

REPORT NUMBER: SINCAP-MGA-2012-021

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

**HYUNDAI MOTOR COMPANY
2012 Hyundai Accent GLS 4-Dr Sedan
NHTSA No.: MC0504**

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



Test Date: November 2, 2011

Final Report Date: January 3, 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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Approved by: 
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Approval Date: January 3, 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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12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards (NVS-111) 1200 New Jersey Ave, SE, Room W43-410 Washington, D.C. 20590		13. Type of Report and Period Covered: Final Test Report November 2, 2011 to January 3, 2012																												
		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 Hyundai Accent GLS 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 November 2, 2011. The impact velocity of the Moving Deformable Barrier (MDB) was 62.1 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 231 mm at level 2. The test vehicle's performance was as follows:																														
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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.																														
17. Key Words New Car Assessment Program (NCAP) Side Impact MDB ES-2re SID-IIs		18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Administration Technical Information Services Division, NPO-411 1200 New Jersey Ave, SE, Room E12-100 Washington, DC 20590 Email: tis@nhtsa.dot.gov FAX: 202-493-2833																												
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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 Hyundai Accent GLS 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 Hyundai Accent GLS 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 62.1 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 November 2, 2011. 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	322
Maximum Thorax Rib Deflection	mm	44	25
Combined Abdominal Force	N	2500	1206
Pubic Symphysis Force	N	6000	1836

Measurement Description	Passenger ATD (SID-IIs)		
	Units	Threshold	Result
Head Injury Criteria (HIC ₃₆)	N/A	1000	812
Resultant Lower Spine Acceleration	Gs	82	91
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2469
Maximum Thoracic Rib Deflection	mm	38*	38
Maximum Abdomen Rib Deflection	mm	45*	50

*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	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:

- Passenger Lower Thorax Rib DY after 35 msec.
- Left Mid A-Post Y
- Left Lower A-Post is questionable from 0-15 msec.
- Left Lower B-Post Y after 3 msec.
- Left Mid B-Post Y after 5 msec.
- Driver Seat Track is questionable from 13-20 msec.
- Left Rear Seat Y
- Top of Engine X is questionable from 13-25 msec. and 91-107 msec.
- Top of Engine Y is questionable from 16-22 msec.
- MDB Rear X is questionable from 23-28 msec.

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 Hyundai Accent GLS 4-Dr Sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No. MC0504
Test Date: 11/02/2011

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	MC0504	Traction Control System (TCS)	Yes
Model Year	2012	Auto-Leveling System	No
Make	Hyundai	Automatic Door Locks (ADL)	No
Model	Accent	Power Window Auto-Reverse	No
Body Style	Sedan	Other Optional Feature	N/A
VIN	KMHCT4AE9CU091672	Driver Front Airbag	Yes
Body Color	Boston Red	Driver Curtain Airbag	Yes
Odometer Reading (km/mi)	101 / 63	Driver Head/Torso Airbag	No
Engine Displacement (L)	1.6	Driver Torso Airbag	No
Type/No. Cylinders	4	Driver Torso/Pelvis Airbag	Yes
Engine Placement	Lateral	Driver Pelvis Airbag	No
Transmission Type	Automatic	Driver Knee Airbag	No
Transmission Speeds	6	Rear Pass. Curtain Airbag	Yes
Overdrive	No	Rear Pass. Head/Torso Airbag	No
Final Drive	Front	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)	No	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	Hyundai Motor Company	GVWR (kg)	1600
Date of Manufacture	JUL/12/11	GAWR Front (kg)	850
Vehicle Type	Passenger Car	GAWR Rear (kg)	840

VEHICLE SEATING AND WEIGHT CAPACITY DATA

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

VEHICLE SEAT TYPE

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

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

Test Vehicle: 2012 Hyundai Accent GLS 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No. MC0504
 Test Date: 11/02/2011

TEST PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kpa	220	220	220	220
Tire Placard	kpa	220	220	220	220
Owner's Manual	kpa				
As Tested	kpa	220	220	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	358.3	229.1		403.3	296.2		397.3	306.2	
Right	kg	352.0	212.7		363.3	257.2		354.3	268.5	
Ratio	%	61.7	38.3		58.1	41.9		56.7	43.3	
Totals	kg	710.3	441.8	1152.1	766.6	553.4	1320.0	751.6	574.7	1326.3

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1152.1	(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 (TVT _W)	kg	1326.4	(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 TVT_W

Component Description	Weight (kg)
Weight of Ballast, if any	0.0
Left and right tail lights, right side mirror, trunk foam, air pump, fix-a-flat.	7.2

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

Test Vehicle: 2012 Hyundai Accent GLS 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No. MC0504
 Test Date: 11/02/2011

TEST VEHICLE ATTITUDES AND CG

	Units	Fully Loaded	As Tested	Meets Requirement***
Left Front	mm	627	629	Yes
Right Front	mm	636	635	Yes
Right Rear	mm	625	628	Yes
Left Rear	mm	614	623	Yes
Vehicle CG (Aft of Front Axle)	mm	1113	1077	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	46	45	

*** 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 Hyundai Accent GLS 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No. MC0504
 Test Date: 11/02/2011

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	17.4	14.4	15.9
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 SCRP Height (mm)	SCRP Height Position	SCRP Height (mm)		
				Rear-most	Mid-Fore/Aft	Forward-Most
Driver Seat	15.9	Fixed	Max	Fixed	Fixed	Fixed
	15.9	Fixed	Mid	Fixed	Fixed	Fixed
	15.9	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 Hyundai Accent GLS 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

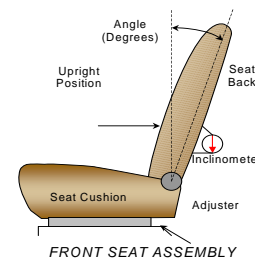
NHTSA No. MC0504
 Test Date: 11/02/2011

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	65.3		8.7	7 th (1 st as 0)
Front Passenger Seat	66.3		8.8	6 th (1 st as 0)
Front Center Seat				
Struck Side Rear Seat	Fixed		9.2*	Fixed
Non-Struck Side Rear Seat	Fixed		Fixed	Fixed
Rear Center Seat	Fixed		Fixed	Fixed

* seat is fixed, angle measured on headrest post guide

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

Test Vehicle: 2012 Hyundai Accent GLS 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No. MC0504
 Test Date: 11/02/2011

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	3 detents (1 st as 1)	0 (uppermost as 0)
Rear Seat	Fixed	Not Applicable

HEAD RESTRAINT ADJUSTMENT

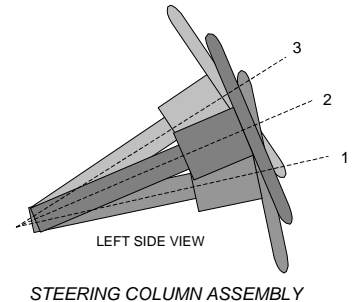
The driver's head restraint is adjusted to the highest and most full forward in-use position. The struck-side rear passenger's head restraint is adjusted to the lowest and most full forward in-use position.

	Total # of Positions	Placed in Position #
Driver Seat	6	Highest
Rear Seat	3	Lowest

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.

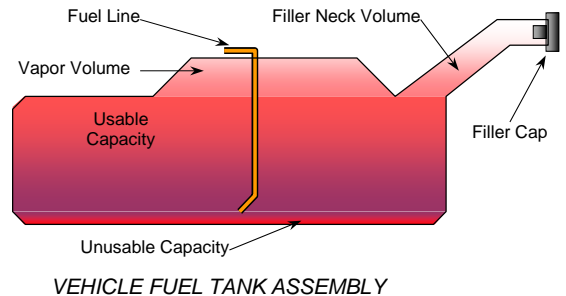
	Degrees	Fore/Aft Position (mm)
Lowermost, Position 1	66.8	
Geometric Center, Position 2	64.6	
Uppermost, Position 3	62.4	
Telescoping Steering Wheel Travel		
Test Position	64.6	



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. No operating instructions. The fuel pipe is on the left side.



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

Test Vehicle: 2012 Hyundai Accent GLS 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No. MC0504
 Test Date: 11/02/2011

FUEL TANK CAPACITY DATA

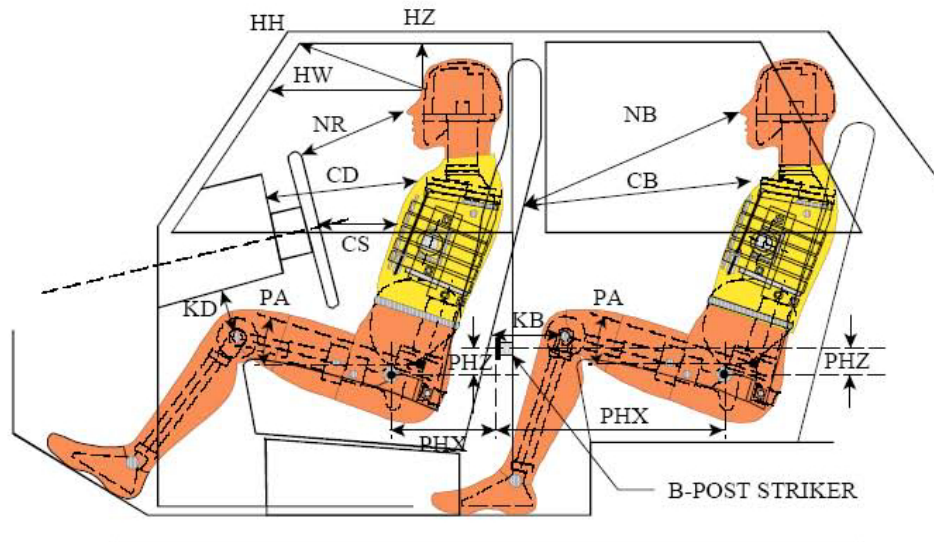
	Liters
Usable Capacity of "Standard" Tank (see Form No. 1)	43.0
Usable Capacity of "Optional" Tank (see Form No. 1)	
Usable Capacity of Standard Tank as Specified in Owner's Manual	43.0
Usable Capacity of Optional Tank as Specified in Owner's Manual	
93% of Usable Capacity	40.0
Actual Amount of Solvent Used	40.0
1/3 of Usable Capacity	14.3

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 Hyundai Accent GLS 4-Dr Sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No. MC0504
Test Date: 11/02/2011



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

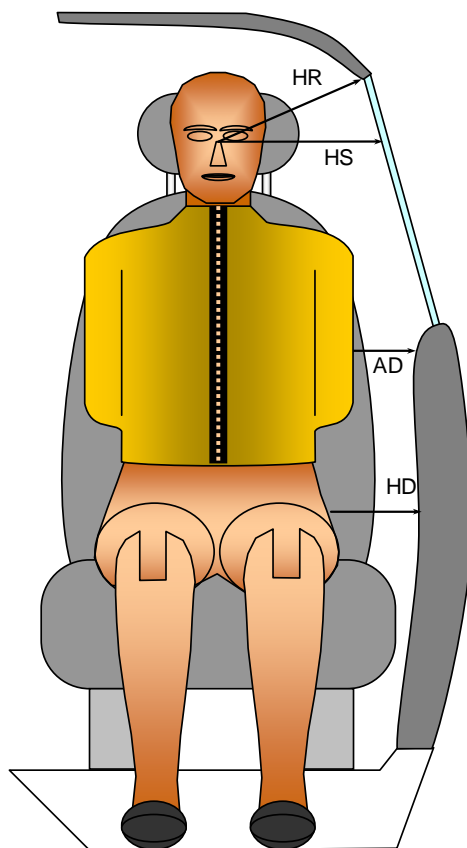
DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Pass. Code	Measurement Description	Driver S/N 032		Passenger S/N 306	
			Length (mm)	Angle(°)	Length (mm)	Angle(°)
HH		Head to Header	373	13.6		
HW		Head to Windshield	616			
HZ	HZ	Head to Roof Liner	155		238	
NR	NB	Nose to Rim/Seat Back	486	14.3	480	4.7
CD	CB	Chest to Dashboard/Seat Back	567	4.9	480	19.4
CS		Chest to Steering Wheel	384	8.7		
KDL	KBL	Left Knee to Dash/Seat Back	181	26.6	218	20.9
KDR	KBR	Right Knee to Dash/Seat Back	164	20.8	210	19.5
PAX	PAX	Pelvic Tilt Angle X		22.6		23.7
	PAY	Pelvic Tilt Angle Y		1.2		-0.9
PHX	PHX	Hip Point to Striker (X-Axis)	163		281	
PHZ	PHZ	Hip Point to Striker (Z-Axis)	136		271	

**DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS**

Test Vehicle: 2012 Hyundai Accent GLS 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No. MC0504
 Test Date: 11/02/2011



FRONT VIEW OF DUMMY

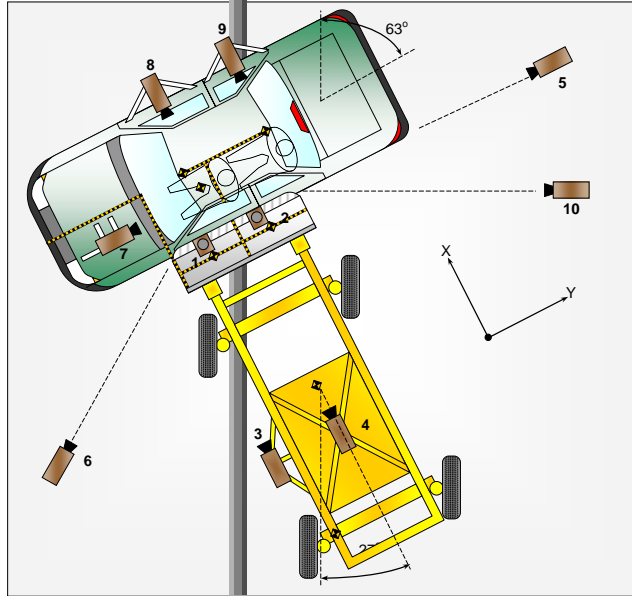
DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver S/N 032	Passenger S/N 306
HR	Head to Side Header	mm	179	228
HS	Head to Side Window	mm	298	339
AD	Arm to Door	mm	88	140
HD	Hip Point to Door	mm	152	146

**DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA**

Test Vehicle: 2012 Hyundai Accent GLS 4-Dr Sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No. MC0504
Test Date: 11/02/2011



CAMERA LOCATIONS AND DATA

No.	Camera View	Coordinates (mm)			Lens Length (mm)	Operating Frame Rate (fps)
		X*	Y*	Z*		
1	Overhead Overall	-210	240	-5050	14	1000
2	Overhead Close-Up	80	90	-5050	20	1000
3	Left Impact Point (MDB)				50	1000
4	Side Overall (MDB)				16	1000
5	Rear	50	4760	-1090	24	1000
6	Left Front	4180	-4450	-1110	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

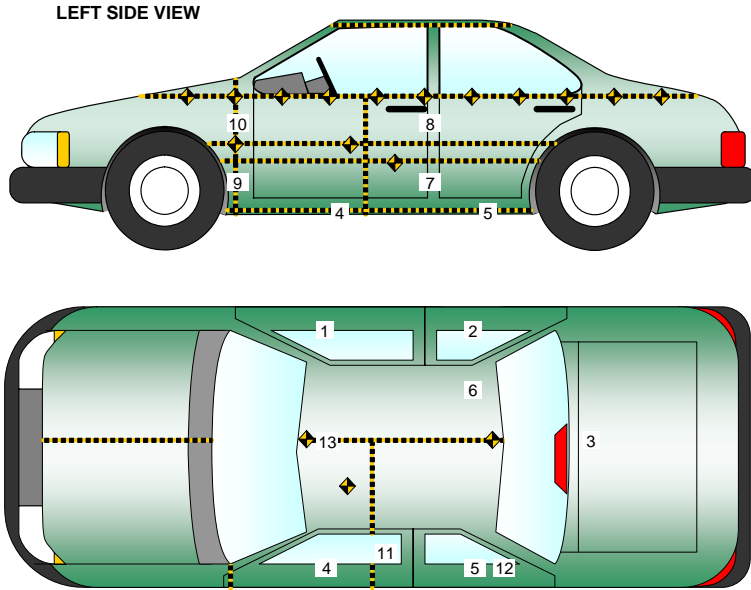
INSTRUMENTATION

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 Hyundai Accent GLS 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No. MC0504
 Test Date: 11/02/2011



TEST VEHICLE ACCELEROMETER LOCATIONS

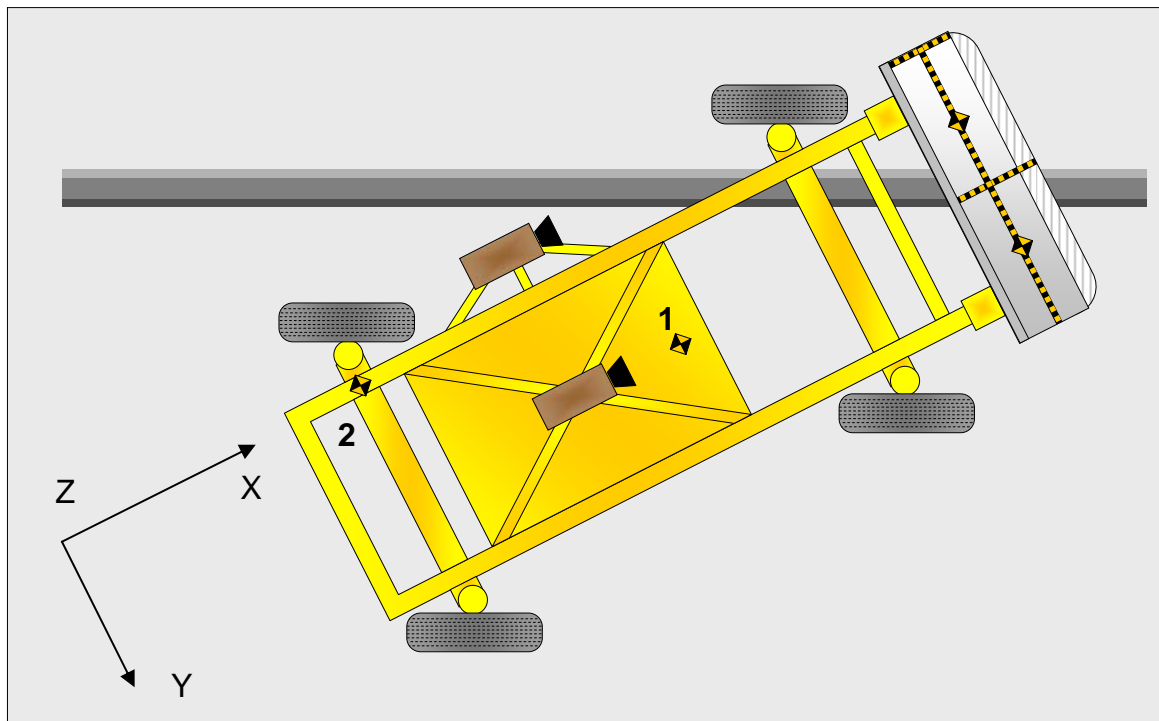
Accelerometer Location				
No.	ID	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2442	211	-165
2	Right Sill at Front Seat	2572	671	-185
3	Right Sill at Rear Seat	1515	676	-178
4	Left Sill at Front Door	2567	-671	-180
5	Left Sill at Rear Door	1512	-676	-190
6	Left Lower A-Post	2978	-670	-460
7	Left Middle A-Post	3072	-771	-714
8	Left Lower B-Post	2131	-656	-520
9	Left Middle B-Post	2022	-667	-698
10	Front Seat Track	2273	-582	-316
11	Rear Seat Structure	1697	-325	-402
12	Rt. Rear Occ. Compartment	1781	330	-205
13	Engine Block	3855	0	-763
14	Rear Above Axle	1043	0	-515

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 Hyundai Accent GLS 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No. MC0504
 Test Date: 11/02/2011



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 Hyundai Accent GLS 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No. MC0504
 Test Date: 11/02/2011

TEST DUMMY INFORMATION AND CONTACT POINTS

Description	Front Seat Dummy (ES-2re)	Rear Seat Dummy (SID-IIs)
Face	Curtain Airbag	Curtain Airbag, Center Headrest
Top of Head	Curtain Airbag	Curtain Airbag, Side Header, Center Headrest
Left Side of Head	Curtain Airbag	Curtain Airbag
Back of Head	Curtain Airbag, Headrest	Curtain Airbag, Side Header
Left Shoulder	Side Airbag	Door Panel
Upper Torso	Side Airbag, Seatback	Door Panel
Lower Torso	Side Airbag, Seatback	Door Panel
Left Hip	Side Airbag, Seat Cushion	Door Panel
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 Hyundai Accent GLS 4-Dr Sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No. MC0504
Test Date: 11/02/2011

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Struck Side Driver		Struck Side Rear Passenger	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	No		
Knee Airbag	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		2568
Vertical Impact Reference Line (Aft of Front Axle) (Intended Impact Point)	mm		344
Actual Impact Point (Aft of Front Axle)	mm		351
Horizontal Offset (+forward / -rearward)	mm	+/- 50 of intended impact point	-7
Vertical Offset (+down / -up)	mm	+/- 20 of intended impact point	5

DATA SHEET NO. 9
MDB SUMMARY OF RESULTS

Test Vehicle: 2012 Hyundai Accent GLS 4-Dr Sedan NHTSA No. MC0504
 Test Program: NCAP Side MDB Impact Test Test Date: 11/02/2011

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	62.1
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	62.2
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	89.9
MDB Forward Line of Motion to Target Vehicle CL	degrees	62.5 to 63.5	63.1
MDB Crabbed Angle to MDB Forward Line of Motion	degrees	26 to 28	26.9

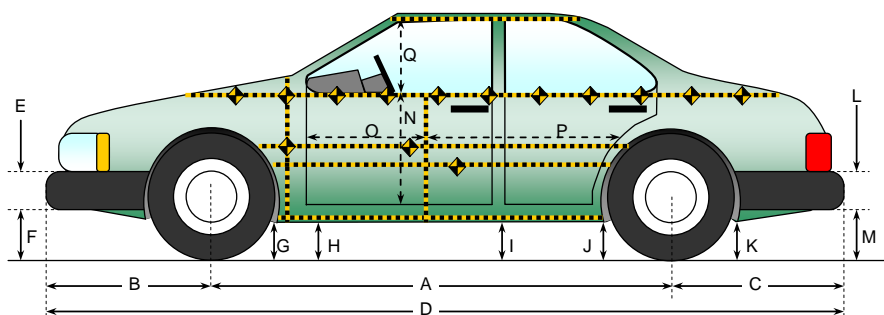
MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE

Row	Vertical Location		From Centerline		Maximum Crush
	Description	Height	Distance	Direction	
A	Center of Bumper	432	800	Left	162
B	Top of Bumper	533	800	Left	85
C	Mid-Level	686	800	Left	116
D	Top of Stack	813	800	Left	145

**DATA SHEET NO. 10
TEST VEHICLE PROFILE MEASUREMENTS**

Test Vehicle: 2012 Hyundai Accent GLS 4-Dr Sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No. MC0504
Test Date: 11/02/2011



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

LEFT SIDE VIEW

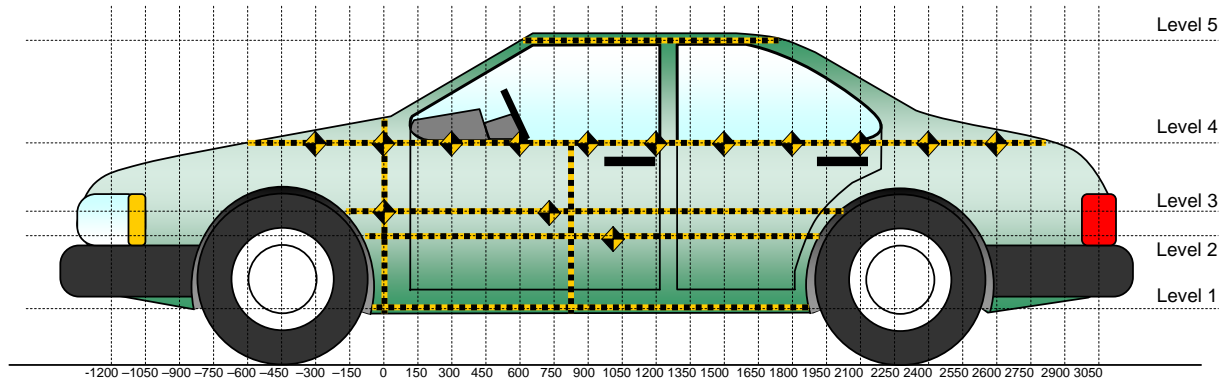
VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2568	2570	-2
B	Front Axle to FSOV	821	821	0
C	Rear Axle to RSOV	975	975	0
D	Total Length at Centerline	4364	4366	-2
E	Front Bumper Thickness	100	100	0
F	Front Bumper Bottom to Ground	205	222	-17
G	Sill Height at Front Wheel Well	140	142	-2
H	Sill Height at Front Door Leading Edge	141	141	0
I	Sill Height at B Pillar	159	160	-1
J1	Sill Height at Rear Wheel Well	150	165	-15
J2	Pinch Weld Height at Rear Wheel Well	151	163	-12
K	Sill Height Aft of Rear Wheel Well	208	201	7
L	Rear Bumper Thickness	60	60	0
M	Rear Bumper Bottom to Ground	342	360	-18
N	Sill Height to Window Bottom Sill	708	633	75
O	Front Door Leading Edge to Impact CL	762	732	30
P	Rear Door Trailing Edge to Impact CL	1158	1160	-2
Q	Front Window Opening	427	425	2
R	Right Side Length	3044	3050	-6
S	Left Side Length	3044	3030	14
T	Vehicle Width at B Post	1688	1525	163

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

Test Vehicle: 2012 Hyundai Accent GLS 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No. MC0504
 Test Date: 11/02/2011



All Measurements Shown in mm

LEFT SIDE VIEW

MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Height Above Ground (mm)	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	226	49	300
2	Occupant Hip Point	502	231	450
3	Mid Door	602	199	450
4	Window Sill	895	165	1650
5	Window Top	1368	14	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 Hyundai Accent GLS 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No. MC0504
 Test Date: 11/02/2011

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-750				457					454					-3	
-600				414					410					-4	
-450				387					387					0	
-300				364					361					-3	
-150			247	348				252	358				5	10	
0		253	258	335			261	265	344			8	7	9	
150	275	262	261	329		279	436	433	365		4	174	172	36	
300	278	262	262	318		327	490	453	401		49	228	191	83	
450	278	261	261	313		322	492	460	445		44	231	199	132	
600	278	261	261	307		324	484	450	464		46	223	189	157	
750	279	260	259	306	542	324	474	443	465	542	45	214	184	159	0
900	280	259	258	303	532	323	483	441	455	537	43	224	183	152	5
1050	281	259	256	303	529	319	477	434	430	536	38	218	178	127	7
1200	281	258	256	299	529	322	477	432	432	540	41	219	176	133	11
1350	283	257	256	296	528	320	477	438	446	542	37	220	182	150	14
1500	284	257	256	291	529	321	478	452	455	538	37	221	196	164	9
1650	285	257	256	290	533	326	477	452	455	538	41	220	196	165	5
1800	285	257	256	291	543	308	458	435	416	542	23	201	179	125	-1
1950		250	252	312			320	364	395			70	112	83	
2100				304					329					25	
2250				312					323					11	
2400				319					320					1	

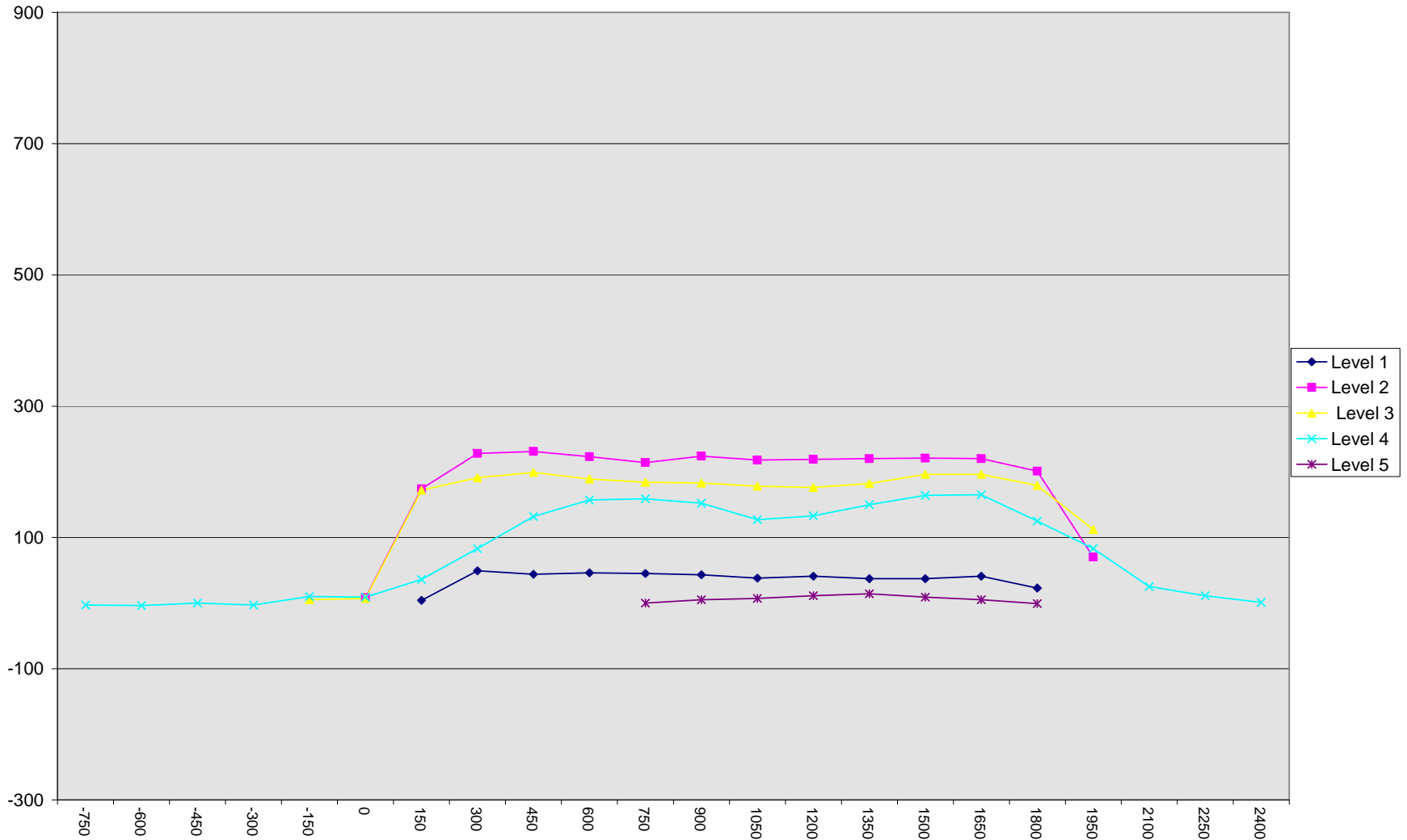
NOTE: Pre-test measurements are taken when the vehicle is in the "As Tested" weight condition. Vehicle measurements forward of the vertical impact reference line are negative. The crush profile grid is established prior to the test based on an estimated impact point.

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

Test Vehicle: 2012 Hyundai Accent GLS 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No. MC0504
 Test Date: 11/02/2011

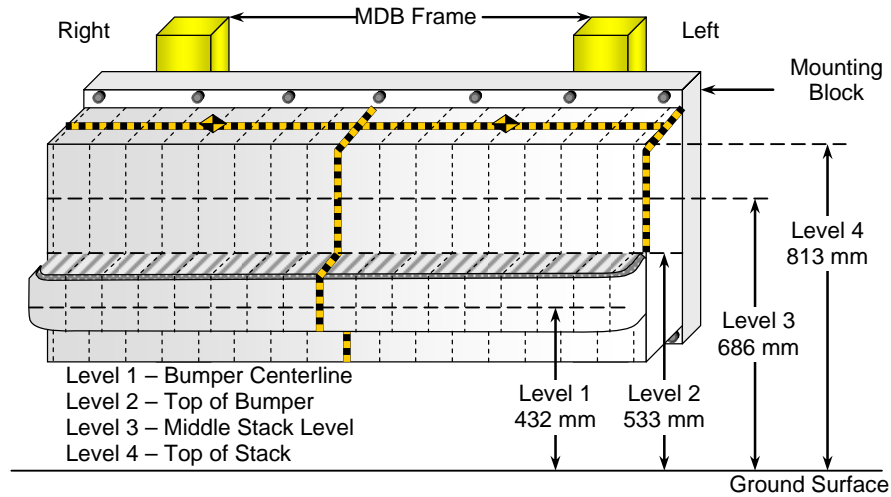
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DATA SHEET NO. 12
MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle: 2012 Hyundai Accent GLS 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No. MC0504
 Test Date: 11/02/2011



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		0	100	200	300	400	500	600	700
4	18	1	-1	0	10	34	75	73	56	28	13	11	13	17	45	83	145
3	19	13	10	6	7	12	38	42	18	9	9	10	13	18	28	57	116
2	70	77	73	69	57	50	53	57	50	58	64	65	65	67	67	78	85
1	134	135	132	132	132	133	131	132	129	126	122	122	124	117	117	125	162

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

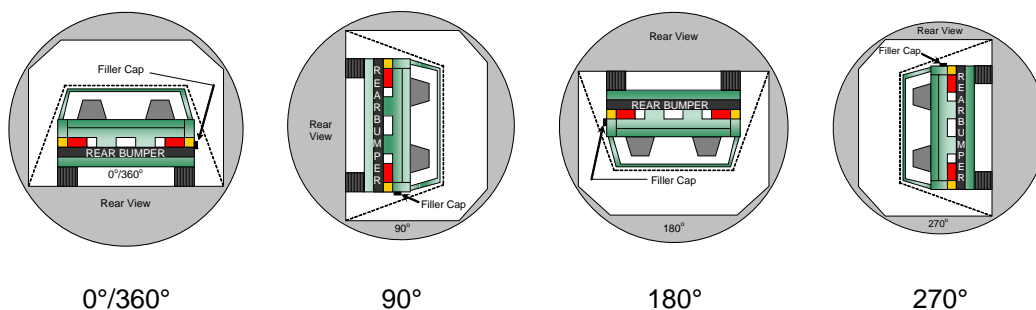
Test Vehicle: 2012 Hyundai Accent GLS 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No. MC0504
 Test Date: 11/02/2011

Test Time: 10:29 am 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°	120	300	420
90° to 180°	115	300	415
180° to 270°	106	300	406
270° to 360°	116	300	416

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

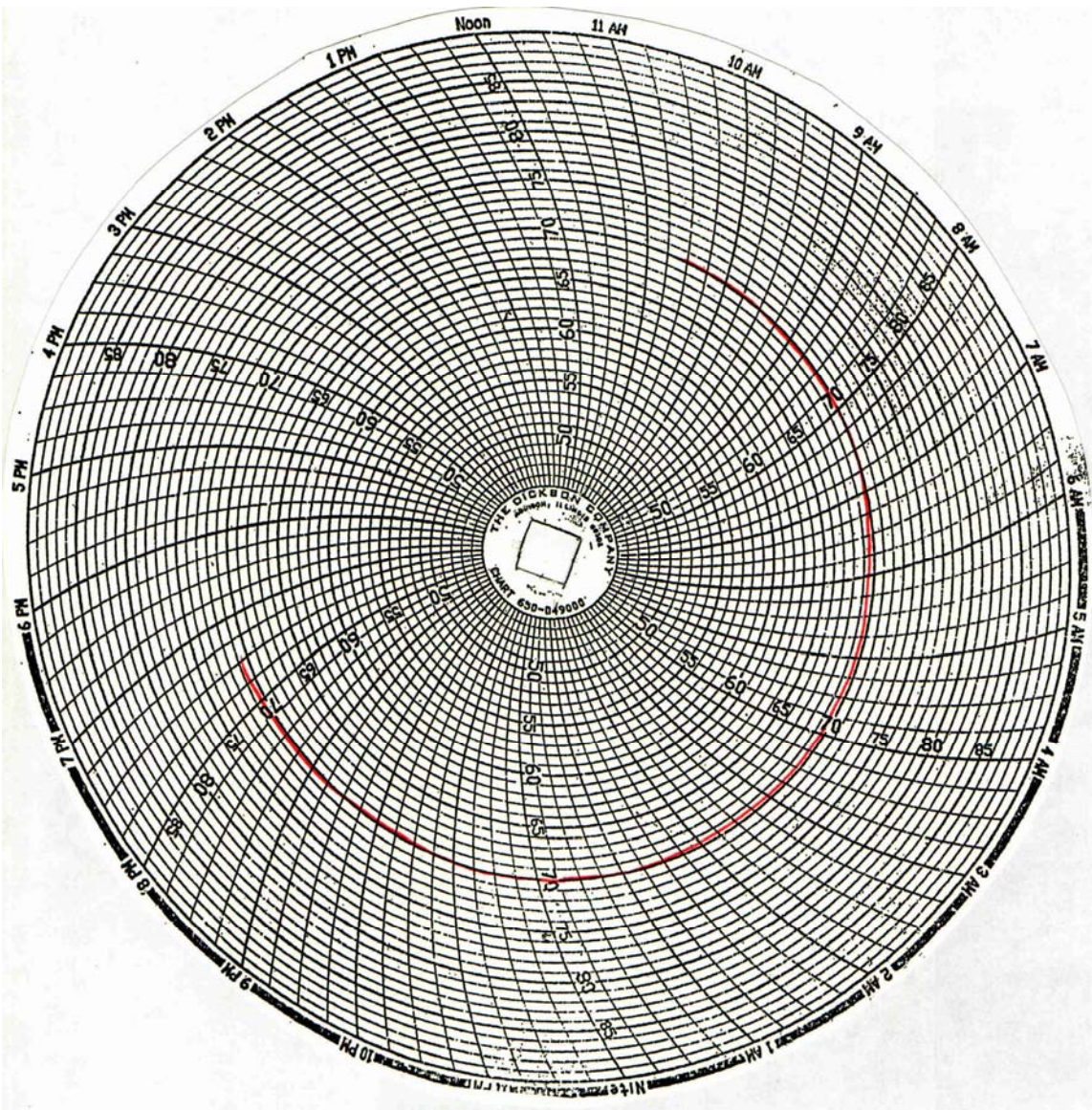
ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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 Hyundai Accent GLS 4-Dr Sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No. MC0504
Test Date: 11/02/2011



APPENDIX A
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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



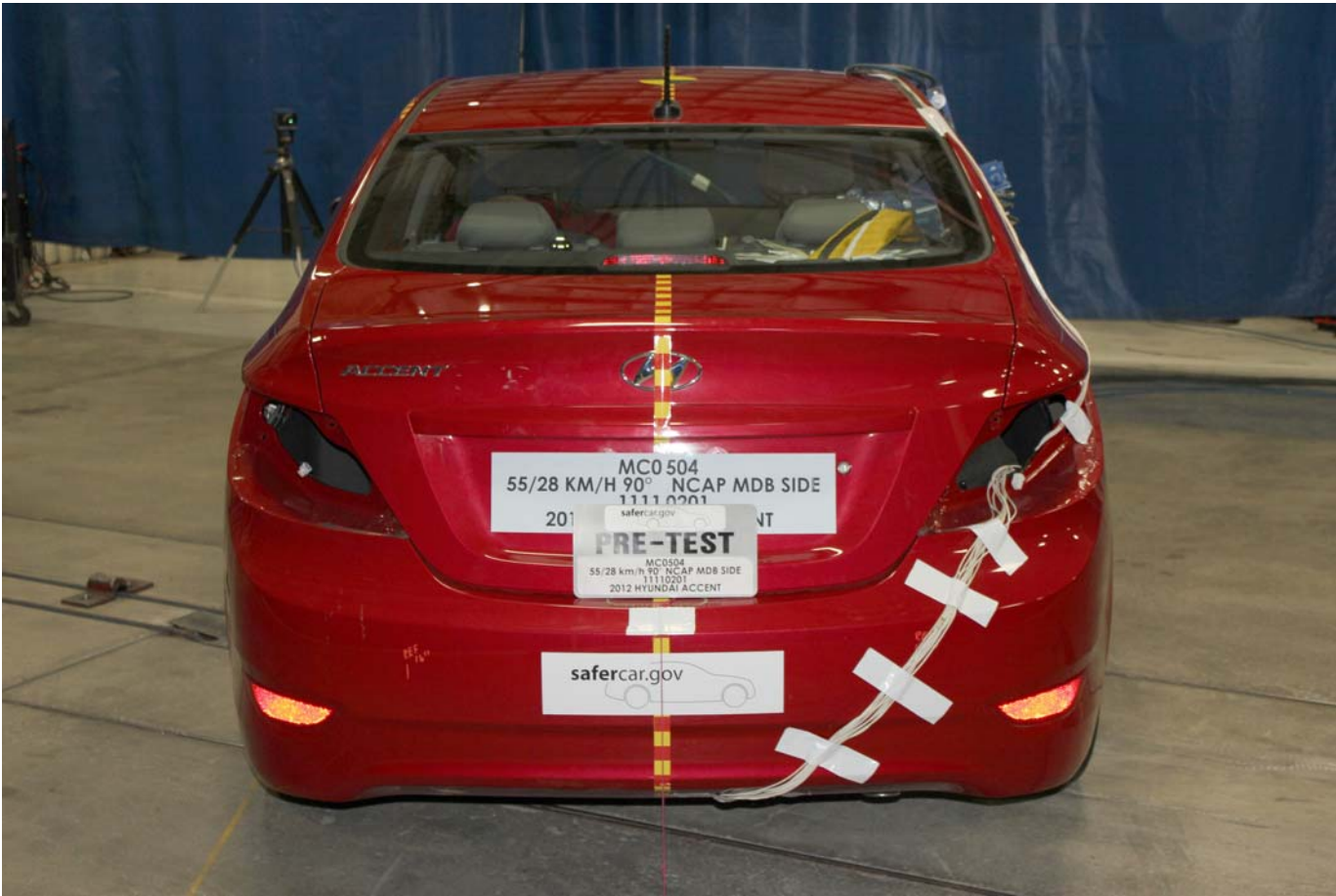
Post-Test Left Side View of Test Vehicle



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



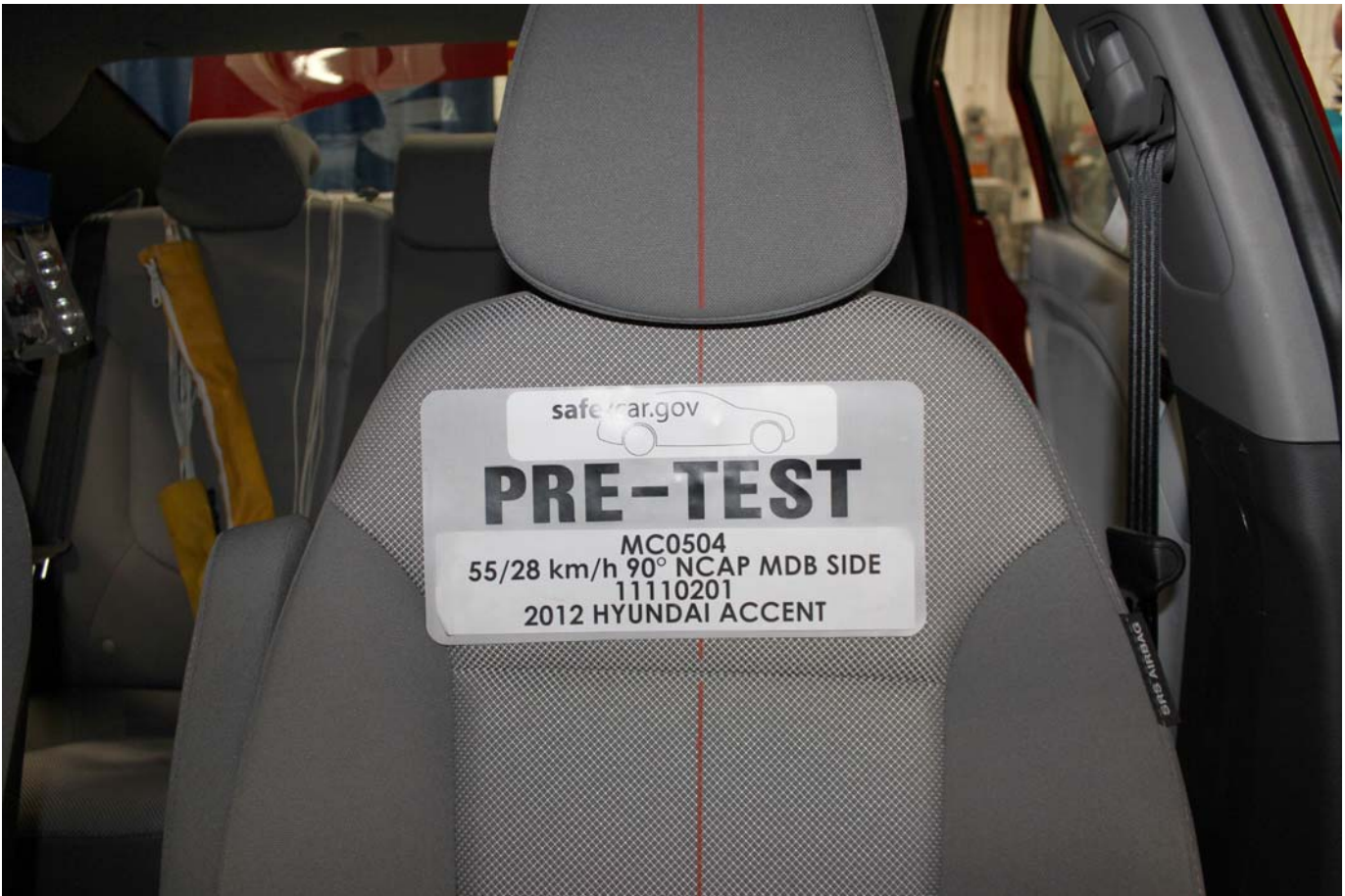
Pre-Test Left Side View of Driver Dummy Showing Belt and Chalking



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



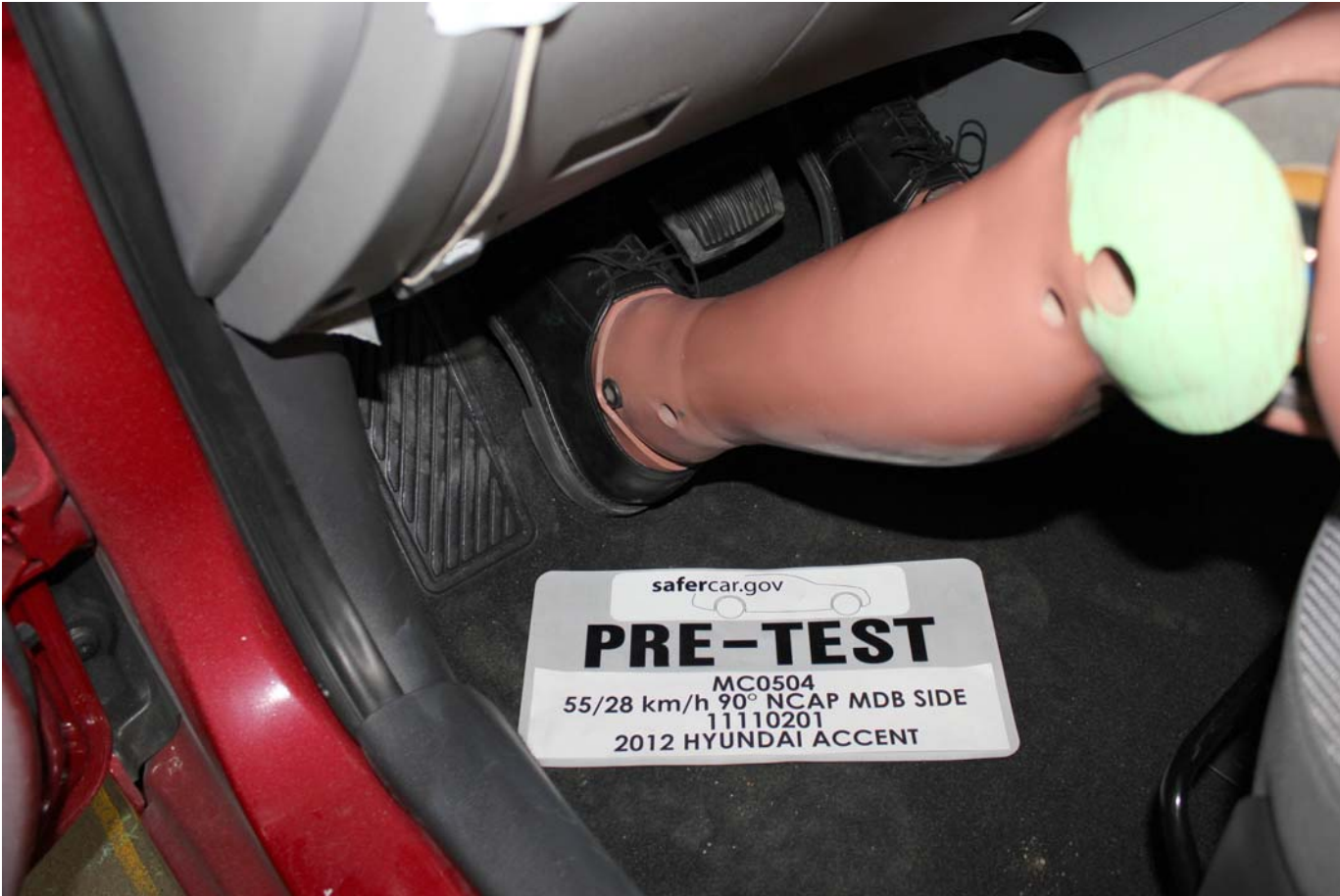
Pre-Test Frontal View of Driver Dummy Head and Shoulders in Relation to Head Restraint



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 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



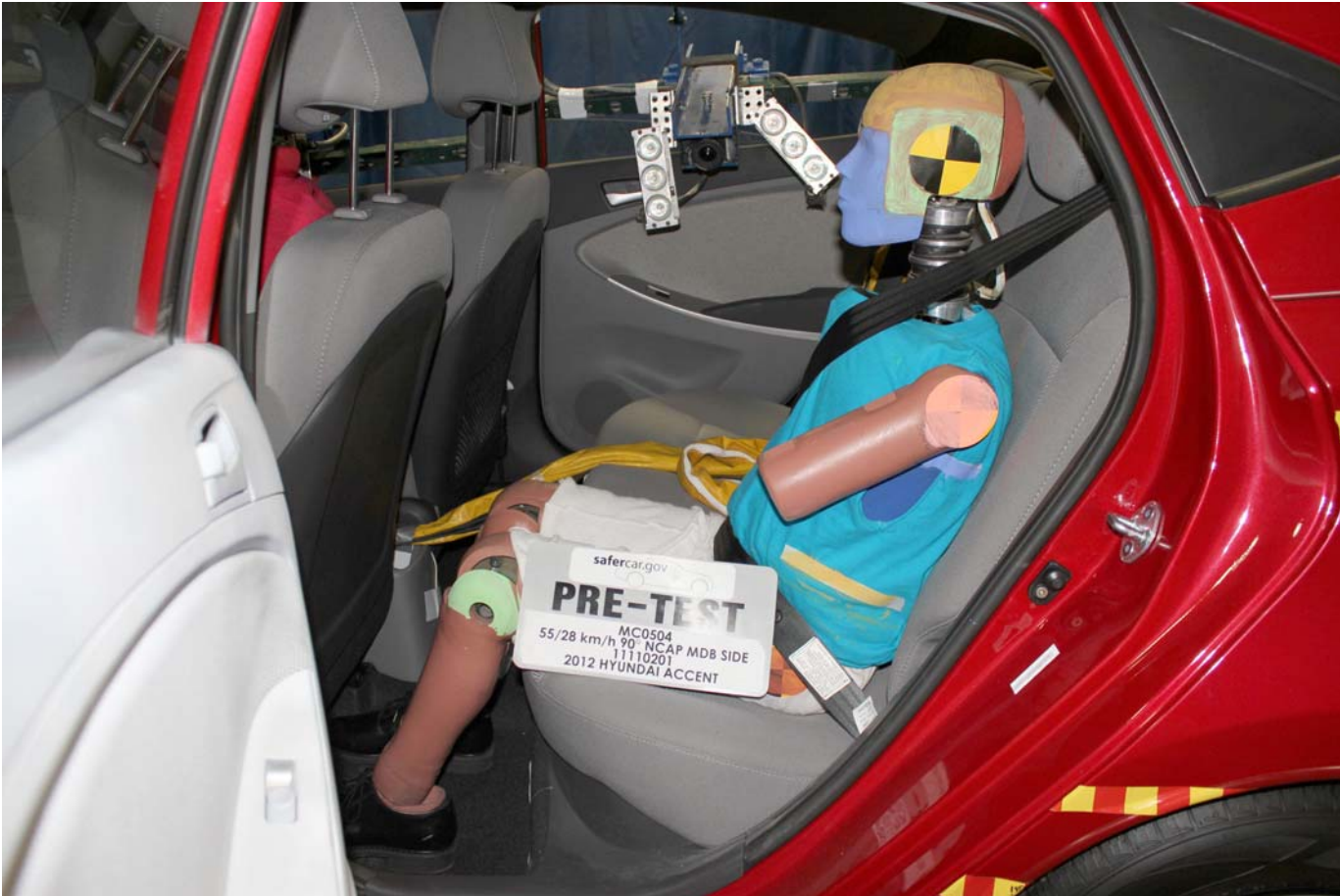
Post-Test Driver Dummy Close-up Torso Contact with Side Airbag View



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



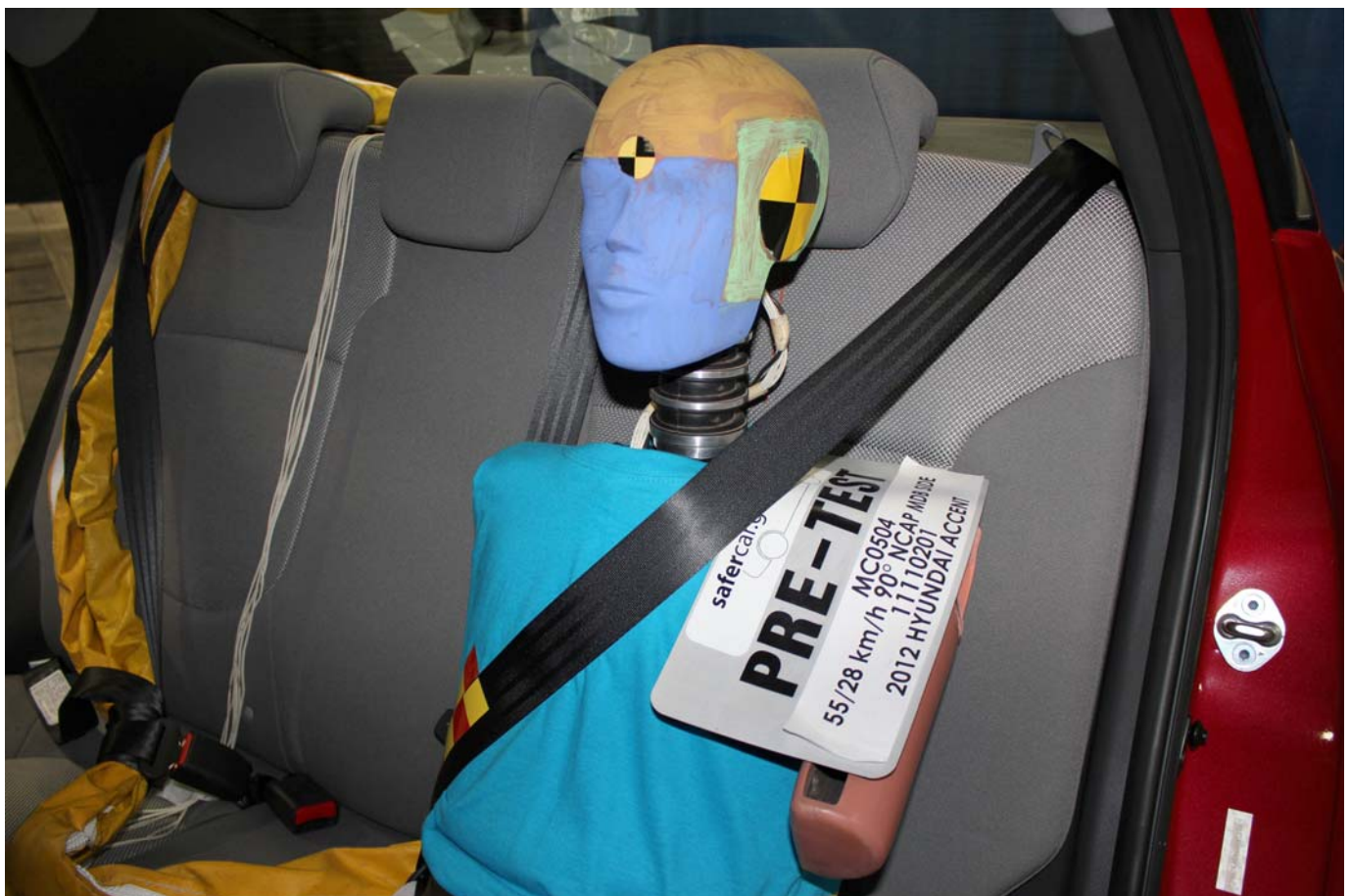
Pre-Test Placement of Rear Passenger Dummy's Feet



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 Side Airbag 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



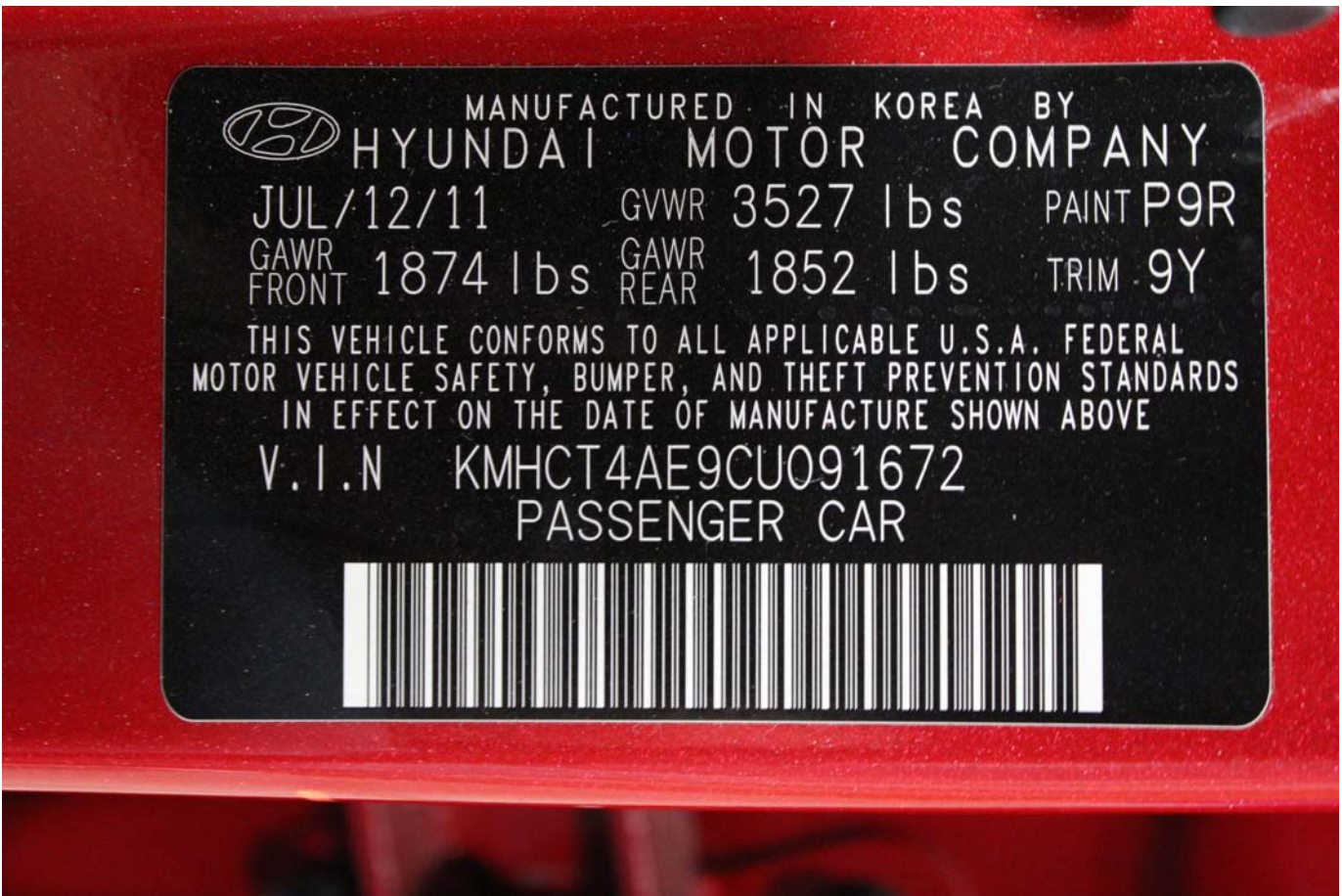
Post-Test Left Side View of MDB Impactor Face



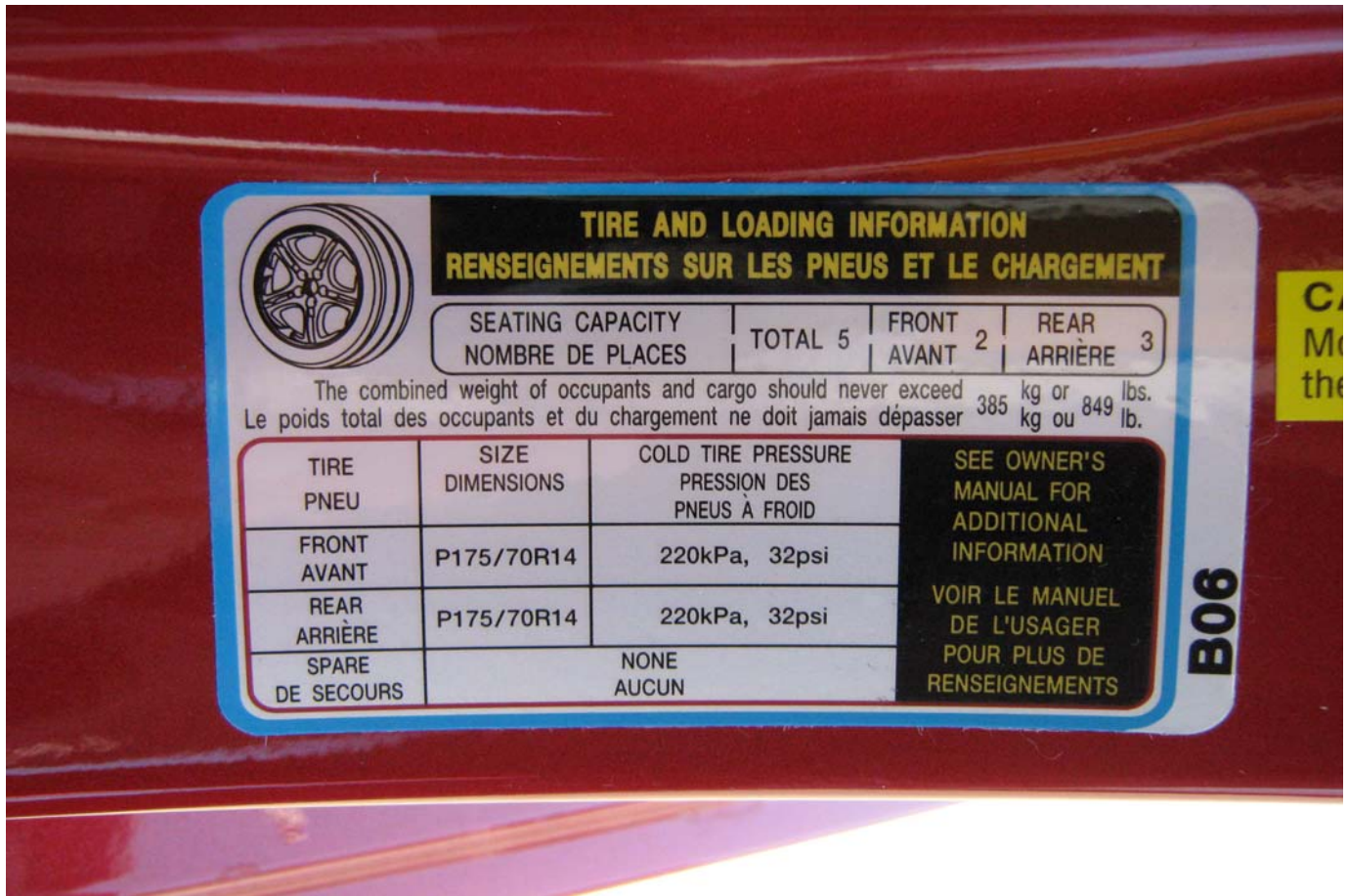
Pre-Test Right Side View of MDB Impactor Face



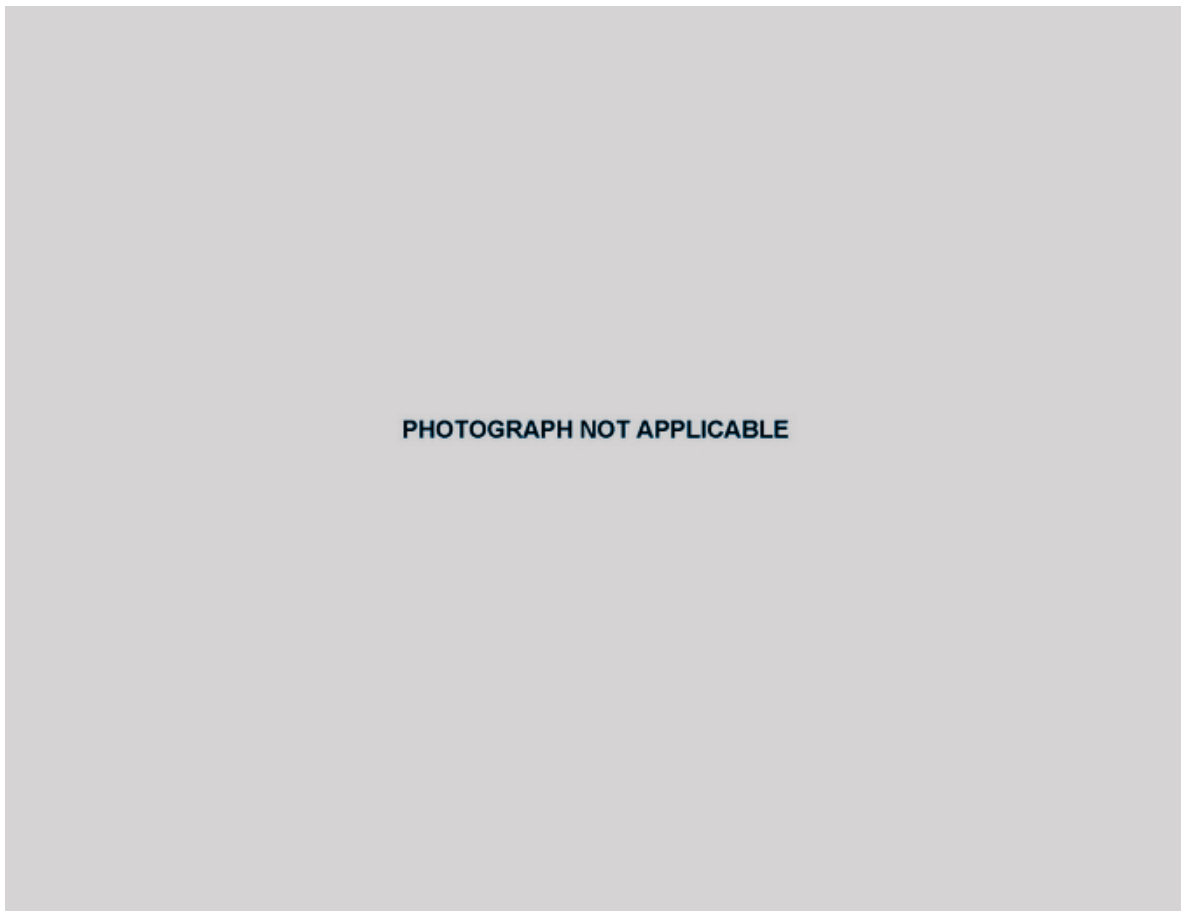
Post-Test Right Side View of MDB Impactor Face



Close-Up View of Vehicle's Certification Label



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



Pre-Test Ballast View



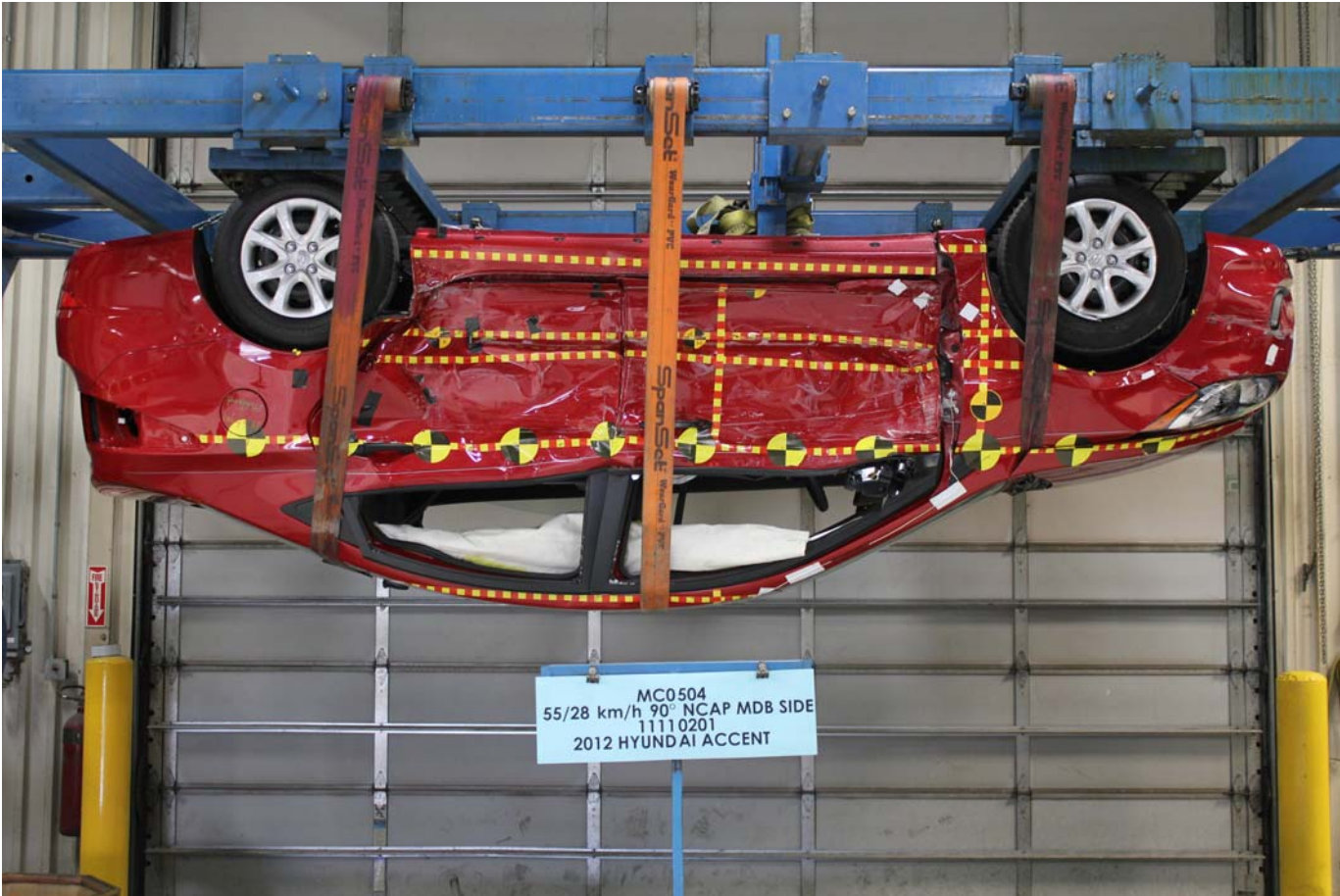
Post-Test Primary and Redundant Speed Trap Read-Out



FMVSS No. 301 Static Rollover 0 Degrees



FMVSS No. 301 Static Rollover 90 Degrees



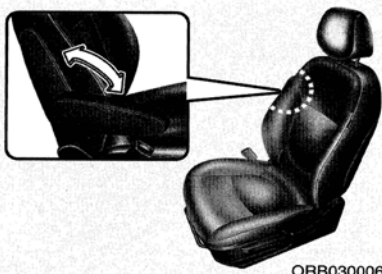
FMVSS No. 301 Static Rollover 180 Degrees



FMVSS No. 301 Static Rollover 270 Degrees



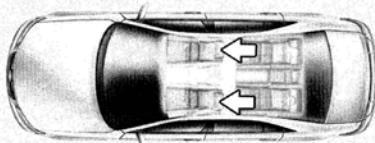
FMVSS No. 301 Static Rollover 360 Degrees



ORB030006

**Armrest (for driver's seat)
(if equipped)**

To use the armrest, swing down the armrest to the lowest position.



OMG038400

Headrest

The driver's and front passenger's seats are equipped with a headrest for the occupant's safety and comfort.

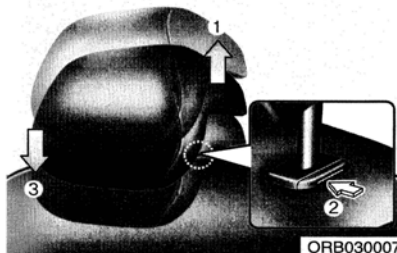
The headrest not only provides comfort for the driver and front passenger, but also helps to protect the head and neck in the event of a collision.

⚠ WARNING

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

3 | 6

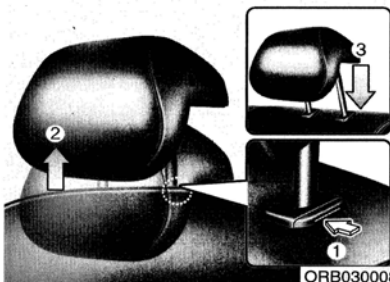
Driver Head Restraint Use and Adjustment Information from Vehicle Owner's Manual



ORB030007

Adjusting the height up and down

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



ORB030008

Removal

To remove the headrest, raise it as far as it can go then press the release button (1) while pulling upward (2).

To reinstall the headrest, put the headrest poles (3) into the holes while pressing the release button (1). Then adjust it to the appropriate height.

⚠ WARNING

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



HNF2041-1

Active headrest (if equipped)

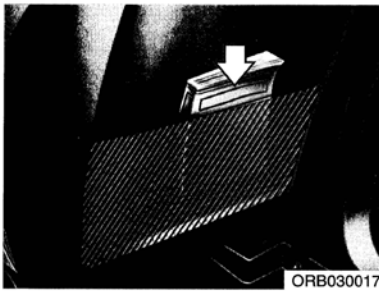
The active headrest is designed to move forward and upward during a rear impact. This helps to prevent the driver's and front passenger's head from moving rearward and thus helps prevent neck injuries.

⚠ WARNING

A gap between the seat and the headrest release button may appear when seating on the seat or when you push or pull the seat. Be careful not to get your finger, etc. caught in the gap.

3 | 7

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



ORB030017

Seatback pocket (if equipped)

The seatback pocket is provided on the back of the front passenger's and driver's seatbacks.

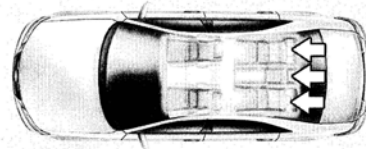
WARNING - Seatback pockets

Do not put heavy or sharp objects in the seatback pockets. In an accident they could come loose from the pocket and injure vehicle occupants.

WARNING

For proper operation of the occupant detection system:

- Do not place any items cumulatively weighing over 2.2 lbs (1 kg) in the seatback pocket or on the seat.
- Do not hang onto the front passenger seat.



ONF039401

Rear seat

Headrest

The rear seat(s) is equipped with headrests in all the seating positions for the occupant's safety and comfort.

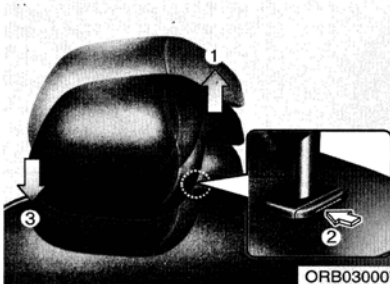
The headrest not only provides comfort for passengers, but also helps to protect the head and neck in the event of a collision.

3:8

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

WARNING

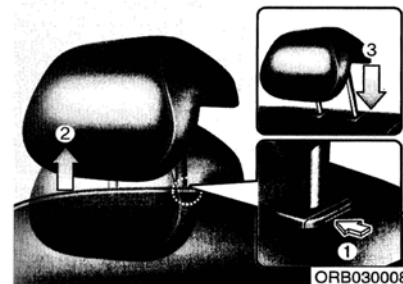
- For maximum effectiveness in case of an accident, the headrest should be adjusted so the middle of the headrest is at the same height of the center of gravity of an occupant's head. Generally, the center of gravity of most people's head is similar with the height of the top of their eyes. Also adjust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



ORB030007

Adjusting the height up and down

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



ORB030008

Removal

To remove the headrest, raise it as far as it can go then press the release button (1) while pulling upward (2).

To reinstall the headrest, put the headrest poles (3) into the holes while pressing the release button (1). Then adjust it to the appropriate height.

WARNING

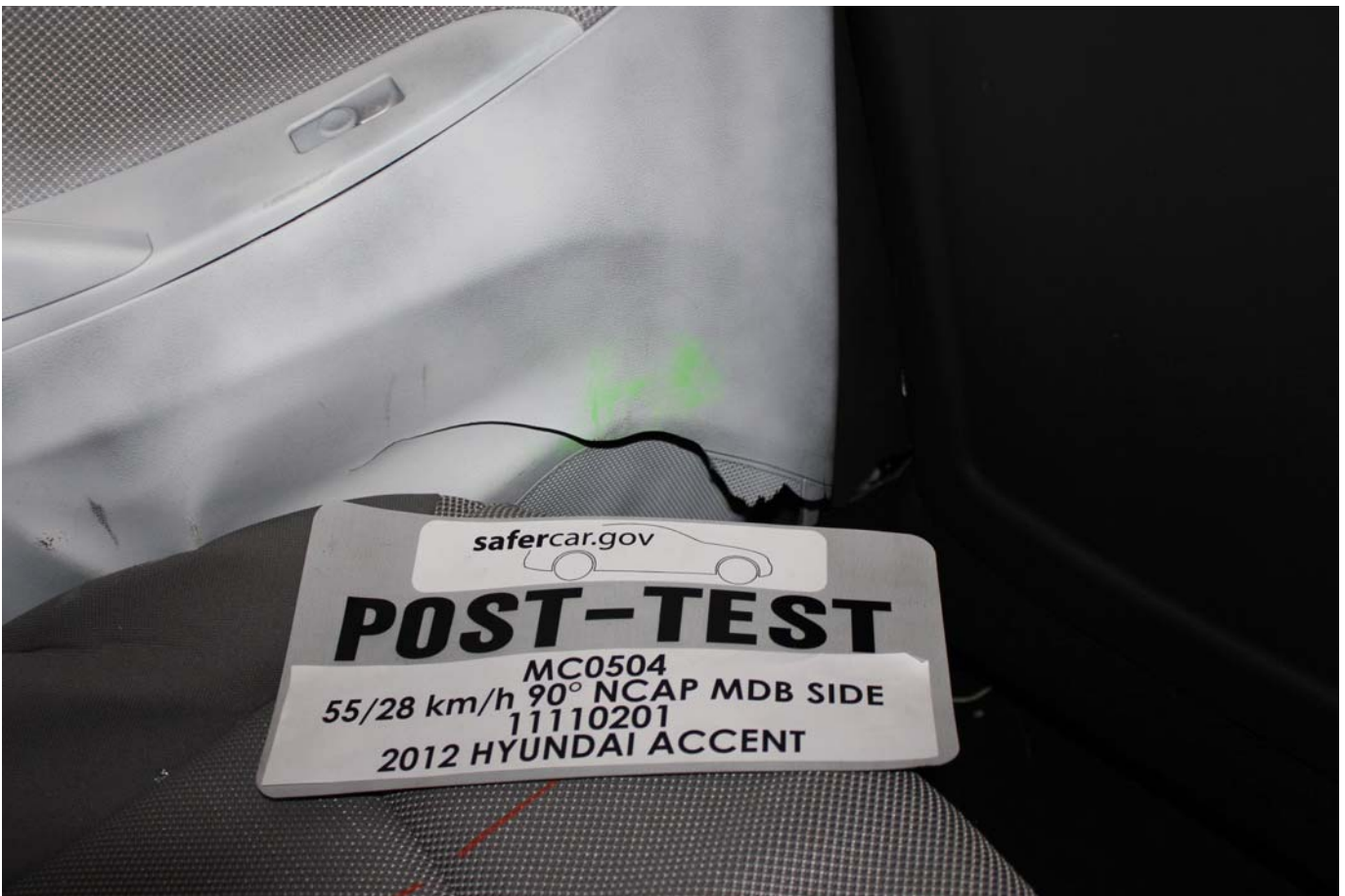
Make sure the headrest locks in position after adjusting it to properly protect the occupants.

3:9

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



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



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

APPENDIX B
DUMMY RESPONSE DATA PLOTS

TABLE OF DATA PLOTS
Driver Dummy Instrumentation Plots

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Figure No. 1.	Driver Head Acceleration (X) Primary vs. Time	B-1
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Figure No. 4.	Driver Head Resultant Acceleration Primary vs. Time	B-1
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Figure No. 8.	Driver Thorax Rib Deflection Maximum vs. Time	B-2
Figure No. 9.	Driver Anterior Abdomen Force (Y) vs. Time	B-3
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Figure No. 11.	Driver Posterior Abdomen Force (Y) vs. Time	B-3
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Figure No. 13.	Driver Pubic Symphysis Force (Y) vs. Time	B-4
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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
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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)

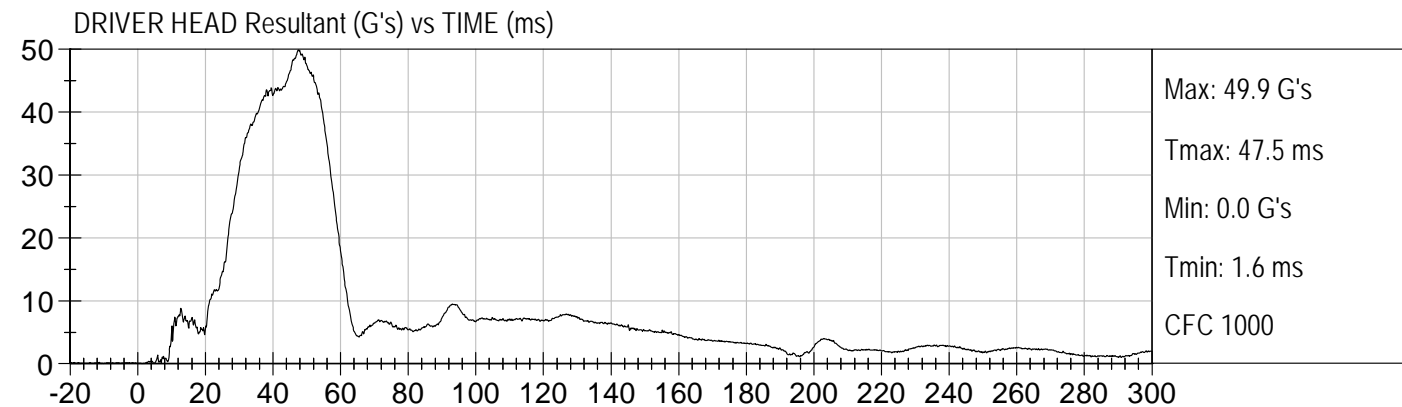
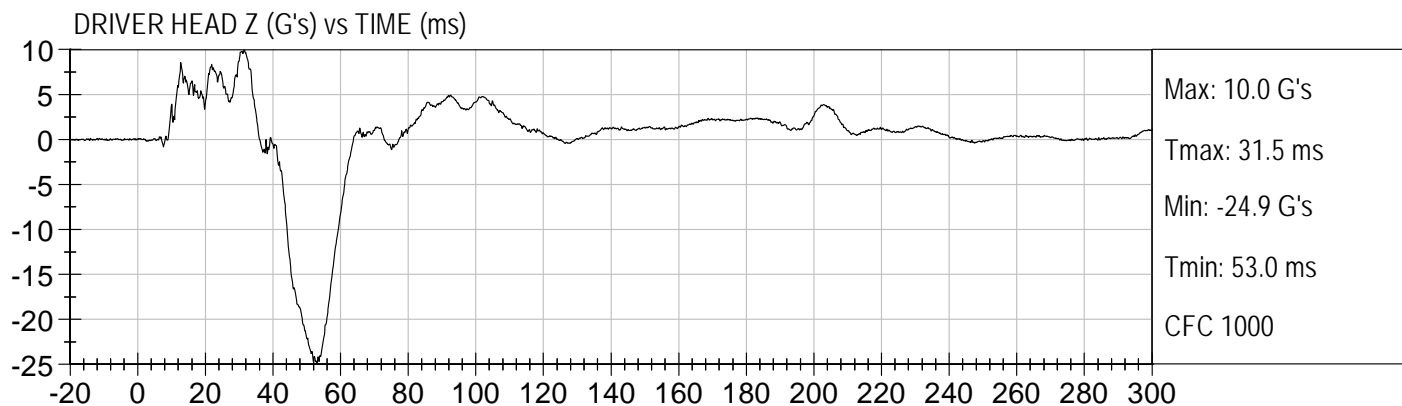
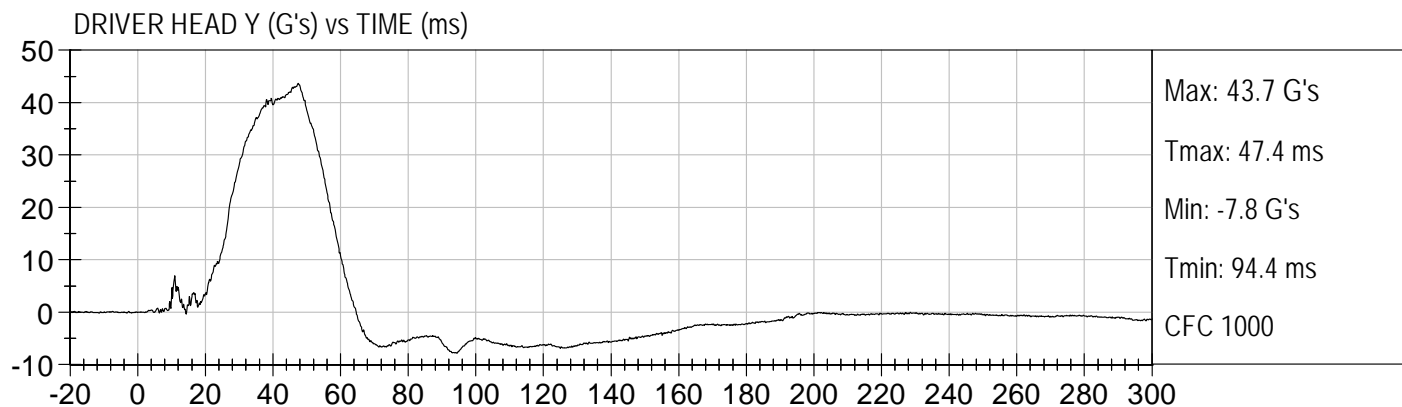
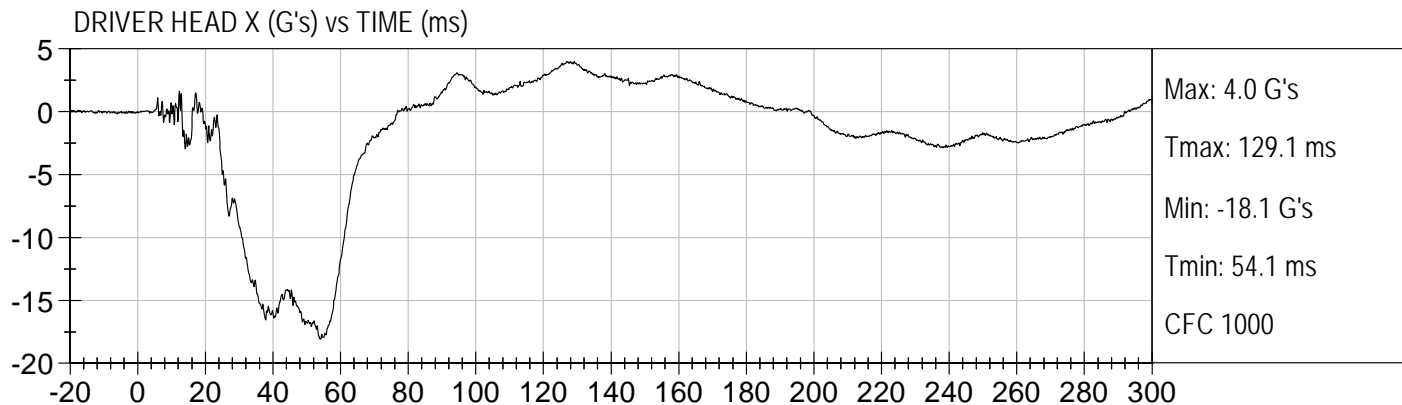
Vehicle Instrumentation Data

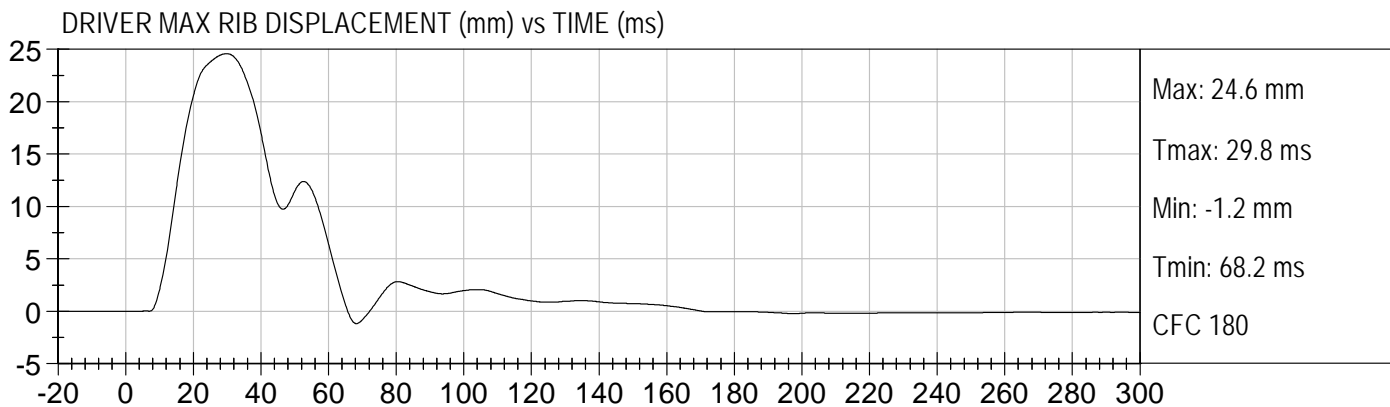
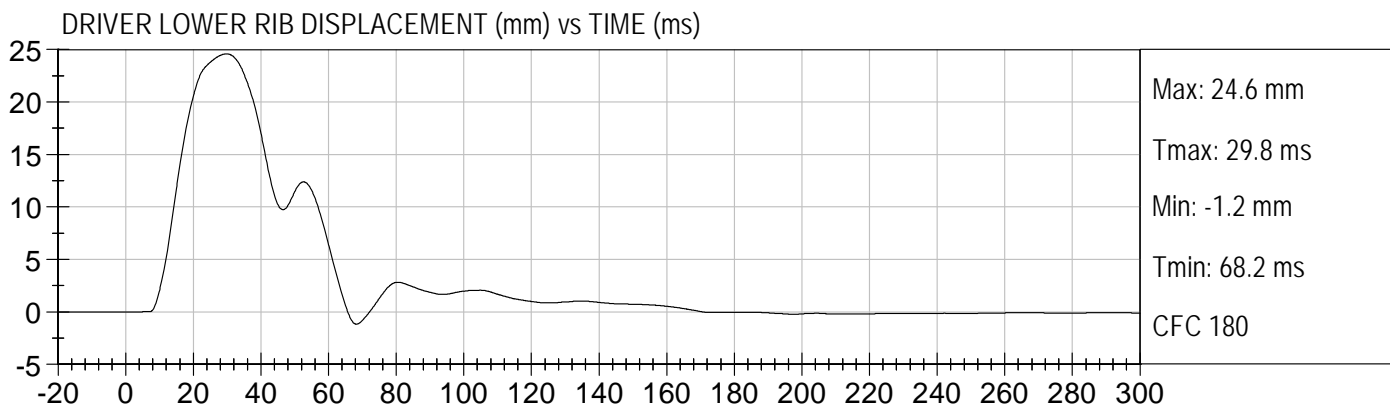
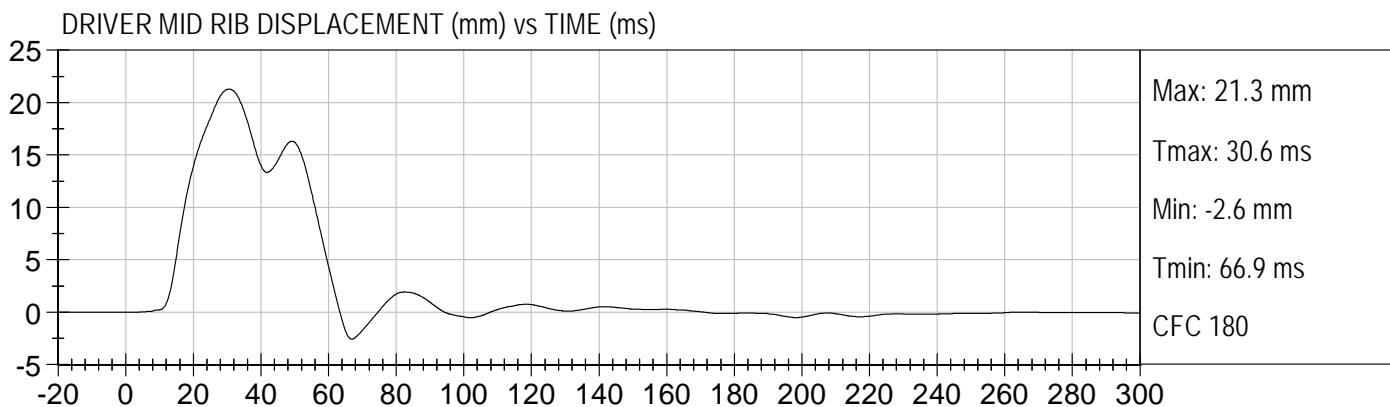
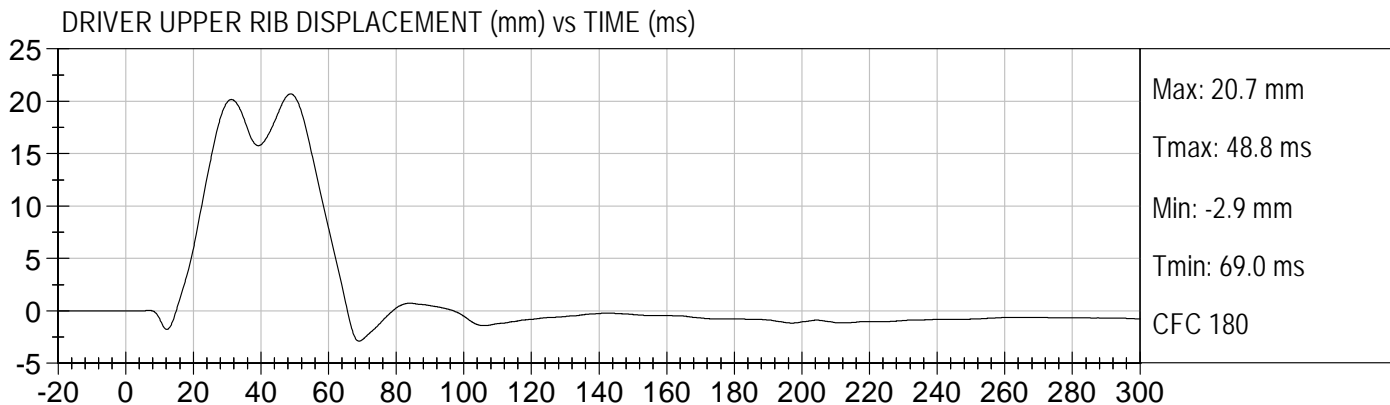
Vehicle Center of Gravity Acceleration (X)
Vehicle Center of Gravity Acceleration (Y)
Vehicle Center of Gravity Acceleration (Z)
Right Side Sill at Front Seat Acceleration (X)
Right Side Sill at Front Seat Acceleration (Y)
Right Side Sill at Front Seat Acceleration (Z)
Right Side Sill at Rear Seat Acceleration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

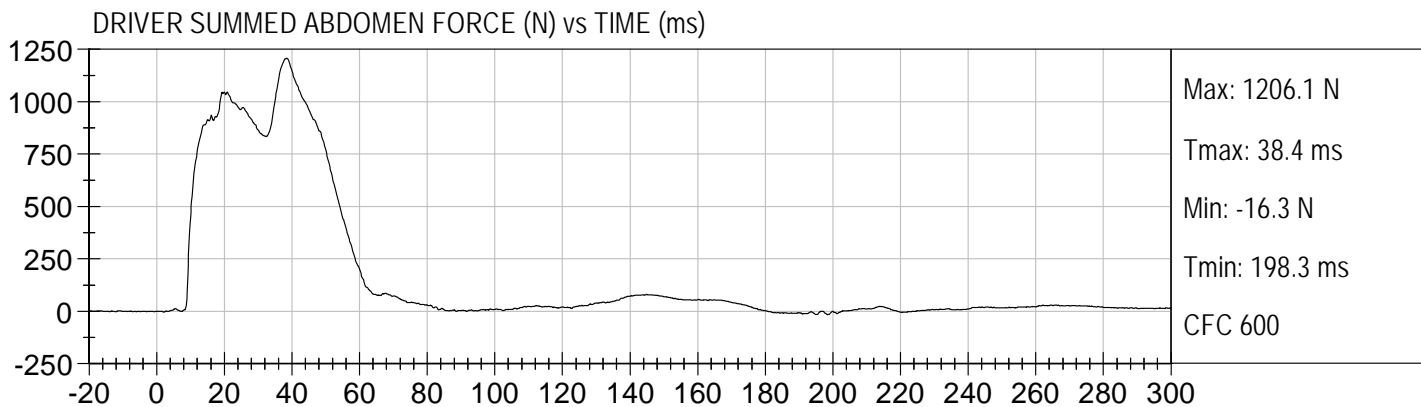
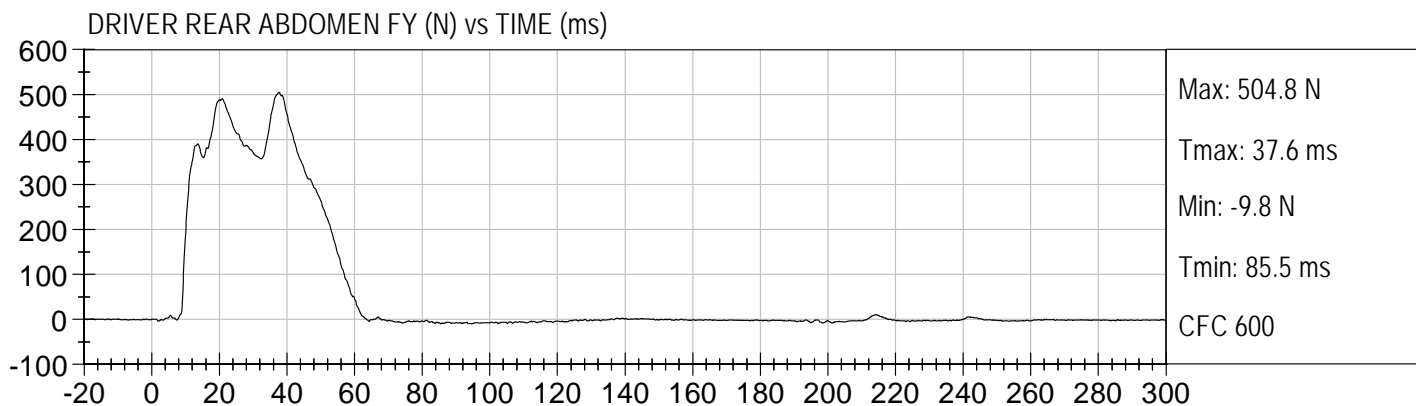
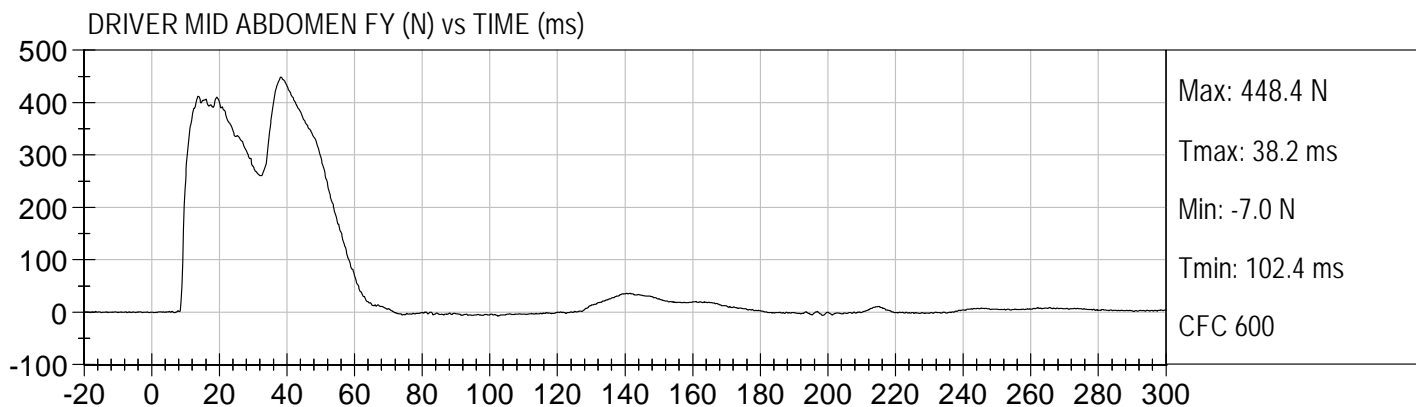
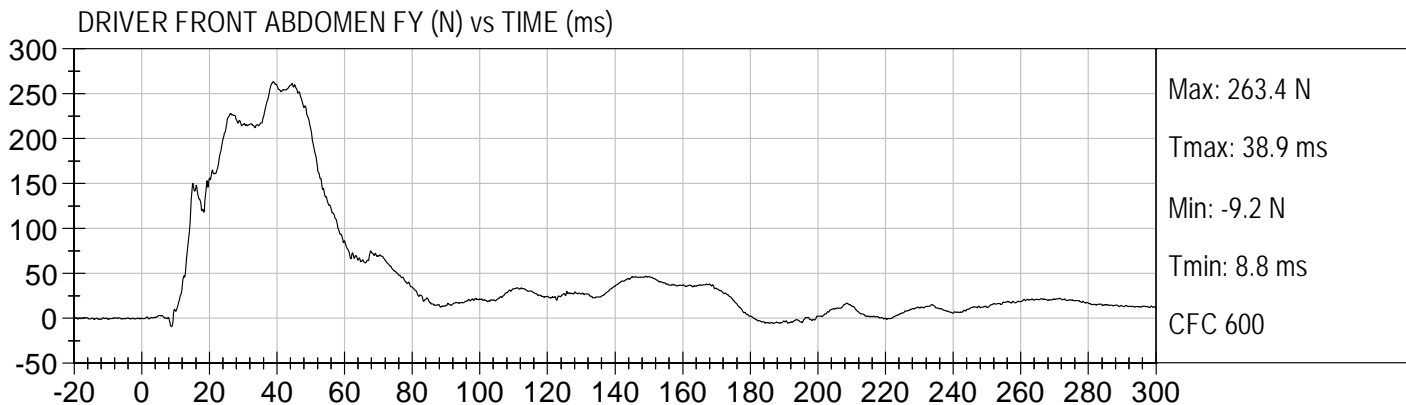
Left Side Sill at Front Seat Acceleration (Y)
Left Side Sill at Rear Seat Acceleration (Y)
Lower A-Post Acceleration (Y)
Middle A-Post Acceleration (Y)
Lower B-Post Acceleration (Y)
Middle B-Post Acceleration (Y)
Front Seat Track Acceleration (Y)
Rear Seat Track Acceleration (Y)
Right Rear Occupant Compartment 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)

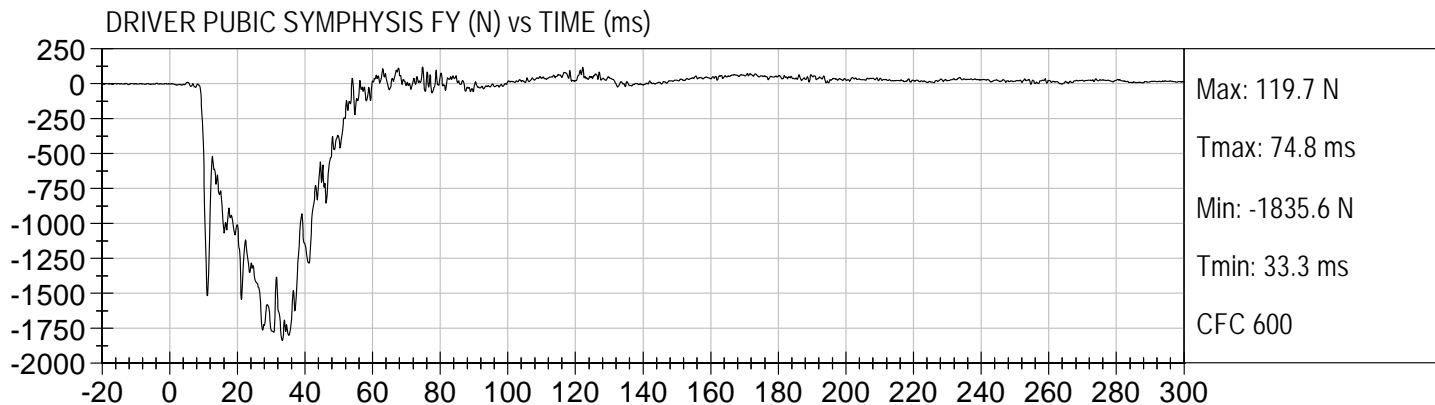
MDB Instrumentation Data

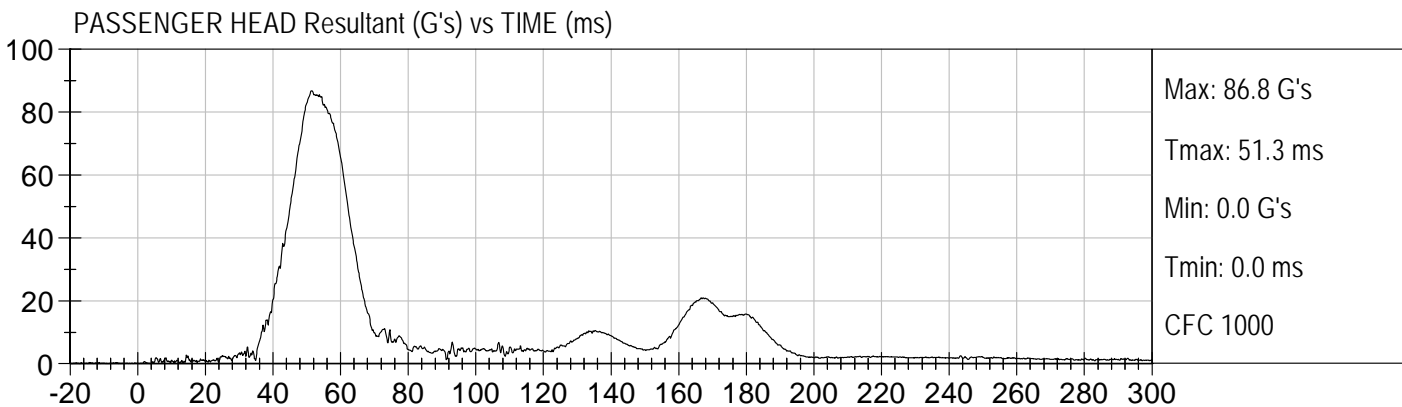
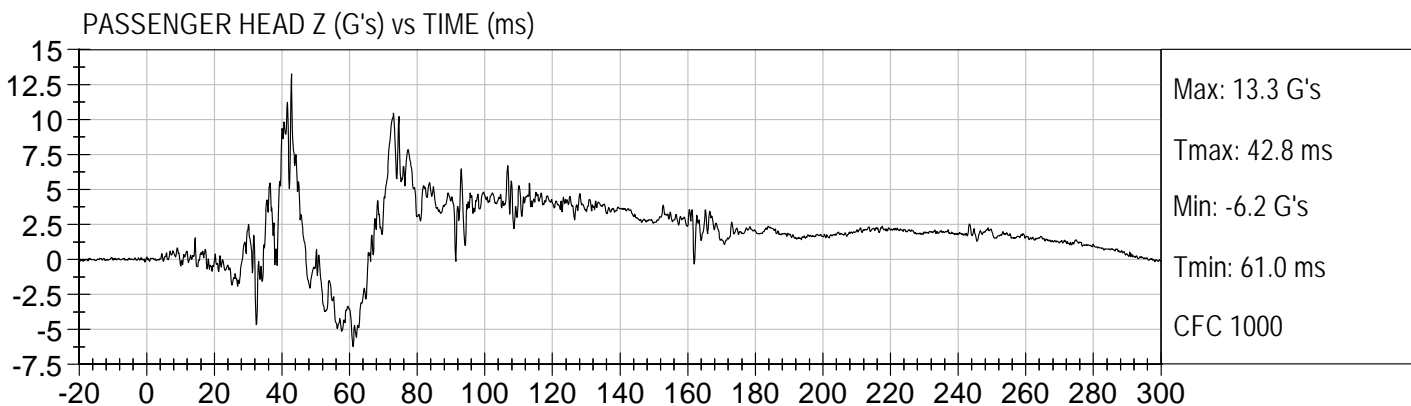
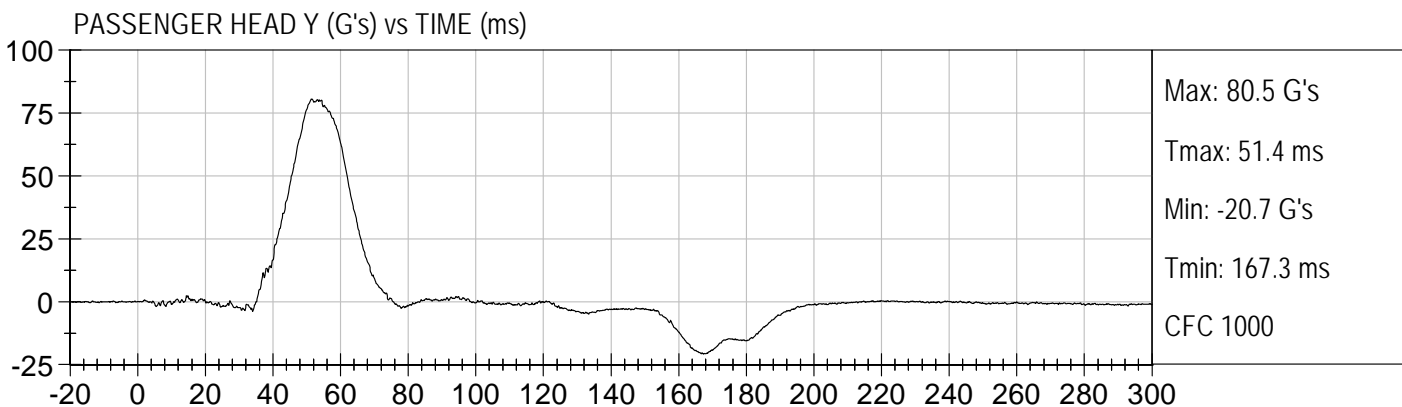
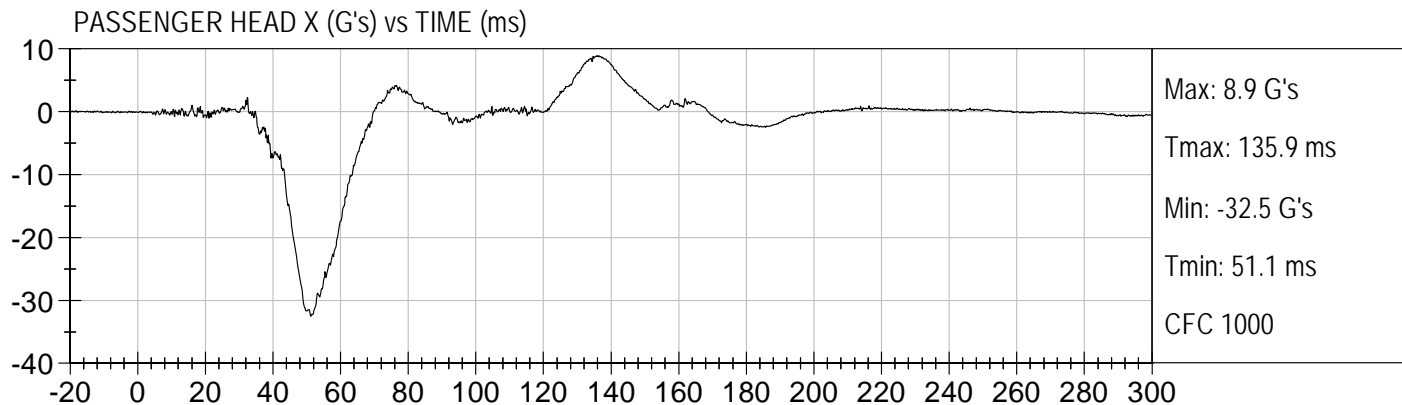
MDB Center of Gravity Acceleration (X)
MDB Center of Gravity Acceleration (Y)
MDB Center of Gravity Acceleration (Z)
MDB Rear Acceleration (X)
MDB Rear Acceleration (Y)
Left MDB Contact Switch
Right MDB Contact Switch

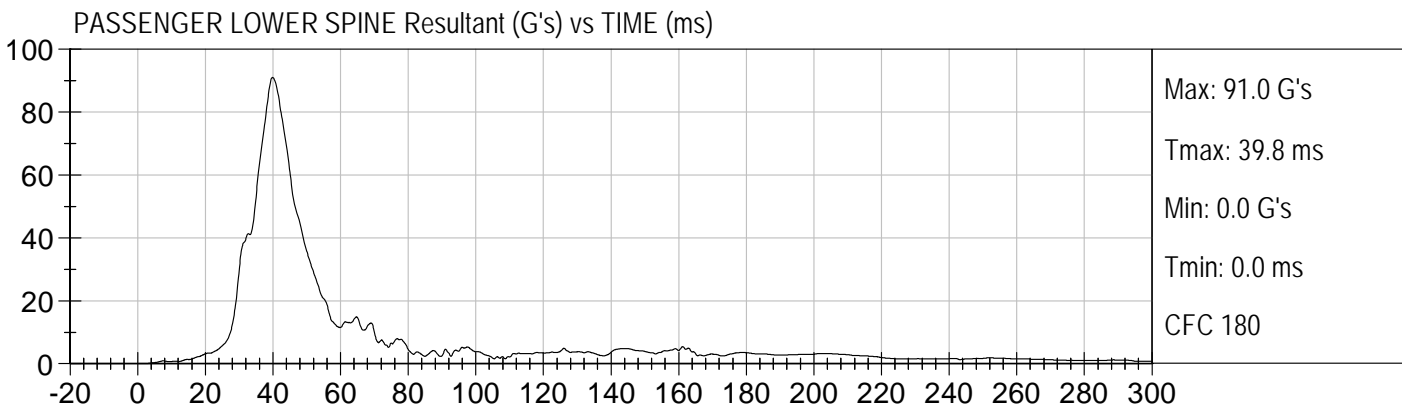
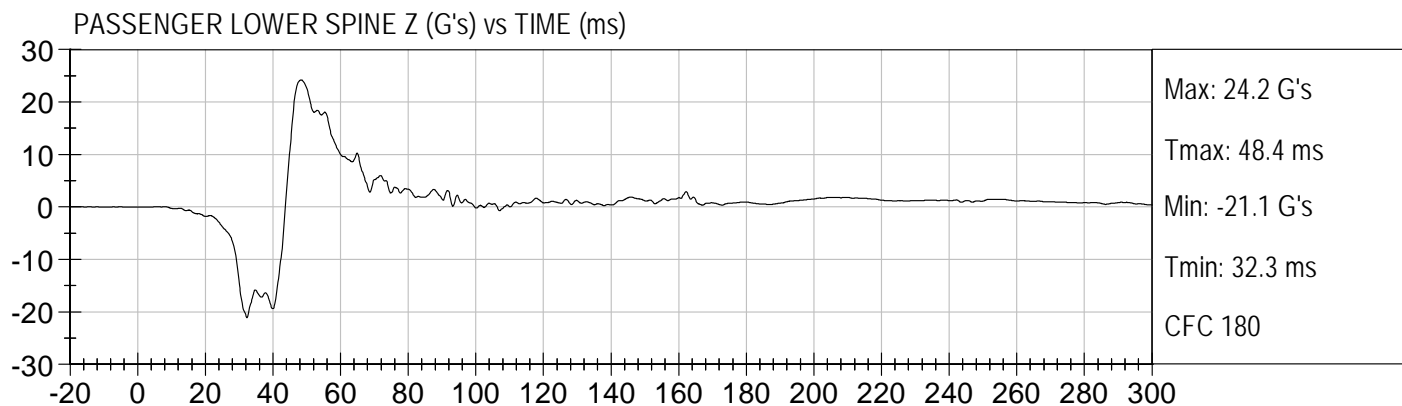
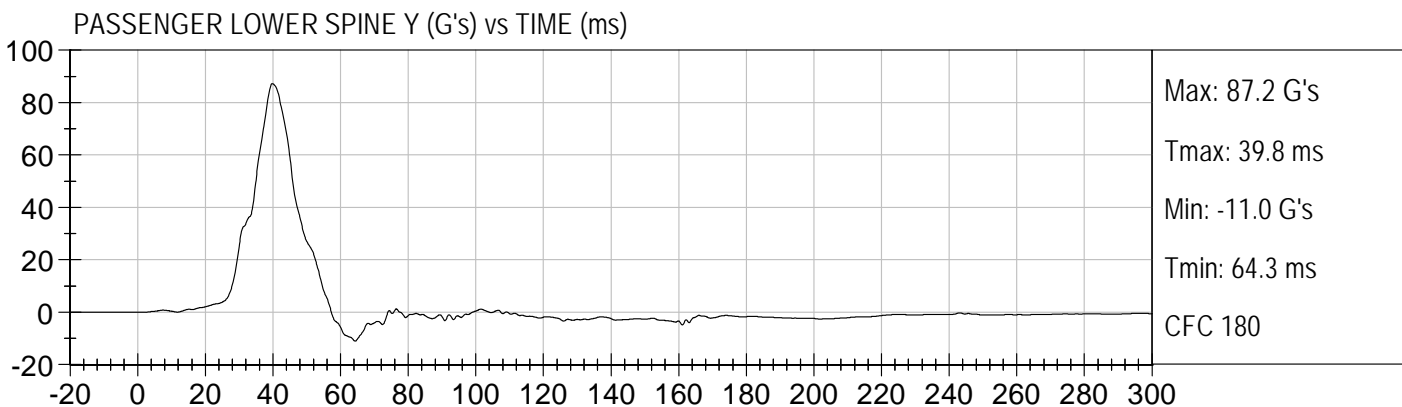
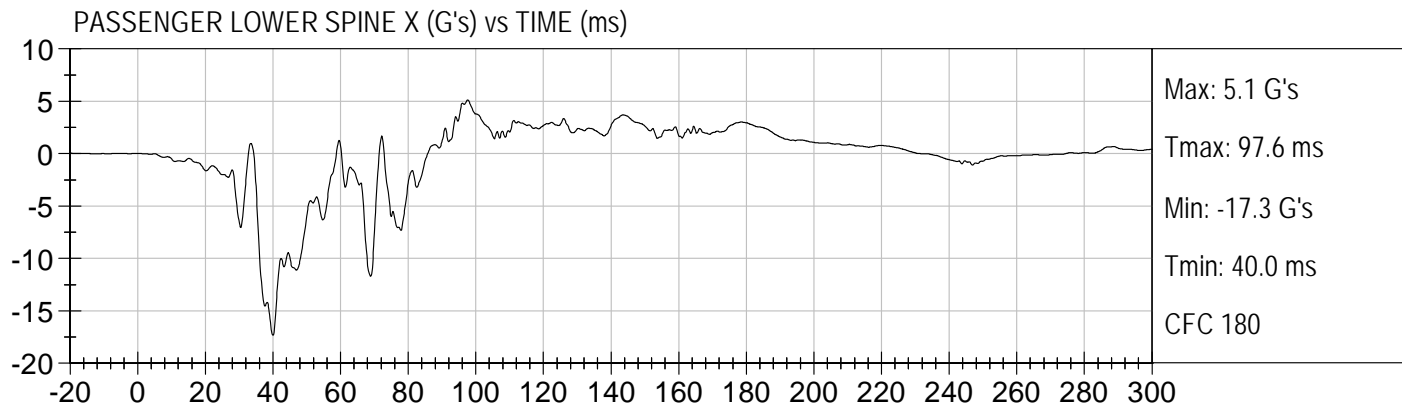


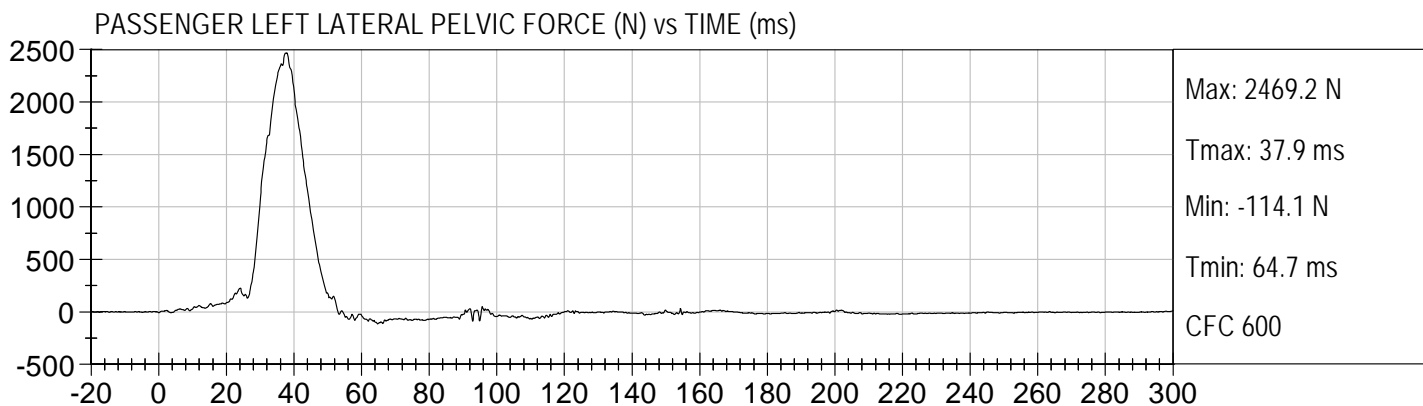
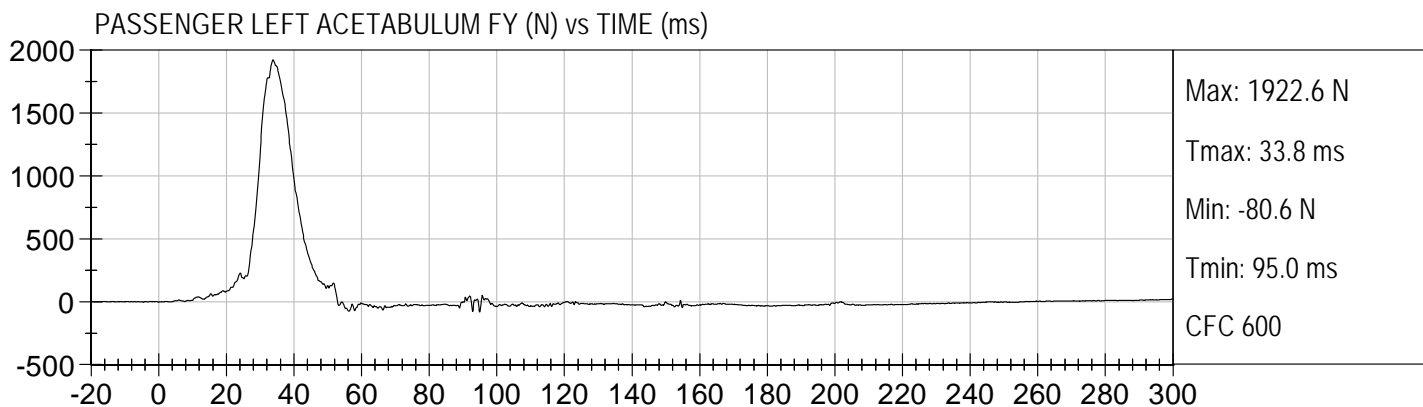
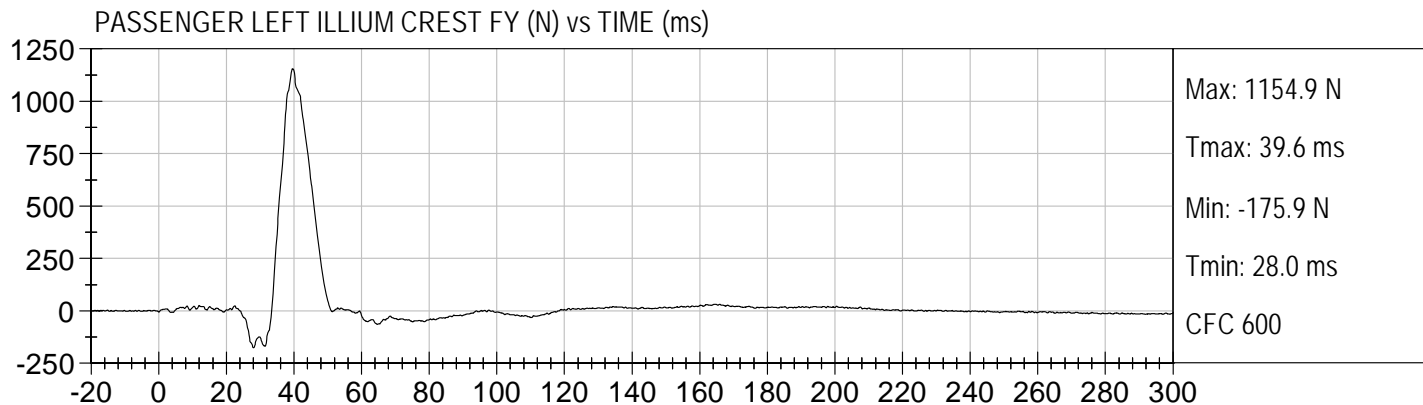












APPENDIX C

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: 032

Test ID: D113561

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	22.1	Pass
Laboratory Relative Humidity	%	10 to 70	35	Pass
Peak Resultant Acceleration	G's	125 to 155	147	Pass
Peak Lateral Acceleration	G's	+/- 15	-11.2	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 15% of peak	Yes	Pass
Overall Test Results				Pass

Jessica Hall
 Laboratory Technician

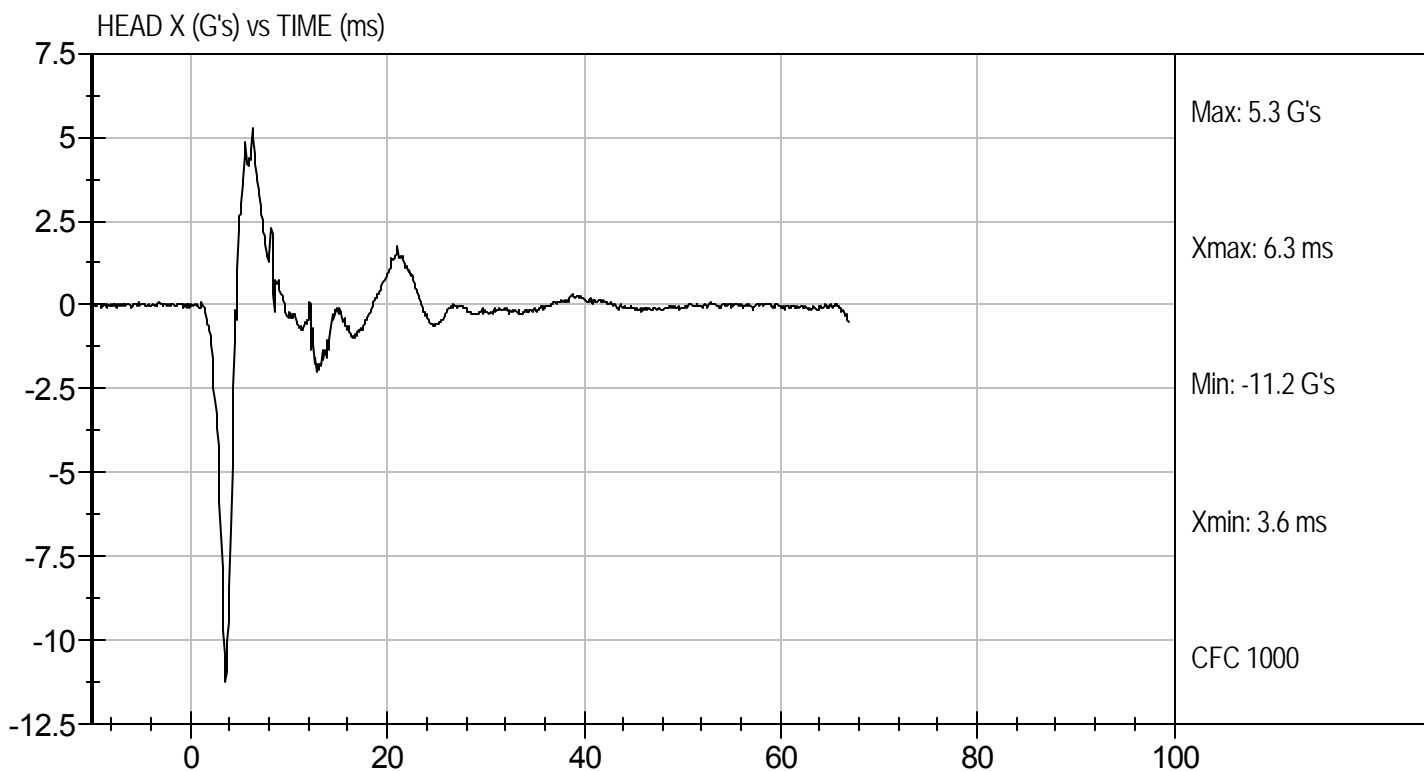
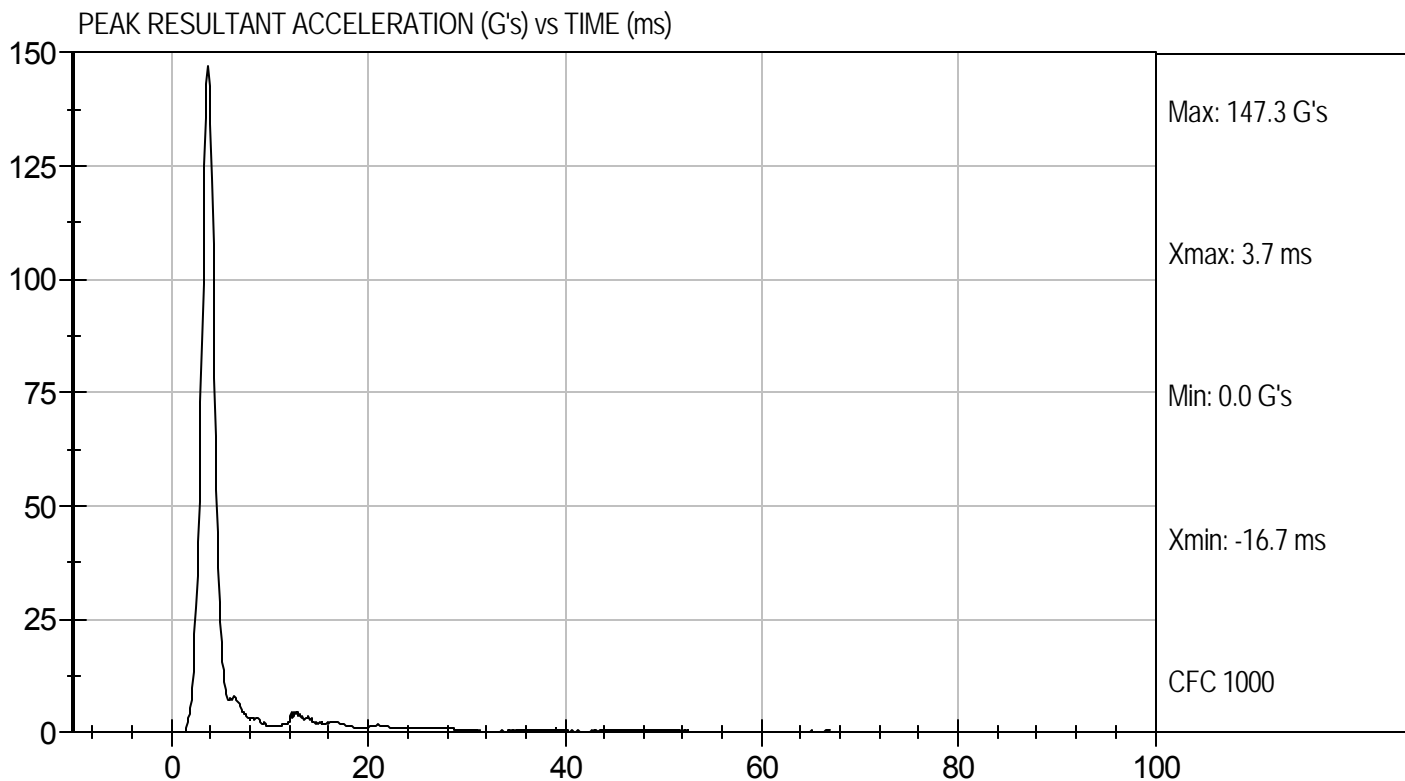
10/26/11
 Test Date

David Winkelbauer
 Approved By



Test Desc: Head Drop
Component ID: D113561

Test Date: 10/26/11
Velocity: 0 ft/s, 0 m/s



**MGA RESEARCH CORPORATION
NECK PENDULUM TEST
ES-2re DUMMY**

ATD Serial No: 032

Test I.D.: D113562

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	18.0 to 22.0	21.9	Pass
Laboratory Relative Humidity		%	10 to 70	36	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	-3.27	Pass
Maximum Flexion Angle		deg	49.0 to 59.0	54.6	Pass
Time of Maximum Flexion Angle		ms	54.0 to 66.0	63.2	Pass
Head Rotation Decay Time to 0 degree		ms	53.0 to 88.0	61.6	Pass
Overall Test Results					Pass

Jessica Hall
Laboratory Technician

10/26/11
Test Date

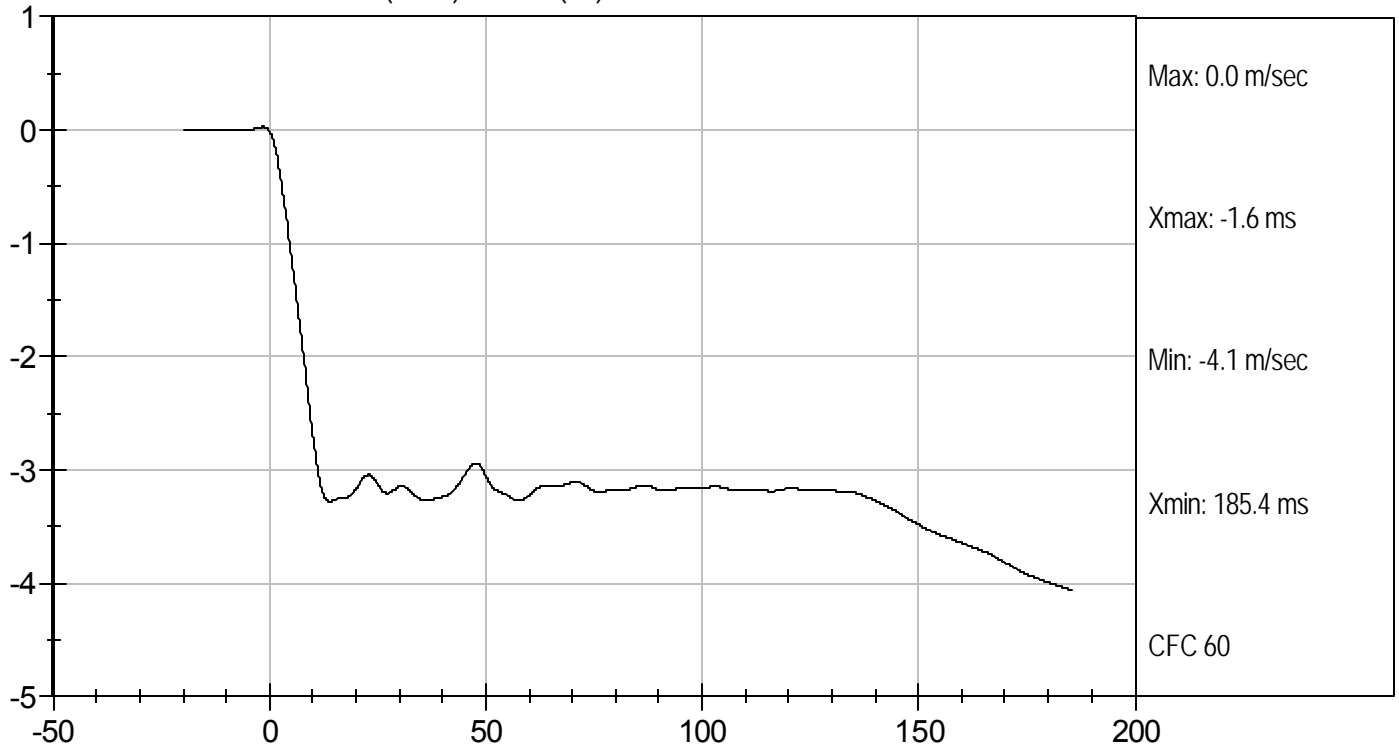
David Winkelbauer
Approved By



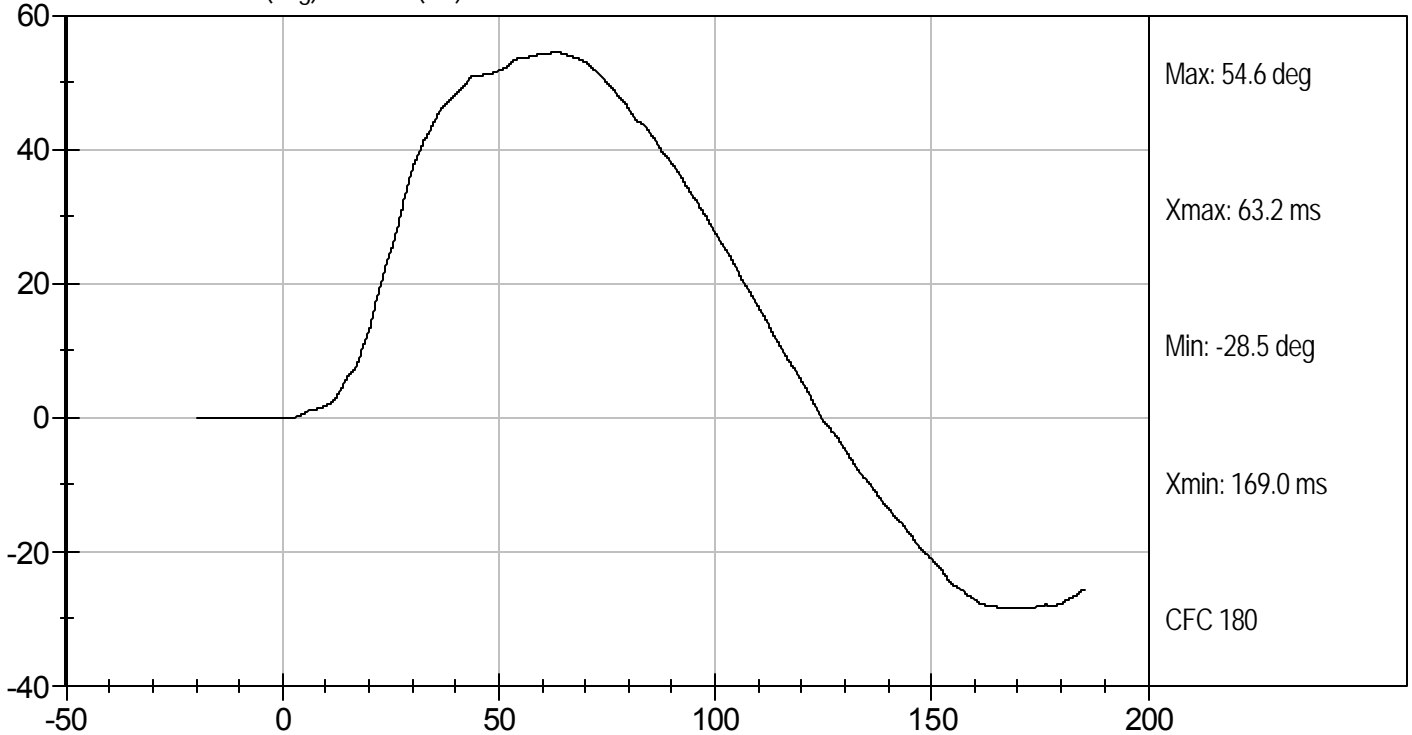
Test Desc: Neck Bending
Component ID: D113562

Test Date: 10/26/11
Velocity: 11.42 ft/s, 3.5 m/s

PENDULUM DECELERATION (m/sec) vs TIME (ms)



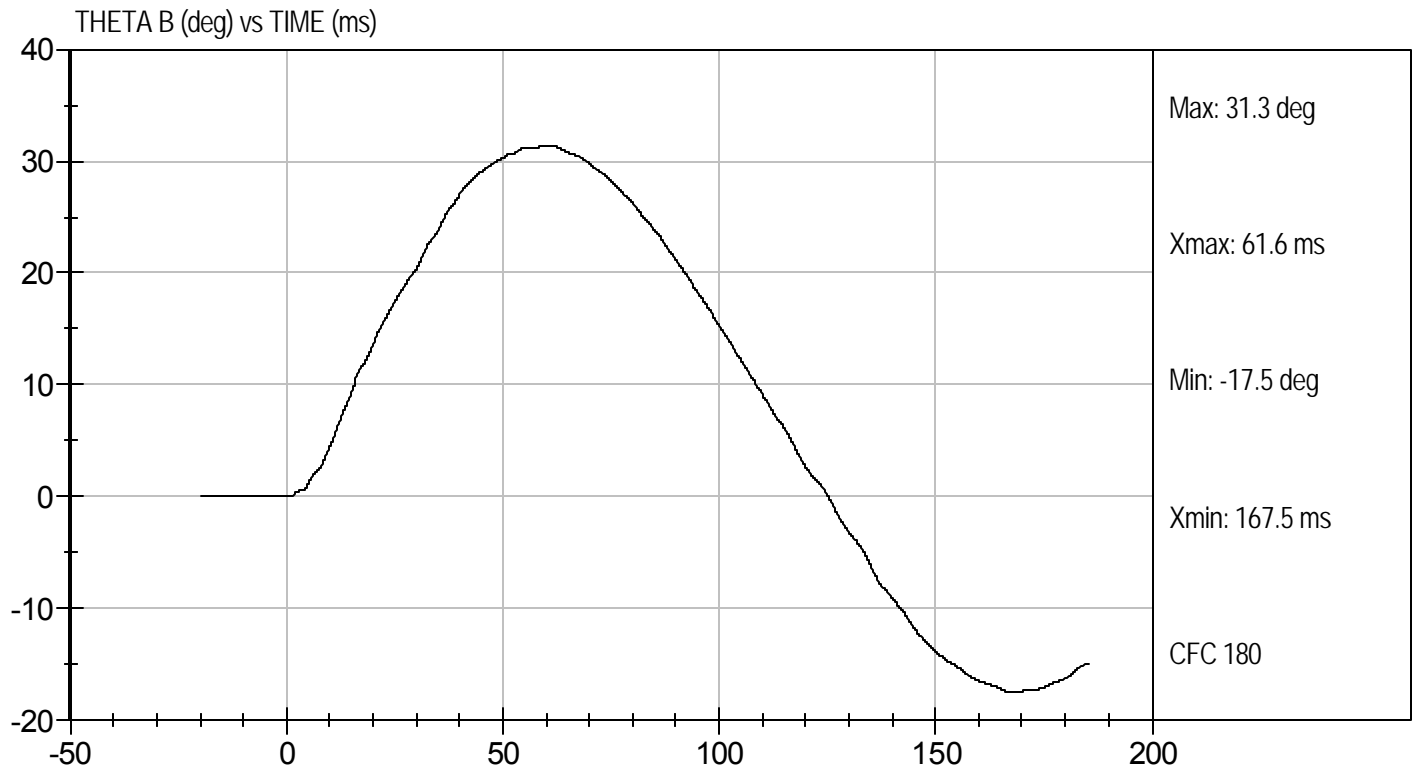
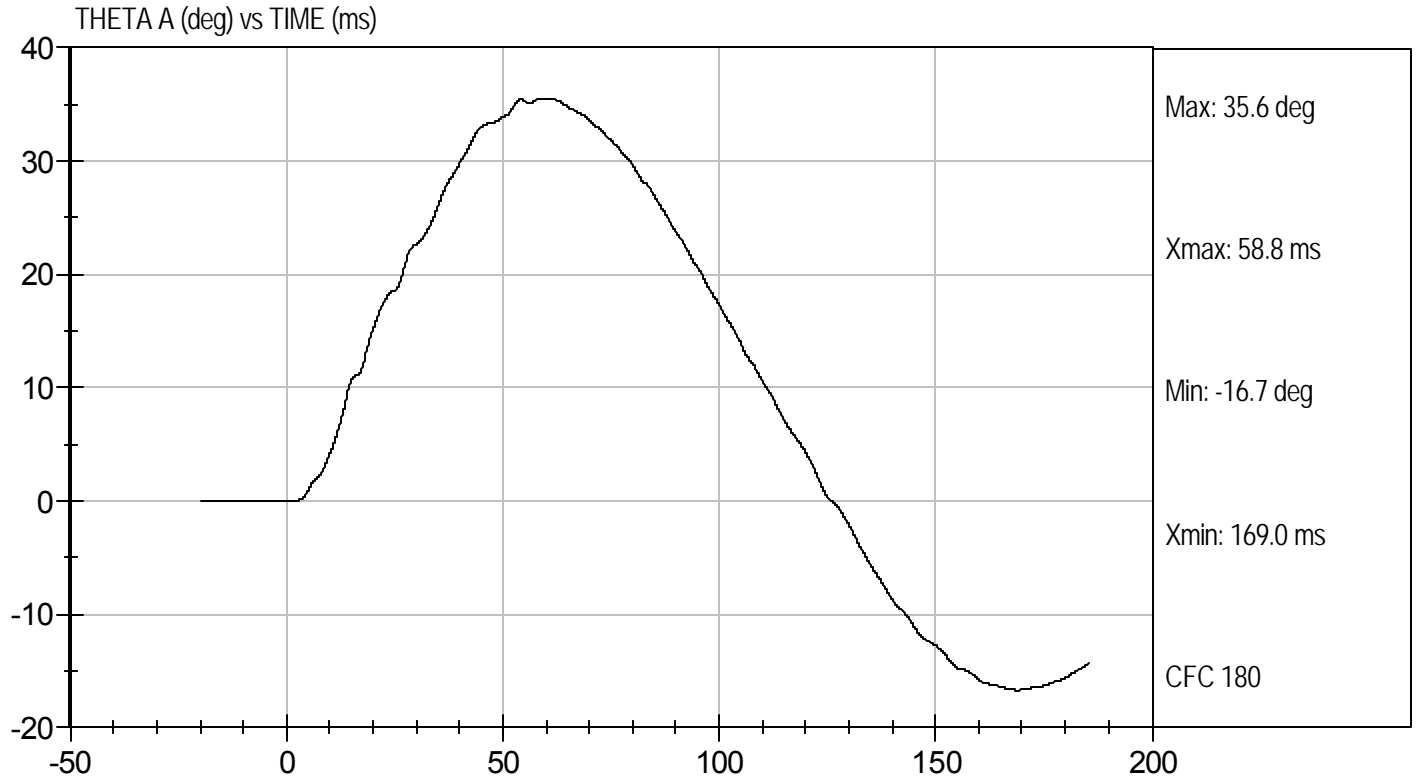
FLEXION ANGLE (deg) vs TIME (ms)





Test Desc: Neck Bending
Component ID: D113562

Test Date: 10/26/11
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: D113563

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	40	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	17.7	Pass
Overall Test Results				Pass

Jessica Gall
 Laboratory Technician

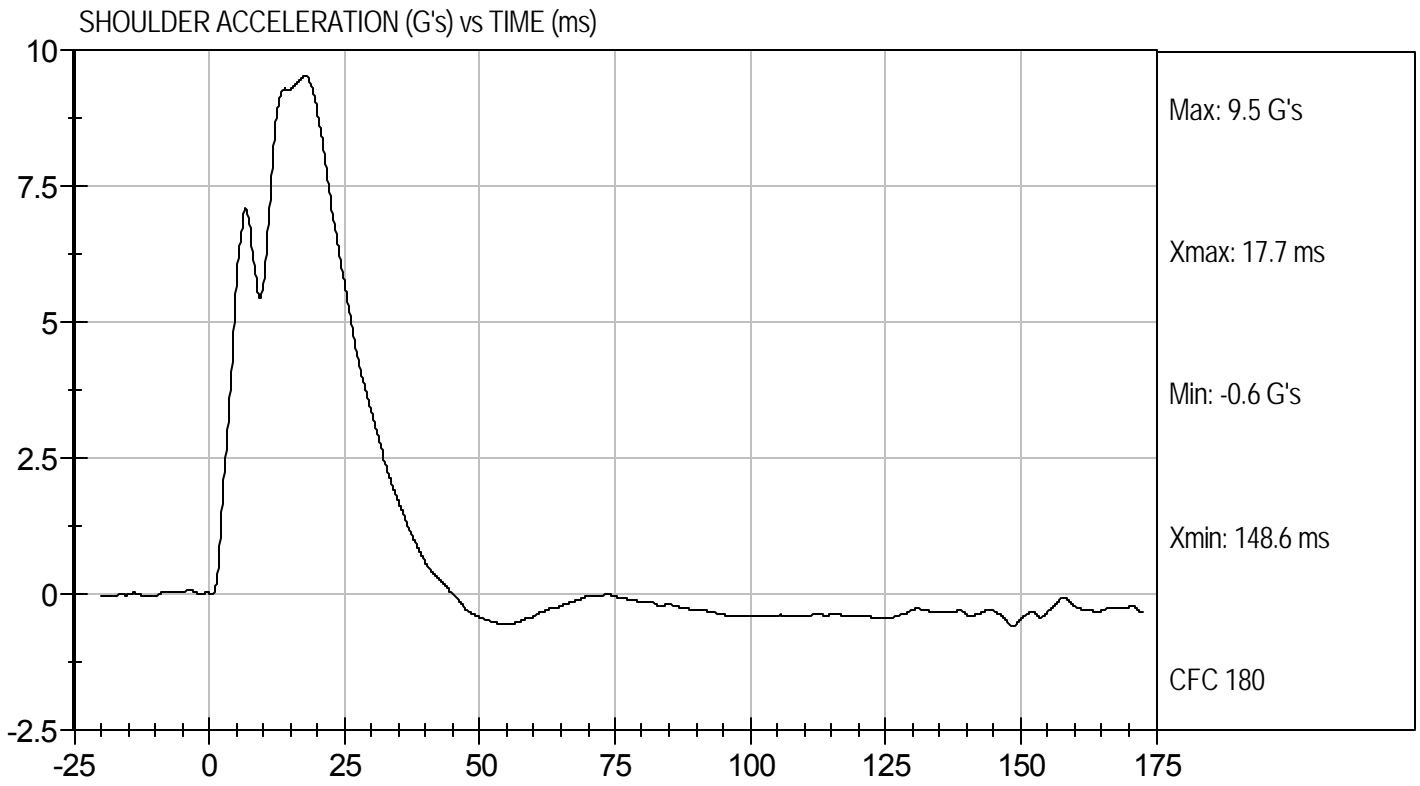
10/25/11
 Test Date

David Winkelbauer
 Approved By



Test Desc: Shoulder Impact
Component ID: D113563

Test Date: 10/25/11
Velocity: 14.24 ft/s, 4.3 m/s



MGA RESEARCH CORPORATION

UPPER RIB TEST

ES-2re DUMMY


ATD Serial No: 032

Test I.D: D113564

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	36	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	48.3	Pass
Overall Test Results				Pass

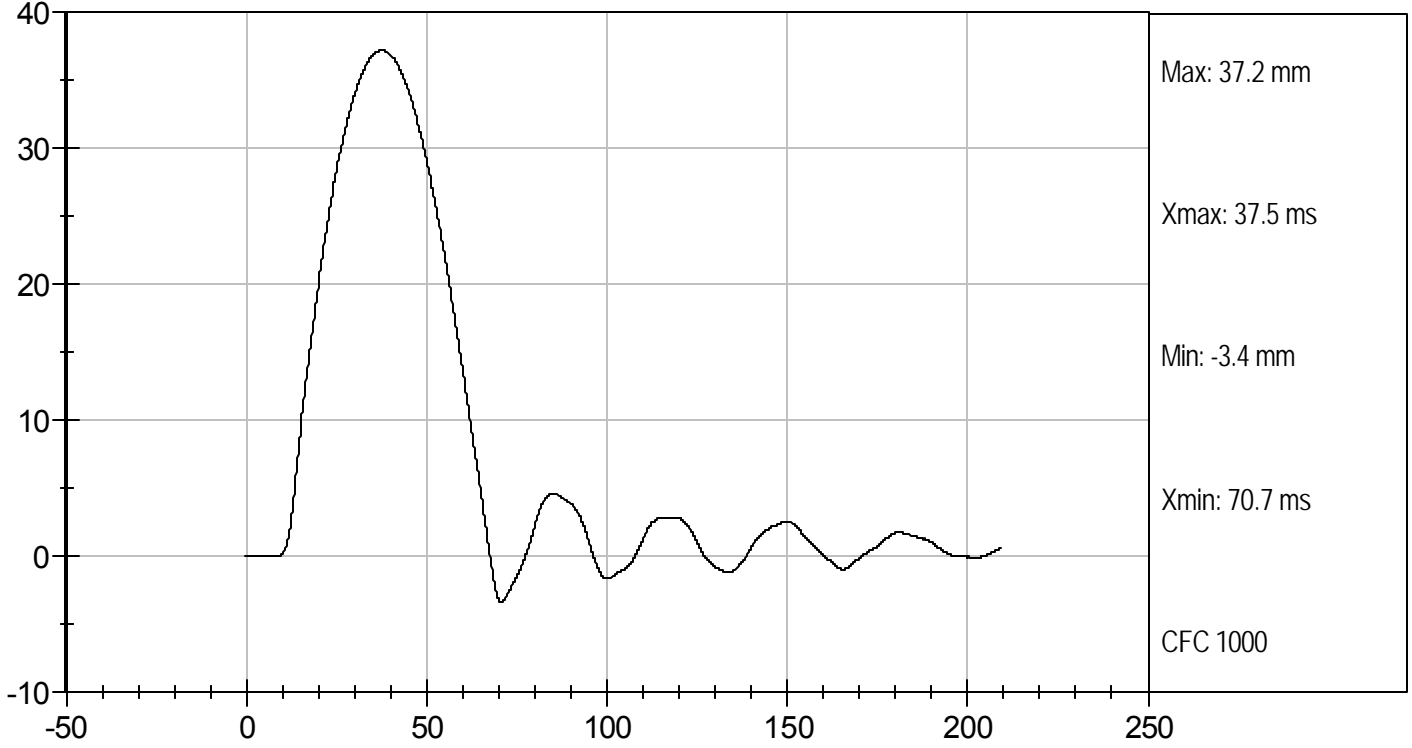

Laboratory Technician

10/26/11
Test Date

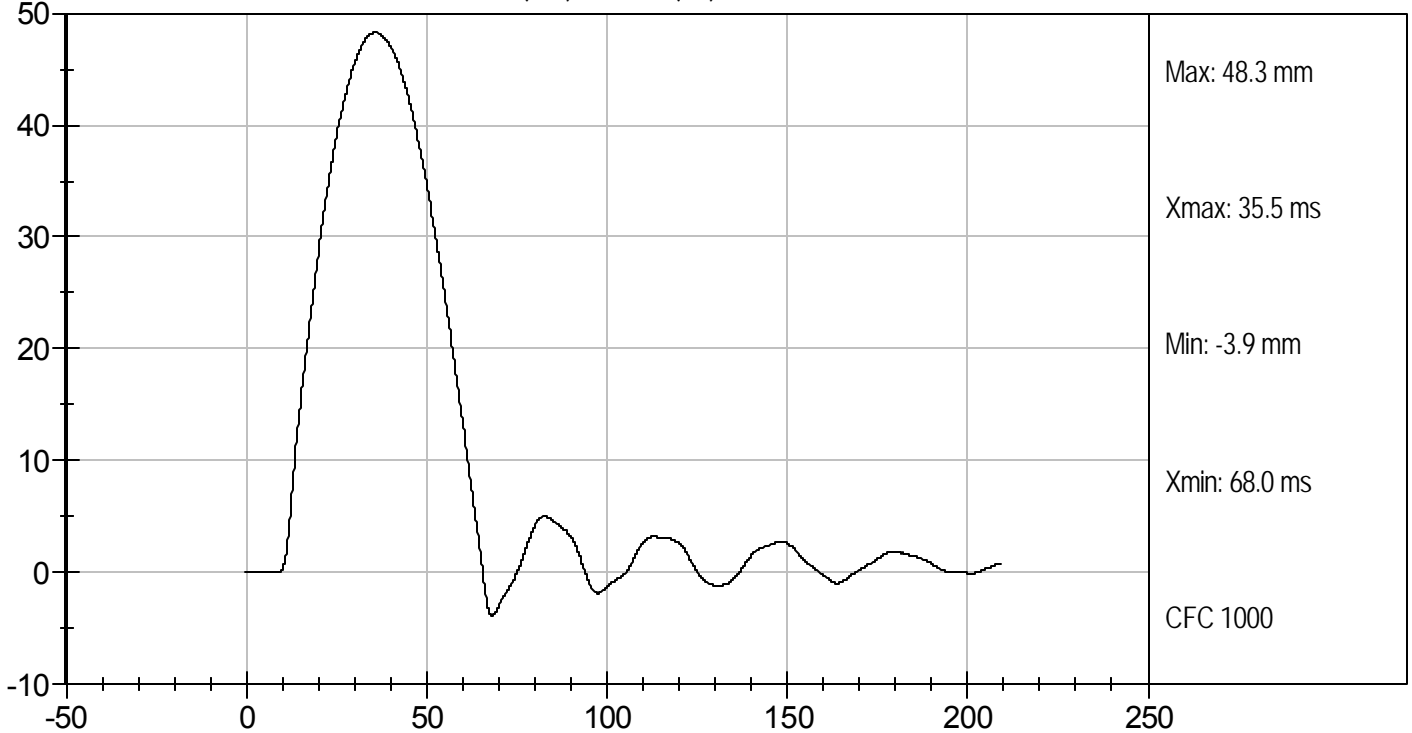

Approved By



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

ES-2re DUMMY

ATD Serial No: 032

Test I.D: D113565

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	36	Pass
Displacement at 3 m/s	mm	36.0 to 40.0	37.1	Pass
Displacement at 4 m/s	mm	46.0 to 51.0	47.7	Pass
Overall Test Results				Pass

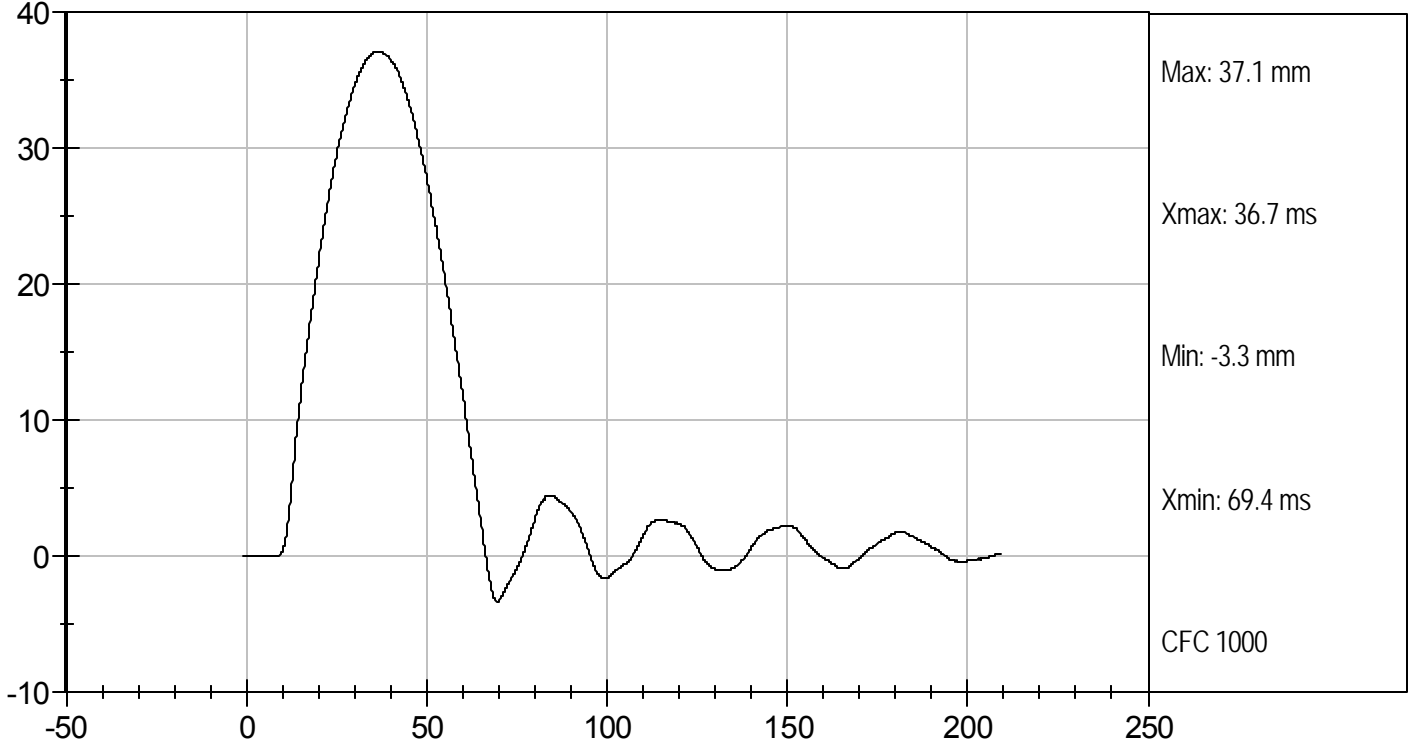
Jessica Hall
Laboratory Technician

10/26/11
Test Date

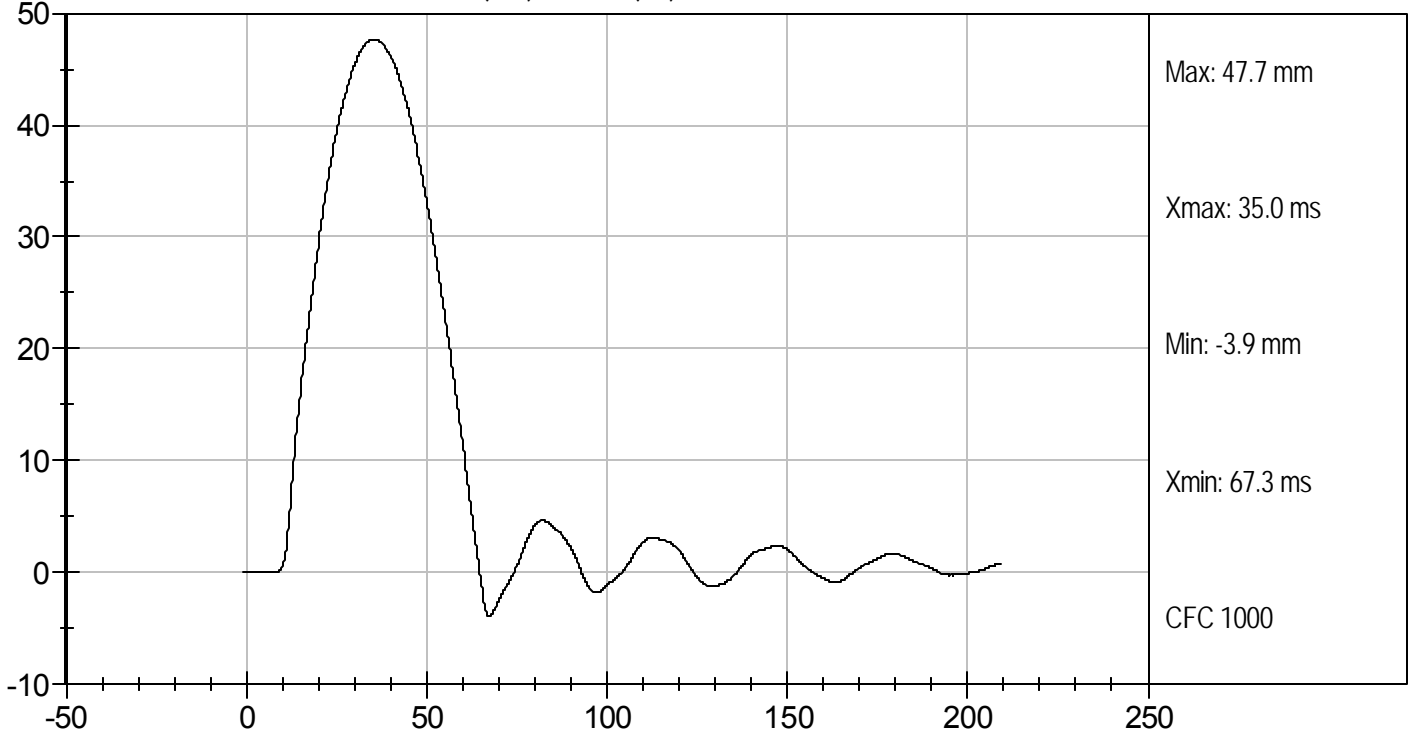
David Winkelbauer
Approved By



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



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



MGA RESEARCH CORPORATION

LOWER RIB TEST

ES-2re DUMMY

ATD Serial No: 032

Test I.D: D113566

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	36	Pass
Displacement at 3 m/s	mm	36.0 to 40.0	37.4	Pass
Displacement at 4 m/s	mm	46.0 to 51.0	48.1	Pass
Overall Test Results				Pass

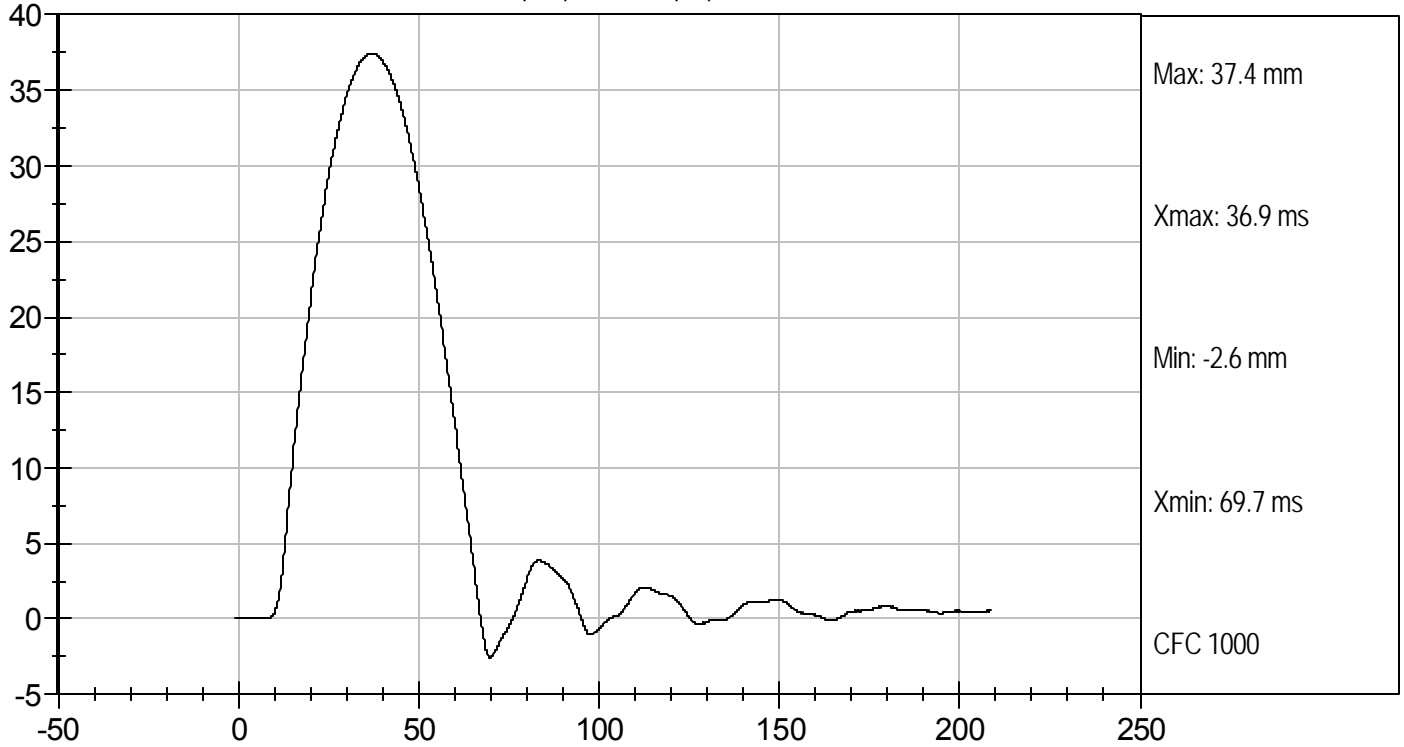
Jessica Gall
Laboratory Technician

10/26/11
Test Date

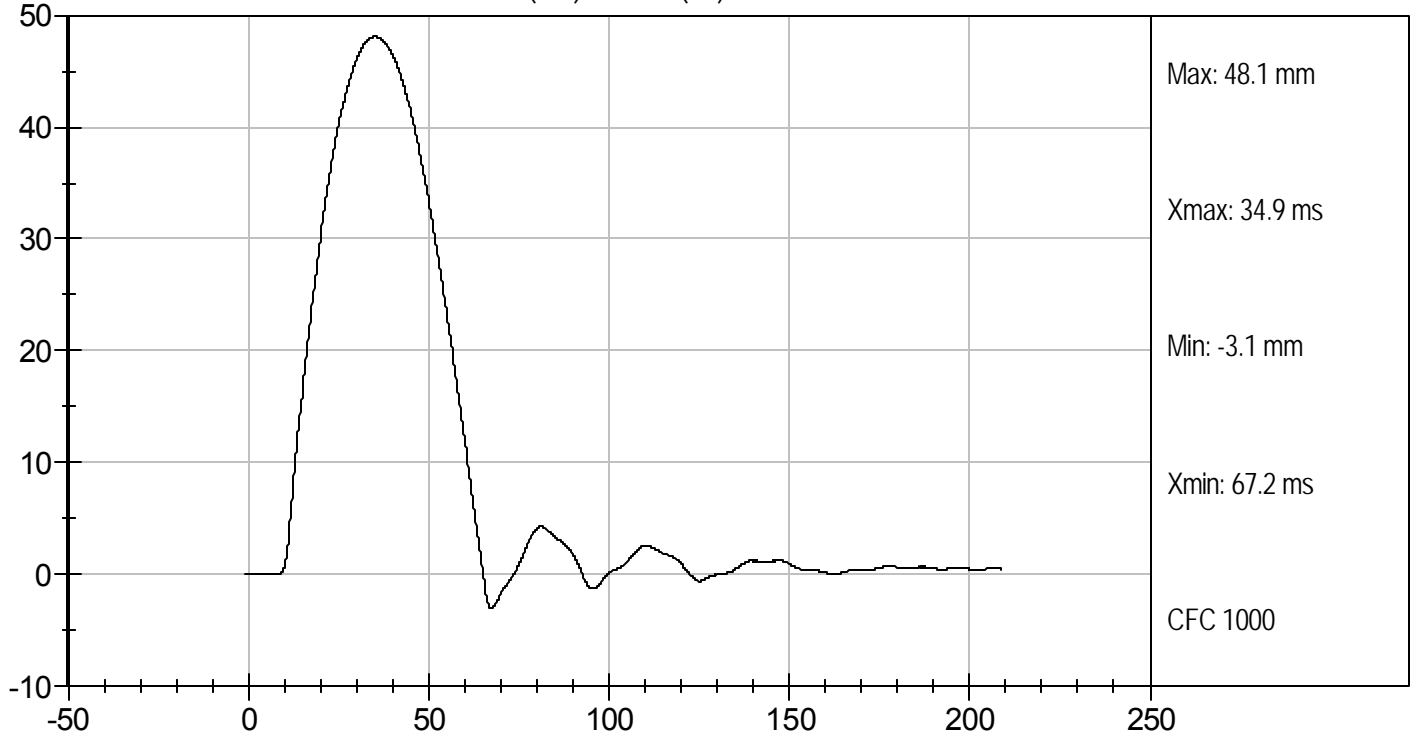
David Winkelbauer
Approved By



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



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



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

ATD Serial No: 032

Test I.D: D113560

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	22.1	Pass
Humidity	%	10 to 70	40	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	5.16	Pass
Upper Rib Displacement	mm	34.0 to 41.0	36.7	Pass
Middle Rib Displacement	mm	37.0 to 45.0	40.0	Pass
Lower Rib Displacement	mm	37.0 to 44.0	39.9	Pass
Overall Test Results				Pass

Jessica Gall
 Laboratory Technician

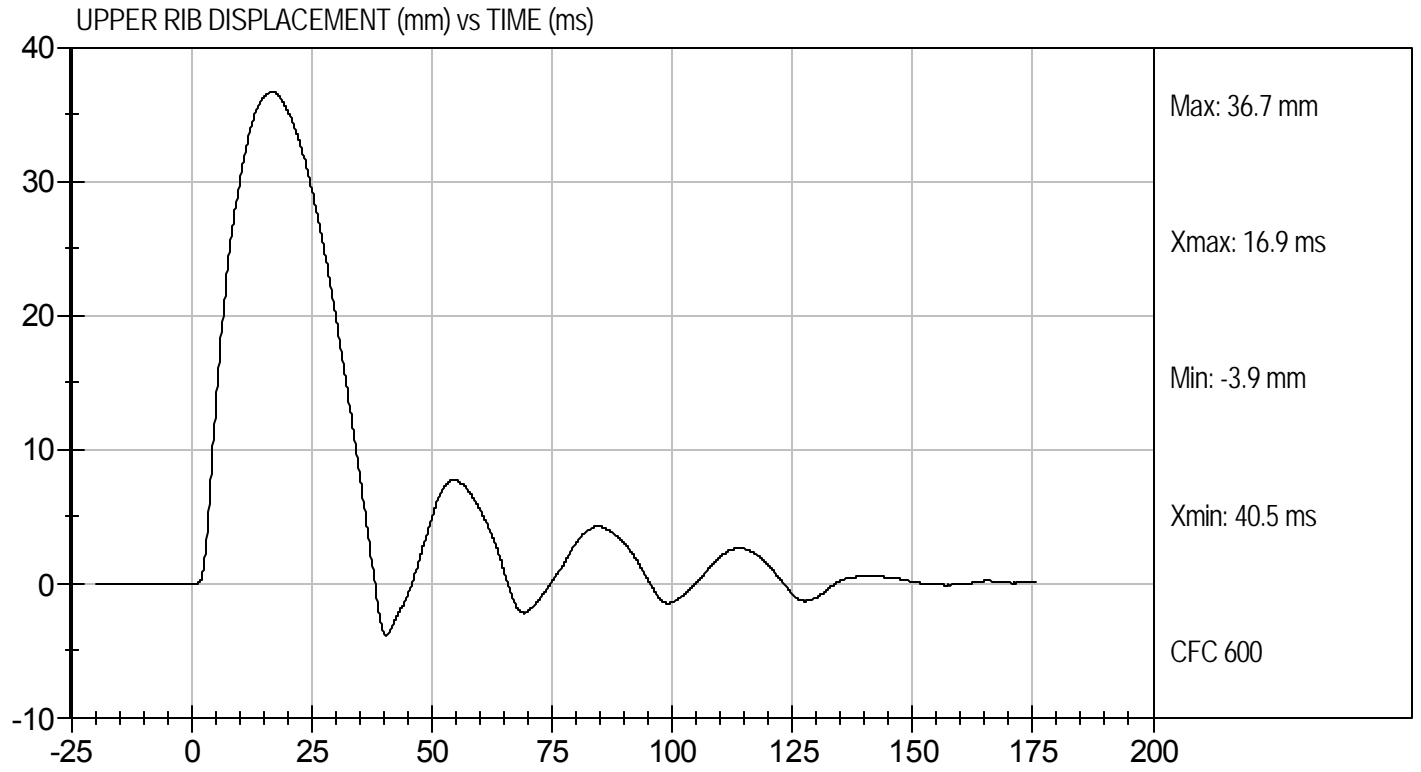
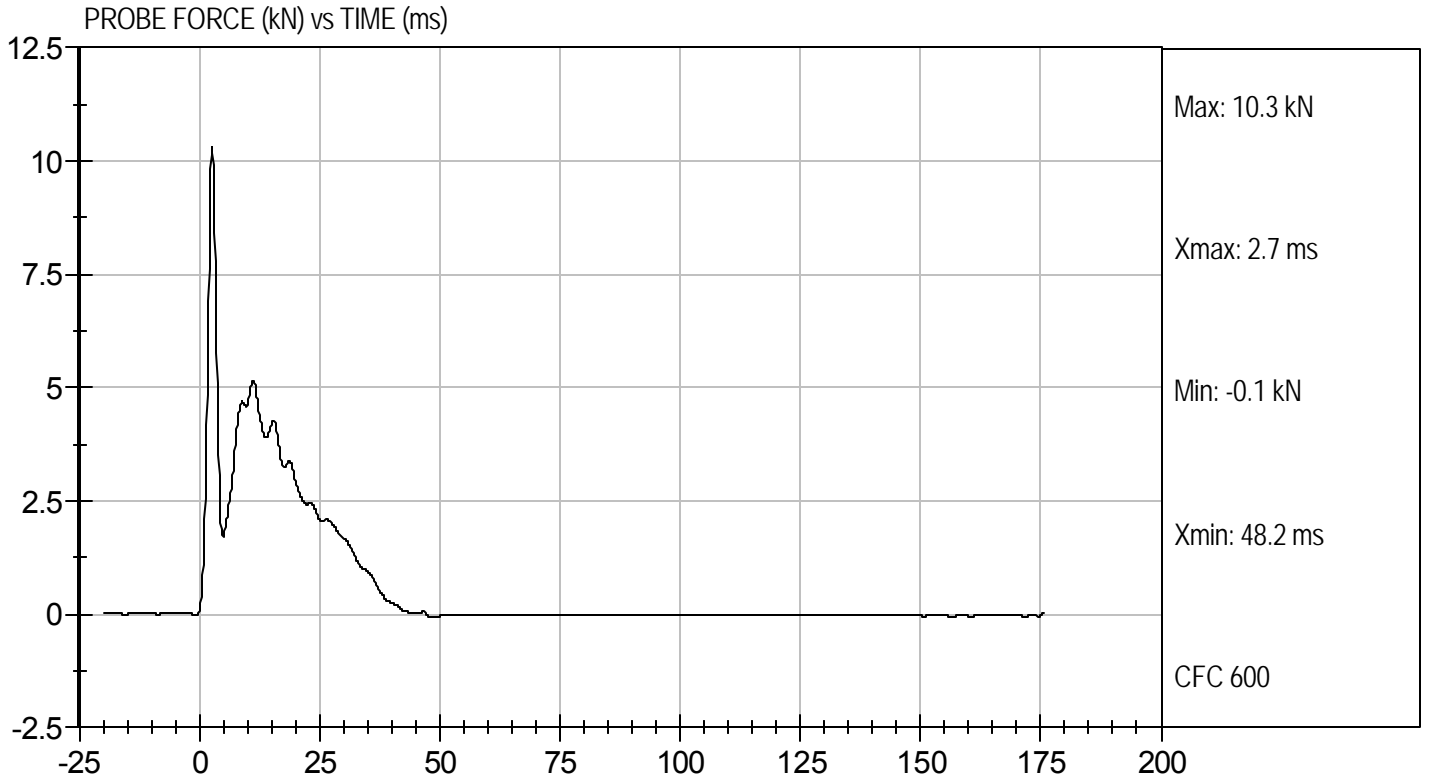
10/25/11
 Test Date

David Winkelbauer
 Approved By



Test Desc: Thorax Impact
Component ID: D113560

Test Date: 10/25/11
Velocity: 18.31 ft/s, 5.58 m/s

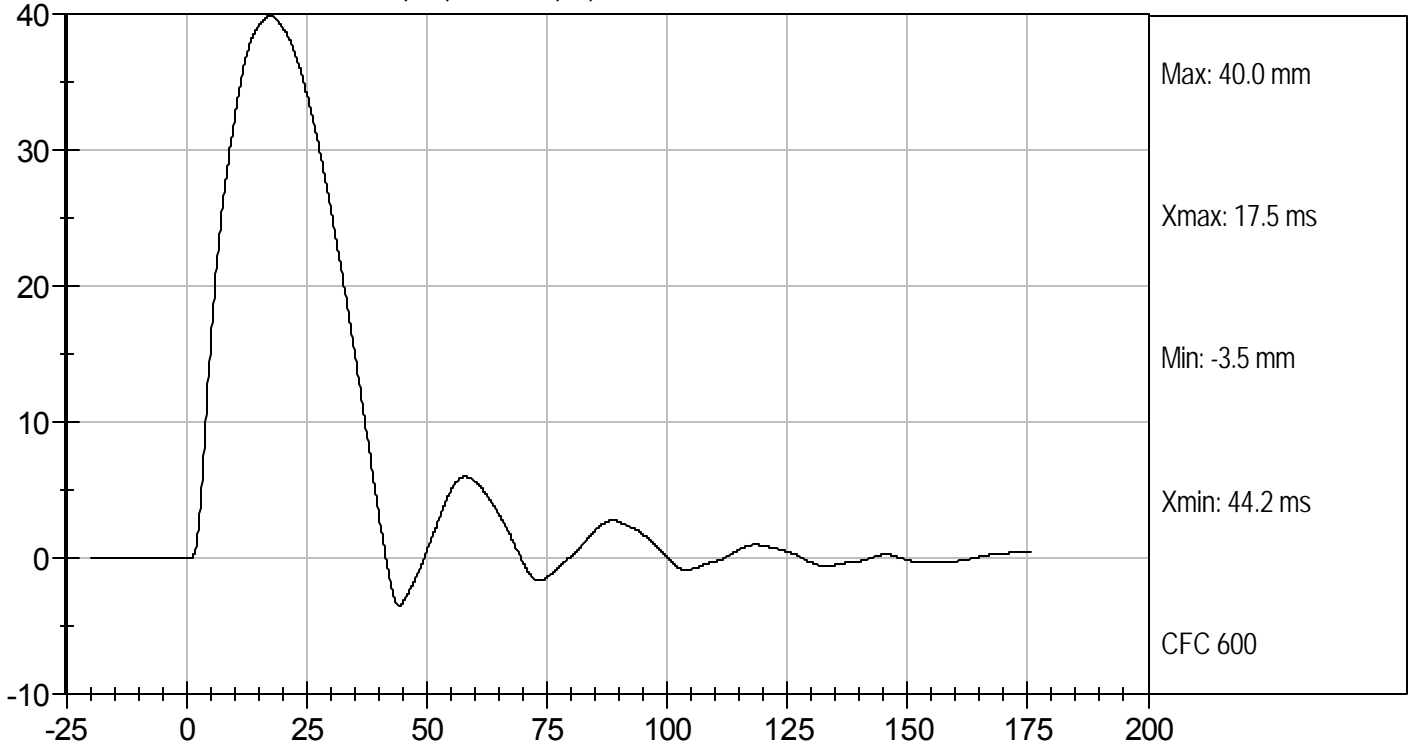




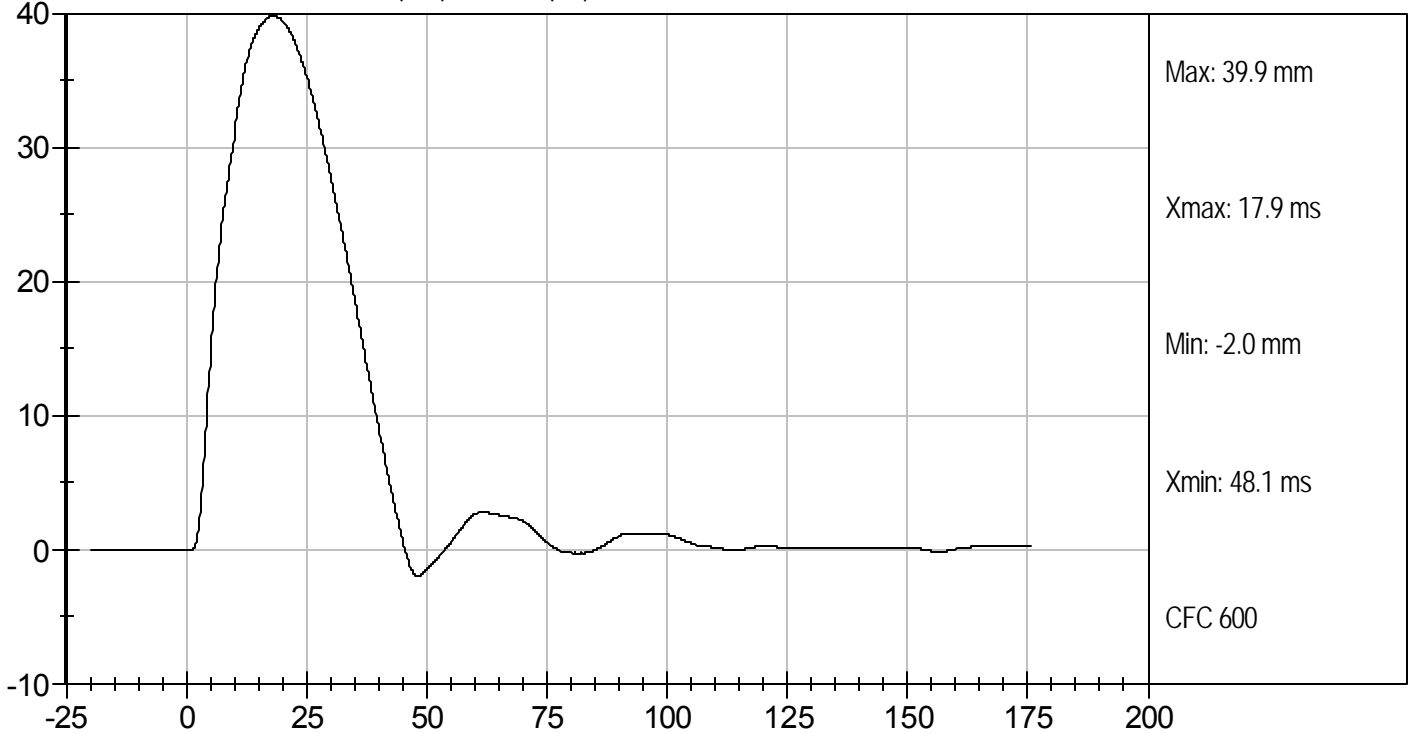
Test Desc: Thorax Impact
Component ID: D113560

Test Date: 10/25/11
Velocity: 18.31 ft/s, 5.58 m/s

MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



LOWER RIB DISPLACEMENT (mm) vs TIME (ms)



MGA RESEARCH CORPORATION

ABDOMEN TEST

ES-2re DUMMY


ATD Serial No: 032

Test I.D: D113567

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	40	Pass
Probe Speed	m/s	3.90 to 4.10	4.06	Pass
Maximum Impact Force	kN	4.00 to 4.80	4.14	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	2.35	Pass
Time of Maximum Abdomen Force	ms	10.00 to 12.30	10.60	Pass
Overall Test Results				Pass


Laboratory Technician

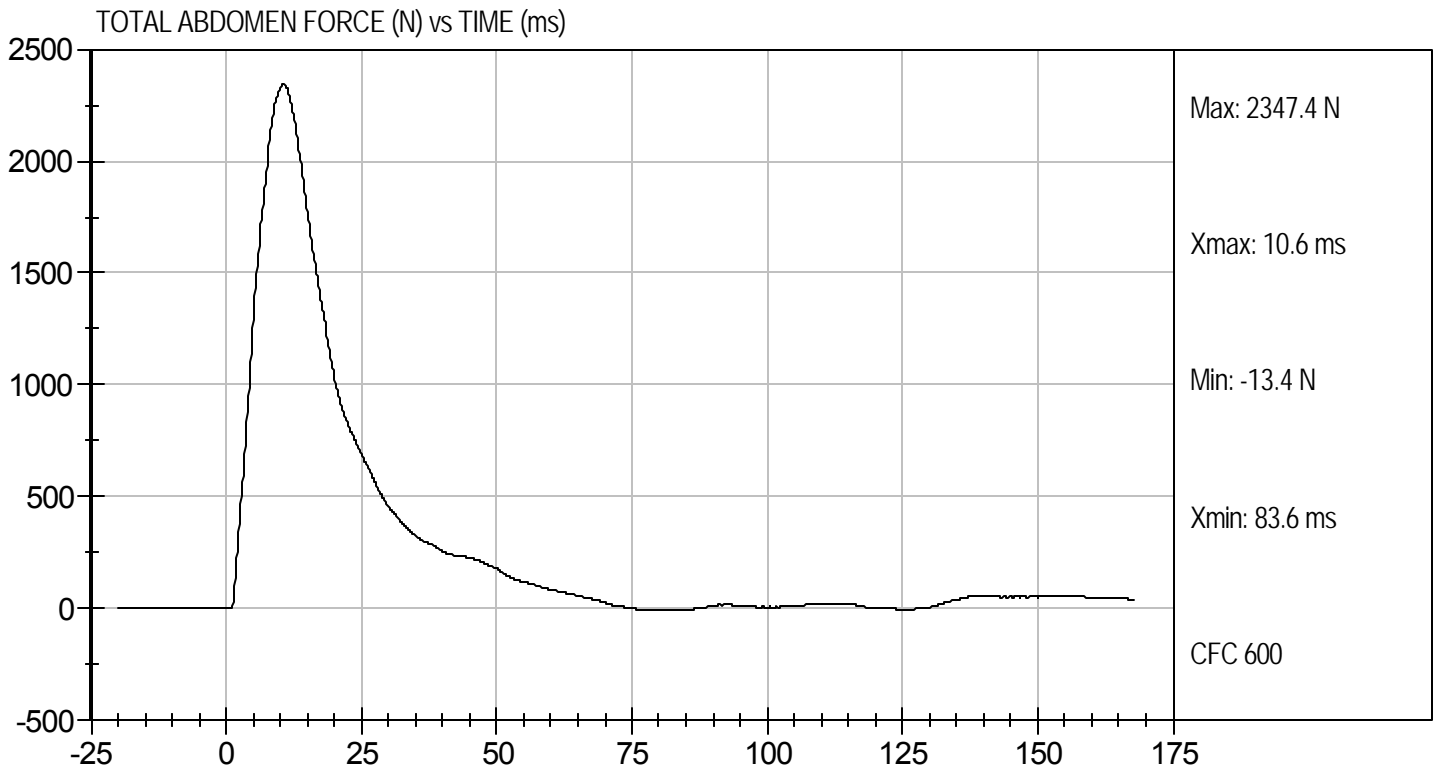
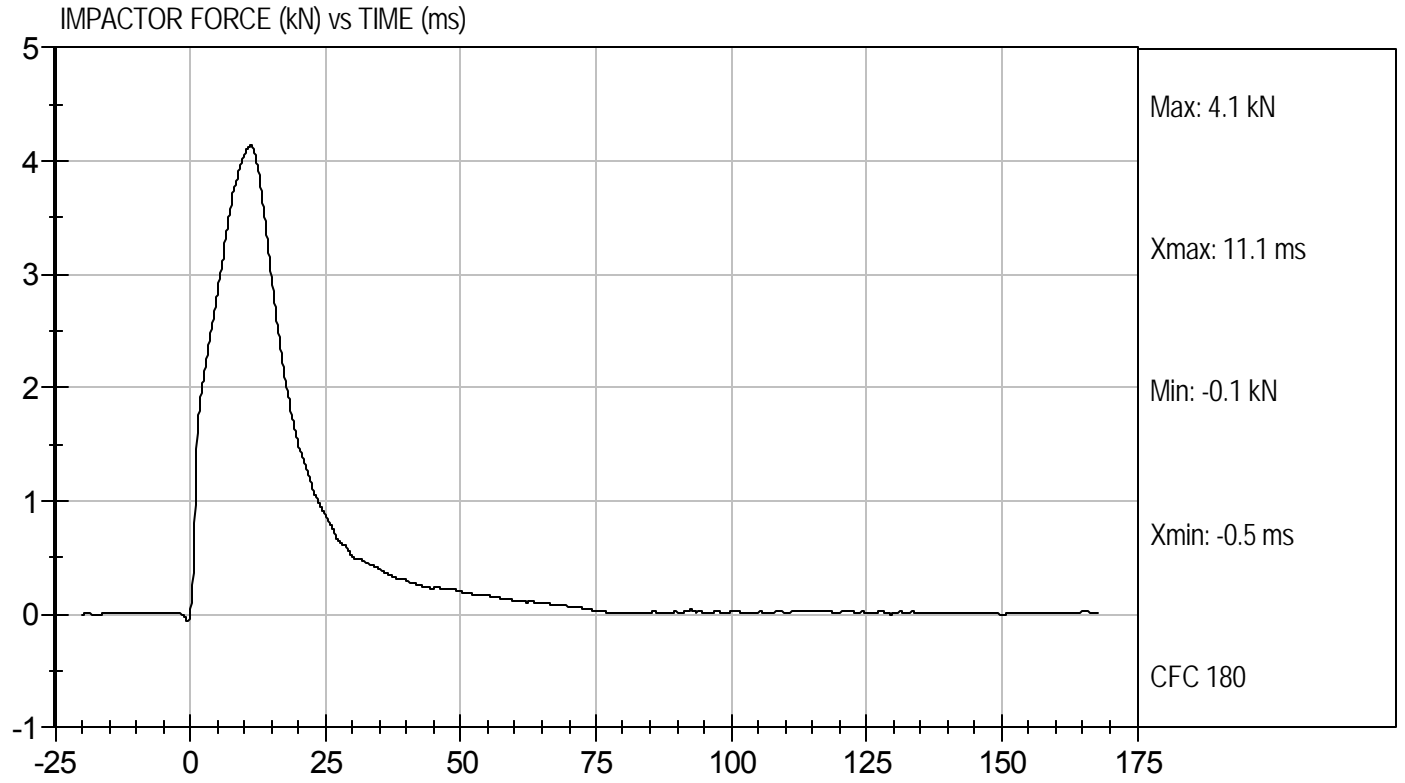
10/25/11
Test Date


Approved By



Test Desc: Abdomen Impact
Component ID: D113567

Test Date: 10/25/11
Velocity: 13.33 ft/s, 4.06 m/s



MGA RESEARCH CORPORATION
LUMBAR SPINE TEST
ES-2re DUMMY

ATD Serial No: 032

Test I.D.: D113568

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	36	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	-5.93	Pass
	30 ms	m/s	>= -6.5	-5.90	Pass
Maximum Flexion Angle		deg	45.0 to 55.0	47.1	Pass
Time of Maximum Flexion Angle		ms	39.0 to 53.0	45.9	Pass
Headform Rotation Decay to Initial Position		ms	37 to 57	43	Pass
Overall Results					Pass

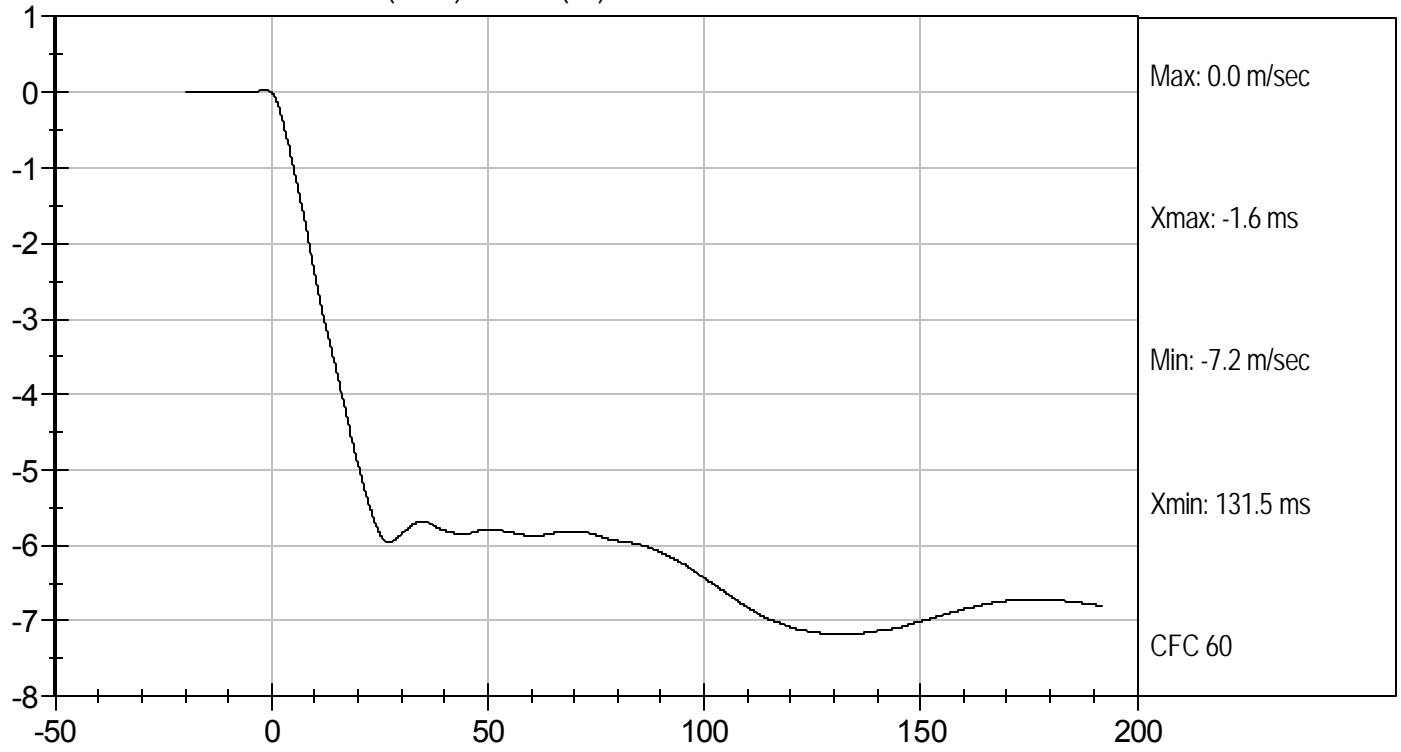
Jessica Hall
 Laboratory Technician

10/26/11
 Test Date

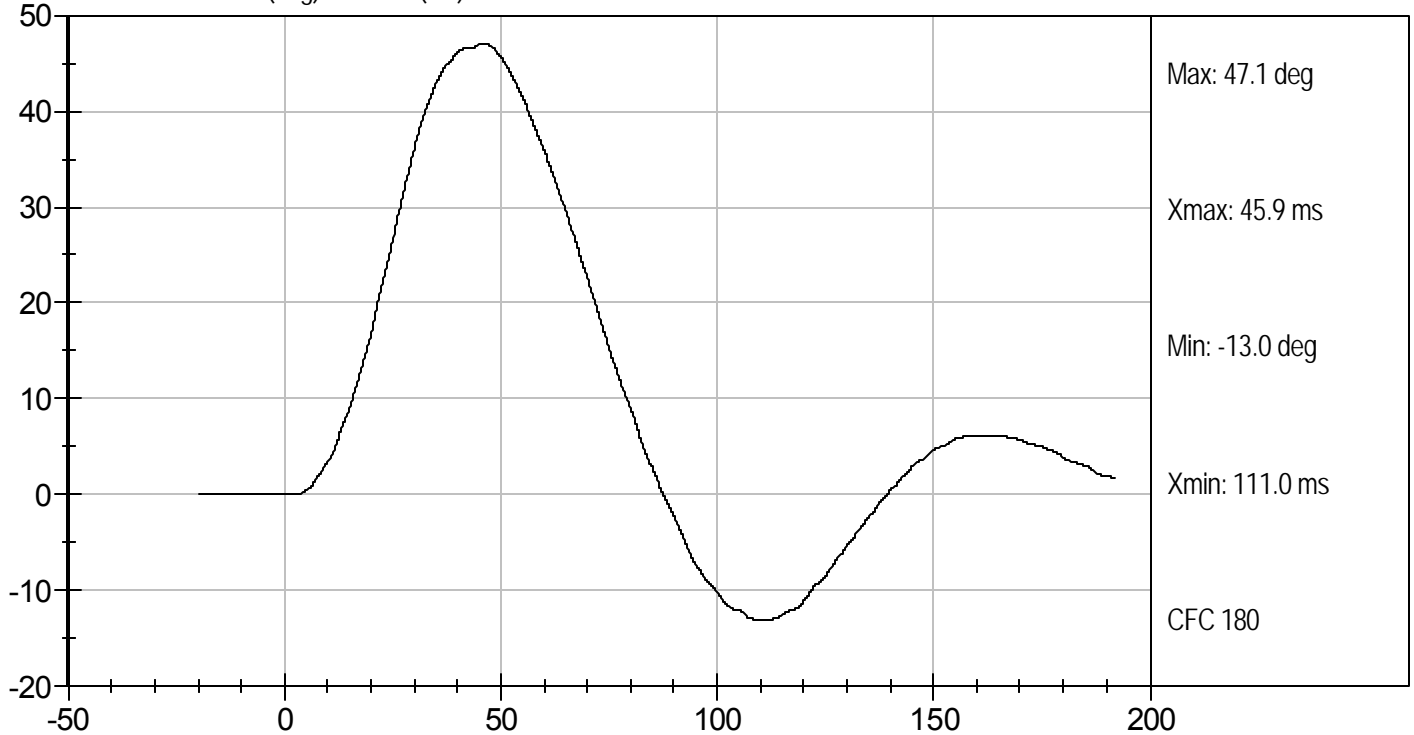
David Winkelbauer
 Approved By



PENDULUM DECELERATION (m/sec) vs TIME (ms)



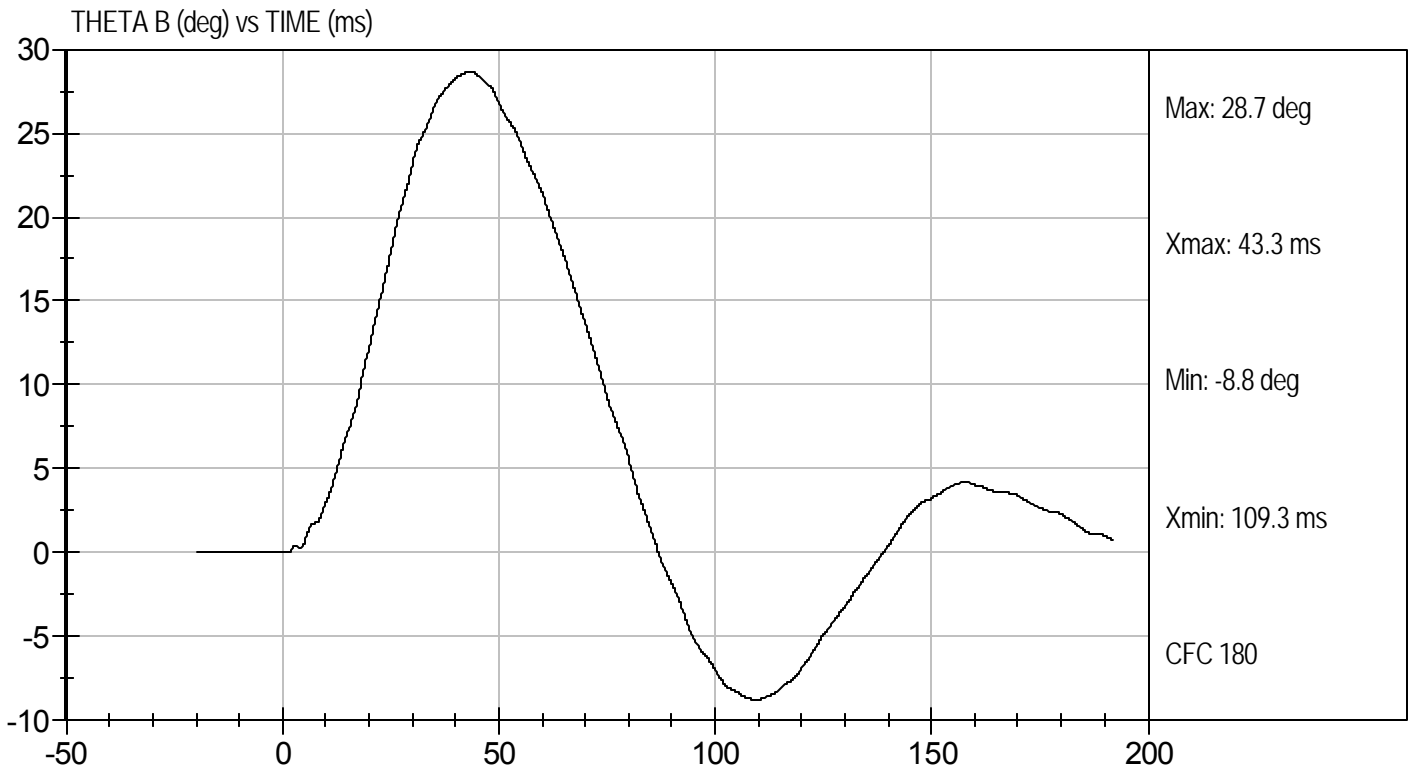
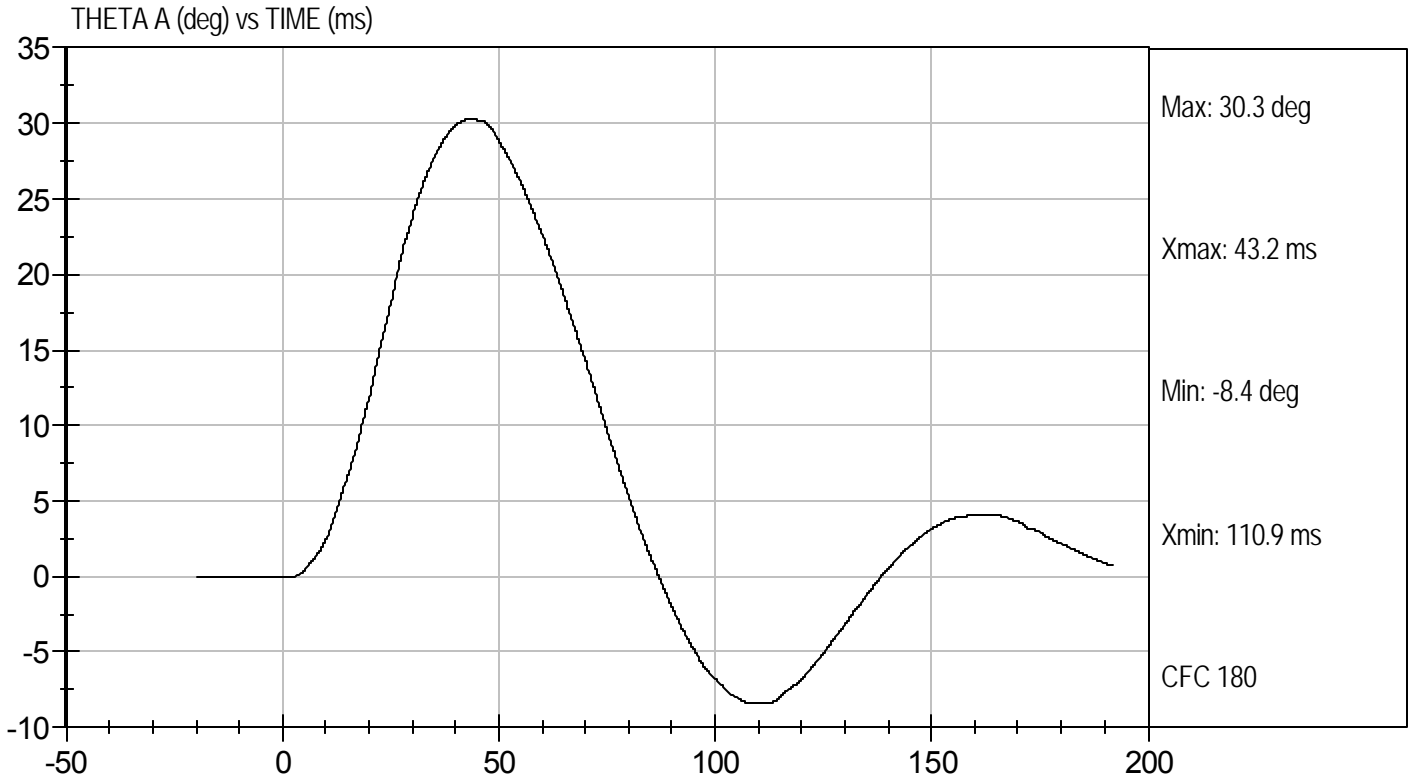
FLEXION ANGLE (deg) vs TIME (ms)





Test Desc: Lumbar Bending
Component ID: D113568

Test Date: 10/26/11
Velocity: 20.08 ft/s, 6.12 m/s



MGA RESEARCH CORPORATION

PELVIS TEST

ES-2re DUMMY


ATD Serial No: 032

Test I.D: D113569

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	40	Pass
Probe Speed	m/s	4.20 to 4.40	4.27	Pass
Maximum Impactor Force	kN	4.70 to 5.40	4.74	Pass
Time of Maximum Impactor Force	ms	11.80 to 16.10	13.50	Pass
Maximum Pubic Force	kN	1.23 to 1.59	1.41	Pass
Time of Maximum Pubic Force	ms	12.20 to 17.00	15.40	Pass
Overall Test Results				Pass


Laboratory Technician

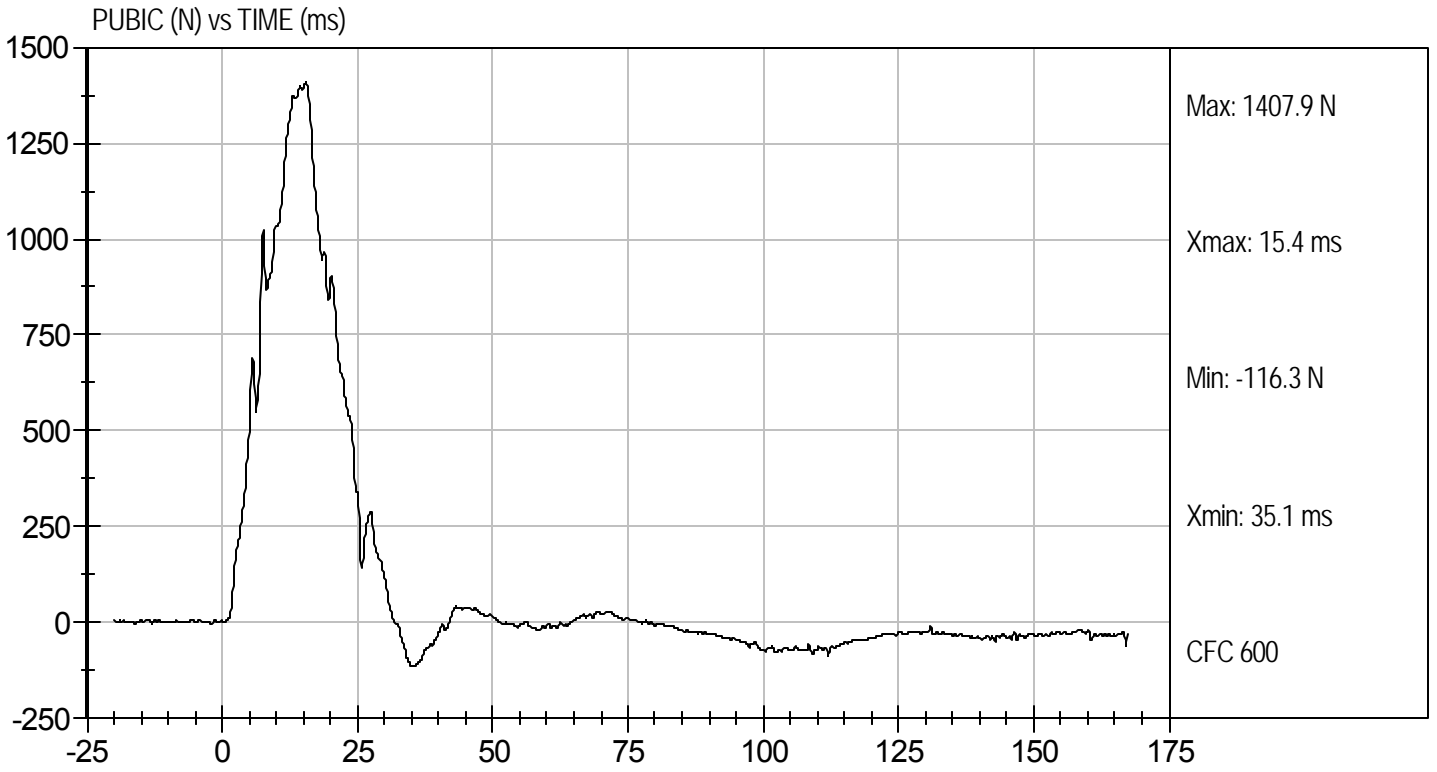
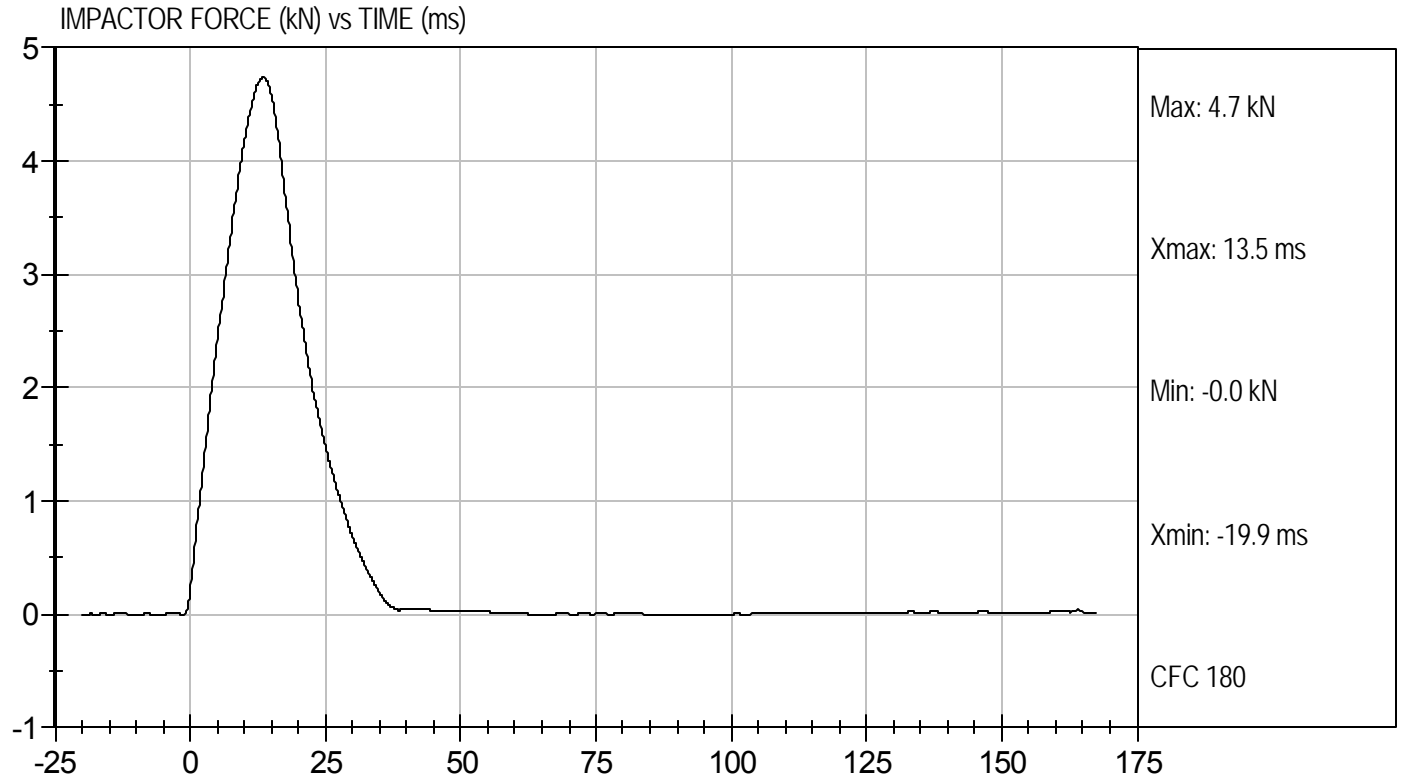
10/25/11
Test Date


Approved By



Test Desc: Pelvis Impact
Component ID: D113569

Test Date: 10/25/11
Velocity: 14.00 ft/s, 4.27 m/s



MGA RESEARCH CORPORATION
HEAD DROP TEST
ES-2re DUMMY

ATD Serial No: 032

Test ID: D113661

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	36	Pass
Peak Resultant Acceleration	G's	125 to 155	153	Pass
Peak Lateral Acceleration	G's	+/- 15	-13	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 15% of peak	Yes	Pass
Overall Test Results				Pass

Jessica Gall
 Laboratory Technician

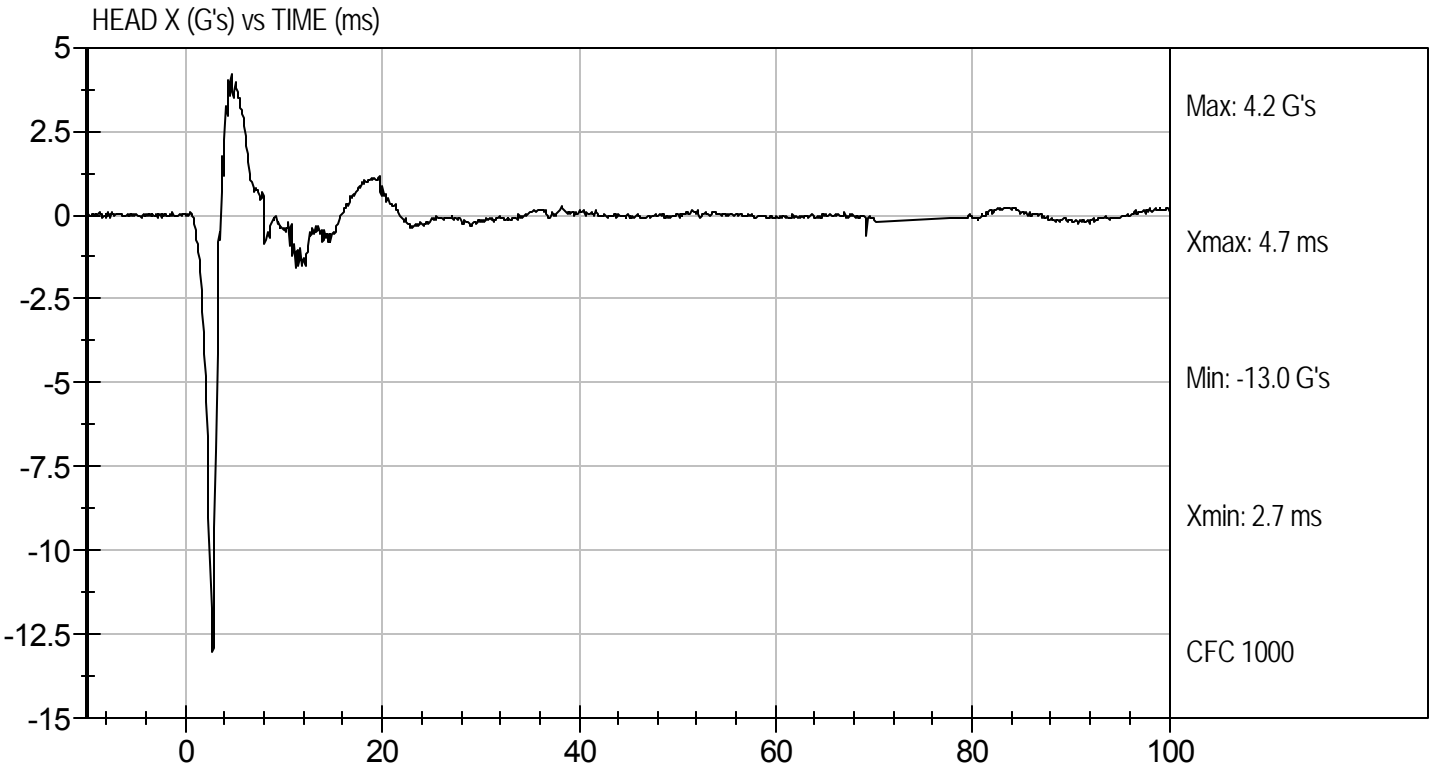
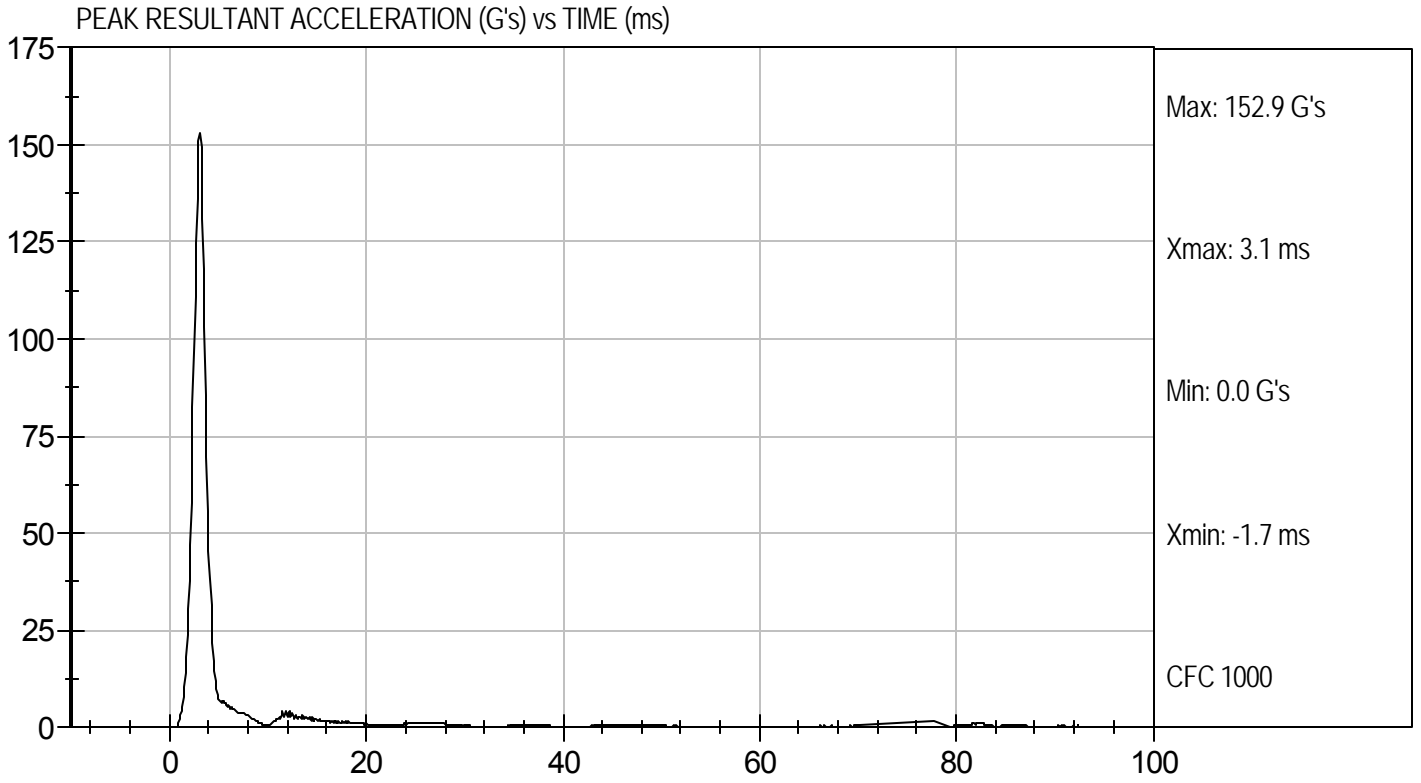
11/3/11
 Test Date

David Winkelbauer
 Approved By



Test Desc: Head Drop
Component ID: D113661

Test Date: 11/3/11
Velocity: 0 ft/s, 0 m/s



MGA RESEARCH CORPORATION
NECK PENDULUM TEST
ES-2re DUMMY


ATD Serial No: 032

Test I.D.: D113662

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	18.0 to 22.0	21.2	Pass
Laboratory Relative Humidity		%	10 to 70	36	Pass
Pendulum Speed		m/s	3.3 to 3.5	3.5	Pass
Pendulum Deceleration	1 ms	m/s	0.00 to -0.05	-0.03	Pass
	3 ms	m/s	-0.25 to -0.375	-0.33	Pass
	14 ms	m/s	-3.20 to -3.70	-3.27	Pass
Maximum Flexion Angle		deg	49.0 to 59.0	52.6	Pass
Time of Maximum Flexion Angle		ms	54.0 to 66.0	62.7	Pass
Head Rotation Decay Time to 0 degree		ms	53.0 to 88.0	57.3	Pass
Overall Test Results					Pass


 Laboratory Technician

11/3/11
 Test Date

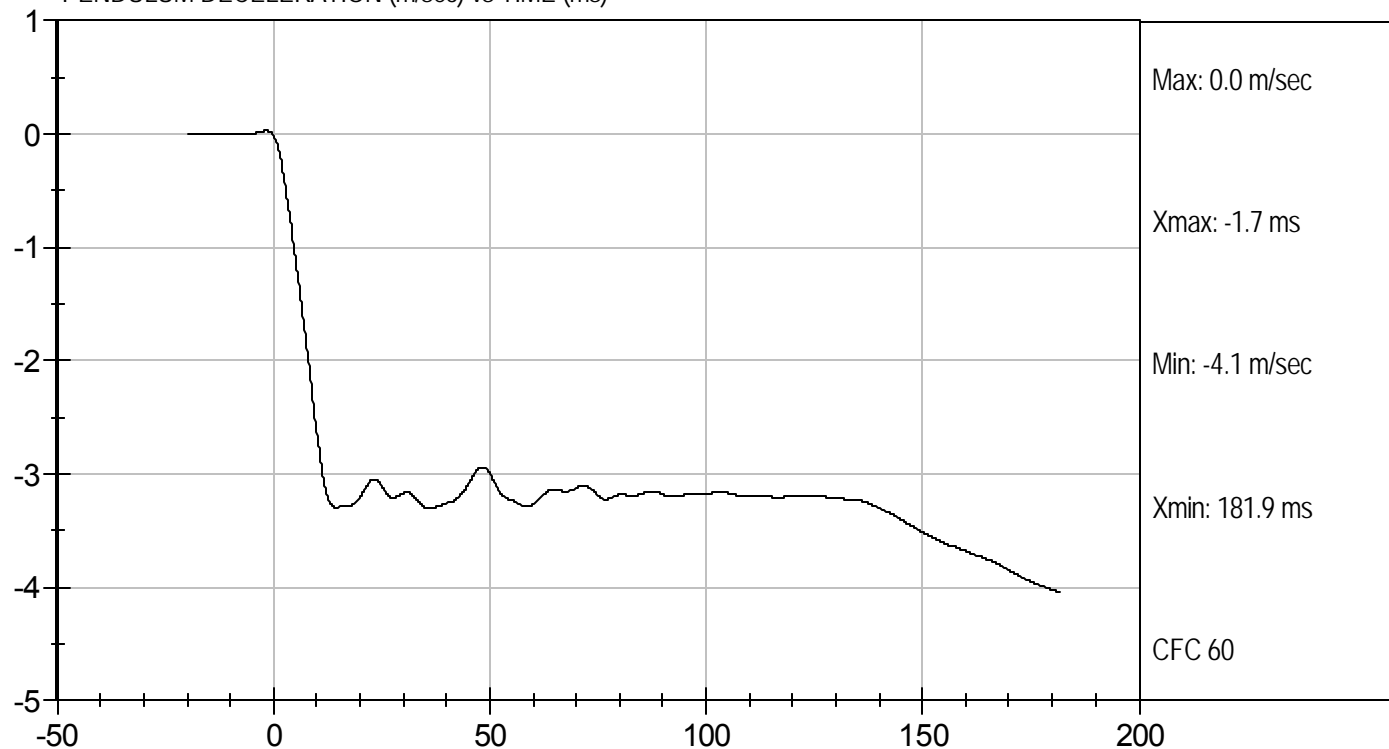

 Approved By



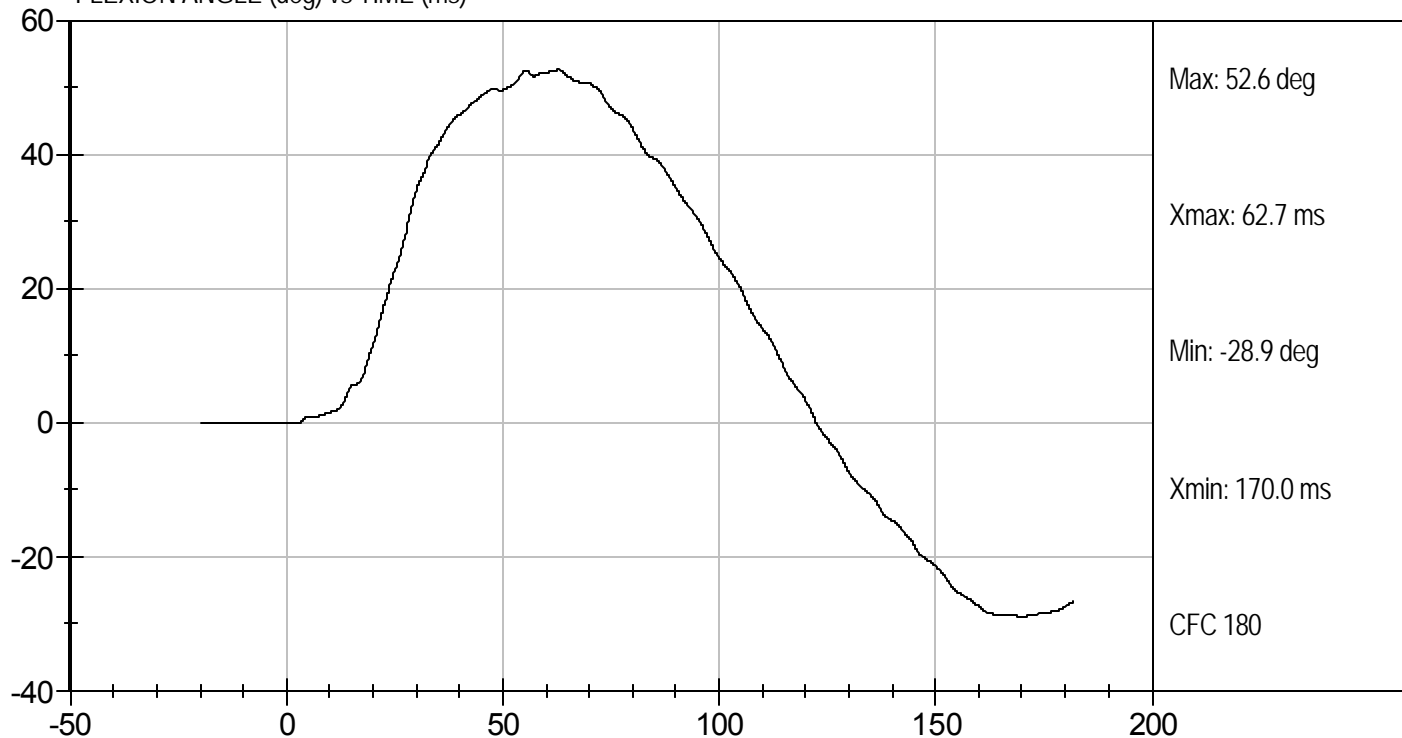
Test Desc: Neck Bending
Component ID: D113662

Test Date: 11/3/11
Velocity: 11.42 ft/s, 3.48 m/s

PENDULUM DECELERATION (m/sec) vs TIME (ms)



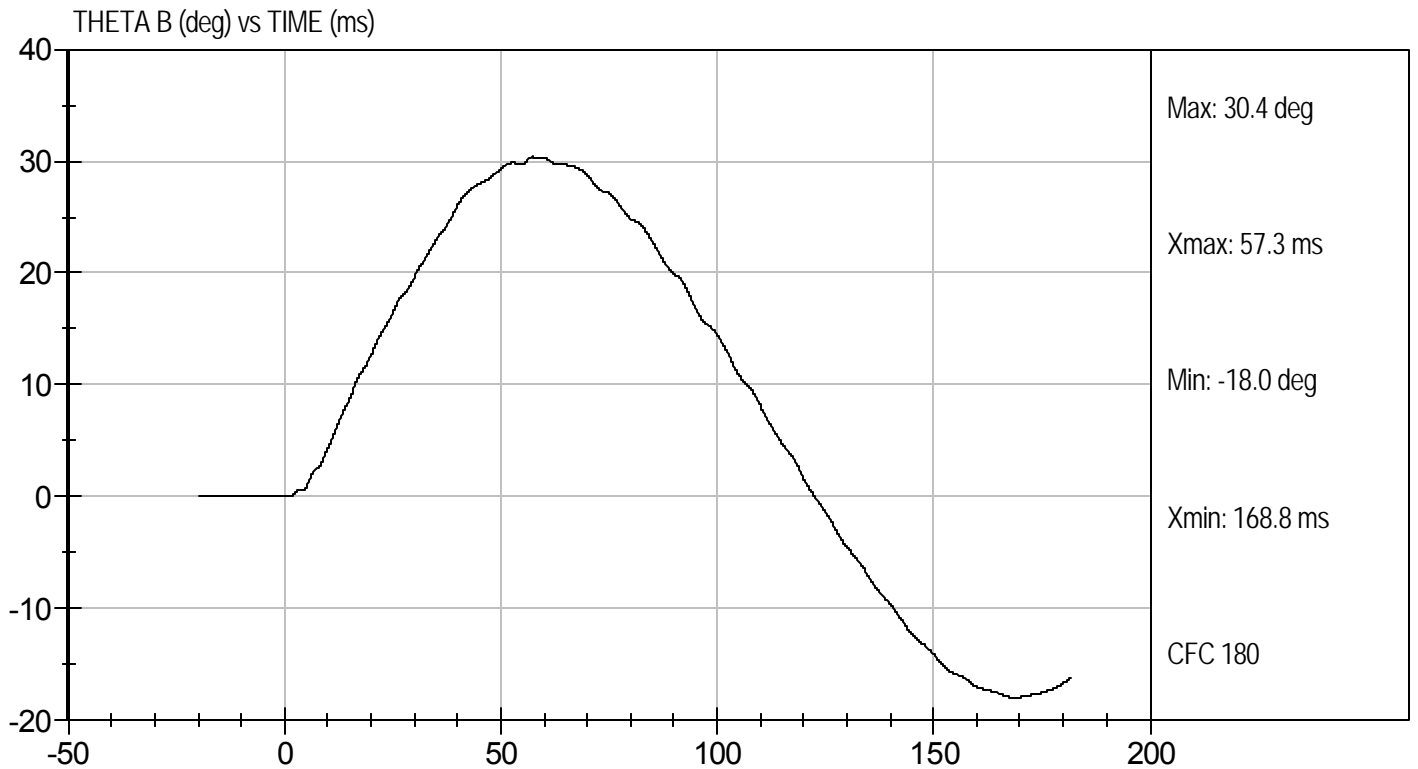
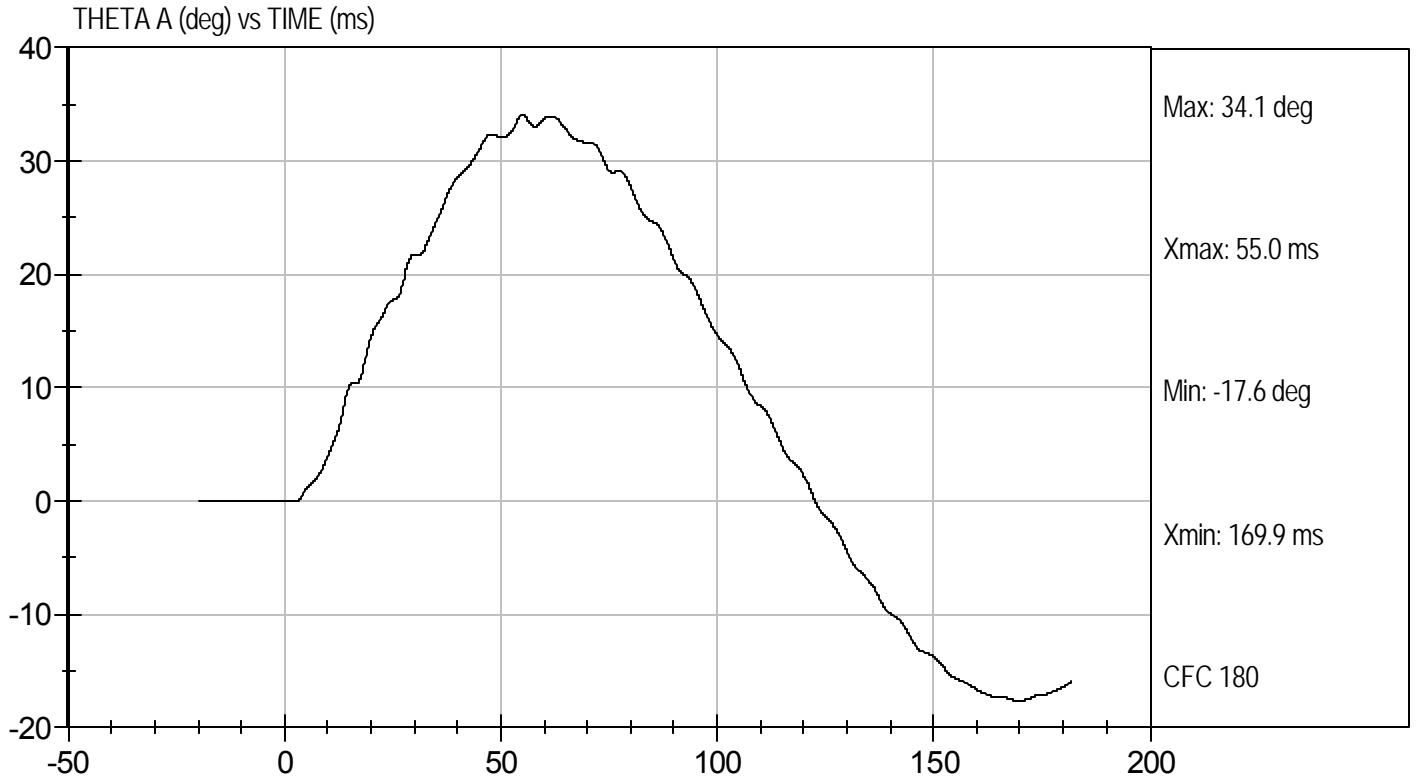
FLEXION ANGLE (deg) vs TIME (ms)





Test Desc: Neck Bending
Component ID: D113662

Test Date: 11/3/11
Velocity: 11.42 ft/s, 3.48 m/s



MGA RESEARCH CORPORATION
SHOULDER IMPACT TEST
ES-2re DUMMY

ATD Serial No: 032

Test I.D: D113663

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	36	Pass
Pendulum Speed	m/s	4.2 to 4.4	4.3	Pass
Peak Shoulder Acceleration	G's	7.5 to 10.5	8.9	Pass
Time of Peak Shoulder Acceleration	ms	NA	13.0	Pass
Overall Test Results				Pass

Jessica Hall
 Laboratory Technician

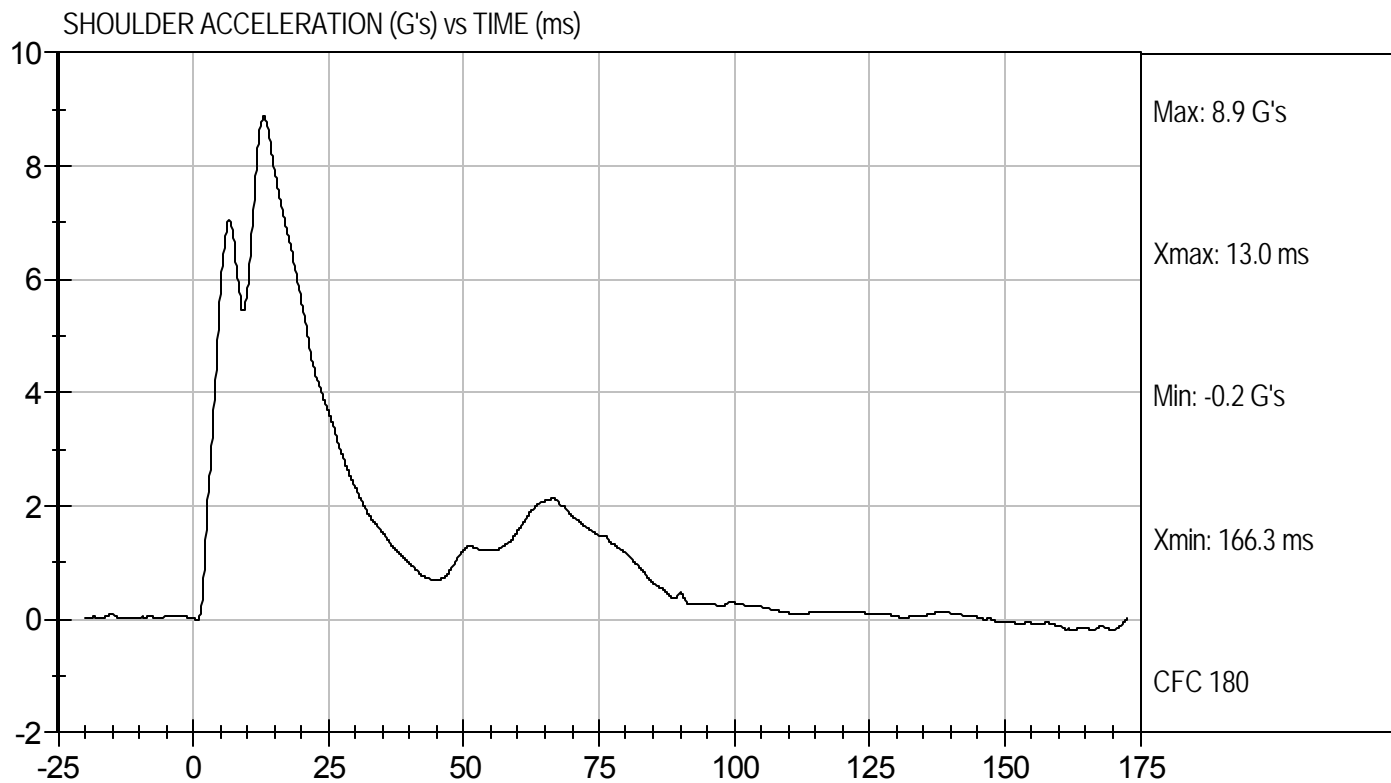
11/2/11
 Test Date

David Winkelbauer
 Approved By



Test Desc: Shoulder Impact
Component ID: D113663

Test Date: 11/2/11
Velocity: 14.24 ft/s, 4.3 m/s



MGA RESEARCH CORPORATION

UPPER RIB TEST

ES-2re DUMMY


ATD Serial No: 032

Test I.D: D113664

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	36	Pass
Displacement at 3 m/s	mm	36.0 to 40.0	37.7	Pass
Displacement at 4 m/s	mm	46.0 to 51.0	48.3	Pass
Overall Test Results				Pass

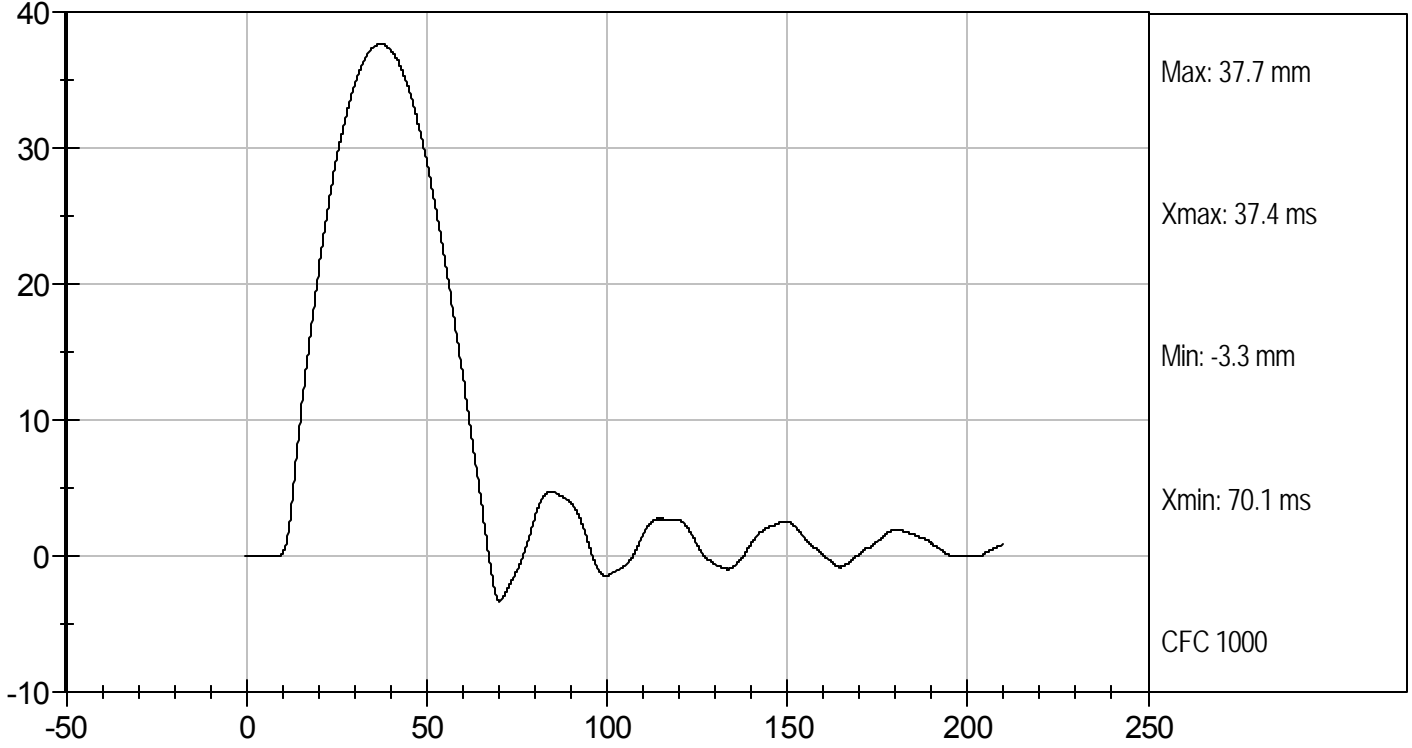

Laboratory Technician

11/3/11
Test Date

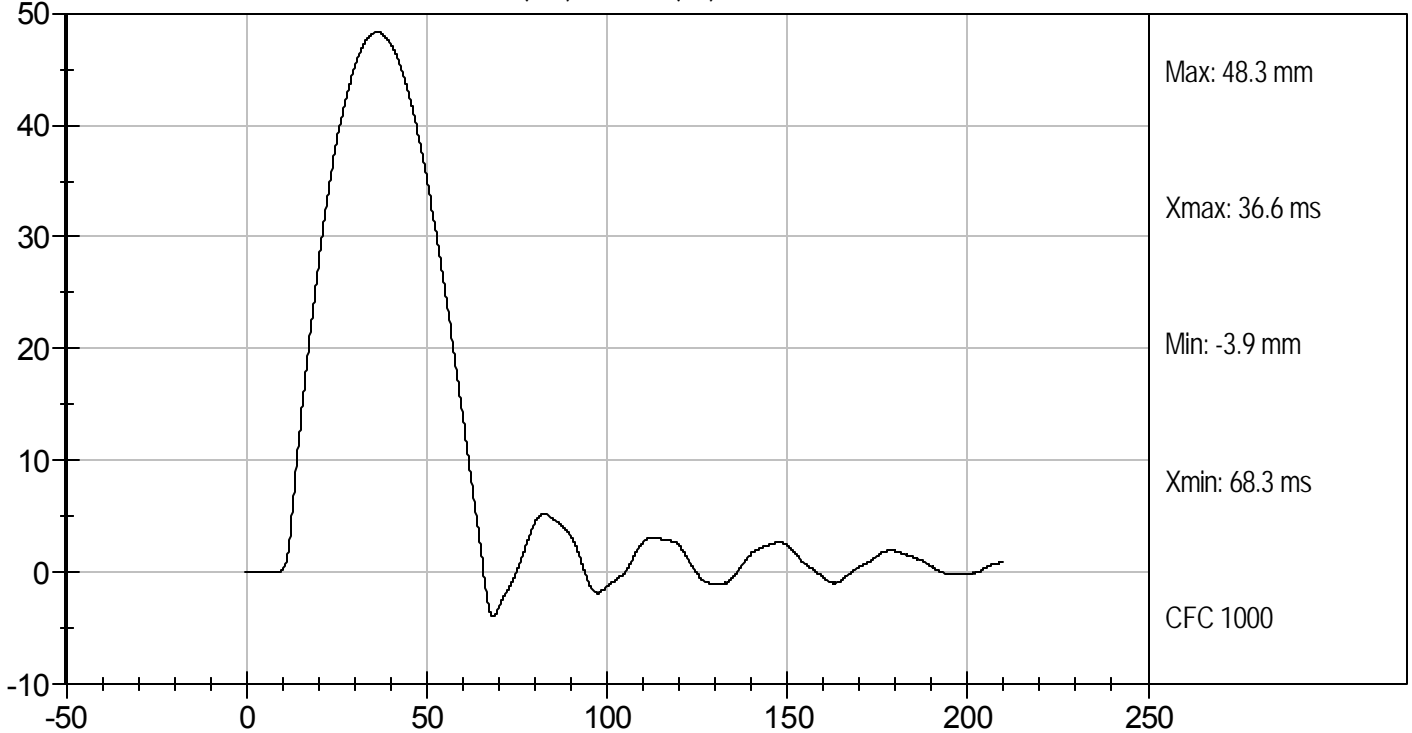

Approved By



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

ES-2re DUMMY


ATD Serial No: 032

Test I.D: D113665

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	36	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	47.9	Pass
Overall Test Results				Pass

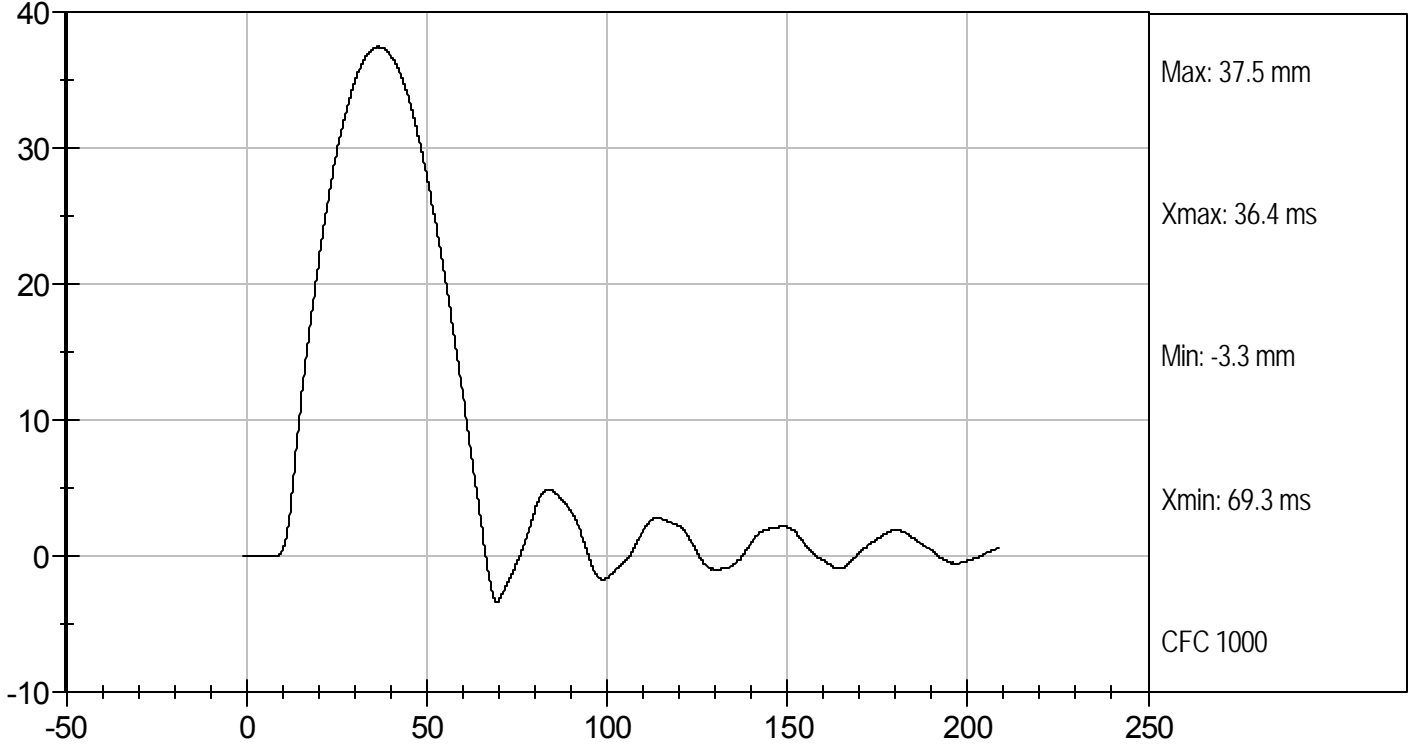

Laboratory Technician

11/3/11
Test Date

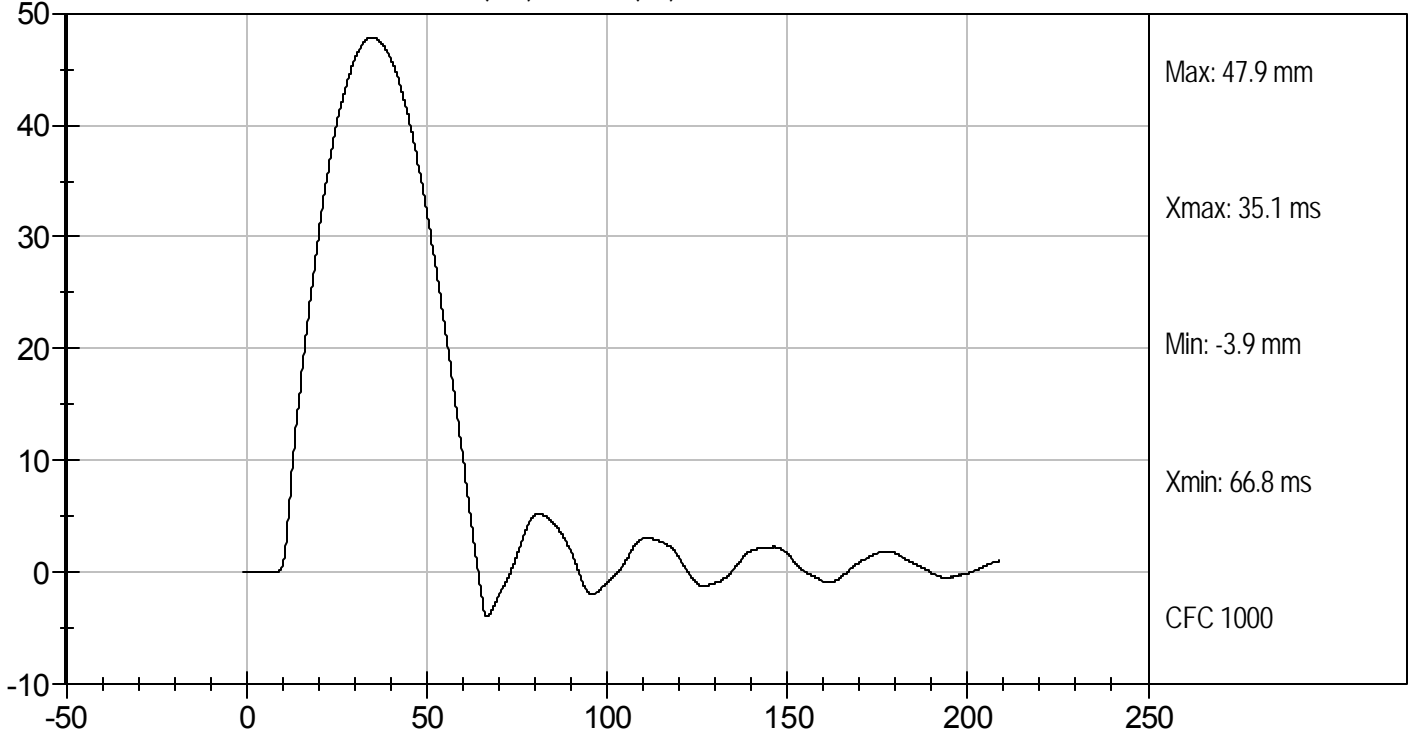

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MID RIB DISPLACEMENT @ 3 M/SEC (mm) vs TIME (ms)



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



MGA RESEARCH CORPORATION

LOWER RIB TEST

ES-2re DUMMY


ATD Serial No: 032

Test I.D: D113666

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	36	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	48.2	Pass
Overall Test Results				Pass

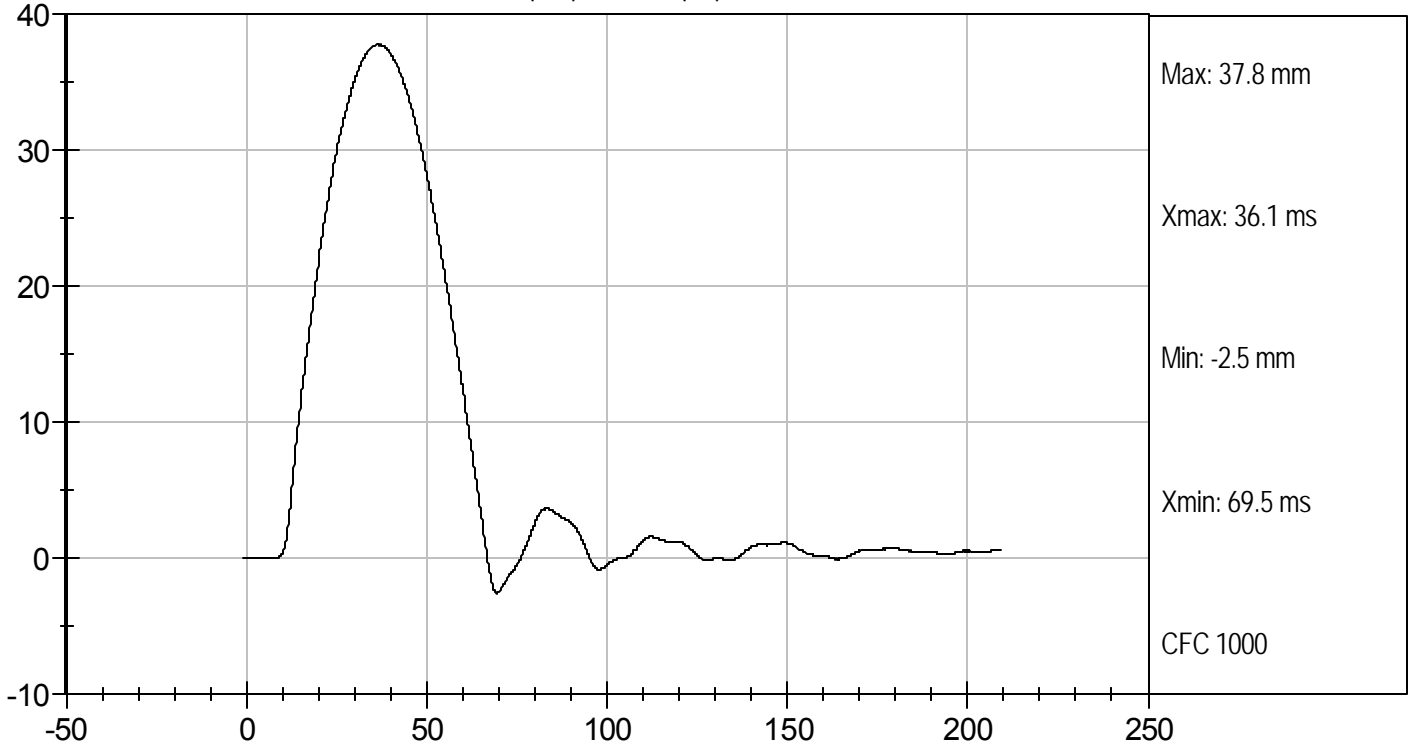

Laboratory Technician

11/3/11
Test Date

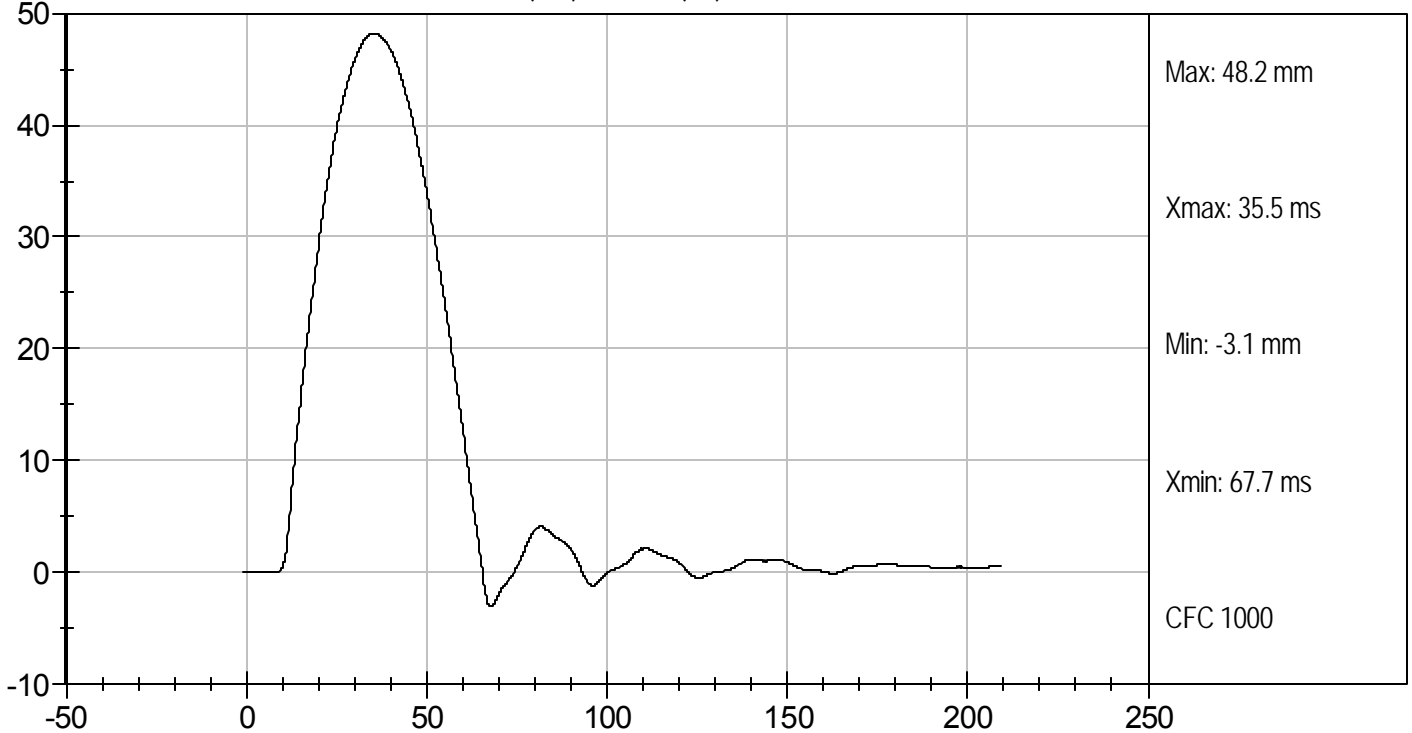

Approved By



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



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



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

ATD Serial No: 032

Test I.D: D113660

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.0	Pass
Humidity	%	10 to 70	36	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	5.19	Pass
Upper Rib Displacement	mm	34.0 to 41.0	37.3	Pass
Middle Rib Displacement	mm	37.0 to 45.0	39.8	Pass
Lower Rib Displacement	mm	37.0 to 44.0	39.0	Pass
Overall Test Results				Pass

Jessica Hall
 Laboratory Technician

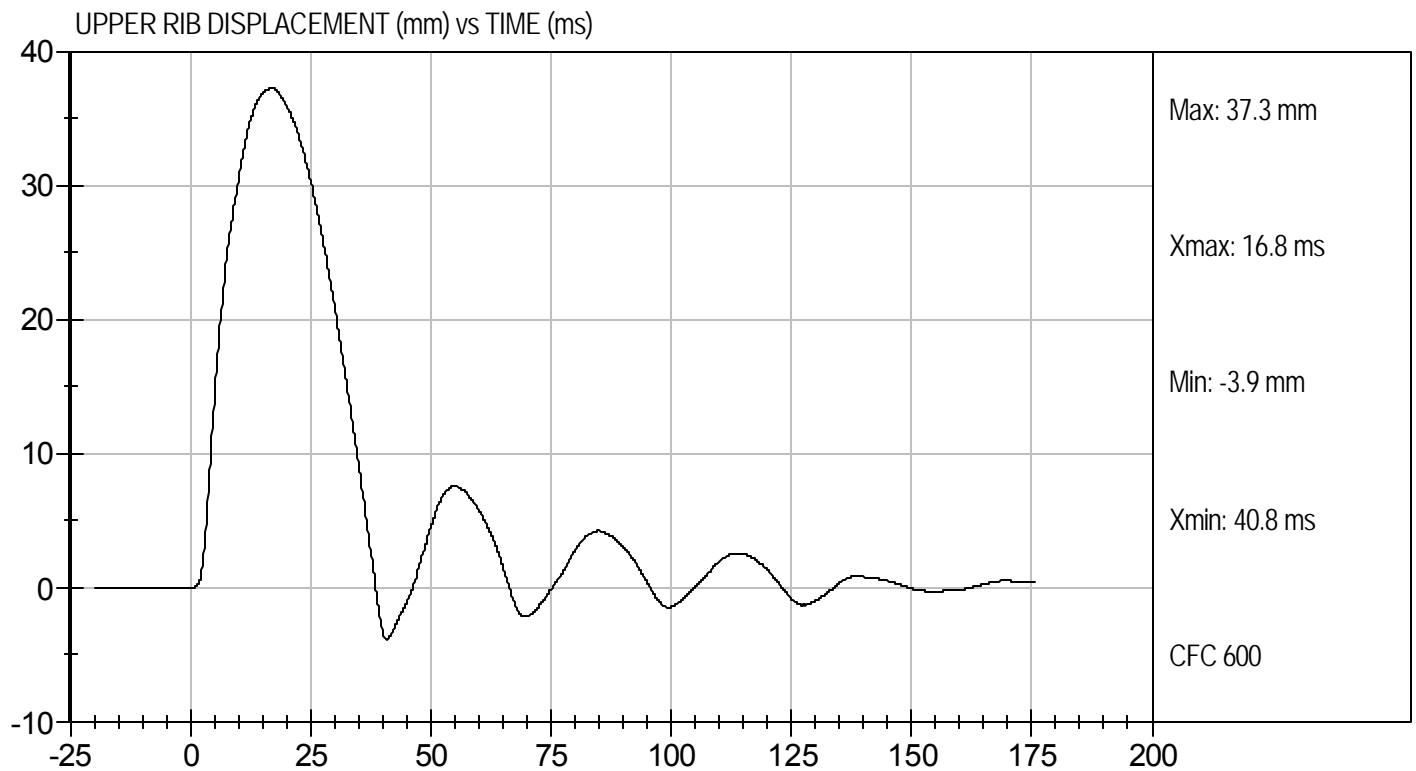
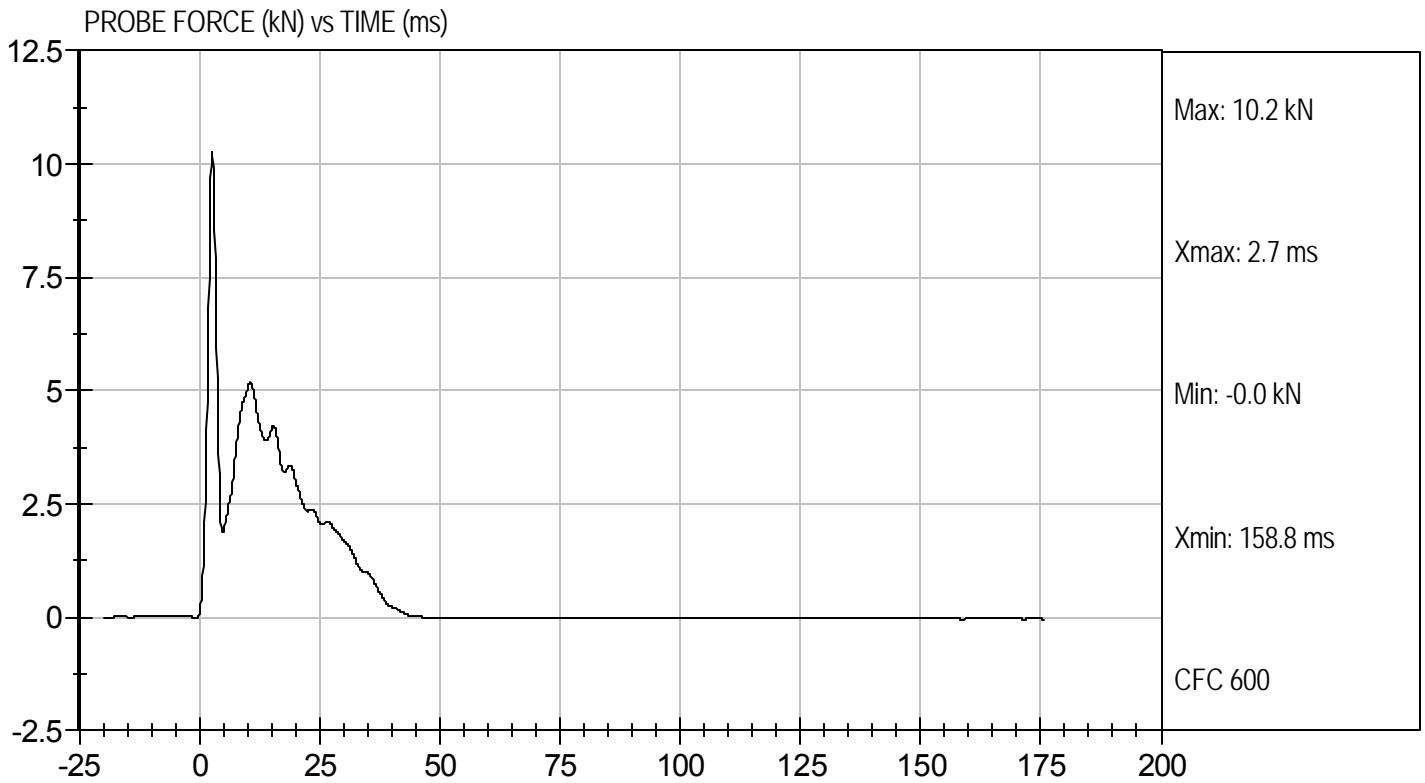
11/2/11
 Test Date

David Winkelbauer
 Approved By



Test Desc: Thorax Impact
Component ID: D113660

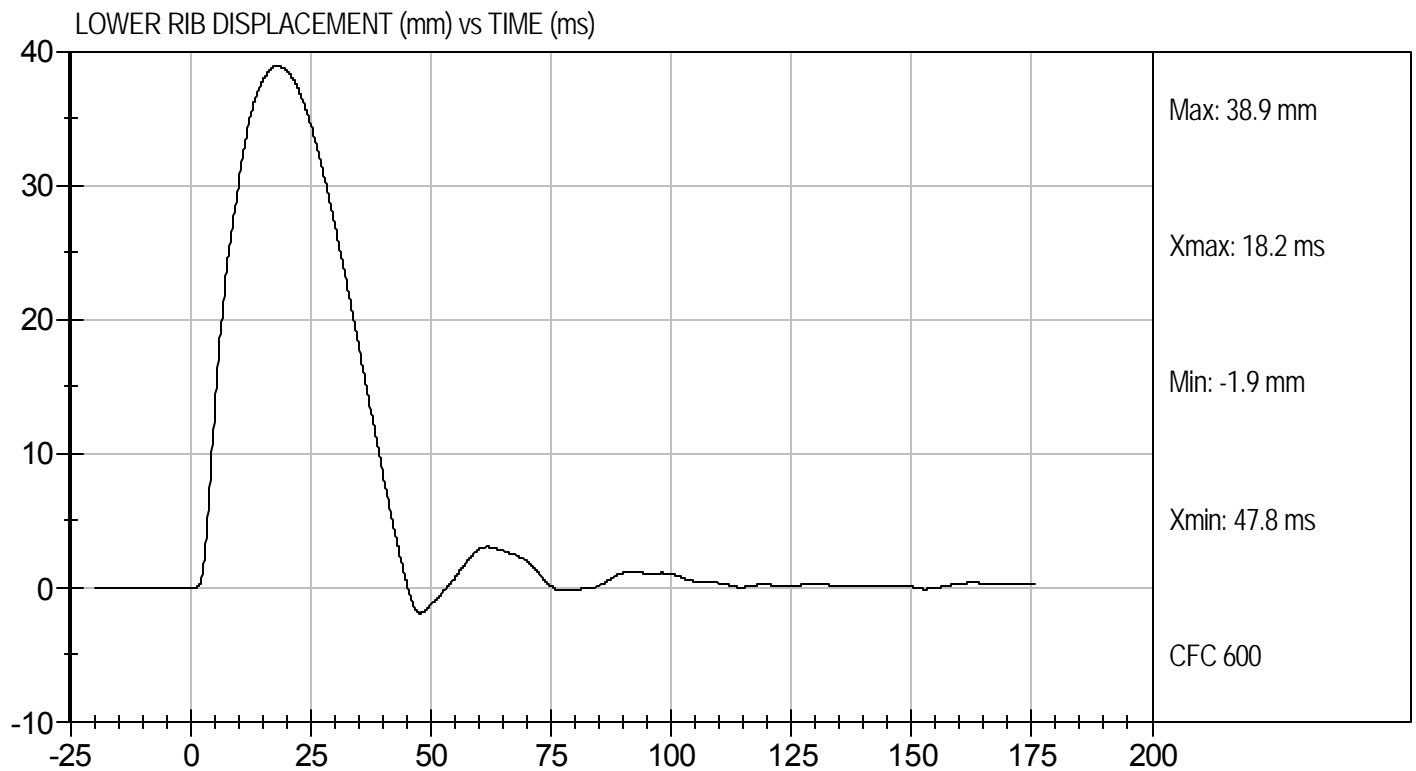
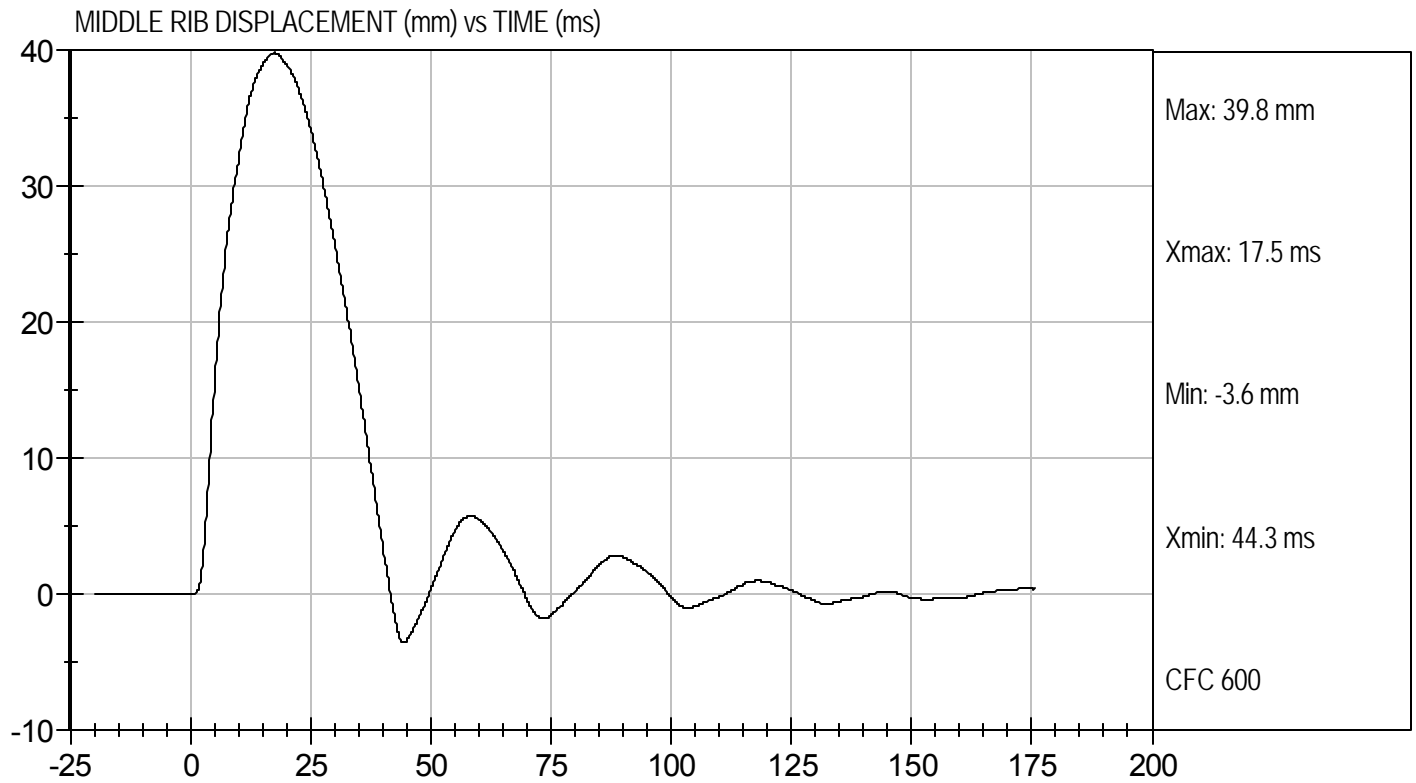
Test Date: 11/2/11
Velocity: 18.31 ft/s, 5.58 m/s





Test Desc: Thorax Impact
Component ID: D113660

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



MGA RESEARCH CORPORATION

ABDOMEN TEST

ES-2re DUMMY

ATD Serial No: 032

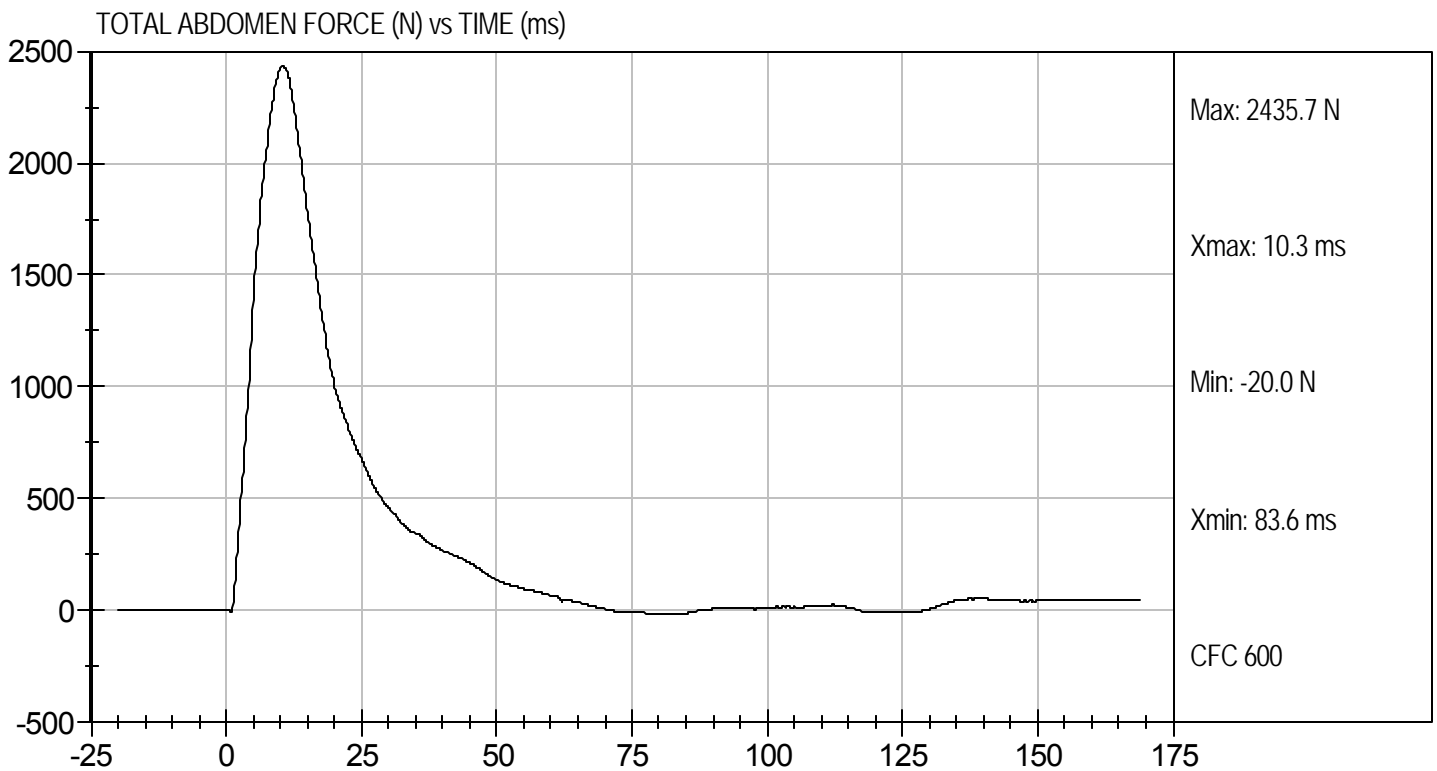
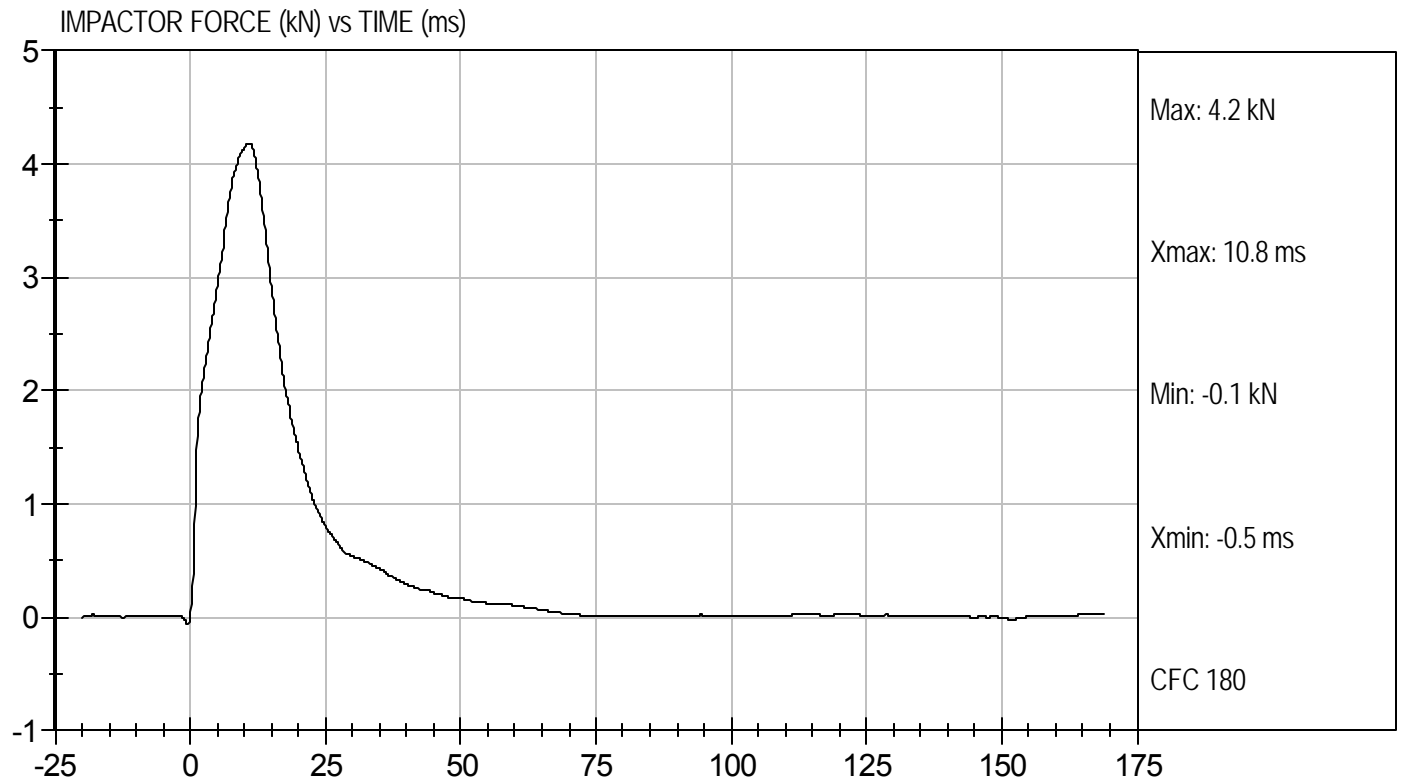
Test I.D: D113667

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	36	Pass
Probe Speed	m/s	3.90 to 4.10	4.03	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	2.44	Pass
Time of Maximum Abdomen Force	ms	10.00 to 12.30	10.30	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

11/2/11
Test Date

David Winkelbauer
Approved By



MGA RESEARCH CORPORATION
LUMBAR SPINE TEST
ES-2re DUMMY

ATD Serial No: 032

Test I.D.: D113668

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity		%	10 to 70	34	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	-0.40	Pass
	27 ms	m/s	-6.50 to -5.80	-5.80	Pass
	30 ms	m/s	>= -6.5	-6.37	Pass
Maximum Flexion Angle		deg	45.0 to 55.0	49.4	Pass
Time of Maximum Flexion Angle		ms	39.0 to 53.0	45.6	Pass
Headform Rotation Decay to Initial Position		ms	37 to 57	45	Pass
Overall Results					Pass

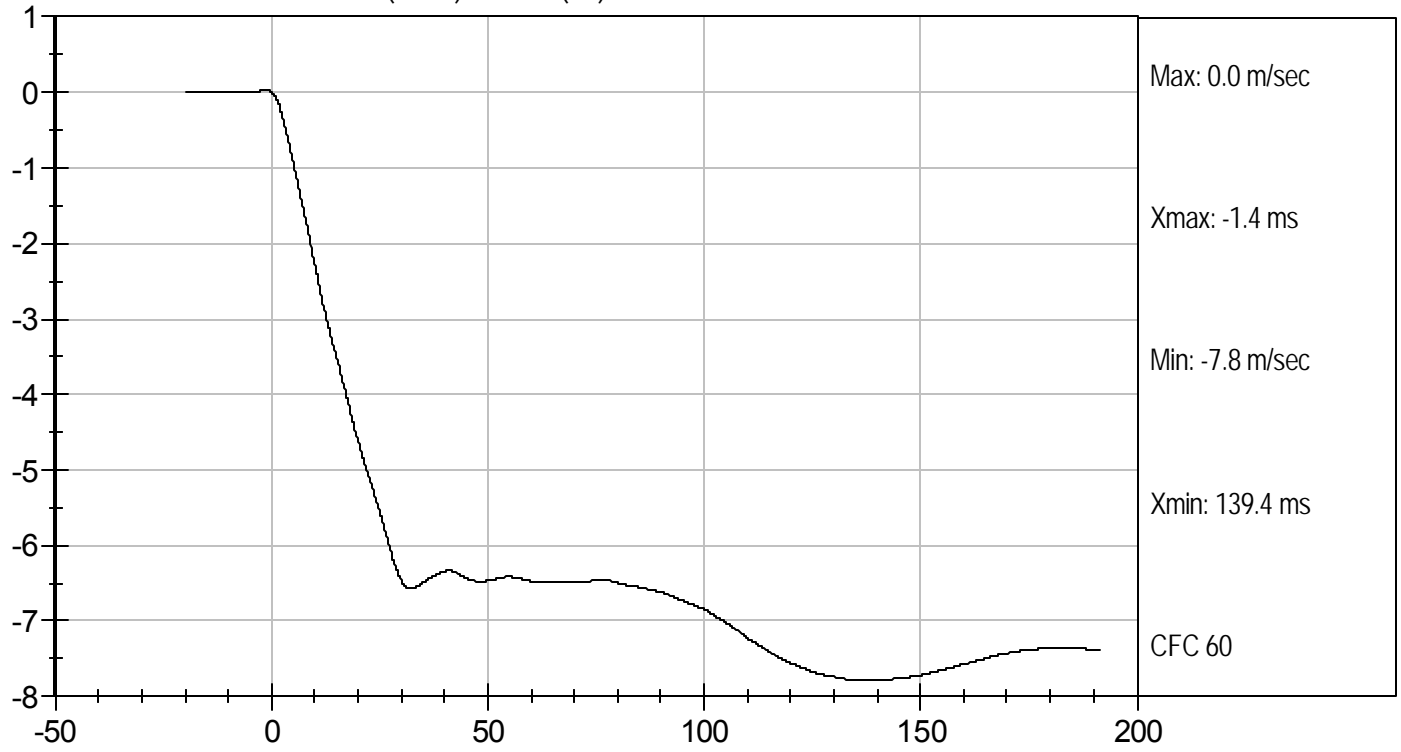
Jessica Gall
 Laboratory Technician

11/3/11
 Test Date

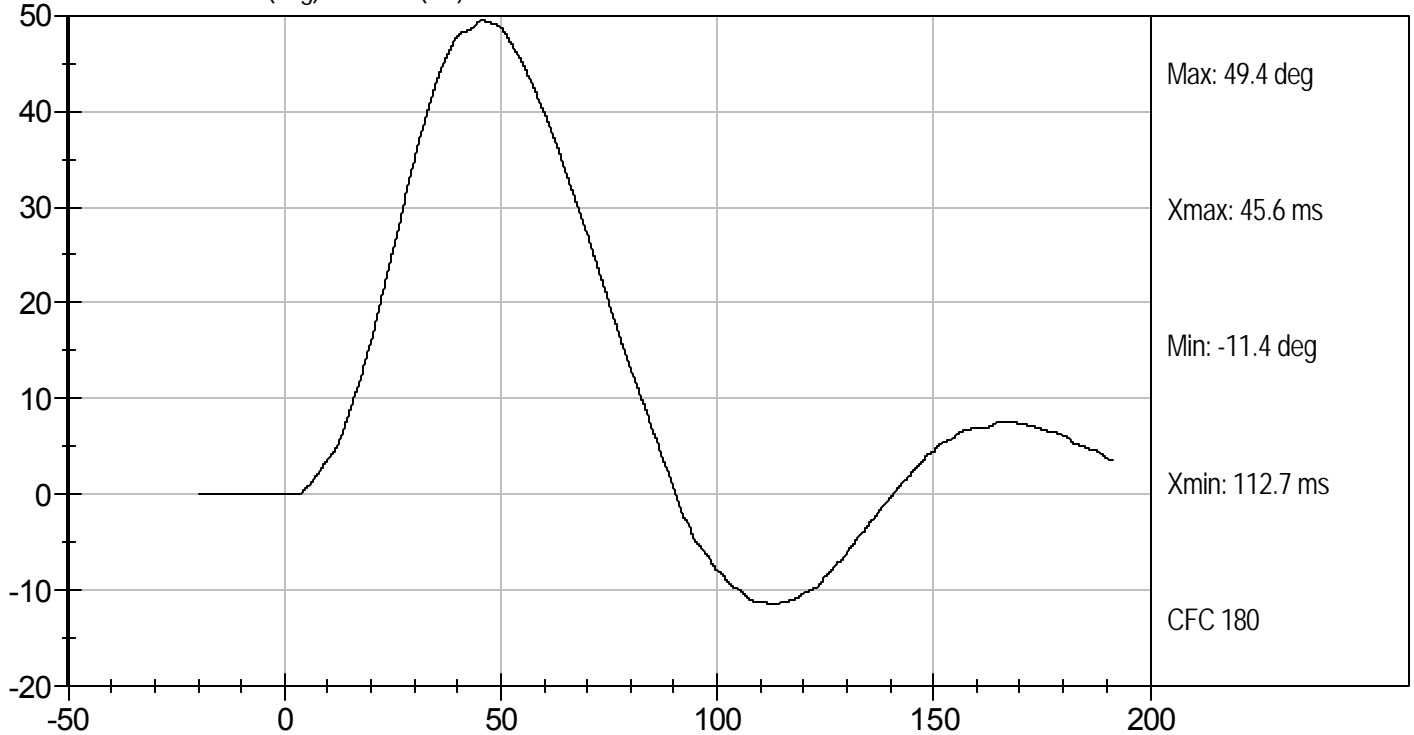
David Winkelbauer
 Approved By



PENDULUM DECELERATION (m/sec) vs TIME (ms)



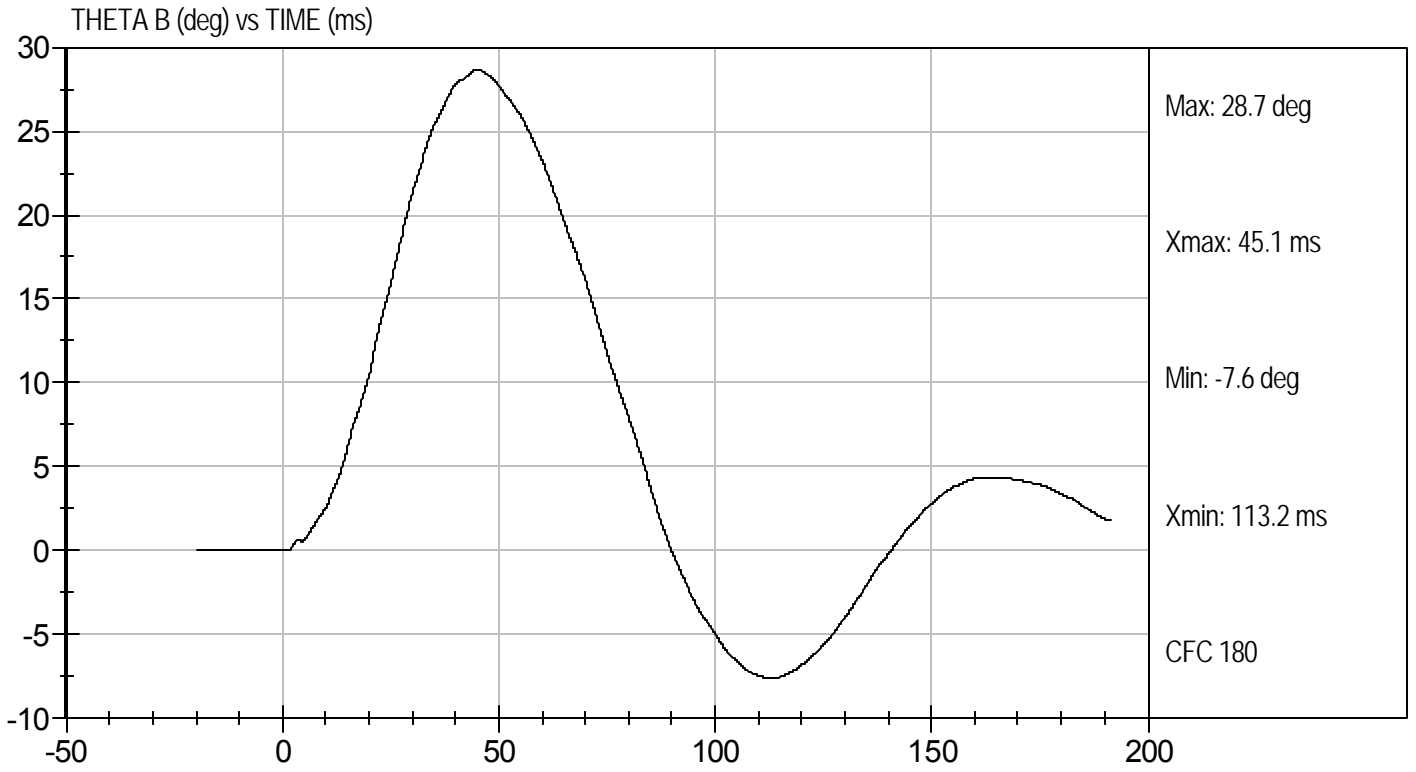
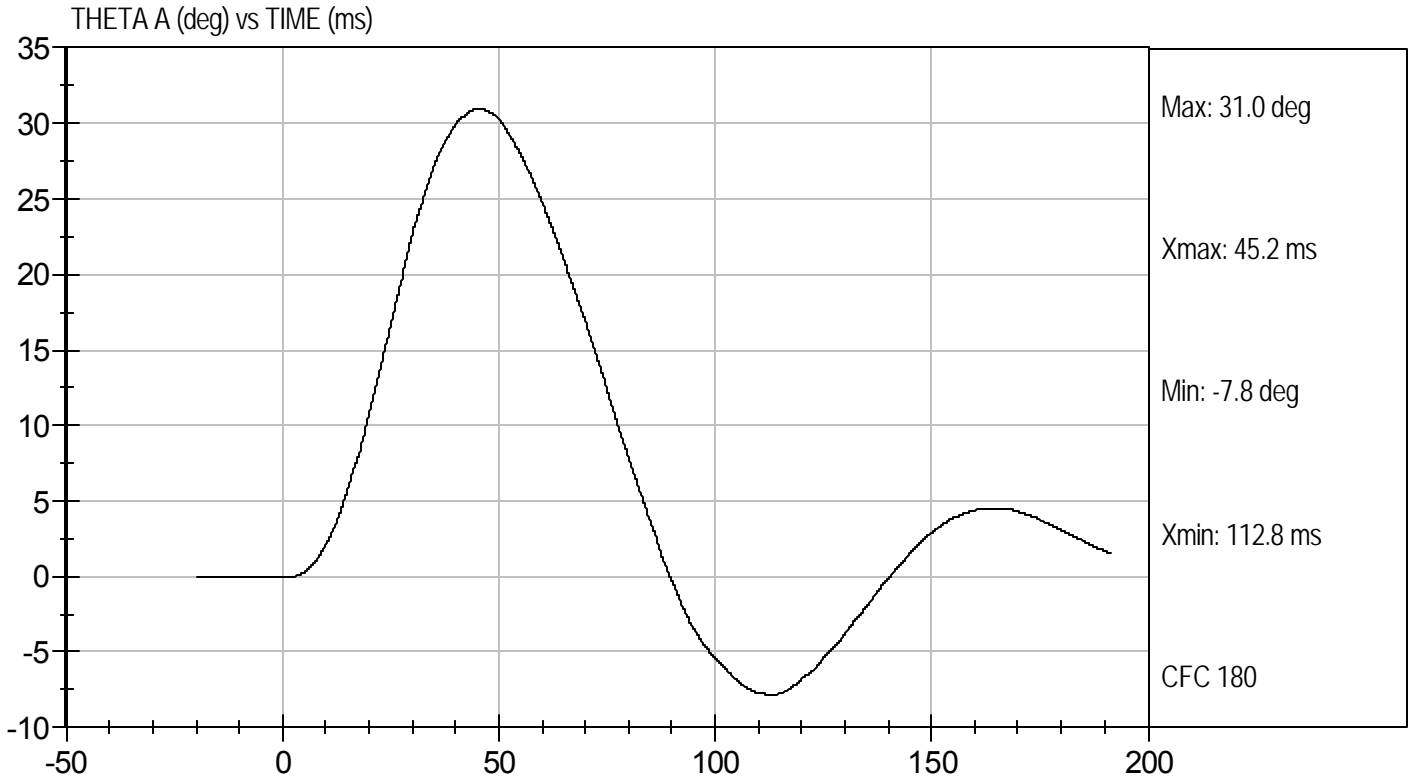
FLEXION ANGLE (deg) vs TIME (ms)





Test Desc: Lumbar Bending
Component ID: D113668

Test Date: 11/3/11
Velocity: 20.08 ft/s, 6.12 m/s



MGA RESEARCH CORPORATION

**PELVIS TEST
ES-2re DUMMY**

ATD Serial No: 032

Test I.D: D113669

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	36	Pass
Probe Speed	m/s	4.20 to 4.40	4.30	Pass
Maximum Impactor Force	kN	4.70 to 5.40	4.72	Pass
Time of Maximum Impactor Force	ms	11.80 to 16.10	13.20	Pass
Maximum Pubic Force	kN	1.23 to 1.59	1.34	Pass
Time of Maximum Pubic Force	ms	12.20 to 17.00	13.40	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

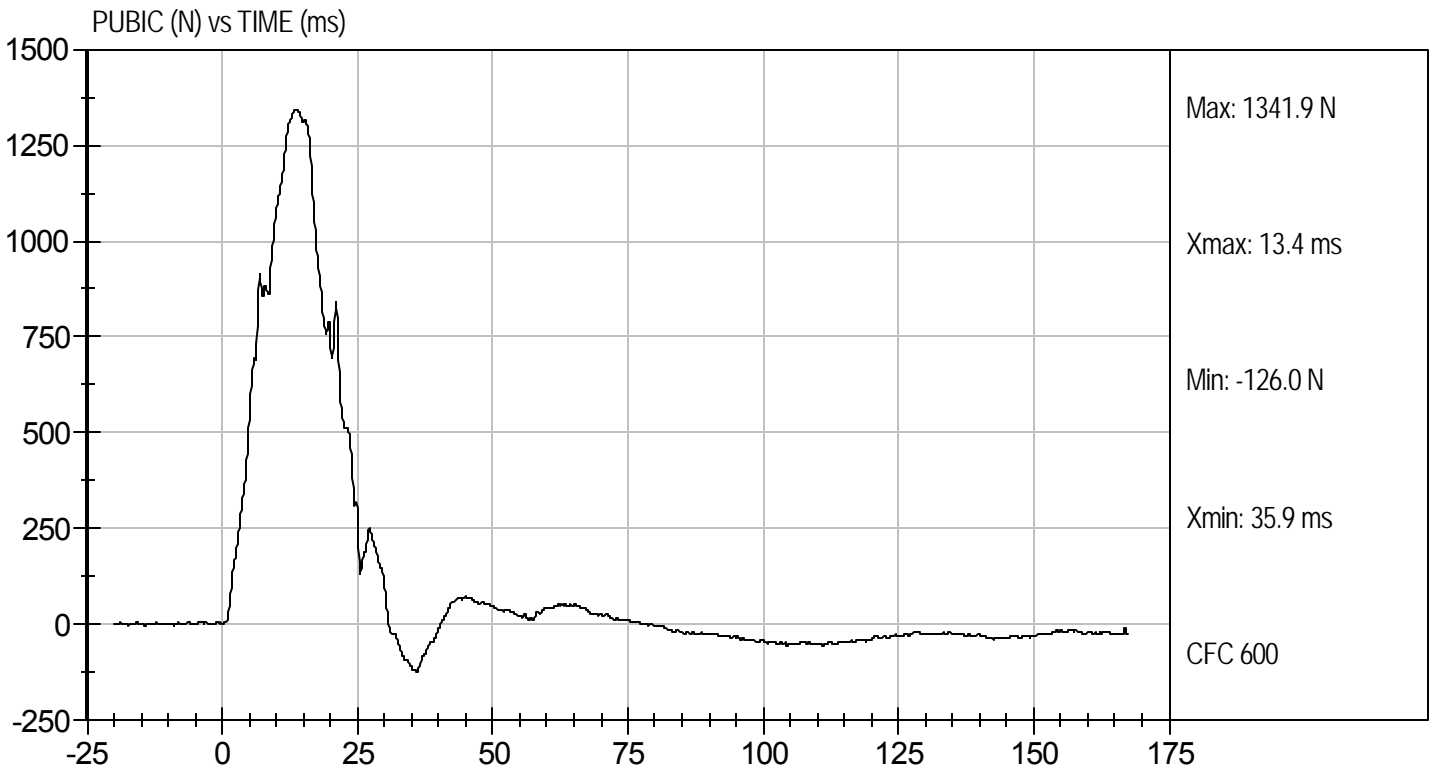
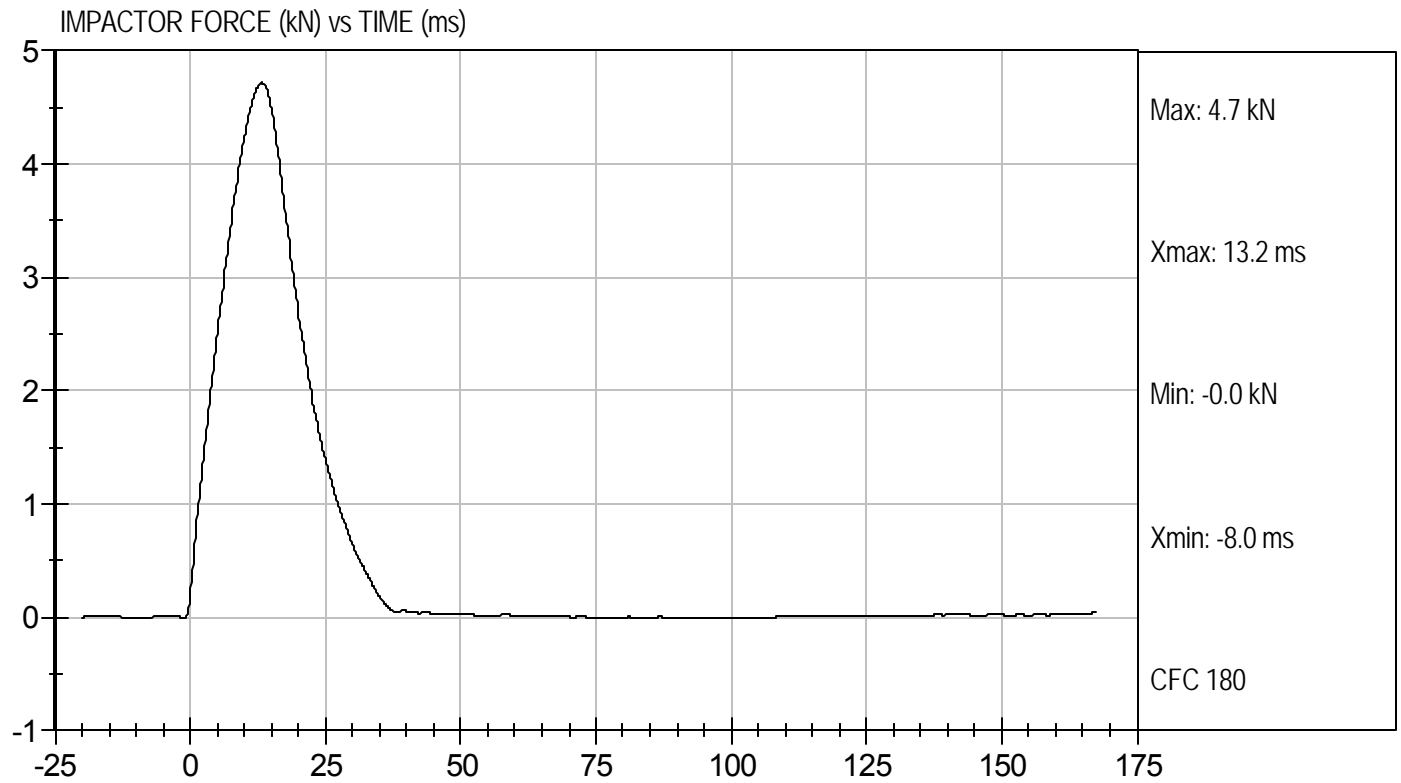
11/2/11
Test Date

David Winkelbauer
Approved By



Test Desc: Pelvis Impact
Component ID: D113669

Test Date: 11/2/11
Velocity: 14.12 ft/s, 4.30 m/s



SID-IIsD External Measurements
SN: 306

No.	Name	Spec. (mm)	Result	Pass/Fail
A	Sitting Height	772 - 788	785	Pass
B	Shoulder Pivot Height	437 - 453	449	Pass
C	H-point Height	79 - 89	86	Pass
D	H-point from Seatback	141 - 151	147	Pass
E	Shoulder Pivot from Backline	97 - 107	99	Pass
F	Thigh Clearance	119 -135	120	Pass
G	Head Breadth	140 - 148	141	Pass
H	Head Back from Backline	40 - 46	45	Pass
I	Head Depth	178 - 188	182	Pass
J	Head Circumference	541 - 551	550	Pass
K	Buttock to Knee Length	514 - 540	538	Pass
L	Popliteal Height	343 - 369	349	Pass
M	Knee Pivot to Floor Height	392 - 409	394	Pass
N	Buttock Popliteal Length	416 - 442	435	Pass
O	Chest Depth w/o Jacket	195 - 211	198	Pass
P	Foot Length	216 - 232	222	Pass
Q	Hip Breadth (w/ pelvic plugs)	313 - 323	317	Pass
R	Arm Length	249 - 259	250	Pass
S	Knee Joint to Seatback	477 - 493	483	Pass
V	Shoulder Width	341 - 357	351	Pass
W	Foot Width	78 - 94	82	Pass
Y	Chest Circumference w/ jacket	851 - 881	863	Pass
Z	Waist Circumference	761 - 791	782	Pass

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

ATD Serial No: 306

Test ID: D113571

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	40	Pass
Peak Resultant Acceleration	G's	115 to 137	120	Pass
Peak Lateral Acceleration	G's	+/- 15	-5.5	Pass
Unimodal	N/A	<15%	Yes	Pass
Overall Test Results				Pass

Jessica Gall
Laboratory Technician

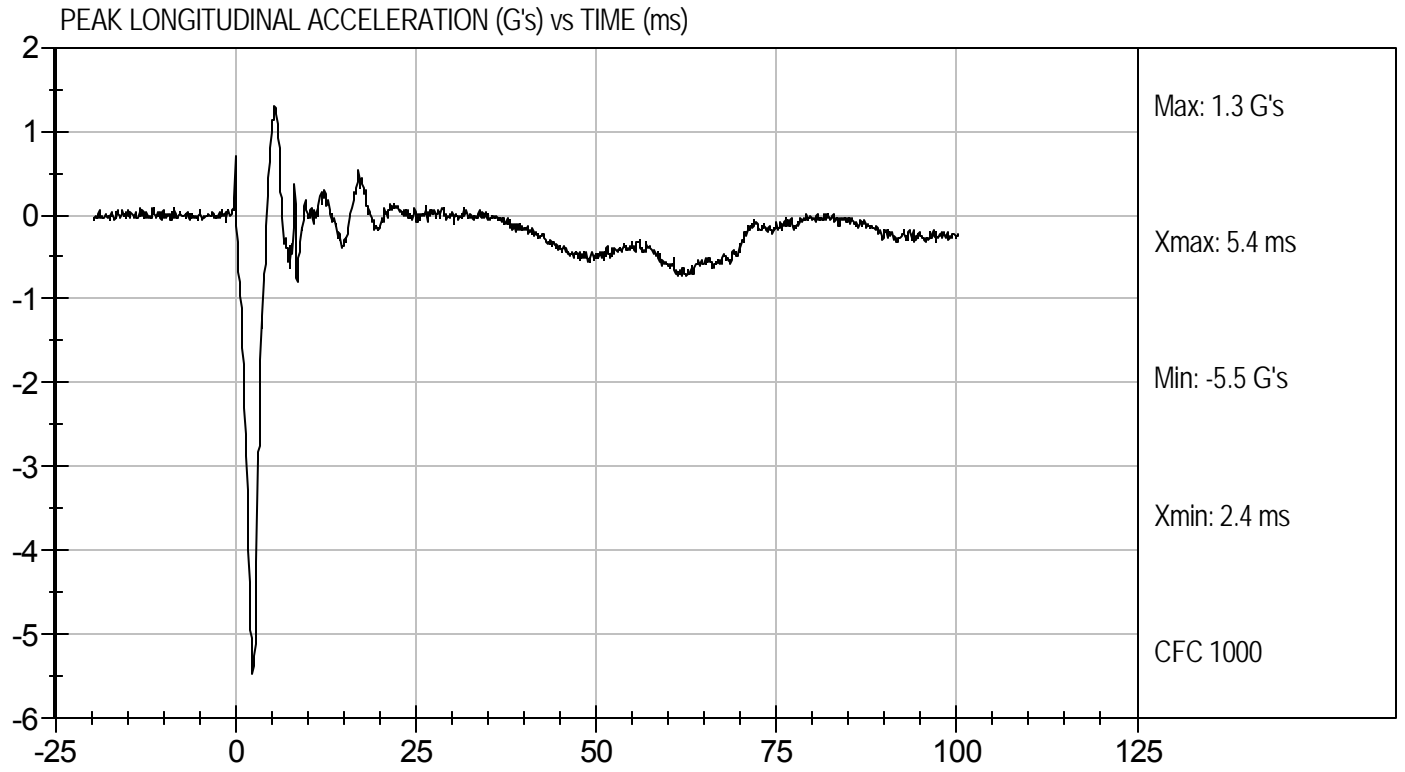
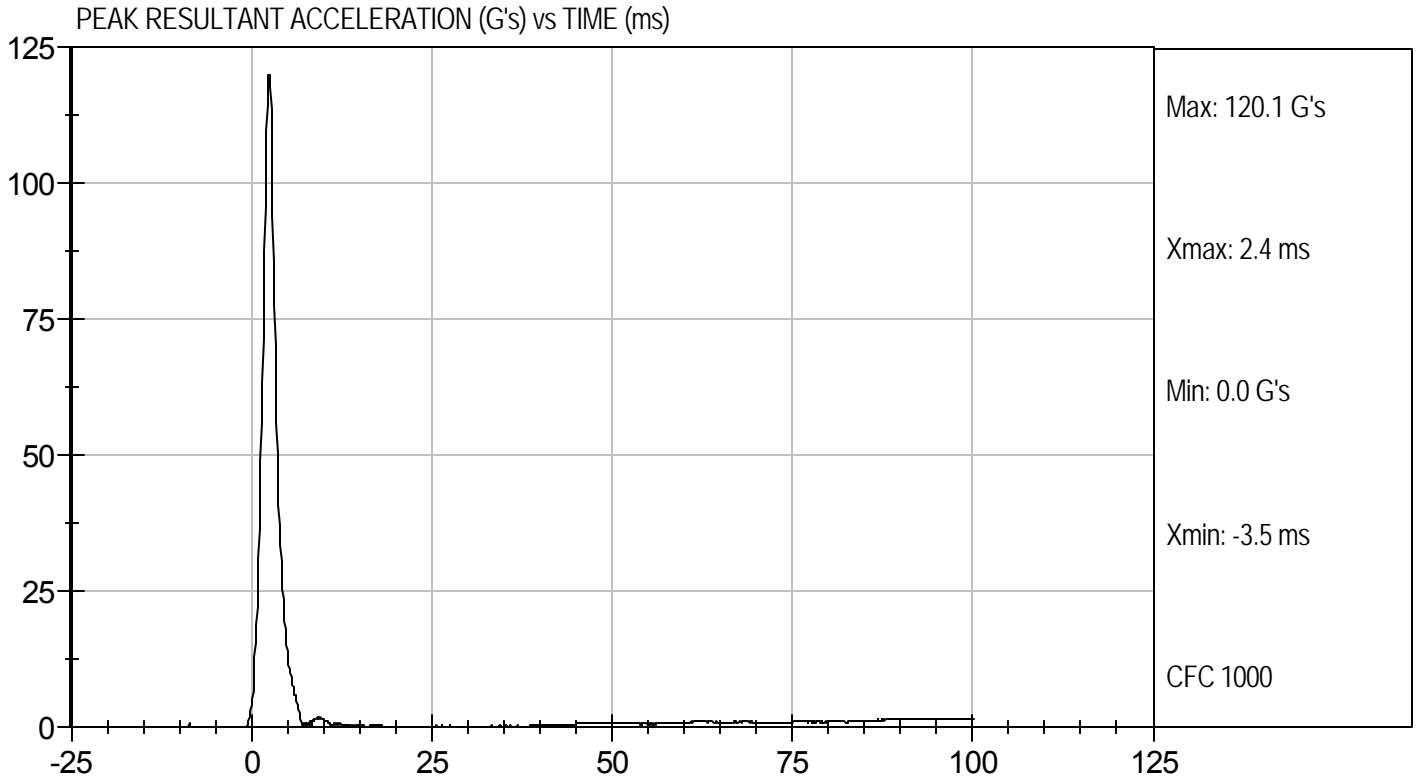
10/25/11
Test Date

David Winkelbauer
Approved By



Test Desc: Head Drop
Component ID: D113571

Test Date: 10/25/11
Velocity: 0 ft/s, 0 m/s



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

ATD Serial No: 306

Test I.D.: D113572

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21.9	Pass
Humidity		%	10 to 70	38	Pass
Impact Velocity		m/s	5.51 to 5.63	5.58	Pass
Delta Velocity	10 ms	m/s	2.20 to 2.80	2.39	Pass
	15 ms	m/s	3.30 to 4.10	3.39	Pass
	20 ms	m/s	4.40 to 5.40	4.51	Pass
	25 ms	m/s	5.40 to 6.10	5.48	Pass
	25-100 ms	m/s	5.50 to 6.20	5.81	Pass
Maximum D-Plane Rotation		deg	71 to 81	73	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	60	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	113	Pass
				Overall Test Results	Pass

Jessica Hall
Laboratory Technician

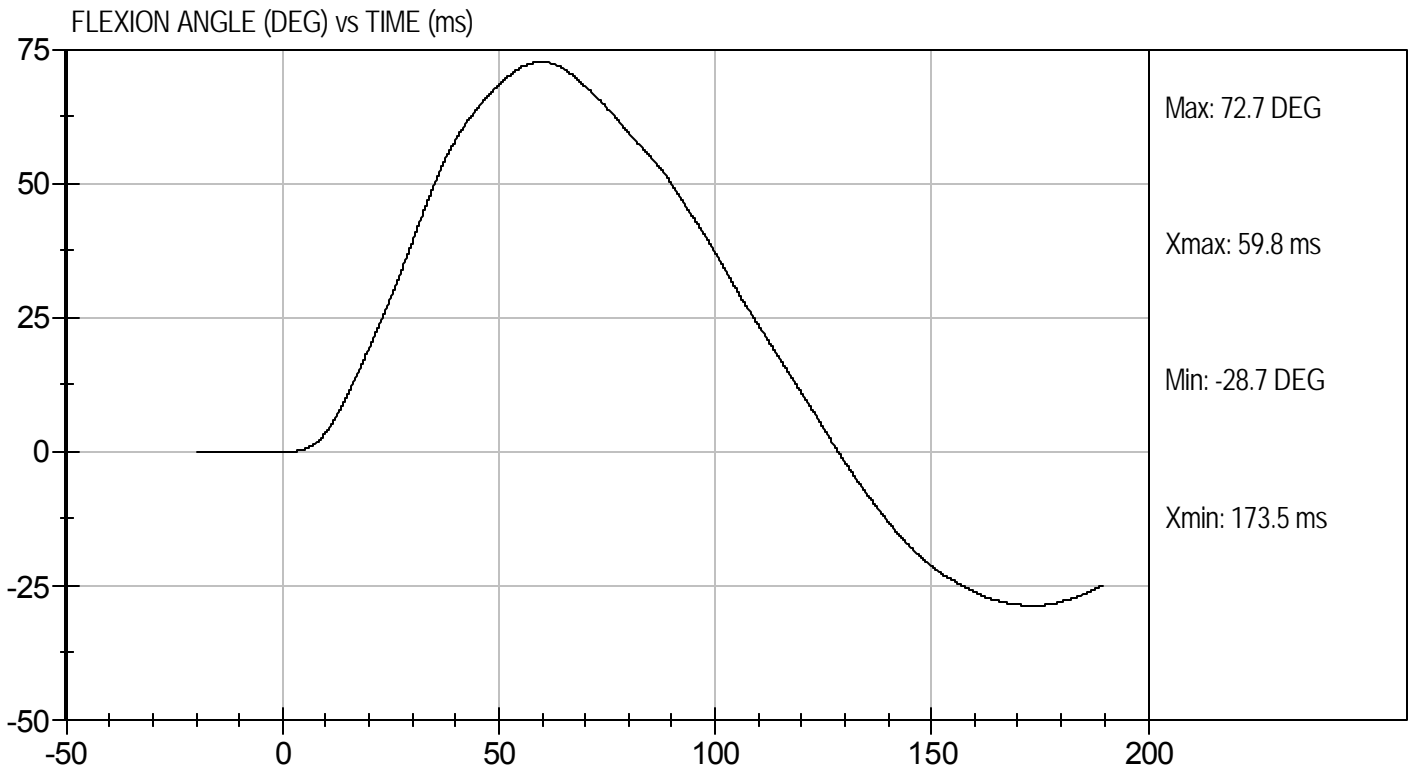
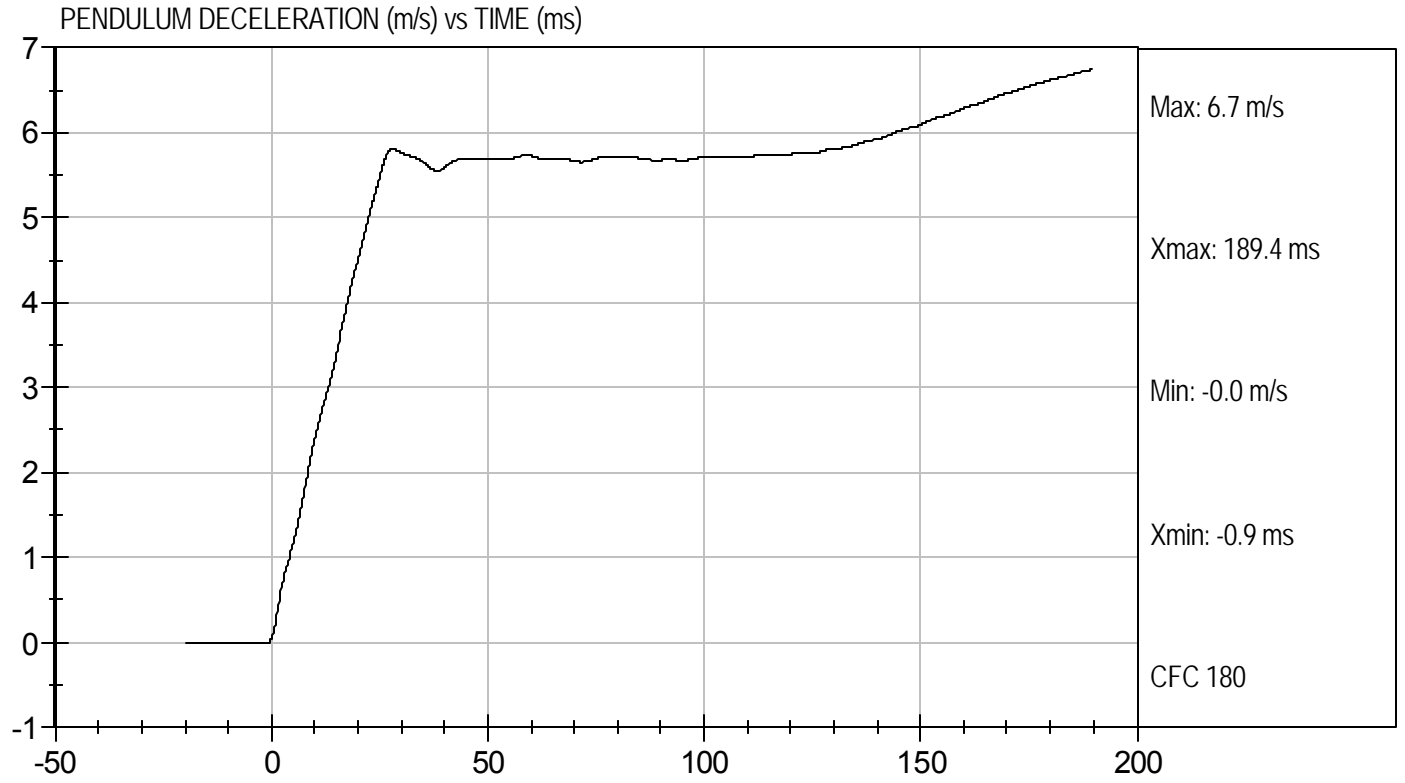
10/25/11
Test Date

David Winkelbauer
Approved By



Test Desc: Neck Bending
Component ID: D113572

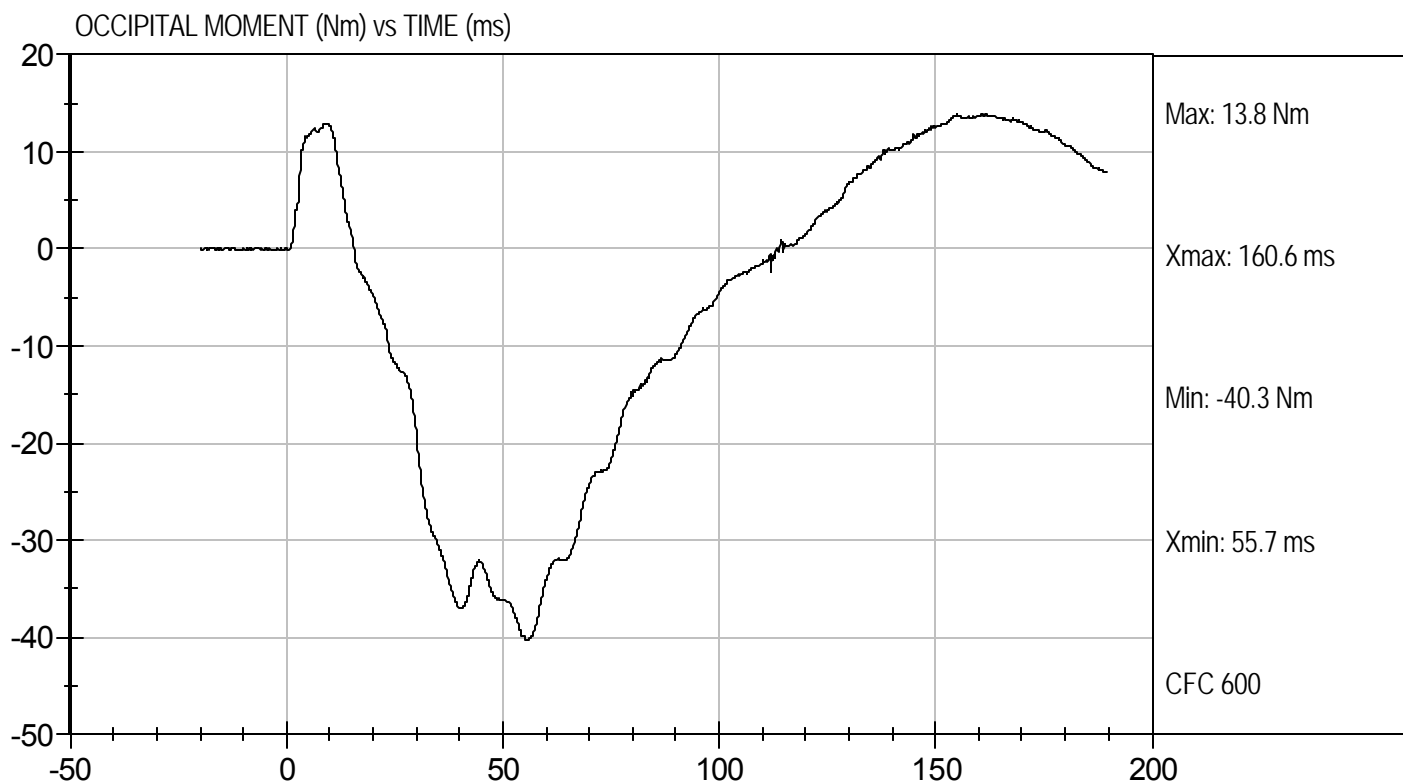
Test Date: 10/25/11
Velocity: 18.31 ft/s, 5.58 m/s





Test Desc: Neck Bending
Component ID: D113572

Test Date: 10/25/11
Velocity: 18.31 ft/s, 5.58 m/s



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

ATD Serial No: 306

Test ID: D113573

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	38	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	28	Pass
Upper Spine (T1) Y Acceleration	G's	17 to 22	18	Pass
Overall Test Results				Pass

Jessica Gall
Laboratory Technician

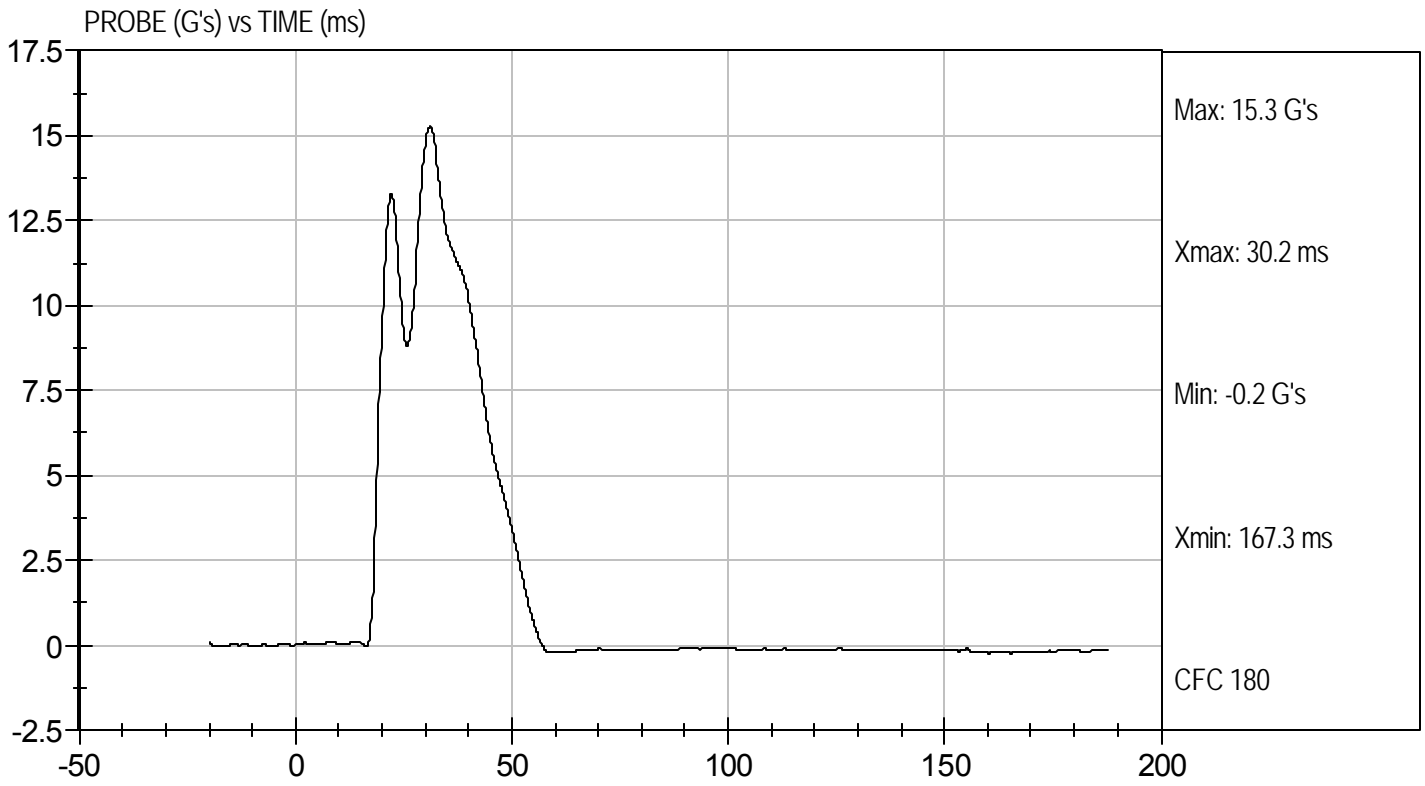
10/26/11
Test Date

David Winkelbauer
Approved By



Test Desc: Shoulder Impact
Component ID: D113573

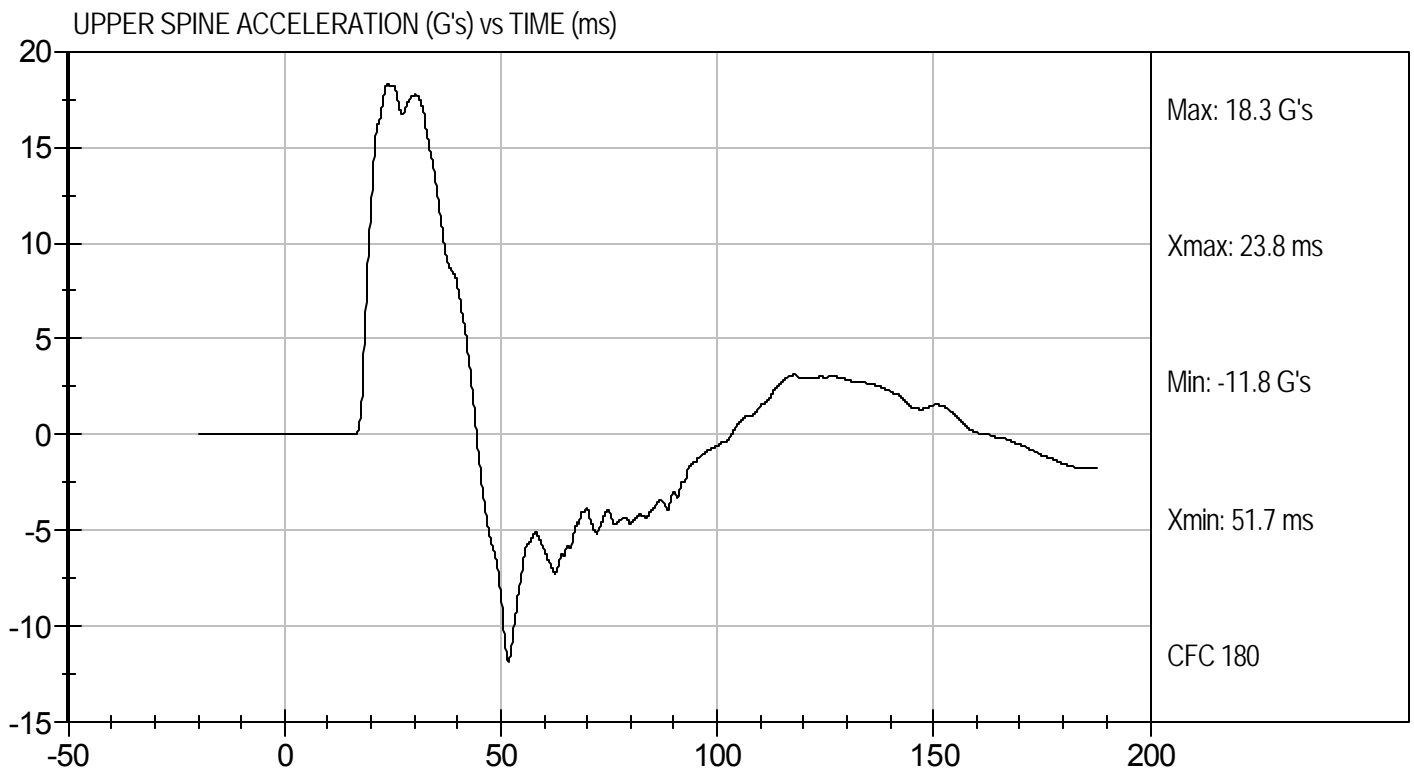
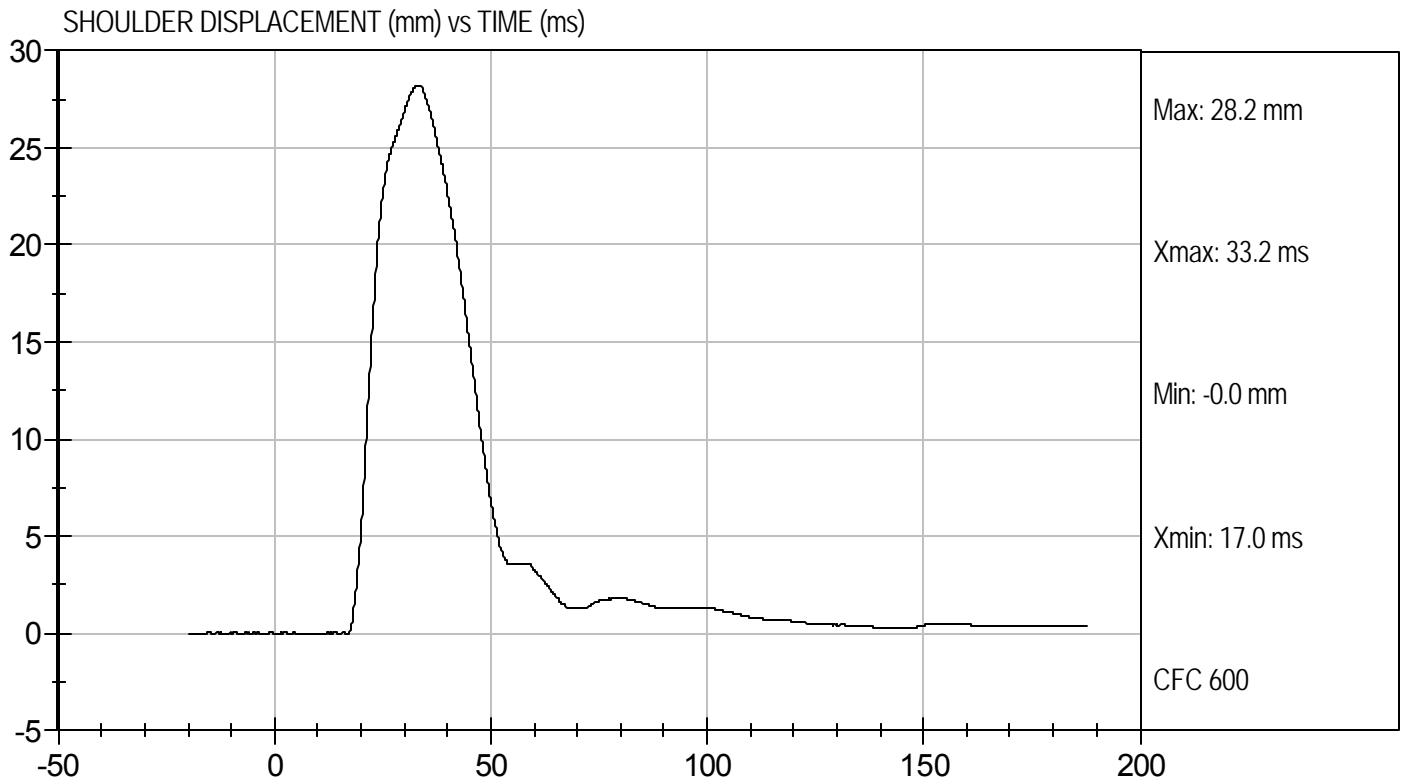
Test Date: 10/26/11
Velocity: 14.25 ft/s, 4.34 m/s





Test Desc: Shoulder Impact
Component ID: D113573

Test Date: 10/26/11
Velocity: 14.25 ft/s, 4.34 m/s



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


ATD Serial No: 306

Test I.D: D113574

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.9	Pass
Humidity	%	10 to 70	38	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	32	Pass
Upper Rib Displacement	mm	25 to 32	29	Pass
Middle Rib Displacement	mm	30 to 36	32	Pass
Lower Rib Displacement	mm	32 to 38	35	Pass
Upper Spine (T1) Y Acceleration	G's	34 to 43	40	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	31	Pass
Overall Test Results				Pass


Laboratory Technician

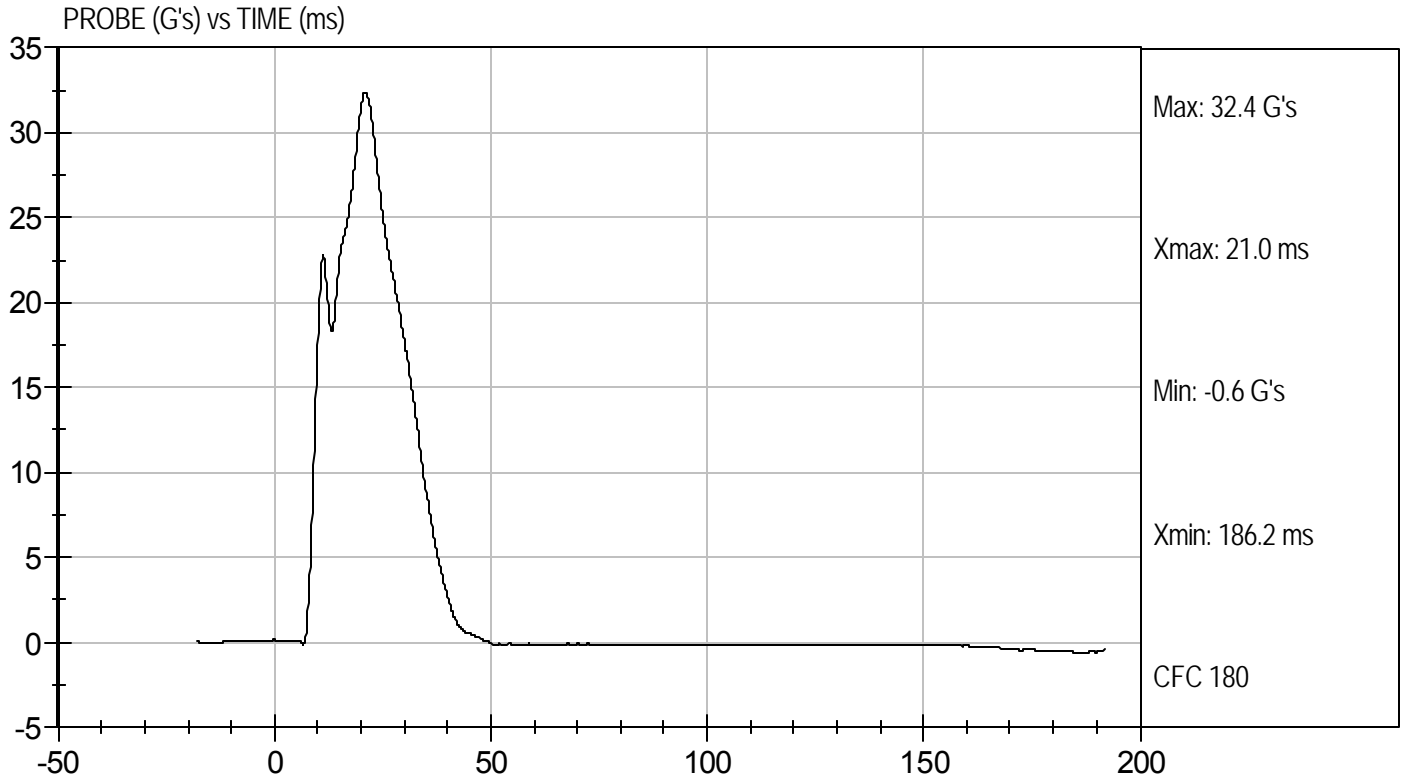
10/26/11
Test Date

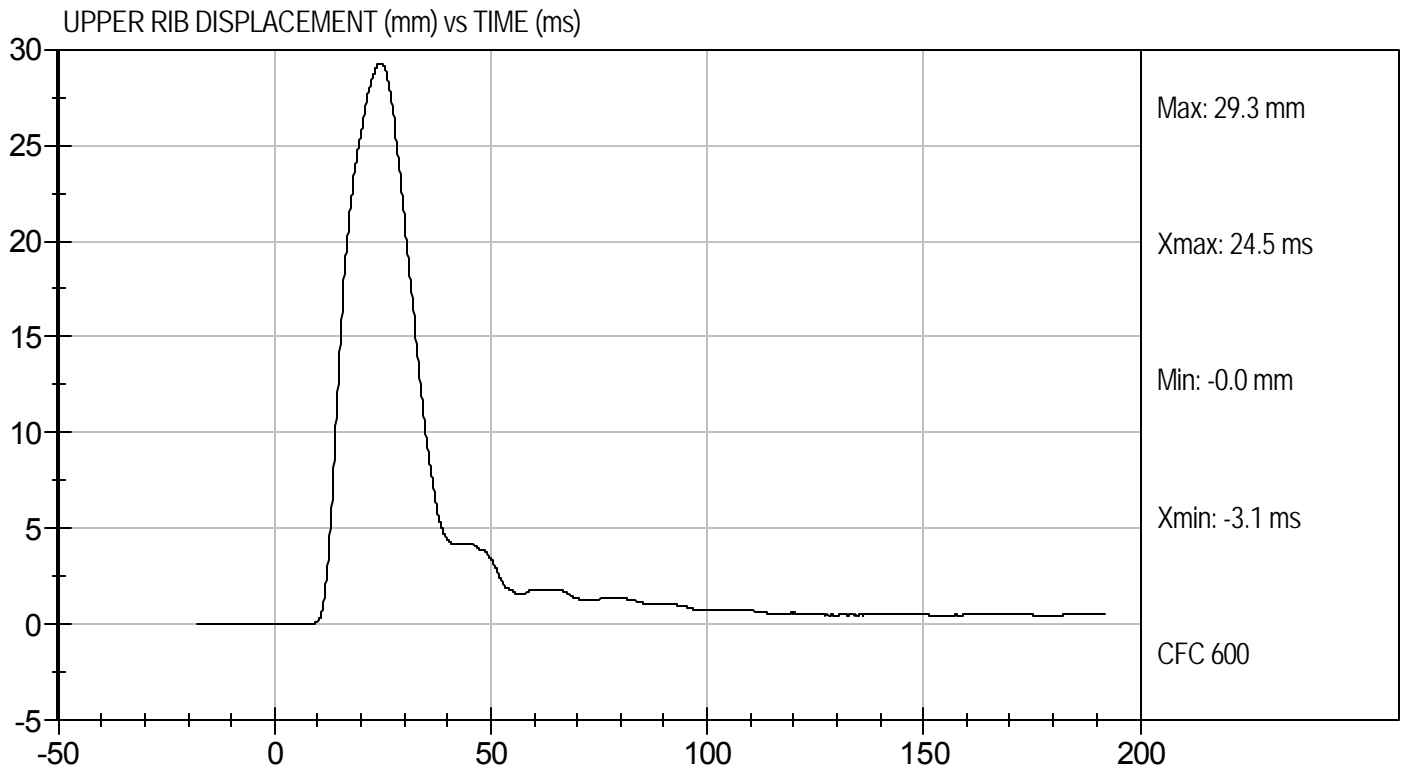
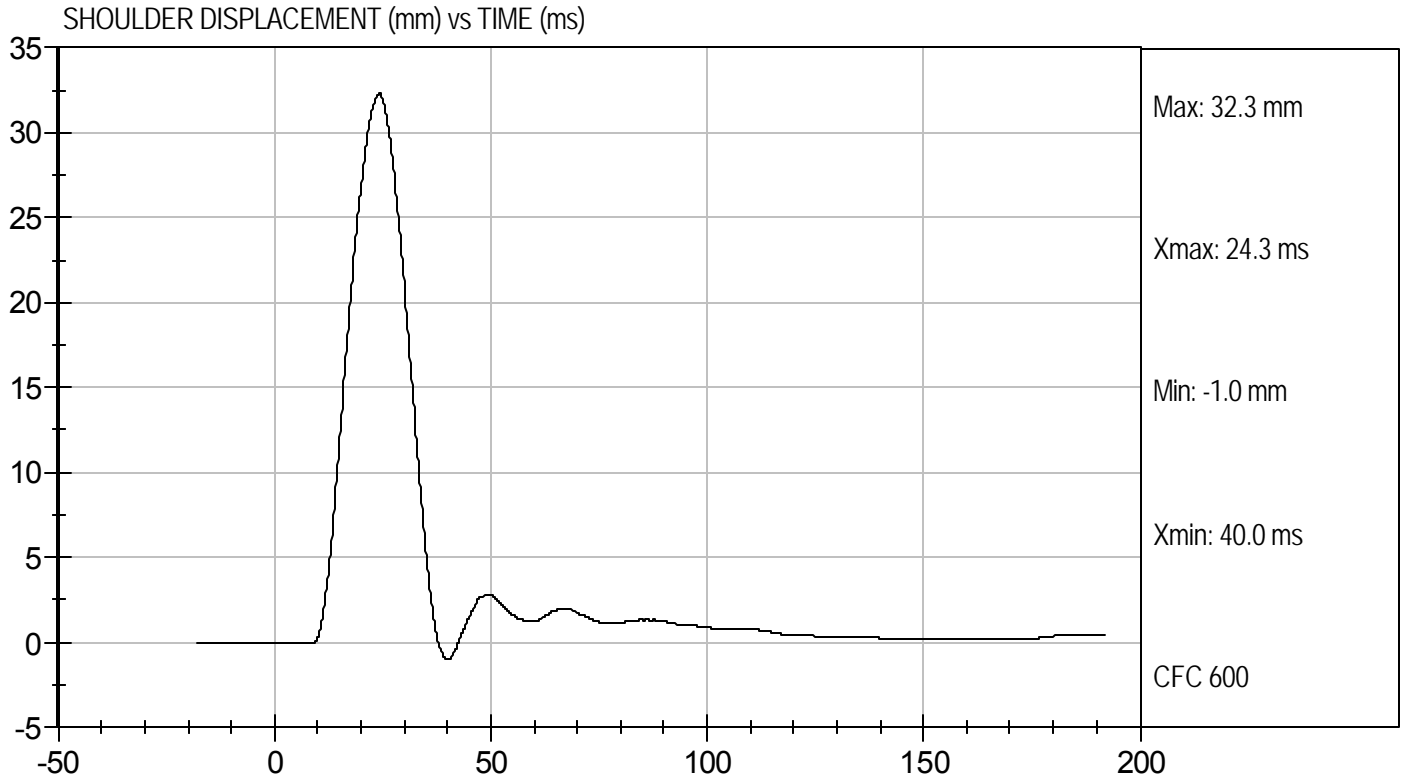

Approved By



Test Desc: Thorax With Arm
Component ID: D113574

Test Date: 10/26/11
Velocity: 22.22 ft/s, 6.77 m/s



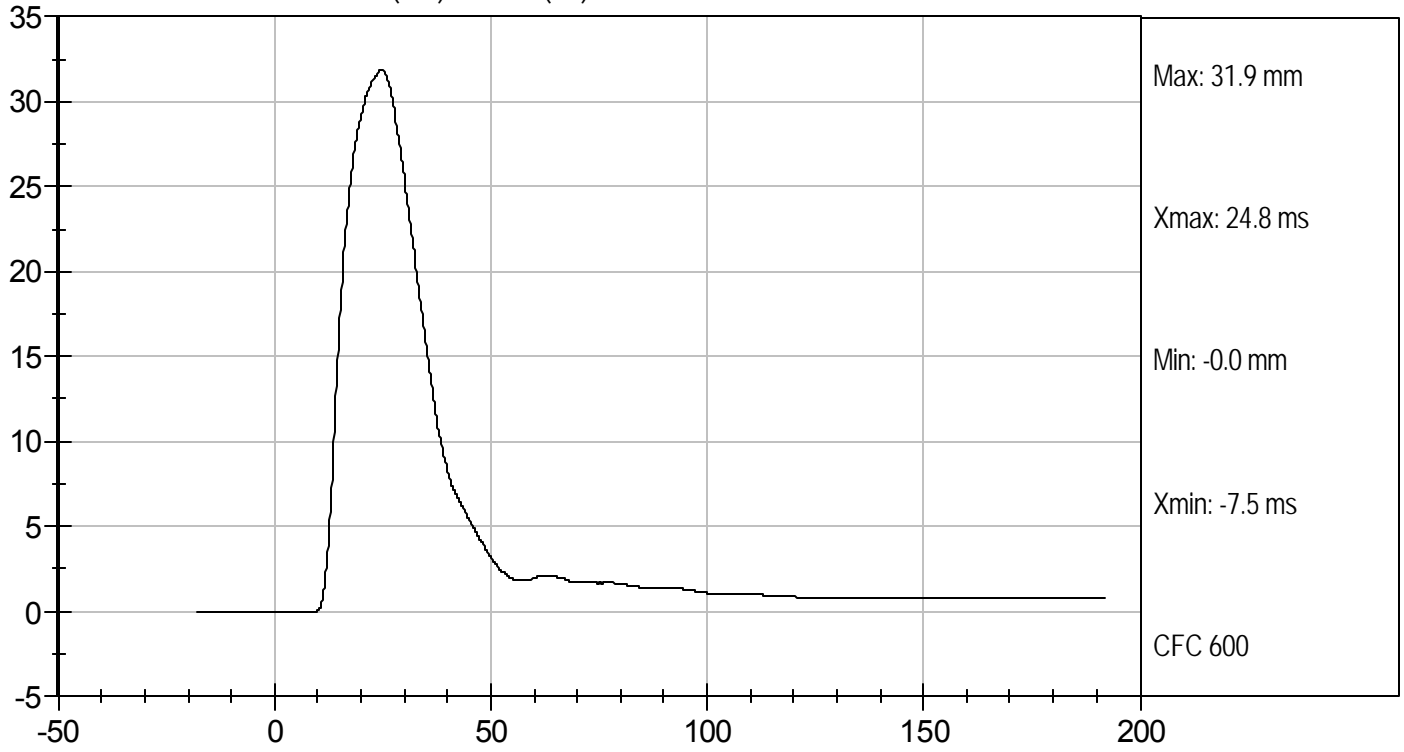




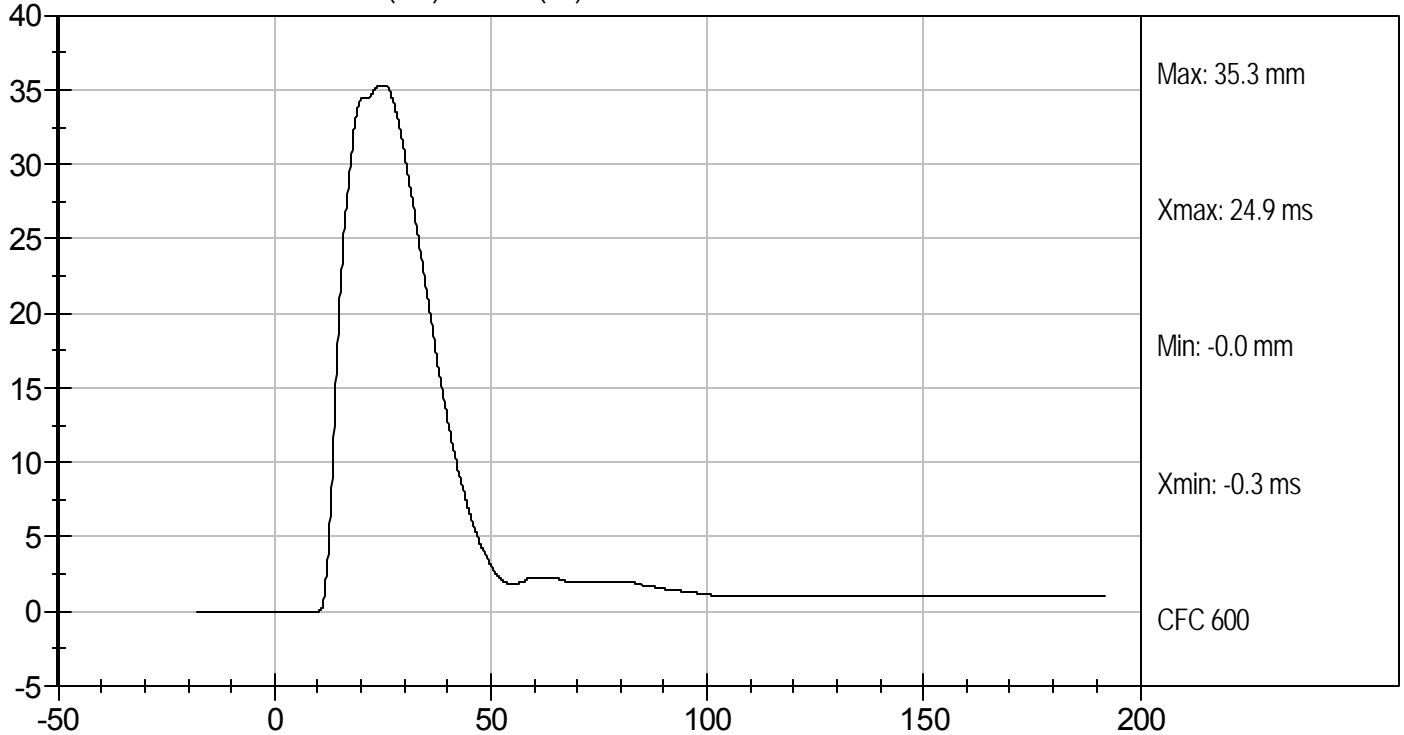
Test Desc: Thorax With Arm
Component ID: D113574

Test Date: 10/26/11
Velocity: 22.22 ft/s, 6.77 m/s

MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



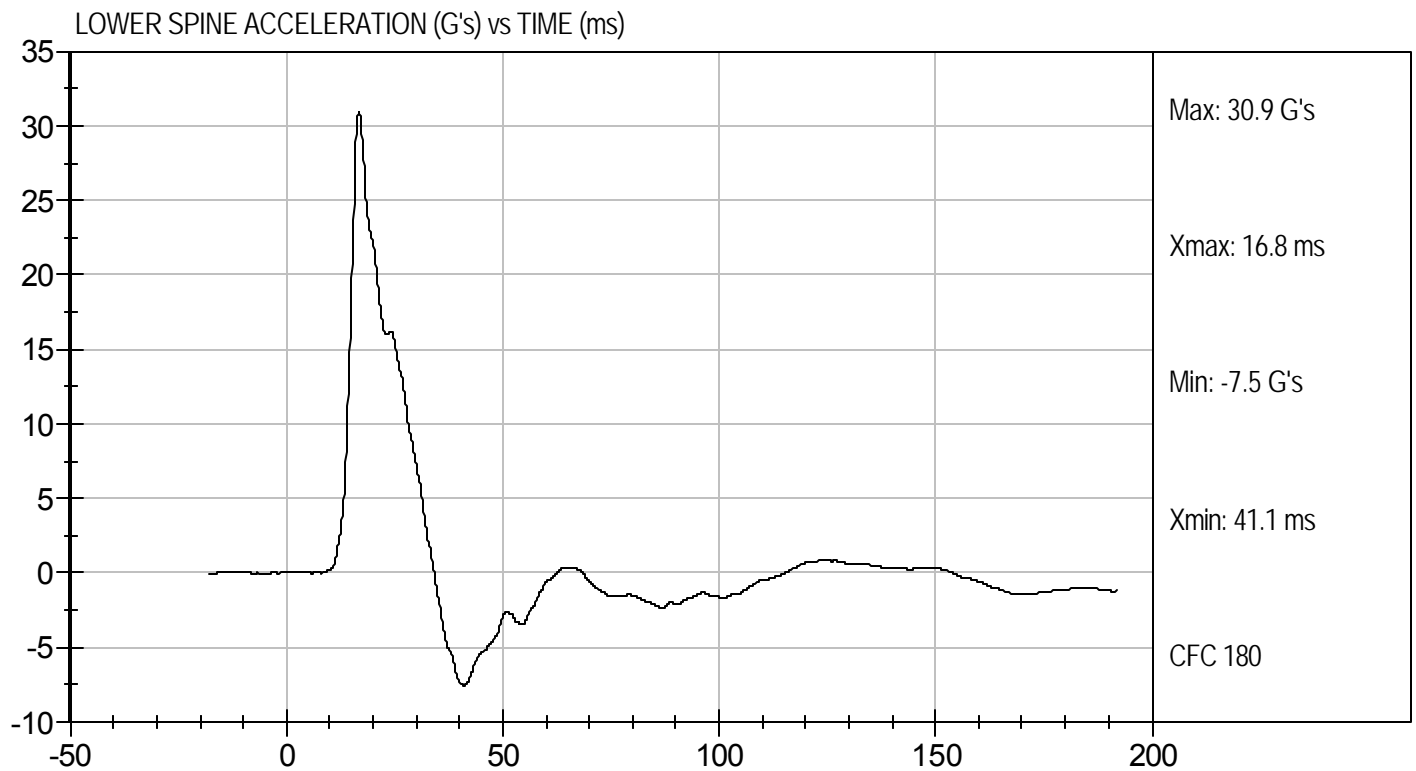
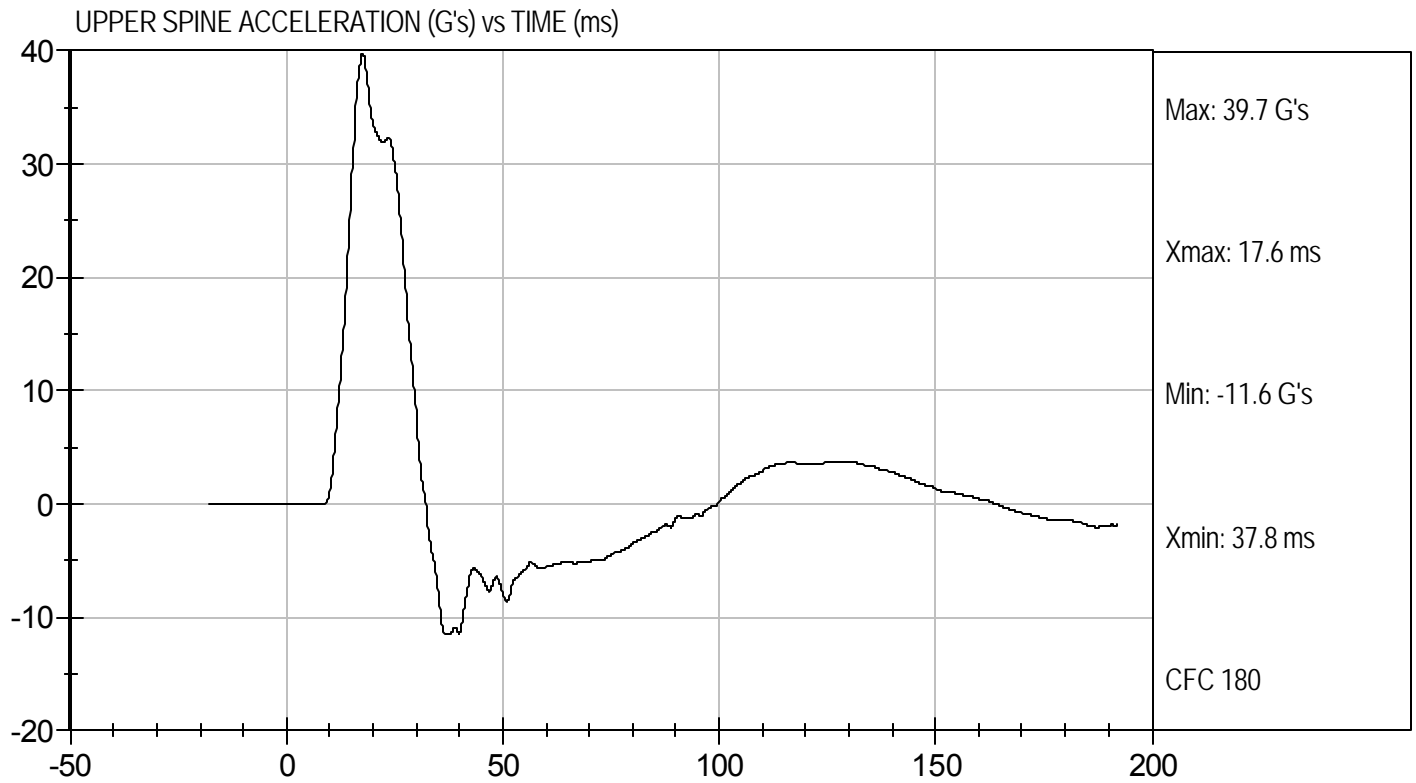
LOWER RIB DISPLACEMENT (mm) vs TIME (ms)





Test Desc: Thorax With Arm
Component ID: D113574

Test Date: 10/26/11
Velocity: 22.22 ft/s, 6.77 m/s



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

ATD Serial No: 306

Test I.D: D113575

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	22.0	Pass
Humidity	%	10 to 70	38	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	39	Pass
Middle Rib Displacement	mm	39 to 45	42	Pass
Lower Rib Displacement	mm	35 to 43	40	Pass
Upper Spine (T1) Y Acceleration	G's	13 to 17	14	Pass
Lower Spine (T12) Y Acceleration	G's	7 to 11	9	Pass
Overall Test Results				Pass

Jessica Hall
 Laboratory Technician

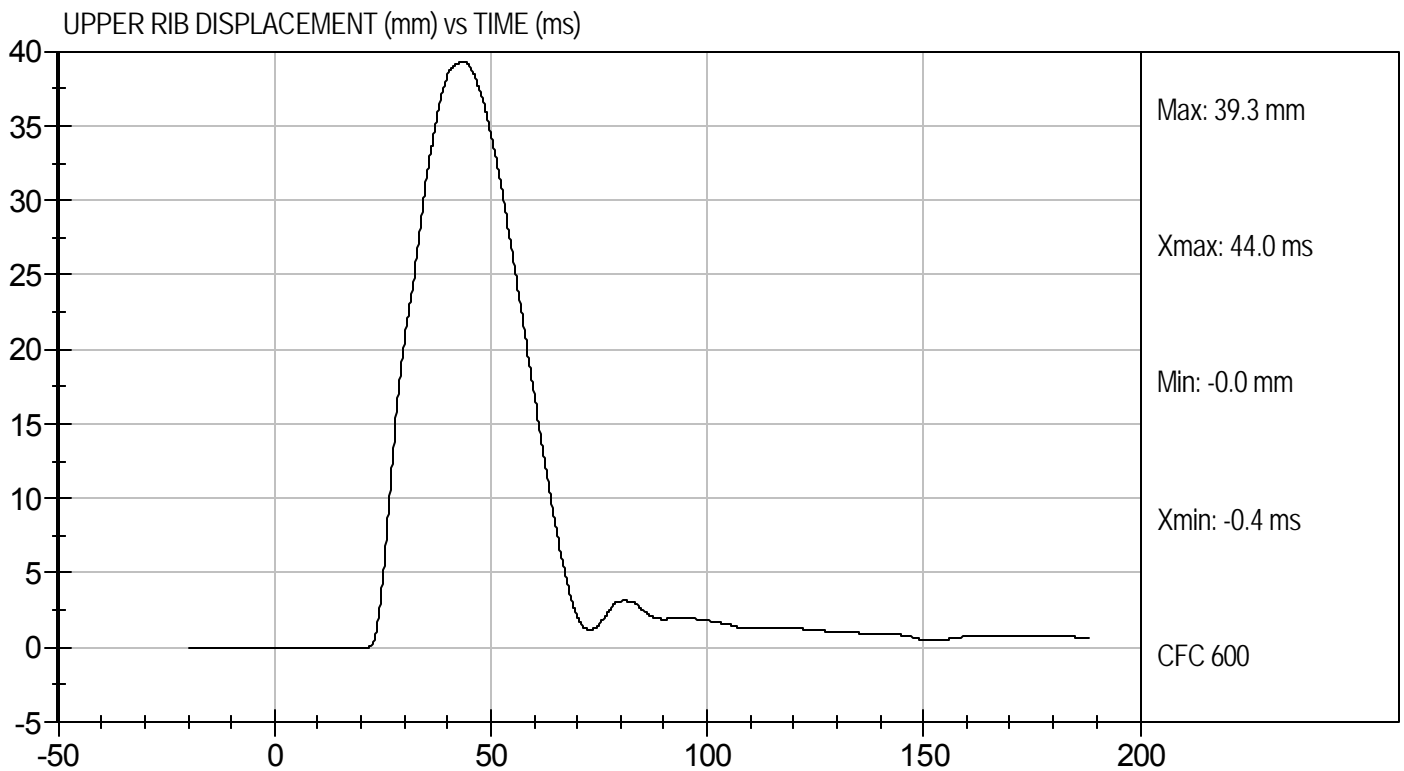
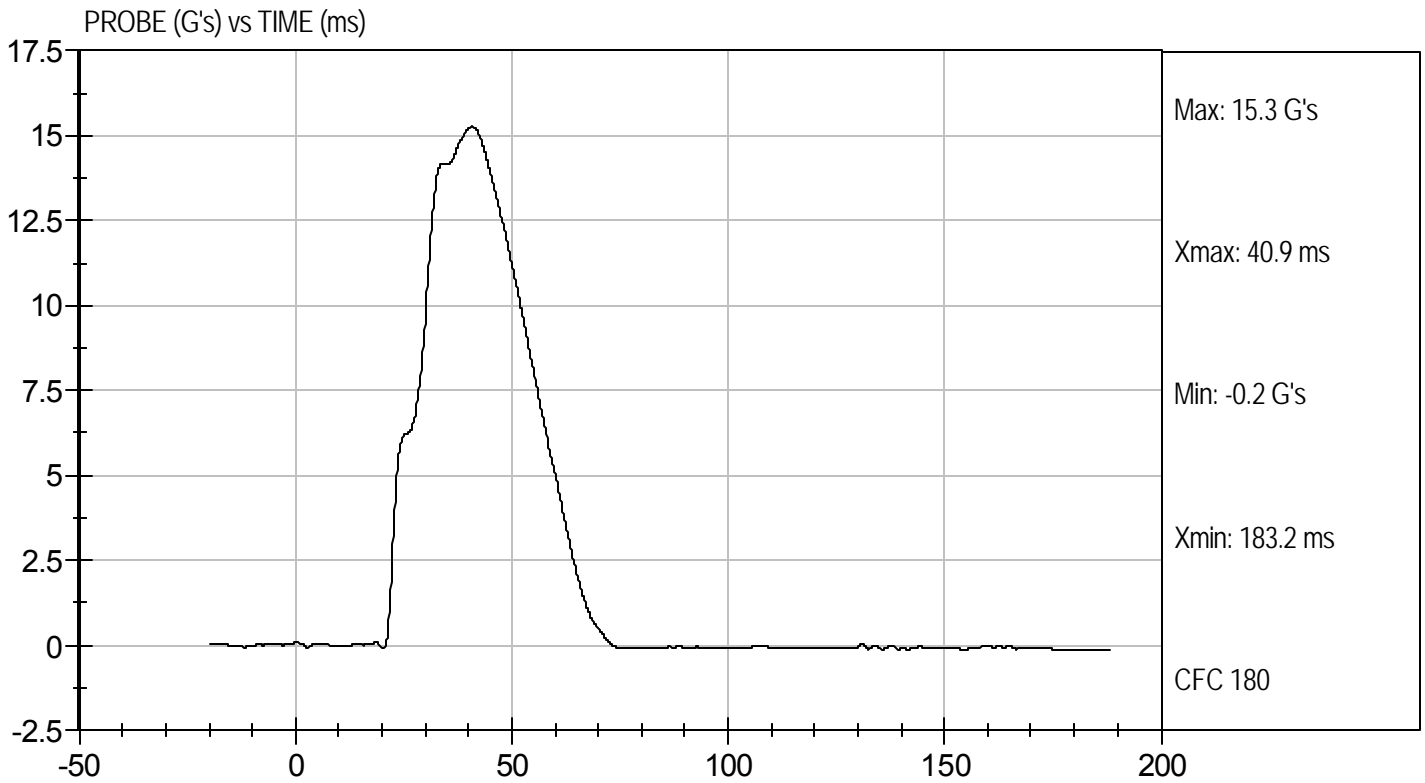
10/26/11
 Test Date

David Winkelbauer
 Approved By



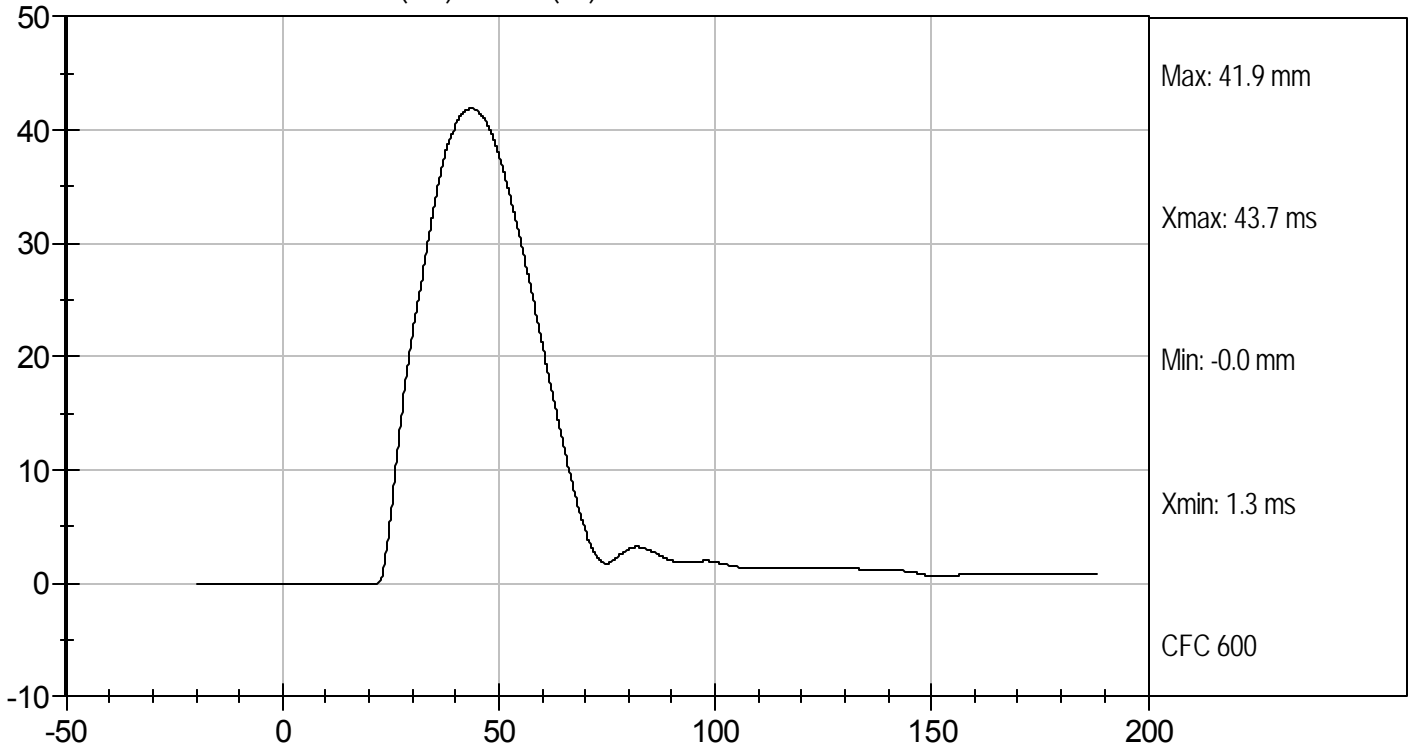
Test Desc: Thorax Without Arm
Component ID: D113575

Test Date: 10/26/11
Velocity: 14.36 ft/s, 4.38 m/s

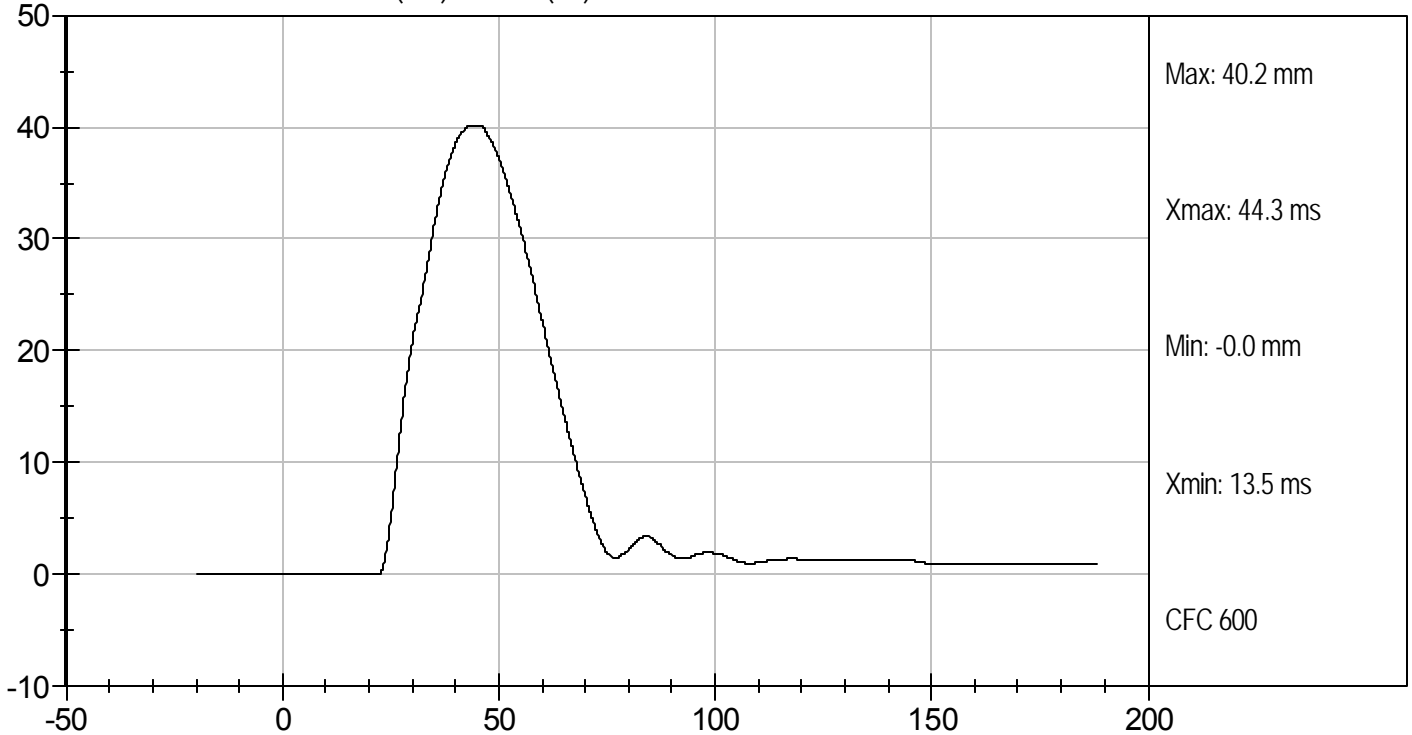




MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



LOWER RIB DISPLACEMENT (mm) vs TIME (ms)

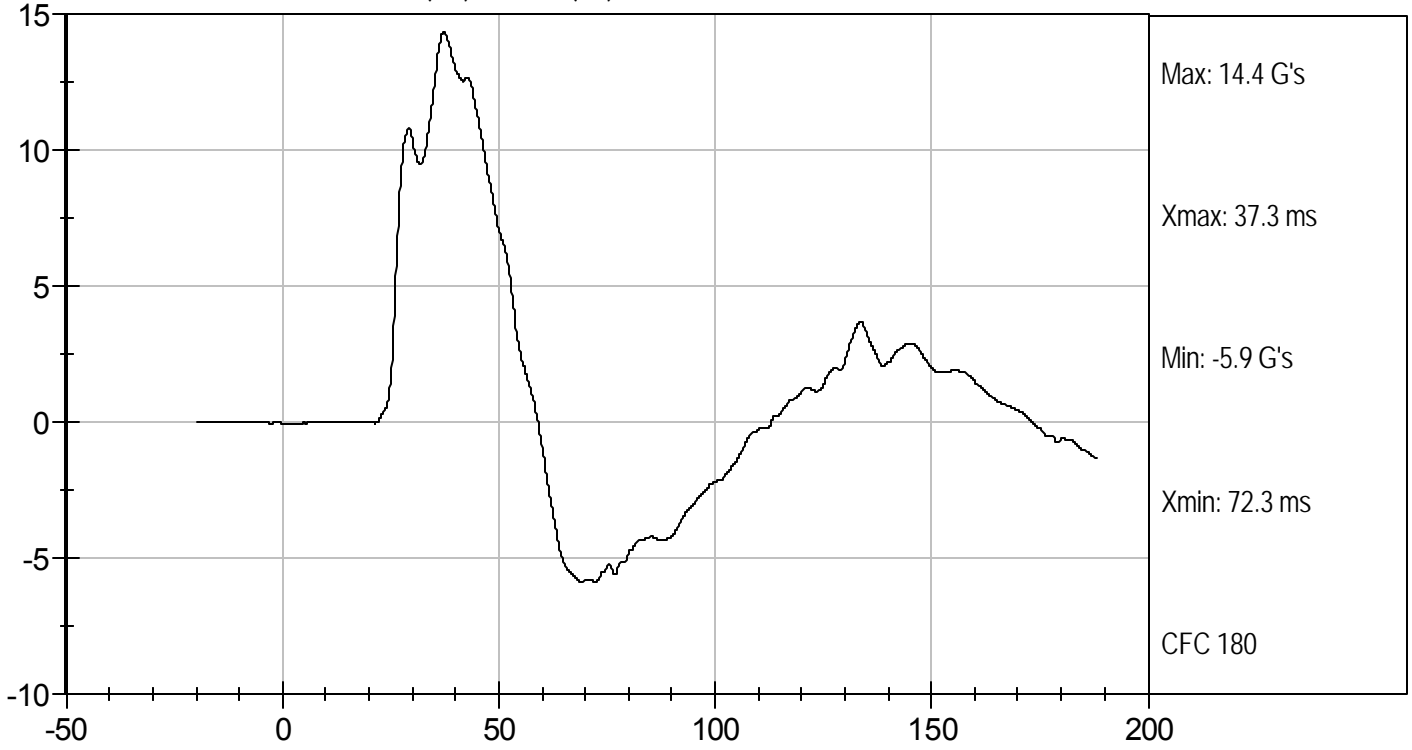




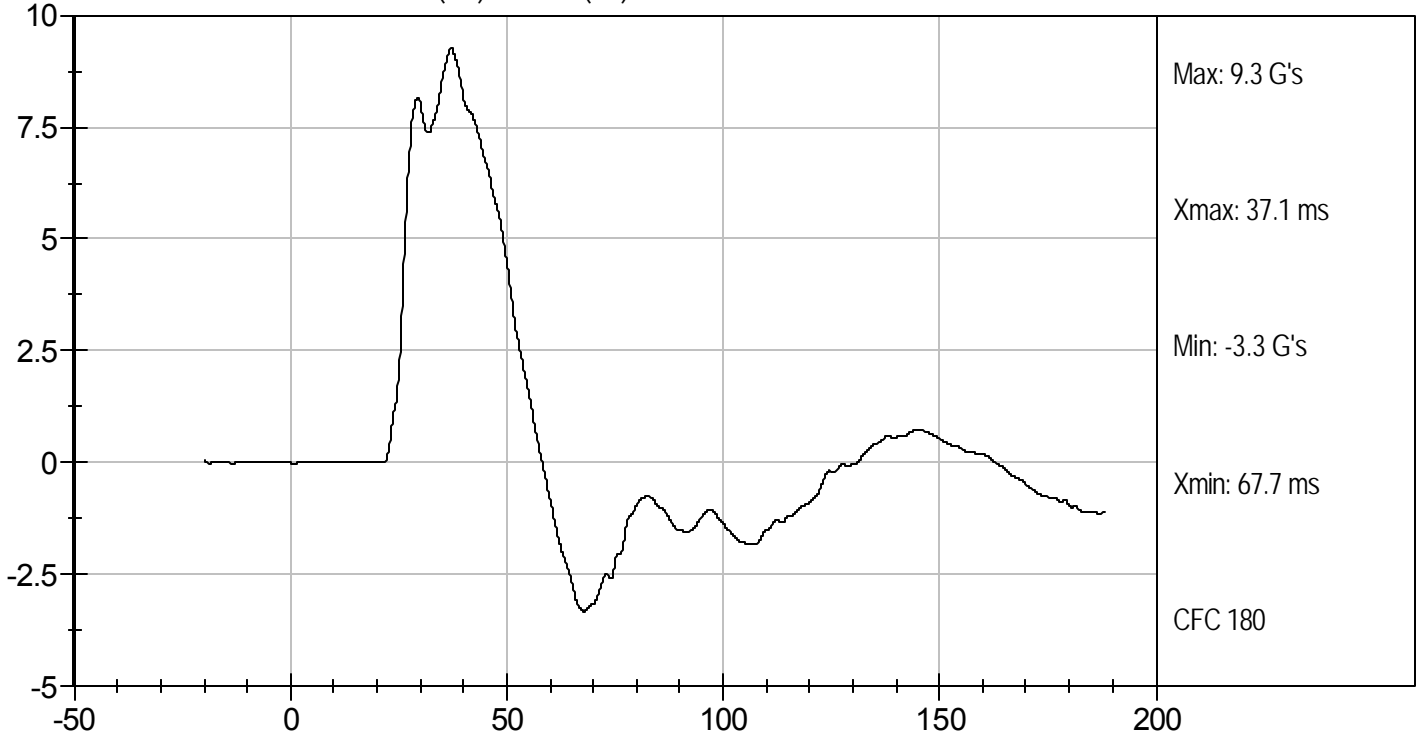
Test Desc: Thorax Without Arm
Component ID: D113575

Test Date: 10/26/11
Velocity: 14.36 ft/s, 4.38 m/s

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



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



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

ATD Serial No: 306

Test I.D: D113576

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.9	Pass
Humidity	%	10 to 70	37	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	45	Pass
Lower Rib Displacement	mm	33 to 44	39	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	10	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

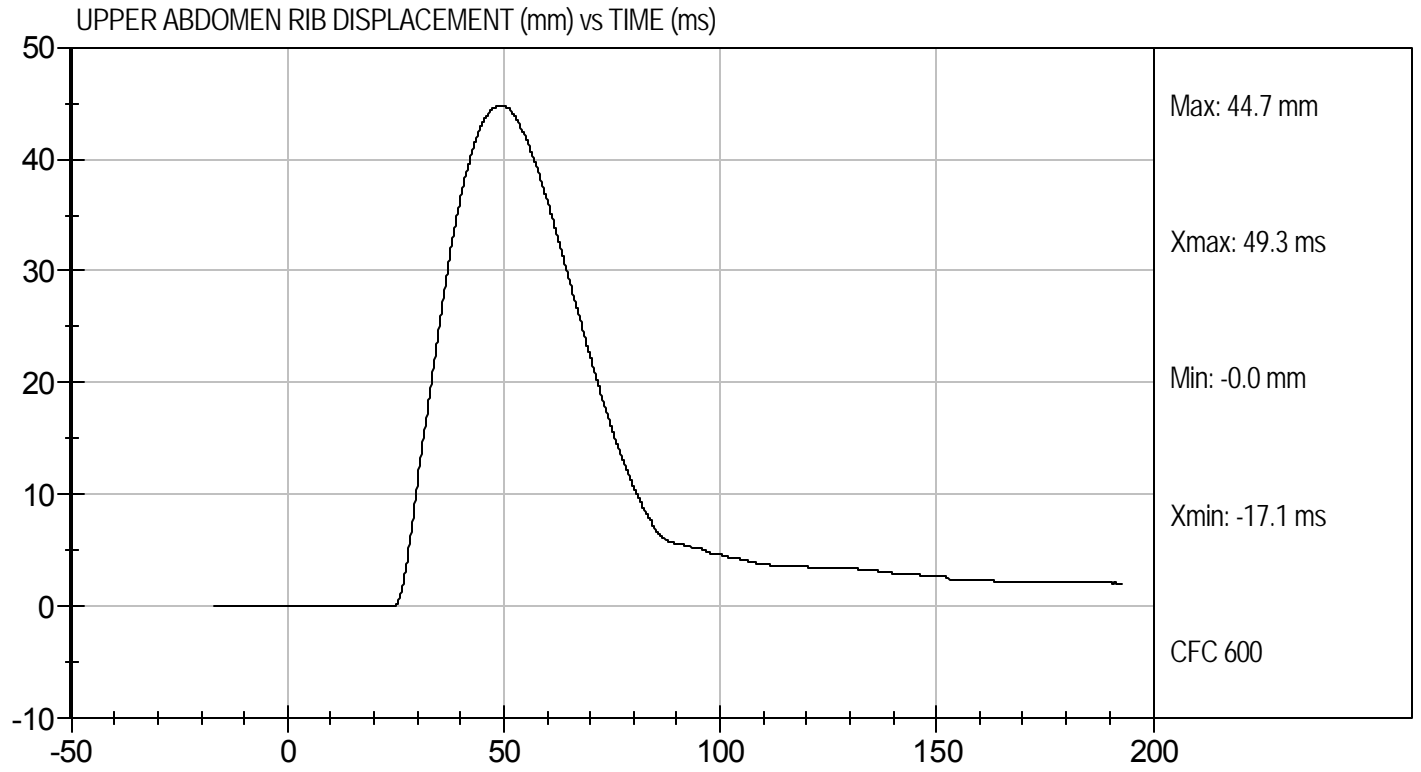
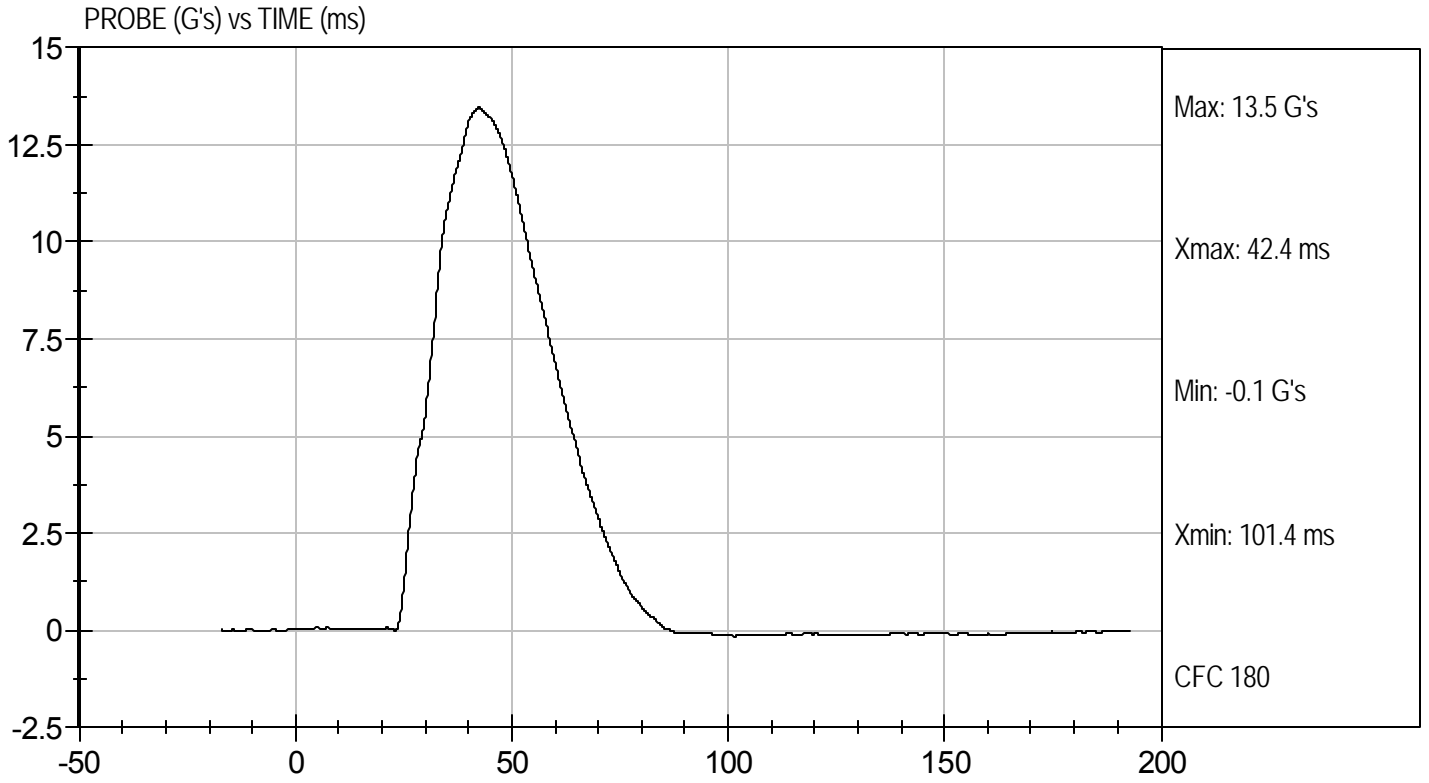
10/26/11
Test Date

David Winkelbauer
Approved By



Test Desc: Abdomen Impact
Component ID: D113576

Test Date: 10/26/11
Velocity: 14.25 ft/s, 4.34 m/s

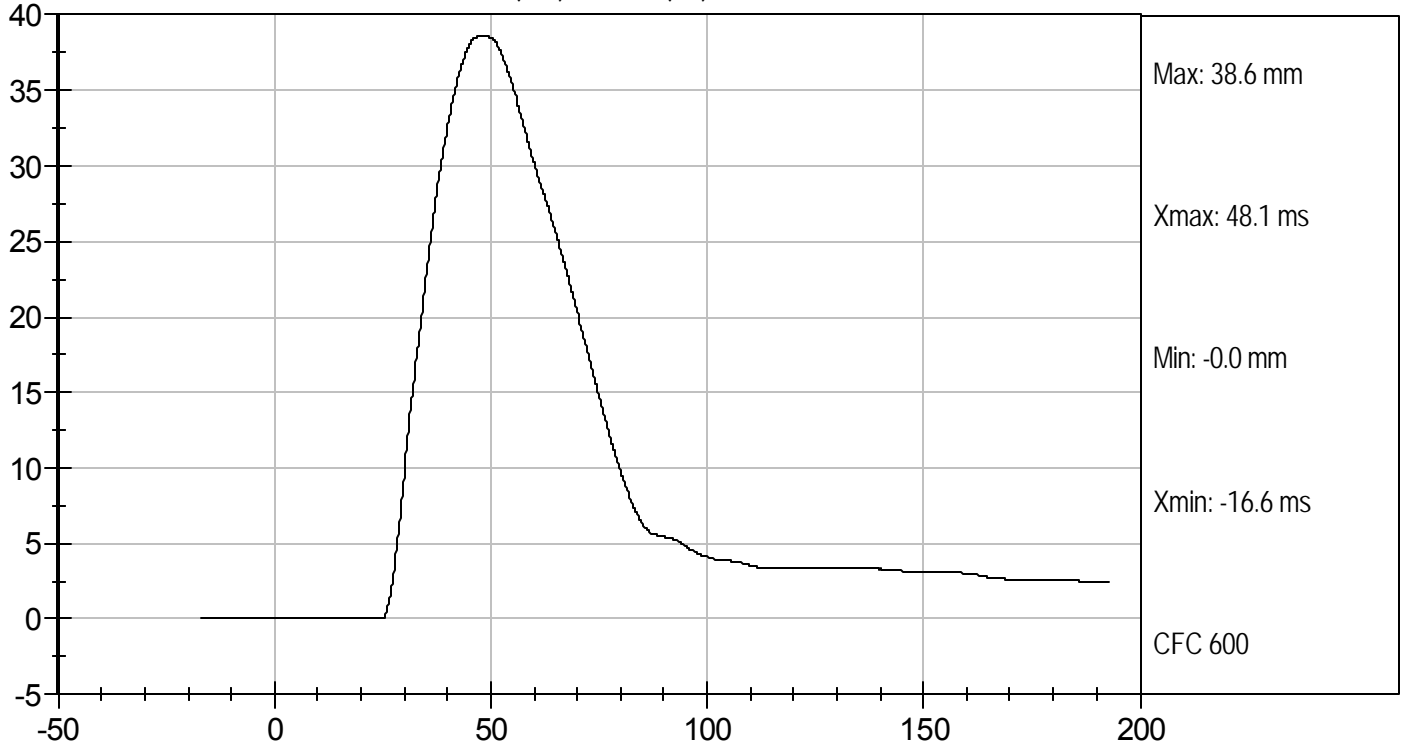




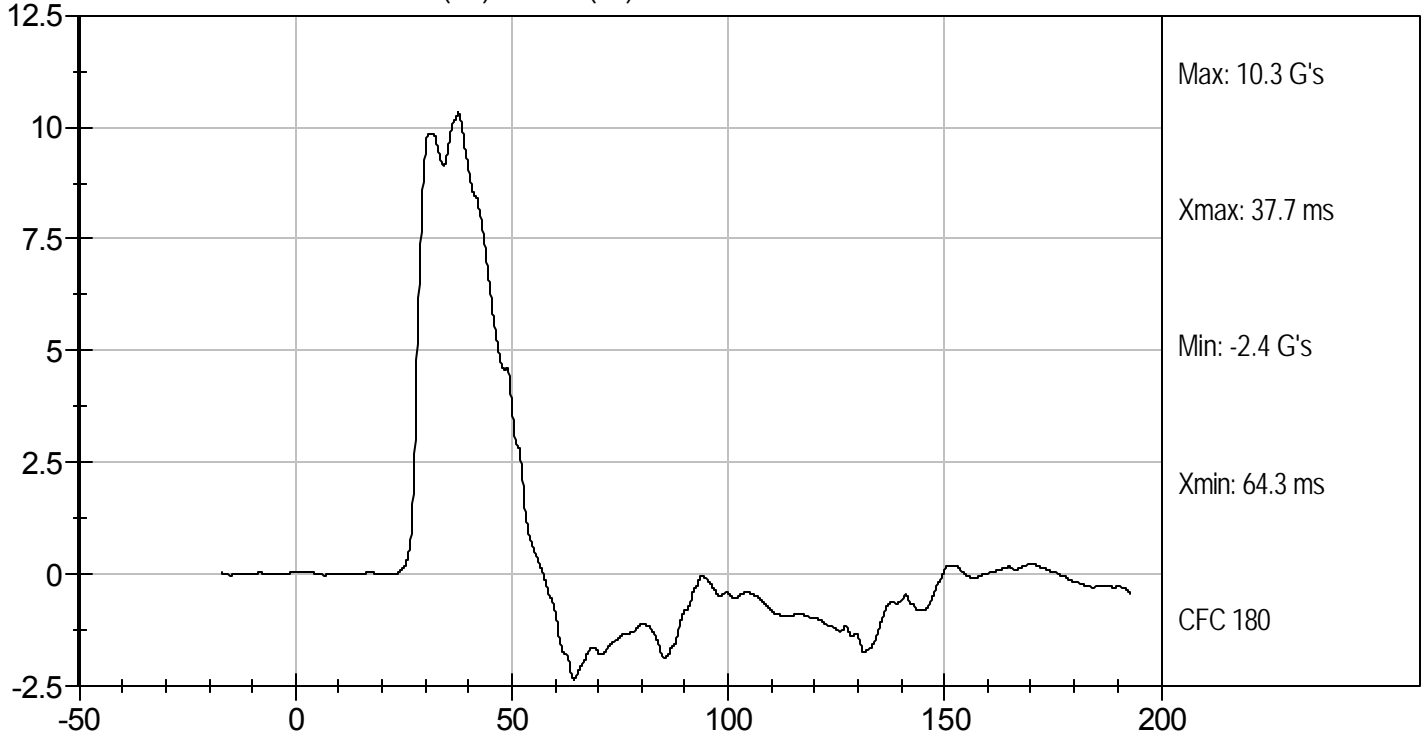
Test Desc: Abdomen Impact
Component ID: D113576

Test Date: 10/26/11
Velocity: 14.25 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: 306

Test I.D: D113577

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.8	Pass
Humidity	%	10 to 70	37	Pass
Impact Velocity	m/s	6.60 to 6.80	6.77	Pass
Peak Impactor Acceleration	G's	38 to 47	42	Pass
Pelvis Y Acceleration after 6 ms	G's	34 to 42	40	Pass
Peak Acetabulum Force	N	3600 to 4300	3904	Pass
Overall Test Results				Pass

Jessica Gall
Laboratory Technician

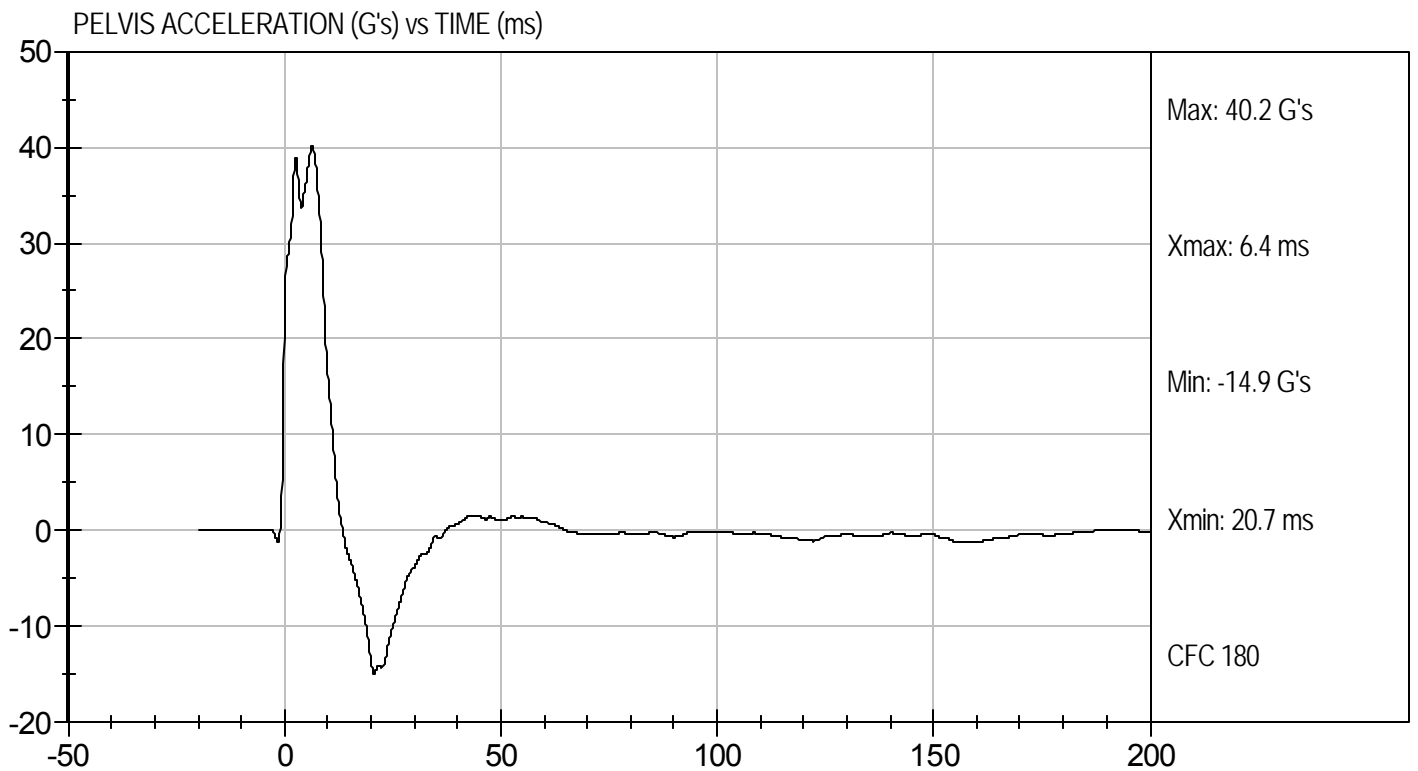
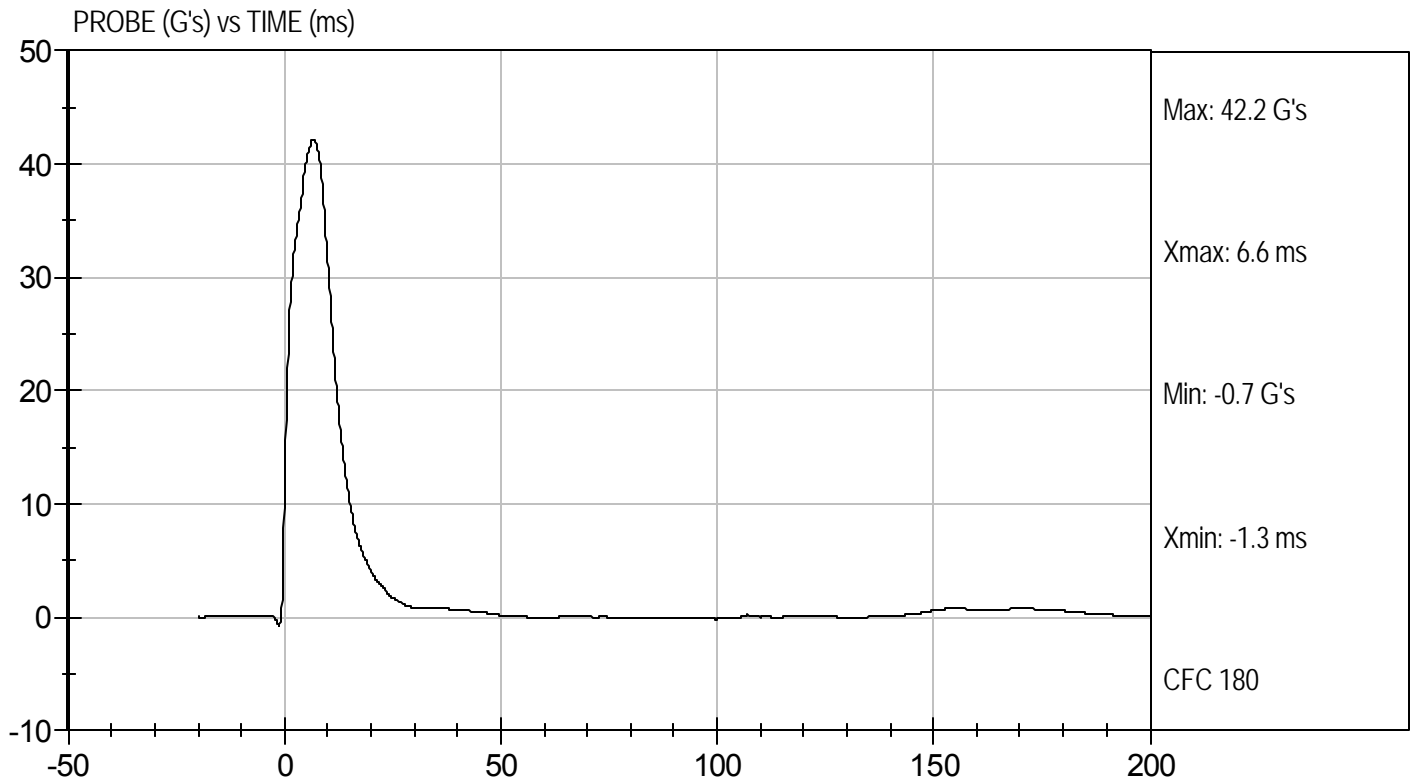
10/26/11
Test Date

David Winkelbauer
Approved By



Test Desc: Pelvis Impact
Component ID: D113577

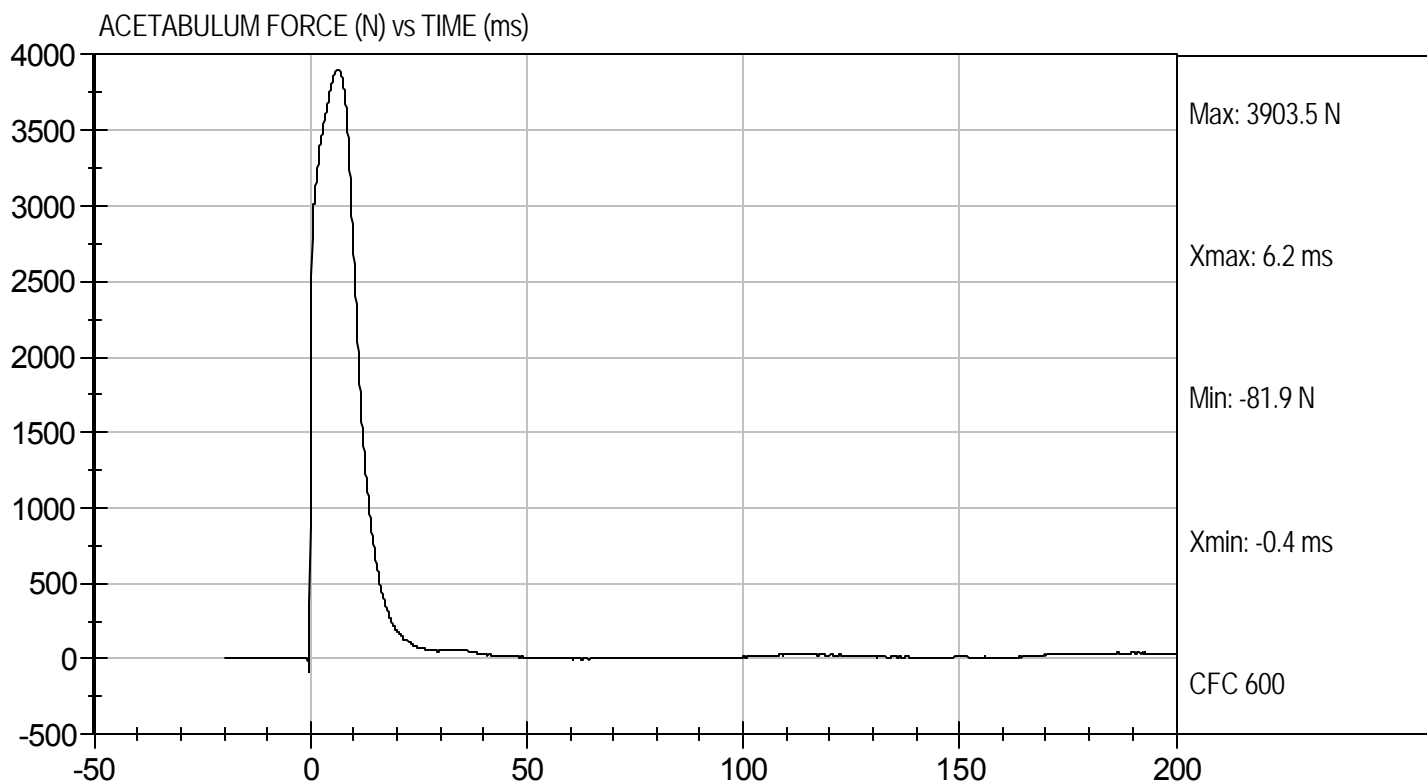
Test Date: 10/26/11
Velocity: 22.22 ft/s, 6.77 m/s





Test Desc: Pelvis Impact
Component ID: D113577

Test Date: 10/26/11
Velocity: 22.22 ft/s, 6.77 m/s



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

ATD Serial No: 306

Test I.D: D113578

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.9	Pass
Humidity	%	10 to 70	37	Pass
Impact Velocity	m/s	4.20 to 4.40	4.30	Pass
Peak Impactor Acceleration	G's	36 to 45	39	Pass
Pelvis Y Acceleration	G's	28 to 39	34	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4769	Pass
Overall Test Results				Pass

Jessica Gall
 Laboratory Technician

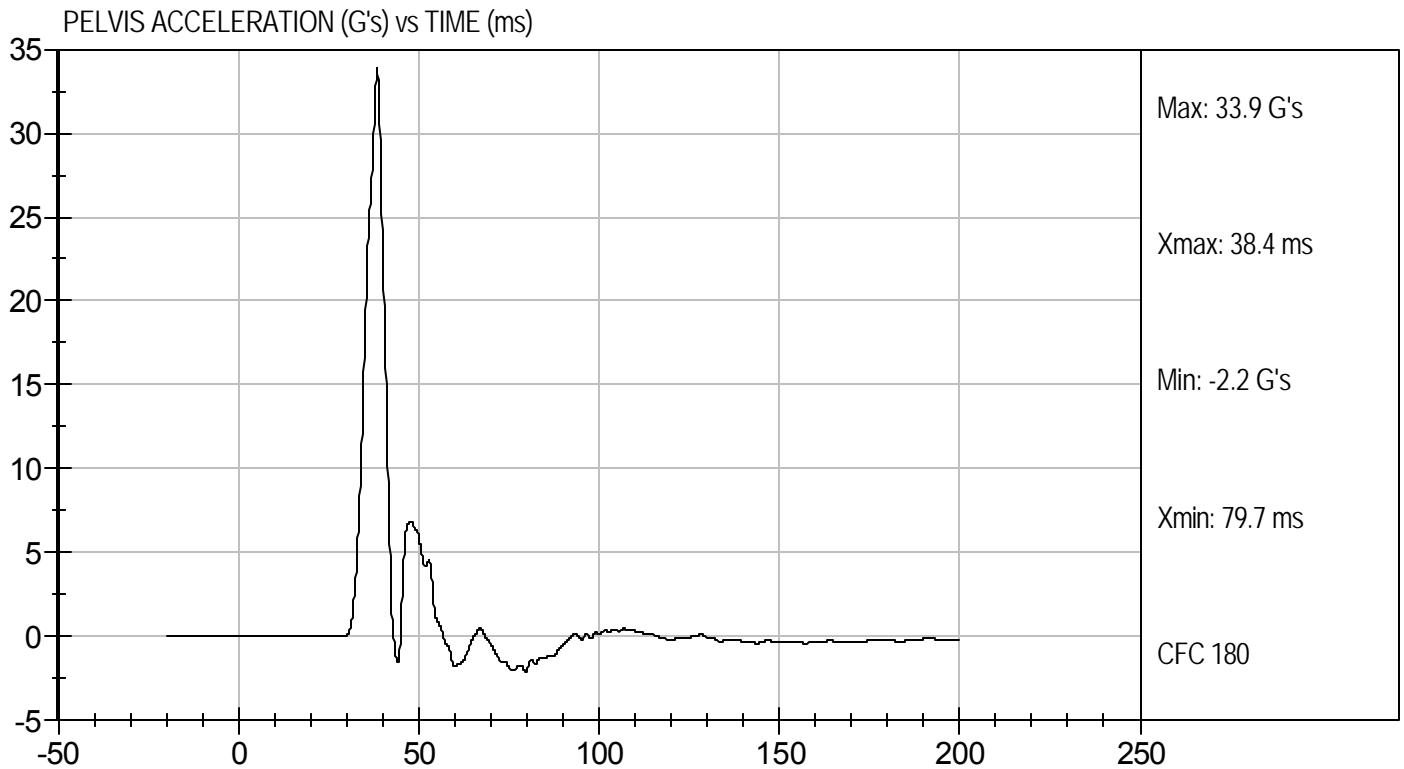
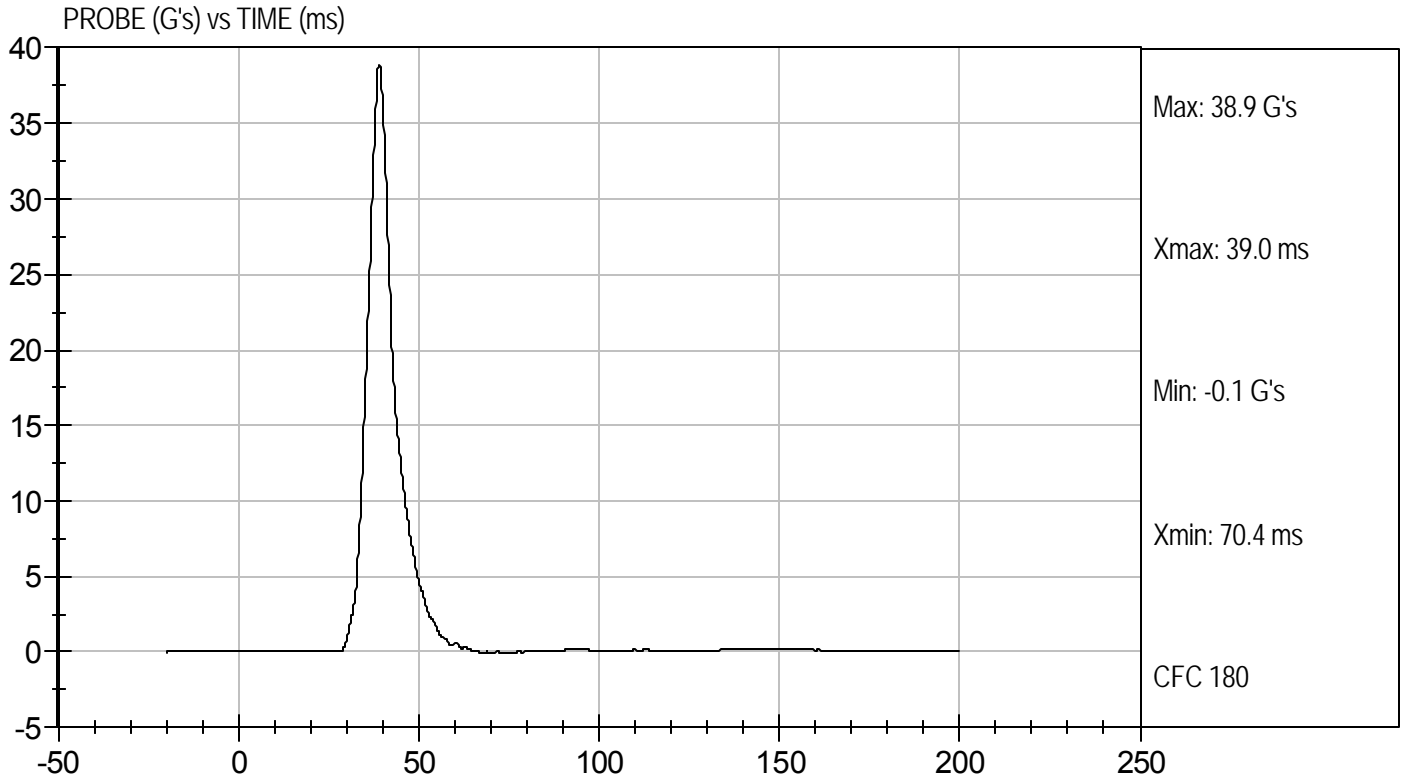
10/26/11
 Test Date

David Winkelbauer
 Approved By



Test Desc: Iliac Impact
Component ID: D113578

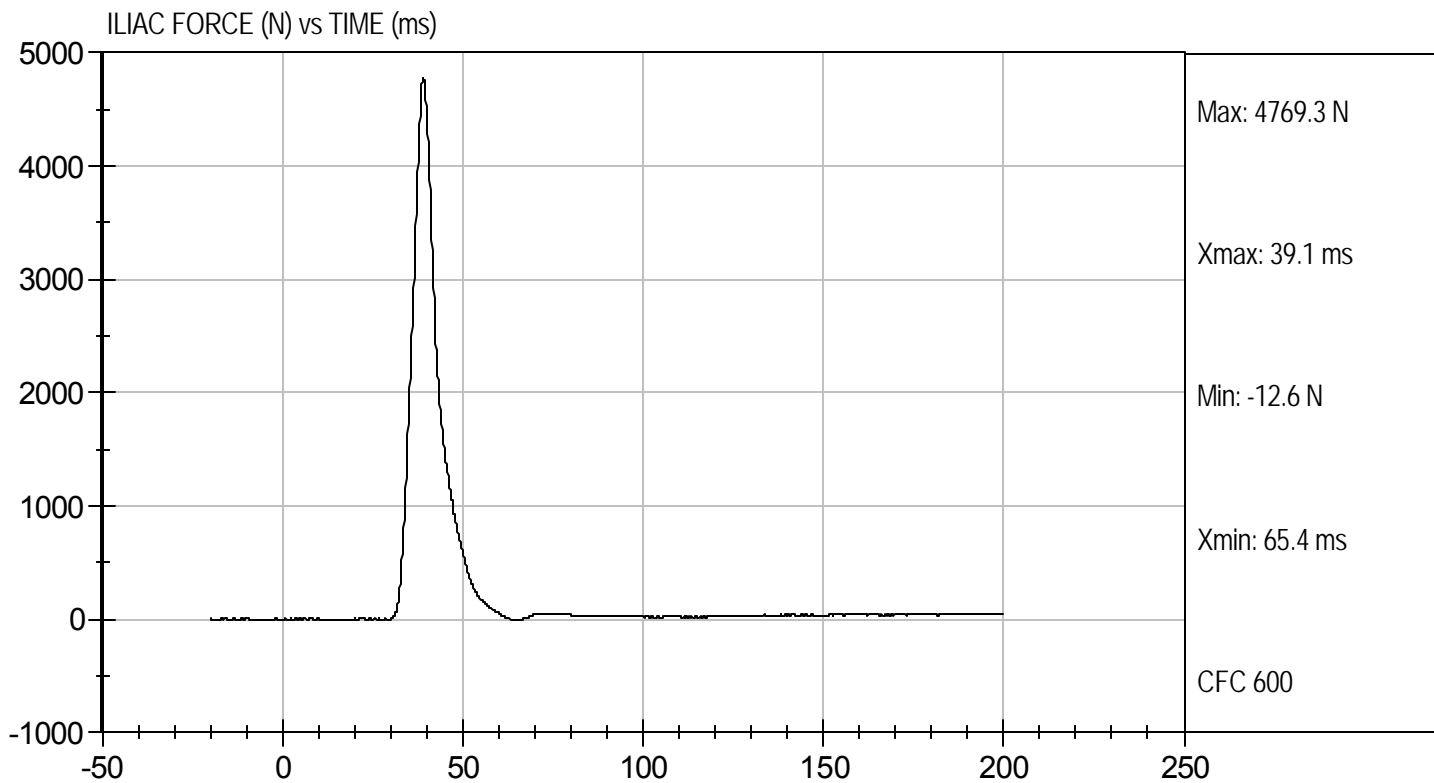
Test Date: 10/26/11
Velocity: 14.12 ft/s, 4.30 m/s





Test Desc: Iliac Impact
Component ID: D113578

Test Date: 10/26/11
Velocity: 14.12 ft/s, 4.30 m/s



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

ATD Serial No: 306

Test ID: D113671

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	34	Pass
Peak Resultant Acceleration	G's	115 to 137	123	Pass
Peak Lateral Acceleration	G's	+/- 15	-2.1	Pass
Unimodal	N/A	<15%	Yes	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

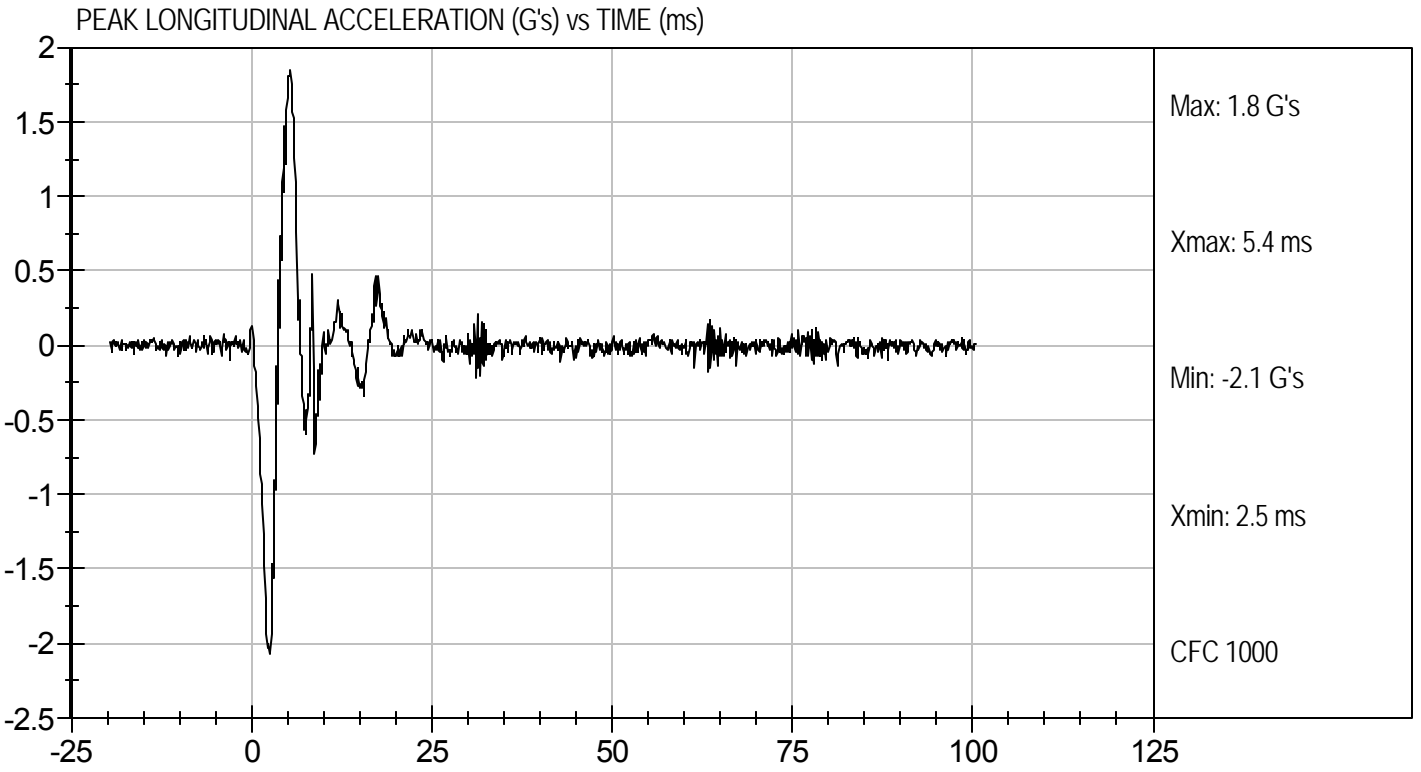
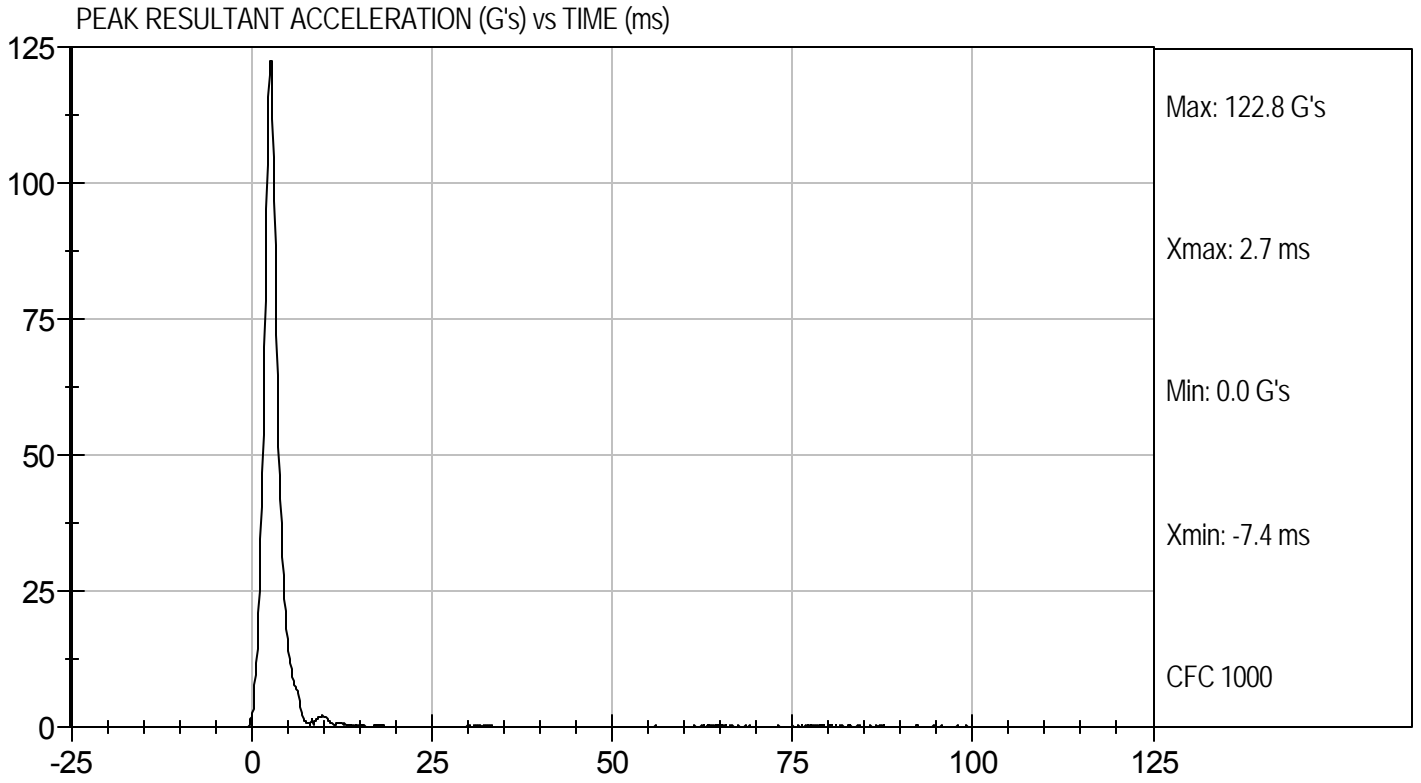
11/2/11
Test Date

David Winkelbauer
Approved By



Test Desc: Head Drop
Component ID: D113671

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



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

ATD Serial No: 306

Test I.D.: D113672

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21.1	Pass
Humidity		%	10 to 70	36	Pass
Impact Velocity		m/s	5.51 to 5.63	5.58	Pass
Delta Velocity	10 ms	m/s	2.20 to 2.80	2.39	Pass
	15 ms	m/s	3.30 to 4.10	3.40	Pass
	20 ms	m/s	4.40 to 5.40	4.55	Pass
	25 ms	m/s	5.40 to 6.10	5.40	Pass
	25-100 ms	m/s	5.50 to 6.20	5.62	Pass
Maximum D-Plane Rotation		deg	71 to 81	71	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	58	Pass
Maximum Occipital Condyle Moment during Rotation Interval Nm			-44 to -36	-42	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	114	Pass
Overall Test Results					Pass

Jessica Hall

Laboratory Technician

11/2/11

Test Date

David Winkelbauer

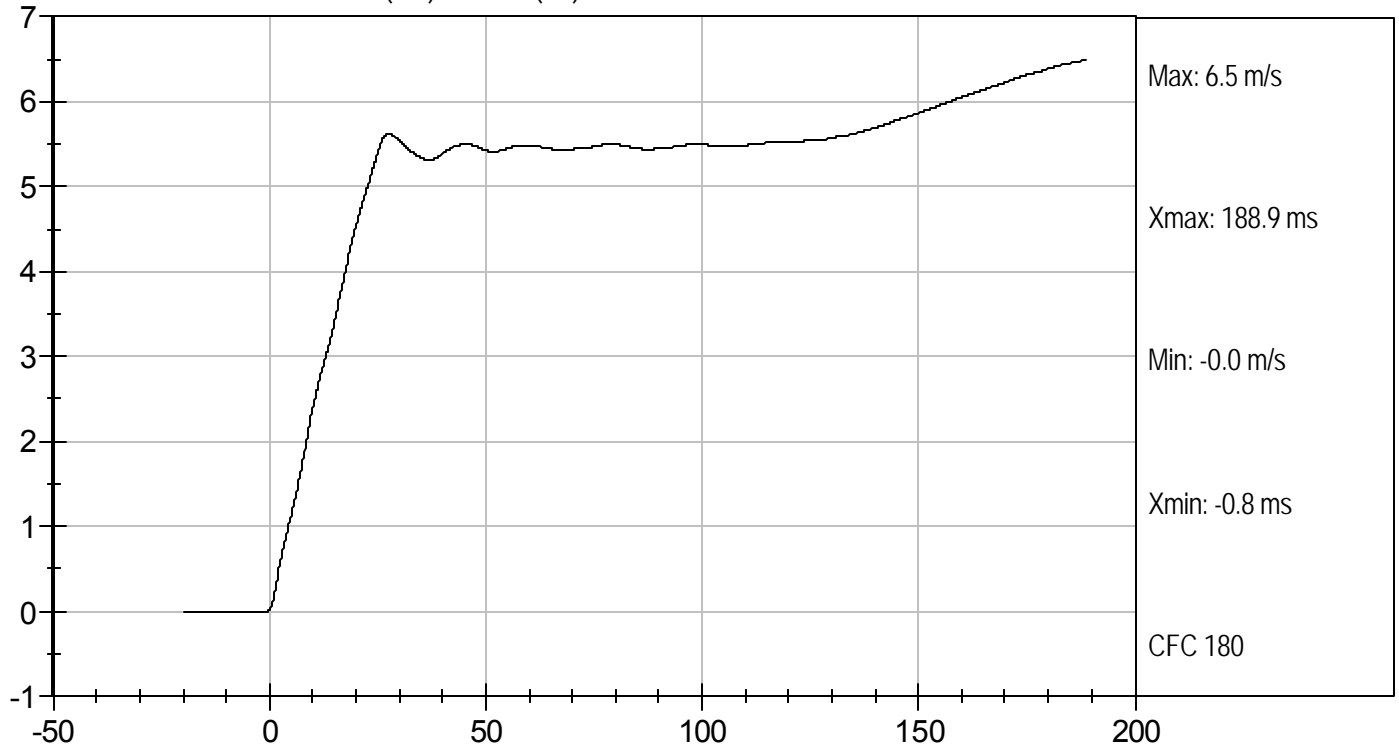
Approved By



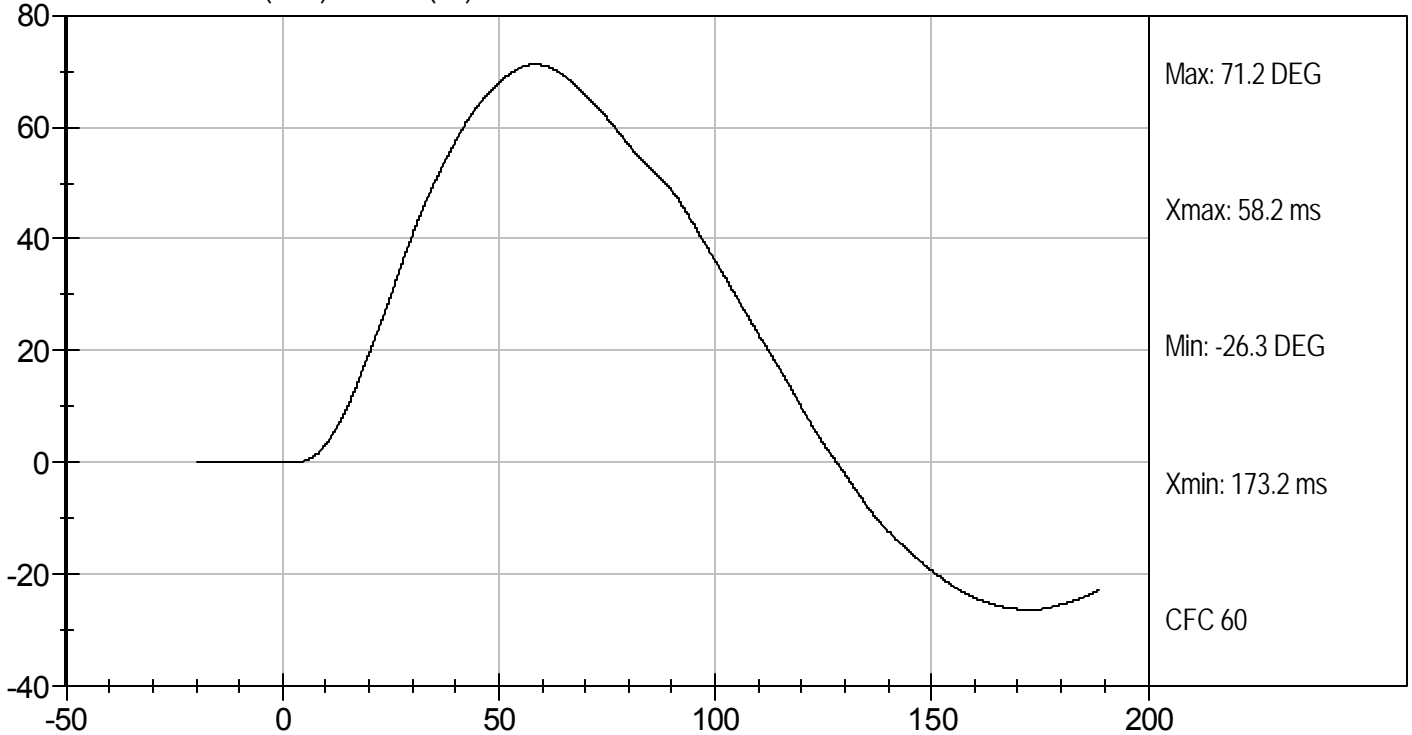
Test Desc: Neck Bending
Component ID: D113672

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

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



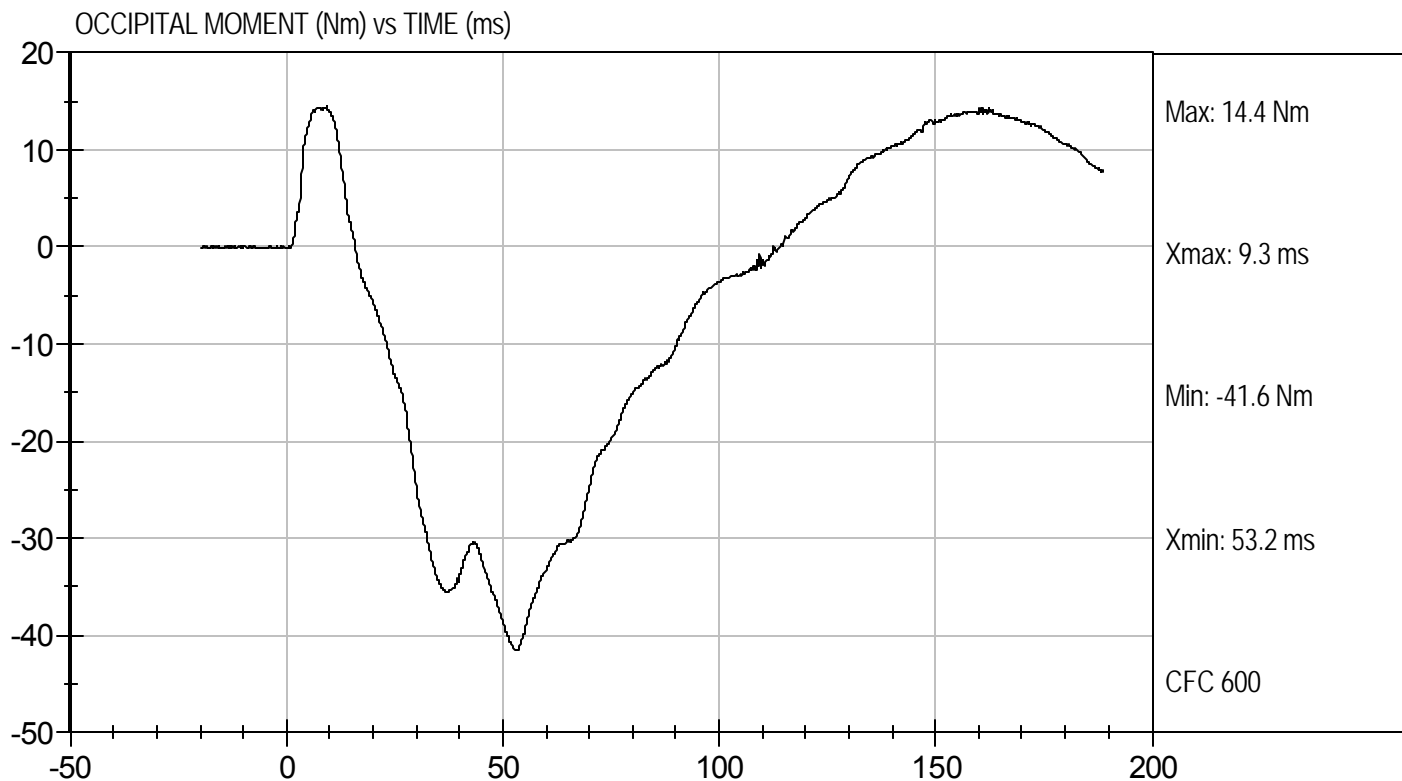
FLEXION ANGLE (DEG) vs TIME (ms)





Test Desc: Neck Bending
Component ID: D113672

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



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

ATD Serial No: 306

Test ID: D113673

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	33	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Maximum Probe Acceleration	G's	13 to 18	16	Pass
Shoulder Displacement	mm	28 to 37	28	Pass
Upper Spine (T1) Y Acceleration	G's	17 to 22	19	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

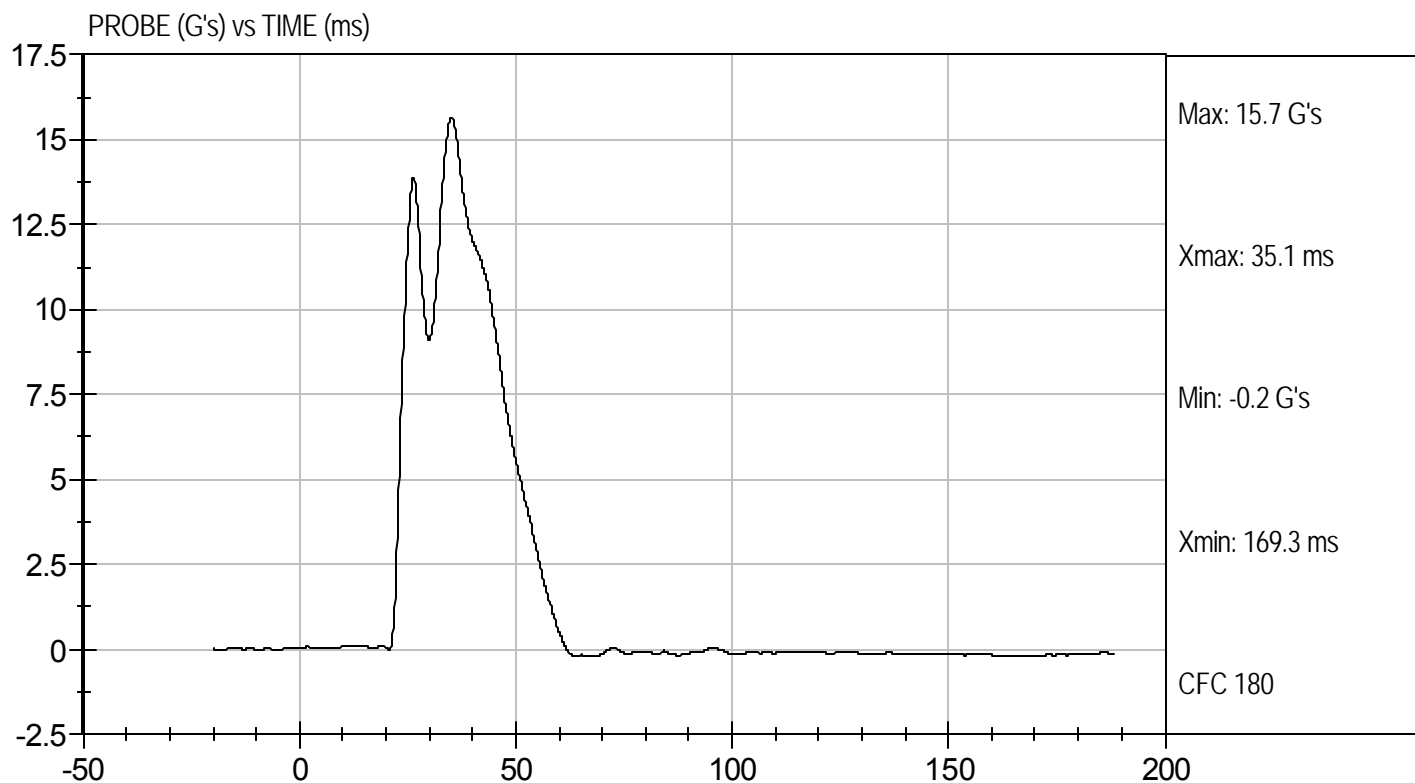
11/3/11
Test Date

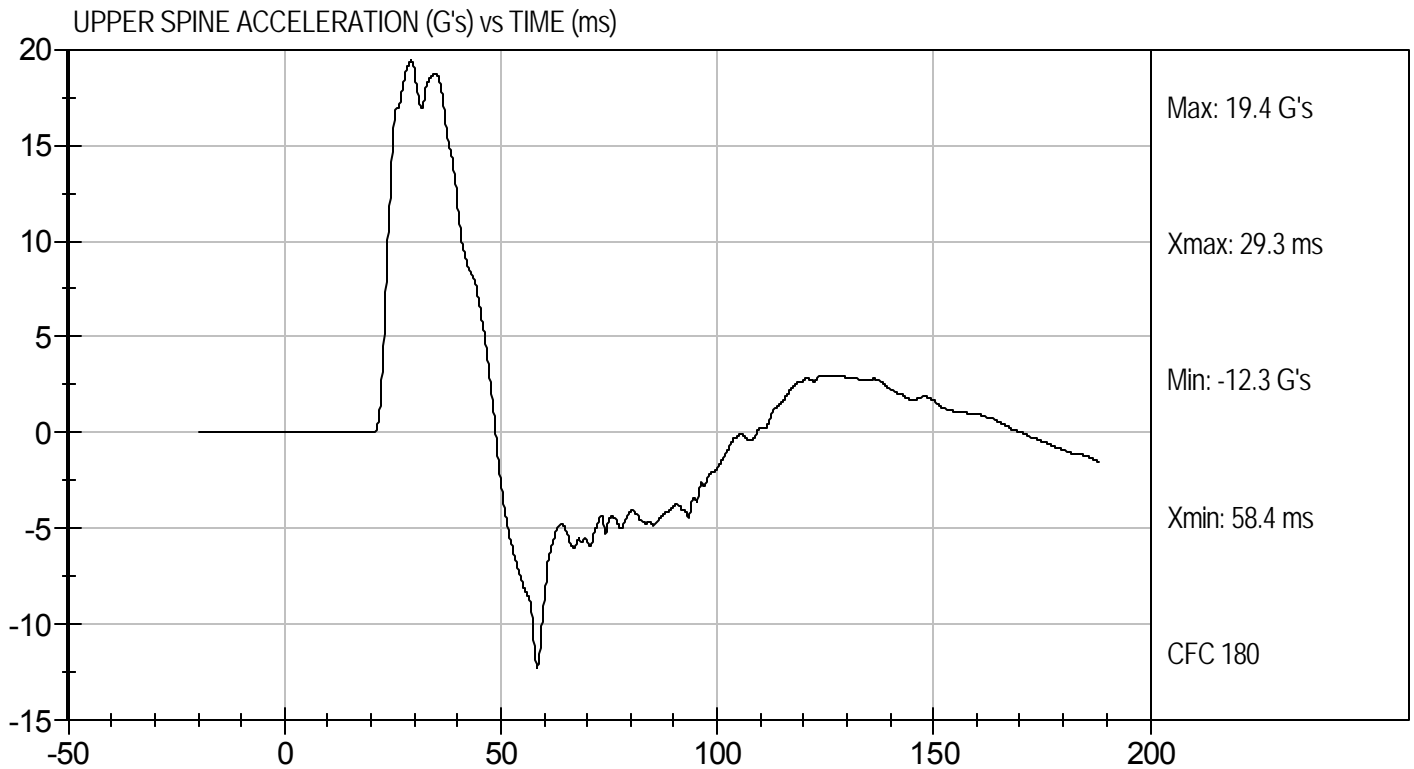
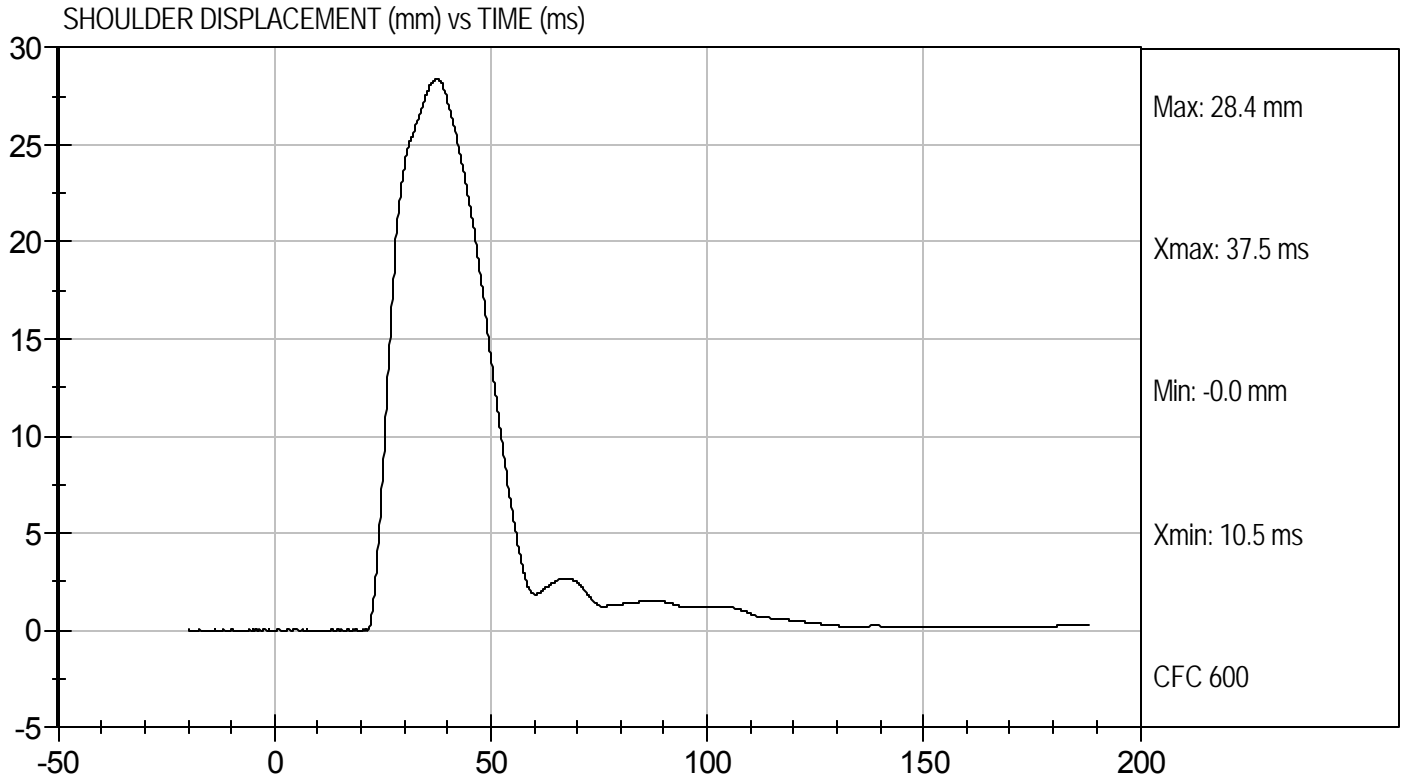
David Winkelbauer
Approved By



Test Desc: Shoulder Impact
Component ID: D113673

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





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

ATD Serial No: 306

Test I.D: D113674

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.1	Pass
Humidity	%	10 to 70	33	Pass
Impact Velocity	m/s	6.60 to 6.80	6.77	Pass
Peak Impactor Acceleration	G's	30 to 36	34	Pass
Shoulder Displacement	mm	31 to 40	31	Pass
Upper Rib Displacement	mm	25 to 32	28	Pass
Middle Rib Displacement	mm	30 to 36	31	Pass
Lower Rib Displacement	mm	32 to 38	34	Pass
Upper Spine (T1) Y Acceleration	G's	34 to 43	40	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	31	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

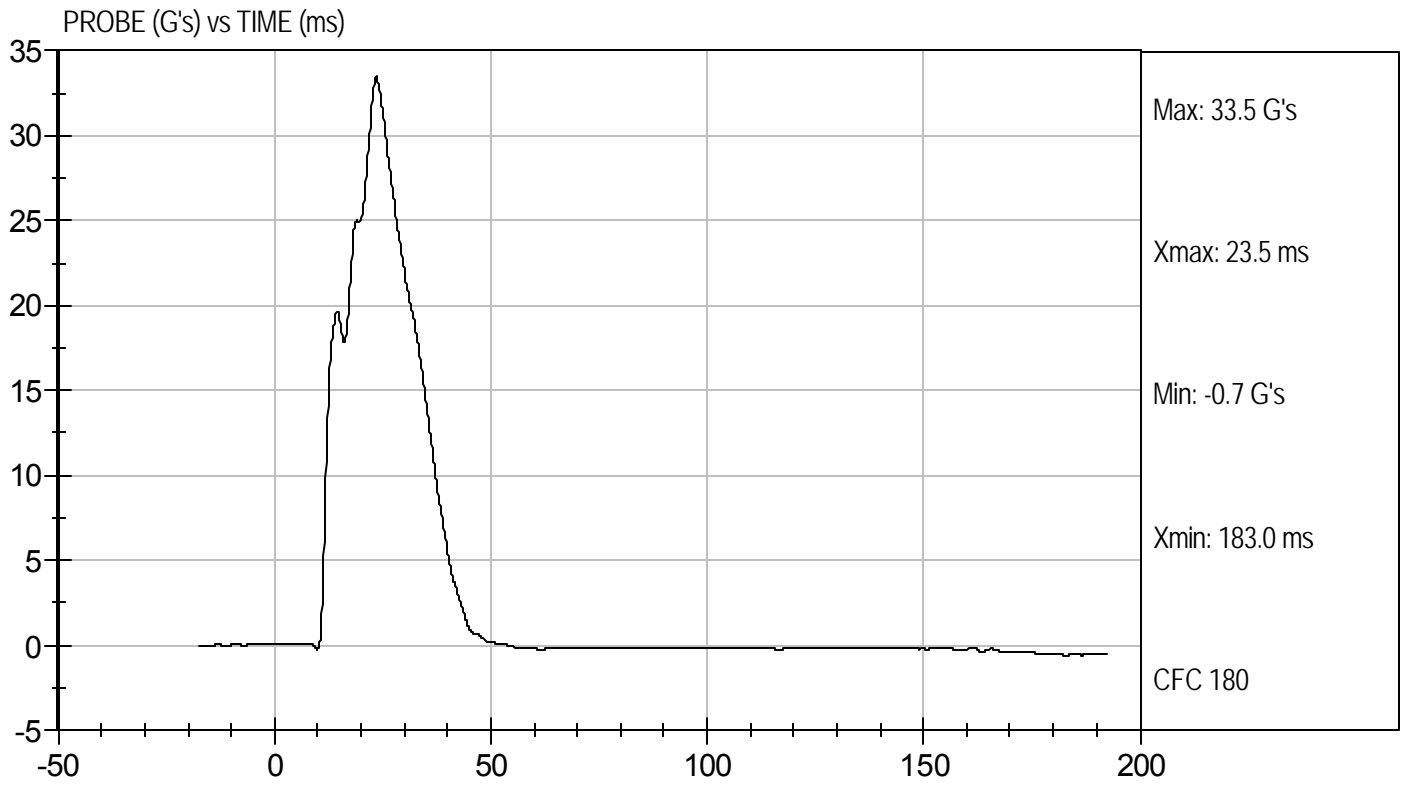
11/3/11
Test Date

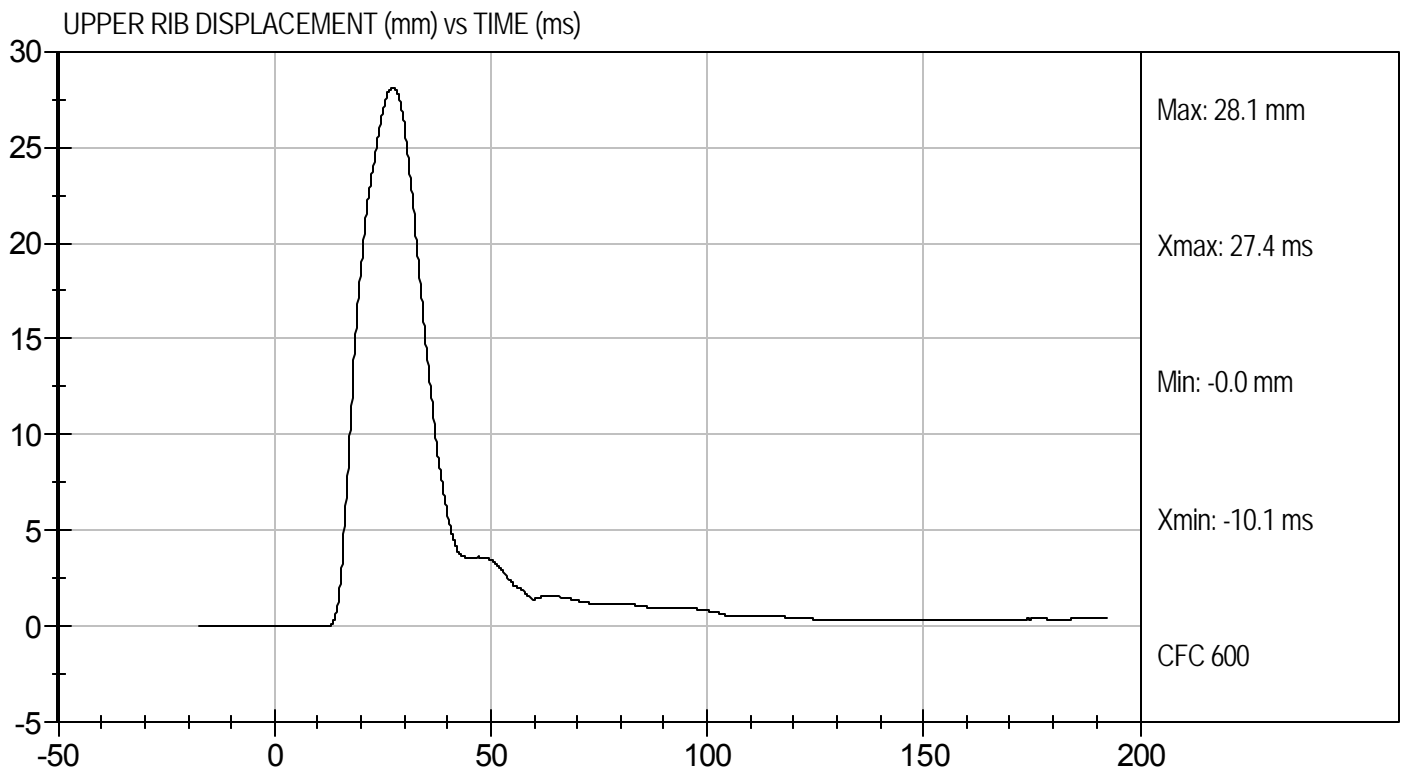
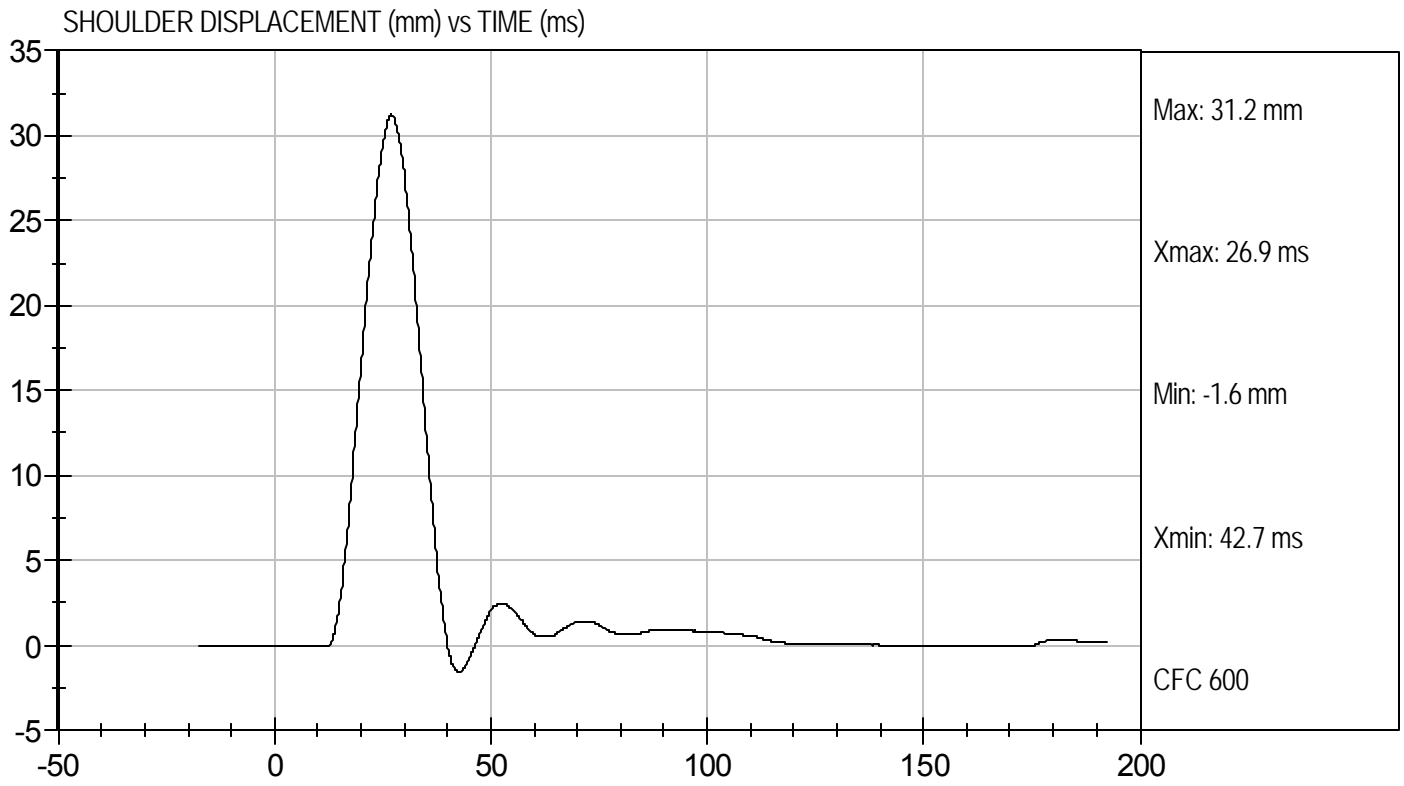
David Winkelbauer
Approved By



Test Desc: Thorax With Arm
Component ID: D113674

Test Date: 11/3/11
Velocity: 22.22 ft/s, 6.77 m/s

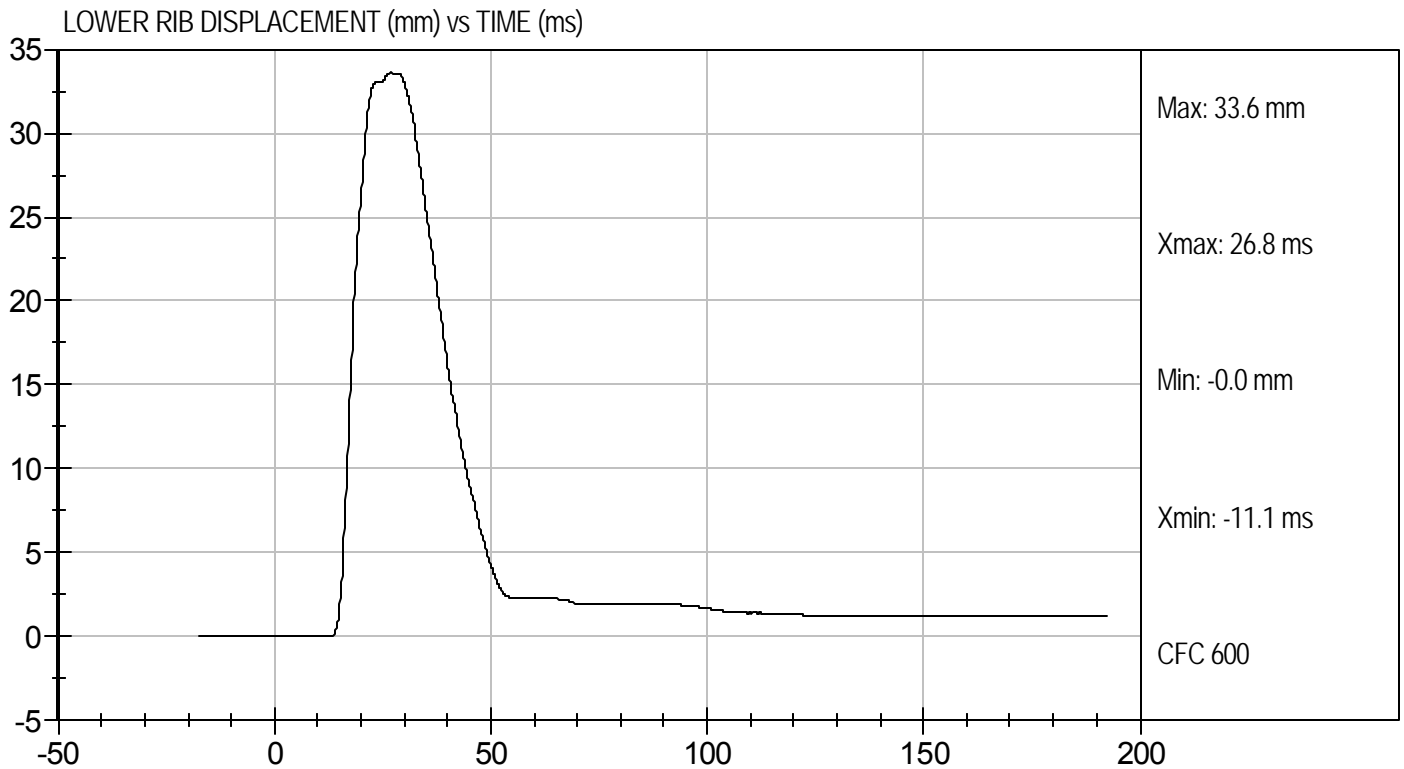
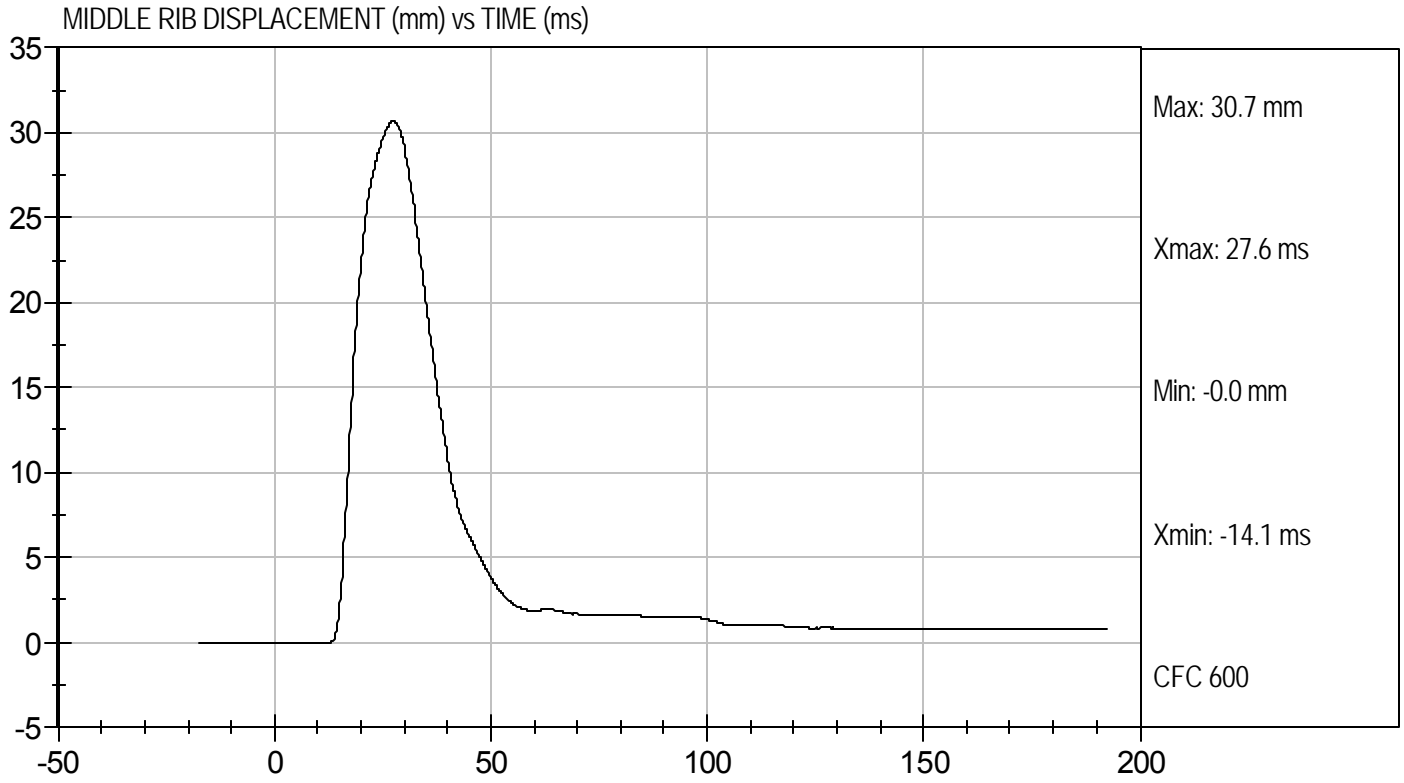






Test Desc: Thorax With Arm
Component ID: D113674

Test Date: 11/3/11
Velocity: 22.22 ft/s, 6.77 m/s

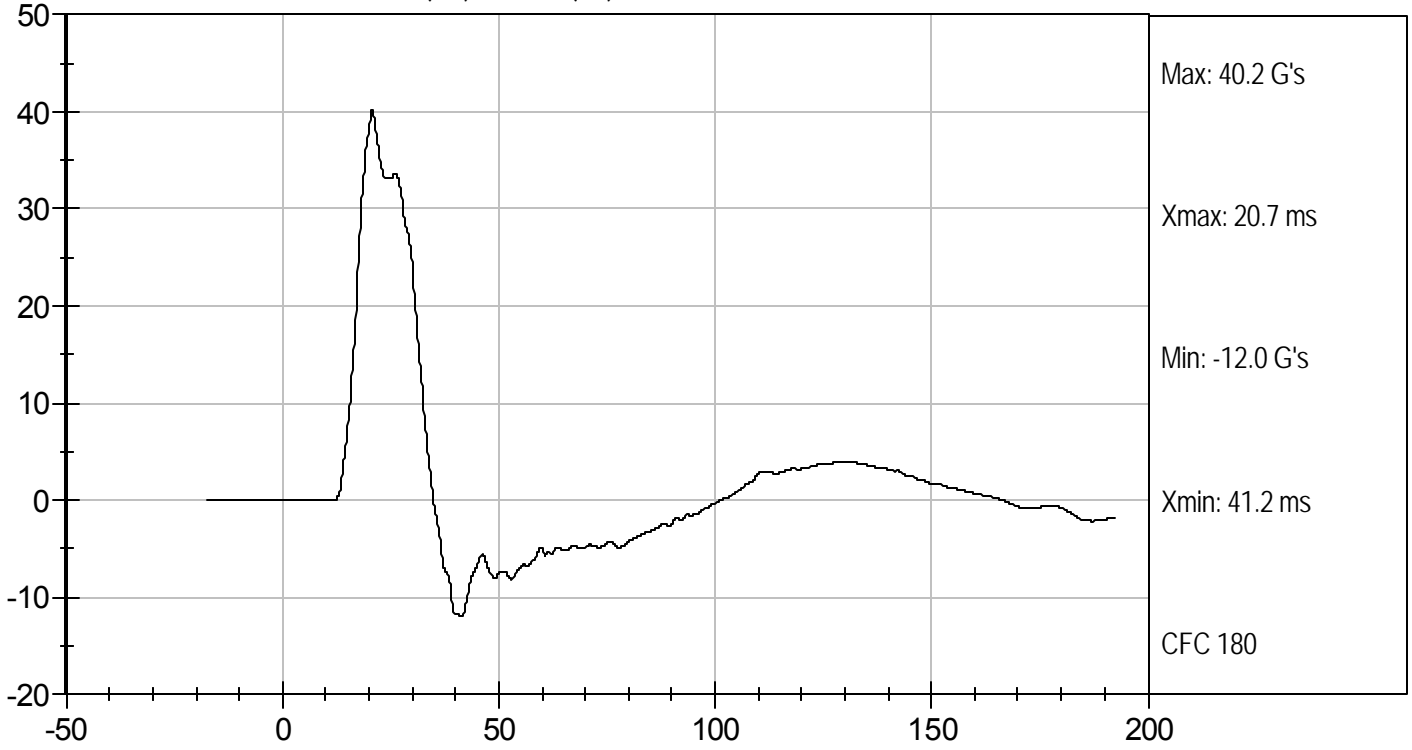




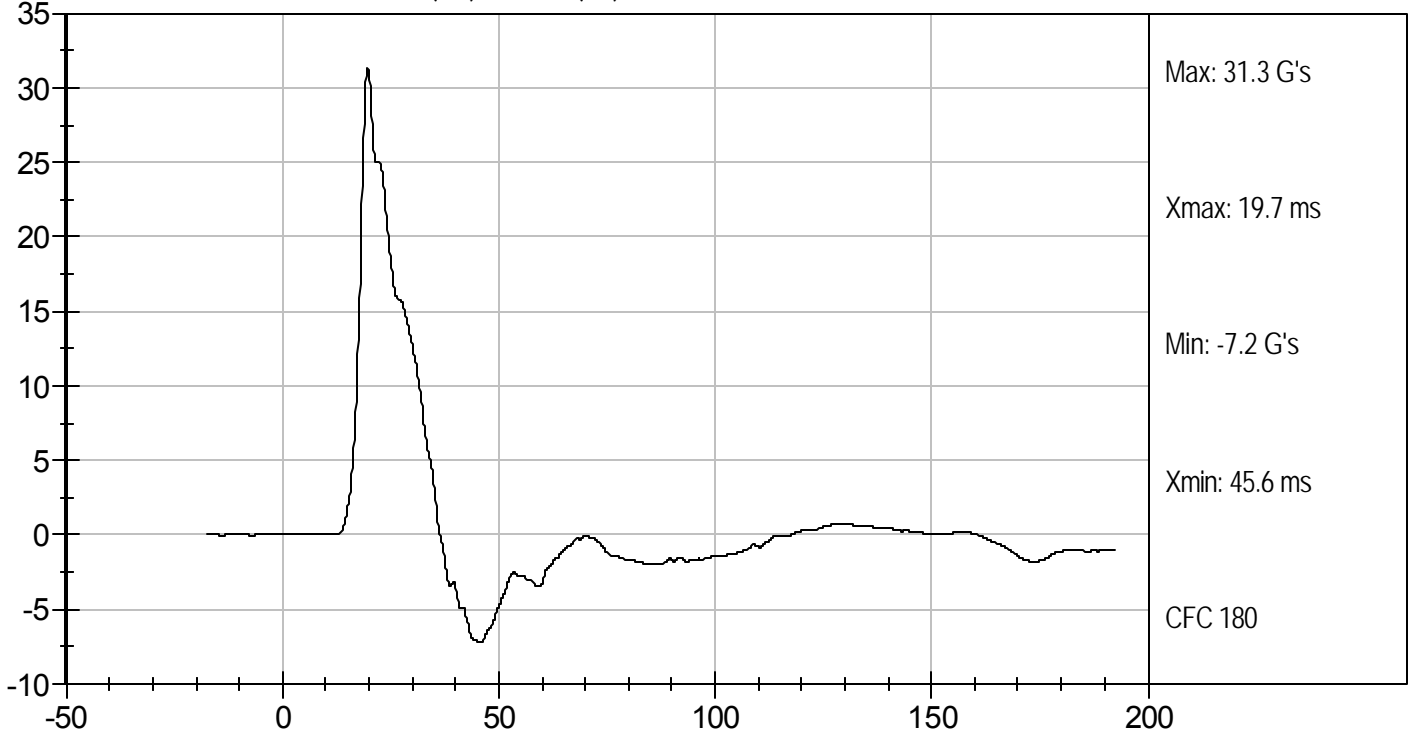
Test Desc: Thorax With Arm
Component ID: D113674

Test Date: 11/3/11
Velocity: 22.22 ft/s, 6.77 m/s

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



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



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


ATD Serial No: 306

Test I.D: D113675

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.1	Pass
Humidity	%	10 to 70	33	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	Pass
Peak Impactor Force	G's	14 to 18	16	Pass
Upper Rib Displacement	mm	32 to 40	37	Pass
Middle Rib Displacement	mm	39 to 45	41	Pass
Lower Rib Displacement	mm	35 to 43	40	Pass
Upper Spine (T1) Y Acceleration	G's	13 to 17	15	Pass
Lower Spine (T12) Y Acceleration	G's	7 to 11	10	Pass
Overall Test Results				Pass


Laboratory Technician

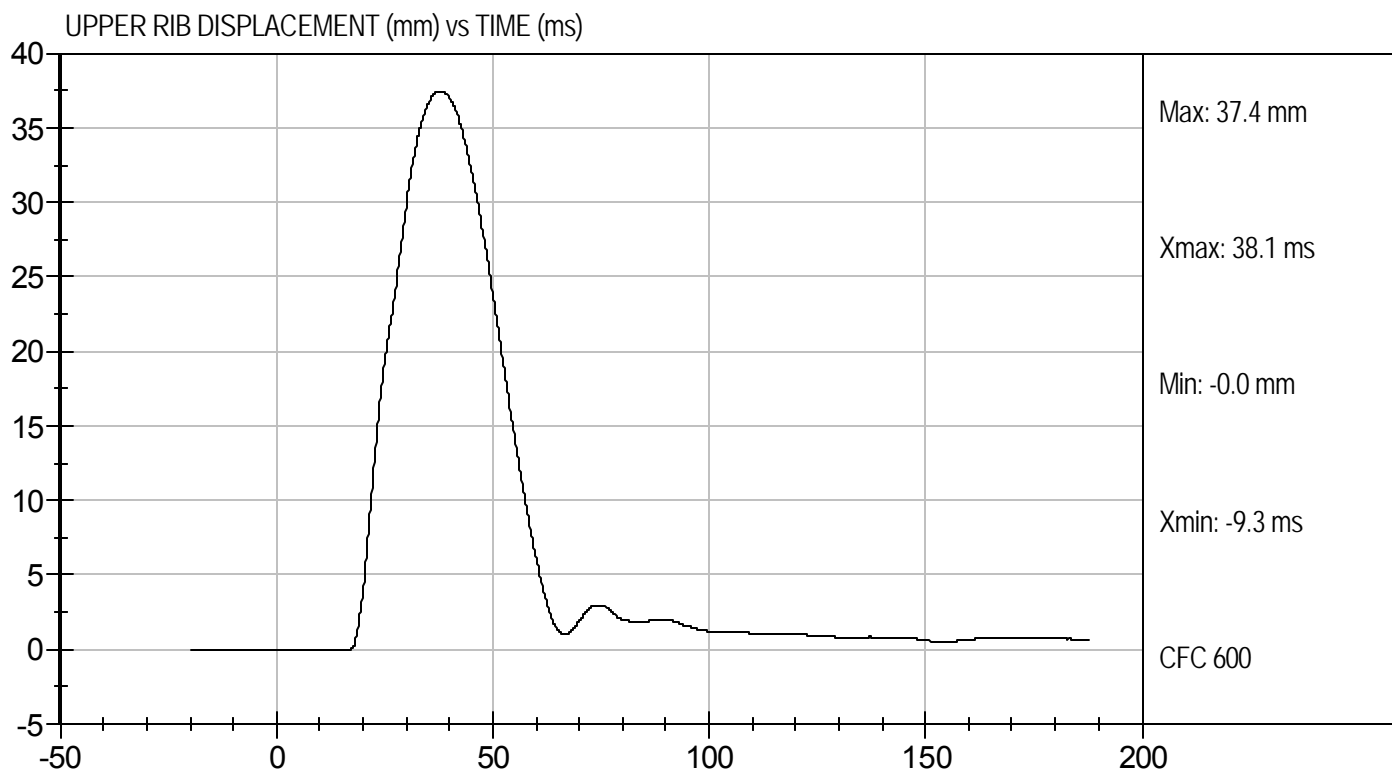
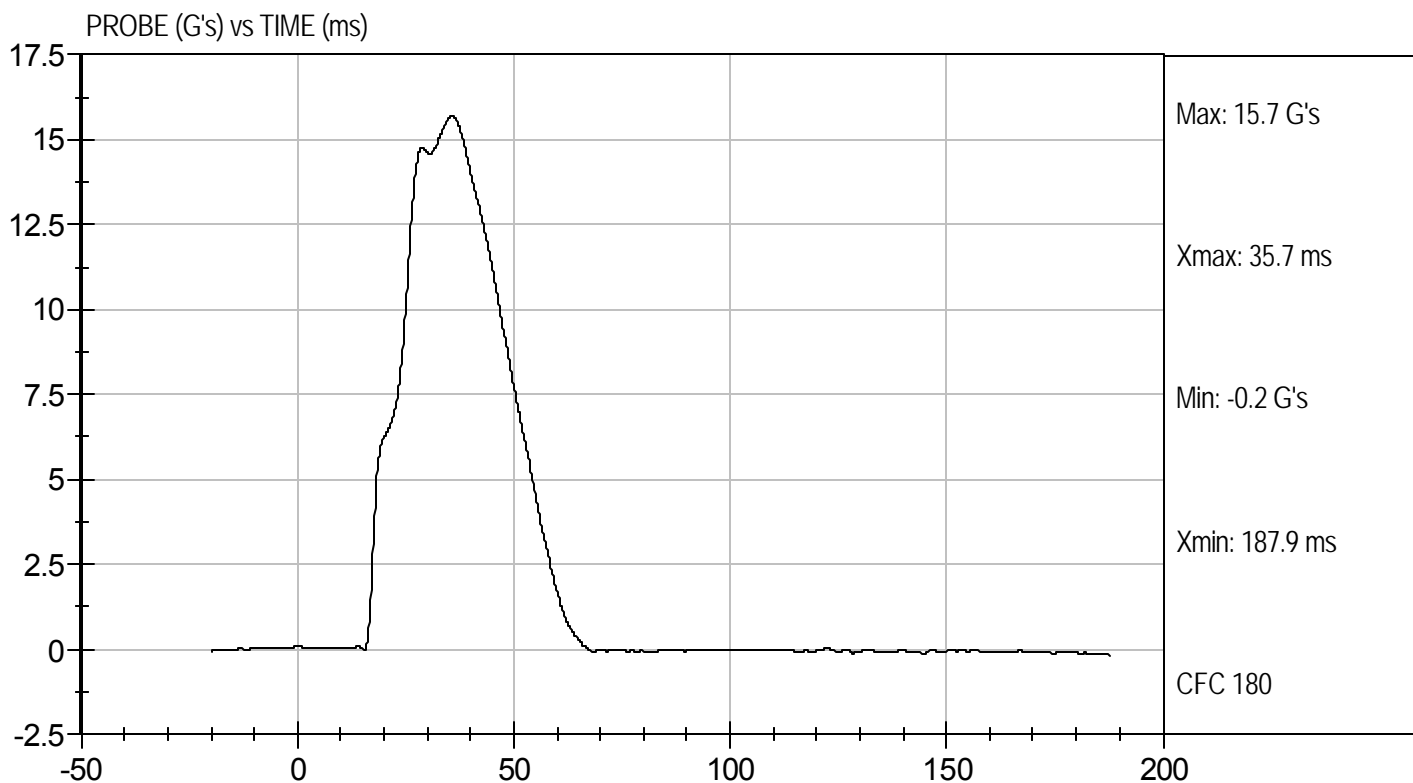
11/3/11
Test Date


Approved By



Test Desc: Thorax Without Arm
Component ID: D113675

Test Date: 11/3/11
Velocity: 14.25 ft/s, 4.34 m/s

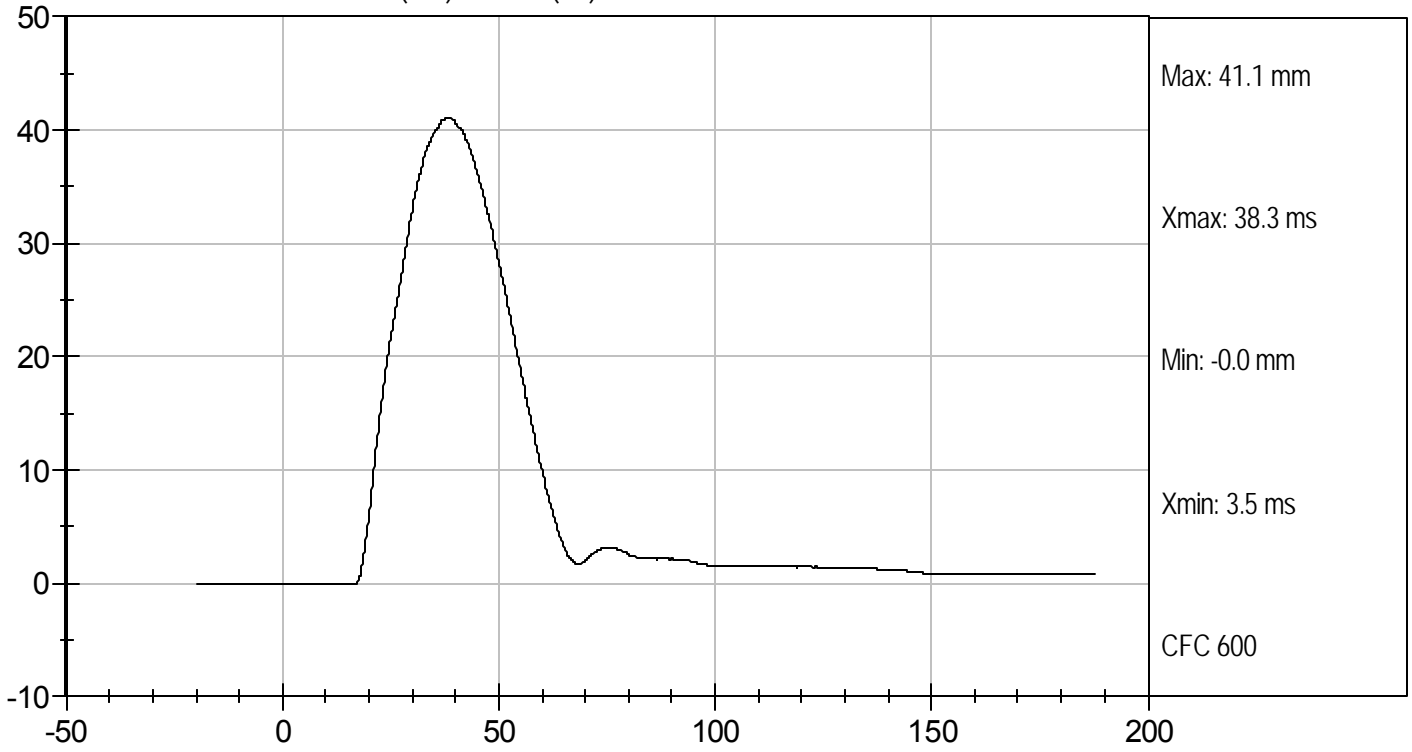




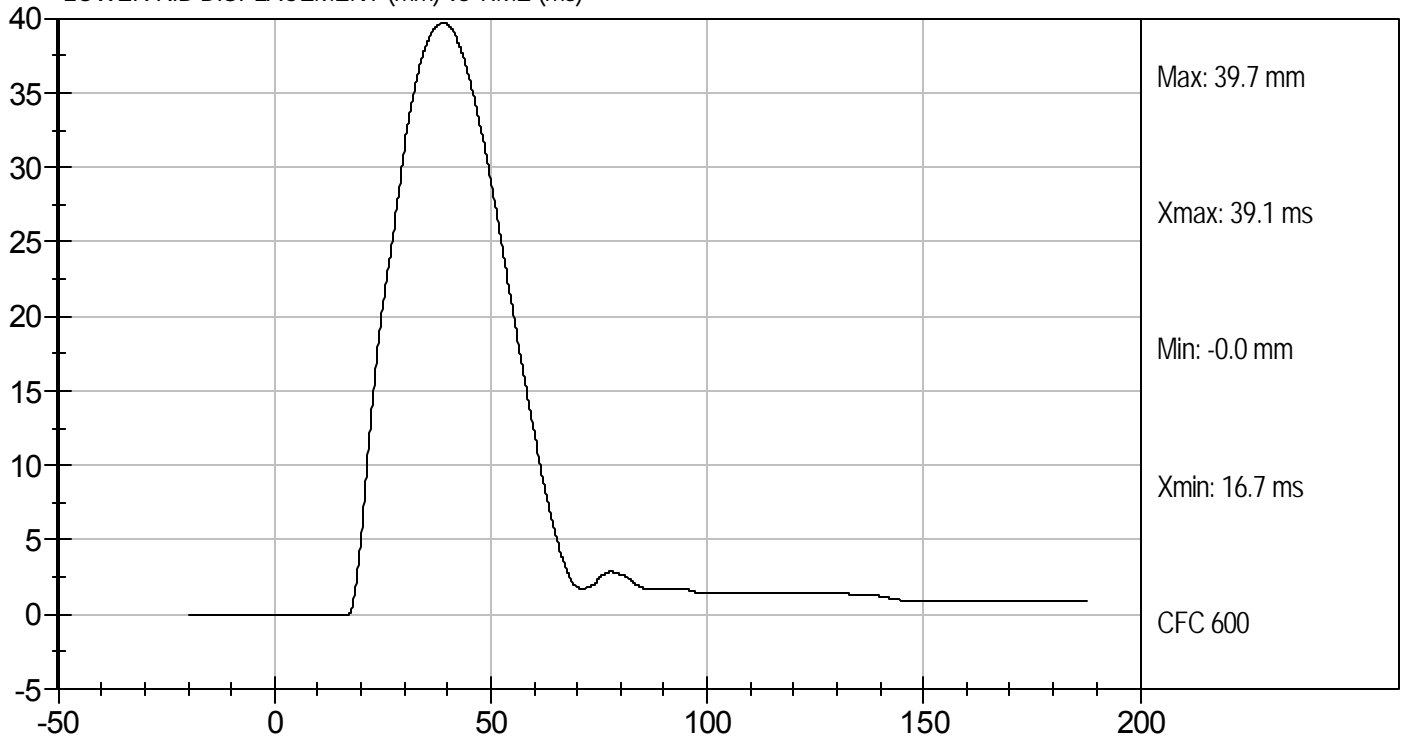
Test Desc: Thorax Without Arm
Component ID: D113675

Test Date: 11/3/11
Velocity: 14.25 ft/s, 4.34 m/s

MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



LOWER RIB DISPLACEMENT (mm) vs TIME (ms)

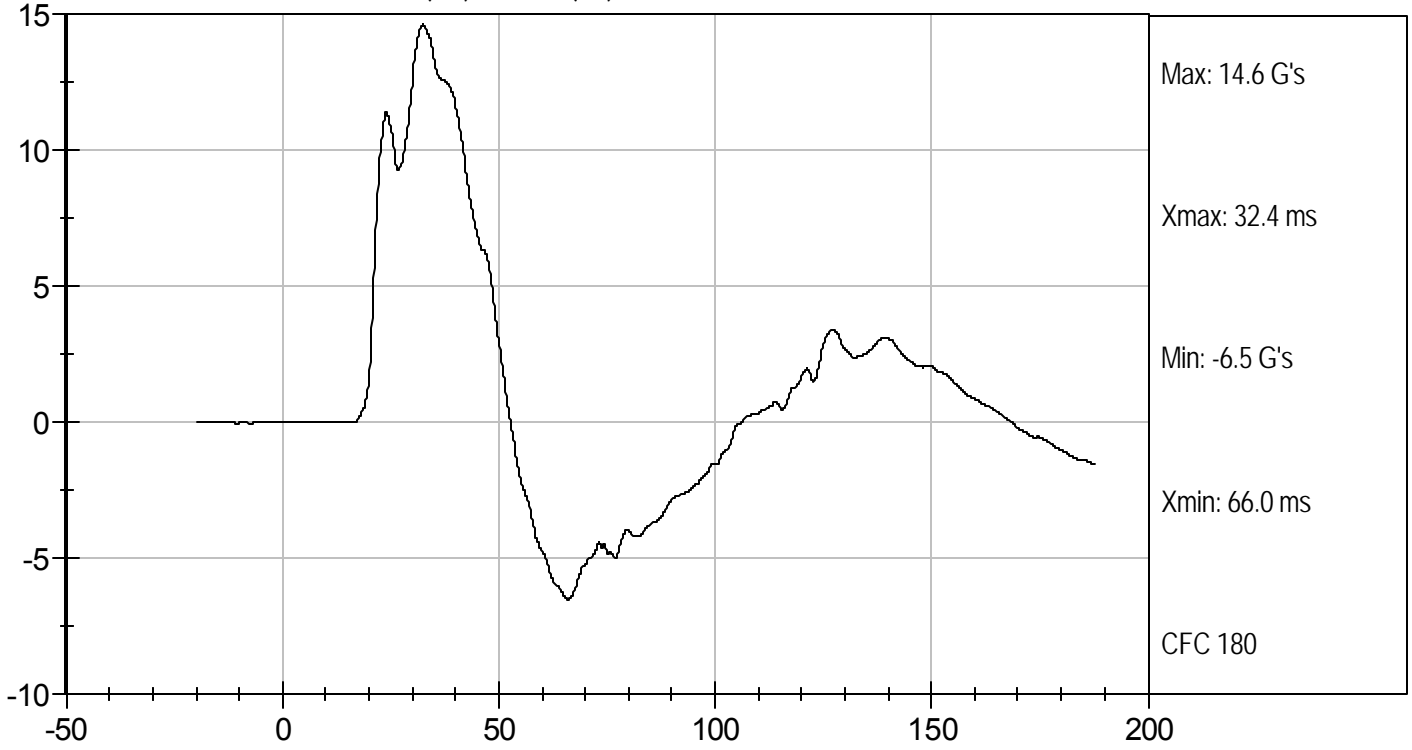




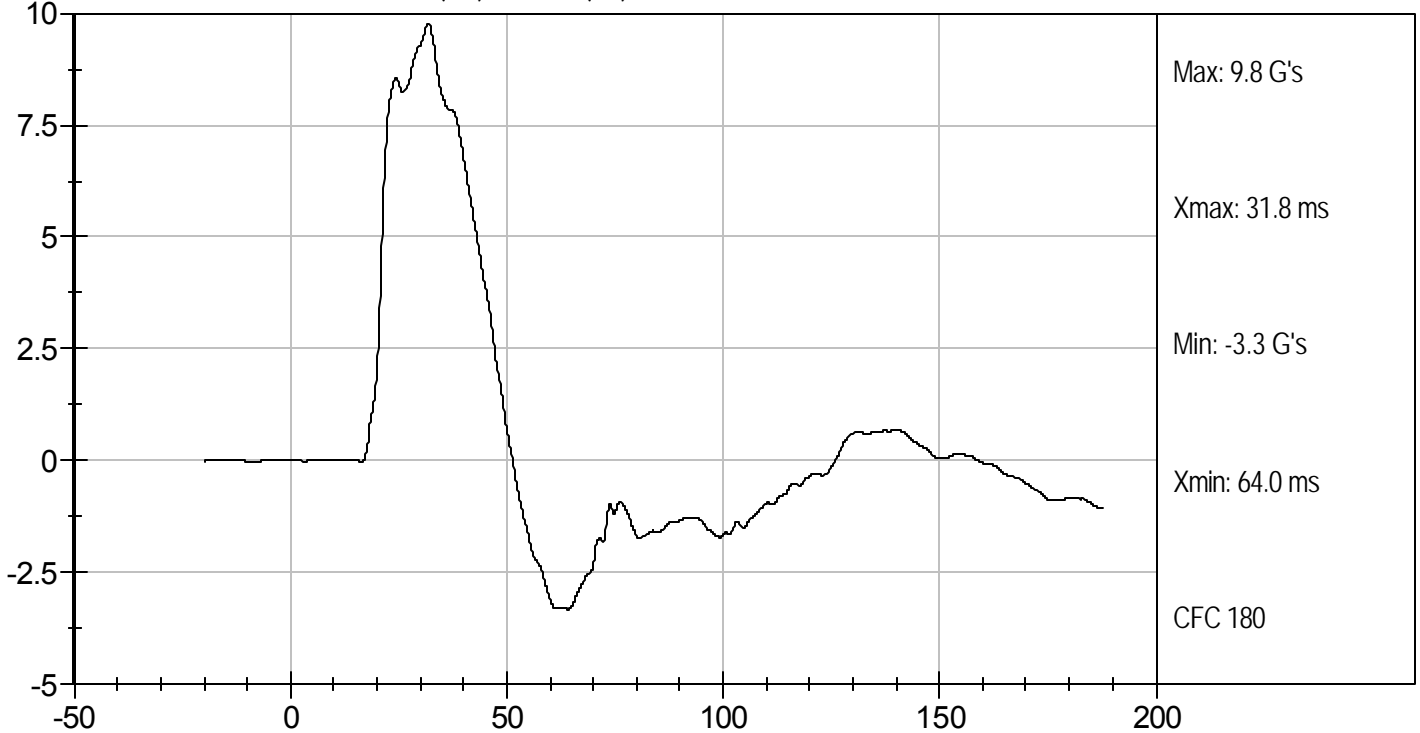
Test Desc: Thorax Without Arm
Component ID: D113675

Test Date: 11/3/11
Velocity: 14.25 ft/s, 4.34 m/s

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



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



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

ATD Serial No: 306

Test I.D: D113676

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	32	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	41	Pass
Lower Rib Displacement	mm	33 to 44	37	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	11	Pass
Overall Test Results				Pass

Jessica Gall
 Laboratory Technician

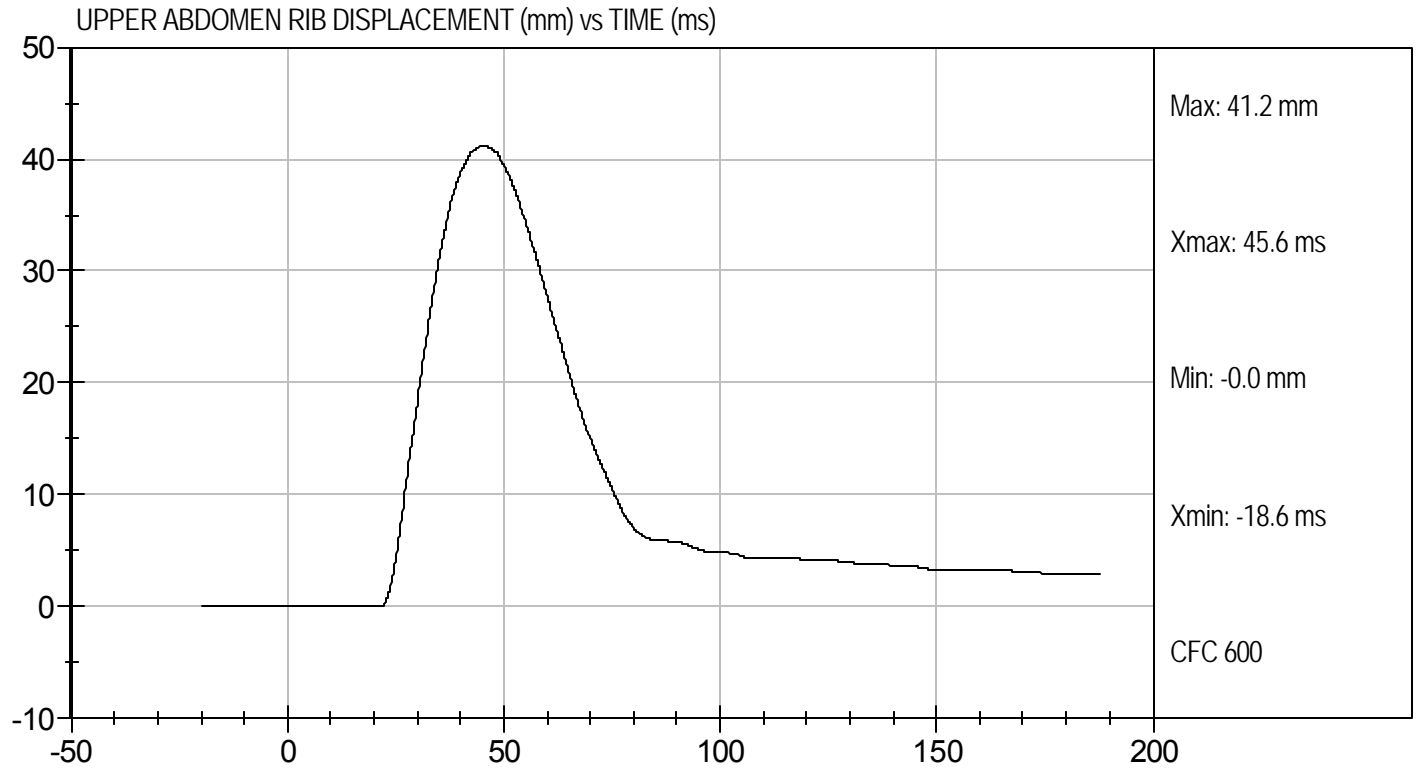
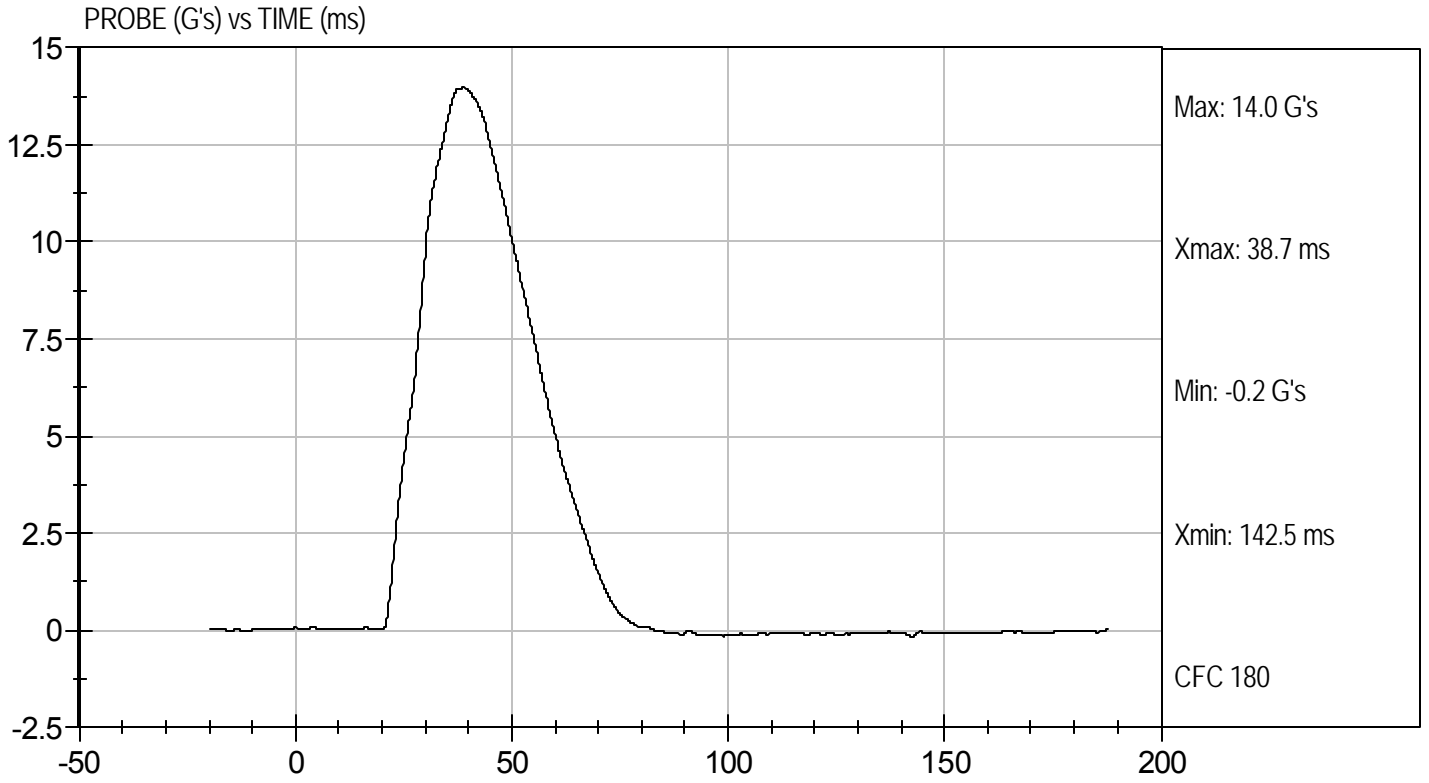
11/3/11
 Test Date

David Winkelbauer
 Approved By



Test Desc: Abdomen Impact
Component ID: D113676

Test Date: 11/3/11
Velocity: 14.12 ft/s, 4.30 m/s

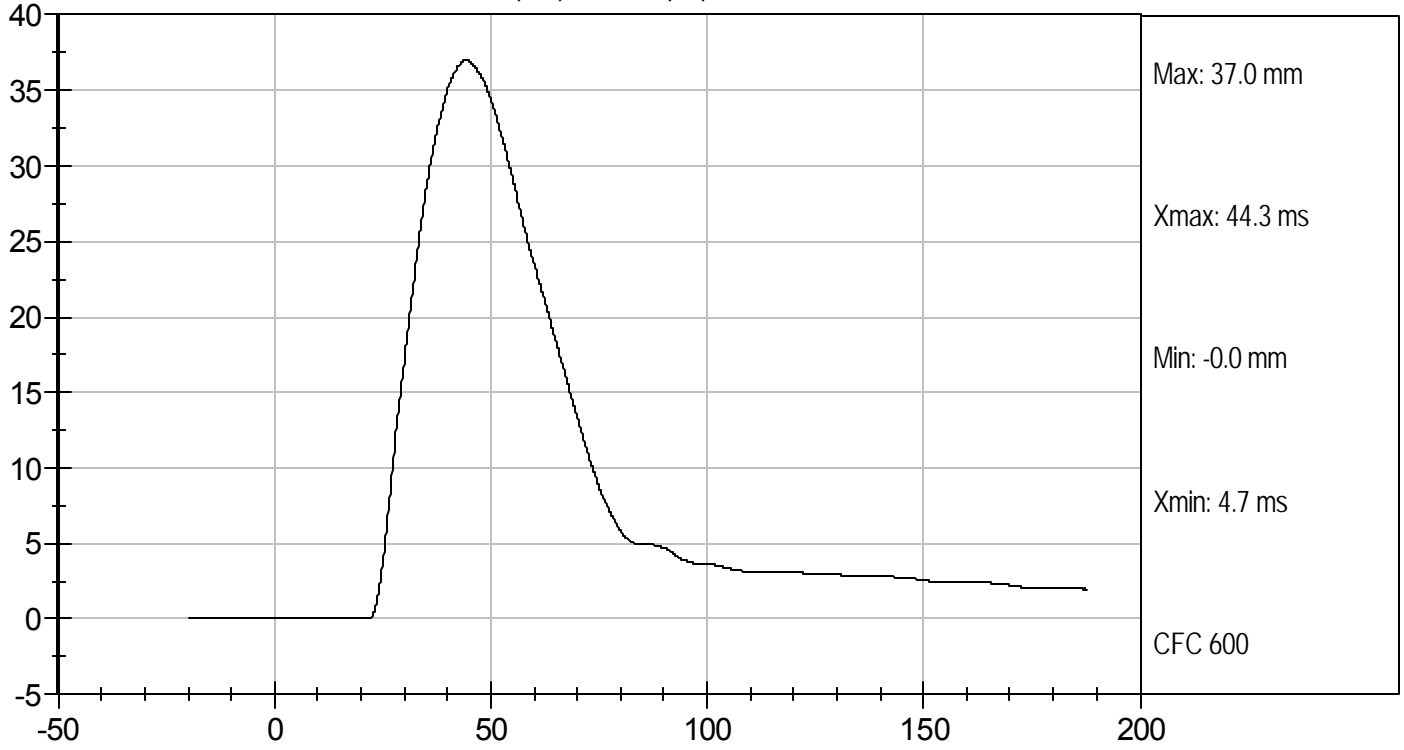




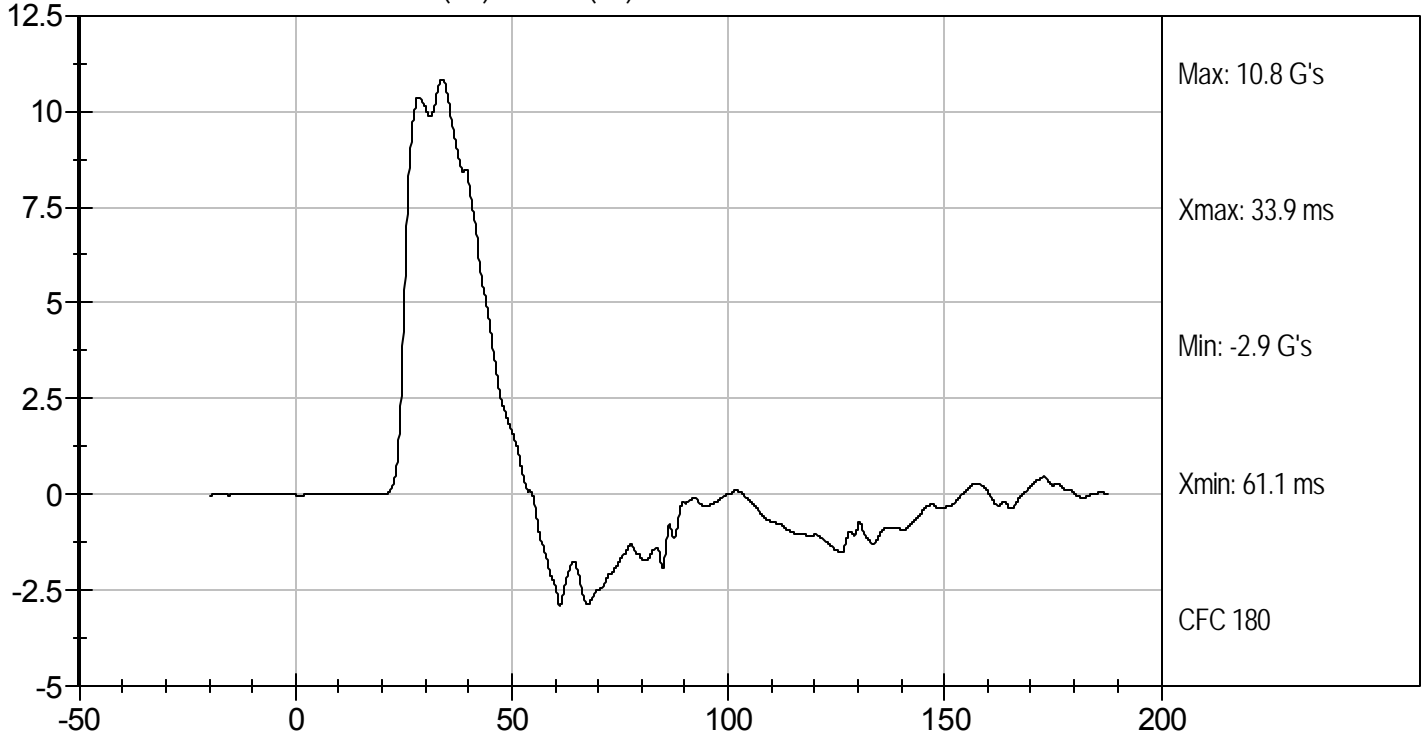
Test Desc: Abdomen Impact
Component ID: D113676

Test Date: 11/3/11
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: 306

Test I.D: D113677

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.2	Pass
Humidity	%	10 to 70	31	Pass
Impact Velocity	m/s	6.60 to 6.80	6.74	Pass
Peak Impactor Acceleration	G's	38 to 47	42	Pass
Pelvis Y Acceleration after 6 ms	G's	34 to 42	39	Pass
Peak Acetabulum Force	N	3600 to 4300	3763	Pass
Overall Test Results				Pass

Jessica Hall
 Laboratory Technician

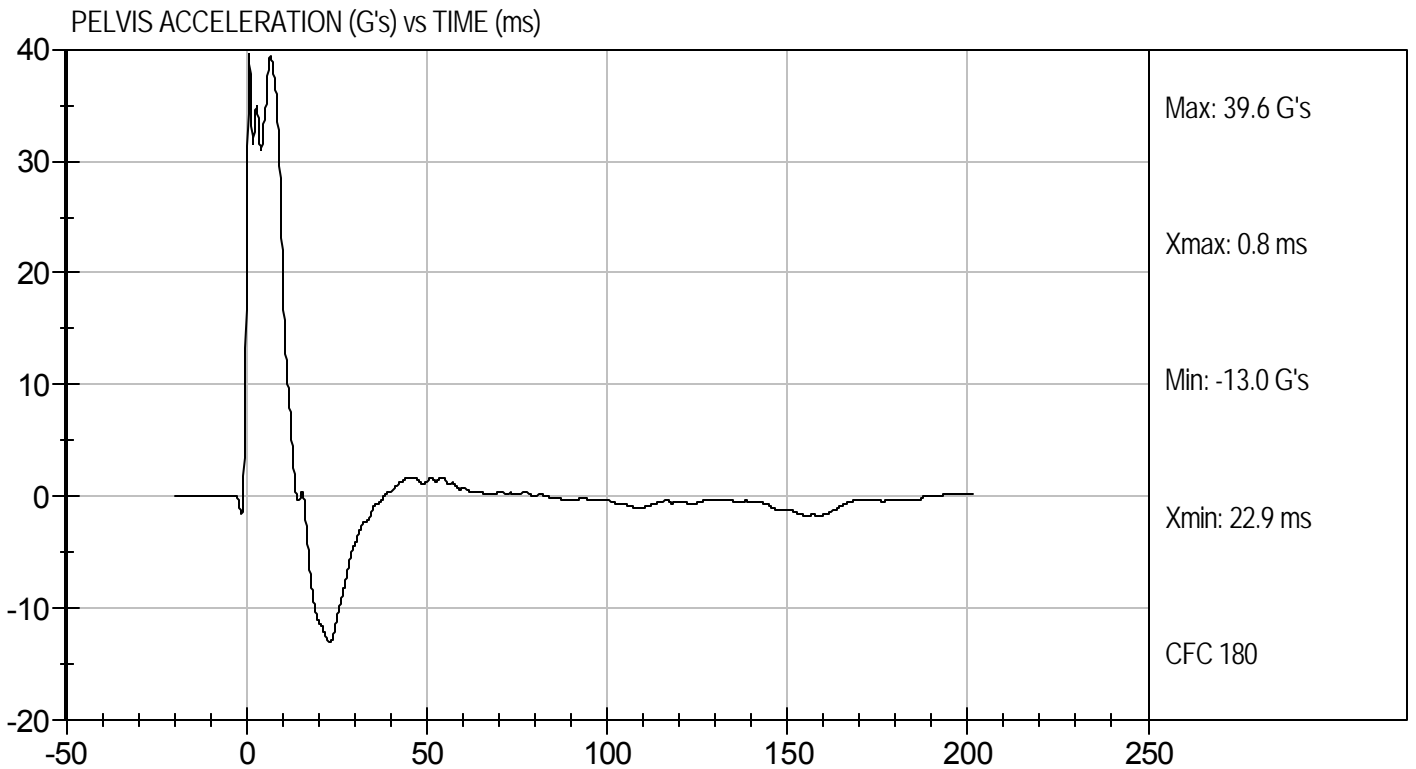
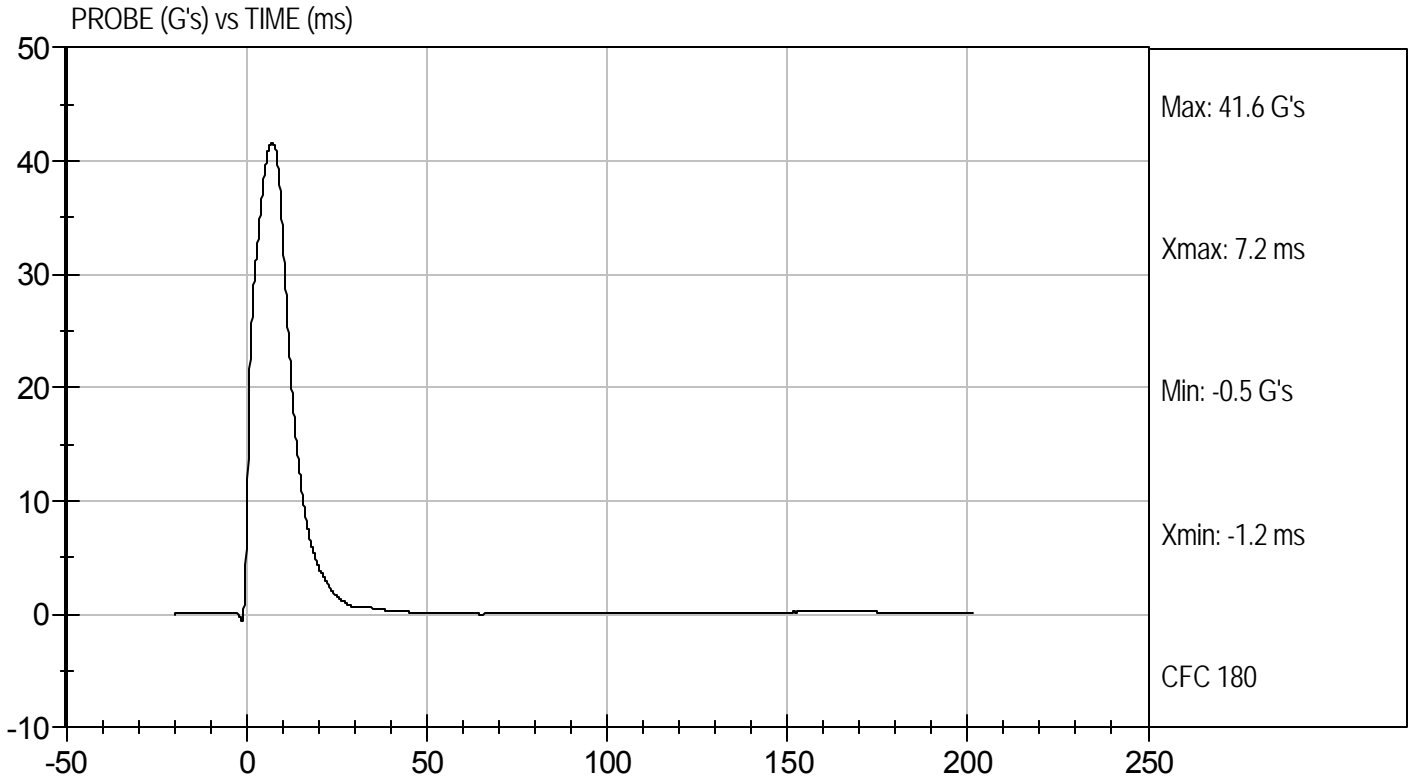
11/3/11
 Test Date

David Winkelbauer
 Approved By



Test Desc: Pelvis Impact
Component ID: D113677

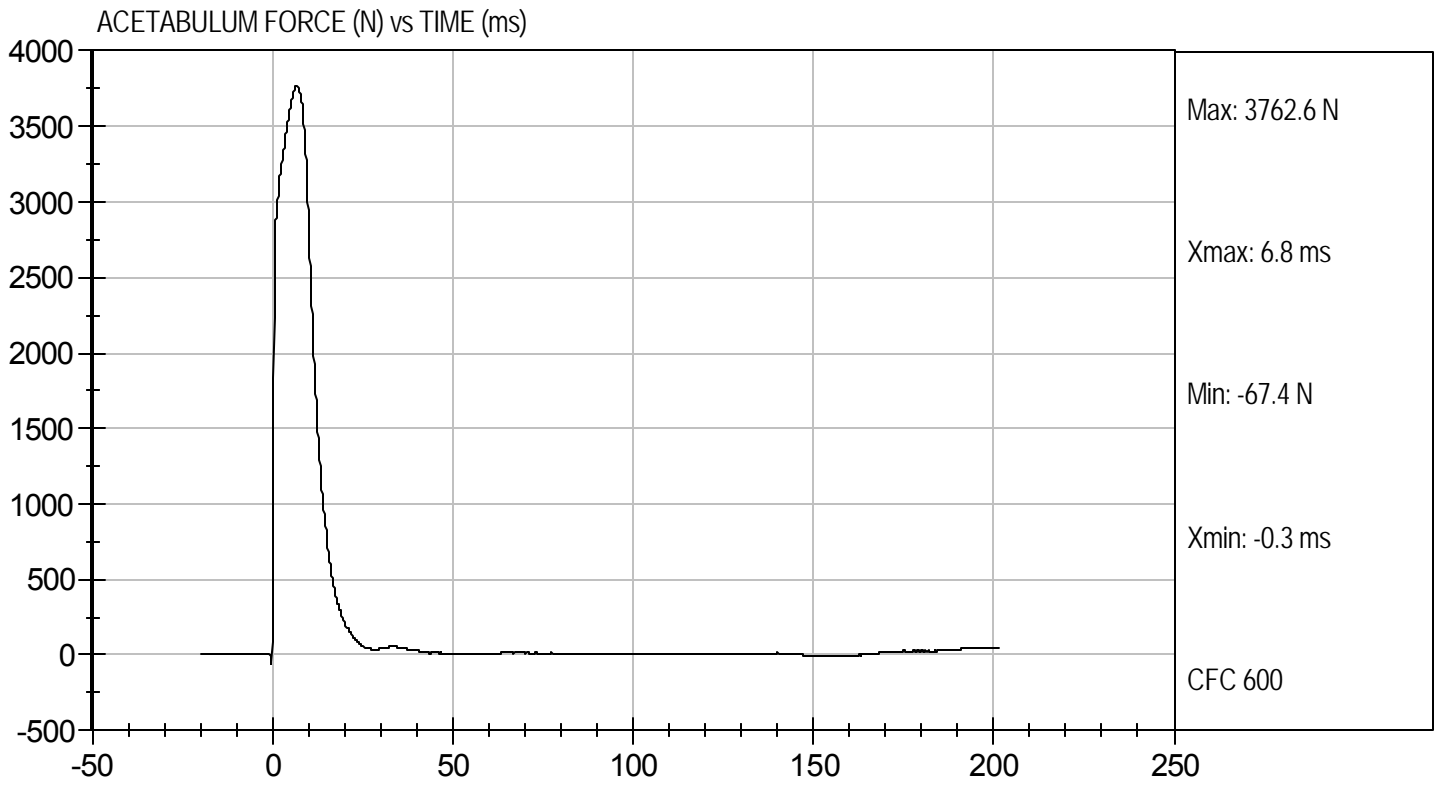
Test Date: 11/3/11
Velocity: 22.12 ft/s, 6.74 m/s





Test Desc: Pelvis Impact
Component ID: D113677

Test Date: 11/3/11
Velocity: 22.12 ft/s, 6.74 m/s



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


ATD Serial No: 306

Test I.D: D113678

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	32	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Peak Impactor Acceleration	G's	36 to 45	39	Pass
Pelvis Y Acceleration	G's	28 to 39	33	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4722	Pass
Overall Test Results				Pass


 Laboratory Technician

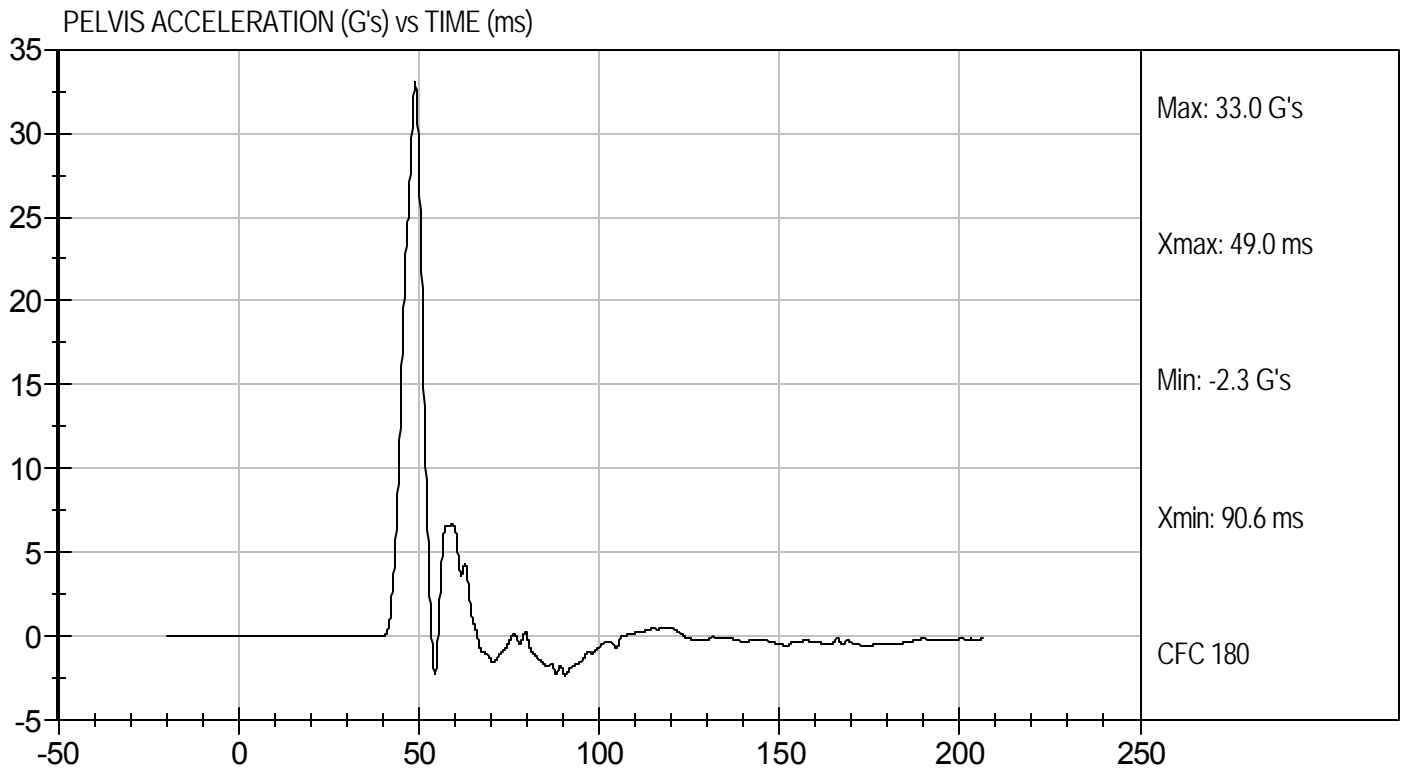
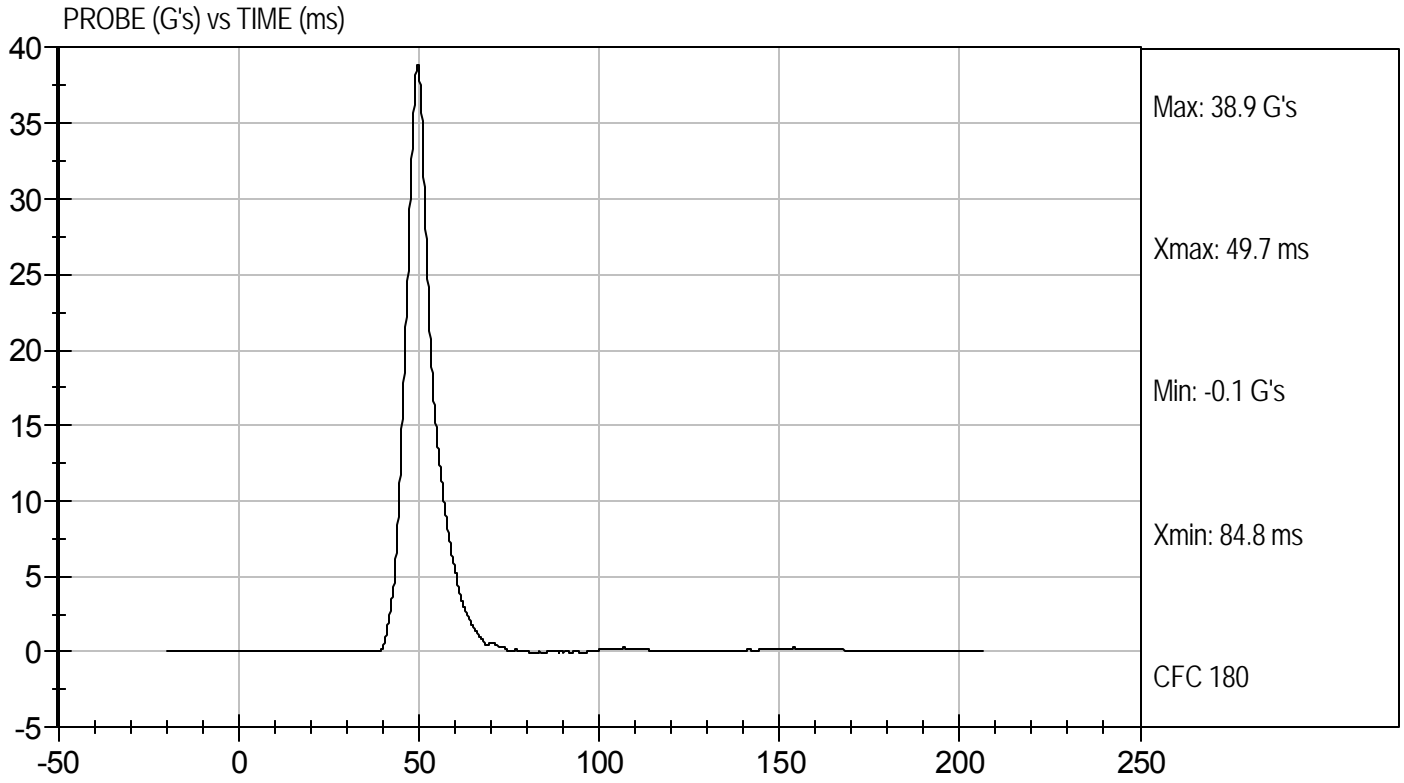
11/3/11
 Test Date


 Approved By



Test Desc: Iliac Impact
Component ID: D113678

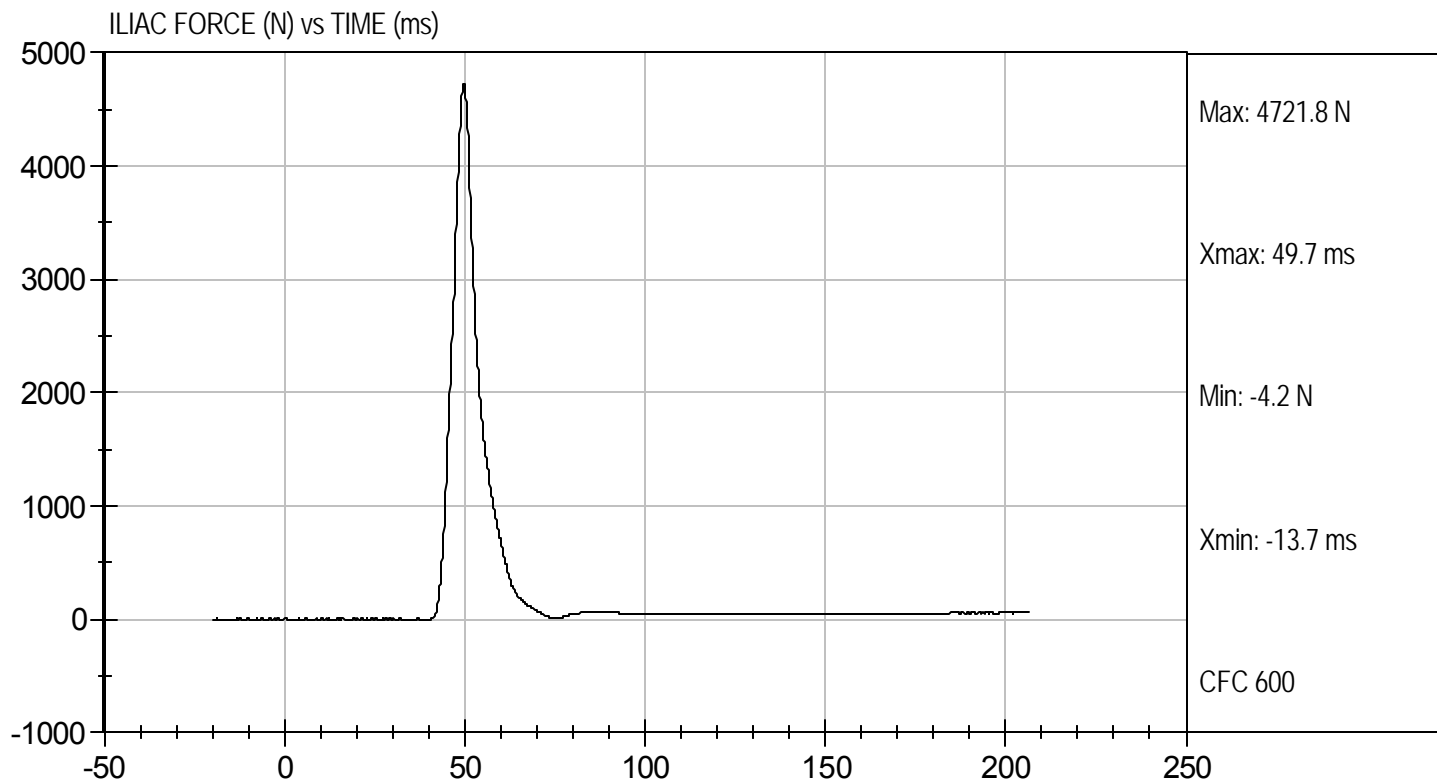
Test Date: 11/3/11
Velocity: 14.36 ft/s, 4.38 m/s





Test Desc: Iliac Impact
Component ID: D113678

Test Date: 11/3/11
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	ABG1532	Denton	01/06/11
	Middle	Y	ABG1534	Denton	01/06/11
	Rear	Y	ABG1535	Denton	01/06/11
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	PG461	Denton	01/06/11

Table 2 – Dummy Instrumentation (SID-IIs)

				SID-IIs S/N 306		
				Serial Number	Manufacturer	Calibration Date
Head Accelerometers			X	P67884	Endevco	06/08/11
			Y	P67886	Endevco	06/08/11
			Z	P67887	Endevco	06/08/11
Head Accelerometers			X	P67888	Endevco	06/08/11
			Y	P67889	Endevco	06/08/11
			Z	P67890	Endevco	06/08/11
Displacement Potentiometers	Thoracic Rib	Upper	Y	G1187	FTSS	06/09/11
		Middle	Y	G1261	FTSS	06/09/11
		Lower	Y	G1270	FTSS	06/09/11
	Abdominal Rib	Upper	Y	G1287	FTSS	06/09/11
		Lower	Y	G1304	FTSS	06/09/11
Lower Spine Accelerometers (T12)			X	P67893	Endevco	06/08/11
			Y	P67894	Endevco	06/08/11
			Z	P67895	Endevco	06/08/11
Acetabulum Load Cell			Y	ACG111	FTSS	05/20/11
Iliac Wing Load Cell			Y	IWG226	FTSS	05/20/11
Pelvis Plug (struck side)				36163	FTSS	08/31/10
Pelvis Plug (non-struck side)				14013	FTSS	08/30/07

Table 3 – Vehicle Instrumentation

		Serial Number	Manufacturer	Calibration Date
Vehicle Center of Gravity	X	P63267	Endevco	09/13/11
Vehicle Center of Gravity	Y	P63265	Endevco	09/13/11
Vehicle Center of Gravity	Z	P63266	Endevco	09/13/11
Right Sill at Front Seat	X	P63338	Endevco	10/20/11
Right Sill at Front Seat	Y	P63336	Endevco	10/20/11
Right Sill at Front Seat	Z	P63337	Endevco	10/20/11
Right Sill at Rear Seat	X	P63256	Endevco	08/22/11
Right Sill at Rear Seat	Y	P63257	Endevco	08/22/11
Right Sill at Rear Seat	Z	P63258	Endevco	08/22/11
Left Sill at Front Door	Y	P59247	Endevco	05/20/11
Left Sill at Rear Door	Y	P59383	Endevco	09/12/11
Left A-Post Lower	Y	P59244	Endevco	06/10/11
Left A-Post Middle	Y	P59251	Endevco	06/10/11
Left B-Post Lower	Y	P47894	Endevco	09/12/11
Left B-Post Middle	Y	P59238	Endevco	06/15/11
Front Seat Track	Y	P47108	Endevco	07/08/11
Rear Seat Track or Structure	Y	P50050	Endevco	06/10/11
Right Rear Occ. Compartment	Y	P59362	Endevco	07/07/11
Engine Block	X	P63254	Endevco	09/13/11
Engine Block	Y	P63255	Endevco	09/13/11
Rear Floorpan Above Axle	X	P63412	Endevco	07/08/11
Rear Floorpan Above Axle	Y	P63411	Endevco	07/08/11
Rear Floorpan Above Axle	Z	P63413	Endevco	07/08/11

Table 4 – MDB Instrumentation

		Serial Number	Manufacturer	Calibration Date
MDB Center of Gravity	X	P63531	Endevco	07/08/11
MDB Center of Gravity	Y	P63532	Endevco	07/08/11
MDB Center of Gravity	Z	P63533	Endevco	07/08/11
Left Frame at Rear Axle Centerline	X	P59322	Endevco	07/07/11
Left Frame at Rear Axle Centerline	Y	P59323	Endevco	07/07/11