

REPORT NUMBER: SINCAP-MGA-2011-072

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

**TOYOTA MOTOR CORPORATION
2011 Scion tC 3-Dr Liftback
NHTSA No.: YB5102**

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



Test Date: February 23, 2011

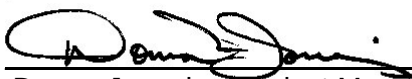
Final Report Date: March 19, 2011

FINAL REPORT

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

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

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Approval Date: March 19, 2011

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

Technical Report Documentation Page

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15. Supplementary Notes																																															
16. Abstract A 55/28 km/h 90° Moving Deformable Barrier NCAP Side Impact Test was conducted on the subject 2011 Scion tC 3-Dr Liftback in accordance with the specifications of the Office of Crashworthiness Standards NCAP Side Laboratory Test Procedure for the generation of consumer information on vehicle side crash protection. The test was conducted at MGA Research Corporation, in Burlington, Wisconsin, on February 23, 2011. The impact velocity of the Moving Deformable Barrier (MDB) was 62.04 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle at the time of impact was 21°C. The target vehicle post-test maximum crush was 234 mm at level 2. The test vehicle's performance was as follows: <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th colspan="4" style="text-align: left;">Driver ATD (ES-2re)</th> </tr> <tr> <th style="text-align: left;">Measurement Description</th> <th style="text-align: left;">Units</th> <th style="text-align: left;">Threshold</th> <th style="text-align: left;">Result</th> </tr> </thead> <tbody> <tr> <td style="text-align: left;">Head Injury Criteria (HIC₃₆)</td> <td>N/A</td> <td>1000</td> <td>106</td> </tr> <tr> <td style="text-align: left;">Maximum Thorax Rib Deflection</td> <td>mm</td> <td>44</td> <td>12</td> </tr> <tr> <td style="text-align: left;">Combined Abdominal Force</td> <td>N</td> <td>2500</td> <td>714</td> </tr> <tr> <td style="text-align: left;">Pubic Symphysis Force</td> <td>N</td> <td>6000</td> <td>1691</td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th colspan="4" style="text-align: left;">Passenger ATD (SID-IIs)</th> </tr> <tr> <th style="text-align: left;">Measurement Description</th> <th style="text-align: left;">Units</th> <th style="text-align: left;">Threshold</th> <th style="text-align: left;">Result</th> </tr> </thead> <tbody> <tr> <td style="text-align: left;">Head Injury Criteria (HIC₃₆)</td> <td>N/A</td> <td>1000</td> <td>430</td> </tr> <tr> <td style="text-align: left;">Lower Spine (T12) Resultant Acceleration</td> <td>G</td> <td>82</td> <td>50</td> </tr> <tr> <td style="text-align: left;">Total Pelvic Force (sum of acetabular and iliac forces)</td> <td>N</td> <td>5525</td> <td>3075</td> </tr> </tbody> </table>				Driver ATD (ES-2re)				Measurement Description	Units	Threshold	Result	Head Injury Criteria (HIC ₃₆)	N/A	1000	106	Maximum Thorax Rib Deflection	mm	44	12	Combined Abdominal Force	N	2500	714	Pubic Symphysis Force	N	6000	1691	Passenger ATD (SID-IIs)				Measurement Description	Units	Threshold	Result	Head Injury Criteria (HIC ₃₆)	N/A	1000	430	Lower Spine (T12) Resultant Acceleration	G	82	50	Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3075
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SECTION 1

PURPOSE AND SUMMARY OF TEST

PURPOSE

This moving deformable barrier side impact test is part of the MY 2011 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-09-D-00124. The purpose of this test is to generate comparative side impact performance in a 2011 Scion tC 3-Dr Liftback. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Side NCAP Laboratory Test Procedure dated January 2010.

SUMMARY

A 2011 Scion tC 3-Dr Liftback 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 62.04 km/h (38.5 mph). The target vehicle was stationary and was positioned at an angle of 63° to the line of forward motion. The side impact test was conducted by MGA Research Corporation in Burlington, Wisconsin, on February 23, 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 January 2010. 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)

- Head CG Triaxial Accelerometers
- Thorax Rib 1 to Rib 3 Displacement Potentiometers
- Abdomen Forward, Middle, and Rear Load Cells
- Lower Spine Triaxial Accelerometers
- Pubic Load Cell

PASSENGER ATD (SID-IIs)

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

DUMMY INJURY VALUES

Measurement Description	Driver ATD (ES-2re)		
	Units	Threshold	Result
Head Injury Criteria (HIC ₃₆)	N/A	1000	106
Maximum Thorax Rib Deflection	mm	44	12
Combined Abdominal Force	N	2500	714
Pubic Symphysis Force	N	6000	1691

Measurement Description	Passenger ATD (SID-IIs)		
	Units	Threshold	Result
Head Injury Criteria (HIC ₃₆)	N/A	1000	430
Lower Spine (T12) Resultant Acceleration	G	82	50
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3075

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

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

GENERAL COMMENTS

There was no valid data collected for:

- Left Rear Sill Y after 40 msec.
- Left Lower B-Post Y after 20 msec.
- Left Mid B-Post Y after 40 msec.
- Left Lower A-Post Y after 10 msec.
- Left Mid A-Post Y after 50 msec.
- Driver Seat Track Y after 10 msec.

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

SECTION 2
OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

DATA SHEET NO. 1

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2011 Scion tC 3-Dr Liftback
 Test Program: NCAP Side MDB Impact Test

NHTSA No. YB5102
 Test Date: 2/23/2011

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	YB5102	Anti-Lock Brakes	Yes
Model Year	2011	All Wheel Drive	No
Make	Scion	Power Steering	Yes
Model	tC	Driver Front Airbag	Yes
Body Style	3-Dr Hatchback	Driver Curtain Airbag	Yes
VIN	JTKJF5C78B3007233	Driver Head/Torso Airbag	No
Body Color	Magnetic Gray Met.	Driver Torso Airbag	No
Delivery Date	2/11/2011	Driver Torso/Pelvis Airbag	Yes
Odometer (mi)	76	Driver Pelvis Airbag	No
Odometer (km)	122	Driver Knee Airbag	Yes
Dealer	Jack Safo Scion	Rear Pass. Front Airbag	No
Transmission	Manual	Rear Pass. Curtain Airbag	Yes
Final Drive	Front	Rear Pass. Head/Torso Airbag	No
Type/No. Cylinders	4	Rear Pass. Torso Airbag	No
Engine Displacement (L)	2.5	Rear Pass. Torso/Pelvis Airbag	No
Engine Placement	Lateral	Rear Pass. Pelvis Airbag	No
Roof Rack	No	Rear Pass. Knee Airbag	No
Sunroof/T-Top	Yes	Pretensioners	Yes
Tinted Glass	No	Load Limiters	Yes
Traction Control	Yes	Automatic Door Locks	Yes
Power Brakes	Yes	Bucket Seats	Yes
Front Disc	Yes	Tilt Steering	Yes
Rear Disc	Yes	Power Seats	No
Does owner's manual provide instruction to turn off automatic door locks?			Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Toyota Motor Corporation	GVWR (kg)	1882
Date of Manufacture	9/10	GAWR Front (kg)	1150
		GAWR Rear (kg)	950

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	2	3		5	
Capacity Weight (VCW) (kg)				388	(A)
DSC x 68.04 (kg)				340	(B)
Cargo Weight (RCLW) (kg)				48	(A-B)

VEHICLE SEAT TYPE

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

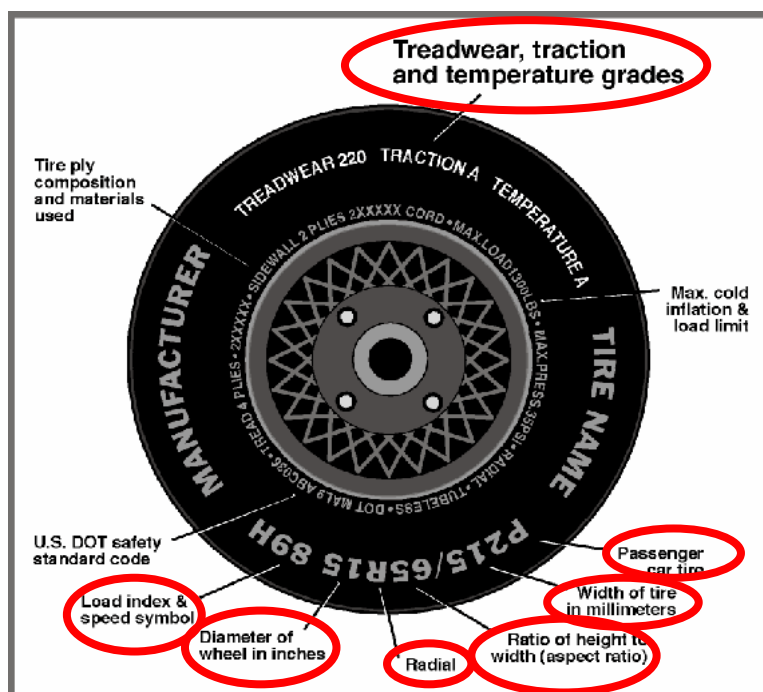
DATA SHEET NO. 1 (continued)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2011 Scion tC 3-Dr Liftback
 Test Program: NCAP Side MDB Impact Test

NHTSA No. YB5102
 Test Date: 2/23/2011

VEHICLE TIRE INFORMATION



DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	230	210
Recommended Tire Size	P225/45R18	P225/45R18
Tire Size on Vehicle	P225/45R18	P225/45R18
Tire Manufacturer	Yokohama	Yokohama
Tire Model	AVID	AVID
Treadwear	360	360
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	2	2
Tire Plies Body	6	6
Load Index & Speed Symbol	91W	91W
Tire Material	Rubber	Rubber
DOT Safety Code Right	FDJ7	FDJ7
DOT Safety Code Left	FDJ7	FDJ7

DATA SHEET NO. 1 (continued)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2011 Scion tC 3-Dr Liftback
 Test Program: NCAP Side MDB Impact Test

NHTSA No. YB5102
 Test Date: 2/23/2011

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	447.2	265.3		492.6	334.7		490.3	341.1	
Right	kg	423.7	266.3		435.4	312.5		431.8	316.2	
Ratio	%	62.1	37.9		58.9	41.1		58.4	41.6	
Totals	kg	870.9	531.6	1402.5	928.0	647.2	1575.2	922.1	657.3	1579.4

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1402.5	(A)
Sum of Actual Weight of 2 P572 ATDs Used	kg	129.3	(B)
Rated Cargo/Luggage Weight (RCLW)	kg	48	(C)
Calculated Target Vehicle Test Weight (TVTW)	kg	1579.8	(A+B+C)

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
Fully Loaded	mm	684	695	680	691	
As Tested (Fully Loaded $\pm$ 10mm at each wheel well)	mm	688	695	688	693	1109

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2700
Total Vehicle Length at Left Side	mm	3520
Total Vehicle Length at Centerline	mm	4420
Total Vehicle Length at Right Side	mm	3520
Weight of Ballast in Cargo Area	kg	18.1
Weight of Vehicle Components Removed	kg	0.0
Amount of Stoddard Solvent in Fuel Tank	L	51.0

Vehicle components removed to meet target vehicle test weight: Right tail light, spare tire, jack & tools.

TEST VEHICLE VERTICAL IMPACT POINT DATA

Measurement Description	Units	Value
Target Impact Point Aft of Front Axle	mm	410
Actual Impact Point Aft of Front Axle	mm	410

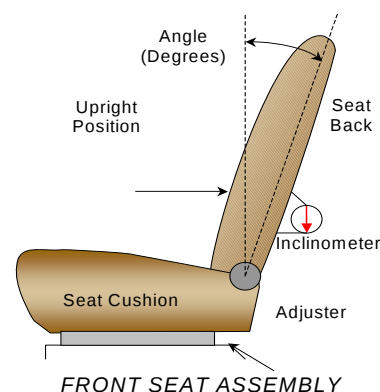
DATA SHEET NO. 2
SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

Test Vehicle: 2011 Scion tC 3-Dr Liftback
 Test Program: NCAP Side MDB Impact Test

NHTSA No. YB5102
 Test Date: 2/23/2011

NOMINAL DESIGN RIDING POSITION

The driver seatback was positioned to the manufacturer's designated angle. The procedure is as follows: Set seat back angle to 3°. The right front passenger seatback was set to match the driver seatback. The left rear seatback was set as specified in Appendix B of the TP dated January 2010. The seat back angle measurements were made relative to the rocker sill on the headrest post.



SEAT BACK ANGLES

	Degrees
Driver with Seated Dummy	4.6° on headrest post
Passenger with Seated Dummy	-0.2° on headrest post

SEAT FORE/AFT POSITIONS

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	24 detents (1 st as 0)	12 th detent (forward-most as 0)
Rear Seat	Fixed	Fixed

Describe method: For the driver seat track, using only the controls that primarily move the seat in the fore-aft direction, the seat was moved to the full rear position and marked. The seat was then moved to the foremost position and marked. The seat was then placed in the mid point of travel and marked. The left rear passenger seat track was fixed.

SEAT BELT UPPER ANCHORAGES

	Total # of Positions	Placed in Position #
Driver Seat	Fixed	
Rear Seat	Fixed	

Describe method: Both the driver seat anchorage and the left rear passenger seat anchorage were fixed.

DATA SHEET NO. 2 (CONTINUED)

SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

Test Vehicle: 2011 Scion tC 3-Dr Liftback
 Test Program: NCAP Side MDB Impact Test

NHTSA No. YB5102
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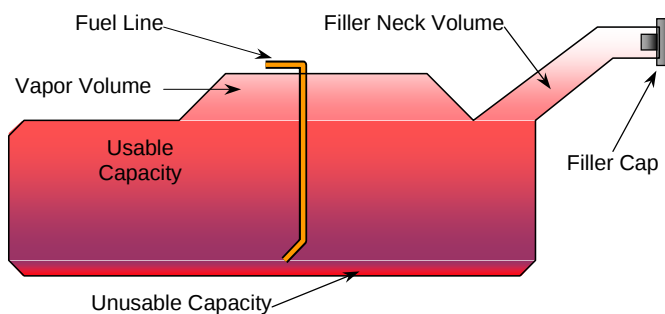
FUEL TANK CAPACITY DATA

	Liters
Usable Capacity of "Standard Tank"	55.0
Usable Capacity of "Optional" Tank	
Usable Capacity Used for FMVSS 301	50.6 to 51.7
Actual Amount of Solvent used	51.0

FUEL PUMP

Describe the fuel pump type, its behavior, and the location of the fuel filler pipe.

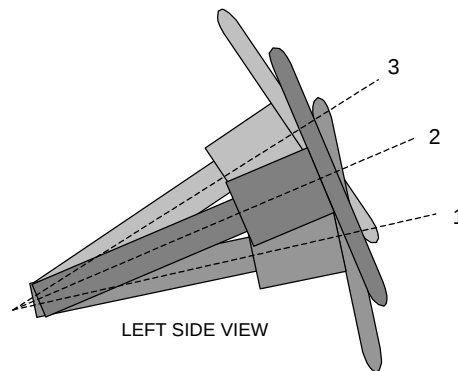
The test vehicle is equipped with an electric fuel pump. The fuel pump is activated when the ignition is turned on. The fuel pipe is on the left side.



VEHICLE FUEL TANK ASSEMBLY

STEERING COLUMN ADJUSTMENT

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



STEERING COLUMN ASSEMBLY

STEERING COLUMN POSITION

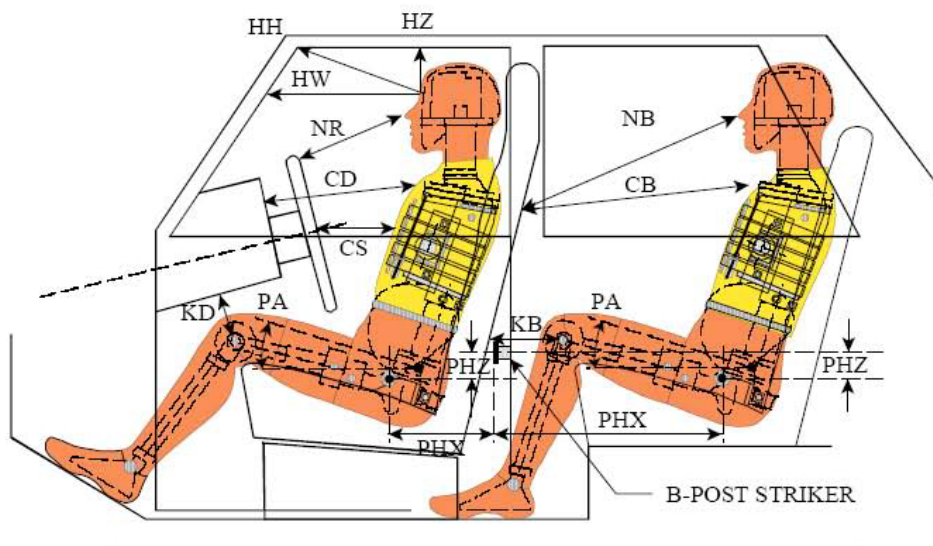
	Detent	Fore/Aft Position (mm)
Lowermost - Position 1	72.4	188
Geometric Center – Position 2	71.0	168
Uppermost – Position 3	69.6	148
Telescoping Steering Wheel Travel		40
Test Position	71.0	168

DATA SHEET NO. 3

DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2011 Scion tC 3-Dr Liftback
 Test Program: NCAP Side MDB Impact Test

NHTSA No. YB5102
 Test Date: 2/23/2011



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

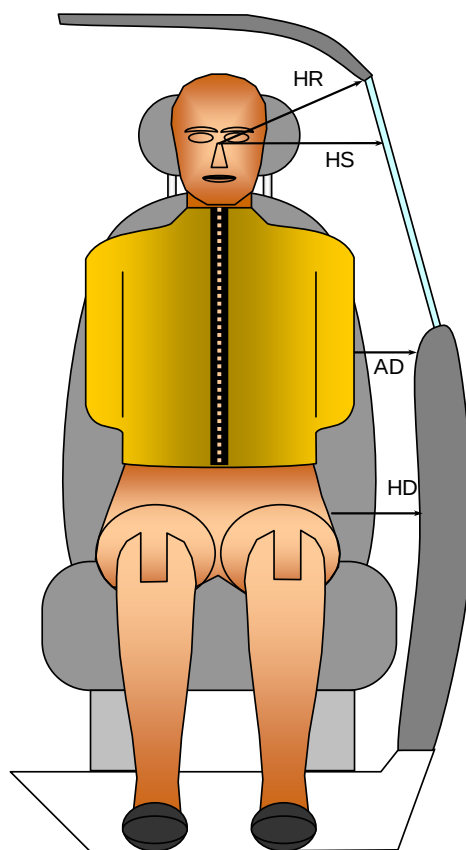
DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Pass. Code	Measurement Description	Driver S/N 032		Passenger S/N 306	
			Length (mm)	Angle(°)	Length (mm)	Angle(°)
HH		Head to Header	407	5.9		
HW		Head to Windshield	616	0		
HZ	HZ	Head to Roof	107	90	194	90
NR	NB	Nose to Rim/Seat Back	401	16.8	542	11.2
CD	CB	Chest to Dash/Seat Back	473	6.8	551	8.0
CS		Chest to Steering Wheel	309	12.3		
KDL	KBL	Left Knee to Dash/Seat Back	203	29.0	333	14.9
KDR	KBR	Right Knee to Dash/Seat Back	167	30.2	335	16.2
PA	PA	Pelvic Angle		25.2		17.7
PHX	PHX	H-Point to Striker (X-Axis)	458	0	499	0
PHZ	PHZ	H-Point to Striker (Z-Axis)	218	90	160	90
SA	SA	Seat Back Angle		4.6		-0.2

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2011 Scion tC 3-Dr Liftback
 Test Program: NCAP Side MDB Impact Test

NHTSA No. YB5102
 Test Date: 2/23/2011



FRONT VIEW OF DUMMY

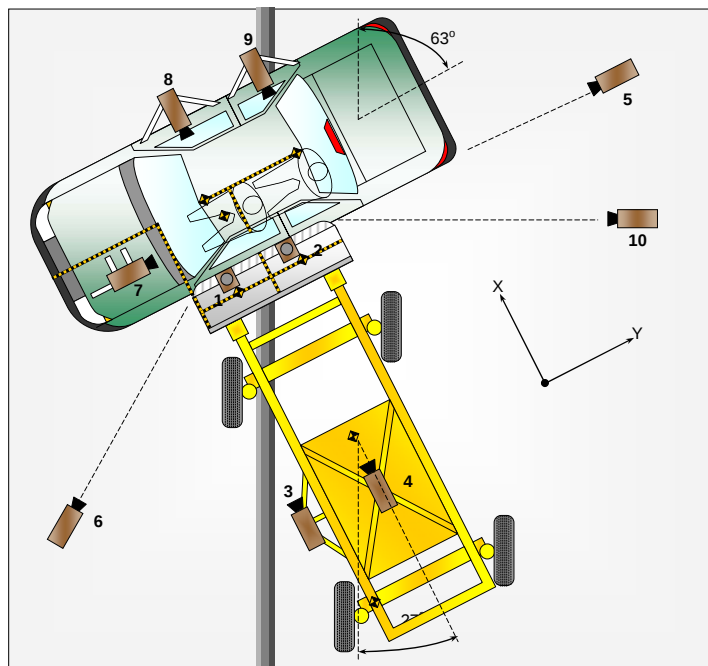
DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver S/N 032	Passenger S/N 306
HR	Head to Side Header	mm	189	188
HS	Head to Side Window	mm	291	403
AD	Arm to Door	mm	90	184
HD	H-Point to Door	mm	158	138

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

Test Vehicle: 2011 Scion tC 3-Dr Liftback
 Test Program: NCAP Side MDB Impact Test

NHTSA No. YB5102
 Test Date: 2/23/2011



CAMERA LOCATIONS AND DATA

No.	Camera View	Coordinates (mm)			Angle	Lens (mm)	Film Speed (fps)
		X*	Y*	Z*			
1	Overhead Overall	-130	0	-5050	88.2	14	1000
2	Overhead Close-up	270	1140	-5050	82.5	50	1000
3	Left Impact Point (MDB)					50	1000
4	Side Overall (MDB)					16	1000
5	Rear	50	4940	-1140	6.3	24	1000
6	Left Front	3120	-4130	-1180	5.6	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

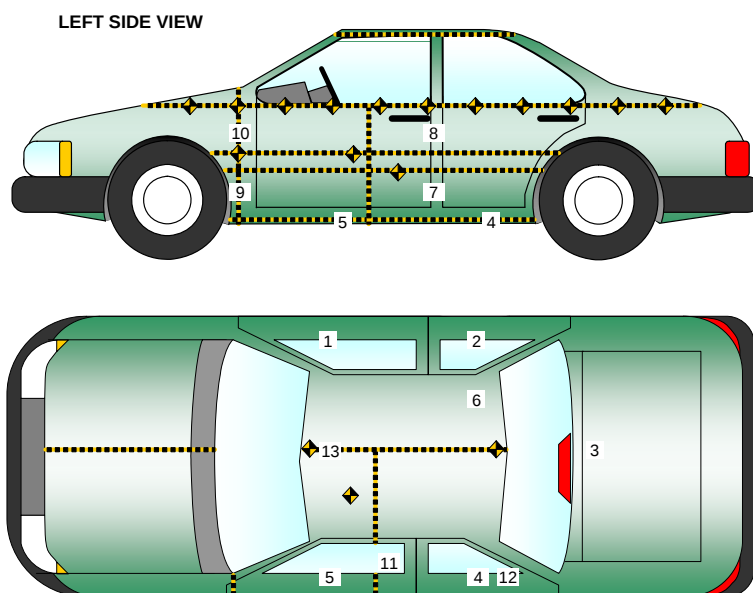
Reference: Impact Point projected to Ground
 +X = To Front of MDB, +Y = To Right of MDB, +Z = Down

* All measurements accurate to ± 6 mm

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

Test Vehicle: 2011 Scion tC 3-Dr Liftback
Test Program: NCAP Side MDB Impact Test

NHTSA No. YB5102
Test Date: 2/23/2011



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

Accelerometer Location				
No.	ID	Coordinates (mm)		
		X	Y	Z
1	Right Sill at Front Seat	2382	710	-222
2	Right Sill at Rear Seat	1243	705	-200
3	Rear Floorpan Above Axle	818	0	-538
4	Left Sill at Rear Door	1319	-705	-202
5	Left Sill at Front Door	2351	-710	-215
6	Rt. Rear Occ. Compartment	1699	345	-272
7	Left Lower B-Post	1818	-717	-495
8	Left Middle B-Post	1795	-713	-736
9	Left Lower A-Post	2914	-709	-523
10	Left Middle A-Post	3011	-798	-818
11	Front Seat Track	2219	-560	-315
12	Rear Seat Track or Structure			
13	Vehicle CG	2355	-230	-208

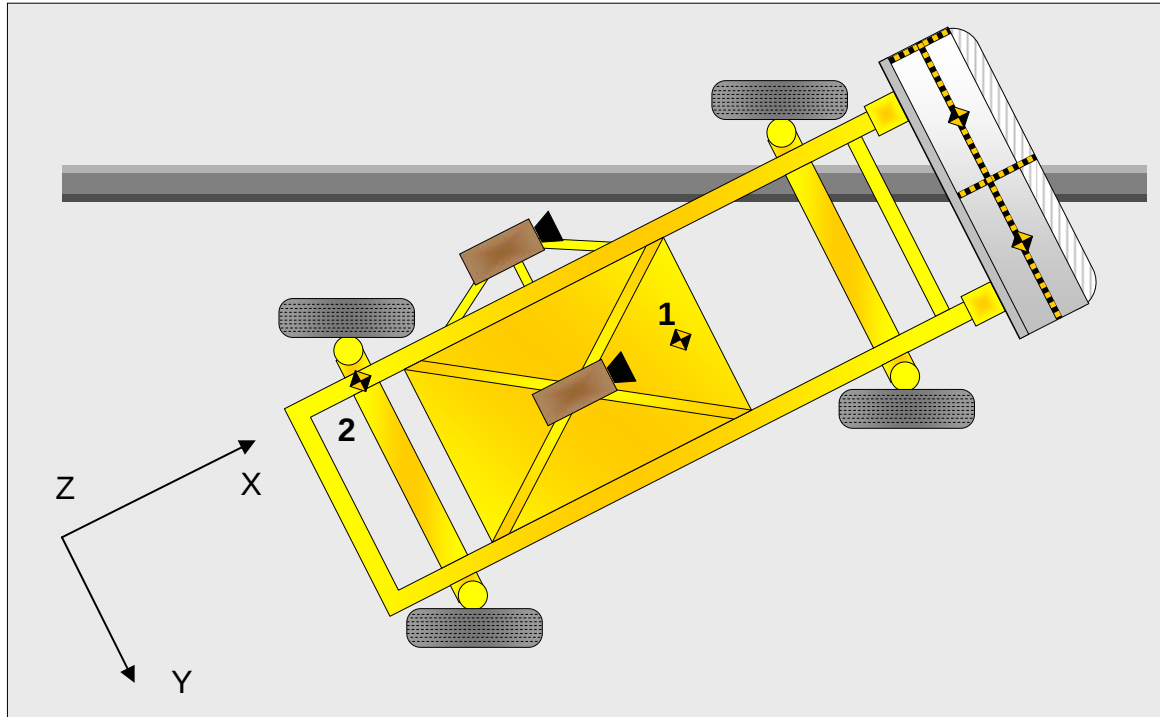
Reference: X – Rear Surface of Vehicle (+ forward)
Y - Vehicle Centerline (+ to right)
Z - Ground Plane (+ down)

DATA SHEET NO. 7

MOVING DEFORMABLE BARRIER (MDB) ACCELEROMETER LOCATIONS

Test Vehicle: 2011 Scion tC 3-Dr Liftback
Test Program: NCAP Side MDB Impact Test

NHTSA No. YB5102
Test Date: 2/23/2011



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
TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle: 2011 Scion tC 3-Dr Liftback
 Test Program: NCAP Side MDB Impact Test

NHTSA No. YB5102
 Test Date: 2/23/2011

MAXIMUM EXTERIOR STATIC CRUSH

Level	Measurement Description	Units	Maximum Crush	Above Ground
1	Sill Top Height	mm	22	200
2	Occupant H-Point	mm	234	475
3	Mid Door	mm	232	625
4	Window Sill	mm	156	930
5	Window Top	mm	35	1320
	Maximum Penetration	mm	234	

INSTRUMENTATION

Driver Dummy Channels	16
Passenger Dummy Channels	16
Vehicle Structure Accelerometers	21
MDB Accelerometers	5
Total No. of Contact Switches	8
Monitoring Channels	4
Total	70

CAMERA COVERAGE

High-Speed Vehicle Onboard	3
High-Speed Offboard	4
High-Speed MDB Onboard	2
Real-Time Stationary	1
Real-Time Panning	1
Total	11

DATA SHEET NO. 9**MOVING DEFORMABLE BARRIER (MDB) SUMMARY OF RESULTS**

Test Vehicle: 2011 Scion tC 3-Dr Liftback
 Test Program: NCAP Side MDB Impact Test

NHTSA No. YB5102
 Test Date: 2/23/2011

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 IMPACT DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.1 to 62.7	62.04
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	62.00
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	89.8

MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE

Vertical Location			From Centerline		Maximum Crush
Row	Description	Height	Distance	Direction	
A	Center of Bumper	432	500	Right	207
B	Top of Bumper	533	800	Right	100
C	Mid-Level	686	800	Left	113
D	Top of Stack	813	800	Left	169

MDB INSTRUMENTATION AND CAMERAS

Accelerometers	5
Contact Switches	2
High-Speed Cameras	2

DATA SHEET NO. 10**POST-TEST OBSERVATIONS**

Test Vehicle: 2011 Scion tC 3-Dr Liftback
 Test Program: NCAP Side MDB Impact Test

NHTSA No. YB5102
 Test Date: 2/23/2011

TEST DUMMY INFORMATION AND CONTACT

Description	Driver (ES-2re)	Passenger (SID-IIs)
Dummy Type / Serial No.	ES-2re / 032	SID-IIs / 306
Head Contact	Curtain Airbag, Headrest, Side Header	Curtain Airbag, Side Header
Upper Torso Contact	Side Airbag	Door Panel
Lower Torso Contact	Side Airbag	Door Panel
Left Knee Contact	Door Panel	Door Panel
Right Knee Contact	Left Knee	Left Knee

POST TEST DOOR OPENING AND SEAT TRACK INFORMATION

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

POST TEST STRUCTURAL OBSERVATIONS

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

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

MDB LEFT EDGE IMPACT POINT DATA

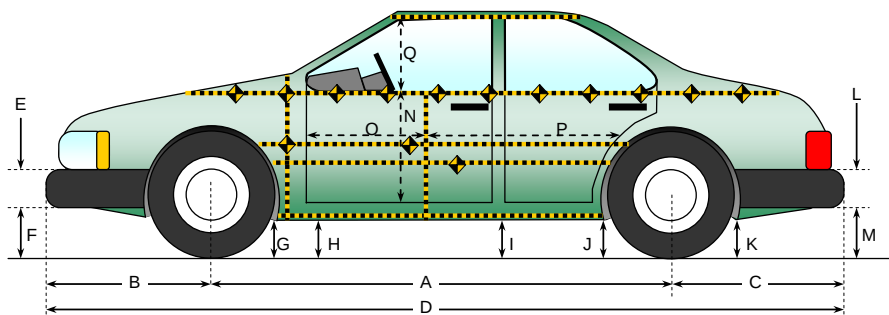
Measured Parameter	Units	Requirement	Value
Horizontal Offset	mm	+/- 50	0
Vertical Offset	mm	+/-20	3 up

DATA SHEET NO. 11

VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2011 Scion tC 3-Dr Liftback
 Test Program: NCAP Side MDB Impact Test

NHTSA No. YB5102
 Test Date: 2/23/2011



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

LEFT SIDE VIEW

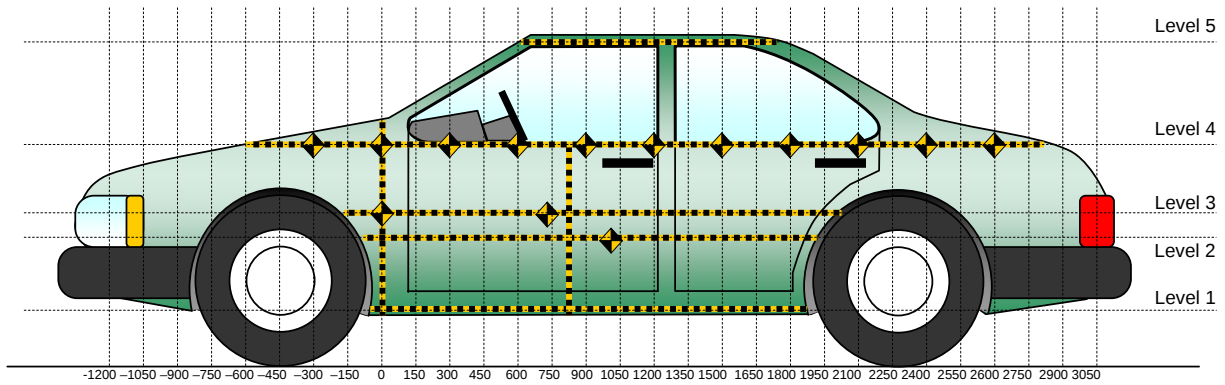
VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2700	2697	3
B	Front Axle to FSOV	910	908	2
C	Rear Axle to RSOV	810	814	-4
D	Total Length at Centerline	4420	4419	1
E	Front Bumper Thickness	120	120	0
F	Front Bumper Bottom to Ground	213	225	-12
G	Sill Height at Front Wheel Well	183	187	-4
H	Sill Height at Front Door Leading Edge	181	190	-9
I	Sill Height at B Pillar	189	195	-6
J1	Sill Height at Rear Wheel Well	163	173	-10
J2	Pinch Weld Height at Rear Wheel Well	183	190	-7
K	Sill Height Aft of Rear Wheel Well	224	212	12
L	Rear Bumper Thickness	120	120	0
M	Rear Bumper Bottom to Ground	305	321	-16
N	Sill Height to Window Bottom Sill	697	645	52
O	Front Door Leading Edge to Impact CL	790	770	20
P	Rear Door Trailing Edge to Impact CL	545	545	0
Q	Front Window Opening	362	365	-3
R	Right Side Length	3520	3529	-9
S	Left Side Length	3520	3489	31
T	Vehicle Width at B Post	1730	1590	140

DATA SHEET NO. 12
VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2011 Scion tC 3-Dr Liftback
Test Program: NCAP Side MDB Impact Test

NHTSA No. YB5102
Test Date: 2/23/2011



All Measurements Shown in mm

LEFT SIDE VIEW

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

Level	Measurement Description	Height Above Ground (mm)
1	Sill Top	200
2	Mid Door	475
3	Occupant H-Point	625
4	Window Sill	930
5	Window Top	1320

DATA SHEET NO. 12 (CONTINUED)
VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2011 Scion tC 3-Dr Liftback
 Test Program: NCAP Side MDB Impact Test

NHTSA No. YB5102
 Test Date: 2/23/2011

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-450				325					349					24	
-300				316					348					32	
-150			200	306				232	345				32	39	
0	245	213	216	296		267	255	272	336		22	42	56	40	
150	246	229	220	287		264	425	400	330		18	196	180	43	
300	246	232	221	284		260	461	419	369		14	229	198	85	
450	250	233	221	280		261	467	428	388		11	234	207	108	
600	250	233	222	276	494	261	466	430	376	511	11	233	208	100	17
750	255	234	223	273	483	263	460	431	374	510	8	226	208	101	27
900	256	235	224	269	477	262	450	426	379	506	6	215	202	110	29
1050	260	236	225	268	473	262	450	425	395	504	2	214	200	127	31
1200	260	236	227	267	473	263	455	420	395	506	3	219	193	128	33
1350	262	237	229	266	472	260	456	415	380	507	-2	219	186	114	35
1500	264	241	233	266	472	259	435	465	422	505	-5	194	232	156	33
1650	263	242	235	271	475	255	426	453	410	495	-8	184	218	139	20
1800	260	230	229	276	483	249	415	460	409	498	-11	185	231	133	15
1950		211	209	277	504		300	392	385	511		89	183	108	7
2100				274					322					48	
2250				277					308					31	
2400				283					306					23	
2550				295					309					14	
2700				323					322					-1	

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

MAXIMUM CRUSH DATA

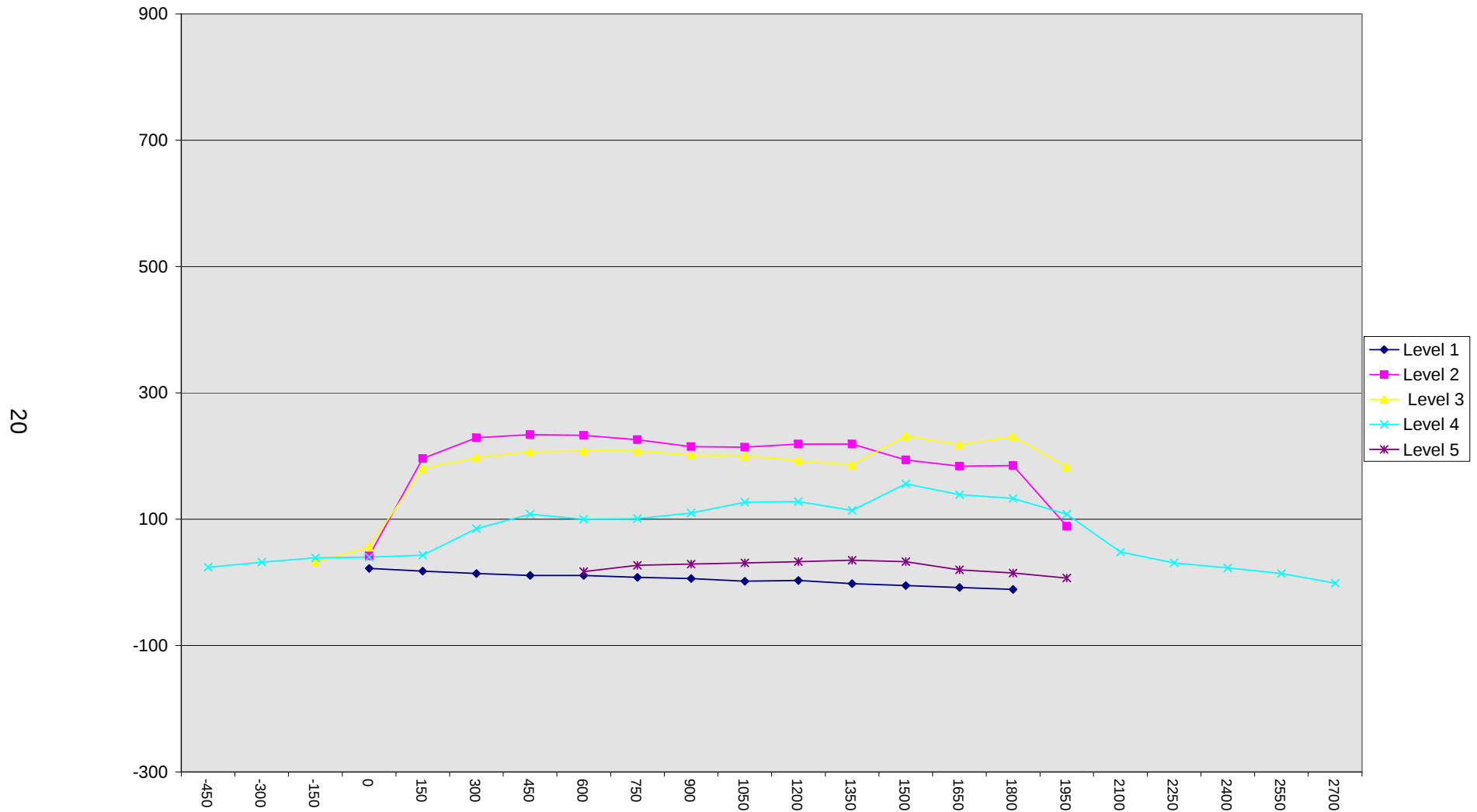
	Level 1	Level 2	Level 3	Level 4	Level 5
Maximum Crush (mm)	22	234	232	156	35
Distance From Impact (mm)	0	450	1500	1500	1350

DATA SHEET NO. 12 (continued)

VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2011 Scion tC 3-Dr Liftback
Test Program: NCAP Side MDB Impact Test

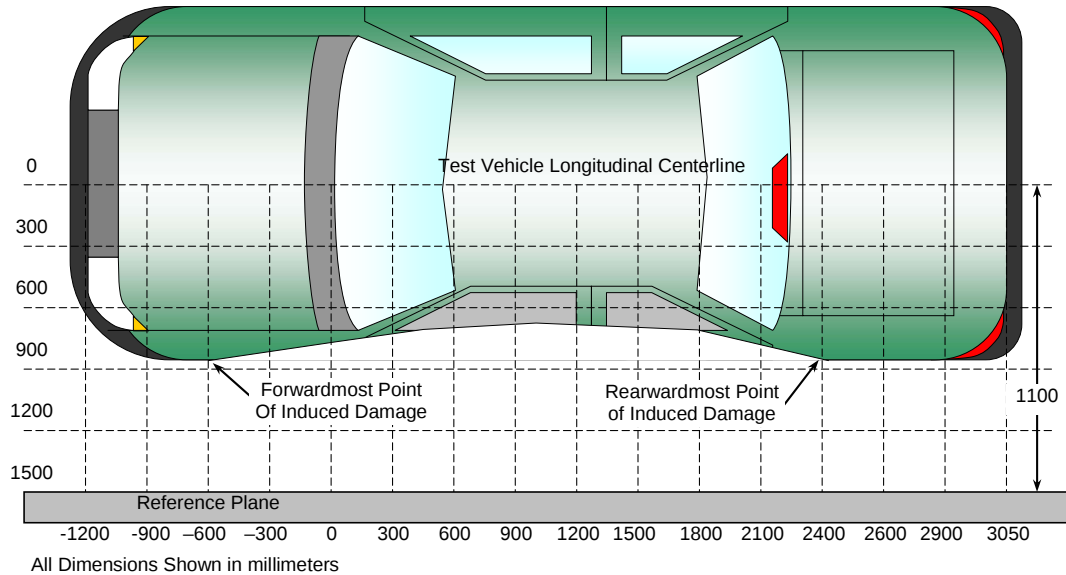
NHTSA No. YB5102
Test Date: 2/23/2011



DATA SHEET NO. 13
VEHICLE DAMAGE PROFILE DISTANCES

Test Vehicle: 2011 Scion tC 3-Dr Liftback
 Test Program: NCAP Side MDB Impact Test

NHTSA No. YB5102
 Test Date: 2/23/2011



TOP VIEW

DAMAGE PROFILE DISTANCES

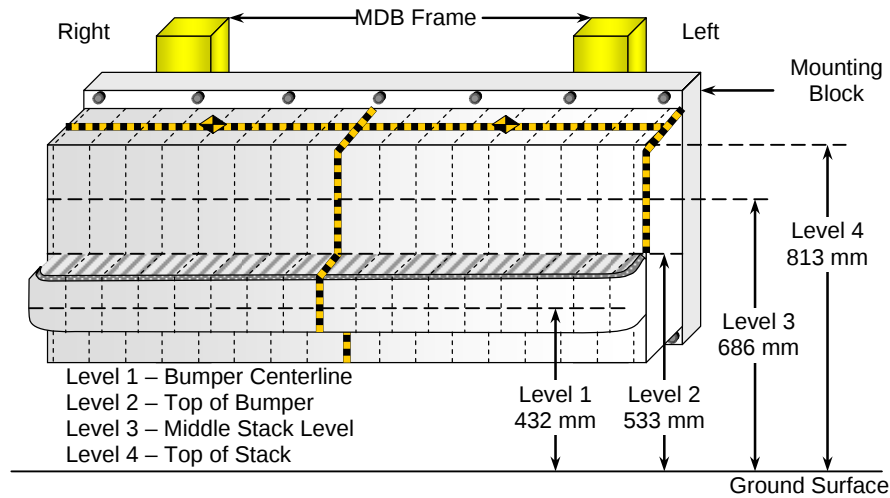
DPD	Distance from Impact Point (mm)	Level	Pre-Test (mm)	Post-Test (mm)	Max. Static Crush (mm)
1	2700	4	323	322	-1
2	2075	4	275	335	60
3	1415	2	238	466	228
4	780	2	234	474	240
5	140	2	226	456	230
6	-450	4	325	349	24

DATA SHEET NO. 14

EXTERIOR STATIC CRUSH FOR IMPACTOR FACE

Test Vehicle: 2011 Scion tC 3-Dr Liftback
 Test Program: NCAP Side MDB Impact Test

NHTSA No. YB5102
 Test Date: 2/23/2011



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		100	200	300	400	500	600	700	800
4	86	64	58	59	106	118	76	44	48	55	63	67	70	73	87	119	169
3	60	39	41	60	93	85	53	34	27	22	19	21	25	37	50	69	113
2	100	88	80	82	92	91	80	76	71	71	72	68	67	69	73	78	86
1	206	202	202	207	201	190	184	179	169	159	150	145	139	134	134	147	162

DATA SHEET NO. 15

FMVSS 301 FUEL SYSTEM INTEGRITY POST-IMPACT DATA

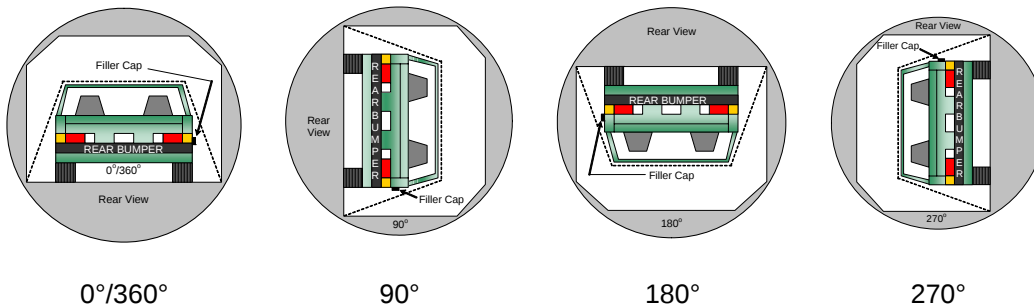
Test Vehicle: 2011 Scion tC 3-Dr Liftback
 Test Program: NCAP Side MDB Impact Test

NHTSA No. YB5102
 Test Date: 2/23/2011

Test Time: 11:00 am Temperature: 21° C

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

FMVSS 301 STATIC ROLLOVER DATA



ROLLOVER SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	111	300	411
90° to 180°	109	300	409
180° to 270°	105	300	405
270° to 360°	114	300	414

FMVSS 301 ROLLOVER SPILLAGE TABLE (units in ounces)

Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eight Minute
0° to 90°	0	0	0	0
90° to 180°	0	0	0	0
180° to 270°	0	0	0	0
270° to 360°	0	0	0	0

ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

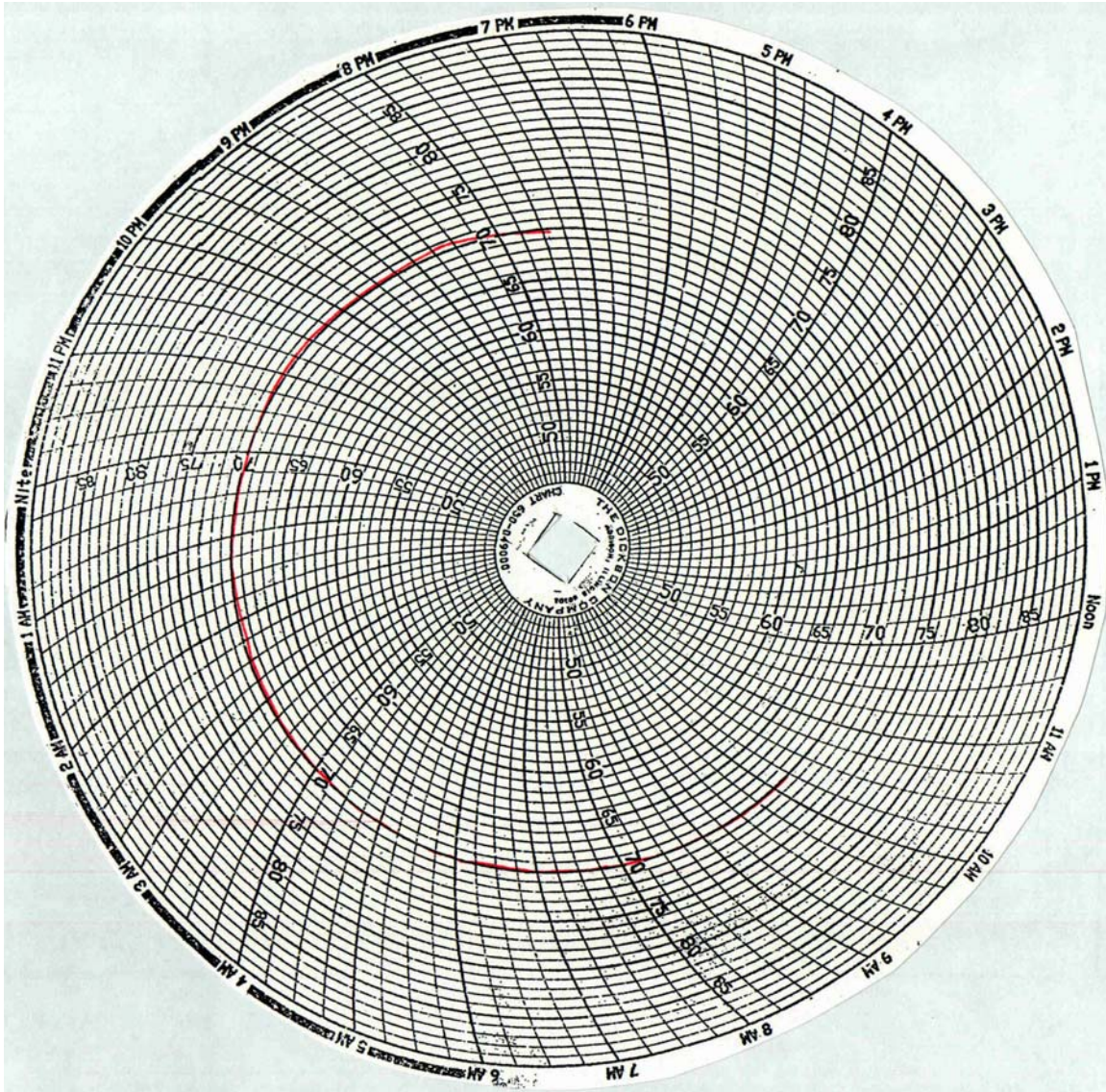
Test Phase	Spillage Location
0° to 90°	
90° to 180°	
180° to 270°	
270° to 360°	

DATA SHEET NO. 16

DUMMY/VEHICLE TEMPERATURE STABILIZATION DATA

Test Vehicle: 2011 Scion tC 3-Dr Liftback
Test Program: NCAP Side MDB Impact Test

NHTSA No. YB5102
Test Date: 2/23/2011



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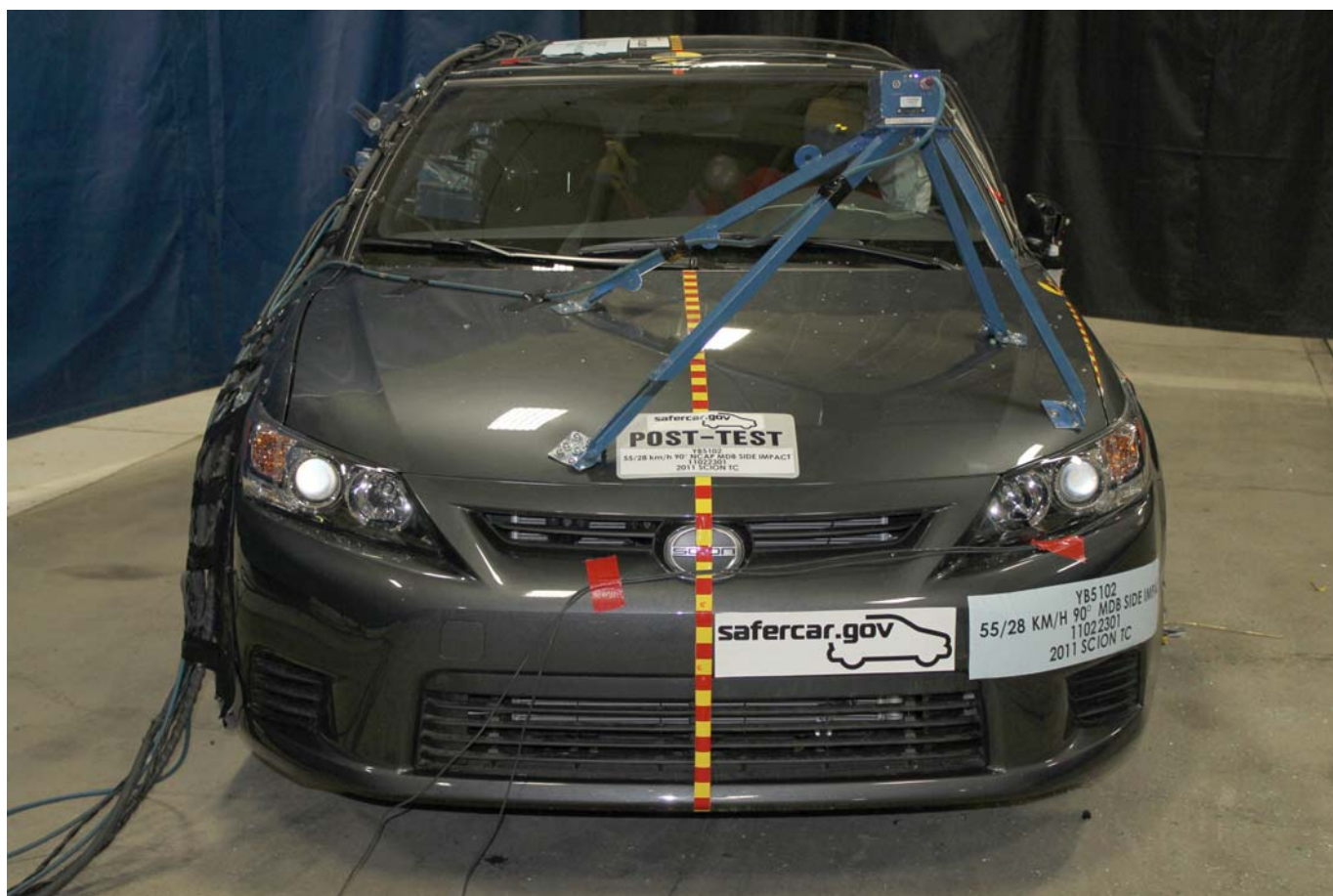
As Delivered Right Front Three-Quarter View of Test Vehicle



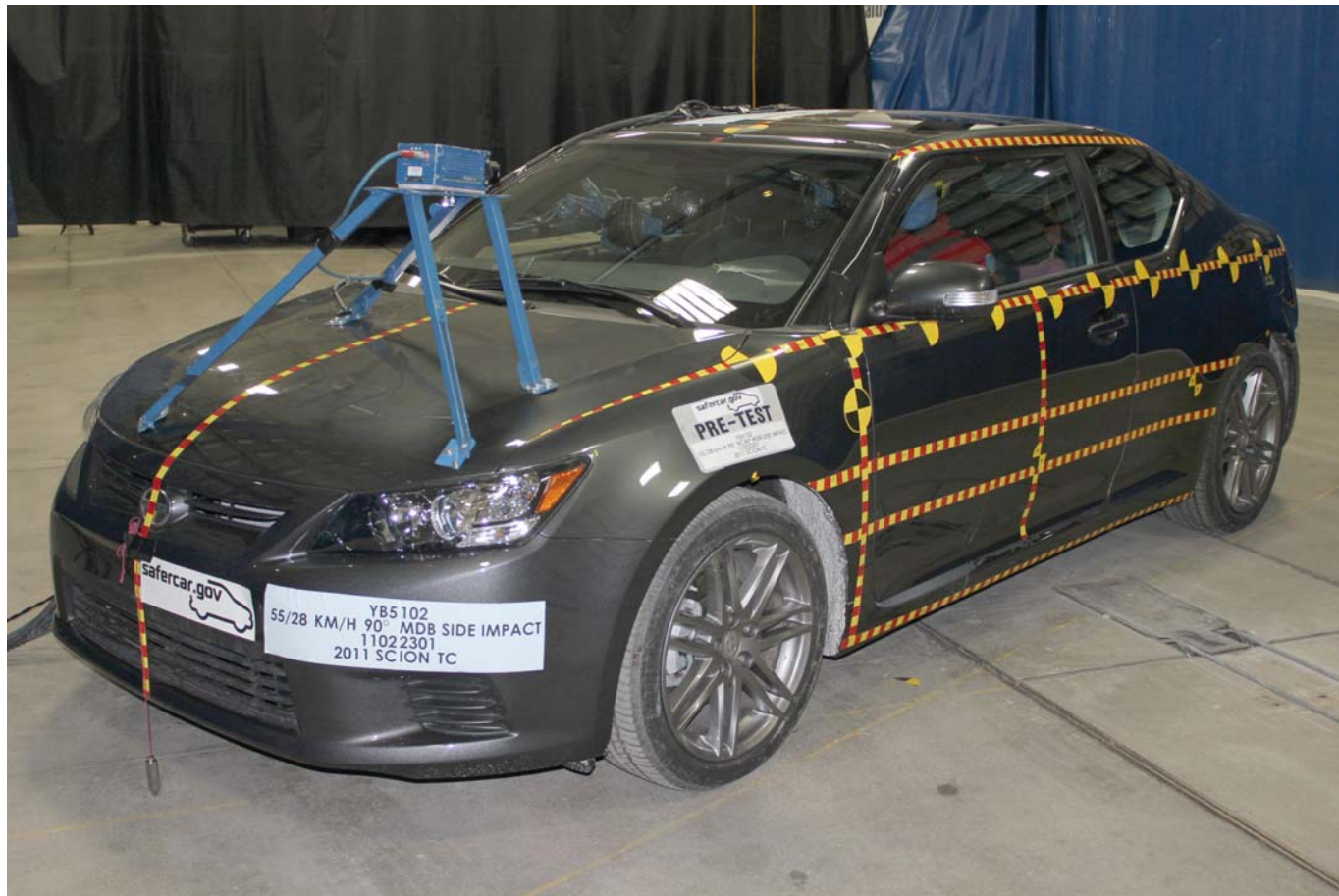
As Delivered Left Rear Three-Quarter View of Test Vehicle



Pre-Test Frontal View of Test Vehicle



Post-Test Frontal View of Test Vehicle



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



Post-Test Left Three-Quarter Front 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



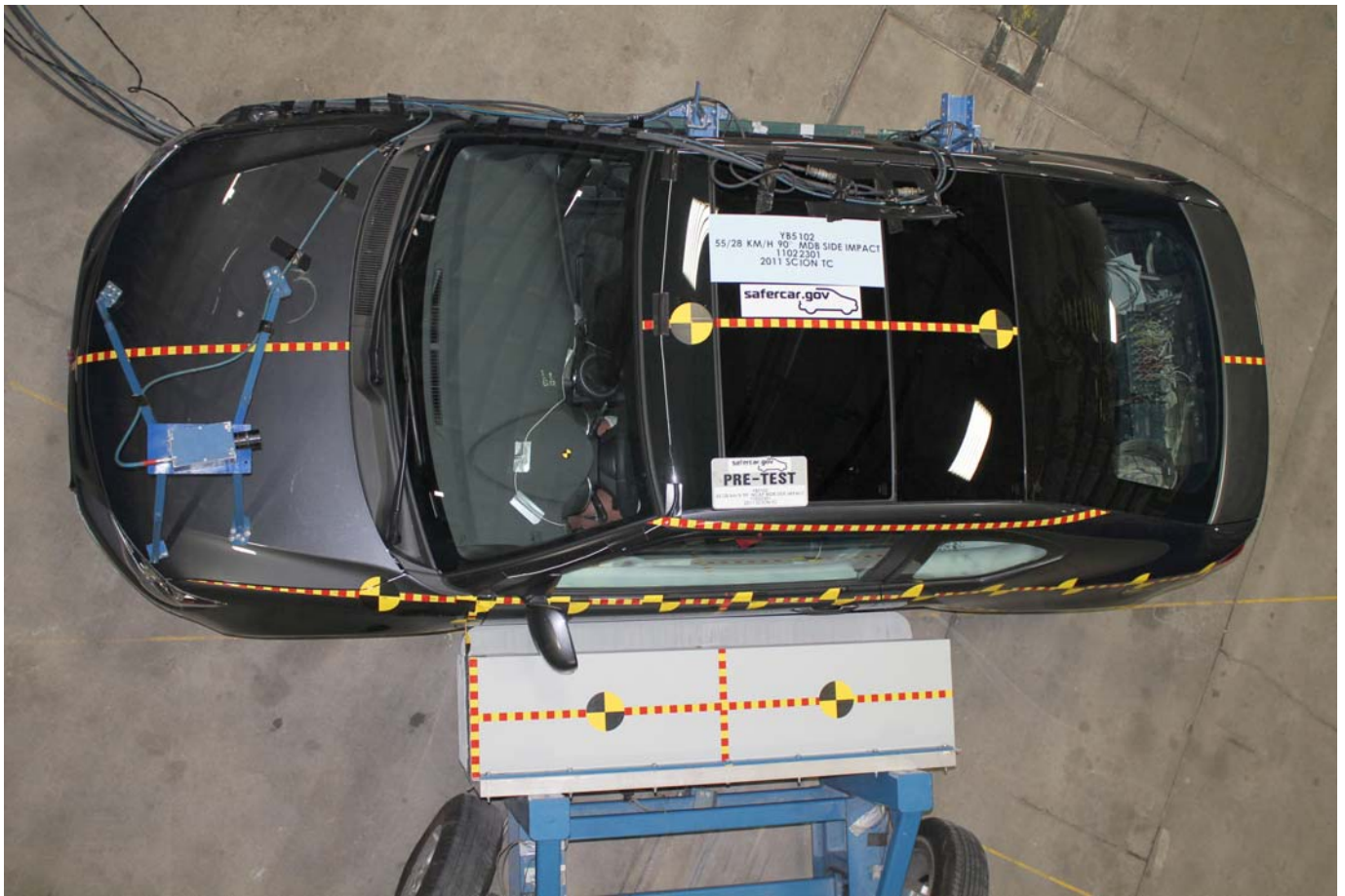
Post-Test Rear View of Test Vehicle



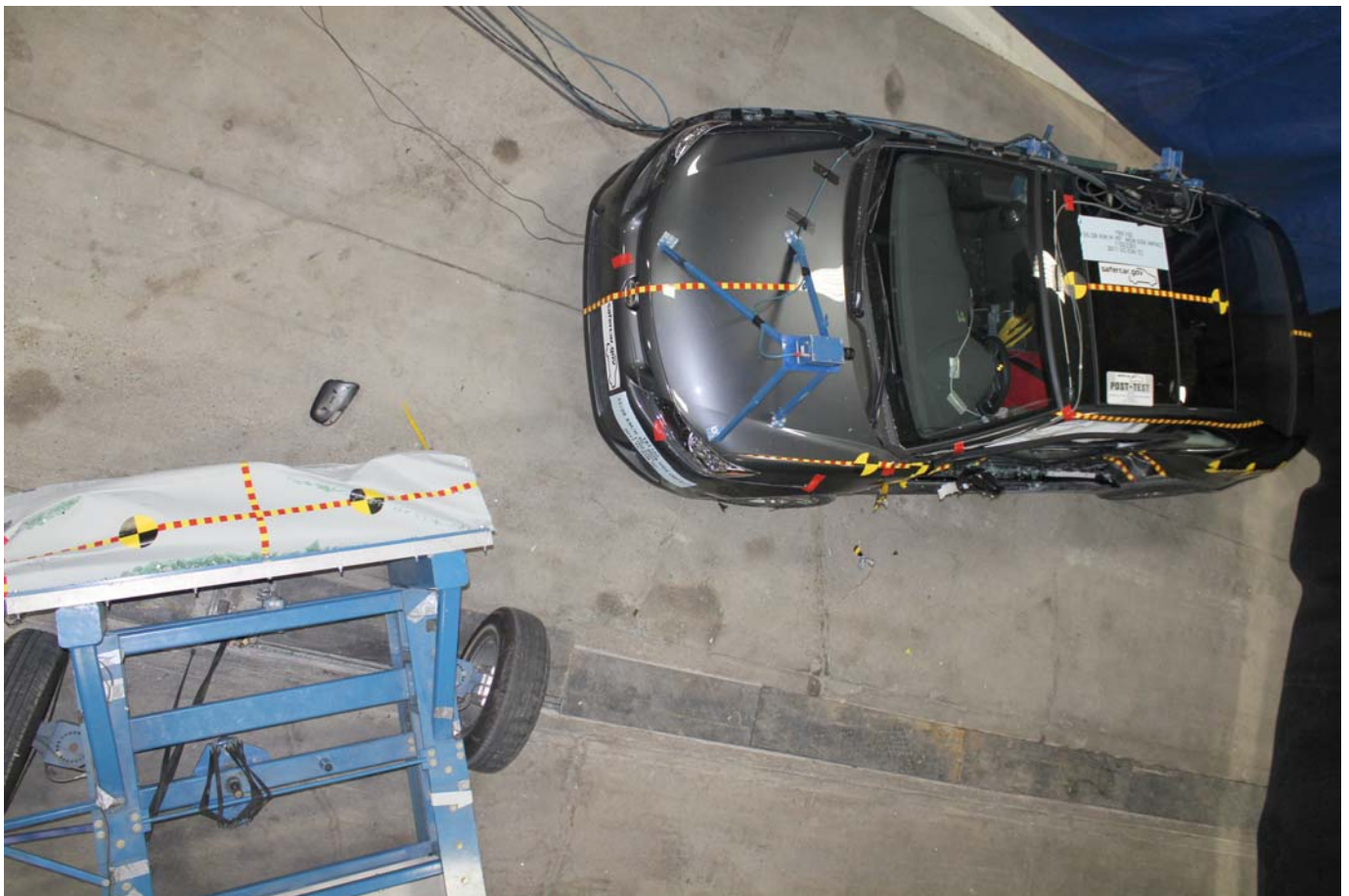
Pre-Test Right Side View of Test Vehicle



Post-Test Right Side View of Test Vehicle



Pre-Test Overhead View of Test Vehicle with MDB Positioned Against Side of Test Vehicle



Post-Test Overhead View of Test Vehicle and MDB



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

PHOTOGRAPH NOT APPLICABLE

Pre-Test Left Rear Door Latch Close-Up

PHOTOGRAPH NOT APPLICABLE

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, Chalking, and Contact Switches



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



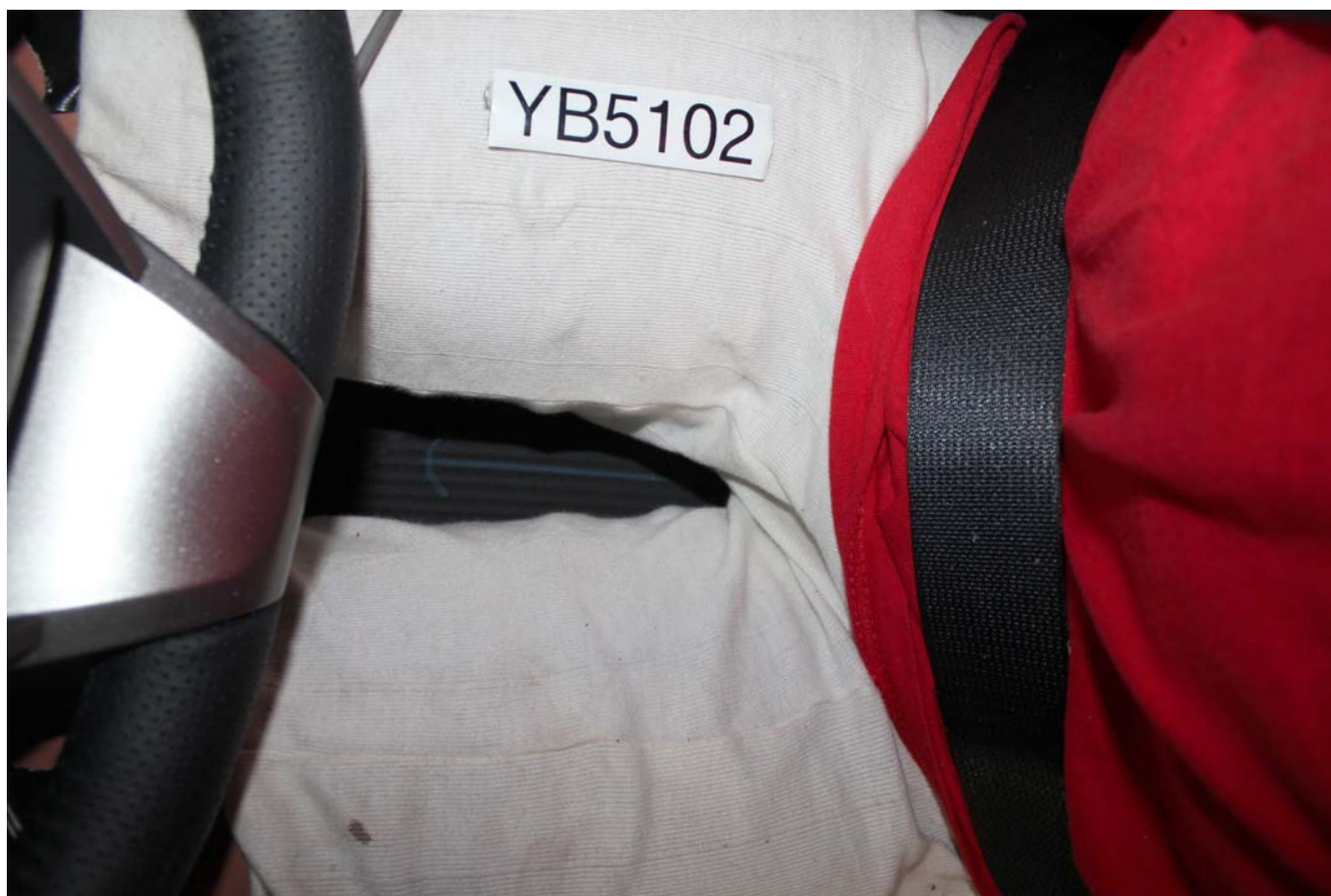
Pre-Test Frontal View of Driver Seat Back Prior to Dummy Positioning



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 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 Front Seat of Occupant Compartment



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



Pre-Test Driver Inner Door Panel View



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



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



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

PHOTOGRAPH NOT APPLICABLE

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

PHOTOGRAPH NOT APPLICABLE

Pre-Test Left Side View of Passenger Dummy Showing Belt, Chalking, and Contact Switches



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

PHOTOGRAPH NOT APPLICABLE

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

PHOTOGRAPH NOT APPLICABLE

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 Seat and Rear Seat Occupant Compartment



Pre-Test Passenger Inner Door Panel View



Post-Test Rear Passenger Inner Door Panel View Showing Dummy Contact Locations



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



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

3 E 21200
VOIR LE MANUEL
DE L'USAGER
POUR PLUS DE
ENSEIGNEMENTS.

MFD. BY: TOYOTA MOTOR CORPORATION 09/10
GVWR 4150LB GAWR FR 2535LB RR 2095LB
THIS VEHICLE CONFORMS TO ALL APPLICABLE
FEDERAL MOTOR VEHICLE SAFETY, BUMPER, AND
THEFT PREVENTION STANDARDS IN EFFECT ON
THE DATE OF MANUFACTURE SHOWN ABOVE.
JTKJF5C78B3007233 PASS. CAR



C/TR: 1G3/FA10 AGT20L-ALFGKA 926 A
A/TM: -02A/EB60 MADE IN JAPAN

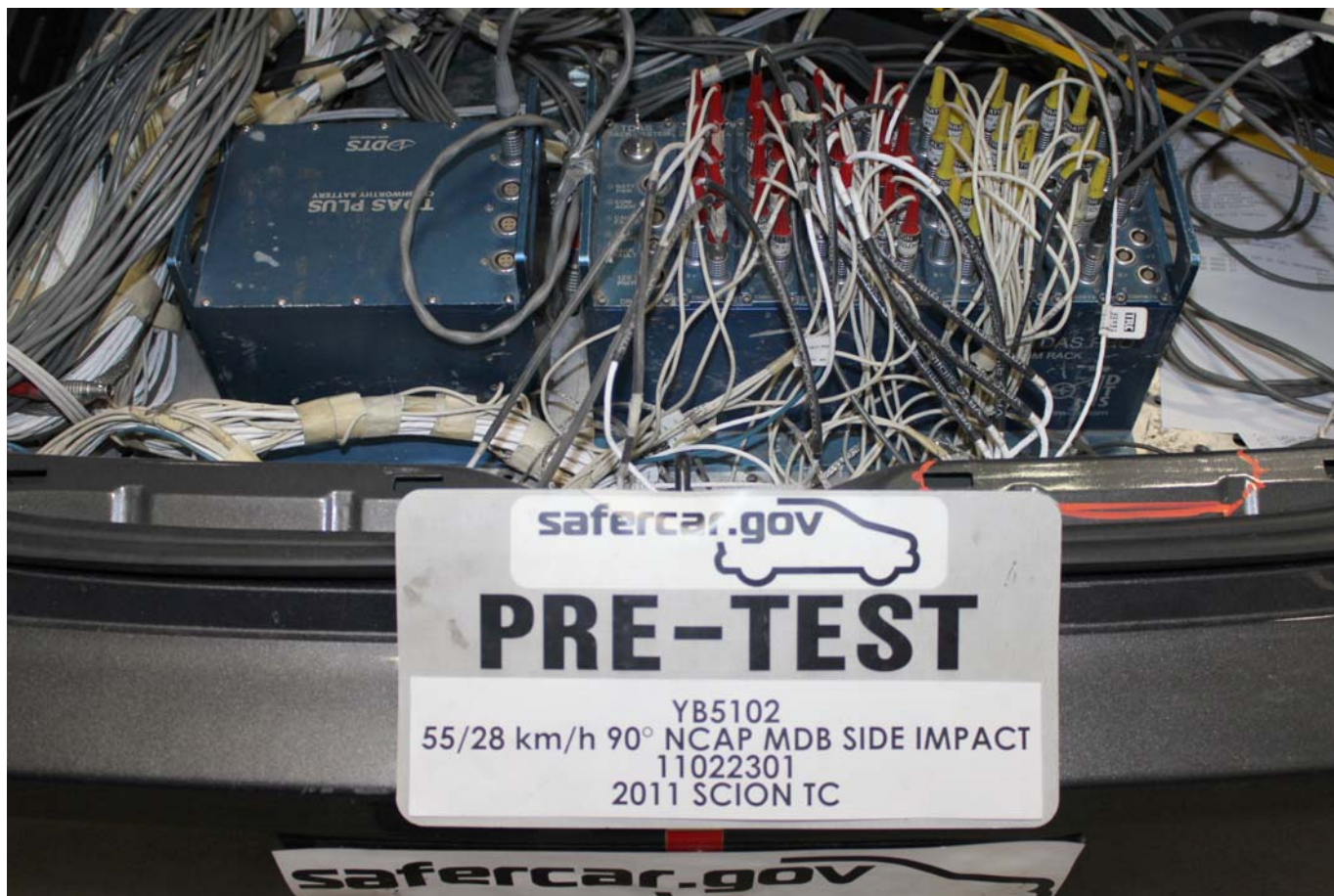
Close-Up View of Vehicle's Certification Label



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



Vehicle's Load Carrying Capacity Reduced Label



Pre-Test Ballast View



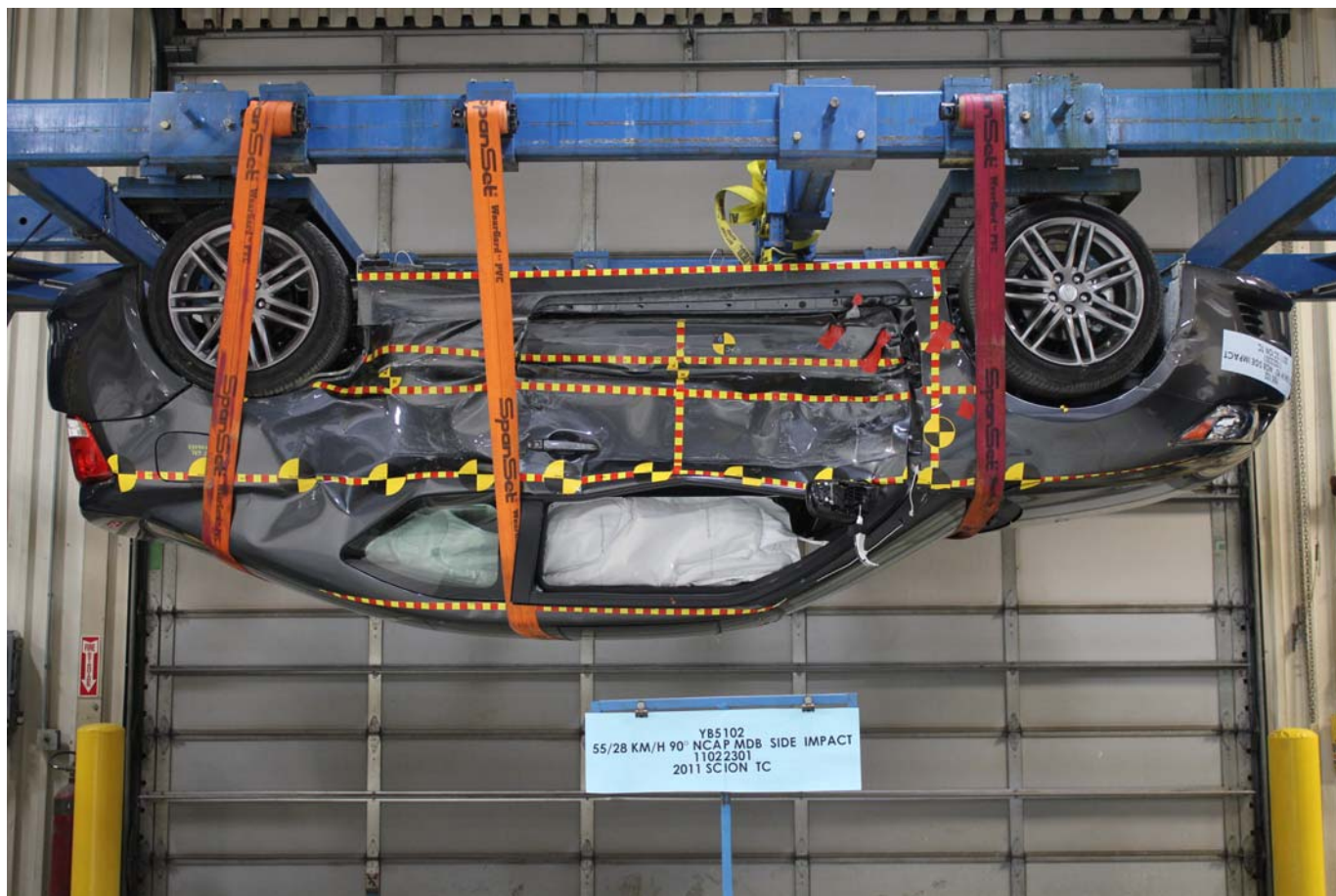
Post-Test Primary and Redundant Speed Trap Read-Out



FMVSS No. 301/305 Rollover 0 Degrees



FMVSS No. 301/305 Rollover 90 Degrees



FMVSS No. 301/305 Rollover 180 Degrees



FMVSS No. 301/305 Rollover 270 Degrees



FMVSS No. 301/305 Rollover 360 Degrees



Impact Event



*Scion is a marque of
Toyota Motor Sales, U.S.A., Inc.

DESC: **SCION tC**
JTKJF5C79B3007233
3 DOOR LIFTBACK

VIN: 2011/6223A
YR/MDL: 2011/6223A
CLR: MAGNETIC GRAY MET./FA10 (01C3110)
PORT/PLANT: Portland, OR RAILHEAD:

GOVERNMENT SAFETY RATINGS

Frontal Crash Driver **Not Rated**
Passenger **Not Rated**
Star ratings based on the risk of injury in a frontal impact. Frontal ratings should ONLY be compared to other vehicles of similar size and weight.

Side Crash Front seat **Not Rated**
Rear seat **Not Rated**
Star ratings based on the risk of injury in a side impact.

Rollover **Not Rated**
Star ratings based on the risk of rollover in a single vehicle crash.

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

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

EPA Fuel Economy Estimates

CITY MPG

23

Expected range
for most drivers
18 to 27 MPG

HIGHWAY MPG

31

Expected range
for most drivers
25 to 37 MPG

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



26
All Compacts

Estimated
Annual Fuel Cost
\$1,732
based on 15,000 miles
at \$3.00 per gallon

Combined Fuel Economy
This Vehicle
26



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

MANUFACTURER'S SUGGESTED RETAIL PRICE **\$18,275.00**
OPTIONAL EQUIPMENT
FE 50 State Emissions

- STANDARD EQUIPMENT**
- 2.5L 4-Cyl DOHC 16V Dual VVT-i 180HP
 - 6-Speed Manual Transmission
 - Electric Power Steering (EPS)
 - 16" Alloy Wheels w/ 5-Spoke Design
 - Ind MacPherson Strut Front Suspension
 - Double Wishbone Rear Suspension
 - 16" Alloy P225/45R18
 - Star Safety System: Vehicle Stability Control (VSC), Traction Control (TRAC), Anti-lock Brake System (ABS) with Electronic Brake Force Distribution (EBD) & Brake Assist
 - Smart Stop Technology
 - Dr and Fr Pass Advanced Airbag System
 - Dr and Fr Side Impact Side Airbags
 - Dr and Fr Side Curtain Airbags
 - Dr and Fr Side Active Headrests
 - Dr and Fr Side Head-Curtain Side-Impact Protection System for Children
 - Tire Pressure Monitoring System
 - First Aid Kit
 - EXTERIOR
 - Chrome Glass Moonroof w/Power Tilt/Slide
 - Chrome Power Outside Mirror w/LED Turn Signal Indicators
 - Projector-Beam Headlamps
 - Front Fog Lamps
 - Wipers w/Variable Intermittent Wipers
 - COMFORT AND CONVENIENCE
 - Sport Front Bucket Seats
 - Power Windows w/ Dr Side Auto Down
 - Power Door Locks
 - Remote Keyless Entry w/ Engine Immobilizer
 - Air Conditioning
 - Pioneer 300W AM/FM/CD w/ 8 Speakers, Aux, and USB Port w/ iPod Connectivity
 - Sport Steering Wheel w/ Audio Controls
 - Multi-Information Display
 - Digital Clock
 - 60/40 Split Reclining Fold-Flat R-Seat
 - 12 Speakers w/ 5-Disc In-Dash Stereo
 - **Full Tank of Gas**

*Customers choosing to upgrade additional accessories are paying for the upgrade only and will not receive the standard equipment upon delivery.

DELIVERY PROCESSING AND HANDLING FEE 720.00

TOTAL **\$18,995.00**

The New Vehicle Limited Warranty provides 3 years/50,000 miles basic coverage. 5-year/100,000 miles powertrain coverage, plus 3-year/unlimited mile corrosion perforation coverage. See Owner's Warranty Information book. A dealer for details. Dealer's suggested retail price includes manufacturer's recommended equipment. Gasoline. Illustration of the suggested retail price includes manufacturer's recommended equipment. Dealer's suggested retail price and accessories are not included in the manufacturer's suggested retail price.

Dealer Name / Address
JACK SAFRO SCION
20445 WEST CAPITOL DRIVE
BROOKFIELD WIS53045

Ship to:

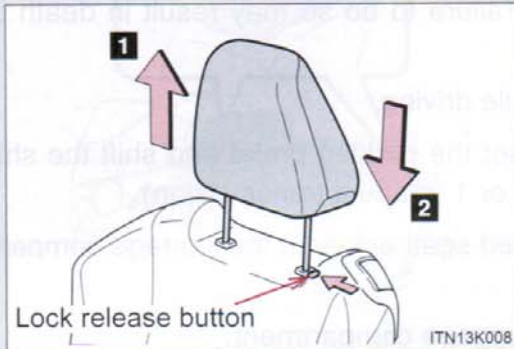


1-3. Adjustable components (seats, mirrors, steering wheel)

Head restraints

Head restraints are provided for all seats.

Front seats



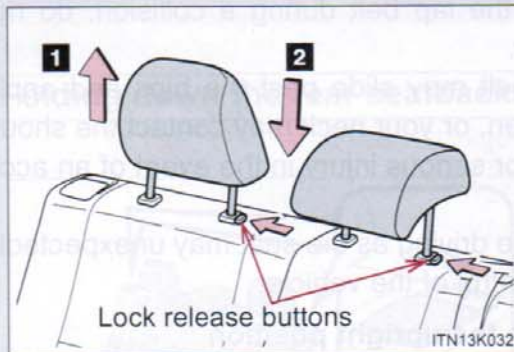
1 Up

Pull the head restraints up.

2 Down

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

Rear seats



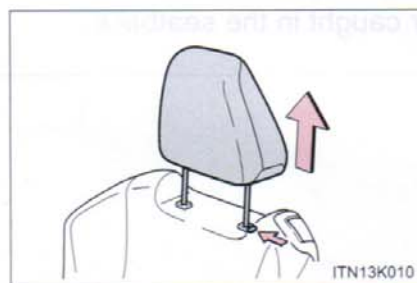
1 Up

Pull the head restraints up.

2 Down

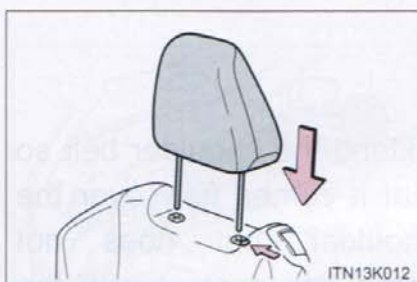
Push the head restraint down while pressing the lock release button.

■ Removing the head restraints



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

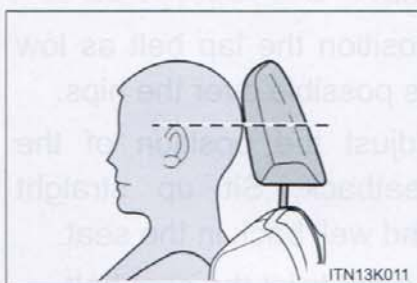
■ Installing the head restraints



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

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

■ Adjusting the height of the head restraints



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

■ Adjusting the rear center seat head restraint

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

⚠ CAUTION

■ Head restraint precautions

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

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

APPENDIX B
DUMMY RESPONSE DATA

TABLE OF DATA PLOTS
Driver & Passenger Dummy Instrumentation Plots
FILTERED DATA

<u>No.</u>	<u>Description</u>	<u>Page No.</u>
Figure No. 1.	Driver Head Acceleration (X) Primary vs. Time	B-1
Figure No. 2.	Driver Head Acceleration (Y) Primary vs. Time	B-1
Figure No. 3.	Driver Head Acceleration (Z) Primary vs. Time	B-1
Figure No. 4.	Driver Head Resultant Acceleration Primary vs. Time	B-1
Figure No. 5.	Driver Upper Thorax Rib Deflection (Y) vs. Time	B-2
Figure No. 6.	Driver Middle Thorax Rib Deflection (Y) vs. Time	B-2
Figure No. 7.	Driver Lower Thorax Rib Deflection (Y) vs. Time	B-2
Figure No. 8.	Driver Thorax Rib Deflection Maximum vs. Time	B-2
Figure No. 9.	Driver Anterior Abdomen Force (Y) vs. Time	B-3
Figure No. 10.	Driver Middle Abdomen Force (Y) vs. Time	B-3
Figure No. 11.	Driver Posterior Abdomen Force (Y) vs. Time	B-3
Figure No. 12.	Driver Total Abdominal Force (Y) vs. Time	B-3
Figure No. 13.	Driver Pubic Symphysis Force (Y) vs. Time	B-4
Figure No. 14.	Passenger Head Acceleration (X) Primary vs. Time	B-5
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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
Figure No. 22.	Passenger Iliac Force on Impact Side (Y) vs. Time	B-7
Figure No. 23.	Passenger Acetabulum Force on Impact Side (Y) vs. Time	B-7
Figure No. 24.	Passenger Total Pelvic Force on Impact Side (Y) vs. Time	B-7

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

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)
Driver Shoulder Contact Switch
Driver Torso Contact Switch
Driver Pelvis Contact Switch
Passenger Head Acceleration Redundant (X)
Passenger Head Acceleration Redundant (Y)
Passenger Head Acceleration Redundant (Z)
Passenger Shoulder Contact Switch
Passenger Torso Contact Switch
Passenger Pelvis Contact Switch

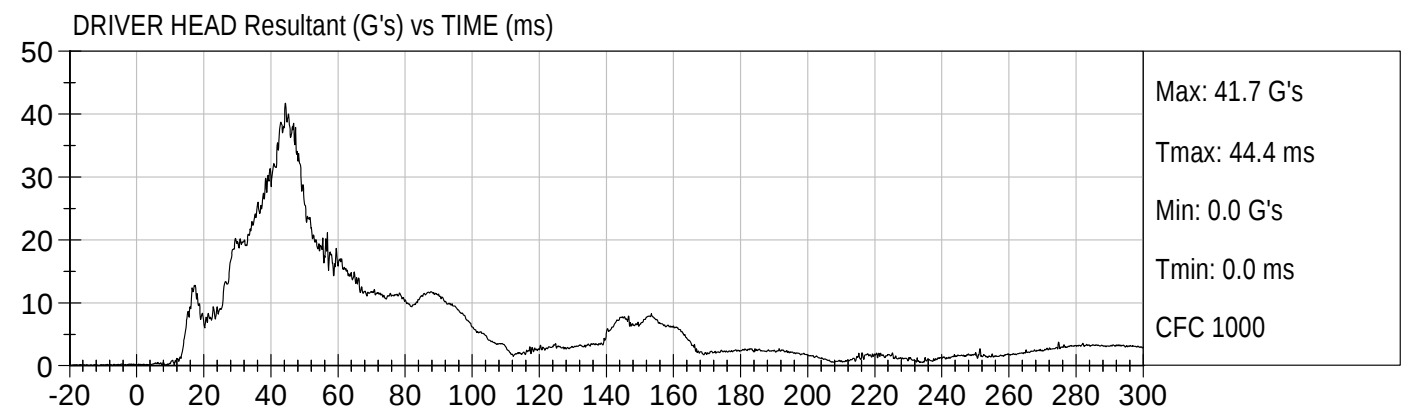
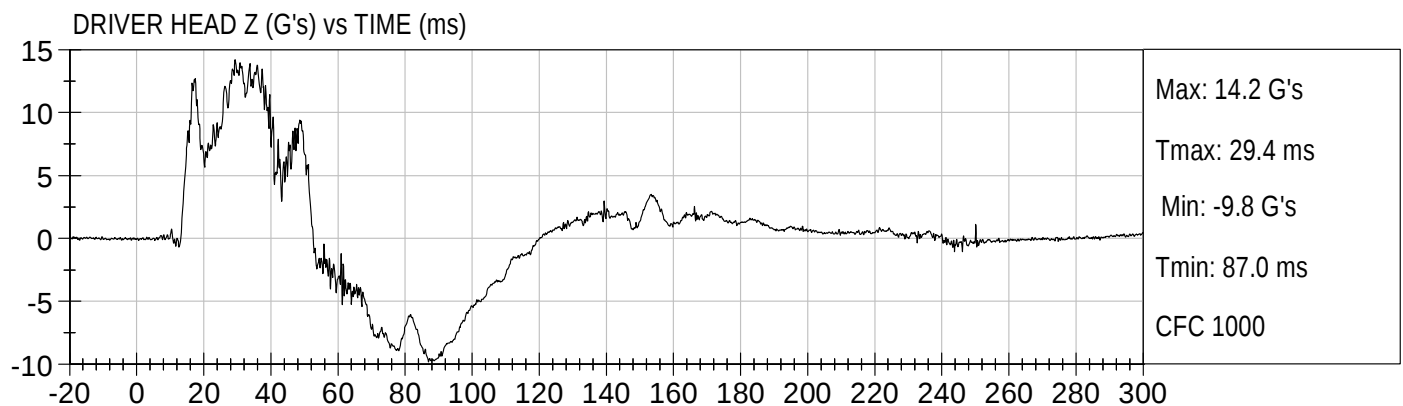
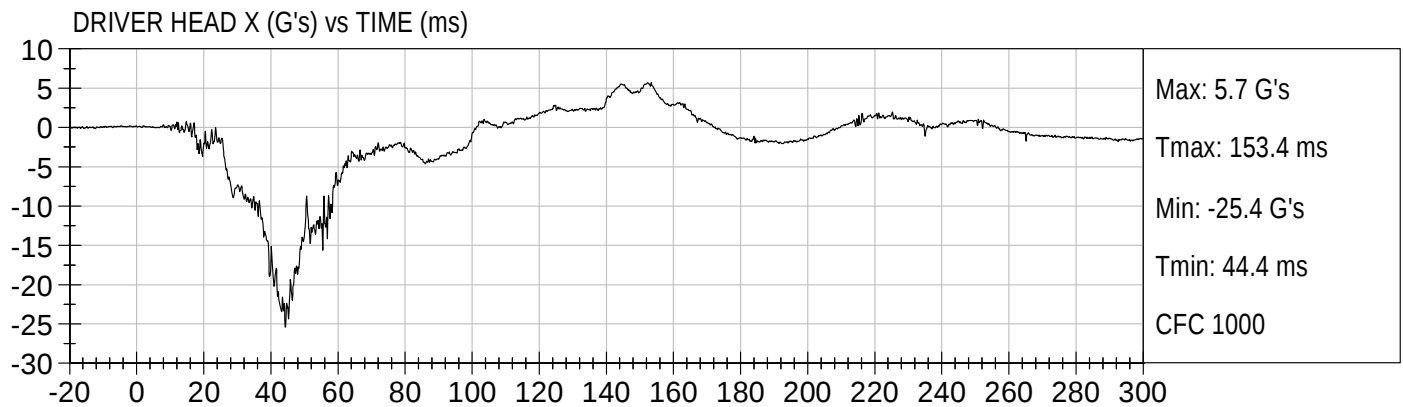
Vehicle Instrumentation Data

Driver Side Airbag Timing
Driver Side Curtain Airbag Timing (not installed)
Passenger Side Airbag Timing (not installed)
Passenger Side Curtain Airbag Timing (not installed)
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)
Rear Floorpan Above Axle Acceleration (X)
Rear Floorpan Above Axle Acceleration (Y)
Rear Floorpan Above Axle Acceleration (Z)
Left Side Sill at Front Seat Acceleration (Y)
Left Side Sill at Rear Seat Acceleration (Y)
Right Rear Occupant Compartment 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)
Vehicle Center of Gravity Acceleration (X)
Vehicle Center of Gravity Acceleration (Y)
Vehicle Center of Gravity Acceleration (Z)

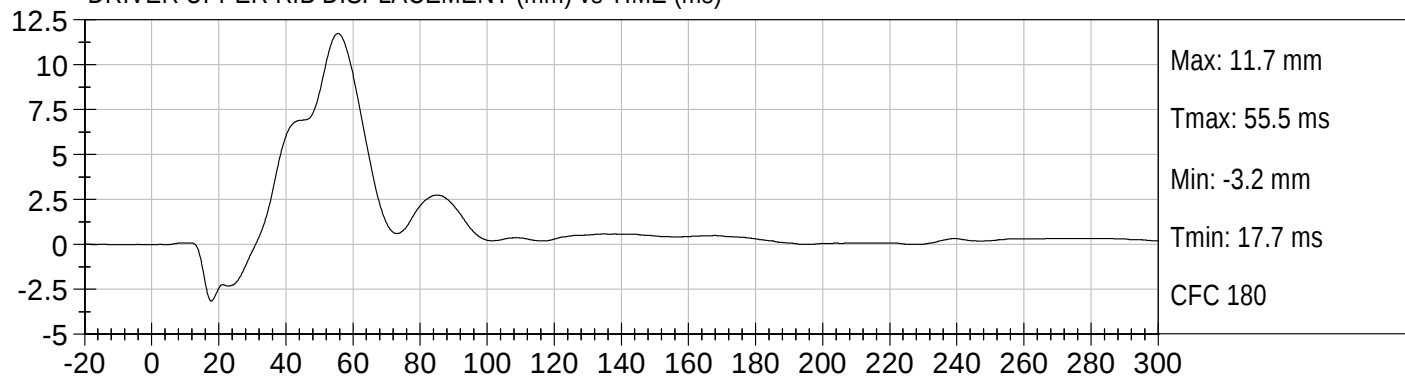
MDB Instrumentation Data

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

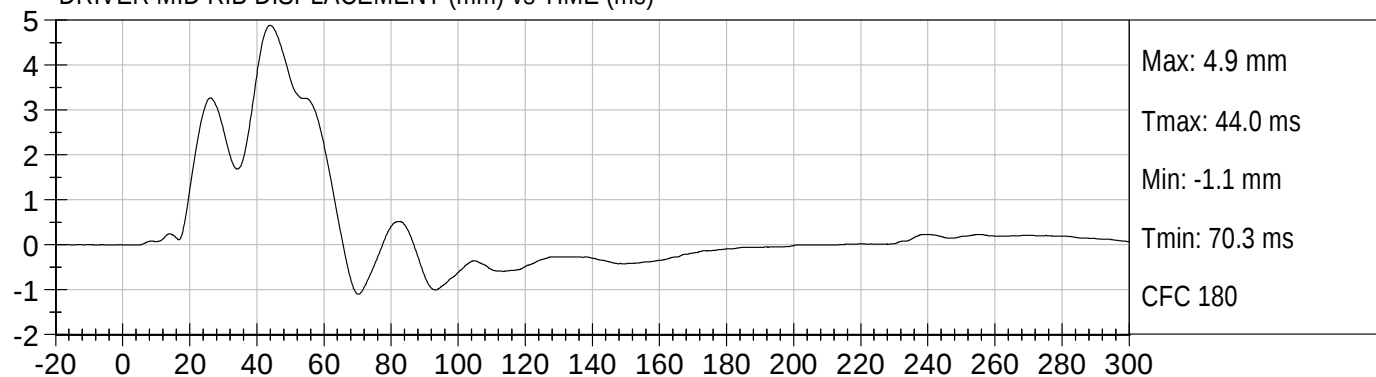




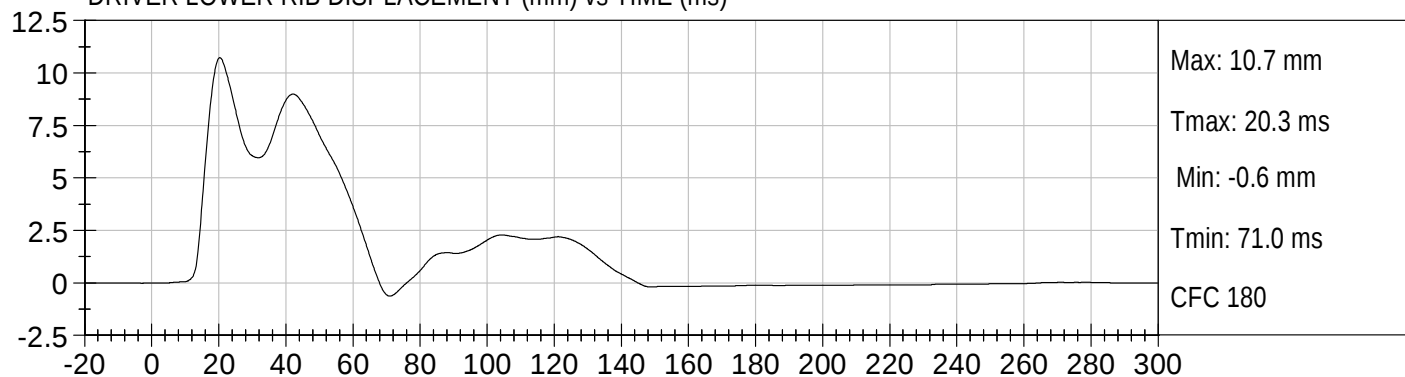
DRIVER UPPER RIB DISPLACEMENT (mm) vs TIME (ms)



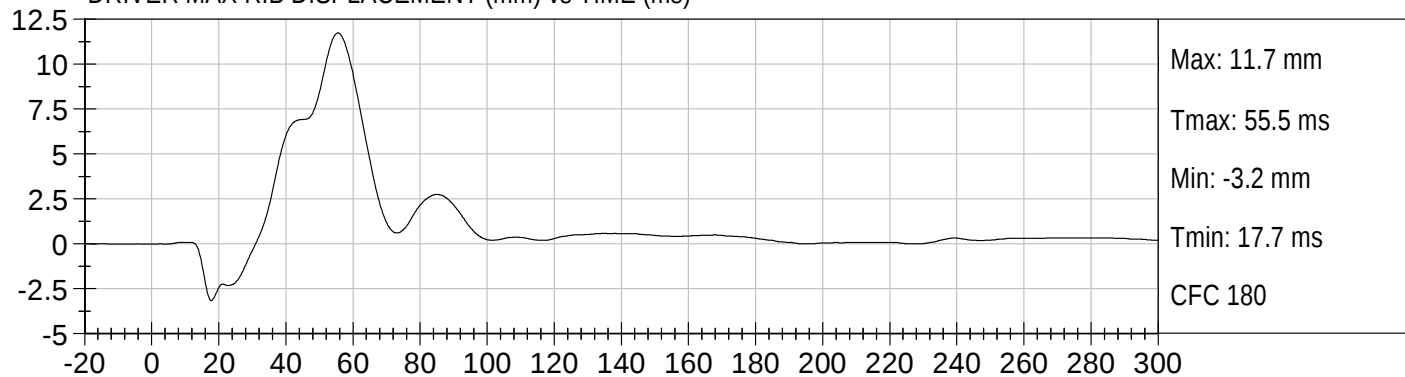
DRIVER MID RIB DISPLACEMENT (mm) vs TIME (ms)



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

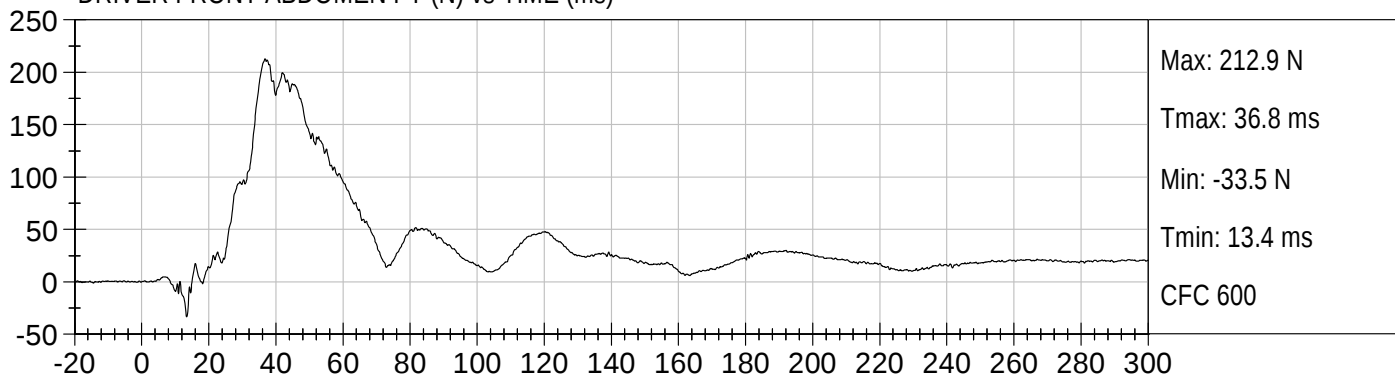


DRIVER MAX RIB DISPLACEMENT (mm) vs TIME (ms)

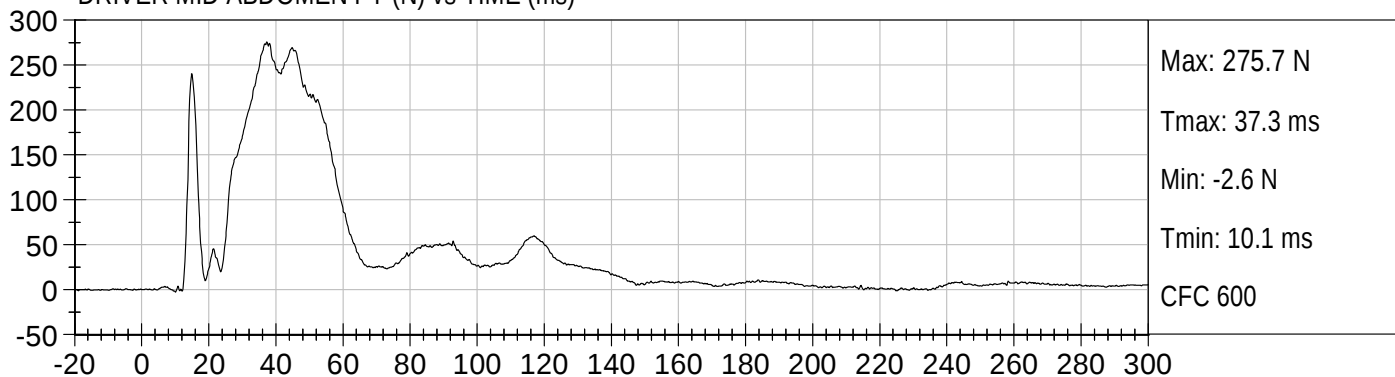




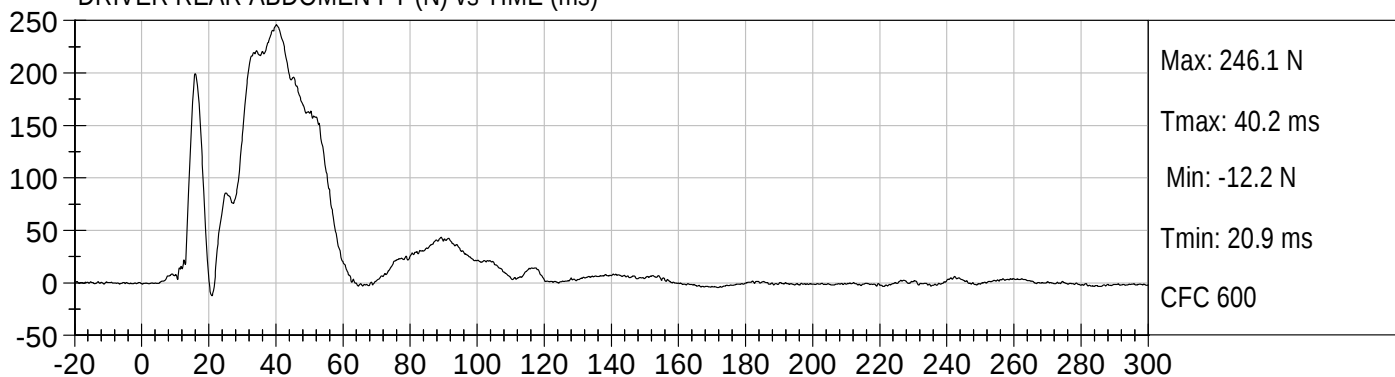
DRIVER FRONT ABDOMEN FY (N) vs TIME (ms)



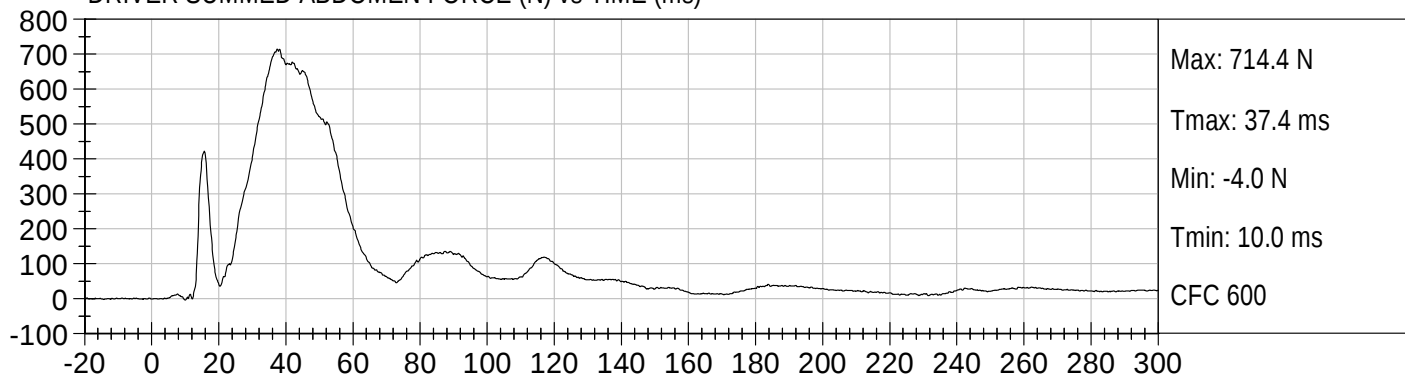
DRIVER MID ABDOMEN FY (N) vs TIME (ms)



DRIVER REAR ABDOMEN FY (N) vs TIME (ms)



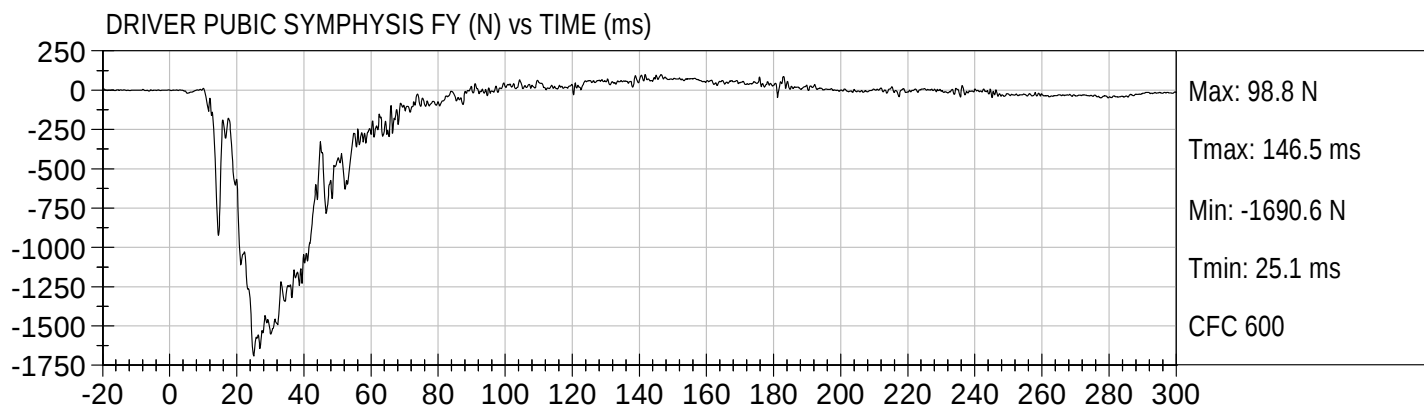
DRIVER SUMMED ABDOMEN FORCE (N) vs TIME (ms)

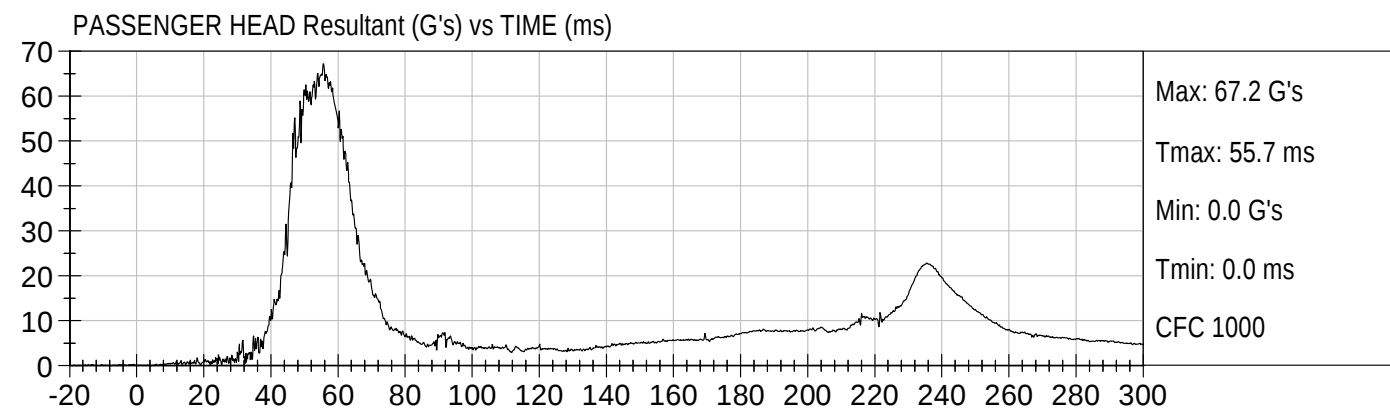
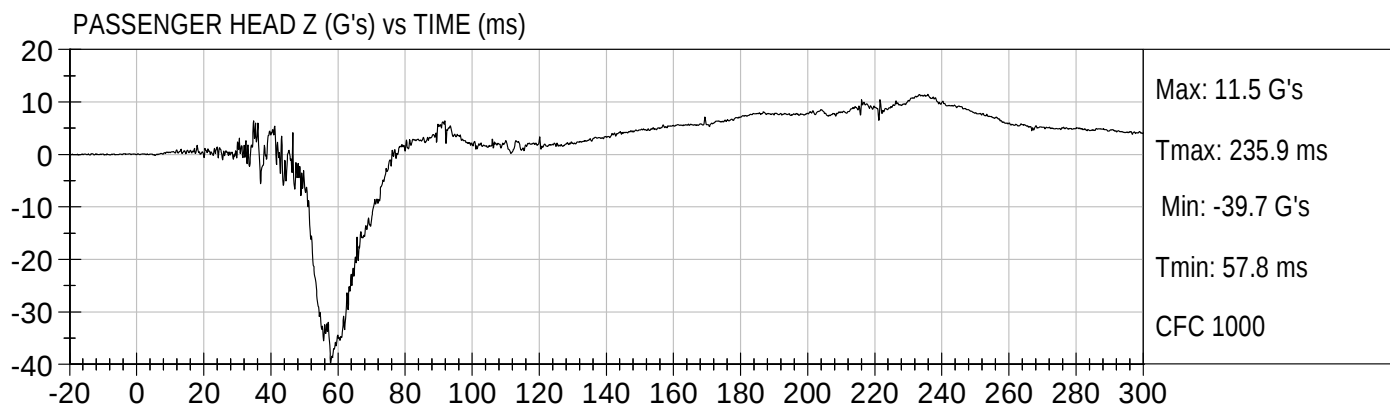
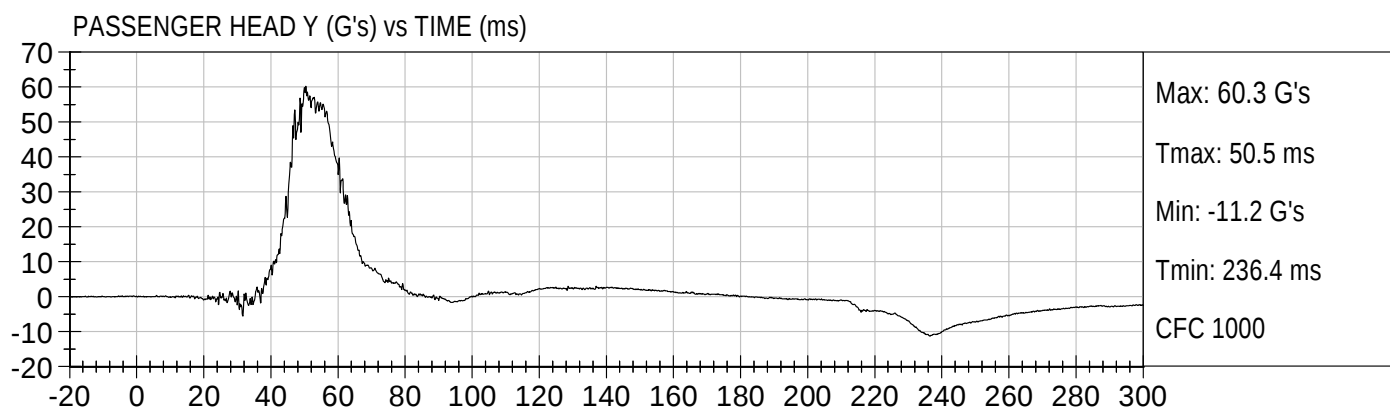
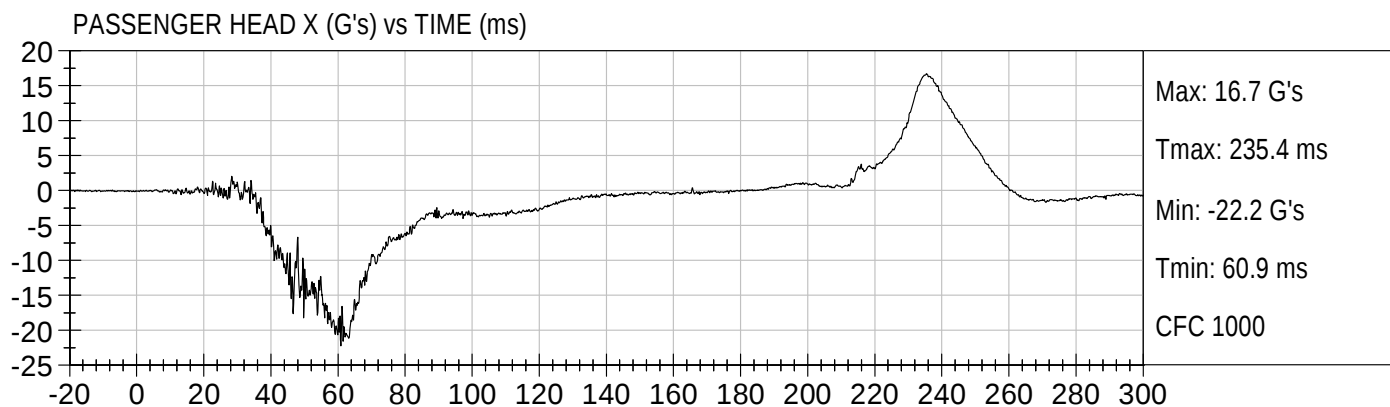


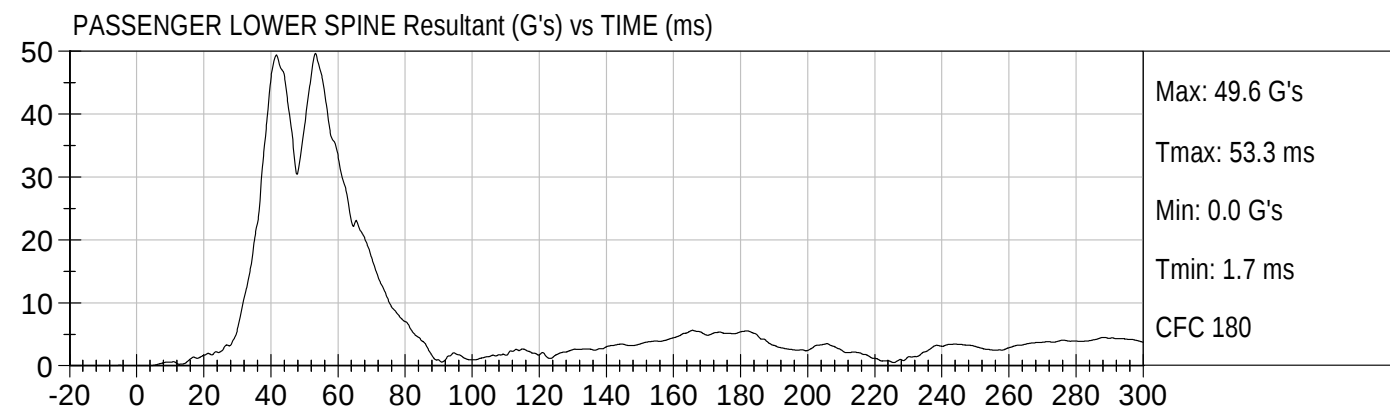
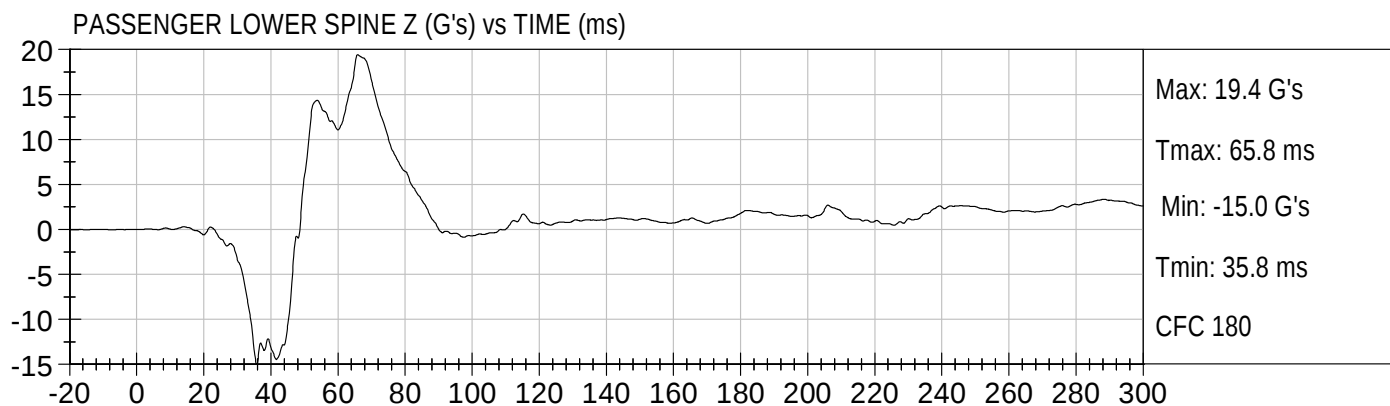
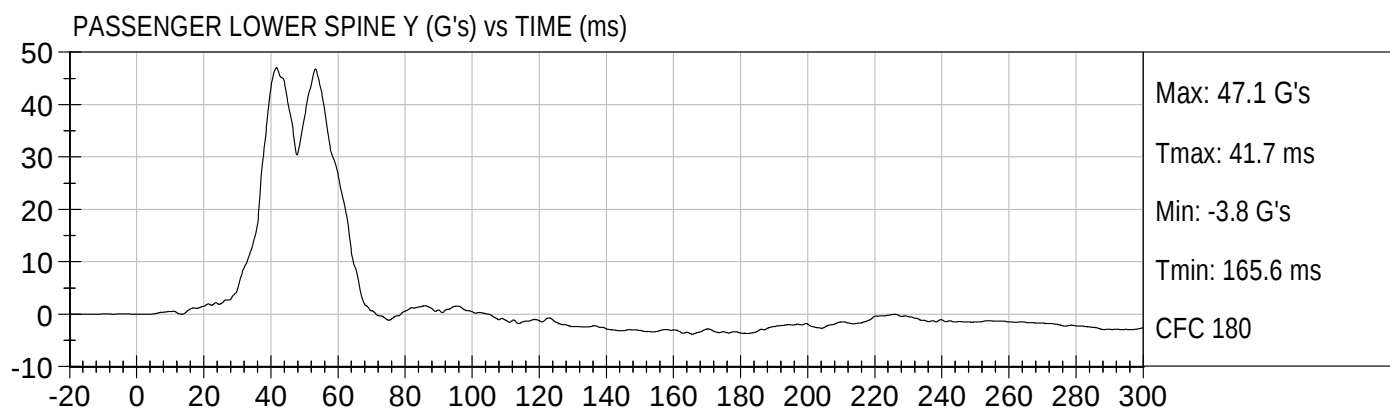
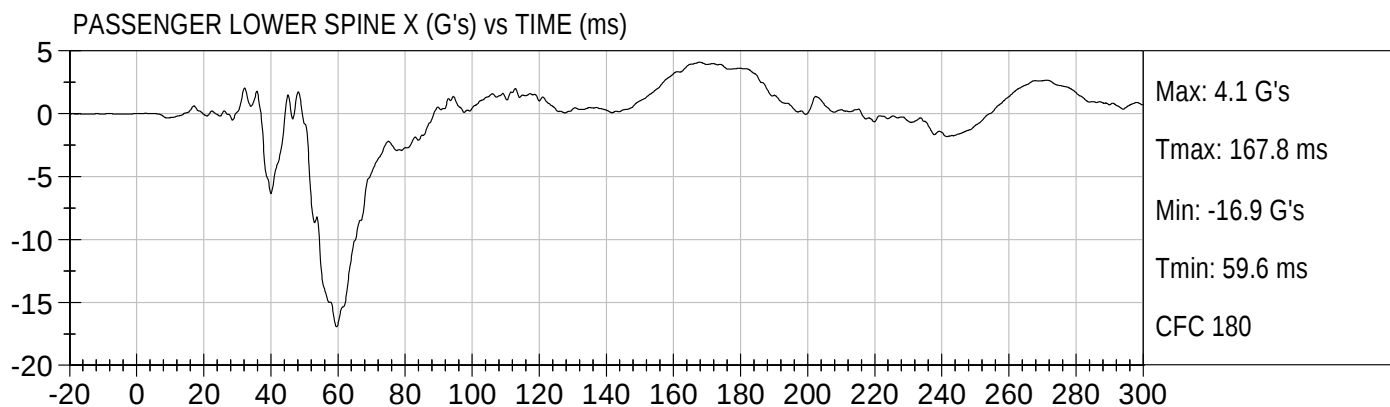


55/28 km/h 90° NCAP MDB Side Impact
2011 Scion tC - YB5102

Test Date: 02/23/2011
Speed: 38.55 mph (62.04 km/h)

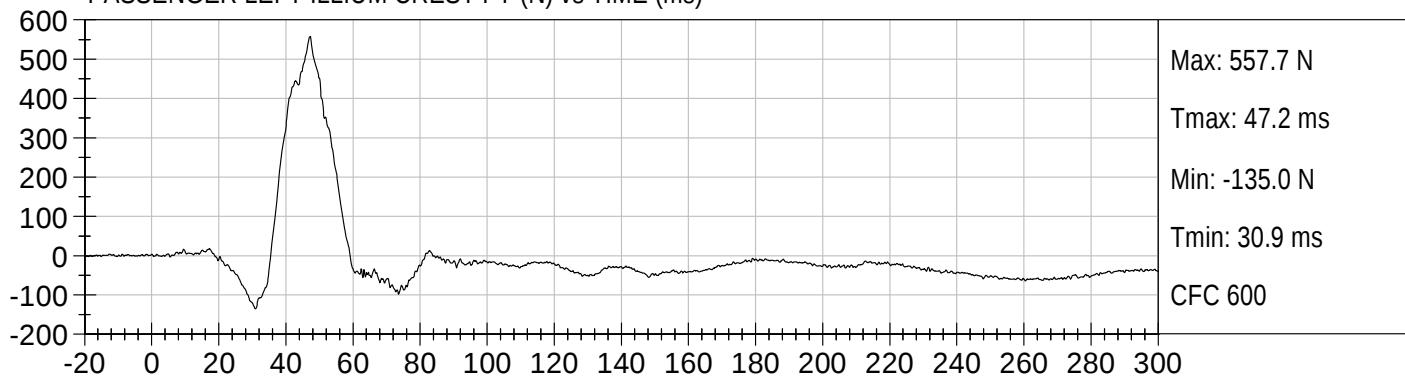




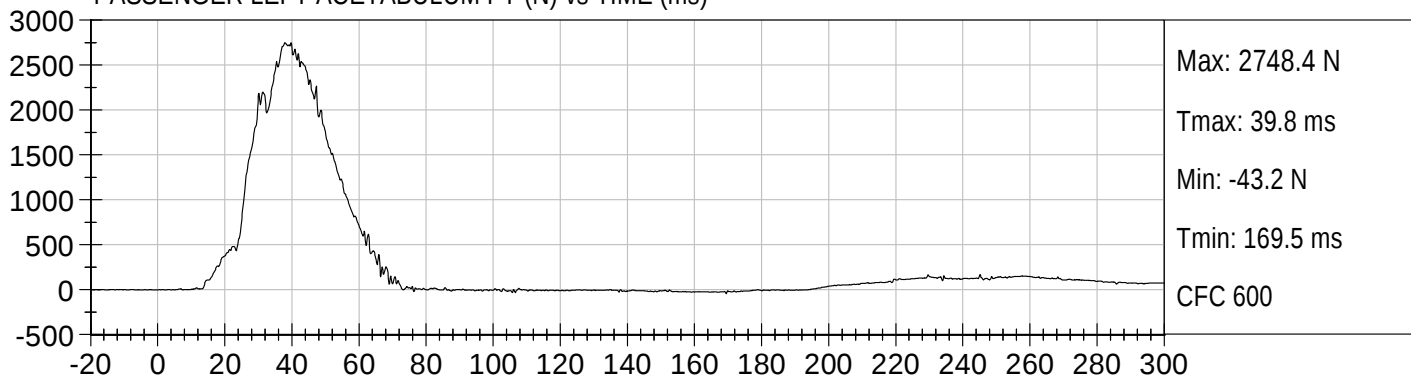




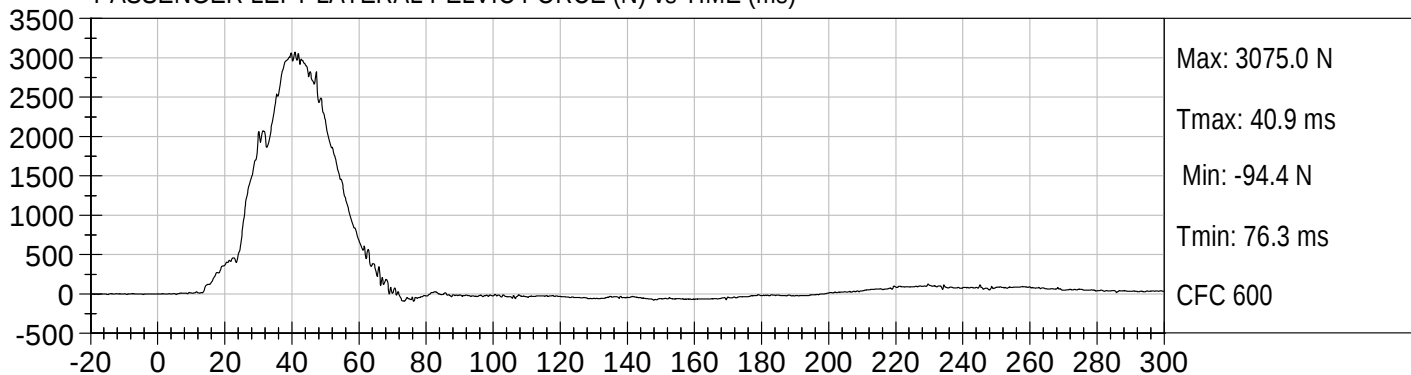
PASSENGER LEFT ILLIUM CREST FY (N) vs TIME (ms)



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



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



APPENDIX C

DUMMY CALIBRATION AND PERFORMANCE VERIFICATION DATA

MGA RESEARCH CORPORATION

HEAD DROP TEST

ES-2re DUMMY

ATD Serial No: 032

Test ID: D11551

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	25	Pass
Peak Resultant Acceleration	G's	125 to 155	141	Pass
Peak Lateral Acceleration	G's	+/- 15	-7.6	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 15% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

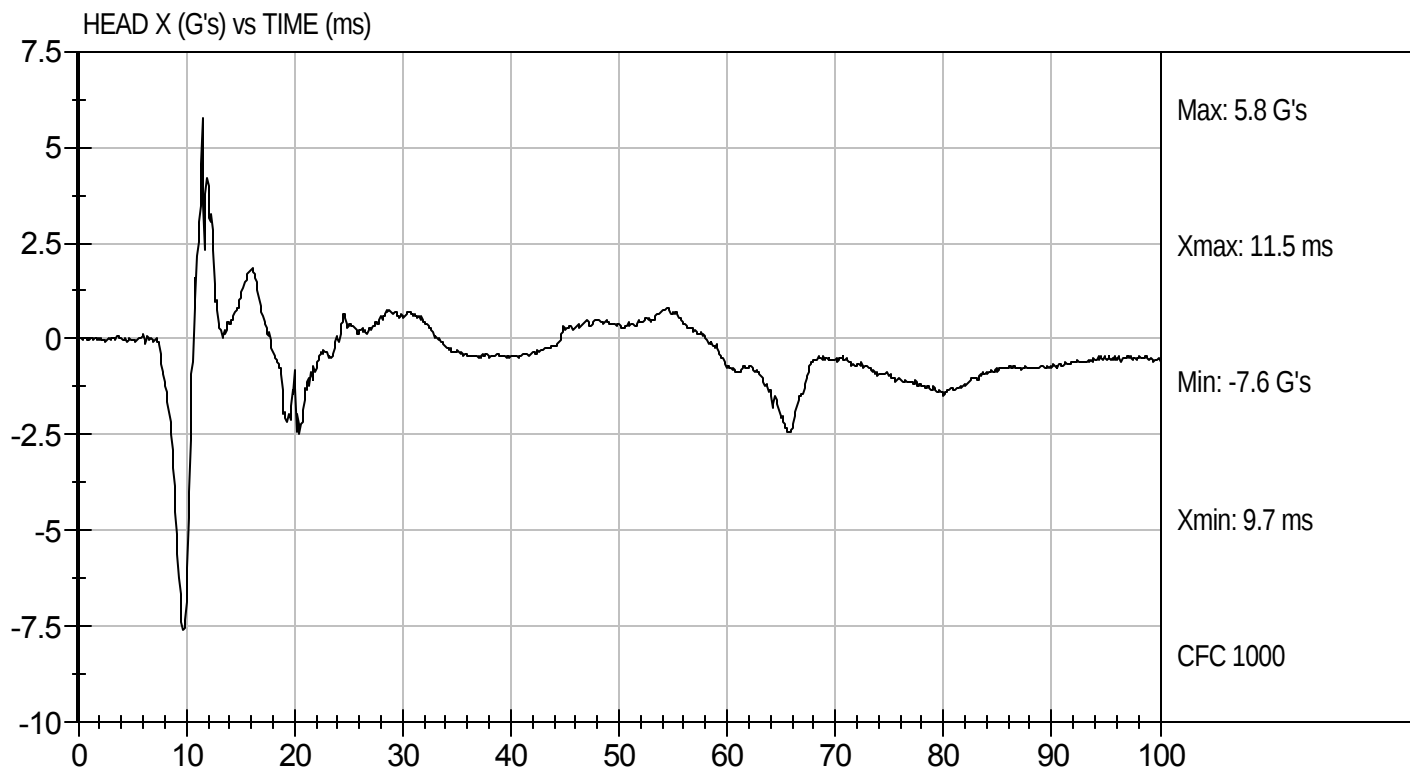
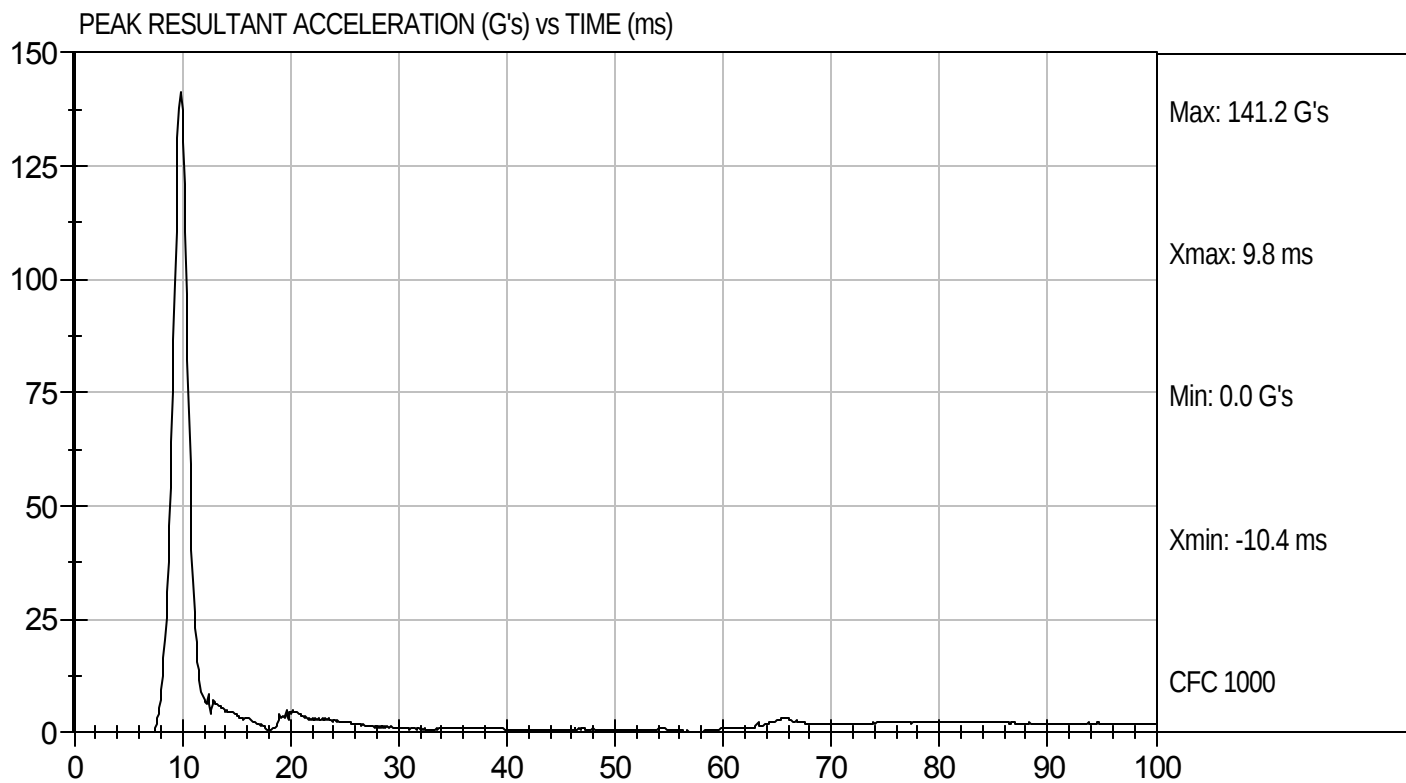
2/16/11
Test Date


Approved By



Test Desc: Head Drop
Component ID: D11551

Test Date: 2/16/11
Velocity: 0 ft/s, 0 m/s

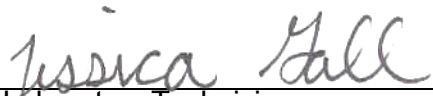


MGA RESEARCH CORPORATION
NECK PENDULUM TEST
ES-2re DUMMY

ATD Serial No: 032

Test I.D: D11552

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	18.0 to 22.0	21.4	Pass
Laboratory Relative Humidity		%	10 to 70	19	Pass
Pendulum Speed		m/s	3.3 to 3.5	3.4	Pass
Pendulum Deceleration	1 ms	m/s	0.00 to -0.05	-0.02	Pass
	3 ms	m/s	-0.25 to -0.375	-0.32	Pass
	14 ms	m/s	-3.20 to -3.70	-3.29	Pass
Maximum Flexion Angle		deg	49.0 to 59.0	54.8	Pass
Time of Maximum Flexion Angle		ms	54.0 to 66.0	62.2	Pass
Head Rotation Decay Time to 0 degree		ms	53.0 to 88.0	63.3	Pass
Overall Test Results					Pass


 Laboratory Technician

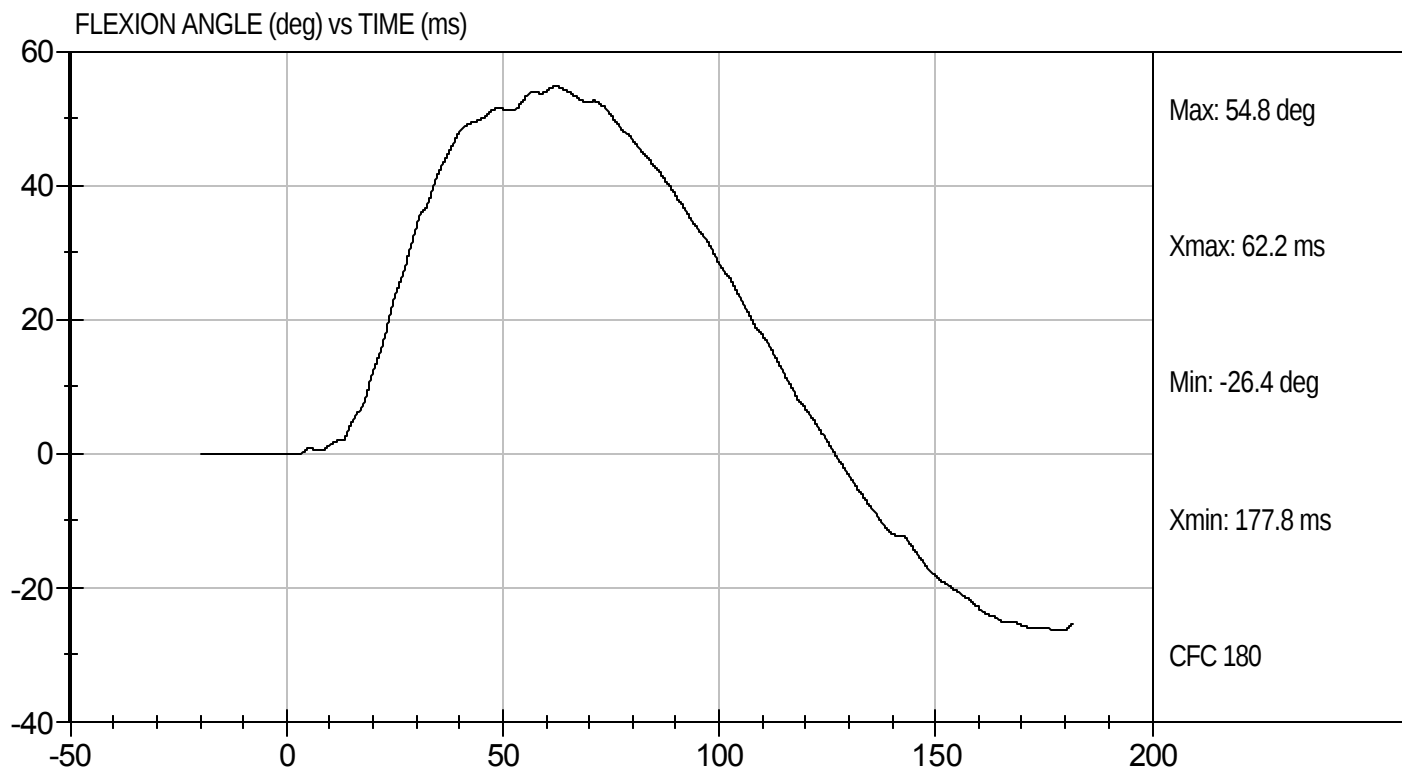
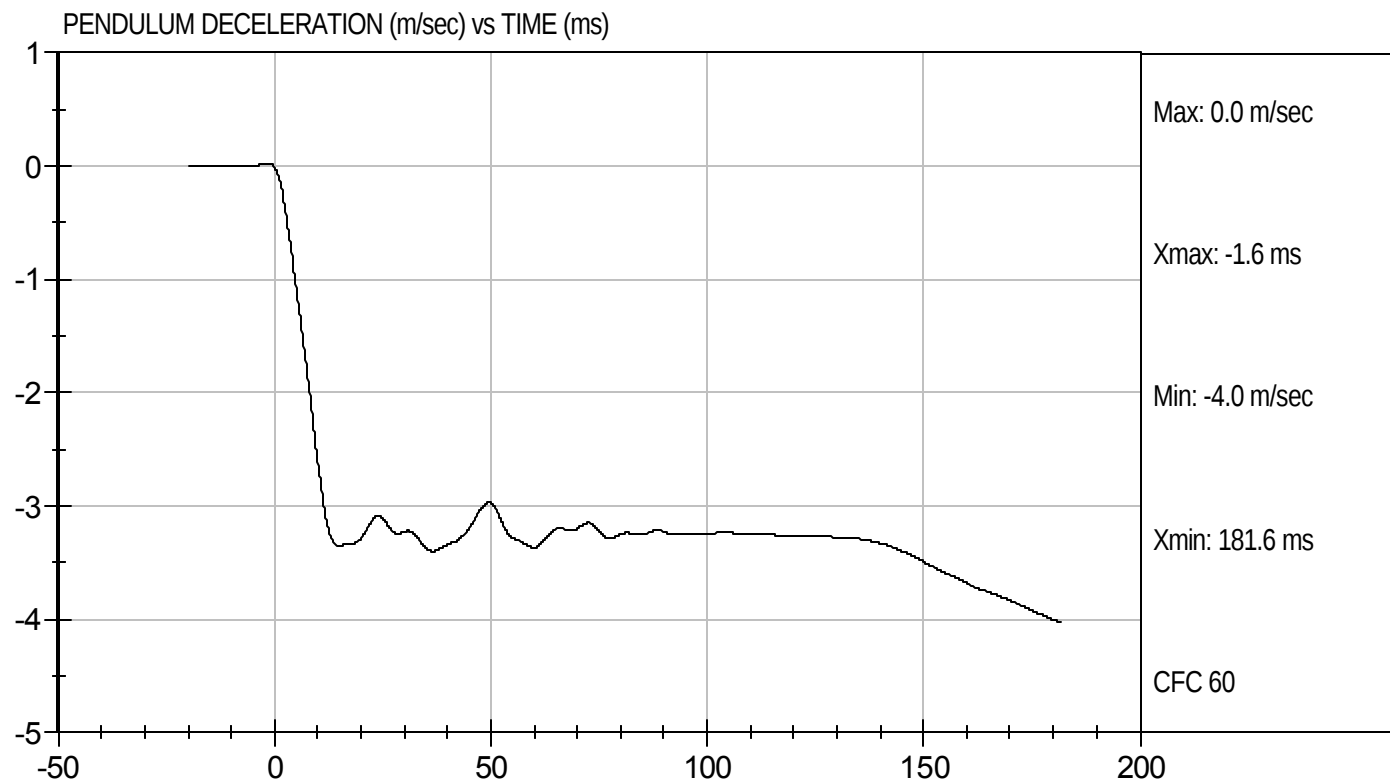
2/15/11
 Test Date


 Approved By



Test Desc: Neck Bending
Component ID: D11552

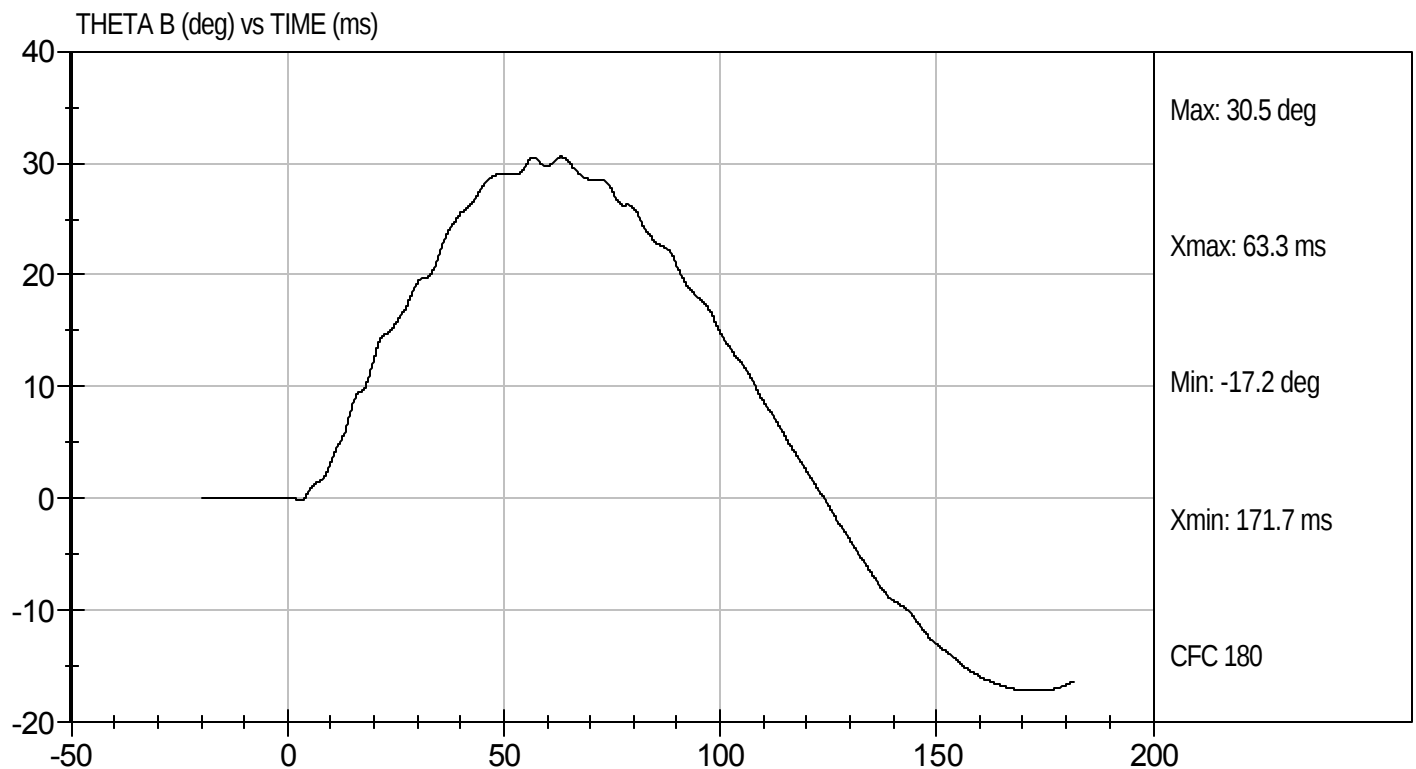
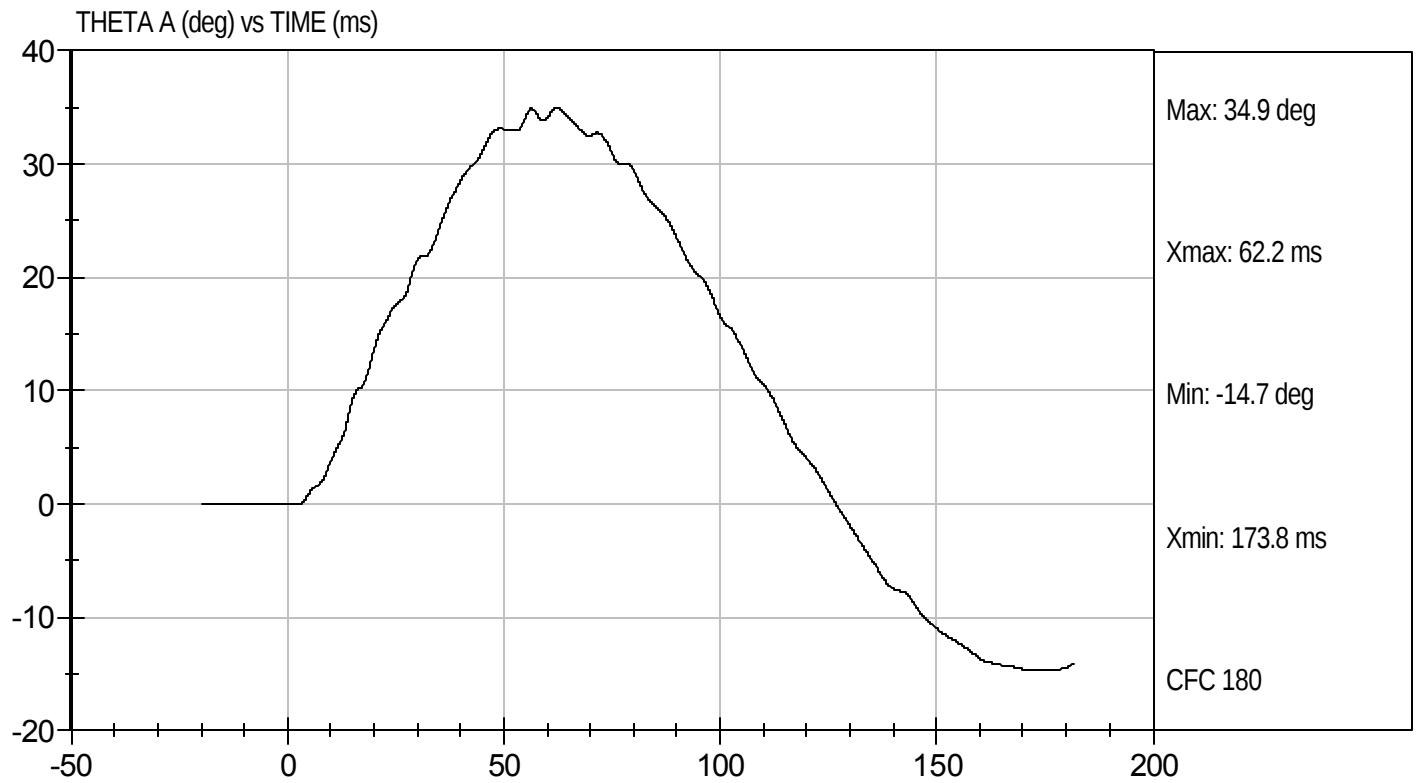
Test Date: 2/15/11
Velocity: 11.11 ft/s, 3.4 m/s





Test Desc: Neck Bending
Component ID: D11552

Test Date: 2/15/11
Velocity: 11.11 ft/s, 3.4 m/s



MGA RESEARCH CORPORATION
SHOULDER IMPACT TEST
ES-2re DUMMY

ATD Serial No: 032

Test I.D: D11553

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	26	Pass
Pendulum Speed	m/s	4.2 to 4.4	4.3	Pass
Peak Shoulder Acceleration	G's	7.5 to 10.5	10.3	Pass
Time of Peak Shoulder Acceleration	ms	NA	15.6	Pass
Overall Test Results			Pass	


Laboratory Technician

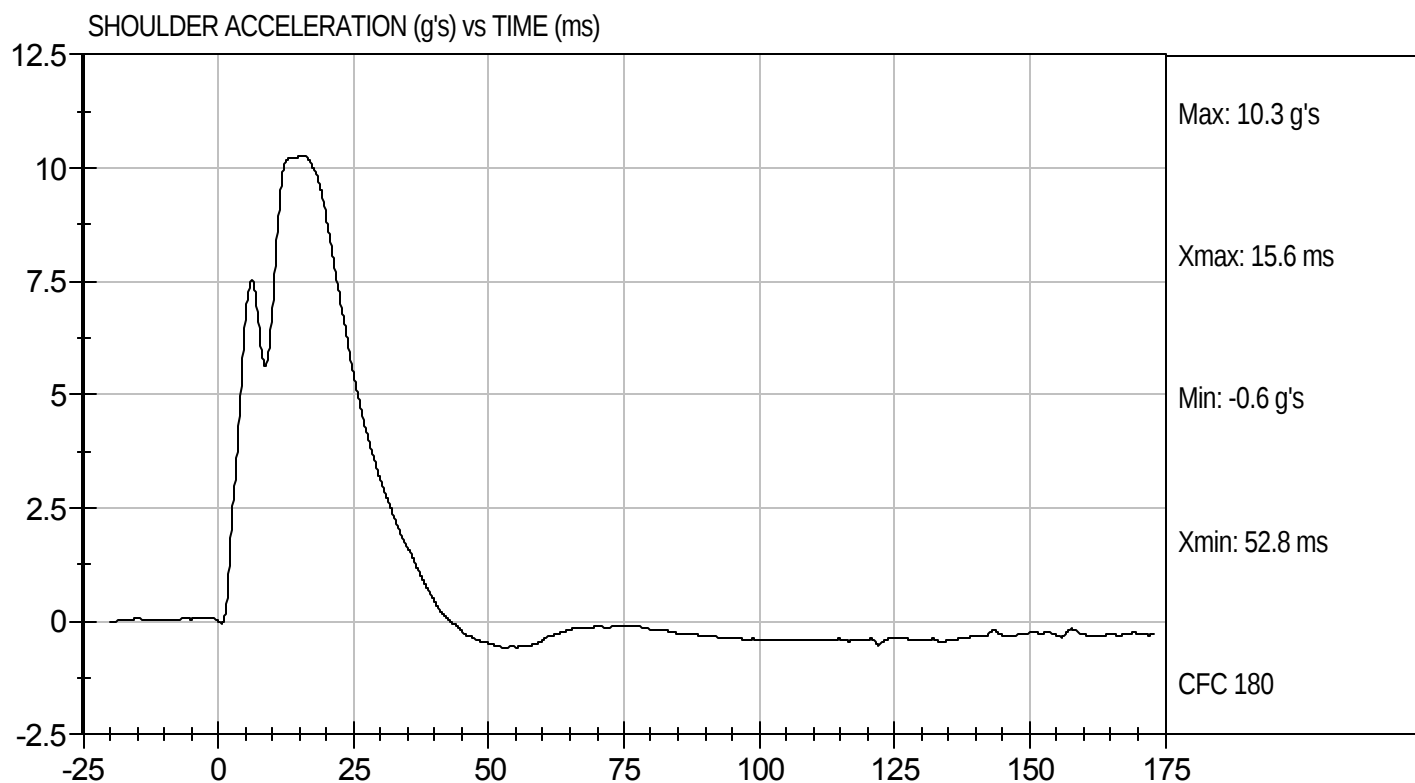
2/16/11
Test Date


Approved By



Test Desc: Shoulder Impact
Component ID: D11553

Test Date: 2/16/11
Velocity: 14.25 ft/s, 4.3 m/s



MGA RESEARCH CORPORATION

UPPER RIB TEST

ES-2re DUMMY

ATD Serial No: 032

Test I.D: D11554

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	22	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	48.2	Pass
Overall Test Results			Pass	


Laboratory Technician

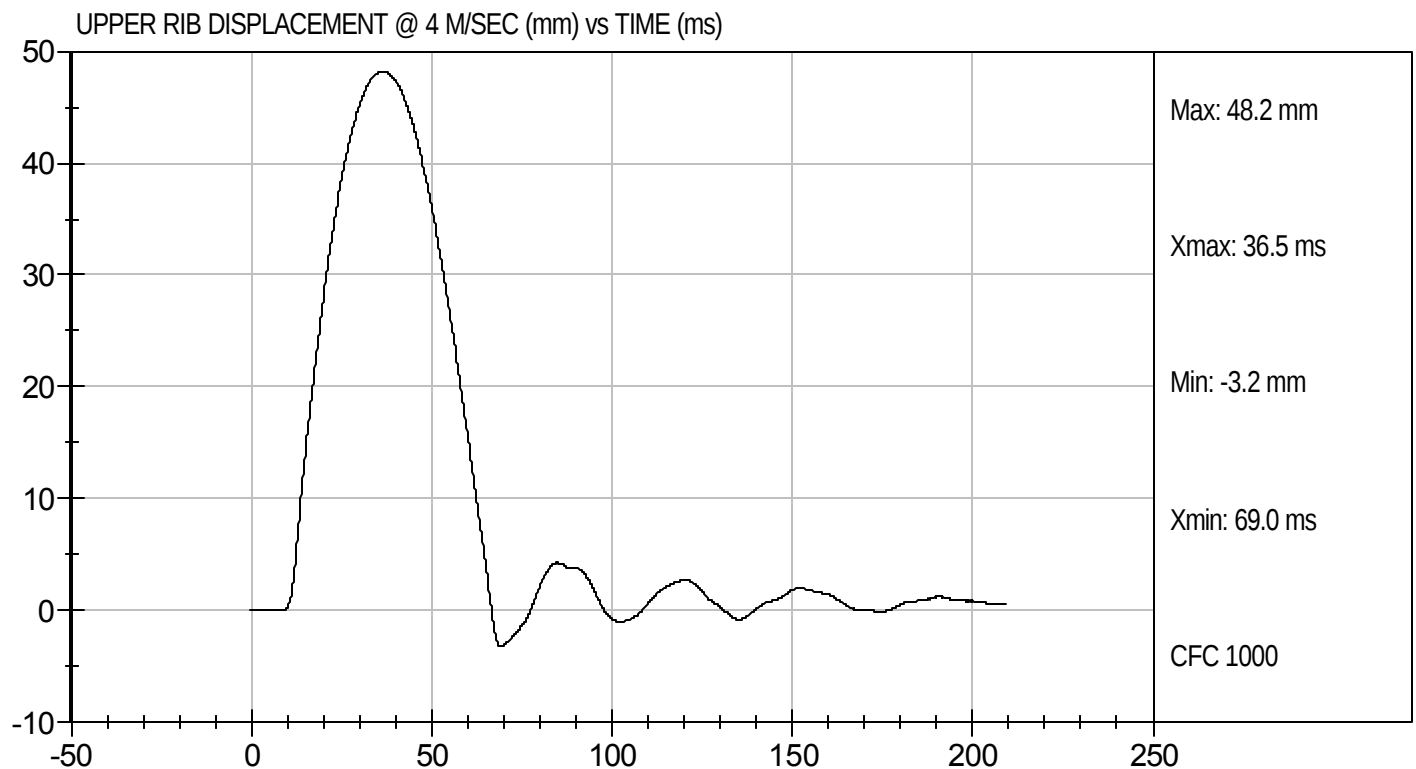
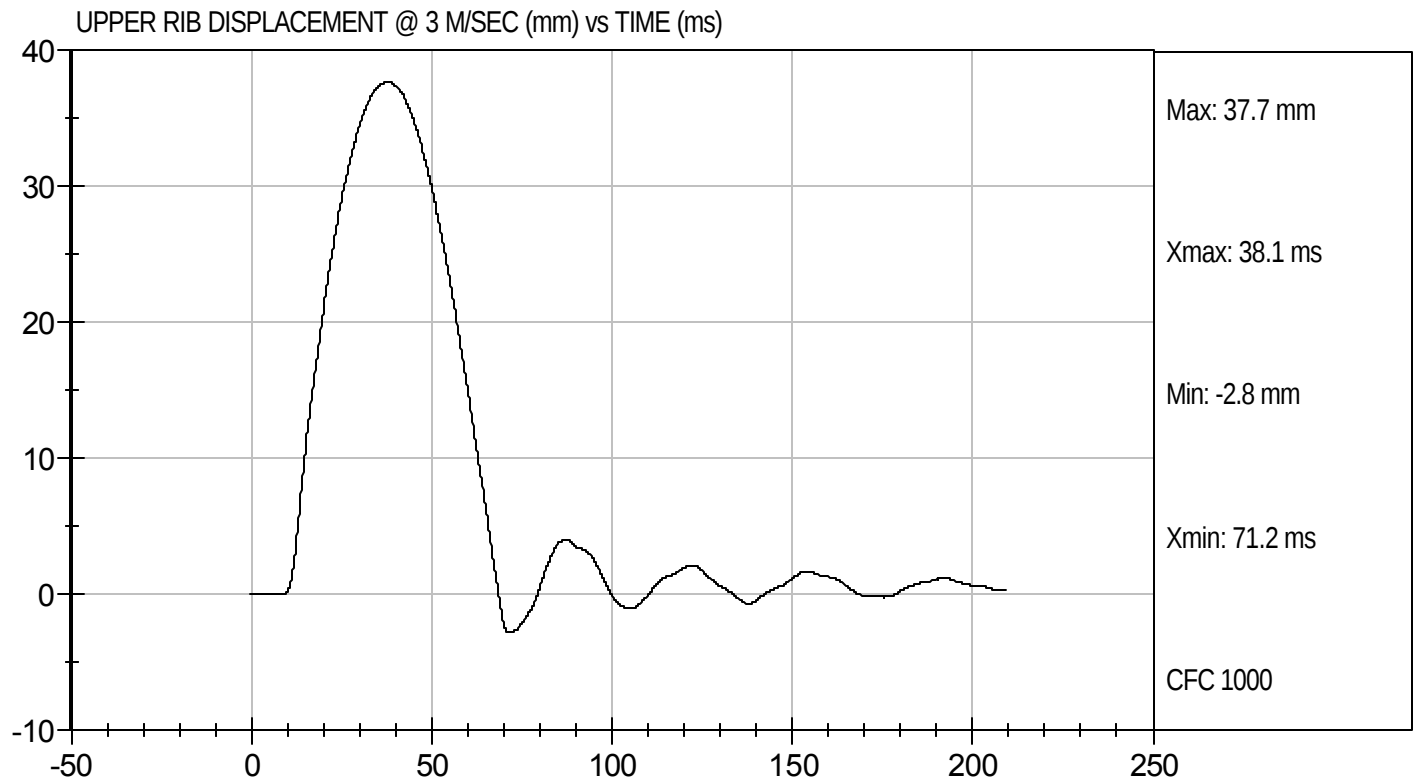
2/15/11
Test Date


Approved By



Test Desc: Rib Impact - Upper
Component ID: D11554

Test Date: 2/15/11



MGA RESEARCH CORPORATION

MID RIB TEST
ES-2re DUMMY

ATD Serial No: 032

Test I.D: D11555

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	22	Pass
Displacement at 3 m/s	mm	36.0 to 40.0	38.1	Pass
Displacement at 4 m/s	mm	46.0 to 51.0	48.4	Pass
Overall Test Results			Pass	


Laboratory Technician

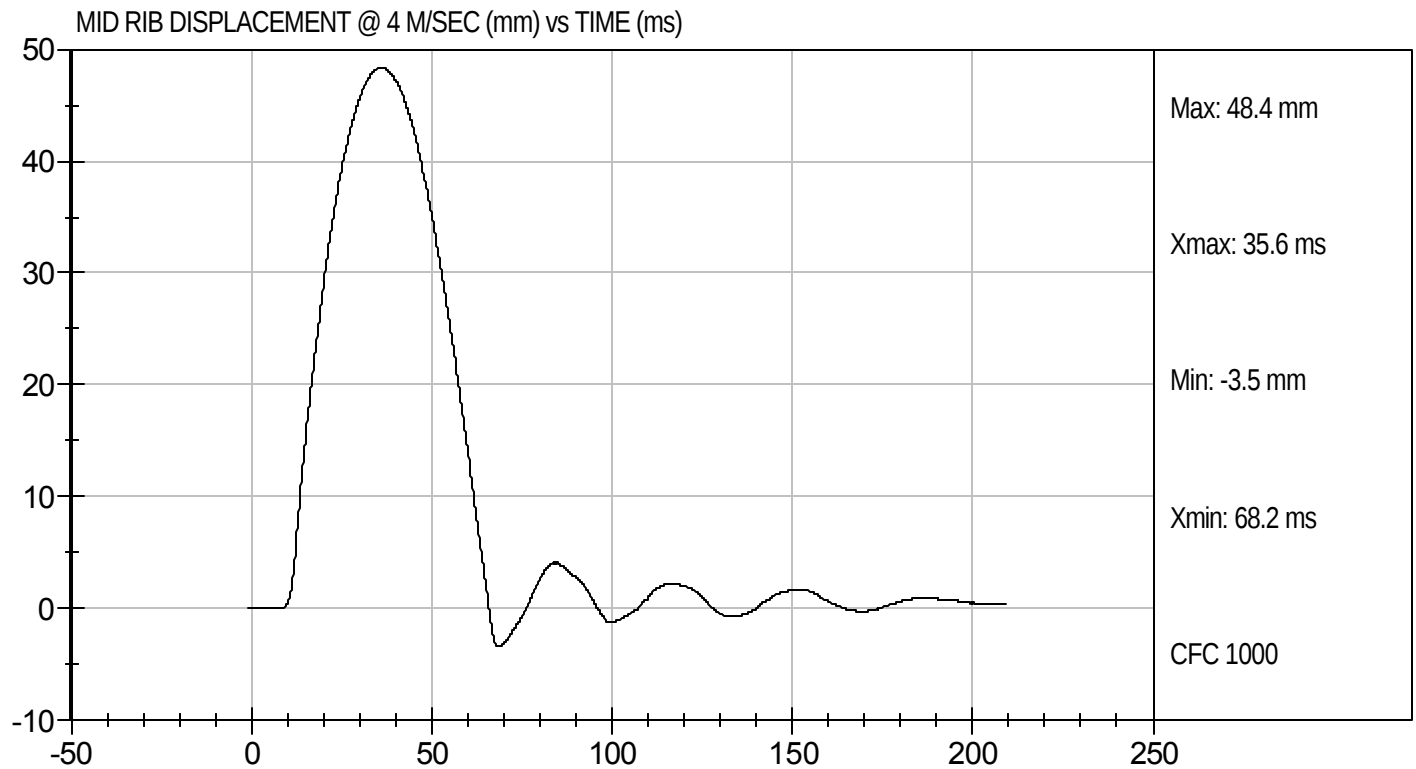
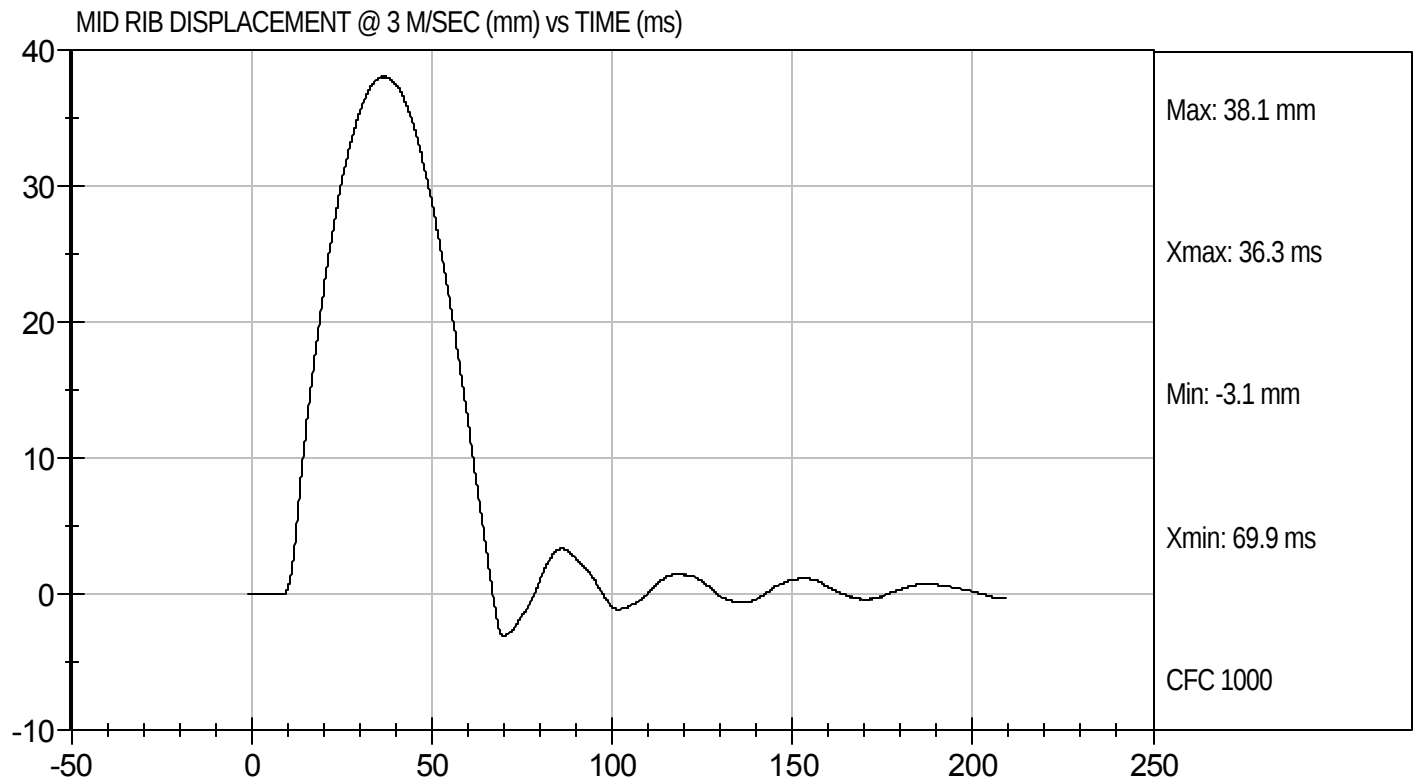
2/15/11
Test Date


Approved By



Test Desc: Rib Impact - Mid
Component ID: D11555

Test Date: 2/15/11



MGA RESEARCH CORPORATION

LOWER RIB TEST

ES-2re DUMMY

ATD Serial No: 032

Test I.D: D11556

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	22	Pass
Displacement at 3 m/s	mm	36.0 to 40.0	39.2	Pass
Displacement at 4 m/s	mm	46.0 to 51.0	48.2	Pass
Overall Test Results			Pass	

Jessica Hall
Laboratory Technician

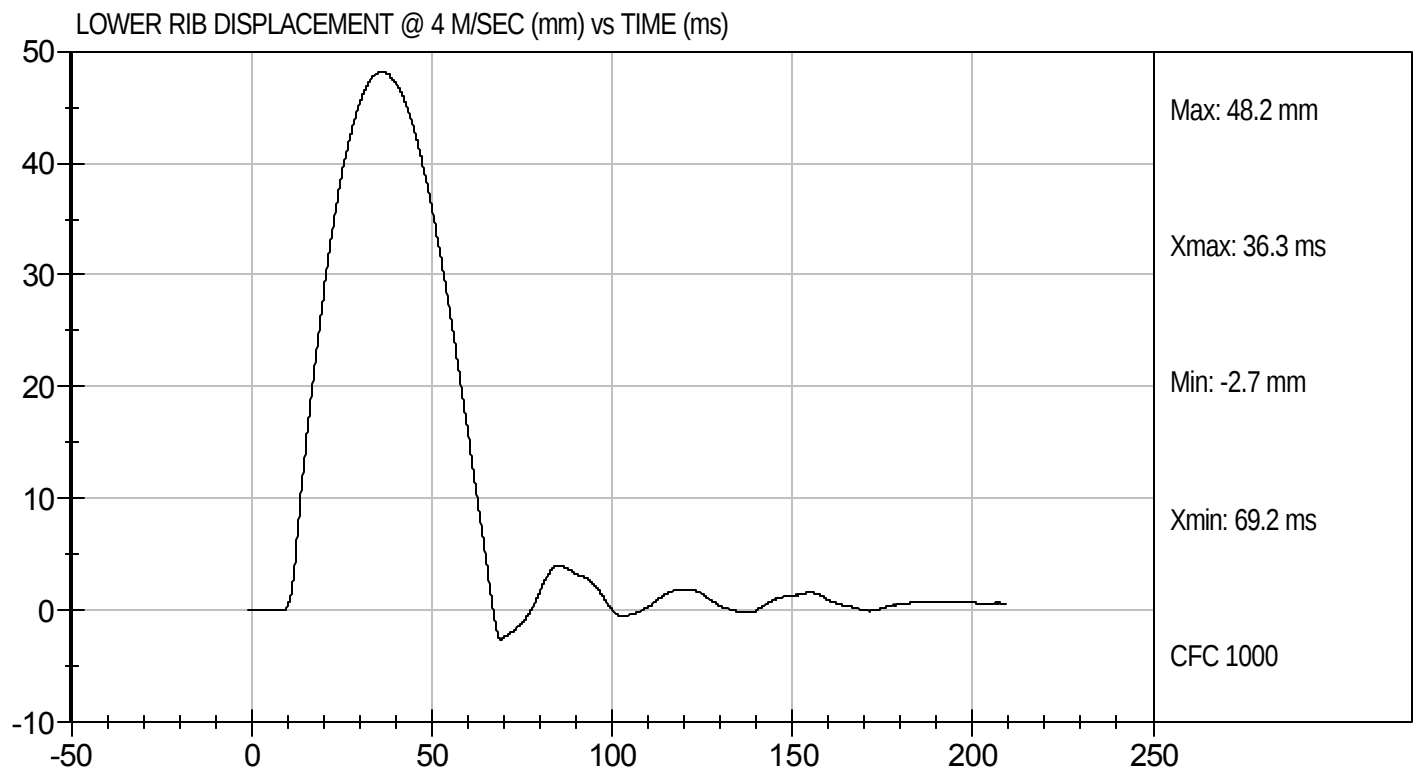
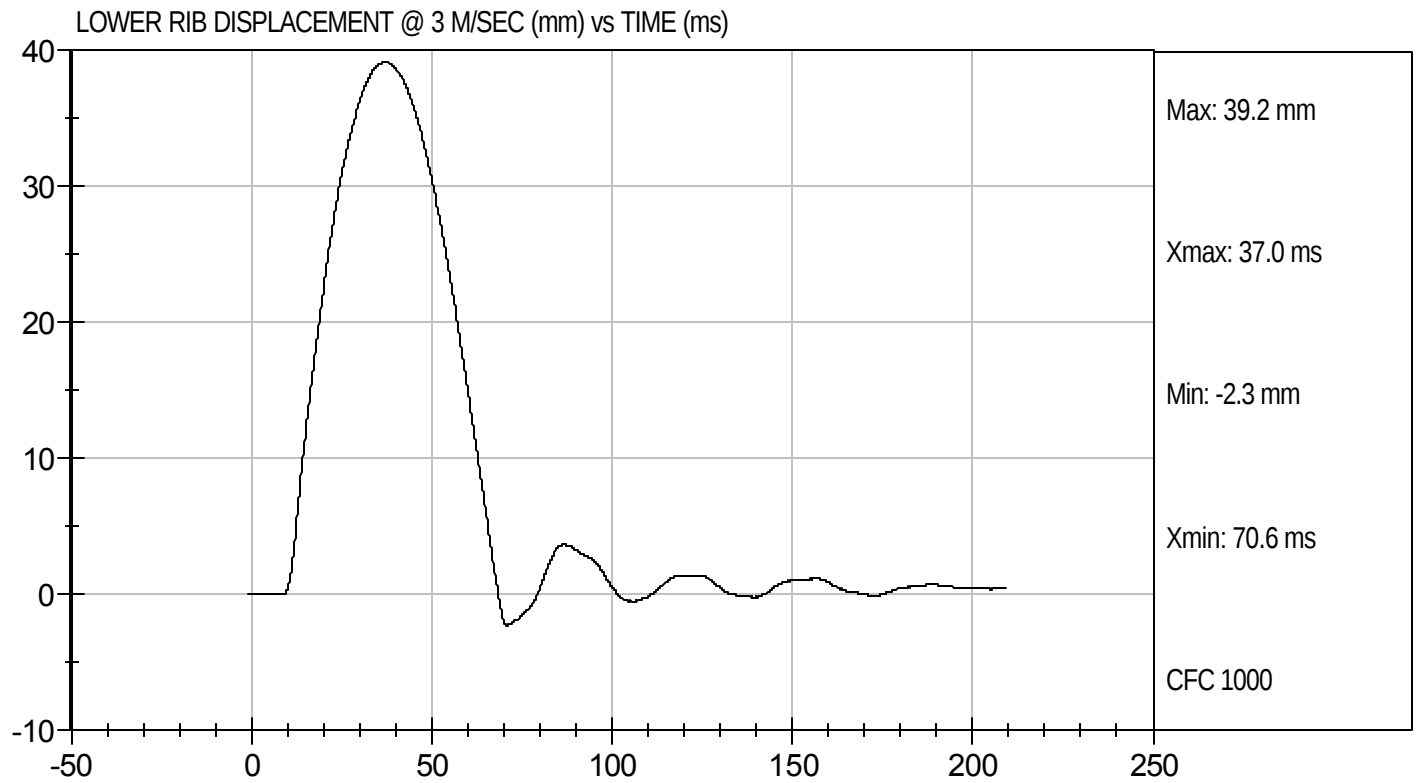
2/15/11
Test Date

David Winkelbauer
Approved By



Test Desc: Rib Impact - Lower
Component ID: D11556

Test Date: 2/15/11



MGA RESEARCH CORPORATION

ABDOMEN TEST

ES-2re DUMMY

ATD Serial No: 032

Test I.D: D11557

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	25	Pass
Probe Speed	m/s	3.90 to 4.10	3.97	Pass
Maximum Impact Force	kN	4.00 to 4.80	4.02	Pass
Time of Maximum Impact Force	ms	10.60 to 13.00	10.70	Pass
Maximum Total Abdomen Force	kN	2.20 to 2.70	2.34	Pass
Time of Maximum Abdomen Force	ms	10.00 to 12.30	10.20	Pass
Overall Test Results				Pass


Laboratory Technician

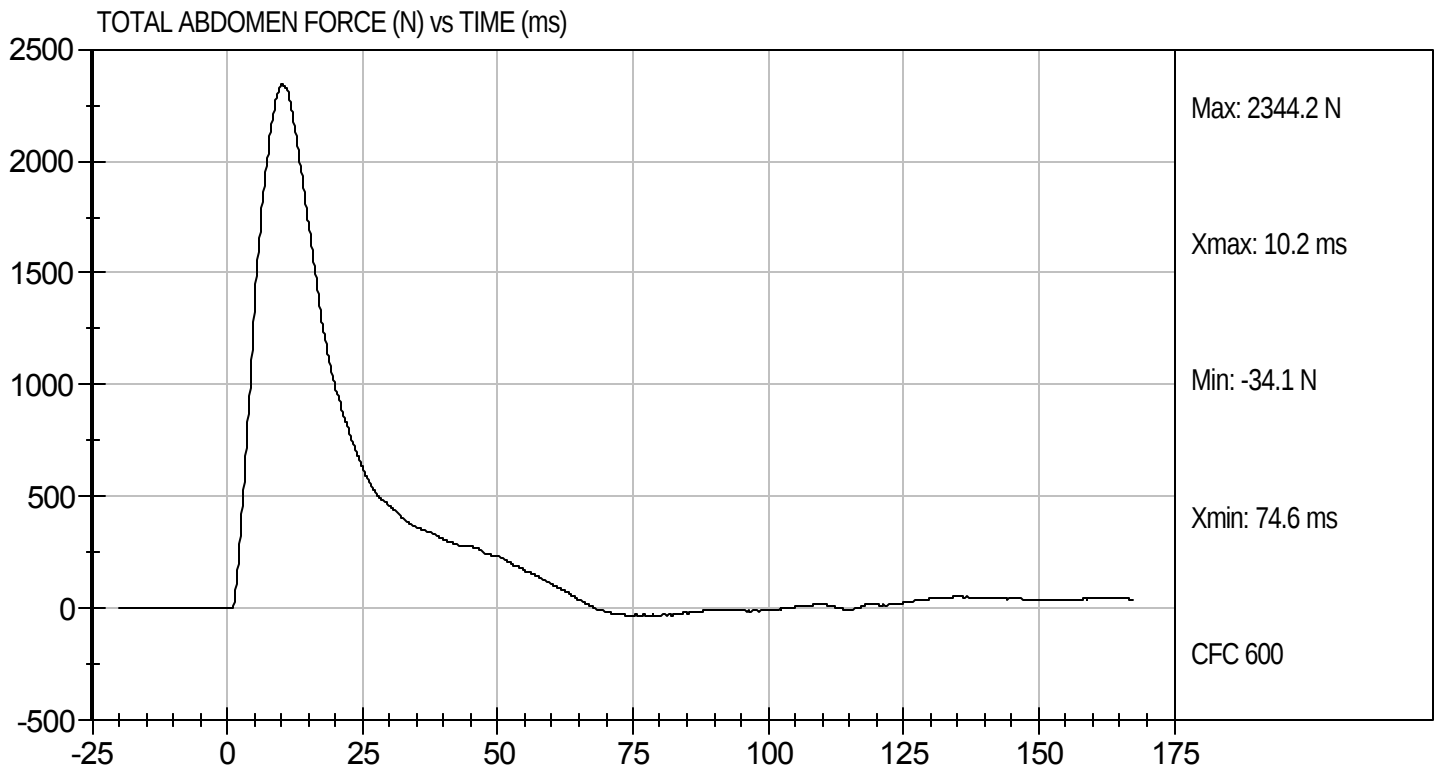
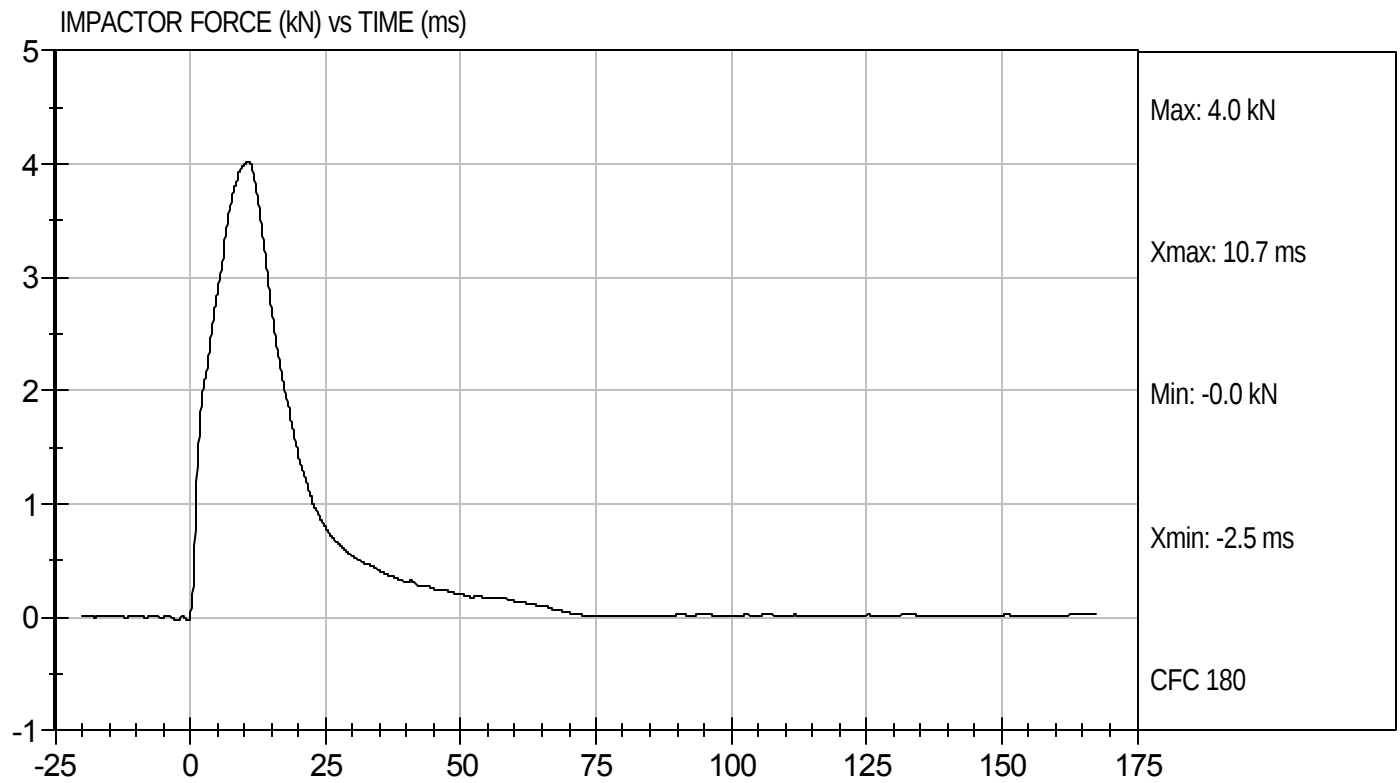
2/16/11
Test Date


Approved By



Test Desc: Abdomen Impact
Component ID: D11557

Test Date: 2/16/11
Velocity: 13.02 ft/s, 3.97 m/s

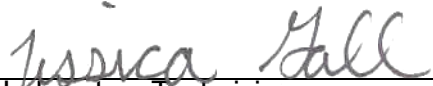


MGA RESEARCH CORPORATION
LUMBAR SPINE TEST
ES-2re DUMMY

ATD Serial No: 032

Test I.D: D11558

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity		%	10 to 70	19	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	-6.01	Pass
	30 ms	m/s	>= -6.5	-5.89	Pass
Maximum Flexion Angle		deg	45.0 to 55.0	49.3	Pass
Time of Maximum Flexion Angle		ms	39.0 to 53.0	44.3	Pass
Headform Rotation Decay to Initial Position		ms	37 to 57	41	Pass
Overall Results					Pass


 Laboratory Technician

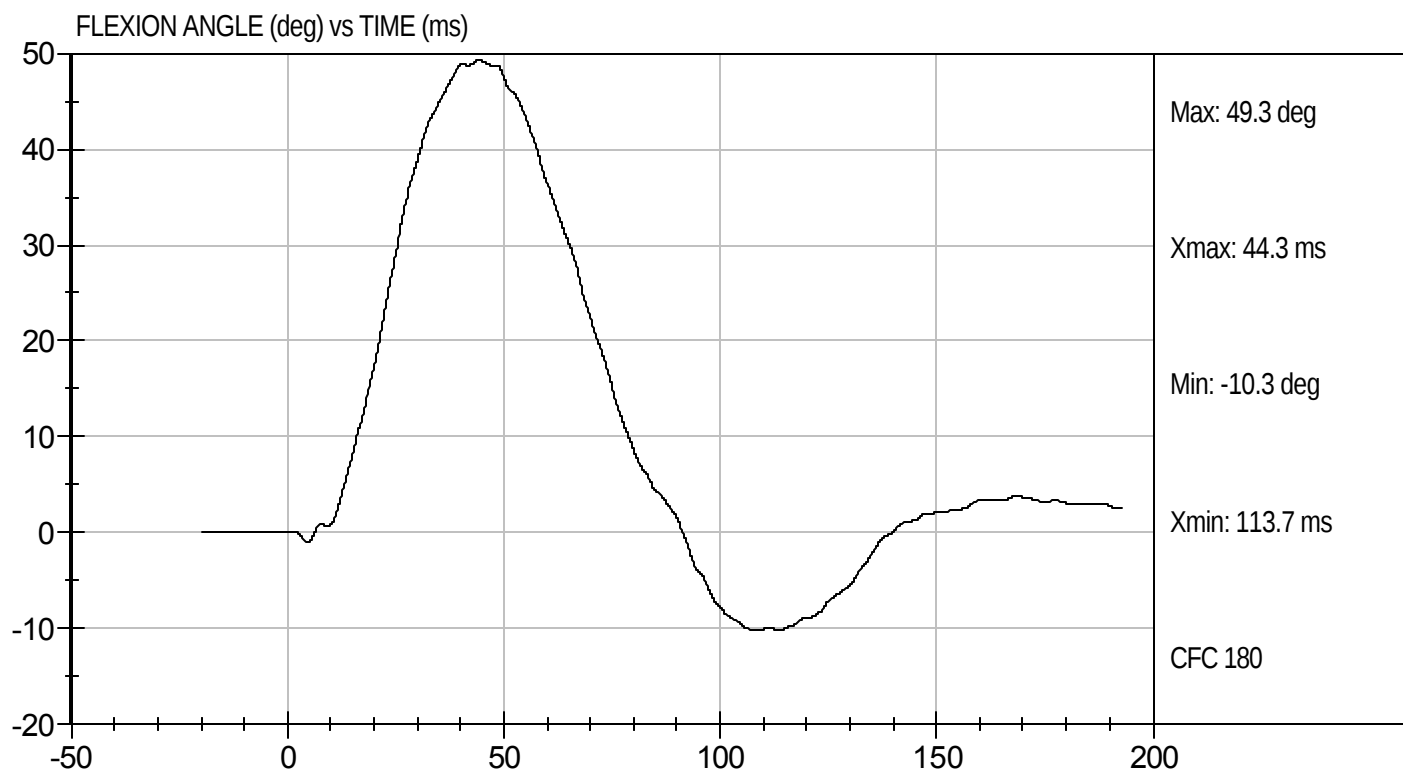
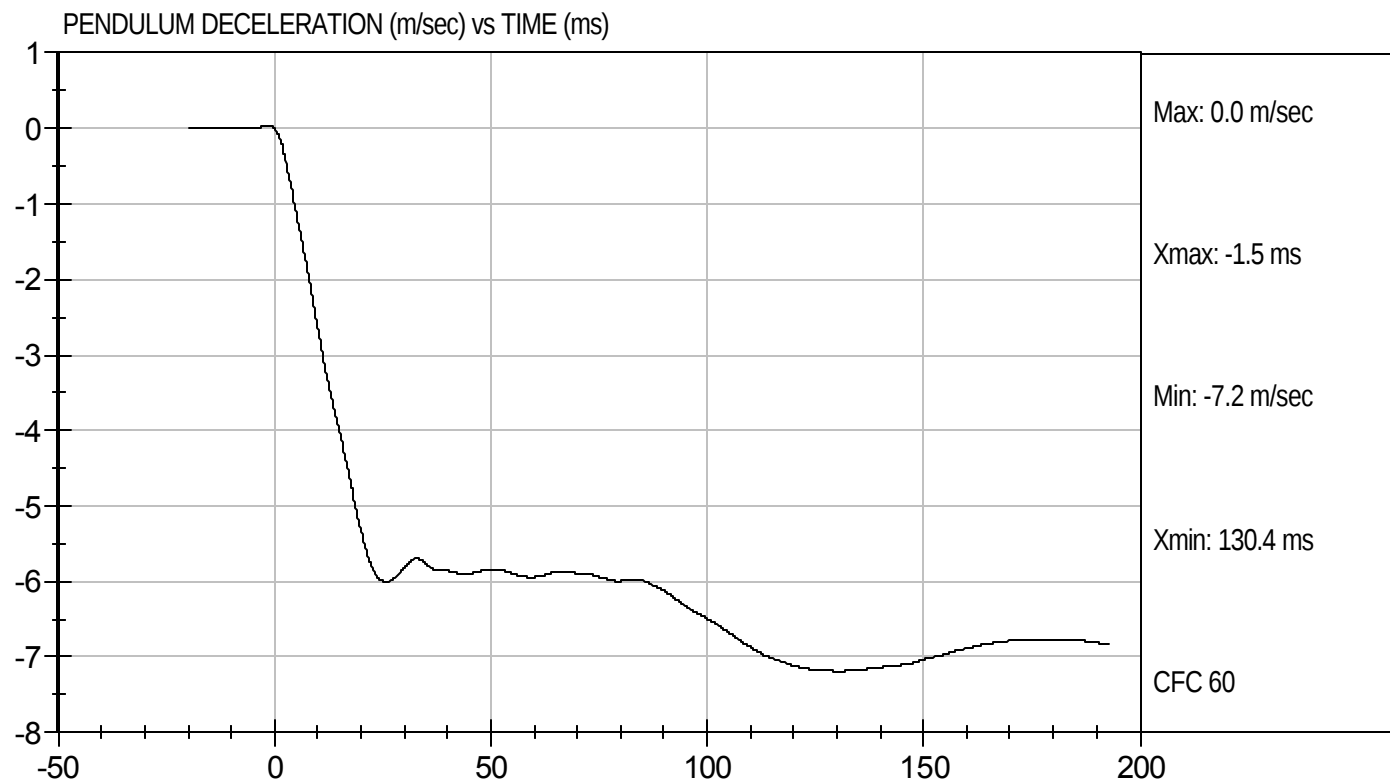
2/15/11
 Test Date


 Approved By



Test Desc: Lumbar Bending
Component ID: D11558

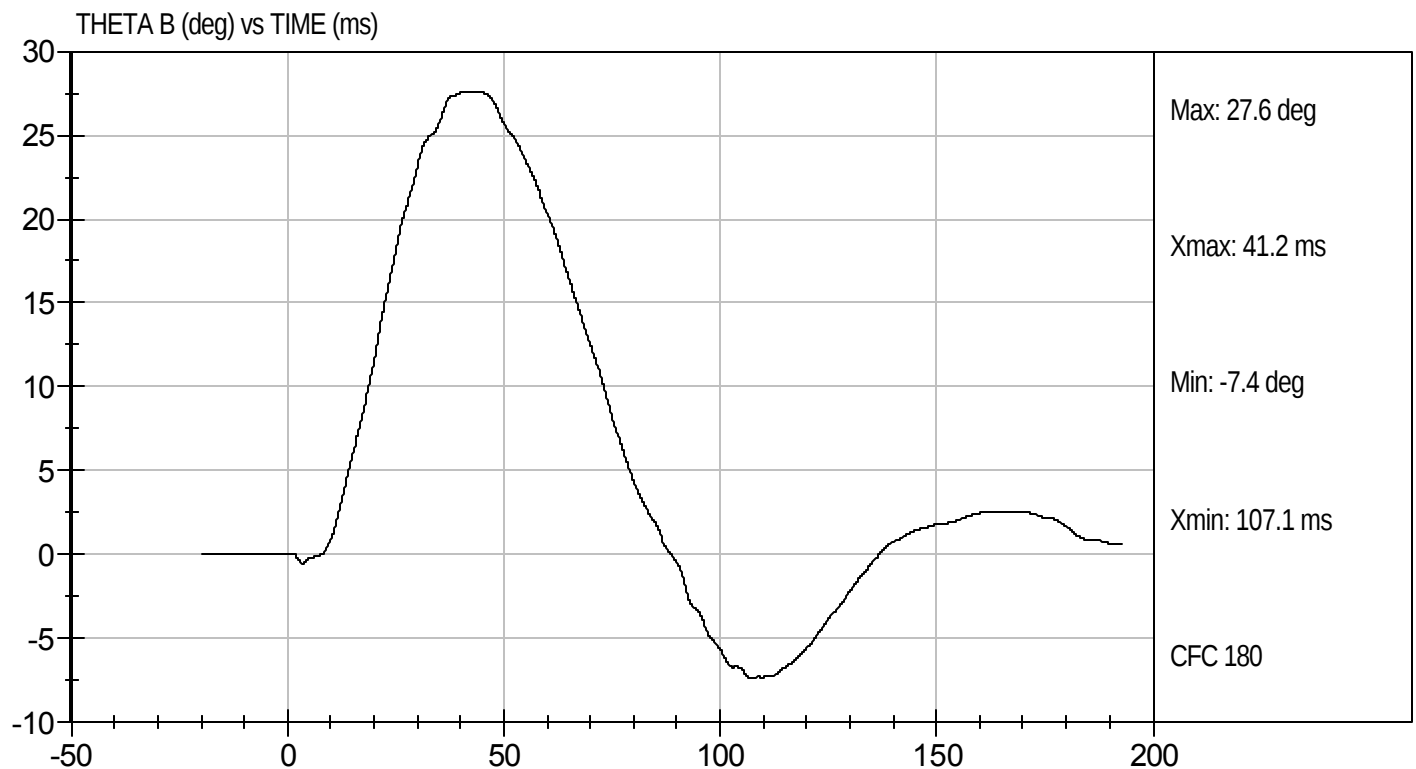
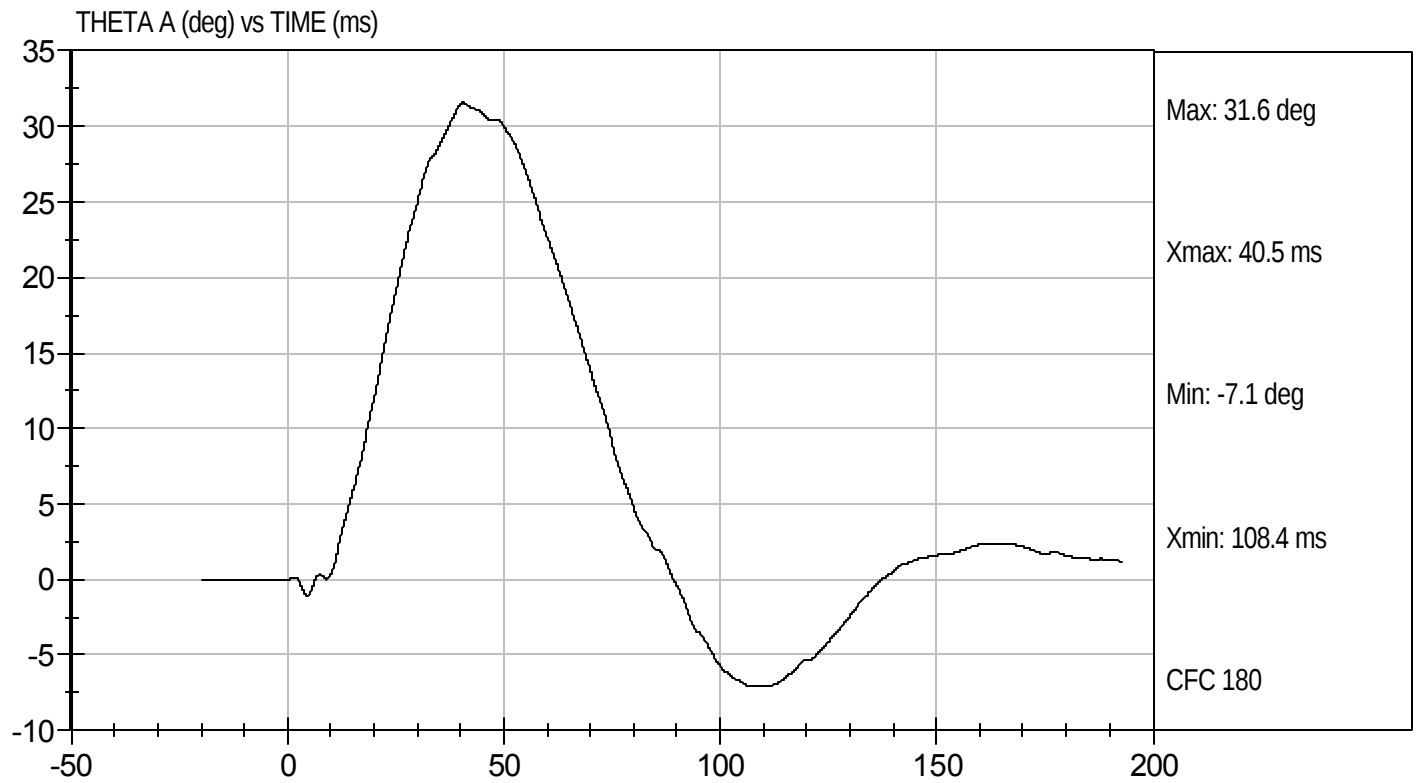
Test Date: 2/15/11
Velocity: 20.08 ft/s, 6.12 m/s





Test Desc: Lumbar Bending
Component ID: D11558

Test Date: 2/15/11
Velocity: 20.08 ft/s, 6.12 m/s



MGA RESEARCH CORPORATION

**PELVIS TEST
ES-2re DUMMY**

ATD Serial No: 032

Test I.D: D11559

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	25	Pass
Probe Speed	m/s	4.20 to 4.40	4.38	Pass
Maximum Impactor Force	kN	4.70 to 5.40	4.78	Pass
Time of Maximum Impactor Force	ms	11.80 to 16.10	13.30	Pass
Maximum Pubic Force	kN	1.23 to 1.59	1.43	Pass
Time of Maximum Pubic Force	ms	12.20 to 17.00	13.80	Pass
Overall Test Results				Pass


Laboratory Technician

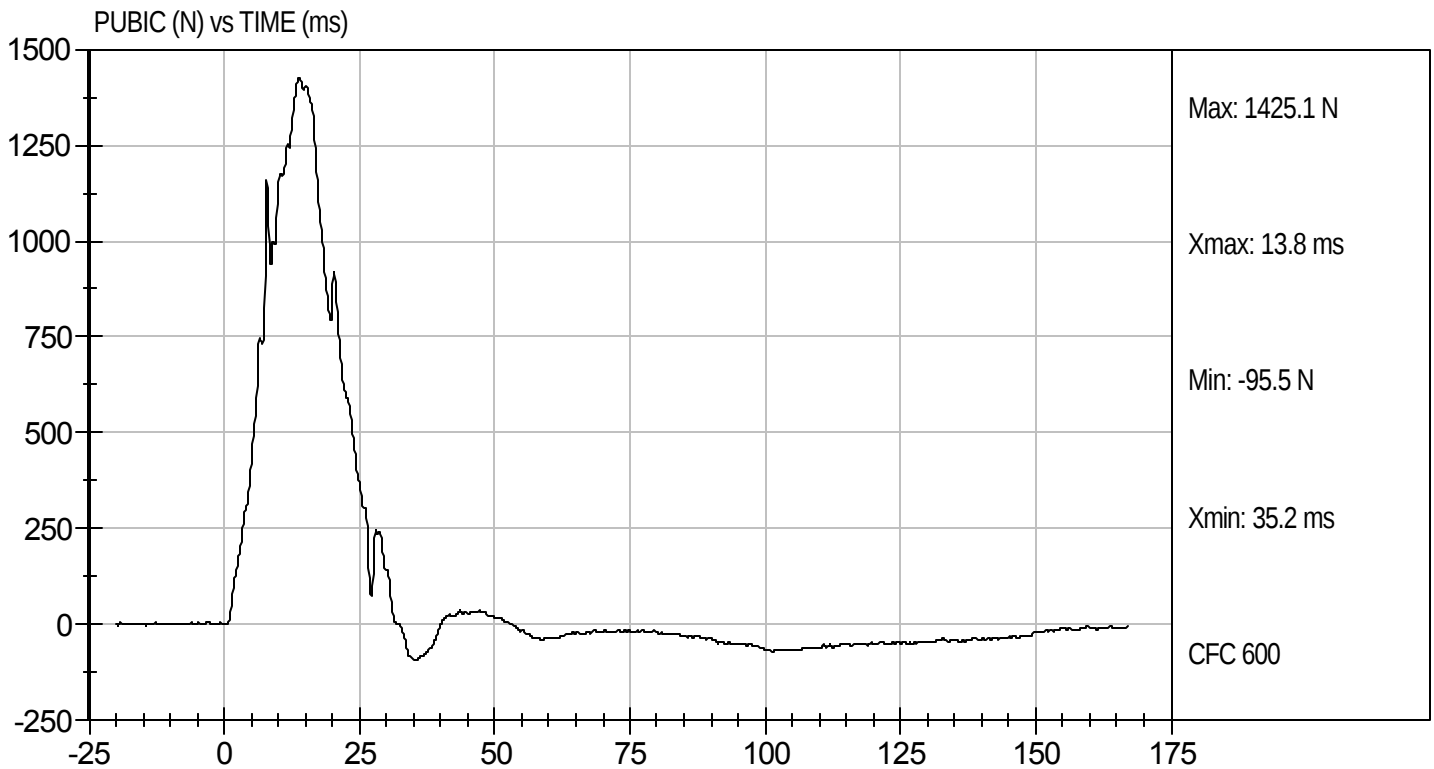
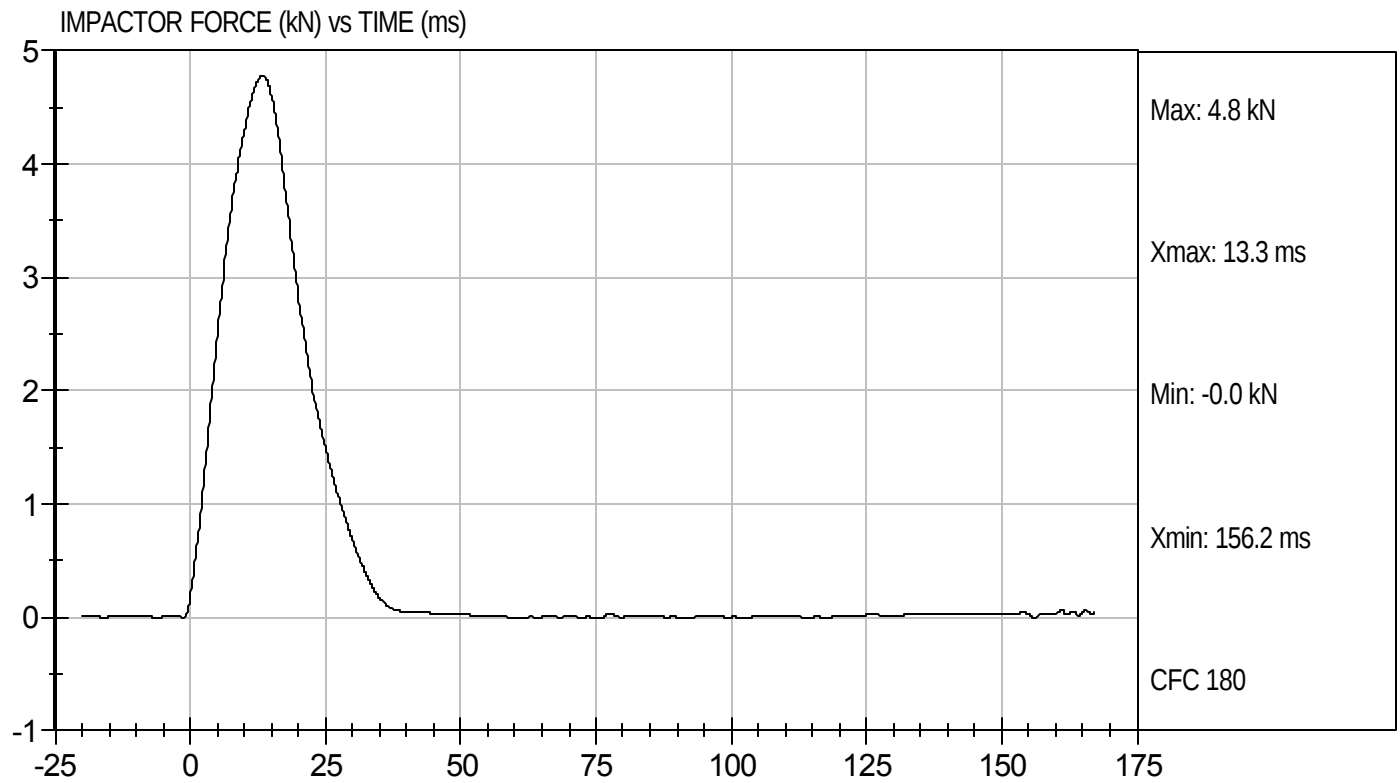
2/16/11
Test Date


Approved By



Test Desc: Pelvis Impact
Component ID: D11559

Test Date: 2/16/11
Velocity: 14.37 ft/s, 4.38 m/s



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

ATD Serial No: 032

Test I.D: D11550

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.6	Pass
Humidity	%	10 to 70	24	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	5.12	Pass
Upper Rib Displacement	mm	34.0 to 41.0	38.2	Pass
Middle Rib Displacement	mm	37.0 to 45.0	40.3	Pass
Lower Rib Displacement	mm	37.0 to 44.0	39.5	Pass
Overall Test Results			Pass	


Laboratory Technician

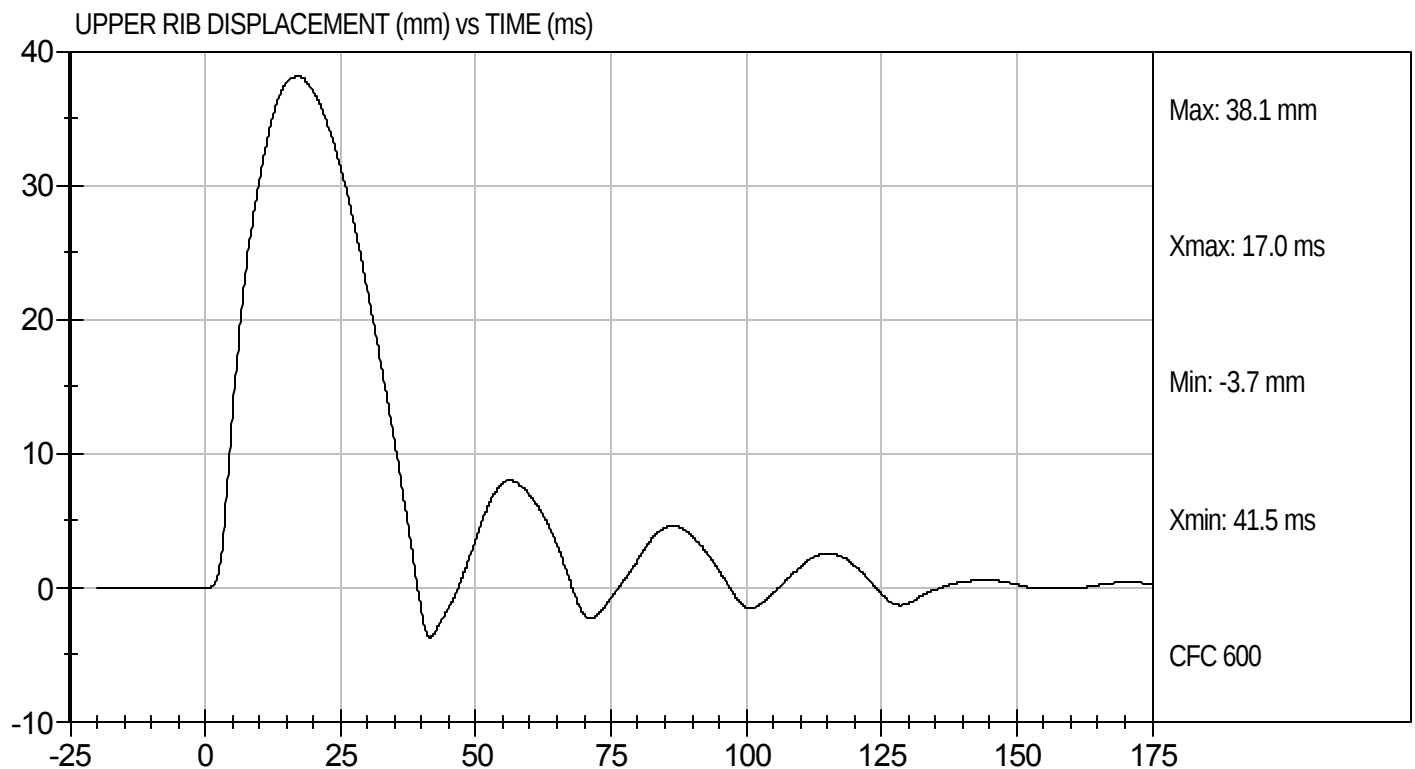
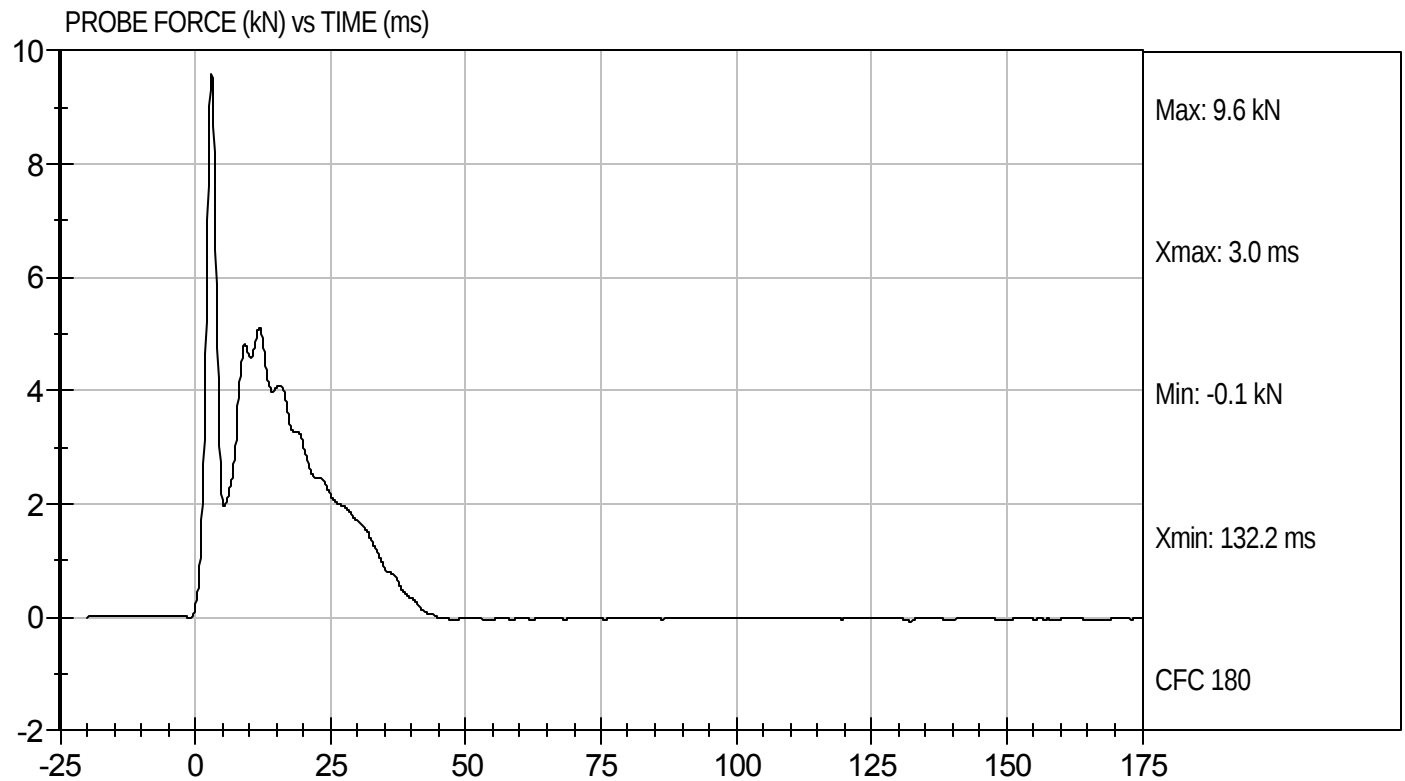
2/16/11
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D11550

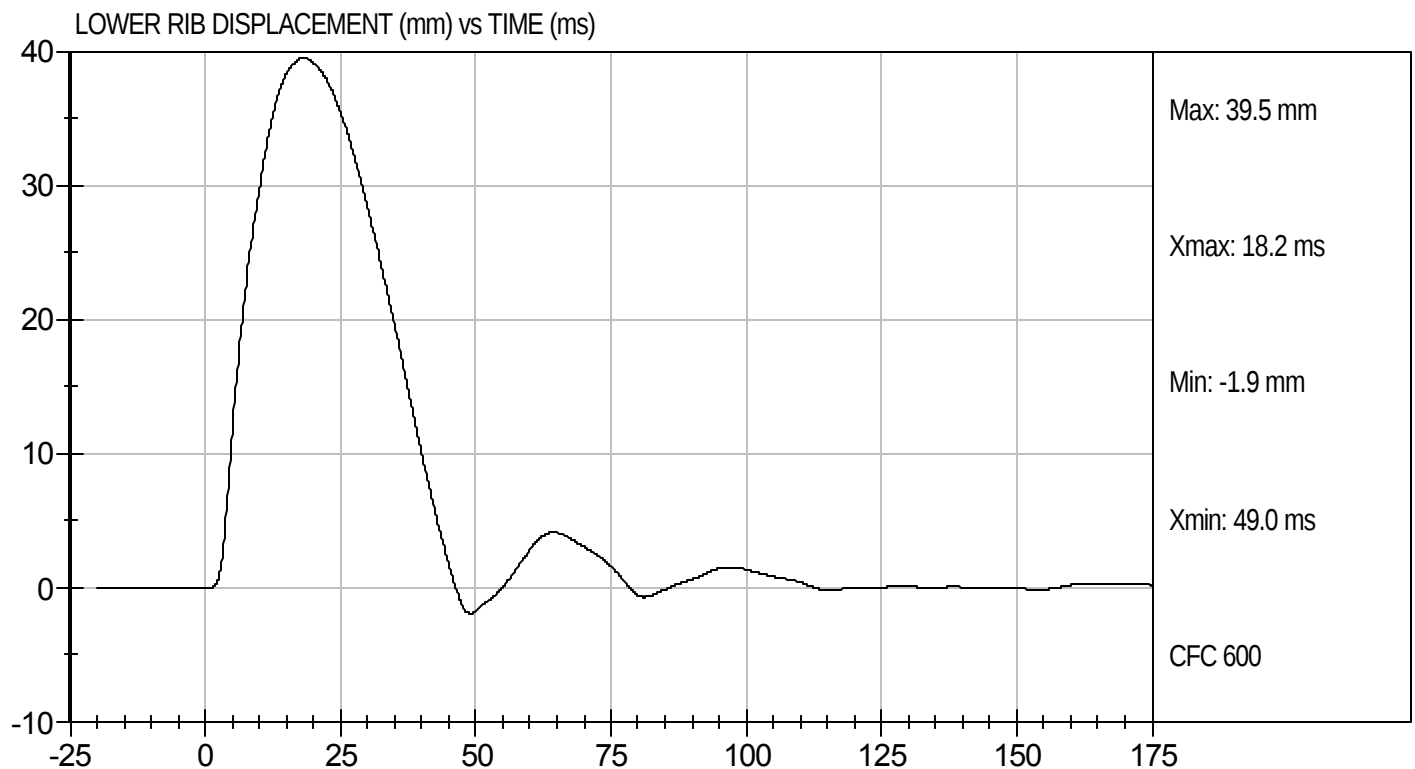
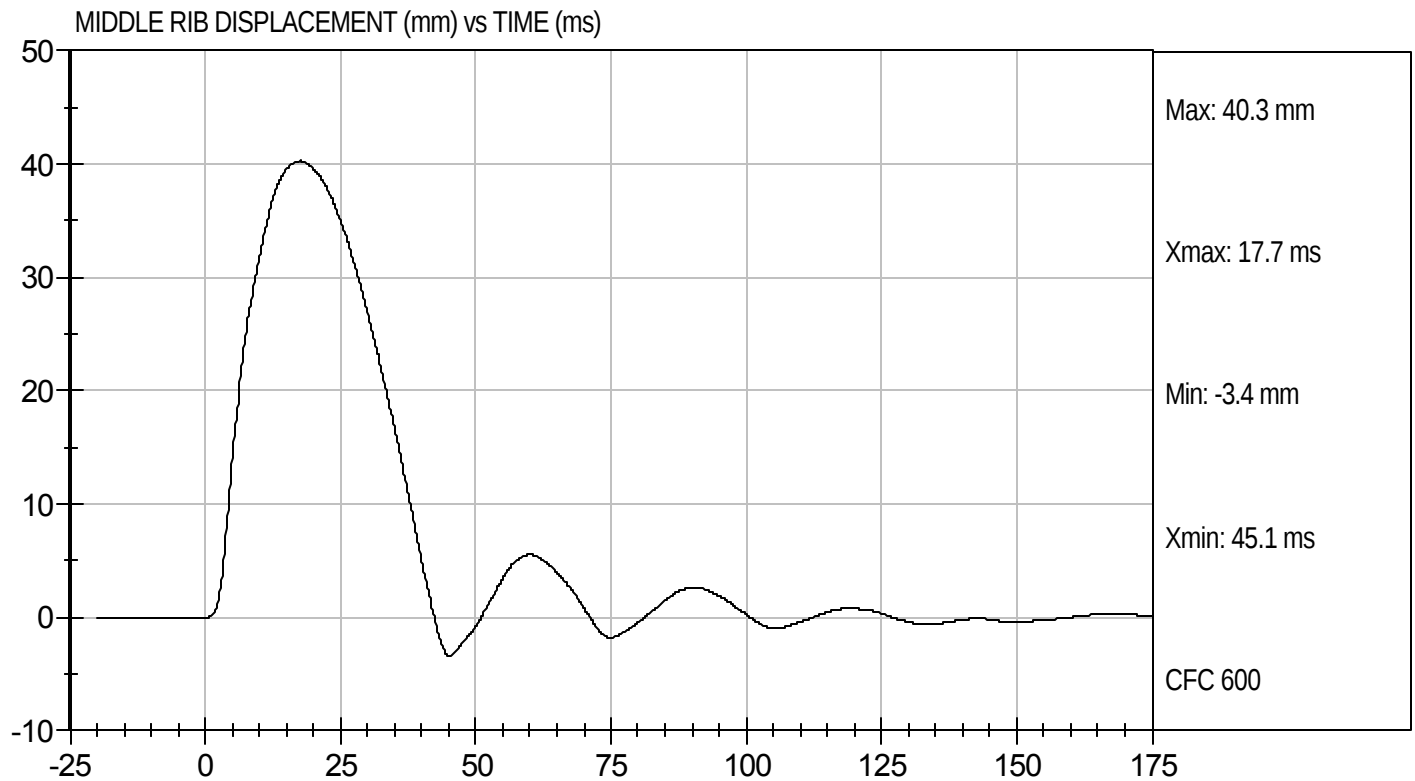
Test Date: 2/16/11
Velocity: 18.32 ft/s, 5.58 m/s





Test Desc: Thorax Impact
Component ID: D11550

Test Date: 2/16/11
Velocity: 18.32 ft/s, 5.58 m/s



MGA RESEARCH CORPORATION

HEAD DROP TEST

ES-2re DUMMY

ATD Serial No: 032

Test ID: D11661

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	24	Pass
Peak Resultant Acceleration	G's	125 to 155	154	Pass
Peak Lateral Acceleration	G's	+/- 15	-9	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 15% of peak	Yes	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

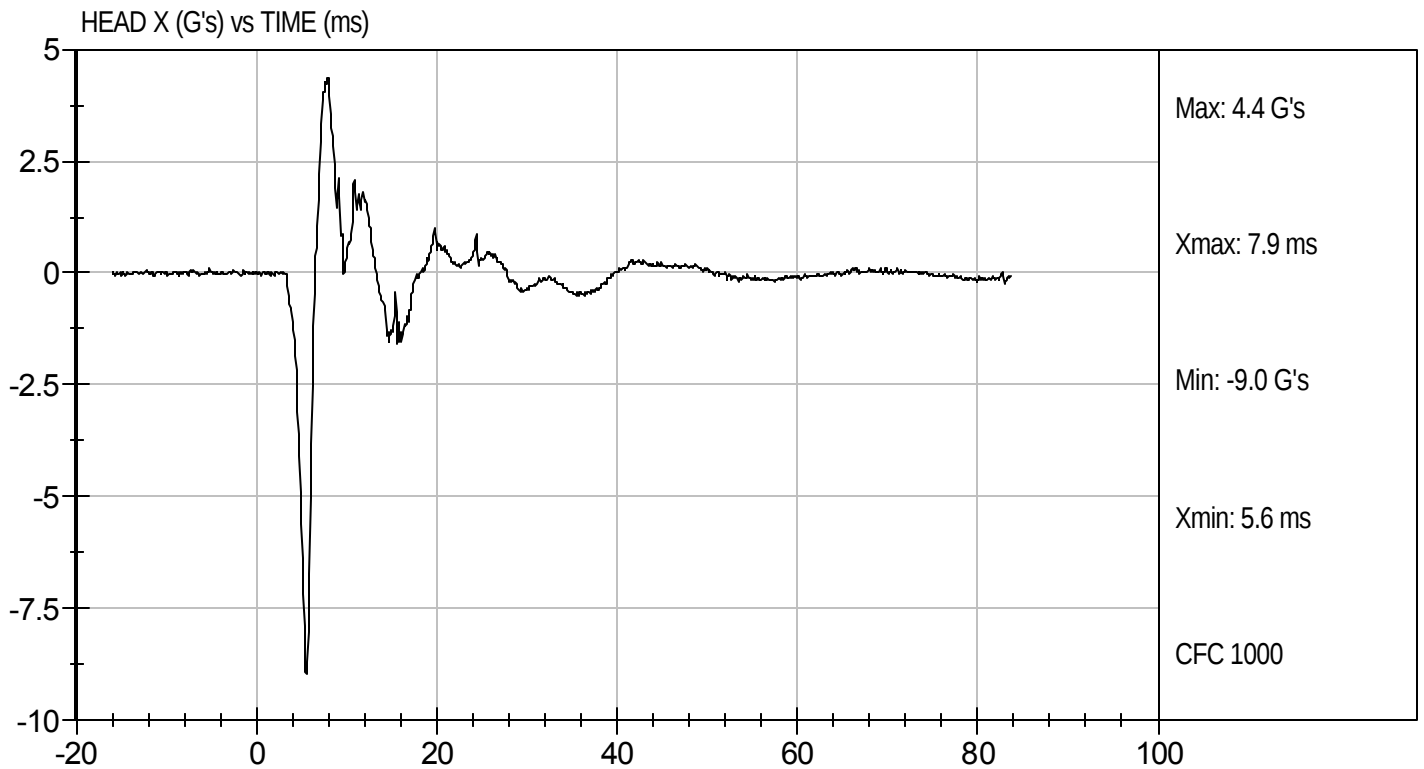
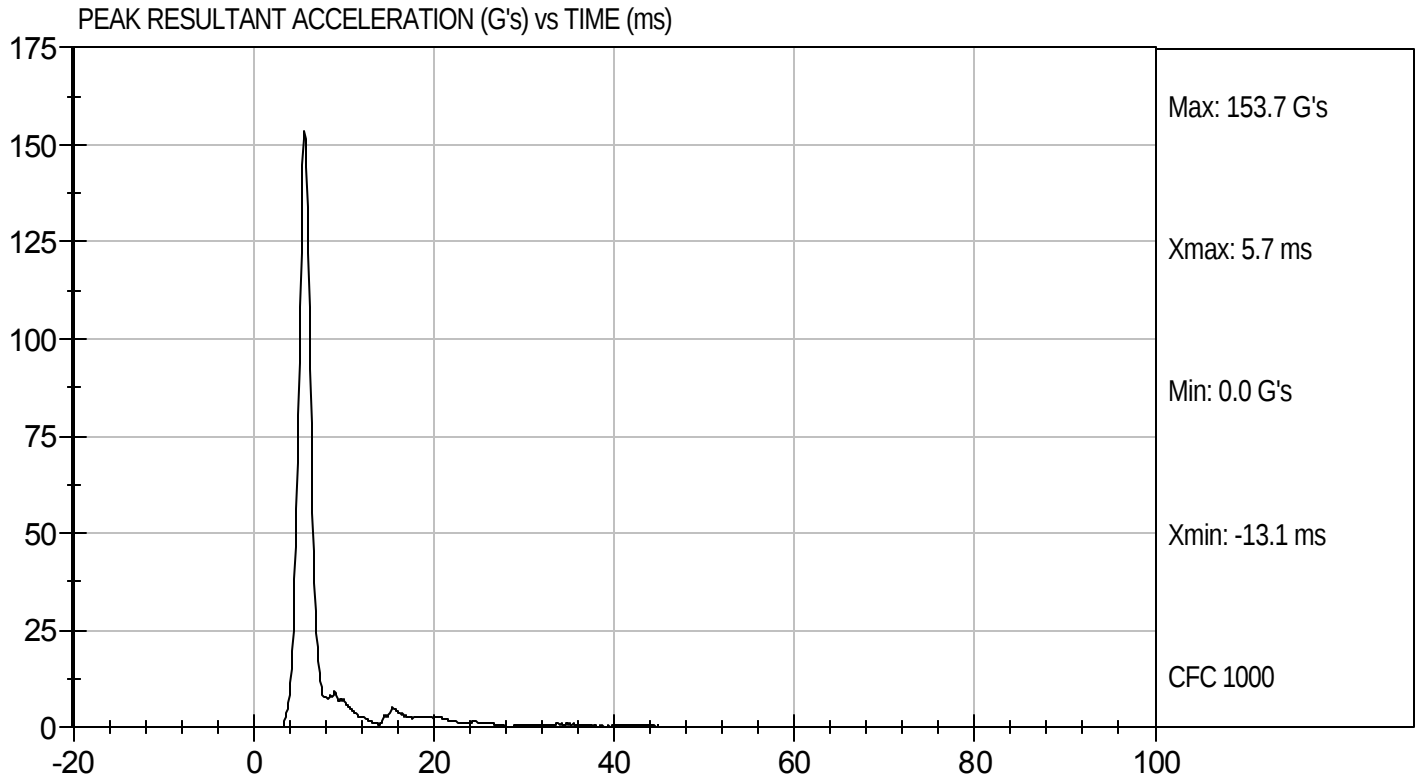
2/23/11
Test Date

David Winkelbauer
Approved By



Test Desc: Head Drop
Component ID: D11661

Test Date: 2/23/11
Velocity: 0 ft/s, 0 m/s

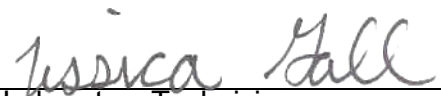


MGA RESEARCH CORPORATION
NECK PENDULUM TEST
ES-2re DUMMY

ATD Serial No: 032

Test I.D: D11662

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	18.0 to 22.0	21.0	Pass
Laboratory Relative Humidity		%	10 to 70	23	Pass
Pendulum Speed		m/s	3.3 to 3.5	3.4	Pass
Pendulum Deceleration	1 ms	m/s	0.00 to -0.05	-0.02	Pass
	3 ms	m/s	-0.25 to -0.375	-0.32	Pass
	14 ms	m/s	-3.20 to -3.70	-3.36	Pass
Maximum Flexion Angle		deg	49.0 to 59.0	51.3	Pass
Time of Maximum Flexion Angle		ms	54.0 to 66.0	59.5	Pass
Head Rotation Decay Time to 0 degree		ms	53.0 to 88.0	61.1	Pass
Overall Test Results					Pass


 Laboratory Technician

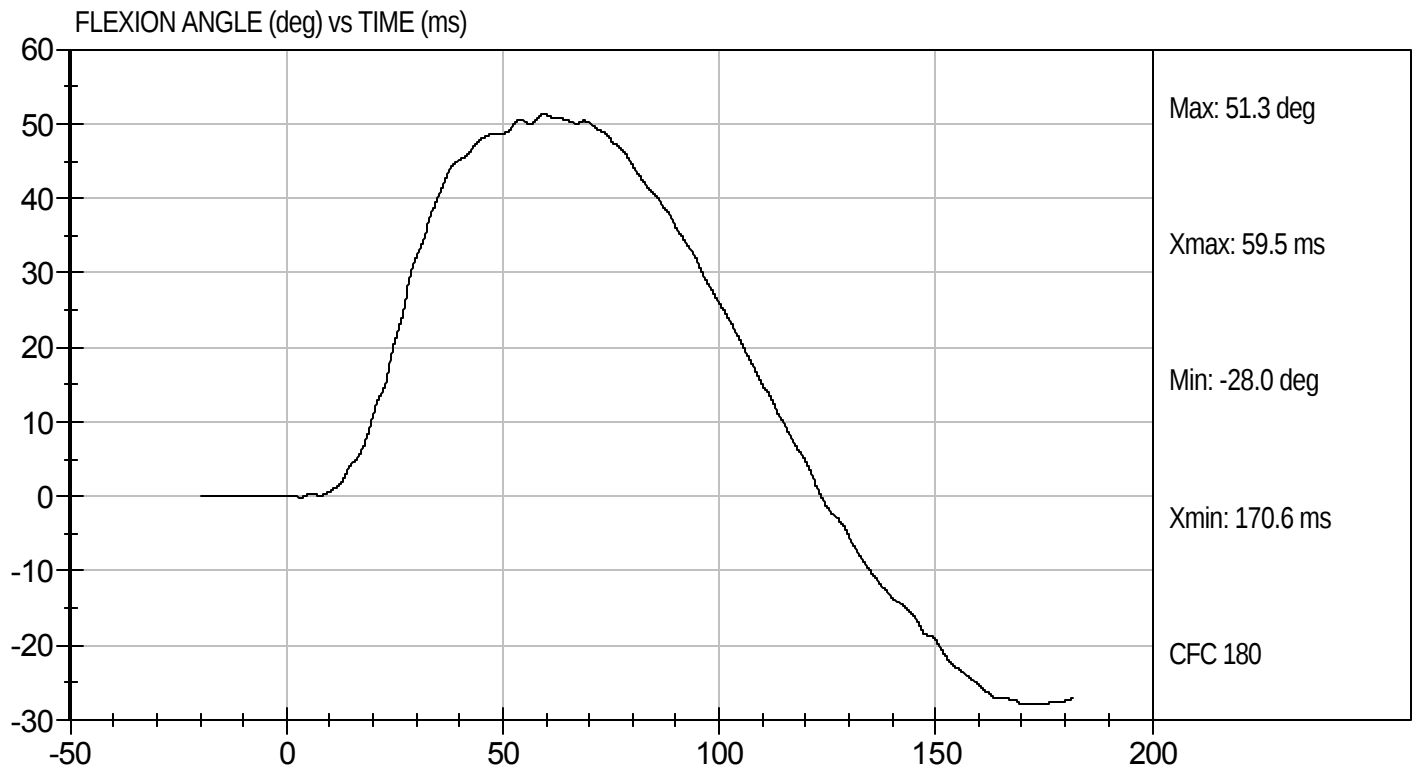
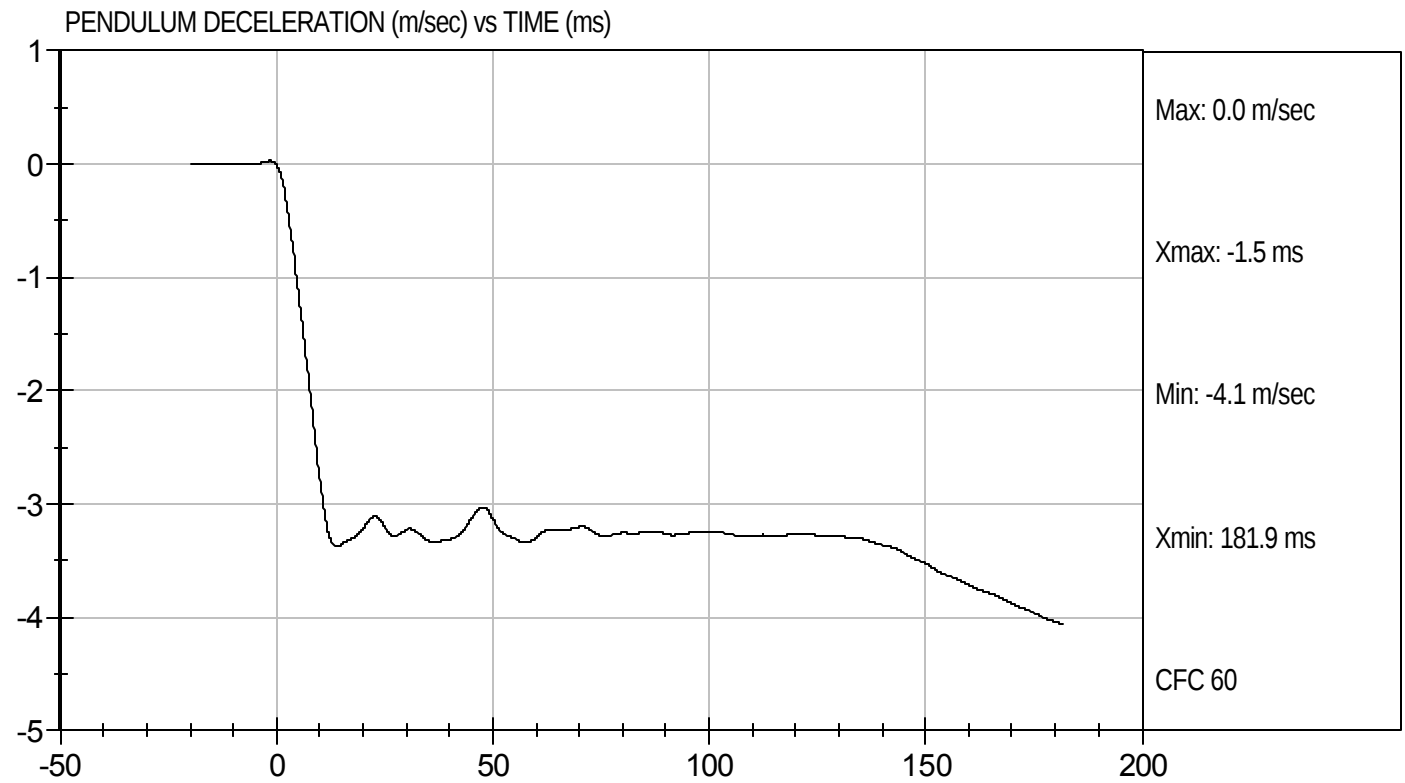
2/23/11
 Test Date


 Approved By



Test Desc: Neck Bending
Component ID: D11662

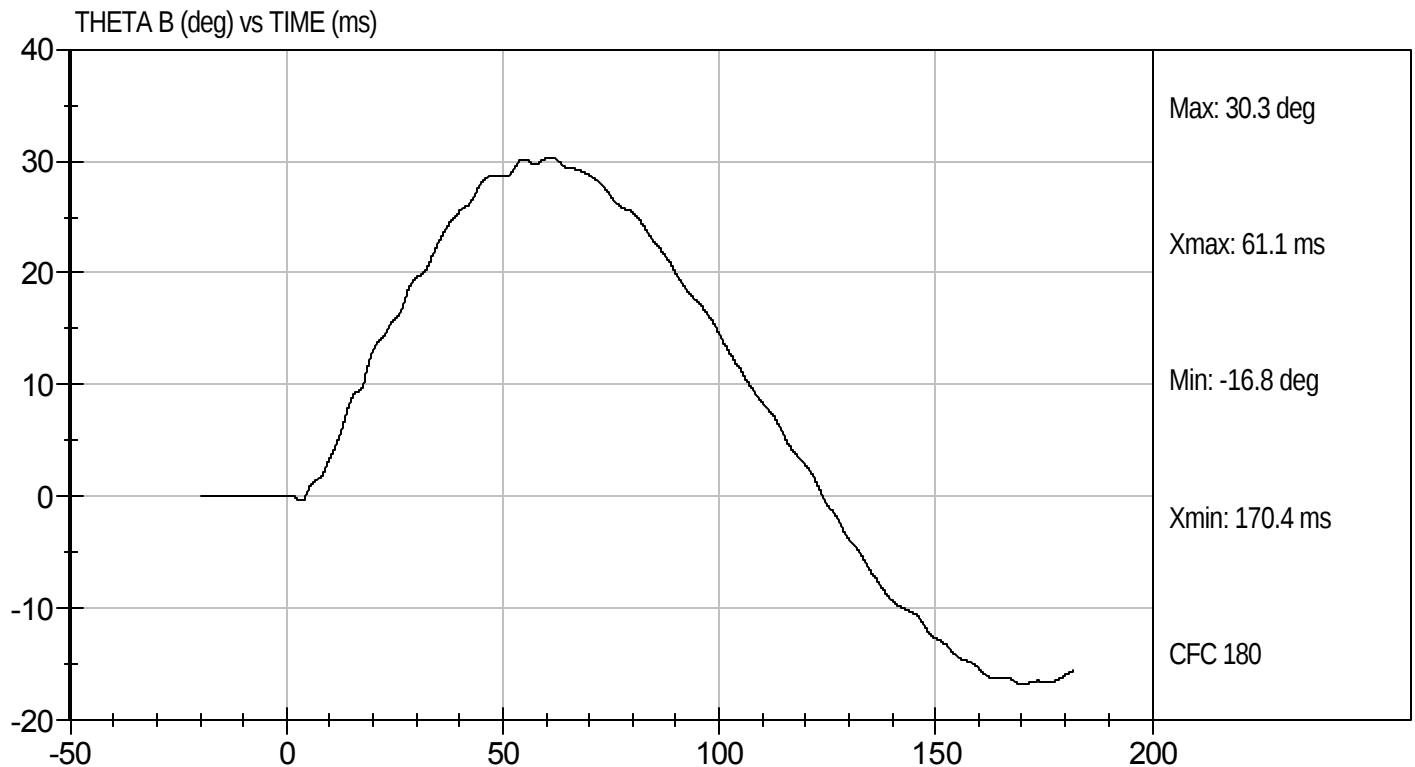
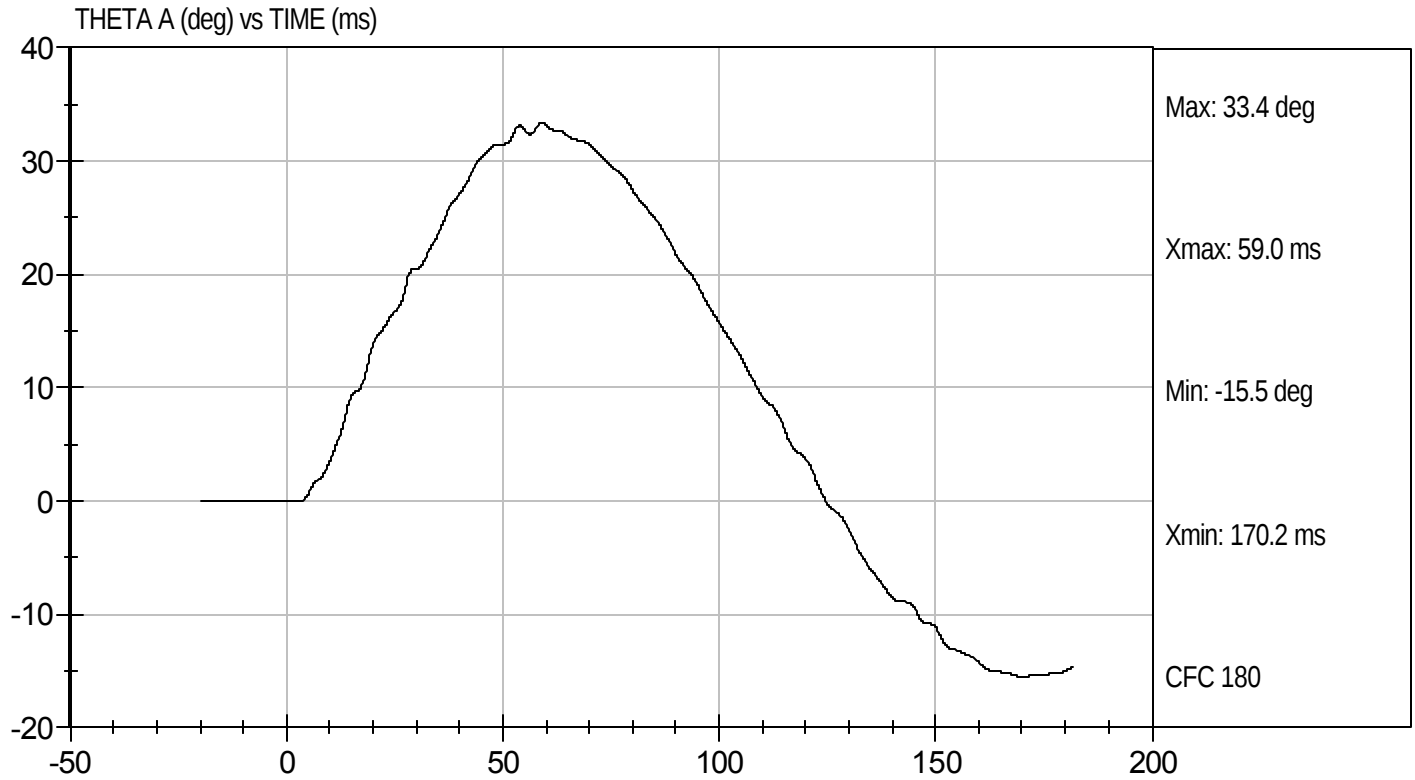
Test Date: 2/23/11
Velocity: 11.26 ft/s, 3.4 m/s





Test Desc: Neck Bending
Component ID: D11662

Test Date: 2/23/11
Velocity: 11.26 ft/s, 3.4 m/s



MGA RESEARCH CORPORATION
SHOULDER IMPACT TEST
ES-2re DUMMY

ATD Serial No: 032

Test I.D: D11663

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	23	Pass
Pendulum Speed	m/s	4.2 to 4.4	4.3	Pass
Peak Shoulder Acceleration	G's	7.5 to 10.5	10.1	Pass
Time of Peak Shoulder Acceleration	ms	NA	32.4	Pass
Overall Test Results			Pass	


Laboratory Technician

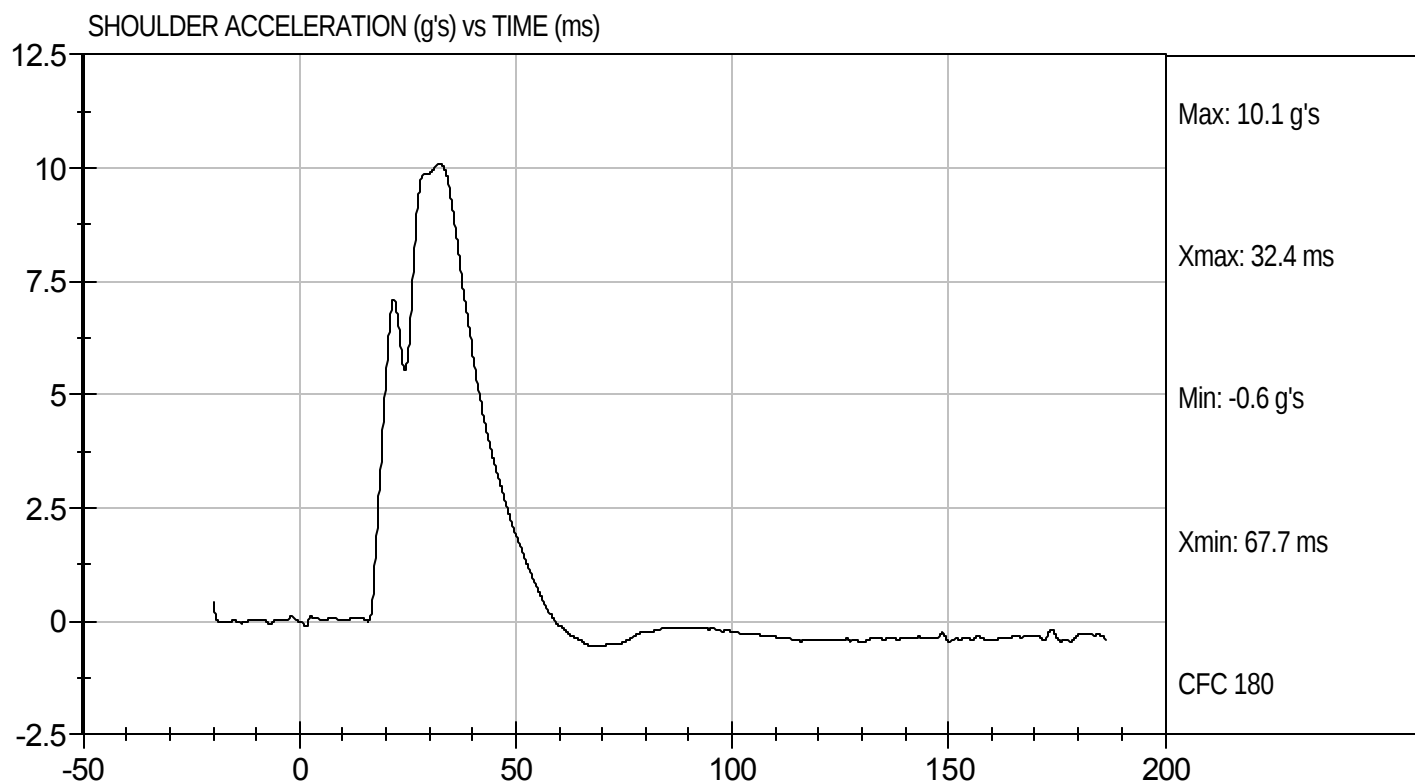
2/23/11
Test Date


Approved By



Test Desc: Shoulder Impact
Component ID: D11663

Test Date: 2/23/11
Velocity: 14.25 ft/s, 4.3 m/s



MGA RESEARCH CORPORATION

UPPER RIB TEST

ES-2re DUMMY

ATD Serial No: 032

Test I.D: D11664

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	23	Pass
Displacement at 3 m/s	mm	36.0 to 40.0	37.9	Pass
Displacement at 4 m/s	mm	46.0 to 51.0	48.1	Pass
			Overall Test Results	Pass

Jessica Hall
Laboratory Technician

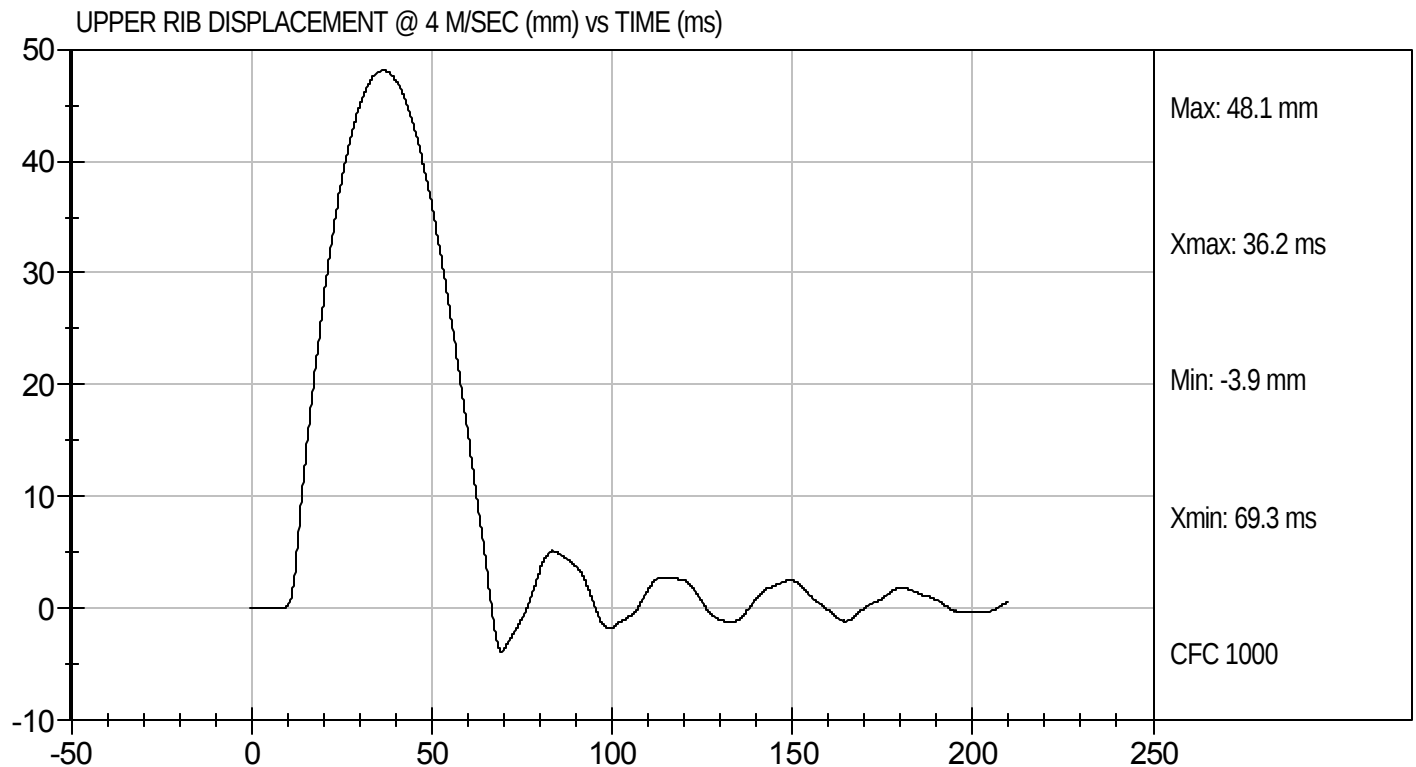
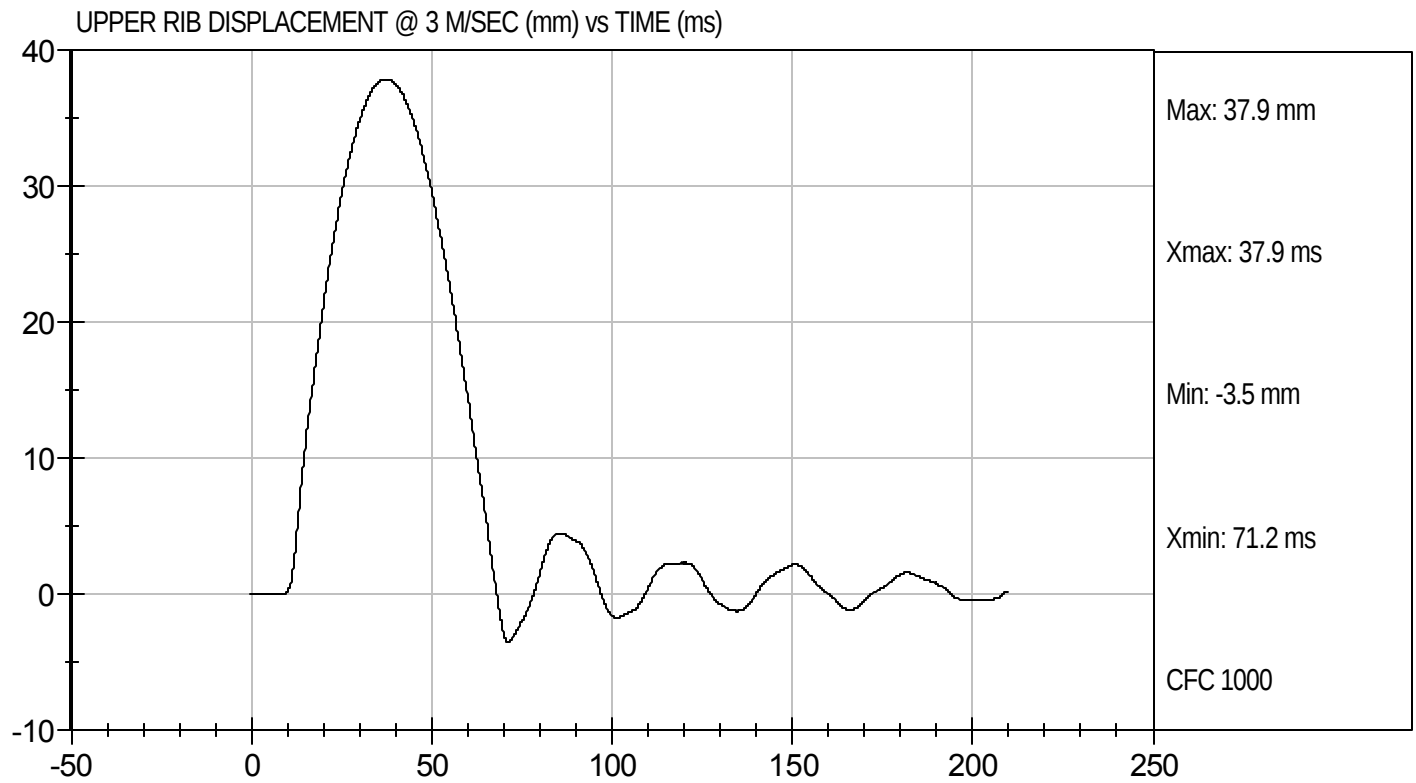
2/23/11
Test Date

David Winkelbauer
Approved By



Test Desc: Rib Impact - Upper
Component ID: D11664

Test Date: 2/23/11



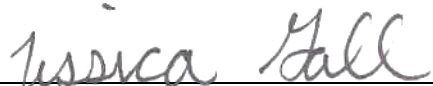
MGA RESEARCH CORPORATION

MID RIB TEST
ES-2re DUMMY

ATD Serial No: 032

Test I.D: D11665

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	23	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

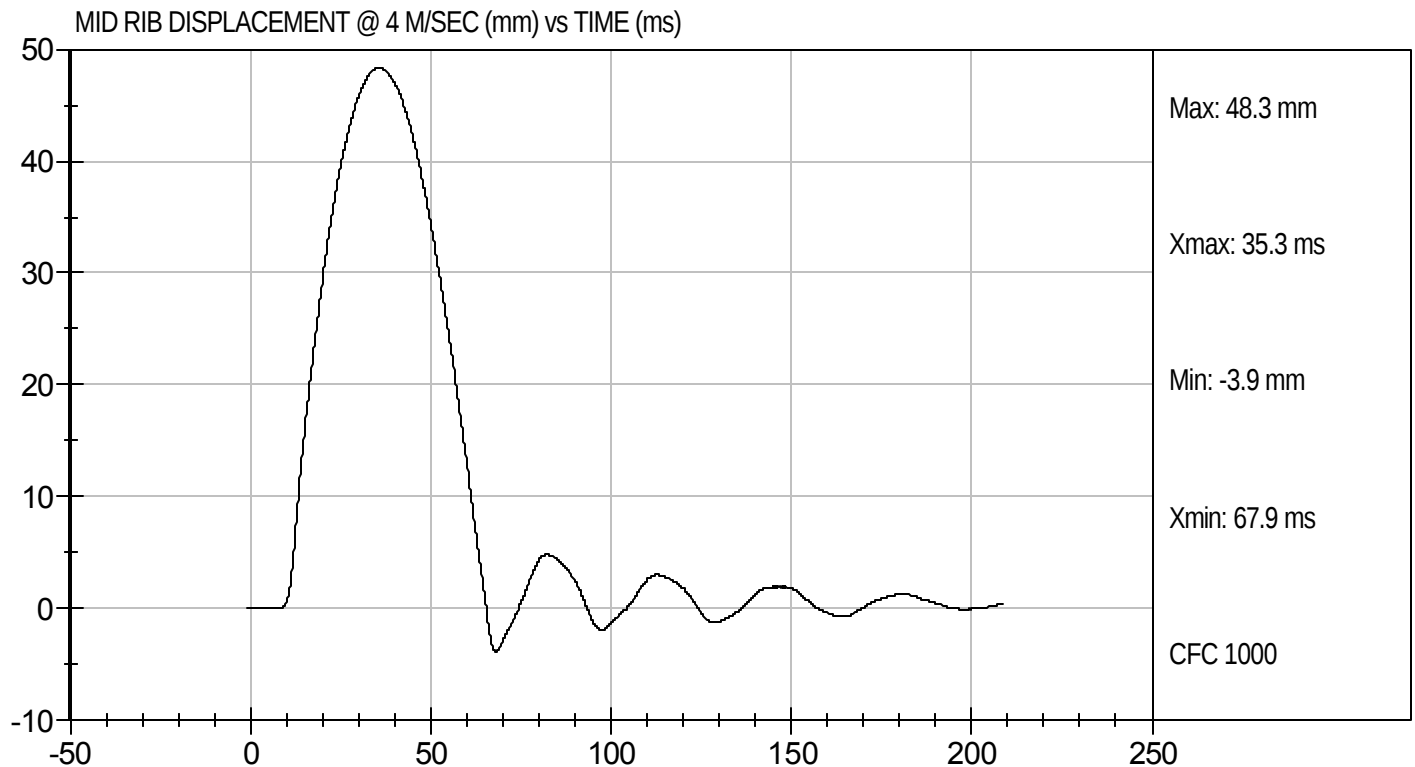
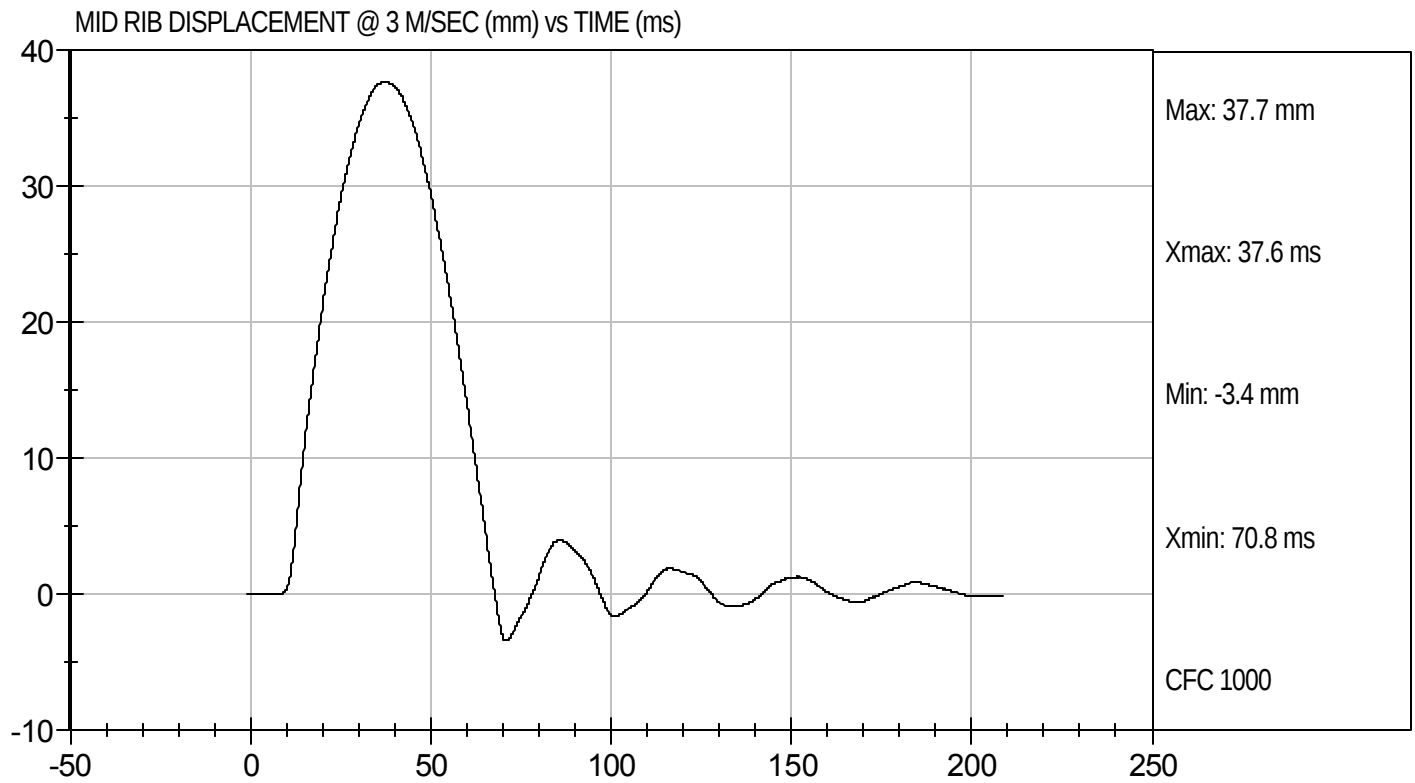
2/23/11
Test Date


Approved By



Test Desc: Rib Impact - Mid
Component ID: D11665

Test Date: 2/23/11



MGA RESEARCH CORPORATION

LOWER RIB TEST

ES-2re DUMMY

ATD Serial No: 032

Test I.D: D11666

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	23	Pass
Displacement at 3 m/s	mm	36.0 to 40.0	39.0	Pass
Displacement at 4 m/s	mm	46.0 to 51.0	49.1	Pass
Overall Test Results			Pass	

Jessica Gall
Laboratory Technician

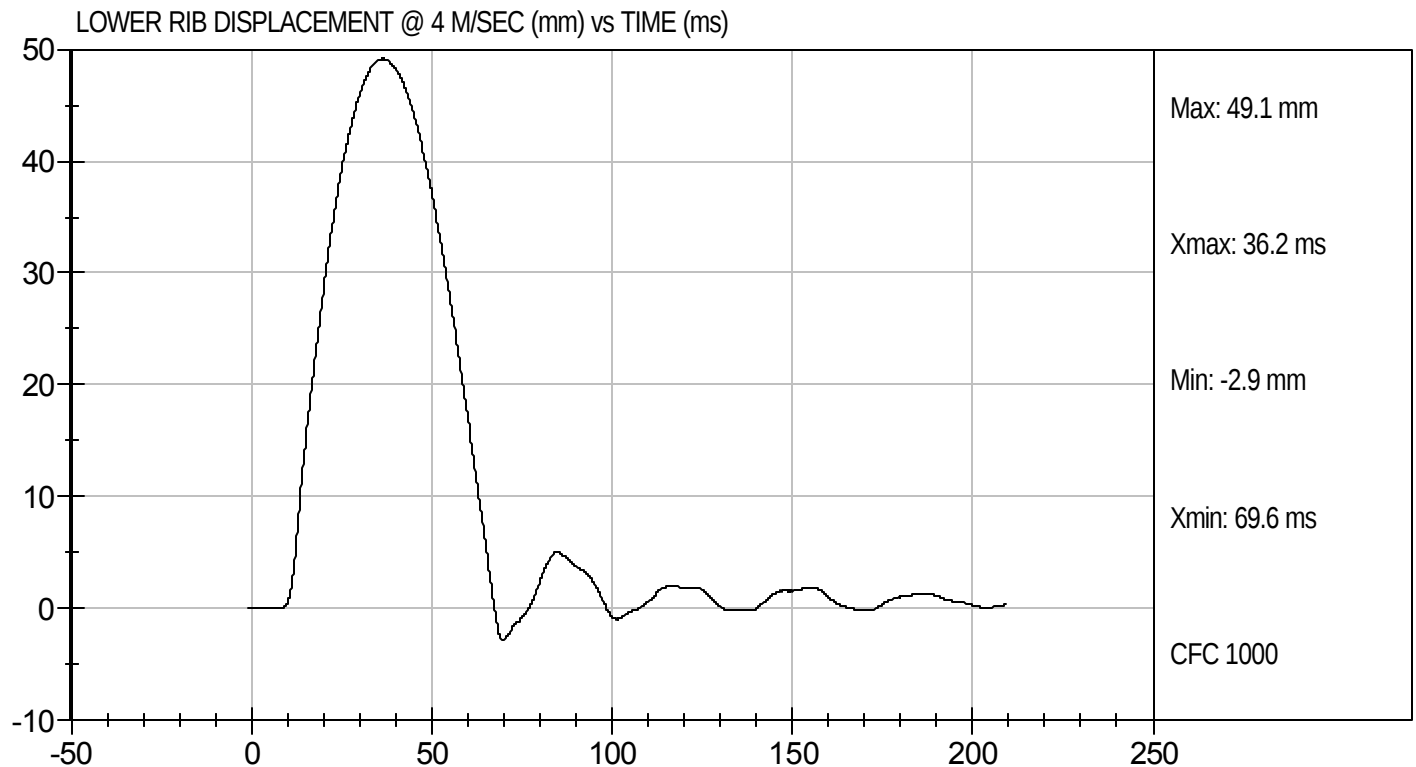
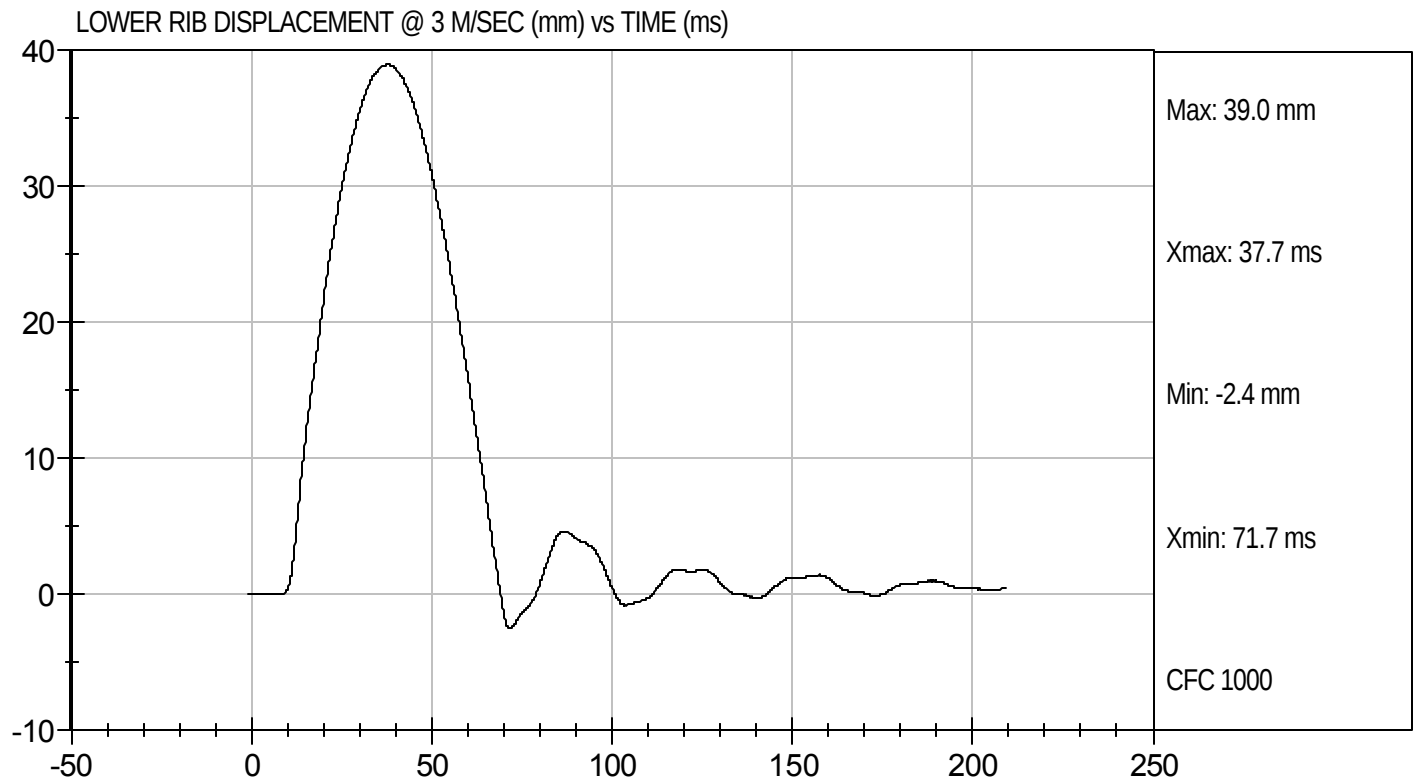
2/23/11
Test Date

David Winkelbauer
Approved By



Test Desc: Rib Impact - Lower
Component ID: D11666

Test Date: 2/23/11



MGA RESEARCH CORPORATION

ABDOMEN TEST

ES-2re DUMMY

ATD Serial No: 032

Test I.D: D11667

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	23	Pass
Probe Speed	m/s	3.90 to 4.10	4.06	Pass
Maximum Impact Force	kN	4.00 to 4.80	4.19	Pass
Time of Maximum Impactor Force	ms	10.60 to 13.00	10.70	Pass
Maximum Total Abdomen Force	kN	2.20 to 2.70	2.39	Pass
Time of Maximum Abdomen Force	ms	10.00 to 12.30	10.20	Pass
Overall Test Results			Pass	

Jessica Hall
Laboratory Technician

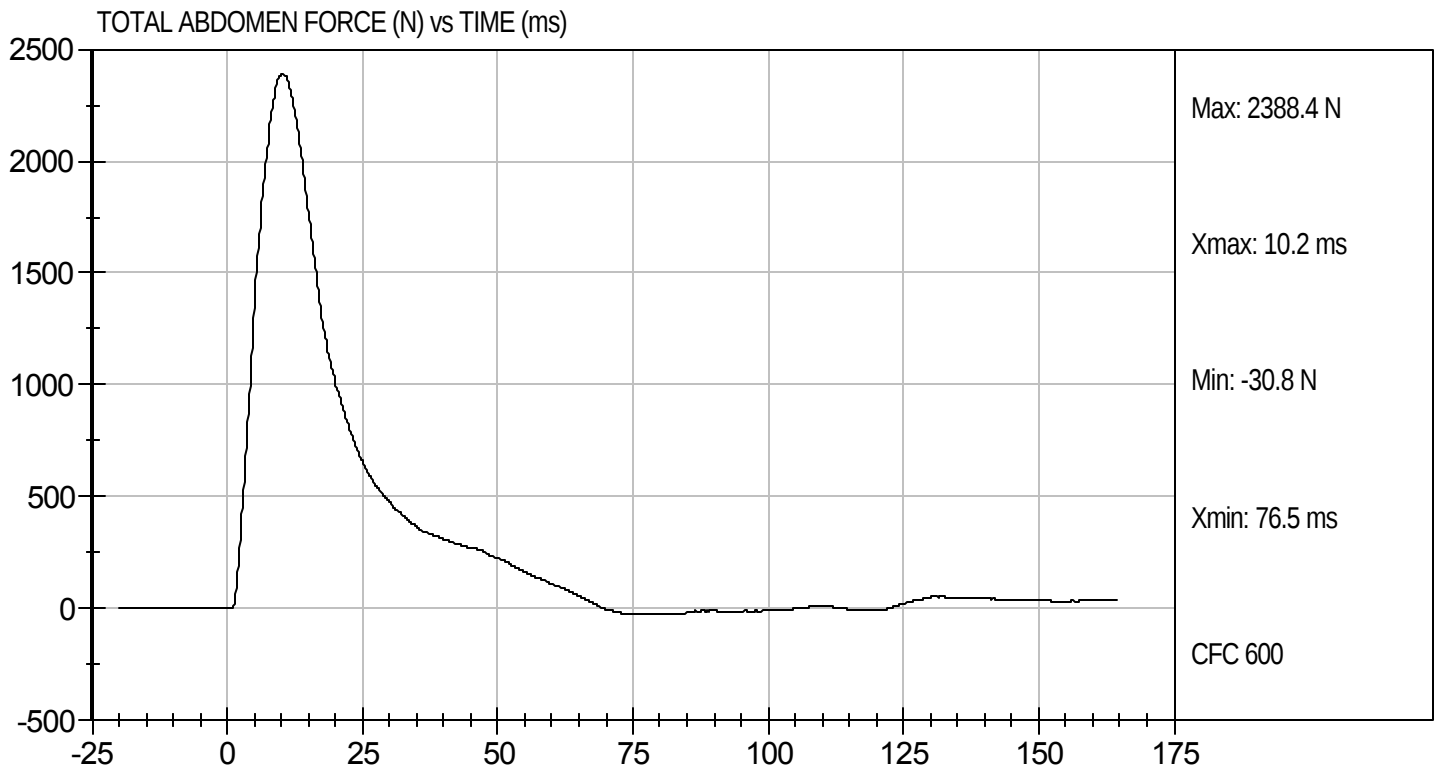
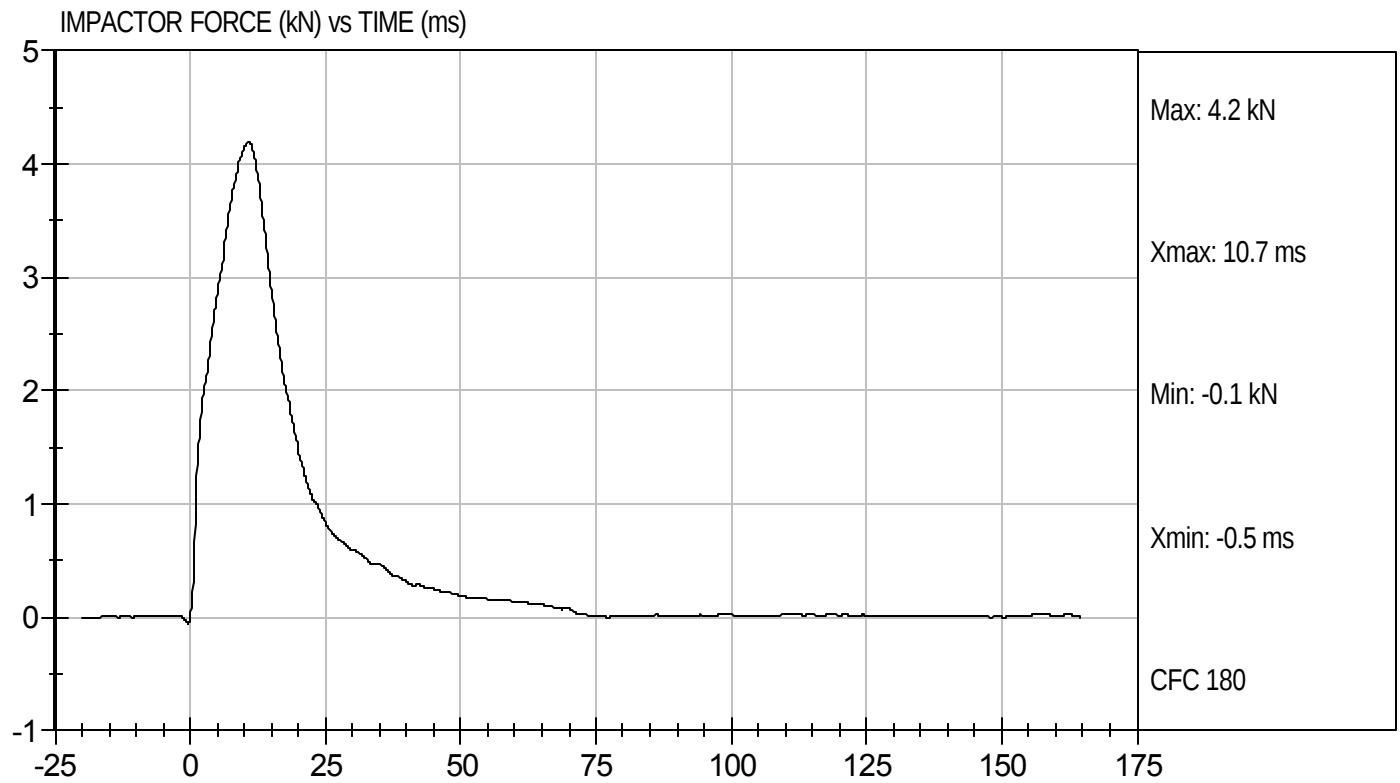
2/23/11
Test Date

David Winkelbauer
Approved By



Test Desc: Abdomen Impact
Component ID: D11667

Test Date: 2/23/11
Velocity: 13.33 ft/s, 4.06 m/s

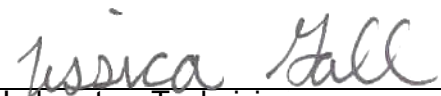


MGA RESEARCH CORPORATION
LUMBAR SPINE TEST
ES-2re DUMMY

ATD Serial No: 032

Test I.D: D11668

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	24	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	-6.09	Pass
	30 ms	m/s	>= -6.5	-5.96	Pass
Maximum Flexion Angle		deg	45.0 to 55.0	49.9	Pass
Time of Maximum Flexion Angle		ms	39.0 to 53.0	39.2	Pass
Headform Rotation Decay to Initial Position		ms	37 to 57	40	Pass
Overall Results					Pass


 Laboratory Technician

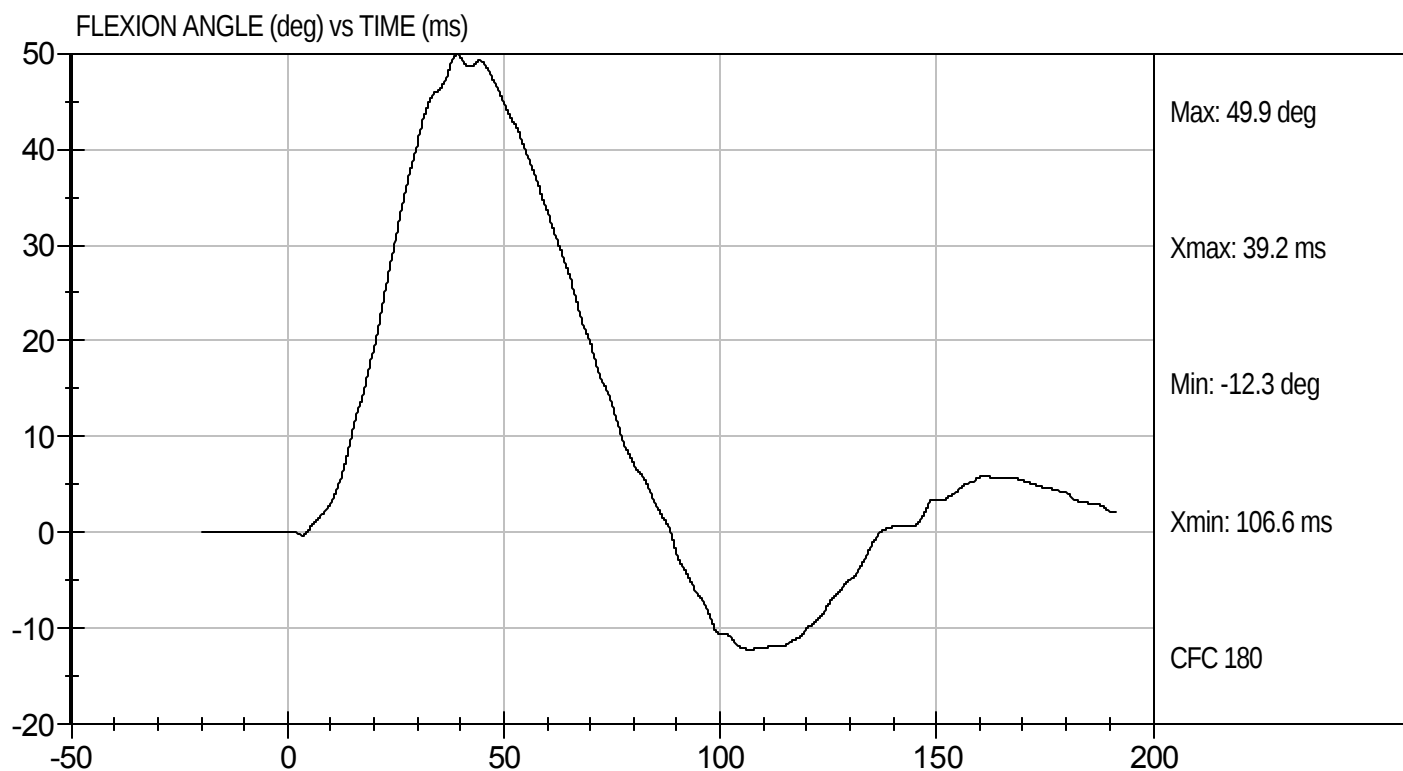
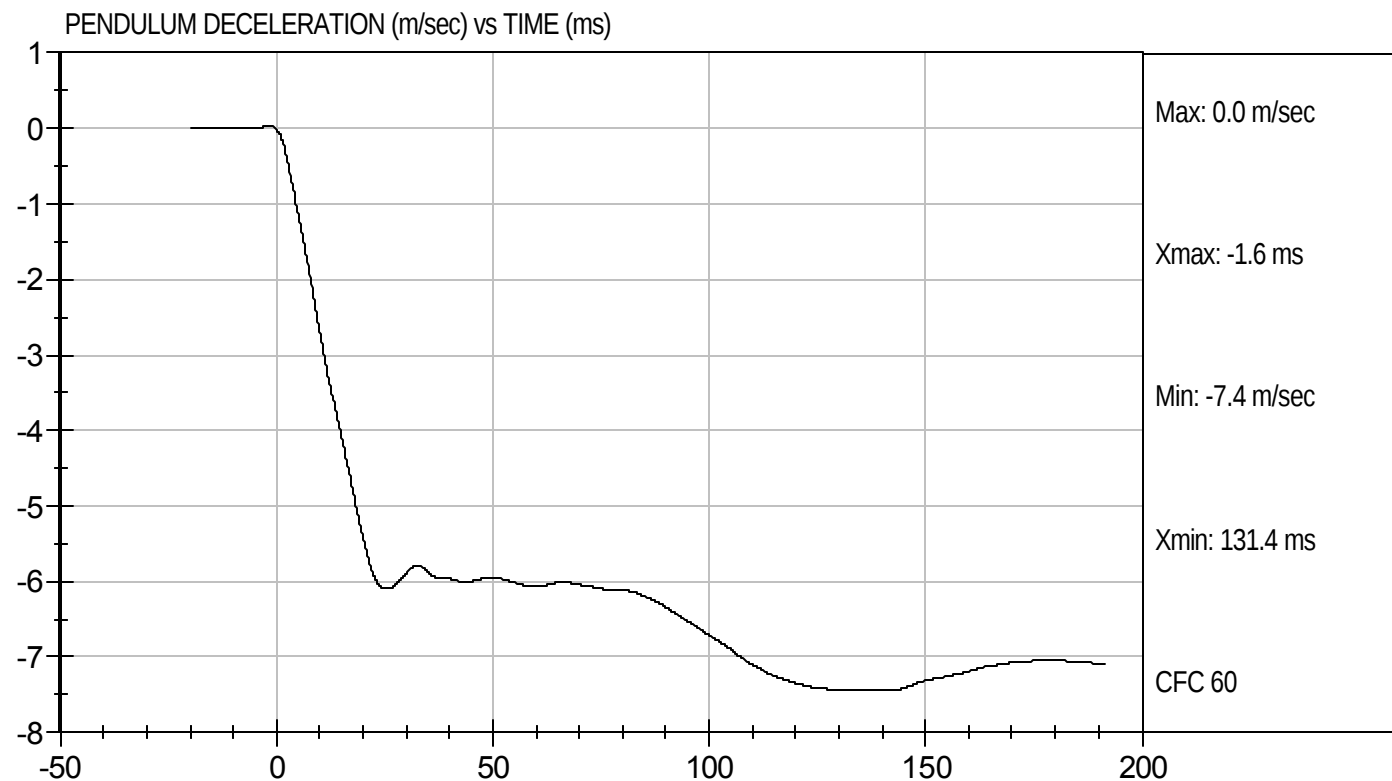
2/23/11
 Test Date


 Approved By



Test Desc: Lumbar Bending
Component ID: D11668

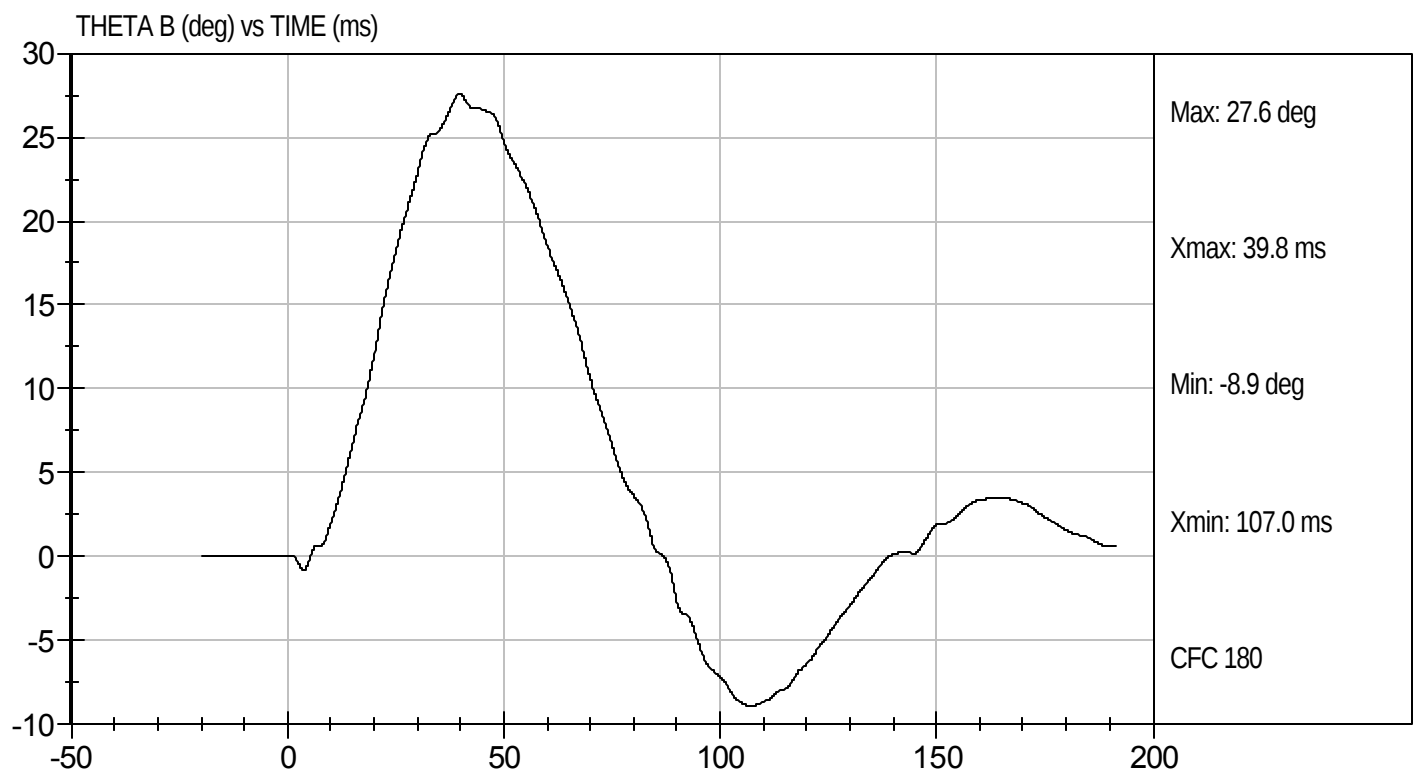
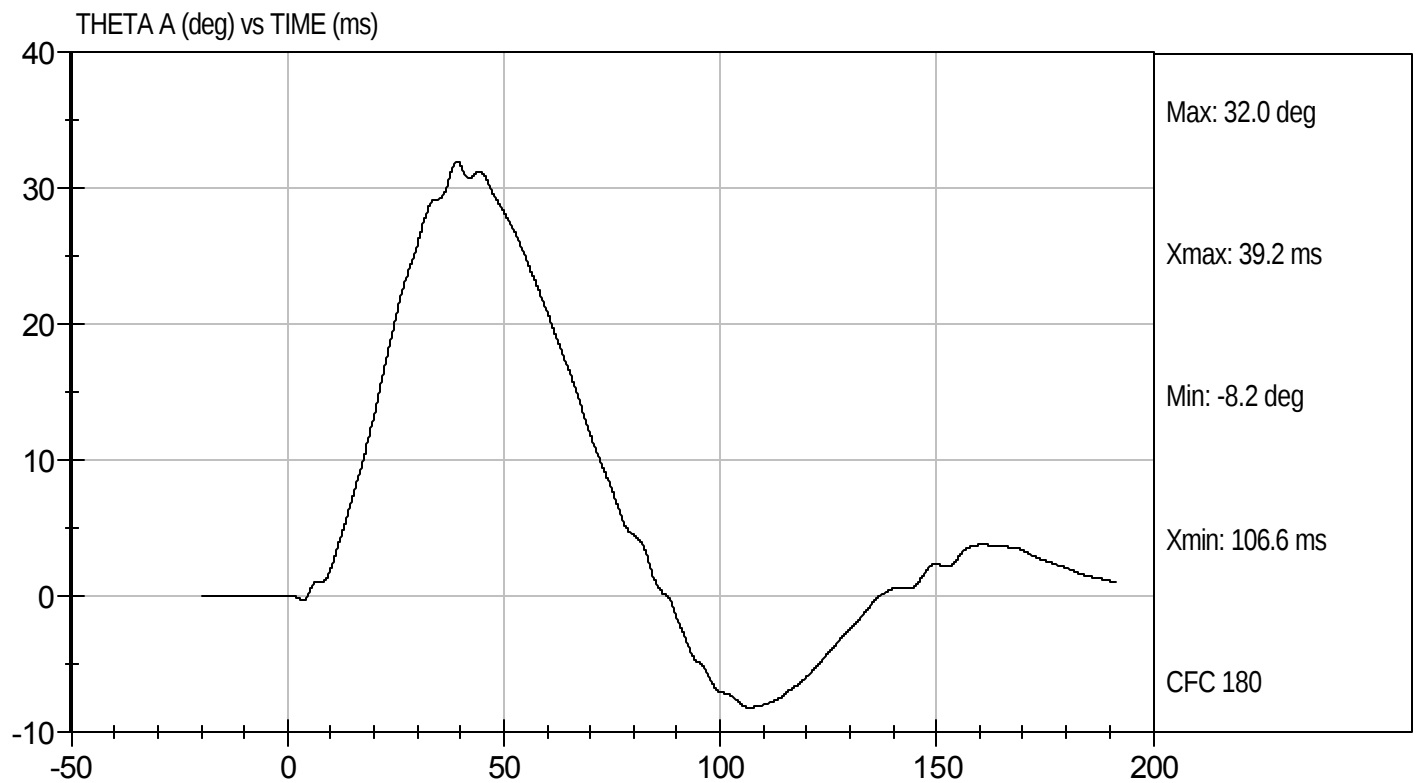
Test Date: 2/23/11
Velocity: 20.08 ft/s, 6.12 m/s





Test Desc: Lumbar Bending
Component ID: D11668

Test Date: 2/23/11
Velocity: 20.08 ft/s, 6.12 m/s



MGA RESEARCH CORPORATION

**PELVIS TEST
ES-2re DUMMY**

ATD Serial No: 032

Test I.D: D11669

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	22	Pass
Probe Speed	m/s	4.20 to 4.40	4.34	Pass
Maximum Impactor Force	kN	4.70 to 5.40	4.75	Pass
Time of Maximum Impactor Force	ms	11.80 to 16.10	12.30	Pass
Maximum Pubic Force	kN	1.23 to 1.59	1.39	Pass
Time of Maximum Pubic Force	ms	12.20 to 17.00	13.30	Pass
Overall Test Results				Pass


Laboratory Technician

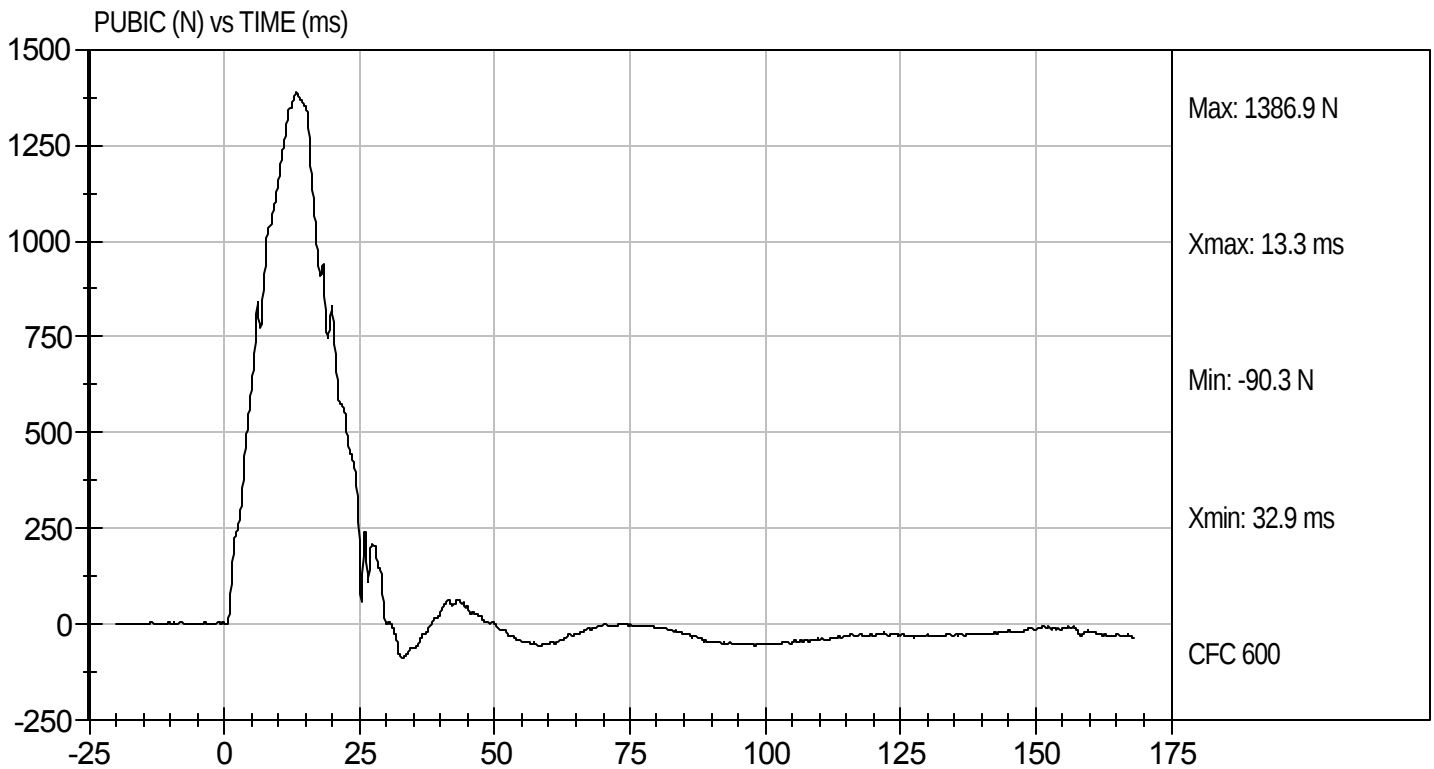
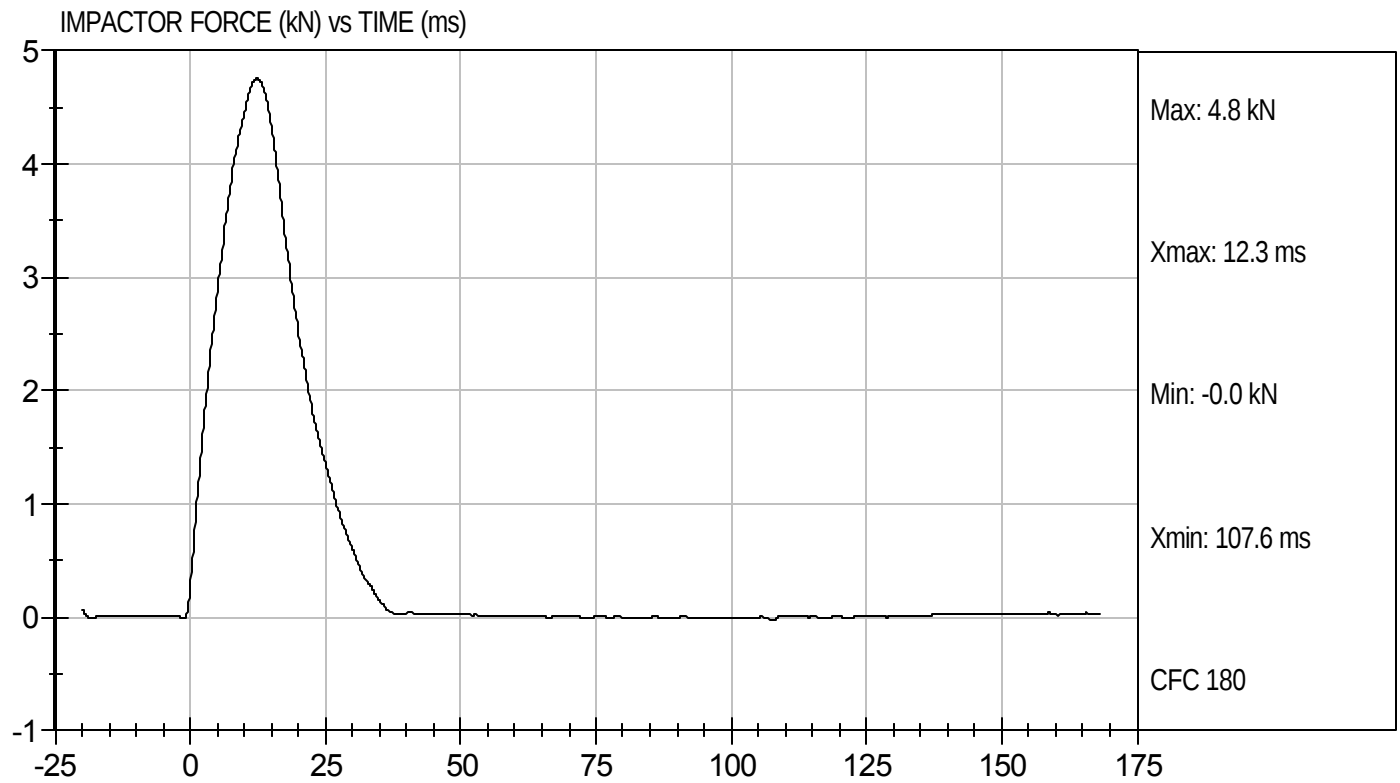
2/23/11
Test Date


Approved By



Test Desc: Pelvis Impact
Component ID: D11669

Test Date: 2/23/11
Velocity: 14.25 ft/s, 4.35 m/s



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

ATD Serial No: 032

Test I.D: D11660

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	22	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	5.13	Pass
Upper Rib Displacement	mm	34.0 to 41.0	39.1	Pass
Middle Rib Displacement	mm	37.0 to 45.0	40.7	Pass
Lower Rib Displacement	mm	37.0 to 44.0	39.5	Pass
Overall Test Results			Pass	


Laboratory Technician

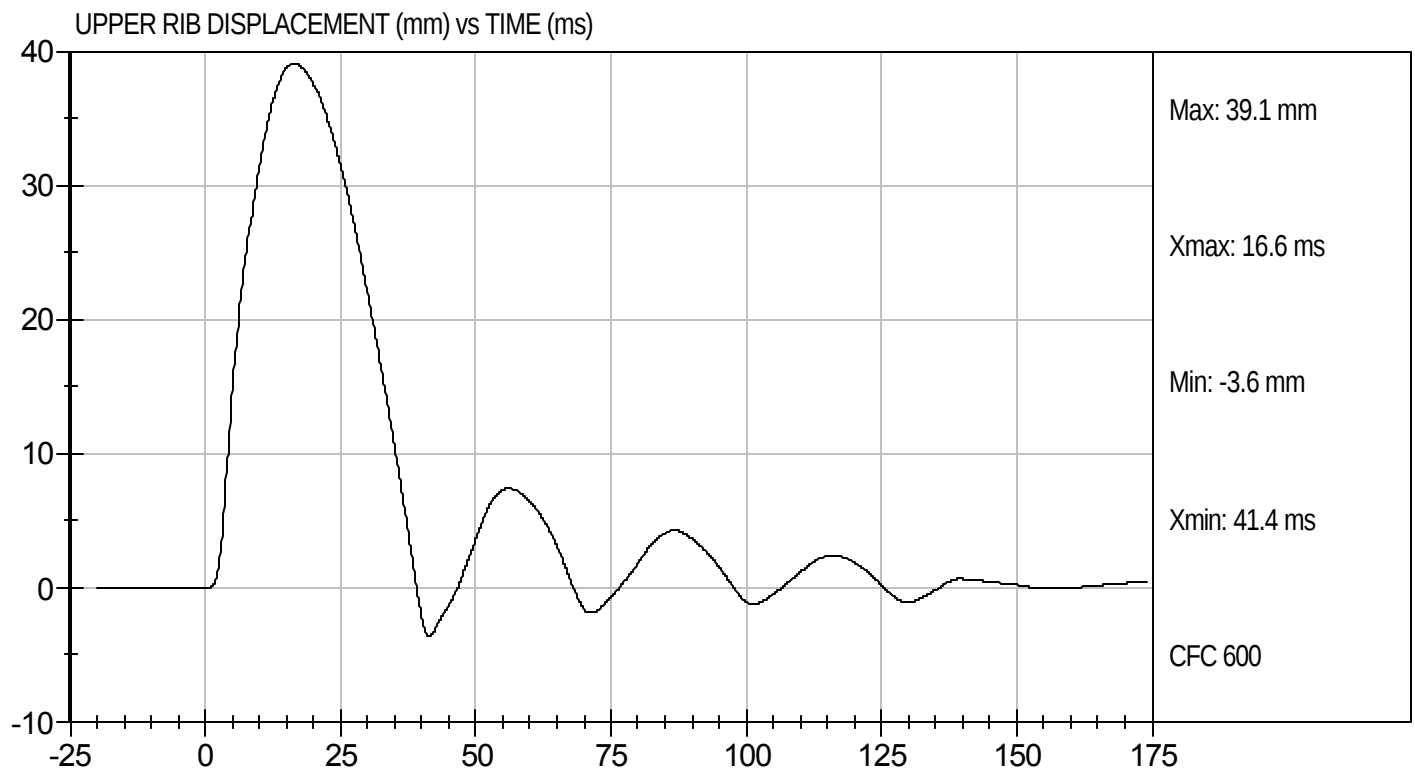
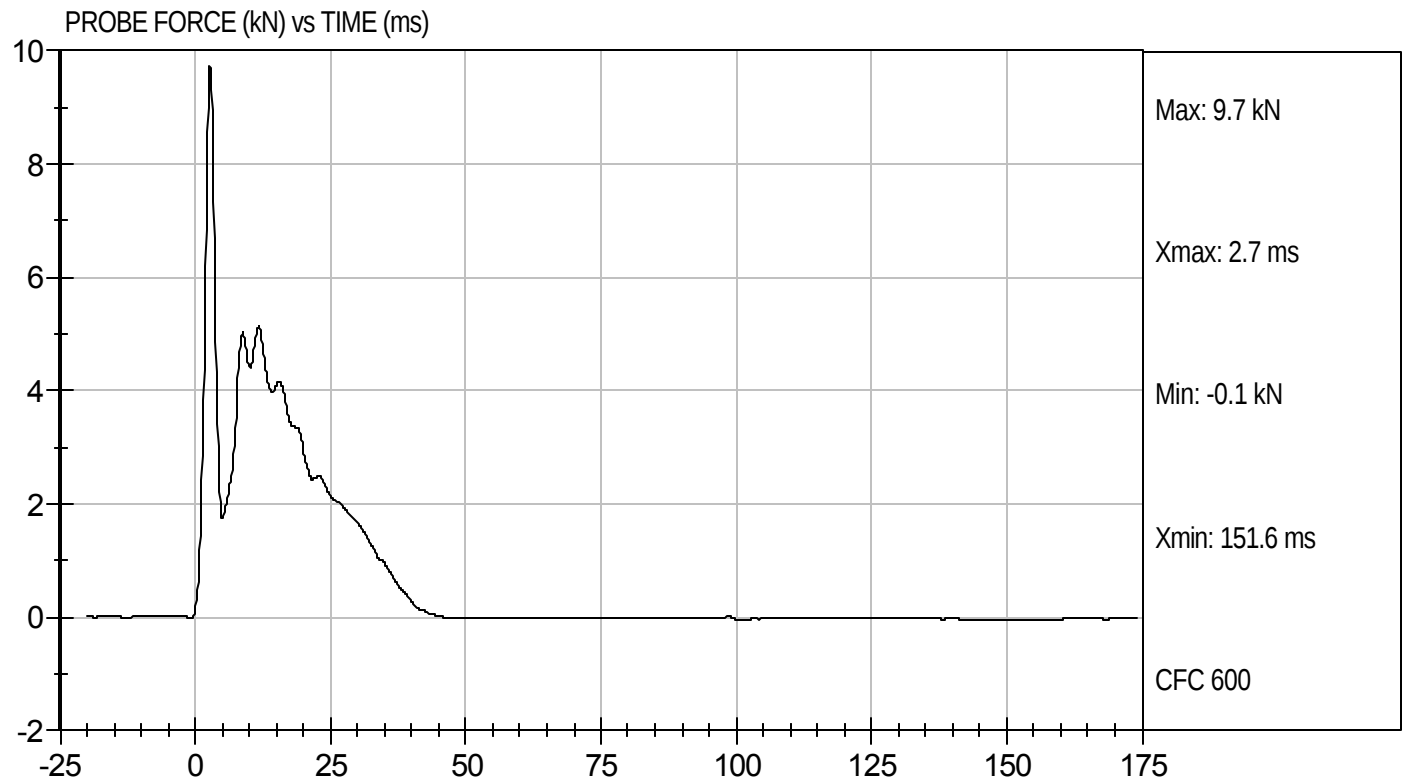
2/23/11
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D11660

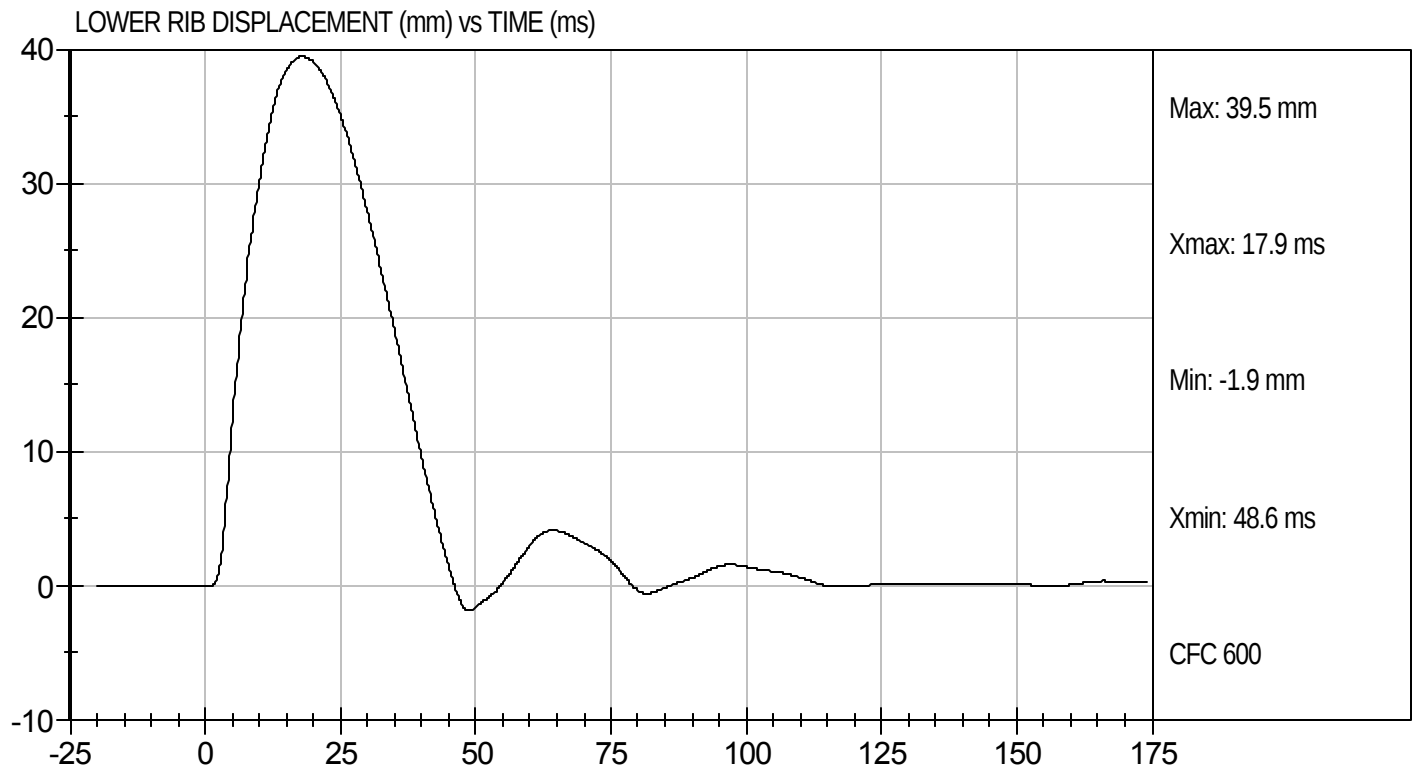
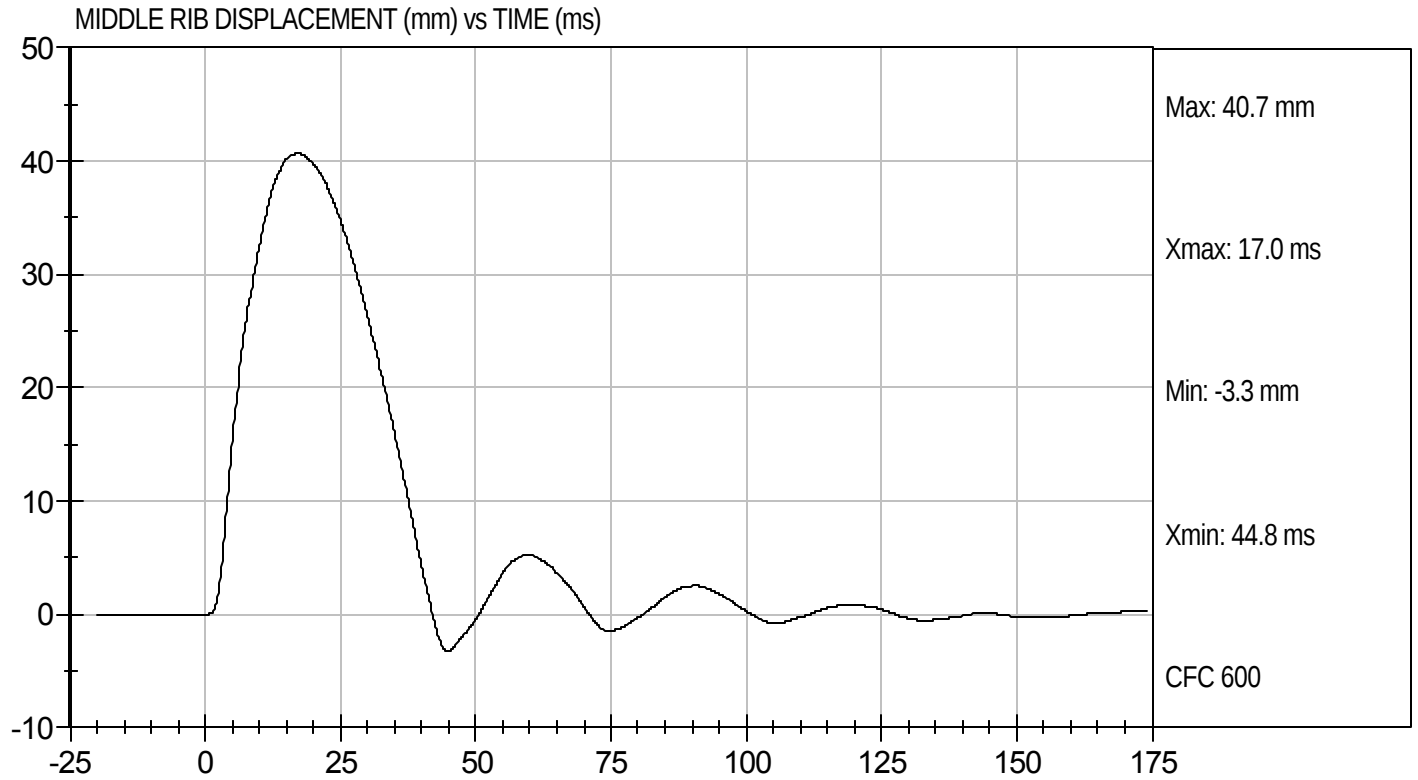
Test Date: 2/23/11
Velocity: 18.32 ft/s, 5.58 m/s





Test Desc: Thorax Impact
Component ID: D11660

Test Date: 2/23/11
Velocity: 18.32 ft/s, 5.58 m/s



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

ATD Serial No: 306

Test ID: D11541

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	19	Pass
Peak Resultant Acceleration	G's	115 to 137	120	Pass
Peak Lateral Acceleration	G's	+/- 15	-4.5	Pass
Unimodal	N/A	<15%	Yes	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

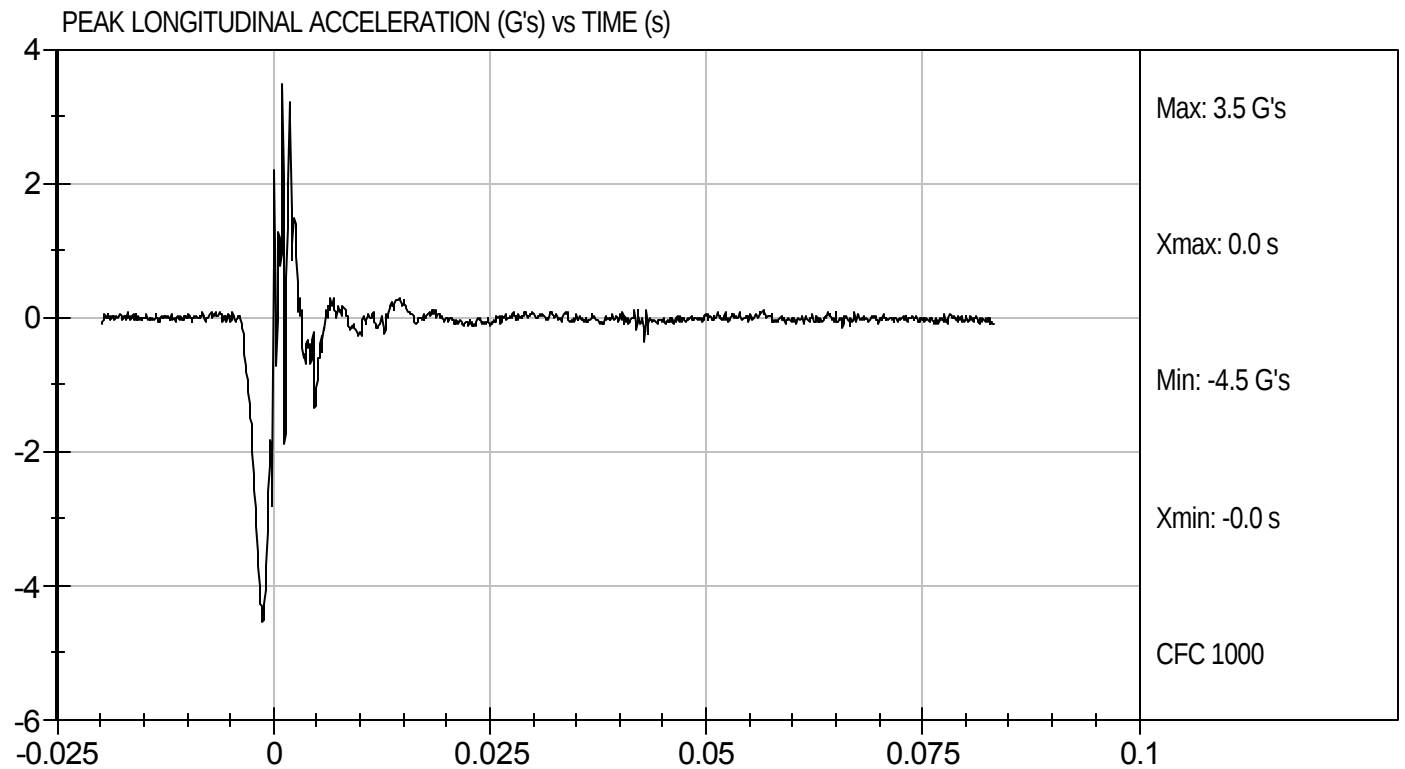
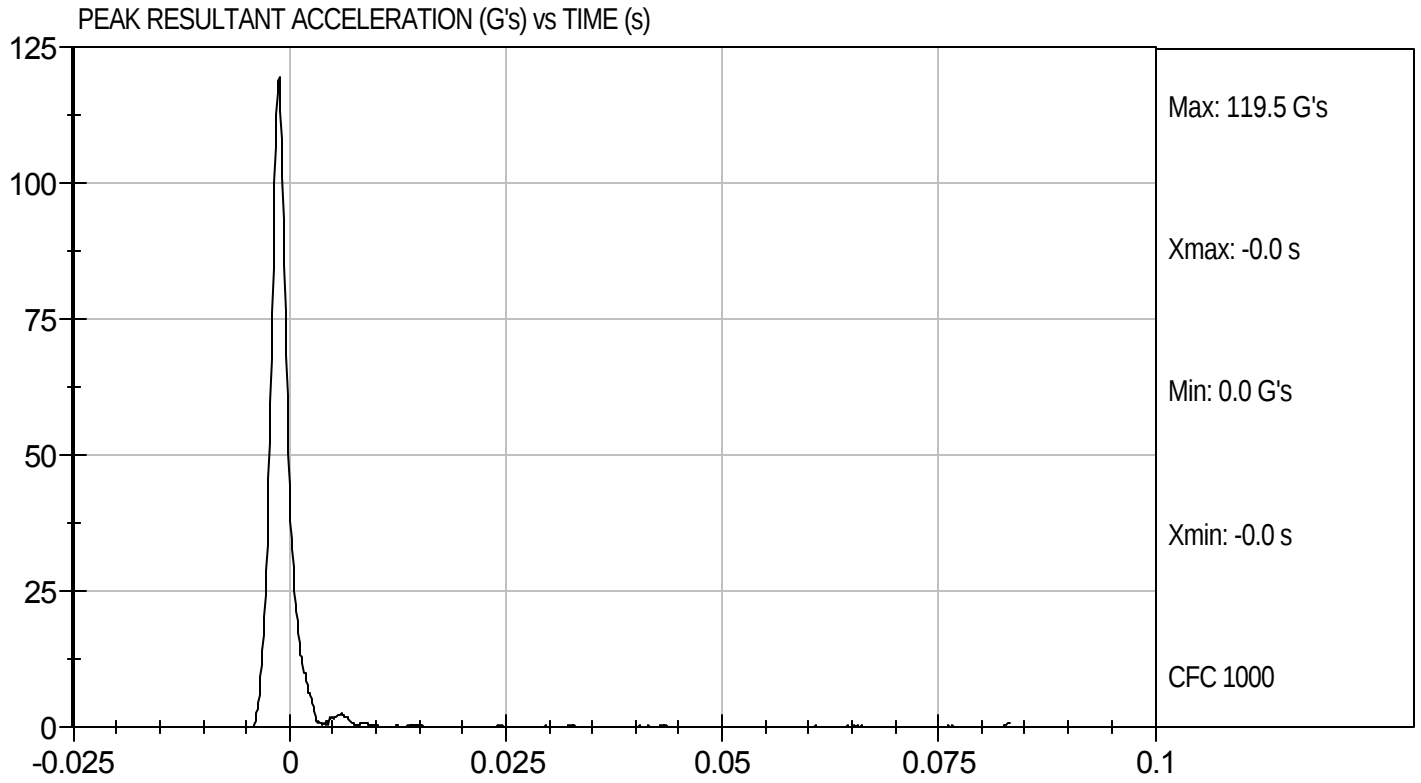
2/15/11
Test Date

David Winkelbauer
Approved By



Test Desc: Head Drop
Component ID: D11541

Test Date: 2/15/11
Velocity: 0 ft/s, 0 m/s

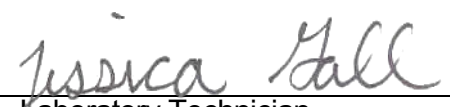


MGA RESEARCH CORPORATION
LATERAL NECK PENDULUM TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306

Test I.D: D11542

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21.3	Pass
Humidity		%	10 to 70	19	Pass
Impact Velocity		m/s	5.51 to 5.63	5.58	Pass
Delta Velocity	10 ms	m/s	2.20 to 2.80	2.52	Pass
	15 ms	m/s	3.30 to 4.10	3.56	Pass
	20 ms	m/s	4.40 to 5.40	4.78	Pass
	25 ms	m/s	5.40 to 6.10	5.49	Pass
	25-100 ms	m/s	5.50 to 6.20	5.51	Pass
Maximum D-Plane Rotation		deg	71 to 81	73	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	62	Pass
Maximum Occipital Condyle Moment during Rotation Interval Nm			-44 to -36	-43	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	119	Pass
Overall Test Results				Pass	


 Laboratory Technician

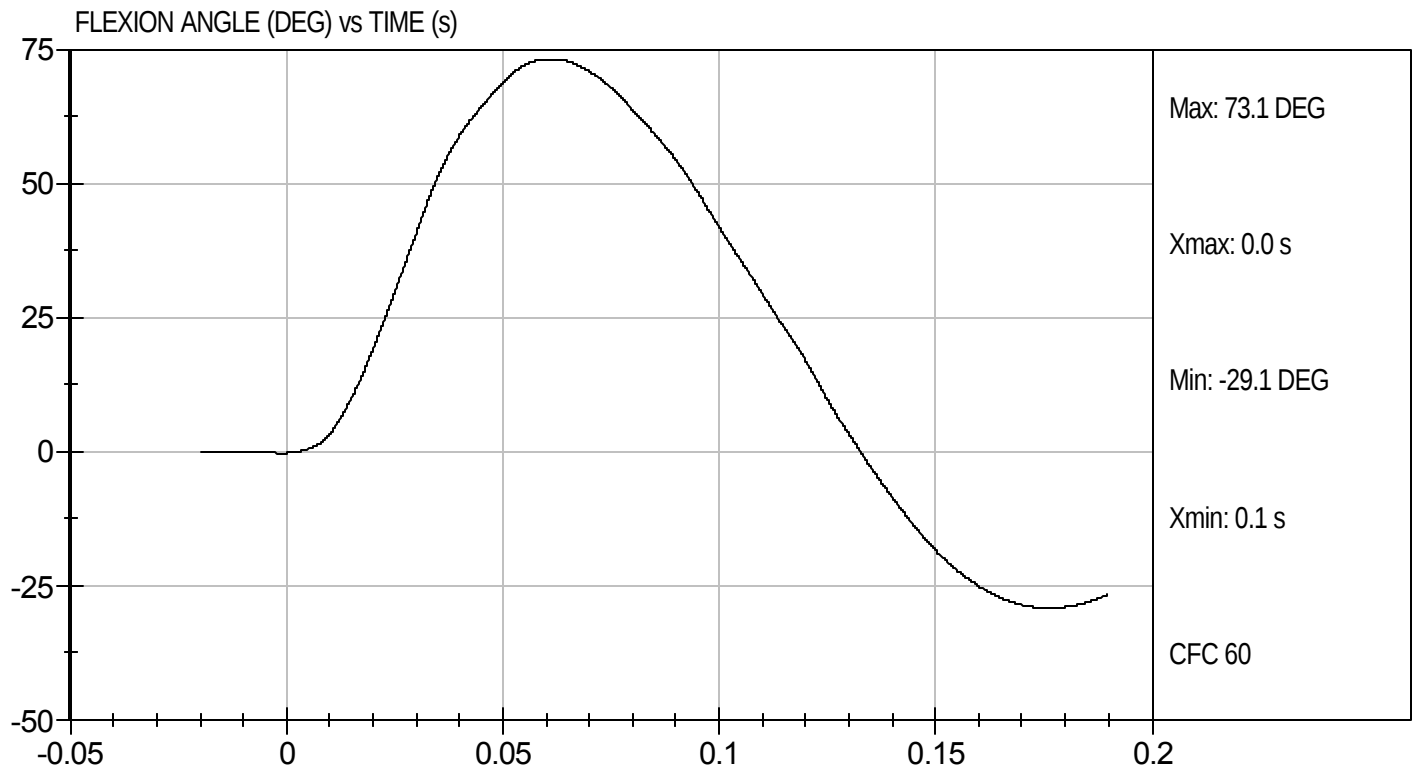
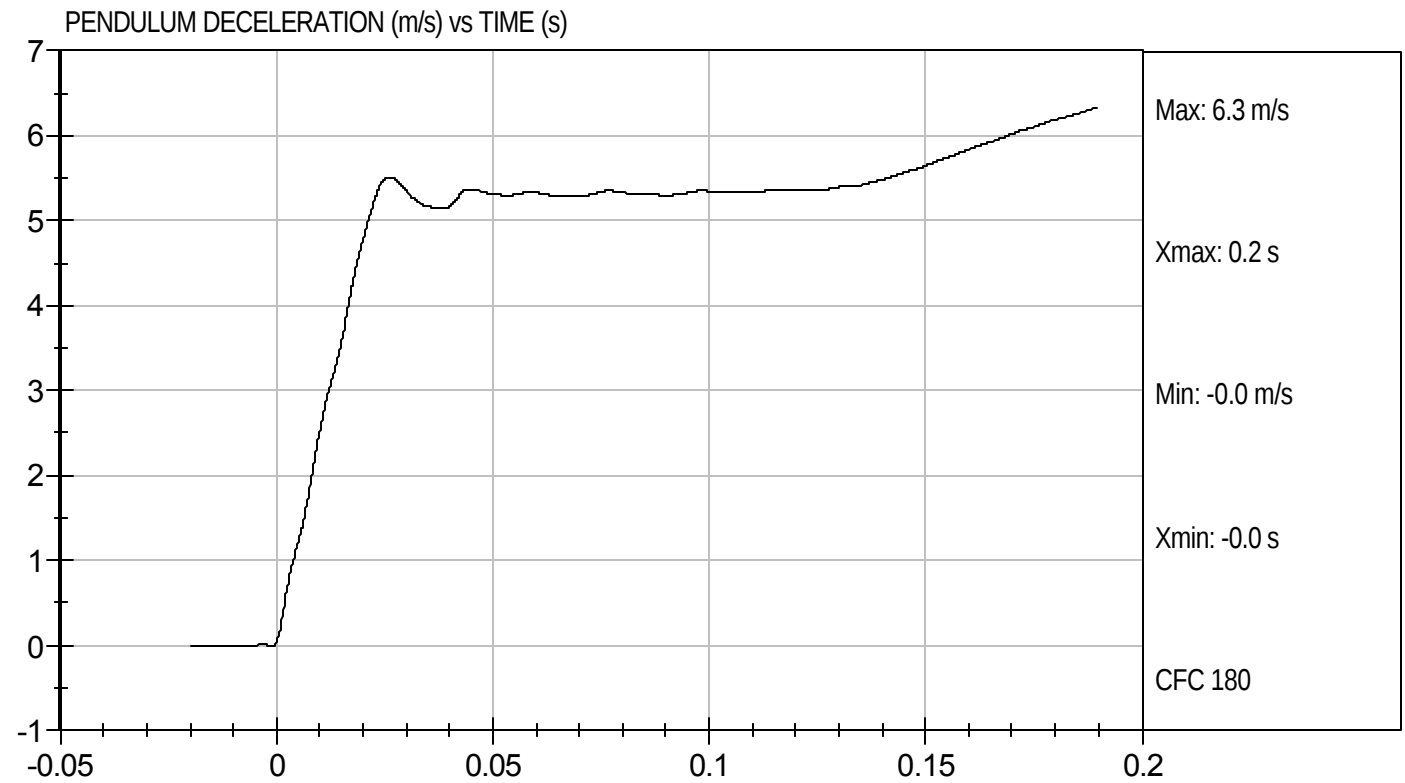
2/15/11
 Test Date


 Approved By



Test Desc: Neck Bending
Component ID: D11542

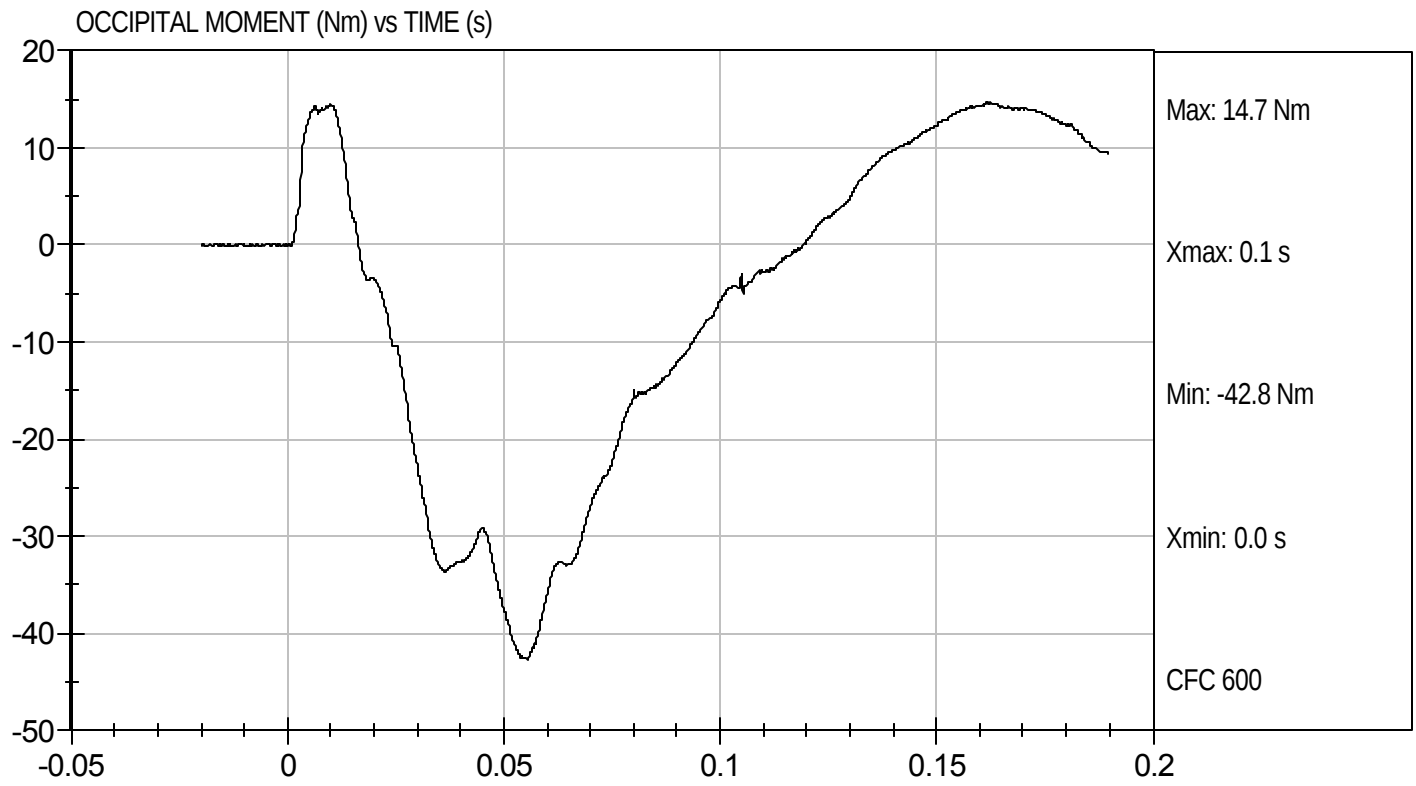
Test Date: 2/15/11
Velocity: 18.32 ft/s, 5.58 m/s





Test Desc: Neck Bending
Component ID: D11542

Test Date: 2/15/11
Velocity: 18.32 ft/s, 5.58 m/s



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

ATD Serial No: 306

Test ID: D11543

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	19	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Maximum Probe Acceleration	G's	13 to 18	15	Pass
Shoulder Displacement	mm	28 to 37	30	Pass
Upper Spine (T1) Y Acceleration	G's	17 to 22	19	Pass
Overall Test Results				Pass


Laboratory Technician

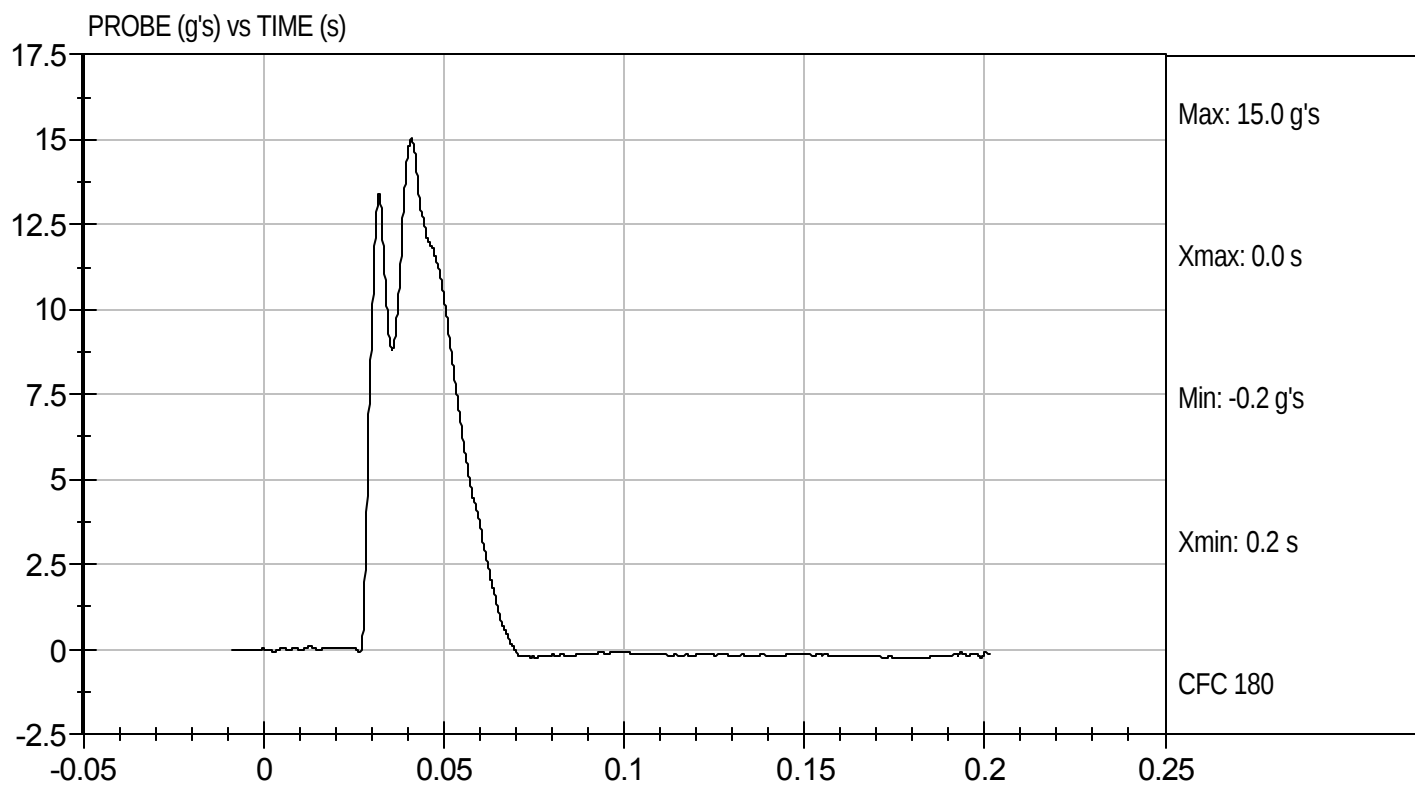
2/15/11
Test Date


Approved By



Test Desc: Shoulder Impact
Component ID: D11543

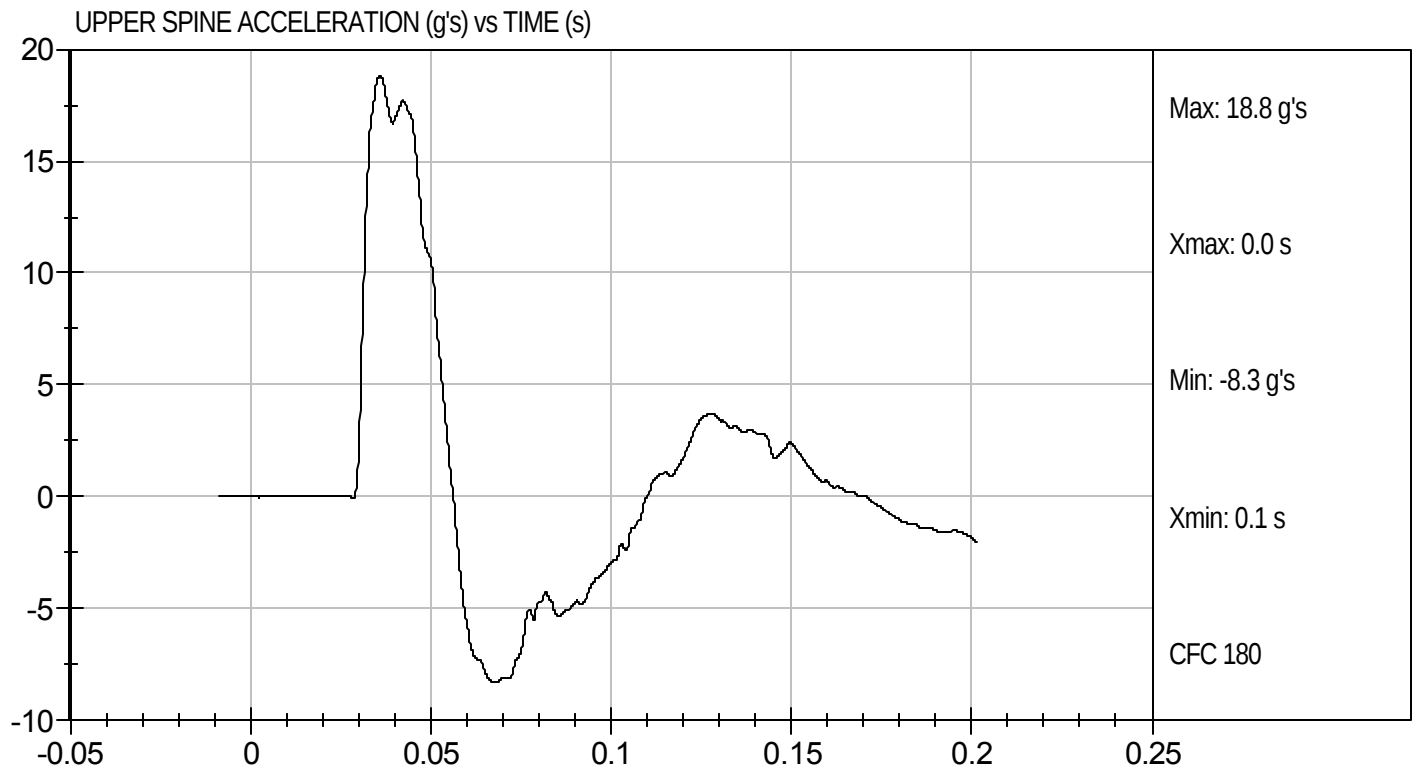
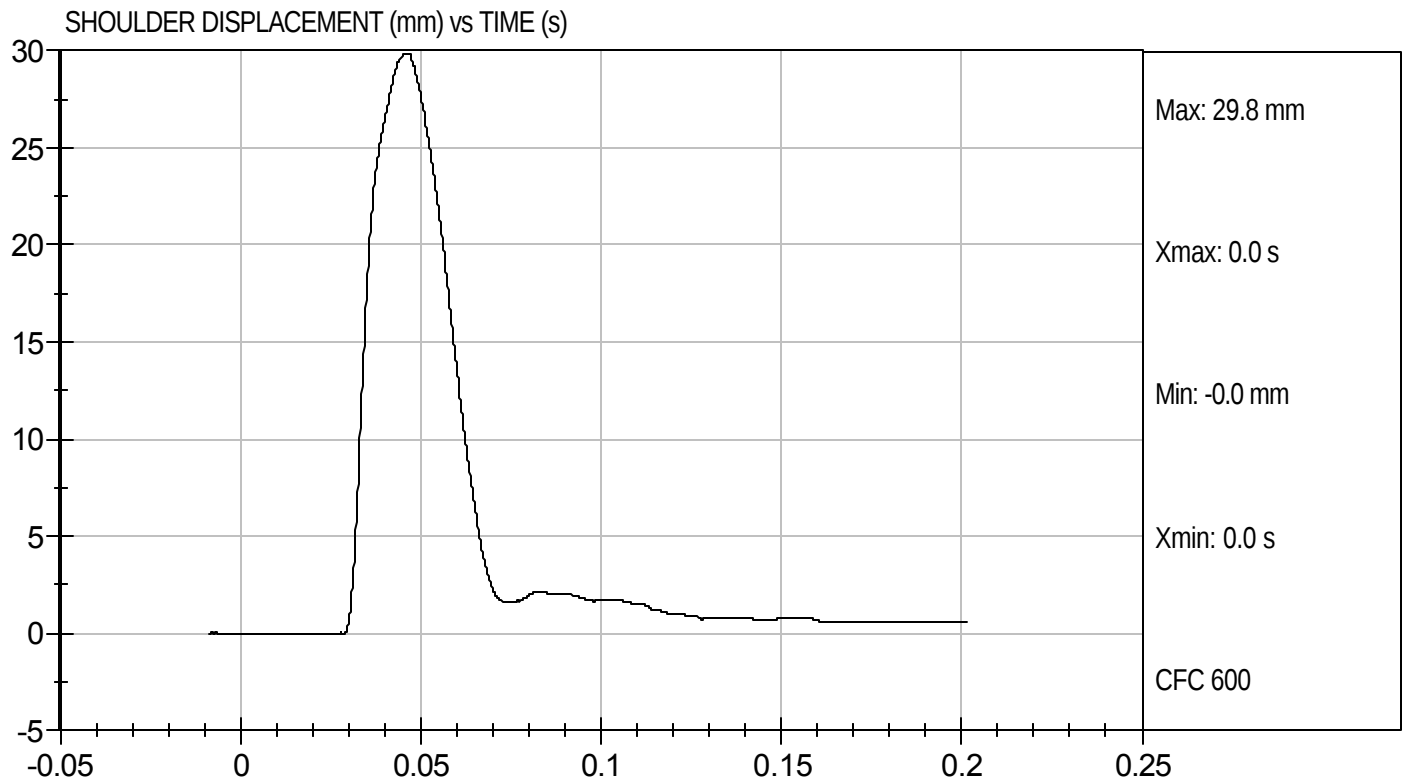
Test Date: 2/15/11
Velocity: 14.36 ft/s, 4.38 m/s





Test Desc: Shoulder Impact
Component ID: D11543

Test Date: 2/15/11
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: D11544

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.2	Pass
Humidity	%	10 to 70	19	Pass
Impact Velocity	m/s	6.60 to 6.80	6.77	Pass
Peak Impactor Acceleration	G's	30 to 36	33	Pass
Shoulder Displacement	mm	31 to 40	32	Pass
Upper Rib Displacement	mm	25 to 32	26	Pass
Middle Rib Displacement	mm	30 to 36	31	Pass
Lower Rib Displacement	mm	32 to 38	35	Pass
Upper Spine (T1) Y Acceleration	G's	34 to 43	39	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	32	Pass
Overall Test Results			Pass	


Laboratory Technician

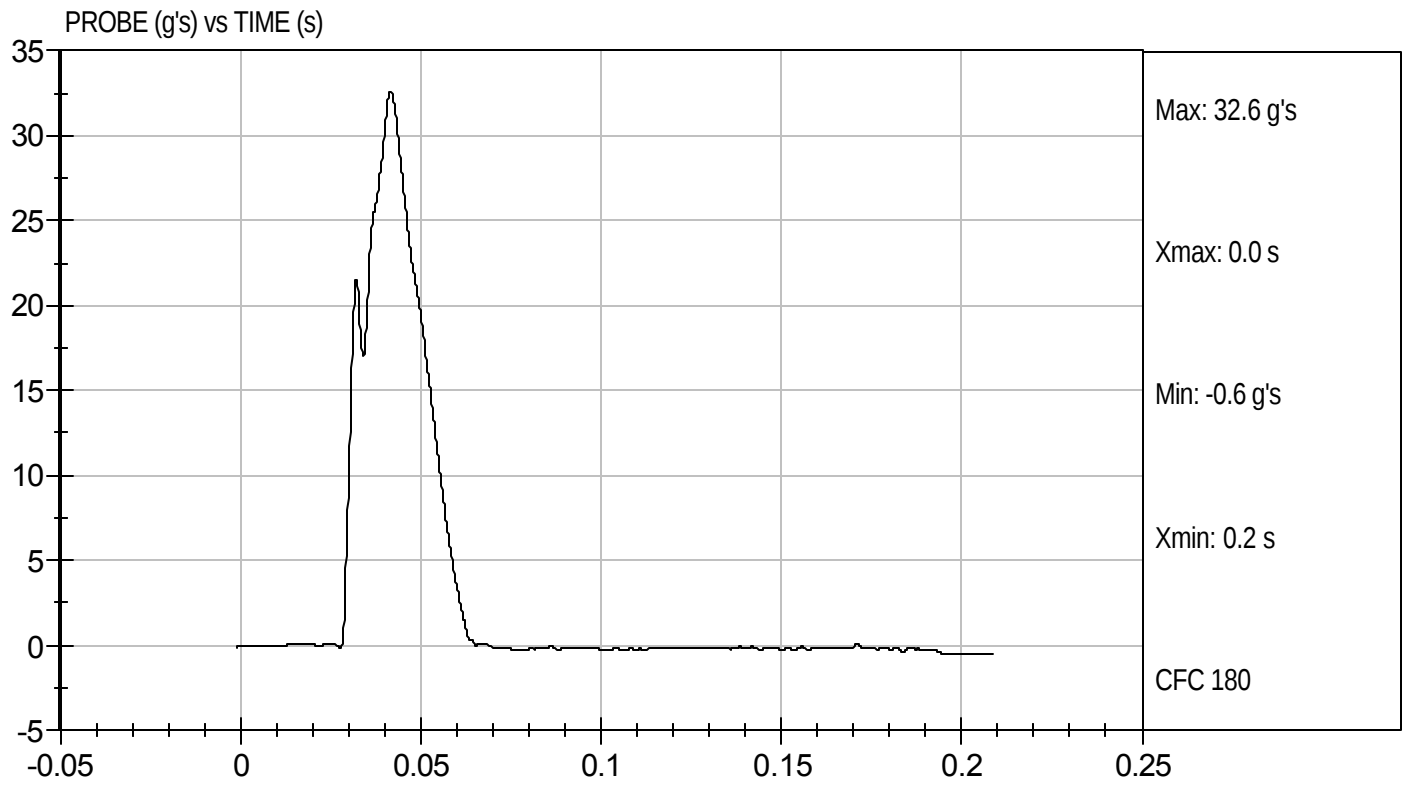
2/15/11
Test Date


Approved By



Test Desc: Thorax With Arm
Component ID: D11544

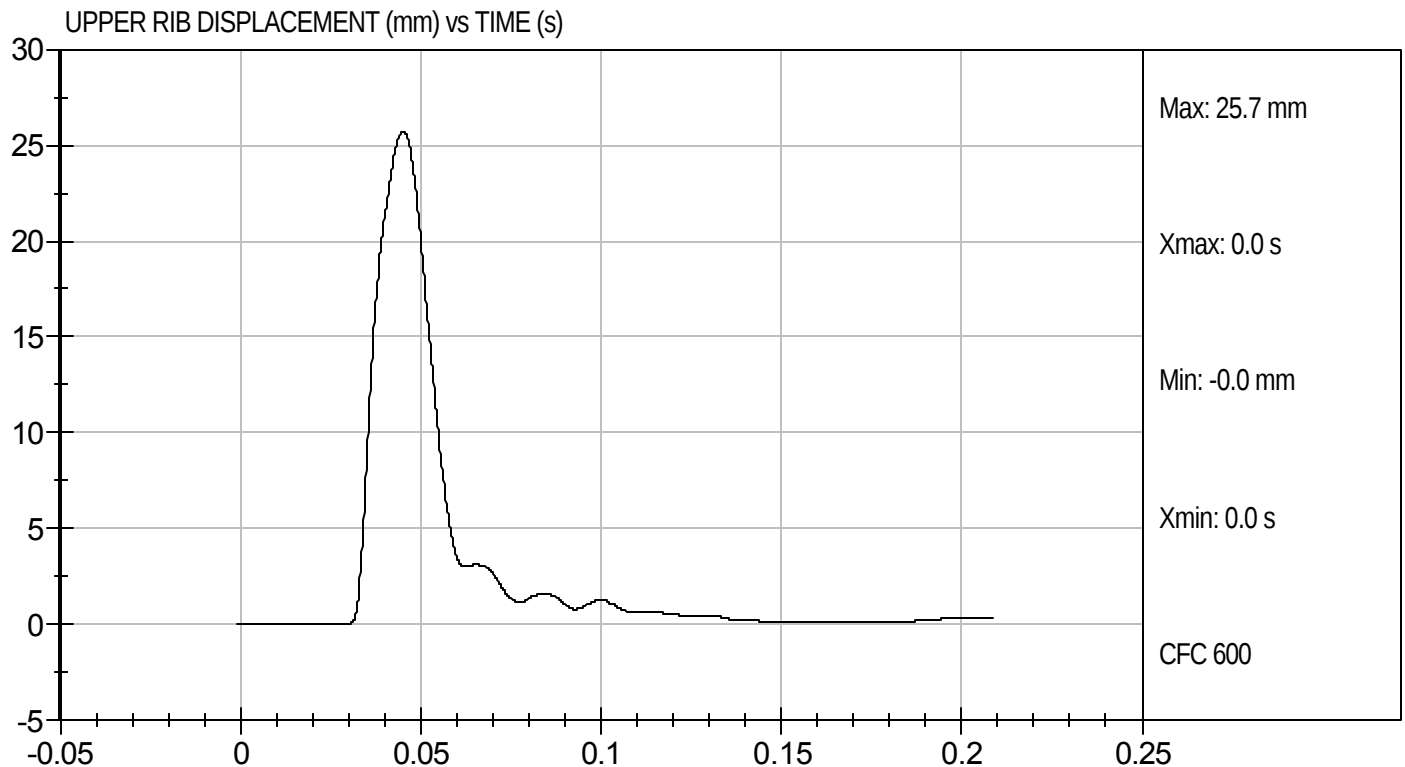
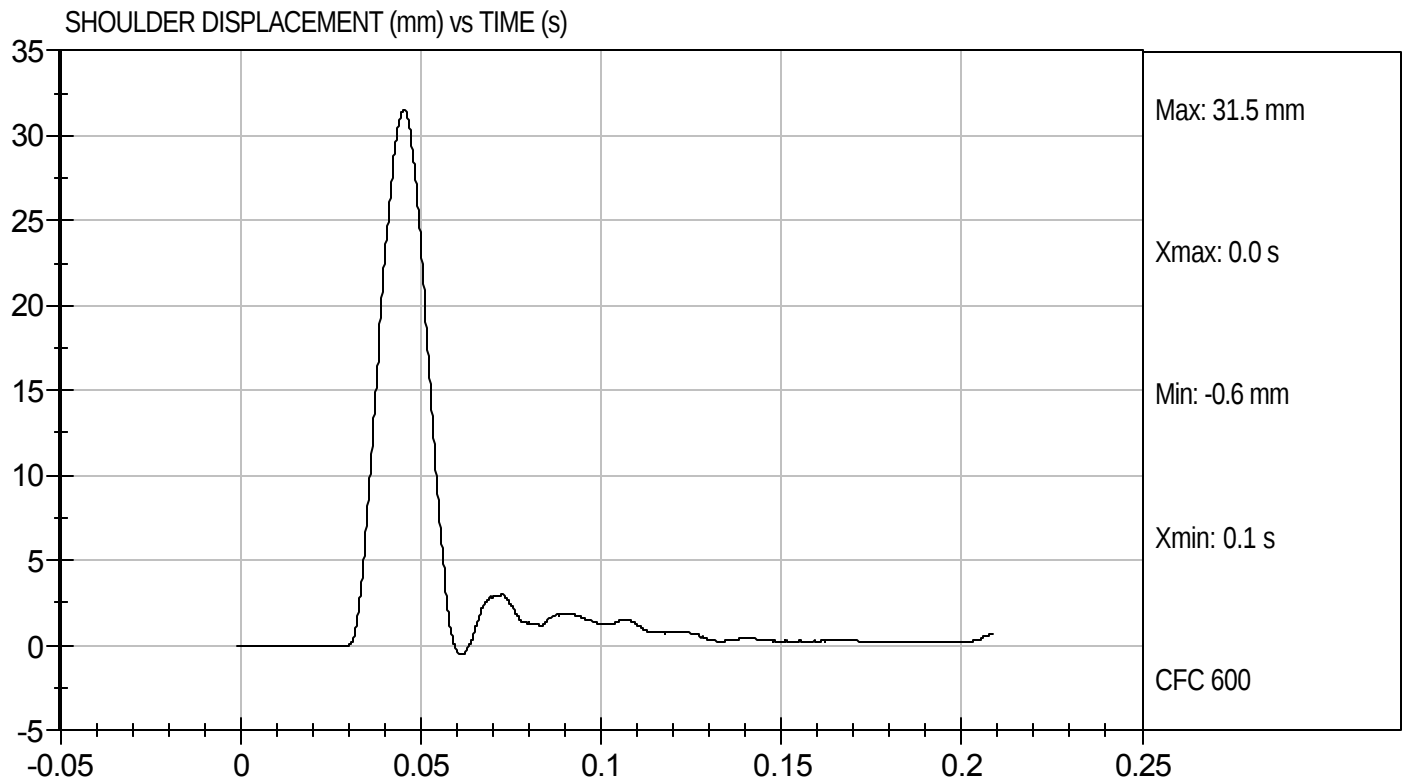
Test Date: 2/15/11
Velocity: 22.2 ft/s, 6.77 m/s





Test Desc: Thorax With Arm
Component ID: D11544

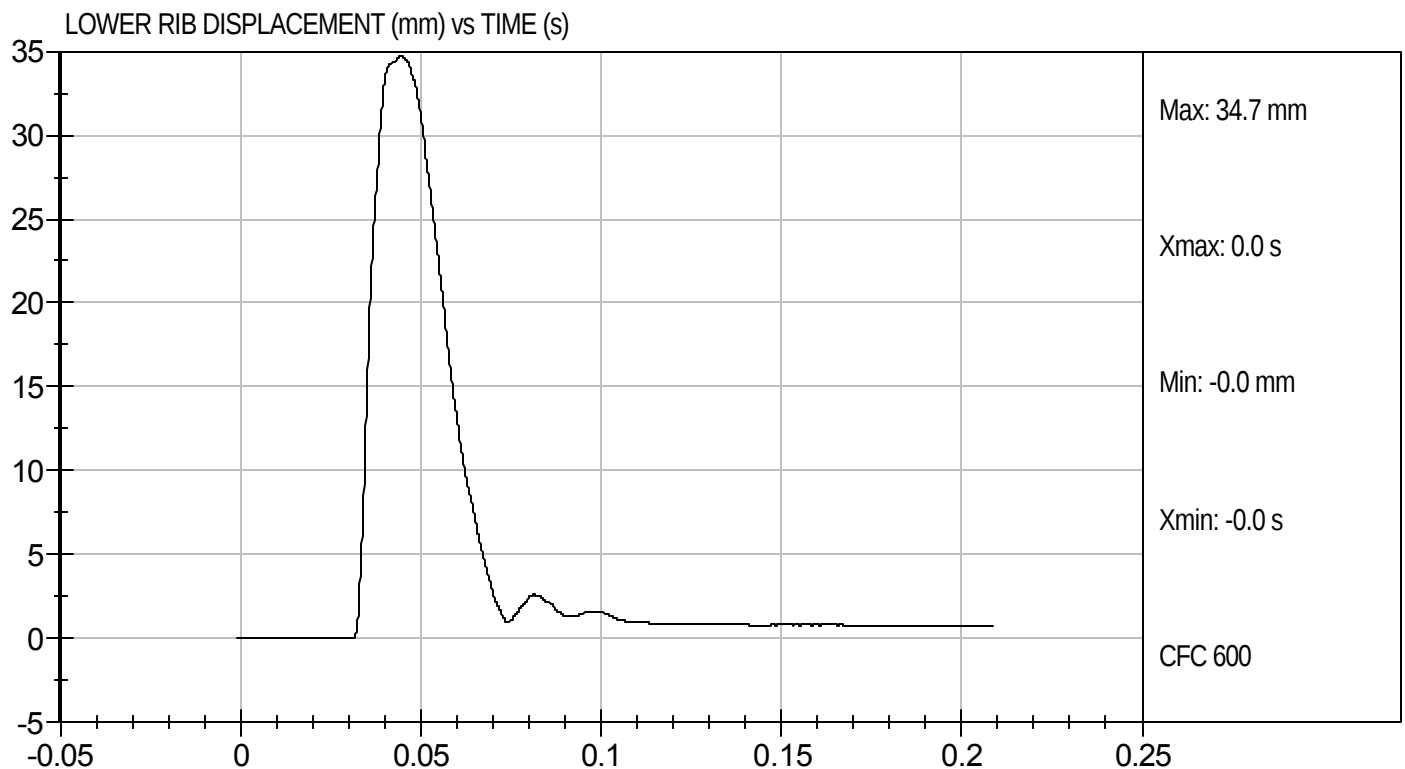
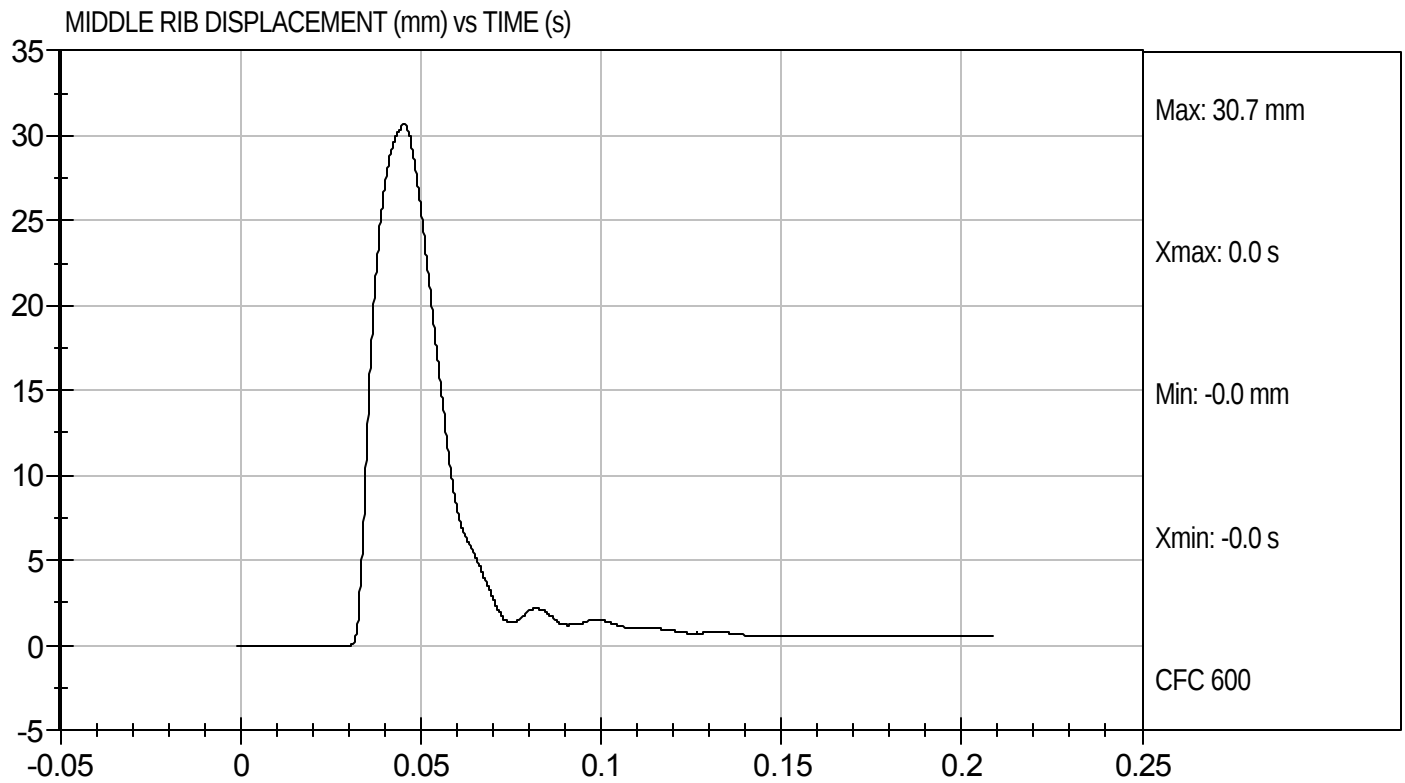
Test Date: 2/15/11
Velocity: 22.2 ft/s, 6.77 m/s





Test Desc: Thorax With Arm
Component ID: D11544

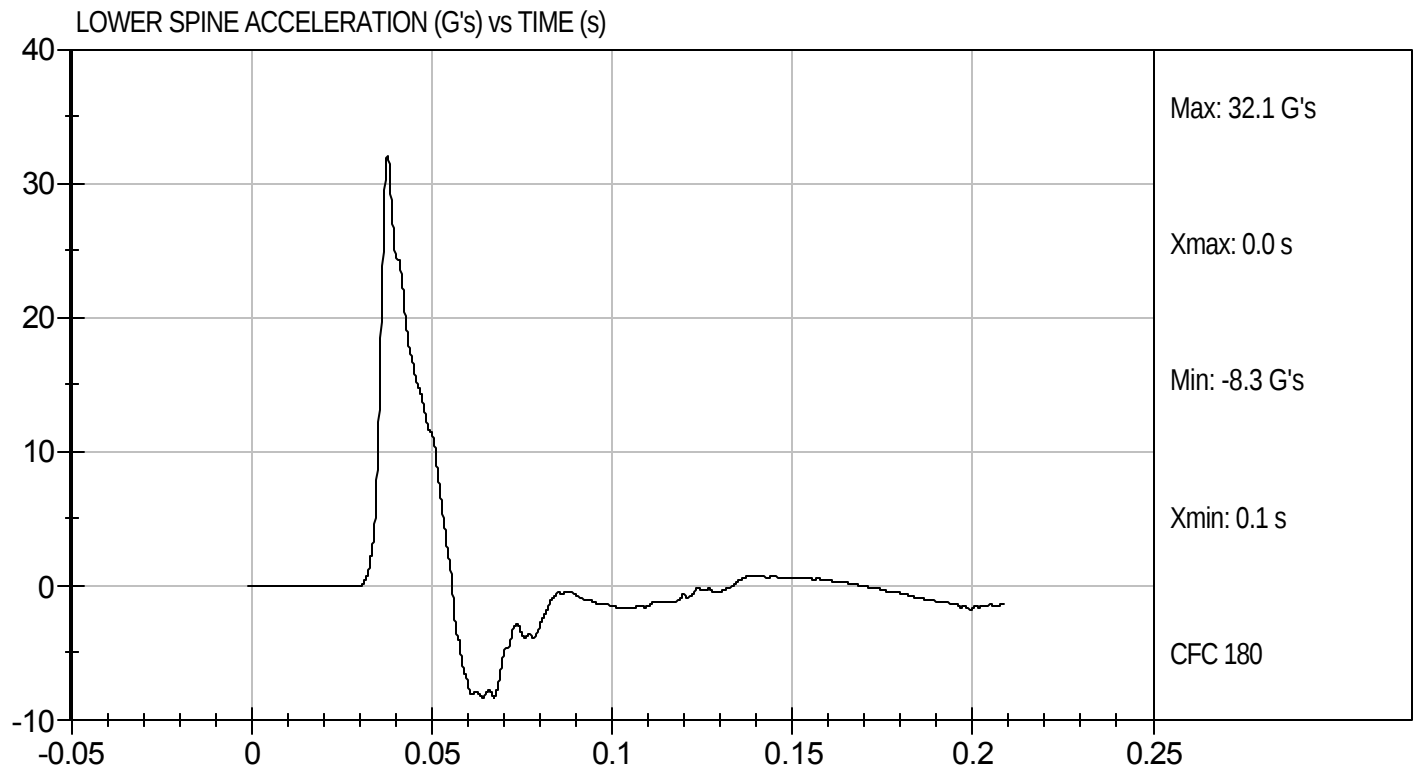
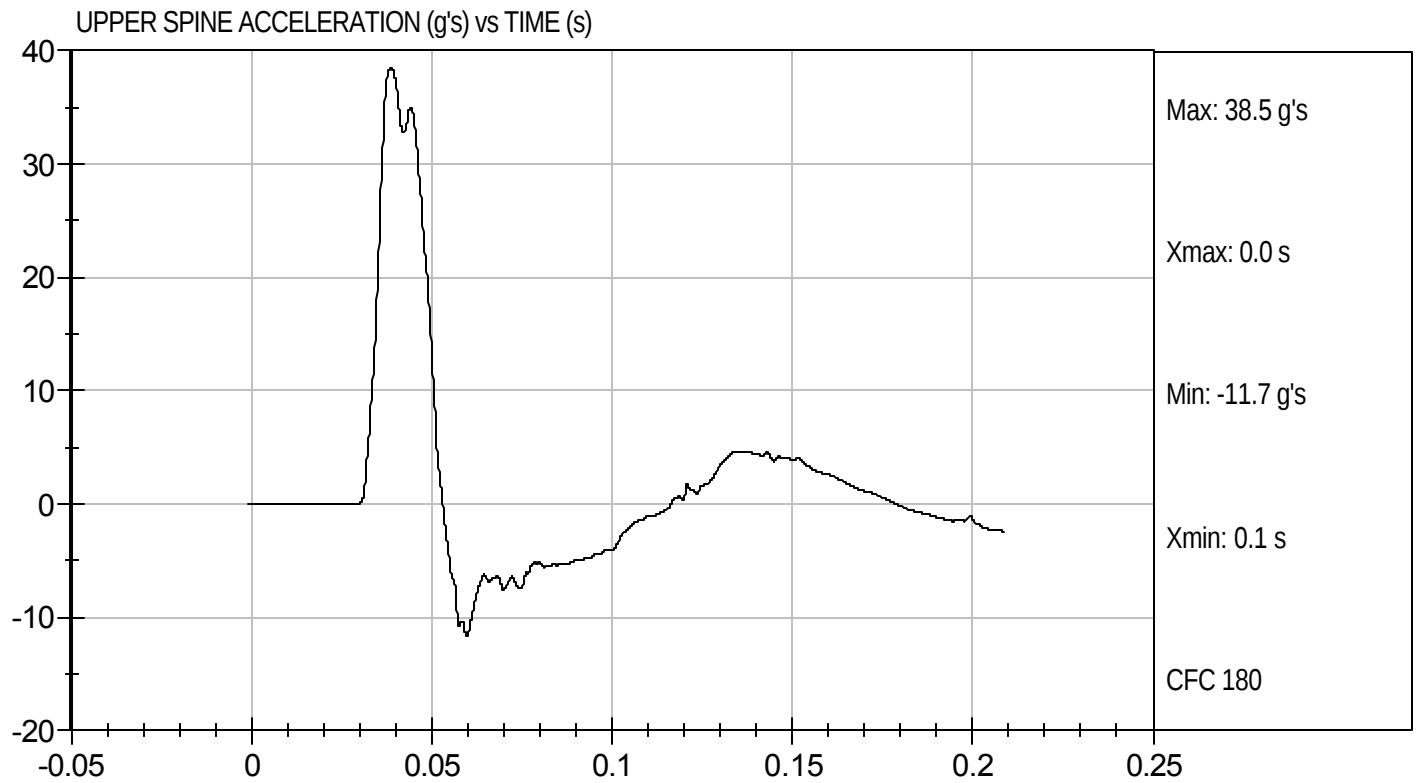
Test Date: 2/15/11
Velocity: 22.2 ft/s, 6.77 m/s





Test Desc: Thorax With Arm
Component ID: D11544

Test Date: 2/15/11
Velocity: 22.2 ft/s, 6.77 m/s



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

ATD Serial No: 306

Test I.D: D11545

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.2	Pass
Humidity	%	10 to 70	19	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Peak Impactor Force	G's	14 to 18	16	Pass
Upper Rib Displacement	mm	32 to 40	34	Pass
Middle Rib Displacement	mm	39 to 45	40	Pass
Lower Rib Displacement	mm	35 to 43	39	Pass
Upper Spine (T1) Y Acceleration	G's	13 to 17	14	Pass
Lower Spine (T12) Y Acceleration	G's	7 to 11	11	Pass
Overall Test Results			Pass	


Laboratory Technician

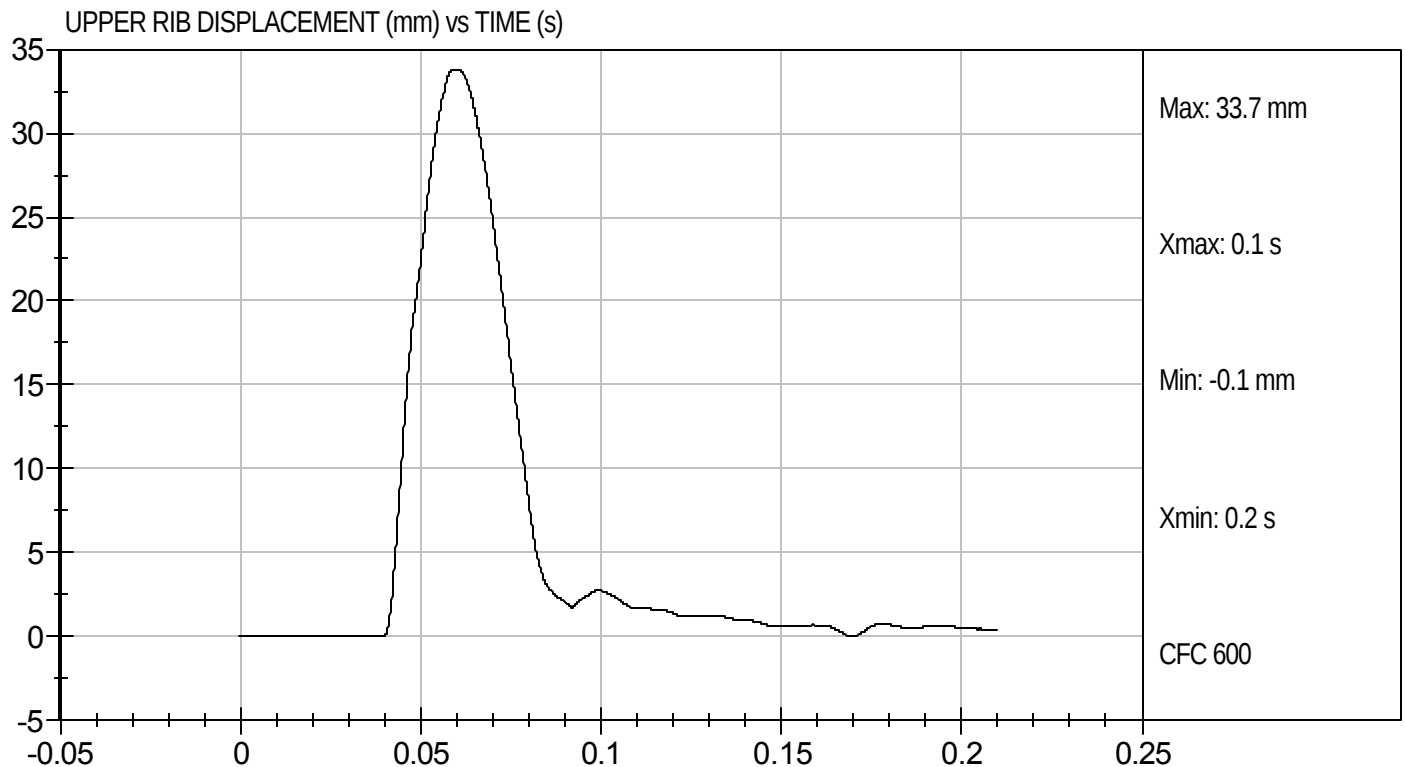
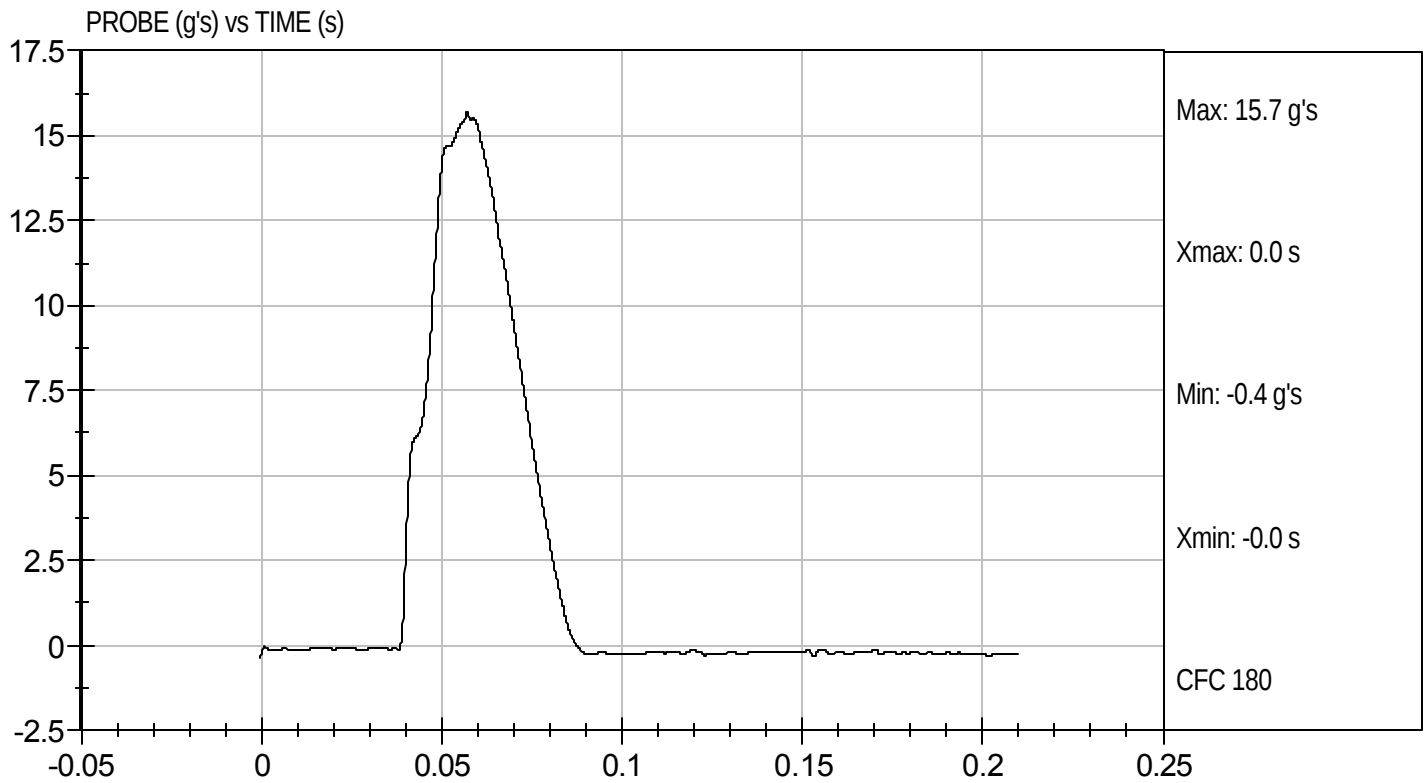
2/15/11
Test Date


Approved By



Test Desc: Thorax Without Arm
Component ID: D11545

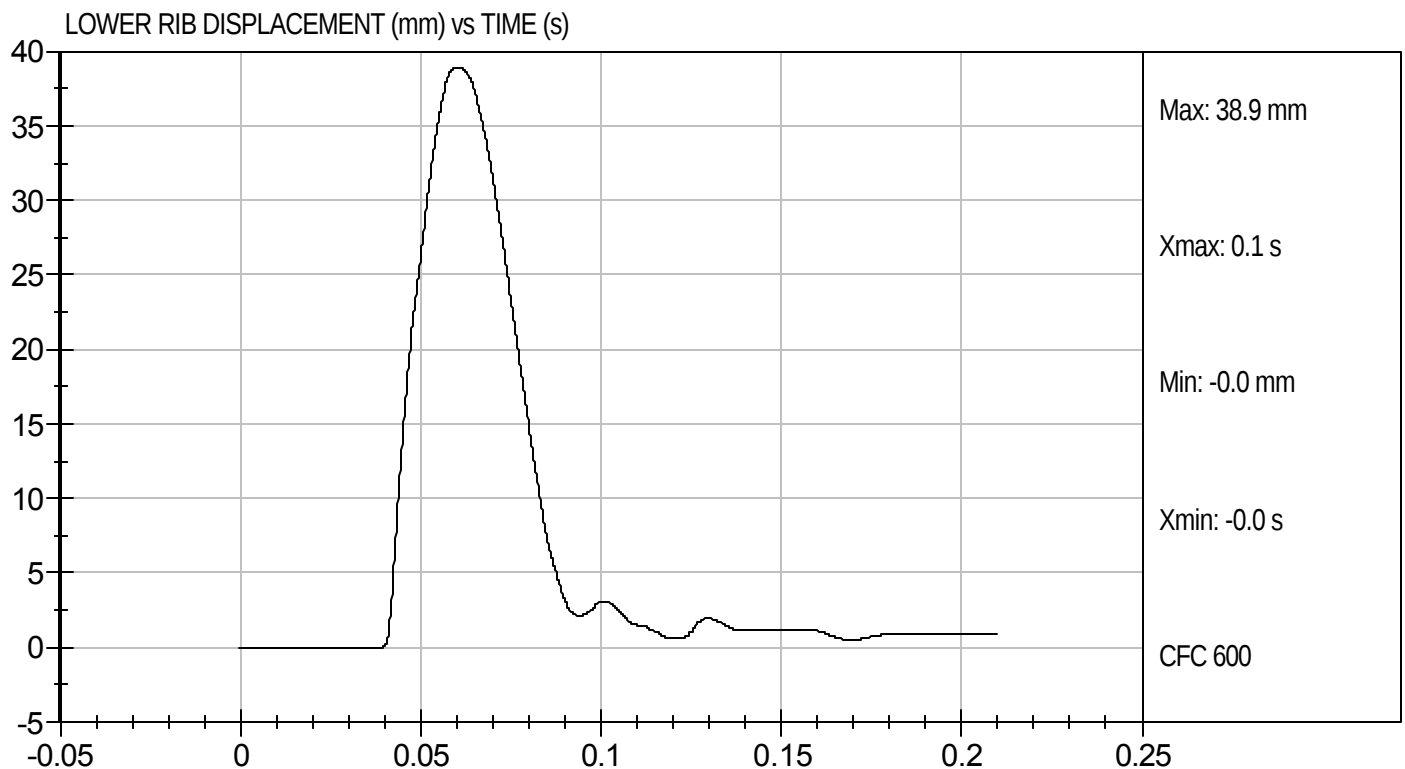
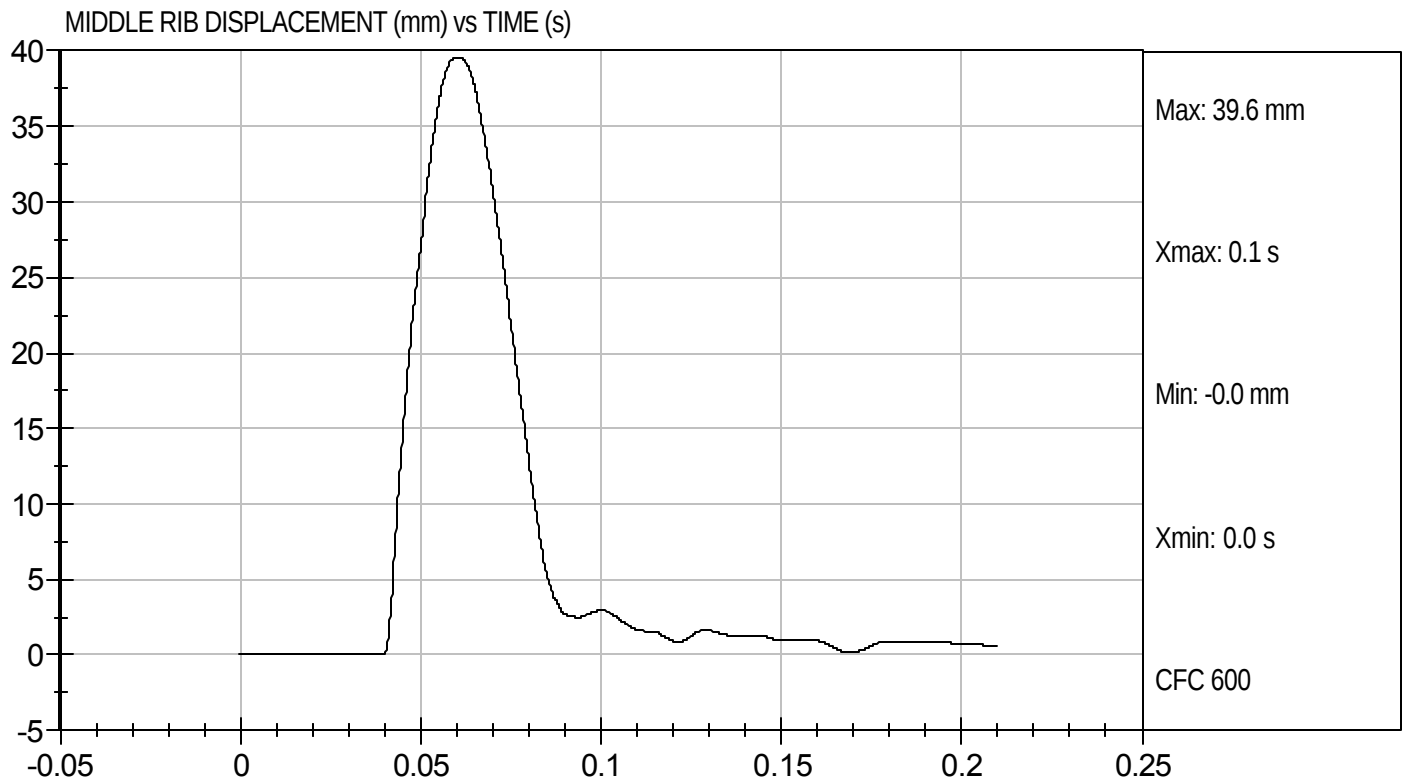
Test Date: 2/15/11
Velocity: 14.36 ft/s, 4.38 m/s





Test Desc: Thorax Without Arm
Component ID: D11545

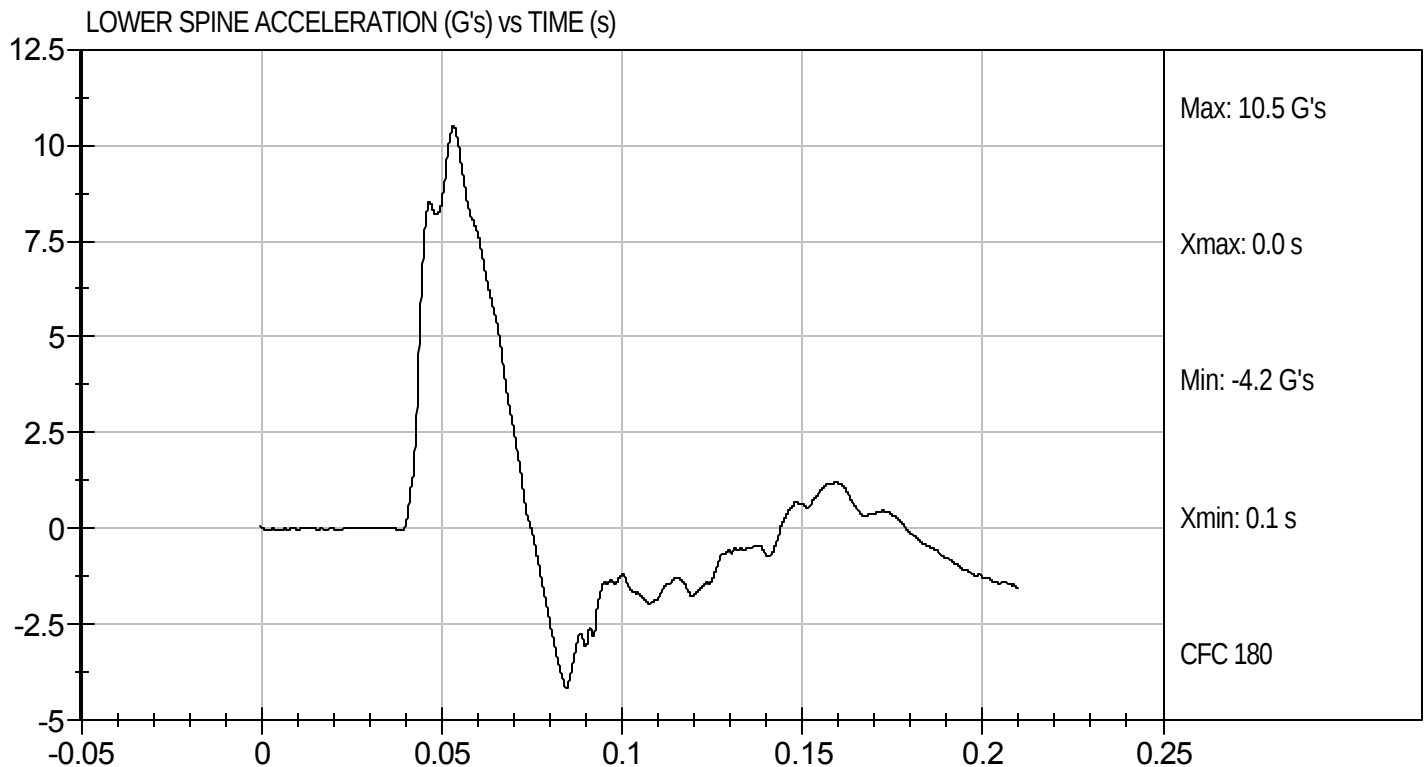
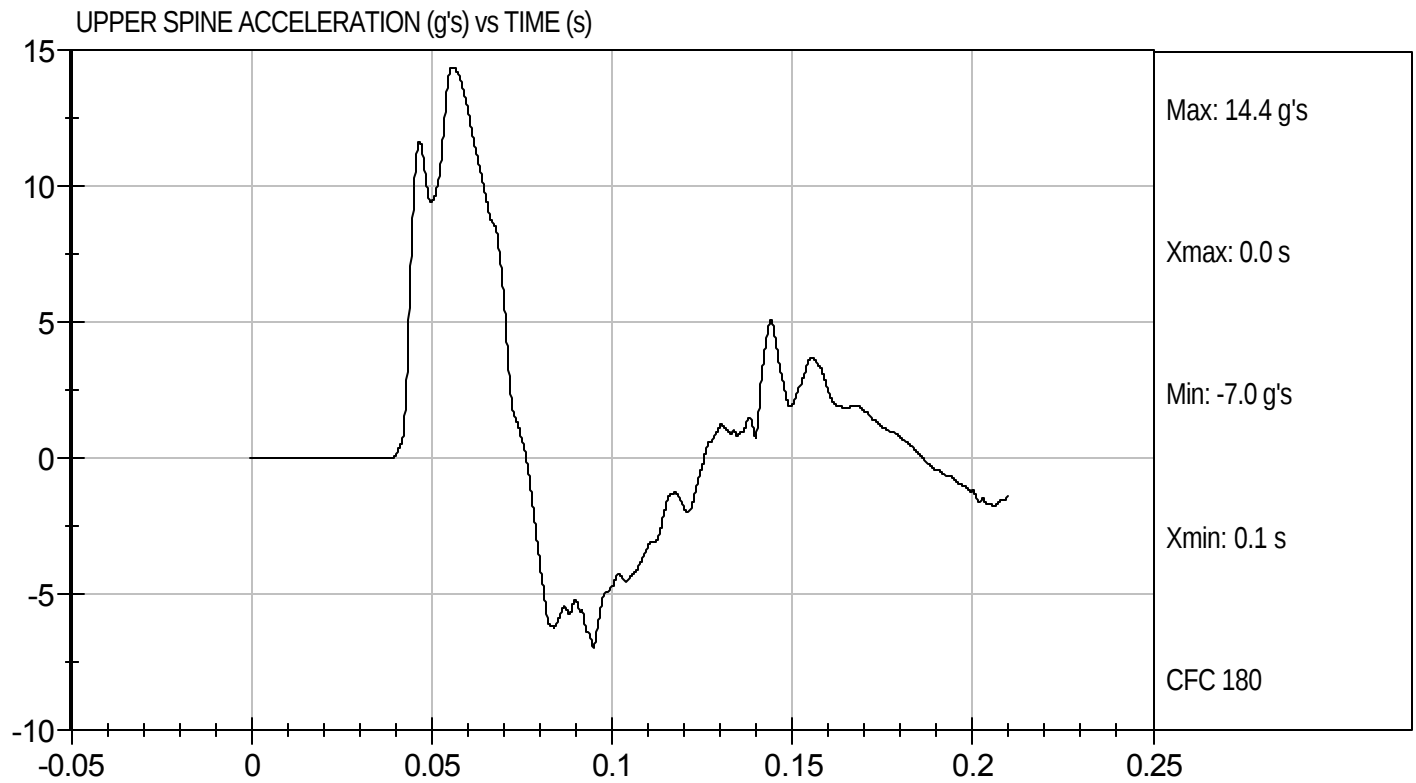
Test Date: 2/15/11
Velocity: 14.36 ft/s, 4.38 m/s





Test Desc: Thorax Without Arm
Component ID: D11545

Test Date: 2/15/11
Velocity: 14.36 ft/s, 4.38 m/s



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

ATD Serial No: 306

Test I.D: D11546

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.2	Pass
Humidity	%	10 to 70	19	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Peak Impactor Acceleration	G's	12 to 16	14	Pass
Upper Rib Displacement	mm	36 to 47	39	Pass
Lower Rib Displacement	mm	33 to 44	37	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	11	Pass
Overall Test Results				Pass


Laboratory Technician

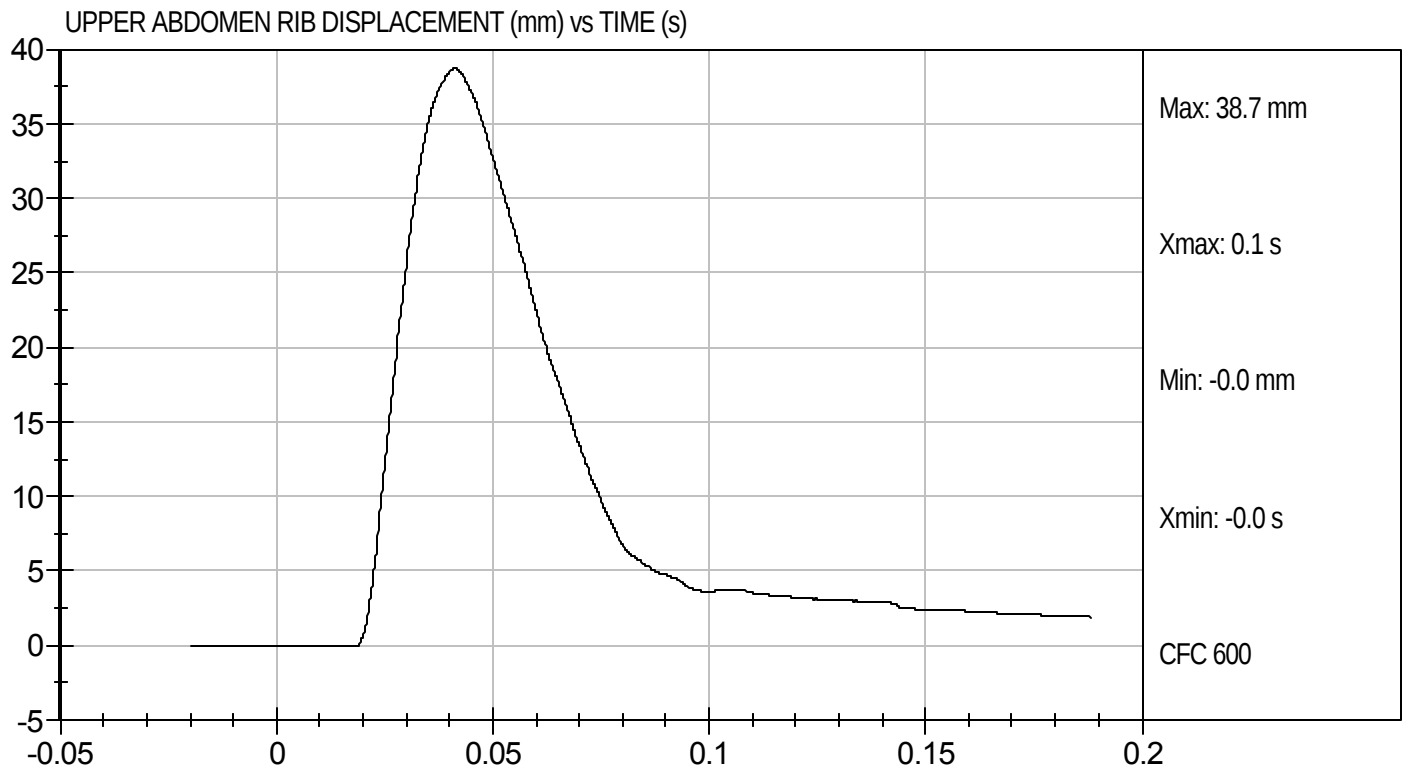
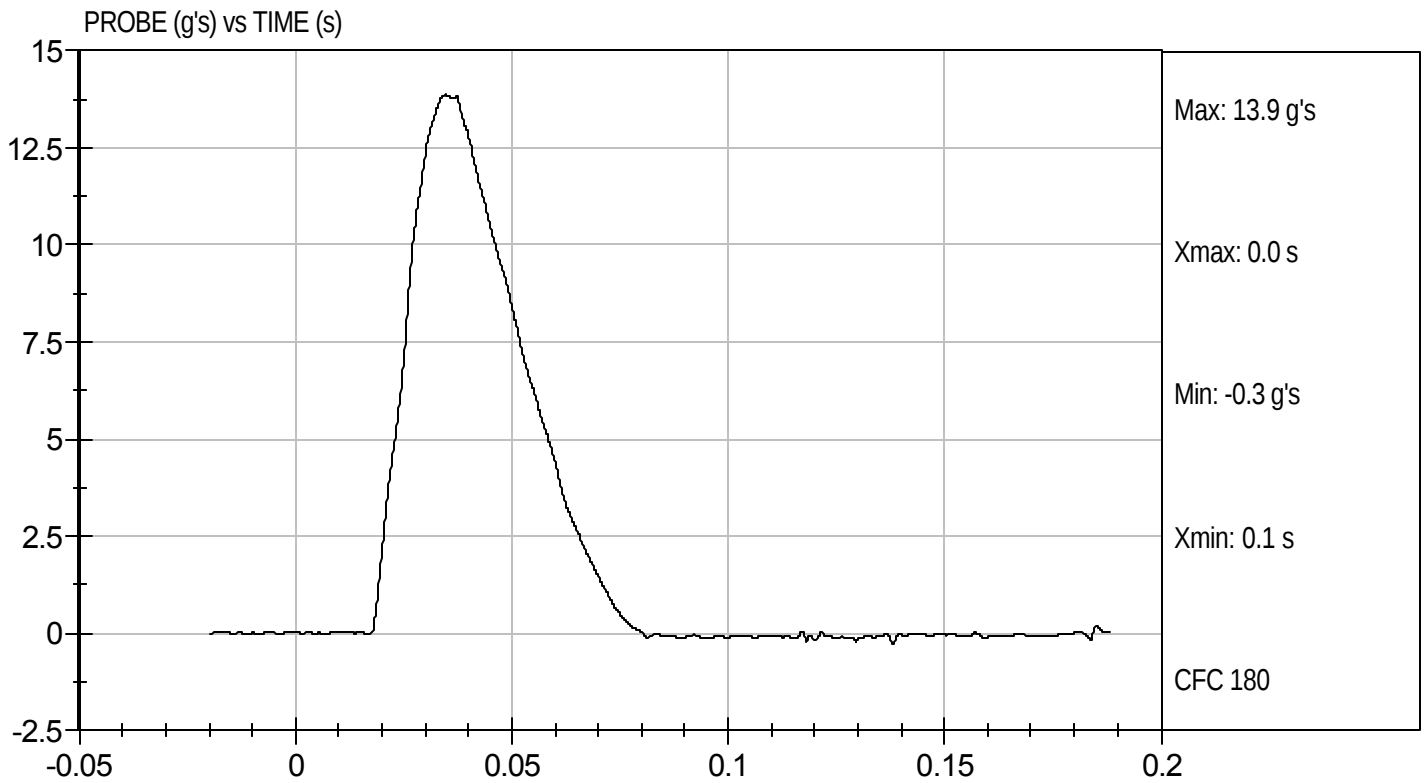
2/15/11
Test Date


Approved By



Test Desc: Abdomen Impact
Component ID: D11546

Test Date: 2/15/11
Velocity: 14.36 ft/s, 4.38 m/s

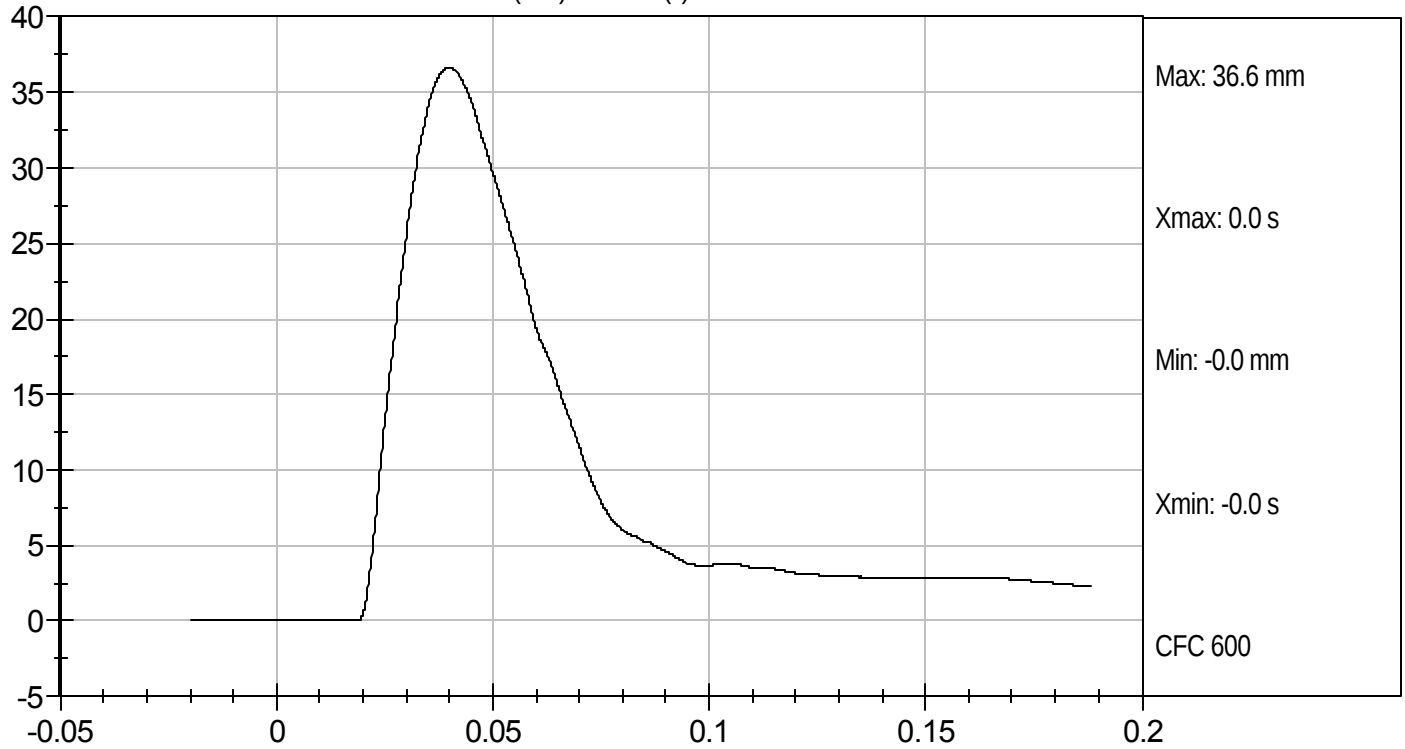




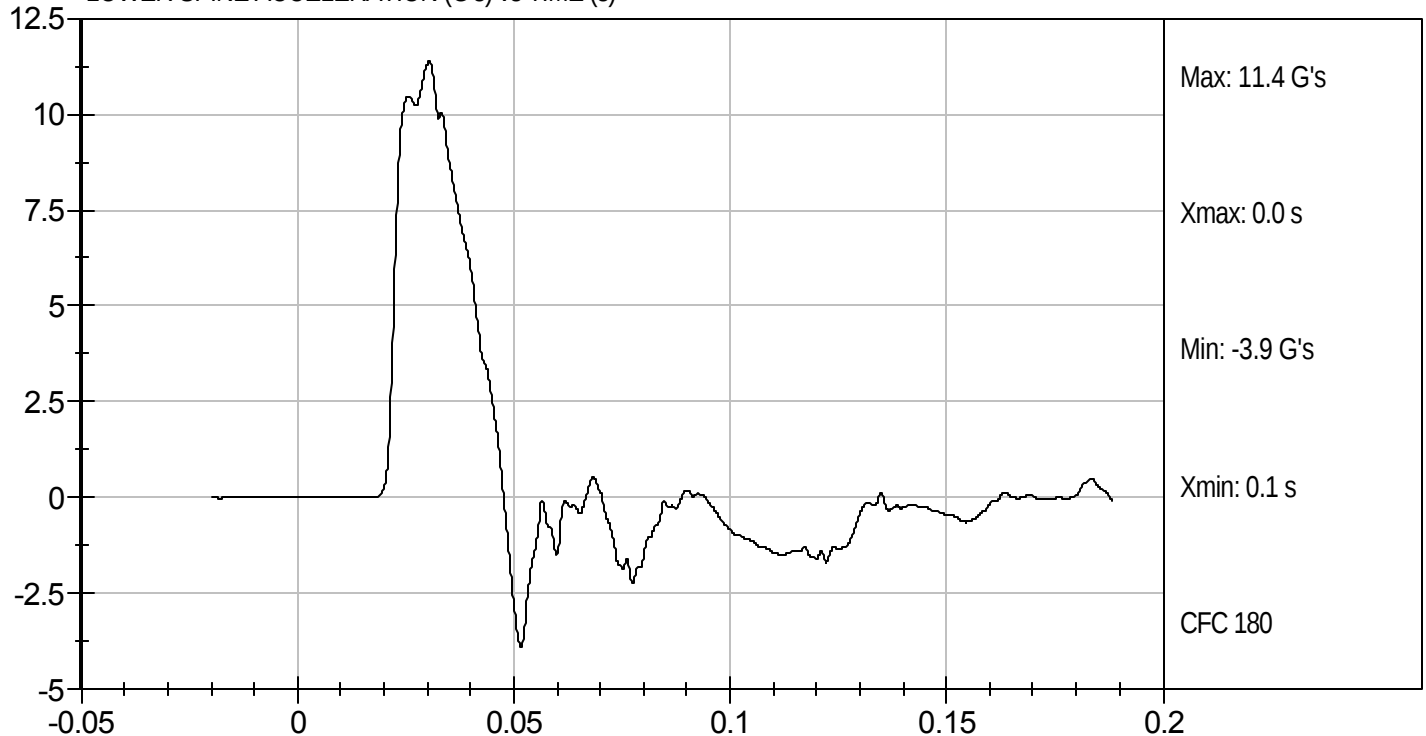
Test Desc: Abdomen Impact
Component ID: D11546

Test Date: 2/15/11
Velocity: 14.36 ft/s, 4.38 m/s

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



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

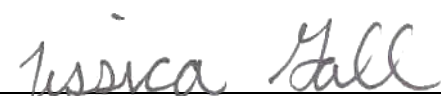


MGA RESEARCH CORPORATION
PELVIS IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306

Test I.D: D11547

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	19	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	4174	Pass
Overall Test Results				Pass


Laboratory Technician

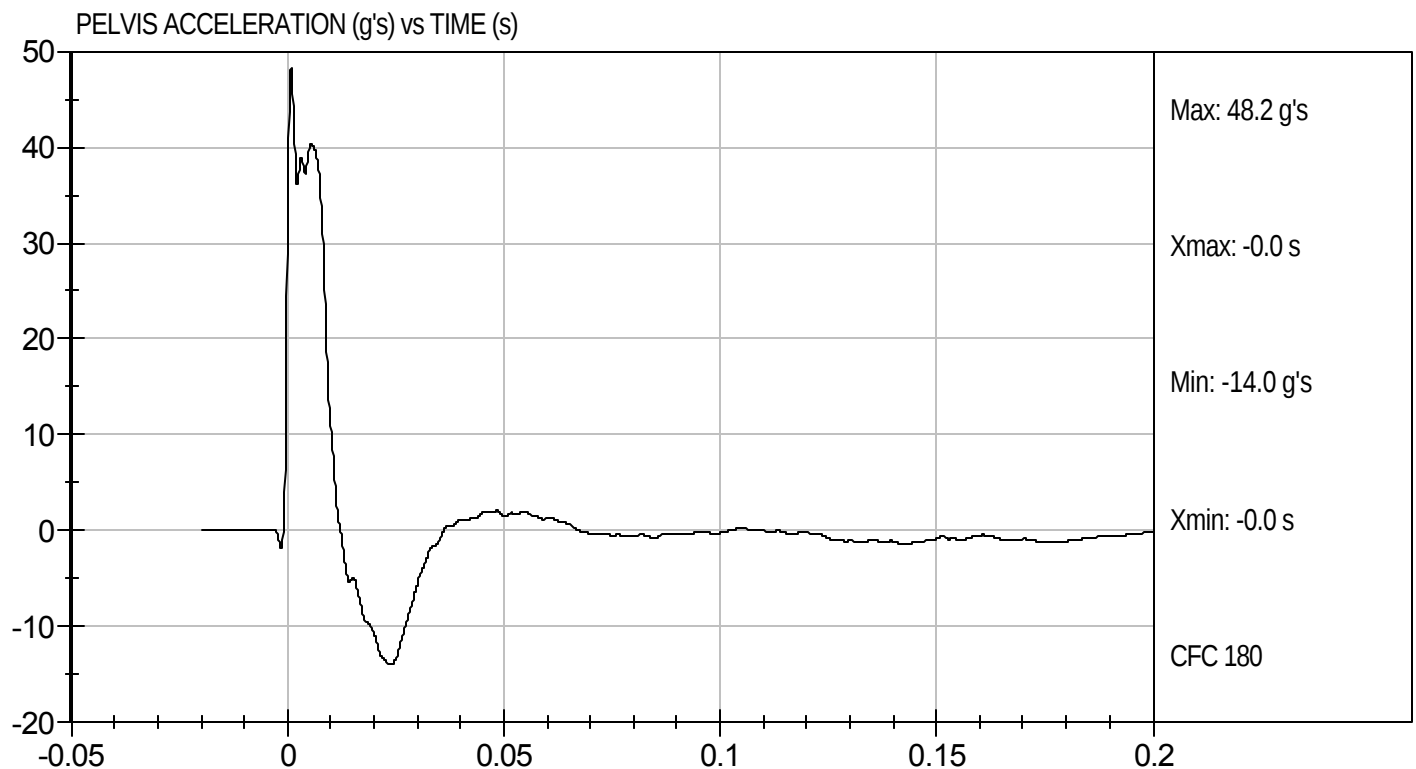
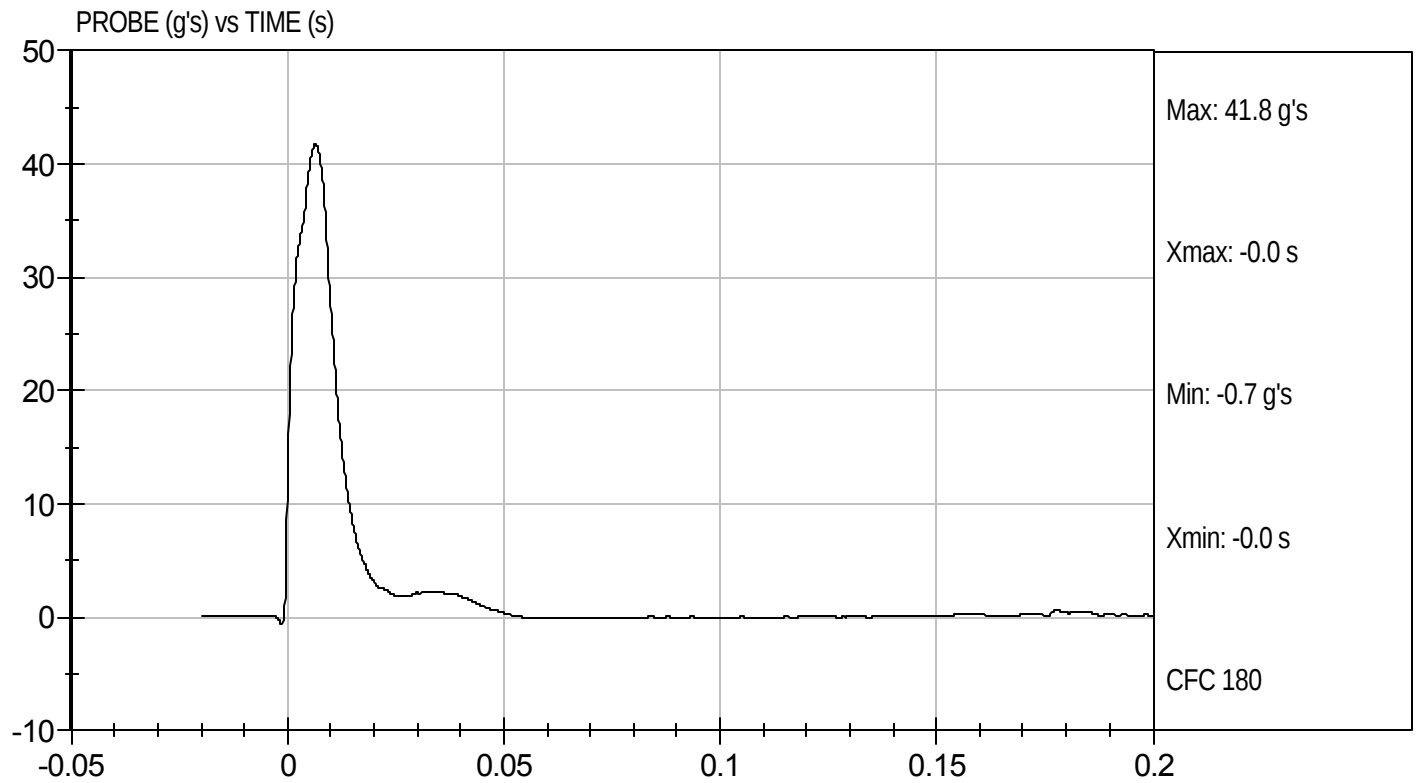
2/15/11
Test Date


Approved By



Test Desc: Pelvis Impact
Component ID: D11547

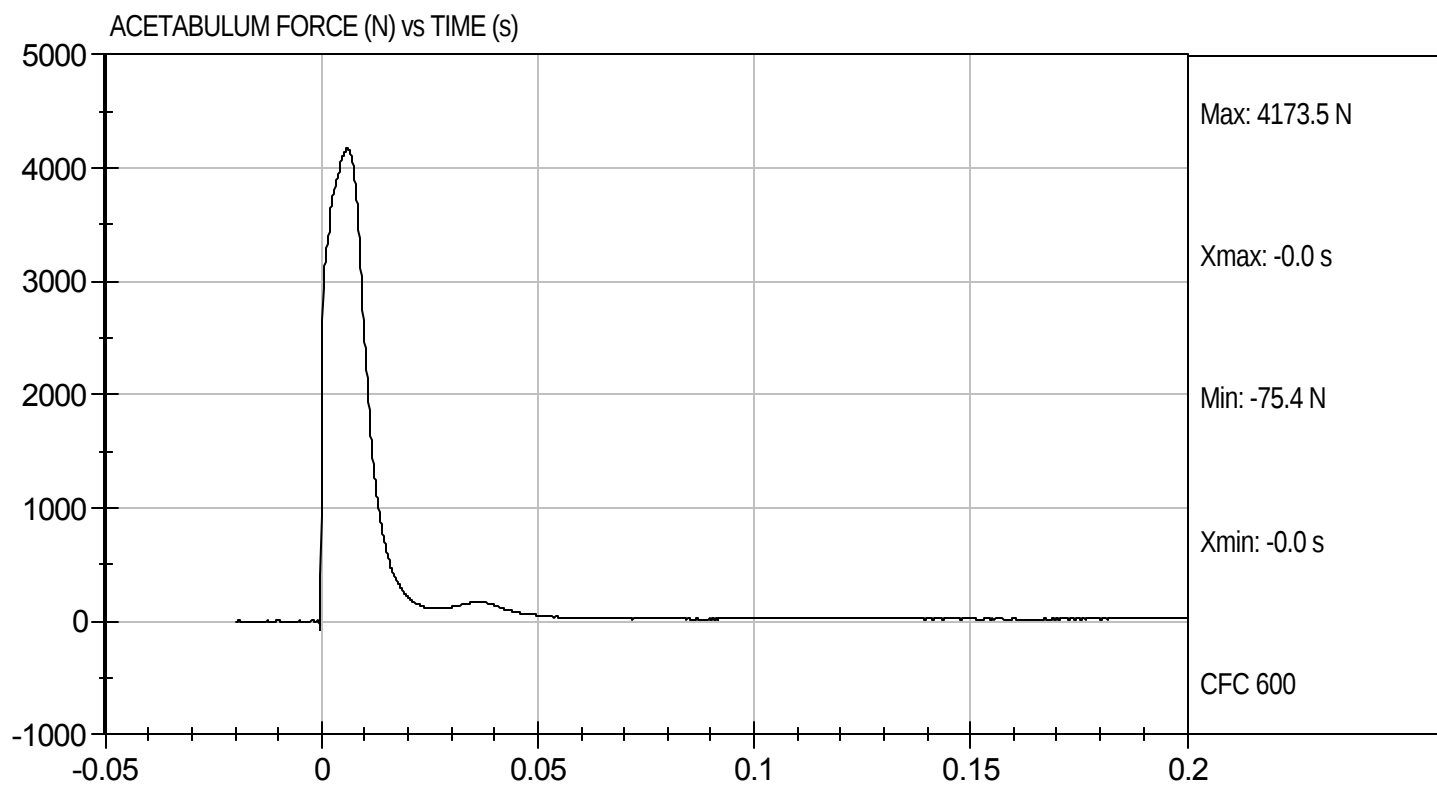
Test Date: 2/15/11
Velocity: 22.2 ft/s, 6.77 m/s





Test Desc: Pelvis Impact
Component ID: D11547

Test Date: 2/15/11
Velocity: 22.2 ft/s, 6.77 m/s

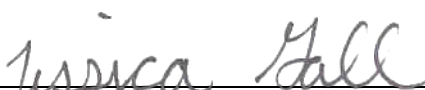


MGA RESEARCH CORPORATION
ILIAC IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306

Test I.D: D11548

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	19	Pass
Impact Velocity	m/s	4.20 to 4.40	4.20	Pass
Peak Impactor Acceleration	G's	36 to 45	38	Pass
Pelvis Y Acceleration	G's	28 to 39	30	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4813	Pass
Overall Test Results				Pass


Laboratory Technician

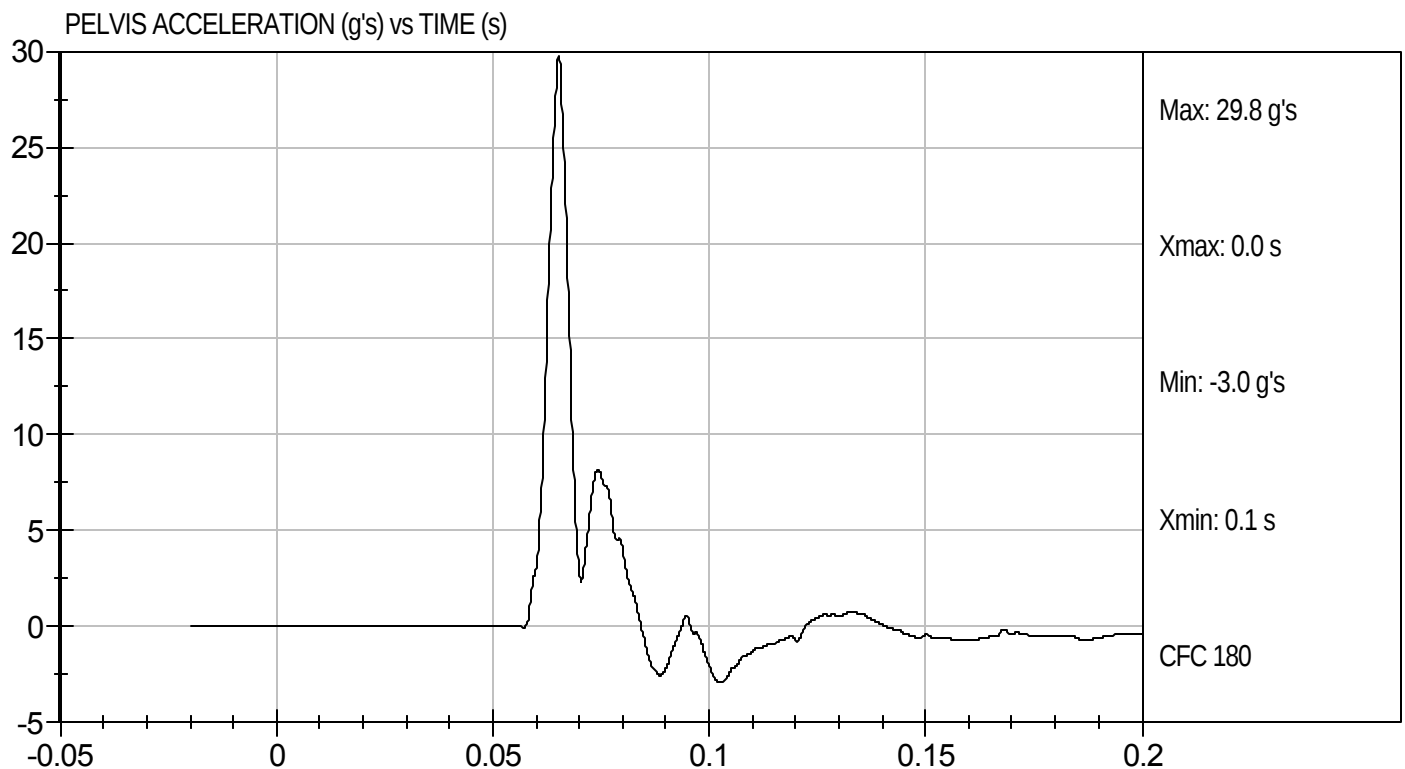
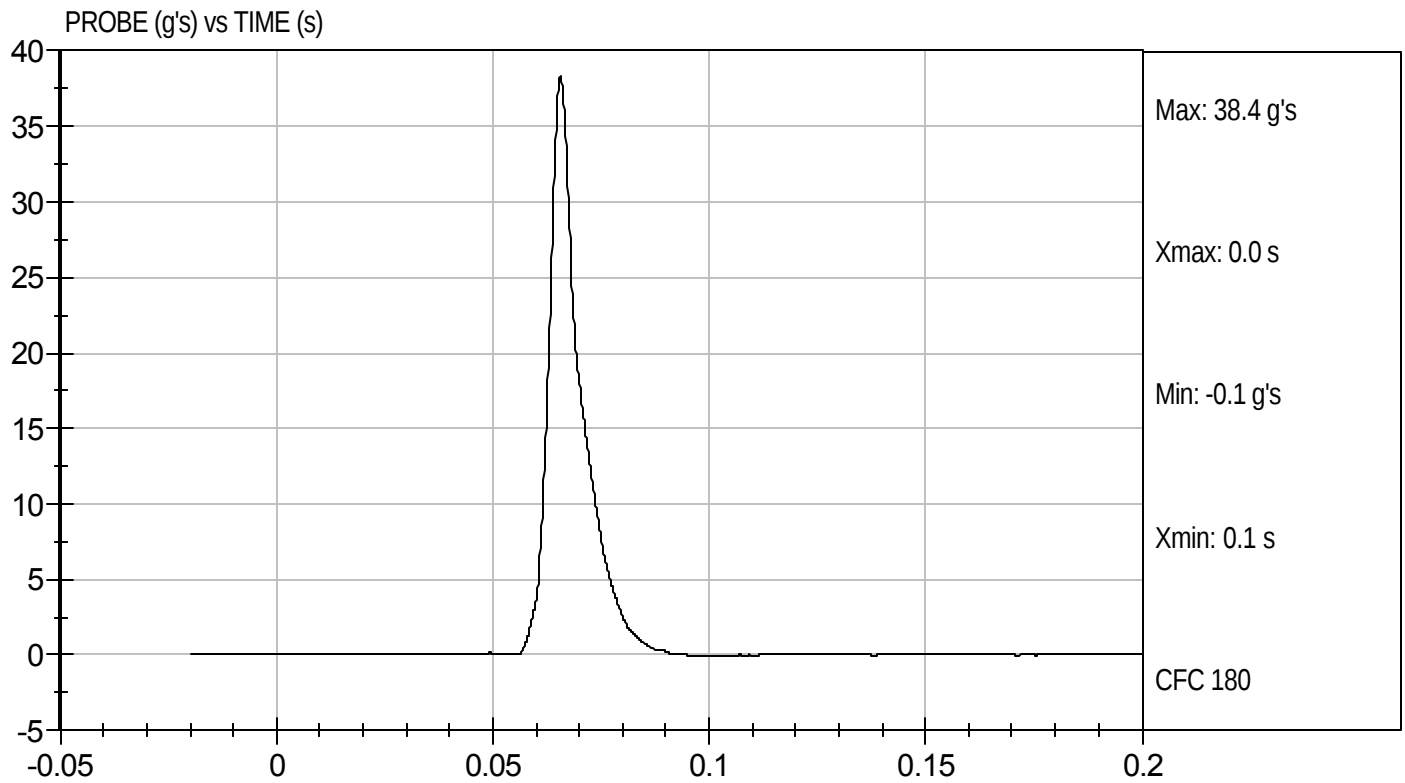
2/15/11
Test Date


Approved By



Test Desc: Iliac Impact
Component ID: D11548

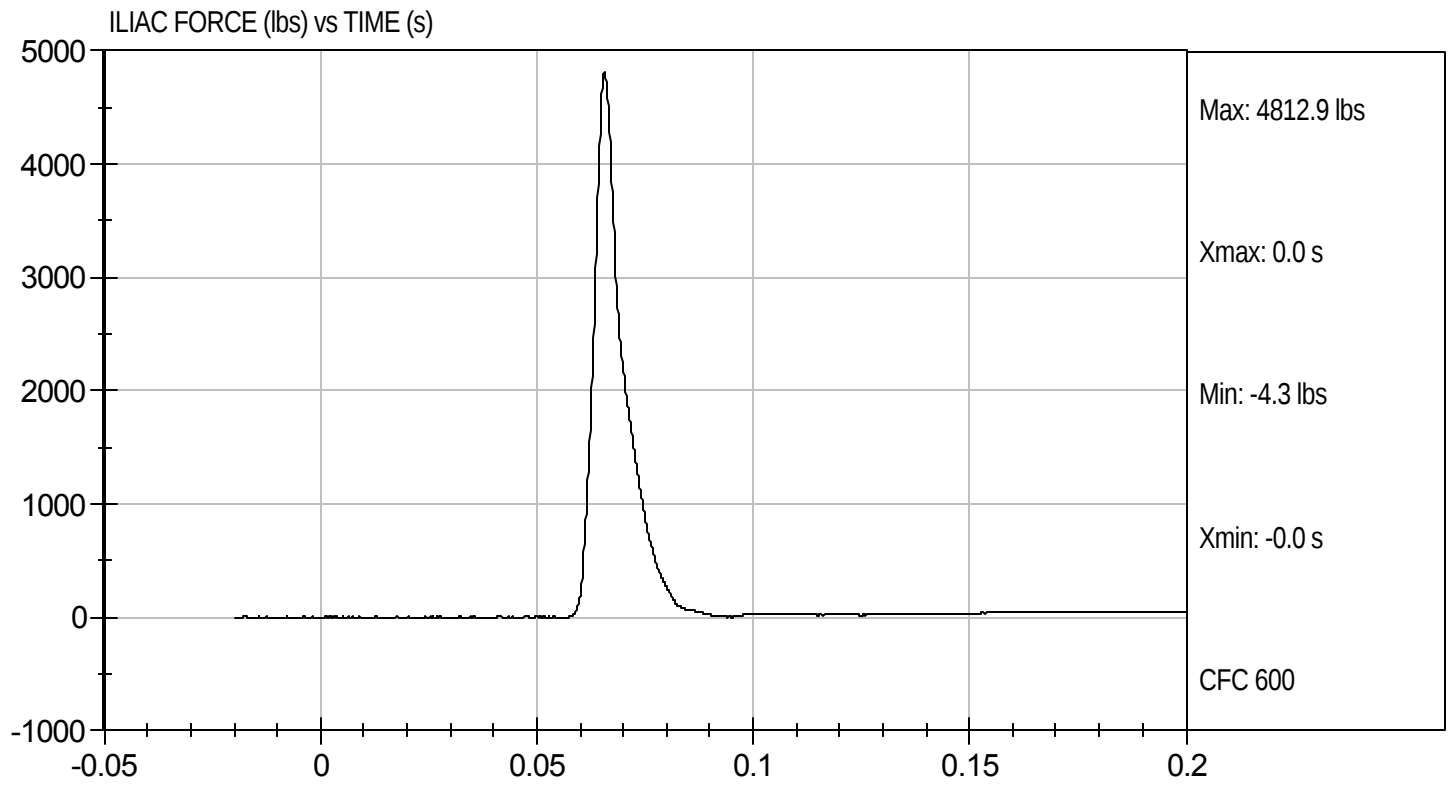
Test Date: 2/15/11
Velocity: 13.78 ft/s, 4.20 m/s





Test Desc: Iliac Impact
Component ID: D11548

Test Date: 2/15/11
Velocity: 13.78 ft/s, 4.20 m/s



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

ATD Serial No: 306

Test ID: D11671

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	24	Pass
Peak Resultant Acceleration	G's	115 to 137	116	Pass
Peak Lateral Acceleration	G's	+/- 15	-6.4	Pass
Unimodal	N/A	<15%	Yes	Pass
Overall Test Results				Pass



Laboratory Technician

2/23/11

Test Date

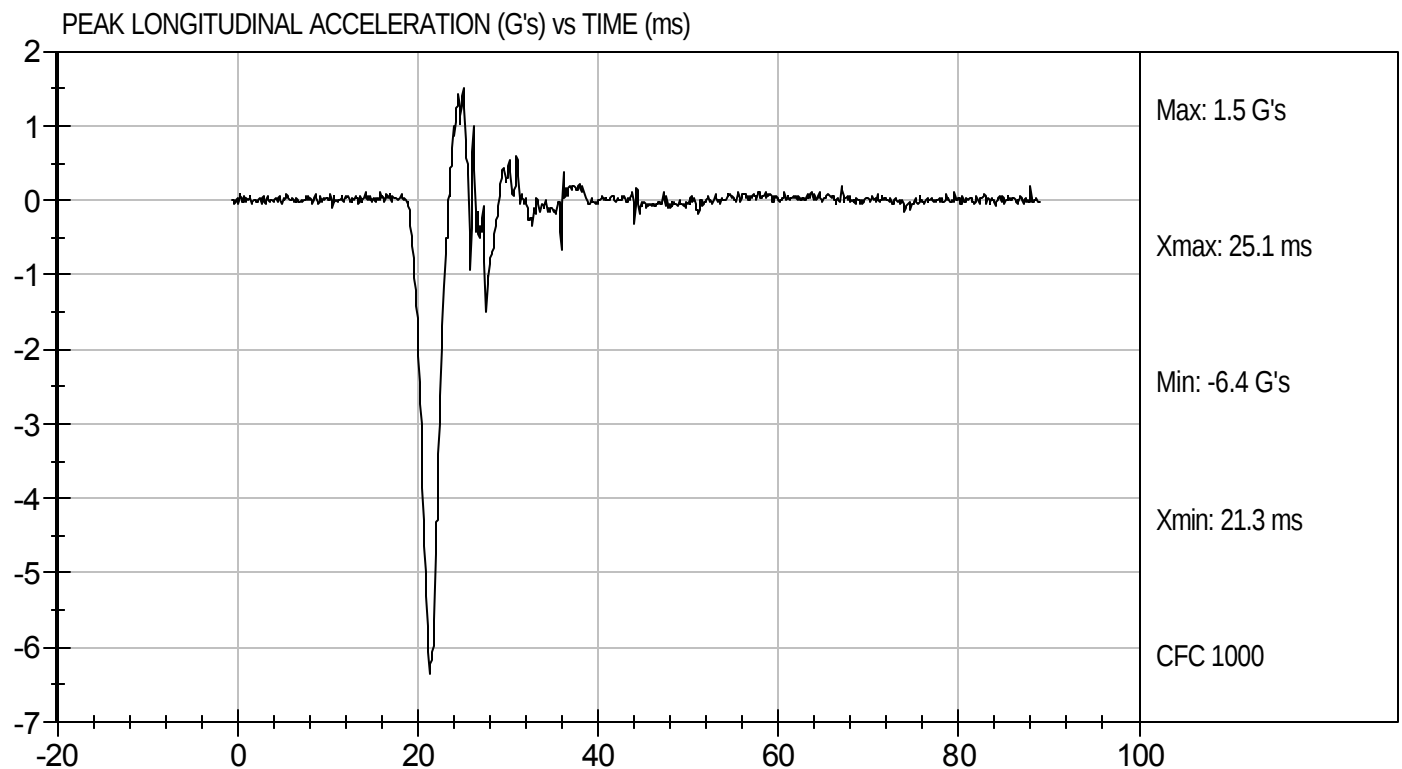
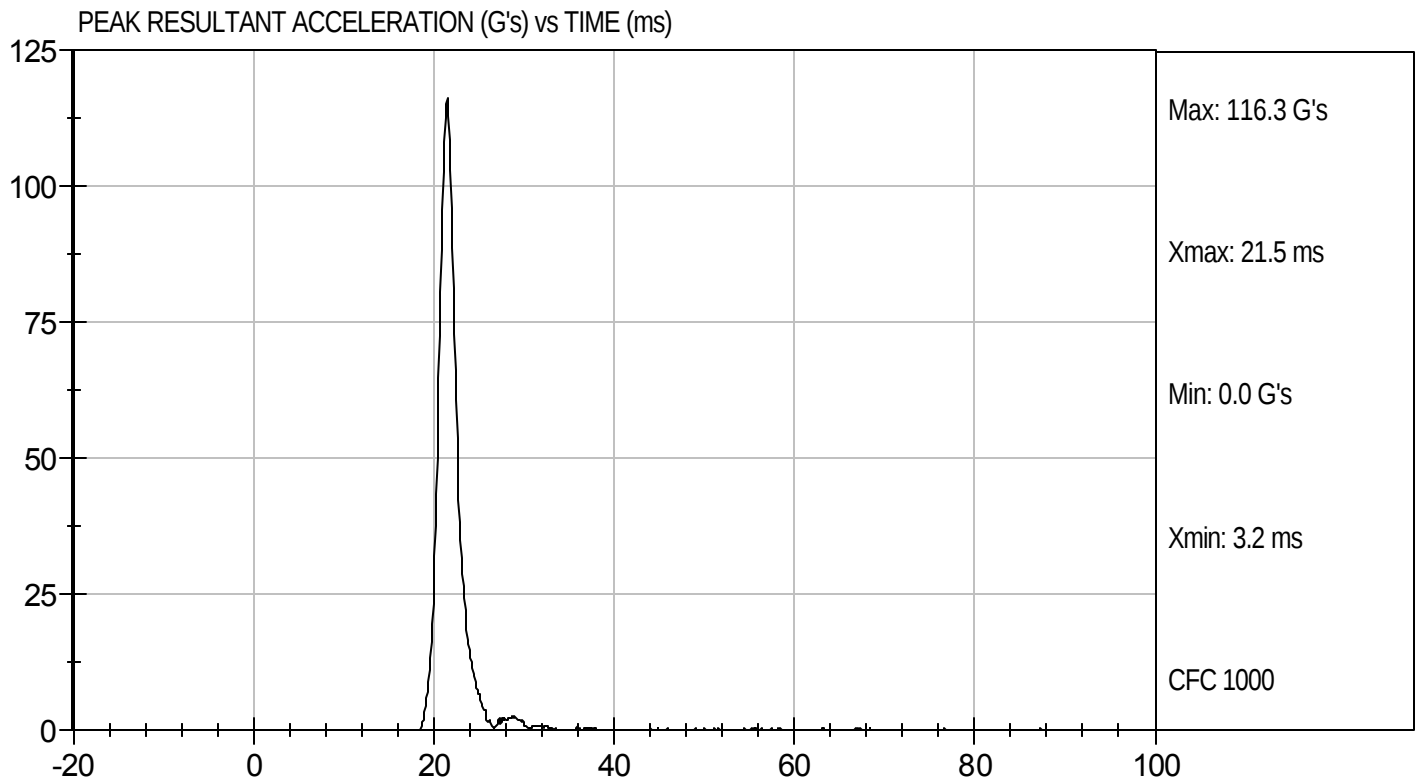


Approved By



Test Desc: Head Drop
Component ID: D11671

Test Date: 2/23/11
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: D11672

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21.2	Pass
Humidity		%	10 to 70	24	Pass
Impact Velocity		m/s	5.51 to 5.63	5.58	Pass
Delta Velocity	10 ms	m/s	2.20 to 2.80	2.47	Pass
	15 ms	m/s	3.30 to 4.10	3.56	Pass
	20 ms	m/s	4.40 to 5.40	4.79	Pass
	25 ms	m/s	5.40 to 6.10	5.54	Pass
	25-100 ms	m/s	5.50 to 6.20	5.54	Pass
Maximum D-Plane Rotation		deg	71 to 81	73	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	63	Pass
Maximum Occipital Condyle Moment during Rotation Interval Nm			-44 to -36	-43	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	118	Pass
Overall Test Results				Pass	

Jessica Gall
Laboratory Technician

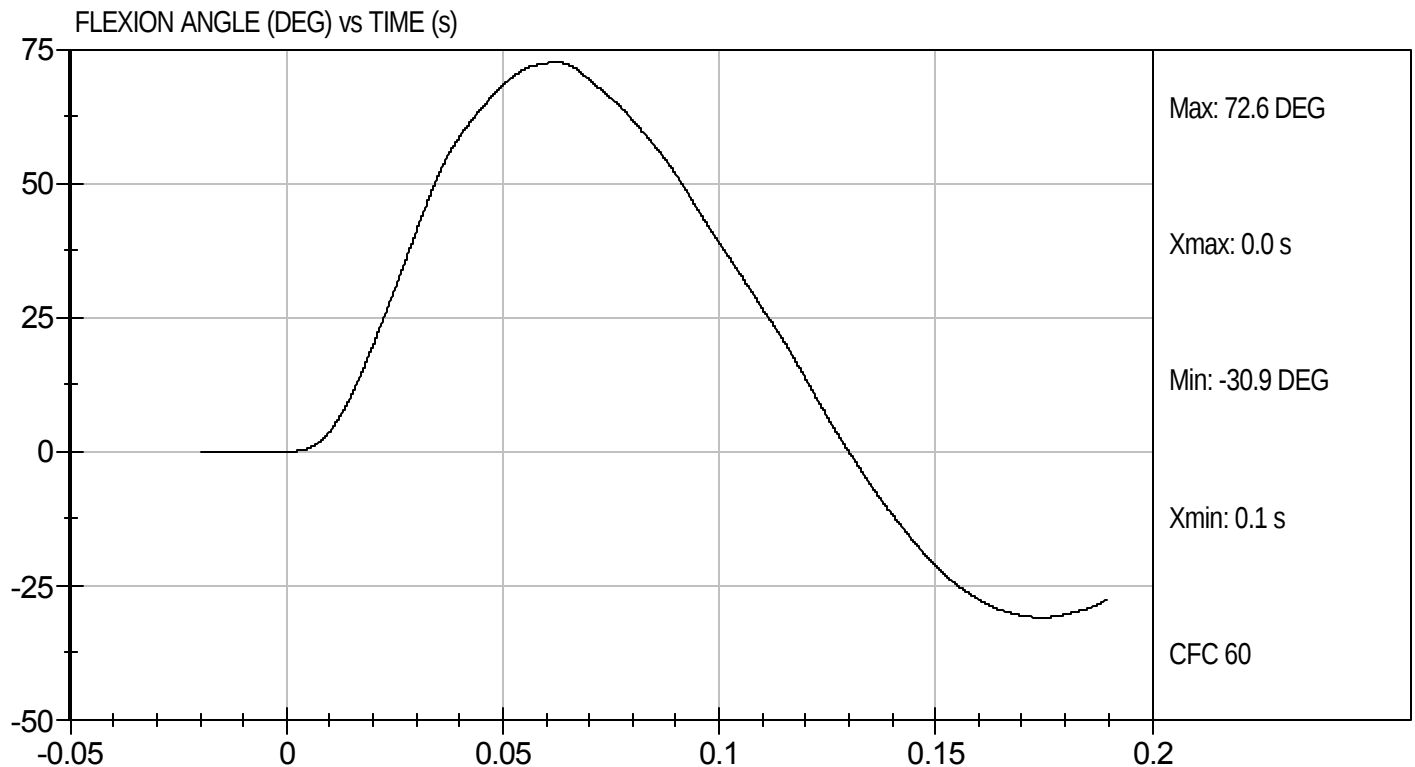
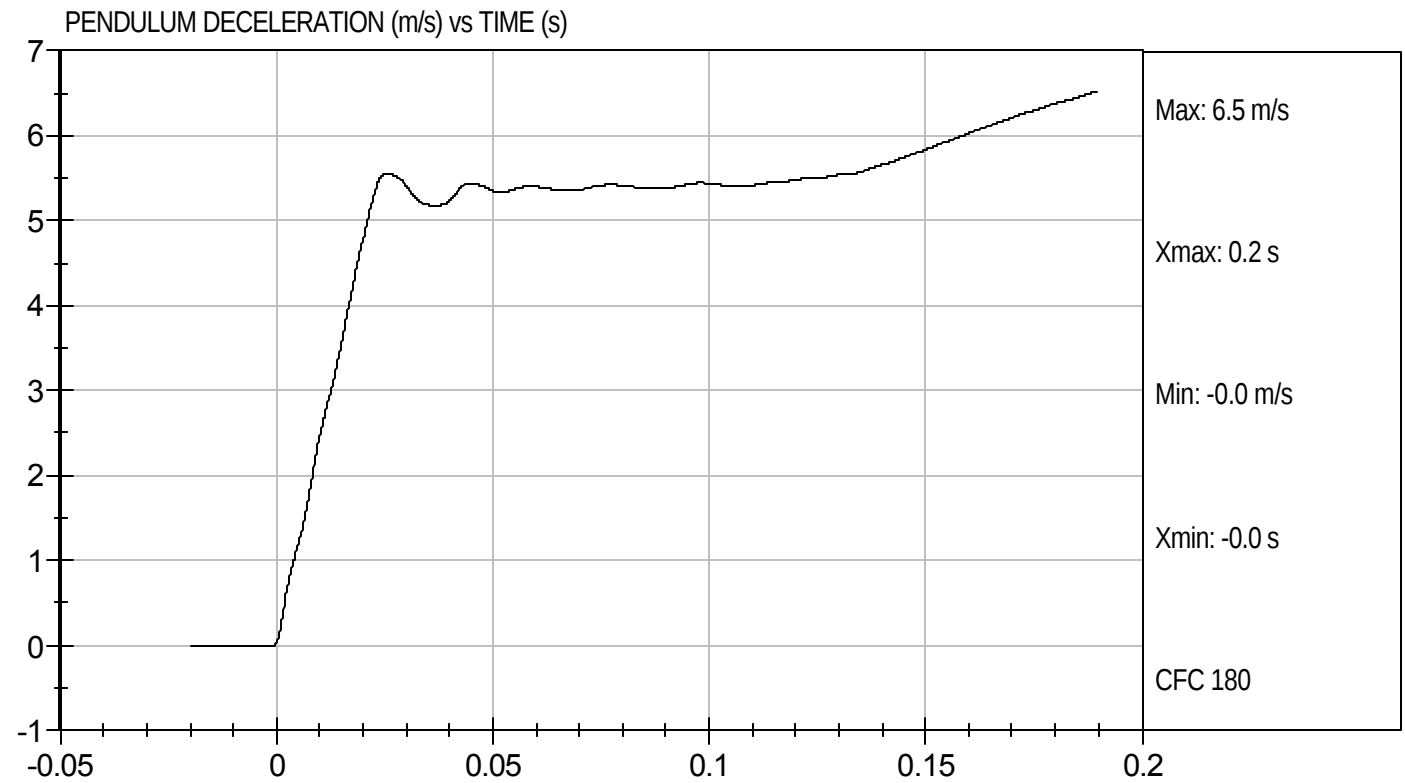
2/23/11
Test Date

David Winkelbauer
Approved By



Test Desc: Neck Bending
Component ID: D11672

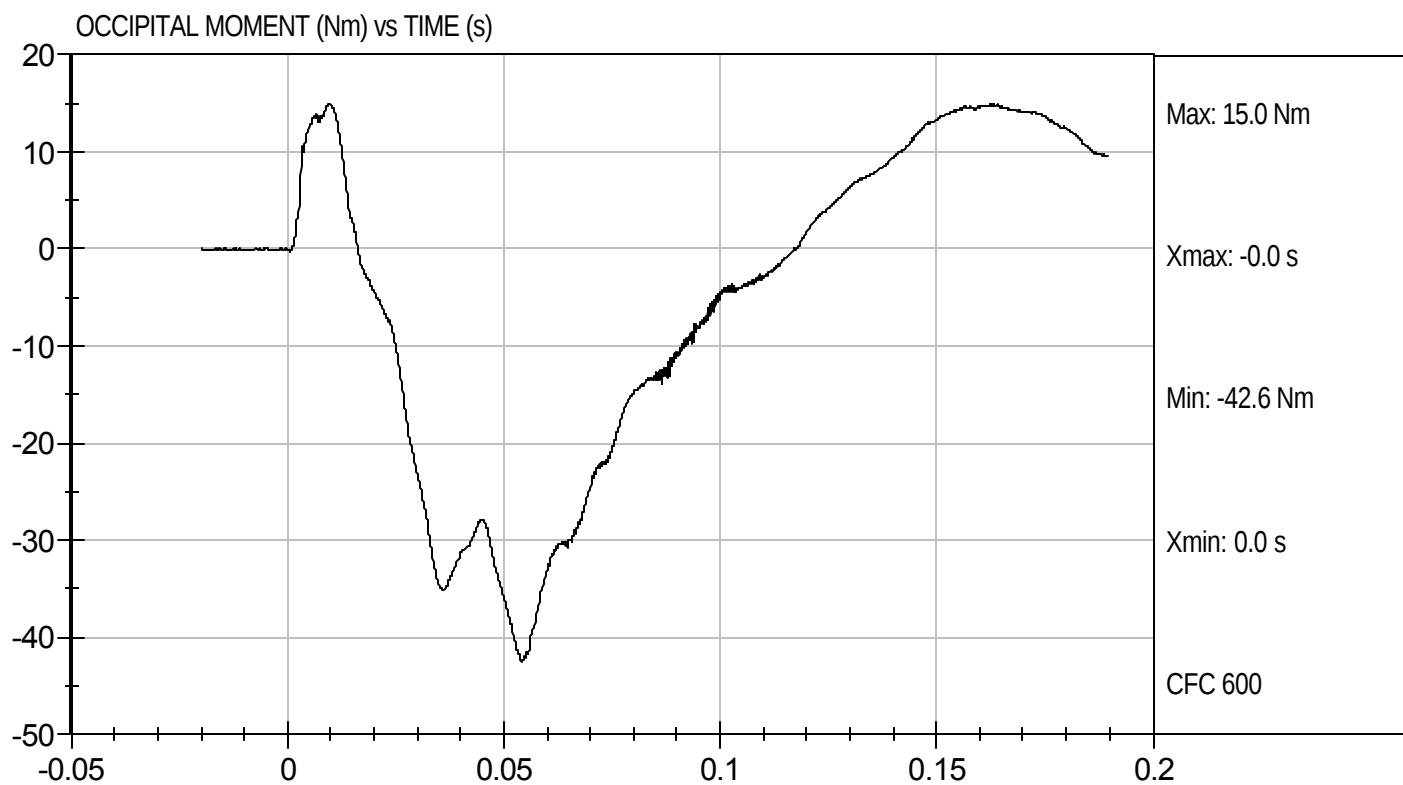
Test Date: 2/23/11
Velocity: 18.31 ft/s, 5.58 m/s





Test Desc: Neck Bending
Component ID: D11672

Test Date: 2/23/11
Velocity: 18.31 ft/s, 5.58 m/s



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

ATD Serial No: 306

Test ID: D11673

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	24	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Maximum Probe Acceleration	G's	13 to 18	14	Pass
Shoulder Displacement	mm	28 to 37	30	Pass
Upper Spine (T1) Y Acceleration	G's	17 to 22	19	Pass
			Overall Test Results	Pass

Jessica Gall
Laboratory Technician

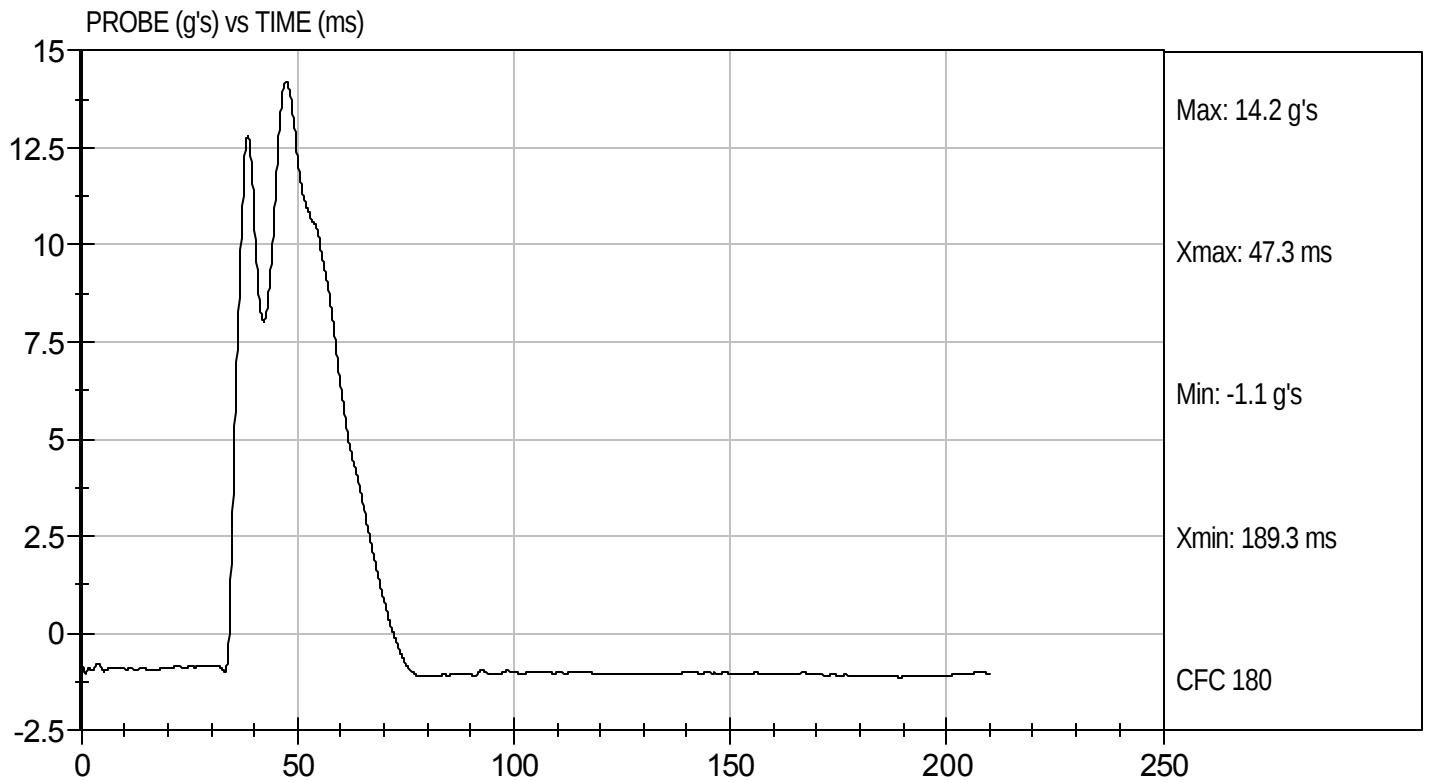
2/23/11
Test Date

David Winkelbauer
Approved By



Test Desc: Shoulder Impact
Component ID: D11673

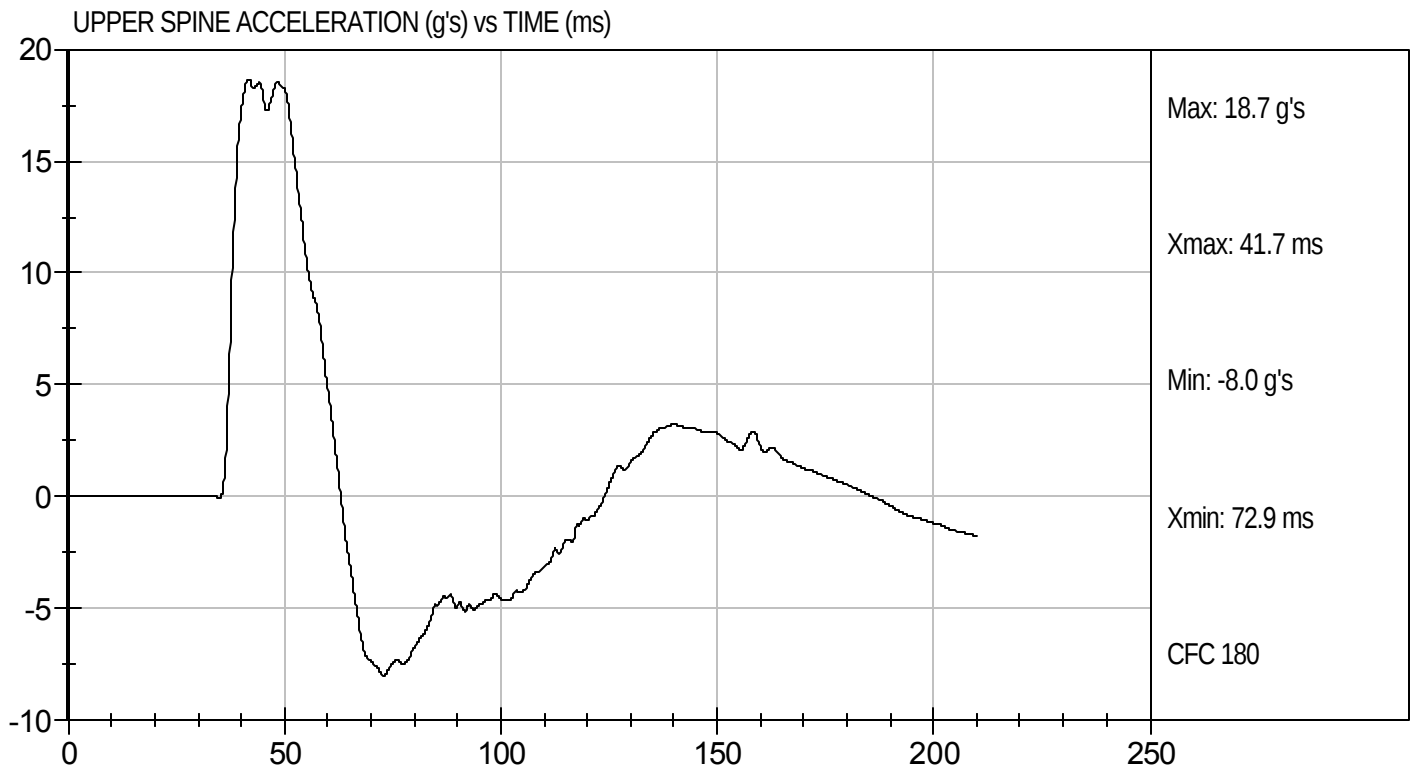
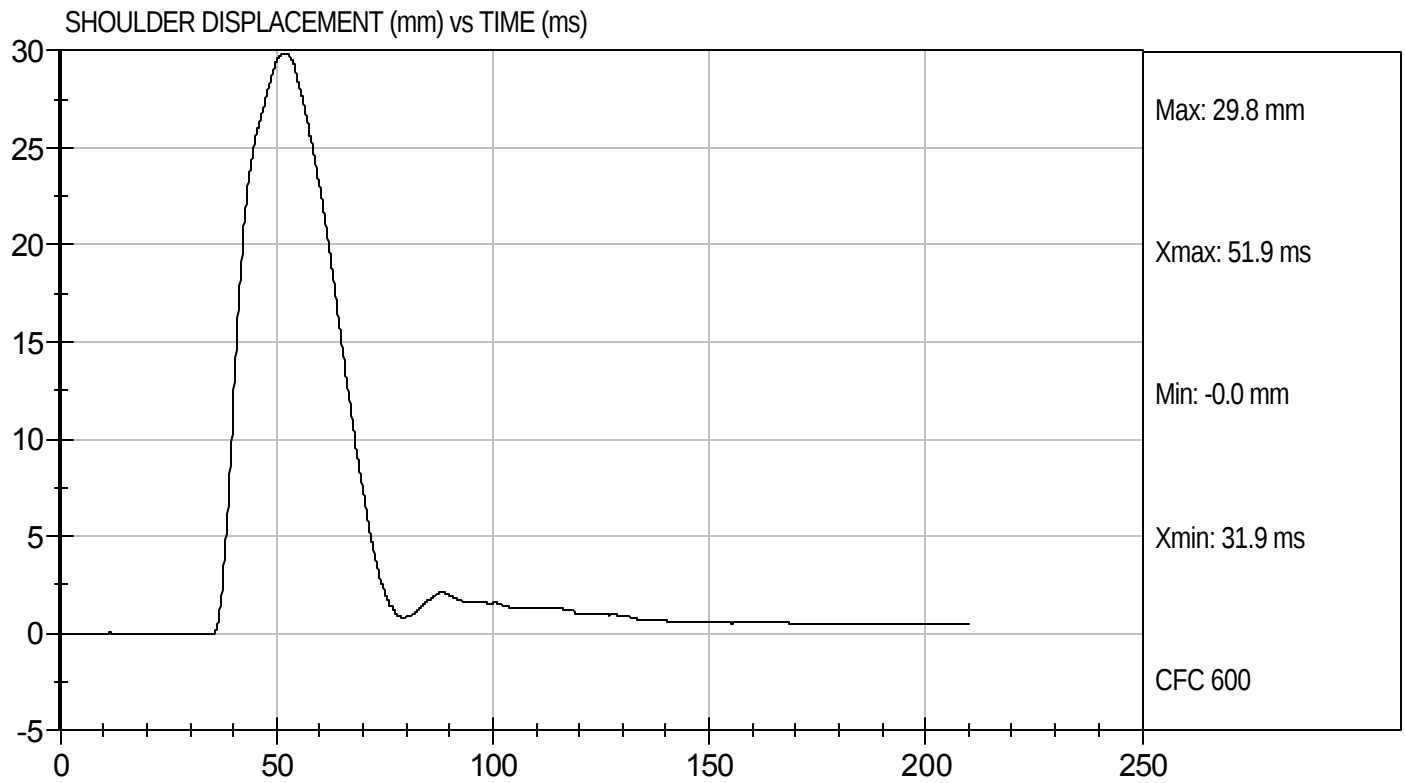
Test Date: 2/23/11
Velocity: 14.36 ft/s, 4.38 m/s





Test Desc: Shoulder Impact
Component ID: D11673

Test Date: 2/23/11
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: D11674

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.2	Pass
Humidity	%	10 to 70	24	Pass
Impact Velocity	m/s	6.60 to 6.80	6.77	Pass
Peak Impactor Acceleration	G's	30 to 36	32	Pass
Shoulder Displacement	mm	31 to 40	32	Pass
Upper Rib Displacement	mm	25 to 32	26	Pass
Middle Rib Displacement	mm	30 to 36	30	Pass
Lower Rib Displacement	mm	32 to 38	34	Pass
Upper Spine (T1) Y Acceleration	G's	34 to 43	39	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	32	Pass
Overall Test Results				Pass


Laboratory Technician

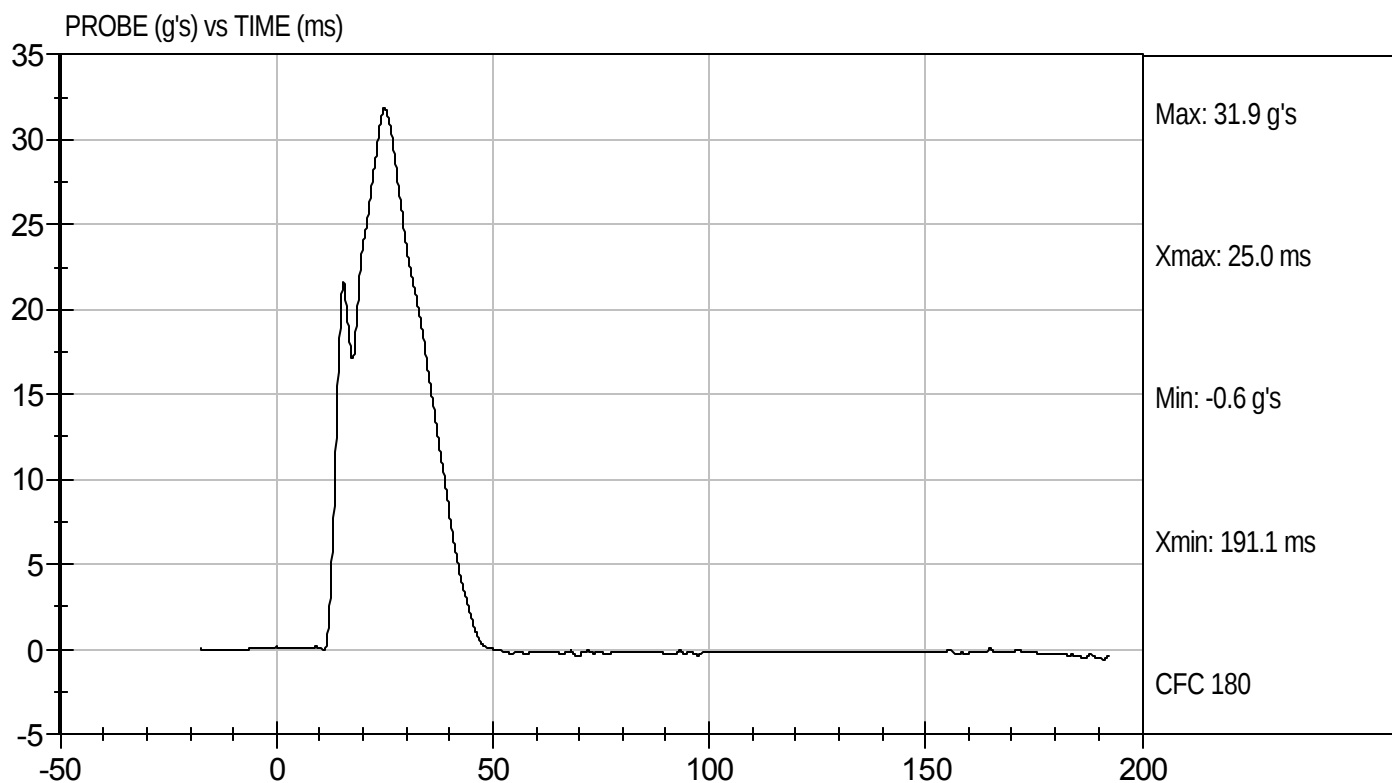
2/23/11
Test Date


Approved By



Test Desc: Thorax With Arm
Component ID: D11674

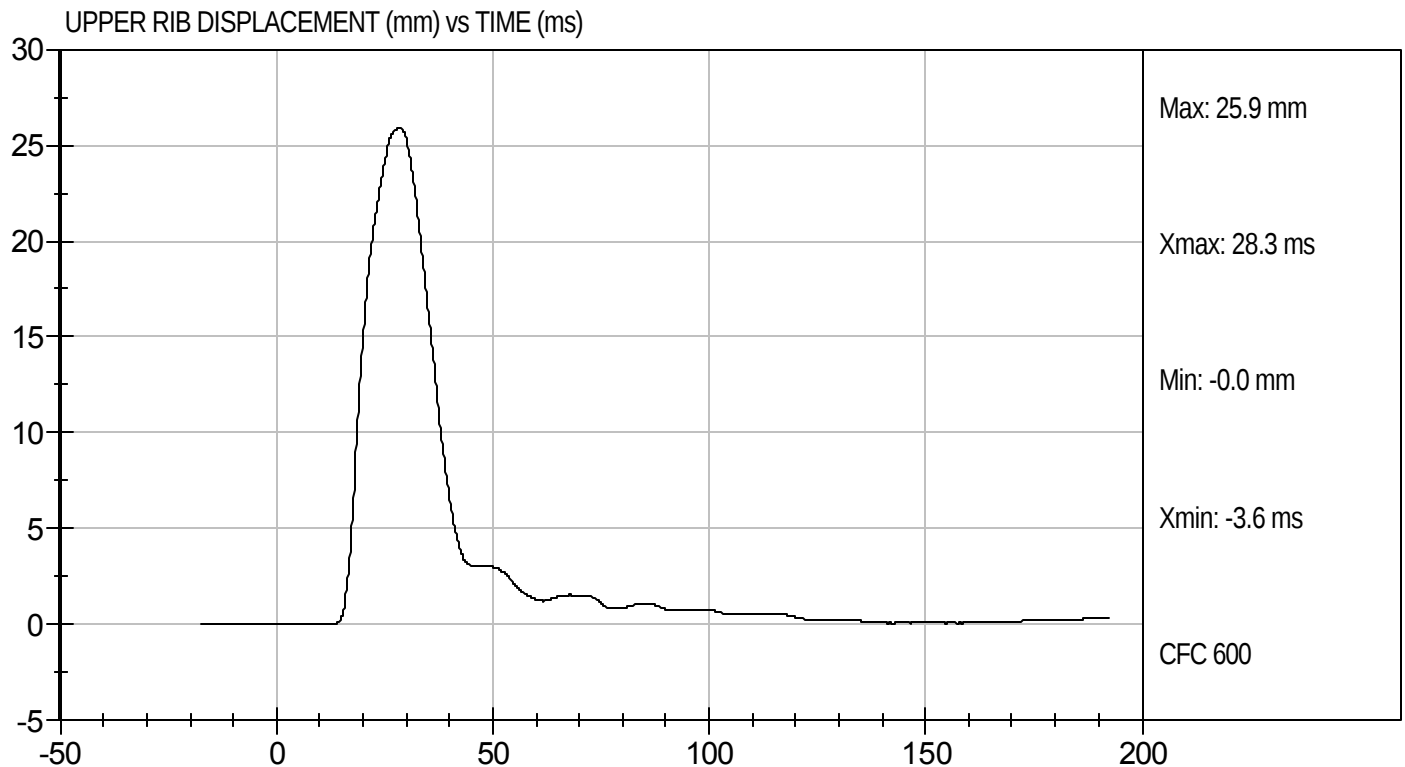
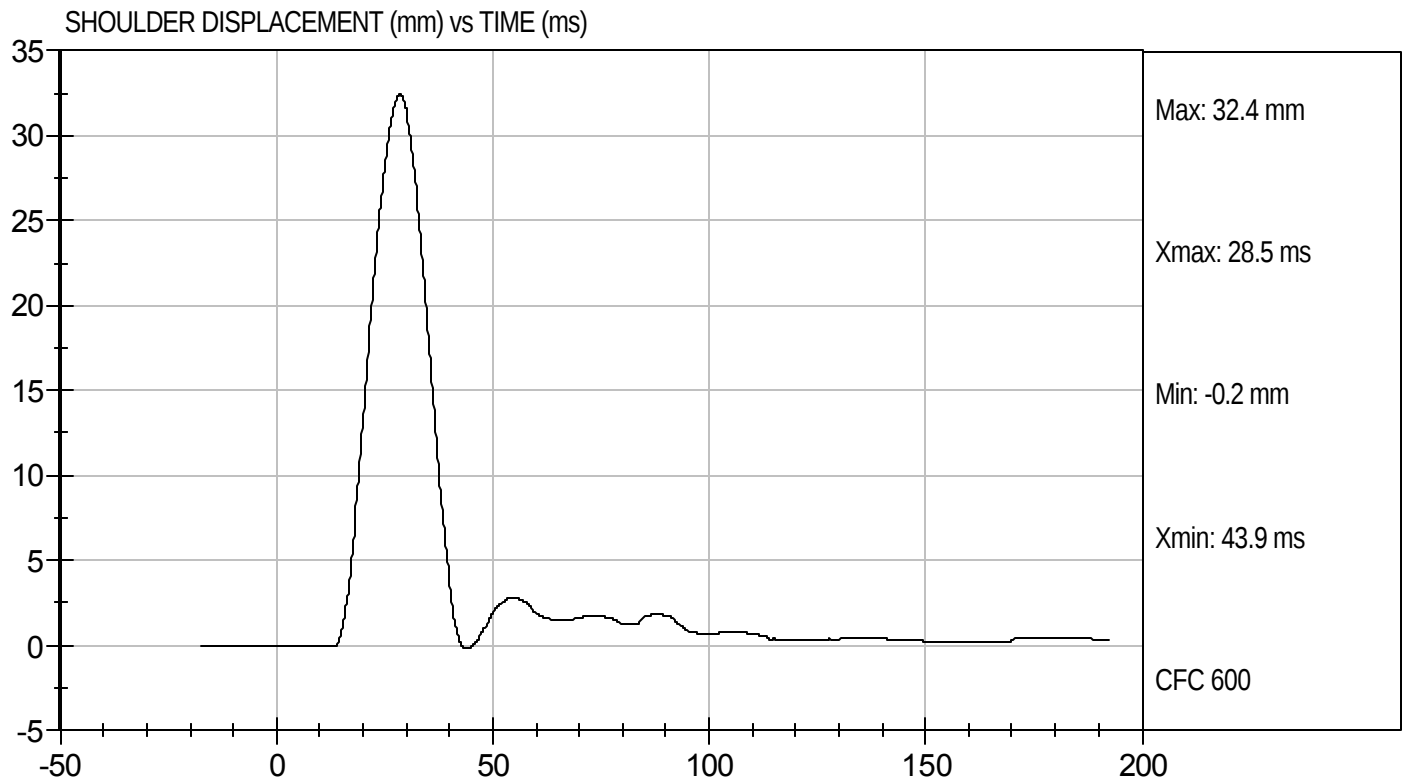
Test Date: 2/23/11
Velocity: 22.2 ft/s, 6.77 m/s





Test Desc: Thorax With Arm
Component ID: D11674

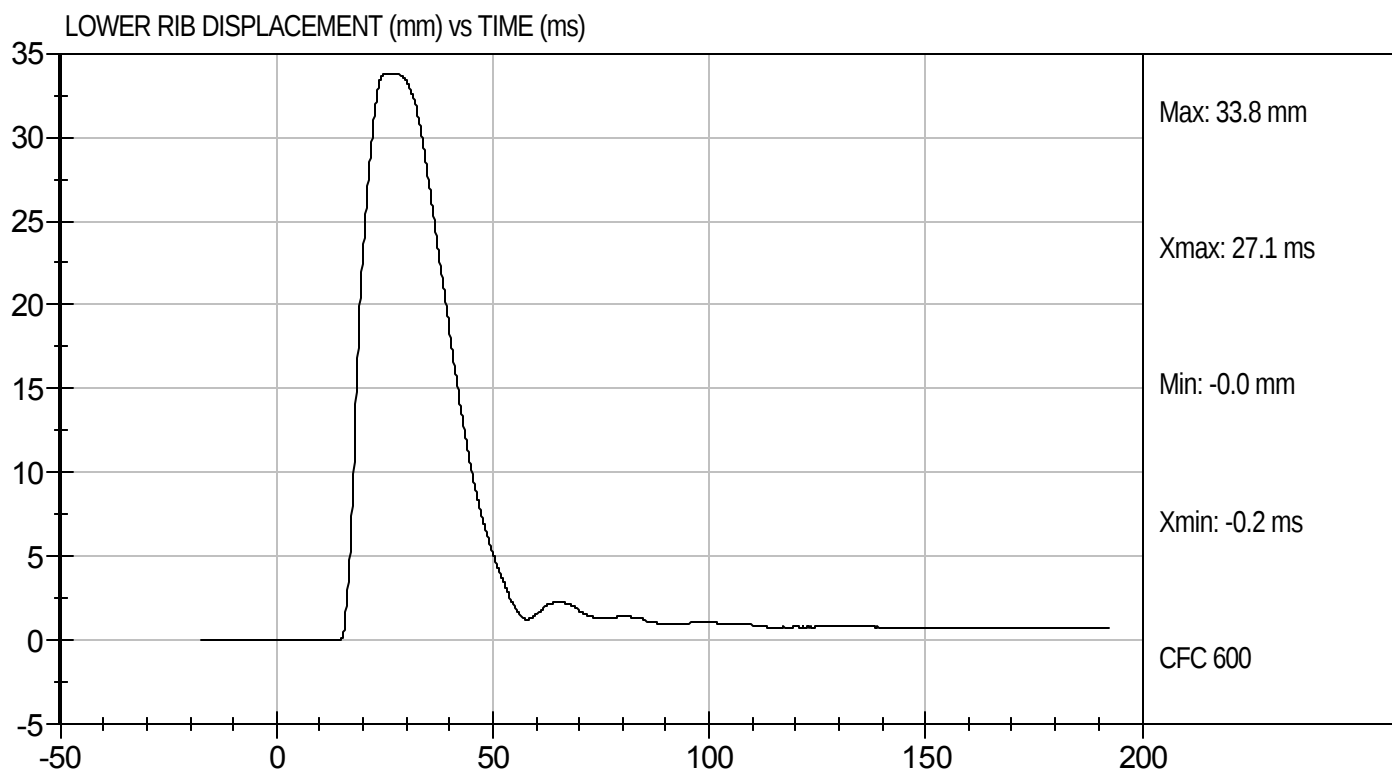
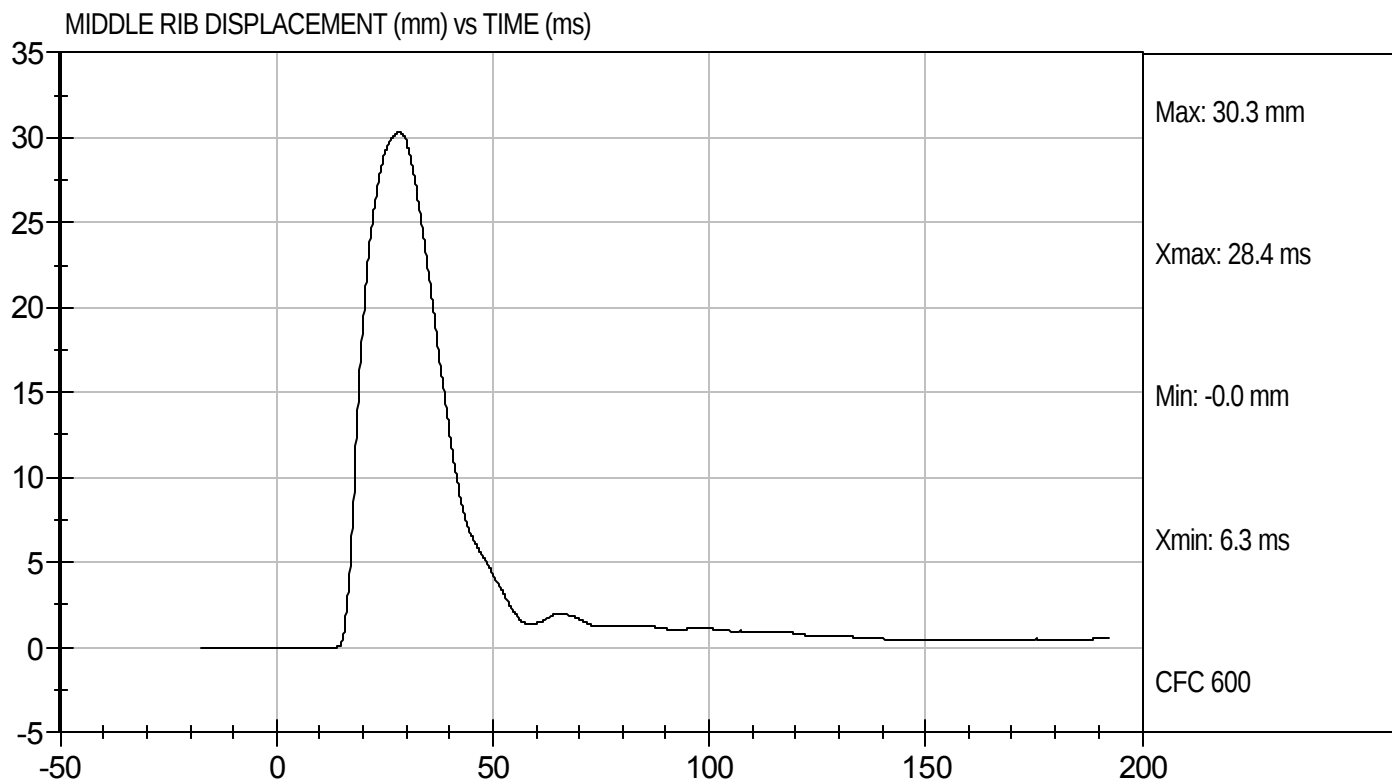
Test Date: 2/23/11
Velocity: 22.2 ft/s, 6.77 m/s





Test Desc: Thorax With Arm
Component ID: D11674

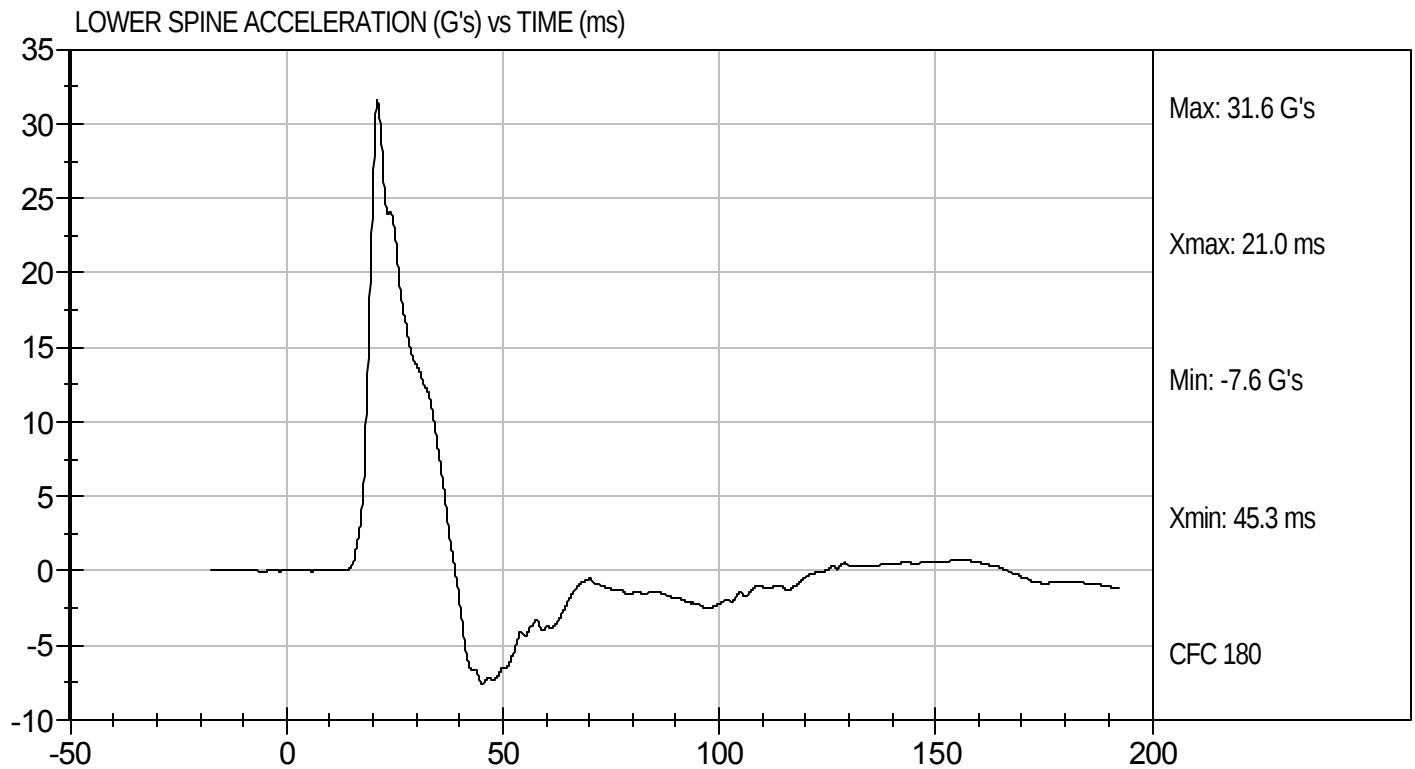
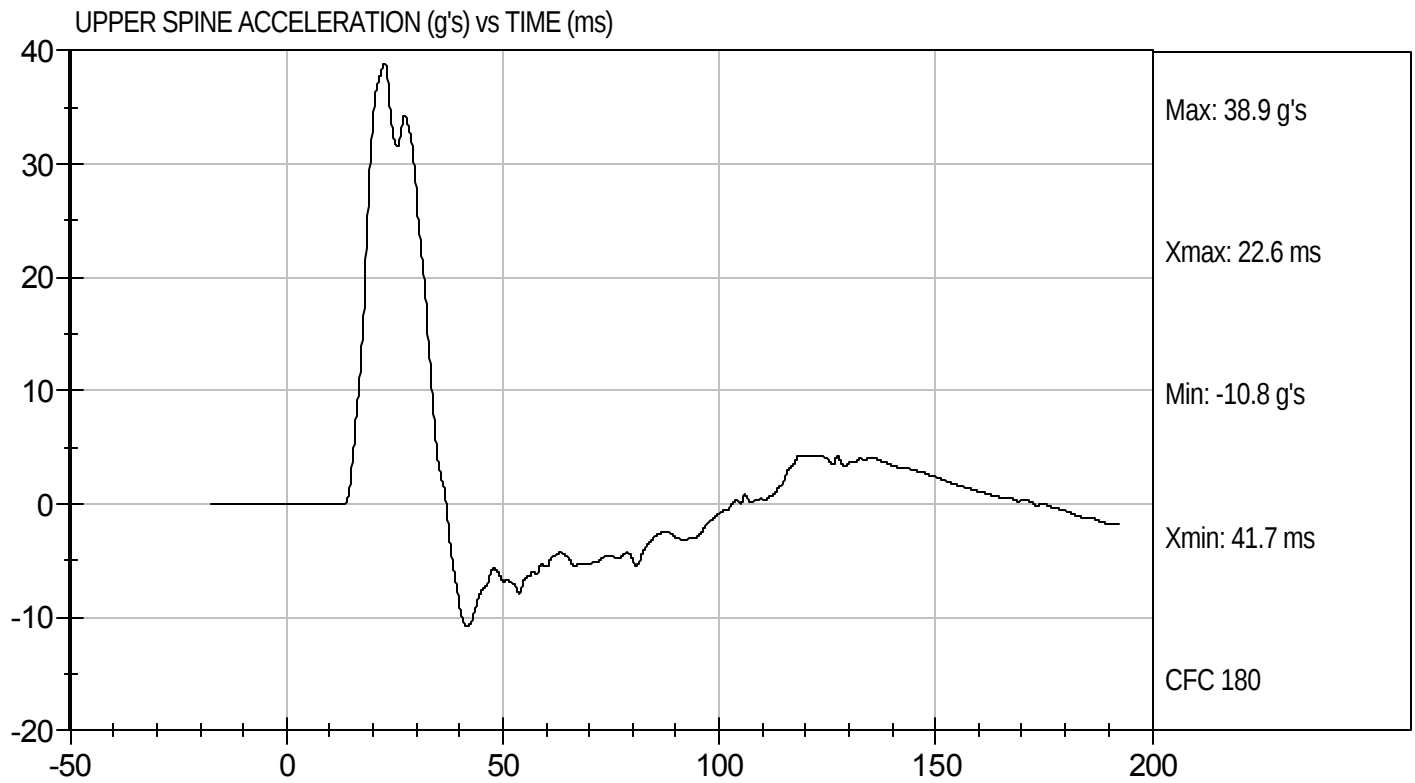
Test Date: 2/23/11
Velocity: 22.2 ft/s, 6.77 m/s





Test Desc: Thorax With Arm
Component ID: D11674

Test Date: 2/23/11
Velocity: 22.2 ft/s, 6.77 m/s



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

ATD Serial No: 306

Test I.D: D11675

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.2	Pass
Humidity	%	10 to 70	24	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Peak Impactor Force	G's	14 to 18	15	Pass
Upper Rib Displacement	mm	32 to 40	35	Pass
Middle Rib Displacement	mm	39 to 45	39	Pass
Lower Rib Displacement	mm	35 to 43	38	Pass
Upper Spine (T1) Y Acceleration	G's	13 to 17	14	Pass
Lower Spine (T12) Y Acceleration	G's	7 to 11	9	Pass
Overall Test Results				Pass


Laboratory Technician

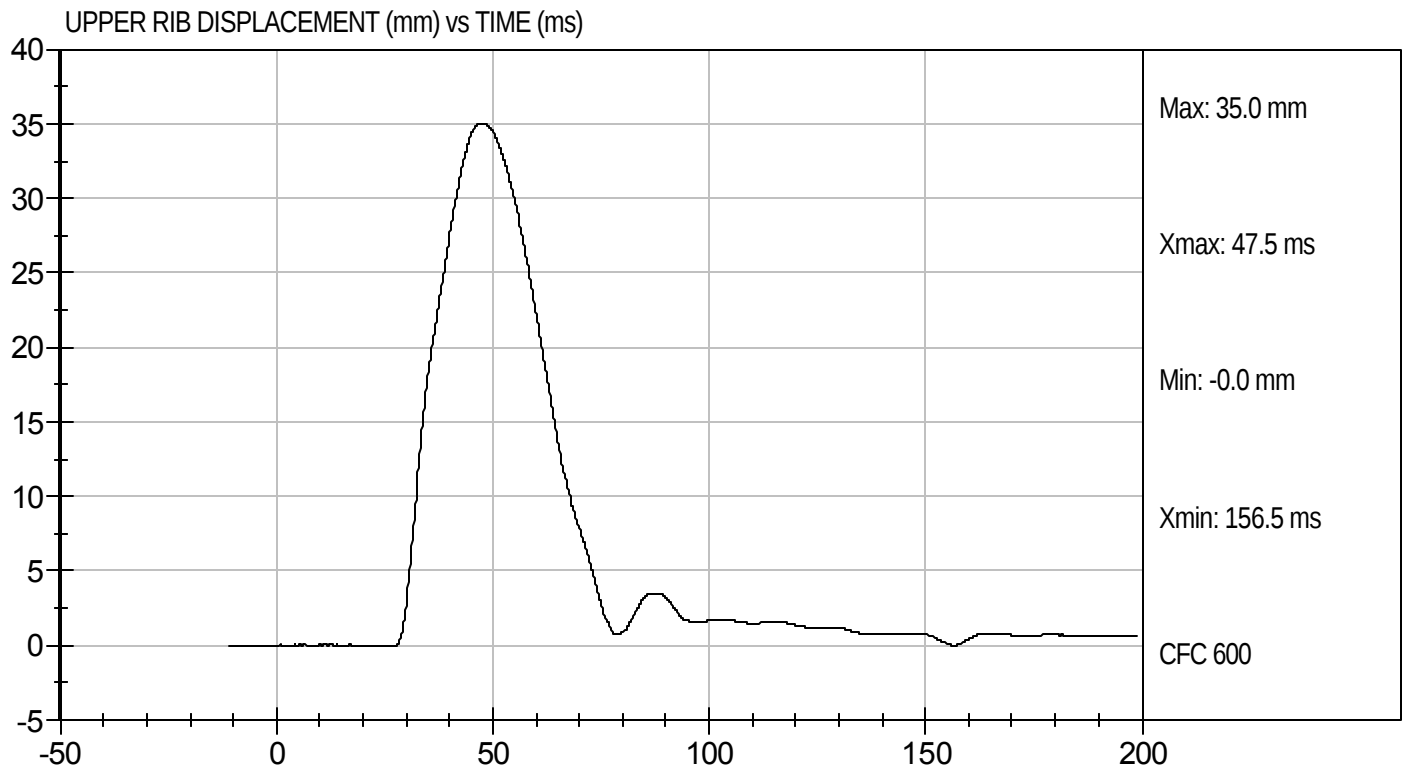
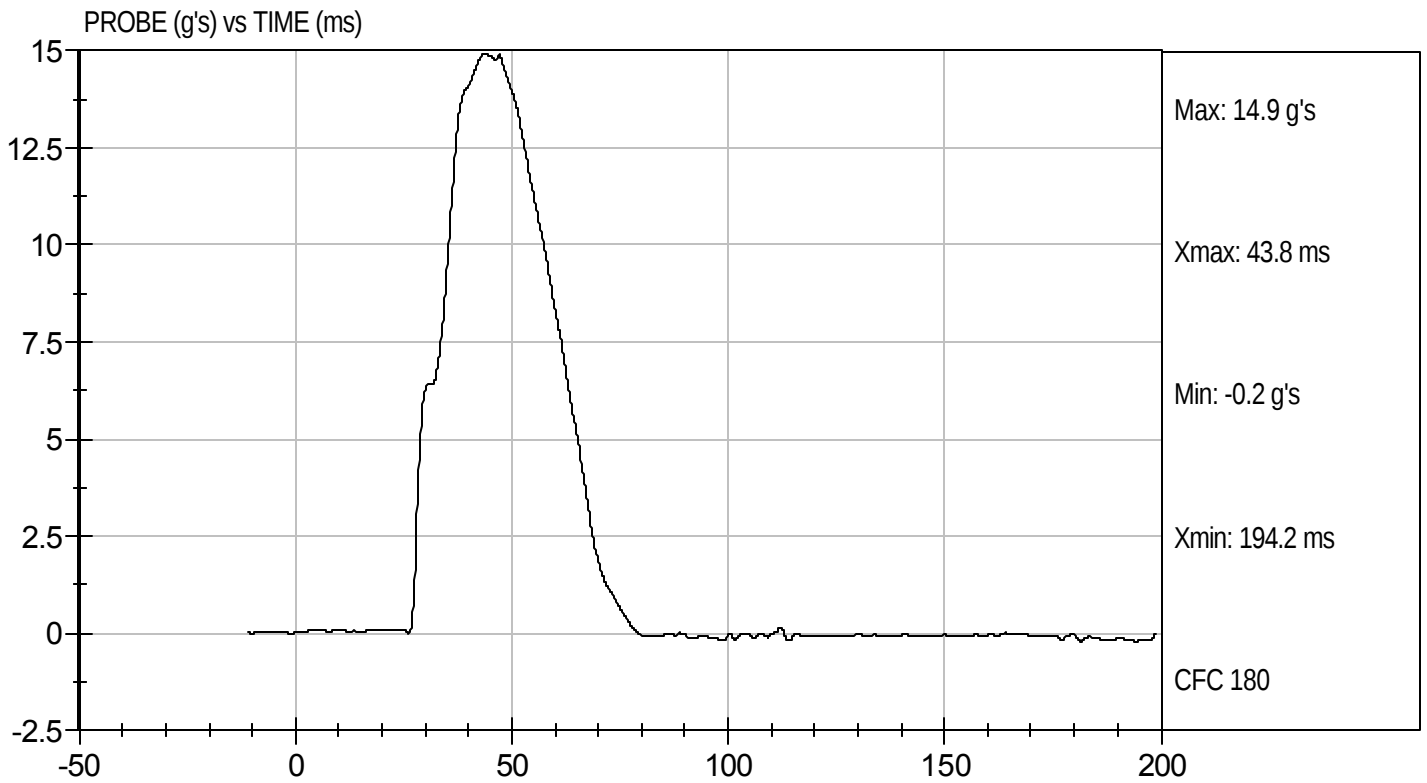
2/23/11
Test Date


Approved By



Test Desc: Thorax Without Arm
Component ID: D11675

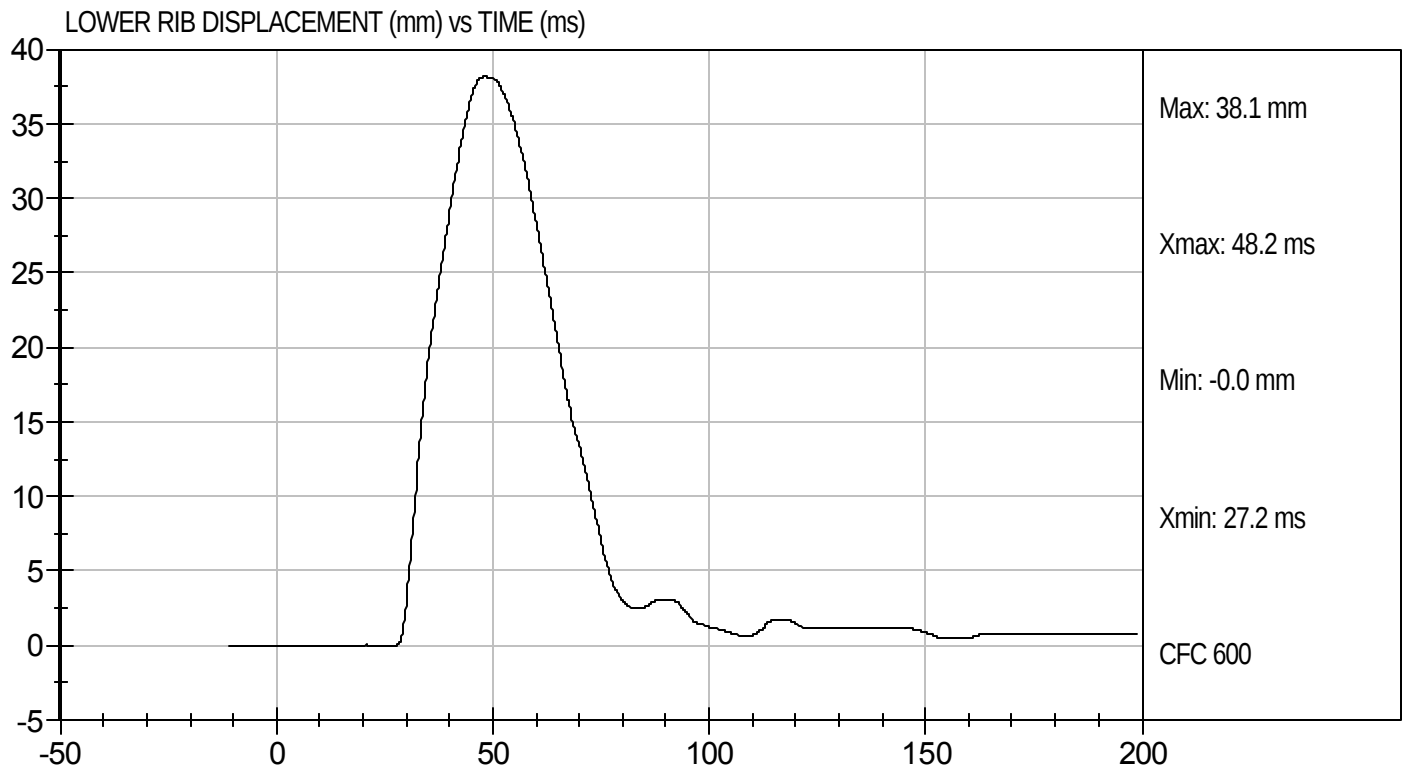
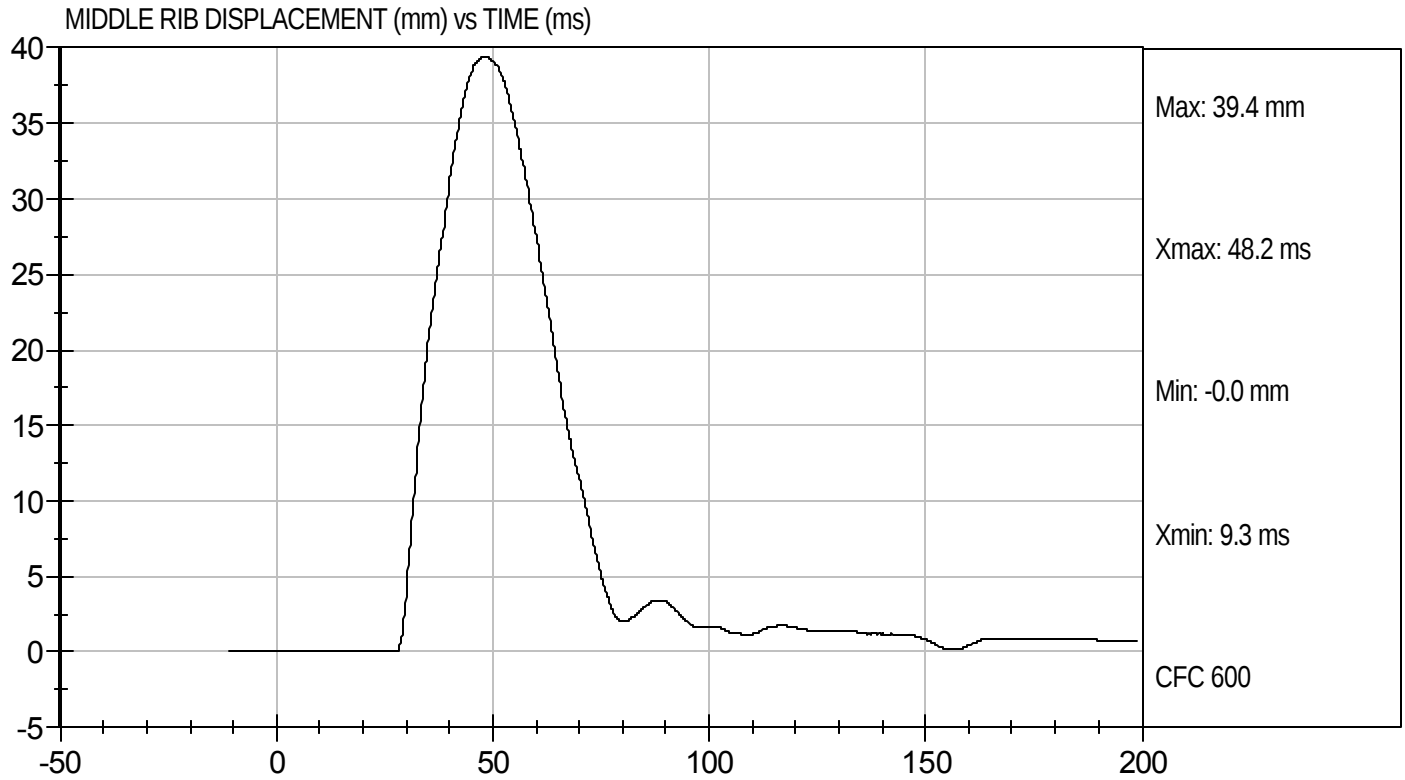
Test Date: 2/23/11
Velocity: 14.36 ft/s, 4.38 m/s





Test Desc: Thorax Without Arm
Component ID: D11675

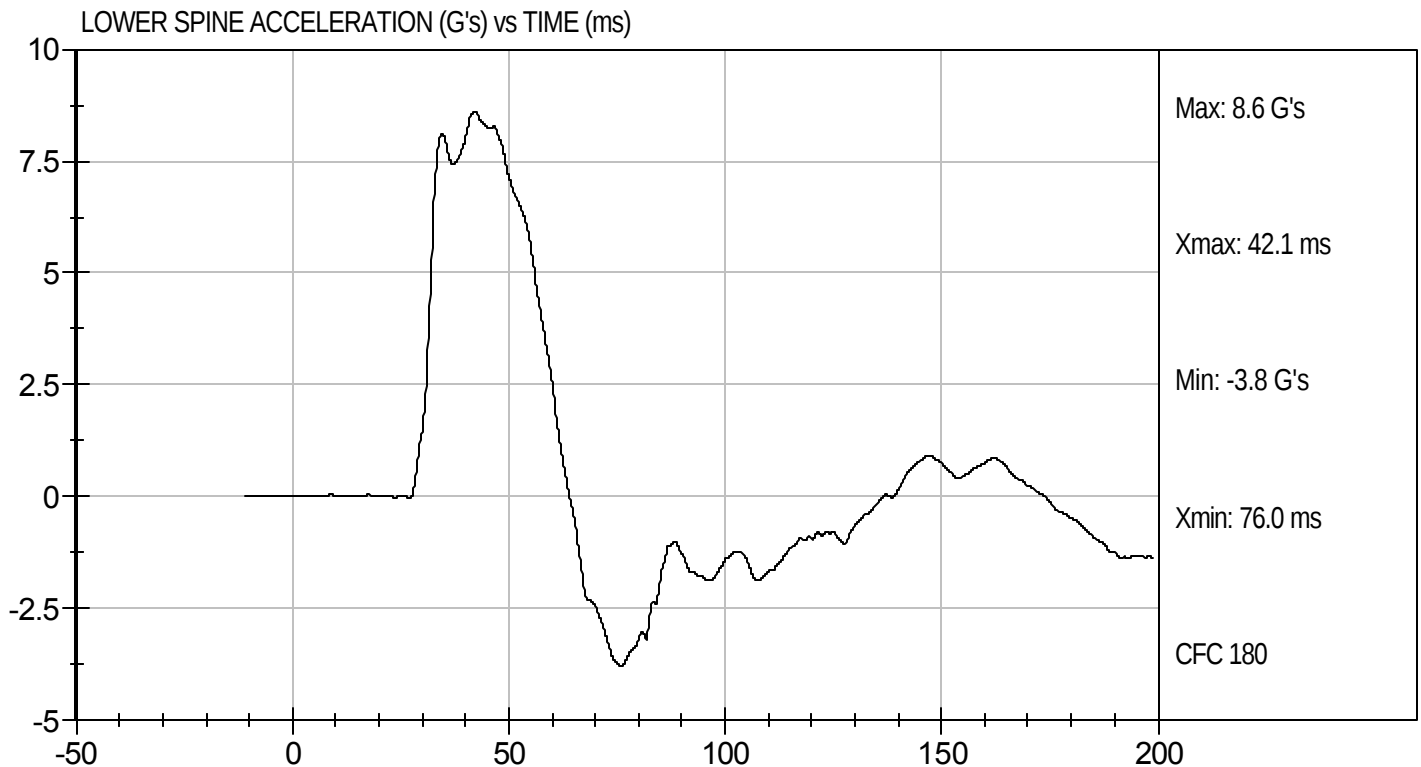
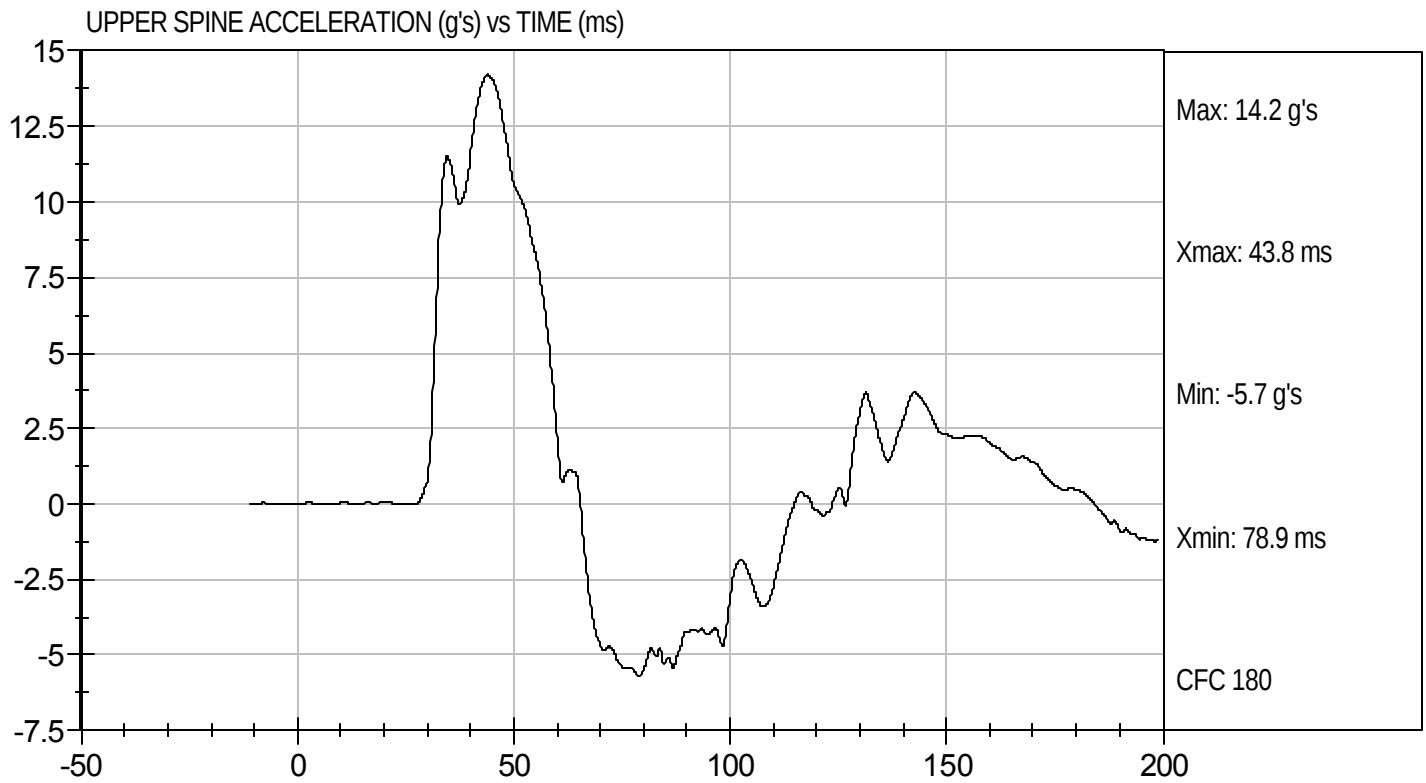
Test Date: 2/23/11
Velocity: 14.36 ft/s, 4.38 m/s





Test Desc: Thorax Without Arm
Component ID: D11675

Test Date: 2/23/11
Velocity: 14.36 ft/s, 4.38 m/s



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

ATD Serial No: 306

Test I.D: D11676

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.2	Pass
Humidity	%	10 to 70	24	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Peak Impactor Acceleration	G's	12 to 16	14	Pass
Upper Rib Displacement	mm	36 to 47	38	Pass
Lower Rib Displacement	mm	33 to 44	37	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	11	Pass
Overall Test Results			Pass	


Laboratory Technician

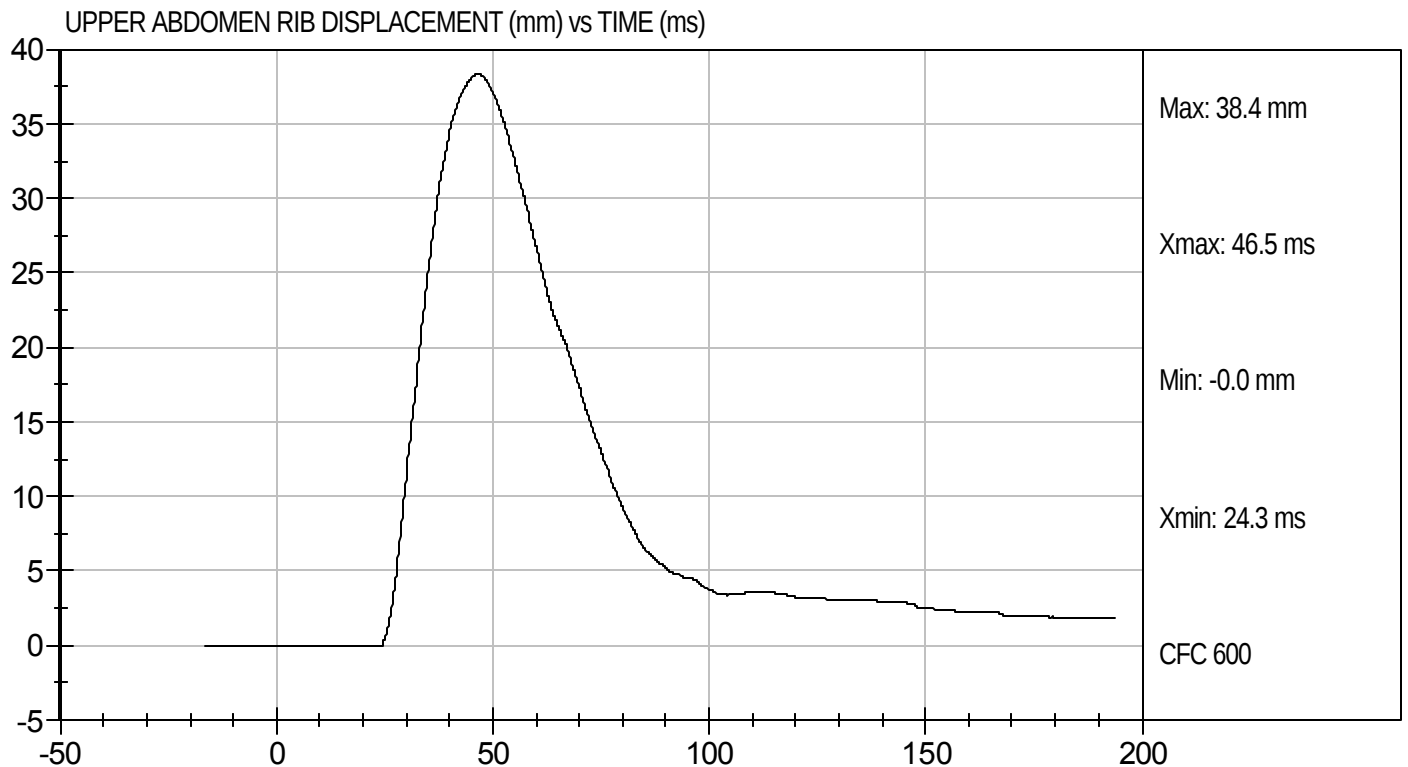
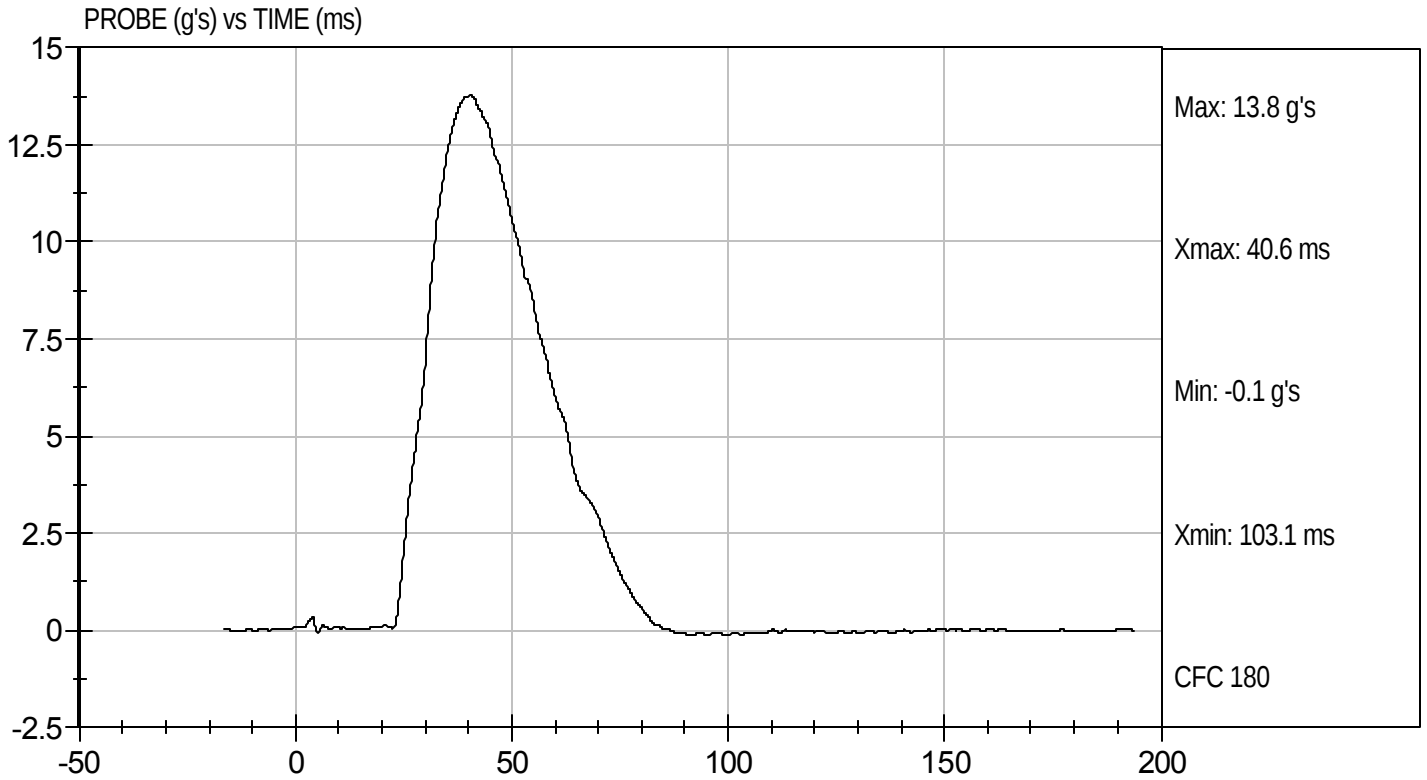
2/23/11
Test Date


Approved By



Test Desc: Abdomen Impact
Component ID: D11676

Test Date: 2/23/11
Velocity: 14.36 ft/s, 4.38 m/s

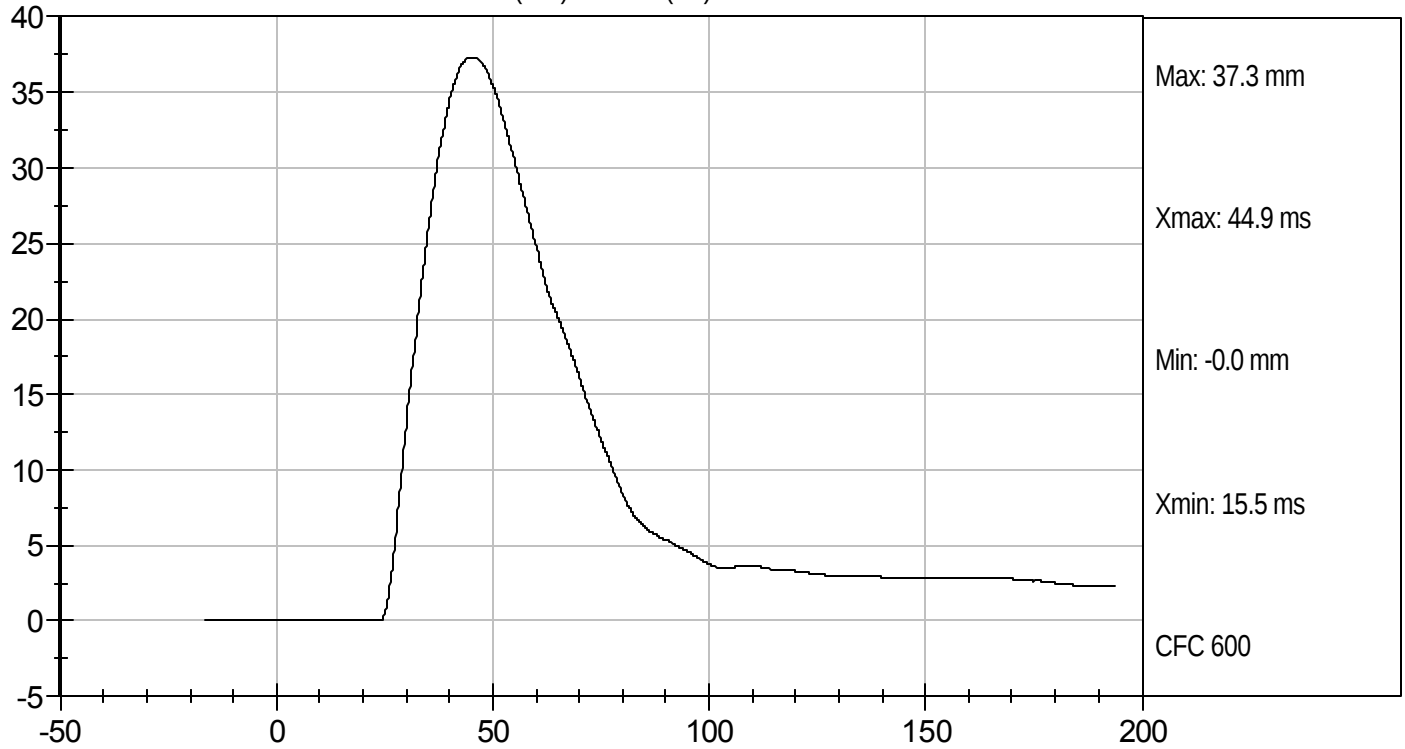




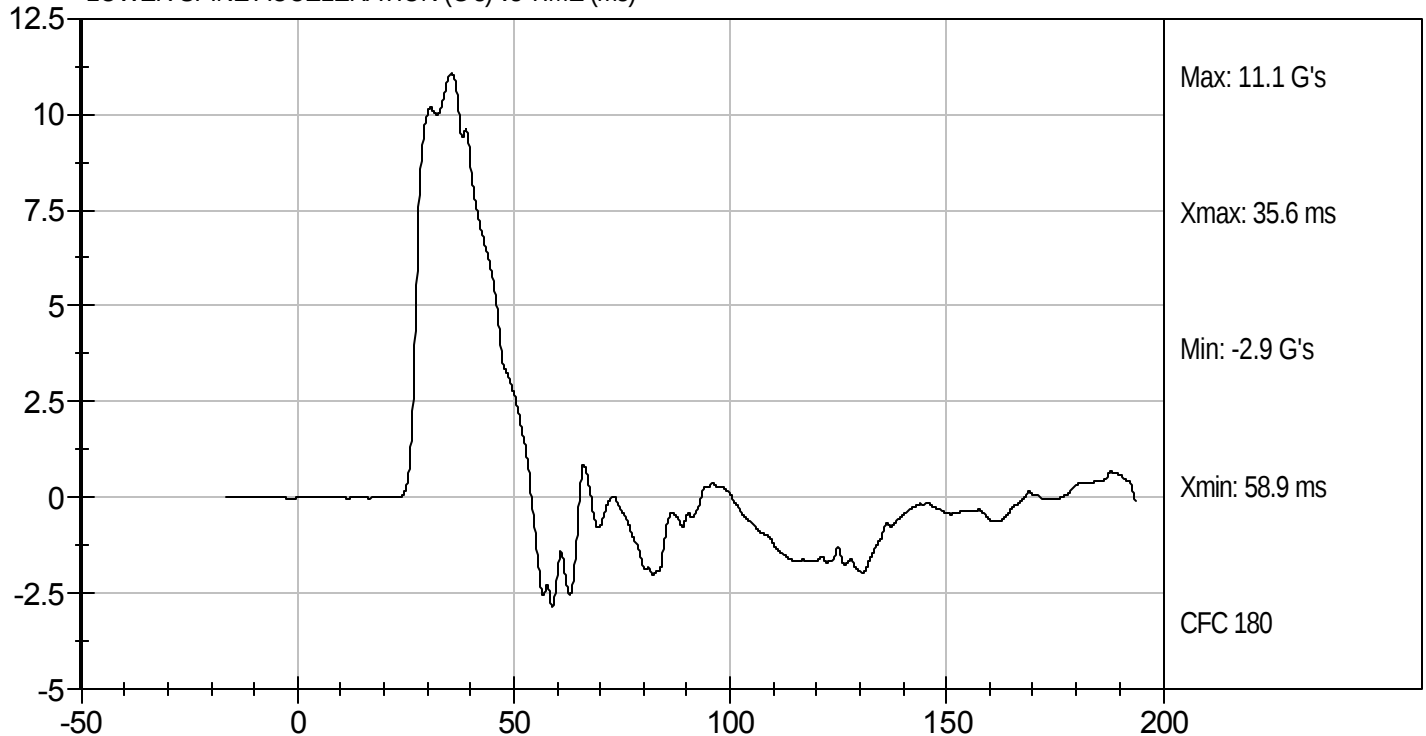
Test Desc: Abdomen Impact
Component ID: D11676

Test Date: 2/23/11
Velocity: 14.36 ft/s, 4.38 m/s

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



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

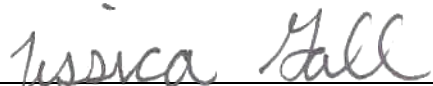


MGA RESEARCH CORPORATION
PELVIS IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306

Test I.D: D11677

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.2	Pass
Humidity	%	10 to 70	24	Pass
Impact Velocity	m/s	6.60 to 6.80	6.77	Pass
Peak Impactor Acceleration	G's	38 to 47	42	Pass
Pelvis Y Acceleration after 6 ms	G's	34 to 42	42	Pass
Peak Acetabulum Force	N	3600 to 4300	4144	Pass
Overall Test Results			Pass	


Laboratory Technician

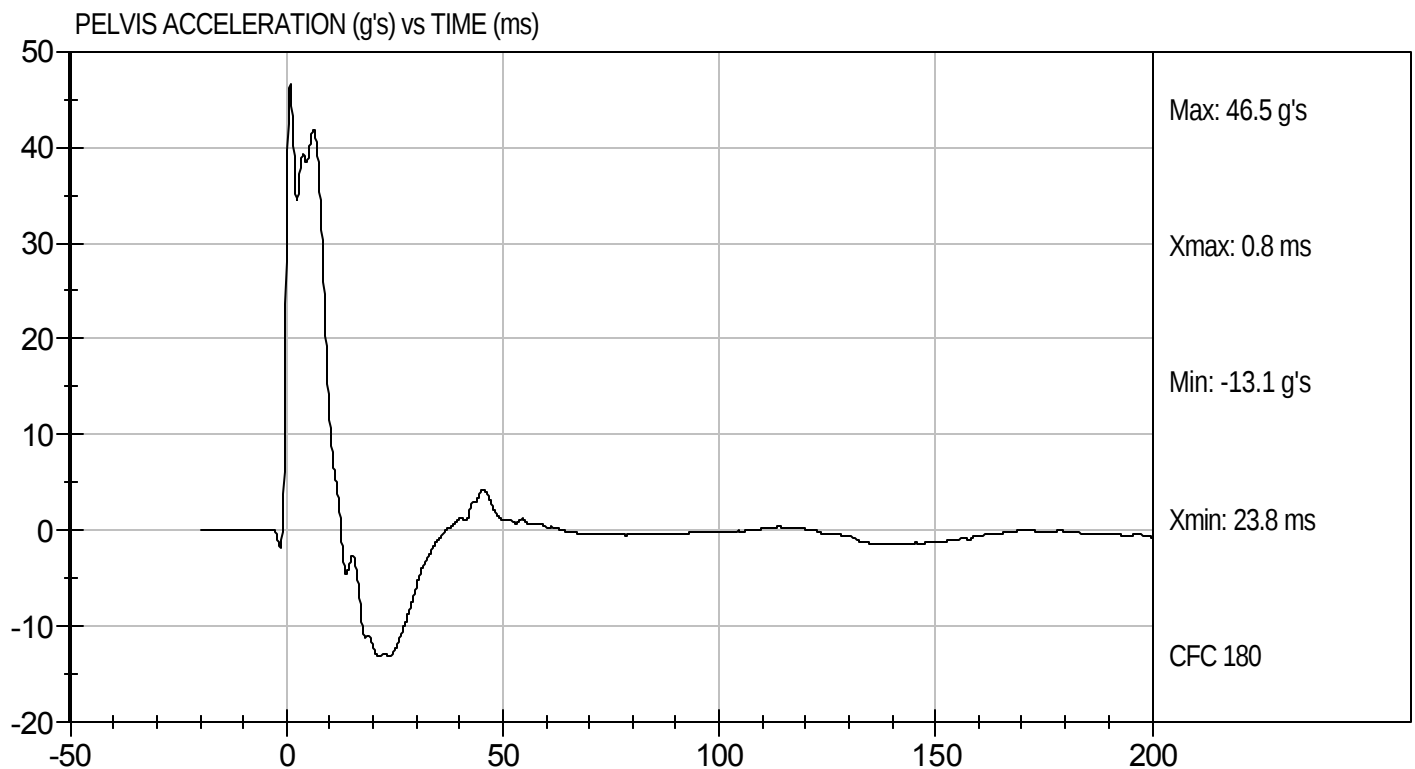
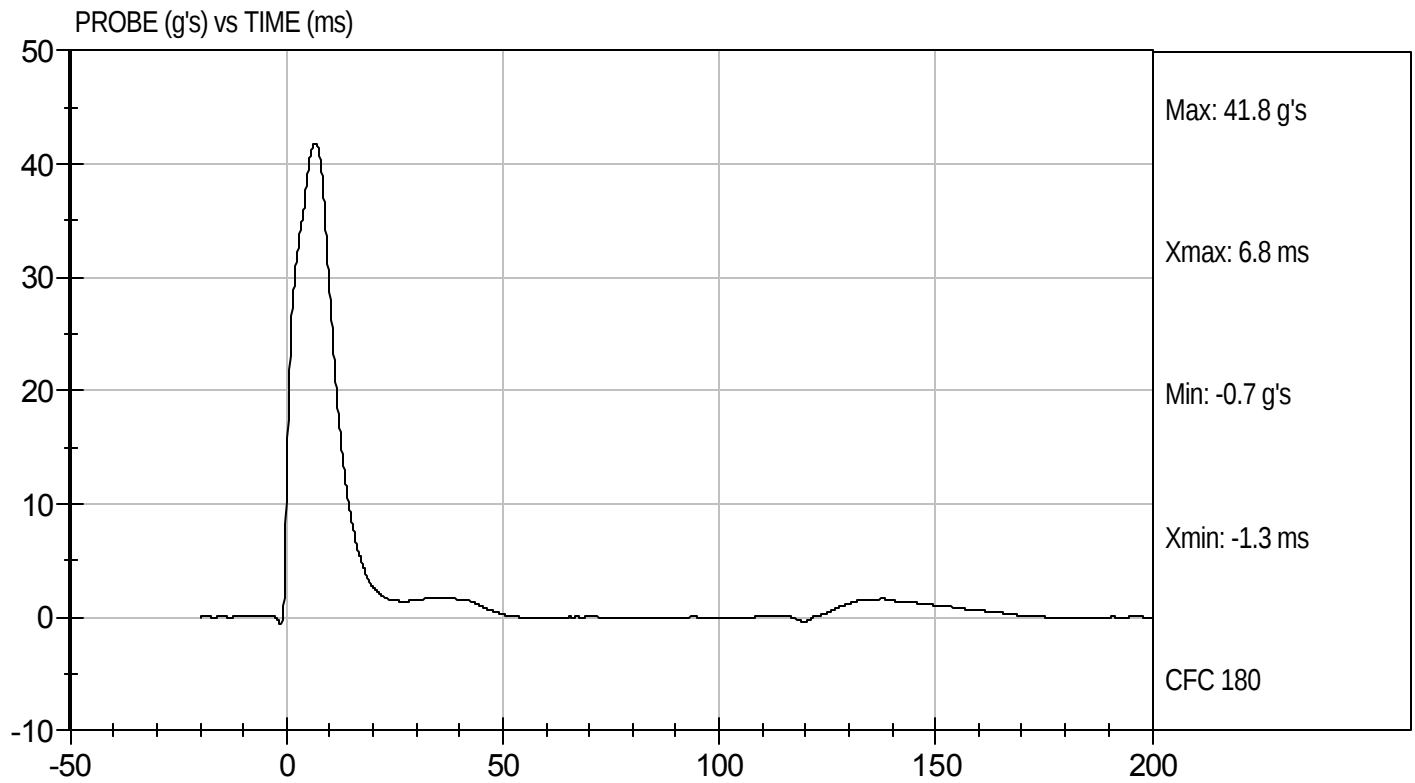
2/23/11
Test Date


Approved By



Test Desc: Pelvis Impact
Component ID: D11677

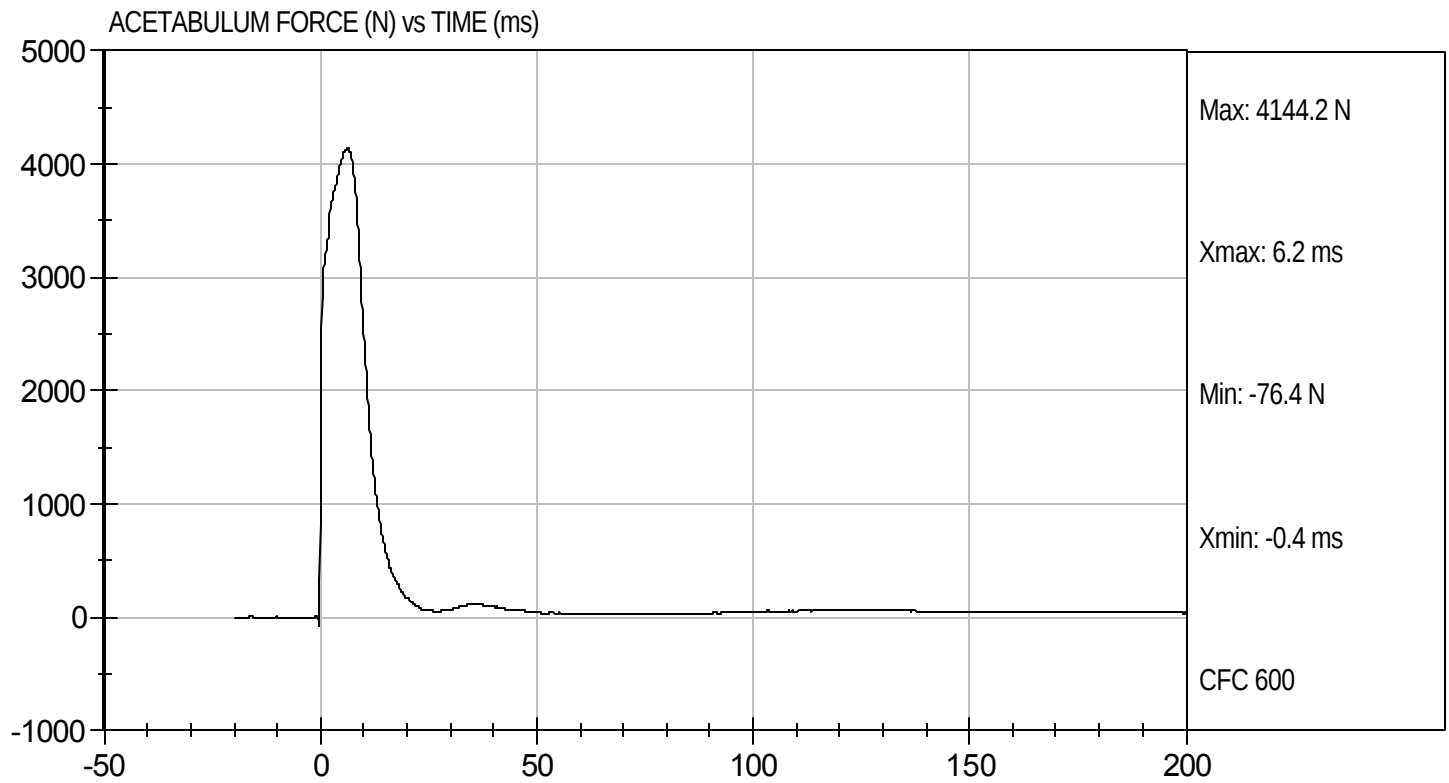
Test Date: 2/23/11
Velocity: 22.2 ft/s, 6.77 m/s





Test Desc: Pelvis Impact
Component ID: D11677

Test Date: 2/23/11
Velocity: 22.2 ft/s, 6.77 m/s



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

ATD Serial No: 306

Test I.D: D11678

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.2	Pass
Humidity	%	10 to 70	24	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	29	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	5021	Pass
Overall Test Results			Pass	

Jessica Hall
Laboratory Technician

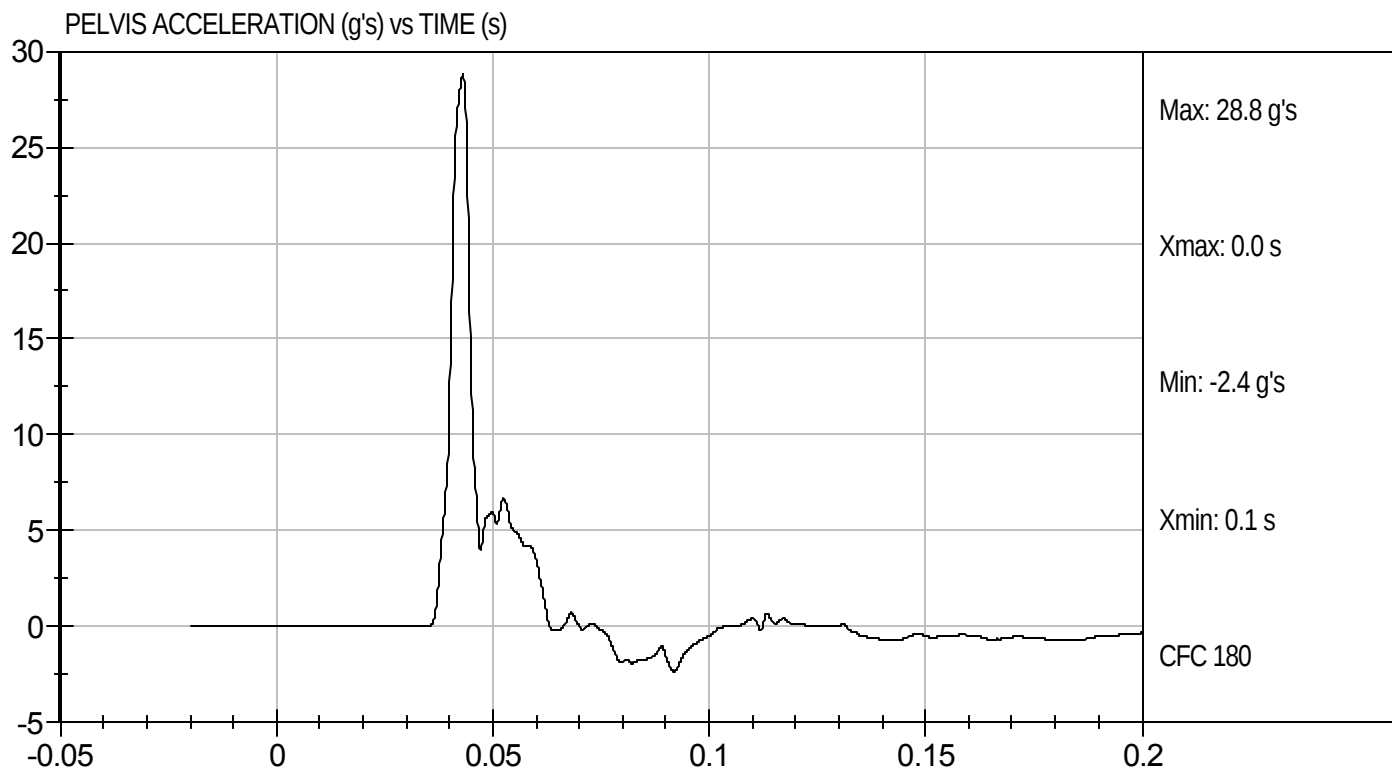
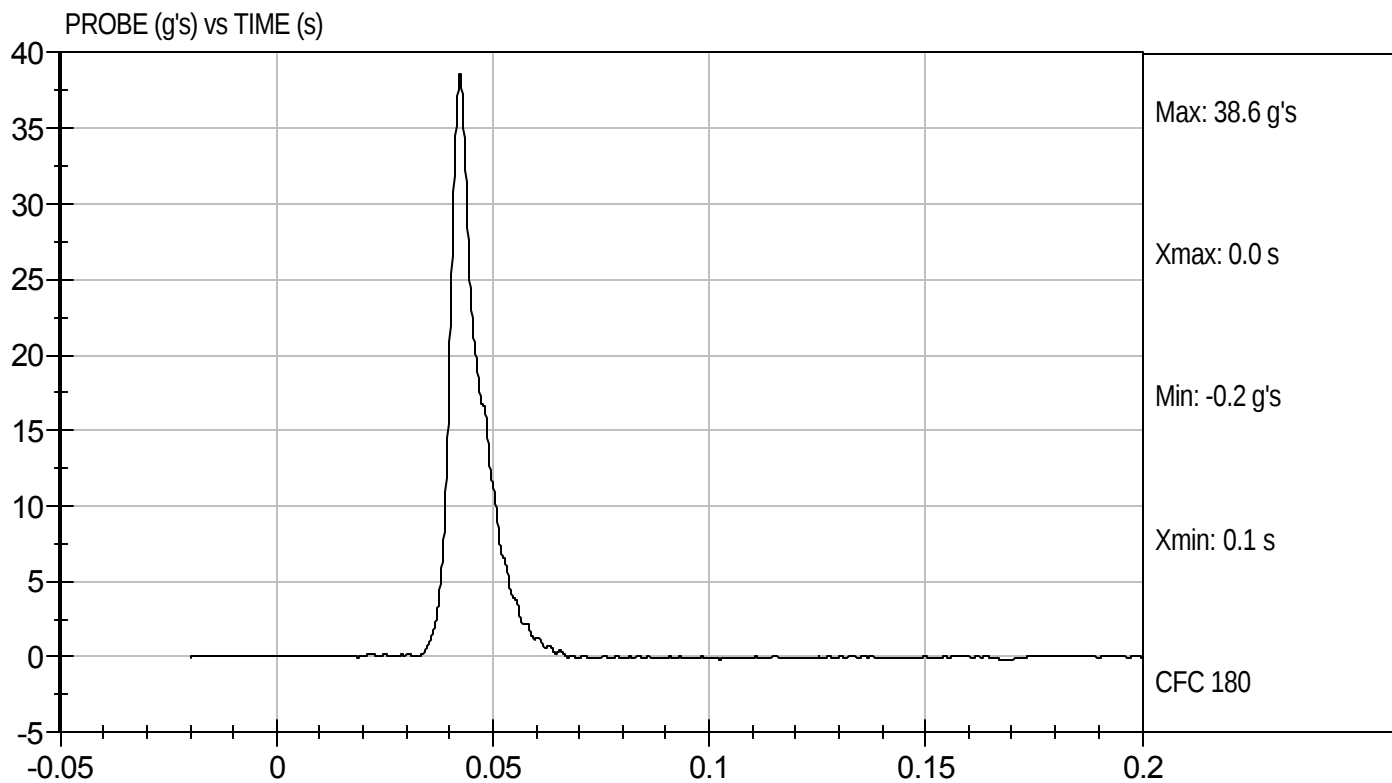
2/23/11
Test Date

David Winkelbauer
Approved By



Test Desc: Iliac Impact
Component ID: D11678

Test Date: 2/23/11
Velocity: 14.36 ft/s, 4.38 m/s





Test Desc: Iliac Impact
Component ID: D11678

Test Date: 2/23/11
Velocity: 14.36 ft/s, 4.38 m/s

