

REPORT NUMBER: SPNCAP-MGA-2011-064

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

**TOYOTA MOTOR MANUFACTURING, CANADA, INC.
2011 Toyota Corolla 4-Dr Sedan
NHTSA No.: MB5106**

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



Test Date: February 7, 2011

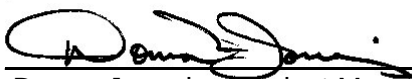
Final Report Date: March 19, 2011

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: March 19, 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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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 Toyota Corolla 4-Dr Sedan 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 February 7, 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 341 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>619</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td>Gs</td> <td>82</td> <td>66</td> </tr> <tr> <td>Combined Acetabular and Iliac Pelvic Force</td> <td>N</td> <td>5525</td> <td>6363</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.					Driver ATD (SID-IIs)			Measurement Description	Units	Threshold	Result	Head Injury Criteria (HIC ₃₆)	N/A	1000	619	Resultant Lower Spine Acceleration	Gs	82	66	Combined Acetabular and Iliac Pelvic Force	N	5525	6363
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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 Toyota Corolla 4-Dr Sedan. 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 Toyota Corolla 4-Dr Sedan. 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 February 7, 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	619	66	Iliac Wing	2372
			Acetabular	4103
			Sum	6363

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 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 Floor Sill Y after 15 msec.
- Left Lower B-Post Y after 10 msec.
- Left Mid B-Post Y after 15 msec.
- Driver Seat Track Y after 30 msec.

The trunk lid opened during the event.

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 Toyota Corolla 4-Dr Sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No. MB5106
 Test Date: 2/07/2011

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	MB5106	Anti-Lock Brakes	Yes
Model Year	2011	All Wheel Drive	No
Make	Toyota	Power Steering	Yes
Model	Corolla	Driver Front Airbag	Yes
Body Style	Sedan	Driver Curtain Airbag	Yes
VIN	2T1BU4EE5BC542051	Driver Head/Torso Airbag	No
Body Color	Barcelona Red Met.	Driver Torso Airbag	Yes
Delivery Date	1/21/2011	Driver Torso/Pelvis Airbag	No
Odometer (mi)	24	Driver Pelvis Airbag	No
Odometer (km)	39	Driver Knee Airbag	No
Dealer	Classic Toyota Waukegan	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)	1.8	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	No	Load Limiters	Yes
Traction Control	Yes	Automatic Door Locks	No
Power Brakes	Yes	Bucket Seats	Yes
Front Disc	Yes	Tilt Steering	Yes
Rear Disc	No	Power Seats	No
Does owner's manual provide instruction to turn off automatic door locks?			N/A

DATA FROM CERTIFICATION LABEL

Manufactured By	Toyota Motor Manufacturing, Canada, Inc.	GVWR (kg)	1742
Date of Manufacture	12/10	GAWR Front (kg)	948
		GAWR Rear (kg)	839

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	2	3		5	
Capacity Weight (VCW) (kg)				366	(A)
DSC x 68.04 kg				340	(B)
Cargo Weight (RCLW) (kg)				26	(A-B)

VEHICLE SEAT TYPE

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

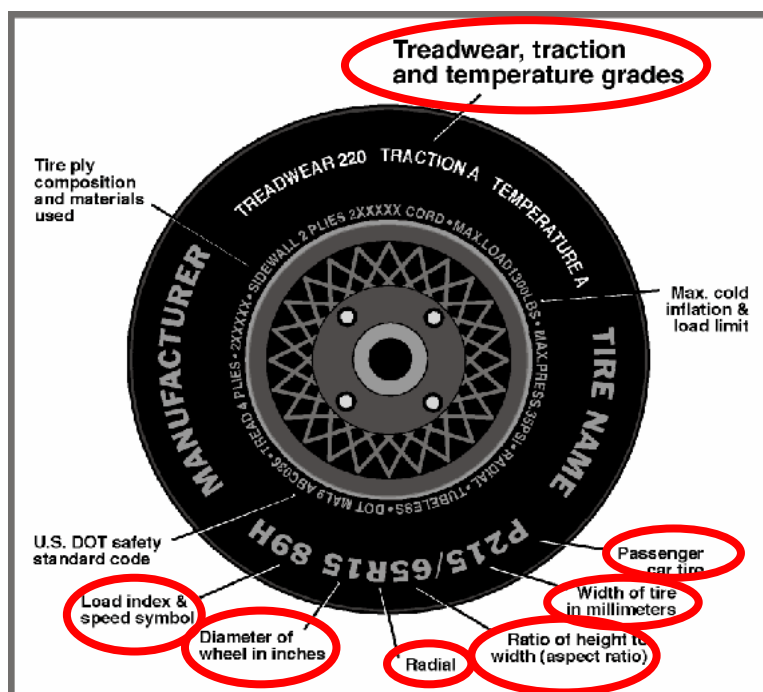
DATA SHEET NO. 1 (continued)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2011 Toyota Corolla 4-Dr Sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No. MB5106
 Test Date: 2/07/2011

VEHICLE TIRE INFORMATION



Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	210	210
Recommended Tire Size	P195/65R15	P195/65R15
Tire Size on Vehicle	P195/65R15	P195/65R15
Tire Manufacturer	Firestone	Firestone
Tire Model	Affinity	Affinity
Treadwear	500	500
Traction	A	A
Temperature Grades	B	B
Tire Plies Sidewall	1	1
Tire Plies Body	3	3
Load Index & Speed Symbol	89S	89S
Tire Material	Rubber	Rubber
DOT Safety Code Right	W2C6 AA6	W2C6 AA6
DOT Safety Code Left	W2C6 AA6	W2C6 AA6

DATA SHEET NO. 1 (continued)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2011 Toyota Corolla 4-Dr Sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No. MB5106
 Test Date: 2/07/2011

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	378.7	257.6		404.6	282.6		398.7	292.6	
Right	kg	385.6	235.4		385.1	258.5		389.6	262.6	
Ratio	%	60.8	39.2		59.3	40.7		58.7	41.3	
Totals	kg	764.3	493.0	1257.3	789.7	541.1	1330.8	788.3	555.2	1343.5

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1257.3	(A)
Actual Weight of 1 P572V ATD (SID-IIIs) ATD Used	kg	52.2	(B)
Rated Cargo/Luggage Weight (RCLW)	kg	26	(C)
Calculated Target Vehicle Test Weight (TVTW)	kg	1335.5	(A+B+C)

TEST VEHICLE ATTITUDES AND CG

	Units	As Delivered	As Tested	Fully Loaded
Driver Door Sill Angle (front-to-rear)*	deg	-0.7	-0.4	-0.3
Front Passenger Sill Angle (front-to-rear)*	deg	-0.7	-0.5	-0.5
Front Bumper Angle (left-to-right)**	deg	-0.1	-0.1	-0.3
Rear Bumper Angle (left-to-right)**	deg	0.0	0.0	0.0
Vehicle CG (Aft of Front Axle)	mm	1019	1057	1074
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	9	25	22

*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	55.3

Vehicle components removed to meet target vehicle test weight: Tail lights, spare tire, jack & tools, trunk carpet, right side mirror, right rear and center rear seat belts, rear upper brake lights, trunk lining, right rear door panel, right rear window, right rear speaker, rear and right front headrests, right b-pillar cover, right c-pillar covers, hubcaps, rear bumper & absorber.

TEST VEHICLE IMPACT POINT DATA

Measurement Parameter	Units	Value
Vertical Impact Reference Line (Aft of Front Axle)	mm	1020
Actual Impact Point (Aft of Front Axle)	mm	1017
Impact Point Difference (- forward / + rearward)	mm	3

DATA SHEET NO. 2

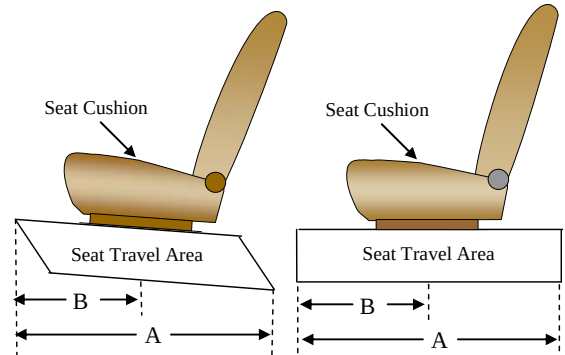
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT, AND FUEL SYSTEM DATA

Test Vehicle: 2011 Toyota Corolla 4-Dr Sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No. MB5106
 Test Date: 2/07/2011

SEAT FORE/AFT POSITIONS

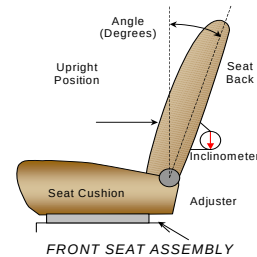
The driver seat was a manual fore/aft adjustable seat with manual height/angle adjustment. The seat travel was set as specified in Appendix B of the TP dated January 2010. The right front passenger seat was set to match the driver seat. The rear passenger seats were fixed.



SEAT FORE/AFT POSITIONING	Total Fore/Aft Travel	Placed in Detent # or Position
Driver Seat	17 detents (1 st as 0)	0 (forward-most as 0)
Front Passenger Seat	17 detents (1 st as 0)	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 rocker sill on the headrest post.



SEAT BACK ANGLE	Degrees	Detents
Driver Seat Back Angle with Seated Dummy	-4.6	1 st detent (first locking as 0)
Front Passenger Seat Back Angle	-5.1	1 st detent (first locking as 0)
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)

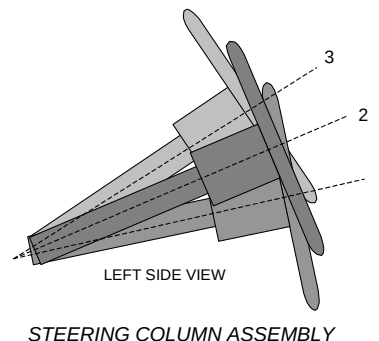
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT, AND FUEL SYSTEM DATA

Test Vehicle: 2011 Toyota Corolla 4-Dr Sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No. MB5106
 Test Date: 2/07/2011

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.

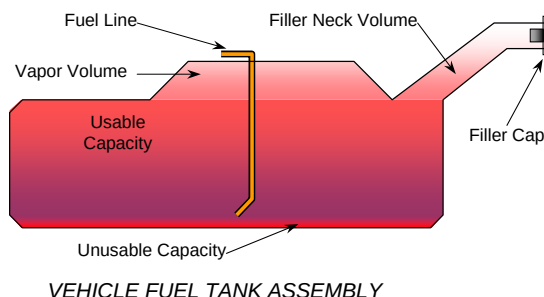


STEERING COLUMN POSITIONING

	Degrees	Fore/Aft Position (mm)
Lowermost - Position 1	66.6	181
Geometric Center – Position 2	65.1	163
Uppermost – Position 3	63.6	144
Telescoping Steering Wheel Travel		37
Test Position	65.1	163

FUEL PUMP

Describe the fuel pump type, its behavior, and the location of the fuel filler pipe. The vehicle is equipped with an electric fuel pump. The fuel pump is activated when the ignition is turned on. The fuel pipe is on the left side.



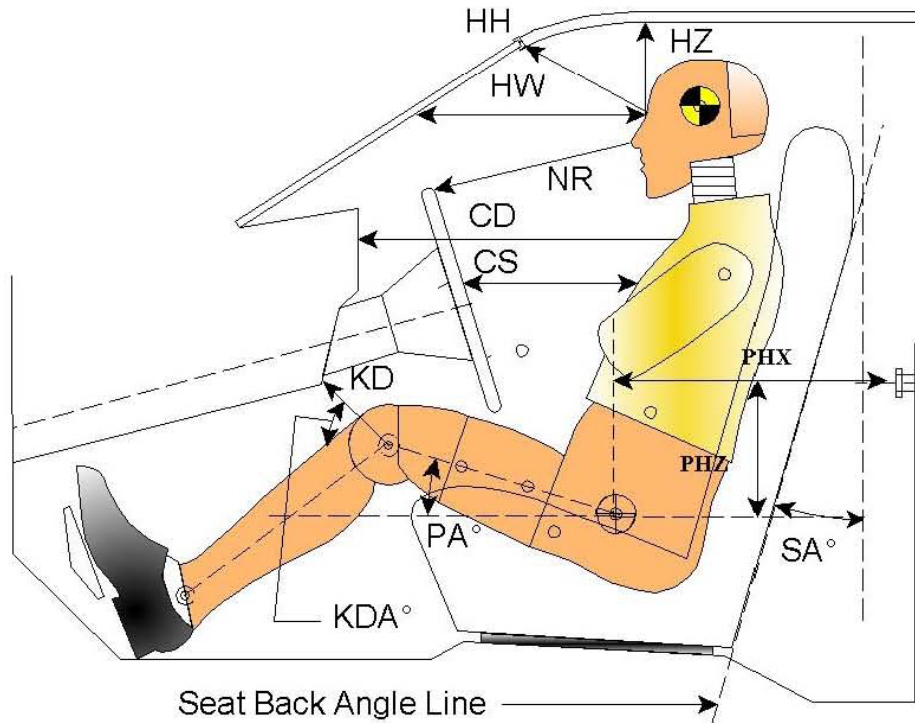
FUEL TANK CAPACITY DATA

	Liters
Usable Capacity of "Standard" Tank	50.0
Usable Capacity of "Optional" Tank	
Usable Capacity of Standard Tank as Specified in Owner's Manual	50.0
Usable Capacity of Optional Tank as Specified in Owner's Manual	
92-94% of Usable Capacity	46.0 to 47.0
Actual Amount of Solvent Used	46.4
1/3 of Usable Capacity	16.7

.DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2011 Toyota Corolla 4-Dr Sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No. MB5106
 Test Date: 2/07/2011

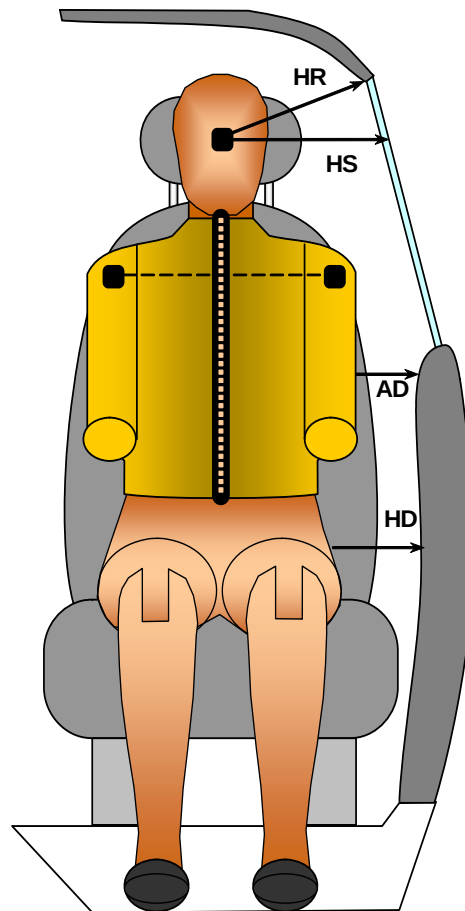


Code	Measurement Description	Driver S/N 296	
		Length (mm)	Angle (°)
HH	Head to Header	220	
HW	Head to Windshield	553	
HZ	Head to Roof	174	
NR	Nose to Rim	212	
CD	Chest to Dash	365	
CS	Chest to Steering Wheel	158	
KDL/KDAL	Left Knee to Dash	92	39.9
KDR/KDAR	Right Knee to Dash	97	37.4
PA	Pelvic Angle		19.0
PHX	H-Point to Striker (X-Axis)	345	
PHZ	H-Point to Striker (Z-Axis)	209	
SA	Seat Back Angle		-4.6

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2011 Toyota Corolla 4-Dr Sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No. MB5106
 Test Date: 2/07/2011



FRONT VIEW OF DUMMY

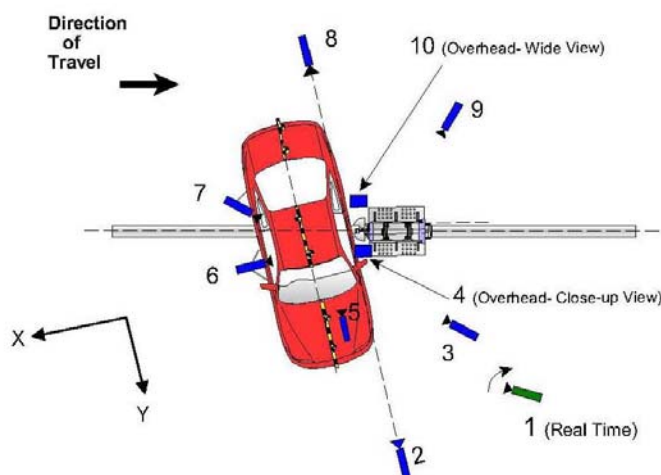
Code	Measurement Description	Driver S/N 296
		Length (mm)
HR	Head to Side Header	220
HS	Head to Side Window	349
AD	Arm to Door	176
HD	H-Point to Door	162

DATA SHEET NO. 5

CAMERA LOCATIONS AND DATA

Test Vehicle: 2011 Toyota Corolla 4-Dr Sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No. MB5106
 Test Date: 2/07/2011



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	40	5480	-1560	24	1000
3	Impact Side 45° Forward	-2120	4030	-1680	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	40	-5590	-1600	24	1000
9	Impact Side 45° Rearward	-3760	-3090	-1660	20	1000
10	Overhead Wide View	280	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

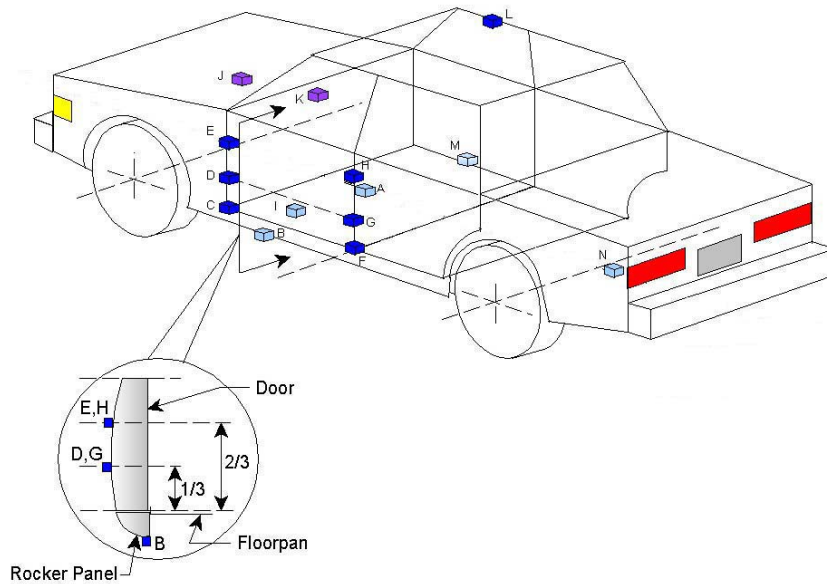
	Number of Channels
Driver Dummy	16
Vehicle Structure	21
Pole Load Cells – Not used	8
Contact Switches	3
Airbag Timing	2
Total No. of Data Channels	50

DATA SHEET NO. 6

VEHICLE ACCELEROMETER DATA

Test Vehicle: 2011 Toyota Corolla 4-Dr Sedan
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NHTSA No. MB5106
 Test Date: 2/07/2011



	Accelerometer Location			
	ID	Coordinates (mm)		
		X	Y	Z
A	Vehicle CG	2510	-200	-205
	Vehicle CG Sensor	2480	-200	-205
B	Left Floor Sill	2732	-680	-193
C	A Pillar Sill	3087	-680	-188
D	A Pillar Low	3087	-695	-481
E	A Pillar Mid	3153	-777	-753
F	B Pillar Sill	2114	-680	-207
G	B Pillar Low	2034	-700	-526
H	B Pillar Mid	2034	-700	-772
I	Driver Seat	2219	-540	-622
L	Engine Top	3742	0	-852
J	Firewall	3561	0	-910
K	Right Roof	2186	535	-1448
M	Right Floor Sill	2267	680	-203
N	Rear Floorpan	1100	0	-525

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 Toyota Corolla 4-Dr Sedan
Test Program: NCAP Side Pole Impact Test

NHTSA No. MB5106
Test Date: 2/07/2011



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 Toyota Corolla 4-Dr Sedan

NHTSA No. MB5106

Test Program: NCAP Side Pole Impact Test

Test Date: 2/07/2011

TEST DUMMY INFORMATION AND CONTACT

Description	Driver
Dummy Type / Serial No.	SID-IIs / 296
Head Contact	Curtain Airbag, Headrest
Upper Torso Contact	Side Airbag
Lower Torso Contact	Door Panel
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 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	32.5
Trap No. 2 Velocity (Redundant)	km/h	31.4 to 33.0	32.5

DATA SHEET NO. 9

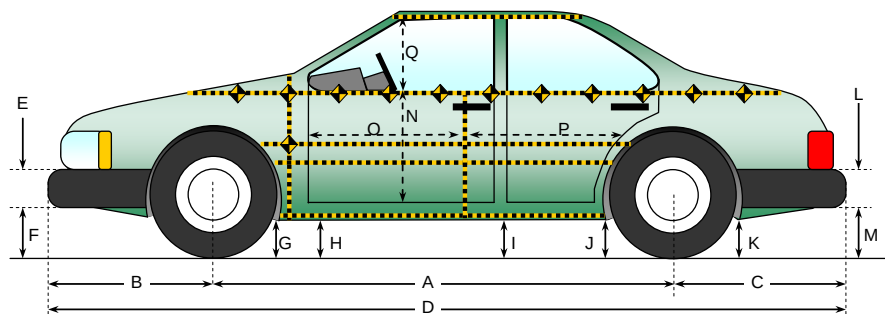
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2011 Toyota Corolla 4-Dr Sedan

NHTSA No. MB5106

Test Program: NCAP Side Pole Impact Test

Test Date: 2/07/2011



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

LEFT SIDE VIEW

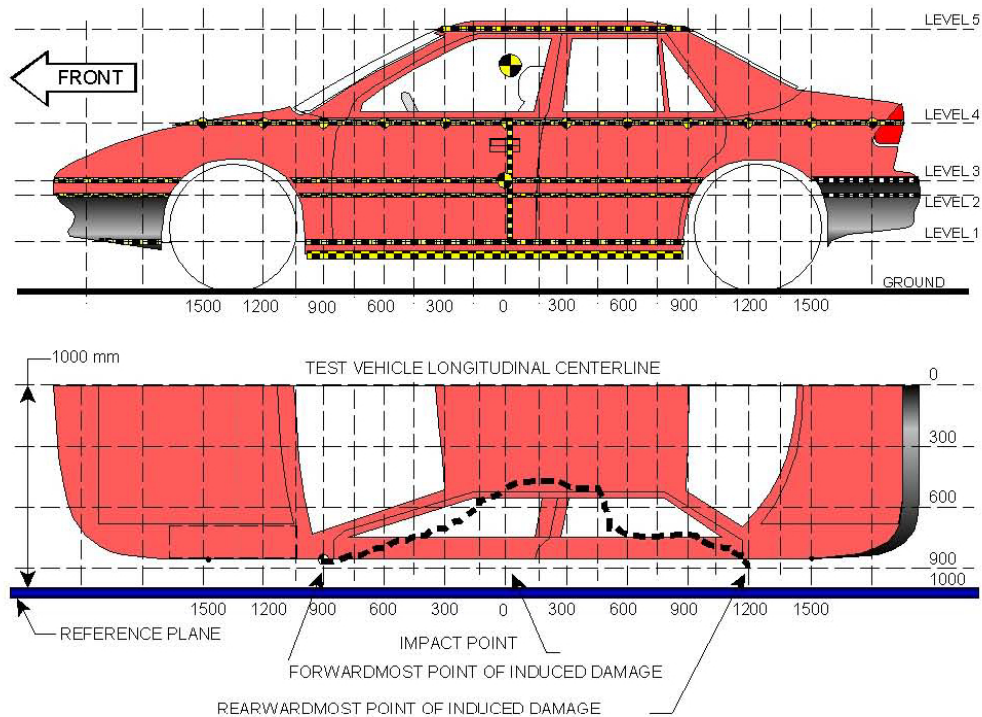
VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2600	2570	30
B	Front Axle to FSOV	942	911	31
C	Rear Axle to RSOV	1004	1063	-59
D1	Total Vehicle Length at Left Side	3485	3398	87
D2	Total Vehicle Length at Centerline	4546	4544	2
D3	Total Vehicle Length at Right Side	3485	3497	-12
E	Front Bumper Thickness	115	115	0
F	Front Bumper Bottom to Ground	226	270	-44
G	Sill Height at Front Wheel Well	168	168	0
H	Sill Height at Front Door Leading Edge	185	196	-11
I	Sill Height at B Pillar	197	214	-17
J1	Sill Height at Rear Wheel Well	215	231	-16
J2	Pinch Weld Height at Rear Wheel Well	204	210	-6
K	Sill Height Aft of Rear Wheel Well	255	260	-5
L	Rear Bumper Thickness	115	115	0
M	Rear Bumper Bottom to Ground	318	306	12
N	Sill Height to Window Bottom Sill	720	712	8
O	Front Door Leading Edge to Impact CL	592	585	7
P	Rear Door Trailing Edge to Impact CL	1336	1316	20
Q	Front Window Opening	421	325	96
R	Right Side Length	3485	3497	-12
S	Left Side Length	3485	3398	87
T	Vehicle Width at B Post	1760	1671	89

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2011 Toyota Corolla 4-Dr Sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No. MB5106
 Test Date: 2/07/2011



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	260
2	Mid Door	541
3	Occupant H-Point	629
4	Window Sill	933
5	Window Top	1374

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

Test Vehicle: 2011 Toyota Corolla 4-Dr Sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No. MB5106
 Test Date: 2/07/2011

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-1350				320					322					2	
-1200				310					319					9	
-1050				299					316					17	
-900				292					319					27	
-750			225	287				252	322				27	35	
-600	251	222	222	288		279	255	257	327		28	33	35	39	
-525	258	229	228	286		302	271	253	333		44	42	25	47	
-450	262	231	230	286		329	311	302	364		67	80	72	78	
-375	264	232	230	285		353	360	349	394		89	128	119	109	
-300	264	232	230	285		380	401	396	429		116	169	166	144	
-225	263	231	230	286		416	432	435	457		153	201	205	171	
-150	262	230	225	285		455	471	472	498		193	241	247	213	
-75	261	229	224	285	510	501	520	515	537	612	240	291	291	252	102
0	260	227	223	284	510	544	557	560	575	635	284	330	337	291	125
75	260	226	222	282	510	532	537	563	567	623	272	311	341	285	113
150	258	226	221	282	509	484	516	523	529	599	226	290	302	247	90
225	257	225	220	281	509	436	463	479	478	588	179	238	259	197	79
300	256	225	220	280	508	396	430	436	435	576	140	205	216	155	68
375	255	225	220	279	509	371	383	376	385	565	116	158	156	106	56
450	255	225	220	279	510	348	322	322	361	554	93	97	102	82	44
525	254	225	220	279	512	324	294	292	346	544	70	69	72	67	32
600	254	225	220	279	515	303	283	280	336	538	49	58	60	57	23
750	253	226	220	280	516	270	268	266	323	537	17	42	46	43	21
900	253	227	222	280	522	232	246	245	306	532	21	19	23	26	10
1050	252	227	223	283	526	197	225	229	290	532	-55	-2	6	7	6
1200	251	224	223	287	537	171	199	205	278	538	-80	-25	-18	-9	1
1350			223	290				209	267				-14	-23	
1500				296					256					-40	
1650				303					309					6	

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 Toyota Corolla 4-Dr Sedan
Test Program: NCAP Side Pole Impact Test

NHTSA No. MB5106
Test Date: 2/07/2011

MAXIMUM CRUSH DATA

	Level 1	Level 2	Level 3	Level 4	Level 5
Maximum Crush (mm)	284	330	341	291	125
Distance From Impact (mm)	0	0	75	0	0

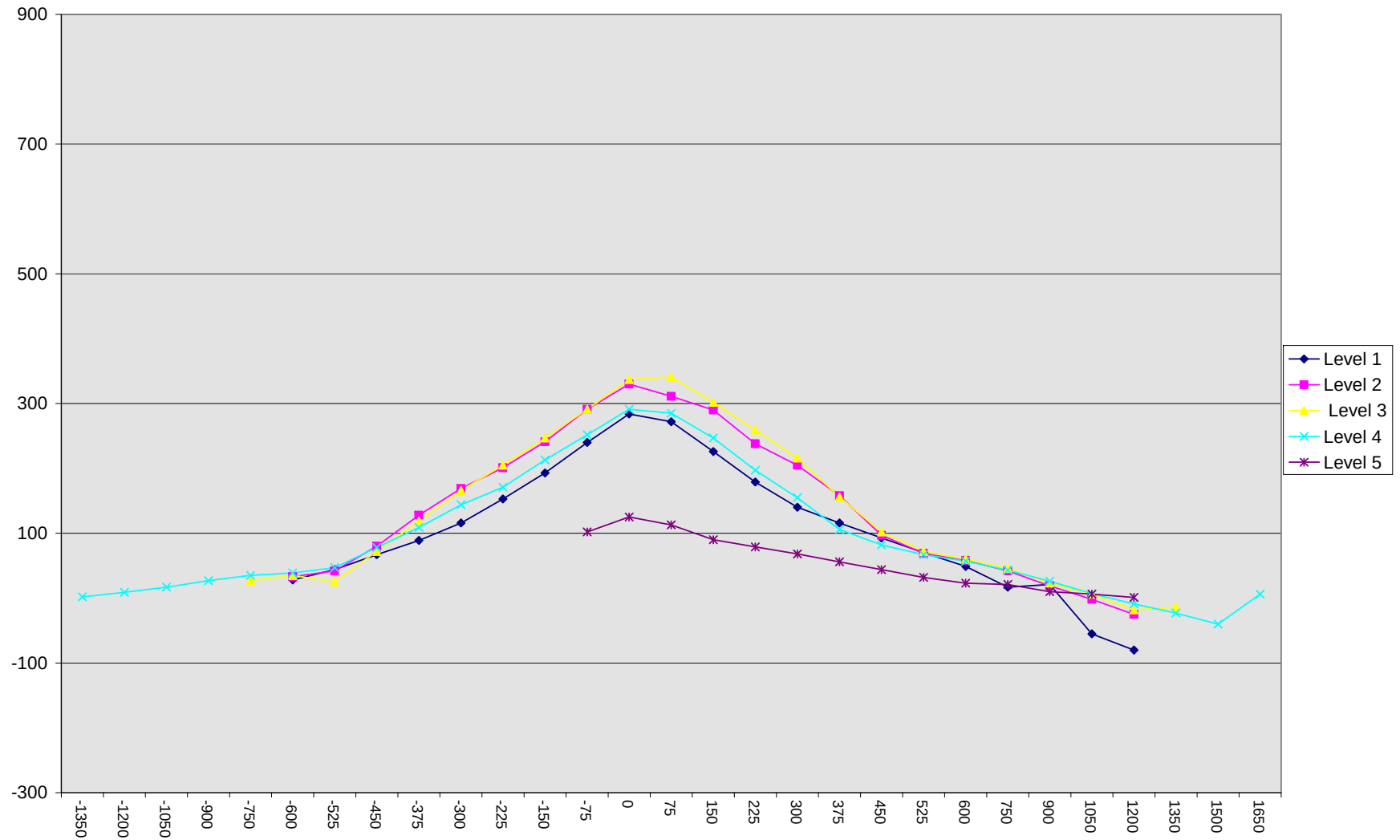
Note: Pre-test measurements are taken when the vehicle is in the "As Tested" weight condition. Vehicle measurements forward of the vertical impact reference line are negative. The crush profile grid is established prior to test based on an estimated impact point. The final distance to impact is determined 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 Toyota Corolla 4-Dr Sedan
Test Program: NCAP Side Pole Impact Test

NHTSA No. MB5106
Test Date: 2/07/2011

20



DATA SHEET NO. 11

FMVSS 301 FUEL SYSTEM INTEGRITY POST-IMPACT DATA

Test Vehicle: 2011 Toyota Corolla 4-Dr Sedan

NHTSA No. MB5106

Test Program: NCAP Side Pole Impact Test

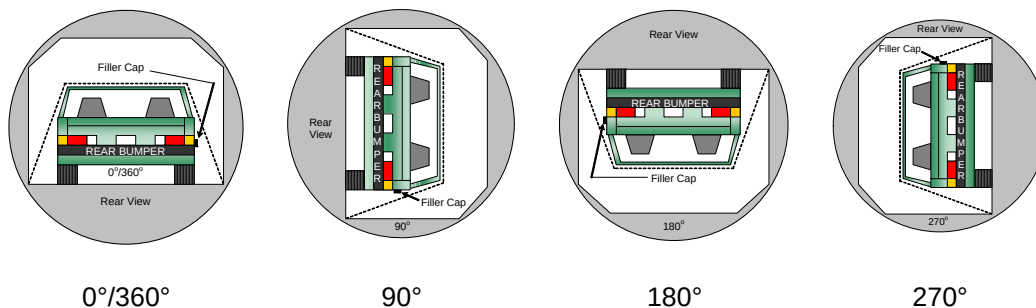
Test Date: 2/07/2011

Test Time: 11:36 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°	124	300	424
90° to 180°	116	300	416
180° to 270°	111	300	411
270° to 360°	117	300	417

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

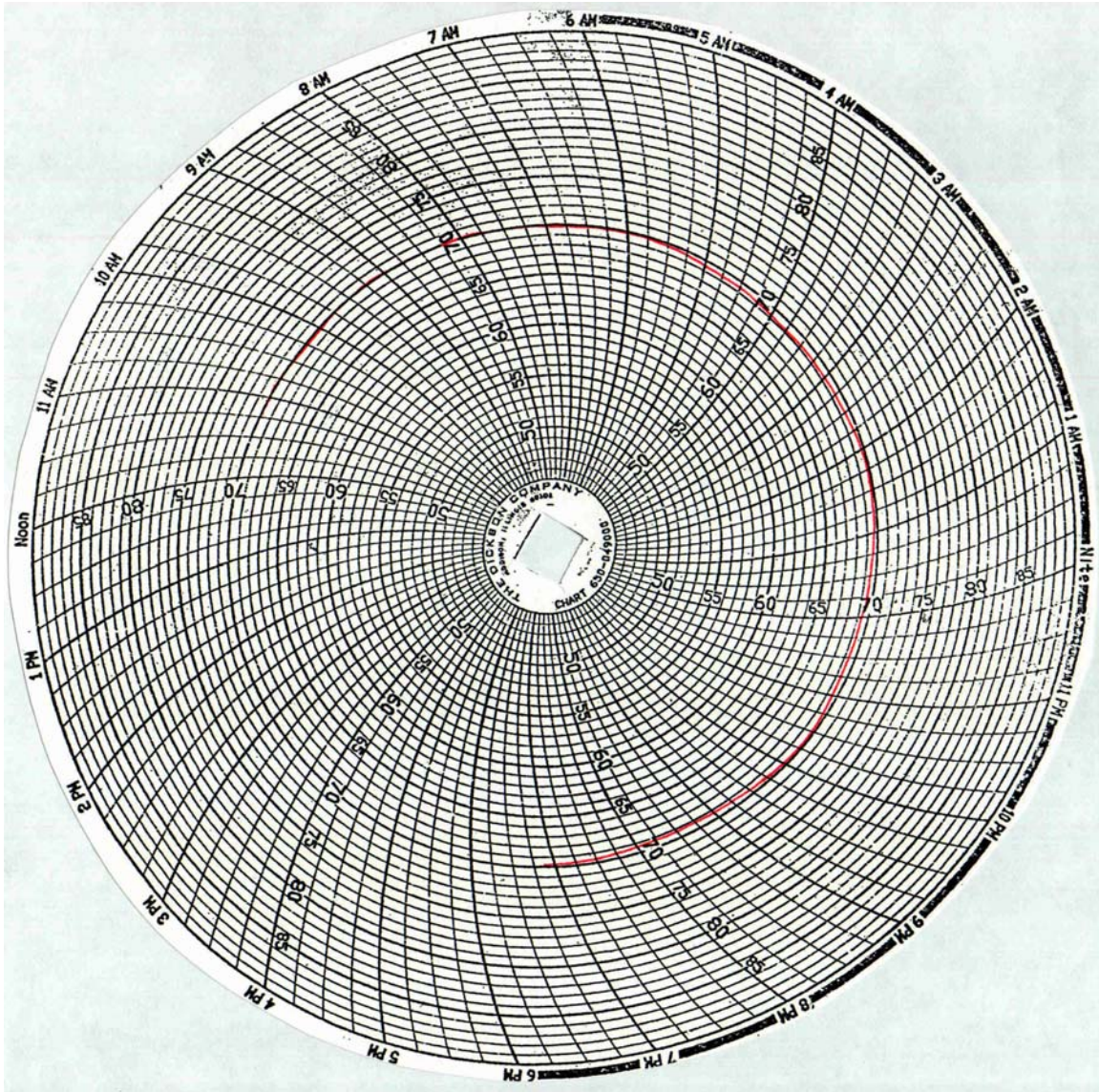
Test Phase	Spillage Location
0° to 90°	
90° to 180°	
180° to 270°	
270° to 360°	

DATA SHEET NO. 12

DUMMY/VEHICLE TEMPERATURE STABILIZATION DATA

Test Vehicle: 2011 Toyota Corolla 4-Dr Sedan
Test Program: NCAP Side Pole Impact Test

NHTSA No. MB5106
Test Date: 2/07/2011



APPENDIX A
PHOTOGRAPHS

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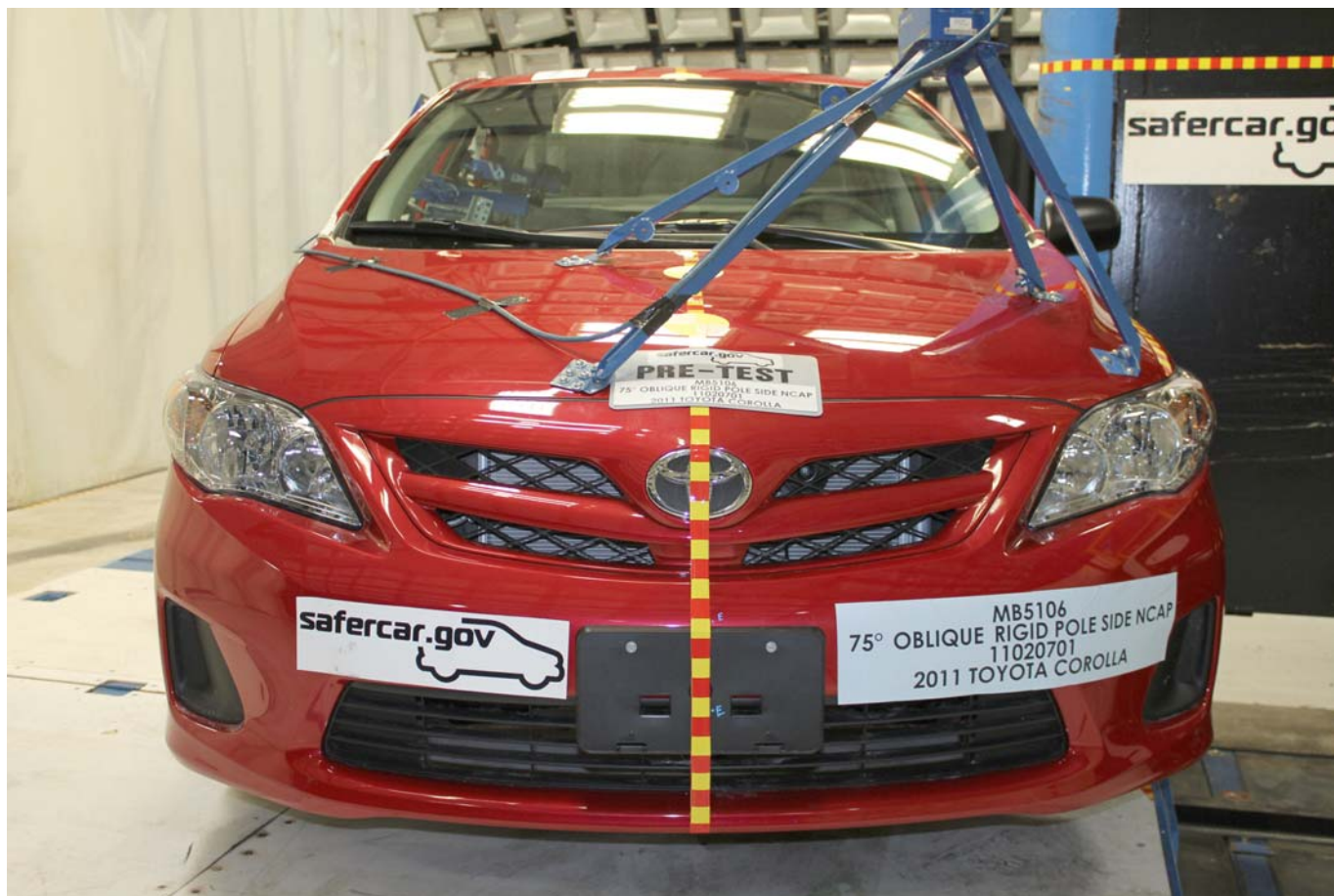
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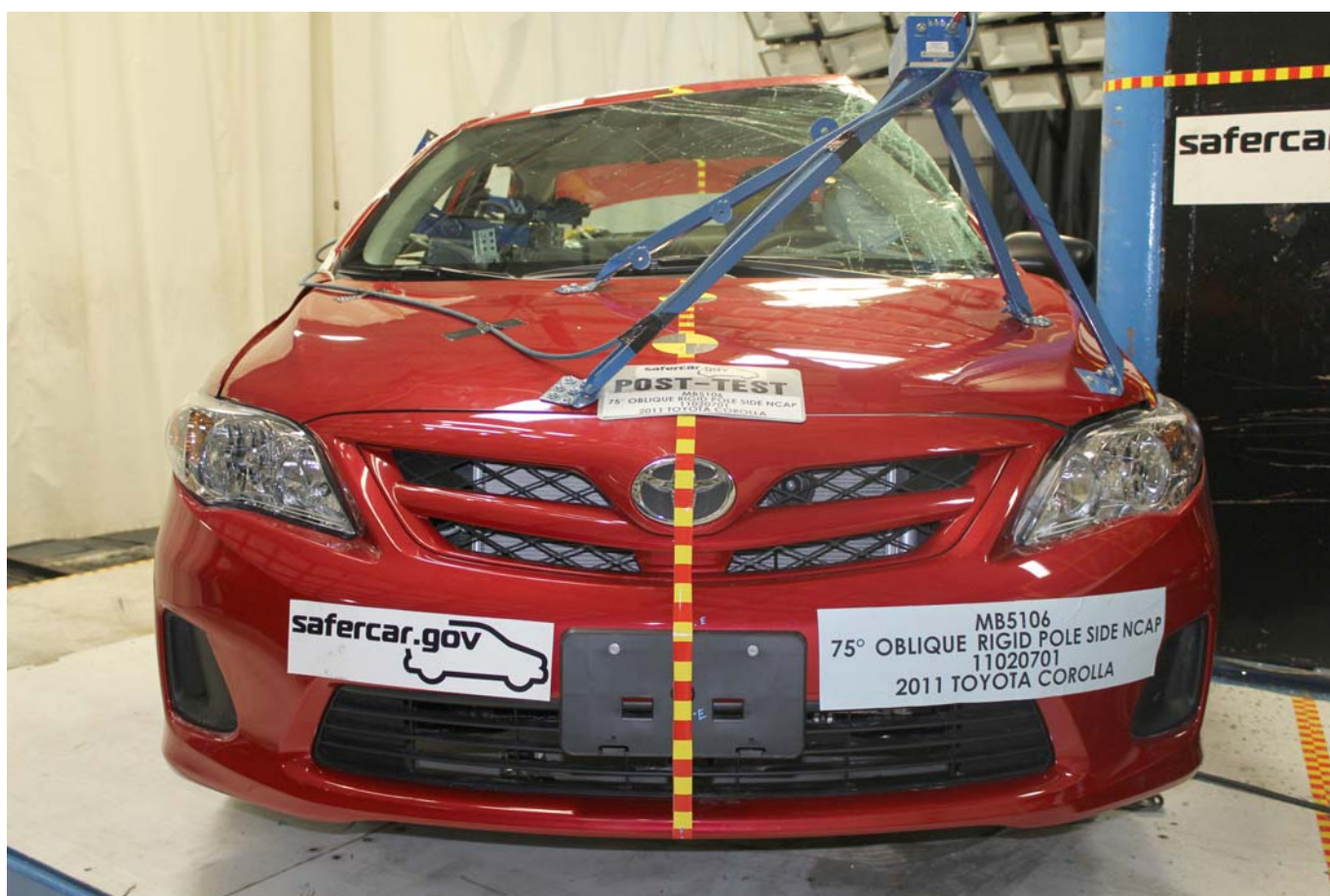
As Delivered Right Front $\frac{3}{4}$ View of Test Vehicle



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



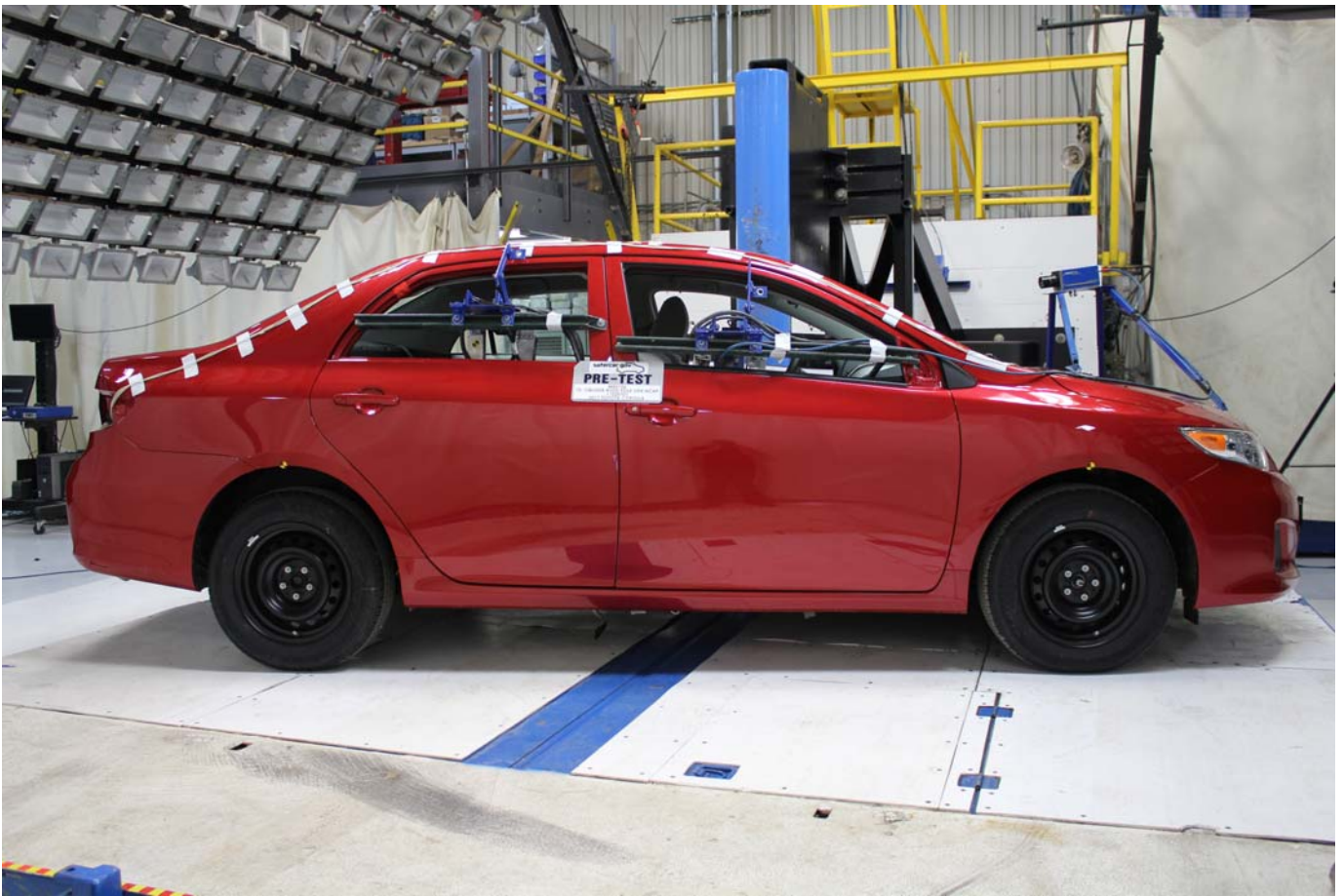
Post-Test Left Rear $\frac{3}{4}$ View of Test Vehicle



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)



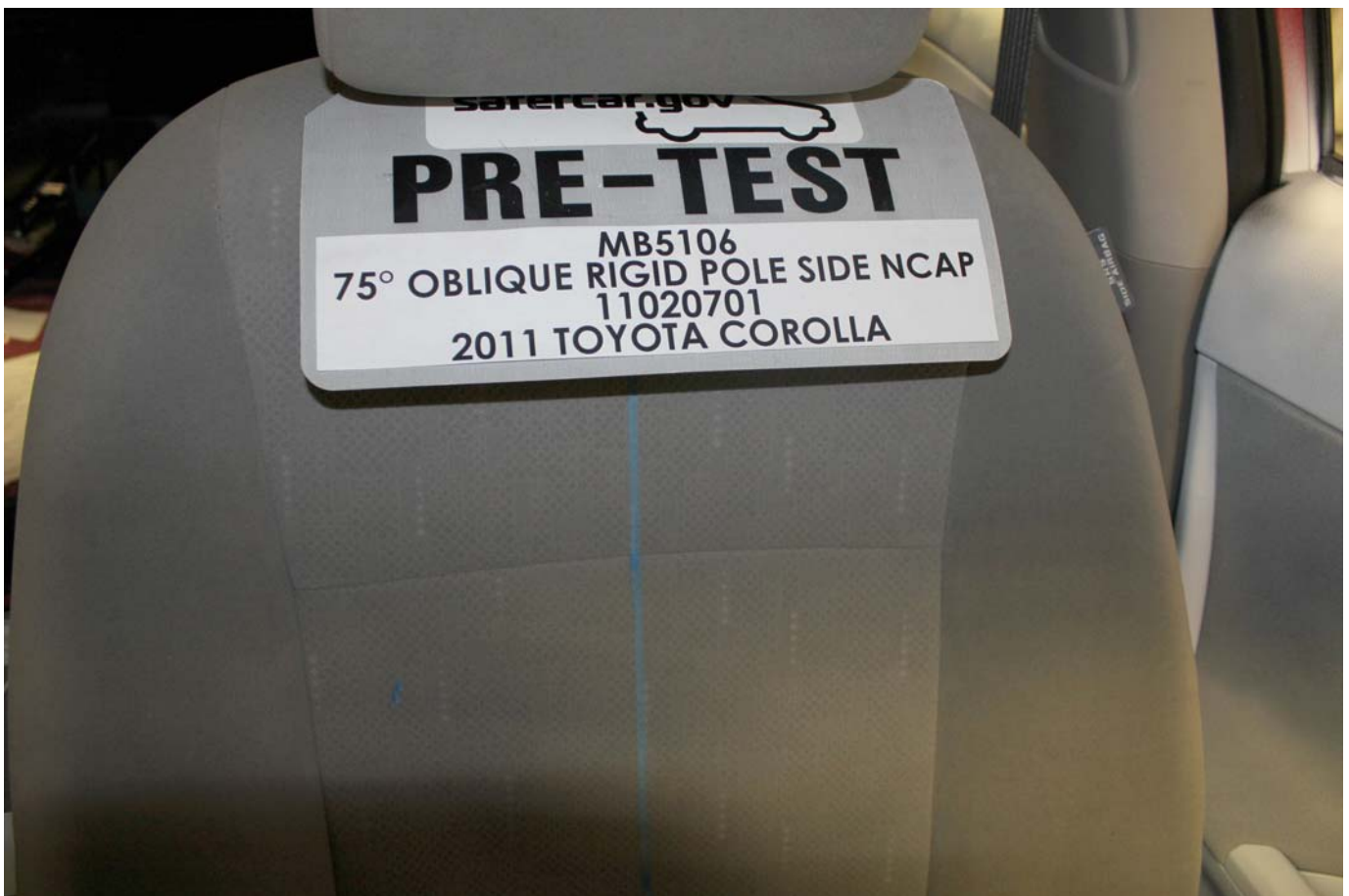
Pre-Test Left Side View of Dummy Showing Belts, Chalking, and Contact Switches (Door Open)



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



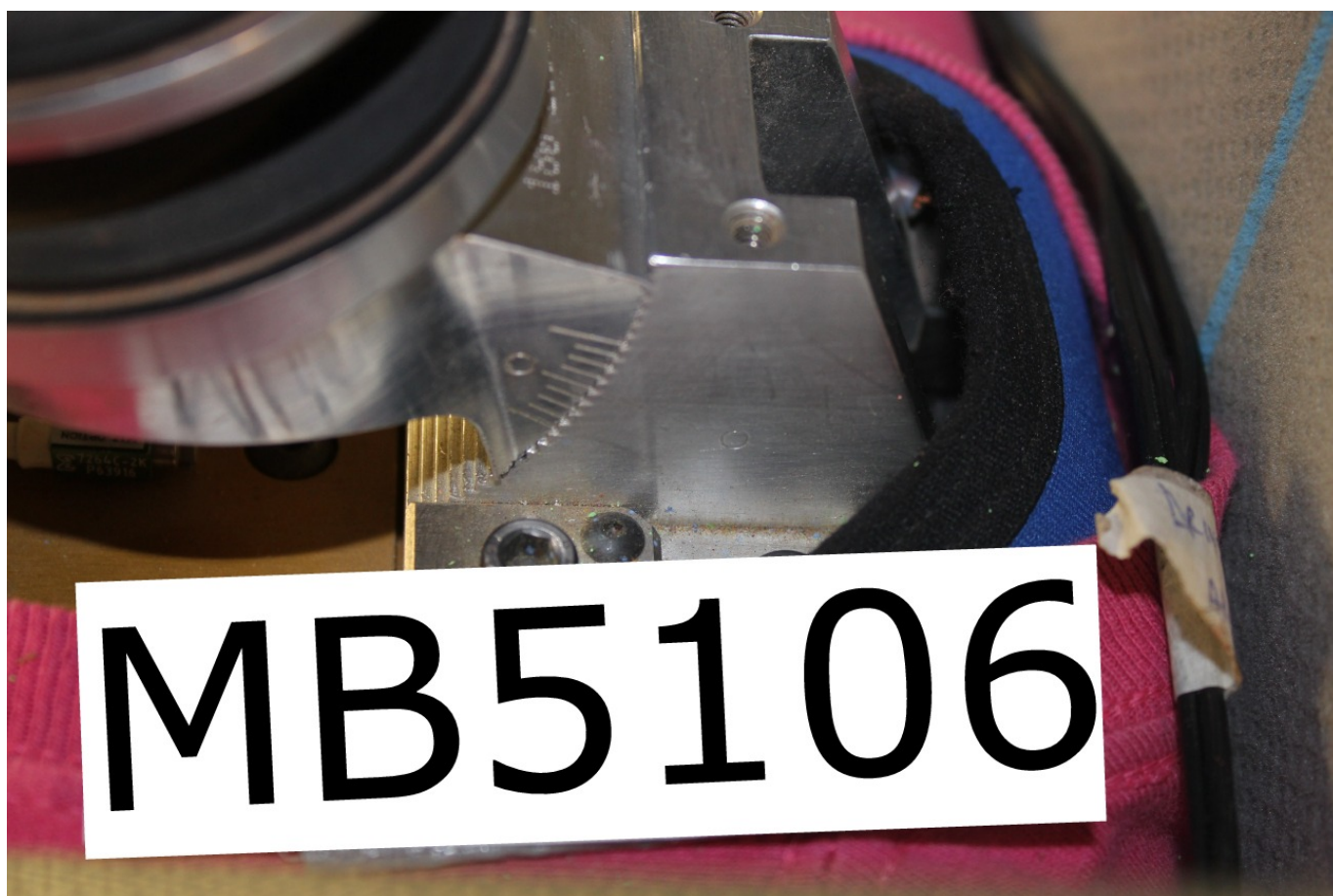
Pre-Test Frontal View of Dummy Head and Shoulders in Relation to Head Restraint



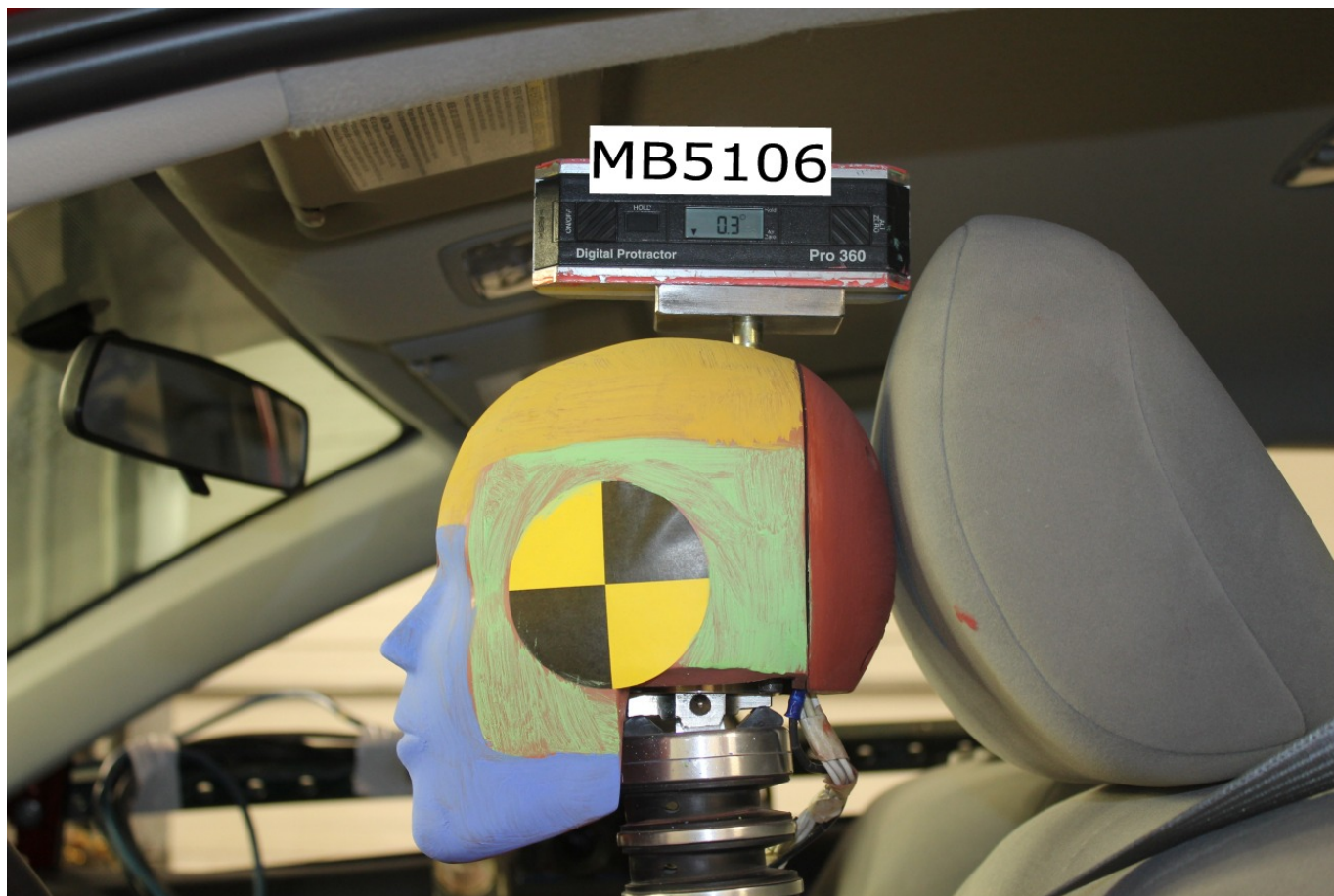
Pre-Test Frontal View of Seat Pan Prior to Dummy Positioning



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



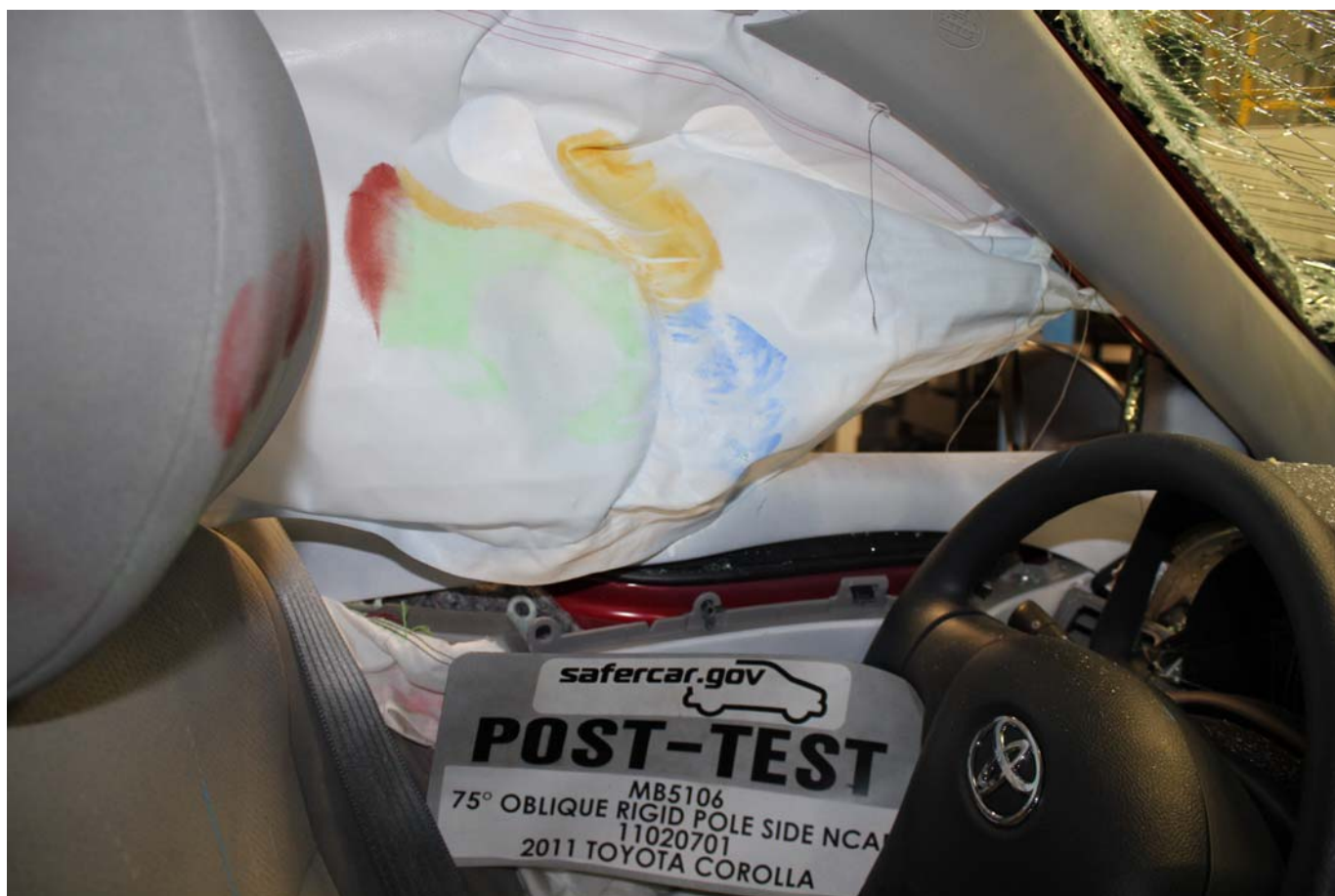
Pre-Test Inner Driver Door Panel View



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

PHOTOGRAPH NOT APPLICABLE

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



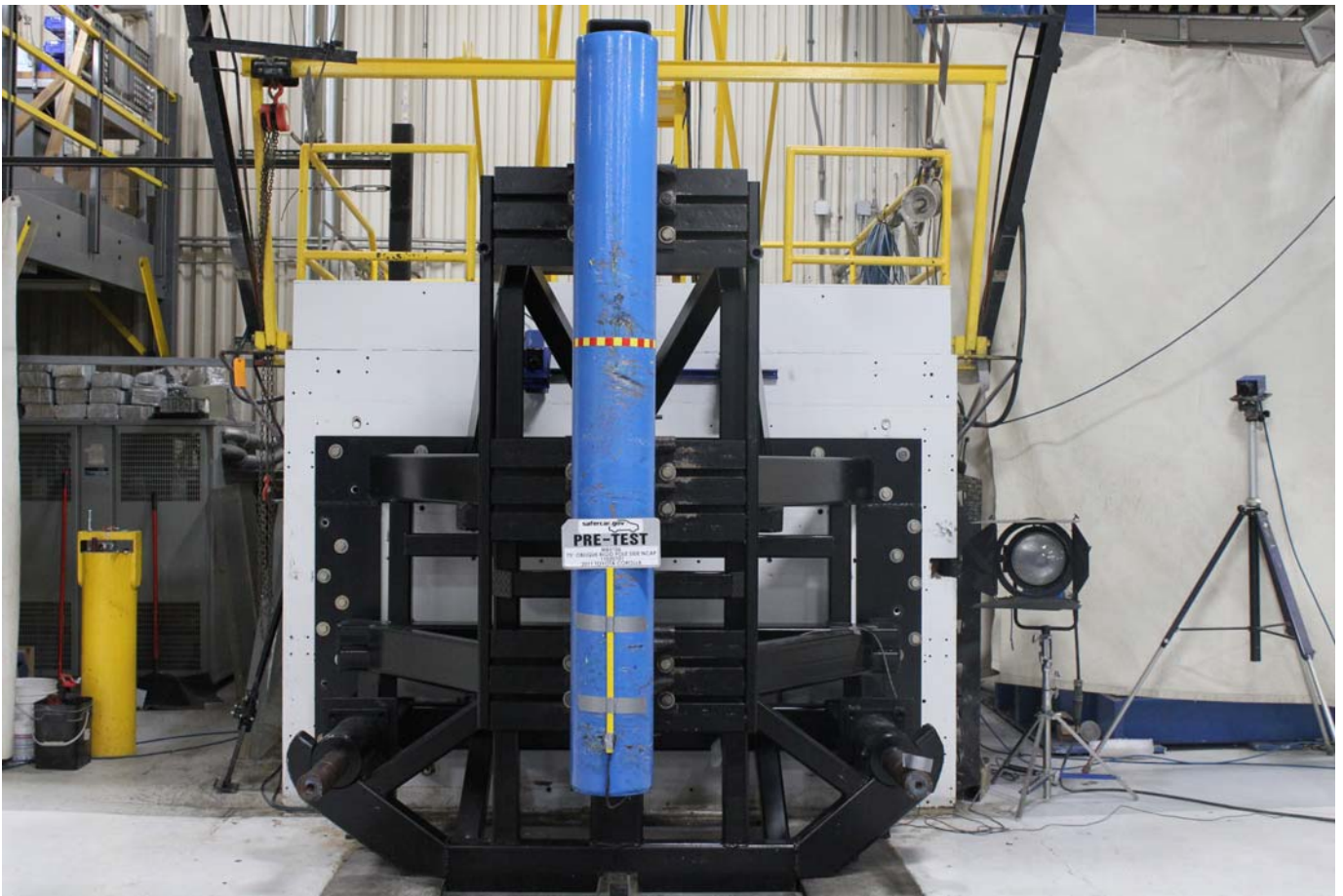
Close-Up View of Vehicle's Certification Label



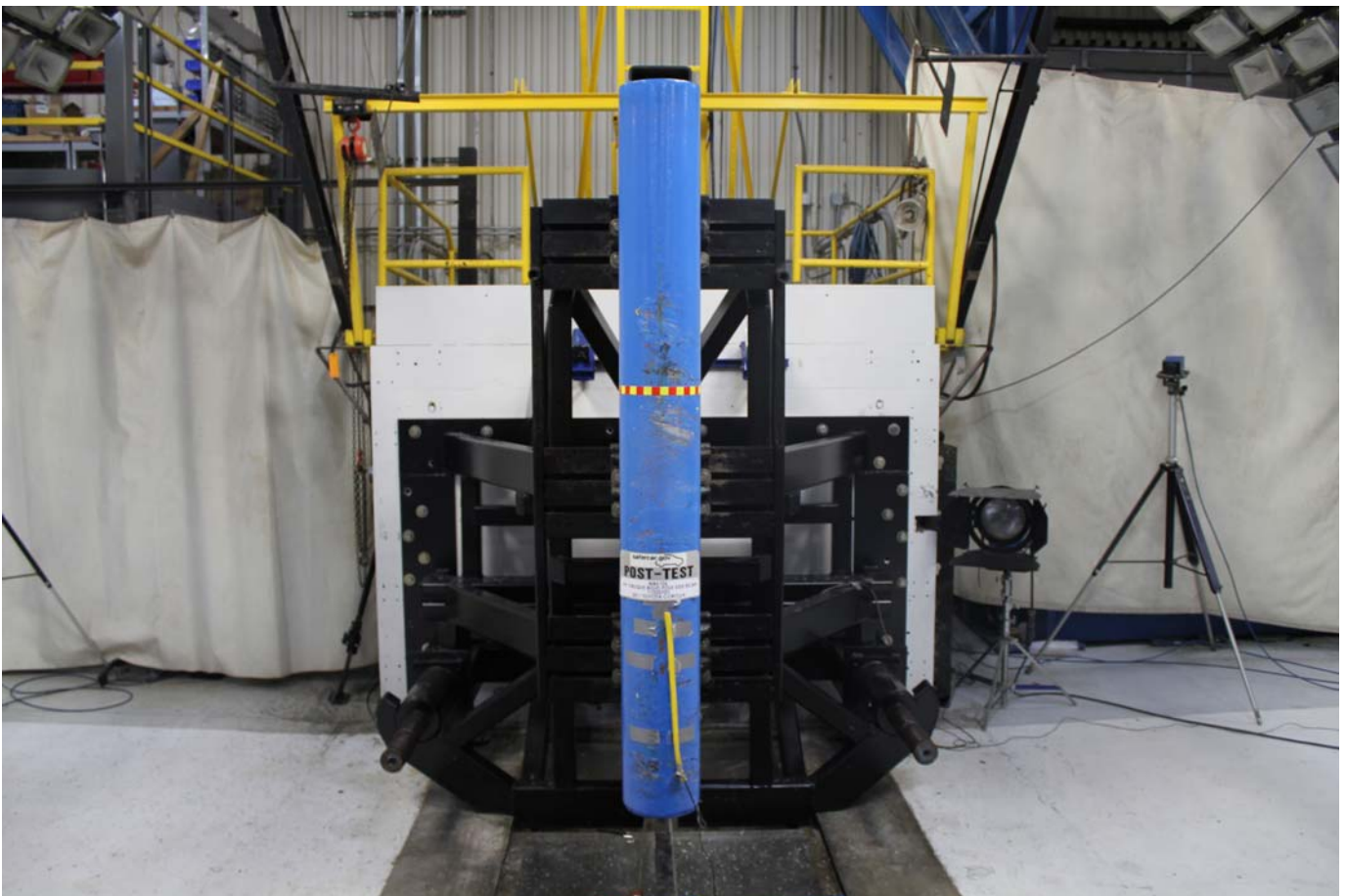
Close-Up View of Vehicle's Tire Information Placard or Label



Close-Up View of Vehicle's Load Carrying Capacity Reduced



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



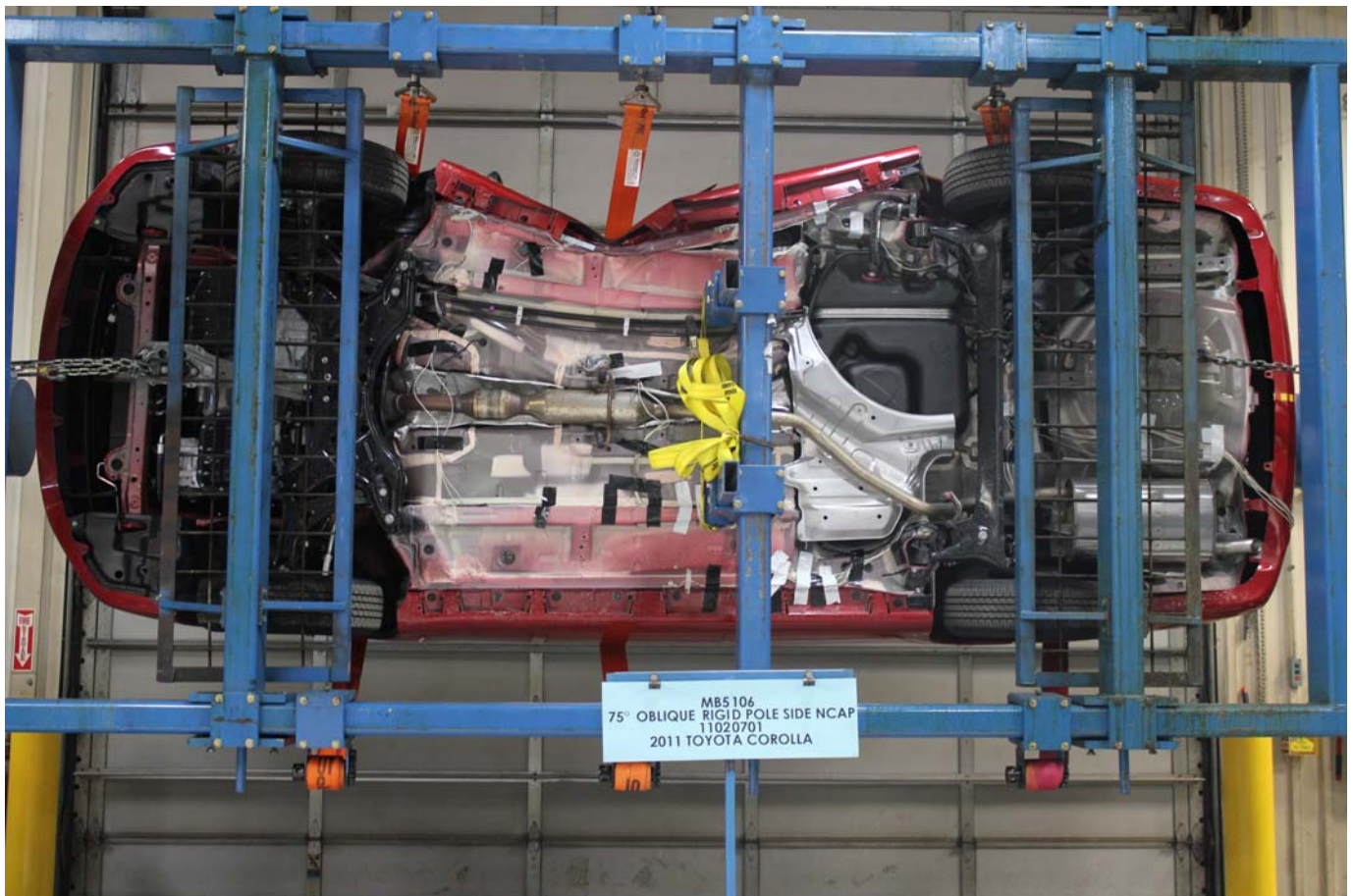
FMVSS No. 301/305 Rollover 0 Degrees



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



moving forward

DESC: **COROLLA** 4-DOOR SEDAN
VIN: **2T1BU4EE5BC542051**
YR/MDL: 2011/1832A
CLR: BARCELONA RED MET./FA16 (03R3/16)
PORT/PLANT: Detroit, MI/TMMC RAILHEAD:

GOVERNMENT SAFETY RATINGS

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

EPA Fuel Economy Estimates

CITY MPG

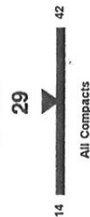
26

Expected range for most drivers
21 to 31 MPG

Estimated Annual Fuel Cost
\$1,552

based on 15,000 miles at \$3.00 per gallon

Combined Fuel Economy
This Vehicle



HIGHWAY MPG

34

Expected range for most drivers
28 to 40 MPG

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



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

STANDARD EQUIPMENT

- MECHANICAL & PERFORMANCE
 - 1.8L DOHC 16V, 158-hp, 140-mph, 170-mph
 - 4-Speed Automatic Transmission
 - Front Wheel Drive
 - MacPherson Strut Front Suspension & Multi-Link Rear Suspension
 - Electric Power Steering (EPS)
 - Ventilated Front Disc/Rear Drum Brakes
 - 15" Steel Wheels with Full Wheel Covers
 - 195/55R15 Tires
- SAFETY
 - Star Safety System Includes: VSC, TRAC, Anti-lock Brake System, EBD, Brake Assist, 3-Point Seatbelts w/ Pretensioners, Dr & Fr Pass Advanced Air Bag System, Dr & Fr Pass Side Mounted Side Airbags, Front & Rear Side Curtain Airbags, Driver Front Air Bag, Side Headlamps, 3-Point Seatbelt, All Seat Positions & Front Seatbelt Pretensioners
 - LATCH (Lwr Anchor & Tethers for Children) Tire Pressure Monitoring System (TPMS) Only
 - Anti-Theft System w/ Engine Immobilizer
 - Daytime Running Lights
- EXTERIOR
 - Body-Color Reflectors
 - Black Power Outside Mirrors
 - Intermittent Windshield Wipers
 - Chrome Door Handles
 - COMFORT & CONVENIENCE
 - Air Conditioning with Air Filter
 - AM/FM/CD MP3/WMA Player w/4 Speakers, Aux. Audio Jack, CD Text Display & ASL
 - 6-Speaker Audio System
 - 80/40 Split Fold-Down Rear Seat
 - 110V Telescopic Steering Wheel
 - 12V Auxiliary Power Outlet
 - 12V Power Windows
 - 12V Power Door Locks
 - Center Console with Storage Compartment
 - Heavy Duty Rear Window Defogger w/Timer
 - Digital Clock
 - Remote Hood and Fuel-Filler Releases
 - Full Tank of Gas

MANUFACTURER'S SUGGESTED RETAIL PRICE **\$16,400.00**

OPTIONAL EQUIPMENT

FE 50 State Emissions 200.00
CF Carpet Floor Mats & Trunk Mat

17919

DELIVERY PROCESSING AND HANDLING FEE 760.00

TOTAL **\$17,360.00**

The New Vehicle Limited Warranty provides 3-year/35,000 mile basic coverage, 5-year/60,000 mile powertrain coverage, and 100,000 mile/10 years or 100,000 mile/10 years, whichever comes first, for the vehicle. An add-on service contract may be available for the vehicle. Manufacturer's suggested retail price includes manufacturer's recommended pre-delivery service. Gasoline, oil, and accessories are not included in the manufacturer's suggested retail price.

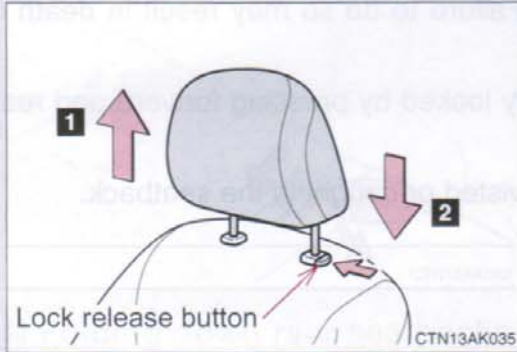
Dealer Name / Address: 48007 Ship to:
5901 ODANA ROAD
MADISON WIS53719



1-3. Adjustable components (seats, mirrors, steering wheel) Head restraints

Head restraints are provided for all seats.

► Front seats



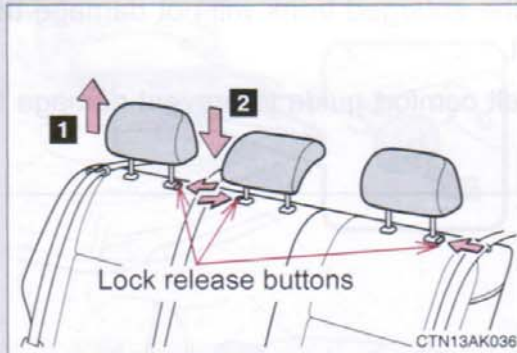
1 Up

Pull the head restraints up.

2 Down

Push the head restraint down while pushing the lock release button.

► Rear seats



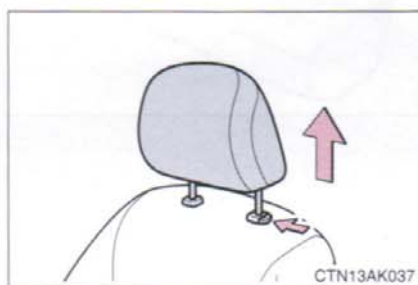
1 Up

Pull the head restraints up.

2 Down

Push the head restraint down while pushing the lock release button.

■ Removing the head restraints



Pull the head restraint up while pressing the lock release button.

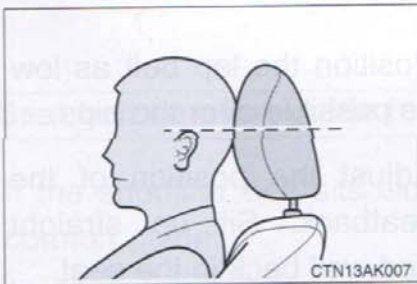
■ Installing the head restraints



Align the head restraint with the installation holes and push it down to the lock position.

Press and hold the lock release button when lowering the head restraint.

■ Adjusting the height of the head restraints



Make sure that the head restraints are adjusted so that the center of the head restraint is closest to the top of your ears.

■ Adjusting the rear center seat head restraint

Always raise the head restraint one level from the stowed position when using.

⚠ CAUTION

■ Head restraint precautions

Observe the following precautions regarding the head restraints. Failure to do so may result in death or serious injury.

- Use the head restraints designed for each respective seat.
- Adjust the head restraints to the correct position at all times.
- After adjusting the head restraints, push down on them and make sure they are locked in position.
- Do not drive with the head restraints removed.

APPENDIX B
DUMMY RESPONSE DATA

TABLE OF DATA PLOTS

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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

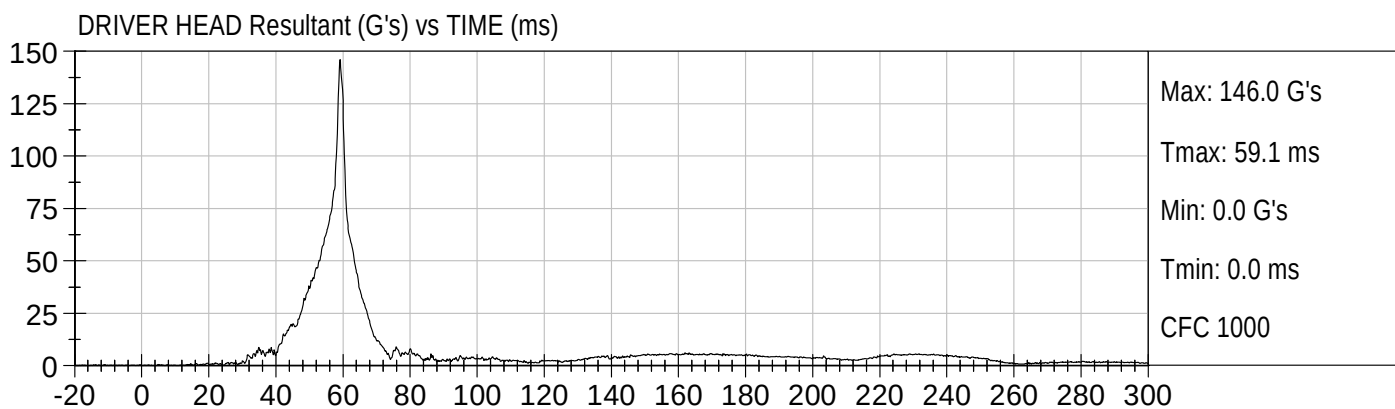
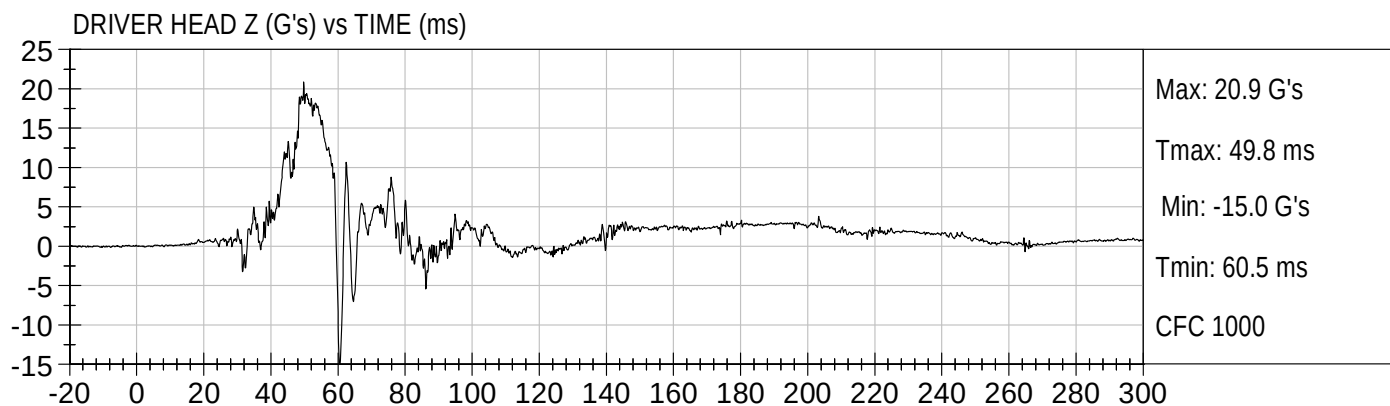
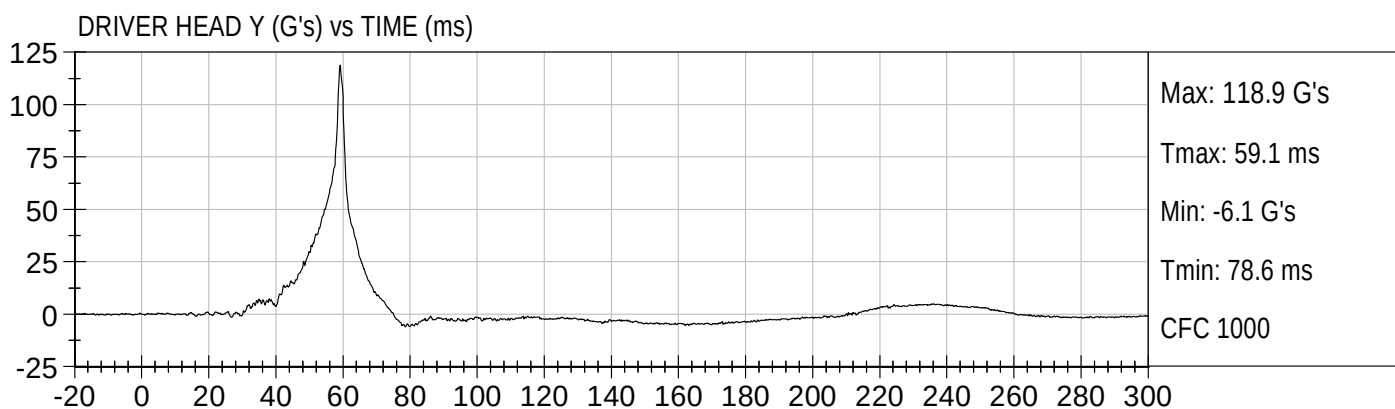
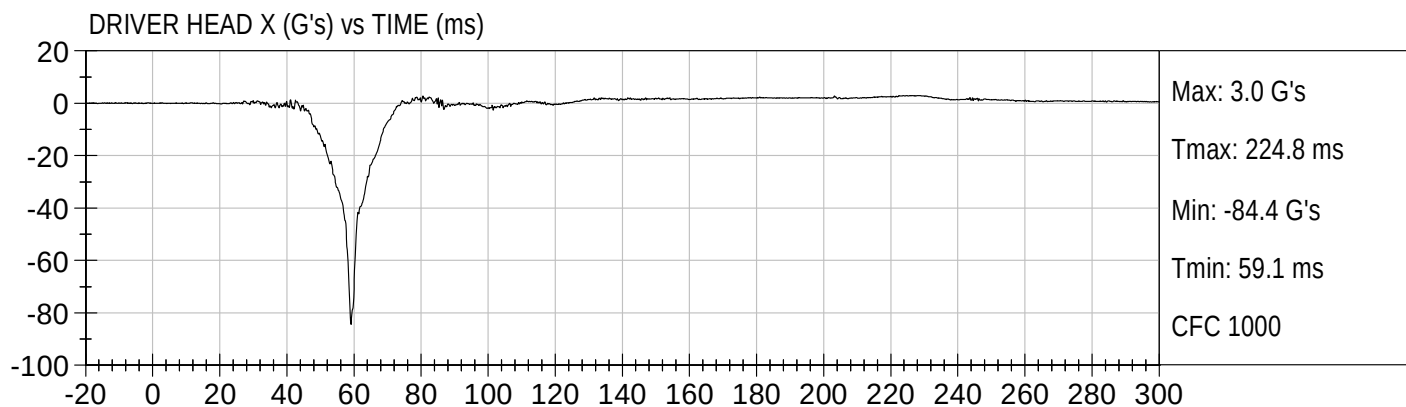
Vehicle CG Acceleration (X)

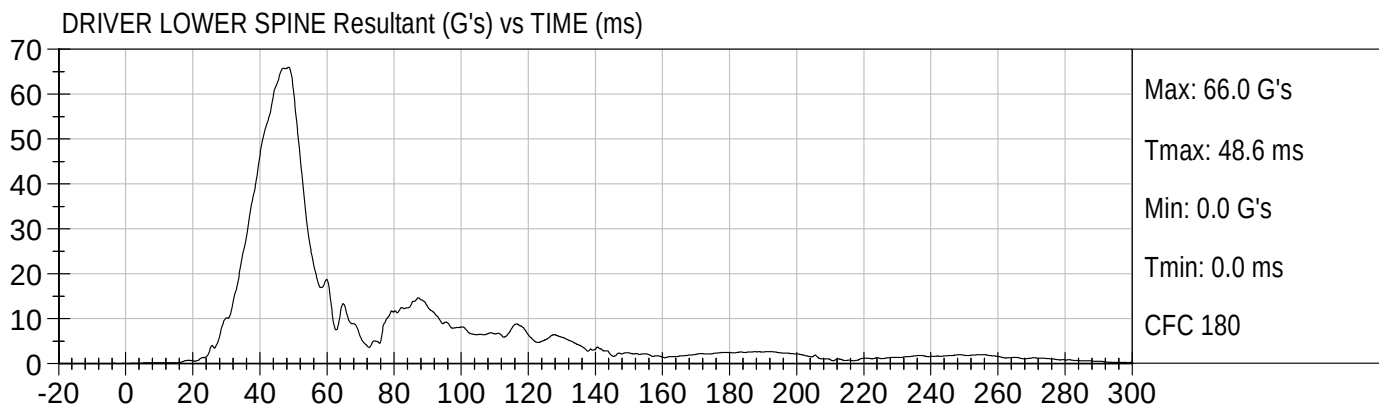
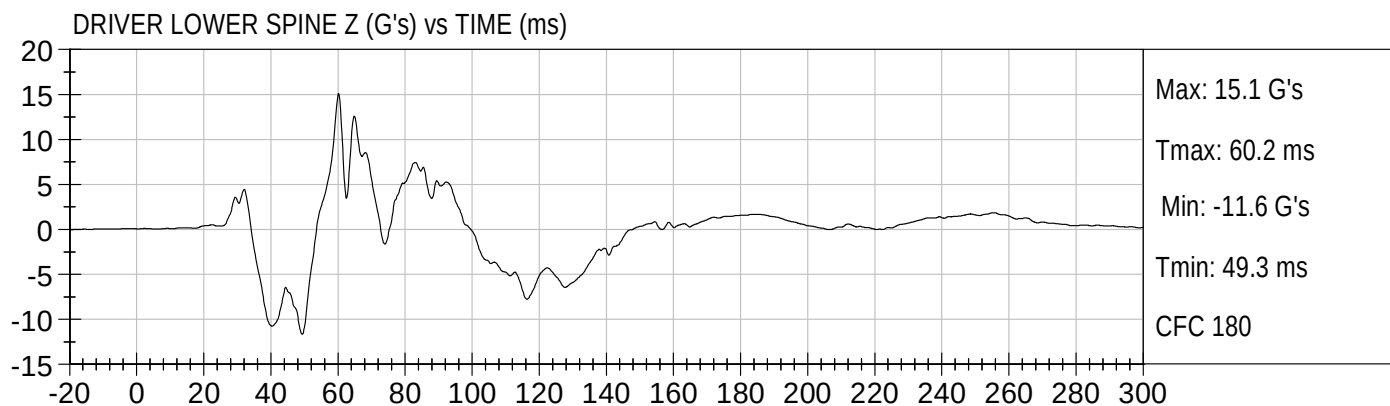
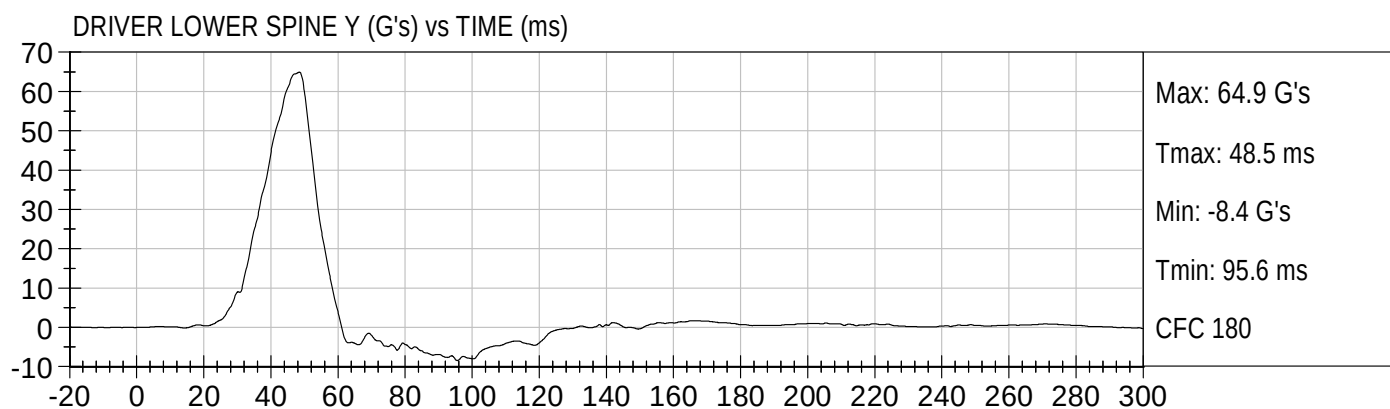
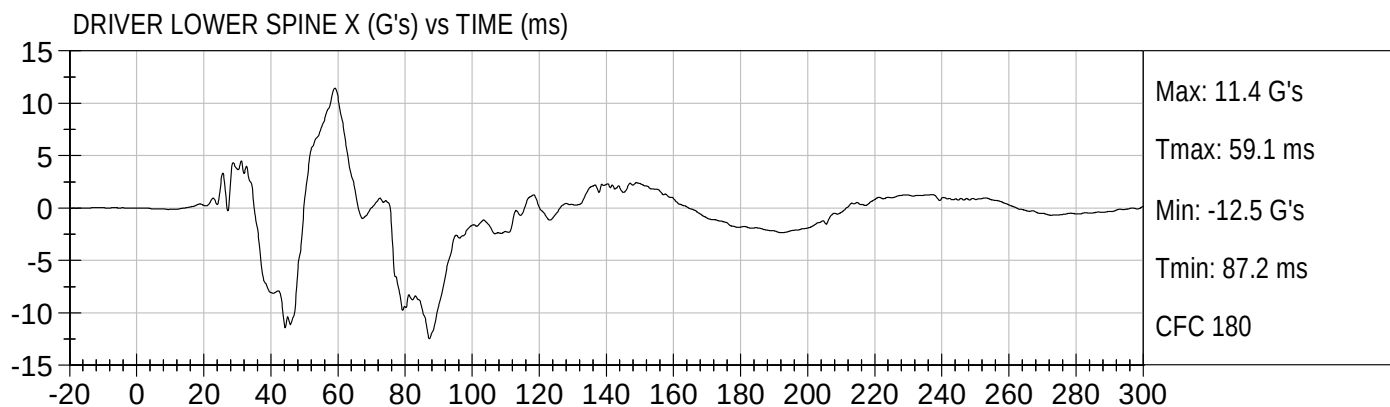
Vehicle CG Acceleration (Y)

Vehicle CG Acceleration (Z)

Vehicle CG Angular Rate About X (Roll)

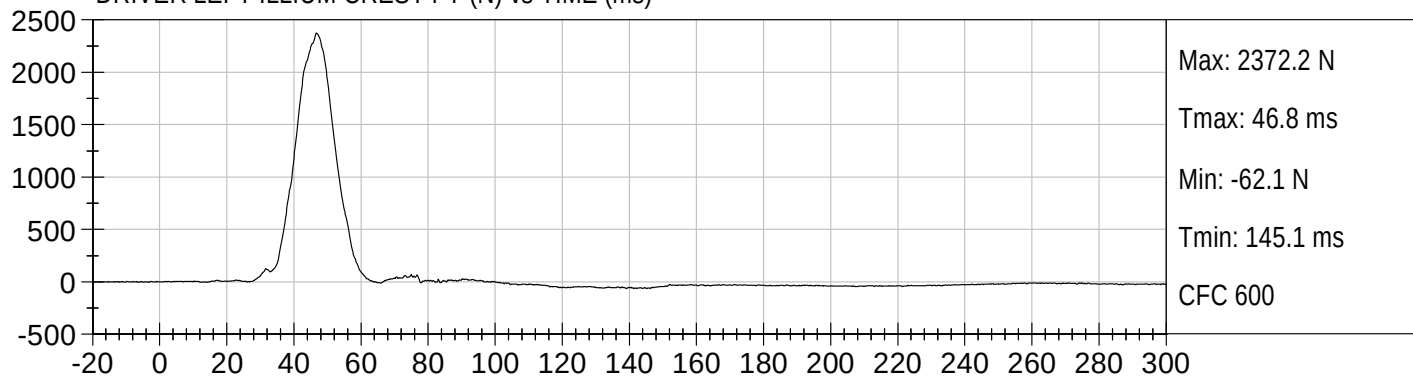
Vehicle CG Angular Rate About Y (Pitch)
Vehicle CG Angular Rate About Z (Yaw)
Left Floor Sill Acceleration (Y)
Left A-Pillar Sill Acceleration (Y)
Left Lower A-Pillar Acceleration (Y)
Left Mid A-Pillar Acceleration (Y)
Left B-Pillar Sill Acceleration (Y)
Left Lower B-Pillar Acceleration (Y)
Left Mid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



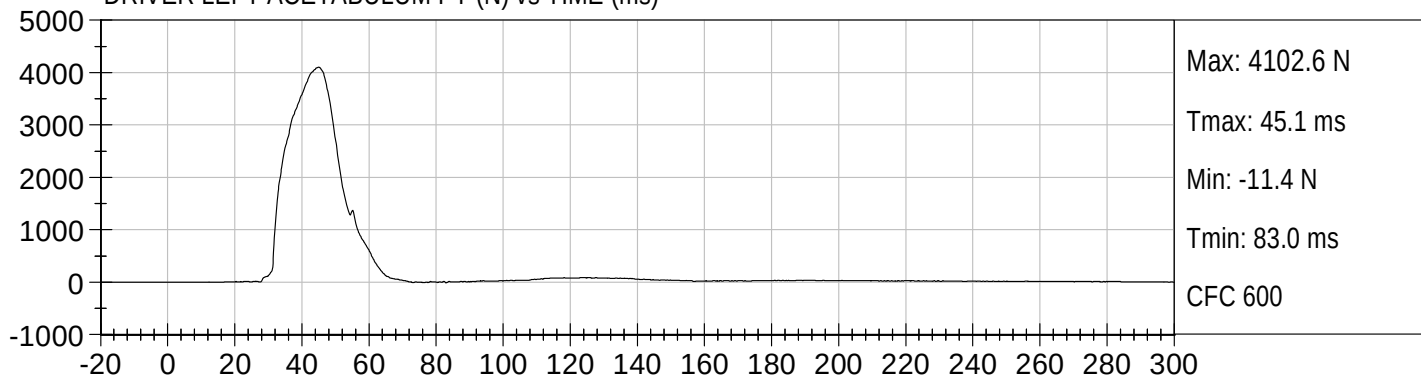




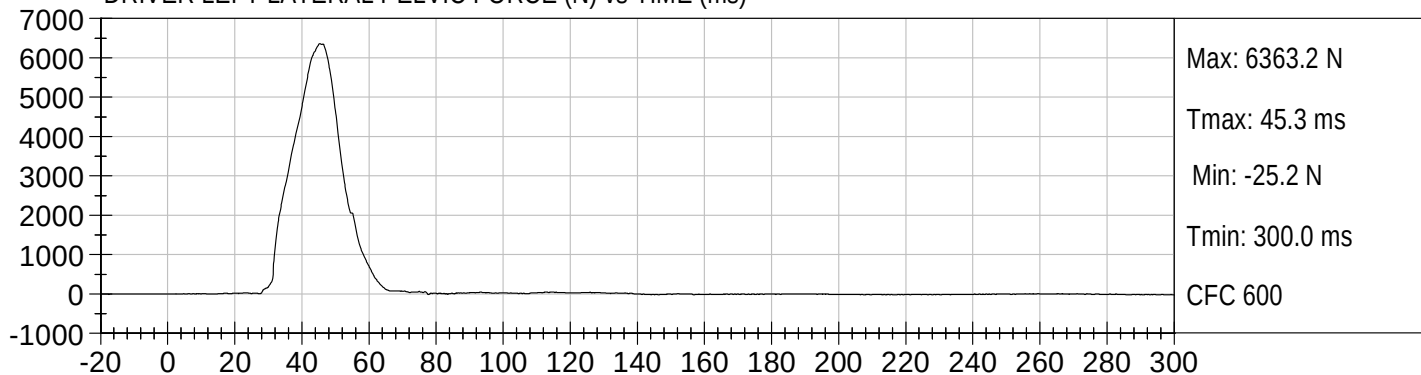
DRIVER LEFT ILLIUM CREST FY (N) vs TIME (ms)



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



DRIVER LEFT LATERAL PELVIC FORCE (N) vs TIME (ms)



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: D11371

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	18	Pass
Peak Resultant Acceleration	G's	115 to 137	121	Pass
Peak Lateral Acceleration	G's	+/- 15	-11	Pass
Unimodal	N/A	<15%	Yes	Pass
Overall Test Results				Pass



Laboratory Technician

2/1/11

Test Date

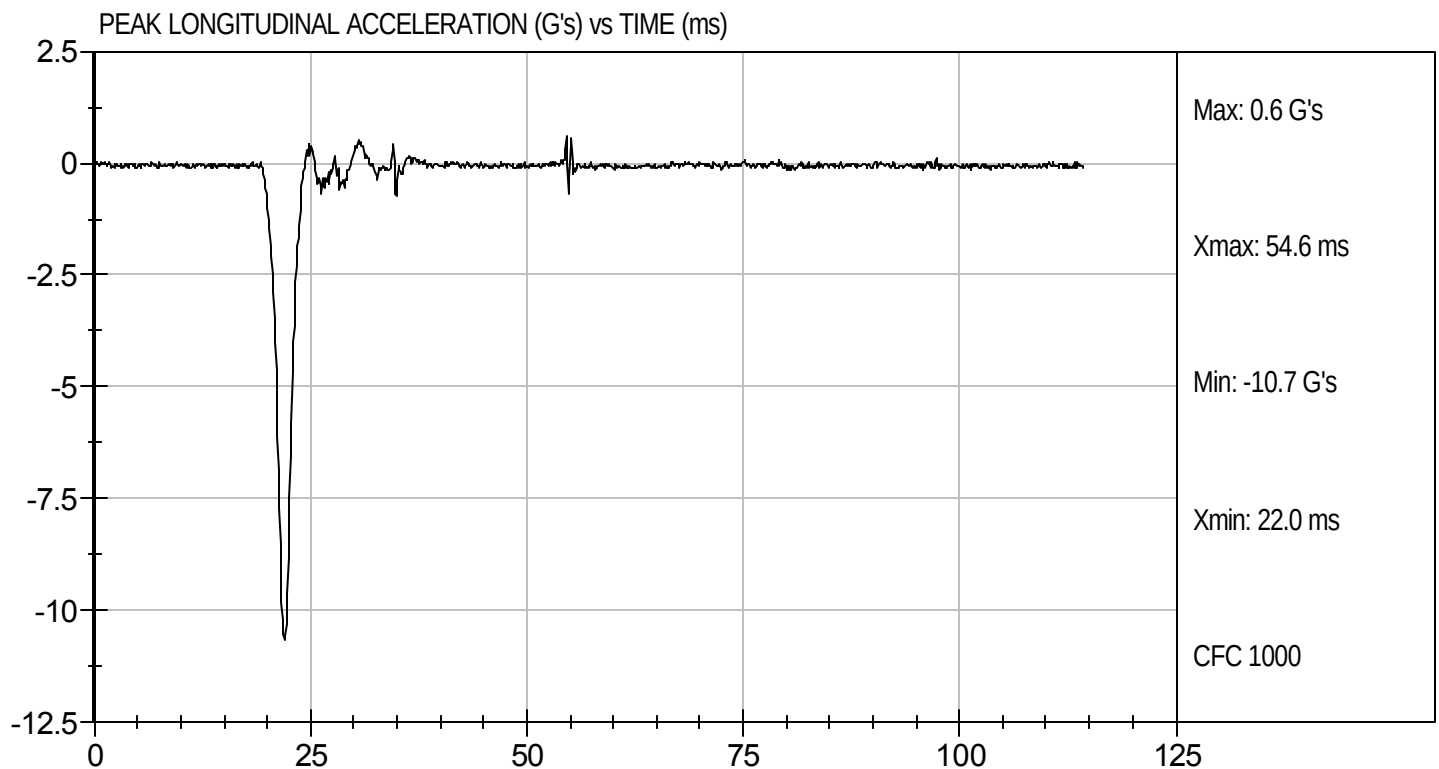
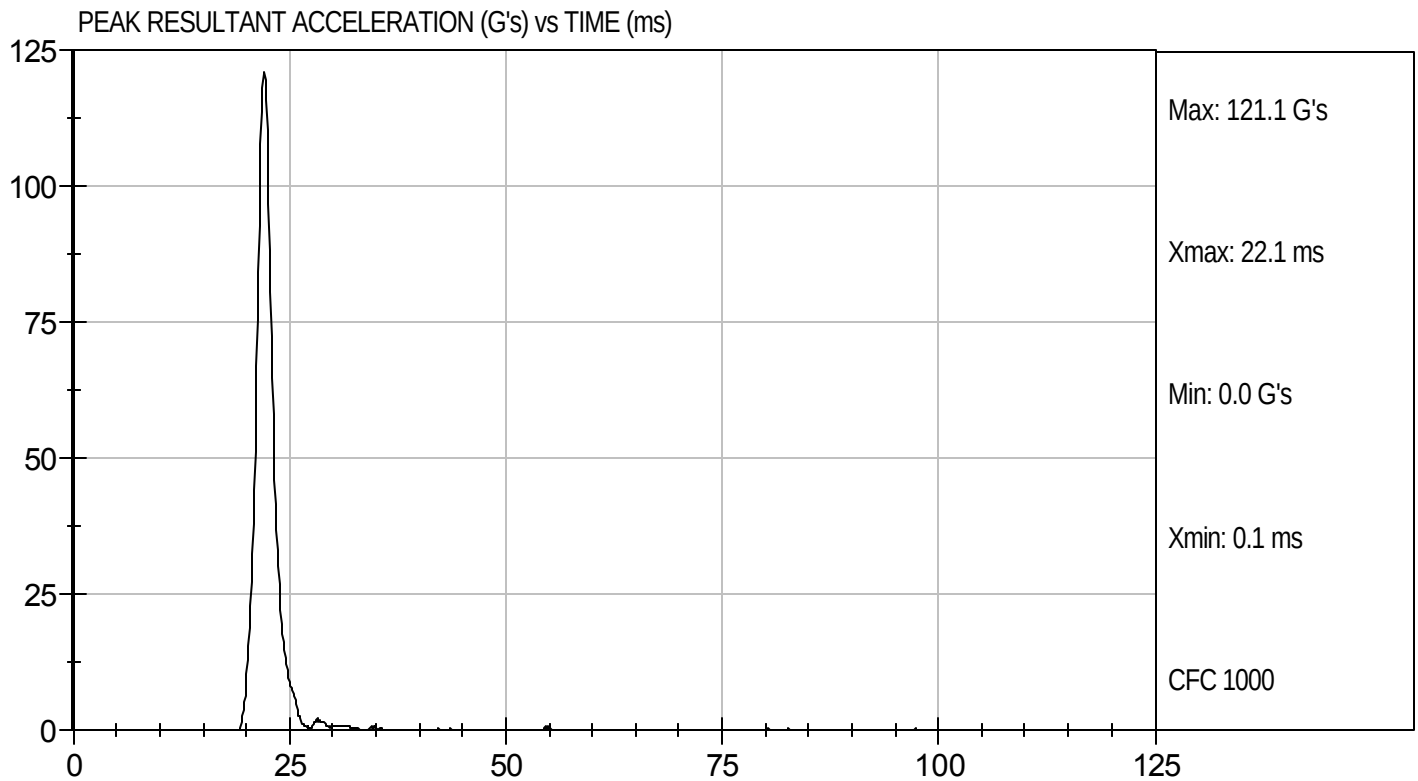


Approved By



Test Desc: Head Drop
Component ID: D11371

Test Date: 2/1/11
Velocity: 0 ft/s, 0.00 m/s

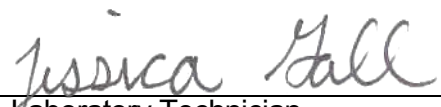


MGA RESEARCH CORPORATION
LATERAL NECK PENDULUM TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

Test I.D: D11372

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21.5	Pass
Humidity		%	10 to 70	18	Pass
Impact Velocity		m/s	5.51 to 5.63	5.58	Pass
Delta Velocity	10 ms	m/s	2.20 to 2.80	2.42	Pass
	15 ms	m/s	3.30 to 4.10	3.39	Pass
	20 ms	m/s	4.40 to 5.40	4.49	Pass
	25 ms	m/s	5.40 to 6.10	5.48	Pass
	25-100 ms	m/s	5.50 to 6.20	5.58	Pass
Maximum D-Plane Rotation		deg	71 to 81	76	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	63	Pass
Maximum Occipital Condyle Moment during Rotation Interval Nm			-44 to -36	-40	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	122	Pass
Overall Test Results				Pass	


 Laboratory Technician

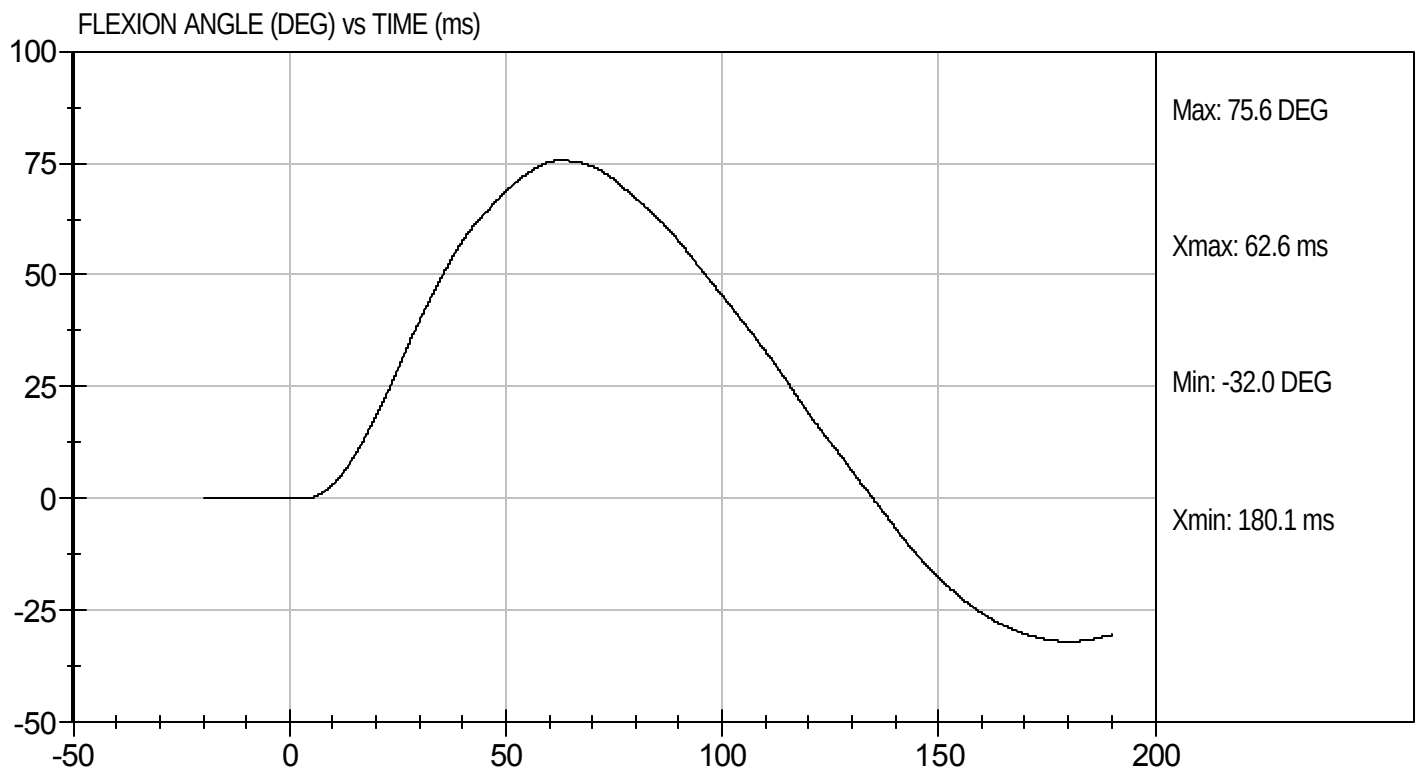
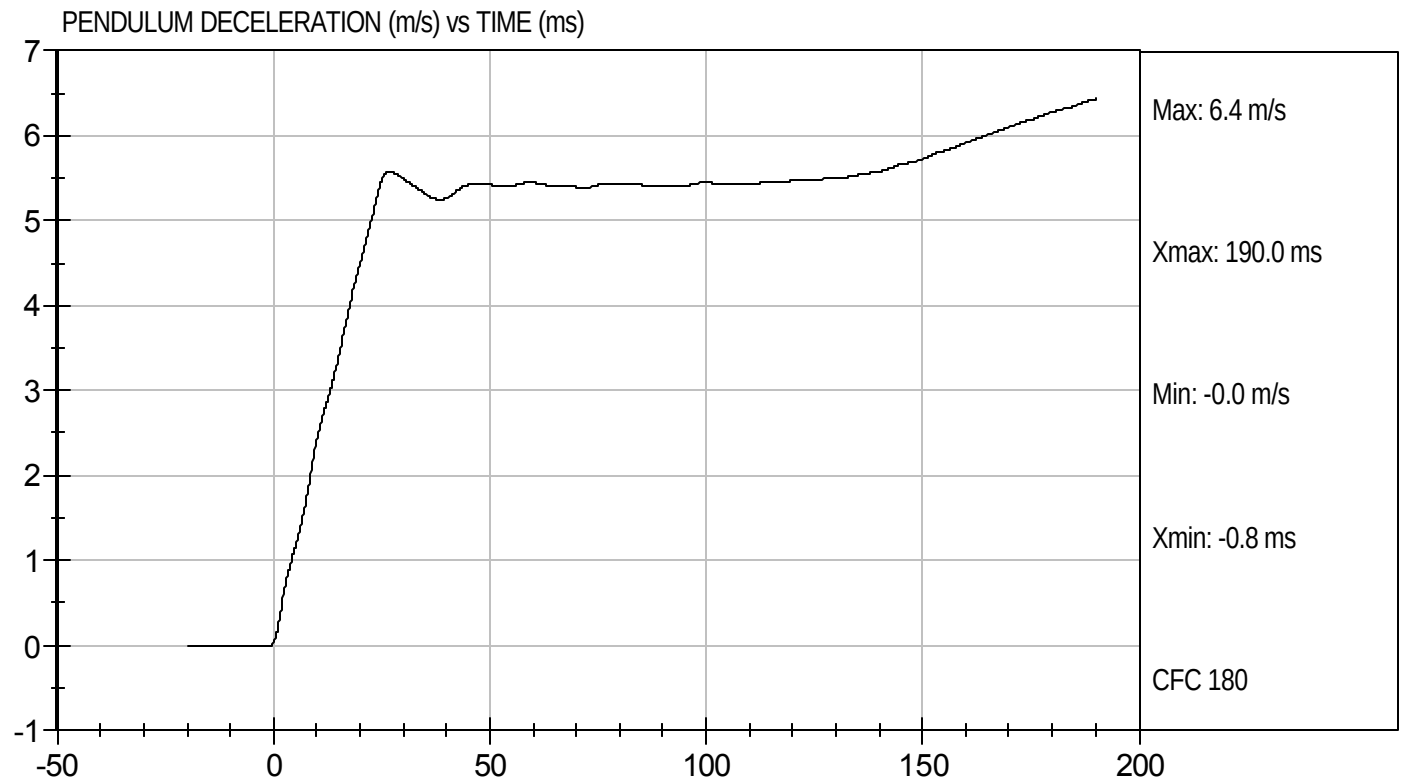
2/1/11
 Test Date


 Approved By



Test Desc: Neck Bending
Component ID: D11372

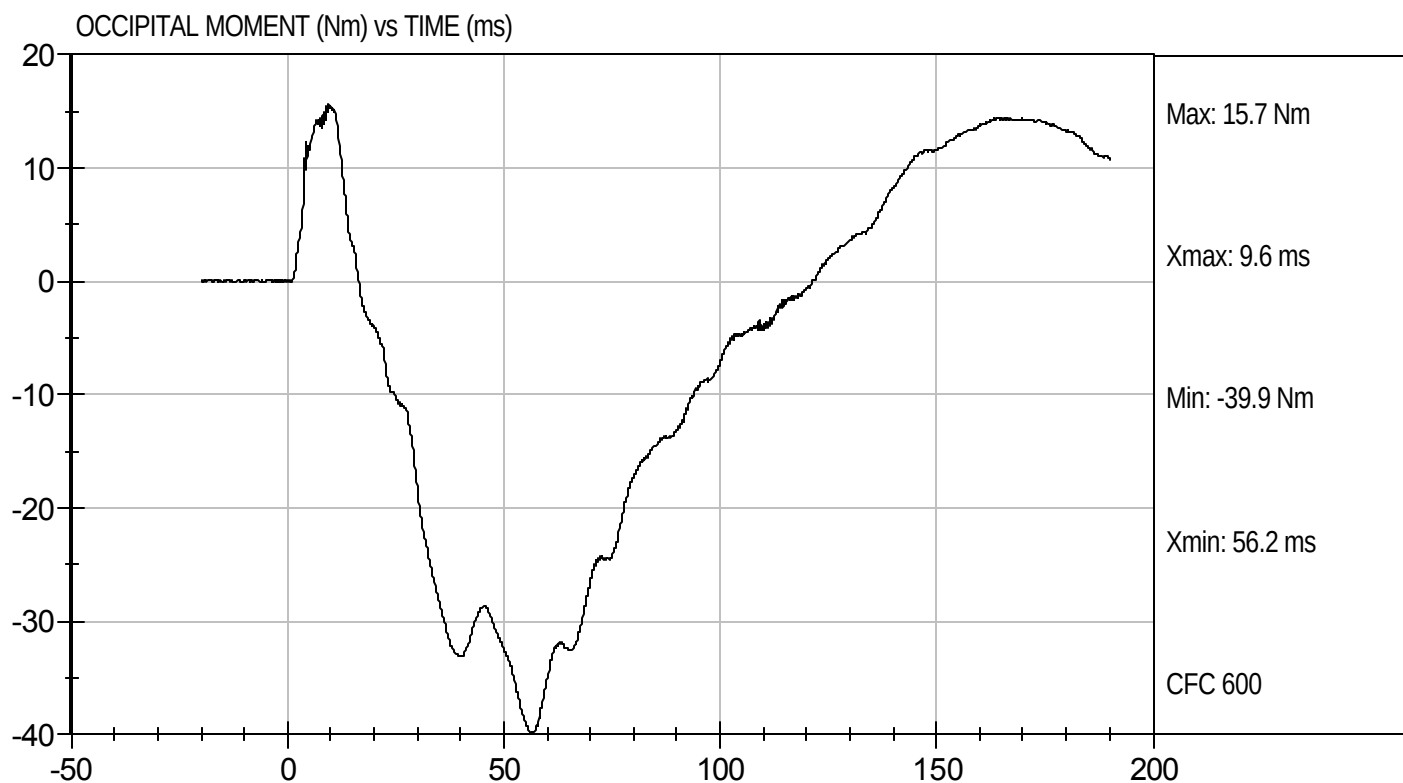
Test Date: 2/1/11
Velocity: 18.31 ft/s, 5.58 m/s





Test Desc: Neck Bending
Component ID: D11372

Test Date: 2/1/11
Velocity: 18.31 ft/s, 5.58 m/s



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

ATD Serial No: 296

Test ID: D11373

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	22.0	Pass
Laboratory Relative Humidity	%	10 to 70	12	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

Jessica Hall
Laboratory Technician

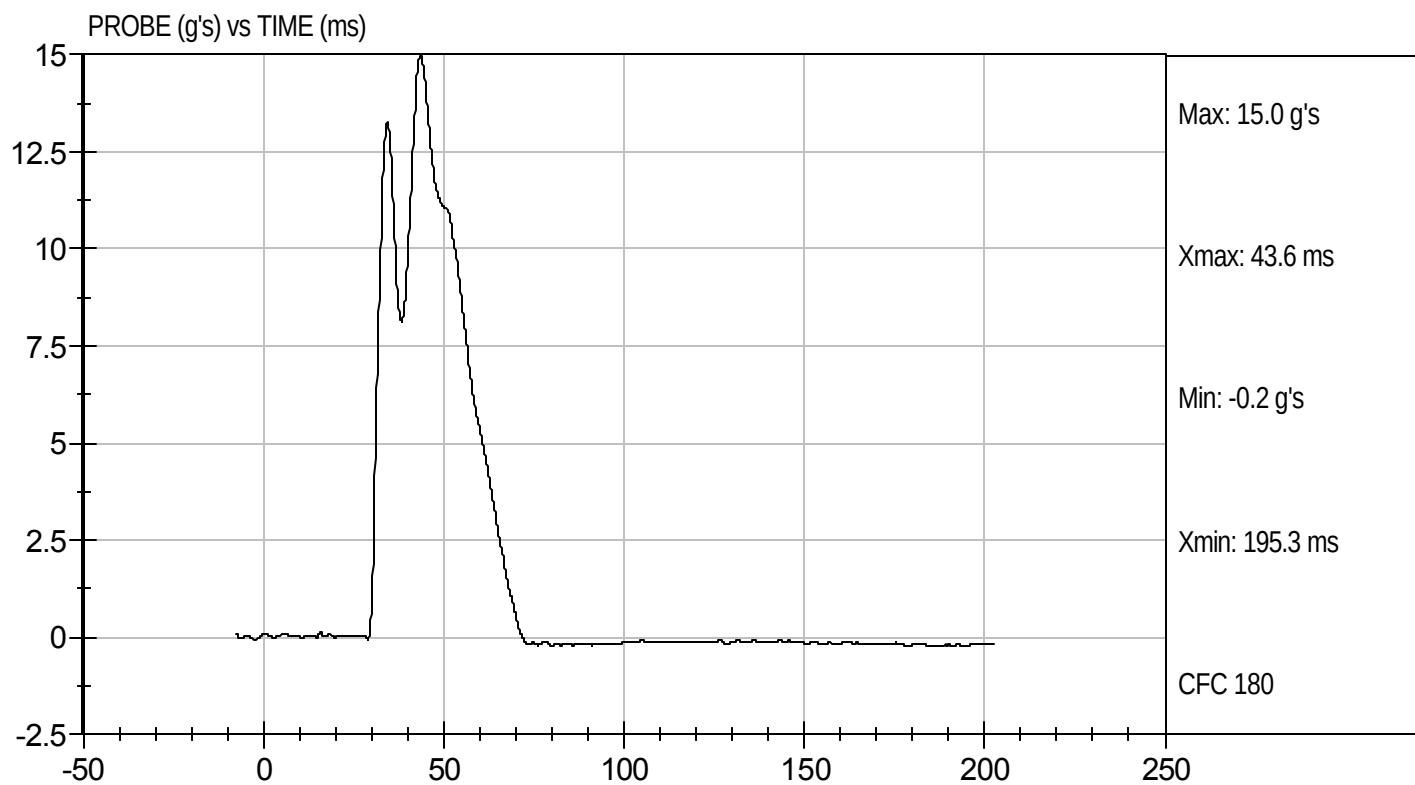
2/3/11
Test Date

David Winkelbauer
Approved By



Test Desc: Shoulder Impact
Component ID: D11373

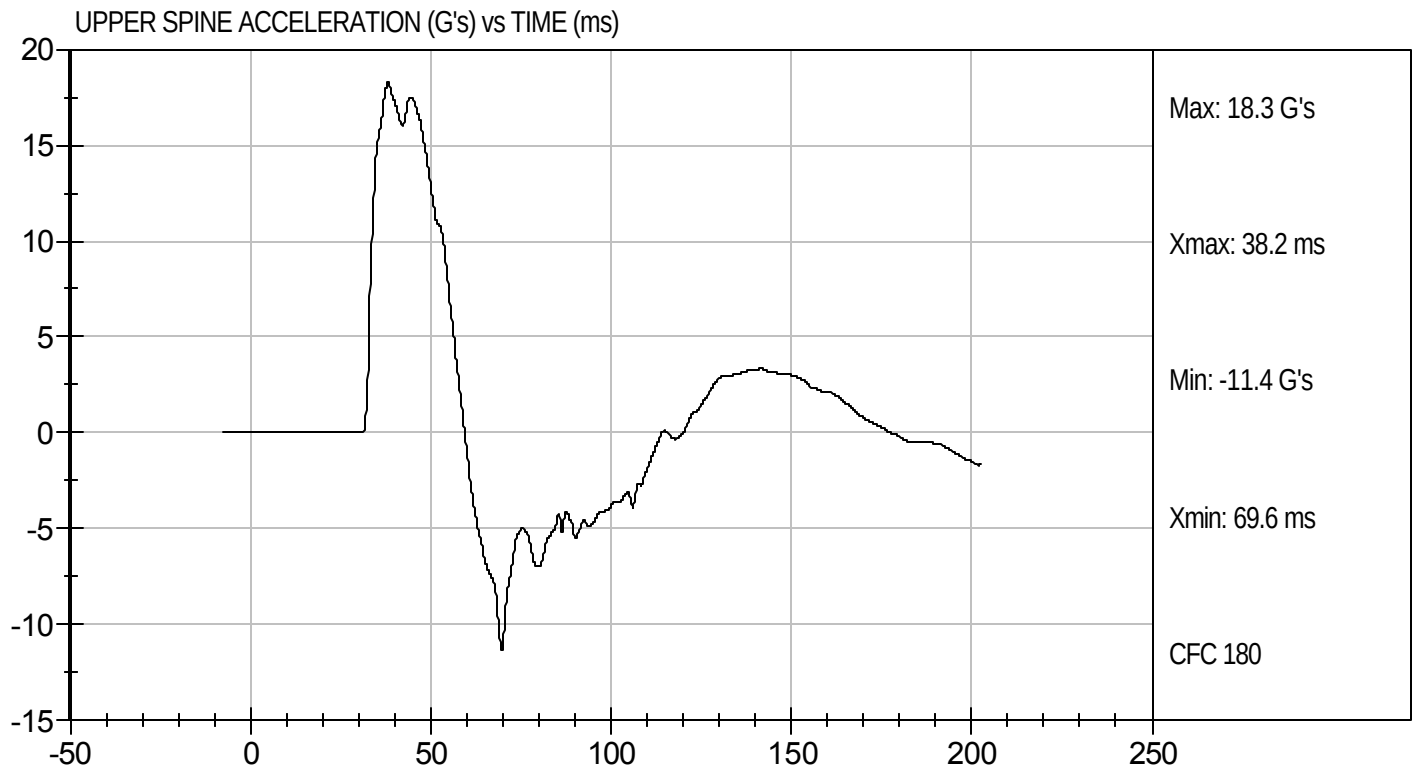
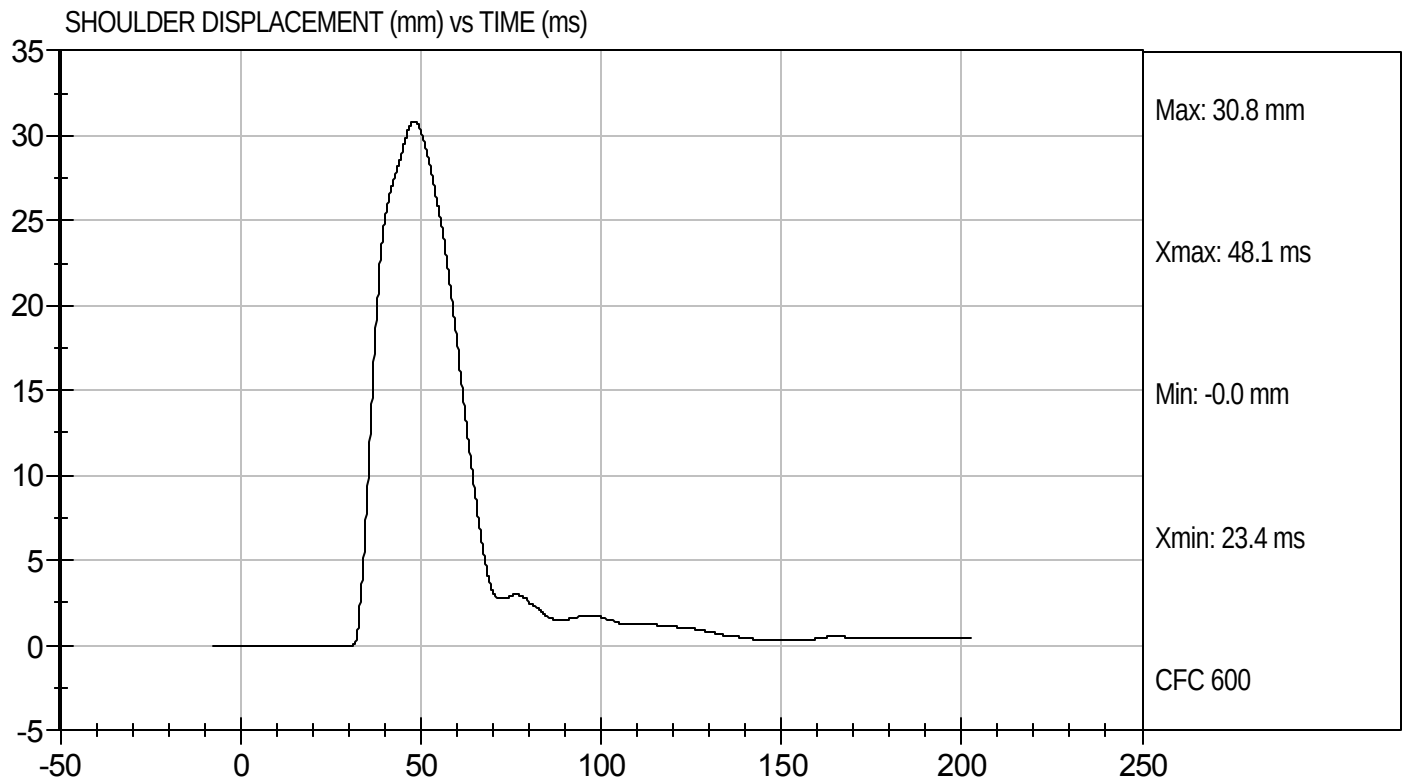
Test Date: 2/3/11
Velocity: 14.37 ft/s, 4.38 m/s





Test Desc: Shoulder Impact
Component ID: D11373

Test Date: 2/3/11
Velocity: 14.37 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: D11374

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.9	Pass
Humidity	%	10 to 70	12	Pass
Impact Velocity	m/s	6.60 to 6.80	6.77	Pass
Peak Impactor Acceleration	G's	30 to 36	32	Pass
Shoulder Displacement	mm	31 to 40	36	Pass
Upper Rib Displacement	mm	25 to 32	30	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	37	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	33	Pass
Overall Test Results				Pass


 Laboratory Technician

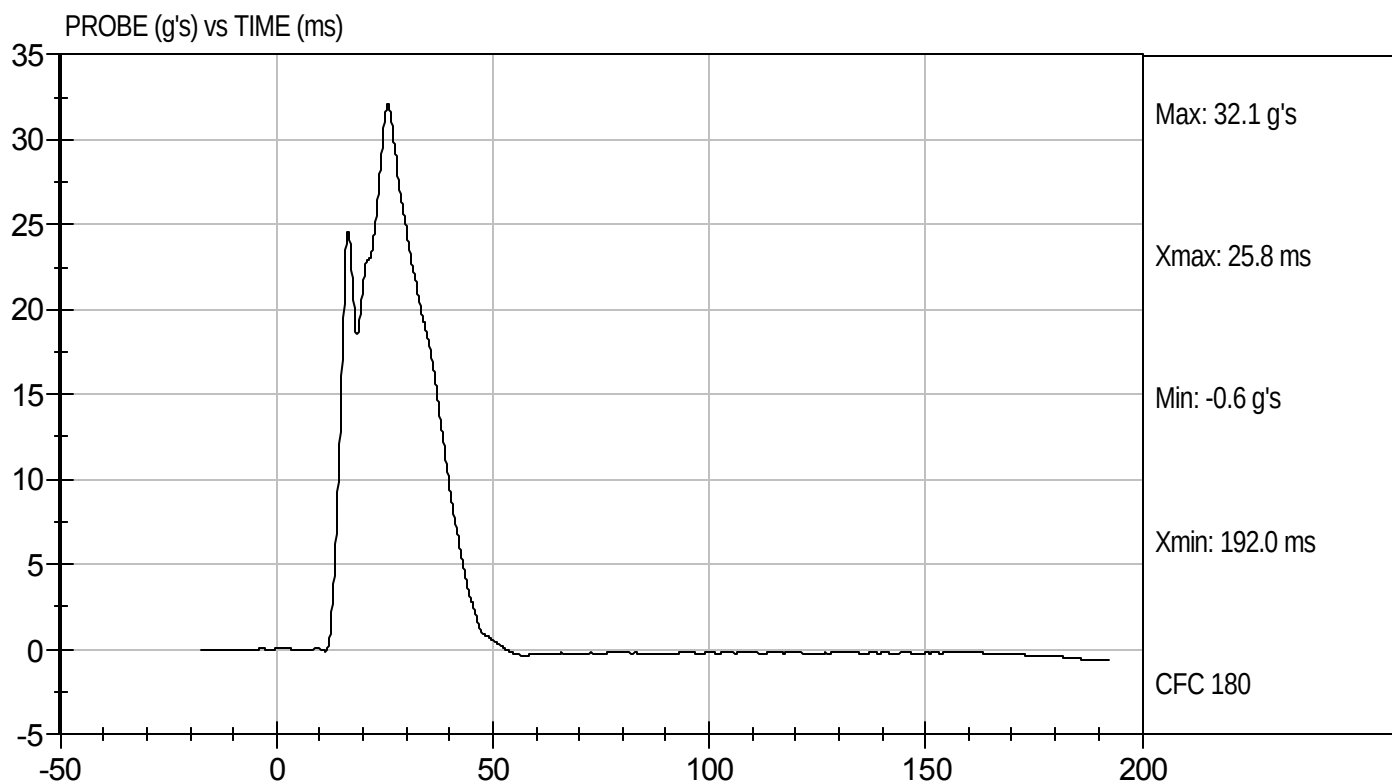
2/3/11
 Test Date


 Approved By



Test Desc: Thorax With Arm
Component ID: D11374

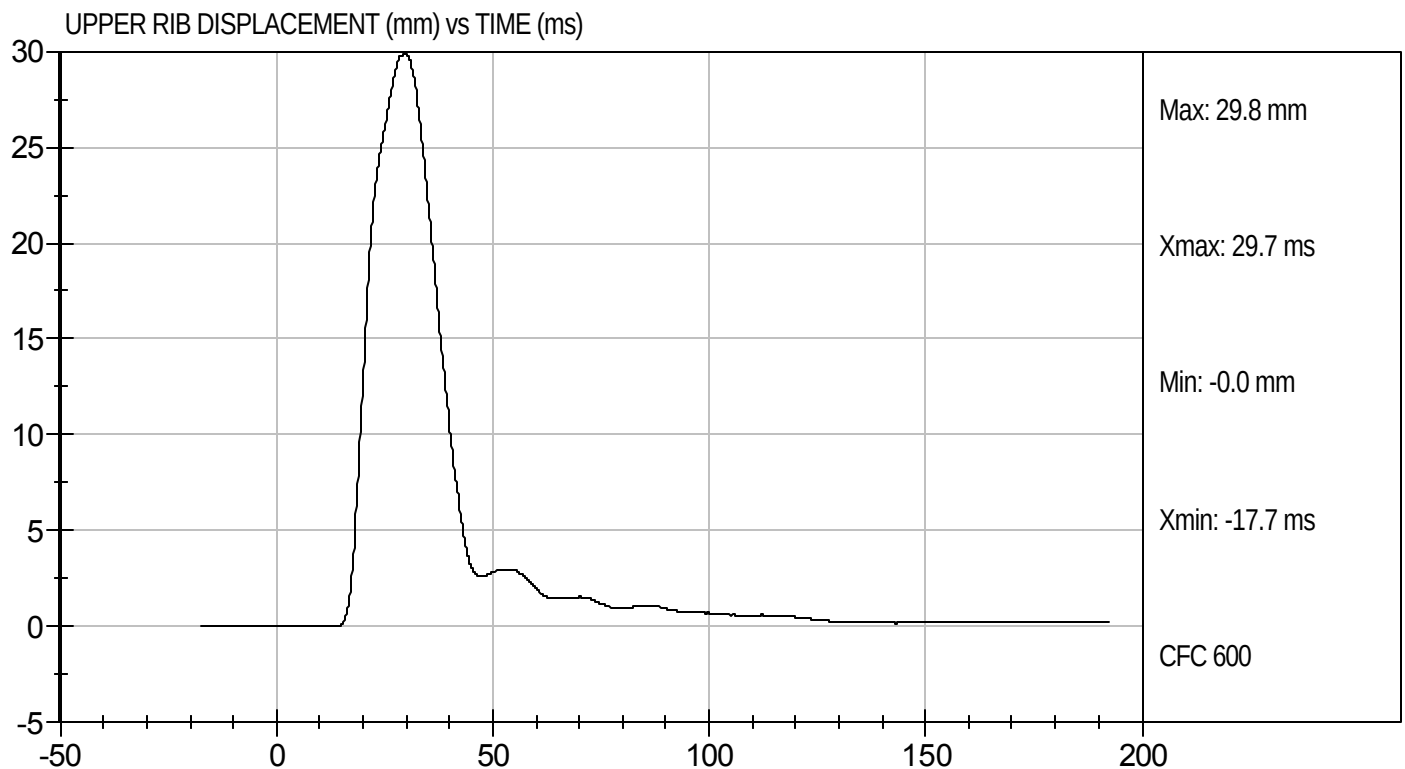
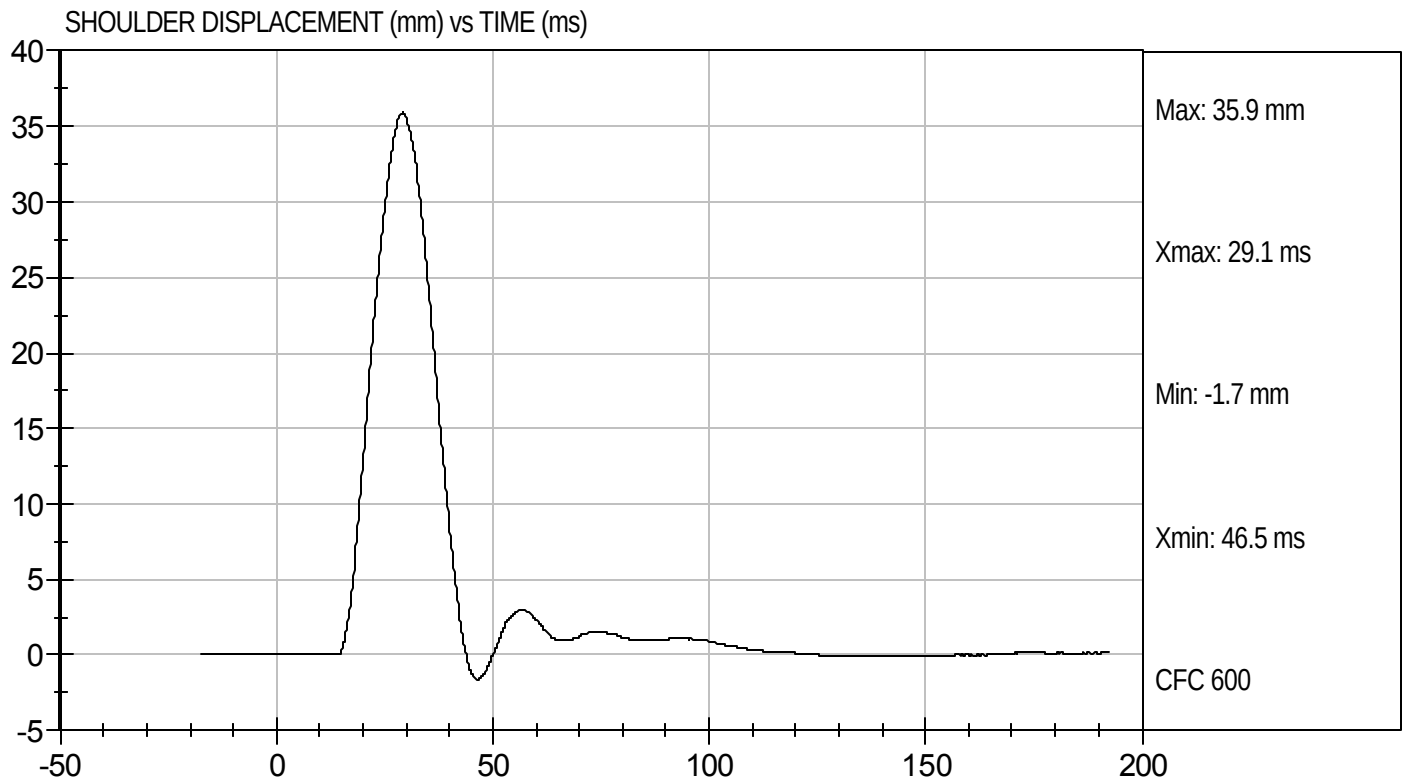
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Velocity: 22.2 ft/s, 6.77 m/s





Test Desc: Thorax With Arm
Component ID: D11374

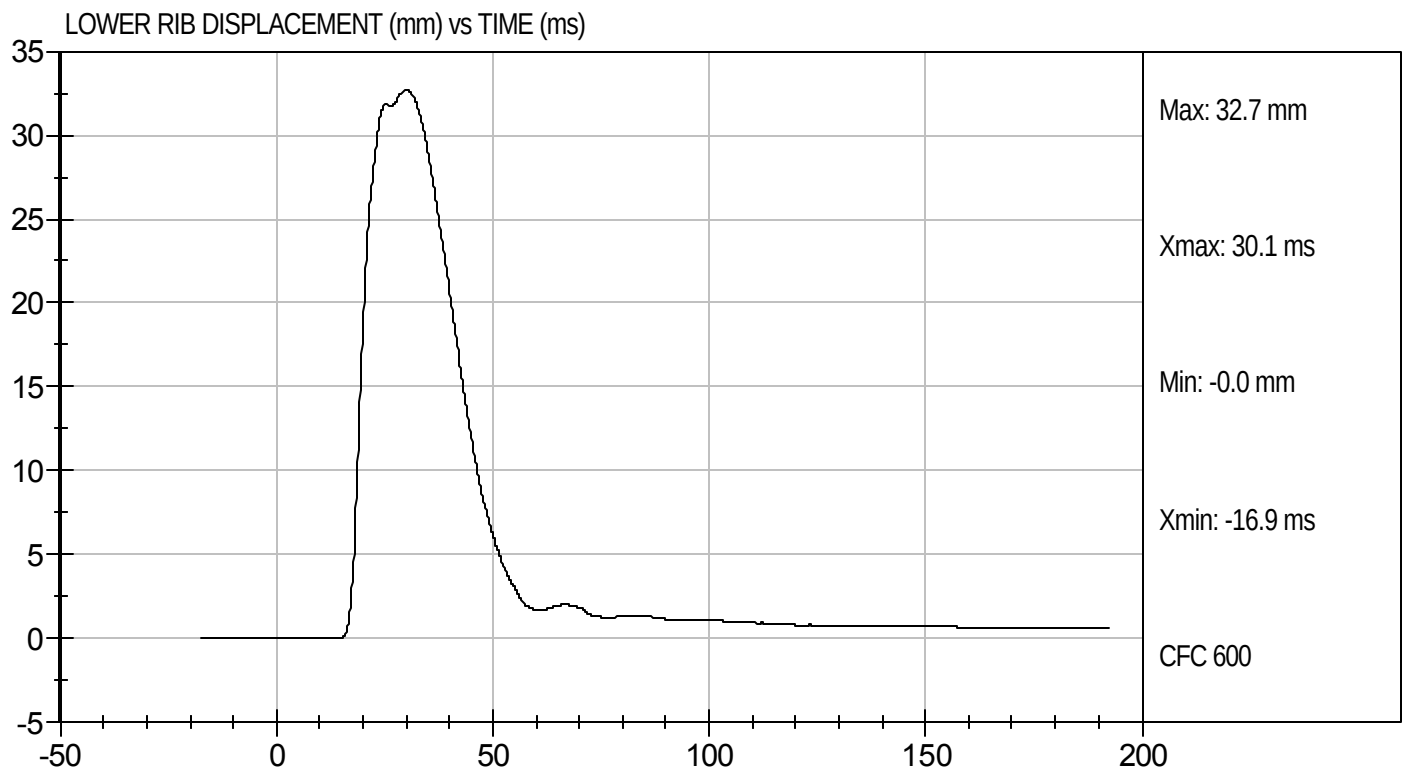
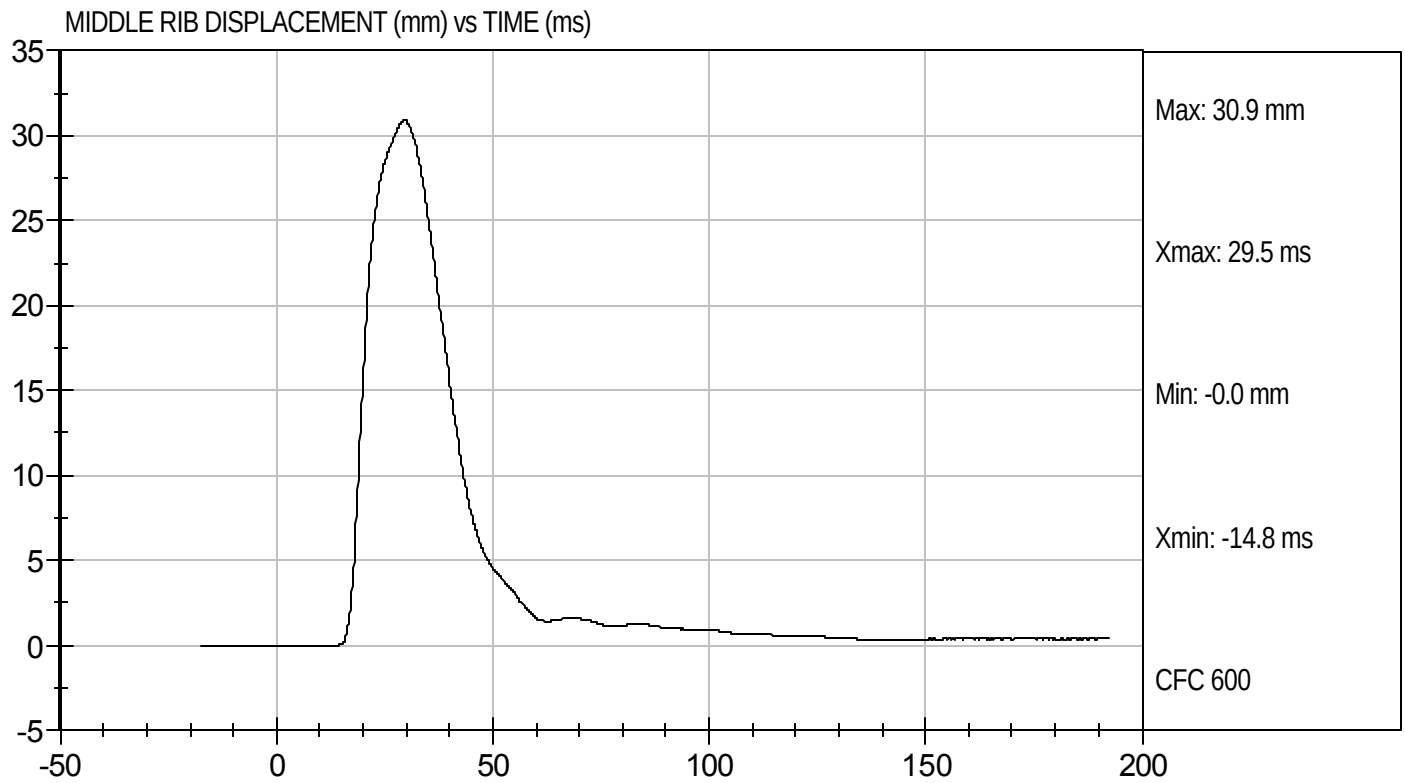
Test Date: 2/3/11
Velocity: 22.2 ft/s, 6.77 m/s





Test Desc: Thorax With Arm
Component ID: D11374

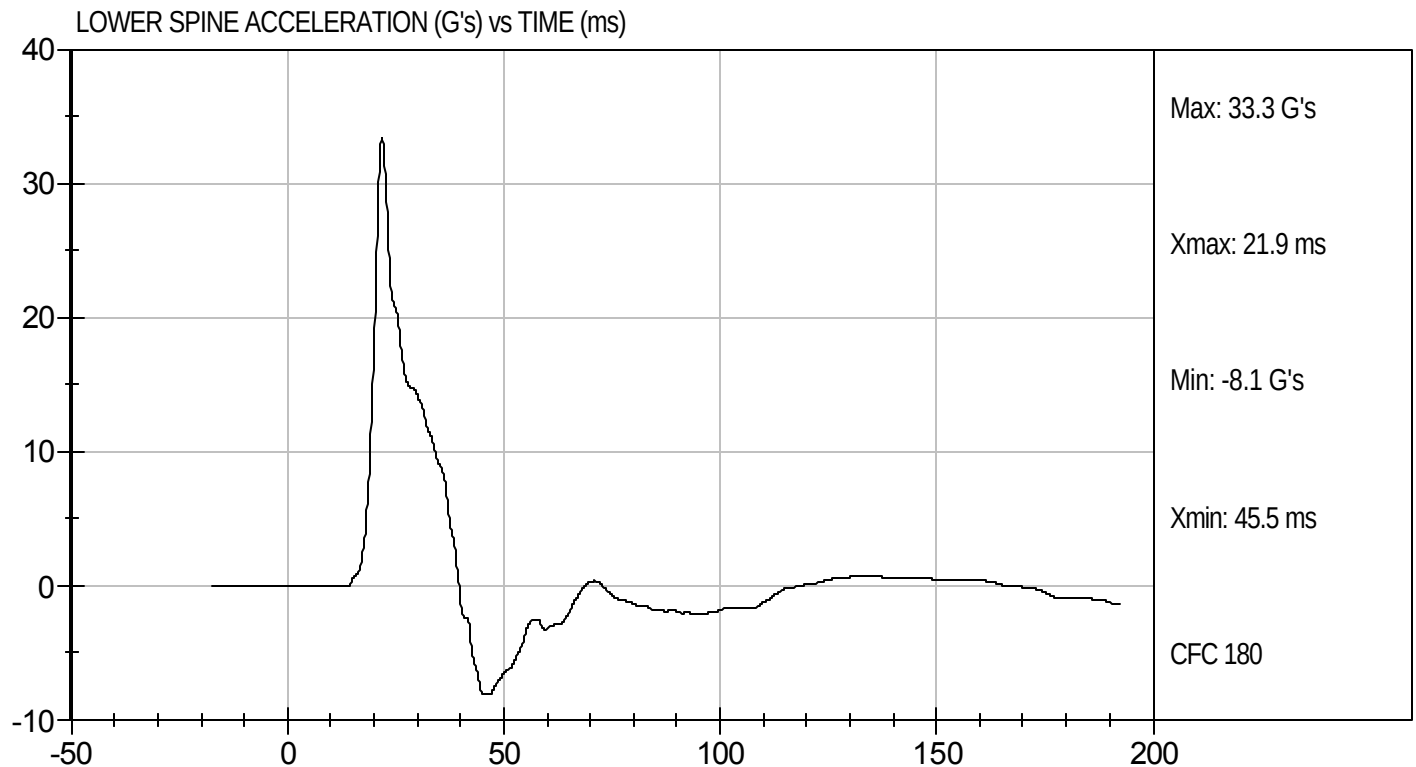
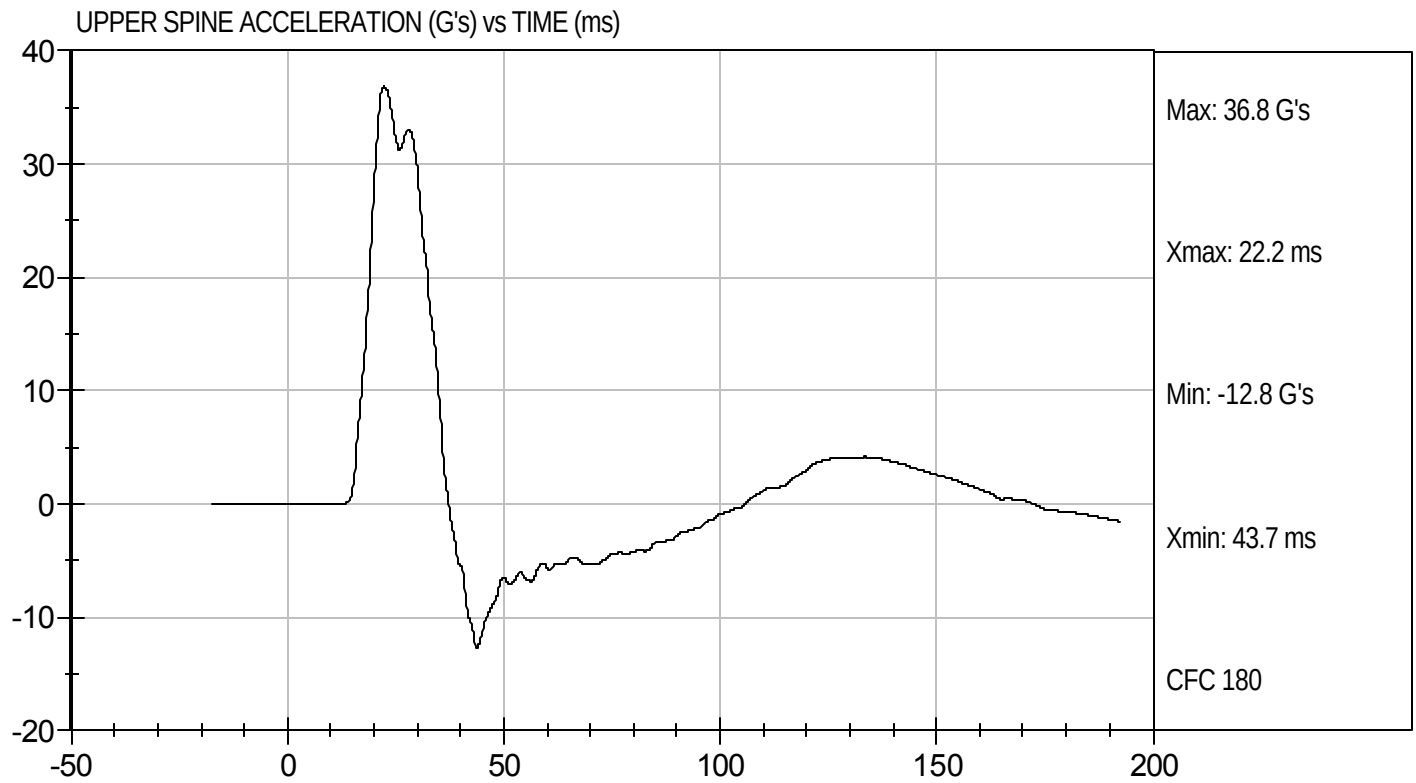
Test Date: 2/3/11
Velocity: 22.2 ft/s, 6.77 m/s





Test Desc: Thorax With Arm
Component ID: D11374

Test Date: 2/3/11
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: D11375

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.9	Pass
Humidity	%	10 to 70	12	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Peak Impactor Force	G's	14 to 18	15	Pass
Upper Rib Displacement	mm	32 to 40	38	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	13	Pass
Lower Spine (T12) Y Acceleration	G's	7 to 11	10	Pass
Overall Test Results			Pass	


Laboratory Technician

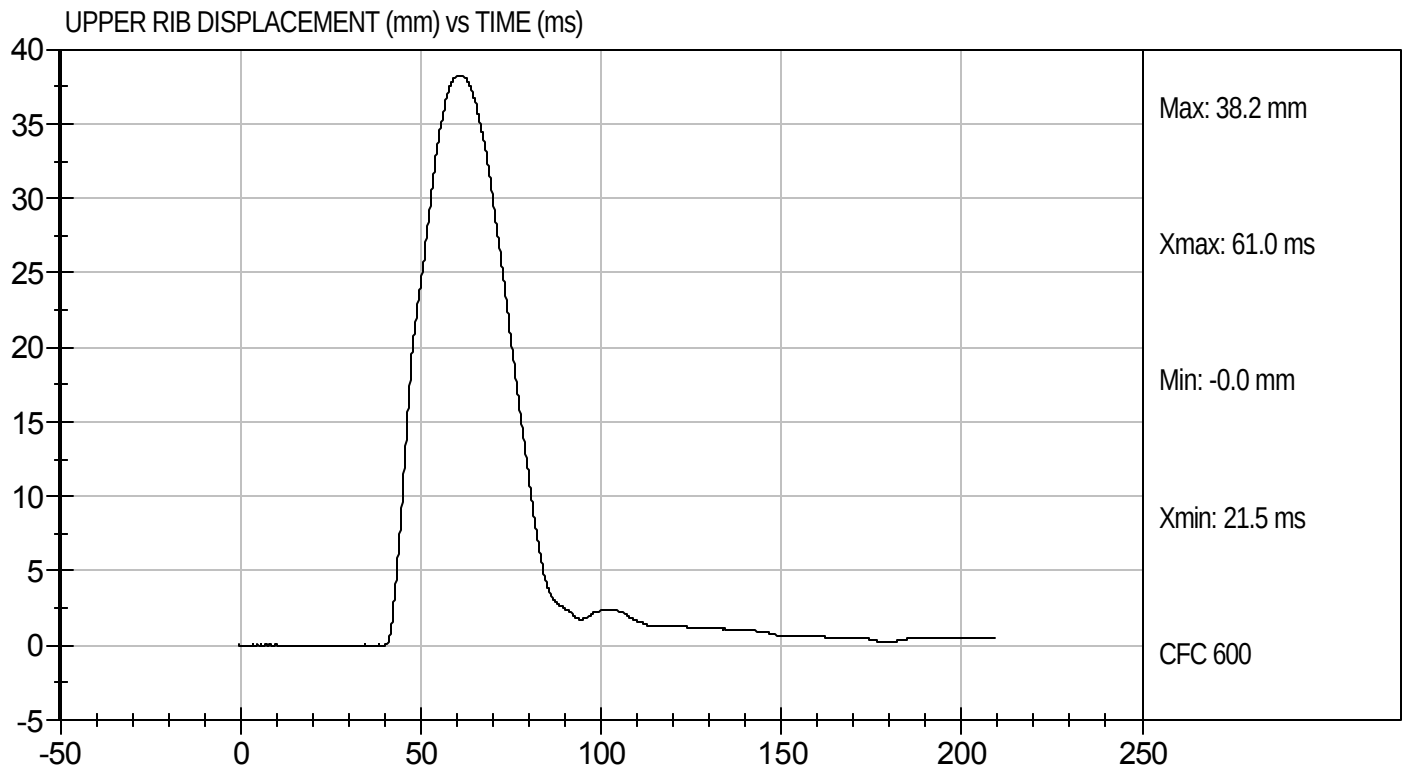
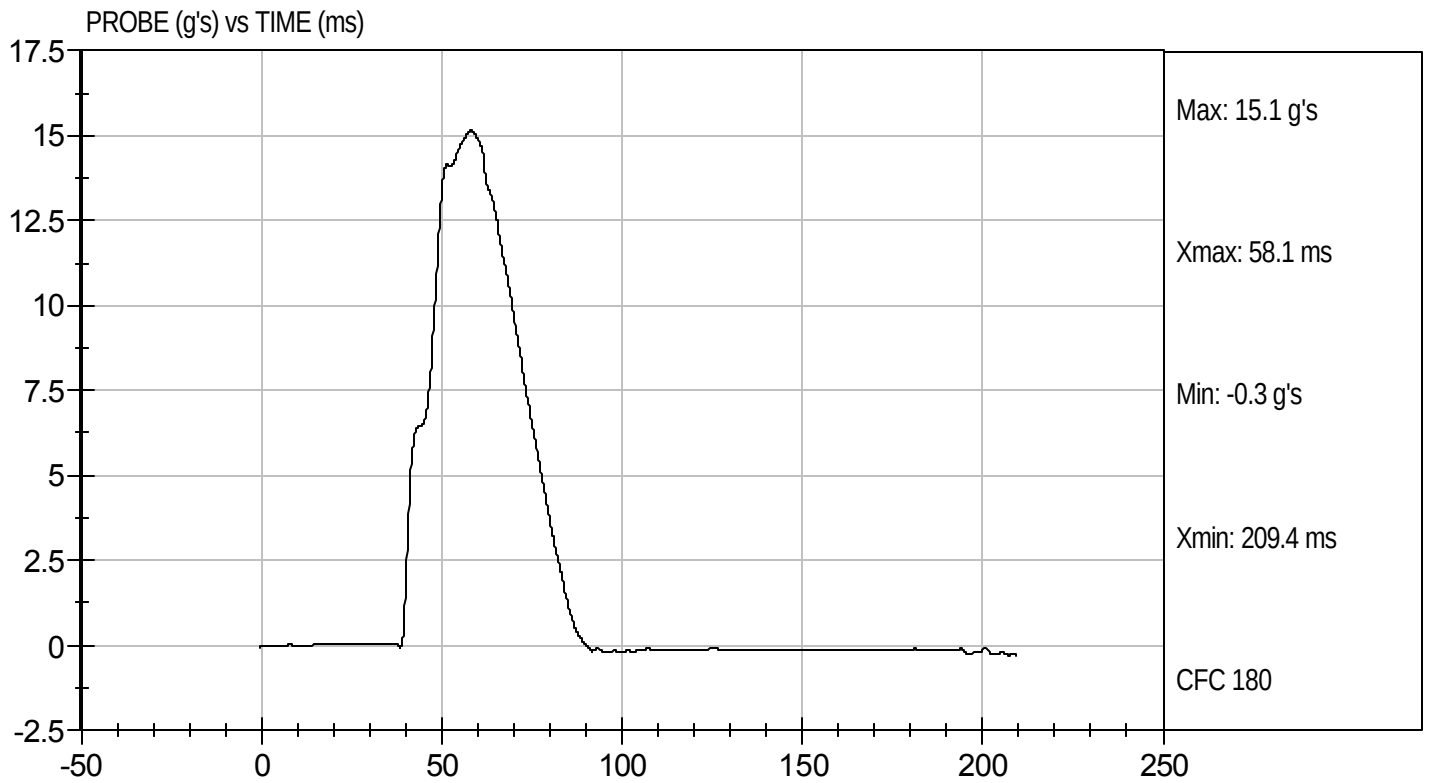
2/3/11
Test Date


Approved By



Test Desc: Thorax Without Arm
Component ID: D11375

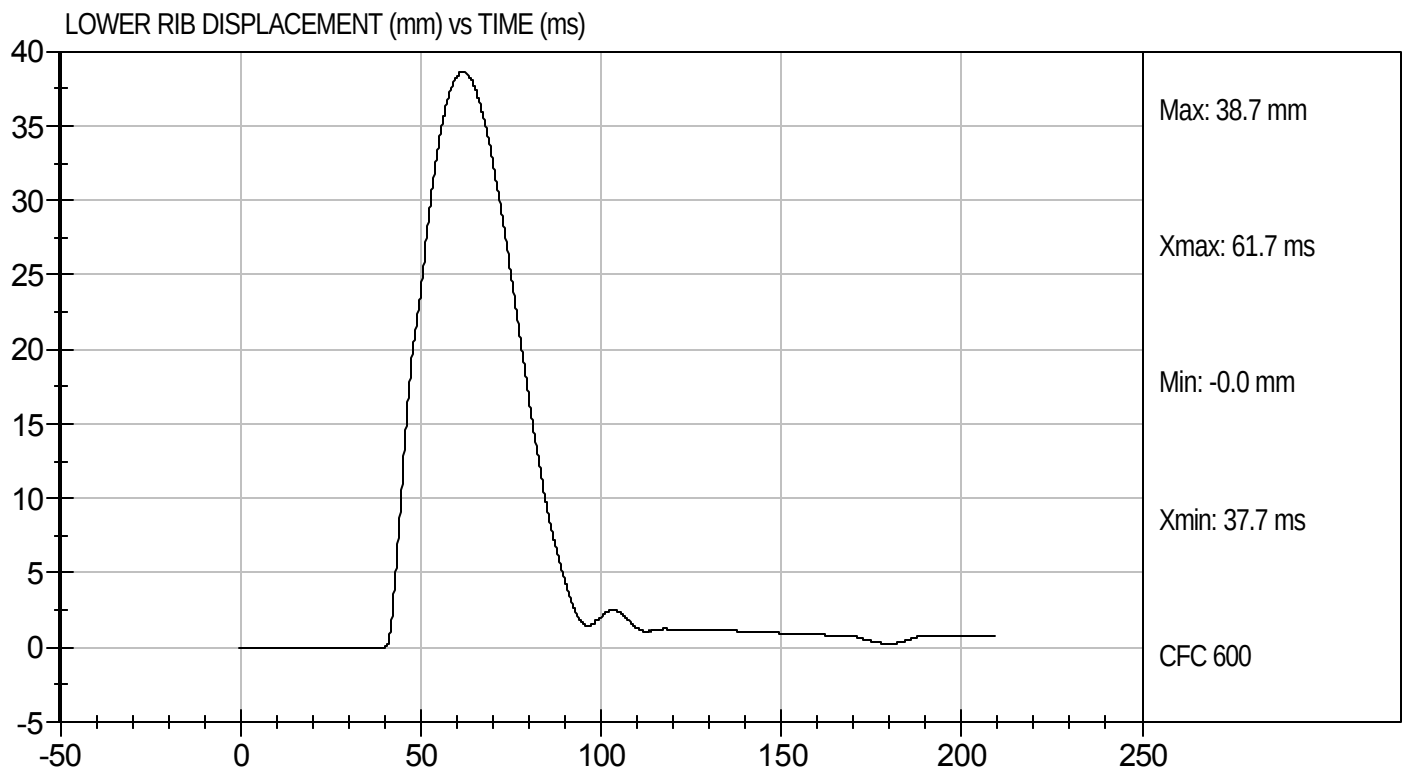
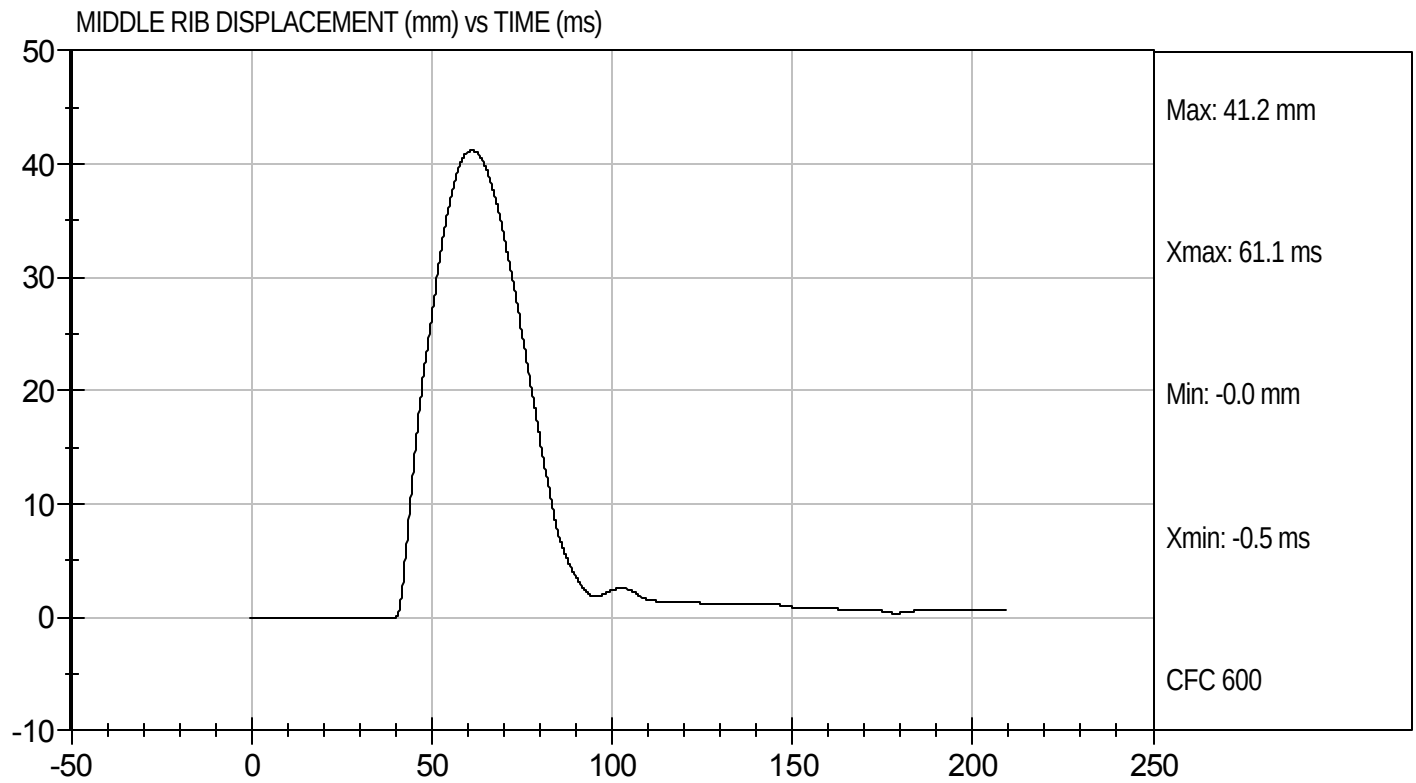
Test Date: 2/3/11
Velocity: 14.37 ft/s, 4.38 m/s





Test Desc: Thorax Without Arm
Component ID: D11375

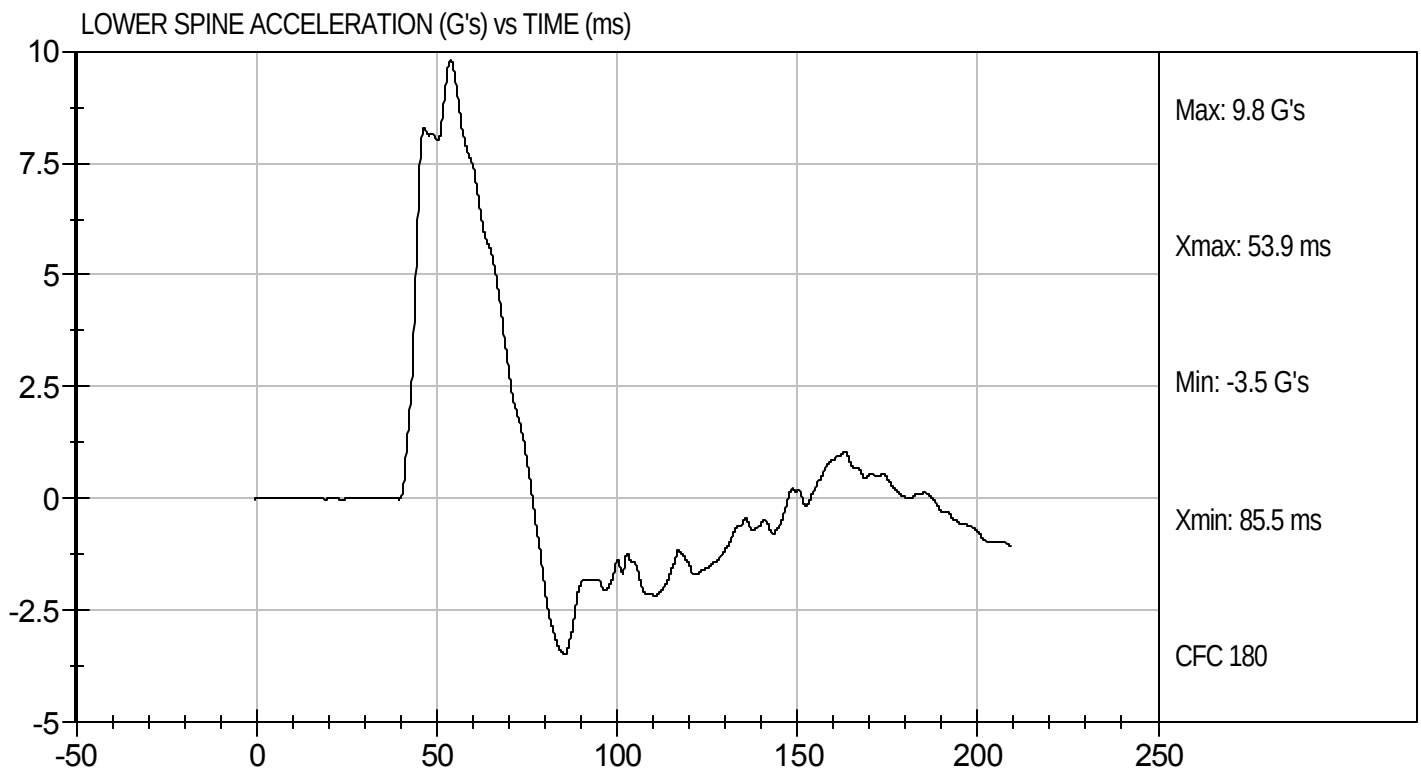
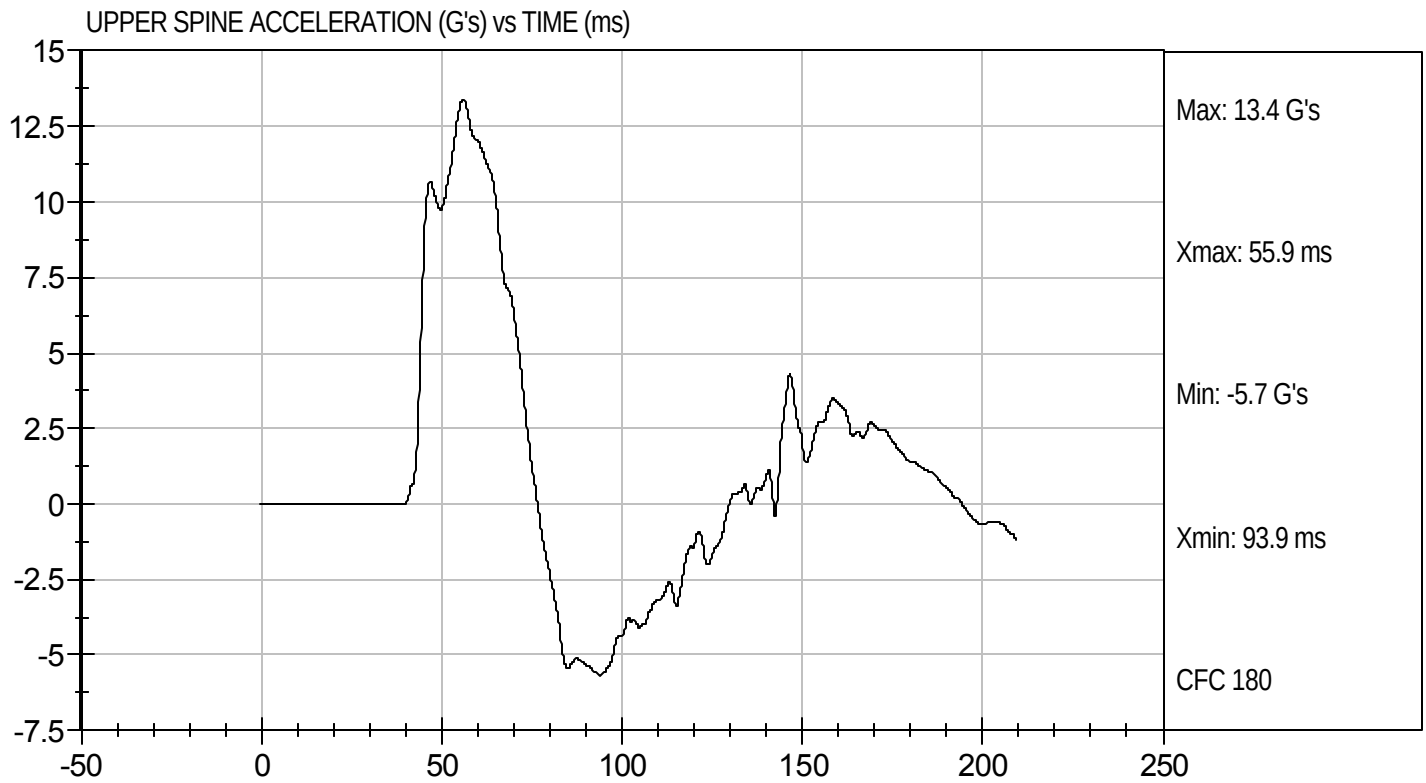
Test Date: 2/3/11
Velocity: 14.37 ft/s, 4.38 m/s





Test Desc: Thorax Without Arm
Component ID: D11375

Test Date: 2/3/11
Velocity: 14.37 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: D11376

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.9	Pass
Humidity	%	10 to 70	12	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	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

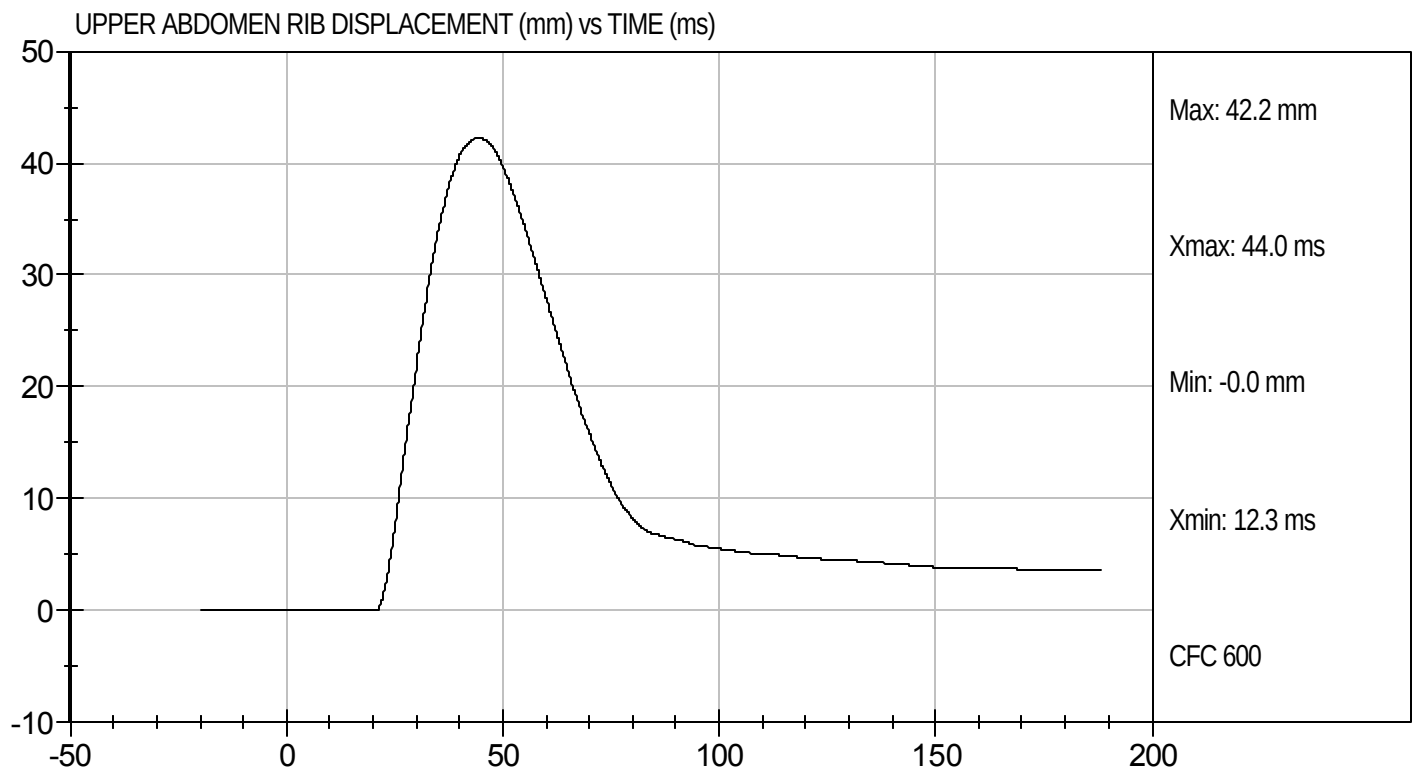
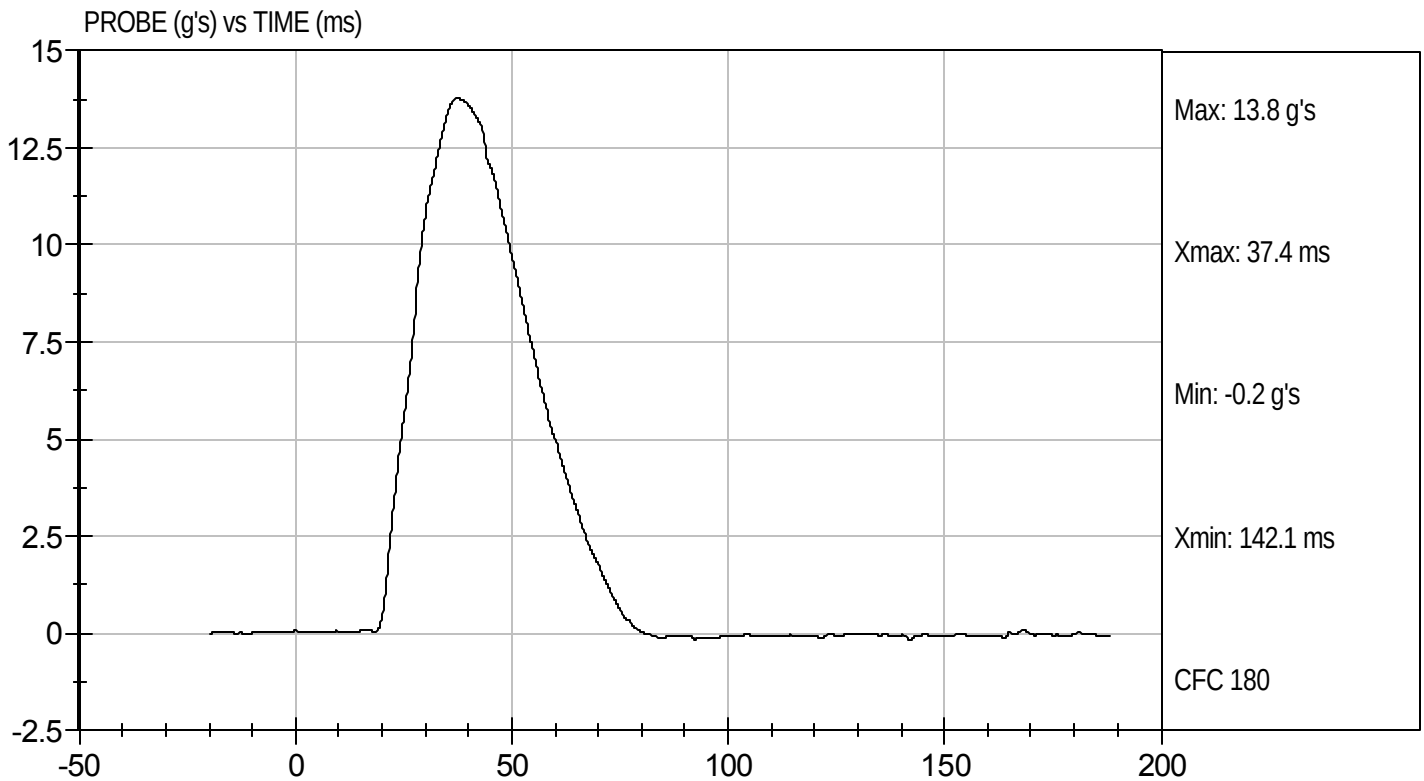
2/3/11
Test Date


Approved By



Test Desc: Abdomen Impact
Component ID: D11376

Test Date: 2/3/11
Velocity: 14.36 ft/s, 4.38 m/s

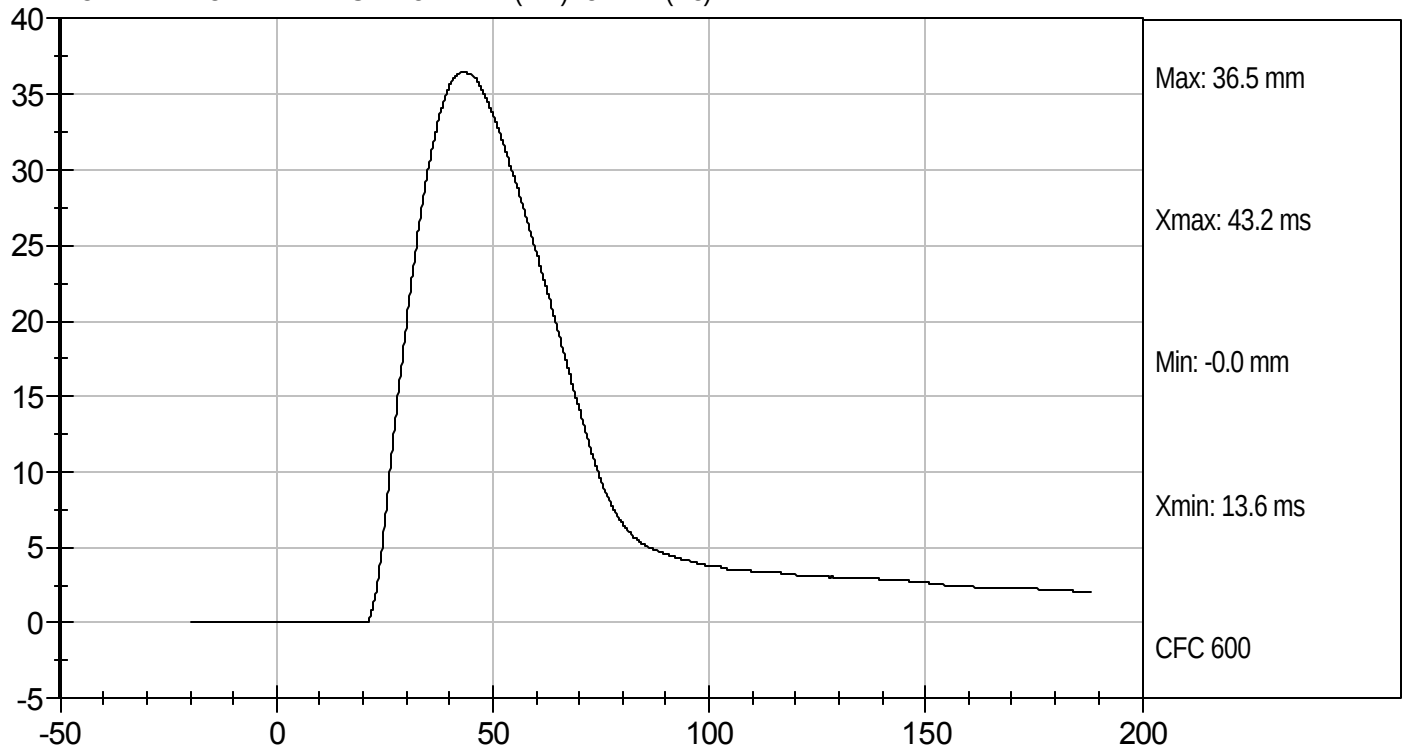




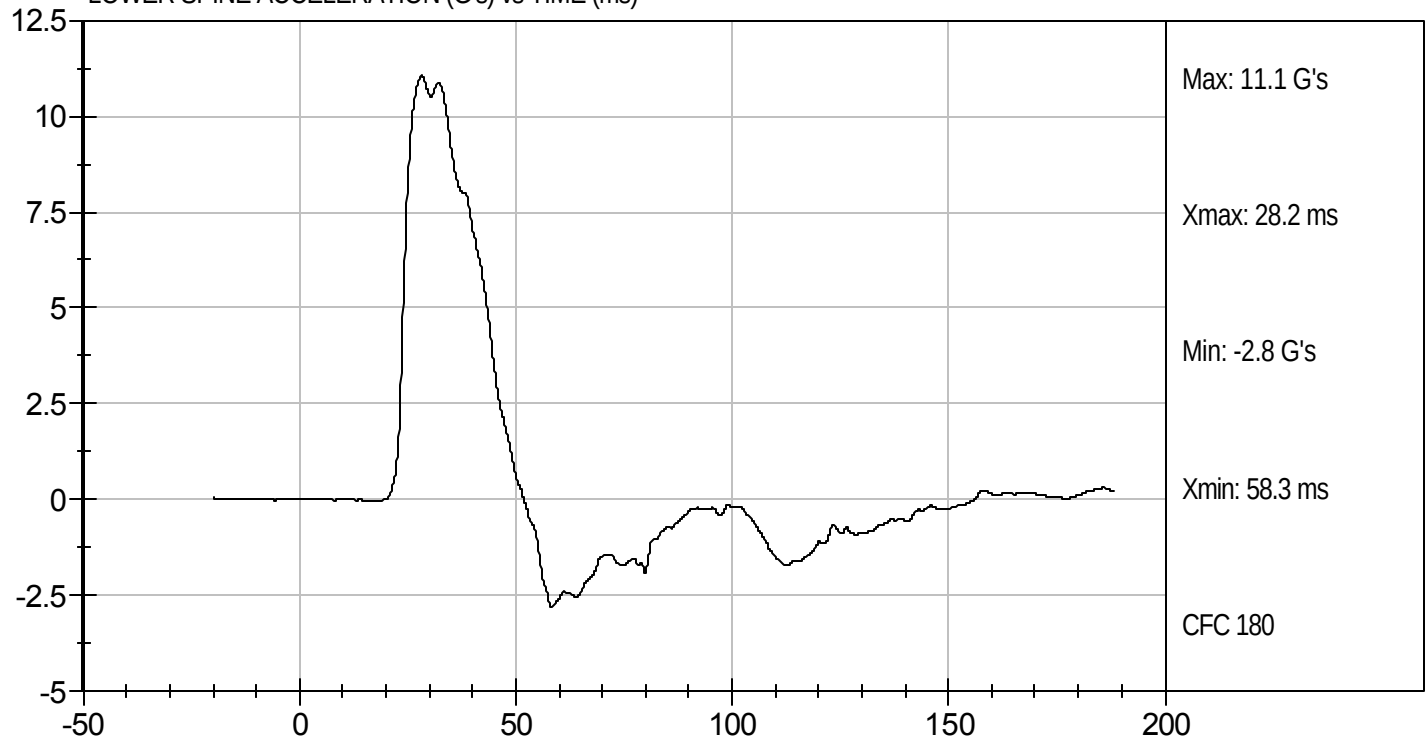
Test Desc: Abdomen Impact
Component ID: D11376

Test Date: 2/3/11
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: D11377

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.9	Pass
Humidity	%	10 to 70	12	Pass
Impact Velocity	m/s	6.60 to 6.80	6.77	Pass
Peak Impactor Acceleration	G's	38 to 47	44	Pass
Pelvis Y Acceleration after 6 ms	G's	34 to 42	41	Pass
Peak Acetabulum Force	N	3600 to 4300	4189	Pass
Overall Test Results				Pass


Laboratory Technician

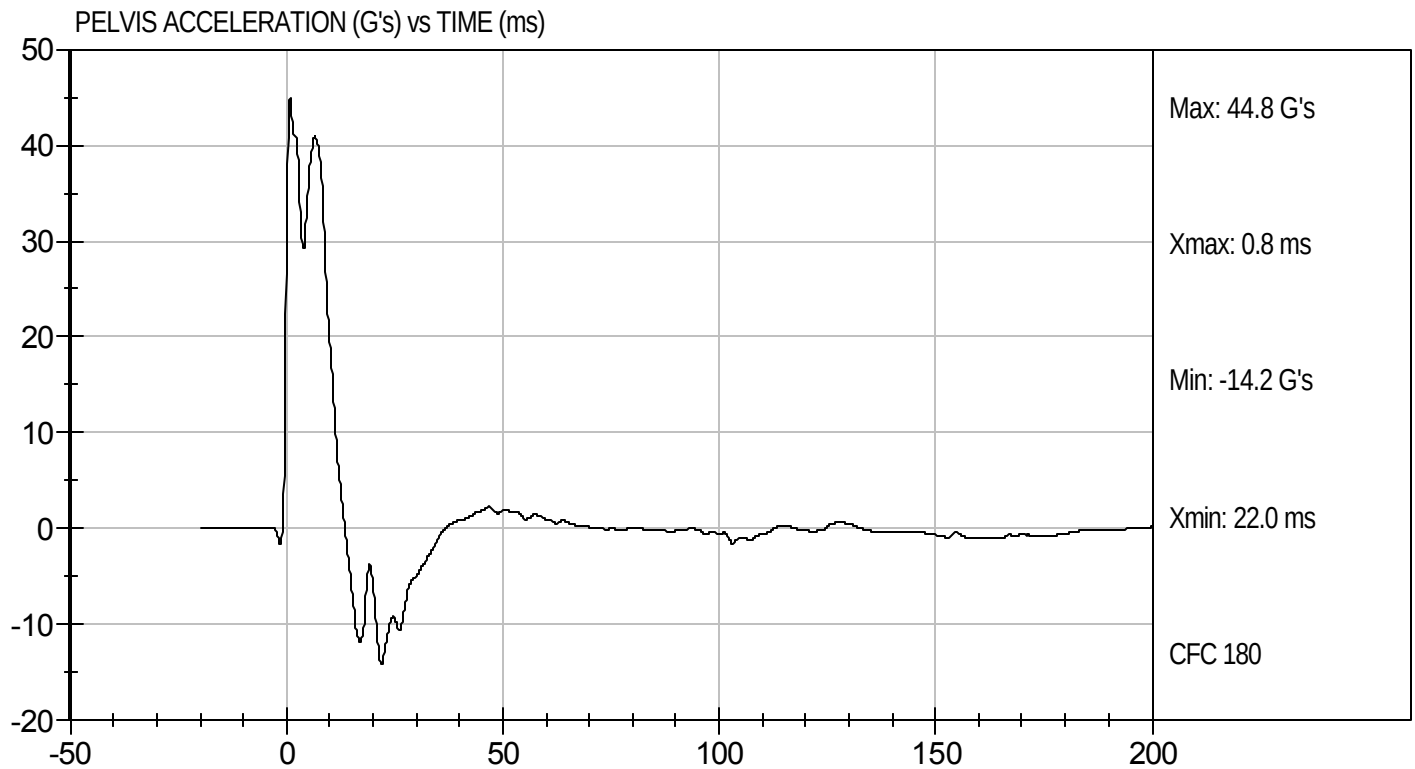
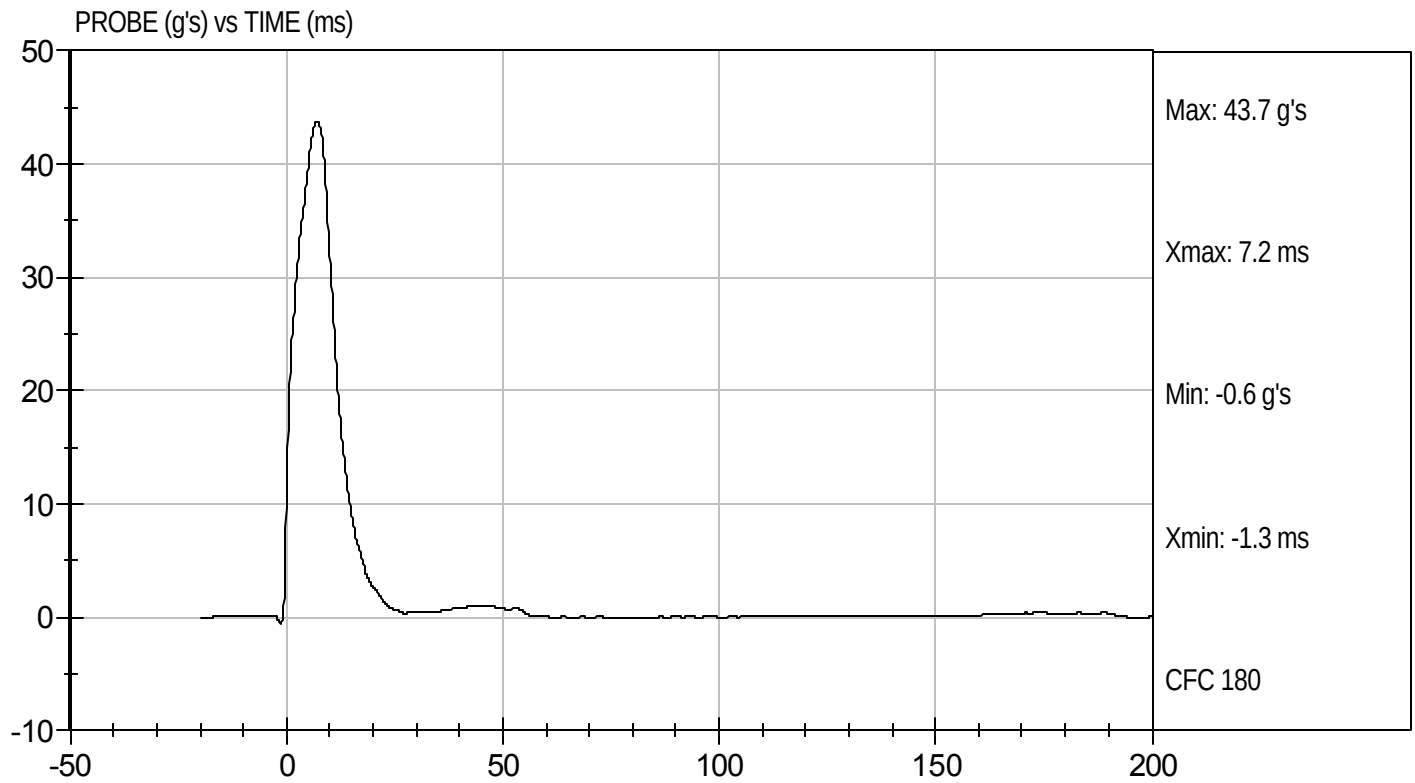
2/3/11
Test Date


Approved By



Test Desc: Pelvis Impact
Component ID: D11377

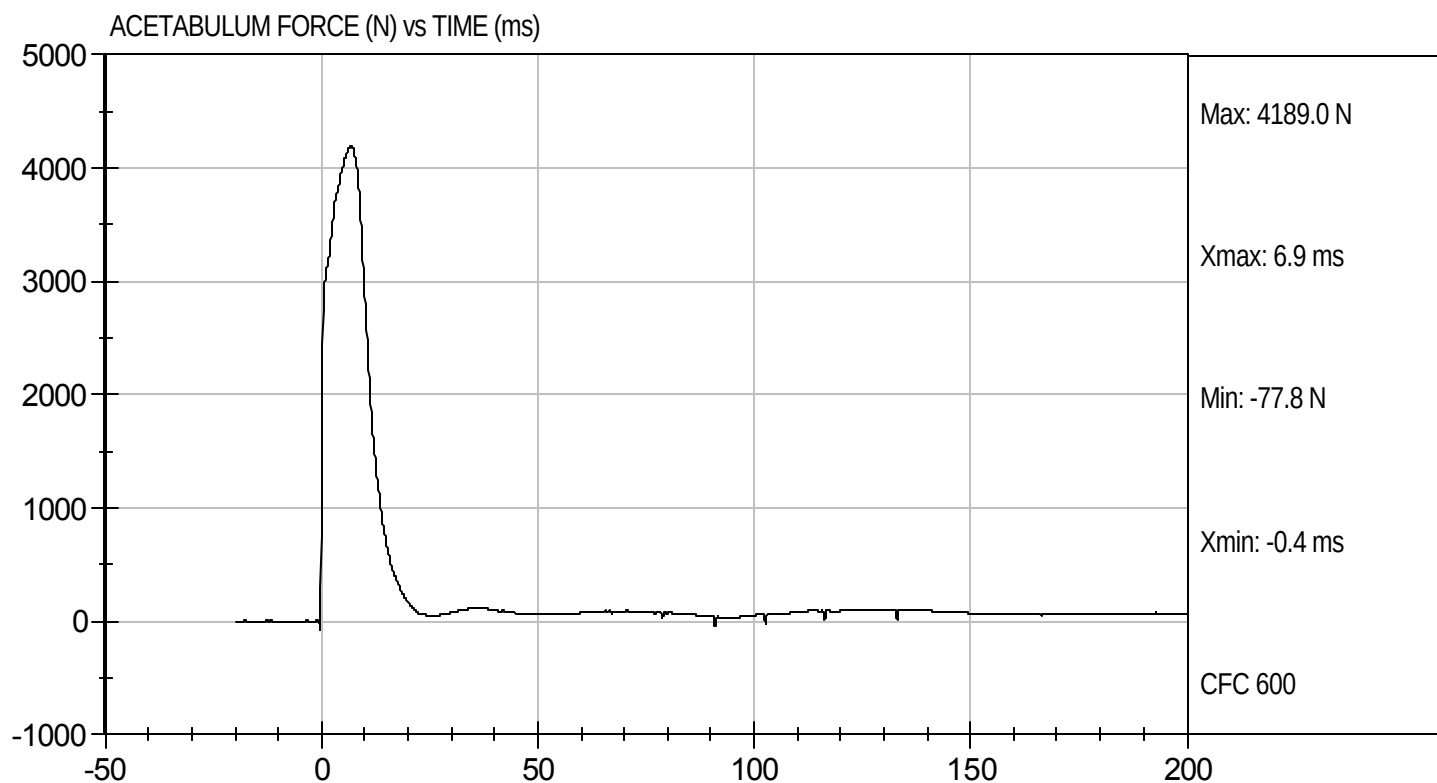
Test Date: 2/3/11
Velocity: 22.2 ft/s, 6.77 m/s





Test Desc: Pelvis Impact
Component ID: D11377

Test Date: 2/3/11
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: D11378

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.9	Pass
Humidity	%	10 to 70	12	Pass
Impact Velocity	m/s	4.20 to 4.40	4.23	Pass
Peak Impactor Acceleration	G's	36 to 45	36	Pass
Pelvis Y Acceleration	G's	28 to 39	30	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4331	Pass
Overall Test Results			Pass	


Laboratory Technician

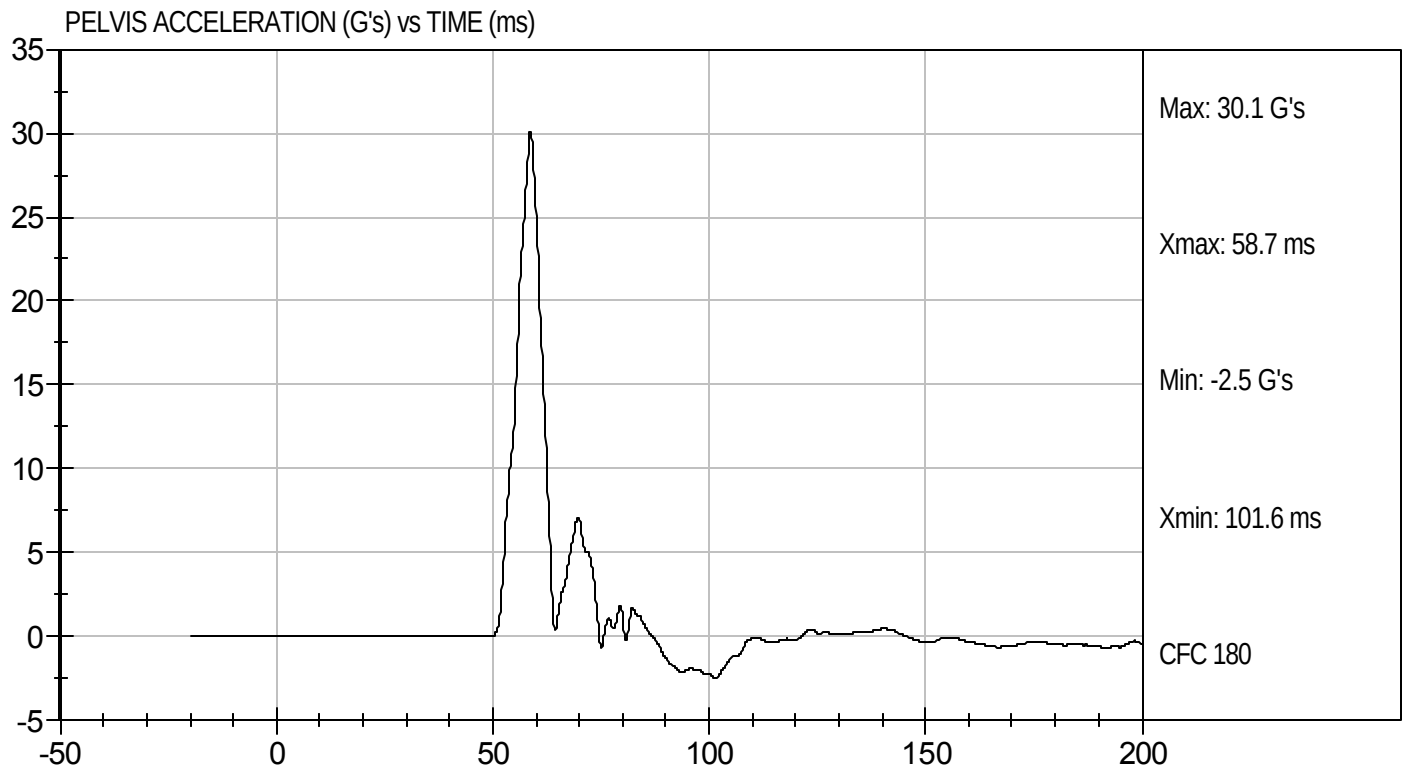
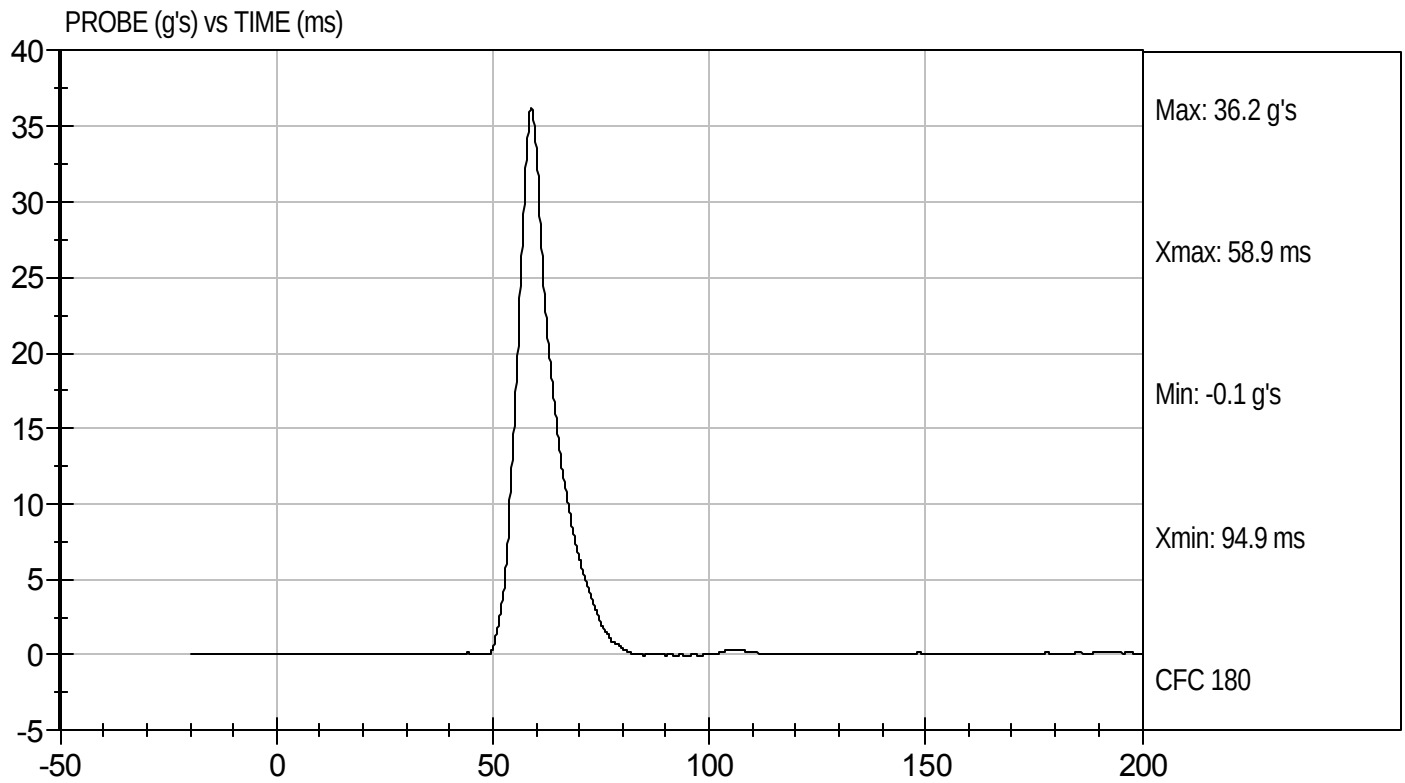
2/3/11
Test Date


Approved By



Test Desc: Iliac Impact
Component ID: D11378

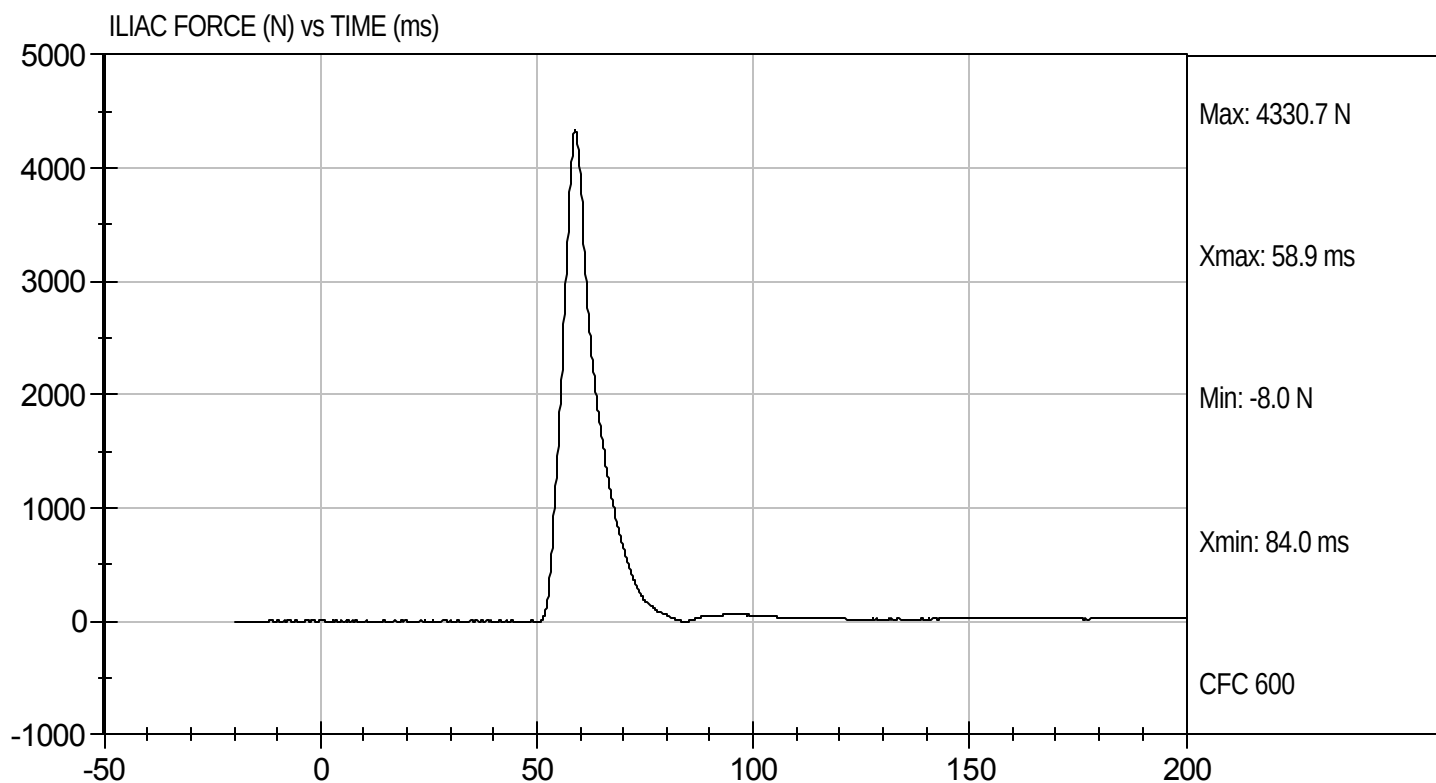
Test Date: 2/3/11
Velocity: 13.88 ft/s, 4.23 m/s





Test Desc: Iliac Impact
Component ID: D11378

Test Date: 2/3/11
Velocity: 13.88 ft/s, 4.23 m/s



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

ATD Serial No: 296

Test ID: D11411

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	17	Pass
Peak Resultant Acceleration	G's	115 to 137	126	Pass
Peak Lateral Acceleration	G's	+/- 15	2.5	Pass
Unimodal	N/A	<15%	Yes	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

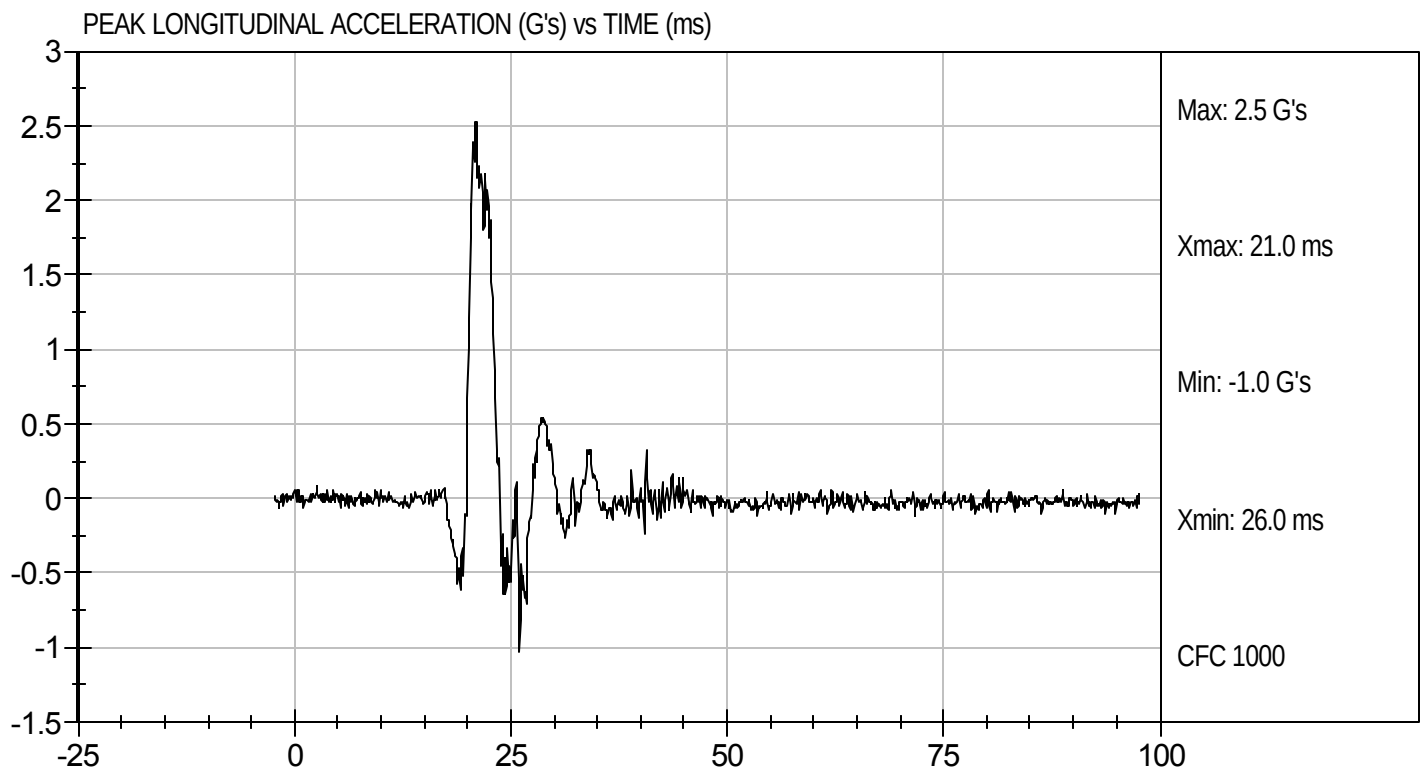
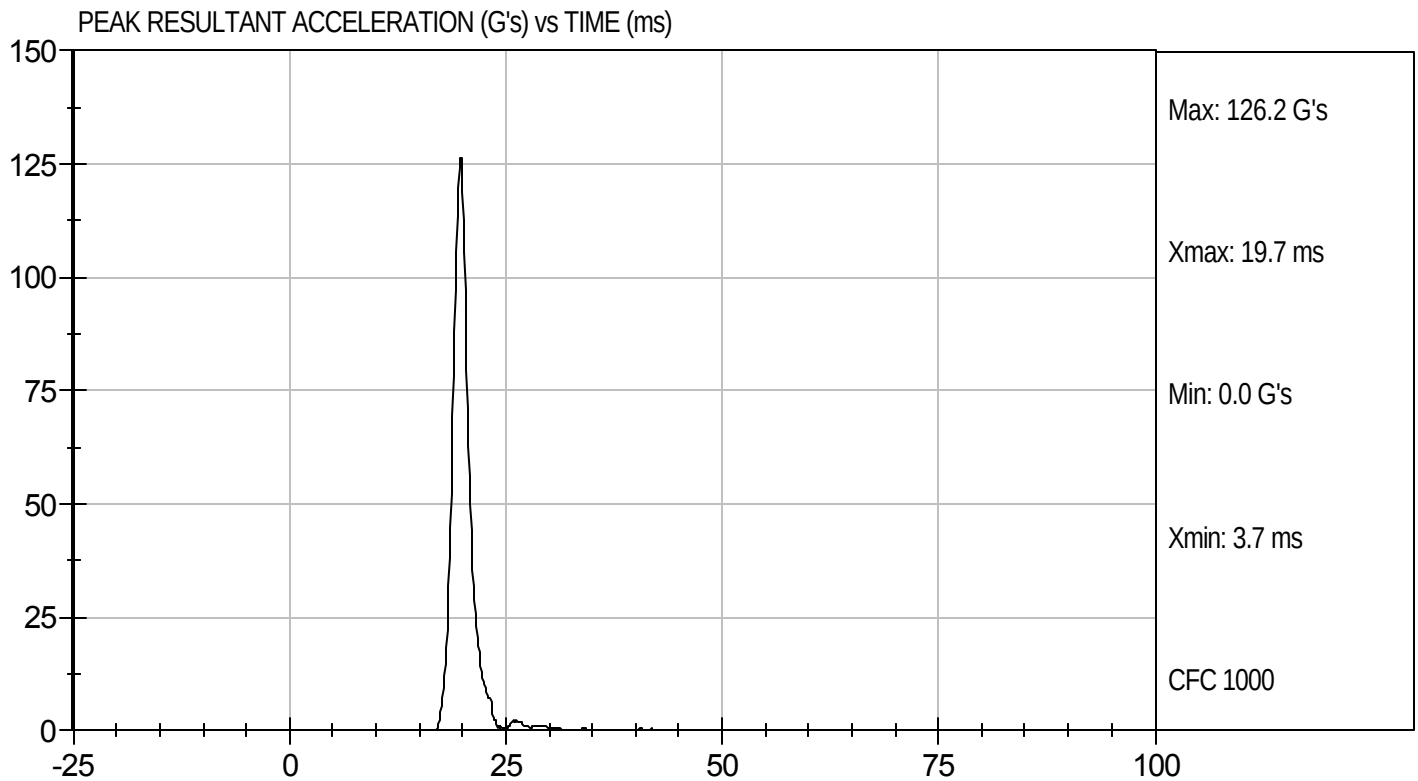
2/8/11
Test Date

David Winkelbauer
Approved By



Test Desc: Head Drop
Component ID: D11411

Test Date: 2/8/11
Velocity: 0 ft/s, 0.00 m/s



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

ATD Serial No: 296

Test I.D: D11412

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21.7	Pass
Humidity		%	10 to 70	17	Pass
Impact Velocity		m/s	5.51 to 5.63	5.58	Pass
Delta Velocity	10 ms	m/s	2.20 to 2.80	2.45	Pass
	15 ms	m/s	3.30 to 4.10	3.43	Pass
	20 ms	m/s	4.40 to 5.40	4.60	Pass
	25 ms	m/s	5.40 to 6.10	5.49	Pass
	25-100 ms	m/s	5.50 to 6.20	5.53	Pass
Maximum D-Plane Rotation		deg	71 to 81	75	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	62	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	120	Pass
Overall Test Results				Pass	

Jessica Gall
Laboratory Technician

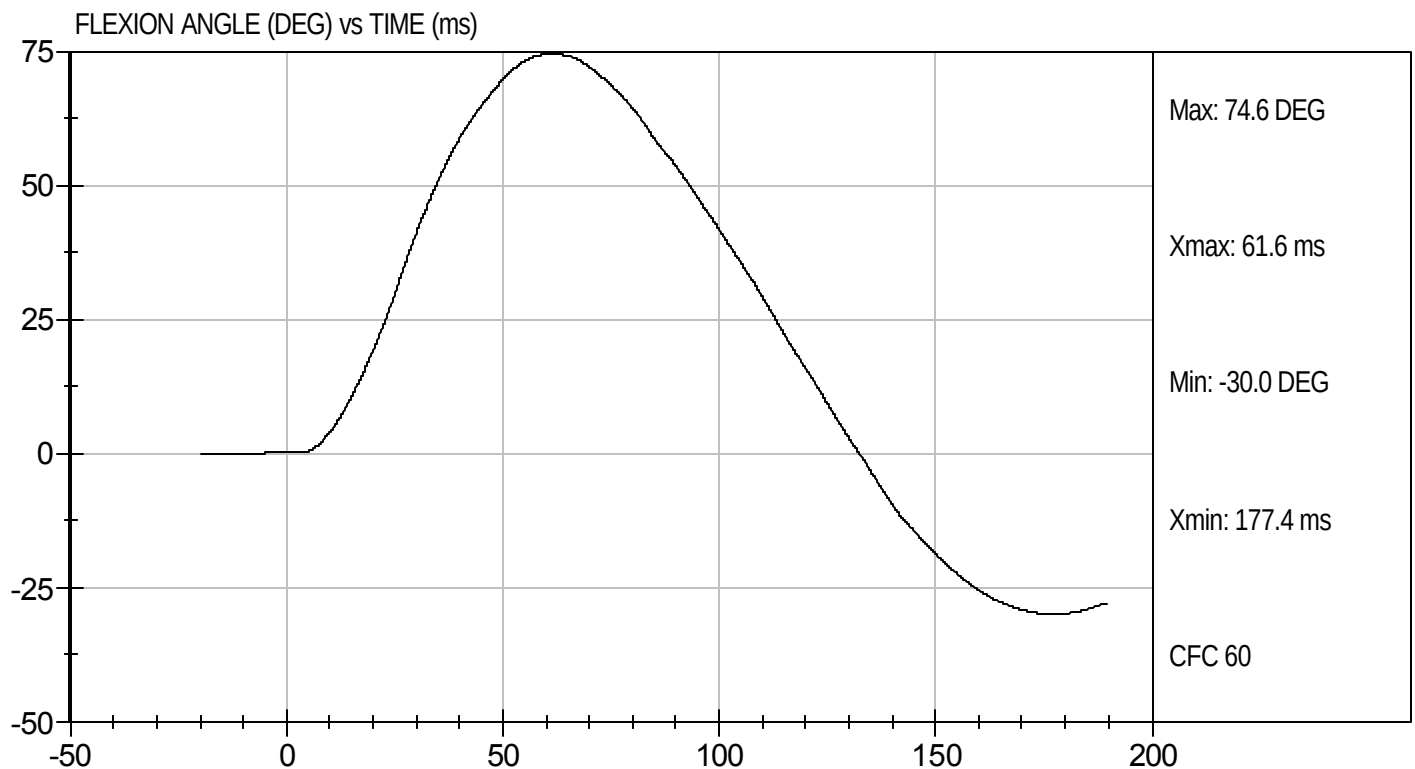
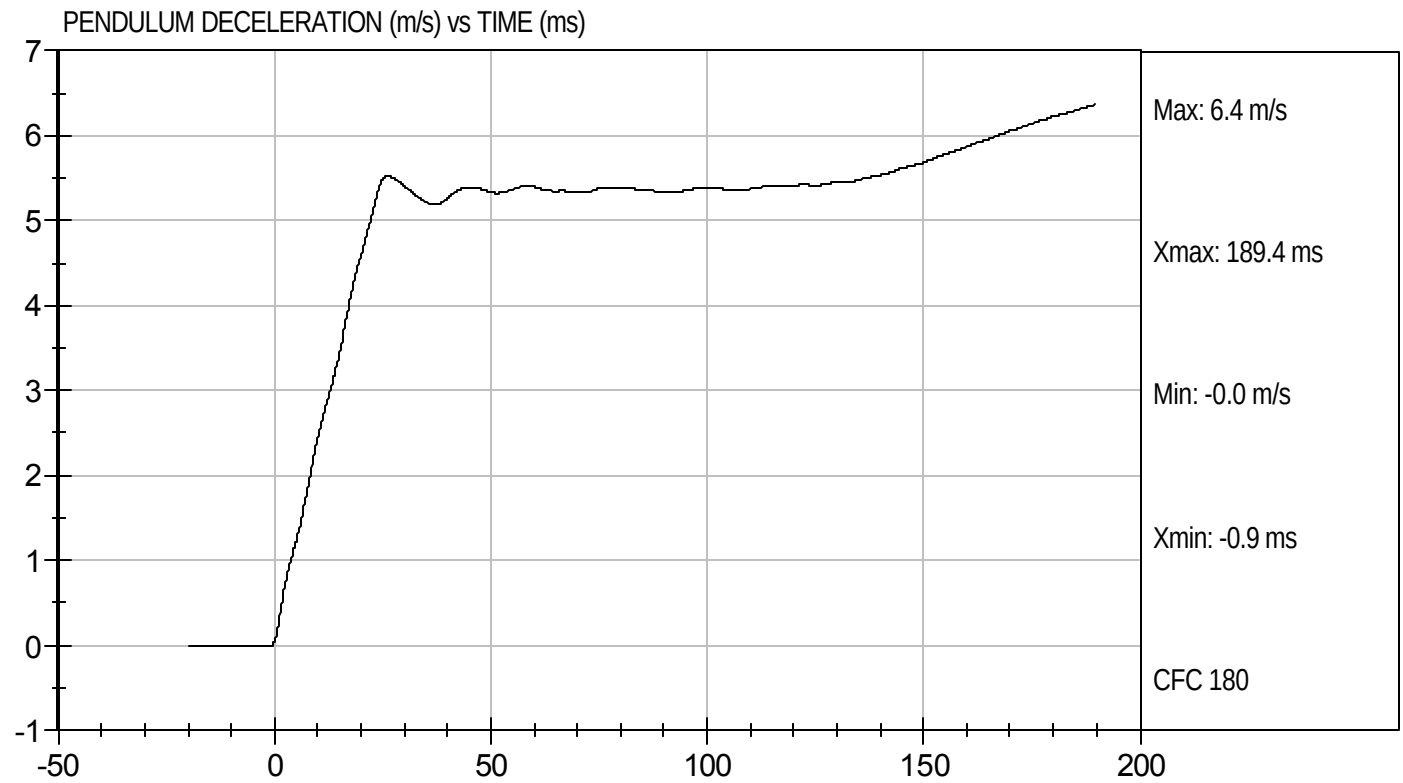
2/8/11
Test Date

David Winkelbauer
Approved By



Test Desc: Neck Bending
Component ID: D11412

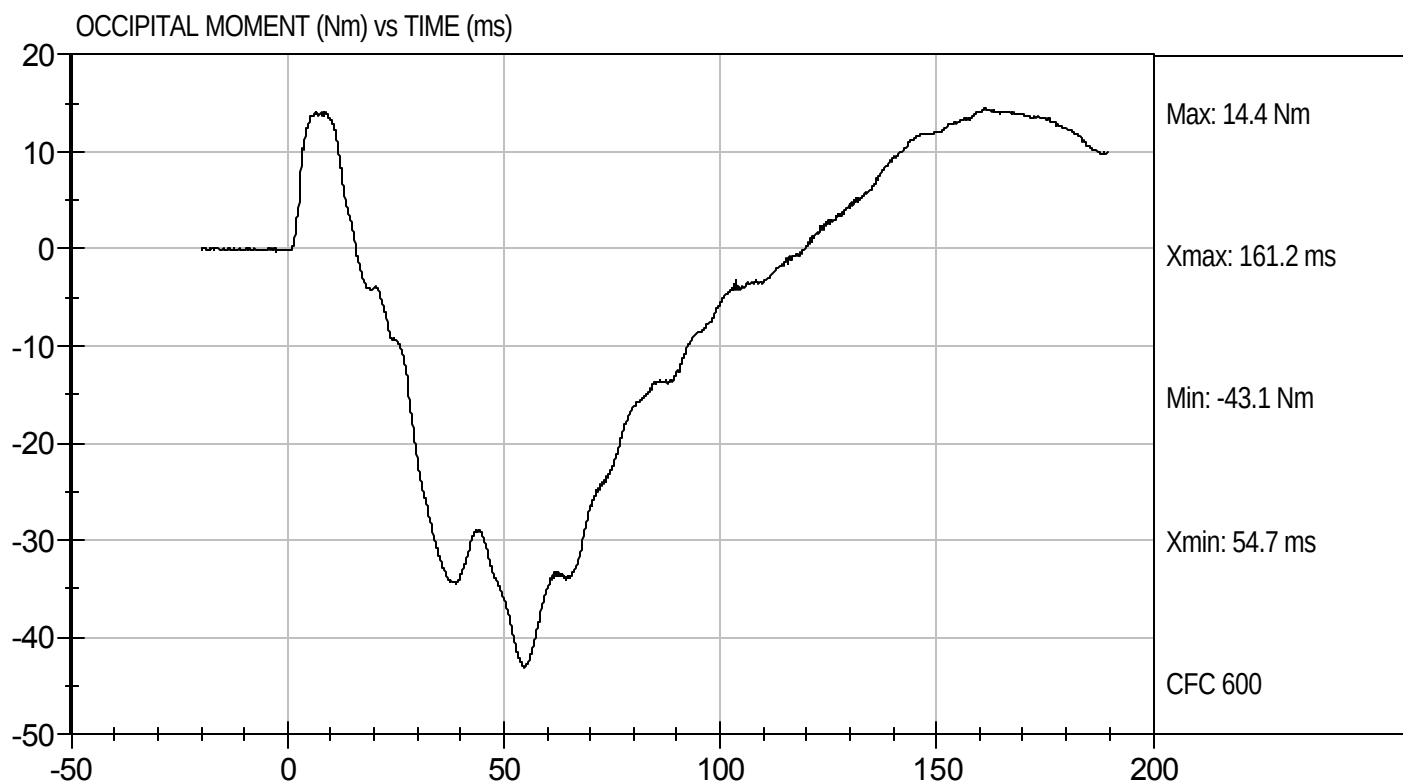
Test Date: 2/8/11
Velocity: 18.32 ft/s, 5.58 m/s





Test Desc: Neck Bending
Component ID: D11412

Test Date: 2/8/11
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: D11413

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	24	Pass
Impact Velocity	m/s	4.20 to 4.40	4.39	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

Jessica Gall
Laboratory Technician

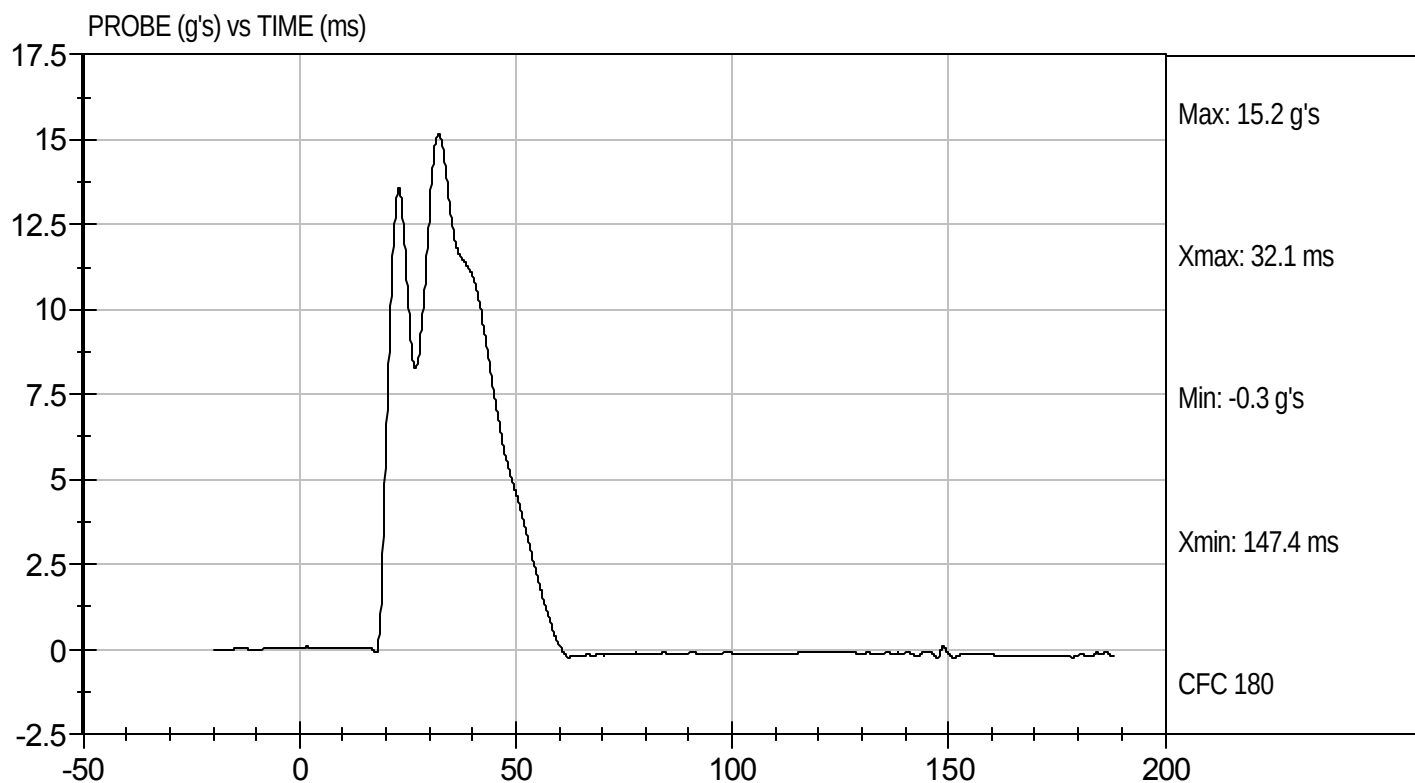
2/7/11
Test Date

David Winkelbauer
Approved By



Test Desc: Shoulder Impact
Component ID: D11413

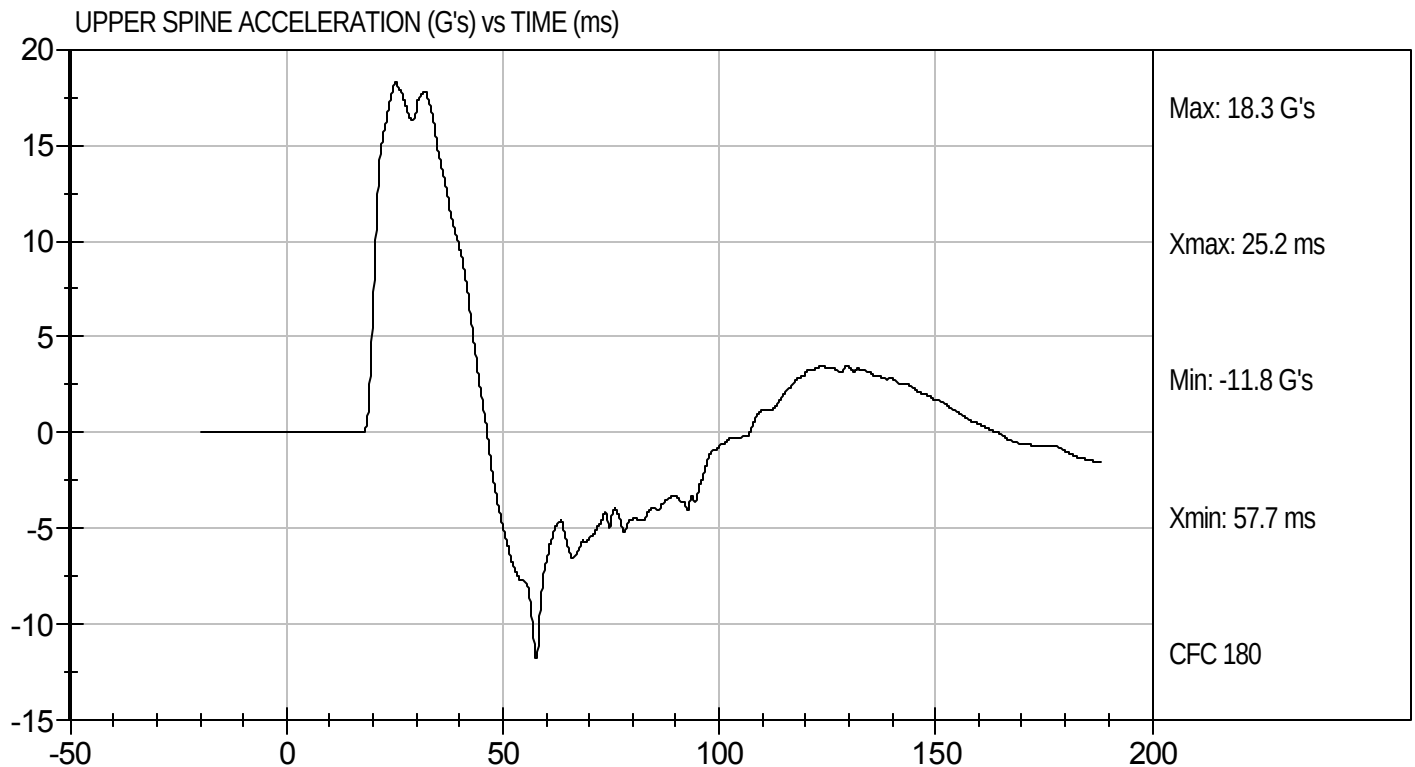
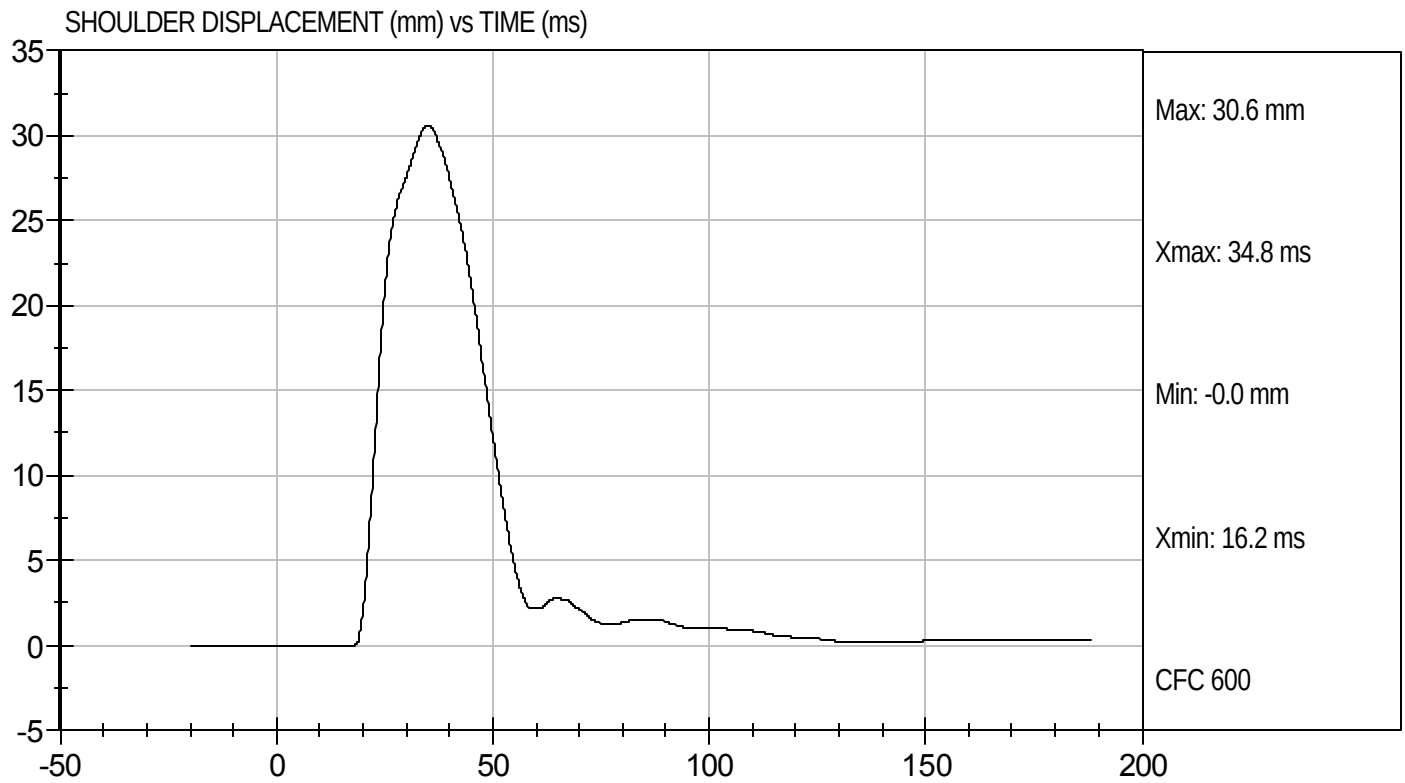
Test Date: 2/7/11
Velocity: 14.41 ft/s, 4.39 m/s





Test Desc: Shoulder Impact
Component ID: D11413

Test Date: 2/7/11
Velocity: 14.41 ft/s, 4.39 m/s



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

ATD Serial No: 296

Test I.D: D11414

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	24	Pass
Impact Velocity	m/s	6.60 to 6.80	6.77	Pass
Peak Impactor Acceleration	G's	30 to 36	32	Pass
Shoulder Displacement	mm	31 to 40	35	Pass
Upper Rib Displacement	mm	25 to 32	30	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	38	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	34	Pass
Overall Test Results			Pass	

Jessica Hall
Laboratory Technician

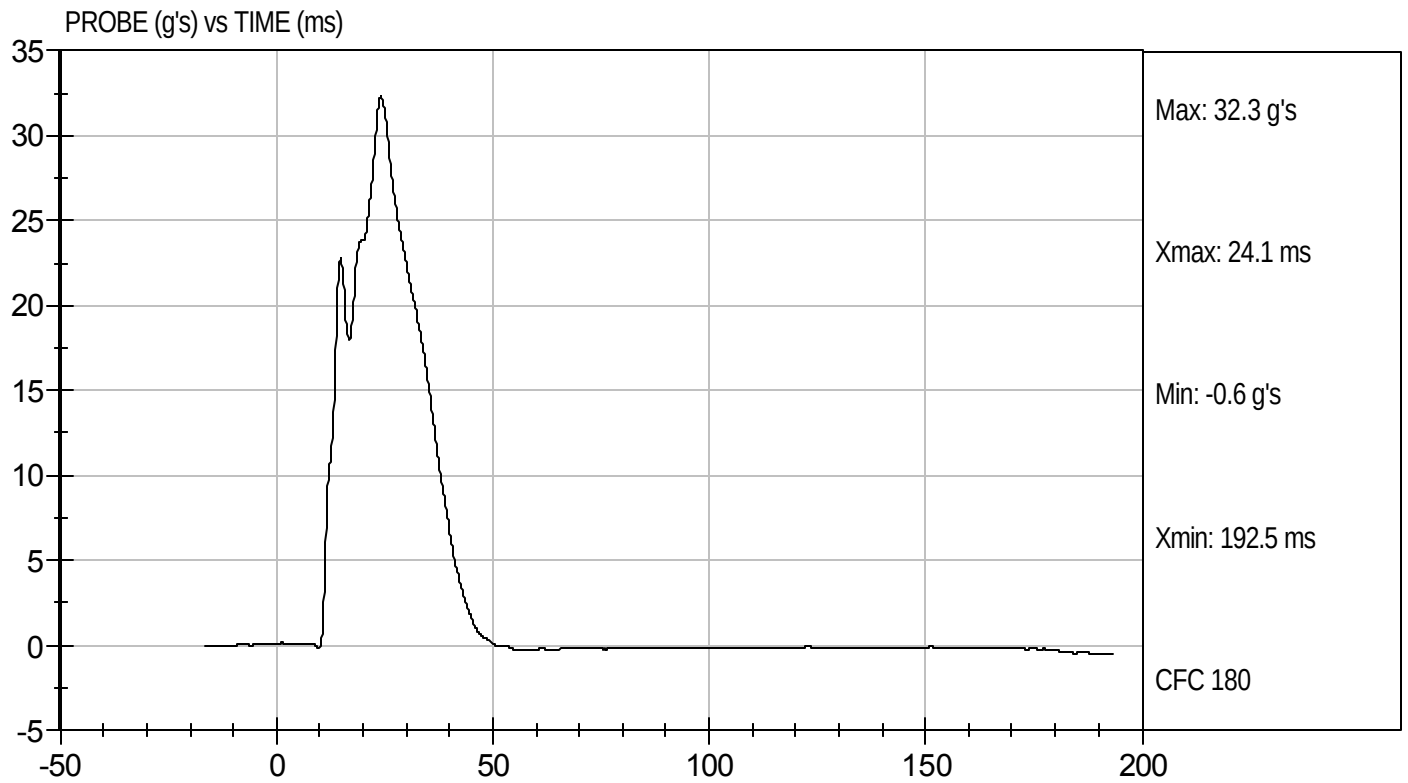
2/7/11
Test Date

David Winkelbauer
Approved By



Test Desc: Thorax With Arm
Component ID: D11414

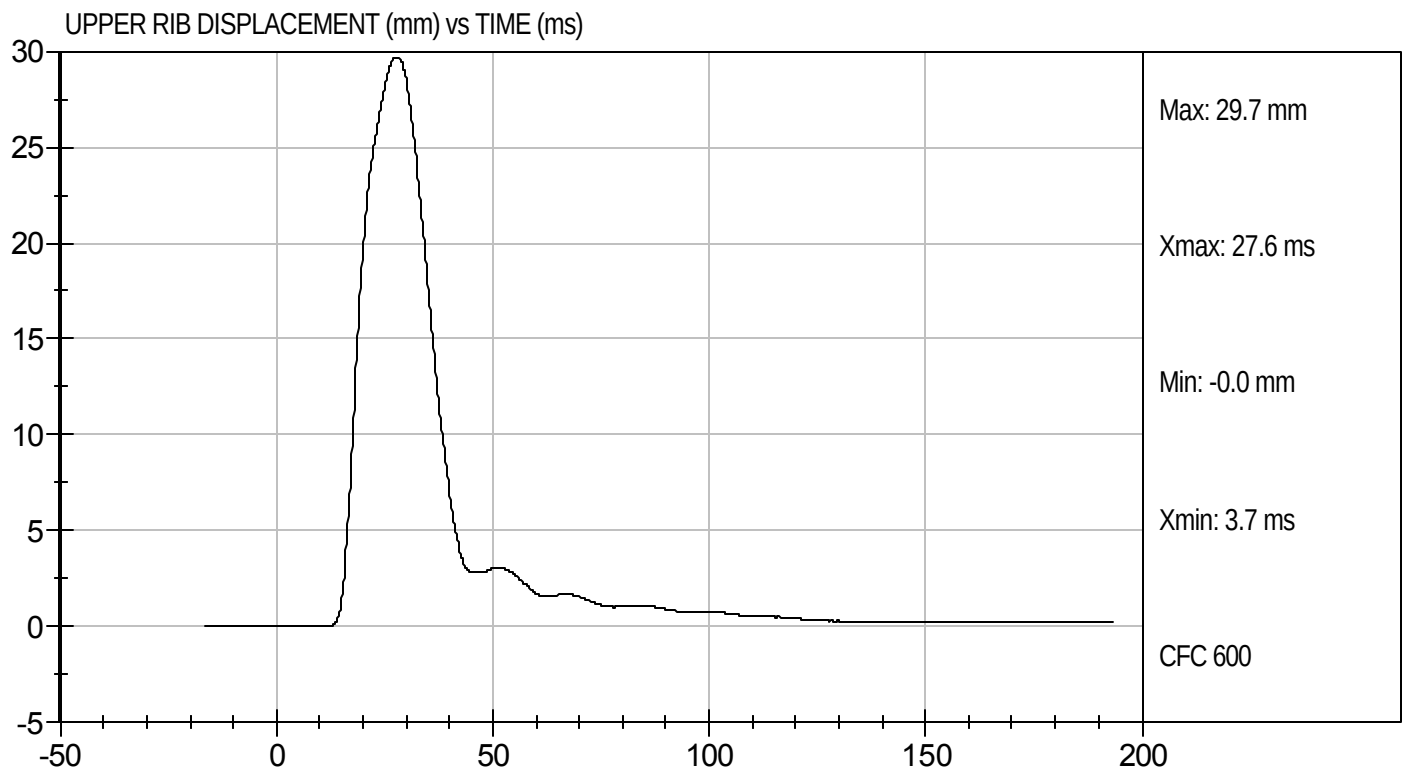
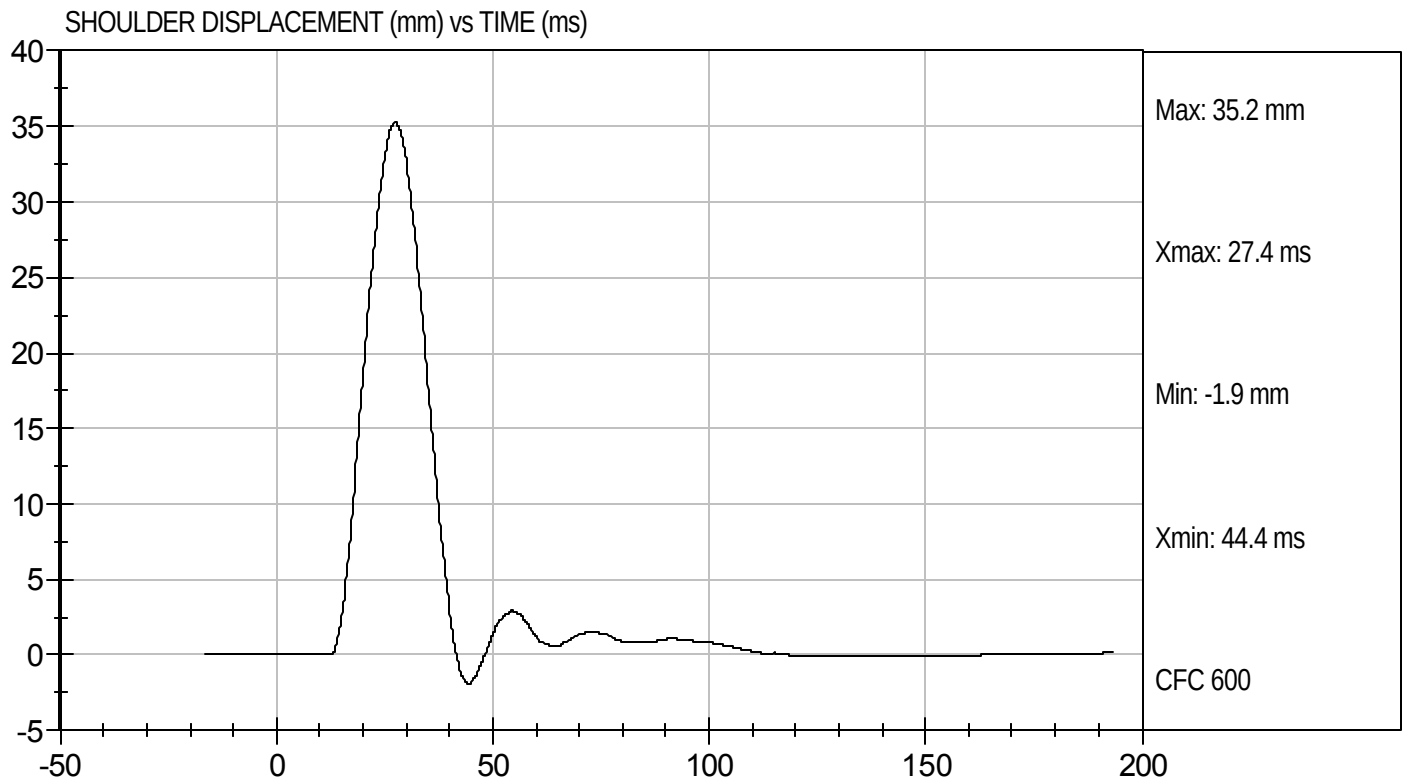
Test Date: 2/7/11
Velocity: 22.22 ft/s, 6.77 m/s





Test Desc: Thorax With Arm
Component ID: D11414

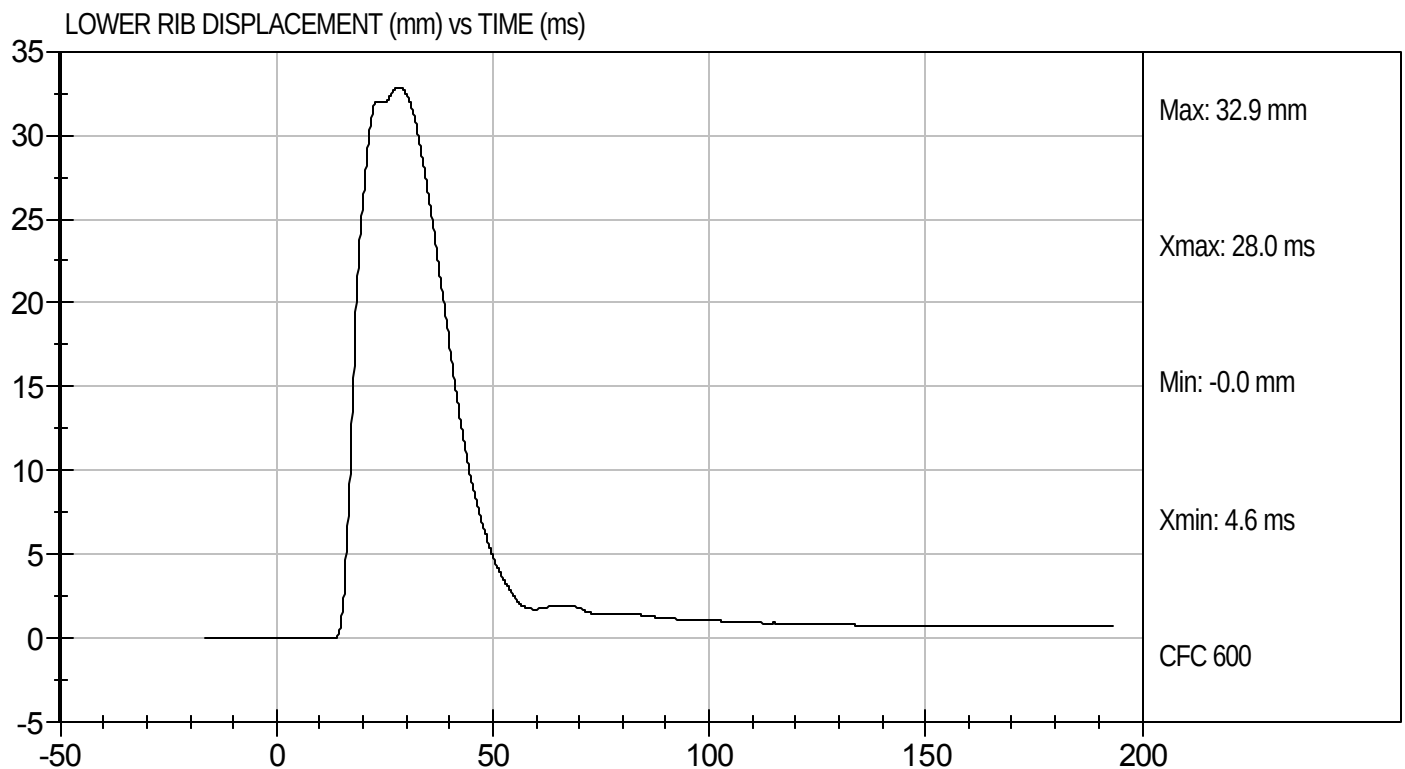
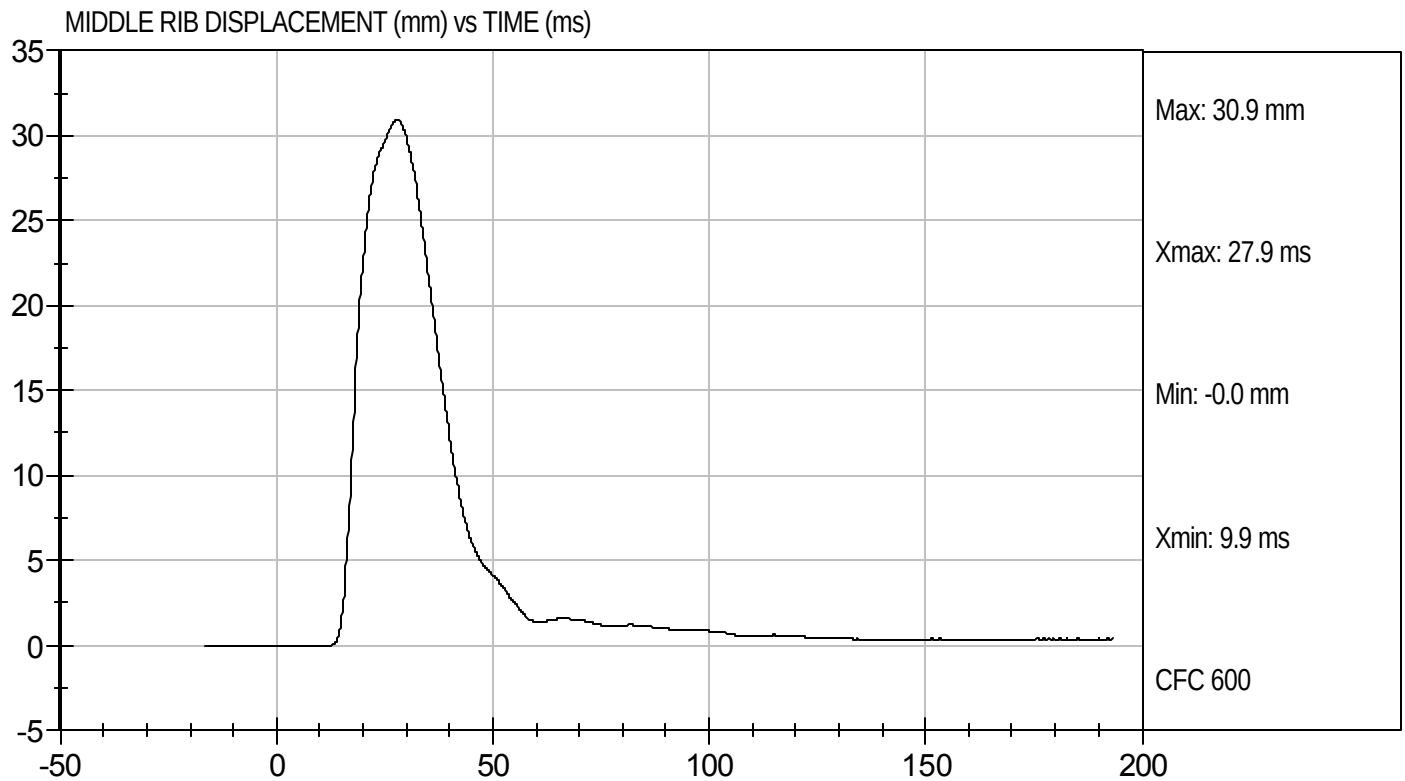
Test Date: 2/7/11
Velocity: 22.22 ft/s, 6.77 m/s





Test Desc: Thorax With Arm
Component ID: D11414

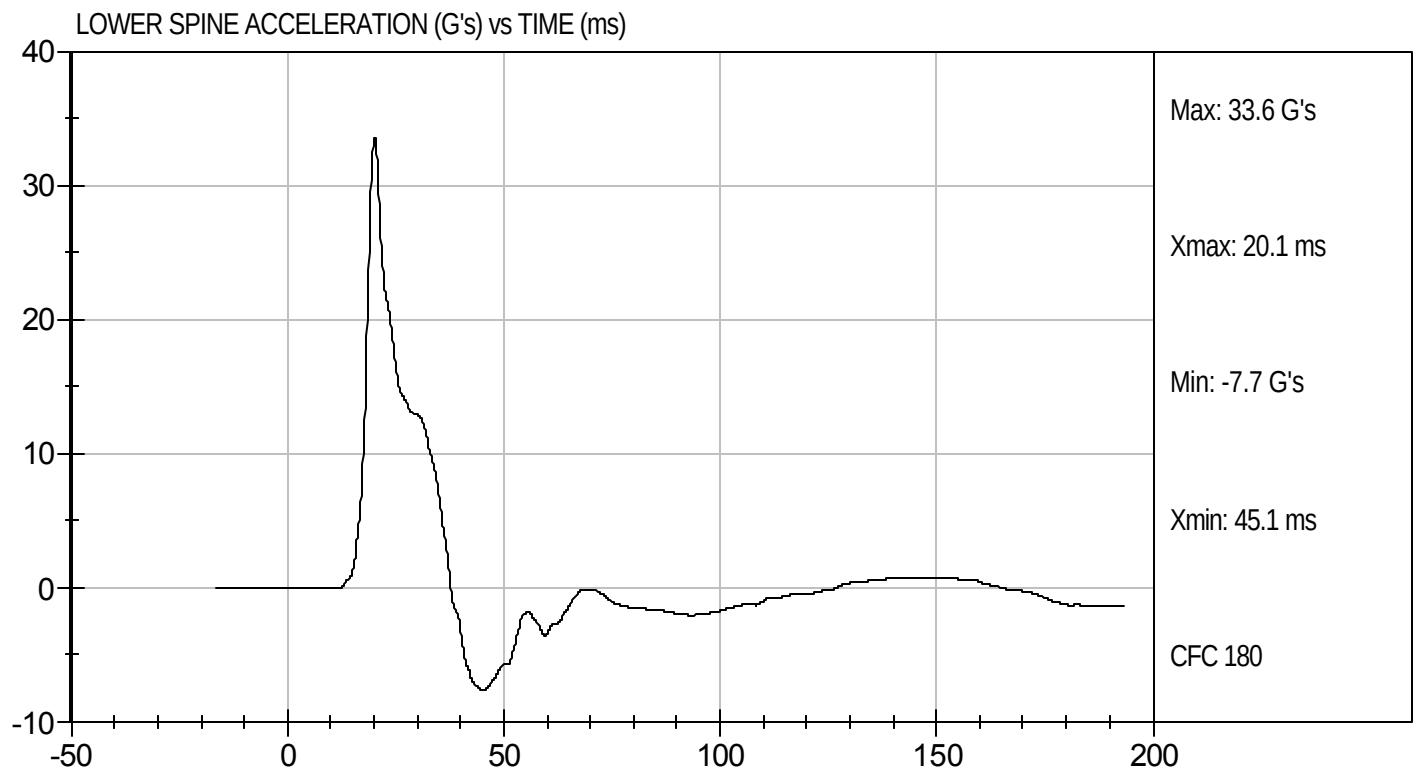
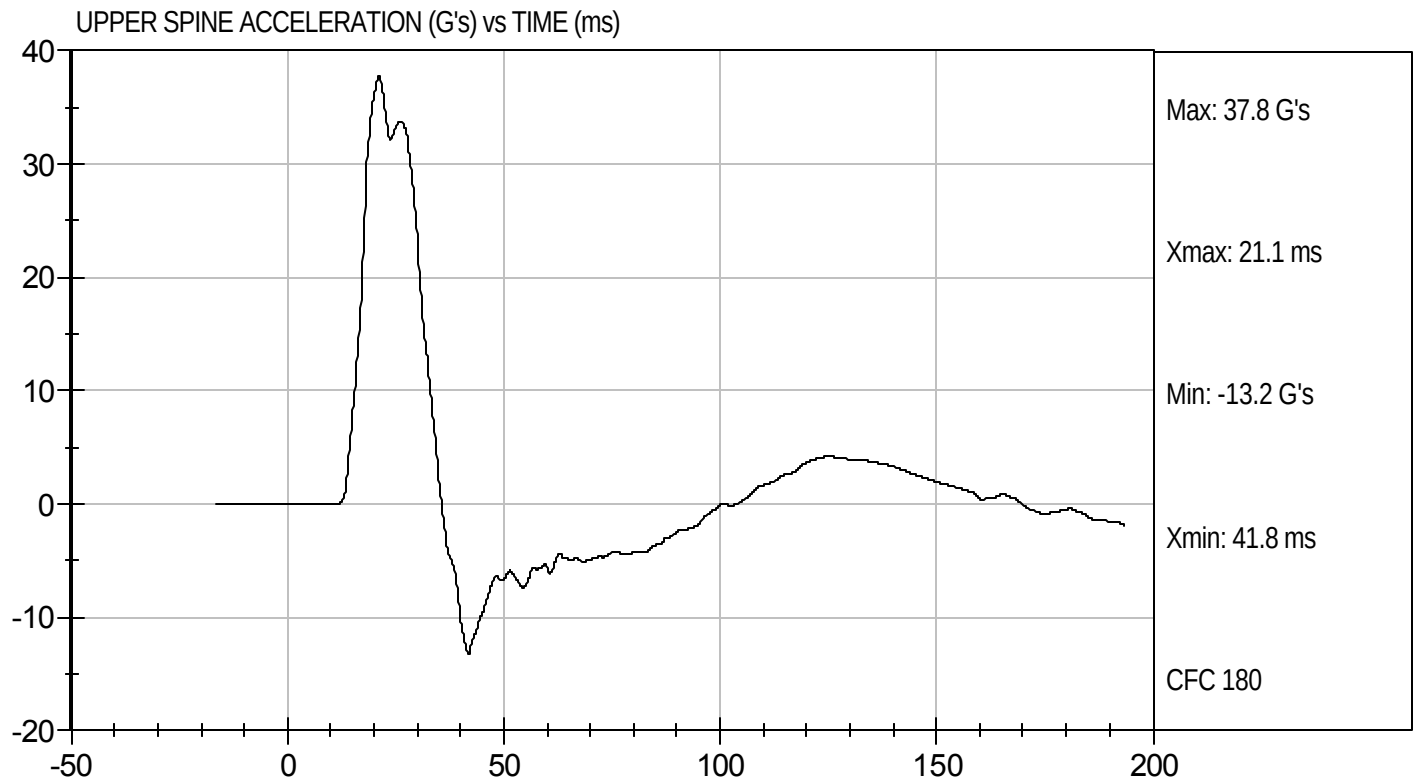
Test Date: 2/7/11
Velocity: 22.22 ft/s, 6.77 m/s





Test Desc: Thorax With Arm
Component ID: D11414

Test Date: 2/7/11
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: D11415

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.5	Pass
Humidity	%	10 to 70	23	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	37	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

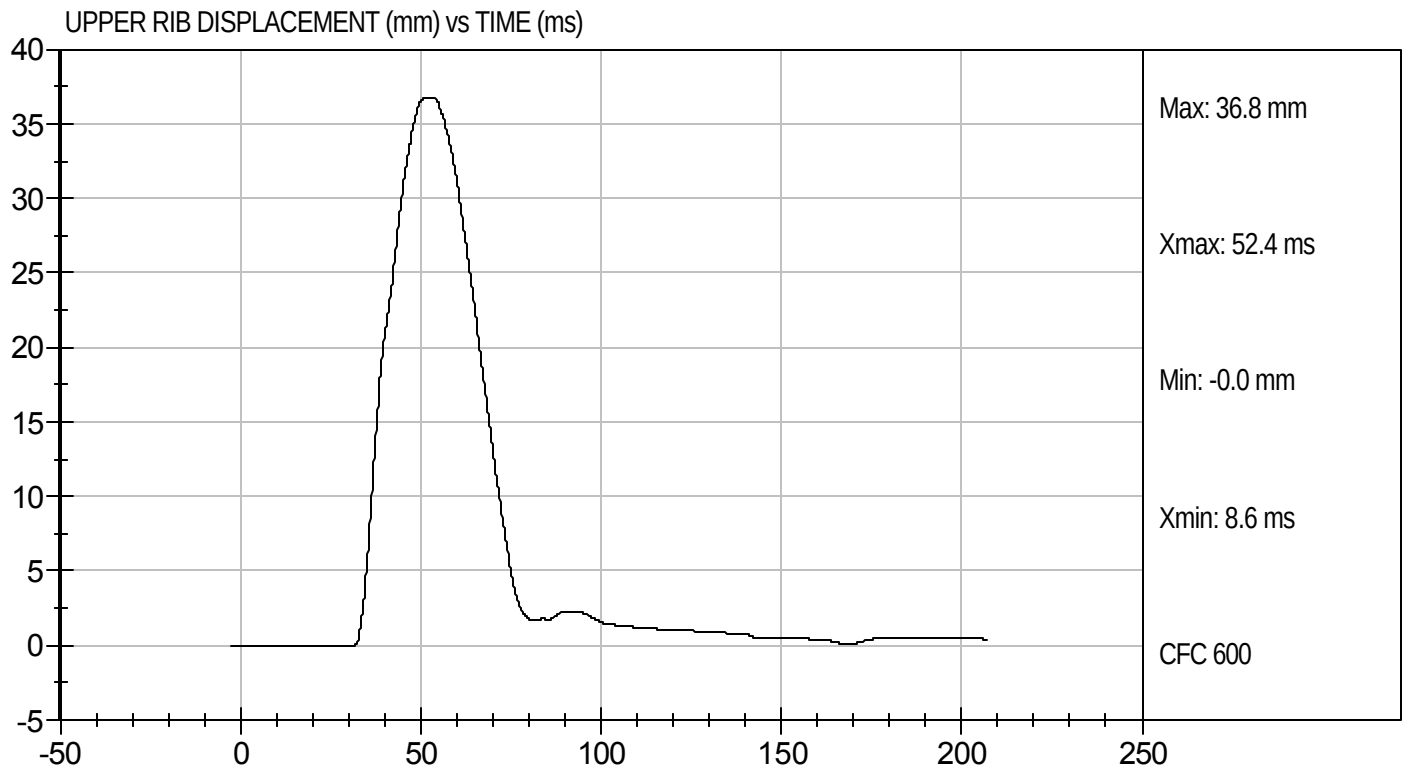
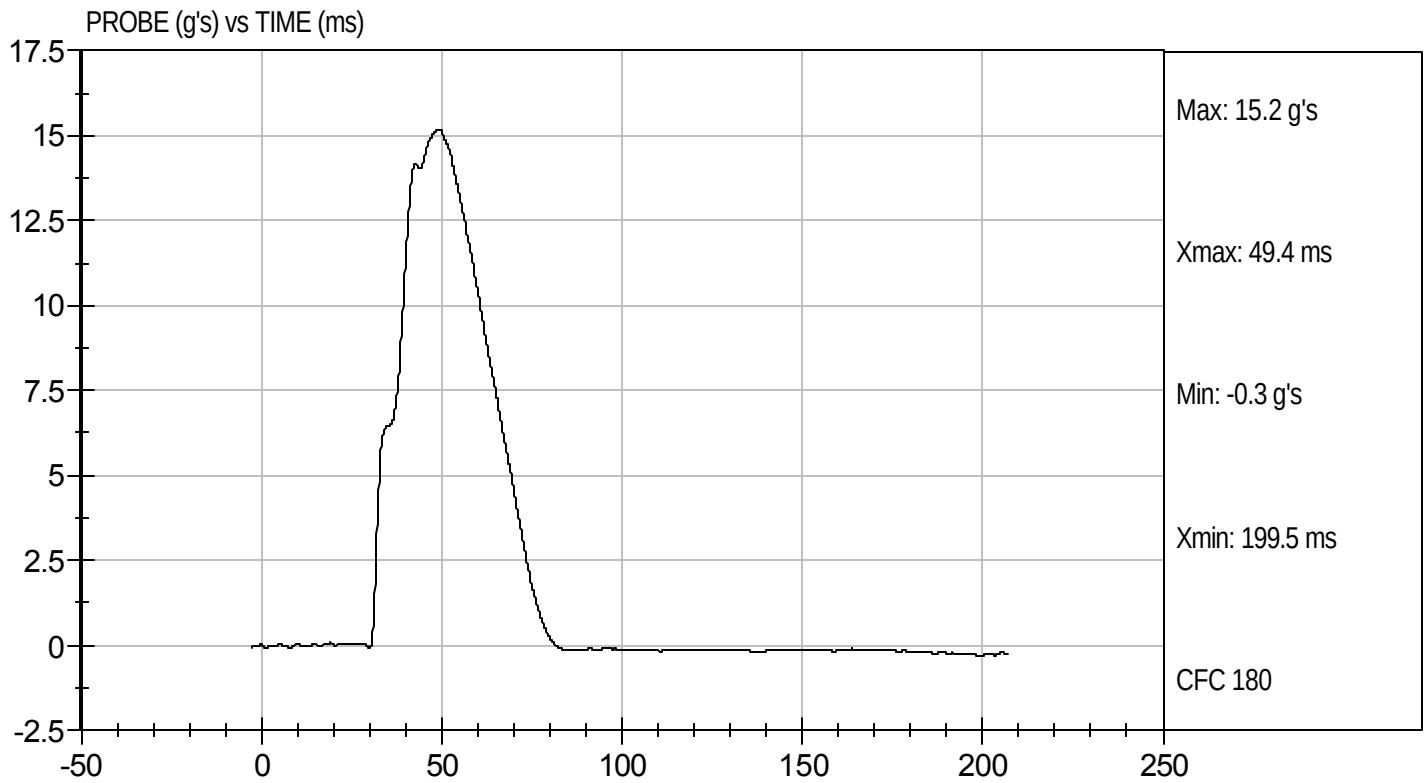
2/7/11
Test Date


Approved By



Test Desc: Thorax Without Arm
Component ID: D11415

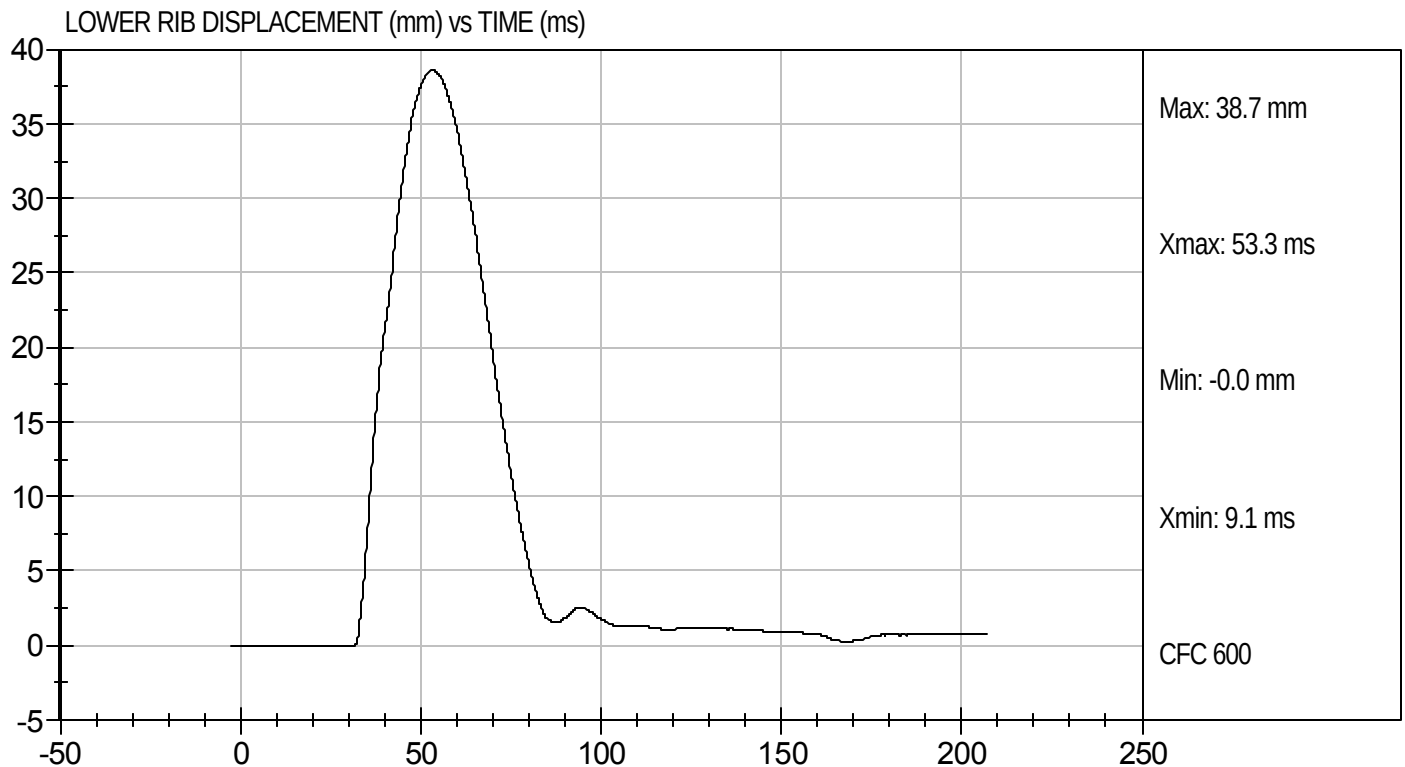
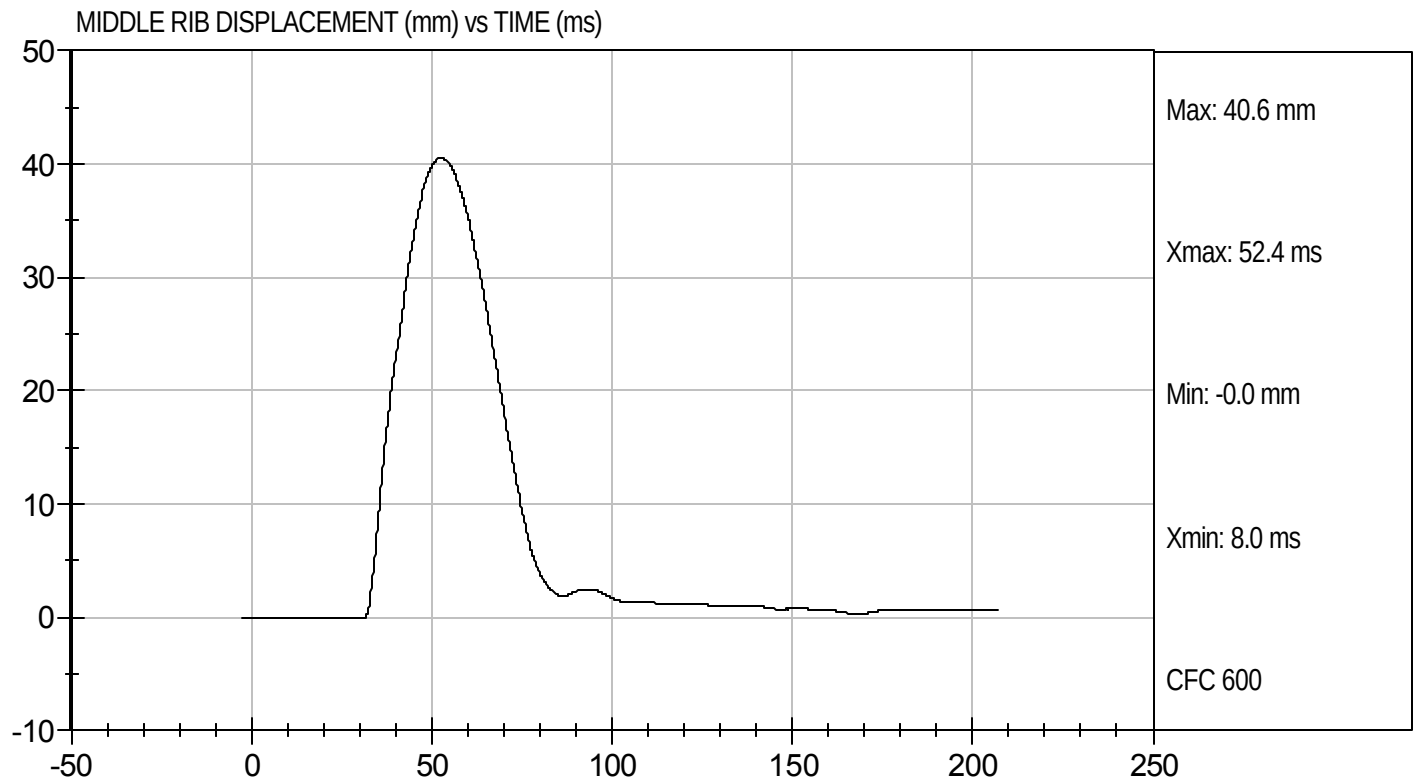
Test Date: 2/7/11
Velocity: 14.25 ft/s, 4.34 m/s





Test Desc: Thorax Without Arm
Component ID: D11415

Test Date: 2/7/11
Velocity: 14.25 ft/s, 4.34 m/s

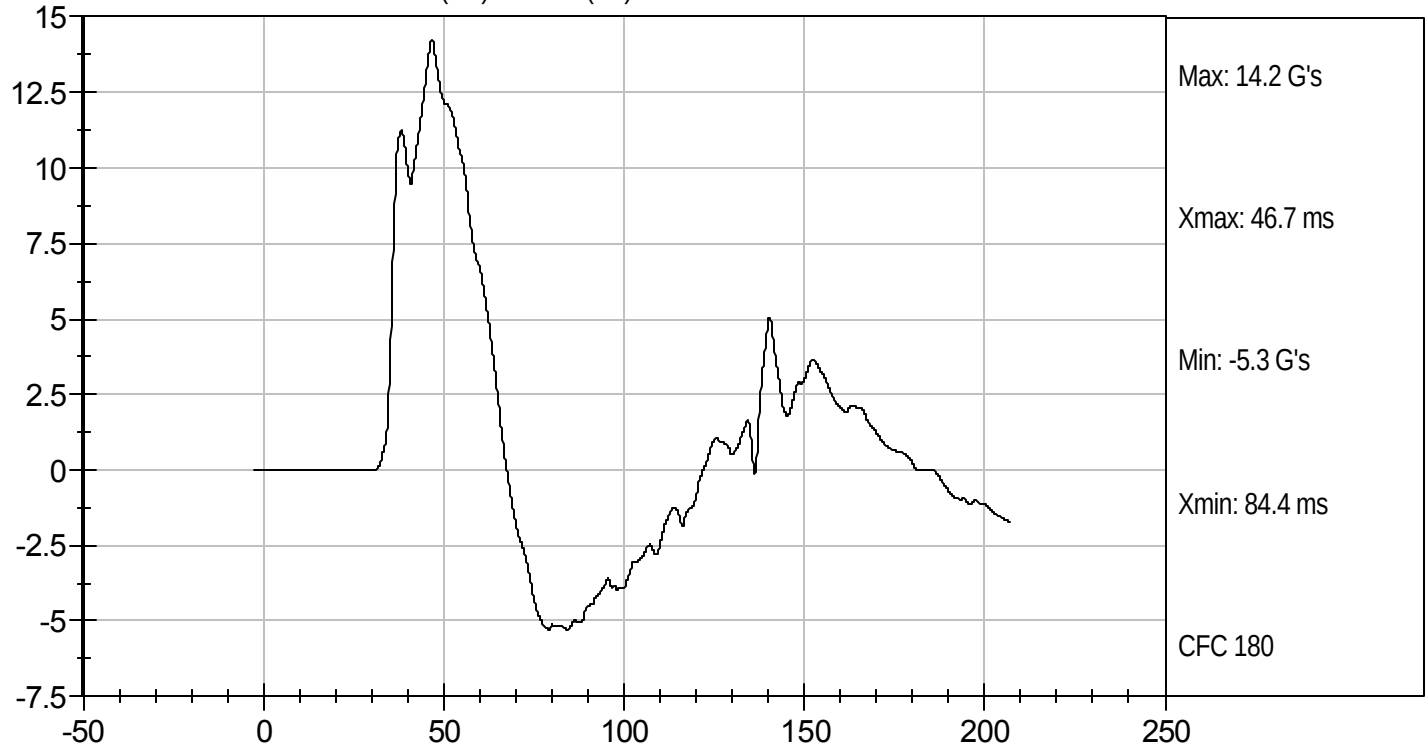




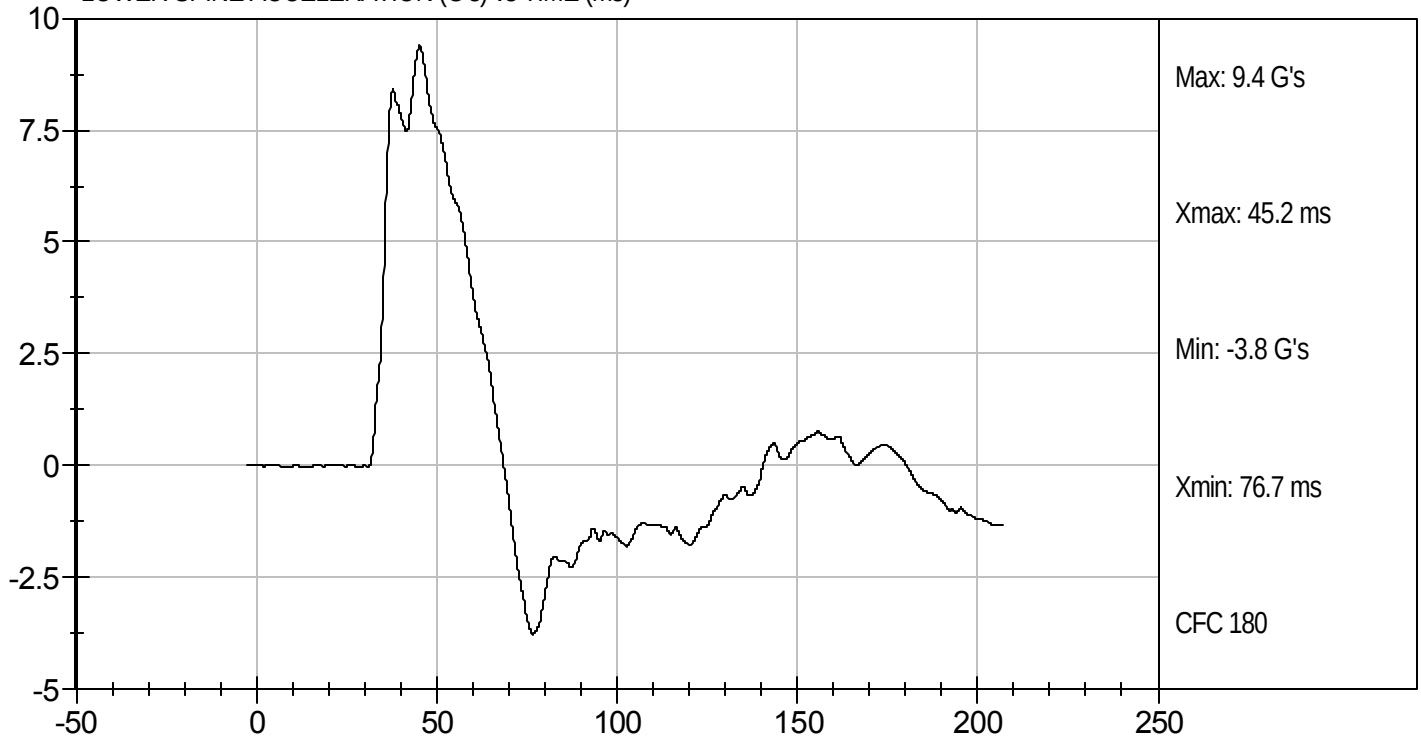
Test Desc: Thorax Without Arm
Component ID: D11415

Test Date: 2/7/11
Velocity: 14.25 ft/s, 4.34 m/s

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



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



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

ATD Serial No: 296

Test I.D: D11416

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.6	Pass
Humidity	%	10 to 70	23	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Peak Impactor Acceleration	G's	12 to 16	14	Pass
Upper Rib Displacement	mm	36 to 47	41	Pass
Lower Rib Displacement	mm	33 to 44	35	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	11	Pass
			Overall Test Results	Pass


Laboratory Technician

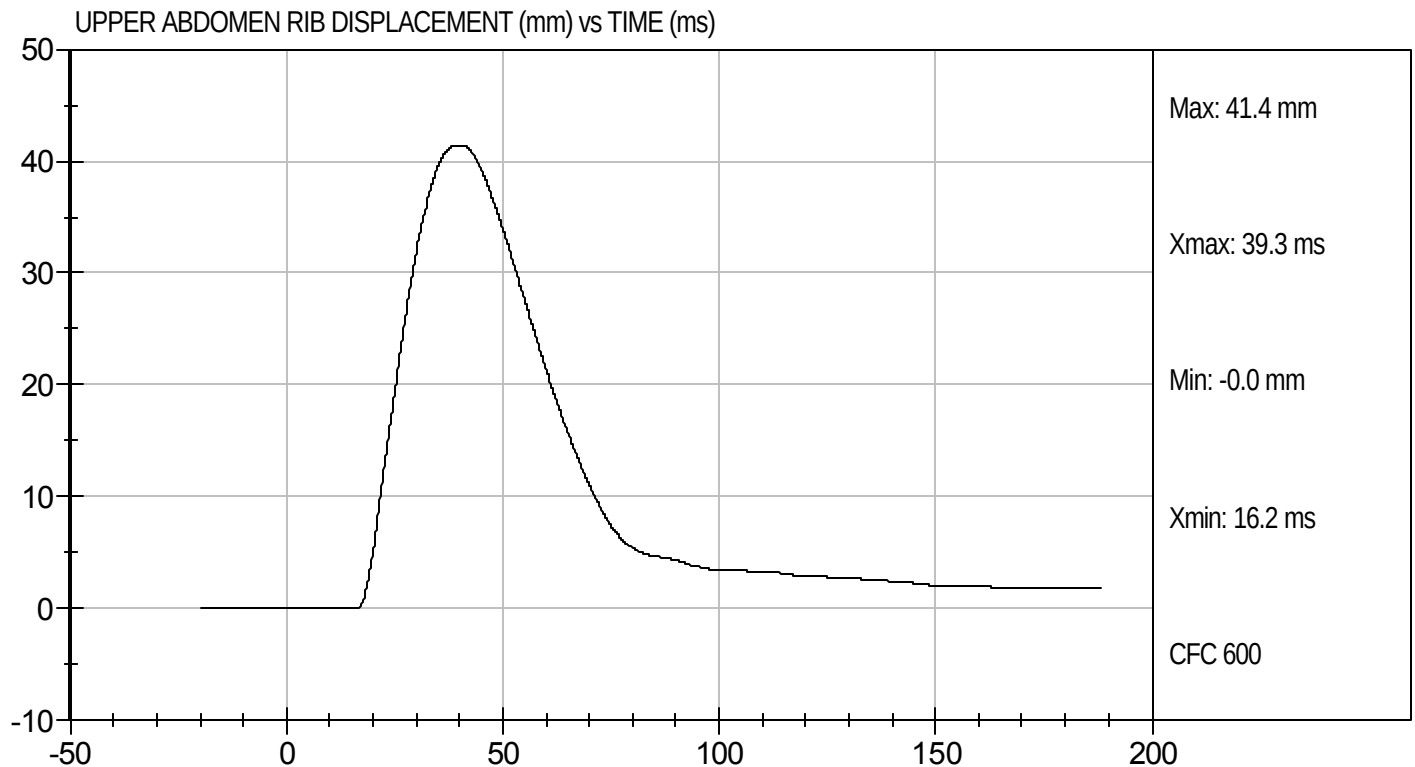
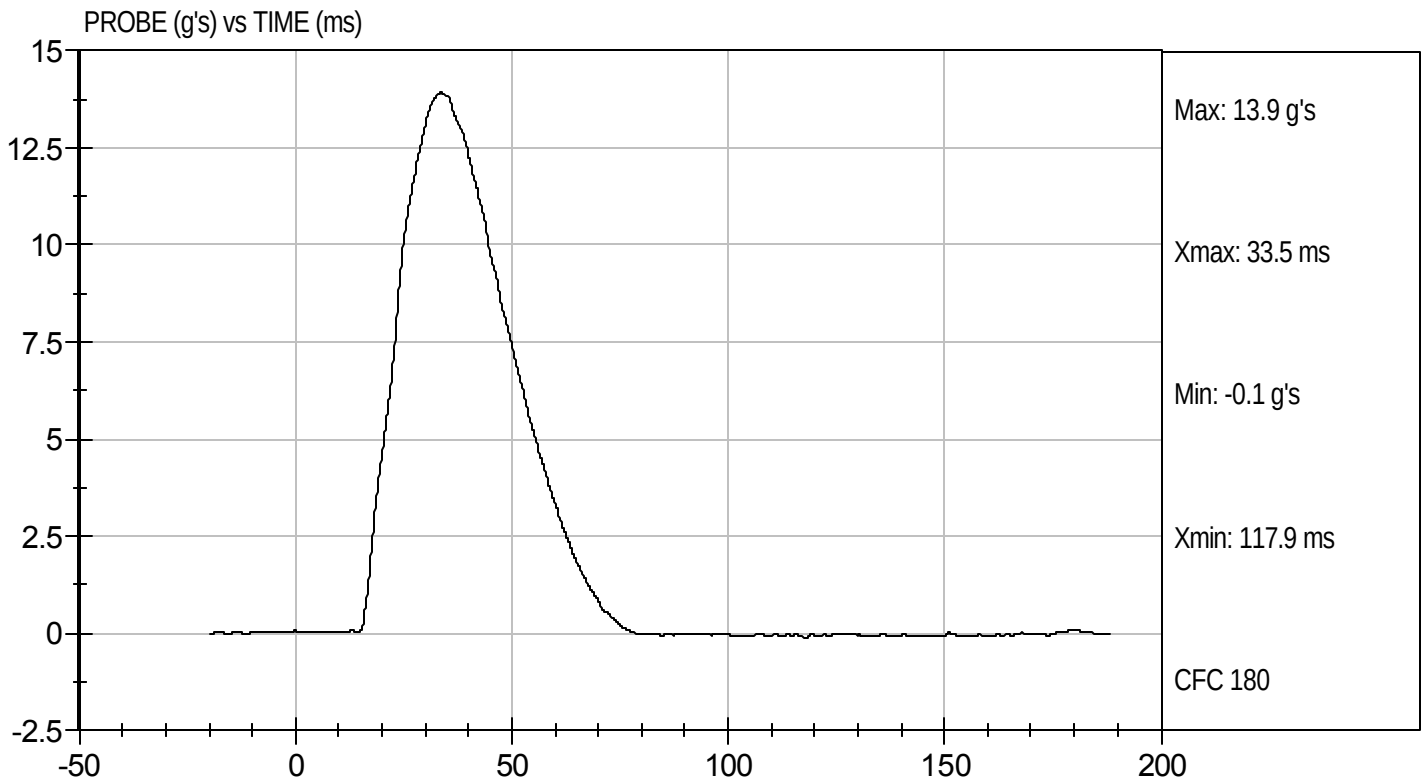
2/7/11
Test Date


Approved By



Test Desc: Abdomen Impact
Component ID: D11416

Test Date: 2/7/11
Velocity: 14.37 ft/s, 4.38 m/s

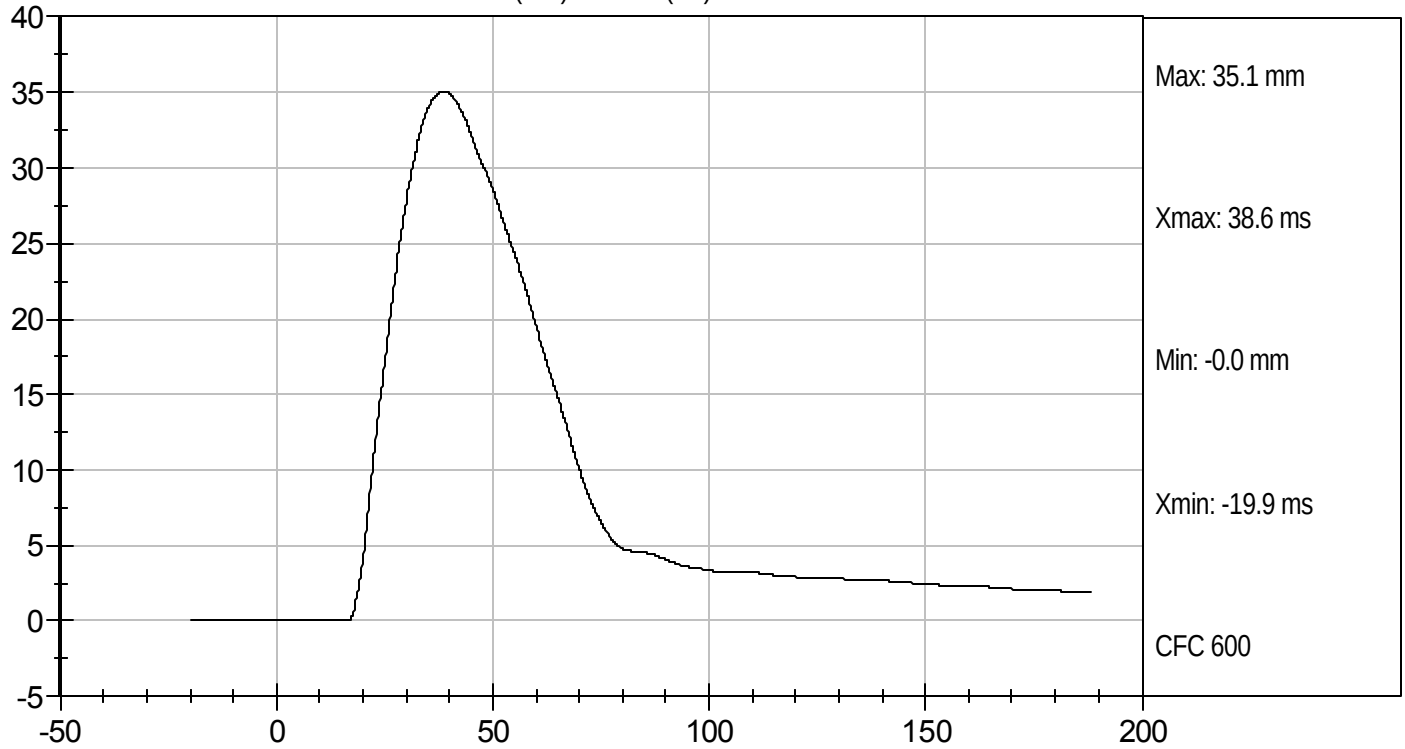




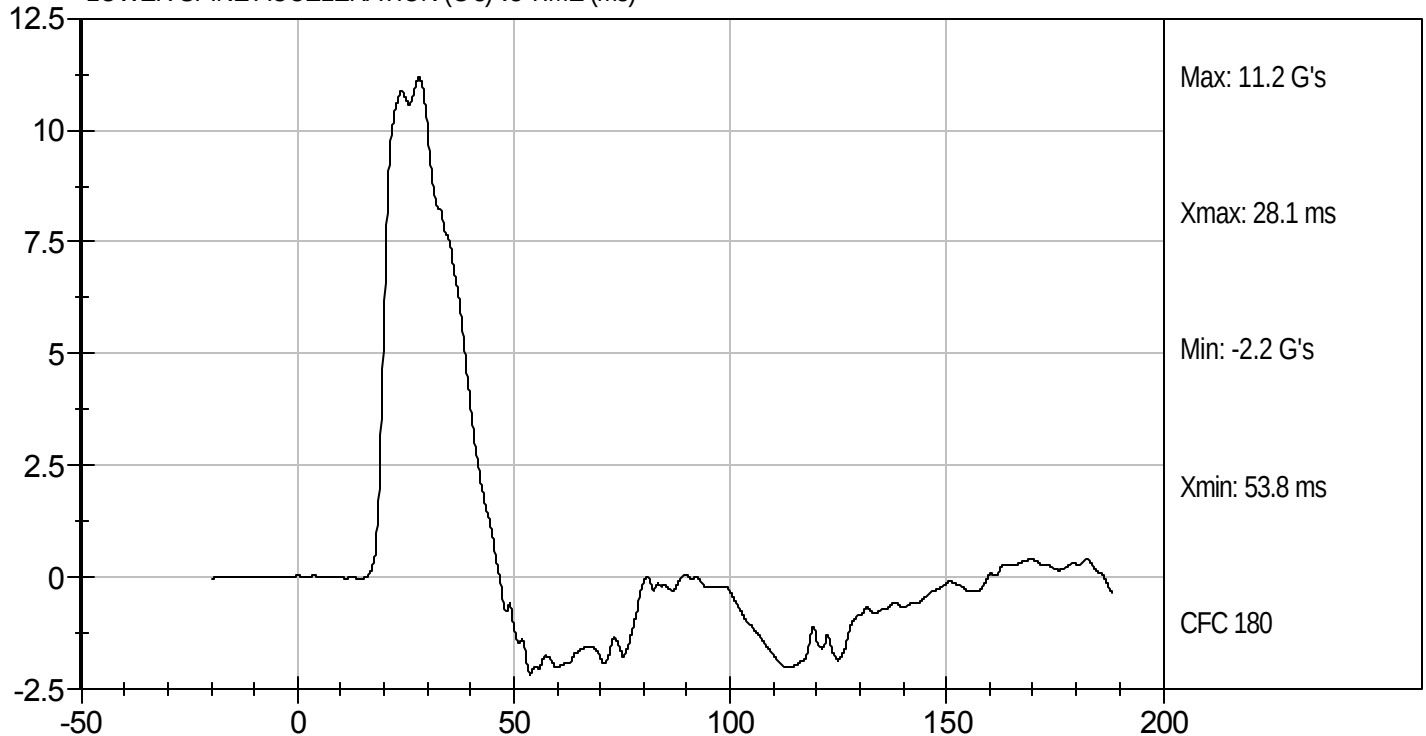
Test Desc: Abdomen Impact
Component ID: D11416

Test Date: 2/7/11
Velocity: 14.37 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: D11417

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	24	Pass
Impact Velocity	m/s	6.60 to 6.80	6.77	Pass
Peak Impactor Acceleration	G's	38 to 47	44	Pass
Pelvis Y Acceleration after 6 ms	G's	34 to 42	41	Pass
Peak Acetabulum Force	N	3600 to 4300	4262	Pass
Overall Test Results			Pass	


Laboratory Technician

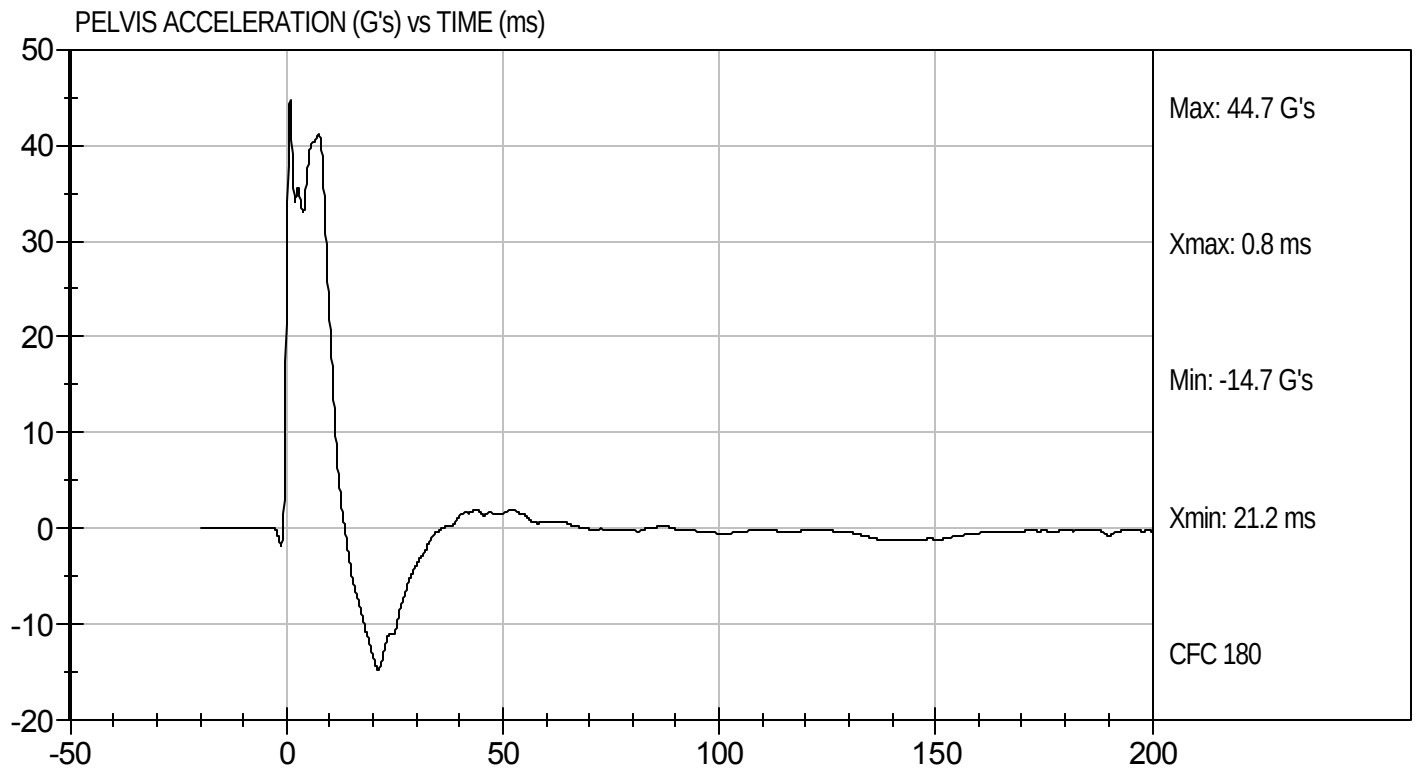
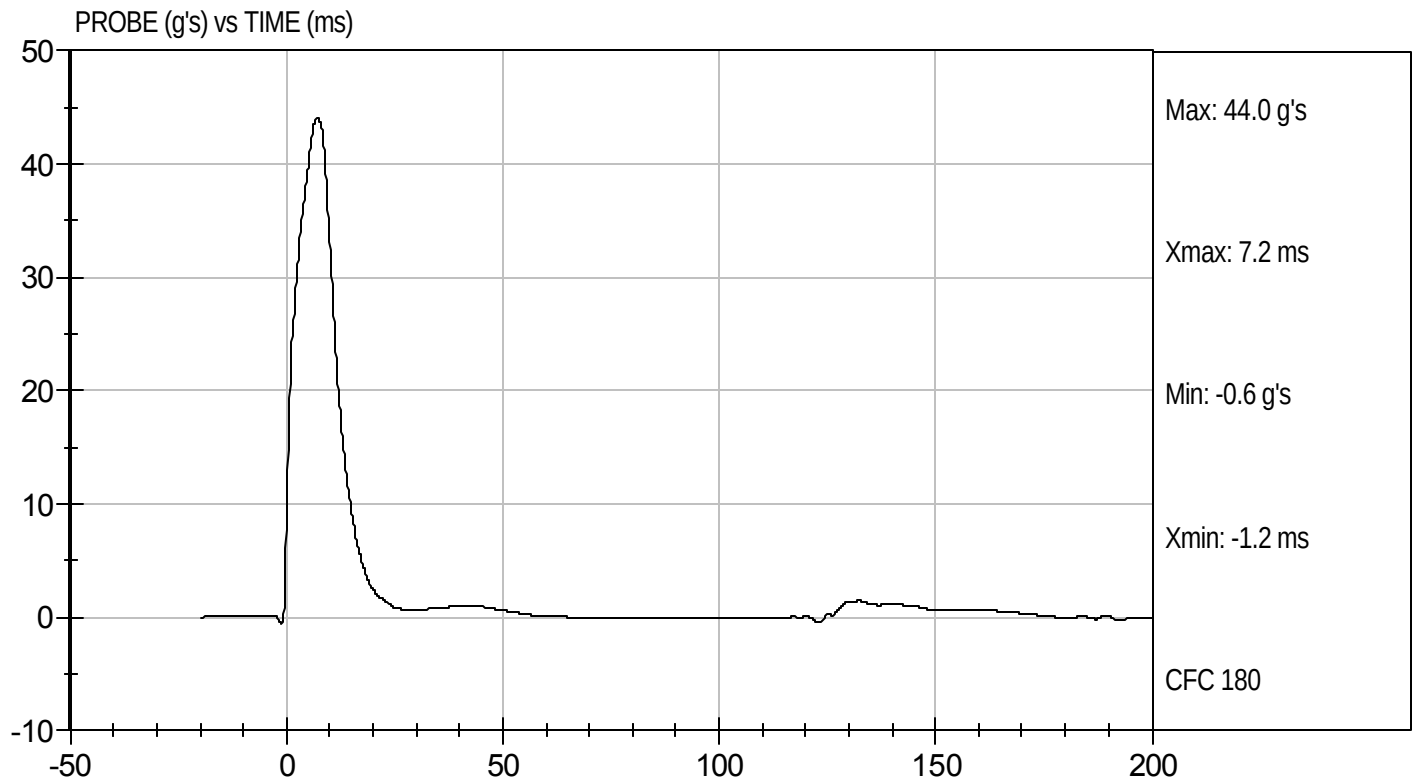
2/7/11
Test Date


Approved By



Test Desc: Pelvis Impact
Component ID: D11417

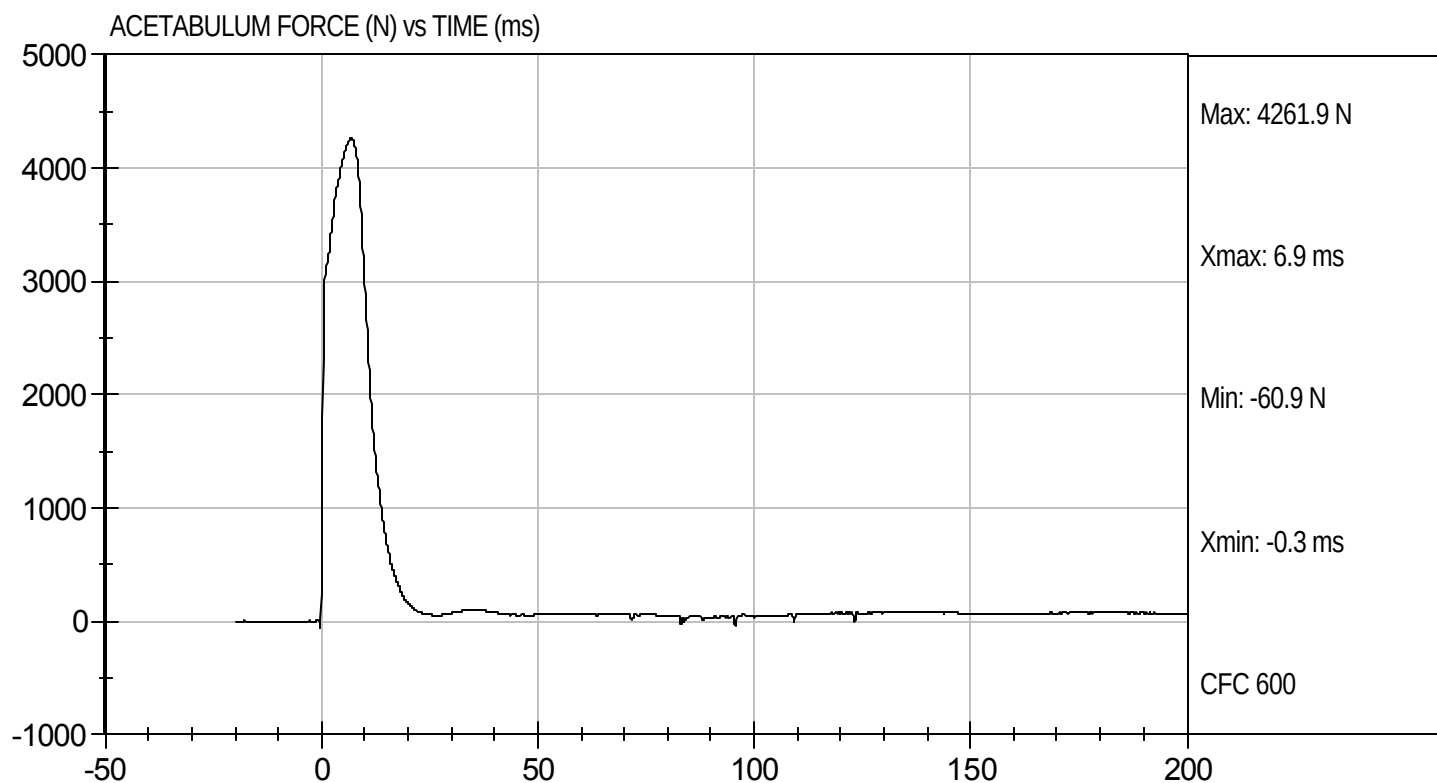
Test Date: 2/7/11
Velocity: 22.20 ft/s, 6.77 m/s





Test Desc: Pelvis Impact
Component ID: D11417

Test Date: 2/7/11
Velocity: 22.20 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: D11418

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.5	Pass
Humidity	%	10 to 70	24	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	Pass
Peak Impactor Acceleration	G's	36 to 45	38	Pass
Pelvis Y Acceleration	G's	28 to 39	29	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4701	Pass
Overall Test Results			Pass	


Laboratory Technician

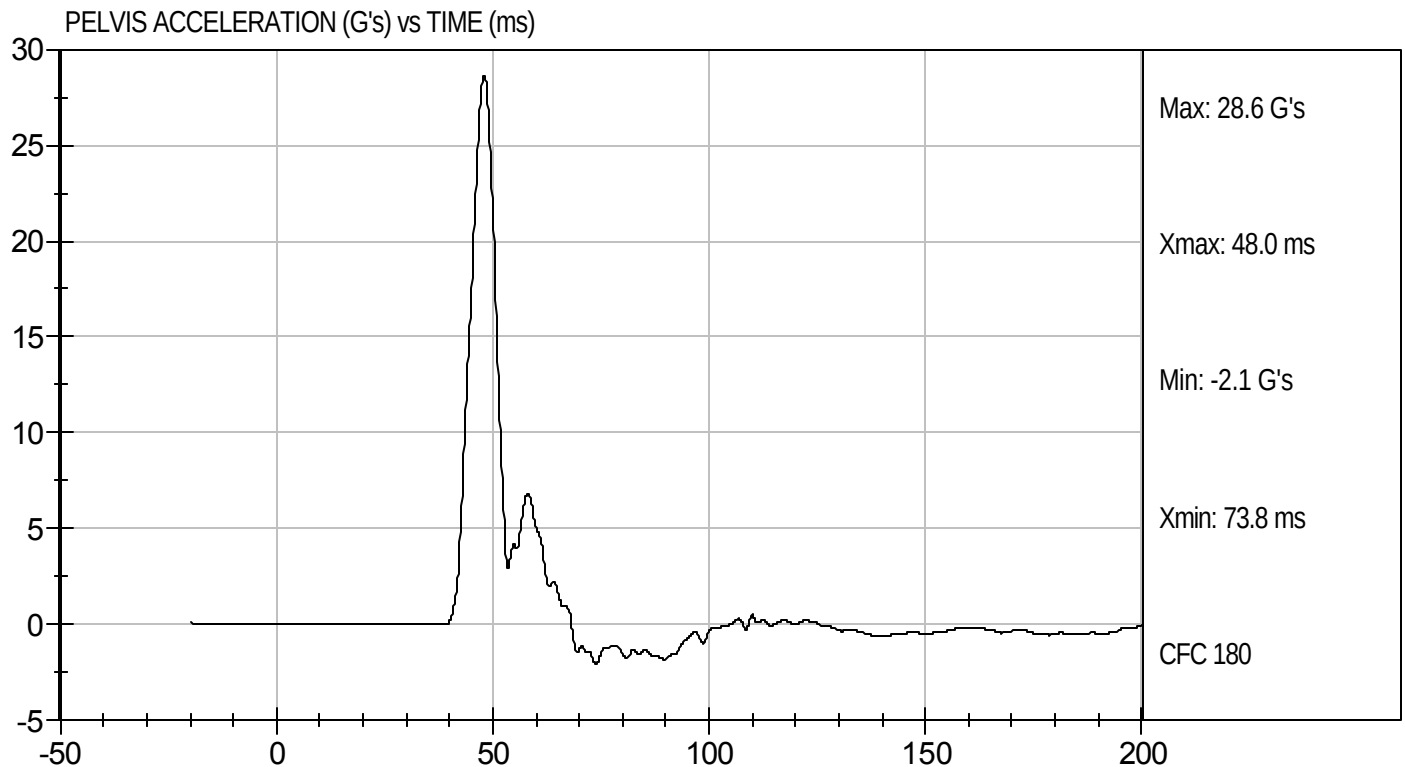
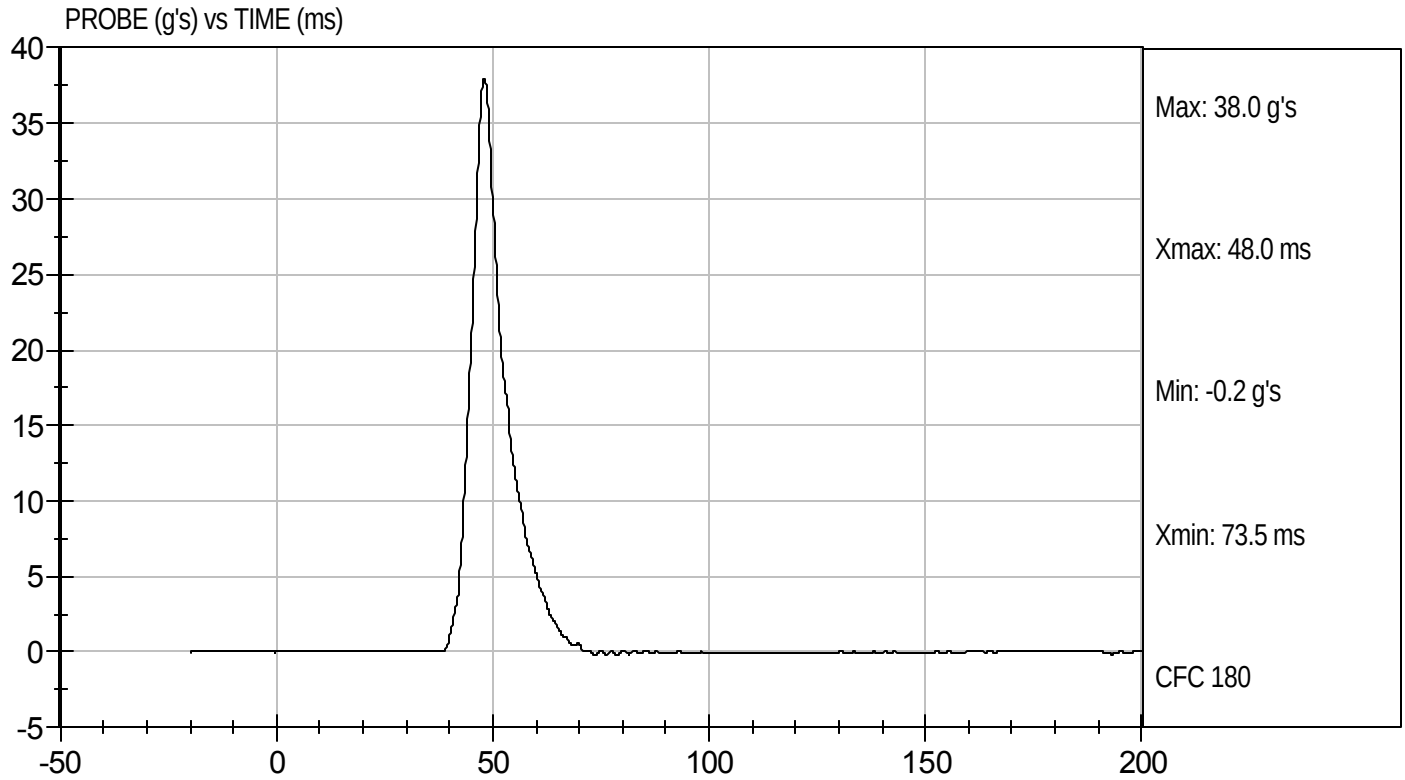
2/7/11
Test Date


Approved By



Test Desc: Iliac Impact
Component ID: D11418

Test Date: 2/7/11
Velocity: 14.25 ft/s, 4.34 m/s





Test Desc: Iliac Impact
Component ID: D11418

Test Date: 2/7/11
Velocity: 14.25 ft/s, 4.34 m/s

