

REPORT NUMBER: SPNCAP-MGA-2011-082

**NEW CAR ASSESSMENT PROGRAM (NCAP)
Side Impact Pole Test**

**HONDA OF CANADA MFG.
2011 Acura ZDX SUV
NHTSA No.: HB5303**

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



Test Date: June 15, 2011

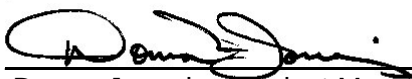
Final Report Date: July 25, 2011

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 DTNH22-09-D-00124.

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Approved by: 
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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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		6. Performing Organization Code MGA																				
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		14. Sponsoring Agency Code NVS-111																				
15. Supplementary Notes																						
16. Abstract A 32.2 km/h (20 mph), 75° oblique impact NCAP Side Pole Test was conducted on the subject 2011 Acura ZDX SUV in accordance with the specifications of the Office of Crashworthiness Standards NCAP Side Pole Laboratory Test Procedure for the generation of consumer information on vehicle side pole crash protection. The test was conducted at MGA Research Corporation, in Burlington, Wisconsin, on June 15, 2011. The impact velocity was 32.5 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle at the time of impact was 21°C. The test vehicle post-test maximum crush was 423 mm at level 2. The test vehicle's performance was as follows: <table border="1" style="margin: 10px auto; border-collapse: collapse; text-align: center;"> <thead> <tr> <th rowspan="2" style="text-align: left;">Measurement Description</th> <th colspan="3">Driver ATD (SID-IIs)</th> </tr> <tr> <th>Units</th> <th>Threshold</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td style="text-align: left;">Head Injury Criteria (HIC₃₆)</td> <td>N/A</td> <td>1000</td> <td>250</td> </tr> <tr> <td style="text-align: left;">Resultant Lower Spine Acceleration</td> <td>Gs</td> <td>82</td> <td>57</td> </tr> <tr> <td style="text-align: left;">Combined Acetabular and Iliac Pelvic Force</td> <td>N</td> <td>5525</td> <td>3525</td> </tr> </tbody> </table> The two doors on the struck side of the vehicle did not separate from the body at the hinges or latches and the opposite doors did not open during the side impact event.				Measurement Description	Driver ATD (SID-IIs)			Units	Threshold	Result	Head Injury Criteria (HIC ₃₆)	N/A	1000	250	Resultant Lower Spine Acceleration	Gs	82	57	Combined Acetabular and Iliac Pelvic Force	N	5525	3525
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17. Key Words New Car Assessment Program (NCAP) Side Impact Pole Part 572V SID-IIs		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
TEST PURPOSE AND PROCEDURE

This side impact test is part of the MY 2011 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-09-D-00124. The purpose of this test is to generate comparative side impact performance in a 2011 Acura ZDX SUV. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Side NCAP Pole Laboratory Test Procedure, dated January 2010.

SECTION 2

SUMMARY OF TEST RESULTS

A rigid pole side impact test was conducted on a 2011 Acura ZDX SUV. The subject vehicle was towed into the rigid pole at an angle of 75° and a velocity of 32.5 km/h. The test was conducted by MGA Research Corporation in Burlington, Wisconsin, on June 15, 2011. Pre-test and post-test photographs of the test vehicle and side impact dummy (SID-IIs) are included in Appendix A of this report.

One Part 572V (SID-IIs) dummy was placed in the driver designated seating position according to instructions specified in the OCWS NCAP Side Pole Laboratory Test Procedure dated January 2010. Camera locations and other pertinent camera information are included in this report.

The Part 572V (SID-IIs) dummy was instrumented accordingly:

Head CG Triaxial Accelerometers
 Thorax Upper, Middle, and Lower Rib Displacement Potentiometers
 Abdomen Upper and Lower Rib Displacement Potentiometers
 Lower Spine Triaxial Accelerometers
 Iliac Load Cell
 Acetabulum Load Cell

Appendix B contains the vehicle and dummy response data. Dummy configuration and performance verification data can be found in Appendix C of this report.

The following table summarizes the results of the test:

DUMMY INJURY VALUES				
Dummy	HIC (36ms)	Resultant Lower Spine Acceleration	Pelvic Force (N)	
SID-IIs 5 th Percentile Female	250	57	Iliac Wing	1171
			Acetabular	2414
			Sum	3525

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Left Front (Driver) P1		Left Rear (Passenger) P4	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	No	No	
Knee Airbag	No		No	
Side Curtain Airbag	Yes	Yes	Yes	Yes
Side Torso/Pelvis Airbag	Yes	Yes	No	
Seat Belt Pretensioner	Yes	Yes	No	
Seat Belt Load Limiter	Yes		No	

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

GENERAL COMMENTS

There was no valid data collected for:

Left Lower A-Post Y after 5 msec.

Driver Seat Track Y after 30 msec.

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

SECTION 3
OCCUPANT AND VEHICLE INFORMATION

DATA SHEET NO. 1

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2011 Acura ZDX SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No. HB5303
Test Date: 6/15/2011

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	HB5303	Anti-Lock Brakes	Yes
Model Year	2011	All Wheel Drive	Yes
Make	Acura	Power Steering	Yes
Model	ZDX	Driver Front Airbag	Yes
Body Style	MPV	Driver Curtain Airbag	Yes
VIN	2HNYB1H49BH500161	Driver Head/Torso Airbag	No
Body Color	Grigio M.	Driver Torso Airbag	No
Delivery Date	6/06/2011	Driver Torso/Pelvis Airbag	Yes
Odometer (mi)	277	Driver Pelvis Airbag	No
Odometer (km)	446	Driver Knee Airbag	No
Dealer	Zimbrick Acura	Rear Pass. Front Airbag	No
Transmission	Automatic	Rear Pass. Curtain Airbag	Yes
Final Drive	AWD	Rear Pass. Head/Torso Airbag	No
Type/No. Cylinders	6	Rear Pass. Torso Airbag	No
Engine Displacement (L)	3.7	Rear Pass. Torso/Pelvis Airbag	No
Engine Placement	Lateral	Rear Pass. Pelvis Airbag	No
Roof Rack	No	Rear Pass. Knee Airbag	No
Sunroof/T-Top	Yes	Pretensioners	Yes
Tinted Glass	No	Load Limiters	Yes
Traction Control	Yes	Automatic Door Locks	Yes
Power Brakes	Yes	Bucket Seats	Yes
Front Disc	Yes	Tilt Steering	Yes
Rear Disc	Yes	Power Seats	Yes
Does owner's manual provide instruction to turn off automatic door locks?			Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Honda of Canada Mfg.	GVWR (kg)	2510
Date of Manufacture	10/10	GAWR Front (kg)	1325
		GAWR Rear (kg)	1215

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	2	3		5	
Capacity Weight (VCW) (kg)				380	(A)
DSC x 68.04 kg				340	(B)
Cargo Weight (RCLW) (kg)				40	(A-B)

VEHICLE SEAT TYPE

Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
Front Seat	X					Manual	Power
Rear or Second Row			X		X		
Third Row Seat							

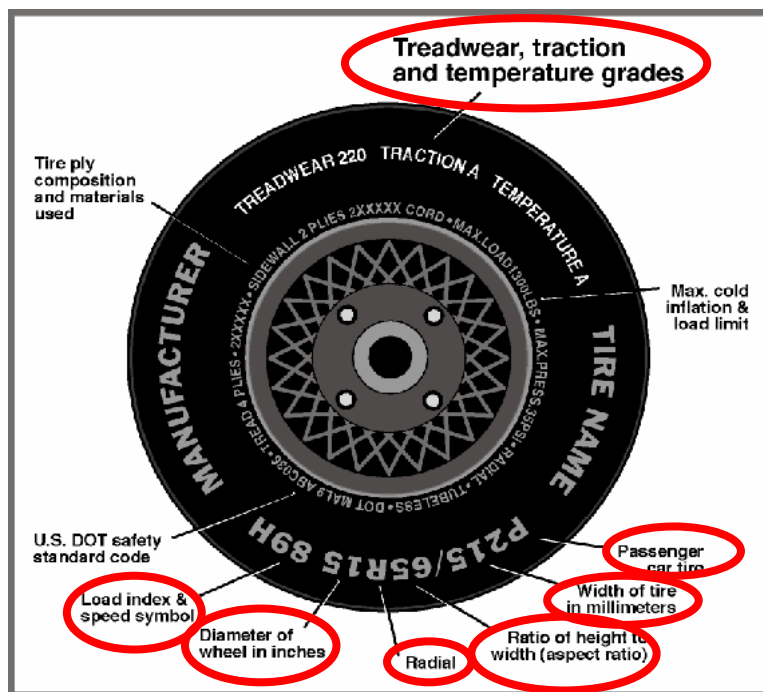
DATA SHEET NO. 1 (continued)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2011 Acura ZDX SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No. HB5303
 Test Date: 6/15/2011

VEHICLE TIRE INFORMATION



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 3310	B3XX 001X 3310
DOT Safety Code Left	B3XX 001X 3310	B3XX 001X 3310

DATA SHEET NO. 1 (continued)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2011 Acura ZDX SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No. HB5303
 Test Date: 6/15/2011

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	579.2	436.4		591.7	457.0		596.9	475.4	
Right	kg	576.1	420.5		597.6	449.2		582.0	448.6	
Ratio	%	57.4	42.6		56.8	43.2		56.1	43.9	
Totals	kg	1155.3	856.9	2012.2	1189.3	906.2	2095.5	1178.9	924.0	2102.9

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	2012.2	(A)
Actual Weight of 1 P572V ATD (SID-IIs) ATD Used	kg	52.2	(B)
Rated Cargo/Luggage Weight (RCLW)	kg	40	(C)
Calculated Target Vehicle Test Weight (TVTW)	kg	2104.4	(A+B+C)

TEST VEHICLE ATTITUDES AND CG

	Units	As Delivered	As Tested	Fully Loaded
Driver Door Sill Angle (front-to-rear)*	deg	-0.3	-0.3	0.1
Front Passenger Sill Angle (front-to-rear)*	deg	-0.1	-0.1	0.0
Front Bumper Angle (left-to-right)**	deg	0.0	0.0	-0.2
Rear Bumper Angle (left-to-right)**	deg	0.0	0.0	0.0
Vehicle CG (Aft of Front Axle)	mm	1173	1191	1211
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	8	1	17

*Front up is positive ** Left up is positive

GENERAL VEHICLE TEST DATA

Measurement Description	Units	Value
Weight of Ballast in Cargo Area	kg	0.0
Weight of Vehicle Components Removed	kg	39.0

Vehicle components removed to meet target vehicle test weight: Both tail lights, right side mirror, spare tire, jack & tools, trunk carpet, rear storage area lid, front splash guard.

TEST VEHICLE IMPACT POINT DATA

Measurement Parameter	Units	Value
Vertical Impact Reference Line (Aft of Front Axle)	mm	1067
Actual Impact Point (Aft of Front Axle)	mm	1073
Impact Point Difference (- forward / + rearward)	mm	6

DATA SHEET NO. 2

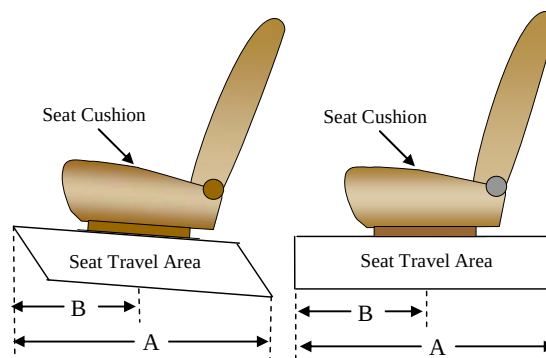
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT, AND FUEL SYSTEM DATA

Test Vehicle: 2011 Acura ZDX SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No. HB5303
 Test Date: 6/15/2011

SEAT FORE/AFT POSITIONS

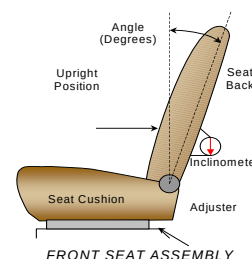
The driver seat was a power fore/aft adjustable seat with power height and cushion angle adjustments. The seat travel was set as specified in Appendix B of the TP dated January 2010. The right front passenger seat was set to match the driver seat. The rear passenger seats were fixed.



SEAT FORE/AFT POSITIONING	Total Fore/Aft Travel	Placed in Detent # or Position
Driver Seat	235 mm	0 (forward-most as 0)
Front Passenger Seat	235 mm	0 (forward-most as 0)
Rear Seat – Struck Side		Fixed
Rear Seat – Non-Struck Side		Fixed

SEAT BACK ANGLE POSITION

The seat back was set as specified in Appendix B of the TP dated January 2010. The seat back angle measurement was made relative to the door sill on the headrest post.



SEAT BACK ANGLE	Degrees	Detents
Driver Seat Back Angle with Seated Dummy	2.9	
Front Passenger Seat Back Angle	2.9	
Struck Side Rear Seat Back Angle		Fixed
Non-Struck Side Rear Passenger Seat Back Angle		Fixed

SEAT BELT UPPER ANCHORAGE

The driver seat belt upper anchorage was set at the manufacturer's specified placement in Form 1.

SEAT BELT UPPER ANCHORAGES	Total # of Positions	Placed in Position #
Driver Seat	4 detents (1 st as 1)	0 (uppermost as 0)

DATA SHEET NO. 2 (CONTINUED)

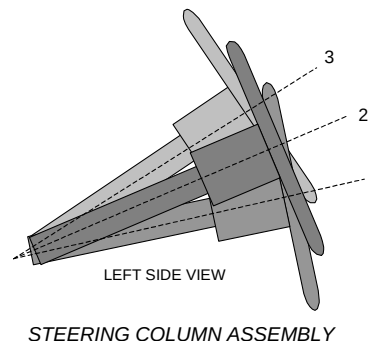
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT, AND FUEL SYSTEM DATA

Test Vehicle: 2011 Acura ZDX SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No. HB5303
 Test Date: 6/15/2011

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.

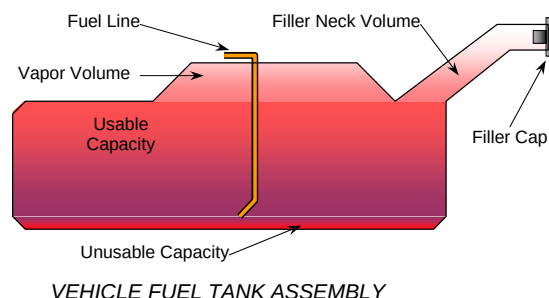


STEERING COLUMN POSITIONING

	Degrees	Fore/Aft Position (mm)
Lowermost - Position 1	71.5	167
Geometric Center – Position 2	68.8	148
Uppermost – Position 3	66.2	129
Telescoping Steering Wheel Travel		38
Test Position	68.8	148

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.



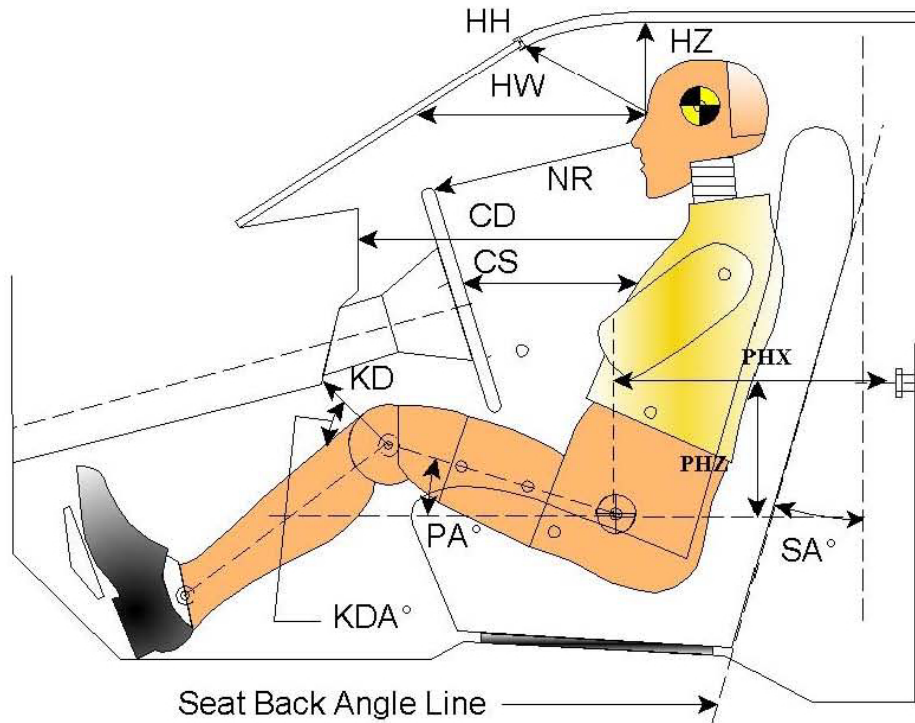
FUEL TANK CAPACITY DATA

	Liters
Usable Capacity of "Standard" Tank	78.7
Usable Capacity of "Optional" Tank	
Usable Capacity of Standard Tank as Specified in Owner's Manual	~ 79.5
Usable Capacity of Optional Tank as Specified in Owner's Manual	
92-94% of Usable Capacity	72.4 to 74.0
Actual Amount of Solvent Used	73.2
1/3 of Usable Capacity	26.2

.DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2011 Acura ZDX SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No. HB5303
 Test Date: 6/15/2011

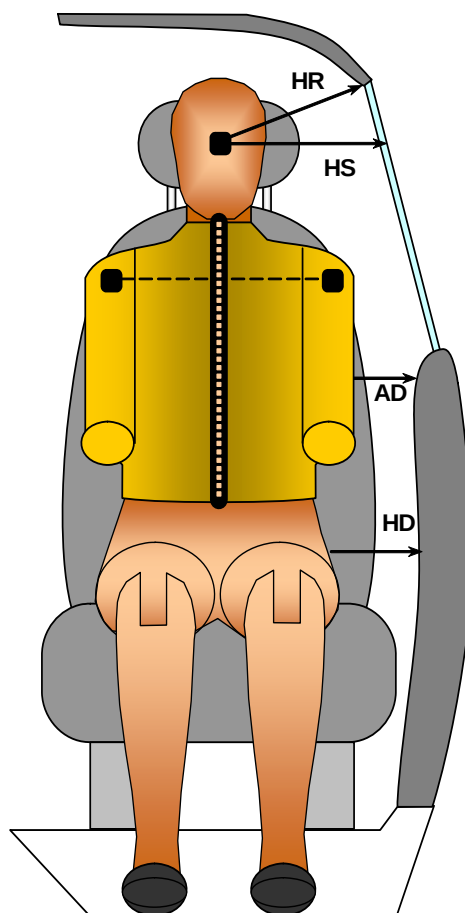


Code	Measurement Description	Driver S/N 296	
		Length (mm)	Angle (°)
HH	Head to Header	242	
HW	Head to Windshield	561	
HZ	Head to Roof	146	
NR	Nose to Rim	220	
CD	Chest to Dash	406	
CS	Chest to Steering Wheel	184	
KDL/KDAL	Left Knee to Dash	94	54.8
KDR/KDAR	Right Knee to Dash	81	49.9
PA	Pelvic Angle		22.0
PHX	H-Point to Striker (X-Axis)	425	
PHZ	H-Point to Striker (Z-Axis)	113	
SA	Seat Back Angle		2.9

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2011 Acura ZDX SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No. HB5303
 Test Date: 6/15/2011



FRONT VIEW OF DUMMY

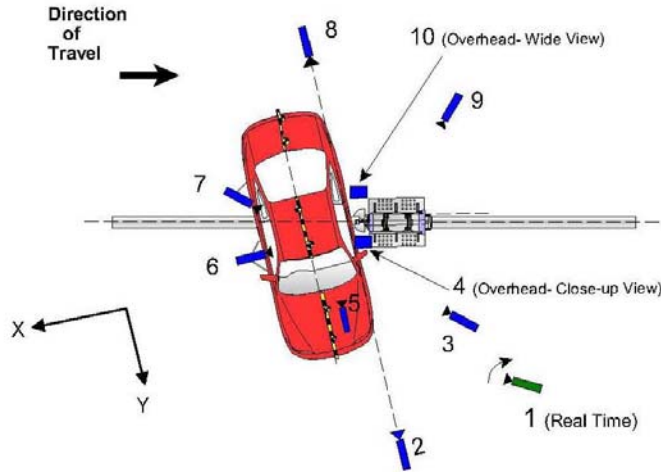
Code	Measurement Description	Driver S/N 296
		Length (mm)
HR	Head to Side Header	224
HS	Head to Side Window	369
AD	Arm to Door	173
HD	H-Point to Door	249

DATA SHEET NO. 5

CAMERA LOCATIONS AND DATA

Test Vehicle: 2011 Acura ZDX SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No. HB5303
 Test Date: 6/15/2011



Reference: (from Point of Impact for X and Y; from Ground for Z):
 +X = Forward of Impact, + Y = Right of Impact, +Z = Down

Camera No.	View	Coordinates (mm)			Lens (mm)	Film Speed (fps)
		X*	Y*	Z*		
1	Real-Time Pan View					30
2	Front Ground Level	50	5210	-1660	24	1000
3	Impact Side 45° Forward	-2420	3880	-1720	20	1000
4	Overhead Closeup	50	0	-4520	50	1000
5	Onboard – Driver Front				16	1000
6	Onboard – Driver Side				8	1000
7	Onboard – Driver Rear				8	1000
8	Rear Ground Level	50	-5520	-1670	24	1000
9	Impact Side 45° Rearward	-3540	-3190	-1740	20	1000
10	Overhead Wide View	650	0	-4610	14	1000
11	Real-Time Dummy Front View					30

* All measurements accurate to ± 6 mm

Note: Vehicle was at a 15° angle to the rigid pole.

INSTRUMENTATION

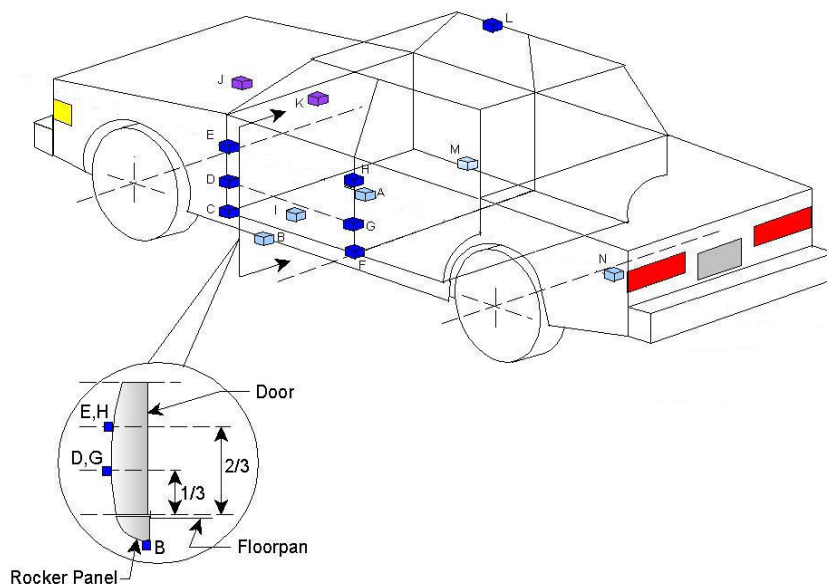
	Number of Channels
Driver Dummy	16
Vehicle Structure	21
Pole Load Cells – Not used	8
Contact Switches – Not installed	3
Airbag Timing – Not installed	2
Total No. of Data Channels	50

DATA SHEET NO. 6

VEHICLE ACCELEROMETER DATA

Test Vehicle: 2011 Acura ZDX SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No. HB5303
 Test Date: 6/15/2011



	Accelerometer Location			
	ID	Coordinates (mm)		
		X	Y	Z
A	Vehicle CG	2660	80	-360
	Vehicle CG Sensor	2660	110	-360
B	Left Floor Sill	2822	-777	-350
C	A Pillar Sill	3198	-777	-350
D	A Pillar Low	3115	-804	-705
E	A Pillar Mid	3212	-867	-892
F	B Pillar Sill	2054	-780	-355
G	B Pillar Low	2003	-774	-690
H	B Pillar Mid	2003	-772	-941
I	Driver Seat	2303	-570	-450
L	Engine Top	3844	0	-938
J	Firewall	3768	0	-1035
K	Right Roof	2093	610	-1622
M	Right Floor Sill	2103	780	-360
N	Rear Floorpan	333	0	-640

Reference: From Point of Impact for X and Y; from Ground for Z):
 +X = Forward of Vehicle, + Y = Right of Vehicle, +Z = Down

DATA SHEET NO. 7
RIGID POLE LOAD CELL DATA

Test Vehicle: 2011 Acura ZDX SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No. HB5303
Test Date: 6/15/2011



254 mm Diameter Rigid Pole

The pole was not instrumented.

Load Cell Locations	
ID	Height From Ground (m)
1	
2	
3	
4	
5	
6	
7	
8	

DATA SHEET NO. 8

POST-TEST OBSERVATIONS

Test Vehicle: 2011 Acura ZDX SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No. HB5303
 Test Date: 6/15/2011

TEST DUMMY INFORMATION AND CONTACT

Description	Driver
Dummy Type / Serial No.	SID-IIs / 296
Head Contact	Curtain Airbag, Headrest
Upper Torso Contact	Side Airbag, Seatback
Lower Torso Contact	Side Airbag, Seat
Left Knee Contact	Door Panel
Right Knee Contact	Left Knee

POST TEST DOOR OPENING AND SEAT TRACK INFORMATION

Description	Front	Rear
Left Side Doors	Remained closed and jammed shut	Remained closed and jammed shut
Right Side Doors	Remained closed and operational	Remained closed and operational
Hatch and Other Doors	Remained closed and operational	Remained closed and operational
Seat Movement	0	0
Seat Back Failure	None	None

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	No Separation
Sill Separation	None
Windshield Damage	Cracked
Window Damage	Left Front & Left Rear Windows Broke, Sunroof Broke
Other Notable Effects	None

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Left Front (Driver) P1		Left Rear (Passenger) P4	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	No	No	
Knee Airbag	No		No	
Side Curtain Airbag	Yes	Yes	Yes	Yes
Side Torso/Pelvis Airbag	Yes	Yes	No	
Seat Belt Pretensioner	Yes	Yes	No	
Seat Belt Load Limiter	Yes		No	

VEHICLE SPEED AND IMPACT DATA

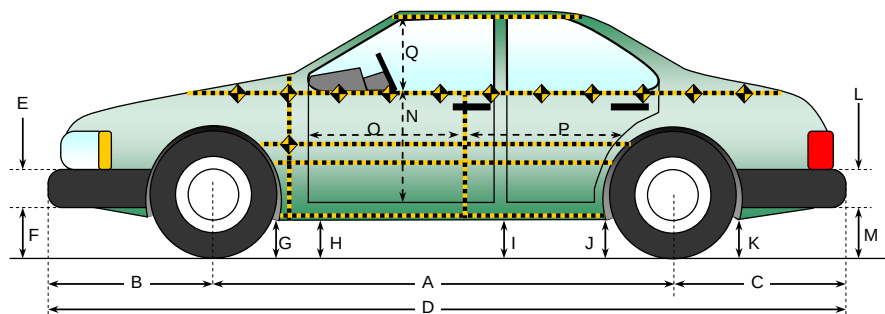
Measured Parameter	Units	Requirement	Value
Horizontal Offset from Vertical Impact Reference Line	mm	+/- 38	6
Trap No. 1 Velocity (Primary)	km/h	31.4 to 33.0	32.5
Trap No. 2 Velocity (Redundant)	km/h	31.4 to 33.0	32.6

DATA SHEET NO. 9

VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2011 Acura ZDX SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No. HB5303
 Test Date: 6/15/2011



All measurements in (mm) with tolerance of ± 3 mm

LEFT SIDE VIEW

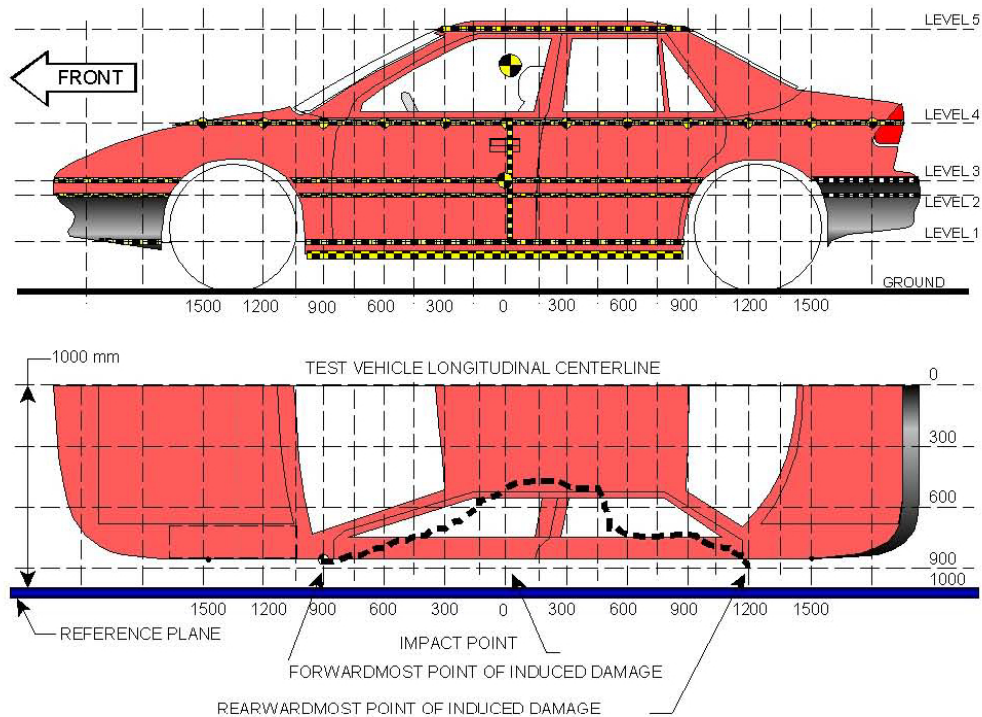
VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2755	2670	85
B	Front Axle to FSOV	1075	1075	0
C	Rear Axle to RSOV	1065	1065	0
D1	Total Vehicle Length at Left Side	3363	3240	123
D2	Total Vehicle Length at Centerline	4895	4810	85
D3	Total Vehicle Length at Right Side	3363	3370	-7
E	Front Bumper Thickness	95	95	0
F	Front Bumper Bottom to Ground	258	300	-42
G	Sill Height at Front Wheel Well	242	238	4
H	Sill Height at Front Door Leading Edge	242	236	6
I	Sill Height at B Pillar	253	246	7
J1	Sill Height at Rear Wheel Well	250	279	-29
J2	Pinch Weld Height at Rear Wheel Well	249	276	-27
K	Sill Height Aft of Rear Wheel Well	303	310	-7
L	Rear Bumper Thickness	100	100	0
M	Rear Bumper Bottom to Ground	395	364	31
N	Sill Height to Window Bottom Sill	826	823	3
O	Front Door Leading Edge to Impact CL	614	610	4
P	Rear Door Trailing Edge to Impact CL	1277	1300	-23
Q	Front Window Opening	423	370	53
R	Right Side Length	3363	3370	-7
S	Left Side Length	3363	3240	123
T	Vehicle Width at B Post	1981	1892	89

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2011 Acura ZDX SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No. HB5303
 Test Date: 6/15/2011



NOTE: The measurements are taken along the vertical impact reference line.
 Vehicle measurements forward of the vertical impact reference line are negative.

Level	Measurement Description	Height Above Ground (mm)
1	Sill Top	330
2	Mid Door	686
3	Occupant H-Point	711
4	Window Sill	1077
5	Window Top	1520

DATA SHEET NO. 10 (CONTINUED)

VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2011 Acura ZDX SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No. HB5303
 Test Date: 6/15/2011

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-1350				275					277					2	
-1200				260					270					10	
-1050				248					264					16	
-900			99	237				144	257				45	20	
-750		100	102	227			130	135	250			30	33	23	
-675		109	110	223			126	130	250			17	20	27	
-600	145	114	114	221		165	145	145	248		20	31	31	27	
-525	161	116	116	218		250	197	198	258		89	81	82	40	
-450	161	116	116	215		287	247	247	285		126	131	131	70	
-375	161	116	116	213		327	295	297	322		166	179	181	109	
-300	161	116	116	211		368	346	344	370		207	230	228	159	
-225	161	116	115	210		403	391	391	413		242	275	276	203	
-150	161	115	115	210	430	472	462	462	482	572	311	347	347	272	142
-75	160	115	115	210	421	506	510	510	525	592	346	395	395	315	171
0	160	114	115	199	418	516	537	537	548	593	356	423	422	349	175
75	160	114	115	198	418	484	518	520	533	568	324	404	405	335	150
150	159	115	115	196	419	420	473	473	478	555	261	358	358	282	136
225	158	115	115	206	421	360	418	418	429	542	202	303	303	223	121
300	158	116	115	206	425	306	359	361	386	531	148	243	246	180	106
375	158	116	115	206	427	266	291	298	332	515	108	175	183	126	88
450	158	117	116	206	429	241	251	254	306	511	83	134	138	100	82
525	157	118	117	206	432	213	225	225	306	511	56	107	108	100	79
600	162	120	119	208	438	215	206	208	303	498	53	86	89	95	60
750	165	123	123	212	445	189	186	187	281	492	24	63	64	69	47
900	167	126	127	213	455	165	164	164	259	484	-2	38	37	46	29
1050	163	126	127	219	465	139	140	143	239	484	-24	14	16	20	19
1200		114	116	219	480		91	96	205	480		-23	-20	-14	0
1350			104	205	499			101	171	489			-3	-34	-10
1500				191	521				190	527				-1	6
1650				196	542				203	556				7	14
1800				209					223					14	

NOTE: The measurements are taken along the vertical impact reference line.
 Vehicle measurements forward of the vertical impact reference line are negative.

DATA SHEET NO. 10 (CONTINUED)
VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2011 Acura ZDX SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No. HB5303
Test Date: 6/15/2011

MAXIMUM CRUSH DATA

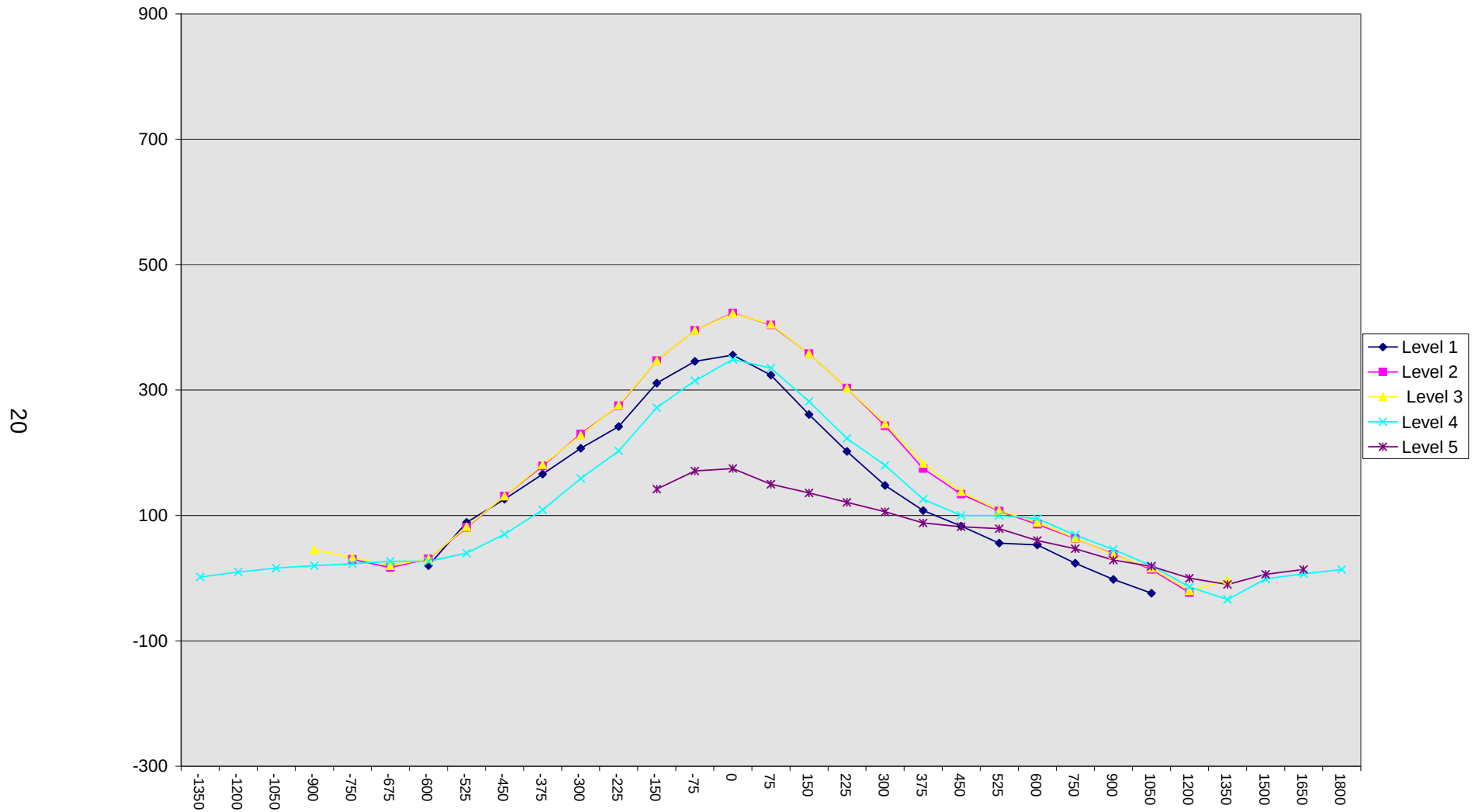
	Level 1	Level 2	Level 3	Level 4	Level 5
Maximum Crush (mm)	356	423	422	349	175
Distance From Impact (mm)	0	0	0	0	0

Note: Pre-test measurements are taken when the vehicle is in the "As Tested" weight condition. Vehicle measurements forward of the vertical impact reference line are negative. The crush profile grid is established prior to test based on an estimated impact point. The final distance to impact is determined after the final dummy positioning and the pole is aligned with the center of gravity of the dummy's head.

DATA SHEET NO. 10 (CONTINUED)
VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2011 Acura ZDX SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No. HB5303
Test Date: 6/15/2011



DATA SHEET NO. 11

FMVSS 301 FUEL SYSTEM INTEGRITY POST-IMPACT DATA

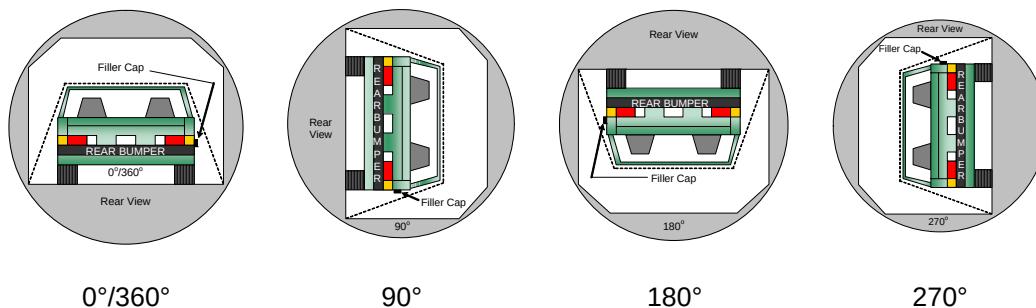
Test Vehicle: 2011 Acura ZDX SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No. HB5303
 Test Date: 6/15/2011

Test Time: 10:59 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

FMVSS 301 STATIC ROLLOVER DATA



ROLLOVER SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	113	300	413
90° to 180°	111	300	411
180° to 270°	105	300	405
270° to 360°	114	300	414

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

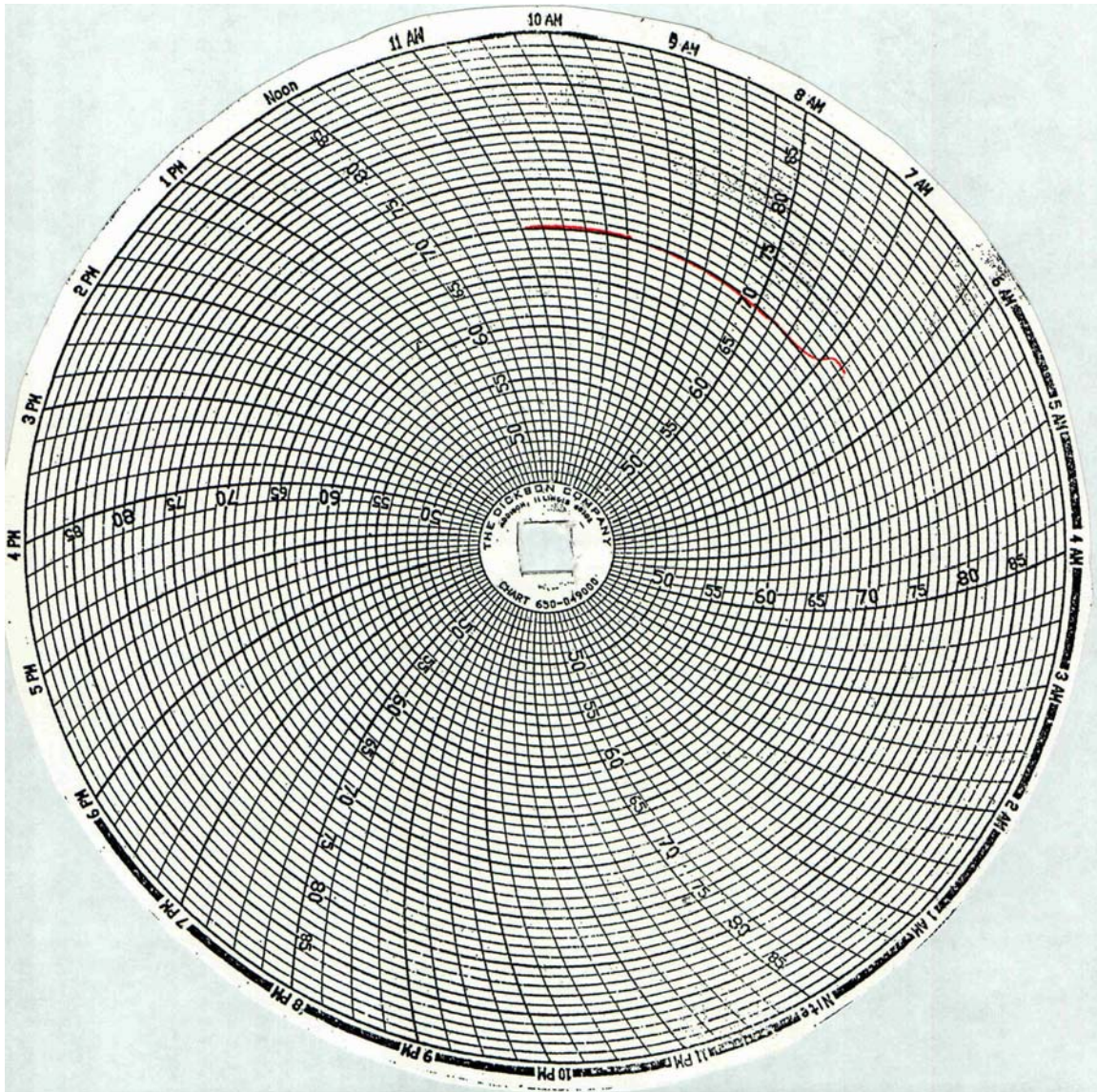
Test Phase	Spillage Location
0° to 90°	
90° to 180°	
180° to 270°	
270° to 360°	

DATA SHEET NO. 12

DUMMY/VEHICLE TEMPERATURE STABILIZATION DATA

Test Vehicle: 2011 Acura ZDX SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No. HB5303
Test Date: 6/15/2011



APPENDIX A
PHOTOGRAPHS

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As Delivered Right Front $\frac{3}{4}$ View of Test Vehicle



As Delivered Left Rear $\frac{3}{4}$ View of Test Vehicle



Pre-Test Frontal View of Test Vehicle



Post-Test Frontal View of Test Vehicle



Pre-Test Left Front $\frac{3}{4}$ View of Test Vehicle



Post-Test Left Front $\frac{3}{4}$ View of Test Vehicle



Pre-Test Left Side View of Test Vehicle



Post-Test Left Side View of Test Vehicle



Pre-Test Left Rear $\frac{3}{4}$ View of Test Vehicle



Post-Test Left Rear $\frac{3}{4}$ View of Test Vehicle



Pre-Test Rear View of Test Vehicle



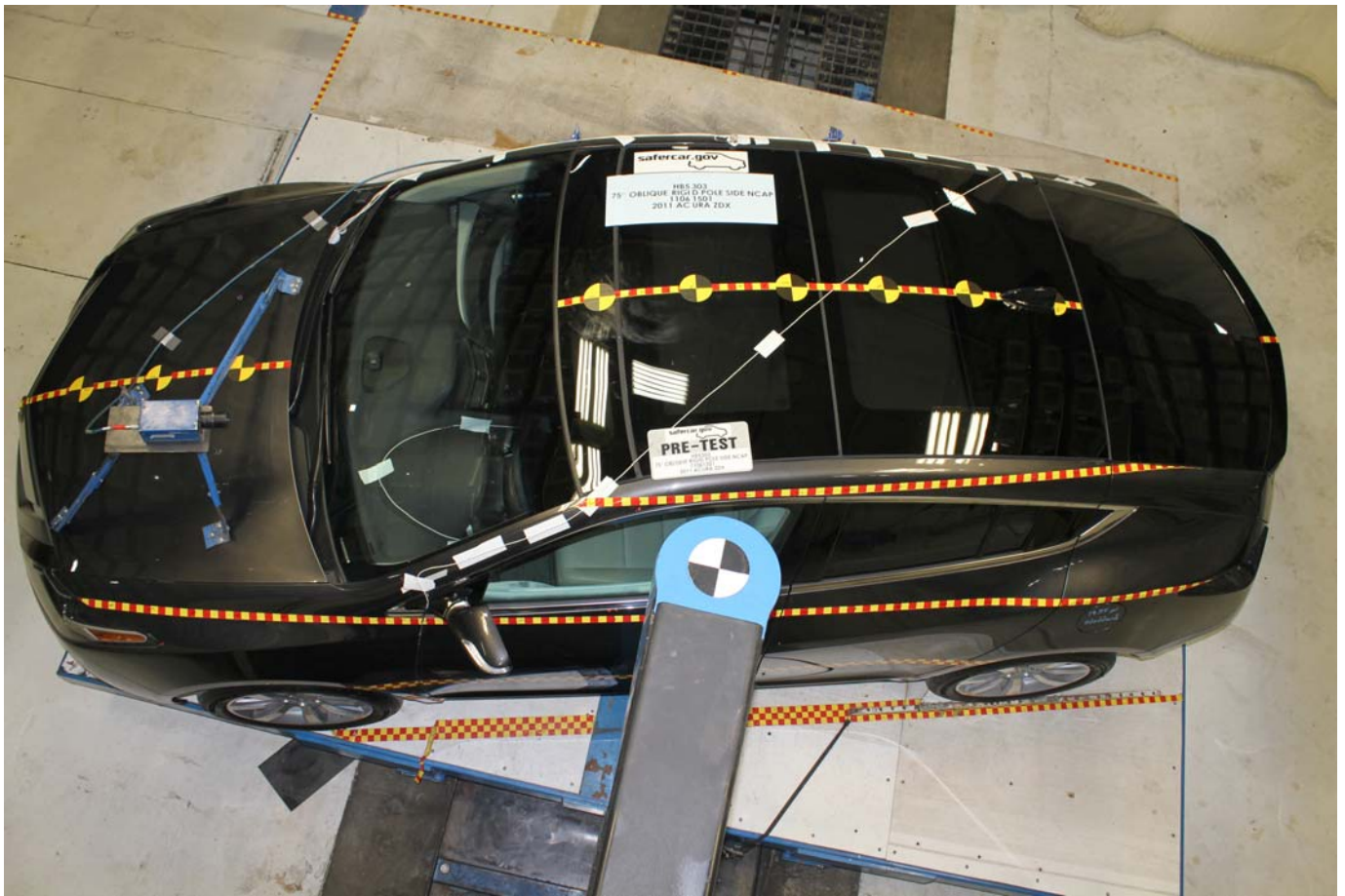
Post-Test Rear View of Test Vehicle



Pre-Test Right Side View of Test Vehicle



Post-Test Right Side View of Test Vehicle



Pre-Test Overhead View of Test Vehicle and Pole



Post-Test Overhead View of Test Vehicle and Pole



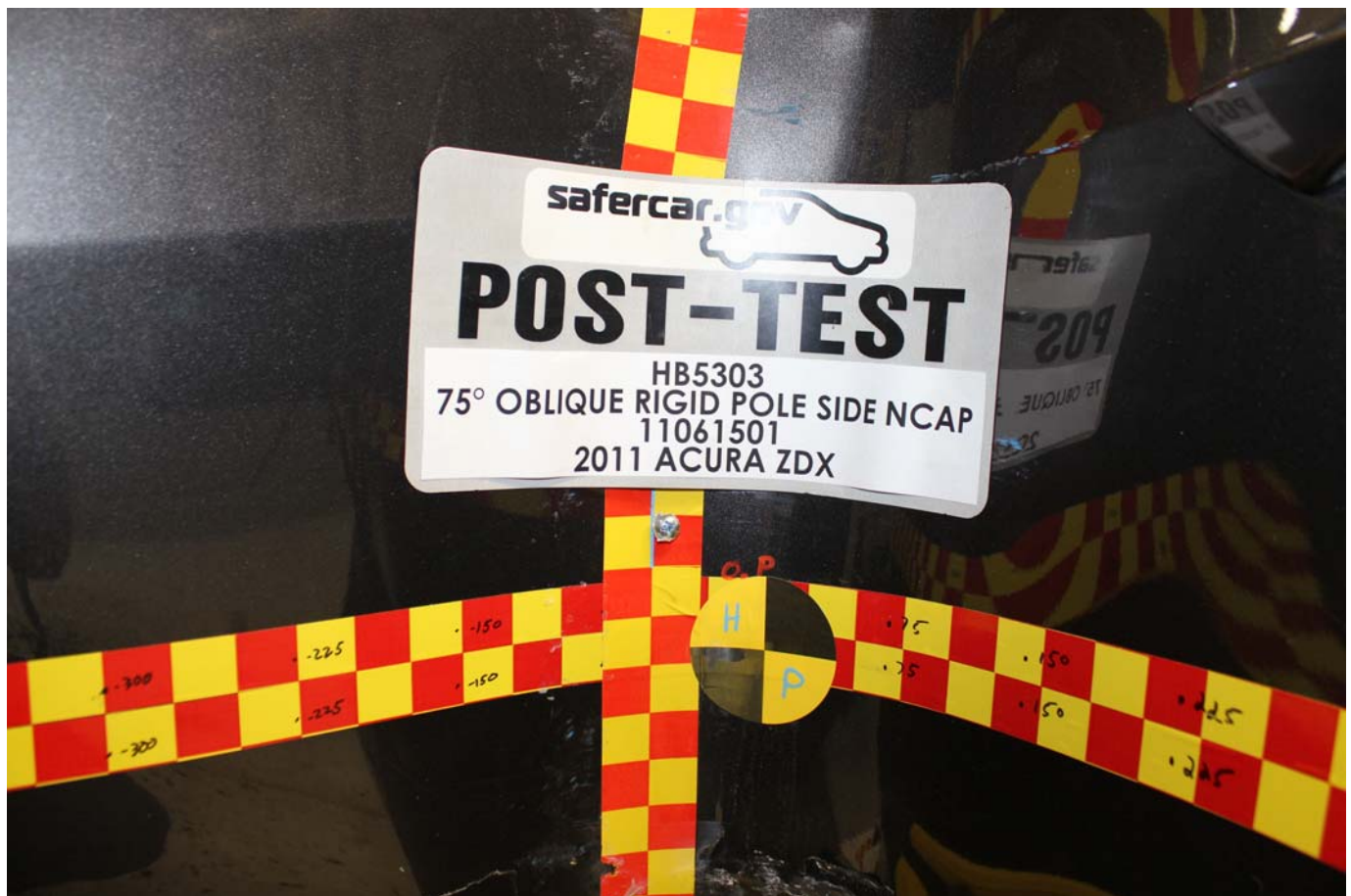
Pre-Test Left Side View of Pole Positioned Against Side of Vehicle



Pre-Test Right Side View of Pole Positioned Against Side of Vehicle



Pre-Test Close-Up View of Impact Point Target



Post-Test Close-Up View of Impact Point Target Showing Impact Location



Pre-Test Front Close-Up View of Dummy (through front window)



Post-Test Front Close-Up View of Dummy (through front window)



Pre-Test Left Side View of Dummy Showing Belts, Chalking, and Contact Switches (Door Open)



Pre-Test Left Side View of Dummy Shoulder and Door Top View



Post-Test Left Side View of Dummy Shoulder and Door Top View



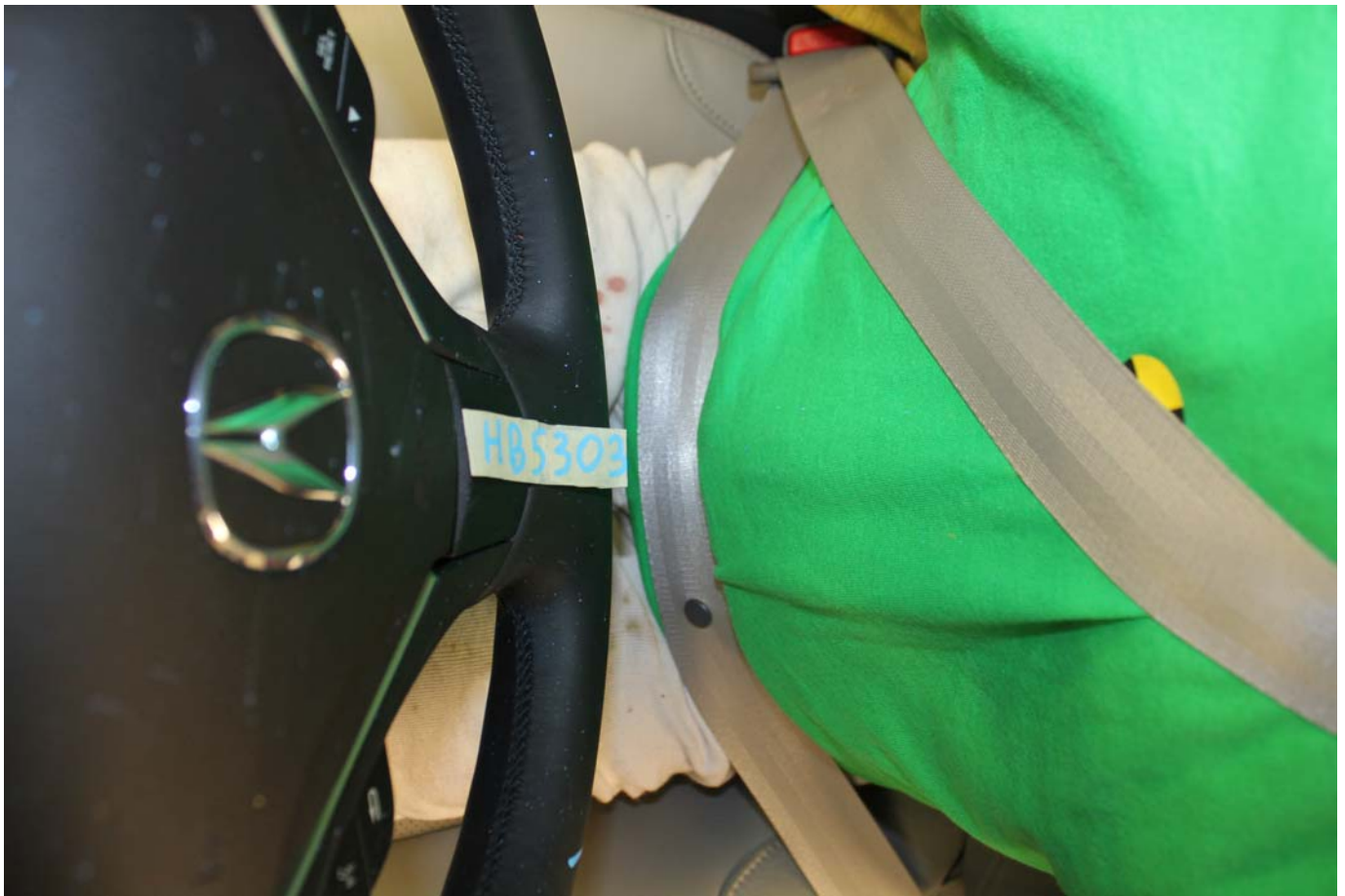
Pre-Test Frontal View of Seat Back Prior to Dummy Positioning



Pre-Test Frontal View of Dummy Head and Shoulders in Relation to Head Restraint



Pre-Test Frontal View of Seat Pan Prior to Dummy Positioning



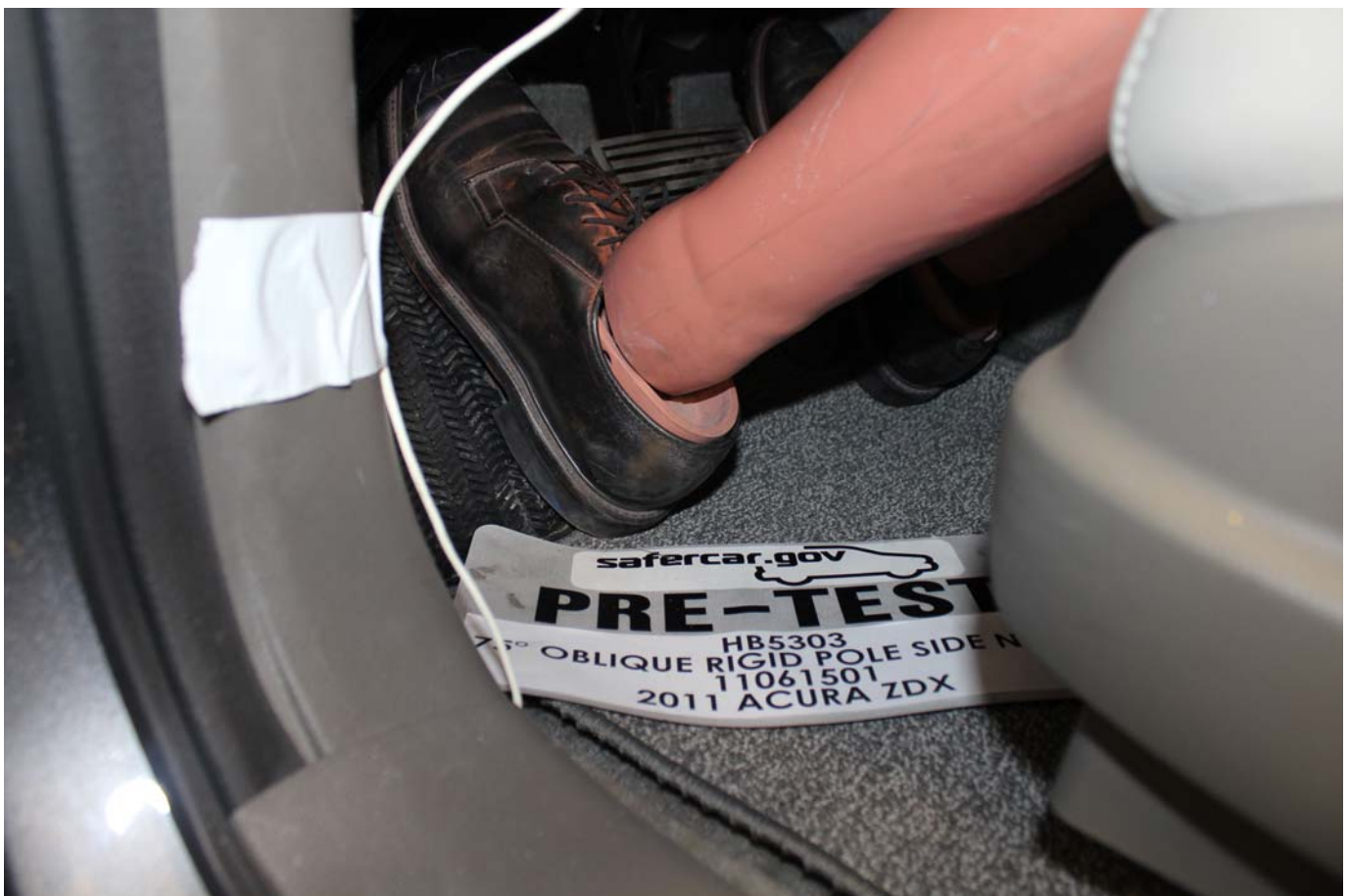
Pre-Test Overhead View of Dummy Thighs on Seat Pan



Pre-Test View of Dummy's Neck Showing Position of Adjustable Neck Bracket



Pre-Test View of Dummy's Head Showing Dummy's Head is Level



Pre-Test Placement of Dummy's Feet



Pre-Test View of Belt Anchorage for Dummy to Show Position



Pre-Test Left Side View of Steering Wheel to Show Position



Pre-Test View of Parking Brake



Pre-Test Close-Up Left Side View of Driver Seat Track Showing Test Position



Pre-Test Close-Up Left Side View of Driver Seat Back Showing Test Position



Pre-Test Close-Up View of Driver Seat Back or Head Restraint Showing Seat Back Test Position



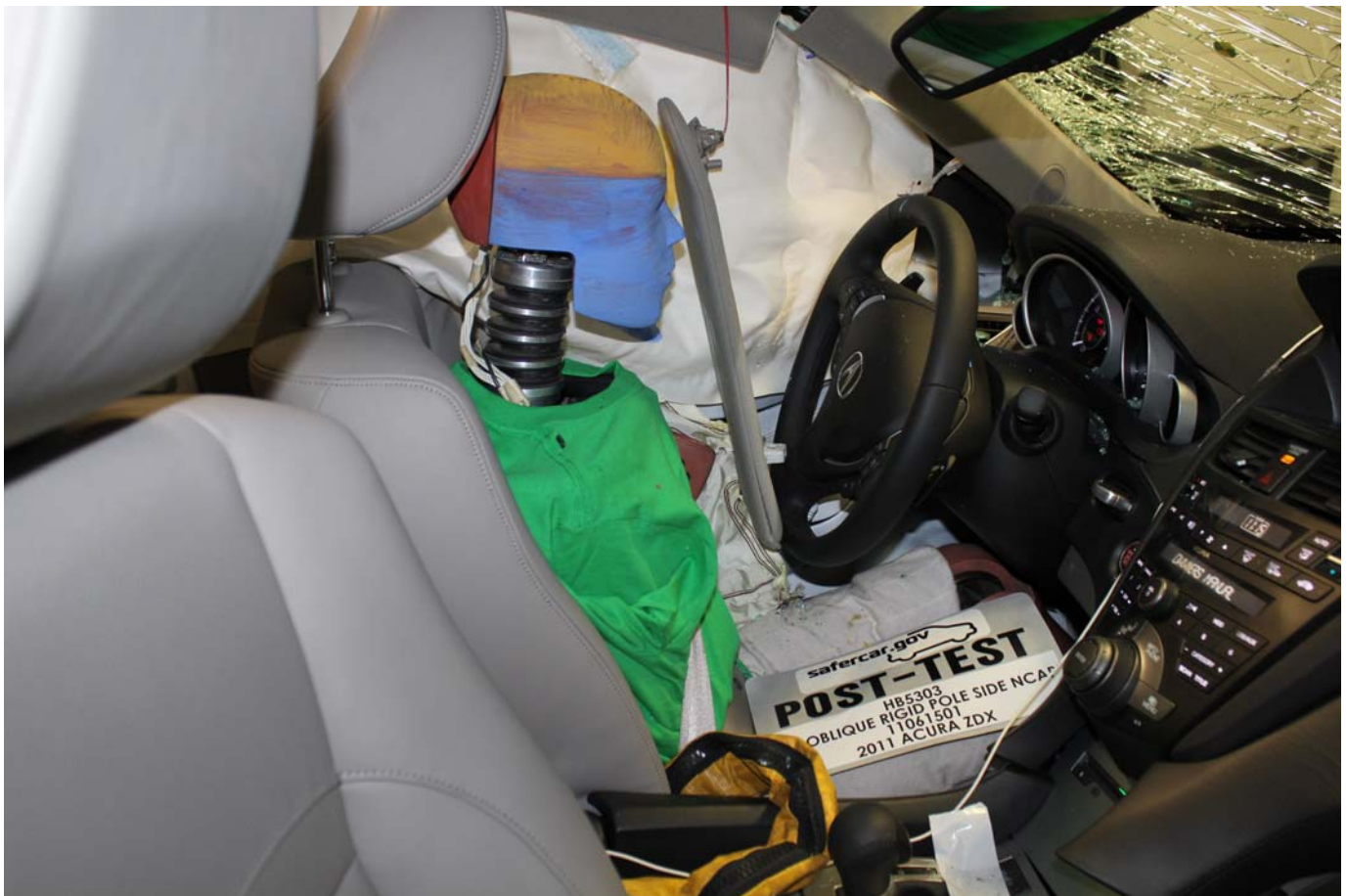
Pre-Test Dummy and Door Clearance View



Post-Test Dummy and Door Clearance View



Pre-Test Right Side View of Dummy and Front Seat Occupant Compartment



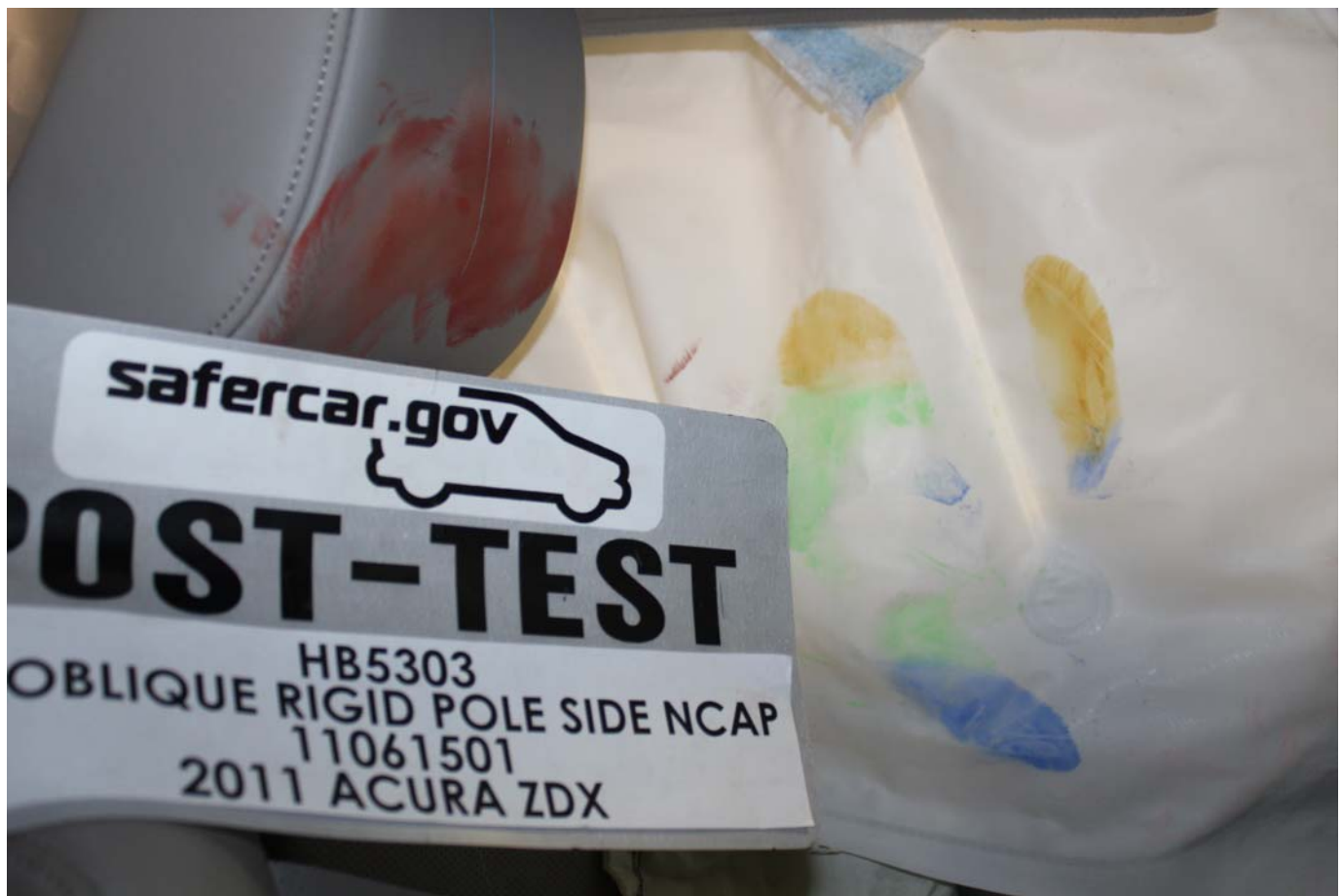
Post-Test Right Side View of Dummy and Front Seat Occupant Compartment



Pre-Test Inner Driver Door Panel View



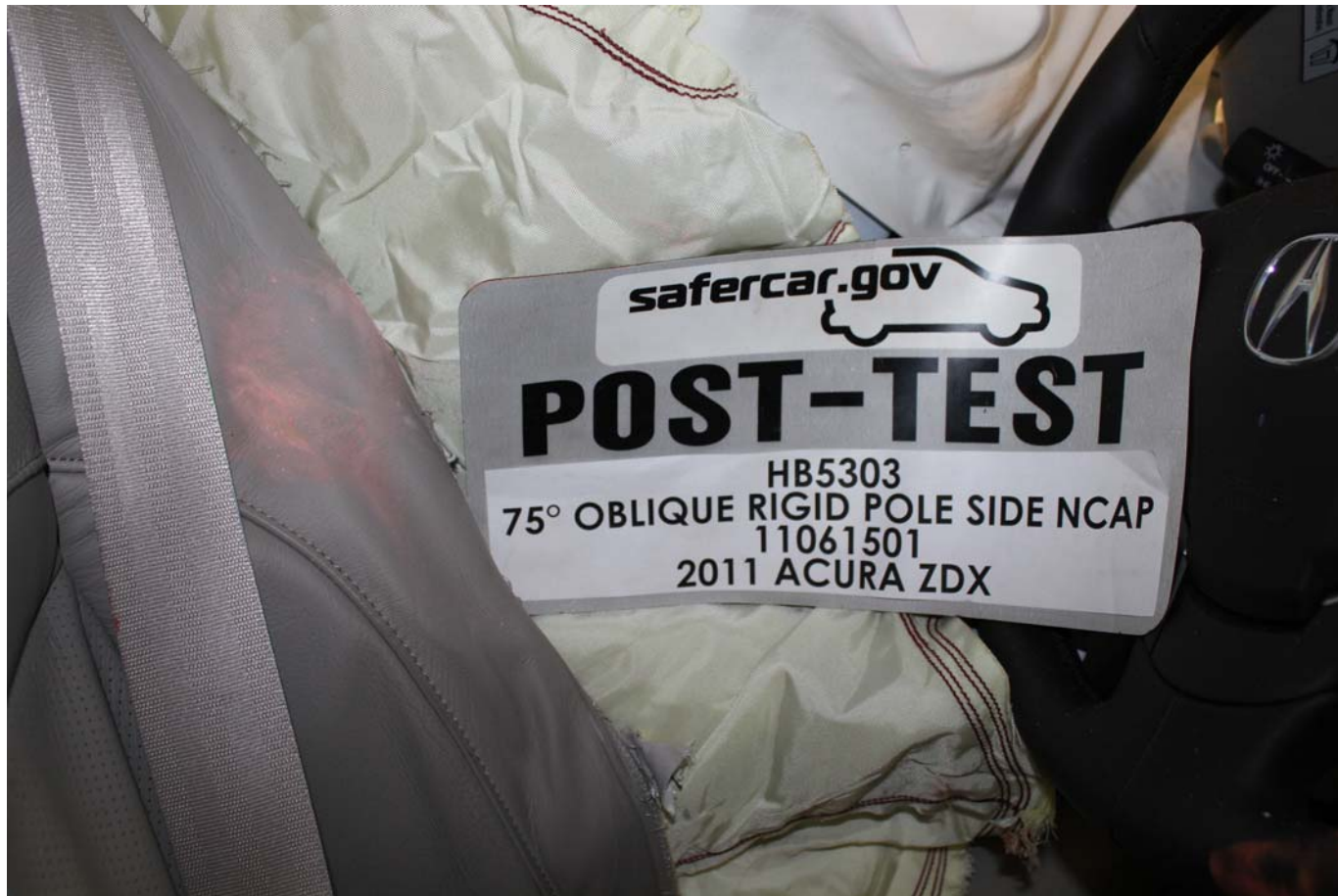
Post-Test Inner Driver Door Panel View Showing Dummy Contact Location



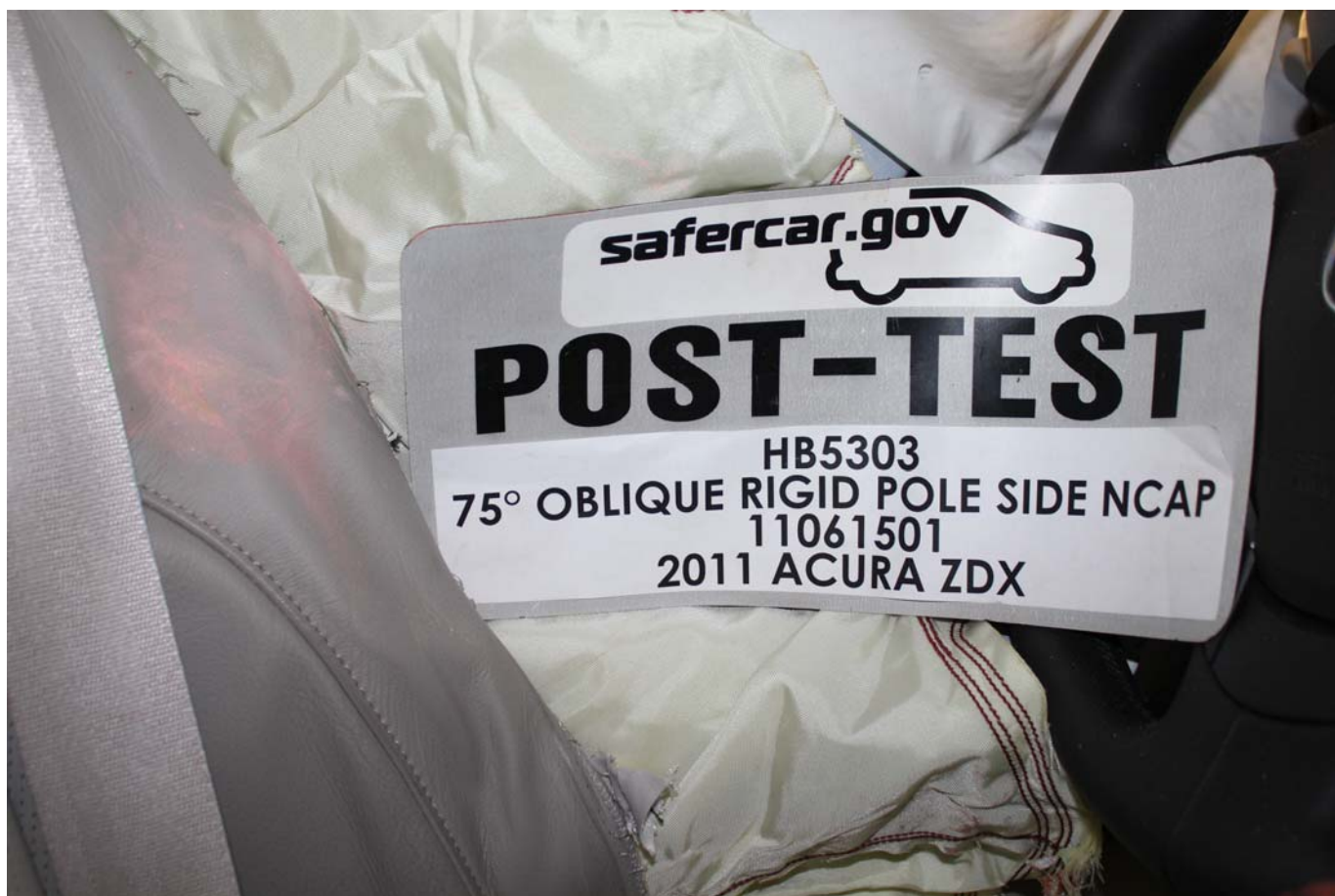
Post-Test Dummy Close-Up Head Contact with Vehicle Interior View



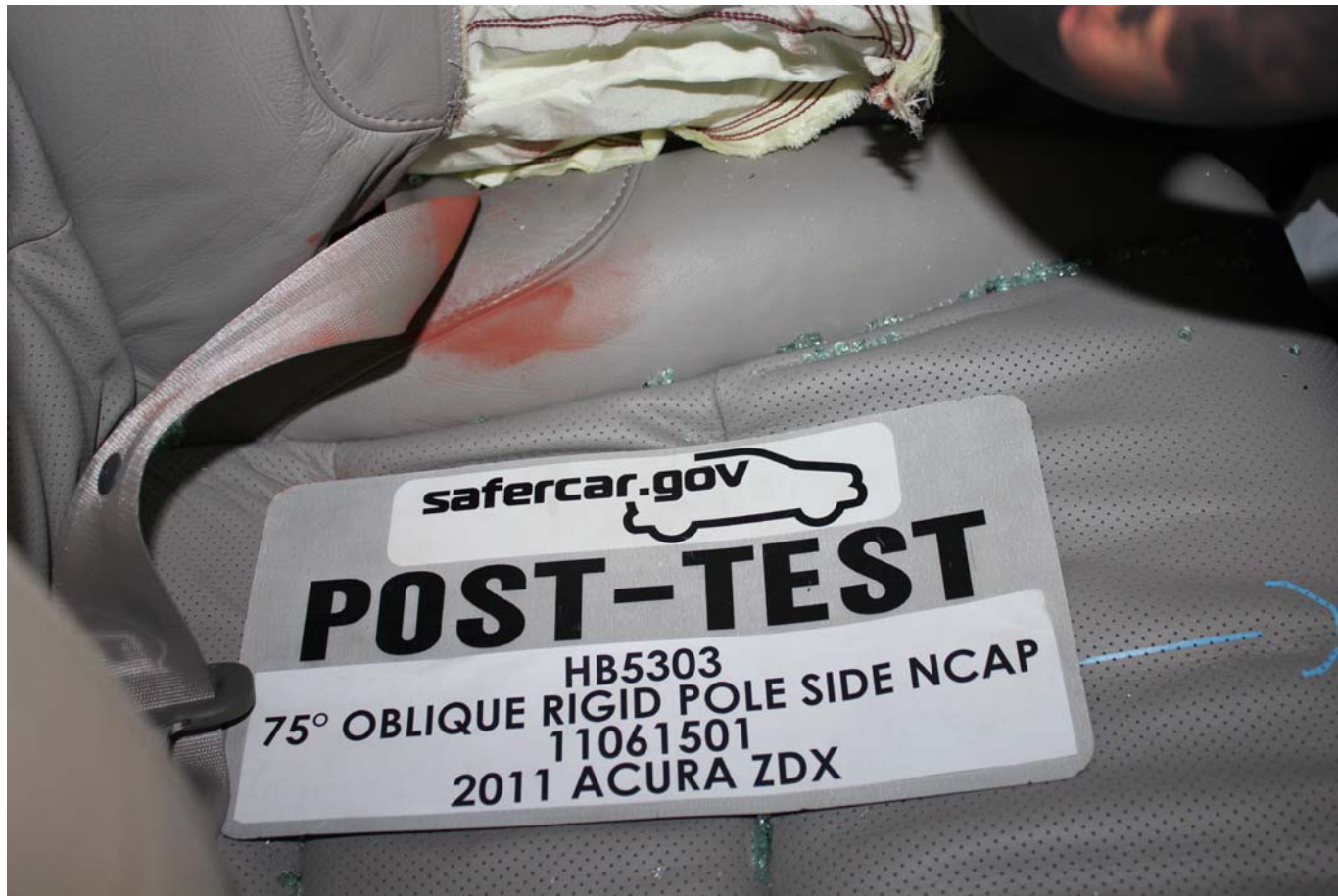
Post-Test Dummy Close-Up Head Contact with Side Airbag View



Post-Test Dummy Close-Up Torso Contact with Vehicle Interior View



Post-Test Dummy Close-Up Torso Contact with Side Airbag View



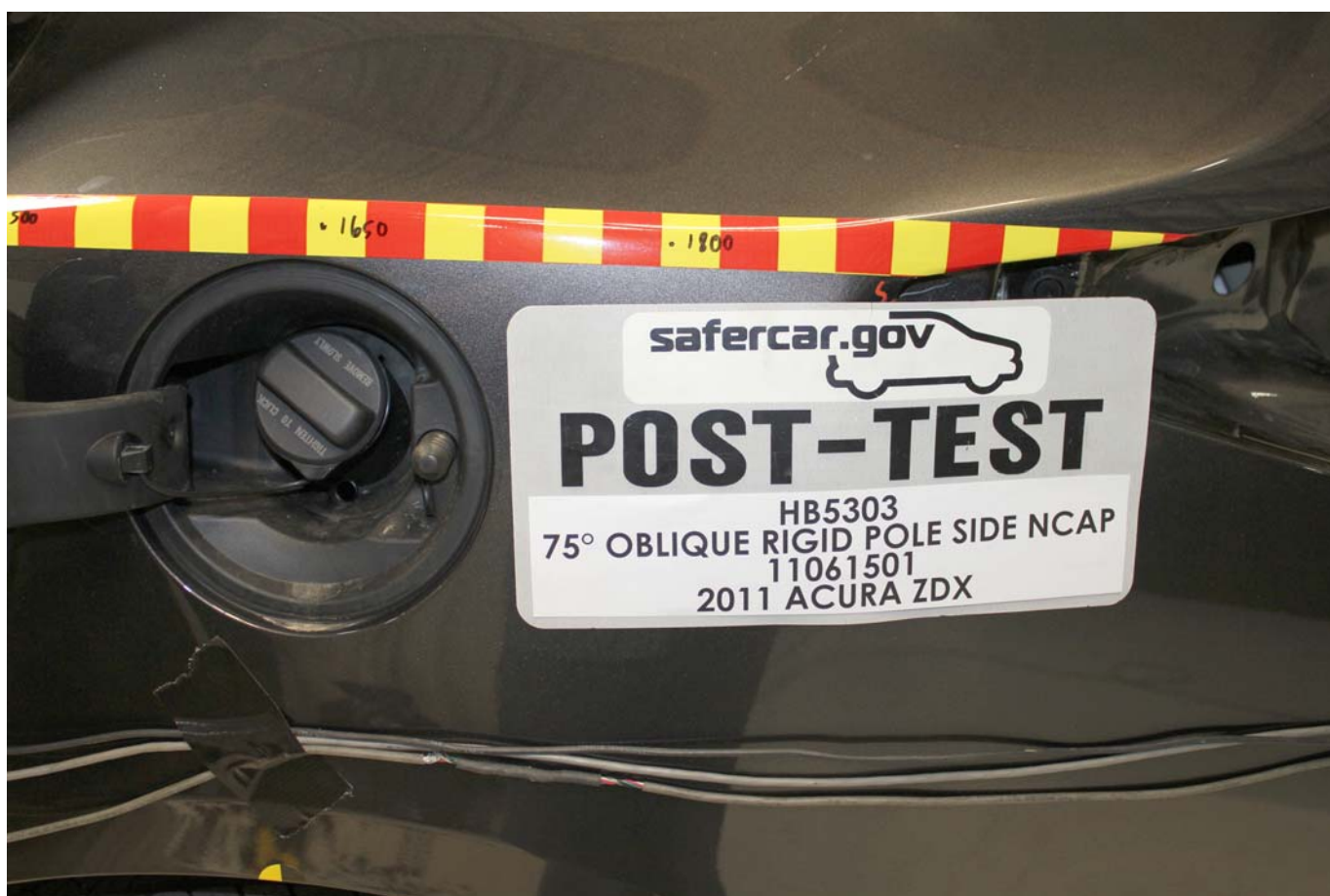
Post-Test Dummy Close-Up Pelvis Contact with Vehicle Interior View



Post-Test Dummy Close-Up Pelvis Contact with Side Airbag View



Pre-Test View of Fuel Filler Cap or Fuel Filler Neck



Post-Test View of Fuel Filler Cap or Fuel Filler Neck

MFD. IN CANADA BY HONDA OF CANADA MFG.,
 - A DIVISION OF HONDA CANADA INC. 10/'10
 GVWR 2510KG (5534LBS) TIRE SIZE RIM SIZE
 GAWR F 1325KG (2921LBS) P255/50R19 103H 19X8.5J
 GAWR R 1215KG (2679LBS) P255/50R19 103H 19X8.5J
 THIS VEHICLE CONFORMS TO ALL APPLICABLE
 FEDERAL MOTOR VEHICLE SAFETY
 AND THEFT PREVENTION STANDARDS IN EFFECT
 ON THE DATE OF MANUFACTURE SHOWN ABOVE.
 V.I.N.: 2HNYB1H49BH500161 TYPE: MPV



SZN B AB5 -NH736MX -B -00

Close-Up View of Vehicle's Certification Label



TIRE AND LOADING INFORMATION

SEATING CAPACITY : TOTAL 5 : FRONT 2 : REAR 3

The combined weight of occupants and cargo should never exceed 380kg or 830lbs.

TIRE	SIZE	COLD TIRE PRESSURE	SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION
FRONT	P255/50R19 103H	220KPA, 32PSI	
REAR		220KPA, 32PSI	
SPARE	T165/80D17 104M	420KPA, 60PSI	

SZNA

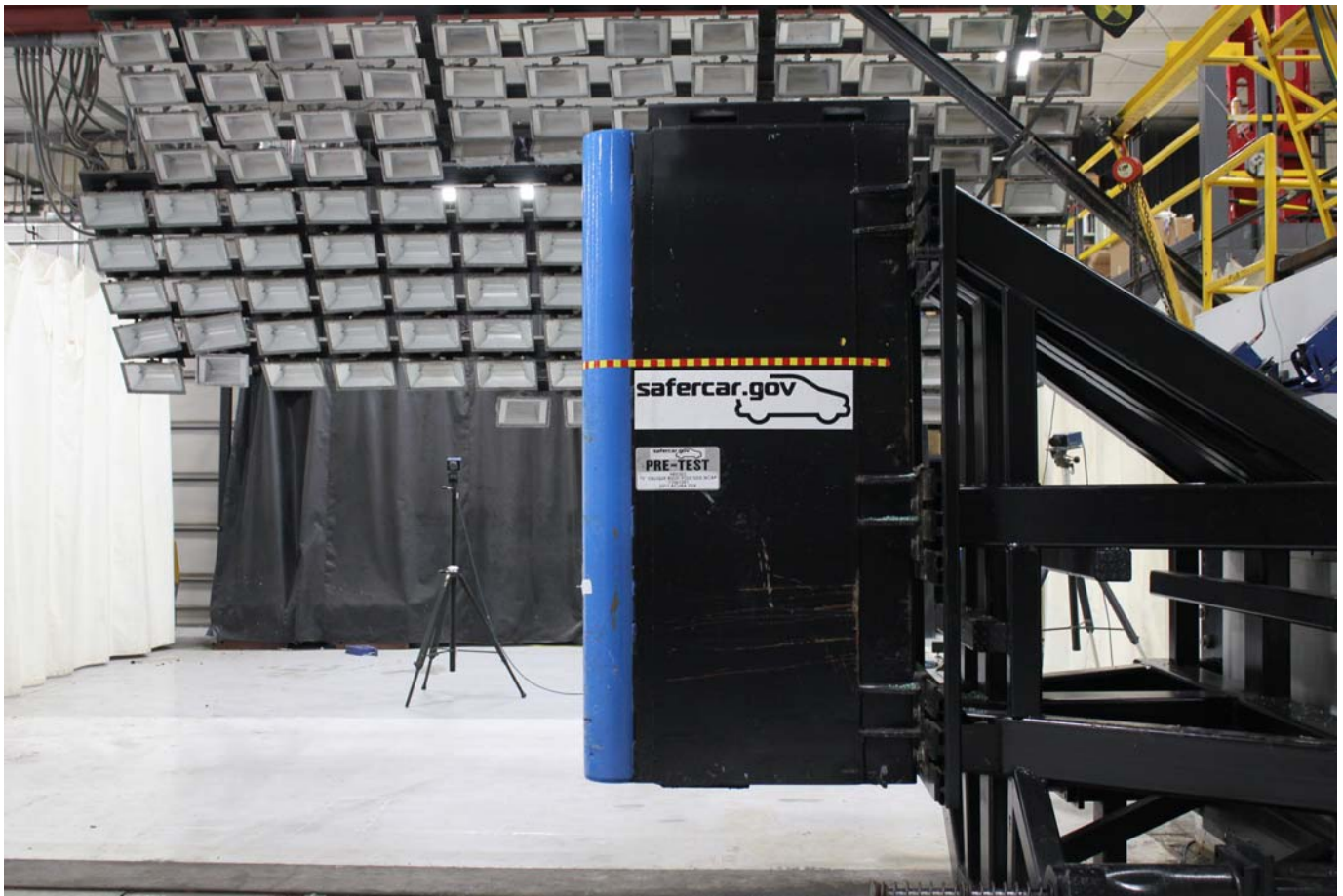
Close-Up View of Vehicle's Tire Information Placard or Label



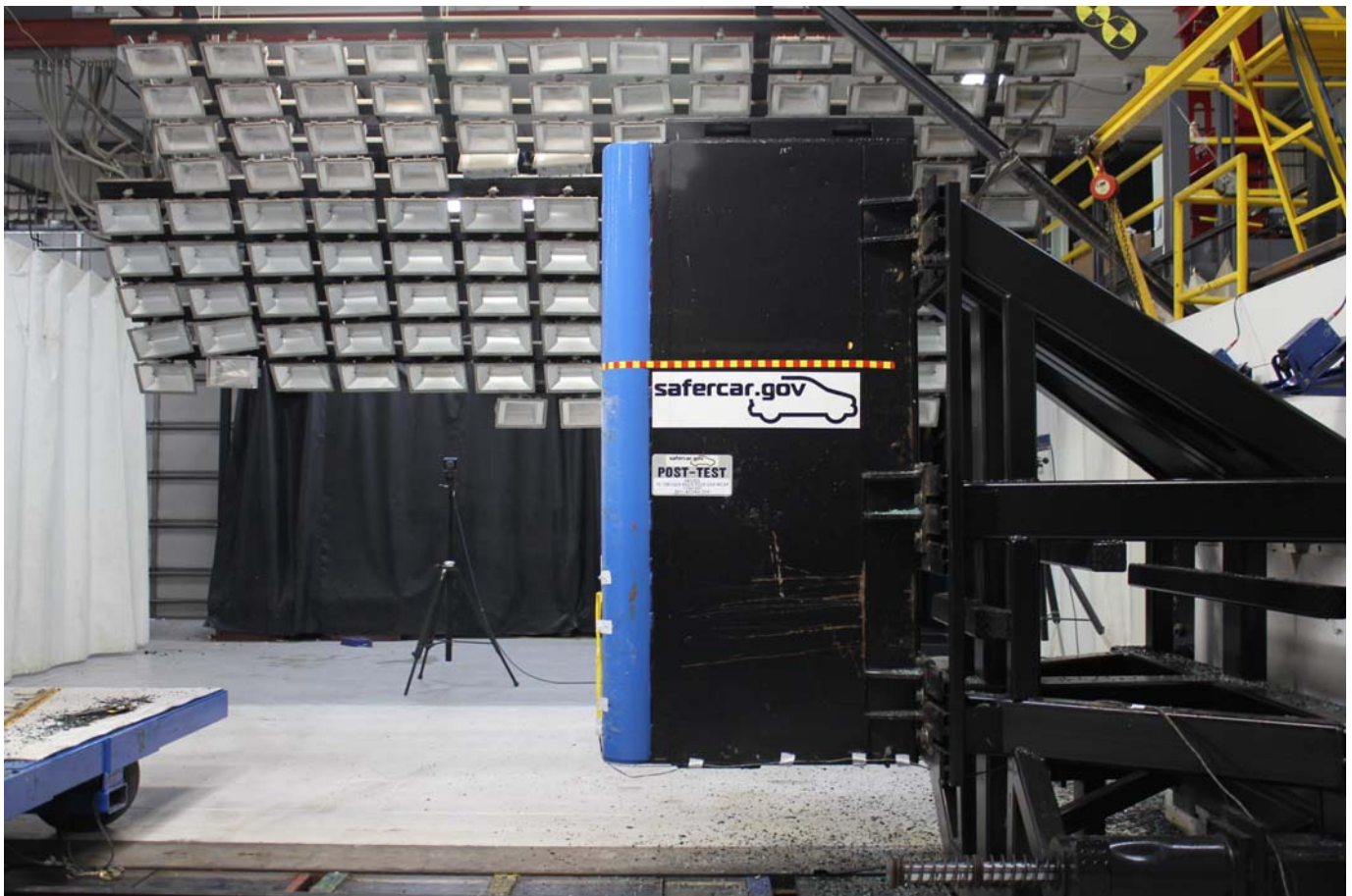
Pre-Test Pole Barrier Front View



Post-Test Pole Barrier Front View



Pre-Test Pole Barrier Side View



Post-Test Pole Barrier Side View

PHOTOGRAPH NOT APPLICABLE

Pre-Test Ballast View



Post-Test Primary and Redundant Speed Trap Read-Out



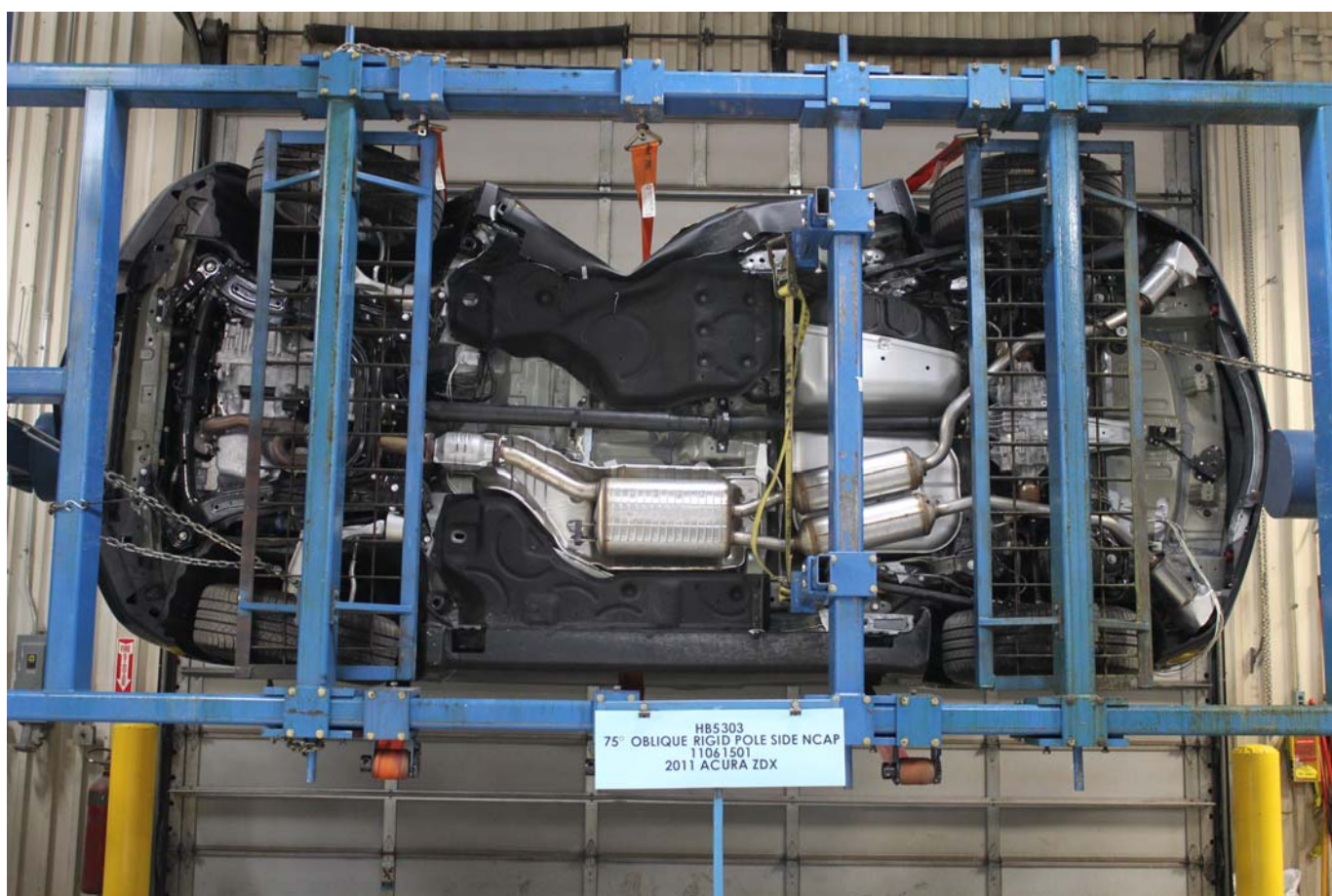
FMVSS No. 301/305 Rollover 0 Degrees



FMVSS No. 301/305 Rollover 90 Degrees



FMVSS No. 301/305 Rollover 180 Degrees



FMVSS No. 301/305 Rollover 270 Degrees



FMVSS No. 301/305 Rollover 360 Degrees



Impact Event



2011 ZDX TECH

VEHICLE NUMBER: 2HNYB1H49BH500161
ENGINE NUMBER: J37A5-2000159 EXT: GRIGIO M.
CONTROL NUMBER: 685253 INT: LAUPE

STANDARD EQUIPMENT AT NO EXTRA COST

- **TECHNICAL FEATURES ***
 - 3.7L VTEC 24-Valve
 - 6-Speed Automatic Transmission with Sequential SportShift
 - SH-AWD System
 - 4-Wheel Disc Brakes
 - MacPherson Strut Front Suspension
 - Rear Multi-Link Suspension
 - Variable-Assist Rack-and-Pinion Power Steering
 - Driver's and Front Passenger's Side Curtain Airbags
 - 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
 - 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
- 32-Way Power Seats
- 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
 - Power Windows with Power Sunrises
 - 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 Command 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 AMP-MDWD-A, CD, DTS, Dolby Pro Logic II
 - Hard Link Drive (HDD)
 - Push-Button Start
 - 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 Lid 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 fees are not included and are included
in the manufacturer's suggested retail price.

Environmental Performance

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

Global Warming Score



Smog Score



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 for more information. **AIR RESOURCES BOARD**

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

HIGHWAY MPG

23

Expected range
for most drivers
19 to 27 MPG

Combined Fuel Economy

19

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

10 32
All SUV's



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.

GOVERNMENT SAFETY RATINGS

Frontal
Crash

Driver
Passenger

Not Rated
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
Rear seat

Not Rated
Not Rated

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

Rollover

★★★★

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

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

FOR THIS VEHICLE
Final Assembly Point:
CANADA

Country of Origin: **ONTARIO**

U.S.A.

Transmission:

JAPAN

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

Seats

Moves the whole seat up and forward, or down and backward. The front of the seat also tilts up or down at the same time.



Adjusts the seat-back angle forward or backward.



Increases or decreases the lumbar support. (Driver's seat only)

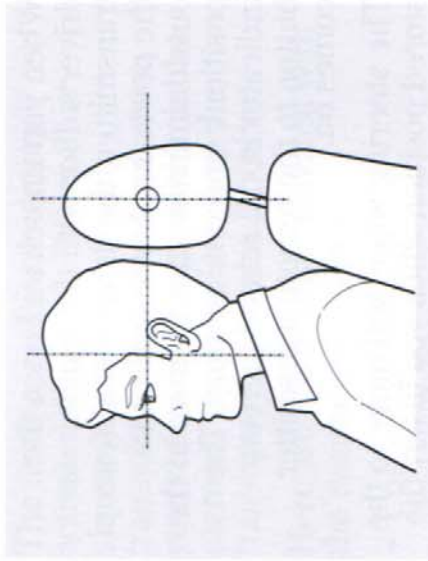


The driver's seat includes a memory feature. Two seat positions can be stored in separate memories. You can then select a memorized position by pushing the appropriate memory button. Refer to page 180 for how to memorize and select the seat positions.

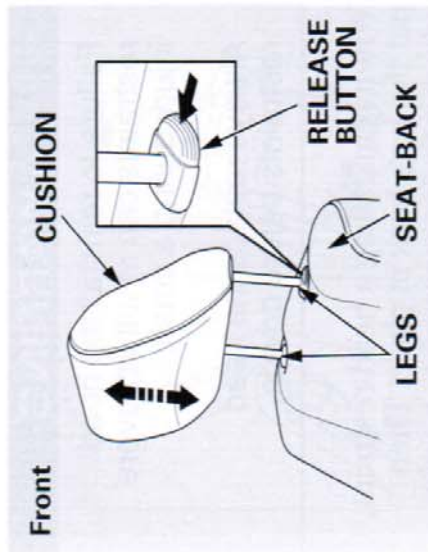
Head Restraints

See page 15 for important safety information and a warning about improperly positioning head restraints.

Your vehicle is equipped with head restraints in all seating positions to help protect you and your passengers from the likelihood of whiplash and other injuries.

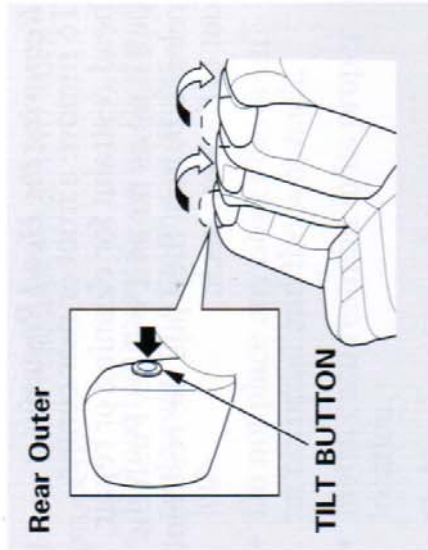
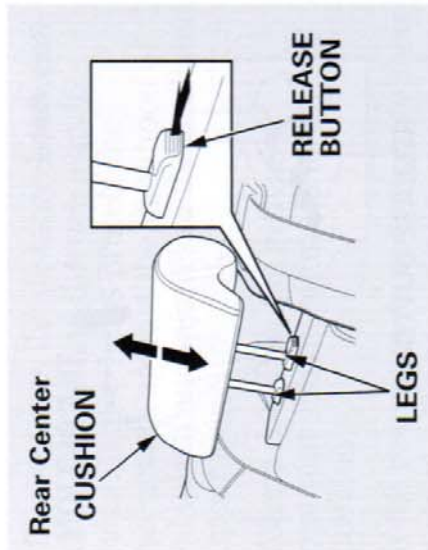


They are most effective when you adjust them so the center of the back of the occupant's head rests against the center of the restraint.



Adjusting the Head Restraint

The head restraints adjust for height. You need both hands to adjust the restraint. Do not attempt to adjust it while driving. To raise it, pull upward. To lower the restraint, push the release button sideways, and push the restraint down.



To lower either rear outer head restraint for better visibility, press the tilt button on the side of the head restraint. It folds down backward. To raise the rear outer head restraint, pull it up from the rear by hand. Make sure the head restraint locks in position when you lower or raise it.

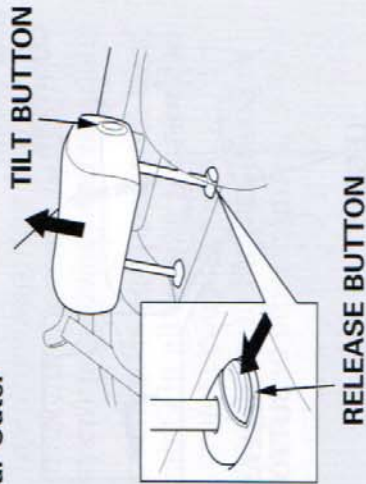
CONTINUED

Seats

Removing the Head Restraint

To remove a front or rear center head restraint for cleaning or repair, pull it up as far as it will go. Push the release button, then pull the restraint out of the seat-back.

Rear Outer



If for some reason you need to remove the rear outer head restraint, push the tilt button, then fold the head restraint backward. Push the release button, then pull the restraint out of the seat-back.

⚠ WARNING

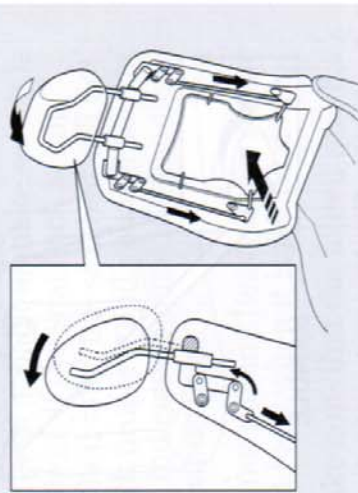
Failure to reinstall the head restraints can result in severe injury during a crash.

Always replace the head restraints before driving.

When reinstalling a head restraint, put the legs back in place. Then adjust it to the appropriate height while pressing the release button.

Make sure the head restraint locks in position when you reinstall it.

Active Head Restraints



The driver's and front passenger's seats have active head restraints. If the vehicle is struck severely from the rear, the occupant properly secured with the seat belt will be pushed against the seat-back and the head restraint will automatically move forward.

This reduces the distance between the restraint and the occupant's head. It also helps protect the occupants against the likelihood of whiplash and injuries to the neck and upper spine.

After a collision, the activated restraint should return to its normal position.

If the restraints do not return to their normal position, or in the event of a severe collision, have the vehicle inspected by an Acura dealer.

For a head restraint system to work properly:

- Do not hang any items on the head restraints, or from the restraint legs.
- Do not place any object between an occupant and the seat-back.
- Install each restraint in its proper location.
- Only use genuine Acura replacement head restraints.

CONTINUED

APPENDIX B
DUMMY RESPONSE DATA

TABLE OF DATA PLOTS

		<u>Page No.</u>
	List of Data Plots Provided in the Test Report	
Figure No. 1.	Driver Head Acceleration (X) Primary vs. Time	B-1
Figure No. 2.	Driver Head Acceleration (Y) Primary vs. Time	B-1
Figure No. 3.	Driver Head Acceleration (Z) Primary vs. Time	B-1
Figure No. 4.	Driver Head Resultant Primary Acceleration vs. Time	B-1
Figure No. 5.	Driver Lower Spine T12 Acceleration (X) vs. Time	B-2
Figure No. 6.	Driver Lower Spine T12 Acceleration (Y) vs. Time	B-2
Figure No. 7.	Driver Lower Spine T12 Acceleration (Z) vs. Time	B-2
Figure No. 8.	Driver Lower Spine T12 Resultant Acceleration vs. Time	B-2
Figure No. 9.	Driver Iliac Wing Force on Impact Side (Y) vs. Time	B-3
Figure No. 10.	Driver Acetabulum Force on Impact Side (Y) vs. Time	B-3
Figure No. 11.	Driver Total Pelvis Force on Impact Side (Y) vs. Time	B-3

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 Acceleration (X) Redundant

Driver Head Acceleration (Y) Redundant

Driver Head Acceleration (Z) Redundant

Driver Upper Thorax Rib Deflection (Y)

Driver Middle Thorax Rib Deflection (Y)

Driver Lower Thorax Rib Deflection (Y)

Driver Upper Abdomen Rib Deflection (Y)

Driver Lower Abdomen Rib Deflection (Y)

Driver Shoulder Contact Switch – Not Installed

Driver Torso Contact Switch – Not Installed

Driver Pelvis Contact Switch – Not Installed

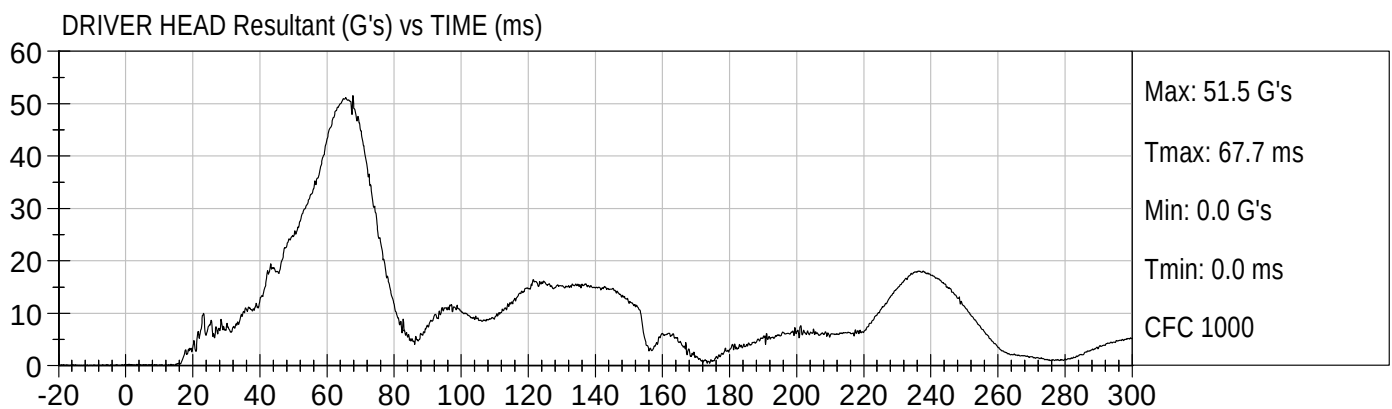
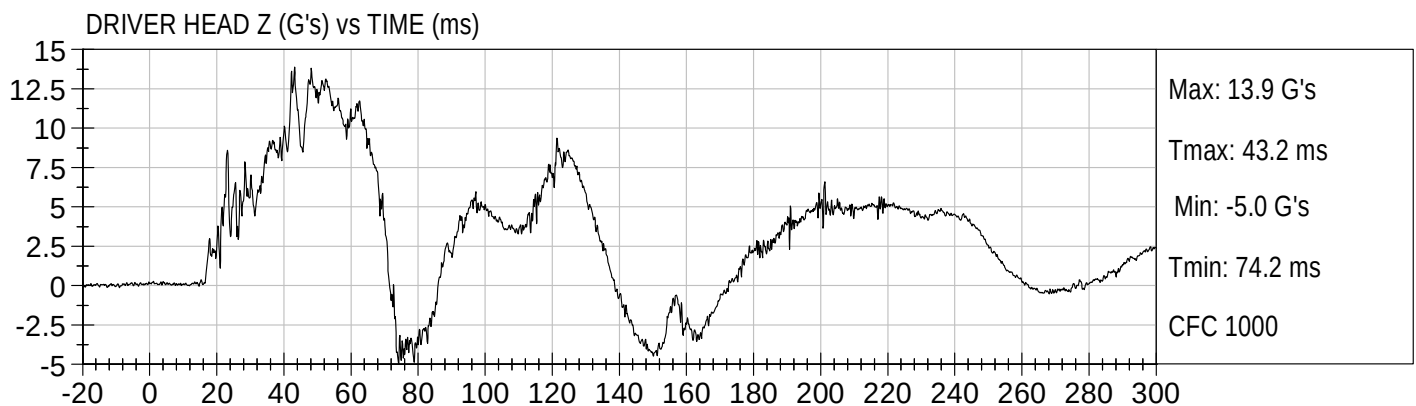
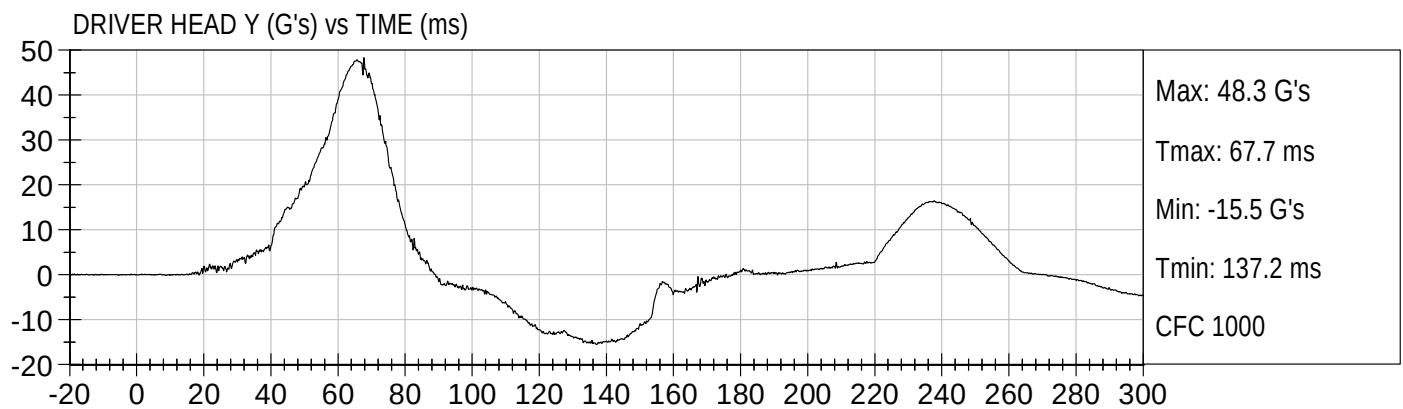
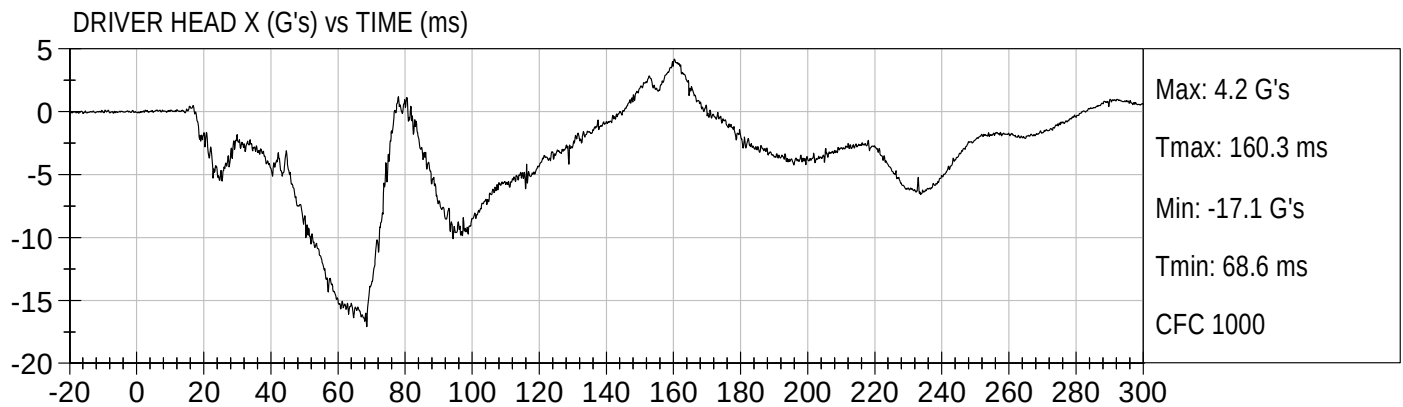
Vehicle CG Acceleration (X)

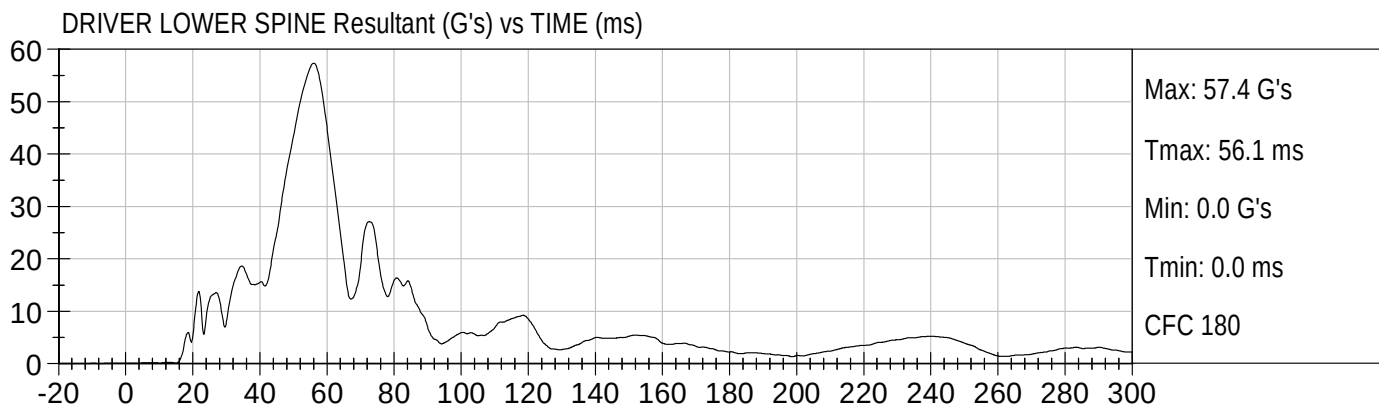
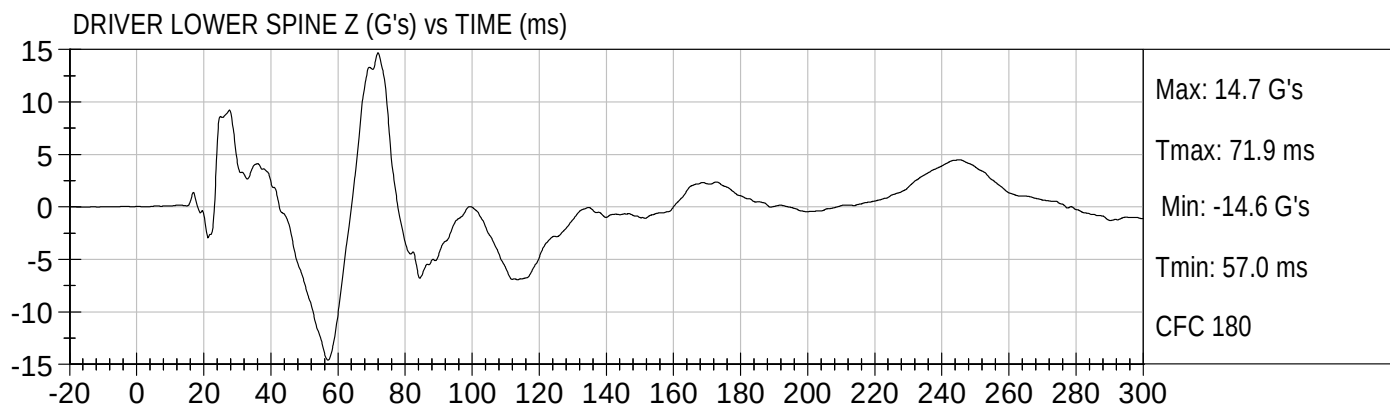
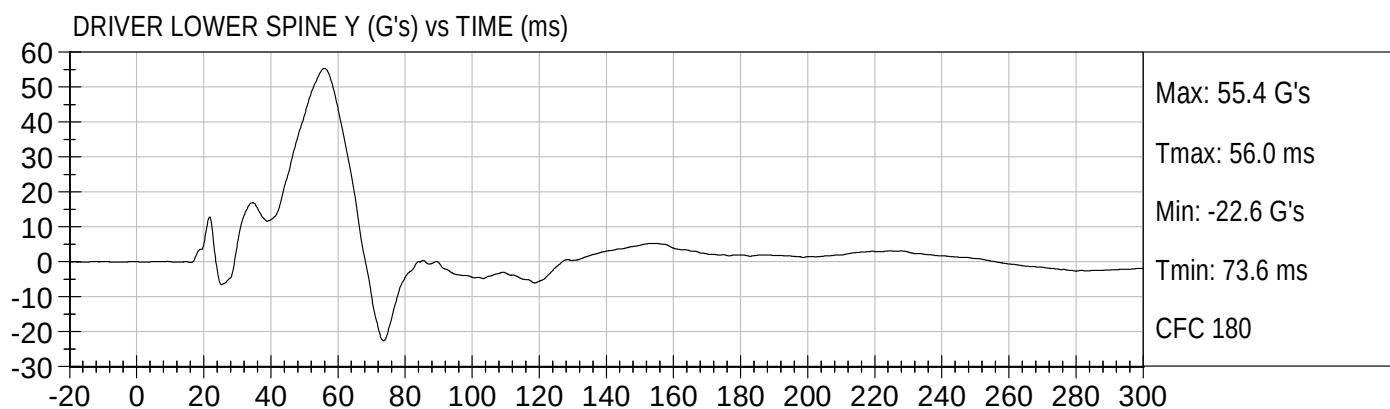
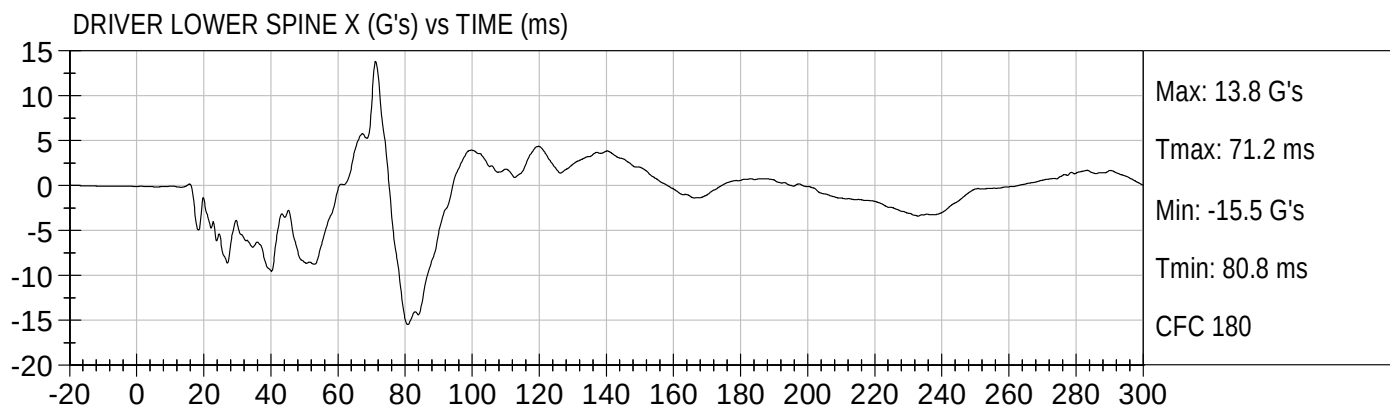
Vehicle CG Acceleration (Y)

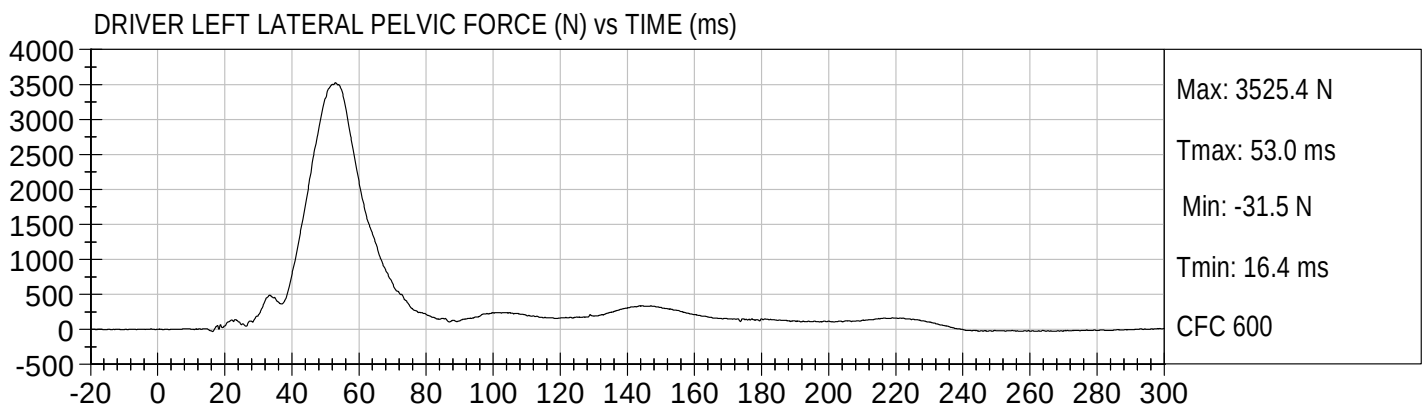
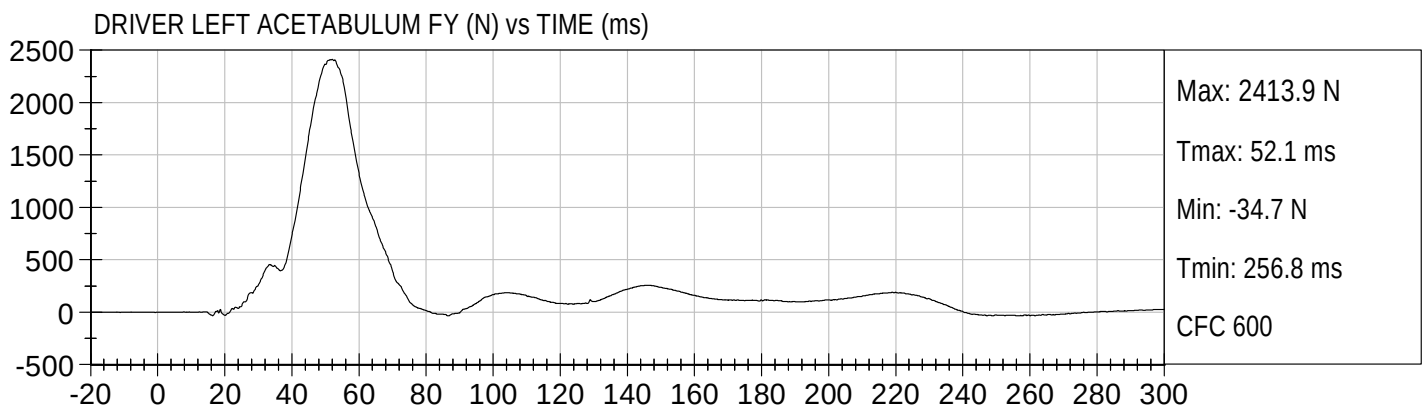
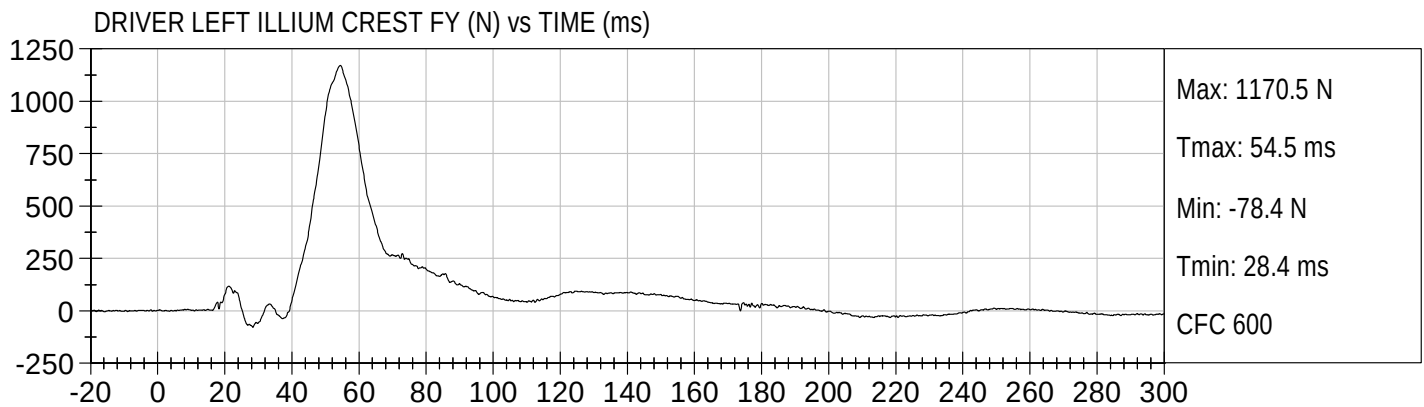
Vehicle CG Acceleration (Z)

Vehicle CG Angular Rate About X (Roll)

Vehicle CG Angular Rate About Y (Pitch)
Vehicle CG Angular Rate About Z (Yaw)
Left Floor Sill Acceleration (Y)
Left A-Pillar Sill Acceleration (Y)
Left Lower A-Pillar Acceleration (Y)
Left Mid A-Pillar Acceleration (Y)
Left B-Pillar Sill Acceleration (Y)
Left Lower B-Pillar Acceleration (Y)
Left Mid B-Pillar Acceleration (Y)
Driver Seat Track at Dummy H-Point Acceleration (Y)
Engine Top Acceleration (X)
Engine Top Acceleration (Y)
Firewall Center Acceleration (Y)
Right Roof at Vertical Impact Reference Line Acceleration (Y)
Right Sill at Vertical Impact Reference Line Acceleration (Y)
Rear Floorpan Behind Rear Axle at Centerline Acceleration (X)
Rear Floorpan Behind Rear Axle at Centerline Acceleration (Y)
Driver Side Airbag Timing – Not Installed
Driver Side Curtain Airbag Timing – Not Installed
Load Cell Pole Barrier #1 Force (Y) – Not used
Load Cell Pole Barrier #2 Force (Y) – Not used
Load Cell Pole Barrier #3 Force (Y) – Not used
Load Cell Pole Barrier #4 Force (Y) – Not used
Load Cell Pole Barrier #5 Force (Y) – Not used
Load Cell Pole Barrier #6 Force (Y) – Not used
Load Cell Pole Barrier #7 Force (Y) – Not used
Load Cell Pole Barrier #8 Force (Y) – Not used







APPENDIX C

DUMMY CALIBRATION AND PERFORMANCE VERIFICATION DATA

MGA RESEARCH CORPORATION
HEAD DROP TEST
SID-Its BUILD LEVEL D DUMMY

ATD Serial No: 296

Test ID: D111761

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	49	Pass
Peak Resultant Acceleration	G's	115 to 137	123	Pass
Peak Lateral Acceleration	G's	+/- 15	2.4	Pass
Unimodal	N/A	<15%	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

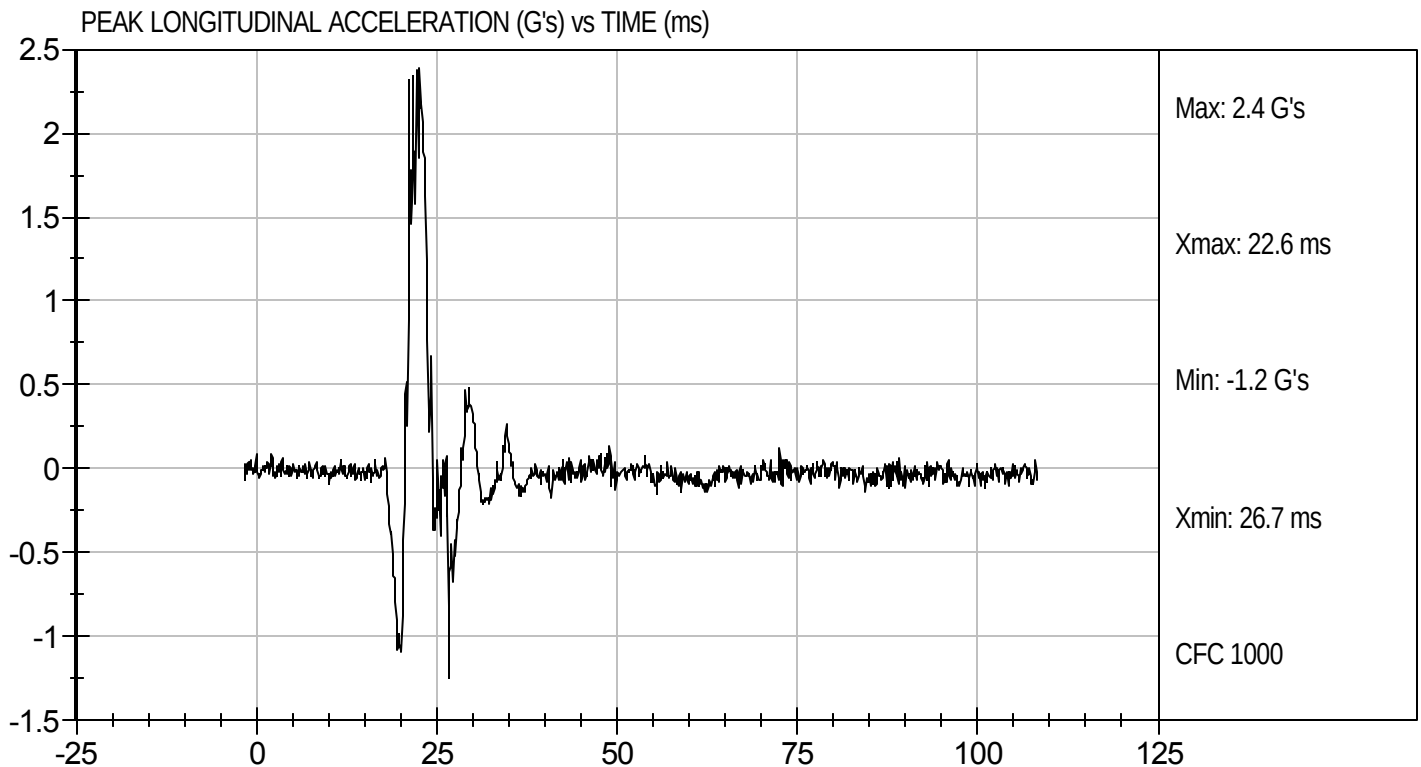
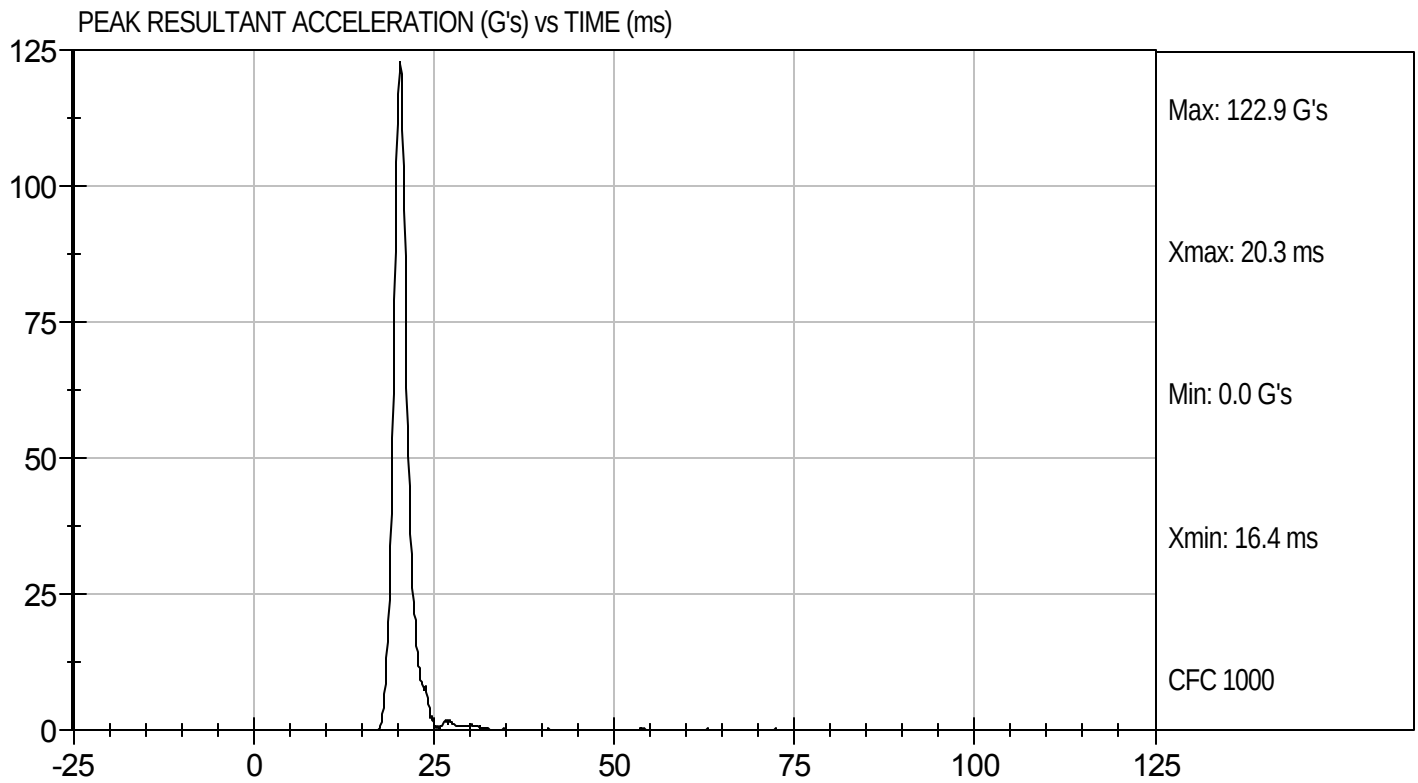
5/13/11
Test Date


Approved By



Test Desc: Head Drop
Component ID: D111761

Test Date: 5/13/11
Velocity: 0 ft/s, 0 m/s

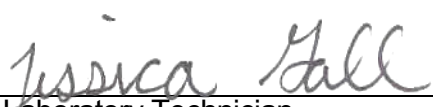


MGA RESEARCH CORPORATION
LATERAL NECK PENDULUM TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

Test I.D: D111762

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	20.9	Pass
Humidity		%	10 to 70	48	Pass
Impact Velocity		m/s	5.51 to 5.63	5.58	Pass
Delta Velocity	10 ms	m/s	2.20 to 2.80	2.68	Pass
	15 ms	m/s	3.30 to 4.10	3.72	Pass
	20 ms	m/s	4.40 to 5.40	4.90	Pass
	25 ms	m/s	5.40 to 6.10	5.58	Pass
	25-100 ms	m/s	5.50 to 6.20	5.61	Pass
Maximum D-Plane Rotation		deg	71 to 81	72	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	56	Pass
Maximum Occipital Condyle Moment during Rotation Interval Nm			-44 to -36	-42	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	118	Pass
Overall Test Results				Pass	


 Laboratory Technician

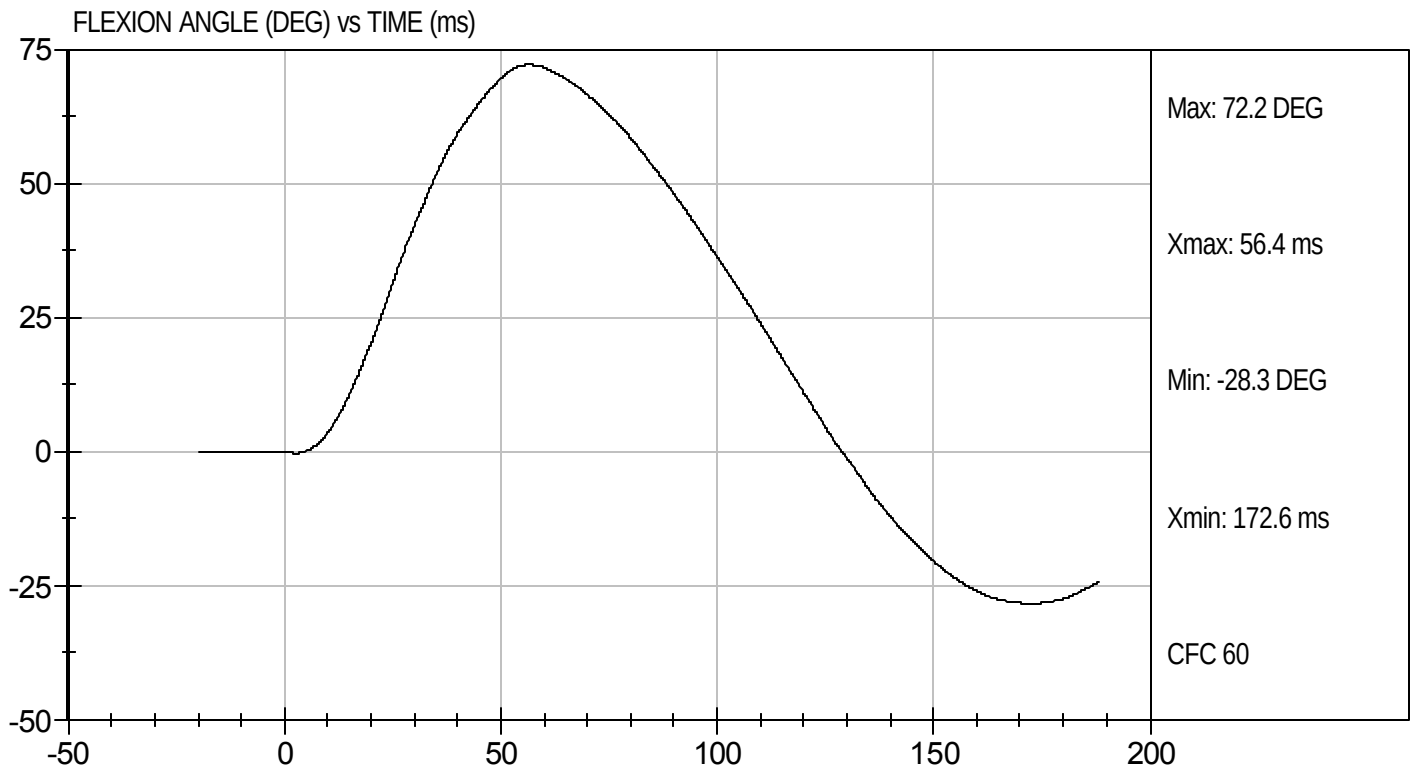
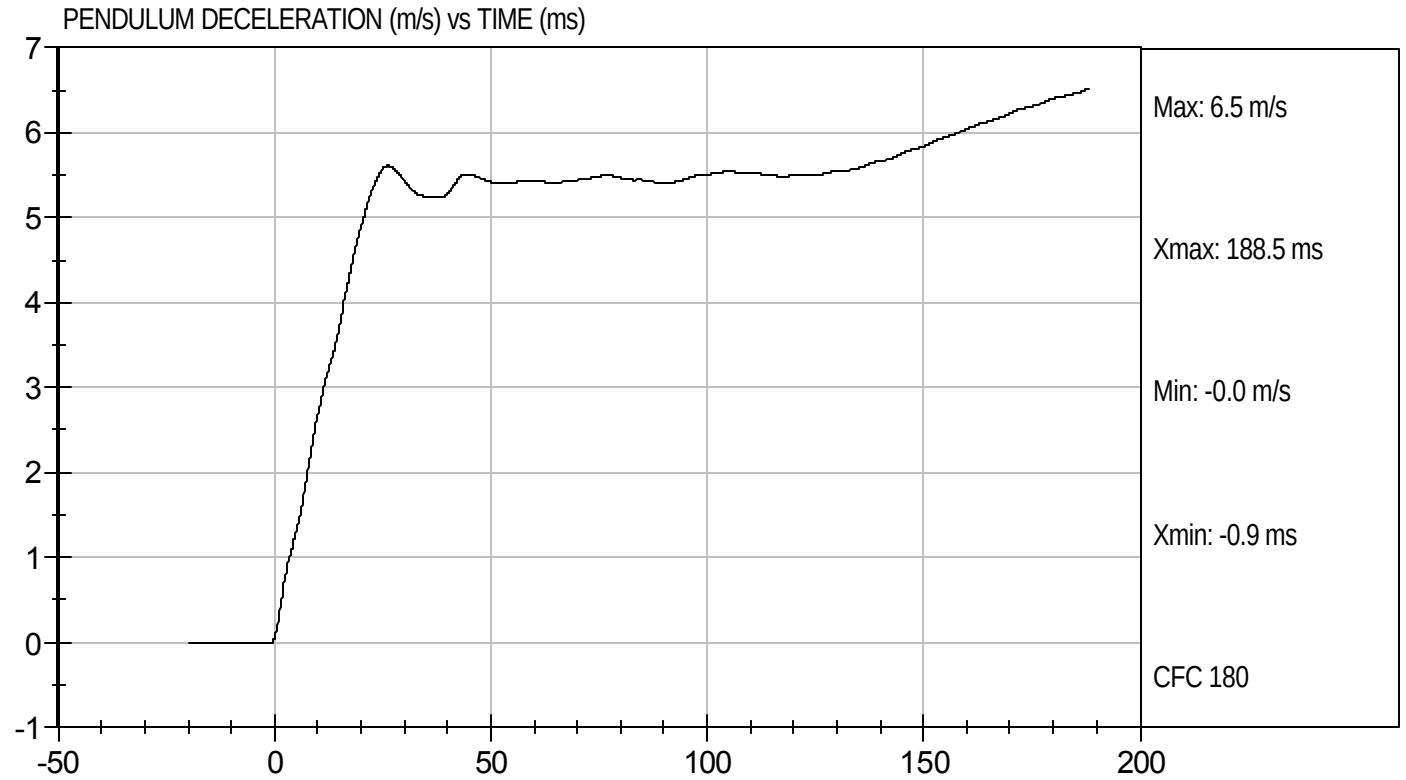
5/13/11
 Test Date


 Approved By



Test Desc: Neck Bending
Component ID: D111762

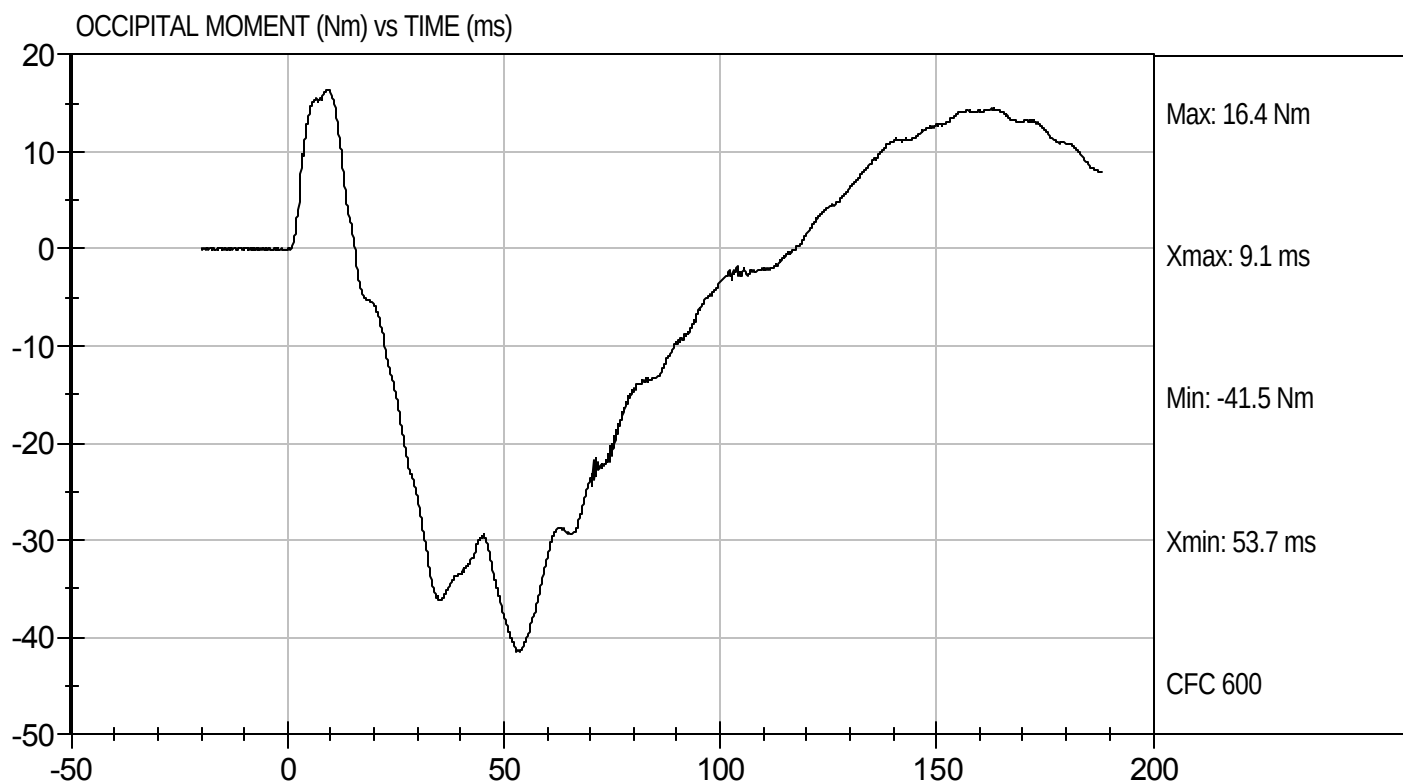
Test Date: 5/13/11
Velocity: 18.32 ft/s, 5.58 m/s





Test Desc: Neck Bending
Component ID: D111762

Test Date: 5/13/11
Velocity: 18.32 ft/s, 5.58 m/s

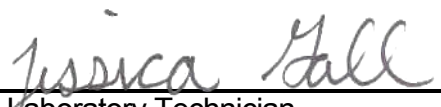


MGA RESEARCH CORPORATION
SHOULDER IMPACT TEST
SID-11s BUILD LEVEL D DUMMY

ATD Serial No: 296

Test ID: D111763

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	48	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Maximum Probe Acceleration	G's	13 to 18	15	Pass
Shoulder Displacement	mm	28 to 37	31	Pass
Upper Spine (T1) Y Acceleration	G's	17 to 22	18	Pass
Overall Test Results				Pass


Laboratory Technician

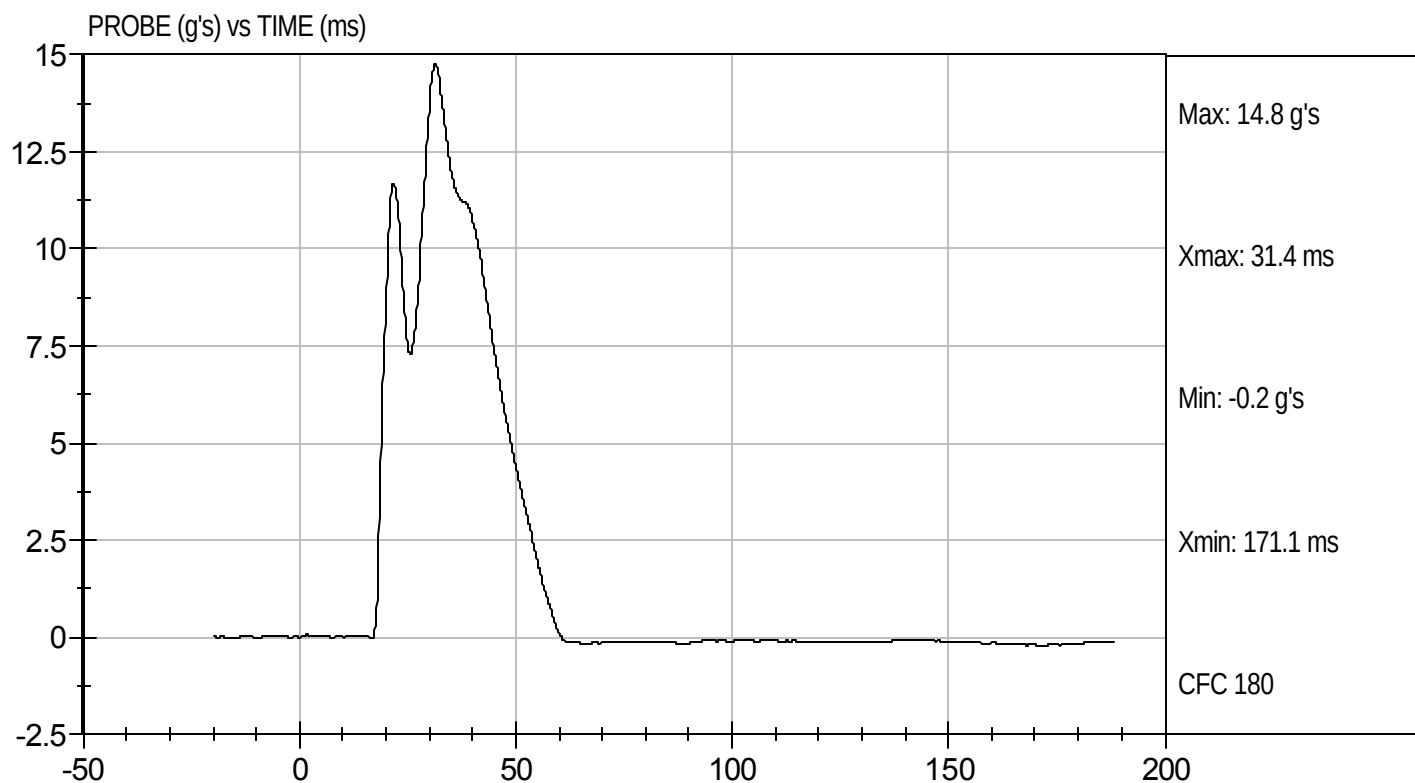
5/12/11
Test Date


Approved By



Test Desc: Shoulder Impact
Component ID: D111763

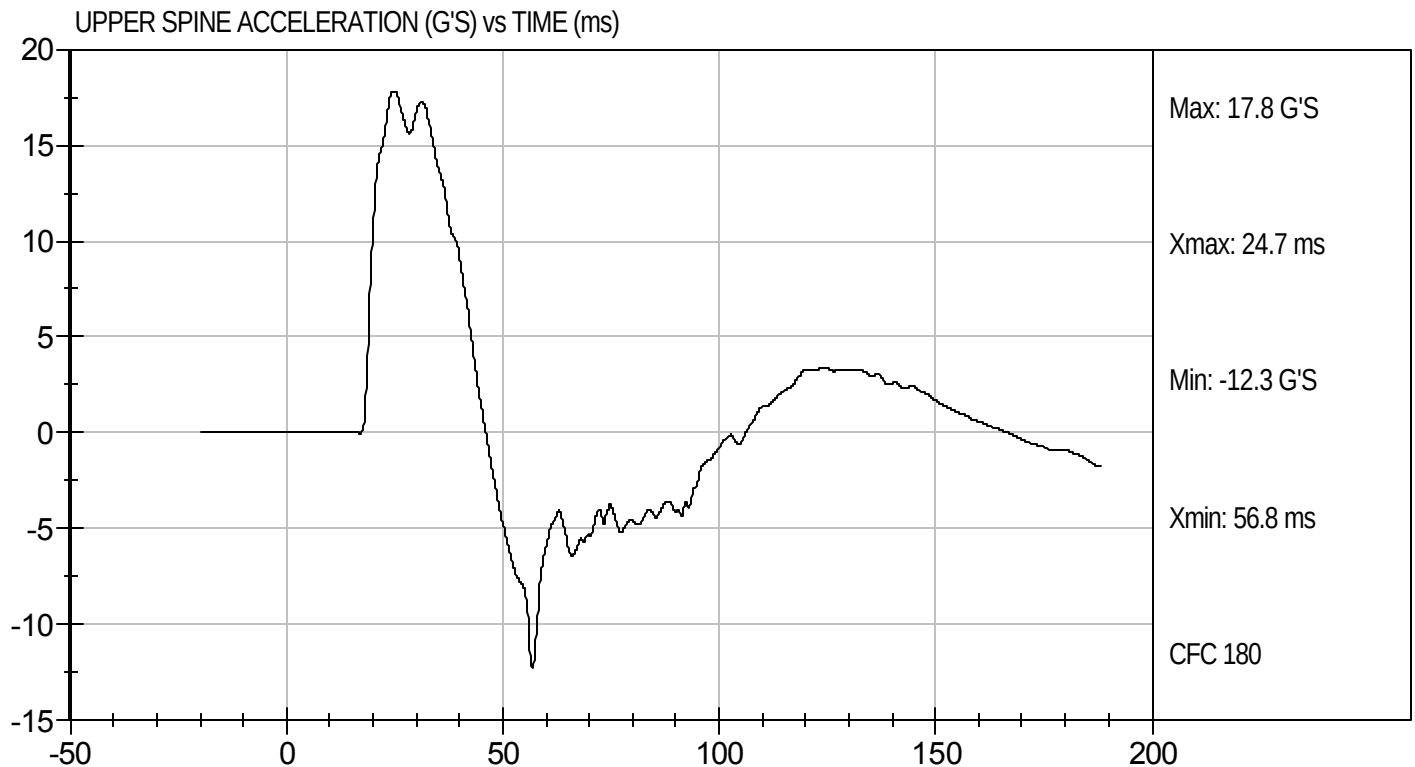
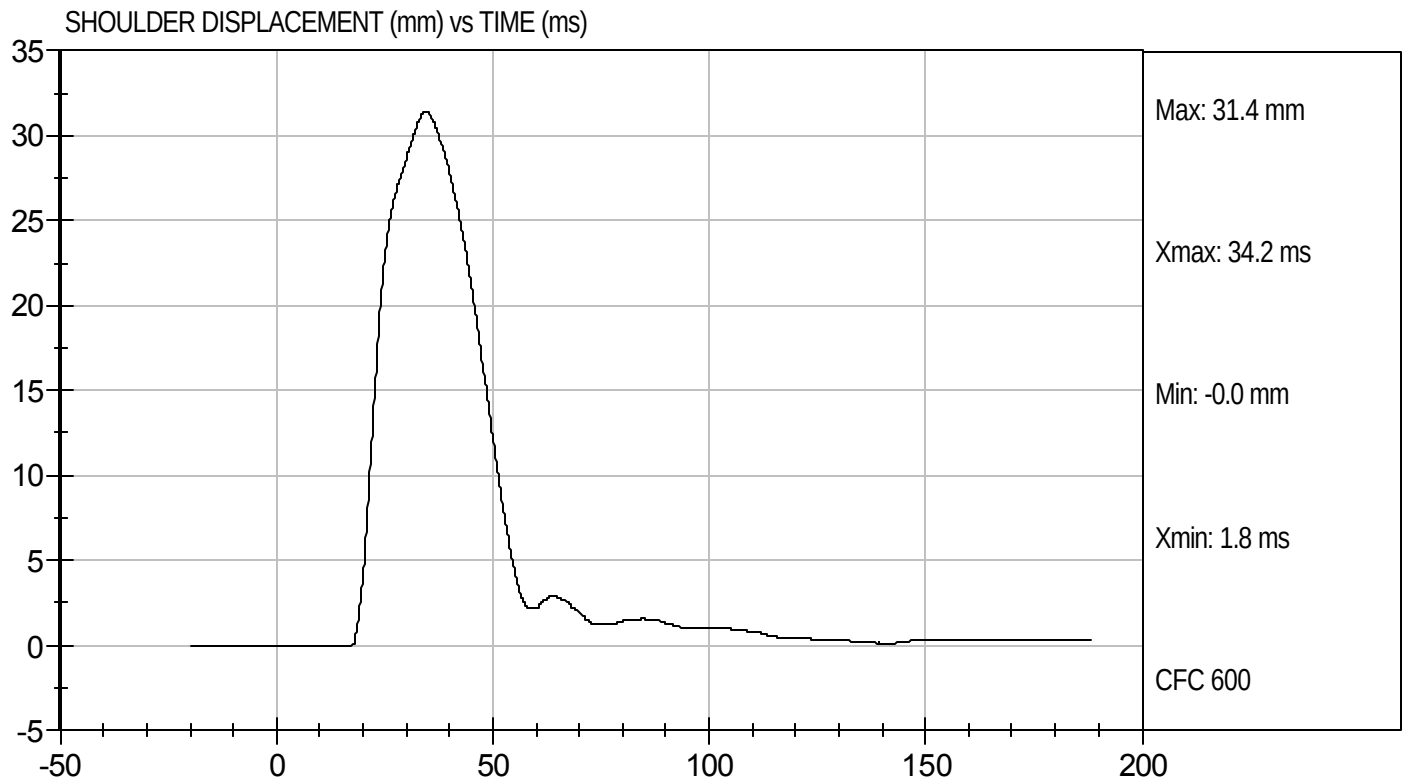
Test Date: 5/12/11
Velocity: 14.36 ft/s, 4.38 m/s





Test Desc: Shoulder Impact
Component ID: D111763

Test Date: 5/12/11
Velocity: 14.36 ft/s, 4.38 m/s



MGA RESEARCH CORPORATION
THORAX (WITH ARM) IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

Test I.D: D111764

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	20.8	Pass
Humidity	%	10 to 70	48	Pass
Impact Velocity	m/s	6.60 to 6.80	6.77	Pass
Peak Impactor Acceleration	G's	30 to 36	31	Pass
Shoulder Displacement	mm	31 to 40	38	Pass
Upper Rib Displacement	mm	25 to 32	31	Pass
Middle Rib Displacement	mm	30 to 36	31	Pass
Lower Rib Displacement	mm	32 to 38	32	Pass
Upper Spine (T1) Y Acceleration	G's	34 to 43	36	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	34	Pass
Overall Test Results				Pass


Laboratory Technician

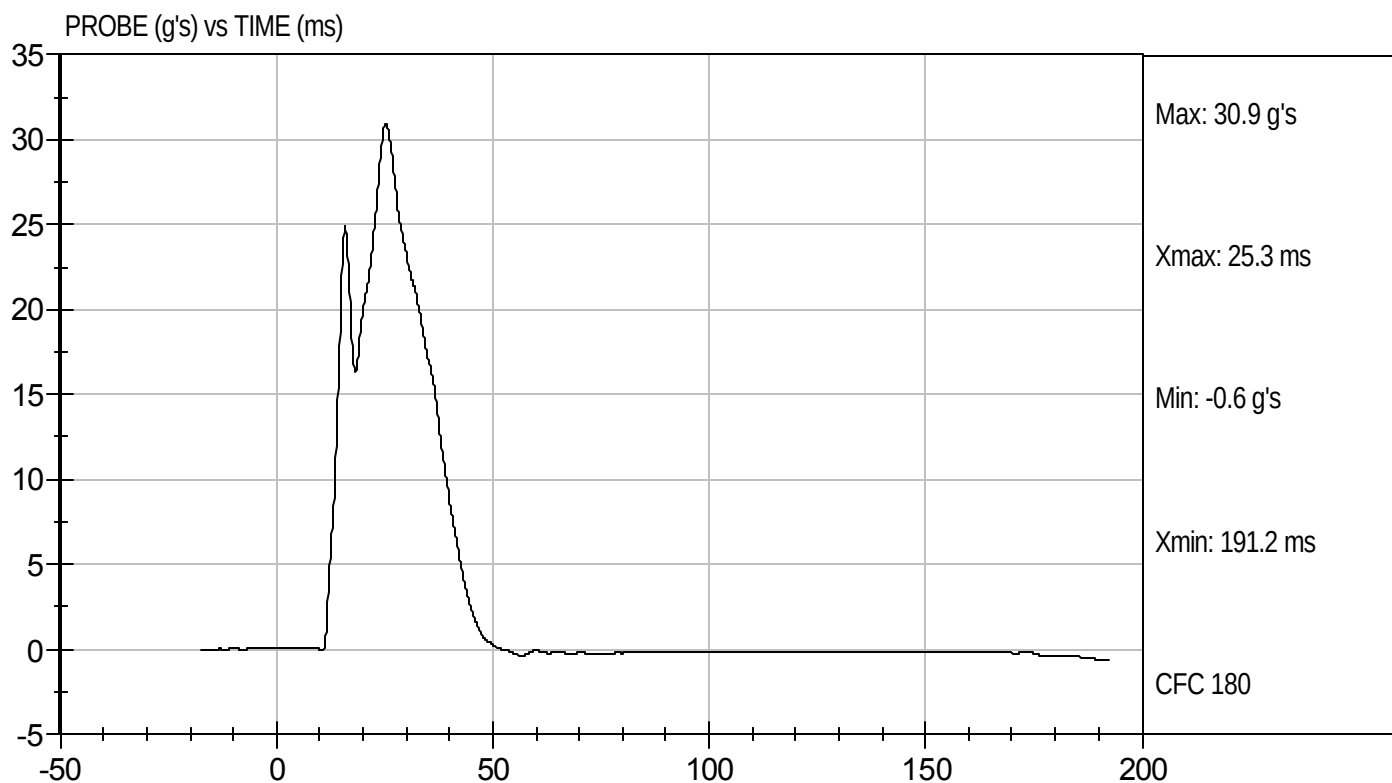
5/12/11
Test Date


Approved By



Test Desc: Thorax With Arm
Component ID: D111764

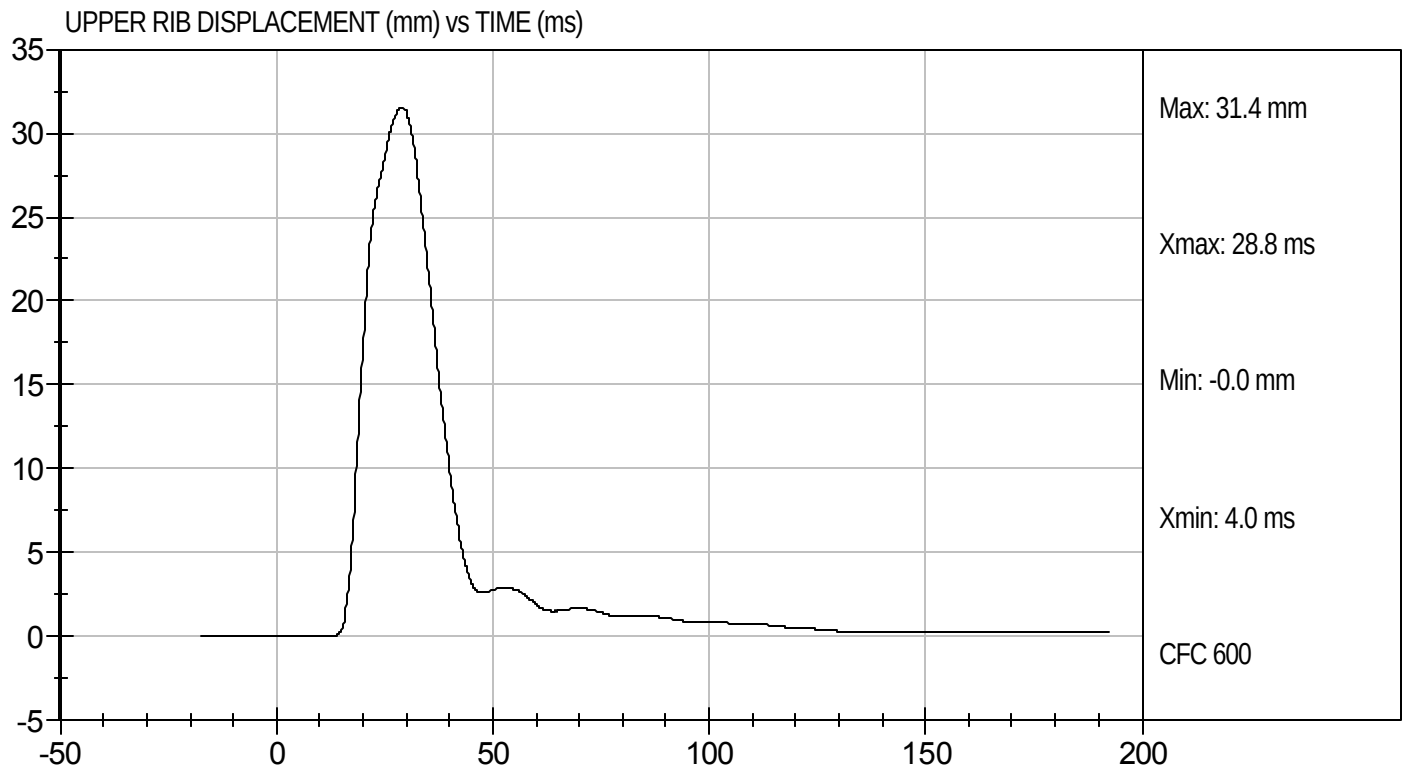
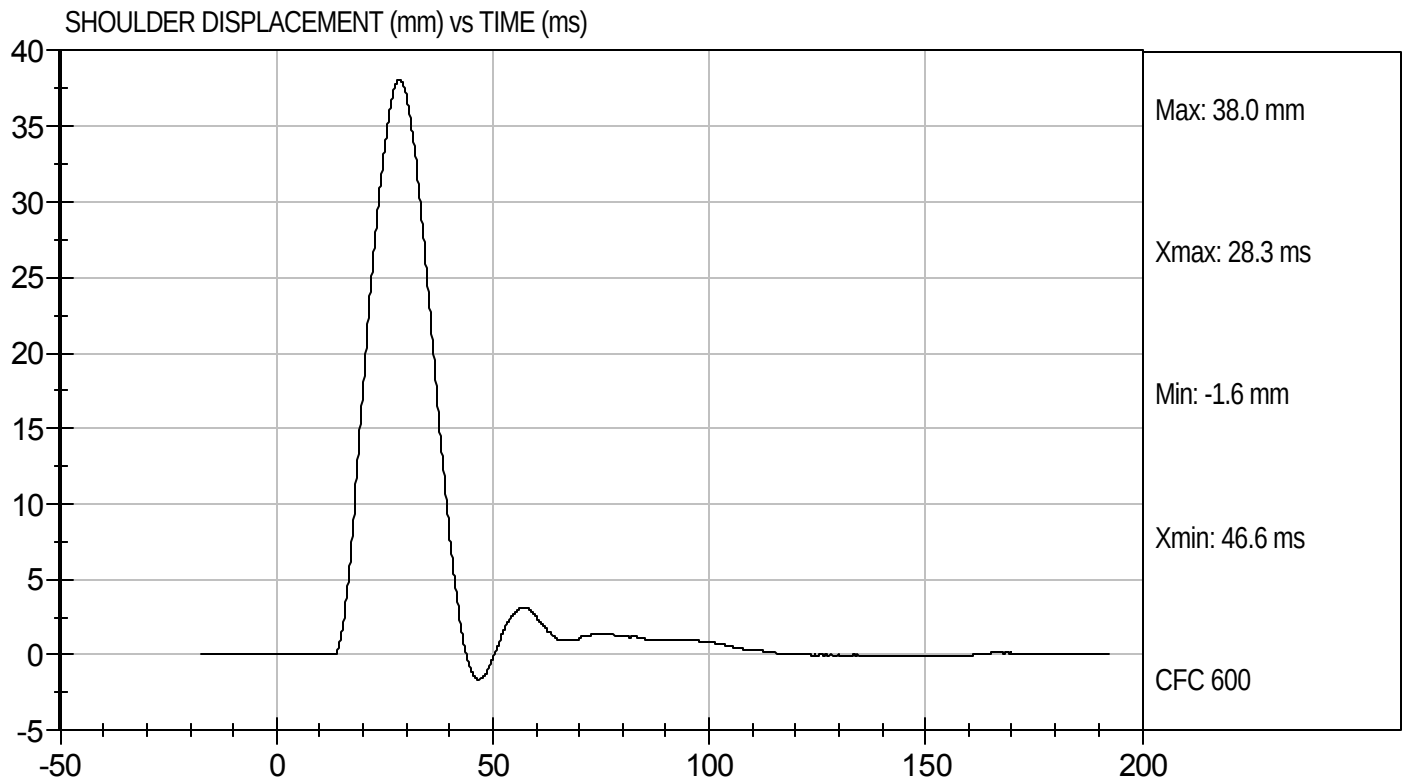
Test Date: 5/12/11
Velocity: 22.2 ft/s, 6.77 m/s





Test Desc: Thorax With Arm
Component ID: D111764

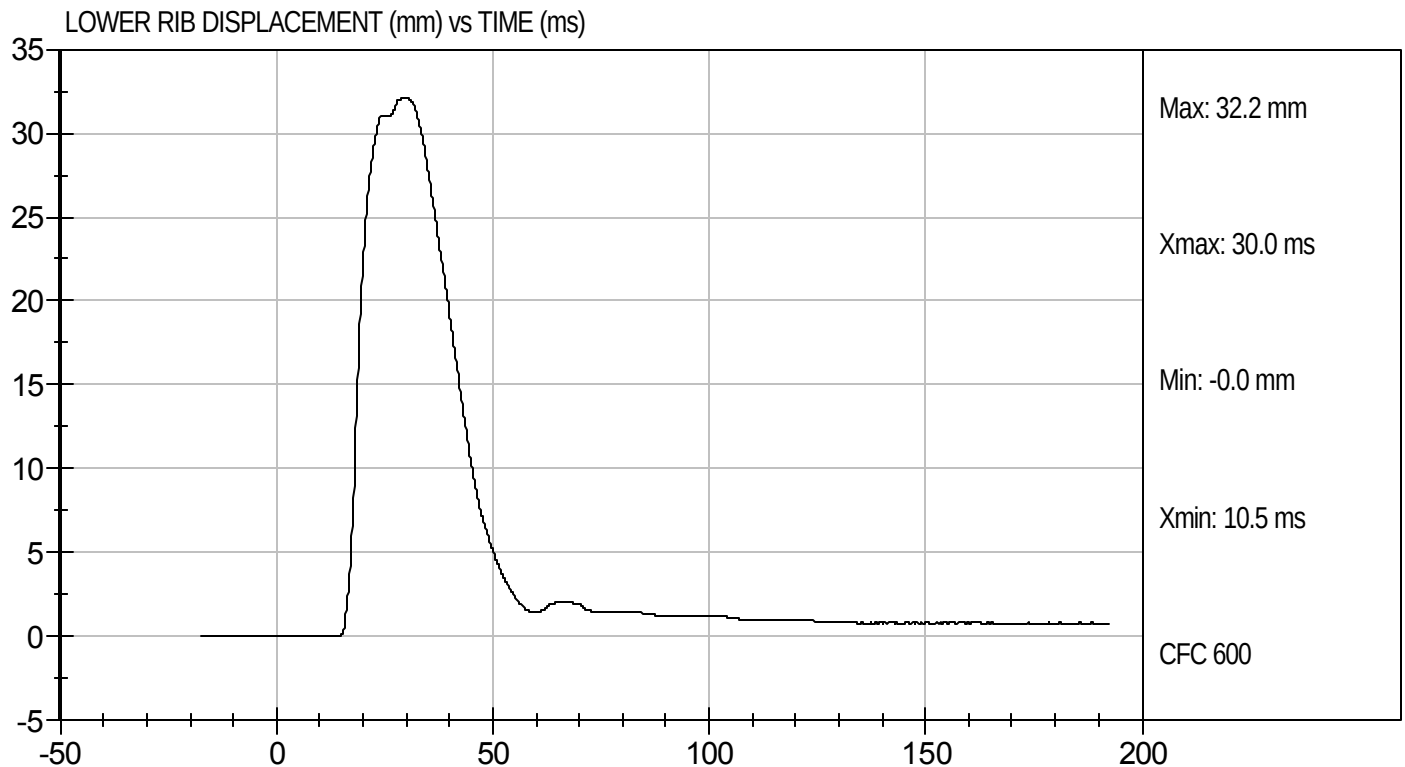
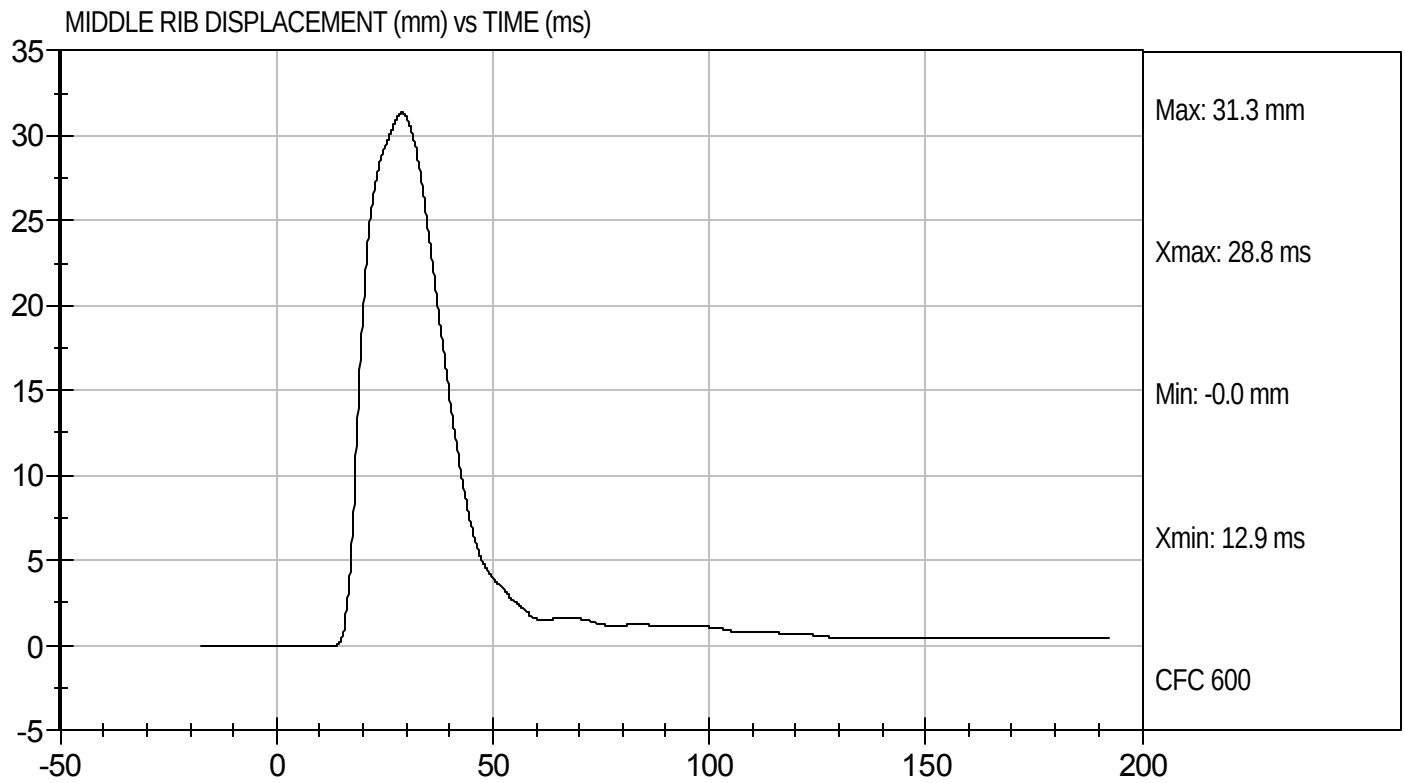
Test Date: 5/12/11
Velocity: 22.2 ft/s, 6.77 m/s





Test Desc: Thorax With Arm
Component ID: D111764

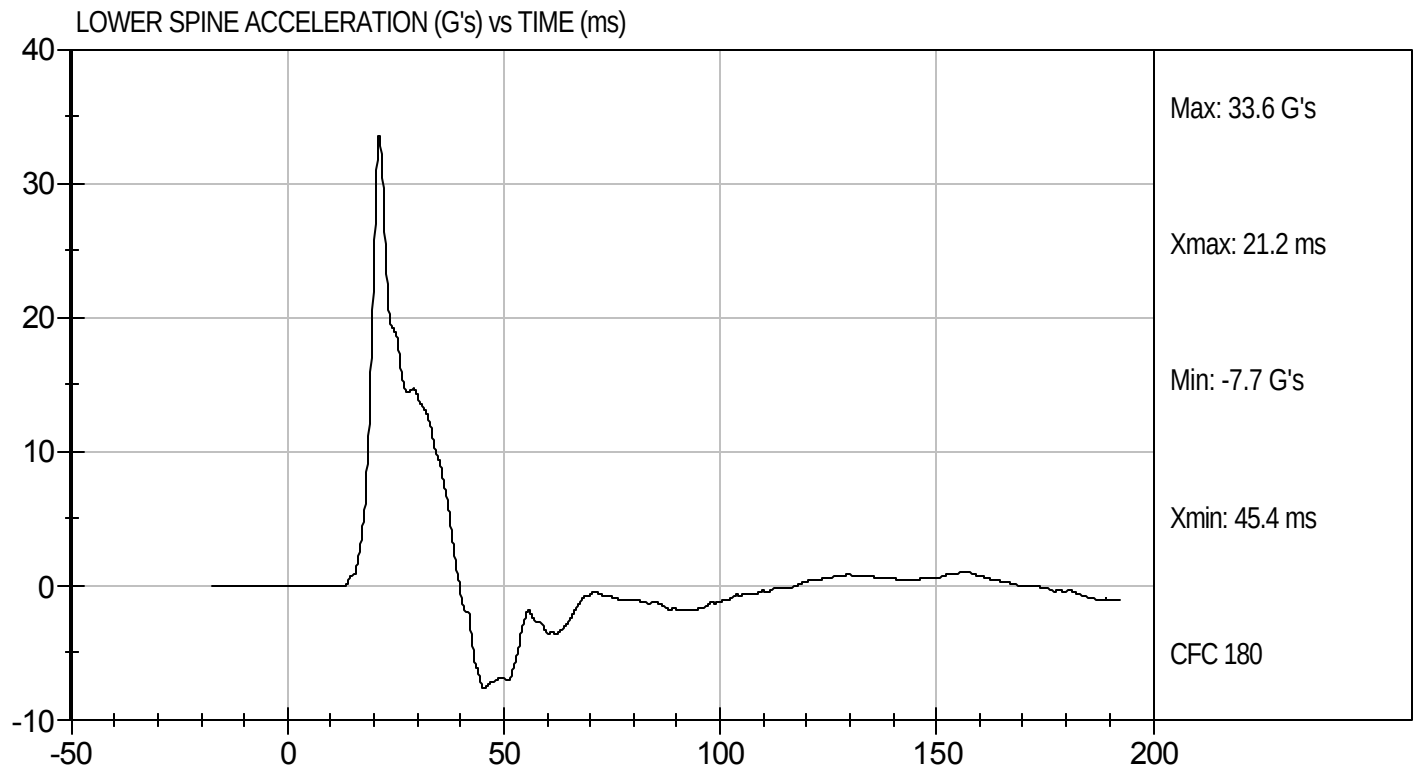
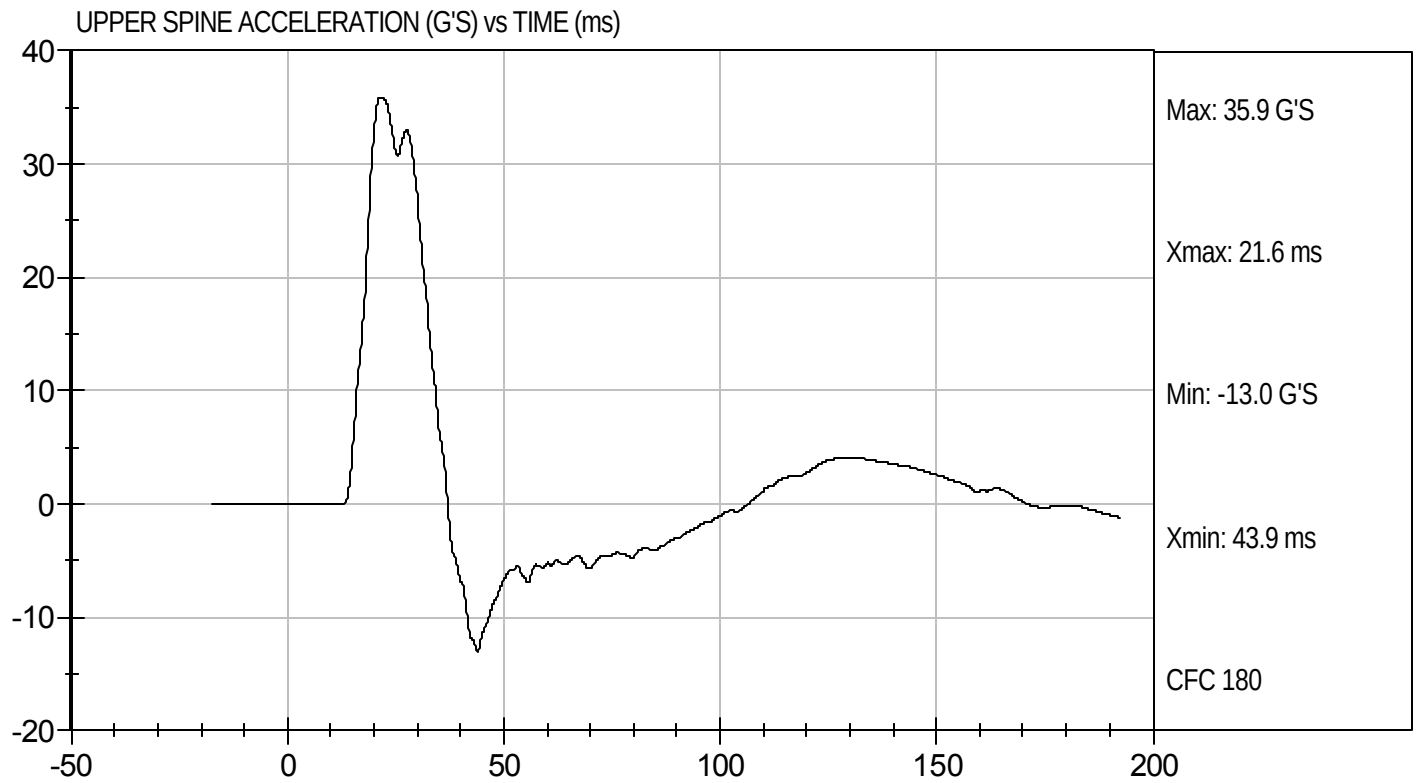
Test Date: 5/12/11
Velocity: 22.2 ft/s, 6.77 m/s





Test Desc: Thorax With Arm
Component ID: D111764

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



MGA RESEARCH CORPORATION
THORAX (WITHOUT ARM) IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

Test I.D: D111765

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	20.8	Pass
Humidity	%	10 to 70	48	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	Pass
Peak Impactor Force	G's	14 to 18	15	Pass
Upper Rib Displacement	mm	32 to 40	40	Pass
Middle Rib Displacement	mm	39 to 45	42	Pass
Lower Rib Displacement	mm	35 to 43	40	Pass
Upper Spine (T1) Y Acceleration	G's	13 to 17	14	Pass
Lower Spine (T12) Y Acceleration	G's	7 to 11	9	Pass
Overall Test Results			Pass	


Laboratory Technician

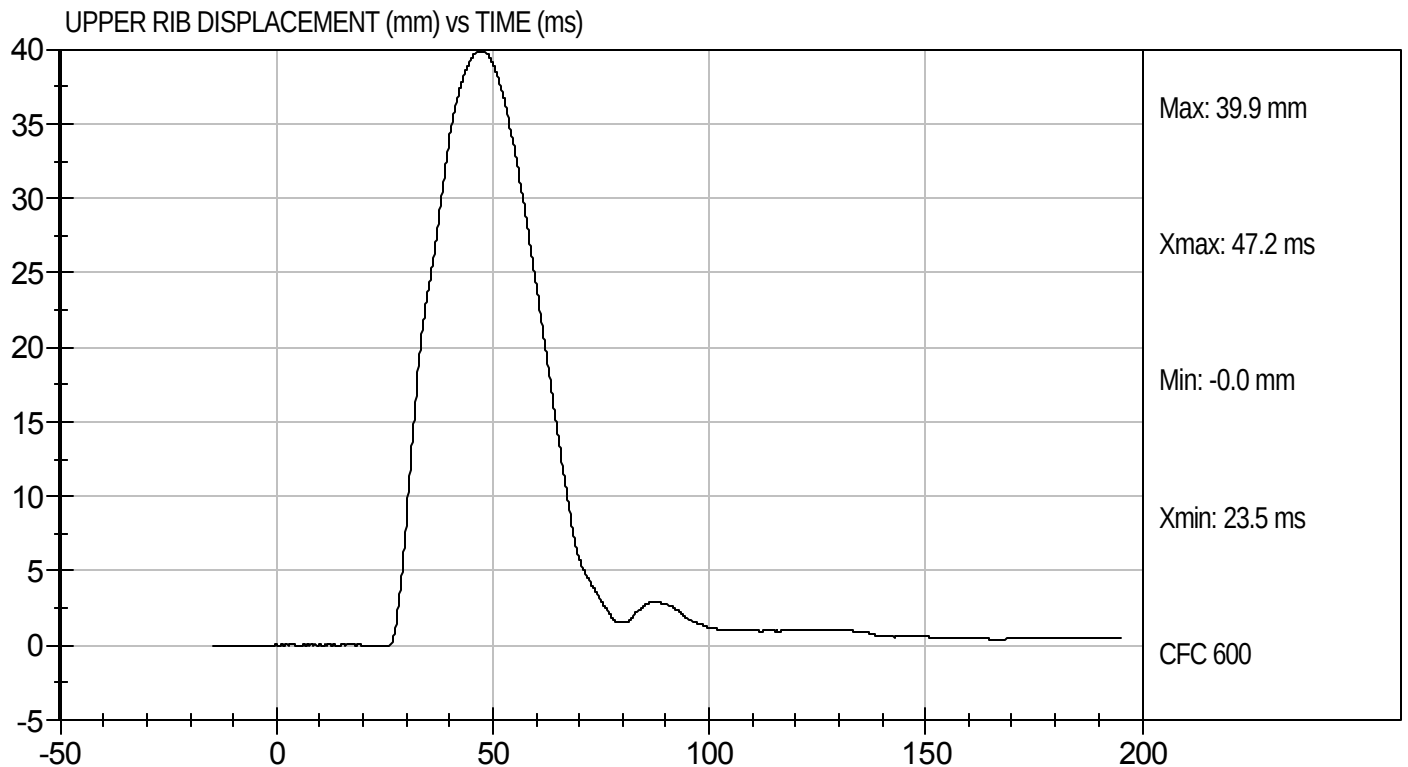
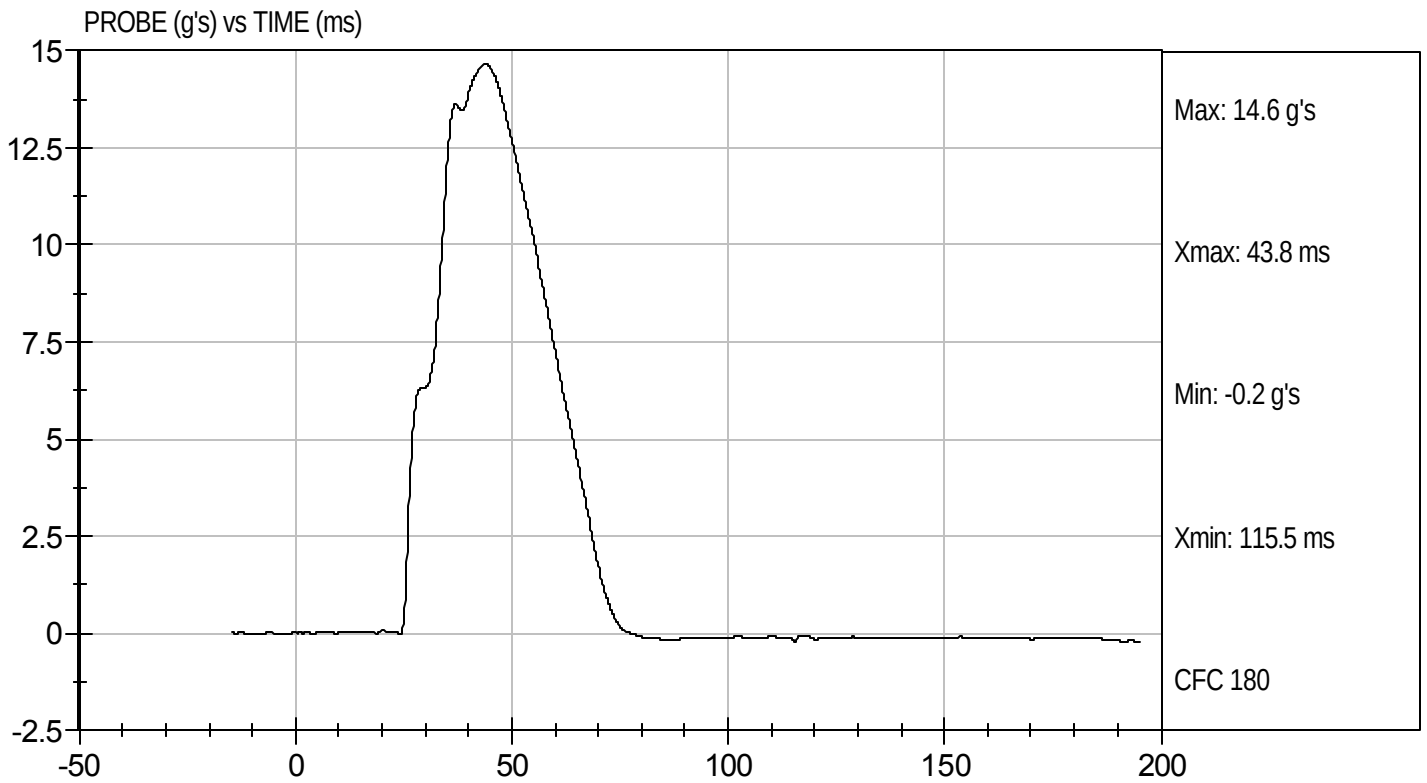
5/12/11
Test Date


Approved By



Test Desc: Thorax Without Arm
Component ID: D111765

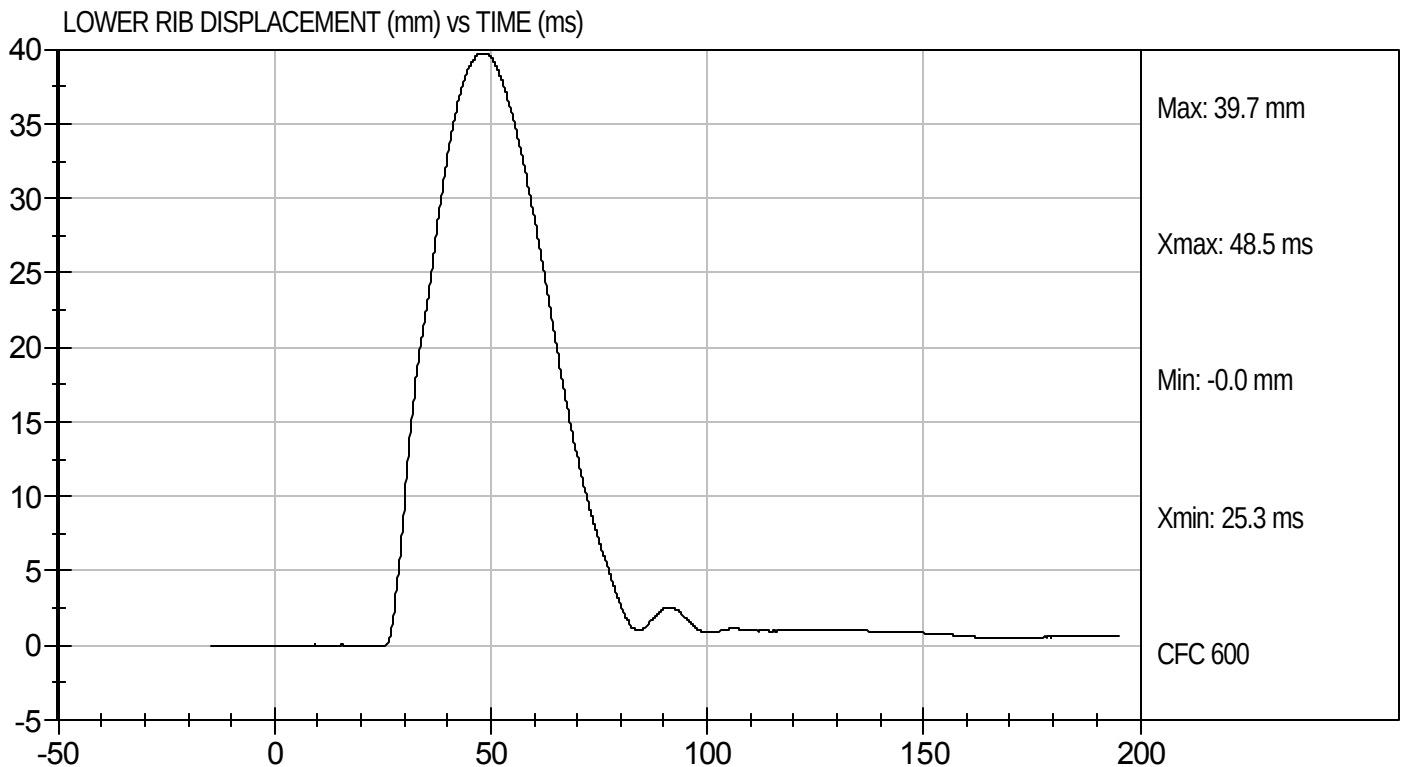
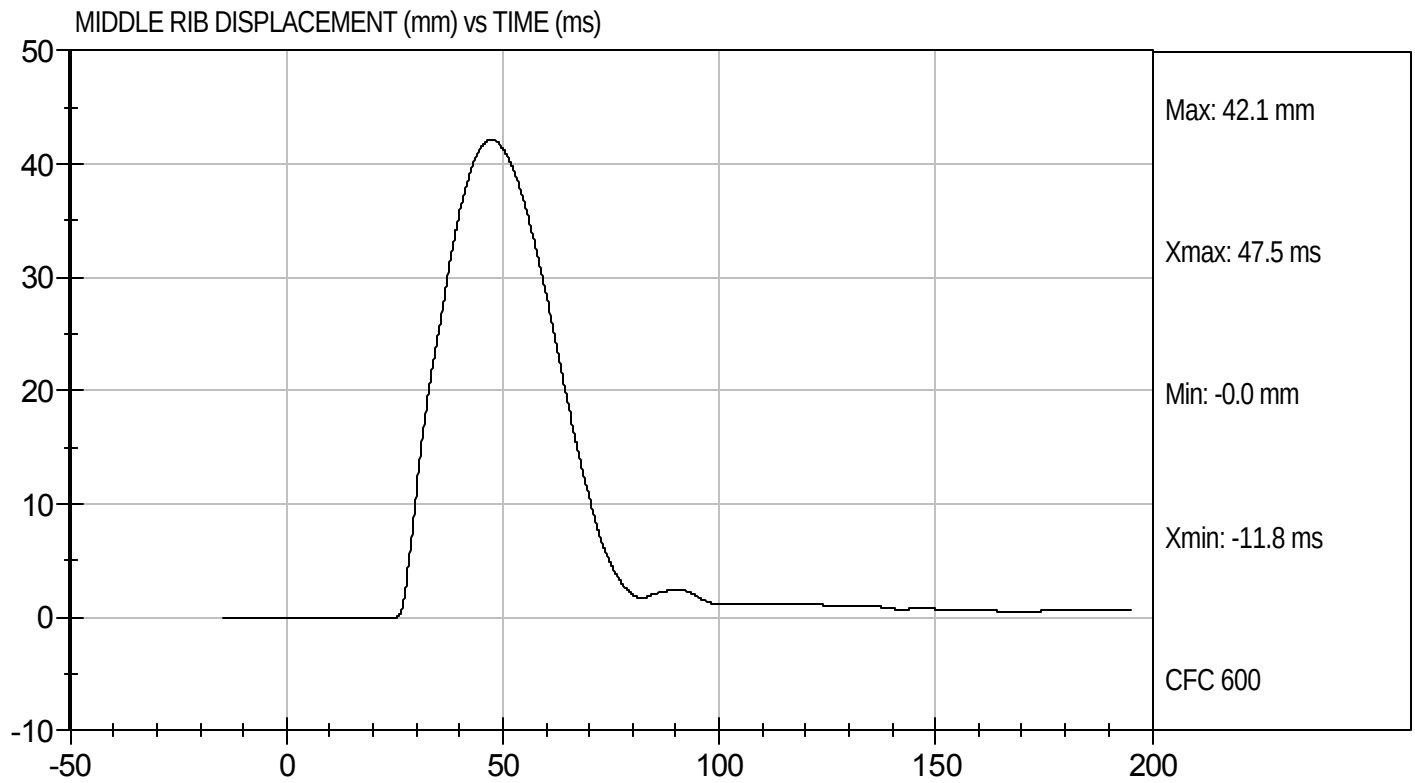
Test Date: 5/12/11
Velocity: 14.24 ft/s, 4.34 m/s





Test Desc: Thorax Without Arm
Component ID: D111765

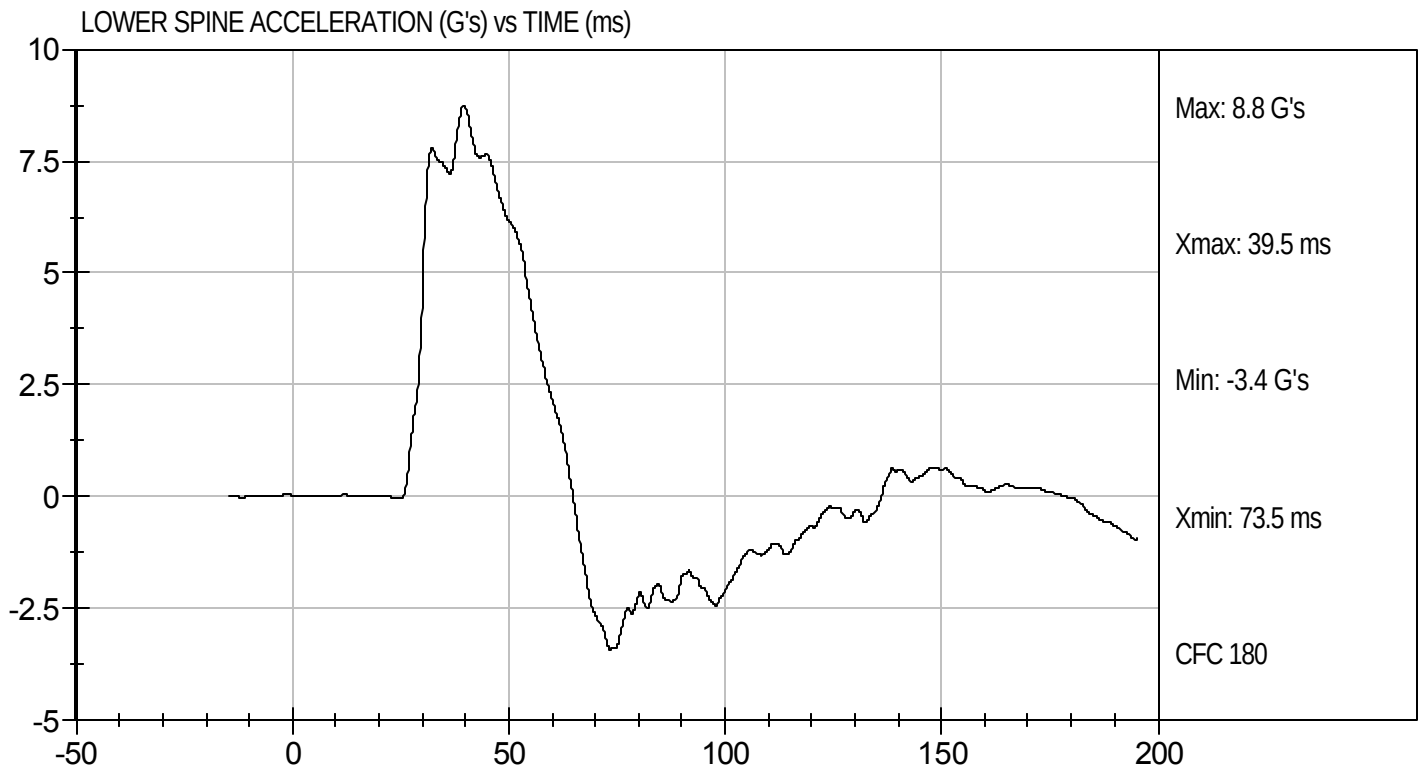
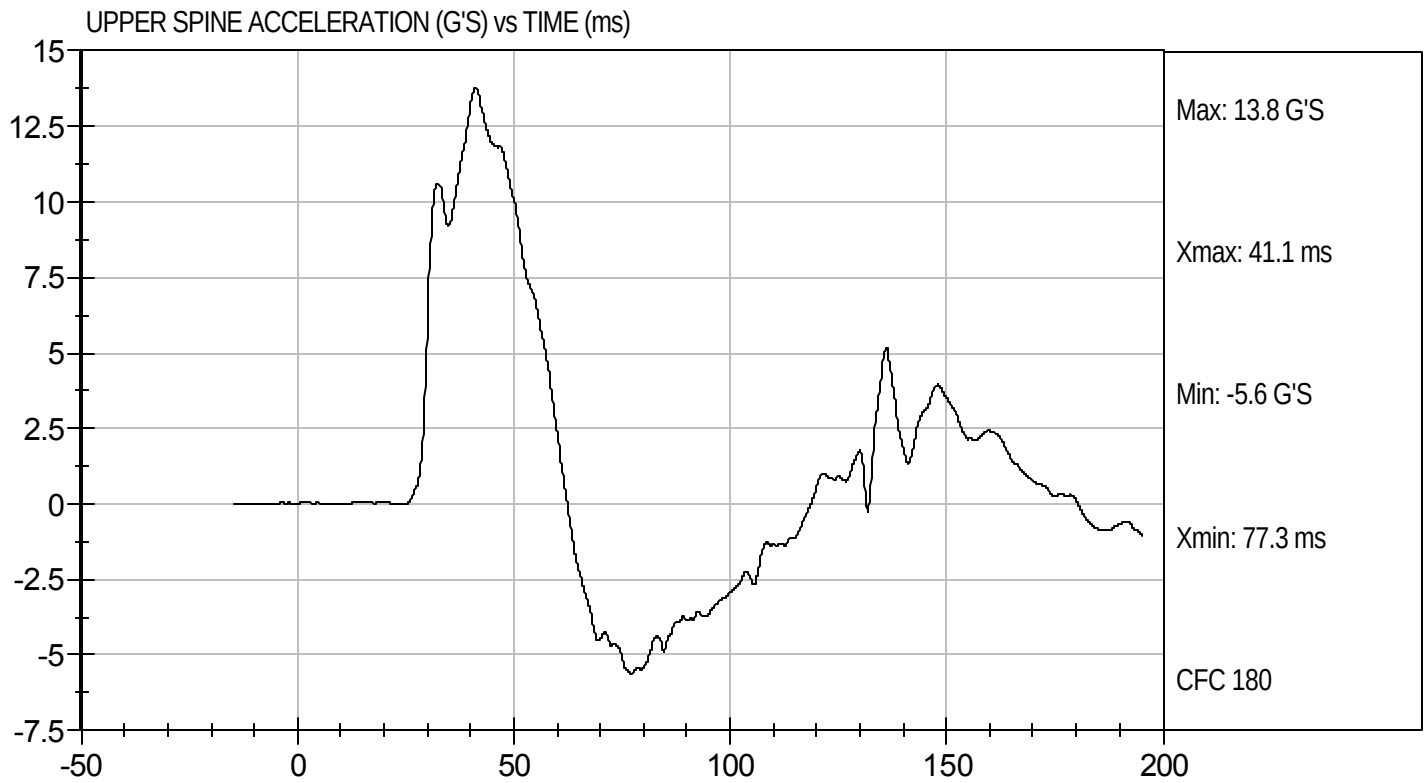
Test Date: 5/12/11
Velocity: 14.24 ft/s, 4.34 m/s





Test Desc: Thorax Without Arm
Component ID: D111765

Test Date: 5/12/11
Velocity: 14.24 ft/s, 4.34 m/s



MGA RESEARCH CORPORATION
ABDOMINAL IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

Test I.D: D111766

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	20.8	Pass
Humidity	%	10 to 70	48	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Peak Impactor Acceleration	G's	12 to 16	13	Pass
Upper Rib Displacement	mm	36 to 47	39	Pass
Lower Rib Displacement	mm	33 to 44	40	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	11	Pass
			Overall Test Results	Pass


Laboratory Technician

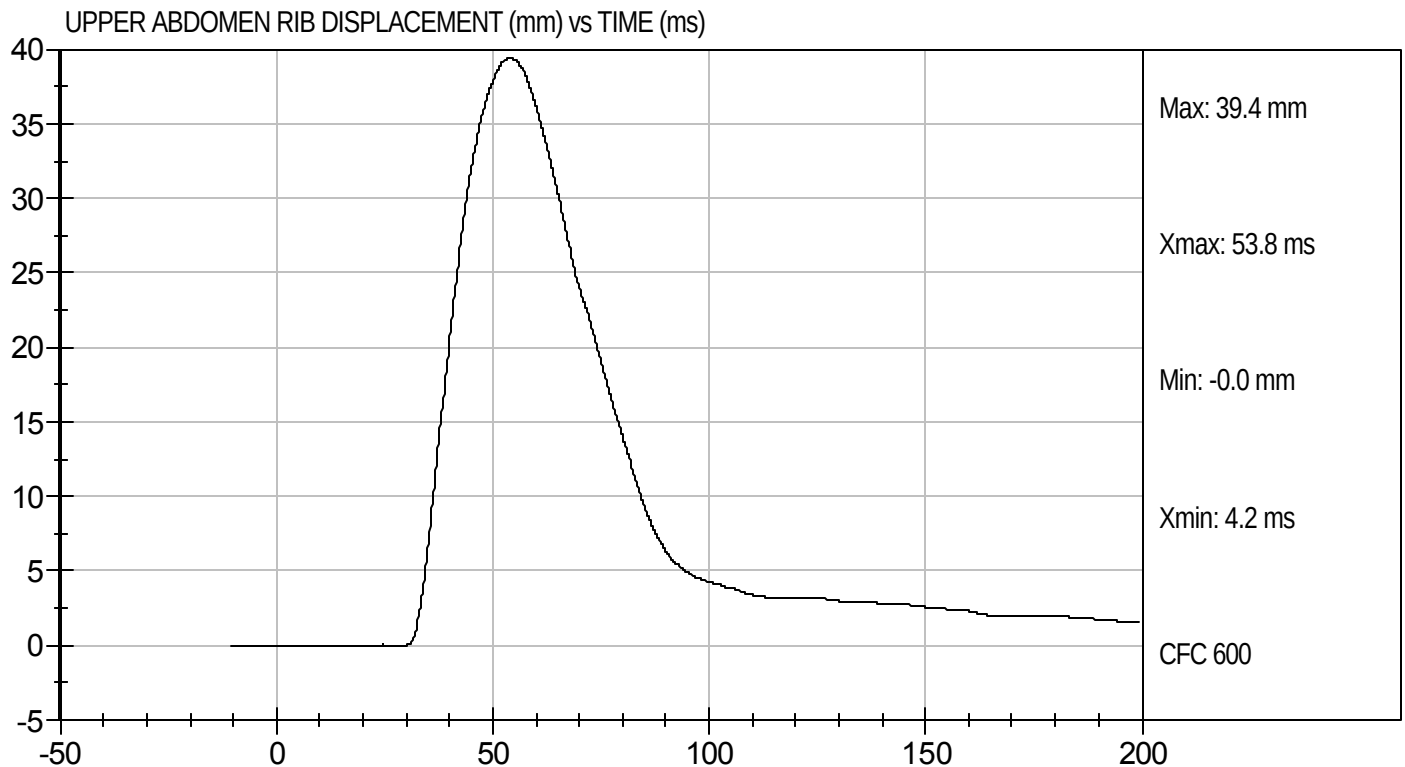
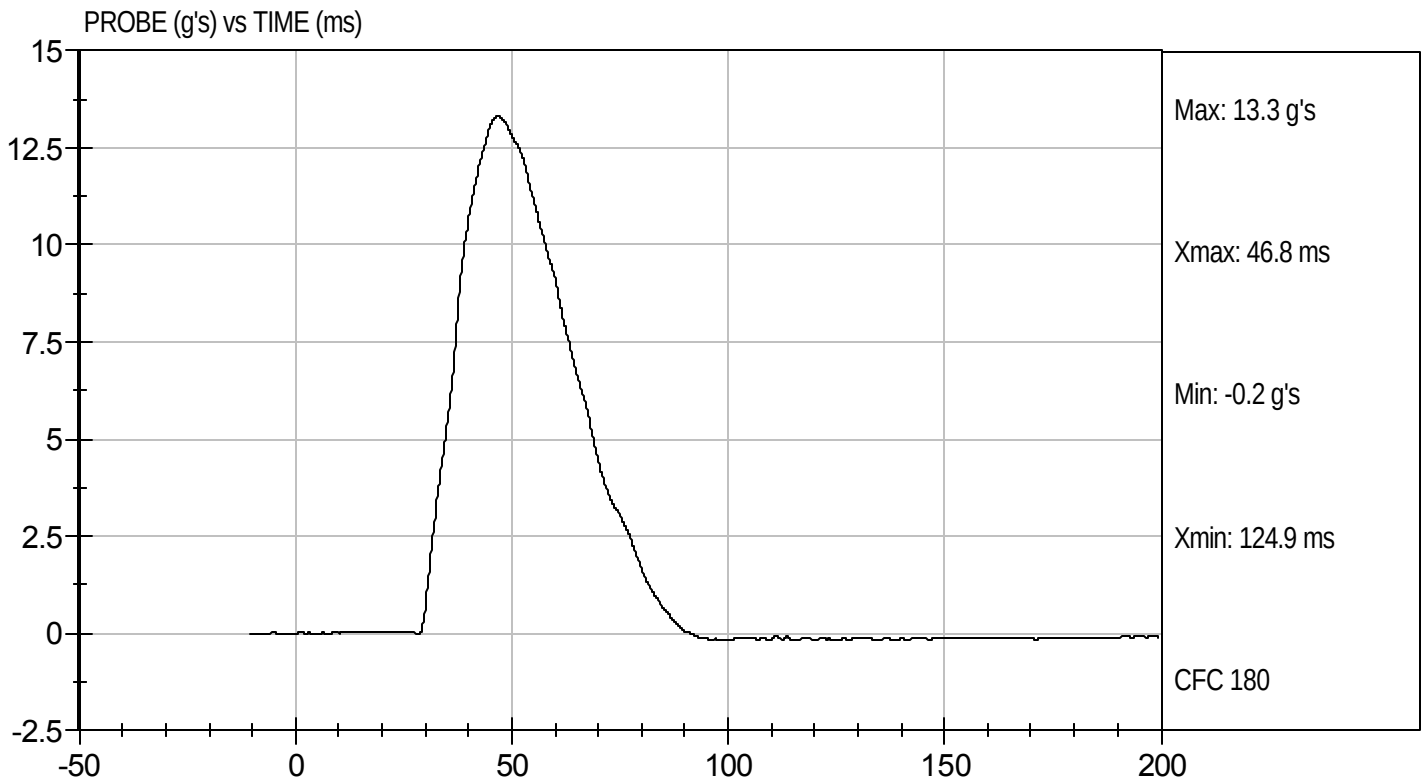
5/12/11
Test Date


Approved By



Test Desc: Abdomen Impact
Component ID: D111766

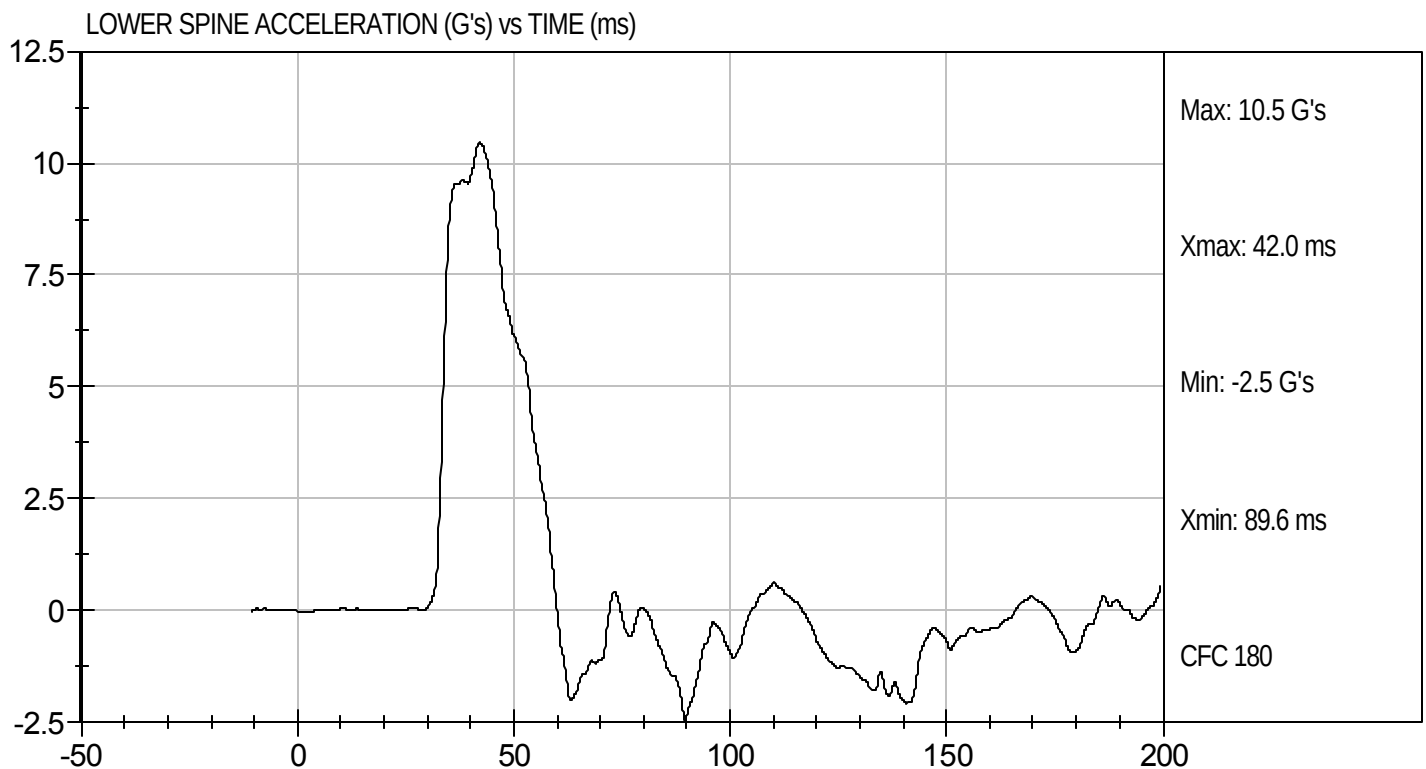
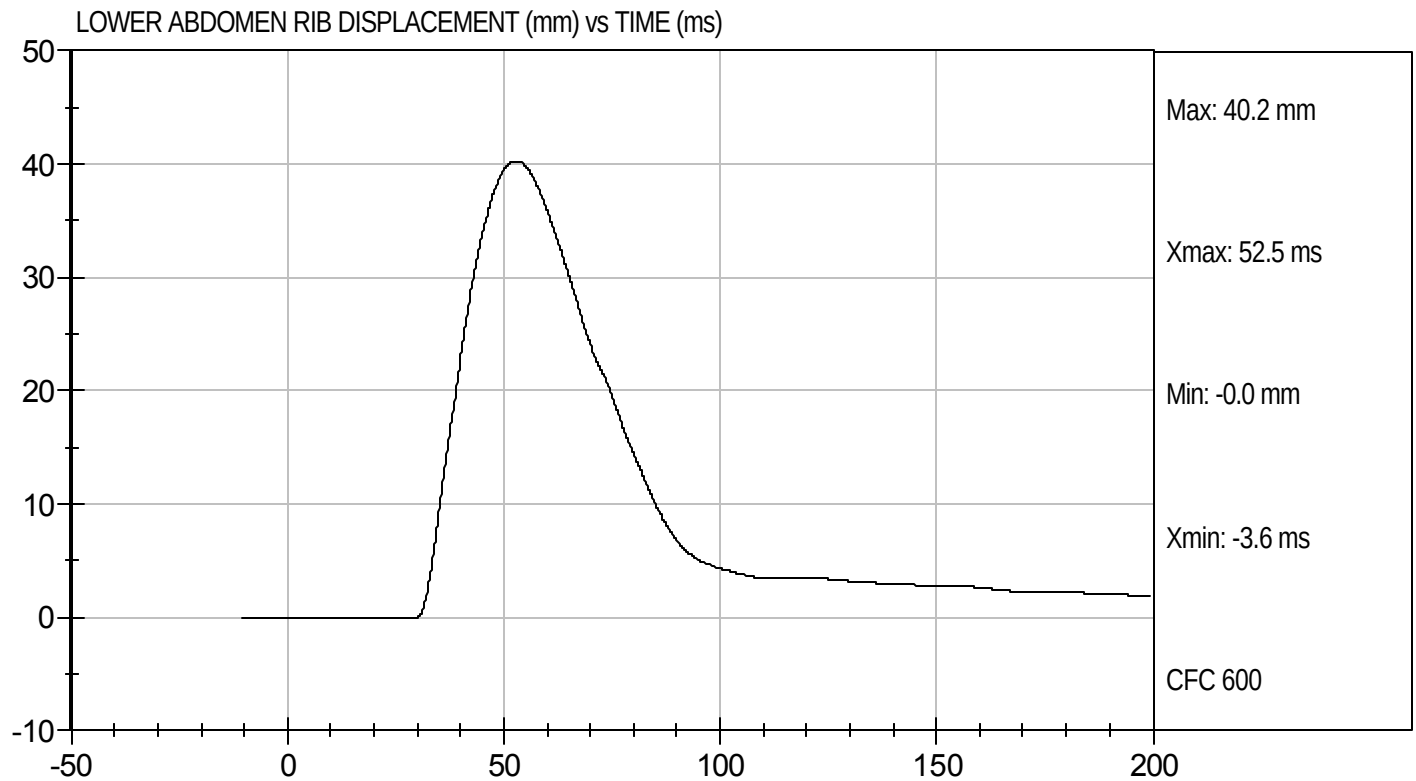
Test Date: 5/12/11
Velocity: 14.36 ft/s, 4.38 m/s





Test Desc: Abdomen Impact
Component ID: D111766

Test Date: 5/12/11
Velocity: 14.36 ft/s, 4.38 m/s



MGA RESEARCH CORPORATION
PELVIS IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

Test I.D: D111767

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	20.8	Pass
Humidity	%	10 to 70	48	Pass
Impact Velocity	m/s	6.60 to 6.80	6.77	Pass
Peak Impactor Acceleration	G's	38 to 47	42	Pass
Pelvis Y Acceleration after 6 ms	G's	34 to 42	41	Pass
Peak Acetabulum Force	N	3600 to 4300	3755	Pass
Overall Test Results				Pass


Laboratory Technician

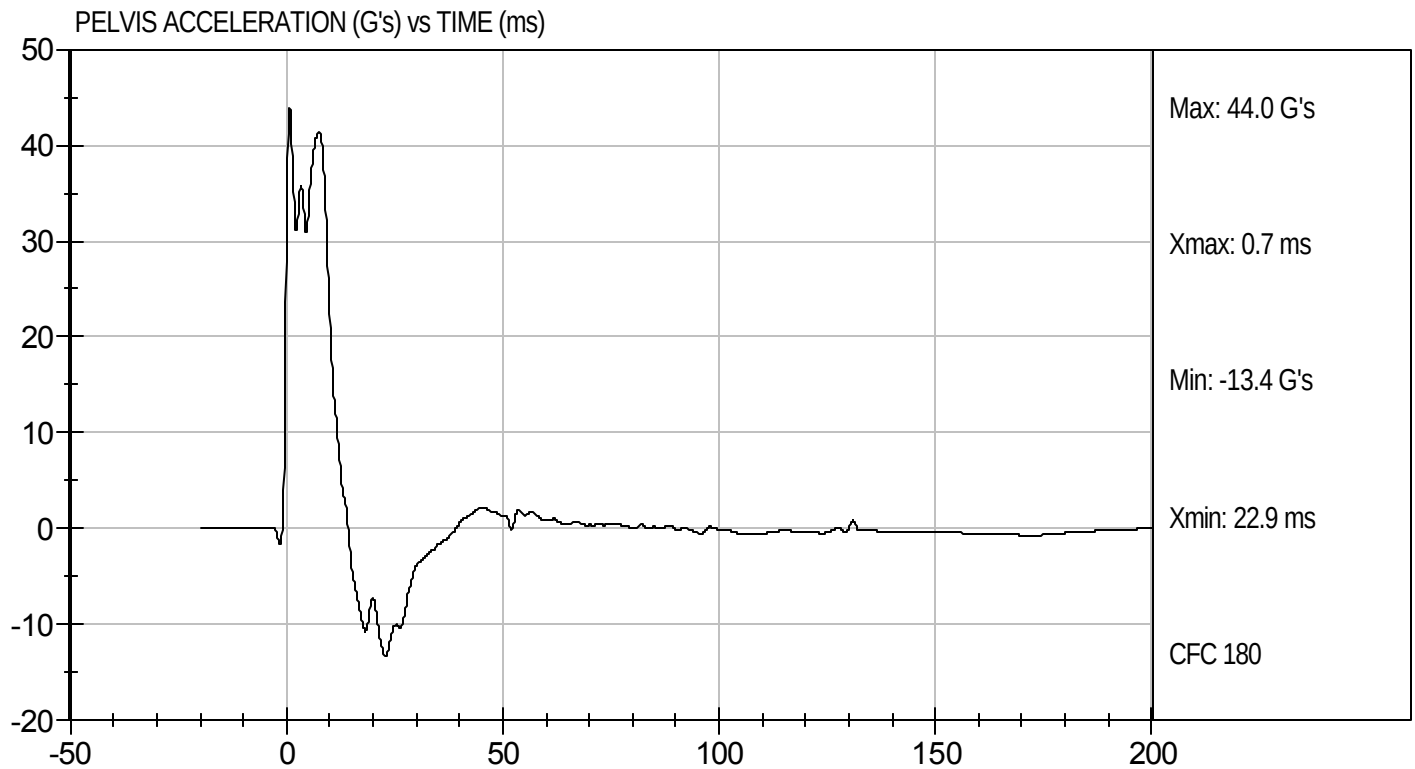
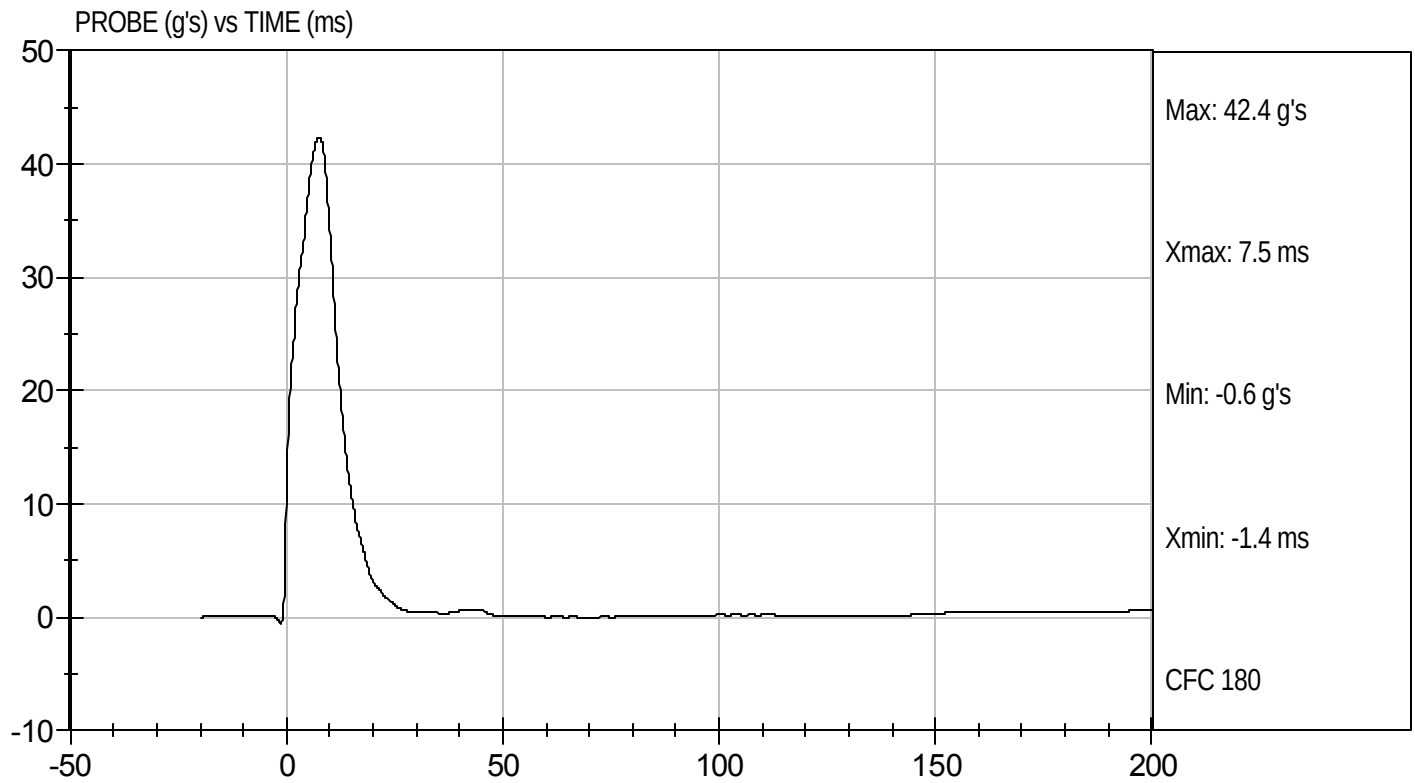
5/12/11
Test Date


Approved By



Test Desc: Pelvis Impact
Component ID: D111767

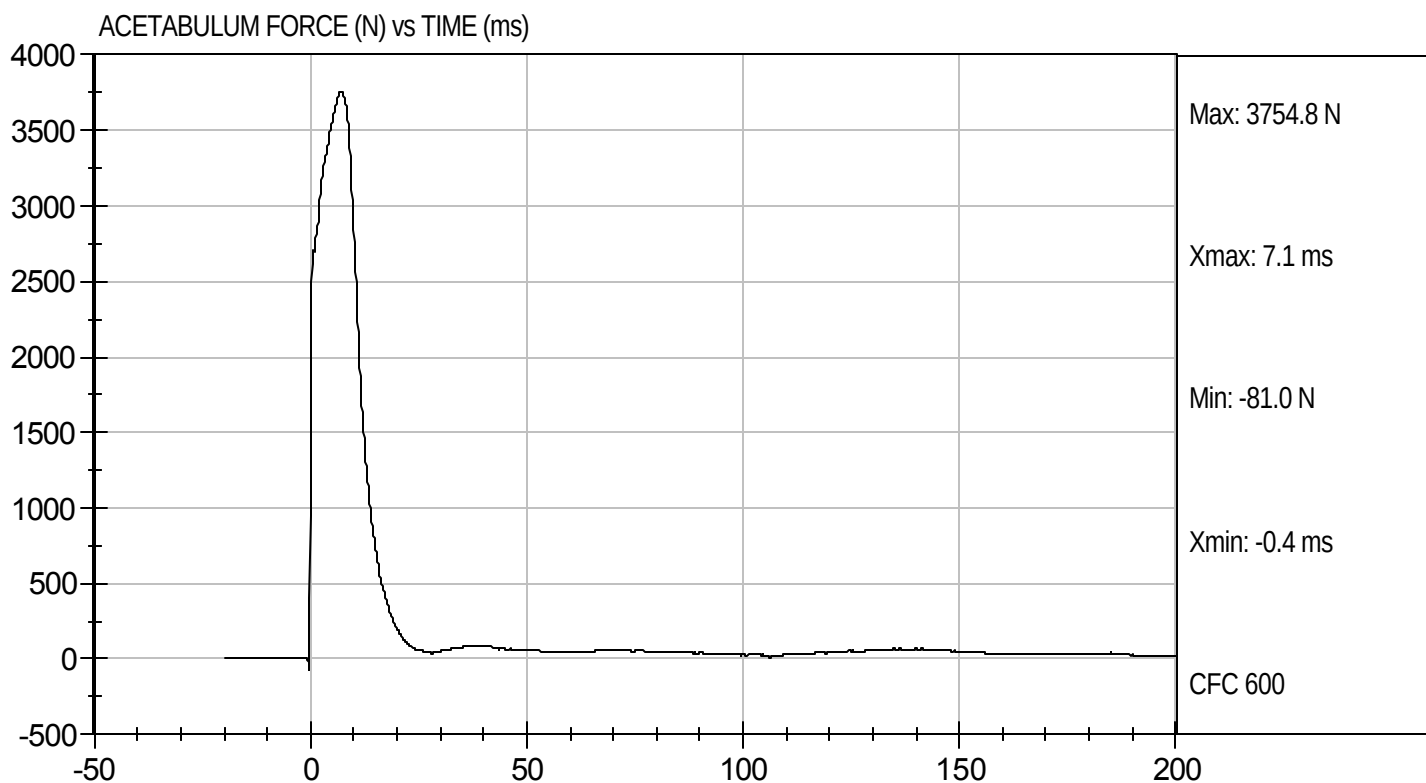
Test Date: 5/12/11
Velocity: 22.2 ft/s, 6.77 m/s





Test Desc: Pelvis Impact
Component ID: D111767

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



MGA RESEARCH CORPORATION
ILIAC IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

Test I.D: D111768

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.2	Pass
Humidity	%	10 to 70	49	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Peak Impactor Acceleration	G's	36 to 45	37	Pass
Pelvis Y Acceleration	G's	28 to 39	31	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4649	Pass
Overall Test Results			Pass	

Jessica Hall
Laboratory Technician

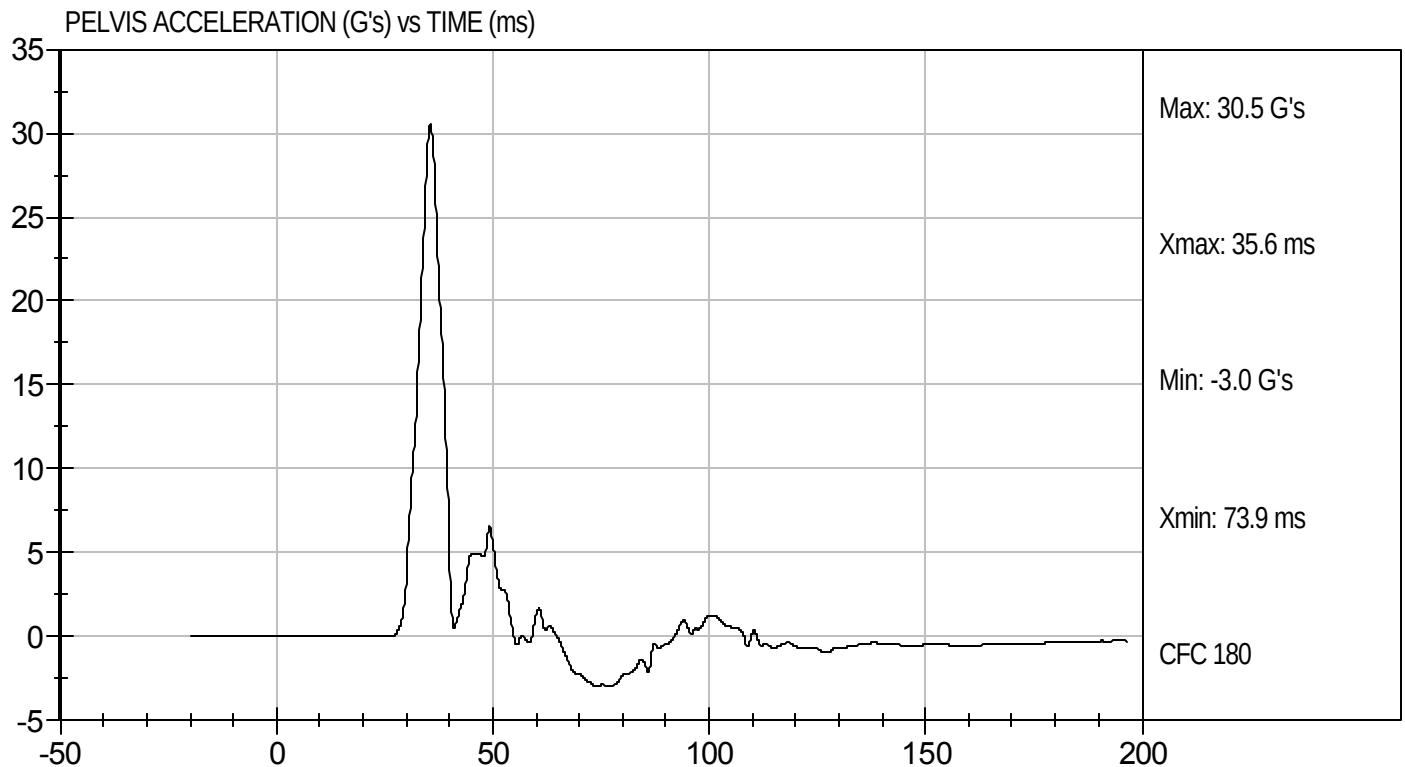
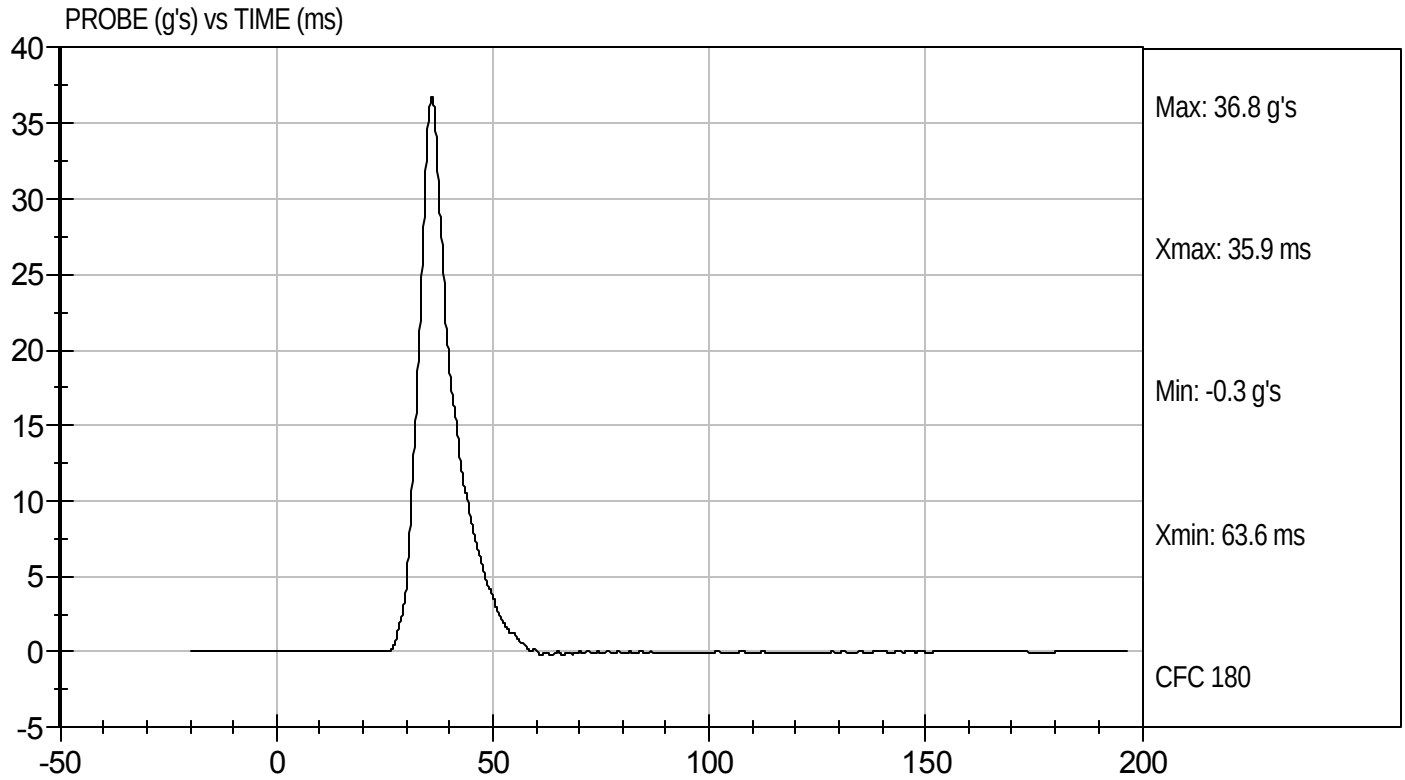
5/13/11
Test Date

David Winkelbauer
Approved By



Test Desc: Iliac Impact
Component ID: D111768

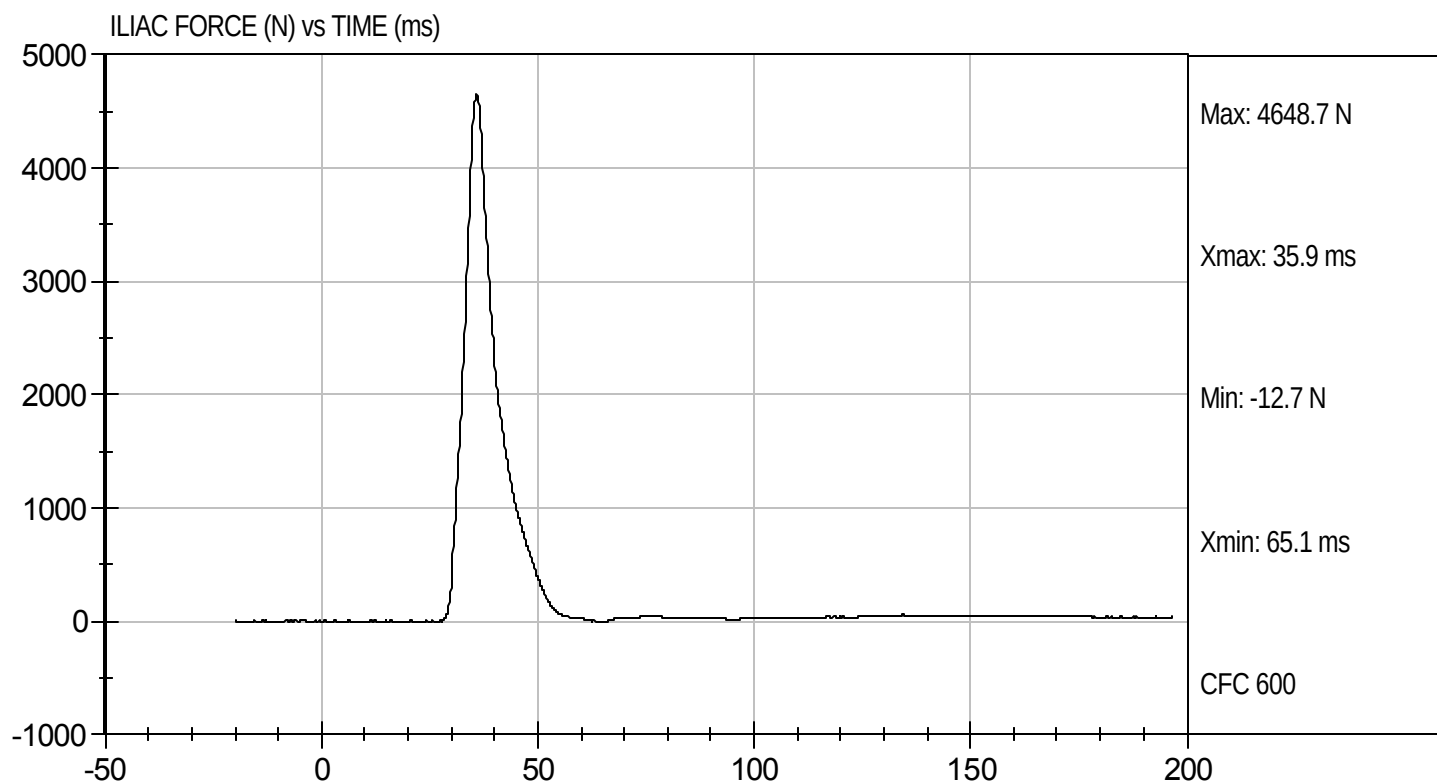
Test Date: 5/13/11
Velocity: 14.37 ft/s, 4.38 m/s





Test Desc: Iliac Impact
Component ID: D111768

Test Date: 5/13/11
Velocity: 14.37 ft/s, 4.38 m/s



MGA RESEARCH CORPORATION
HEAD DROP TEST
SID-Its BUILD LEVEL D DUMMY

ATD Serial No: 296

Test ID: D112091

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	51	Pass
Peak Resultant Acceleration	G's	115 to 137	124	Pass
Peak Lateral Acceleration	G's	+/- 15	-2.7	Pass
Unimodal	N/A	<15%	Yes	Pass
Overall Test Results				Pass

Jessica Galt
Laboratory Technician

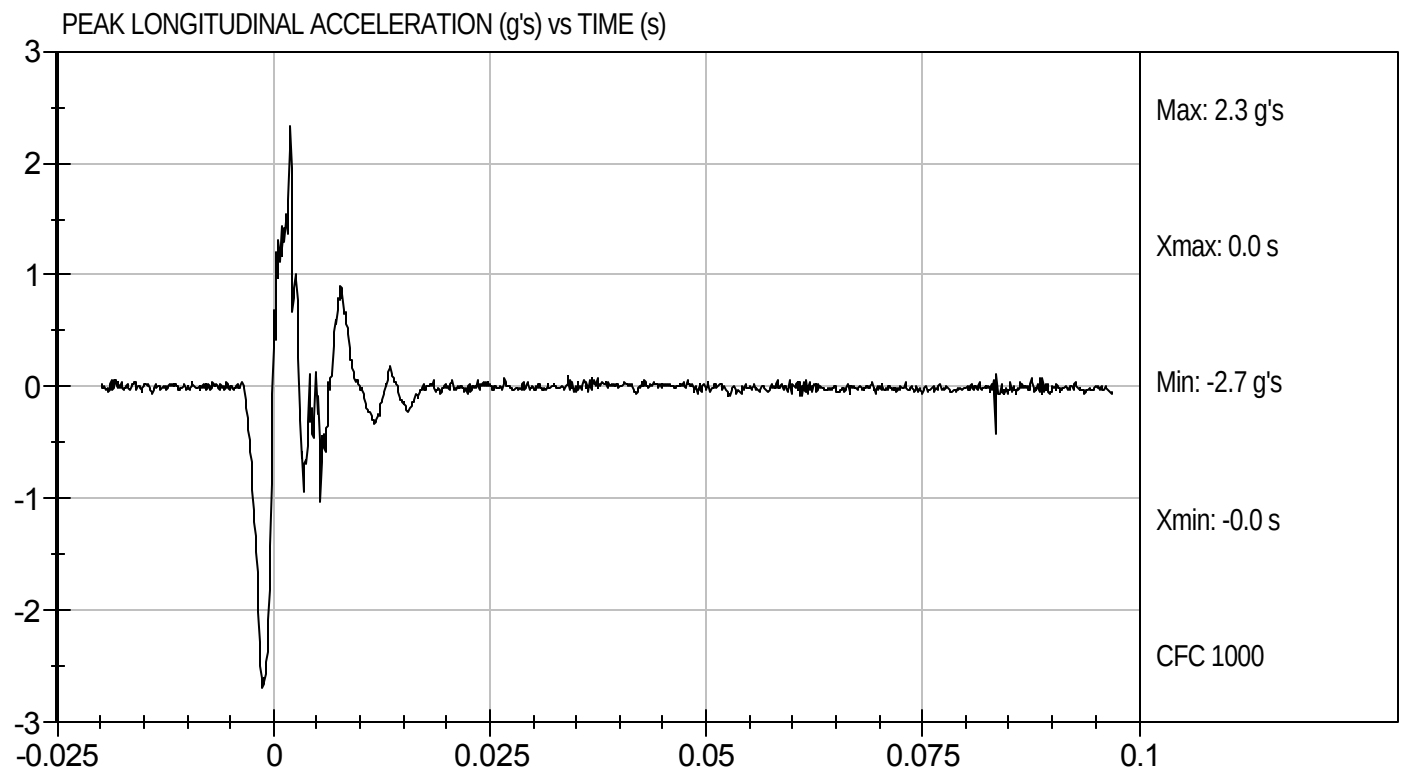
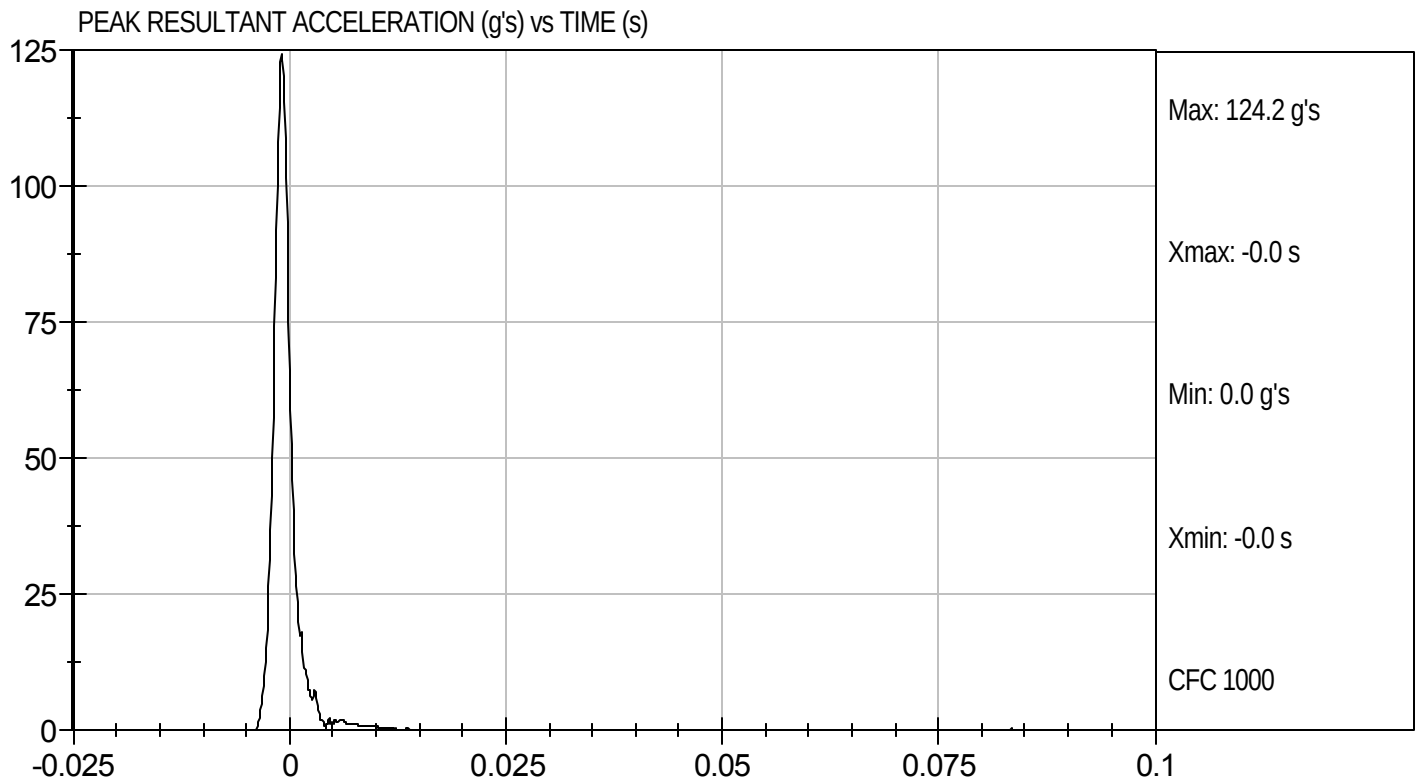
6/16/11
Test Date

David Winkelbauer
Approved By



Test Desc: Head Drop
Component ID: D112091

Test Date: 6/16/11
Velocity: 0 ft/s, 0 m/s

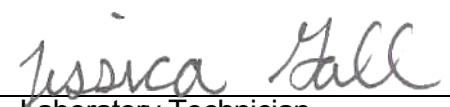


MGA RESEARCH CORPORATION
LATERAL NECK PENDULUM TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

Test I.D: D112092

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21.6	Pass
Humidity		%	10 to 70	52	Pass
Impact Velocity		m/s	5.51 to 5.63	5.58	Pass
Delta Velocity	10 ms	m/s	2.20 to 2.80	2.77	Pass
	15 ms	m/s	3.30 to 4.10	3.87	Pass
	20 ms	m/s	4.40 to 5.40	5.06	Pass
	25 ms	m/s	5.40 to 6.10	5.51	Pass
	25-100 ms	m/s	5.50 to 6.20	5.52	Pass
Maximum D-Plane Rotation		deg	71 to 81	72	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	57	Pass
Maximum Occipital Condyle Moment during Rotation Interval Nm			-44 to -36	-41	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	113	Pass
Overall Test Results				Pass	


 Laboratory Technician

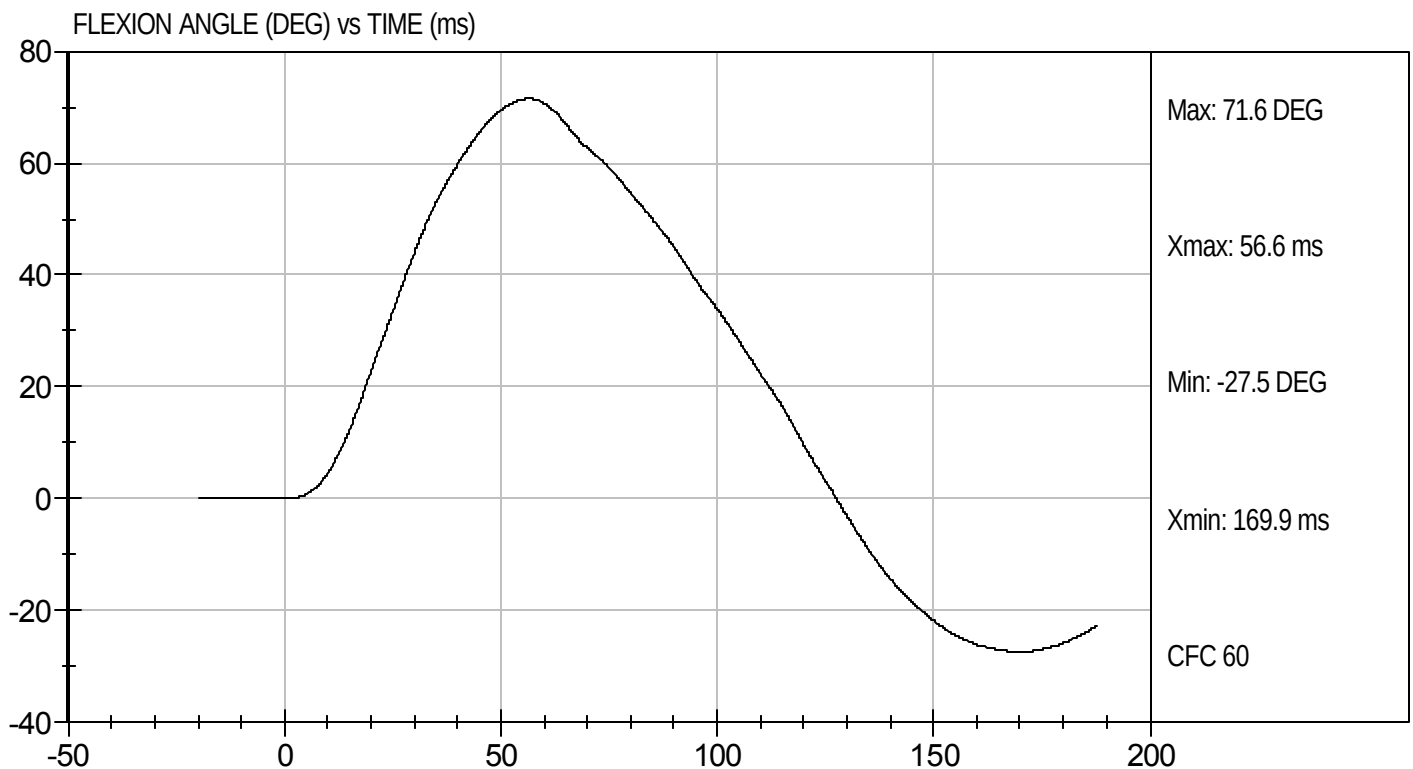
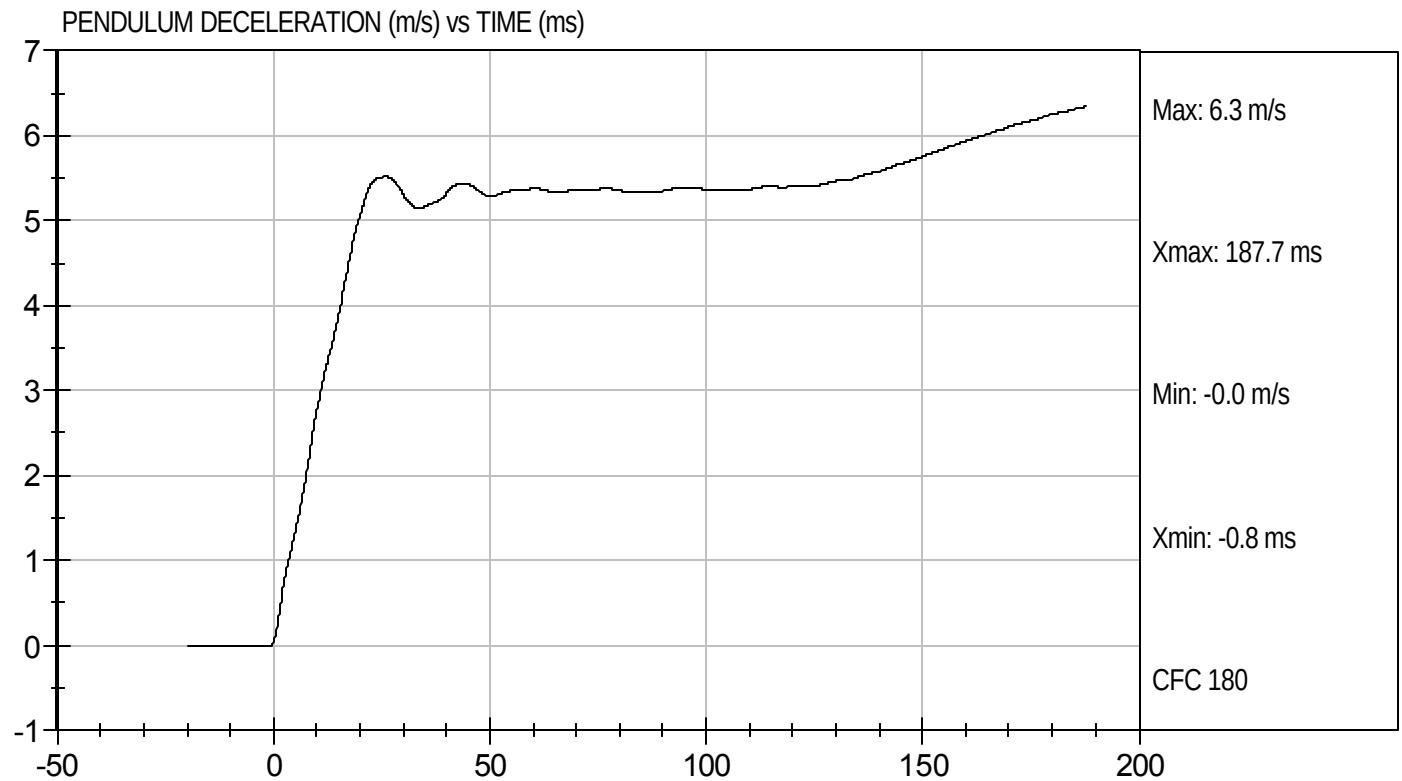
6/16/11
 Test Date


 Approved By



Test Desc: Neck Bending
Component ID: D112092

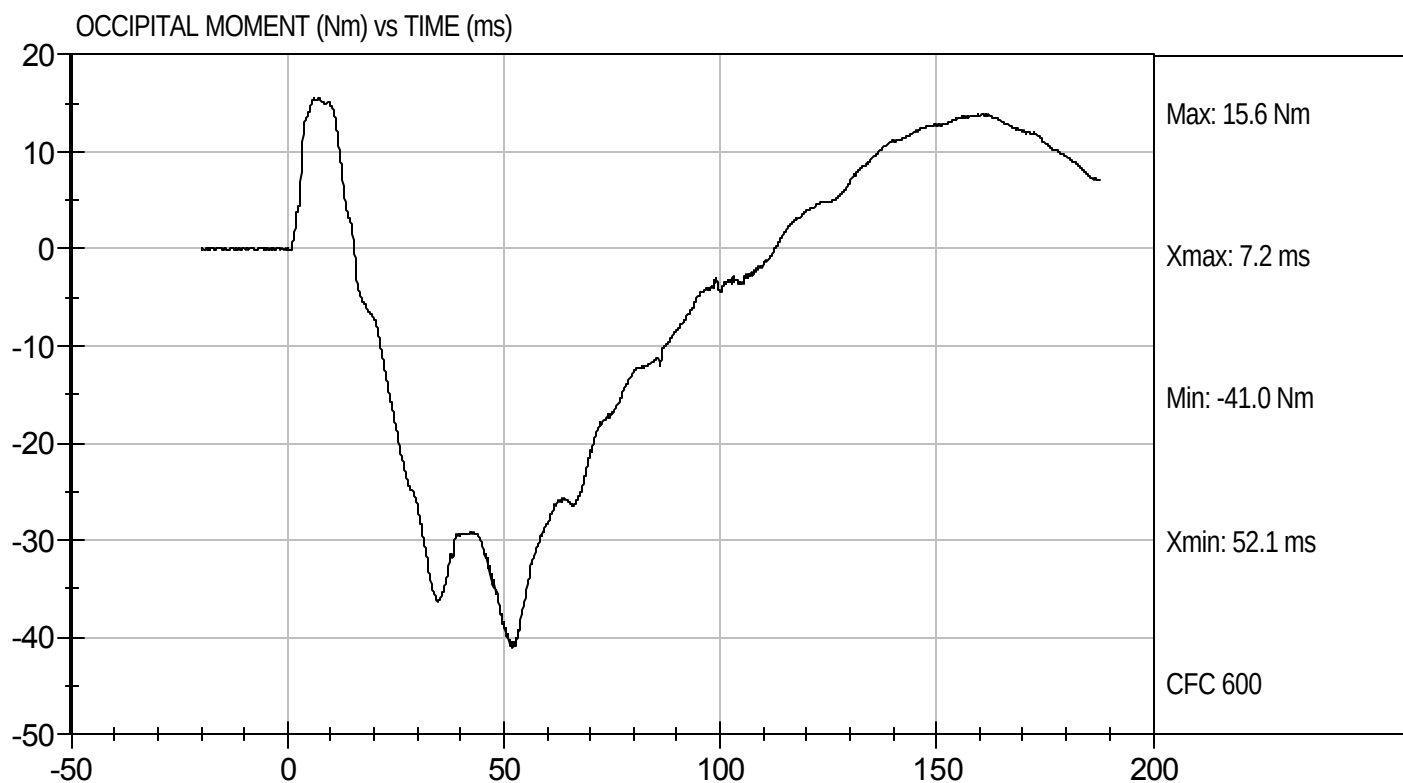
Test Date: 6/16/11
Velocity: 18.32 ft/s, 5.58 m/s





Test Desc: Neck Bending
Component ID: D112092

Test Date: 6/16/11
Velocity: 18.32 ft/s, 5.58 m/s



MGA RESEARCH CORPORATION
SHOULDER IMPACT TEST
SID-11s BUILD LEVEL D DUMMY

ATD Serial No: 296

Test ID: D112093

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	51	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Maximum Probe Acceleration	G's	13 to 18	15	Pass
Shoulder Displacement	mm	28 to 37	32	Pass
Upper Spine (T1) Y Acceleration	G's	17 to 22	18	Pass
Overall Test Results			Pass	

Jessica Gall
Laboratory Technician

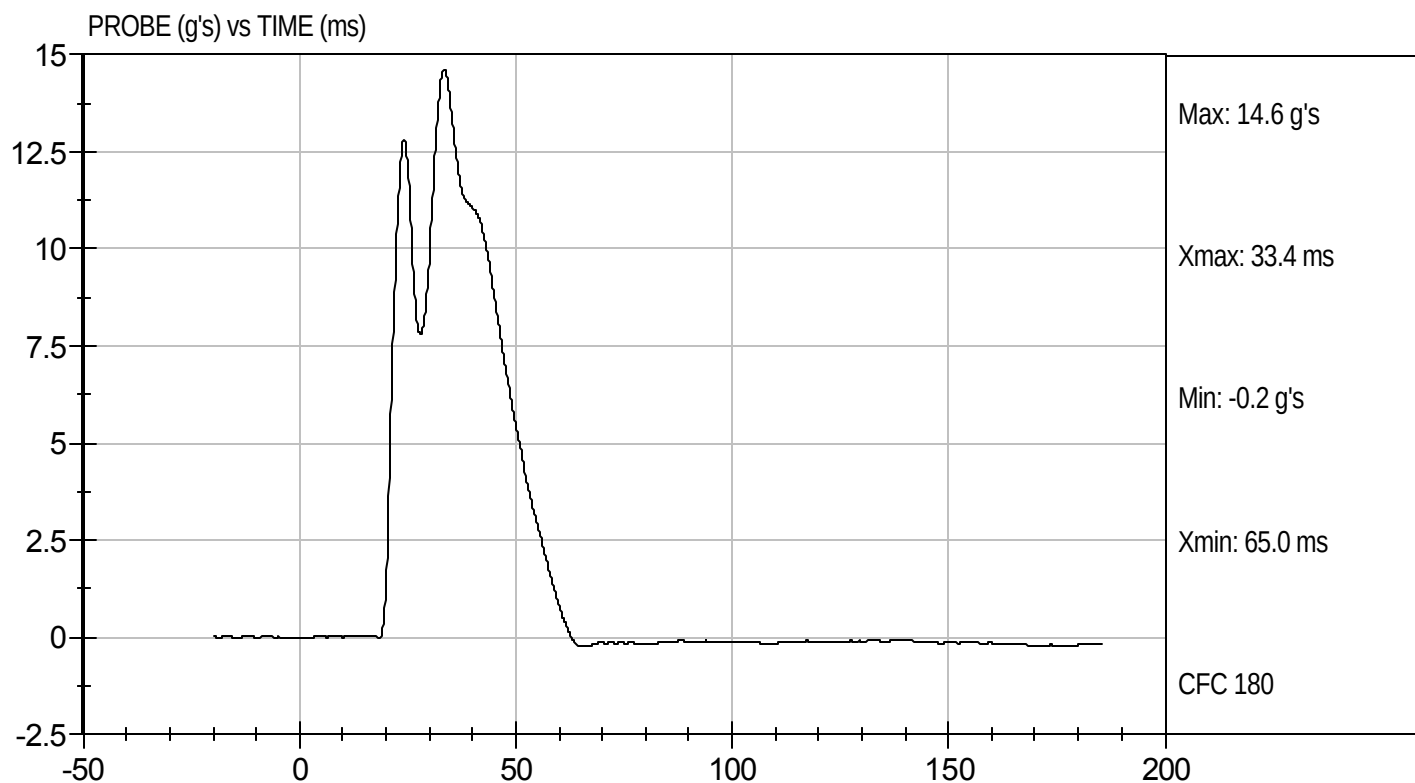
6/16/11
Test Date

David Winkelbauer
Approved By



Test Desc: Shoulder Impact
Component ID: D112093

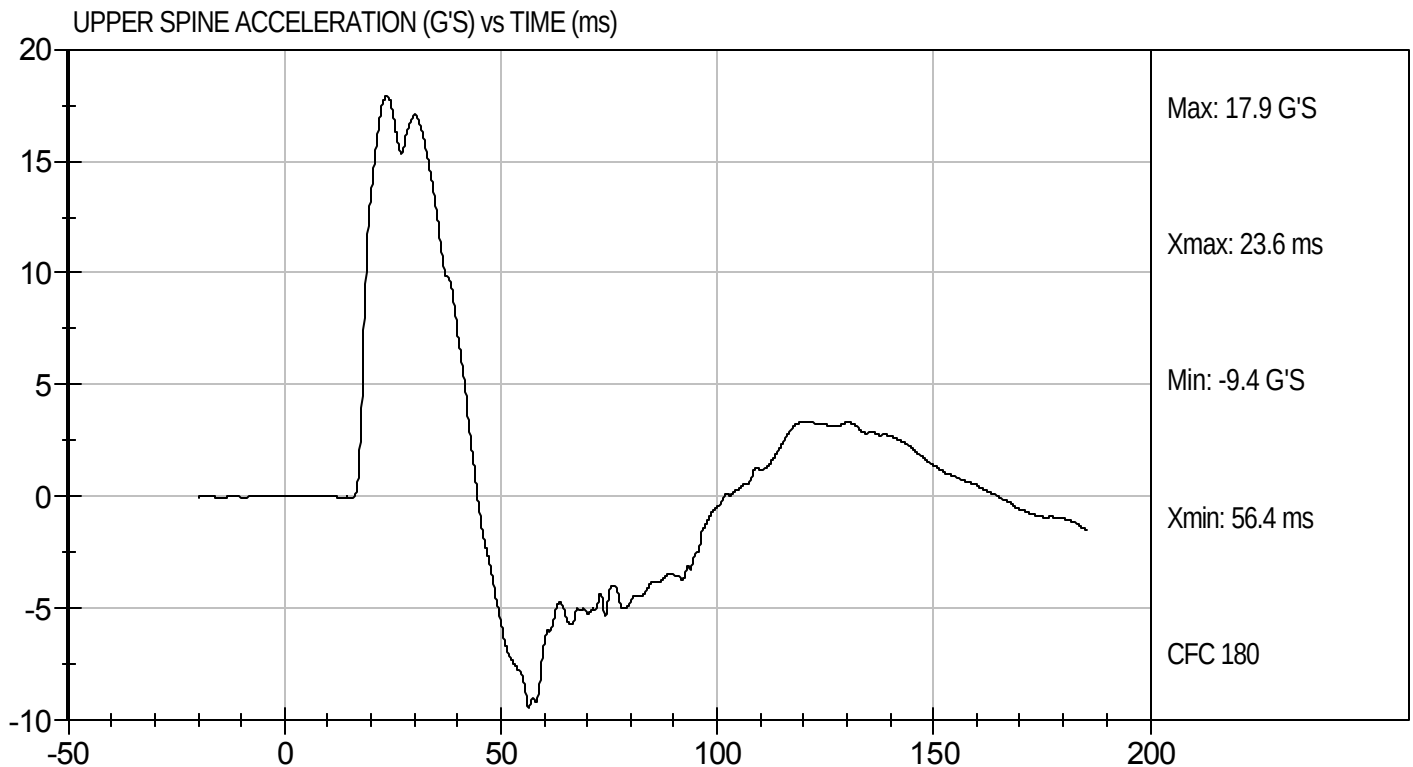
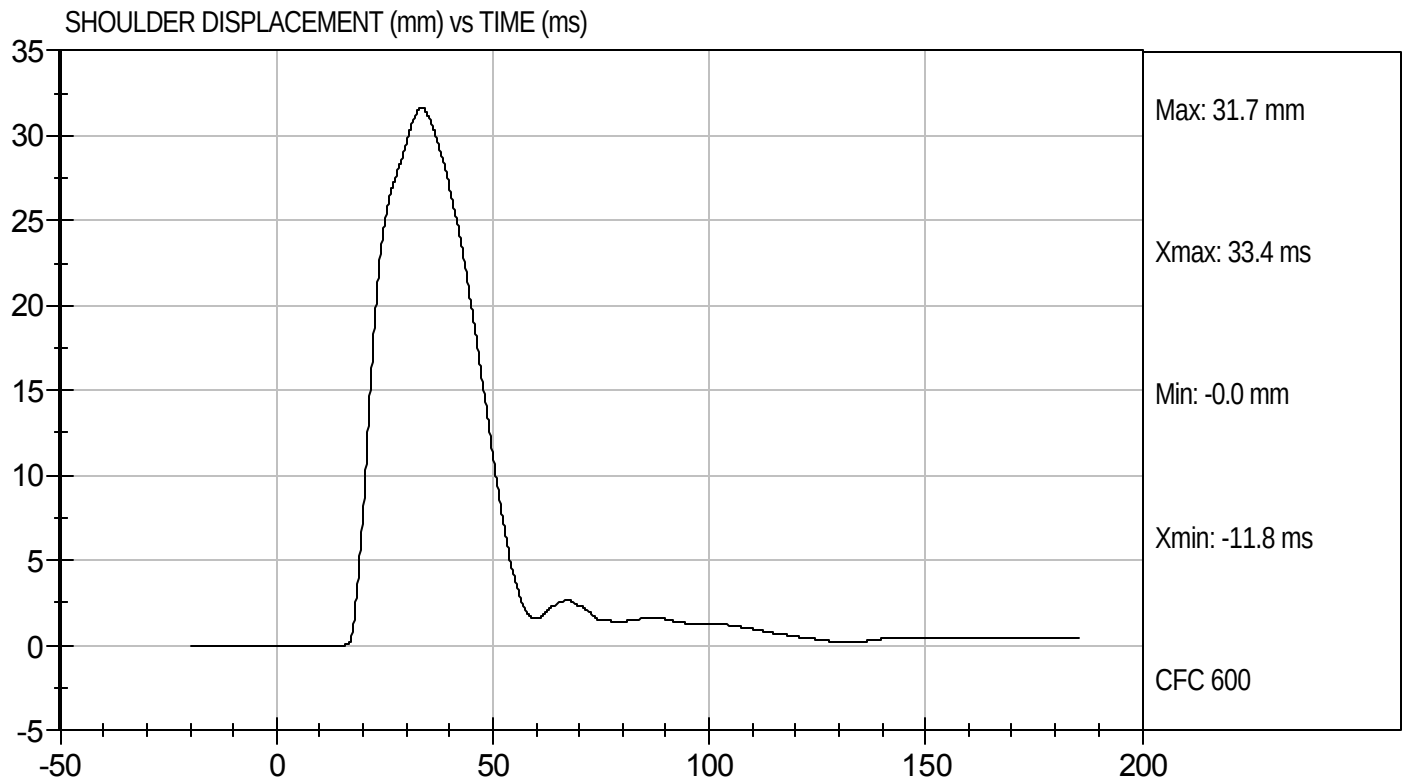
Test Date: 6/16/11
Velocity: 14.36 ft/s, 4.38 m/s





Test Desc: Shoulder Impact
Component ID: D112093

Test Date: 6/16/11
Velocity: 14.36 ft/s, 4.38 m/s



MGA RESEARCH CORPORATION
THORAX (WITH ARM) IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

Test I.D: D112094

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.6	Pass
Humidity	%	10 to 70	51	Pass
Impact Velocity	m/s	6.60 to 6.80	6.77	Pass
Peak Impactor Acceleration	G's	30 to 36	31	Pass
Shoulder Displacement	mm	31 to 40	37	Pass
Upper Rib Displacement	mm	25 to 32	28	Pass
Middle Rib Displacement	mm	30 to 36	32	Pass
Lower Rib Displacement	mm	32 to 38	33	Pass
Upper Spine (T1) Y Acceleration	G's	34 to 43	38	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	32	Pass
Overall Test Results			Pass	


Laboratory Technician

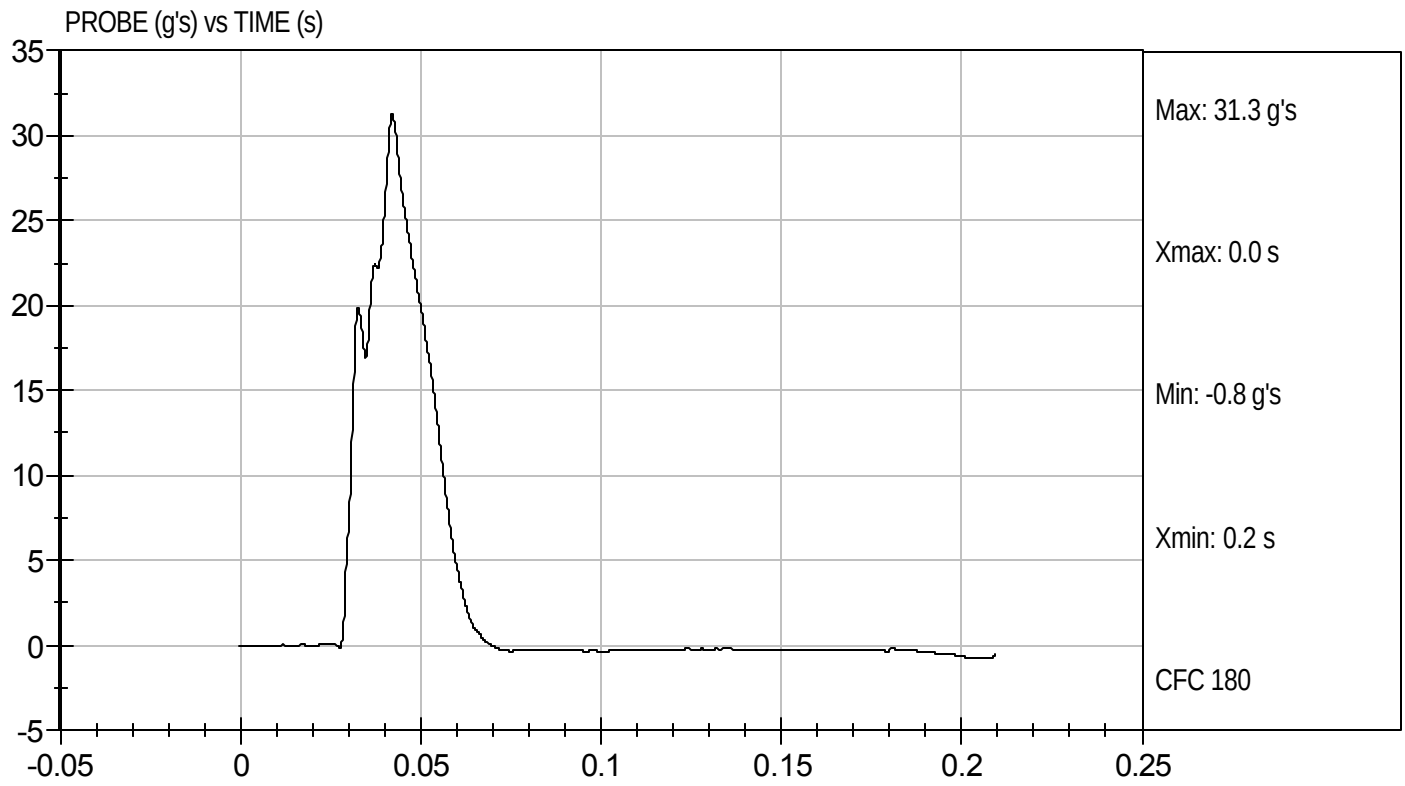
6/16/11
Test Date


Approved By



Test Desc: Thorax With Arm
Component ID: D112094

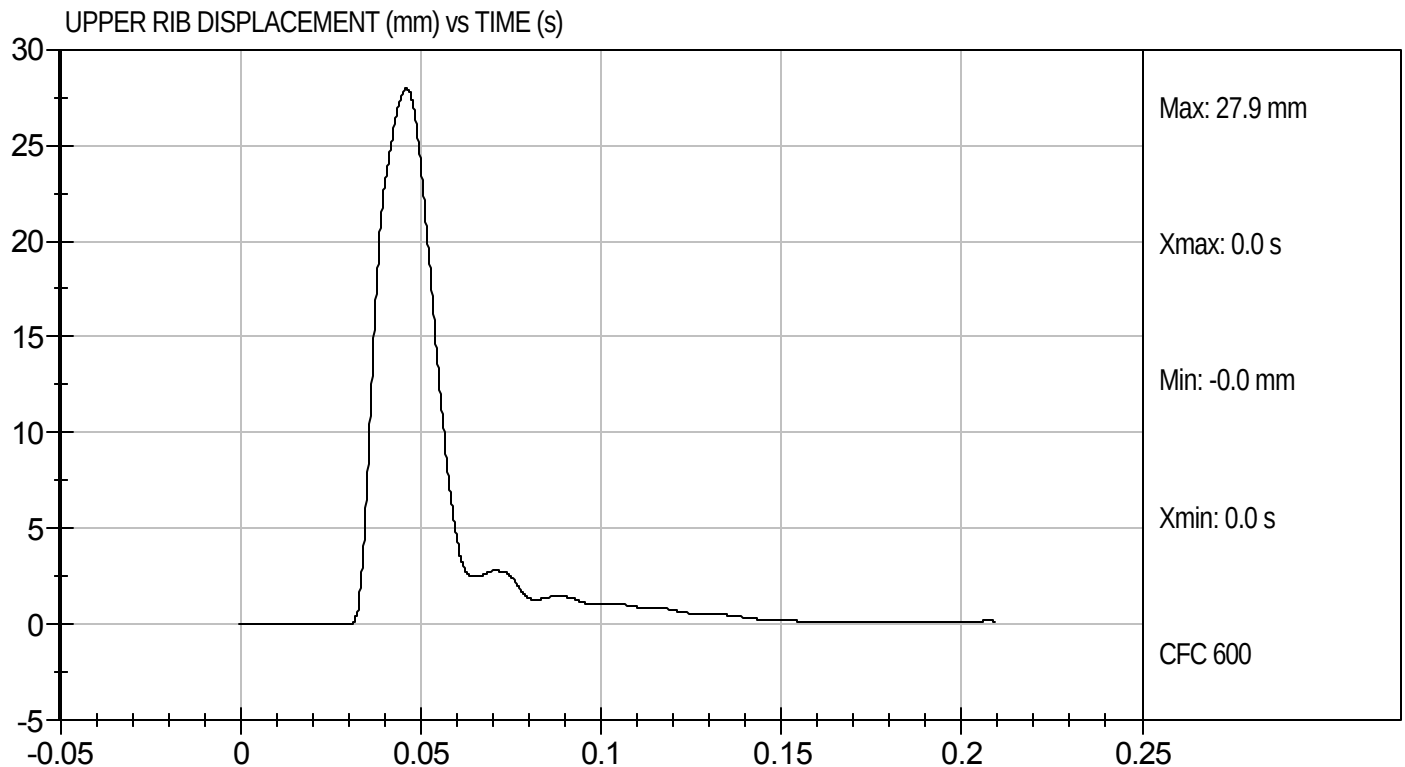
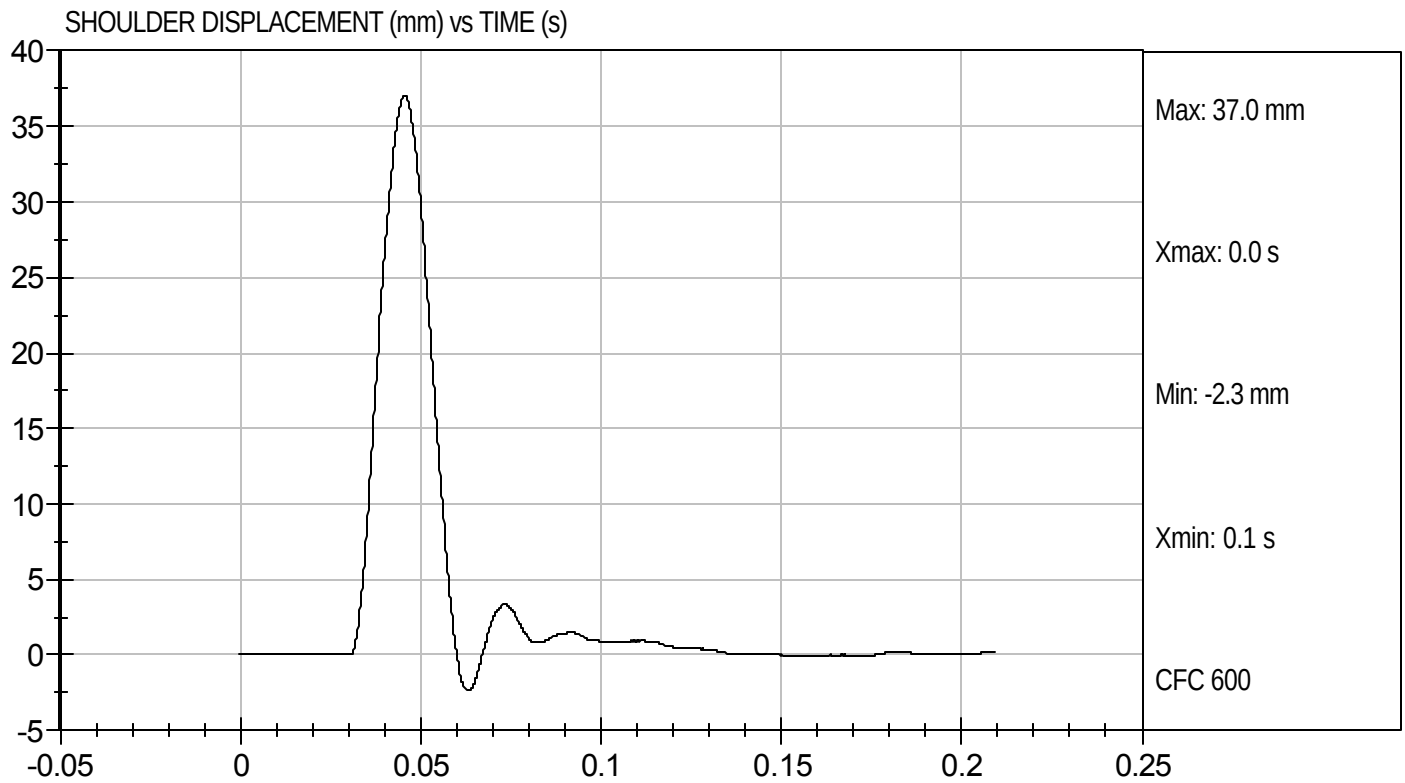
Test Date: 6/16/11
Velocity: 22.22 ft/s, 6.77 m/s





Test Desc: Thorax With Arm
Component ID: D112094

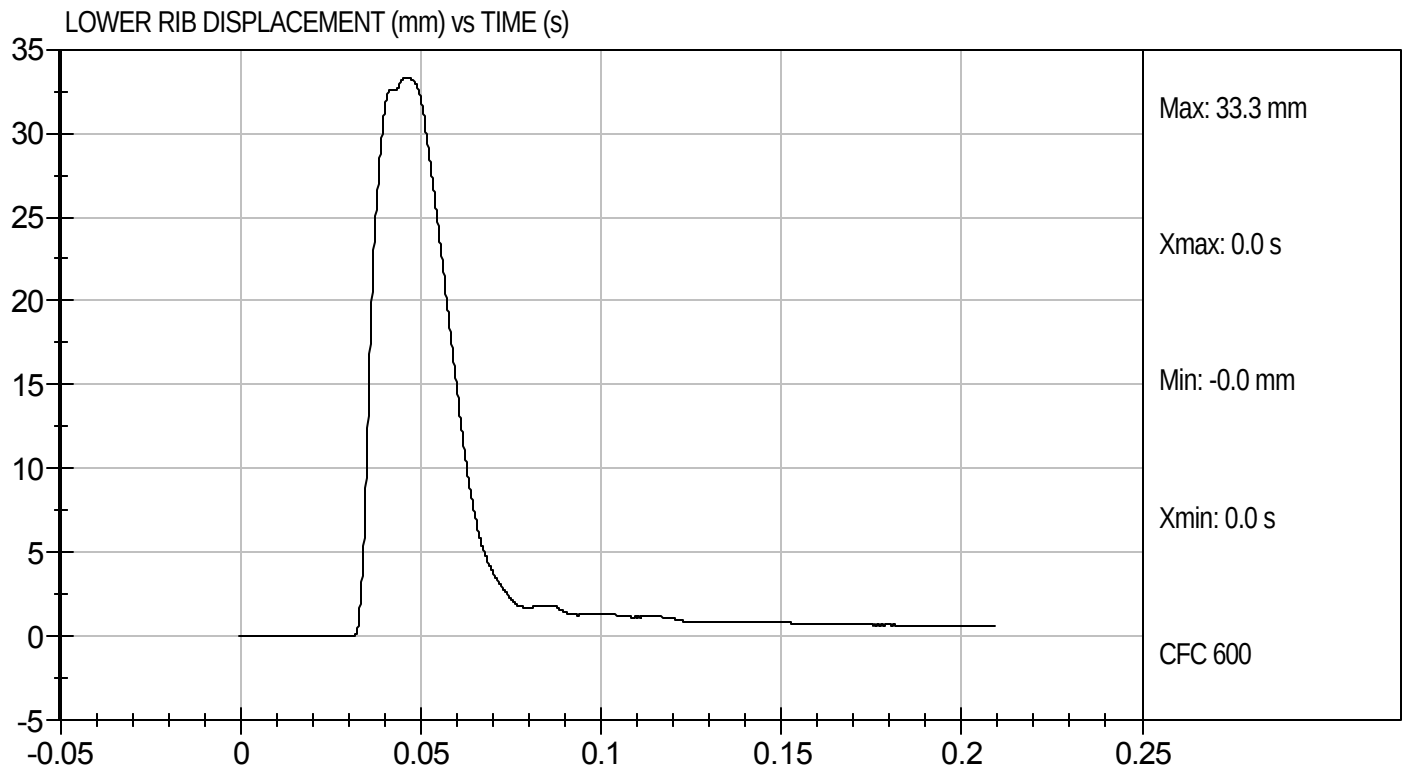
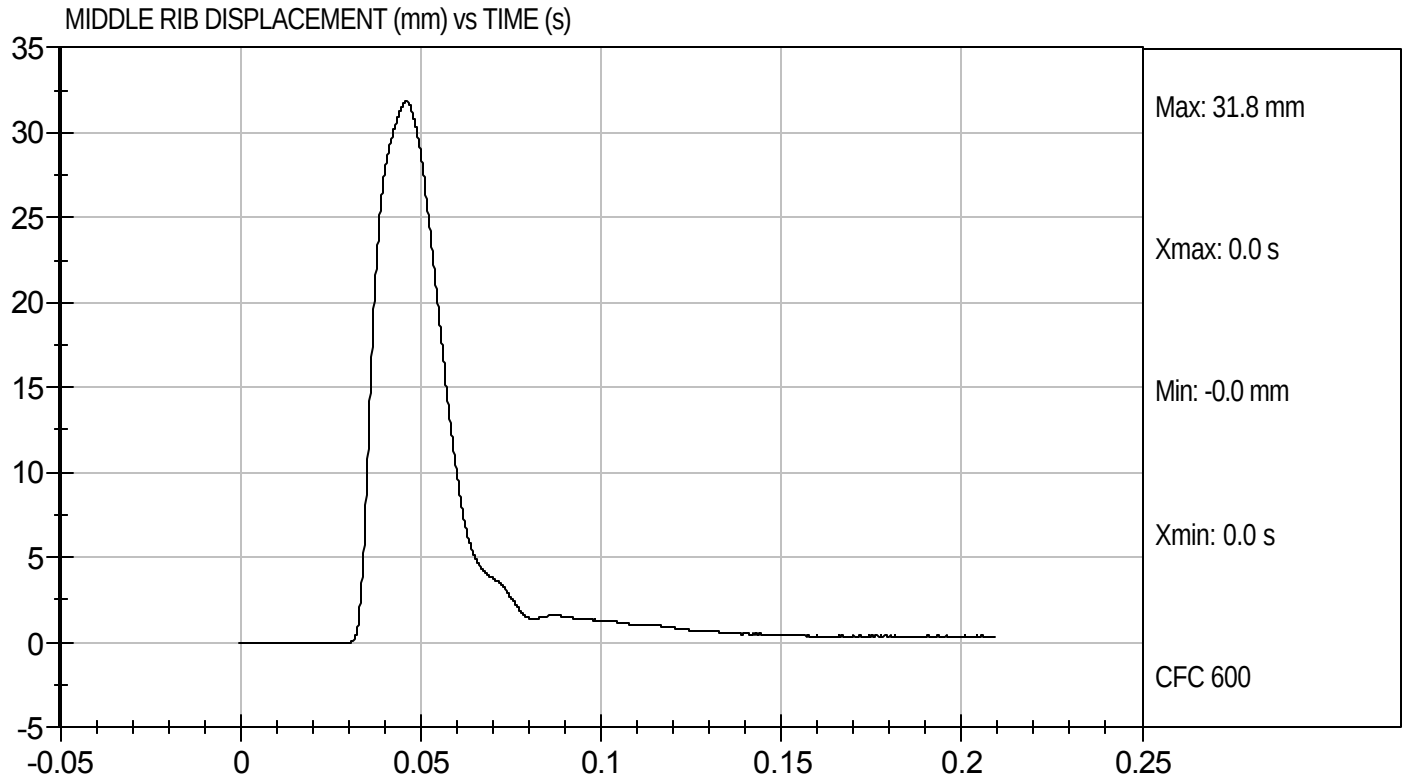
Test Date: 6/16/11
Velocity: 22.22 ft/s, 6.77 m/s





Test Desc: Thorax With Arm
Component ID: D112094

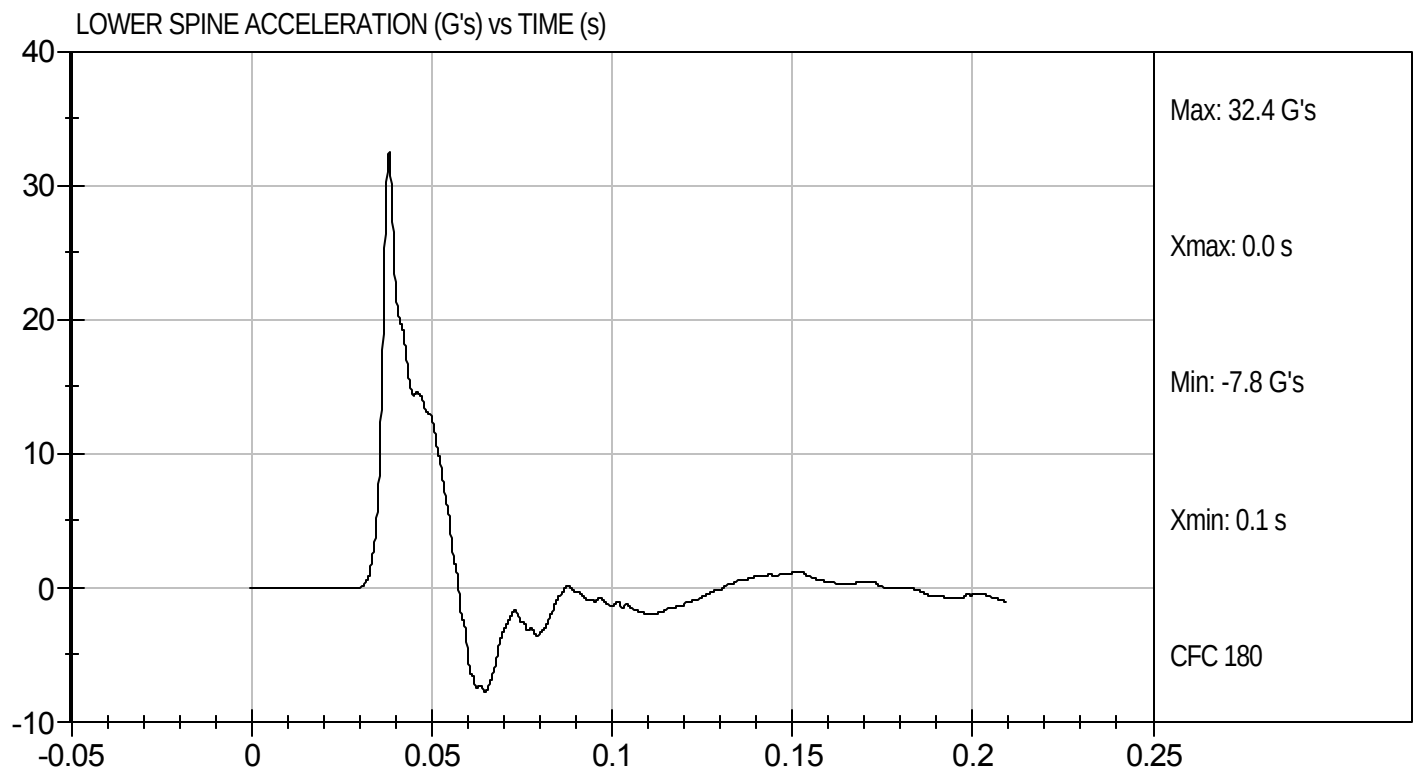
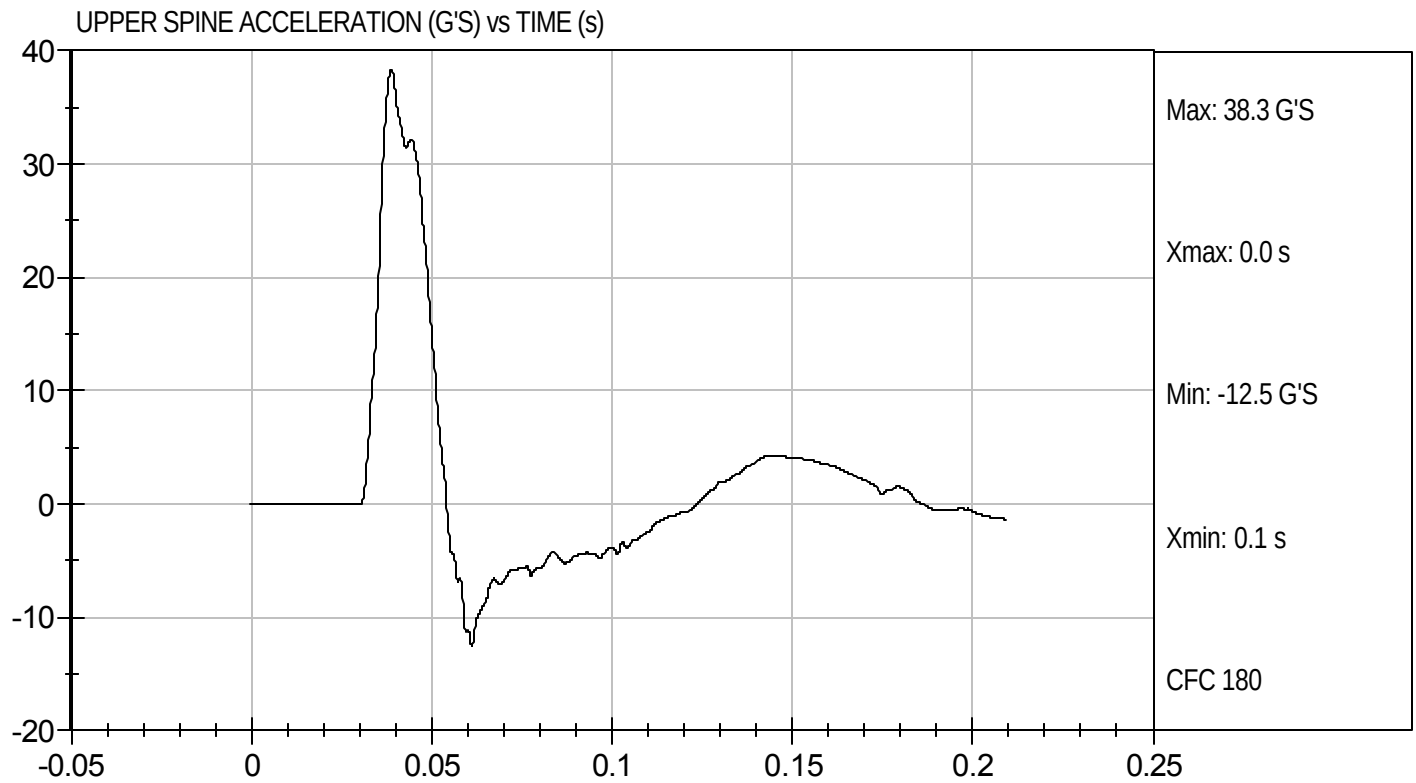
Test Date: 6/16/11
Velocity: 22.22 ft/s, 6.77 m/s





Test Desc: Thorax With Arm
Component ID: D112094

Test Date: 6/16/11
Velocity: 22.22 ft/s, 6.77 m/s



MGA RESEARCH CORPORATION
THORAX (WITHOUT ARM) IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

Test I.D: D112095

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.4	Pass
Humidity	%	10 to 70	51	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Peak Impactor Force	G's	14 to 18	14	Pass
Upper Rib Displacement	mm	32 to 40	36	Pass
Middle Rib Displacement	mm	39 to 45	41	Pass
Lower Rib Displacement	mm	35 to 43	39	Pass
Upper Spine (T1) Y Acceleration	G's	13 to 17	14	Pass
Lower Spine (T12) Y Acceleration	G's	7 to 11	8	Pass
Overall Test Results			Pass	


Laboratory Technician

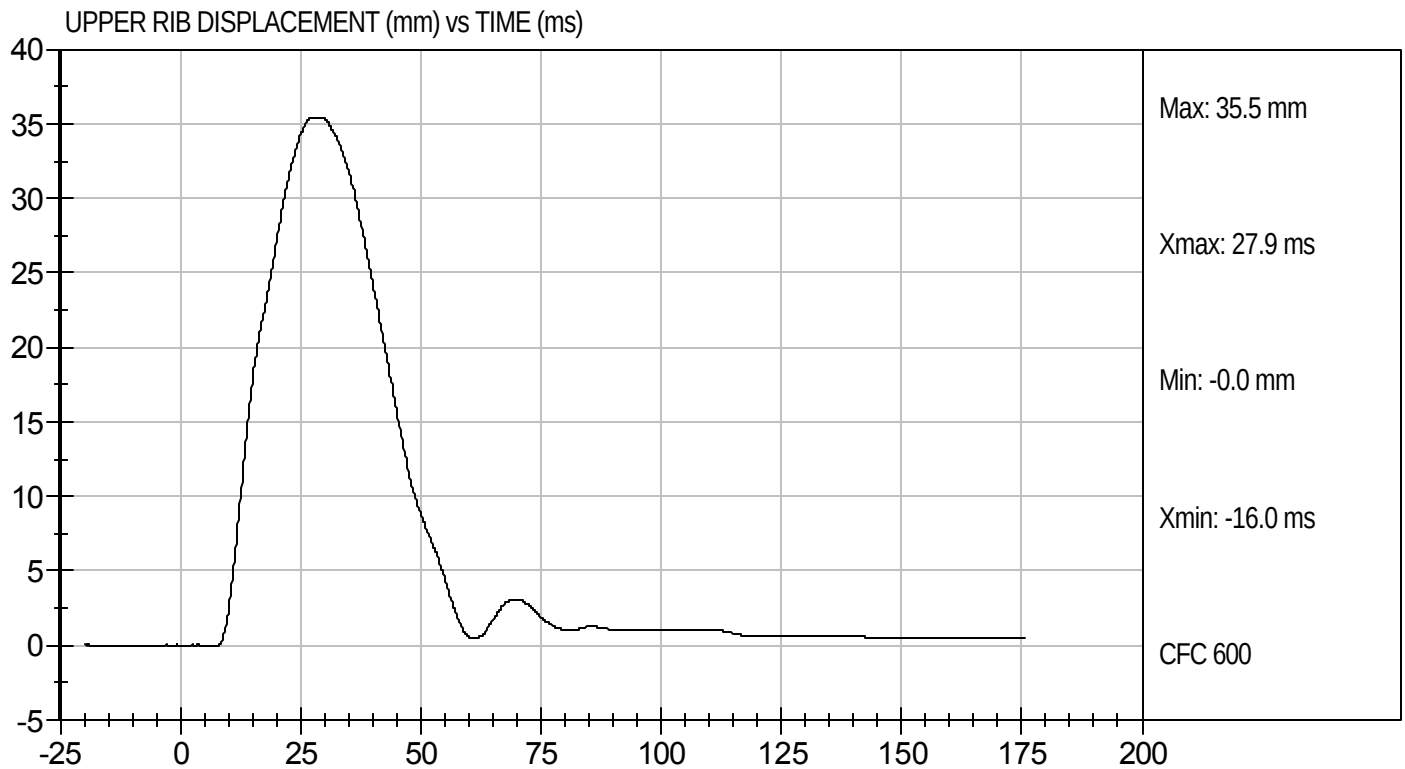
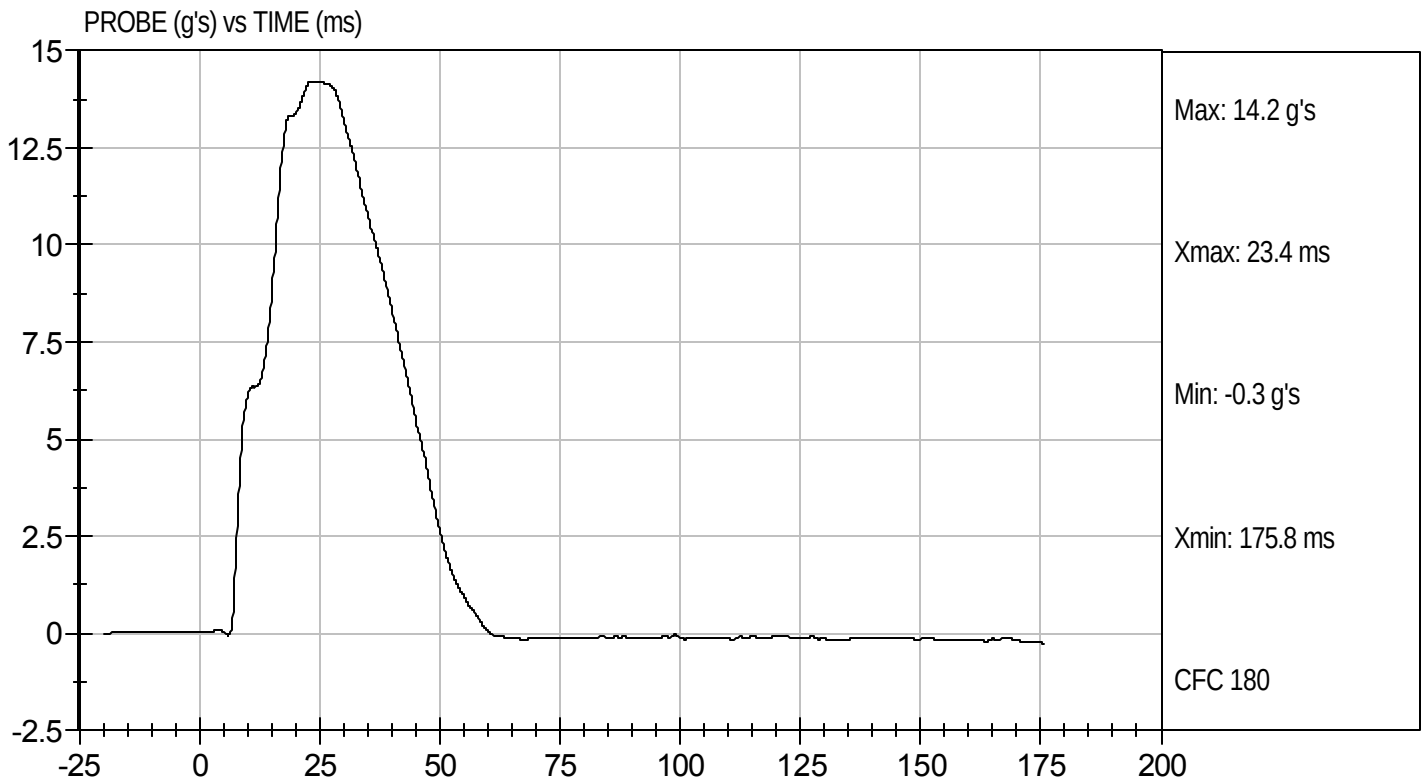
6/16/11
Test Date


Approved By



Test Desc: Thorax Without Arm
Component ID: D112095

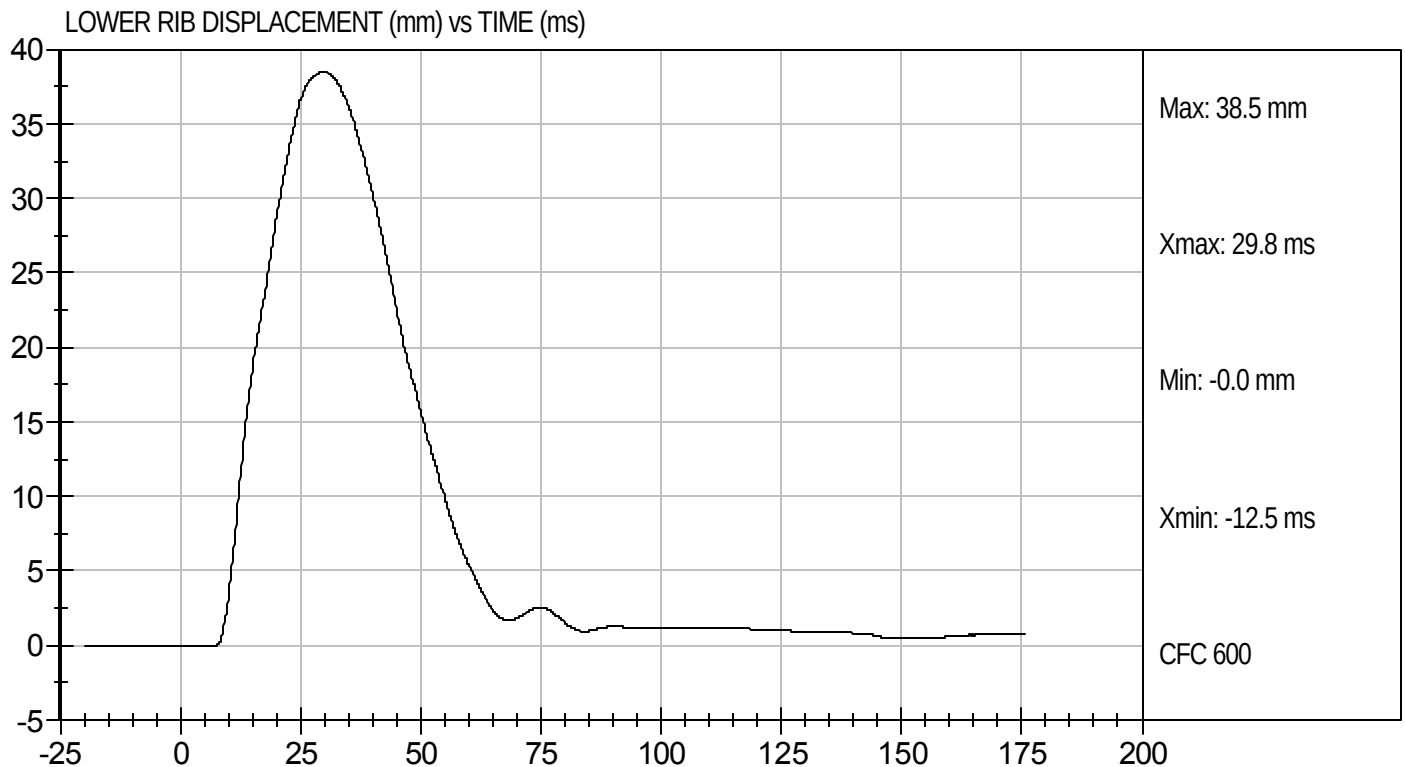
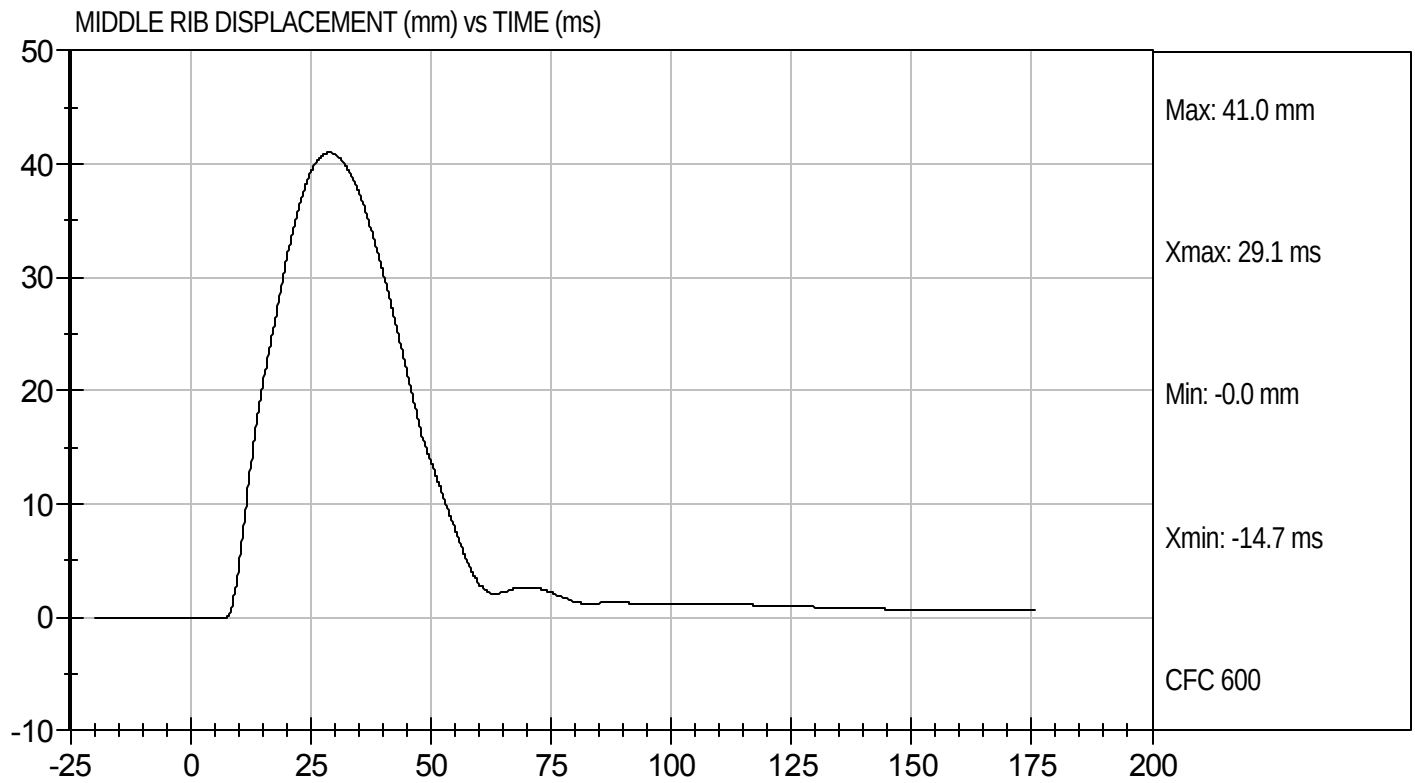
Test Date: 6/16/11
Velocity: 14.36 ft/s, 4.38 m/s





Test Desc: Thorax Without Arm
Component ID: D112095

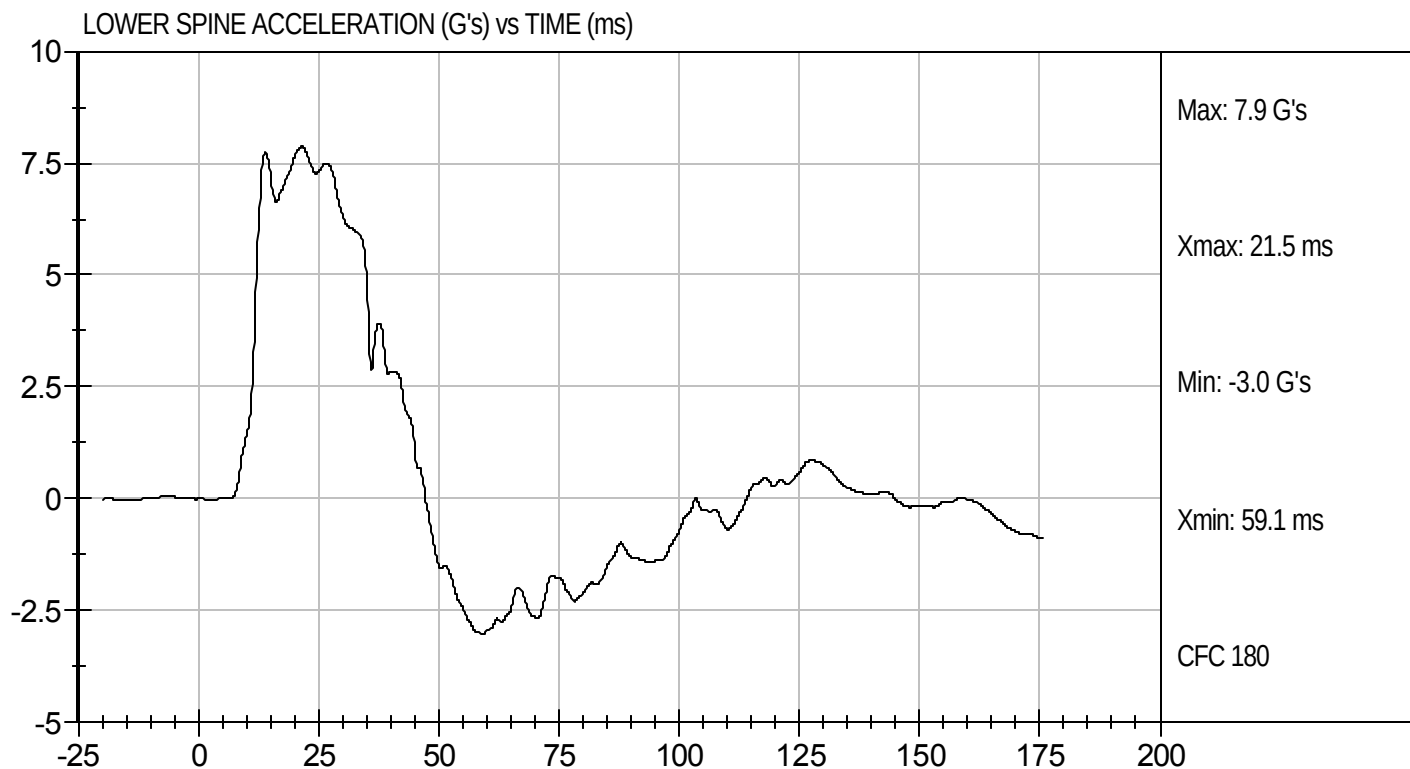
Test Date: 6/16/11
Velocity: 14.36 ft/s, 4.38 m/s





Test Desc: Thorax Without Arm
Component ID: D112095

Test Date: 6/16/11
Velocity: 14.36 ft/s, 4.38 m/s



MGA RESEARCH CORPORATION
ABDOMINAL IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

Test I.D: D112096

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.4	Pass
Humidity	%	10 to 70	51	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Peak Impactor Acceleration	G's	12 to 16	13	Pass
Upper Rib Displacement	mm	36 to 47	38	Pass
Lower Rib Displacement	mm	33 to 44	39	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	10	Pass
Overall Test Results			Pass	

Jessica Gall
Laboratory Technician

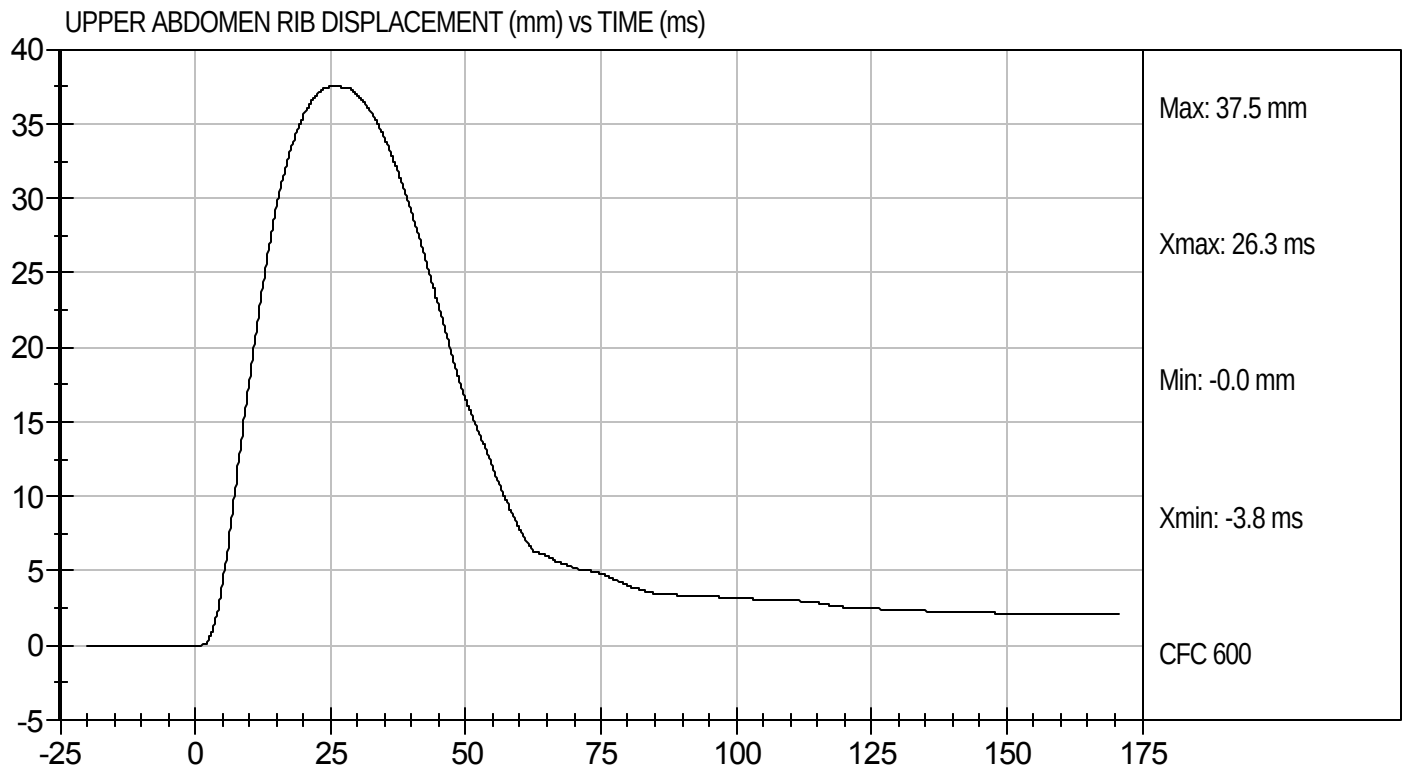
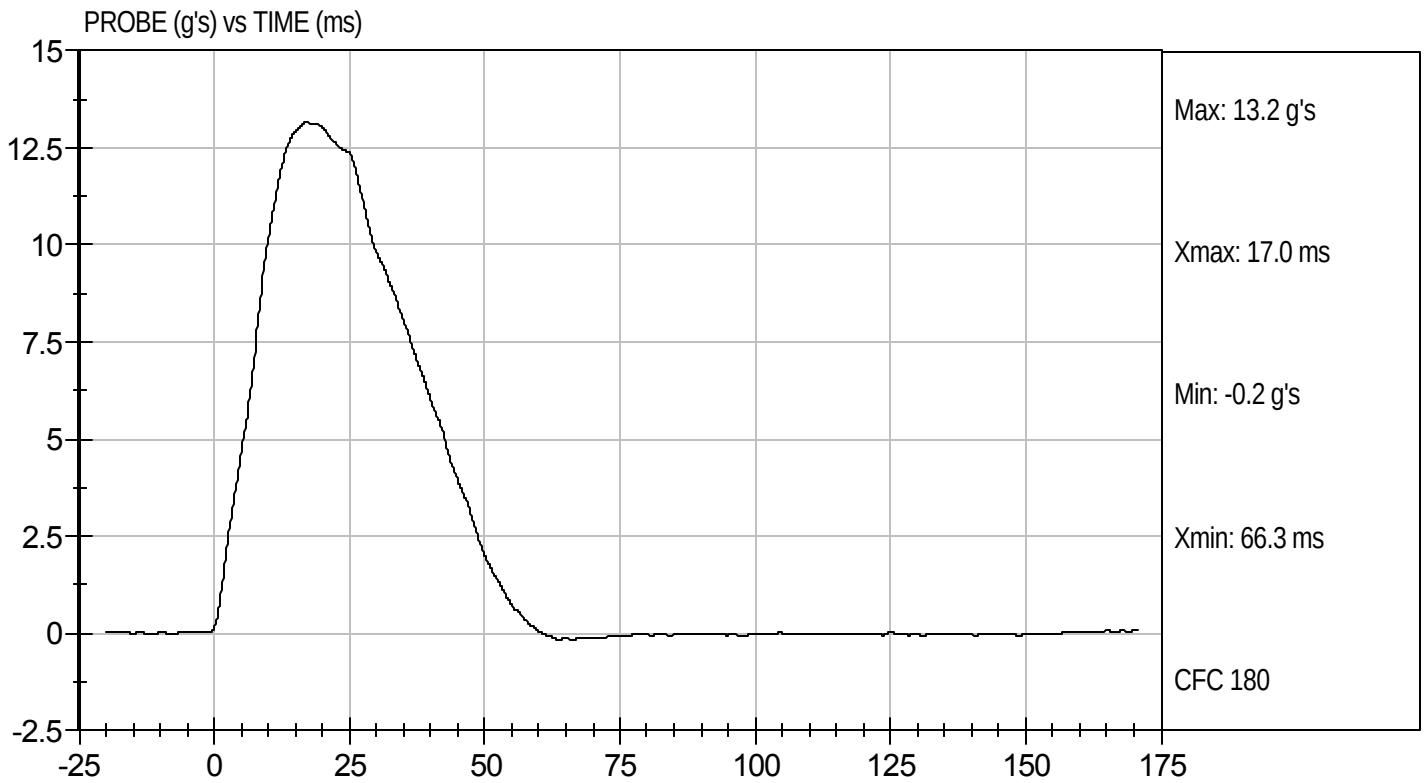
6/16/11
Test Date

David Winkelbauer
Approved By



Test Desc: Abdomen Impact
Component ID: D112096

Test Date: 6/16/11
Velocity: 14.36 ft/s, 4.38 m/s

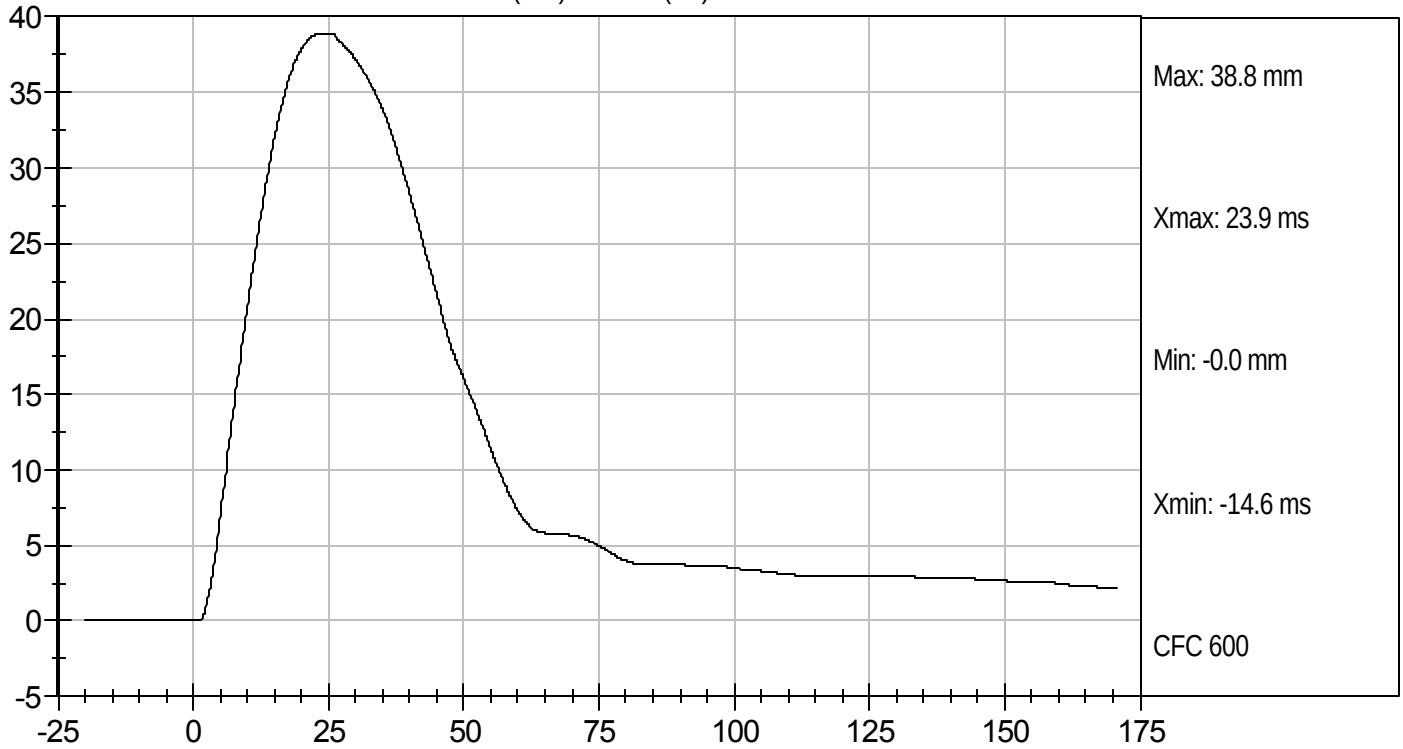




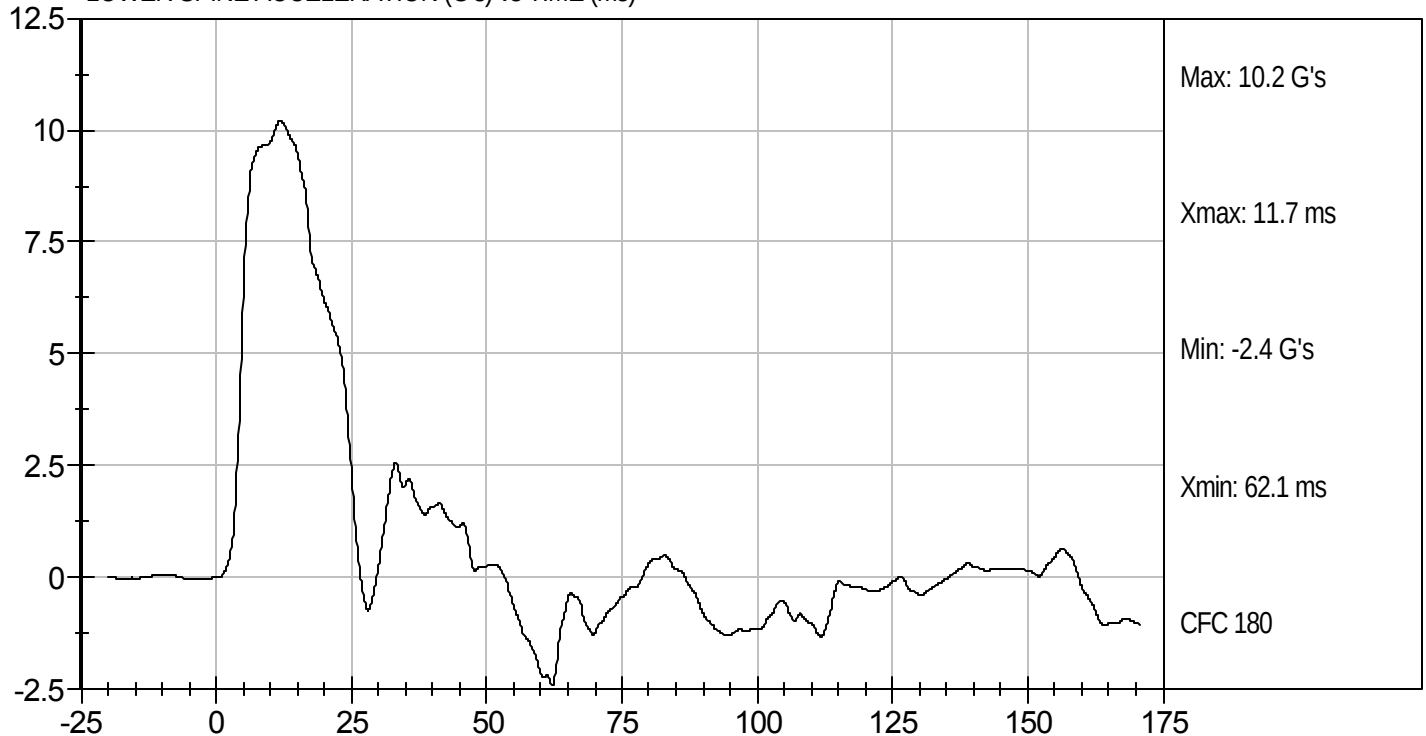
Test Desc: Abdomen Impact
Component ID: D112096

Test Date: 6/16/11
Velocity: 14.36 ft/s, 4.38 m/s

LOWER ABDOMEN RIB DISPLACEMENT (mm) vs TIME (ms)



LOWER SPINE ACCELERATION (G's) vs TIME (ms)

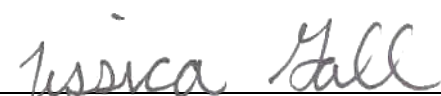


MGA RESEARCH CORPORATION
PELVIS IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

Test I.D: D112097

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.4	Pass
Humidity	%	10 to 70	51	Pass
Impact Velocity	m/s	6.60 to 6.80	6.77	Pass
Peak Impactor Acceleration	G's	38 to 47	43	Pass
Pelvis Y Acceleration after 6 ms	G's	34 to 42	41	Pass
Peak Acetabulum Force	N	3600 to 4300	3817	Pass
Overall Test Results				Pass


Laboratory Technician

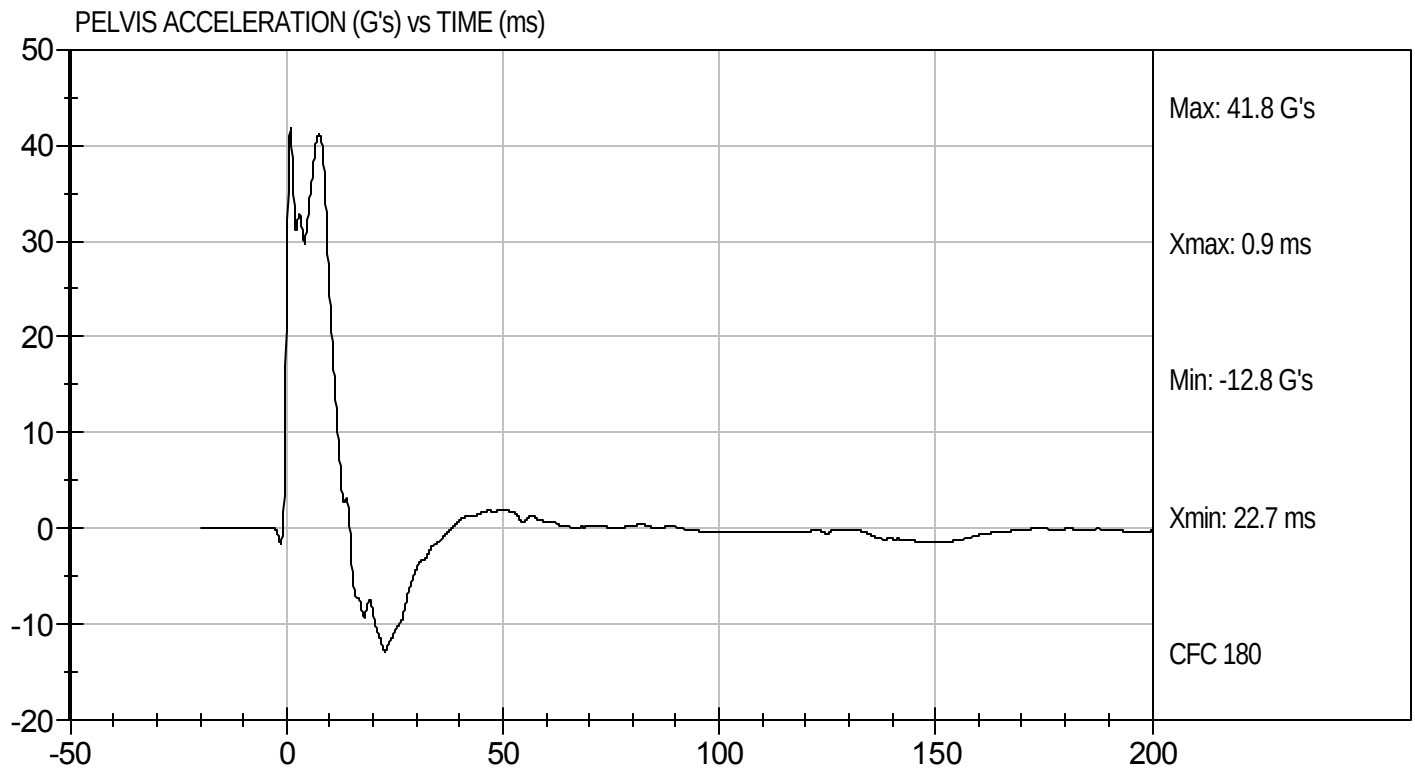
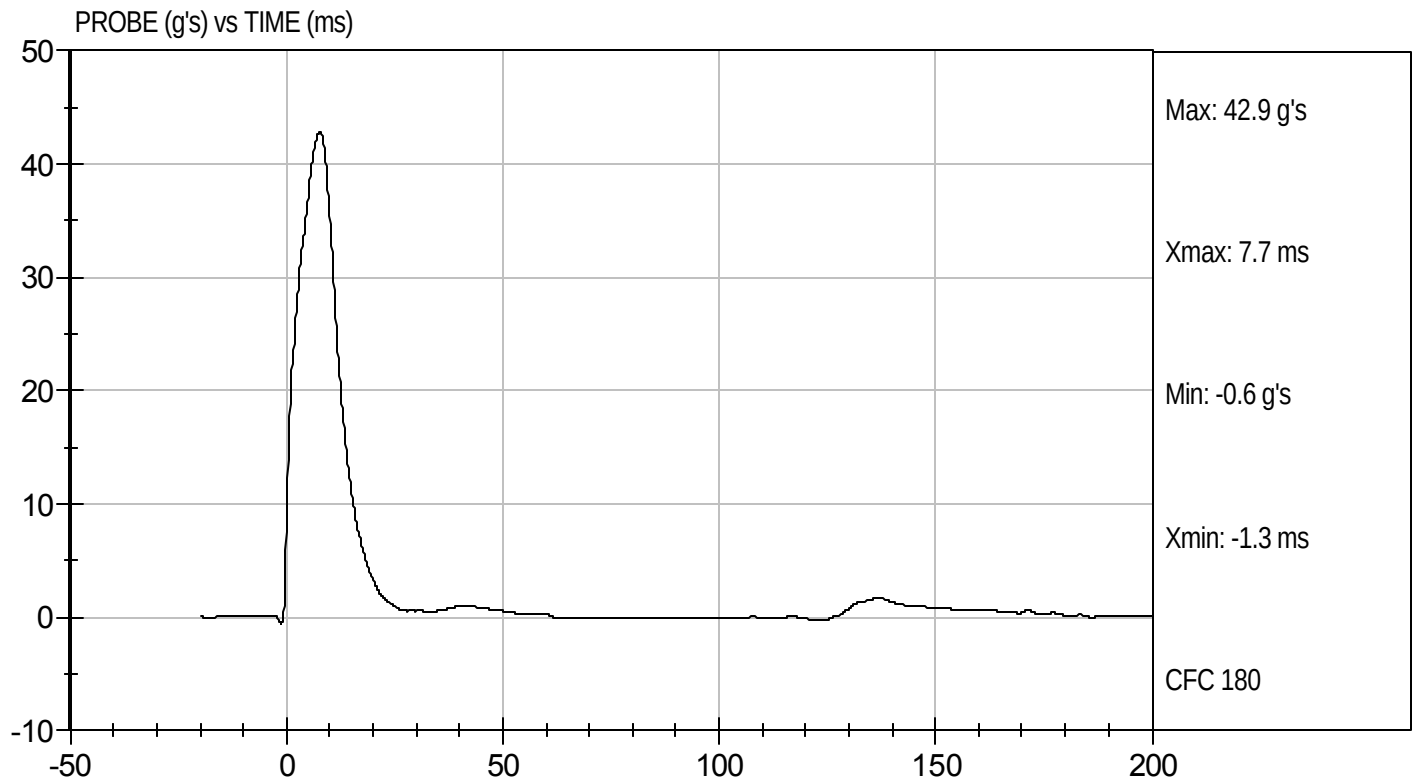
6/16/11
Test Date


Approved By



Test Desc: Pelvis Impact
Component ID: D112097

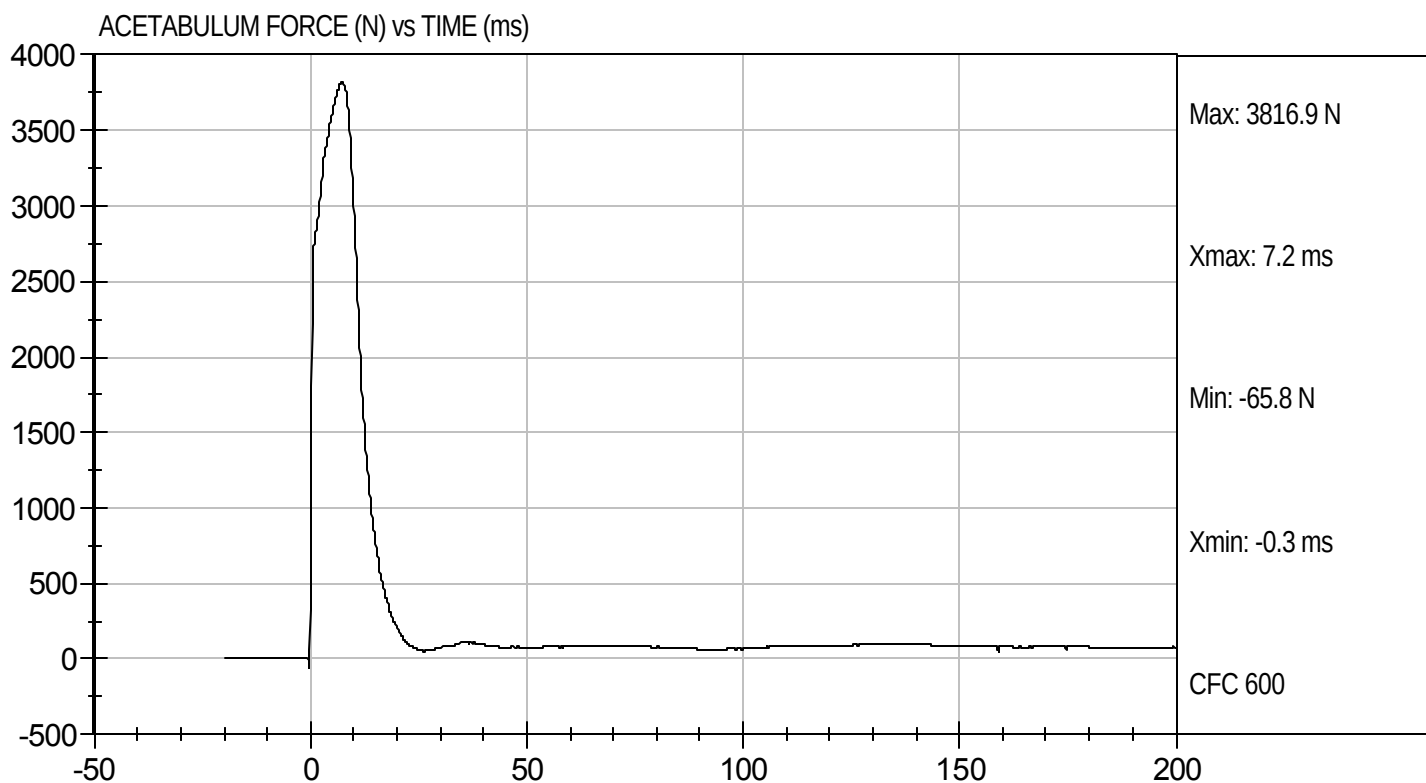
Test Date: 6/16/11
Velocity: 22.2 ft/s, 6.77 m/s





Test Desc: Pelvis Impact
Component ID: D112097

Test Date: 6/16/11
Velocity: 22.2 ft/s, 6.77 m/s



MGA RESEARCH CORPORATION
ILIAC IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

Test I.D: D112098

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.4	Pass
Humidity	%	10 to 70	51	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Peak Impactor Acceleration	G's	36 to 45	36	Pass
Pelvis Y Acceleration	G's	28 to 39	31	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4543	Pass
Overall Test Results			Pass	


Laboratory Technician

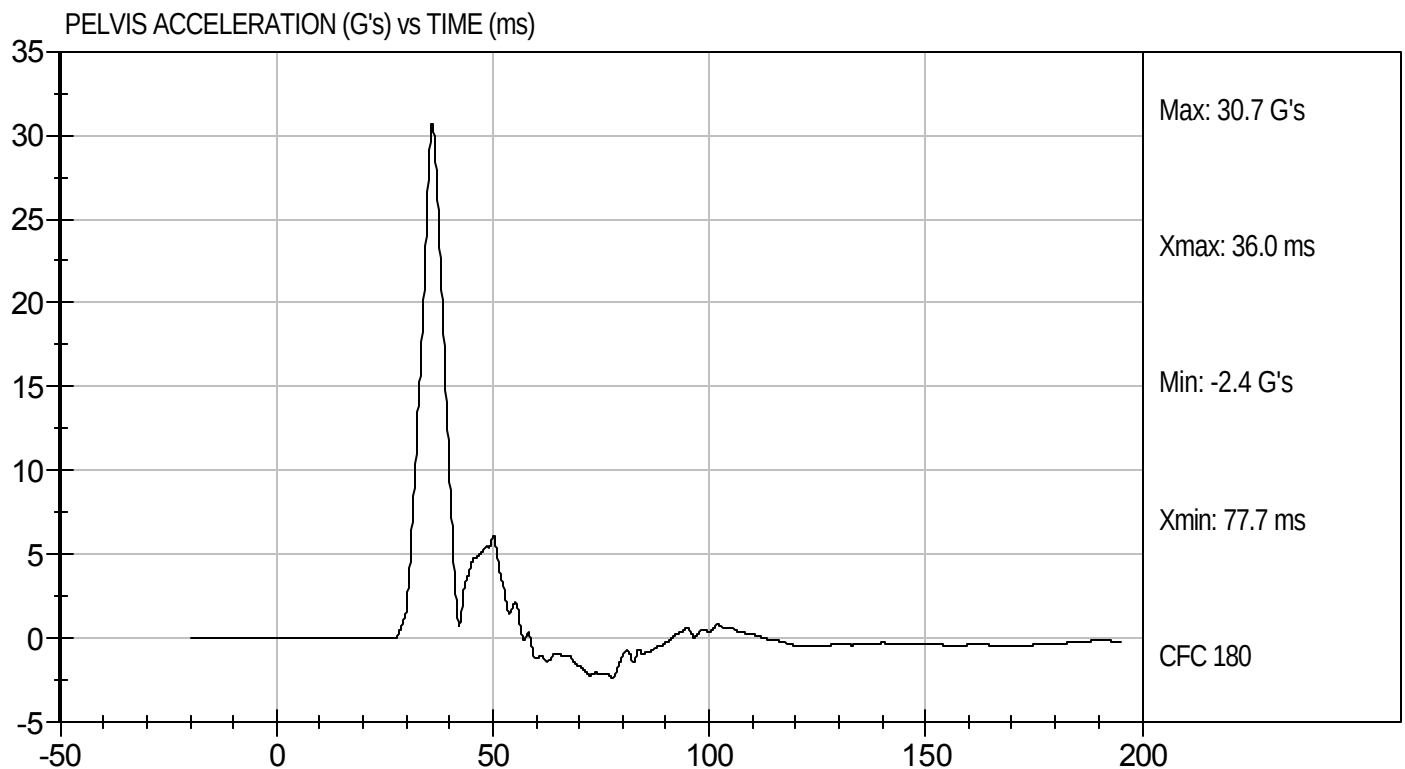
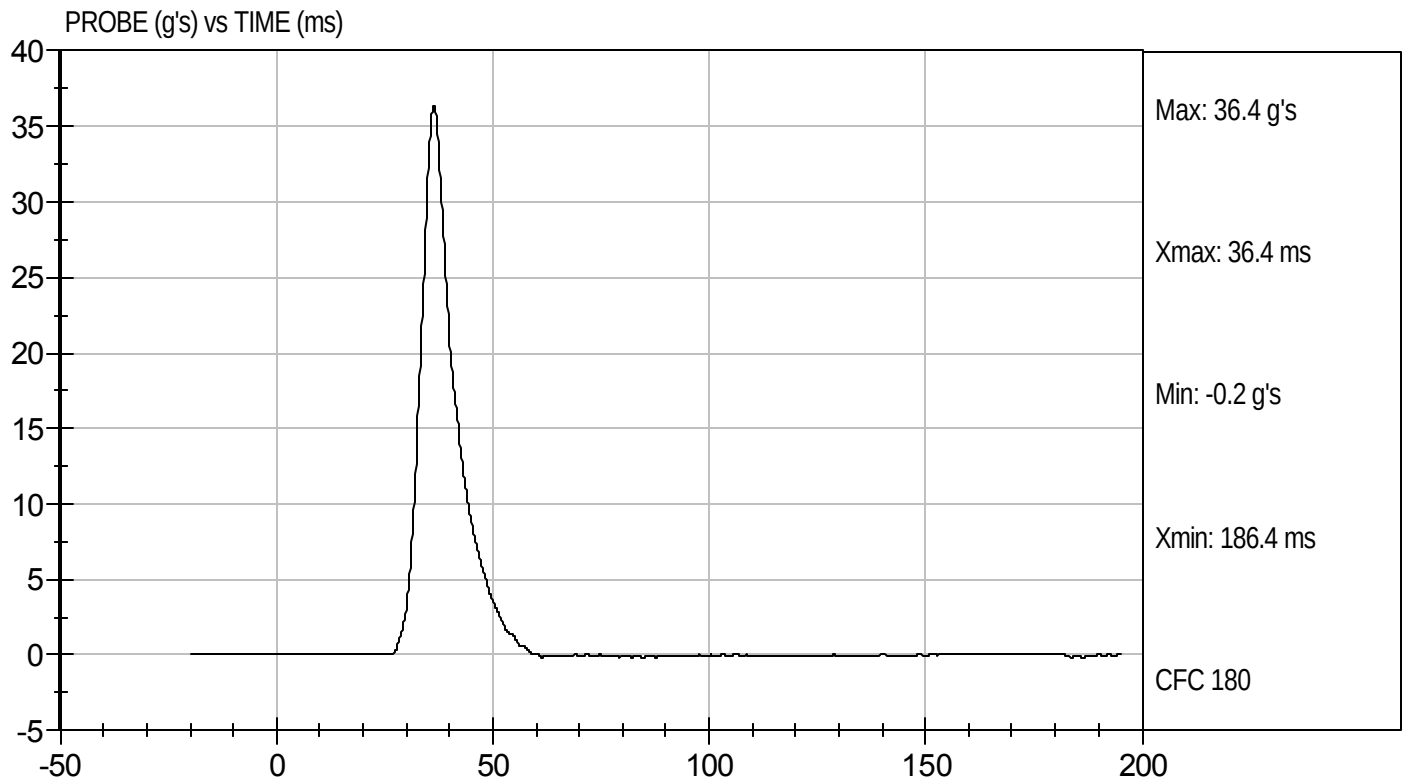
6/16/11
Test Date


Approved By



Test Desc: Iliac Impact
Component ID: D112098

Test Date: 6/16/11
Velocity: 14.36 ft/s, 4.38 m/s





Test Desc: Iliac Impact
Component ID: D112098

Test Date: 6/16/11
Velocity: 14.36 ft/s, 4.38 m/s

