REPORT NUMBER: NCAP-MGA-2011-084

NEW CAR ASSESSMENT PROGRAM (NCAP)
Frontal Barrier Impact Test

HONDA OF CANADA MFG.
2011 Acura ZDX SUV
NHTSA No.: HB5305

MGA RESEARCH CORPORATION
5000 Warren Road
Burlington, WI 53105

Test Date: June 17, 2011

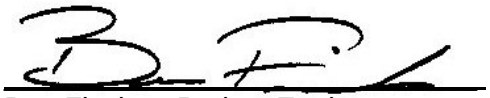
Final Report Date: July 25, 2011

FINAL REPORT

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

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

Prepared by: 
Donna Janovicz, Project Manager

Approved by: 
Ben Fischer, Project Engineer

Approval Date: July 25, 2011

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

Technical Report Documentation Page

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4. Title and Subtitle Final Report of New Car Assessment Program Frontal Impact Testing of 2011 Acura ZDX SUV NHTSA No.: HB5305		*5. Report Date* July 25, 2011 *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 June 17, 2011 to July 25, 2011 *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 ZDX 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 June 17, 2011.

The impact velocity was 56.4 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 665 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	162	301
Maximum Chest Compression	mm	63	52	23	12
Nij	N/A	1	1	0.19	0.18
Neck Tension	N	4170	2620	879	492
Neck Compression	N	4000	2520	41	85
Left Femur Force	N	10008	6805	3093	3380
Right Femur Force	N	10008	6805	3716	3758

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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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 rigid barrier was impacted by a 2011 Acura ZDX SUV at a velocity of 56.4 kph. The test was performed at MGA Research Corporation on June 17, 2011. Pre-and post-test photographs of the vehicle and dummies can be found in Appendix A.

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

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

Both ATDs were fully instrumented with head, chest and pelvis tri-axial accelerometers, chest displacement potentiometers, upper neck transducers, right/left femur load cells, and lower leg instrumentation. Seat belt load cells were on the driver's lap and shoulder belts and the passenger's lap belt to measure dummy torso and pelvic section loading. The driver (position 1) ATD (Serial No. 036) and the right-front passenger (position 2) ATD (Serial No. 634) were calibrated previous to this test. Certification details, along with verification data, are found in Appendix C of this report.

The 100 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 665 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 and steering column. 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})	162	79.8	94.8	23	0.19	879	41	3093	3716
Passenger (5^{th})	301	80.3	95.3	12	0.18	492	85	3380	3758

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

TEST NOTES

None

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 ZDX SUV
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: HB5305
Test Date: 6/17/2011

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	HB5305
Model Year	2011
Make	Acura
Model	ZDX
Body Style	SUV
VIN	2HNYB1H43BH500575
Body Color	Palladium M.
Delivery Date	6/08/2011
Odometer (mi)	159
Odometer (km)	256
Dealer	Bergstrom Acura
Transmission	Automatic
Final Drive	AWD
Type/No. Cylinders	6
Engine Displacement (L)	3.7
Engine Placement	Lateral
Roof Rack	No
Sunroof/T-Top	Yes
Tinted Glass	No
Traction Control	Yes
Power Brakes	Yes
Front Disc	Yes
Rear Disc	Yes
Does owner's manual provide instructions to turn off automatic door locks?	Yes

Anti-Lock Brakes	Yes
All Wheel Drive	Yes
Power Steering	Yes
Driver Front Airbag	Yes
Driver Curtain Airbag	Yes
Driver Head/Torso Airbag	No
Driver Torso Airbag	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	02/11

GVWR (kg)	2510
GAWR Front (kg)	1325
GAWR Rear (kg)	1215

VEHICLE SEATING AND WEIGHT CAPACITY DATA

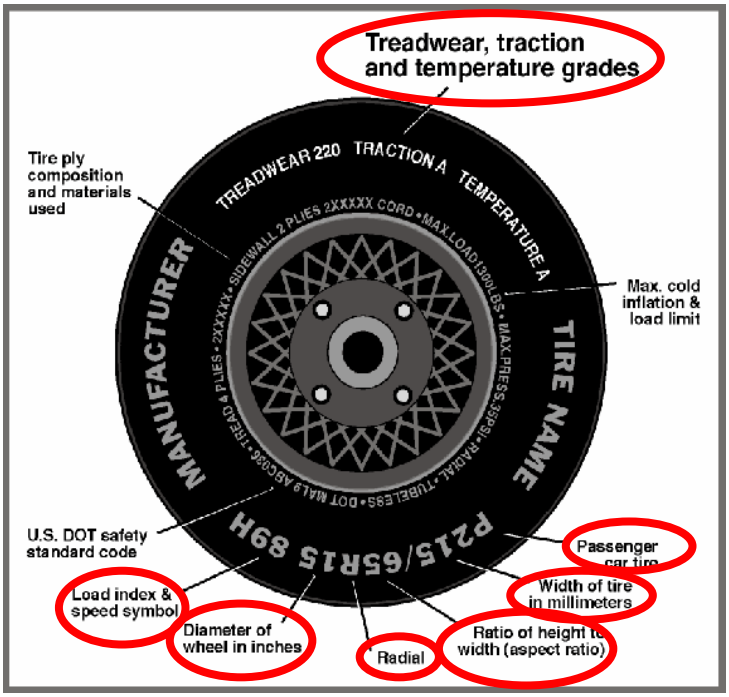
Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Split Bench		
Designated Seating Capacity (DSC)	2	3		5
Capacity Weight (VCW) (kg)				380
Cargo Weight (RCLW) (kg)				40

DATA SHEET NO. 1 (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2011 Acura ZDX SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: HB5305
Test Date: 6/17/2011



Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	220	220
Recommended Tire Size	P255/50R19	P255/50R19
Tire Size on Vehicle	P255/50R19	P255/50R19
Tire Manufacturer	Michelin	Michelin
Tire Model	Latitude	Latitude
Treadwear	440	440
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	2	2
Tire Plies Body	5	5
Load Index & Speed Symbol	103H	103H
Tire Material	Rubber	Rubber
DOT Safety Code Right	B3XX 001X 5110	B3XX 001X 5110
DOT Safety Code Left	B3XX 001X 5110	B3XX 001X 5110

DATA SHEET NO. 1 (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2011 Acura ZDX SUV NHTSA No.: HB5305
Test Program: NCAP Frontal Barrier Impact Test Test Date: 6/17/2011

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	580.6	442.7		616.9	499.0	
Right	kg	579.2	411.9		613.3	457.2	
Ratio	%	57.6	42.4		56.3	43.7	
Totals	kg	1159.8	854.6	2014.4	1230.2	956.2	2186.4

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	2014.4
Weight of 1 P572E ATD & 1 P572O ATD	kg	140.6
Rated Cargo/Luggage Weight (RCLW)	kg	40
Calculated Target Vehicle Target Weight (TVTW)	kg	2195.0

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	785	797	802	795	1169
As Tested	mm	781	782	781	783	1205
Post Test	mm	860	841	792	775	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2755
Total Vehicle Length at Left Side	mm	4570
Total Vehicle Length at Centerline	mm	4895
Total Vehicle Length at Right Side	mm	4570
Weight of Ballast in Cargo Area	kg	20.4
Weight of Vehicle Components Removed	kg	26.5
Amount of Stoddard Solvent in Fuel Tank	L	73.2

List of components removed to meet test weight: Right tail light, trunk carpet, jack & tools, plastic trim from cargo area.

DATA SHEET NO. 1 (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2011 Acura ZDX SUV NHTSA No.: HB5305
Test Program: NCAP Frontal Barrier Impact Test Test Date: 6/17/2011

TARGET VEHICLE STRUCTURAL MEASUREMENT

	Elements	Pre-Test (mm)
1	Total Length	4895
2	Total Width	1981
3	Bumper Top Height	595
4	Bumper Bottom Height	500
5	Longitudinal Member Top Height	610
6	Distance between Longitudinal Members	975
7	Longitudinal Member Width	55
8	Engine Top Height	930
9	Engine Bottom Height	260
10	Engine and Gearbox Width	790
11	Front Bumper-Engine Distance	350
12	Front Shock Absorber Fixing Height	1040
13	Bonnet Leading Edge Height	910
14	Front Shock Absorber Fixing Width	1220
15	Front Bumper – Front Axle Distance	1220
16	Front Axle – A-Pillar Distance	490
17	A-Pillar – B-Pillar Distance	1175
18	B-Pillar – Rear Axle Distance	1100
19	B-Pillar – C-Pillar Distance	600
20	Roof Sill Bottom Height	1635
21	Roof Sill Top Height	1490
22	Floor Sill bottom Height	271
23	Floor Sill Top Height	470

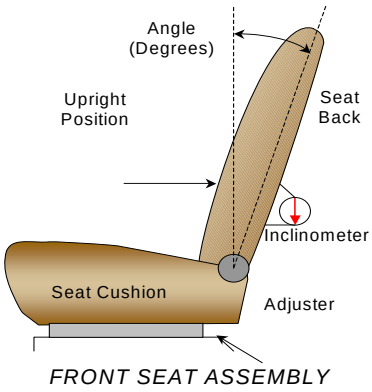
DATA SHEET NO. 2

SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

Test Vehicle: 2011 Acura ZDX SUV NHTSA No.: HB5305
Test Program: NCAP Frontal Barrier Impact Test Test Date: 6/17/2011

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	12.7° on headrest post guide
Passenger Seat Back Angle	15.1° on inboard headrest post guide

SEAT FORE/AFT POSITIONS

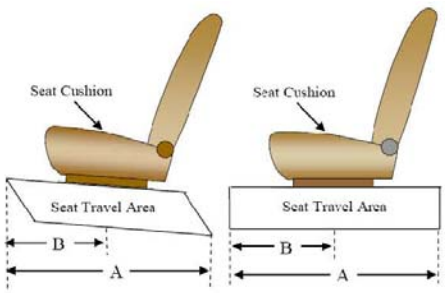
The driver and passenger seat fore/aft positions are adjusted following Appendix F, "Driver & Passenger Seating & Positioning Procedures" in the NCAP Test Procedure dated January 2010.

SEAT FORE/AFT POSITIONS	Total Fore/Aft Travel	Placed in Position #
Driver Seat	290 mm	145 mm (forward-most as 0)
Passenger Seat	238 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 (1st as 1)	0 (uppermost as 0)
Passenger Seat	4 (1st as 1)	0 (uppermost as 0)



DATA SHEET NO. 2 (CONTINUED)

SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

Test Vehicle: 2011 Acura ZDX SUV NHTSA No.: HB5305
Test Program: NCAP Frontal Barrier Impact Test Test Date: 6/17/2011

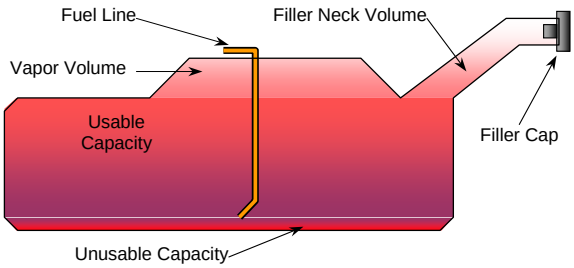
FUEL TANK CAPACITY DATA

	Liters
Usable Capacity of "Standard Tank"	78.7
Usable Capacity of "Optional" Tank	
92-94% of Usable Capacity	72.4 to 74.0
Actual Amount of Solvent used	73.2
1/3 of Usable Capacity	26.2

FUEL PUMP

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

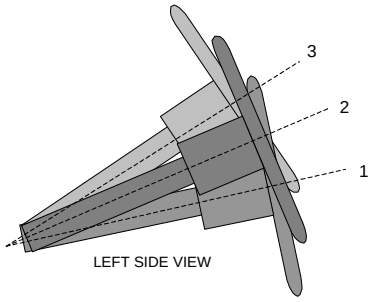
The vehicle is equipped with an electric fuel pump. After the engine start/stop switch is turned from OFF to ON mode, the pump will be filled up for two seconds, and then the pressure is maintained. The fuel pipe is on the left side.



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

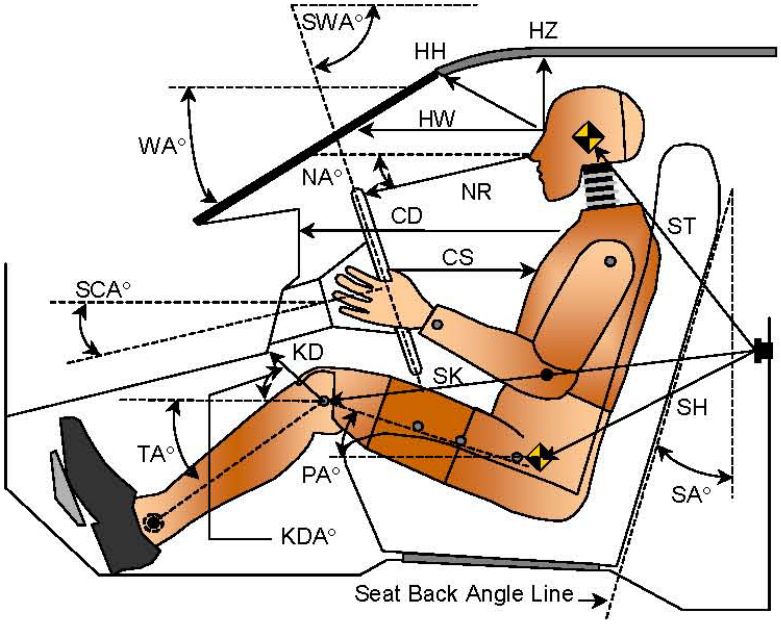
STEERING COLUMN POSITION

	Degrees	Fore/Aft Position (mm)
Lowermost – Position 1	71.8	235
Geometric Center – Position 2	68.8	215
Uppermost – Position 3	65.8	195
Telescoping Steering Wheel Travel		40
Test Position	68.8	215

DATA SHEET NO. 3

DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2011 Acura ZDX SUV NHTSA No.: HB5305
Test Program: NCAP Frontal Barrier Impact Test Test Date: 6/17/2011

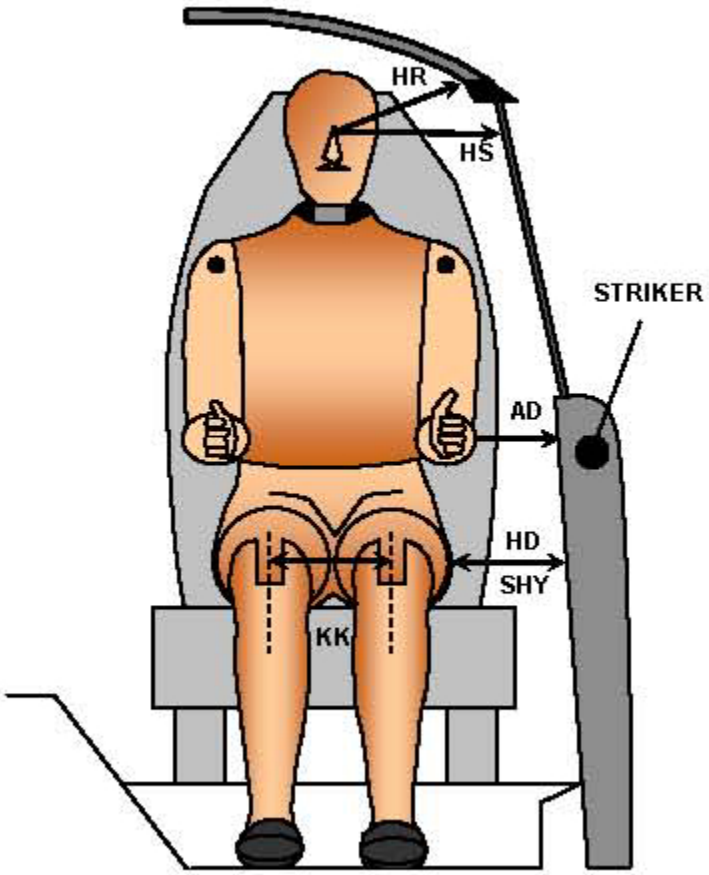


Code	Measurement Description	Driver S/N 036		Passenger S/N 634	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA	Windshield Angle		23.8		
SWA	Steering Wheel Angle		68.8		
SCA	Steering Column Angle		21.2		
SA	Seat Back Angle		12.7		15.1
HZ	Head to Roof (Z)	185	90	163	90
HH	Head to Header	320	20.7	298	35.6
HW	Head to Windshield	682	0	654	0
NR	Nose to Rim	385	8.5		
CD	Chest to Dash	531		436	
CS	Chest to Steering Hub	310	4.4		
RA	Rim to Abdomen	197	0		
KDL	Left Knee to Dash	136	31.8	91	35.8
KDR	Right Knee to Dash	113	34.2	80	39.3
PA	Pelvic Angle		23.9		22.4
TA	Tibia Angle		42.1		46.1
SK	Striker to Knee	687	87.6	767	92.3
ST	Striker to Head	548	17.6	545	35.0
SH	Striker to H-Point	302	115.8	421	104.1

DATA SHEET NO. 4

DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2011 Acura ZDX SUV NHTSA No.: HB5305
Test Program: NCAP Frontal Barrier Impact Test Test Date: 6/17/2011



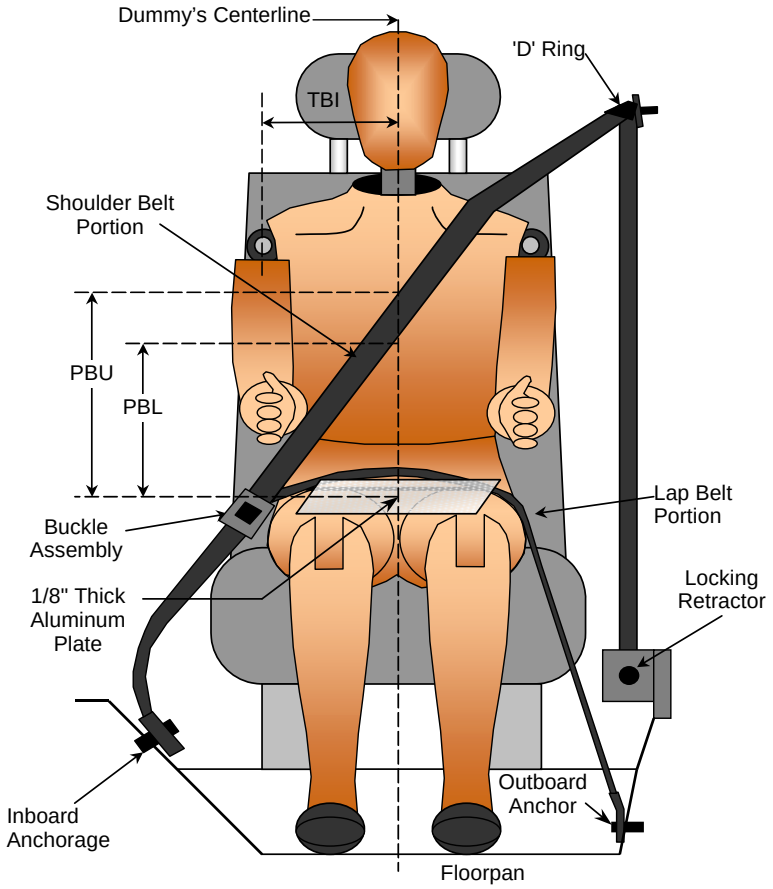
FRONT VIEW OF DUMMY

Code	Measurement Description	Driver S/N 036	Passenger S/N 634
		Length (mm)	
AD	Arm to Door	130	83
HD	H-Point to Door	183	109
HR	Head to Side Header	201	232
HS	Head to Side Window	344	475
KK	Knee to Knee	330	211
SHY	Striker to H-Point (Y Direction)	320	344
AA	Ankle to Ankle	330	173

DATA SHEET NO. 5

SEAT BELT POSITIONING DATA

Test Vehicle: 2011 Acura ZDX SUV
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: HB5305
Test Date: 6/17/2011



FRONT VIEW OF DUMMY

SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU - Top surface of reference to belt upper edge	mm	365	315
PBL - Top surface of reference to belt lower edge	mm	285	220

BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Shoulder Belt Length as measured on ATD	mm	910	930
Lap Belt Length as measured on ATD	mm	515	480
Remainder of belt on reel	mm	1845	1860
Total Belt Length for Continuous Webbing Systems	mm	3270	3270

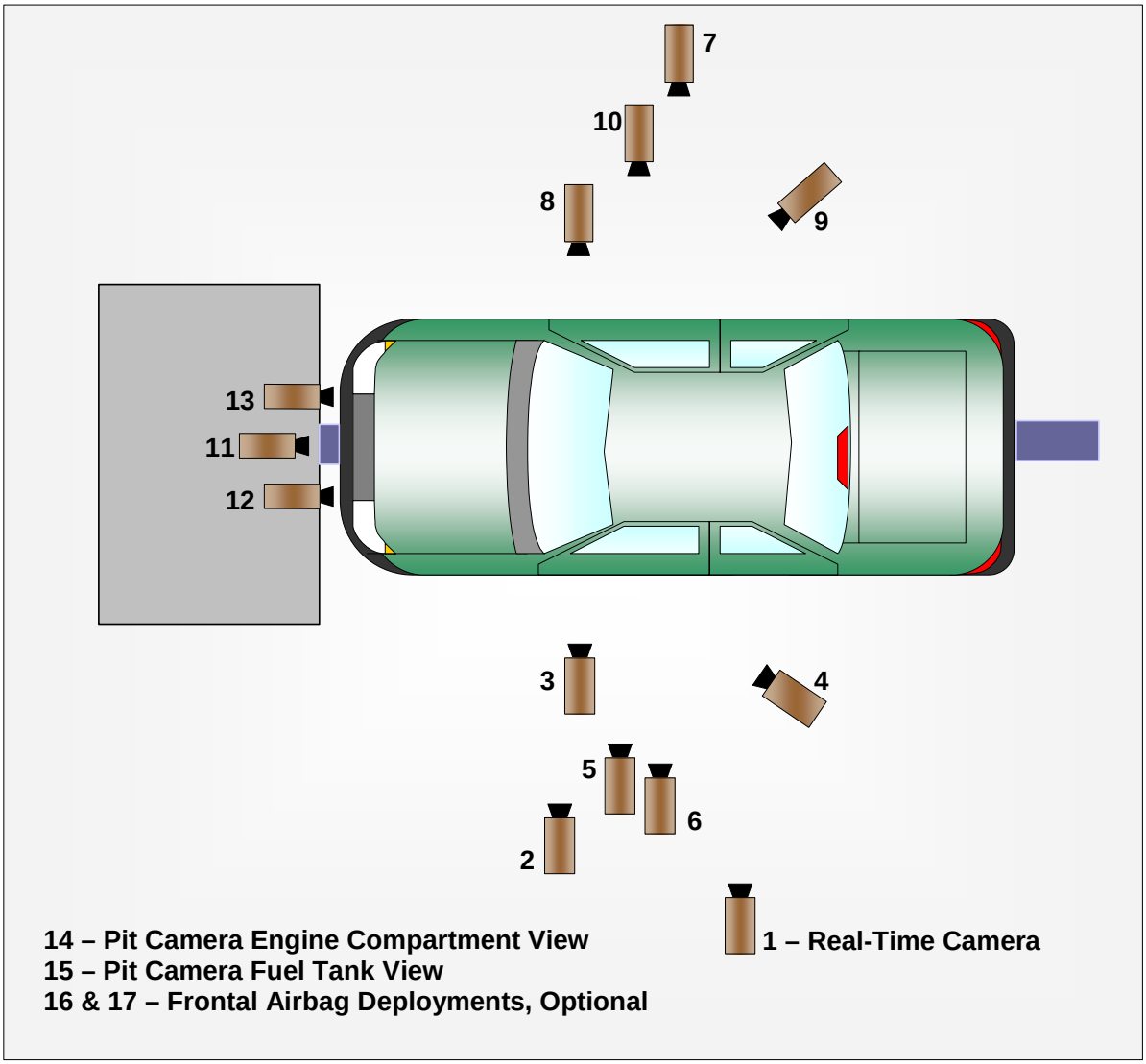
DATA SHEET NO. 6

HIGH-SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2011 Acura ZDX SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: HB5305
Test Date: 6/17/2011

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 ZDX SUV NHTSA No.: HB5305
Test Program: NCAP Frontal Barrier Impact Test Test Date: 6/17/2011

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	1210	-5090	-1090	24	1000
3	Driver Close-Up	1330	-6120	-1720	35	1000
4	Driver Angle	5290	-4840	-1730	50	1000
5	Steering Column Top	720	-5130	-1230	24	1000
6	Steering Column Bottom	700	-5100	-830	24	1000
7	Right Overall	2080	6340	-1100	20	1000
8	Passenger Close-Up	1390	6210	-1740	35	1000
9	Passenger Angle	5300	4850	-1800	50	1000
10	Right Front Half	1230	5050	-1110	24	1000
11	Windshield	-260	0	-2860	24	1000
12	Top Driver	-20	-460	-2040	12.5	1000
13	Top Passenger	-20	460	-2040	12.5	1000
14	Pit Front	1130	0	3150	24	1000
15	Pit Rear	2990	0	3150	24	1000
16	Onboard Driver Side (optional)					
17	Onboard Passenger Side (optional)					
18	Real-Time Pan View					30

*COORDINATES:

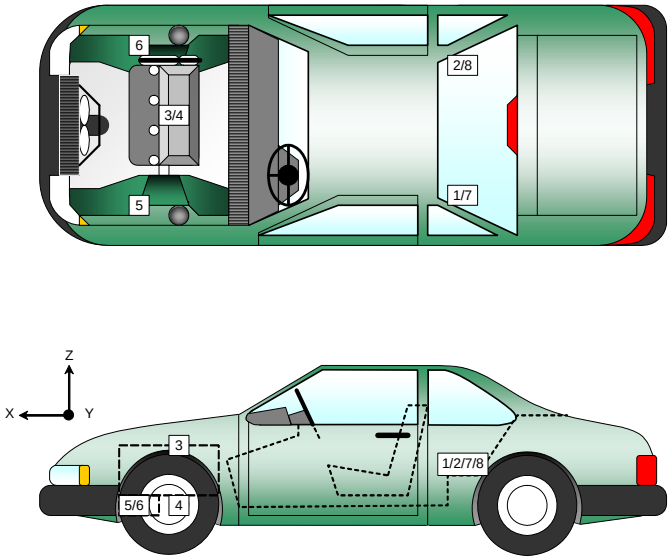
+X = forward of impact plane
+Y = right of monorail centerline
+Z = below ground level

Cameras 16 & 17 were not used for this test.

DATA SHEET NO. 7

VEHICLE ACCELEROMETER DATA

Test Vehicle: 2011 Acura ZDX SUV
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: HB5305
Test Date: 6/17/2011



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear X-Member X	1945	-340	-425
2	Right Rear X-Member X	1945	340	-425
3	Engine Top X	3792	0	-920
4	Engine Bottom X	3820	0	-320
5	Left Brake Caliper X	3850	-750	-245
6	Right Brake Caliper X	3850	750	-245
7	Left Rear X-Member Z	1945	-340	-425
8	Right Rear X-Member Z	1945	340	-425

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

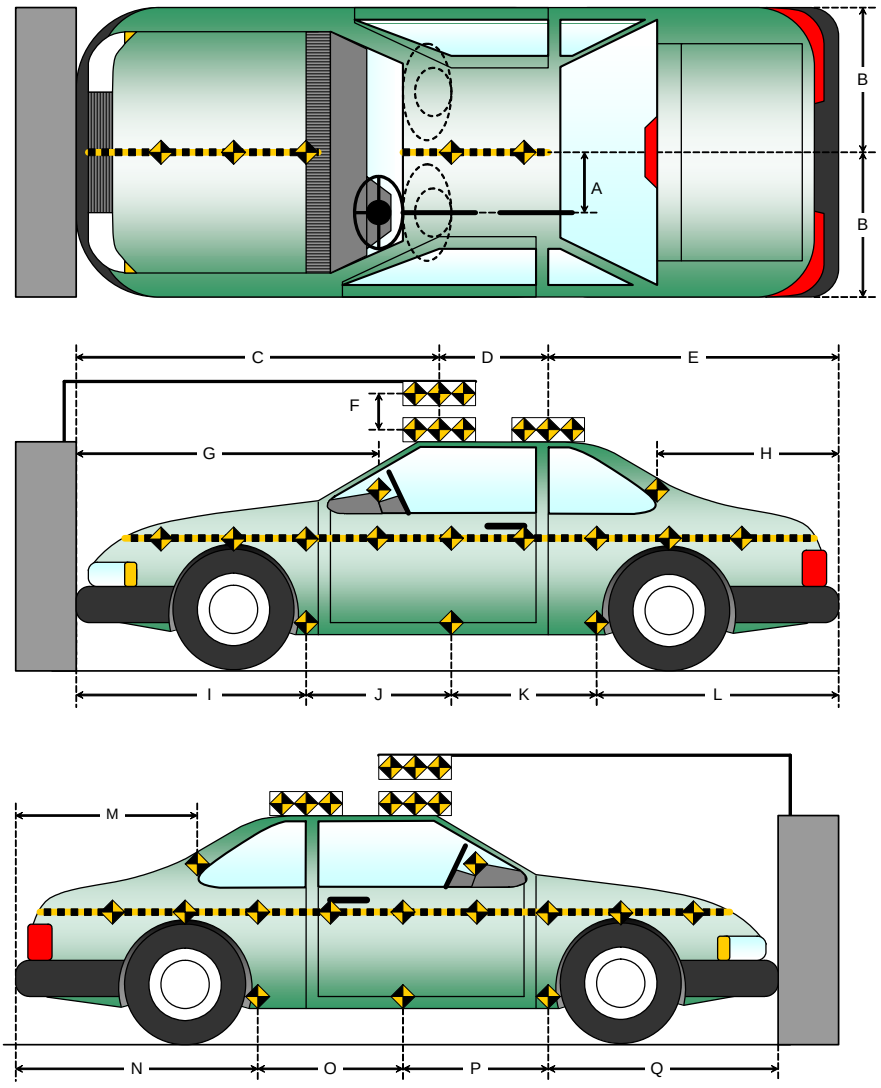
DATA SHEET NO. 8

PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2011 Acura ZDX SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: HB5305
Test Date: 6/17/2011

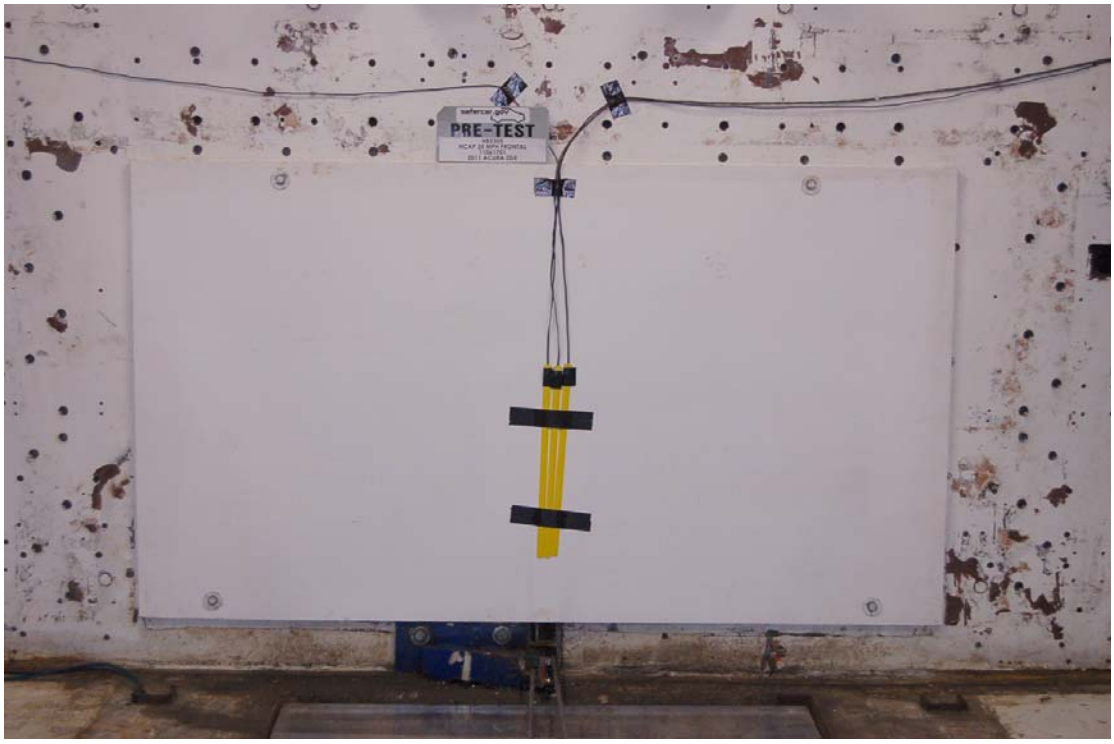
Item	Value (mm)
A	400
B	990
C	2485
D	660
E	1750
F	85
G	
H	1032
I	1595
J	888
K	888
L	1524
M	1032
N	1524
O	888
P	888
Q	1595



DATA SHEET NO. 9

FIXED BARRIER

Test Vehicle: 2011 Acura ZDX SUV NHTSA No.: HB5305
Test Program: NCAP Frontal Barrier Impact Test Test Date: 6/17/2011



DATA SHEET NO. 10

TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle: 2011 Acura ZDX SUV
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: HB5305
Test Date: 6/17/2011

INSTRUMENTATION

Driver Dummy Data Channels	46
Passenger Dummy Data Channels	46
Vehicle Structure Accelerometers	8
Barrier Channels	0
Total	100

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 ZDX SUV NHTSA No.: HB5305
Test Program: NCAP Frontal Barrier Impact Test Test Date: 6/17/2011

TEST DUMMY INFORMATION AND CONTACT

Description	Driver	Passenger
Dummy Type / Serial No.	HIII 50% / 036	HIII 5% / 634
Head Contact	Airbag, Headrest	Airbag, Headrest
Upper Torso Contact	Airbag	Airbag
Lower Torso Contact	None	None
Left Knee Contact	Knee Bolster & Steering Column	Glovebox
Right Knee Contact	Knee Bolster & Steering Column	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	442
Center	mm	450
Right Side	mm	485
Average	mm	459

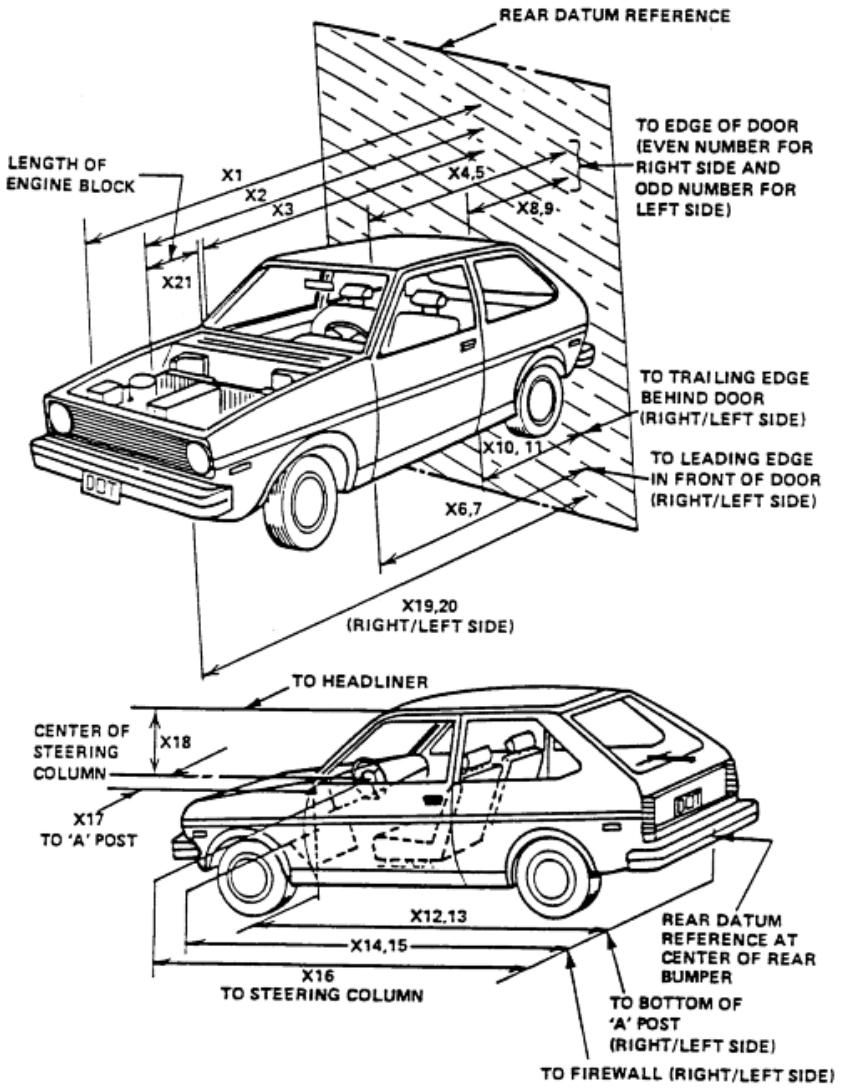
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Left Front (Driver) P1		Right Front (Passenger)	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	Yes	Yes	Yes
Knee Airbag	No		No	
Curtain Side Airbag	Yes	Disabled	Yes	Disabled
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 ZDX SUV NHTSA No.: HB5305
Test Program: NCAP Frontal Barrier Impact Test Test Date: 6/17/2011



DATA SHEET NO. 12 (CONTINUED)

VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2011 Acura ZDX SUV NHTSA No.: HB5305
Test Program: NCAP Frontal Barrier Impact Test Test Date: 6/17/2011

RSOV (Rear Surface of Vehicle)

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	mm	4895	4230	665
2	RSOV to Front of Engine	mm	4170	3910	260
3	RSOV to Firewall	mm	3750	3750	0
4	RSOV to Upper Leading Edge of Right Door	mm	3172	3170	2
5	RSOV to Upper Leading Edge of Left Door	mm	3172	3168	4
6	RSOV to Lower Leading Edge of Right Door	mm	3140	3137	3
7	RSOV to Lower Leading Edge of Left Door	mm	3140	3137	3
8	RSOV to Upper Trailing Edge of Right Door	mm	2030	2030	0
9	RSOV to Upper Trailing Edge of Left Door	mm	2030	2030	0
10	RSOV to Lower Trailing Edge of Right Door	mm	2055	2055	0
11	RSOV to Lower Trailing Edge of Left Door	mm	2055	2052	3
12	RSOV to Bottom of “A” Post of Right Side	mm	3180	3177	3
13	RSOV to Bottom of “A” Post of Left Side	mm	3180	3178	2
14	RSOV to Firewall, Right Side	mm	3780	3775	5
15	RSOV to Firewall, Left Side	mm	3770	3766	4
16	RSOV to Steering Column	mm	2765	2755	10
17	Center of Steering Column to “A” Post	mm	357	*	*
18	Center of Steering Column to Headliner	mm	400	*	*
19	RSOV to Right Side of Front Bumper	mm	4570	4253	317
20	RSOV to Left Side of Front Bumper	mm	4570	4302	268
21	Length of Engine Block	mm	495	495	0
RD	RSOV to Right Side of Dash Panel	mm	2945	2942	3
CD	RSOV to Center of Dash Panel	mm	2975	2973	2
LD	RSOV to Left Side of Dash Panel	mm	2940	2940	0

* Steering Column Tilt Mechanism Broke.

DATA SHEET NO. 13

ACCIDENT INVESTIGATION DIVISION DATA

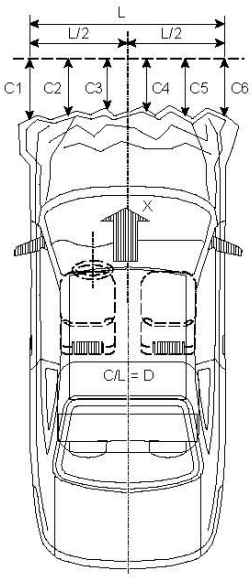
Test Vehicle: 2011 Acura ZDX SUV NHTSA No.: HB5305
Test Program: NCAP Frontal Barrier Impact Test Test Date: 6/17/2011

VEHICLE INFORMATION

VIN: 2HNYB1H43BH500575 Wheelbase (mm): 2755
Vehicle Size Category: MPV Test Weight (kg): 2186.4

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): 56.4
Velocity Change (km/h): 64.7
Time of Separation (msec): 114.7



CRUSH PROFILE

Collision Deformation Classification: Frontal
Midpoint of Damage: Centerline
Damage Region Length (mm): 1472
Impact Mode: Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	4570	4302	268
C2	Crush zone 2 at left side	mm	4673	4298	375
C3	Crush zone 3 at left side	mm	4755	4276	479
C4	Crush zone 4 at right side	mm	4755	4266	489
C5	Crush zone 5 at right side	mm	4673	4270	403
C6	Crush zone 6 at right side	mm	4570	4253	317
L	C1 TO C6	mm	1472	1468	4

DATA SHEET NO. 14

VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2011 Acura ZDX SUV
Test Program: NCAP Frontal Barrier Impact Test

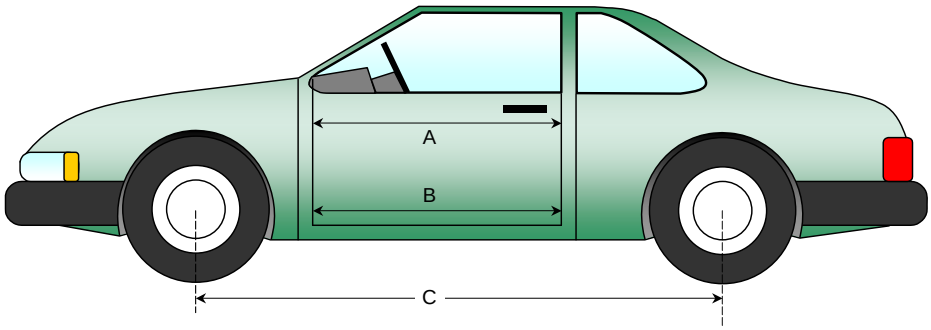
NHTSA No.: HB5305
Test Date: 6/17/2011

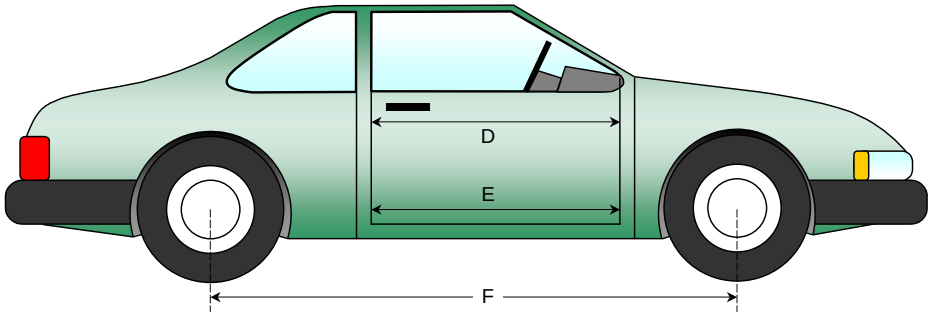
DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	1021	1021	0
B	Left Side Lower	mm	935	937	-2
D	Right Side Upper	mm	1018	1018	0
E	Right Side Lower	mm	935	935	0

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2755	2680	75
F	Right Side Wheelbase	mm	2755	2632	123





DATA SHEET NO. 14 (CONTINUED)

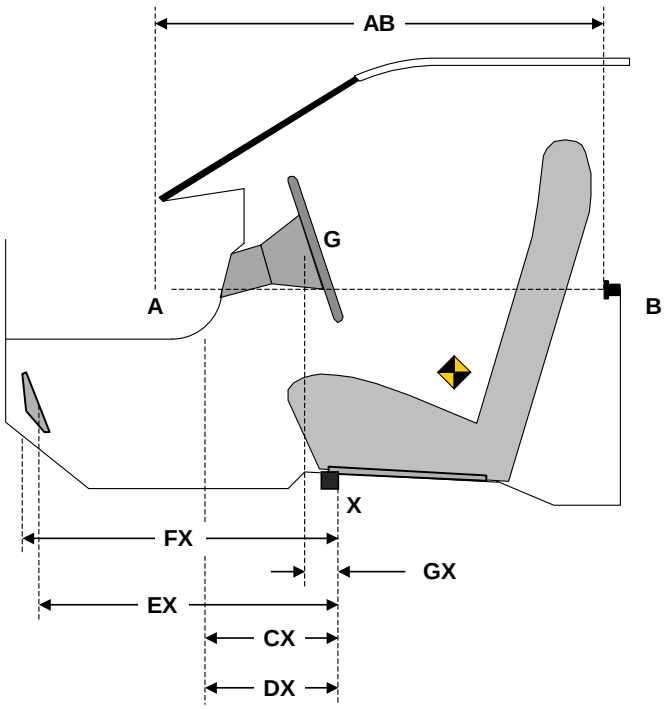
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2011 Acura ZDX SUV
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: HB5305
Test Date: 6/17/2011

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside window jam)	mm	875	877	-2
CX	Left Knee Bolster to X	mm	275	272	3
DX	Right Knee Bolster to X	mm	275	272	3
EX	Brake Pedal to X	mm	580	530	50
FX	Foot Rest to X	mm	585	580	5
GX	Center of Steering Column Wheel Hub to X	mm	56	48	8

X = Front of Seat Track (stationary)

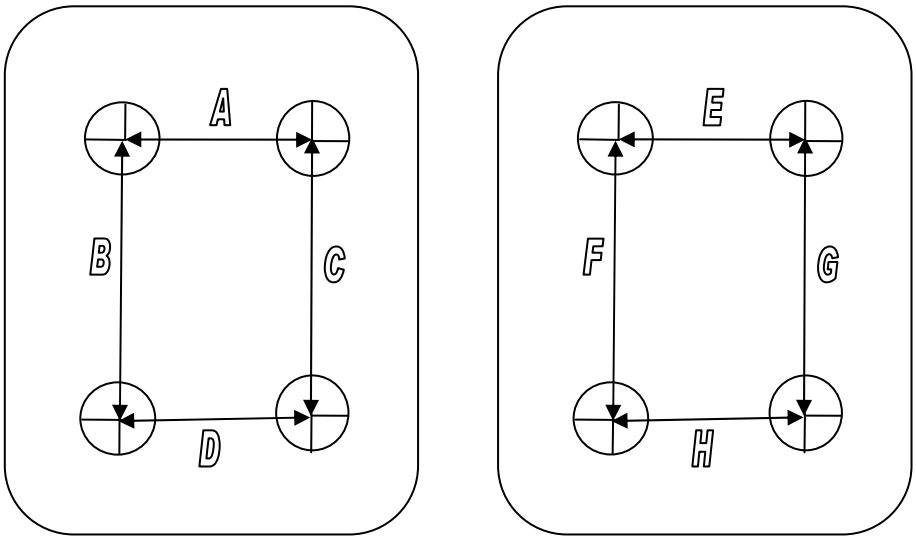


DRIVER COMPARTMENT

DATA SHEET NO. 14 (CONTINUED)

VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2011 Acura ZDX SUV NHTSA No.: HB5305
Test Program: NCAP Frontal Barrier Impact Test Test Date: 6/17/2011



Driver Passenger

TOP VIEW THROUGH FLOOR PAN

UNDERBODY FLOORBOARD DEFORMATION

Measurement	Units	Pre-Test	Post-Test	Difference
A	mm	325	324	1
B	mm	195	195	0
C	mm	192	193	-1
D	mm	325	325	0
E	mm	325	325	0
F	mm	185	185	0
G	mm	200	200	0
H	mm	325	325	0

DATA SHEET NO. 15

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

Test Vehicle: 2011 Acura ZDX SUV NHTSA No.: HB5305
Test Program: NCAP Frontal Barrier Impact Test Test Date: 6/17/2011

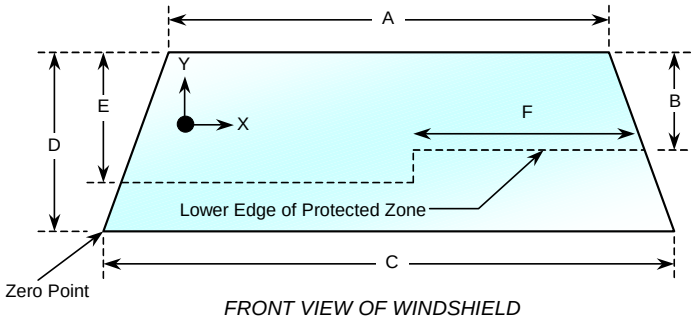
Windshield Mounting Details:
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

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	2259	2259	100
Right Side	2259	2259	100
Total	4518	4518	100



FRONT VIEW OF WINDSHIELD

Item	Units	Value
A	mm	1312
B	mm	500
C	mm	1570
D	mm	818
E	mm	529
F	mm	486

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 ZDX SUV NHTSA No.: HB5305
Test Program: NCAP Frontal Barrier Impact Test Test Date: 6/17/2011

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

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

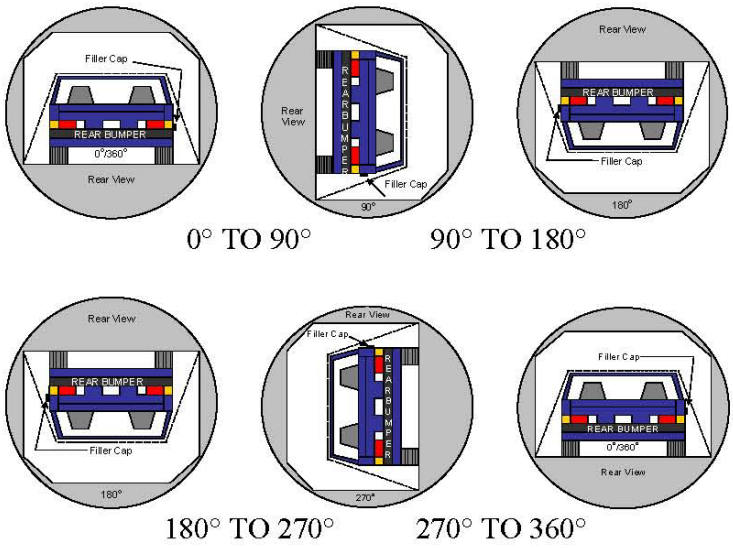
A. From impact until vehicle motion ceases: 0 oz.
(Maximum Allowable = 1 ounce)
B. For the 5 minute period after motion ceases: None
(Maximum allowable = 5 ounces)
C. For the following 25 minutes: None
(Maximum allowable = 1 oz./minute)
D. Spillage Details: None

DATA SHEET NO. 16

FMVSS 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2011 Acura ZDX SUV NHTSA No.: HB5305
Test Program: NCAP Frontal Barrier Impact Test Test Date: 6/17/2011

1. The specified fixture rollover rate for each 90° of rotation is 60 to 180 seconds.
2. The position hold time at each position is 300 seconds (minimum).
3. Details of Stoddard Solvent spillage: **None**



SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	117	300	417
90° to 180°	111	300	411
180° to 270°	105	300	405
270° to 360°	112	300	412

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

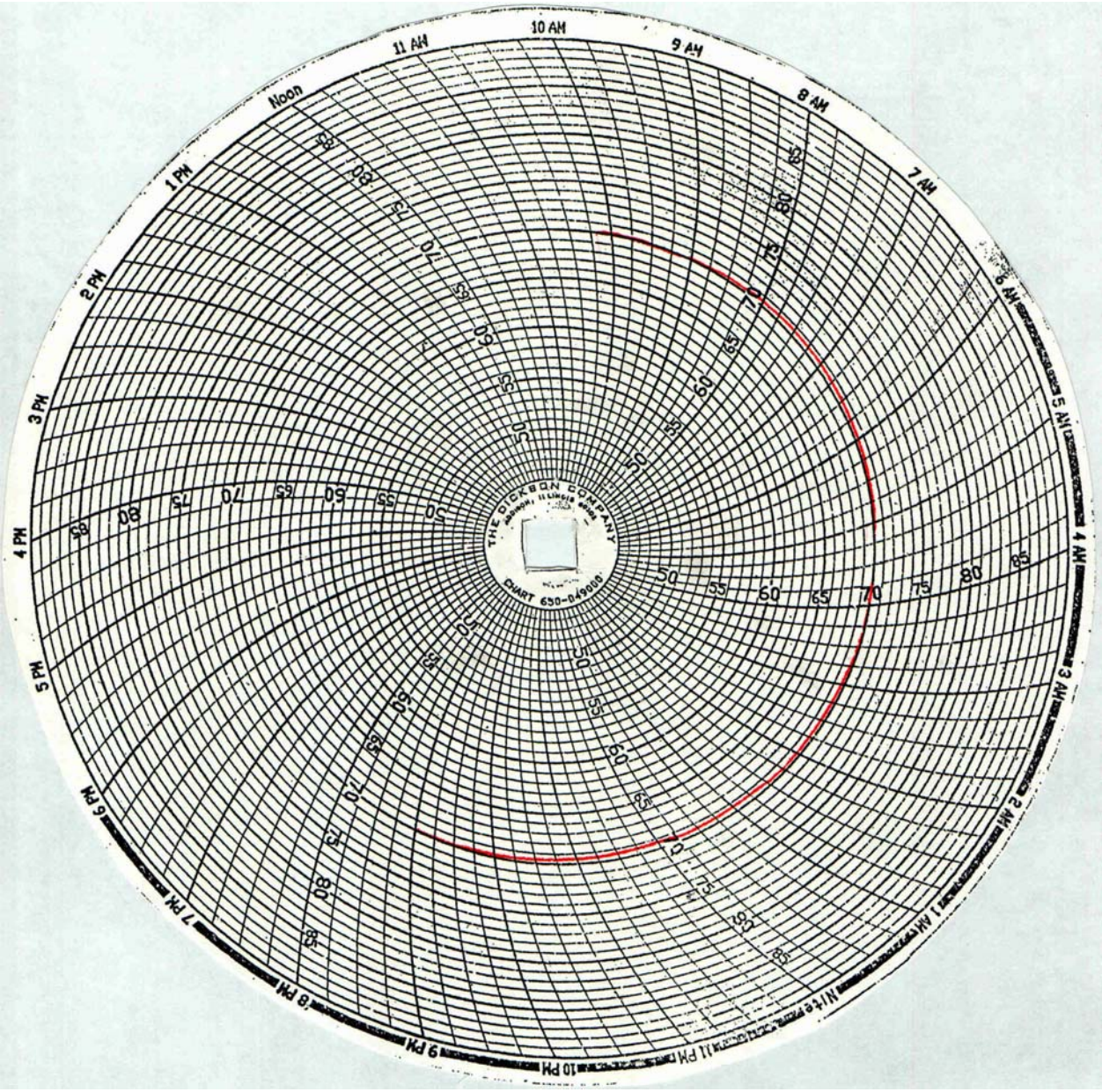
ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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 ZDX SUV NHTSA No.: HB5305
Test Program: NCAP Frontal Barrier Impact Test Test Date: 6/17/2011



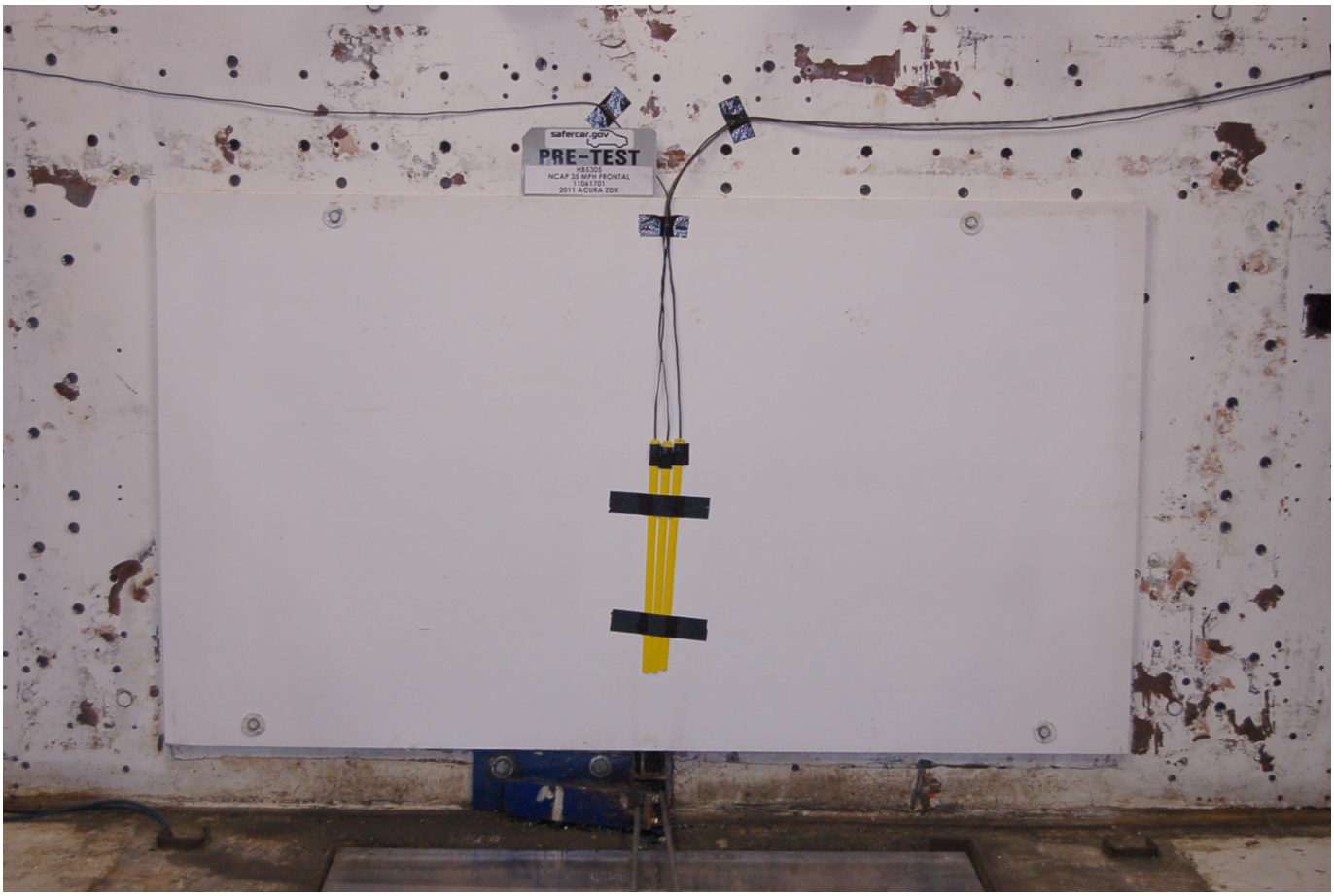
APPENDIX A

PHOTOGRAPHS

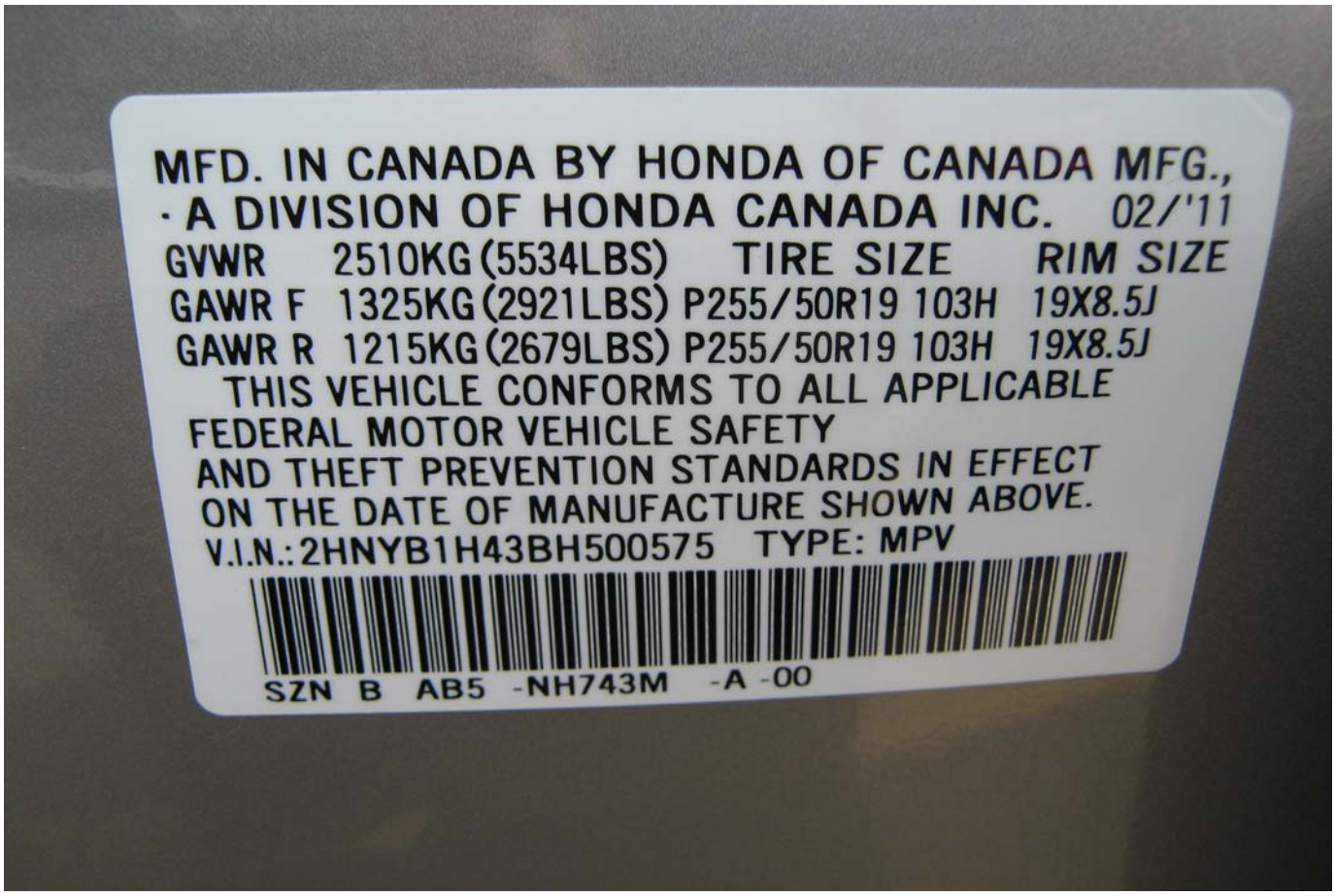
TABLE OF PHOTOGRAPHS

PHOTOGRAPH NOT APPLICABLE

Load Cell Location



Barrier Wall



Manufacturer's Label

Tire Placard

Right Front Three-Quarter View, As Received

Left Rear Three-Quarter View, As Received

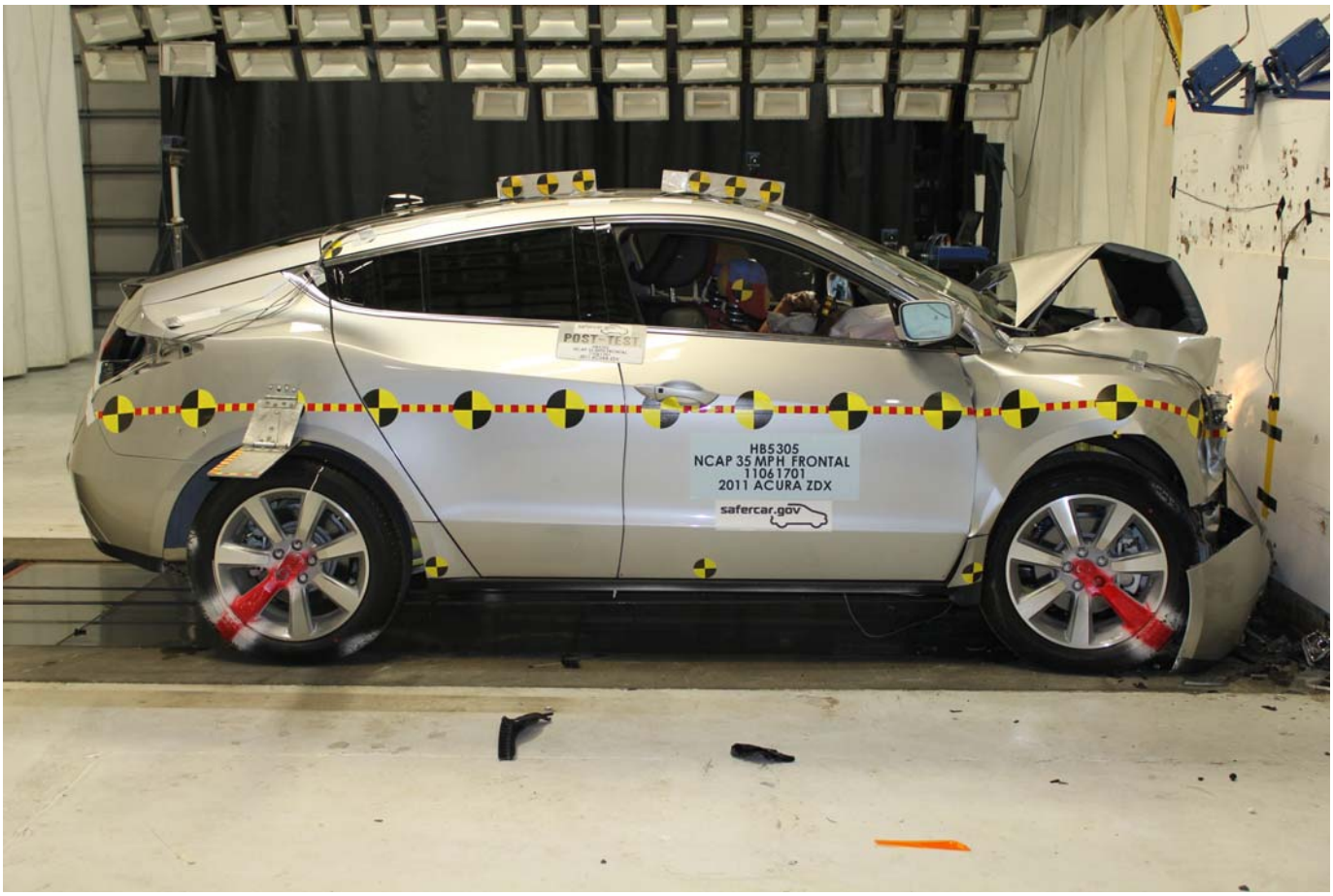
Pre-Test Front View

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

PHOTOGRAPH NOT AVAILABLE

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

PHOTOGRAPH NOT AVAILABLE

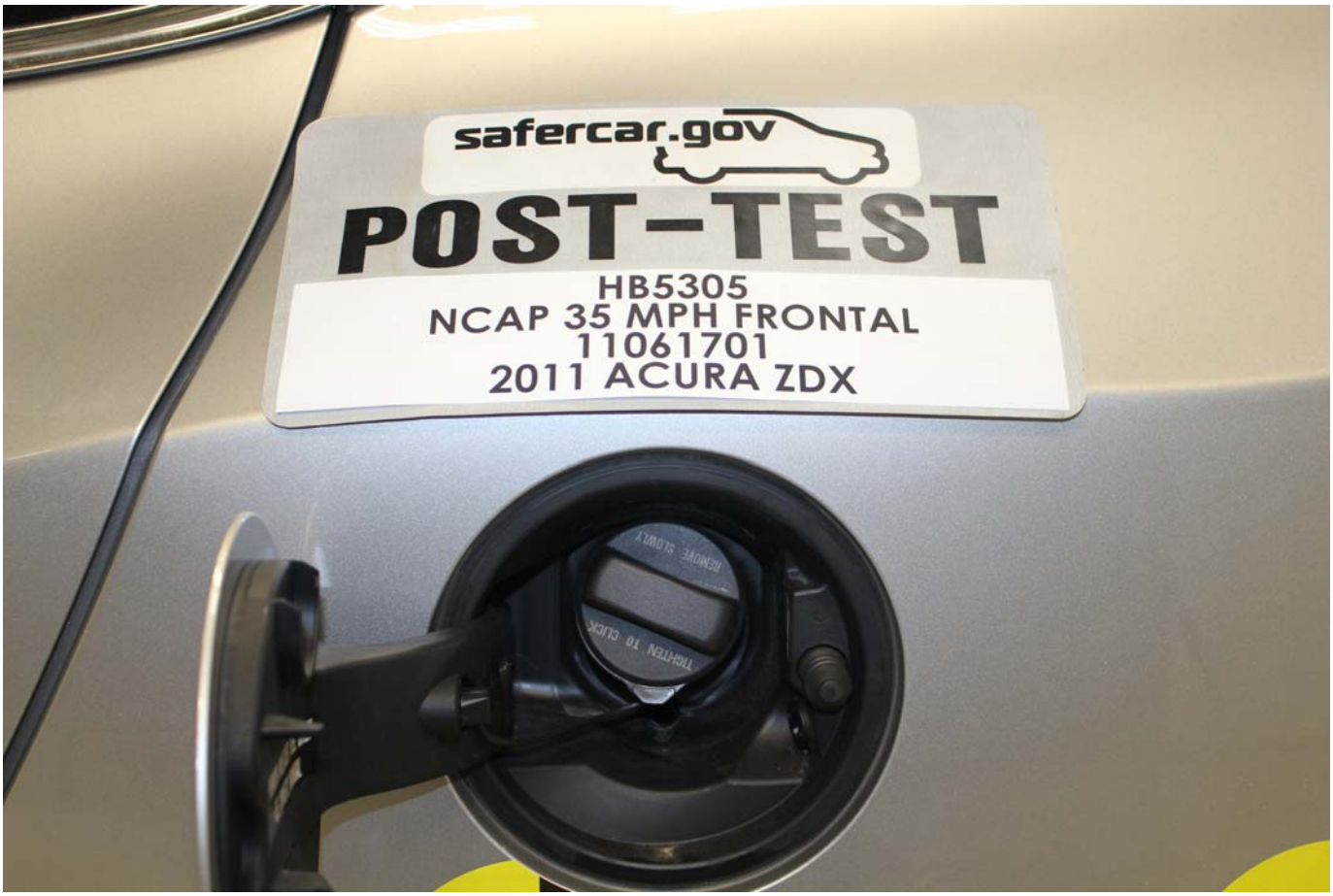
Pre-Test Windshield View

Post-Test Windshield View

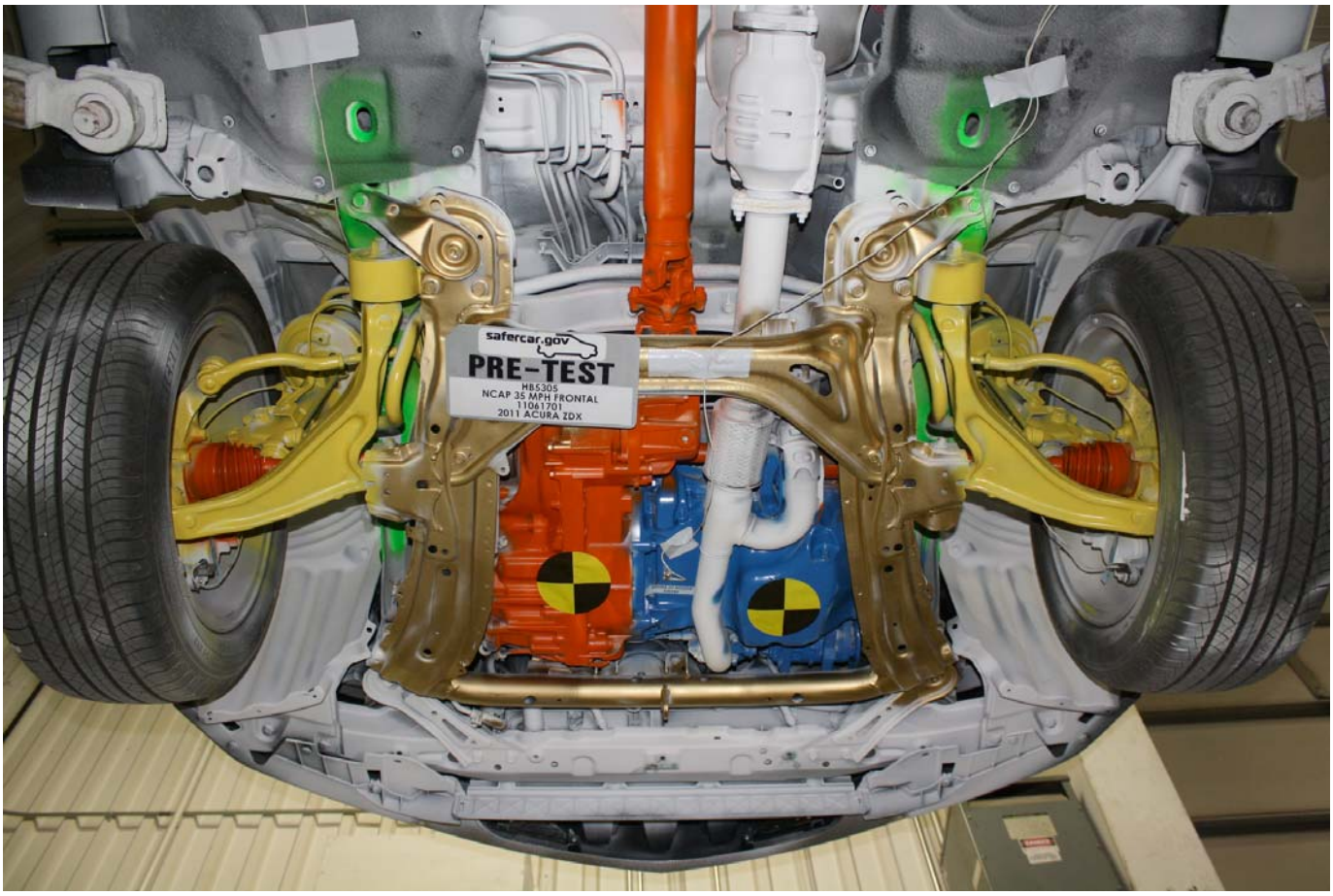
Pre-Test Engine Compartment View

Post-Test Engine Compartment View

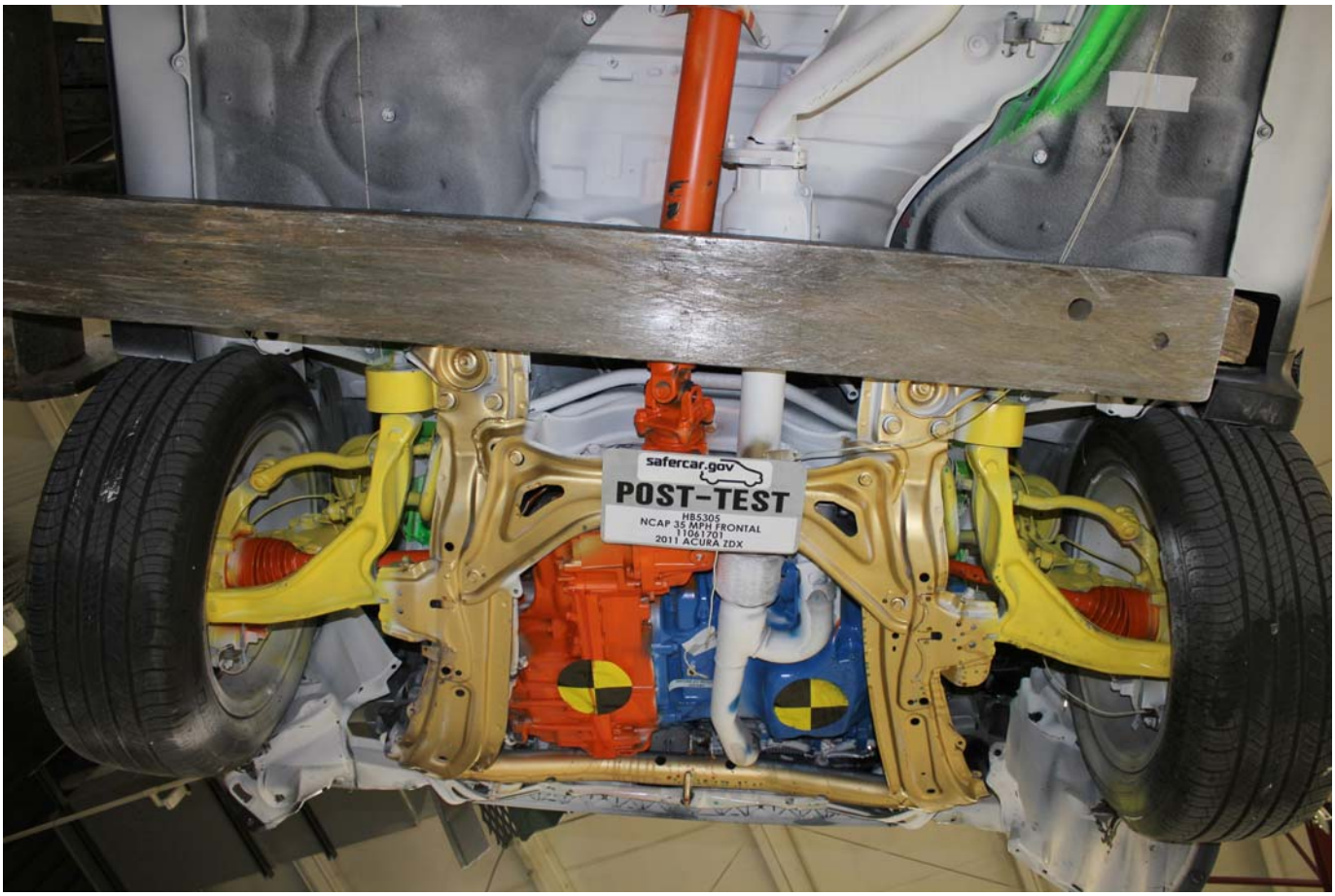
Pre-Test Fuel Cap View



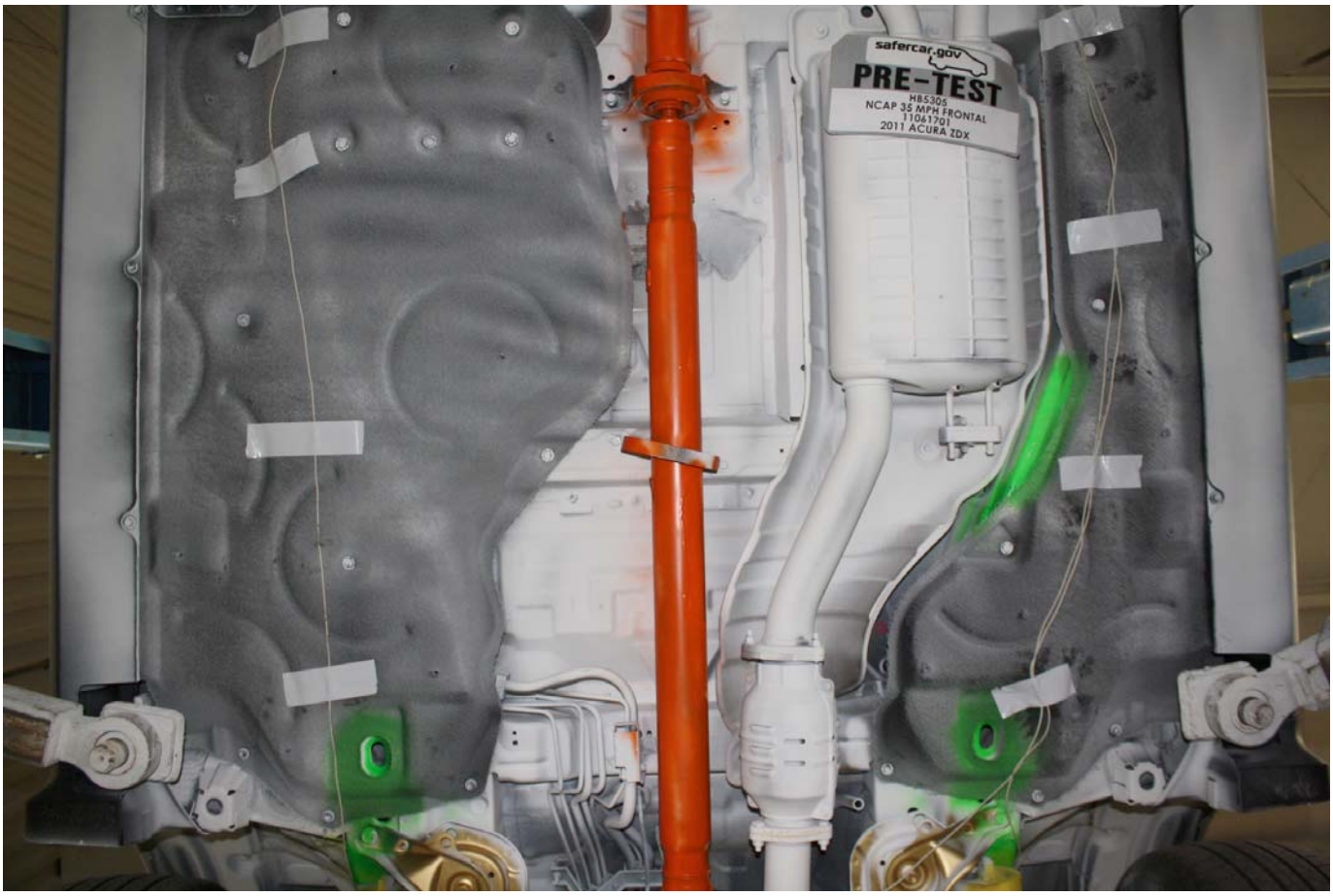
Post-Test Fuel Cap View



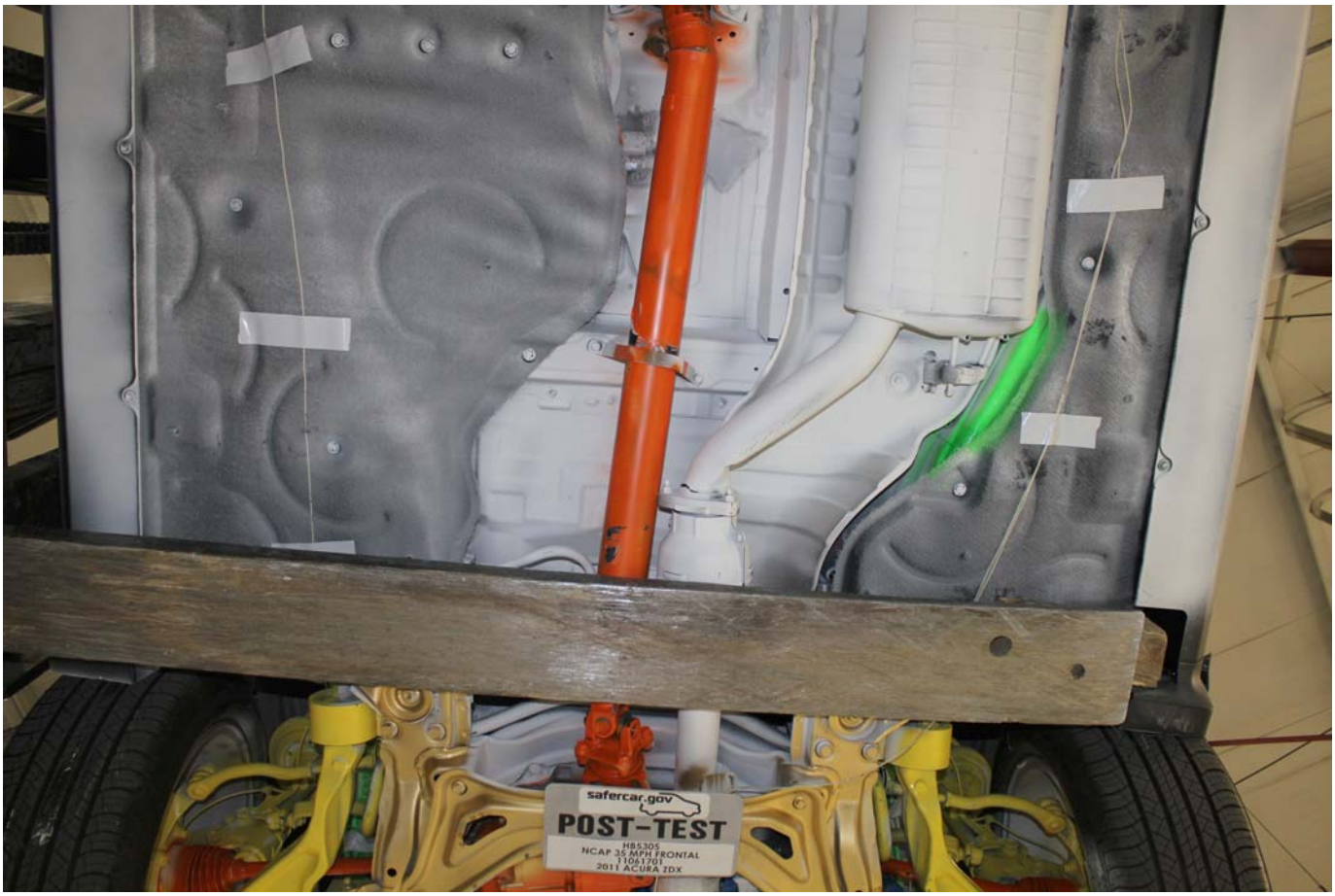
Pre-Test Front Underbody View



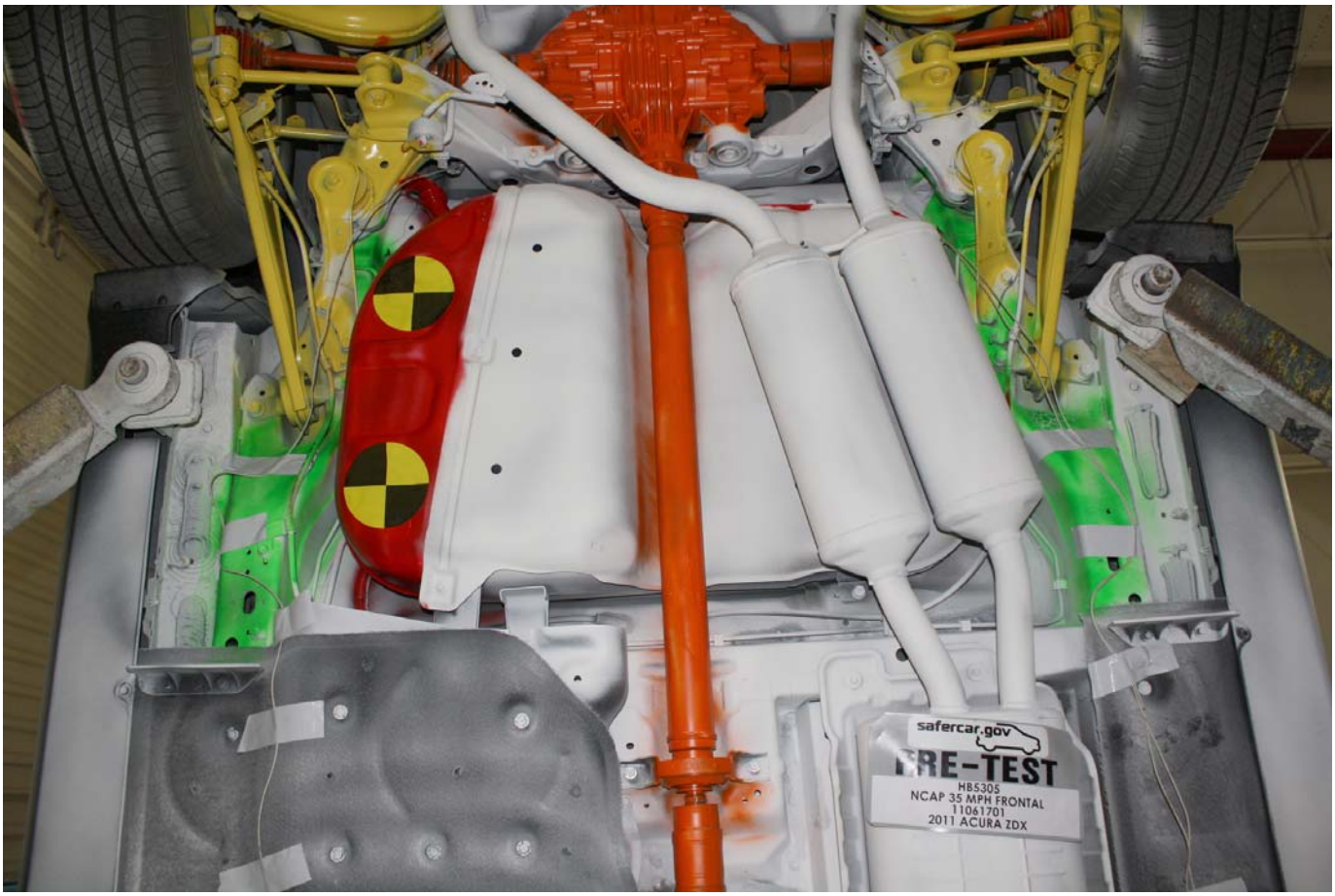
Post-Test Front Underbody View



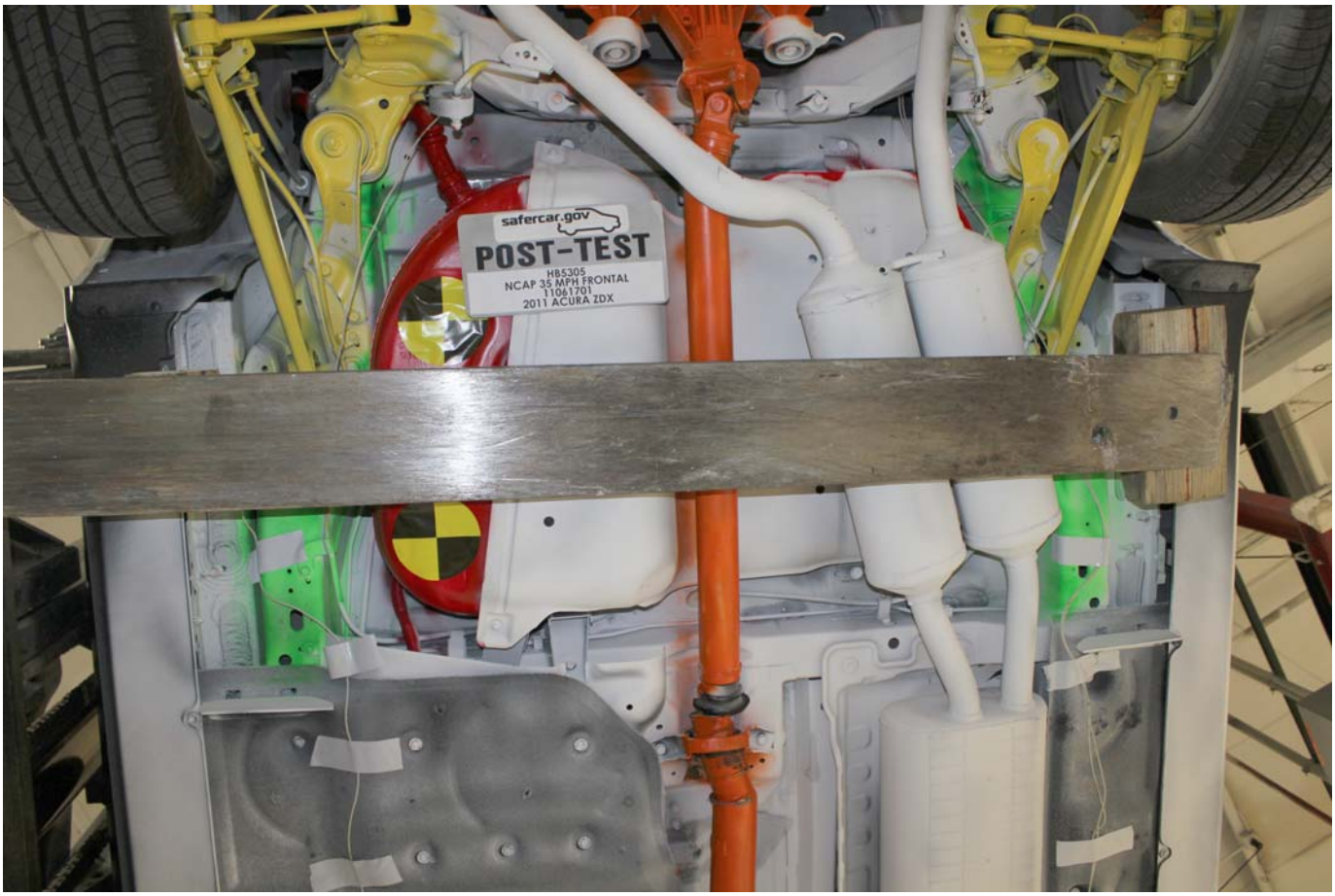
Pre-Test Mid Front Underbody View



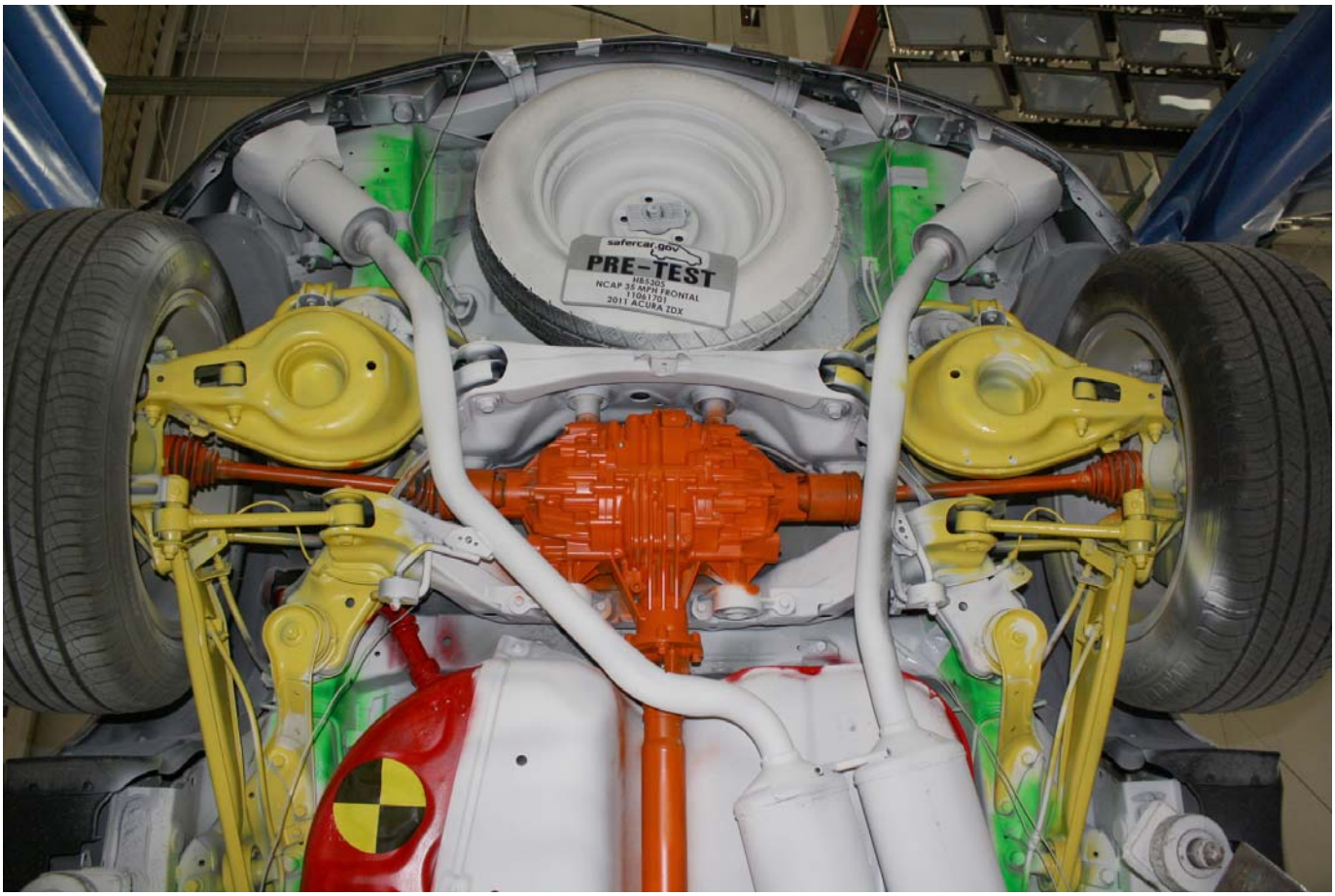
Post-Test Mid Front Underbody View



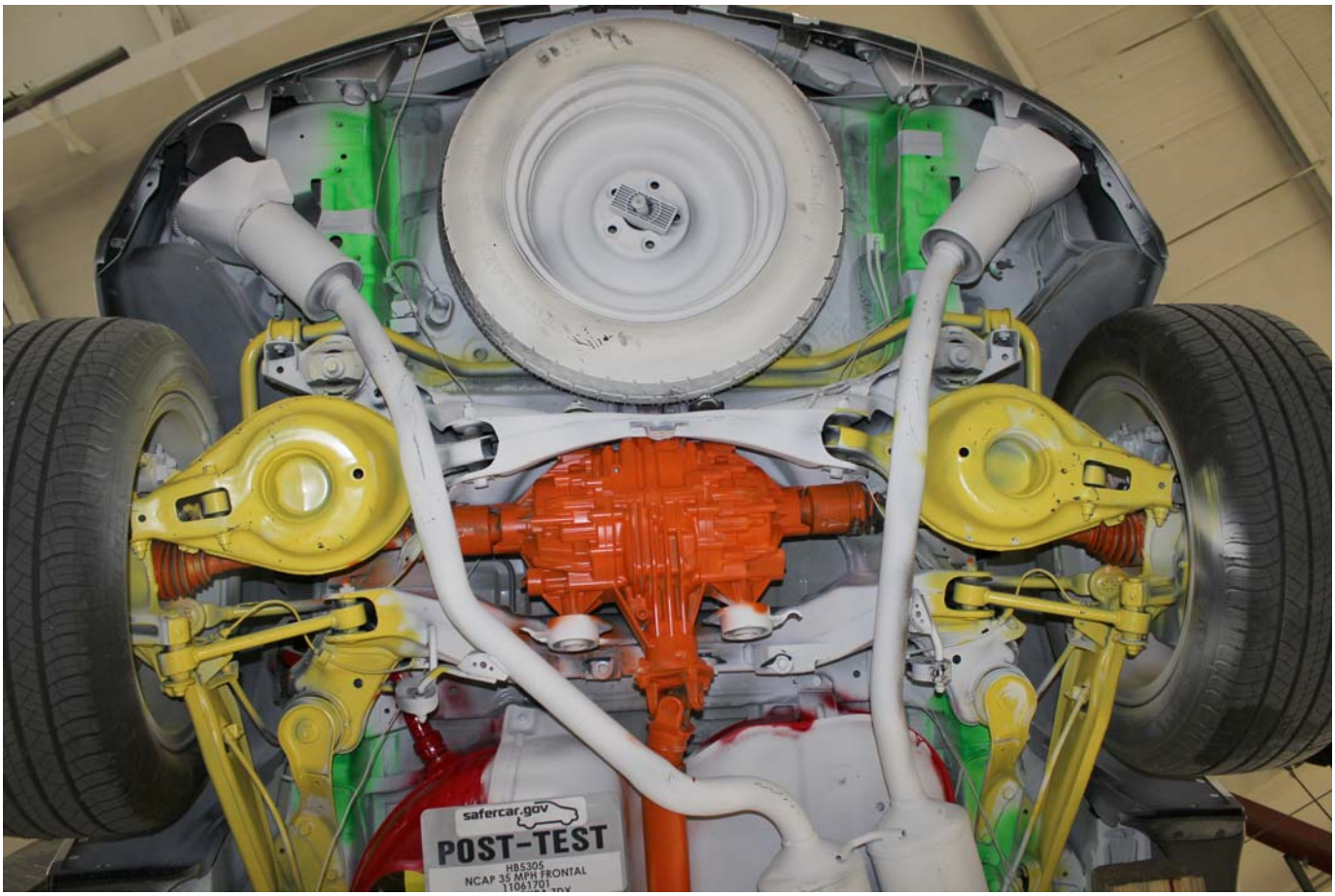
Pre-Test Mid Rear Underbody View



Post-Test Mid Rear Underbody View



Pre-Test Rear Underbody View



Post-Test Rear Underbody View

Pre-Test Dummy Cable Routing

Post-Test Dummy Cable Routing

Pre-Test Driver Dummy Front View

Post-Test Driver Dummy Front View

Pre-Test Driver Dummy Window View

Post-Test Driver Dummy Window View

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

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

Pre-Test Driver's Seat Fore-Aft Markings

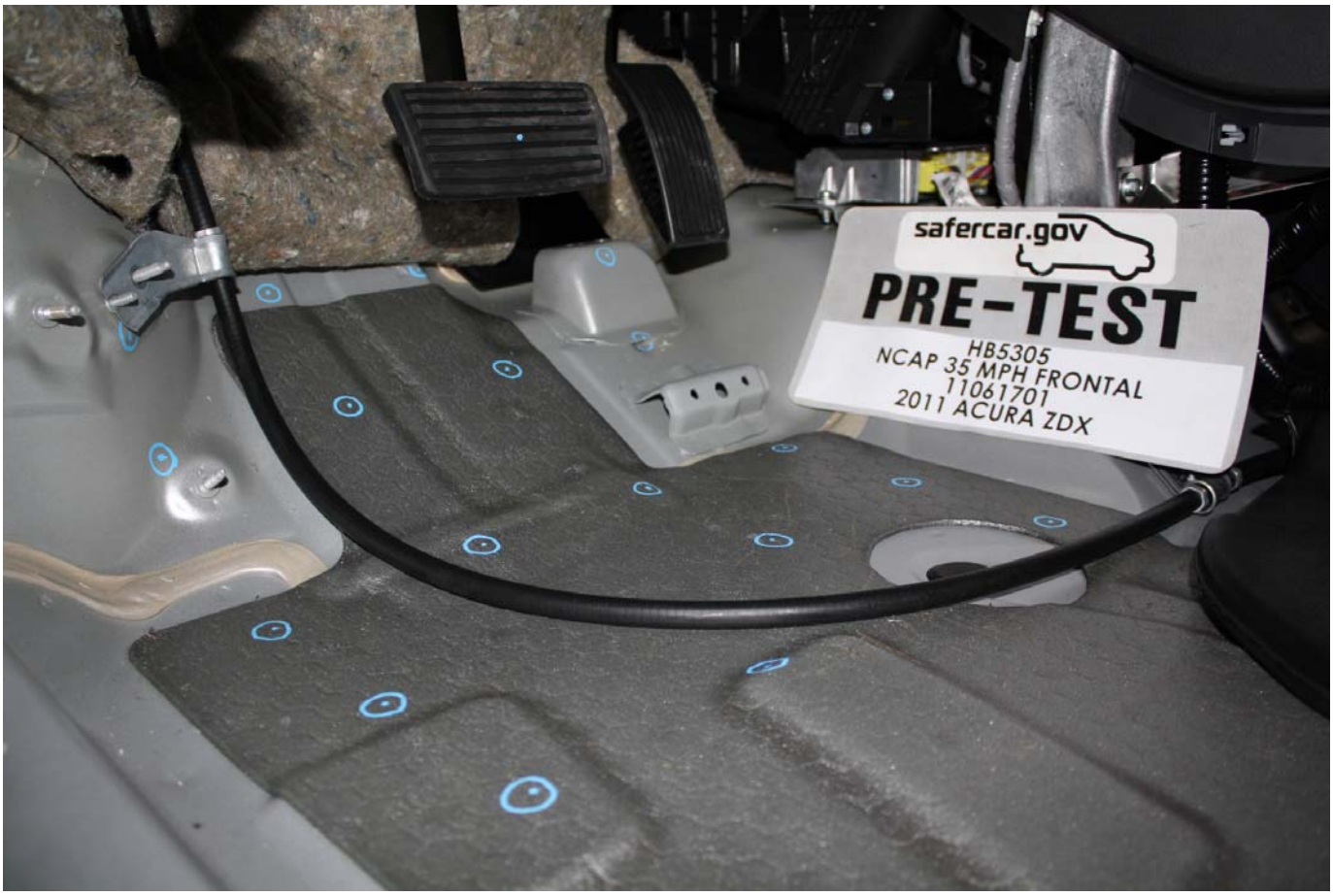
Post-Test Driver's Seat Fore-Aft Markings

Pre-Test Driver Dummy Feet

Post-Test Driver Dummy Feet

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

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



Pre-Test Driver's Side Floorpan

Post-Test Driver's Side Floorpan

Post-Test Driver Dummy Contact with Airbag

Post-Test Driver Dummy Contact with Headrest

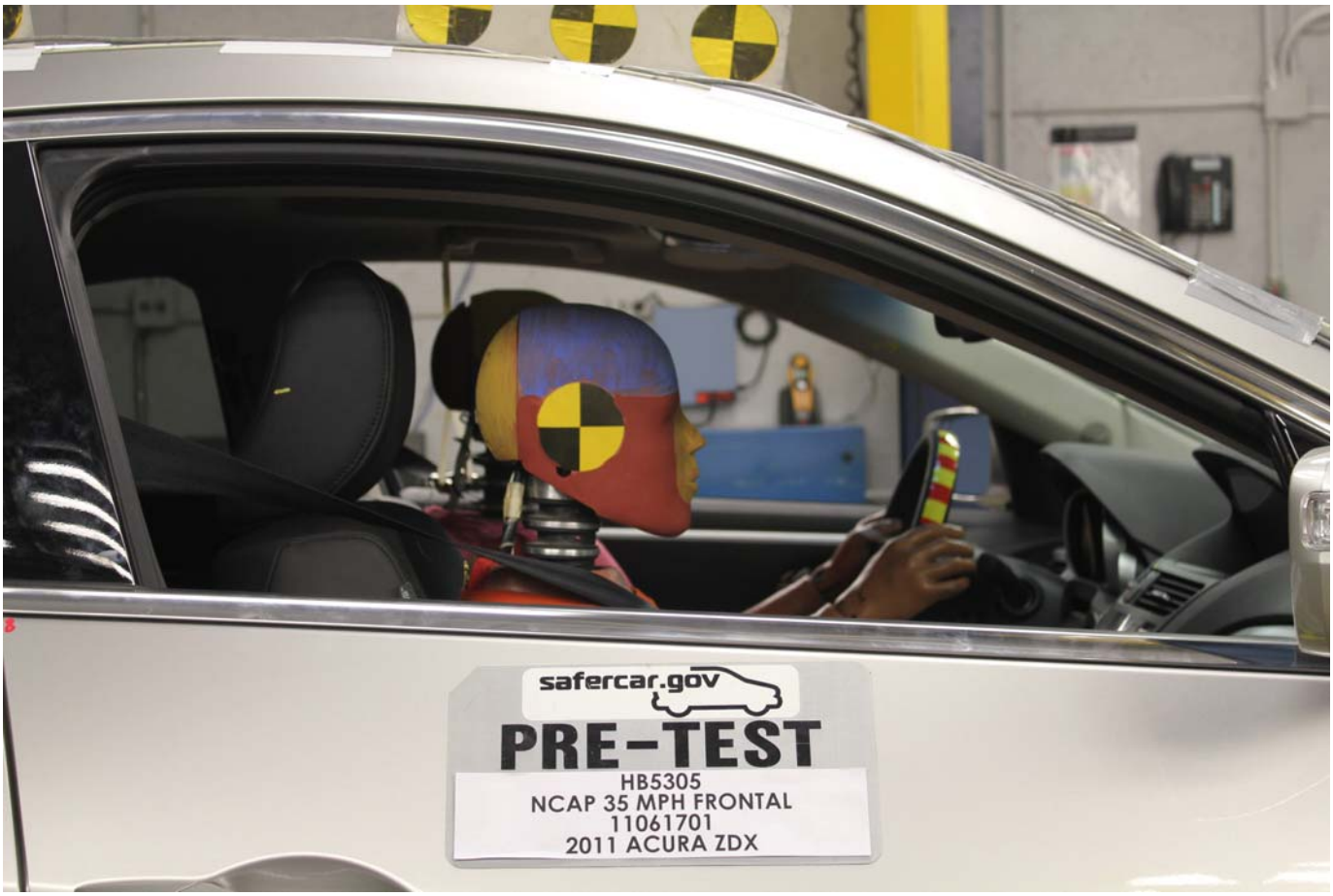
Post-Test Driver Dummy Contact with Knee Bolster

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

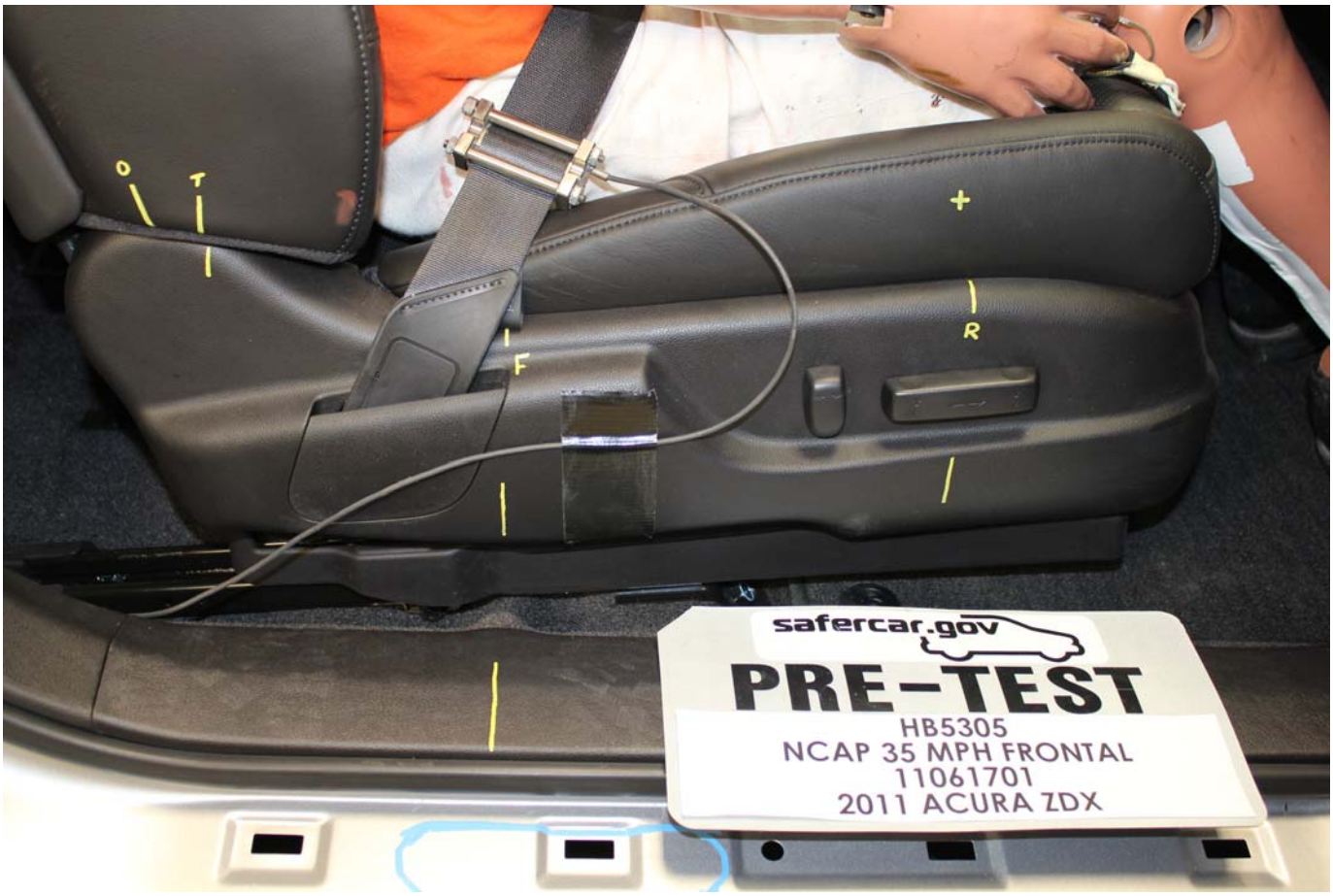


Pre-Test Passenger Dummy Window View

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

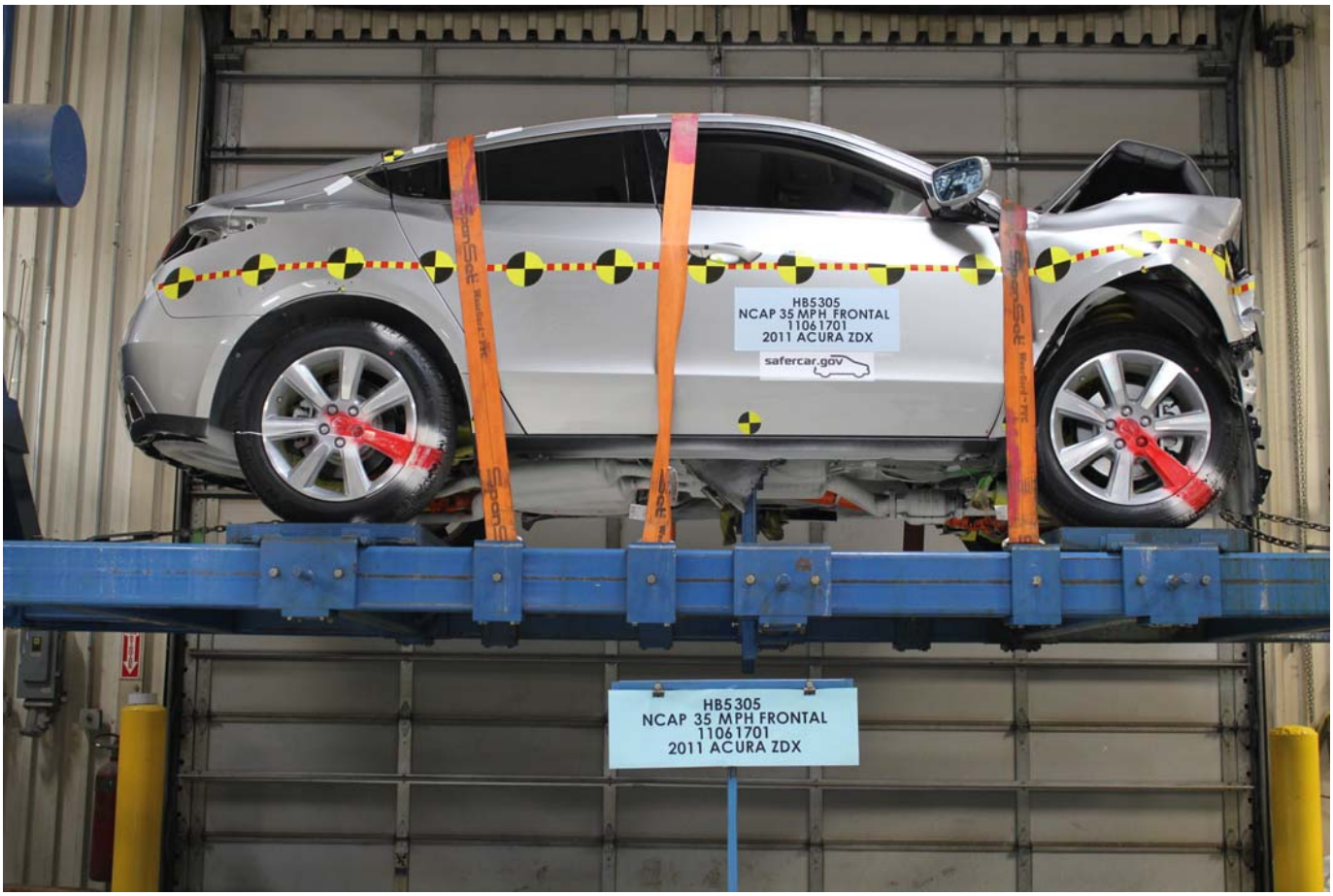
Post-Test Passenger Dummy Contact with Glovebox

Ballast Installed in Vehicle

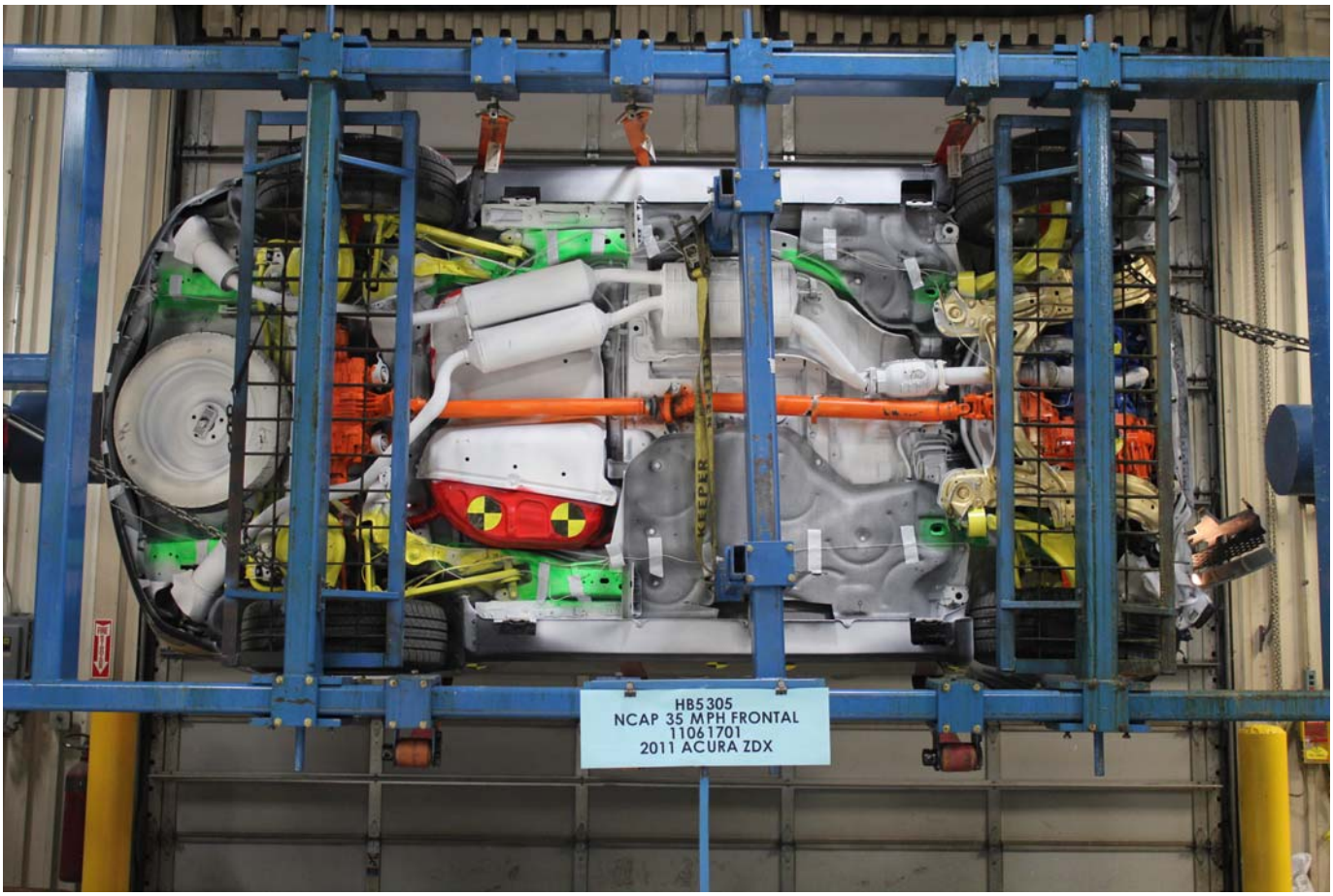
PHOTOGRAPH NOT APPLICABLE

Post-Test Stoddard Solvent Spillage Location View

Post-Test Speed Trap Read-Out



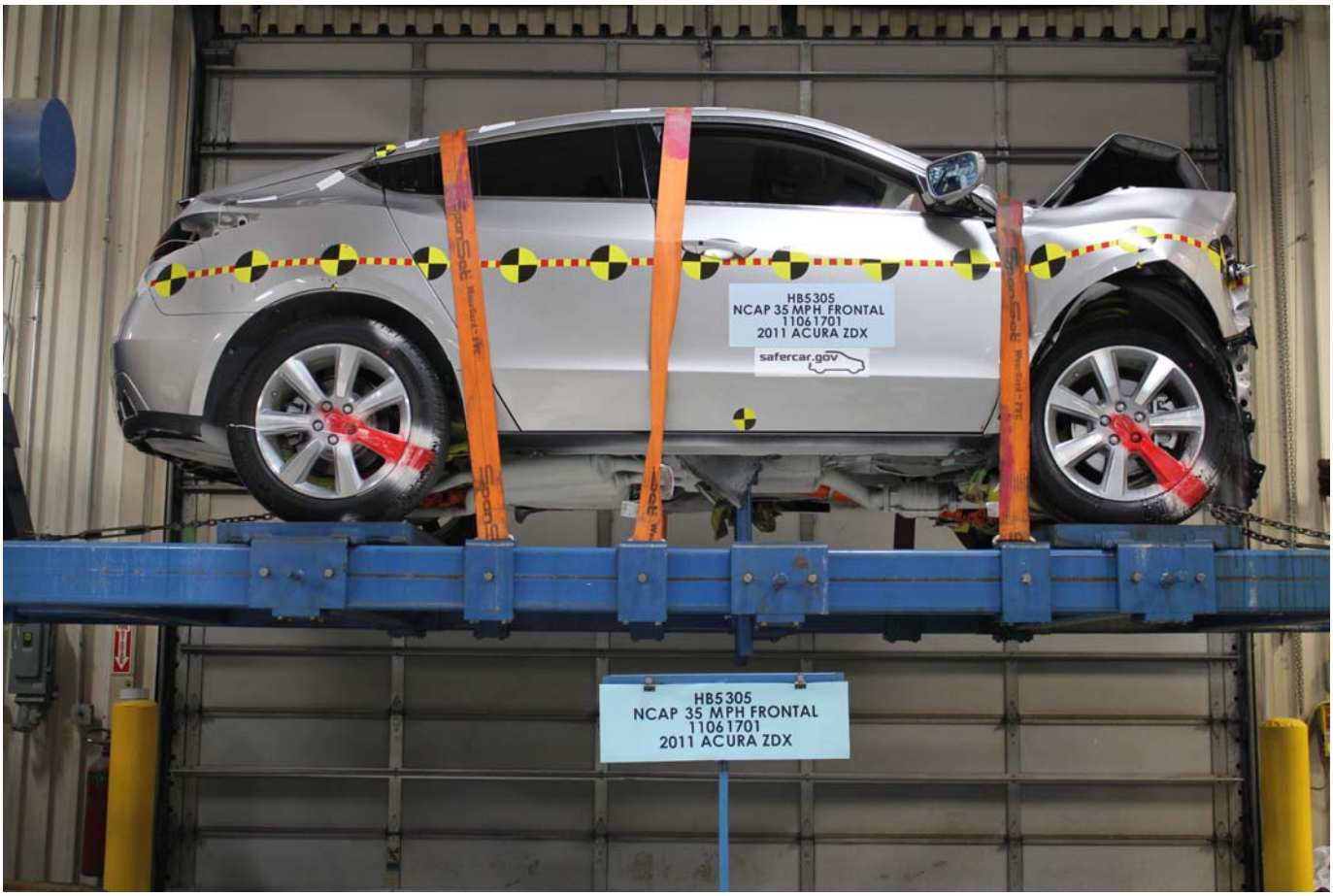
Vehicle at 0 Degrees on Static Rollover Device



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

Monroney Label

ACURA

2011 ZDX TECH

VEHICLE NUMBER: 2HNYB1H43BH500575
ENGINE NUMBER: J37A5-2000619 EXT: PALLADIUM M.
CONTROL NUMBER: 760184 INT: EBONY

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
- Drive-by-Wire Throttle System
- 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 ***
- XM Satellite Radio
- MP3/Auxiliary Input Jack
- USB Audio Interface
- Radio Data System (RDS)
- Bluetooth Audio
- Driver Recognition Memory System
- Driver's 10-Way Power Seat
- Front Passenger's 8-Way Power Seat
- Heated Front Seats
- HomeLink System
- Bluetooth HandsFreeLink
- Front Auto Up/Down Windows
- Acura Personalized Settings
- Auto Dimming Rearview Mirror

*** EXTERIOR FEATURES ***
- Power Tailgate
- Panoramic Glass Roof with Power Sunshades
- 19" x 8.5" Alloy Wheels
- P255/50 R19 All-Season Tires
- Xenon HID Headlights
- Fog Lights
- Heated Power Door Mirrors with Turn Indicators

*** TECH PACKAGE ***
- Acura Navigation System with Voice Recognition and Multi-View Rear Camera
- AcuraLink Communication System with Real-Time Traffic and Weather (available in select markets)
- Sport Seats with Perforated Premium Leather Trim
- Acura/ELS Surround-Sound System with 10 Speakers and AM/FM/DVD-A, CD, DTS, Dolby Pro Logic II
- Hard Disk Drive (HDD)
- Push-Button Ignition
- GPS-Linked, Dual-Zone Auto Climate Control with Air Filtration System
- Keyless Access System with Security System

Manufacturer's Suggested Retail Price	**$50,145.00**

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

-XM Radio is available in the 48 contiguous states

Destination and Handling	860.00
TOTAL VEHICLE PRICE (includes Pre-Delivery Service)	**$51,005.00**

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	Smog Score
5	5
1 Average new vehicle 10 Cleanest	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

BERGSTROM ACURA
4575 CONVERTERS DRIVE
GRAND CHUTE, WI 54913

ORIG. DLR: 251554
REF.NO: 40111
HN CODE: AL-4864
EMISSION: 50 STATE

PORT OF ENTRY: BUFFALO
DELIVERY POINT: CHICAGO
SHIP#:
ROW/SPACE: 112-060 208-008
TRANS.METHOD: N50 ELWOOD

DEALER: 251554

VIN: 2HNYB1H43BH500575

EPA Fuel Economy Estimates

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

Estimated Annual Fuel Cost
$2,525
based on 15,000 miles at $3.20 per gallon

Combined Fuel Economy
This Vehicle
19
10 — 32
All SUVs

HIGHWAY MPG **23**
Expected range for most drivers **19** to **27** MPG

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

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

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 ★★★★

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

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

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

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 Left Femur Redundant

Driver Right Femur Redundant

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 Left Femur Redundant

Passenger Right Femur Redundant

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

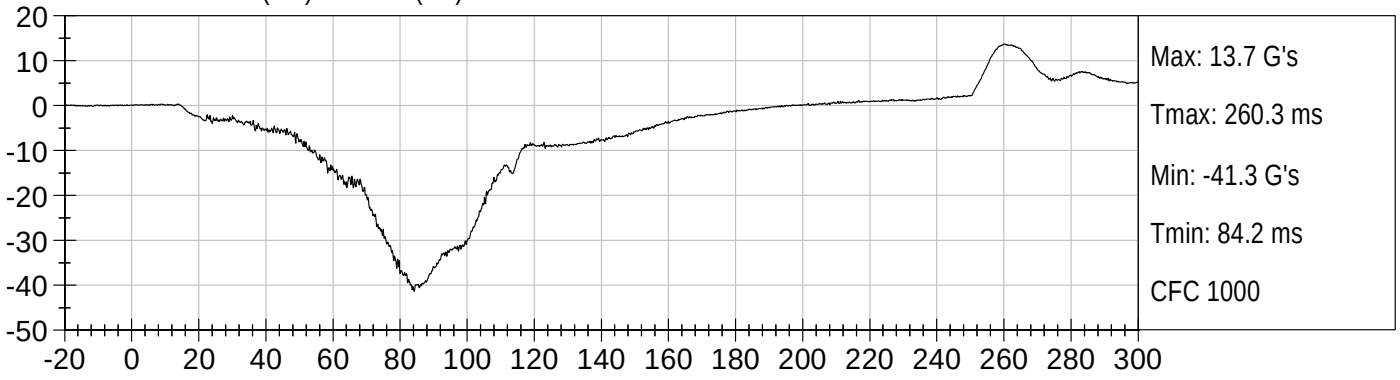
Vehicle Left Brake Caliper X

Vehicle Right Brake Caliper X

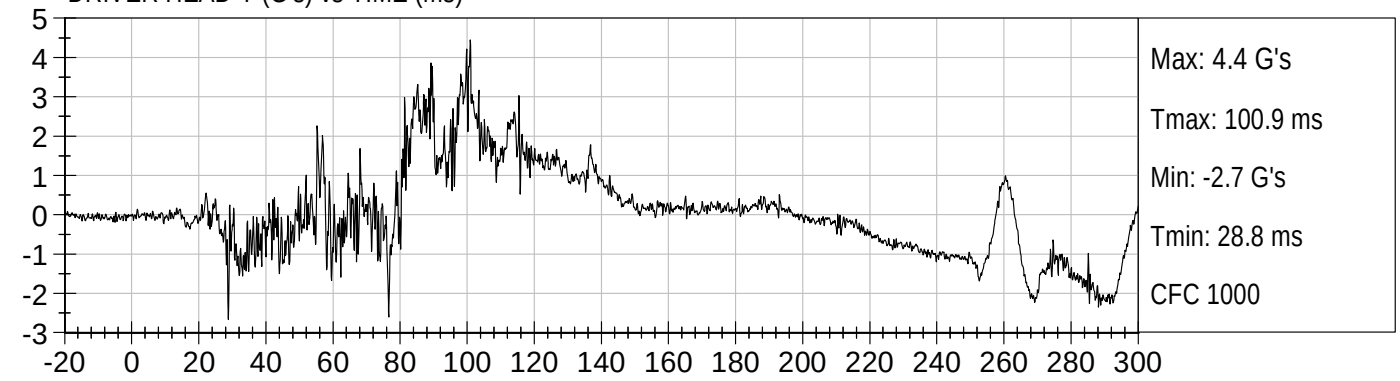
NCAP 35mph Frontal
2011 Acura ZDX - HB5305

Test Date: 06/17/2011
Speed: 35.1 mph (56.4 km/h)

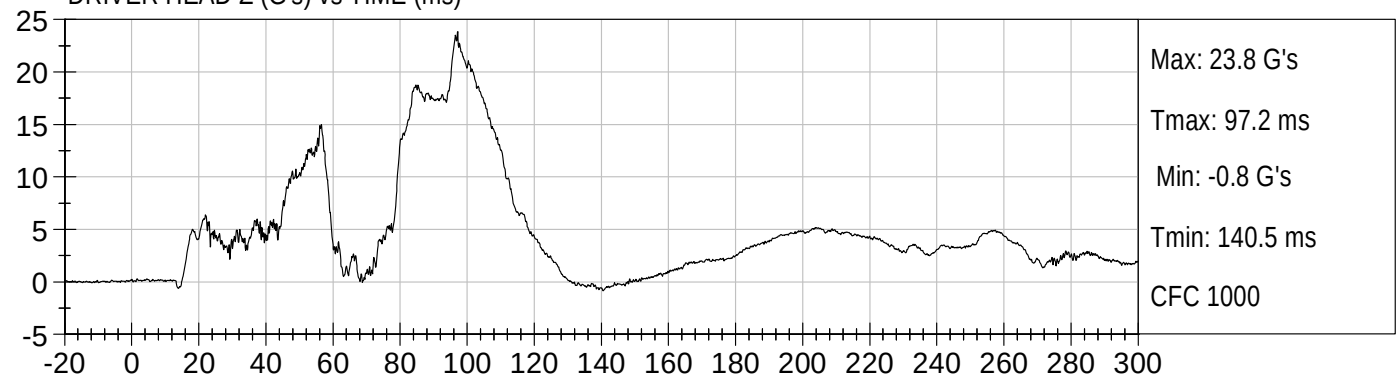
DRIVER HEAD X (G's) vs TIME (ms)



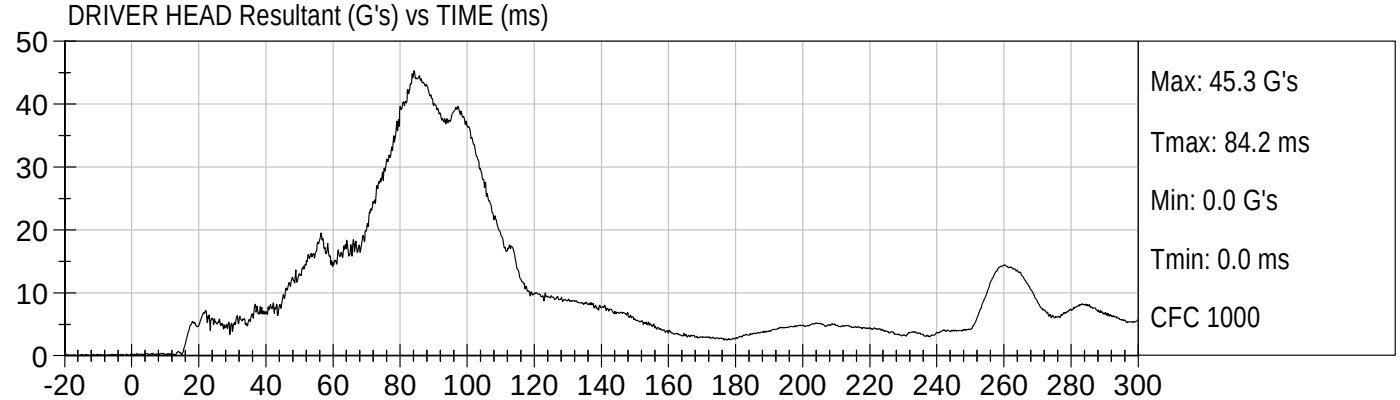
DRIVER HEAD Y (G's) vs TIME (ms)



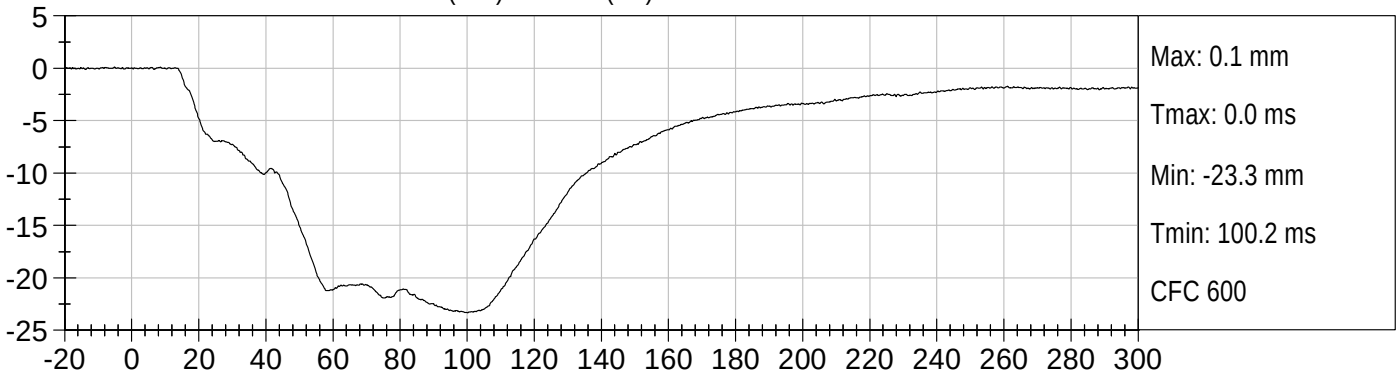
DRIVER HEAD Z (G's) vs TIME (ms)



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



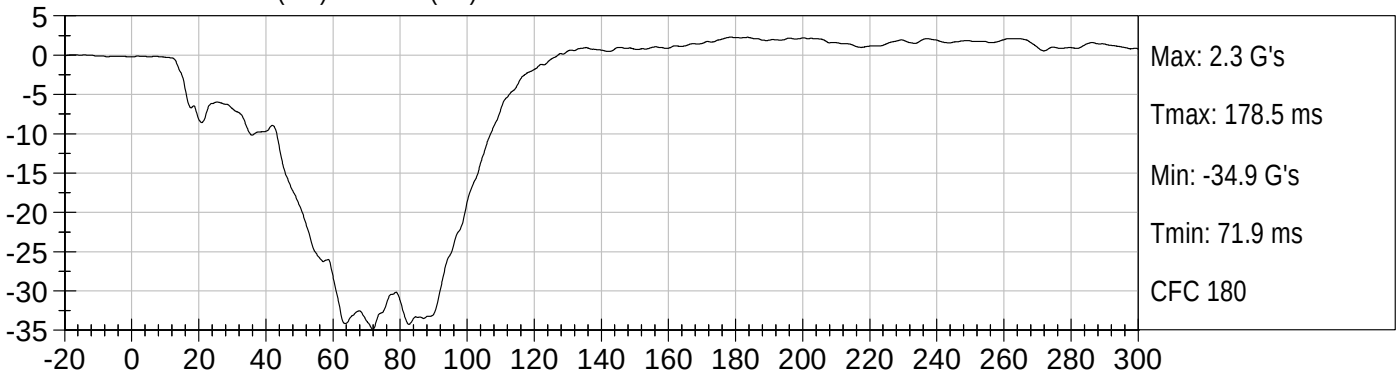
DRIVER CHEST DISPLACEMENT (mm) vs TIME (ms)



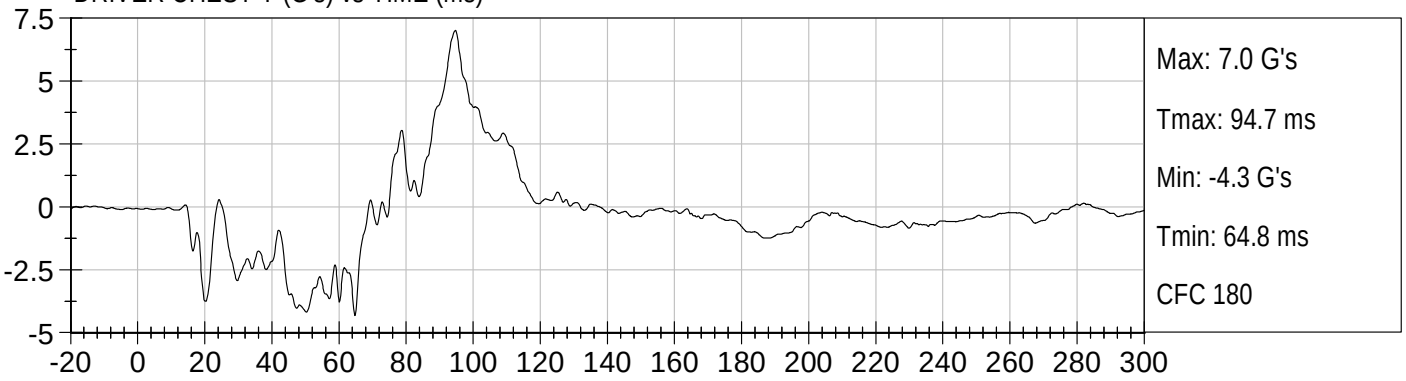
NCAP 35mph Frontal
2011 Acura ZDX - HB5305

Test Date: 06/17/2011
Speed: 35.1 mph (56.4 km/h)

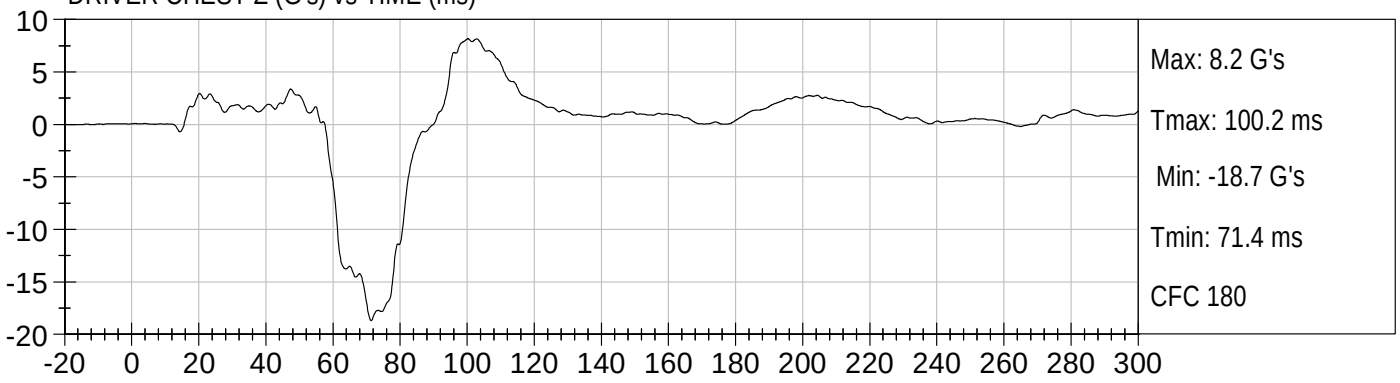
DRIVER CHEST X (G's) vs TIME (ms)



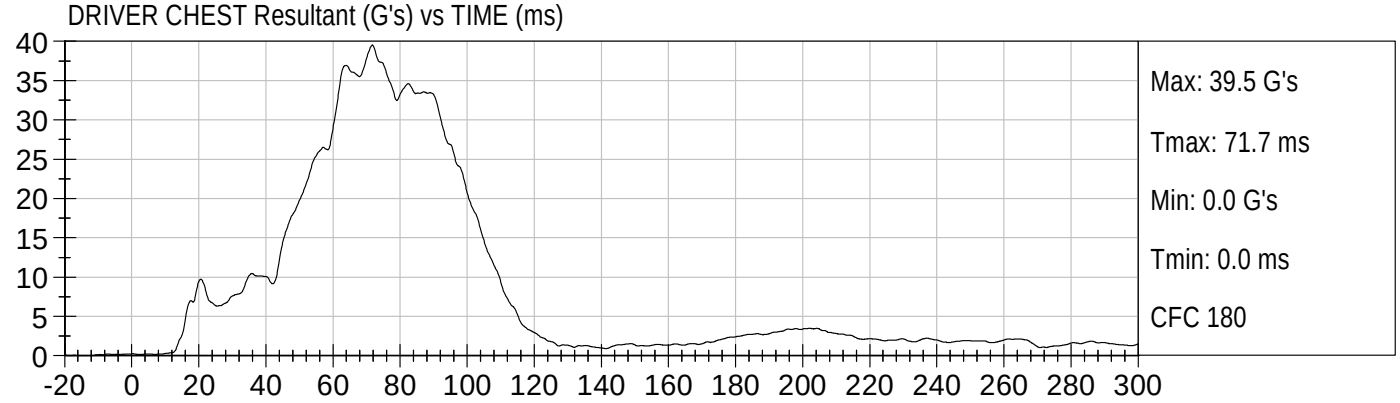
DRIVER CHEST Y (G's) vs TIME (ms)



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



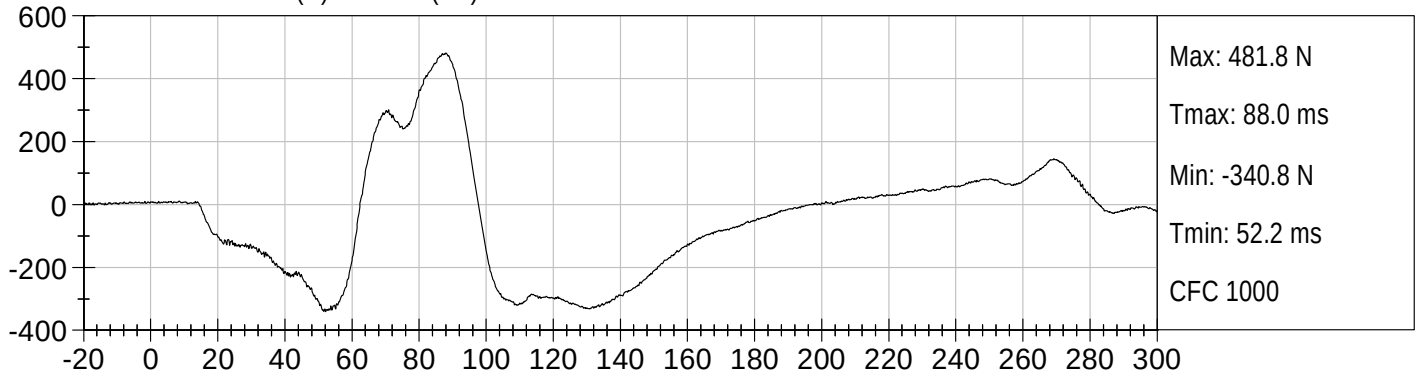
DRIVER CHEST Resultant (G's) vs TIME (ms)



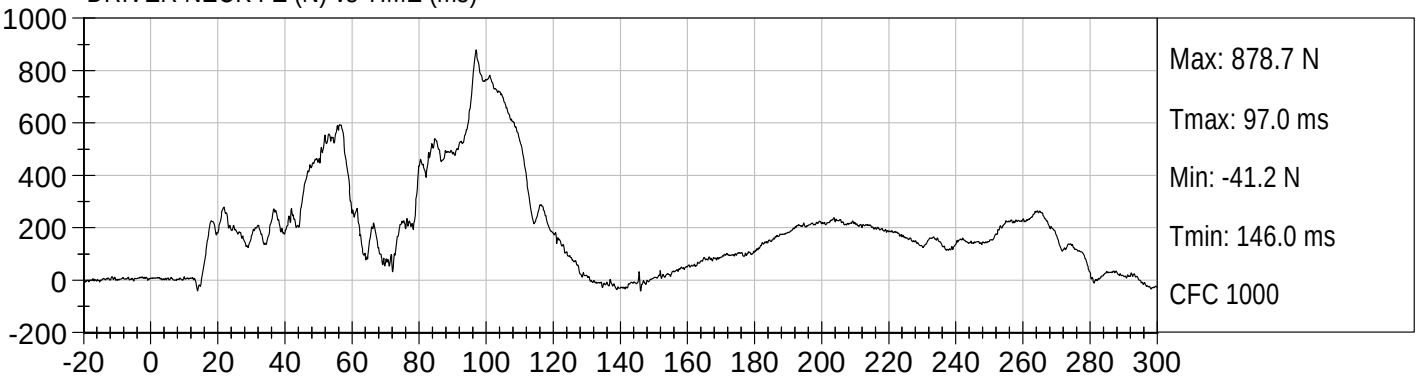
NCAP 35mph Frontal
2011 Acura ZDX - HB5305

Test Date: 06/17/2011
Speed: 35.1 mph (56.4 km/h)

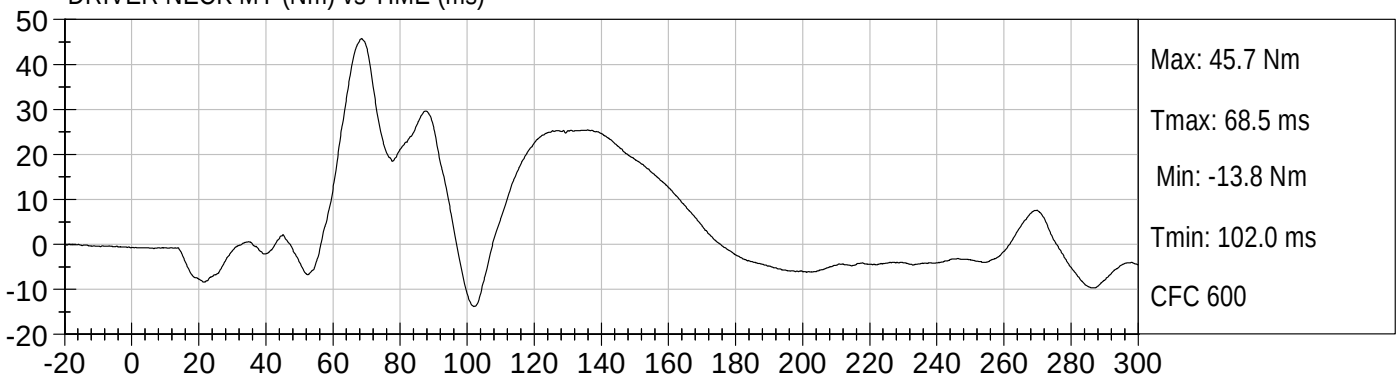
DRIVER NECK FX (N) vs TIME (ms)



DRIVER NECK FZ (N) vs TIME (ms)



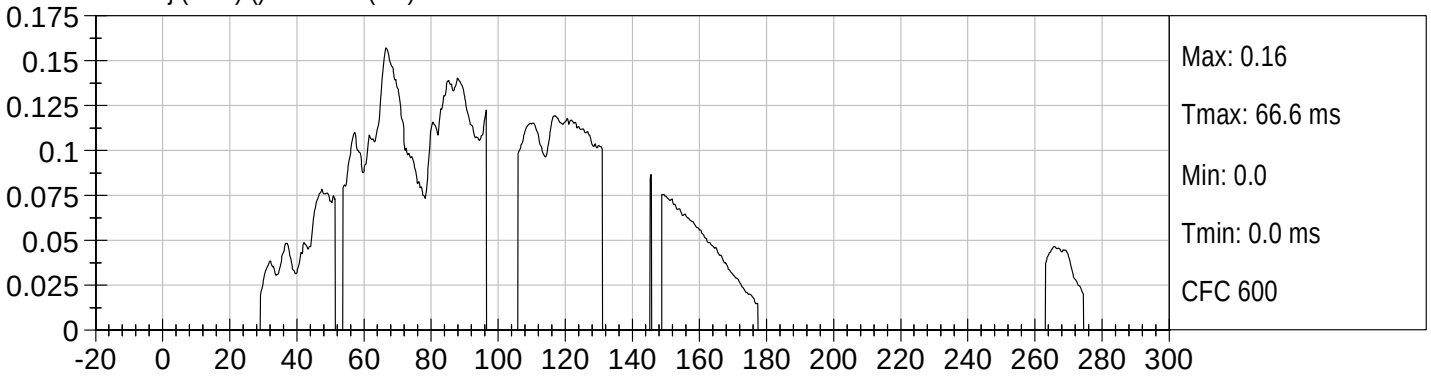
DRIVER NECK MY (Nm) vs TIME (ms)



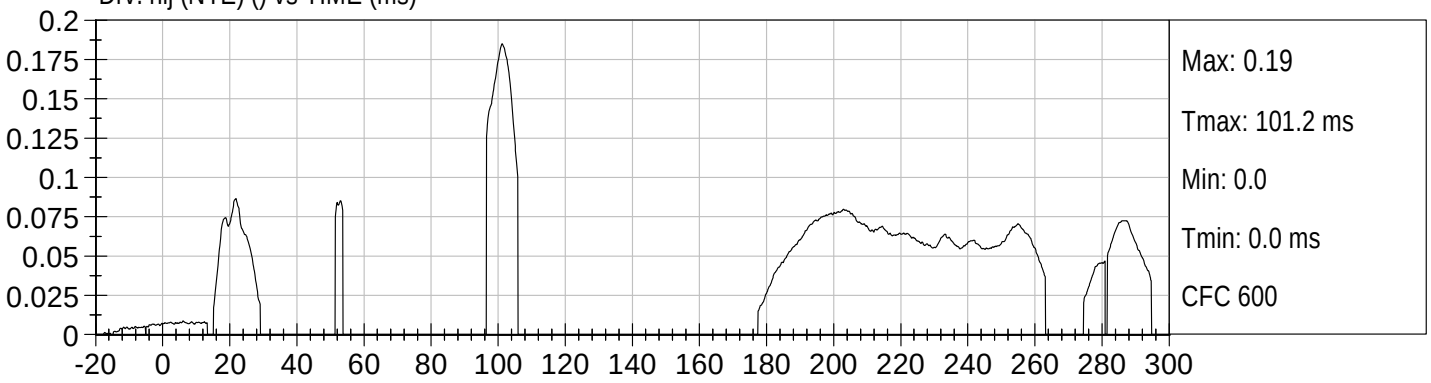
NCAP 35mph Frontal
2011 Acura ZDX - HB5305

Test Date: 06/17/2011
Speed: 35.1 mph (56.4 km/h)

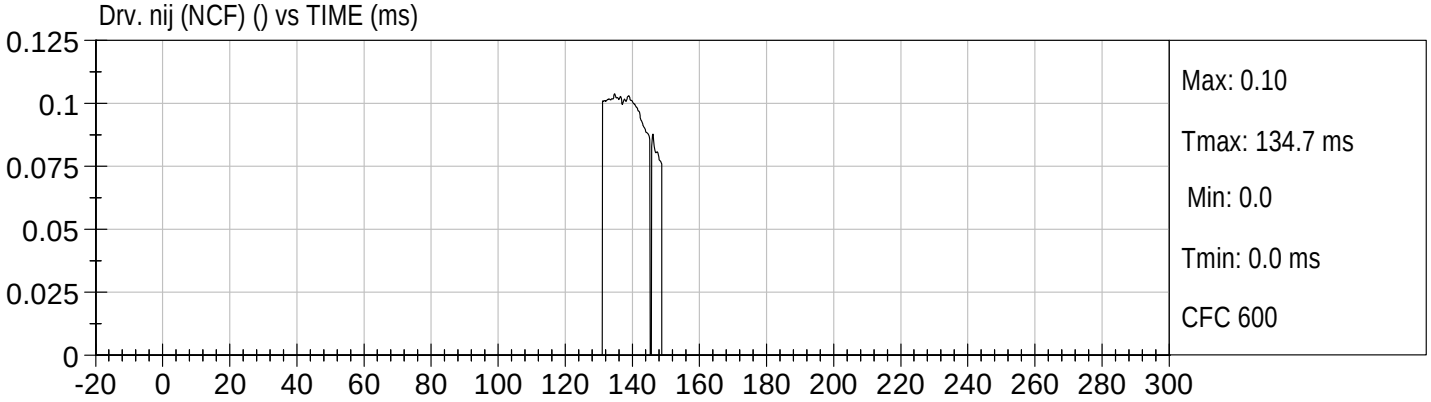
Drv. nij (NTF) () vs TIME (ms)



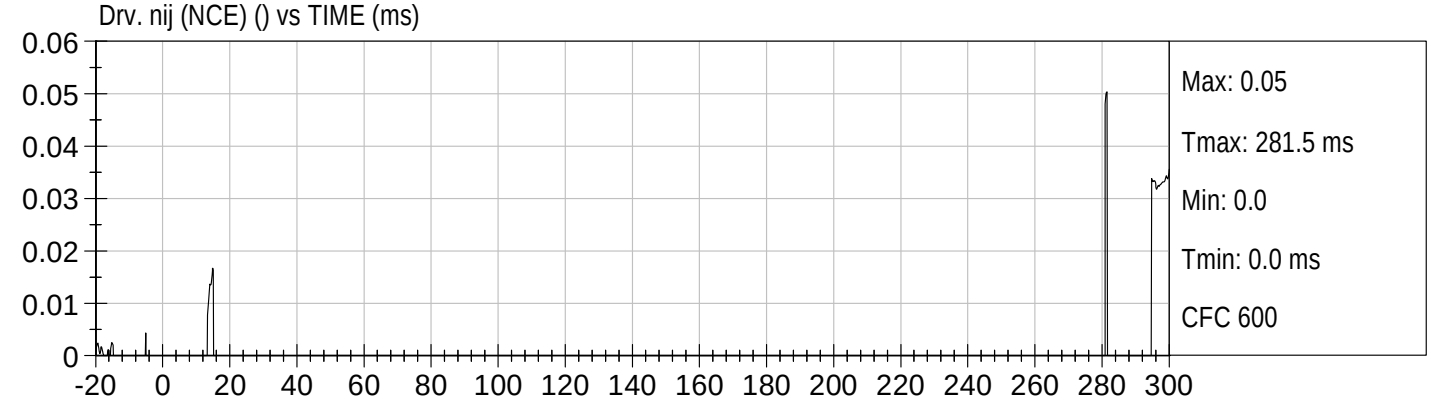
Drv. nij (NTE) () vs TIME (ms)



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



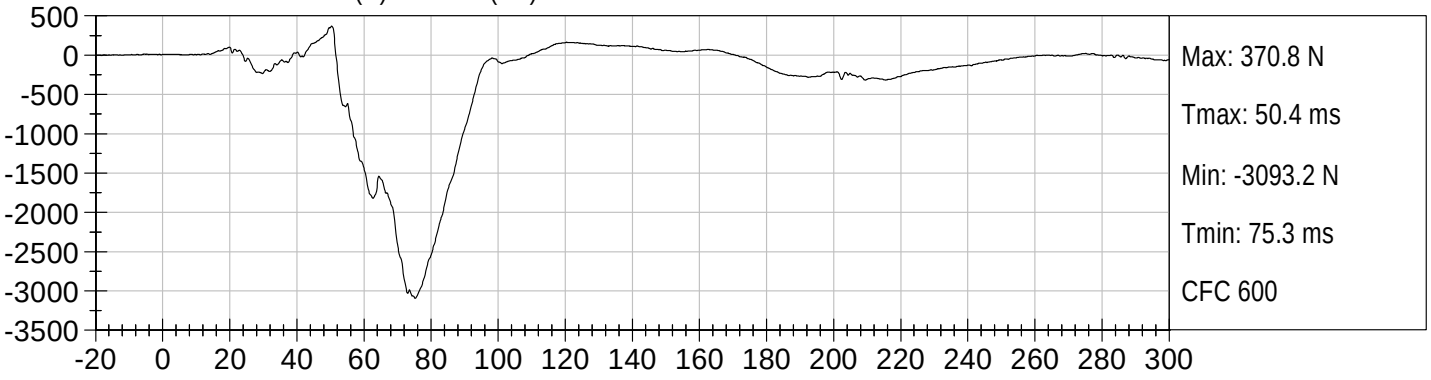
Drv. nij (NCE) () vs TIME (ms)



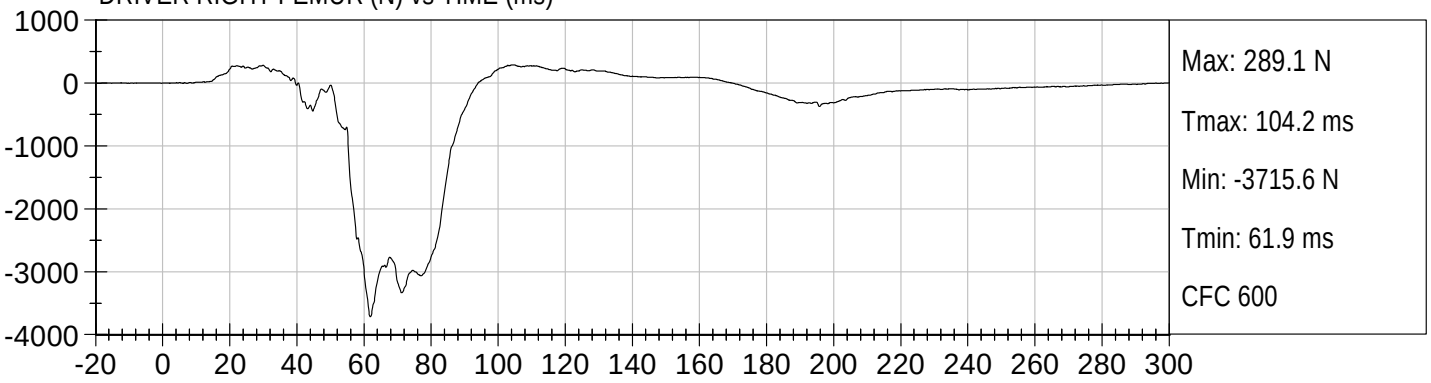
NCAP 35mph Frontal
2011 Acura ZDX - HB5305

Test Date: 06/17/2011
Speed: 35.1 mph (56.4 km/h)

DRIVER LEFT FEMUR (N) vs TIME (ms)



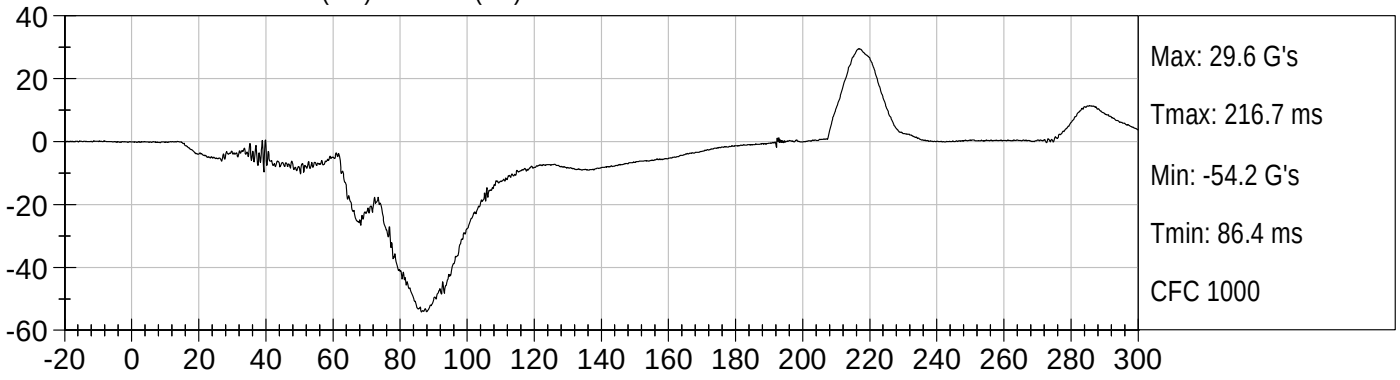
DRIVER RIGHT FEMUR (N) vs TIME (ms)



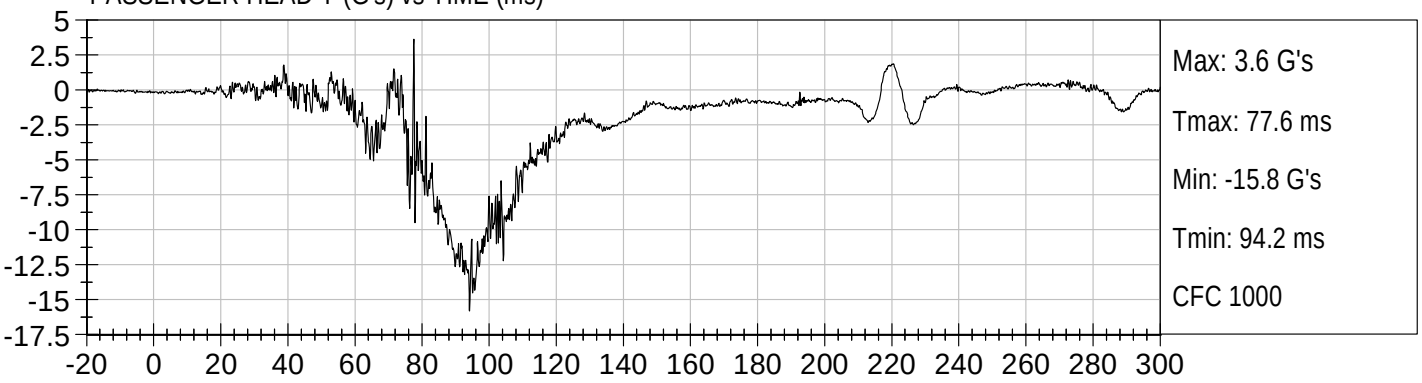
NCAP 35mph Frontal
2011 Acura ZDX - HB5305

Test Date: 06/17/2011
Speed: 35.1 mph (56.4 km/h)

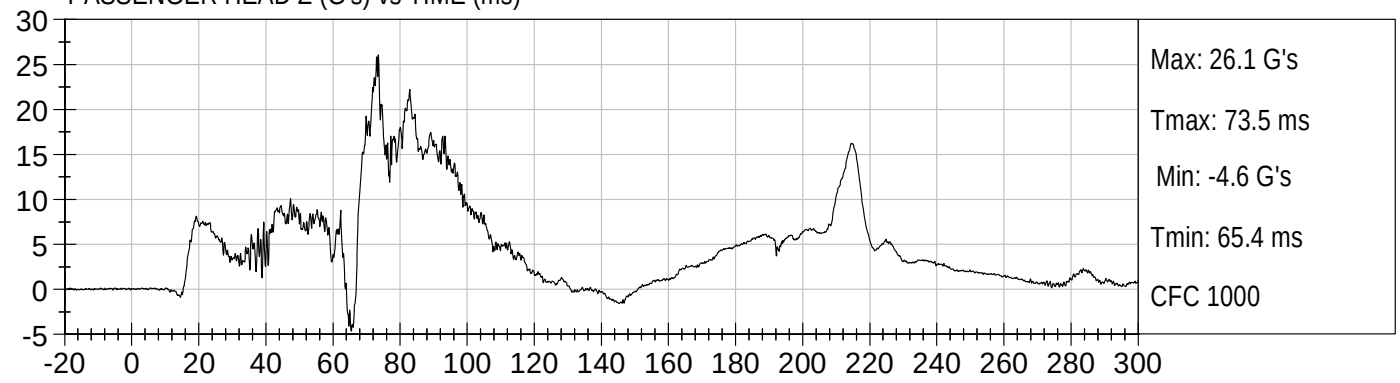
PASSENGER HEAD X (G's) vs TIME (ms)



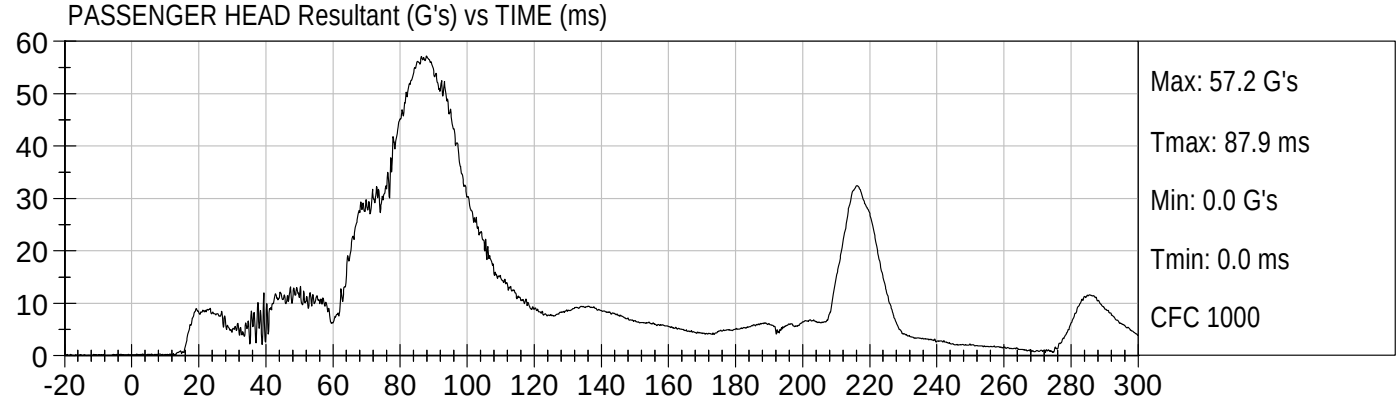
PASSENGER HEAD Y (G's) vs TIME (ms)



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



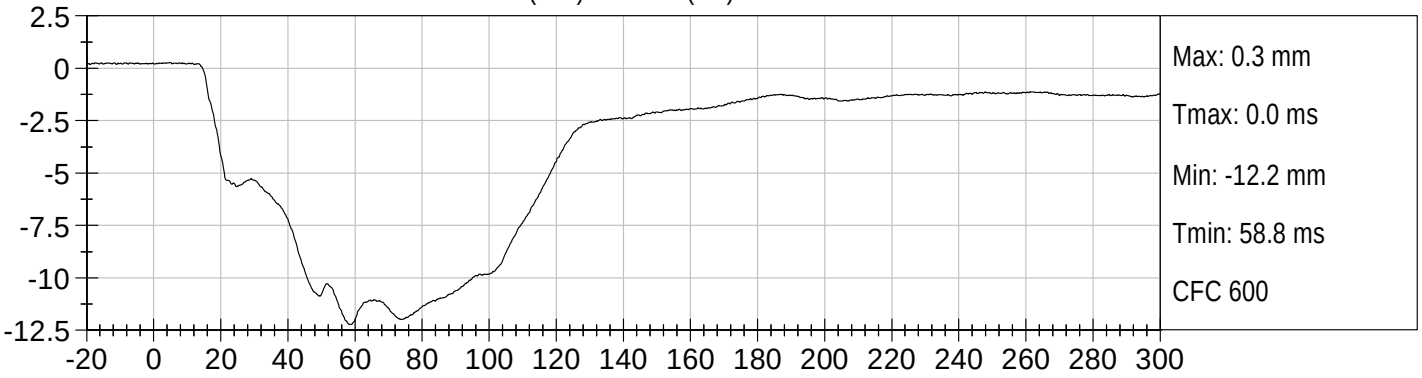
PASSENGER HEAD Resultant (G's) vs TIME (ms)



NCAP 35mph Frontal
2011 Acura ZDX - HB5305

Test Date: 06/17/2011
Speed: 35.1 mph (56.4 km/h)

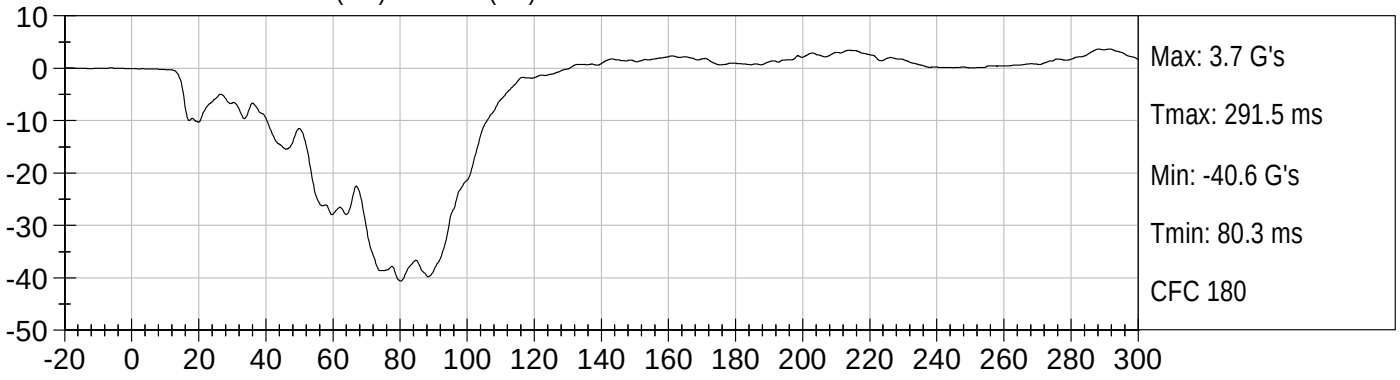
PASSENGER CHEST DISPLACEMENT (mm) vs TIME (ms)



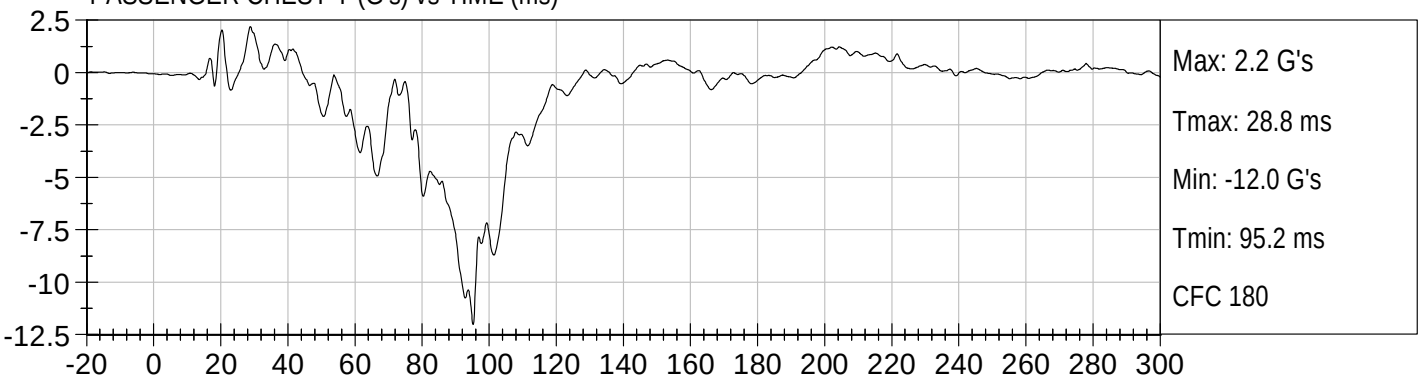
NCAP 35mph Frontal
2011 Acura ZDX - HB5305

Test Date: 06/17/2011
Speed: 35.1 mph (56.4 km/h)

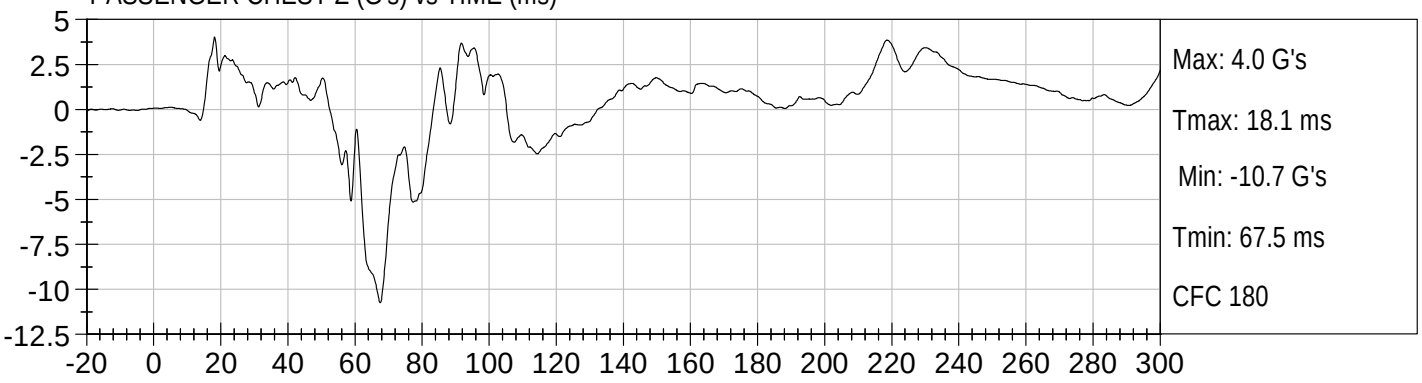
PASSENGER CHEST X (G's) vs TIME (ms)



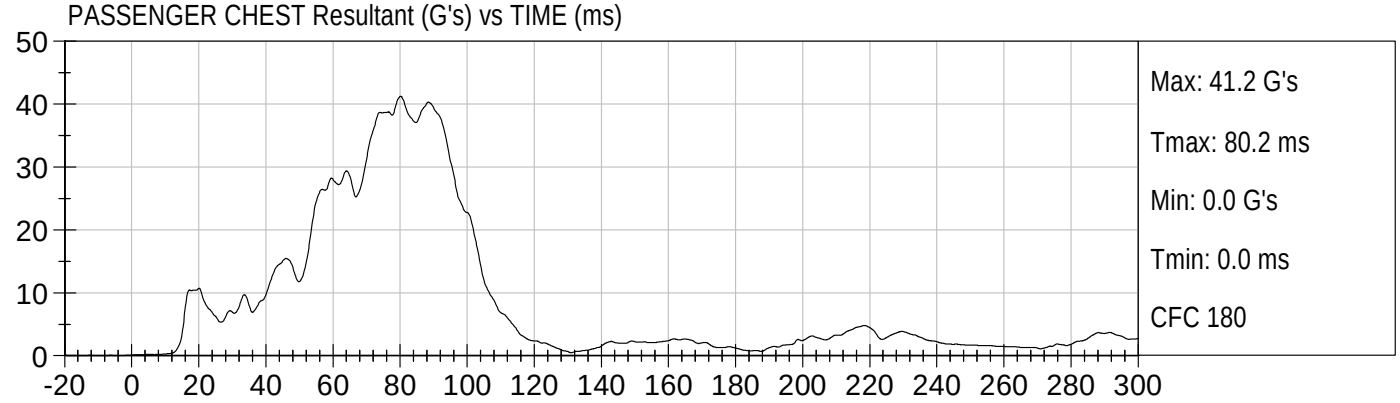
PASSENGER CHEST Y (G's) vs TIME (ms)



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



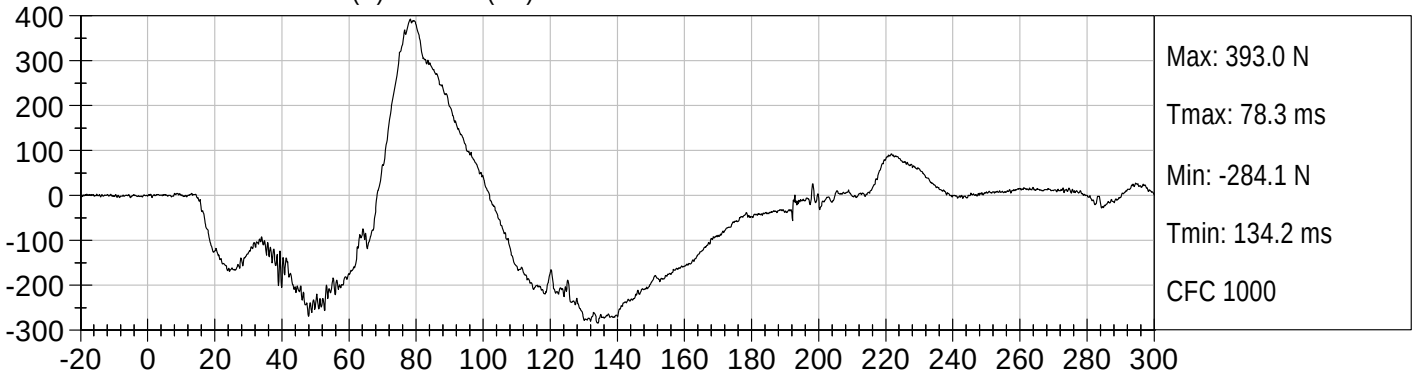
PASSENGER CHEST Resultant (G's) vs TIME (ms)



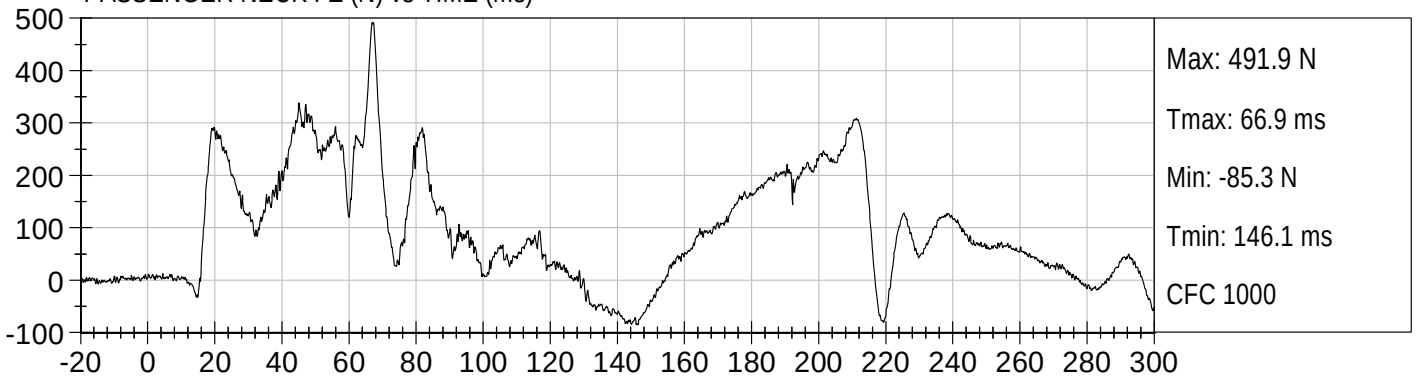
NCAP 35mph Frontal
2011 Acura ZDX - HB5305

Test Date: 06/17/2011
Speed: 35.1 mph (56.4 km/h)

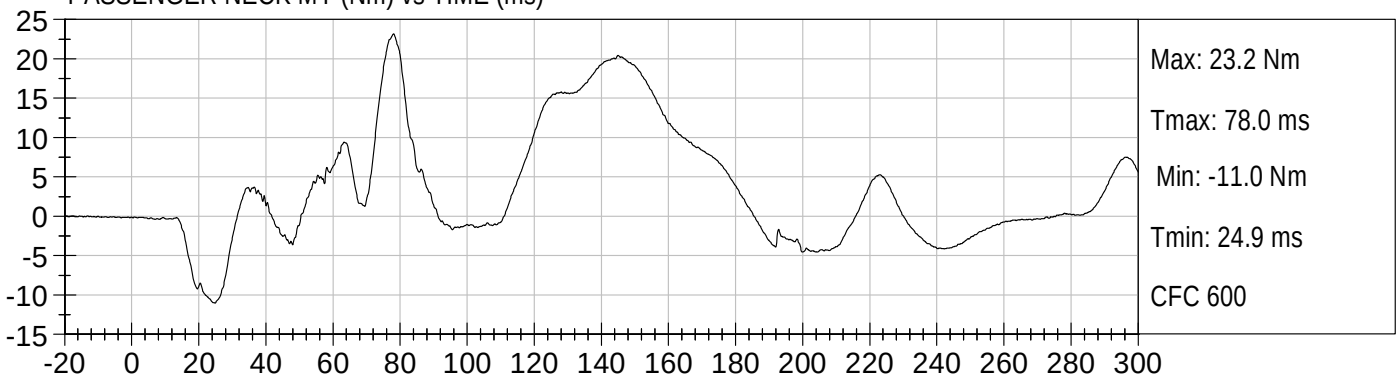
PASSENGER NECK FX (N) vs TIME (ms)



PASSENGER NECK FZ (N) vs TIME (ms)



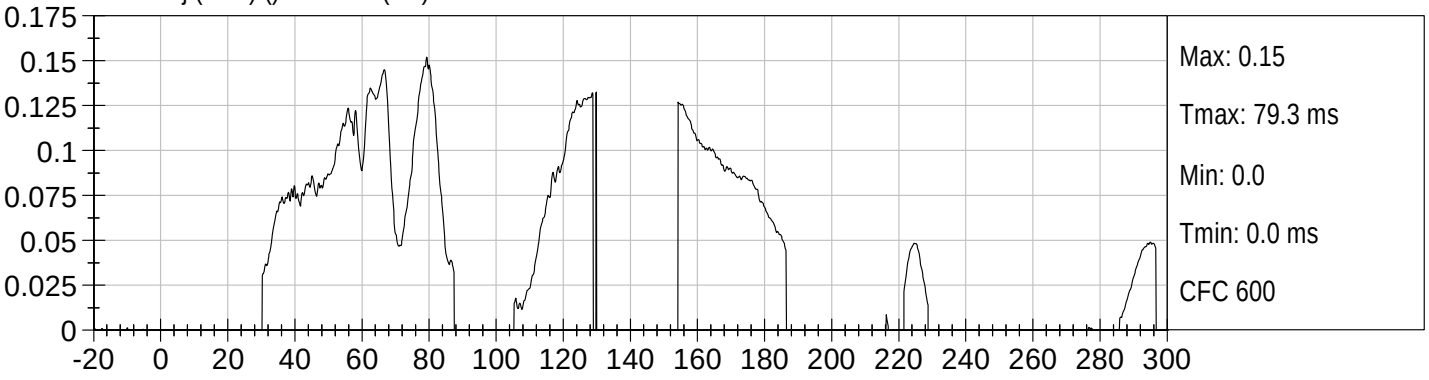
PASSENGER NECK MY (Nm) vs TIME (ms)



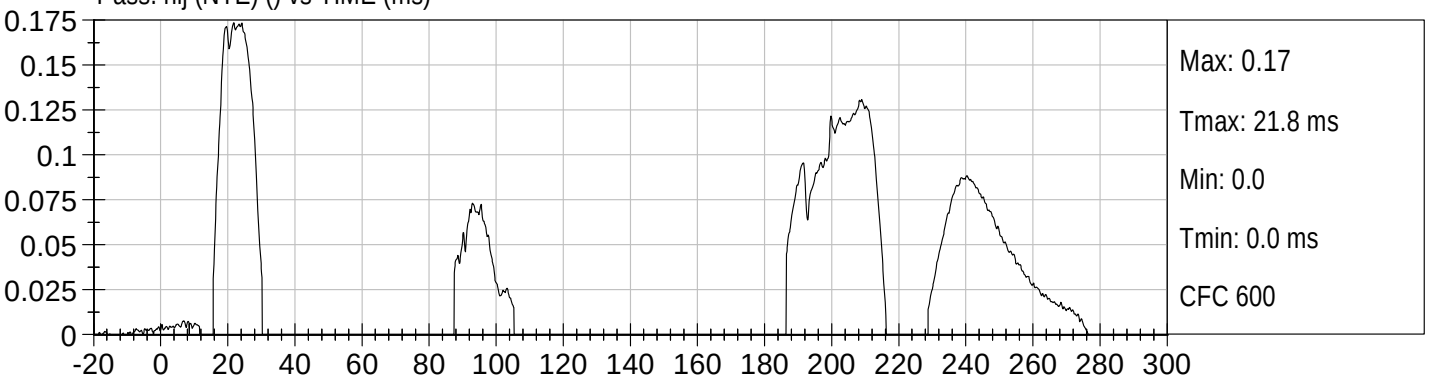
NCAP 35mph Frontal
2011 Acura ZDX - HB5305

Test Date: 06/17/2011
Speed: 35.1 mph (56.4 km/h)

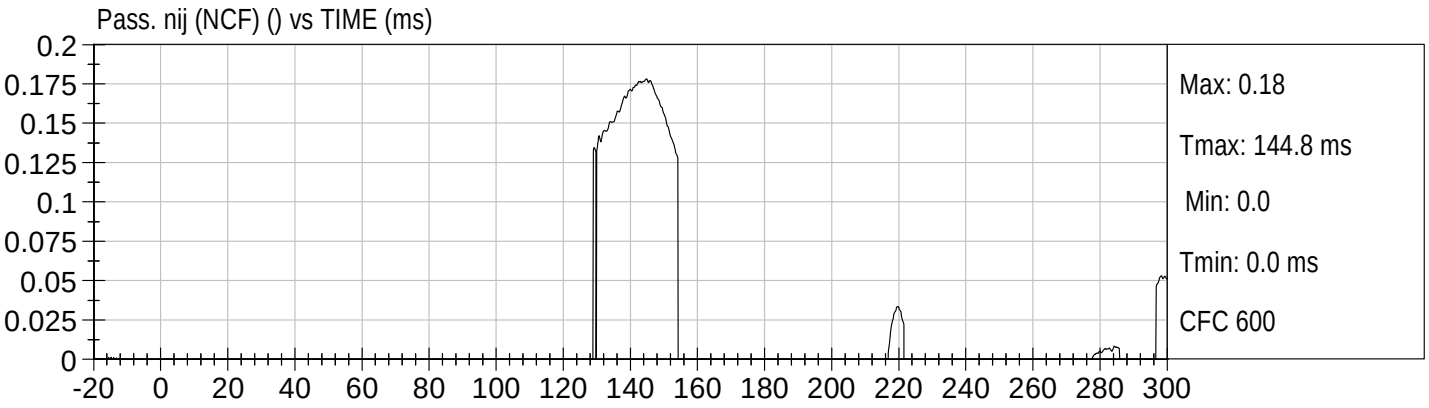
Pass. nij (NTF) () vs TIME (ms)



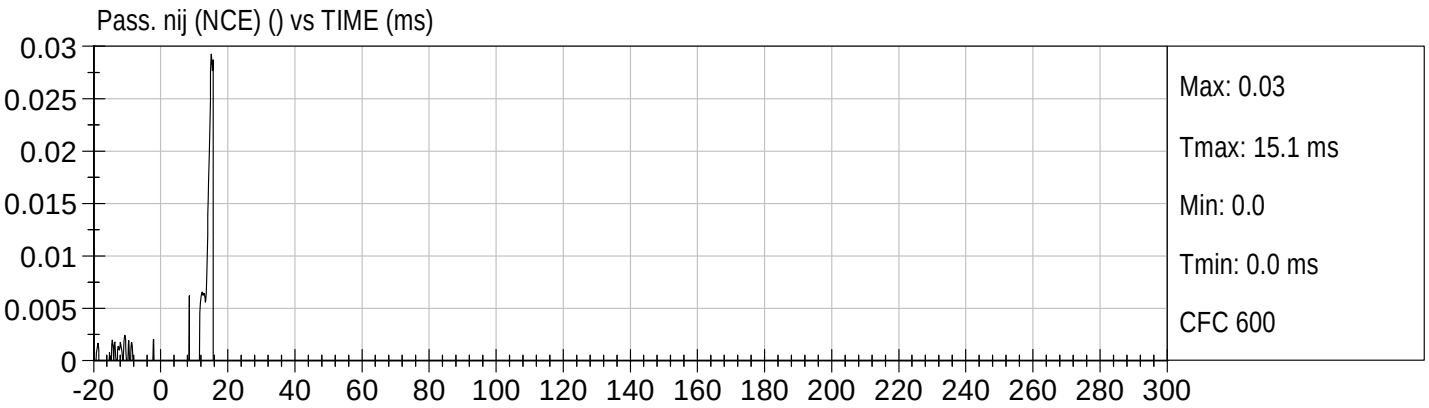
Pass. nij (NTE) () vs TIME (ms)



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



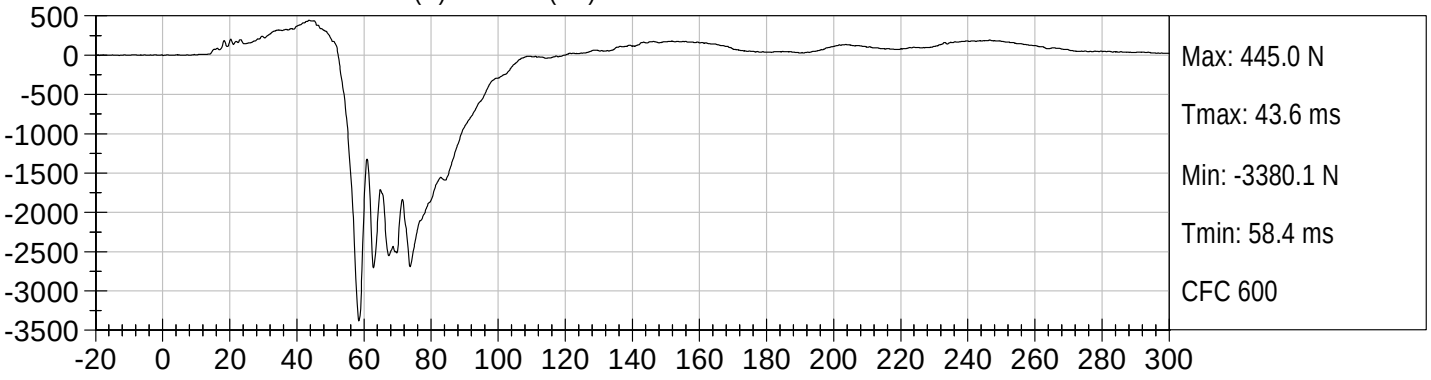
Pass. nij (NCE) () vs TIME (ms)



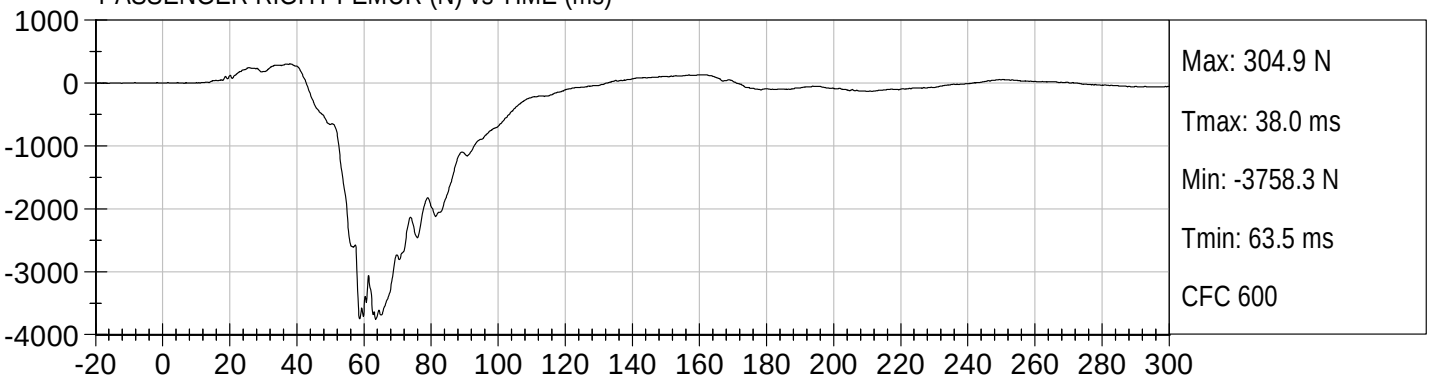
NCAP 35mph Frontal
2011 Acura ZDX - HB5305

Test Date: 06/17/2011
Speed: 35.1 mph (56.4 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: 036 **Test ID:** D111741

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	47	Pass
Peak Resultant Acceleration	G's	225 - 275	238	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	7.7	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
		Overall Test Results		Pass

Jessica Hall
Laboratory Technician

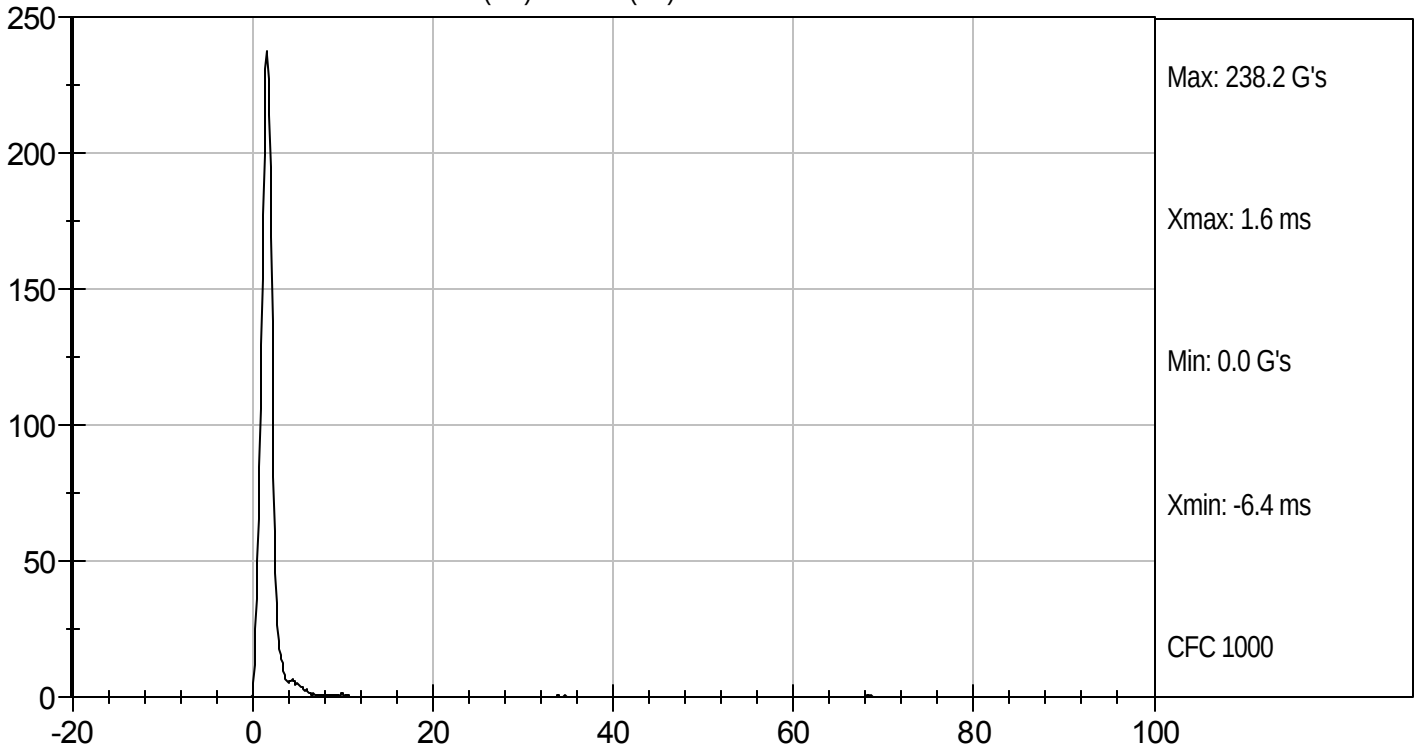
5/11/11
Test Date

David Winkelbauer
Approved By

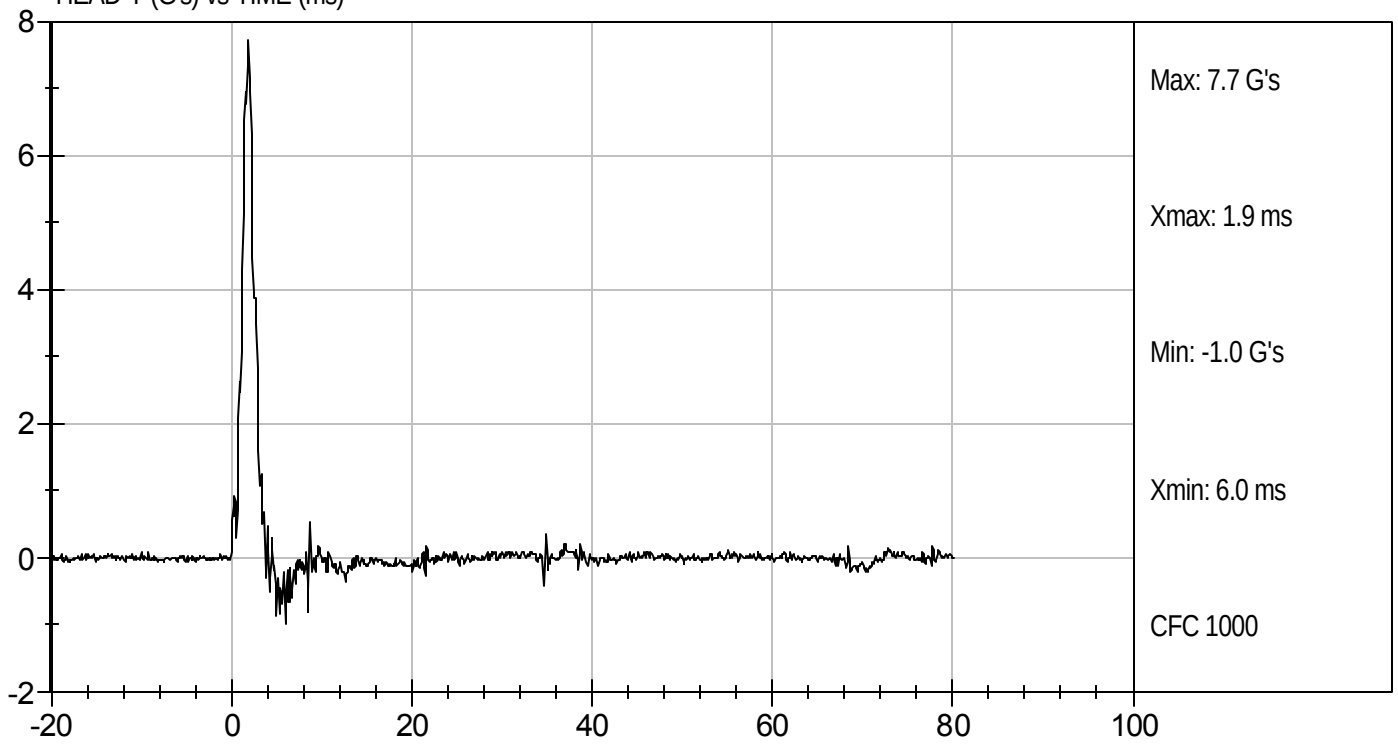
Test Desc: Head Drop
Component ID: D111741

Test Date: 5/11/11
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: 036 **Test I.D:** D111742

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	49	Pass
Pendulum Velocity		m/s	6.89 to 7.13	6.96	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	24.23	Pass
	20 ms	G's	17.60 to 22.60	19.05	Pass
	30 ms	G's	12.50 to 18.50	12.84	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	12.8	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	34.5	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	72.8	Pass
	Time	ms	57.0 to 64.0	58.9	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	116.5	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	94.6	Pass
	Time	ms	47.0 to 58.0	48.6	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	97.2	Pass
			Overall Test Results		Pass

Jessica Hall
Laboratory Technician

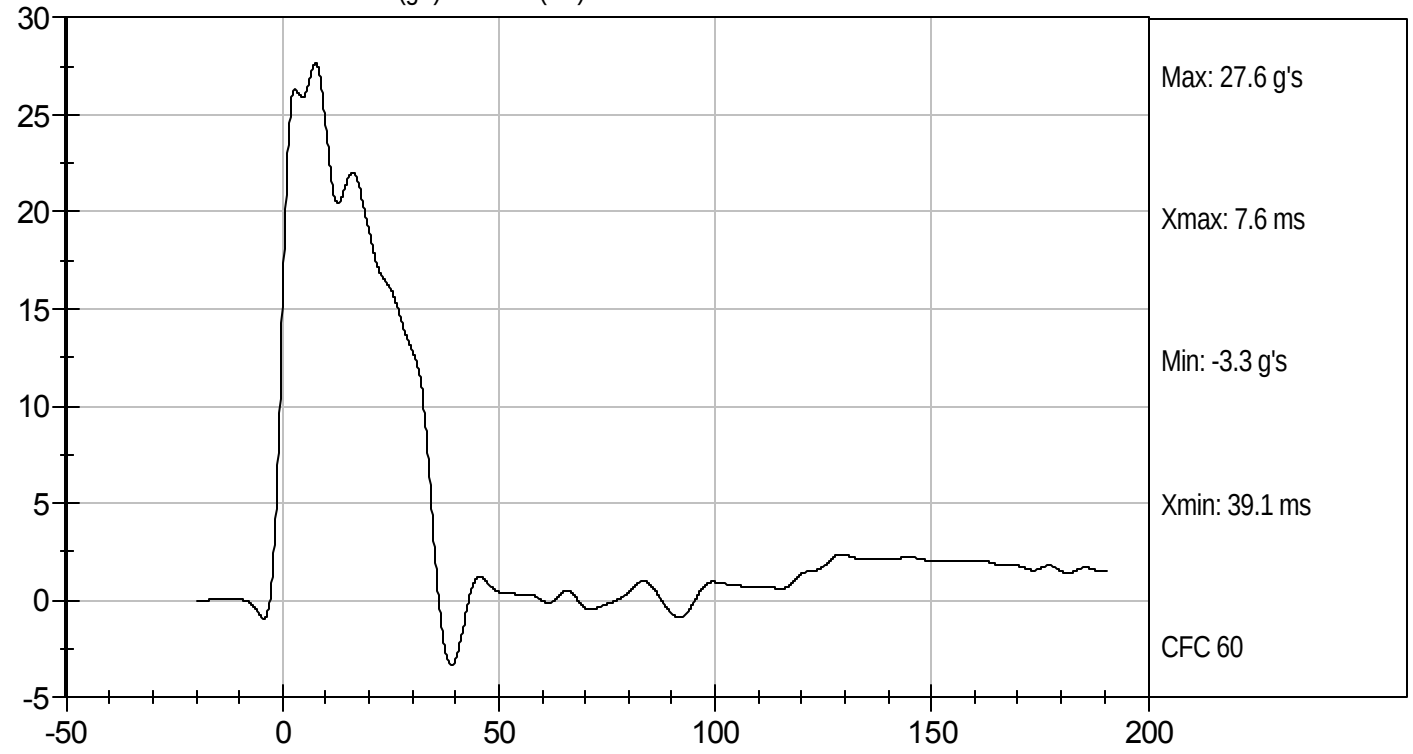
5/12/11
Test Date

David Winkelbauer
Approved By

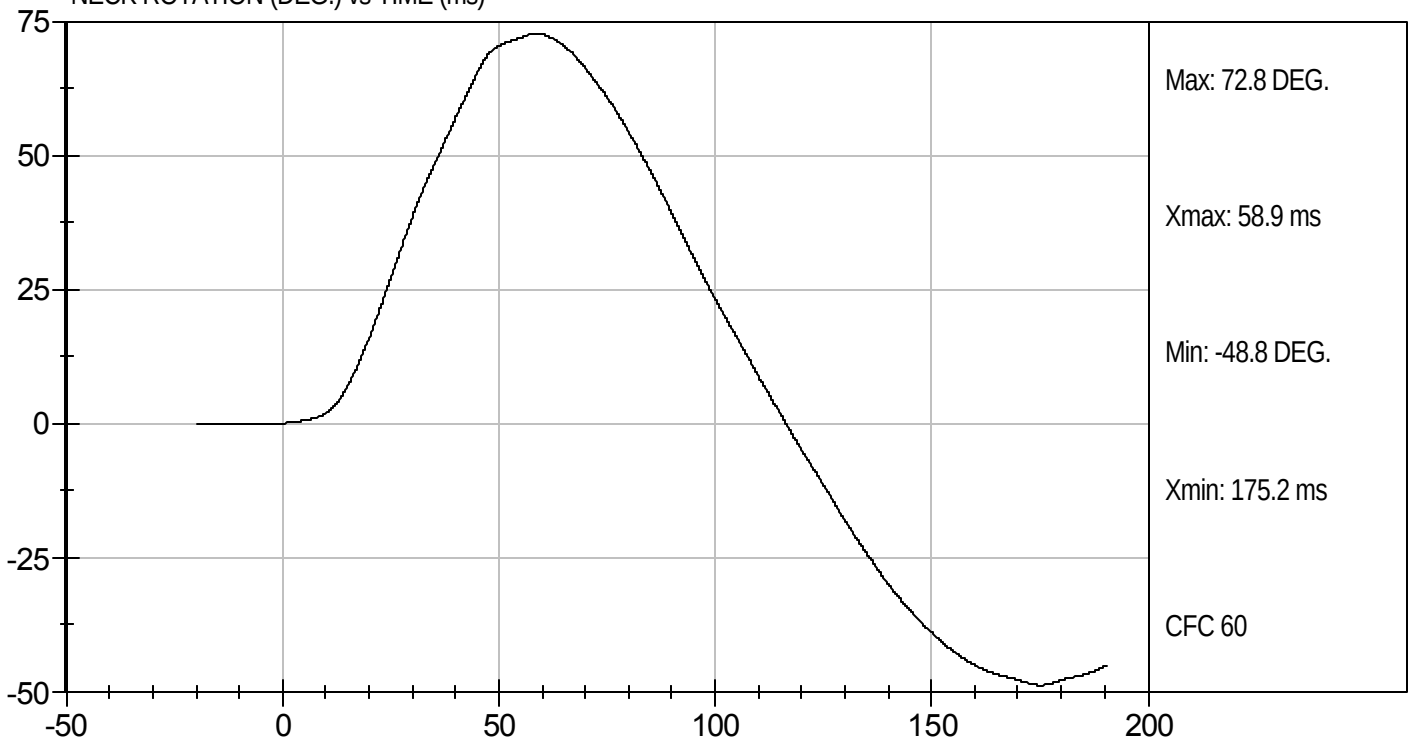
Test Desc: Neck Flexion
Component ID: D111742

Test Date: 5/12/11
Velocity: 22.83 ft/s, 6.96 m/s

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

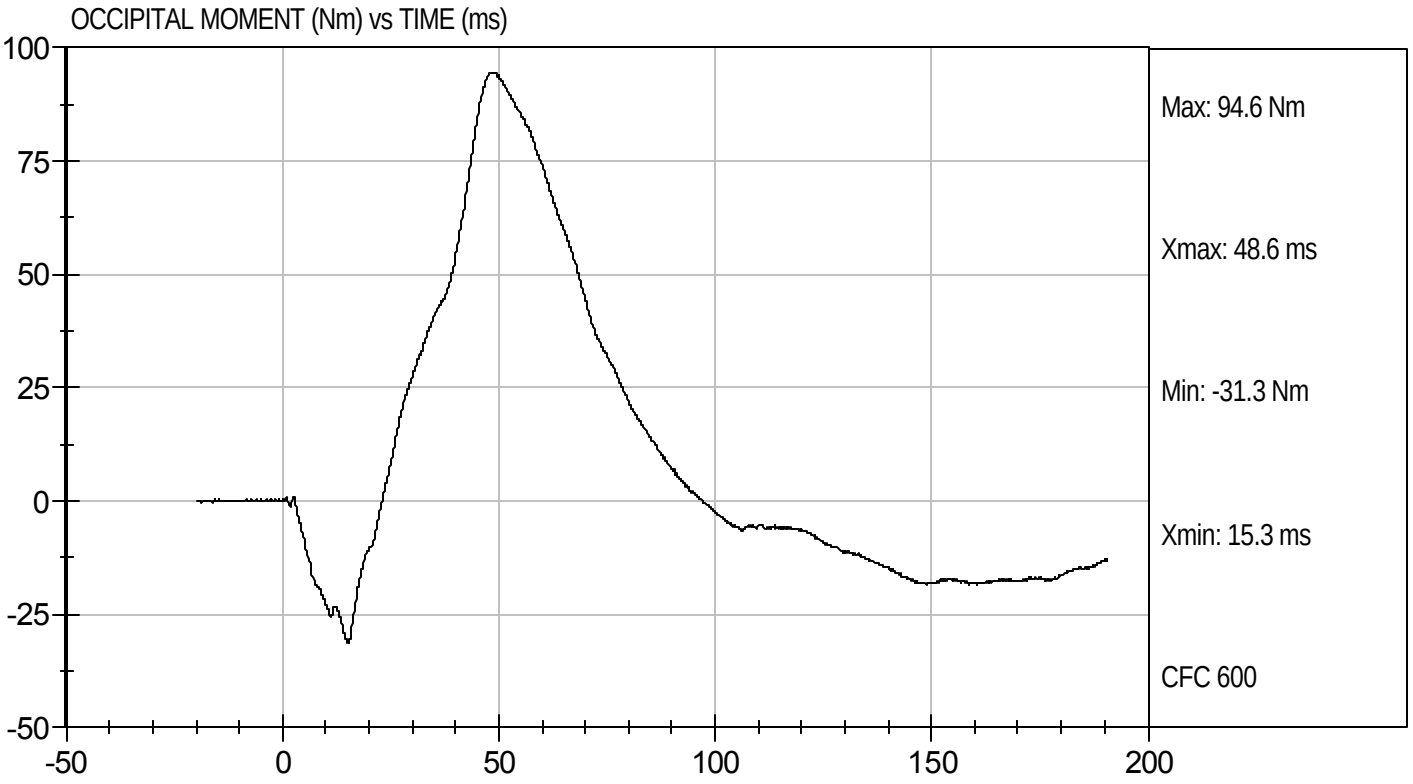


NECK ROTATION (DEG.) vs TIME (ms)



Test Desc: Neck Flexion
Component ID: D111742

Test Date: 5/12/11
Velocity: 22.83 ft/s, 6.96 m/s



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036 **Test I.D:** D111743

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	49	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.12	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	18.67	Pass
	20 ms	G's	14.00 to 19.00	17.25	Pass
	30 ms	G's	11.00 to 16.00	12.01	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	13.0	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	38.0	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	98.5	Pass
	Time	ms	72.0 to 82.0	74.0	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	158.0	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-70.6	Pass
	Time	ms	65.0 to 79.0	69.0	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	140.0	Pass
			Overall Test Results		Pass

Jessica Hall
Laboratory Technician

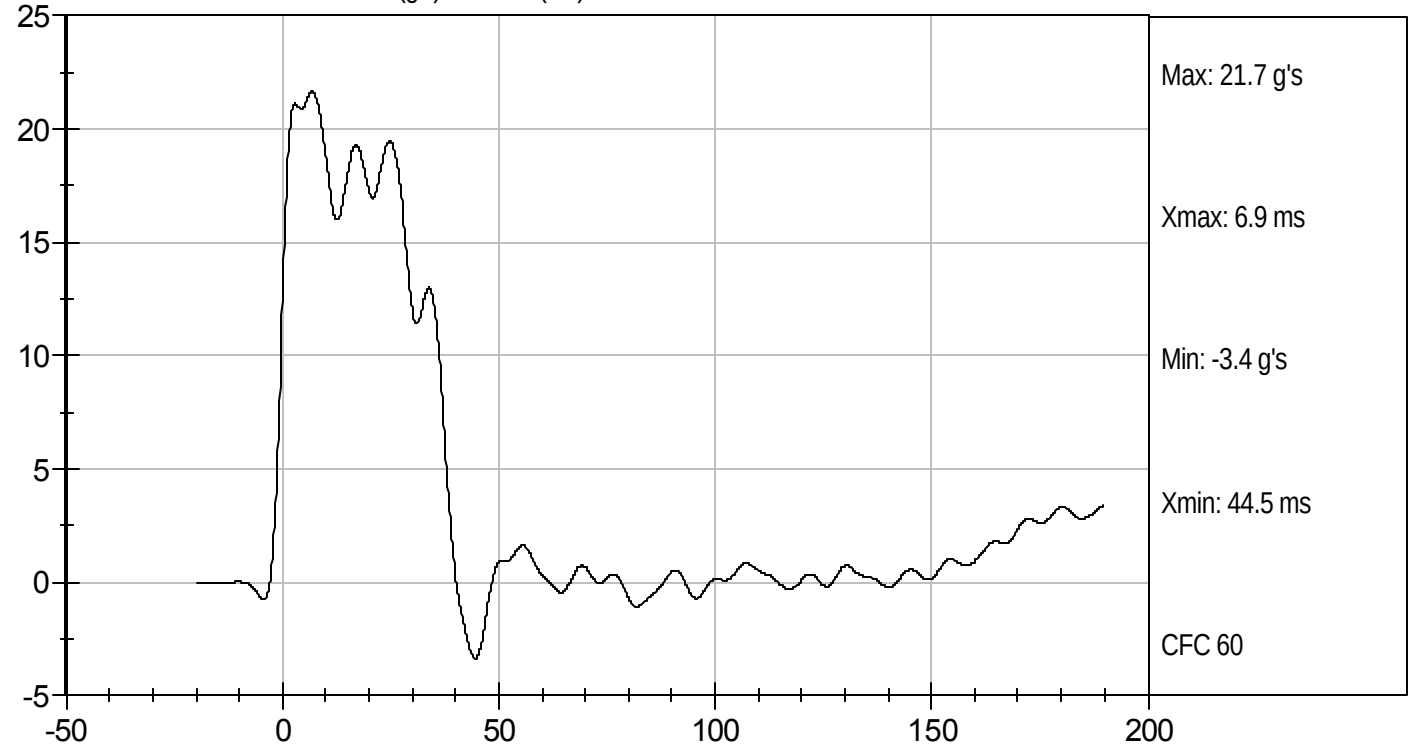
5/12/11
Test Date

David Winkelbauer
Approved By

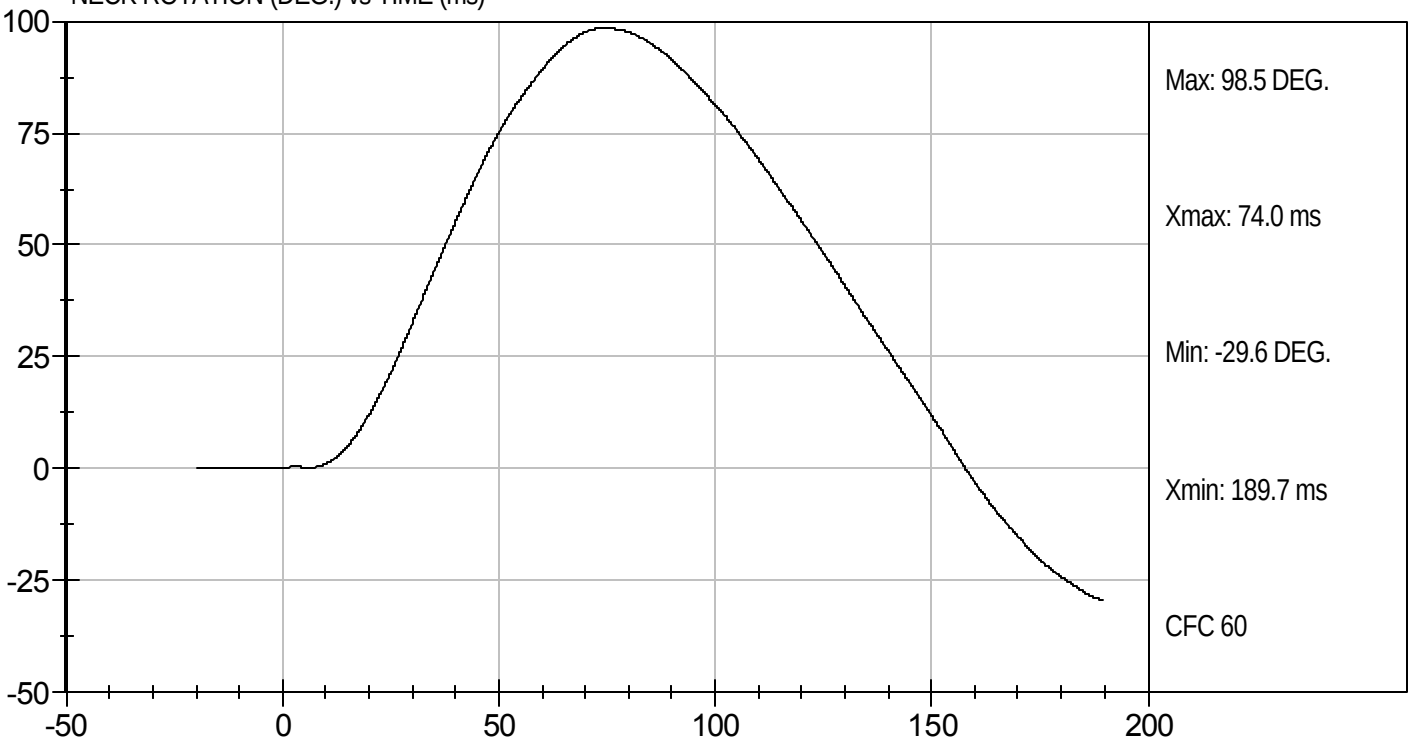
Test Desc: Neck Extension
Component ID: D111743

Test Date: 5/12/11
Velocity: 20.08 ft/s, 6.12 m/s

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

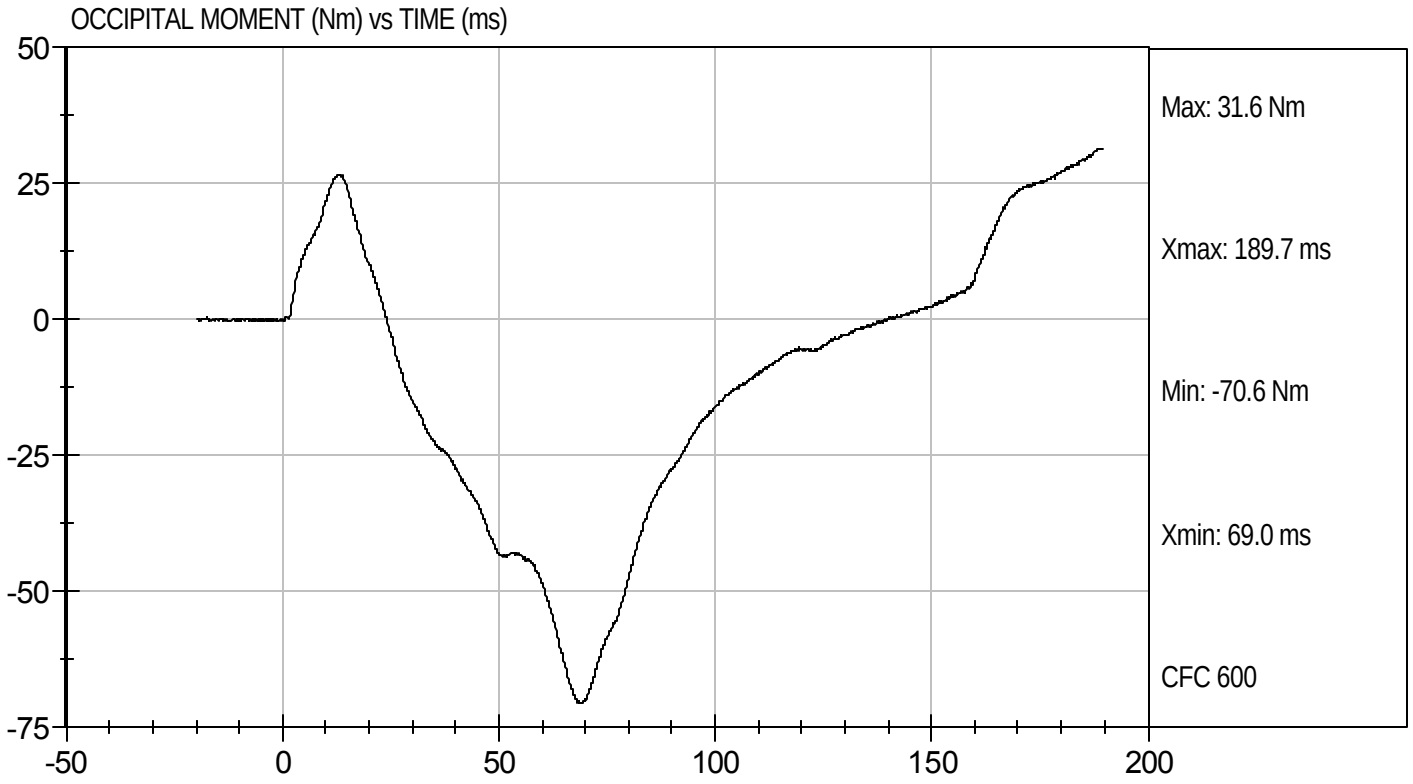


NECK ROTATION (DEG.) vs TIME (ms)



Test Desc: Neck Extension
Component ID: D111743

Test Date: 5/12/11
Velocity: 20.08 ft/s, 6.12 m/s



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036 **Test I.D:** D111744

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	49	Pass
Probe Velocity	m/s	6.58 to 6.82	6.77	Pass
Peak Probe Force	N	5159 to 5893	5,309	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.92	Pass
Internal Hysteresis	%	69 to 85	71	Pass
		Overall Test Results		Pass

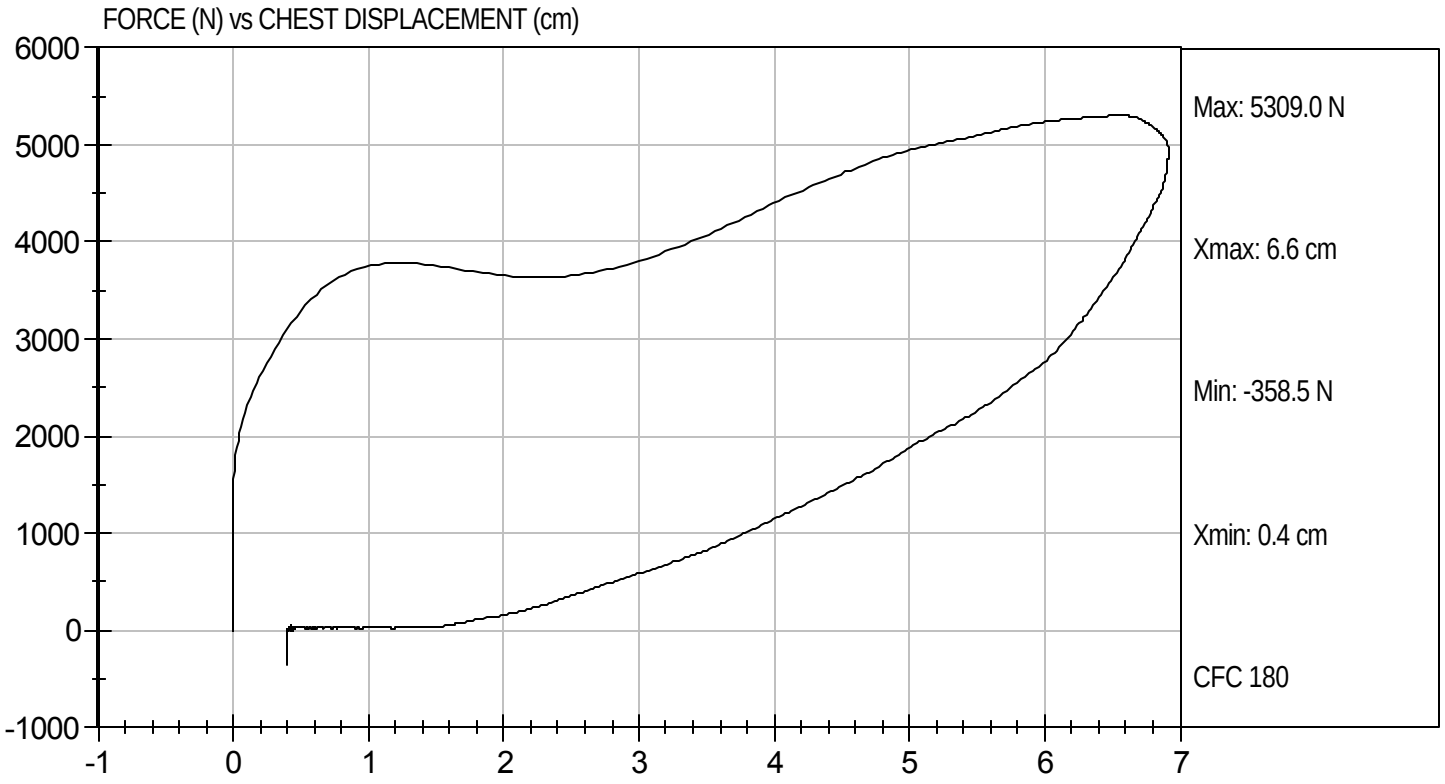
Jessica Hall
Laboratory Technician

5/12/11
Test Date

David Winkelbauer
Approved By

Test Desc: Thorax Impact
Component ID: D111744

Test Date: 5/12/11
Velocity: 22.22 ft/s, 6.77 m/s



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036 **Test I.D:** D111745

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	49	Pass
Probe Velocity	m/s	2.07 to 2.13	2.10	Pass
Peak Probe Force	Newtons	4715 to 5782	5,012	Pass
		Overall Test Results		Pass

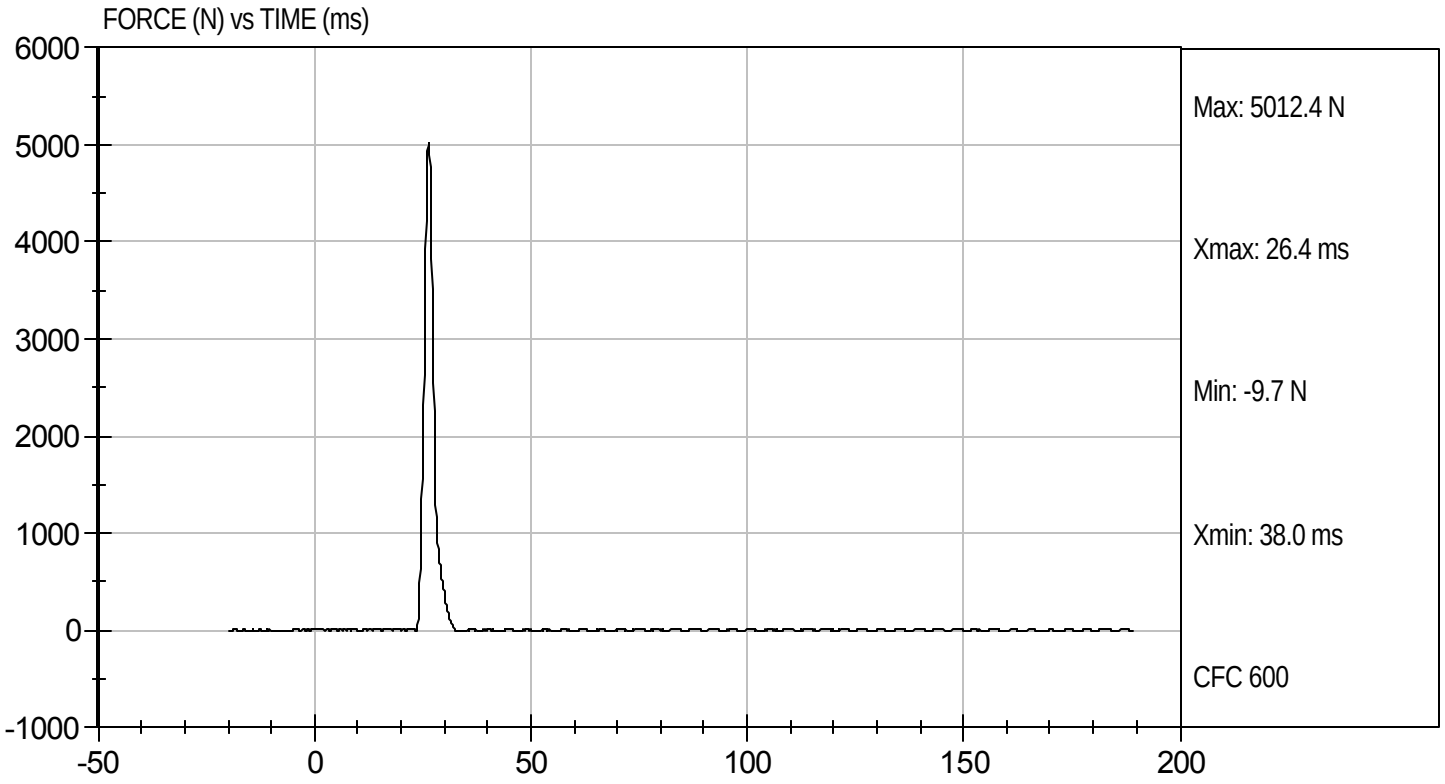
Jessica Hall
Laboratory Technician

5/12/11
Test Date

David Winkelbauer
Approved By

Test Desc: Right Knee
Component ID: D111745

Test Date: 5/12/11
Velocity: 6.9 ft/s, 2.10 m/s



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036 **Test I.D:** D111746

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	49	Pass
Probe Velocity	m/s	2.07 to 2.13	2.07	Pass
Peak Probe Force	Newtons	4715 to 5782	5,640	Pass
		Overall Test Results		Pass

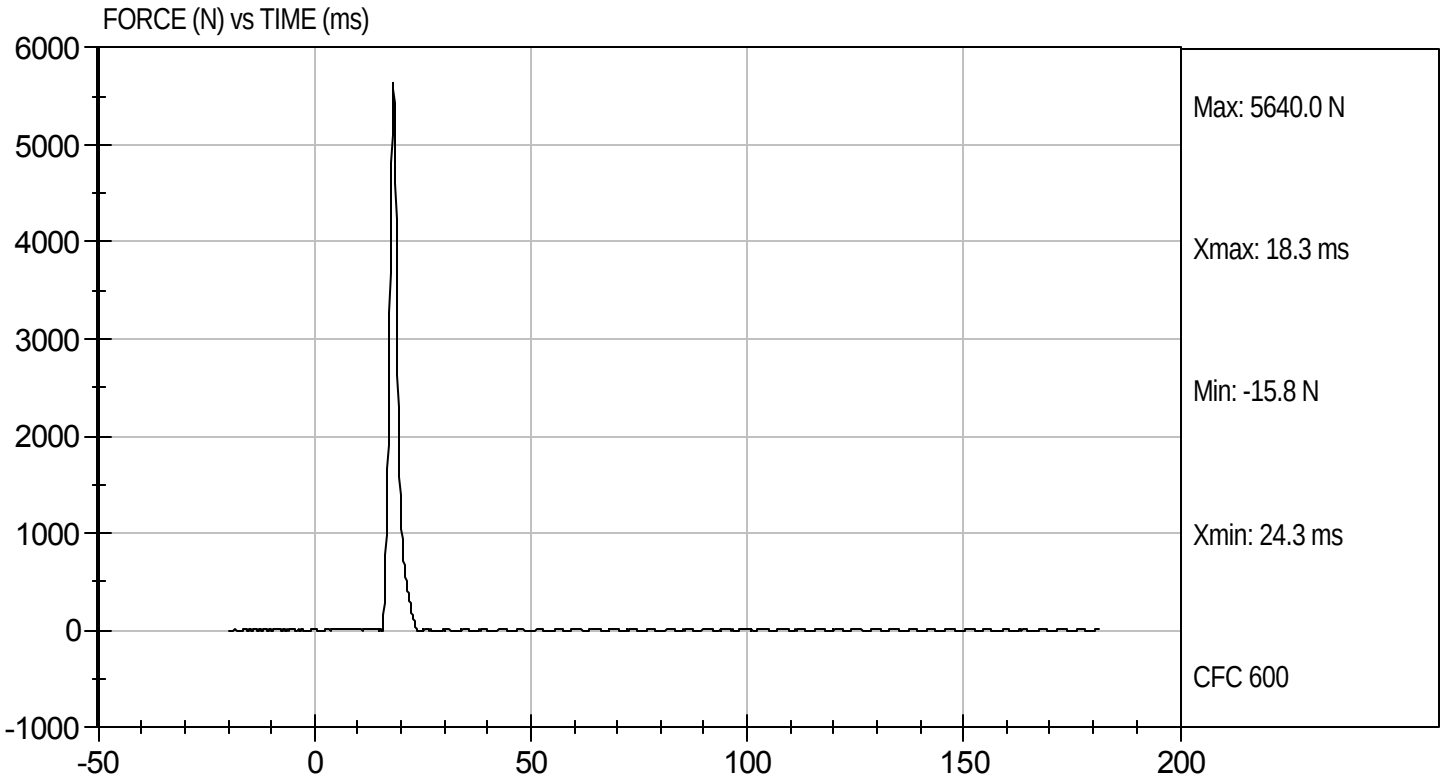
Jessica Gall
Laboratory Technician

5/12/11
Test Date

David Winkelbauer
Approved By

Test Desc: Left Knee
Component ID: D111746

Test Date: 5/12/11
Velocity: 6.80 ft/s, 2.07 m/s



MGA RESEARCH CORPORATION

HIP-FEMUR FLEXION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036 **Test I.D:** D111740

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.9	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	47	47	Pass
Rotation Rate	deg/s	5 -10	8	8	Pass
30 Degrees	Nm	94.9 Nm Max	58.3	54.6	Pass
150 ft-lbf / 203.4 Nm	Deg	40- 50 Degree Max Rotation	49	48	Pass
		Overall Test Results			Pass

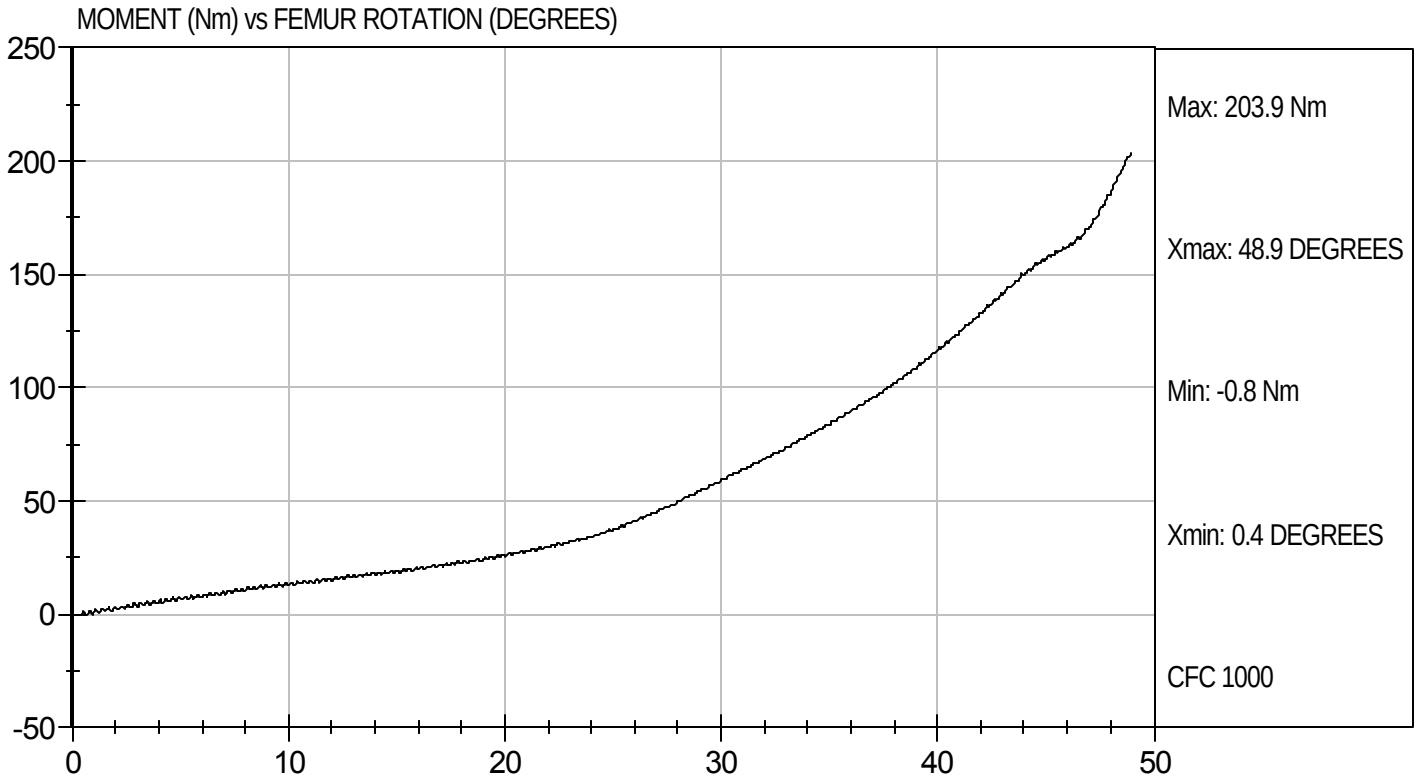
Jessica Hall
Laboratory Technician

5/11/11
Test Date

David Winkelbauer
Approved By

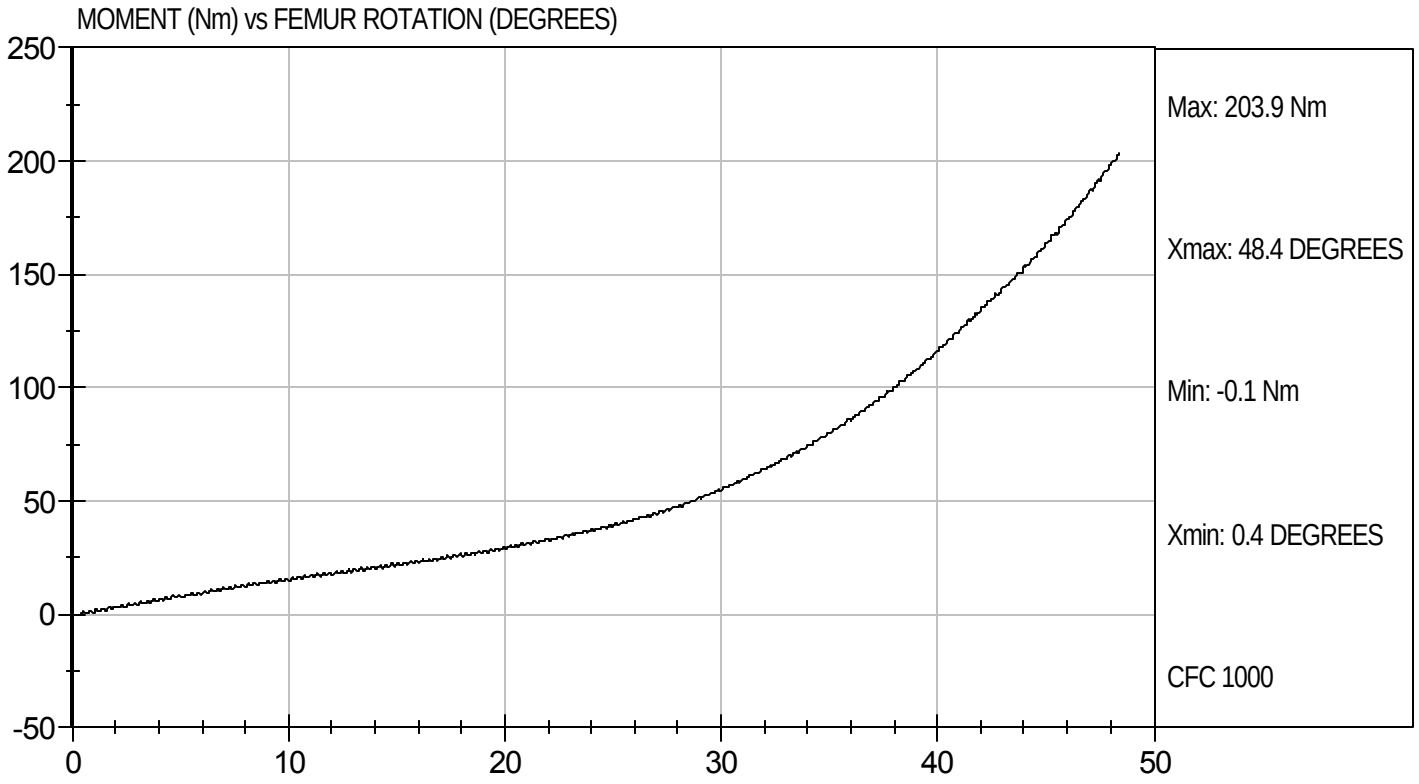
Test Desc: Hip Femur Flexion
Component ID: D111749

Test Date: 5/11/11
Velocity: 0 ft/s, 0.00 m/s



Test Desc: Hip Femur Flexion
Component ID: D111740

Test Date: 5/11/11
Velocity: 0 ft/s, 0.00 m/s



MGA RESEARCH CORPORATION

HEAD DROP TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036 **Test ID:** D112151

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	53	Pass
Peak Resultant Acceleration	G's	225 - 275	245	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-2.8	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
		Overall Test Results		Pass

Jessica Hall
Laboratory Technician

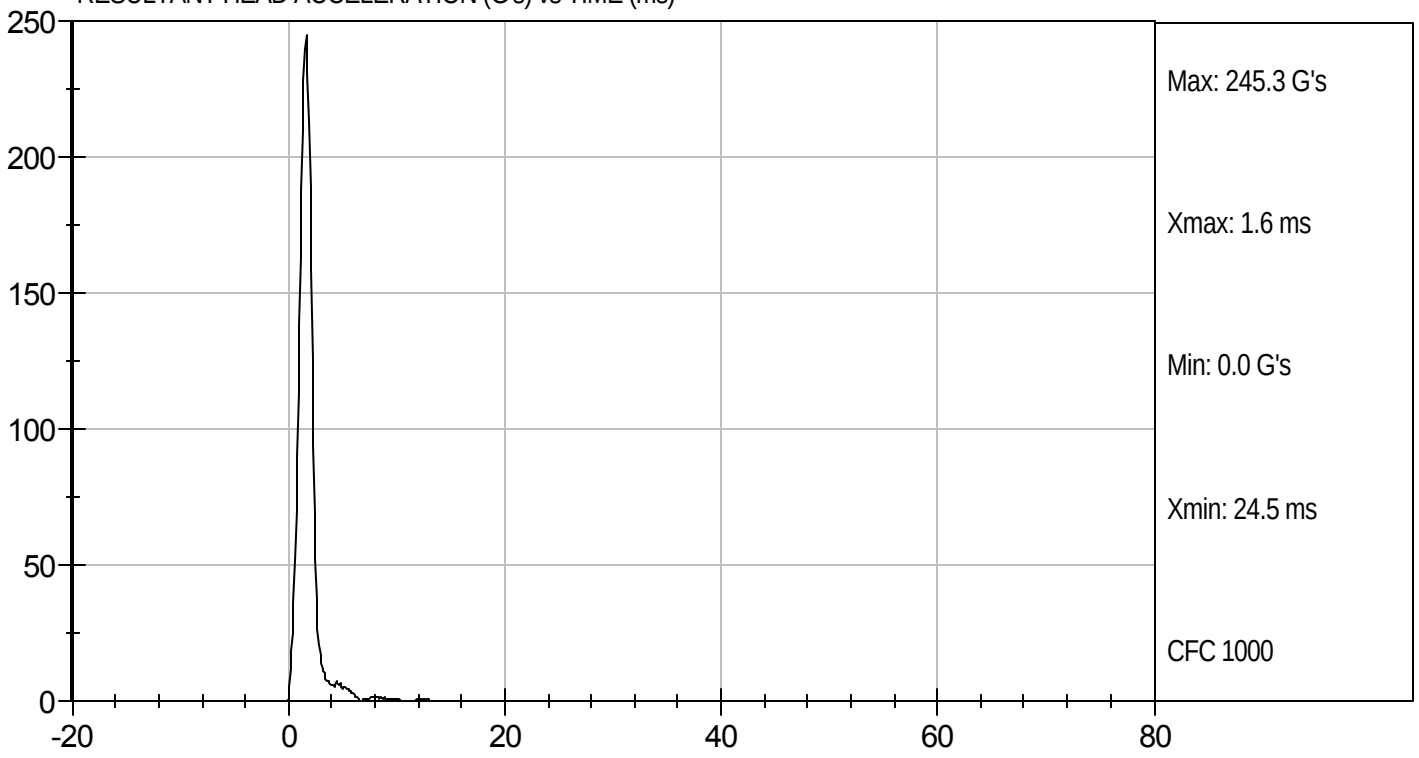
6/21/11
Test Date

David Winkelbauer
Approved By

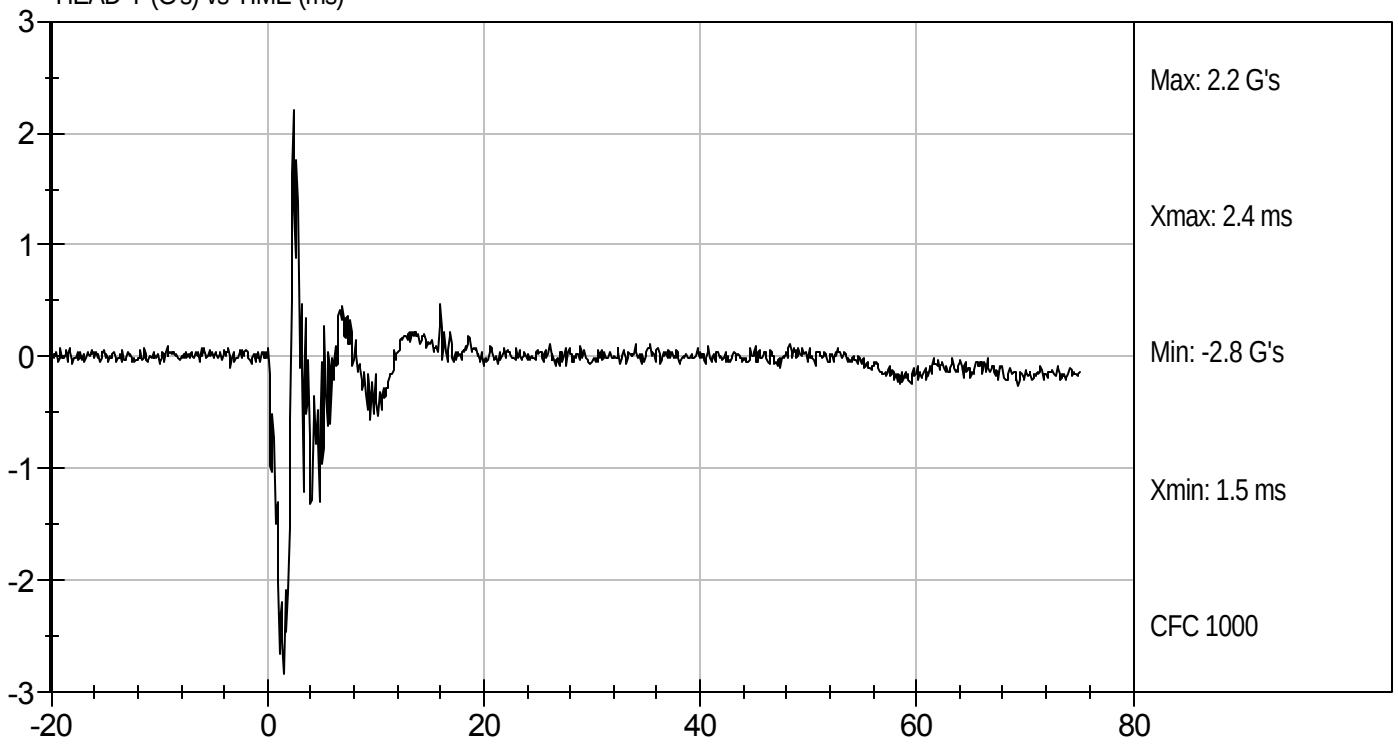
Test Desc: Head Drop
Component ID: D112151

Test Date: 6/21/11
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: 036 **Test I.D:** D112152

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	20.9	Pass
Laboratory Relative Humidity		%	10 to 70	53	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	24.03	Pass
	20 ms	G's	17.60 to 22.60	19.28	Pass
	30 ms	G's	12.50 to 18.50	12.87	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	12.8	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	35.8	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	69.7	Pass
	Time	ms	57.0 to 64.0	57.4	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	116.6	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	97.9	Pass
	Time	ms	47.0 to 58.0	49.0	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	97.6	Pass
			Overall Test Results		Pass

Jessica Hall
Laboratory Technician

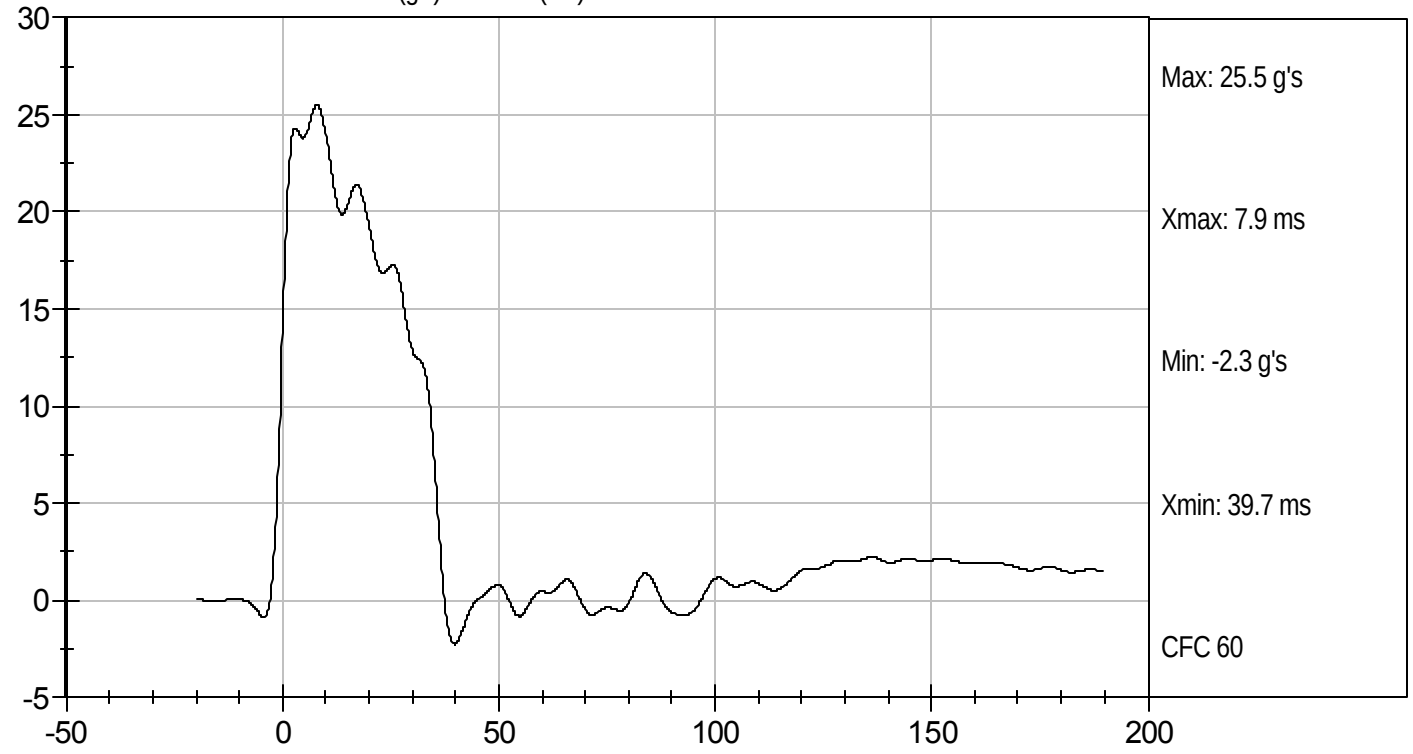
6/21/11
Test Date

David Winkelbauer
Approved By

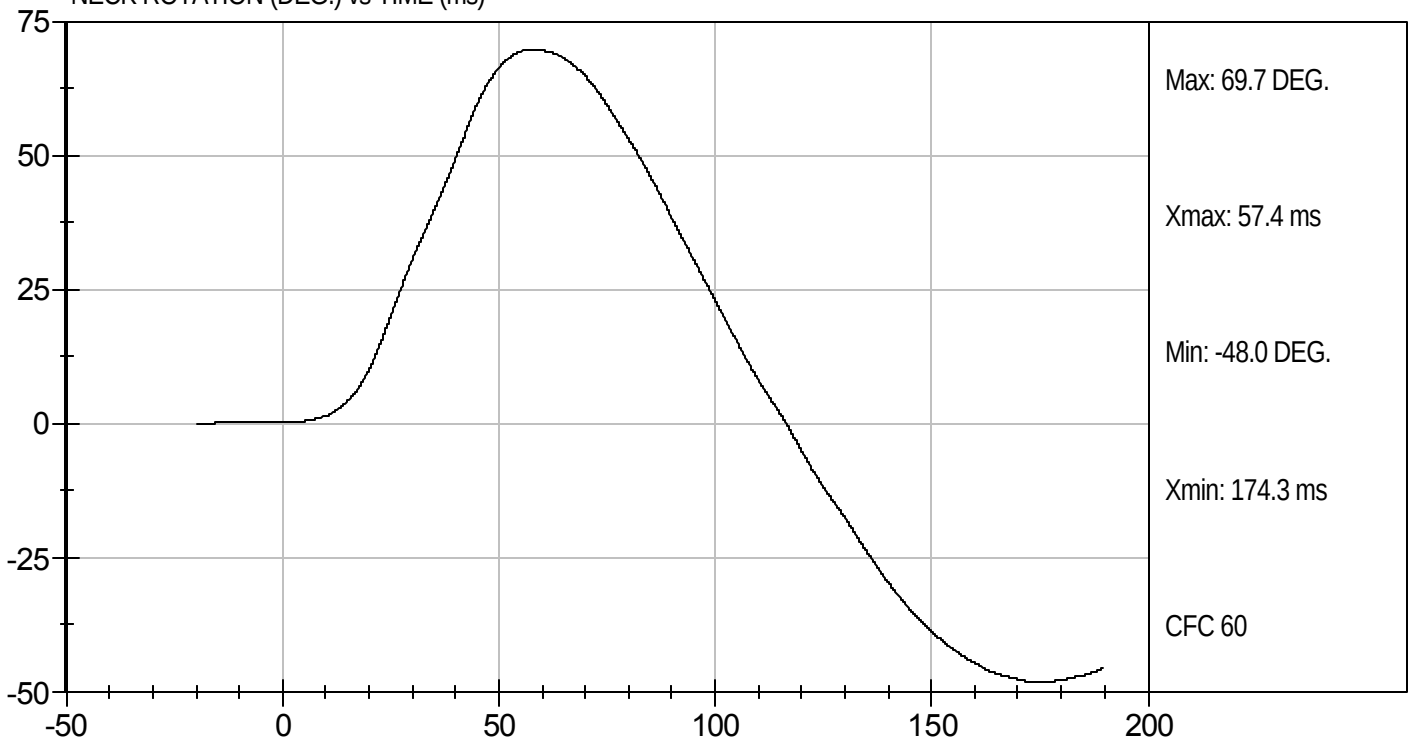
Test Desc: Neck Flexion
Component ID: D112152

Test Date: 6/21/11
Velocity: 23.15 ft/s, 7.06 m/s

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

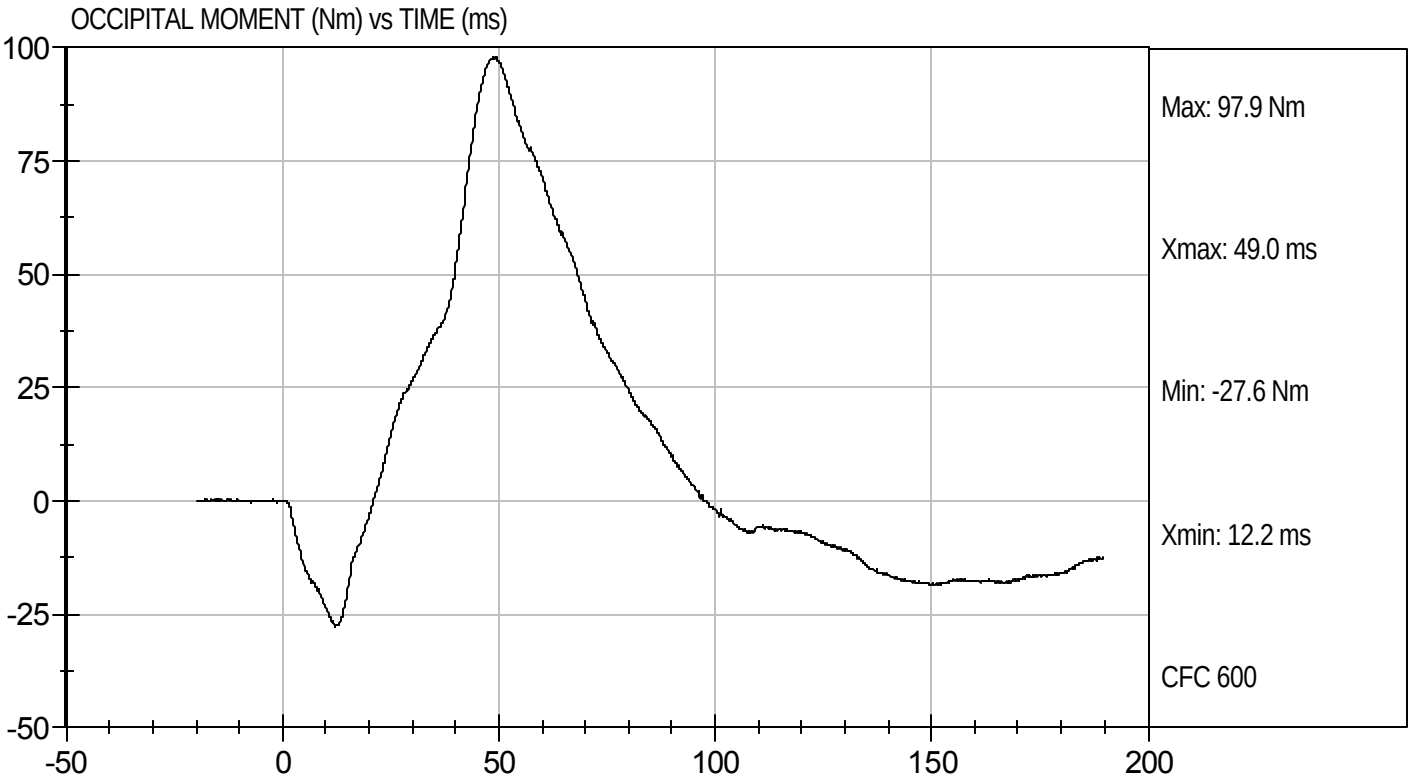


NECK ROTATION (DEG.) vs TIME (ms)



Test Desc: Neck Flexion
Component ID: D112152

Test Date: 6/21/11
Velocity: 23.15 ft/s, 7.06 m/s



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036 **Test I.D:** D112153

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	20.9	Pass
Laboratory Relative Humidity		%	10 to 70	53	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.12	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	19.43	Pass
	20 ms	G's	14.00 to 19.00	15.89	Pass
	30 ms	G's	11.00 to 16.00	14.86	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	15.4	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	94.7	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	155.3	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-68.6	Pass
	Time	ms	65.0 to 79.0	68.5	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	138.3	Pass
			Overall Test Results		Pass

Jessica Hall
Laboratory Technician

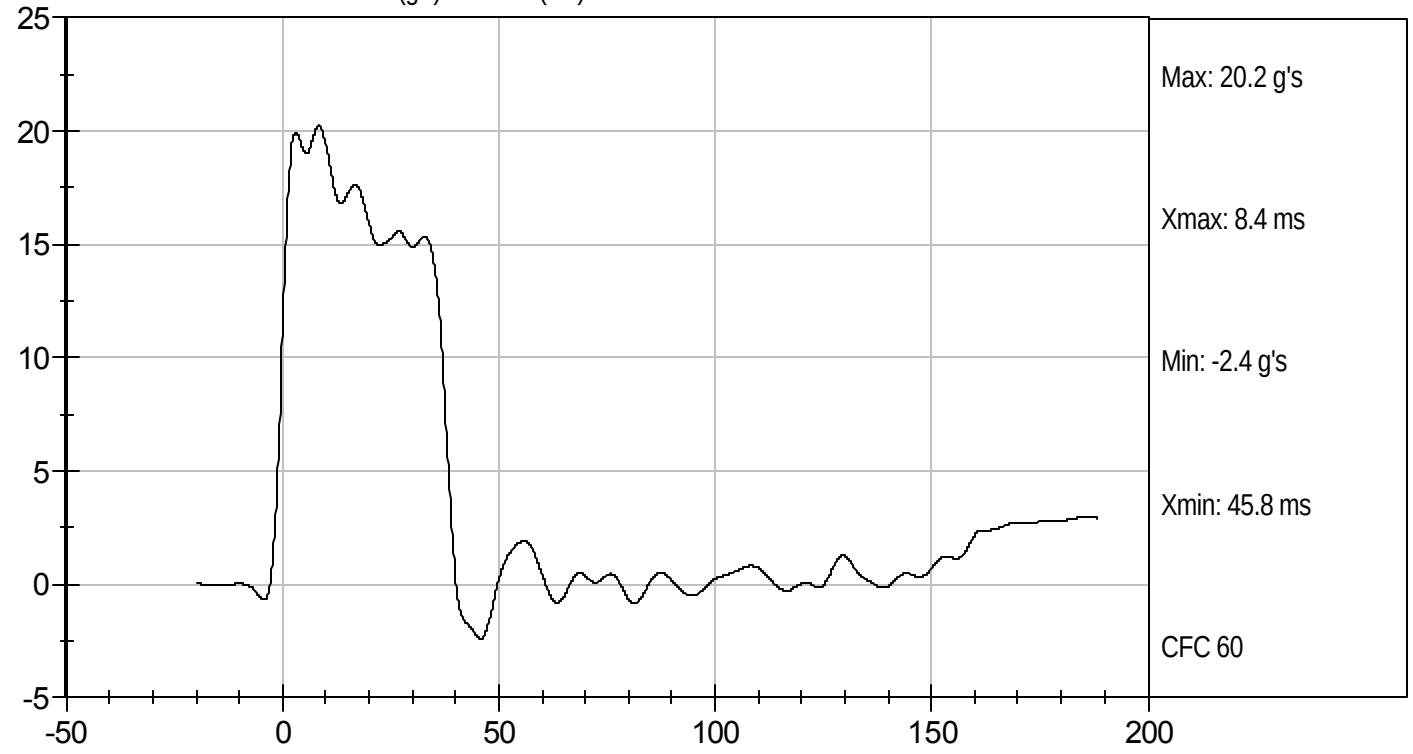
6/21/11
Test Date

David Winkelbauer
Approved By

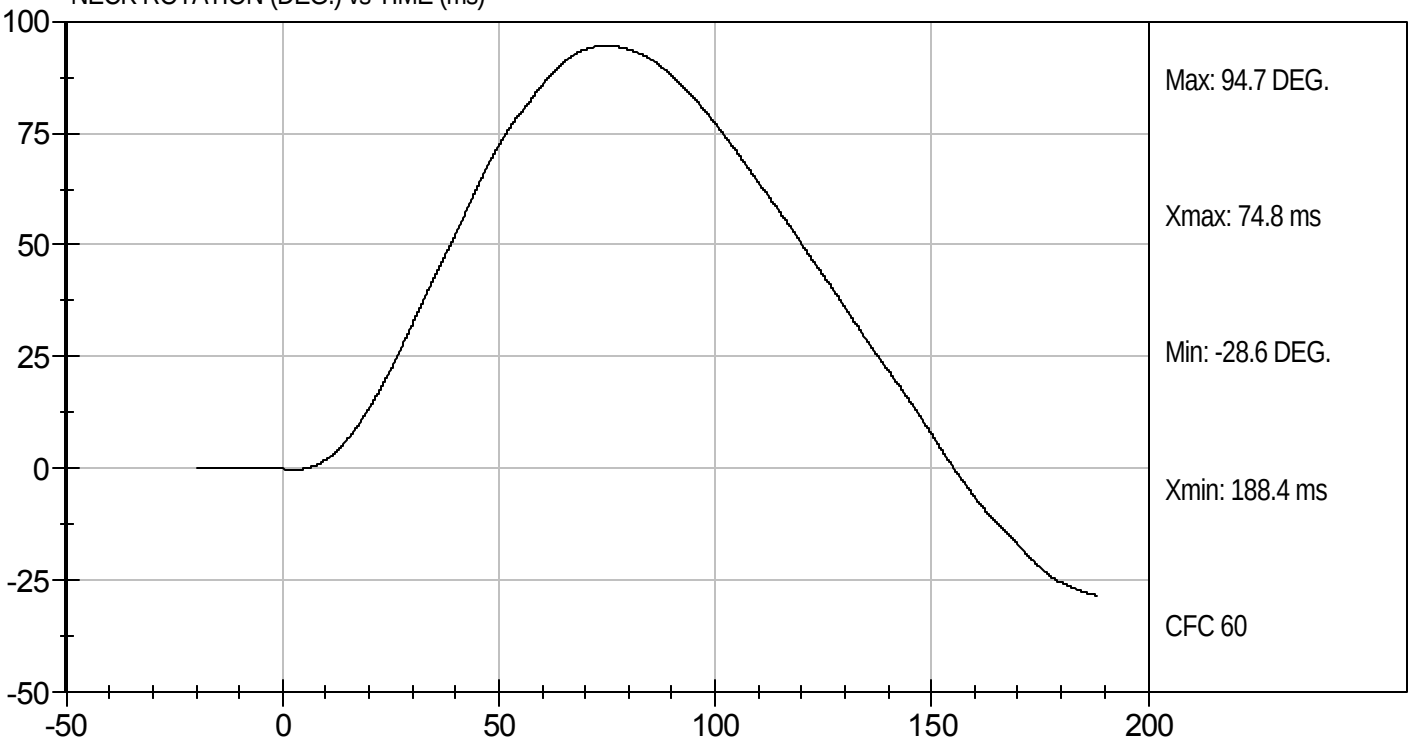
Test Desc: Neck Extension
Component ID: D112153

Test Date: 6/21/11
Velocity: 20.08 ft/s, 6.12 m/s

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

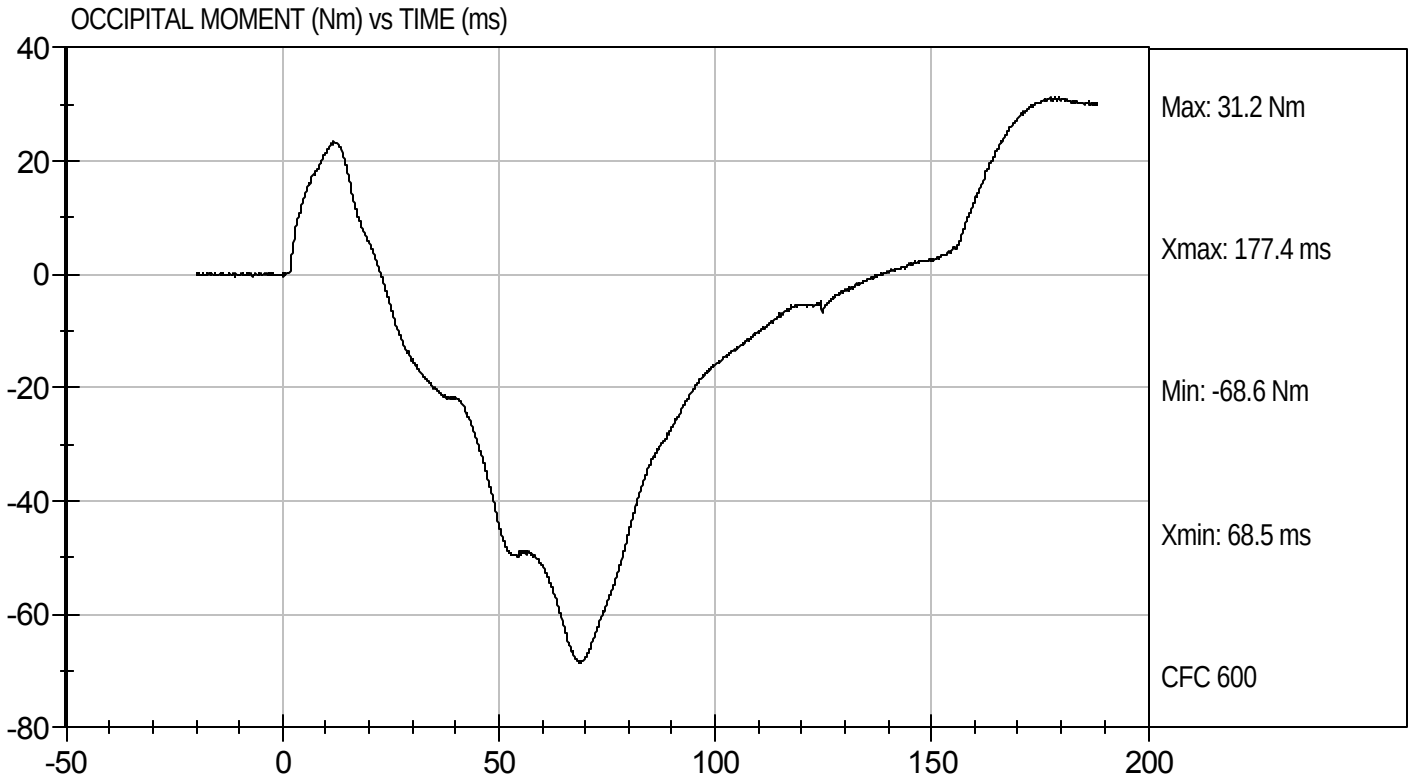


NECK ROTATION (DEG.) vs TIME (ms)



Test Desc: Neck Extension
Component ID: D112153

Test Date: 6/21/11
Velocity: 20.08 ft/s, 6.12 m/s



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036 **Test I.D:** D112154

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	54	Pass
Probe Velocity	m/s	6.58 to 6.82	6.68	Pass
Peak Probe Force	N	5159 to 5893	5,407	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.99	Pass
Internal Hysteresis	%	69 to 85	72	Pass
		Overall Test Results		Pass

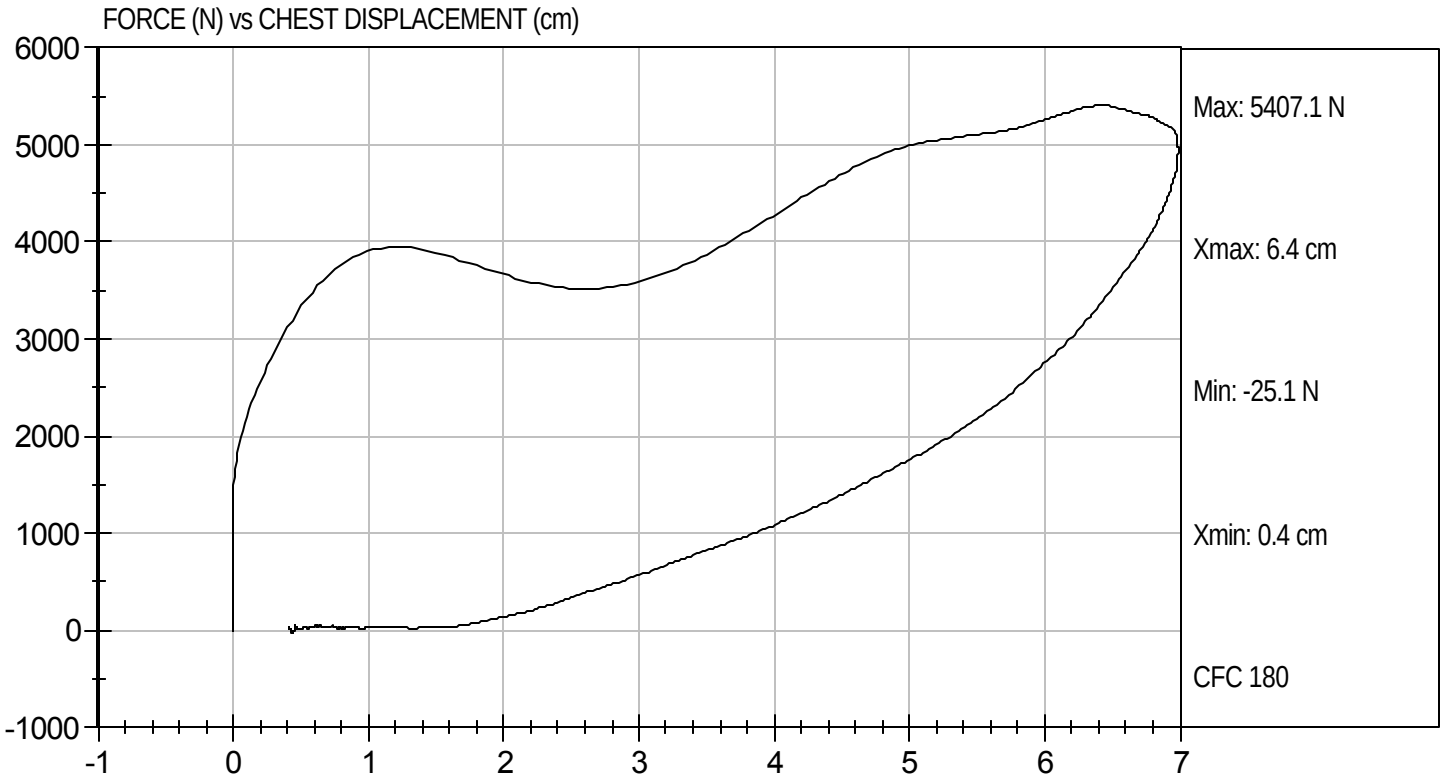
Jessica Gall
Laboratory Technician

6/22/11
Test Date

David Winkelbauer
Approved By

Test Desc: Thorax Impact
Component ID: D112154

Test Date: 6/22/11
Velocity: 21.9 ft/s, 6.68 m/s



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036 **Test I.D:** D112155

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	54	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	Newtons	4715 to 5782	5,194	Pass
		Overall Test Results		Pass

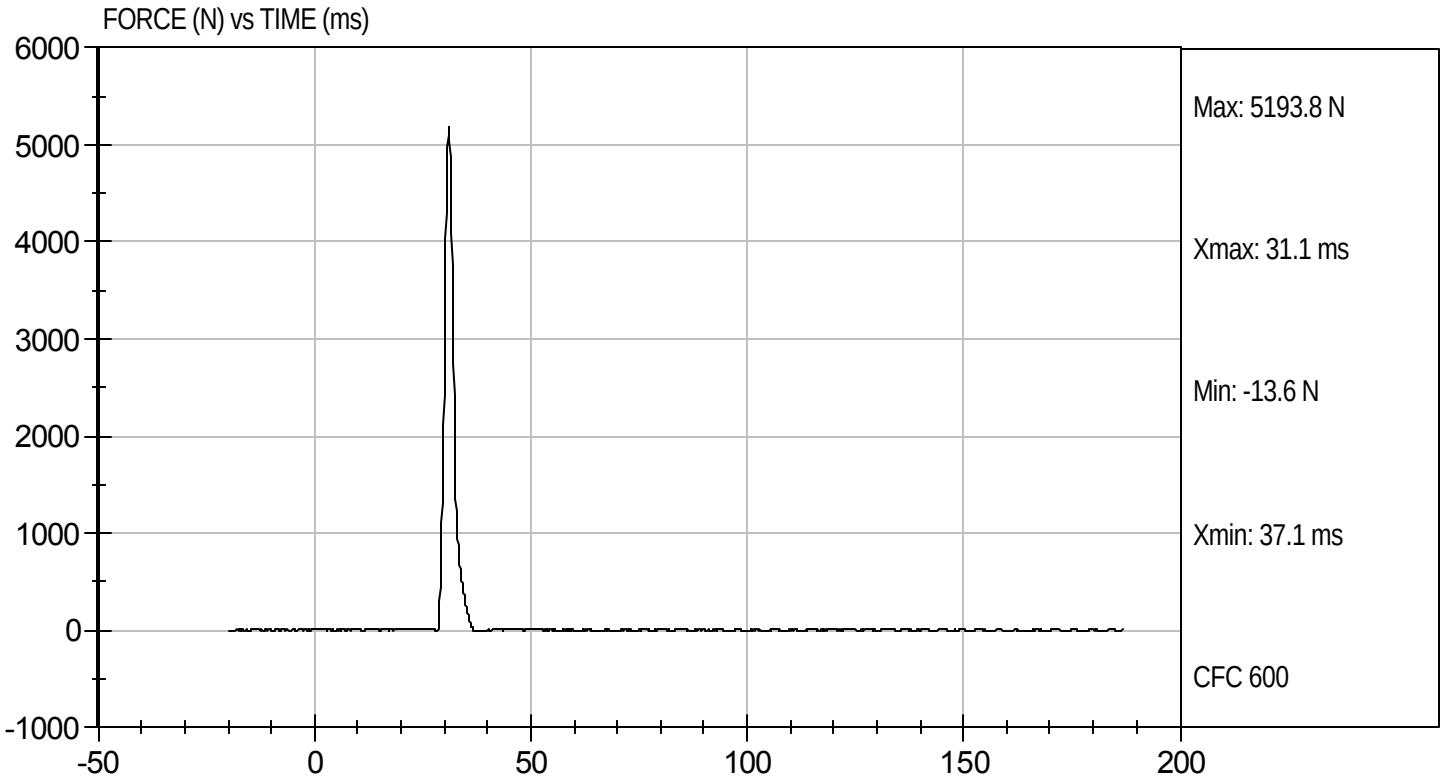
Jessica Gall
Laboratory Technician

6/21/11
Test Date

David Winkelbauer
Approved By

Test Desc: Right Knee
Component ID: D112155

Test Date: 6/21/11
Velocity: 6.97 ft/s, 2.12 m/s



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036 **Test I.D:** D112156

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	54	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	Newtons	4715 to 5782	5,506	Pass
		Overall Test Results		Pass

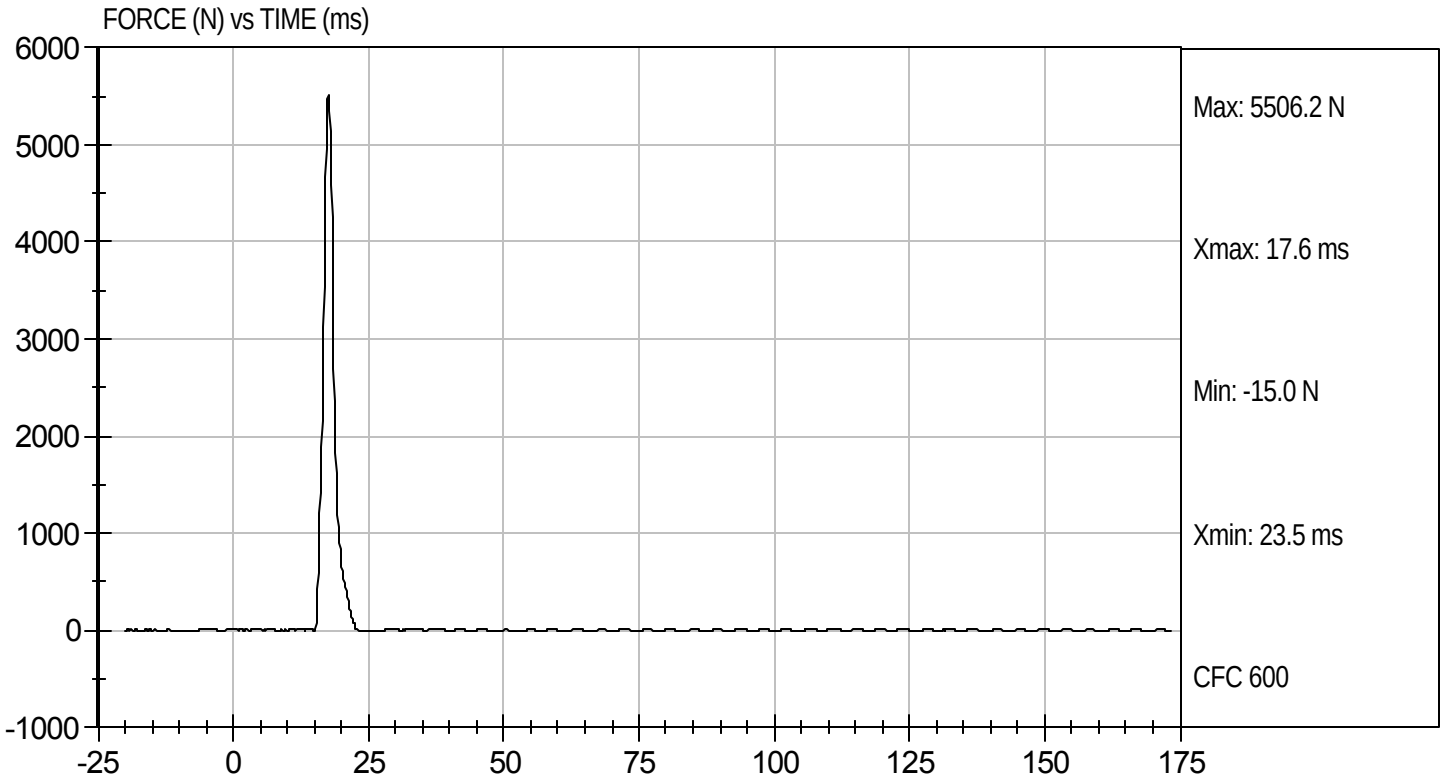
Jessica Gall
Laboratory Technician

6/21/11
Test Date

David Winkelbauer
Approved By

Test Desc: Left Knee
Component ID: D112156

Test Date: 6/21/11
Velocity: 6.97 ft/s, 2.12 m/s



MGA RESEARCH CORPORATION

HIP-FEMUR FLEXION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036 **Test I.D:** D112150

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.1	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	53	53	Pass
Rotation Rate	deg/s	5 -10	8	8	Pass
30 Degrees	Nm	94.9 Nm Max	56.8	48.5	Pass
150 ft-lbf / 203.4 Nm	Deg	40- 50 Degree Max Rotation	50	49	Pass
		Overall Test Results			Pass

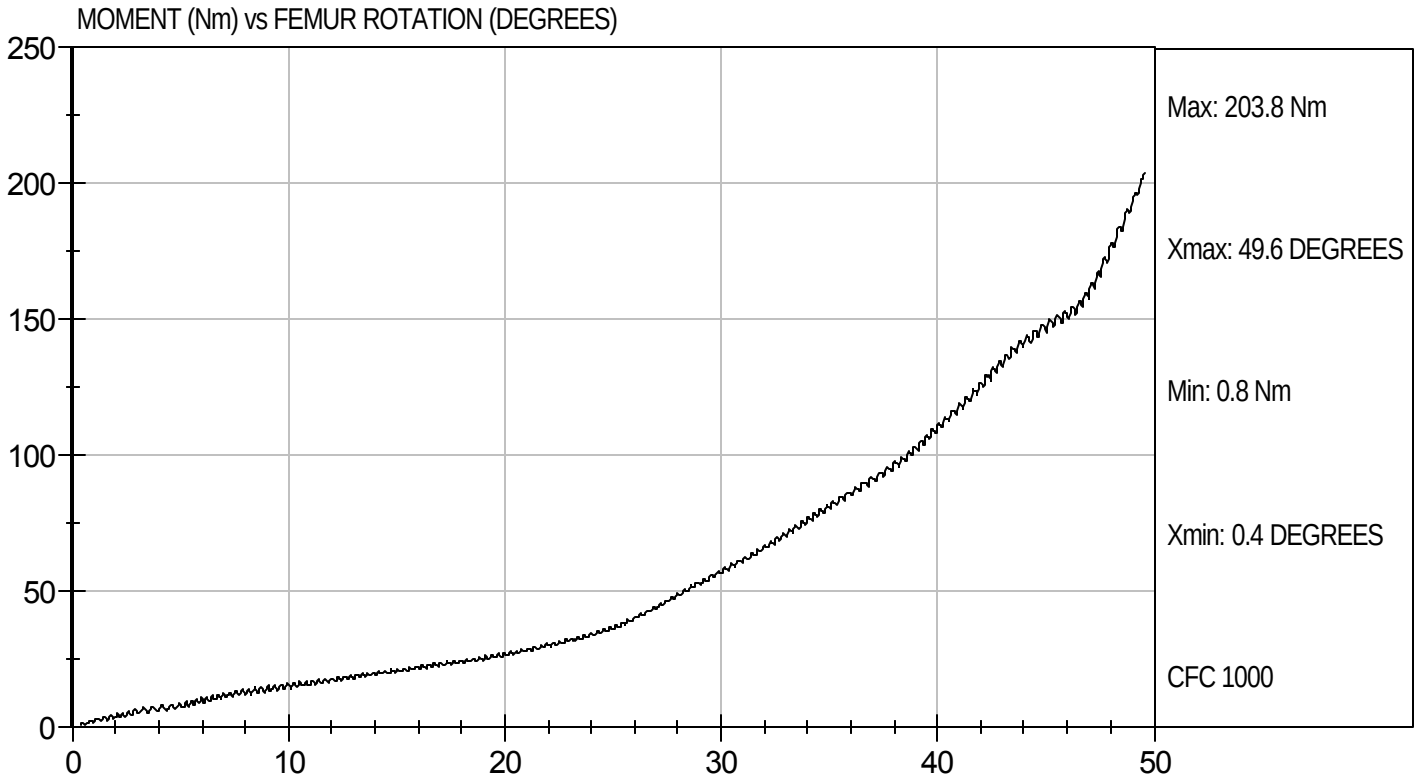
Jessica Hall
Laboratory Technician

6/21/11
Test Date

David Winkelbauer
Approved By

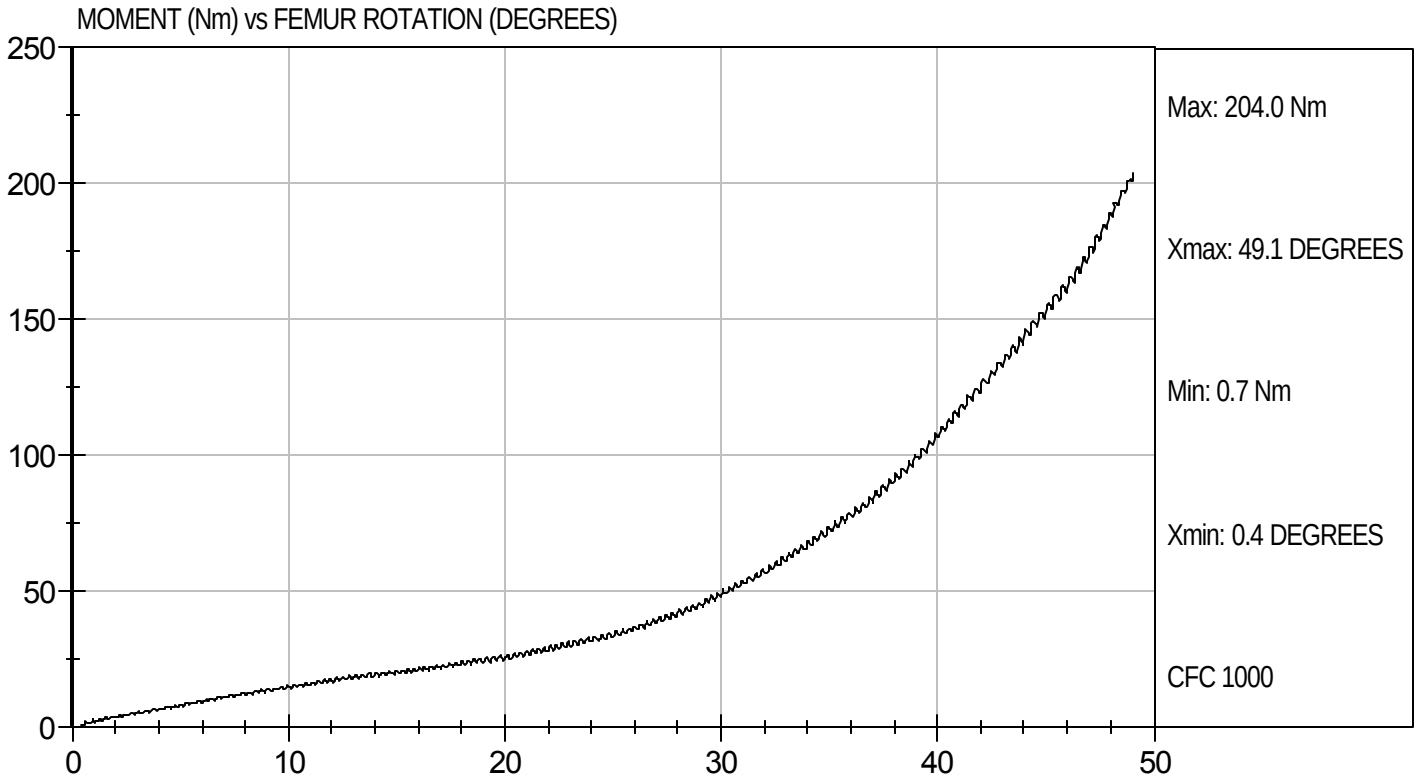
Test Desc: Hip Femur Flexion
Component ID: D112159

Test Date: 6/21/11
Velocity: 0 ft/s, 0.00 m/s



Test Desc: Hip Femur Flexion
Component ID: D112150

Test Date: 6/21/11
Velocity: 0 ft/s, 0.00 m/s



MGA RESEARCH CORPORATION

HEAD DROP TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test ID:** D111751

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	47	Pass
Peak Resultant Acceleration	G's	250 to 300	274	Pass
Peak Lateral Acceleration	G's	+/- 15	-1.8	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
		Overall Test Results		Pass

Jessica Hall
Laboratory Technician

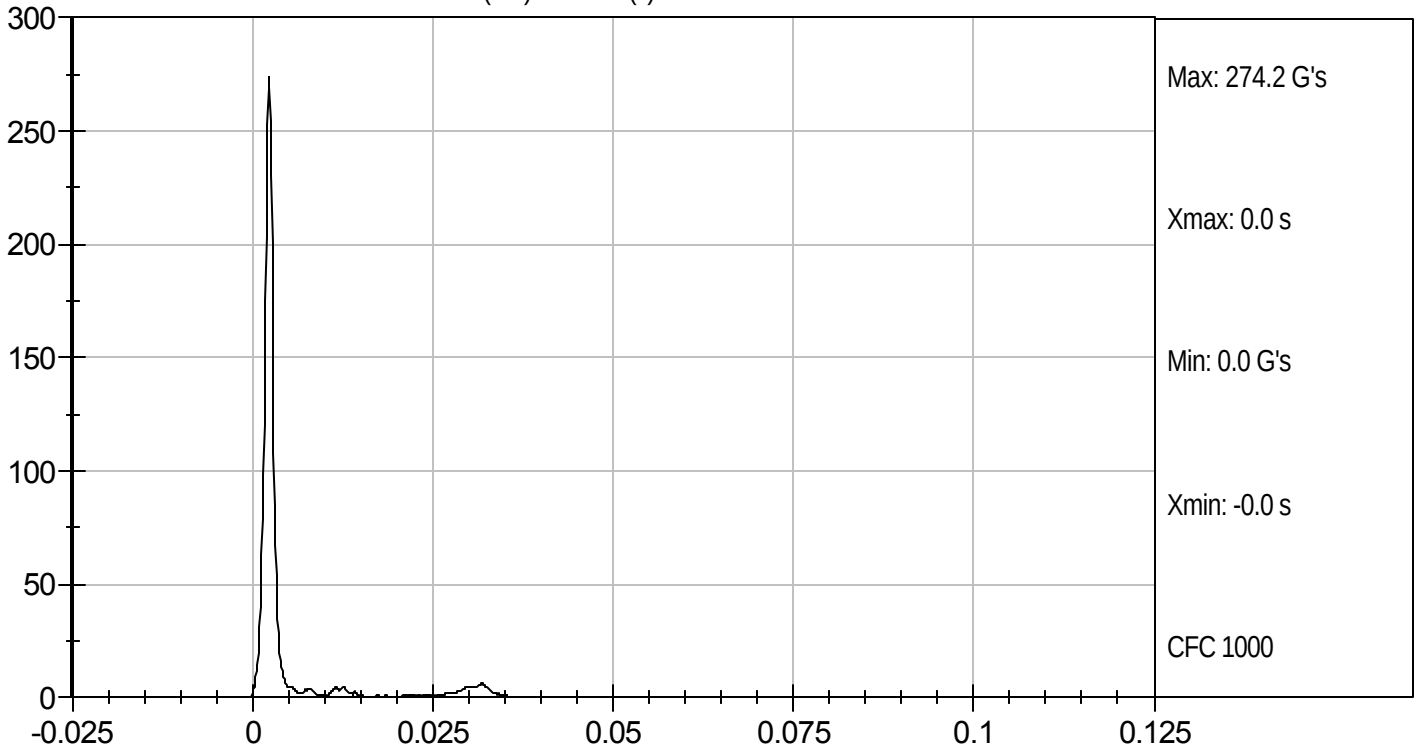
5/11/11
Test Date

David Winkelbauer
Approved By

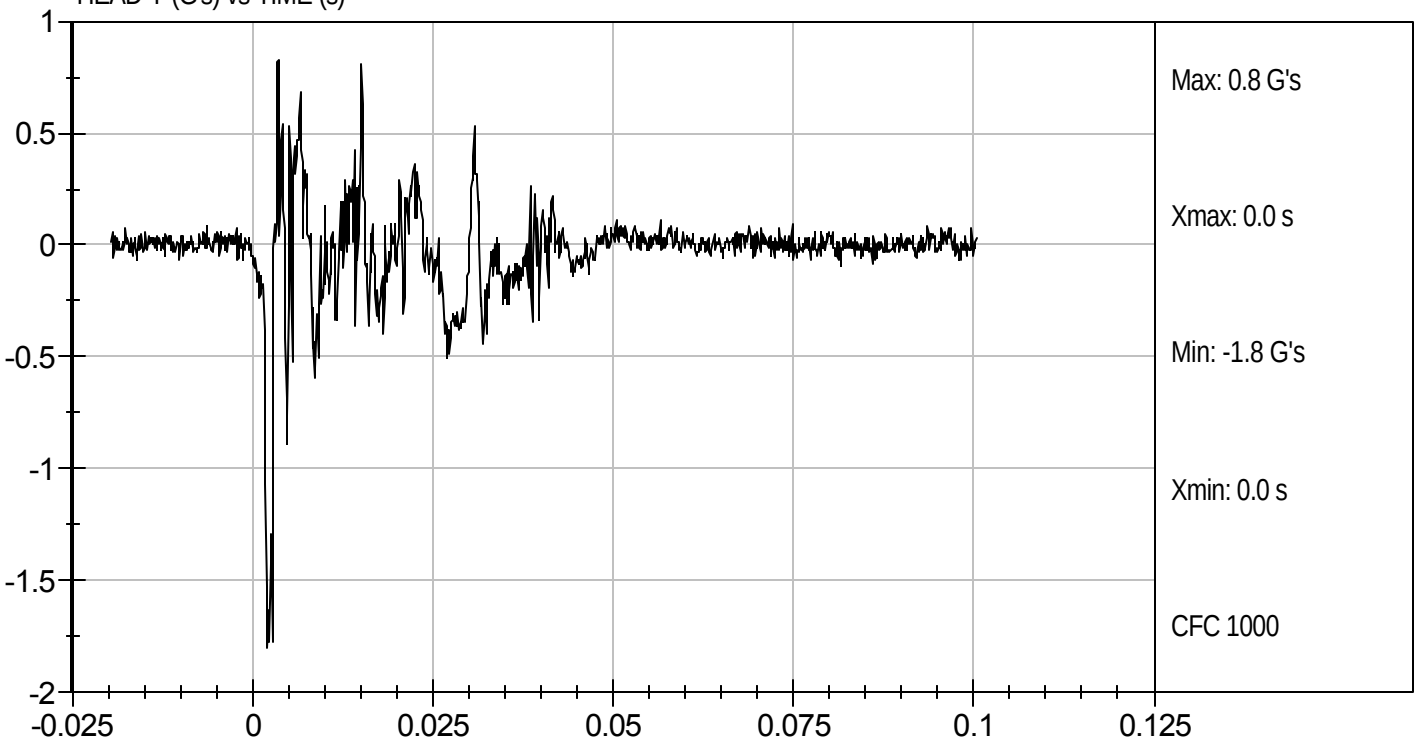
Test Desc: Head Drop
Component ID: D111751

Test Date: 5/11/11
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:** D111752

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	49	Pass
Pendulum Speed		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	m/s	2.1 to 2.5	2.3	Pass
	20 ms	m/s	4.0 to 5.0	4.3	Pass
	30 ms	m/s	5.8 to 7.0	5.9	Pass
D Plane Rotation	Max	deg	77 to 91	77	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	89	Pass
			Overall Results		Pass

Jessica Hall
Laboratory Technician

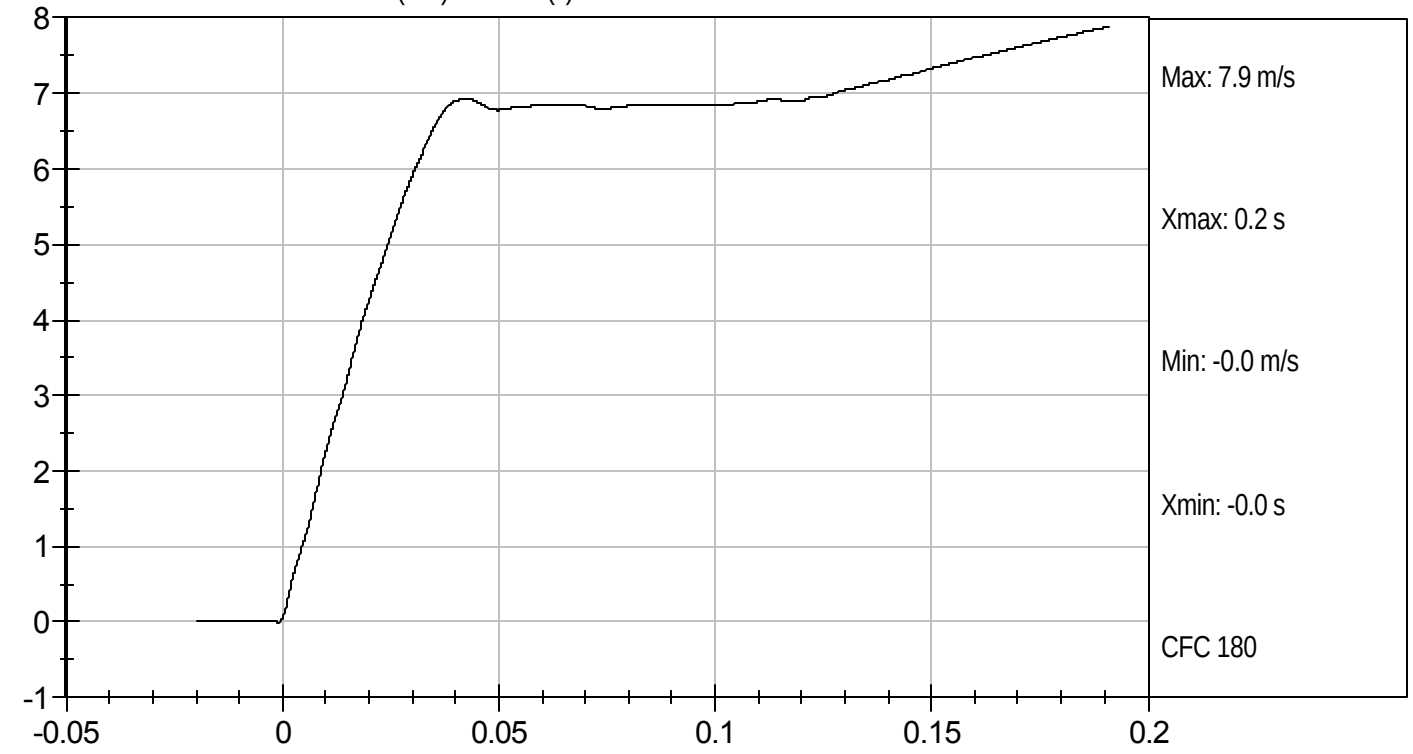
5/11/11
Test Date

David Winkelbauer
Approved By

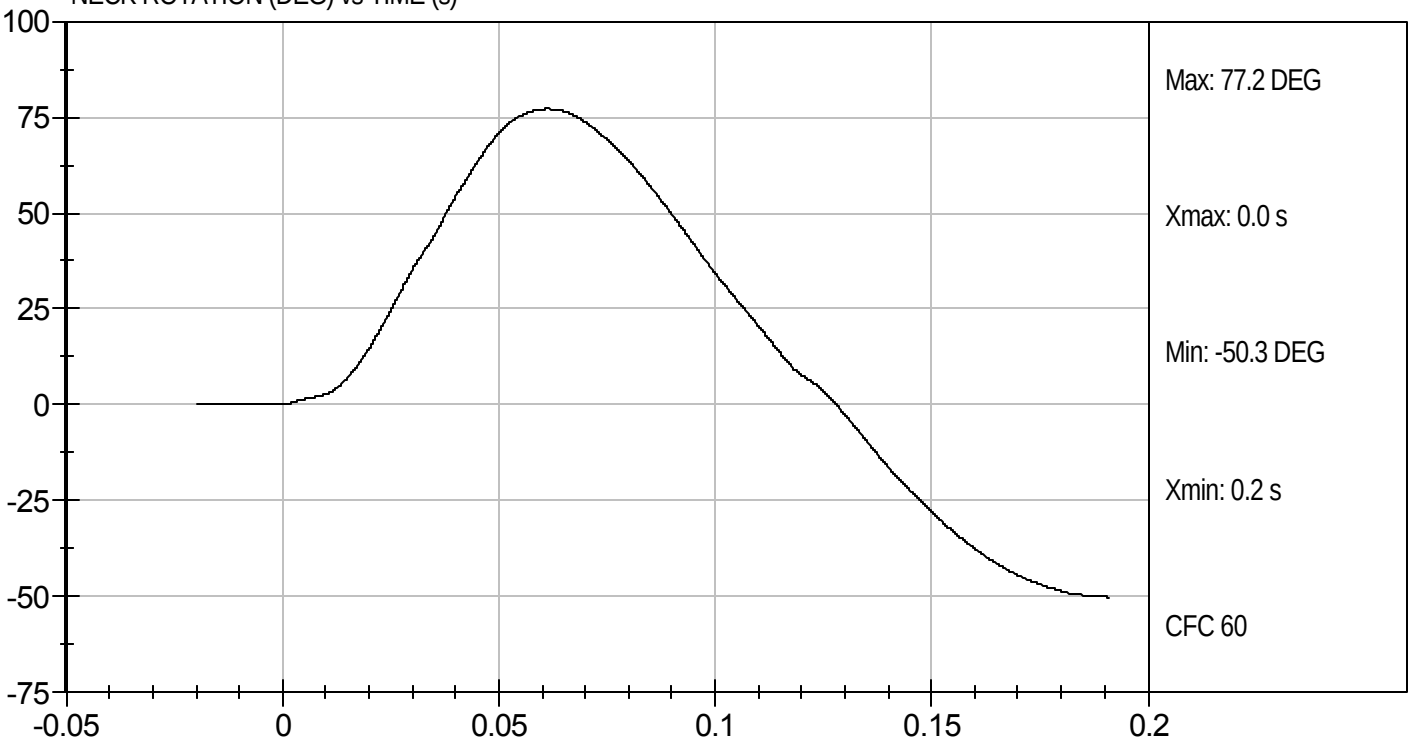
Test Desc: Neck Flexion
Component ID: D111752

Test Date: 5/11/11
Velocity: 23.15 ft/s, 7.06 m/s

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

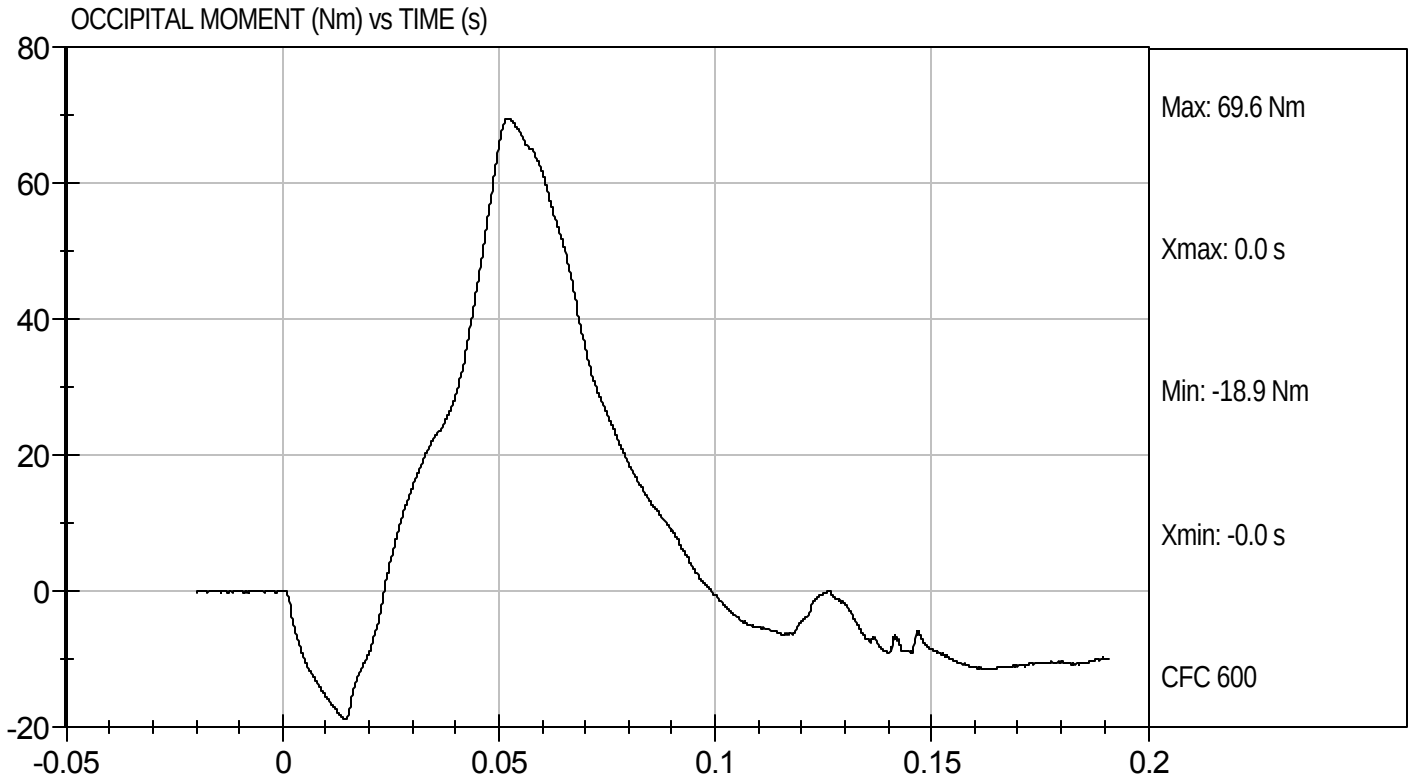


NECK ROTATION (DEG) vs TIME (s)



Test Desc: Neck Flexion
Component ID: D111752

Test Date: 5/11/11
Velocity: 23.15 ft/s, 7.06 m/s



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D111753

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	22.1	Pass
Laboratory Relative Humidity		%	10 to 70	49	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.12	Pass
Pendulum Deceleration	10 ms	m/s	1.5 to 1.9	1.9	Pass
	20 ms	m/s	3.1 to 3.9	3.6	Pass
	30 ms	m/s	4.6 to 5.6	5.2	Pass
D Plane Rotation	Max	deg	99 to 114	107	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	104	Pass
			Overall Results		Pass

Jessica Hall
Laboratory Technician

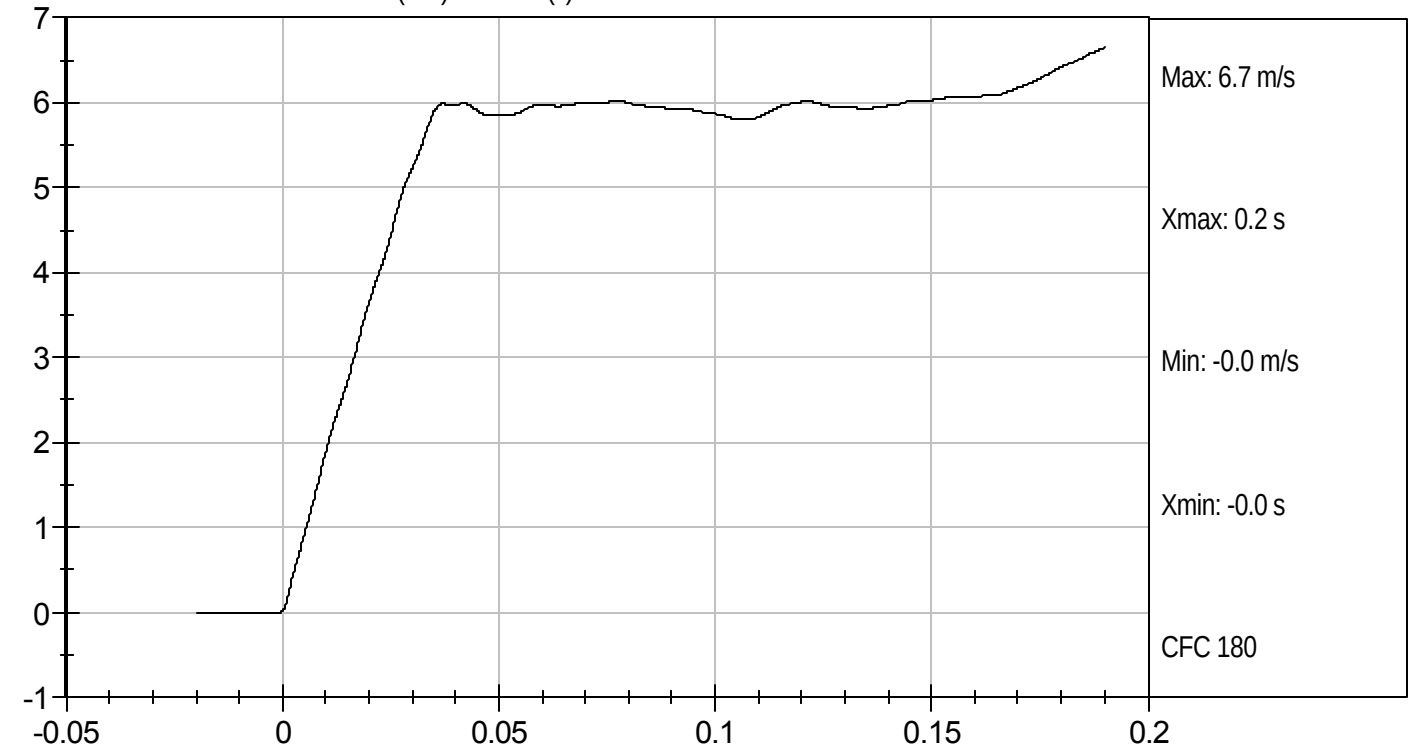
5/12/11
Test Date

David Winkelbauer
Approved By

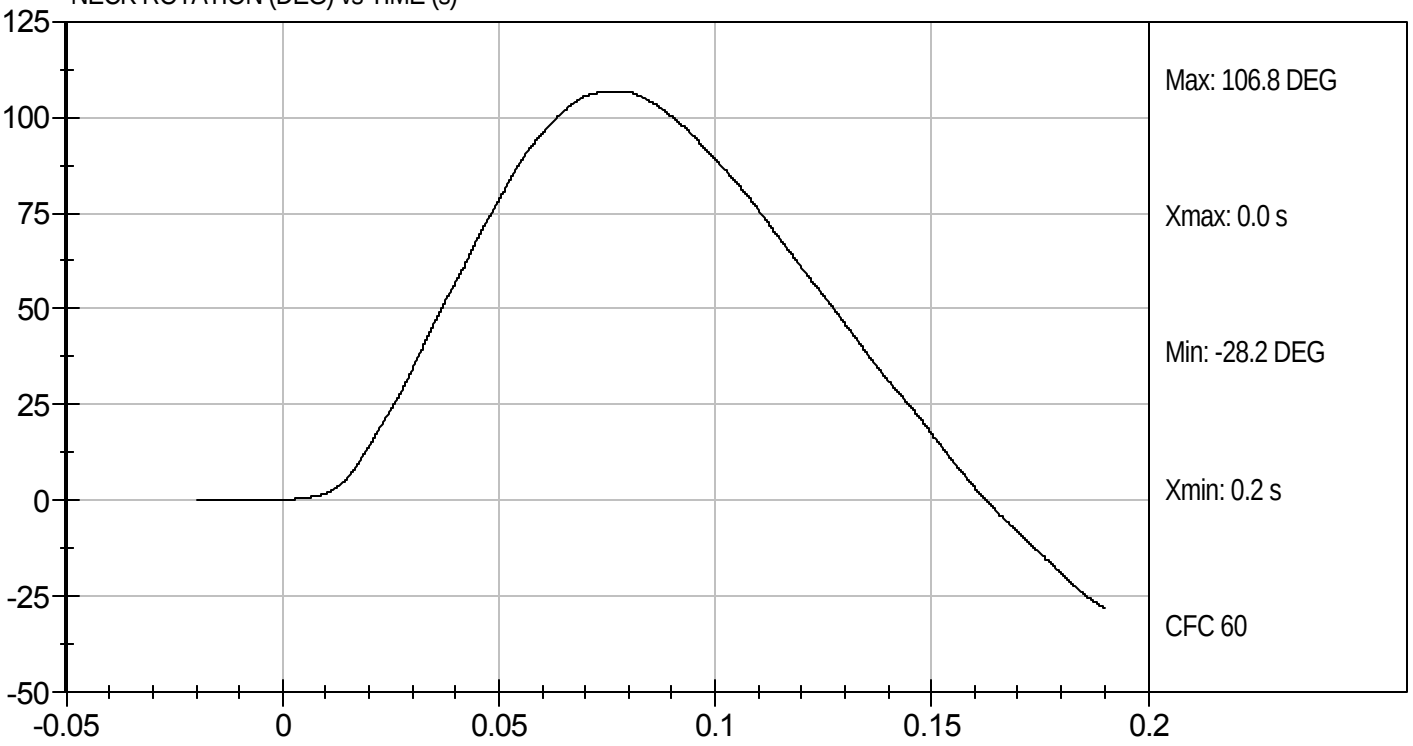
Test Desc: Neck Extension
Component ID: D111753

Test Date: 5/12/11
Velocity: 20.08 ft/s, 6.12 m/s

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

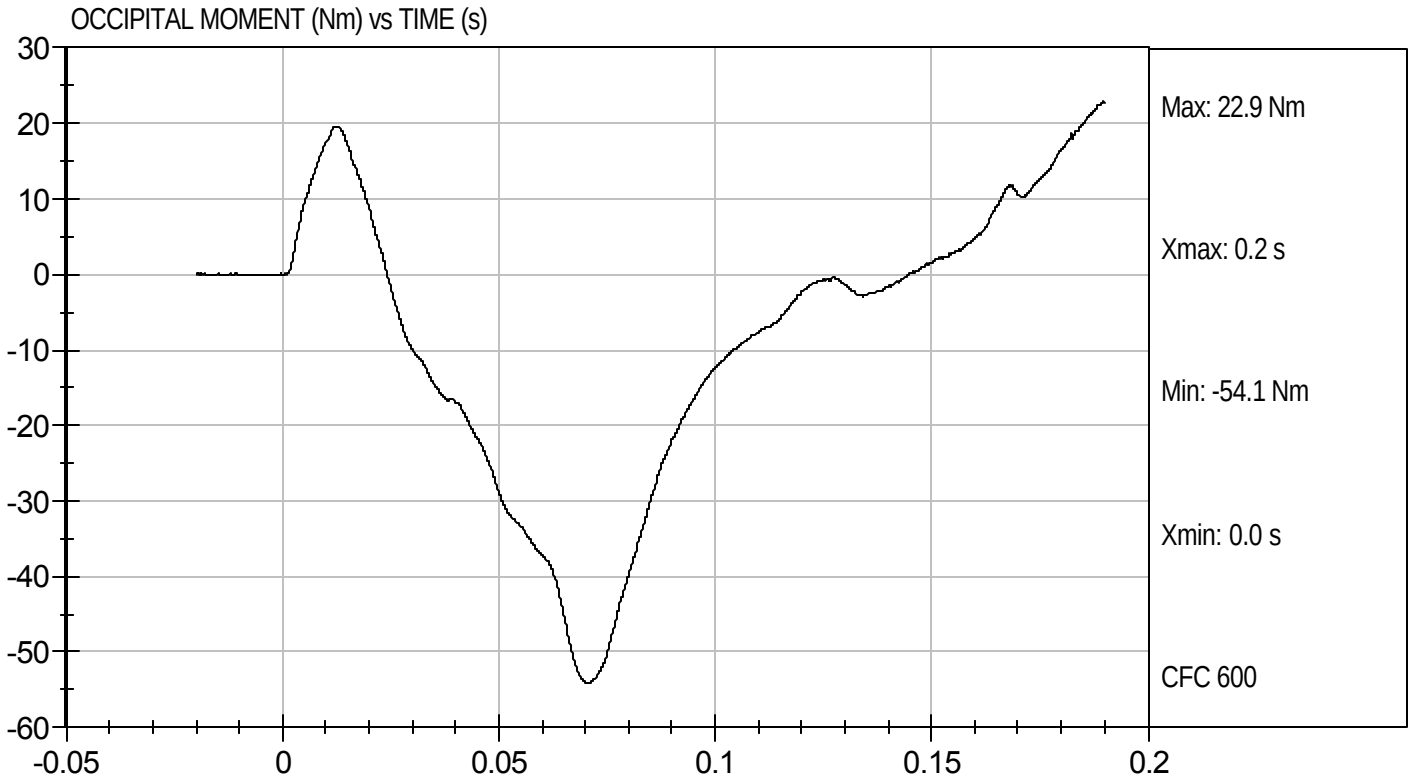


NECK ROTATION (DEG) vs TIME (s)



Test Desc: Neck Extension
Component ID: D111753

Test Date: 5/12/11
Velocity: 20.08 ft/s, 6.12 m/s



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D111754

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.4	Pass
Relative Humidity	%	10 to 70	49	Pass
Probe Speed	m/s	6.59 to 6.83	6.77	Pass
Peak Deflection	mm	50 to 58	56	Pass
Peak Resistive Force w/in Deflection Corridor	kN	3.9 to 4.4	4.02	Pass
Internal Hysteresis	%	69 to 85	69	Pass
Peak Force 18 mm - 50 mm	N	<= 4,600 N	3929	Pass
		Overall Test Results		Pass

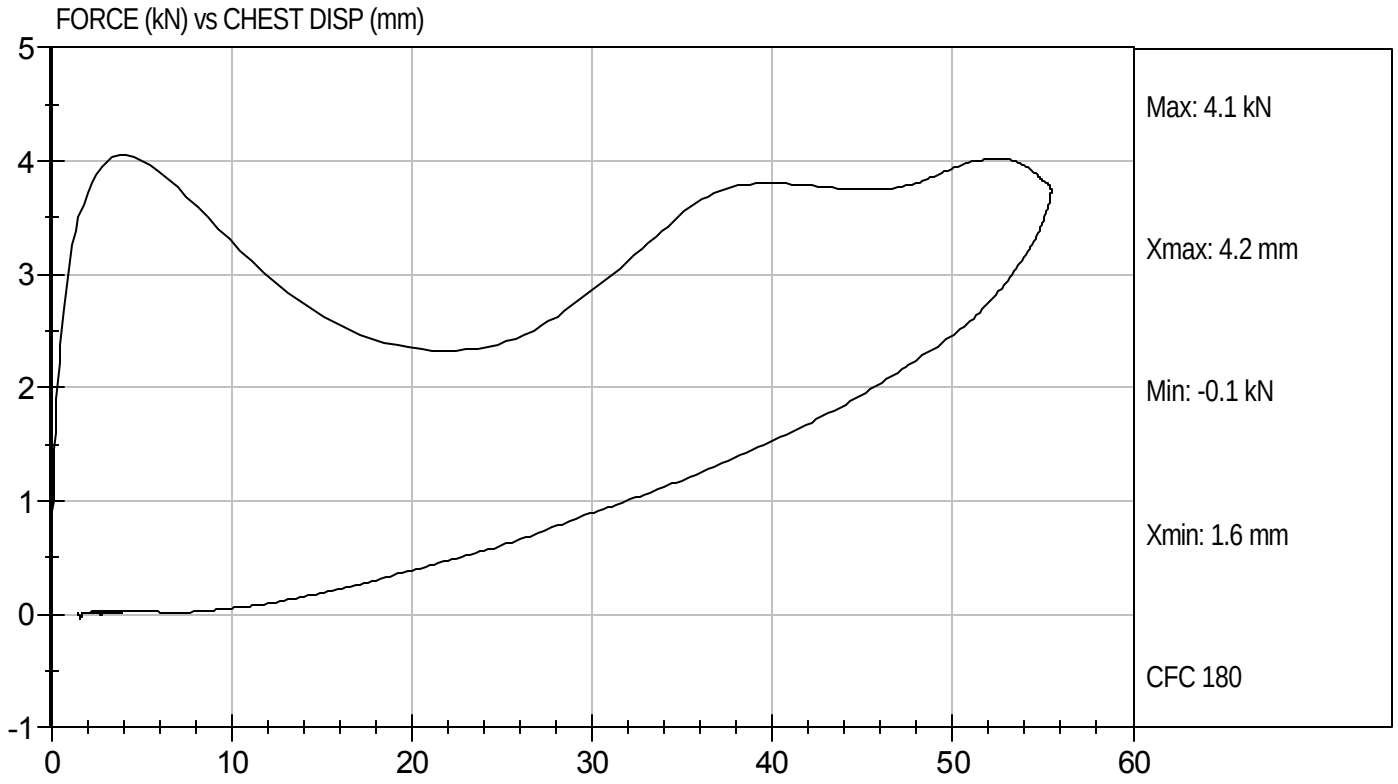
Jessica Hall
Laboratory Technician

5/12/11
Test Date

David Winkelbauer
Approved By

Test Desc: Thorax Impact
Component ID: D111754

Test Date: 5/12/11
Velocity: 22.2 ft/s, 6.77 m/s



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D111755

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	49	Pass
Probe Speed	m/s	2.07 to 2.13	2.10	Pass
Maximum Force	kN	3.45 to 4.06	3.99	Pass
		Overall Test Results		Pass

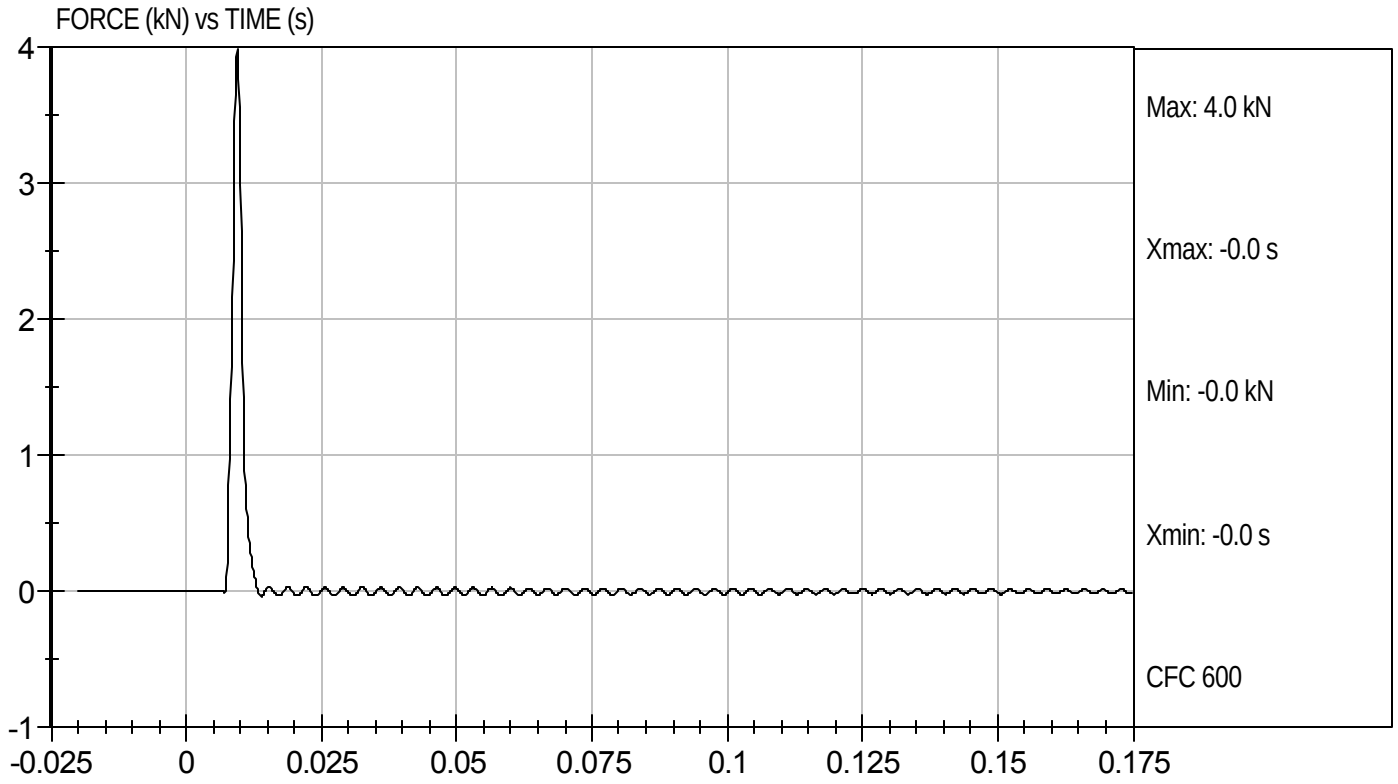
Jessica Gall
Laboratory Technician

5/12/11
Test Date

David Winkelbauer
Approved By

Test Desc: Right Knee
Component ID: D111755

Test Date: 5/12/11
Velocity: 6.9 ft/s, 2.10 m/s



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D111756

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	49	Pass
Probe Speed	m/s	2.07 to 2.13	2.10	Pass
Maximum Force	kN	3.45 to 4.06	3.88	Pass
		Overall Test Results		Pass

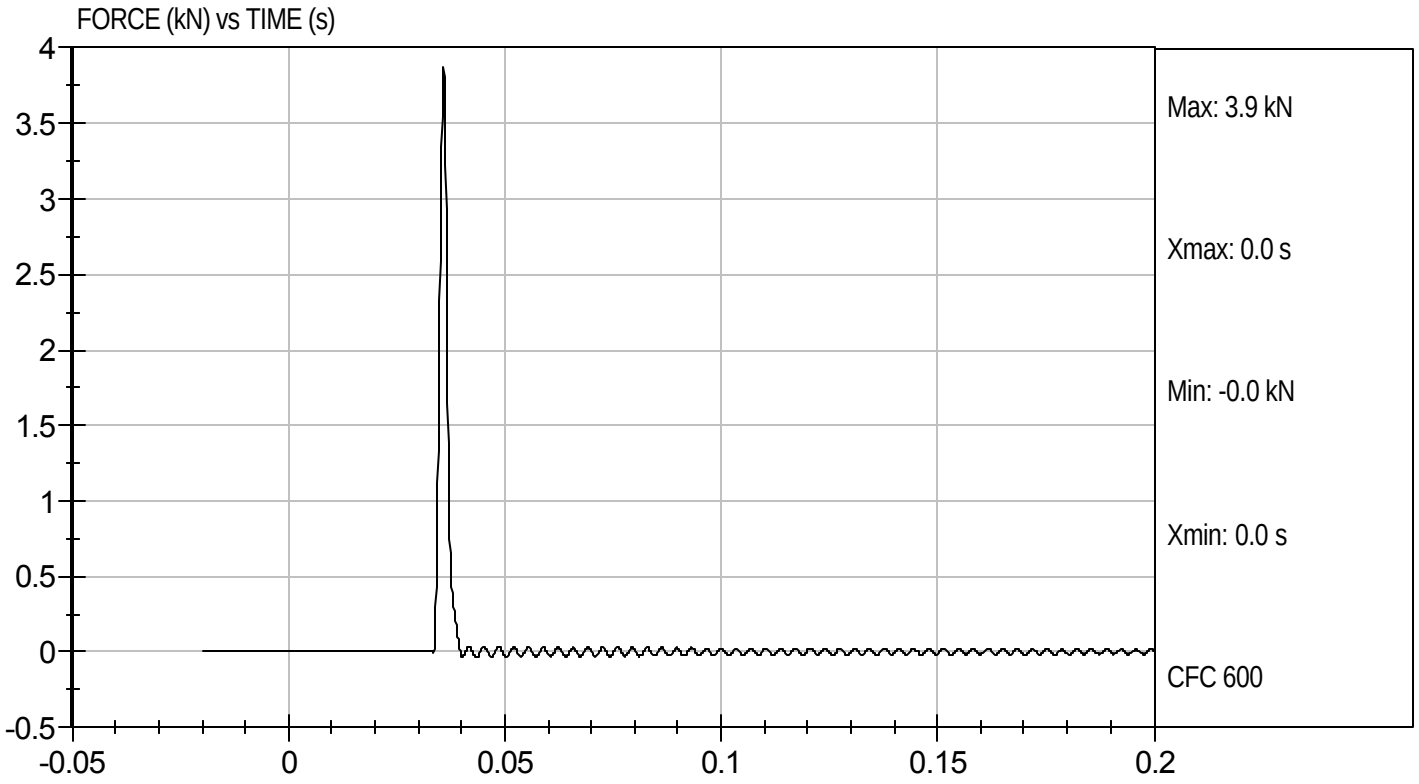
Jessica Gall
Laboratory Technician

5/12/11
Test Date

David Winkelbauer
Approved By

Test Desc: Left Knee
Component ID: D111756

Test Date: 5/12/11
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:** D111757

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	22.0	Pass
Laboratory Relative Humidity	%	10 to 70	50	Pass
Initial Angle	deg	0 to 20	18	Pass
Return Angle	deg	+/- 8	7	Pass
Force at 45 deg	N	320 to 390	333	Pass
Upper Torso Deflection Rate	Deg/sec	0.5 to 1.5	1.0	Pass
		Overall Result		Pass

Jessica Gall
Laboratory Technician

5/12/11
Test Date

David Winkelbauer
Approved By

MGA RESEARCH CORPORATION

HEAD DROP TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test ID:** D112161

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	53	Pass
Peak Resultant Acceleration	G's	250 to 300	273	Pass
Peak Lateral Acceleration	G's	+/- 15	-5.5	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
		Overall Test Results		Pass

Jessica Gall
Laboratory Technician

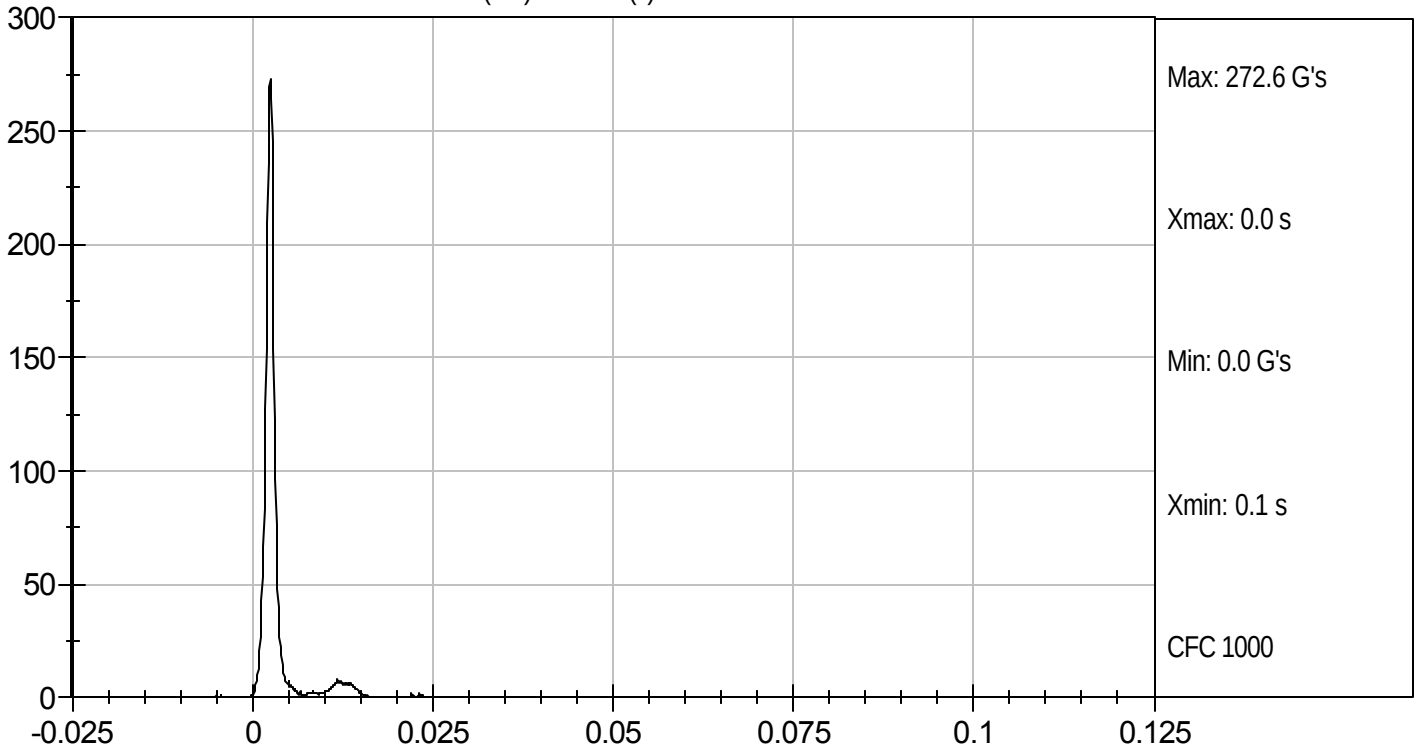
6/21/11
Test Date

David Winkelbauer
Approved By

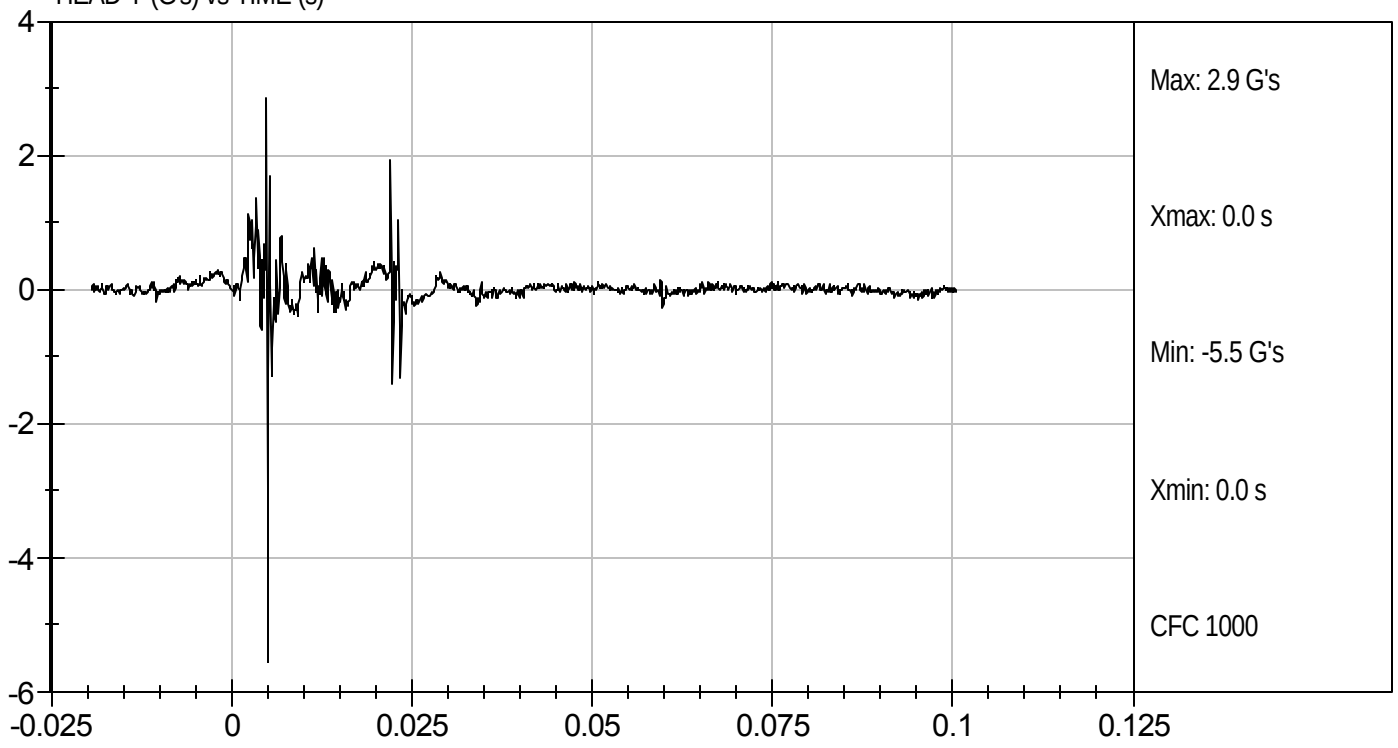
Test Desc: Head Drop
Component ID: D112161

Test Date: 6/21/11
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:** D112162

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	58	Pass
Pendulum Speed		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	m/s	2.1 to 2.5	2.4	Pass
	20 ms	m/s	4.0 to 5.0	4.6	Pass
	30 ms	m/s	5.8 to 7.0	6.2	Pass
D Plane Rotation	Max	deg	77 to 91	77	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	87	Pass
			Overall Results		Pass

Jessica Hall
Laboratory Technician

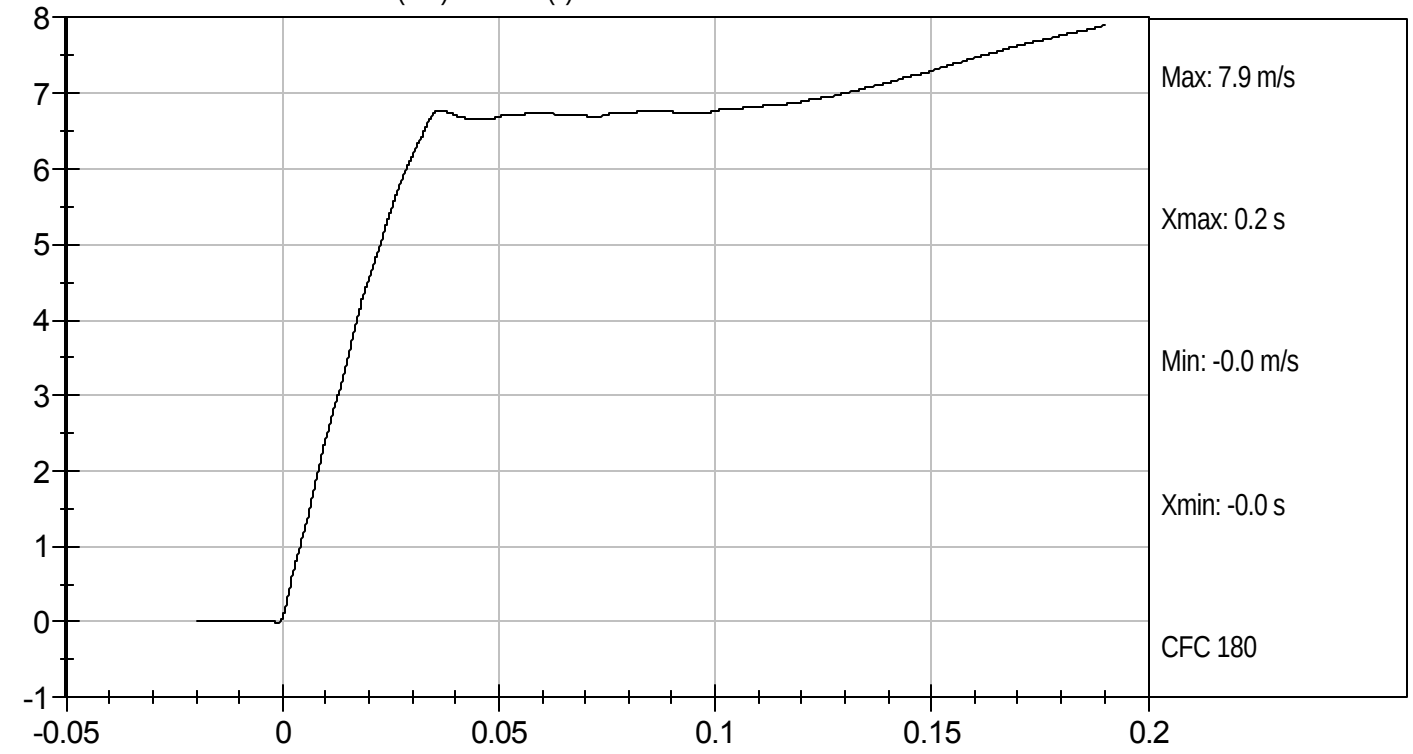
6/22/11
Test Date

David Winkelbauer
Approved By

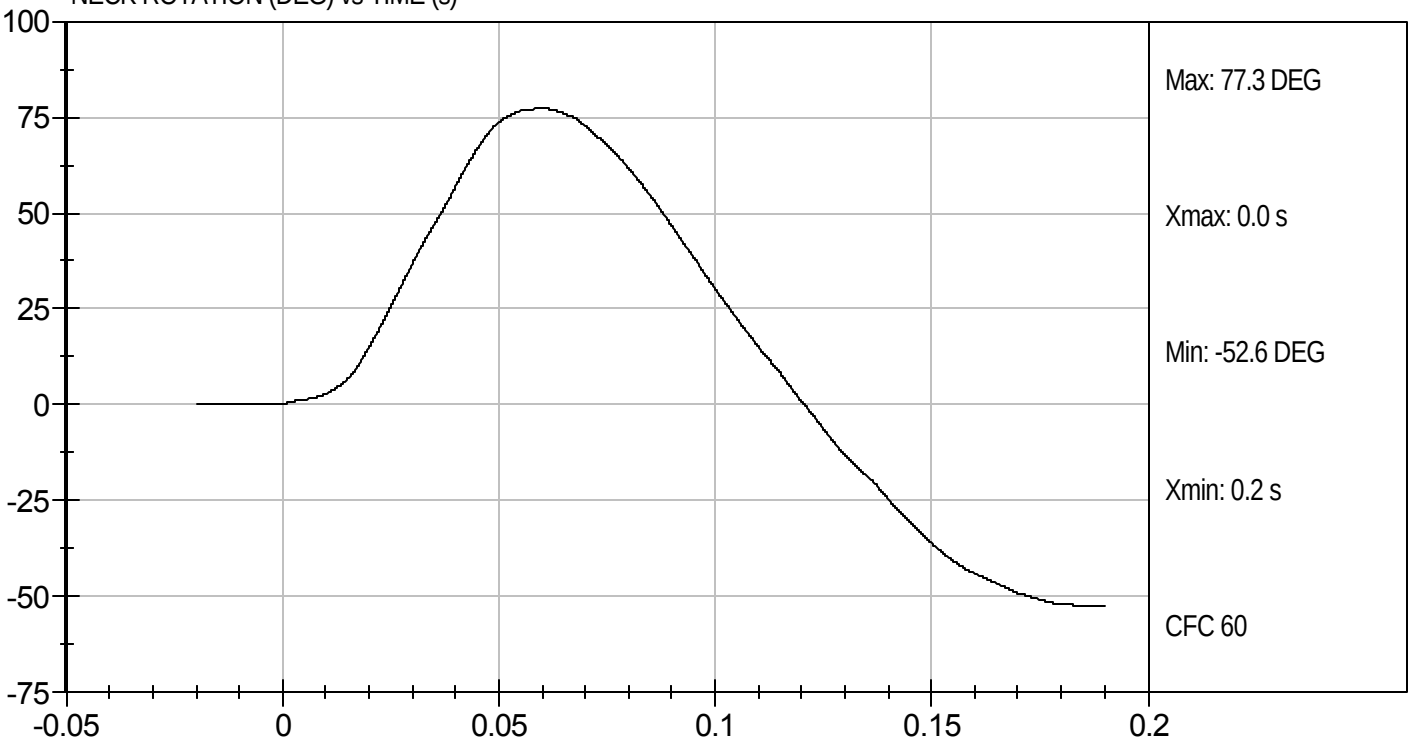
Test Desc: Neck Flexion
Component ID: D112162

Test Date: 6/22/11
Velocity: 23.15 ft/s, 7.06 m/s

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

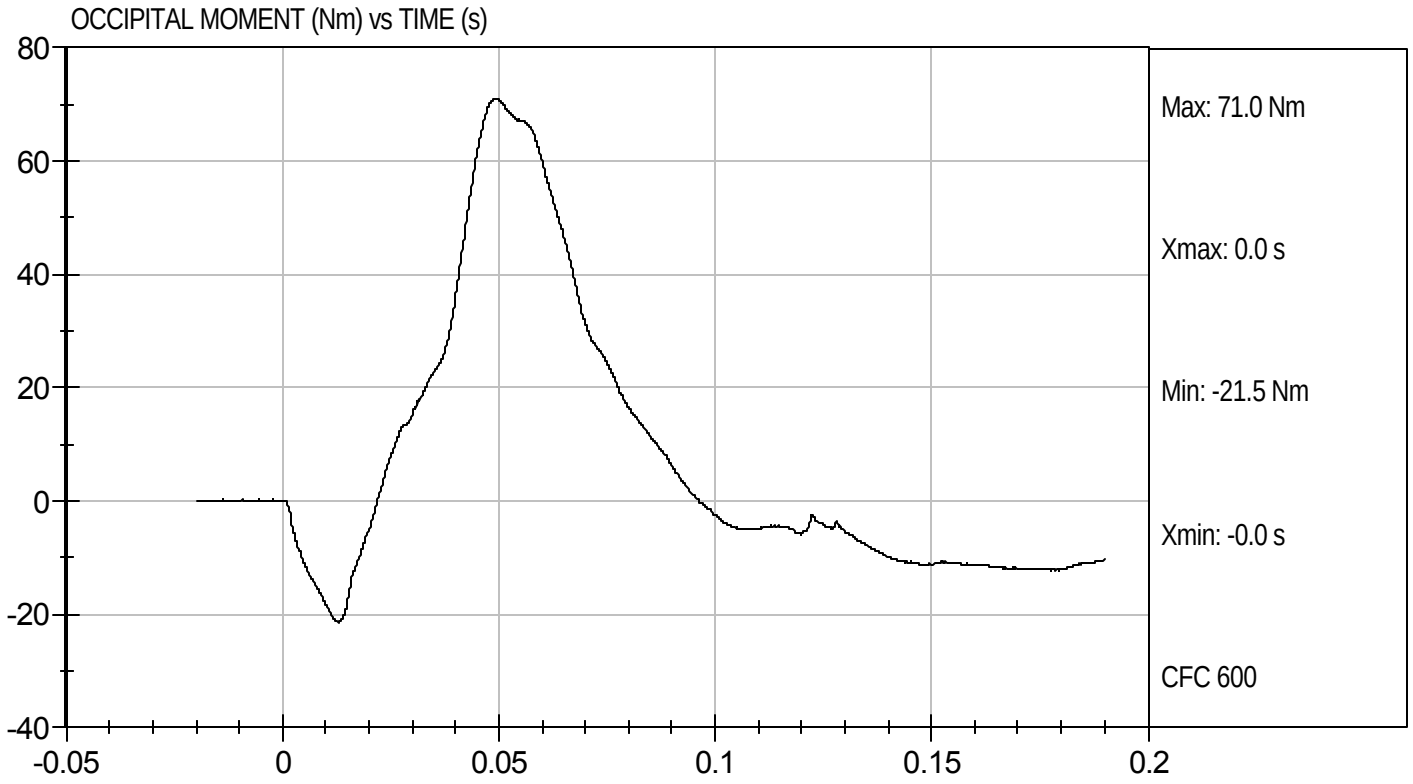


NECK ROTATION (DEG) vs TIME (s)



Test Desc: Neck Flexion
Component ID: D112162

Test Date: 6/22/11
Velocity: 23.15 ft/s, 7.06 m/s



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D112163

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	58	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.12	Pass
Pendulum Deceleration	10 ms	m/s	1.5 to 1.9	1.8	Pass
	20 ms	m/s	3.1 to 3.9	3.4	Pass
	30 ms	m/s	4.6 to 5.6	4.8	Pass
D Plane Rotation	Max	deg	99 to 114	103	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	-65 to -53	-53	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	107	Pass
			Overall Results		Pass

Jessica Hall
Laboratory Technician

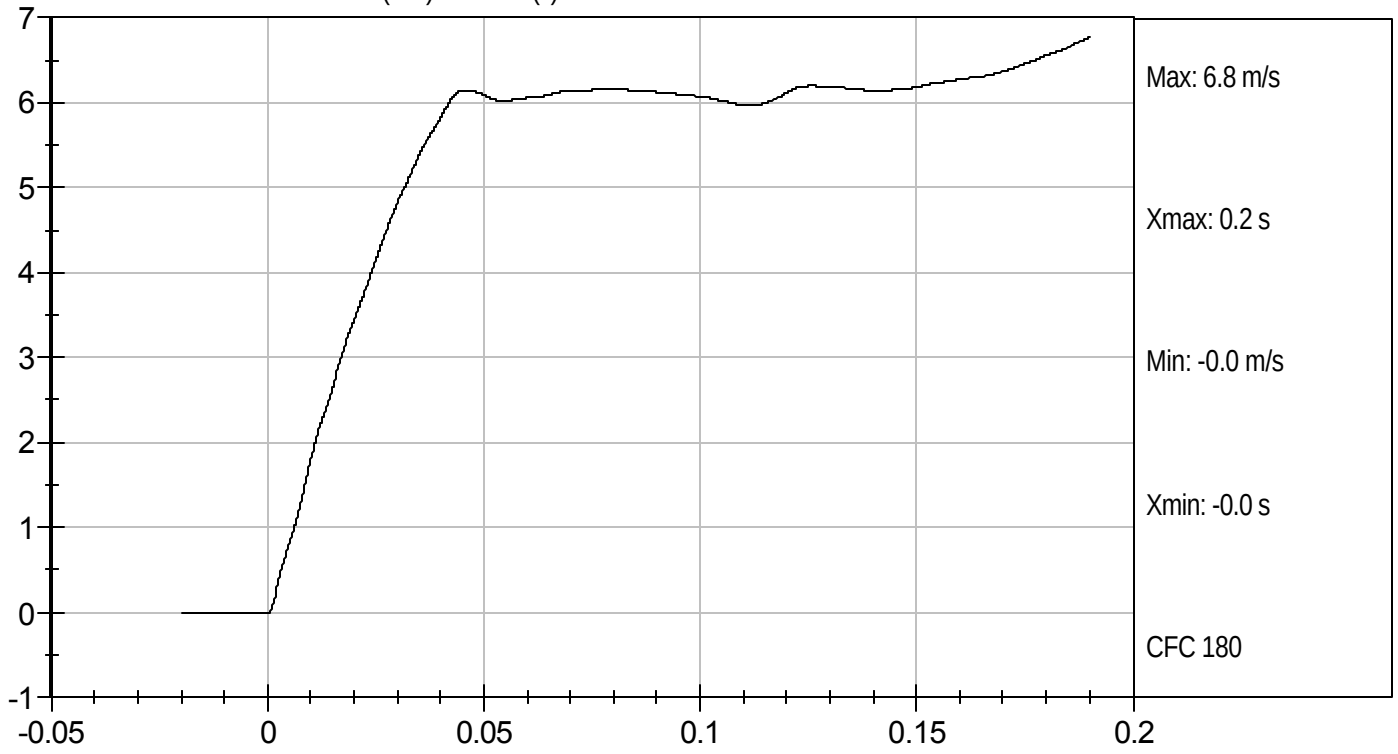
6/22/11
Test Date

David Winkelbauer
Approved By

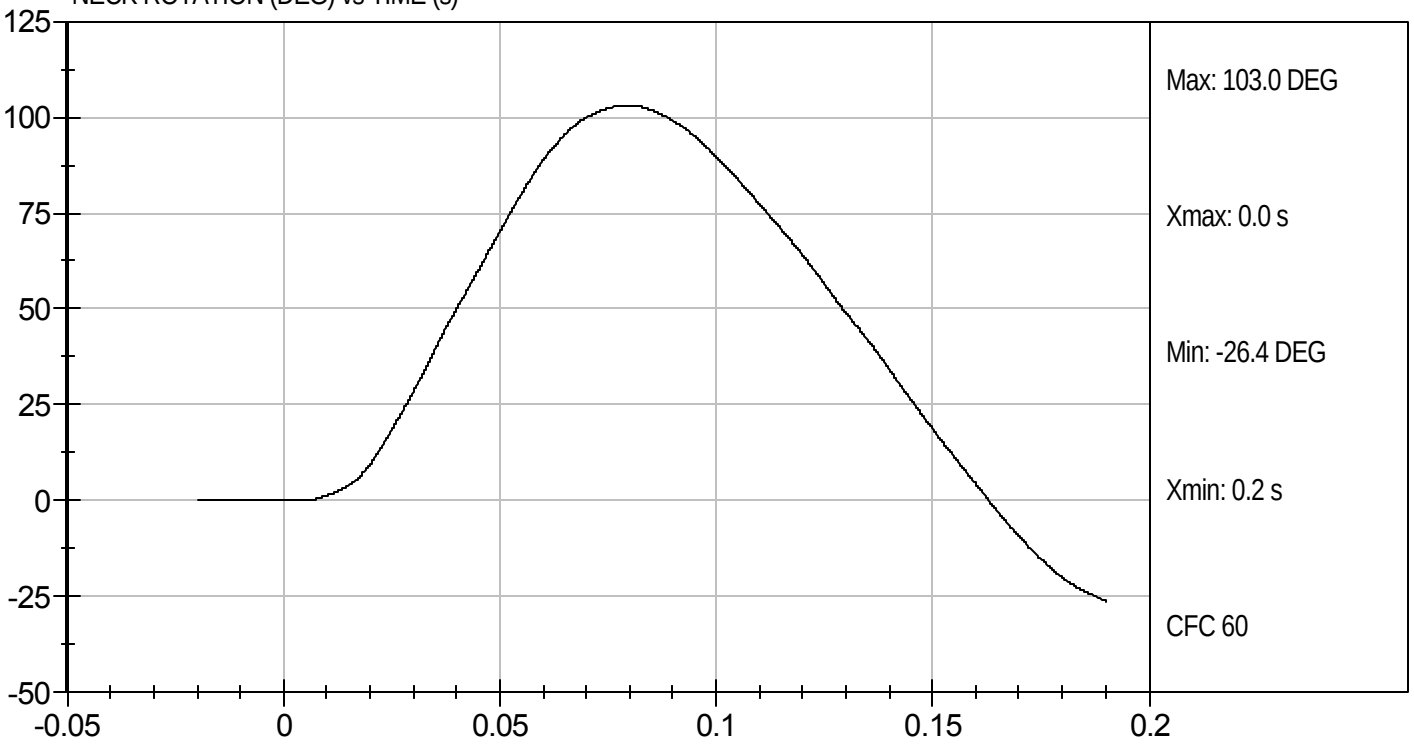
Test Desc: Neck Extension
Component ID: D112163

Test Date: 6/22/11
Velocity: 20.08 ft/s, 6.12 m/s

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

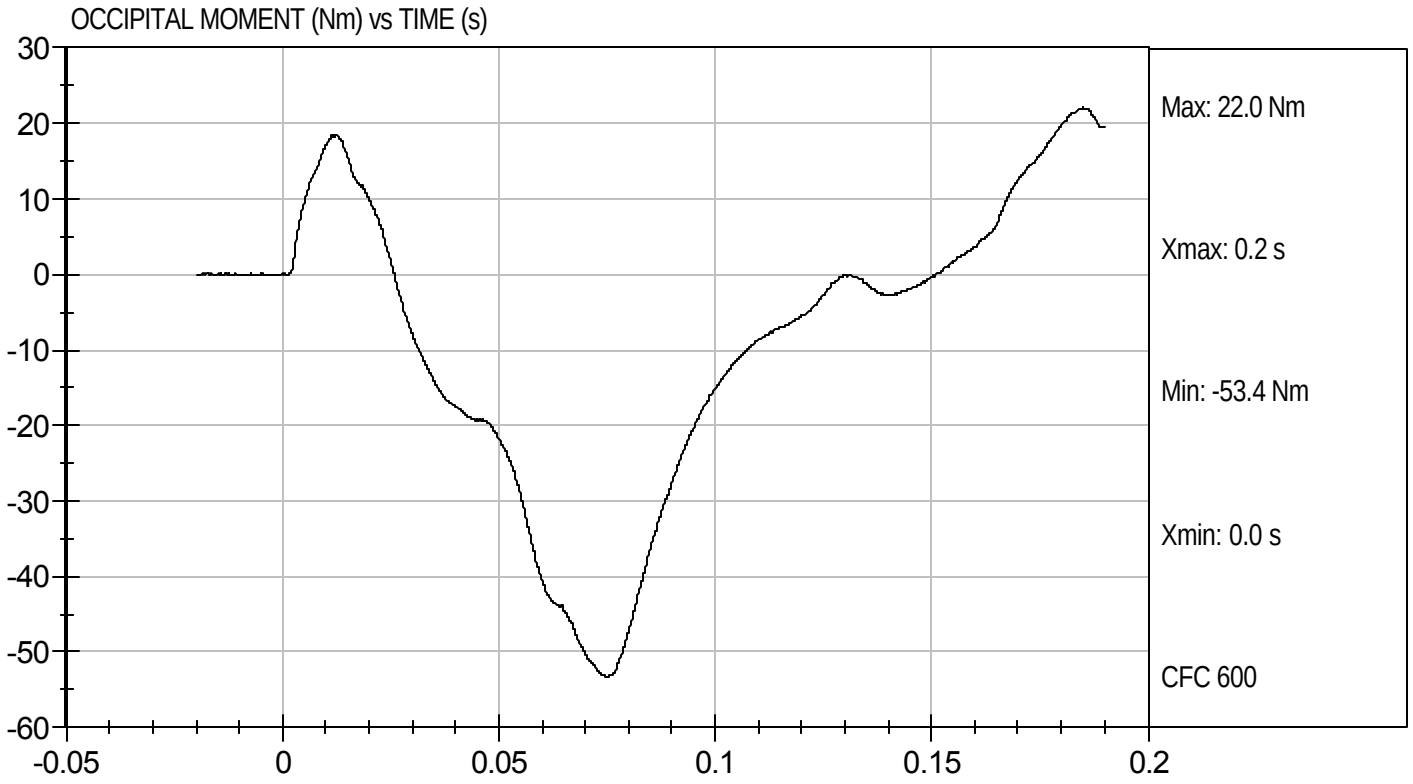


NECK ROTATION (DEG) vs TIME (s)



Test Desc: Neck Extension
Component ID: D112163

Test Date: 6/22/11
Velocity: 20.08 ft/s, 6.12 m/s



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D112164

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.1	Pass
Relative Humidity	%	10 to 70	54	Pass
Probe Speed	m/s	6.59 to 6.83	6.77	Pass
Peak Deflection	mm	50 to 58	54	Pass
Peak Resistive Force w/in Deflection Corridor	kN	3.9 to 4.4	4.15	Pass
Internal Hysteresis	%	69 to 85	69	Pass
Peak Force 18 mm - 50 mm	N	<= 4,600 N	4069	Pass
		Overall Test Results		Pass

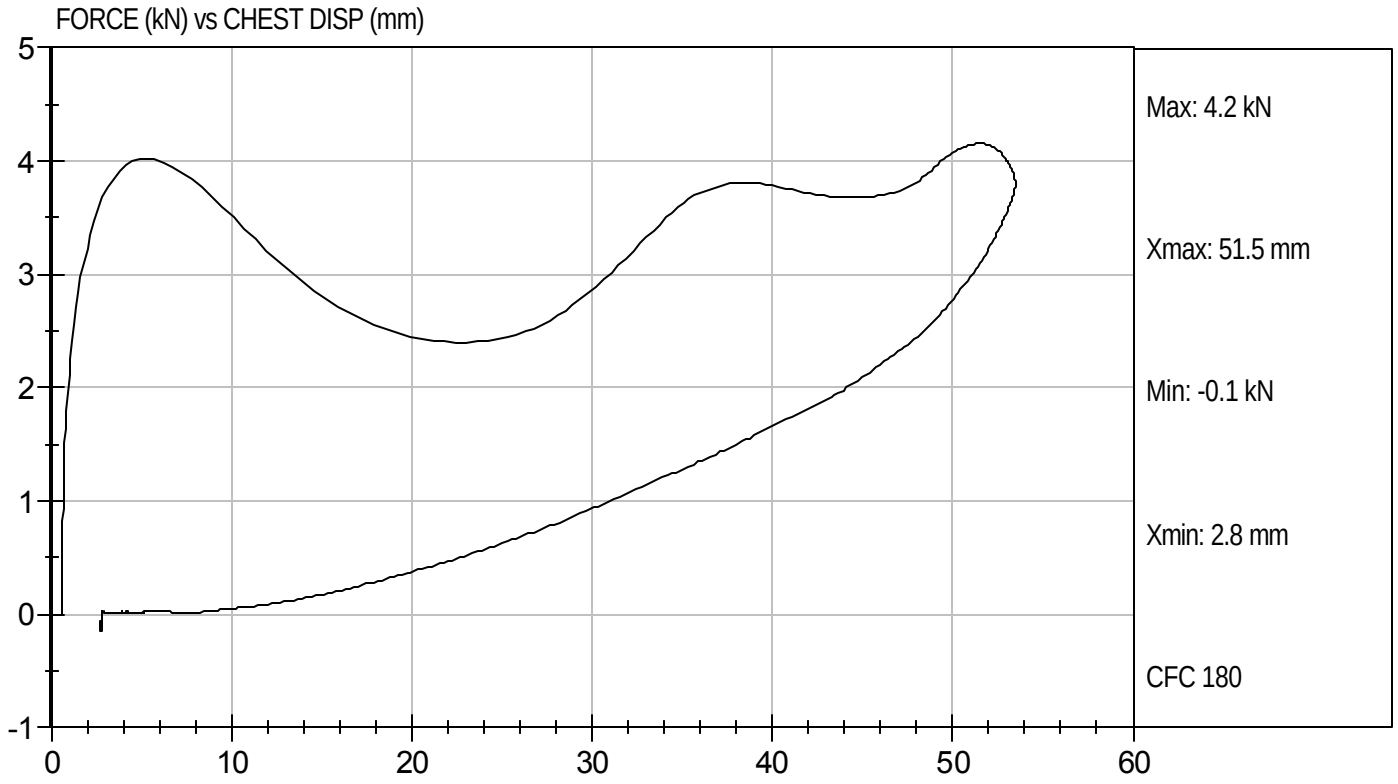
Jessica Hall
Laboratory Technician

6/22/11
Test Date

David Winkelbauer
Approved By

Test Desc: Thorax Impact
Component ID: D112164

Test Date: 6/22/11
Velocity: 22.2 ft/s, 6.77 m/s



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D112165

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	54	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	kN	3.45 to 4.06	3.88	Pass
		Overall Test Results		Pass

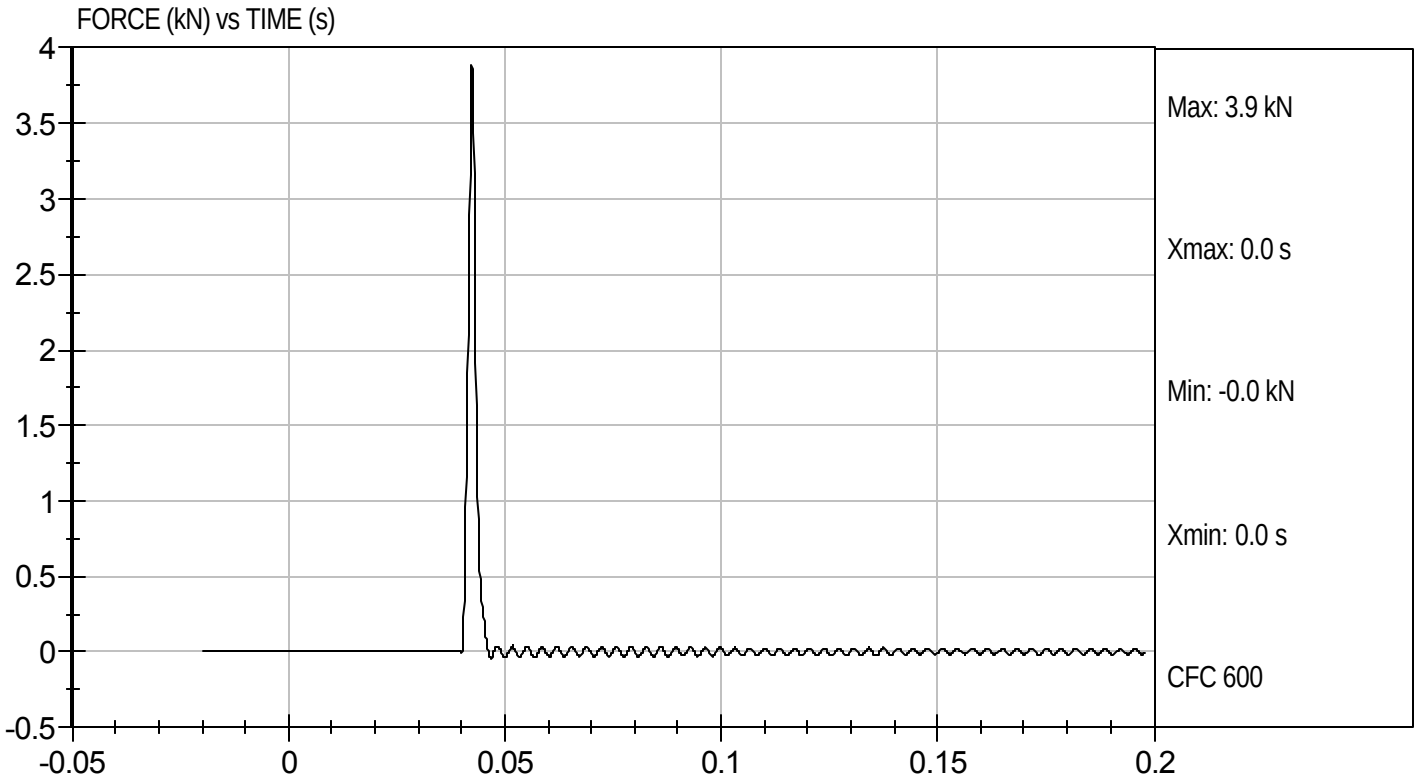
Jessica Gall
Laboratory Technician

6/21/11
Test Date

David Winkelbauer
Approved By

Test Desc: Right Knee
Component ID: D112165

Test Date: 6/21/11
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:** D112166

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	54	Pass
Probe Speed	m/s	2.07 to 2.13	2.10	Pass
Maximum Force	kN	3.45 to 4.06	3.64	Pass
		Overall Test Results		Pass

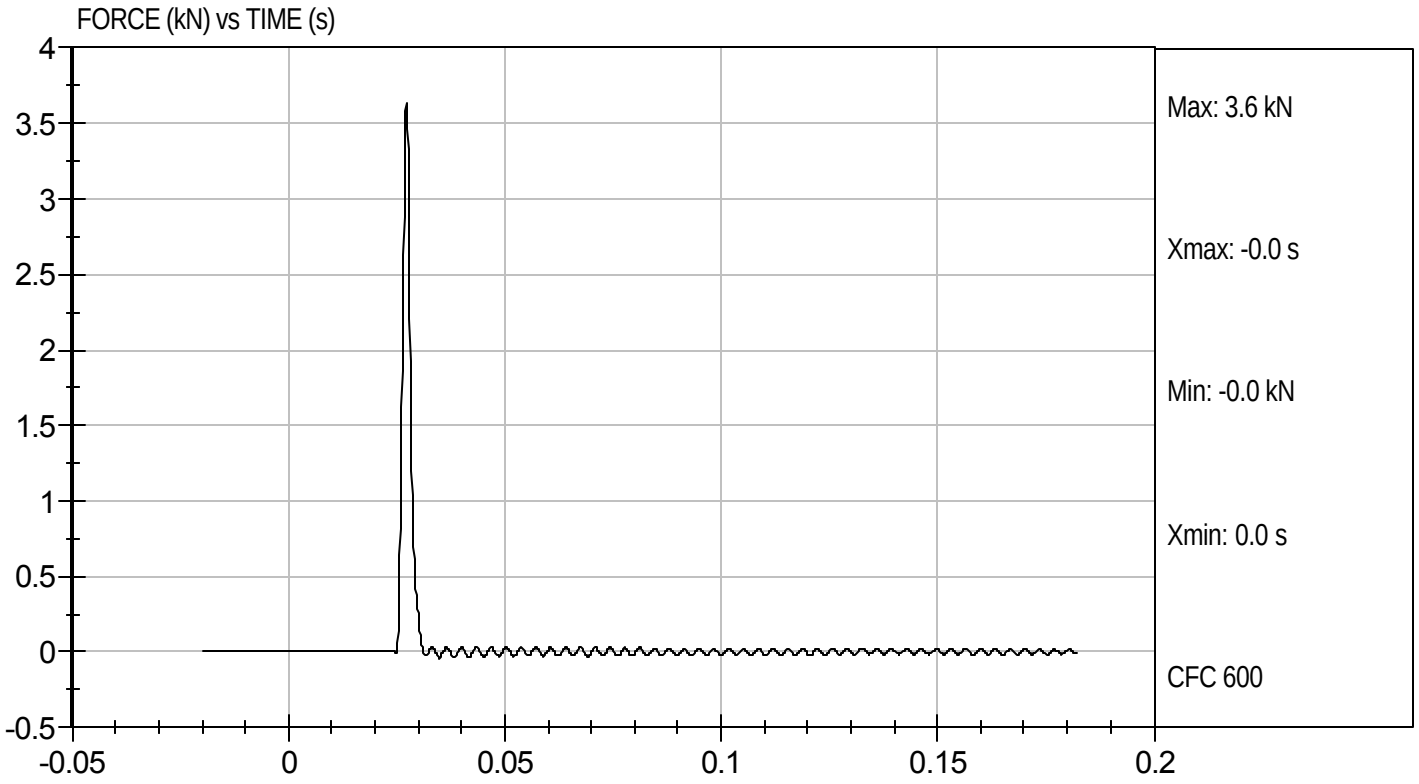
Jessica Hall
Laboratory Technician

6/21/11
Test Date

David Winkelbauer
Approved By

Test Desc: Left Knee
Component ID: D112166

Test Date: 6/21/11
Velocity: 6.88 ft/s, 2.10 m/s



MGA RESEARCH CORPORATION

TORSO FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D112167

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	54	Pass
Initial Angle	deg	0 to 20	18	Pass
Return Angle	deg	+/- 8	4	Pass
Force at 45 deg	N	320 to 390	347	Pass
Upper Torso Deflection Rate	Deg/sec	0.5 to 1.5	1.0	Pass
		Overall Result		Pass

Jessica Gall
Laboratory Technician

6/21/11
Test Date

David Winkelbauer
Approved By