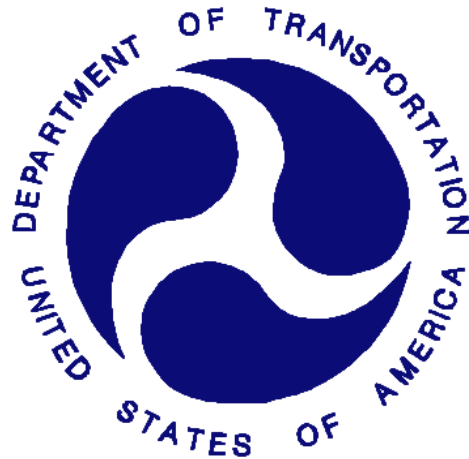


REPORT NUMBER: SINCAP-MGA-2012-061

**NEW CAR ASSESSMENT PROGRAM (NCAP)
Moving Deformable Barrier Side Impact Test**

**FUJI HEAVY INDUSTRIES LTD.
2012 Subaru Impreza 4-Dr Sedan
NHTSA No.: MC5504**

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



Test Date: February 14, 2012

Final Report Date: April 27, 2012

FINAL REPORT

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

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Prepared by: 
Donna Janovicz, Project Manager

Approved by: 
Ben Fischer, Project Engineer

Approval Date: April 27, 2012

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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		14. Sponsoring Agency Code NVS-111																																																					
15. Supplementary Notes																																																							
16. Abstract A 55/28 km/h 90° Moving Deformable Barrier NCAP Side Impact Test was conducted on the subject 2012 Subaru Impreza 4-Dr Sedan in accordance with the specifications of the Office of Crashworthiness Standards NCAP Side Laboratory Test Procedure for the generation of consumer information on vehicle side crash protection. The test was conducted at MGA Research Corporation, in Burlington, Wisconsin, on February 14, 2012. The impact velocity of the Moving Deformable Barrier (MDB) was 62.2 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle at the time of impact was 21.1°C. The target vehicle post-test maximum crush was 244 mm at level 2. The test vehicle's performance was as follows: <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th></th> <th colspan="3">Driver ATD (ES-2re)</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>158</td> </tr> <tr> <td>Maximum Thorax Rib Deflection</td> <td>mm</td> <td>44</td> <td>29</td> </tr> <tr> <td>Total Abdominal Force</td> <td>N</td> <td>2500</td> <td>958</td> </tr> <tr> <td>Pubic Symphysis Force</td> <td>N</td> <td>6000</td> <td>2083</td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th></th> <th colspan="3">Passenger 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>388</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td>Gs</td> <td>82</td> <td>80</td> </tr> <tr> <td>Total Pelvic Force (sum of acetabular and iliac forces)</td> <td>N</td> <td>5525</td> <td>4983</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td>mm</td> <td>38*</td> <td>39</td> </tr> <tr> <td>Maximum Abdomen Rib Deflection</td> <td>mm</td> <td>45*</td> <td>34</td> </tr> </tbody> </table> *Proposed IARV 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 (ES-2re)			Measurement Description	Units	Threshold	Result	Head Injury Criteria (HIC ₃₆)	N/A	1000	158	Maximum Thorax Rib Deflection	mm	44	29	Total Abdominal Force	N	2500	958	Pubic Symphysis Force	N	6000	2083		Passenger ATD (SID-IIs)			Measurement Description	Units	Threshold	Result	Head Injury Criteria (HIC ₃₆)	N/A	1000	388	Resultant Lower Spine Acceleration	Gs	82	80	Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	4983	Maximum Thoracic Rib Deflection	mm	38*	39	Maximum Abdomen Rib Deflection	mm	45*	34
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SECTION 1

TEST PURPOSE AND PROCEDURE

This moving deformable barrier side impact test is part of the MY 2012 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 2012 Subaru Impreza 4-Dr Sedan. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Side NCAP Laboratory Test Procedure dated August 2011.

SECTION 2 SUMMARY OF TEST RESULTS

A 2012 Subaru Impreza 4-Dr Sedan was impacted on the left (driver's) side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 62.2 km/h (38.6 mph). The target vehicle was stationary and was positioned at an angle of 63° to the line of forward motion. The side impact test was conducted by MGA Research Corporation in Burlington, Wisconsin, on February 14, 2012. Pretest and post test photographs of the test vehicle, the MDB, and the dummies (ES-2re and SID-IIs) are included in this report.

Dummies were placed in the driver and left rear designated seating positions according to instructions specified in the OCWS NCAP Side Laboratory Test Procedure dated August 2011. The side impact event was documented by eleven (11) cameras. Camera locations are included in this report.

The dummies were instrumented in the following manner:

DRIVER ATD (ES-2re)

Primary and Redundant Head CG Triaxial Accelerometers
Chest Upper Rib, Middle Rib, and Lower Rib Y-Axis Displacement Potentiometers
Abdomen Forward, Middle, and Rear Y-Axis Load Cells
Lower Spine (T12) Triaxial Accelerometers
Pubic Symphysis Y-Axis Load Cell

PASSENGER ATD (SID-IIs)

Primary and Redundant Head CG Triaxial Accelerometers
Chest Upper Rib, Middle Rib, and Lower Rib Y-Axis Displacement Potentiometers
Abdomen Upper Rib and Lower Rib Y-Axis Displacement Potentiometers
Lower Spine (T12) Triaxial Accelerometers
Acetabulum and Iliac Wing Y-Axis Load Cells

Appendix B contains the dummy response data. Dummy configuration and performance verification data can be found in Appendix C of this report. Appendix D contains the test equipment and instrumentation calibration data.

Dummy Injury readings were recorded as follows:

DUMMY INJURY VALUES

Measurement Description	Driver ATD (ES-2re)		
	Units	Threshold	Result
Head Injury Criteria (HIC ₃₆)	N/A	1000	158
Maximum Thorax Rib Deflection	mm	44	29
Total Abdominal Force	N	2500	958
Pubic Symphysis Force	N	6000	2083

Measurement Description	Passenger ATD (SID-IIs)		
	Units	Threshold	Result
Head Injury Criteria (HIC ₃₆)	N/A	1000	388
Resultant Lower Spine Acceleration	Gs	82	80
Total Pelvic Force	N	5525	4983
Maximum Thoracic Rib Deflection	mm	38*	39
Maximum Abdomen Rib Deflection	mm	45*	34

*Proposed IARV

Supplemental restraint information is given below:

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Struck Side Driver		Struck Side Rear Passenger	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	No		
Knee Airbag	Yes	No		
Side Curtain Airbag	Yes	Yes	Yes	Yes
Side Torso/Abdomen/Pelvis Airbag	Yes	Yes	No	
Seat Belt Pretensioner	Yes	Yes	No	
Seat Belt Load Limiter	Yes		No	
Other				

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
- Left Mid A-Post Y after 2ms
- Left Lower B-Post Y after 3ms
- Left Mid B-Post Y after 3ms

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

SECTION 3
OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2012 Subaru Impreza 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No. MC5504
 Test Date: 2/14/2012

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	MC5504	Traction Control System (TCS)	No
Model Year	2012	Auto-Leveling System	No
Make	Subaru	Automatic Door Locks (ADL)	No
Model	Impreza	Power Window Auto-Reverse	No
Body Style	Sedan	Other Optional Feature	N/A
VIN	JF1GJAA60CH005585	Driver Front Airbag	Yes
Body Color	Ice Silver Metallic	Driver Curtain Airbag	Yes
Odometer Reading (km/mi)	77 / 48	Driver Head/Torso Airbag	No
Engine Displacement (L)	2.0	Driver Torso Airbag	No
Type/No. Cylinders	4	Driver Torso/Pelvis Airbag	Yes
Engine Placement	Longitudinal	Driver Pelvis Airbag	No
Transmission Type	Automatic	Driver Knee Airbag	Yes
Transmission Speeds	Continuous	Rear Pass. Curtain Airbag	Yes
Overdrive	No	Rear Pass. Head/Torso Airbag	No
Final Drive	AWD	Rear Pass. Torso Airbag	No
Roof Rack	No	Rear Pass. Torso/Pelvis Airbag	No
Sunroof/T-Top	No	Rear Pass. Pelvis Airbag	No
Running Boards	No	Driver Seat Belt Pretensioner	Yes
Tilt Steering Wheel	Yes	Rear Pass. Seat Belt Pretensioner	No
Power Seats	No	Driver Load Limiter	Yes
Anti-Lock Brakes (ABS)	Yes	Rear Pass. Load Limiter	No
All Wheel Drive (AWD)	Yes	Other Safety Restraint	N/A
Does owner's manual provide instruction to turn off automatic door locks?			N/A

DATA FROM CERTIFICATION LABEL

Manufactured By	Fuji Heavy Industries Ltd.	GVWR (kg)	1950
Date of Manufacture	10/11	GAWR Front (kg)	990
Vehicle Type	Passenger Car	GAWR Rear (kg)	1000

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	2	3		5	(A)
Capacity Weight (VCW) (kg)				385	(B)
DSC x 68.04 kg				340	(A-B)
Rated Cargo and Luggage Weight (RCLW)				45	

VEHICLE SEAT TYPE

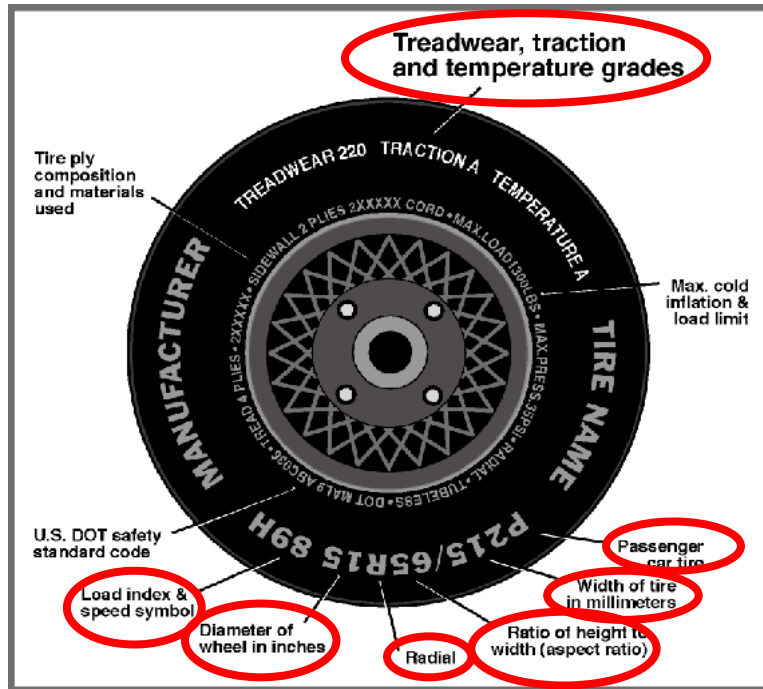
Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						Manual	Power
Front Seat	X					w/lever	
Rear or Second Row			X		X		
Third Row Seat							

DATA SHEET NO. 1 (CONTINUED)
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2012 Subaru Impreza 4-Dr Sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No. MC5504
Test Date: 2/14/2012

VEHICLE TIRE INFORMATION



TIRE PLACARD INFORMATION

Measured Parameter	Front	Rear
Recommended Cold Tire Pressure (kPa)	230	220
Recommended Tire Size	P195/65R15	P195/65R15

TIRE SIDEWALL INFORMATION

Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	275	275
Tire Size on Vehicle	P195/65R15	P195/65R15
Tire Manufacturer	Yokohama	Yokohama
Tire Name	AVID S33	AVID S33
Tire Type	Passenger	Passenger
Tire Width	195	195
Aspect Ratio	65	65
Radial	Yes	Yes
Wheel Diameter	15	15
Load Index/Speed Symbol	89H	89H
Treadwear	200	200
Traction Grade	B	B
Temperature Grade	A	A
Tire Material	Rubber	Rubber

DATA SHEET NO. 1 (CONTINUED)
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2012 Subaru Impreza 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No. MC5504
 Test Date: 2/14/2012

TEST PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kpa	230	230	220	220
Tire Placard	kpa	230	230	220	220
Owner's Manual	kpa				
As Tested	kpa	230	230	220	220

MDB TIRE SPECIFICATIONS

	Requirement	Units	LF	RF	LR	RR
Tire Size	P205/75R15	N/A	P205/75R15	P205/75R15	P205/75R15	P205/75R15
Tire	200 ± 21	kpa	220	220	220	220

TEST VEHICLE AXLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	408.3	283.0		453.6	344.7		455.0	358.8	
Right	kg	411.4	259.5		409.1	322.1		407.3	314.3	
Ratio	%	60.2	39.8		56.4	43.6		56.2	43.8	
Totals	kg	819.7	542.5	1362.2	862.7	666.8	1529.5	862.3	673.1	1535.4

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1362.2	(A)
Sum of Actual Weight of 2 P572 ATDs Used	kg	129.3	(B)
Rated Cargo/Luggage Weight (RCLW)	kg	45	(C)
Calculated Vehicle Target Weight (TVTW)	kg	1536.5	(A+B+C)

Does the measured As Tested Vehicle Weight lie within the required weight range (i.e. Calculated Test Vehicle Target Weight – 4.5 kg to 9 kg)? **YES**

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Weight of Ballast, if any	22.7
Spare tire, jack & tools, right taillight, trunk carpet.	20.4

DATA SHEET NO. 1 (CONTINUED)
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2012 Subaru Impreza 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No. MC5504
 Test Date: 2/14/2012

TEST VEHICLE ATTITUDES AND CG

	Units	Fully Loaded	As Tested	Meets Requirement***
Left Front	mm	663	664	Yes
Right Front	mm	673	671	Yes
Right Rear	mm	660	653	Yes
Left Rear	mm	640	645	Yes
Vehicle CG (Aft of Front Axle)	mm	1163	1157	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	46	34	

*** The "As Tested" vehicle attitude measurements must be equal to or within ± 10 mm of the "Fully Loaded" vehicle attitude measurements at each wheel well.

DATA SHEET NO. 2
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEM DATA

Test Vehicle: 2012 Subaru Impreza 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No. MC5504
 Test Date: 2/14/2012

SEAT POSITIONING

The driver's seat, front center seat (if applicable), and right front passenger's seat should be set to the mid-track, lowest, mid-angle position. The struck-side rear passenger's seat, rear center seat, and non-struck side rear passenger's seats should be set to the rear-most, lowest, mid-angle position.

SCRL ANGLE RANGE

Seat	SCRL (°)		
	Max	Min	Mid
Driver Seat	16.4	12.4	14.4
Front Passenger Seat	Fixed	Fixed	Fixed
Front Center Seat			
Struck Side Rear Seat	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed

SEAT HEIGHT AND ANGLE

Seat	As Tested SCRL Angle (Mid) (°)	As Tested SCR Height (mm)	SCR Height Position	SCR Height (mm)		
				Rear- most	Mid- Fore/Aft	Forward- Most
Driver Seat	14.4	Fixed	Max	Fixed	Fixed	Fixed
	14.4	Fixed	Mid	Fixed	Fixed	Fixed
	14.4	Fixed	Min	Fixed	Fixed	Fixed
Front Passenger Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
	Fixed	Fixed	Mid	Fixed	Fixed	Fixed
	Fixed	Fixed	Min	Fixed	Fixed	Fixed
Front Center Seat			Max			
			Mid			
			Min			
Struck Side Rear Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
	Fixed	Fixed	Mid	Fixed	Fixed	Fixed
	Fixed	Fixed	Min	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
	Fixed	Fixed	Mid	Fixed	Fixed	Fixed
	Fixed	Fixed	Min	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
	Fixed	Fixed	Mid	Fixed	Fixed	Fixed
	Fixed	Fixed	Min	Fixed	Fixed	Fixed

DATA SHEET NO. 2 (CONTINUED)
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEM DATA

Test Vehicle: 2012 Subaru Impreza 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

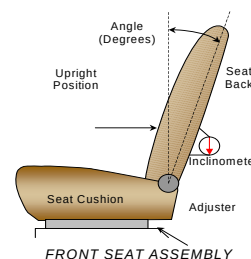
NHTSA No. MC5504
 Test Date: 2/14/2012

SEAT FORE/AFT POSITIONS

Seat	Total Fore/Aft Travel		Test Position from Forward-most Position	
	mm	Detents	mm	Detent
Driver Seat	240	25 (1 st as 1)	120	12 th (1 st as 0)
Front Passenger Seat	240	25 (1 st as 1)	120	12 th (1 st as 0)
Front Center Seat				
Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Non-Struck Side	Fixed	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed	Fixed

SEAT BACK ANGLE ADJUSTMENT

The driver's seat back is positioned to the manufacturer's designated design angle. The front passenger's seat back is positioned in a similar manner as the driver's seat back. The struck side rear seat back is fixed. The rear center and non-struck side rear outboard seat backs are also fixed.



Seat	Total Seat Back Angle Range		Test Position from Vertical	
	Degrees	Detents	Degrees	Detent
Driver Seat w/Seated Dummy	60.0		-1.5	5 th (1 st as 0)
Front Passenger Seat	57.8		-1.3	5 th (1 st as 0)
Front Center Seat				
Struck Side Rear Seat	Fixed	Fixed	8.9*	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	8.9*	Fixed
Rear Center Seat	Fixed	Fixed	8.9*	Fixed

*Seat back was fixed, angle measured on top of headrest post guide.

DATA SHEET NO. 2 (CONTINUED)
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEM DATA

Test Vehicle: 2012 Subaru Impreza 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No. MC5504
 Test Date: 2/14/2012

SEAT BELT ANCHORAGE ADJUSTMENT

Seat belt anchorages are adjusted in accordance with the information provided by the manufacturer on Form No. 1.

	Total # of Positions	Placed in Position #
Driver Seat	4 detents (1 st as 1)	1 (uppermost as 0)
Rear Seat	Fixed	Not Applicable

HEAD RESTRAINT ADJUSTMENT

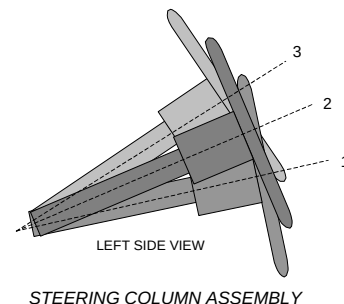
The driver's head restraint is adjusted to the highest and most full forward in-use position. The struck-side rear passenger's head restraint is adjusted to the lowest and most full forward in-use position.

	Total # of Positions	Placed in Position #
Driver Seat	3	Highest and Full-Forward
Rear Seat	Fixed	Not Applicable

STEERING COLUMN ADJUSTMENT

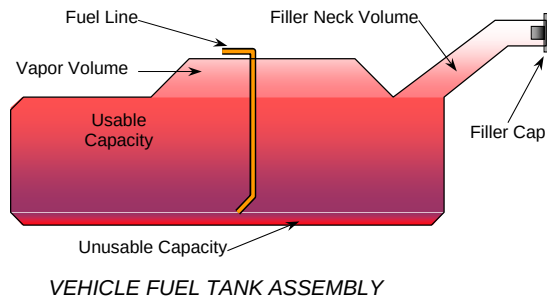
Steering wheel and column adjustments are made so that the steering wheel geometric locus is described when it moves through its full range of motion.

	Degrees	Fore/Aft Position (mm)
Lowermost, Position 1	68.3	219
Geometric Center, Position 2	66.8	199
Uppermost, Position 3	65.3	179
Telescoping Steering Wheel Travel		40
Test Position	66.8	199



FUEL PUMP

Describe the fuel pump type, details about how it operates and the location of the fuel filler pipe.
The vehicle is equipped with an electric fuel pump. Pump operates a few seconds after an ignition switch is turned ON. After that, pump operates only while engine is running. The fuel pipe is on the right side.



DATA SHEET NO. 2 (CONTINUED)
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEM DATA

Test Vehicle: 2012 Subaru Impreza 4-Dr Sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No. MC5504
Test Date: 2/14/2012

FUEL TANK CAPACITY DATA

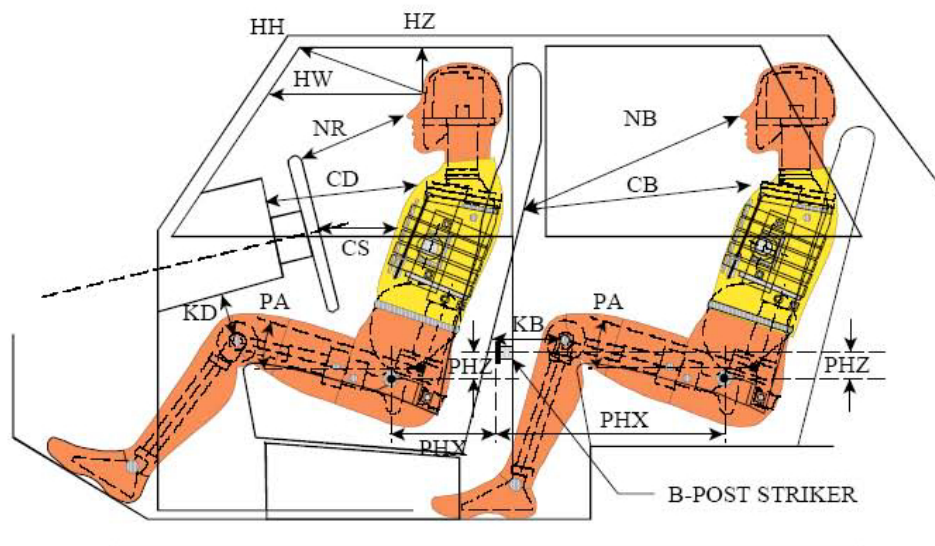
	Liters
Usable Capacity of "Standard" Tank (see Form No. 1)	54.9
Usable Capacity of "Optional" Tank (see Form No. 1)	
Usable Capacity of Standard Tank as Specified in Owner's Manual	55.0
Usable Capacity of Optional Tank as Specified in Owner's Manual	
93% of Usable Capacity	51.1
Actual Amount of Solvent Used	51.1
1/3 of Usable Capacity	18.3

Is the actual amount of solvent used in the test equal to 93% $\pm$ 1%
of the Usable Capacity stated in Form No. 1? **YES**

DATA SHEET NO. 3 DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2012 Subaru Impreza 4-Dr Sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No. MC5504
Test Date: 2/14/2012



LEFT SIDE VIEW

NOTE: 2-DOOR VEHICLE SHOWN.
REAR DUMMY PHX & PHZ
MEASUREMENTS FOR A 4-DOOR
VEHICLE WOULD USE THE C-POST
STRIKER AS A REFERENCE POINT

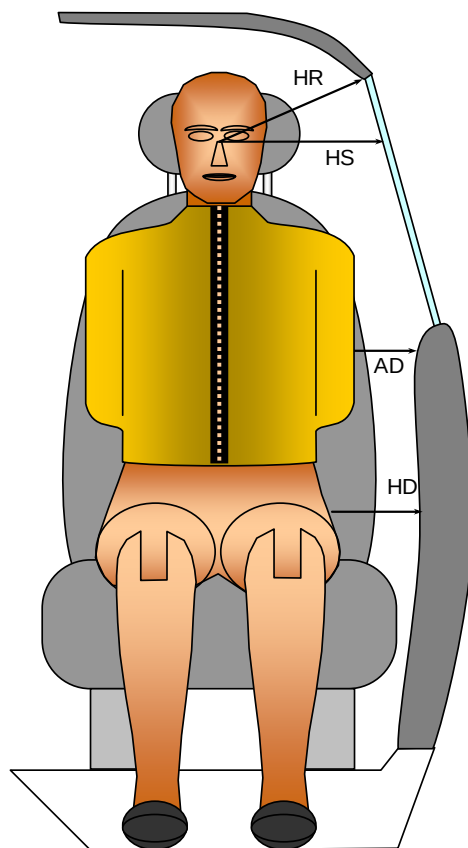
DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Pass. Code	Measurement Description	Driver S/N 032		Passenger S/N 296	
			Length (mm)	Angle(°)	Length (mm)	Angle(°)
HH		Head to Header	286	19.6		
HW		Head to Windshield	562			
HZ	HZ	Head to Roof Liner	139		247	
NR	NB	Nose to Rim/Seat Back	409	14.5	553	12.3
CD	CB	Chest to Dashboard/Seat Back	533	4.7	549	7.0
CS		Chest to Steering Wheel	326	11.8		
KDL	KBL	Left Knee to Dash/Seat Back	171	32.5	299	22.3
KDR	KBR	Right Knee to Dash/Seat Back	155	33.0	296	22.7
PAX	PAX	Pelvic Tilt Angle X		20.0		21.3
	PAY	Pelvic Tilt Angle Y		-1.6		-0.4
PHX	PHX	Hip Point to Striker (X-Axis)	219		310	
PHZ	PHZ	Hip Point to Striker (Z-Axis)	193		301	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2012 Subaru Impreza 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No. MC5504
 Test Date: 2/14/2012



FRONT VIEW OF DUMMY

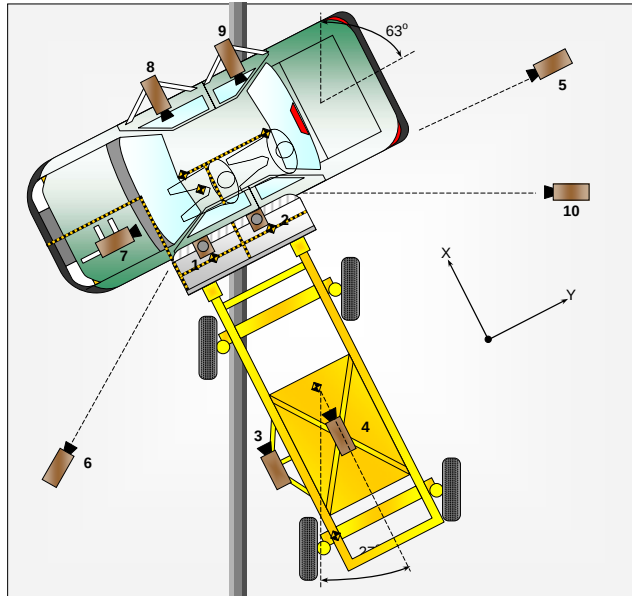
DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver S/N 032	Passenger S/N 296
HR	Head to Side Header	mm	197	240
HS	Head to Side Window	mm	313	359
AD	Arm to Door	mm	98	152
HD	Hip Point to Door	mm	162	164

DATA SHEET NO. 5 CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2012 Subaru Impreza 4-Dr Sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No. MC5504
Test Date: 2/14/2012



CAMERA LOCATIONS AND DATA

No.	Camera View	Coordinates (mm)			Lens Length (mm)	Operating Frame Rate (fps)
		X*	Y*	Z*		
1	Overhead Overall	100	590	-4860	14	1000
2	Overhead Close-Up	100	470	-4860	20	1000
3	Left Impact Point (MDB)				50	1000
4	Side Overall (MDB)				16	1000
5	Rear	90	4510	-1080	24	1000
6	Left Front	2190	-4210	-1090	24	1000
7	Driver Front (OB)				16	1000
8	Driver Side (OB)				8	1000
9	Passenger Side (OB)				8	1000
10	Real Time Left Rear					30
11	Real Time Inrun					30

Reference: Impact Point projected to Ground; +X = To Front of MDB, + Y = To Right of MDB, +Z = Down

* All measurements accurate to ± 6 mm

Explain why camera(s) did not operate as intended: Not Applicable

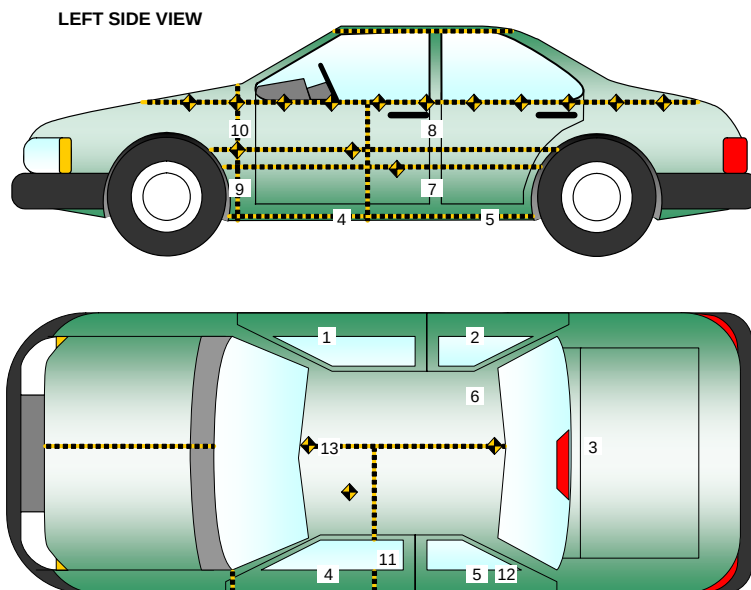
INSTRUMENTATION

Driver Dummy Channels	16
Passenger Dummy Channels	16
Vehicle Structure Accelerometers	23
MDB Accelerometers	5
MDB Contacts	2
Total	62

DATA SHEET NO. 6 **TEST VEHICLE ACCELEROMETER LOCATIONS**

Test Vehicle: 2012 Subaru Impreza 4-Dr Sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No. MC5504
Test Date: 2/14/2012



TEST VEHICLE ACCELEROMETER LOCATIONS

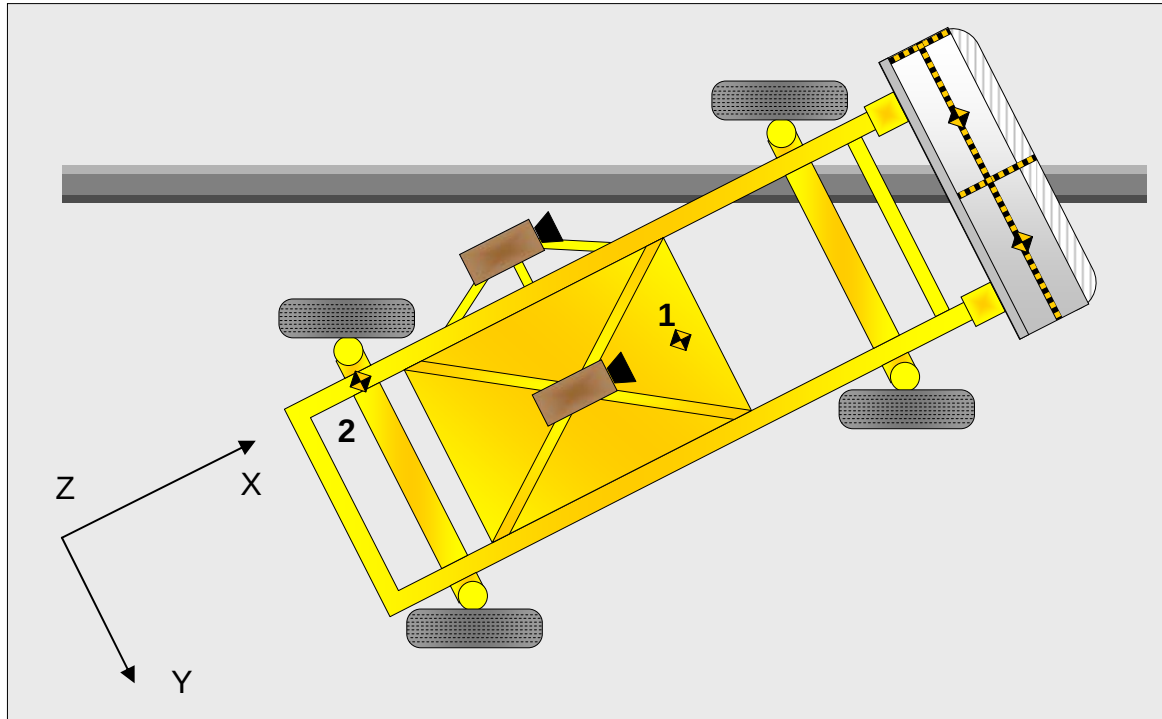
Accelerometer Location				
No.	ID	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2544	200	-188
2	Right Sill at Front Seat	2281	725	-160
3	Right Sill at Rear Seat	1539	725	-165
4	Left Sill at Front Door	2590	-722	-155
5	Left Sill at Rear Door	1528	-725	-165
6	Left Lower A-Post	3093	-689	-426
7	Left Middle A-Post	3156	-750	-709
8	Left Lower B-Post	1968	-711	-440
9	Left Middle B-Post	1968	-687	-703
10	Front Seat Track	2362	-529	-295
11	Rear Seat Structure	1749	-365	-316
12	Rt. Rear Occ. Compartment	1810	362	-210
13	Engine Block	3841	-86	-792
14	Rear Above Axle	839	0	-447

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

DATA SHEET NO. 7
MDB ACCELEROMETER LOCATIONS

Test Vehicle: 2012 Subaru Impreza 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No. MC5504
 Test Date: 2/14/2012



MDB ACCELEROMETER LOCATIONS

Loc. No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	MDB CG	-1105	0	-330
2	MDB Rear	-2580	-650	-625

Reference: X - MDB Face (+ forward)
 Y - MDB Centerline (+ to right)
 Z - Ground Plane (+ down)

DATA SHEET NO. 8
POST-TEST OBSERVATIONS

Test Vehicle: 2012 Subaru Impreza 4-Dr Sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No. MC5504
Test Date: 2/14/2012

TEST DUMMY INFORMATION AND CONTACT POINTS

Description	Front Seat Dummy (ES-2re)	Rear Seat Dummy (SID-IIs)
Face	Curtain Airbag	Curtain Airbag
Top of Head	Headliner	Curtain Airbag, Headliner, Center Headrest
Left Side of Head	Curtain Airbag, Headliner	Curtain Airbag
Back of Head	Curtain Airbag, Headliner, Headrest	Curtain Airbag, Headliner, Center Headrest
Left Shoulder	Curtain Airbag, Side Airbag	Door Panel
Upper Torso	Side Airbag, Seatback	Door Panel
Lower Torso	Side Airbag, Seatback	Door Panel
Left Hip	Side Airbag, Door Panel, Seat Cushion	Door Panel, Seat Cushion
Left Knee	Door Panel	Door Panel

POST-TEST DOOR PERFORMANCE

Description	Struck Side		Non-Struck Side		Rear Hatch/ Other Door
	Front	Rear	Front	Rear	
Remained Closed and Operational	No	No	Yes	Yes	Yes
Total Separation from Vehicle at Hinges or Latches	No	No	No	No	No
Latch or Hinge Systems Pulled Out of Their Anchorages	No	No	No	No	No
Disengaged from Latched Position	No	No	No	No	No
Latch Separated from Striker	No	No	No	No	No
Jammed Shut	Yes	Yes	No	No	No
If Door Opened at Striker, Record Width of Opening at Striker (mm)	N/A	N/A	N/A	N/A	N/A

POST-TEST SEAT PERFORMANCE

Description	Struck Side		Non-Struck Side	
	Front	Rear	Front	Rear
Seat Movement Along Seat Track	No	No	No	No
Seat Disengagement from Floor Pan	No	No	No	No
Seat Back Movement from Initial Position	No	No	No	No
Seat Back Collapse	No	No	No	No

POST-TEST STRUCTURAL OBSERVATIONS

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

DATA SHEET NO. 8 (CONTINUED)
POST-TEST OBSERVATIONS

Test Vehicle: 2012 Subaru Impreza 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No. MC5504
 Test Date: 2/14/2012

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Struck Side Driver		Struck Side Rear Passenger	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	No		
Knee Airbag	Yes	No		
Side Curtain Airbag	Yes	Yes	Yes	Yes
Side Torso/Abdomen/Pelvis Airbag	Yes	Yes	No	
Seat Belt Pretensioner	Yes	Yes	No	
Seat Belt Load Limiter	Yes		No	
Other				

IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vehicle Wheel Base	mm		2654
Vertical Impact Reference Line (Aft of Front Axle) (Intended Impact Point)	mm		387
Actual Impact Point (Aft of Front Axle)	mm		400
Horizontal Offset (+forward / -rearward)	mm	+/- 50 of intended impact point	-13
Vertical Offset (+down / -up)	mm	+/- 20 of intended impact point	0

DATA SHEET NO. 9
MDB SUMMARY OF RESULTS

Test Vehicle: 2012 Subaru Impreza 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No. MC5504
 Test Date: 2/14/2012

MDB SPECIFICATIONS

Measurement Description	Length (mm)
Overall Width of Framework Carriage	1252
Overall Length Including Honeycomb Face	4115
Wheelbase of Framework Carriage	2592
CG Location aft of Front Axle	1129

MDB WEIGHTS

	Units	Front Axle	Rear Axle	Total
Left	kg	411.8	281.6	
Right	kg	356.8	311.3	
Ratio	%	56.5	43.5	
Totals	kg	768.6	592.9	1361.5

SPEED AND ANGLE AT IMPACT DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.1 to 62.7	62.2
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	61.9
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	90.0
MDB Forward Line of Motion to Target Vehicle CL	degrees	62.5 to 63.5	63.2
MDB Crabbed Angle to MDB Forward Line of Motion	degrees	26 to 28	26.8

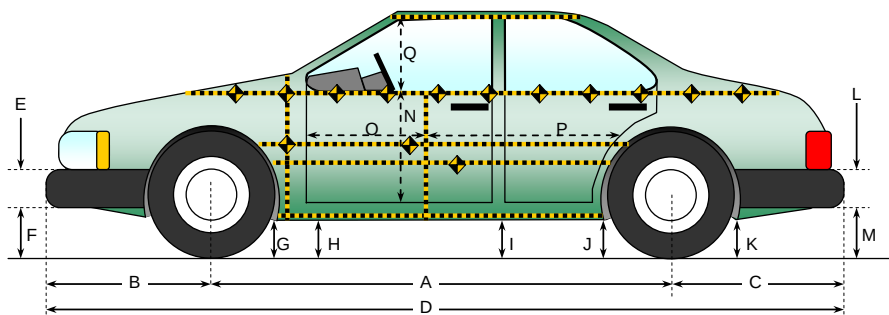
MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE

Vertical Location			From Centerline		Maximum Crush
Row	Description	Height	Distance	Direction	
A	Center of Bumper	432	800	Right	170
B	Top of Bumper	533	800	Left	75
C	Mid-Level	686	800	Left	115
D	Top of Stack	813	800	Left	134

DATA SHEET NO. 10
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2012 Subaru Impreza 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No. MC5504
 Test Date: 2/14/2012



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

LEFT SIDE VIEW

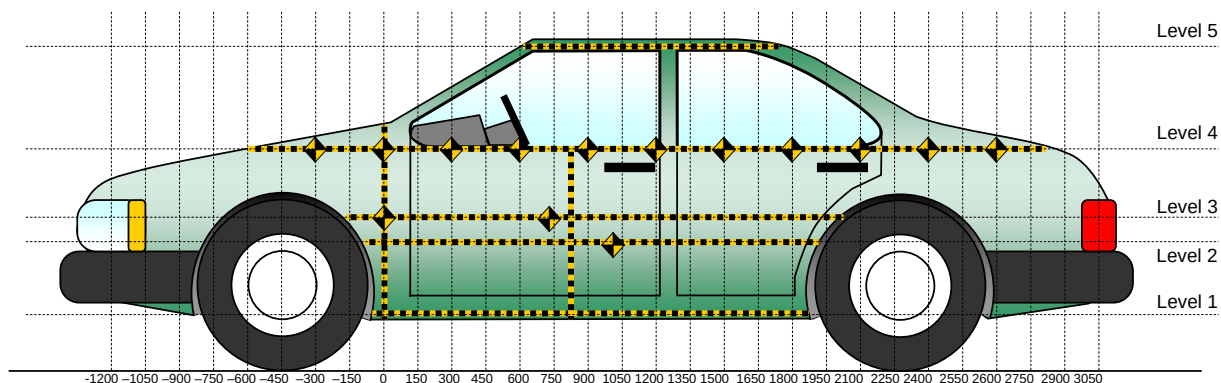
VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2654	2647	7
B	Front Axle to FSOV	938	967	-29
C	Rear Axle to RSOV	988	978	10
D	Total Length at Centerline	4580	4592	-12
E	Front Bumper Thickness	120	120	0
F	Front Bumper Bottom to Ground	207	208	-1
G	Sill Height at Front Wheel Well	136	171	-35
H	Sill Height at Front Door Leading Edge	137	173	-36
I	Sill Height at B Pillar	132	170	-38
J1	Sill Height at Rear Wheel Well	127	159	-32
J2	Pinch Weld Height at Rear Wheel Well	129	163	-34
K	Sill Height Aft of Rear Wheel Well	200	200	0
L	Rear Bumper Thickness	80	80	0
M	Rear Bumper Bottom to Ground	300	314	-14
N	Sill Height to Window Bottom Sill	716	638	78
O	Front Door Leading Edge to Impact CL	769	716	53
P	Rear Door Trailing Edge to Impact CL	1143	1088	55
Q	Front Window Opening	406	390	16
R	Right Side Length	3495	3492	3
S	Left Side Length	3495	3473	22
T	Vehicle Width at B Post	1741	1537	204

DATA SHEET NO. 11 **TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS**

Test Vehicle: 2012 Subaru Impreza 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No. MC5504
 Test Date: 2/14/2012



All Measurements Shown in mm

LEFT SIDE VIEW

MAXIMUM EXTERIOR CRUSH MEAUREMENTS

Level	Measurement Description	Height Above Ground (mm)	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	217	59	900
2	Occupant Hip Point	476	244	600
3	Mid Door	593	237	1800
4	Window Sill	876	208	1500
5	Window Top	1371	18	1350

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. 11 (CONTINUED)
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2012 Subaru Impreza 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No. MC5504
 Test Date: 2/14/2012

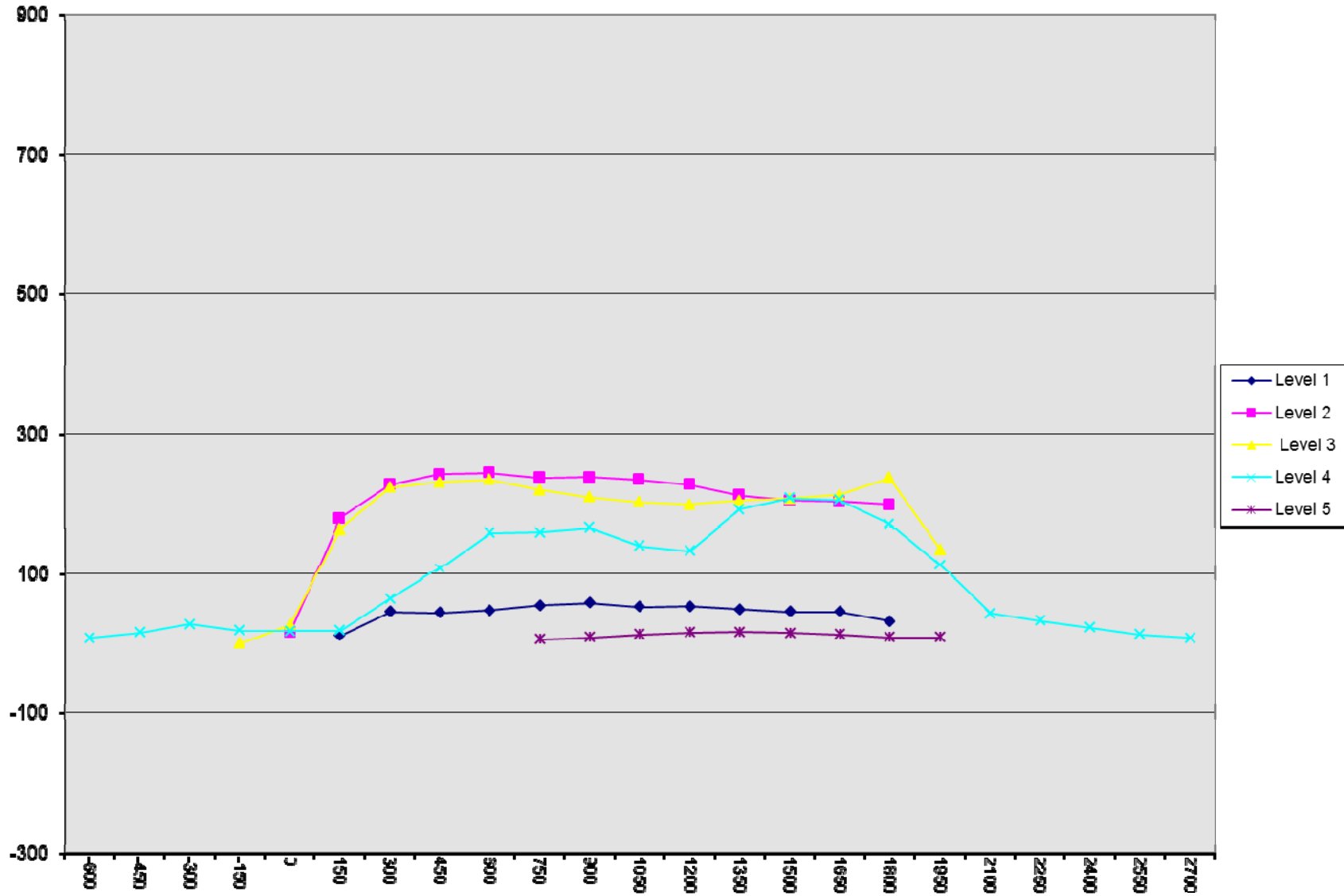
	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-600				351					360					9	
-450				326					343					17	
-300				311					340					29	
-150			232	306				234	326				2	20	
0		235	235	307			252	263	326			17	28	19	
150	275	239	237	303		288	418	401	323		13	179	164	20	
300	276	240	236	296		322	467	459	361		46	227	223	65	
450	277	239	235	290		322	481	466	398		45	242	231	108	
600	277	238	232	285		325	482	466	444		48	244	234	159	
750	277	238	231	278	504	332	475	451	438	511	55	237	220	160	7
900	277	238	230	274	496	336	476	439	440	506	59	238	209	166	10
1050	277	238	230	270	494	330	472	432	411	508	53	234	202	141	14
1200	277	241	232	268	494	331	468	431	402	511	54	227	199	134	17
1350	277	241	233	267	495	327	453	437	459	513	50	212	204	192	18
1500	277	242	235	267	496	323	446	442	475	512	46	204	207	208	16
1650	278	241	237	270	499	324	444	450	475	513	46	203	213	205	14
1800	275	237	236	272	507	308	436	473	443	517	33	199	237	171	10
1950			232	284	518			368	398	528			136	114	10
2100				284					328					44	
2250				287					321					34	
2400				293					317					24	
2550				303					317					14	
2700				314					323					9	

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 the test based on an estimated impact point.

DATA SHEET NO. 11 (CONTINUED)
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2012 Subaru Impreza 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

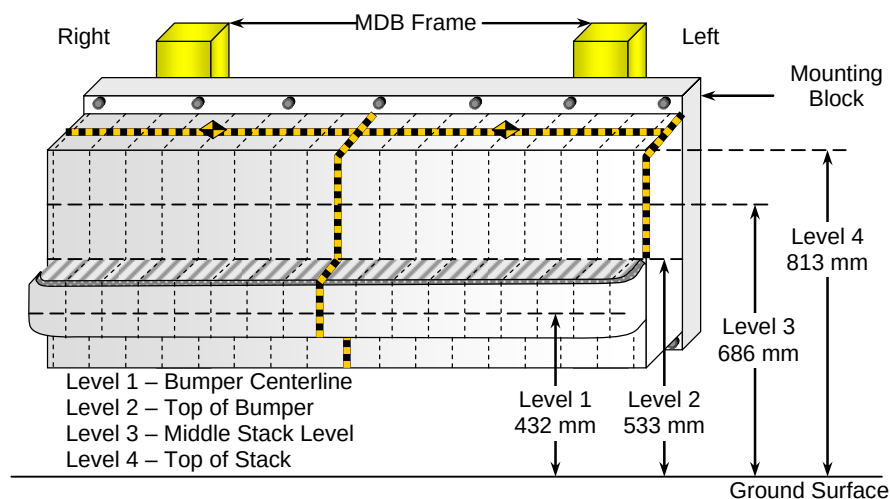
NHTSA No. MC5504
 Test Date: 2/14/2012



DATA SHEET NO. 12
MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle: 2012 Subaru Impreza 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No. MC5504
 Test Date: 2/14/2012



FRONT VIEW

DEFORMABLE BARRIER STATIC CRUSH

Stack Level	Distance Right of Center (mm)								C _L	Distance Left of Center (mm)							
	800	700	600	500	400	300	200	100		100	200	300	400	500	600	700	800
4	55	25	10	9	20	50	89	77	47	24	18	15	12	25	66	109	134
3	53	9	5	8	11	20	42	56	30	19	7	5	9	10	15	47	115
2	70	65	57	55	55	60	63	66	59	45	49	55	59	57	62	67	75
1	170	169	162	159	160	159	155	142	130	131	129	125	122	121	122	132	154

DATA SHEET NO. 13
FMVSS 301 FUEL SYSTEM INTEGRITY POST-IMPACT DATA

Test Vehicle: 2012 Subaru Impreza 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

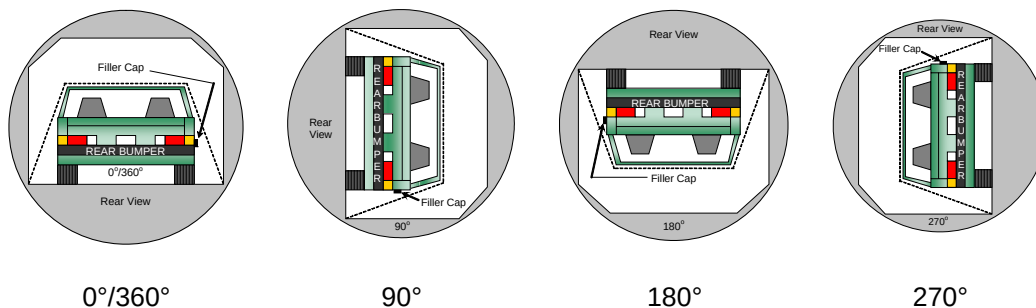
NHTSA No. MC5504
 Test Date: 2/14/2012

Test Time: 4:04 pm

Temperature: 21.1° C

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

FMVSS 301 STATIC ROLLOVER DATA



ROLLOVER SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	113	300	413
90° to 180°	108	300	408
180° to 270°	102	300	402
270° to 360°	118	300	418

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

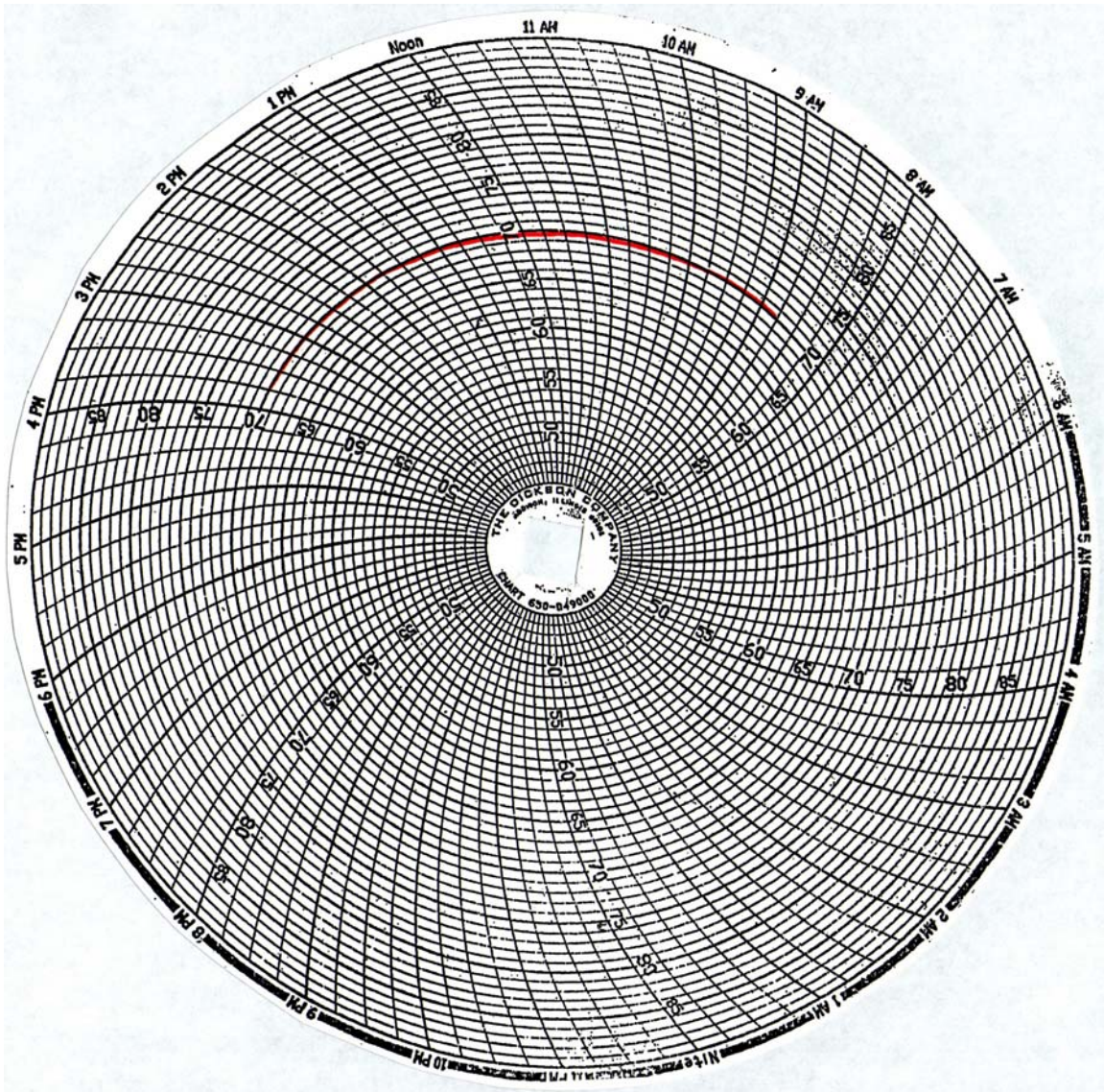
ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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

DATA SHEET NO. 14
DUMMY/VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION DATA

Test Vehicle: 2012 Subaru Impreza 4-Dr Sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No. MC5504
Test Date: 2/14/2012



APPENDIX A
PHOTOGRAPHS

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As Delivered Right Front Three-Quarter View of Test Vehicle



As Delivered Left Rear Three-Quarter View of Test Vehicle



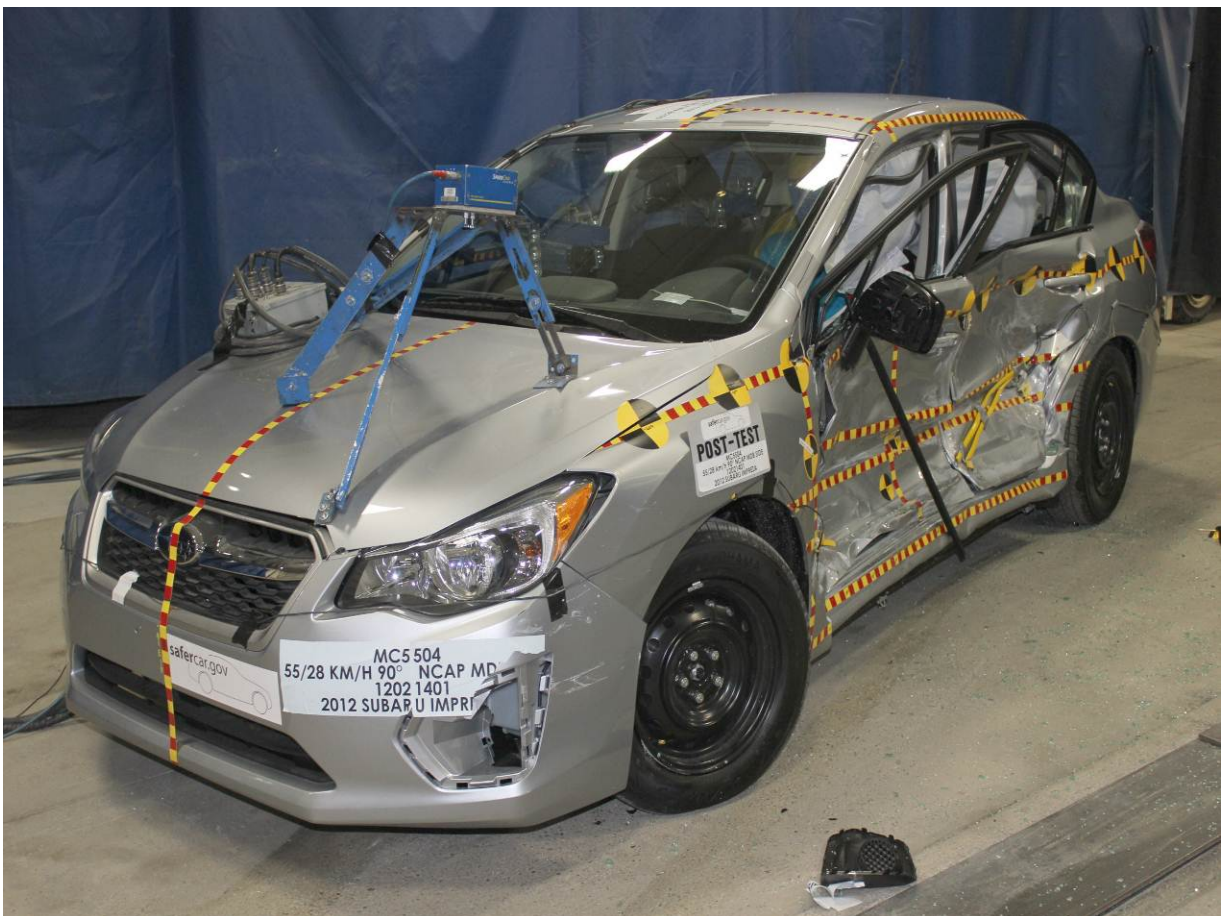
Pre-Test Frontal View of Test Vehicle



Post-Test Frontal View of Test Vehicle



Pre-Test Left Front Three-Quarter View of Test Vehicle



Post-Test Left Front Three-Quarter View of Test Vehicle



Pre-Test Left Side View of Test Vehicle



Post-Test Left Side View of Test Vehicle



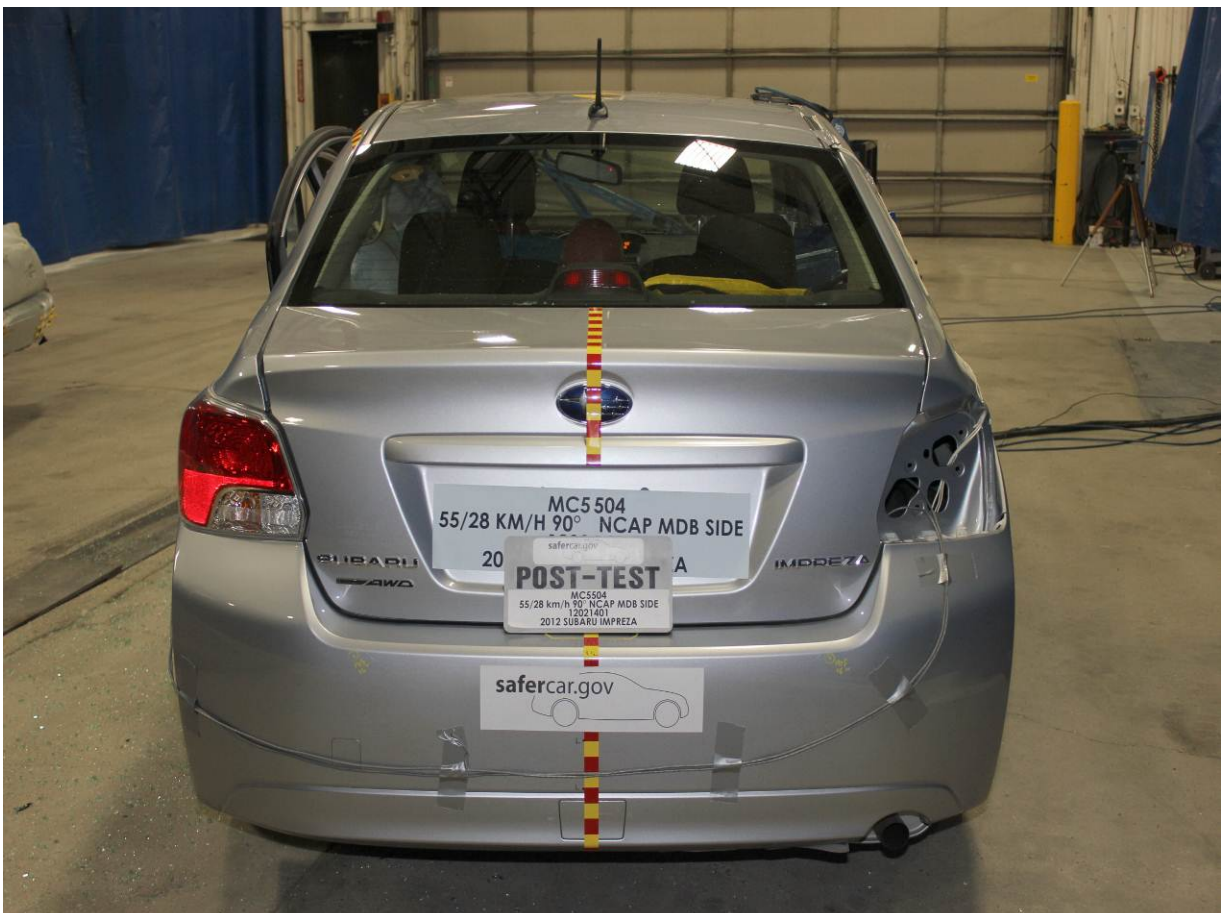
Pre-Test Left Three-Quarter Rear View of Test Vehicle



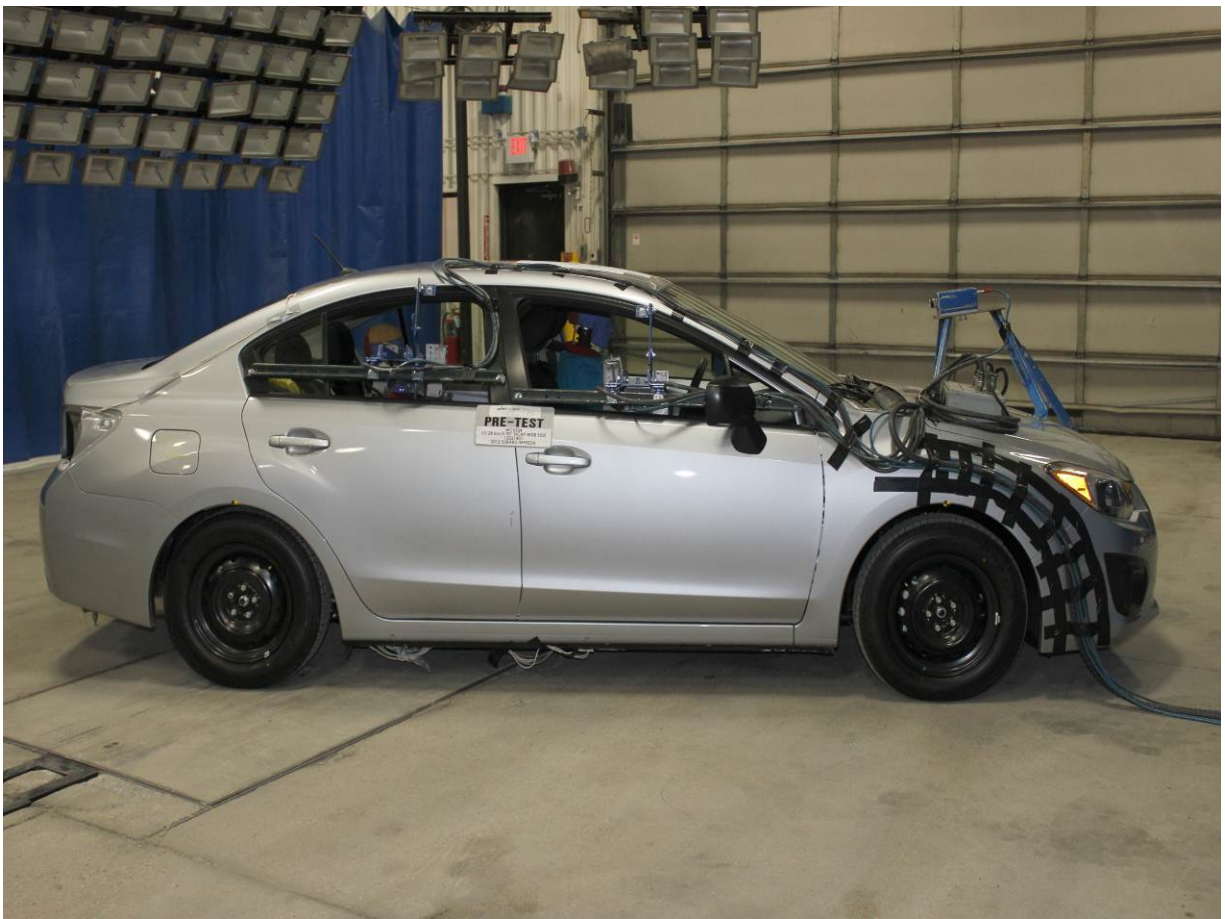
Post-Test Left Three-Quarter Rear View of Test Vehicle



Pre-Test Rear View of Test Vehicle



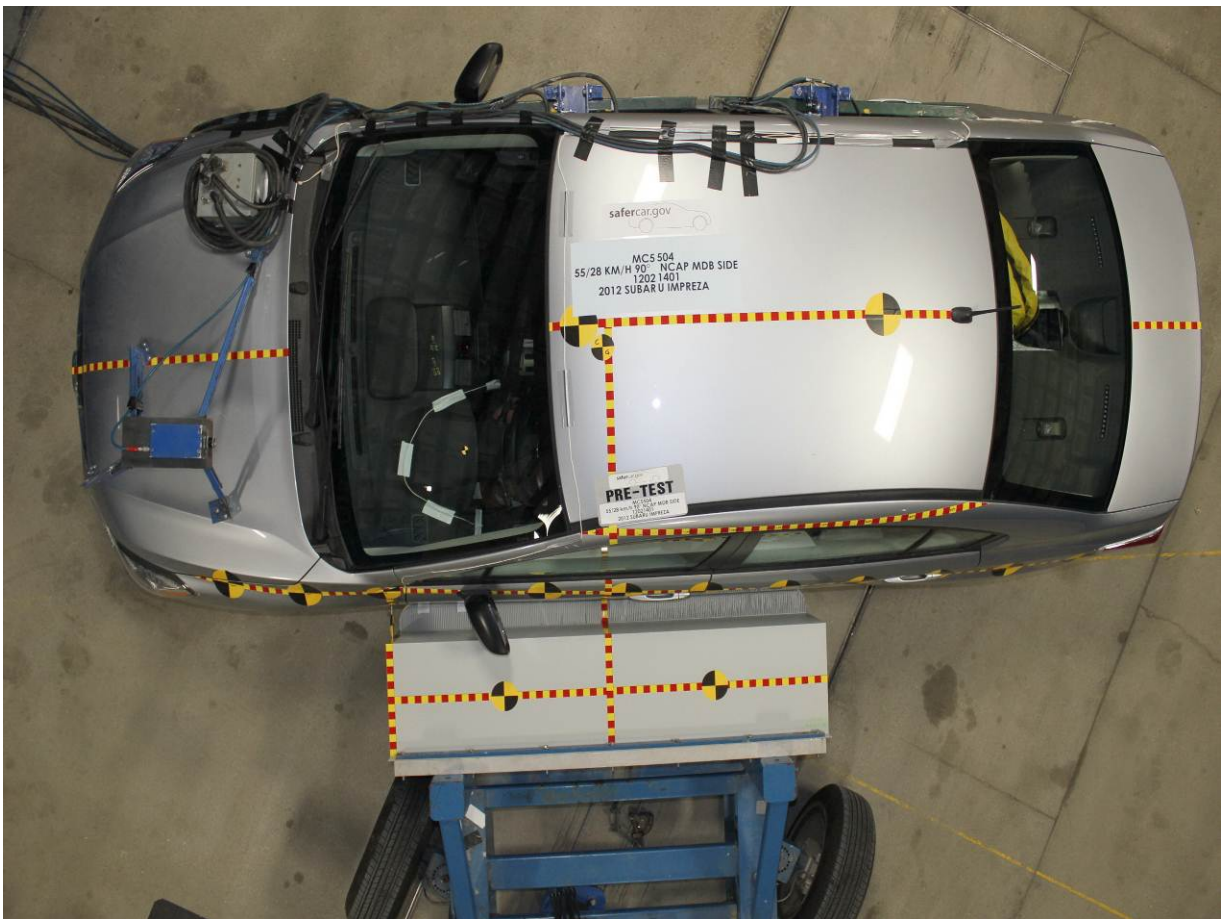
Post-Test Rear View of Test Vehicle



Pre-Test Right Side View of Test Vehicle



Post-Test Right Side View of Test Vehicle



Pre-Test Overhead View of Test Area



Post-Test Overhead View of Test Area



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



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



Pre-Test Close-Up View of Impact Point Target



Post-Test Close-Up View of Impact Point Target



Pre-Test Left Front Door Latch Close-Up



Post-Test Left Front Door Latch Close-Up



Pre-Test Left Rear Door Latch Close-Up



Post-Test Left Rear Door Latch Close-Up



Pre-Test Front Close-Up View of Driver Dummy



Post-Test Front Close-Up View of Driver Dummy



Pre-Test Left Side View of Driver Dummy Showing Belt and Chalking



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



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



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



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



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



Pre-Test Overhead View of Driver Dummy Thighs on Seat Pan



Pre-Test Placement of Driver Dummy's Feet



Pre-Test View of Belt Anchorage for Driver Dummy



Pre-Test Left Side View of Steering Wheel



Pre-Test View of Disengaged Parking Brake



Pre-Test View of Parking Brake



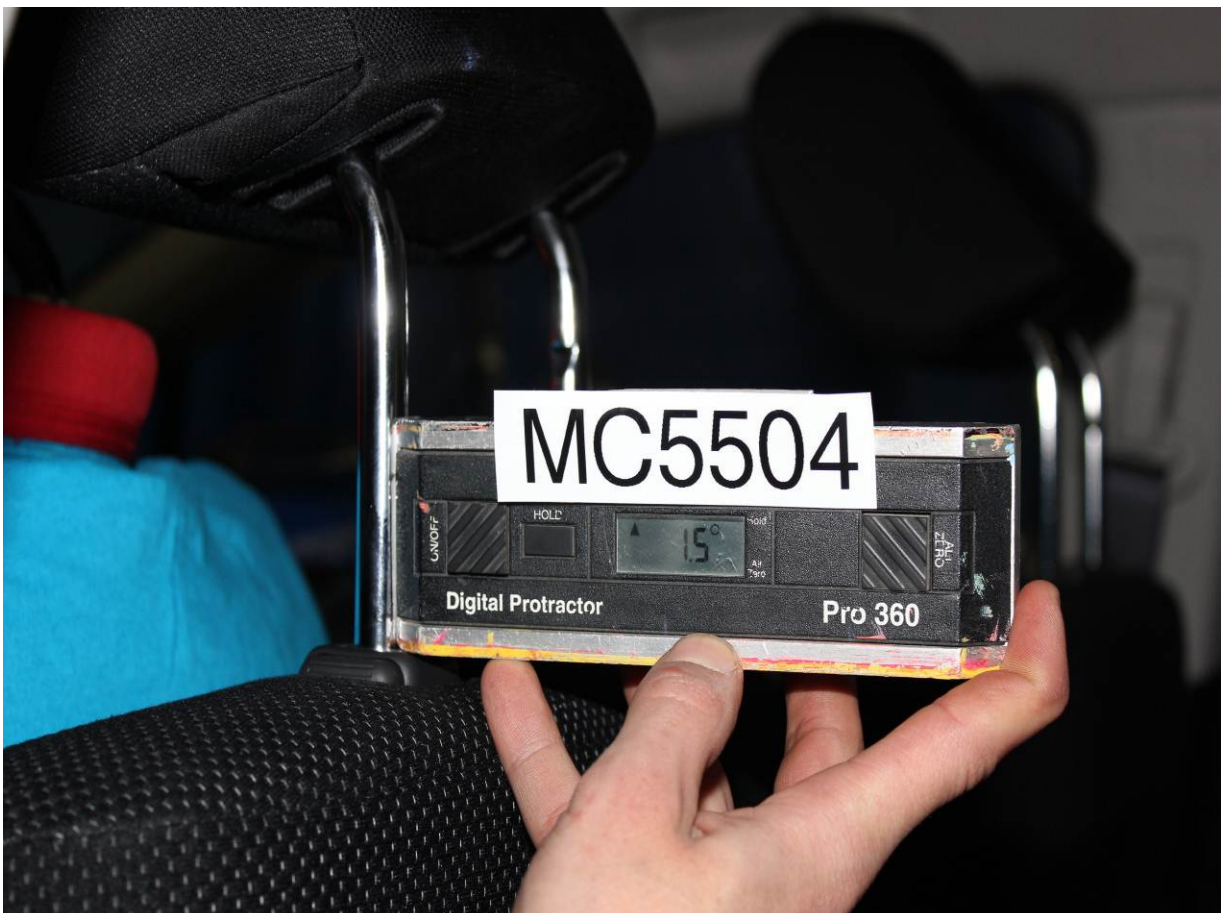
Pre-Test Close-Up Left Side View of Driver Seat Track



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



Pre-Test Close-Up Left Side View of Driver Headrest Position



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



Pre-Test Driver Dummy and Door Clearance View



Post-Test Driver Dummy and Door Clearance View



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



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



Pre-Test Driver Inner Door Panel View



Post-Test Driver Inner Door Panel View



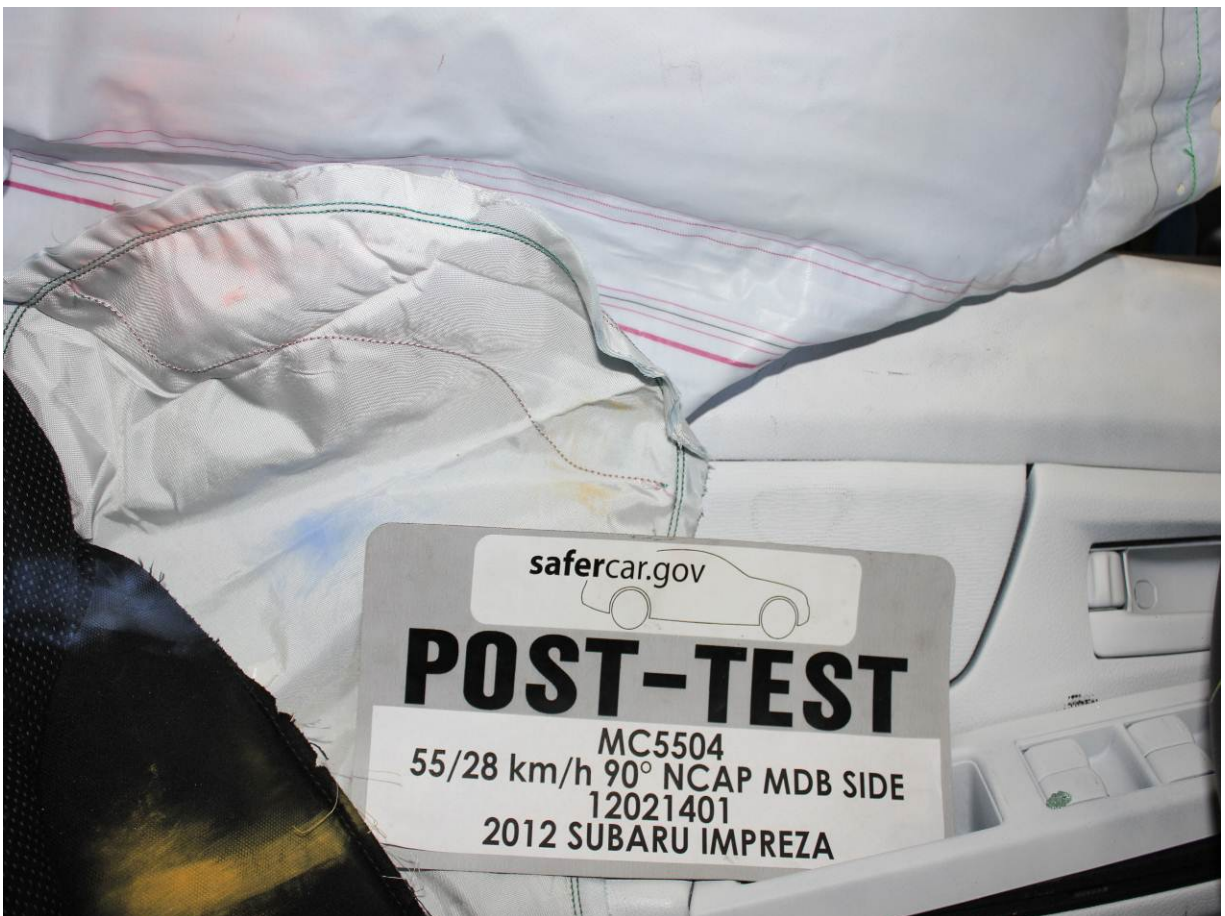
Post-Test Driver Dummy Close-up Head Contact with Vehicle Interior View



Post-Test Driver Dummy Close-up Head Contact with Side Airbag View



Post-Test Driver Dummy Close-up Torso Contact with Vehicle Interior View



Post-Test Driver Dummy Close-up Torso Contact with Side Airbag View



Post-Test Driver Dummy Close-up Pelvis Contact with Vehicle Interior View



Post-Test Driver Dummy Close-up Pelvis Contact with Side Airbag View



Pre-Test Left Side View of Rear Passenger Dummy Showing Belt and Chalking



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



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



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



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



Pre-Test Overhead View of Rear Passenger Seat Pan Prior to Dummy Positioning



Pre-Test Overhead View of Rear Passenger Dummy Thighs on Seat Pan



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



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



Pre-Test Placement of Rear Passenger Dummy's Feet



Pre-Test View of Belt Anchorage for Rear Passenger Dummy



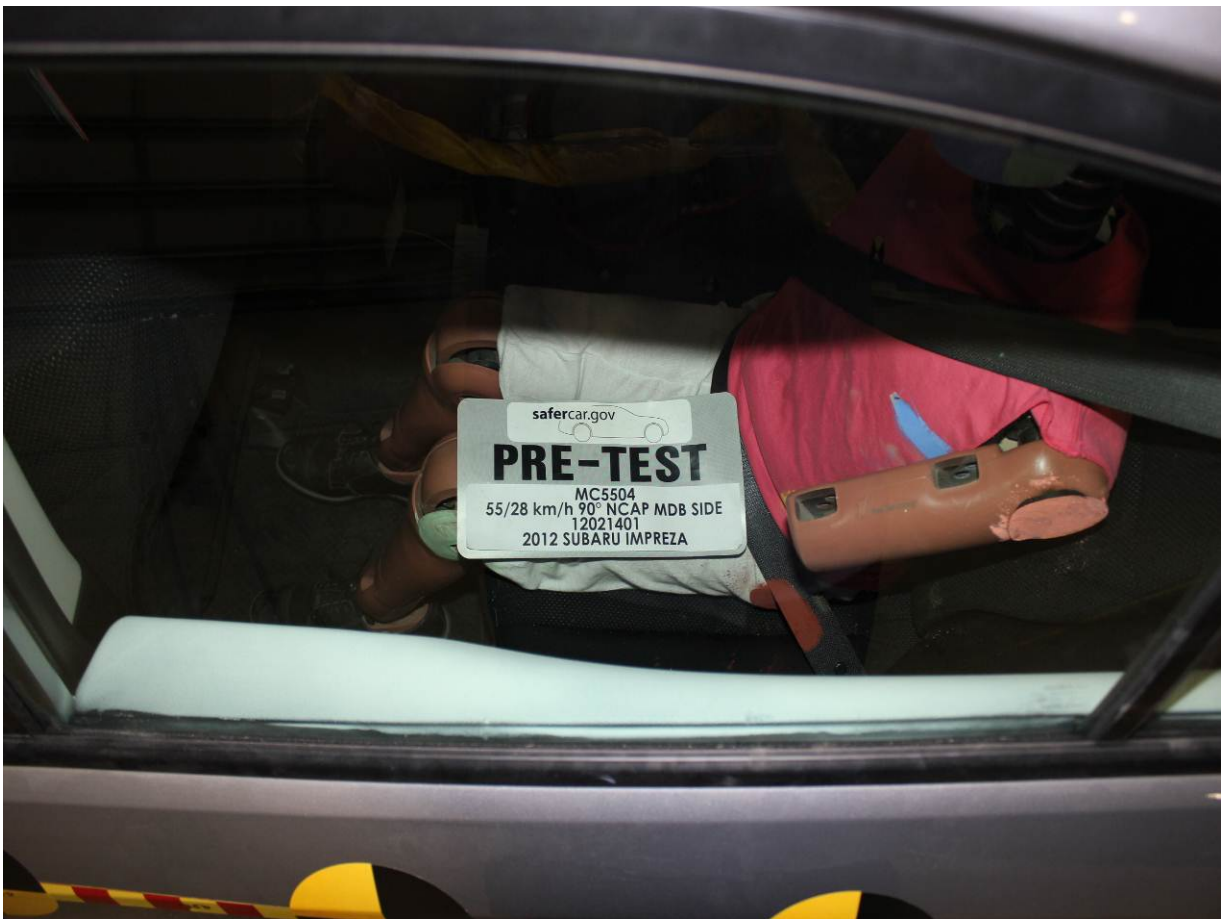
Pre-Test Close-Up Left Side View of Rear Passenger Seat Track



Pre-Test Close-Up Left Side View of Rear Passenger Seat Back



Pre-Test Close-up View of Rear Passenger Seat Back or Head Restraint



Pre-Test Rear Passenger Dummy and Door Clearance View



Post-Test Rear Passenger Dummy and Door Clearance View



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



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



Pre-Test Rear Passenger Inner Door Panel View



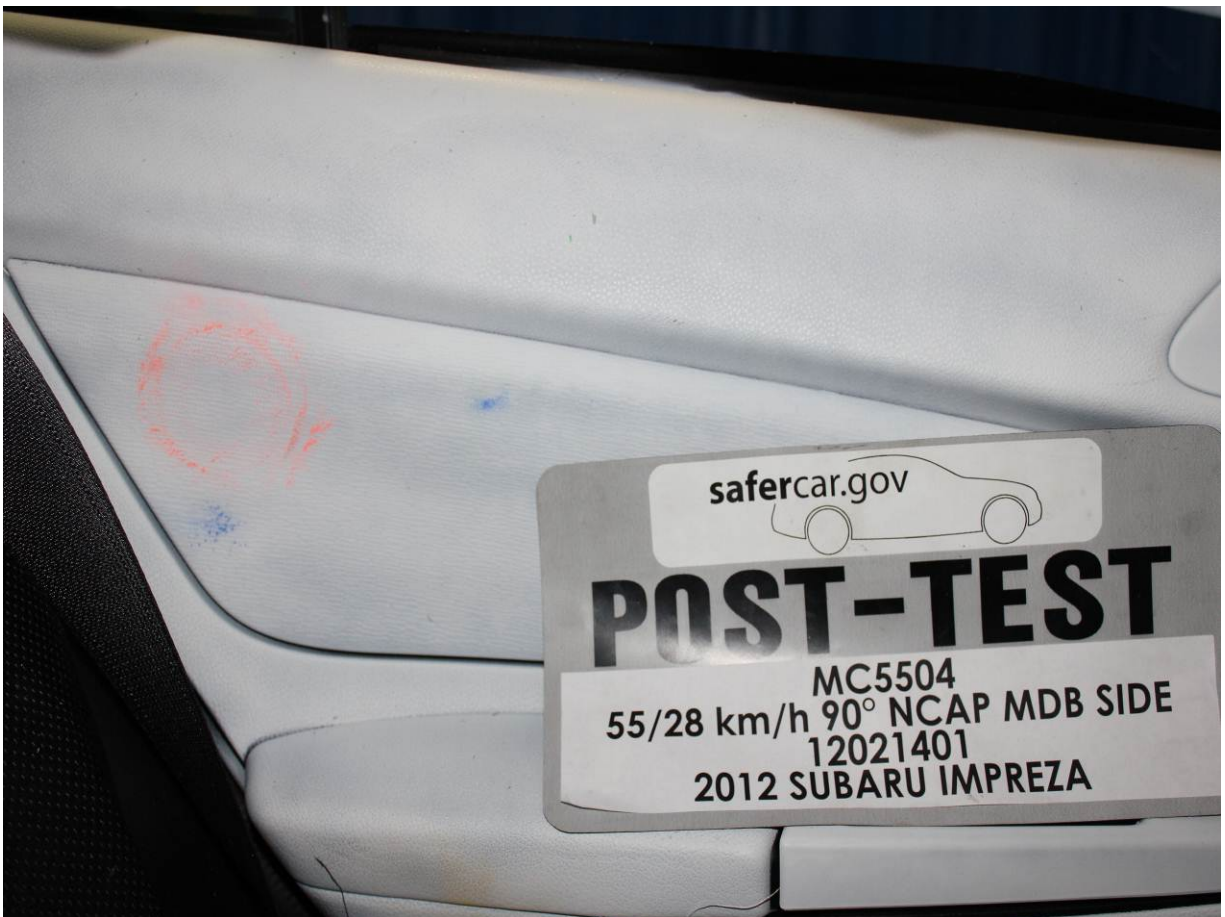
Post-Test Rear Passenger Inner Door Panel View



Post-Test Rear Passenger Dummy Close-up Head Contact with Vehicle Interior View



Post-Test Rear Passenger Dummy Close-up Head Contact with Vehicle Interior View



Post-Test Rear Passenger Dummy Close-up Torso Contact with Vehicle Interior View



Post-Test Rear Passenger Dummy Close-up Torso Contact with Vehicle Interior View

PHOTOGRAPH NOT APPLICABLE

Post-Test Rear Passenger Dummy Close-up Torso Contact with Side Airbag View



Post-Test Rear Passenger Dummy Close-up Pelvis Contact with Vehicle Interior View

PHOTOGRAPH NOT APPLICABLE

Post-Test Rear Passenger 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



Pre-Test Front View of MDB Impactor Face



Post-Test Front View of MDB Impactor Face



Pre-Test Top View of MDB Impactor Face



Post-Test Top View of MDB Impactor Face



Pre-Test Left Side View of MDB Impactor Face



Post-Test Left Side View of MDB Impactor Face



Pre-Test Right Side View of MDB Impactor Face



Post-Test Right Side View of MDB Impactor Face



Close-Up View of Vehicle's Certification Label



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



Pre-Test Ballast View



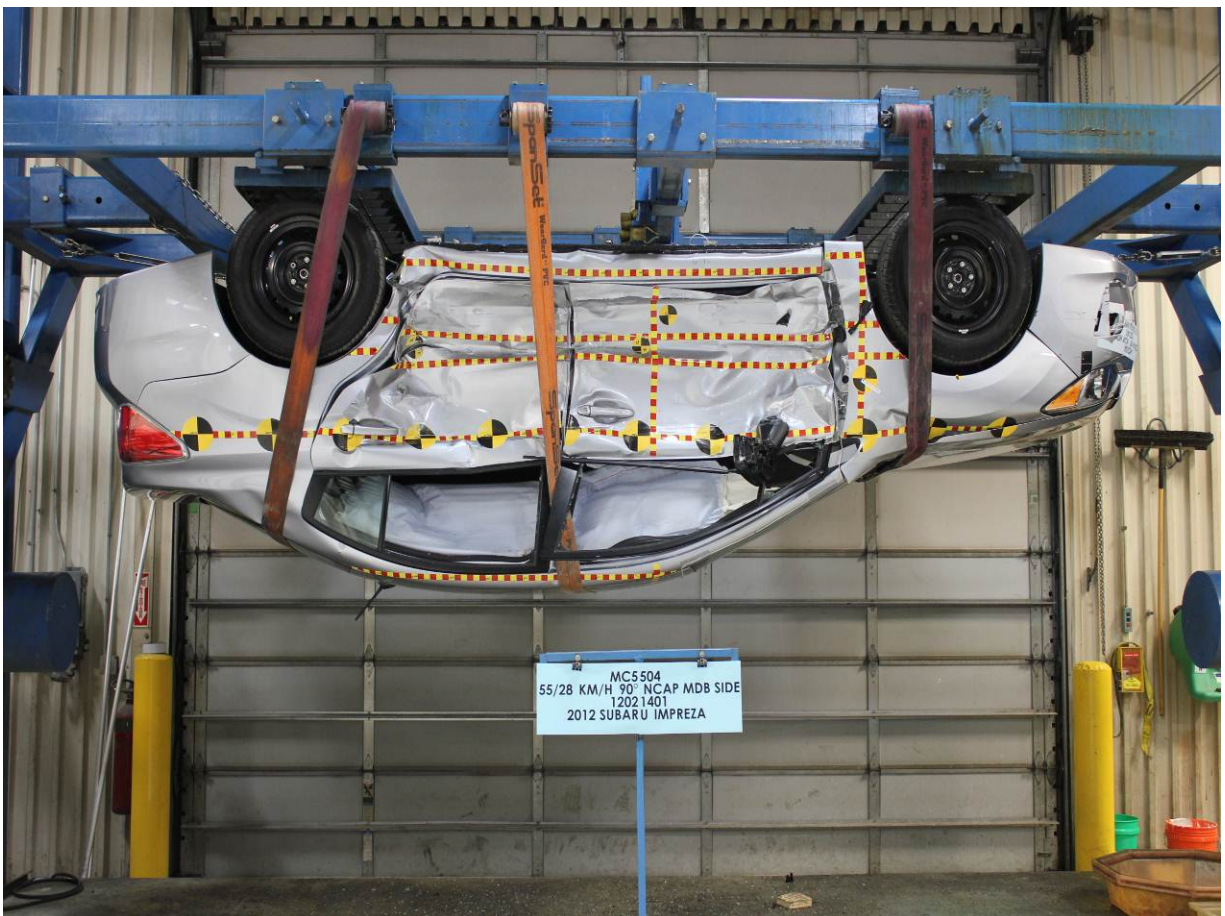
Post-Test Primary and Redundant Speed Trap Read-Out



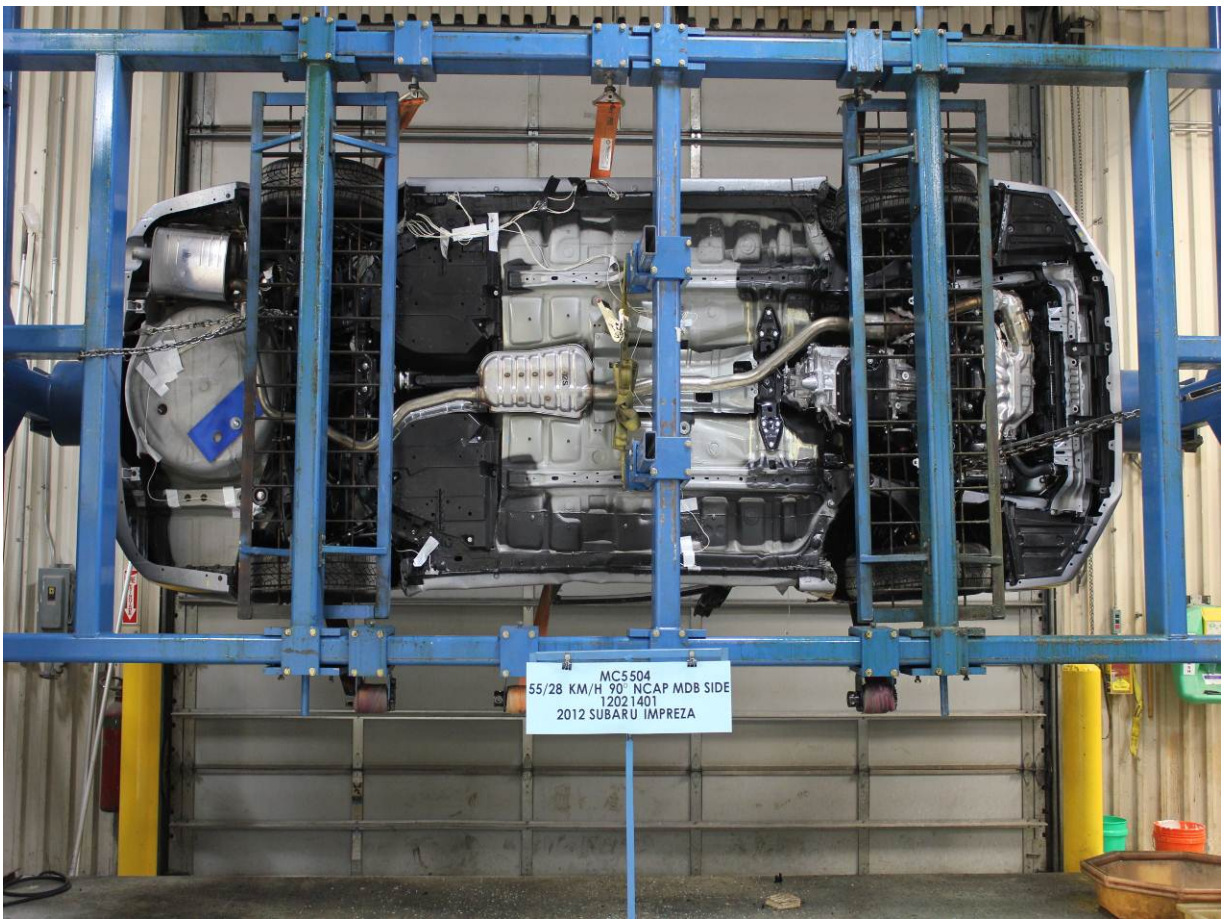
FMVSS No. 301 Static Rollover 0 Degrees



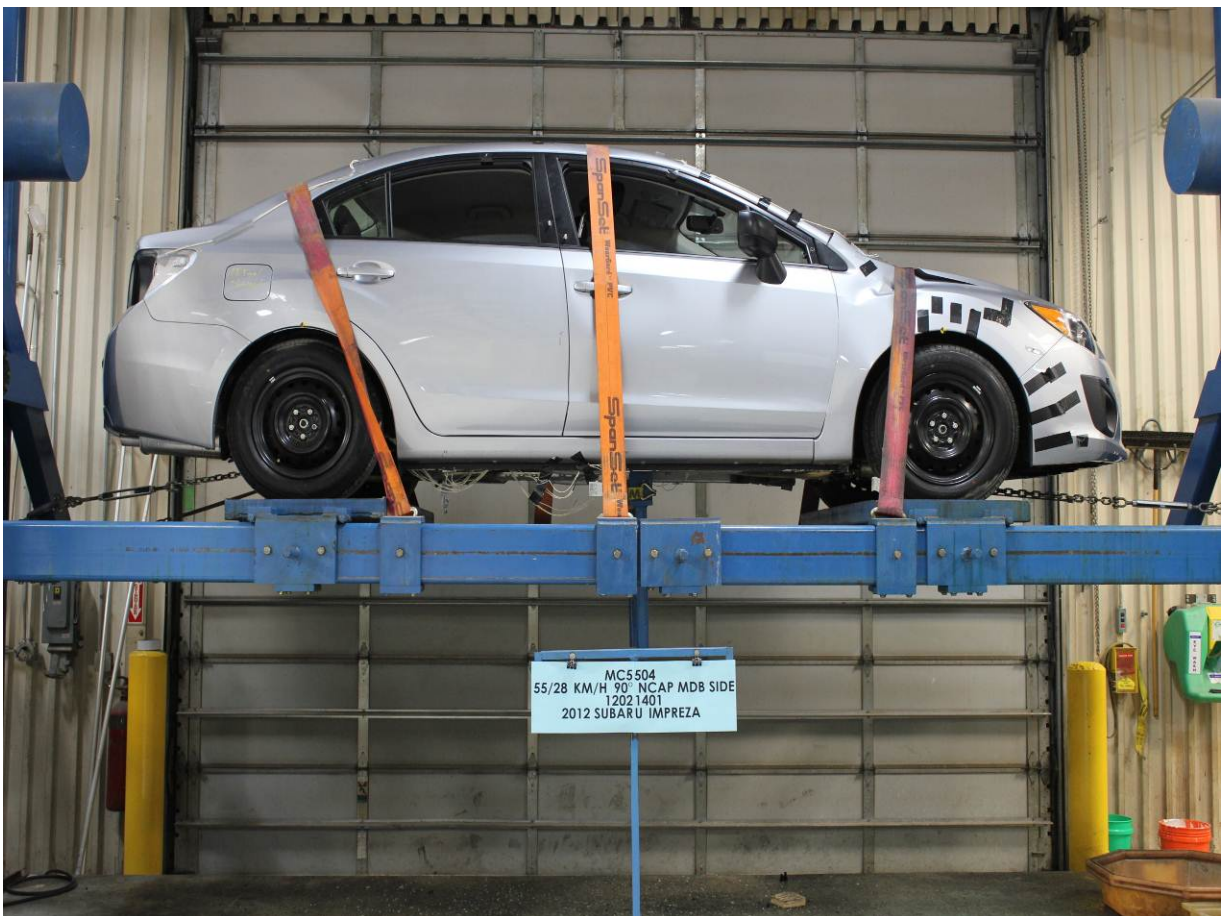
FMVSS No. 301 Static Rollover 90 Degrees



FMVSS No. 301 Static Rollover 180 Degrees



FMVSS No. 301 Static Rollover 270 Degrees



FMVSS No. 301 Static Rollover 360 Degrees



Impact Event

IMPREZA

VIN: JF1GJAA60CH005585
Model/Code: 2012 Subaru Impreza 2.5i / C/B
Exterior Color: Ice Silver Metallic
Port / Assembly: Vancouver, WA
Deliver by / Carrier: Truck / 601-601061

SHIP TO: 070590
 WILDE SUBARU
 1710 HWY 164
 WAUKESHA, WI 53186

SOLD TO: 070590
 WILDE SUBARU
 1710 HWY 164
 WAUKESHA, WI 53186

STANDARD EQUIPMENT

SAFETY
 Symmetrical All-Wheel Drive (AWD)
 Vehicle Dynamics Control (VDC)
 Subaru Advanced Frontal Air Bag System
 Front Seat Side-Impact Air Bags
 Side-Curtain Airbags
 Driver's Knee Airbag
 Safety Pedal System
 4-Wheel Disc Brakes w/Brake Assist
 Anti-Lock Braking System (ABS)
 Electronic Brake-Force Distribution
 Tire Pressure Monitoring System (TPMS)
 Ring-Shape Reinforcement Frame Design
 Anti-Theft Alarm & Immobilizer System

PERFORMANCE AND EXTERIOR
 Daytime Running Lights (DRL)
 2.0L Horizontally-Opposed DOHC Engine
 Four Wheel Independent Suspension
 Variable Intermittent Windshield Wipers
 105/95 R15 All-Season Tires

COMFORT, CONVENIENCE AND INTERIOR
 Air Conditioning w/Air Filtration System
 AM/FM/CD Audio System
 Carpeted Floor Mats
 Tilt / Telescopic Steering Column
 Power Door Locks & Dual Power Mirrors

Remote Keyless Entry System
 Power Windows With Driver's Auto Down
 Dual Cup Holders & Four Bottle Holders
 Tilt-Adjustable Front Seat Headrests
 Height Adjustable Driver's Seat
 60/40 Split Fold-Down Rear Seatback
 Multi-Function Trip Computer
 Dual Map Lights
 12V Power Outlet

LIMITED WARRANTY/ROADSIDE ASSISTANCE
 3 Yrs / 36,000 Miles Basic
 5 Years / 80,000 Miles Powertrain
 5 Yrs/Unlimited Mileage Rust Perforation

3 Yrs / 36,000 24/7 Roadside Assistance
 See Owner Info Kit&Warranty For Details

OPTIONAL EQUIPMENT

Manufacturer's Suggested Retail Price	
Lineartronic Continuously Variable Transmission w/ 6-Speed Manual Mode	\$17,495.00
Full Tank of Gas	INCLD
Auto-Dim Mirror/Comp	\$186.00
Bumper Applique Sedan	\$91.00
Cargo Tray 4d	\$71.00

GOVERNMENT SAFETY RATINGS

Frontal	Driver	Not Rated
	Passenger	Not Rated

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

Side	Front Seat	Not Rated
	Rear Seat	Not Rated

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

Rollover	Not Rated

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

Star ratings range from 1 to 5 stars (★★★★★), with 5 being the highest.
 Source: National Highway Traffic Safety Administration (NHTSA)
 Visit www.safercar.gov or 1-888-327-4236

EPA Fuel Economy Estimates

CITY MPG

27

Expected range for most drivers
22 to 32 MPG

Estimated Annual Fuel Cost
\$1,848

based on 15,000 miles at 3.70 per gallon

Combined Fuel Economy This Vehicle
30

10 60
All Compact

HIGHWAY MPG

36

Expected range for most drivers
29 to 43 MPG

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

Environmental Performance

Protect the environment, choose vehicles with higher scores:

Global Warming Score

7

Average new vehicle

Smog Score

4

Average new vehicle

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

PART CONTENT INFORMATION
 FOR VEHICLES IN THIS CARLINE:
 U.S./CANADIAN PARTS CONTENT: 0%
 MAJOR SOURCES OF FOREIGN PARTS CONTENT: JAPAN: 100%
 Note: Parts content does not include final assembly, distribution, or other non-parts costs.

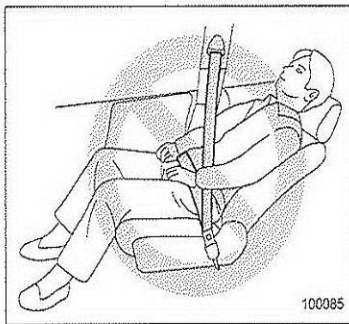
FOR THIS VEHICLE:
 FINAL ASSEMBLY POINT: Otsu Gumma, JAPAN
 COUNTRY OF ORIGIN: ENGINE: JAPAN
 TRANSMISSION: JAPAN

Destination and Delivery \$750.00
Total Suggested Retail Price \$19,593.00

THE ONLY EXTENDED SERVICE CONTRACT BACKED BY SUBARU.
 It could be the most important option you choose.
 After-warranty mechanical repair protection up to 100,000 miles
 Nobody protects your Subaru like Subaru!

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*JF1 is a registered trademark of Apple Inc. Subaru is a registered trademark of Subaru Corporation. JF1 is a registered trademark of Subaru Corporation. JF1 is a registered trademark of Subaru Corporation. JF1 is a registered trademark of Subaru Corporation.

Monroney Label



WARNING

To prevent the passenger from sliding under the seatbelt in the event of a collision, always put the seatback in the upright position while the vehicle is in motion. Also, do not place objects such as cushions between the passenger and the seatback. If you do so, the risk of sliding under the lap belt and of the lap belt sliding up over the abdomen will increase, and both can result in serious internal injury or death.

Seat cushion height adjustment (driver's seat)



- 1) When the lever is pushed down, the seat is lowered.
- 2) When the lever is pulled up, the seat rises.

The height of the seat can be adjusted by moving the seat cushion adjustment lever up and down.

Head restraint adjustment (if equipped)

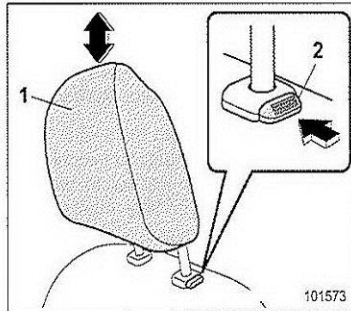
WARNING

- Never drive the vehicle with the head restraints removed because they are designed to reduce the risk of serious neck injury in the event that the vehicle is struck from the rear. Also, never install the head restraints the opposite way round. Doing so will prevent the head restraints from functioning as intended. Therefore, when you remove the head restraints, you must reinstall all head restraints correctly to protect vehicle occupants.
- All occupants, including the driver, should not operate a vehicle or sit in a vehicle's seat until the head restraints are placed in their proper positions in order to minimize the risk of neck injury in the event of a crash.

The head restraints for the driver's seat and front passenger's seat are adjustable in the following ways.

Driver Head Restraint Use and Adjustment Information from Vehicle Owner's Manual

▼ Head restraint height adjustment



- 1) Head restraint
- 2) Release button

Each head restraint should be adjusted so that the center of the head restraint is closest to the top of the occupant's ears.

To raise:

Pull the head restraint up.

To lower:

Push the head restraint down while pressing the release button on the top of the seatback.

To remove:

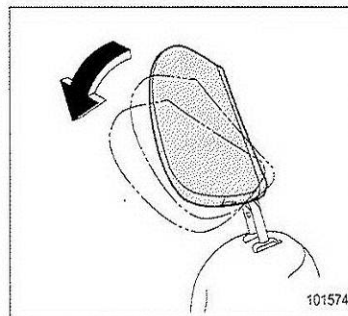
While pressing the release button, pull out the head restraint.

To install:

Install the head restraint into the holes that

are located on the top of the seatback until the head restraint locks.

▼ Head restraint angle adjustment



The angle of the head restraint can be adjusted in several steps. While maintaining a suitable driving posture, adjust the head restraint to a position where the back of your head is as close to the head restraint as possible.

To tilt:

Tilt the head restraint by hand to the preferred position. A click will be audible when the head restraint is locked.

To return:

Tilt the head restraint once as far forward as it can go. The head restraint will automatically return to the fully upright position. Then, adjust the head restraint

again to the preferred angle.

Driver Head Restraint Use and Adjustment Information from Vehicle Owner's Manual

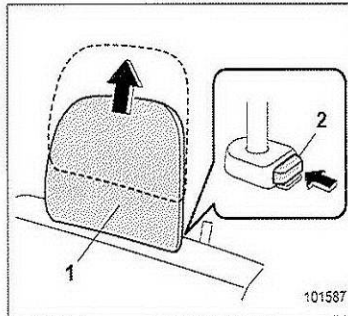
Head restraint adjustment

Both the rear window side seats and the rear center seat are equipped with head restraints.

WARNING

- Never drive the vehicle with the head restraints removed because they are designed to reduce the risk of serious neck injury in the event that the vehicle is struck from the rear. Therefore, when you have removed the head restraints, you must reinstall all head restraints to protect vehicle occupants.
- All occupants, including the driver, should not operate a vehicle or sit in a vehicle's seat until the head restraints are placed in their proper positions in order to minimize the risk of neck injury in the event of a crash.

Rear windows side seating position



- 1) Head restraint
- 2) Release button

To remove:

While pressing the release button, pull out the head restraint.

To install:

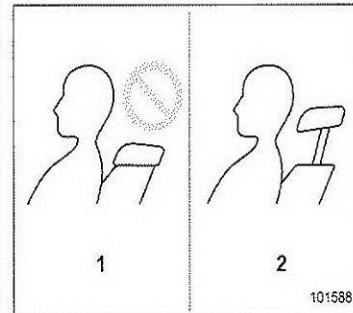
Install the head restraint into the holes that are located on the top of the seatback until the head restraint locks.

Rear center seating position

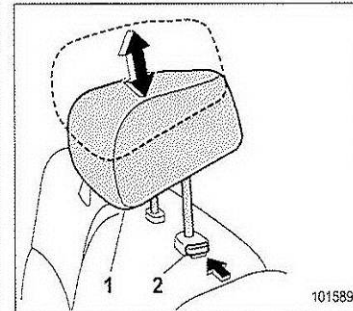
CAUTION

The head restraint is not intended to be used at the lowest position. Before sitting on the seat, raise the head restraint to the extended position.

tion.



- 1) Incorrect (retracted position)
- 2) Correct (extended position)



- 1) Head restraint
- 2) Release button

Left Rear Passenger Head Restraint Use and Adjustment Information from Vehicle Owner's Manual

To raise:

Pull the head restraint up.

To lower:

Push the head restraint down while pressing the release button on the top of the seatback.

To remove:

While pressing the release button, pull out the head restraint.

To install:

Install the head restraint into the holes that are located on the top of the seatback until the head restraint locks.

When the rear-center seating position is occupied, raise the head restraint to the extended position. When the rear center seating position is not occupied, lower the head restraint to improve rearward visibility.

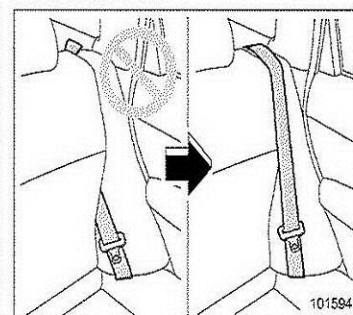
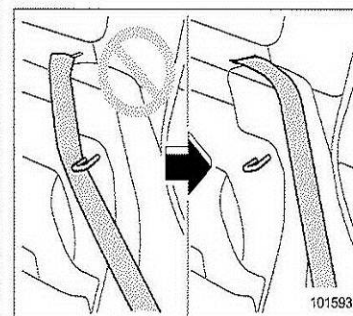
Folding down the rear seat-back

WARNING

- When you fold down the seat-back, check that there are no passengers or objects on the rear seat. Not doing so creates a risk of injury or property damage if the seatback suddenly

folds down.

- Never allow passengers to ride on the folded rear seatback or in the cargo area or trunk. Doing so may result in serious injury or death.
- Secure all objects and especially long items properly to prevent them from being thrown around inside the vehicle and causing serious injury during a sudden stop, a sudden steering maneuver or a rapid acceleration.
- When you return the seatback to its original position, shake the seatback slightly to confirm that it is securely fixed in place. If the seatback is not securely fixed in place, the seatback may suddenly fold down in the event of sudden braking, or objects may move out from the cargo area or trunk, which could cause serious injury or death.



WARNING

When the seatback is returned to its original position, observe the following precautions. Failure to do so may lead to serious injury or an

Left Rear Passenger Head Restraint Use and Adjustment Information from Vehicle Owner's Manual



Post-Test Driver Dummy Knee Contact with Vehicle Interior View



Post-Test Rear Passenger Dummy Knee Contact with Vehicle Interior View

APPENDIX B

DUMMY RESPONSE DATA PLOTS

TABLE OF DATA PLOTS
Driver Dummy Instrumentation Plots

<u>No.</u>	<u>Description</u>	<u>Page No.</u>
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 Acceleration Primary vs. Time	B-1
Figure No. 5.	Driver Upper Thorax Rib Deflection (Y) vs. Time	B-2
Figure No. 6.	Driver Middle Thorax Rib Deflection (Y) vs. Time	B-2
Figure No. 7.	Driver Lower Thorax Rib Deflection (Y) vs. Time	B-2
Figure No. 8.	Driver Thorax Rib Deflection Maximum vs. Time	B-2
Figure No. 9.	Driver Anterior Abdomen Force (Y) vs. Time	B-3
Figure No. 10.	Driver Middle Abdomen Force (Y) vs. Time	B-3
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Figure No. 14.	Passenger Head Acceleration (X) Primary vs. Time	B-5
Figure No. 15.	Passenger Head Acceleration (Y) Primary vs. Time	B-5
Figure No. 16.	Passenger Head Acceleration (Z) Primary vs. Time	B-5
Figure No. 17.	Passenger Head Resultant Acceleration Primary vs. Time	B-5
Figure No. 18.	Passenger Lower Spine T12 Acceleration (X) vs. Time	B-6
Figure No. 19.	Passenger Lower Spine T12 Acceleration (Y) vs. Time	B-6
Figure No. 20.	Passenger Lower Spine T12 Acceleration (Z) vs. Time	B-6
Figure No. 21.	Passenger Lower Spine T12 Resultant Acceleration vs. Time	B-6
Figure No. 22.	Passenger Iliac Force on Impact Side (Y) vs. Time	B-7
Figure No. 23.	Passenger Acetabulum Force on Impact Side (Y) vs. Time	B-7
Figure No. 24.	Passenger Total Pelvic Force on Impact Side (Y) vs. Time	B-7

The following additional data for this test can be obtained from the Research and Development section of the NHTSA website. The website can be found at www.NHTSA.dot.gov

Additional Driver & Passenger Dummy Instrumentation Data

Driver Lower Spine T12 Acceleration (X)
Driver Lower Spine T12 Acceleration (Y)
Driver Lower Spine T12 Acceleration (Z)
Passenger Upper Thorax Rib Deflection (Y)
Passenger Middle Thorax Rib Deflection (Y)
Passenger Lower Thorax Rib Deflection (Y)
Passenger Upper Abdomen Rib Deflection (Y)
Passenger Lower Abdomen Rib Deflection (Y)
Driver Head Acceleration Redundant (X)
Driver Head Acceleration Redundant (Y)
Driver Head Acceleration Redundant (Z)
Passenger Head Acceleration Redundant (X)
Passenger Head Acceleration Redundant (Y)
Passenger Head Acceleration Redundant (Z)

Vehicle Instrumentation Data

Vehicle Center of Gravity Acceleration (X)
Vehicle Center of Gravity Acceleration (Y)
Vehicle Center of Gravity Acceleration (Z)
Right Side Sill at Front Seat Acceleration (X)
Right Side Sill at Front Seat Acceleration (Y)
Right Side Sill at Front Seat Acceleration (Z)
Right Side Sill at Rear Seat Acceleration (X)
Right Side Sill at Rear Seat Acceleration (Y)
Right Side Sill at Rear Seat Acceleration (Z)

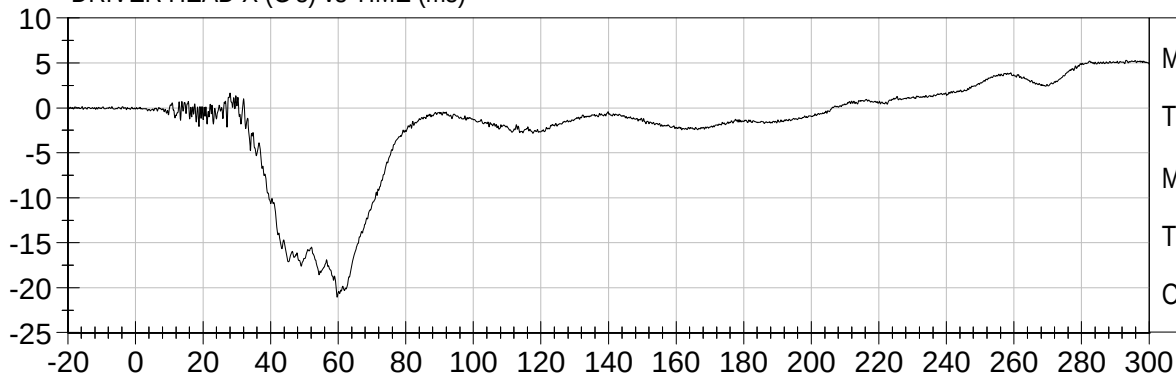
Left Side Sill at Front Seat Acceleration (Y)
Left Side Sill at Rear Seat Acceleration (Y)
Lower A-Post Acceleration (Y)
Middle A-Post Acceleration (Y)
Lower B-Post Acceleration (Y)
Middle B-Post Acceleration (Y)
Front Seat Track Acceleration (Y)
Rear Seat Track Acceleration (Y)
Right Rear Occupant Compartment Acceleration (Y)
Engine Block (X)
Engine Block (Y)
Rear Floorpan Above Axle Acceleration (X)
Rear Floorpan Above Axle Acceleration (Y)
Rear Floorpan Above Axle Acceleration (Z)

MDB Instrumentation Data

MDB Center of Gravity Acceleration (X)
MDB Center of Gravity Acceleration (Y)
MDB Center of Gravity Acceleration (Z)
MDB Rear Acceleration (X)
MDB Rear Acceleration (Y)
Left MDB Contact Switch
Right MDB Contact Switch

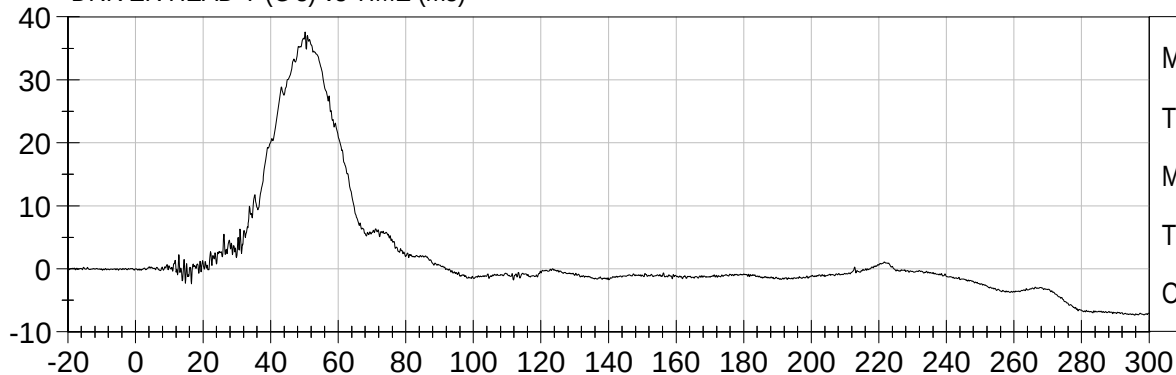


DRIVER HEAD X (G's) vs TIME (ms)



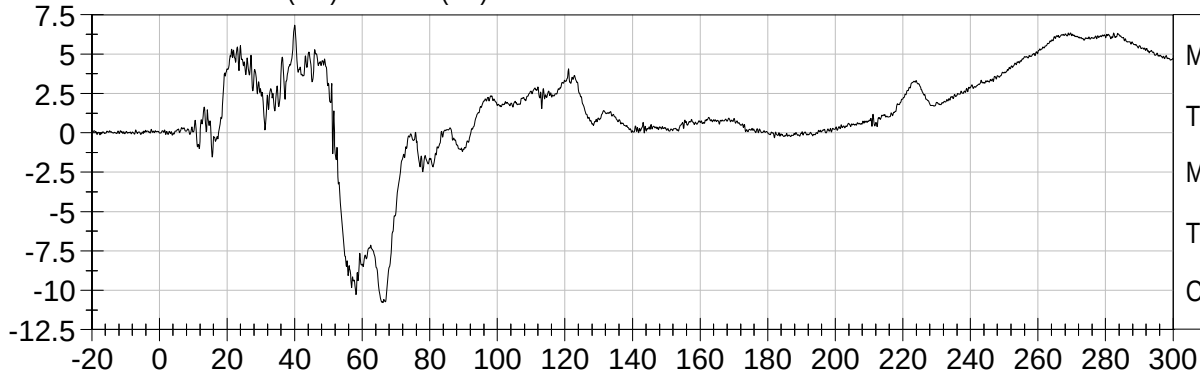
Max: 5.3 G's
Tmax: 293.2 ms
Min: -21.1 G's
Tmin: 59.7 ms
CFC 1000

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



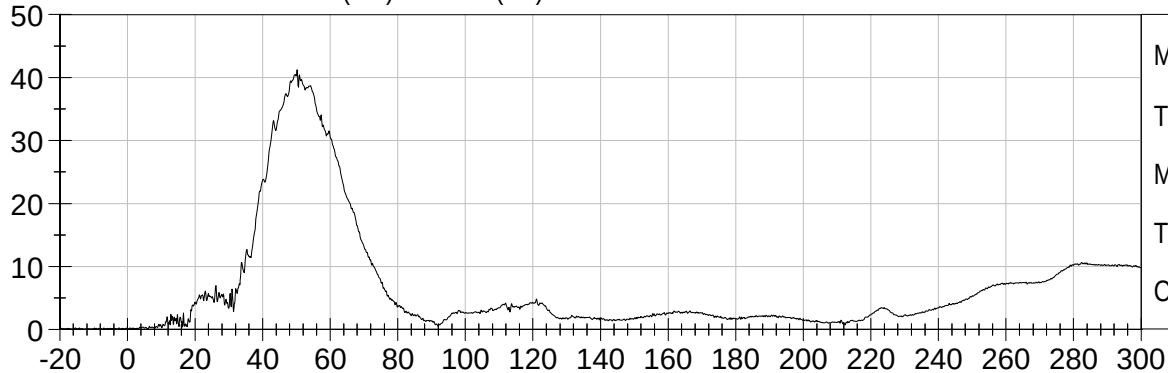
Max: 37.6 G's
Tmax: 50.2 ms
Min: -7.4 G's
Tmin: 295.7 ms
CFC 1000

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

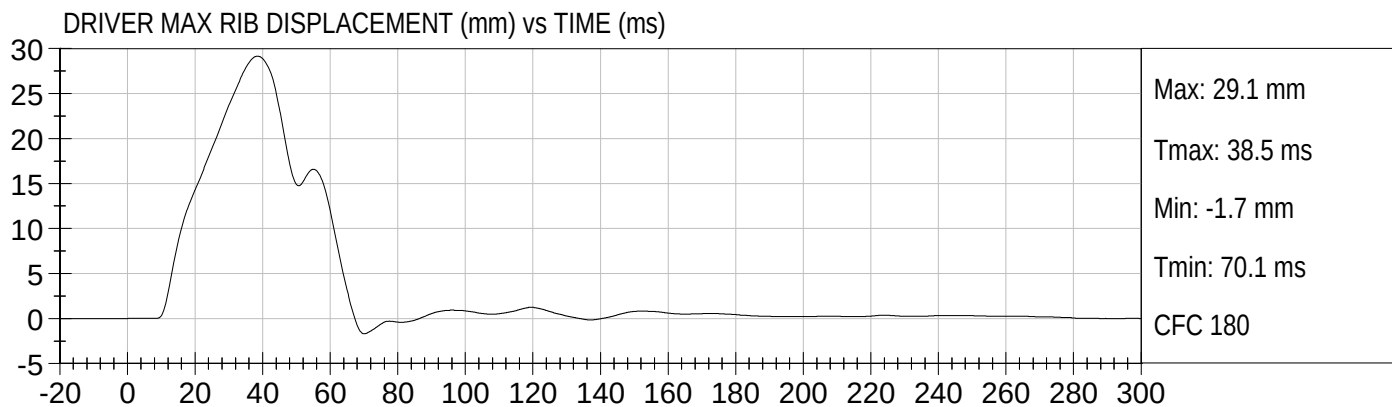
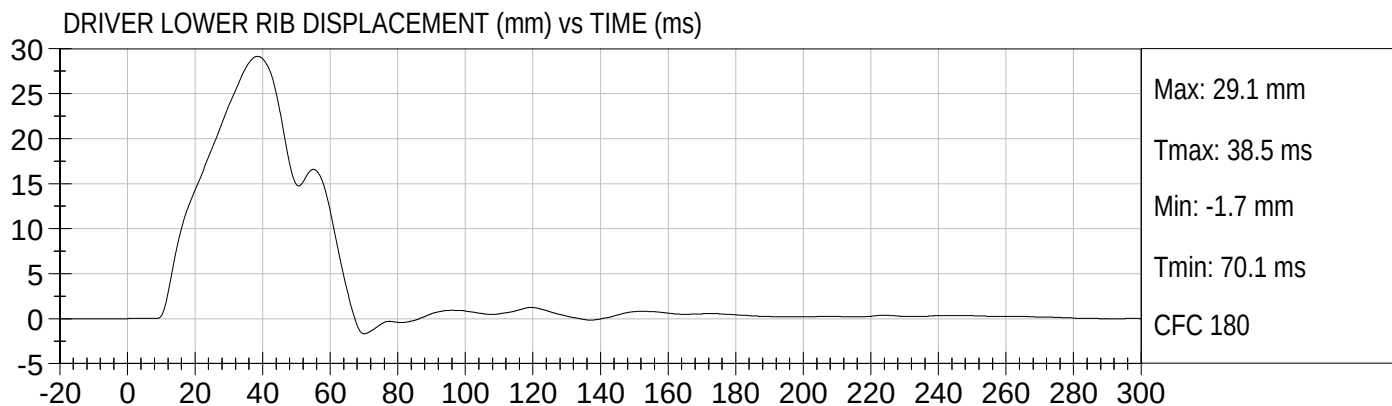
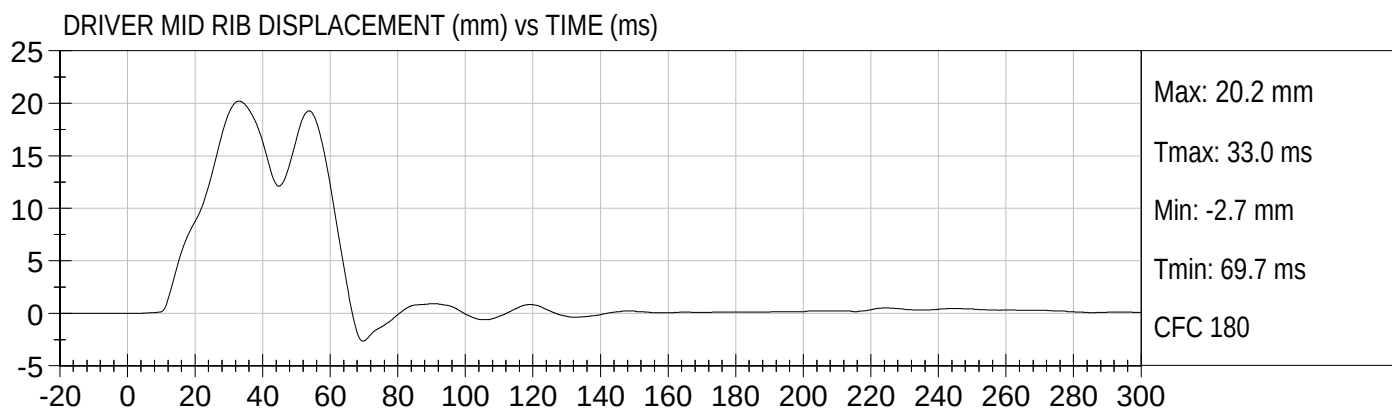
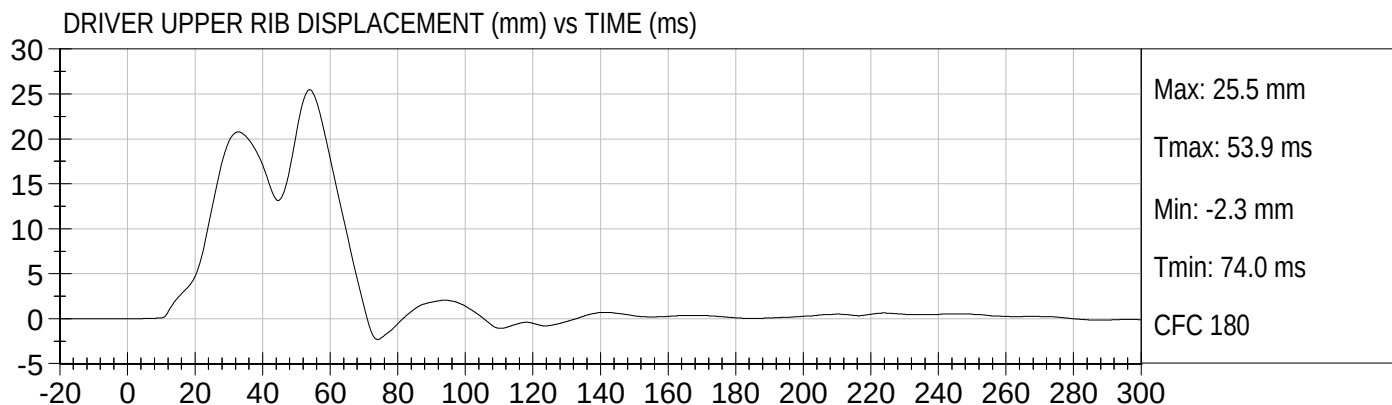


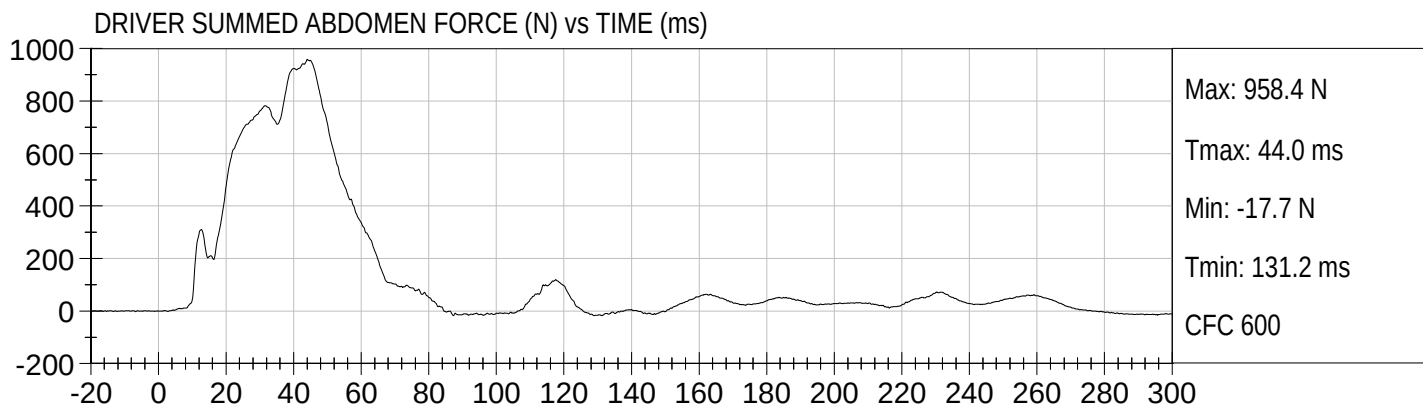
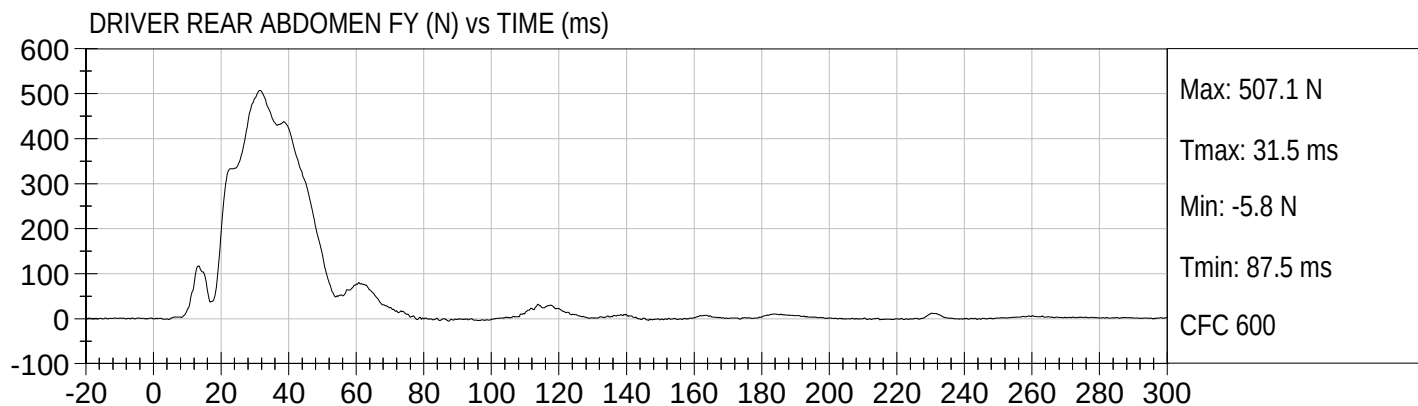
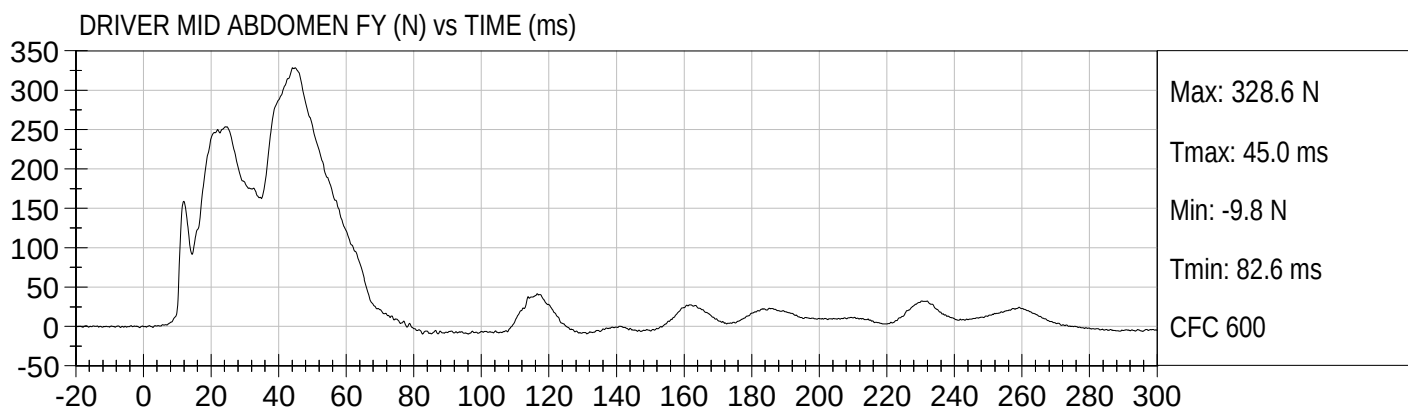
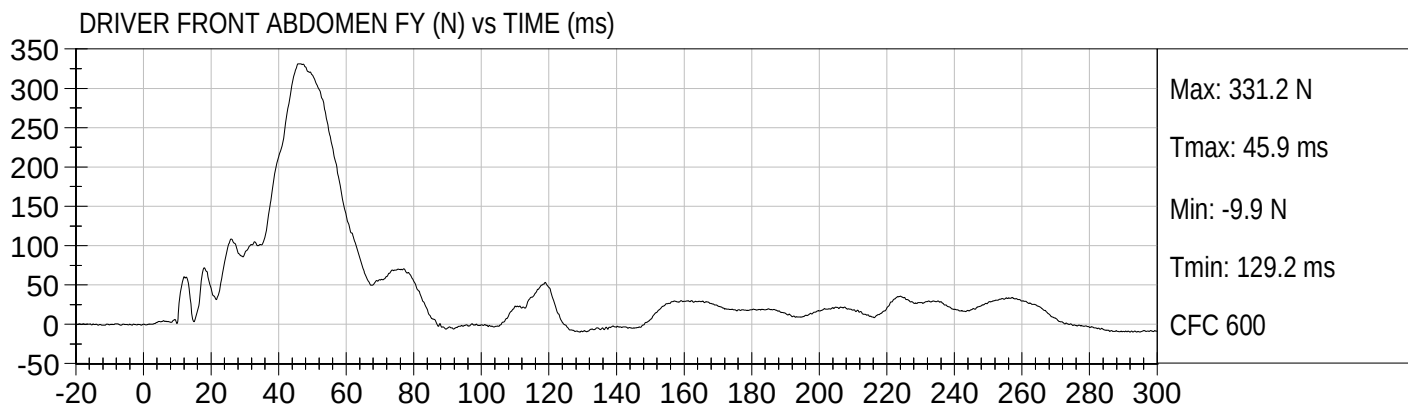
Max: 6.8 G's
Tmax: 40.0 ms
Min: -10.8 G's
Tmin: 66.2 ms
CFC 1000

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



Max: 41.2 G's
Tmax: 50.2 ms
Min: 0.0 G's
Tmin: 0.2 ms
CFC 1000

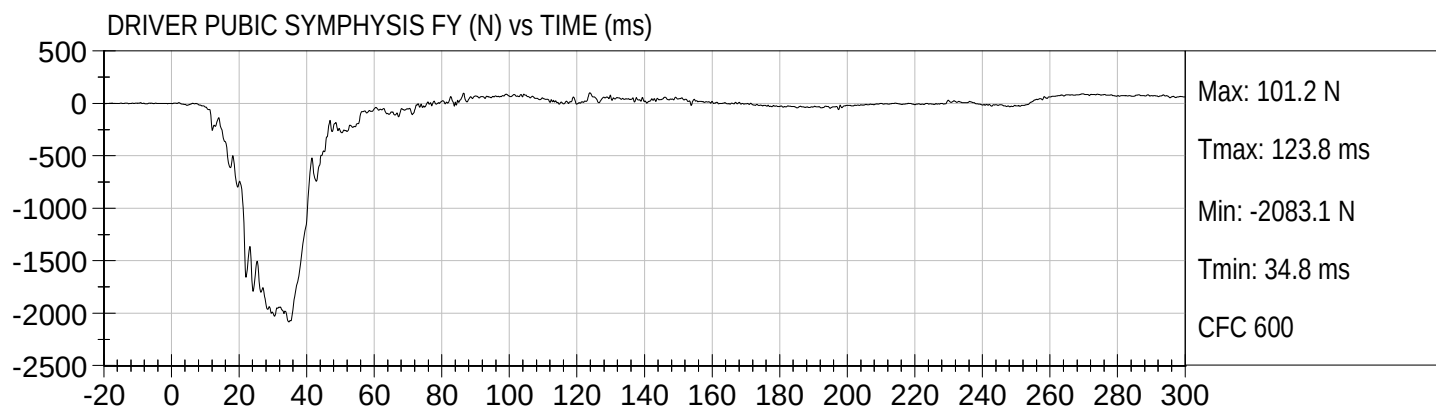






55/28 km/h 90° NCAP MDB Side Impact
2012 Subaru Impreza - MC5504

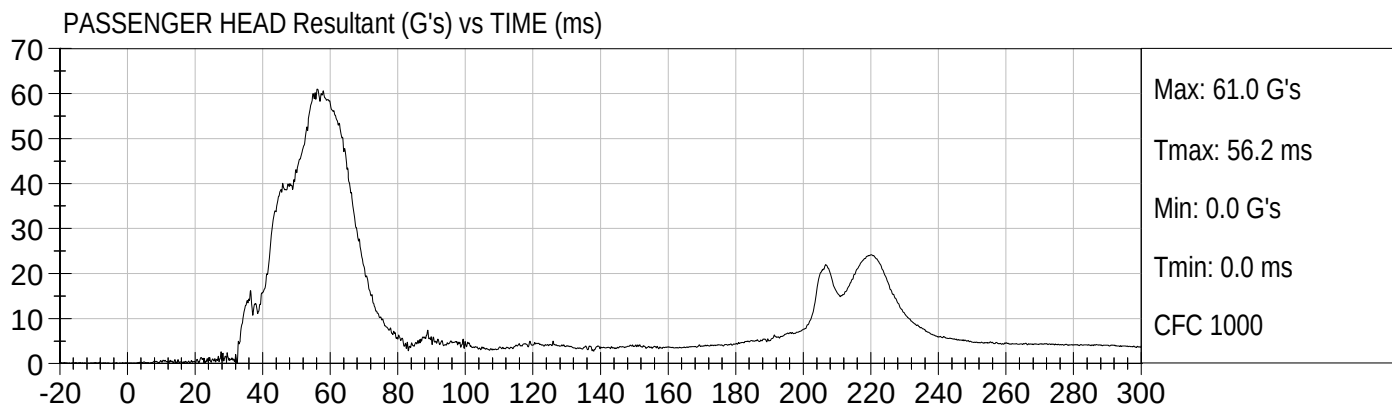
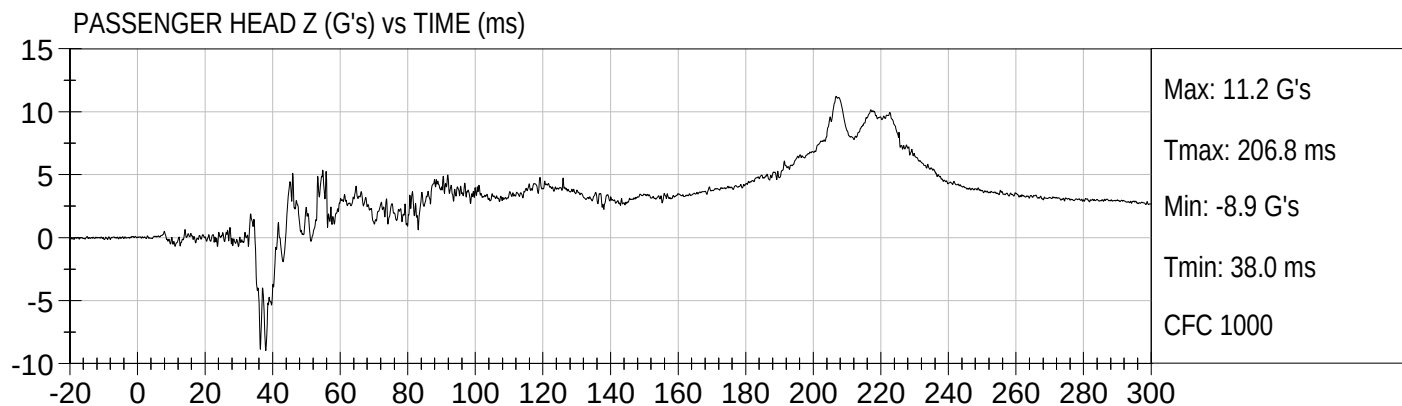
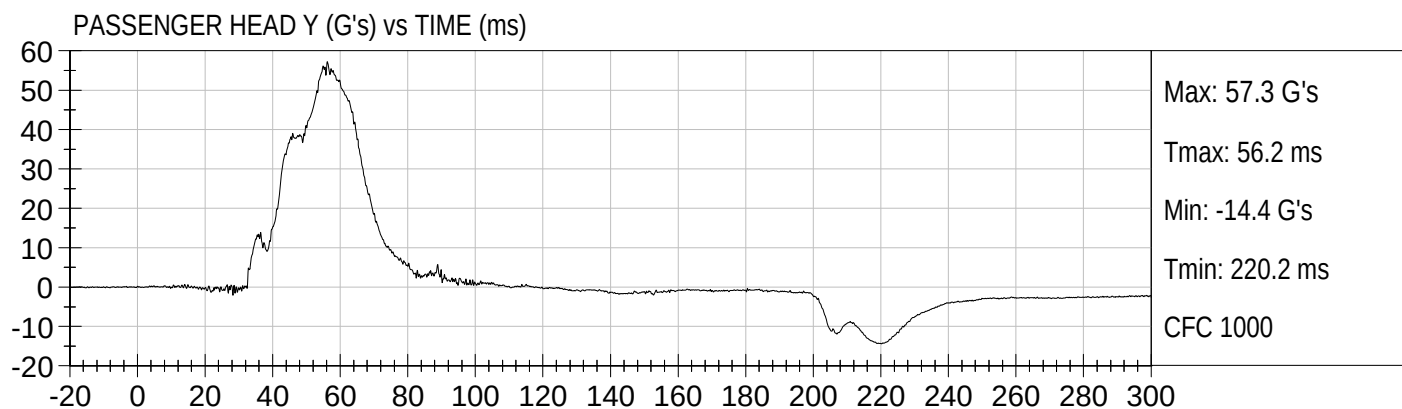
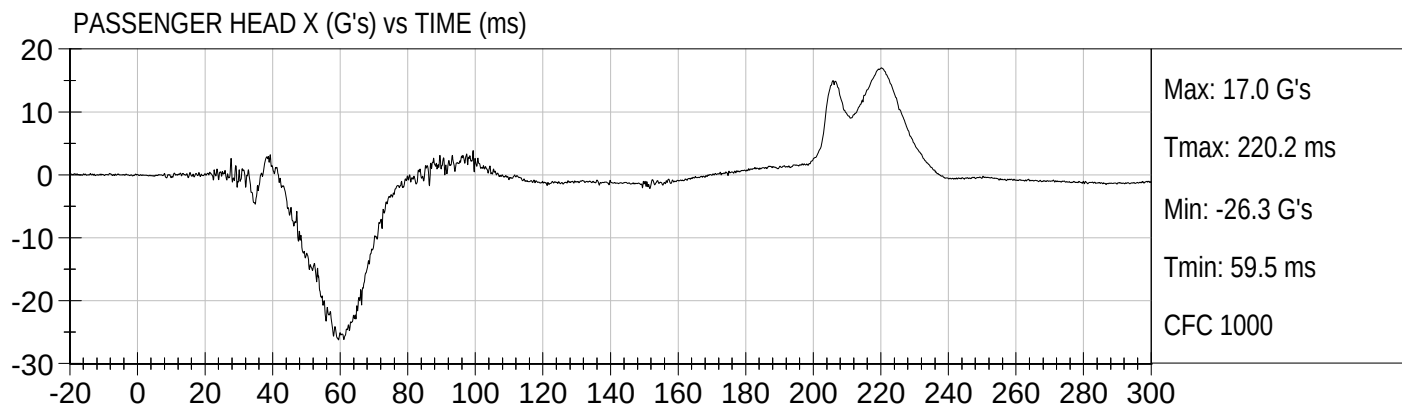
Test Date: 02/14/2012
Speed: 38.6 mph (62.2 km/h)

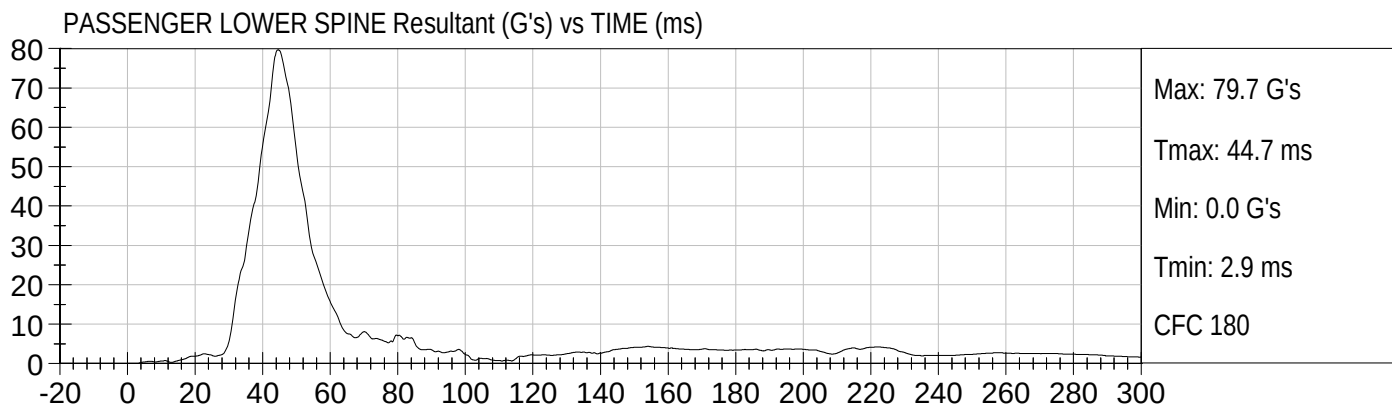
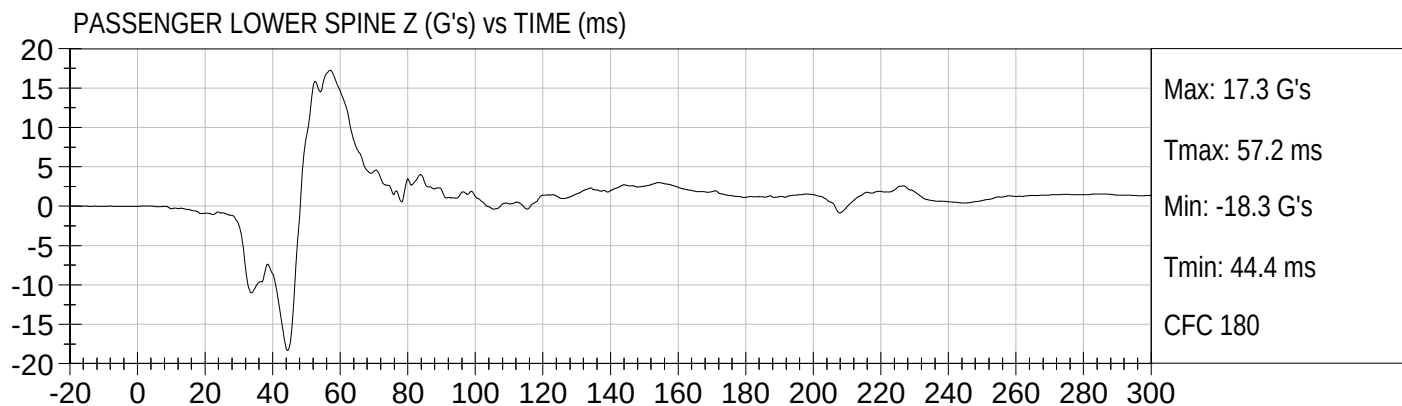
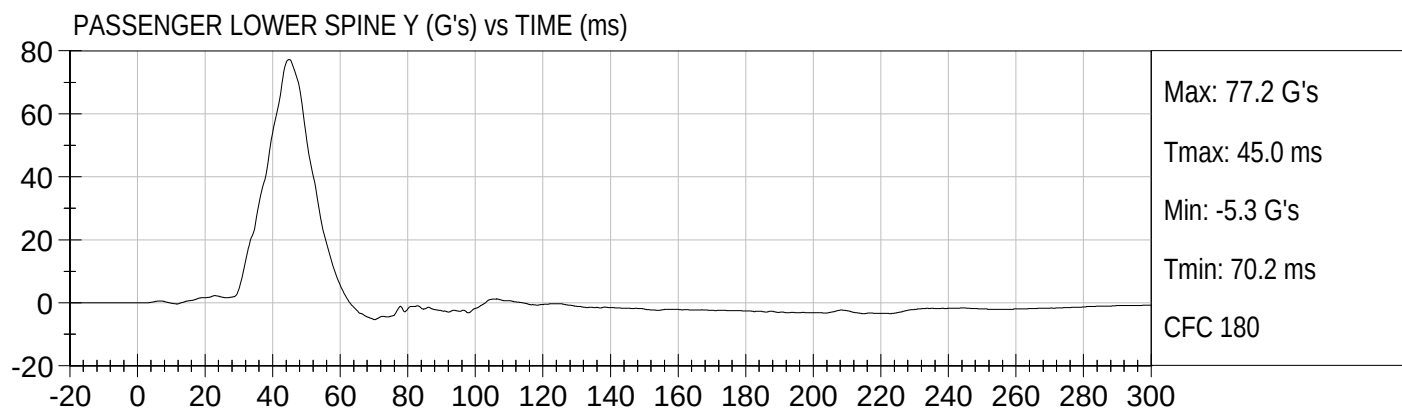
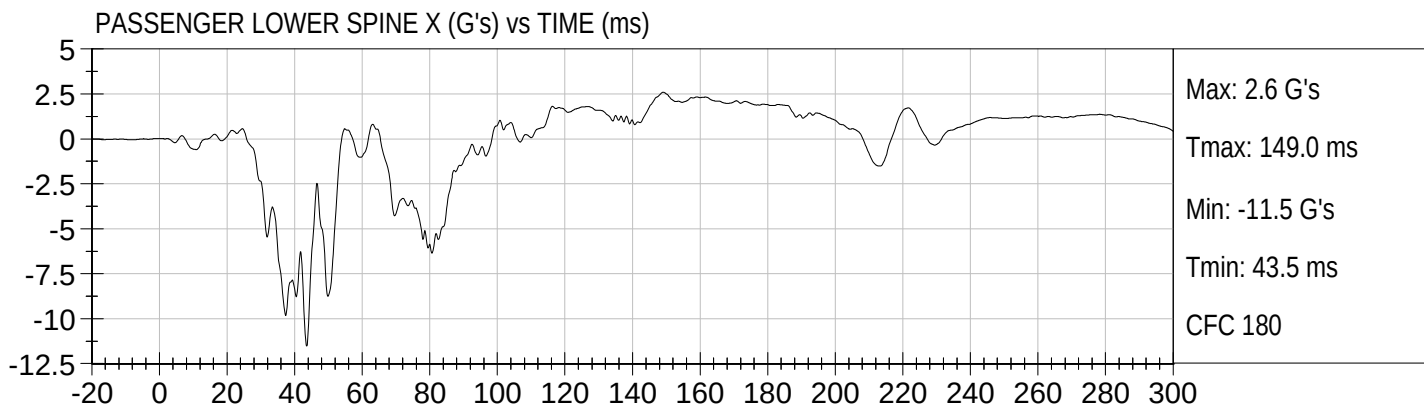


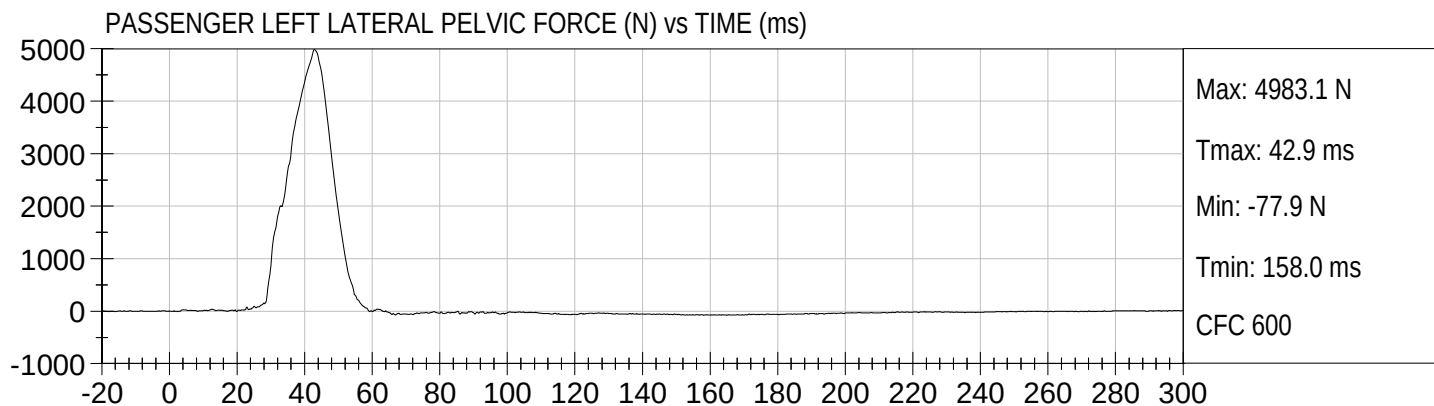
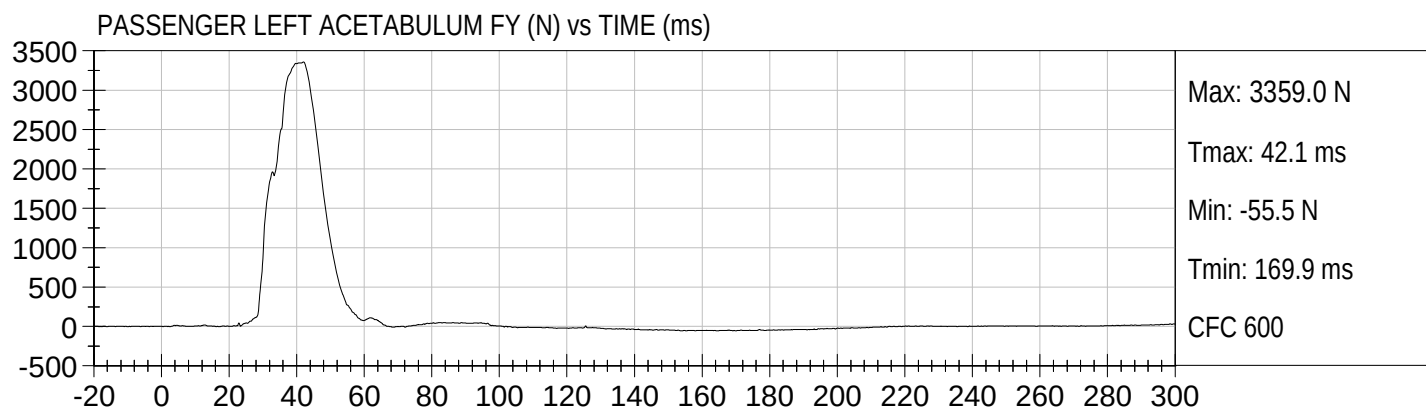
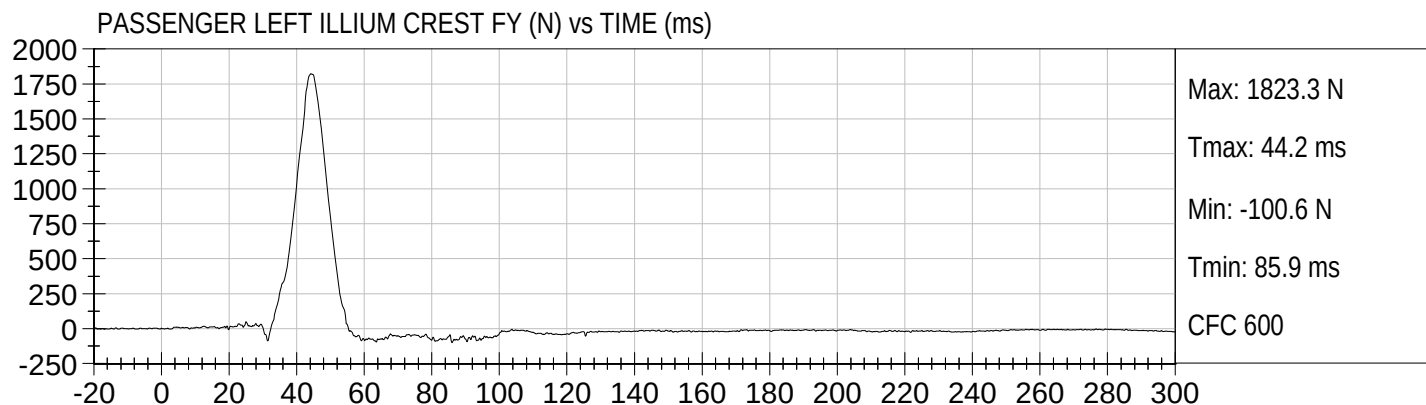


55/28 km/h 90° NCAP MDB Side Impact
2012 Subaru Impreza - MC5504

Test Date: 02/14/2012
Speed: 38.6 mph (62.2 km/h)







APPENDIX C

DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

ES-2re External Measurements
SN: 032

No.	Name	Spec. (mm)	Result	Pass/Fail
1	Sitting Height	900 - 918	915	Pass
2	Seat to Shoulder Joint	558 - 572	568	Pass
3	Seat to Lower Face of Thoracic Spine Box	346 - 356	355	Pass
4	Seat to Hip Joint (center of bolt)	97 - 103	98	Pass
5	Sole to Seat, Sitting	333 - 451	440	Pass
6	Head Width	152 - 158	157	Pass
7	Shoulder/Arm Width	461 - 479	464	Pass
8	Thorax Width	322 - 332	323	Pass
9	Abdomen Width	273 - 287	281	Pass
10	Pelvis Lap Width	359 - 373	370	Pass
11	Head Depth	196 - 206	203	Pass
12	Thorax Depth	262 - 272	264	Pass
13	Abdomen Depth	194 - 204	196	Pass
14	Pelvis Depth	235 - 245	236	Pass
15	Back of Buttocks to Hip Joint (center of bolt)	150 - 160	151	Pass
16	Back of Buttocks to Front Knee	597 - 615	607	Pass

MGA RESEARCH CORPORATION

HEAD DROP TEST

ES-2re DUMMY

ATD Serial No: 032Test ID: D12451

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	17	Pass
Peak Resultant Acceleration	G's	125 to 155	147	Pass
Peak Longitudinal Acceleration	G's	+/- 15	-8.5	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 15% of peak	Yes	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

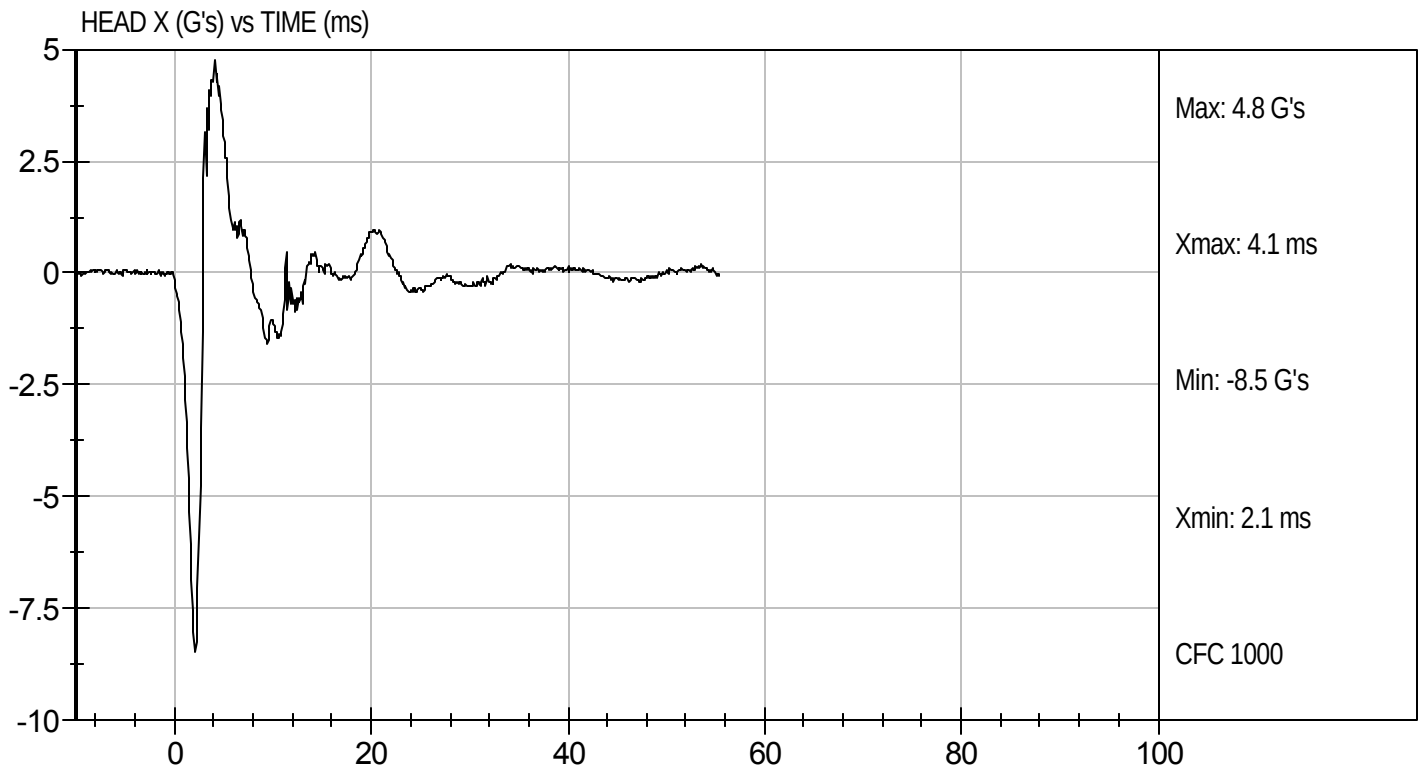
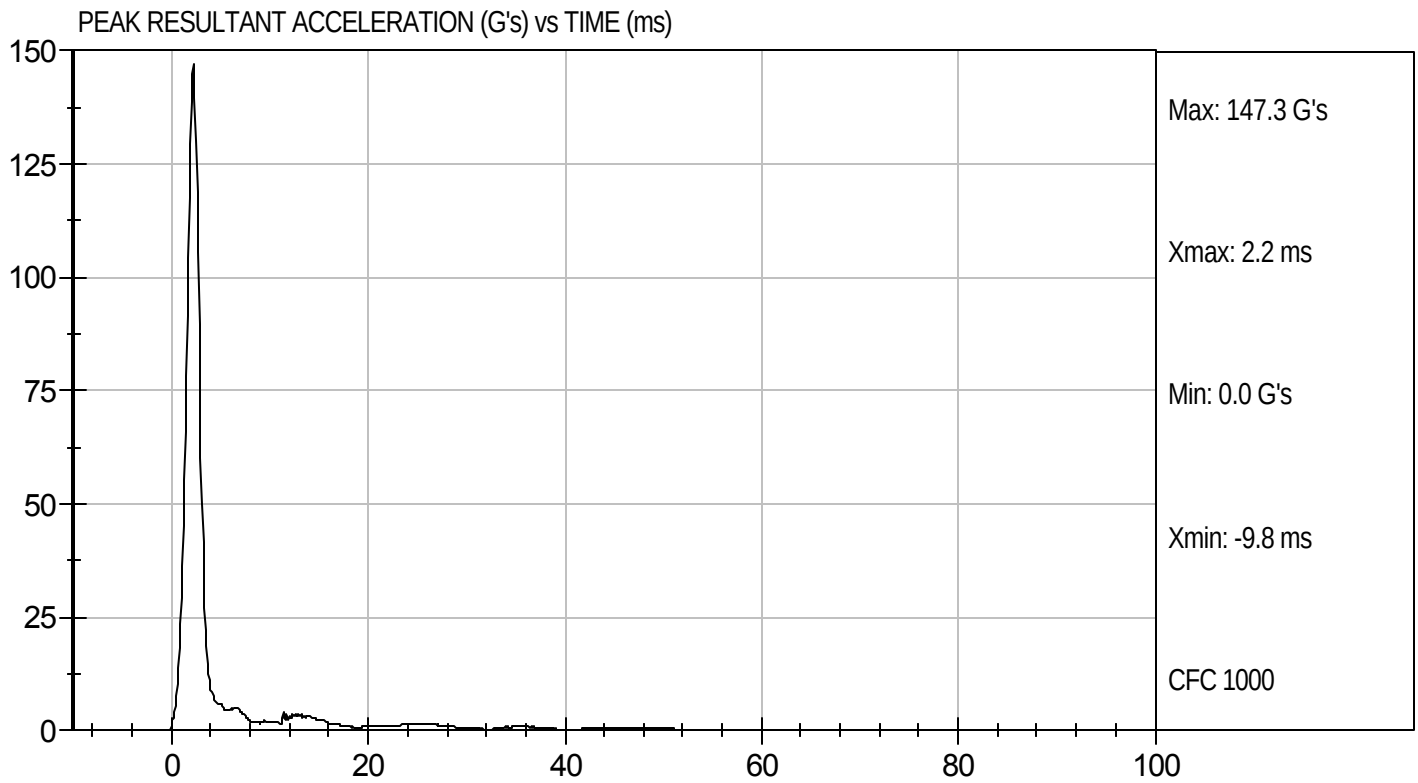
2/13/12
Test Date

David Winkelbauer
Approved By



Test Desc: Head Drop
Component ID: D12451

Test Date: 2/13/12
Velocity: 0 ft/s, 0 m/s



MGA RESEARCH CORPORATION
NECK PENDULUM TEST
ES-2re DUMMY

ATD Serial No: 032

Test I.D: D12452

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	18.0 to 22.0	21.7	Pass
Laboratory Relative Humidity		%	10 to 70	16	Pass
Pendulum Speed		m/s	3.3 to 3.5	3.5	Pass
Pendulum Deceleration	1 ms	m/s	0.00 to -0.05	-0.01	Pass
	3 ms	m/s	-0.25 to -0.375	-0.34	Pass
	14 ms	m/s	-3.20 to -3.70	-3.35	Pass
Maximum Flexion Angle		deg	49.0 to 59.0	51.5	Pass
Time of Maximum Flexion Angle		ms	54.0 to 66.0	60.0	Pass
Head Rotation Decay Time to 0 degree		ms	53.0 to 88.0	58.4	Pass
Overall Test Results					Pass


 Laboratory Technician

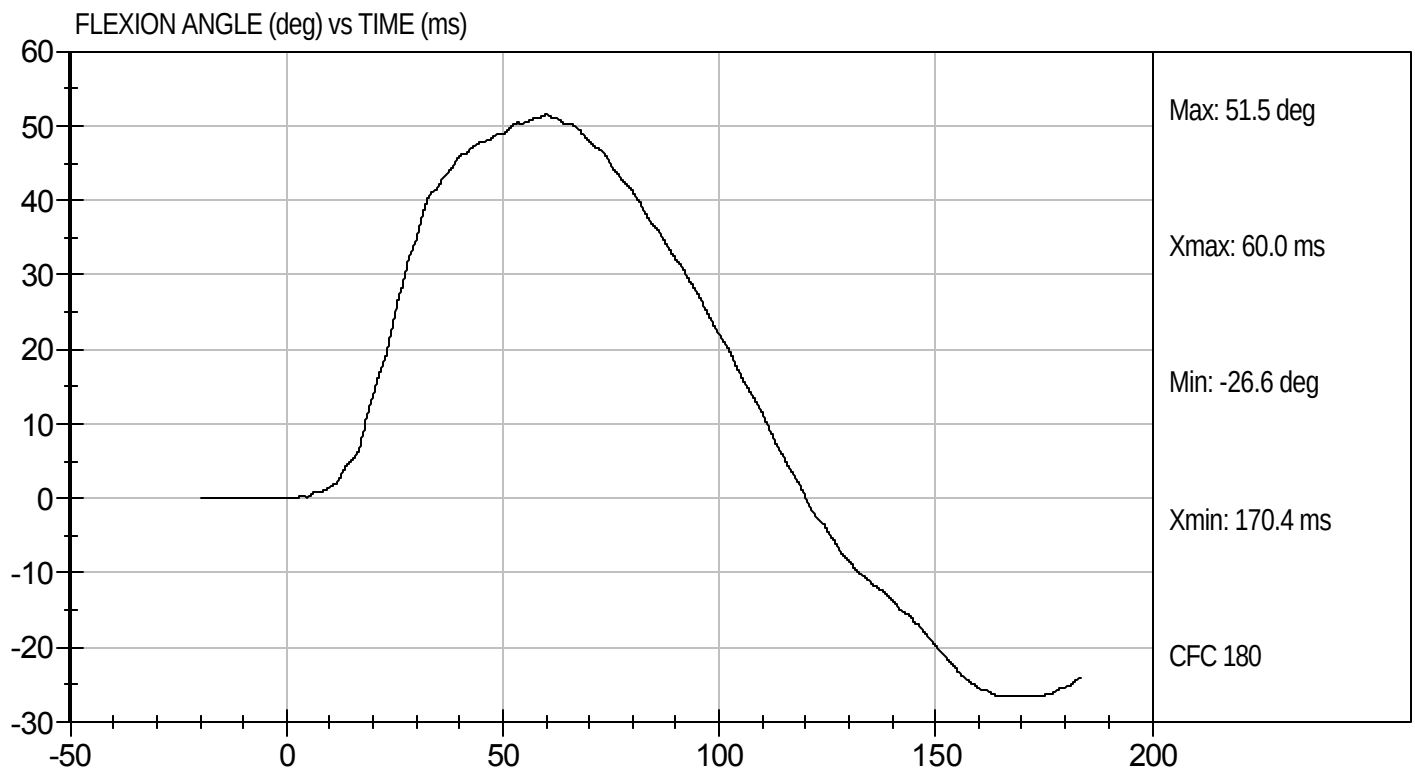
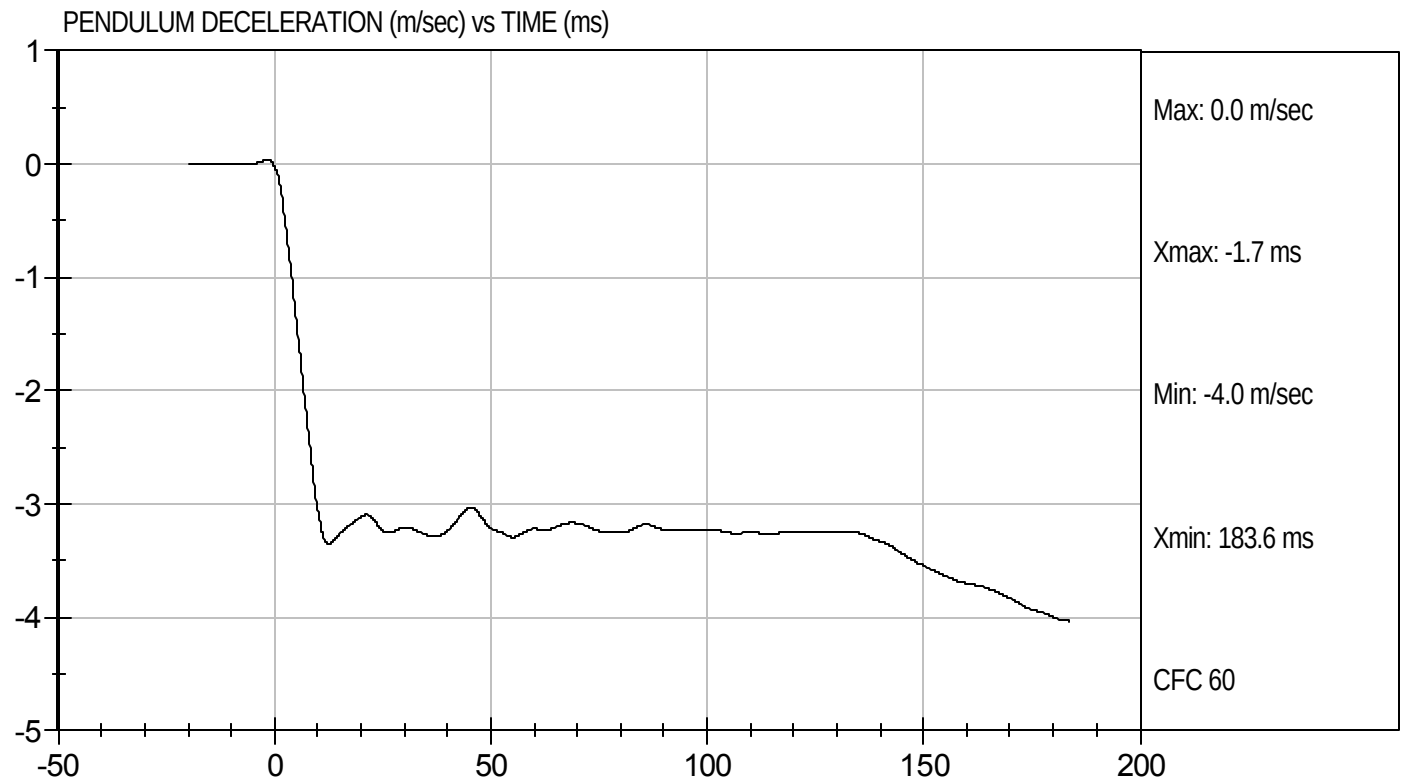
2/13/12
 Test Date


 Approved By



Test Desc: Neck Bending
Component ID: D12452

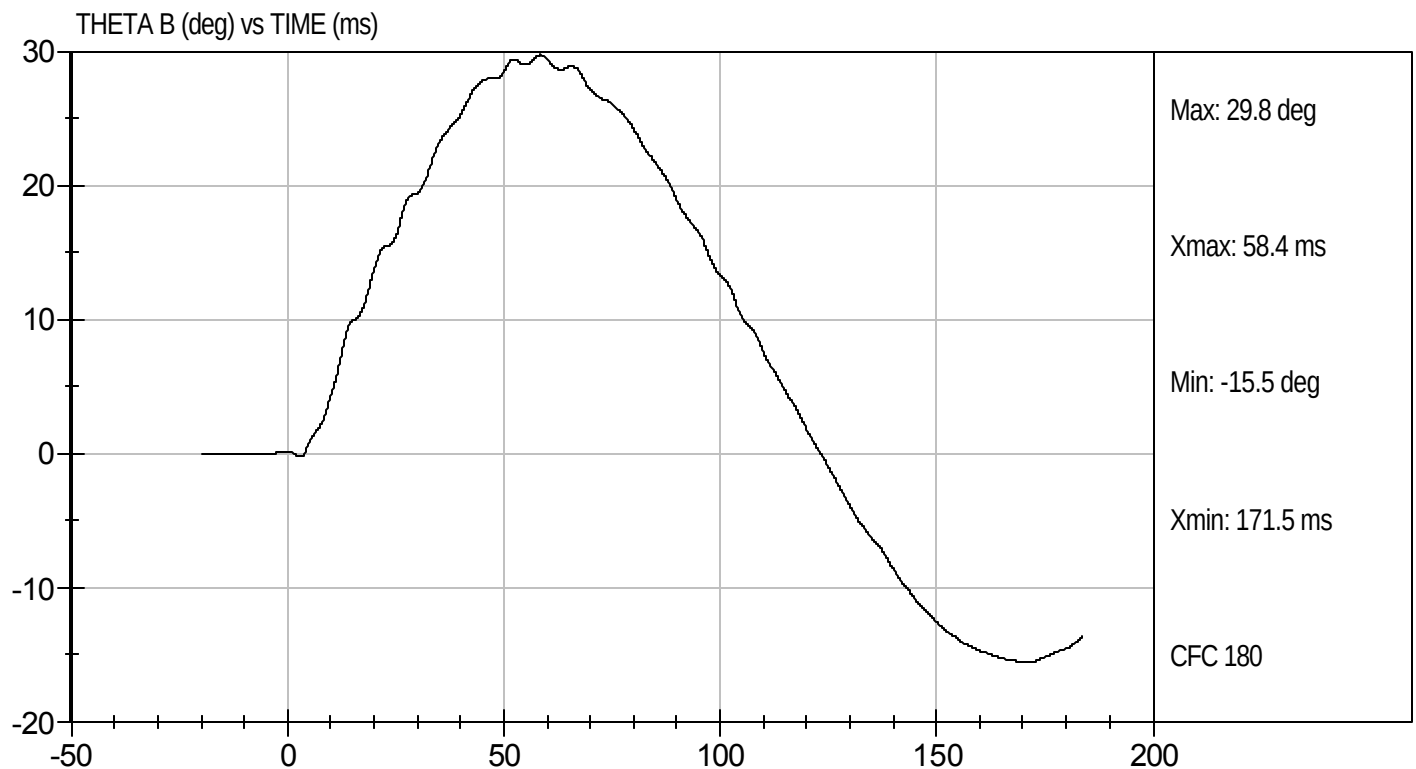
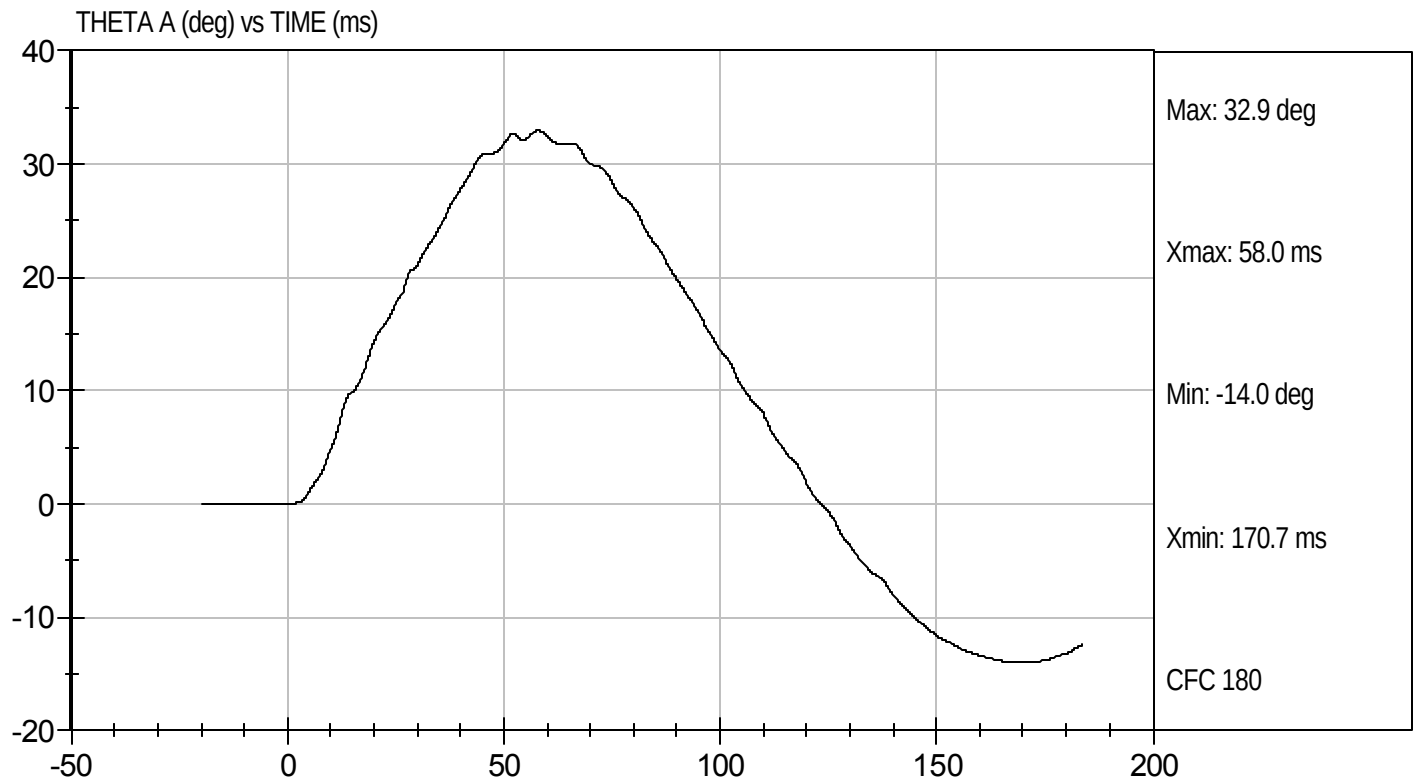
Test Date: 2/13/12
Velocity: 11.34 ft/s, 3.5 m/s





Test Desc: Neck Bending
Component ID: D12452

Test Date: 2/13/12
Velocity: 11.34 ft/s, 3.5 m/s



MGA RESEARCH CORPORATION
SHOULDER IMPACT TEST
ES-2re DUMMY

ATD Serial No: 032

Test I.D: D12453

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	17	Pass
Pendulum Speed	m/s	4.2 to 4.4	4.3	Pass
Peak Shoulder Acceleration	G's	7.5 to 10.5	9.9	Pass
Time of Peak Shoulder Acceleration	ms	NA	16.9	Pass
Overall Test Results			Pass	



Laboratory Technician

2/13/12

Test Date

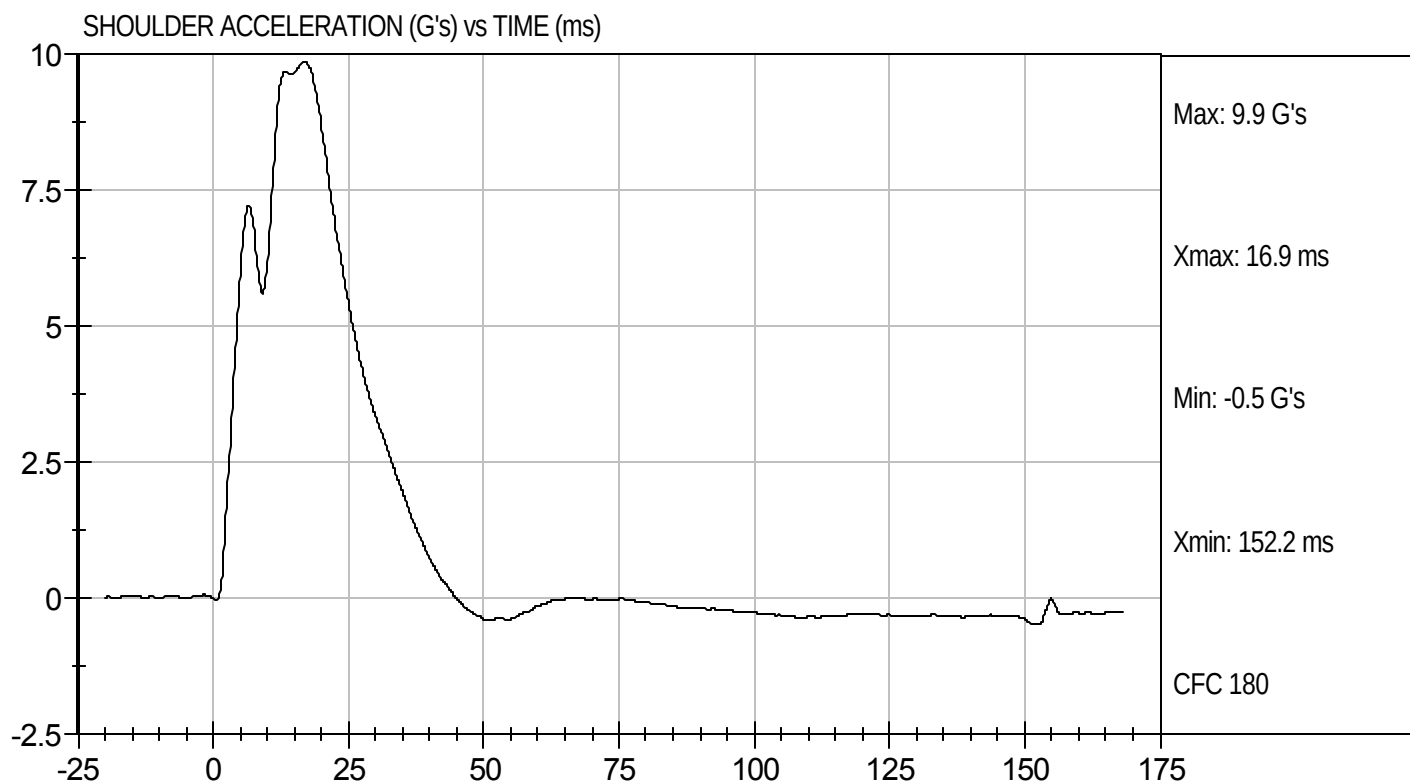


Approved By



Test Desc: Shoulder Impact
Component ID: D12453

Test Date: 2/13/12
Velocity: 14.00 ft/s, 4.3 m/s



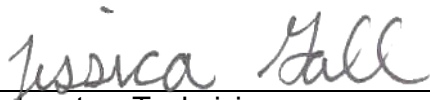
MGA RESEARCH CORPORATION

UPPER RIB TEST
EUROSID 2 DUMMY

ATD Serial No: 032

Test I.D: D12454

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	16	Pass
Displacement at 3 m/s	mm	36.0 to 40.0	37.5	Pass
Displacement at 4 m/s	mm	46.0 to 51.0	48.3	Pass
			Overall Test Results	Pass


Laboratory Technician

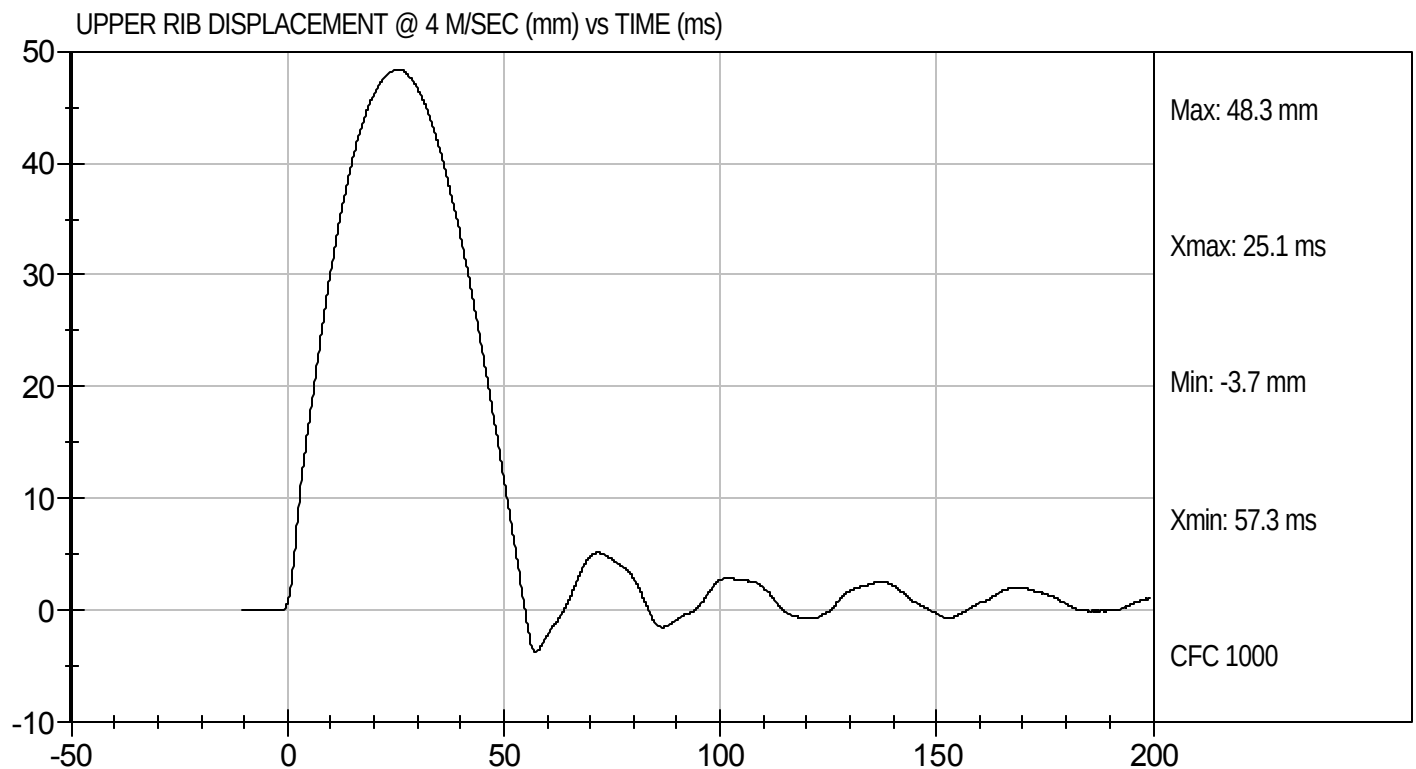
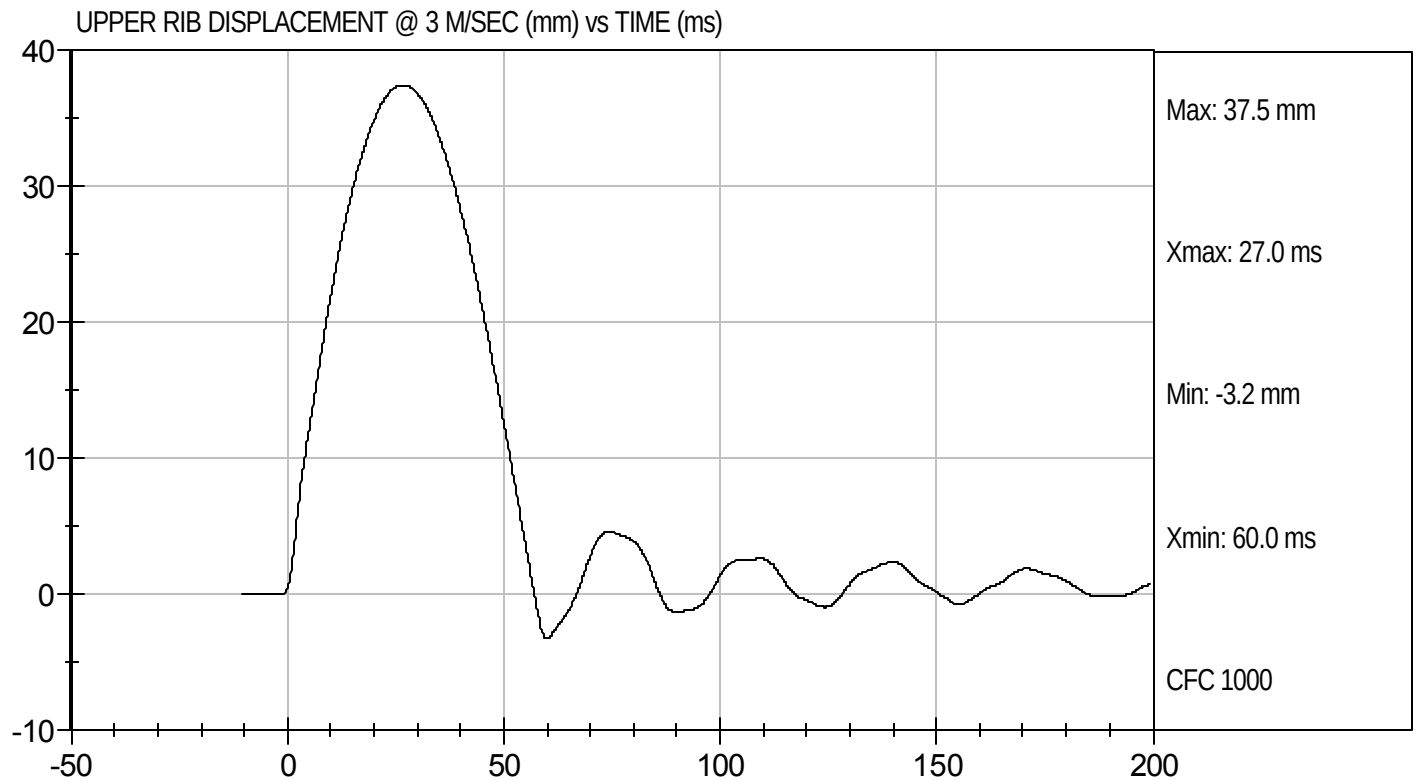
2/13/12
Test Date


Approved By



Test Desc: Rib Impact - Upper
Component ID: D12454

Test Date: 2/13/12



MGA RESEARCH CORPORATION

MID RIB TEST
EUROSID 2 DUMMY

ATD Serial No: 032

Test I.D: D12455

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	16	Pass
Displacement at 3 m/s	mm	36.0 to 40.0	37.2	Pass
Displacement at 4 m/s	mm	46.0 to 51.0	47.3	Pass
			Overall Test Results	Pass


Laboratory Technician

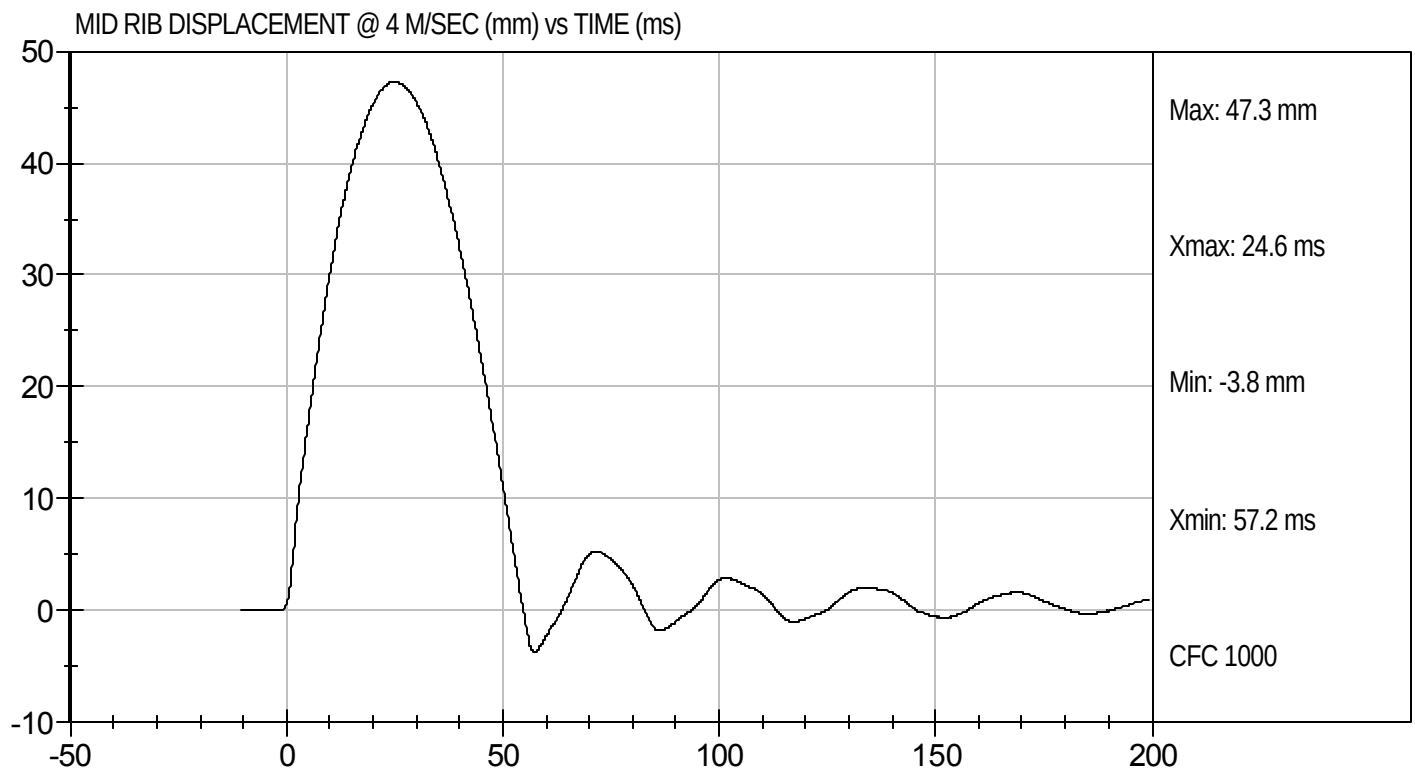
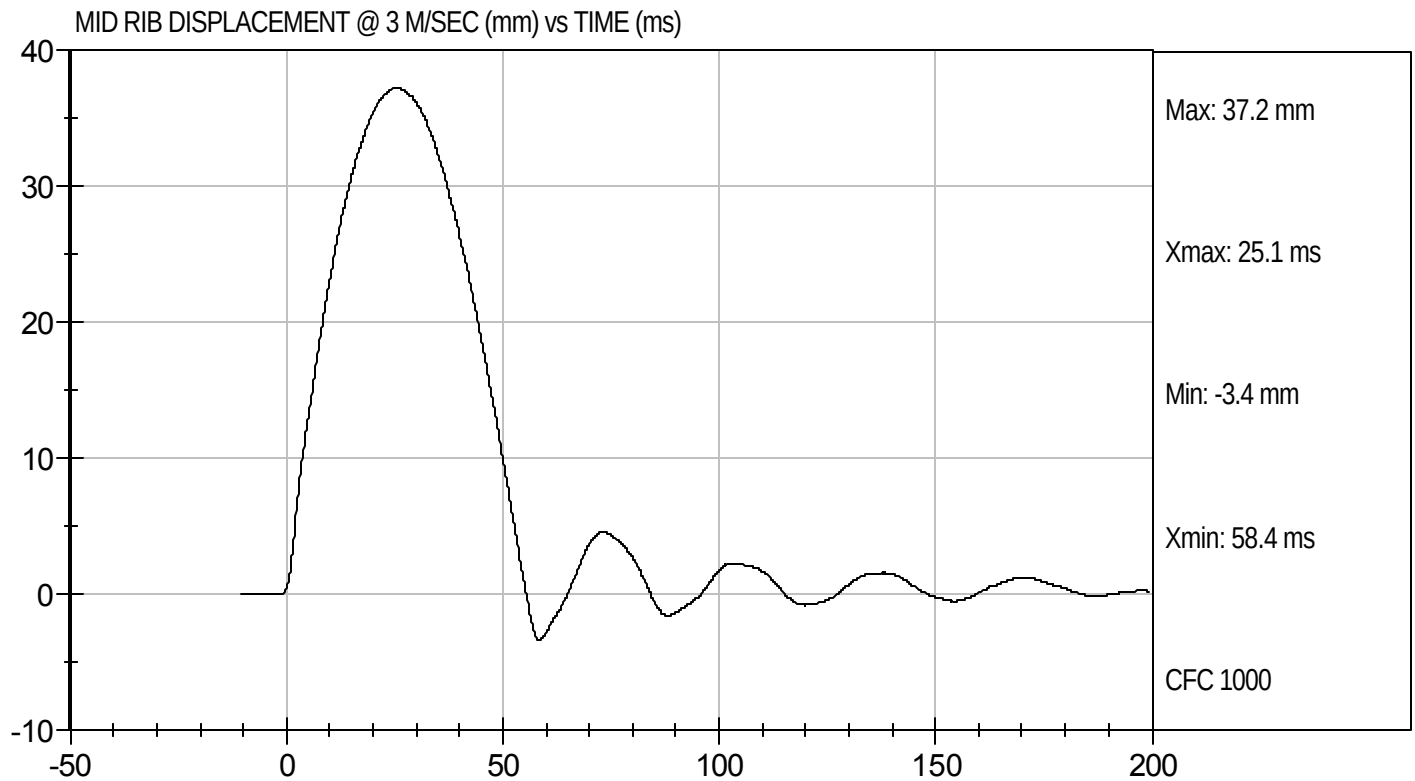
2/13/12
Test Date


Approved By



Test Desc: Rib Impact - Mid
Component ID: D12455

Test Date: 2/13/12



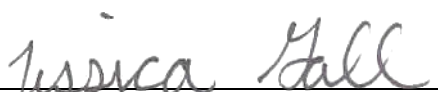
MGA RESEARCH CORPORATION

**LOWER RIB TEST
EUROSID 2 DUMMY**

ATD Serial No: 032

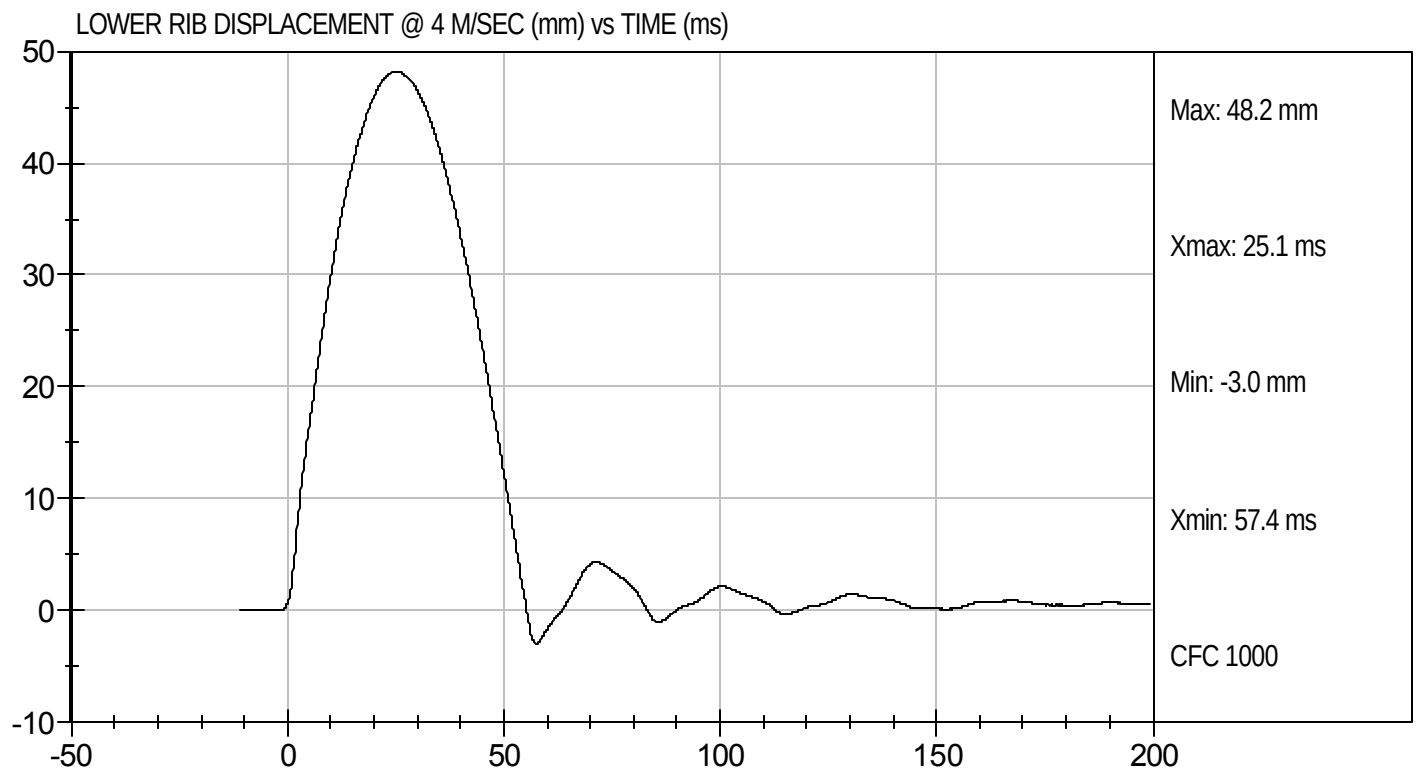
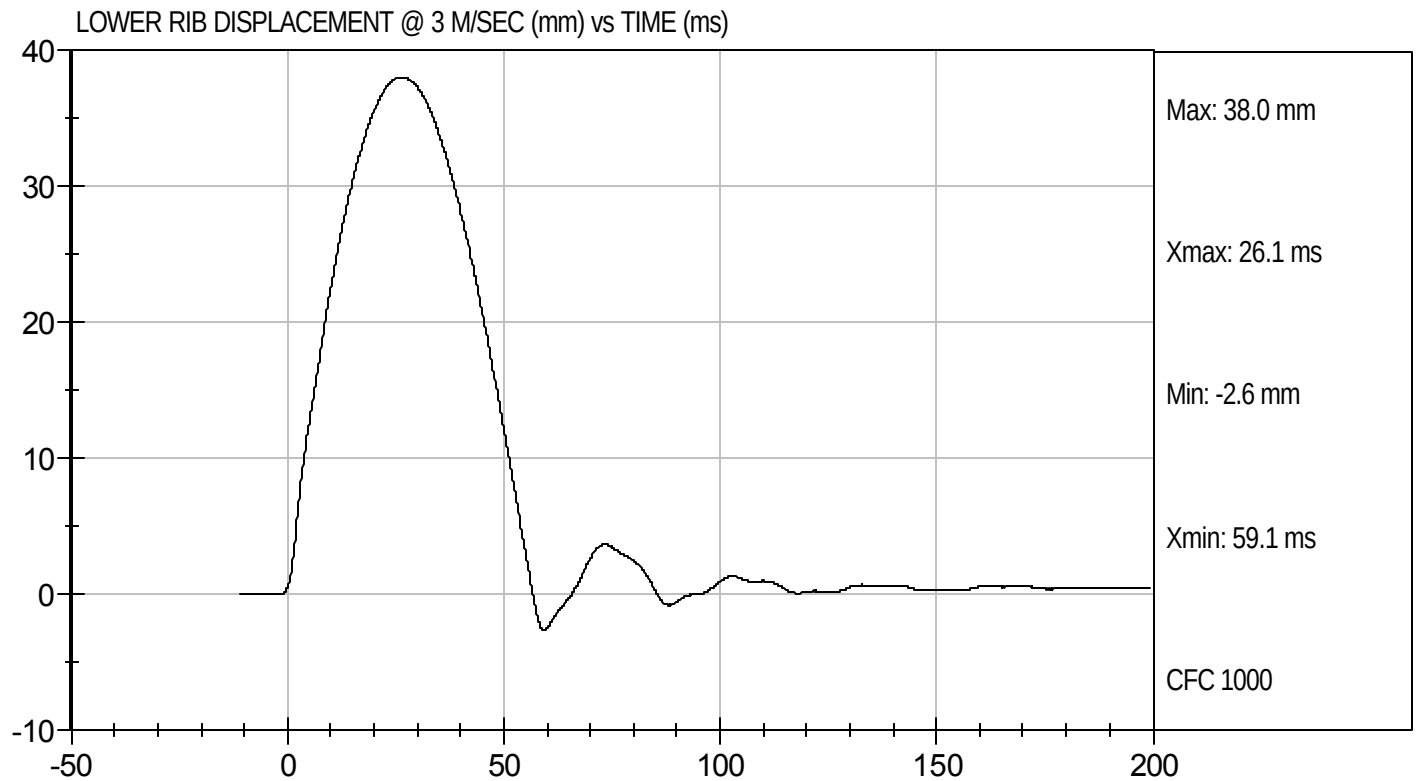
Test I.D: D12456

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	16	Pass
Displacement at 3 m/s	mm	36.0 to 40.0	38.0	Pass
Displacement at 4 m/s	mm	46.0 to 51.0	48.2	Pass
			Overall Test Results	Pass


Laboratory Technician

2/13/12
Test Date


Approved By



MGA RESEARCH CORPORATION
FULL BODY THORAX IMPACT TEST
ES-2re DUMMY

ATD Serial No: 032

Test I.D: D12450

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	17	Pass
Probe Speed	m/s	5.40 to 5.60	5.58	Pass
Maximum Impactor Force (after 6 ms)	kN	5.10 to 6.20	5.11	Pass
Upper Rib Displacement	mm	34.0 to 41.0	36.8	Pass
Middle Rib Displacement	mm	37.0 to 45.0	39.5	Pass
Lower Rib Displacement	mm	37.0 to 44.0	38.7	Pass
Overall Test Results			Pass	


Laboratory Technician

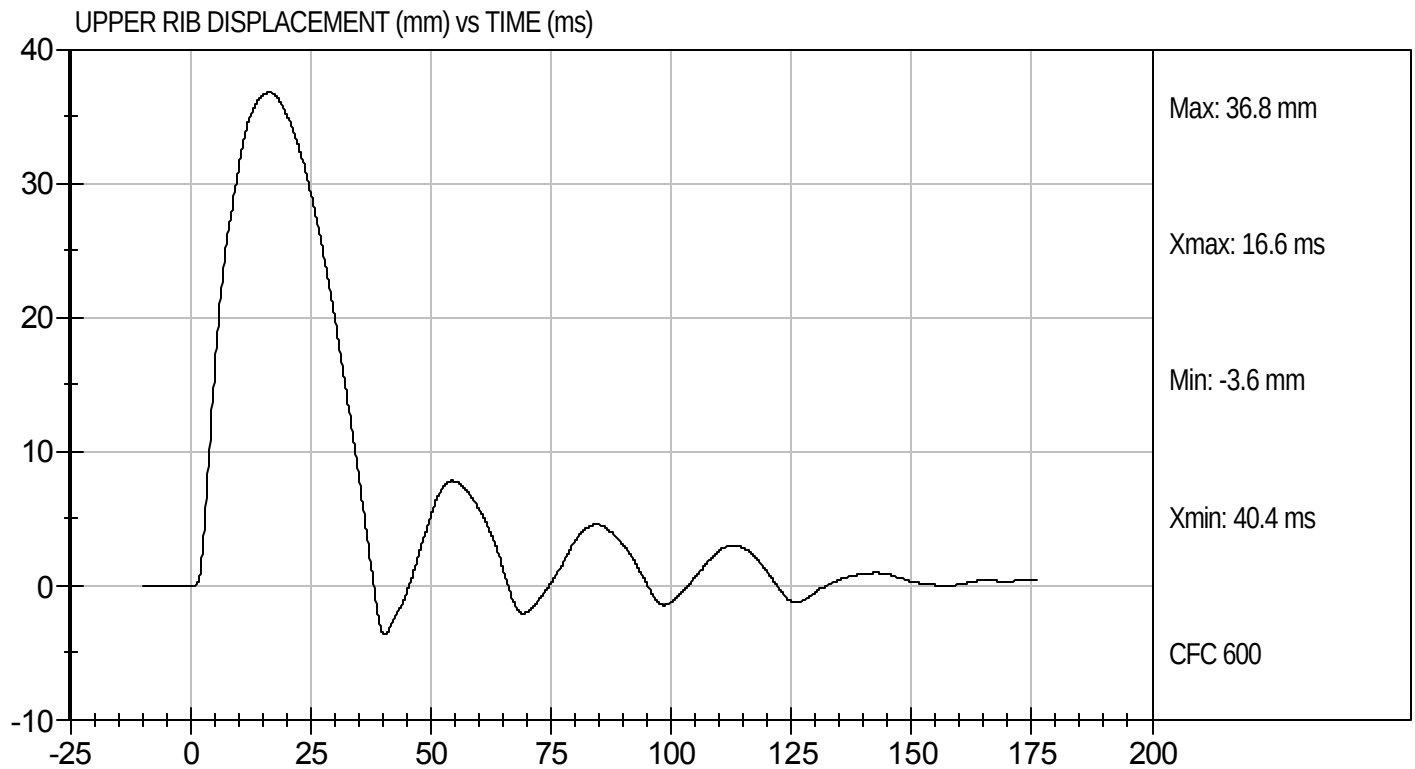
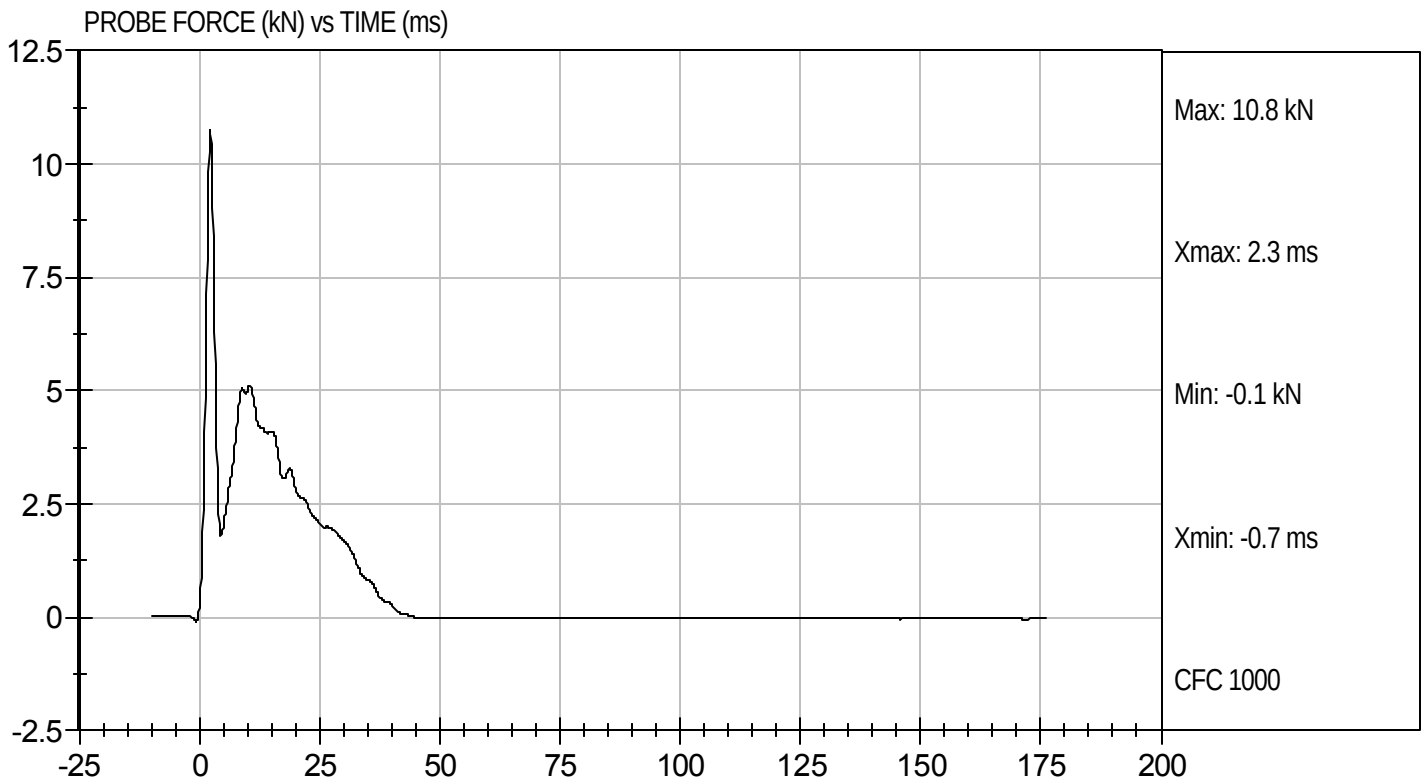
2/14/12
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D12450

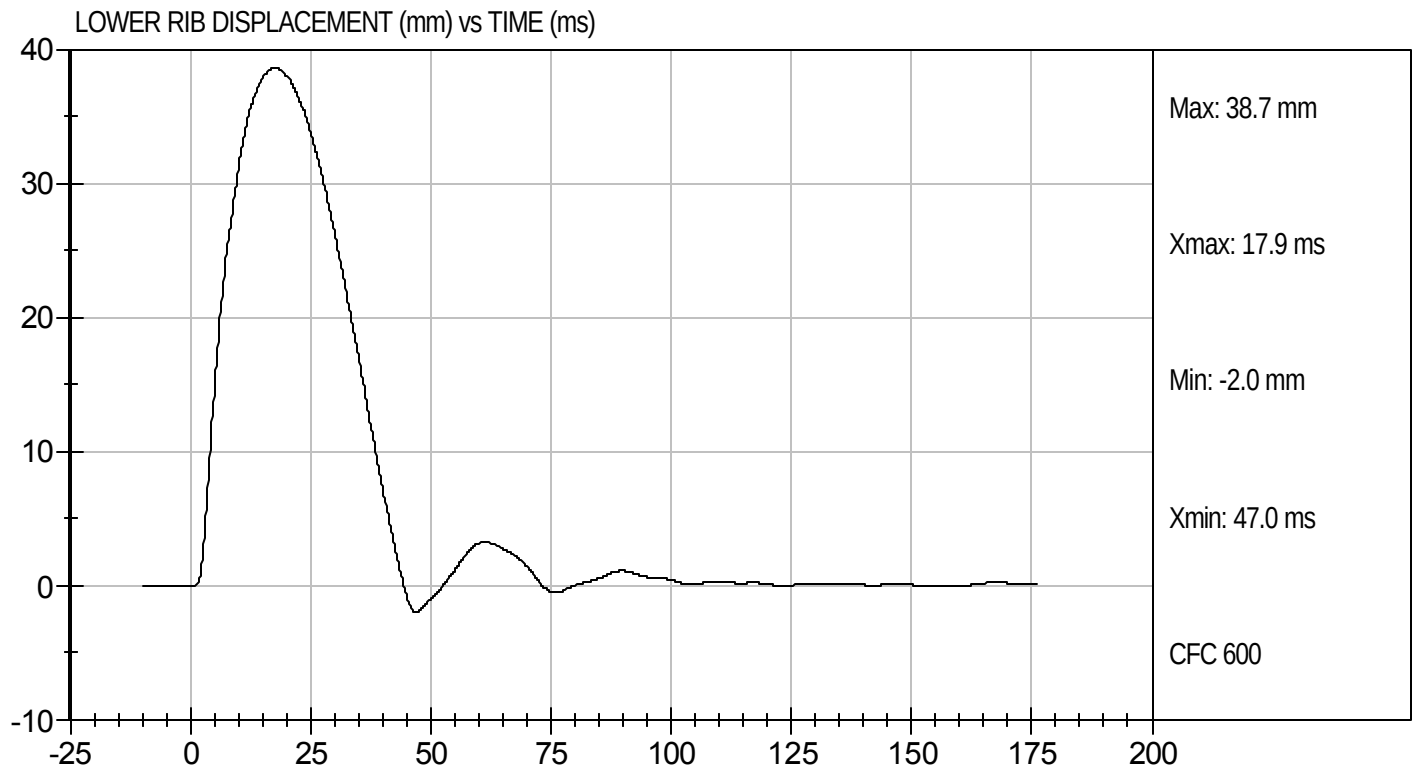
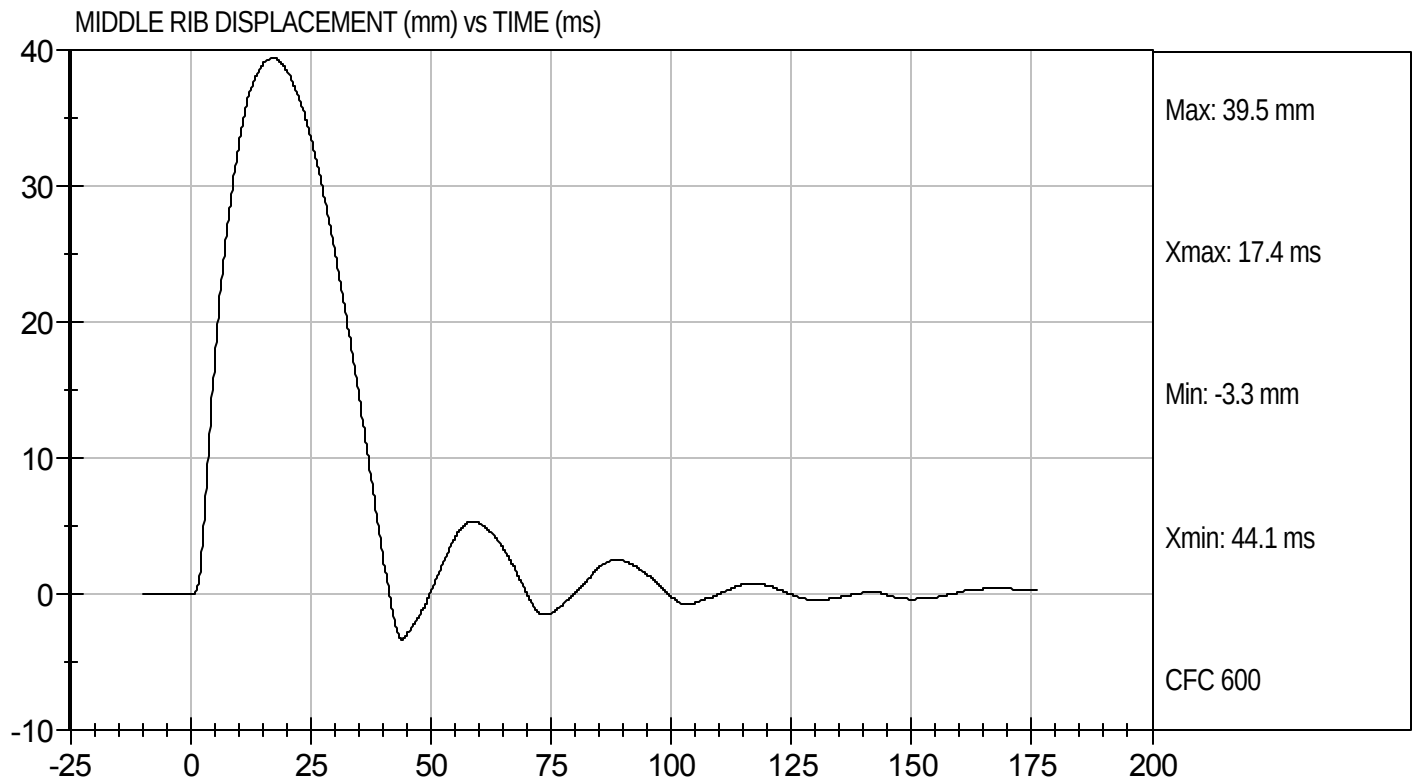
Test Date: 2/14/12
Velocity: 18.31 ft/s, 5.58 m/s





Test Desc: Thorax Impact
Component ID: D12450

Test Date: 2/14/12
Velocity: 18.31 ft/s, 5.58 m/s



MGA RESEARCH CORPORATION

ABDOMEN TEST

ES-2re DUMMY

ATD Serial No: 032

Test I.D: D12457

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	17	Pass
Probe Speed	m/s	3.90 to 4.10	3.93	Pass
Maximum Impact Force	kN	4.00 to 4.80	4.13	Pass
Time of Maximum Impact Force	ms	10.60 to 13.00	11.10	Pass
Maximum Total Abdomen Force	kN	2.20 to 2.70	2.49	Pass
Time of Maximum Abdomen Force	ms	10.00 to 12.30	10.20	Pass
Overall Test Results				Pass


Laboratory Technician

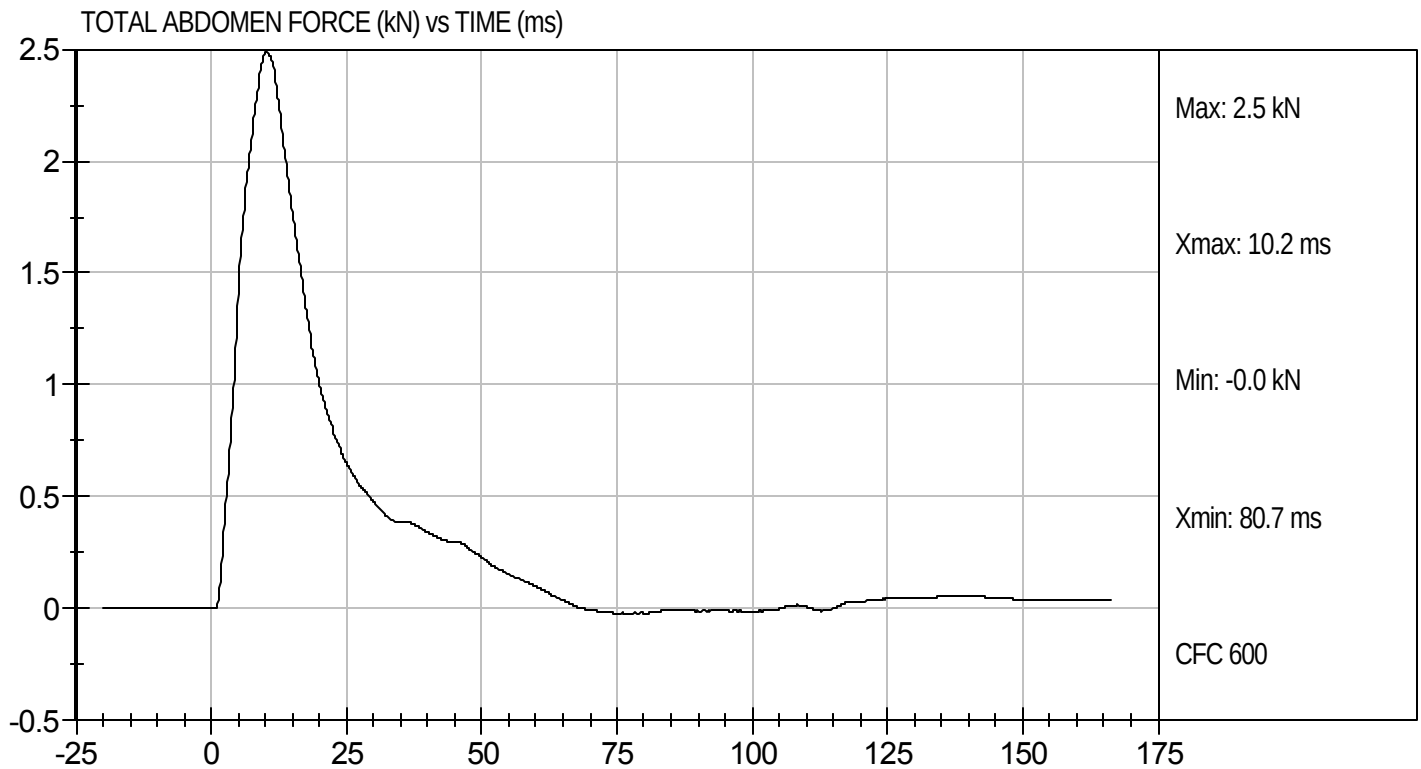
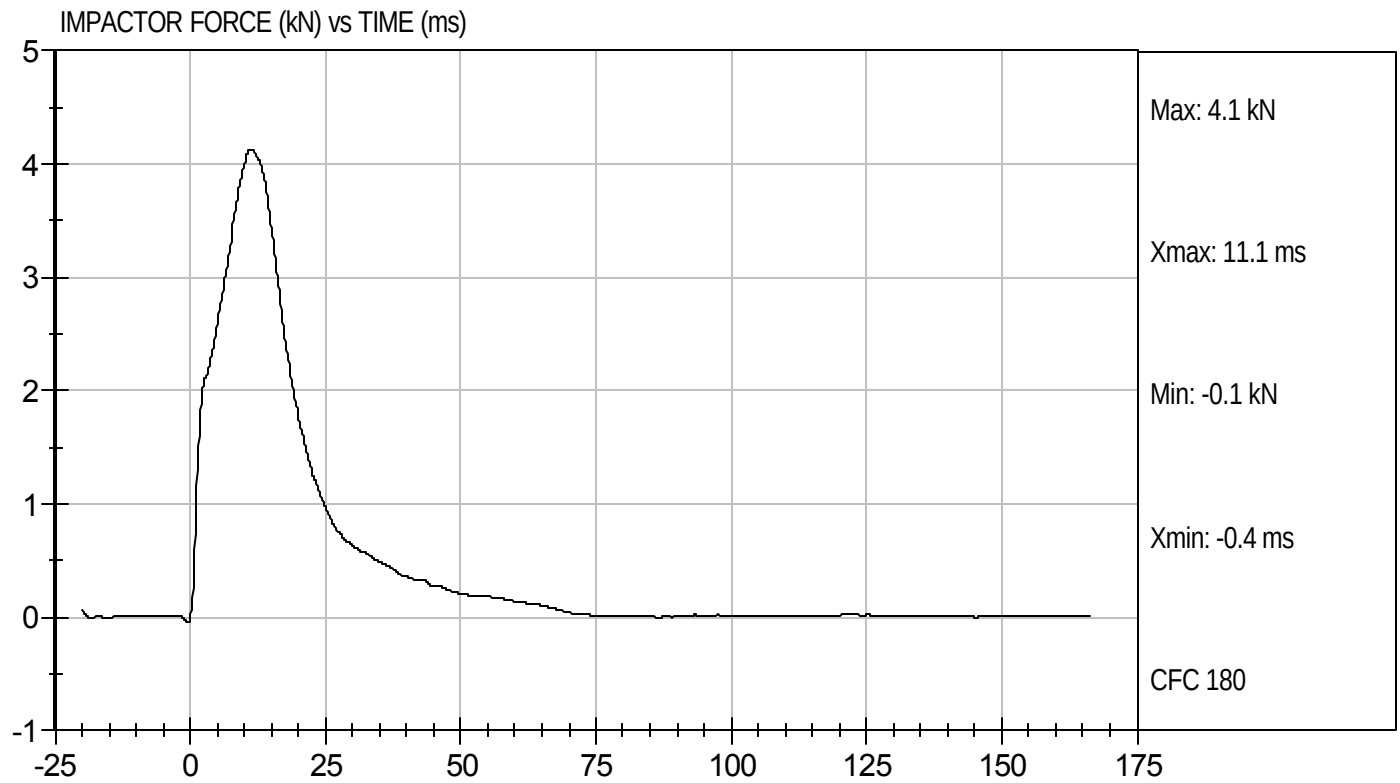
2/13/12
Test Date


Approved By



Test Desc: Abdomen Impact
Component ID: D12457

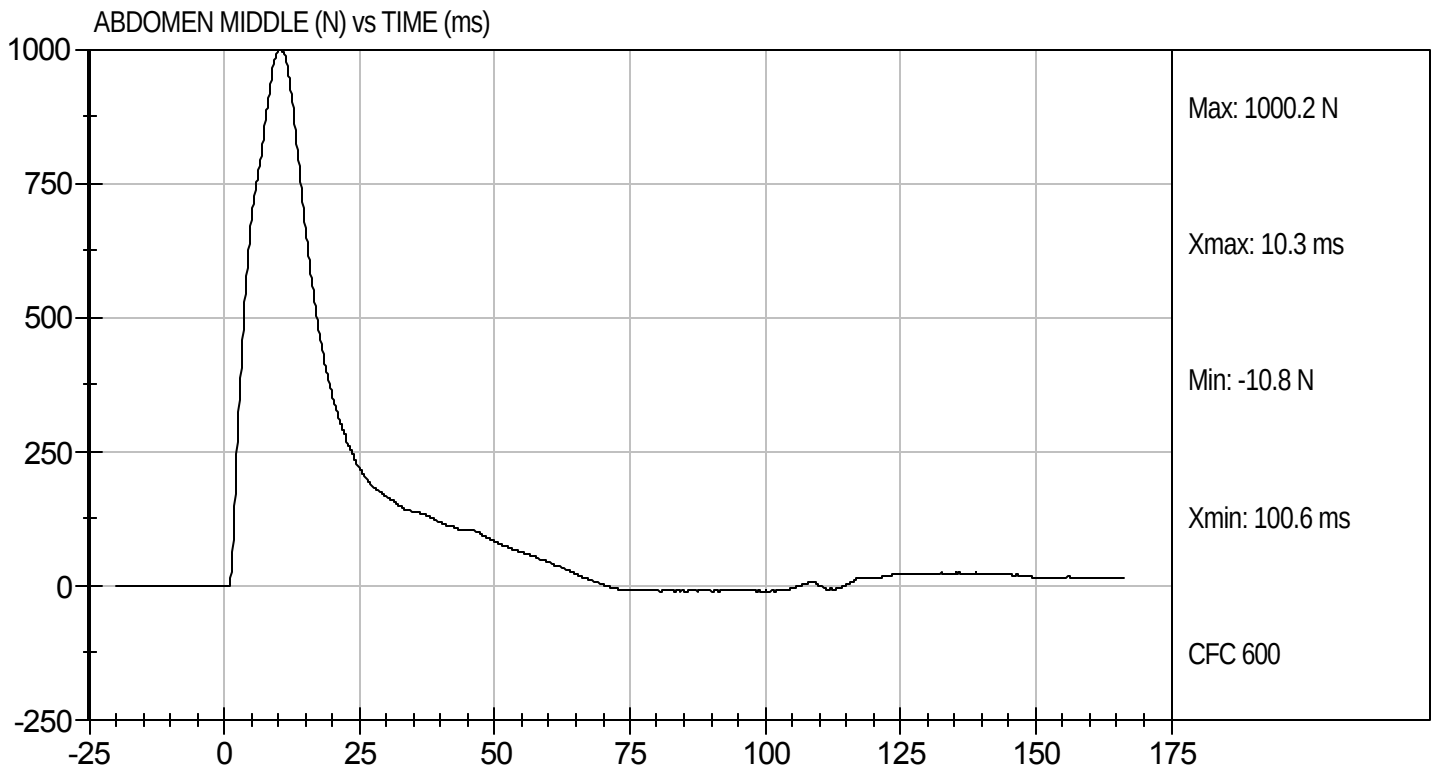
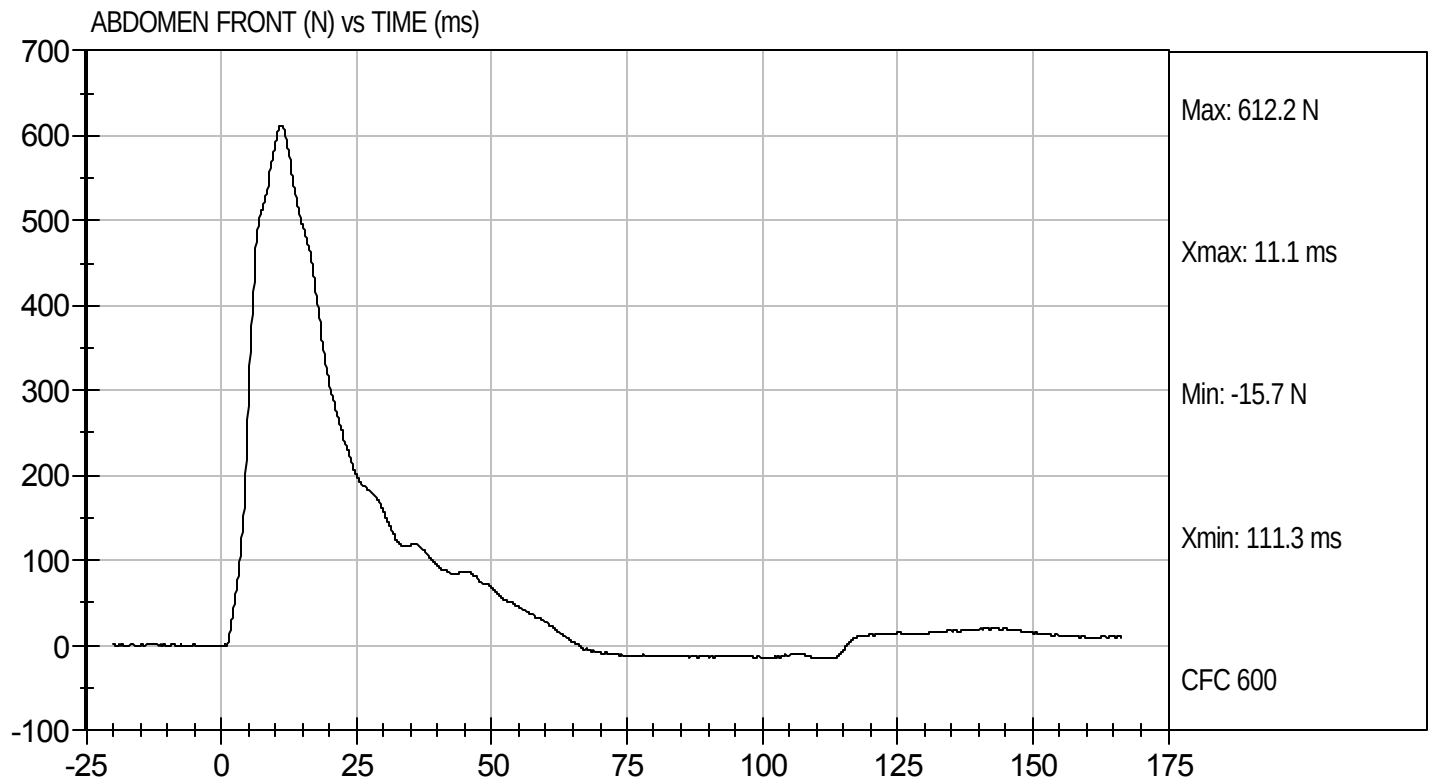
Test Date: 2/13/12
Velocity: 12.91 ft/s, 3.93 m/s





Test Desc: Abdomen Impact
Component ID: D12457

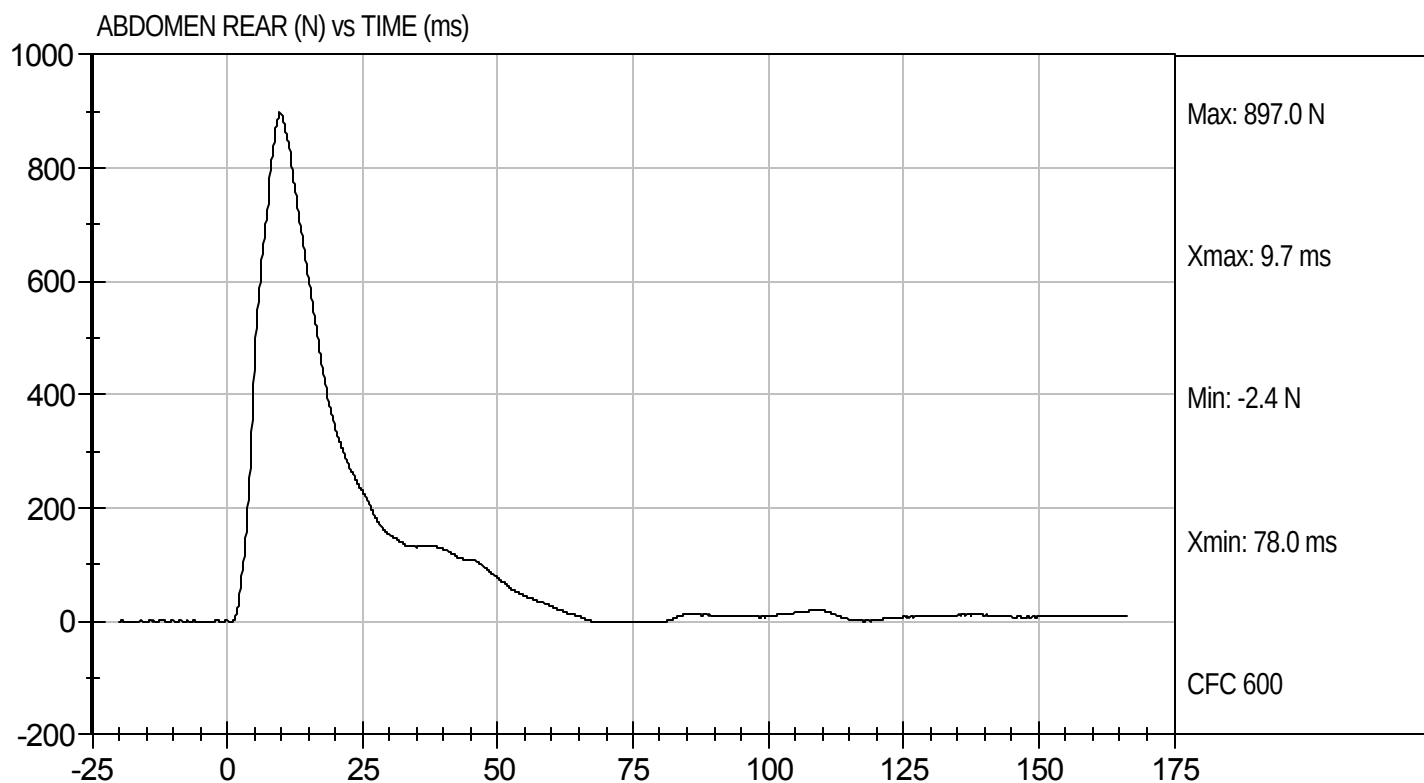
Test Date: 2/13/12
Velocity: 12.91 ft/s, 3.93 m/s





Test Desc: Abdomen Impact
Component ID: D12457

Test Date: 2/13/12
Velocity: 12.91 ft/s, 3.93 m/s

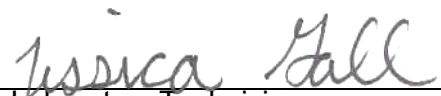


MGA RESEARCH CORPORATION
LUMBAR SPINE TEST
ES-2re DUMMY

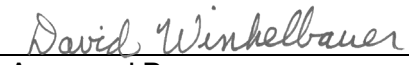
ATD Serial No: 032

Test I.D: D12458

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	16	Pass
Pendulum Speed		m/s	5.95 to 6.15	6.12	Pass
Pendulum Deceleration	1 ms	m/s	-0.05 to 0.00	-0.01	Pass
	3.7 ms	m/s	-0.425 to -0.24	-0.42	Pass
	27 ms	m/s	-6.50 to -5.80	-5.97	Pass
	30 ms	m/s	>= -6.5	-5.88	Pass
Maximum Flexion Angle		deg	45.0 to 55.0	48.5	Pass
Time of Maximum Flexion Angle		ms	39.0 to 53.0	44.7	Pass
Headform Rotation Decay to Initial Position		ms	37 to 57	42	Pass
Overall Results					Pass


 Laboratory Technician

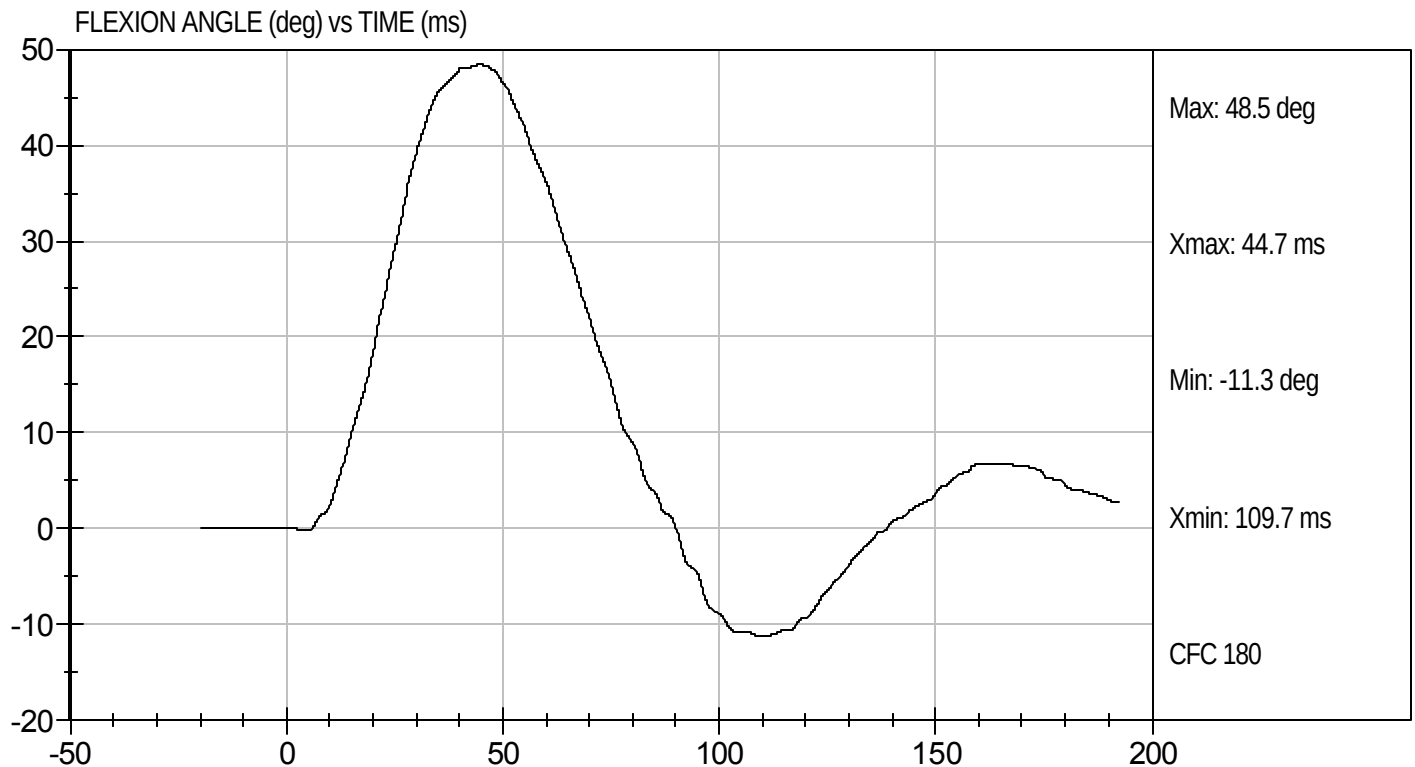
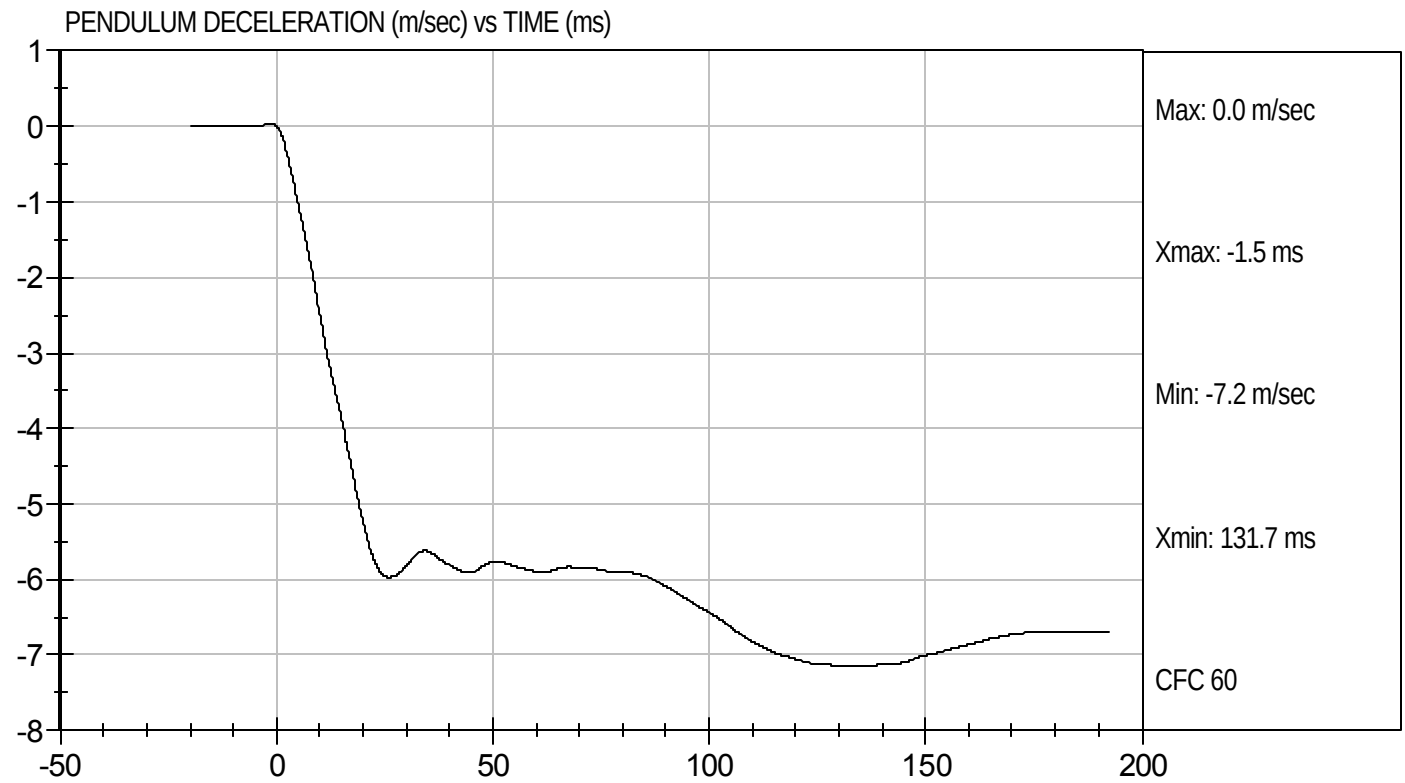
2/13/12
 Test Date


 Approved By



Test Desc: Lumbar Bending
Component ID: D12458

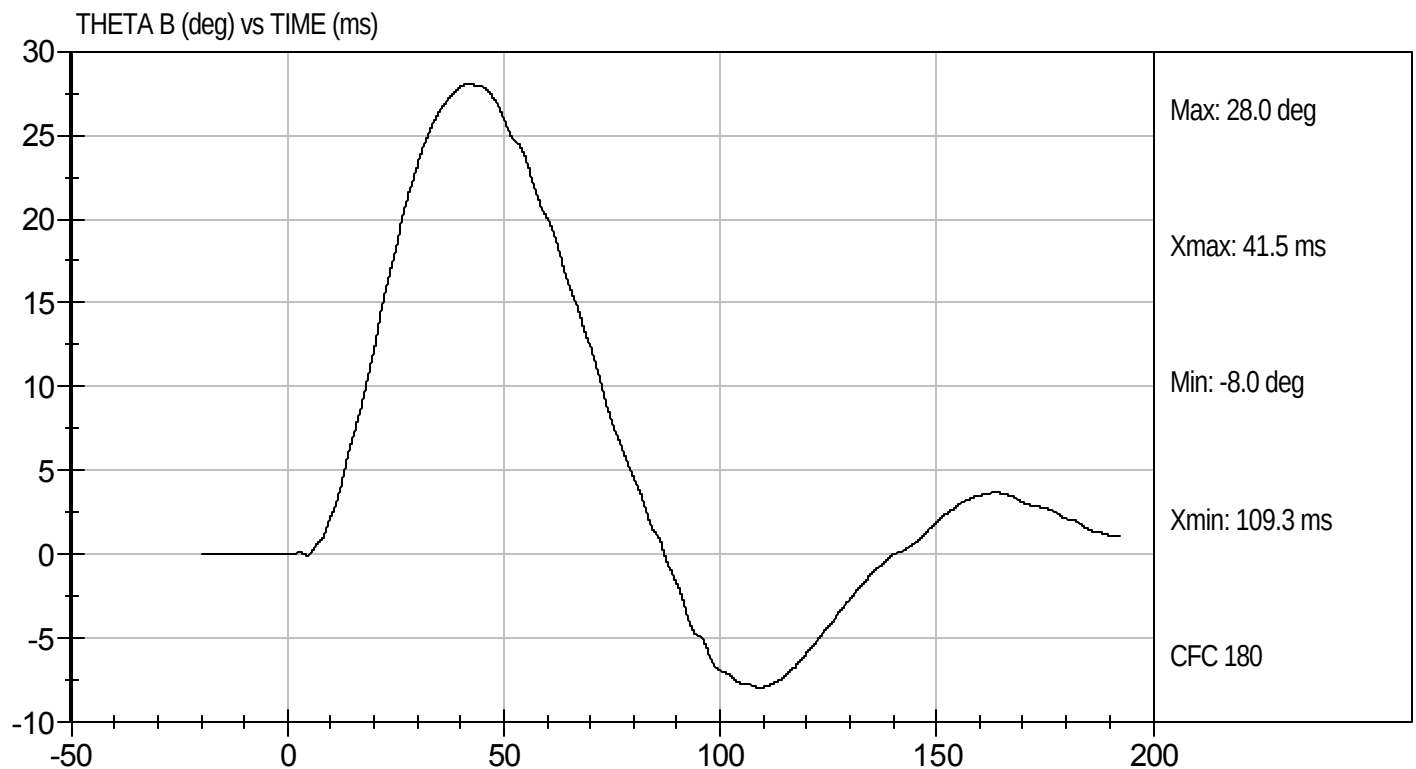
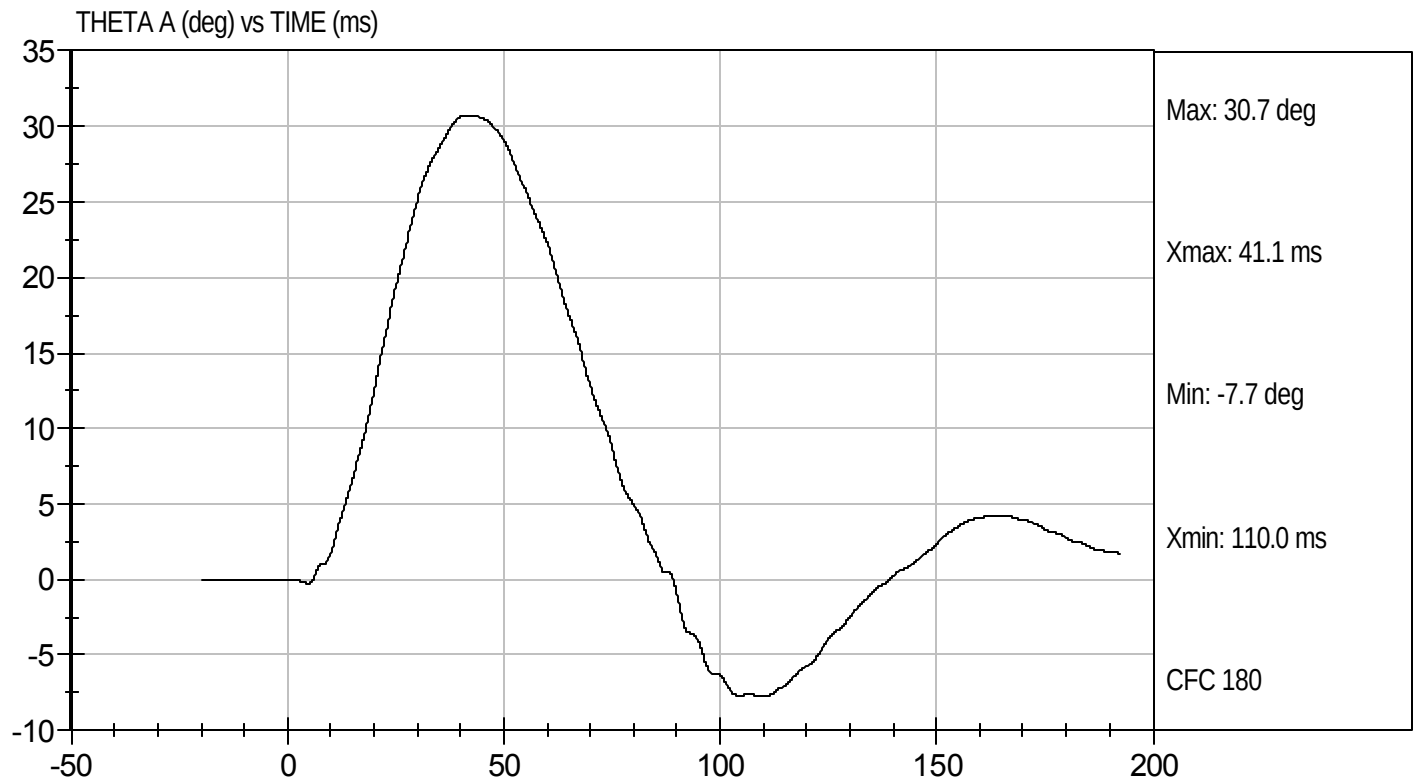
Test Date: 2/13/12
Velocity: 20.08 ft/s, 6.12 m/s





Test Desc: Lumbar Bending
Component ID: D12458

Test Date: 2/13/12
Velocity: 20.08 ft/s, 6.12 m/s



MGA RESEARCH CORPORATION

PELVIS TEST
ES-2re DUMMY

ATD Serial No: 032

Test I.D: D12459

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	17	Pass
Probe Speed	m/s	4.20 to 4.40	4.30	Pass
Maximum Impactor Force	kN	4.70 to 5.40	5.03	Pass
Time of Maximum Impactor Force	ms	11.80 to 16.10	13.10	Pass
Maximum Pubic Force	kN	1.23 to 1.59	1.39	Pass
Time of Maximum Pubic Force	ms	12.20 to 17.00	14.20	Pass
Overall Test Results				Pass


Laboratory Technician

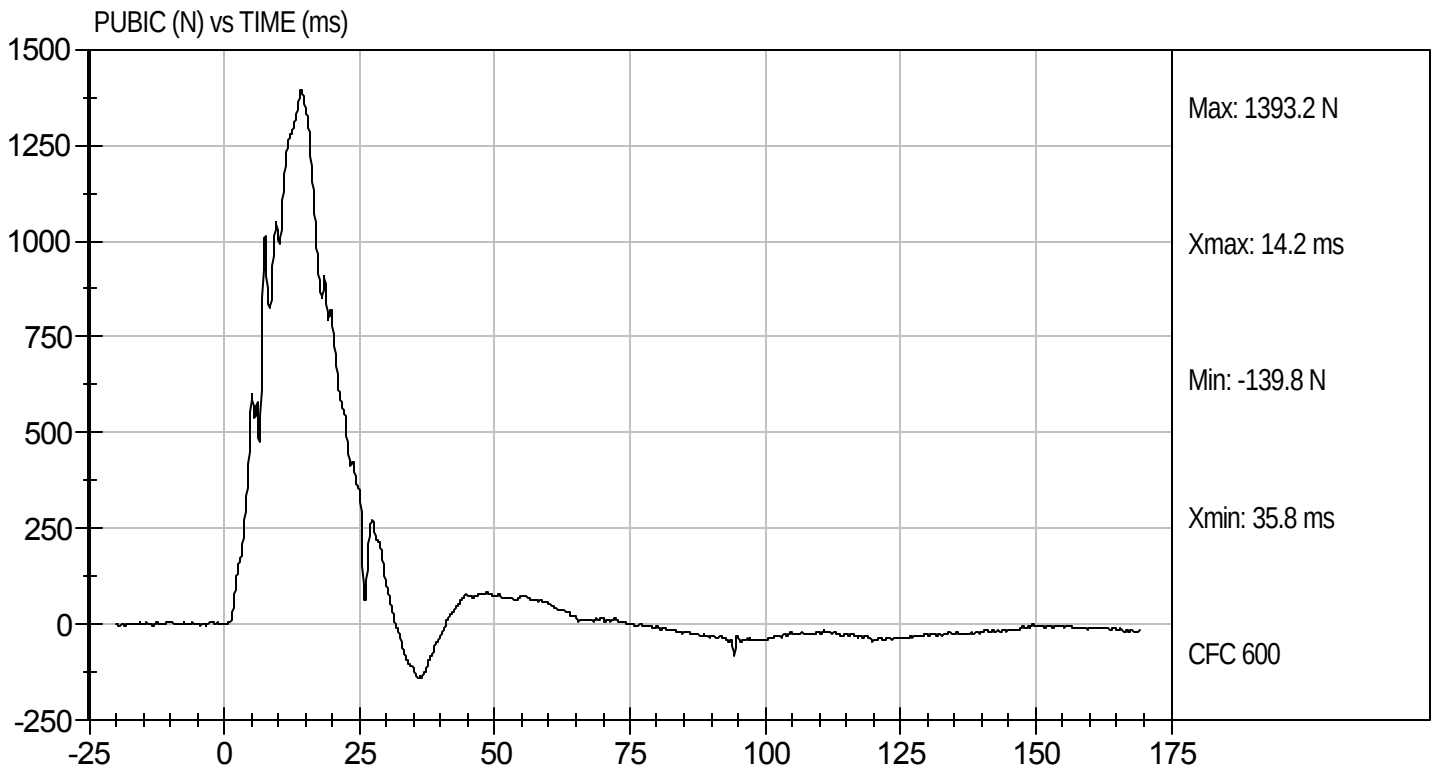
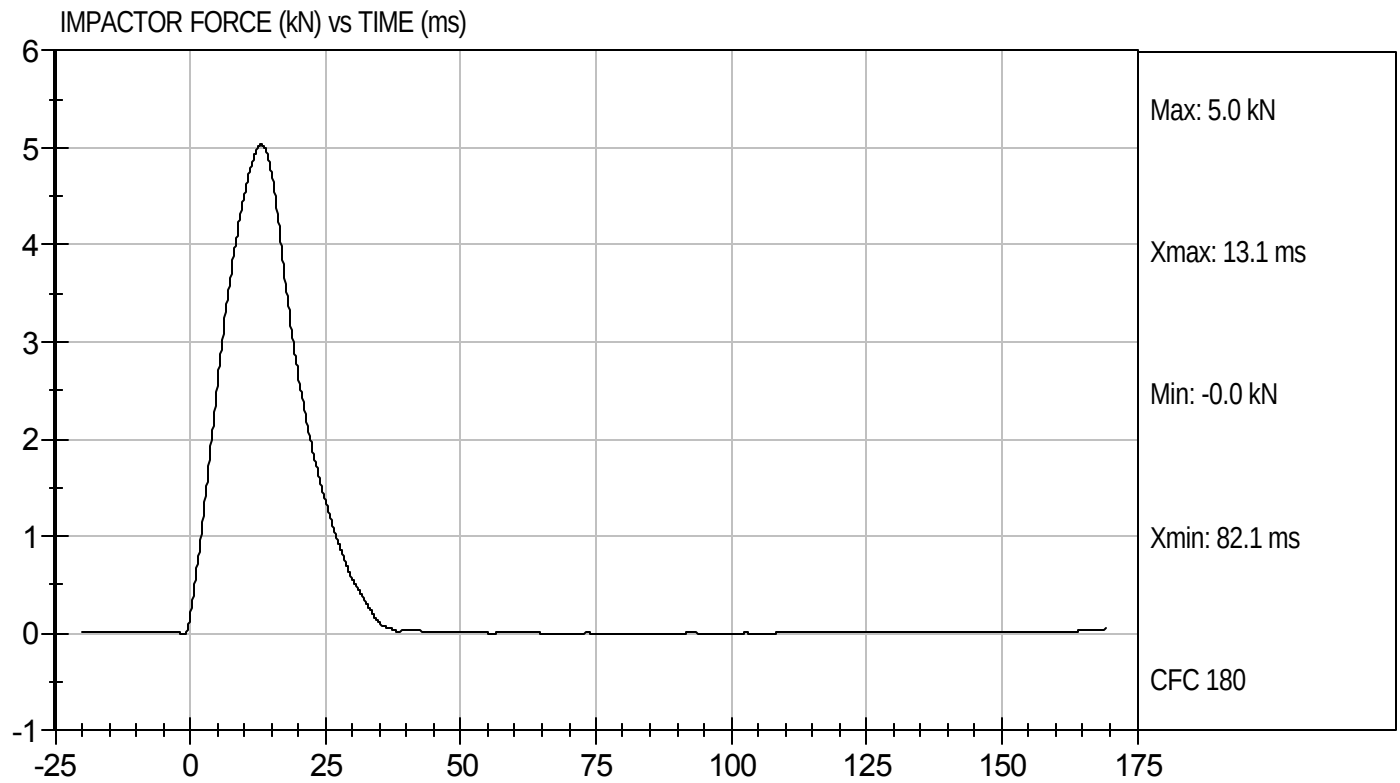
2/13/12
Test Date


Approved By



Test Desc: Pelvis Impact
Component ID: D12459

Test Date: 2/13/12
Velocity: 14.12 ft/s, 4.30 m/s



MGA RESEARCH CORPORATION

HEAD DROP TEST

ES-2re DUMMY

ATD Serial No: 032

Test ID: D12481

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	22.0	Pass
Laboratory Relative Humidity	%	10 to 70	25	Pass
Peak Resultant Acceleration	G's	125 to 155	146	Pass
Peak Longitudinal Acceleration	G's	+/- 15	6.1	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 15% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

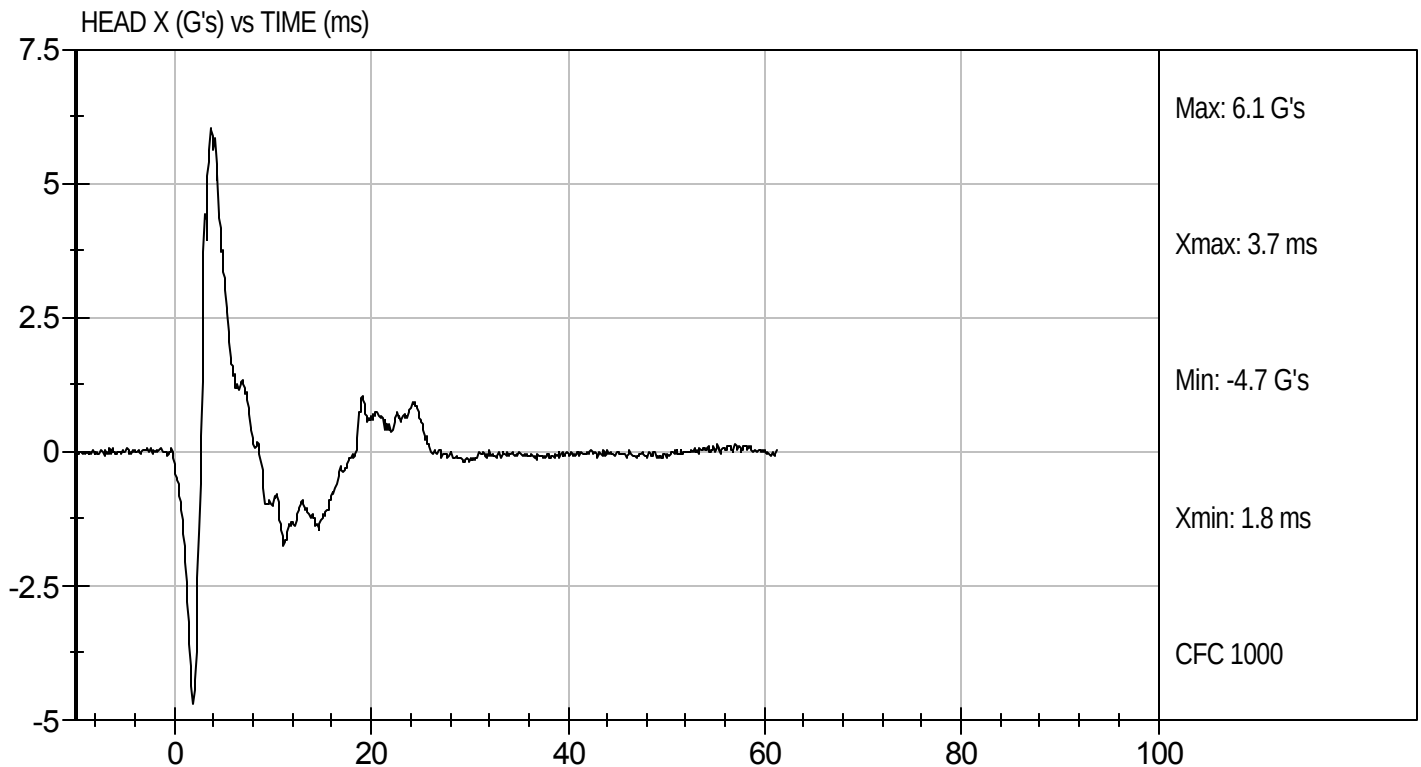
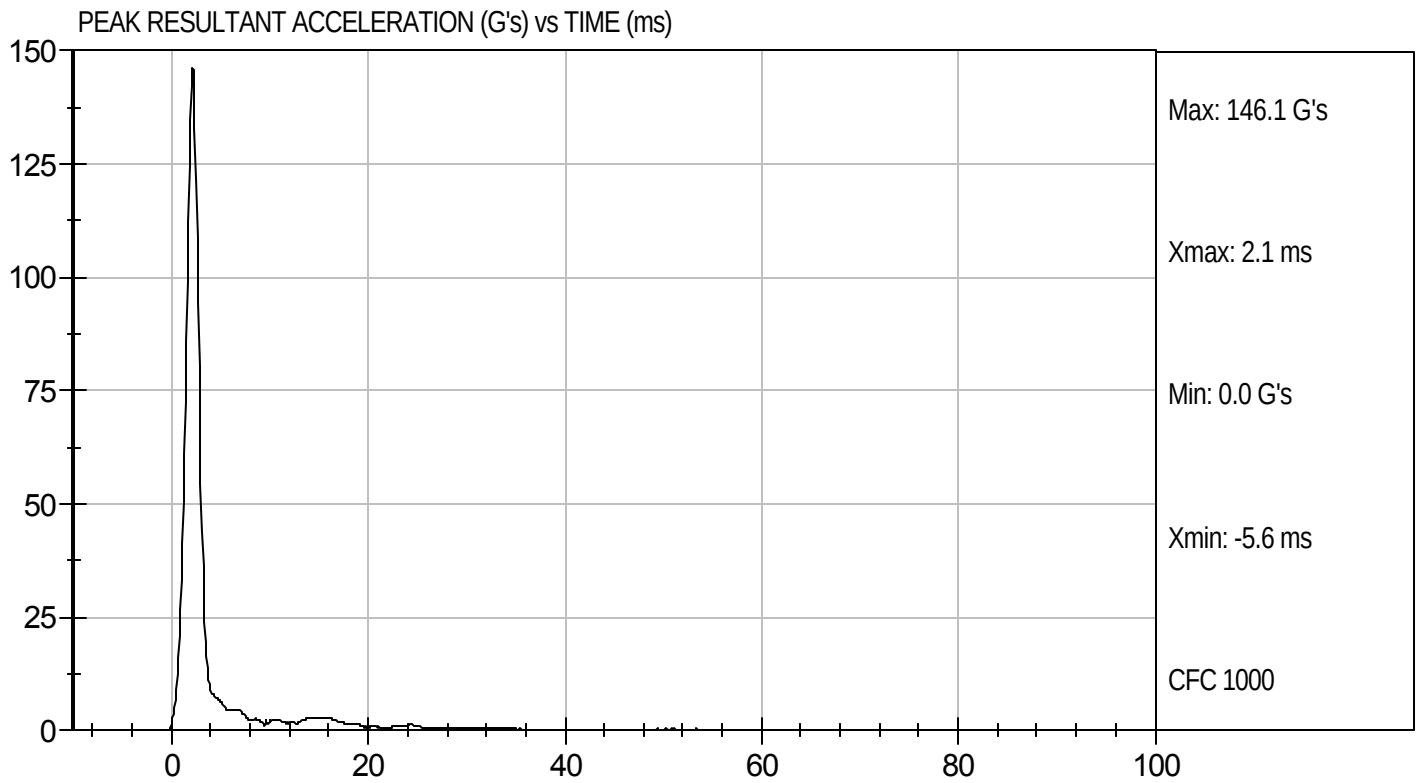
2/15/12
Test Date


Approved By



Test Desc: Head Drop
Component ID: D12481

Test Date: 2/15/12
Velocity: 0 ft/s, 0 m/s

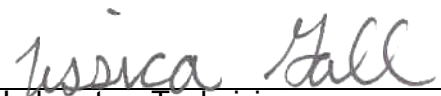


MGA RESEARCH CORPORATION
NECK PENDULUM TEST
ES-2re DUMMY

ATD Serial No: 032

Test I.D: D12482

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	18.0 to 22.0	22.0	Pass
Laboratory Relative Humidity		%	10 to 70	25	Pass
Pendulum Speed		m/s	3.3 to 3.5	3.5	Pass
Pendulum Deceleration	1 ms	m/s	0.00 to -0.05	-0.02	Pass
	3 ms	m/s	-0.25 to -0.375	-0.33	Pass
	14 ms	m/s	-3.20 to -3.70	-3.26	Pass
Maximum Flexion Angle		deg	49.0 to 59.0	52.1	Pass
Time of Maximum Flexion Angle		ms	54.0 to 66.0	58.1	Pass
Head Rotation Decay Time to 0 degree		ms	53.0 to 88.0	55.5	Pass
Overall Test Results					Pass


 Laboratory Technician

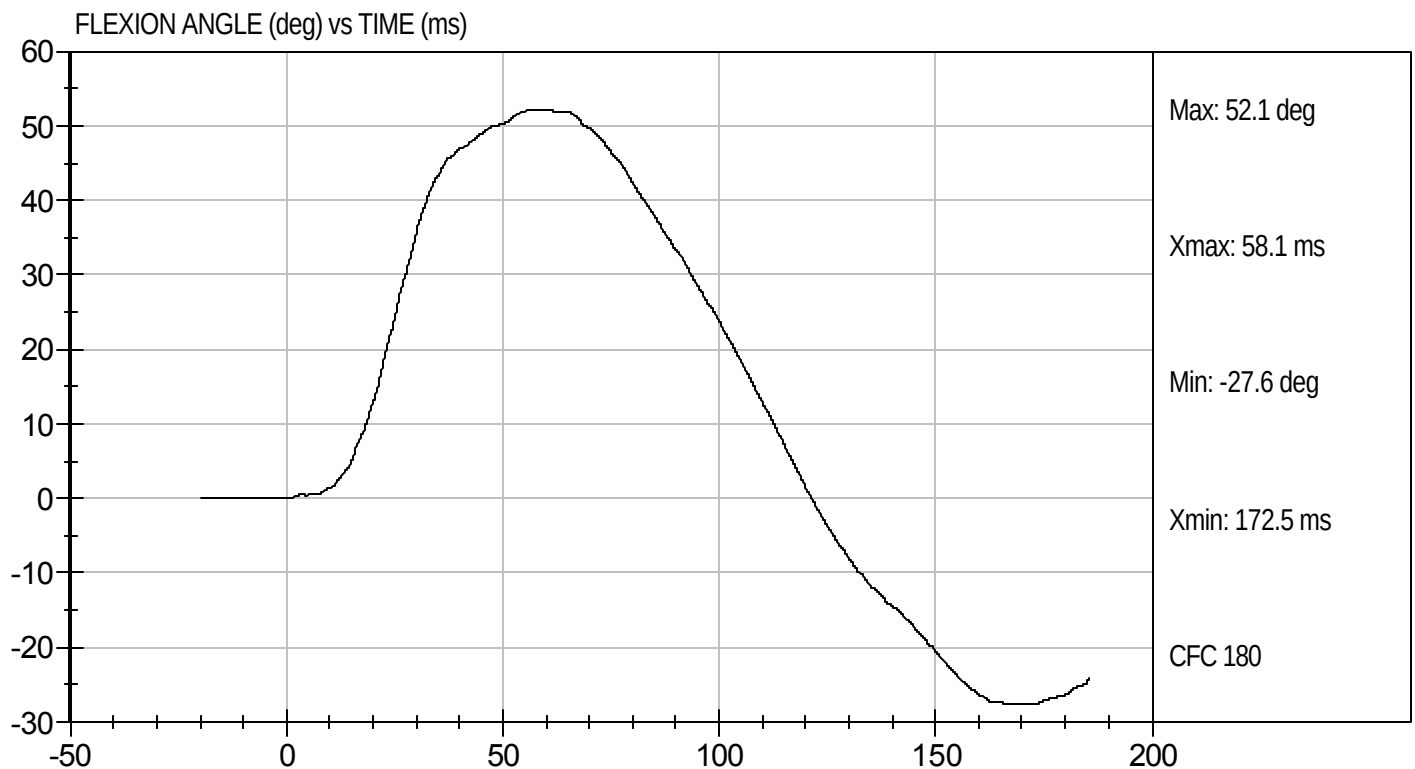
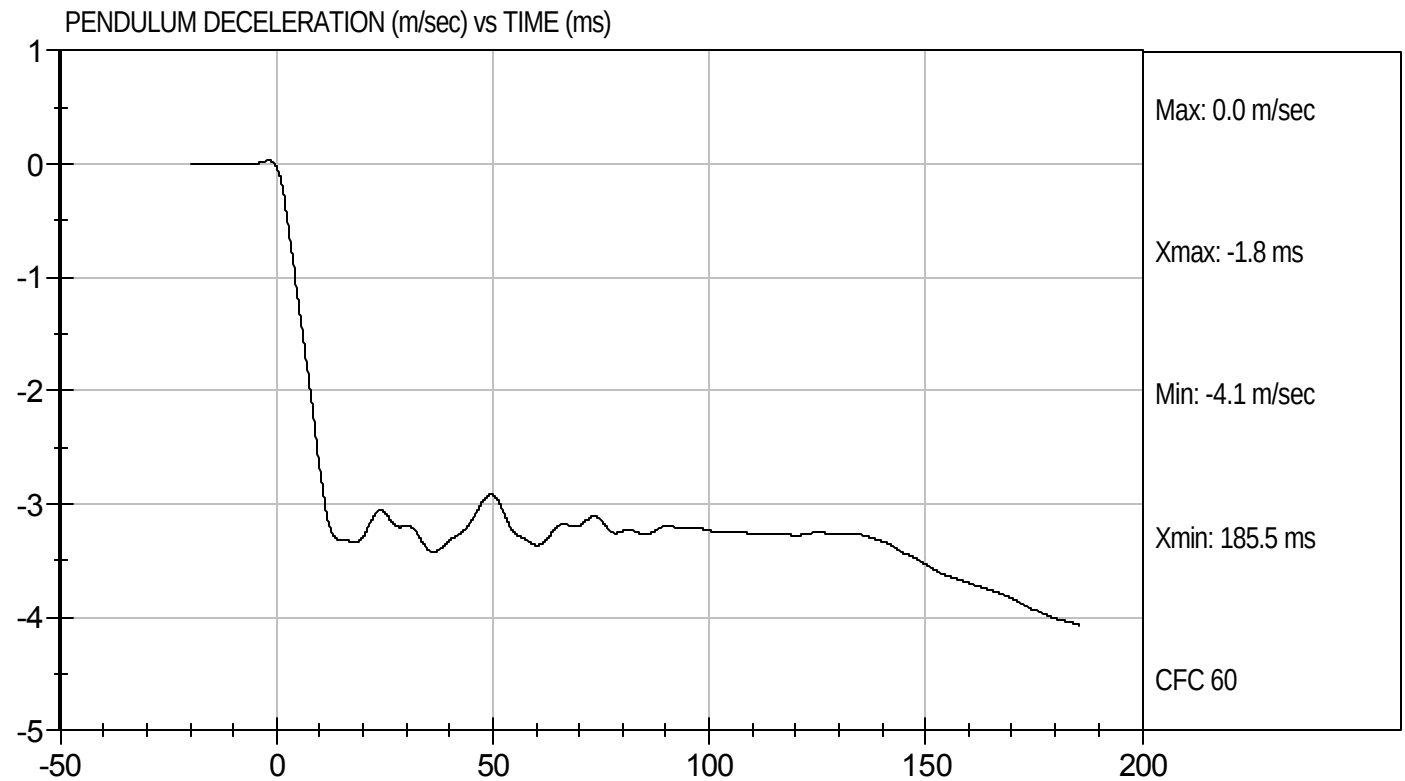
2/15/12
 Test Date


 Approved By



Test Desc: Neck Bending
Component ID: D12482

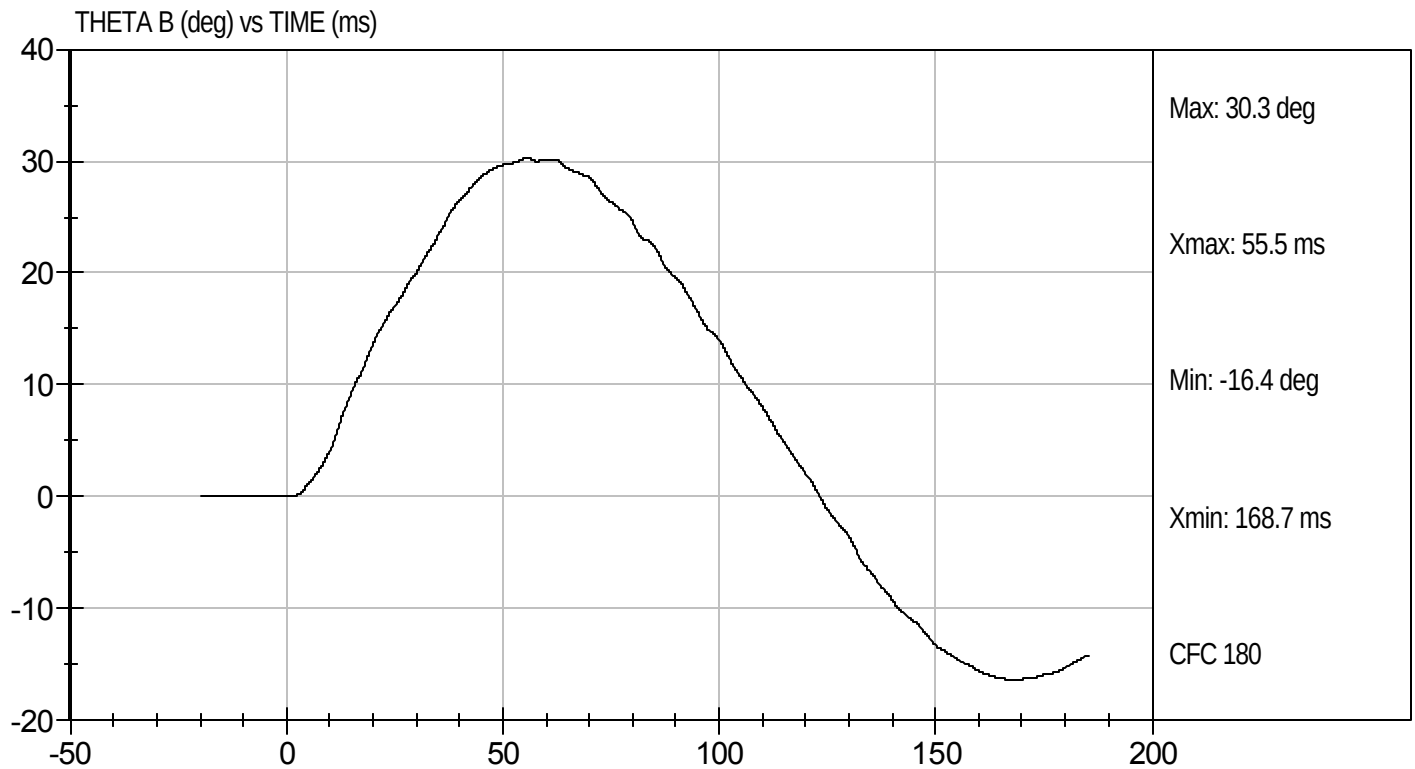
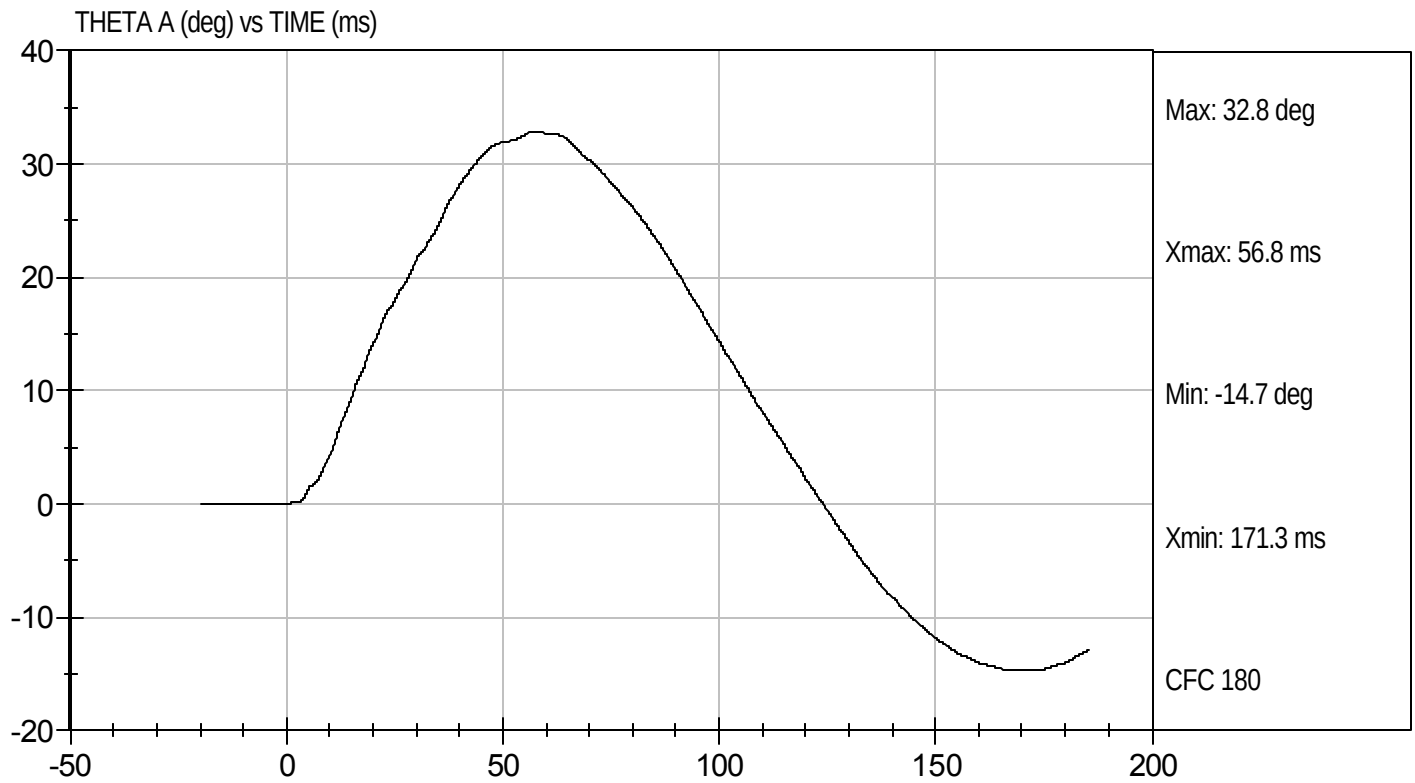
Test Date: 2/15/12
Velocity: 11.42 ft/s, 3.5 m/s





Test Desc: Neck Bending
Component ID: D12482

Test Date: 2/15/12
Velocity: 11.42 ft/s, 3.5 m/s



MGA RESEARCH CORPORATION
SHOULDER IMPACT TEST
ES-2re DUMMY

ATD Serial No: 032

Test I.D: D12483

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	24	Pass
Pendulum Speed	m/s	4.2 to 4.4	4.3	Pass
Peak Shoulder Acceleration	G's	7.5 to 10.5	9.5	Pass
Time of Peak Shoulder Acceleration	ms	NA	13.2	Pass
Overall Test Results			Pass	



Laboratory Technician

2/15/12

Test Date

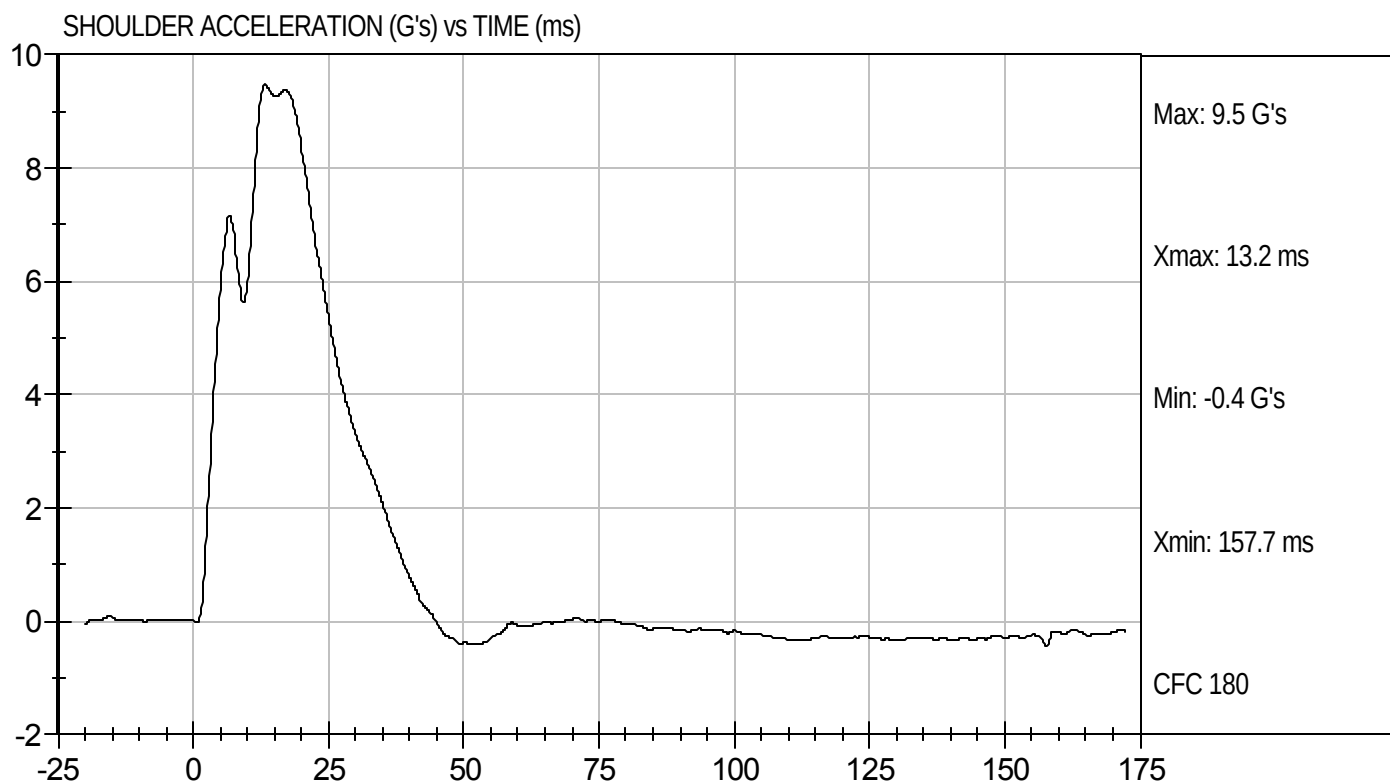


Approved By



Test Desc: Shoulder Impact
Component ID: D12483

Test Date: 2/15/12
Velocity: 14.12 ft/s, 4.3 m/s



MGA RESEARCH CORPORATION

**UPPER RIB TEST
EUROSID 2 DUMMY**

ATD Serial No: 032

Test I.D: D12484

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	24	Pass
Displacement at 3 m/s	mm	36.0 to 40.0	37.3	Pass
Displacement at 4 m/s	mm	46.0 to 51.0	48.5	Pass
			Overall Test Results	Pass


Laboratory Technician

2/15/12
Test Date

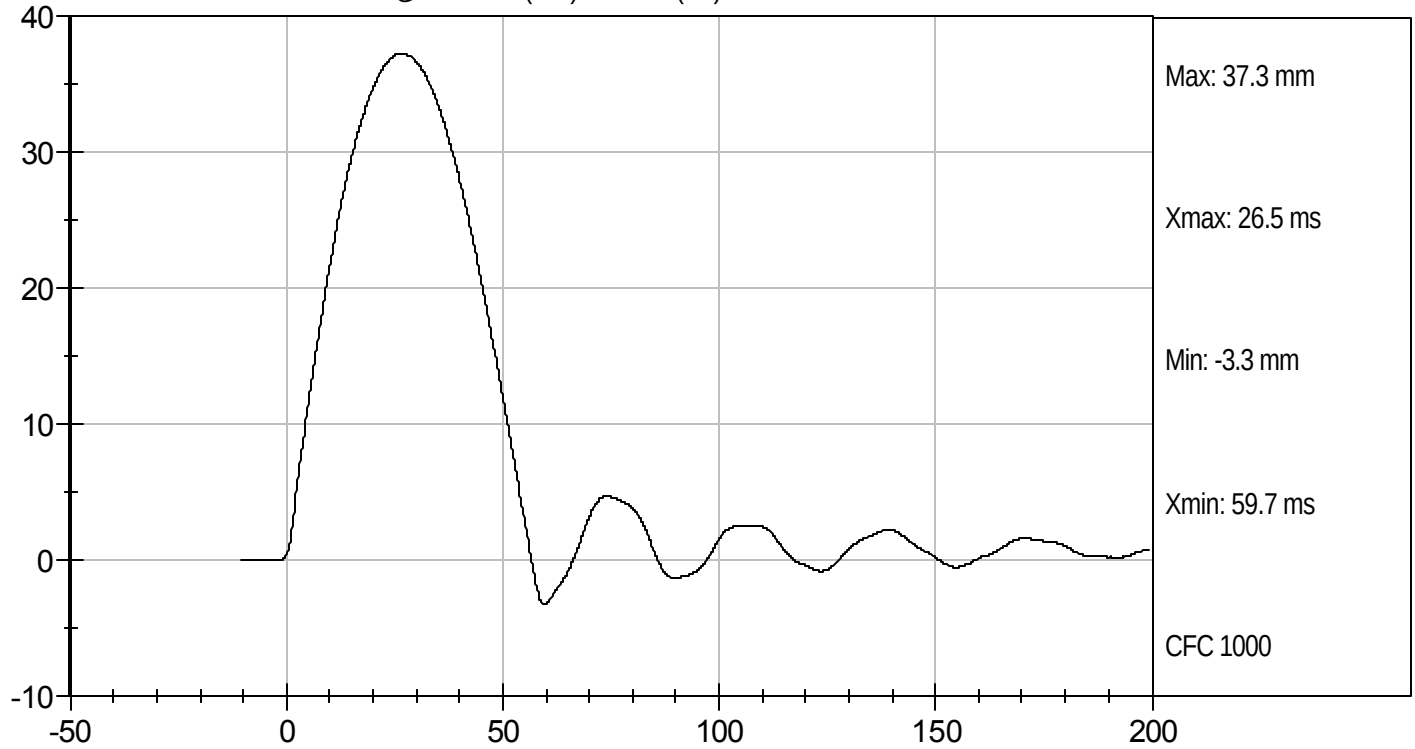

Approved By



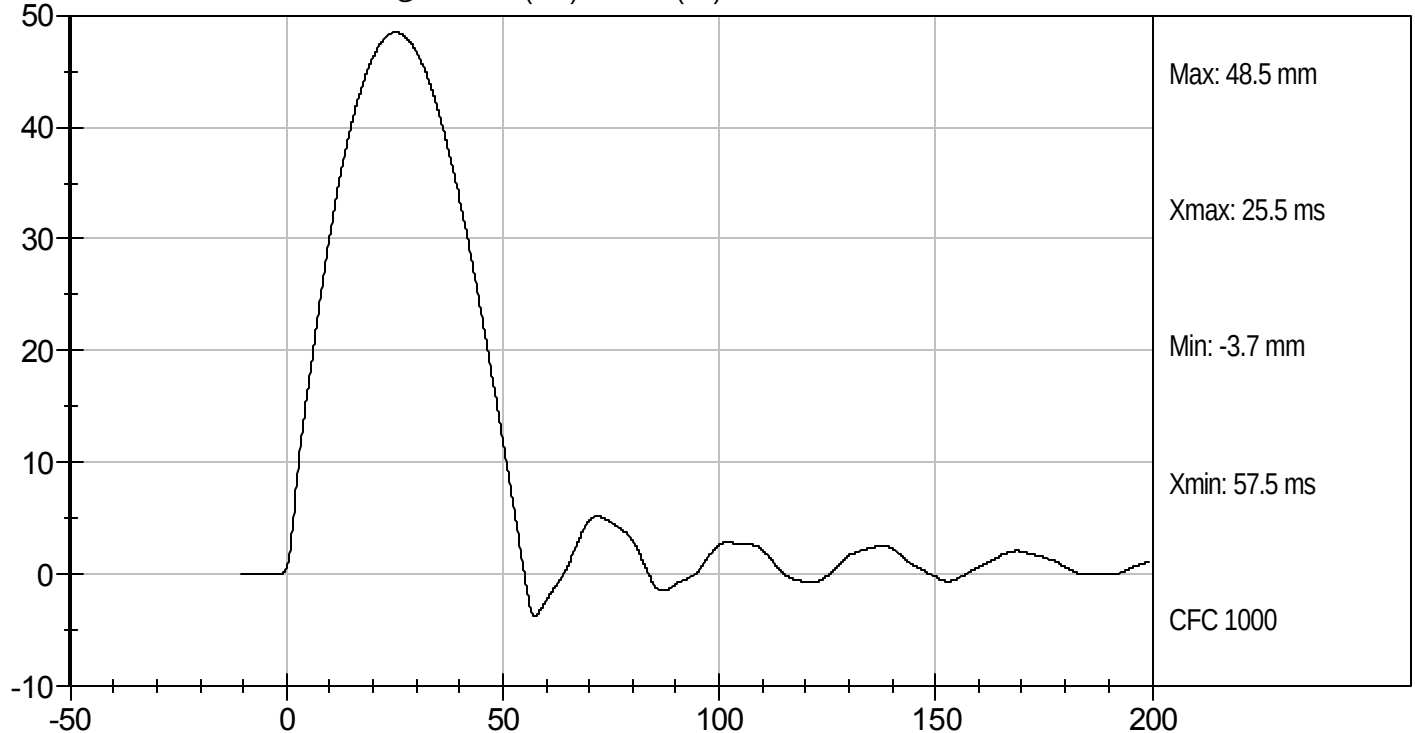
Test Desc: Rib Impact - Upper
Component ID: D12484

Test Date: 2/15/12

UPPER RIB DISPLACEMENT @ 3 M/SEC (mm) vs TIME (ms)



UPPER RIB DISPLACEMENT @ 4 M/SEC (mm) vs TIME (ms)



MGA RESEARCH CORPORATION

MID RIB TEST
EUROSID 2 DUMMY

ATD Serial No: 032

Test I.D: D12485

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	24	Pass
Displacement at 3 m/s	mm	36.0 to 40.0	37.8	Pass
Displacement at 4 m/s	mm	46.0 to 51.0	47.7	Pass
			Overall Test Results	Pass

Jessica Hall
Laboratory Technician

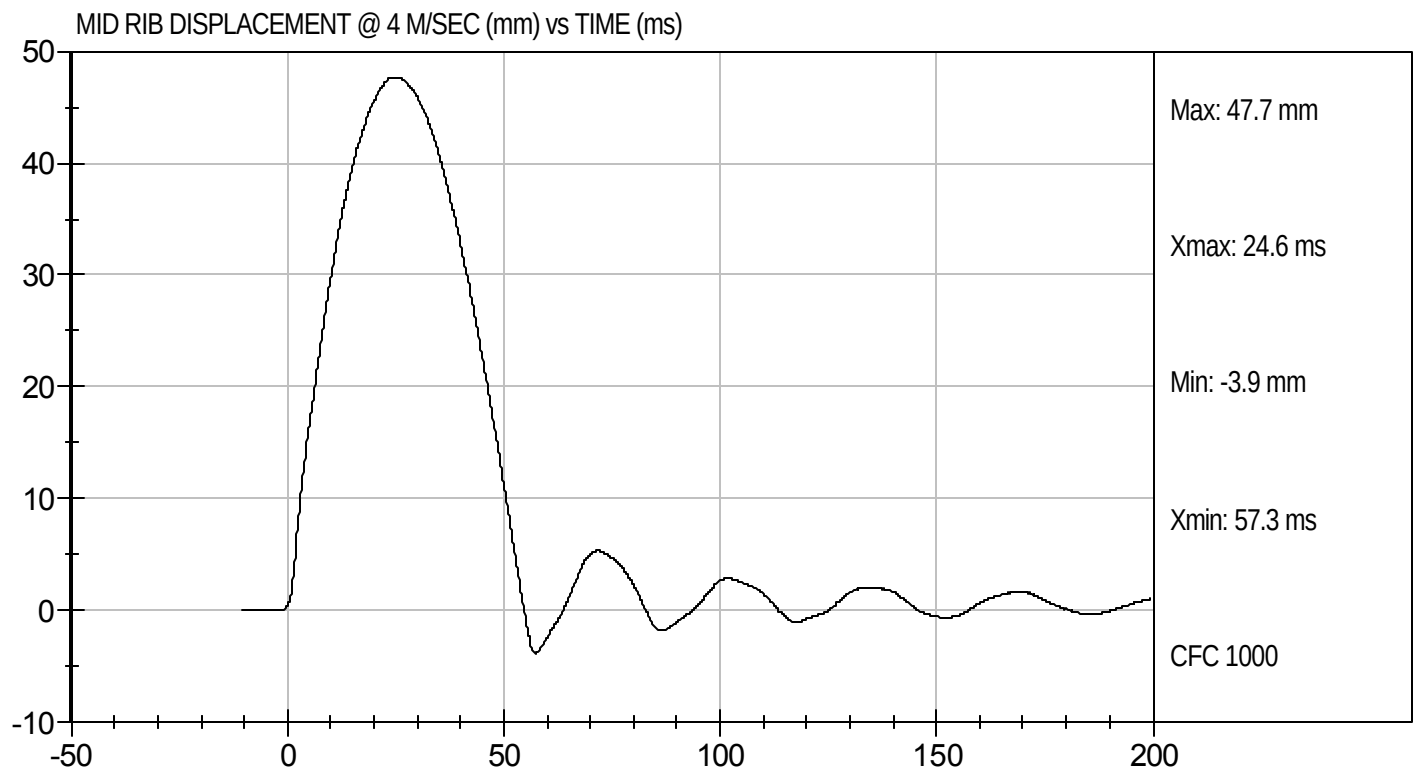
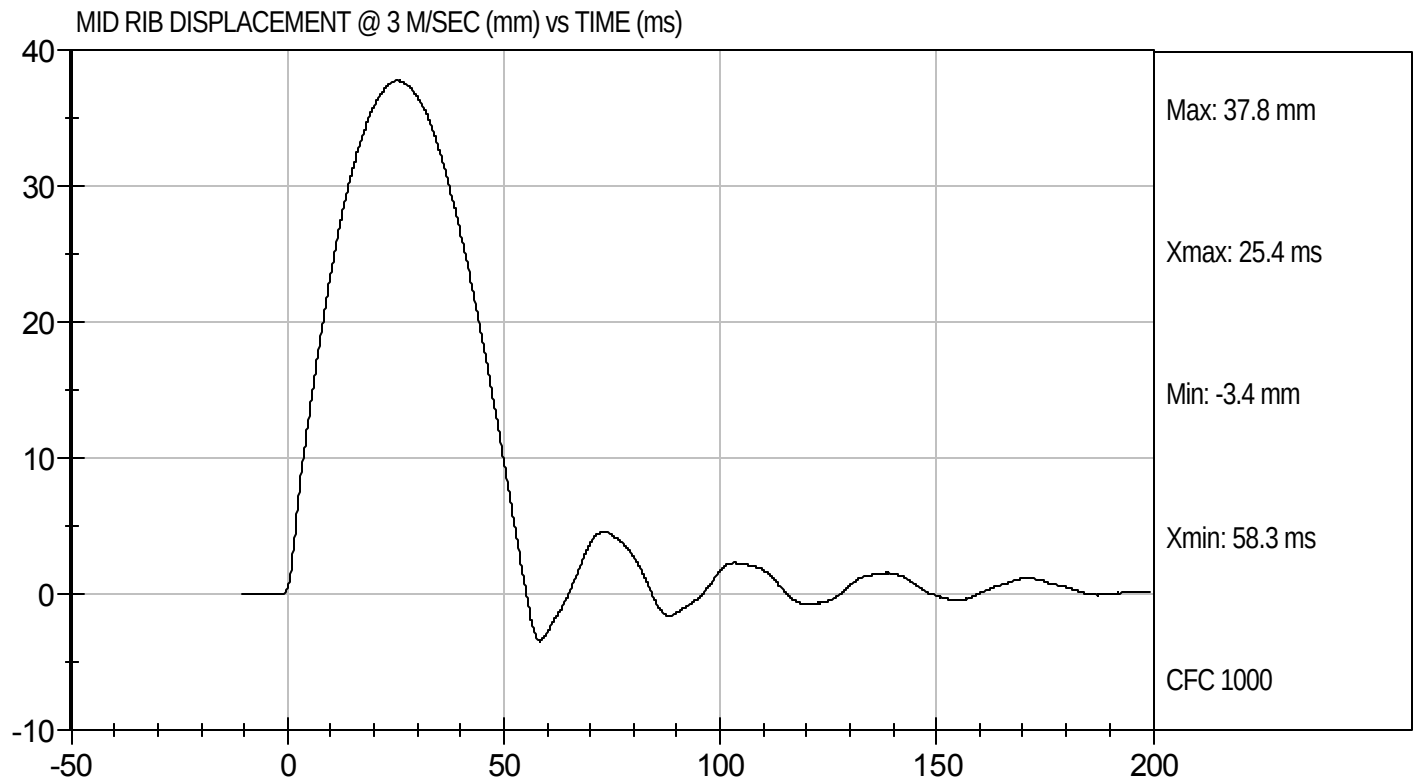
2/15/12
Test Date

David Winkelbauer
Approved By



Test Desc: Rib Impact - Mid
Component ID: D12485

Test Date: 2/15/12



MGA RESEARCH CORPORATION

LOWER RIB TEST
EUROSID 2 DUMMY

ATD Serial No: 032

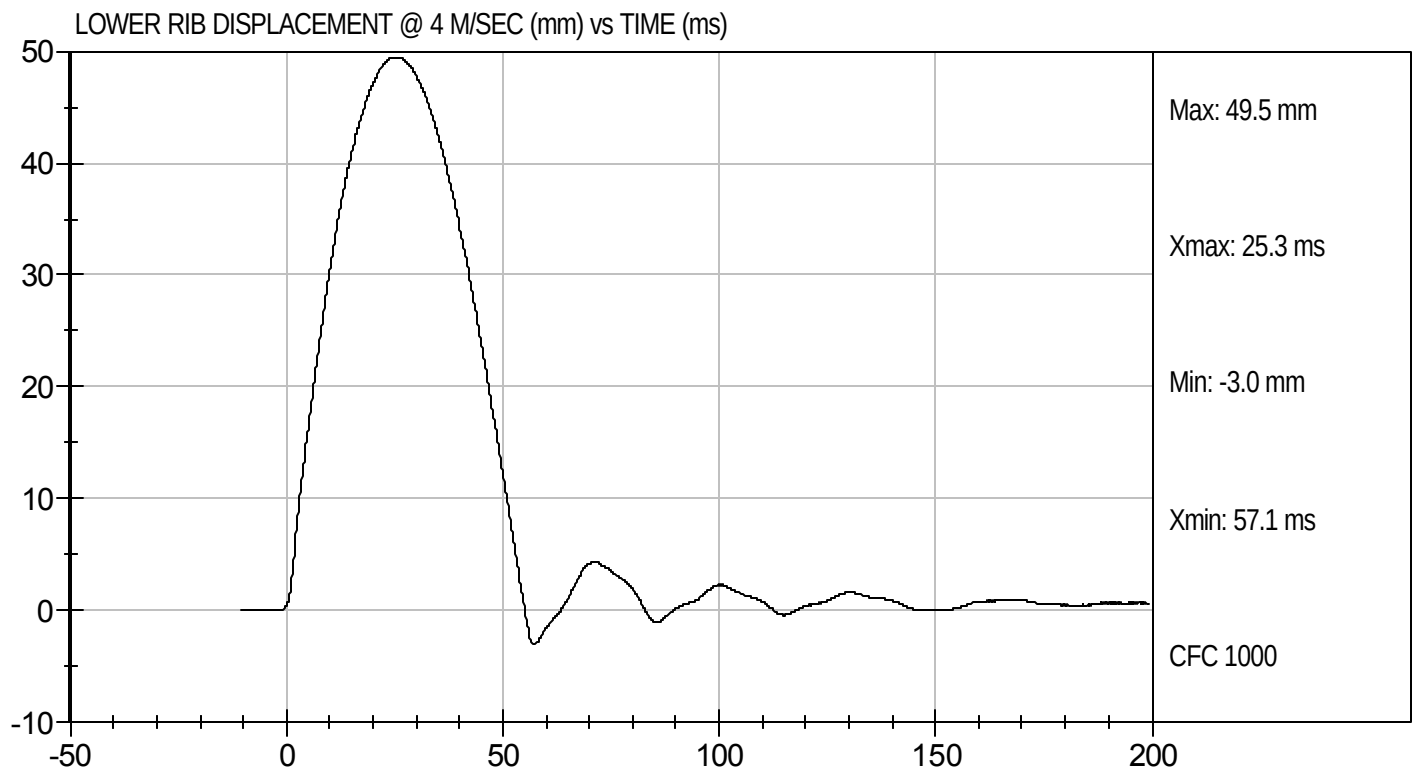
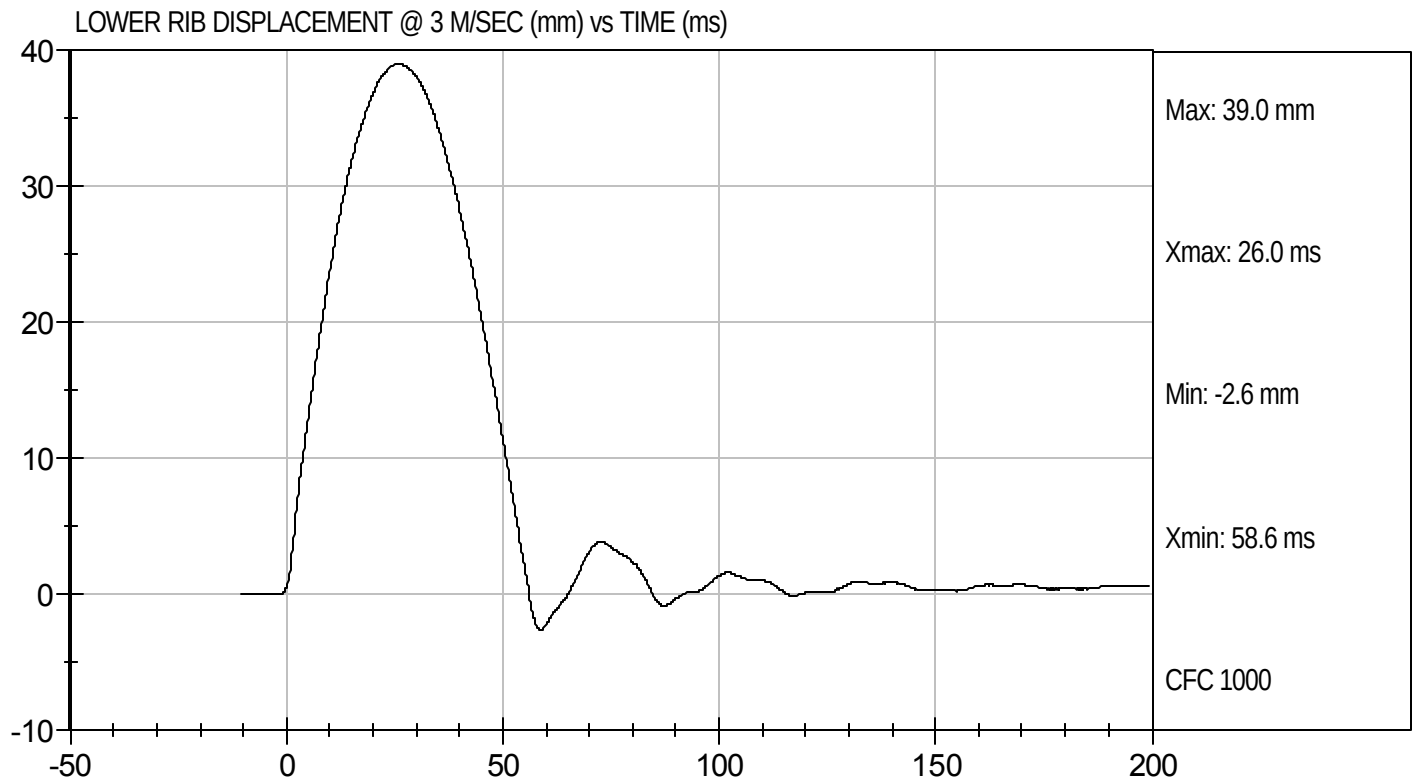
Test I.D: D12486

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	24	Pass
Displacement at 3 m/s	mm	36.0 to 40.0	39.0	Pass
Displacement at 4 m/s	mm	46.0 to 51.0	49.5	Pass
			Overall Test Results	Pass


Laboratory Technician

2/15/12
Test Date


Approved By



MGA RESEARCH CORPORATION
FULL BODY THORAX IMPACT TEST
ES-2re DUMMY

ATD Serial No: 032

Test I.D: D12480

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.5	Pass
Humidity	%	10 to 70	23	Pass
Probe Speed	m/s	5.40 to 5.60	5.52	Pass
Maximum Impactor Force (after 6 ms)	kN	5.10 to 6.20	5.18	Pass
Upper Rib Displacement	mm	34.0 to 41.0	36.6	Pass
Middle Rib Displacement	mm	37.0 to 45.0	39.6	Pass
Lower Rib Displacement	mm	37.0 to 44.0	39.1	Pass
Overall Test Results			Pass	


Laboratory Technician

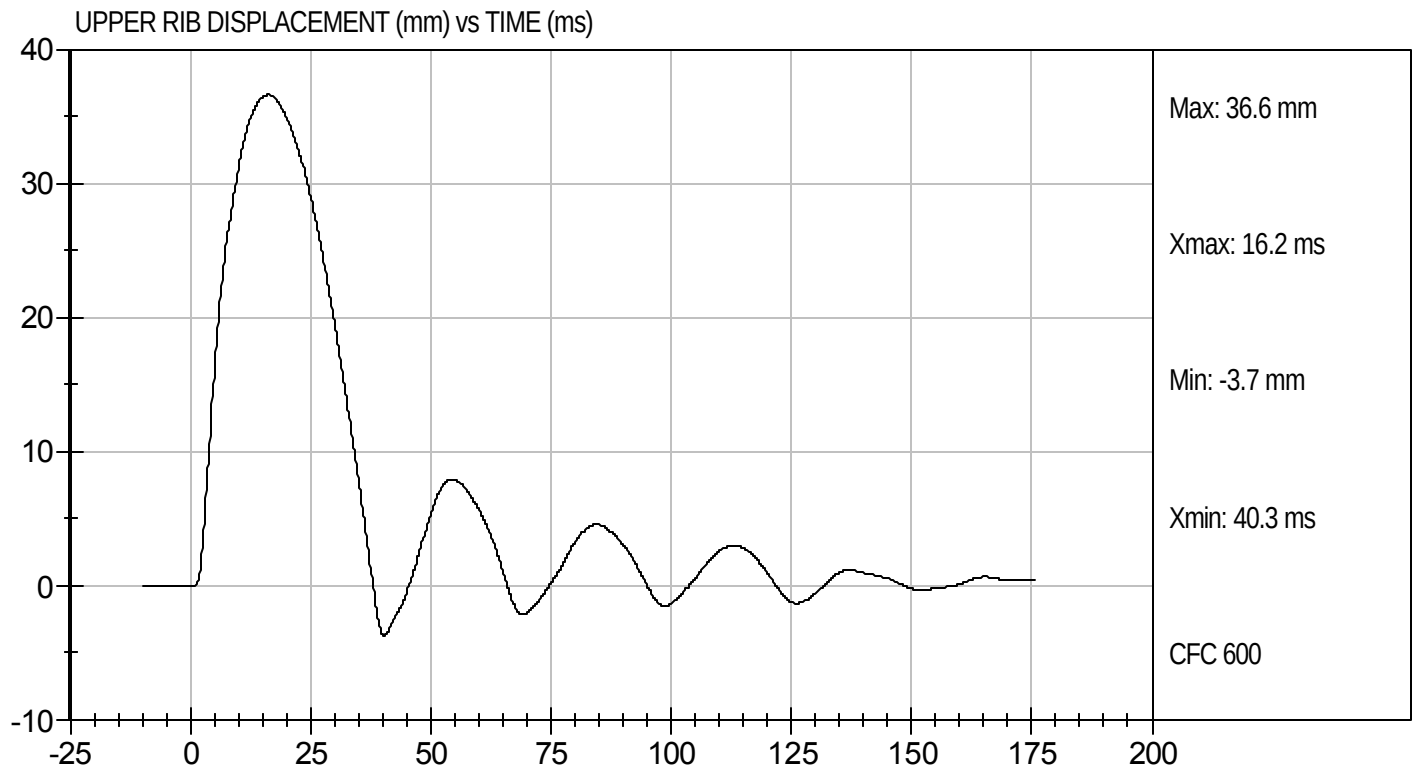
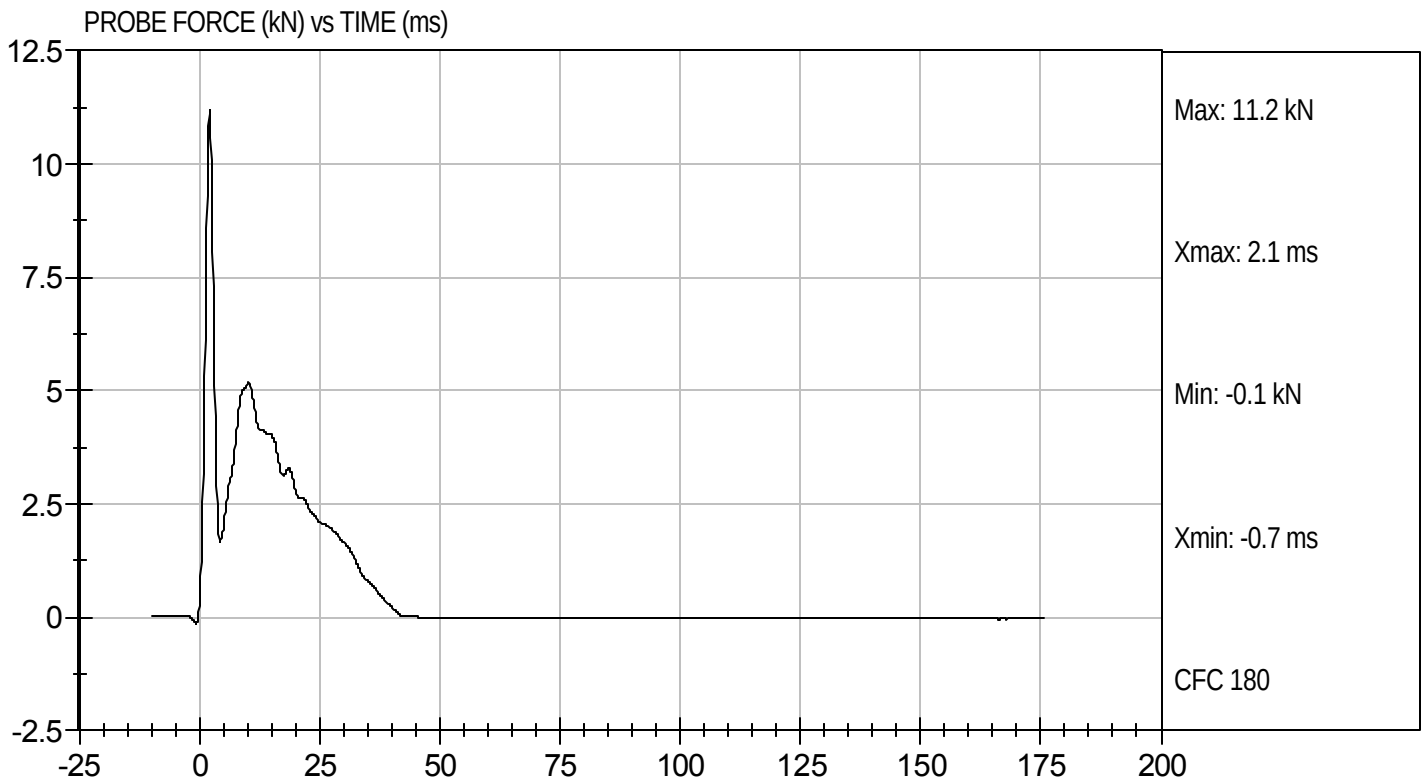
2/15/12
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D12480

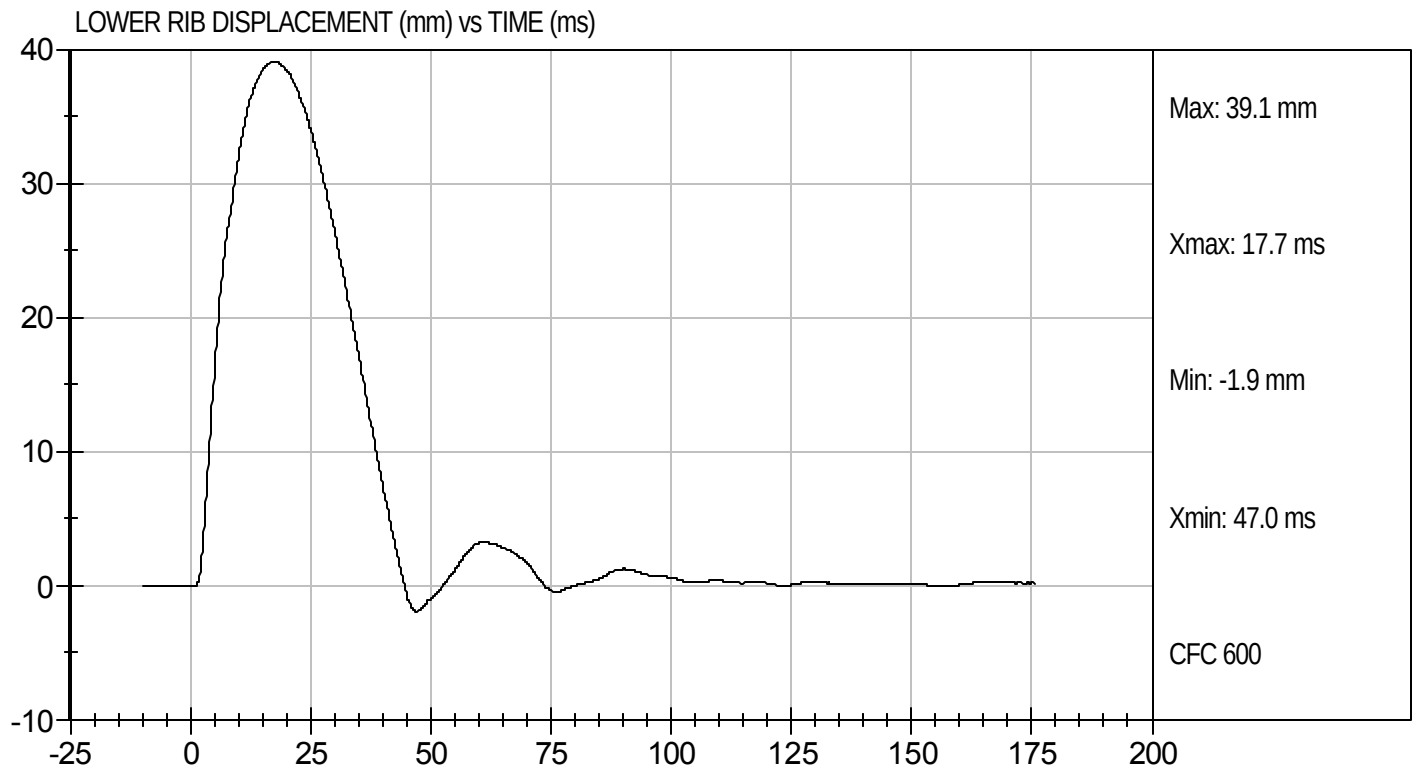
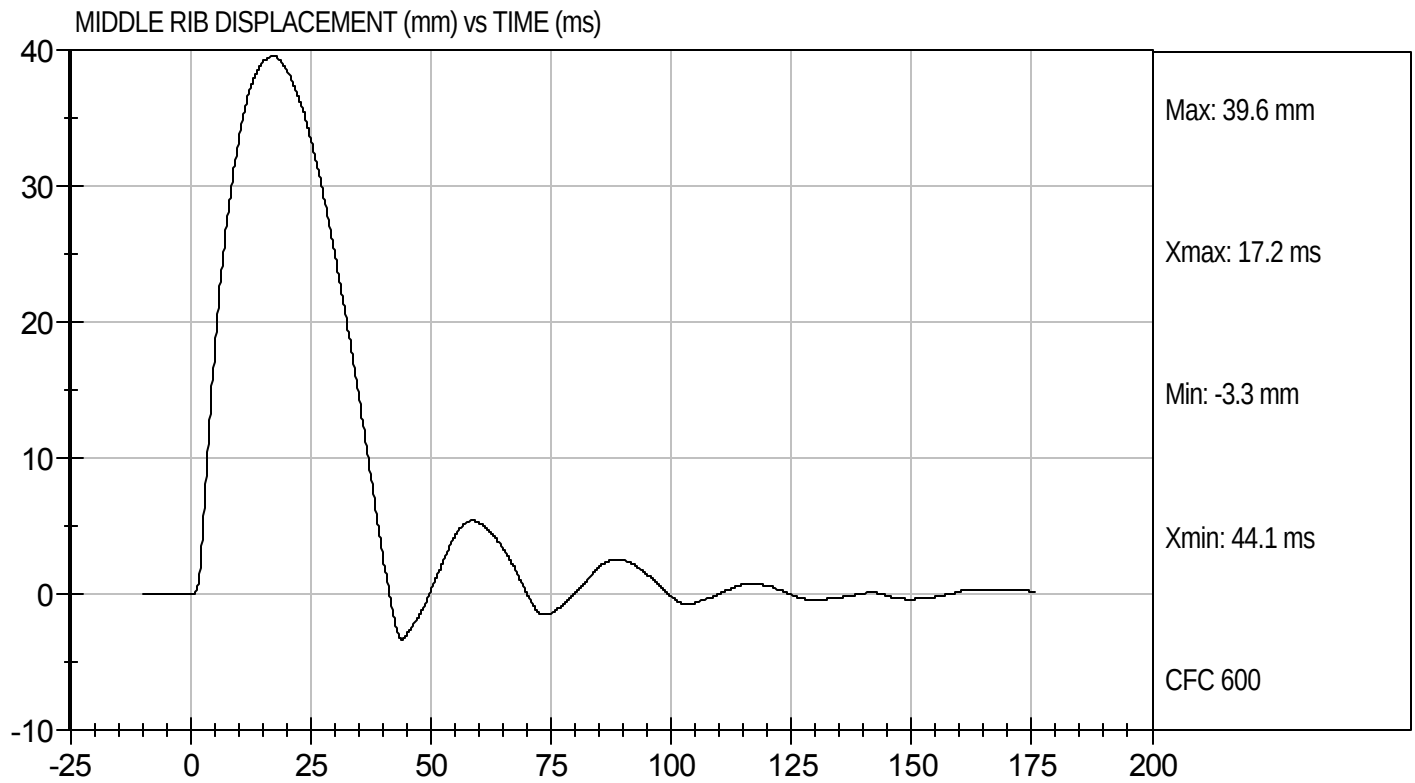
Test Date: 2/15/12
Velocity: 18.12 ft/s, 5.52 m/s





Test Desc: Thorax Impact
Component ID: D12480

Test Date: 2/15/12
Velocity: 18.12 ft/s, 5.52 m/s



MGA RESEARCH CORPORATION

ABDOMEN TEST

ES-2re DUMMY

ATD Serial No: 032

Test I.D: D12487

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	24	Pass
Probe Speed	m/s	3.90 to 4.10	3.97	Pass
Maximum Impact Force	kN	4.00 to 4.80	4.18	Pass
Time of Maximum Impact Force	ms	10.60 to 13.00	10.80	Pass
Maximum Total Abdomen Force	kN	2.20 to 2.70	2.39	Pass
Time of Maximum Abdomen Force	ms	10.00 to 12.30	10.40	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

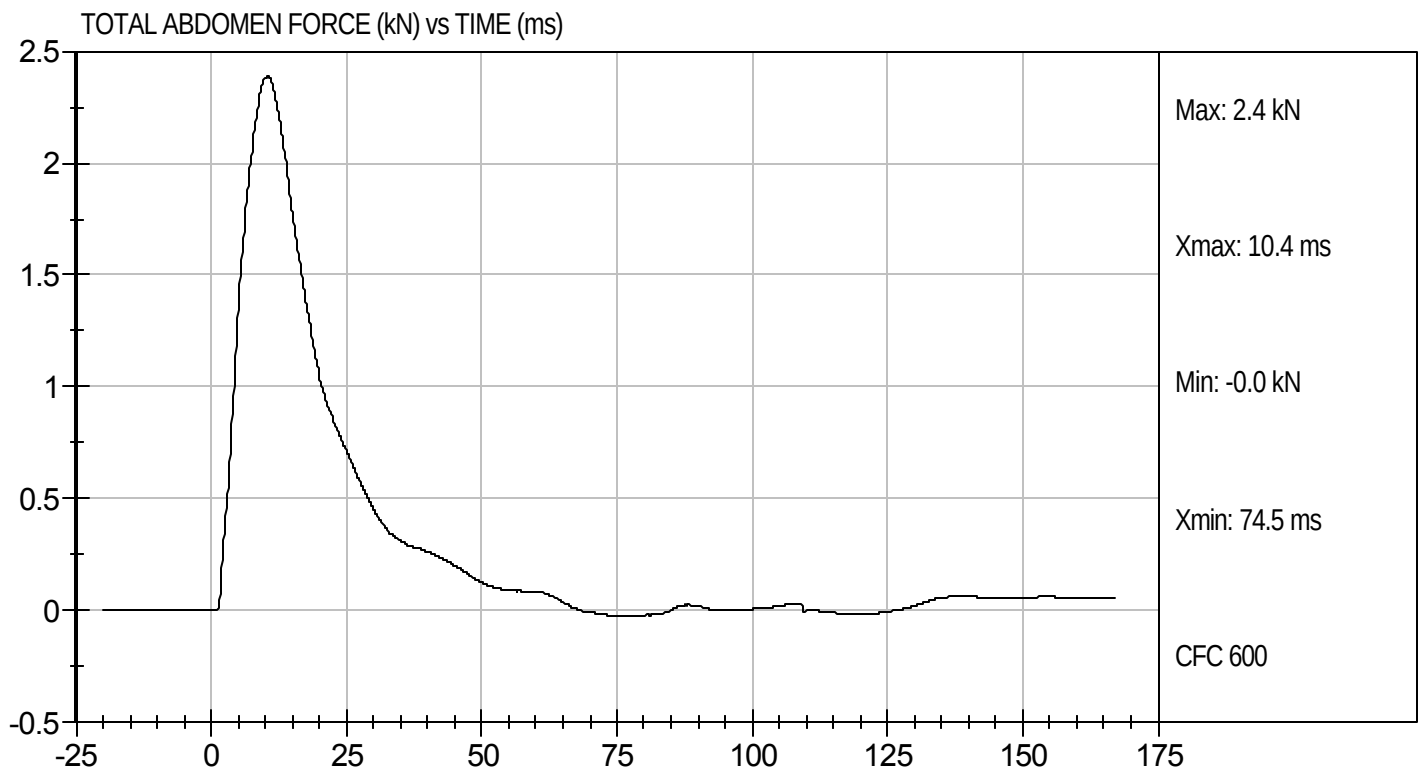
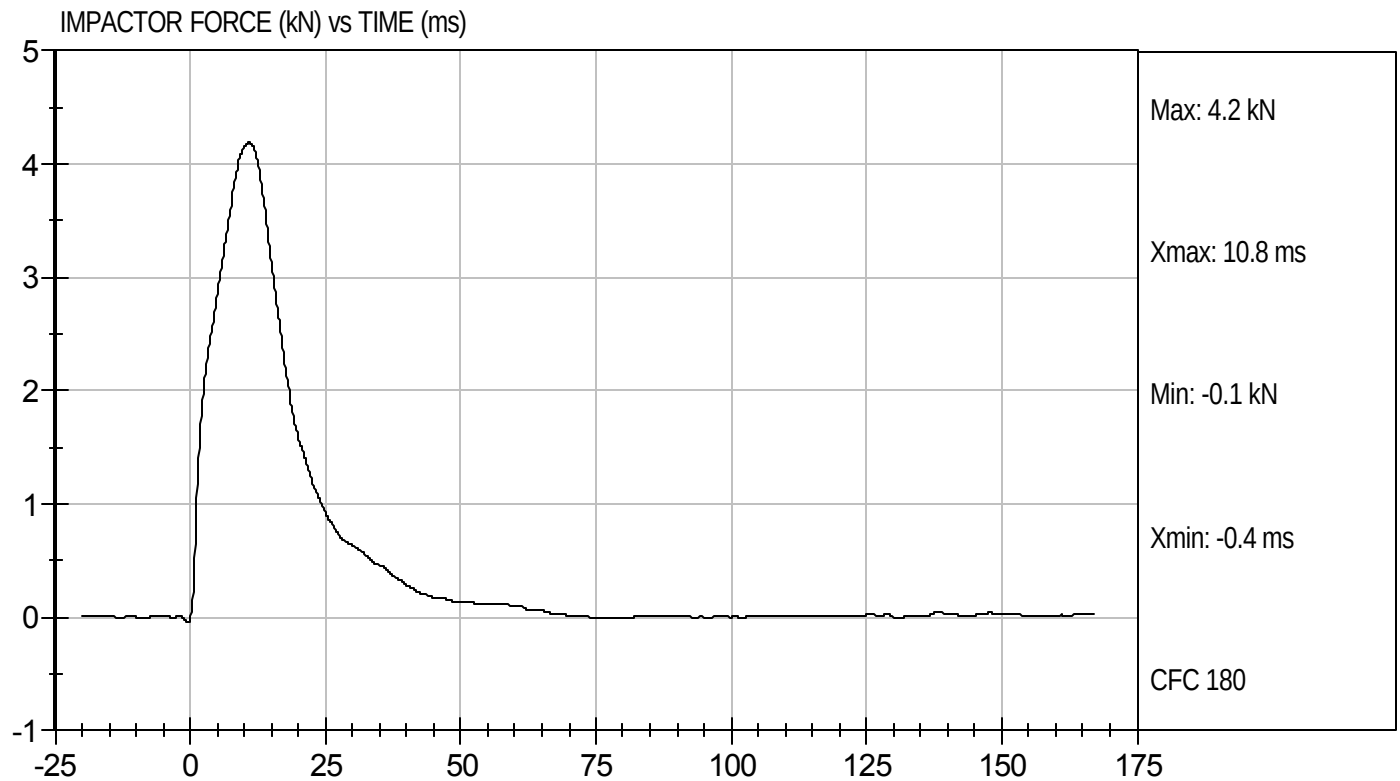
2/15/12
Test Date

David Winkelbauer
Approved By



Test Desc: Abdomen Impact
Component ID: D12487

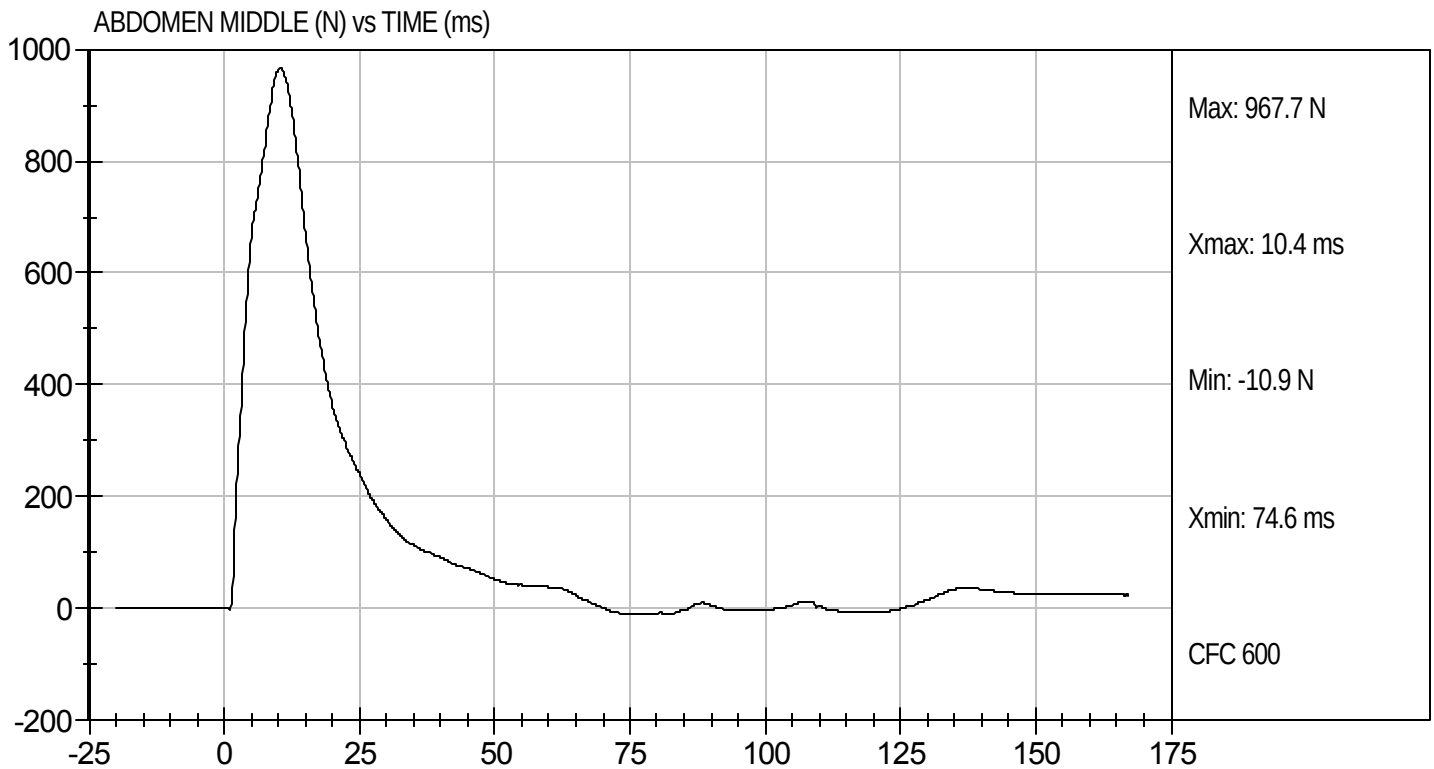
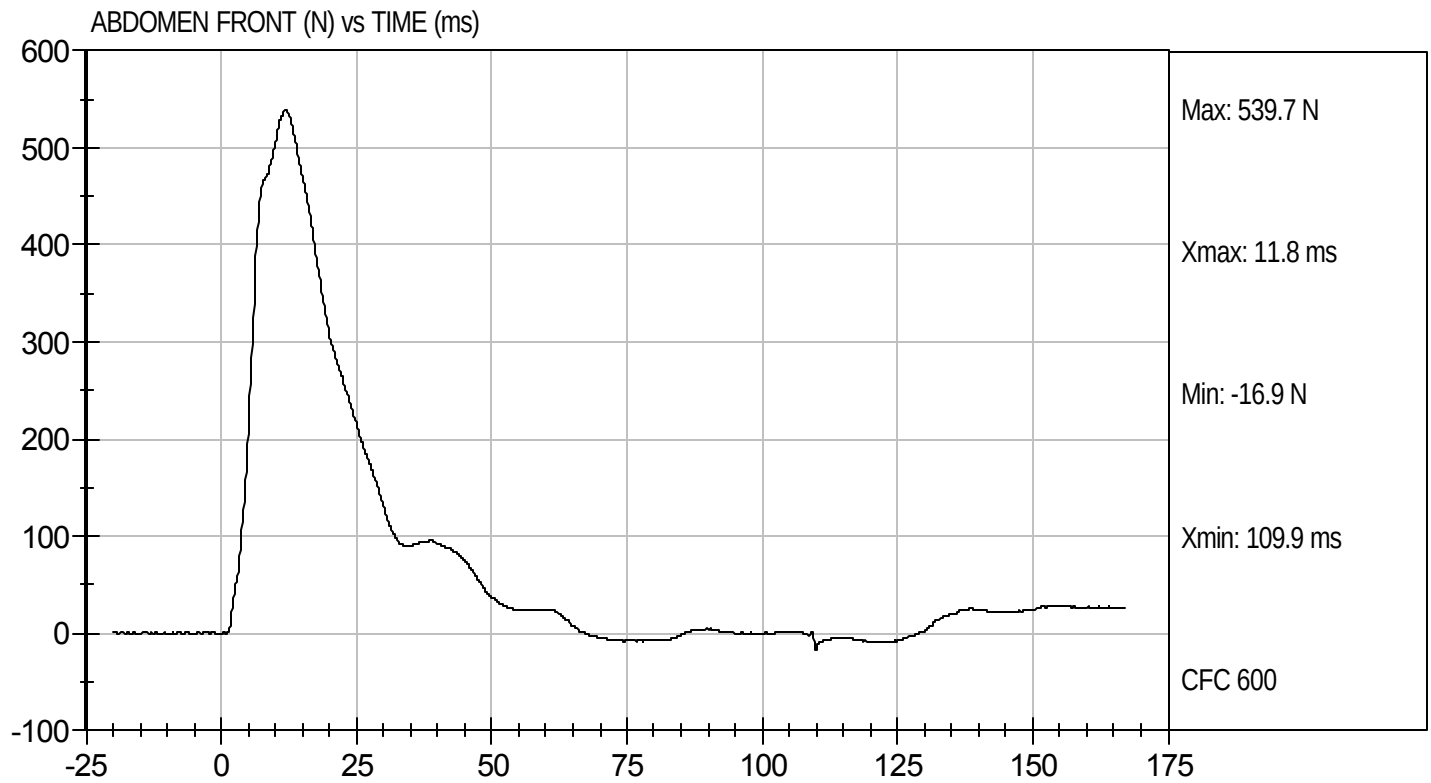
Test Date: 2/15/12
Velocity: 13.02 ft/s, 3.97 m/s





Test Desc: Abdomen Impact
Component ID: D12487

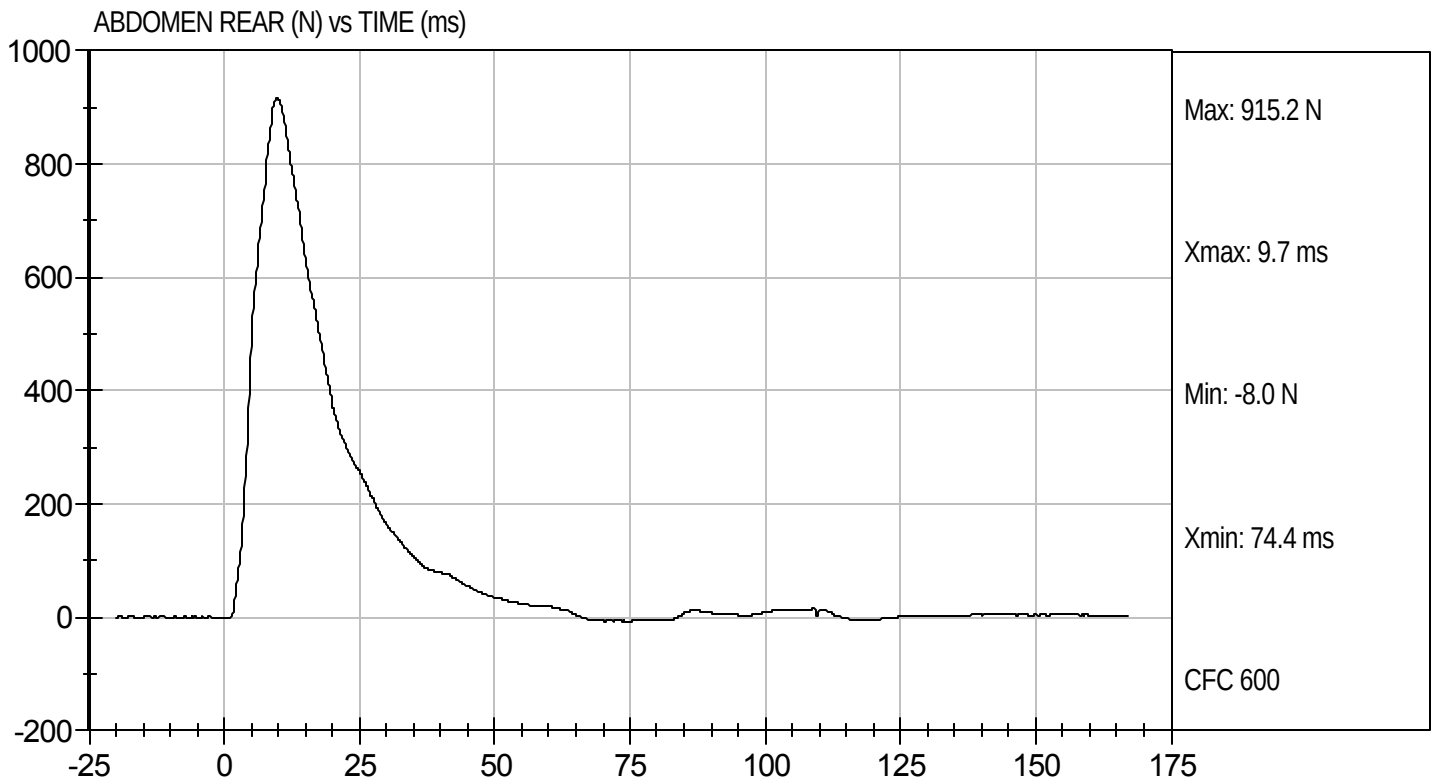
Test Date: 2/15/12
Velocity: 13.02 ft/s, 3.97 m/s





Test Desc: Abdomen Impact
Component ID: D12487

Test Date: 2/15/12
Velocity: 13.02 ft/s, 3.97 m/s



MGA RESEARCH CORPORATION
LUMBAR SPINE TEST
ES-2re DUMMY

ATD Serial No: 032

Test I.D: D12488

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.9	Pass
Laboratory Relative Humidity		%	10 to 70	25	Pass
Pendulum Speed		m/s	5.95 to 6.15	6.13	Pass
Pendulum Deceleration	1 ms	m/s	-0.05 to 0.00	-0.00	Pass
	3.7 ms	m/s	-0.425 to -0.24	-0.40	Pass
	27 ms	m/s	-6.50 to -5.80	-5.86	Pass
	30 ms	m/s	>= -6.5	-5.72	Pass
Maximum Flexion Angle		deg	45.0 to 55.0	47.0	Pass
Time of Maximum Flexion Angle		ms	39.0 to 53.0	45.5	Pass
Headform Rotation Decay to Initial Position		ms	37 to 57	42	Pass
Overall Results				Pass	


 Laboratory Technician

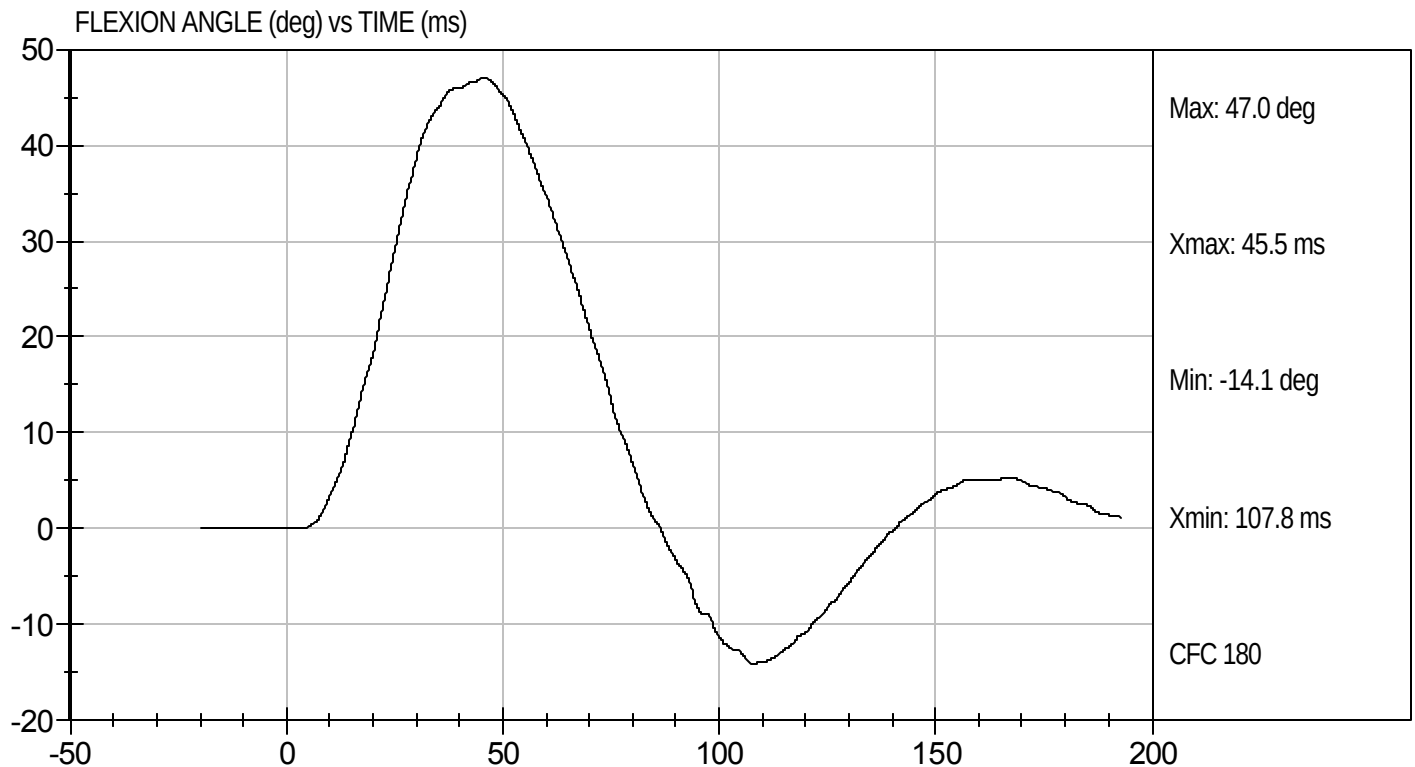
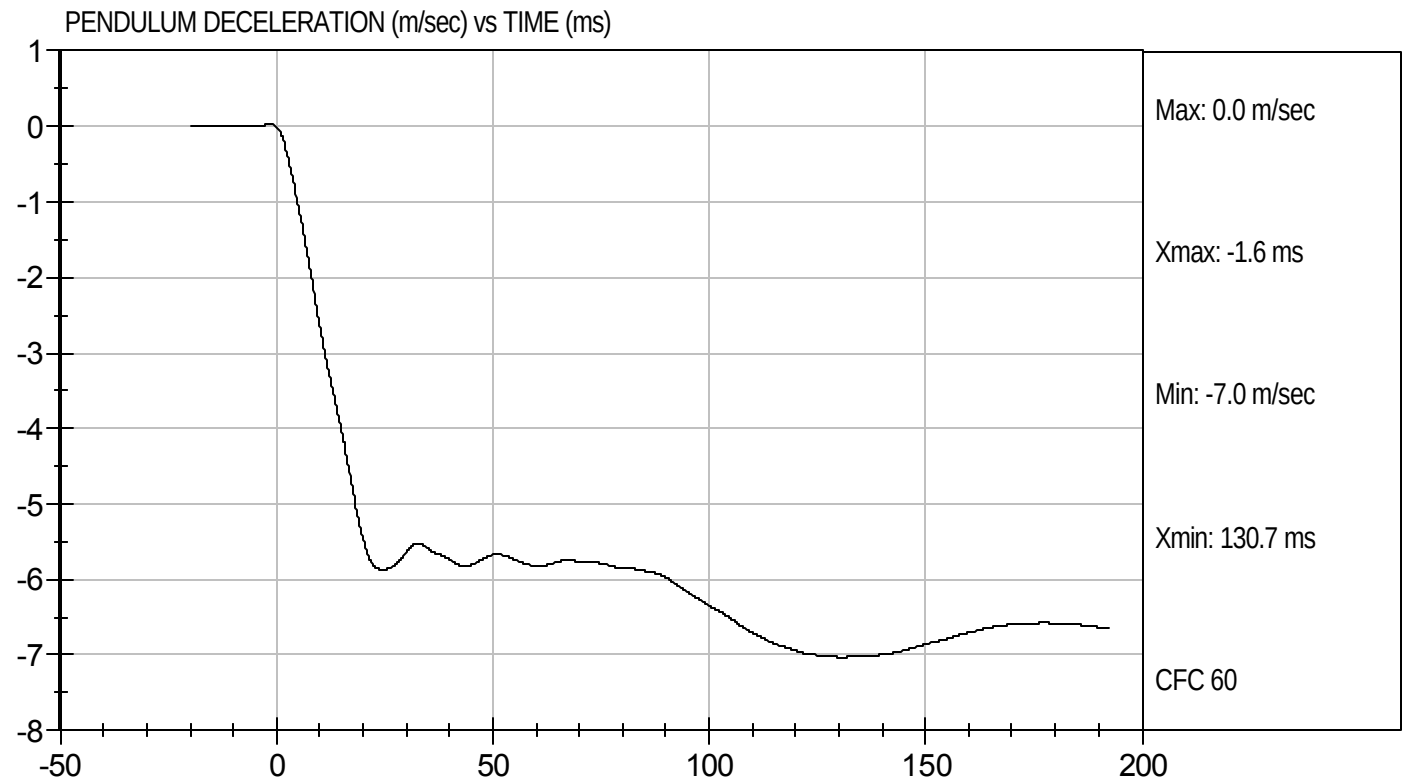
2/15/12
 Test Date


 Approved By



Test Desc: Lumbar Bending
Component ID: D12488

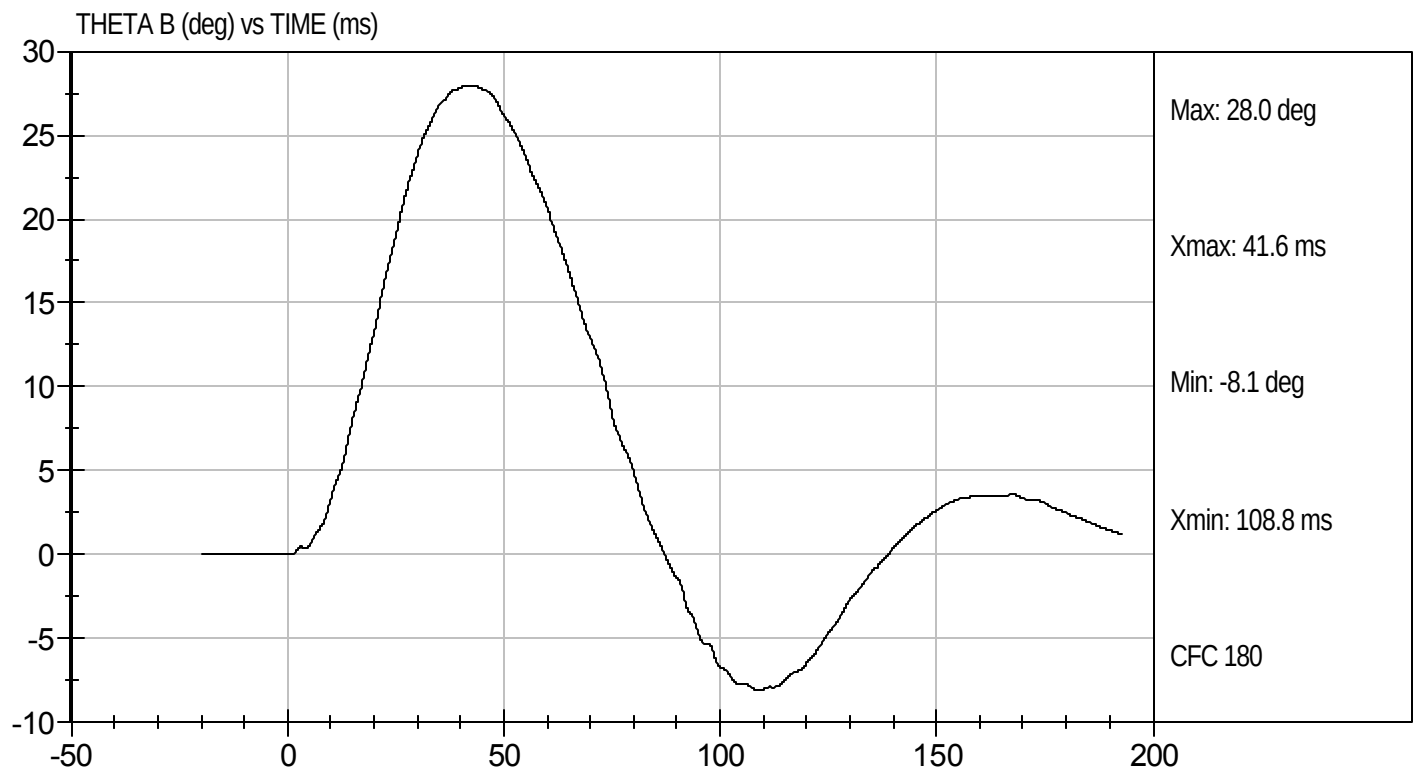
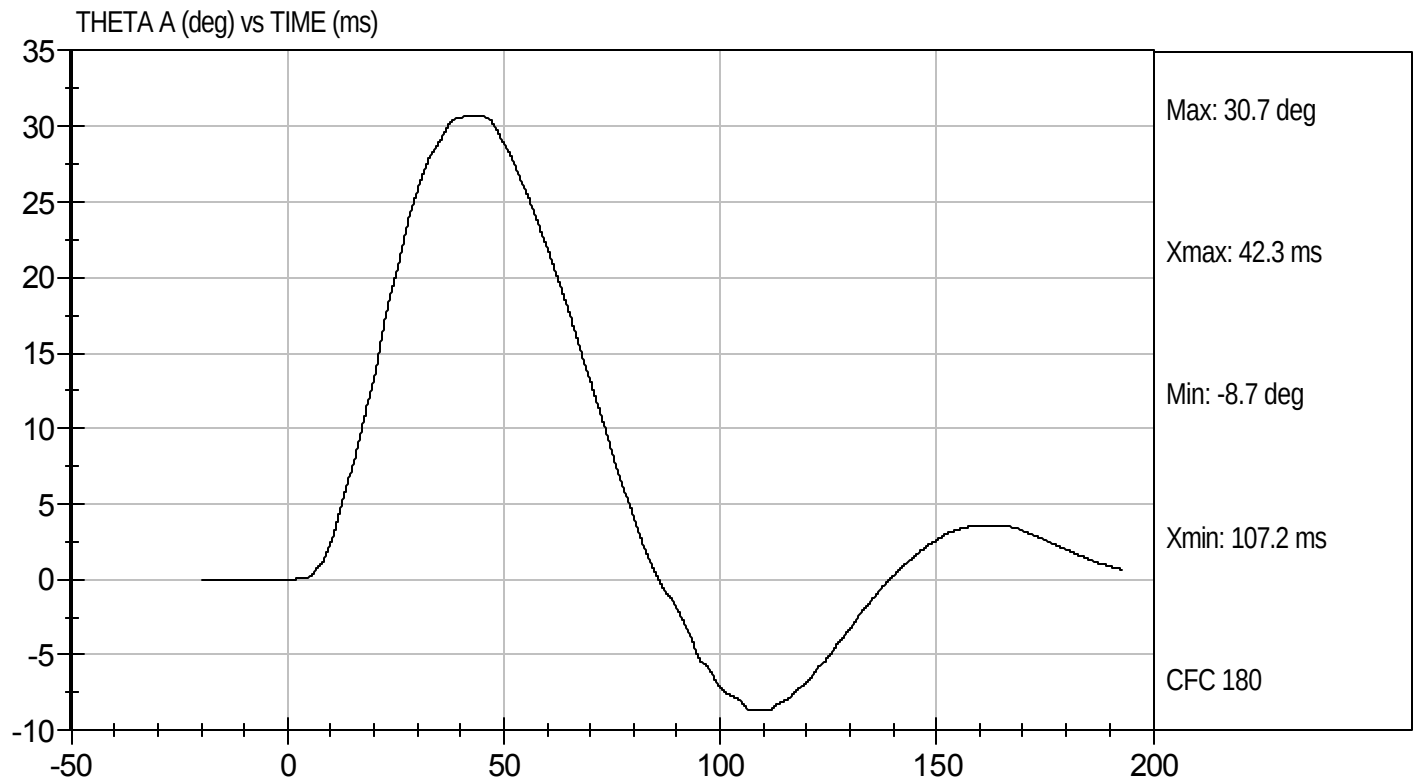
Test Date: 2/15/12
Velocity: 20.10 ft/s, 6.13 m/s





Test Desc: Lumbar Bending
Component ID: D12488

Test Date: 2/15/12
Velocity: 20.10 ft/s, 6.13 m/s



MGA RESEARCH CORPORATION

PELVIS TEST
ES-2re DUMMY

ATD Serial No: 032

Test I.D: D12489

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	23	Pass
Probe Speed	m/s	4.20 to 4.40	4.27	Pass
Maximum Impactor Force	kN	4.70 to 5.40	5.04	Pass
Time of Maximum Impactor Force	ms	11.80 to 16.10	12.70	Pass
Maximum Pubic Force	kN	1.23 to 1.59	1.31	Pass
Time of Maximum Pubic Force	ms	12.20 to 17.00	13.10	Pass
Overall Test Results				Pass


Laboratory Technician

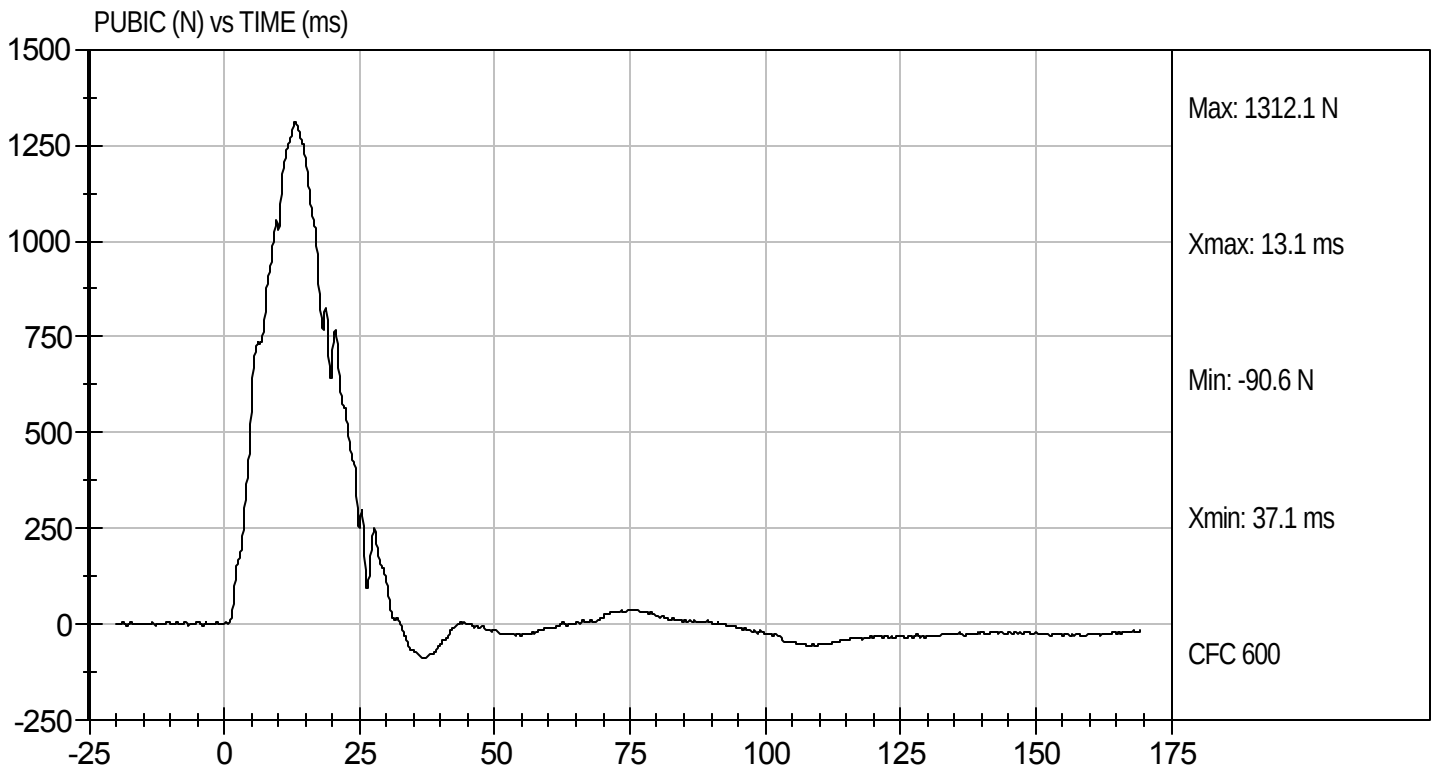
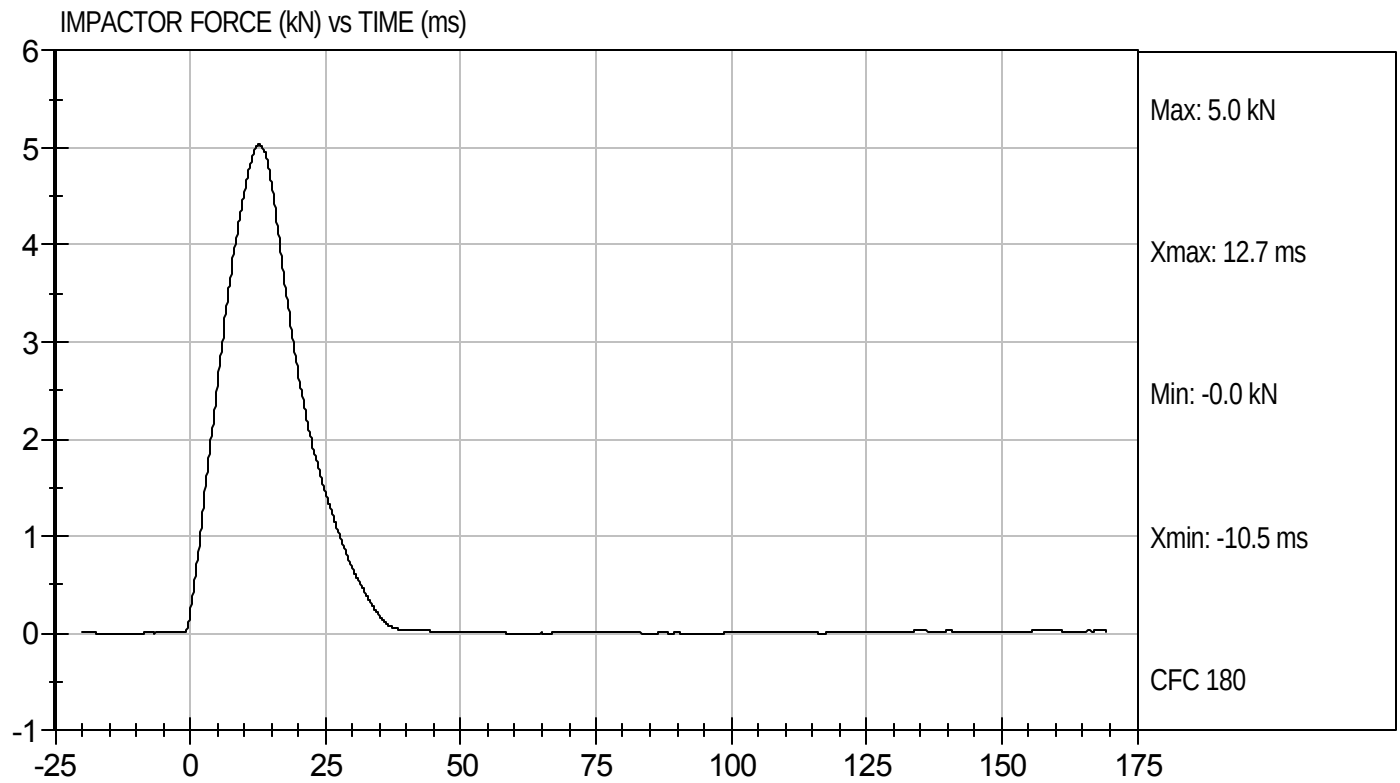
2/15/12
Test Date


Approved By



Test Desc: Pelvis Impact
Component ID: D12489

Test Date: 2/15/12
Velocity: 14.01 ft/s, 4.27 m/s



SID-IIsD External Measurements
SN: 296

No.	Name	Spec. (mm)	Result	Pass/Fail
A	Sitting Height	772 - 788	784	Pass
B	Shoulder Pivot Height	437 - 453	442	Pass
C	H-point Height	79 - 89	83	Pass
D	H-point from Seatback	141 - 151	145	Pass
E	Shoulder Pivot from Backline	97 - 107	99	Pass
F	Thigh Clearance	119 -135	121	Pass
G	Head Breadth	140 - 148	142	Pass
H	Head Back from Backline	40 - 46	45	Pass
I	Head Depth	178 - 188	180	Pass
J	Head Circumference	541 - 551	548	Pass
K	Buttock to Knee Length	514 - 540	535	Pass
L	Popliteal Height	343 - 369	358	Pass
M	Knee Pivot to Floor Height	392 - 409	404	Pass
N	Buttock Popliteal Length	416 - 442	435	Pass
O	Chest Depth w/o Jacket	195 - 211	206	Pass
P	Foot Length	216 - 232	219	Pass
Q	Hip Breadth (w/ pelvic plugs)	313 - 323	316	Pass
R	Arm Length	249 - 259	250	Pass
S	Knee Joint to Seatback	477 - 493	481	Pass
V	Shoulder Width	341 - 357	346	Pass
W	Foot Width	78 - 94	85	Pass
Y	Chest Circumference w/ jacket	851 - 881	870	Pass
Z	Waist Circumference	761 - 791	772	Pass

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

ATD Serial No: 296

Test ID: D12461

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	16	Pass
Peak Resultant Acceleration	G's	115 to 137	119	Pass
Peak Longitudinal Acceleration	G's	+/- 15	-4.6	Pass
Unimodal	N/A	<15%	Yes	Pass
Overall Test Results				Pass



Laboratory Technician

2/13/12
Test Date

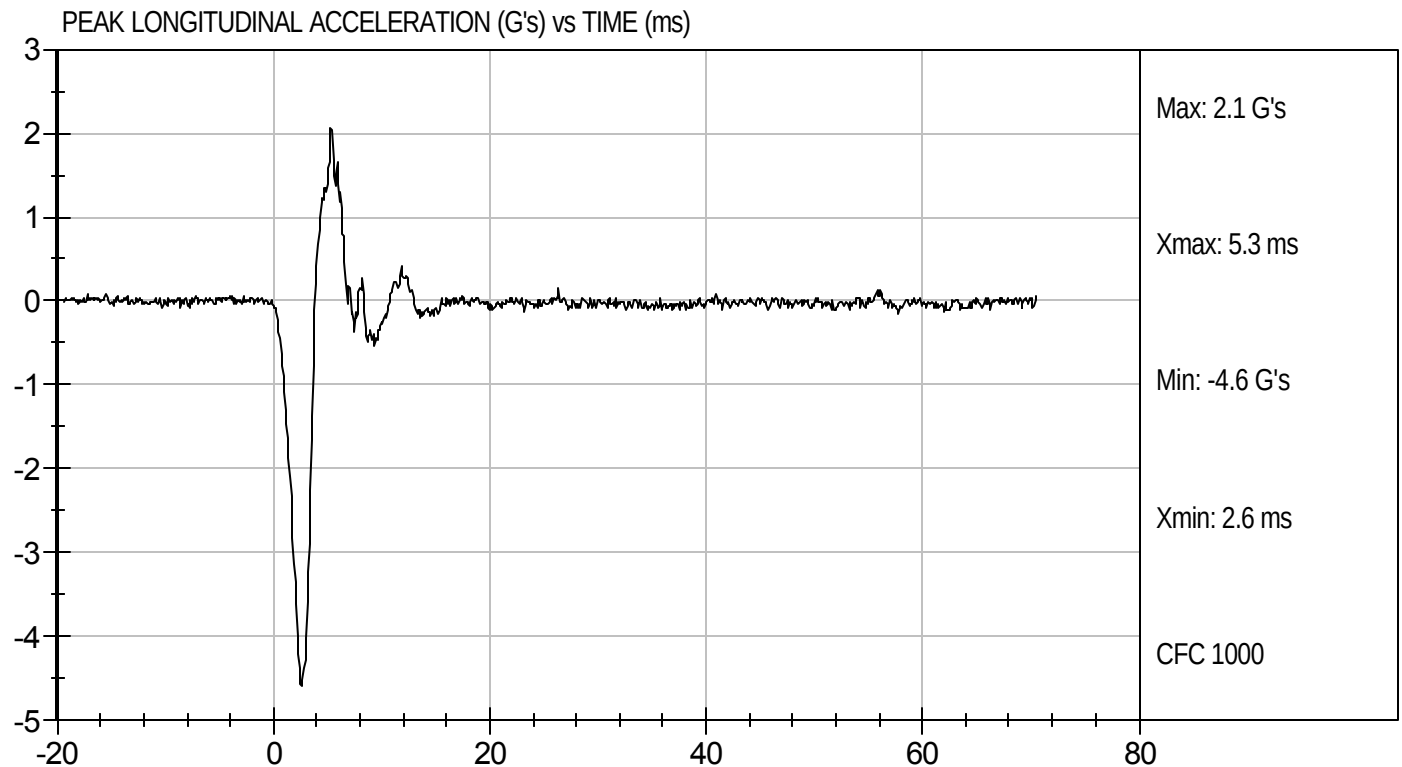
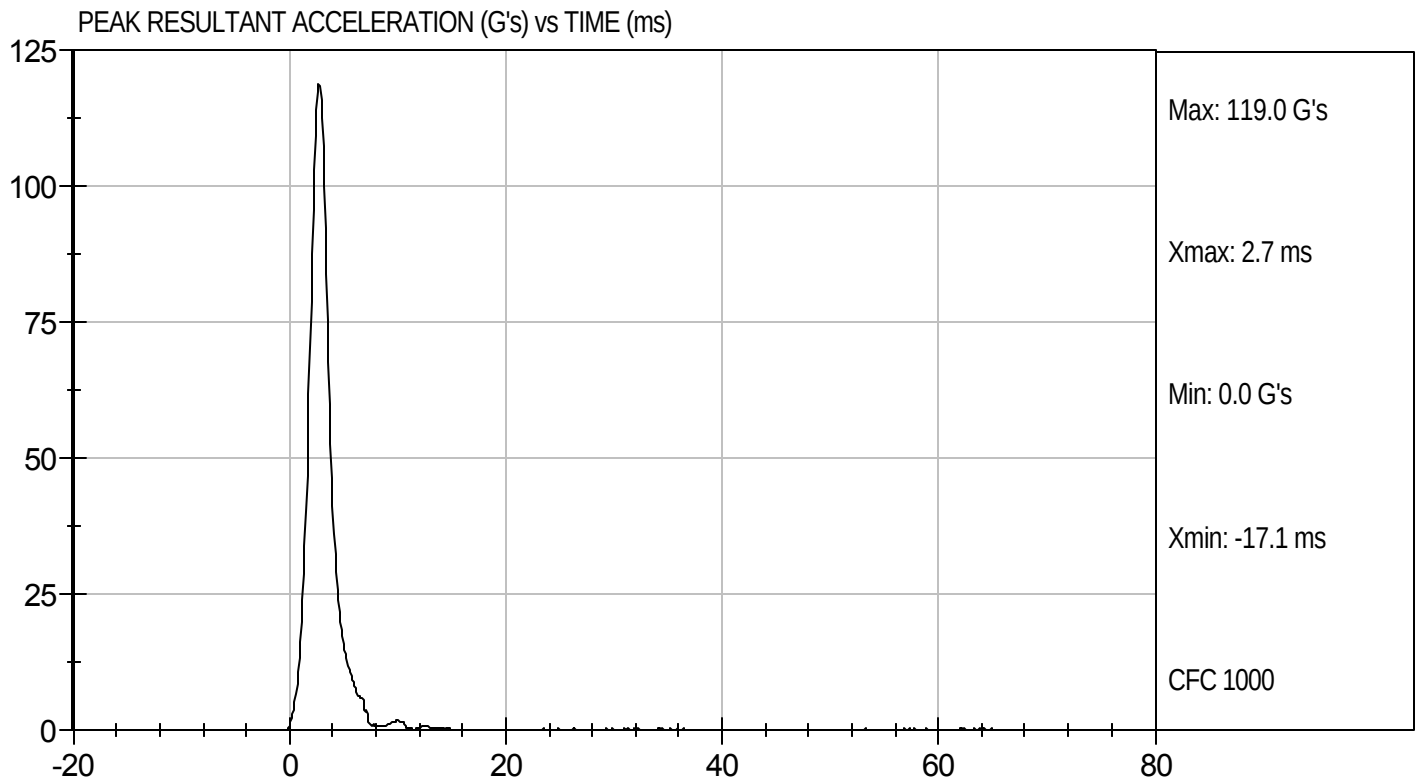


Approved By



Test Desc: Head Drop
Component ID: D12461

Test Date: 2/13/12
Velocity: 0 ft/s, 0 m/s

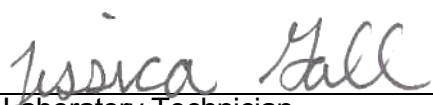


MGA RESEARCH CORPORATION
LATERAL NECK PENDULUM TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

Test I.D: D12462

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21.6	Pass
Humidity		%	10 to 70	16	Pass
Impact Velocity		m/s	5.51 to 5.63	5.58	Pass
Delta Velocity	10 ms	m/s	2.20 to 2.80	2.44	Pass
	15 ms	m/s	3.30 to 4.10	3.51	Pass
	20 ms	m/s	4.40 to 5.40	4.70	Pass
	25 ms	m/s	5.40 to 6.10	5.53	Pass
	25-100 ms	m/s	5.50 to 6.20	5.57	Pass
Maximum D-Plane Rotation		deg	71 to 81	71	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	62	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	119	Pass
Overall Test Results				Pass	


 Laboratory Technician

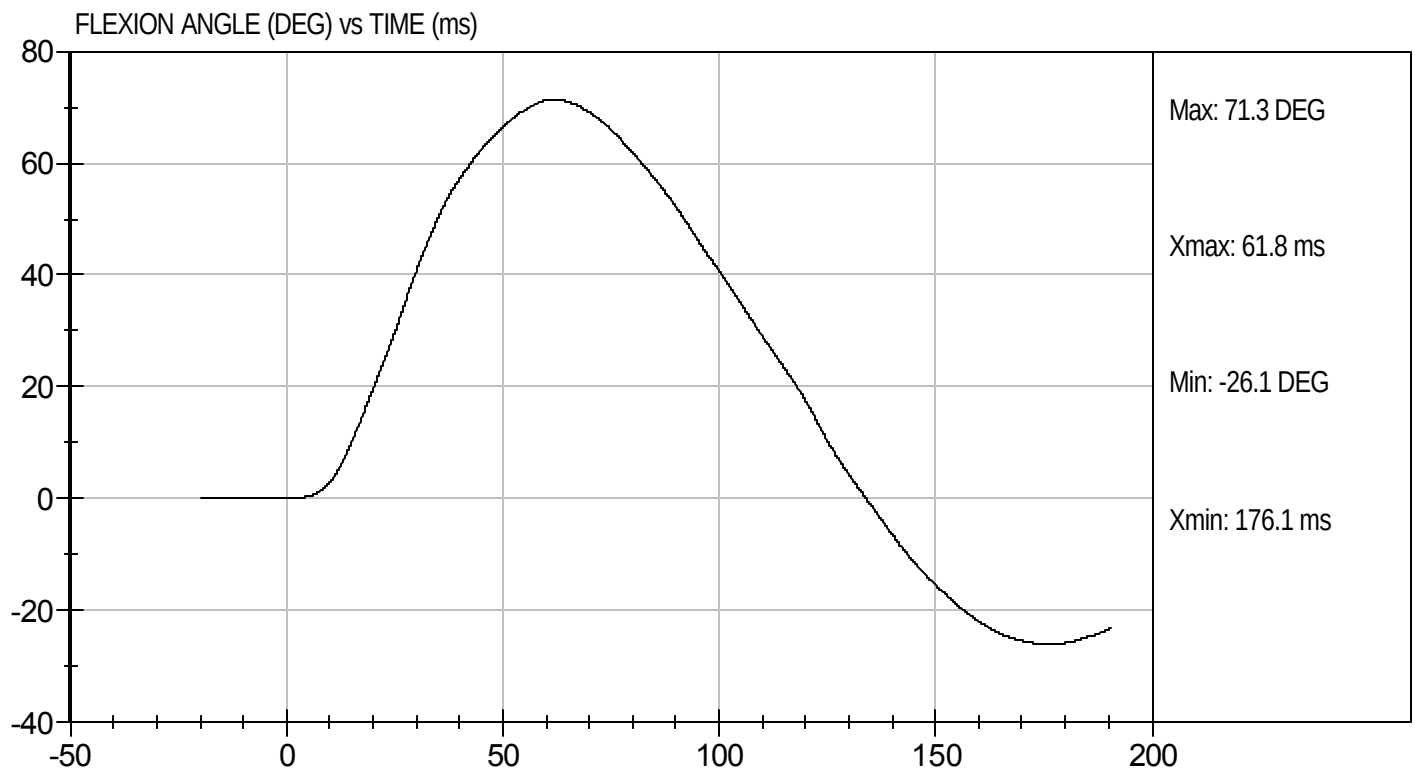
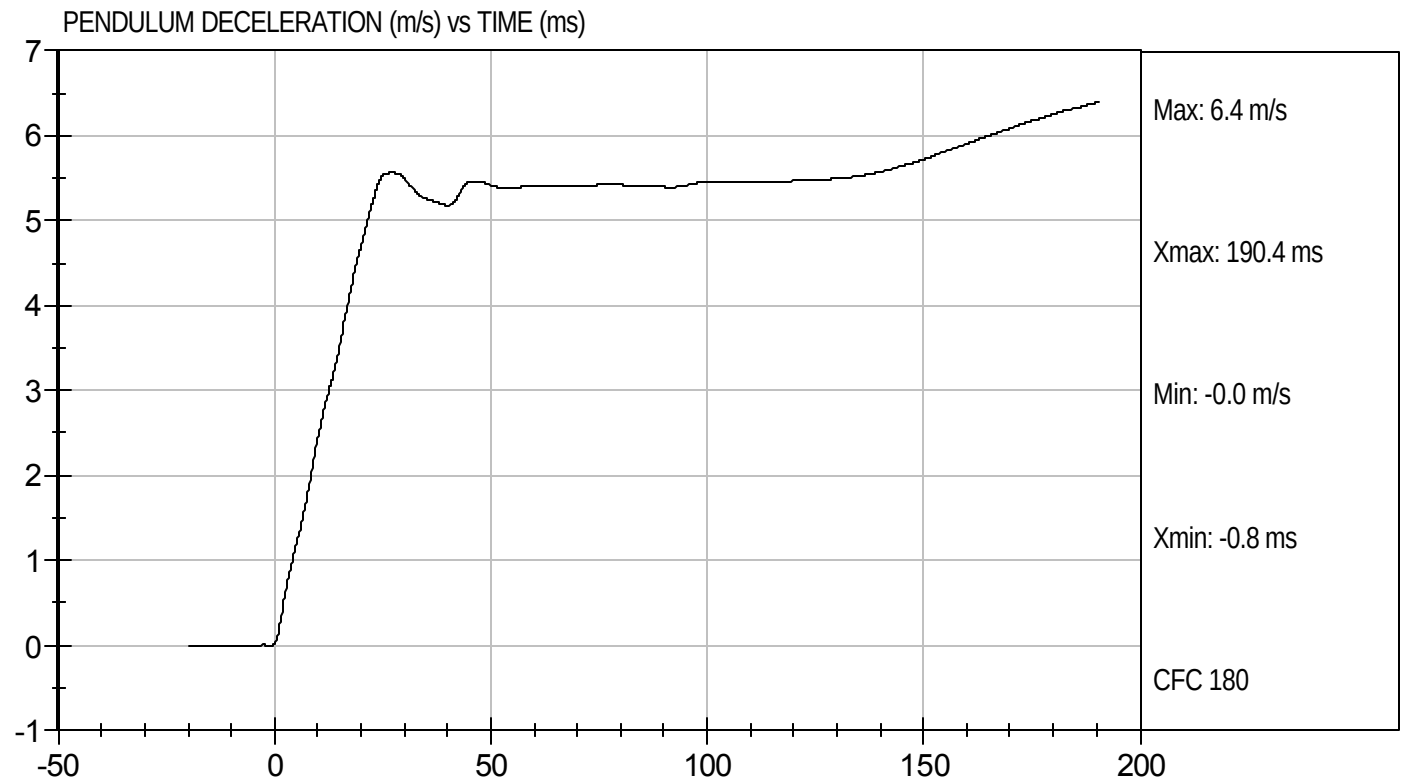
2/13/12
 Test Date


 Approved By



Test Desc: Neck Bending
Component ID: D12462

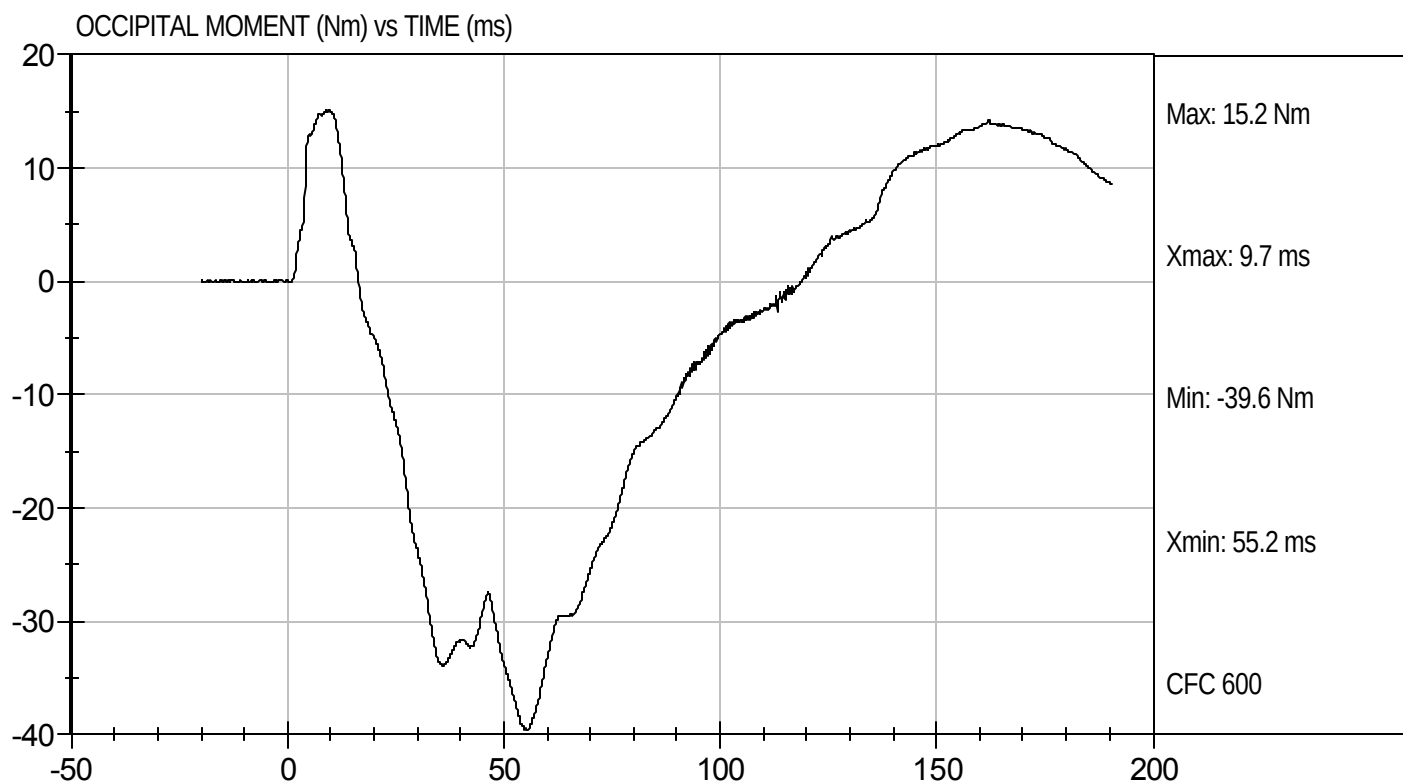
Test Date: 2/13/12
Velocity: 18.32 ft/s, 5.58 m/s





Test Desc: Neck Bending
Component ID: D12462

Test Date: 2/13/12
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: D12463

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	17	Pass
Impact Velocity	m/s	4.20 to 4.40	4.30	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	19	Pass
			Overall Test Results	Pass


Laboratory Technician

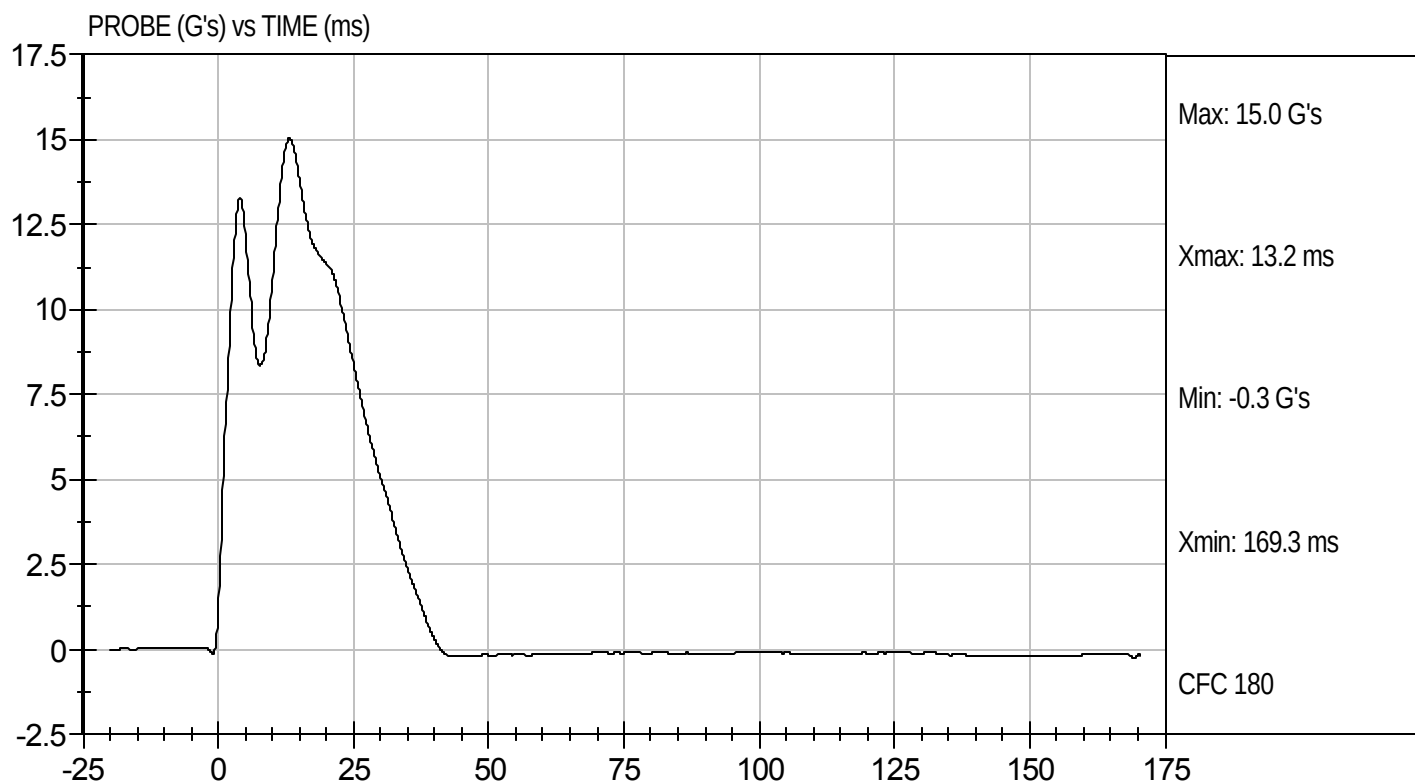
2/13/12
Test Date


Approved By



Test Desc: Shoulder Impact
Component ID: D12463

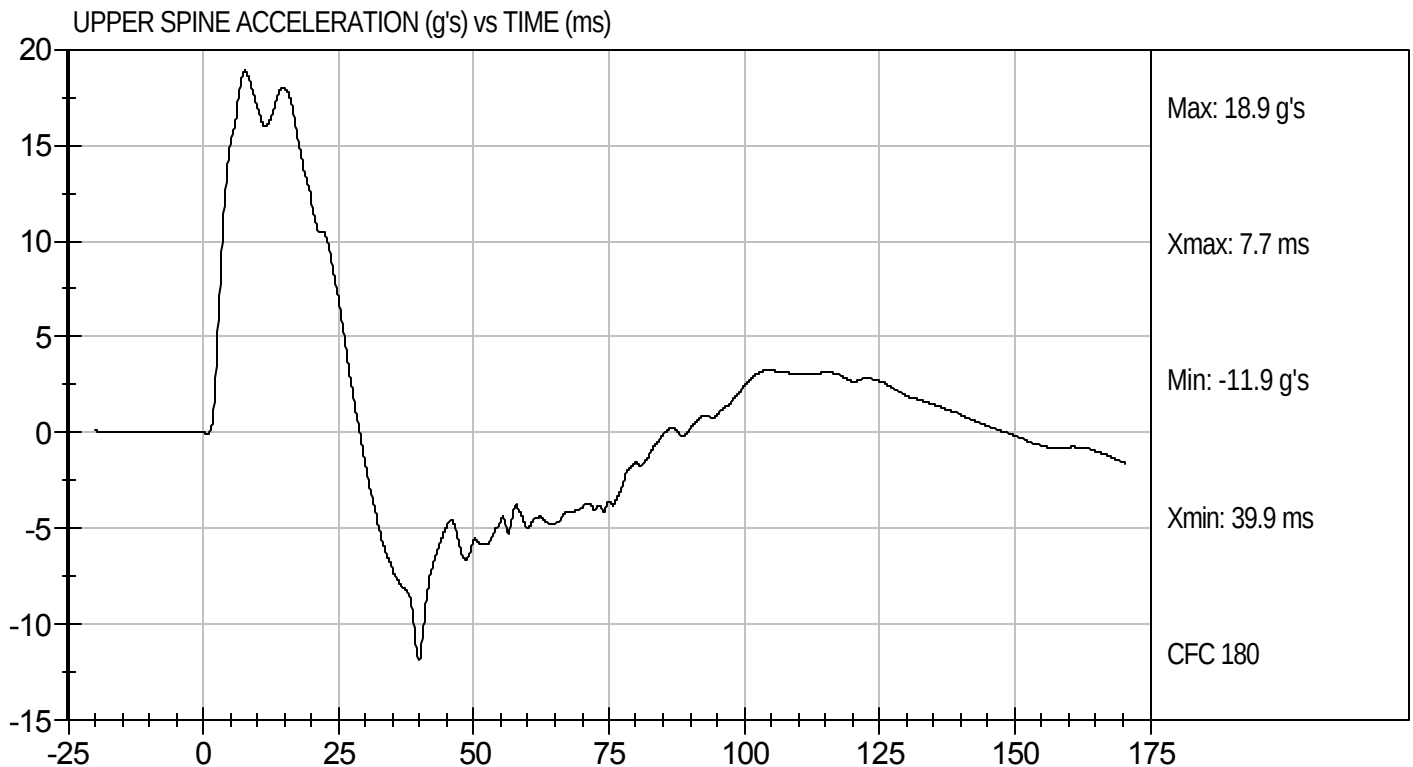
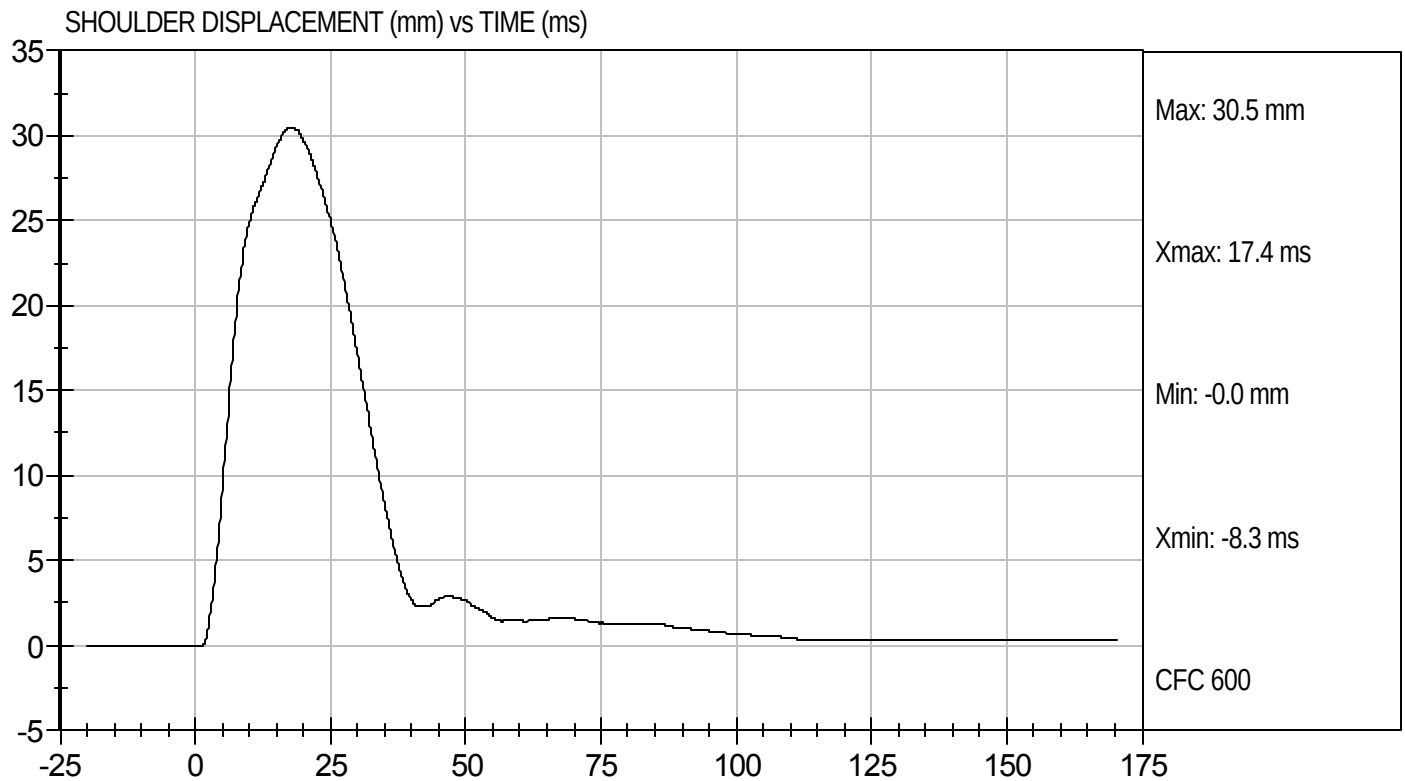
Test Date: 2/13/12
Velocity: 14.12 ft/s, 4.30 m/s





Test Desc: Shoulder Impact
Component ID: D12463

Test Date: 2/13/12
Velocity: 14.12 ft/s, 4.30 m/s



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

ATD Serial No: 296

Test I.D: D12464

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	6.60 to 6.80	6.77	Pass
Peak Impactor Acceleration	G's	30 to 36	33	Pass
Shoulder Displacement	mm	31 to 40	35	Pass
Upper Rib Displacement	mm	25 to 32	27	Pass
Middle Rib Displacement	mm	30 to 36	32	Pass
Lower Rib Displacement	mm	32 to 38	33	Pass
Upper Spine (T1) Y Acceleration	G's	34 to 43	38	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	32	Pass
Overall Test Results			Pass	


Laboratory Technician

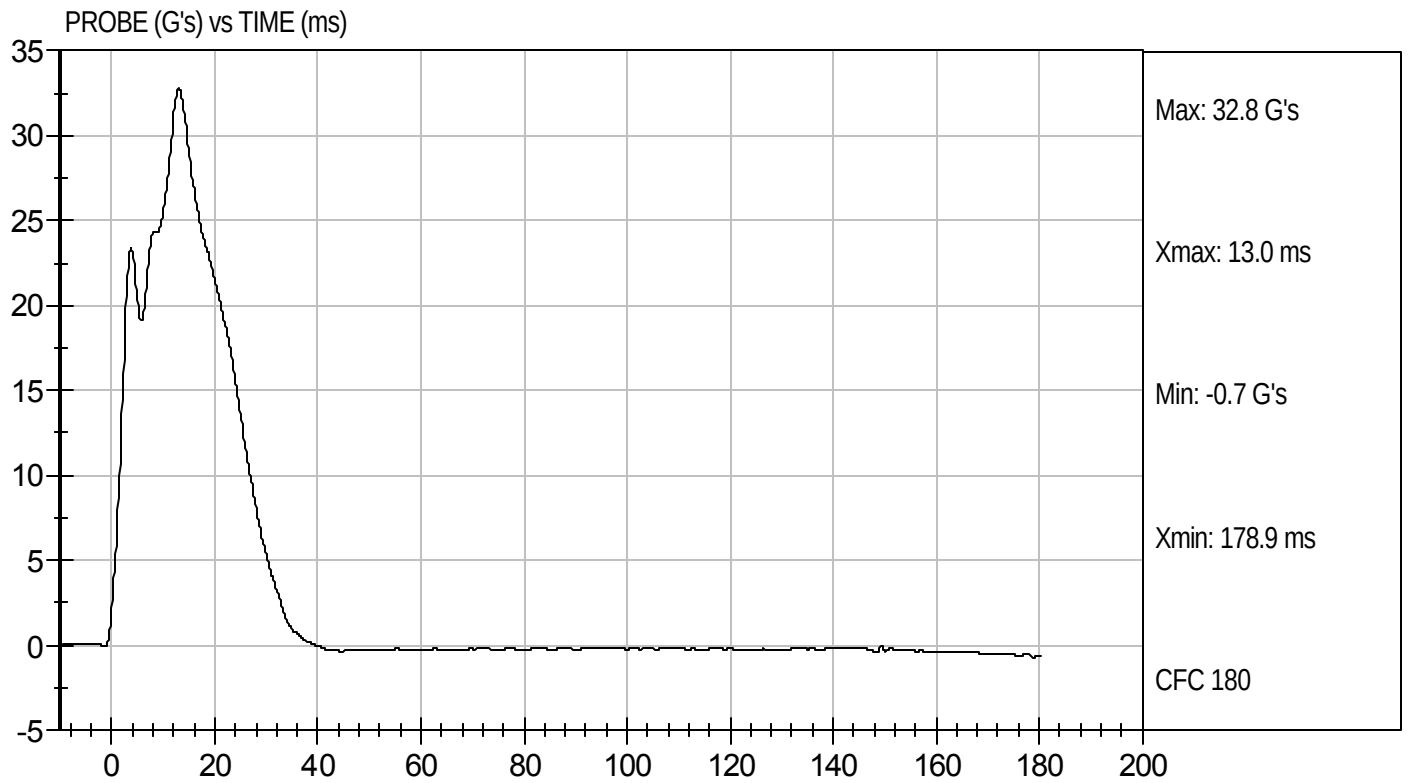
2/13/12
Test Date


Approved By



Test Desc: Thorax With Arm
Component ID: D12464

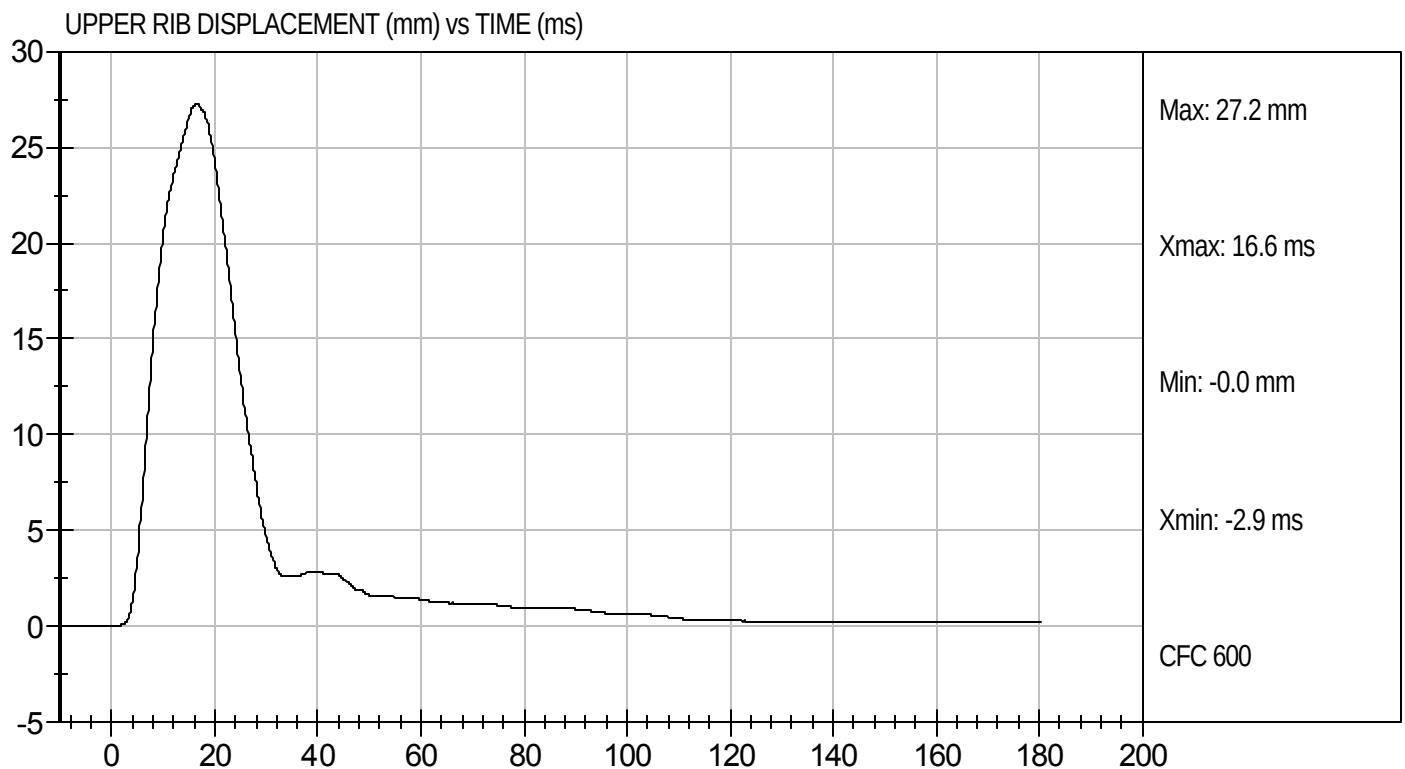
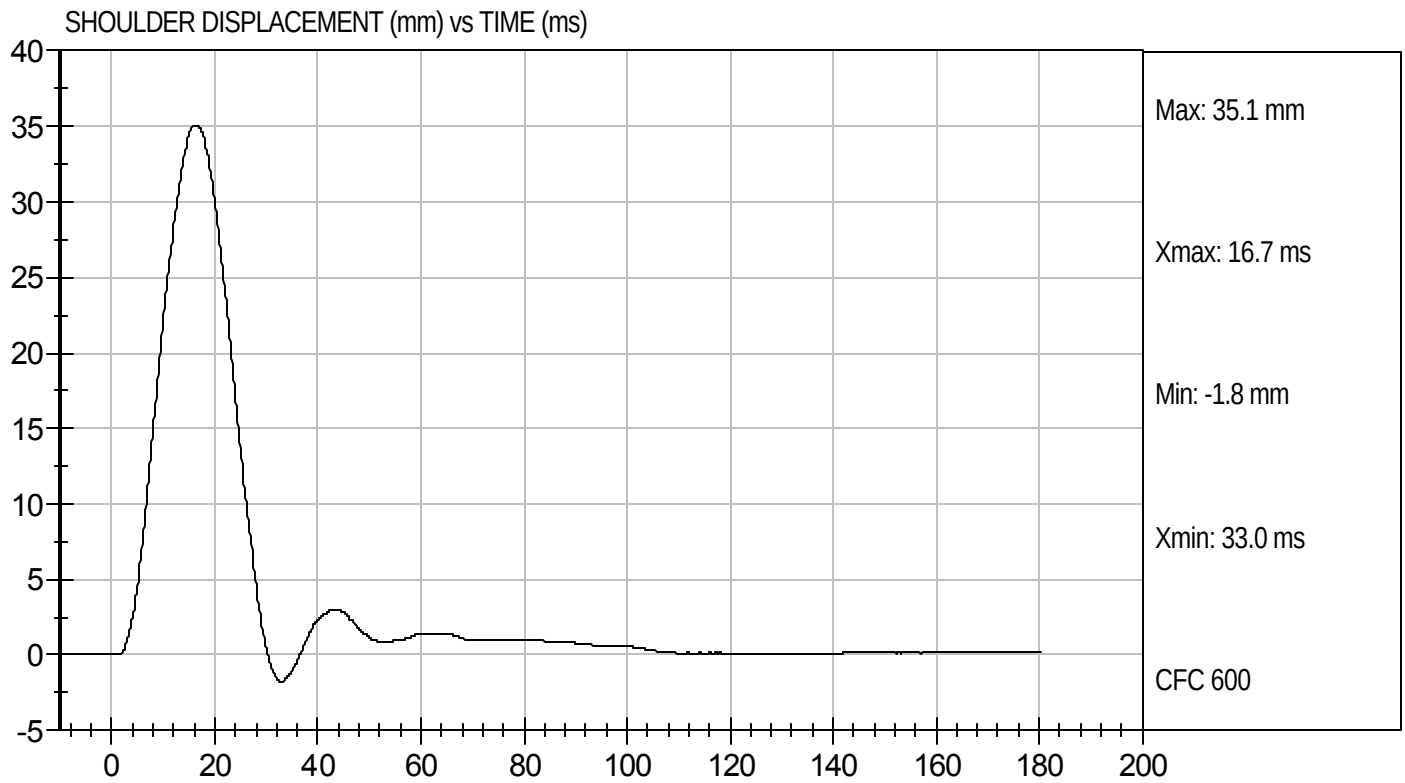
Test Date: 2/13/12
Velocity: 22.22 ft/s, 6.77 m/s





Test Desc: Thorax With Arm
Component ID: D12464

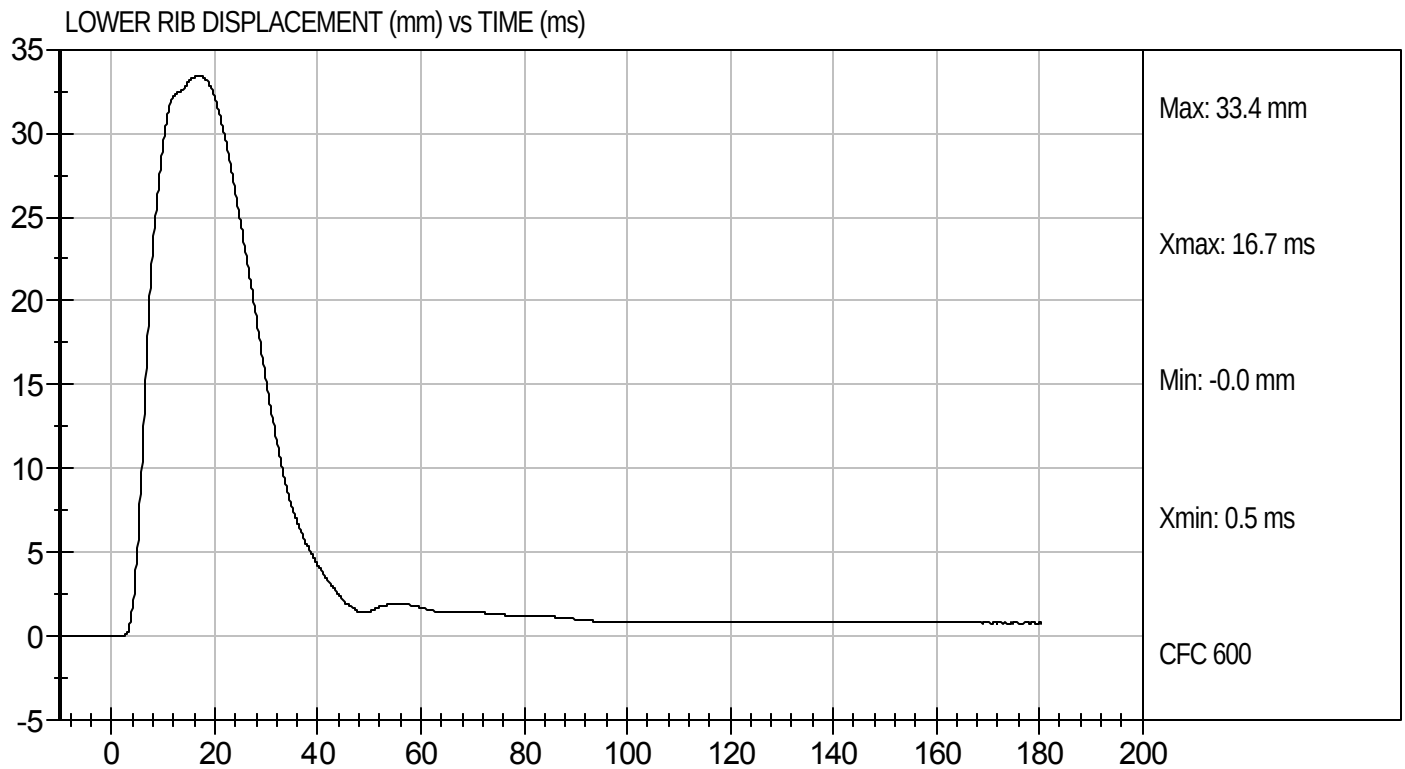
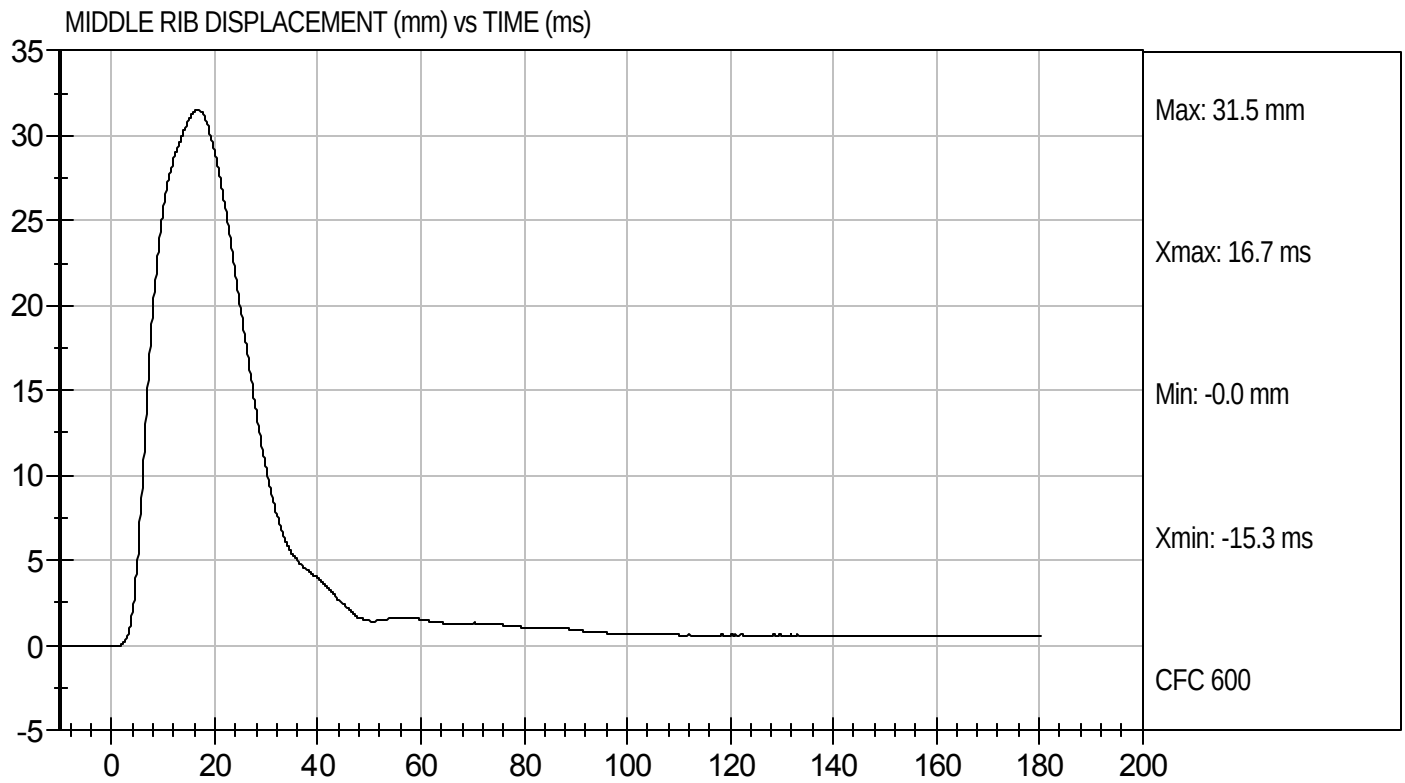
Test Date: 2/13/12
Velocity: 22.22 ft/s, 6.77 m/s





Test Desc: Thorax With Arm
Component ID: D12464

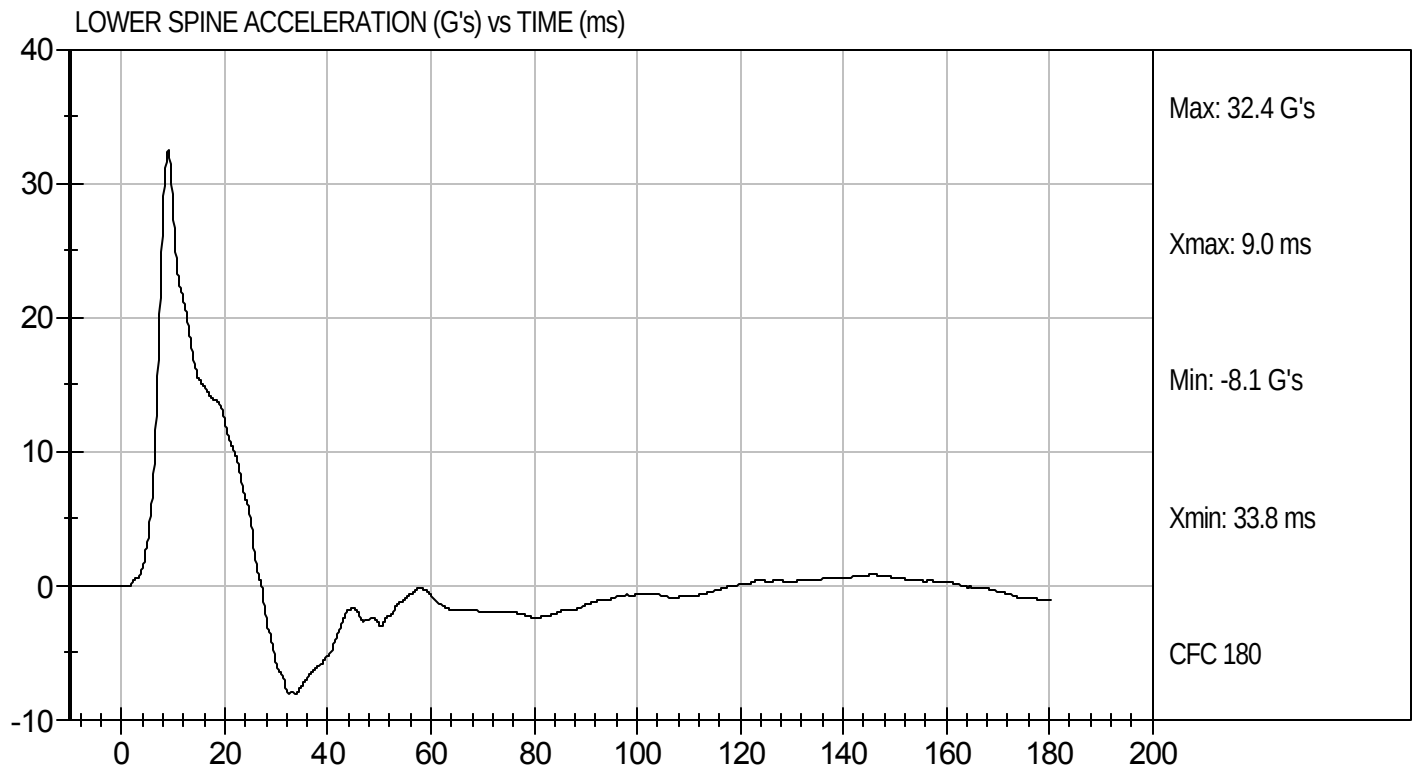
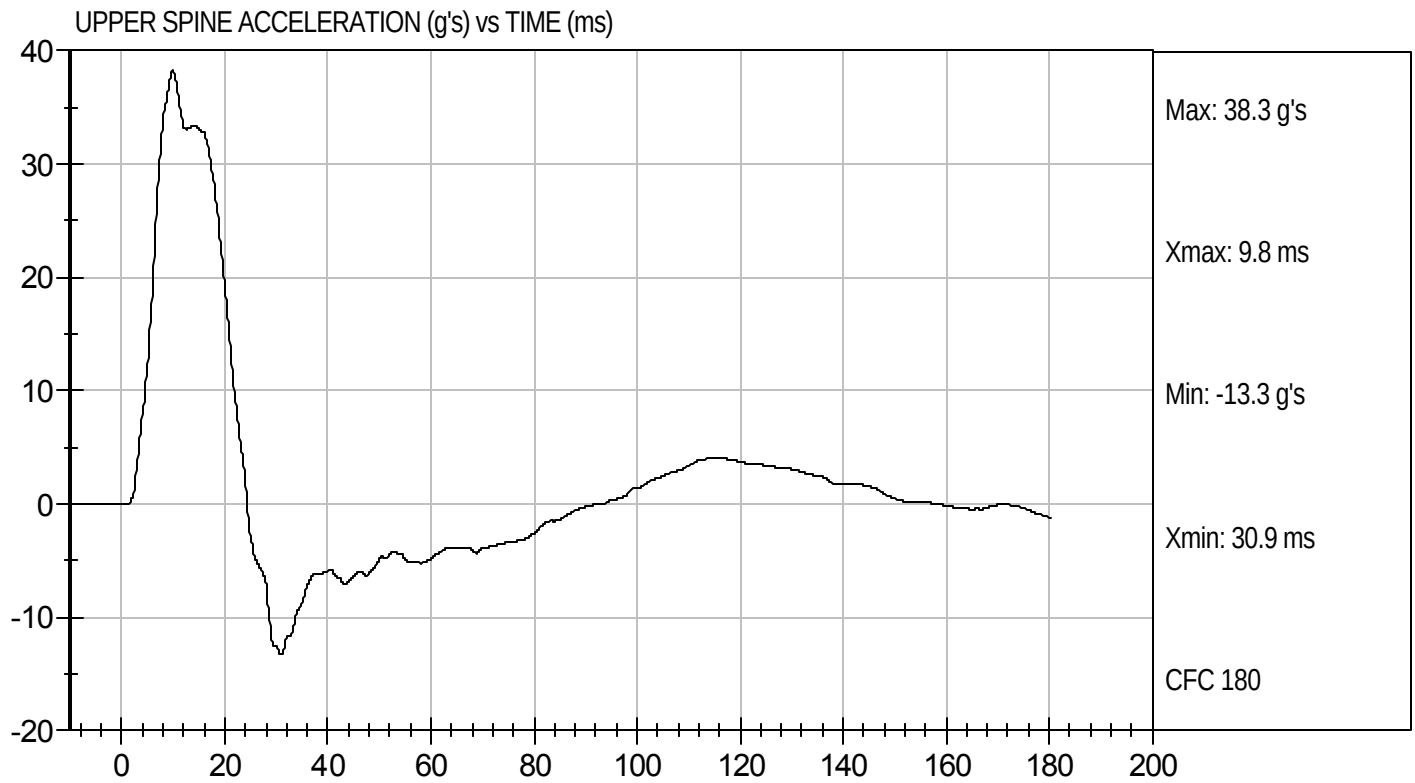
Test Date: 2/13/12
Velocity: 22.22 ft/s, 6.77 m/s





Test Desc: Thorax With Arm
Component ID: D12464

Test Date: 2/13/12
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: D12465

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	4.20 to 4.40	4.23	Pass
Peak Impactor Force	G's	14 to 18	15	Pass
Upper Rib Displacement	mm	32 to 40	36	Pass
Middle Rib Displacement	mm	39 to 45	41	Pass
Lower Rib Displacement	mm	35 to 43	38	Pass
Upper Spine (T1) Y Acceleration	G's	13 to 17	14	Pass
Lower Spine (T12) Y Acceleration	G's	7 to 11	8	Pass
Overall Test Results			Pass	


Laboratory Technician

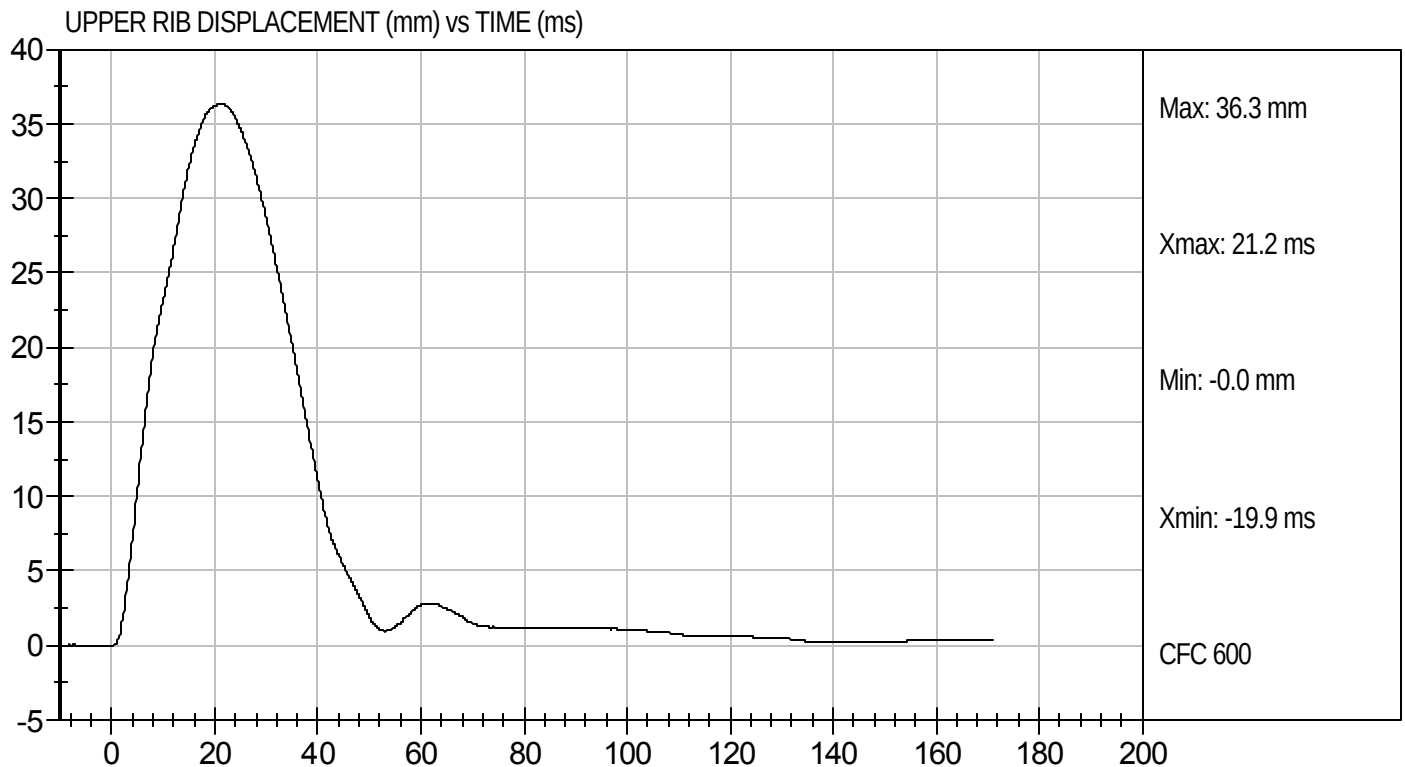
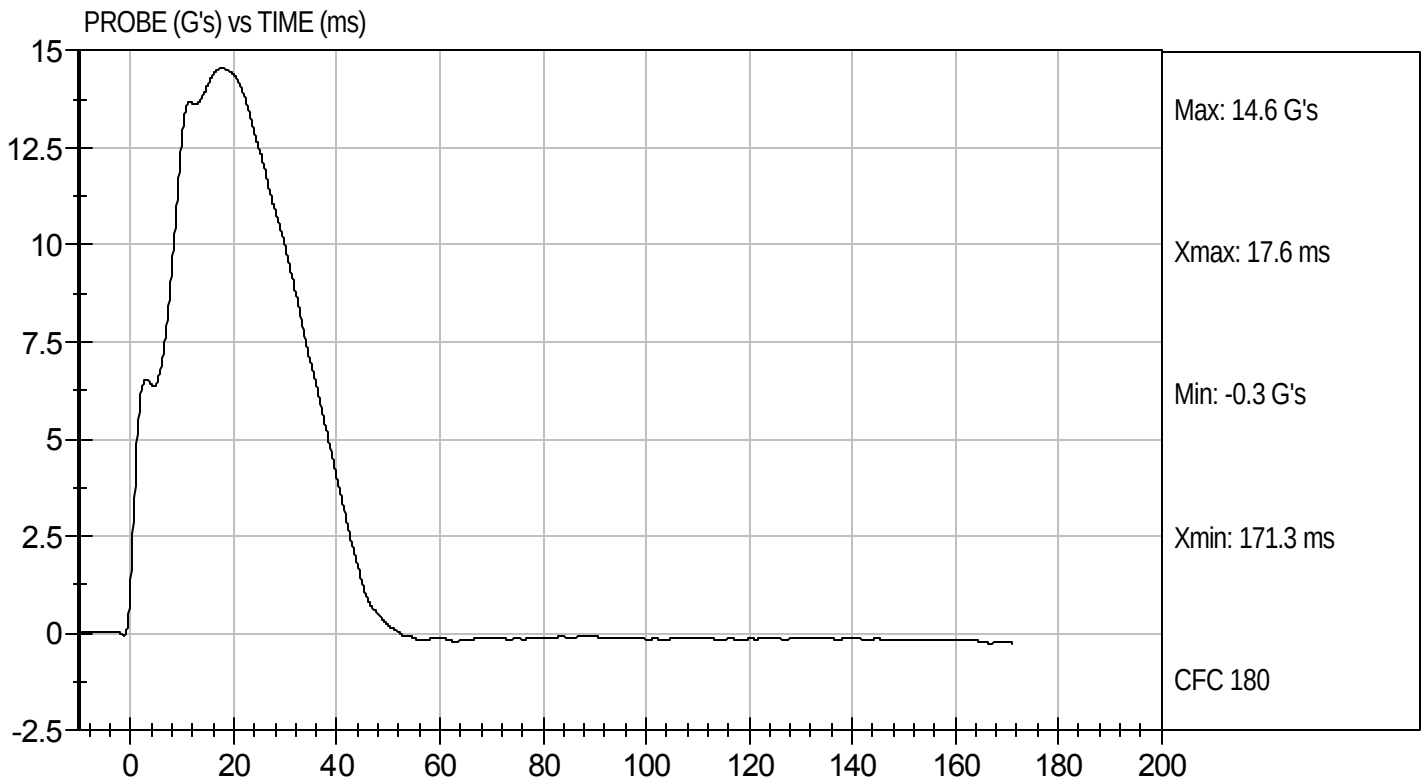
2/13/12
Test Date


Approved By



Test Desc: Thorax Without Arm
Component ID: D12465

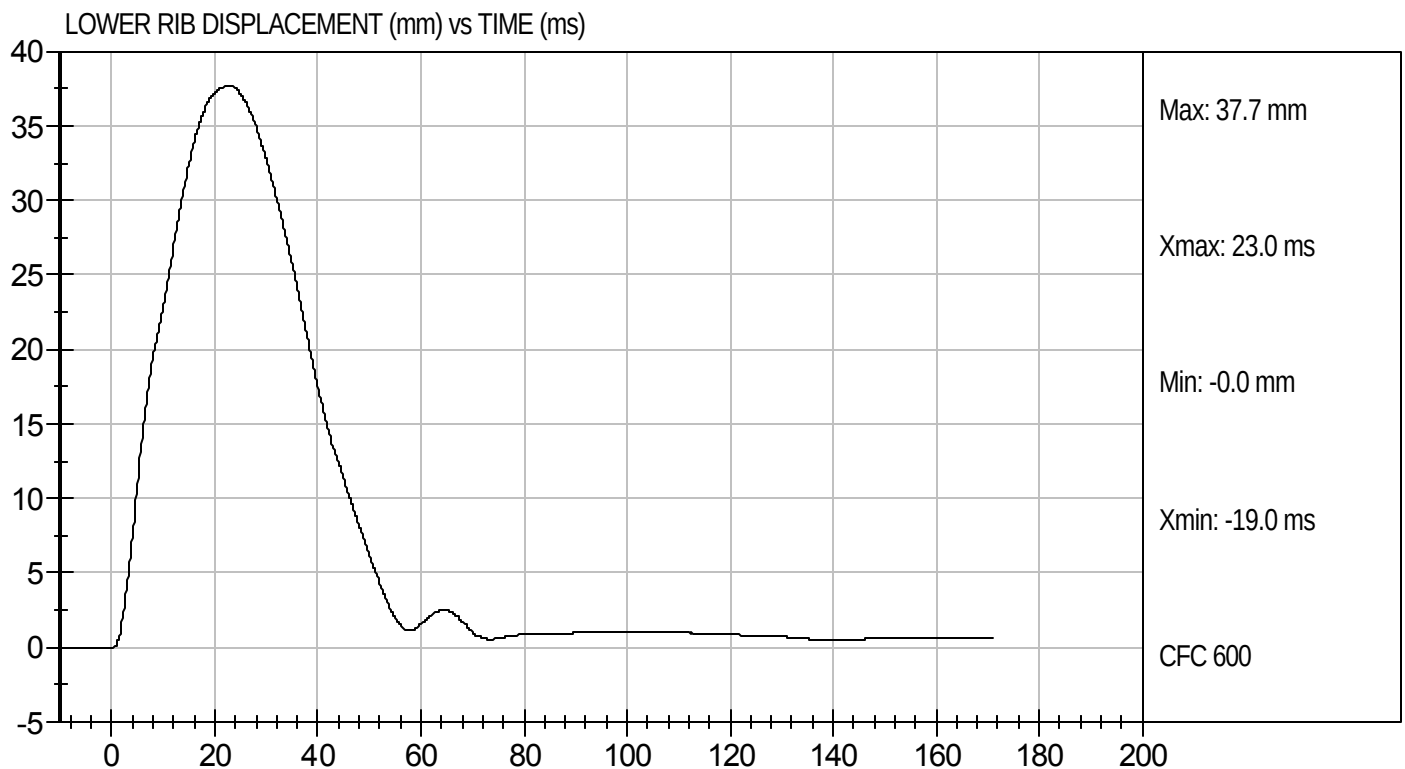
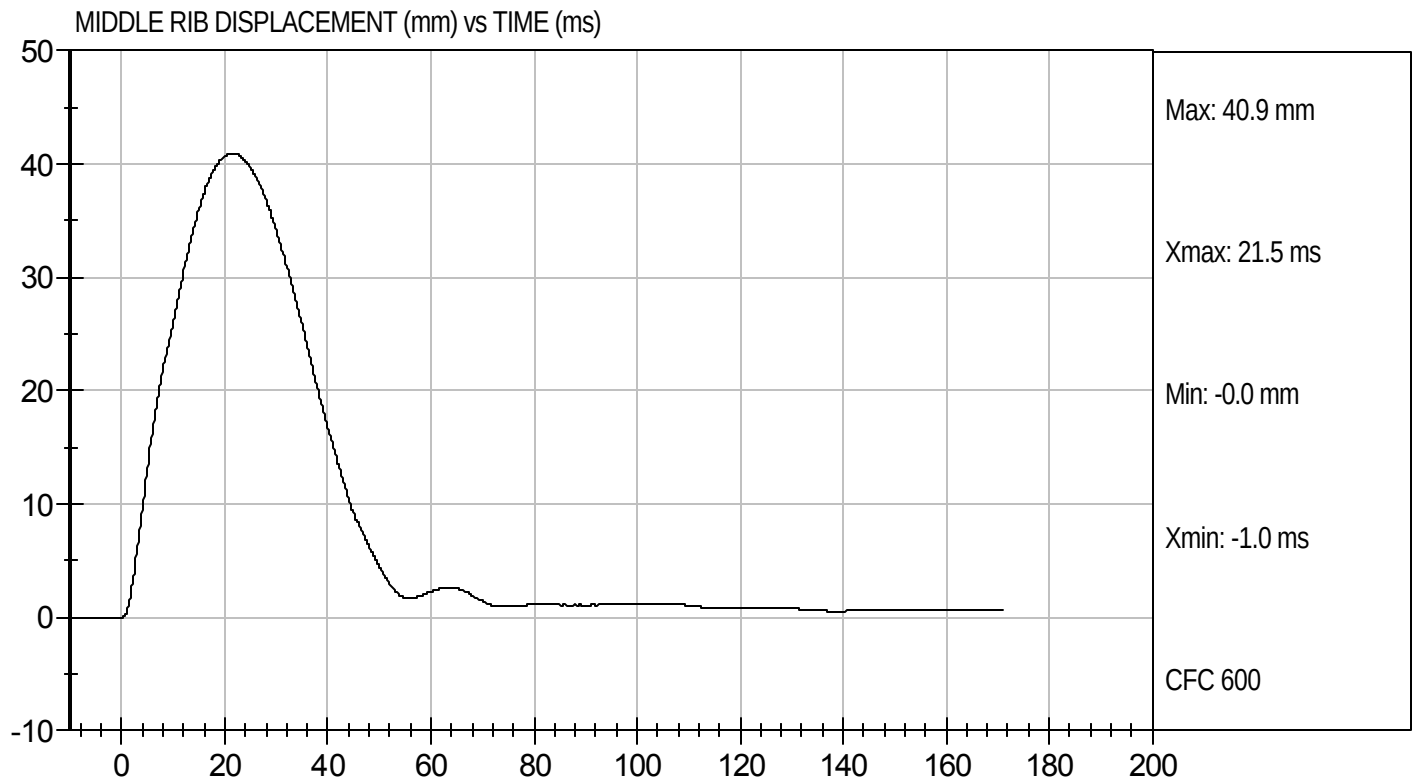
Test Date: 2/13/12
Velocity: 13.88 ft/s, 4.23 m/s





Test Desc: Thorax Without Arm
Component ID: D12465

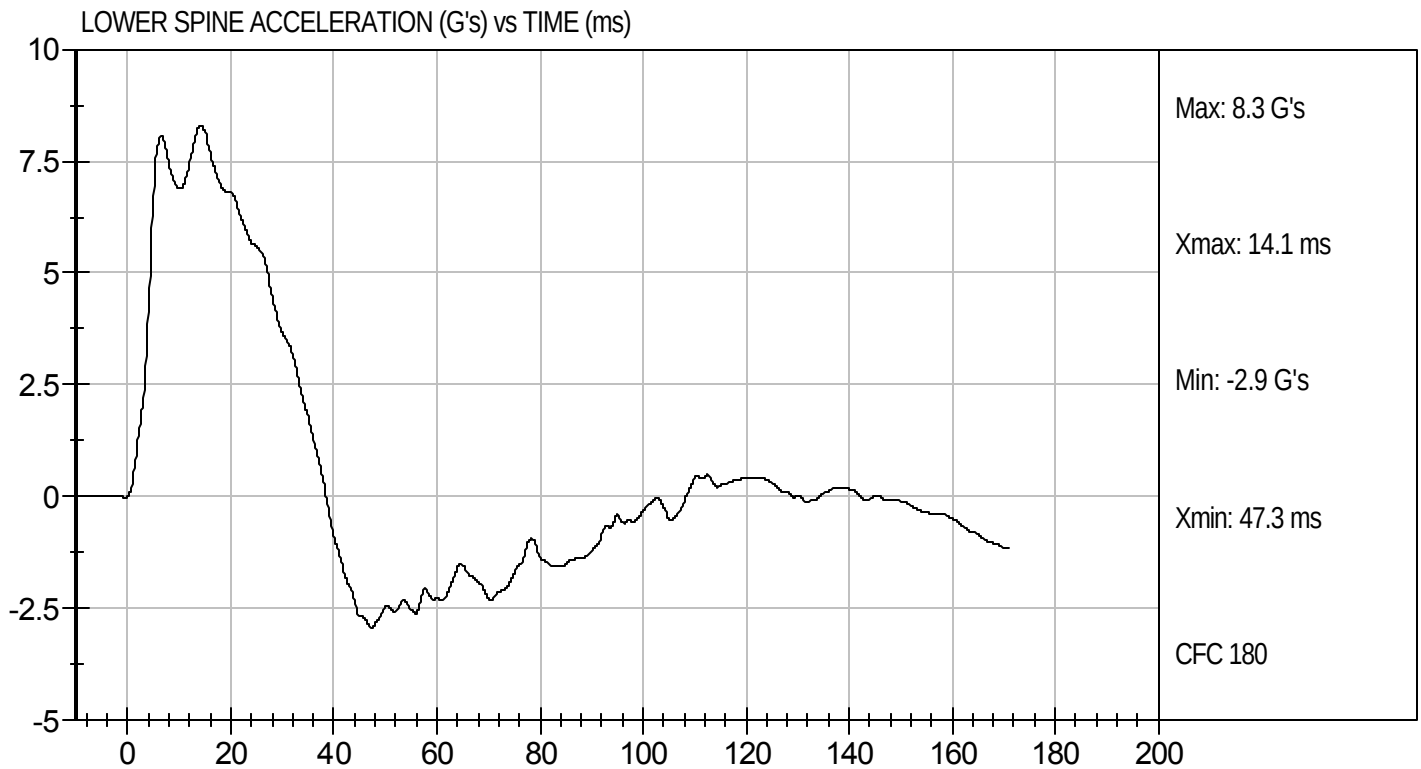
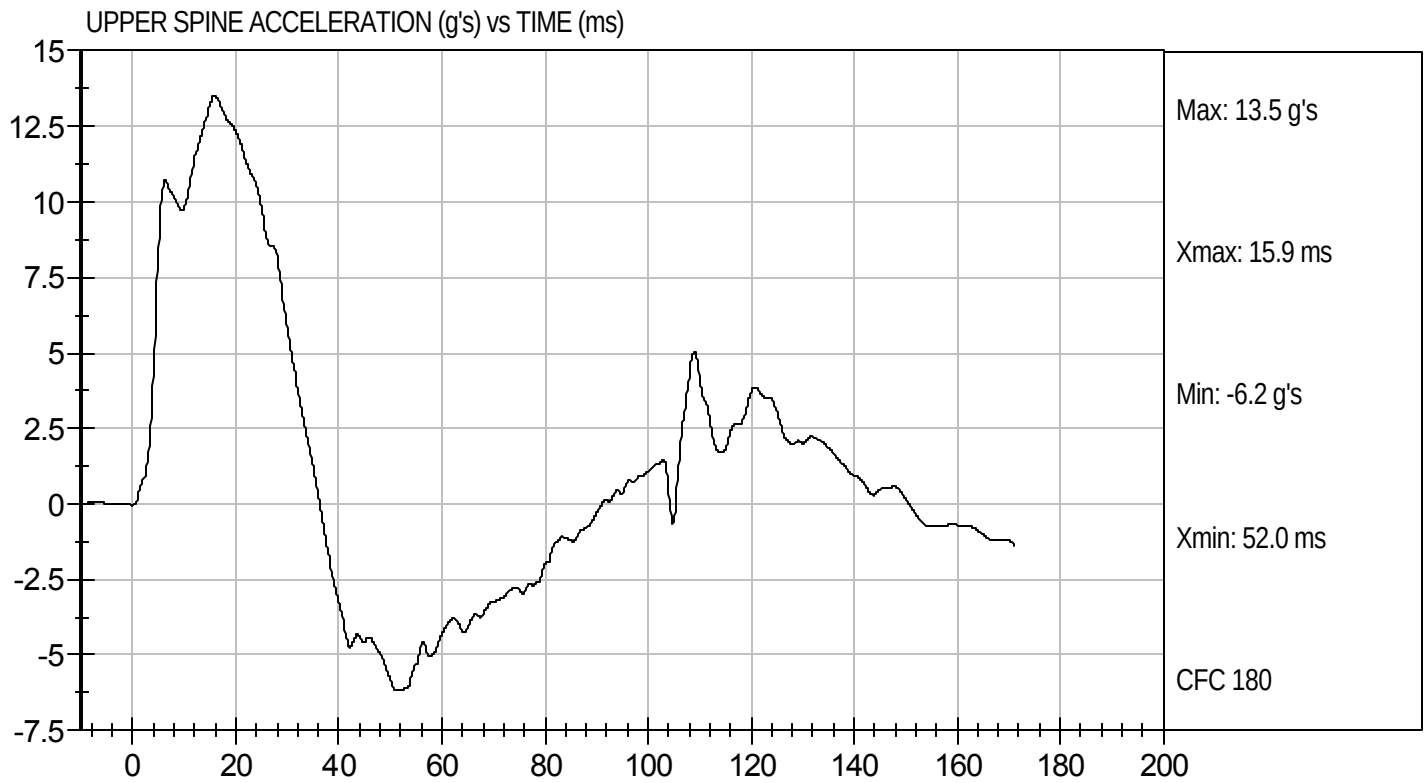
Test Date: 2/13/12
Velocity: 13.88 ft/s, 4.23 m/s





Test Desc: Thorax Without Arm
Component ID: D12465

Test Date: 2/13/12
Velocity: 13.88 ft/s, 4.23 m/s



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

ATD Serial No: 296

Test I.D: D12466

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	4.20 to 4.40	4.30	Pass
Peak Impactor Acceleration	G's	12 to 16	14	Pass
Upper Rib Displacement	mm	36 to 47	37	Pass
Lower Rib Displacement	mm	33 to 44	35	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	10	Pass
Overall Test Results			Pass	

Jessica Hall
Laboratory Technician

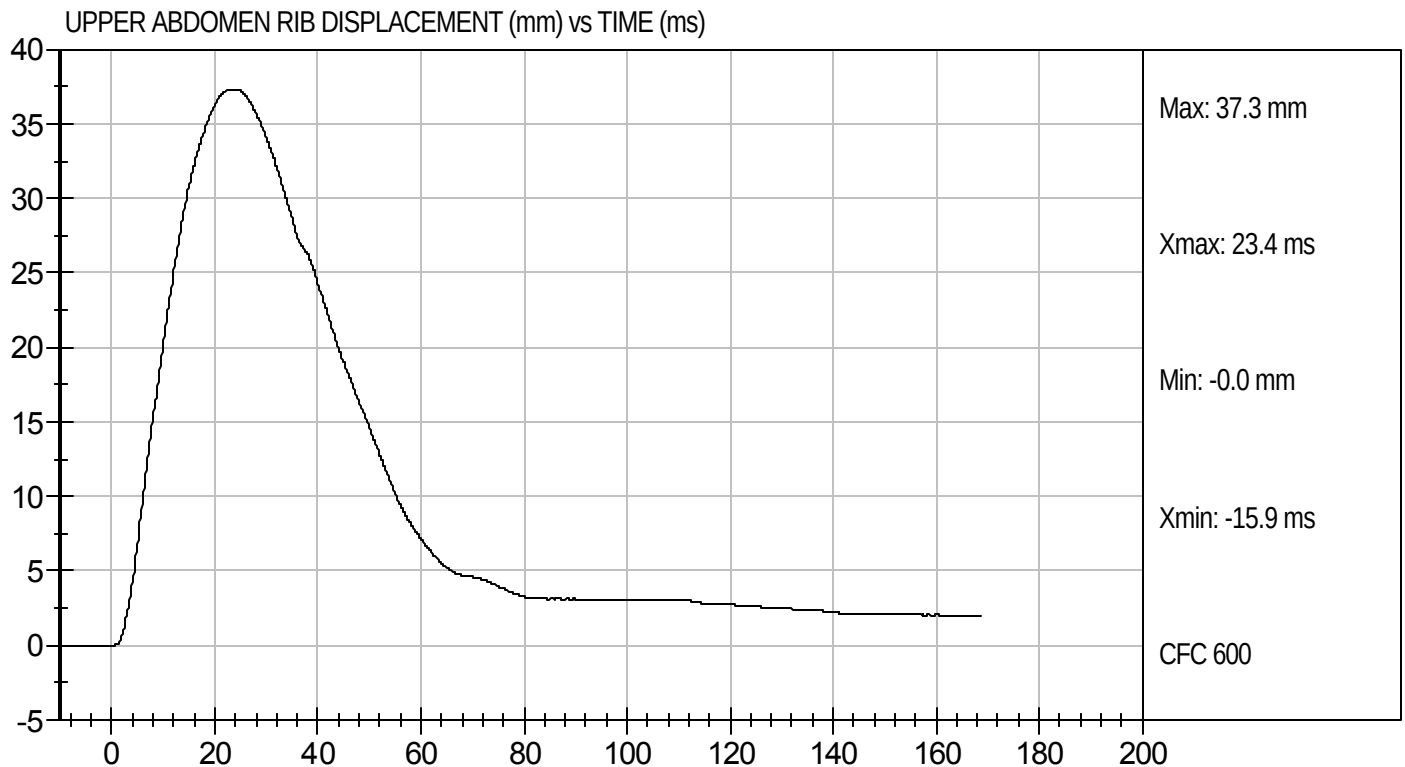
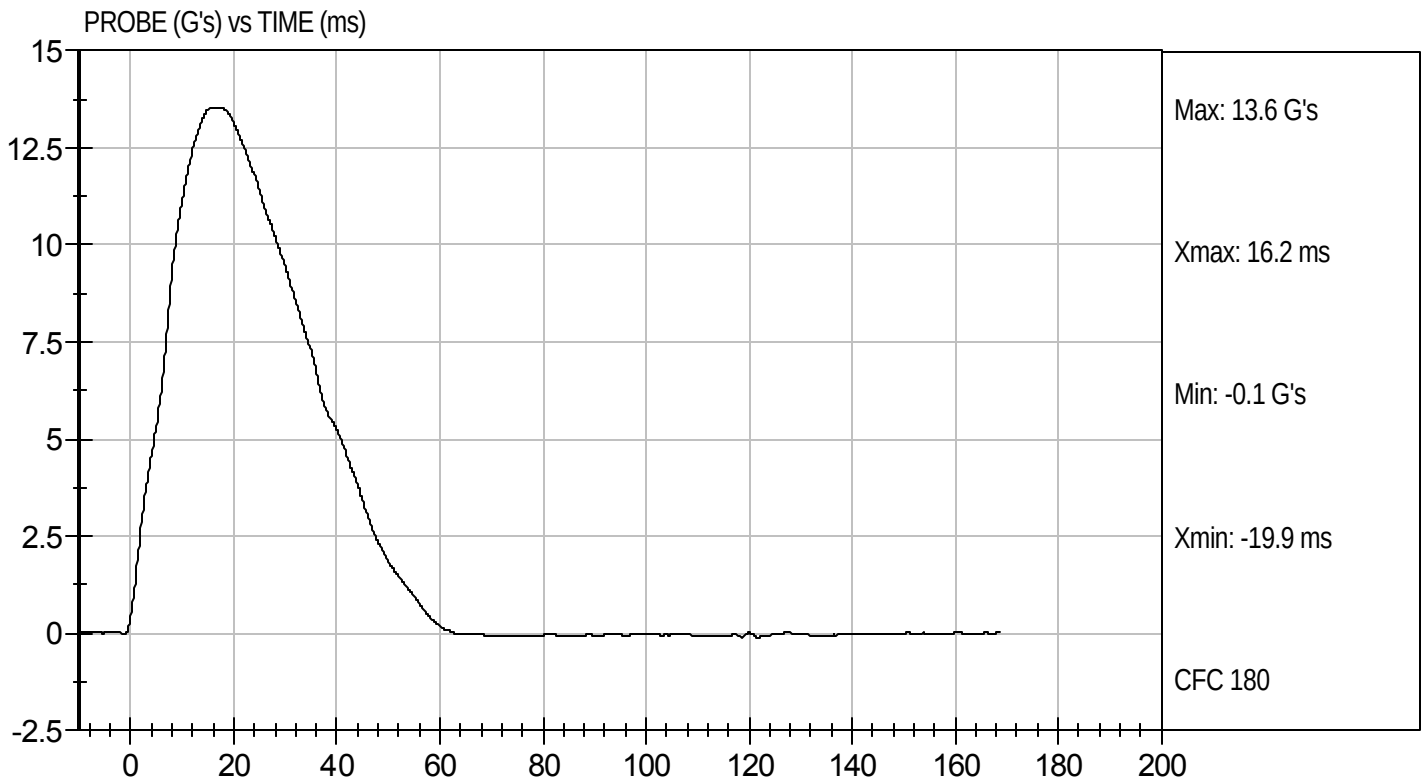
2/13/12
Test Date

David Winkelbauer
Approved By



Test Desc: Abdomen Impact
Component ID: D12466

Test Date: 2/13/12
Velocity: 14.12 ft/s, 4.30 m/s

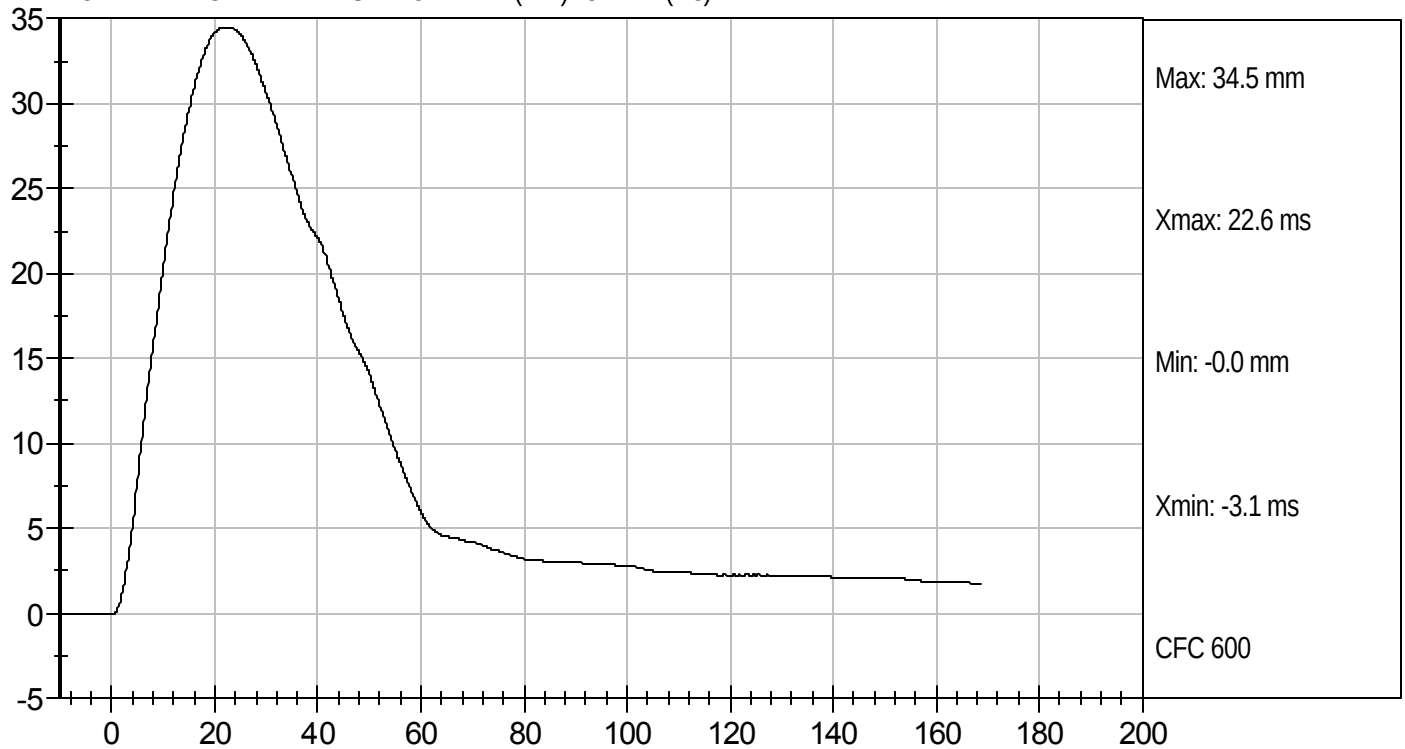




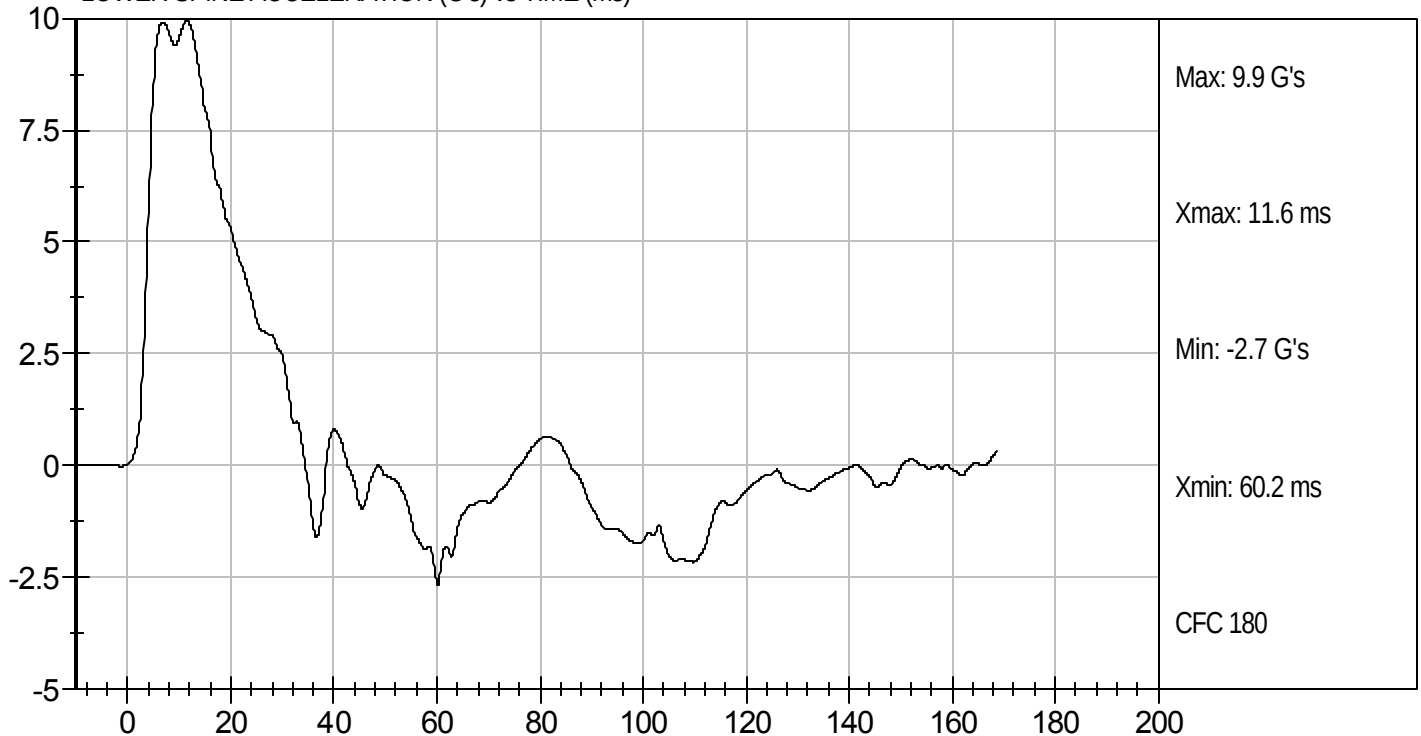
Test Desc: Abdomen Impact
Component ID: D12466

Test Date: 2/13/12
Velocity: 14.12 ft/s, 4.30 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: D12467

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	6.60 to 6.80	6.68	Pass
Peak Impactor Acceleration	G's	38 to 47	42	Pass
Pelvis Y Acceleration after 6 ms	G's	34 to 42	41	Pass
Peak Acetabulum Force	N	3600 to 4300	3934	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

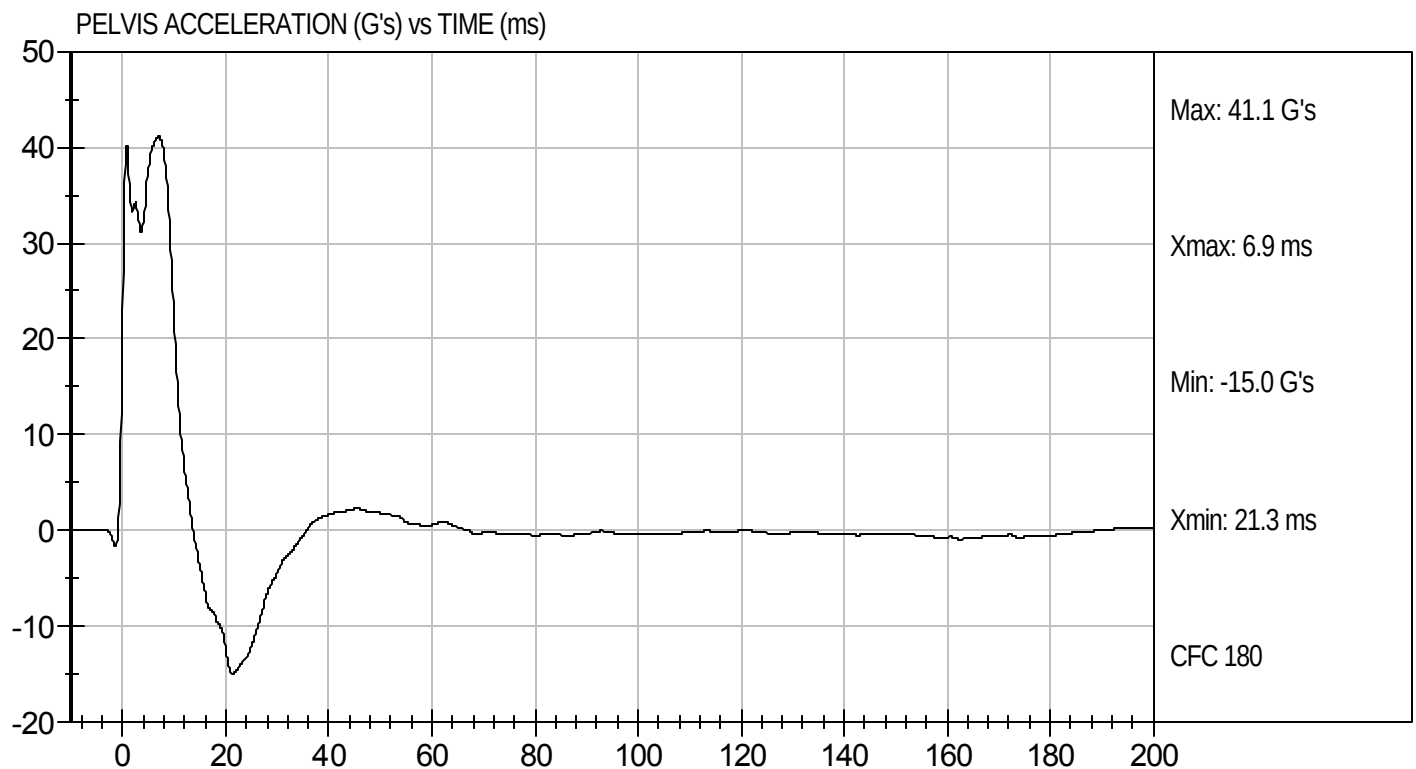
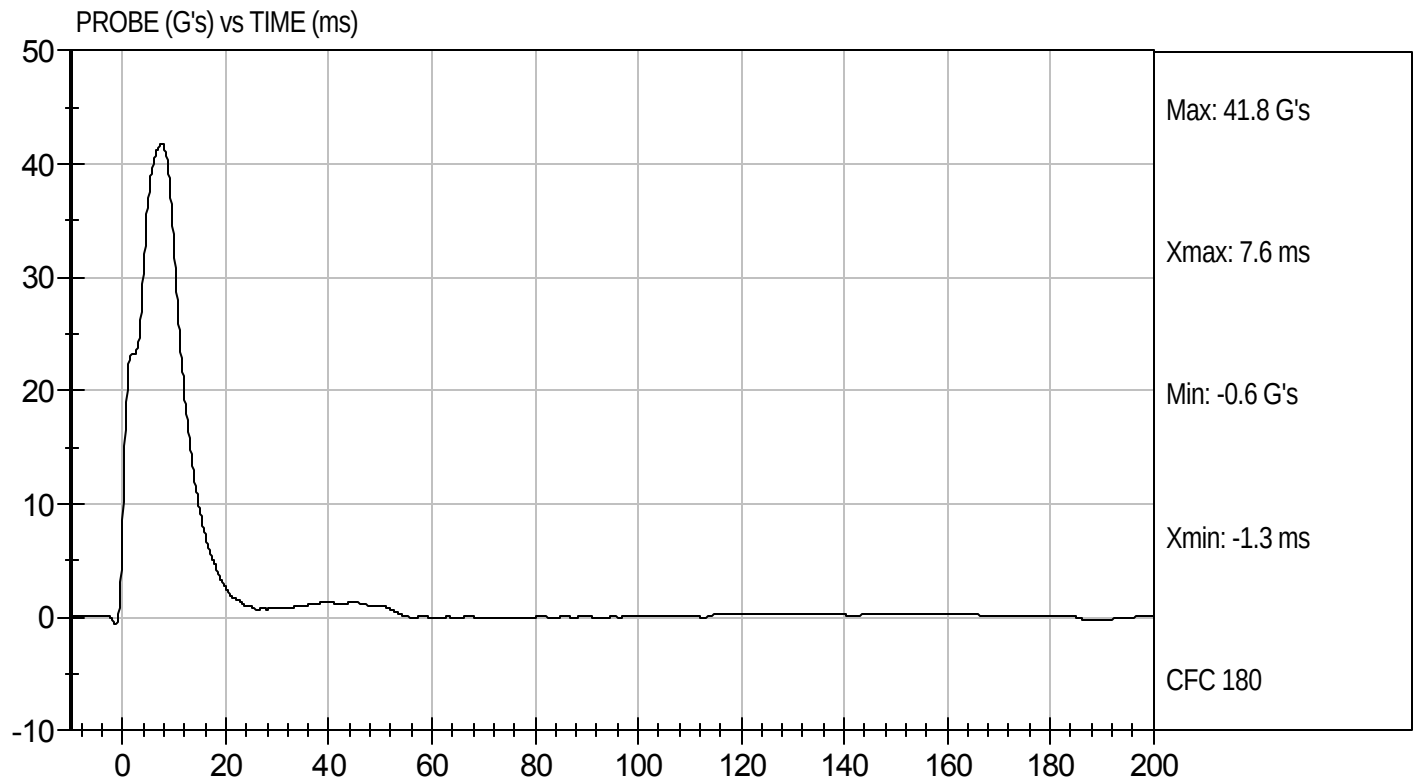
2/13/12
Test Date

David Winkelbauer
Approved By



Test Desc: Pelvis Impact
Component ID: D12467

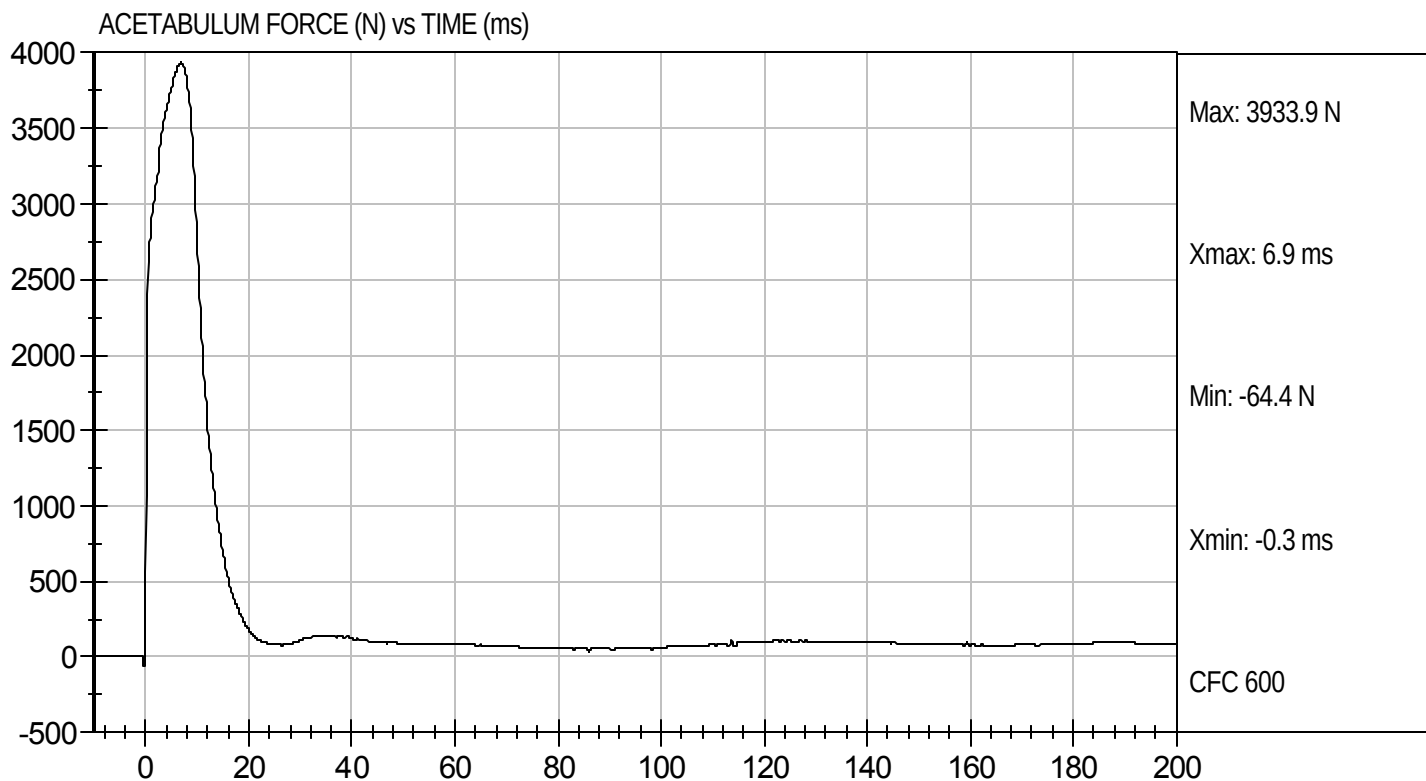
Test Date: 2/13/12
Velocity: 21.9 ft/s, 6.68 m/s





Test Desc: Pelvis Impact
Component ID: D12467

Test Date: 2/13/12
Velocity: 21.9 ft/s, 6.68 m/s

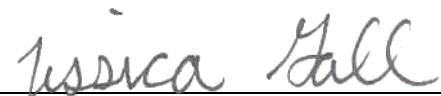


MGA RESEARCH CORPORATION
ILIAC IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

Test I.D: D12468

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	4.20 to 4.40	4.34	Pass
Peak Impactor Acceleration	G's	36 to 45	37	Pass
Pelvis Y Acceleration	G's	28 to 39	29	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4408	Pass
Overall Test Results			Pass	


Laboratory Technician

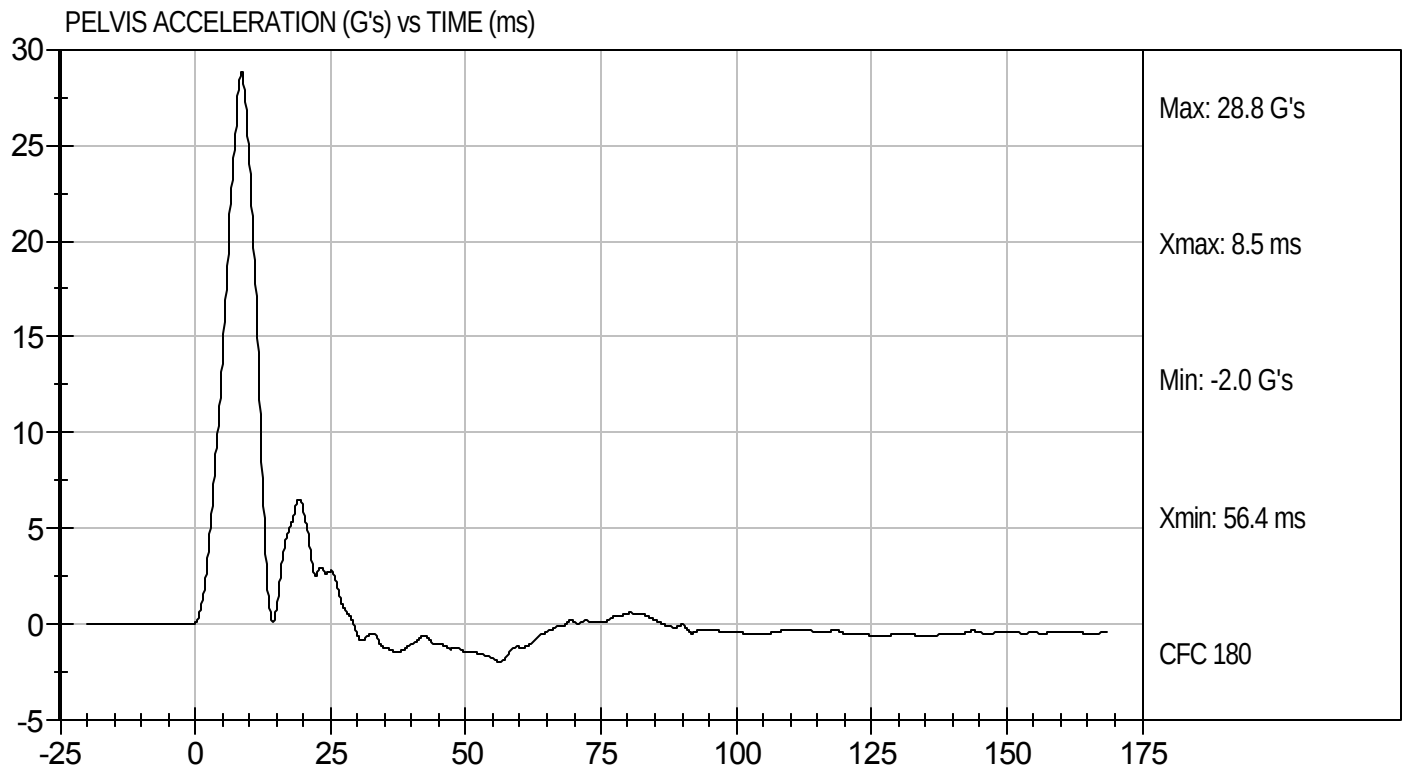
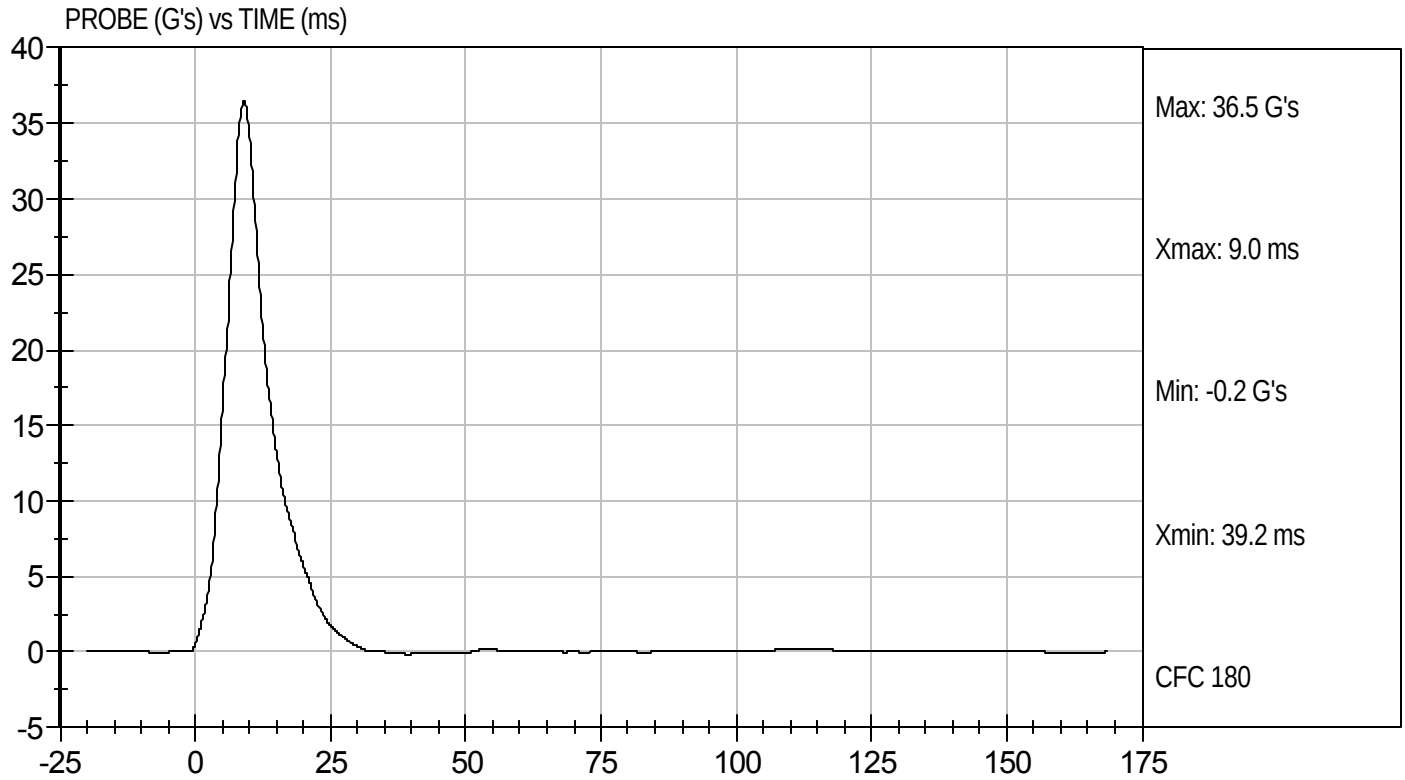
2/13/12
Test Date


Approved By



Test Desc: Iliac Impact
Component ID: D12468

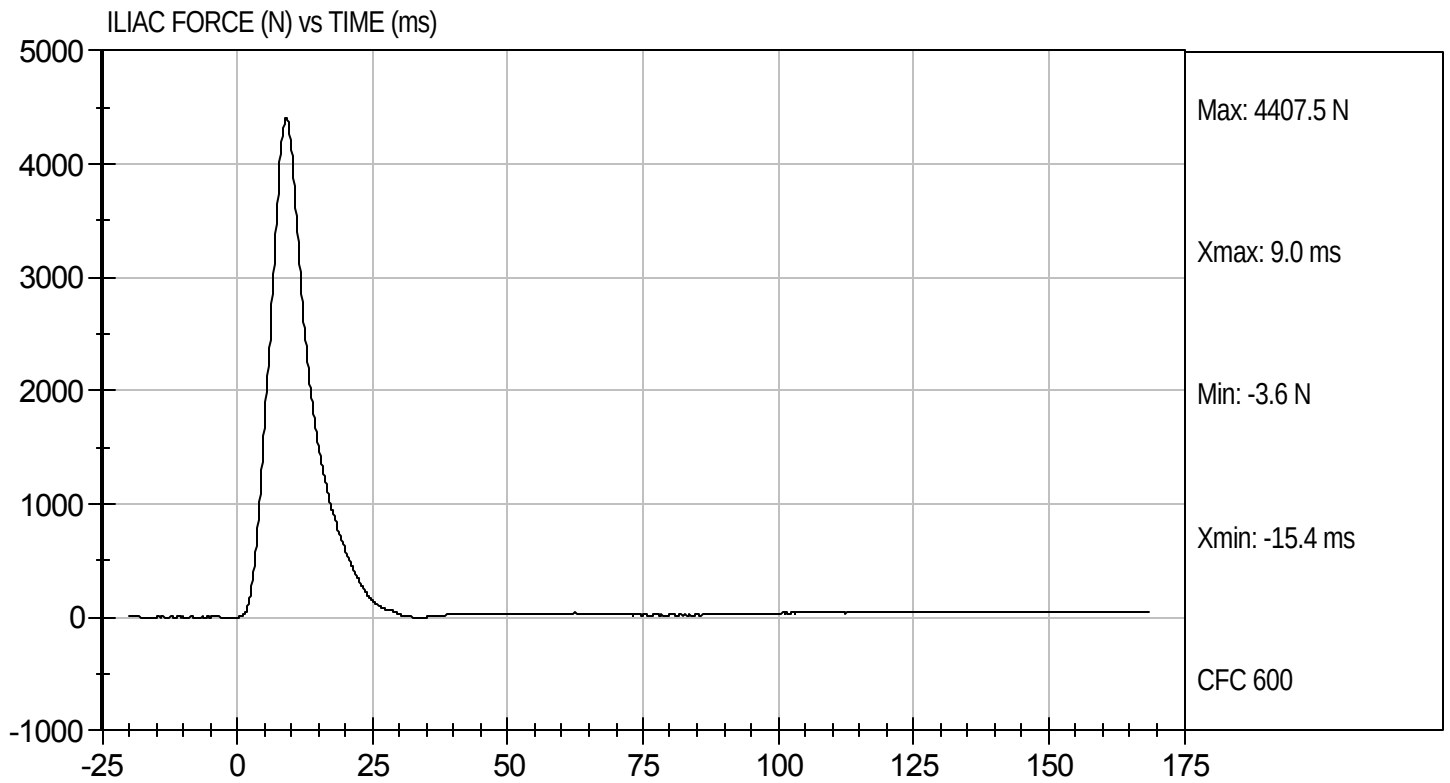
Test Date: 2/13/12
Velocity: 14.24 ft/s, 4.34 m/s





Test Desc: Iliac Impact
Component ID: D12468

Test Date: 2/13/12
Velocity: 14.24 ft/s, 4.34 m/s



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

ATD Serial No: 296

Test ID: D12491

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	24	Pass
Peak Resultant Acceleration	G's	115 to 137	129	Pass
Peak Longitudinal Acceleration	G's	+/- 15	7	Pass
Unimodal	N/A	<15%	Yes	Pass
Overall Test Results				Pass



Laboratory Technician

2/15/12

Test Date

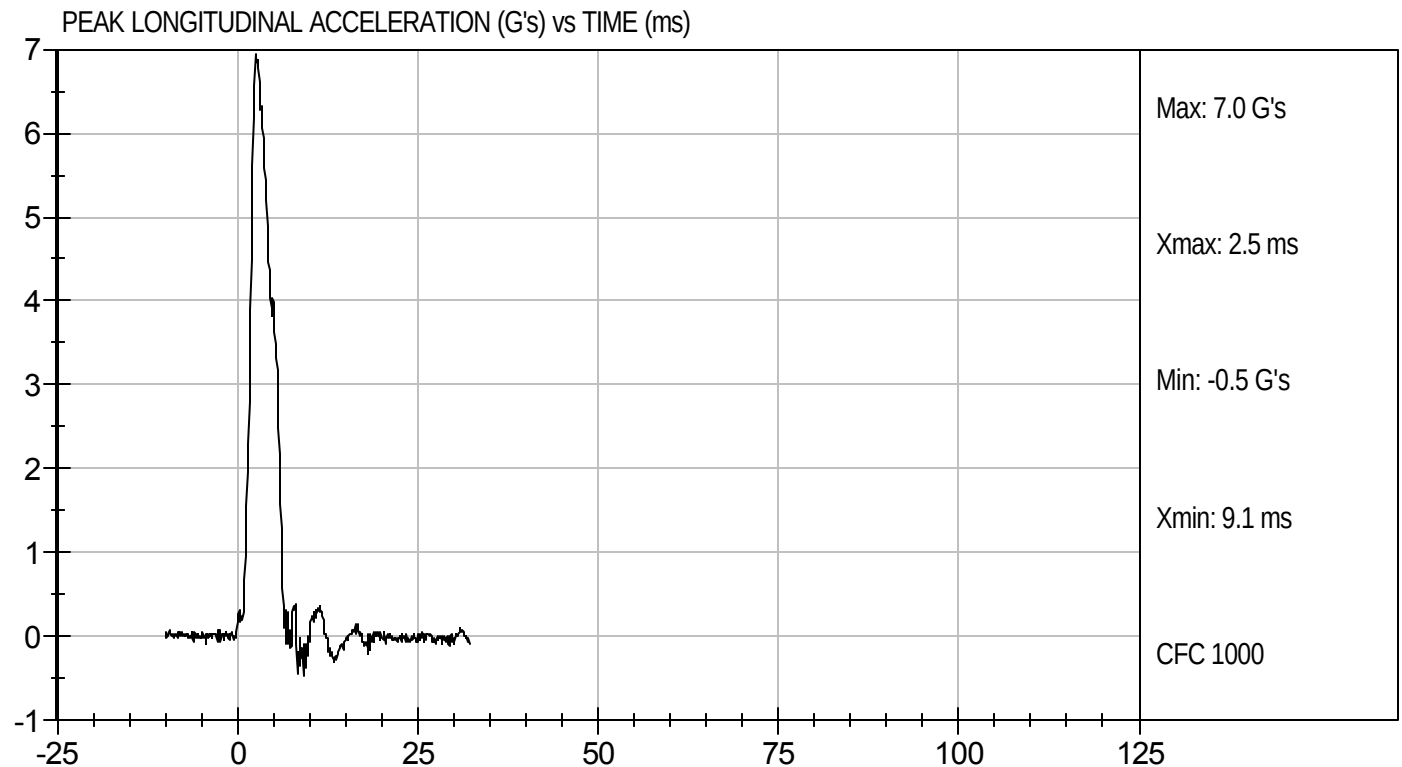
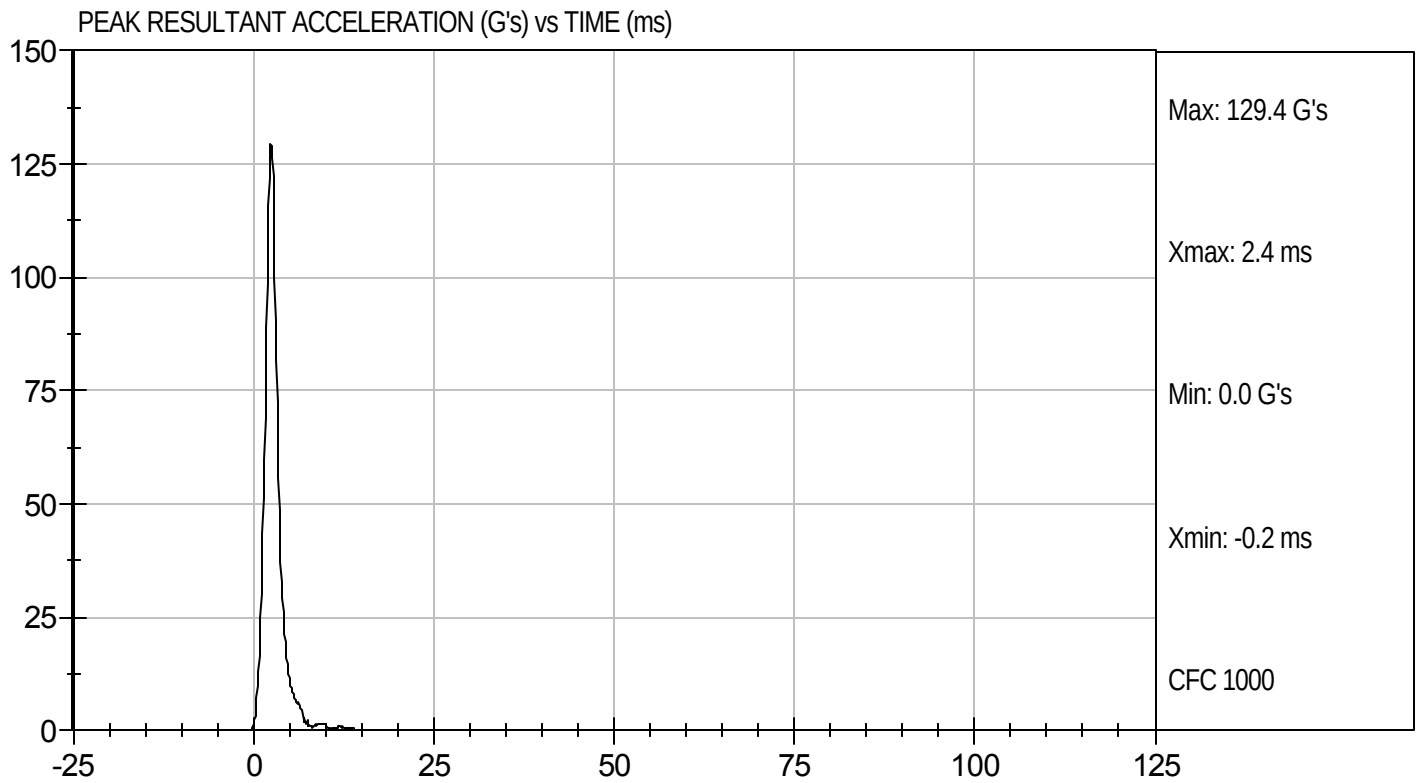


Approved By



Test Desc: Head Drop
Component ID: D12491

Test Date: 2/15/12
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: D12492

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21.9	Pass
Humidity		%	10 to 70	24	Pass
Impact Velocity		m/s	5.51 to 5.63	5.58	Pass
Delta Velocity	10 ms	m/s	2.20 to 2.80	2.49	Pass
	15 ms	m/s	3.30 to 4.10	3.54	Pass
	20 ms	m/s	4.40 to 5.40	4.75	Pass
	25 ms	m/s	5.40 to 6.10	5.51	Pass
	25-100 ms	m/s	5.50 to 6.20	5.55	Pass
Maximum D-Plane Rotation		deg	71 to 81	73	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	61	Pass
Maximum Occipital Condyle Moment during Rotation Interval Nm			-44 to -36	-42	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	118	Pass
Overall Test Results				Pass	


 Laboratory Technician

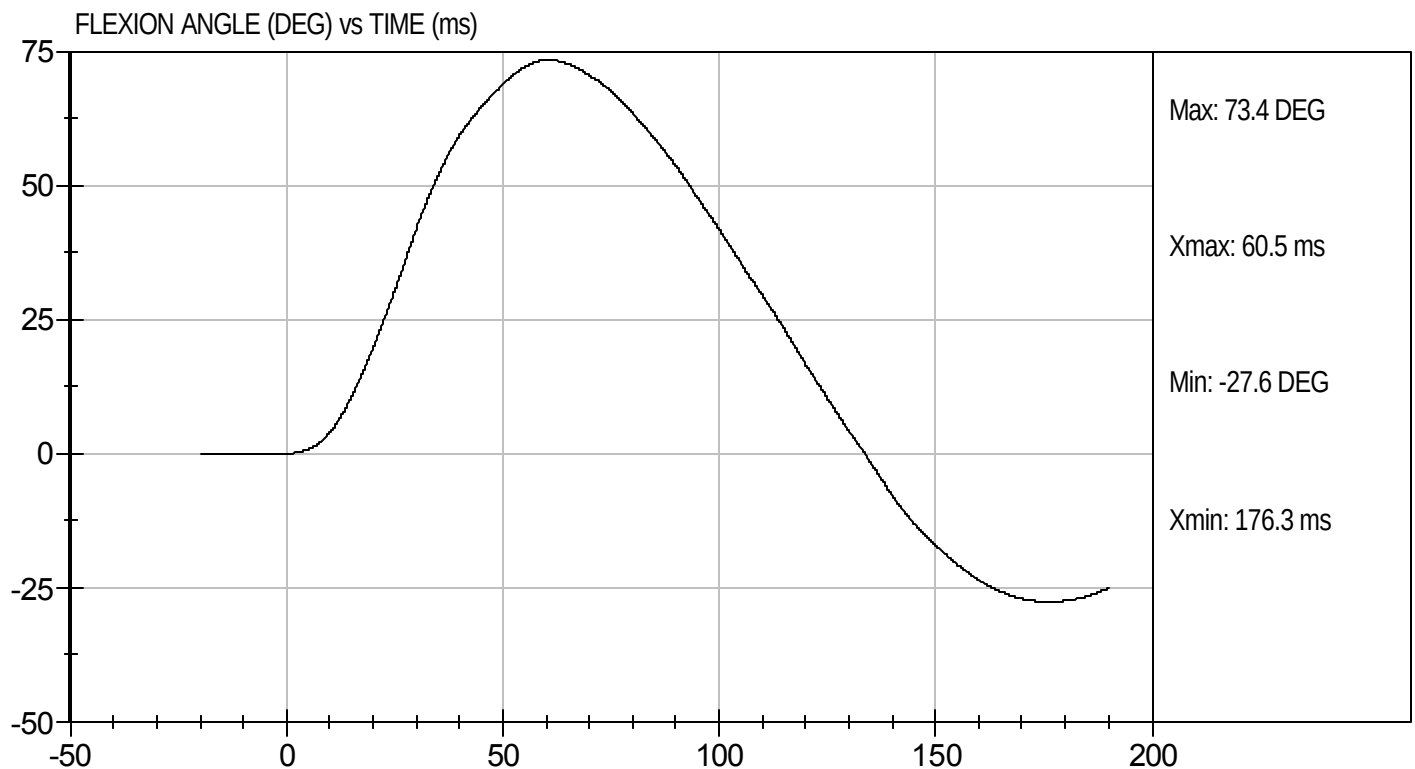
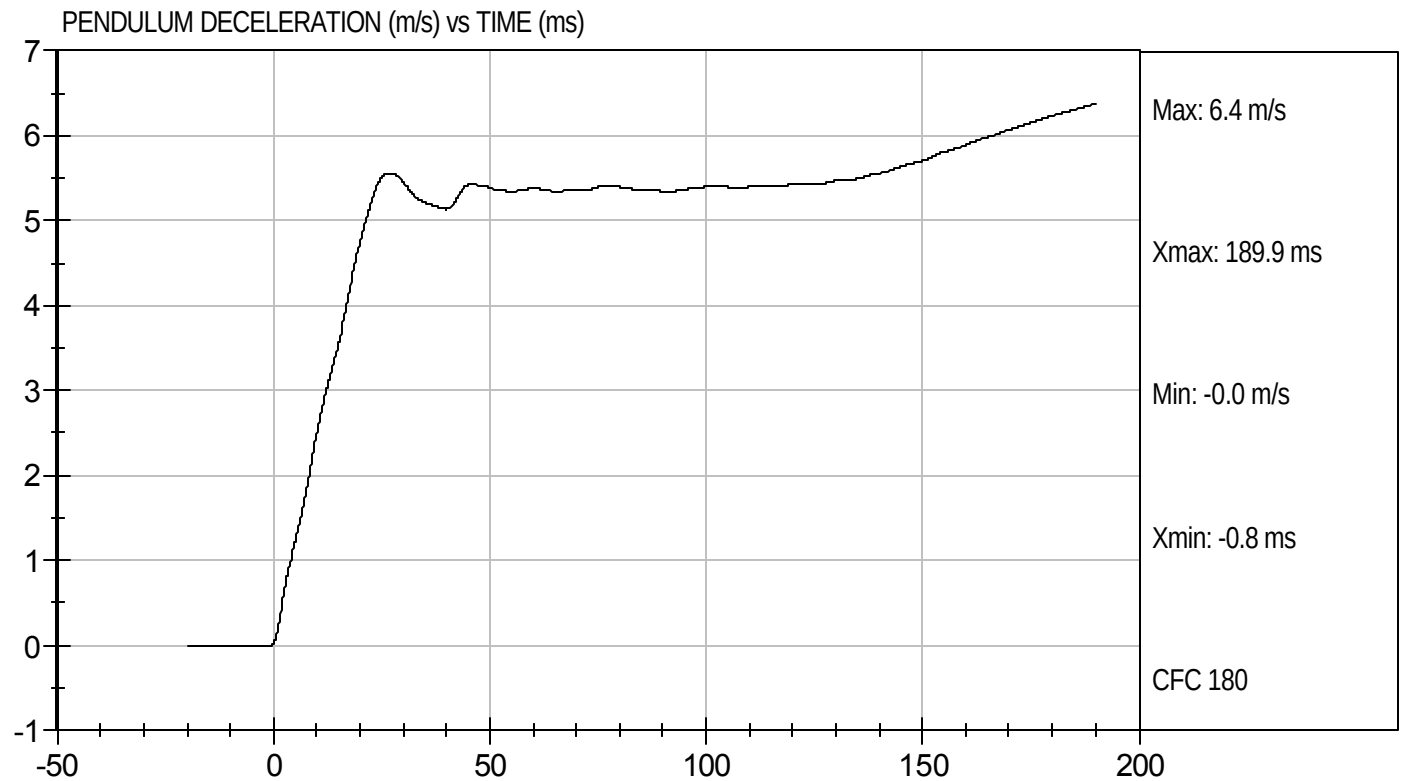
2/15/12
 Test Date


 Approved By



Test Desc: Neck Bending
Component ID: D12492

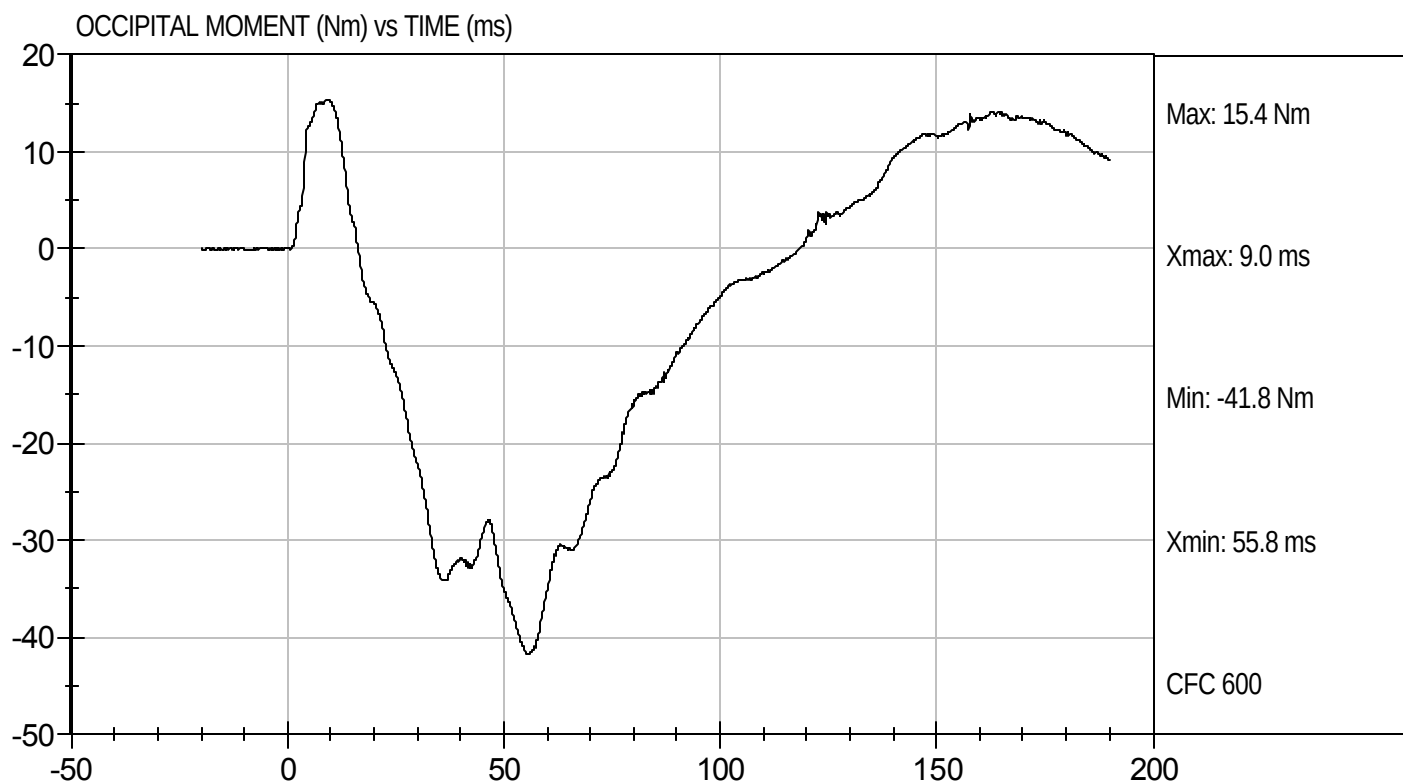
Test Date: 2/15/12
Velocity: 18.32 ft/s, 5.58 m/s





Test Desc: Neck Bending
Component ID: D12492

Test Date: 2/15/12
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: D12493

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	22.1	Pass
Laboratory Relative Humidity	%	10 to 70	26	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	32	Pass
Upper Spine (T1) Y Acceleration	G's	17 to 22	19	Pass
Overall Test Results			Pass	

Jessica Gall
Laboratory Technician

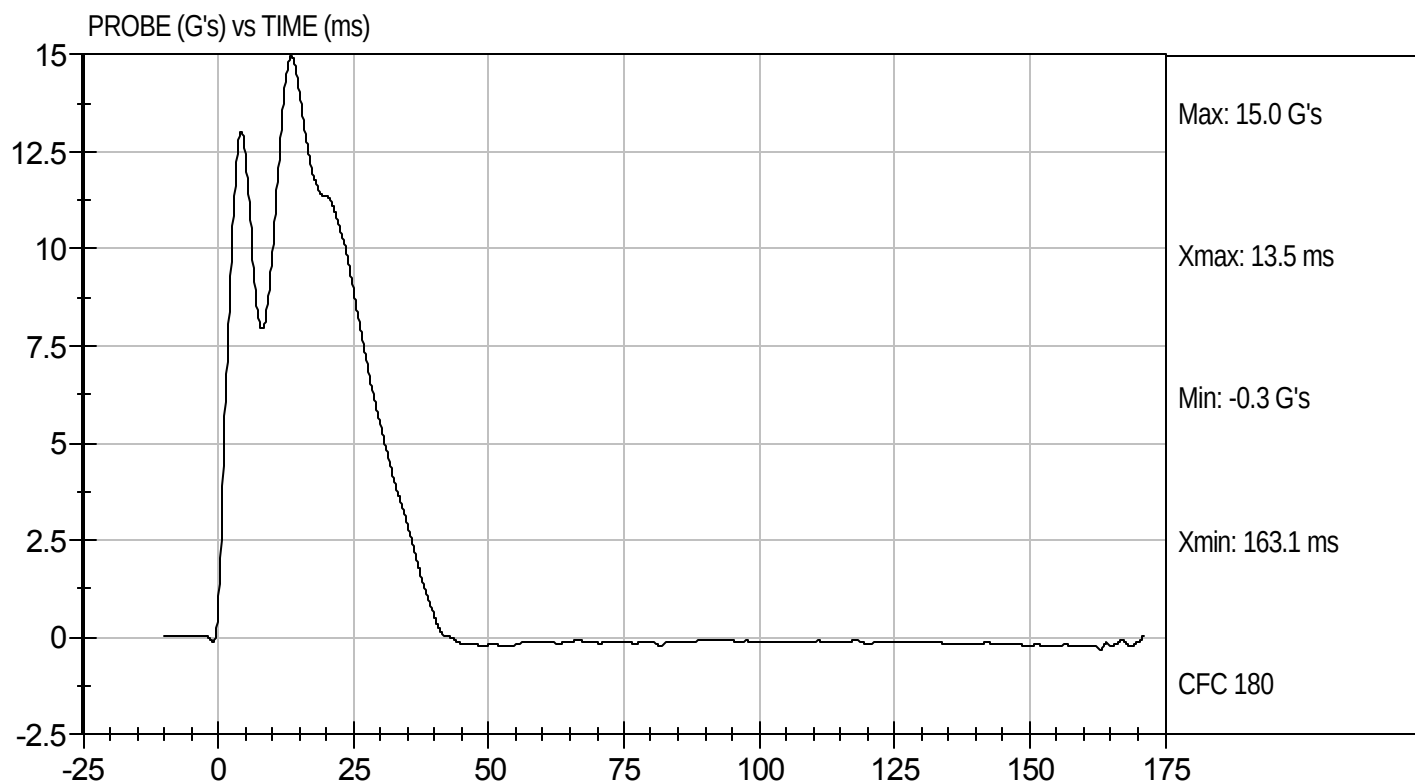
2/15/12
Test Date

David Winkelbauer
Approved By



Test Desc: Shoulder Impact
Component ID: D12493

Test Date: 2/15/12
Velocity: 14.24 ft/s, 4.34 m/s

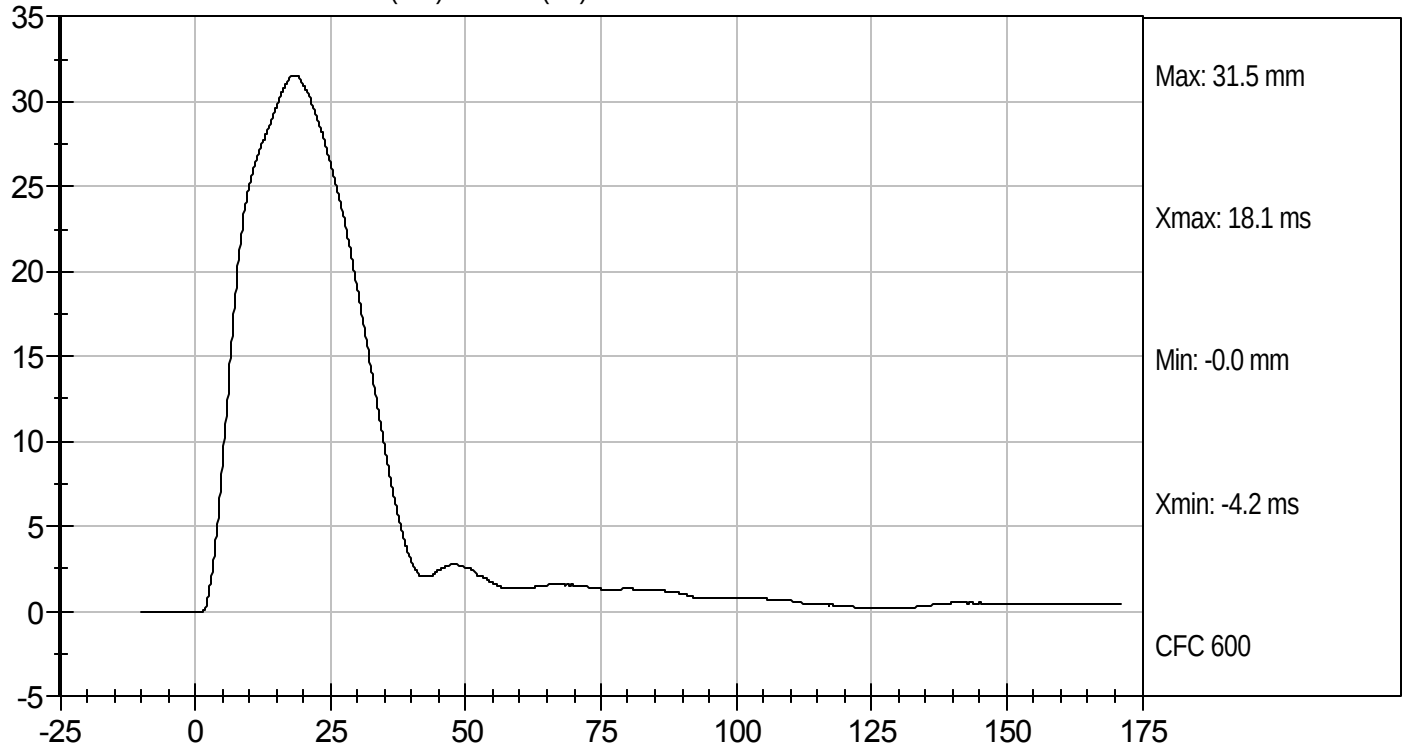




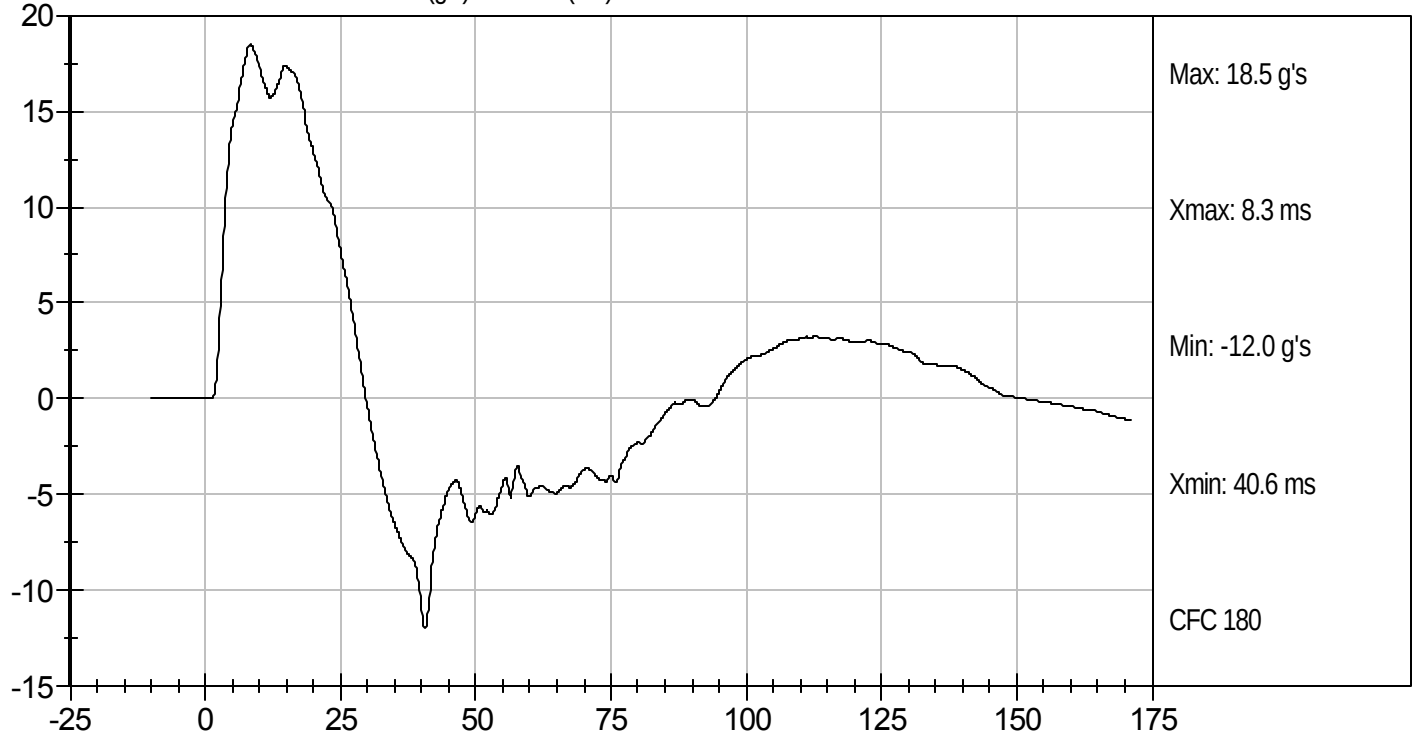
Test Desc: Shoulder Impact
Component ID: D12493

Test Date: 2/15/12
Velocity: 14.24 ft/s, 4.34 m/s

SHOULDER DISPLACEMENT (mm) vs TIME (ms)



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



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

ATD Serial No: 296

Test I.D: D12494

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	22.1	Pass
Humidity	%	10 to 70	26	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	28	Pass
Middle Rib Displacement	mm	30 to 36	32	Pass
Lower Rib Displacement	mm	32 to 38	34	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

Jessica Gall
Laboratory Technician

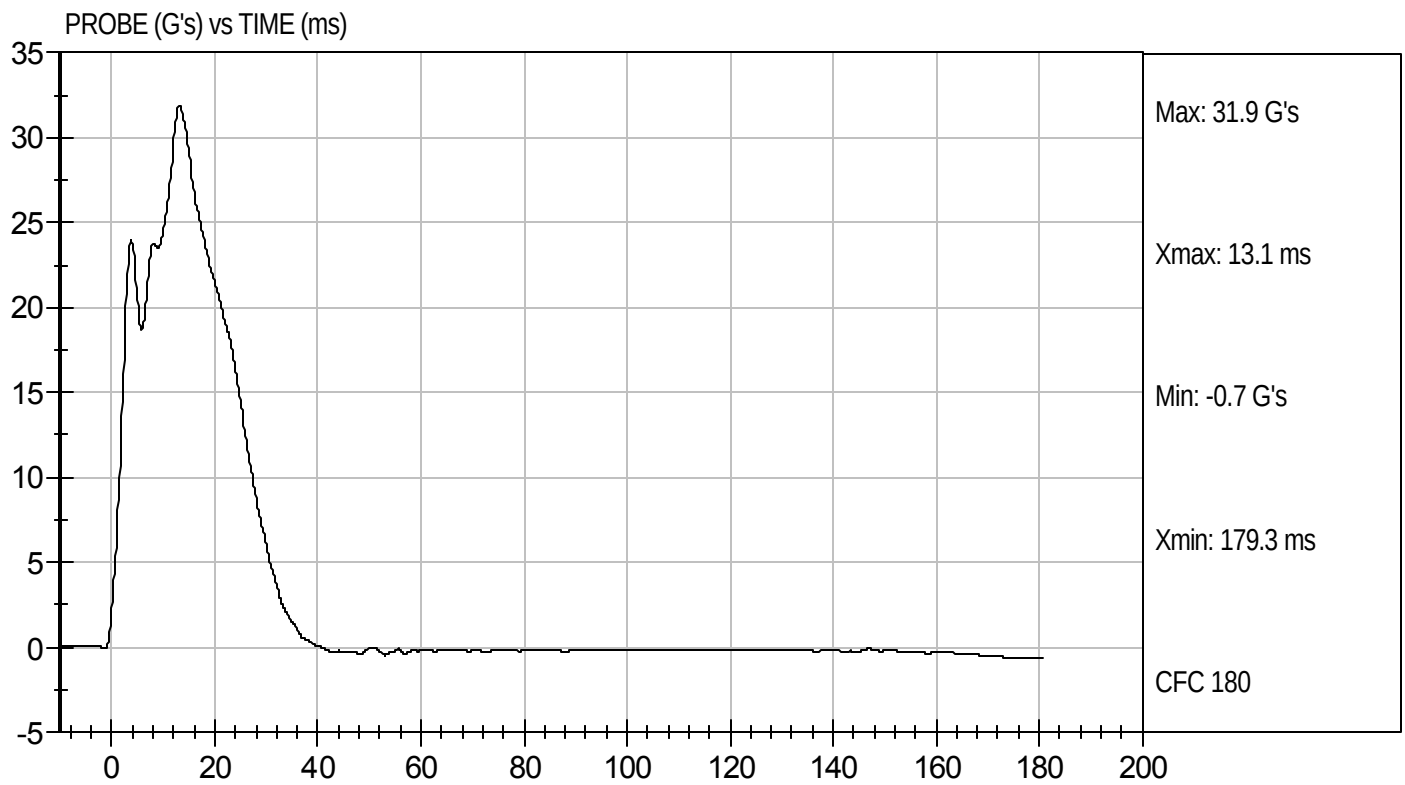
2/15/12
Test Date

David Winkelbauer
Approved By



Test Desc: Thorax With Arm
Component ID: D12494

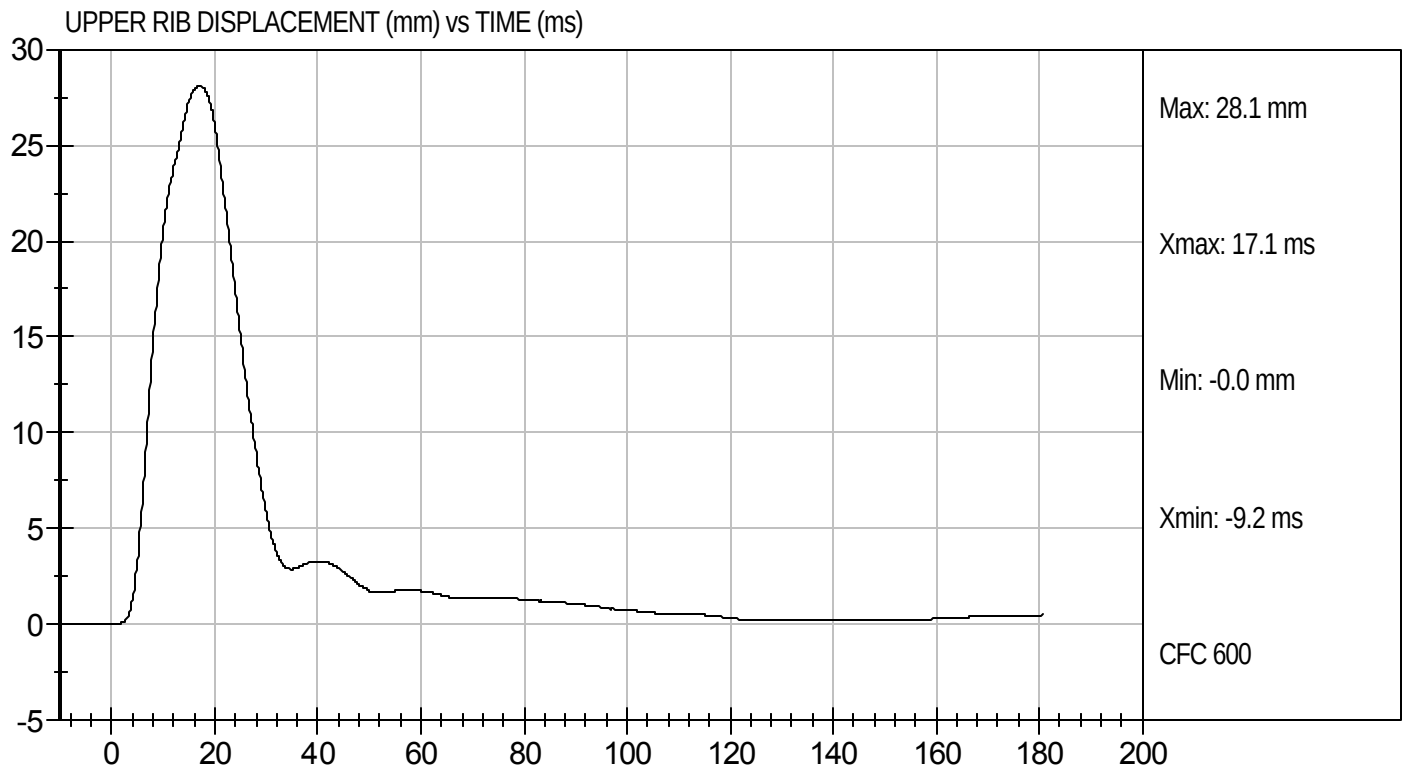
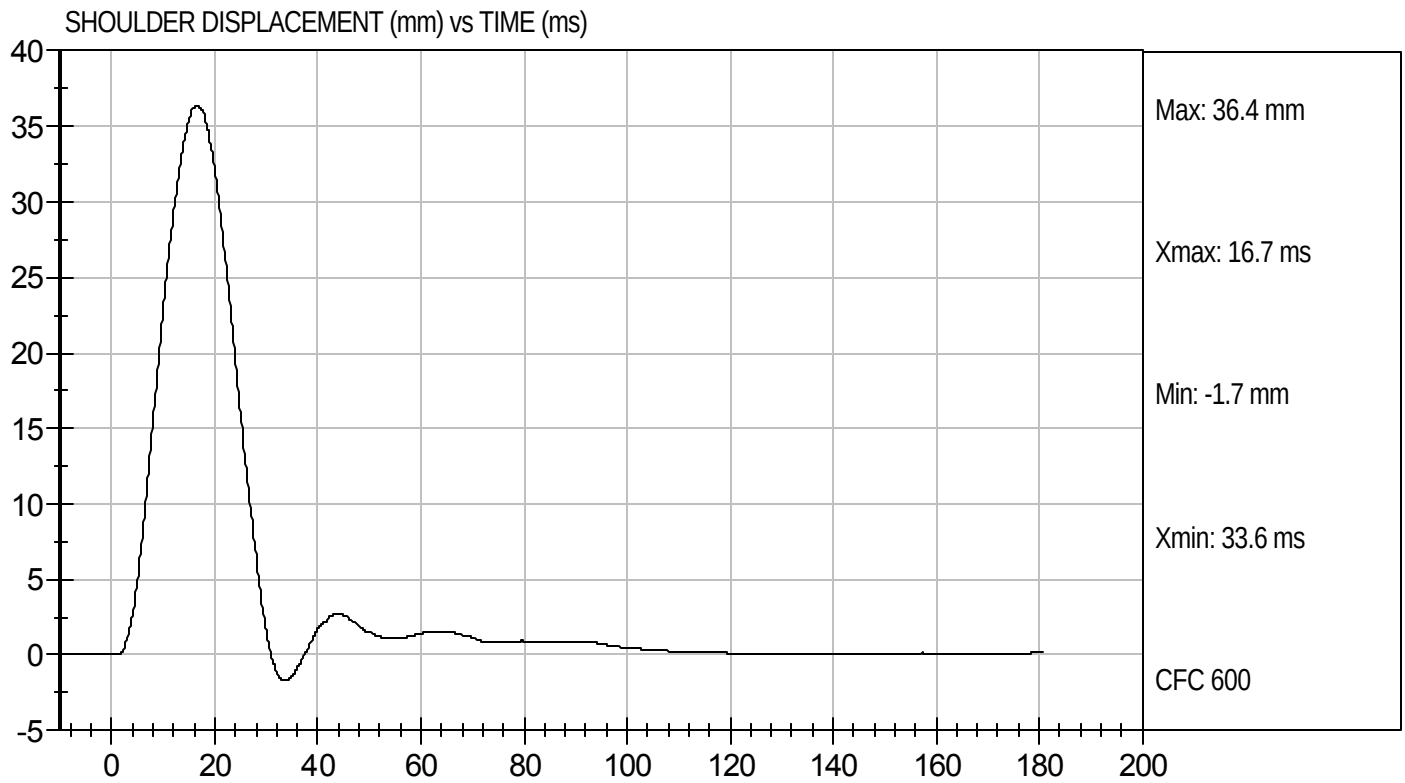
Test Date: 2/15/12
Velocity: 22.22 ft/s, 6.77 m/s





Test Desc: Thorax With Arm
Component ID: D12494

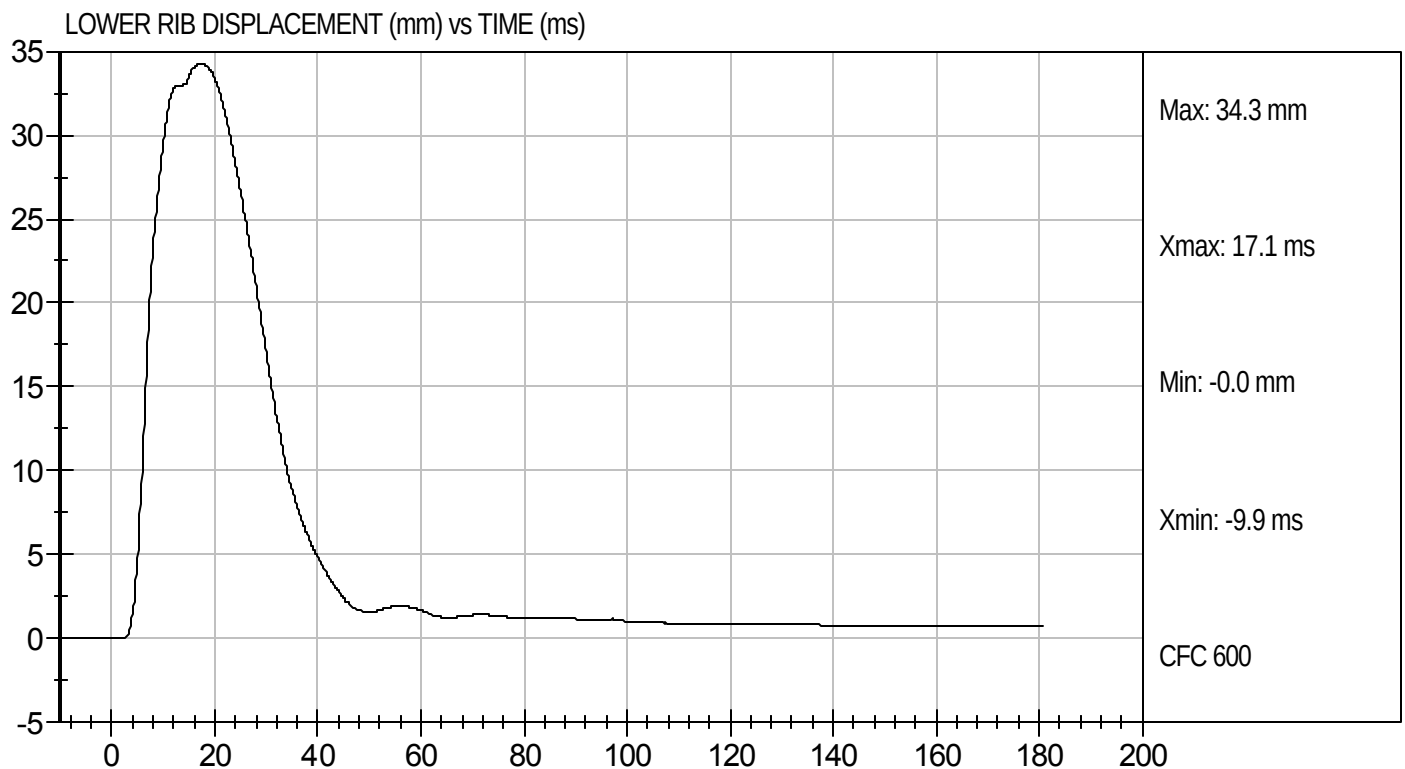
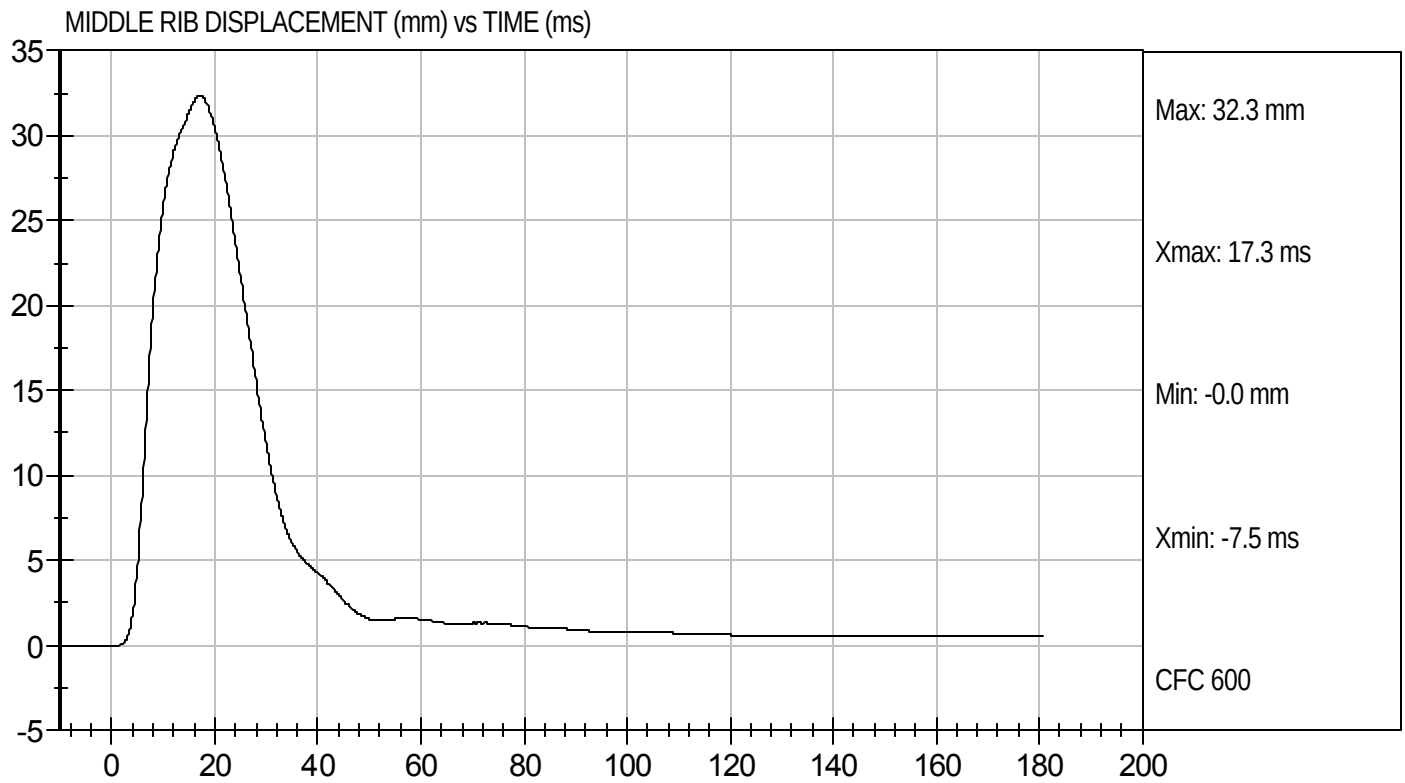
Test Date: 2/15/12
Velocity: 22.22 ft/s, 6.77 m/s





Test Desc: Thorax With Arm
Component ID: D12494

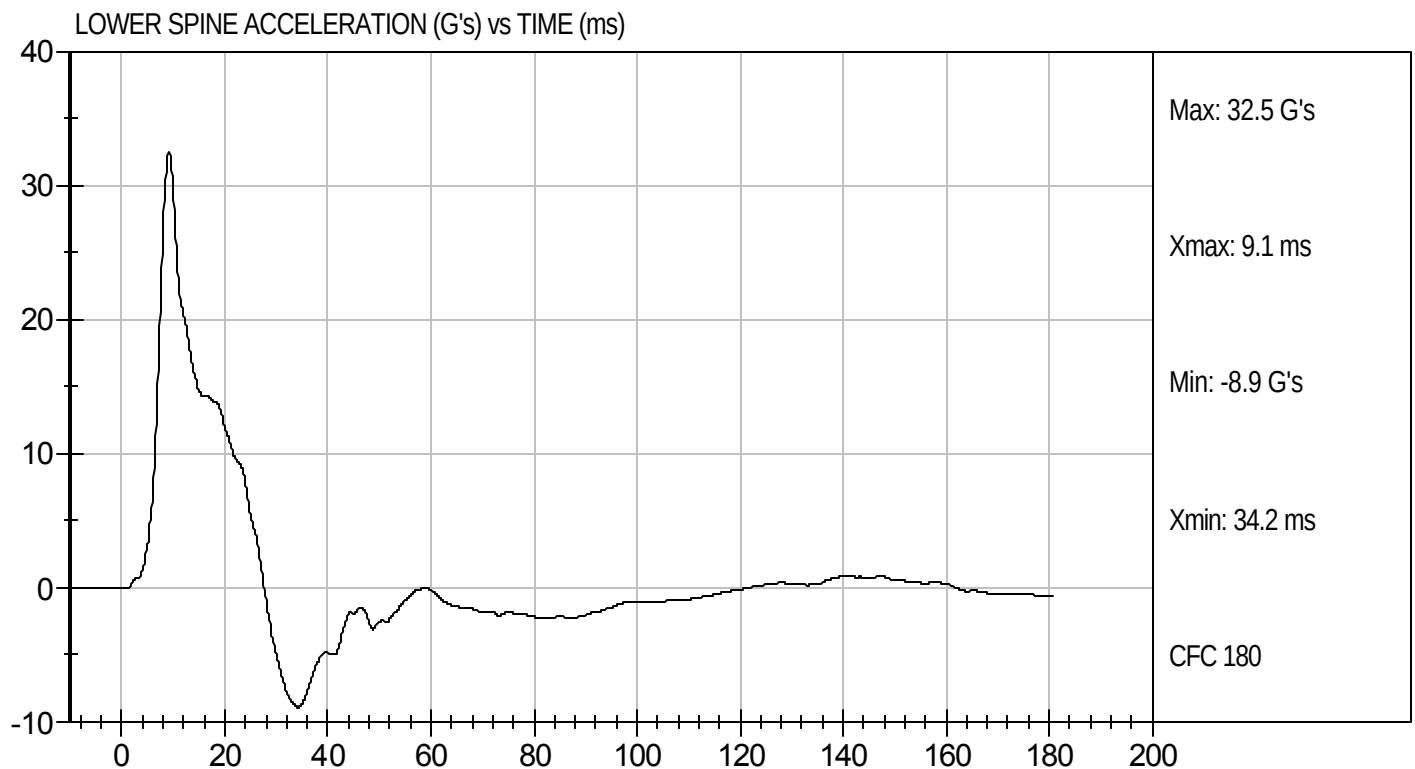
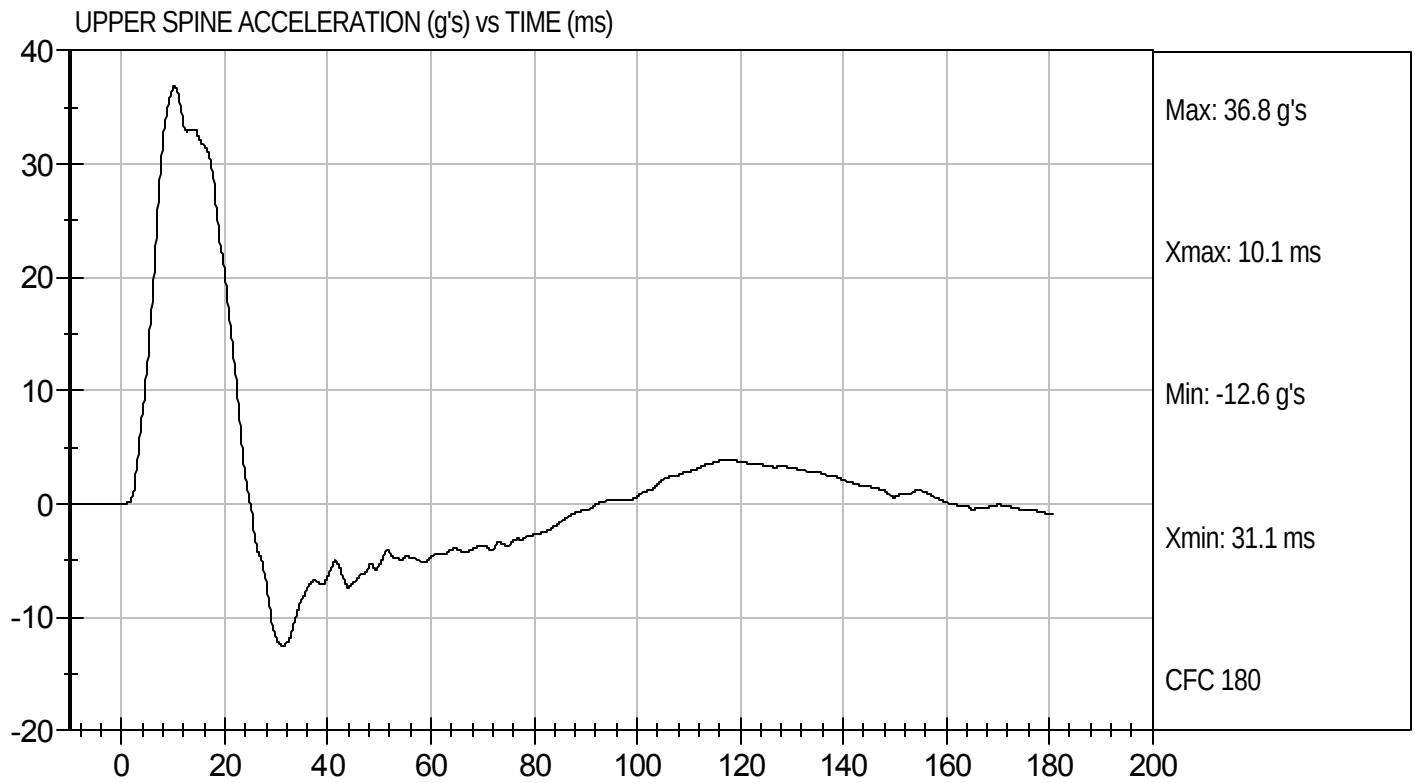
Test Date: 2/15/12
Velocity: 22.22 ft/s, 6.77 m/s





Test Desc: Thorax With Arm
Component ID: D12494

Test Date: 2/15/12
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: D12495

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	22.1	Pass
Humidity	%	10 to 70	26	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	35	Pass
Middle Rib Displacement	mm	39 to 45	42	Pass
Lower Rib Displacement	mm	35 to 43	40	Pass
Upper Spine (T1) Y Acceleration	G's	13 to 17	13	Pass
Lower Spine (T12) Y Acceleration	G's	7 to 11	9	Pass
Overall Test Results				Pass


Laboratory Technician

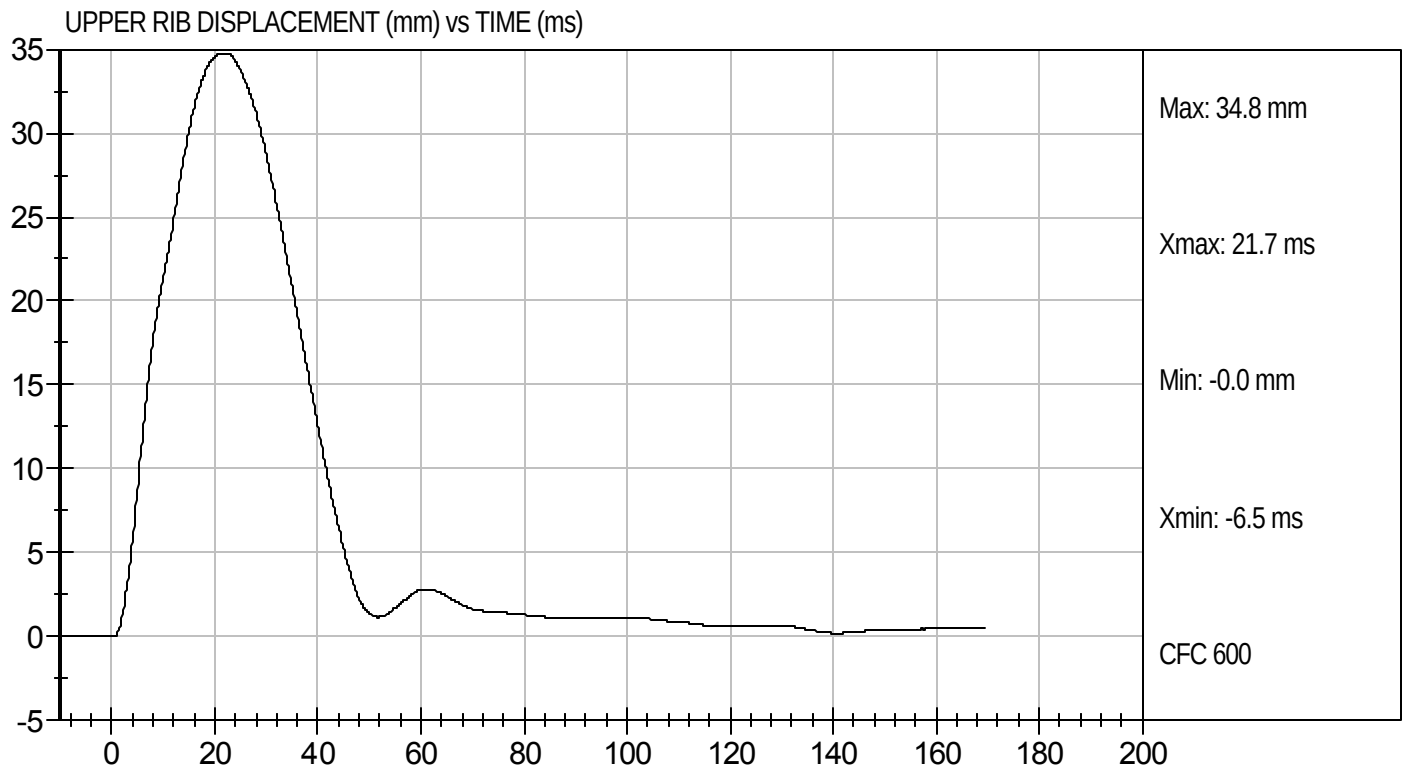
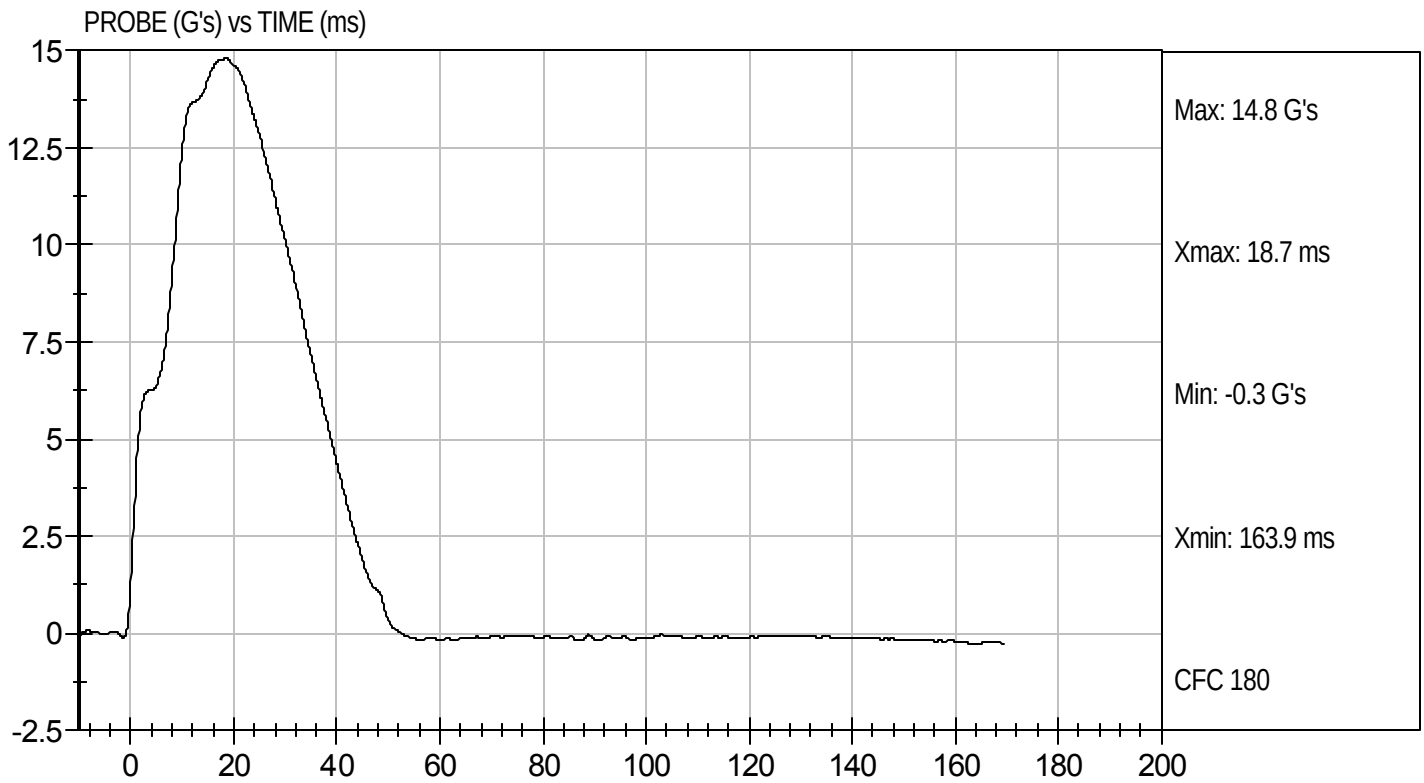
2/15/12
Test Date


Approved By



Test Desc: Thorax Without Arm
Component ID: D12495

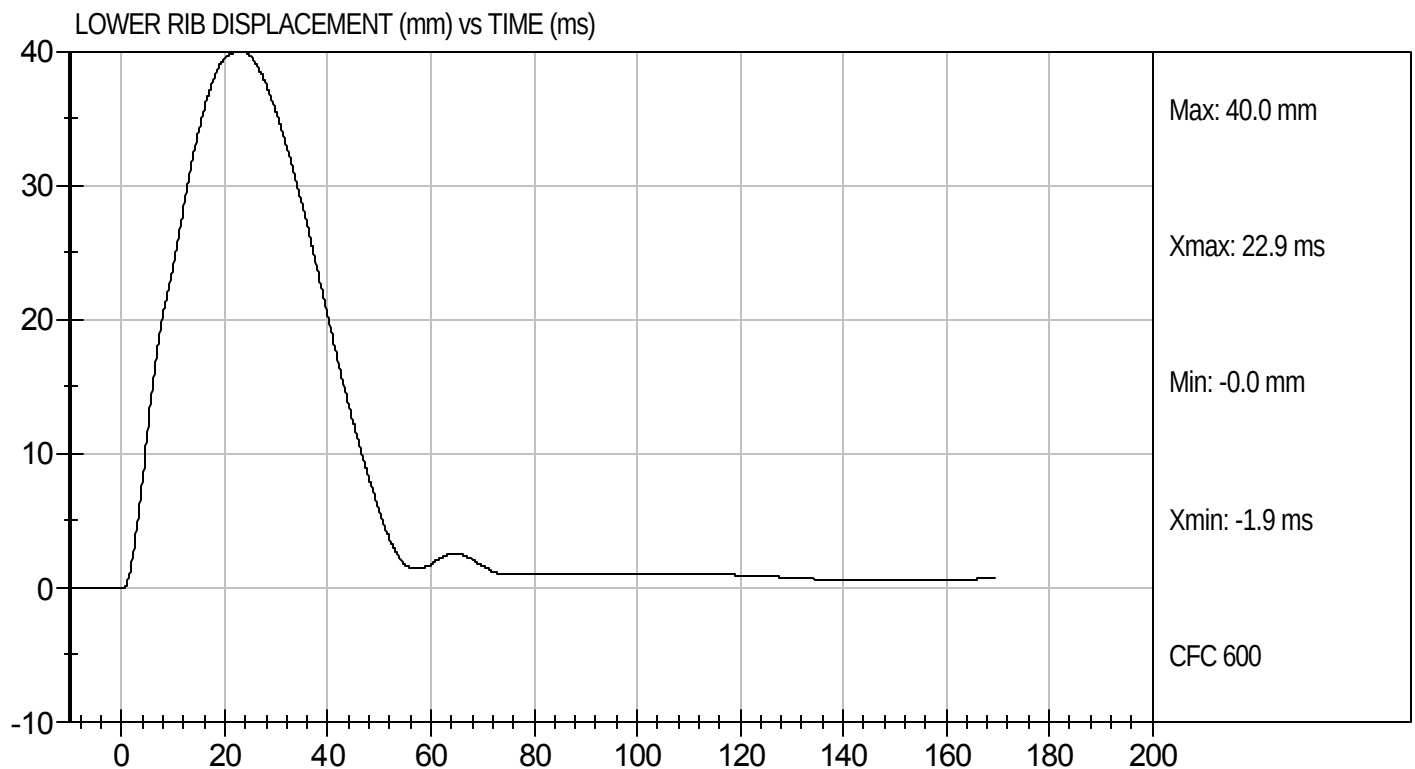
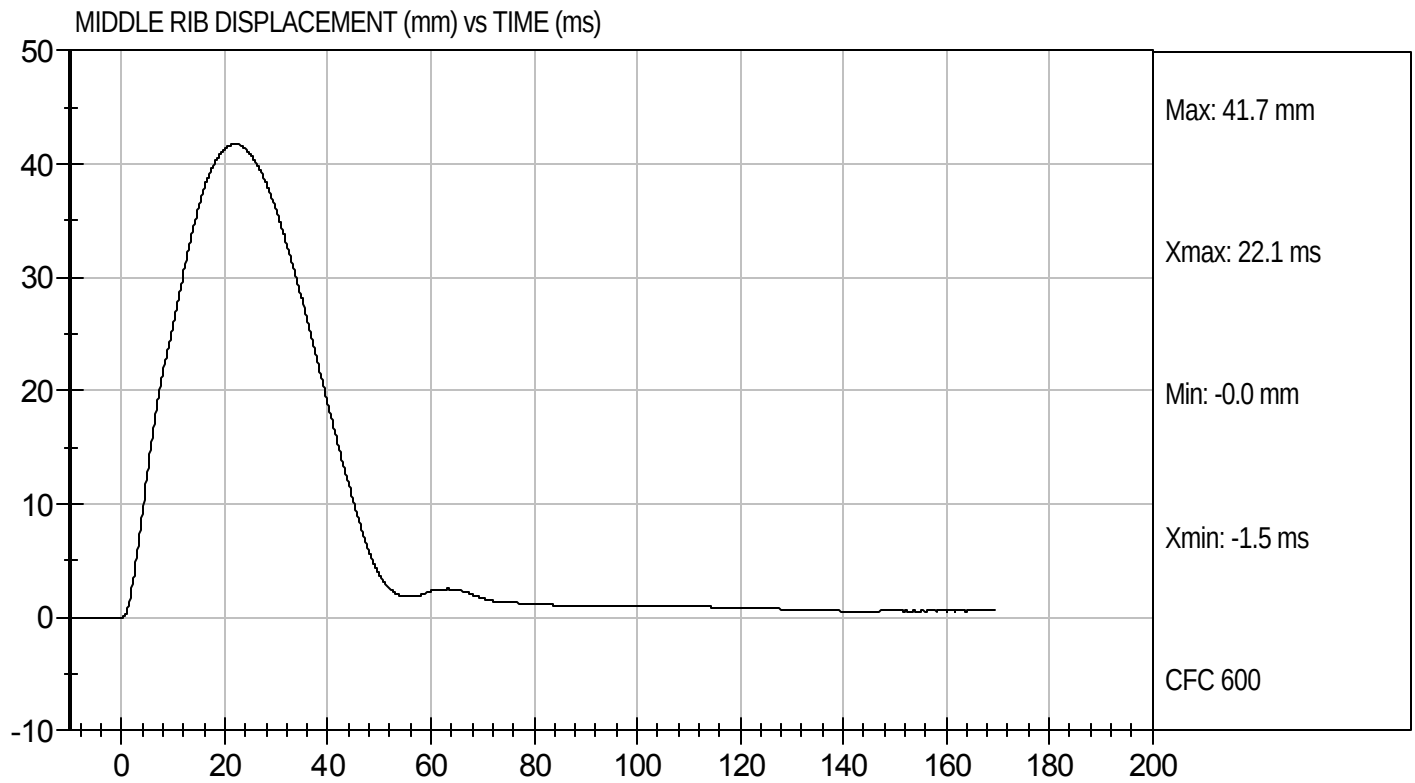
Test Date: 2/15/12
Velocity: 14.36 ft/s, 4.38 m/s





Test Desc: Thorax Without Arm
Component ID: D12495

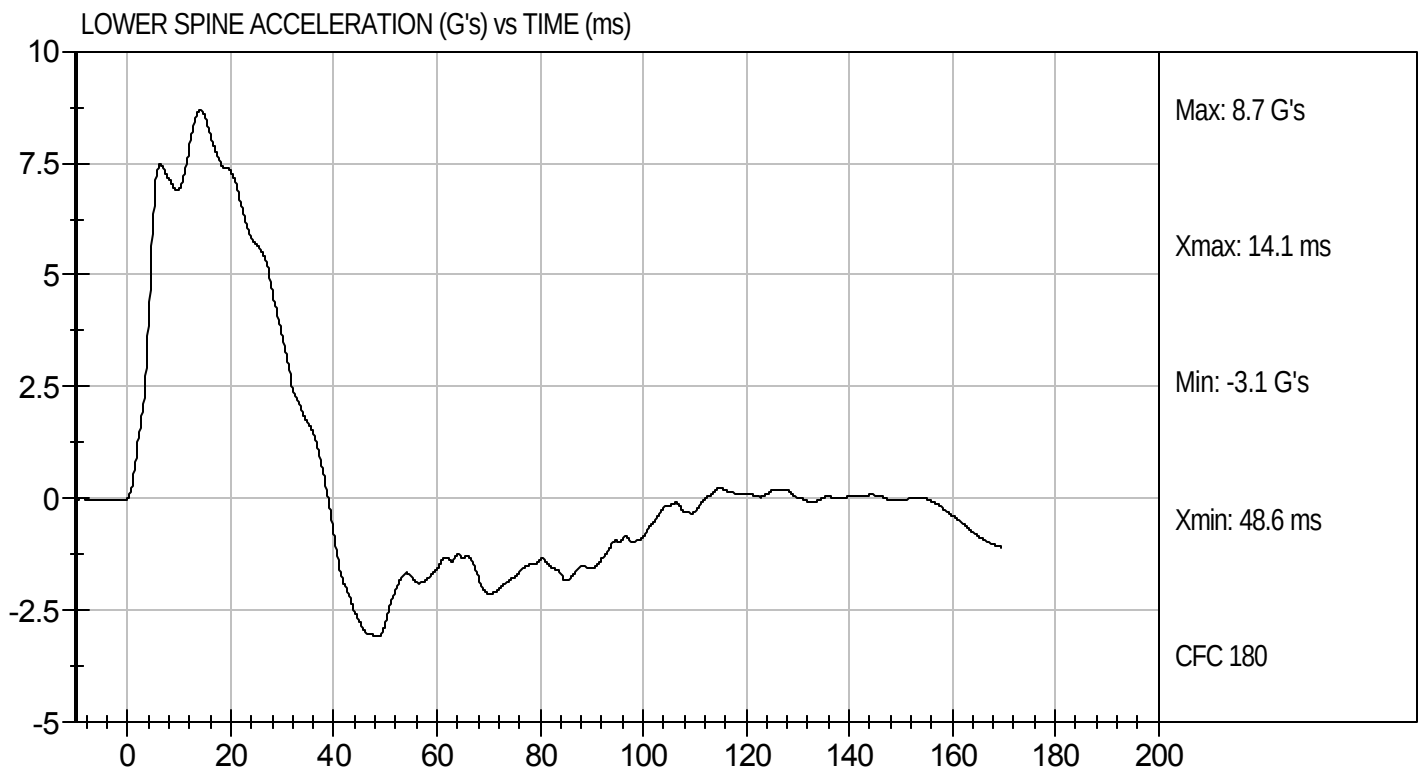
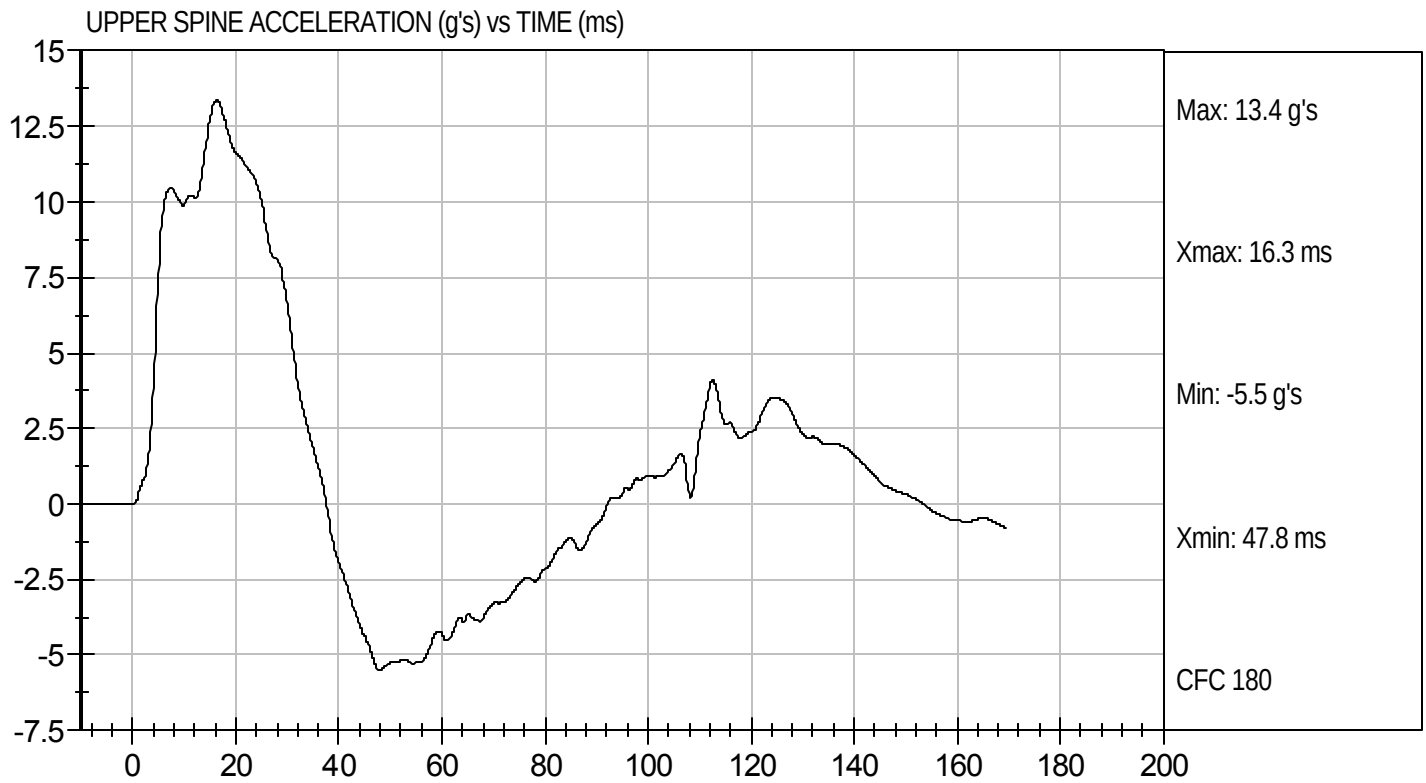
Test Date: 2/15/12
Velocity: 14.36 ft/s, 4.38 m/s





Test Desc: Thorax Without Arm
Component ID: D12495

Test Date: 2/15/12
Velocity: 14.36 ft/s, 4.38 m/s



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

ATD Serial No: 296

Test I.D: D12496

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	22.1	Pass
Humidity	%	10 to 70	26	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	41	Pass
Lower Rib Displacement	mm	33 to 44	36	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	10	Pass
Overall Test Results			Pass	


Laboratory Technician

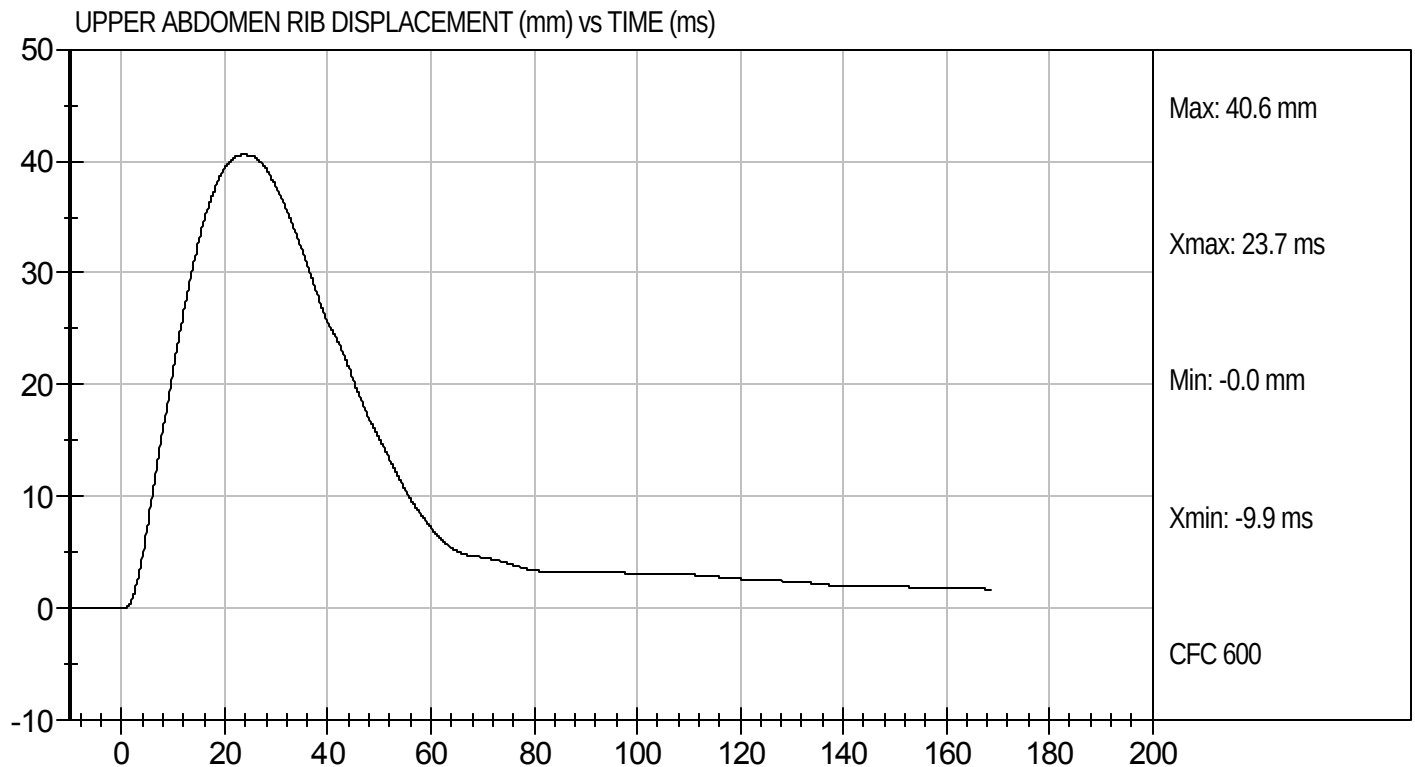
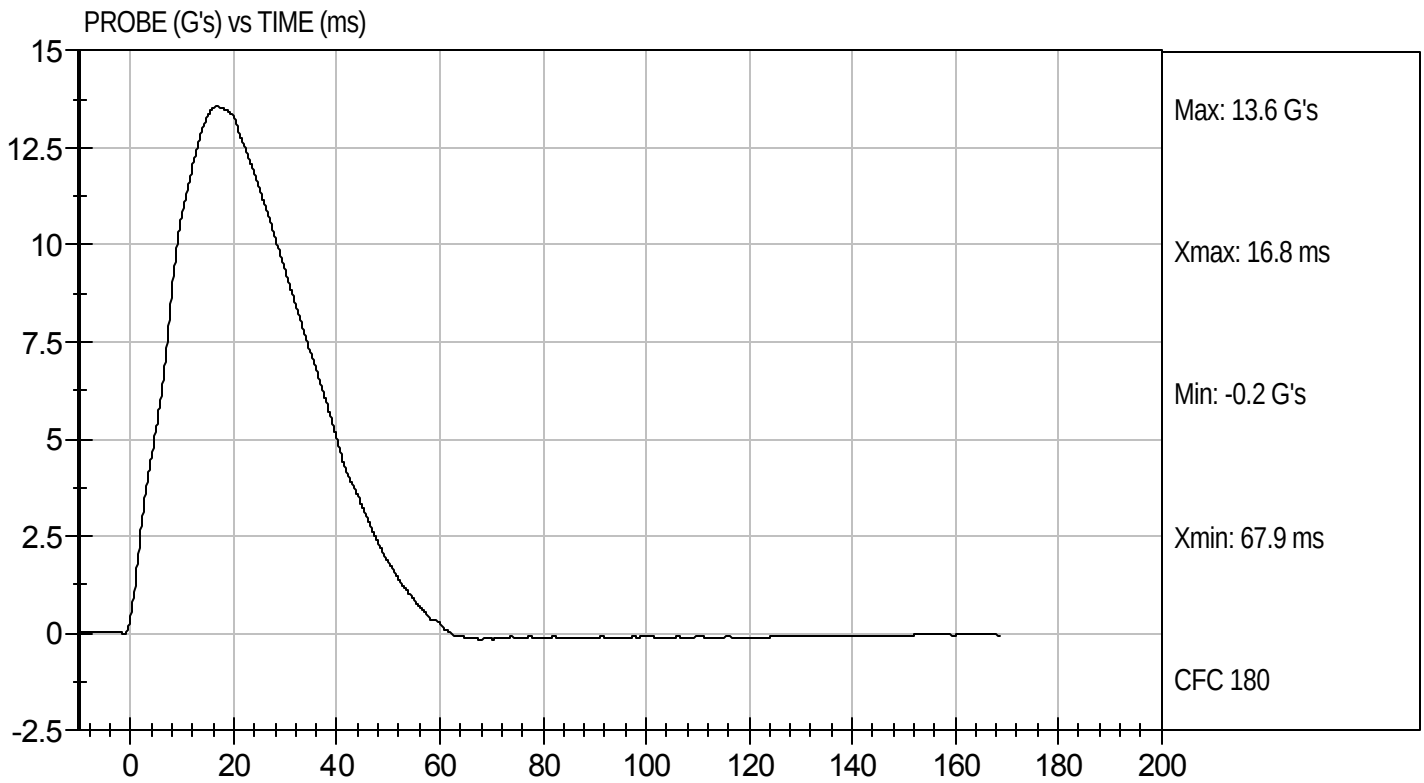
2/15/12
Test Date


Approved By



Test Desc: Abdomen Impact
Component ID: D12496

Test Date: 2/15/12
Velocity: 14.24 ft/s, 4.34 m/s

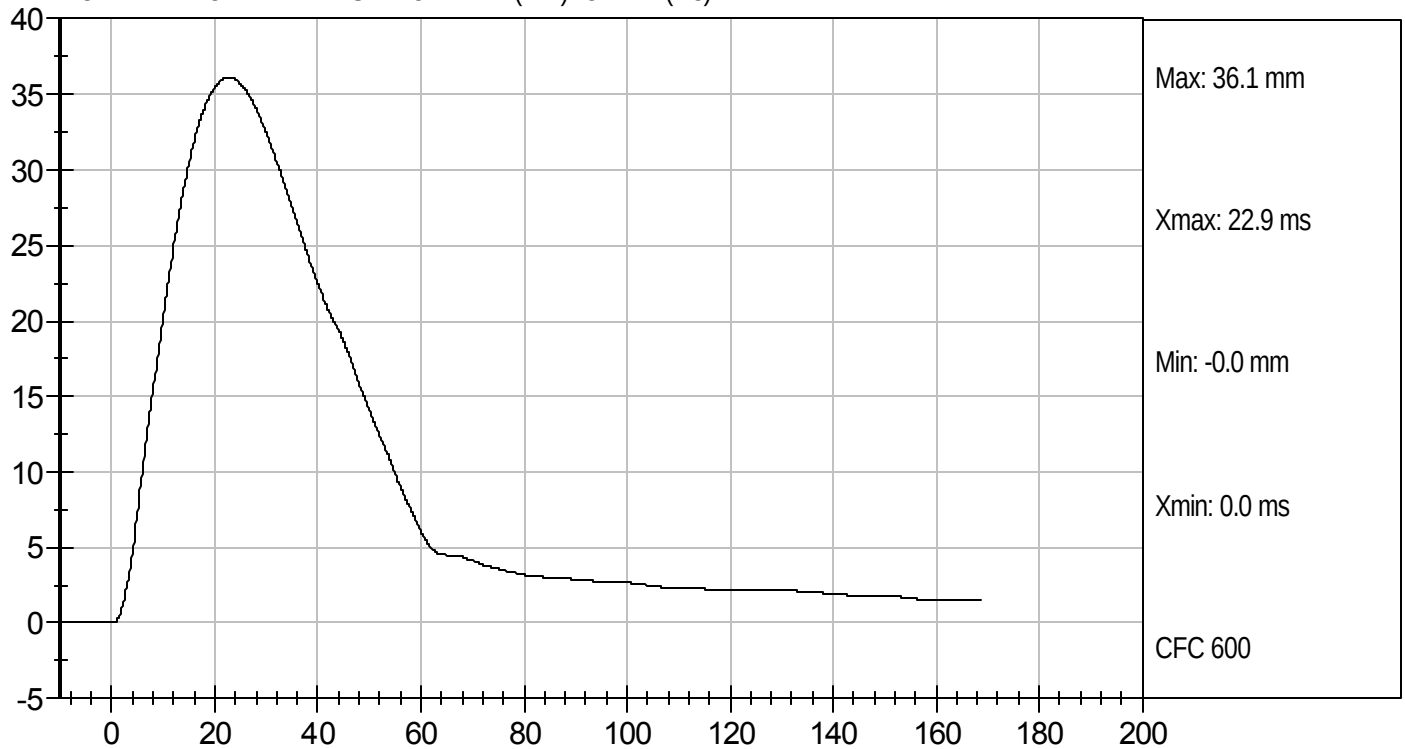




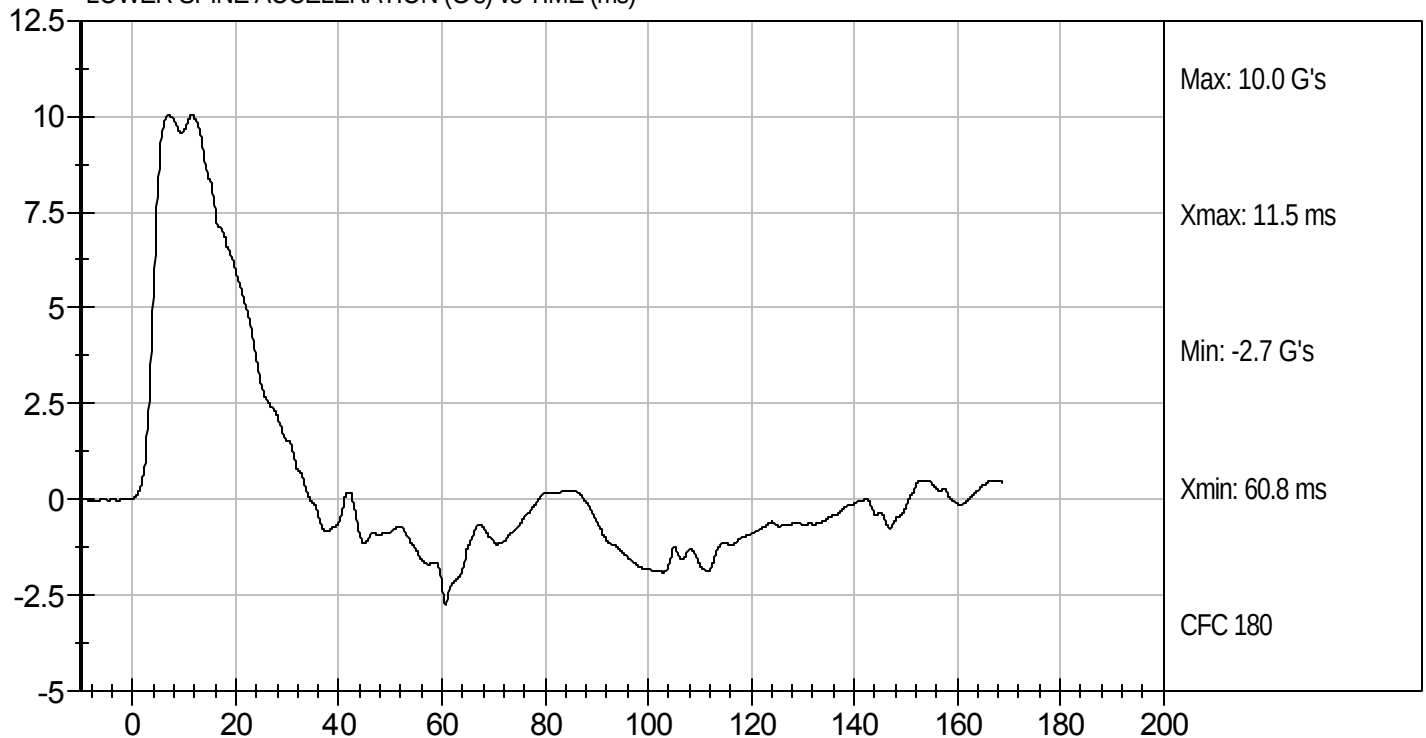
Test Desc: Abdomen Impact
Component ID: D12496

Test Date: 2/15/12
Velocity: 14.24 ft/s, 4.34 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: D12497

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	22.1	Pass
Humidity	%	10 to 70	26	Pass
Impact Velocity	m/s	6.60 to 6.80	6.68	Pass
Peak Impactor Acceleration	G's	38 to 47	43	Pass
Pelvis Y Acceleration after 6 ms	G's	34 to 42	41	Pass
Peak Acetabulum Force	N	3600 to 4300	3914	Pass
Overall Test Results				Pass


Laboratory Technician

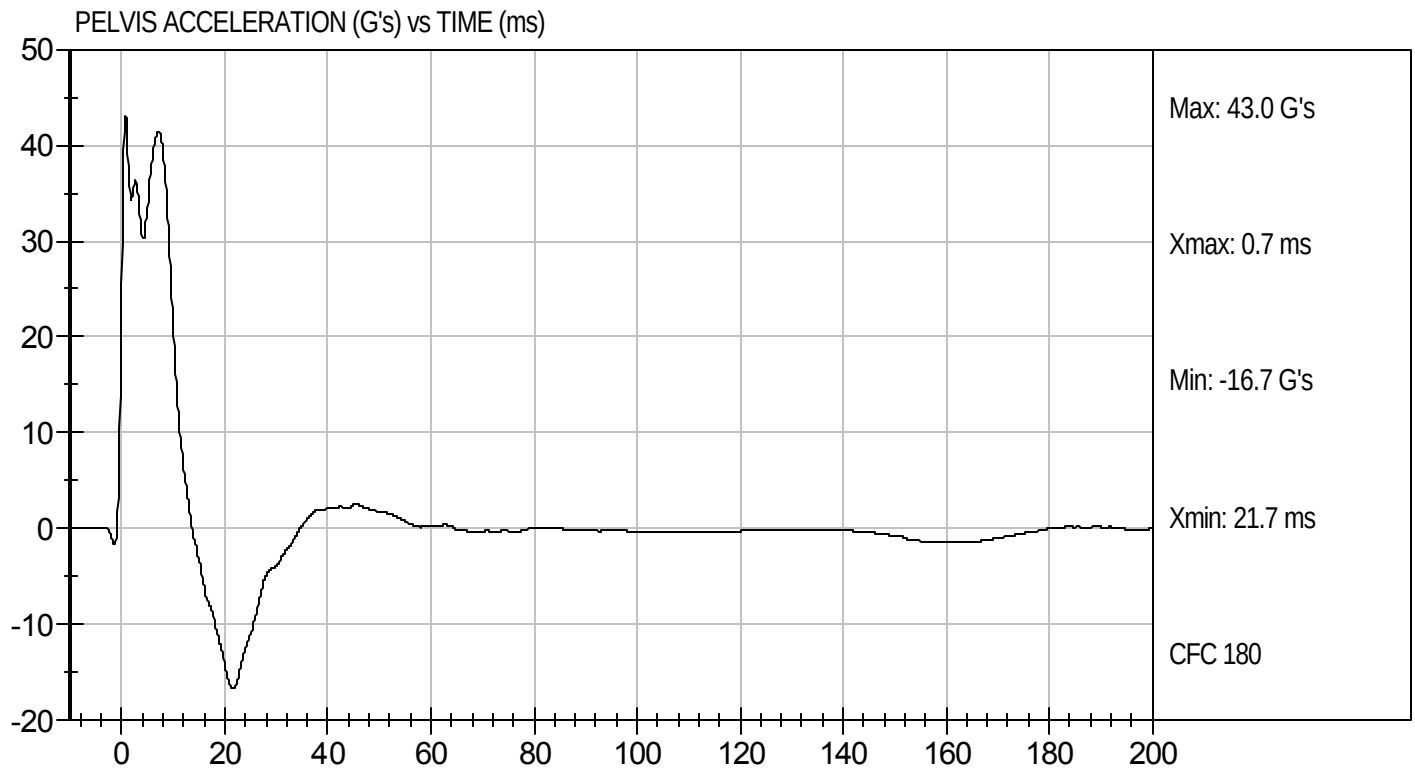
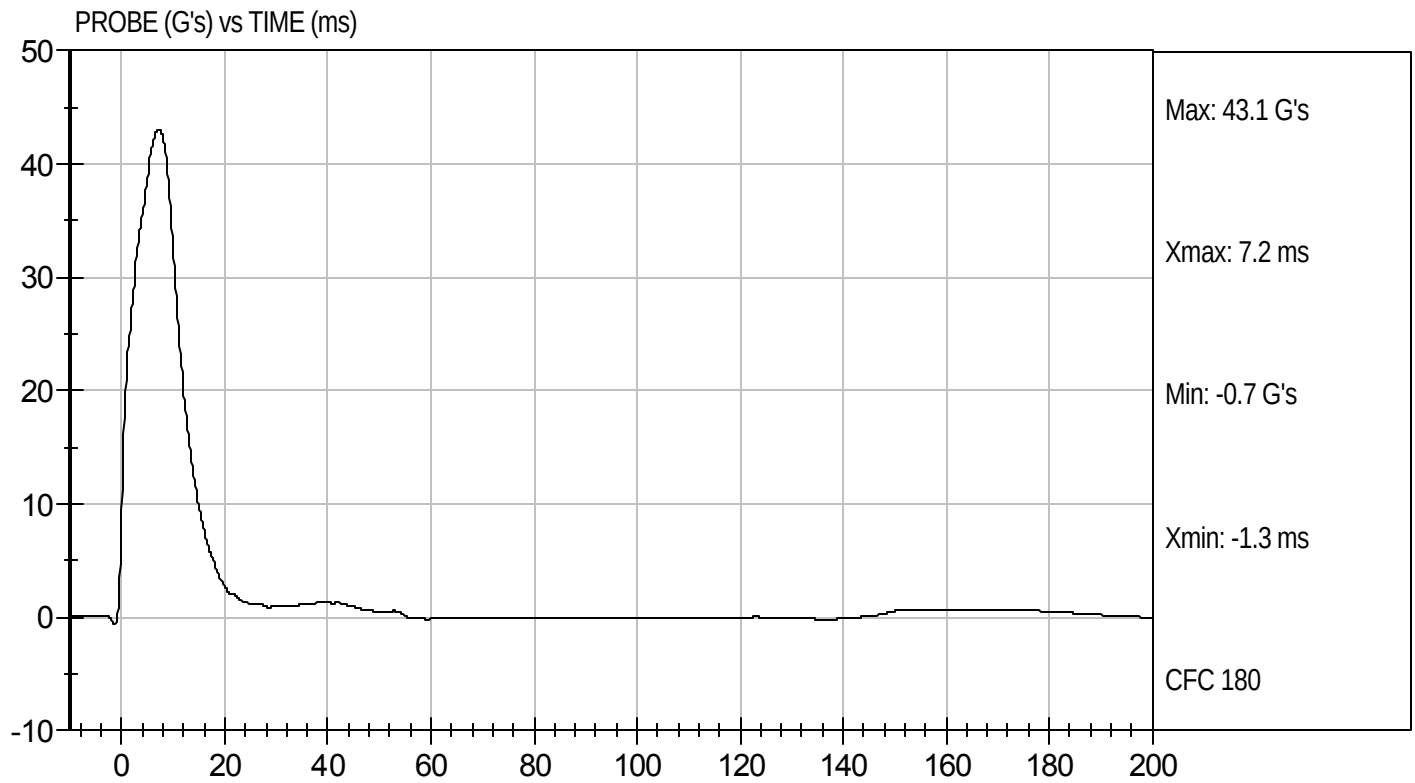
2/15/12
Test Date


Approved By



Test Desc: Pelvis Impact
Component ID: D12497

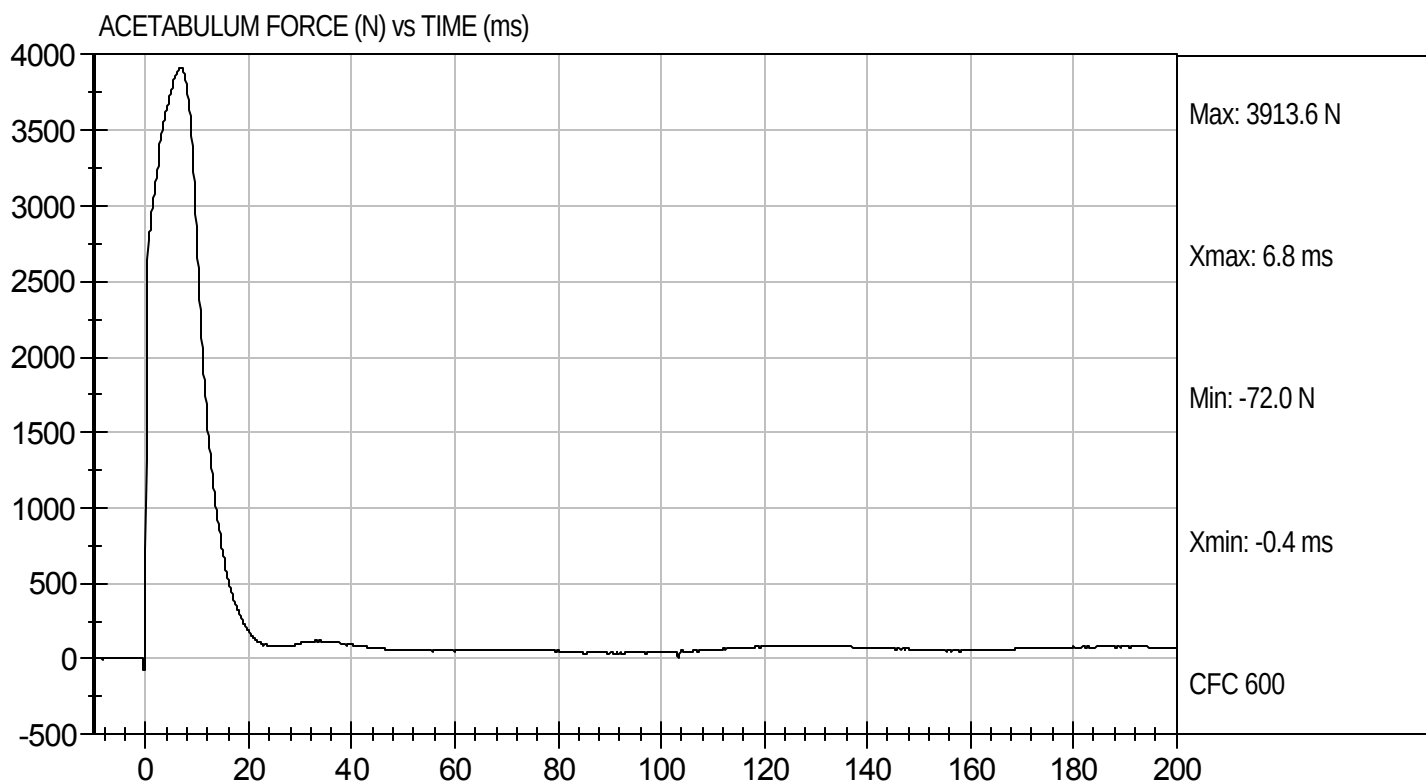
Test Date: 2/15/12
Velocity: 21.9 ft/s, 6.68 m/s





Test Desc: Pelvis Impact
Component ID: D12497

Test Date: 2/15/12
Velocity: 21.9 ft/s, 6.68 m/s

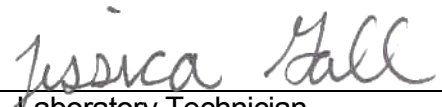


MGA RESEARCH CORPORATION
ILIAC IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

Test I.D: D12498

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	22.1	Pass
Humidity	%	10 to 70	26	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	29	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4409	Pass
Overall Test Results			Pass	


Laboratory Technician

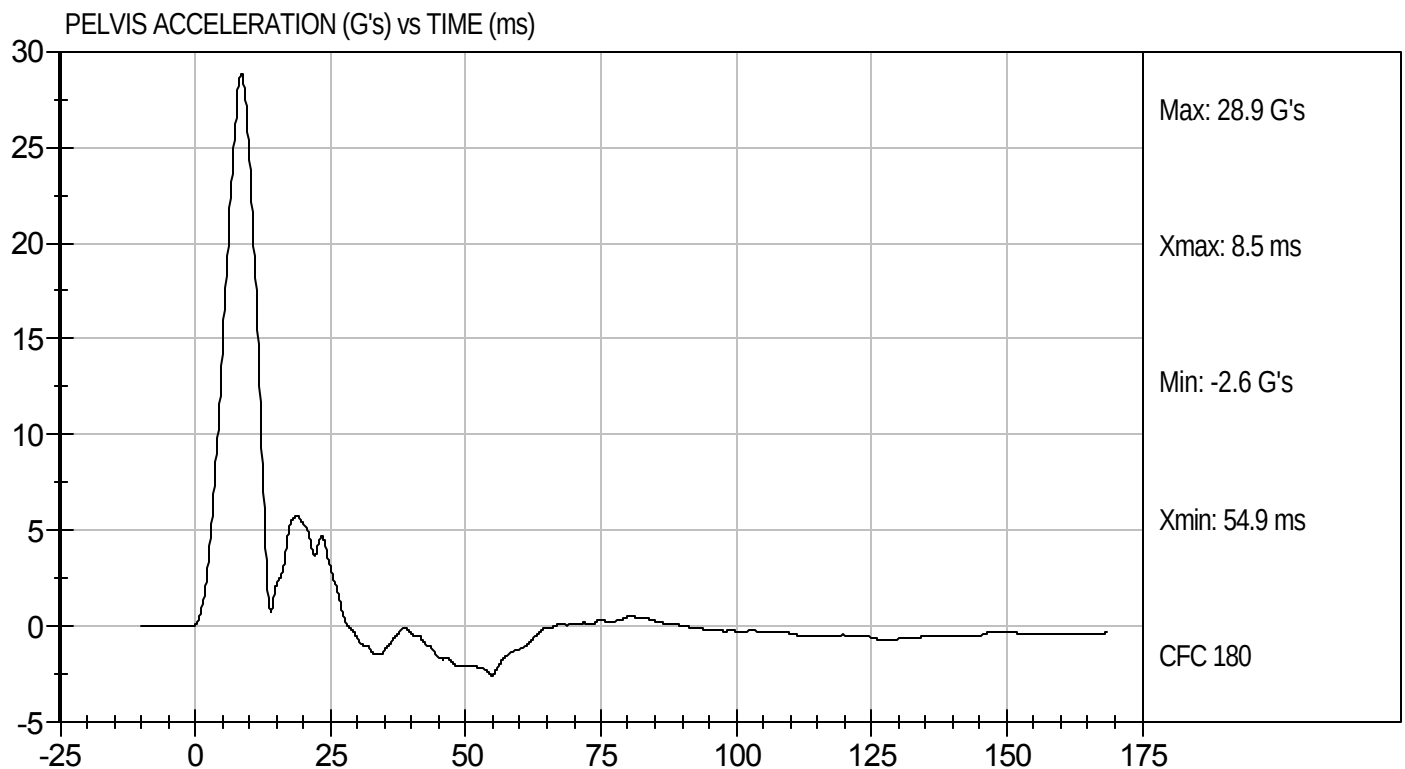
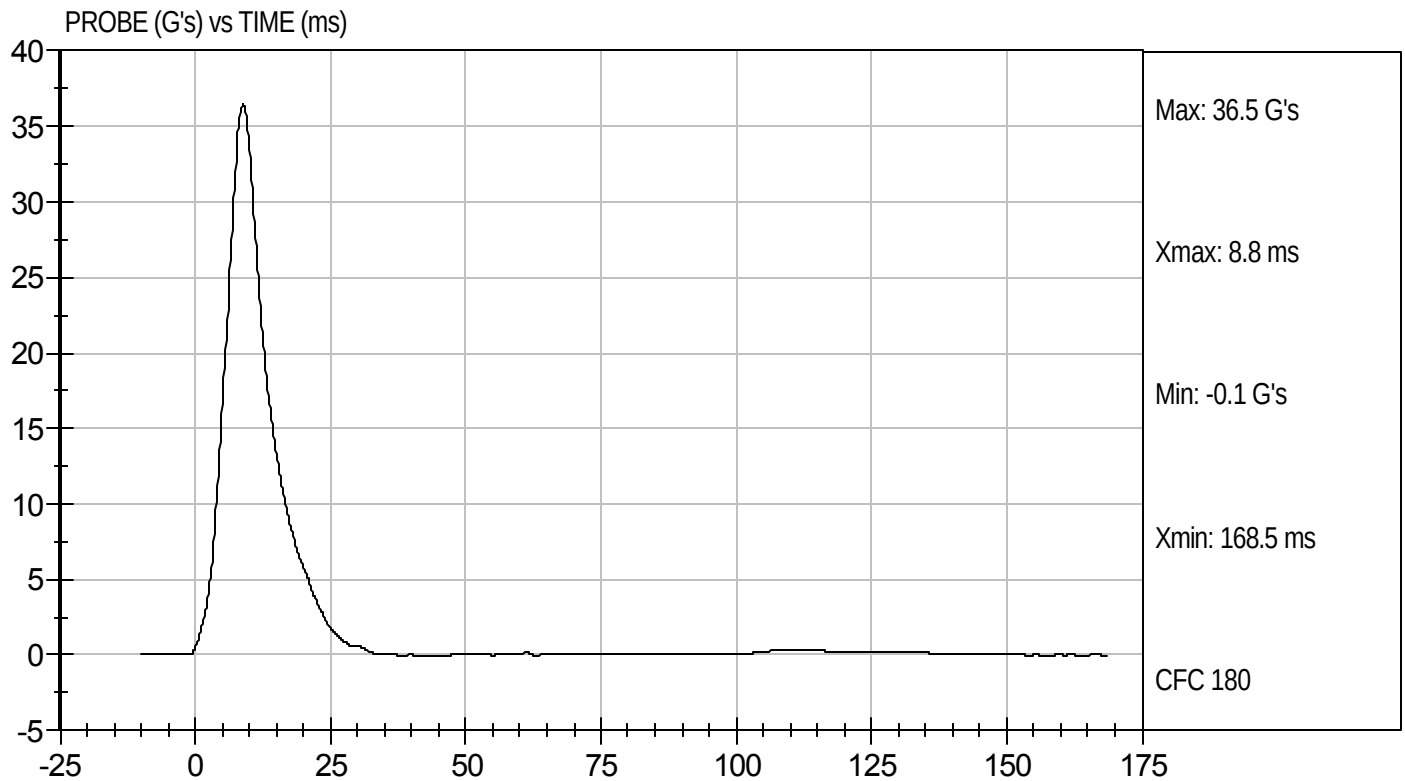
2/15/12
Test Date


Approved By



Test Desc: Iliac Impact
Component ID: D12498

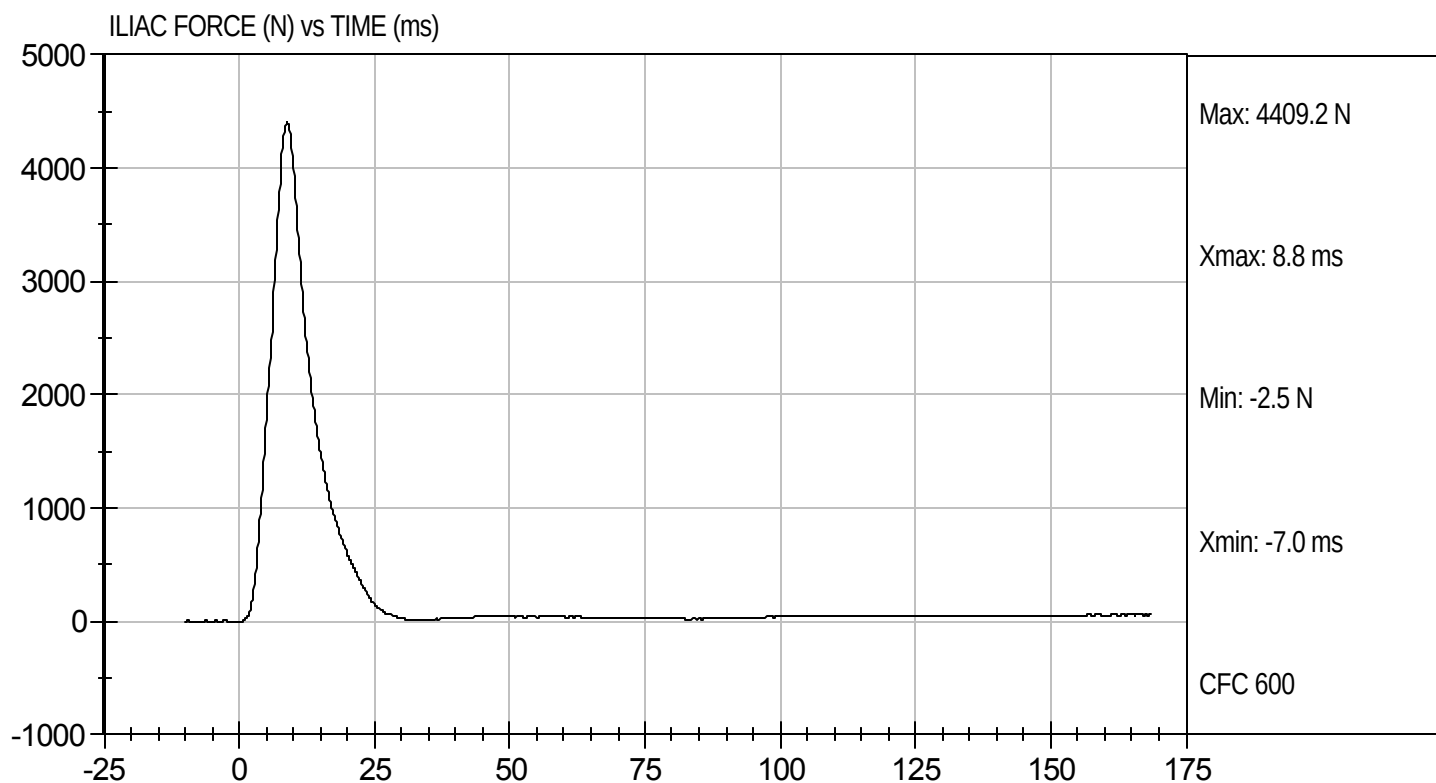
Test Date: 2/15/12
Velocity: 14.36 ft/s, 4.38 m/s





Test Desc: Iliac Impact
Component ID: D12498

Test Date: 2/15/12
Velocity: 14.36 ft/s, 4.38 m/s



APPENDIX D

TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

Table 1 – Dummy Instrumentation (ES-2re)

			ES-2re S/N 032		
			Serial Number	Manufacturer	Calibration Date
Head Accelerometers		X	P73737	Endevco	10/04/11
		Y	P73738	Endevco	10/04/11
		Z	P73740	Endevco	10/04/11
Head Accelerometers		Xr	P66627	Endevco	10/10/11
		Yr	P73753	Endevco	10/04/11
		Zr	P73754	Endevco	10/04/11
Thorax Rib Displacement Potentiometers	Upper	Y	G176	Honeywell	10/12/11
	Middle	Y	G169	Honeywell	10/12/11
	Lower	Y	G164	Honeywell	10/12/11
Abdomen Load Cells	Forward	Y	ABG1513	Denton	05/20/11
	Middle	Y	ABG1531	Denton	05/20/11
	Rear	Y	ABG1536	Denton	05/20/11
Lower Spine Accelerometers (T12)		X	P73742	Endevco	10/04/11
		Y	P73743	Endevco	10/04/11
		Z	P73749	Endevco	10/04/11
Pubic Symphysis Load Cell		Y	PG462	Denton	05/20/11

Table 2 – Dummy Instrumentation (SID-IIs)

			SID-IIs S/N 296			
			Serial Number	Manufacturer	Calibration Date	
Head Accelerometers			X	P67363	Endevco	10/13/11
			Y	P67364	Endevco	10/13/11
			Z	P67365	Endevco	10/13/11
Head Accelerometers			X	P64023	Endevco	10/13/11
			Y	P66672	Endevco	10/13/11
			Z	P66762	Endevco	10/13/11
Displacement Potentiometers	Thoracic Rib	Upper	Y	G1214	FTSS	10/18/11
		Middle	Y	G1163	FTSS	10/18/11
		Lower	Y	G1158	FTSS	10/18/11
	Abdominal Rib	Upper	Y	G1146	FTSS	10/18/11
		Lower	Y	G1126	FTSS	10/18/11
Lower Spine Accelerometers (T12)			X	P67286	Endevco	09/22/11
			Y	P67289	Endevco	09/22/11
			Z	P67291	Endevco	09/22/11
Acetabulum Load Cell			Y	ACG269	FTSS	12/23/11
Iliac Wing Load Cell			Y	IWG282	FTSS	12/23/11
Pelvis Plug (struck side)				46418	FTSS	09/22/11
Pelvis Plug (non-struck side)				46428	FTSS	09/22/11

Table 3 – Vehicle Instrumentation

		Serial Number	Manufacturer	Calibration Date
Vehicle Center of Gravity	X	P59299	Endevco	12/14/11
Vehicle Center of Gravity	Y	P59300	Endevco	12/14/11
Vehicle Center of Gravity	Z	P59298	Endevco	12/14/11
Right Sill at Front Seat	X	P59317	Endevco	10/20/11
Right Sill at Front Seat	Y	P59316	Endevco	10/20/11
Right Sill at Front Seat	Z	P59315	Endevco	10/20/11
Right Sill at Rear Seat	X	P63506	Endevco	10/25/11
Right Sill at Rear Seat	Y	P63508	Endevco	10/25/11
Right Sill at Rear Seat	Z	P63507	Endevco	10/25/11
Left Sill at Front Door	Y	P63277	Endevco	11/04/11
Left Sill at Rear Door	Y	P63401	Endevco	11/04/11
Left A-Post Lower	Y	P59275	Endevco	11/04/11
Left A-Post Middle	Y	P63262	Endevco	01/13/12
Left B-Post Lower	Y	P59305	Endevco	10/20/11
Left B-Post Middle	Y	P63516	Endevco	11/04/11
Front Seat Track	Y	P63397	Endevco	01/12/12
Rear Seat Track or Structure	Y	P63280	Endevco	11/04/11
Right Rear Occ. Compartment	Y	P63414	Endevco	11/04/11
Engine Block	X	P59339	Endevco	11/04/11
Engine Block	Y	P59338	Endevco	11/04/11
Rear Floorpan Above Axle	X	P59327	Endevco	12/14/11
Rear Floorpan Above Axle	Y	P59326	Endevco	12/14/11
Rear Floorpan Above Axle	Z	P59325	Endevco	12/14/11

Table 4 – MDB Instrumentation

		Serial Number	Manufacturer	Calibration Date
MDB Center of Gravity	X	P59379	Endevco	12/14/11
MDB Center of Gravity	Y	P59380	Endevco	12/14/11
MDB Center of Gravity	Z	P59381	Endevco	12/14/11
Left Frame at Rear Axle Centerline	X	P59279	Endevco	12/13/11
Left Frame at Rear Axle Centerline	Y	P59280	Endevco	12/13/11