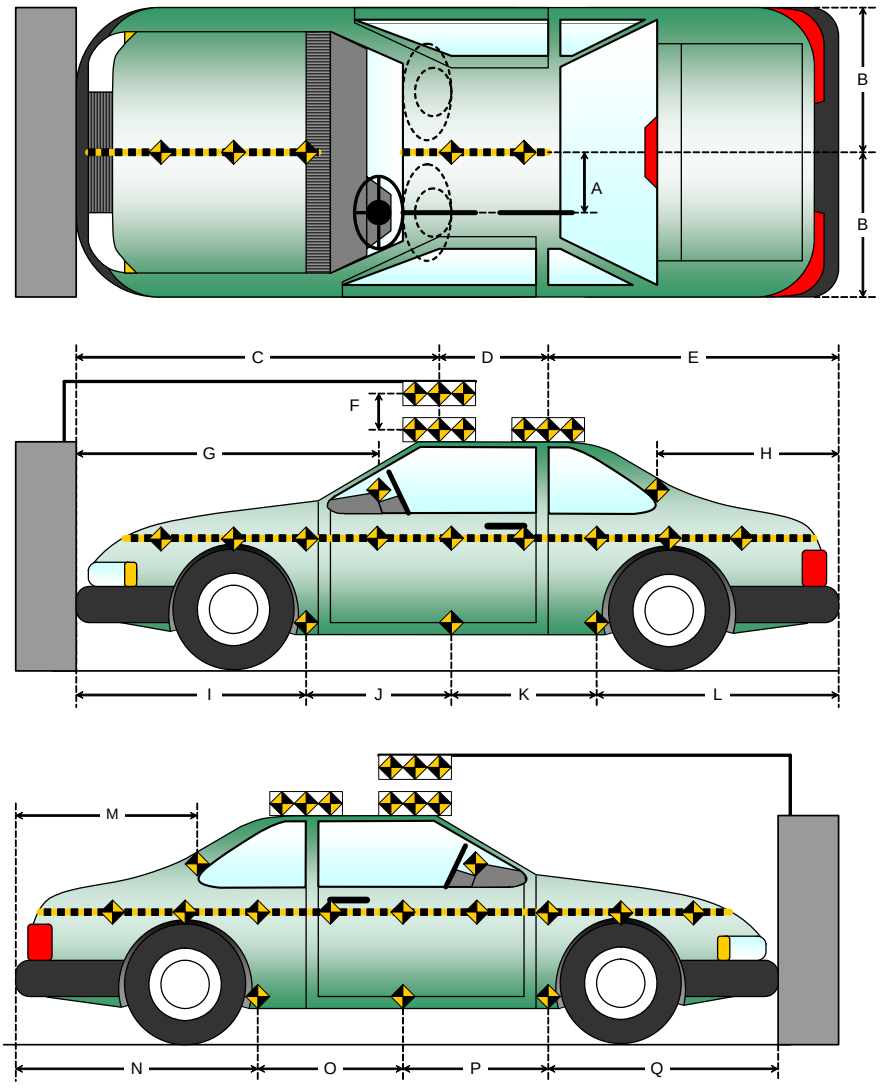
DATA SHEET NO. 8

PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2011 Acura MDX AWD SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB5317
Test Date: 11/01/2010

Item	Value (mm)
A	430
B	988
C	2420
D	670
E	1788
F	90
G	
H	1360
I	1555
J	840
K	840
L	1643
M	1360
N	1643
O	840
P	840
Q	1555



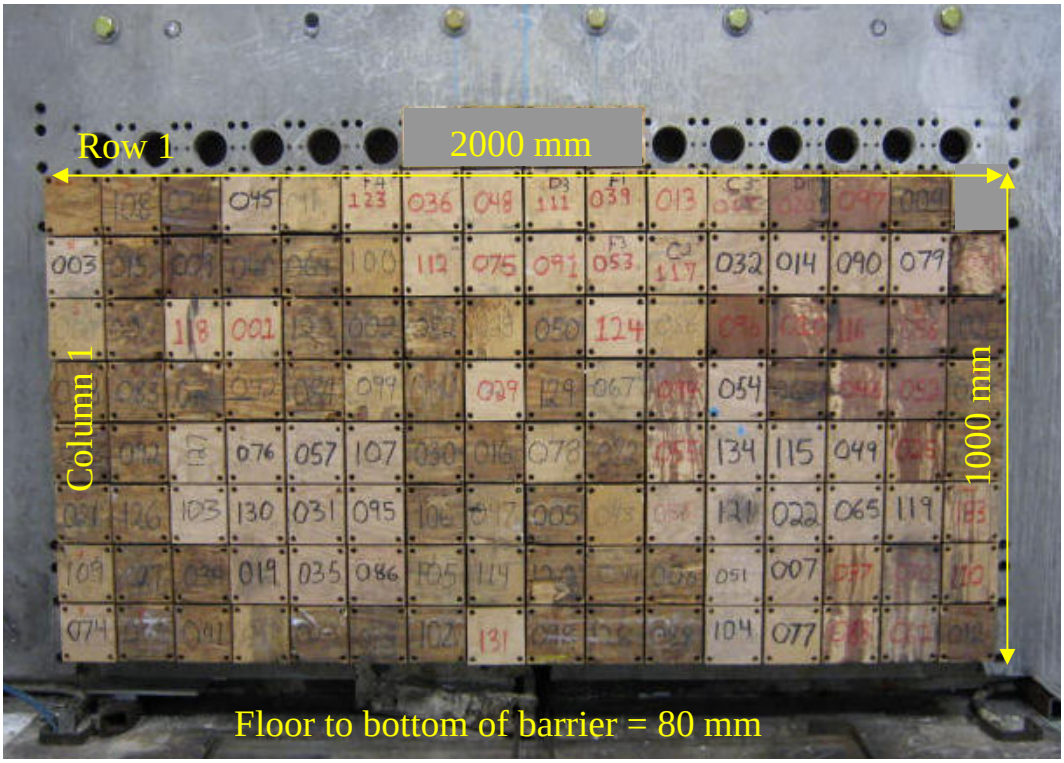
DATA SHEET NO. 9

LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle: 2011 Acura MDX AWD SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB5317
Test Date: 11/01/2010

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 Acura MDX AWD SUV NHTSA No.: MB5317
Test Program: NCAP Frontal Barrier Impact Test Test Date: 11/01/2010

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 Acura MDX AWD SUV NHTSA No.: MB5317
Test Program: NCAP Frontal Barrier Impact Test Test Date: 11/01/2010

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	Airbag	Airbag
Left Knee Contact	Knee Bolster	Glovebox
Right Knee Contact	Knee Bolster	Glovebox

DOOR OPENING AND SEAT TRACK INFORMATION

Description	Driver	Passenger
Locked/Unlocked Doors	Doors were unlocked	Doors were unlocked
Front Door Opening	Door remained closed and latched; Door opened without tools	Door remained closed and latched; Door opened without tools
Rear Door Opening	Door remained closed and latched; Door opened without tools	Door remained closed and latched; Door opened without tools
Seat Track Shift (mm)	0	0
Seat Back Failure	None	None

POST TEST STRUCTURAL OBSERVATIONS

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

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	467
Center	mm	507
Right Side	mm	552
Average	mm	509

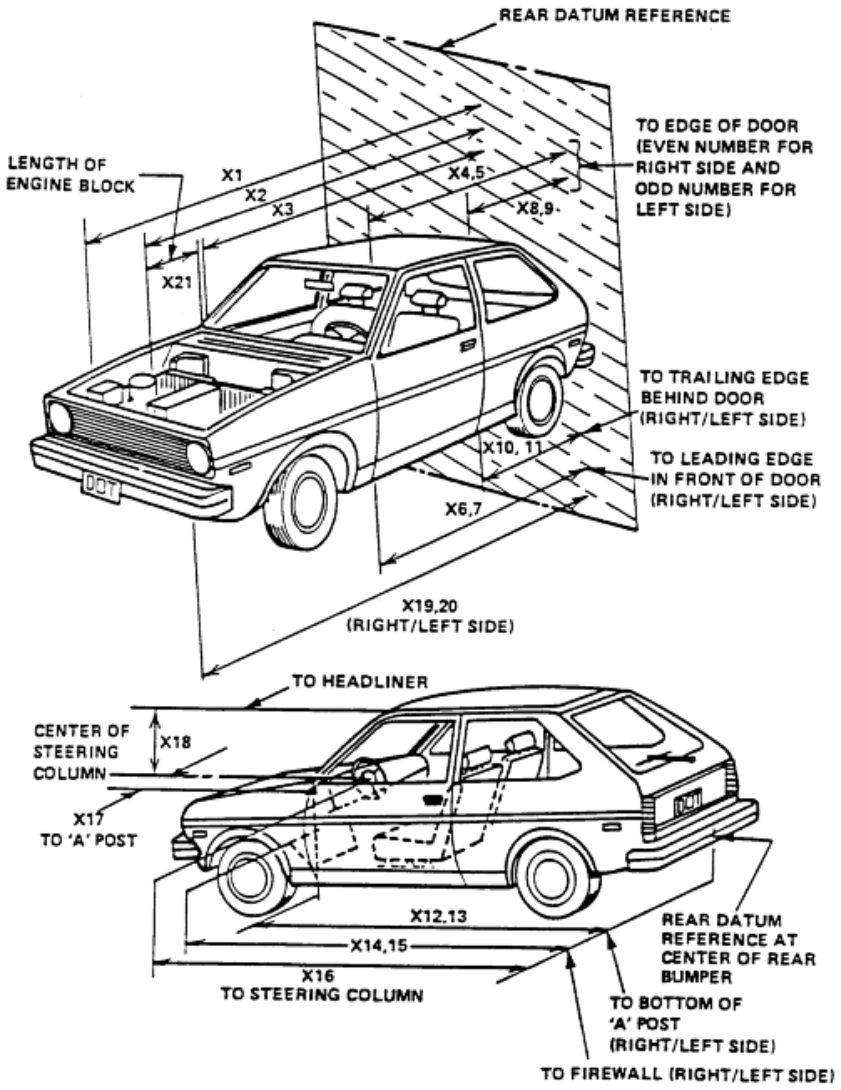
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Left Front (Driver) P1		Left Front (Passenger) P2	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	Yes	Yes	Yes
Knee Airbag	No		No	
Curtain Side Airbag	Yes	No	Yes	No
Torso/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 Acura MDX AWD SUV NHTSA No.: MB5317
Test Program: NCAP Frontal Barrier Impact Test Test Date: 11/01/2010



DATA SHEET NO. 12 (CONTINUED)

VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2011 Acura MDX AWD SUV NHTSA No.: MB5317
Test Program: NCAP Frontal Barrier Impact Test Test Date: 11/01/2010

RSOV (Rear Surface of Vehicle)

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	mm	4878	4285	593
2	RSOV to Front of Engine	mm	4200	3972	228
3	RSOV to Firewall	mm	3863	3854	9
4	RSOV to Upper Leading Edge of Right Door	mm	3308	3299	9
5	RSOV to Upper Leading Edge of Left Door	mm	3307	3305	2
6	RSOV to Lower Leading Edge of Right Door	mm	3275	3273	2
7	RSOV to Lower Leading Edge of Left Door	mm	3281	3273	8
8	RSOV to Upper Trailing Edge of Right Door	mm	2250	2250	0
9	RSOV to Upper Trailing Edge of Left Door	mm	2253	2250	3
10	RSOV to Lower Trailing Edge of Right Door	mm	2260	2262	-2
11	RSOV to Lower Trailing Edge of Left Door	mm	2255	2255	0
12	RSOV to Bottom of “A” Post of Right Side	mm	3270	3268	2
13	RSOV to Bottom of “A” Post of Left Side	mm	3260	3259	1
14	RSOV to Firewall, Right Side	mm	3880	3858	22
15	RSOV to Firewall, Left Side	mm	3855	3842	13
16	RSOV to Steering Column	mm	2890	2875	15
17	Center of Steering Column to “A” Post	mm	355	430	-75
18	Center of Steering Column to Headliner	mm	415	517	-102
19	RSOV to Right Side of Front Bumper	mm	4440	4173	267
20	RSOV to Left Side of Front Bumper	mm	4440	4195	245
21	Length of Engine Block	mm	340	340	0
RD	RSOV to Right Side of Dash Panel	mm	3110	3096	14
CD	RSOV to Center of Dash Panel	mm	3150	3161	-11
LD	RSOV to Left Side of Dash Panel	mm	3105	3100	5

DATA SHEET NO. 13

ACCIDENT INVESTIGATION DIVISION DATA

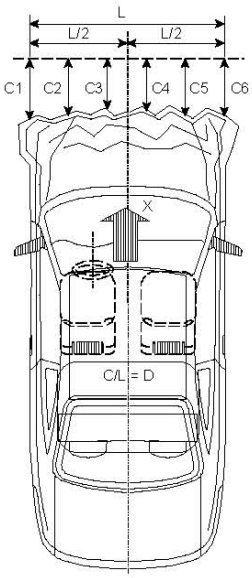
Test Vehicle: 2011 Acura MDX AWD SUV NHTSA No.: MB5317
Test Program: NCAP Frontal Barrier Impact Test Test Date: 11/01/2010

VEHICLE INFORMATION

VIN: 2HNYD2H23BH503734 Wheelbase (mm): 2756
Vehicle Size Category: MPV Test Weight (kg): 2255.3

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): 56.3
Velocity Change (km/h): 67.5
Time of Separation (msec): 102



CRUSH PROFILE

Collision Deformation Classification: Frontal
Midpoint of Damage: Centerline
Damage Region Length (mm): 1940
Impact Mode: Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	4440	4195	245
C2	Crush zone 2 at left side	mm	4640	4218	422
C3	Crush zone 3 at left side	mm	4740	4188	552
C4	Crush zone 4 at right side	mm	4741	4180	561
C5	Crush zone 5 at right side	mm	4640	4273	367
C6	Crush zone 6 at right side	mm	4440	4173	267
L	C1 TO C6	mm	1940	1934	6

DATA SHEET NO. 14

VEHICLE INTRUSION MEASUREMENTS

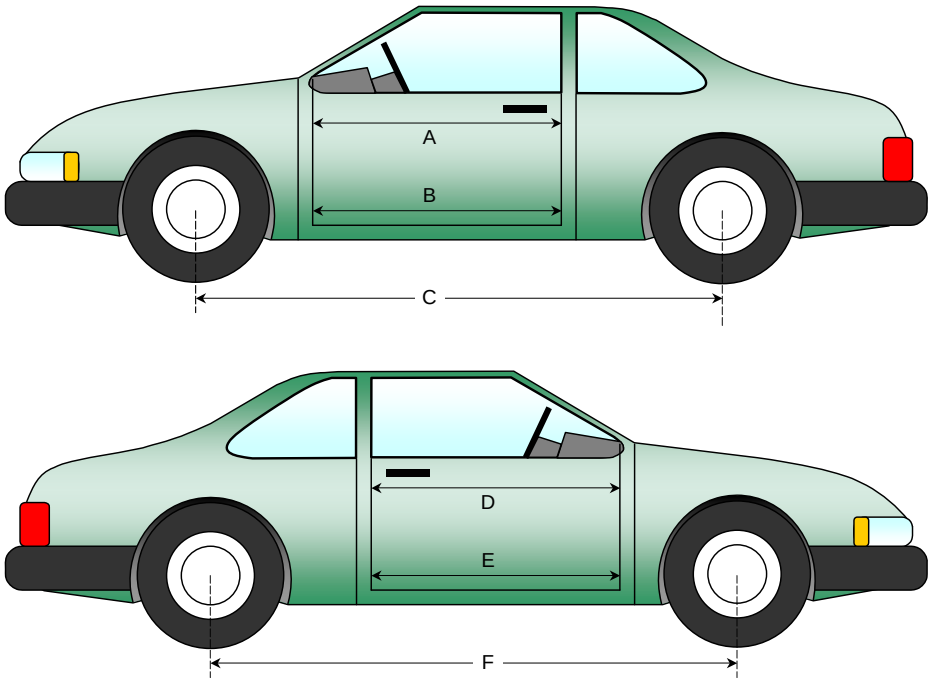
Test Vehicle: 2011 Acura MDX AWD SUV
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: MB5317
Test Date: 11/01/2010

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	950	950	0
B	Left Side Lower	mm	855	855	0
D	Right Side Upper	mm	950	950	0
E	Right Side Lower	mm	855	855	0

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2756	2667	89
F	Right Side Wheelbase	mm	2756	2614	142



DATA SHEET NO. 14 (CONTINUED)

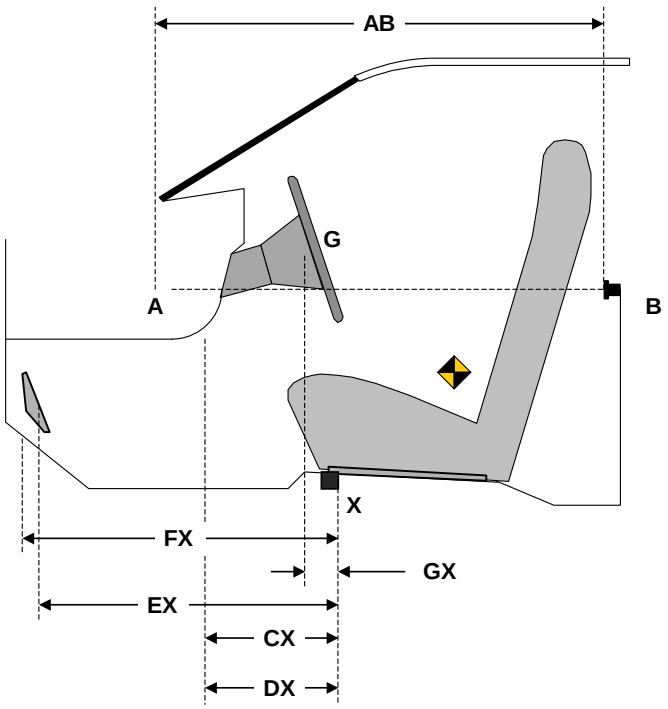
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2011 Acura MDX AWD SUV NHTSA No.: MB5317
Test Program: NCAP Frontal Barrier Impact Test Test Date: 11/01/2010

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside window jam)	mm	806	806	0
CX	Left Knee Bolster to X	mm	270	261	9
DX	Right Knee Bolster to X	mm	270	265	5
EX	Brake Pedal to X	mm	575	510	65
FX	Foot Rest to X	mm	585	561	24
GX	Center of Steering Column Wheel Hub to X	mm	105	52	53

X = Front of Seat Track (stationary)

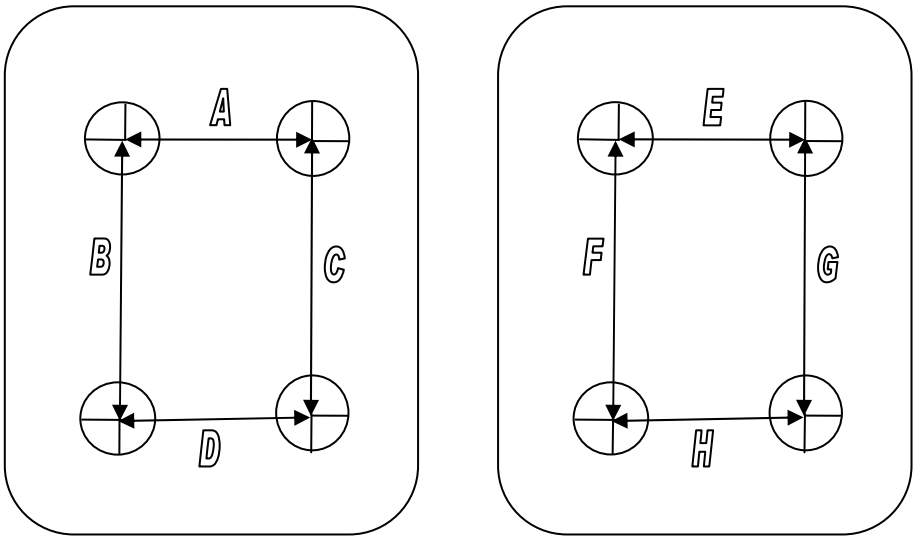


DRIVER COMPARTMENT

DATA SHEET NO. 14 (CONTINUED)

VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2011 Acura MDX AWD SUV NHTSA No.: MB5317
Test Program: NCAP Frontal Barrier Impact Test Test Date: 11/01/2010



Driver Passenger

TOP VIEW THROUGH FLOOR PAN

UNDERBODY FLOORBOARD DEFORMATION

Measurement	Units	Pre-Test	Post-Test	Difference
A	mm	200	200	0
B	mm	200	200	0
C	mm	200	200	0
D	mm	200	200	0
E	mm	200	200	0
F	mm	200	200	0
G	mm	200	200	0
H	mm	200	200	0

DATA SHEET NO. 15

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

Test Vehicle: 2011 Acura MDX AWD SUV NHTSA No.: MB5317
Test Program: NCAP Frontal Barrier Impact Test Test Date: 11/01/2010

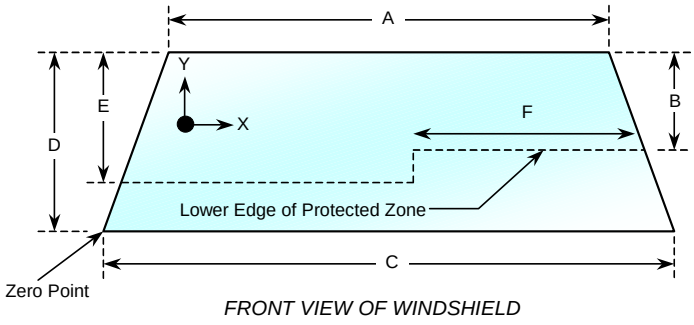
Windshield Mounting Details:
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

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	2268	2268	100
Right Side	2268	2268	100
Total	4536	4536	100



FRONT VIEW OF WINDSHIELD

Item	Units	Value
A	mm	1305
B	mm	500
C	mm	1611
D	mm	810
E	mm	540
F	mm	483

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 Acura MDX AWD SUV	NHTSA No.:	MB5317
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	11/01/2010

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Test Time: 10:37 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)

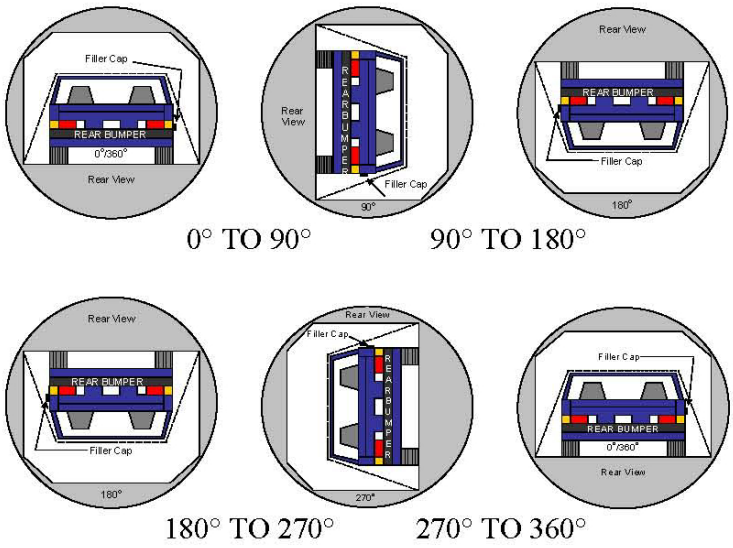
D. Spillage Details: None

DATA SHEET NO. 16

FMVSS 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2011 Acura MDX AWD SUV NHTSA No.: MB5317
Test Program: NCAP Frontal Barrier Impact Test Test Date: 11/01/2010

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°	114	300	414
90° to 180°	117	300	417
180° to 270°	111	300	411
270° to 360°	122	300	422

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

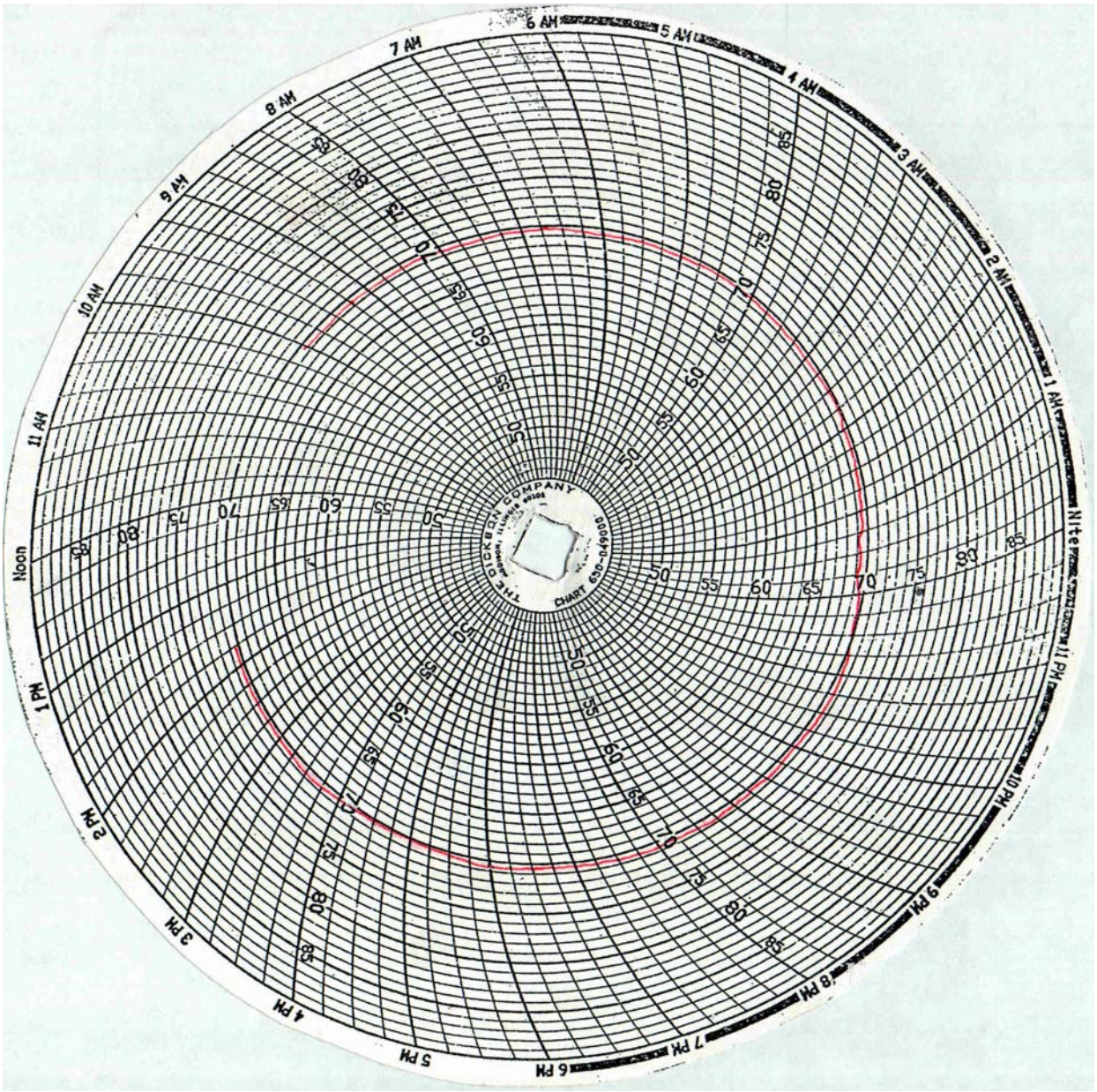
ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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

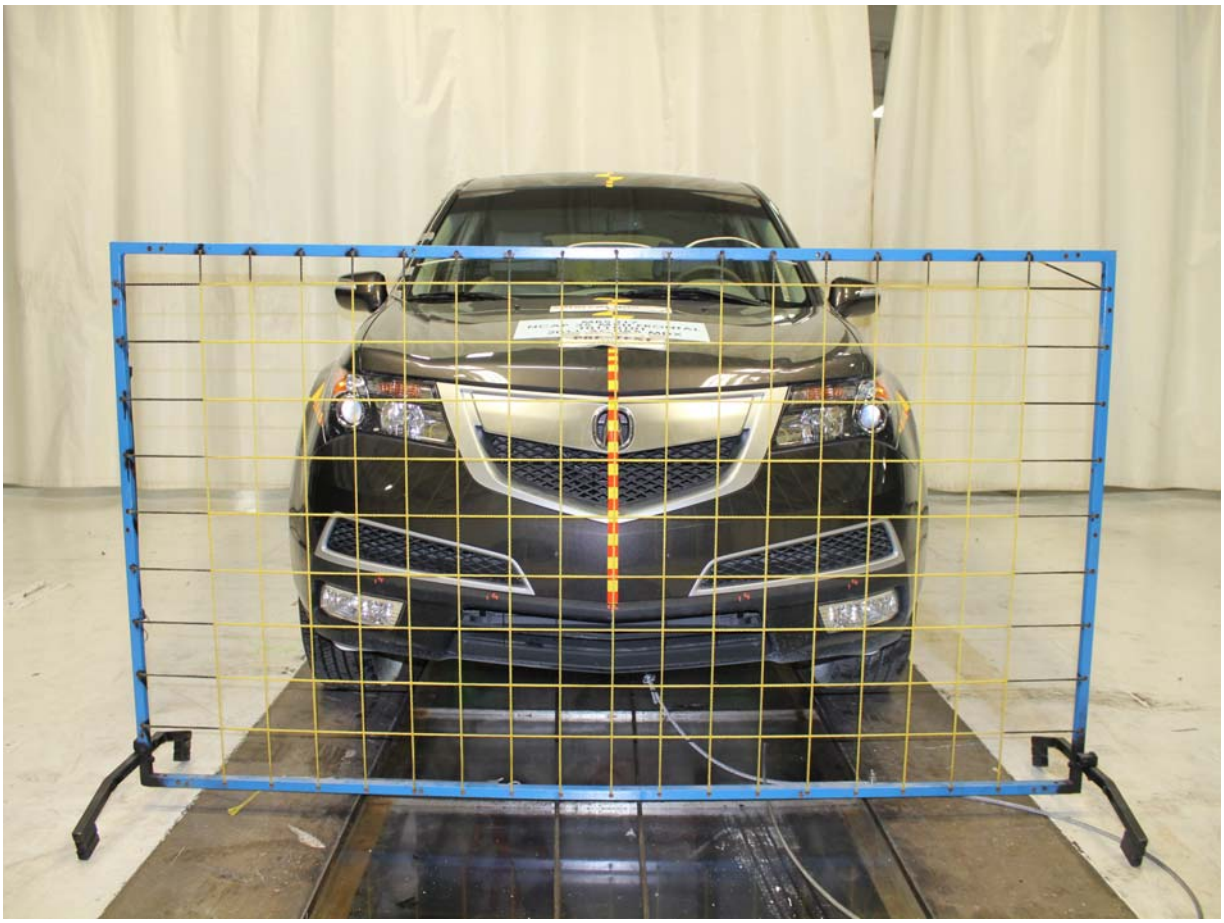
Test Vehicle: 2011 Acura MDX AWD SUV NHTSA No.: MB5317
Test Program: NCAP Frontal Barrier Impact Test Test Date: 11/01/2010



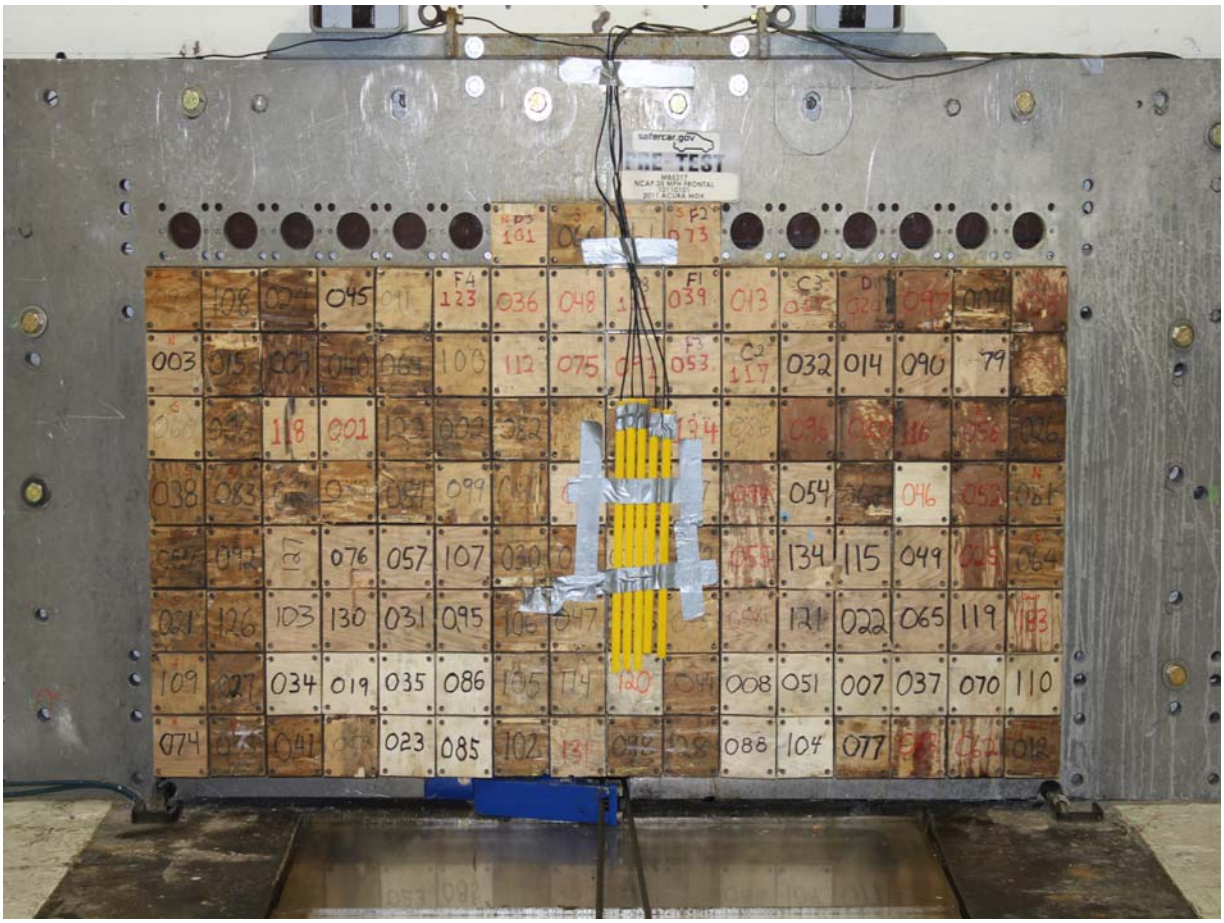
APPENDIX A

PHOTOGRAPHS

TABLE OF PHOTOGRAPHS



Load Cell Location



Load Cell Wall

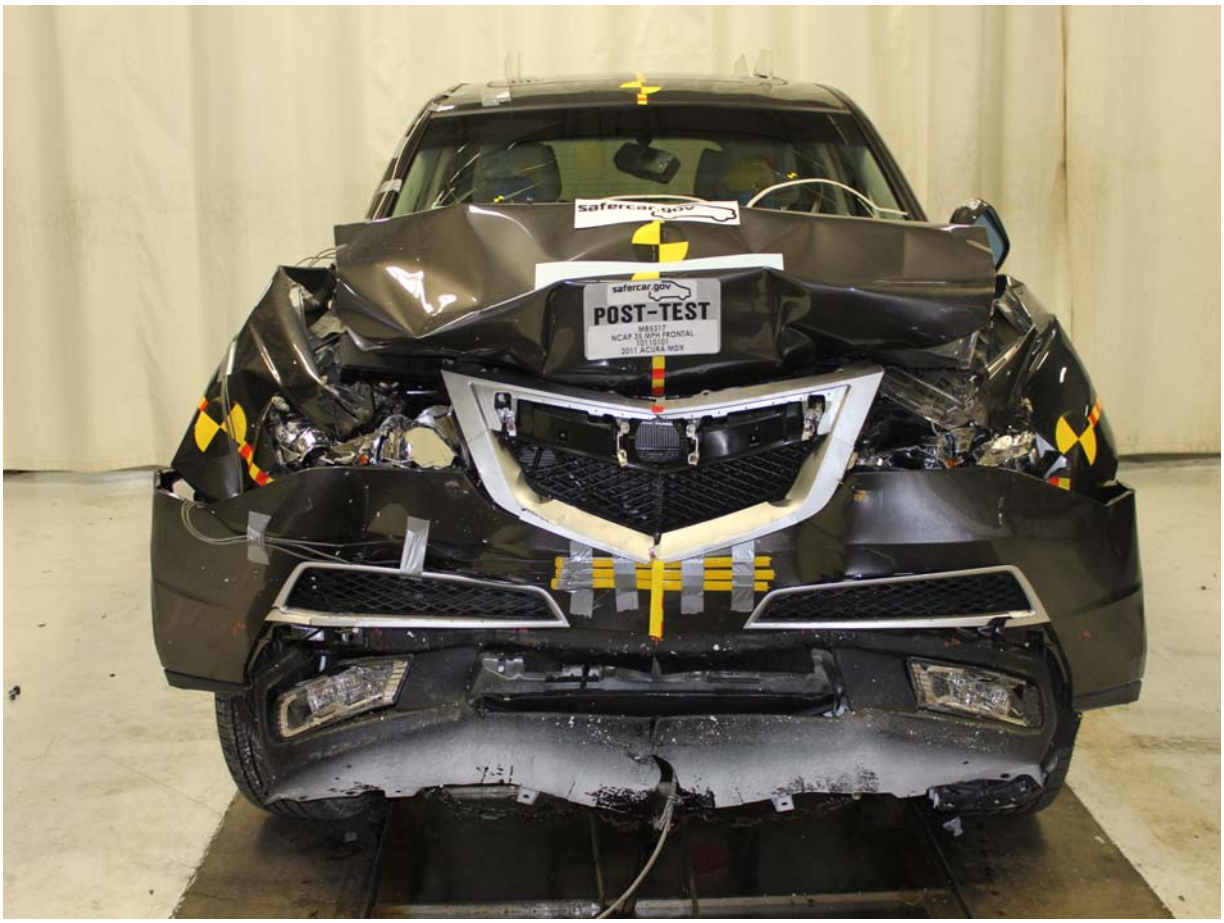
Manufacturer's Label

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

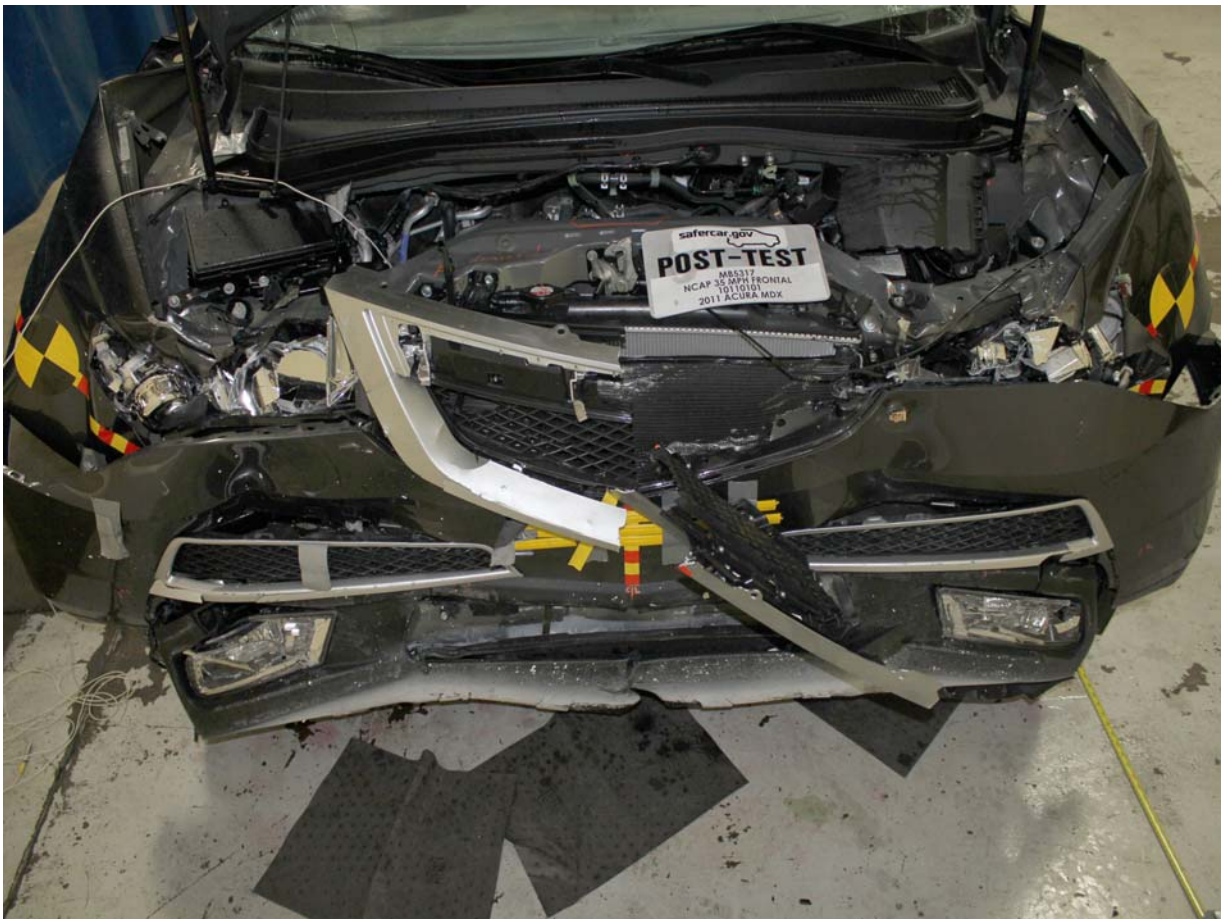
Pre-Test Left Rear Three-Quarter View (with vehicle at barrier)

Post-Test Left Rear Three-Quarter View

Pre-Test Windshield View

Post-Test Windshield View

Pre-Test Engine Compartment View

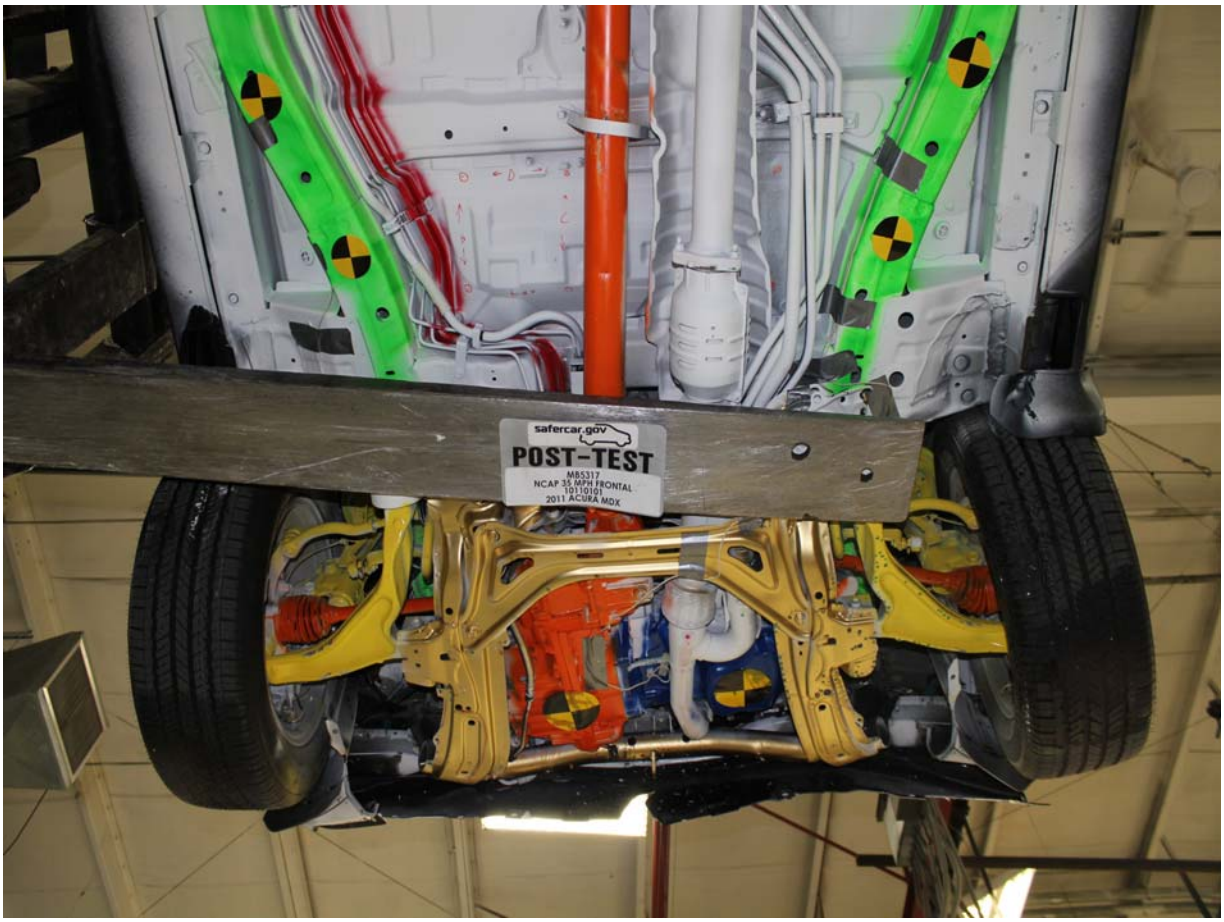


Post-Test Engine Compartment View

Pre-Test Fuel Cap View

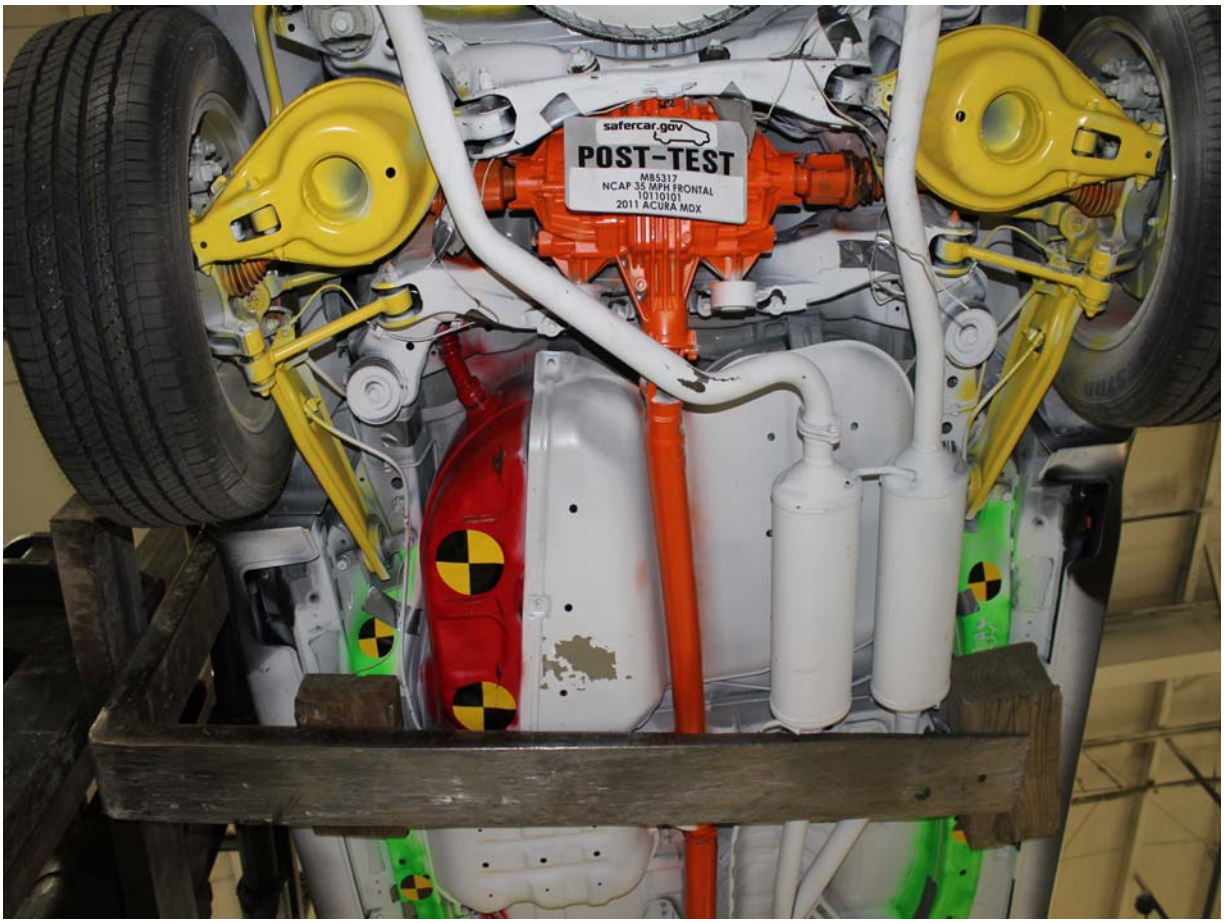
Post-Test Fuel Cap View

Pre-Test Front Underbody View



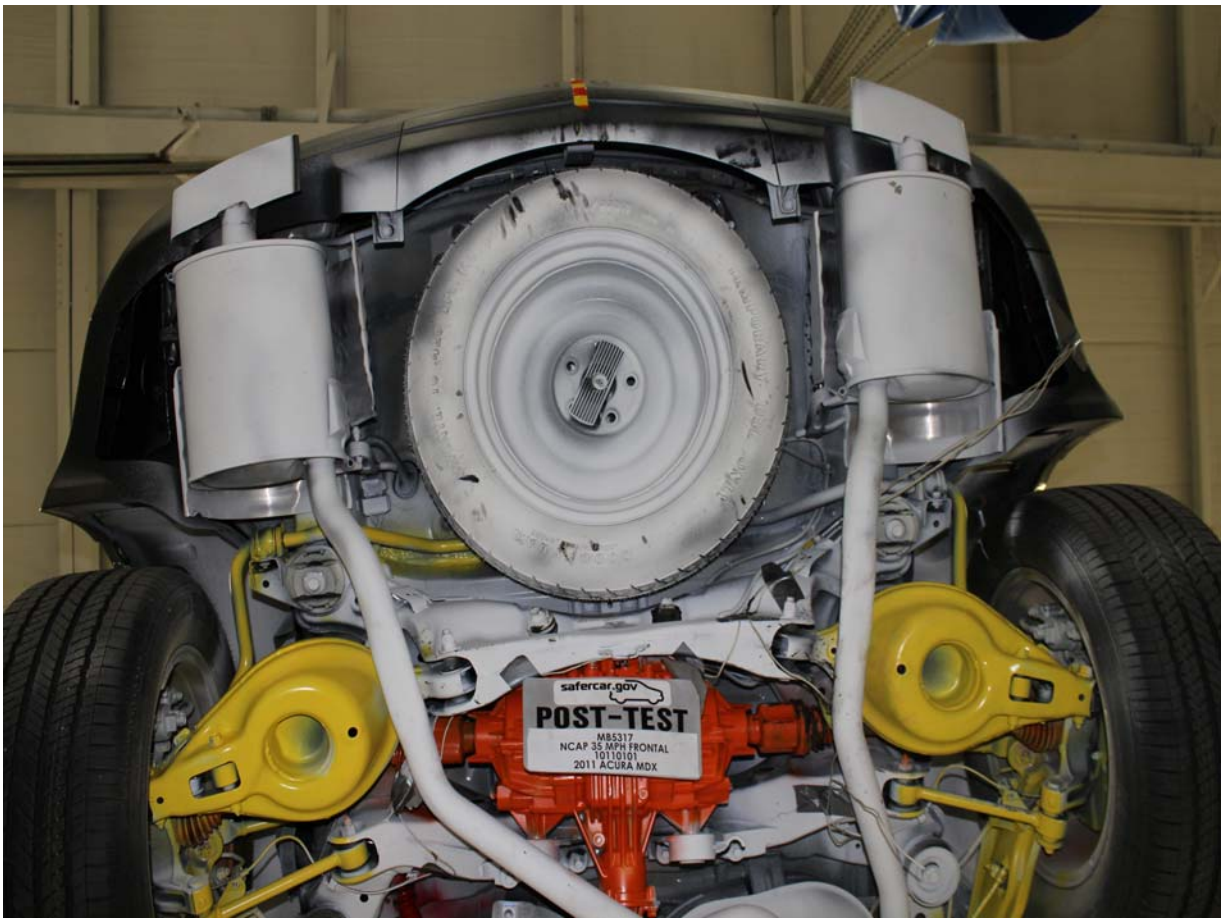
Post-Test Front Underbody View

Pre-Test Mid 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

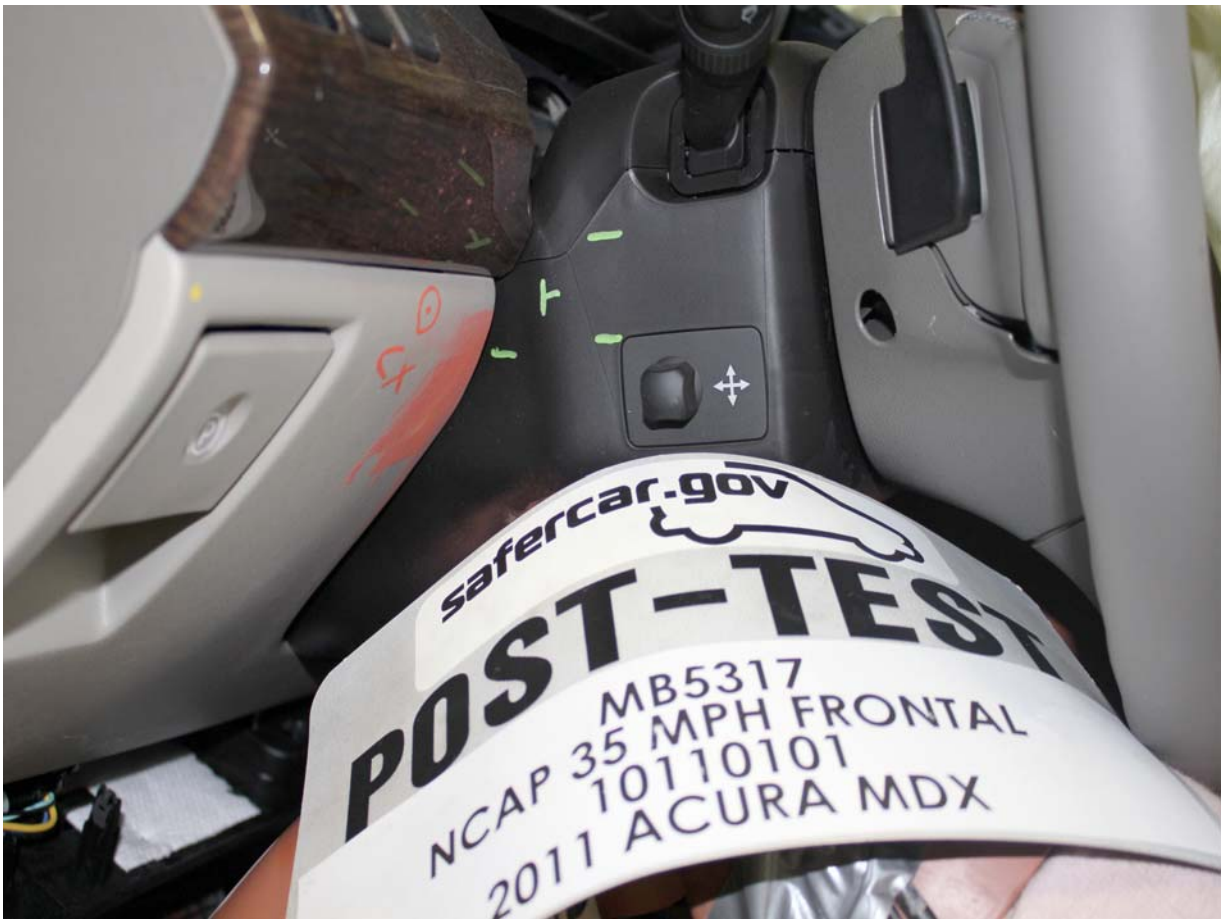
Post-Test Driver's Side Floorpan

Post-Test Driver Dummy Contact with Airbag

Post-Test Driver Dummy Contact with Headrest

Post-Test Driver Dummy Contact with Knee Bolster

Pre-Test View of Steering Column Shear Capsule



Post-Test View of Steering Column Shear Capsule

Pre-Test Passenger Dummy Front View

Post-Test Passenger Dummy Front View

Pre-Test Passenger Dummy Window View

Post-Test Passenger Dummy Window View

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

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

Pre-Test Passenger's Seat Fore-Aft Markings

Post-Test Passenger's Seat Fore-Aft Markings

Pre-Test Passenger Dummy Feet

Post-Test Passenger Dummy Feet

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

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

Pre-Test Passenger's Side Floorpan

Post-Test Passenger's Side Floorpan

Post-Test Passenger Dummy Contact with Airbag

Post-Test Passenger Dummy Contact with Headrest

Post-Test Passenger Dummy Contact with Glovebox

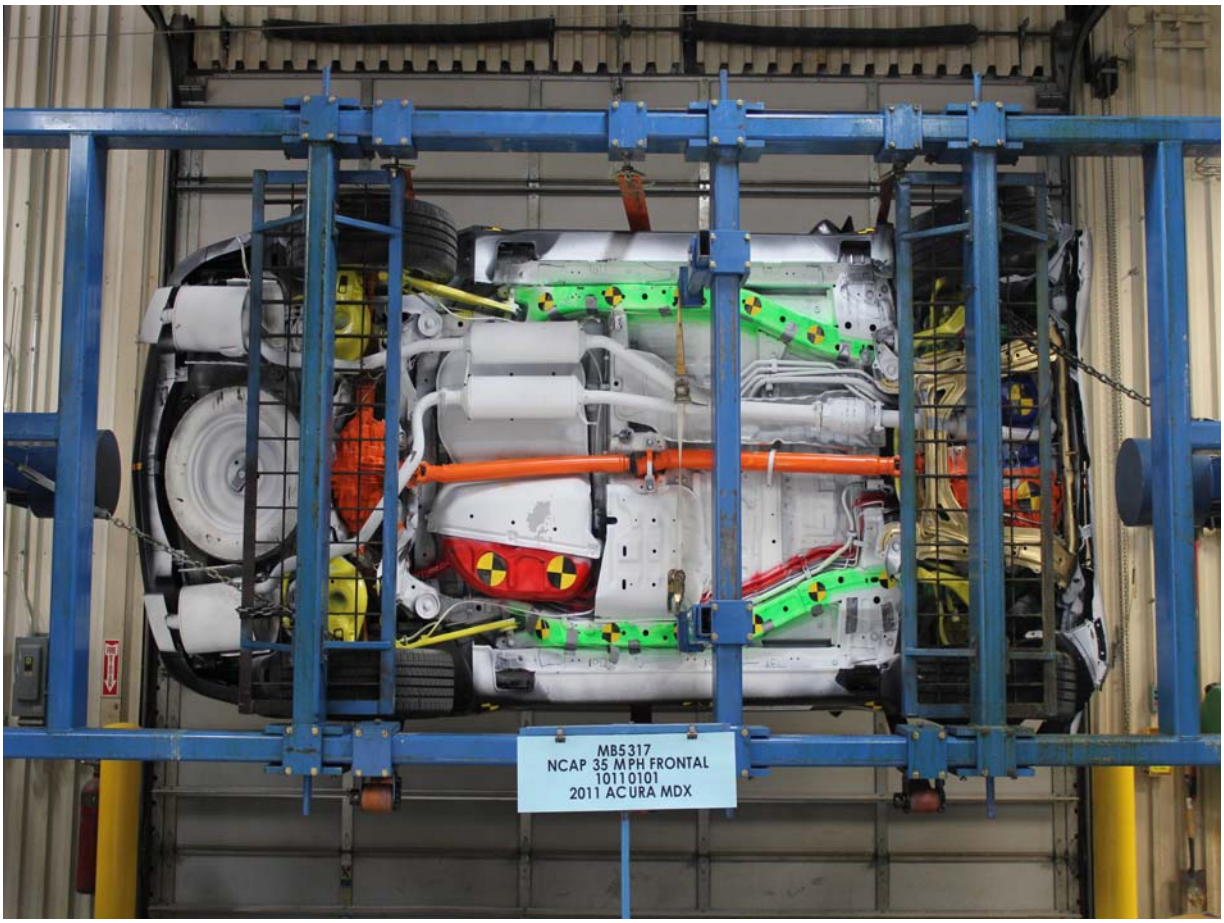
Ballast Installed in Vehicle

PHOTOGRAPH NOT APPLICABLE

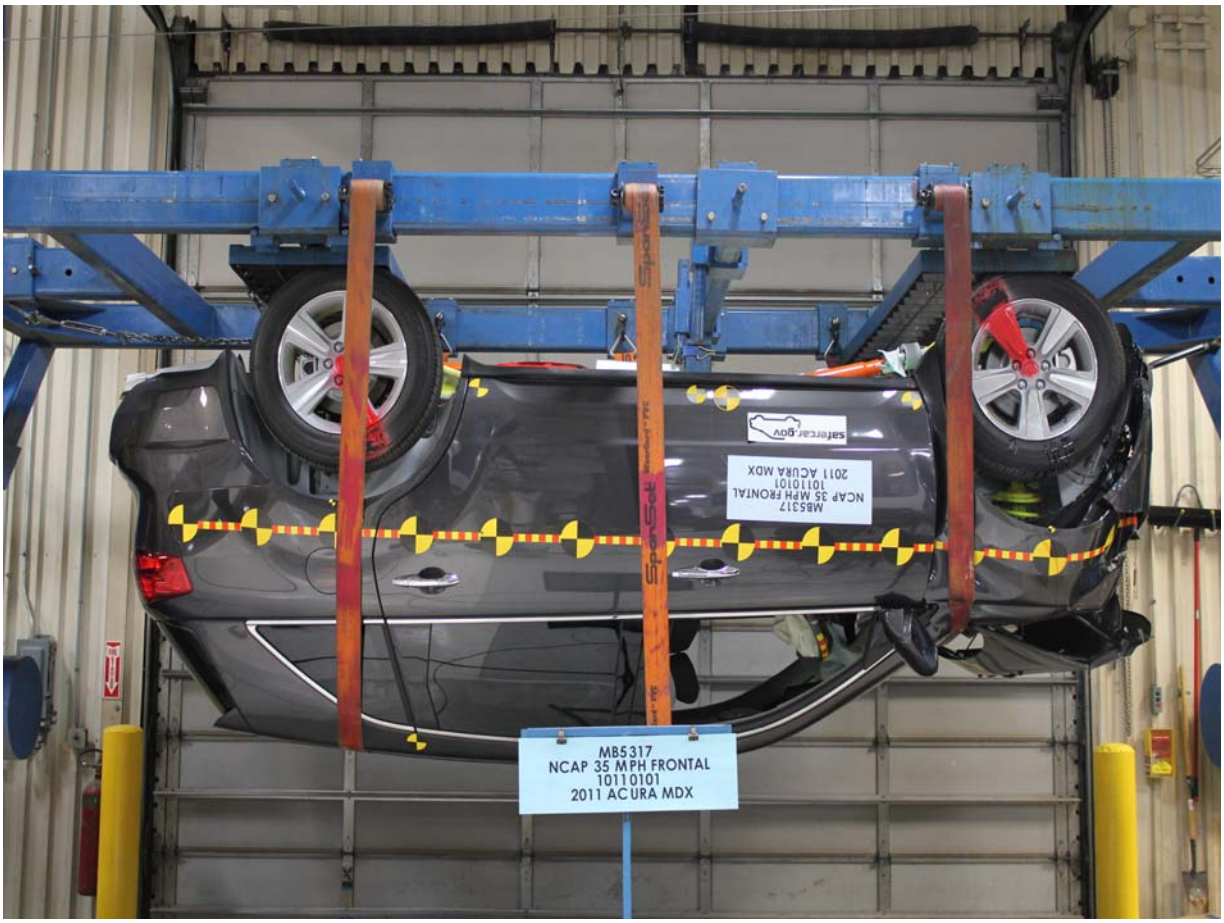
Post-Test Stoddard Solvent Spillage Location View

Post-Test Speed Trap Read-Out

Vehicle at 0 Degrees on Static Rollover Device



Vehicle at 90 Degrees on Static Rollover Device



Vehicle at 180 Degrees on Static Rollover Device

Vehicle at 270 Degrees on Static Rollover Device

Vehicle at 360 Degrees on Static Rollover Device

Vehicle Impact

ACURA

2011 MDX

VEHICLE NUMBER: **2HNYD2H23BH503734**
ENGINE NUMBER: **J37A1-7004637** EXT: **GRIGIO M.**
CONTROL NUMBER: **644543** INT: **TAUPE**

STANDARD EQUIPMENT AT NO EXTRA COST

*** TECHNICAL FEATURES ***
- 300hp 3.7-Liter SOHC 24-Valve VTEC V6 Engine
- 6-Speed Automatic Transmission with Sequential SportShift
- Paddle Shifters
- SH-AWD System
- 4-Wheel Disc Brakes
- MacPhearson Strut Front Suspension
- Rear Multi-Link Suspension
- Variable-Assist Rack-and-Pinion Power Steering
- Immobilizer Theft-Deterrent System

*** SAFETY FEATURES ***
- Driver's and Front Passenger's Dual-Stage Airbags (SRS)
- Driver's and Front Passenger's Side Airbags
- Side Curtain Airbags with Rollover Sensor
- Vehicle Stability Assist (VSA)
- Anti-Lock Braking System (ABS)
- Electronic Brake Distribution (EBD)
- Brake Assist
- 3-Point Seat Belts
- Front Seat Belts with Automatic Tensioning System
- Active Front Head Restraints
- Tire Pressure Monitoring System
- ACE Body Structure
- Side-Impact Door Beams
- Day Time Running Lights (DRL)
- LATCH System for Child Seats

*** INTERIOR FEATURES ***
- Sport Seats with Leather Trim
- Acura Premium Sound System with 8 Speakers and AM/FM/6-Disc In-Dash CD
- XM Satellite Radio
- MP3/Auxiliary Input Jack
- Driver Recognition Memory System
- Driver's 10-Way Power Seat
- Front Passenger's 8-Way Power Seat
- Heated Front Seats
- HomeLink System
- Bluetooth HandsFreeLink
- Tri-Zone Auto Climate Control with Air Filtration System
- Acura Personalized Settings
- Auto Dimming Rearview Mirror with Rearview Camera Display

*** EXTERIOR FEATURES ***
- Power Tailgate
- Power Moonroof with Tilt Feature
- 18" x 8.0" Alloy Wheels
- P255/55 R18 All-Season Tires
- Xenon HID Headlights
- Fog Lights
- Heated Power Door Mirrors with Turn Indicators
- Remote Entry with Security System

Manufacturer's Suggested Retail Price **$42,580.00**

MSRP Includes:
-6YR/70K Mile Powertrain Warranty
-4YR/50K Mile Ltd Vehicle Warranty
-Full Tank of Fuel
-3 Months Free XM Radio Service

-XM Radio is available in the 48 contiguous states

Destination and Handling 860.00

TOTAL VEHICLE PRICE
(includes Pre-Delivery Service)

$43,440.00

License and title fees, state and local taxes and dealer options and accessories are not included in the manufacturer's suggested retail price.

Environmental Performance

Protect the environment, choose vehicles with **higher scores:**

Global Warming Score 5
1 — Average new vehicle — 10 **Cleanest**

Smog Score 5
1 — Average new vehicle — 10 **Cleanest**

Vehicle emissions are a primary contributor to global warming and smog. Scores are determined by the California Air Resources Board based on this vehicle's measured emissions. Please visit www.DriveClean.ca.gov for more information. California Environmental Protection Agency AIR RESOURCES BOARD

CONTINENTAL ACURA OF NAPE
2275 AURORA AVENUE
NAPERVILLE, IL 60540

PORT OF ENTRY: BUFFALO
DELIVERY POINT: CHICAGO
SHIP#:
ROW/SPACE: 256-006
TRANS.METHOD: N50 ELWOOD

VIN: 2HNYD2H23BH503734

ORIG. DLR: 251144
REF.NO: 40281
HN CODE: AL-8896
EMISSION: 50 STATE

DEALER: 251144

EPA Fuel Economy Estimates

CITY MPG **16**
Expected range for most drivers **13** to **19** MPG

Estimated Annual Fuel Cost
$2,669
based on 15,000 miles at $3.20 per gallon

HIGHWAY MPG **21**
Expected range for most drivers **17** to **25** MPG

Combined Fuel Economy
This Vehicle
18
10 — 32
All SUVs

Your actual mileage will vary depending on how you drive and maintain your vehicle

See the FREE Fuel Economy Guide at dealers or www.fueleconomy.gov

PARTS CONTENT INFORMATION

FOR VEHICLES IN THIS CARLINE
U.S./Canadian Parts Content: **65 %**
Major Sources of Foreign Parts Content:
JAPAN 25 %

NOTE: Parts content does not include final assembly, distribution or other non-parts costs.

FOR THIS VEHICLE
Final Assembly Point:
ALLISTON, ONTARIO CANADA
Country of Origin: Engine:
U.S.A.
Transmission:
JAPAN

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).

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

Monroney Label

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

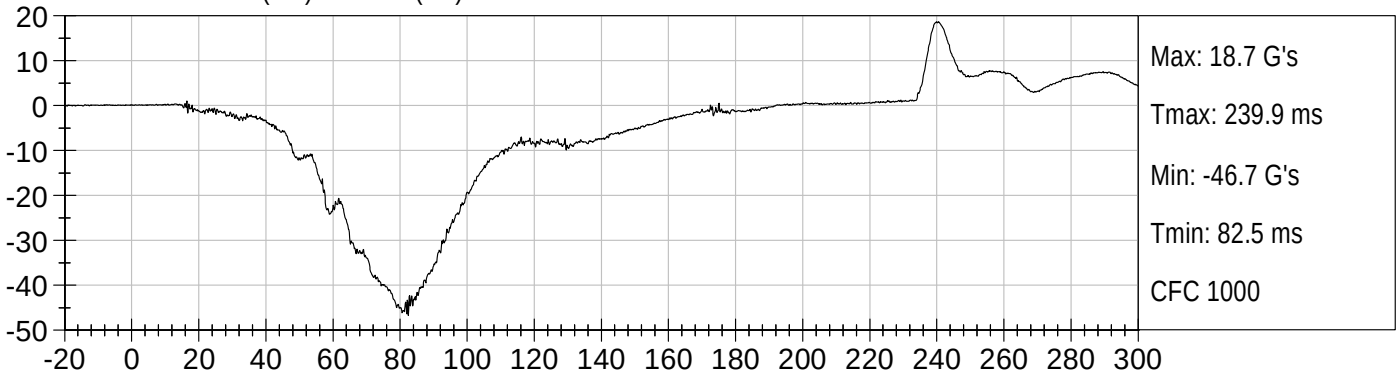
Vehicle Left Brake Caliper X

Vehicle Right Brake Caliper X

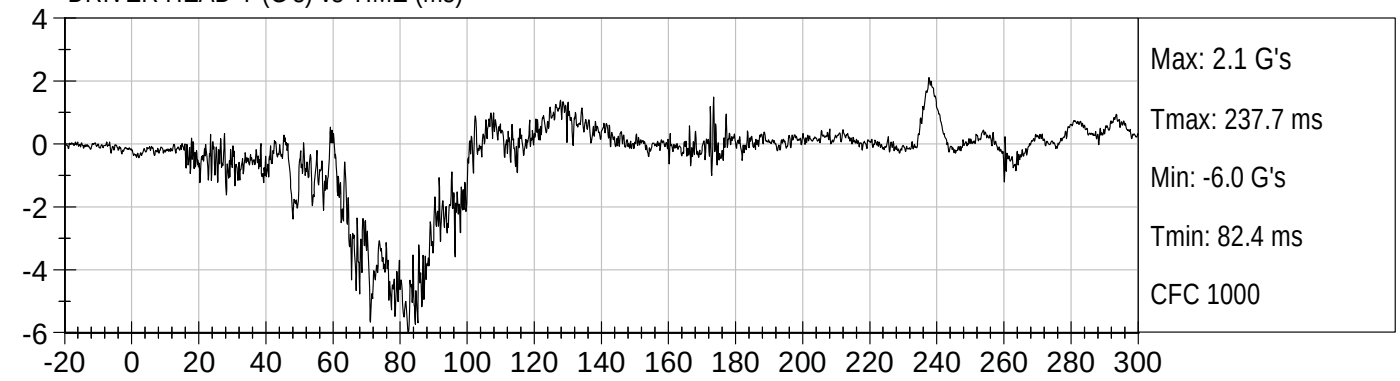
NCAP 35mph Frontal
2011 Acura MDX - MB5317

Test Date: 11/01/2010
Speed: 35.0 mph (56.3 km/h)

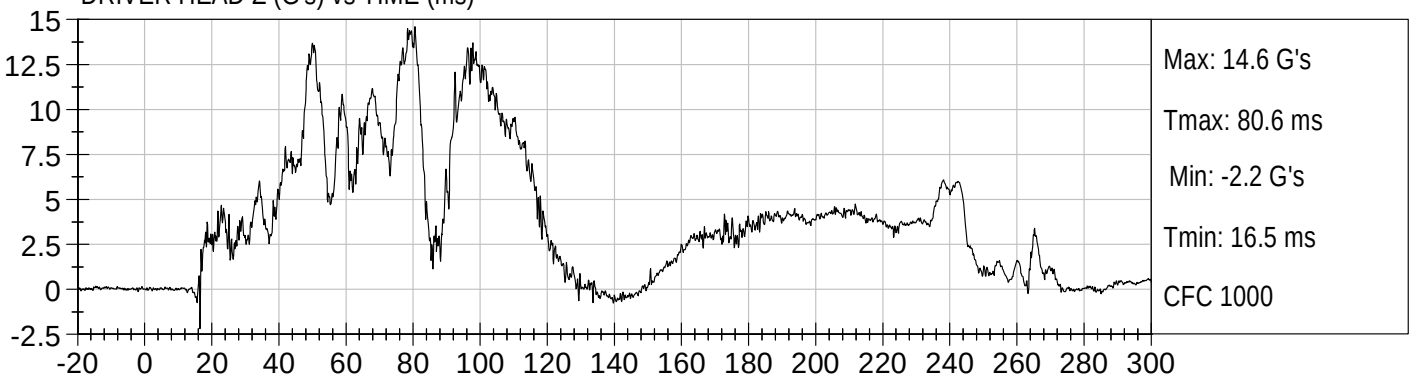
DRIVER HEAD X (G's) vs TIME (ms)



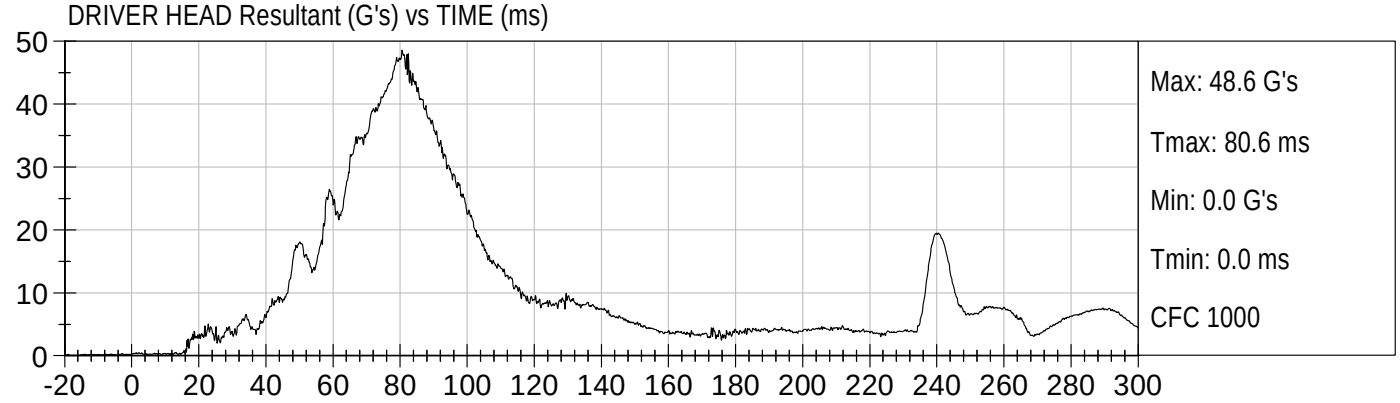
DRIVER HEAD Y (G's) vs TIME (ms)



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



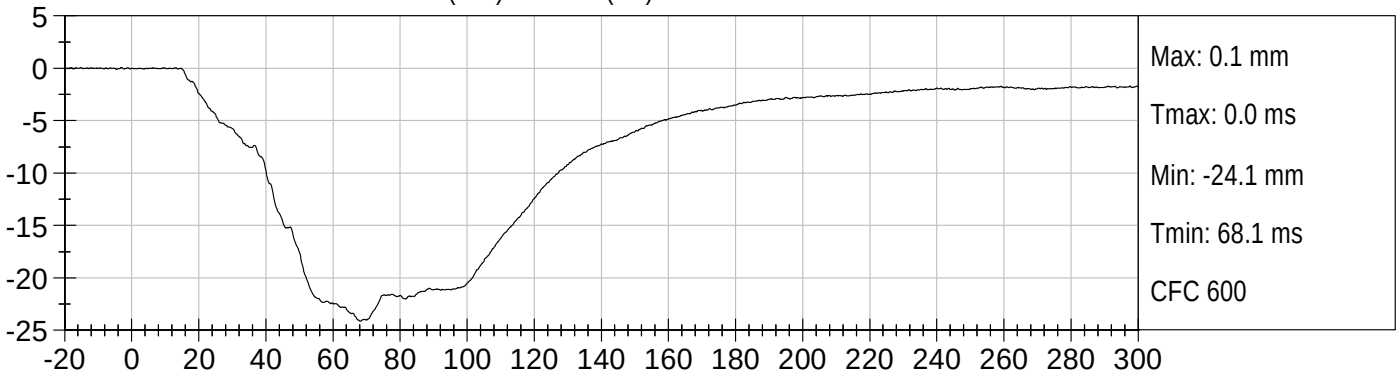
DRIVER HEAD Resultant (G's) vs TIME (ms)



NCAP 35mph Frontal
2011 Acura MDX - MB5317

Test Date: 11/01/2010
Speed: 35.0 mph (56.3 km/h)

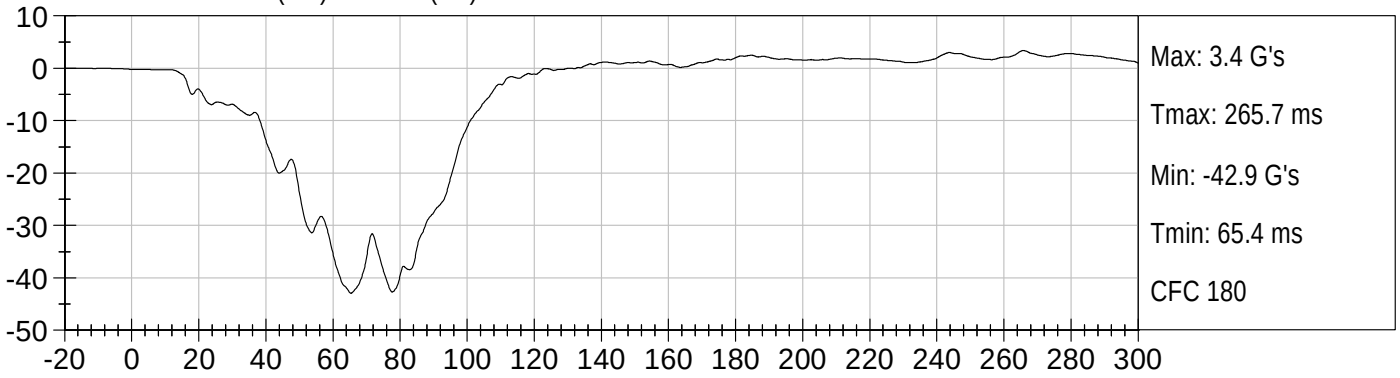
DRIVER CHEST DISPLACEMENT (mm) vs TIME (ms)



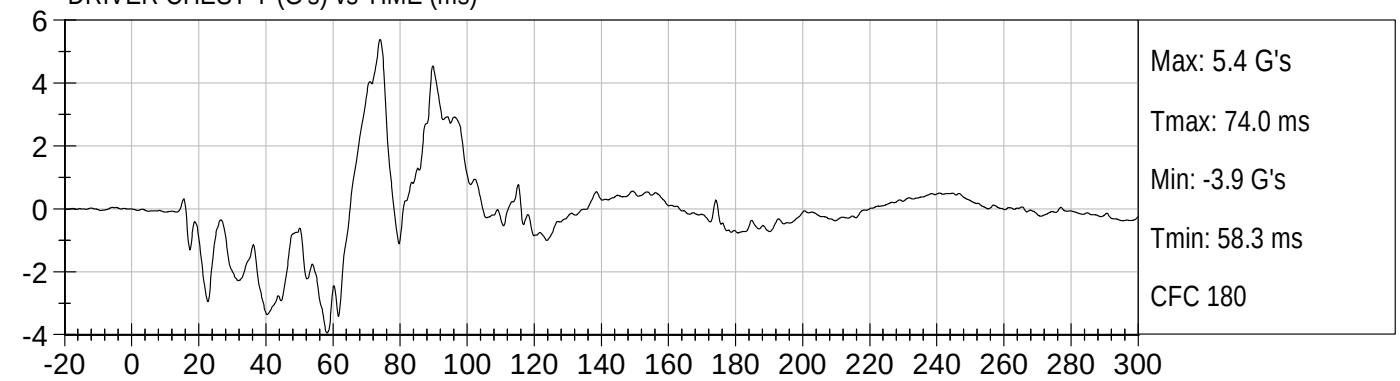
NCAP 35mph Frontal
2011 Acura MDX - MB5317

Test Date: 11/01/2010
Speed: 35.0 mph (56.3 km/h)

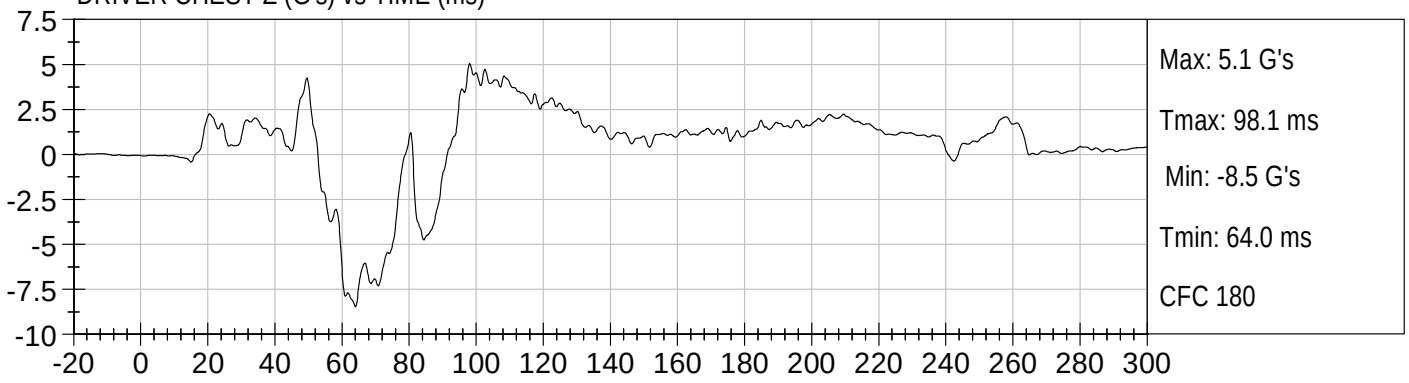
DRIVER CHEST X (G's) vs TIME (ms)



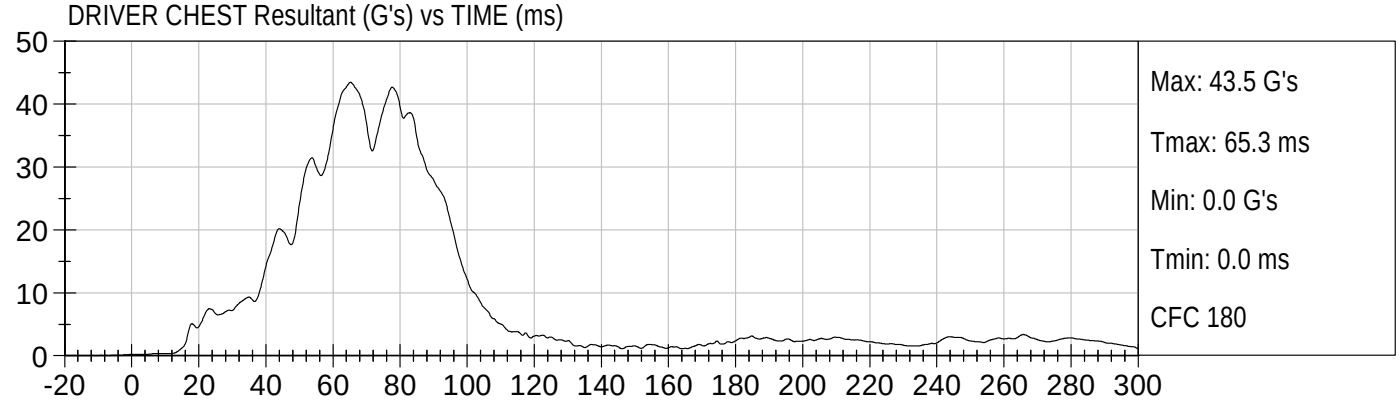
DRIVER CHEST Y (G's) vs TIME (ms)



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



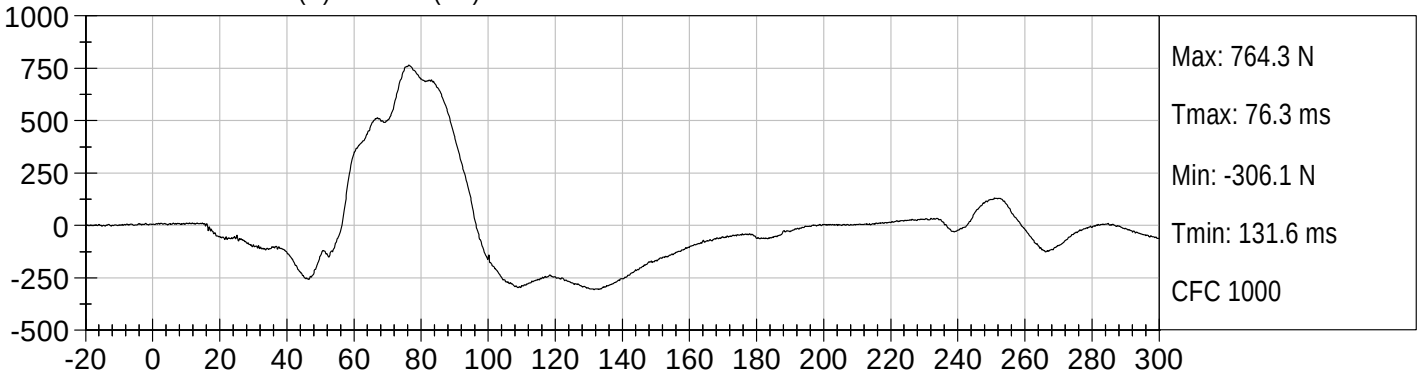
DRIVER CHEST Resultant (G's) vs TIME (ms)



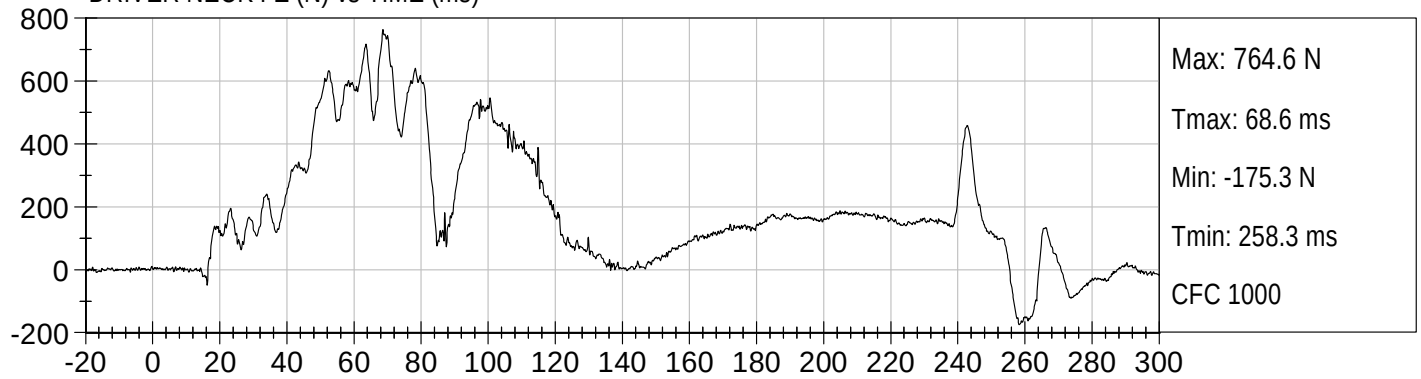
NCAP 35mph Frontal
2011 Acura MDX - MB5317

Test Date: 11/01/2010
Speed: 35.0 mph (56.3 km/h)

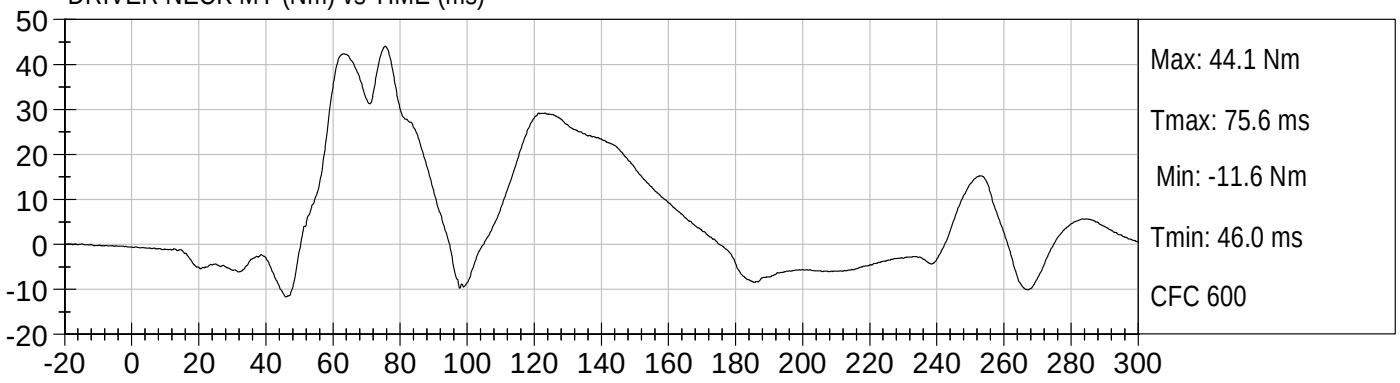
DRIVER NECK FX (N) vs TIME (ms)

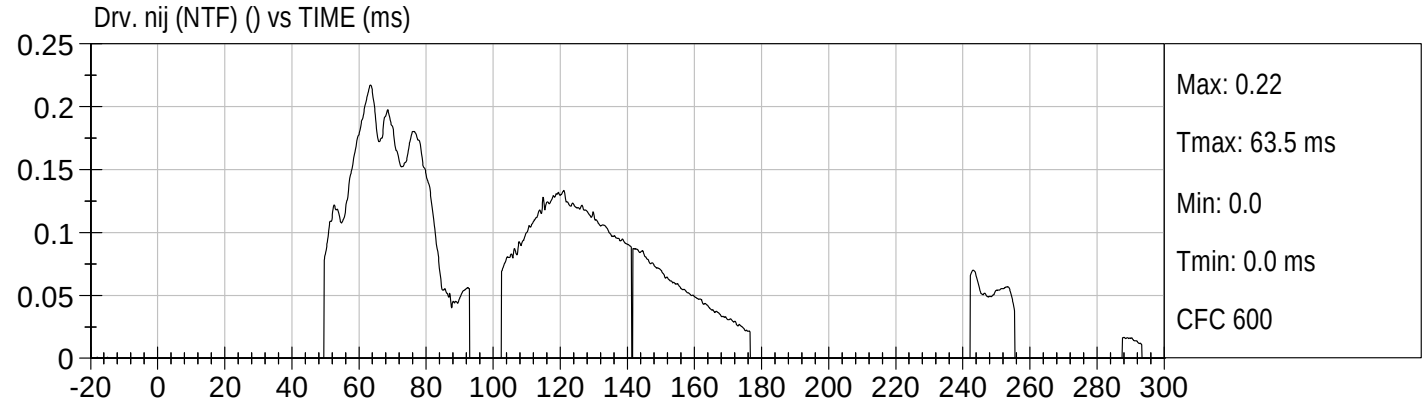


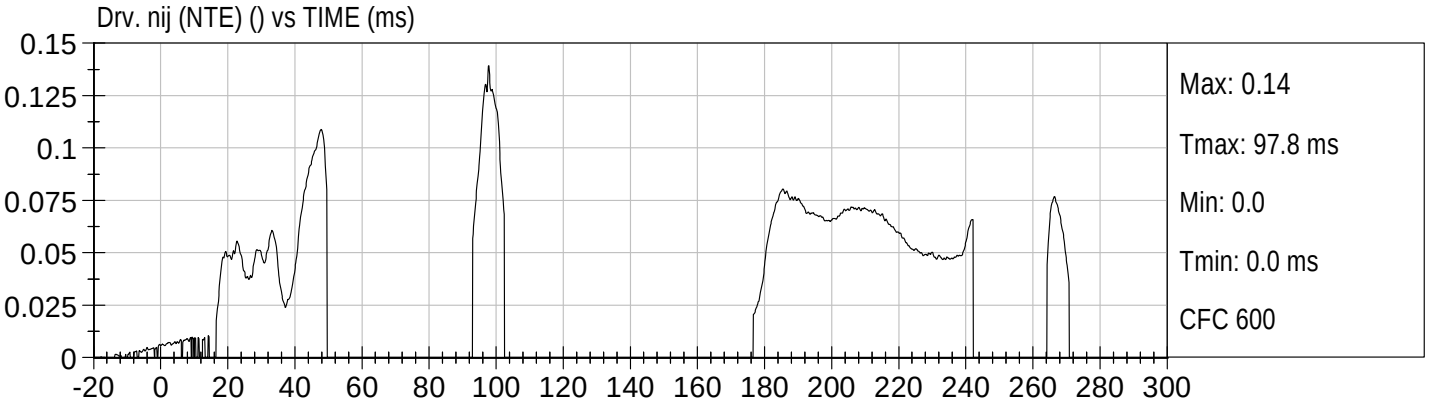
DRIVER NECK FZ (N) vs TIME (ms)

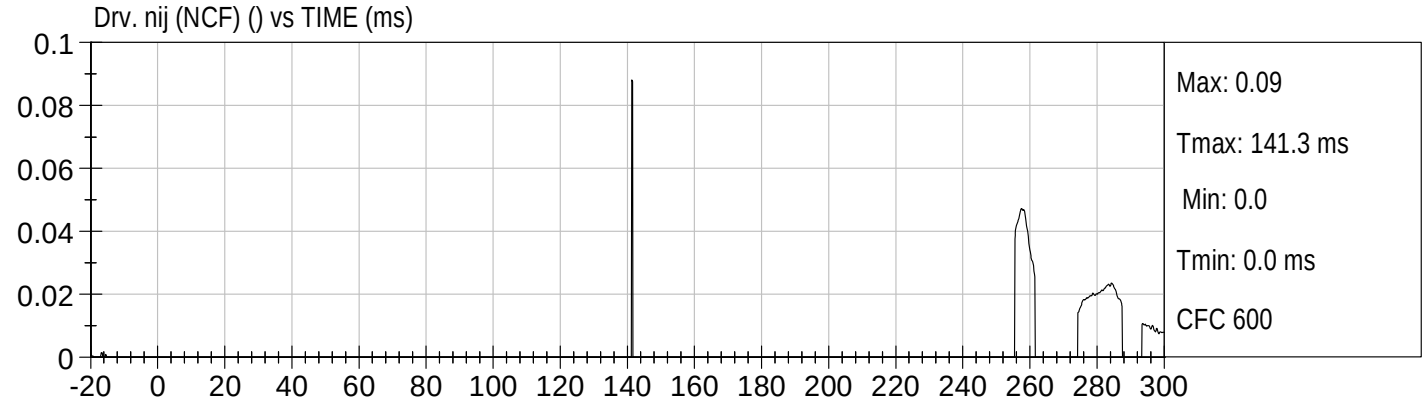


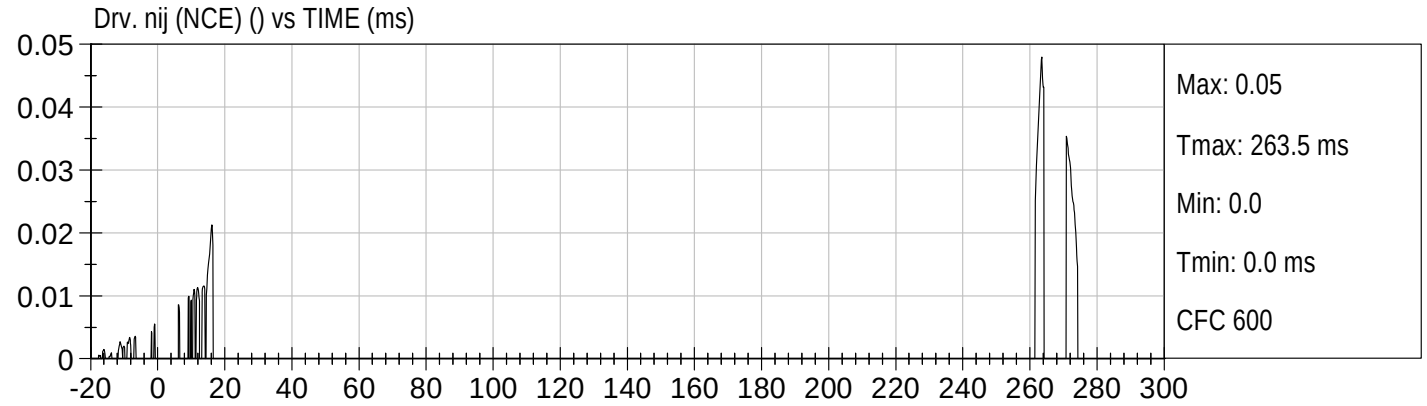
DRIVER NECK MY (Nm) vs TIME (ms)




Drv. nij (NTF) () vs TIME (ms)
0.25
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: 0.22
Tmax: 63.5 ms
Min: 0.0
Tmin: 0.0 ms
CFC 600


Drv. nij (NTE) () 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: 0.14
Tmax: 97.8 ms
Min: 0.0
Tmin: 0.0 ms
CFC 600

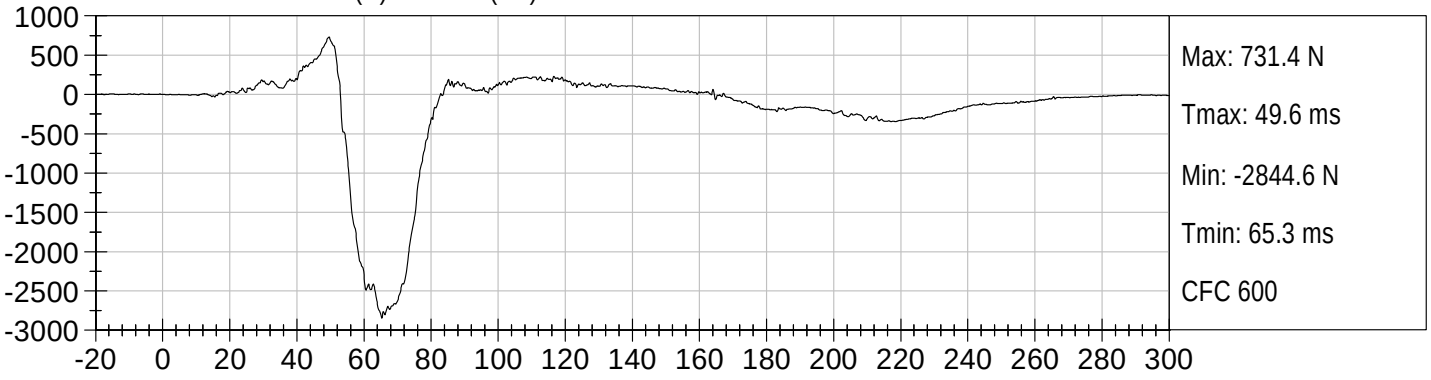

Drv. nij (NCF) () vs TIME (ms)
0.1
0.08
0.06
0.04
0.02
0
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.09
Tmax: 141.3 ms
Min: 0.0
Tmin: 0.0 ms
CFC 600


Drv. nij (NCE) () vs TIME (ms)
0.05
0.04
0.03
0.02
0.01
0
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.05
Tmax: 263.5 ms
Min: 0.0
Tmin: 0.0 ms
CFC 600

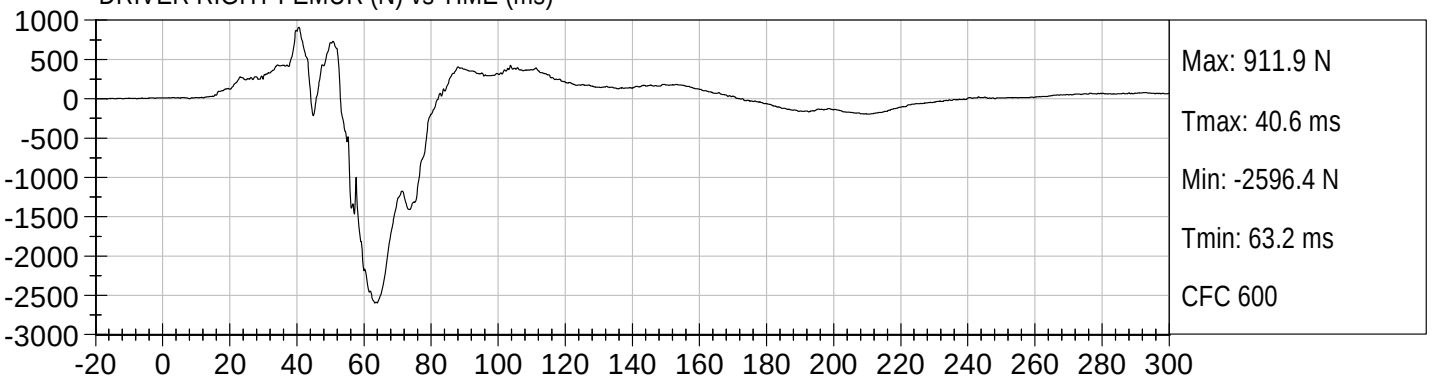
NCAP 35mph Frontal
2011 Acura MDX - MB5317

Test Date: 11/01/2010
Speed: 35.0 mph (56.3 km/h)

DRIVER LEFT FEMUR (N) vs TIME (ms)



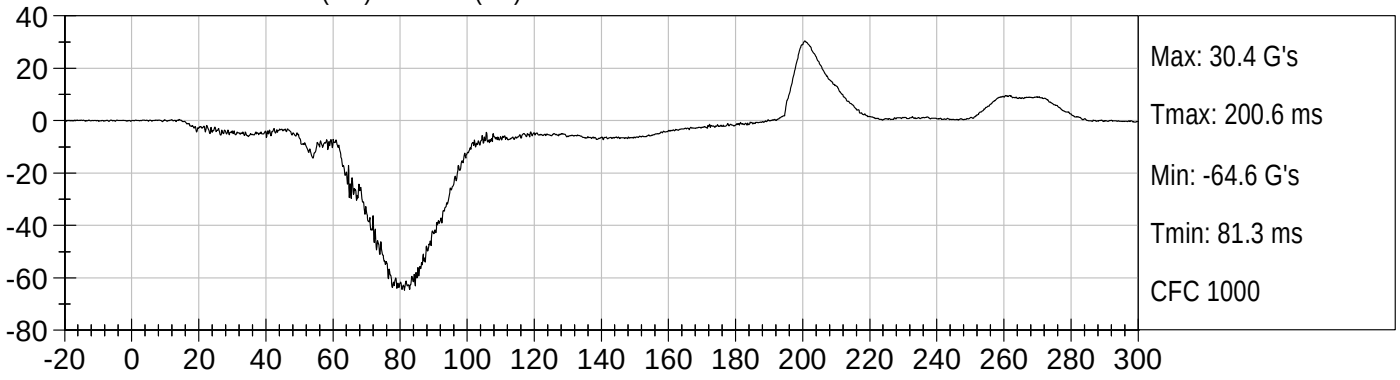
DRIVER RIGHT FEMUR (N) vs TIME (ms)



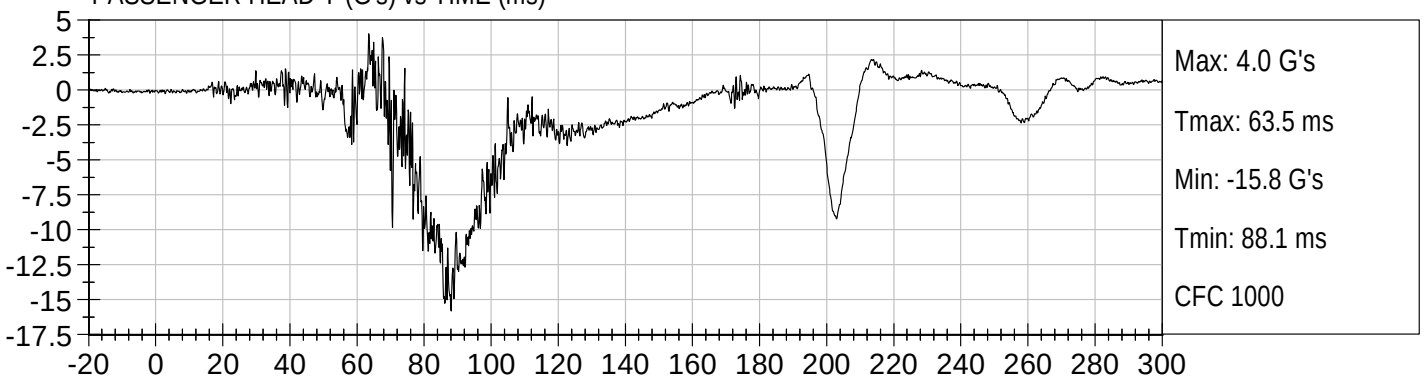
NCAP 35mph Frontal
2011 Acura MDX - MB5317

Test Date: 11/01/2010
Speed: 35.0 mph (56.3 km/h)

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

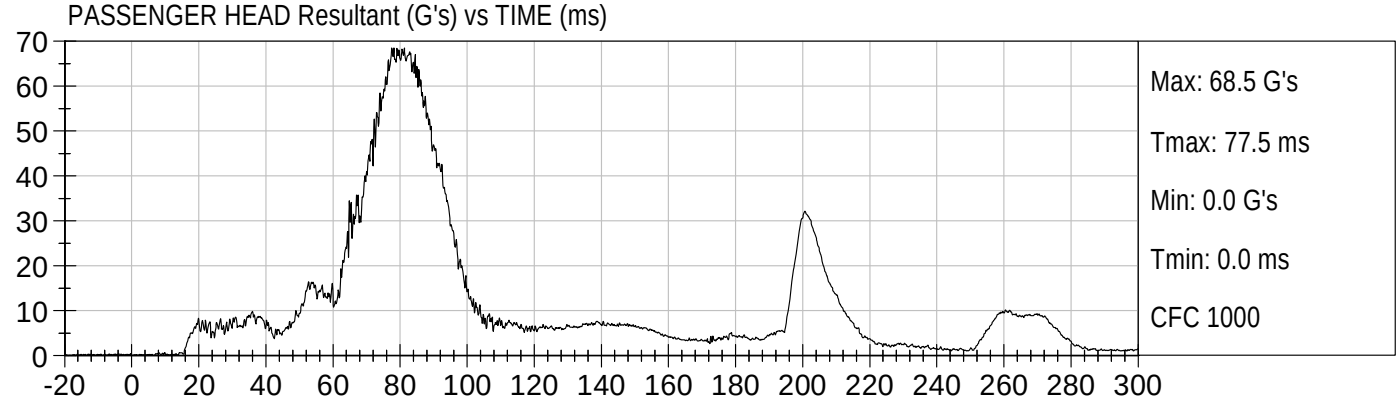


PASSENGER HEAD Y (G's) vs TIME (ms)



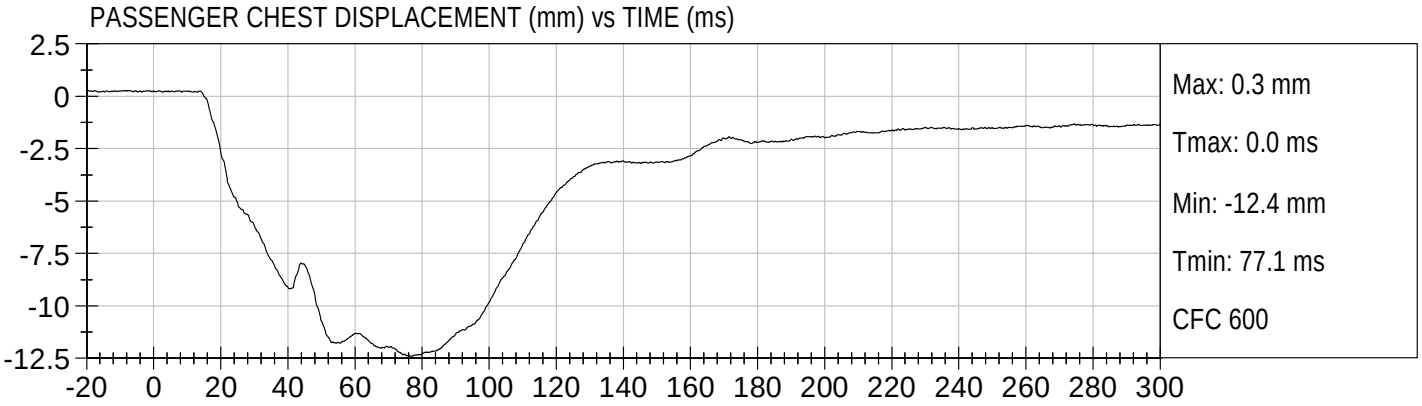
PASSENGER HEAD Z (G's) vs TIME (ms)

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

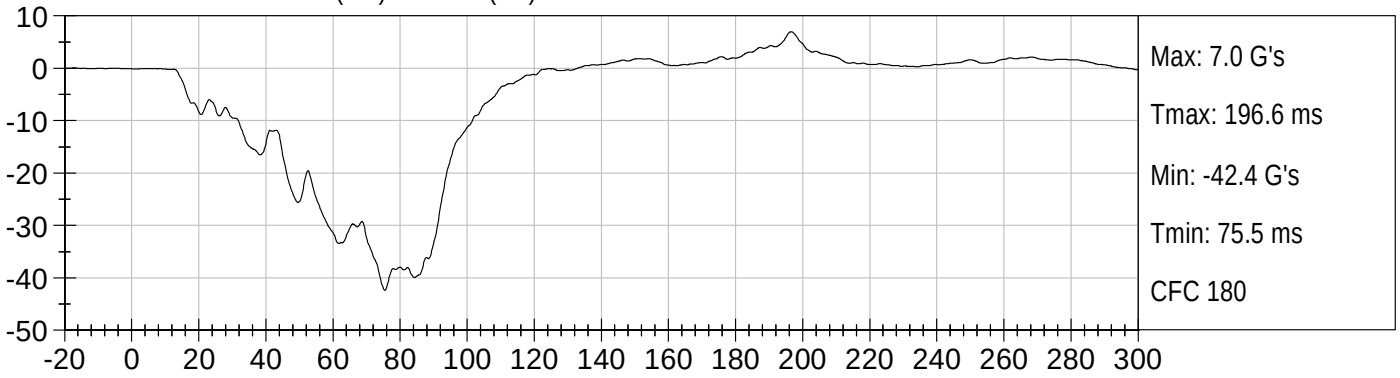


NCAP 35mph Frontal
2011 Acura MDX - MB5317

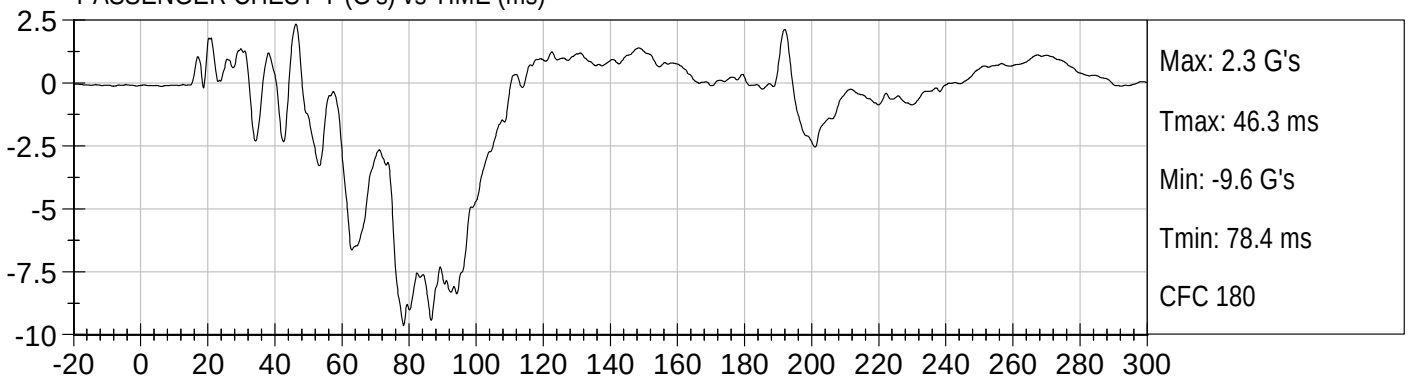
Test Date: 11/01/2010
Speed: 35.0 mph (56.3 km/h)



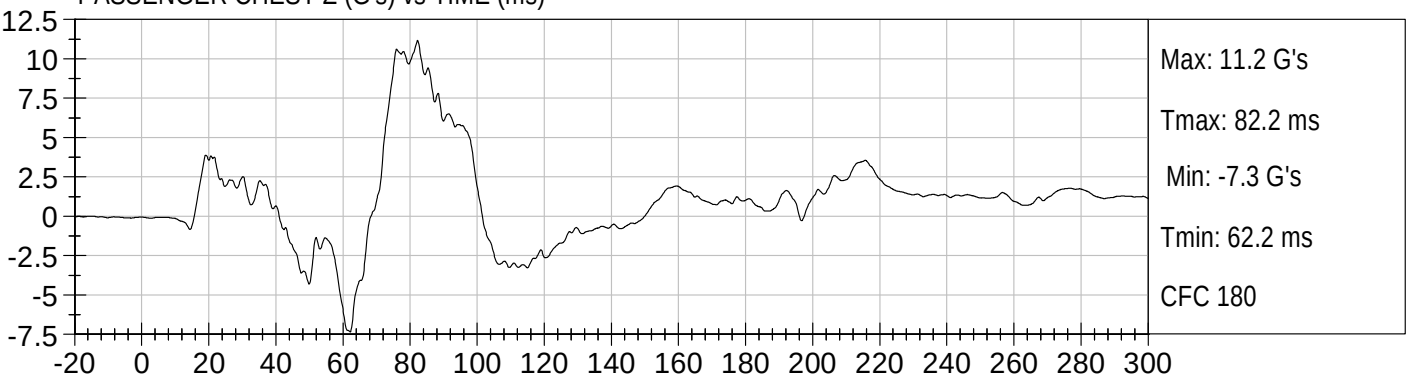
PASSENGER CHEST X (G's) vs TIME (ms)



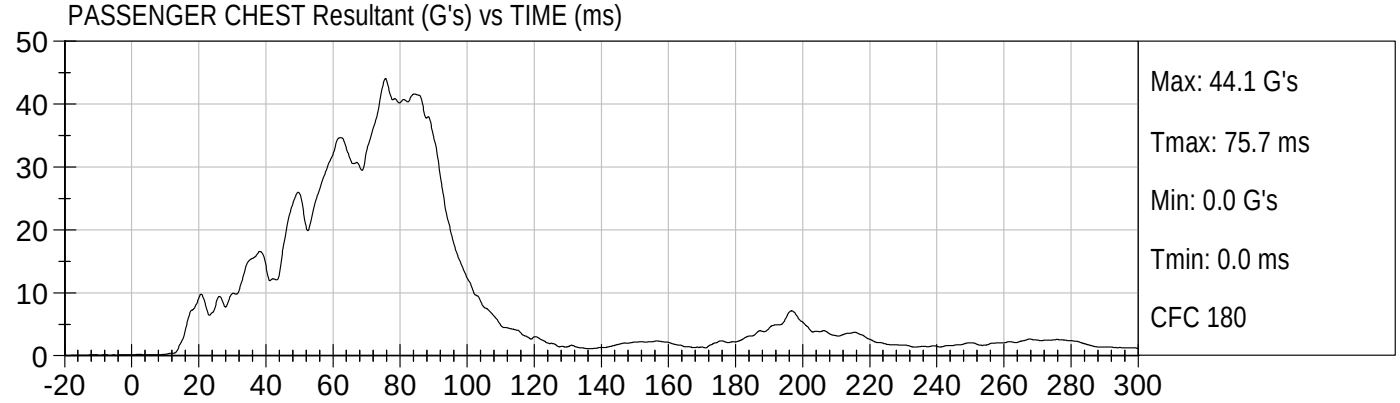
PASSENGER CHEST Y (G's) vs TIME (ms)



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



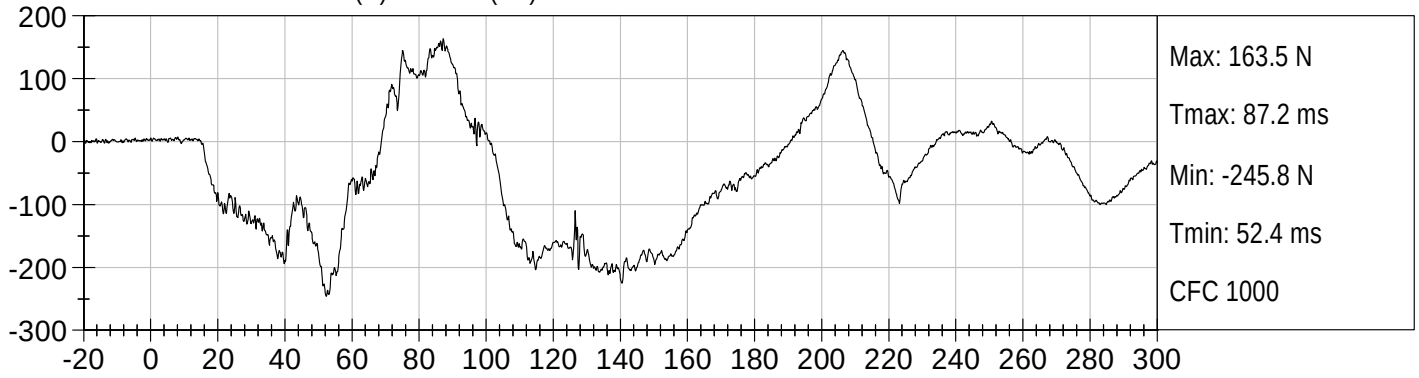
PASSENGER CHEST Resultant (G's) vs TIME (ms)



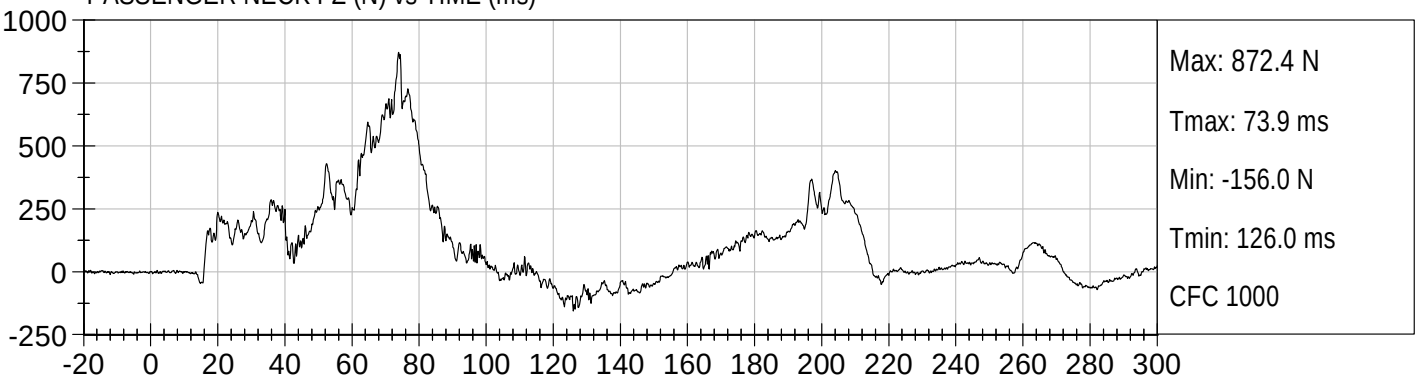
NCAP 35mph Frontal
2011 Acura MDX - MB5317

Test Date: 11/01/2010
Speed: 35.0 mph (56.3 km/h)

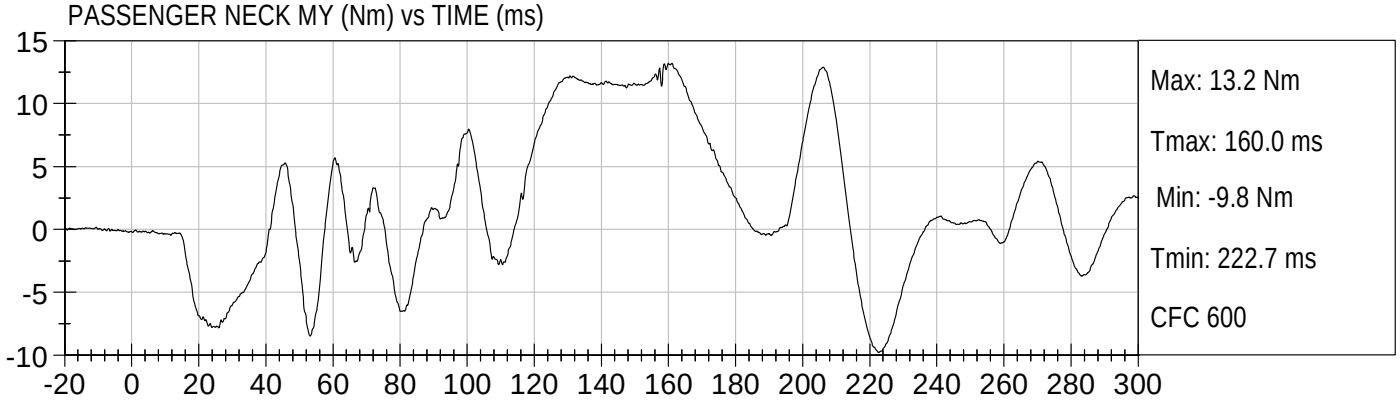
PASSENGER NECK FX (N) vs TIME (ms)



PASSENGER NECK FZ (N) vs TIME (ms)



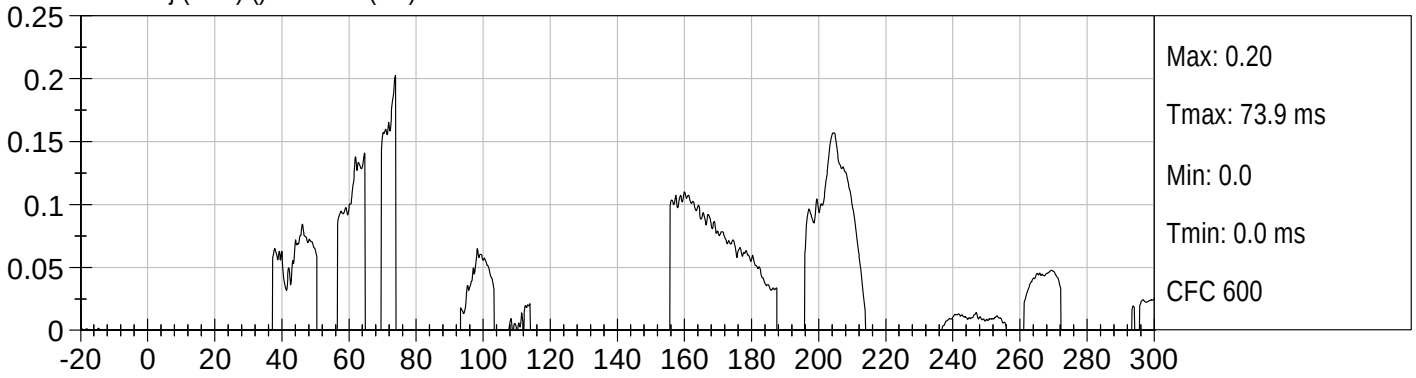
PASSENGER NECK MY (Nm) vs TIME (ms)



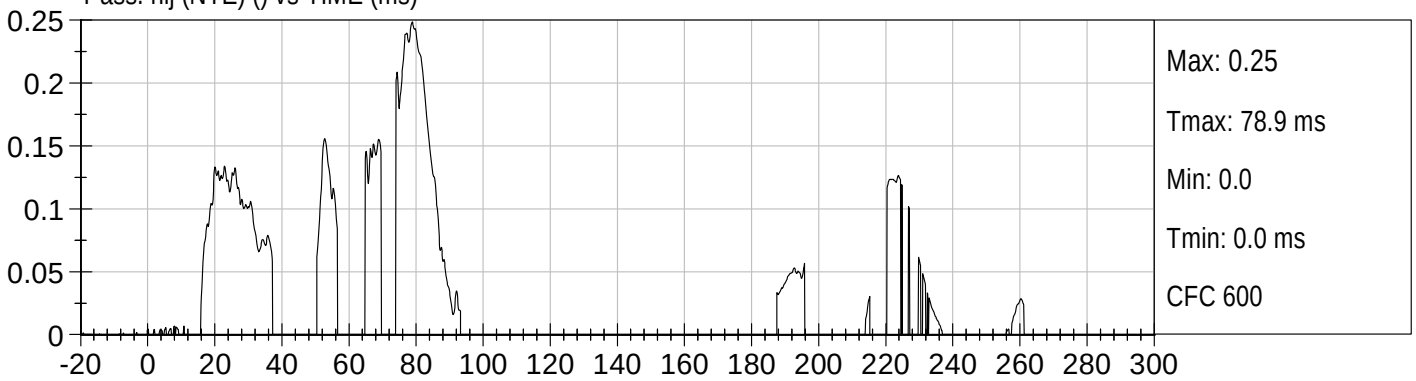
NCAP 35mph Frontal
2011 Acura MDX - MB5317

Test Date: 11/01/2010
Speed: 35.0 mph (56.3 km/h)

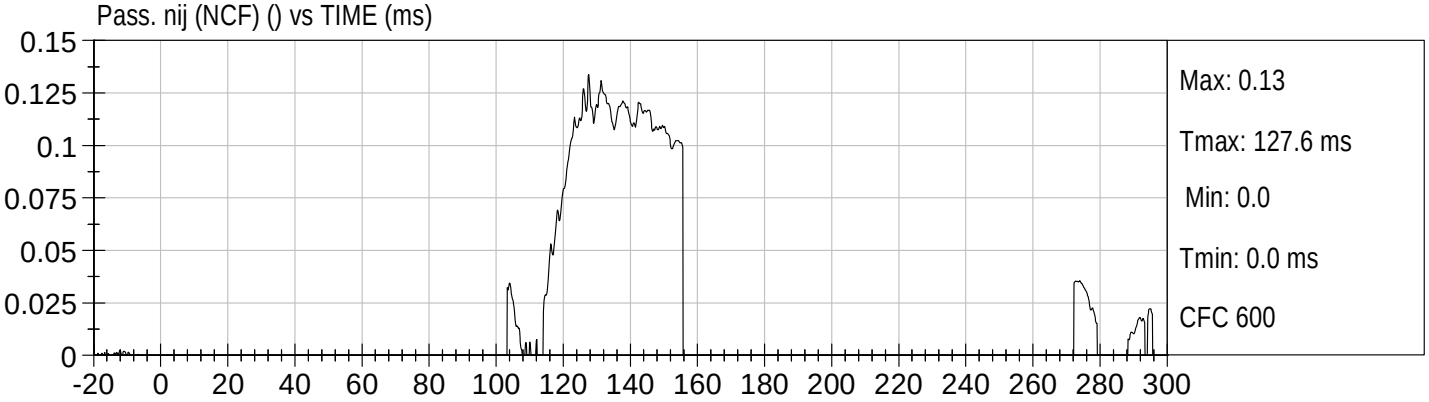
Pass. nij (NTF) () vs TIME (ms)



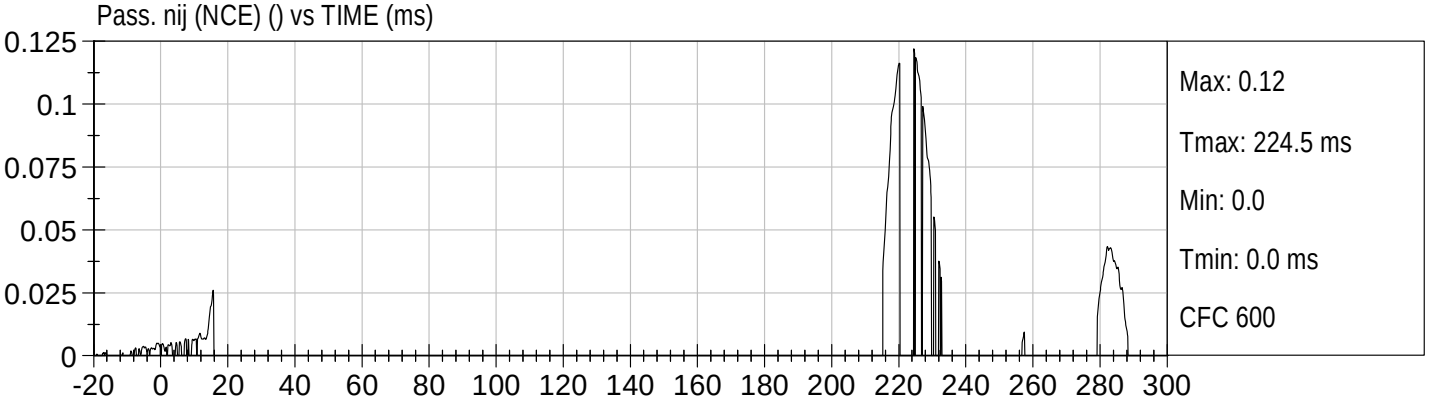
Pass. nij (NTE) () vs TIME (ms)



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



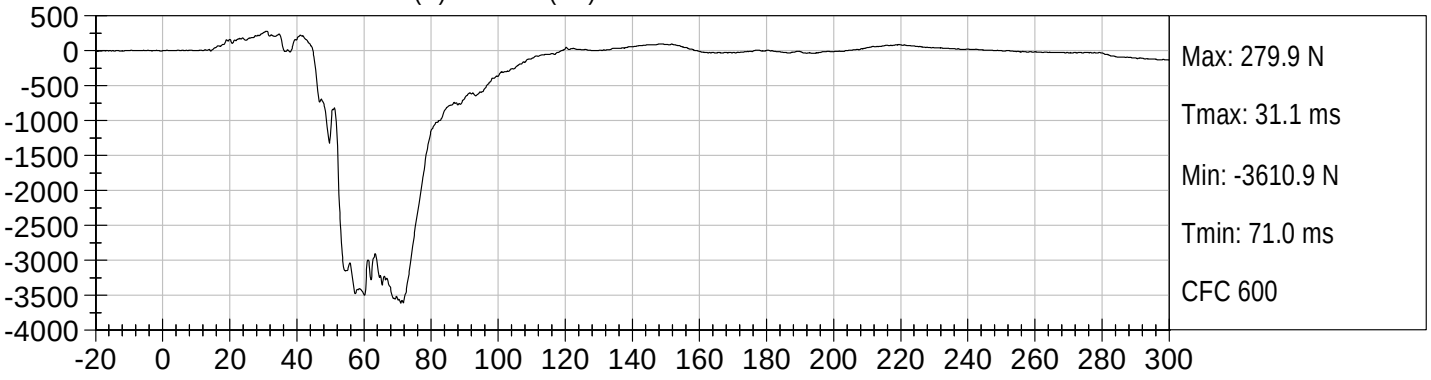
Pass. nij (NCE) () vs TIME (ms)



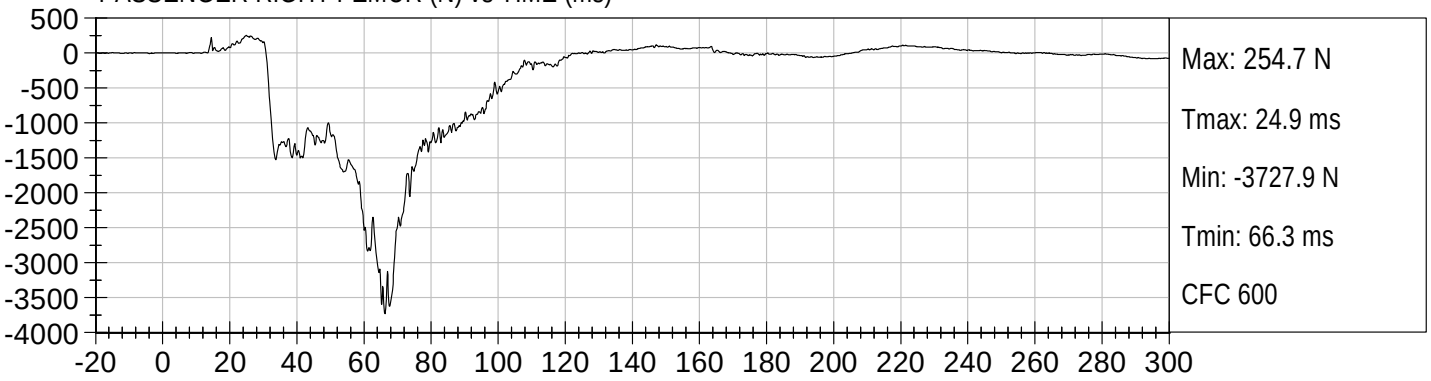
NCAP 35mph Frontal
2011 Acura MDX - MB5317

Test Date: 11/01/2010
Speed: 35.0 mph (56.3 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:** D103601

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

Jessica Hall
Laboratory Technician

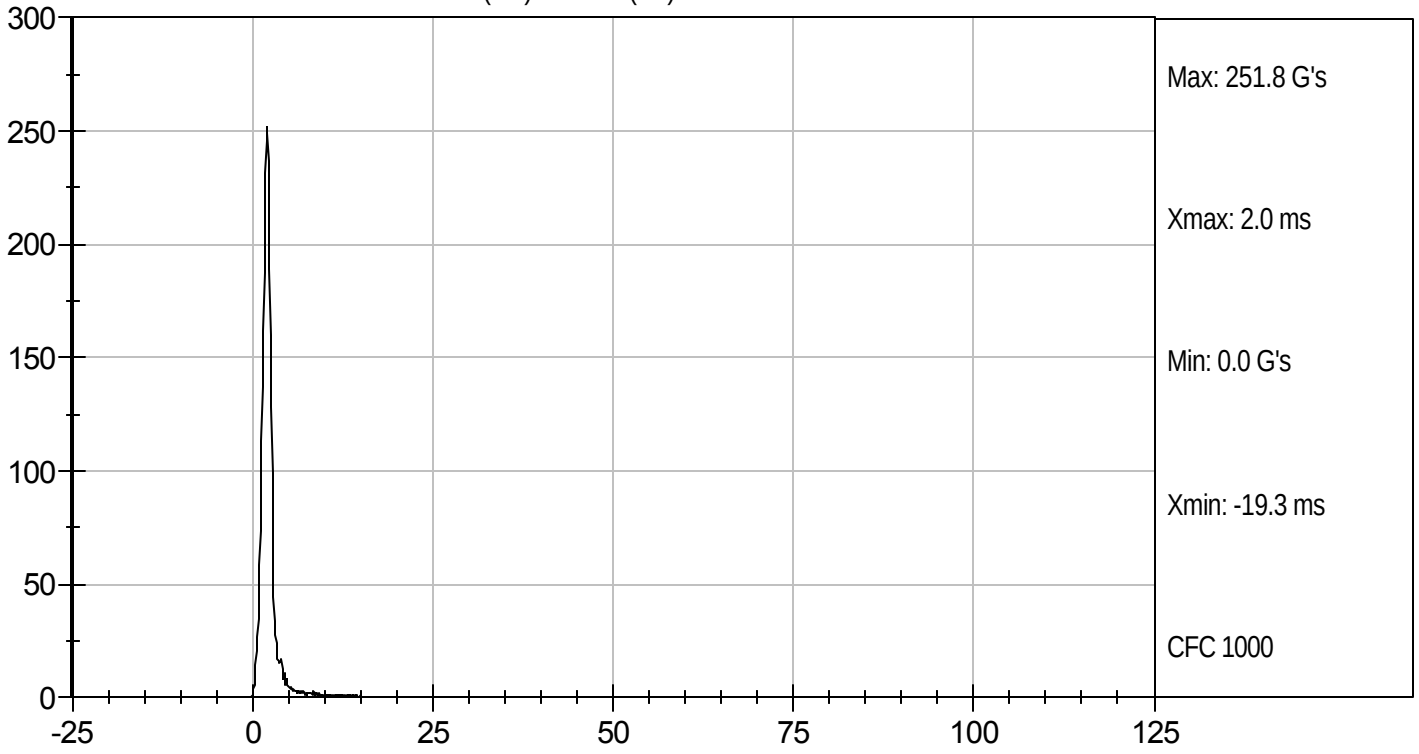
10/21/10
Test Date

David Winkelbauer
Approved By

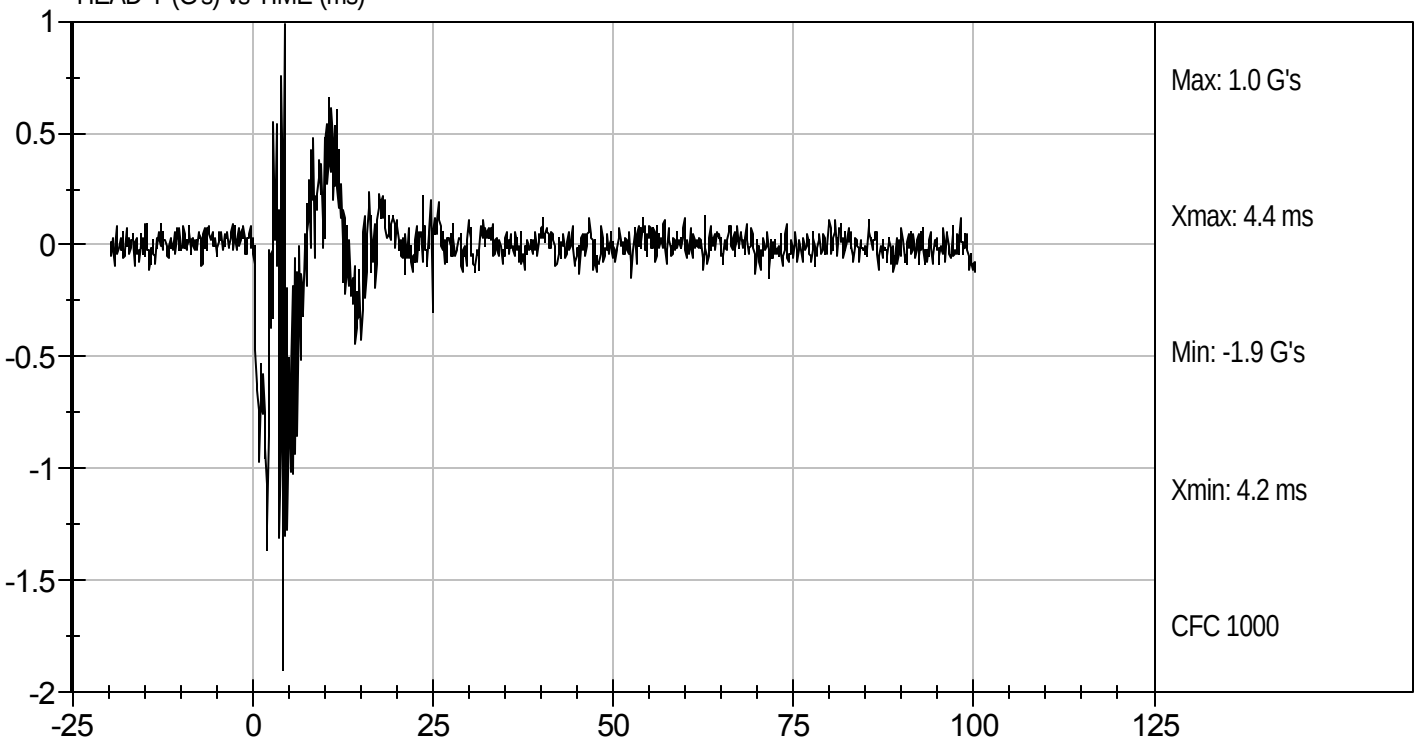
Test Desc: Head Drop
Component ID: D103601

Test Date: 10/21/10
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:** D103602

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity		%	10 to 70	33	Pass
Pendulum Velocity		m/s	6.89 to 7.13	6.96	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	22.65	Pass
	20 ms	G's	17.60 to 22.60	20.15	Pass
	30 ms	G's	12.50 to 18.50	12.78	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	13.29	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	36.2	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	68.2	Pass
	Time	ms	57.0 to 64.0	60.6	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	113.2	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	95.9	Pass
	Time	ms	47.0 to 58.0	49.7	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	100.1	Pass
			Overall Test Results		Pass

Jessica Hall
Laboratory Technician

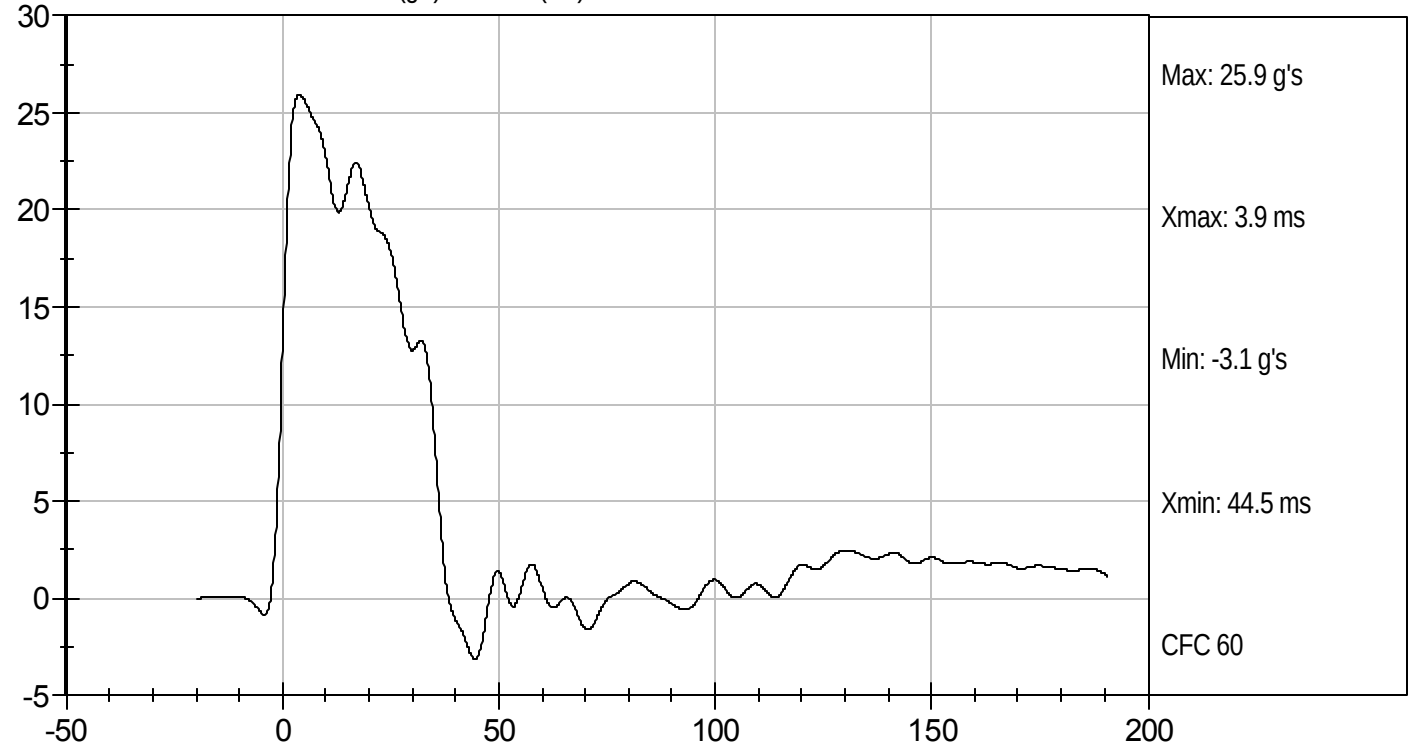
10/21/10
Test Date

David Winhellbauer
Approved By

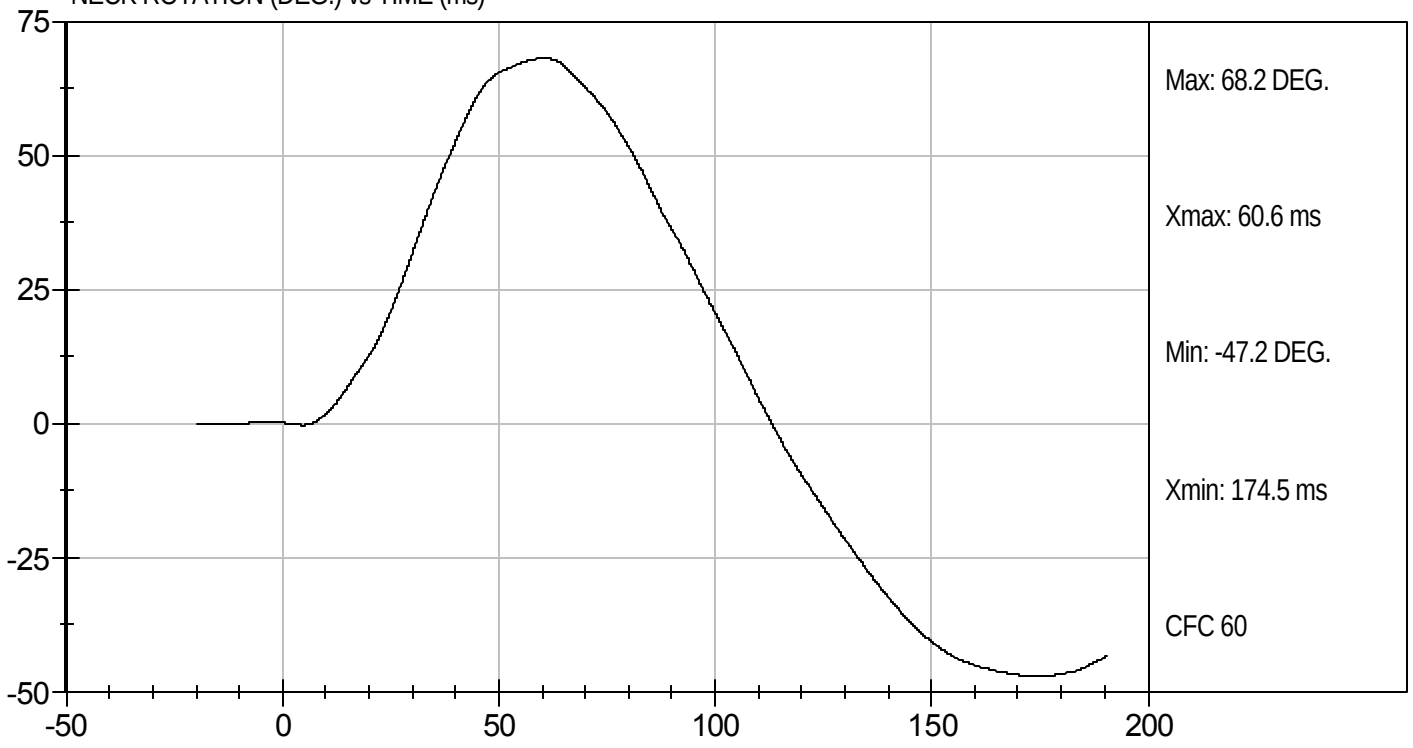
Test Desc: Neck Flexion
Component ID: D103602

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

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

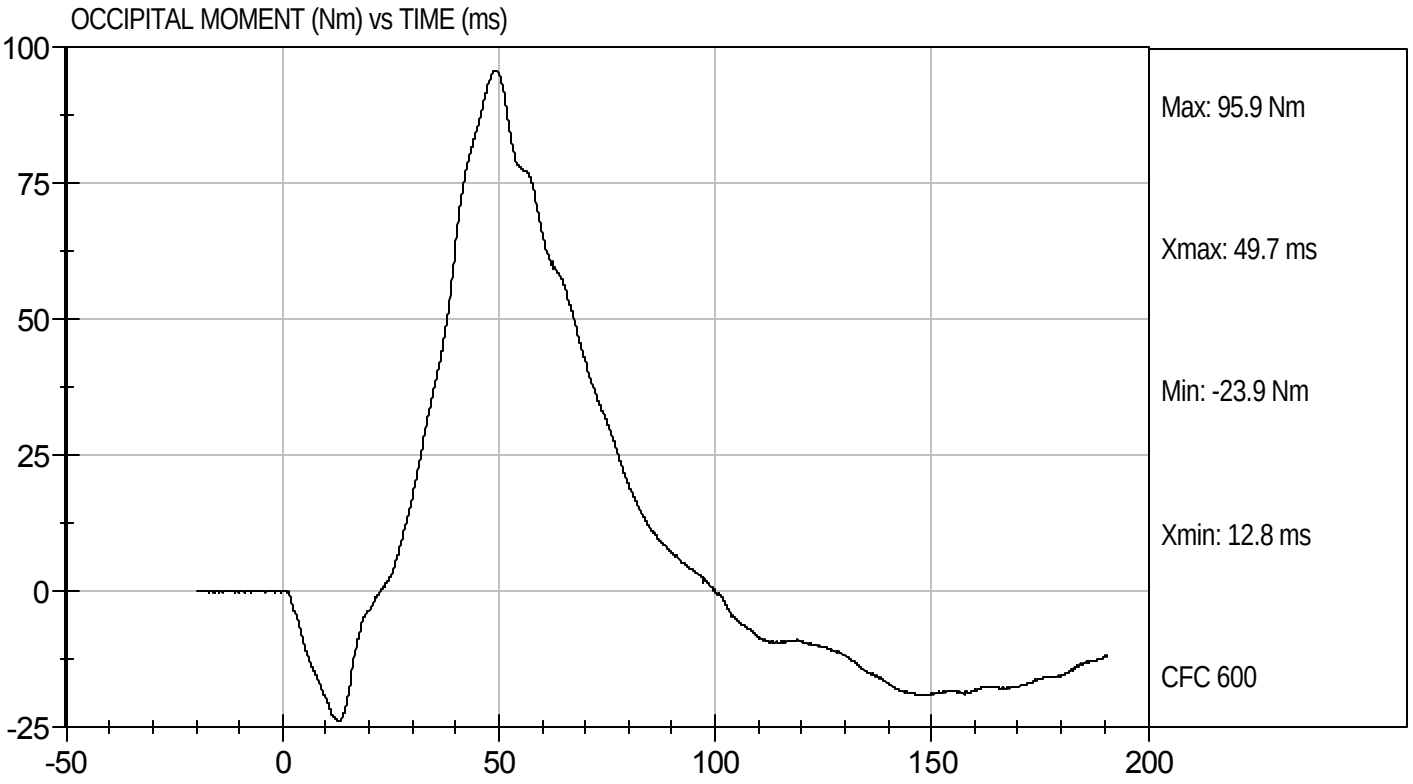


NECK ROTATION (DEG.) vs TIME (ms)



Test Desc: Neck Flexion
Component ID: D103602

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



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D103603

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.5	Pass
Laboratory Relative Humidity		%	10 to 70	33	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.12	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	18.70	Pass
	20 ms	G's	14.00 to 19.00	16.44	Pass
	30 ms	G's	11.00 to 16.00	12.96	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	13.50	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	38.4	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	96.4	Pass
	Time	ms	72.0 to 82.0	74.8	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	154.7	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-60.9	Pass
	Time	ms	65.0 to 79.0	69.9	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	139.8	Pass
			Overall Test Results		Pass

Jessica Hall
Laboratory Technician

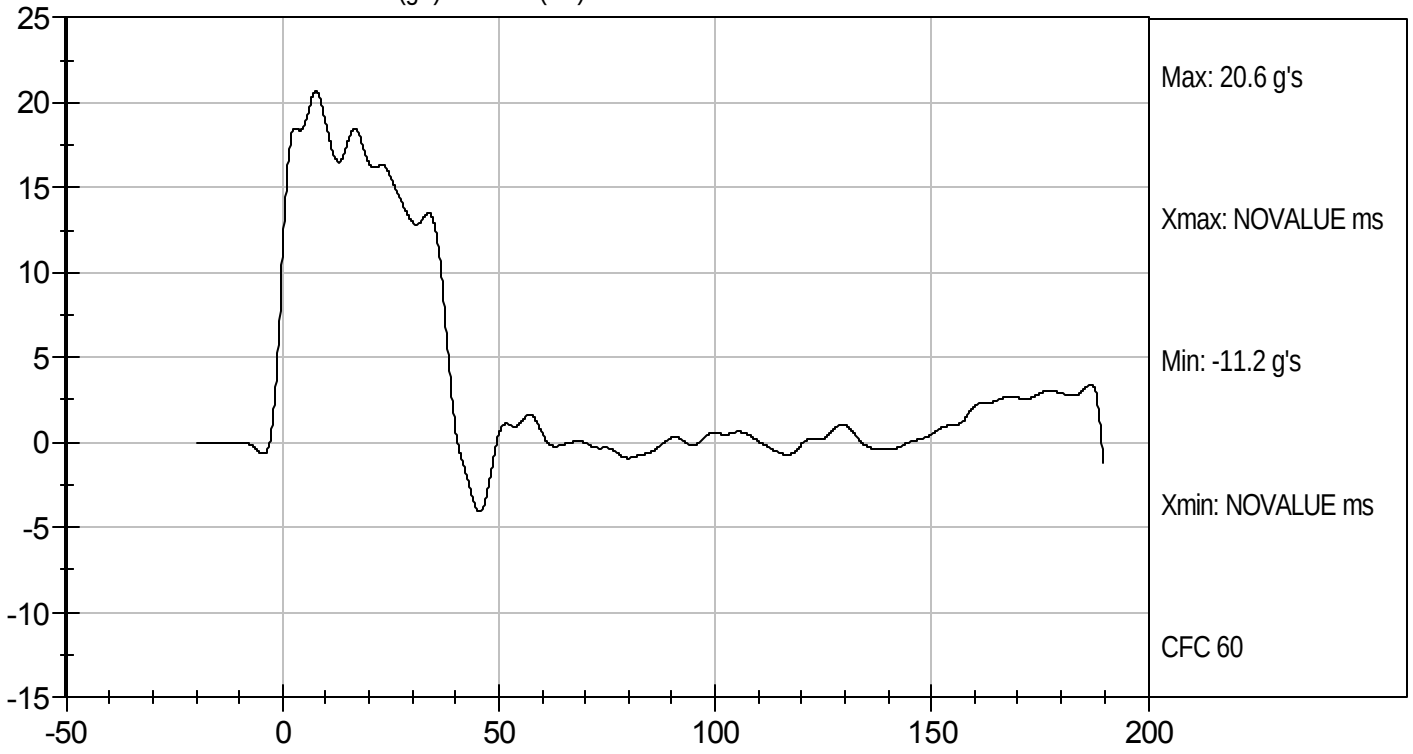
10/21/10
Test Date

David Winkelbauer
Approved By

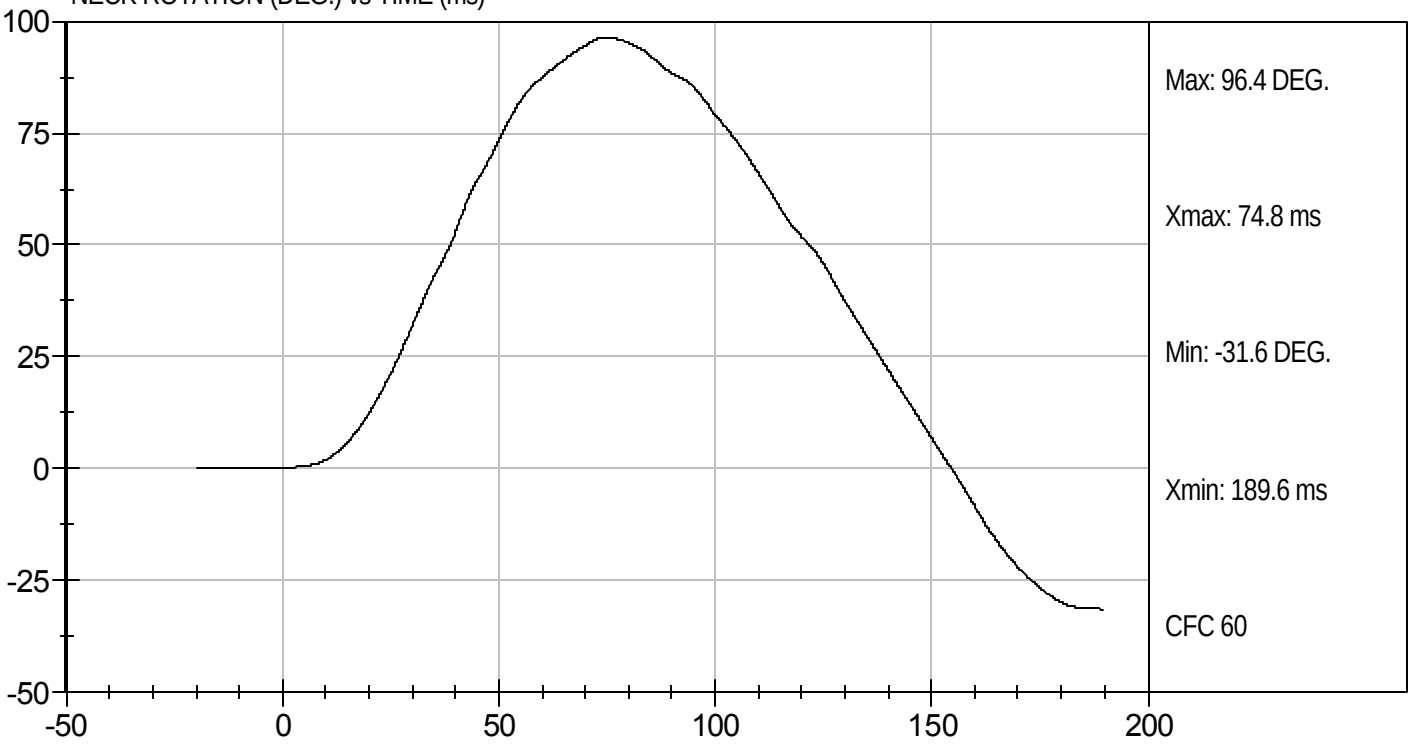
Test Desc: Neck Extension
Component ID: D103603

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

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

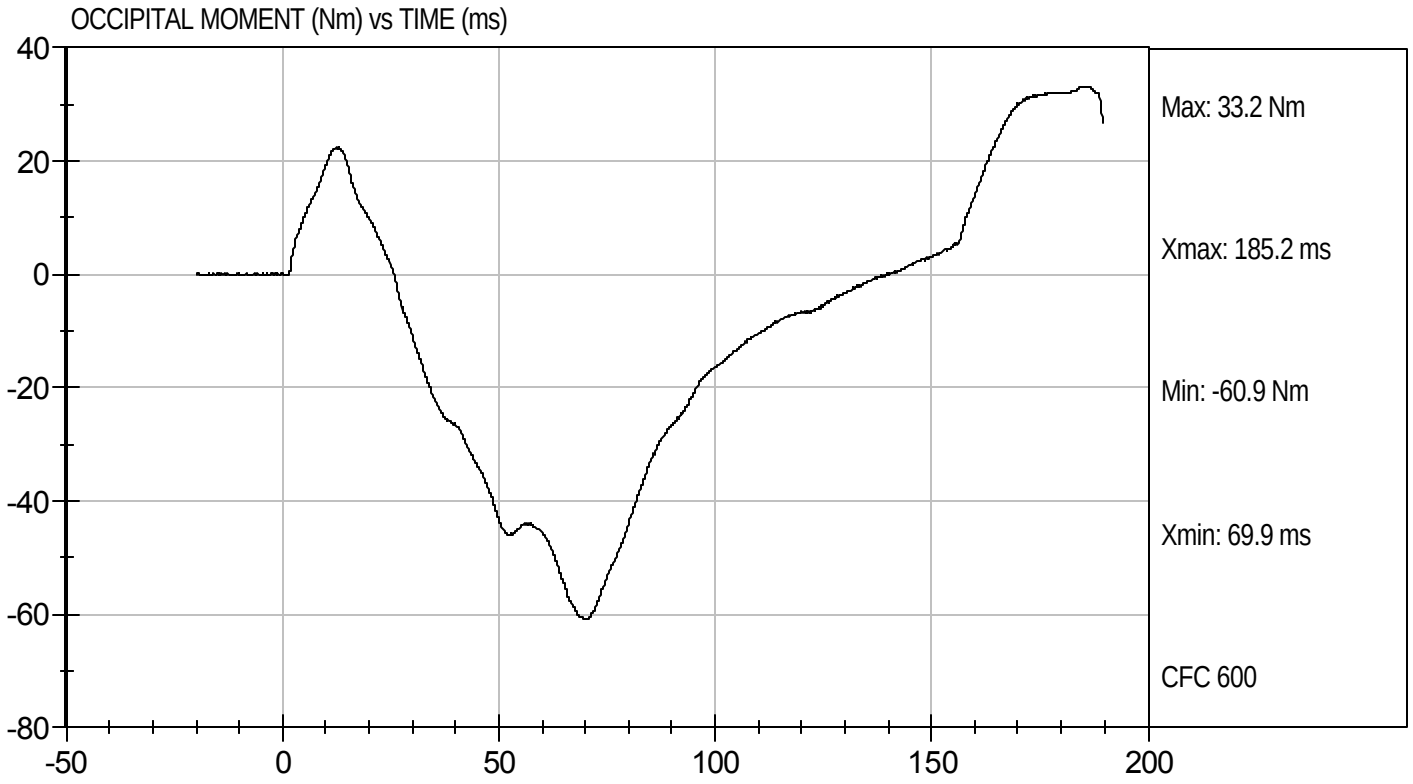


NECK ROTATION (DEG.) vs TIME (ms)



Test Desc: Neck Extension
Component ID: D103603

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



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D103604

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Probe Velocity	m/s	6.58 to 6.82	6.60	Pass
Peak Probe Force	N	5159 to 5893	5,348	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.48	Pass
Internal Hysteresis	%	69 to 85	71	Pass
		Overall Test Results		Pass

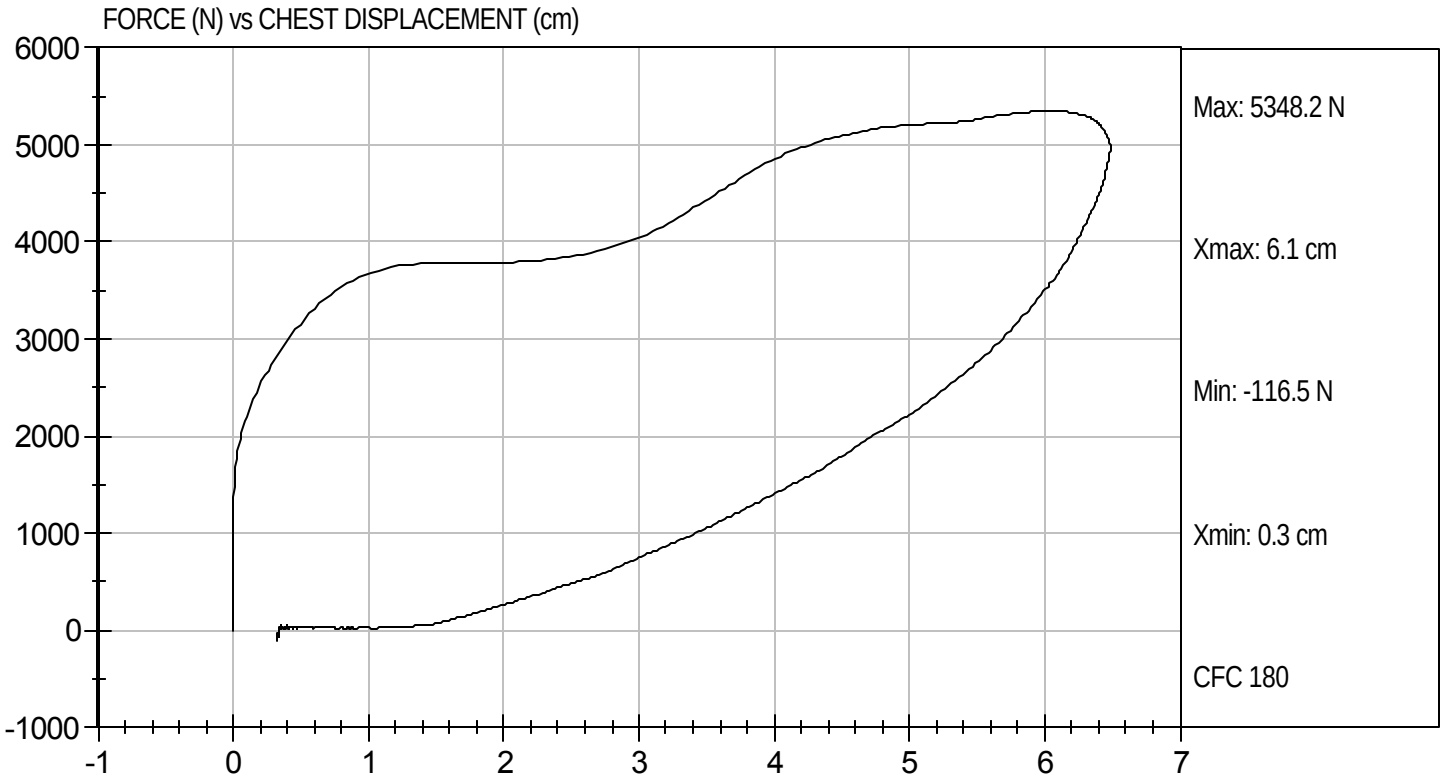
Jessica Gall
Laboratory Technician

10/20/10
Test Date

David Winkelbauer
Approved By

Test Desc: Thorax Impact
Component ID: D103604

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



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D103605

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

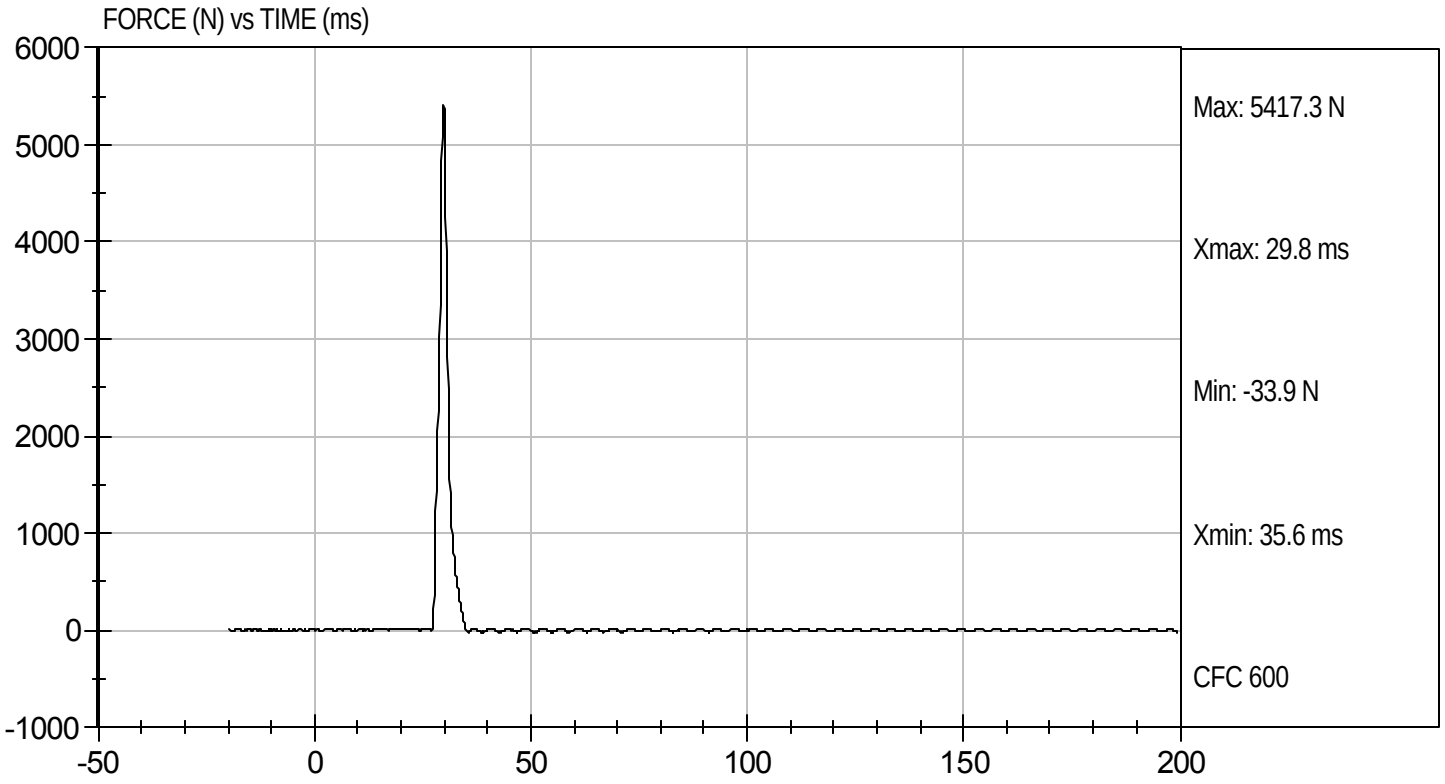
Jessica Gall
Laboratory Technician

10/20/10
Test Date

David Winkelbauer
Approved By

Test Desc: Right Knee
Component ID: D103605

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



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D103606

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

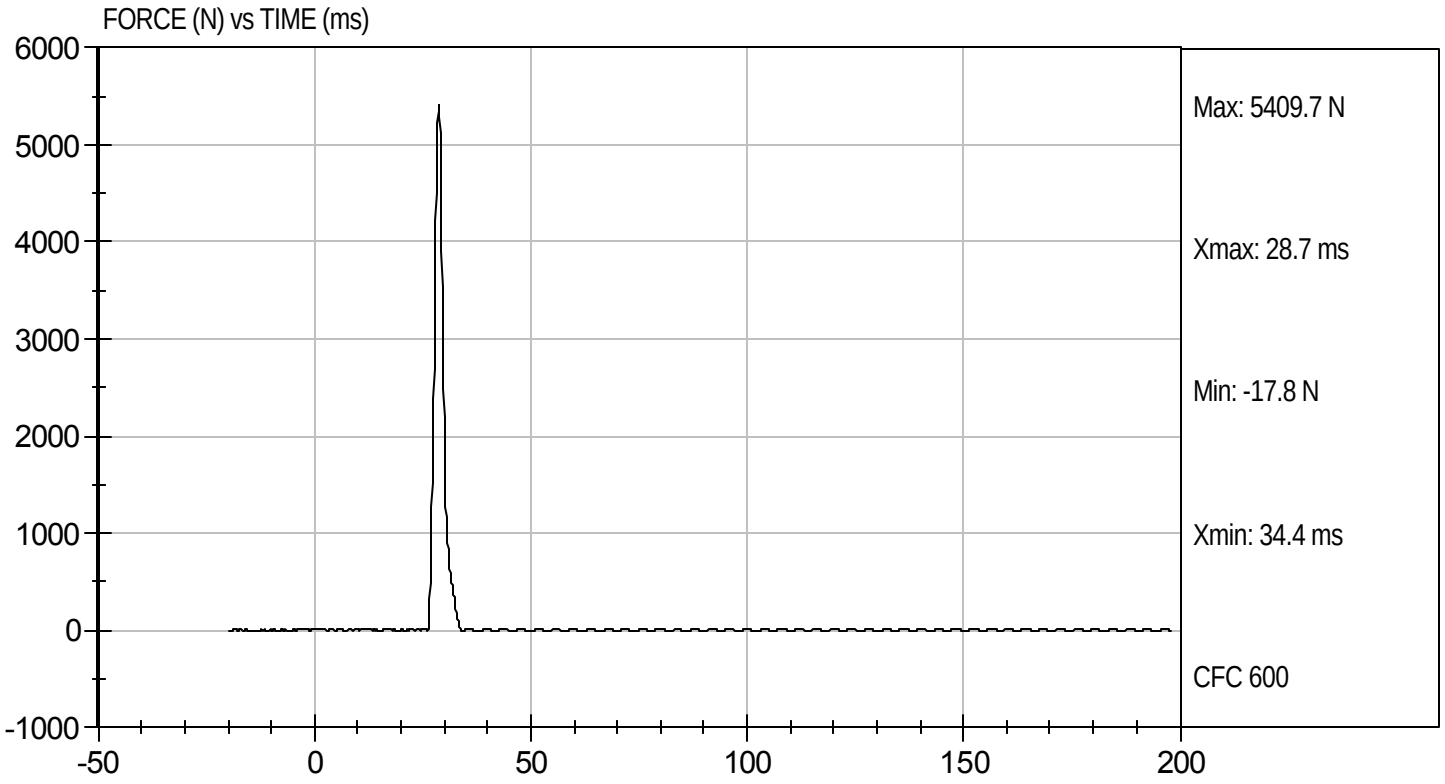
Jessica Gall
Laboratory Technician

10/20/10
Test Date

David Winkelbauer
Approved By

Test Desc: Left Knee
Component ID: D103606

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



MGA RESEARCH CORPORATION

HIP-FEMUR FLEXION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D103600

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

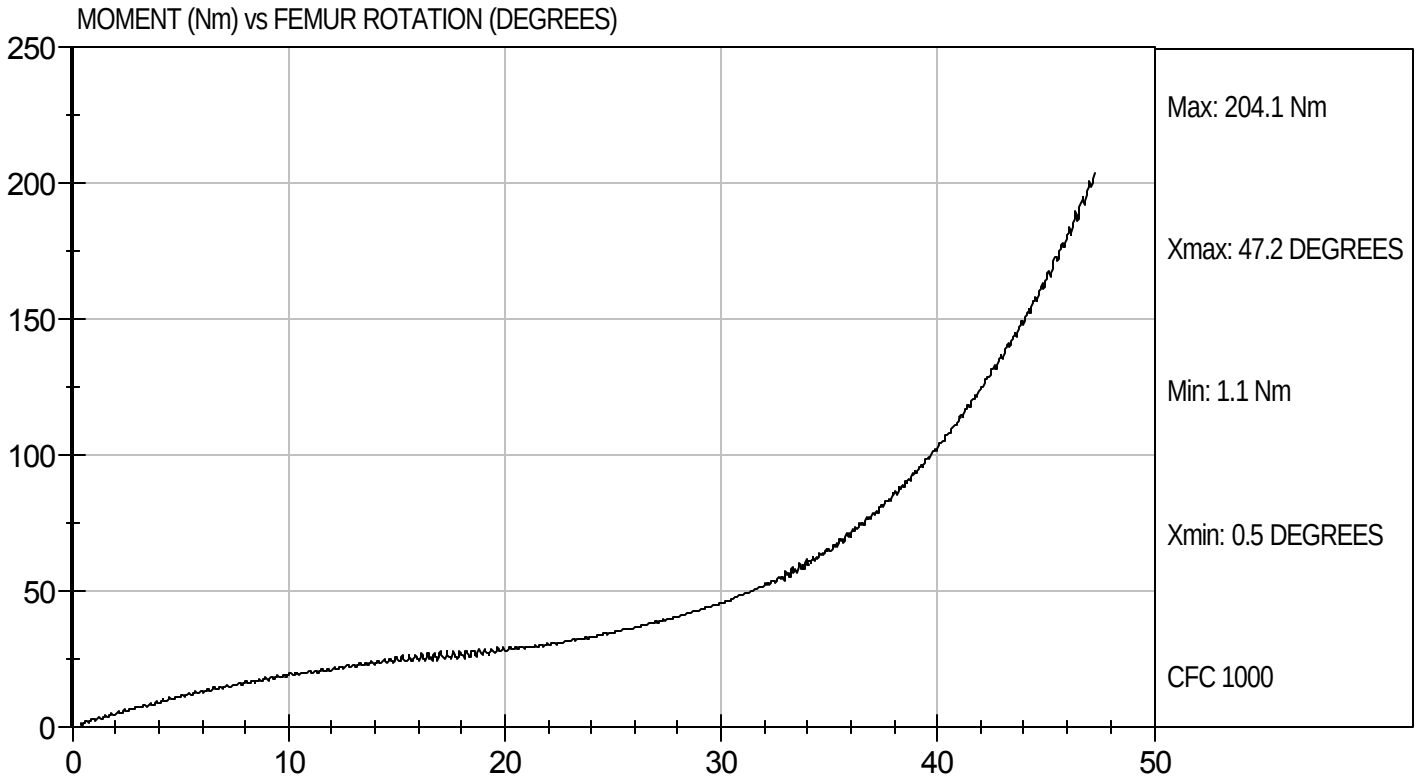
Jessica Gall
Laboratory Technician

10/21/10
Test Date

David Winkelbauer
Approved By

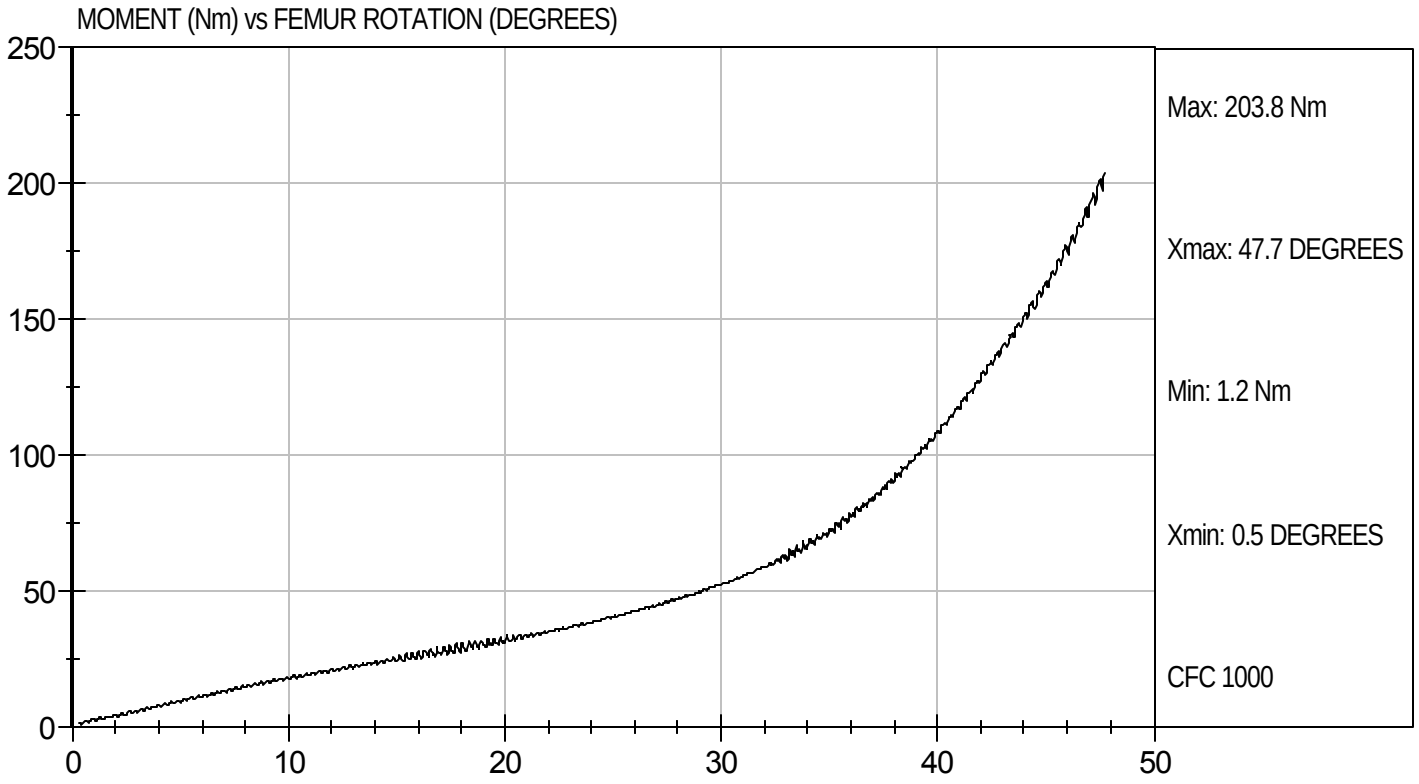
Test Desc: Hip Femur Flexion
Component ID: D103609

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



Test Desc: Hip Femur Flexion
Component ID: D103600

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



MGA RESEARCH CORPORATION

HEAD DROP TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test ID:** D103751

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	22.1	Pass
Laboratory Relative Humidity	%	10 to 70	29	Pass
Peak Resultant Acceleration	G's	225 - 275	255	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-2.7	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
		Overall Test Results		Pass

Jessica Hall
Laboratory Technician

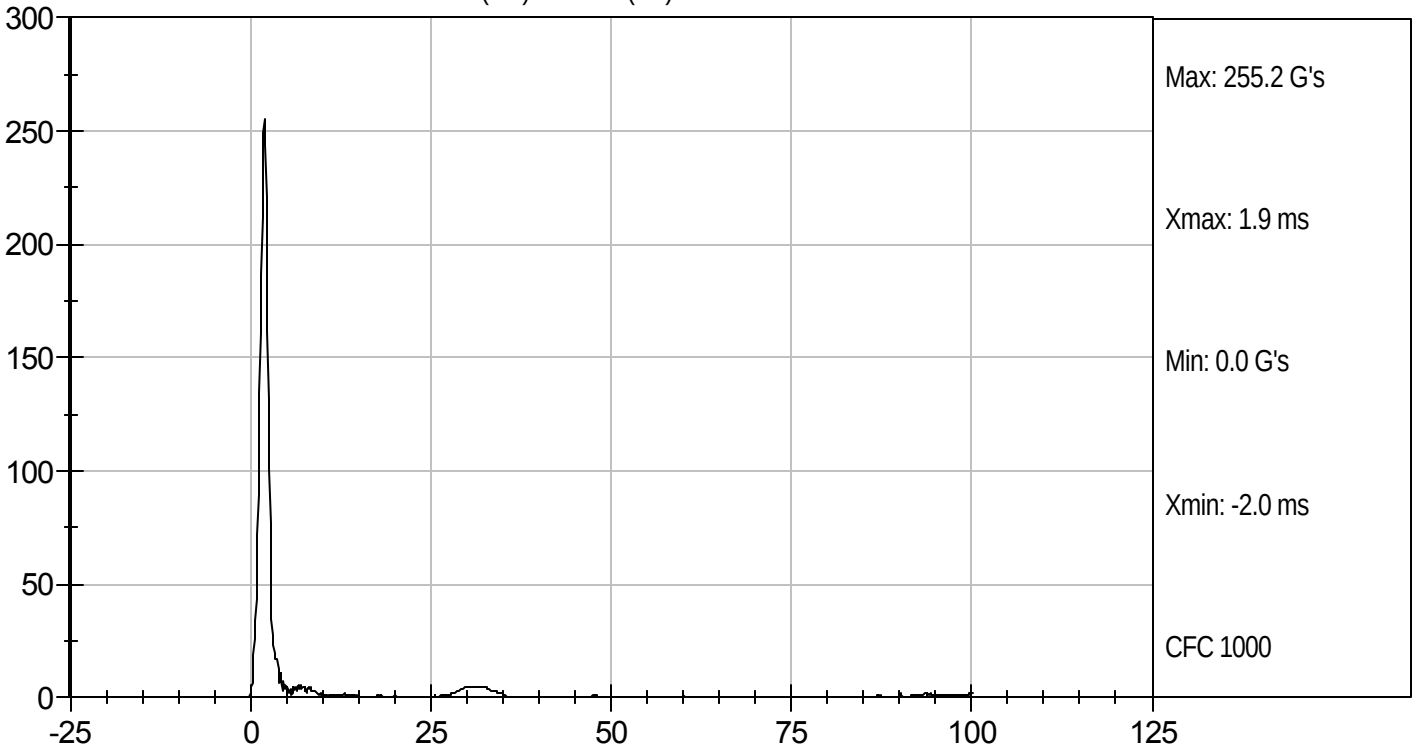
11/1/10
Test Date

David Winkelbauer
Approved By

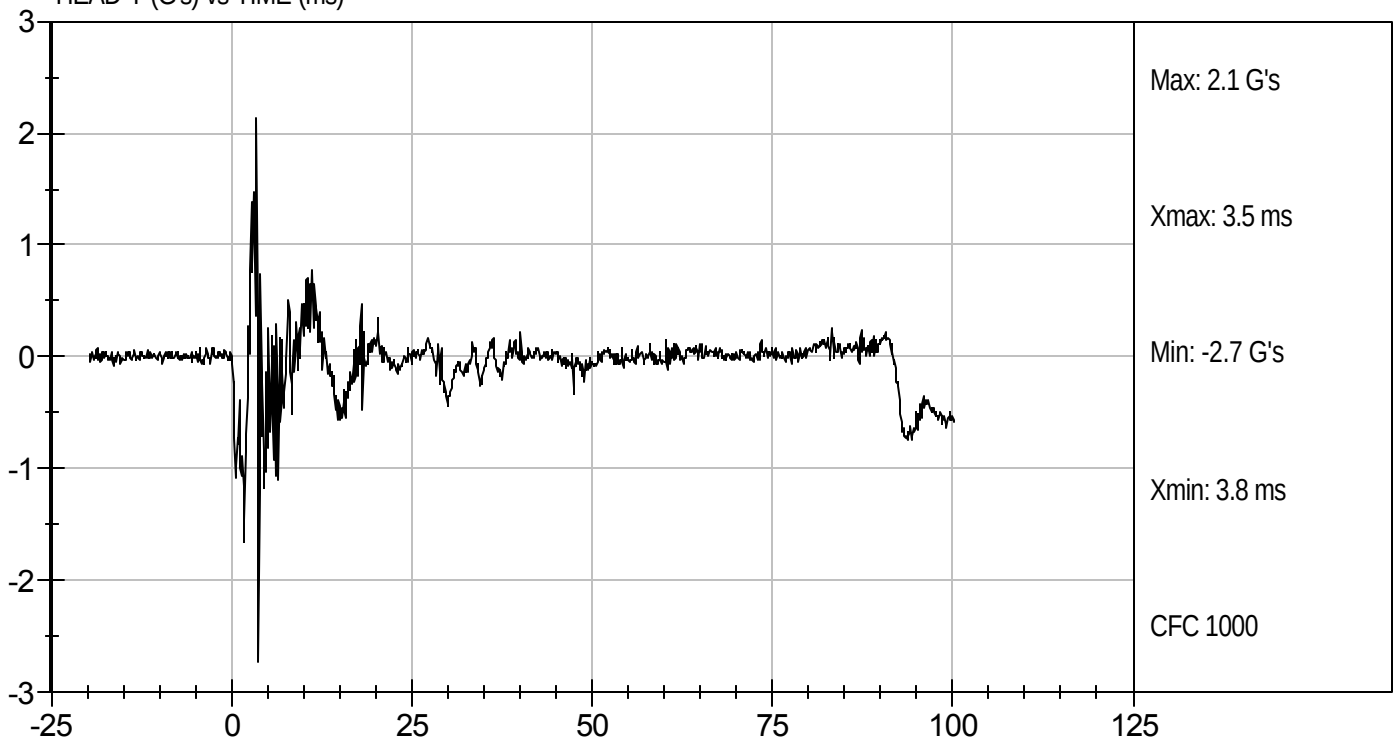
Test Desc: Head Drop
Component ID: D103751

Test Date: 11/1/10
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:** D103752

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.0	Pass
Laboratory Relative Humidity		%	10 to 70	25	Pass
Pendulum Velocity		m/s	6.89 to 7.13	6.96	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	23.01	Pass
	20 ms	G's	17.60 to 22.60	20.05	Pass
	30 ms	G's	12.50 to 18.50	14.49	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	14.45	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	34.7	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	71.3	Pass
	Time	ms	57.0 to 64.0	58.7	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	113.9	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	97.4	Pass
	Time	ms	47.0 to 58.0	48.0	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	99.1	Pass
			Overall Test Results		Pass

Jessica Hall
Laboratory Technician

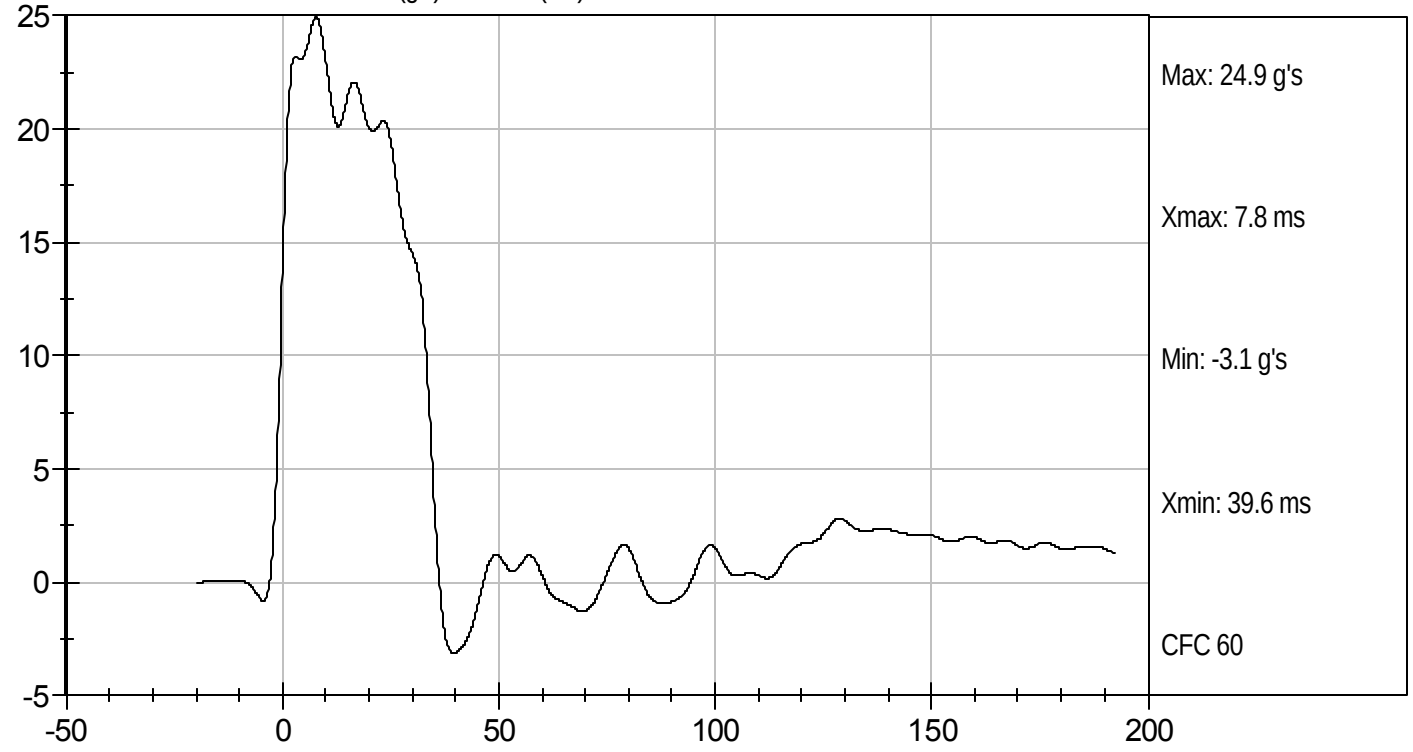
11/2/10
Test Date

David Winkelbauer
Approved By

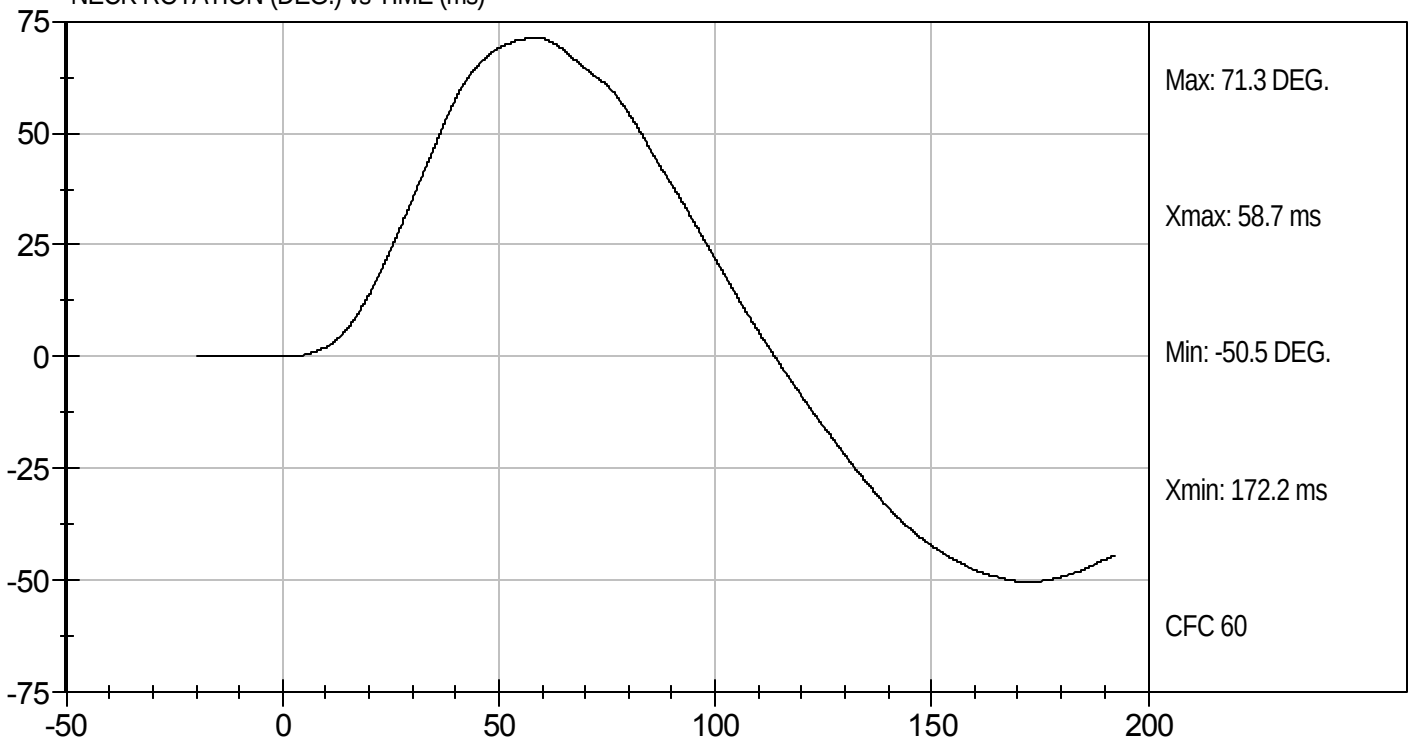
Test Desc: Neck Flexion
Component ID: D103752

Test Date: 11/2/10
Velocity: 22.83 ft/s, 6.96 m/s

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

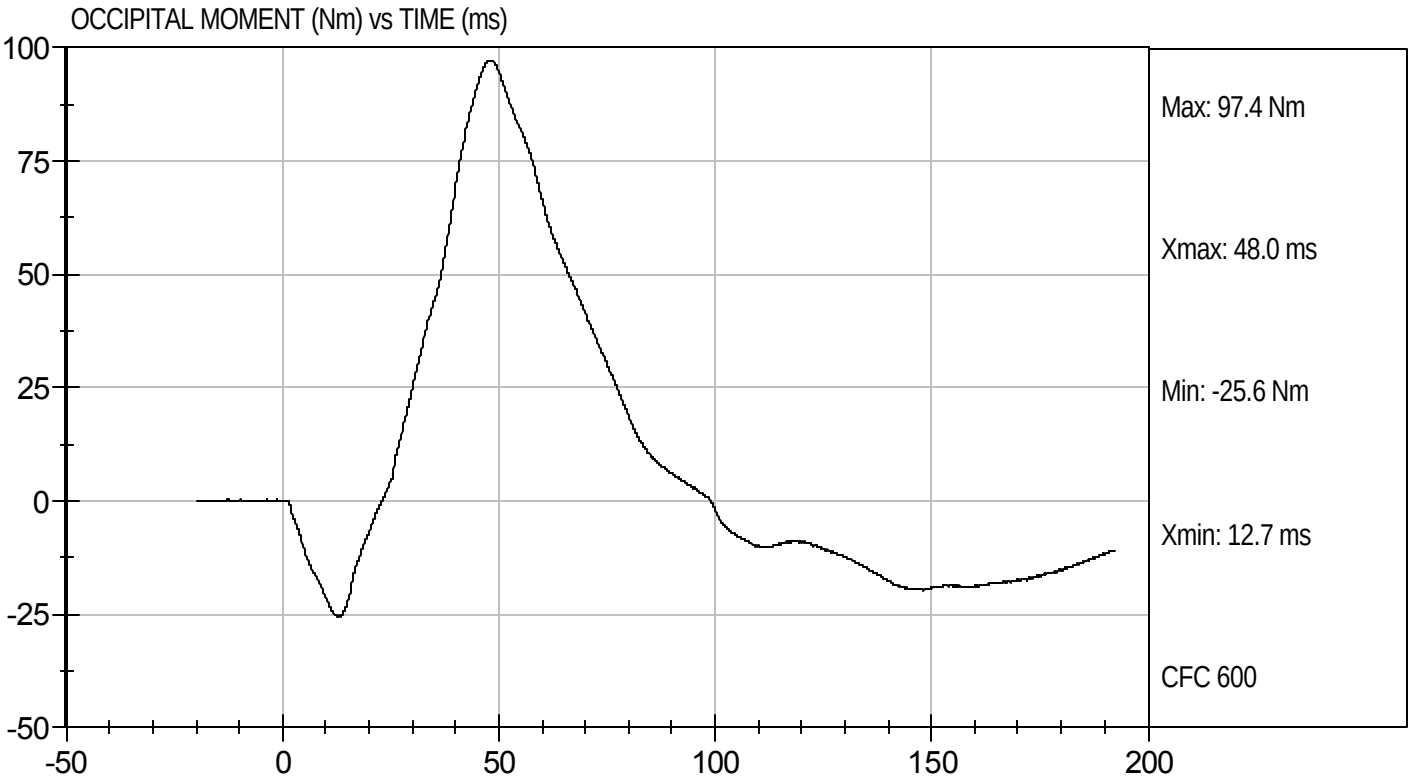


NECK ROTATION (DEG.) vs TIME (ms)



Test Desc: Neck Flexion
Component ID: D103752

Test Date: 11/2/10
Velocity: 22.83 ft/s, 6.96 m/s



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D103753

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.0	Pass
Laboratory Relative Humidity		%	10 to 70	25	Pass
Pendulum Velocity		m/s	5.95 to 6.19	5.97	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	19.05	Pass
	20 ms	G's	14.00 to 19.00	17.31	Pass
	30 ms	G's	11.00 to 16.00	13.08	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	13.07	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	39.2	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	95.2	Pass
	Time	ms	72.0 to 82.0	76.4	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	155.5	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-62.1	Pass
	Time	ms	65.0 to 79.0	70.9	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	142.6	Pass
			Overall Test Results		Pass

Jessica Hall
Laboratory Technician

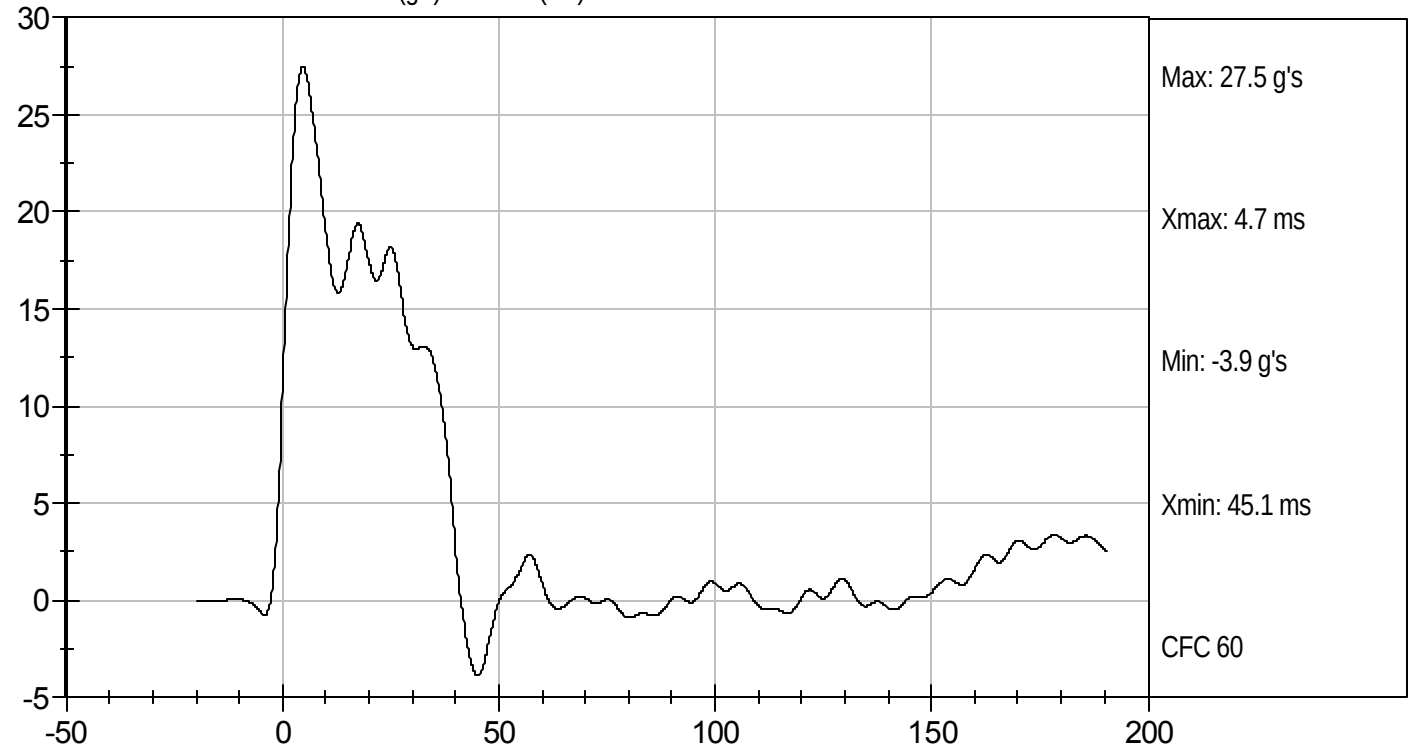
11/2/10
Test Date

David Winkelbauer
Approved By

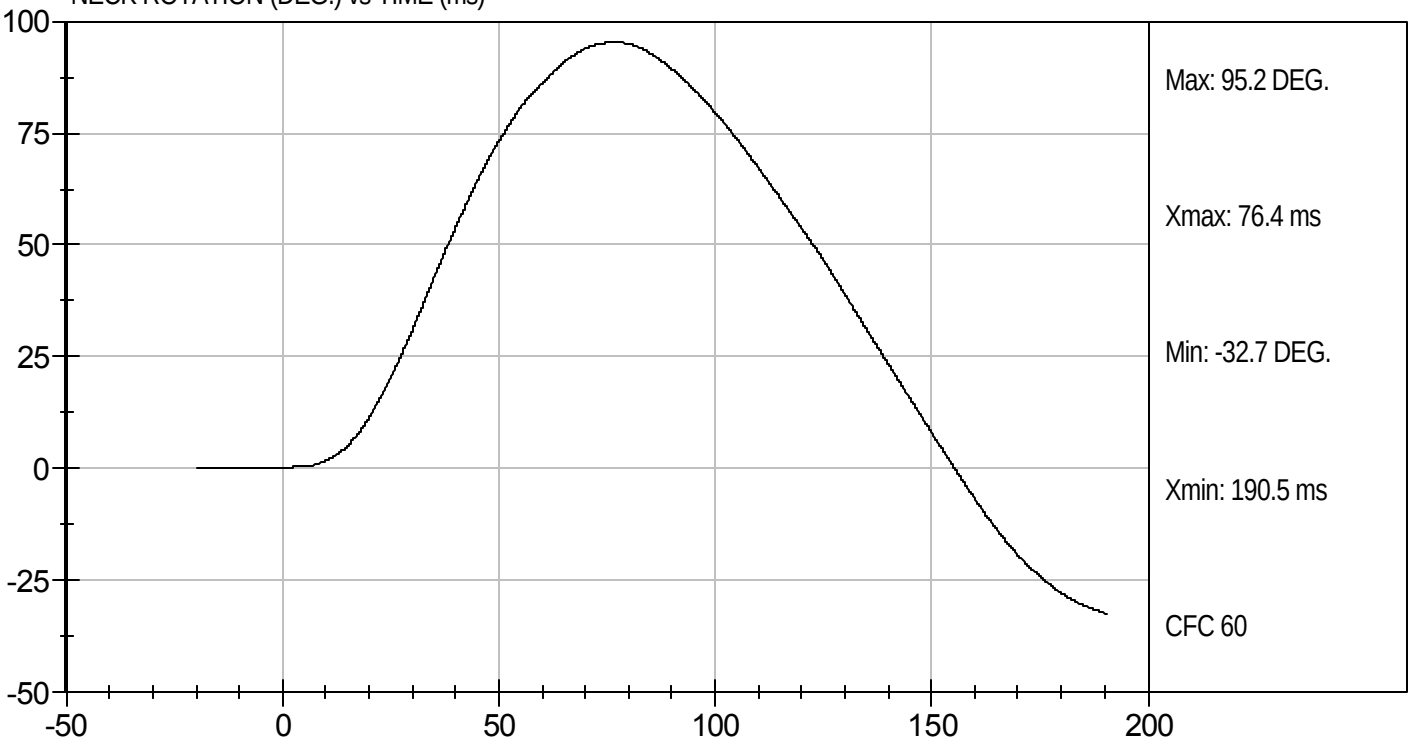
Test Desc: Neck Extension
Component ID: D103753

Test Date: 11/2/10
Velocity: 19.6 ft/s, 5.97 m/s

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

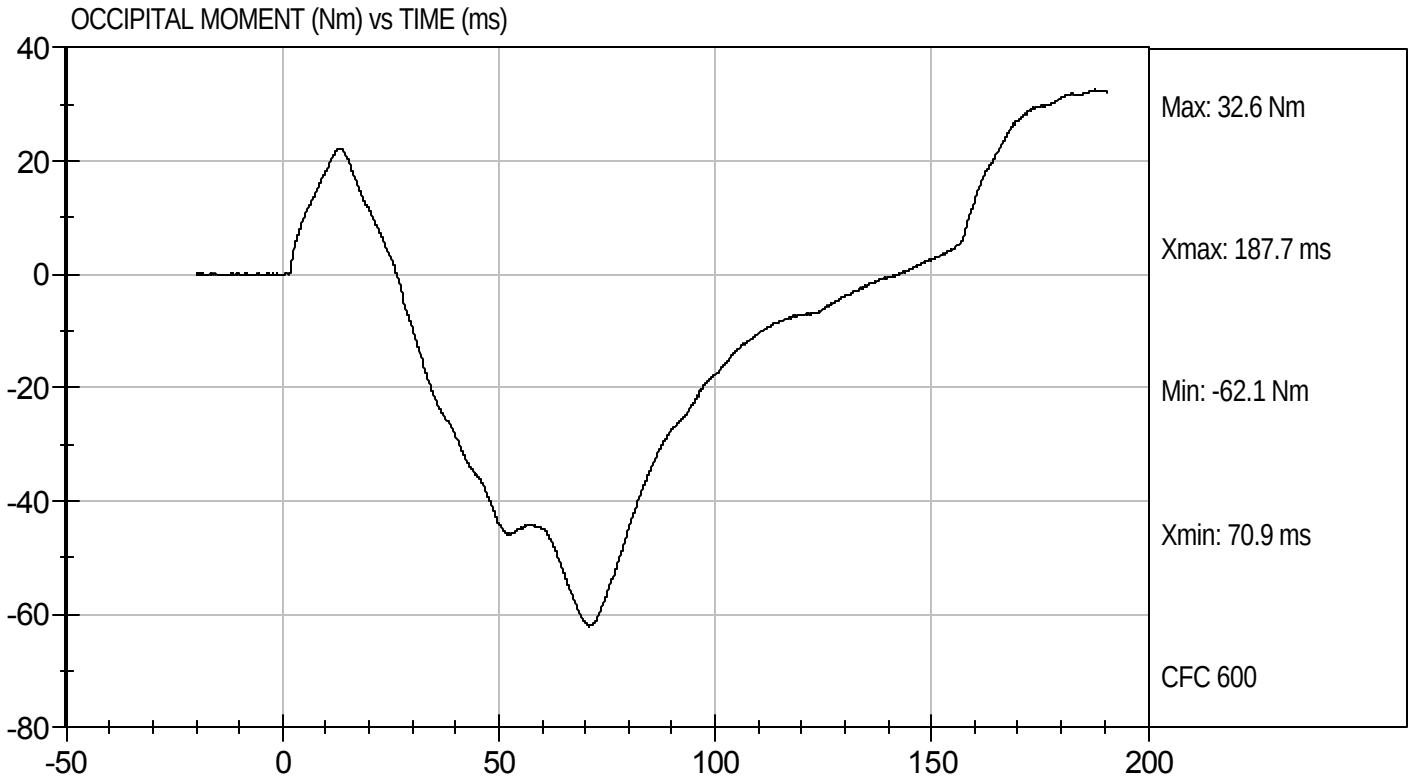


NECK ROTATION (DEG.) vs TIME (ms)



Test Desc: Neck Extension
Component ID: D103753

Test Date: 11/2/10
Velocity: 19.6 ft/s, 5.97 m/s



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D103754

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	29	Pass
Probe Velocity	m/s	6.58 to 6.82	6.68	Pass
Peak Probe Force	N	5159 to 5893	5,301	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.54	Pass
Internal Hysteresis	%	69 to 85	71	Pass
		Overall Test Results		Pass

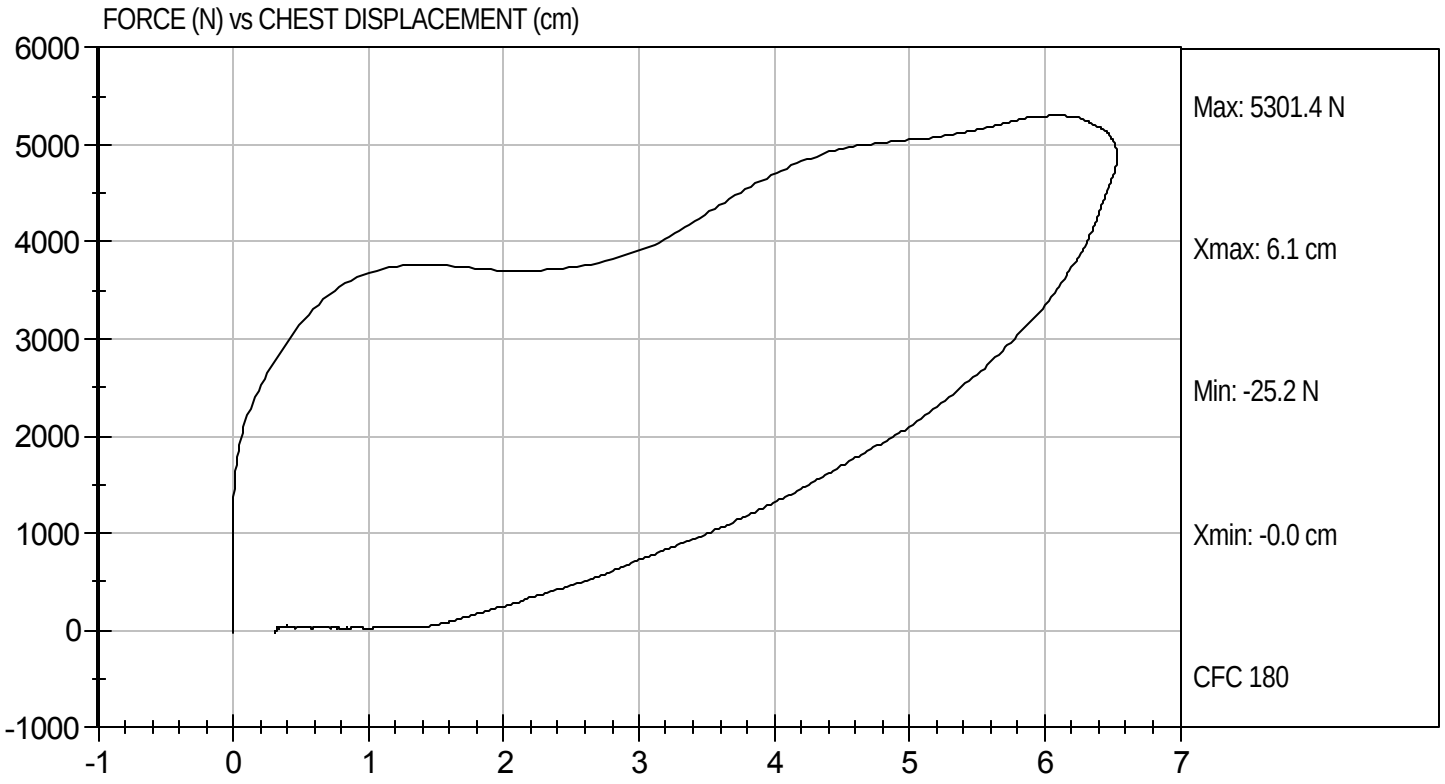
Jessica Hall
Laboratory Technician

11/1/10
Test Date

David Winkelbauer
Approved By

Test Desc: Thorax Impact
Component ID: D103754

Test Date: 11/1/10
Velocity: 21.93 ft/s, 6.68 m/s



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D103755

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	22.1	Pass
Laboratory Relative Humidity	%	10 to 70	29	Pass
Probe Velocity	m/s	2.07 to 2.13	2.09	Pass
Peak Probe Force	Newtons	4715 to 5782	4,857	Pass
		Overall Test Results		Pass

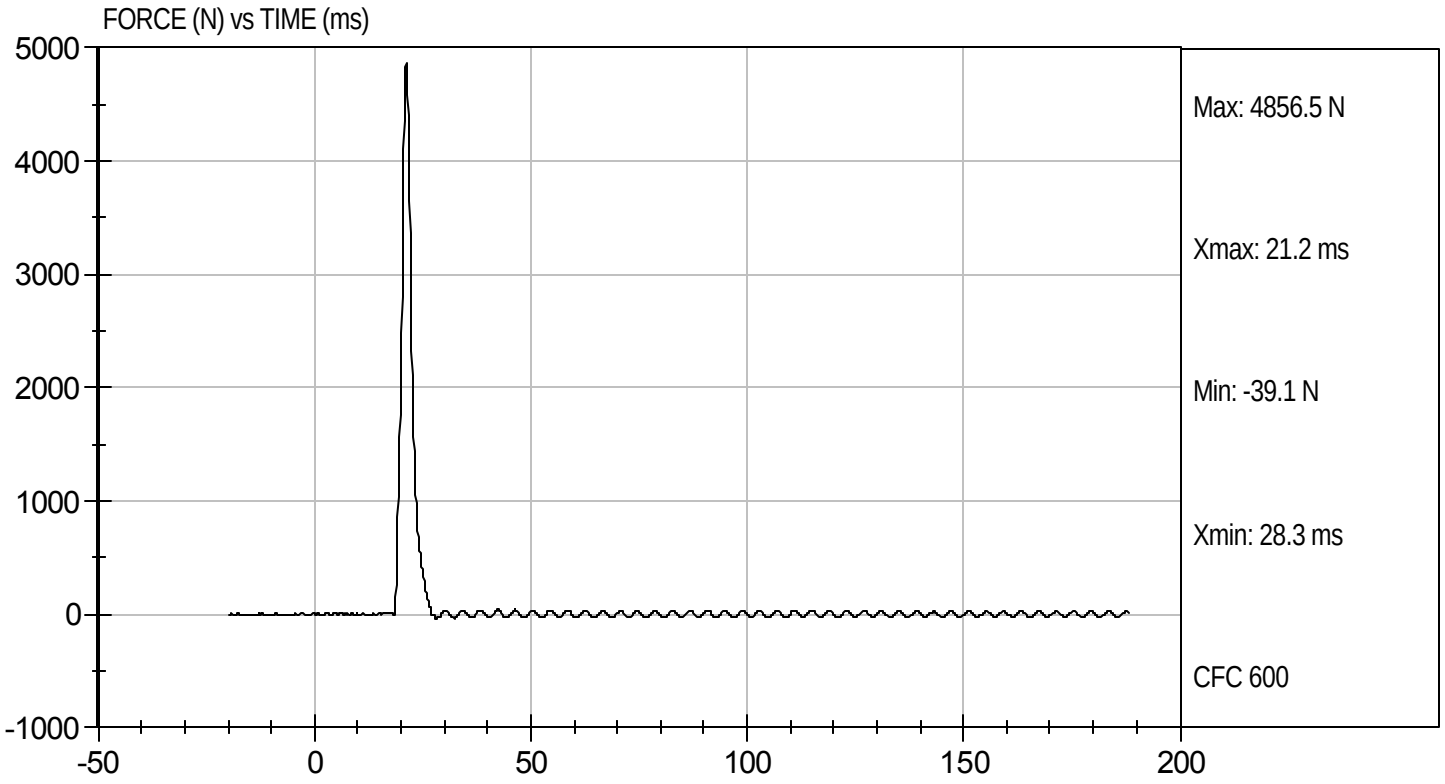
Jessica Hall
Laboratory Technician

11/1/10
Test Date

David Winkelbauer
Approved By

Test Desc: Right Knee
Component ID: D103755

Test Date: 11/1/10
Velocity: 6.86 ft/s, 2.09 m/s



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D103756

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	22.1	Pass
Laboratory Relative Humidity	%	10 to 70	29	Pass
Probe Velocity	m/s	2.07 to 2.13	2.09	Pass
Peak Probe Force	Newtons	4715 to 5782	5,086	Pass
		Overall Test Results		Pass

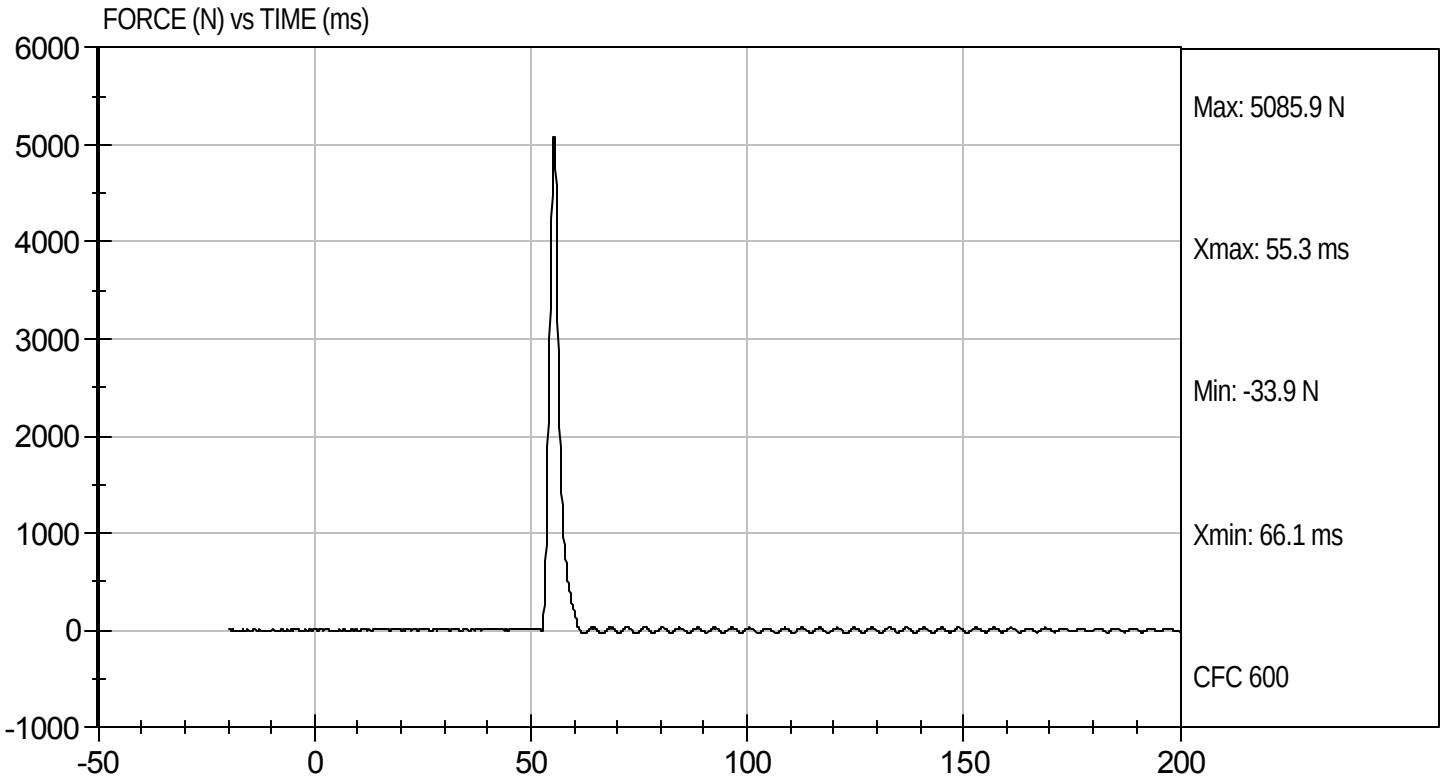
Jessica Gall
Laboratory Technician

11/1/10
Test Date

David Winkelbauer
Approved By

Test Desc: Left Knee
Component ID: D103756

Test Date: 11/1/10
Velocity: 6.86 ft/s, 2.09 m/s



MGA RESEARCH CORPORATION

HIP-FEMUR FLEXION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D103750

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	22.1	22.1	Pass
Laboratory Relative Humidity	%	10 to 70	29	29	Pass
Rotation Rate	deg/s	5 -10	8	8	Pass
30 Degrees	Nm	94.9 Nm Max	44.2	45.9	Pass
150 ft-lbf / 203.4 Nm	Deg	40- 50 Degree Max Rotation	47	49	Pass
		Overall Test Results			Pass

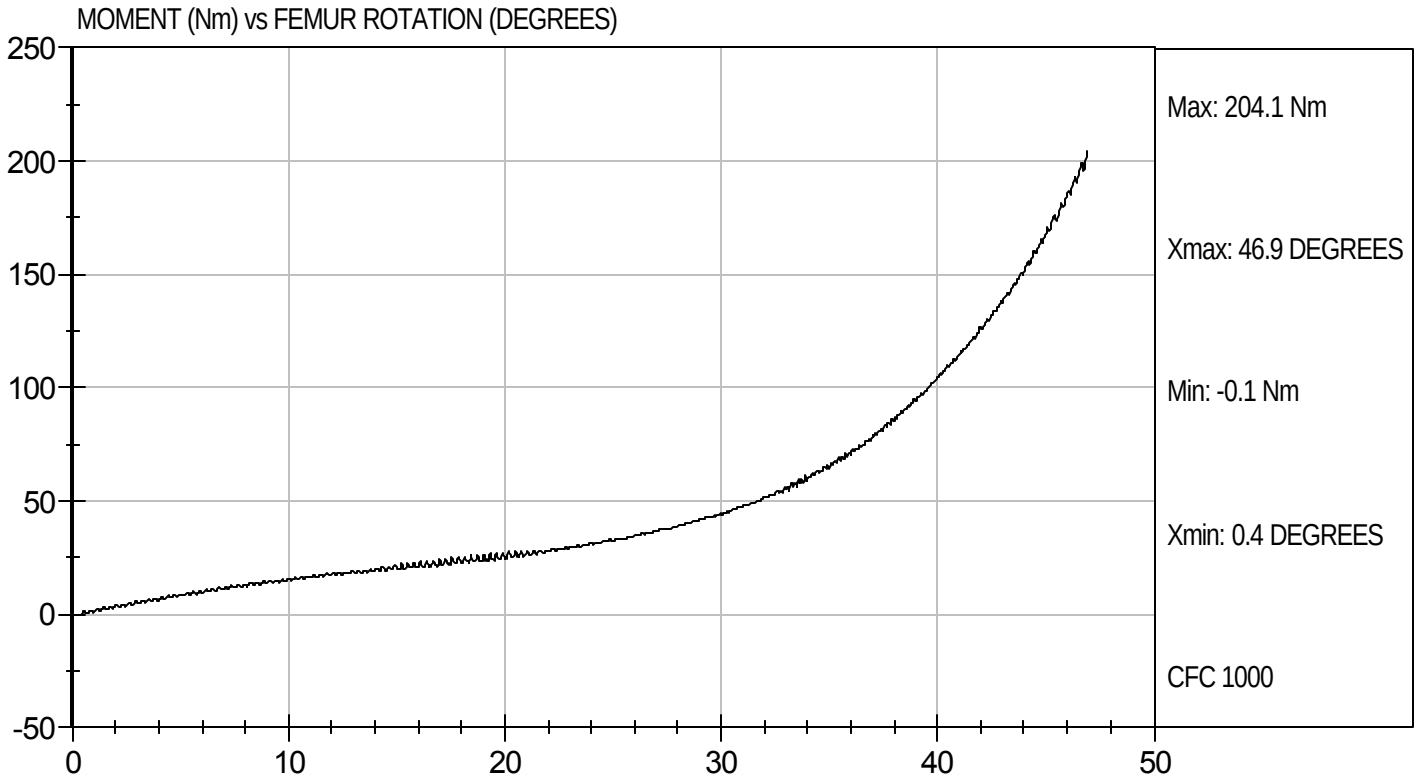
Jessica Hall
Laboratory Technician

11/1/10
Test Date

David Winkelbauer
Approved By

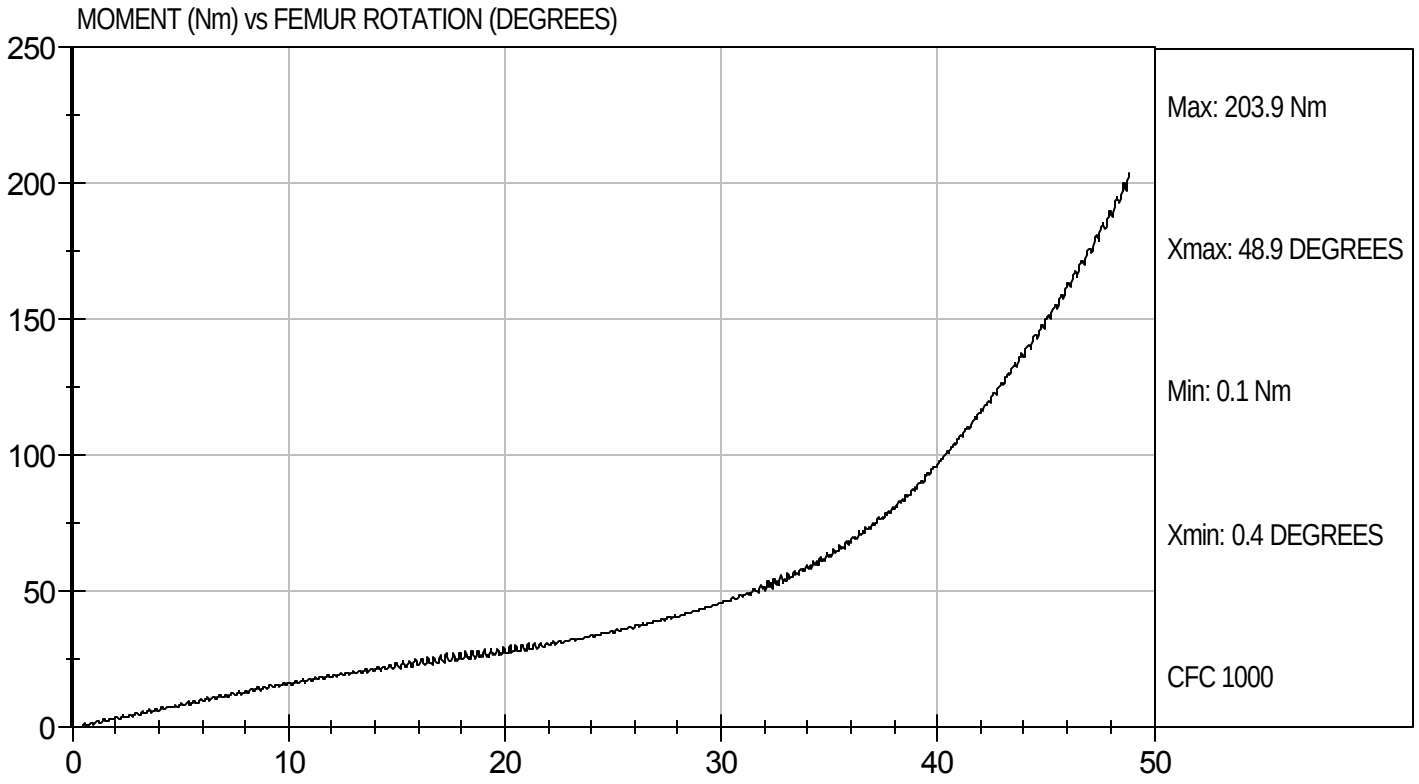
Test Desc: Hip Femur Flexion
Component ID: D103759

Test Date: 11/1/10
Velocity: 0 ft/s, 0.00 m/s



Test Desc: Hip Femur Flexion
Component ID: D103750

Test Date: 11/1/10
Velocity: 0 ft/s, 0.00 m/s



MGA RESEARCH CORPORATION

HEAD DROP TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test ID:** D103551

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Peak Resultant Acceleration	G's	250 to 300	278	Pass
Peak Lateral Acceleration	G's	+/- 15	1.4	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
		Overall Test Results		Pass

Jessica Gall
Laboratory Technician

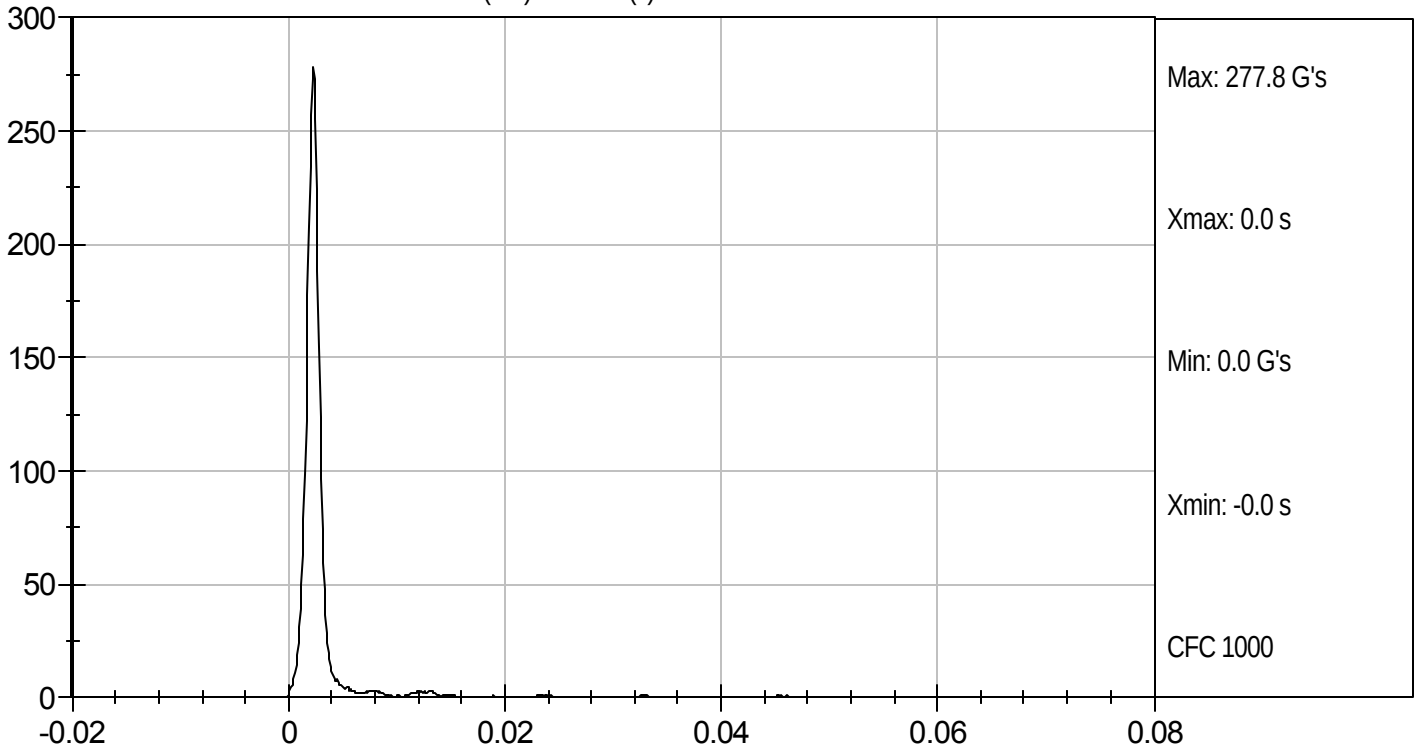
10/18/10
Test Date

David Winkelbauer
Approved By

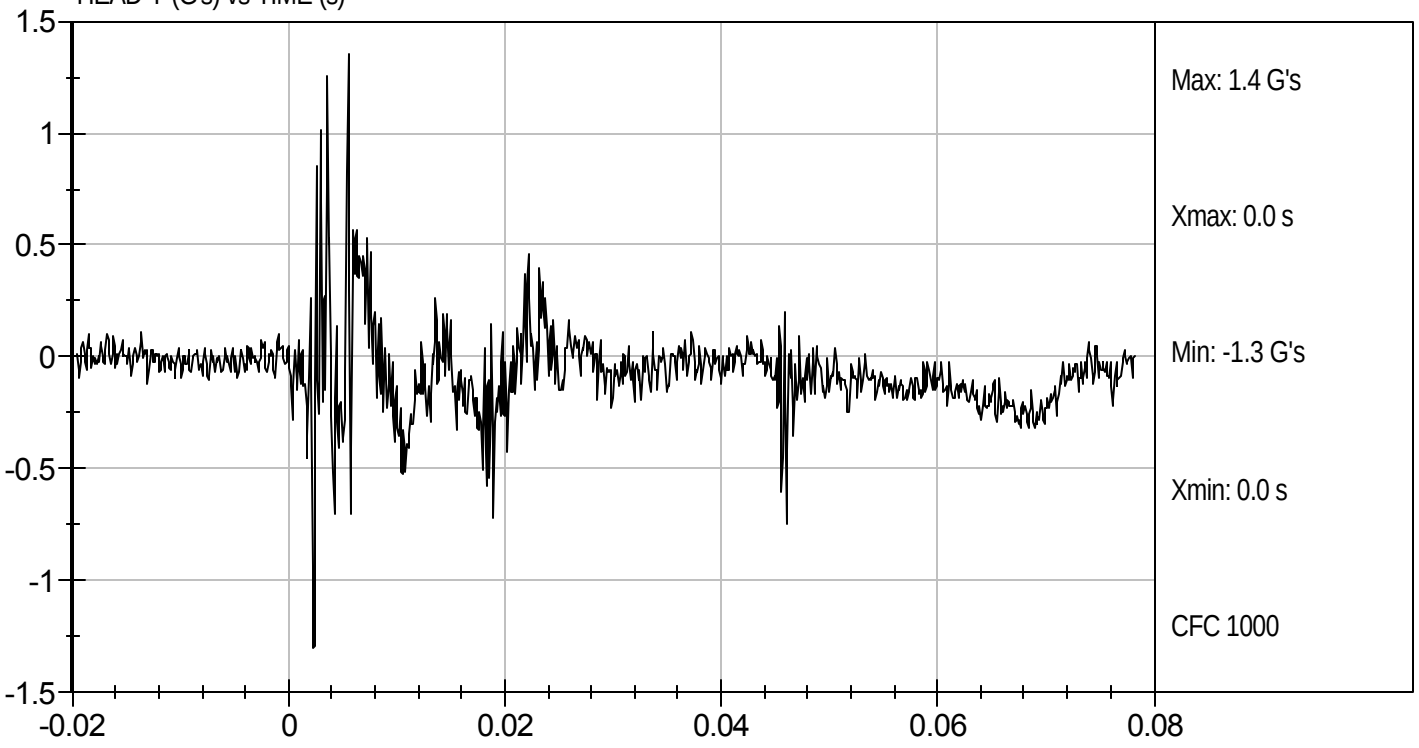
Test Desc: Head Drop
Component ID: D103551

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

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



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



MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D103552

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	32	Pass
Pendulum 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	6.5	Pass
D Plane Rotation	Max	deg	77 to 91	80	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	69 to 83	71	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	85	Pass
			Overall Results		Pass

Jessica Hall
Laboratory Technician

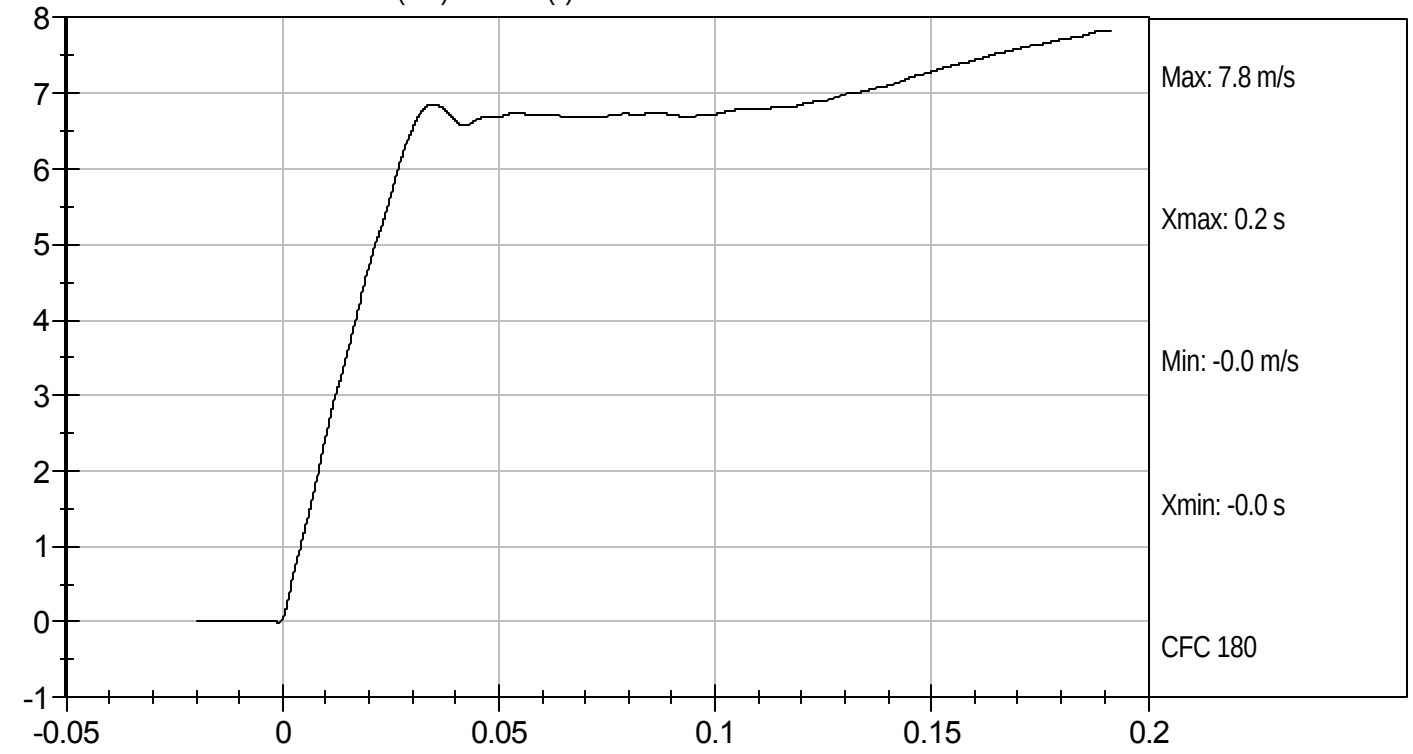
10/18/10
Test Date

David Winkelbauer
Approved By

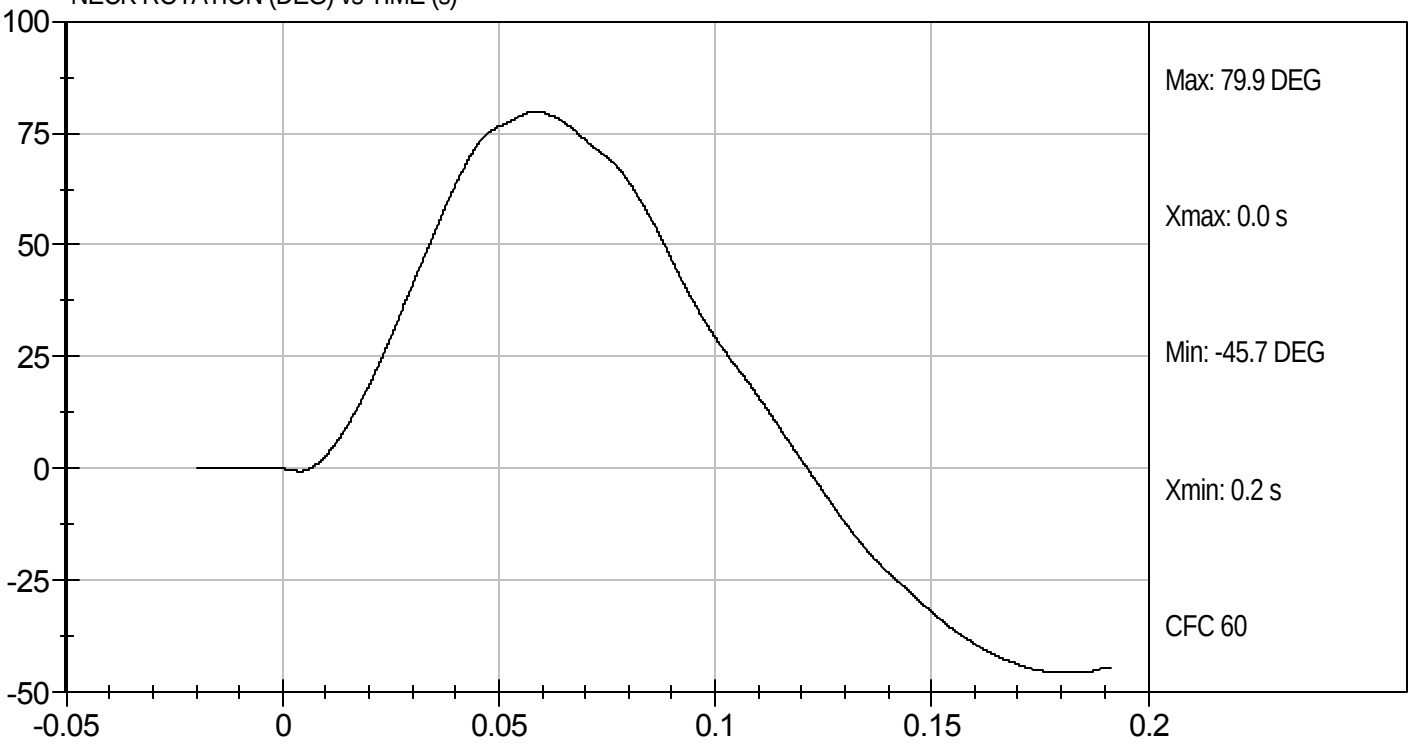
Test Desc: Neck Flexion
Component ID: D103552

Test Date: 10/18/10
Velocity: 23.1 ft/s, 7.04 m/s

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

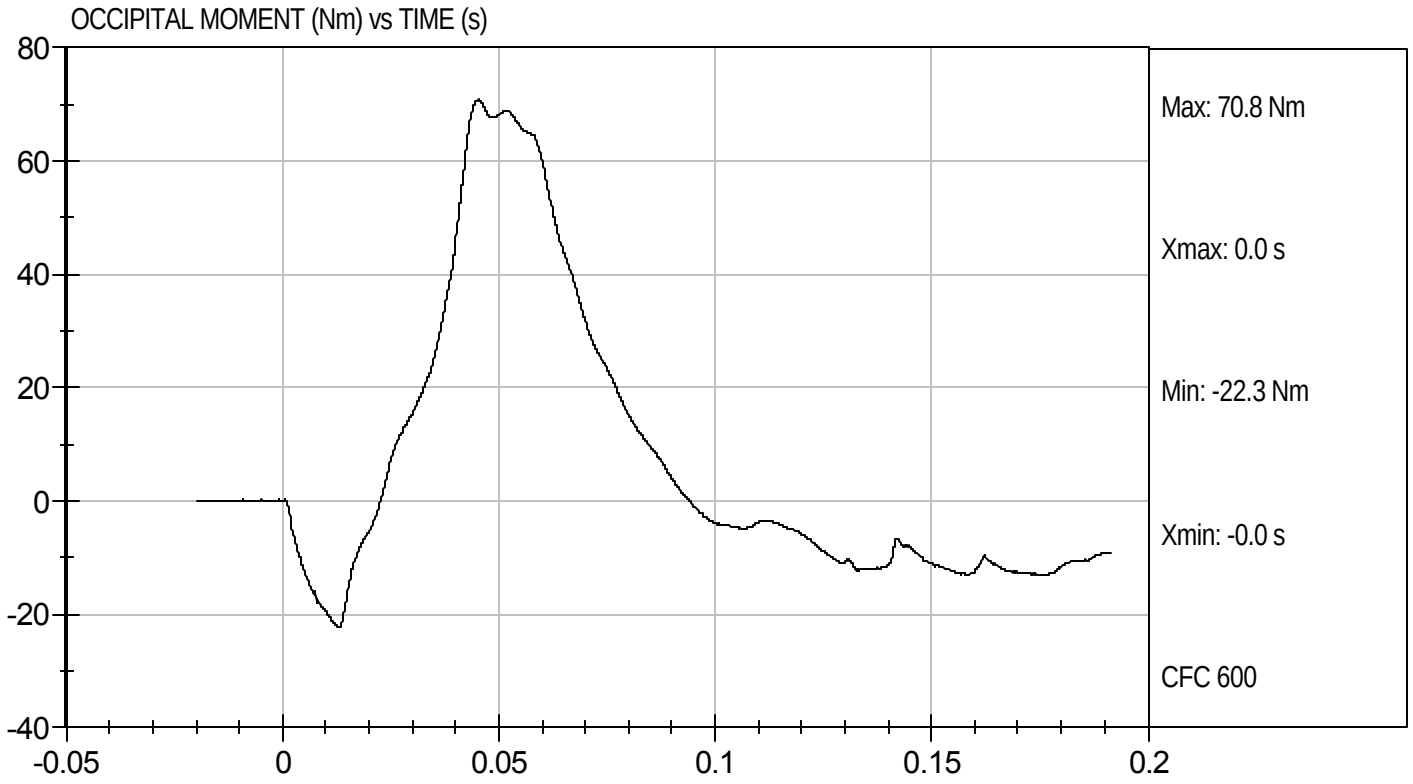


NECK ROTATION (DEG) vs TIME (s)



Test Desc: Neck Flexion
Component ID: D103552

Test Date: 10/18/10
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:** D103553

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	32	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.05	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	5.1	Pass
D Plane Rotation	Max	deg	99 to 114	103	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	-65 to -53	-54	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	101	Pass
			Overall Results		Pass

Jessica Gall
Laboratory Technician

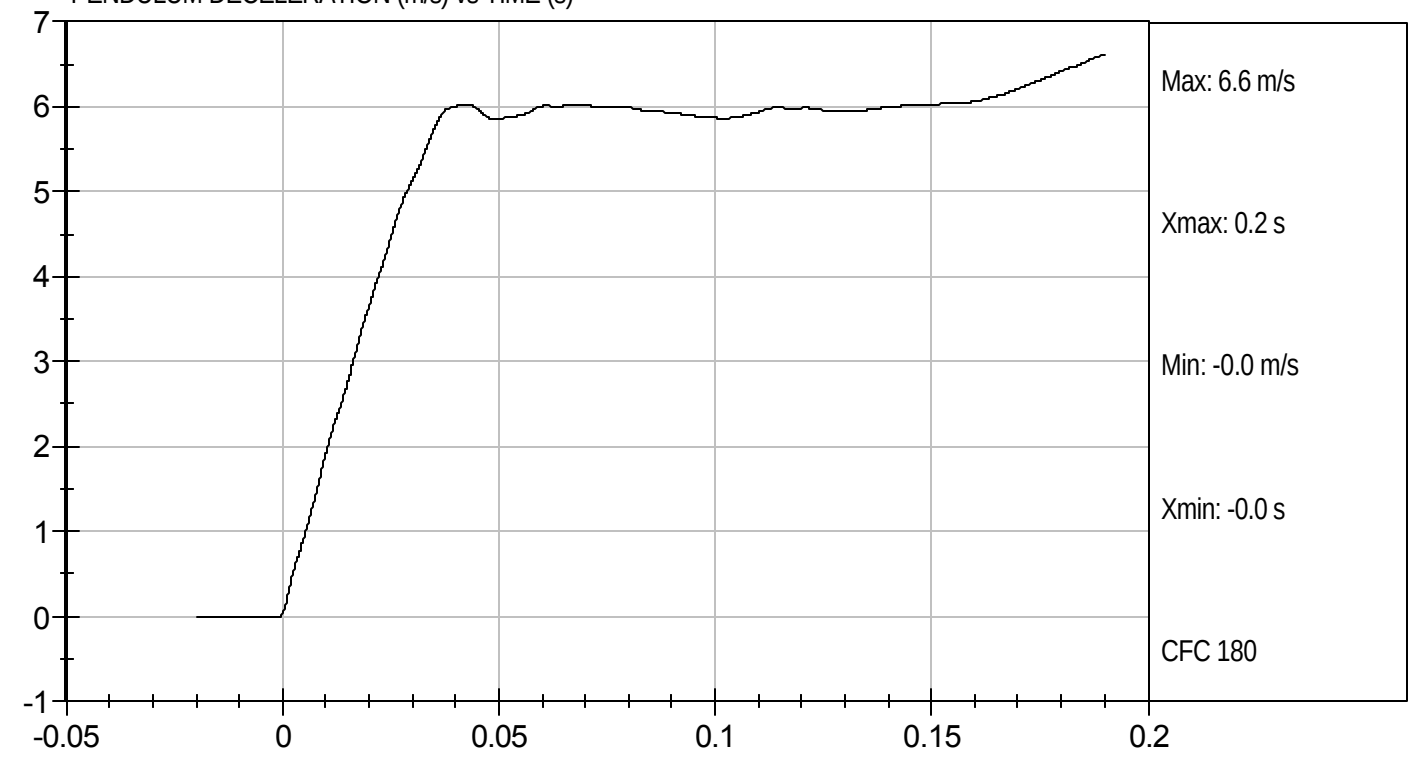
10/18/10
Test Date

David Winkelbauer
Approved By

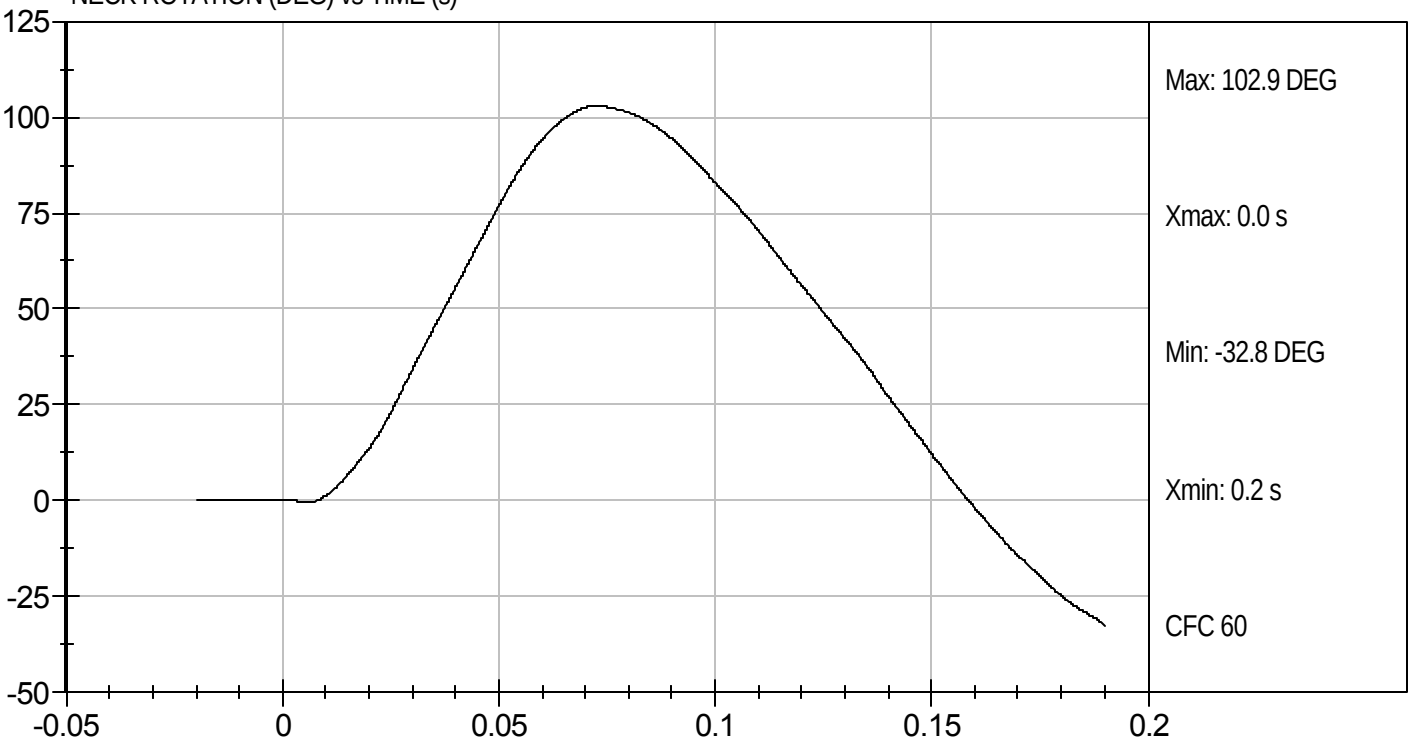
Test Desc: Neck Extension
Component ID: D103553

Test Date: 10/18/10
Velocity: 19.84 ft/s, 6.05 m/s

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

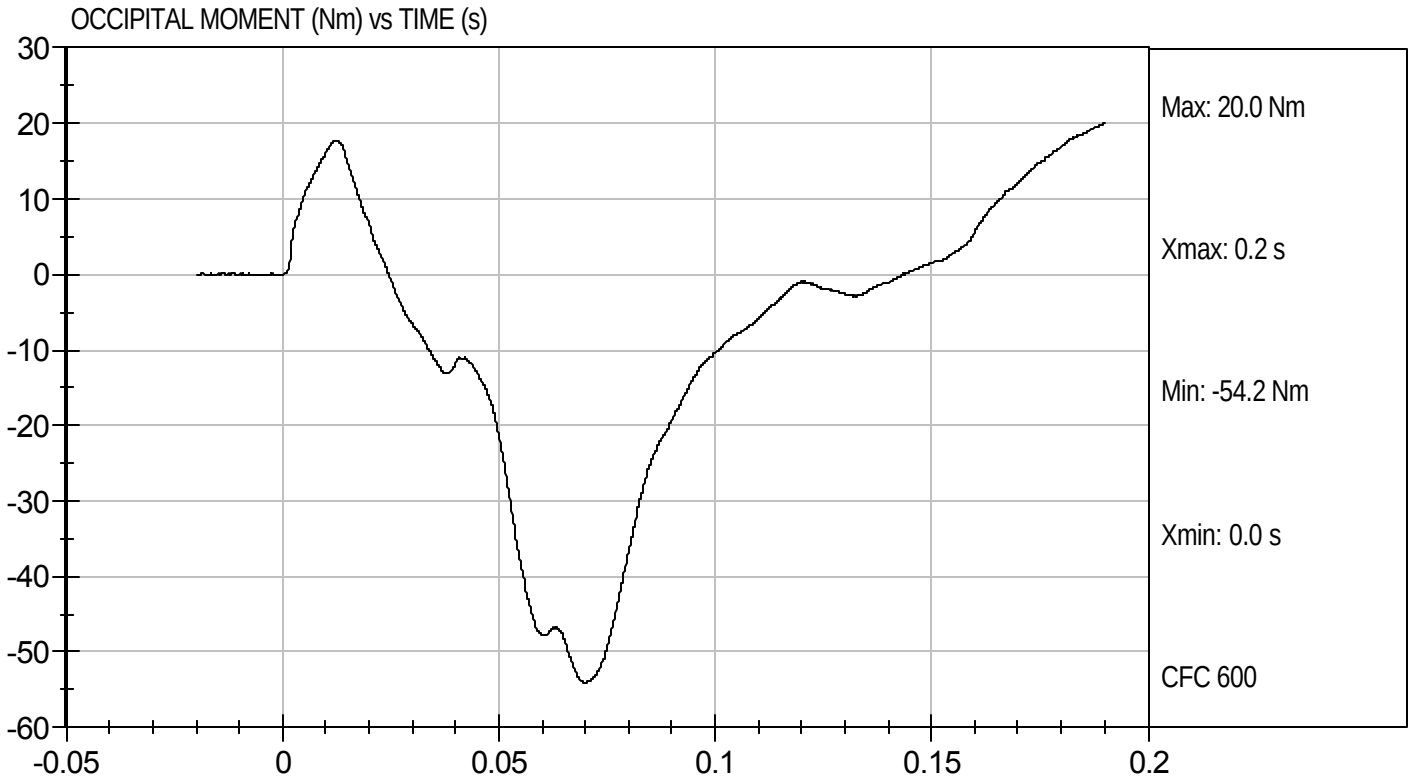


NECK ROTATION (DEG) vs TIME (s)



Test Desc: Neck Extension
Component ID: D103553

Test Date: 10/18/10
Velocity: 19.84 ft/s, 6.05 m/s



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D103554

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	20.9	Pass
Relative Humidity	%	10 to 70	32	Pass
Probe Speed	m/s	6.59 to 6.83	6.77	Pass
Peak Deflection	mm	50 to 58	54	Pass
Peak Resistive Force w/in Deflection Corridor	kN	3.9 to 4.4	4.27	Pass
Internal Hysteresis	%	69 to 85	70	Pass
Peak Force 18 mm - 50 mm	N	<= 4,600 N	4219	Pass
		Overall Test Results		Pass

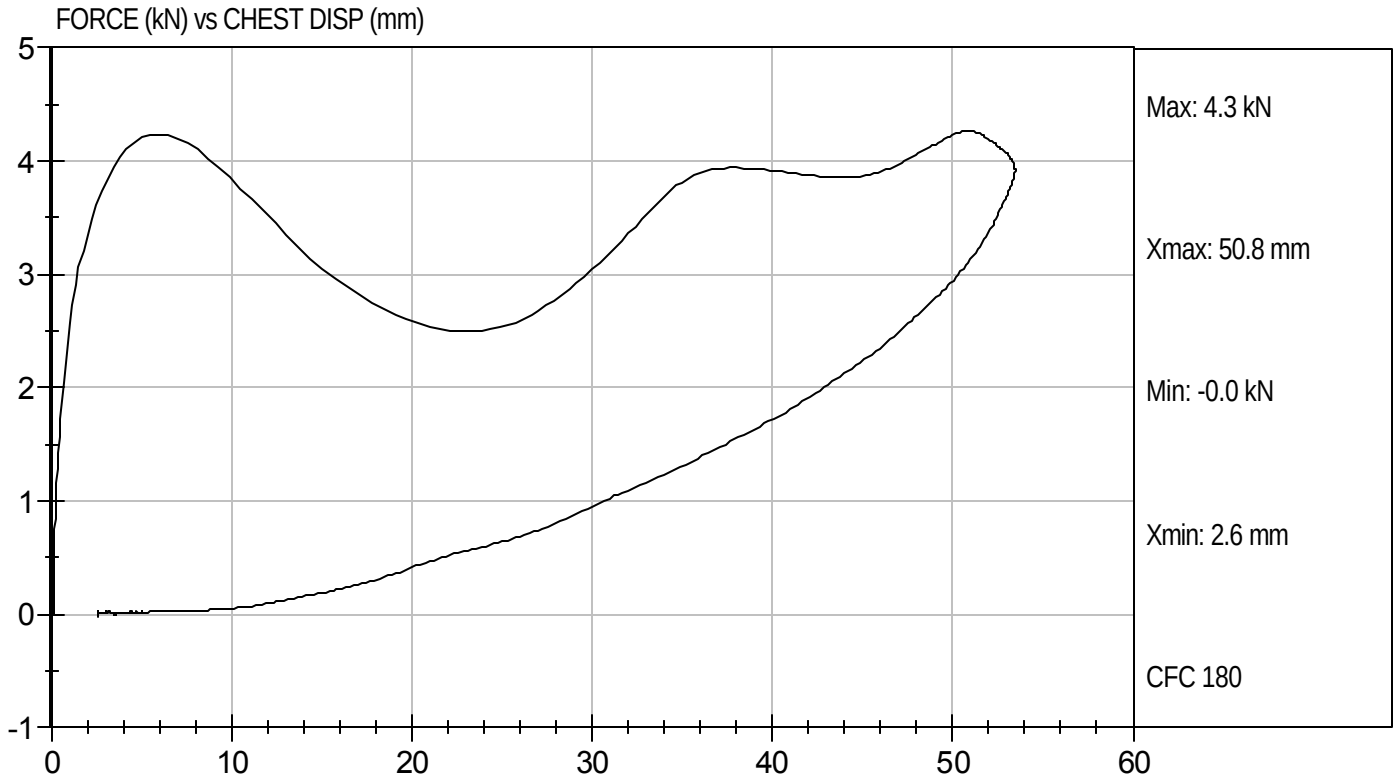
Jessica Hall
Laboratory Technician

10/18/10
Test Date

David Winkelbauer
Approved By

Test Desc: Thorax Impact
Component ID: D103554

Test Date: 10/18/10
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:** D103555

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	kN	3.45 to 4.06	3.72	Pass
		Overall Test Results		Pass

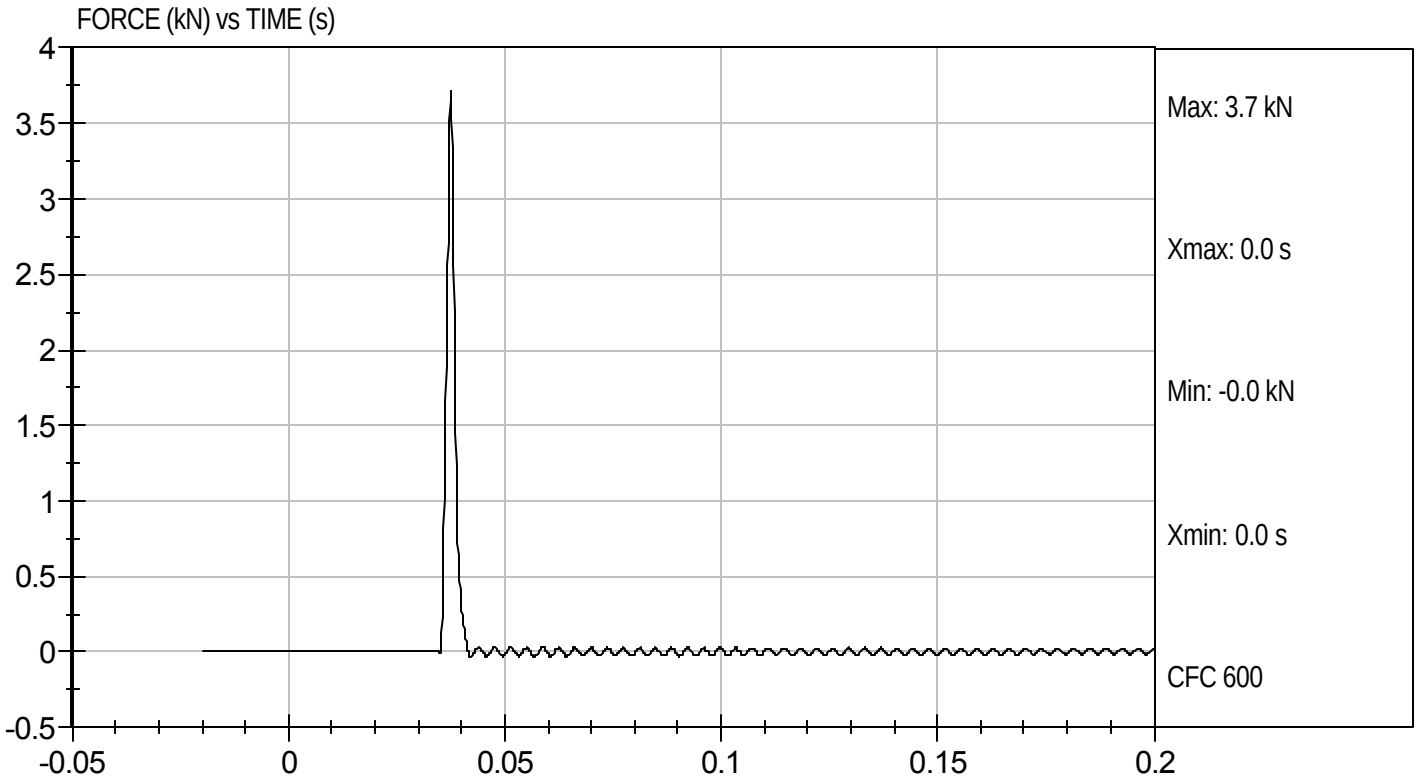
Jessica Hall
Laboratory Technician

10/18/10
Test Date

David Winkelbauer
Approved By

Test Desc: Right Knee
Component ID: D103555

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



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D103556

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Probe Speed	m/s	2.07 to 2.13	2.10	Pass
Maximum Force	kN	3.45 to 4.06	3.92	Pass
		Overall Test Results		Pass

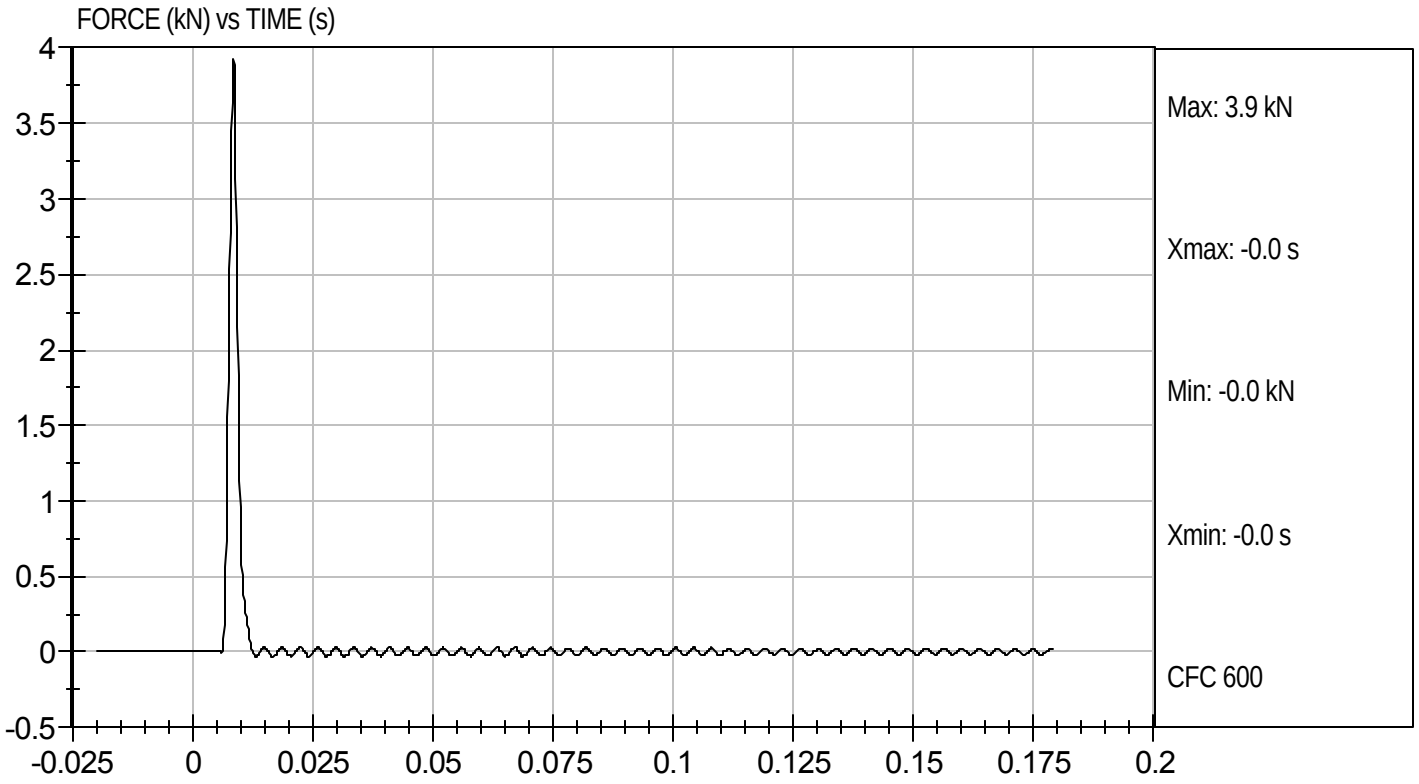
Jessica Hall
Laboratory Technician

10/18/10
Test Date

David Winkelbauer
Approved By

Test Desc: Left Knee
Component ID: D103556

Test Date: 10/18/10
Velocity: 6.89 ft/s, 2.10 m/s



MGA RESEARCH CORPORATION

TORSO FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D103557

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	20.9	Pass
Laboratory Relative Humidity	%	10 to 70	33	Pass
Initial Angle	deg	0 to 20	17	Pass
Return Angle	deg	+/- 8	5	Pass
Force at 45 deg	N	320 to 390	381	Pass
Upper Torso Deflection Rate	Deg/sec	0.5 - 1.5	1.0	Pass
		Overall Result		Pass

Jessica Hall
Laboratory Technician

10/18/2010
Test Date

David Winkelbauer
Approved By

MGA RESEARCH CORPORATION

HEAD DROP TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test ID:** D103761

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	29	Pass
Peak Resultant Acceleration	G's	250 to 300	264	Pass
Peak Lateral Acceleration	G's	+/- 15	-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

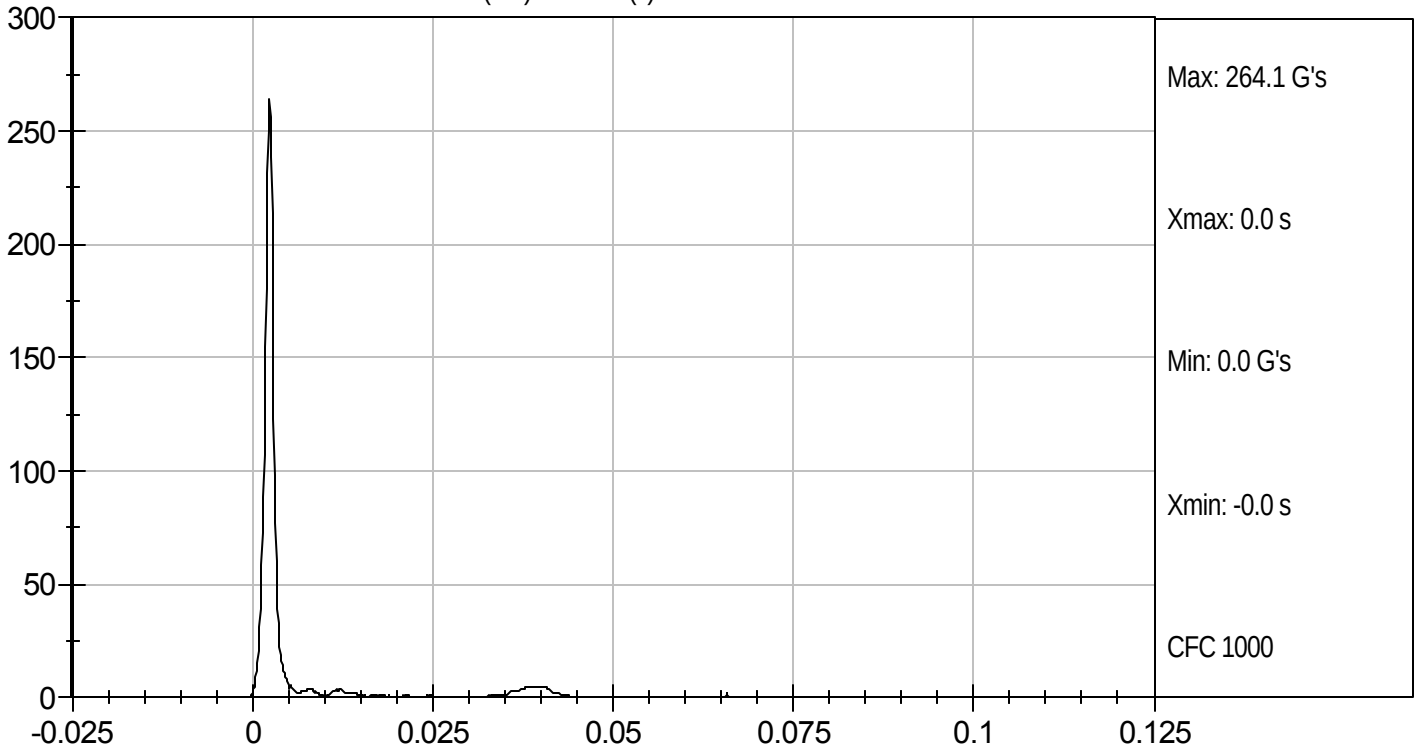
11/1/10
Test Date

David Winkelbauer
Approved By

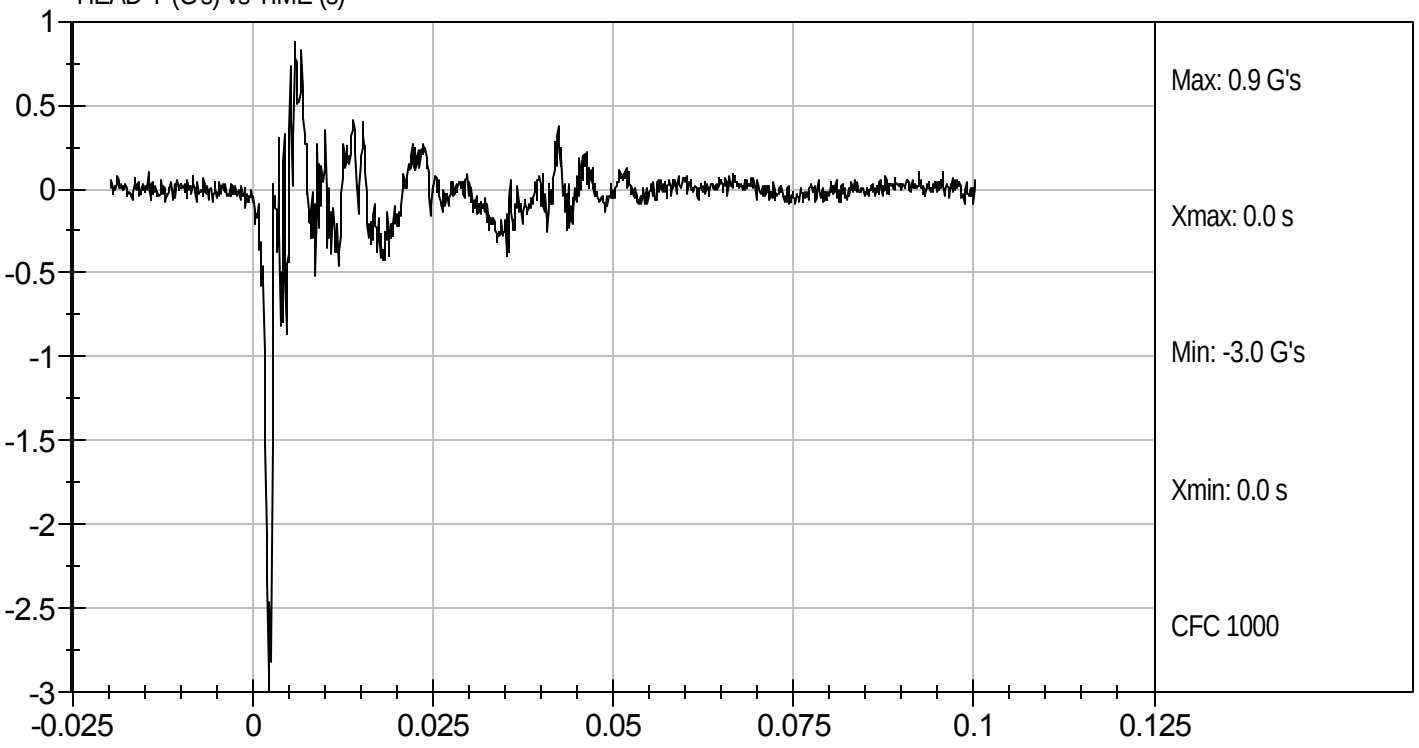
Test Desc: Head Drop
Component ID: D103761

Test Date: 11/1/10
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:** D103762

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	30	Pass
Pendulum Speed		m/s	6.89 to 7.13	6.96	Pass
Pendulum Deceleration	10 ms	m/s	2.1 to 2.5	2.5	Pass
	20 ms	m/s	4.0 to 5.0	4.8	Pass
	30 ms	m/s	5.8 to 7.0	6.6	Pass
D Plane Rotation	Max	deg	77 to 91	84	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	69 to 83	70	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	87	Pass
			Overall Results		Pass

Jessica Hall
Laboratory Technician

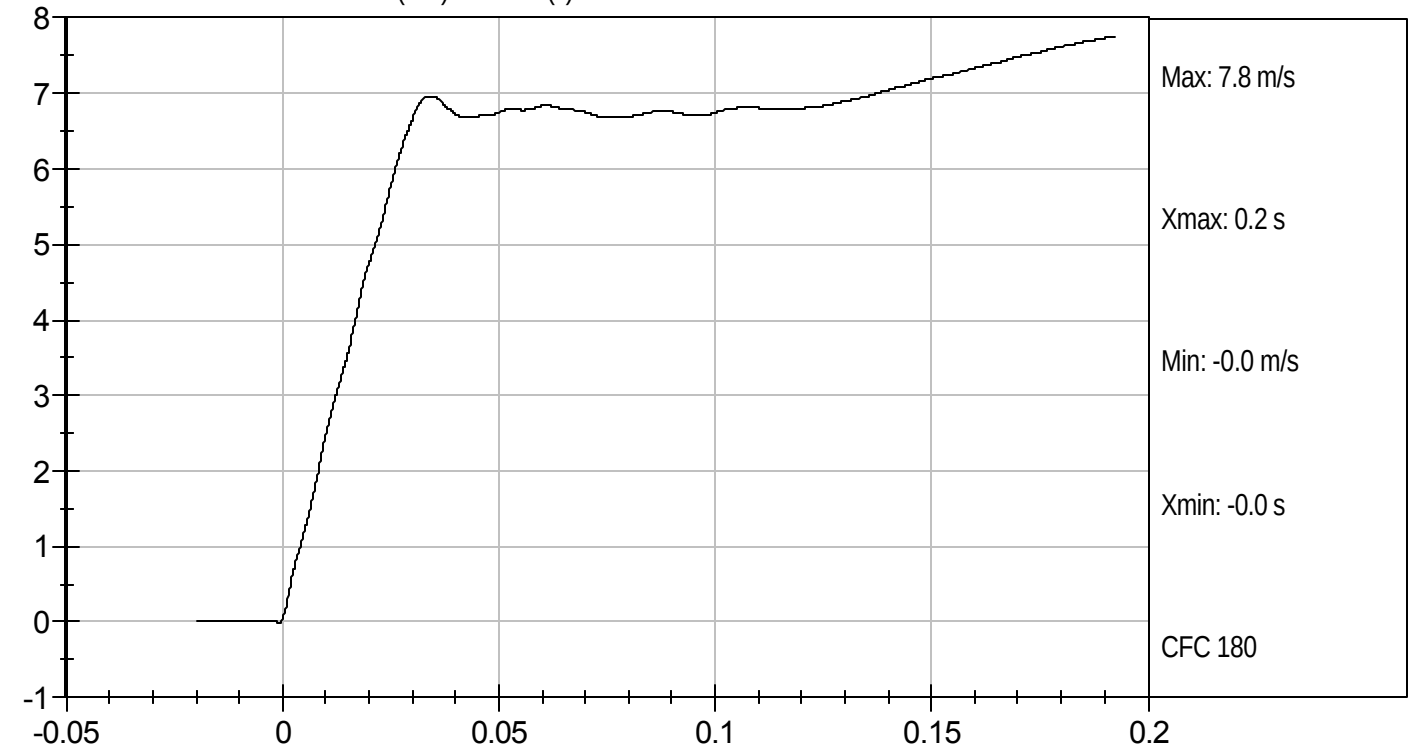
11/1/10
Test Date

David Winkelbauer
Approved By

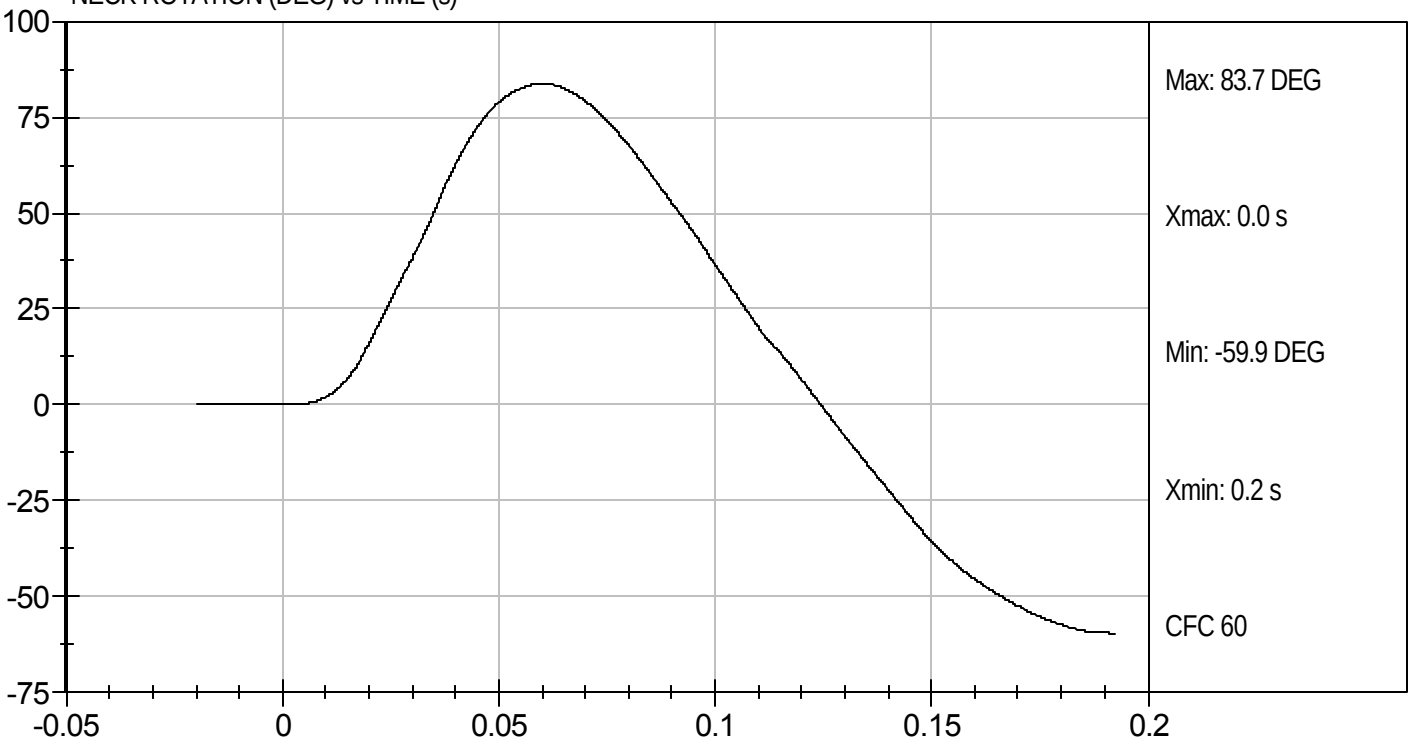
Test Desc: Neck Flexion
Component ID: D103762

Test Date: 11/1/10
Velocity: 22.83 ft/s, 6.96 m/s

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

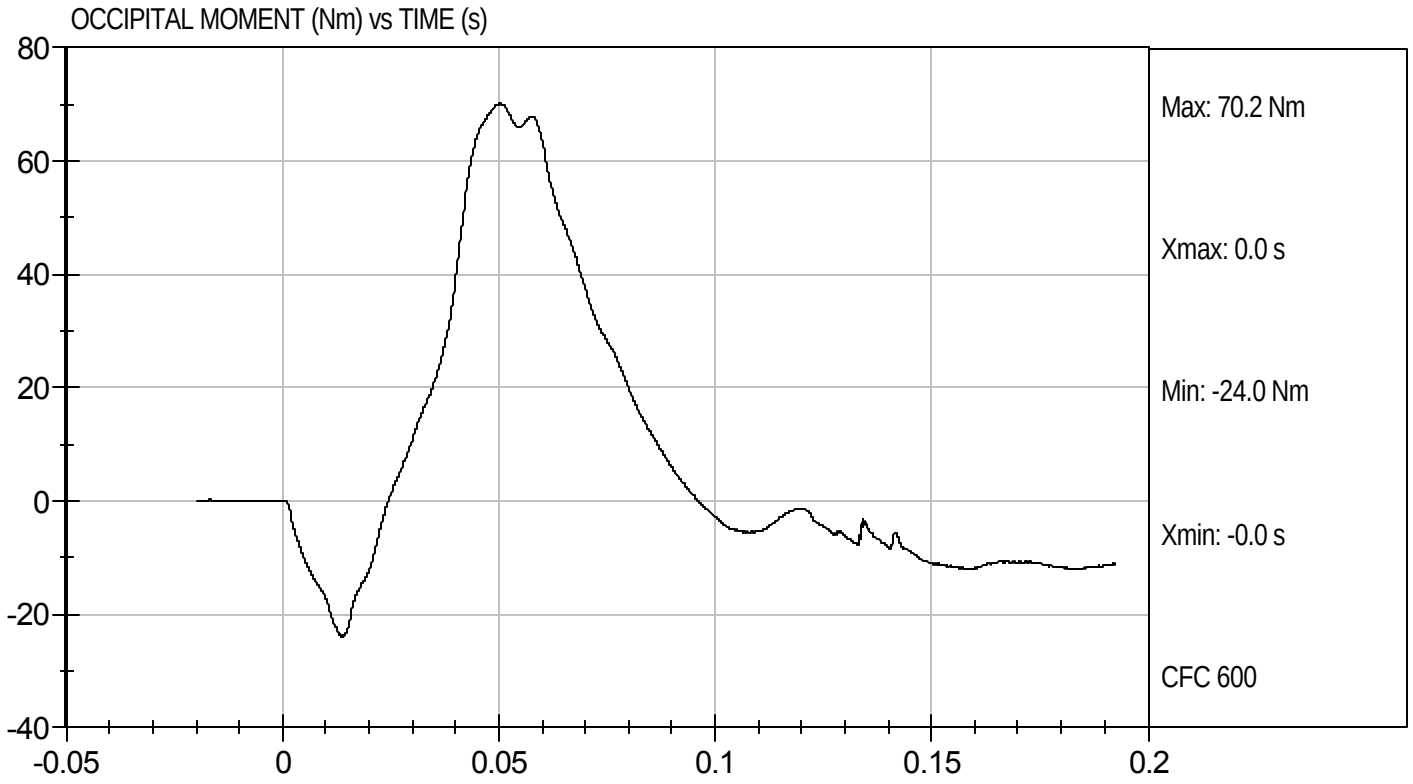


NECK ROTATION (DEG) vs TIME (s)



Test Desc: Neck Flexion
Component ID: D103762

Test Date: 11/1/10
Velocity: 22.83 ft/s, 6.96 m/s



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D103763

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	30	Pass
Pendulum Speed		m/s	5.95 to 6.19	5.97	Pass
Pendulum Deceleration	10 ms	m/s	1.5 to 1.9	1.9	Pass
	20 ms	m/s	3.1 to 3.9	3.8	Pass
	30 ms	m/s	4.6 to 5.6	5.4	Pass
D Plane Rotation	Max	deg	99 to 114	113	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	-65 to -53	-55	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	97	Pass
			Overall Results		Pass

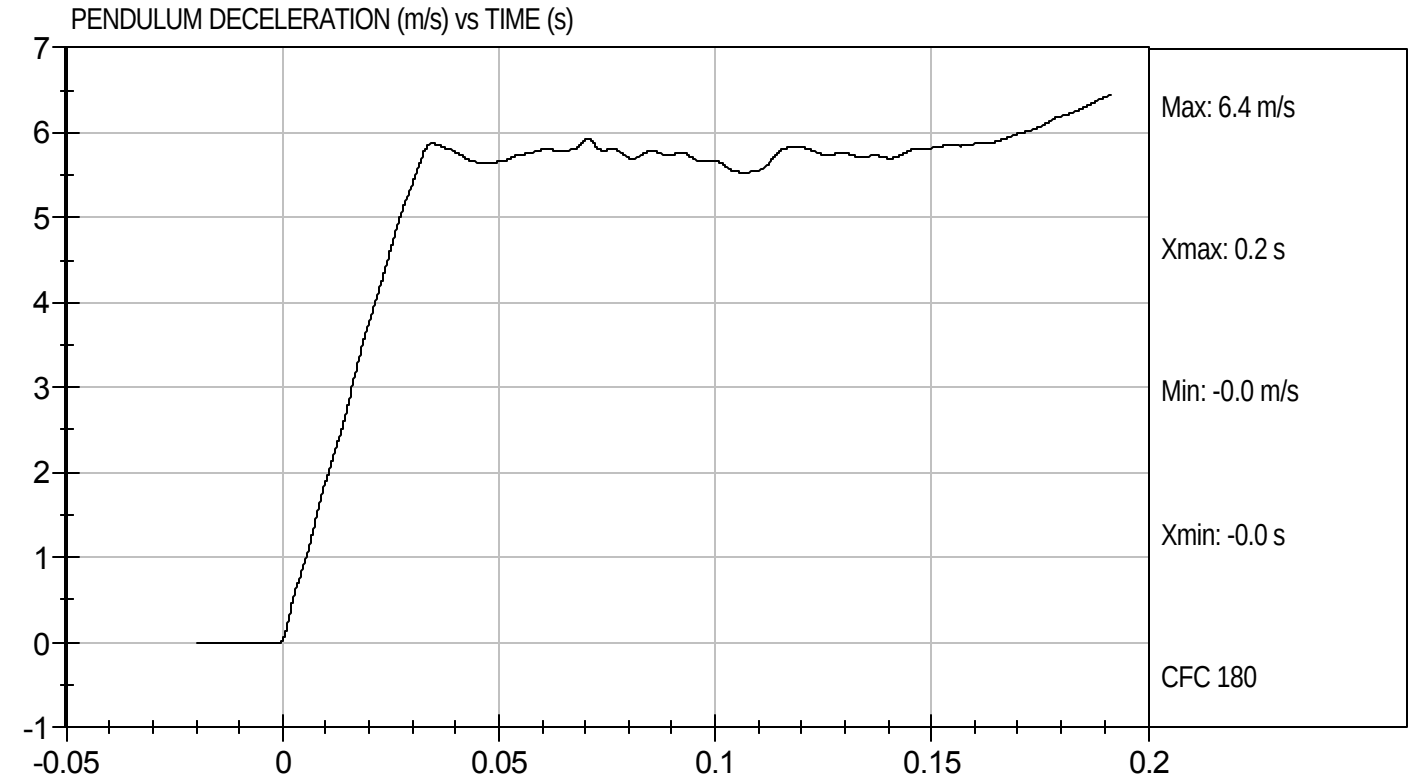
Jessica Hall
Laboratory Technician

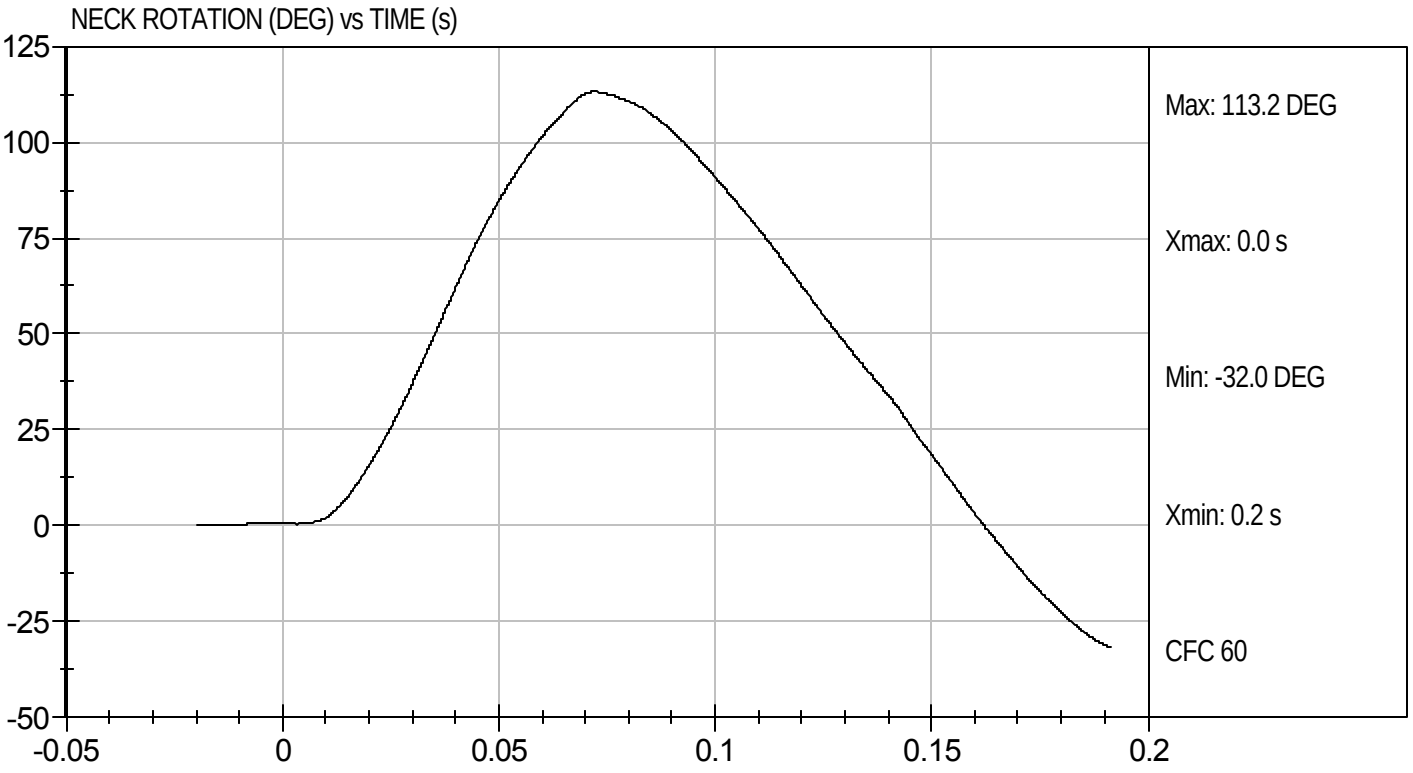
11/1/10
Test Date

David Winkelbauer
Approved By

Test Desc: Neck Extension
Component ID: D103763

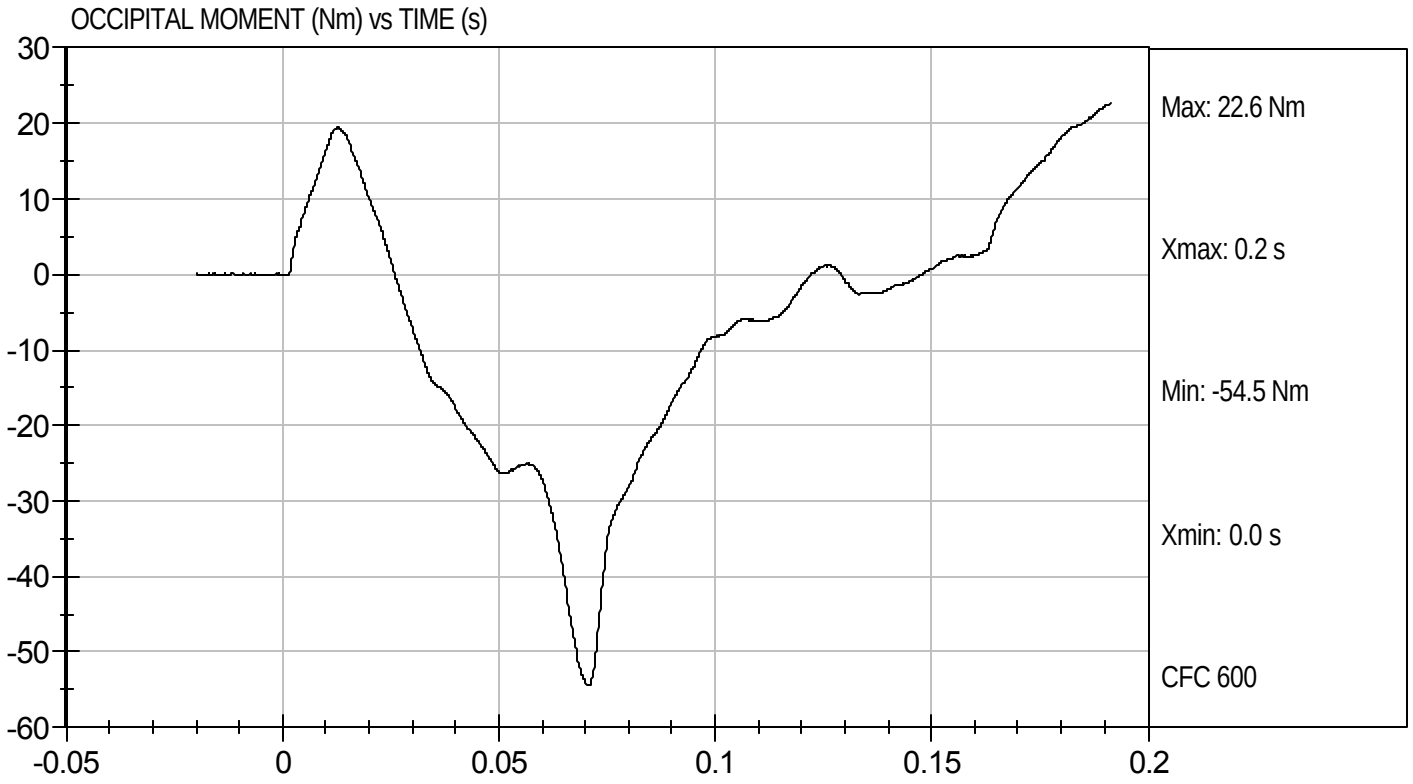
Test Date: 11/1/10
Velocity: 19.6 ft/s, 5.97 m/s





Test Desc: Neck Extension
Component ID: D103763

Test Date: 11/1/10
Velocity: 19.6 ft/s, 5.97 m/s



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D103764

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	22.0	Pass
Relative Humidity	%	10 to 70	27	Pass
Probe Speed	m/s	6.59 to 6.83	6.77	Pass
Peak Deflection	mm	50 to 58	53	Pass
Peak Resistive Force w/in Deflection Corridor	kN	3.9 to 4.4	4.3	Pass
Internal Hysteresis	%	69 to 85	70	Pass
Peak Force 18 mm - 50 mm	N	<= 4,600 N	4311	Pass
		Overall Test Results		Pass

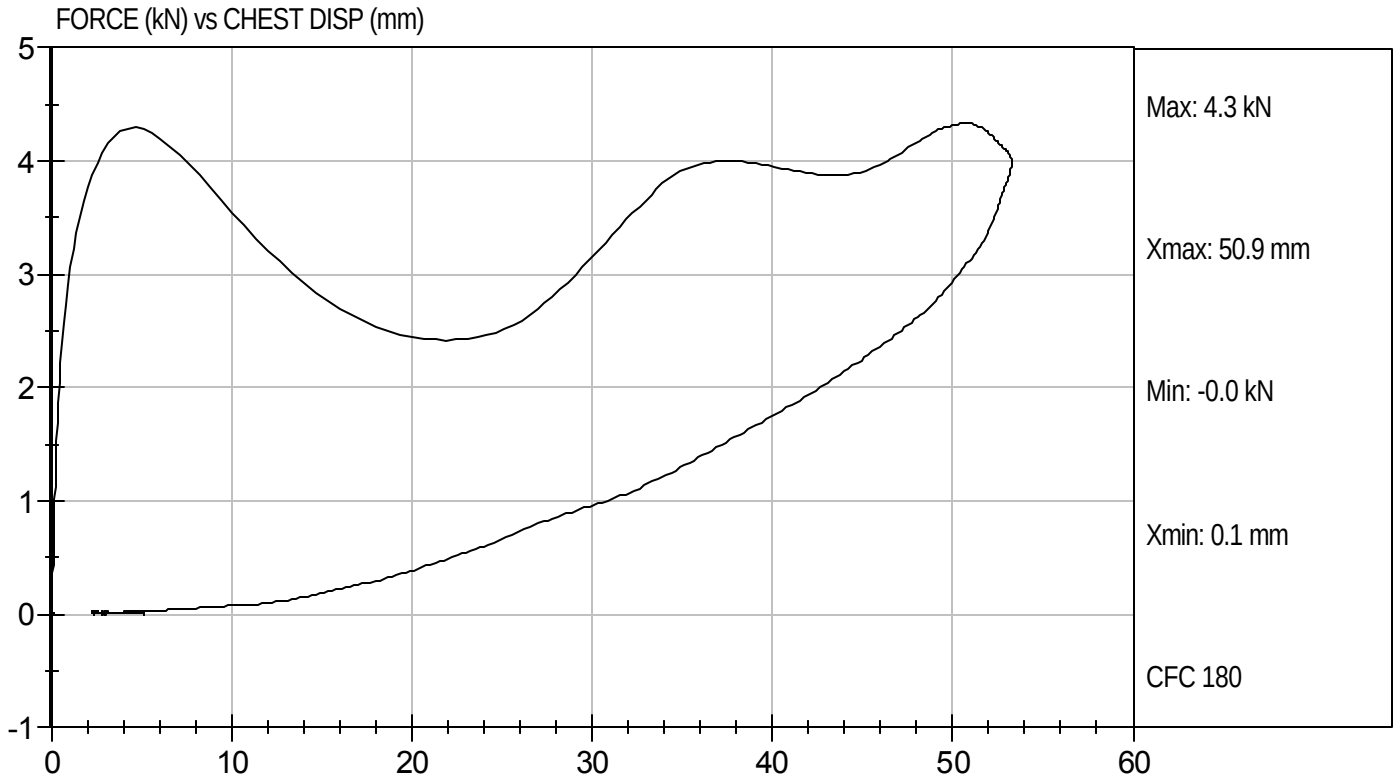
Jessica Hall
Laboratory Technician

11/2/10
Test Date

David Winkelbauer
Approved By

Test Desc: Thorax Impact
Component ID: D103764

Test Date: 11/2/10
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:** D103765

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	22.0	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Speed	m/s	2.07 to 2.13	2.11	Pass
Maximum Force	kN	3.45 to 4.06	3.67	Pass
		Overall Test Results		Pass

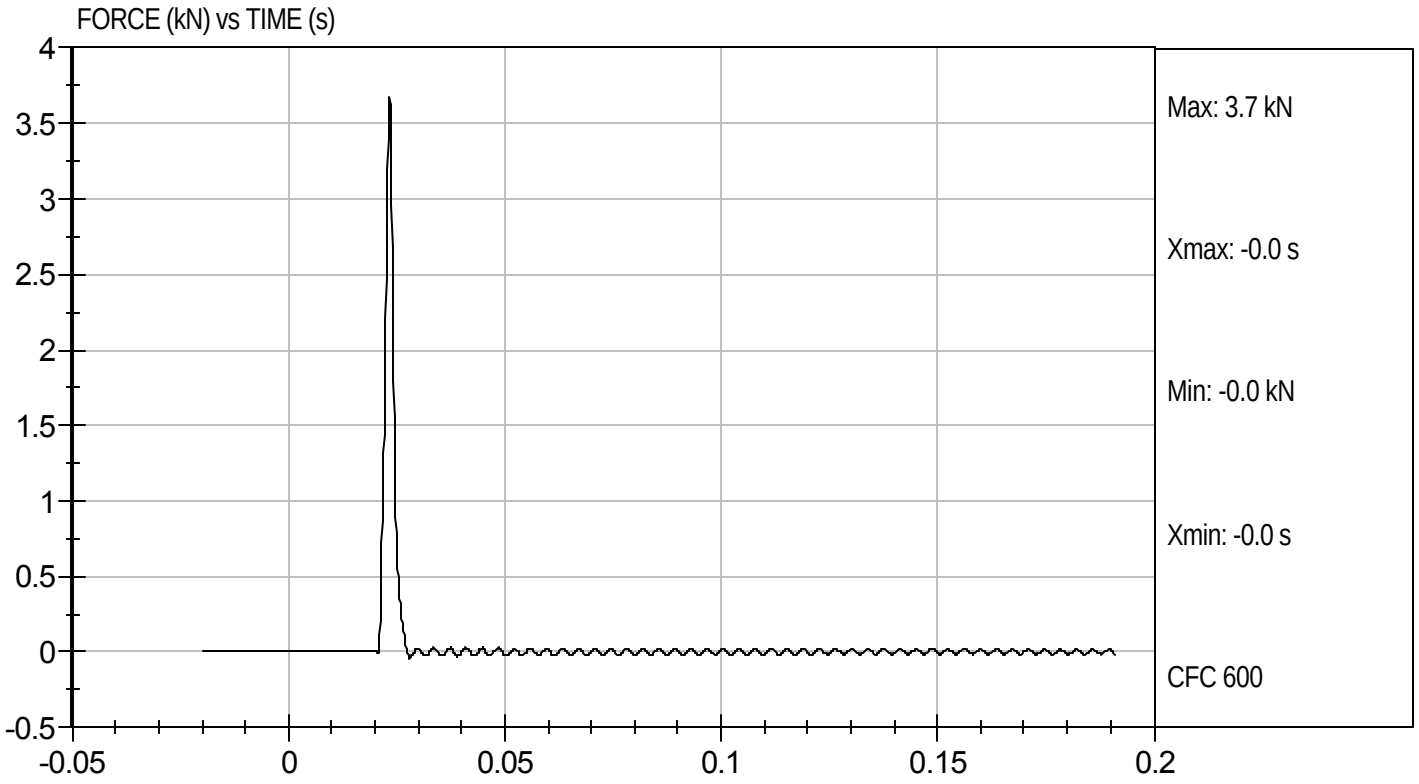
Jessica Gall
Laboratory Technician

11/1/10
Test Date

David Winkelbauer
Approved By

Test Desc: Right Knee
Component ID: D103765

Test Date: 11/1/10
Velocity: 6.92 ft/s, 2.11 m/s



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D103766

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	22.0	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	kN	3.45 to 4.06	3.67	Pass
		Overall Test Results		Pass

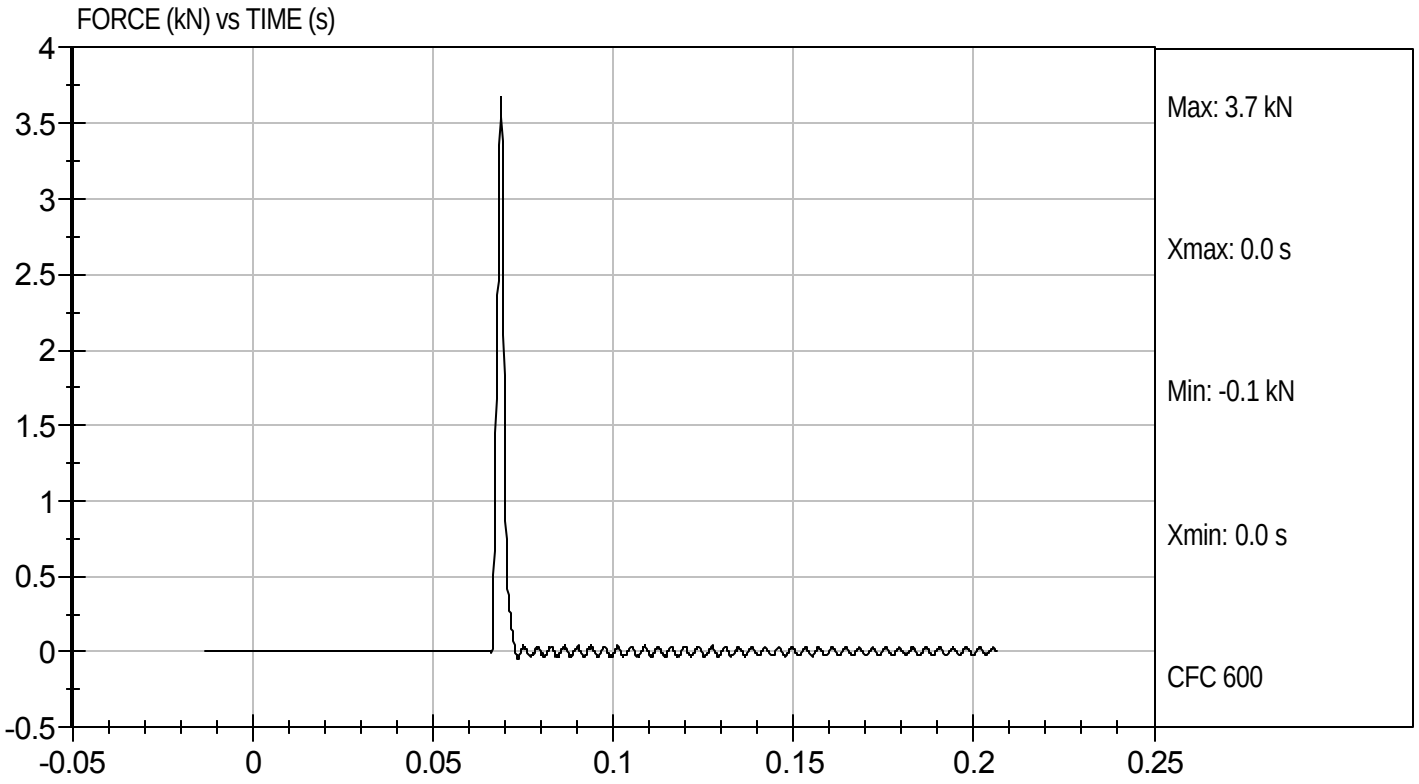
Jessica Gall
Laboratory Technician

11/1/10
Test Date

David Winkelbauer
Approved By

Test Desc: Left Knee
Component ID: D103766

Test Date: 11/1/10
Velocity: 6.94 ft/s, 2.12 m/s



MGA RESEARCH CORPORATION

TORSO FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D103767

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	29	Pass
Initial Angle	deg	0 to 20	17	Pass
Return Angle	deg	+/- 8	6	Pass
Force at 45 deg	N	320 to 390	371	Pass
Upper Torso Deflection Rate	Deg/sec	0.5 to 1.5	1.0	Pass
		Overall Result		Pass

Jessica Hall
Laboratory Technician

11/1/10
Test Date

David Winkelbauer
Approved By