

REPORT NUMBER: SPNCAP-MGA-2011-010

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

**KIA MOTORS MANUFACTURING GEORGIA, INC.
2011 Kia Sorento LX FWD
NHTSA No.: MB0505**

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



Test Date: August 6, 2010

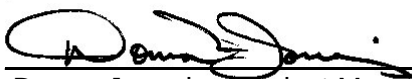
Final Report Date: September 9, 2010

FINAL REPORT

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

This final test report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, in response to Contract Number DTNH22-09-D-00124.

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Approval Date: September 9, 2010

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

Technical Report Documentation Page

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7. Author(s) Donna Janovicz, Project Manager Ben Fischer, Project Engineer		8. Performing Organization Report No. SPNCAP-MGA-2011-010																					
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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 Kia Sorento LX FWD 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 August 6, 2010. The impact velocity was 32.3 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 424 mm at level 3. The test vehicle's performance was as follows: <table border="1" style="margin: 10px auto; border-collapse: collapse; text-align: center;"> <thead> <tr> <th></th> <th colspan="3">Driver ATD (SID-IIs)</th> </tr> <tr> <th>Measurement Description</th> <th>Units</th> <th>Threshold</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₃₆)</td> <td>N/A</td> <td>1000</td> <td>194</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td>Gs</td> <td>82</td> <td>43</td> </tr> <tr> <td>Combined Acetabular and Iliac Pelvic Force</td> <td>N</td> <td>5525</td> <td>4233</td> </tr> </tbody> </table> The 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.					Driver ATD (SID-IIs)			Measurement Description	Units	Threshold	Result	Head Injury Criteria (HIC ₃₆)	N/A	1000	194	Resultant Lower Spine Acceleration	Gs	82	43	Combined Acetabular and Iliac Pelvic Force	N	5525	4233
	Driver ATD (SID-IIs)																						
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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 Kia Sorento LX FWD. 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 Kia Sorento LX FWD. The subject vehicle was towed into the rigid pole at an angle of 75° and a velocity of 32.3 km/h. The test was conducted by MGA Research Corporation in Burlington, Wisconsin, on August 6, 2010. 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 Accelerometers
- Thorax Upper, Middle, and Lower Rib Potentiometers
- Abdomen Upper and Lower Rib Potentiometers
- Lower Spine 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	194	43	Iliac Wing	1076
			Acetabular	3210
			Sum	4233

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 60 msec.

Left Mid A-Post Y after 60 msec.

Left Lower B-Post Y after 60 msec.

.

Camera No. 11 - Real-Time View of Dummy Movement did not run.

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 Kia Sorento LX FWD
Test Program: NCAP Side Pole Impact Test

NHTSA No. MB0505
Test Date: 8/06/2010

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	MB0505	Anti-Lock Brakes	Yes
Model Year	2011	All Wheel Drive	No
Make	Kia	Power Steering	Yes
Model	Sorento	Driver Front Airbag	Yes
Body Style	MPV	Driver Curtain Airbag	Yes
VIN	5XYKT3A12BG064272	Driver Head/Torso Airbag	No
Body Color	Dark Cherry	Driver Torso Airbag	No
Delivery Date	7/12/2010	Driver Torso/Pelvis Airbag	Yes
Odometer (mi)	146	Driver Pelvis Airbag	No
Odometer (km)	235	Driver Knee Airbag	No
Dealer	Boucher Fleet Group	Rear Pass. Front Airbag	No
Transmission	Automatic	Rear Pass. Curtain Airbag	Yes
Final Drive	Front	Rear Pass. Head/Torso Airbag	No
Type/No. Cylinders	4	Rear Pass. Torso Airbag	No
Engine Displacement (L)	2.4	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	No	Pretensioners	Yes
Tinted Glass	Yes	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	No
Does owner's manual provide instruction to turn off automatic door locks?			No

DATA FROM CERTIFICATION LABEL

Manufactured By	Kia Motors Manufacturing Georgia, Inc.	GVWR (kg)	2190
Date of Manufacture	MAY/22/10	GAWR Front (kg)	1350
		GAWR Rear (kg)	1450

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	2	3		5	
Capacity Weight (VCW) (kg)				420	(A)
DSC x 68.04 kg				340	(B)
Cargo Weight (RCLW) (kg)				80	(A-B)

VEHICLE SEAT TYPE

Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	60/40 Split Folding	Contoured	Fixed	Adjustable	
Front Seat	X					w/Lever	
Rear or Second Row			X			w/Lever	
Third Row Seat							

GENERAL TEST AND VEHICLE PARAMETER DATA

NHTSA No. MB0505
Test Date: 8/06/2010

The diagram shows a cross-section of a tire mounted on a wheel. The following labels point to specific markings on the tire sidewall:

- Treadwear, traction and temperature grades:** Points to the top of the sidewall where 'TREADWEAR 220', 'TRACTION A', and 'TEMPERATURE A' are printed.
- Tire ply composition and materials used:** Points to the text 'SIDEWALL 2 PLYS 2XXXXX CORD • MAX LOAD 1300 LB • MAX PRESS 35 PSI • RADIAL • TUBELESS • DOT M49 ASBC66 • FREQ 4 PLYS • 2XXXXX •'.
- Max. cold inflation & load limit:** Points to the text 'MAX. COLD INFLATION & LOAD LIMIT'.
- U.S. DOT safety standard code:** Points to the text 'DOT M49 ASBC66'.
- Load index & speed symbol:** Points to the code '89H'.
- Diameter of wheel in inches:** Points to the code '15' in 'P215/65R15 89H'.
- Radial:** Points to the 'R' in 'P215/65R15 89H'.
- Ratio of height to width (aspect ratio):** Points to the code '65' in 'P215/65R15 89H'.
- Width of tire in millimeters:** Points to the code '215' in 'P215/65R15 89H'.
- Passenger car tire:** Points to the 'P' in 'P215/65R15 89H'.

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	230	230
Recommended Tire Size	P235/65R17	P235/65R17
Tire Size on Vehicle	P235/65R17	P235/65R17
Tire Model	Kumho	Kumho
Tire Manufacturer	SOLUS KL21	SOLUS KL21
Treadwear	500	500
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	2 poly	2 poly
Tire Plies Body	5	5
Load Index & Speed Symbol	103T	103T
Tire Material	Rubber	Rubber
DOT Safety Code Right	DOT H2B9 YPL9	DOT H2B9 YPL9
DOT Safety Code Left	DOT H2B9 YPL9	DOT H2B9 YPL9

DATA SHEET NO. 1 (continued)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2011 Kia Sorento LX FWD
 Test Program: NCAP Side Pole Impact Test

NHTSA No. MB0505
 Test Date: 8/06/2010

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	479.9	356.1		502.1	405.5		499.4	417.3	
Right	kg	480.3	338.4		490.8	383.3		483.1	388.7	
Ratio	%	58.0	42.0		55.7	44.3		54.9	45.1	
Totals	kg	960.2	694.5	1654.7	992.9	788.8	1781.7	982.5	806.0	1788.5

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1654.7	(A)
Actual Weight of 1 P572V ATD (SID-IIs) ATD Used	kg	52.2	(B)
Rated Cargo/Luggage Weight (RCLW)	kg	80	(C)
Calculated Target Vehicle Test Weight (TVTW)	kg	1786.9	(A+B+C)

TEST VEHICLE ATTITUDES AND CG

	Units	As Delivered	As Tested	Fully Loaded
Driver Door Sill Angle (front-to-rear)*	deg	0.0	-0.1	-0.2
Front Passenger Sill Angle (front-to-rear)*	deg	-0.5	-0.3	-0.2
Front Bumper Angle (left-to-right)**	deg	-0.5	-0.5	-0.6
Rear Bumper Angle (left-to-right)**	deg	0.0	0.0	0.0
Vehicle CG (Aft of Front Axle)	mm	1135	1197	1219
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	8	15	20

*Front up is positive ** Left up is positive

GENERAL VEHICLE TEST DATA

Measurement Description	Units	Value
Weight of Ballast in Cargo Area	kg	13.6
Weight of Vehicle Components Removed	kg	19.1

Vehicle components removed to meet target vehicle test weight: Cargo compartment, jack & tools, right rear tail light, right front mirror.

TEST VEHICLE IMPACT POINT DATA

Measurement Parameter	Units	Value
Vertical Impact Reference Line (Aft of Front Axle)	mm	1094
Actual Impact Point (Aft of Front Axle)	mm	1097
Impact Point Difference (- forward / + rearward)	mm	3

DATA SHEET NO. 2

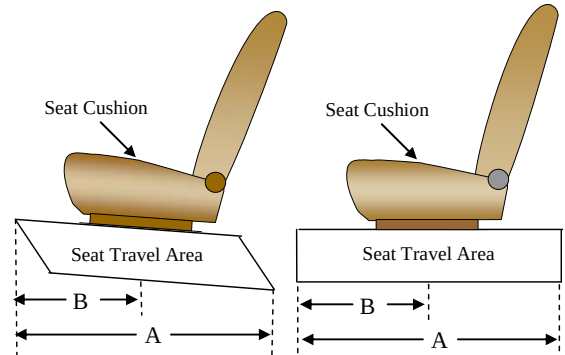
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT, AND FUEL SYSTEM DATA

Test Vehicle: 2011 Kia Sorento LX FWD
 Test Program: NCAP Side Pole Impact Test

NHTSA No. MB0505
 Test Date: 8/06/2010

SEAT FORE/AFT POSITIONS

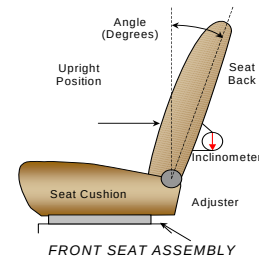
The driver seat was a manual fore/aft adjustable seat. The seat travel was set as specified in Appendix B of the TP dated January 2010. The right front passenger manual seat was set to match the driver seat. The rear passenger seats were not adjustable.



SEAT FORE/AFT POSITIONING	Total Fore/Aft Travel (mm)	Placed in Detent # or Position (mm)
Driver Seat	24 detents	0 detent (full forward)
Front Passenger Seat	24 detents	0 detent (full forward)
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 rocker sill at the headrest post for the front seats and at the seat back frame for the rear seats.



SEAT BACK ANGLE	Degrees	Detents
Driver Seat Back Angle with Seated Dummy	-7.8 (headrest post)	
Front Passenger Seat Back Angle	-7.8 (headrest post)	
Struck Side Rear Seat Back Angle	19.0 (seat back frame)	
Non-Struck Side Rear Passenger Seat Back Angle	19.0 (seat back frame)	

SEAT BELT UPPER ANCHORAGE

The driver and passenger seat belt upper anchorages were set at the manufacturer's specified placement in Form 1.

SEAT BELT UPPER ANCHORAGES	Total # of Positions	Placed in Position #
Driver Seat	3 detents	2 (uppermost as 0)
Front Passenger Seat	3 detents	2 (uppermost as 0)

DATA SHEET NO. 2 (CONTINUED)

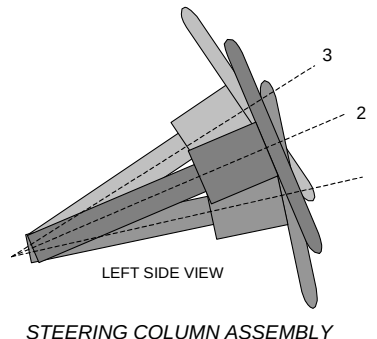
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT, AND FUEL SYSTEM DATA

Test Vehicle: 2011 Kia Sorento LX FWD
 Test Program: NCAP Side Pole Impact Test

NHTSA No. MB0505
 Test Date: 8/06/2010

STEERING COLUMN ADJUSTMENT

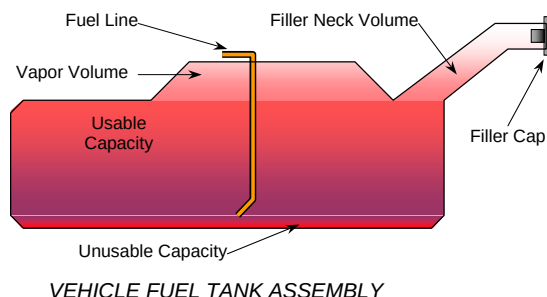
Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when moved through its full range of motion. An aluminum plate is placed across the rim of the steering wheel, an inclinometer is placed on the plate and the angle is measured.



STEERING COLUMN POSITIONING

	Degrees	Fore/Aft Position (mm)
Lowermost - Position 1	65.3	185 mm
Geometric Center – Position 2	63.1	165 mm
Uppermost – Position 3	60.9	145 mm
Telescoping Steering Wheel Travel	4.4	40 mm
Test Position	63.1	165 mm

Describe the fuel pump type, its behavior, and the location of the fuel filler pipe. The test vehicle is equipped with an electric fuel pump. Fuel pump will operate when the key is in the “ON” position. The fuel pipe is on the left side.



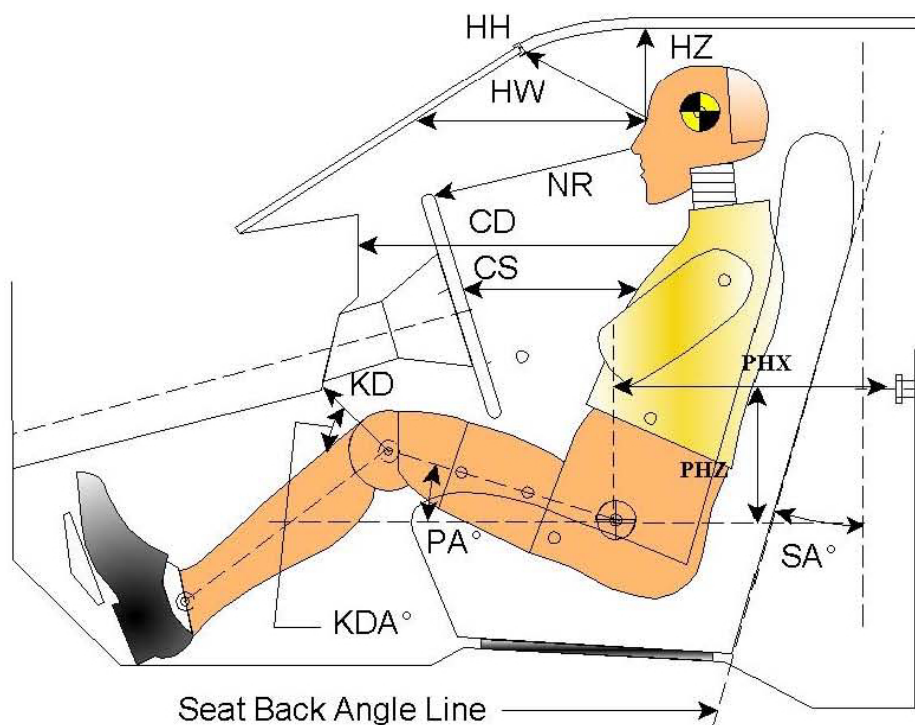
FUEL TANK CAPACITY DATA

	Liters
Usable Capacity of “Standard” Tank	68.0
Usable Capacity of “Optional” Tank	
Usable Capacity of Standard Tank as Specified in Owner’s Manual	68.0
Usable Capacity of Optional Tank as Specified in Owner’s Manual	
92-94% of Usable Capacity	62.6 to 63.9
Actual Amount of Solvent Used	63.2
1/3 of Usable Capacity	22.7

.DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2011 Kia Sorento LX FWD
 Test Program: NCAP Side Pole Impact Test

NHTSA No. MB0505
 Test Date: 8/06/2010

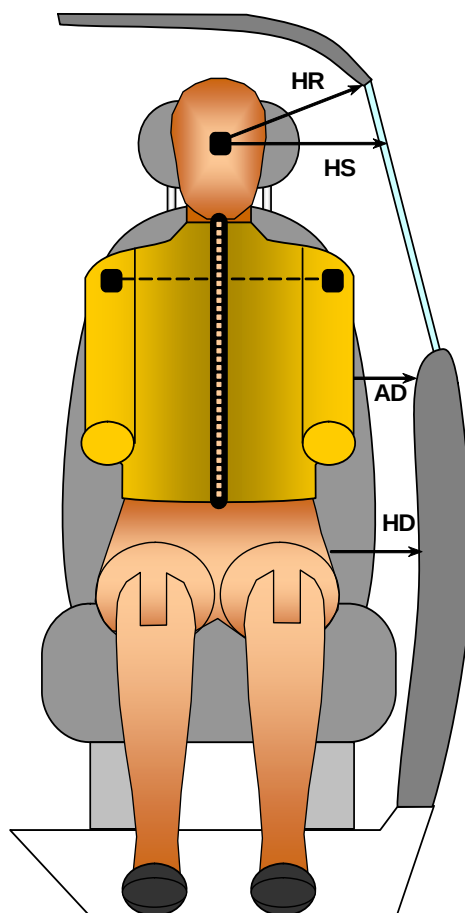


Code	Measurement Description	Driver S/N 296	
		Length (mm)	Angle (°)
HH	Head to Header	238	
HW	Head to Windshield	538	
HZ	Head to Roof	182	
NR	Nose to Rim	246	
CD	Chest to Dash	398	
CS	Chest to Steering Wheel	156	
KDL/KDAL	Left Knee to Dash	78	29.4
KDR/KDAR	Right Knee to Dash	66	29.0
PA	Pelvic Angle		20.4
PHX	H-Point to Striker (X-Axis)	357	
PHZ	H-Point to Striker (Z-Axis)	177	
SA	Seat Back Angle		-7.8

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2011 Kia Sorento LX FWD
 Test Program: NCAP Side Pole Impact Test

NHTSA No. MB0505
 Test Date: 8/06/2010



FRONT VIEW OF DUMMY

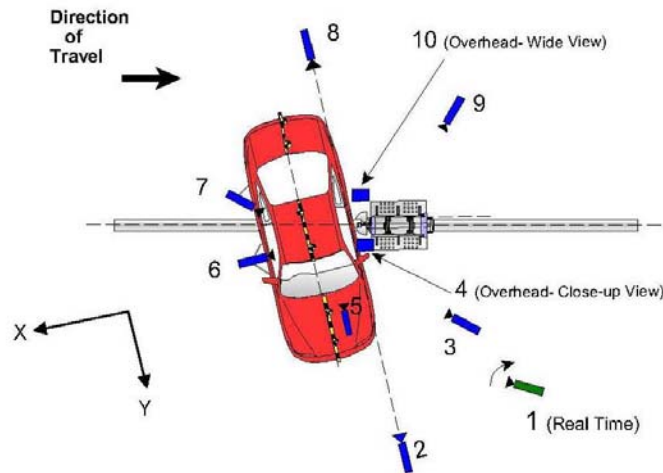
Code	Measurement Description	Driver S/N 296
		Length (mm)
HR	Head to Side Header	270
HS	Head to Side Window	354
AD	Arm to Door	148
HD	H-Point to Door	159

DATA SHEET NO. 5

CAMERA LOCATIONS AND DATA

Test Vehicle: 2011 Kia Sorento LX FWD
 Test Program: NCAP Side Pole Impact Test

NHTSA No. MB0505
 Test Date: 8/06/2010



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	20	5510	-1630	24	1000
3	Impact Side 45° Forward	-1720	4180	-1640	20	1000
4	Overhead Closeup	40	0	-4520	50	1000
5	Onboard – Driver Front				12.5	1000
6	Onboard – Driver Side				8	1000
7	Onboard – Driver Rear				8	1000
8	Rear Ground Level	0	-6540	-1590	24	1000
9	Impact Side 45° Rearward	-3590	-2820	-1660	20	1000
10	Overhead Wide View	80	0	-4520	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

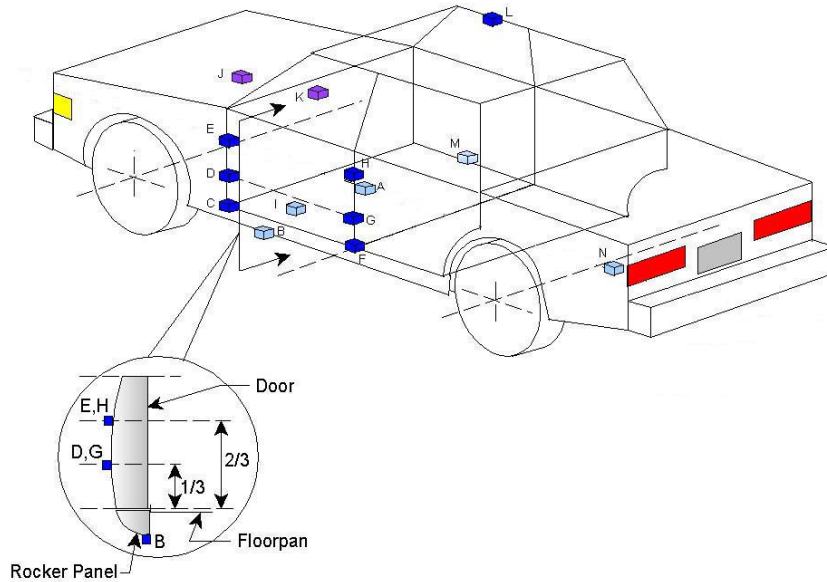
	Number of Channels
Driver Dummy	16
Vehicle Structure	21
Pole Load Cells – Not used	8
Contact Switches	3
Airbag Timing	2
Total No. of Data Channels	50

DATA SHEET NO. 6

VEHICLE ACCELEROMETER DATA

Test Vehicle: 2011 Kia Sorento LX FWD
 Test Program: NCAP Side Pole Impact Test

NHTSA No. MB0505
 Test Date: 8/06/2010



	Accelerometer Location			
	ID	Coordinates (mm)		
		X	Y	Z
A	Vehicle CG	2510	-60	-355
	Vehicle CG Sensor	2550	-60	-355
B	Left Floor Sill	2912	-758	-289
C	A Pillar Sill	3210	-758	-291
D	A Pillar Low	3093	-719	-623
E	A Pillar Mid	3182	-840	-884
F	B Pillar Sill	2144	-758	-285
G	B Pillar Low	2083	-767	-682
H	B Pillar Mid	2083	-763	-930
I	Driver Seat	2402	-575	-514
L	Engine Top	3912	0	-886
J	Firewall	3635	0	-1059
K	Right Roof	2146	520	-1685
M	Right Floor Sill	2545	758	-290
N	Rear Floorpan	950	0	-540

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 Kia Sorento LX FWD
Test Program: NCAP Side Pole Impact Test

NHTSA No. MB0505
Test Date: 8/06/2010



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 Kia Sorento LX FWD
 Test Program: NCAP Side Pole Impact Test

NHTSA No. MB0505
 Test Date: 8/06/2010

TEST DUMMY INFORMATION AND CONTACT

Description	Driver
Dummy Type / Serial No.	SID-IIs / 296
Head Contact	Curtain Airbag, Headrest
Upper Torso Contact	Side Airbag
Lower Torso Contact	Side Airbag
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 Window 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

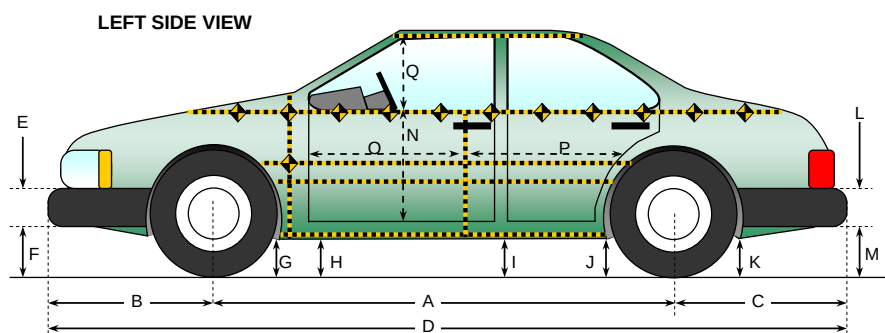
Measured Parameter	Units	Requirement	Value
Horizontal Offset from Vertical Impact Reference Line	mm	+/- 38	+3
Trap No. 1 Velocity (Primary)	km/h	31.4 to 33.0	32.3
Trap No. 2 Velocity (Redundant)	km/h	31.4 to 33.0	32.5

DATA SHEET NO. 9

VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2011 Kia Sorento LX FWD
 Test Program: NCAP Side Pole Impact Test

NHTSA No. MB0505
 Test Date: 8/06/2010



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

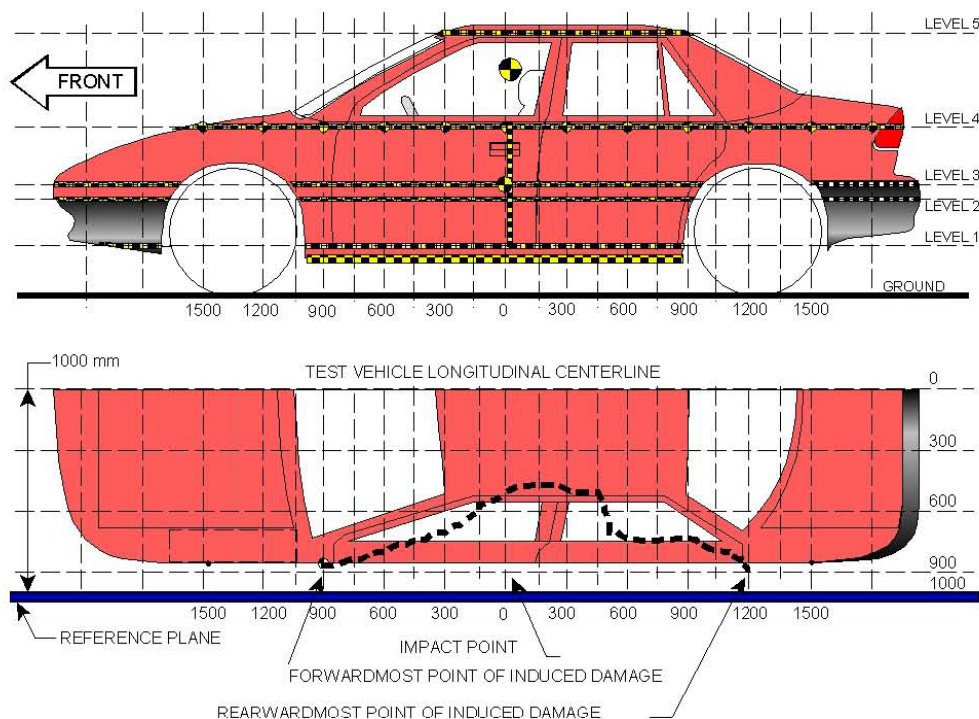
VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2704	2594	110
B	Front Axle to FSOV	916	933	-17
C	Rear Axle to RSOV	1061	1059	2
D1	Total Vehicle Length at Left Side	3832	3680	152
D2	Total Vehicle Length at Centerline	4681	4586	95
D3	Total Vehicle Length at Right Side	3832	3845	-13
E	Front Bumper Thickness	118	118	0
F	Front Bumper Bottom to Ground	458	510	-52
G	Sill Height at Front Wheel Well	261	250	11
H	Sill Height at Front Door Leading Edge	261	240	21
I	Sill Height at B Pillar	275	273	2
J1	Sill Height at Rear Wheel Well	275	283	-8
J2	Pinch Weld Height at Rear Wheel Well	274	280	-6
K	Sill Height Aft of Rear Wheel Well	300	305	-5
L	Rear Bumper Thickness	83	83	0
M	Rear Bumper Bottom to Ground	417	405	12
N	Sill Height to Window Bottom Sill	790	806	-16
O	Front Door Leading Edge to Impact CL	655	644	11
P	Rear Door Trailing Edge to Impact CL	1268	1284	-16
Q	Front Window Opening	474	439	35
R	Right Side Length	3832	3845	-13
S	Left Side Length	3832	3680	152
T	Vehicle Width at B Post	1858	1713	145

DATA SHEET NO. 10 **VEHICLE EXTERIOR CRUSH MEASUREMENTS**

Test Vehicle: 2011 Kia Sorento LX FWD
 Test Program: NCAP Side Pole Impact Test

NHTSA No. MB0505
 Test Date: 8/06/2010



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	355
2	Occupant H-Point	785
3	Mid-Door	760
4	Window Sill	1112
5	Window Top	1605

DATA SHEET NO. 10 (CONTINUED)

VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2011 Kia Sorento LX FWD
Test Program: NCAP Side Pole Impact Test

NHTSA No. MB0505
Test Date: 8/06/2010

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-750		179	176	253			199	196	248			20	20	-5	
-600	217	187	186	266		284	216	219	276		67	29	33	10	
-525	217	186	186	263		318	272	274	302		101	86	88	39	
-450	218	186	185	260		353	325	326	343		135	139	141	83	
-375	219	185	184	259		389	377	378	378		170	192	194	119	
-300	219	184	184	252		432	420	420	428		213	236	236	176	
-225	220	183	183	251		488	473	474	486		268	290	291	235	
-150	220	183	183	247	473	548	538	540	546	592	328	355	357	299	119
-75	221	183	183	245	470	603	594	595	599	626	382	411	412	354	156
0	220	183	182	242	471	605	606	606	600	615	385	423	424	358	144
75	221	182	182	241	471	589	593	591	585	601	368	411	409	344	130
150	221	182	182	239	473	516	536	535	525	568	295	354	353	286	95
225	223	182	182	237	473	457	468	470	461	547	234	286	288	224	74
300	223	182	182	235	476	411	412	411	405	529	188	230	229	170	53
375	223	181	182	233	476	367	350	350	349	514	144	169	168	116	38
450	222	182	182	232	478	341	301	303	329	504	119	119	121	97	26
600	223	183	183	231	480	295	271	272	301	488	72	88	89	70	8
750	224	185	185	231	482	261	247	249	281	488	37	62	64	50	6
900	225	185	187	230	482	223	216	217	255	483	-2	31	30	25	1
1050	228	187	186	231	484	199	199	199	245	490	-29	12	13	14	6
1200		176	176	233	487		163	162	223	495		-13	-14	-10	8
1350				236	492				210	512				-26	20
1500				234	501				239	507				5	6
1650				245	506				244	510				-1	4
1800				251	517				250	521				-1	4

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 Kia Sorento LX FWD
Test Program: NCAP Side Pole Impact Test

NHTSA No. MB0505
Test Date: 8/06/2010

MAXIMUM CRUSH DATA

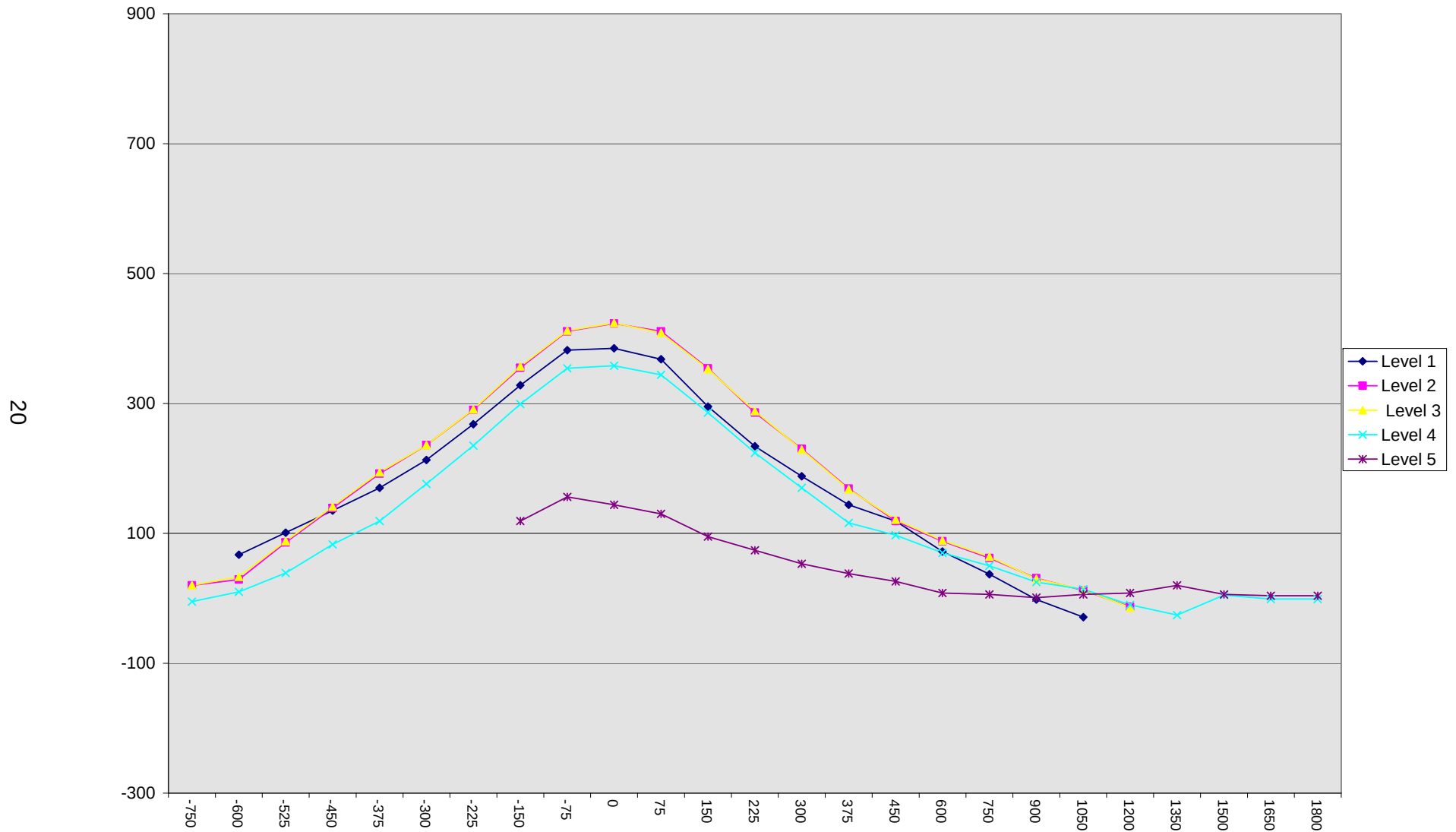
	Level 1	Level 2	Level 3	Level 4	Level 5
Maximum Crush (mm)	385	423	424	358	156
Distance From Impact (mm)	0	0	0	0	-75

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 Kia Sorento LX FWD
Test Program: NCAP Side Pole Impact Test

NHTSA No. MB0505
Test Date: 8/06/2010



DATA SHEET NO. 11

FMVSS 301 FUEL SYSTEM INTEGRITY POST-IMPACT DATA

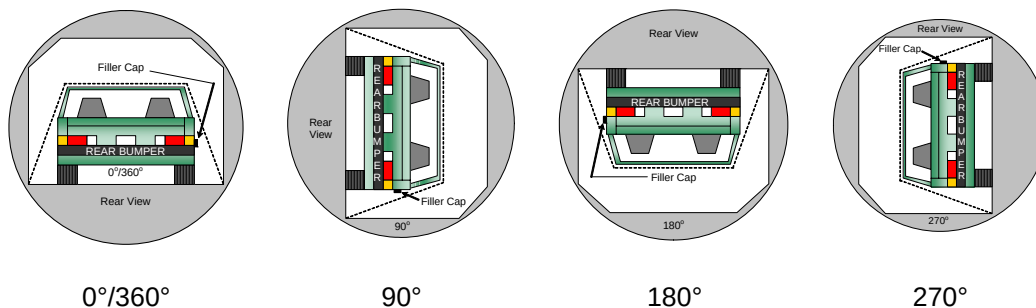
Test Vehicle: 2011 Kia Sorento LX FWD
 Test Program: NCAP Side Pole Impact Test

NHTSA No. MB0505
 Test Date: 8/06/2010

Test Time: 2:35 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°	109	300	409
90° to 180°	118	300	418
180° to 270°	115	300	415
270° to 360°	115	300	415

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

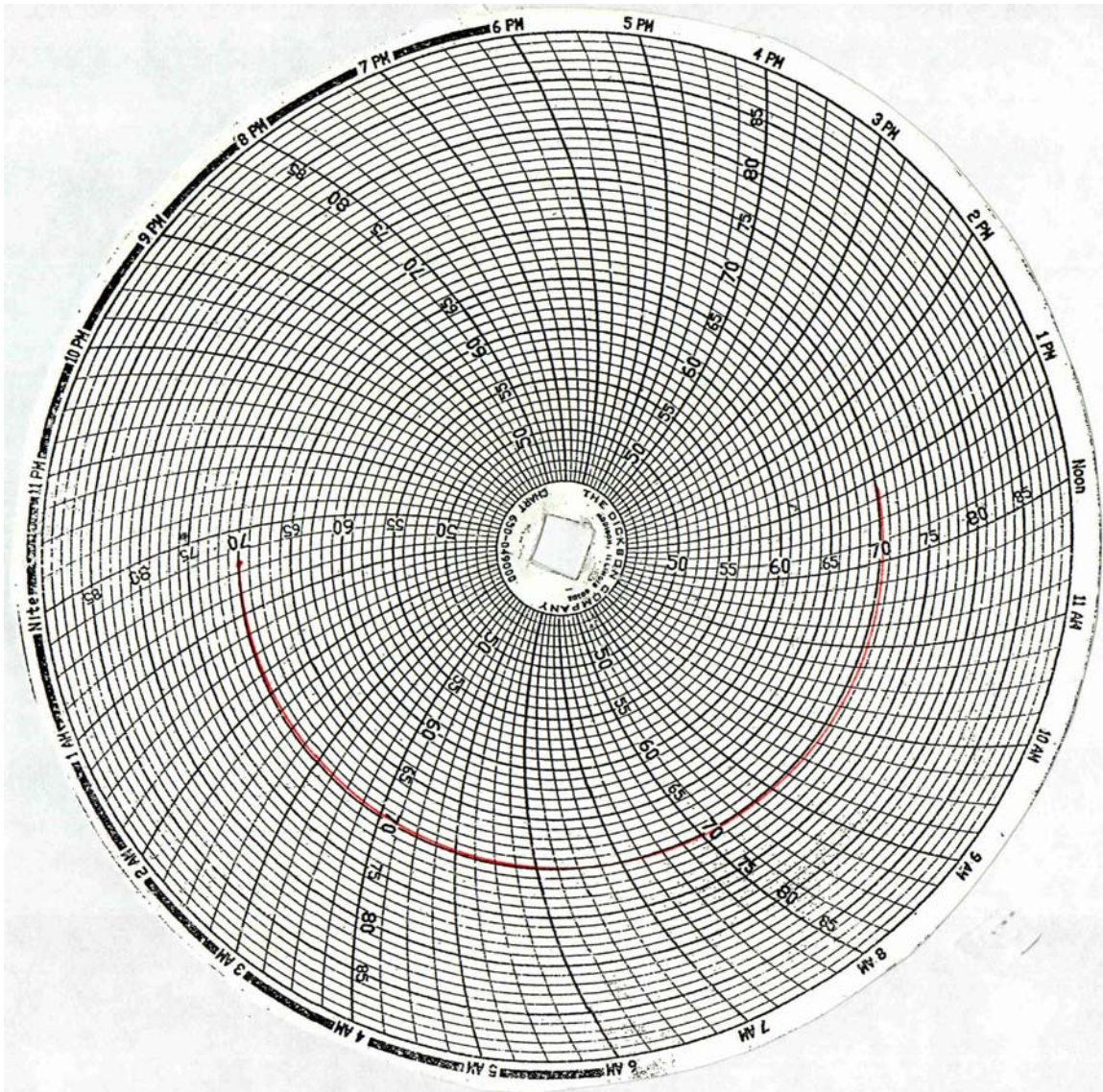
Test Phase	Spillage Location
0° to 90°	
90° to 180°	
180° to 270°	
270° to 360°	

DATA SHEET NO. 12

DUMMY/VEHICLE TEMPERATURE STABILIZATION DATA

Test Vehicle: 2011 Kia Sorento LX FWD
Test Program: NCAP Side Pole Impact Test

NHTSA No. MB0505
Test Date: 8/06/2010



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



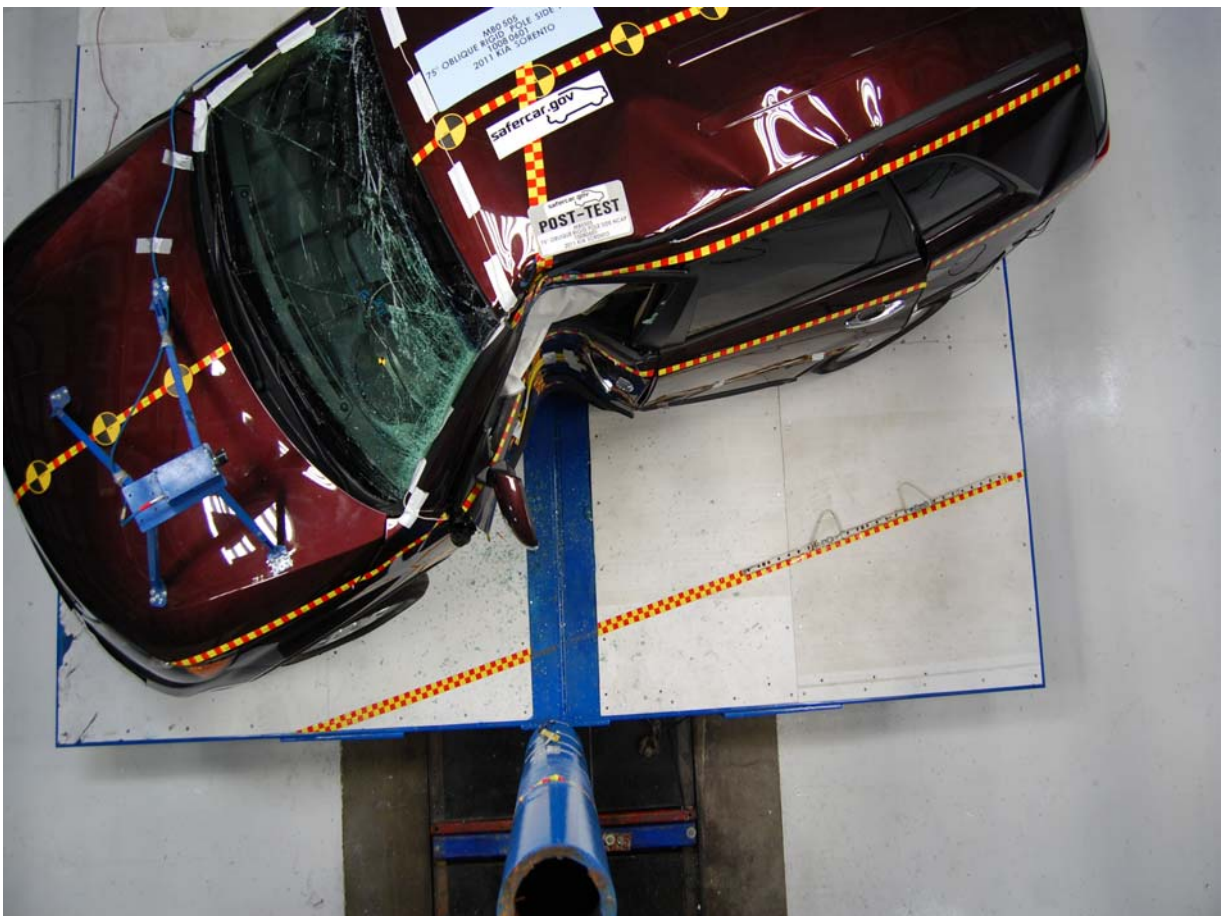
Pre-Test Right Side View of Test Vehicle



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 at Ideal Impact Point



Pre-Test Right Side View of Pole Positioned Against Side of Vehicle at Ideal Impact Point



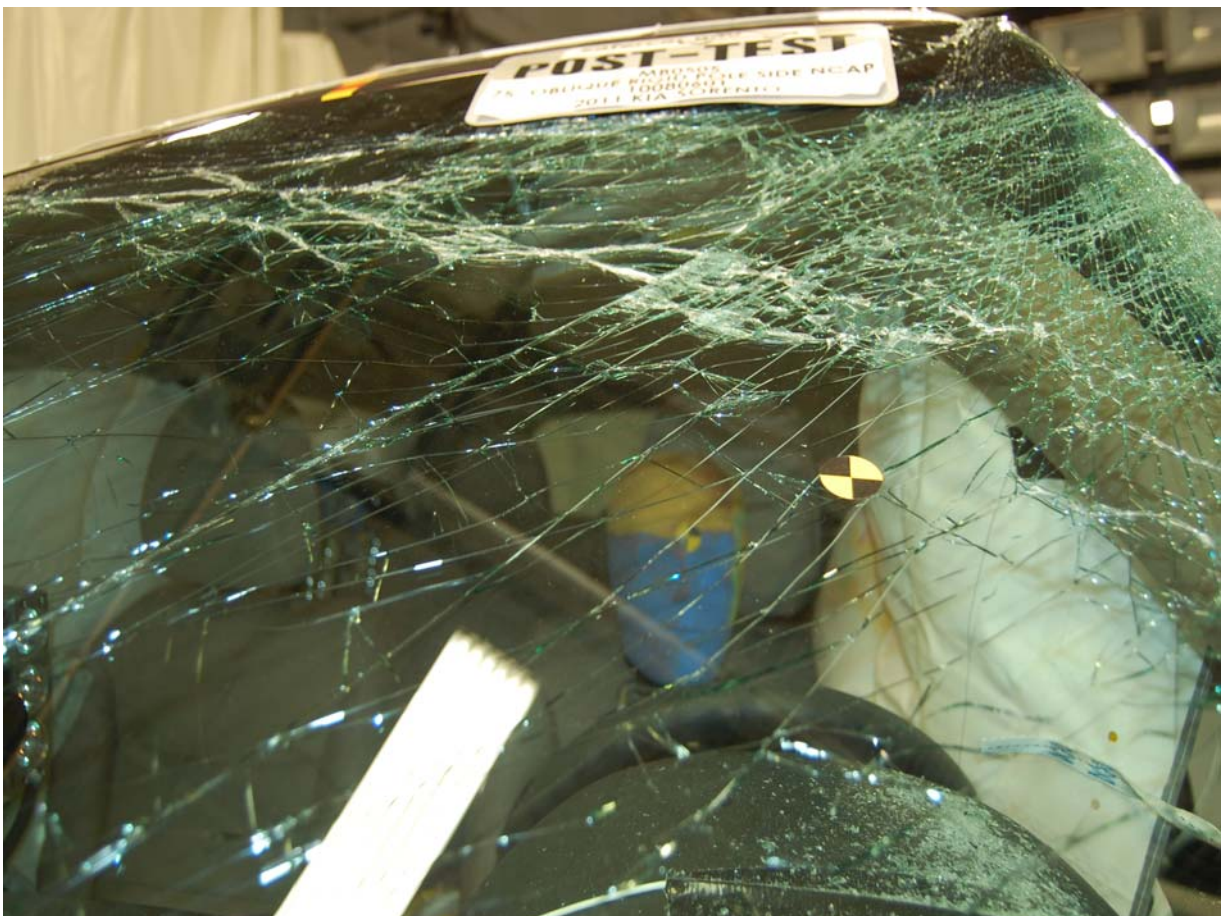
Pre-Test Close-Up View of Impact Point Target



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



Pre-Test Front Close-Up View of Dummy



Post-Test Front Close-Up View of Dummy



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



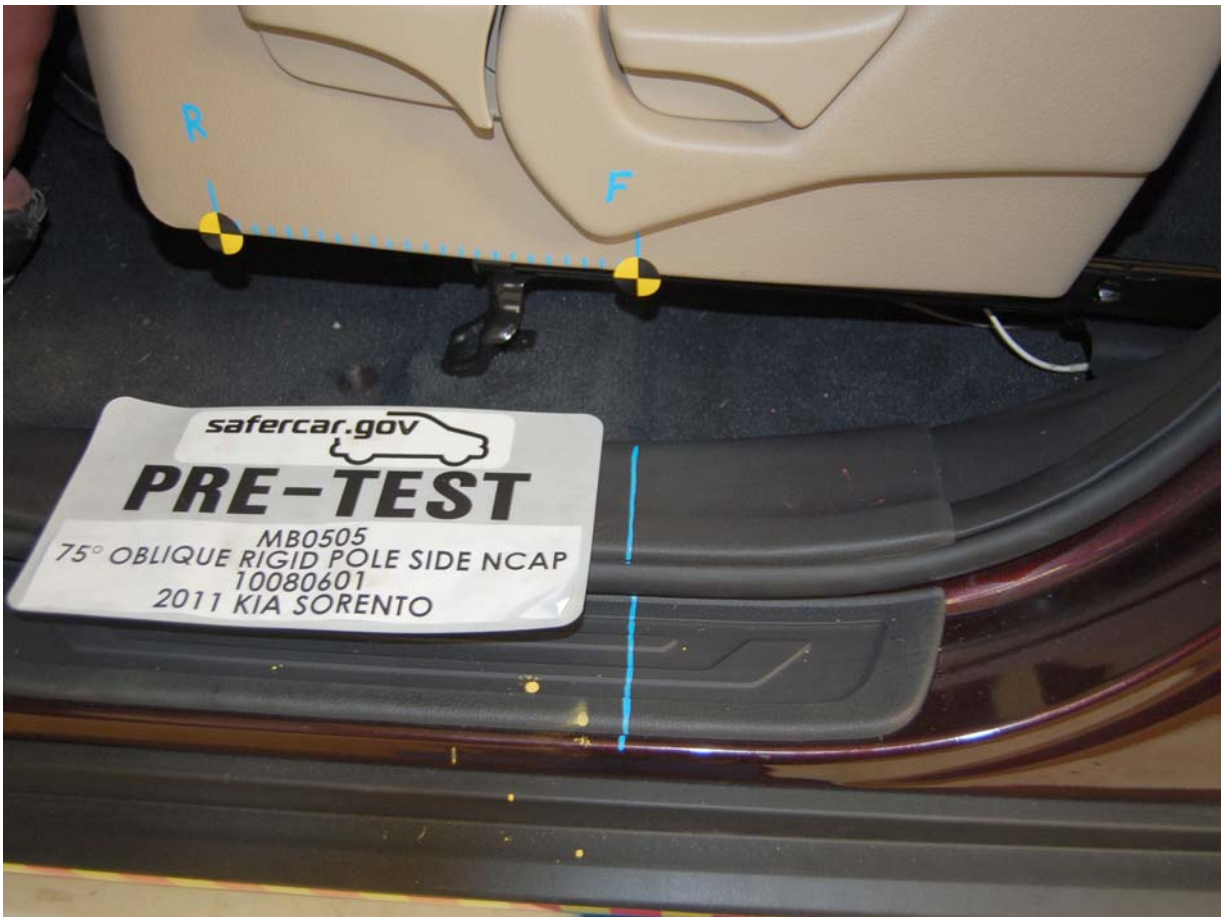
Pre-Test View of Belt Anchorage for Dummy to Show Position



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



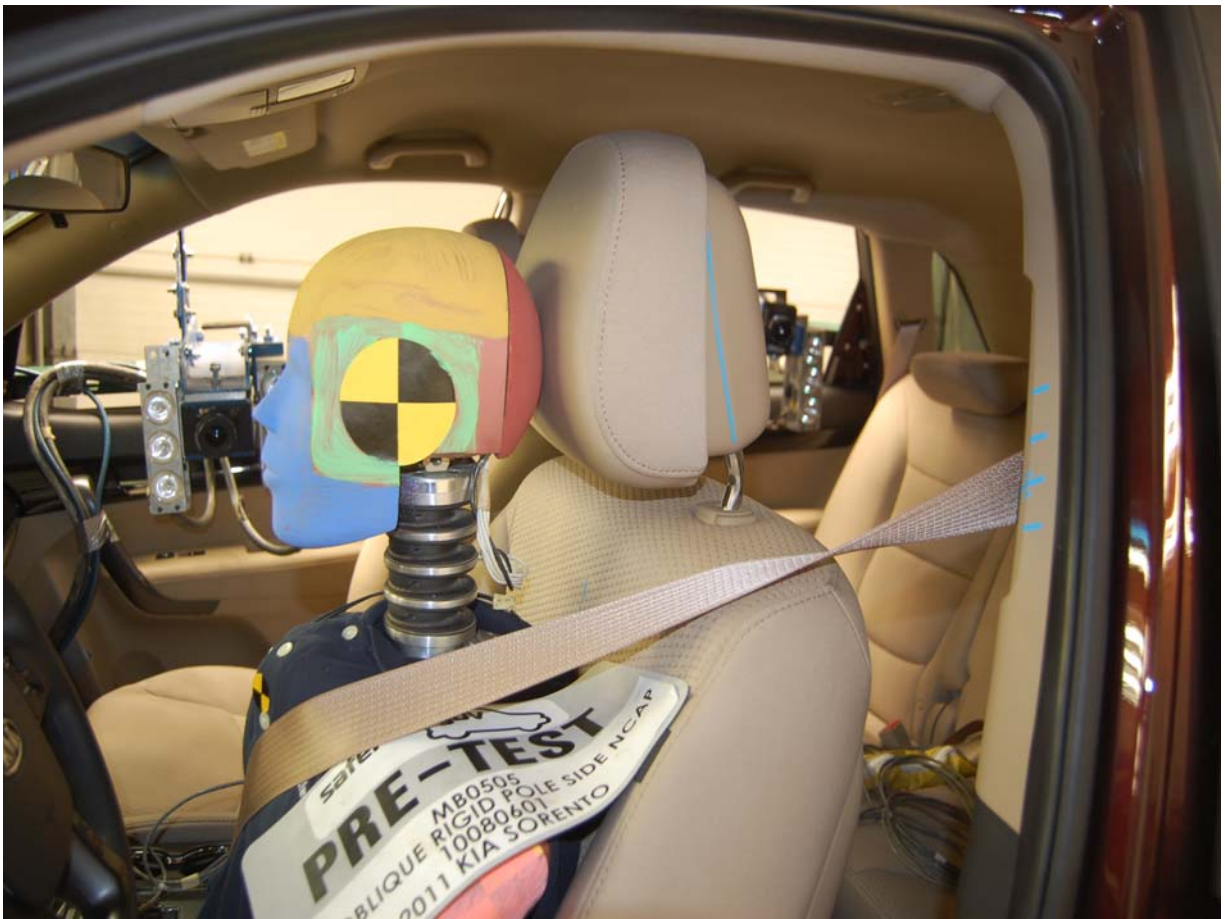
Pre-Test View of Parking Brake



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



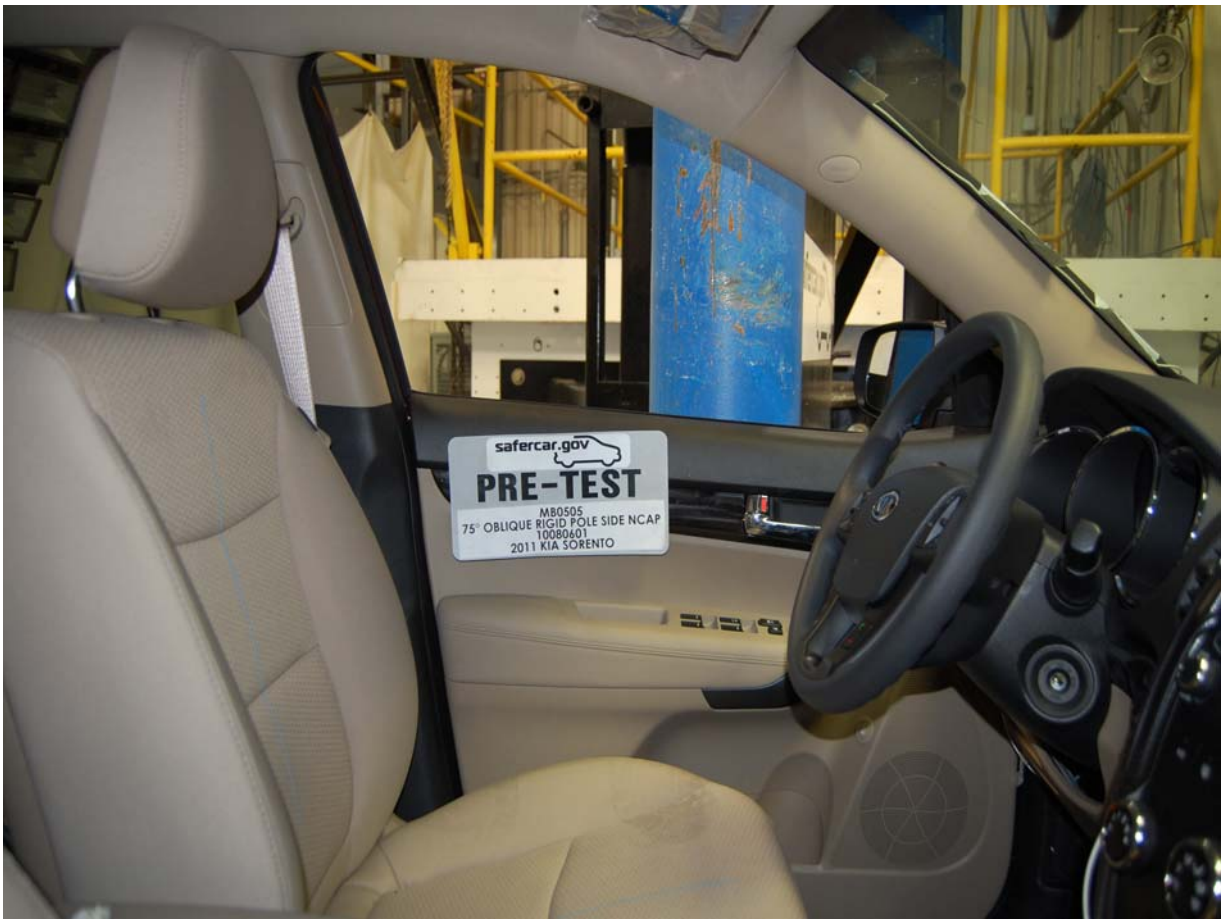
Post-Test Dummy and Door Clearance View



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 Door Panel View



Post-Test Inner Door Panel View Showing Dummy Contact Location



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



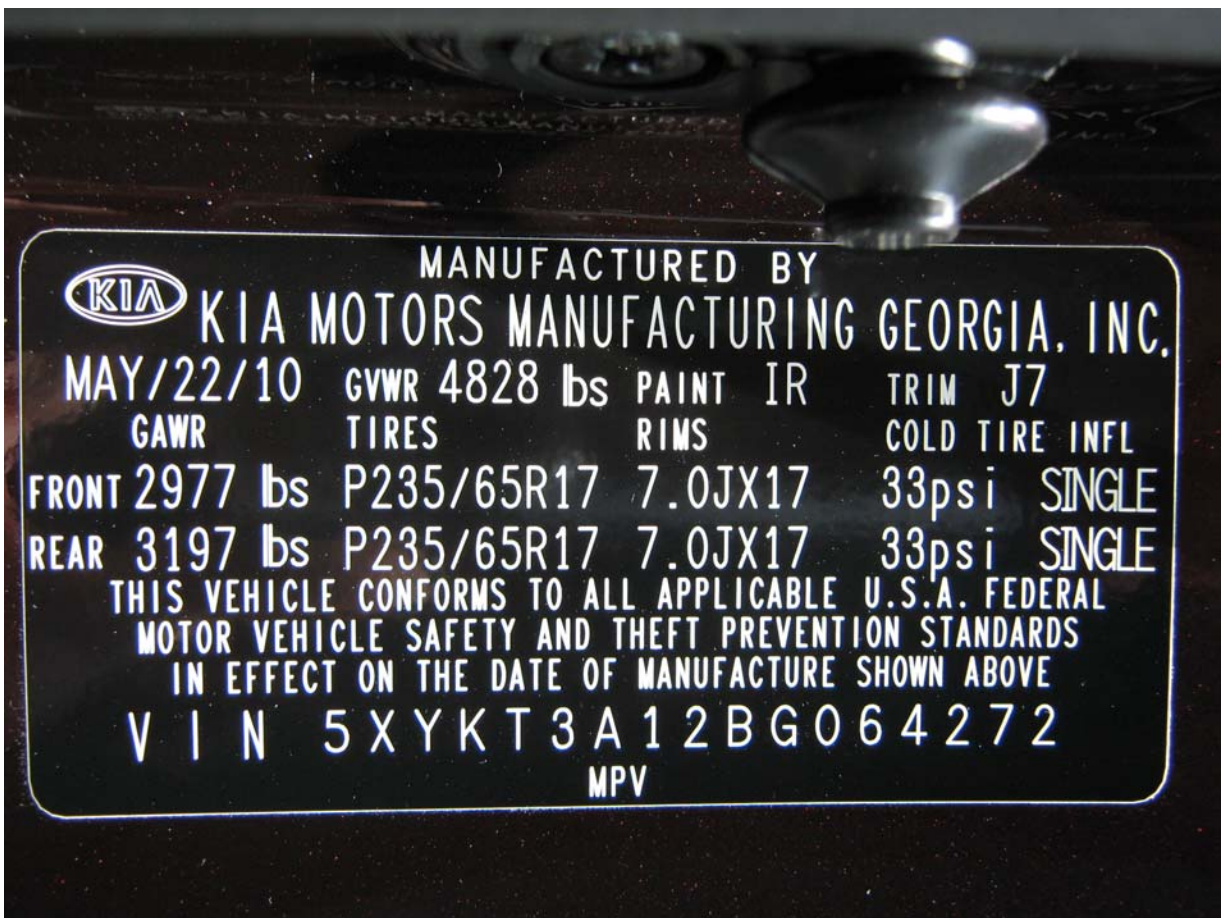
Post-Test Dummy Close-Up Pelvis Contact with Side Airbag View



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



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



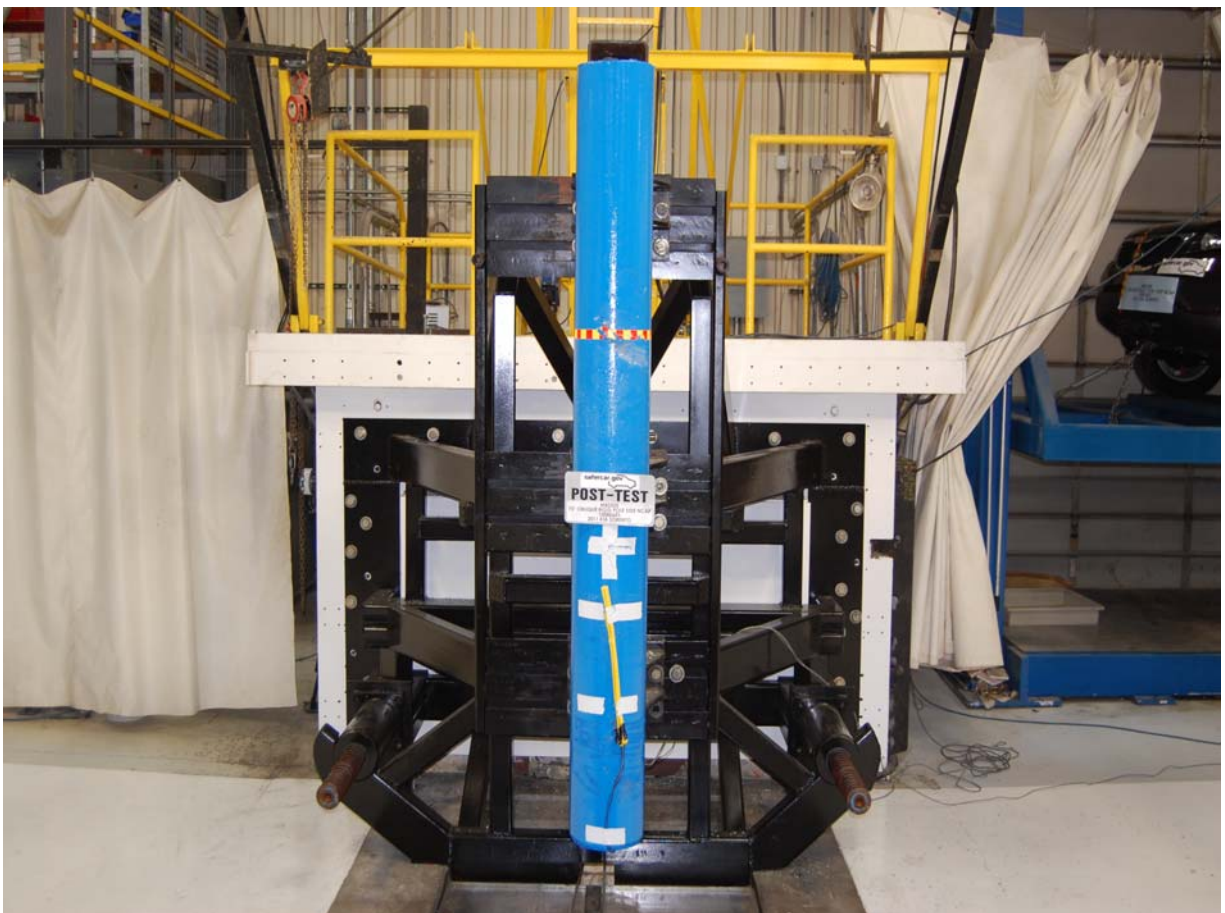
Close-Up View of Vehicle's Certification Label



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



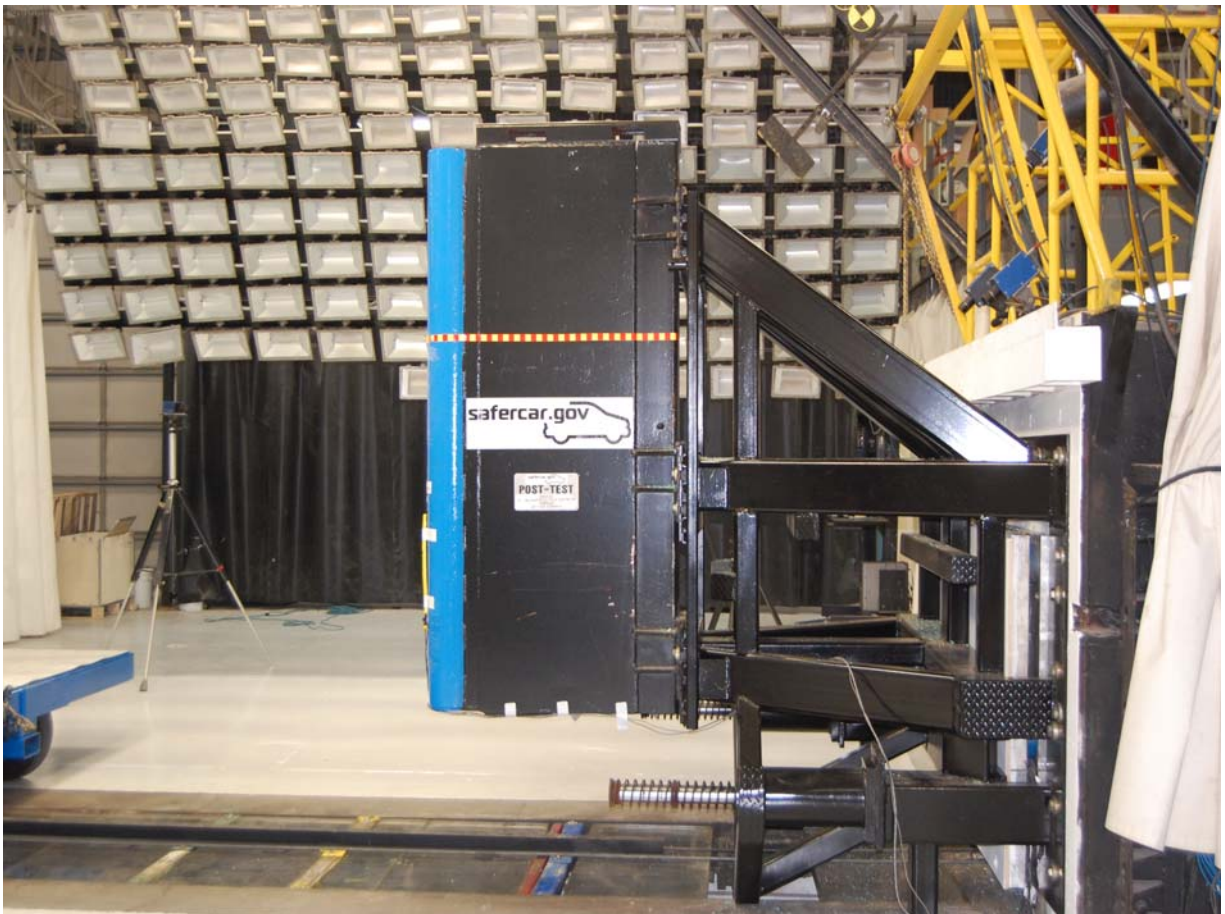
Pre-Test Pole Barrier Front View



Post-Test Pole Barrier Front View



Pre-Test Pole Barrier Side View



Post-Test Pole Barrier Side View



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



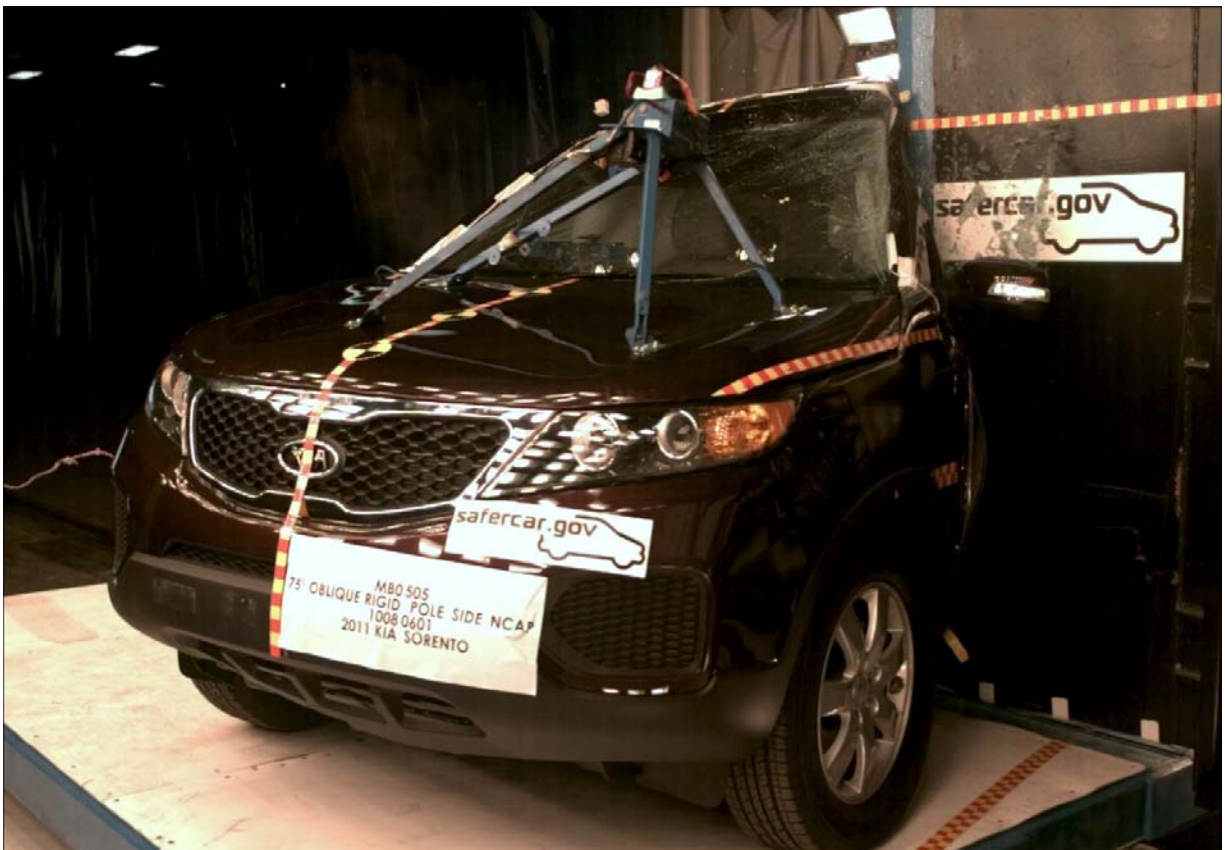
FMVSS No. 301/305 Rollover 180 Degrees



FMVSS No. 301/305 Rollover 270 Degrees



FMVSS No. 301/305 Rollover 360 Degrees



Impact Event (Impact Side)

		2011 72222 KIA SORENTO LX FWD MODEL DESCRIPTION DARK CHERRY/BEIGE EXTERIOR / INTERIOR COLOR 5XVKT9A12BQ064272 G4KEAK20 VEHICLE NUMBER WEST POINT TRUCK MODE OF TRANSPORTATION		SOLD TO: ILO62 NAPLETON'S RIVER OAKS KIA 1851 RIVER OAKS DRIVE CALUMET CITY IL 60408		SHIP TO: ILO62	
STANDARD FEATURES		MANUFACTURER'S SUGGESTED RETAIL PRICE					
MECHANICAL 2.4L 16-Valve DOHC CVT 4-Cylinder Engine 6-Speed Automatic Transmission w/ Sportmatic Independent Front and Rear Suspension Hydraulic Power-assisted Rack and Pinion Steering Front and Rear Disc Brakes P235/65R17 Tires/Alloy Wheels SAFETY Anti-Lock Brake System (ABS) Dual Front Advanced Airbags Front Seat-Mounted Side Airbags Side Curtain Airbags (1st & 2nd Row) Electronic Stability Control (ESC) Traction Control System (TCS) Tire Pressure Monitoring System (TPMS) Downhill Brake Control (DBC) Hill Assist Control (HAC) Front Active Headrests Lower Anchors and Tethers for Children (LATCH) INTERIOR Air Conditioning Power Windows, Door Locks, Outside Mirrors AM/FM/CD/MP3 Audio System SIRIUS Satellite Radio** USB and Auxiliary Input Jacks Bluetooth Wireless Technology 60/40 Split Folding and Reclining 2nd Row Seats Remote Keyless Entry System Cruise Control Steering-wheel-mounted Controls Tilt & Telescopic Steering Column Overhead Console w/Sunglasses Storage ECONOMINDER TM Indicator Illuminated Vanity Mirrors 2nd Row Armrest/Cupholder EXTERIOR Chrome Front Grille / Door Handles Rear Privacy Glass Outside Mirror Turn Signal Indicators 10 Years/100,000 Miles LIMITED POWERTRAIN WARRANTY 5 YEARS/60,000 MILES 24-HOUR ROADSIDE ASSISTANCE **Includes 3-month complimentary subscription ***Ask dealer for details		ADDITIONAL INSTALLED EQUIPMENT: (In addition to or in place of standard features) Carpeted Floor Mats Wheel Locks					
		\$22,395.00		\$115.00 \$45.00		\$22,555.00 \$795.00 \$23,350.00	
		MSRP INCLUDING OPTIONS		INLAND FREIGHT AND HANDLING		TOTAL MANUFACTURER'S SUGGESTED RETAIL PRICE	
						Manufacturer's suggested retail price includes manufacturer's recommended pre-delivery service, license and title fees, state and local taxes and other dealer installed options and accessories are not included in the manufacturer's suggested retail price.	
						TOTAL ADDITIONAL WEIGHT: 9.6	

EPA Fuel Economy Estimates

These estimates reflect new EPA methods beginning with 2008 models.

CITY MPG

21

Expected range for most drivers
17 to 25 MPG

Estimated Annual Fuel Cost
\$1626.00

based on 15,000 miles at \$2.00 per gallon

HIGHWAY MPG

29

Expected range for most drivers
24 to 34 MPG

Combined Fuel Economy

This Vehicle

24

32

10

32

8UVS

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

GOVERNMENT SAFETY RATINGS

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

FOR VEHICLES IN THIS CAR LINE U.S./CANADIAN PARTS CONTENT: 68%

MAJOR SOURCES OF FOREIGN PARTS:

KOREA: 42%

NOTE: PARTS CONTENT DOES NOT INCLUDE FINAL ASSEMBLY, DISTRIBUTION, OR OTHER NON-PARTS COSTS.

FOR THIS VEHICLE FINAL ASSEMBLY POINT:

USA

COUNTRY OF ORIGIN ENGINE:

USA

TRANSMISSION:

KOREA

This vehicle has not been rated by the government for frontal crash, side crash or rollover risk.

Source: National Highway Traffic Safety Administration (NHTSA).

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

Environmental Performance

Protect the environment, choose vehicles with higher scores:

Global Warming Score

7

Average new vehicle

Smog Score

5

Average new vehicle

Using alternative fuels may improve scores. See www.DriveClean.ca.gov

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. AIR RESOURCES BOARD

Safety features of your vehicle

2nd row seat

1. Insert the rear seat belt buckle in the pocket (if equipped) between the rear seatback and cushion, and insert the rear seat belt webbing into the guide to prevent the seat belt from being damaged.
2. Set the front seatback to the upright position and if necessary, slide the front seat forward.
3. Lower the rear headrests to the lowest position.



OXM039021N



OXM039024N

4. Pull on the seatback folding lever, then fold the seat toward the front of the vehicle, the headrest will automatically fold down.
5. When you return the seatback to its upright position, always be sure it has locked into position by pushing on the top of the seatback.



OXM039055N

6. Unfold the headrest manually.
7. Return the rear seat belt to the proper position.

Safety features of your vehicle



OXM039022N

- Double folding (2nd row right seat, if equipped)
Pull the double folding strap on the right rear seatback, then pull up the rear of the portion seat cushion toward the front of the vehicle. When you return the seat cushion to its original position, always be sure it has locked into position by pulling the rear portion of the seat cushion.

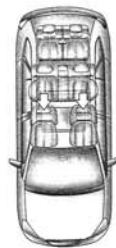
WARNING

When you return the rear seatback to its upright position after being folded down:

Be careful not to damage the seat belt webbing or buckle. Do not allow the seat belt webbing or buckle to get caught or pinched in the rear seat. Ensure that the seatback is completely locked into its upright position by pushing on the top of the seatback. Otherwise, in an accident or sudden stop, the seat could fold down and allow cargo to enter the passenger compartment, which could result in serious injury or death.

WARNING - Uprighting seat

When you return the seatback to its upright position, hold the seatback and return it slowly and be sure there are no other occupants around the seat. If the seatback is returned without being held and controlled, the back of the seat could move forward or backward resulting in accidental injury to a person struck by the seatback.



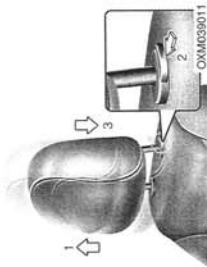
CO10104AHM

Headrest

The driver's and front passenger's seats are equipped with a headrest for the occupant's safety and comfort. The headrest not only provides comfort for the driver and front passenger, but also helps protect the head and neck in the event of a rear collision.

OHM0038048N

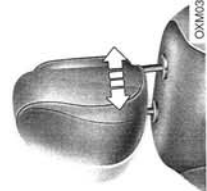
- ▲ WARNING**
- For maximum effectiveness in case of an accident, the headrest should be adjusted so the middle of the headrest is at the same height of the center of gravity of an occupant's head. Generally, the center of gravity of most people's head is similar with the height of the top of their eyes. Also, adjust the headrest as close to your head as possible. For this reason, the use of a cushion that holds the body away from the seatback is not recommended.
 - Do not operate the vehicle with the headrests removed. Severe injury to the occupants may occur in the event of an accident. Headrests may provide protection against neck injuries when properly adjusted.
 - Do not adjust the headrest position of the driver's seat while the vehicle is in motion.



OXM039011

Adjusting the height up and down

To raise the headrest, pull it up to the desired position (1). To lower the headrest, push and hold the release button (2) on the headrest support and lower the headrest to the desired position (3).



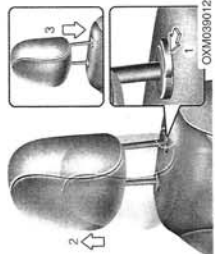
OXM039010

Adjusting the angle (if equipped)

The headrest angle may be adjusted by pulling or pushing the lower part of the headrest. Adjust the headrest so that it properly supports the head and neck.

▲ CAUTION

Excessive pulling or pushing may damage the headrest.



OXM039012

Removal (except active headrest)

To remove the headrest, raise it as far as it can go then press the release button (1) while pulling the headrest up (2). To reinstall the headrest, put the headrest poles (3) into the holes while pressing the release button (1). Then adjust it to the appropriate height.

▲ WARNING

Make sure the headrest locks in position after adjusting it to properly protect the occupants.



HNF2041-1

Active headrest (if equipped)

The active headrest is designed to move forward and upward during a rear impact. This helps prevent the driver's and front passenger's heads from moving backward and thus helps minimize neck injuries.

For your safety, the active headrest can't be removed. If there is any problem with the active headrest, take your vehicle to an authorized KIA dealer and have the system checked.

APPENDIX B
DUMMY RESPONSE DATA

TABLE OF DATA PLOTS

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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
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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

Driver Torso Contact Switch

Driver Pelvis Contact Switch

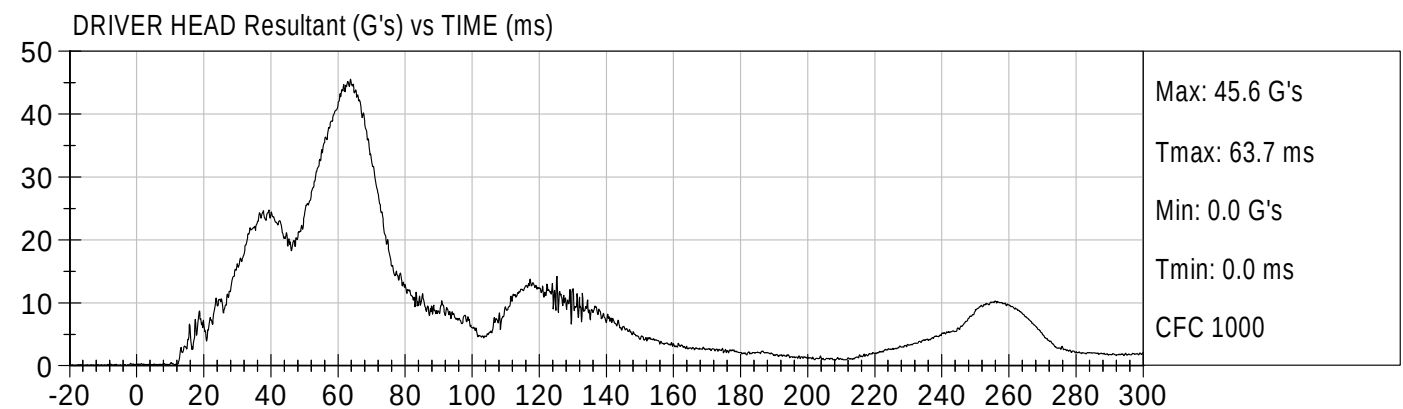
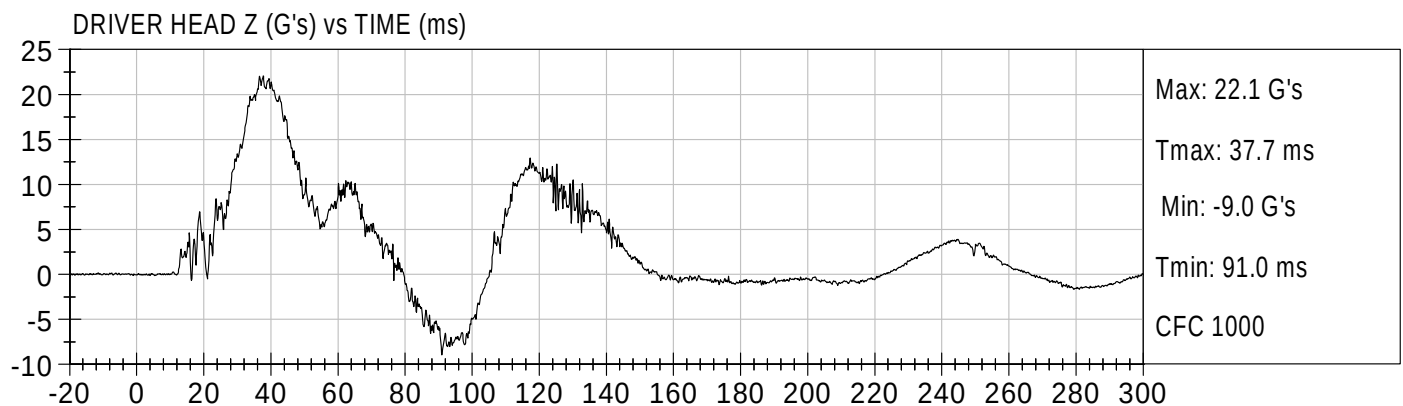
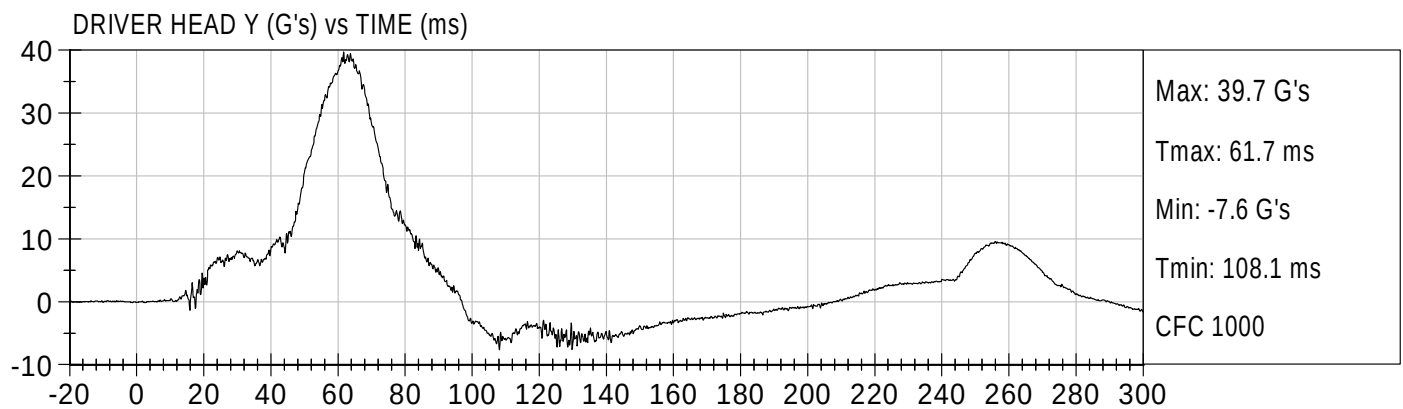
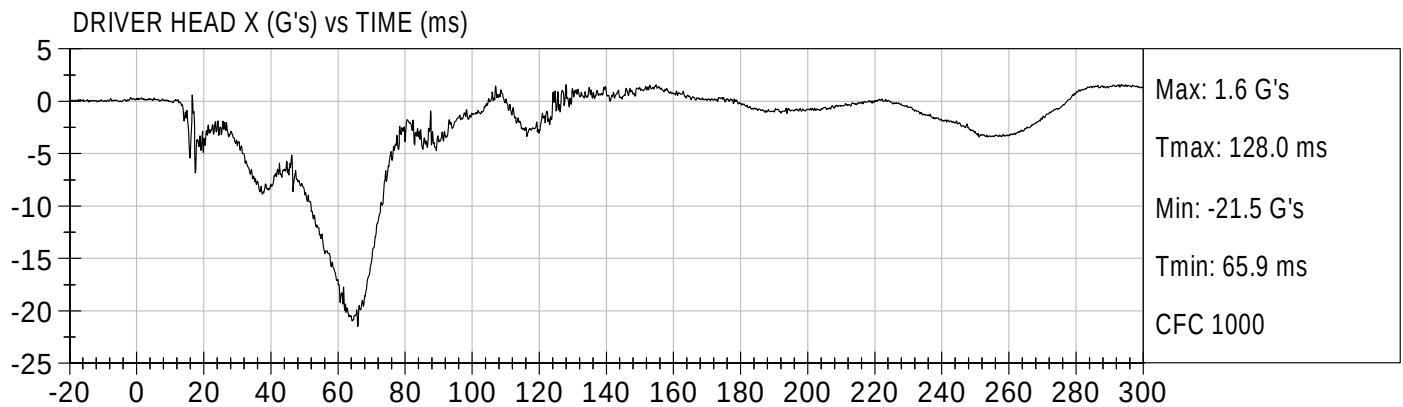
Vehicle CG Acceleration (X)

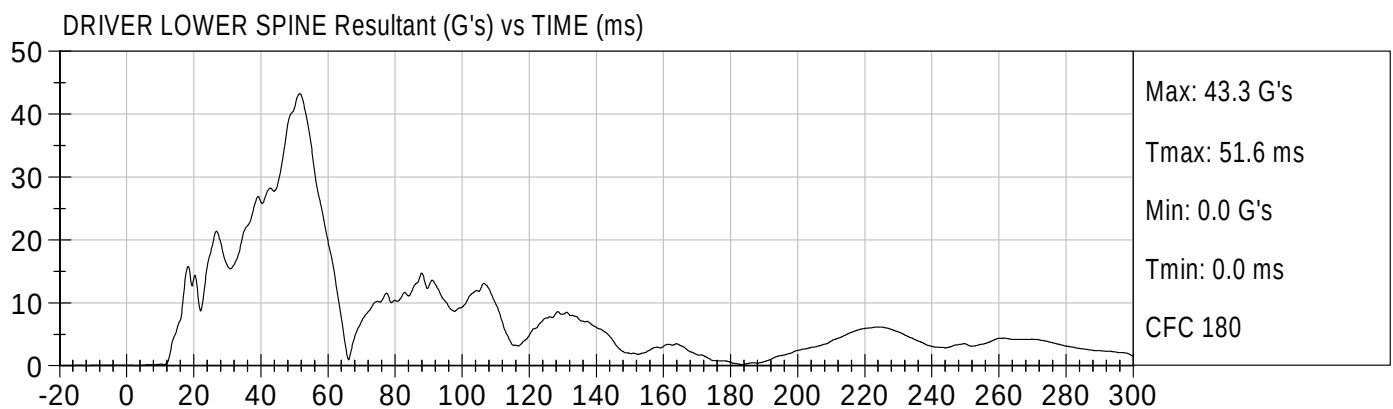
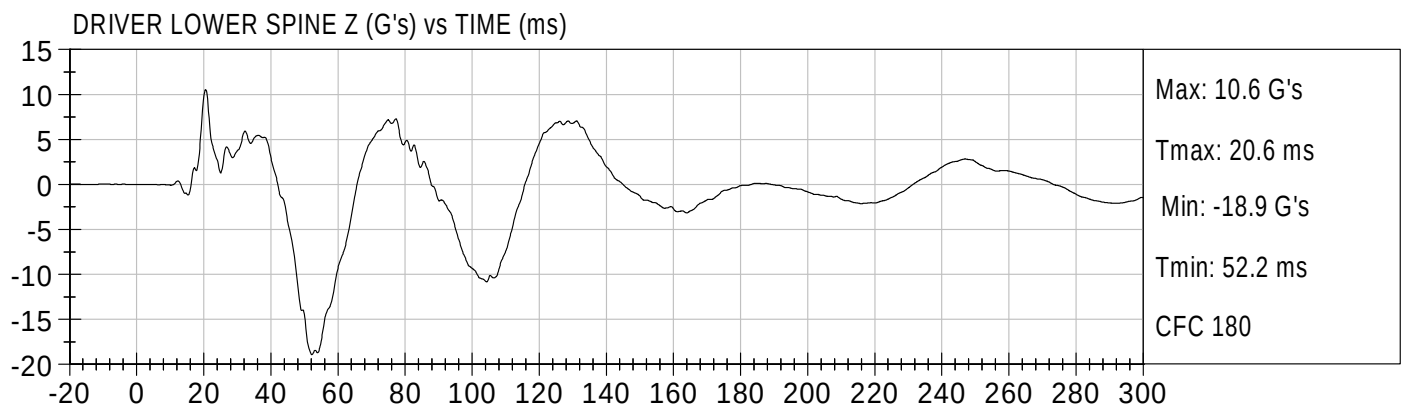
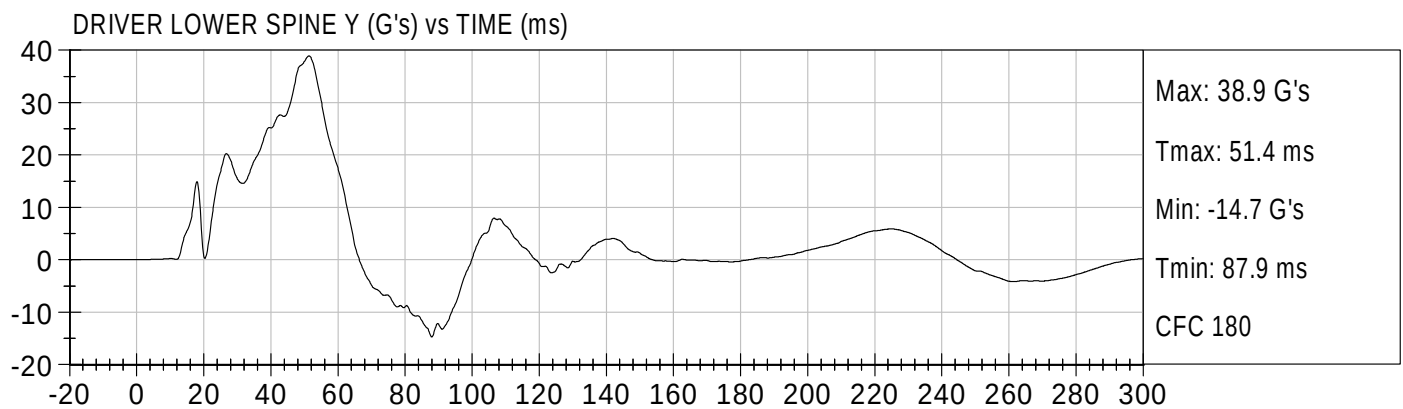
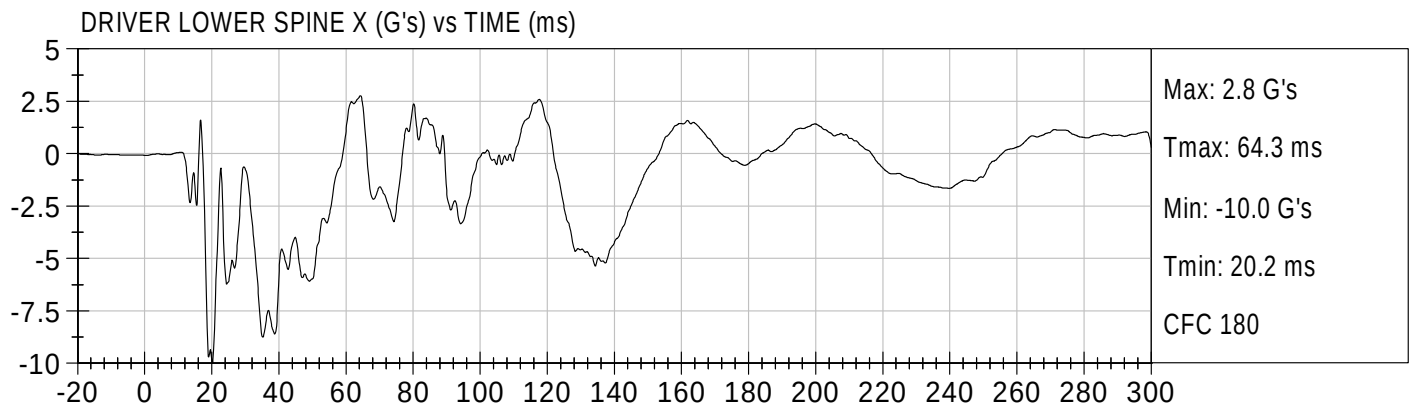
Vehicle CG Acceleration (Y)

Vehicle CG Acceleration (Z)

Vehicle CG Angular Rate About X (Roll)

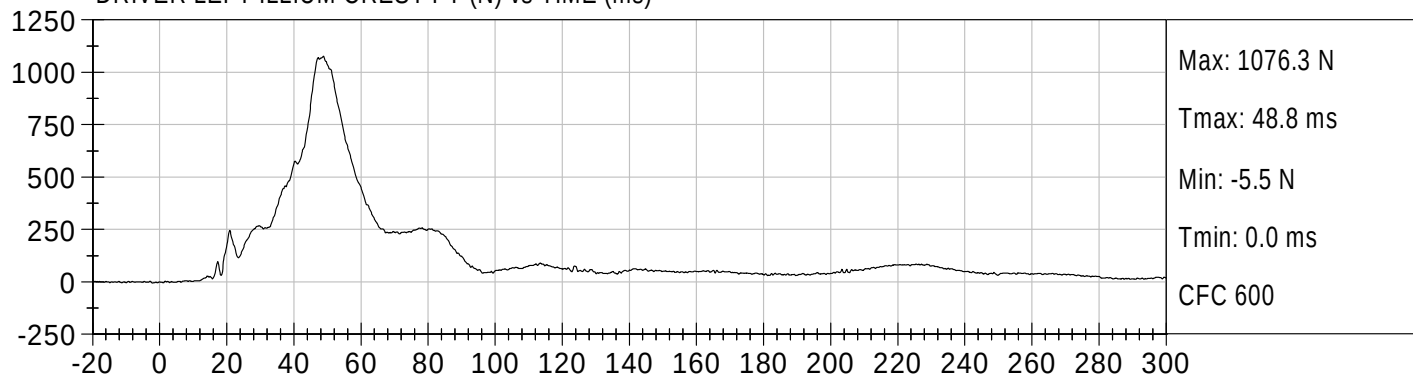
Vehicle CG Angular Rate About Y (Pitch)
Vehicle CG Angular Rate About Z (Yaw)
Left Floor Sill Acceleration (Y)
Left A-Pillar Sill Acceleration (Y)
Left Lower A-Pillar Acceleration (Y)
Left Mid A-Pillar Acceleration (Y)
Left B-Pillar Sill Acceleration (Y)
Left Lower B-Pillar Acceleration (Y)
Left Mid 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
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



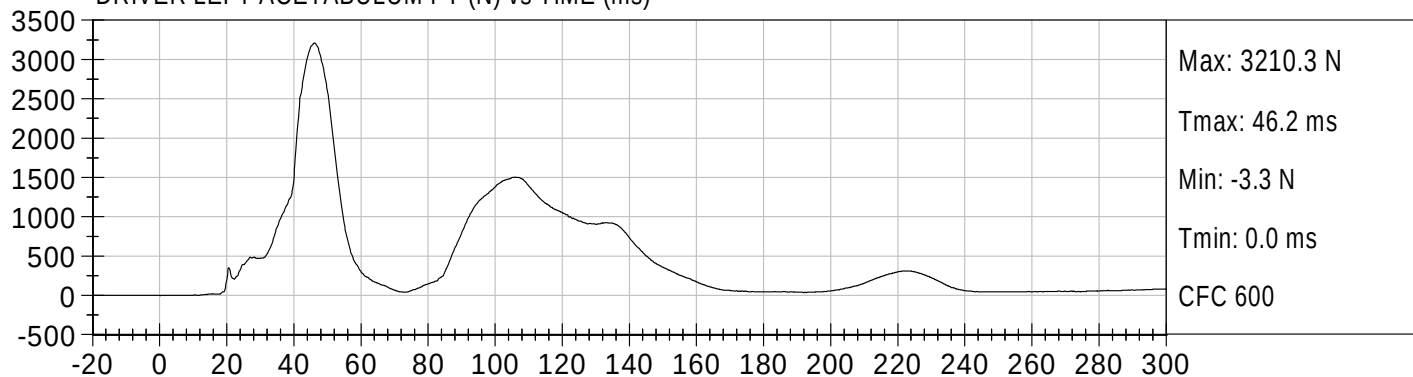




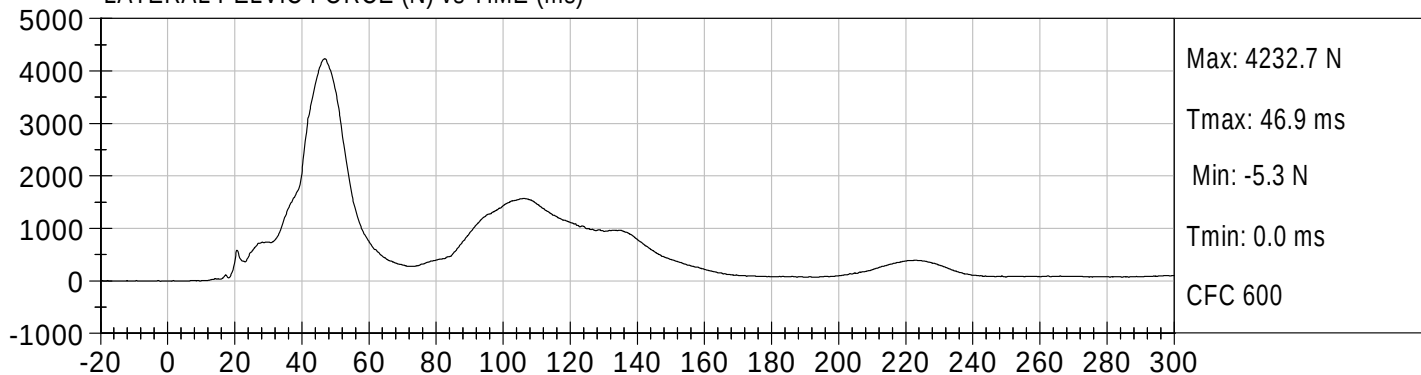
DRIVER LEFT ILLIUM CREST FY (N) vs TIME (ms)



DRIVER LEFT ACETABULUM FY (N) vs TIME (ms)



LATERAL PELVIC FORCE (N) vs TIME (ms)



APPENDIX C

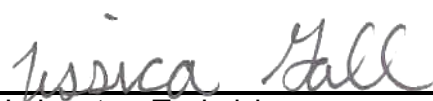
DUMMY CALIBRATION AND PERFORMANCE VERIFICATION DATA

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

ATD Serial No: 296

Test ID: D102521

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	58	Pass
Peak Resultant Acceleration	G's	115 to 137	125	Pass
Peak Lateral Acceleration	G's	+/- 15	6.7	Pass
Unimodal	N/A	<15%	Yes	Pass
Overall Test Results				Pass



Laboratory Technician

8/4/10
Test Date

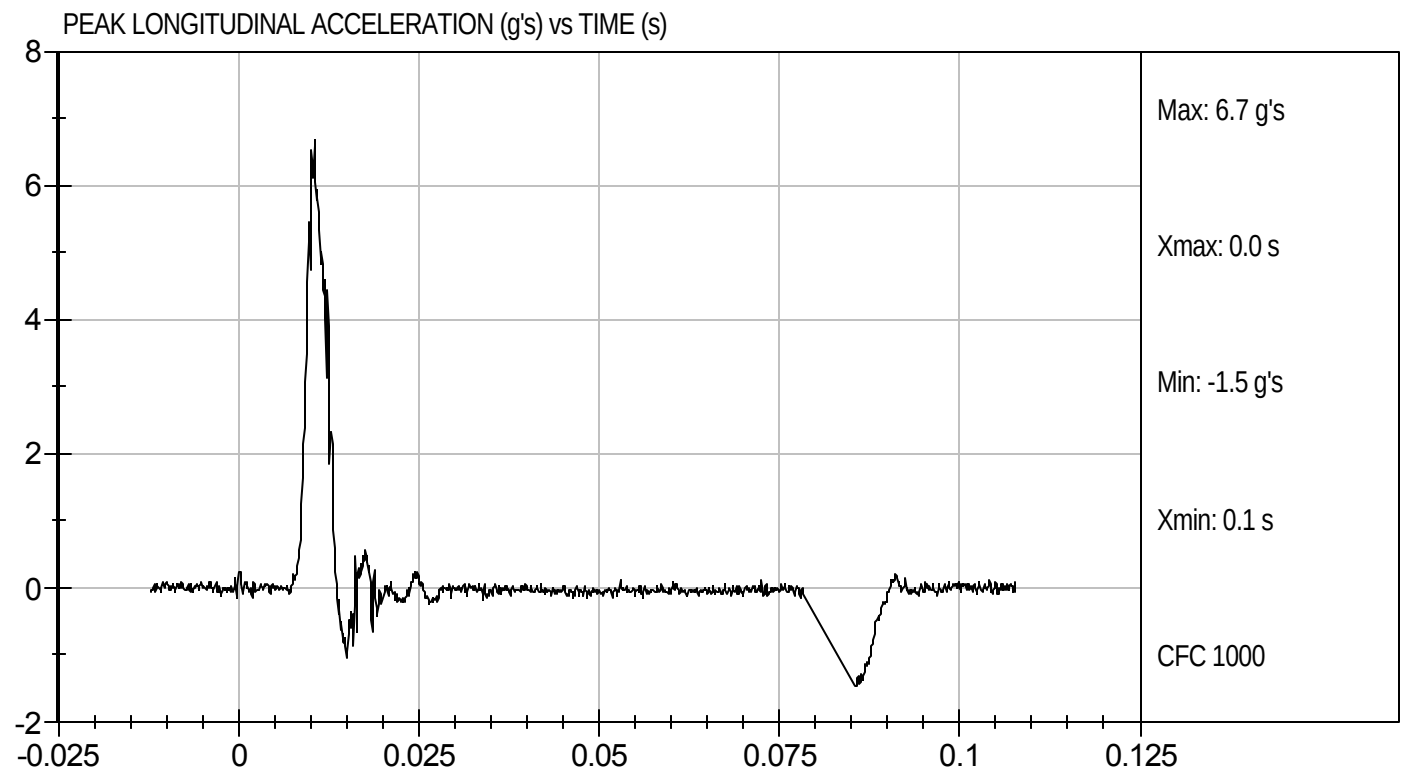
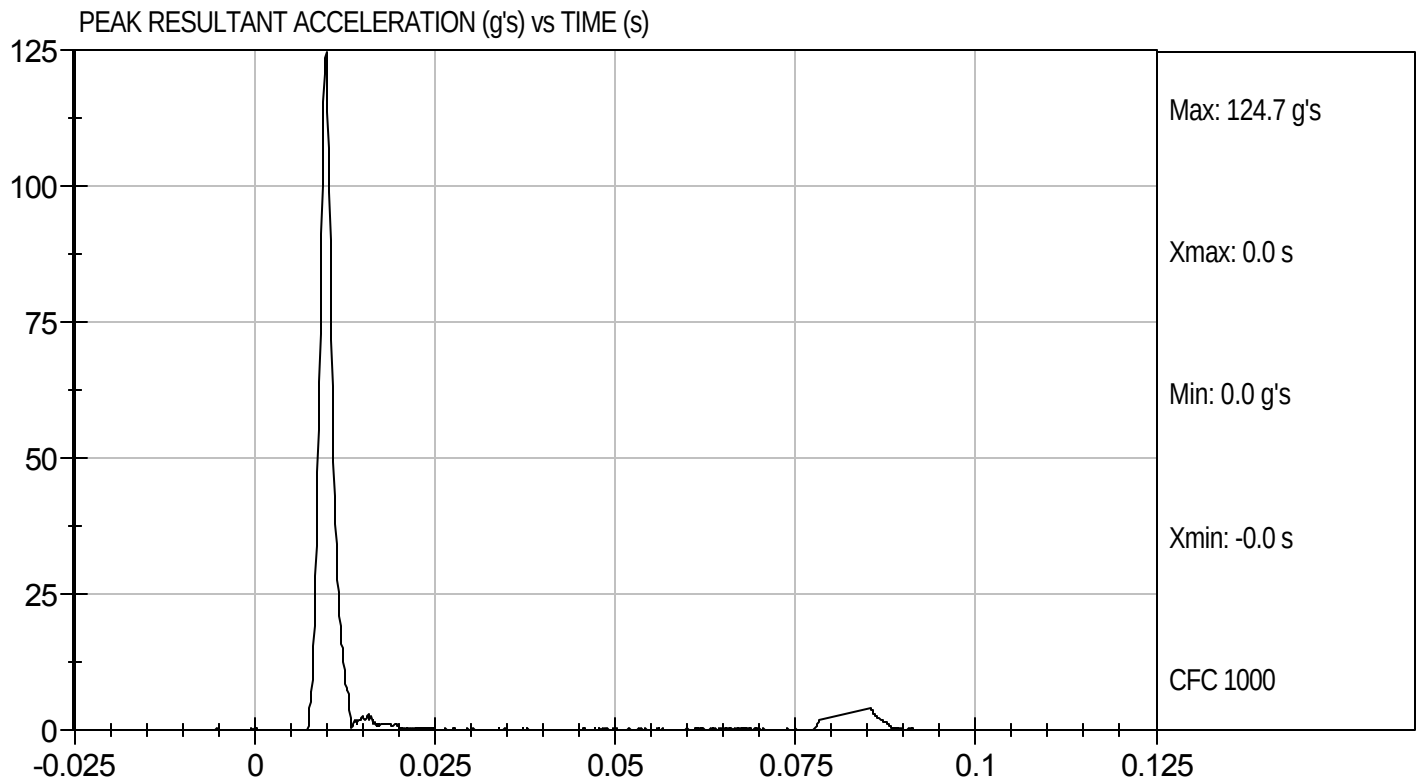


Approved By



Test Desc: Head Drop
Component ID: D102521

Test Date: 8/4/10
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: D102522

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21.5	Pass
Humidity		%	10 to 70	58	Pass
Impact Velocity		m/s	5.51 to 5.63	5.58	Pass
Delta Velocity	10 ms	m/s	2.20 to 2.80	2.60	Pass
	15 ms	m/s	3.30 to 4.10	3.75	Pass
	20 ms	m/s	4.40 to 5.40	4.99	Pass
	25 ms	m/s	5.40 to 6.10	5.53	Pass
	25-100 ms	m/s	5.50 to 6.20	5.54	Pass
Maximum D-Plane Rotation		deg	71 to 81	72	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	58	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	115	Pass
Overall Test Results				Pass	


 Laboratory Technician

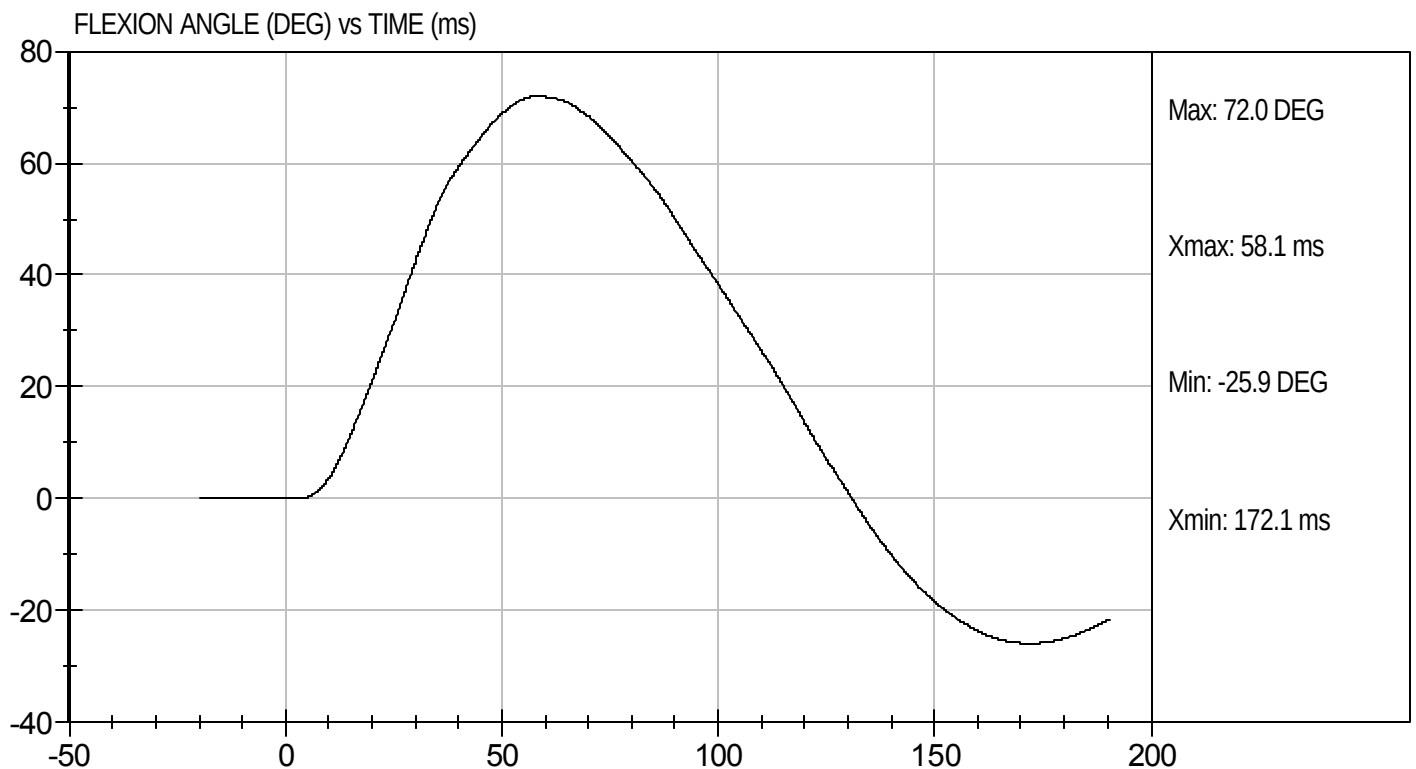
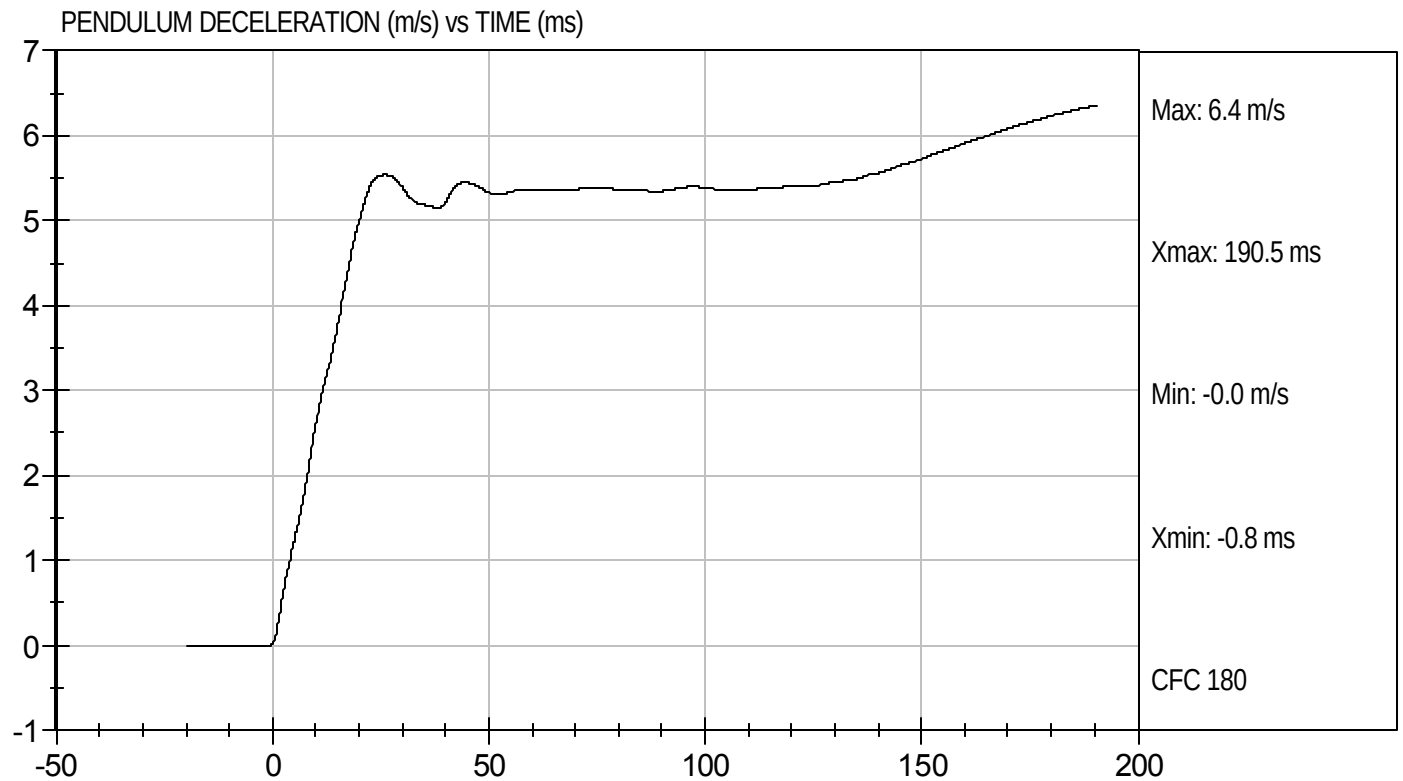
8/4/10
 Test Date


 Approved By



Test Desc: Neck Bending
Component ID: D102522

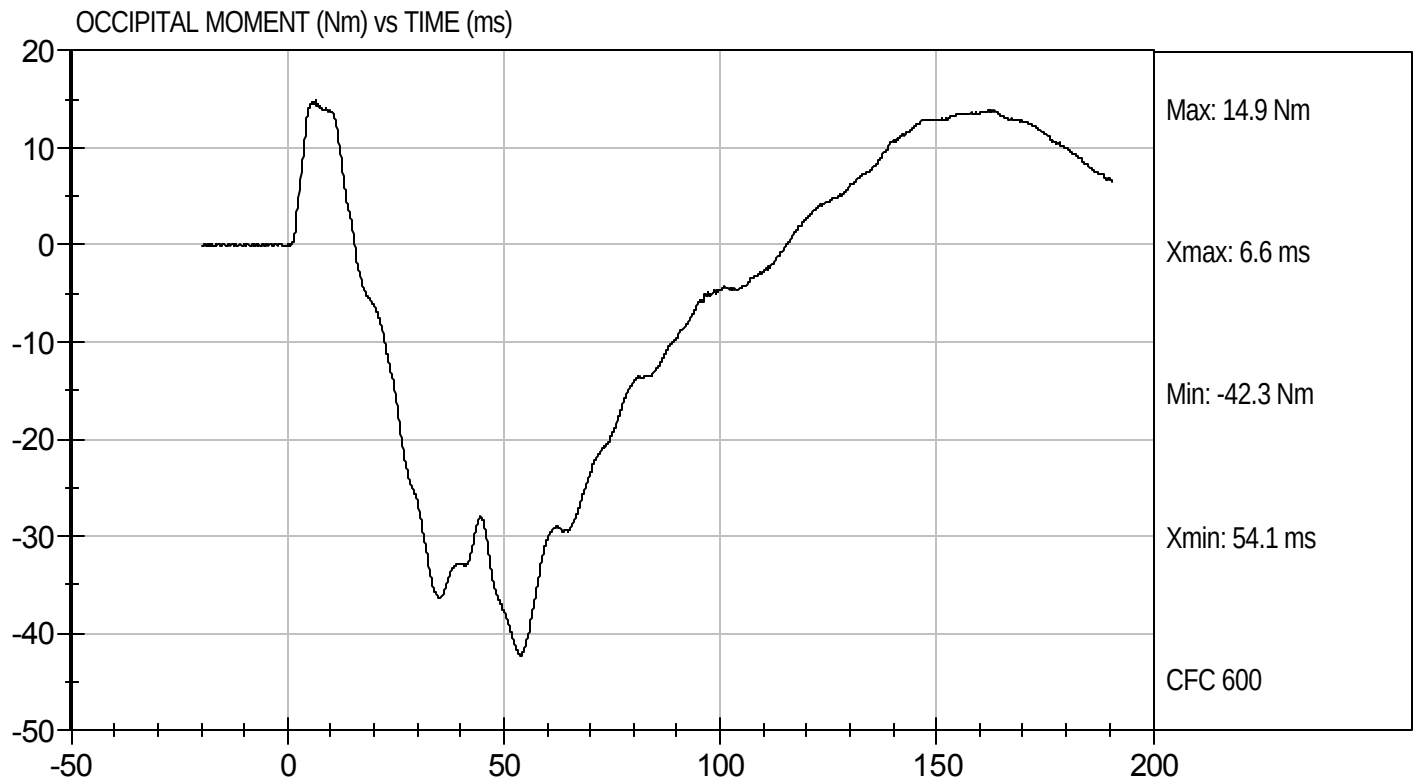
Test Date: 8/4/10
Velocity: 18.32 ft/s, 5.58 m/s





Test Desc: Neck Bending
Component ID: D102522

Test Date: 8/4/10
Velocity: 18.32 ft/s, 5.58 m/s



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

ATD Serial No: 296

Test ID: D102523

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	58	Pass
Impact Velocity	m/s	4.20 to 4.40	4.27	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

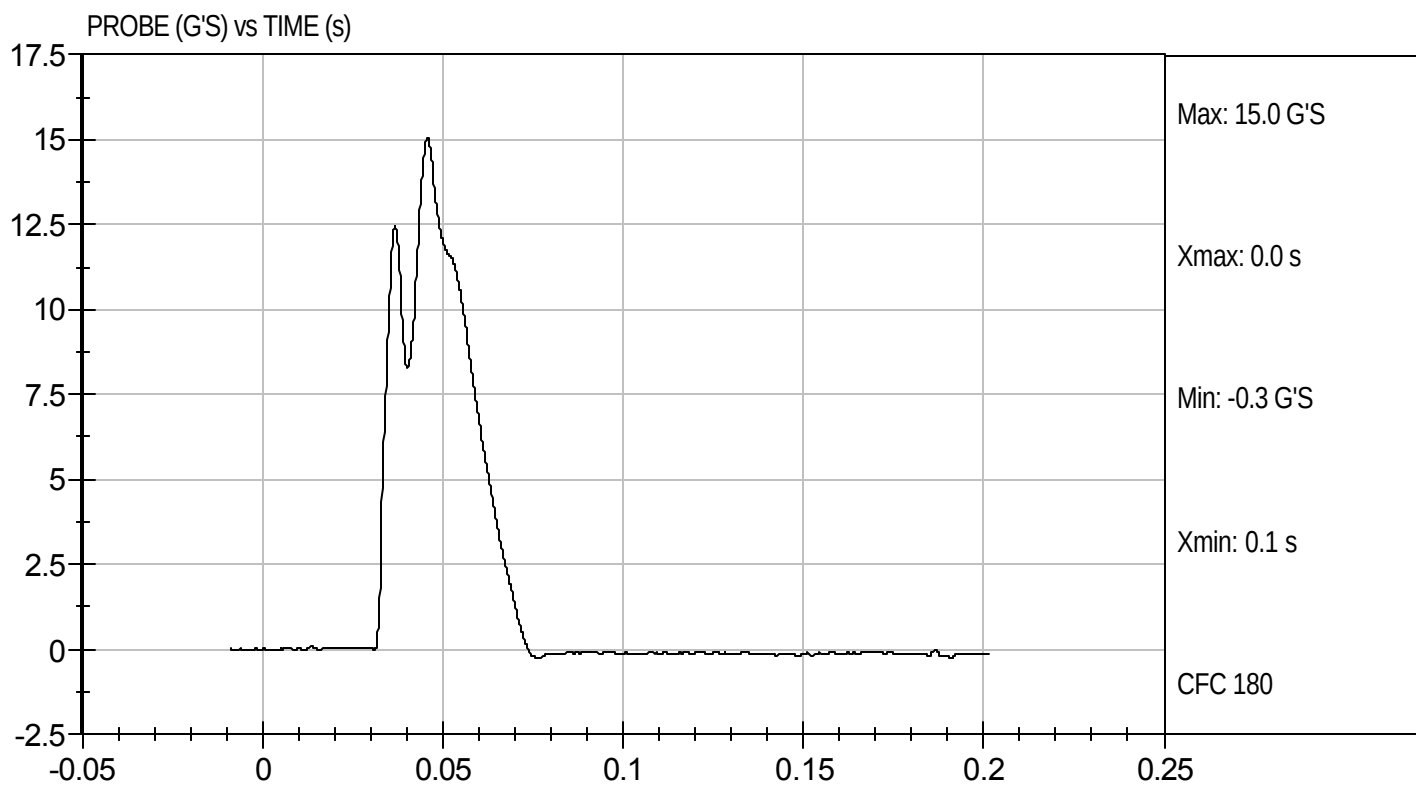
8/4/10
Test Date


Approved By



Test Desc: Shoulder Impact
Component ID: D102523

Test Date: 8/4/10
Velocity: 14.01 ft/s, 4.27 m/s

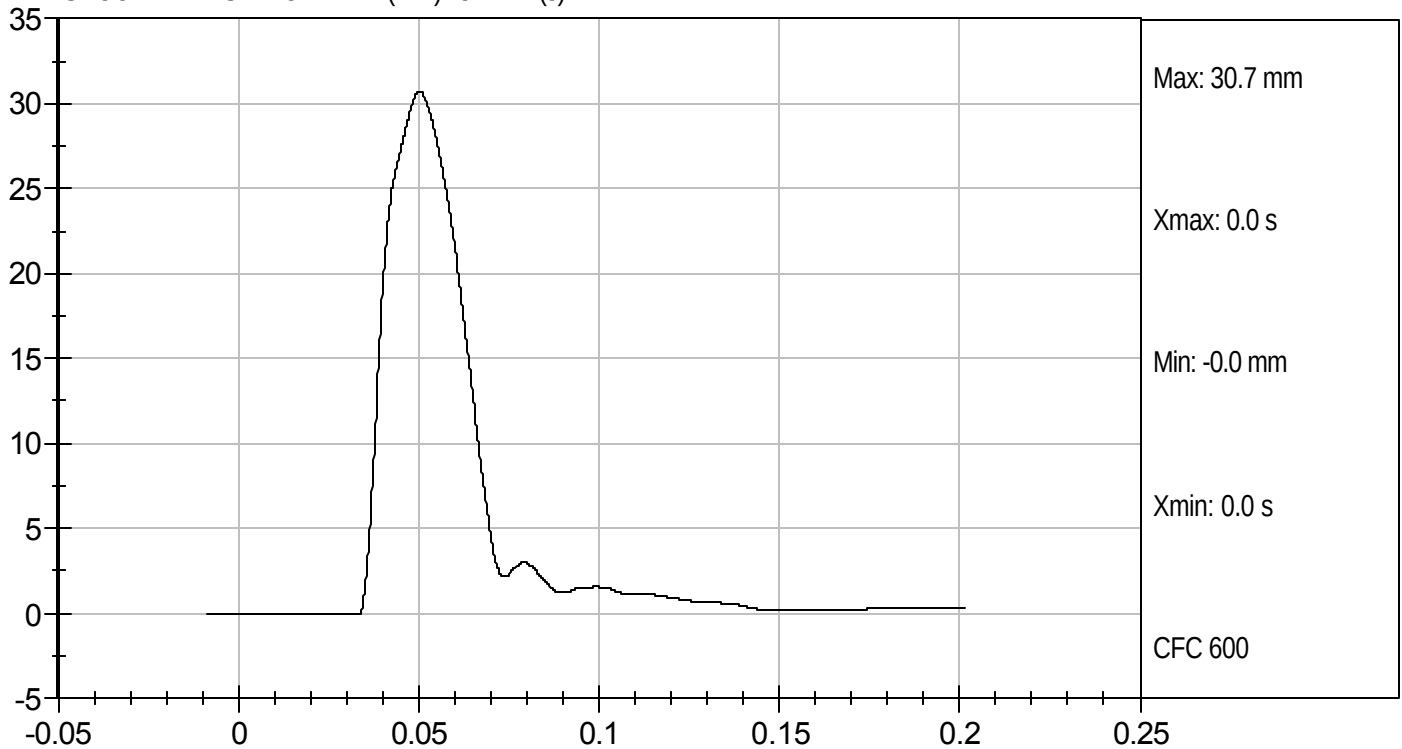




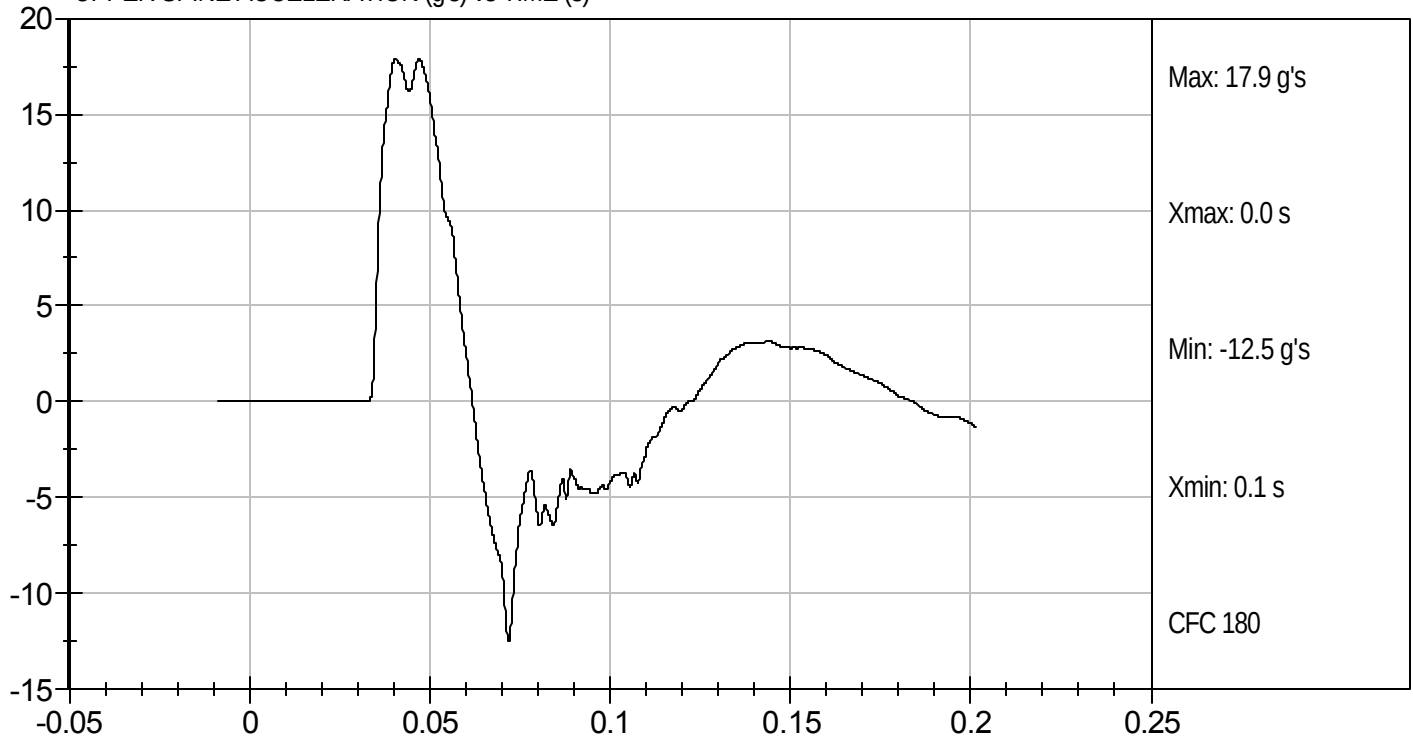
Test Desc: Shoulder Impact
Component ID: D102523

Test Date: 8/4/10
Velocity: 14.01 ft/s, 4.27 m/s

SHOULDER DISPLACEMENT (mm) vs TIME (s)



UPPER SPINE ACCELERATION (g's) vs TIME (s)



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

ATD Serial No: 296

Test I.D: D102524

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.5	Pass
Humidity	%	10 to 70	58	Pass
Impact Velocity	m/s	6.60 to 6.80	6.69	Pass
Peak Impactor Acceleration	G's	30 to 36	33	Pass
Shoulder Displacement	mm	31 to 40	36	Pass
Upper Rib Displacement	mm	25 to 32	27	Pass
Middle Rib Displacement	mm	30 to 36	31	Pass
Lower Rib Displacement	mm	32 to 38	33	Pass
Upper Spine (T1) Y Acceleration	G's	34 to 43	35	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	33	Pass
Overall Test Results			Pass	


Laboratory Technician

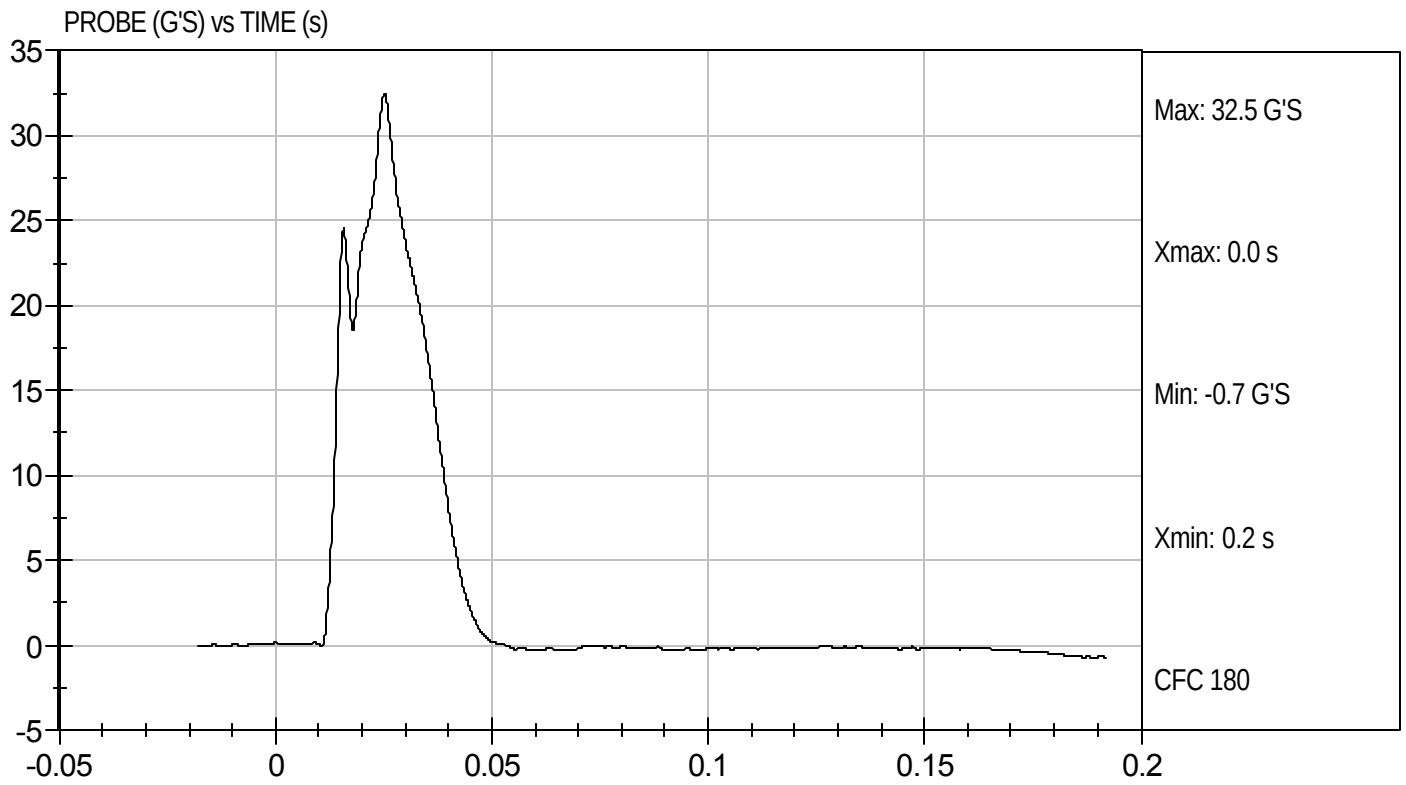
8/4/10
Test Date


Approved By



Test Desc: Thorax With Arm
Component ID: D102524

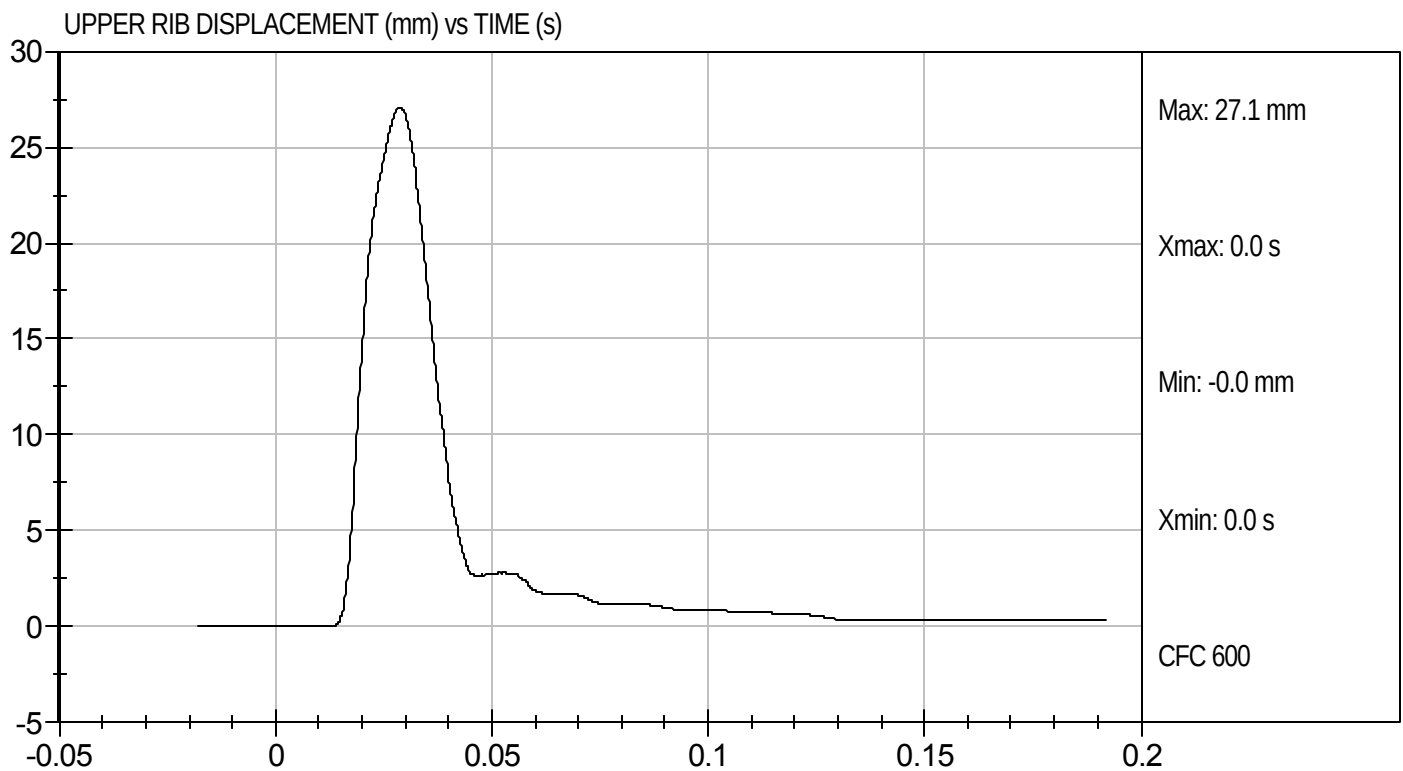
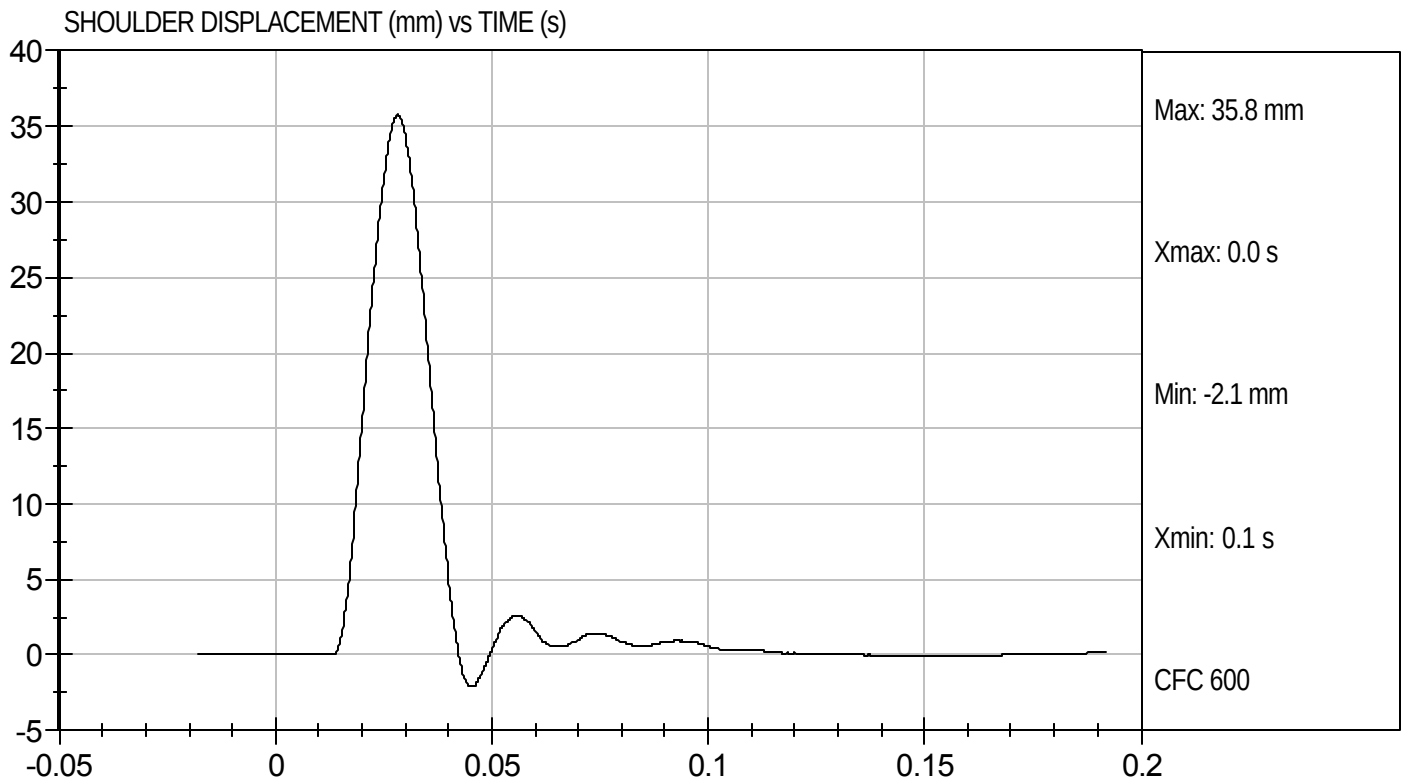
Test Date: 8/4/10
Velocity: 21.96 ft/s, 6.69 m/s





Test Desc: Thorax With Arm
Component ID: D102524

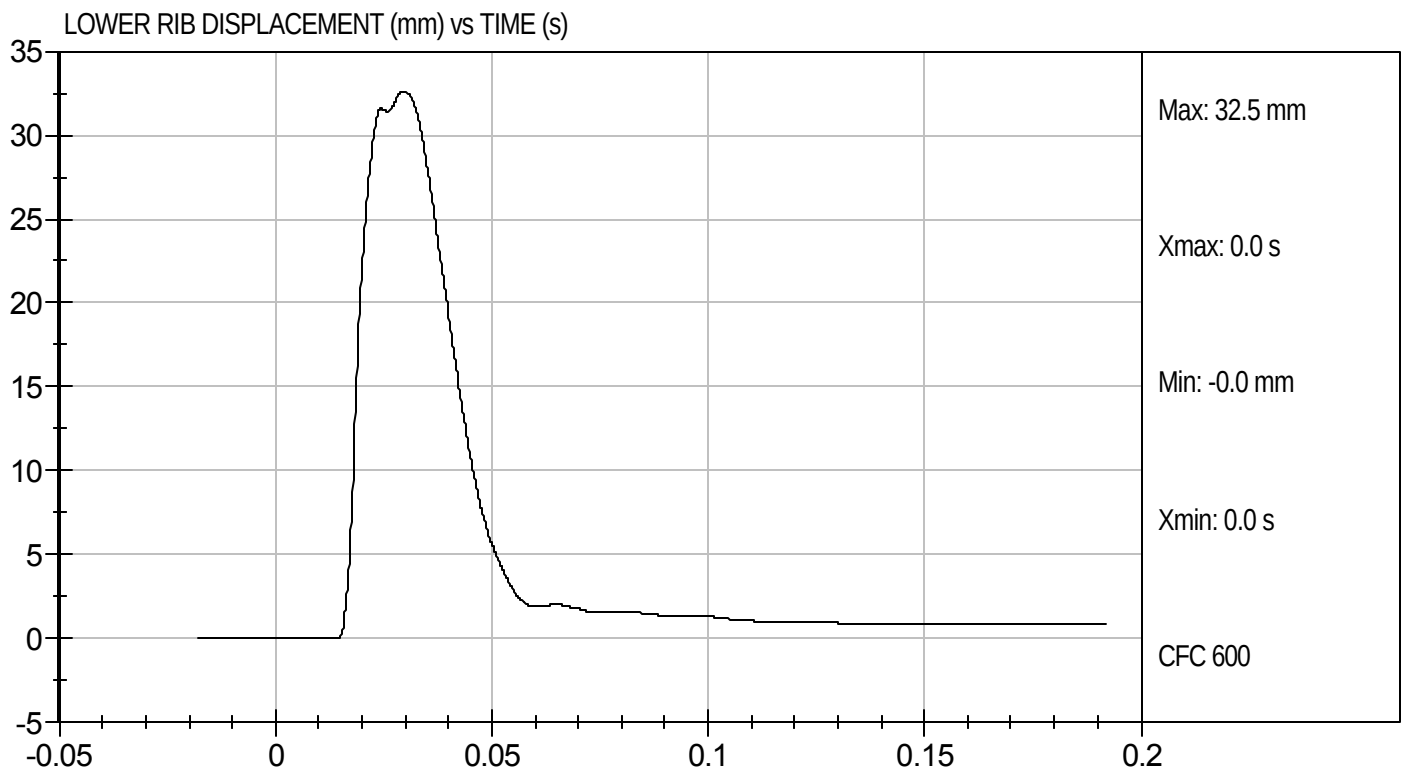
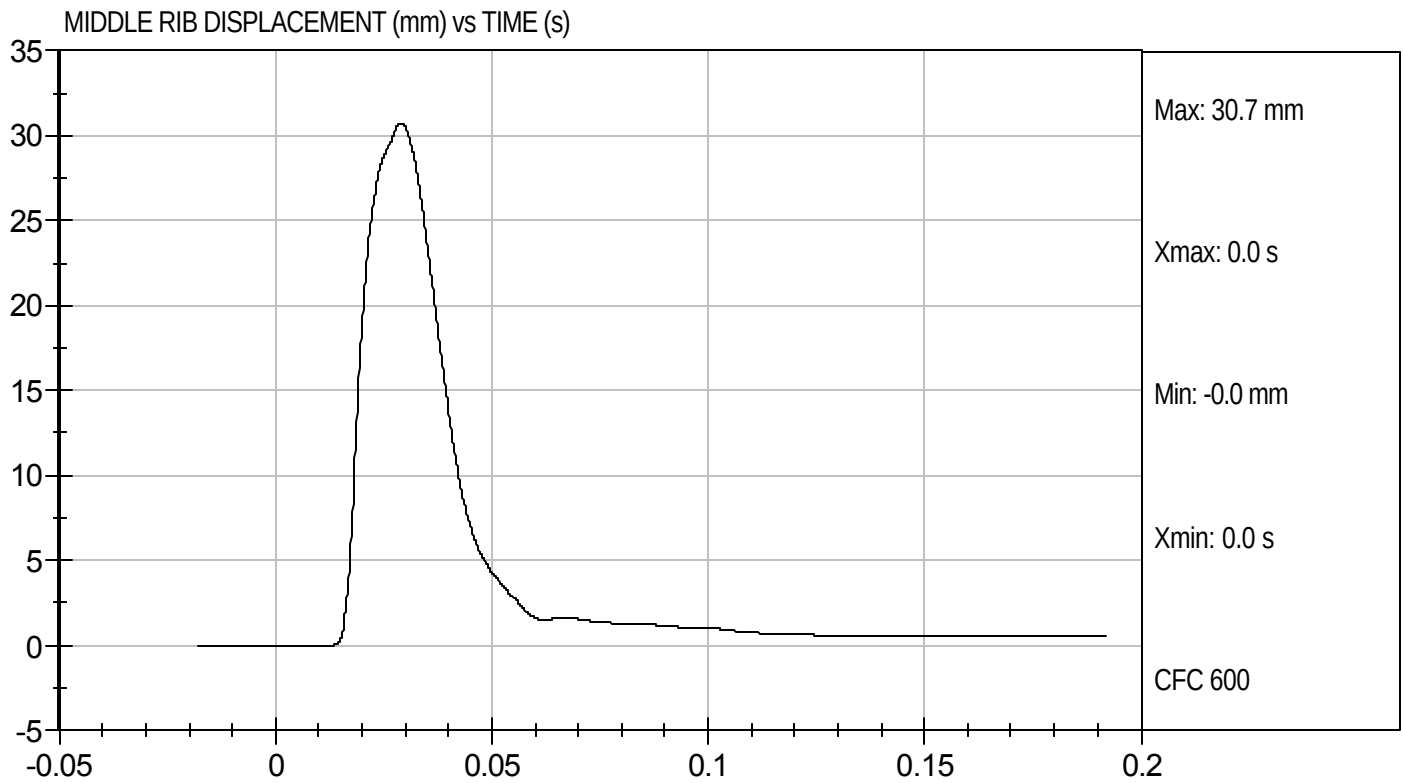
Test Date: 8/4/10
Velocity: 21.96 ft/s, 6.69 m/s





Test Desc: Thorax With Arm
Component ID: D102524

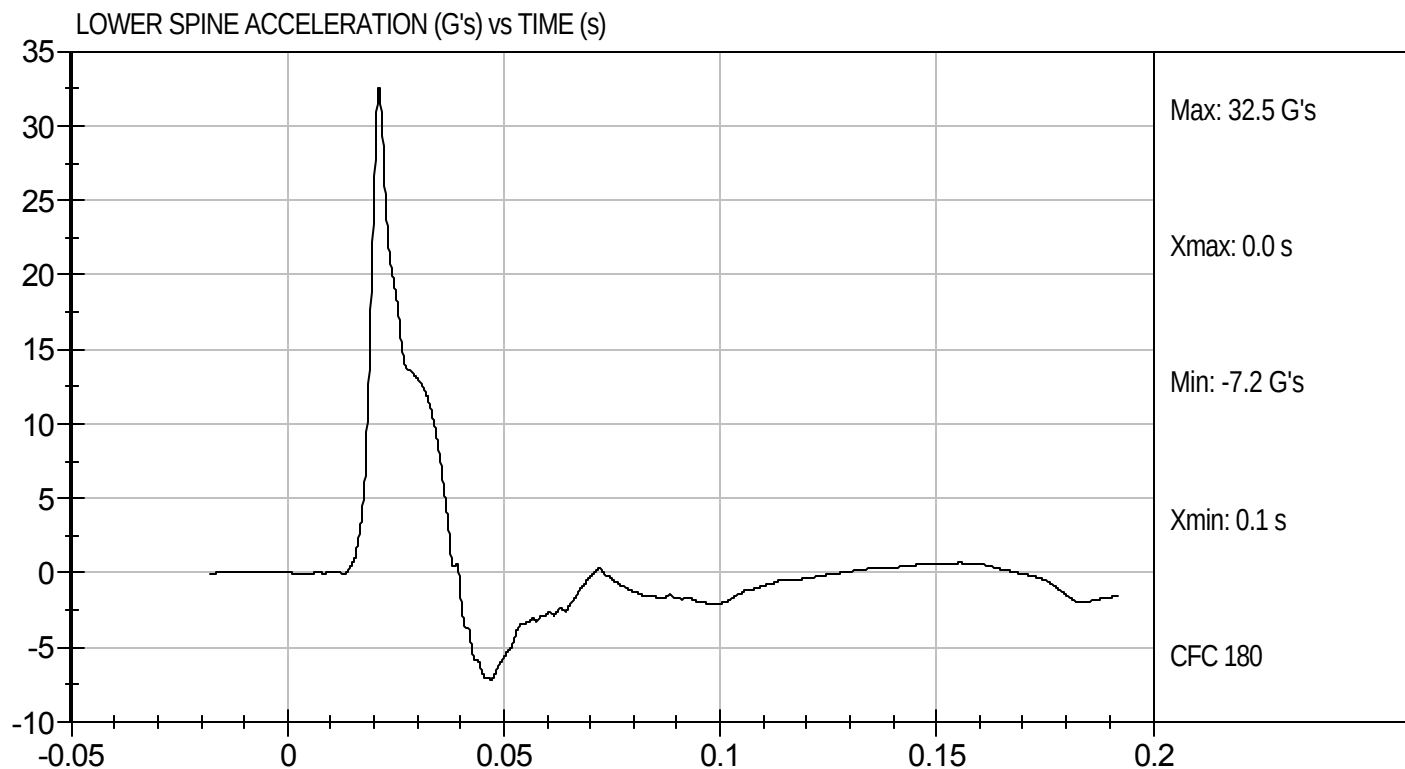
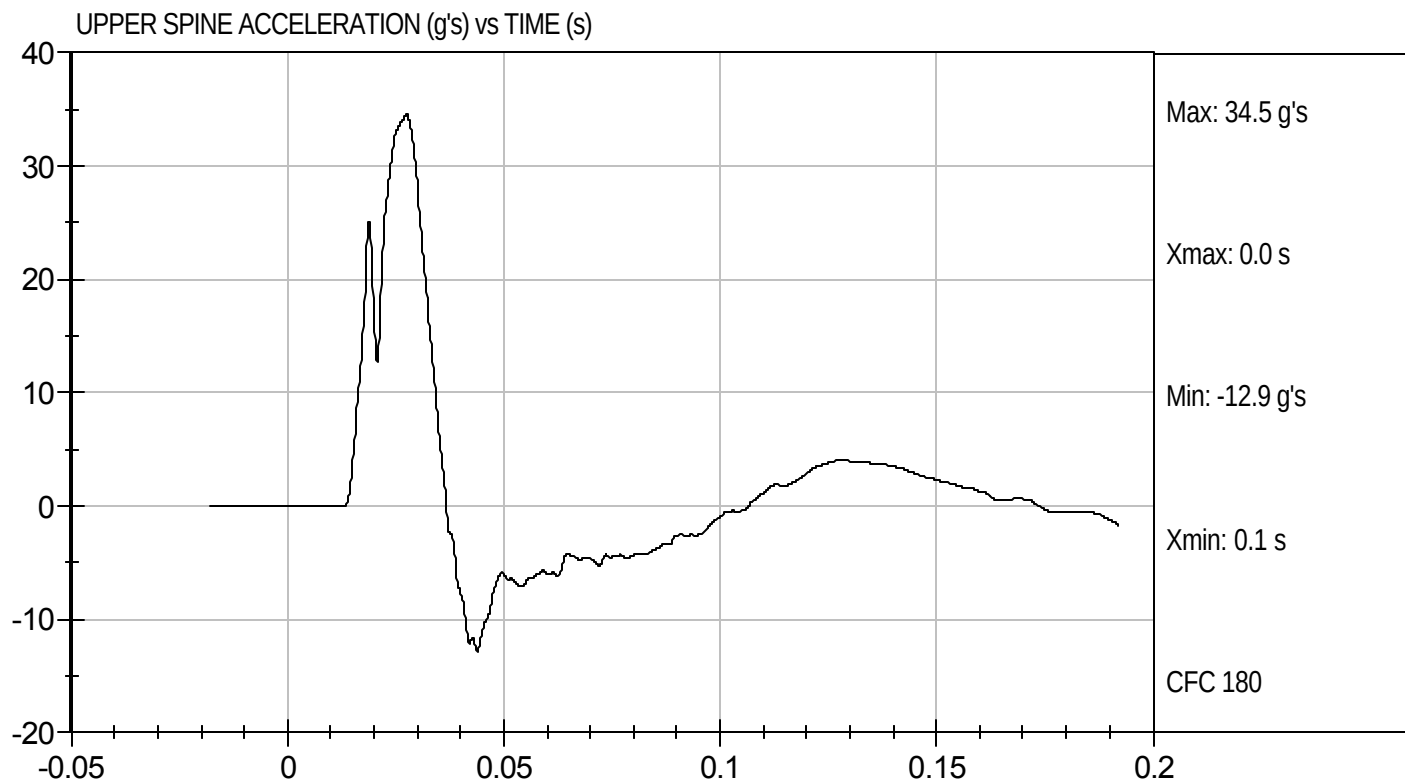
Test Date: 8/4/10
Velocity: 21.96 ft/s, 6.69 m/s





Test Desc: Thorax With Arm
Component ID: D102524

Test Date: 8/4/10
Velocity: 21.96 ft/s, 6.69 m/s

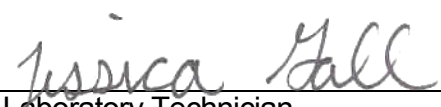


MGA RESEARCH CORPORATION
THORAX (WITHOUT ARM) IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

Test I.D: D102525

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	22.2	Pass
Humidity	%	10 to 70	51	Pass
Impact Velocity	m/s	4.20 to 4.40	4.30	Pass
Peak Impactor Force	G's	14 to 18	15	Pass
Upper Rib Displacement	mm	32 to 40	35	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	9	Pass
Overall Test Results				Pass


Laboratory Technician

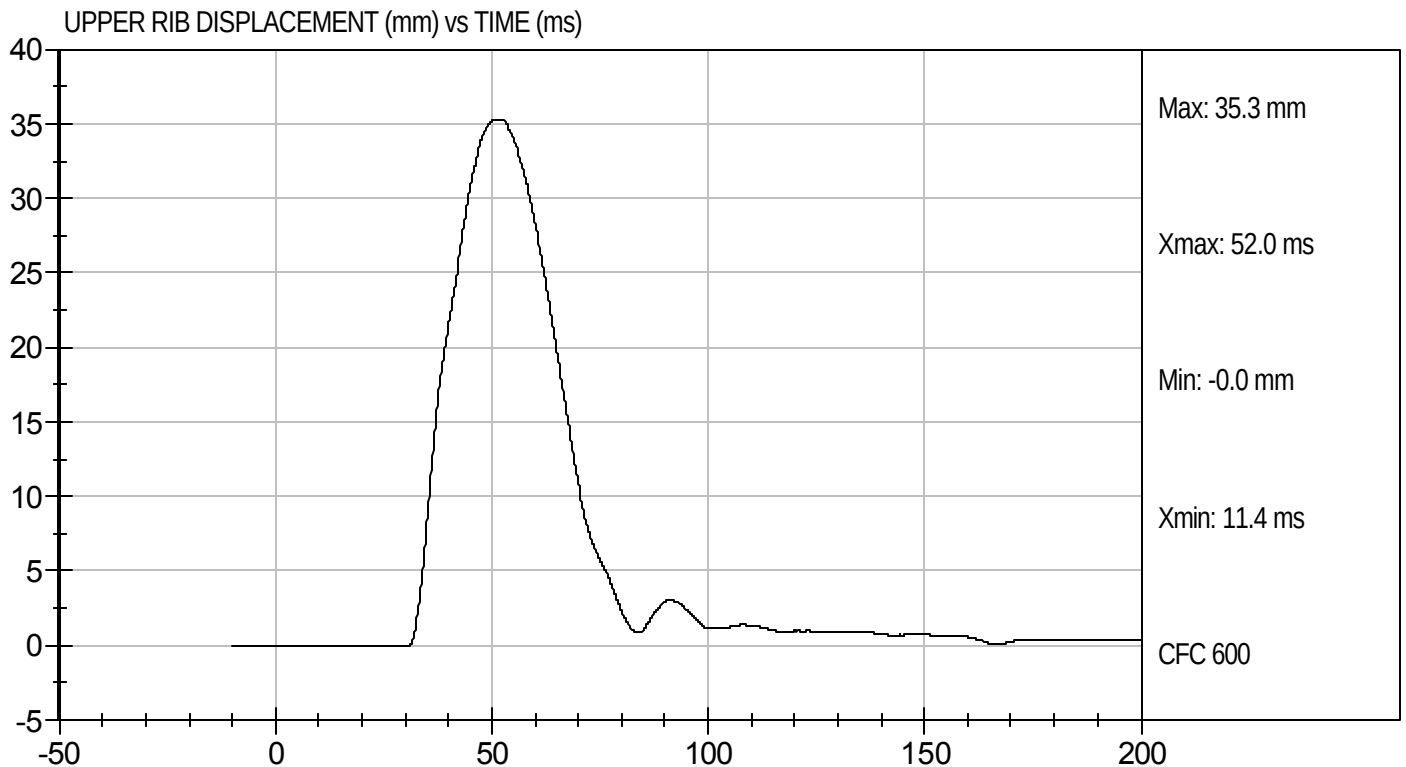
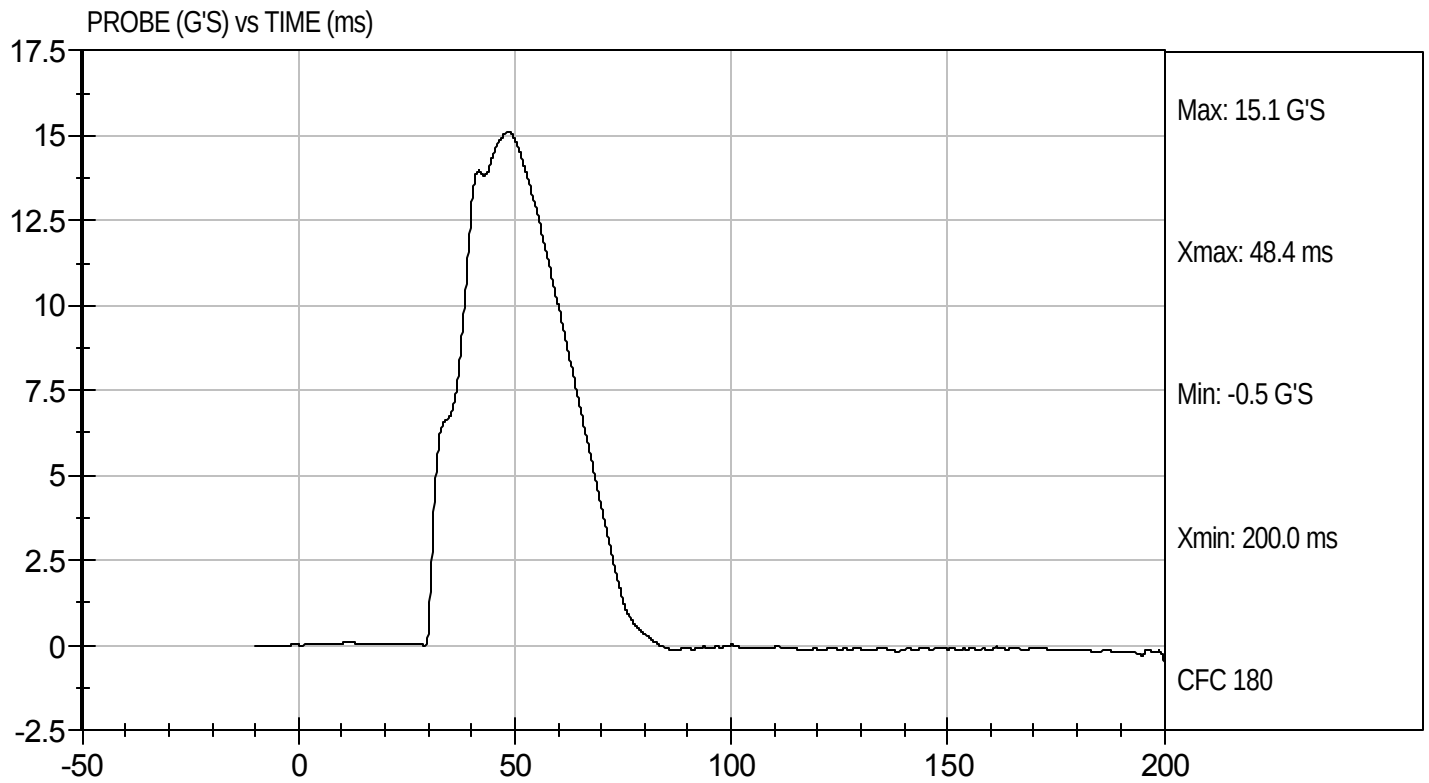
8/5/10
Test Date


Approved By



Test Desc: Thorax Without Arm
Component ID: D102525

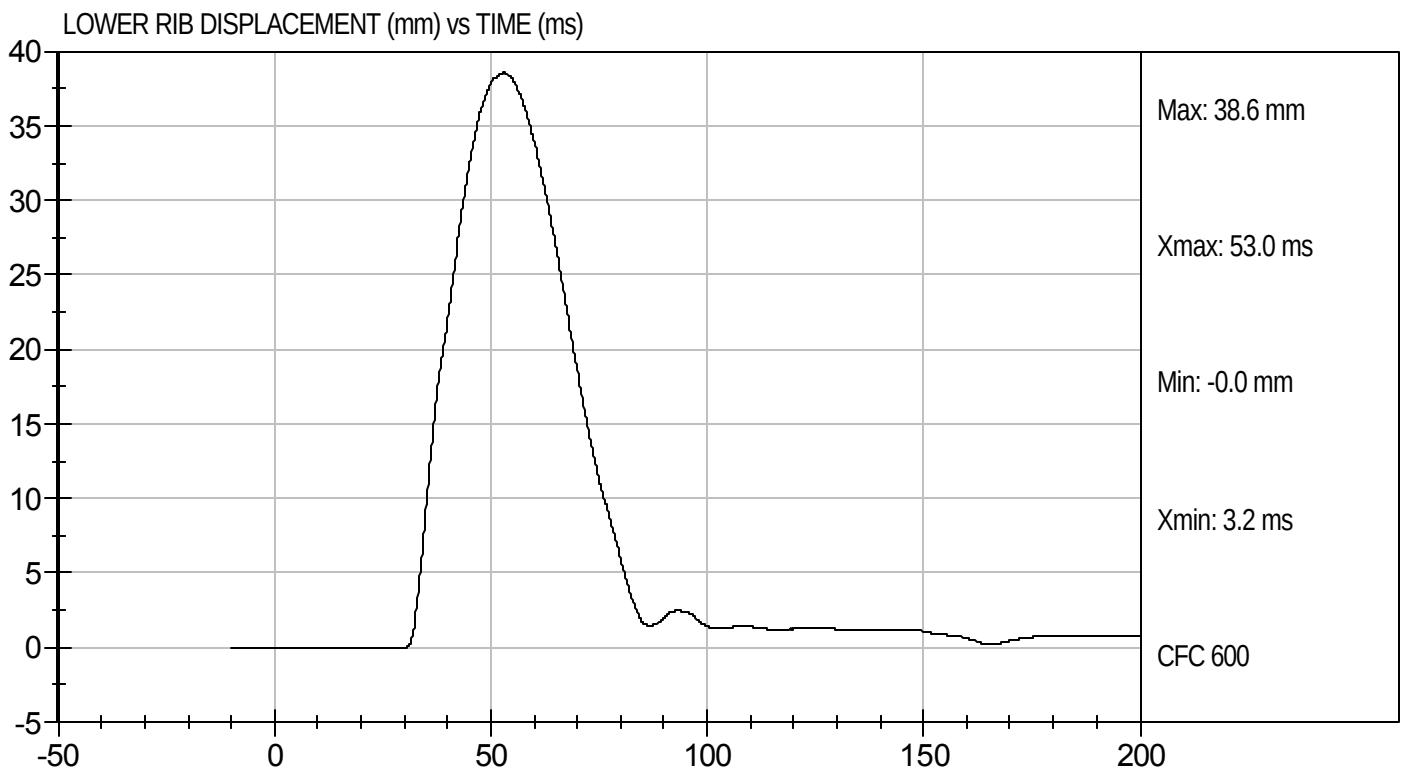
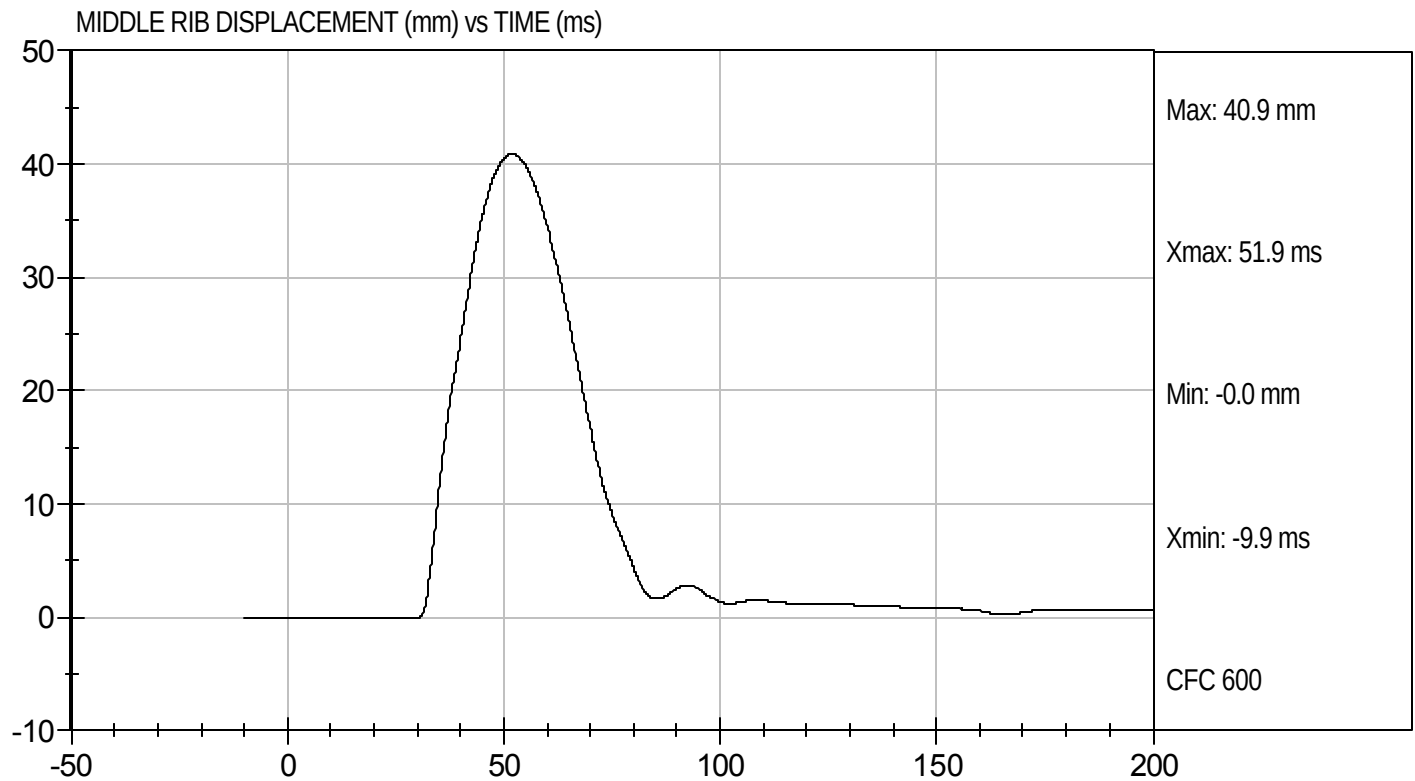
Test Date: 8/5/10
Velocity: 14.1 ft/s, 4.30 m/s





Test Desc: Thorax Without Arm
Component ID: D102525

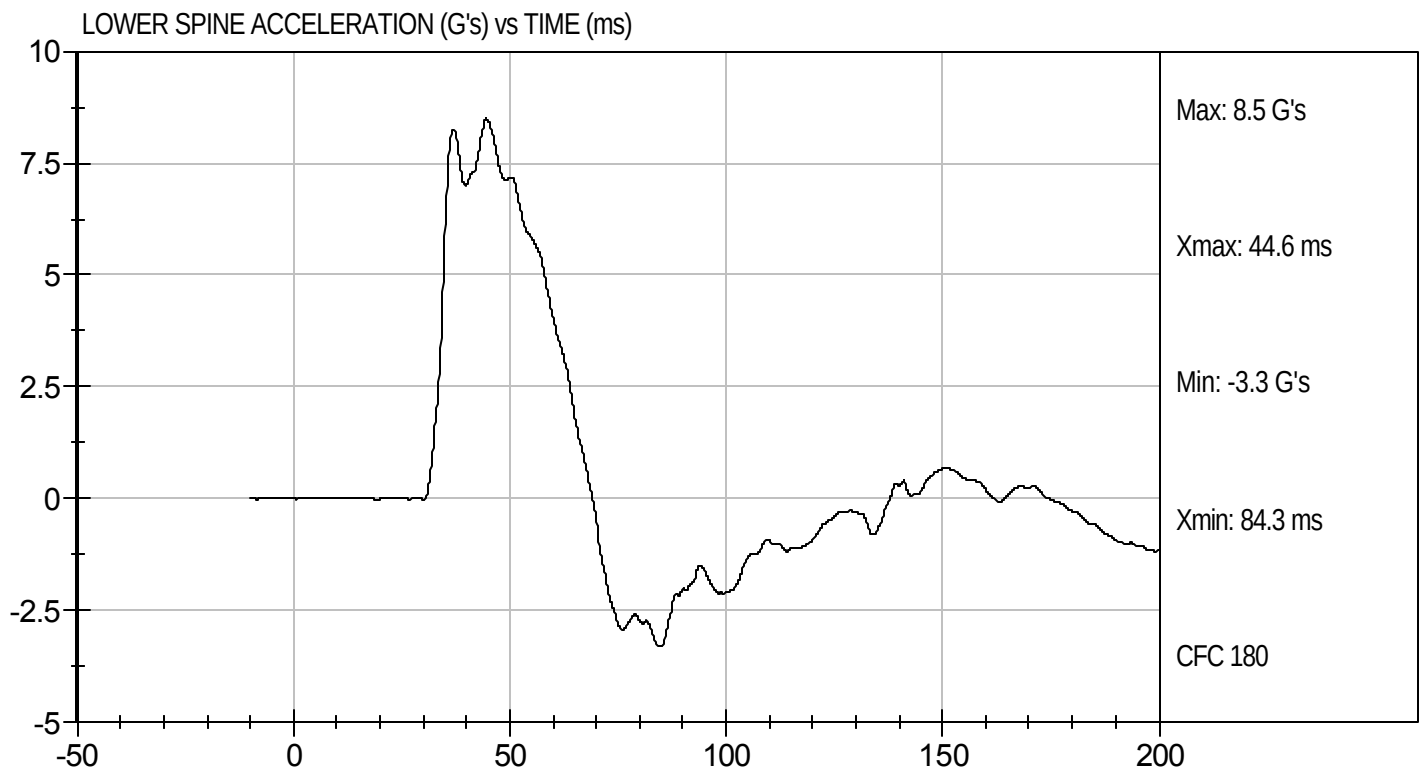
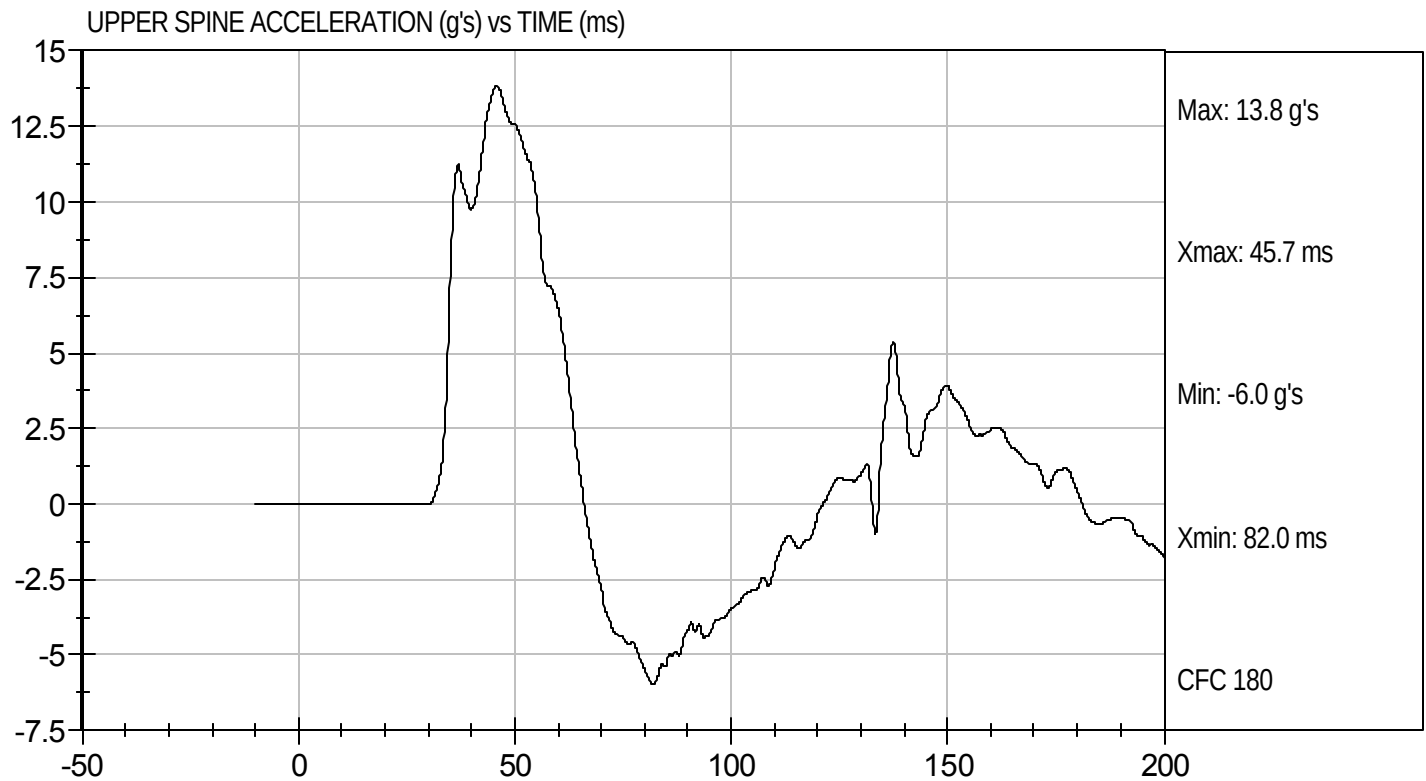
Test Date: 8/5/10
Velocity: 14.1 ft/s, 4.30 m/s





Test Desc: Thorax Without Arm
Component ID: D102525

Test Date: 8/5/10
Velocity: 14.1 ft/s, 4.30 m/s



MGA RESEARCH CORPORATION
ABDOMINAL IMPACT TEST
SID-II's BUILD LEVEL D DUMMY

ATD Serial No: 296

Test I.D: D102526

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	22.2	Pass
Humidity	%	10 to 70	51	Pass
Impact Velocity	m/s	4.20 to 4.40	4.21	Pass
Peak Impactor Acceleration	G's	12 to 16	14	Pass
Upper Rib Displacement	mm	36 to 47	42	Pass
Lower Rib Displacement	mm	33 to 44	37	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	11	Pass
Overall Test Results				Pass


Laboratory Technician

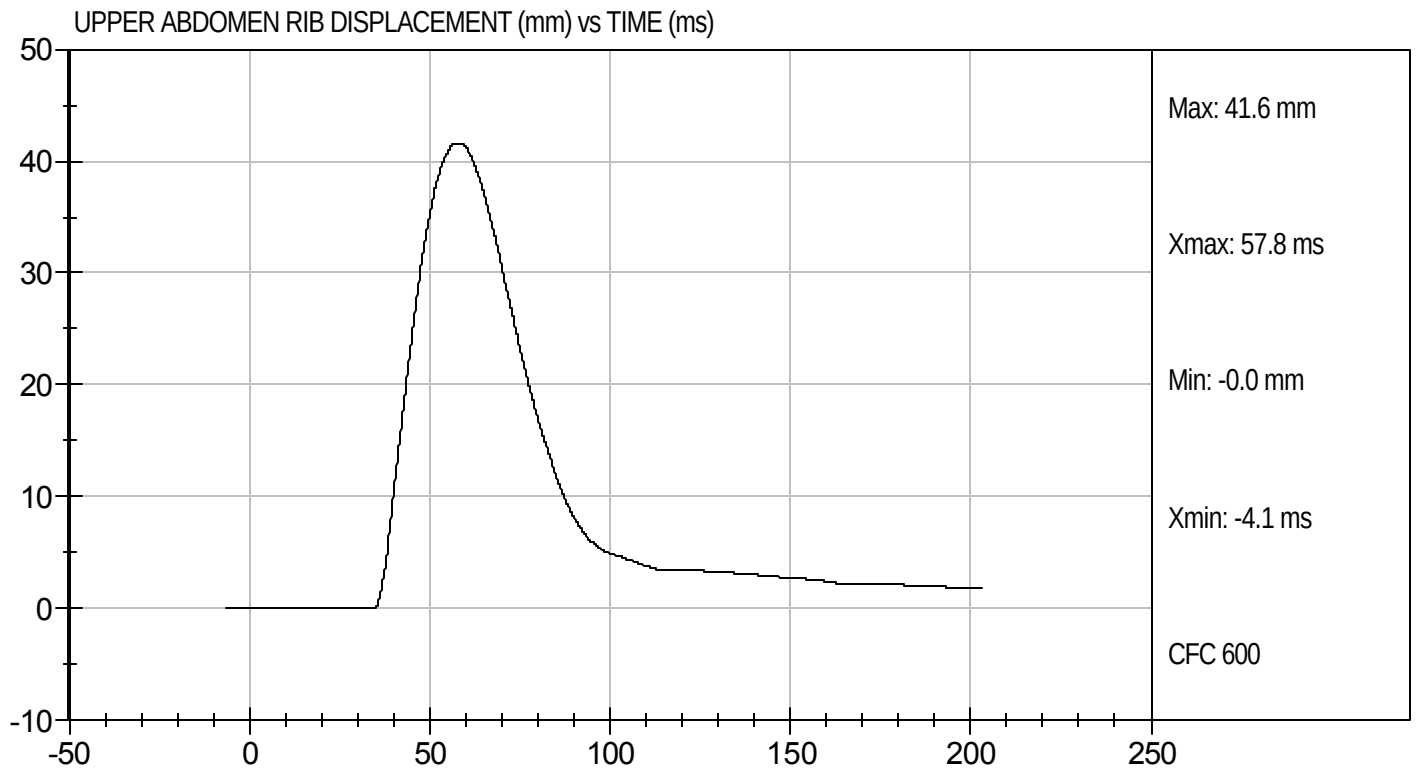
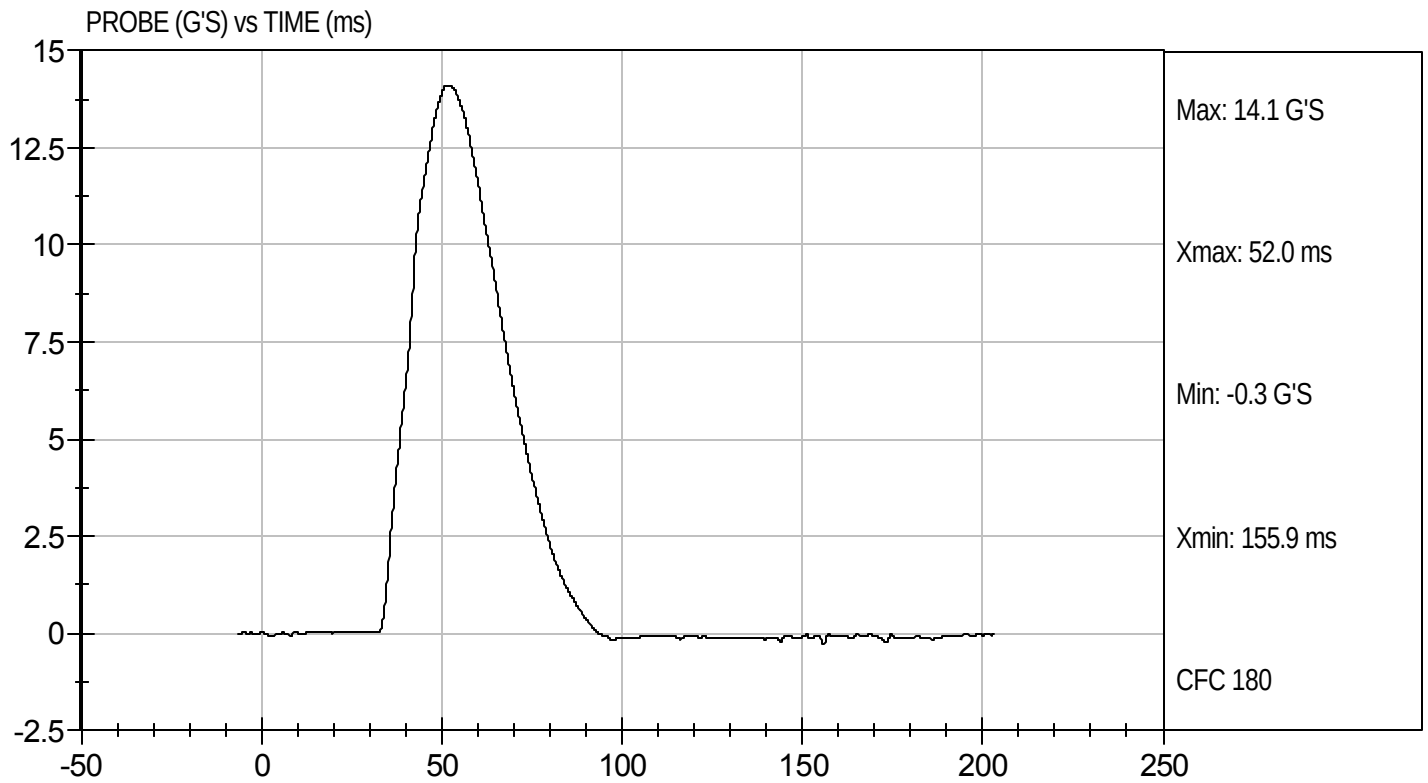
8/5/10
Test Date


Approved By



Test Desc: Abdomen Impact
Component ID: D102526

Test Date: 8/5/10
Velocity: 13.8 ft/s, 4.21 m/s

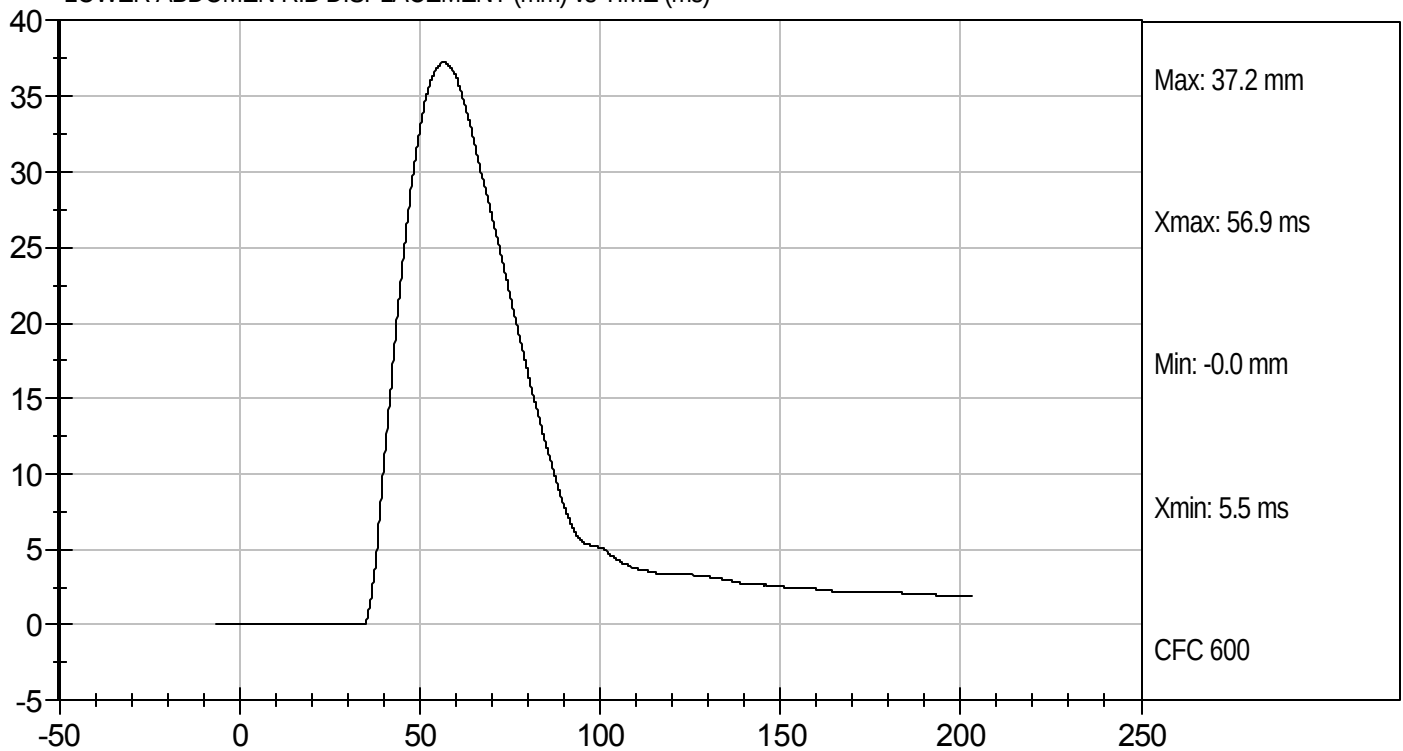




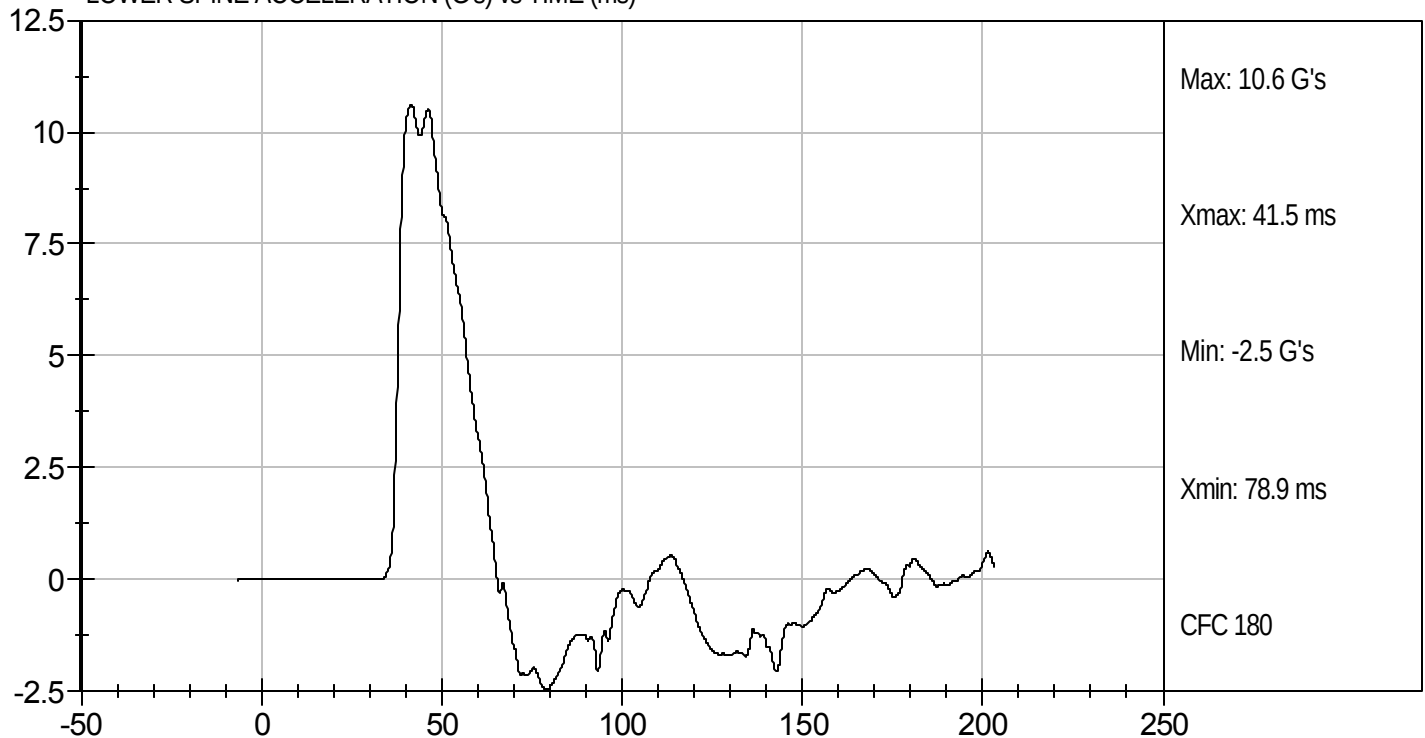
Test Desc: Abdomen Impact
Component ID: D102526

Test Date: 8/5/10
Velocity: 13.8 ft/s, 4.21 m/s

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



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

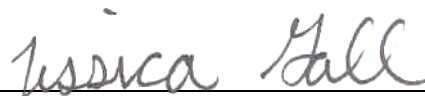


MGA RESEARCH CORPORATION
PELVIS IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

Test I.D: D102527

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	22.2	Pass
Humidity	%	10 to 70	51	Pass
Impact Velocity	m/s	6.60 to 6.80	6.71	Pass
Peak Impactor Acceleration	G's	38 to 47	43	Pass
Pelvis Y Acceleration after 6 ms	G's	34 to 42	40	Pass
Peak Acetabulum Force	N	3600 to 4300	4070	Pass
Overall Test Results				Pass


Laboratory Technician

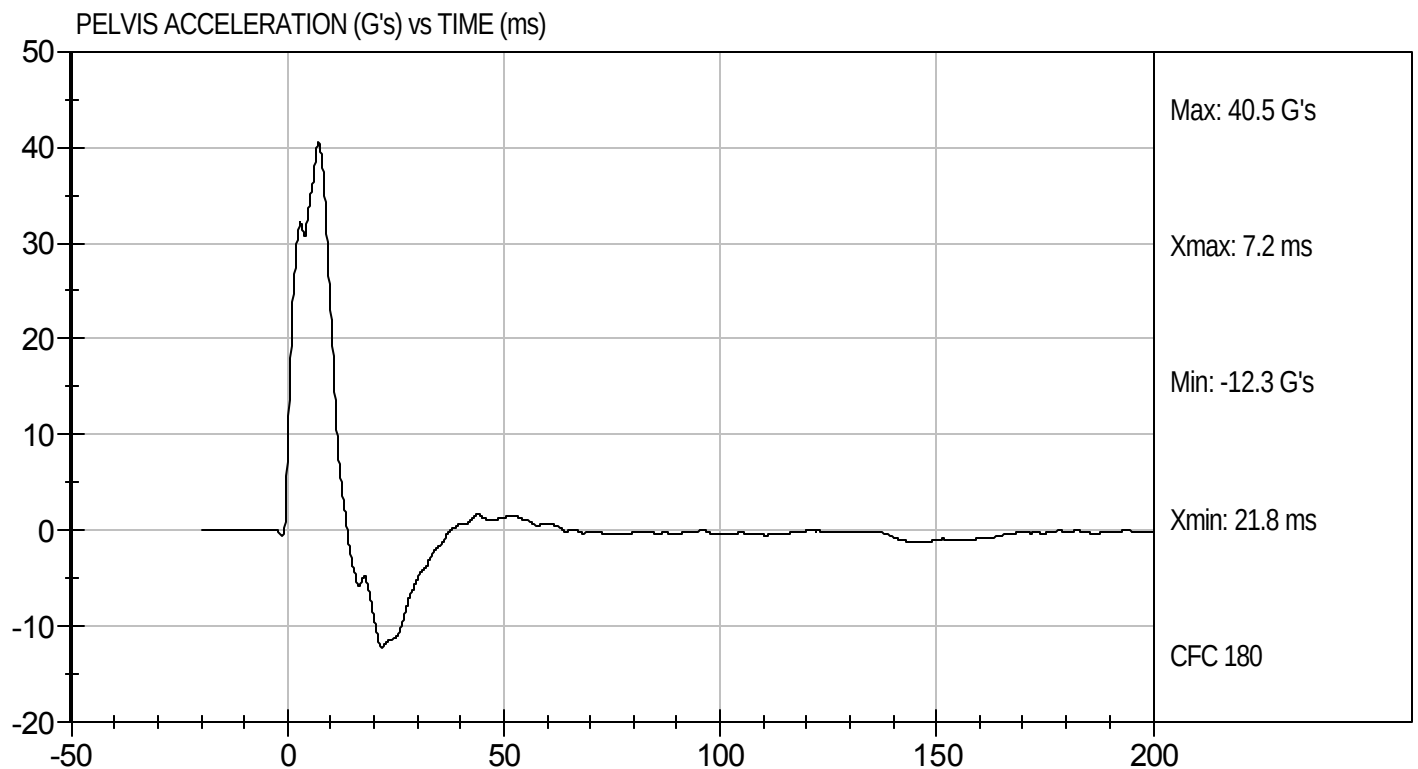
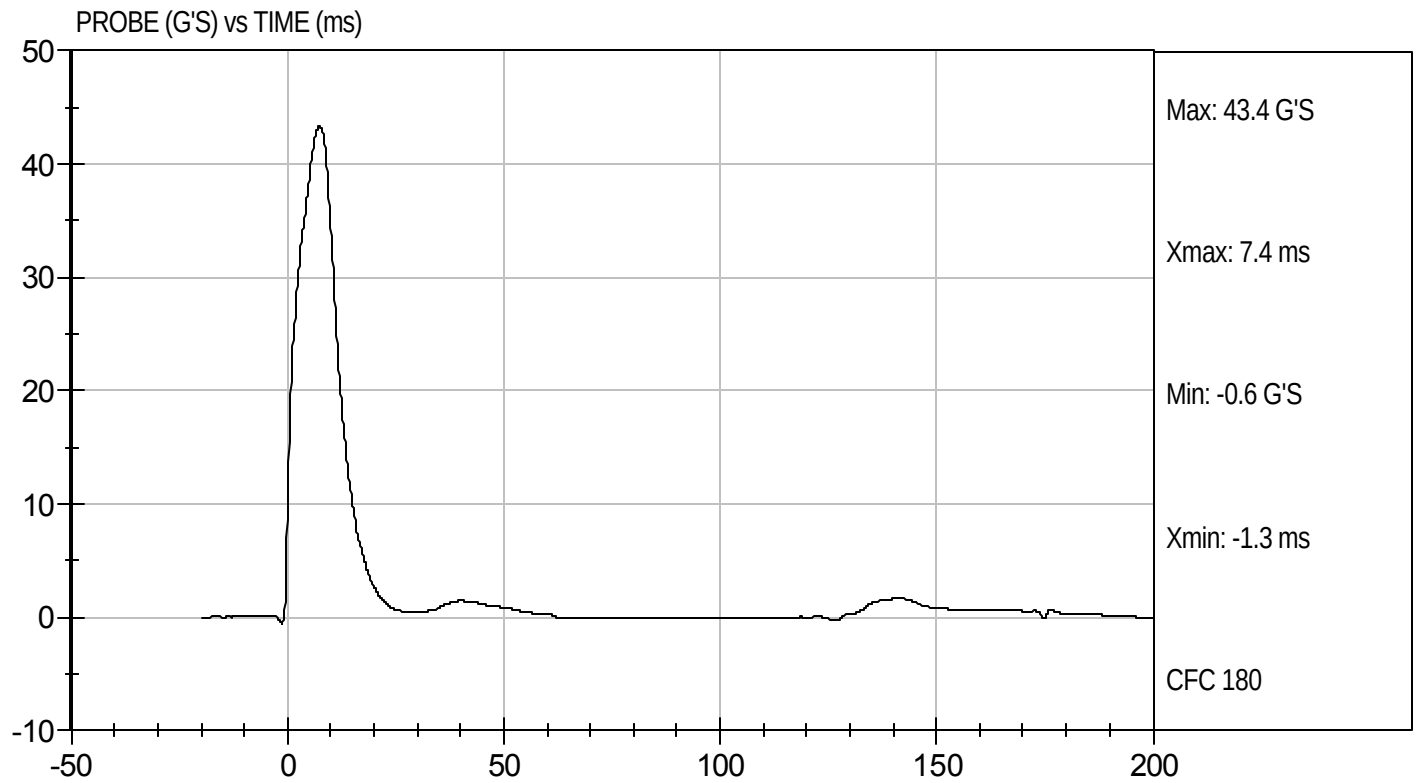
8/5/10
Test Date


Approved By



Test Desc: Pelvis Impact
Component ID: D102527

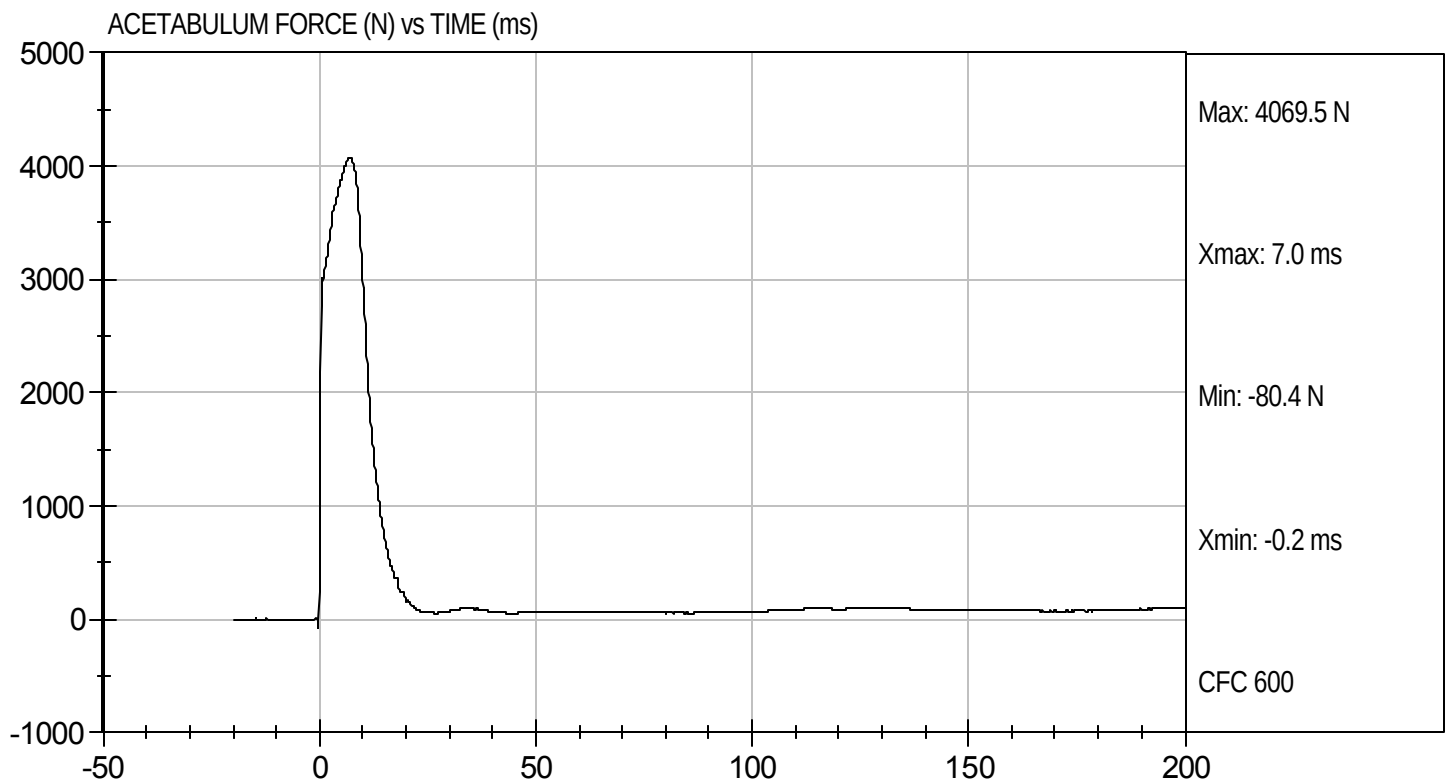
Test Date: 8/5/10
Velocity: 22.0 ft/s, 6.71 m/s





Test Desc: Pelvis Impact
Component ID: D102527

Test Date: 8/5/10
Velocity: 22.0 ft/s, 6.71 m/s



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

ATD Serial No: 296

Test I.D: D102528

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	22.2	Pass
Humidity	%	10 to 70	51	Pass
Impact Velocity	m/s	4.20 to 4.40	4.36	Pass
Peak Impactor Acceleration	G's	36 to 45	39	Pass
Pelvis Y Acceleration	G's	28 to 39	36	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4774	Pass
Overall Test Results			Pass	


Laboratory Technician

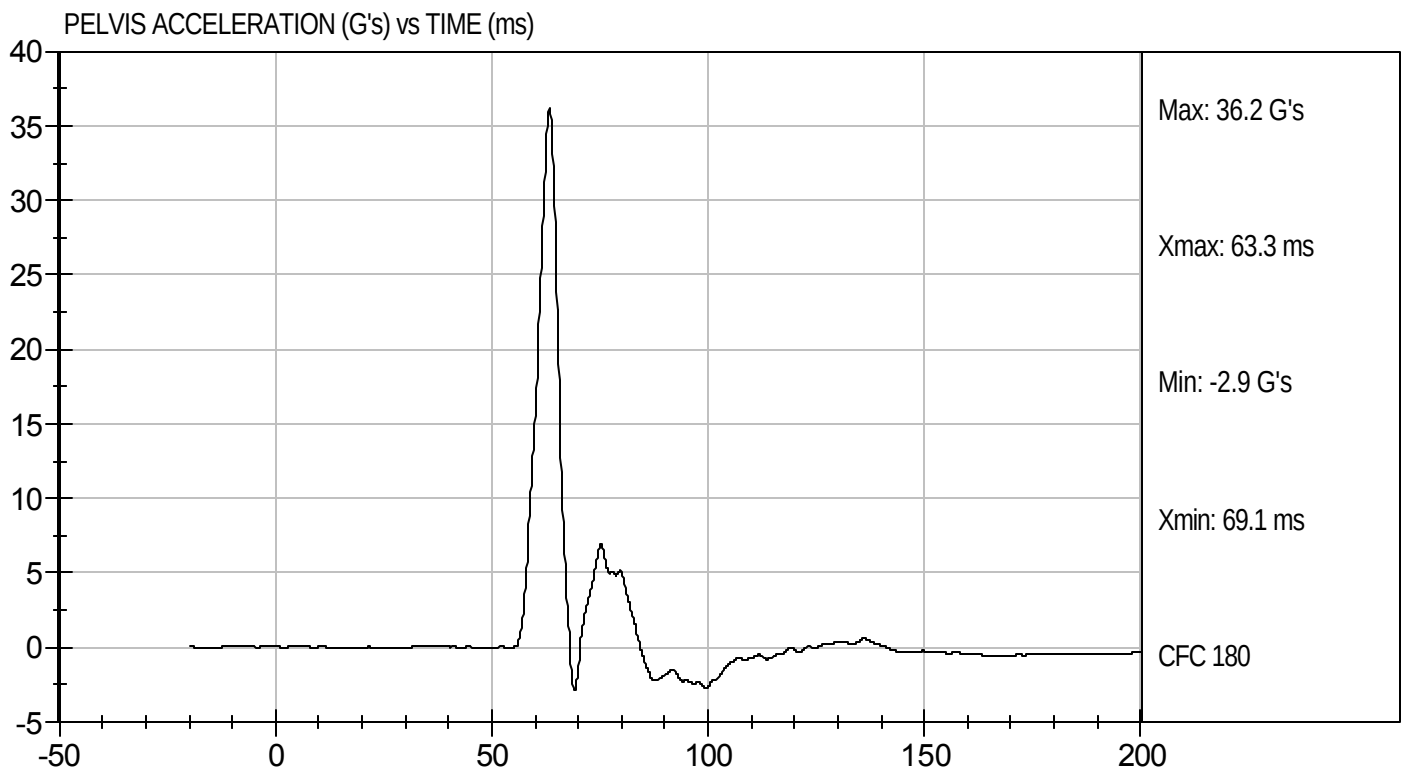
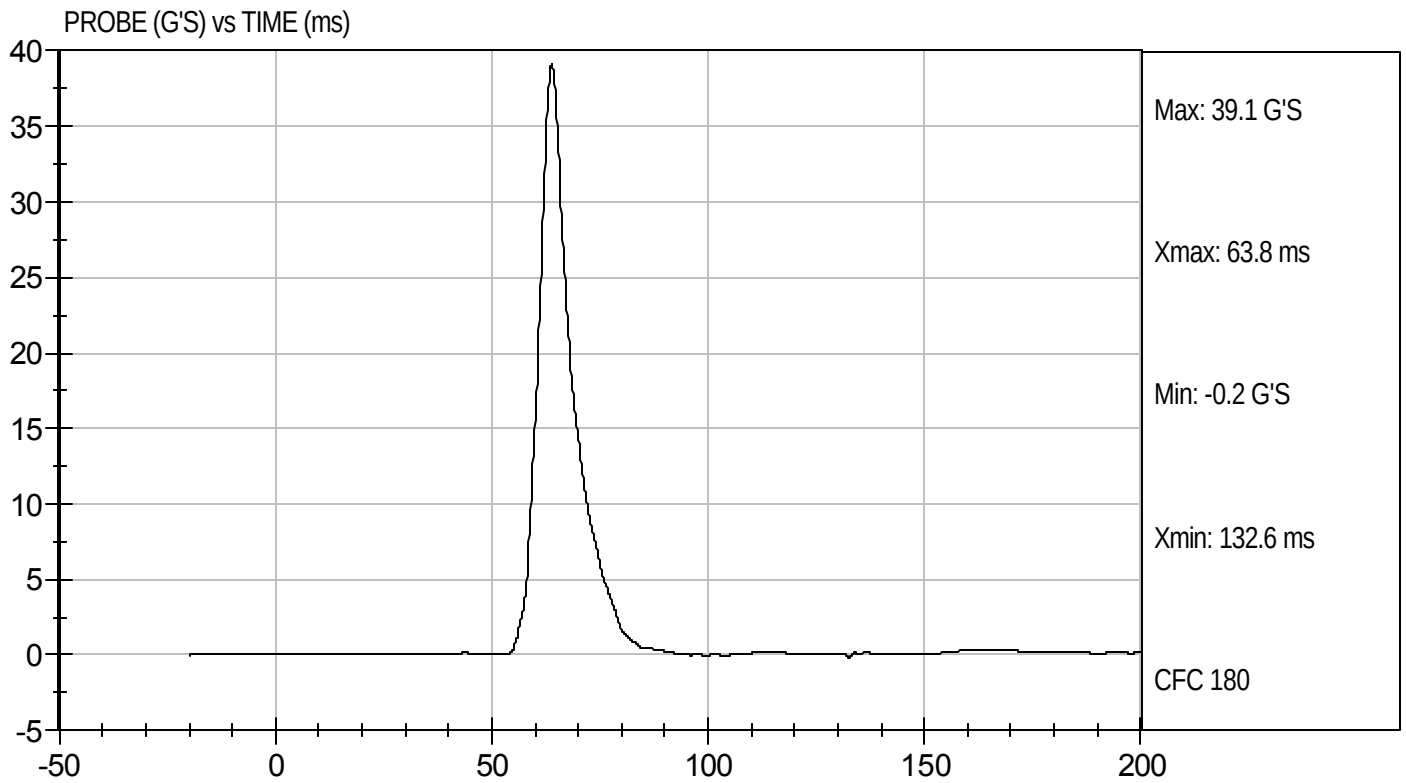
8/5/10
Test Date


Approved By



Test Desc: Pelvis Impact
Component ID: D102528

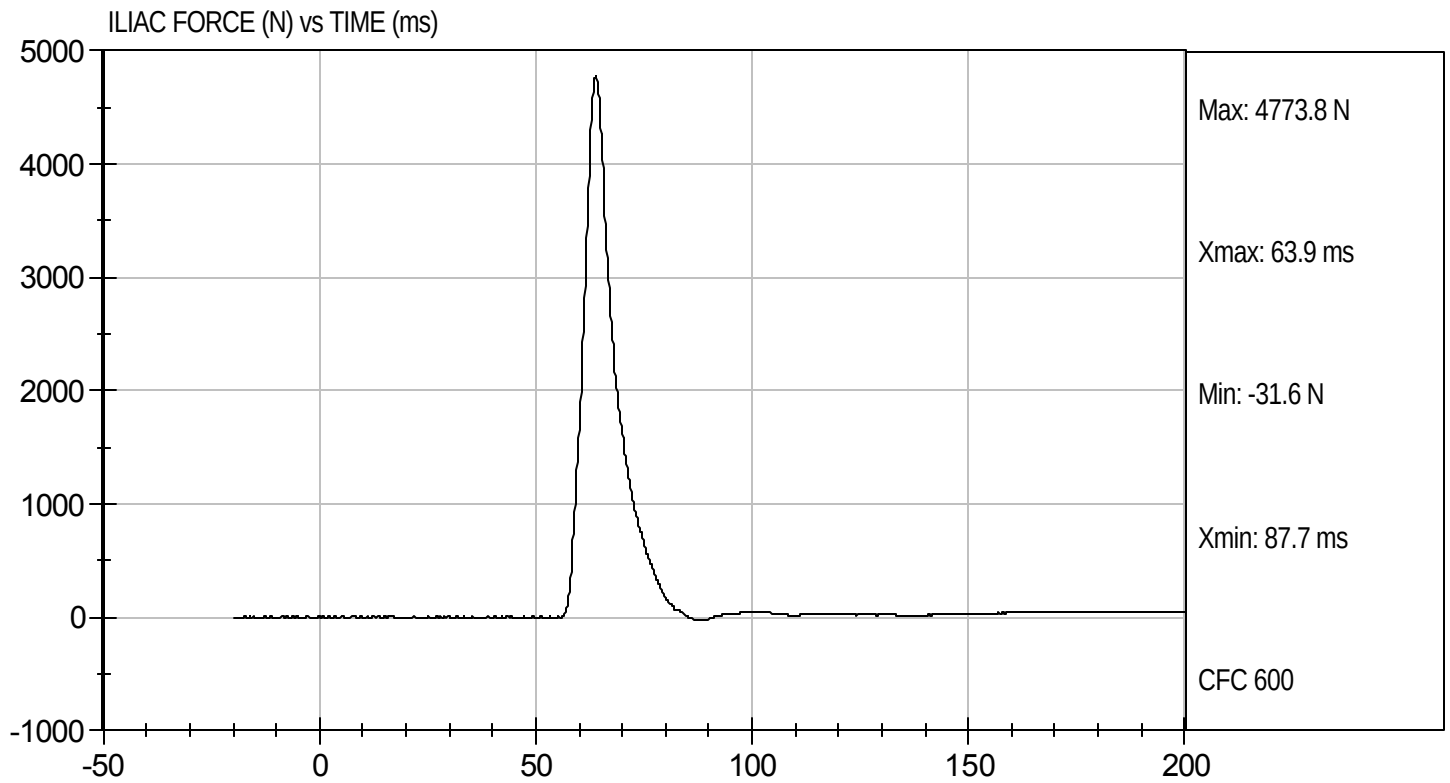
Test Date: 8/5/10
Velocity: 14.3 ft/s, 4.36 m/s





Test Desc: Pelvis Impact
Component ID: D102528

Test Date: 8/5/10
Velocity: 14.3 ft/s, 4.36 m/s



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

ATD Serial No: 296

Test ID: D102551

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	53	Pass
Peak Resultant Acceleration	G's	115 to 137	121	Pass
Peak Lateral Acceleration	G's	+/- 15	-4.2	Pass
Unimodal	N/A	<15%	Yes	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

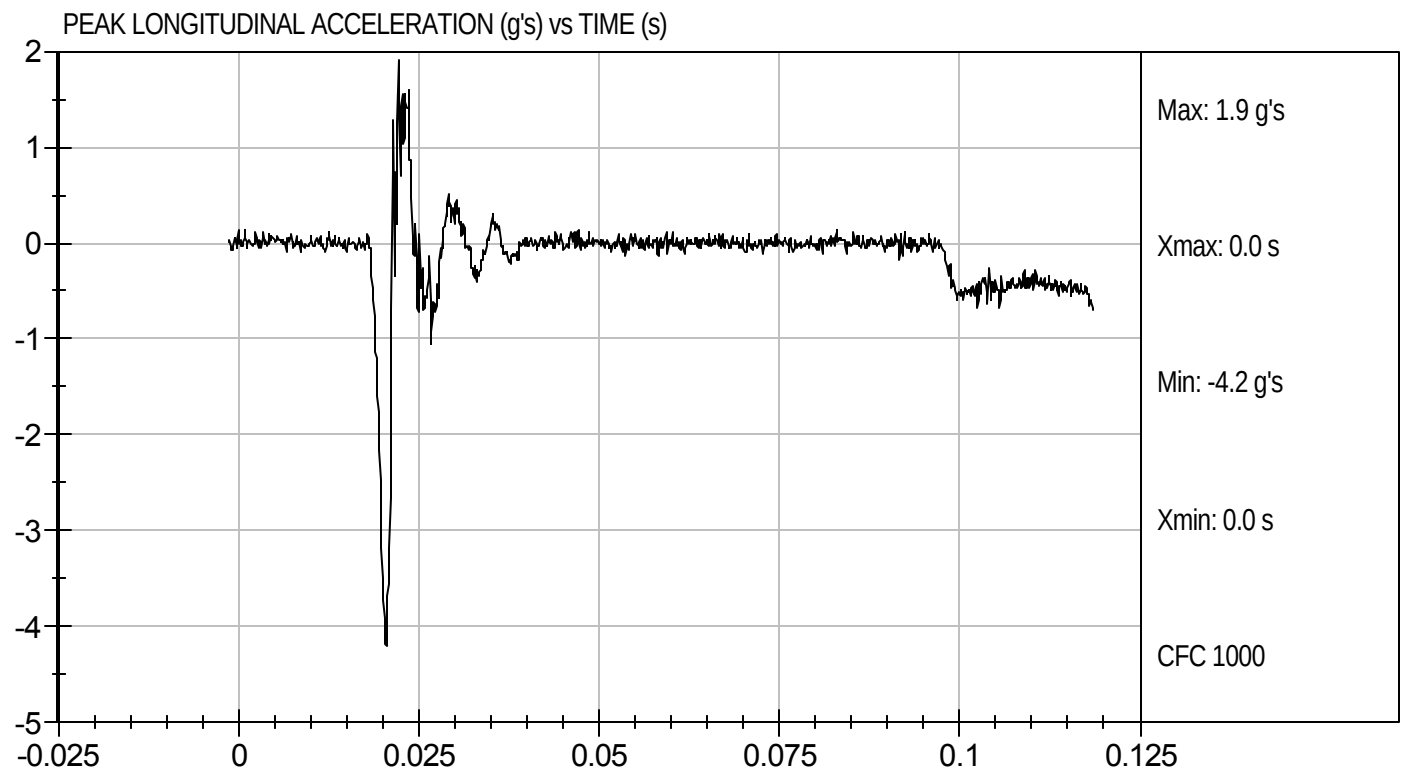
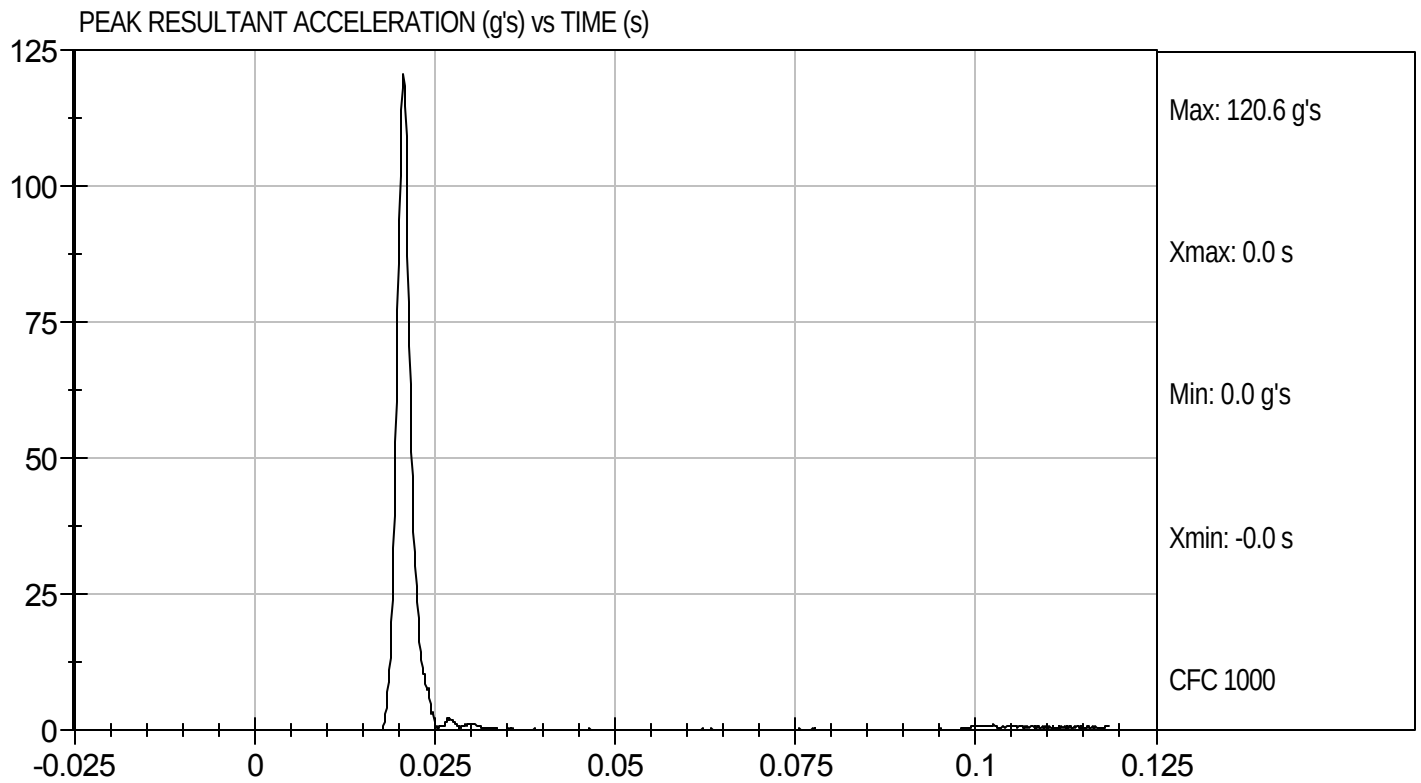
8/9/10
Test Date

David Winkelbauer
Approved By



Test Desc: Head Drop
Component ID: D102551

Test Date: 8/9/10
Velocity: 0 ft/s, 0 m/s

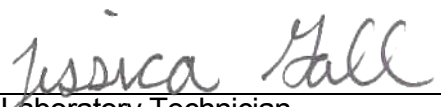


MGA RESEARCH CORPORATION
LATERAL NECK PENDULUM TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

Test I.D: D102552

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	20.9	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	3.85	Pass
	20 ms	m/s	4.40 to 5.40	5.13	Pass
	25 ms	m/s	5.40 to 6.10	5.70	Pass
	25-100 ms	m/s	5.50 to 6.20	5.70	Pass
Maximum D-Plane Rotation		deg	71 to 81	72	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	58	Pass
Maximum Occipital Condyle Moment during Rotation Interval Nm			-44 to -36	-43	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	113	Pass
Overall Test Results				Pass	


 Laboratory Technician

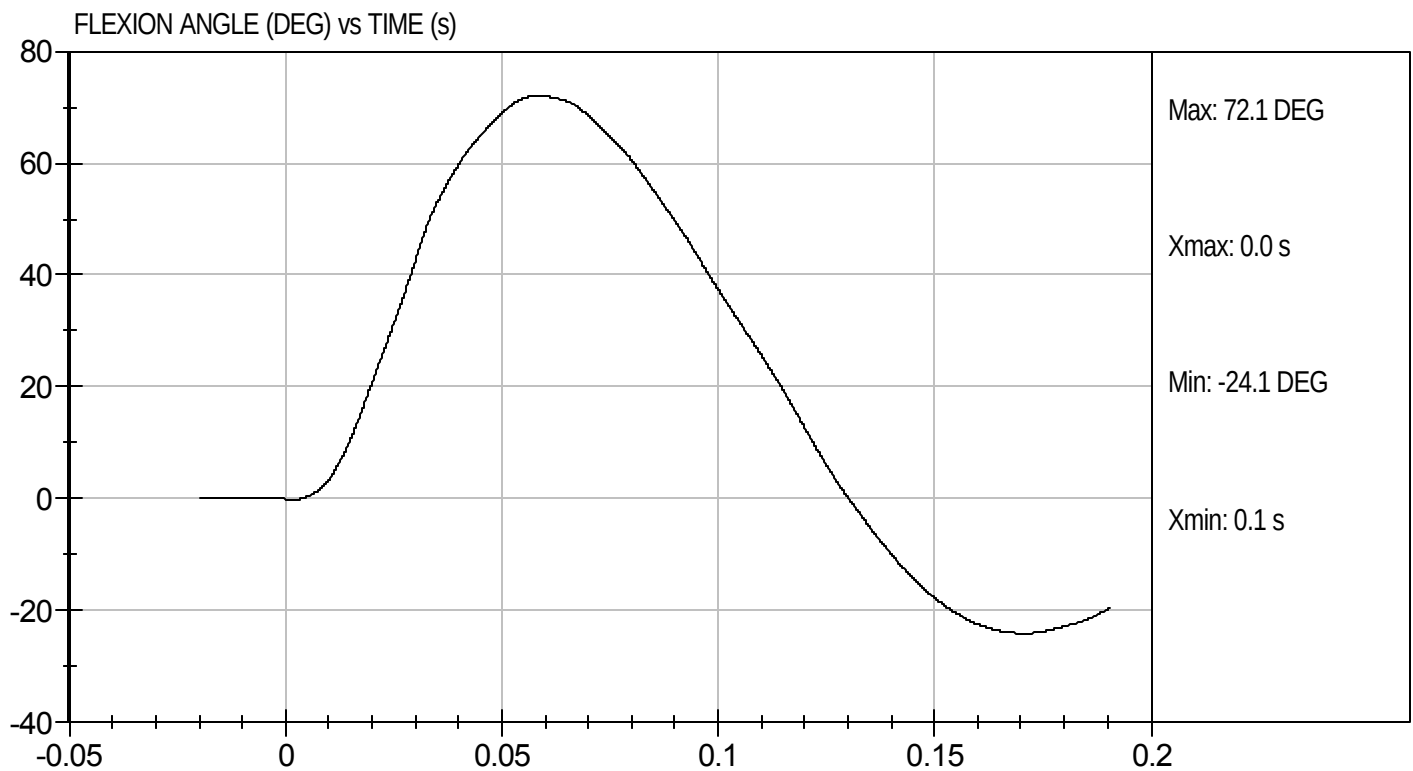
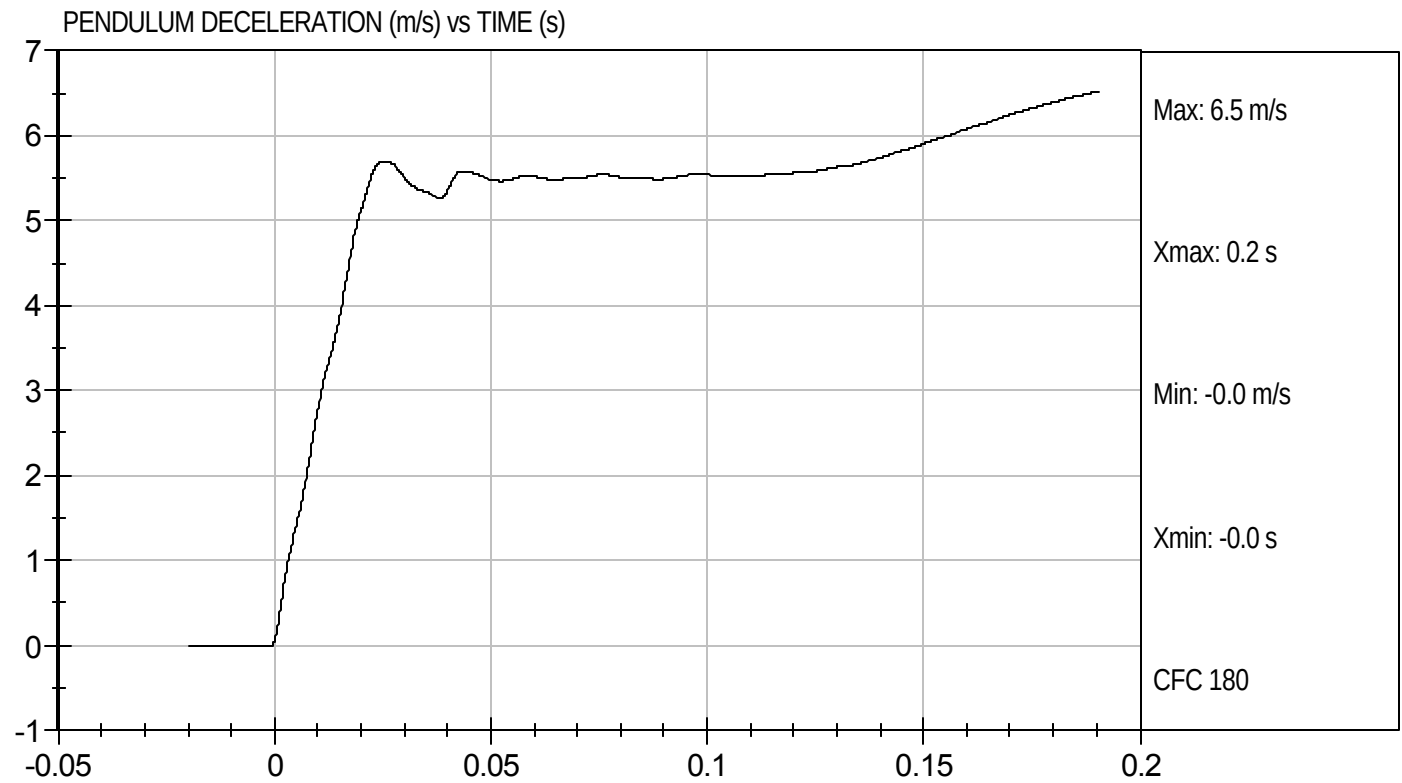
8/9/10
 Test Date


 Approved By



Test Desc: Neck Bending
Component ID: D102552

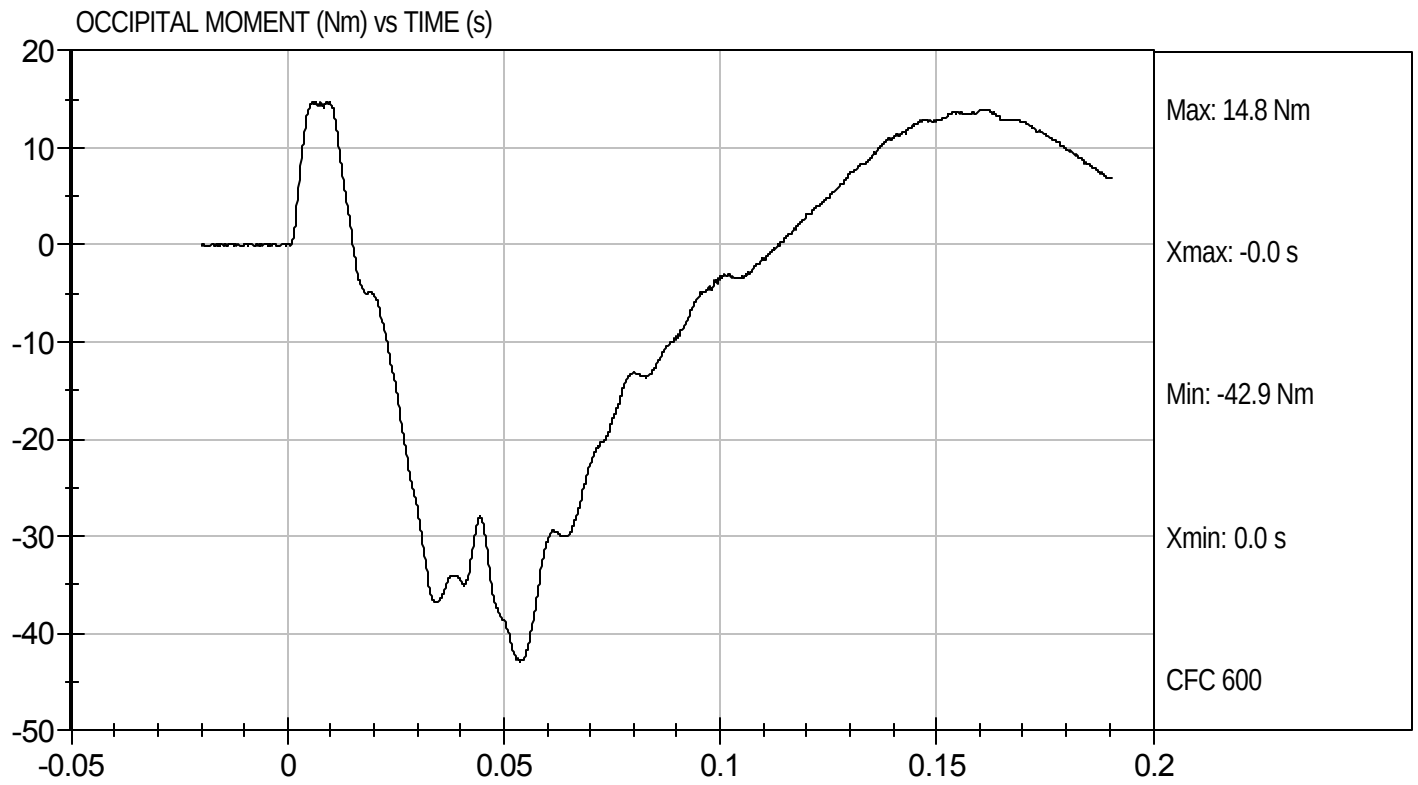
Test Date: 8/9/10
Velocity: 18.32 ft/s, 5.58 m/s





Test Desc: Neck Bending
Component ID: D102552

Test Date: 8/9/10
Velocity: 18.32 ft/s, 5.58 m/s

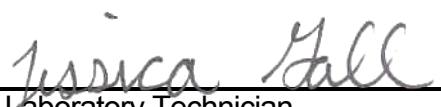


MGA RESEARCH CORPORATION
SHOULDER IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

Test ID: D102553

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	51	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	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

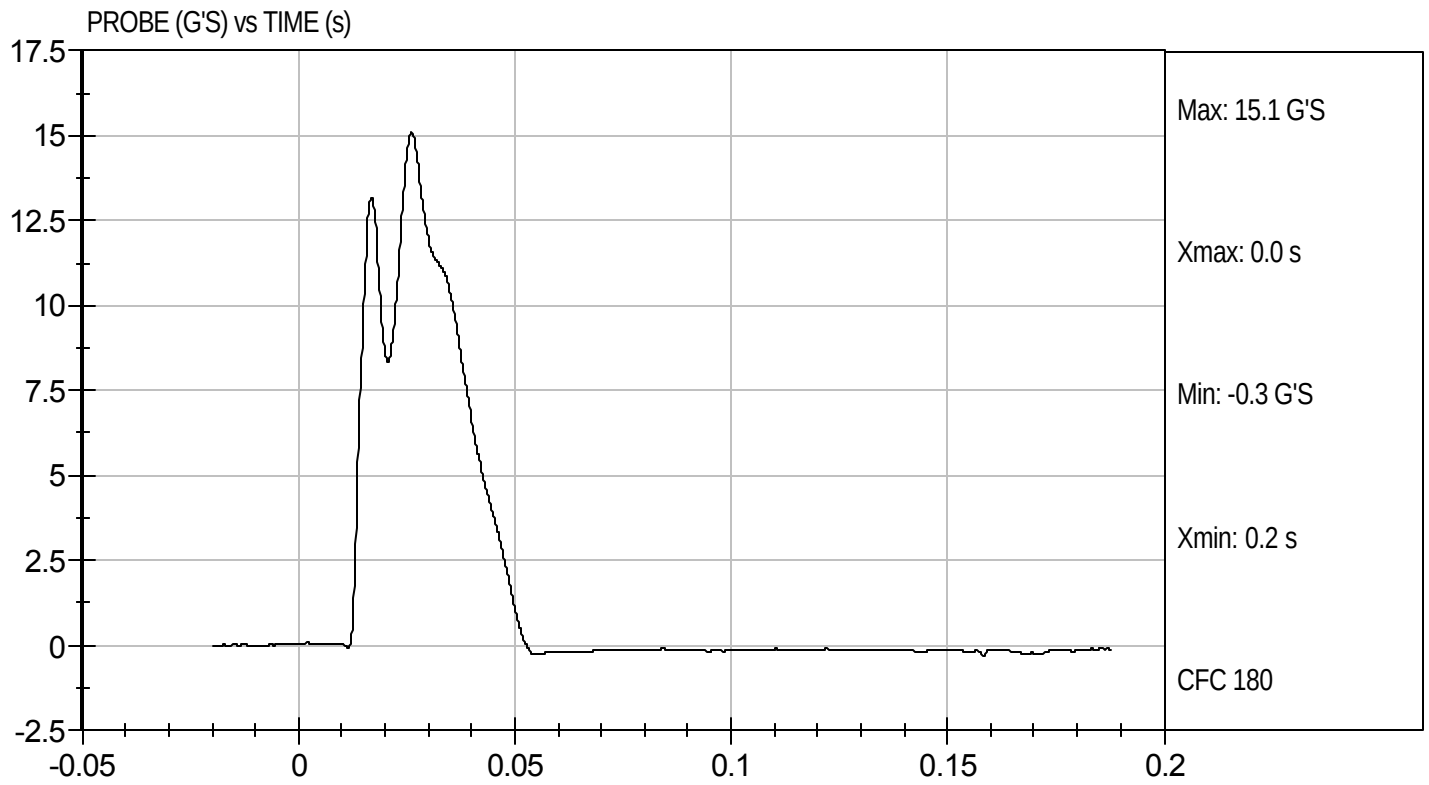
8/9/10
Test Date


Approved By



Test Desc: Shoulder Impact
Component ID: D102553

Test Date: 8/9/10
Velocity: 14.25 ft/s, 4.34 m/s

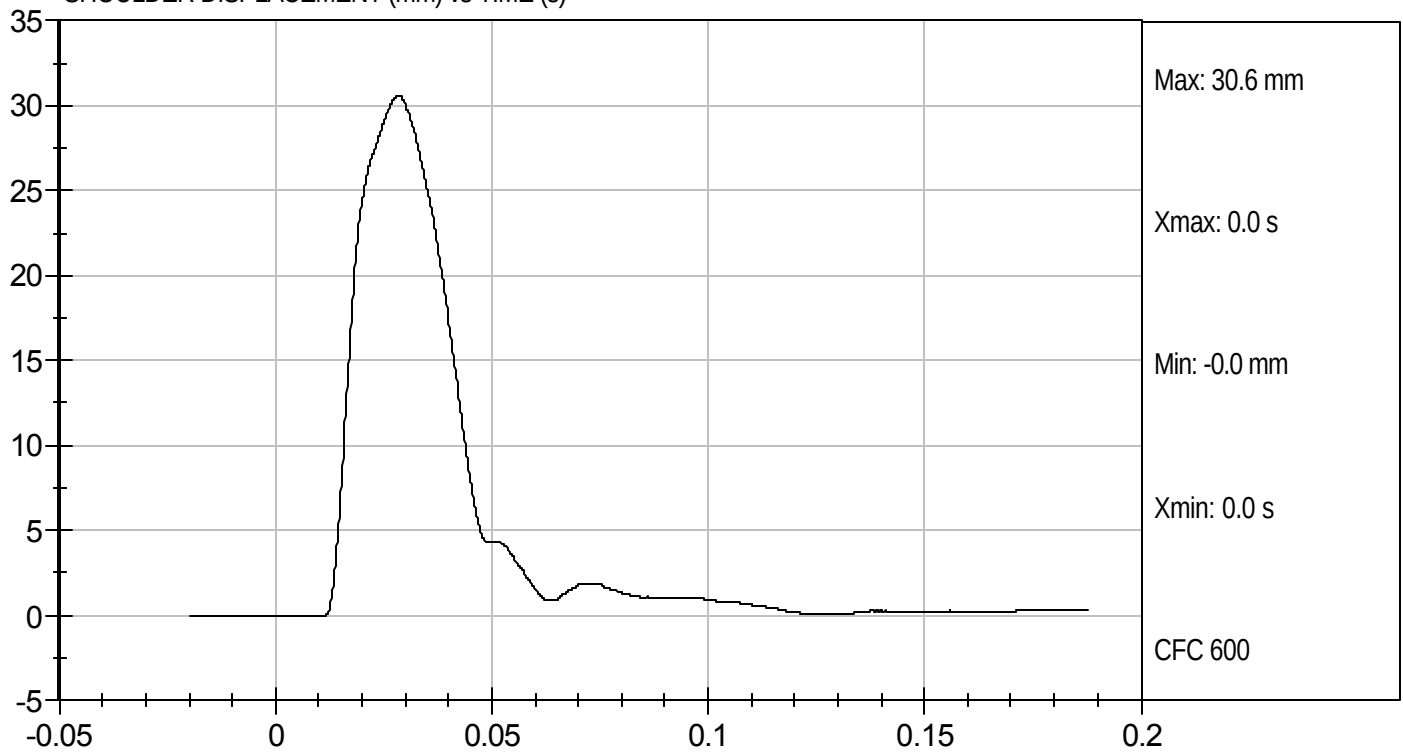




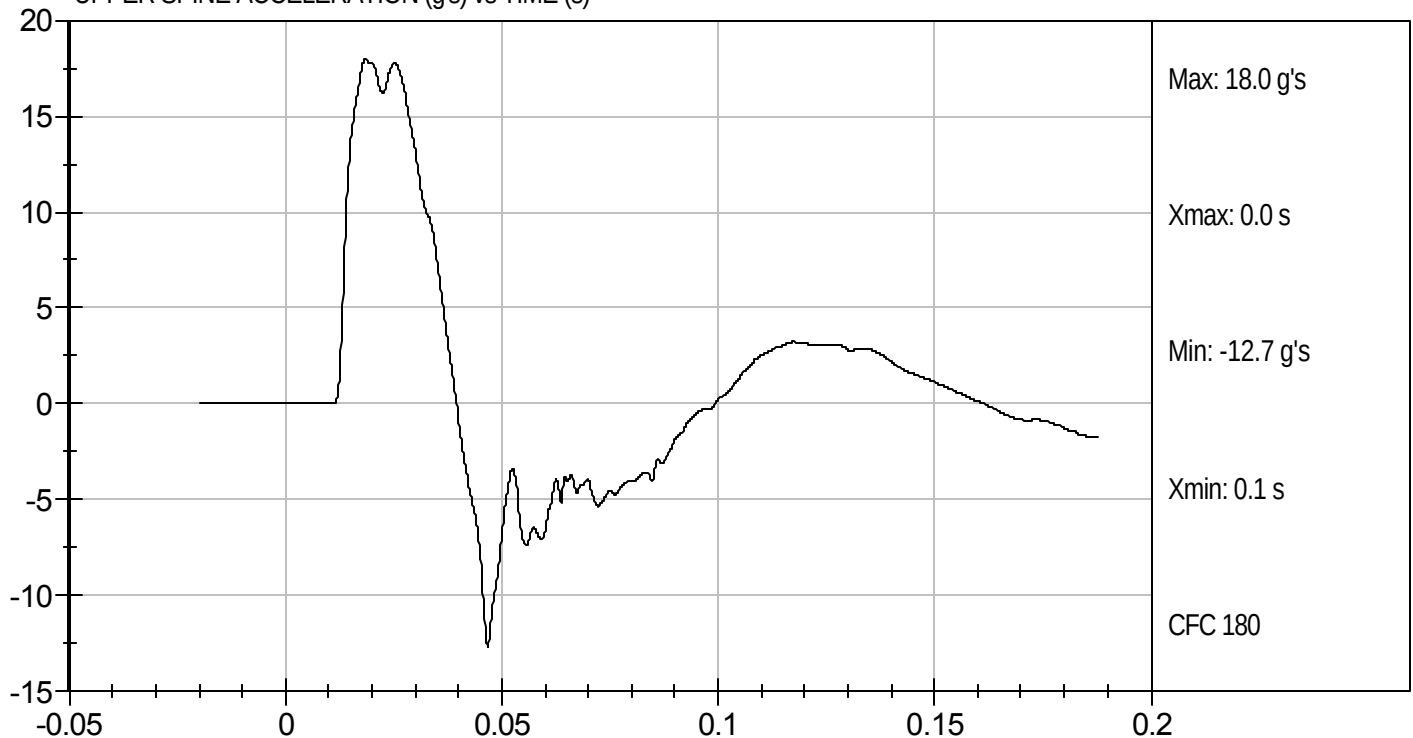
Test Desc: Shoulder Impact
Component ID: D102553

Test Date: 8/9/10
Velocity: 14.25 ft/s, 4.34 m/s

SHOULDER DISPLACEMENT (mm) vs TIME (s)



UPPER SPINE ACCELERATION (g's) vs TIME (s)



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

ATD Serial No: 296

Test I.D: D102554

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.5	Pass
Humidity	%	10 to 70	51	Pass
Impact Velocity	m/s	6.60 to 6.80	6.68	Pass
Peak Impactor Acceleration	G's	30 to 36	32	Pass
Shoulder Displacement	mm	31 to 40	33	Pass
Upper Rib Displacement	mm	25 to 32	26	Pass
Middle Rib Displacement	mm	30 to 36	32	Pass
Lower Rib Displacement	mm	32 to 38	35	Pass
Upper Spine (T1) Y Acceleration	G's	34 to 43	38	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	30	Pass
Overall Test Results			Pass	


Laboratory Technician

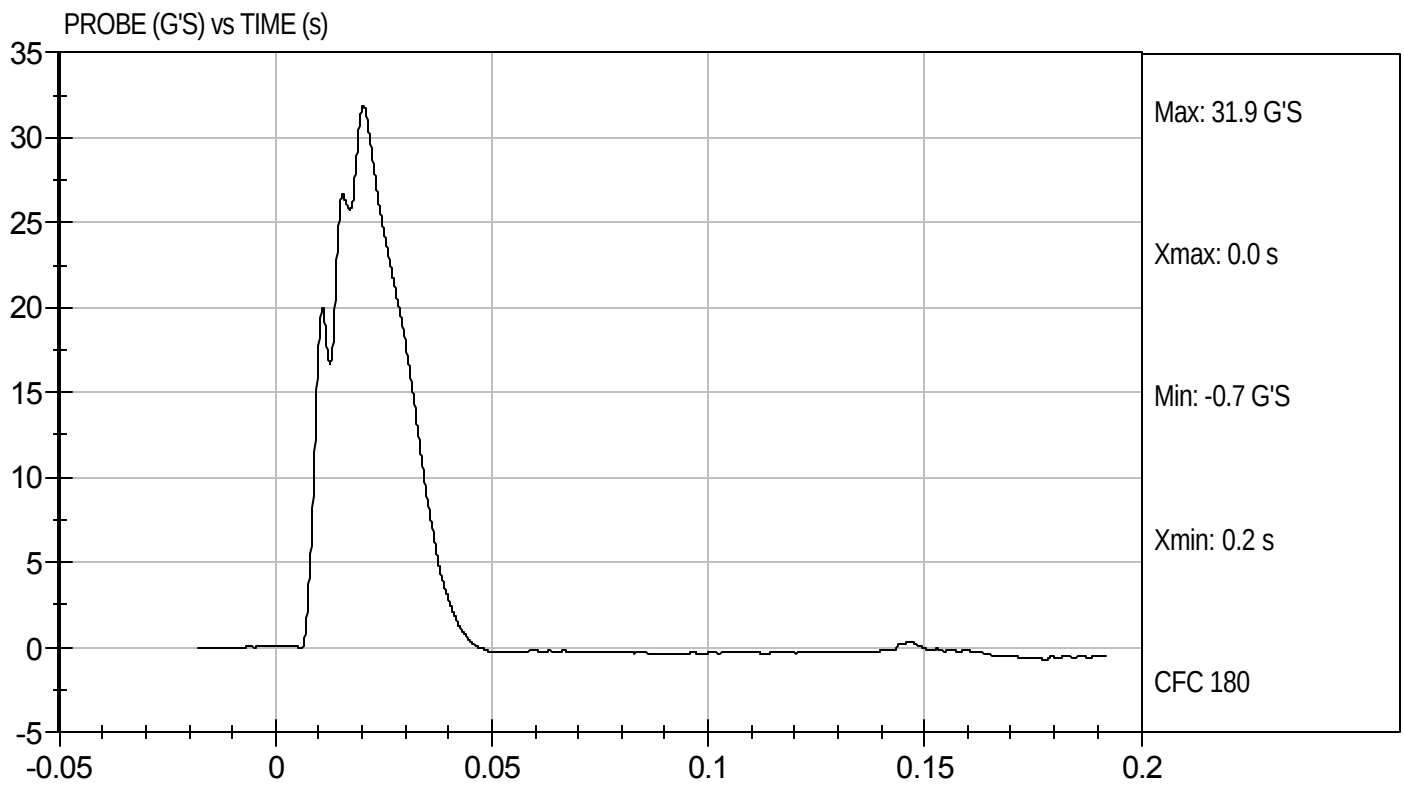
8/9/10
Test Date


Approved By



Test Desc: Thorax With Arm
Component ID: D102554

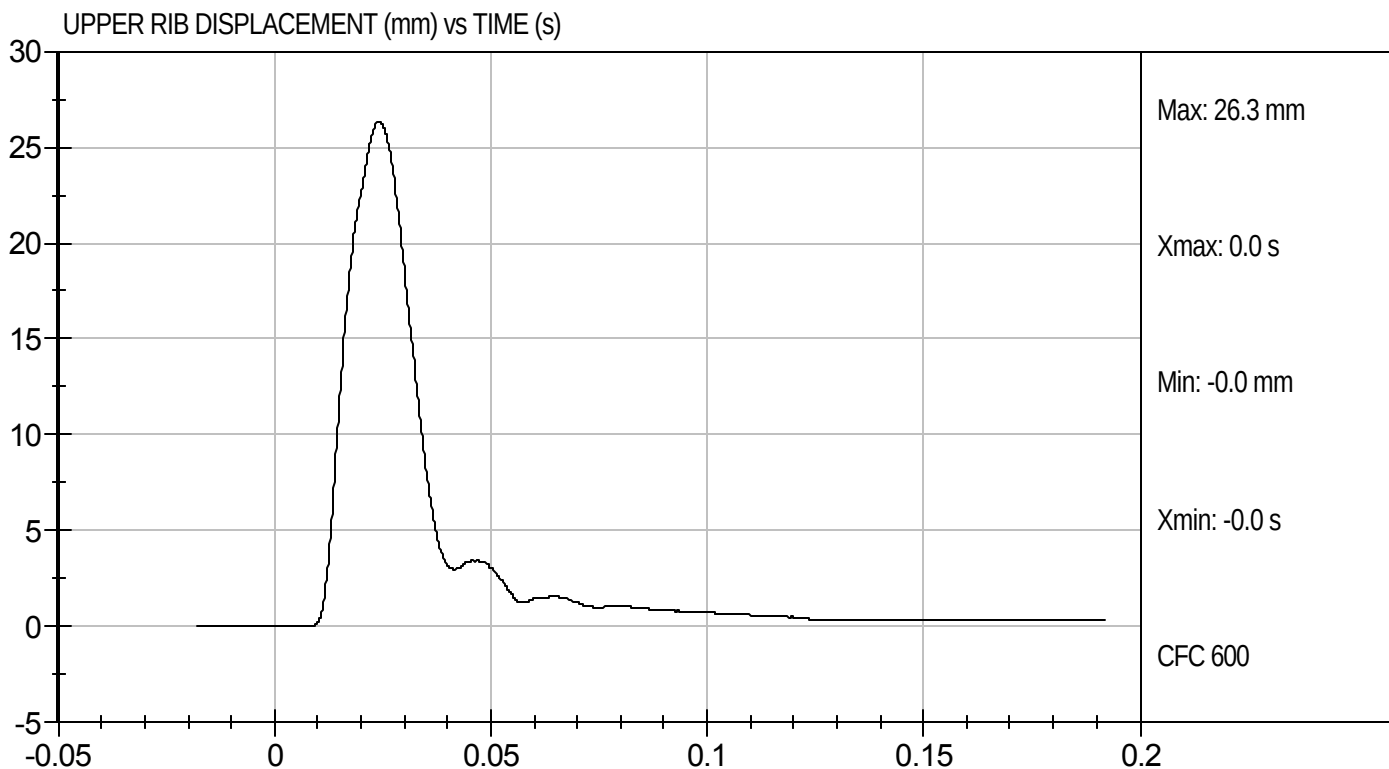
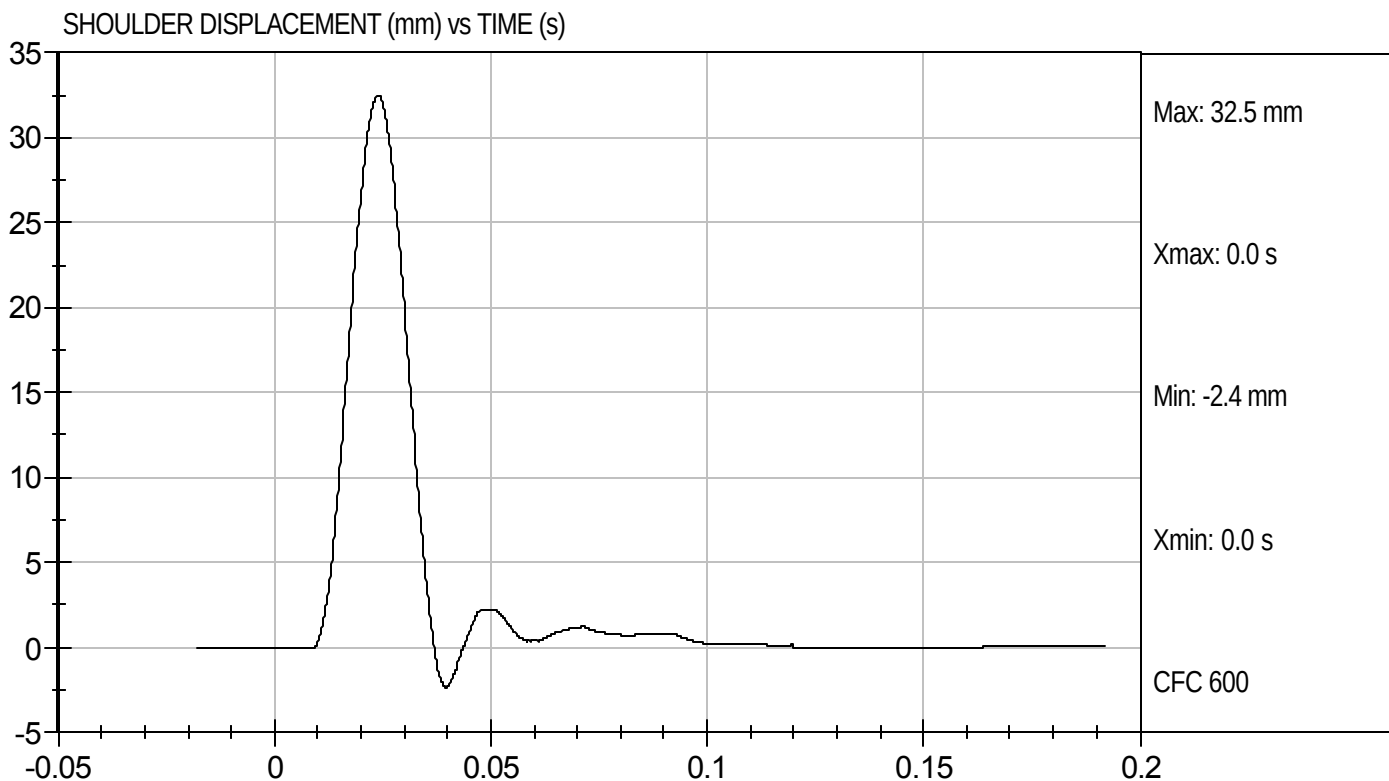
Test Date: 8/9/10
Velocity: 21.93 ft/s, 6.68 m/s





Test Desc: Thorax With Arm
Component ID: D102554

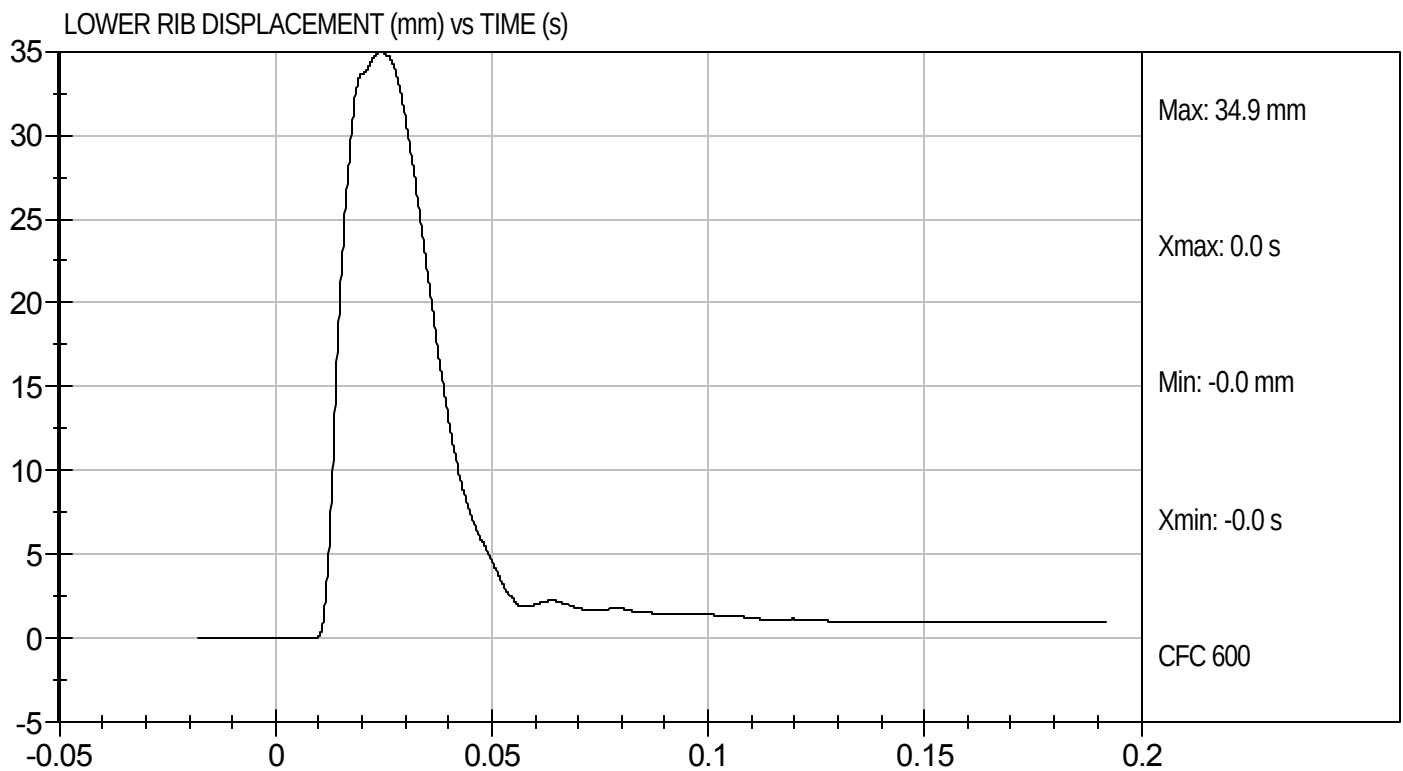
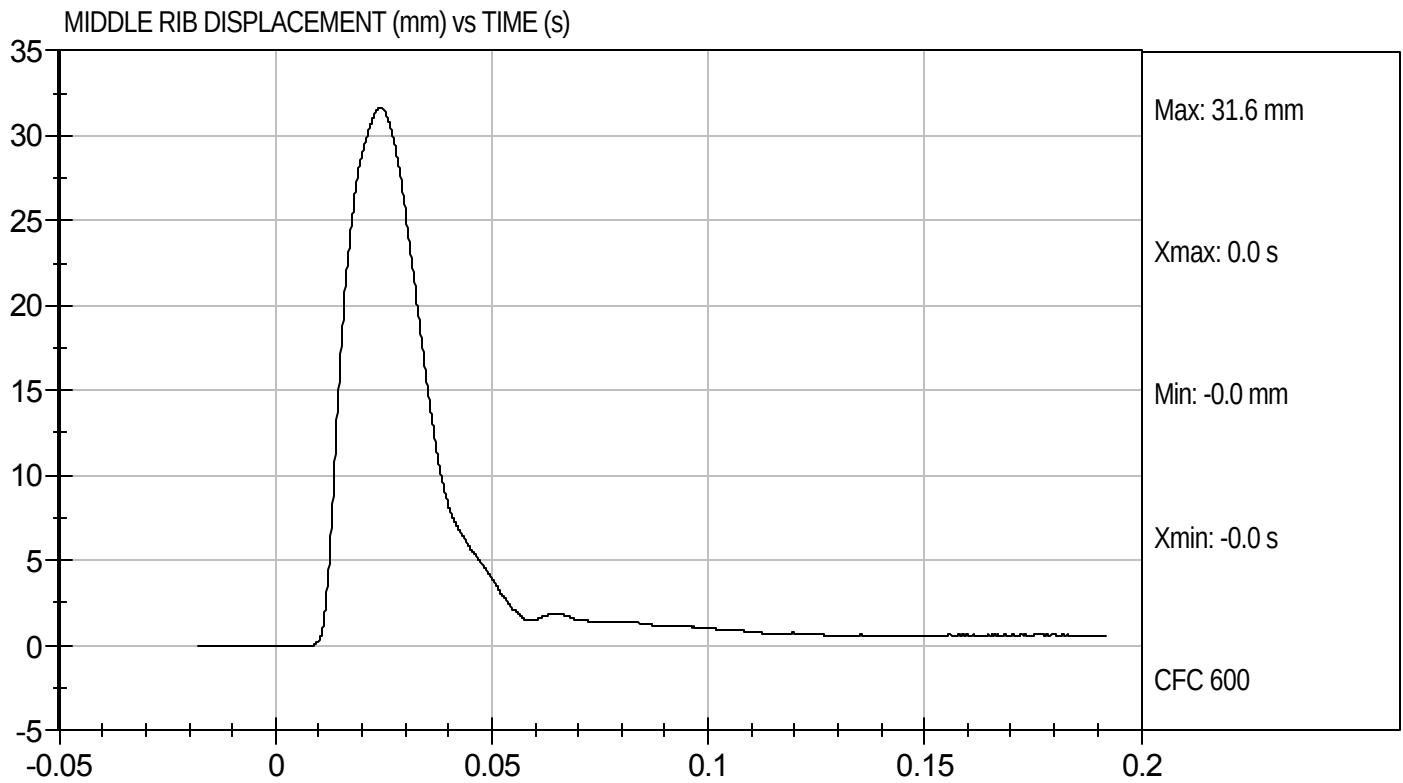
Test Date: 8/9/10
Velocity: 21.93 ft/s, 6.68 m/s





Test Desc: Thorax With Arm
Component ID: D102554

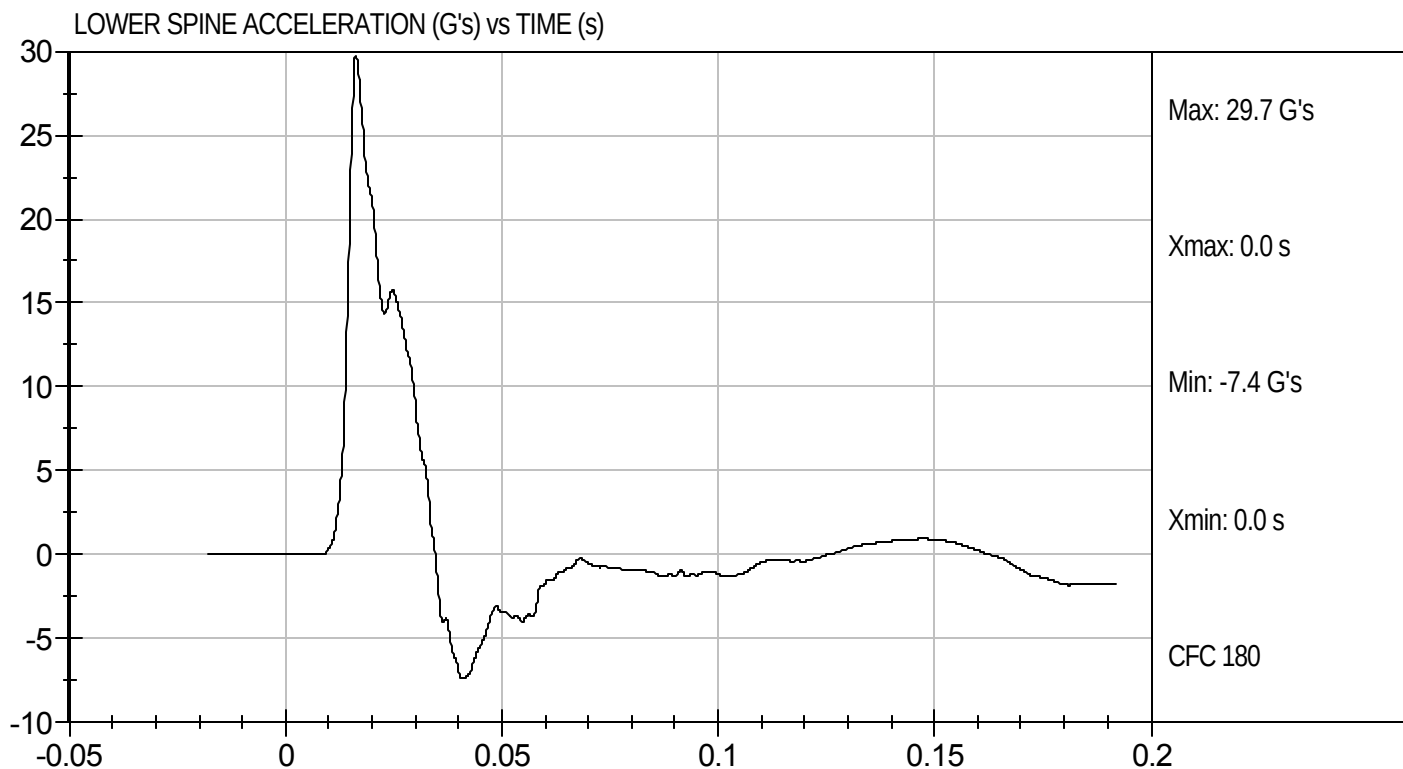
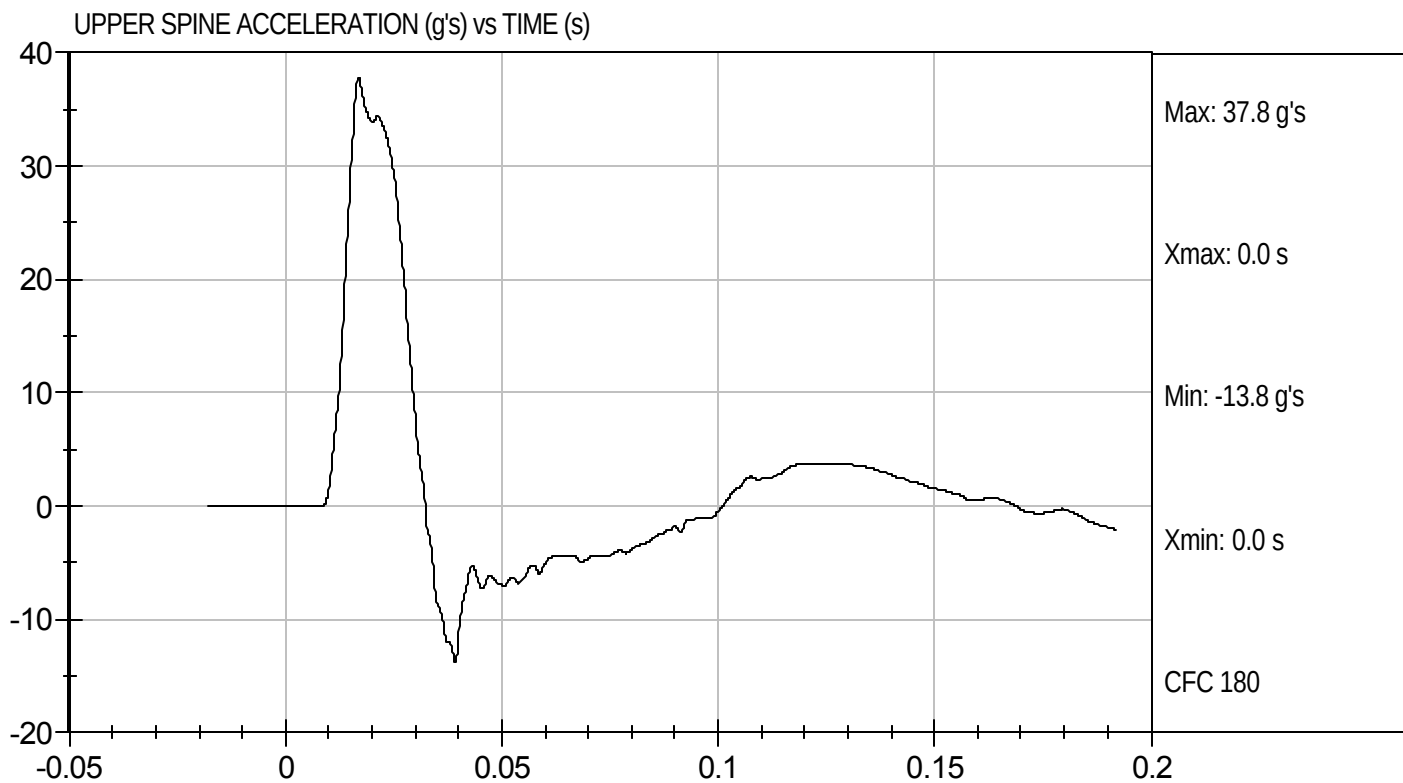
Test Date: 8/9/10
Velocity: 21.93 ft/s, 6.68 m/s





Test Desc: Thorax With Arm
Component ID: D102554

Test Date: 8/9/10
Velocity: 21.93 ft/s, 6.68 m/s



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

ATD Serial No: 296

Test I.D: D102555

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.5	Pass
Humidity	%	10 to 70	51	Pass
Impact Velocity	m/s	4.20 to 4.40	4.27	Pass
Peak Impactor Force	G's	14 to 18	15	Pass
Upper Rib Displacement	mm	32 to 40	35	Pass
Middle Rib Displacement	mm	39 to 45	41	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

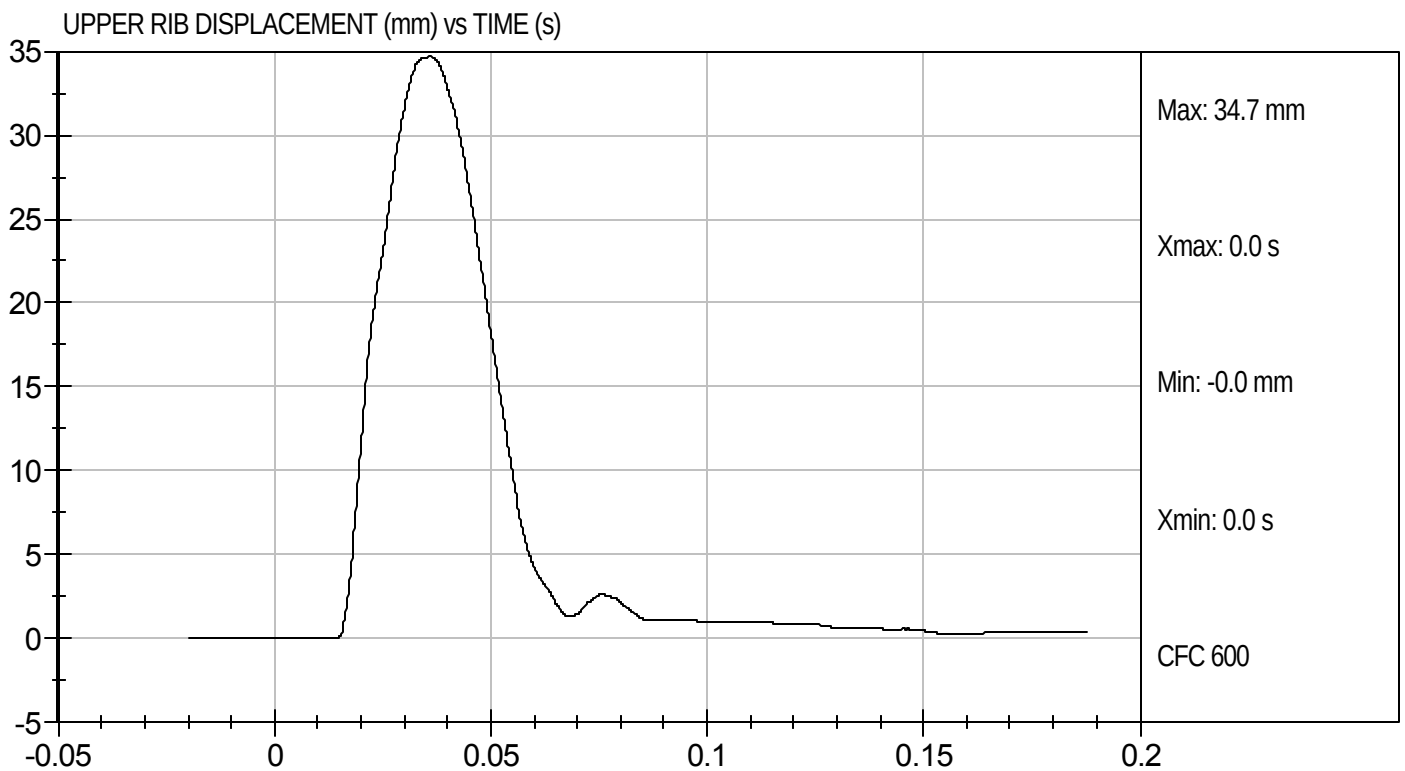
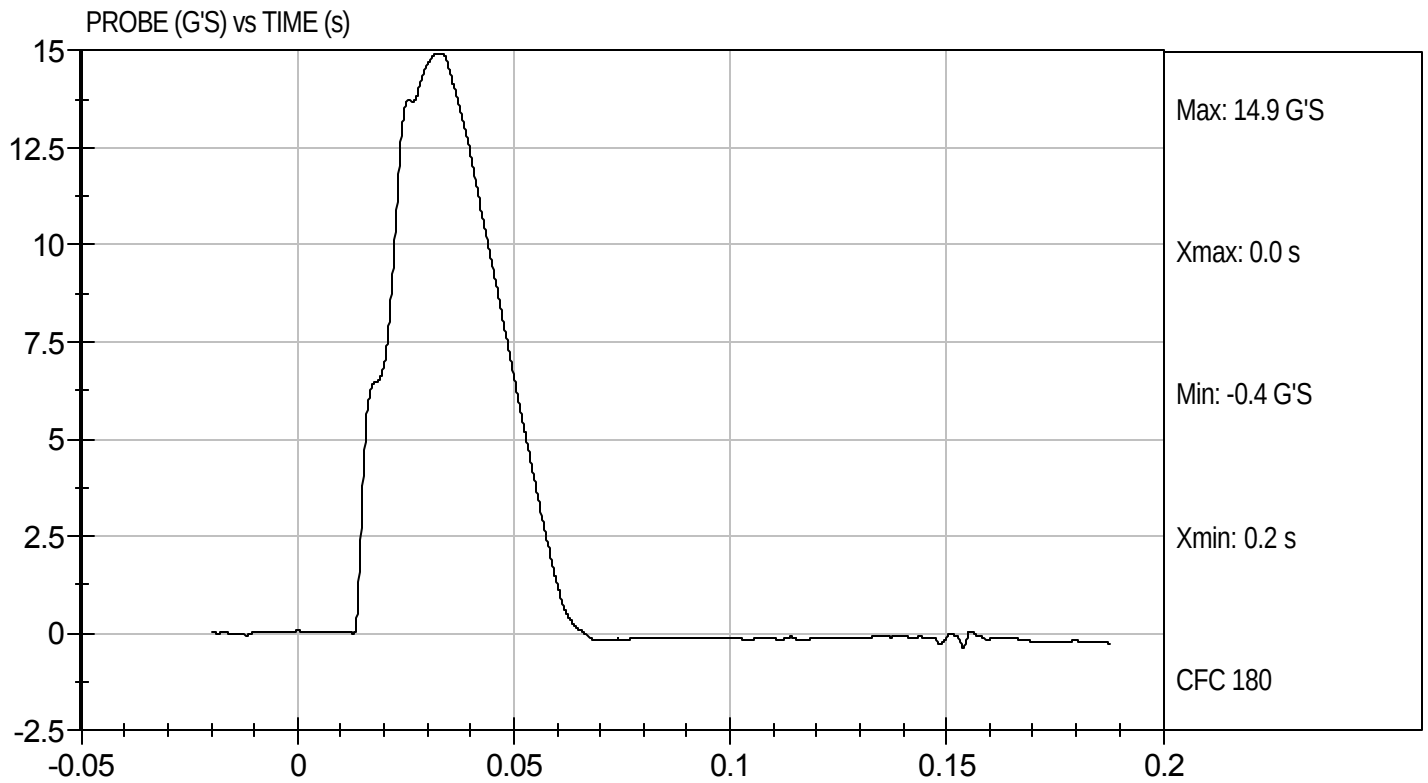
8/9/10
Test Date


Approved By



Test Desc: Thorax Without Arm
Component ID: D102555

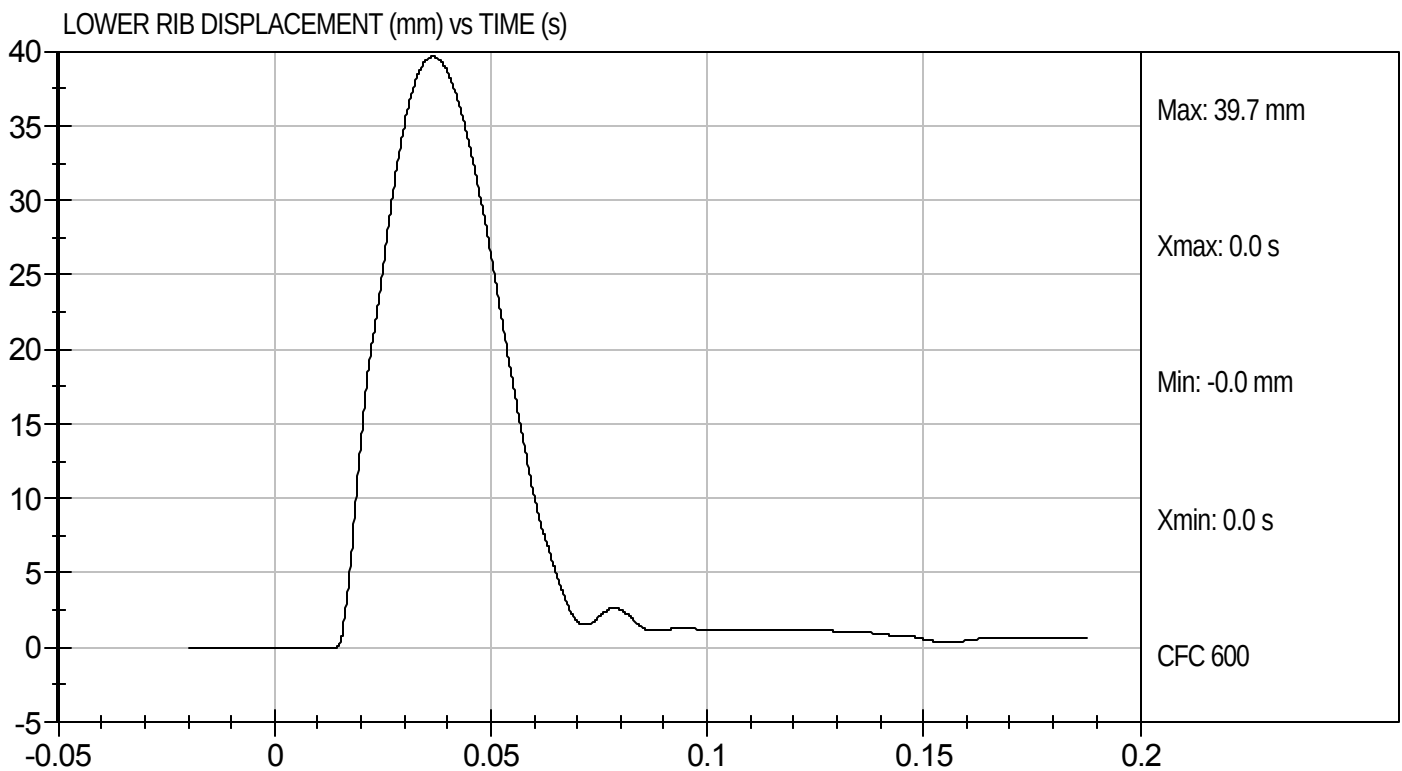
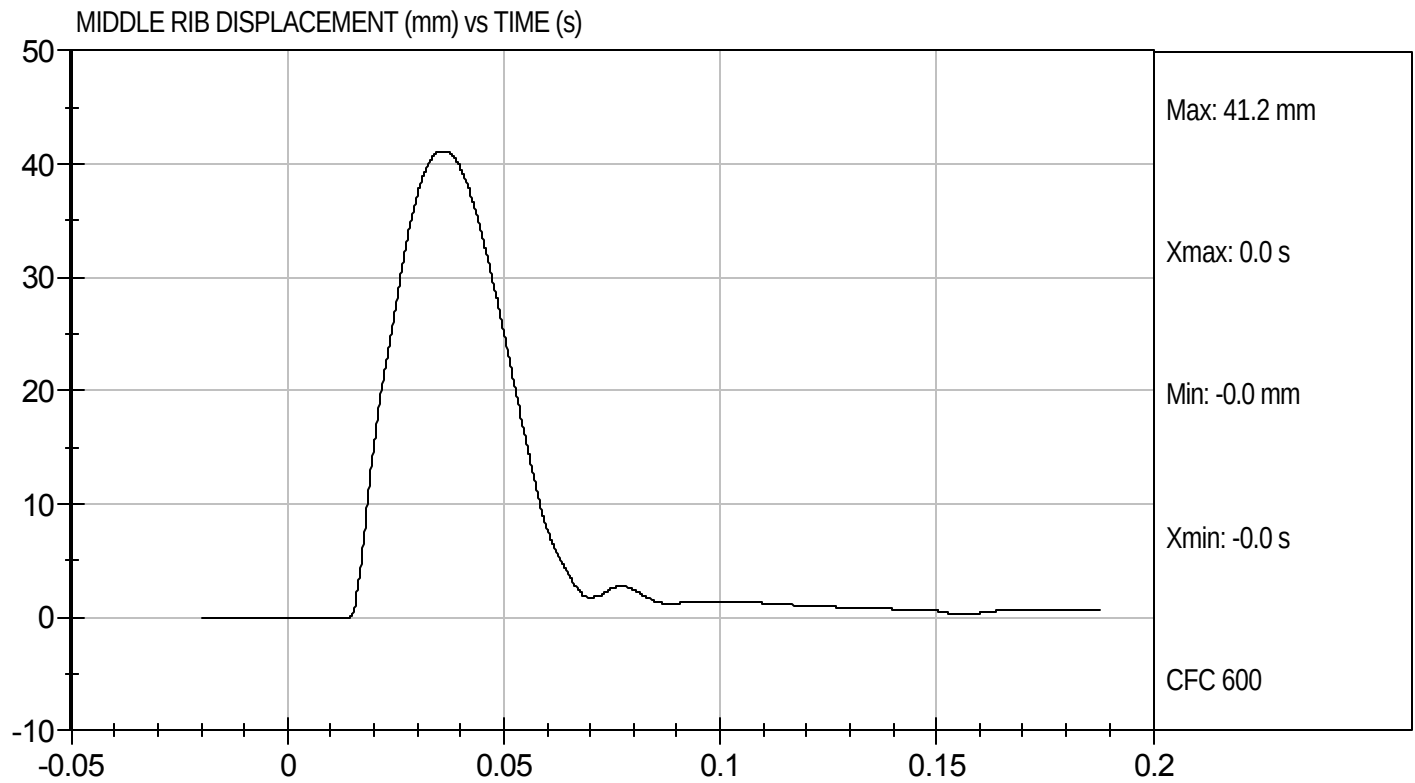
Test Date: 8/9/10
Velocity: 14.01 ft/s, 4.27 m/s





Test Desc: Thorax Without Arm
Component ID: D102555

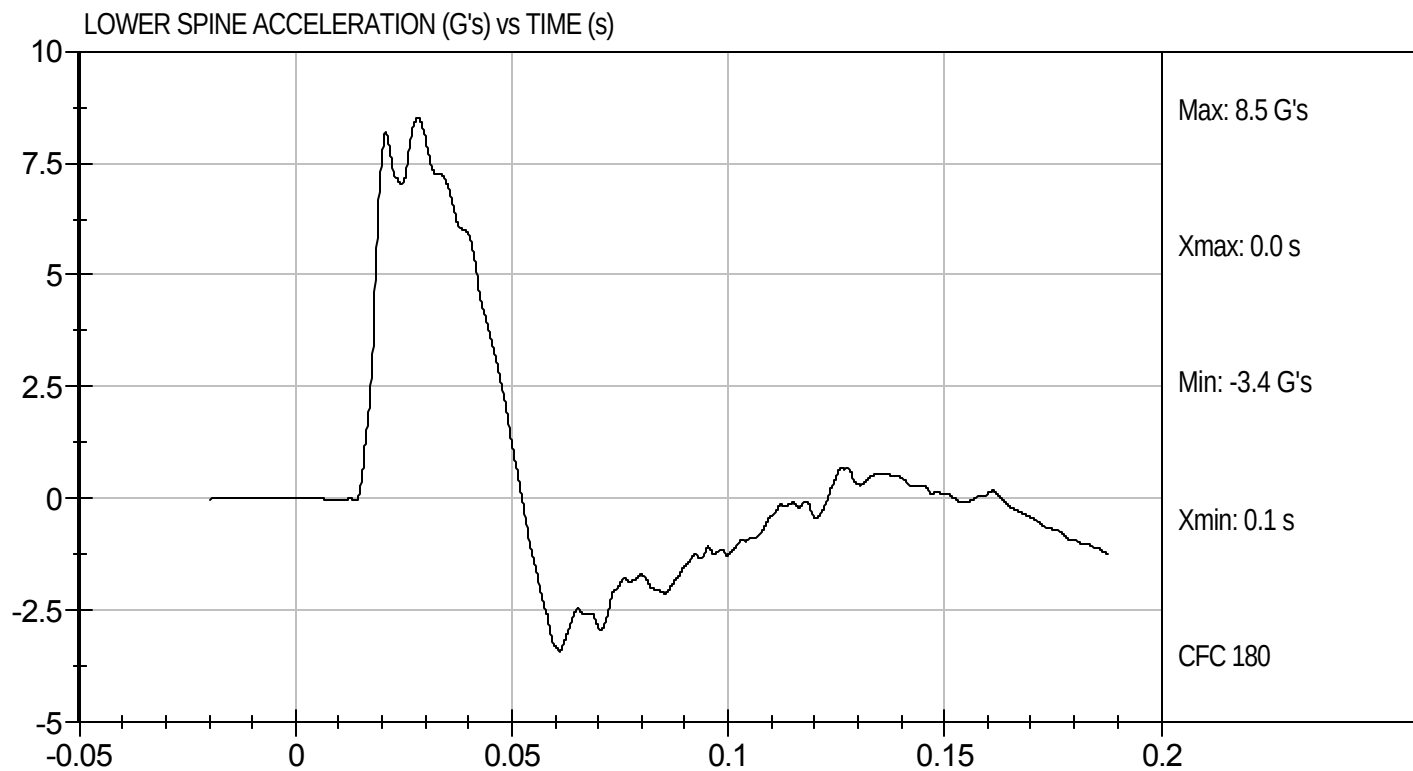
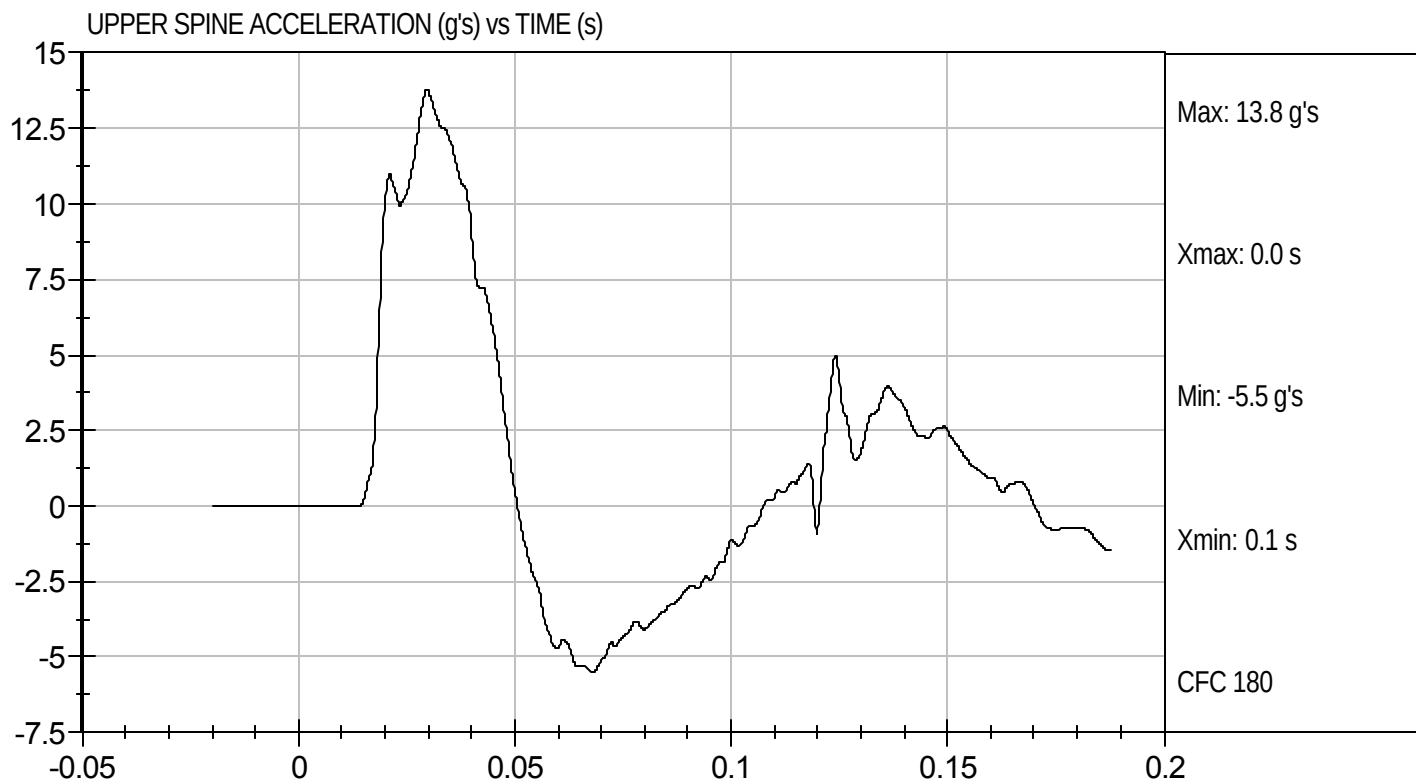
Test Date: 8/9/10
Velocity: 14.01 ft/s, 4.27 m/s





Test Desc: Thorax Without Arm
Component ID: D102555

Test Date: 8/9/10
Velocity: 14.01 ft/s, 4.27 m/s



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

ATD Serial No: 296

Test I.D: D102556

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.4	Pass
Humidity	%	10 to 70	53	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	Pass
Peak Impactor Acceleration	G's	12 to 16	14	Pass
Upper Rib Displacement	mm	36 to 47	36	Pass
Lower Rib Displacement	mm	33 to 44	42	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	11	Pass
Overall Test Results				Pass


Laboratory Technician

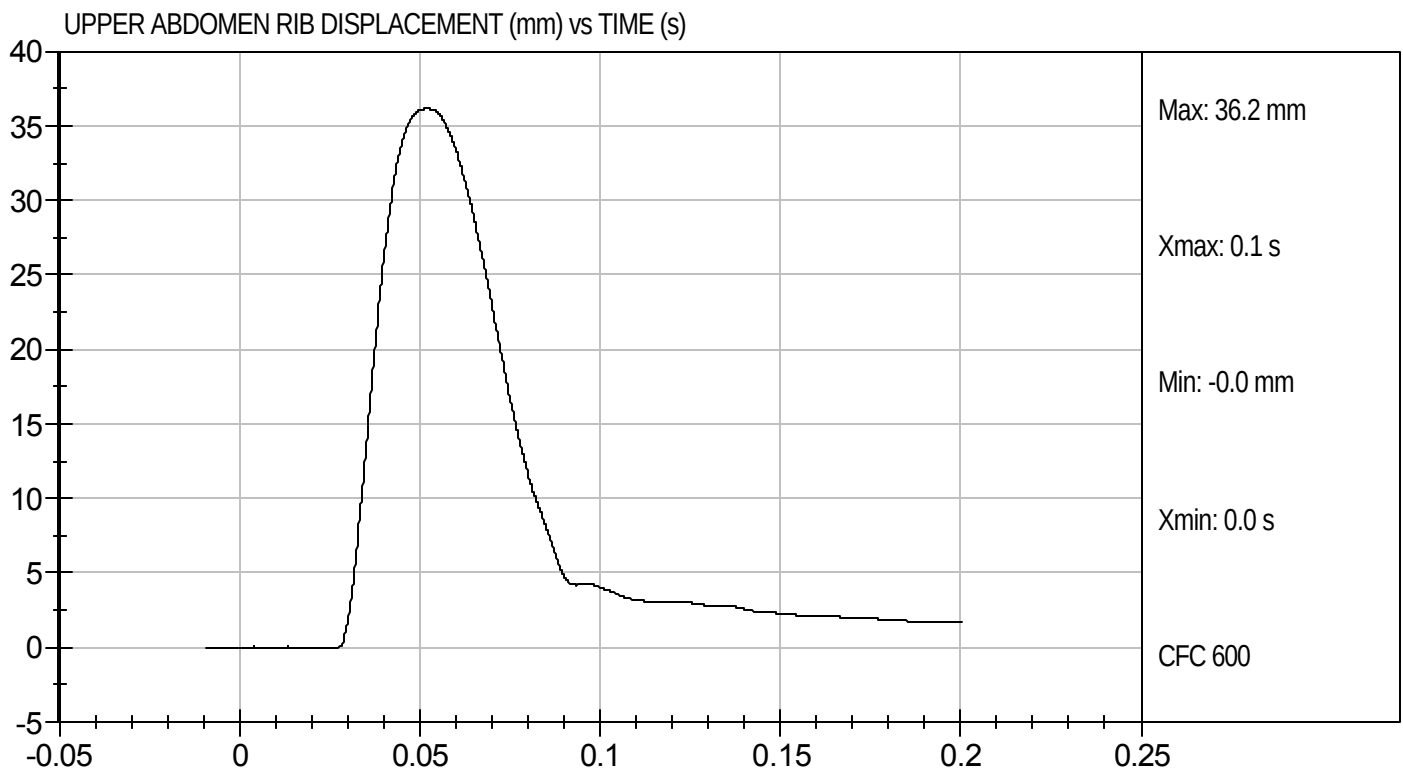
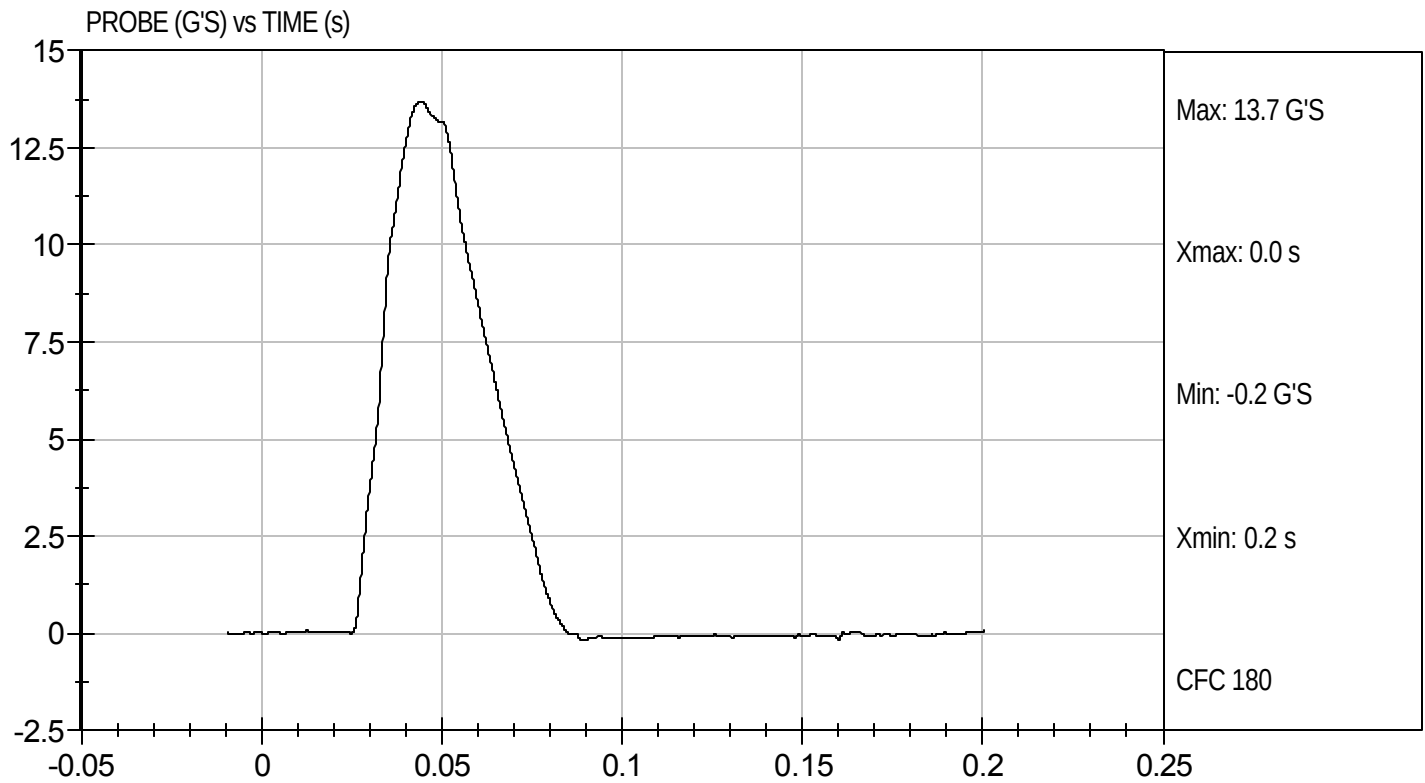
8/9/10
Test Date


Approved By



Test Desc: Abdomen Impact
Component ID: D102556

Test Date: 8/9/10
Velocity: 14.25 ft/s, 4.34 m/s

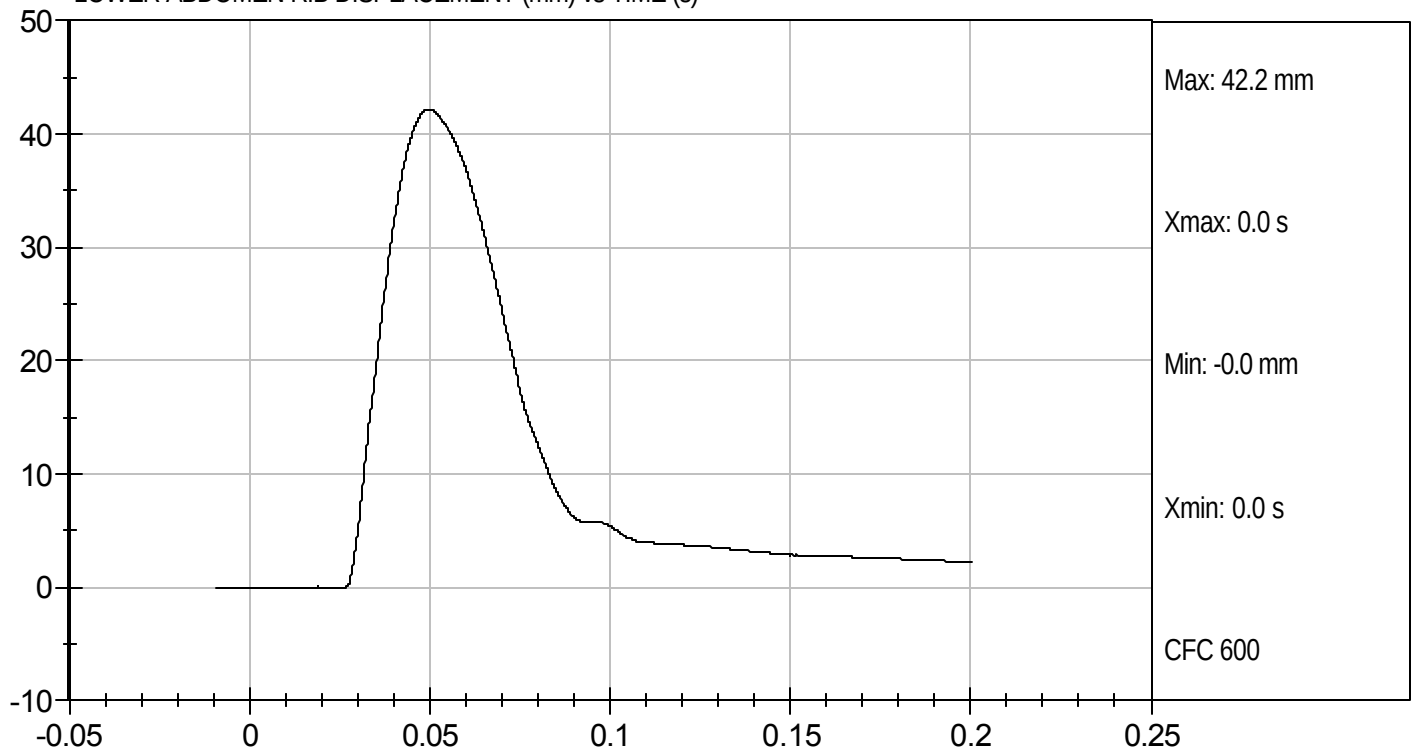




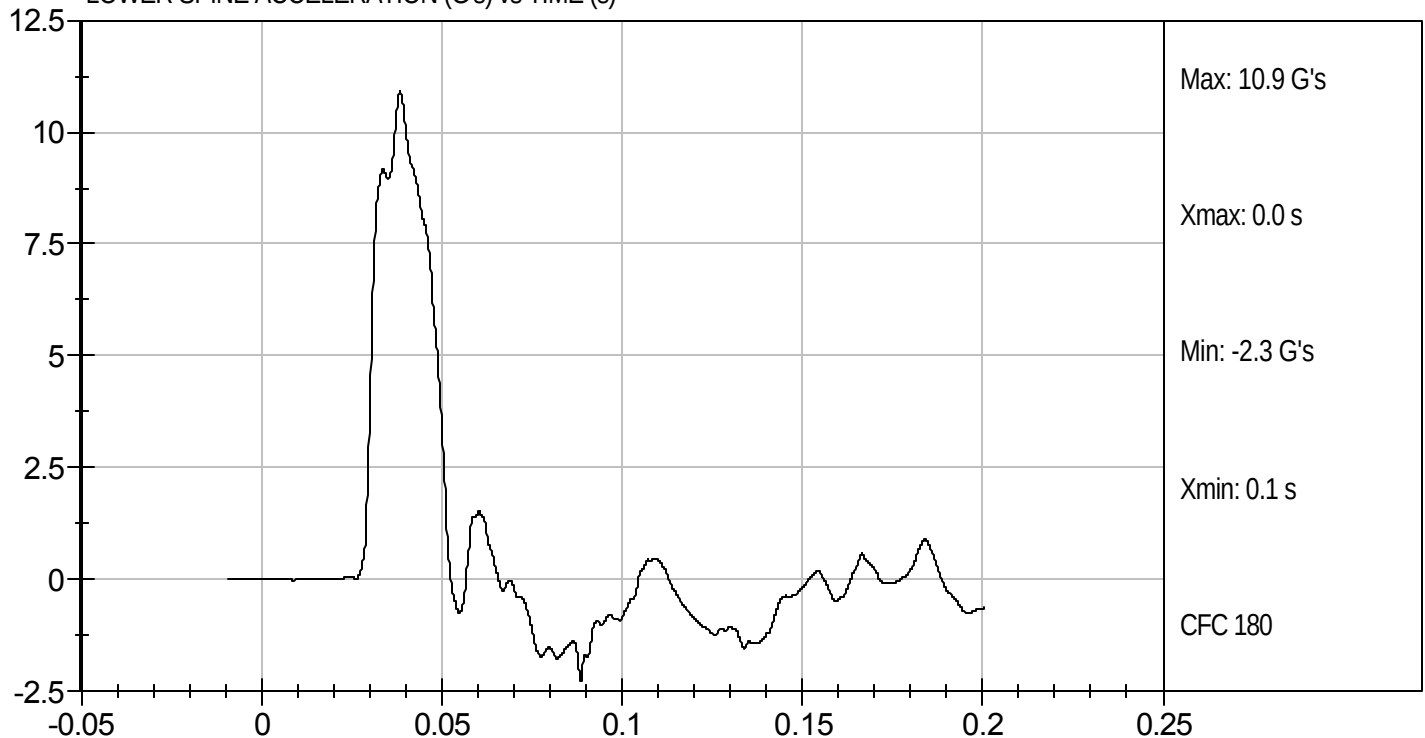
Test Desc: Abdomen Impact
Component ID: D102556

Test Date: 8/9/10
Velocity: 14.25 ft/s, 4.34 m/s

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



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



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

ATD Serial No: 296

Test I.D: D102557

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.4	Pass
Humidity	%	10 to 70	53	Pass
Impact Velocity	m/s	6.60 to 6.80	6.68	Pass
Peak Impactor Acceleration	G's	38 to 47	44	Pass
Pelvis Y Acceleration after 6 ms	G's	34 to 42	39	Pass
Peak Acetabulum Force	N	3600 to 4300	4112	Pass
Overall Test Results				Pass


Laboratory Technician

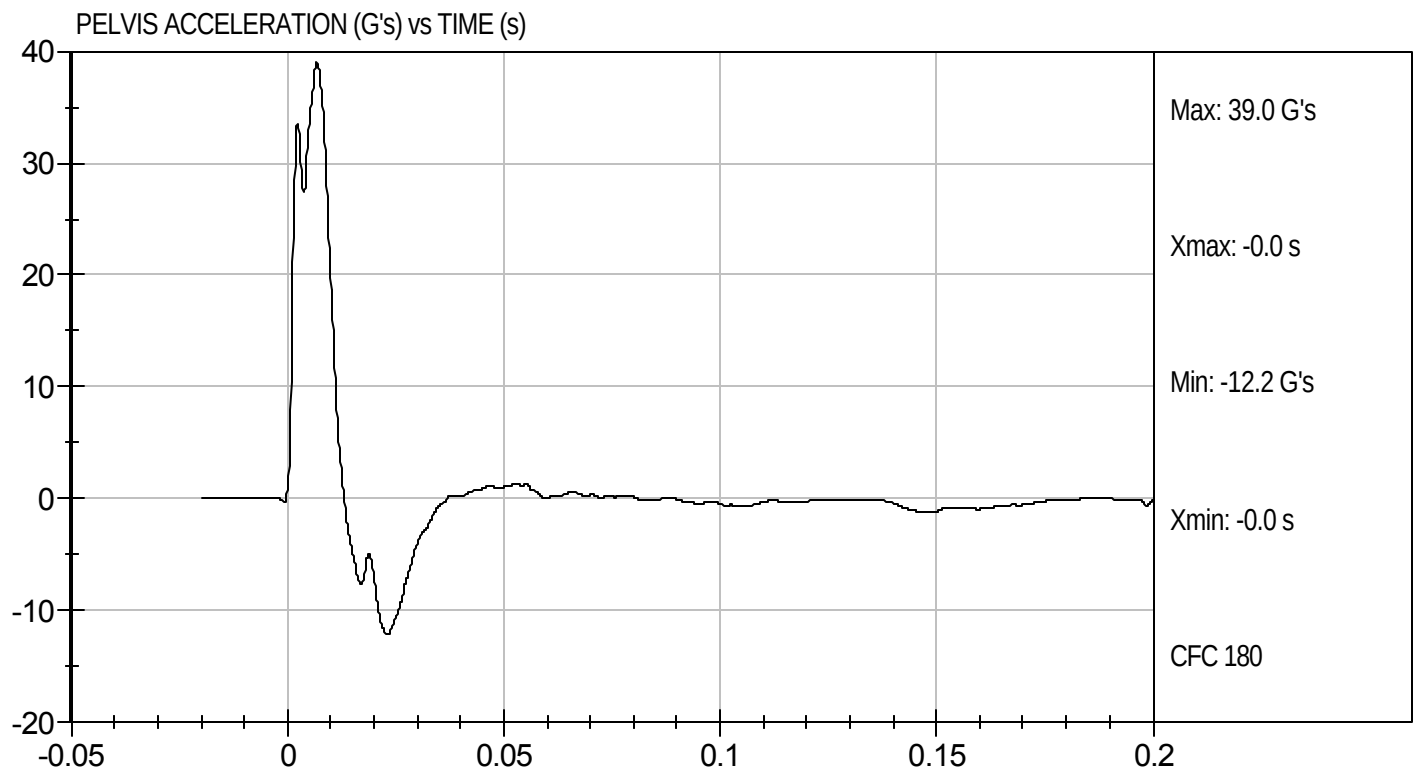
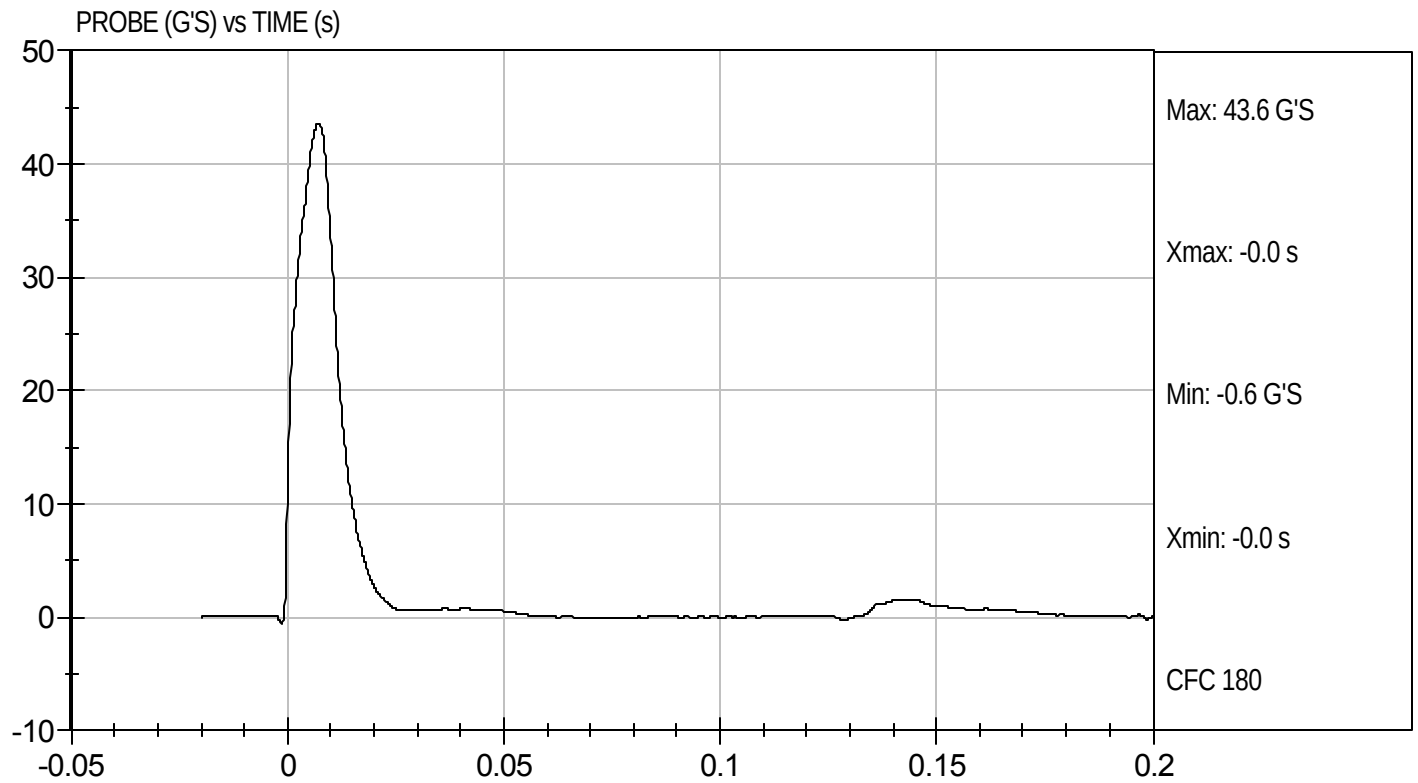
8/9/10
Test Date


Approved By



Test Desc: Pelvis Impact
Component ID: D102557

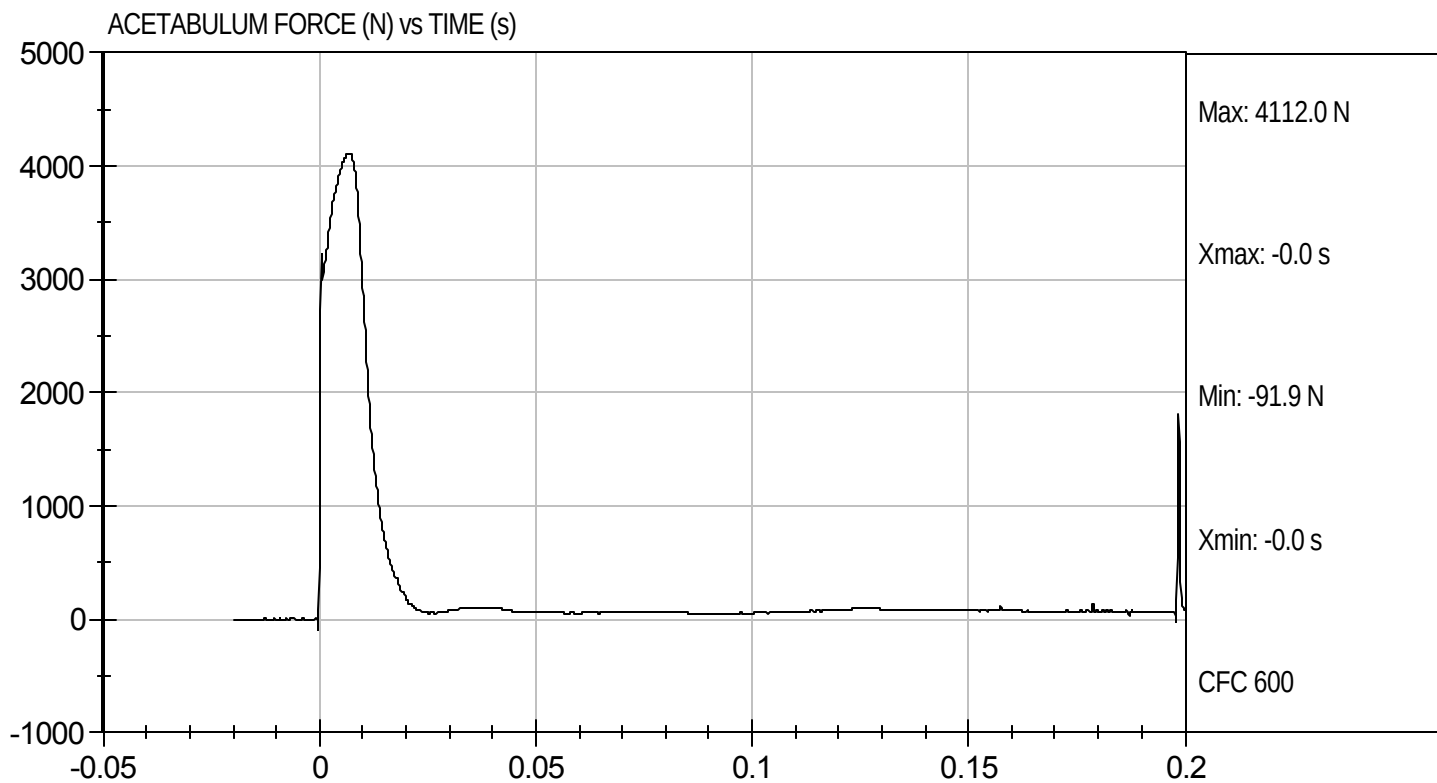
Test Date: 8/9/10
Velocity: 21.93 ft/s, 6.68 m/s





Test Desc: Pelvis Impact
Component ID: D102557

Test Date: 8/9/10
Velocity: 21.93 ft/s, 6.68 m/s

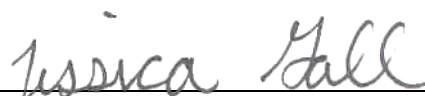


MGA RESEARCH CORPORATION
ILIAC IMPACT TEST
SID-IIIs BUILD LEVEL D DUMMY

ATD Serial No: 296

Test I.D: D102558

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	52	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	33	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4664	Pass
Overall Test Results			Pass	


Laboratory Technician

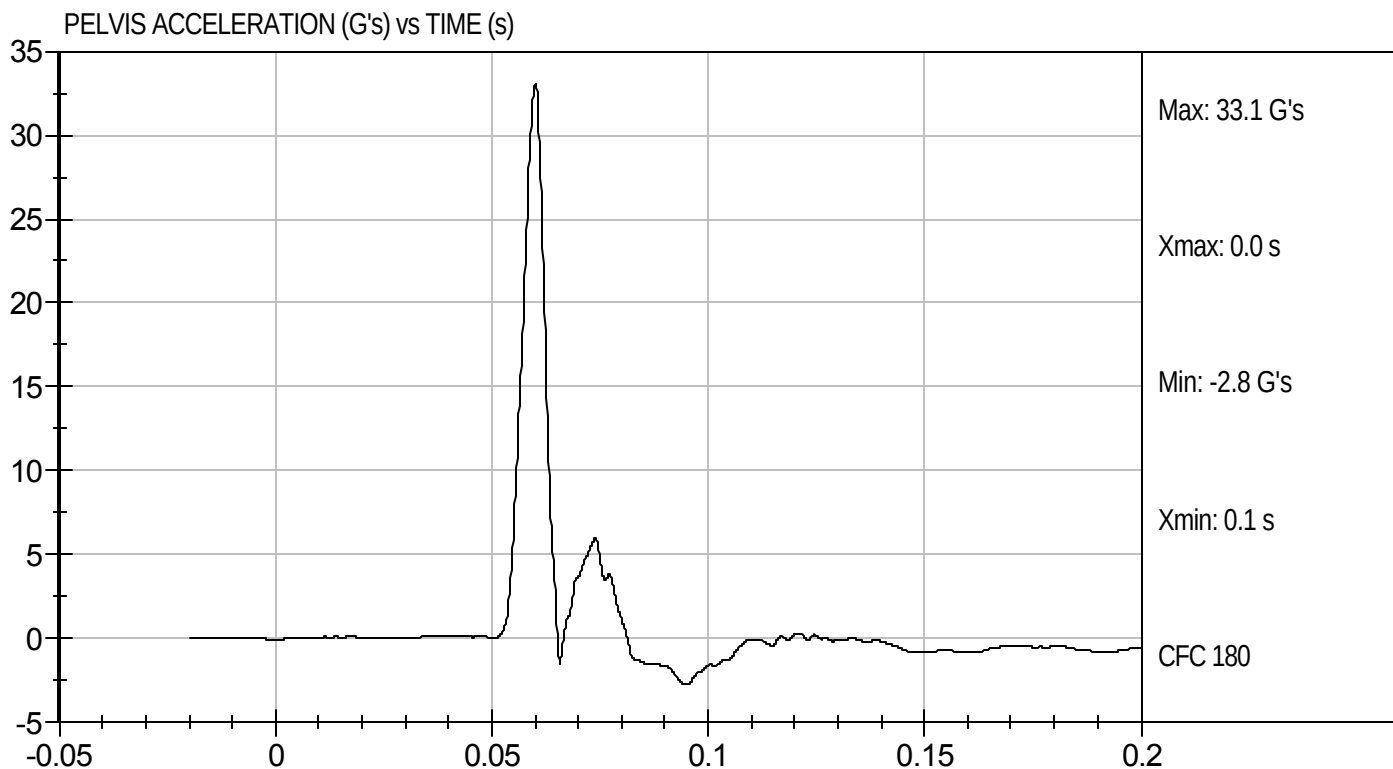
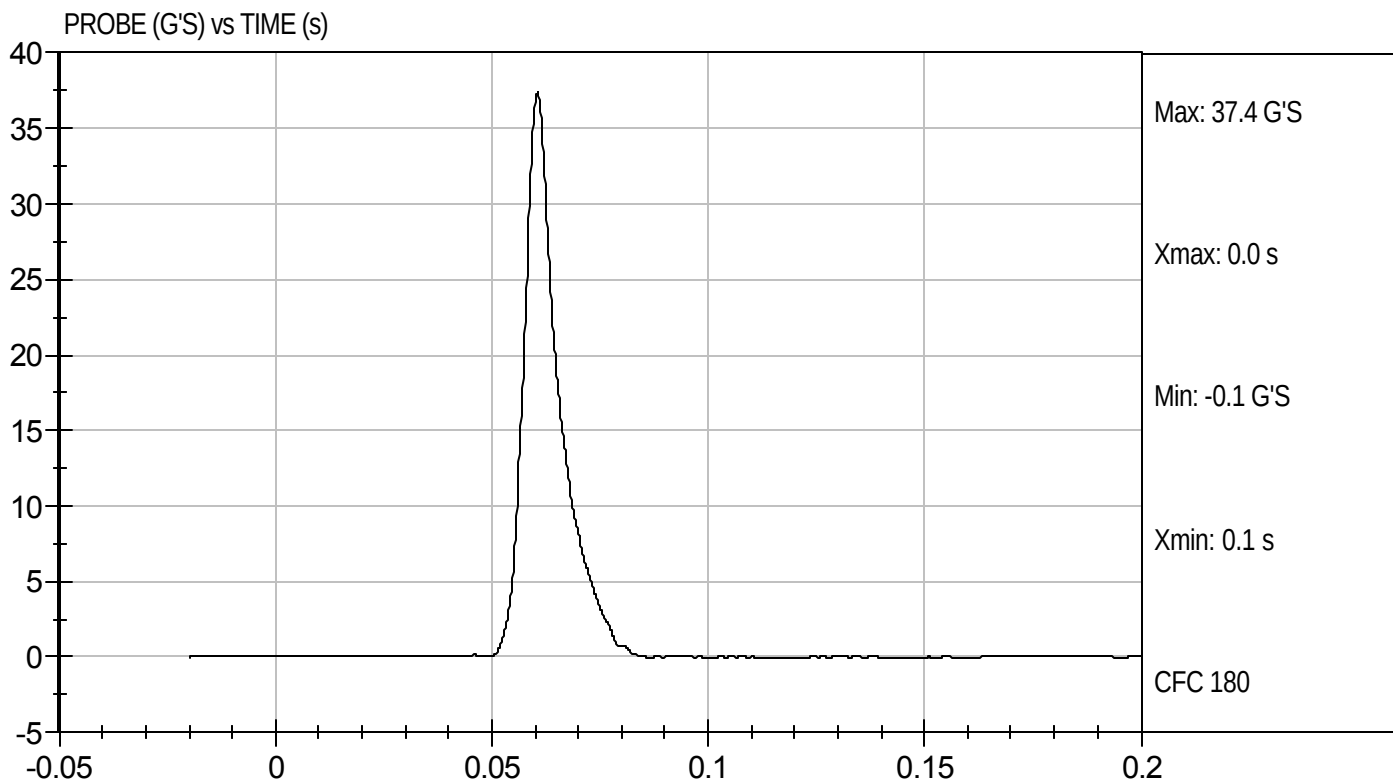
8/9/10
Test Date


Approved By



Test Desc: Iliac Impact
Component ID: D102558

Test Date: 8/9/10
Velocity: 14.37 ft/s, 4.38 m/s





Test Desc: Iliac Impact
Component ID: D102558

Test Date: 8/9/10
Velocity: 14.37 ft/s, 4.38 m/s

