

REPORT NUMBER: SINCAP-MGA-2011-066

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

**TOYOTA MOTOR MANUFACTURING, CANADA, INC.
2011 Toyota Corolla 4-Dr Sedan
NHTSA No.: MB5107**

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



Test Date: February 9, 2011

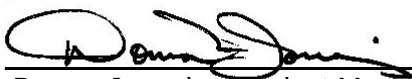
Final Report Date: March 19, 2011

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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16. Abstract A 55/28 km/h 90° Moving Deformable Barrier NCAP Side Impact Test was conducted on the subject 2011 Toyota Corolla 4-Dr Sedan in accordance with the specifications of the Office of Crashworthiness Standards NCAP Side 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 9, 2011. The impact velocity of the Moving Deformable Barrier (MDB) was 62.2 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle at the time of impact was 21°C. The target vehicle post-test maximum crush was 231 mm at level 2. The test vehicle's performance was as follows: <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th></th> <th colspan="3">Driver ATD (ES-2re)</th> </tr> <tr> <th>Measurement Description</th> <th>Units</th> <th>Threshold</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₃₆)</td> <td>N/A</td> <td>1000</td> <td>150</td> </tr> <tr> <td>Maximum Thorax Rib Deflection</td> <td>mm</td> <td>44</td> <td>19</td> </tr> <tr> <td>Combined Abdominal Force</td> <td>N</td> <td>2500</td> <td>917</td> </tr> <tr> <td>Pubic Symphysis Force</td> <td>N</td> <td>6000</td> <td>2164</td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th></th> <th colspan="3">Passenger ATD (SID-IIs)</th> </tr> <tr> <th>Measurement Description</th> <th>Units</th> <th>Threshold</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₃₆)</td> <td>N/A</td> <td>1000</td> <td>179</td> </tr> <tr> <td>Lower Spine (T12) Resultant Acceleration</td> <td>G</td> <td>82</td> <td>80</td> </tr> <tr> <td>Total Pelvic Force (sum of acetabular and iliac forces)</td> <td>N</td> <td>5525</td> <td>5892</td> </tr> </tbody> </table>					Driver ATD (ES-2re)			Measurement Description	Units	Threshold	Result	Head Injury Criteria (HIC ₃₆)	N/A	1000	150	Maximum Thorax Rib Deflection	mm	44	19	Combined Abdominal Force	N	2500	917	Pubic Symphysis Force	N	6000	2164		Passenger ATD (SID-IIs)			Measurement Description	Units	Threshold	Result	Head Injury Criteria (HIC ₃₆)	N/A	1000	179	Lower Spine (T12) Resultant Acceleration	G	82	80	Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	5892
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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 Toyota Corolla 4-Dr Sedan. 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 Toyota Corolla 4-Dr Sedan was impacted on the left (driver's) side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 62.2 km/h (38.7 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 9, 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	150
Maximum Thorax Rib Deflection	mm	44	19
Combined Abdominal Force	N	2500	917
Pubic Symphysis Force	N	6000	2164

Measurement Description	Passenger ATD (SID-IIs)		
	Units	Threshold	Result
Head Injury Criteria (HIC ₃₆)	N/A	1000	179
Lower Spine (T12) Resultant Acceleration	G	82	80
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	5892

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

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

GENERAL COMMENTS

There was no valid data collected for:

- Left Lower B-Post Y
- Left Mid B-Post Y after 10 msec.
- Left Lower A-Post Y
- Driver Seat Track Y after 20 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 Toyota Corolla 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No. MB5107
 Test Date: 2/09/2011

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	MB5107	Anti-Lock Brakes	Yes
Model Year	2011	All Wheel Drive	No
Make	Toyota	Power Steering	Yes
Model	Corolla	Driver Front Airbag	Yes
Body Style	Sedan	Driver Curtain Airbag	Yes
VIN	2T1BU4EE5BC539389	Driver Head/Torso Airbag	No
Body Color	Classic Silver Met.	Driver Torso Airbag	Yes
Delivery Date	1/21/2011	Driver Torso/Pelvis Airbag	No
Odometer (mi)	86	Driver Pelvis Airbag	No
Odometer (km)	138	Driver Knee Airbag	No
Dealer	Classic Toyota Waukegan	Rear Pass. Front Airbag	No
Transmission	Automatic	Rear Pass. Curtain Airbag	Yes
Final Drive	Front	Rear Pass. Head/Torso Airbag	No
Type/No. Cylinders	4	Rear Pass. Torso Airbag	No
Engine Displacement (L)	1.8	Rear Pass. Torso/Pelvis Airbag	No
Engine Placement	Lateral	Rear Pass. Pelvis Airbag	No
Roof Rack	No	Rear Pass. Knee Airbag	No
Sunroof/T-Top	No	Pretensioners	Yes
Tinted Glass	No	Load Limiters	Yes
Traction Control	Yes	Automatic Door Locks	No
Power Brakes	Yes	Bucket Seats	Yes
Front Disc	Yes	Tilt Steering	Yes
Rear Disc	No	Power Seats	No
Does owner's manual provide instruction to turn off automatic door locks?			N/A

DATA FROM CERTIFICATION LABEL

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

VEHICLE SEATING AND WEIGHT CAPACITY DATA

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

VEHICLE SEAT TYPE

	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							

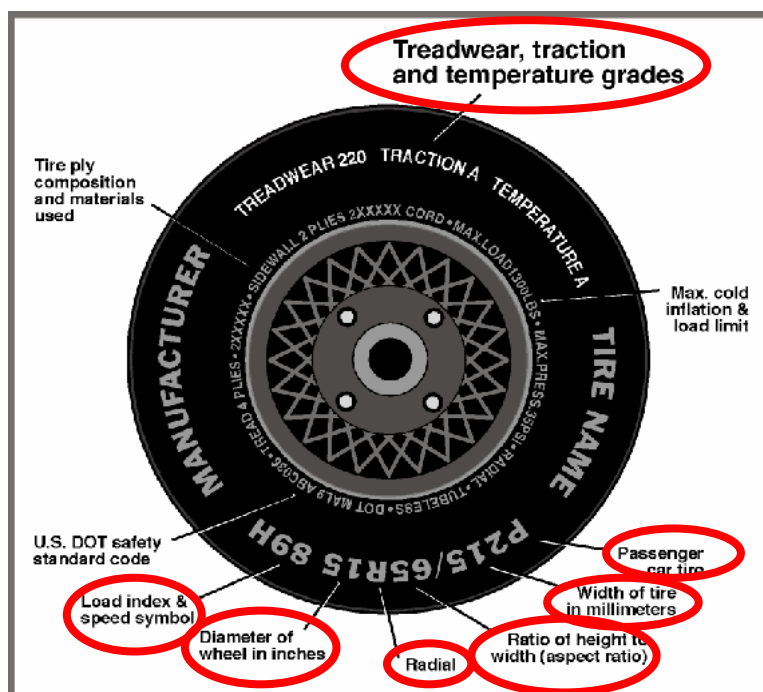
DATA SHEET NO. 1 (continued)

GENERAL TEST AND VEHICLE PARAMETER DATA

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

NHTSA No. MB5107
 Test Date: 2/09/2011

VEHICLE TIRE INFORMATION



DATA FROM TIRE PLACARD

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

DATA SHEET NO. 1 (continued)

GENERAL TEST AND VEHICLE PARAMETER DATA

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

NHTSA No. MB5107
 Test Date: 2/09/2011

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	389.6	242.7		435.0	298.9		427.7	291.7	
Right	kg	374.7	246.3		387.4	282.1		407.8	289.4	
Ratio	%	61.0	39.0		58.6	41.4		59.0	41.0	
Totals	kg	764.3	489.0	1253.3	822.4	581.0	1403.4	835.5	581.1	1416.6

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1253.3	(A)
Sum of Actual Weight of 2 P572 ATDs Used	kg	129.3	(B)
Rated Cargo/Luggage Weight (RCLW)	kg	26	(C)
Calculated Target Vehicle Test Weight (TVTW)	kg	1408.6	(A+B+C)

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
Fully Loaded	mm	662	664	675	686	
As Tested (Fully Loaded $\pm$ 10mm at each wheel well)	mm	665	670	680	682	1076

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2600
Total Vehicle Length at Left Side	mm	3485
Total Vehicle Length at Centerline	mm	4546
Total Vehicle Length at Right Side	mm	3485
Weight of Ballast in Cargo Area	kg	0.0
Weight of Vehicle Components Removed	kg	1.4
Amount of Stoddard Solvent in Fuel Tank	L	46.4

Vehicle components removed to meet target vehicle test weight: Right tail light, right side mirror, right side headrests.

TEST VEHICLE VERTICAL IMPACT POINT DATA

Measurement Description	Units	Value
Target Impact Point Aft of Front Axle	mm	360
Actual Impact Point Aft of Front Axle	mm	342

DATA SHEET NO. 2

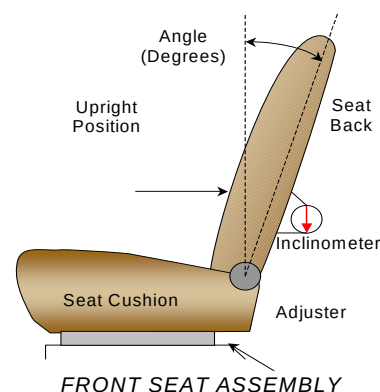
SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

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

NHTSA No. MB5107
 Test Date: 2/09/2011

NOMINAL DESIGN RIDING POSITION

The driver seatback is positioned to the manufacturer's designated angle. The procedure is as follows: Set seat back angle at 2° measured at the headrest post measured against rocker (door) sill. The right front passenger seatback is set to match the driver seatback. The left rear passenger seat back is fixed.



SEAT BACK ANGLES

	Degrees
Driver with Seated Dummy	3.3° on headrest post
Passenger with Seated Dummy	7.2° on headrest post

SEAT FORE/AFT POSITIONS

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	17 detents (1 st as 0)	8 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	4 detents (1 st as 1)	0 detent (uppermost as 0)
Rear Seat	Fixed	Fixed

Describe method: The driver seat anchorage was set in the uppermost detent and the left rear passenger seat anchorage was fixed.

DATA SHEET NO. 2 (CONTINUED)

SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

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

NHTSA No. MB5107
 Test Date: 2/09/2011

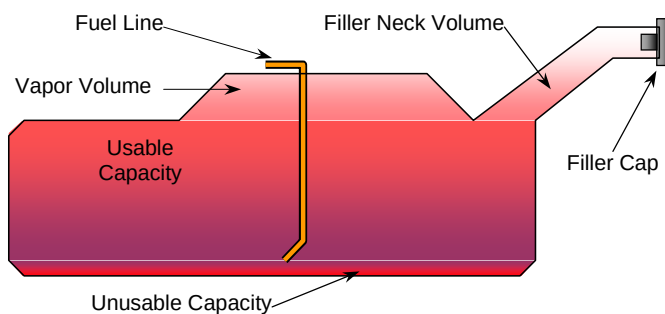
FUEL TANK CAPACITY DATA

	Liters
Usable Capacity of "Standard Tank"	50.0
Usable Capacity of "Optional" Tank	
Usable Capacity Used for FMVSS 301	46.0 to 47.0
Actual Amount of Solvent used	46.4

FUEL PUMP

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

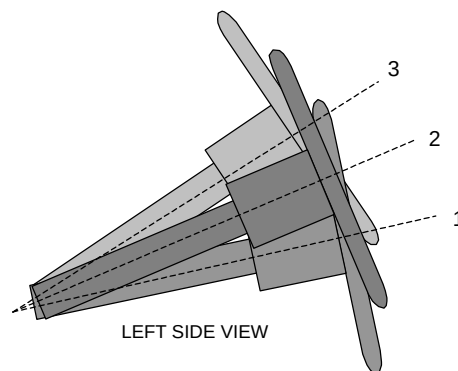
The test vehicle is equipped with an electric fuel pump. The fuel pump is activated when the ignition is turned on. The fuel pipe is on the left side.



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

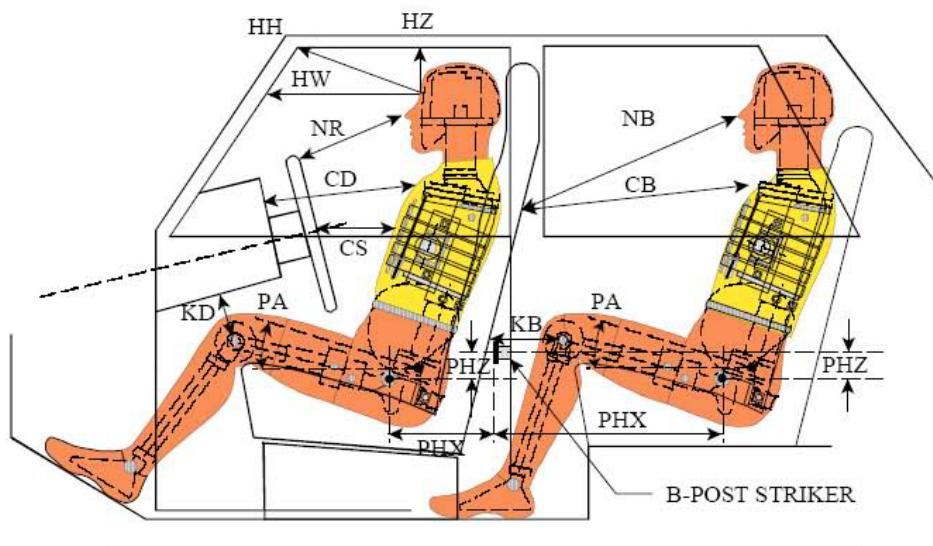
	Detent	Fore/Aft Position (mm)
Lowermost - Position 1	67.2	178
Geometric Center – Position 2	65.7	160
Uppermost – Position 3	64.2	143
Telescoping Steering Wheel Travel		35
Test Position	65.7	160

DATA SHEET NO. 3

DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

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

NHTSA No. MB5107
 Test Date: 2/09/2011



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

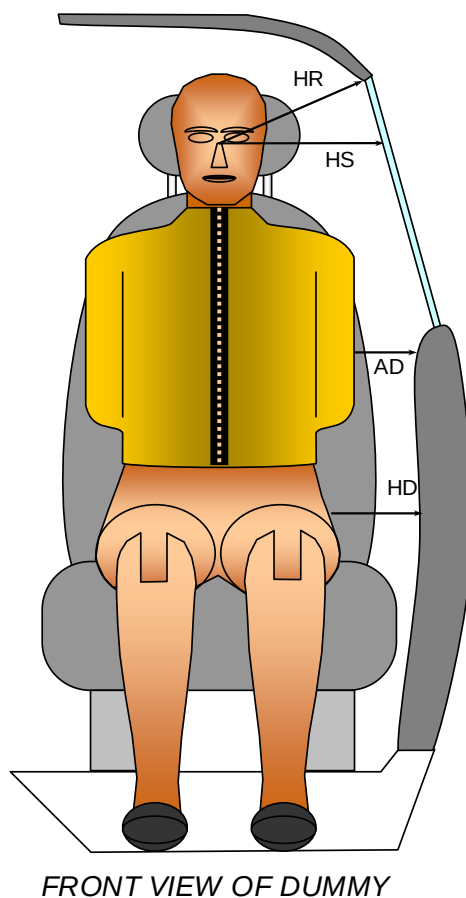
DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Pass. Code	Measurement Description	Driver S/N 032		Passenger S/N 306	
			Length (mm)	Angle(°)	Length (mm)	Angle(°)
HH		Head to Header	351	14.8		
HW		Head to Windshield	571	0		
HZ	HZ	Head to Roof	127	90	240	90
NR	NB	Nose to Rim/Seat Back	414	15.6	551	18.0
CD	CB	Chest to Dash/Seat Back	496	2.4	537	7.1
CS		Chest to Steering Wheel	300	10.6		
KDL	KBL	Left Knee to Dash/Seat Back	109	24.4	271	24.2
KDR	KBR	Right Knee to Dash/Seat Back	104	26.7	276	25.6
PA	PA	Pelvic Angle		13.7		21.1
PHX	PHX	H-Point to Striker (X-Axis)	218	0	301	0
PHZ	PHZ	H-Point to Striker (Z-Axis)	205	90	300	90
SA	SA	Seat Back Angle		3.3		7.2

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

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

NHTSA No. MB5107
 Test Date: 2/09/2011



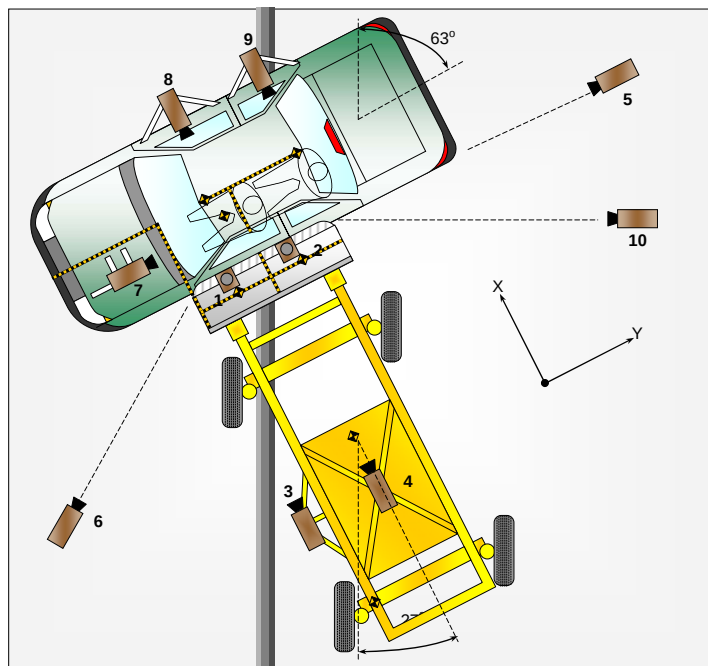
DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver S/N 032	Passenger S/N 306
HR	Head to Side Header	mm	191	228
HS	Head to Side Window	mm	305	349
AD	Arm to Door	mm	108	179
HD	H-Point to Door	mm	153	175

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

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

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 Test Date: 2/09/2011



CAMERA LOCATIONS AND DATA

No.	Camera View	Coordinates (mm)			Angle	Lens (mm)	Film Speed (fps)
		X*	Y*	Z*			
1	Overhead Overall	-180	0	-5050	87.4	14	1000
2	Overhead Close-up	300	1150	-5050	83.1	50	1000
3	Left Impact Point (MDB)					50	1000
4	Side Overall (MDB)					16	1000
5	Rear	30	5070	-1160	5.9	24	1000
6	Left Front	3470	-4160	-1190	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

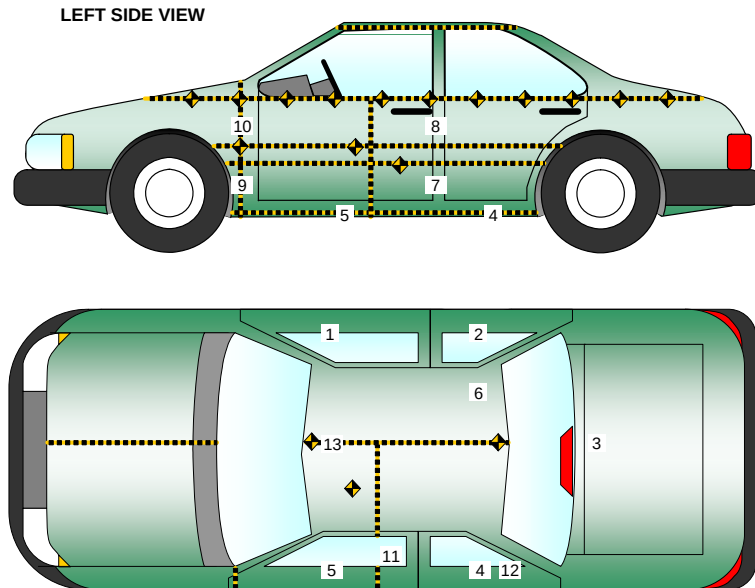
Reference: Impact Point projected to Ground
 +X = To Front of MDB, +Y = To Right of MDB, +Z = Down

* All measurements accurate to ± 6 mm

DATA SHEET NO. 6
VEHICLE ACCELEROMETER LOCATIONS

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

NHTSA No. MB5107
 Test Date: 2/09/2011



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

Accelerometer Location				
No.	ID	Coordinates (mm)		
		X	Y	Z
1	Right Sill at Front Seat	2556	683	225
2	Right Sill at Rear Seat	1690	674	230
3	Rear Floorpan Above Axle	1066	0	526
4	Left Sill at Rear Door	1690	-674	225
5	Left Sill at Front Door	2600	-683	215
6	Rt. Rear Occ. Compartment	1840	350	235
7	Left Lower B-Post	2054	-688	539
8	Left Middle B-Post	2054	-695	780
9	Left Lower A-Post	3075	-665	505
10	Left Middle A-Post	3100	-790	739
11	Front Seat Track	2120	-560	333
12	Rear Seat Track or Structure			
13	Vehicle CG	2565	-200	228

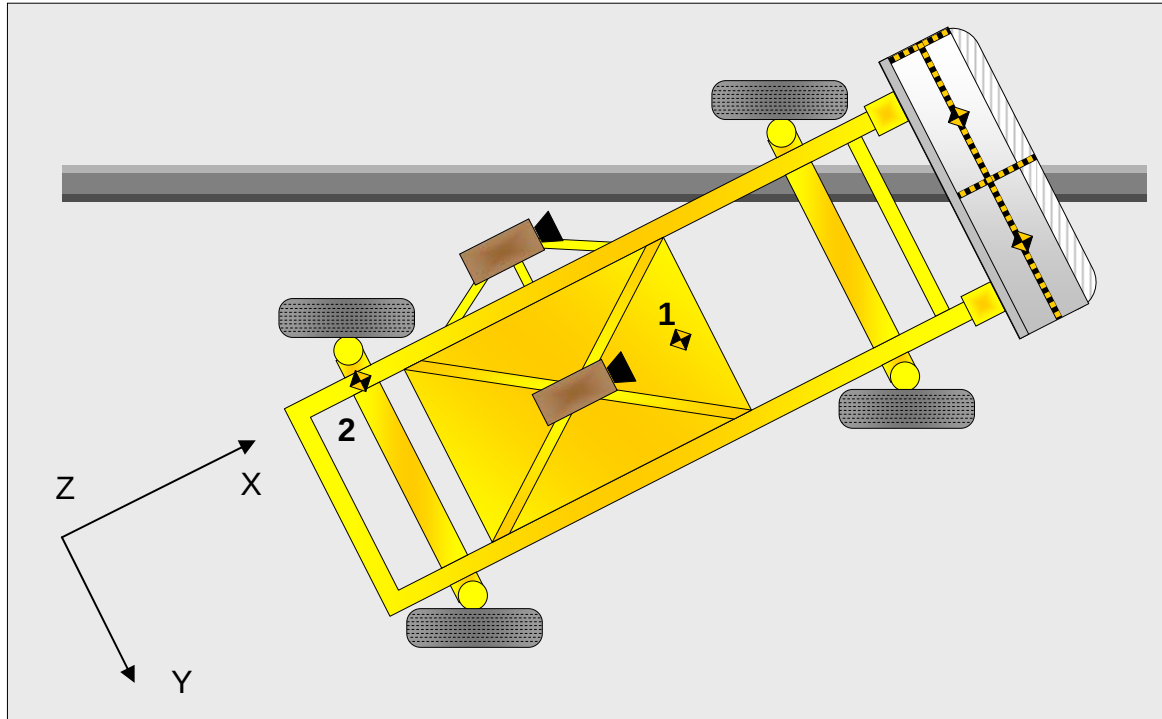
Reference: X – Rear Surface of Vehicle (+ forward)
 Y - Vehicle Centerline (+ to right)
 Z - Ground Plane (+ up)

DATA SHEET NO. 7

MOVING DEFORMABLE BARRIER (MDB) ACCELEROMETER LOCATIONS

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

NHTSA No. MB5107
Test Date: 2/09/2011



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

NHTSA No. MB5107
 Test Date: 2/09/2011

MAXIMUM EXTERIOR STATIC CRUSH

Level	Measurement Description	Units	Maximum Crush	Above Ground
1	Sill Top Height	mm	31	245
2	Occupant H-Point	mm	231	522
3	Mid Door	mm	224	620
4	Window Sill	mm	96	939
5	Window Top	mm	34	1382
	Maximum Penetration	mm	231	

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

NHTSA No. MB5107
 Test Date: 2/09/2011

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	62.2
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	62.1
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	800	Left	170
B	Top of Bumper	533	800	Left	90
C	Mid-Level	686	800	Left	106
D	Top of Stack	813	800	Left	139

MDB INSTRUMENTATION AND CAMERAS

Accelerometers	5
Contact Switches	2
High-Speed Cameras	2

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

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

NHTSA No. MB5107
 Test Date: 2/09/2011

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, Center Headrest
Upper Torso Contact	Side Airbag	Door Panel, Seat
Lower Torso Contact	Door Panel	Door Panel, Seat
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	Remained closed and jammed shut
Right Side Doors	Remained closed and operational	Remained closed and operational
Hatch and Other Doors	Remained closed and operational	Remained closed and operational
Seat Movement	0	0
Seat Back Failure	None	None

POST TEST STRUCTURAL OBSERVATIONS

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

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

MDB LEFT EDGE IMPACT POINT DATA

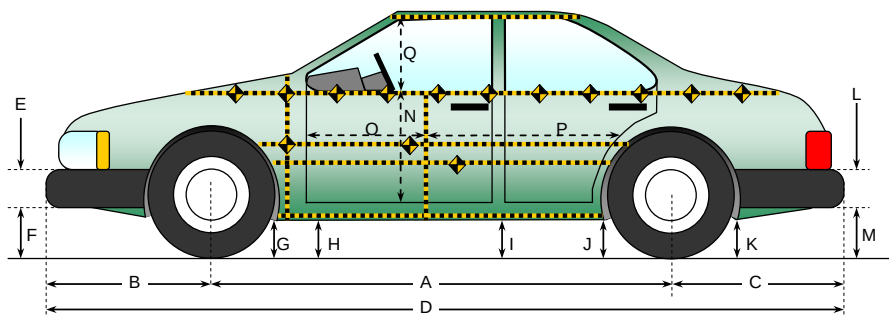
Measured Parameter	Units	Requirement	Value
Horizontal Offset	mm	+/- 50	18 forward
Vertical Offset	mm	+/-20	7 down

DATA SHEET NO. 11

VEHICLE PROFILE MEASUREMENTS

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

NHTSA No. MB5107
 Test Date: 2/09/2011



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

LEFT SIDE VIEW

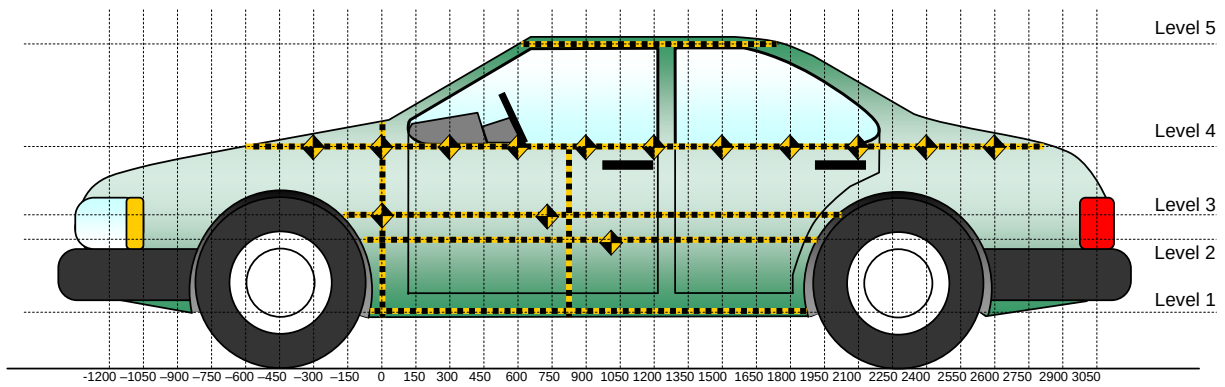
VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2600	2610	-10
B	Front Axle to FSOV	942	942	0
C	Rear Axle to RSOV	1004	995	9
D	Total Length at Centerline	4546	4547	-1
E	Front Bumper Thickness	115	115	0
F	Front Bumper Bottom to Ground	227	233	-6
G	Sill Height at Front Wheel Well	168	166	2
H	Sill Height at Front Door Leading Edge	186	181	5
I	Sill Height at B Pillar	186	192	-6
J1	Sill Height at Rear Wheel Well	191	210	-19
J2	Pinch Weld Height at Rear Wheel Well	188	195	-7
K	Sill Height Aft of Rear Wheel Well	233	233	0
L	Rear Bumper Thickness	115	115	0
M	Rear Bumper Bottom to Ground	297	282	15
N	Sill Height to Window Bottom Sill	725	592	133
O	Front Door Leading Edge to Impact CL	790	755	35
P	Rear Door Trailing Edge to Impact CL	1133	1100	33
Q	Front Window Opening	422	433	-11
R	Right Side Length	3485	3490	-5
S	Left Side Length	3485	3467	18
T	Vehicle Width at B Post	1760	1710	50

DATA SHEET NO. 12
VEHICLE EXTERIOR CRUSH MEASUREMENTS

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

NHTSA No. MB5107
 Test Date: 2/09/2011



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	245
2	Mid Door	522
3	Occupant H-Point	620
4	Window Sill	939
5	Window Top	1382

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

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

NHTSA No. MB5107
 Test Date: 2/09/2011

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-750				387					385					-2	
-600				355					352					-3	
-450				327					324					-3	
-300				310					333					23	
-150			216	302				268	335				52	33	
0		220	222	292			293	281	321			73	59	29	
150	264	232	230	289		287	440	407	335		23	208	177	46	
300	268	235	229	288		291	453	427	340		23	218	198	52	
450	268	233	227	287		292	453	426	353		24	220	199	66	
600	265	230	224	284	510	296	442	437	363	523	31	212	213	79	13
750	263	228	222	282	508	293	440	425	369	523	30	212	203	87	15
900	261	227	220	280	507	290	446	427	376	526	29	219	207	96	19
1050	259	226	220	279	506	288	433	420	357	533	29	207	200	78	27
1200	258	227	220	279	508	285	458	425	367	542	27	231	205	88	34
1350	258	227	221	280	509	283	450	432	370	540	25	223	211	90	31
1500	257	228	222	282	508	280	449	446	362	540	23	221	224	80	32
1650	255	228	224	282	512	276	422	429	357	536	21	194	205	75	24
1800	254	226	223	286	516	274	376	390	326	532	20	150	167	40	16
1950			220	289	526			310	303	540			90	14	14
2100				294					315					21	
2250				304					337					33	
2400				314					333					19	
2550				325					331					6	
2700				338					343					5	
2850				354					356					2	

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)	31	231	224	96	34
Distance From Impact (mm)	600	1200	1500	900	1200

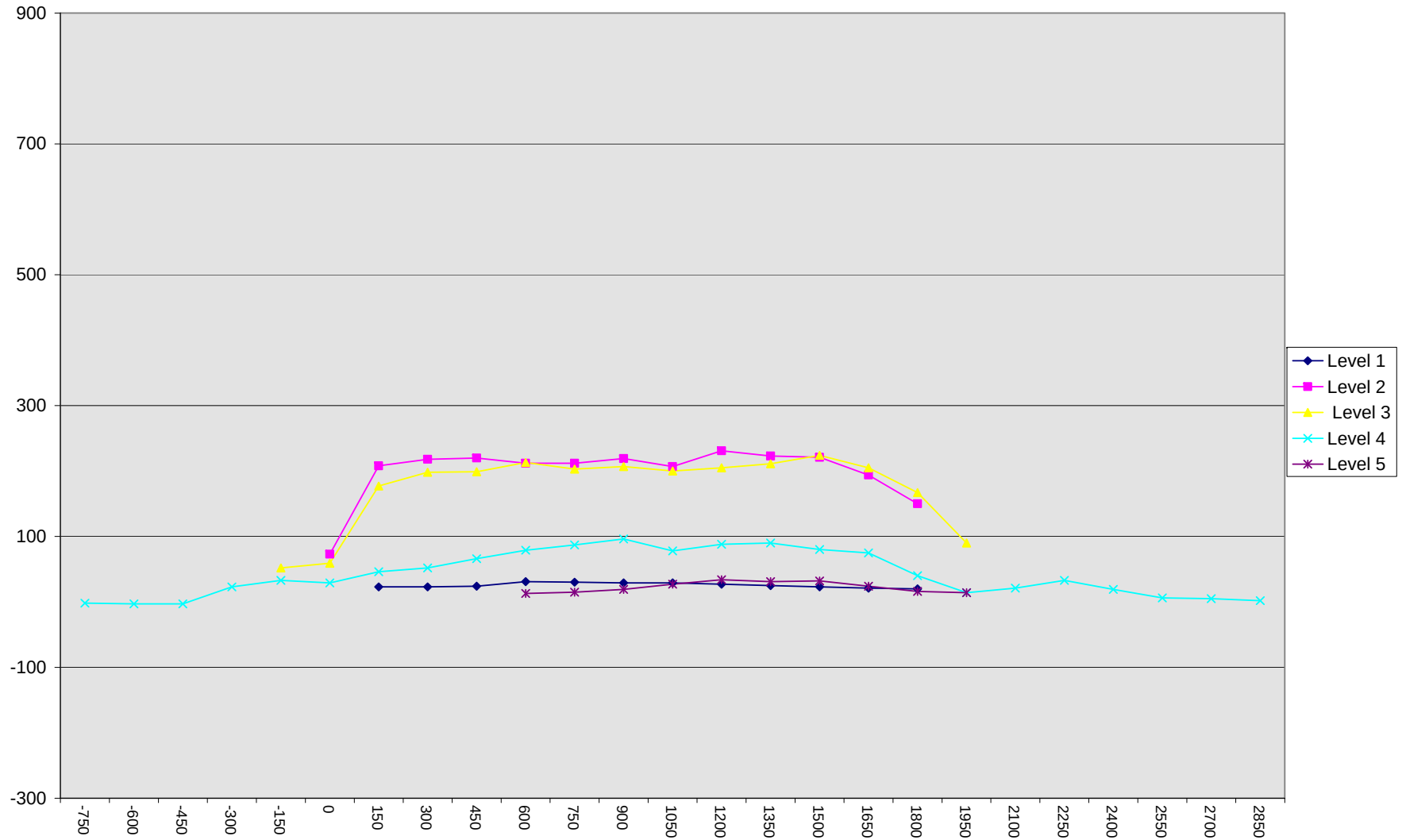
DATA SHEET NO. 12 (continued)

VEHICLE EXTERIOR CRUSH MEASUREMENTS

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

NHTSA No. MB5107
 Test Date: 2/09/2011

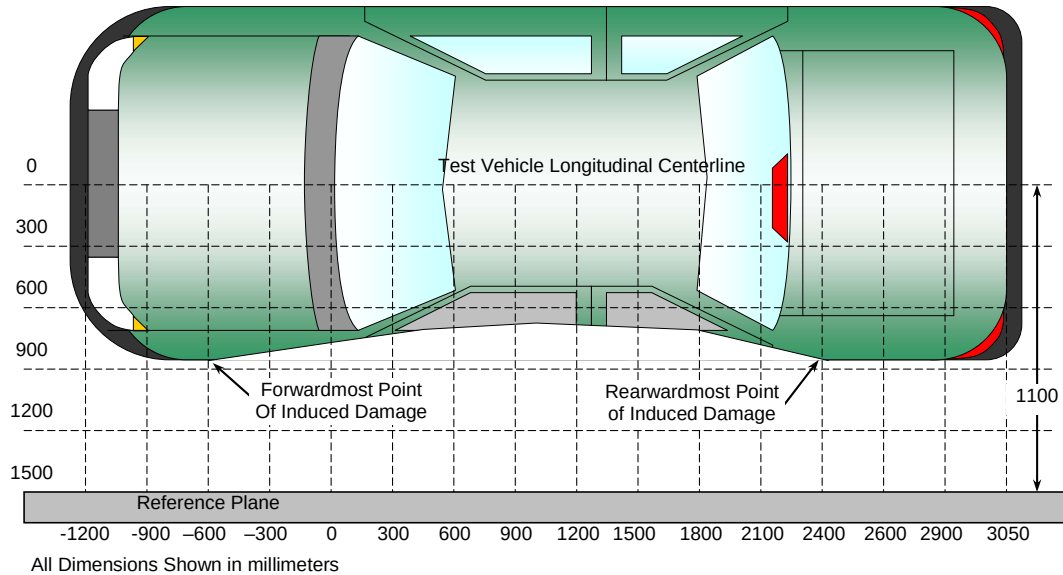
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DATA SHEET NO. 13
VEHICLE DAMAGE PROFILE DISTANCES

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

NHTSA No. MB5107
 Test Date: 2/09/2011



TOP VIEW

DAMAGE PROFILE DISTANCES

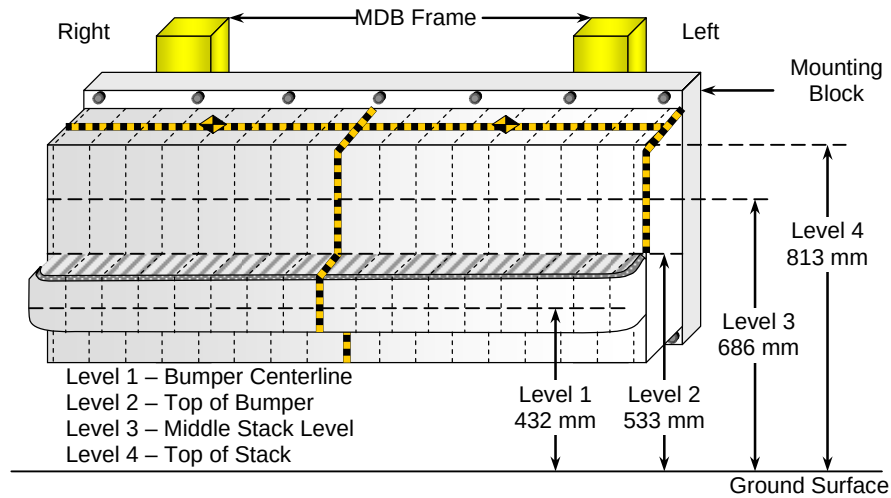
DPD	Distance from Impact Point (mm)	Level	Pre-Test (mm)	Post-Test (mm)	Max. Static Crush (mm)
1	2850	4	354	356	2
2	2115	4	295	307	12
3	1395	2	227	459	232
4	655	3	223	444	221
5	-38	4	293	322	29
6	-750	4	387	385	-2

DATA SHEET NO. 14

EXTERIOR STATIC CRUSH FOR IMPACTOR FACE

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

NHTSA No. MB5107
 Test Date: 2/09/2011



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	40	29	24	27	37	69	107	87	69	49	41	48	53	65	86	106	139
3	52	32	27	28	26	37	70	69	41	24	20	19	21	32	42	62	106
2	89	79	72	64	63	53	67	68	55	55	60	68	68	75	73	79	90
1	169	161	151	151	153	157	153	150	146	142	142	142	142	140	142	162	170

DATA SHEET NO. 15

FMVSS 301 FUEL SYSTEM INTEGRITY POST-IMPACT DATA

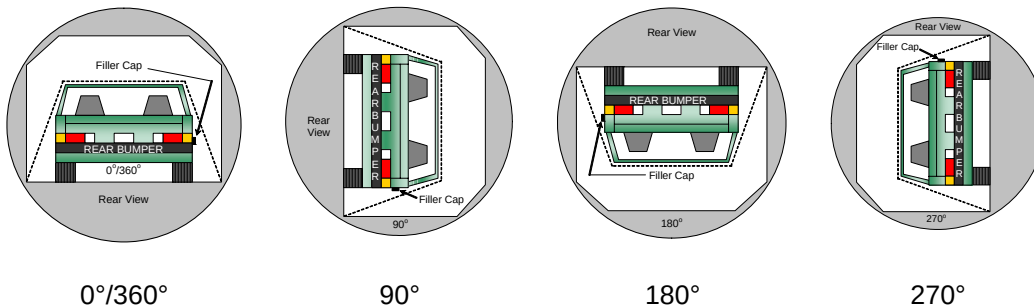
Test Vehicle: 2011 Toyota Corolla 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No. MB5107
 Test Date: 2/09/2011

Test Time: 1:02 pm 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°	119	300	419
90° to 180°	114	300	414
180° to 270°	110	300	410
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

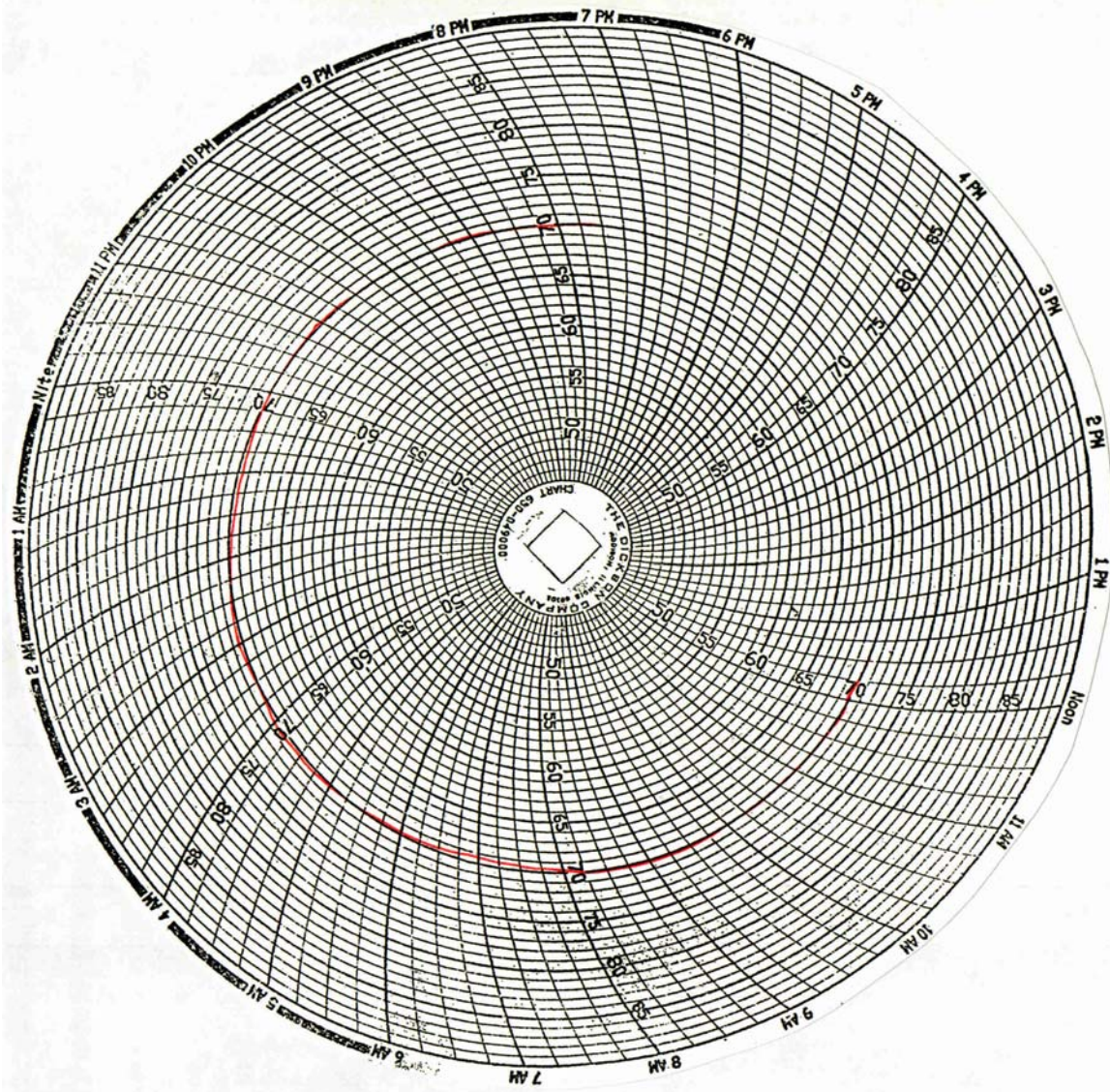
Test Phase	Spillage Location
0° to 90°	
90° to 180°	
180° to 270°	
270° to 360°	

DATA SHEET NO. 16

DUMMY/VEHICLE TEMPERATURE STABILIZATION DATA

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

NHTSA No. MB5107
Test Date: 2/09/2011



APPENDIX A
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As Delivered Right Front Three-Quarter View of Test Vehicle



As Delivered Left Rear Three-Quarter View of Test Vehicle



Pre-Test Frontal View of Test Vehicle



Post-Test Frontal View of Test Vehicle



Pre-Test Left 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



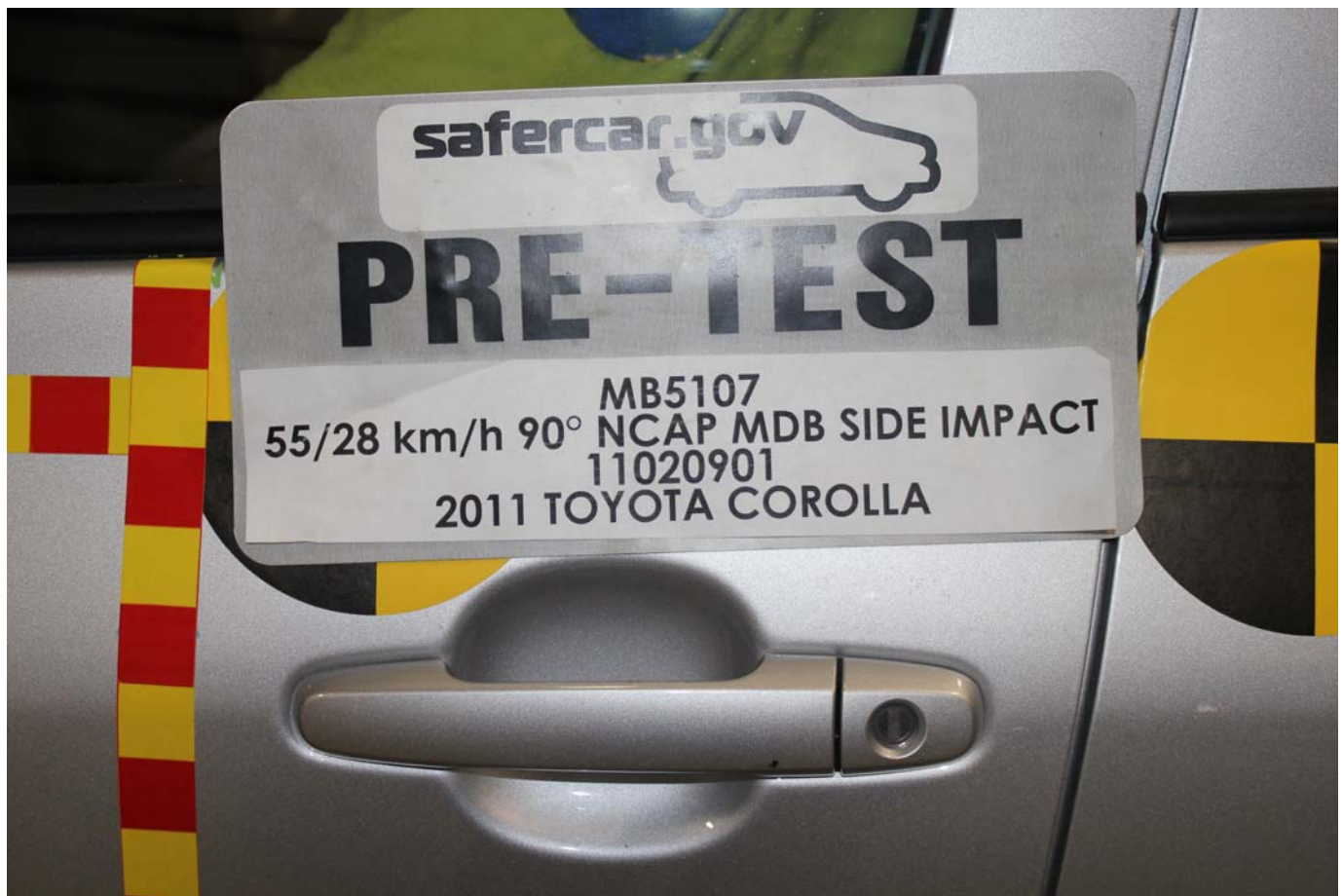
Pre-Test Right Side View of MDB Positioned Against Side of Test Vehicle



Pre-Test Close-Up View of Impact Point Target



Post-Test Close-Up View of Impact Point Target



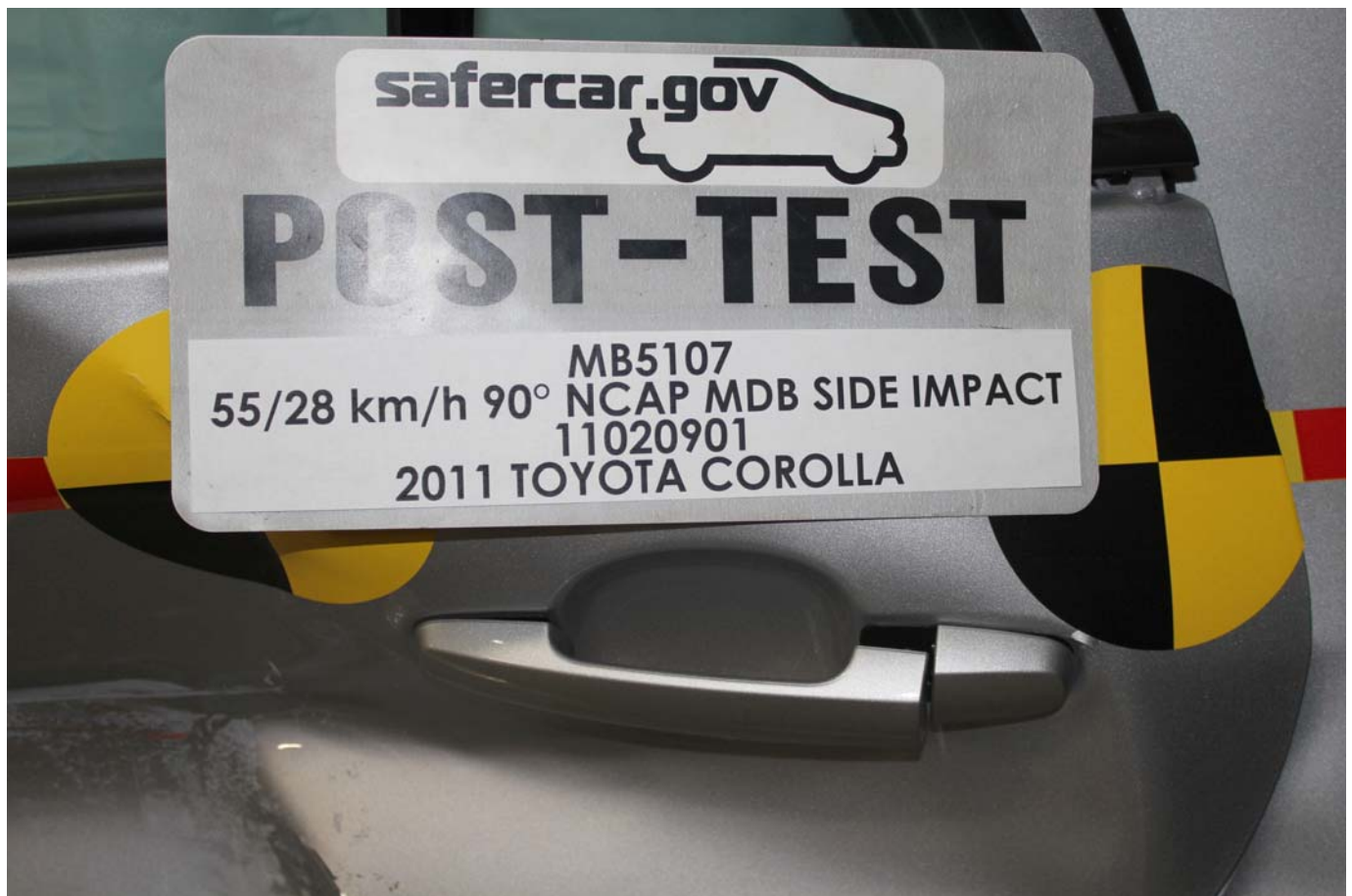
Pre-Test Left Front Door Latch Close-Up



Post-Test Left Front Door Latch Close-Up



Pre-Test Left Rear Door Latch Close-Up



Post-Test Left Rear Door Latch Close-Up



Pre-Test Front Close-Up View of Driver Dummy



Post-Test Front Close-Up View of Driver Dummy



Pre-Test Left Side View of Driver Dummy Showing Belt, 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



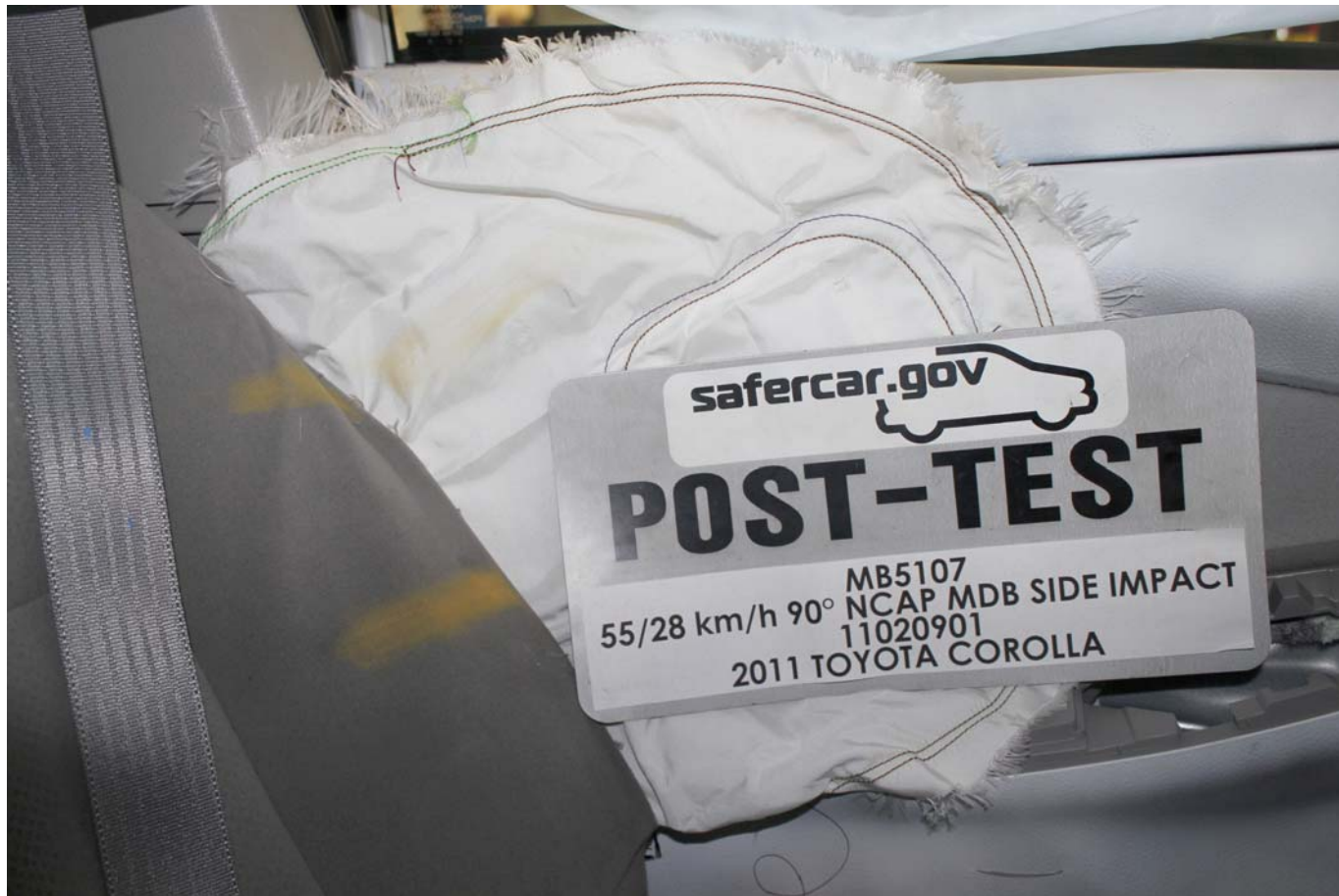
Post-Test Driver Inner Door Panel View Showing Driver Dummy Contact Locations



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



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



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

PHOTOGRAPH NOT APPLICABLE

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



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



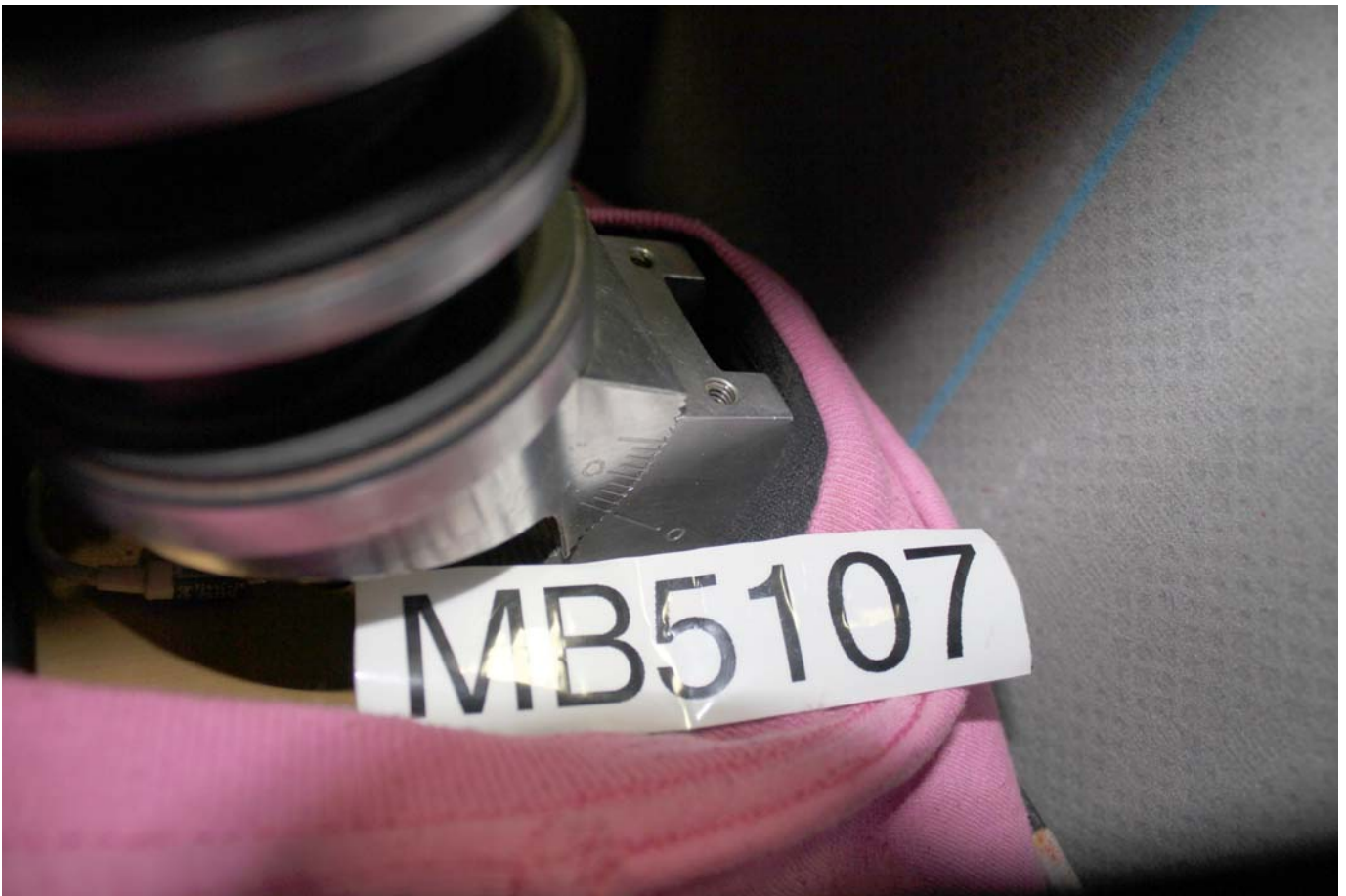
Pre-Test Frontal View of Rear Passenger Dummy Head and Shoulders in Relation to Head Restraint



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



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



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



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



Pre-Test Rear Passenger Dummy and Door Clearance View



Post-Test Rear Passenger Dummy and Door Clearance View



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



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



Pre-Test Passenger Inner Door Panel View



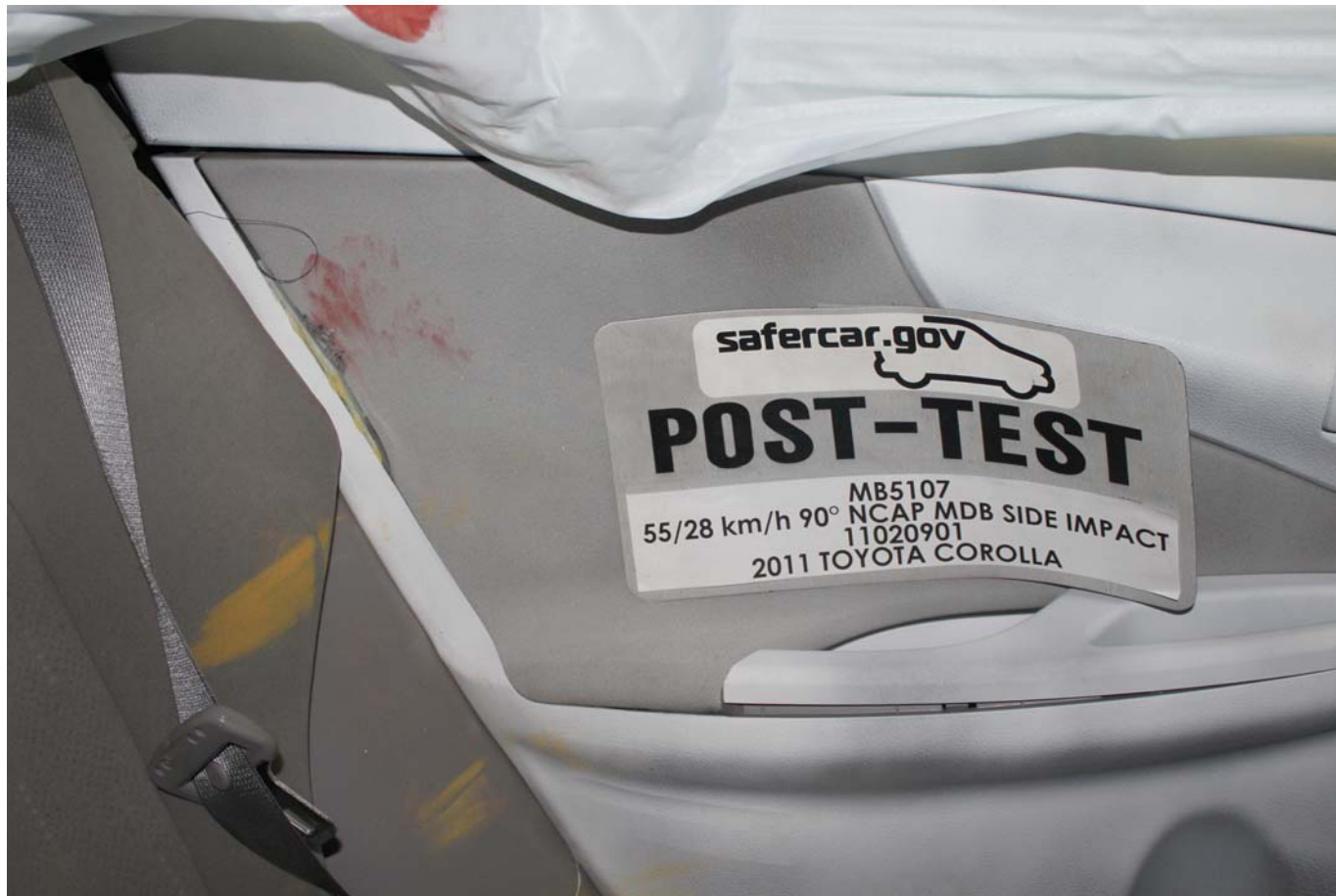
Post-Test Rear Passenger Inner Door Panel View Showing Dummy Contact Locations



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

PHOTOGRAPH NOT APPLICABLE

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



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



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



Pre-Test Front View of MDB Impactor Face



Post-Test Front View of MDB Impactor Face



Pre-Test Top View of MDB Impactor Face



Post-Test Top View of MDB Impactor Face



Pre-Test Left Side View of MDB Impactor Face



Post-Test Left Side View of MDB Impactor Face



Pre-Test Right Side View of MDB Impactor Face



Post-Test Right Side View of MDB Impactor Face



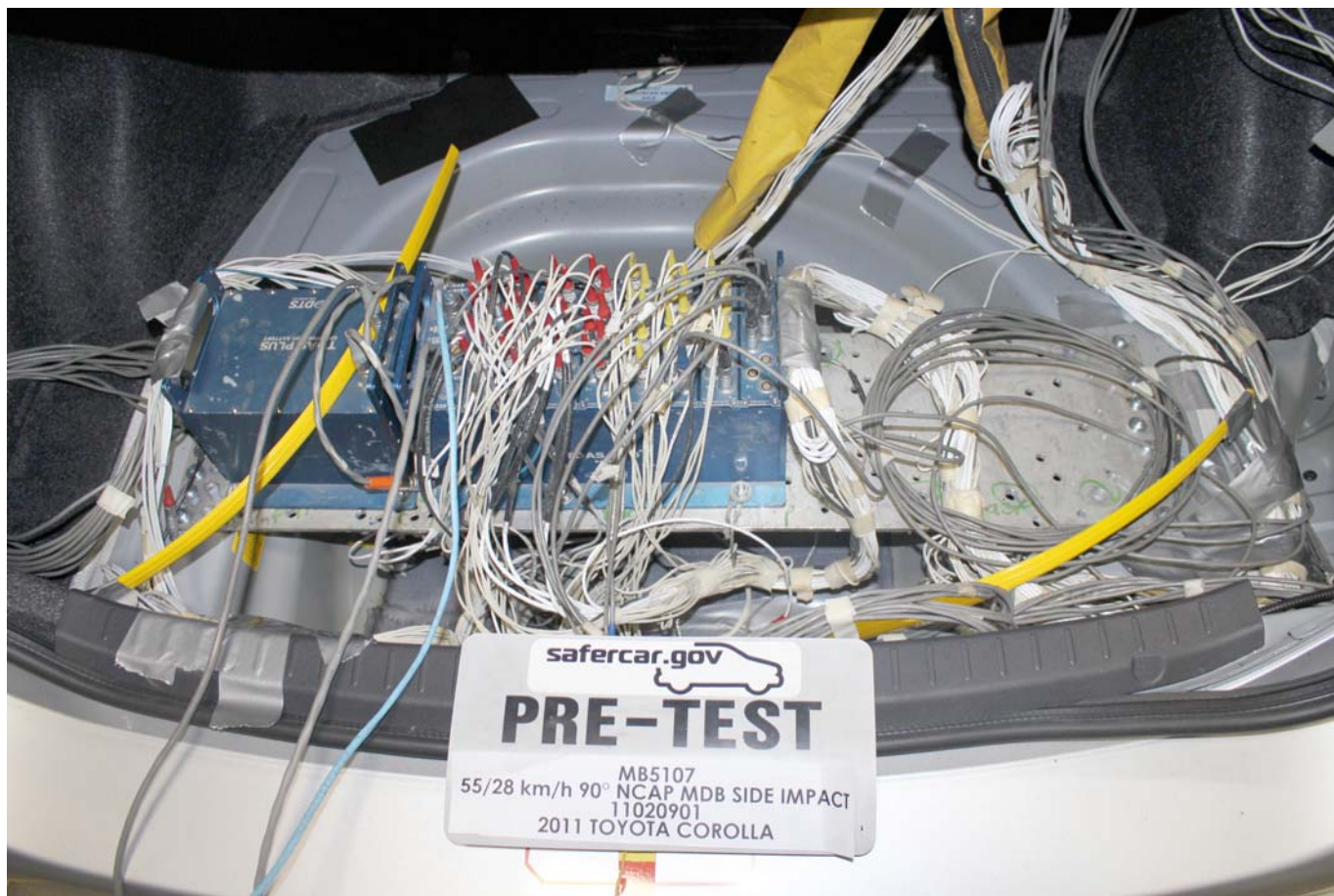
Close-Up View of Vehicle's Certification Label



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



Vehicle's Load Carrying Capacity Reduced



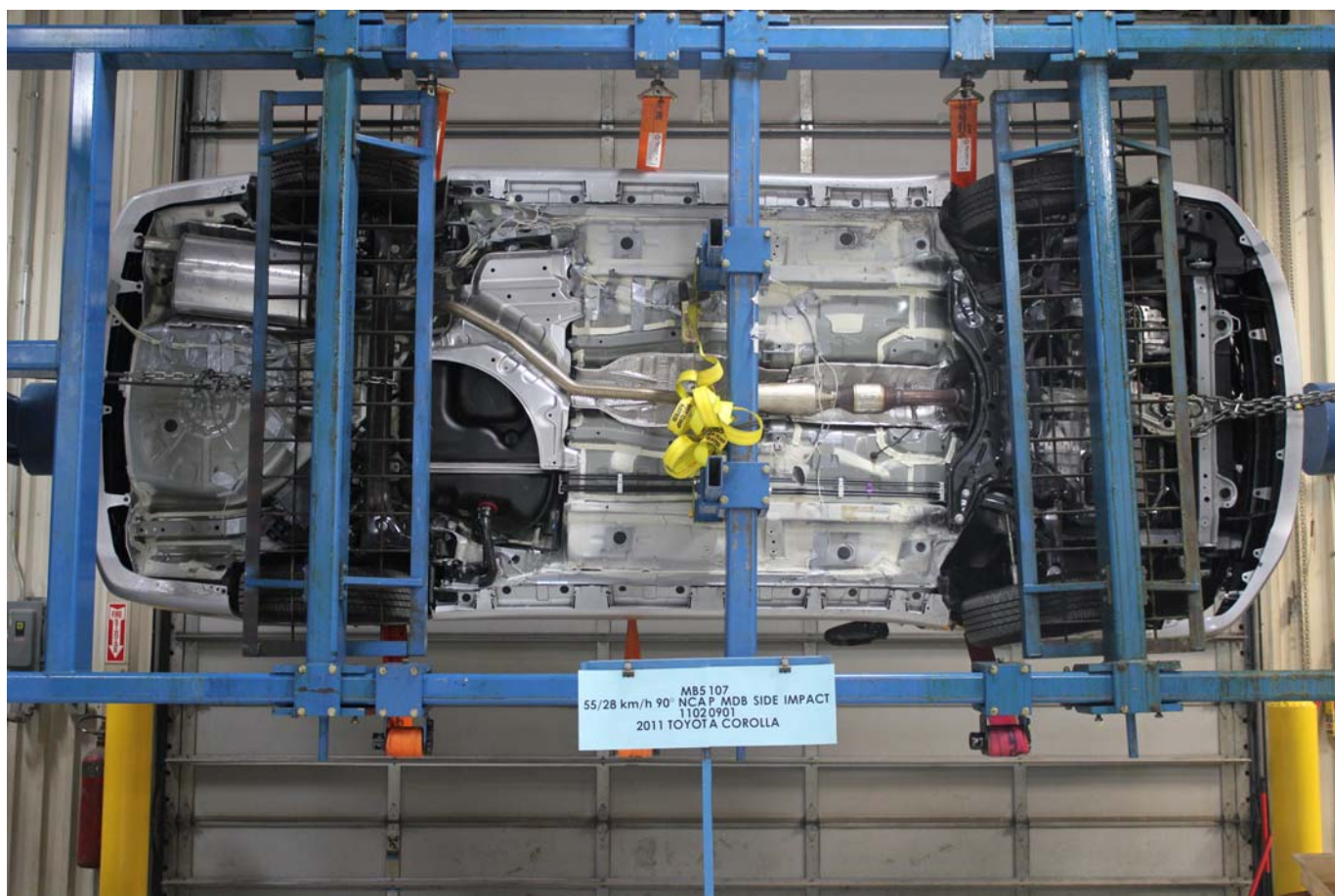
Pre-Test Ballast View



Post-Test Primary and Redundant Speed Trap Read-Out



FMVSS No. 301/305 Rollover 0 Degrees



FMVSS No. 301/305 Rollover 90 Degrees



FMVSS No. 301/305 Rollover 180 Degrees



FMVSS No. 301/305 Rollover 270 Degrees



FMVSS No. 301/305 Rollover 360 Degrees



Impact Event



moving forward

4-DOOR SEDAN

DESC.: **COROLLA**
VIN: **2T1BU4EE5BC539389**

YR/MDL: 2011/1832A

CLR: CLASSIC SILVER MET/FA16

PORT/PLANT: Detroit, MI/TMMC

(01F7/16)

RAILHEAD:

GOVERNMENT SAFETY RATINGS

This vehicle has not been rated by the government for frontal crash, side crash or rollover risk.
Source: National Highway Traffic Safety Administration (NHTSA).

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

EPA Fuel Economy Estimates

CITY MPG

26

Expected range for most drivers
21 to 31 MPG

Estimated

Annual Fuel Cost
\$1,552

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

Combined Fuel Economy

This Vehicle

29

14 42

All Compacts

HIGHWAY MPG

34

Expected range for most drivers
28 to 40 MPG

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



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

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

OPTIONAL EQUIPMENT

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

STANDARD EQUIPMENT

- MECHANICAL & PERFORMANCE
 - 1.8L DOHC 16-Valve, 4 Cyl Dual VVT-i
 - 5-Speed Automatic Transmission
 - Front Wheel Drive
 - Torsion Beam Rear Suspension
 - Electric Power Steering
 - Ventilated Front Disc/Rear Drum Brakes
 - 15" Steel Wheels with Full Wheel Covers and P195/65R15 Tires
 - Star Safety System Includes: VSC, TRAC, Anti-lock Brake System, EBD, Brake Assist & Smart Stop Technology (SST)
 - Front Side Curtain Side Airbags
 - Dr & Fr Pass Seat Mounted Side Airbags
 - Front & Rear Side Curtain Airbags
 - Driver & Front Passenger Headrests
 - Front Side Curtain Airbags
 - Front Seatbelt Pretensioners
 - LATCH (Lwr Anchor & Tethers for Children) for Outboard Rear Seating Positions Only
 - Anti-Theft System w/ Engine Immobilizer
 - Daytime Running Lights
- EXTERIOR
 - Black Power Outside Mirrors
 - Intermittent Windshield Wipers
 - Color-Keyed Outside Door Handles
 - Color-Keyed Power Locks
 - Color-Keyed Power Windows
 - Air Conditioning with Air Filter
 - AM/FM/CD MP3/WMA Player w/4 Speakers, Aux Audio Jack, CD Text Display & SL-Link
 - 60/40 Split Fold-Down Rear Seat
 - 110V Telescopic Steering Wheel
 - 12V Auxiliary Power Outlet
 - Power Windows with Memory
 - Center Console with Storage Compartment
 - Heavy Duty Rear Window DeLugger w/Timer
 - Power Lock
 - Power Windows and Fuel-Filter Releases
 - Full Tank of Gas***

DELIVERY, PROCESSING AND HANDLING FEE 760.00

TOTAL **\$17,360.00**

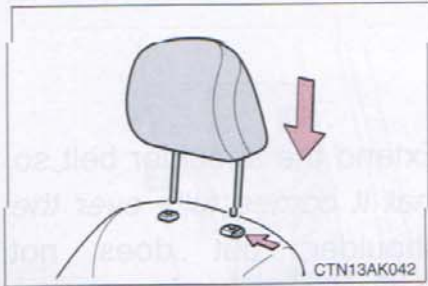
The New Vehicle Limited Warranty provides 3-year/50,000 mile basic coverage. 5-year/100,000 mile powertrain coverage is available for vehicles with a 5-year/100,000 mile powertrain warranty. An extended warranty program may be available for the vehicle. Manufacturer's suggested retail price includes manufacturer's recommended pre-delivery service. Gasoline, oil, and other accessories are not included in the manufacturer's suggested retail price.

Dealer Name / Address
TOYOTA OF WESTERN AVE
6941 SOUTH WESTERN AVE
CHICAGO
IL 60636

Ship to:



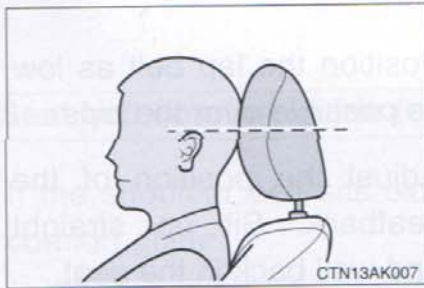
■ Installing the head restraints



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

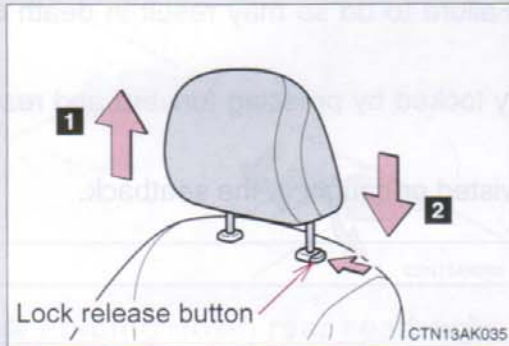
Observe the following precautions regarding the head restraints. Failure to do so may result in death or serious injury.

- 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.

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

Head restraints are provided for all seats.

► Front seats



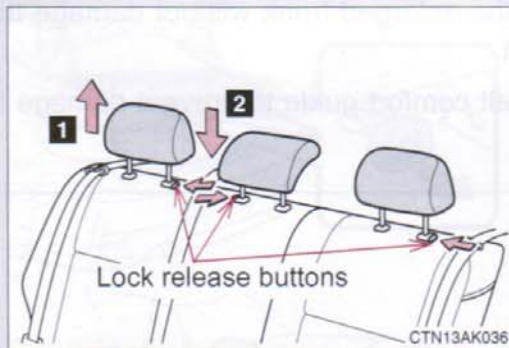
1 Up

Pull the head restraints up.

2 Down

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

► Rear seats



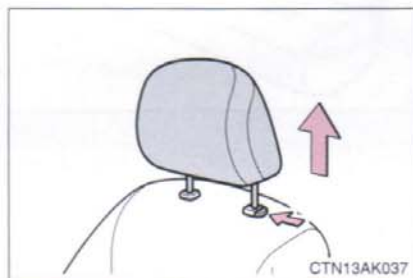
1 Up

Pull the head restraints up.

2 Down

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

■ Removing the head restraints



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

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
Figure No. 15.	Passenger Head Acceleration (Y) Primary vs. Time	B-5
Figure No. 16.	Passenger Head Acceleration (Z) Primary vs. Time	B-5
Figure No. 17.	Passenger Head Resultant Acceleration Primary vs. Time	B-5
Figure No. 18.	Passenger Lower Spine T12 Acceleration (X) vs. Time	B-6
Figure No. 19.	Passenger Lower Spine T12 Acceleration (Y) vs. Time	B-6
Figure No. 20.	Passenger Lower Spine T12 Acceleration (Z) vs. Time	B-6
Figure No. 21.	Passenger Lower Spine T12 Resultant Acceleration vs. Time	B-6
Figure No. 22.	Passenger Iliac Force on Impact Side (Y) vs. Time	B-7
Figure No. 23.	Passenger Acetabulum Force on Impact Side (Y) vs. Time	B-7
Figure No. 24.	Passenger Total Pelvic Force on Impact Side (Y) vs. Time	B-7

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

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

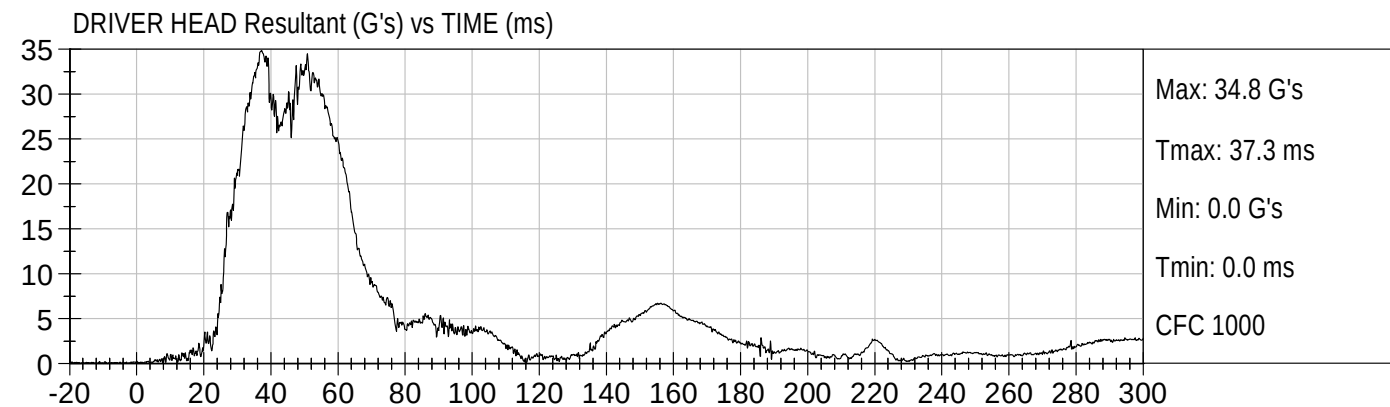
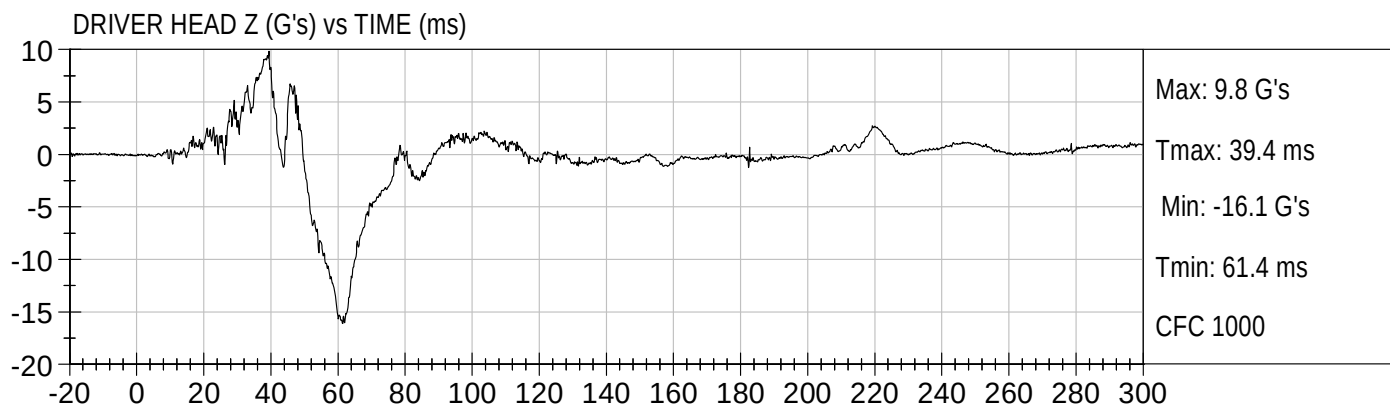
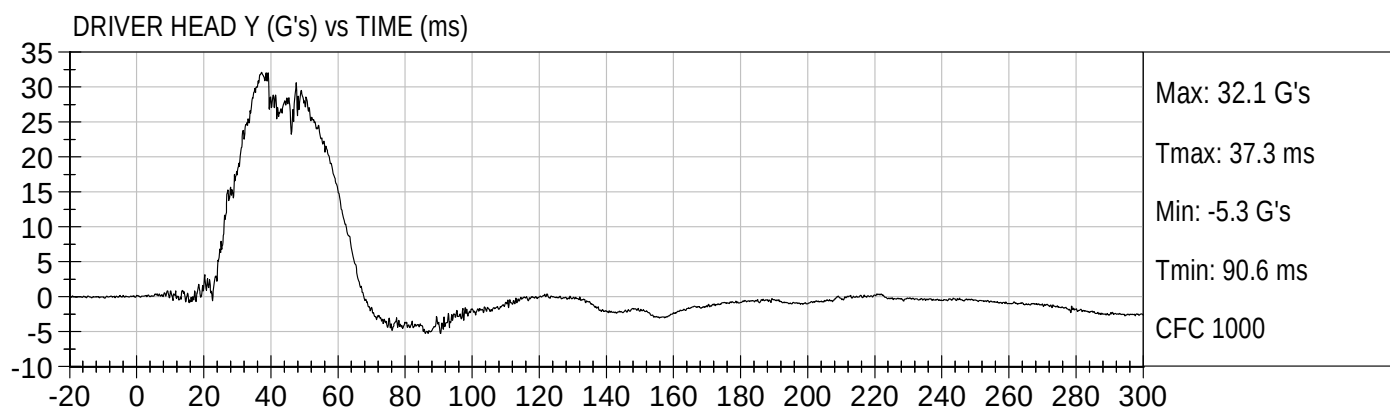
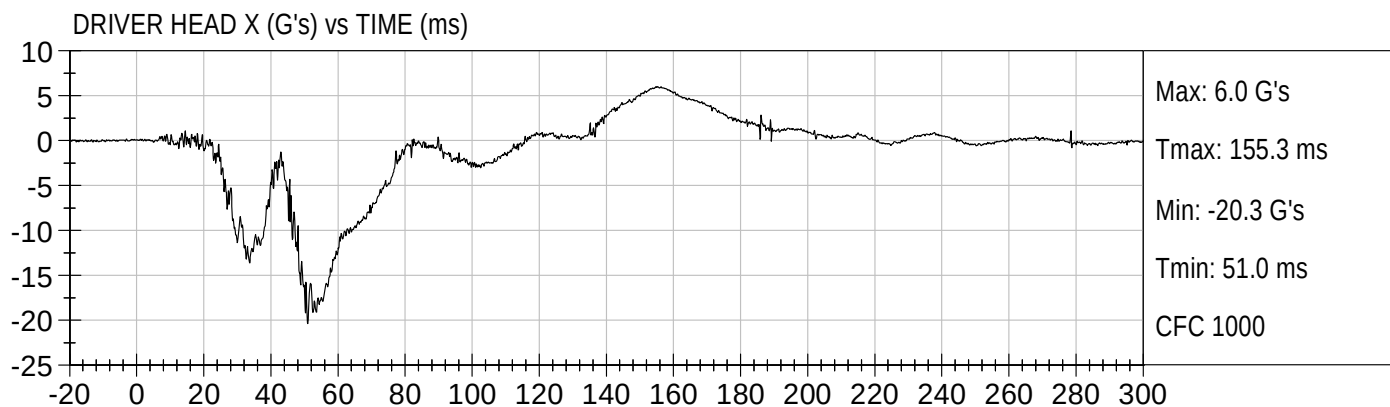
Vehicle Instrumentation Data

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)

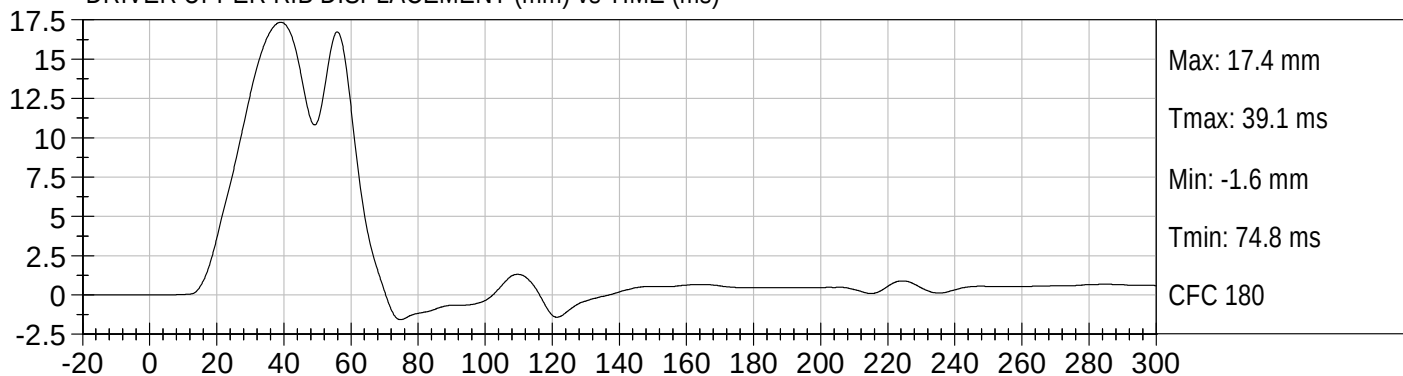
MDB Instrumentation Data

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

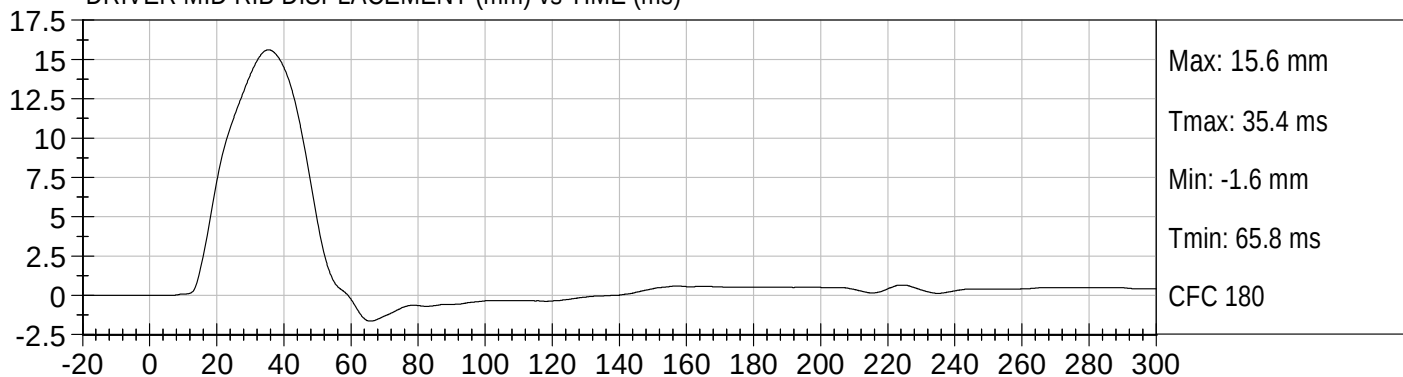




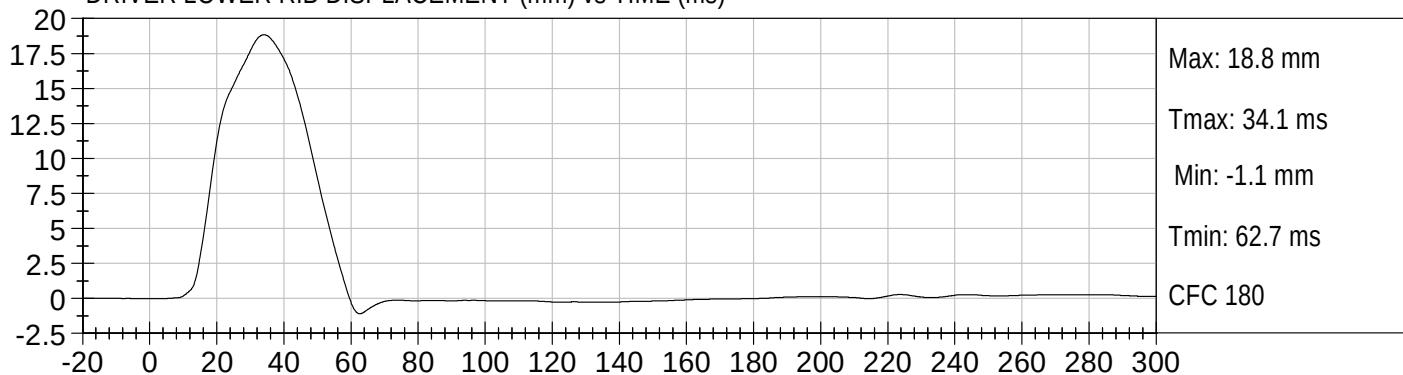
DRIVER UPPER RIB DISPLACEMENT (mm) vs TIME (ms)



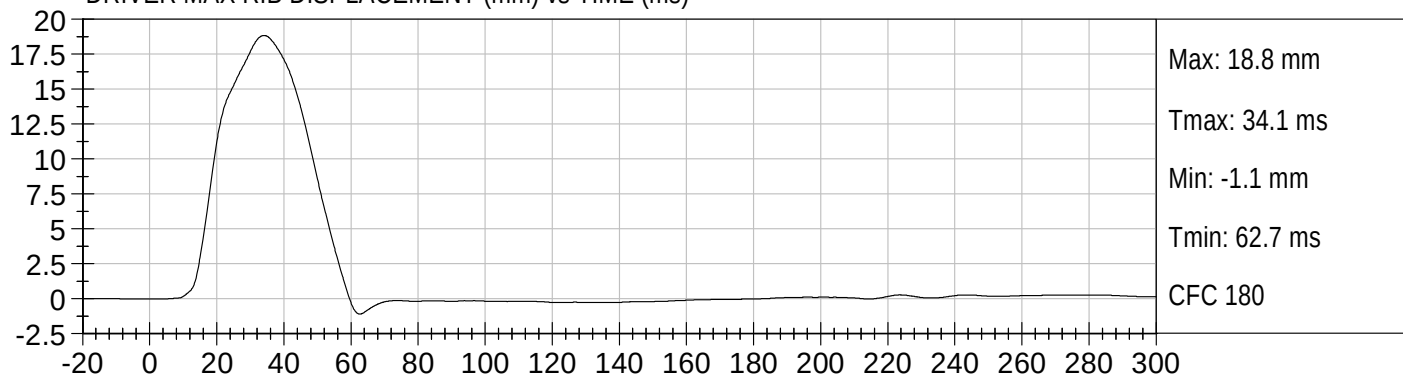
DRIVER MID RIB DISPLACEMENT (mm) vs TIME (ms)



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

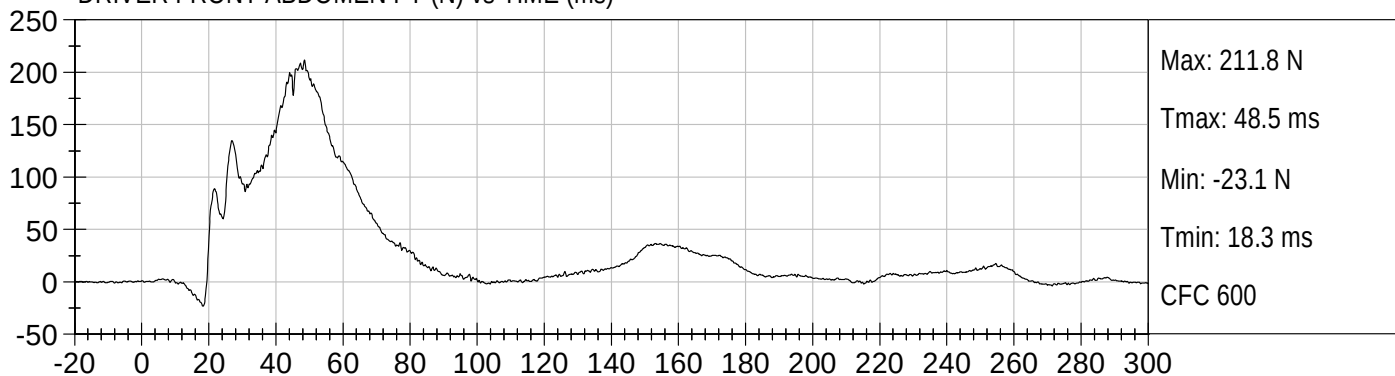


DRIVER MAX RIB DISPLACEMENT (mm) vs TIME (ms)

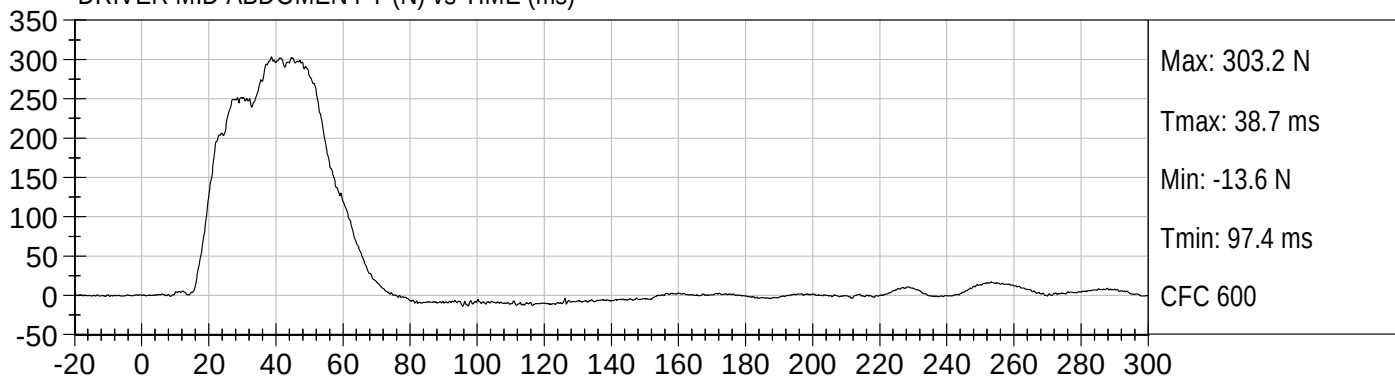




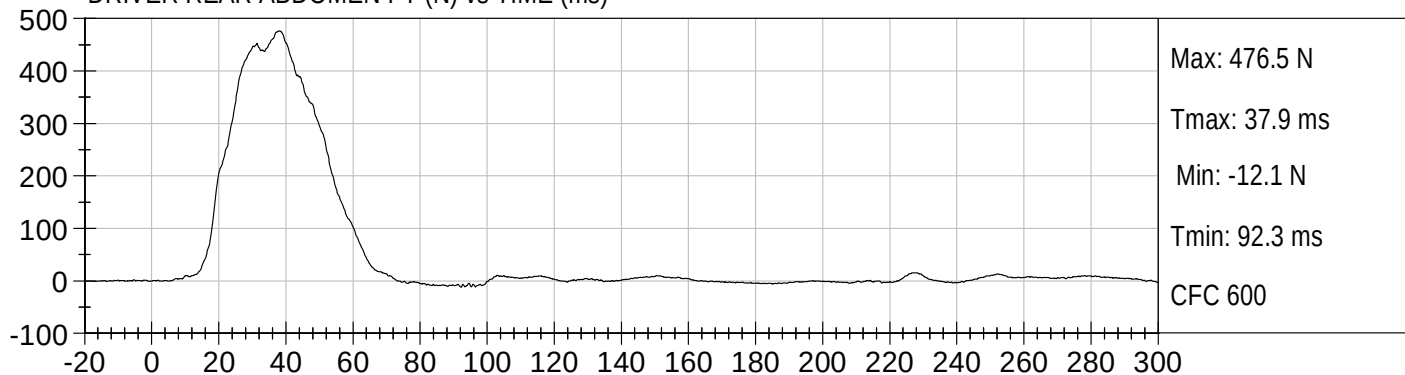
DRIVER FRONT ABDOMEN FY (N) vs TIME (ms)



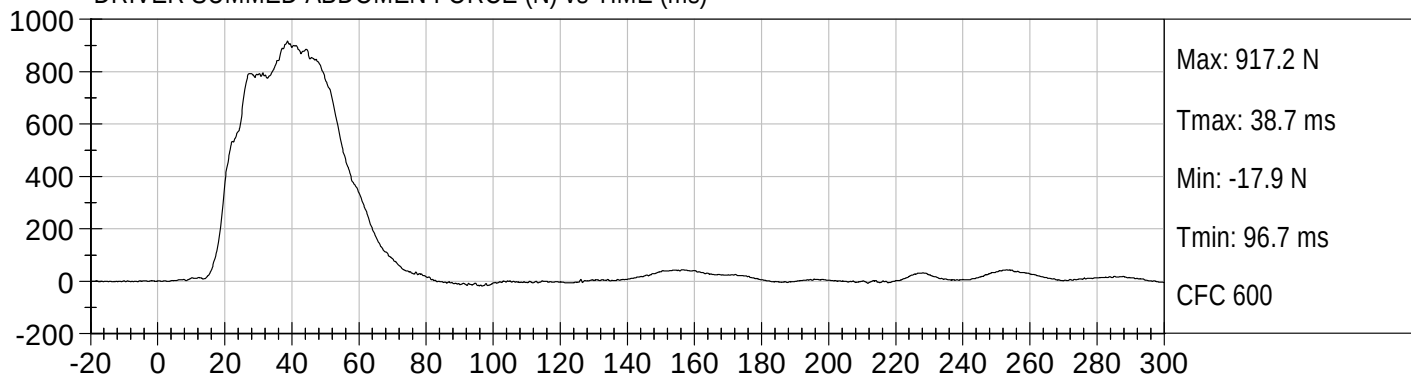
DRIVER MID ABDOMEN FY (N) vs TIME (ms)



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



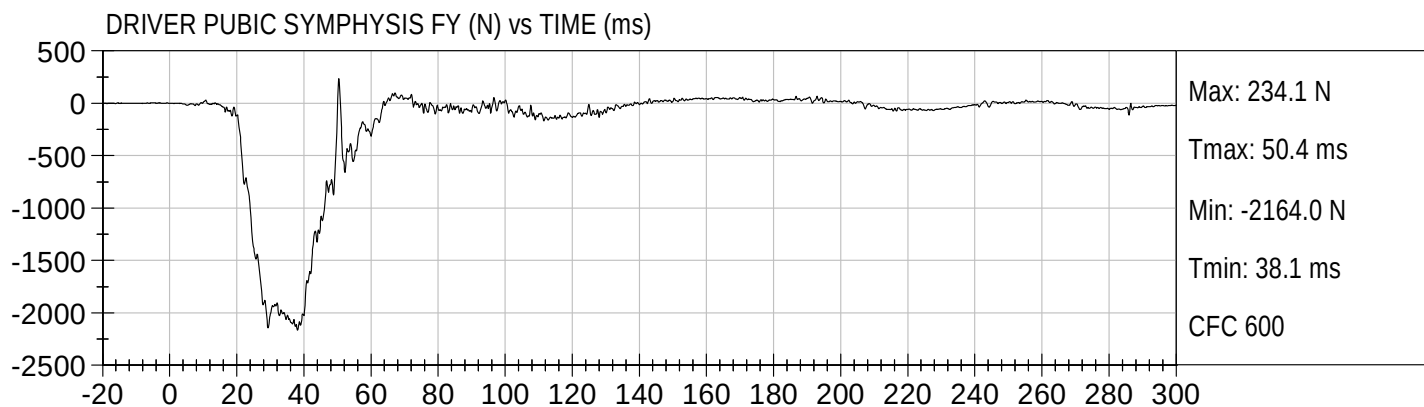
DRIVER SUMMED ABDOMEN FORCE (N) vs TIME (ms)





55/28 km/h 90° NCAP MDB Side Impact
2011 Toyota Corolla - MB5107

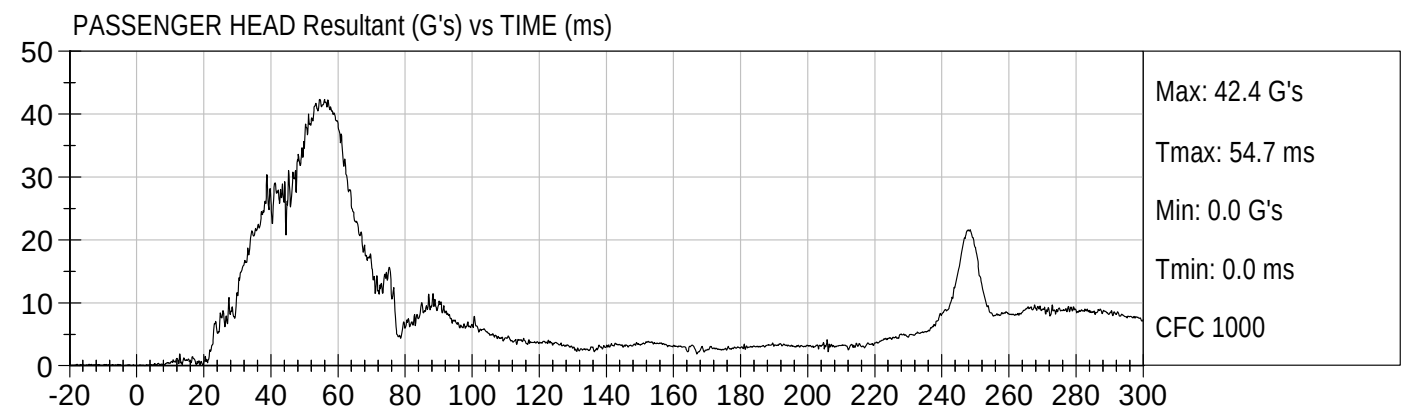
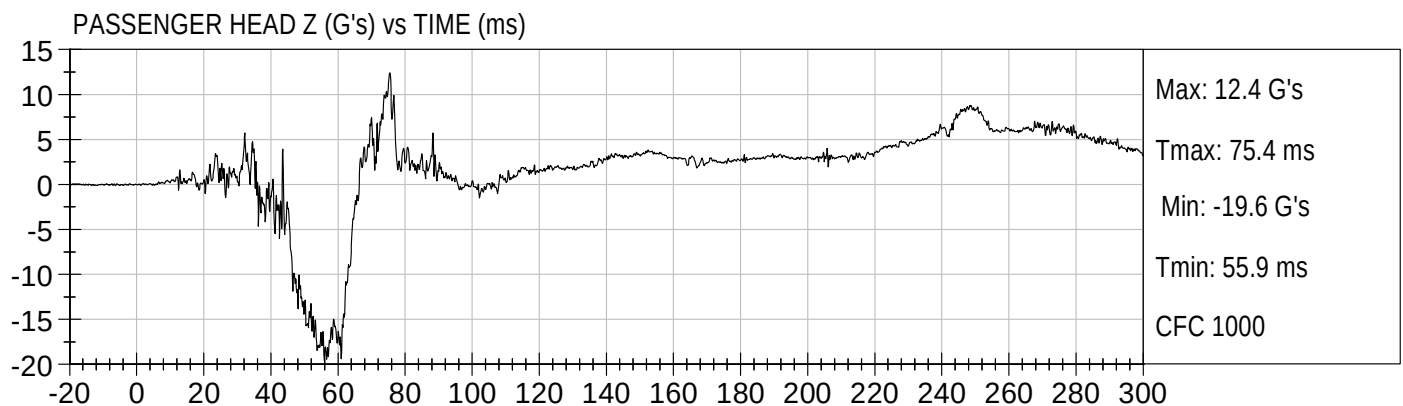
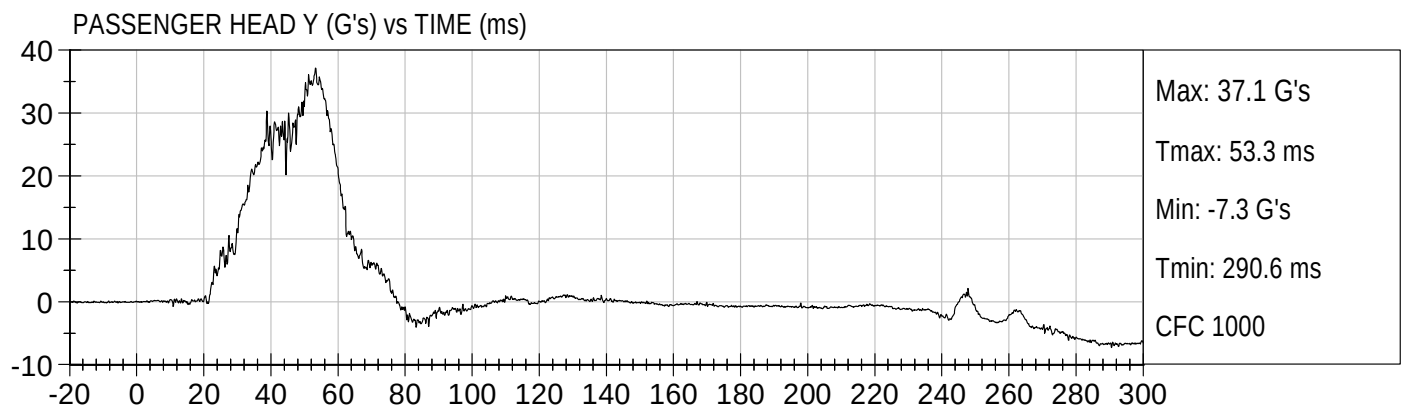
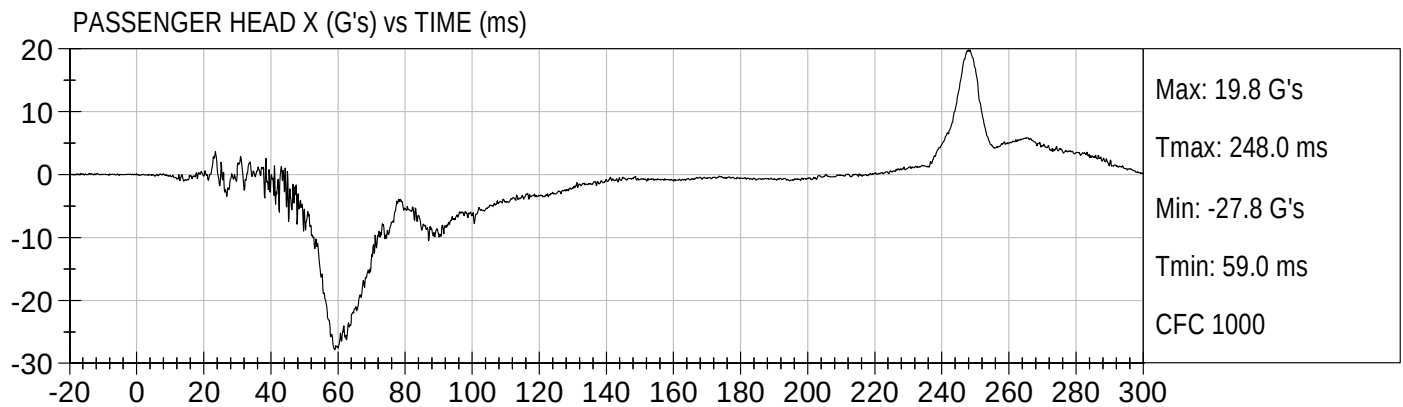
Test Date: 02/09/2011
Speed: 38.7 mph (62.2 km/h)

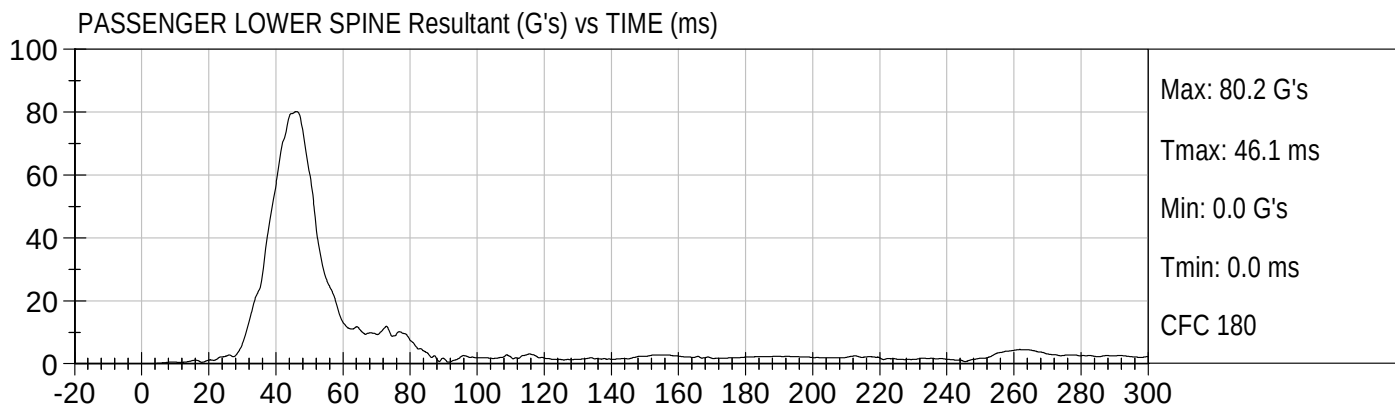
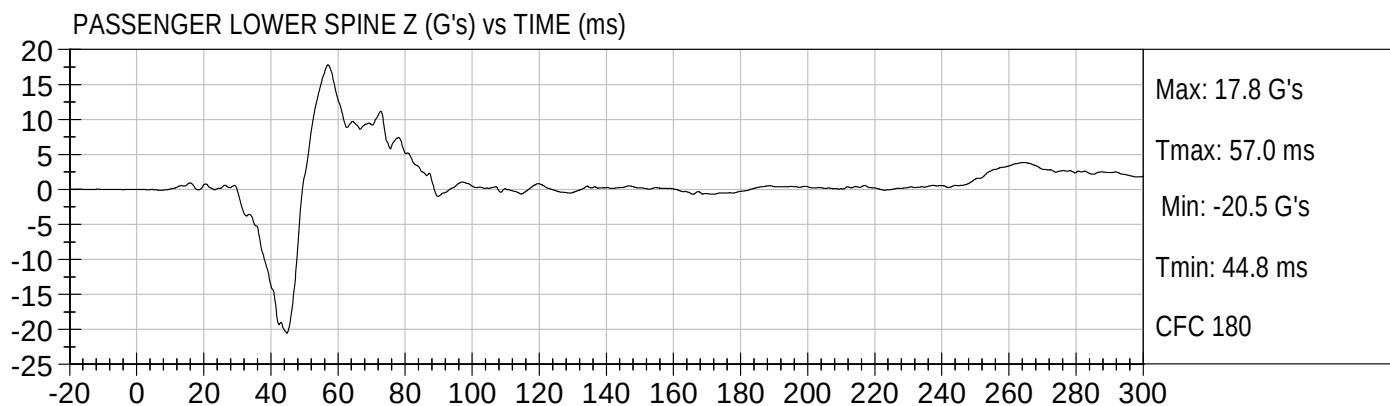
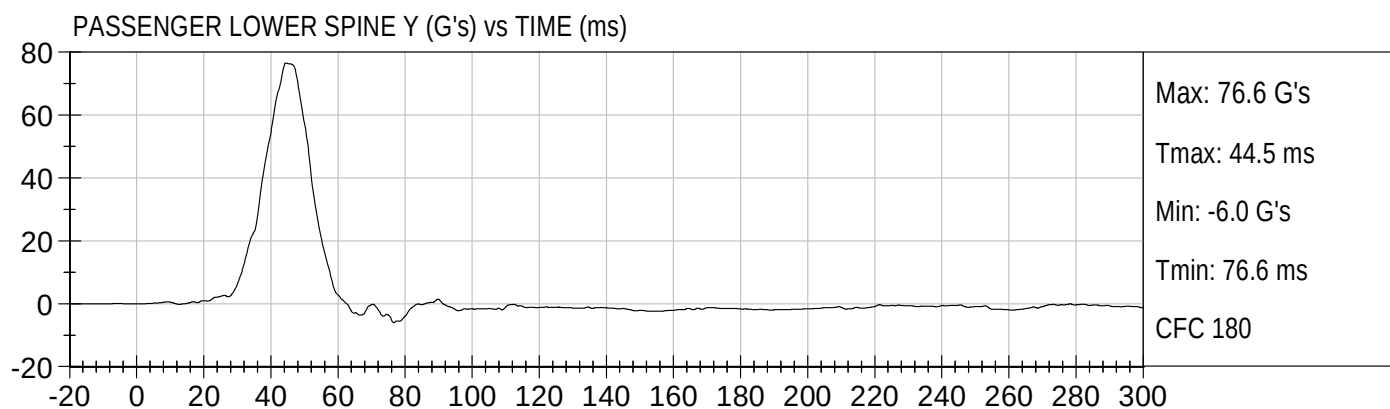
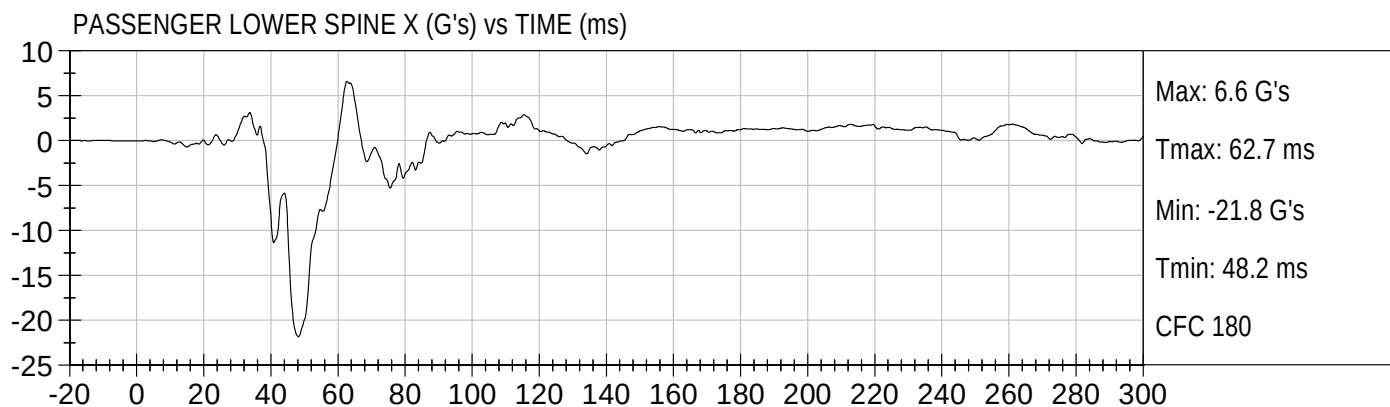




55/28 km/h 90° NCAP MDB Side Impact
2011 Toyota Corolla - MB5107

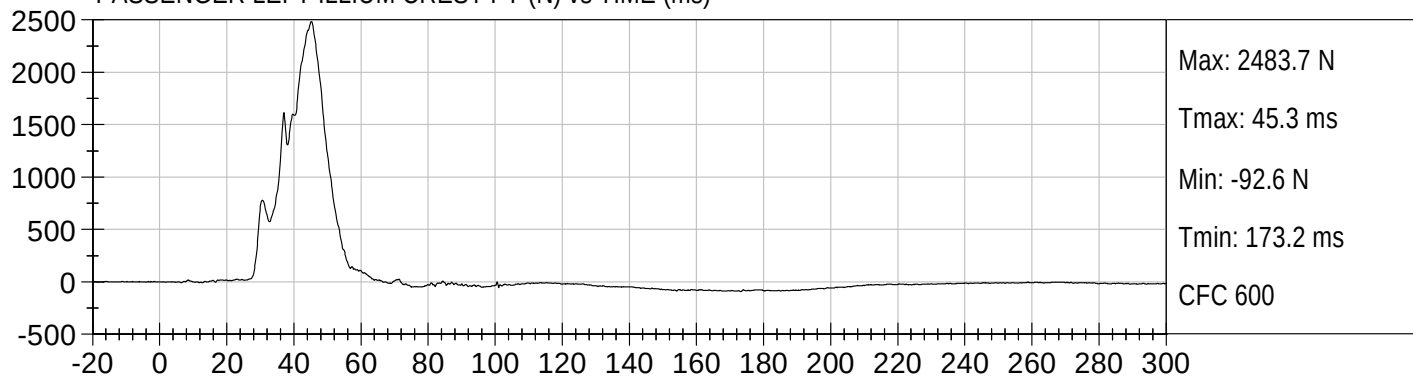
Test Date: 02/09/2011
Speed: 38.7 mph (62.2 km/h)



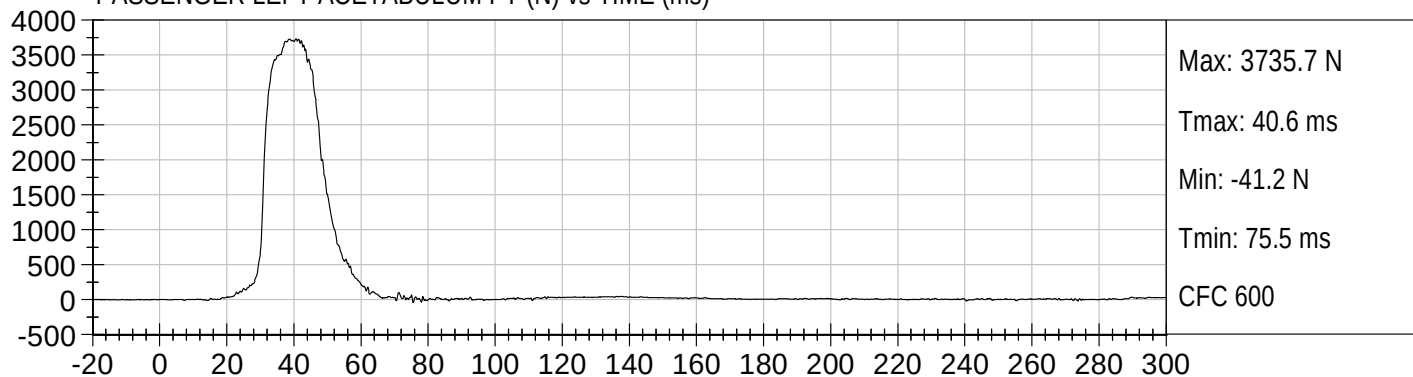




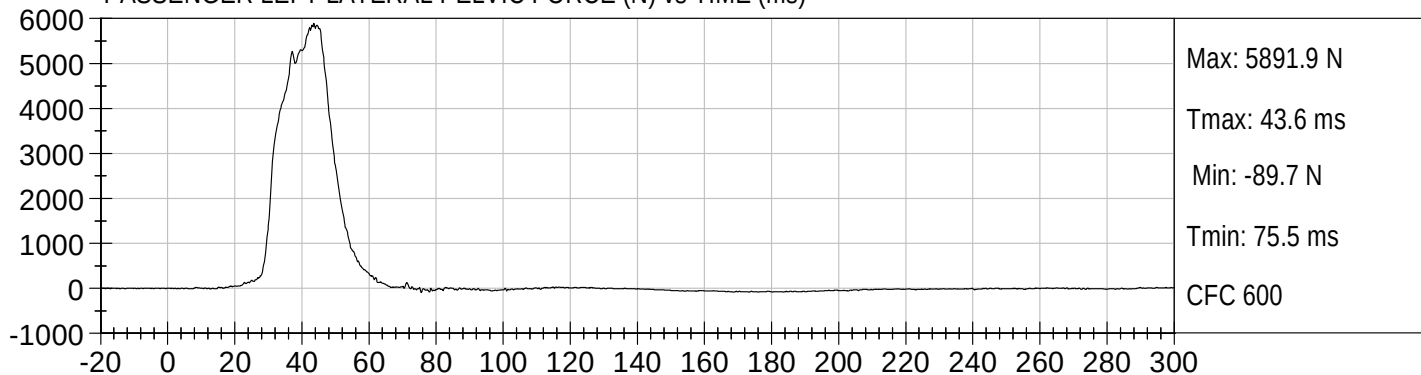
PASSENGER LEFT ILLIUM CREST FY (N) vs TIME (ms)



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: 032Test ID: D104511

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	20.9	Pass
Laboratory Relative Humidity	%	10 to 70	15	Pass
Peak Resultant Acceleration	G's	125 to 155	138	Pass
Peak Lateral Acceleration	G's	+/- 15	-6.6	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 15% of peak	Yes	Pass
Overall Test Results				Pass

Jessica Gall
Laboratory Technician

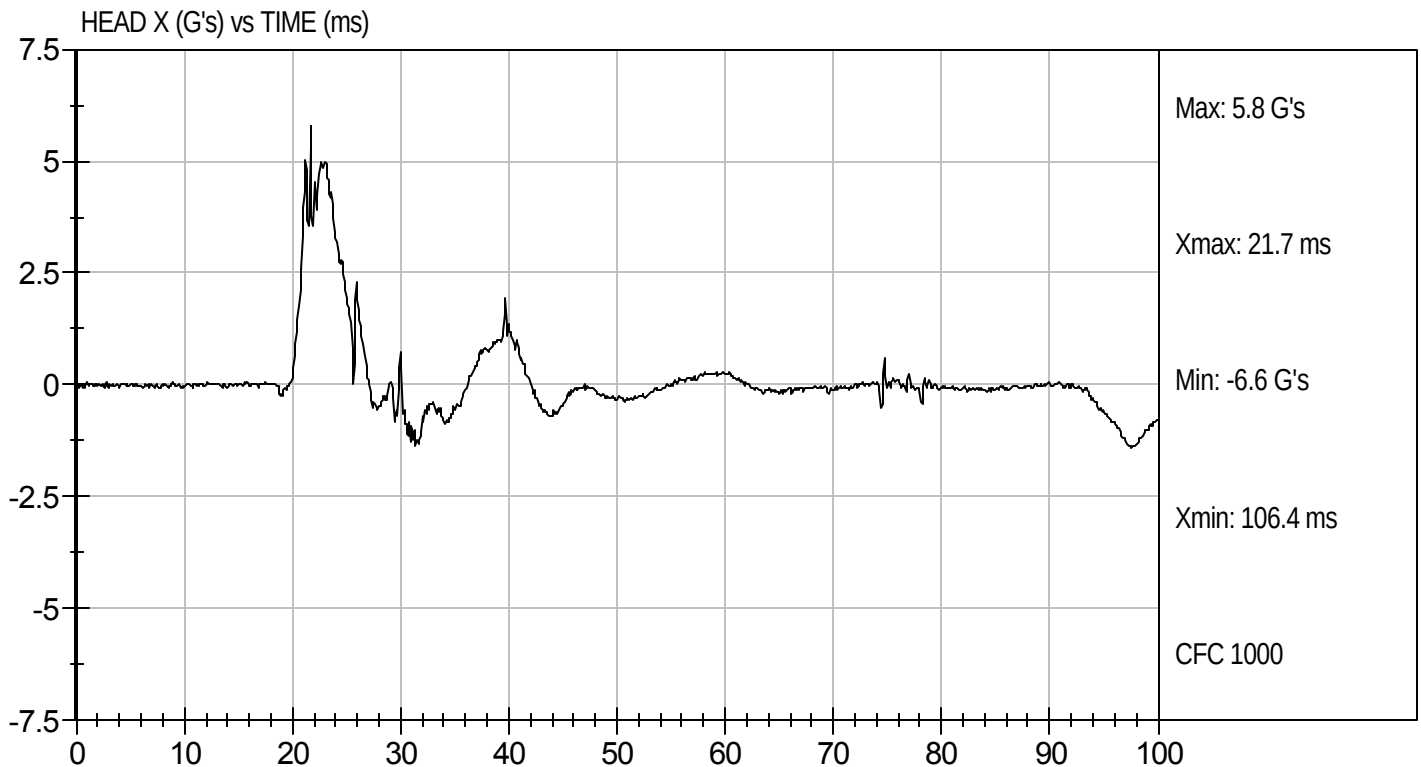
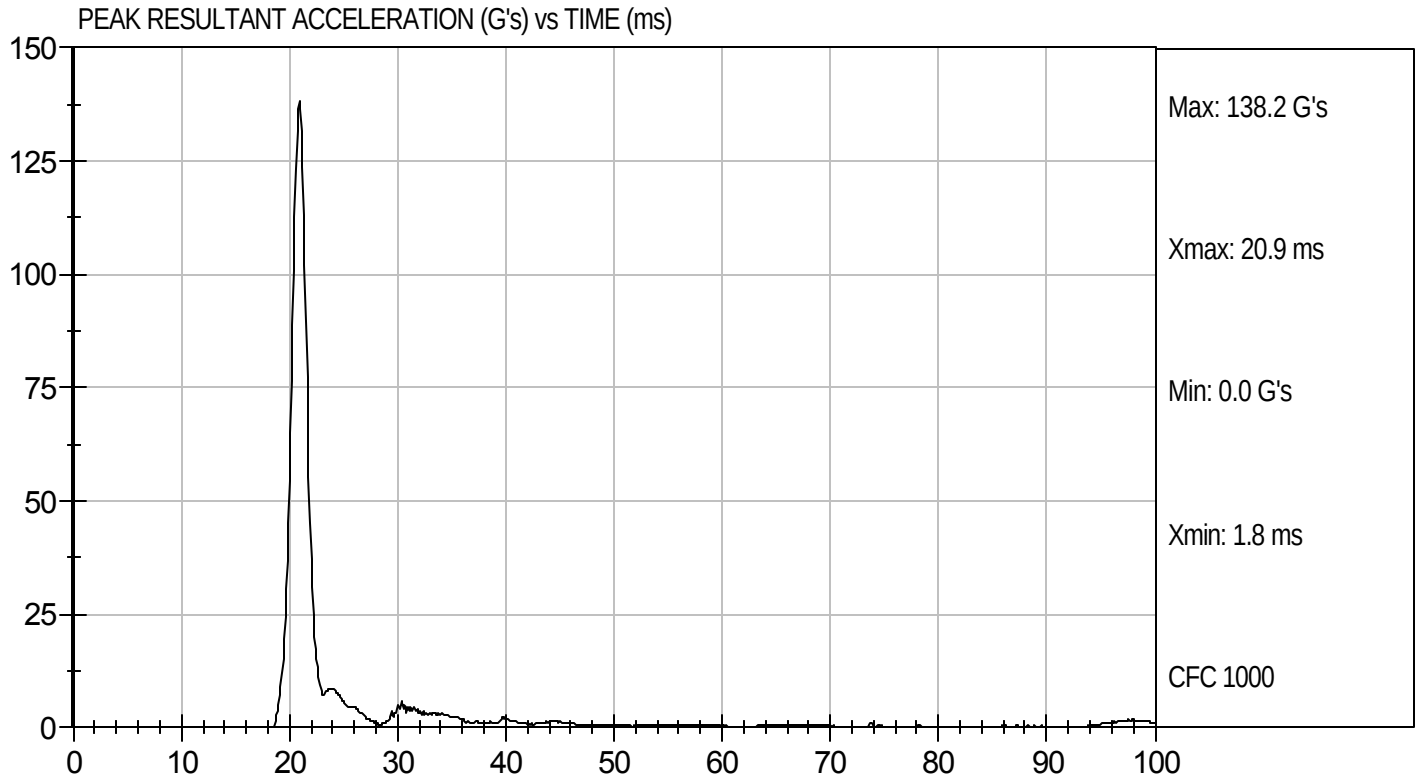
12/20/10
Test Date

David Winkelbauer
Approved By



Test Desc: Head Drop
Component ID: D104511

Test Date: 12/20/10
Velocity: 0 ft/s, 0 m/s

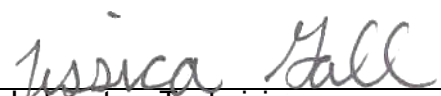


MGA RESEARCH CORPORATION
NECK PENDULUM TEST
ES-2re DUMMY

ATD Serial No: 032

Test I.D: D104512

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	14	Pass
Pendulum Speed		m/s	3.3 to 3.5	3.5	Pass
Pendulum Deceleration	1 ms	m/s	0.00 to -0.05	-0.03	Pass
	3 ms	m/s	-0.25 to -0.375	-0.33	Pass
	14 ms	m/s	-3.20 to -3.70	-3.34	Pass
Maximum Flexion Angle		deg	49.0 to 59.0	51.7	Pass
Time of Maximum Flexion Angle		ms	54.0 to 66.0	58.5	Pass
Head Rotation Decay Time to 0 degree		ms	53.0 to 88.0	61.4	Pass
Overall Test Results					Pass


 Laboratory Technician

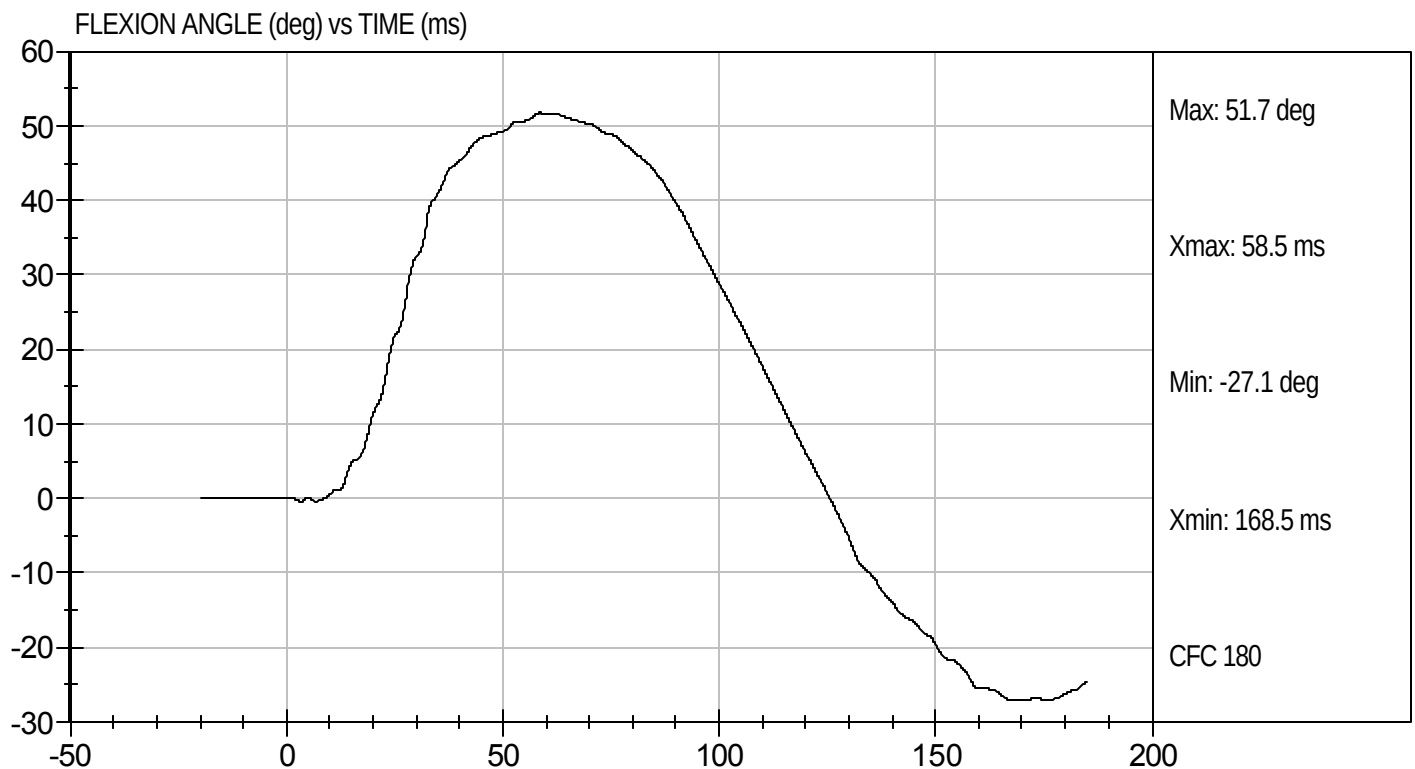
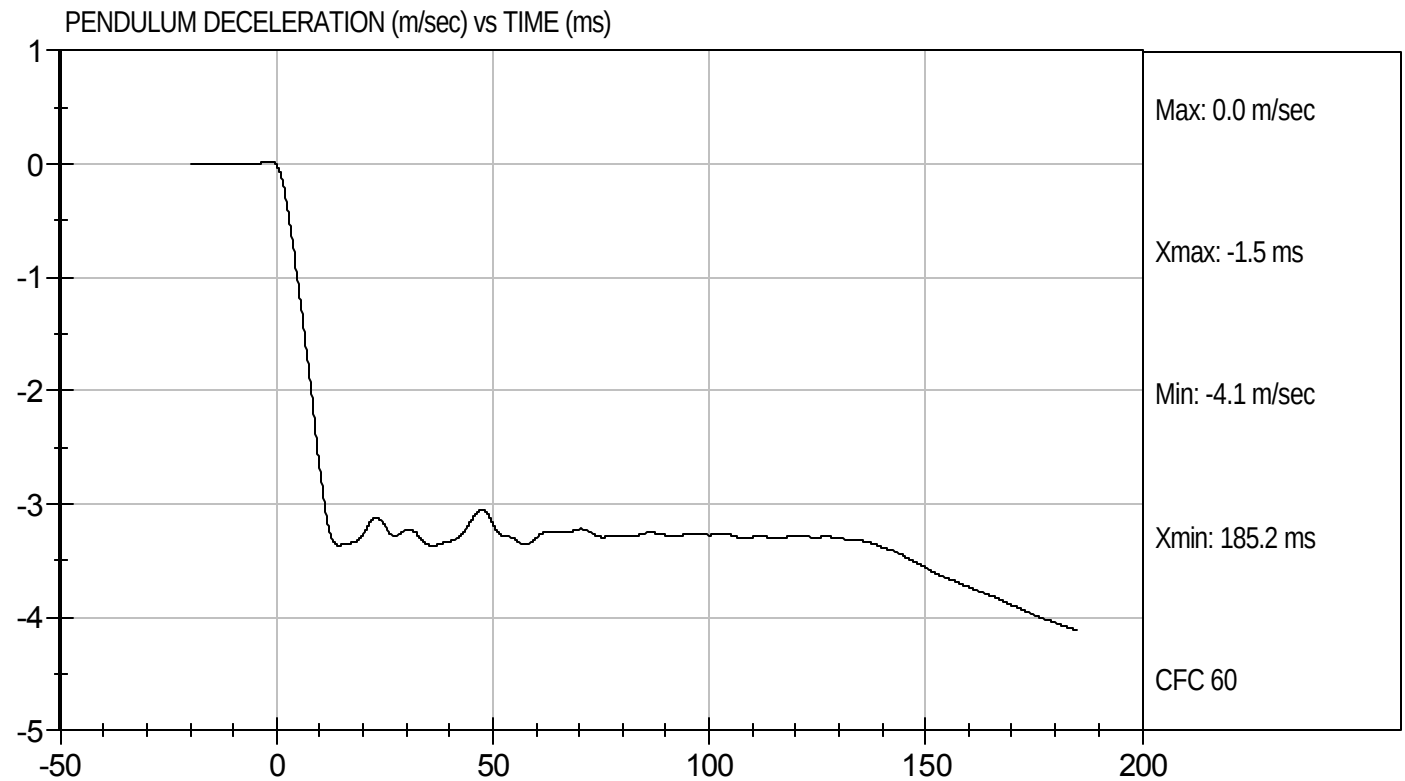
12/20/10
 Test Date


 Approved By



Test Desc: Neck Bending
Component ID: D104512

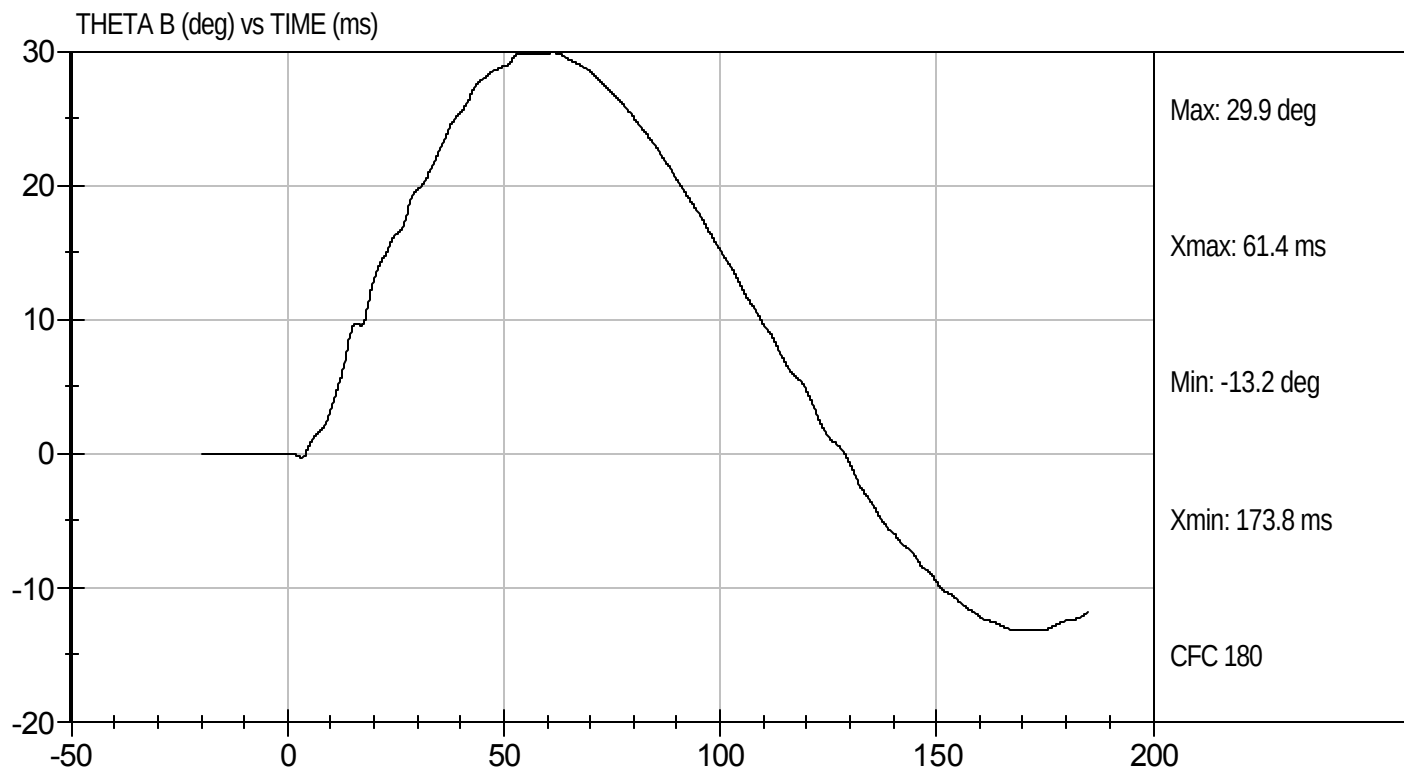
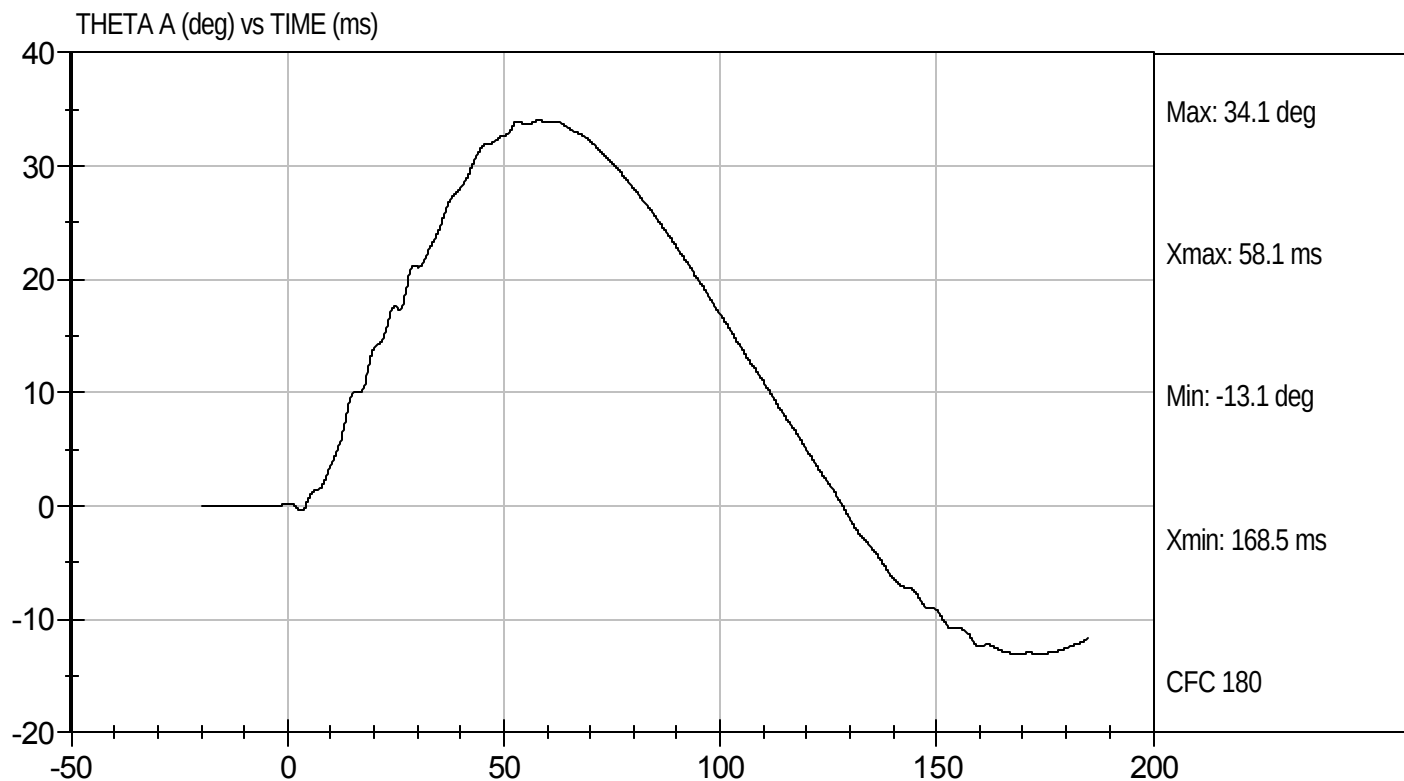
Test Date: 12/20/10
Velocity: 11.41 ft/s, 3.48 m/s





Test Desc: Neck Bending
Component ID: D104512

Test Date: 12/20/10
Velocity: 11.41 ft/s, 3.48 m/s

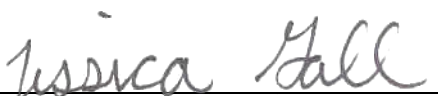


MGA RESEARCH CORPORATION
SHOULDER IMPACT TEST
ES-2re DUMMY

ATD Serial No: 032

Test I.D: D104513

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	15	Pass
Pendulum Speed	m/s	4.2 to 4.4	4.2	Pass
Peak Shoulder Acceleration	G's	7.5 to 10.5	10.4	Pass
Time of Peak Shoulder Acceleration	ms	NA	13.3	Pass
Overall Test Results			Pass	


Laboratory Technician

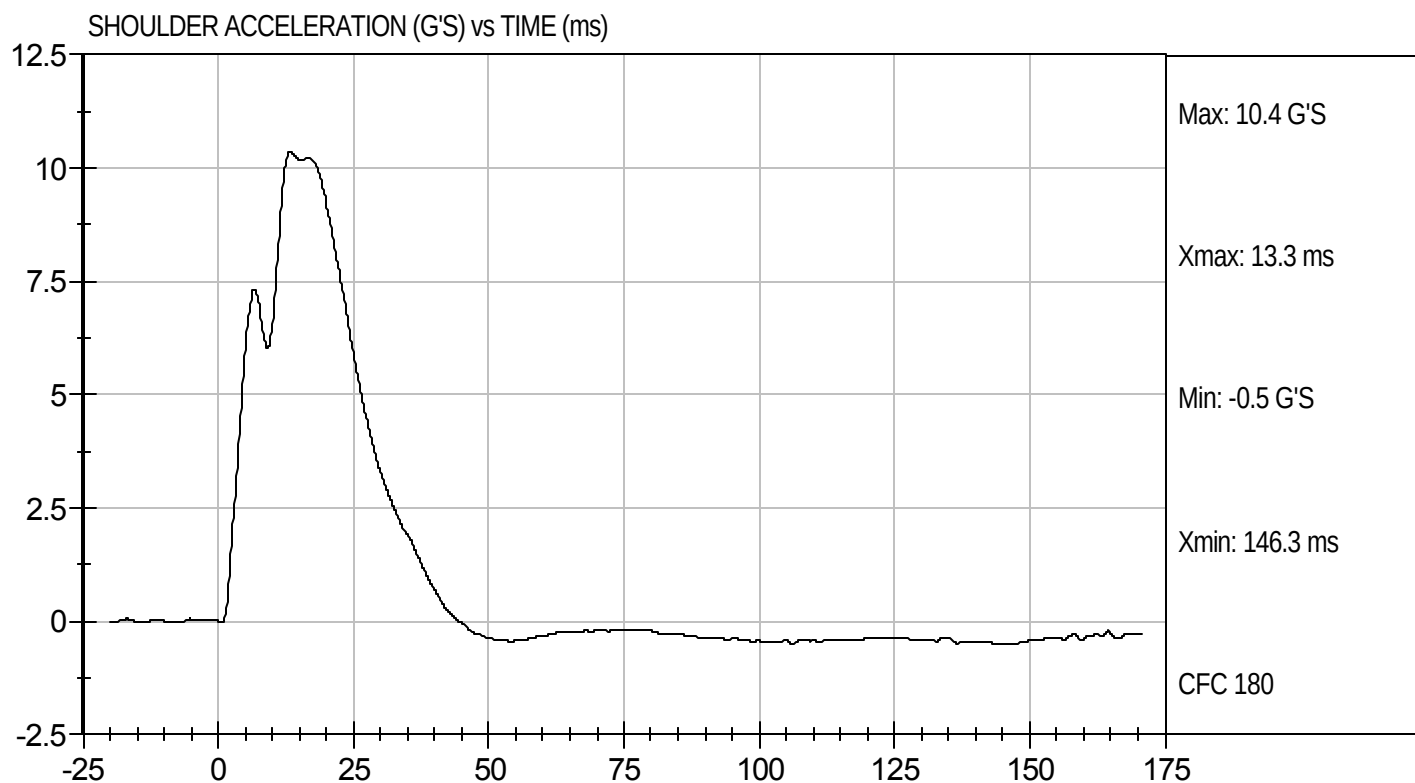
12/20/10
Test Date


Approved By



Test Desc: Shoulder Impact
Component ID: D104513

Test Date: 12/20/10
Velocity: 13.89 ft/s, 4.2 m/s



MGA RESEARCH CORPORATION

UPPER RIB TEST

ES-2re DUMMY

ATD Serial No: 032

Test I.D: D104514

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	18	Pass
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	48.5	Pass
Overall Test Results			Pass	


Laboratory Technician

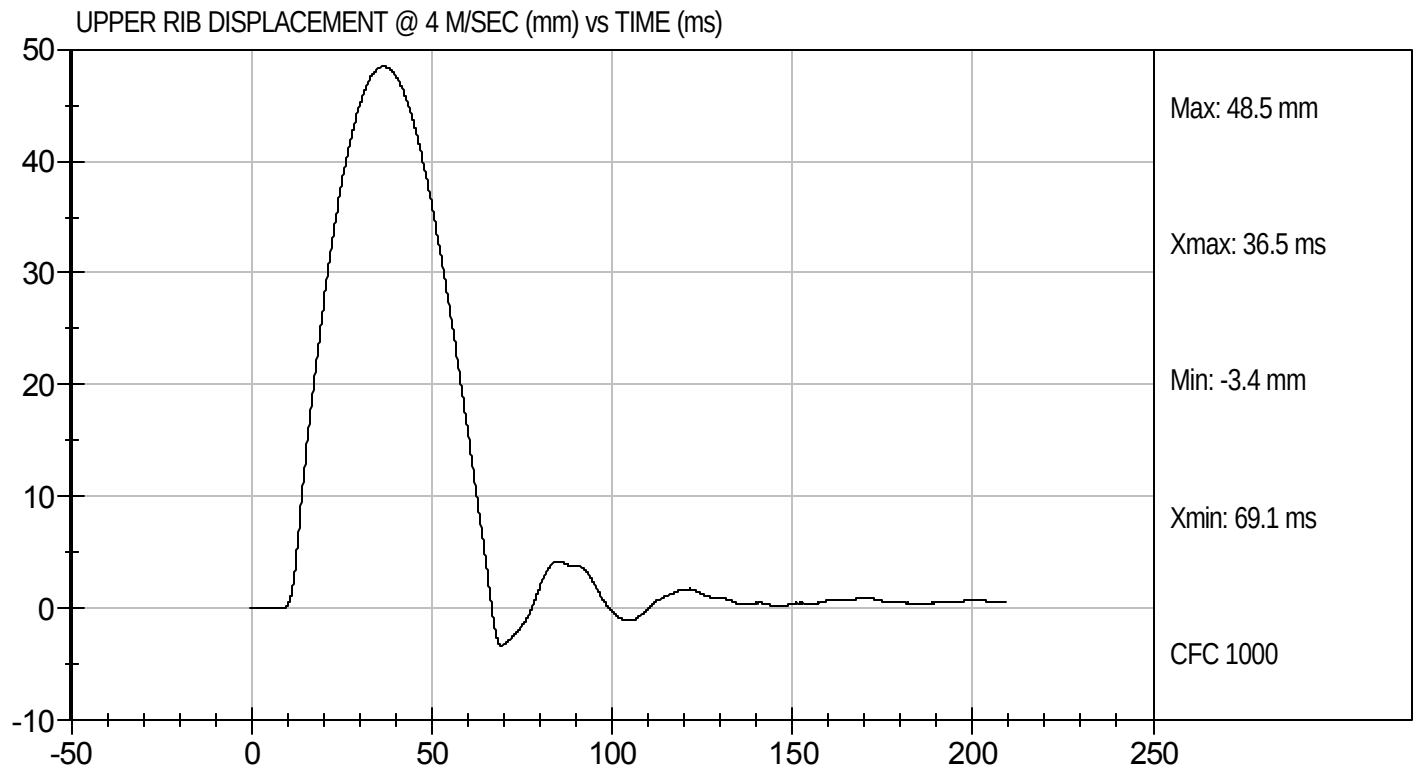
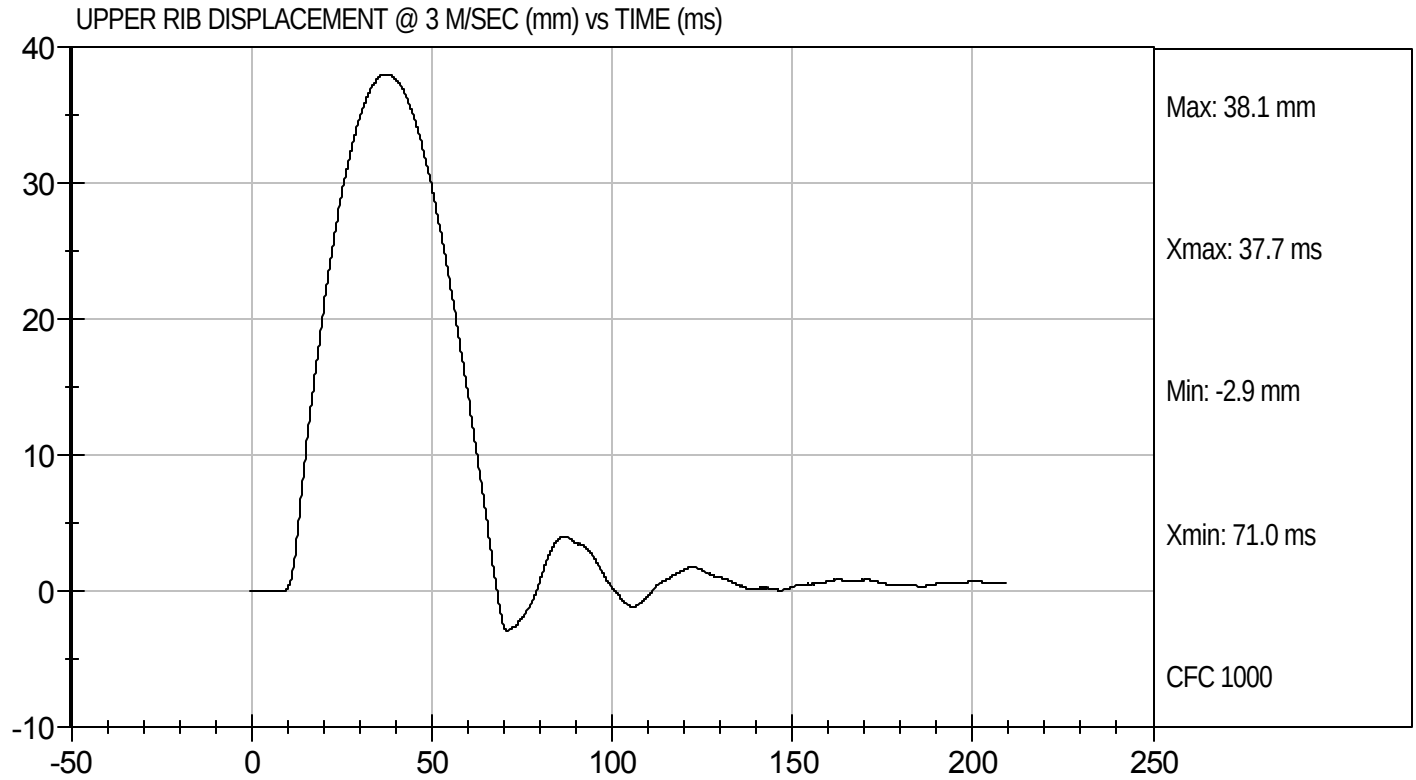
12/17/10
Test Date


Approved By



Test Desc: Rib Impact - Upper
Component ID: D104514

Test Date: 12/17/10



MGA RESEARCH CORPORATION

MID RIB TEST
ES-2re DUMMY

ATD Serial No: 032

Test I.D: D104515

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	18	Pass
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	48.1	Pass
			Overall Test Results	Pass


Laboratory Technician

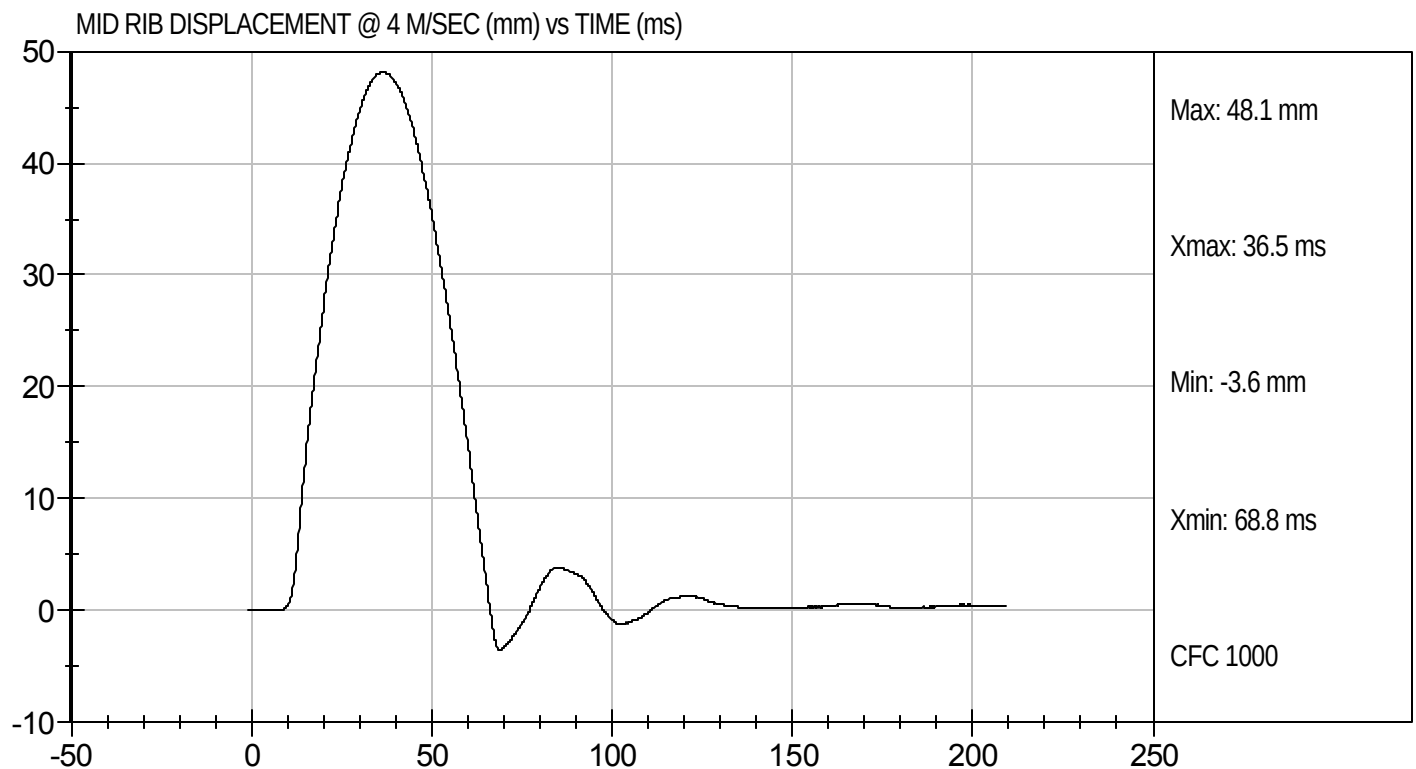
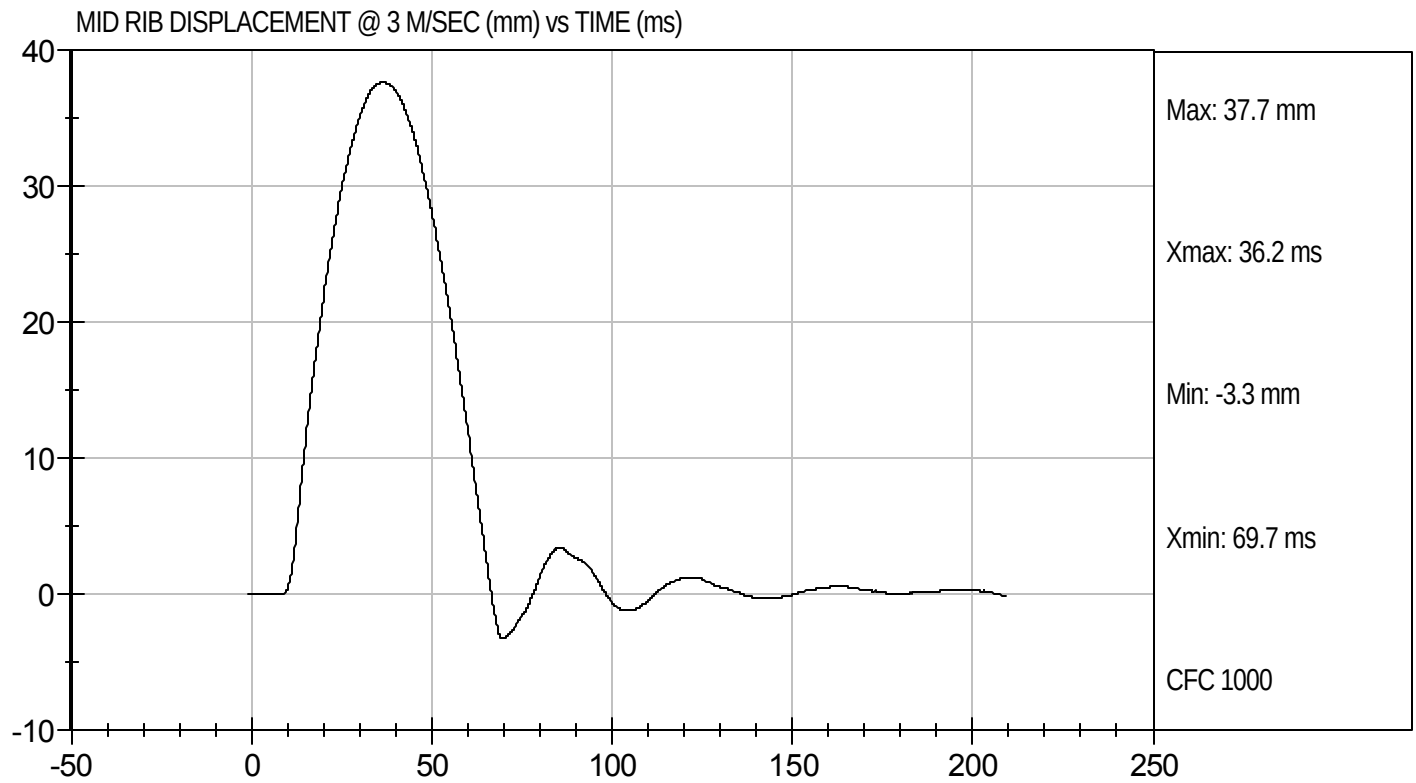
12/17/10
Test Date


Approved By



Test Desc: Rib Impact - Mid
Component ID: D104515

Test Date: 12/17/10



MGA RESEARCH CORPORATION

LOWER RIB TEST

ES-2re DUMMY

ATD Serial No: 032

Test I.D: D104516

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	18	Pass
Displacement at 3 m/s	mm	36.0 to 40.0	38.3	Pass
Displacement at 4 m/s	mm	46.0 to 51.0	48.0	Pass
Overall Test Results			Pass	

Jessica Hall
Laboratory Technician

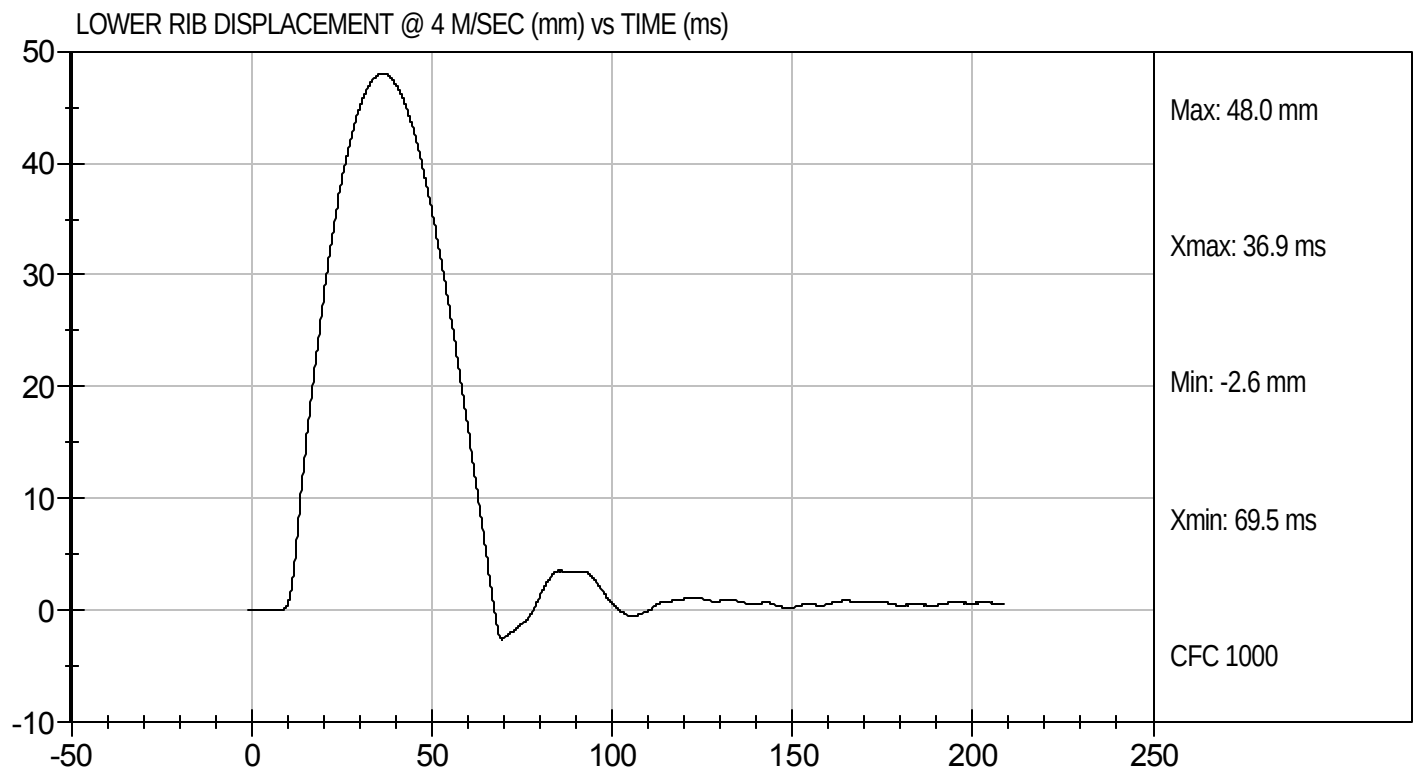
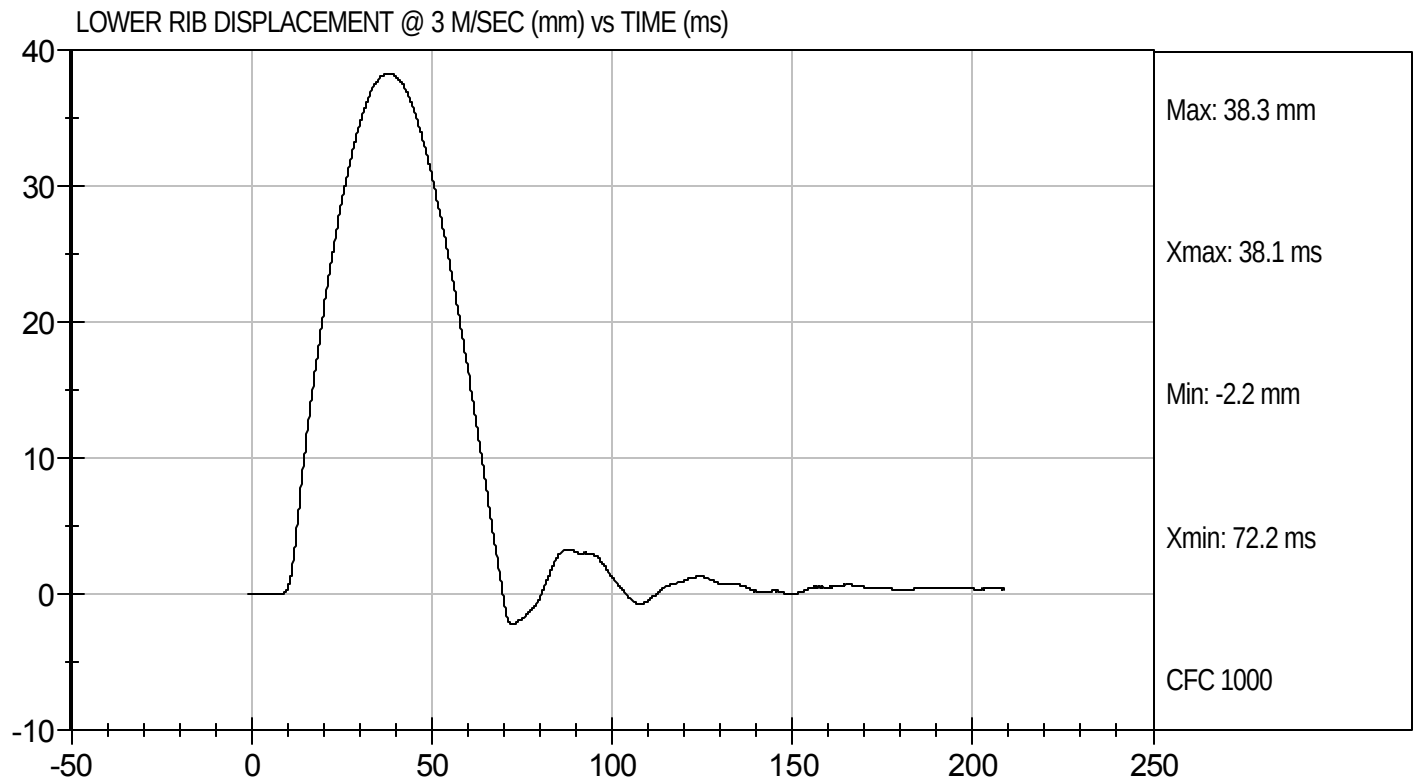
12/17/10
Test Date

David Winkelbauer
Approved By



Test Desc: Rib Impact - Lower
Component ID: D104516

Test Date: 12/17/10



MGA RESEARCH CORPORATION

ABDOMEN TEST

ES-2re DUMMY

ATD Serial No: 032

Test I.D: D104517

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	15	Pass
Probe Speed	m/s	3.90 to 4.10	4.06	Pass
Maximum Impact Force	kN	4.00 to 4.80	4.37	Pass
Time of Maximum Impactor Force	ms	10.60 to 13.00	10.90	Pass
Maximum Total Abdomen Force	kN	2.20 to 2.70	2.51	Pass
Time of Maximum Abdomen Force	ms	10.00 to 12.30	10.50	Pass
Overall Test Results				Pass


Laboratory Technician

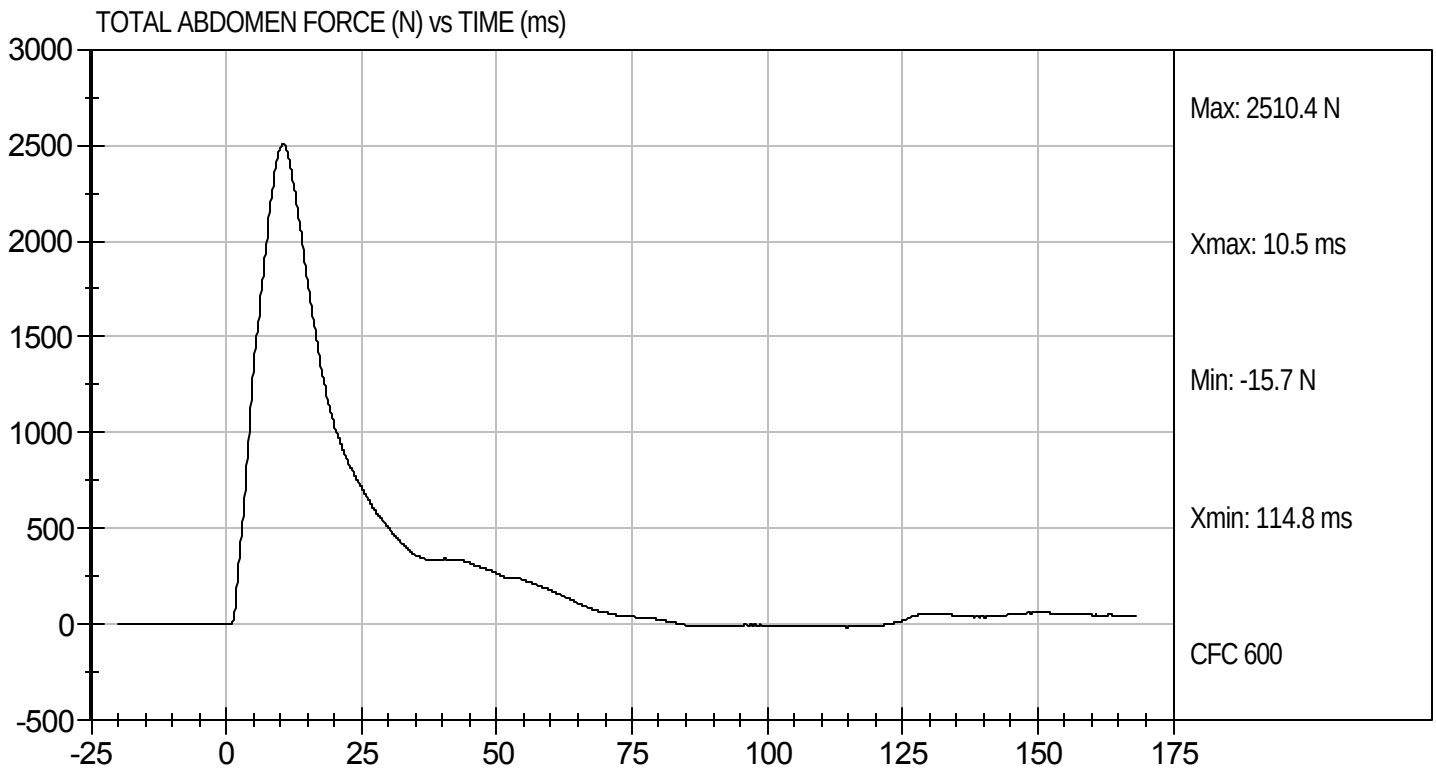
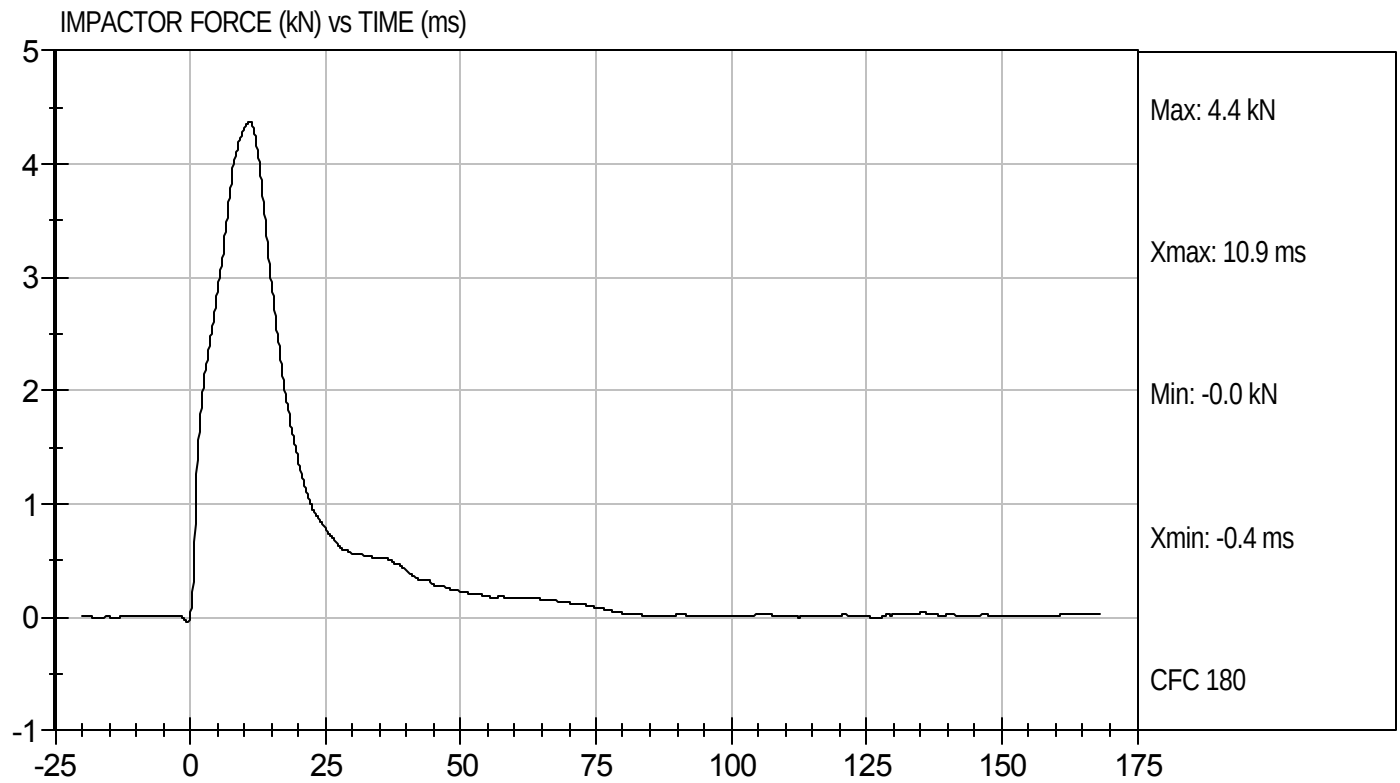
12/20/10
Test Date


Approved By



Test Desc: Abdomen Impact
Component ID: D104517

Test Date: 12/20/10
Velocity: 13.33 ft/s, 4.06 m/s

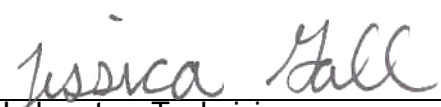


MGA RESEARCH CORPORATION
LUMBAR SPINE TEST
ES-2re DUMMY

ATD Serial No: 032

Test I.D: D104518

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	15	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	-6.07	Pass
Maximum Flexion Angle		deg	45.0 to 55.0	48.2	Pass
Time of Maximum Flexion Angle		ms	39.0 to 53.0	42.1	Pass
Headform Rotation Decay to Initial Position		ms	37 to 57	42	Pass
Overall Results					Pass


 Laboratory Technician

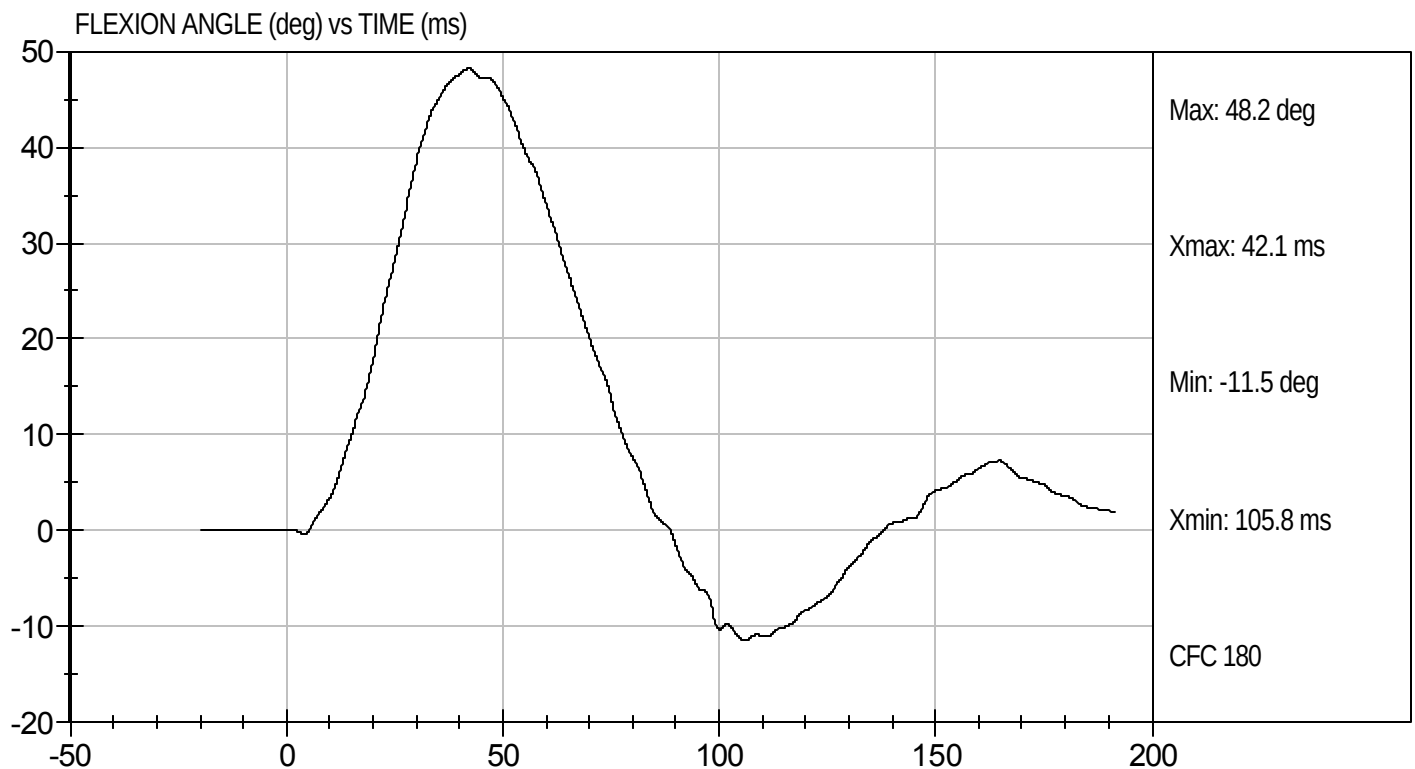
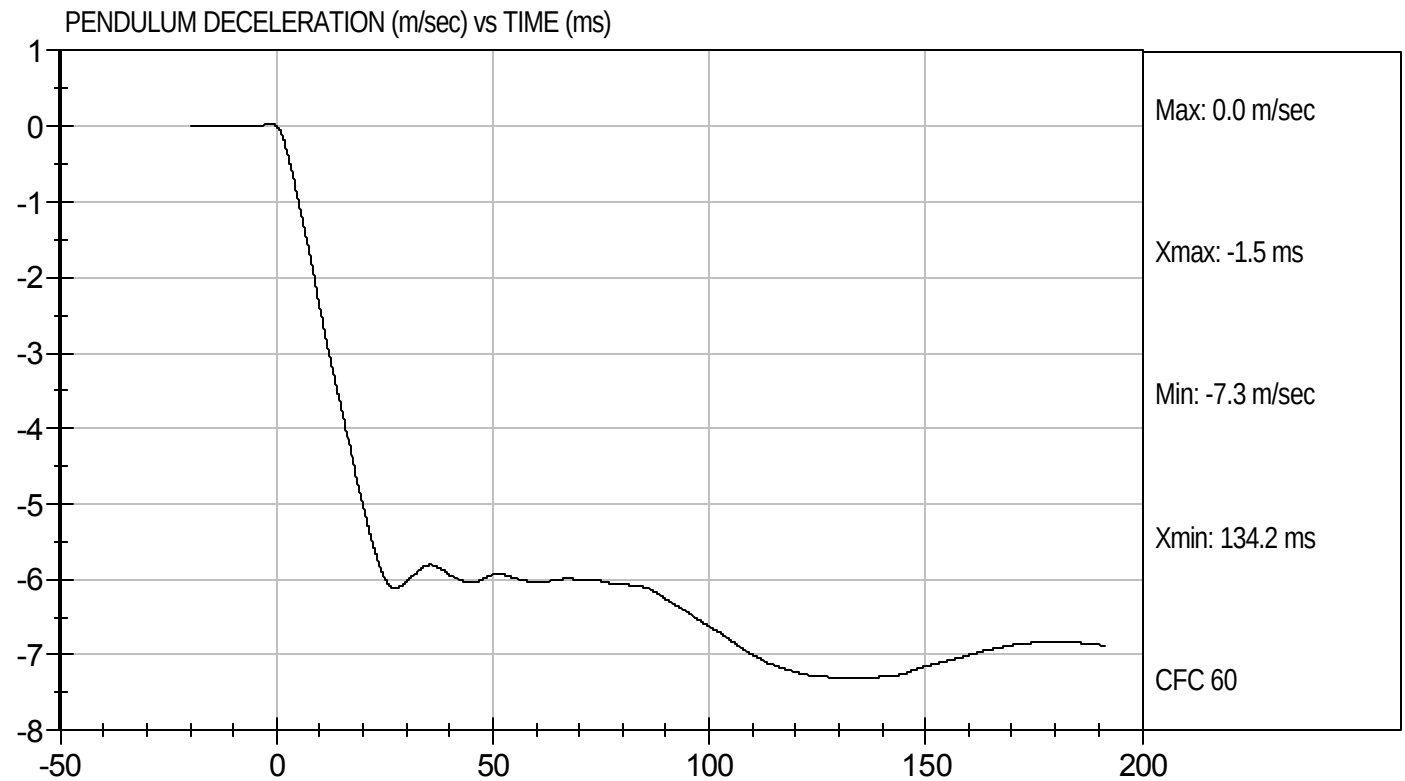
12/17/10
 Test Date


 Approved By



Test Desc: Lumbar Bending
Component ID: D104518

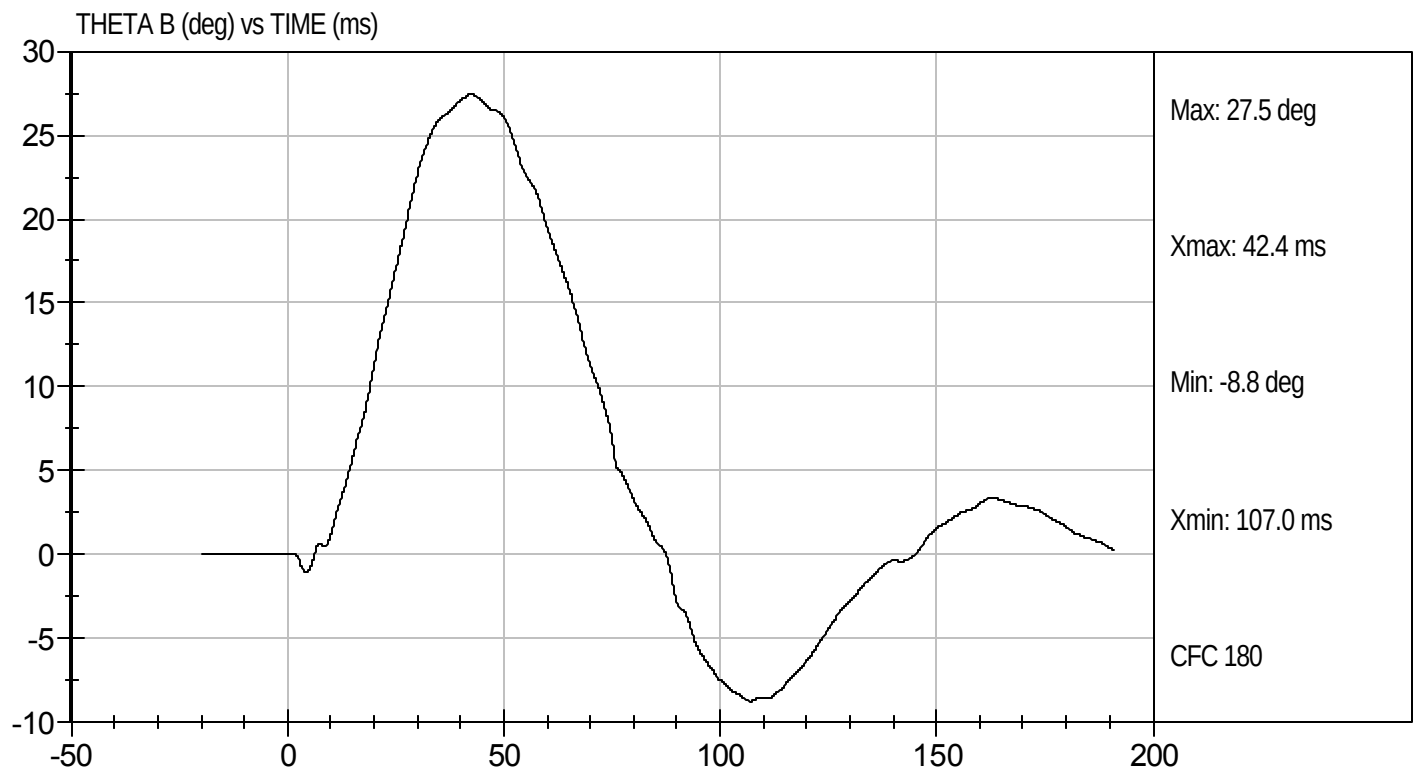
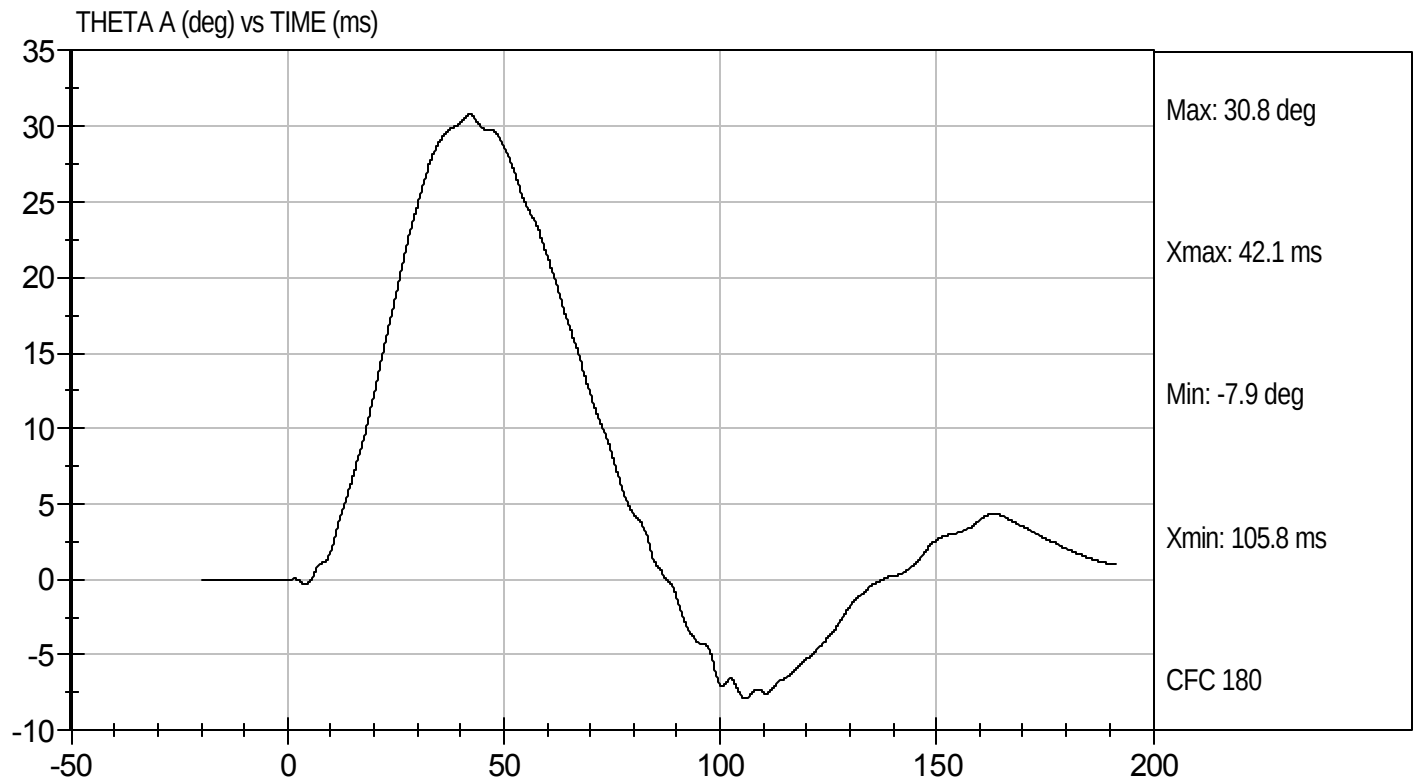
Test Date: 12/17/10
Velocity: 20.08 ft/s, 6.12 m/s





Test Desc: Lumbar Bending
Component ID: D104518

Test Date: 12/17/10
Velocity: 20.08 ft/s, 6.12 m/s



MGA RESEARCH CORPORATION

PELVIS TEST
ES-2re DUMMY

ATD Serial No: 032

Test I.D: D104519

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	17	Pass
Probe Speed	m/s	4.20 to 4.40	4.38	Pass
Maximum Impactor Force	kN	4.70 to 5.40	4.75	Pass
Time of Maximum Impactor Force	ms	11.80 to 16.10	12.60	Pass
Maximum Pubic Force	kN	1.23 to 1.59	1.40	Pass
Time of Maximum Pubic Force	ms	12.20 to 17.00	13.90	Pass
Overall Test Results				Pass


Laboratory Technician

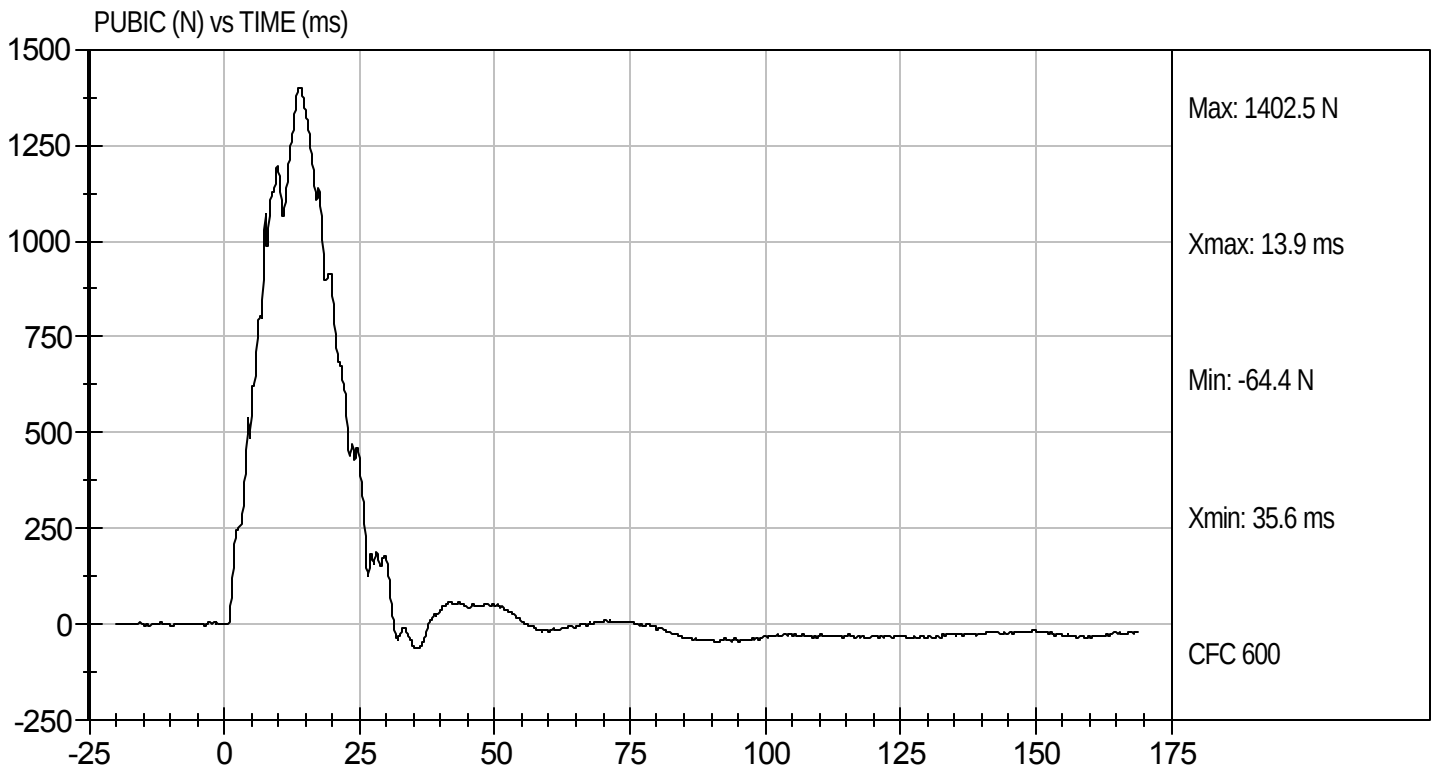
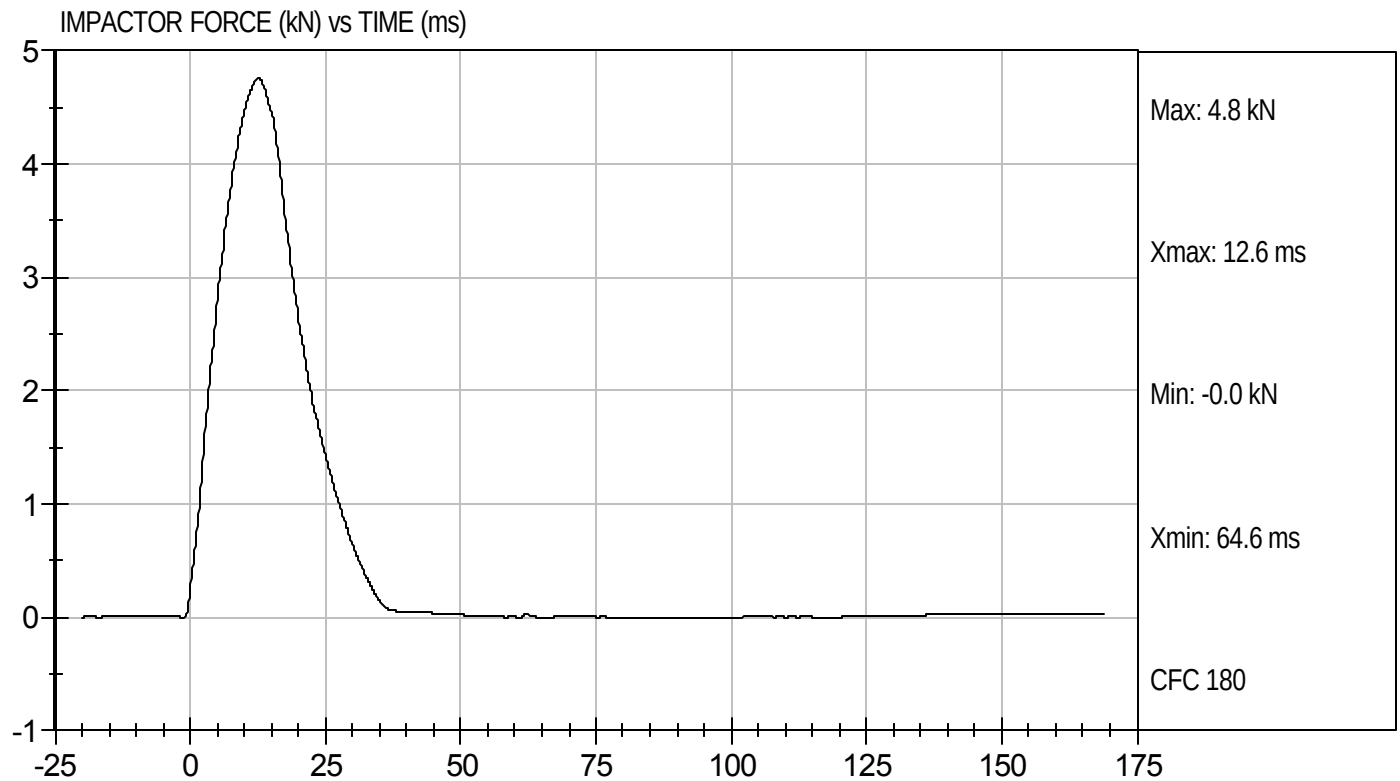
12/20/10
Test Date


Approved By



Test Desc: Pelvis Impact
Component ID: D104519

Test Date: 12/20/10
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: D104510

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.1	Pass
Humidity	%	10 to 70	17	Pass
Probe Speed	m/s	5.40 to 5.60	5.58	Pass
Maximum Impactor Force (after 6 ms)	kN	5.10 to 6.20	5.11	Pass
Upper Rib Displacement	mm	34.0 to 41.0	38.7	Pass
Middle Rib Displacement	mm	37.0 to 45.0	40.5	Pass
Lower Rib Displacement	mm	37.0 to 44.0	39.6	Pass
			Overall Test Results	Pass


Laboratory Technician

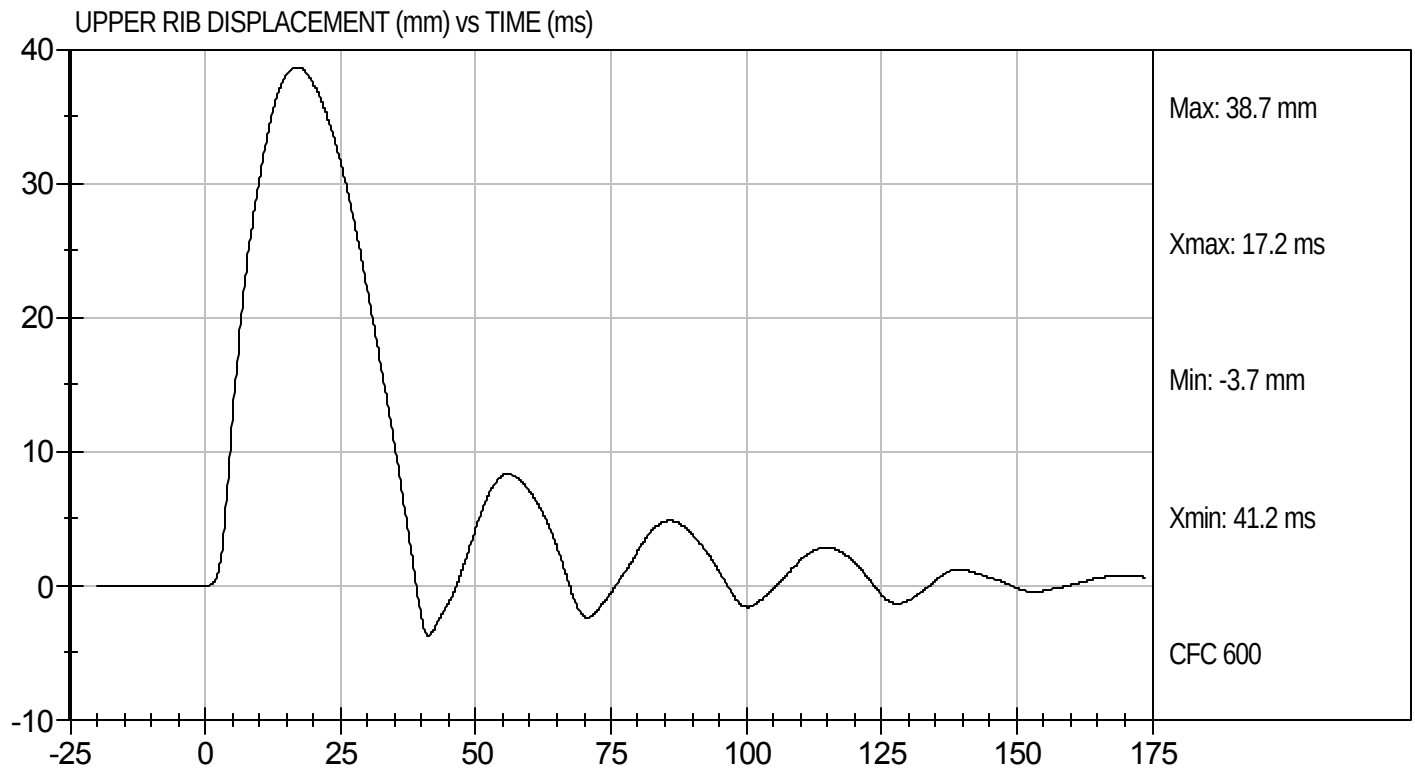
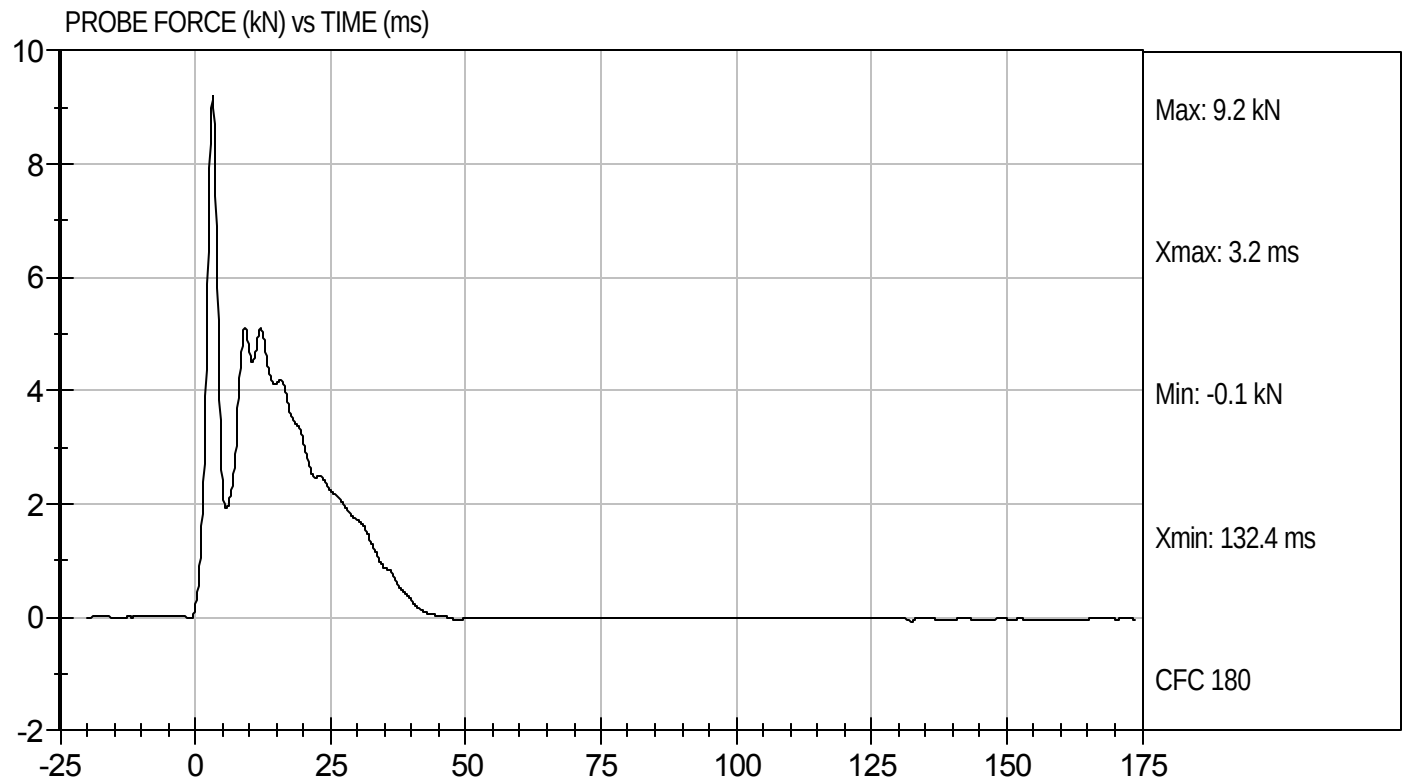
12/20/10
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D104510

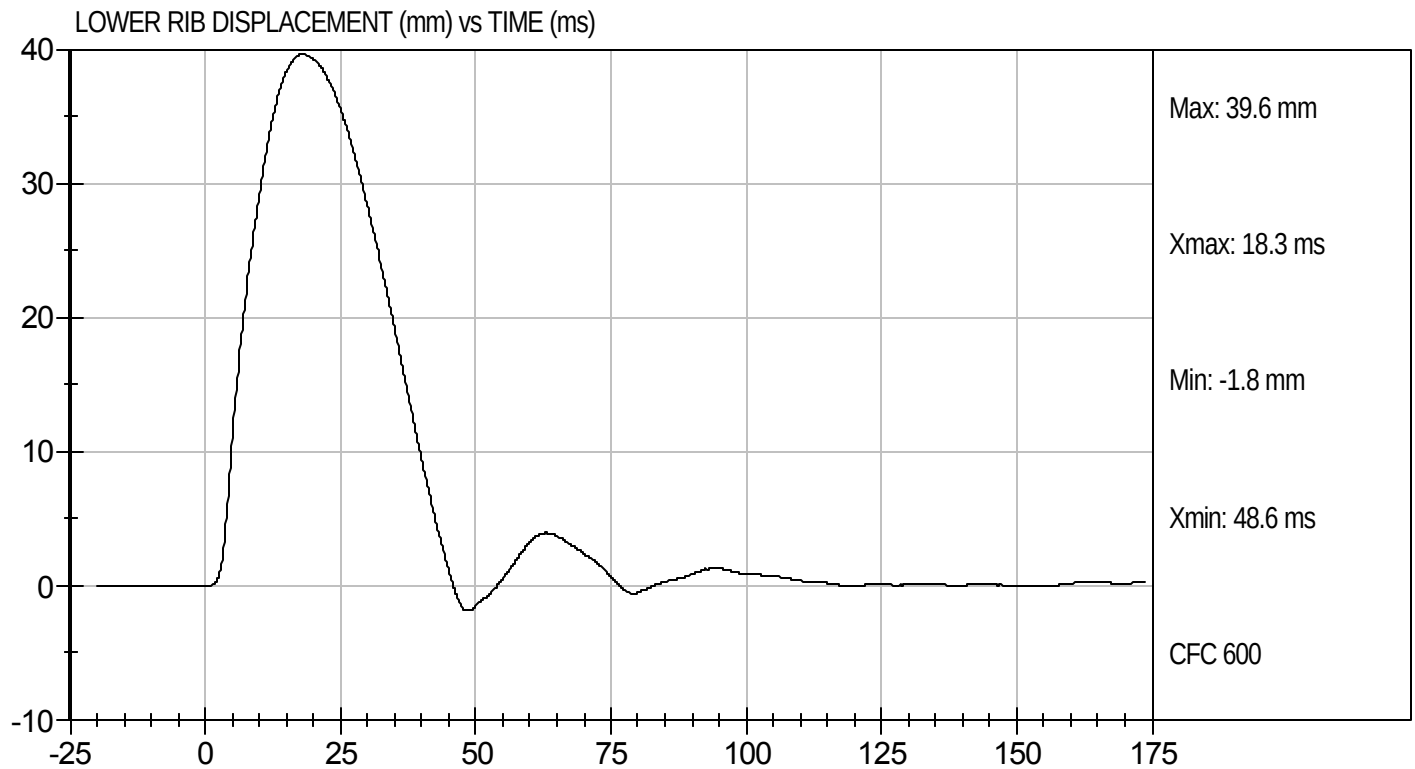
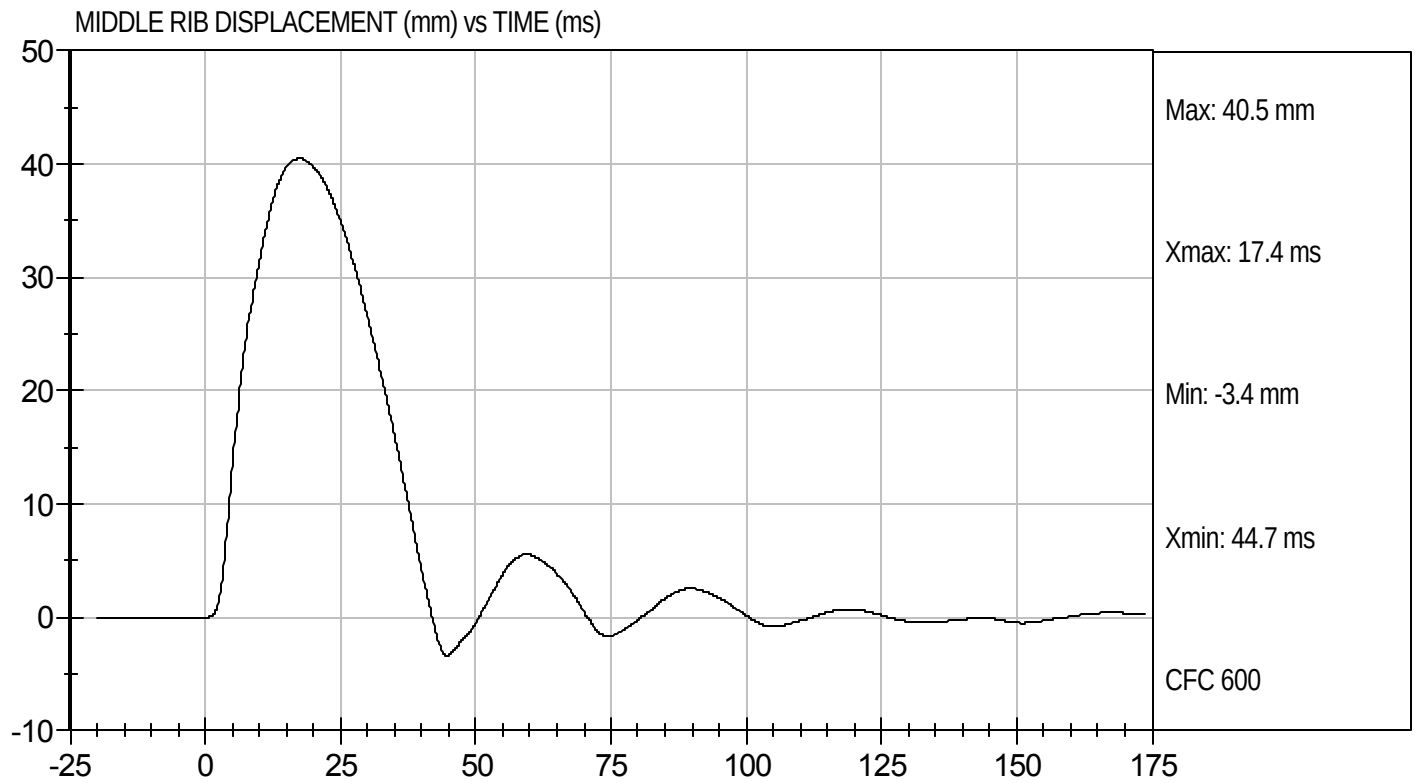
Test Date: 12/20/10
Velocity: 18.32 ft/s, 5.58 m/s





Test Desc: Thorax Impact
Component ID: D104510

Test Date: 12/20/10
Velocity: 18.32 ft/s, 5.58 m/s



MGA RESEARCH CORPORATION

HEAD DROP TEST

ES-2re DUMMY

ATD Serial No: 032

Test ID: D11481

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	12	Pass
Peak Resultant Acceleration	G's	125 to 155	150	Pass
Peak Lateral Acceleration	G's	+/- 15	5.3	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 15% of peak	Yes	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

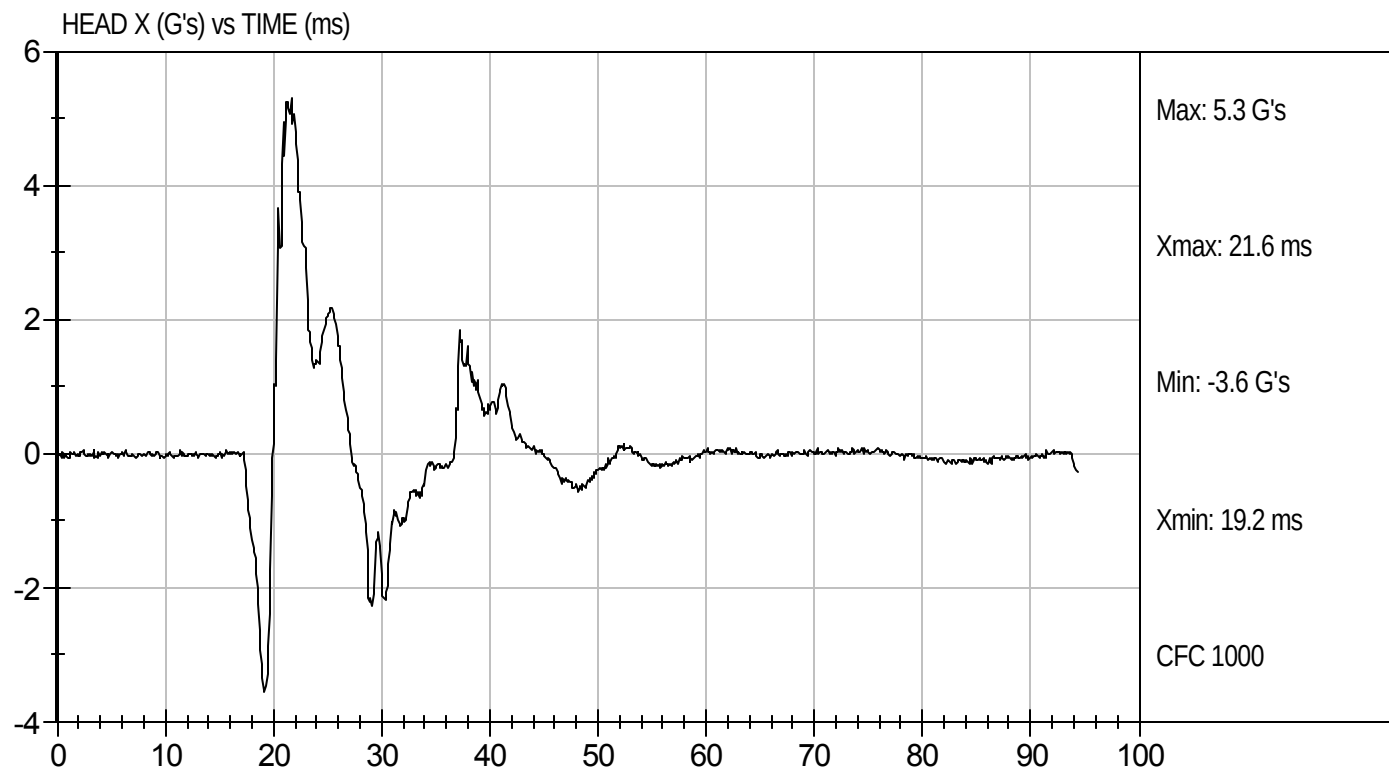
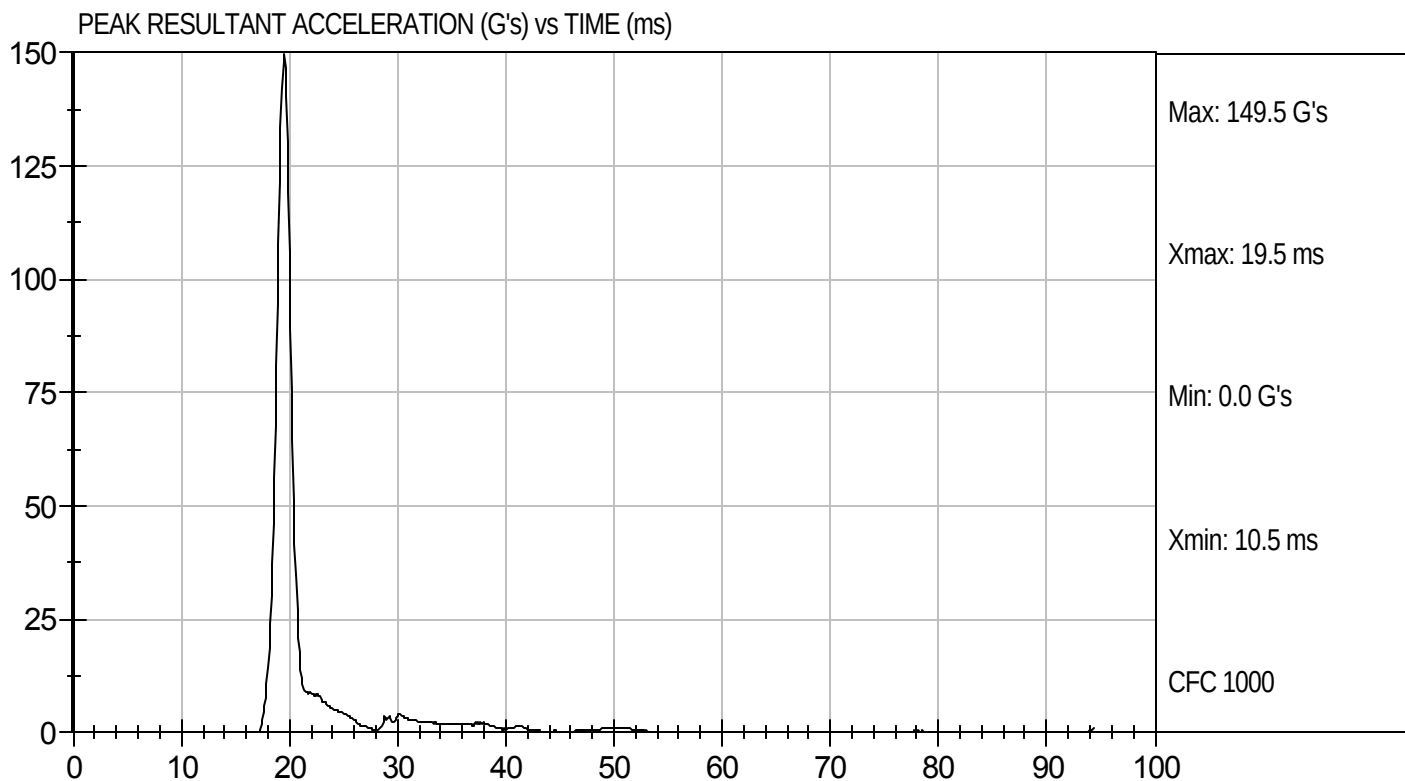
2/11/11
Test Date

David Winkelbauer
Approved By



Test Desc: Head Drop
Component ID: D11481

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

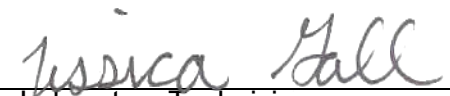


MGA RESEARCH CORPORATION
NECK PENDULUM TEST
ES-2re DUMMY

ATD Serial No: 032

Test I.D: D11482

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	18.0 to 22.0	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	16	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	-3.33	Pass
Maximum Flexion Angle		deg	49.0 to 59.0	51.5	Pass
Time of Maximum Flexion Angle		ms	54.0 to 66.0	57.9	Pass
Head Rotation Decay Time to 0 degree		ms	53.0 to 88.0	60.6	Pass
Overall Test Results					Pass


 Laboratory Technician

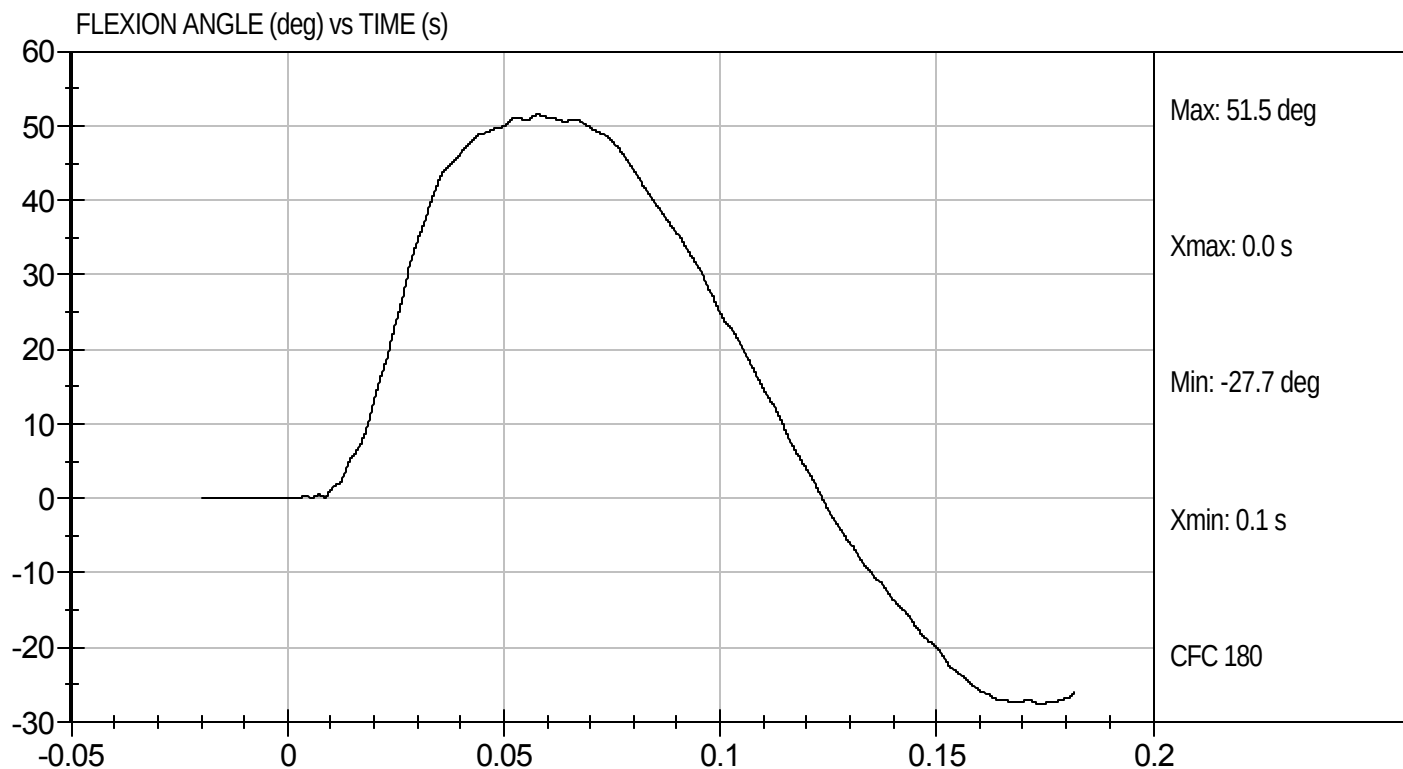
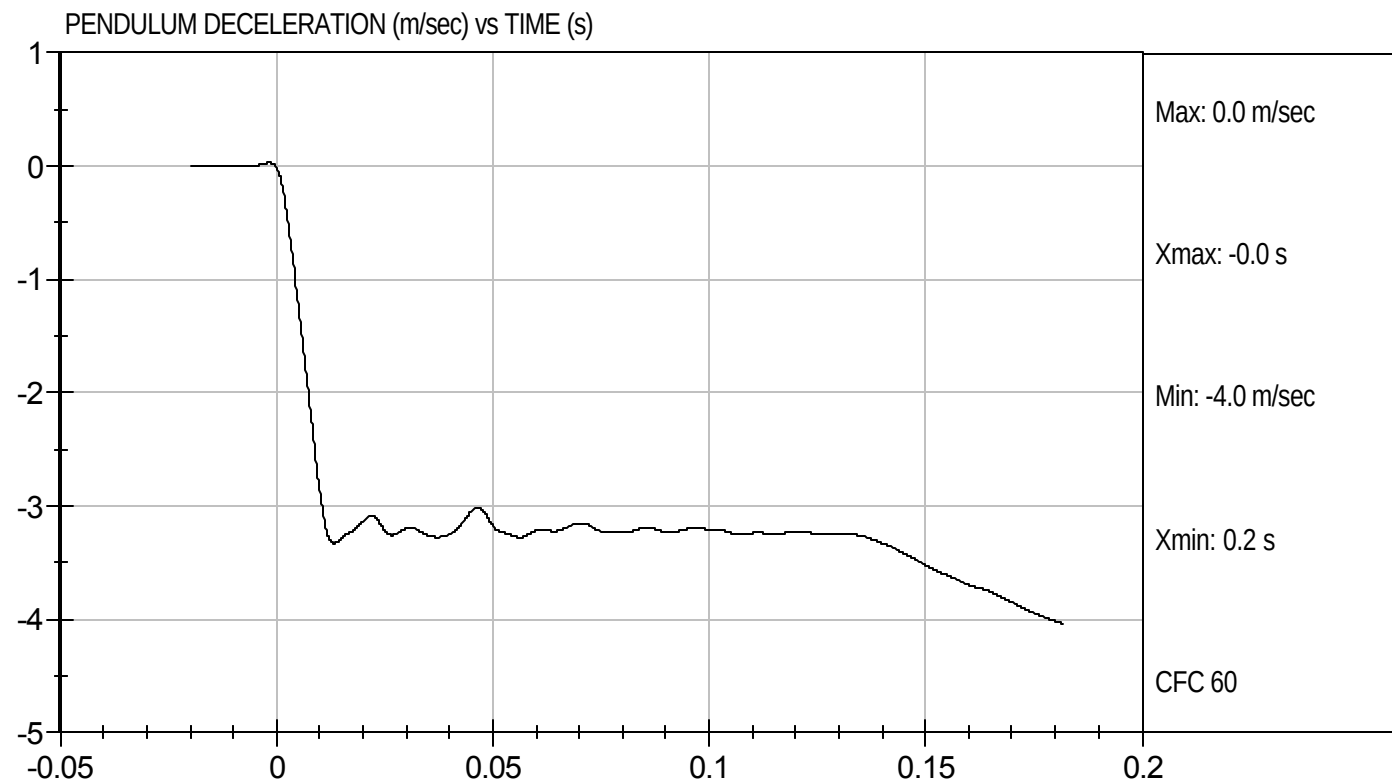
2/10/11
 Test Date


 Approved By



Test Desc: Neck Bending
Component ID: D11482

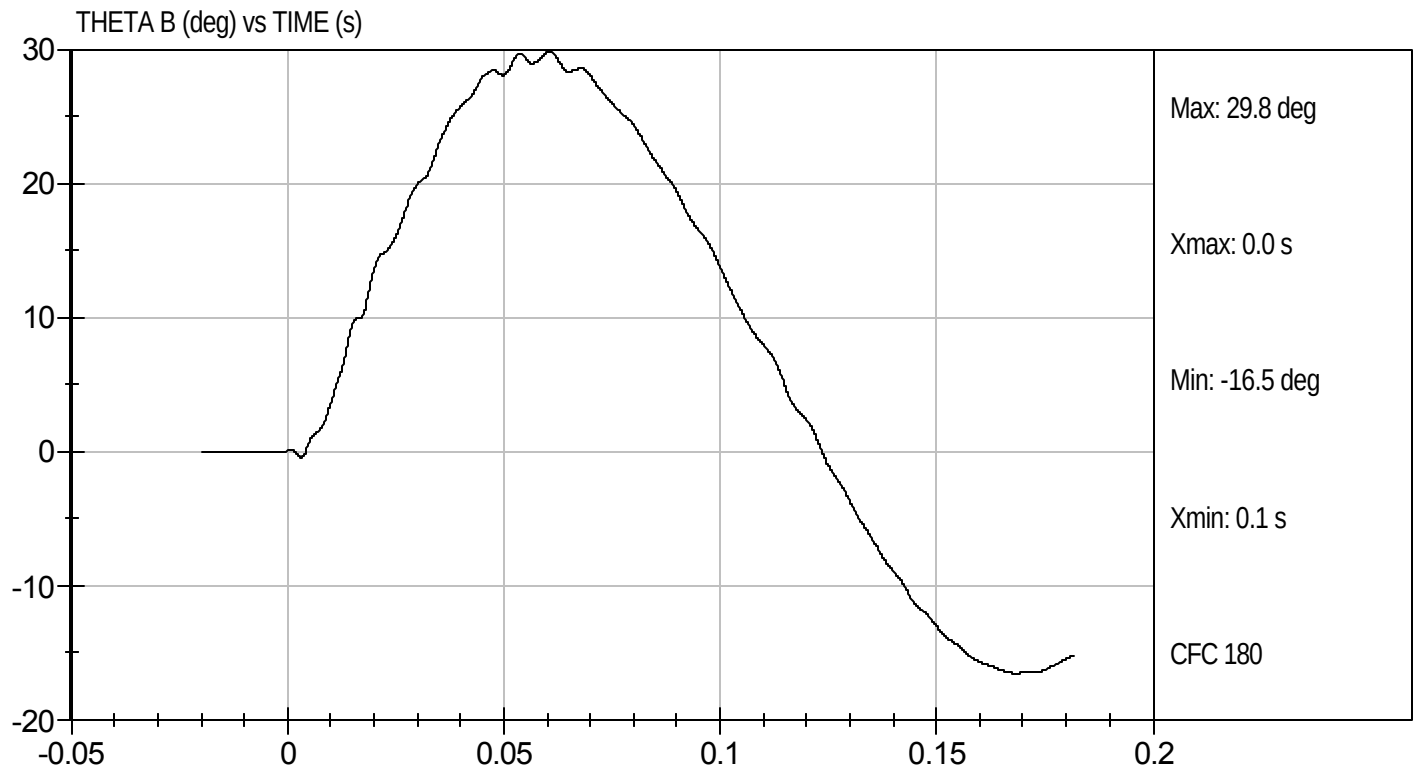
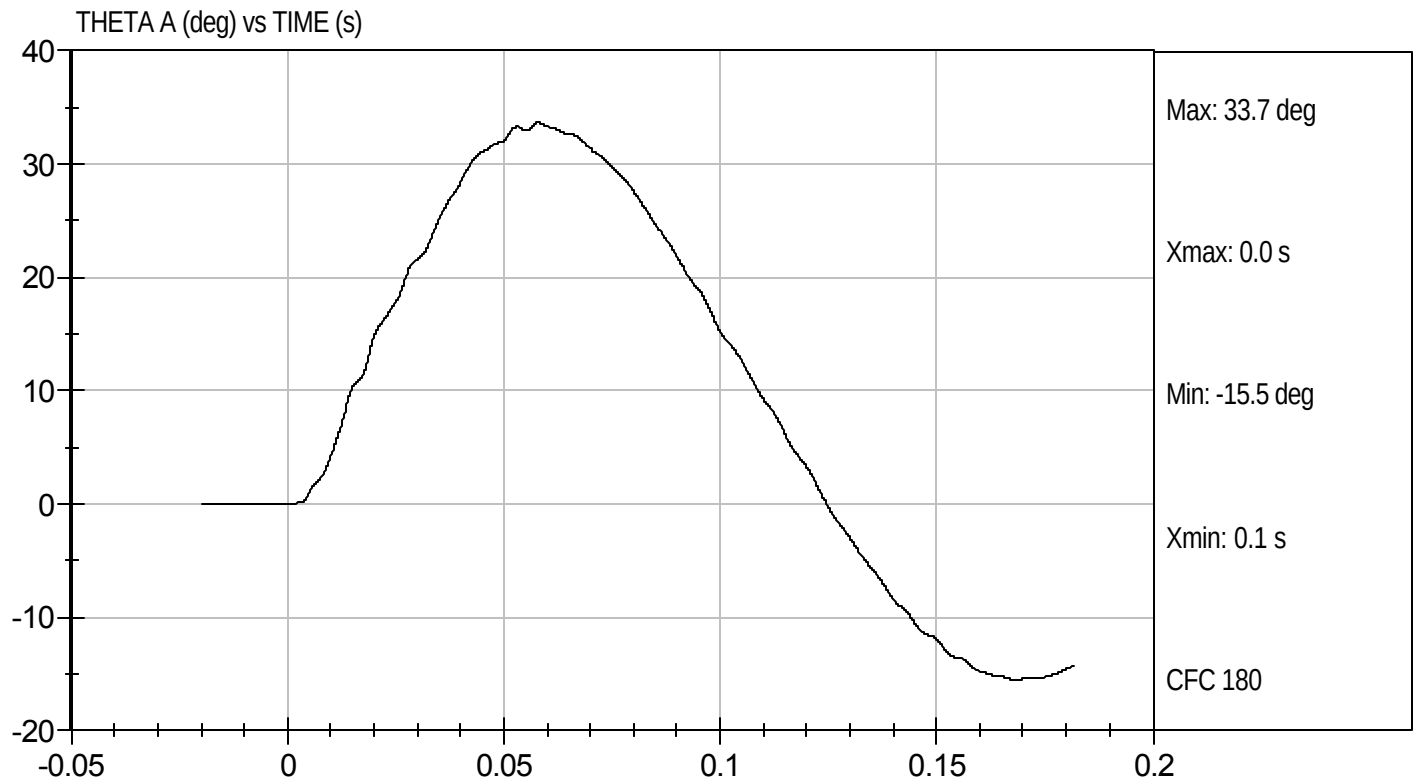
Test Date: 2/10/11
Velocity: 11.11 ft/s, 3.39 m/s





Test Desc: Neck Bending
Component ID: D11482

Test Date: 2/10/11
Velocity: 11.11 ft/s, 3.39 m/s



MGA RESEARCH CORPORATION
SHOULDER IMPACT TEST
ES-2re DUMMY

ATD Serial No: 032

Test I.D: D11483

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	12	Pass
Pendulum Speed	m/s	4.2 to 4.4	4.3	Pass
Peak Shoulder Acceleration	G's	7.5 to 10.5	10.0	Pass
Time of Peak Shoulder Acceleration	ms	NA	13.0	Pass
Overall Test Results			Pass	


Laboratory Technician

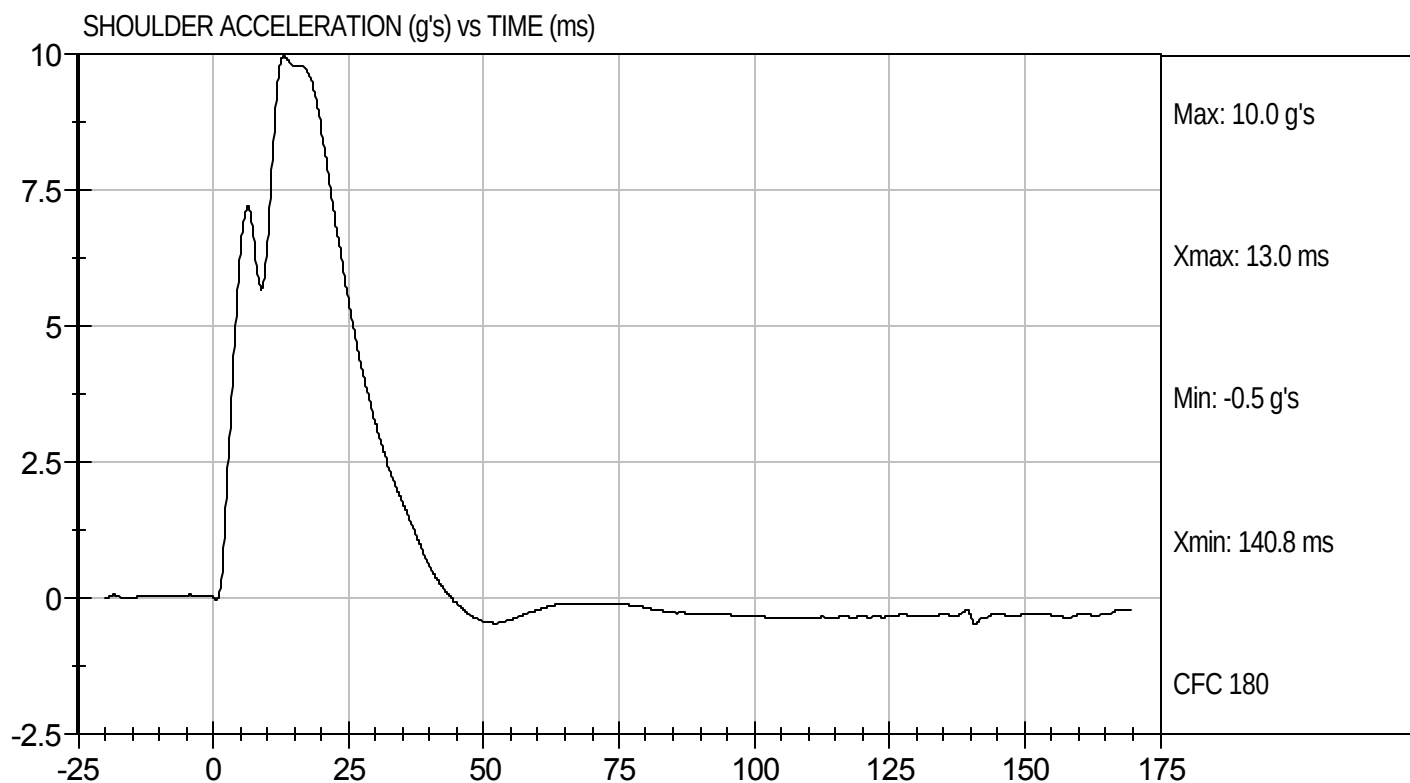
2/10/11
Test Date


Approved By



Test Desc: Shoulder Impact
Component ID: D11483

Test Date: 2/10/11
Velocity: 14.12 ft/s, 4.3 m/s



MGA RESEARCH CORPORATION

UPPER RIB TEST

ES-2re DUMMY

ATD Serial No: 032

Test I.D: D11484

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	15	Pass
Displacement at 3 m/s	mm	36.0 to 40.0	38.4	Pass
Displacement at 4 m/s	mm	46.0 to 51.0	48.2	Pass
			Overall Test Results	Pass


Laboratory Technician

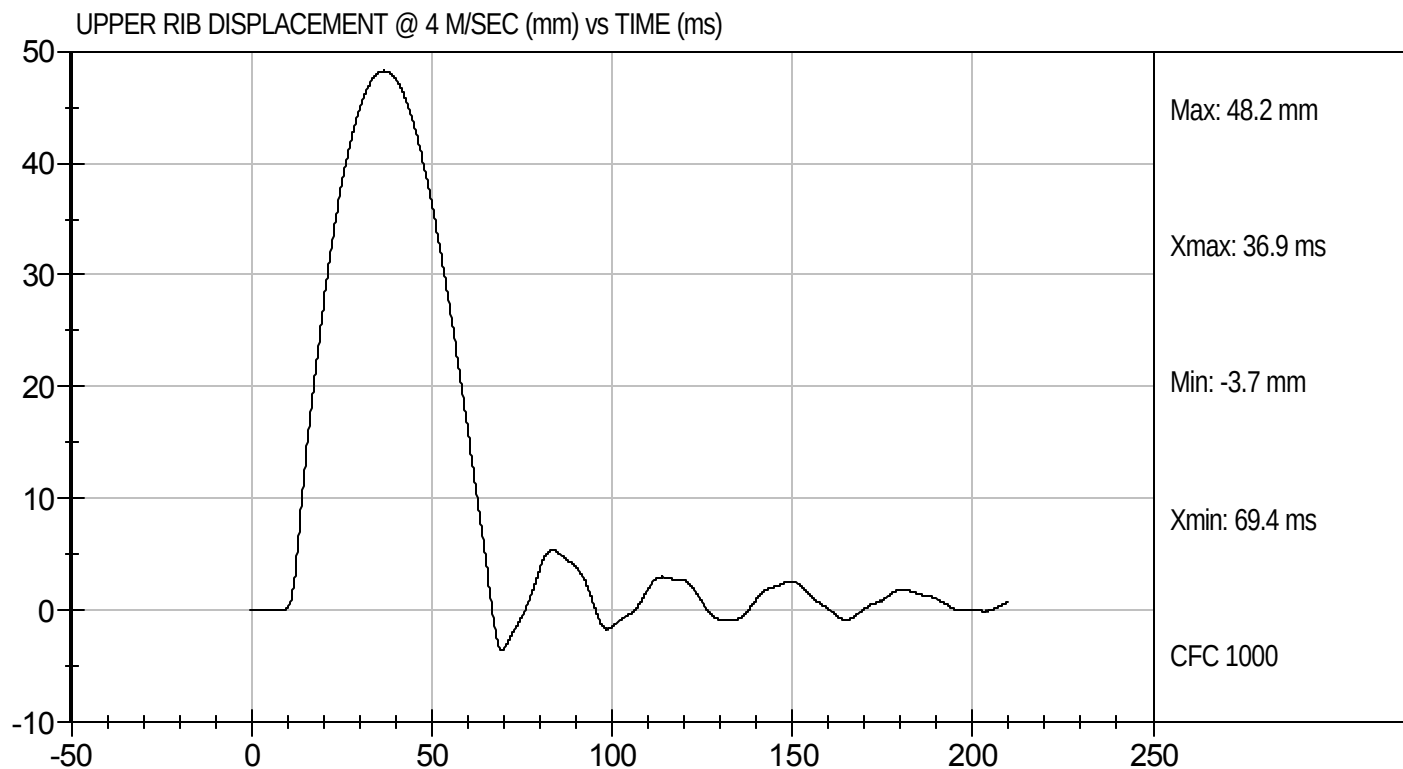
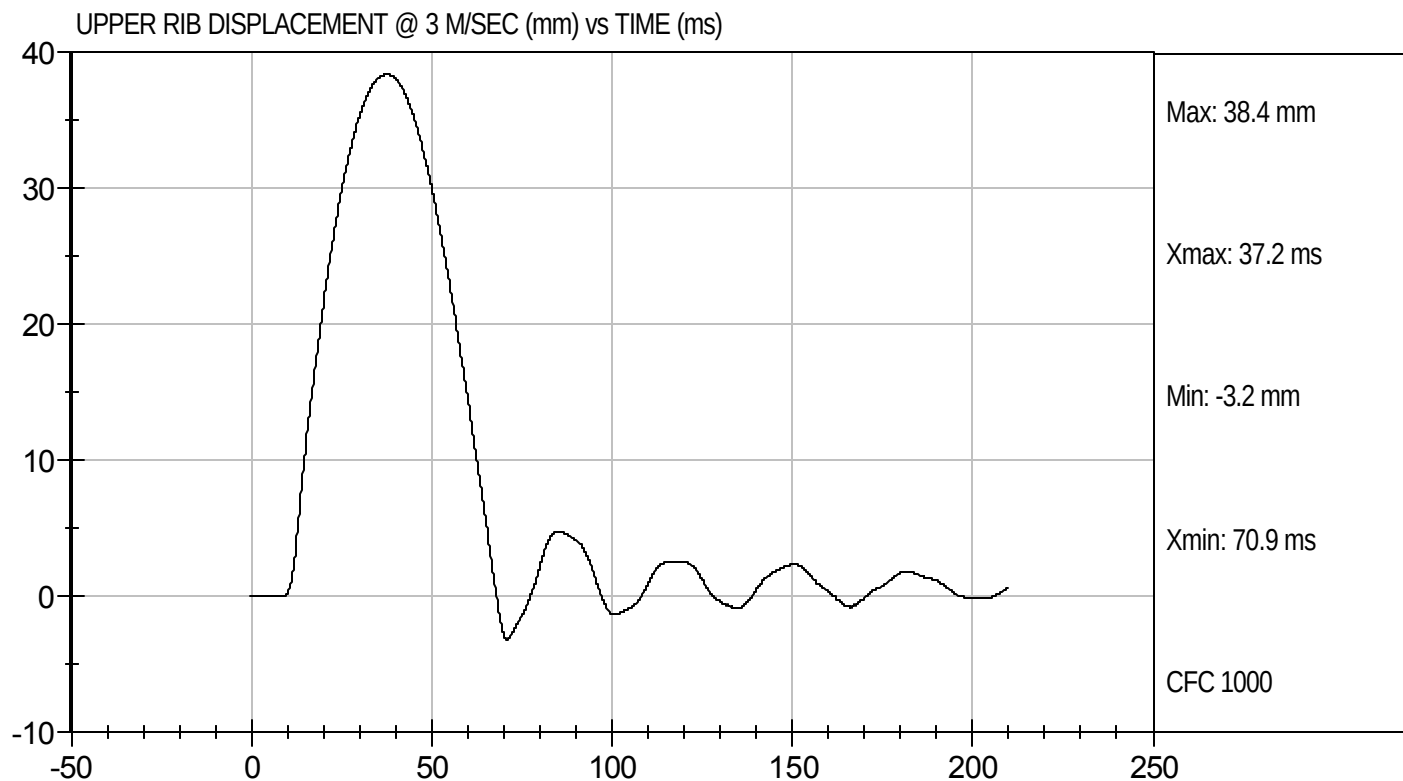
2/10/11
Test Date


Approved By



Test Desc: Rib Impact - Upper
Component ID: D11484

Test Date: 2/10/11



MGA RESEARCH CORPORATION

MID RIB TEST
ES-2re DUMMY

ATD Serial No: 032

Test I.D: D11485

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	15	Pass
Displacement at 3 m/s	mm	36.0 to 40.0	38.0	Pass
Displacement at 4 m/s	mm	46.0 to 51.0	48.1	Pass
			Overall Test Results	Pass


Laboratory Technician

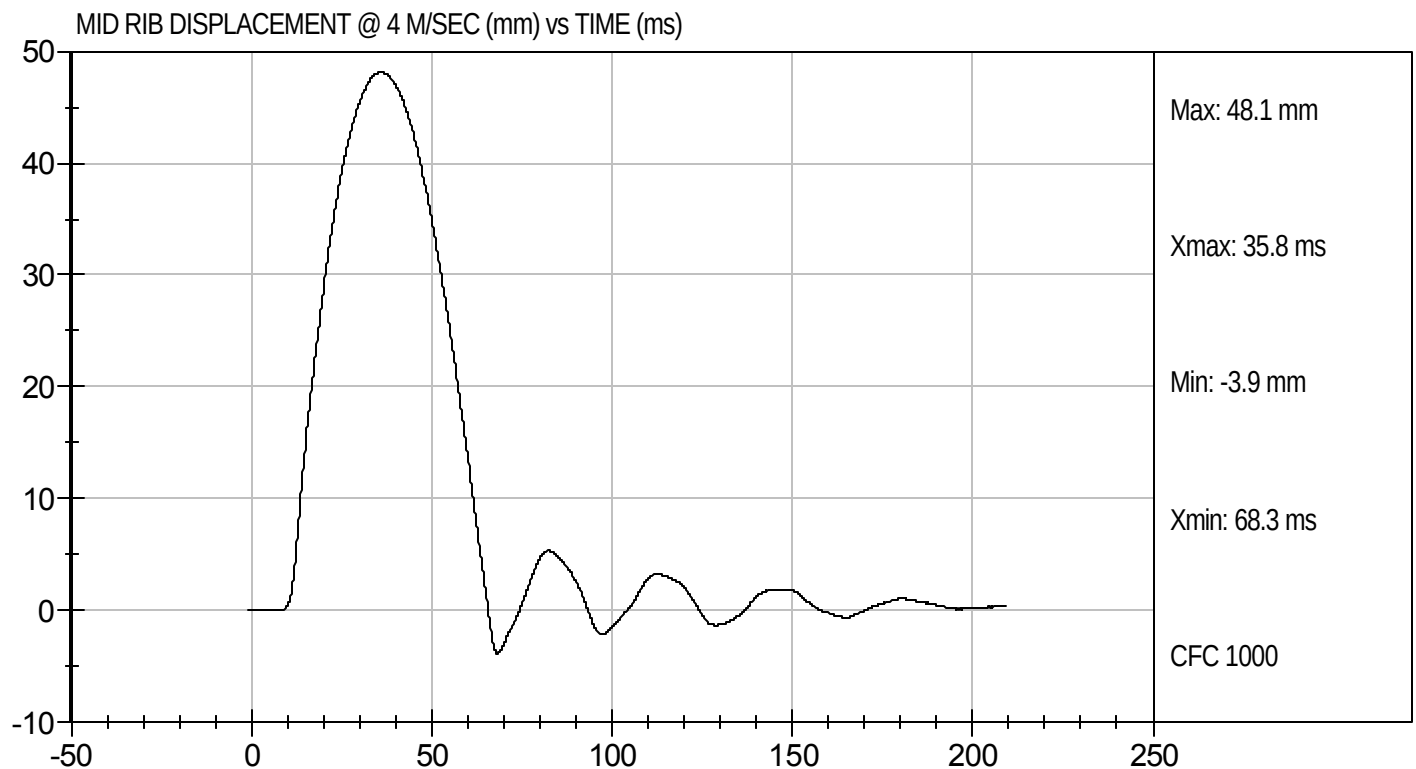
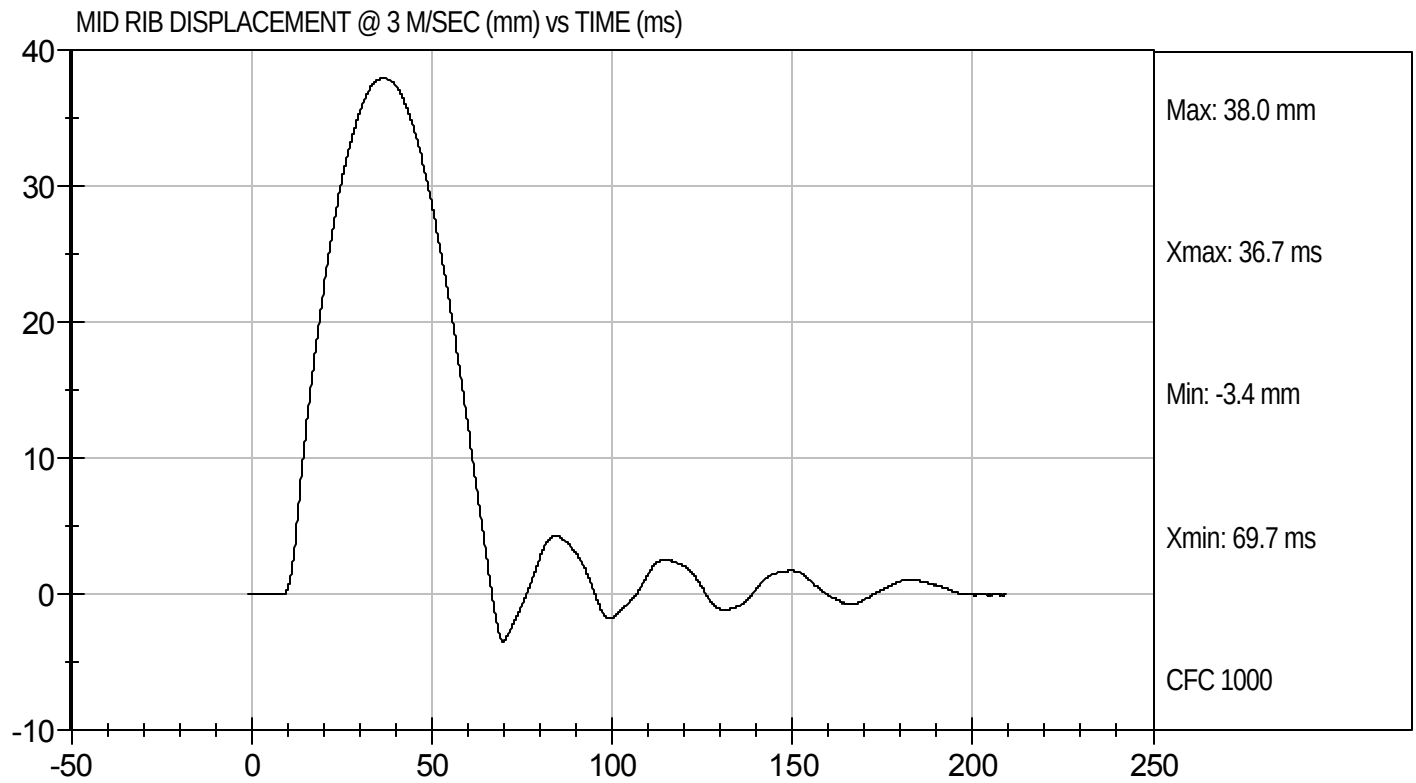
2/10/11
Test Date


Approved By



Test Desc: Rib Impact - Mid
Component ID: D11485

Test Date: 2/10/11



MGA RESEARCH CORPORATION

LOWER RIB TEST

ES-2re DUMMY

ATD Serial No: 032

Test I.D: D11486

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	15	Pass
Displacement at 3 m/s	mm	36.0 to 40.0	38.2	Pass
Displacement at 4 m/s	mm	46.0 to 51.0	48.2	Pass
			Overall Test Results	Pass

Jessica Gall
Laboratory Technician

2/10/11
Test Date

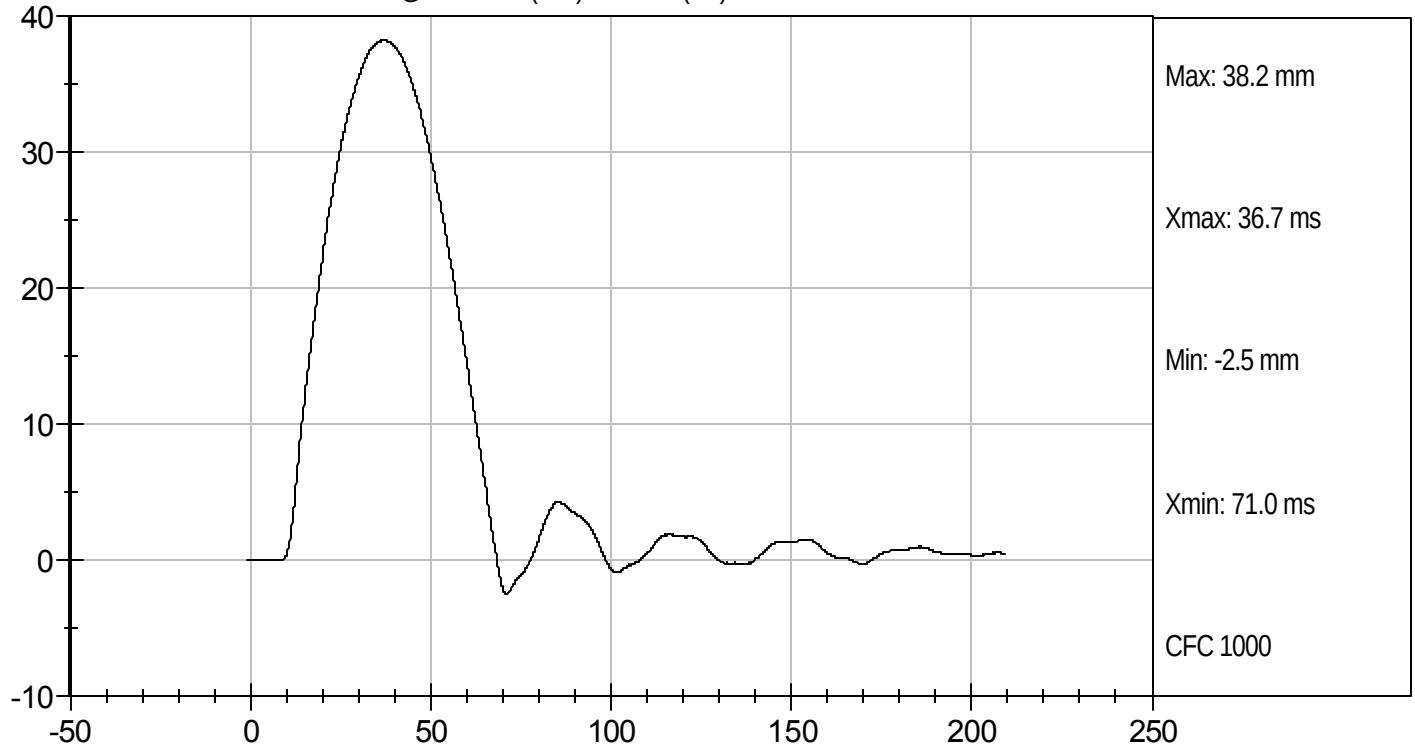
David Winkelbauer
Approved By



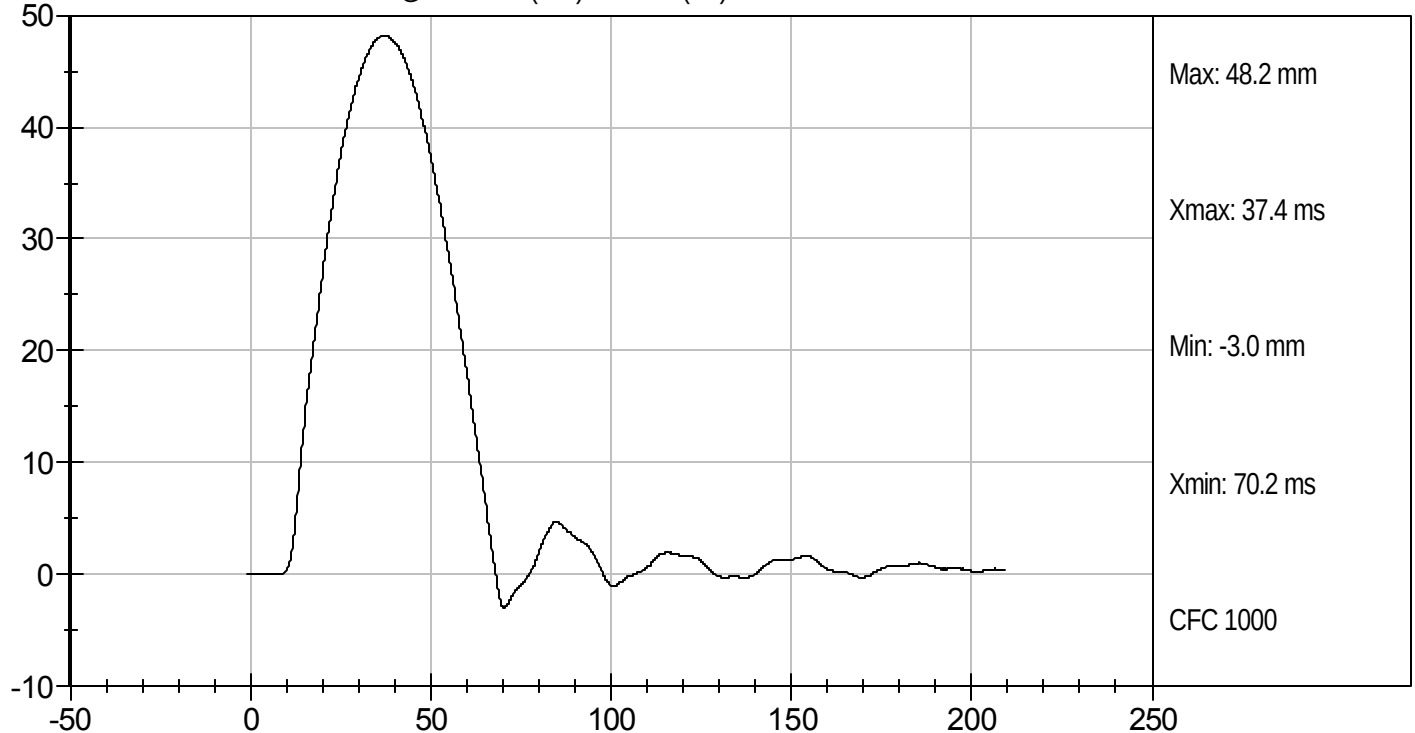
Test Desc: Rib Impact - Lower
Component ID: D11486

Test Date: 2/10/11

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



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



MGA RESEARCH CORPORATION

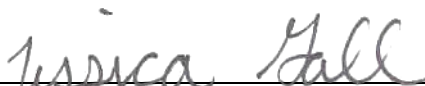
ABDOMEN TEST

ES-2re DUMMY

ATD Serial No: 032

Test I.D: D11487

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	12	Pass
Probe Speed	m/s	3.90 to 4.10	4.10	Pass
Maximum Impact Force	kN	4.00 to 4.80	4.47	Pass
Time of Maximum Impact Force	ms	10.60 to 13.00	10.60	Pass
Maximum Total Abdomen Force	kN	2.20 to 2.70	2.51	Pass
Time of Maximum Abdomen Force	ms	10.00 to 12.30	10.80	Pass
Overall Test Results				Pass


Laboratory Technician

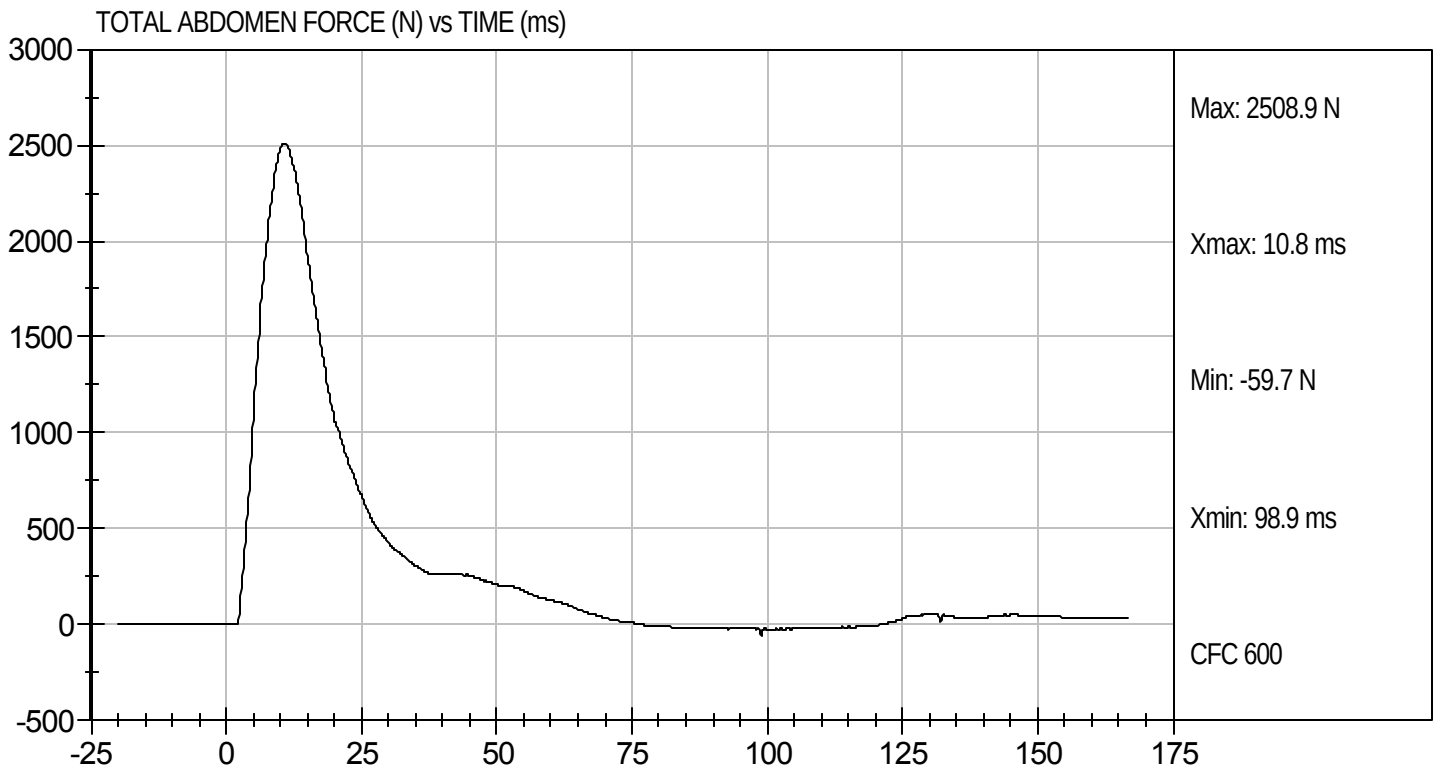
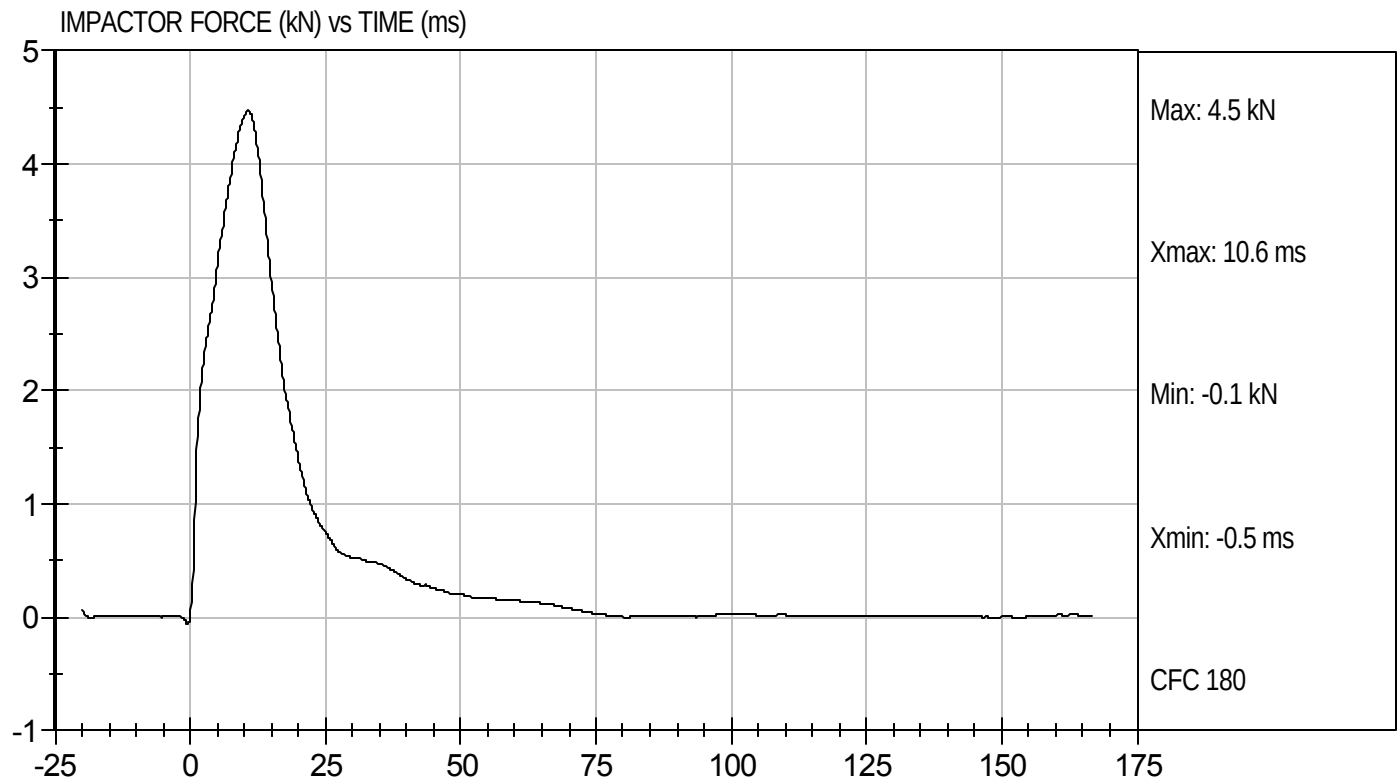
2/10/11
Test Date


Approved By



Test Desc: Abdomen Impact
Component ID: D11487

Test Date: 2/10/11
Velocity: 13.44 ft/s, 4.1 m/s

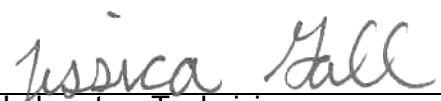


MGA RESEARCH CORPORATION
LUMBAR SPINE TEST
ES-2re DUMMY

ATD Serial No: 032

Test I.D: D11488

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	11	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	-6.03	Pass
	30 ms	m/s	>= -6.5	-5.99	Pass
Maximum Flexion Angle		deg	45.0 to 55.0	47.7	Pass
Time of Maximum Flexion Angle		ms	39.0 to 53.0	45.2	Pass
Headform Rotation Decay to Initial Position		ms	37 to 57	41	Pass
Overall Results					Pass


 Laboratory Technician

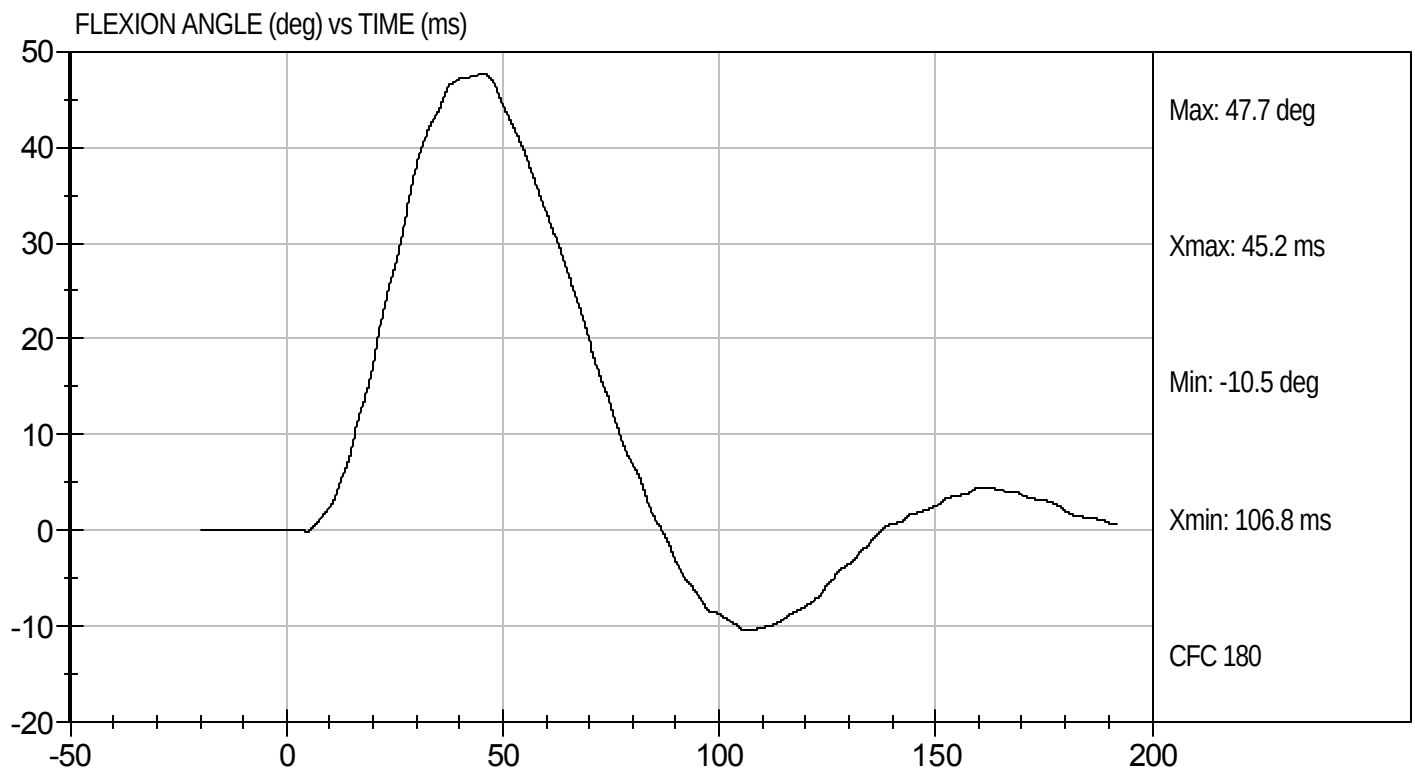
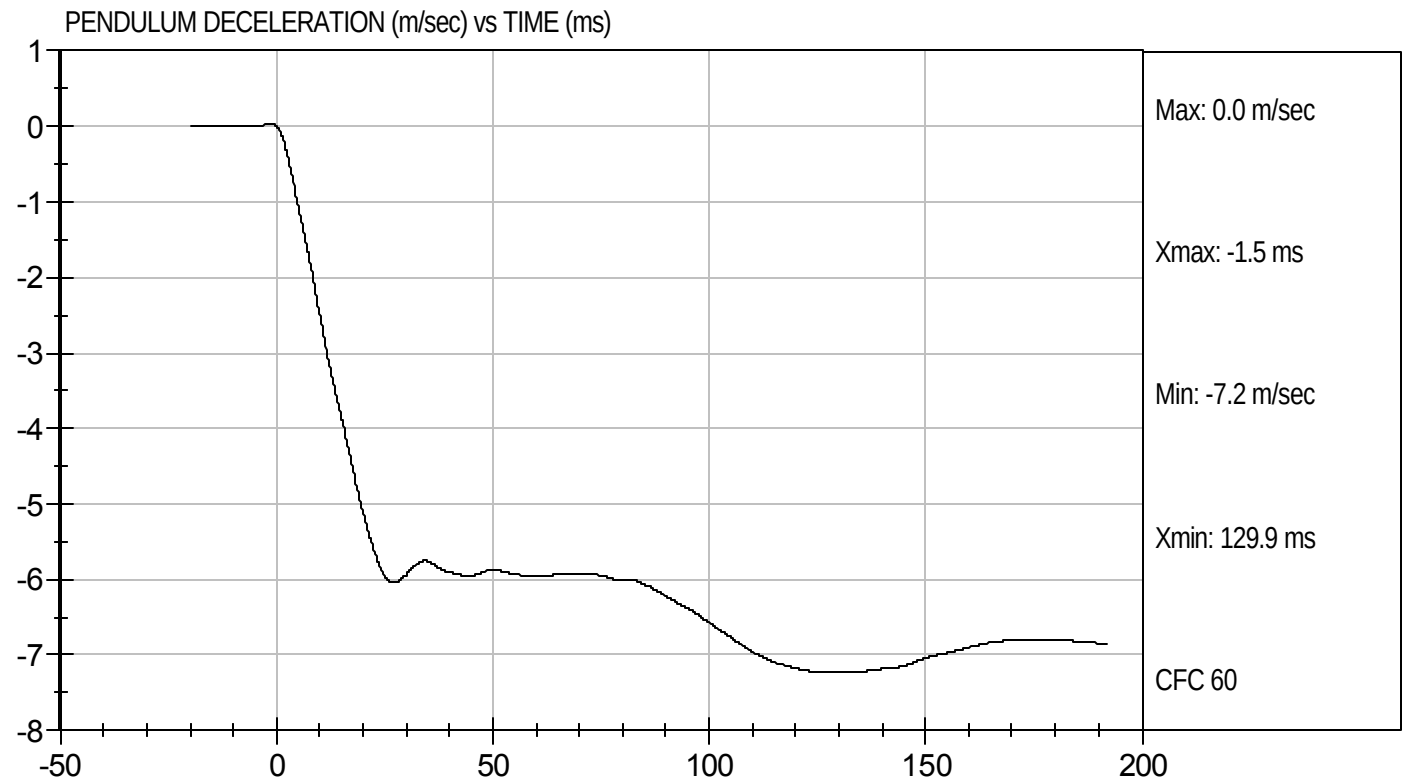
2/10/11
 Test Date


 Approved By



Test Desc: Lumbar Bending
Component ID: D11488

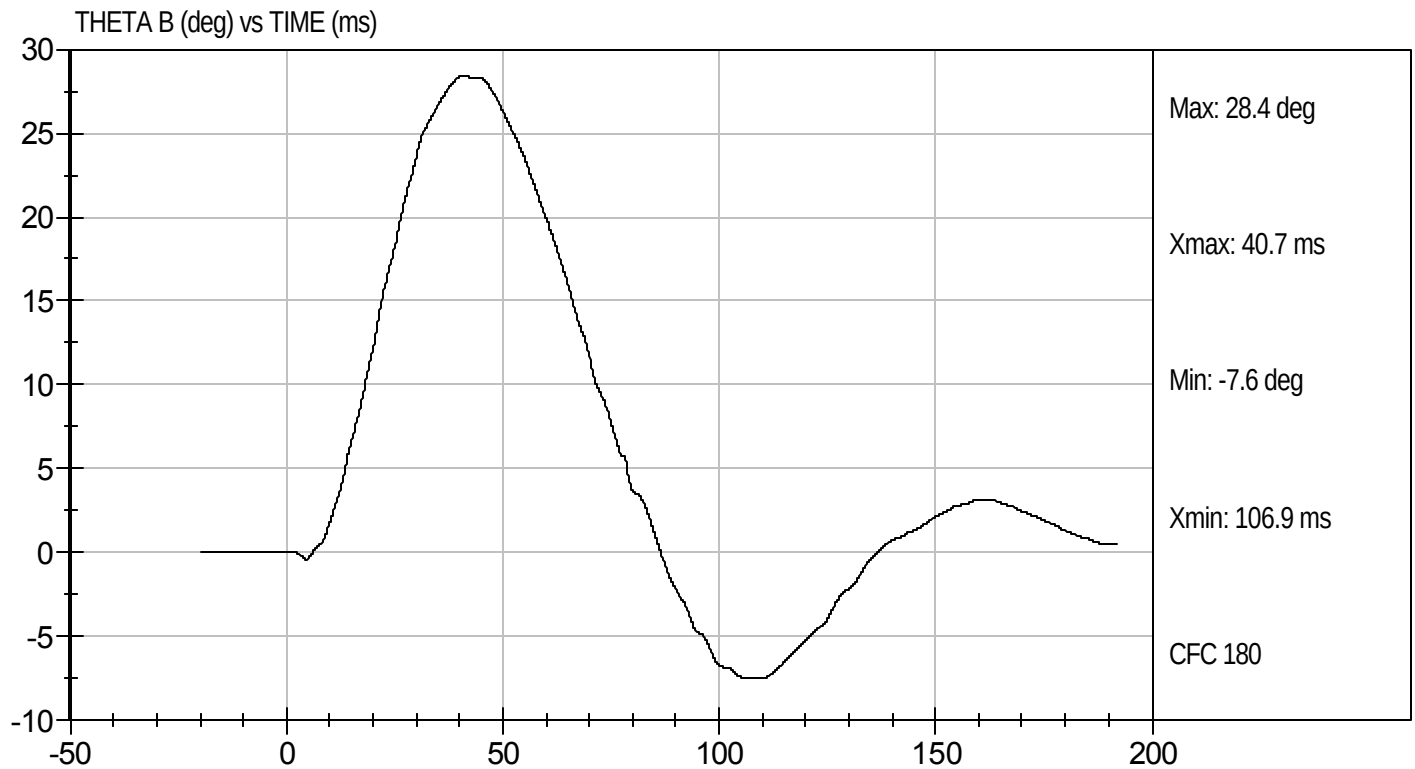
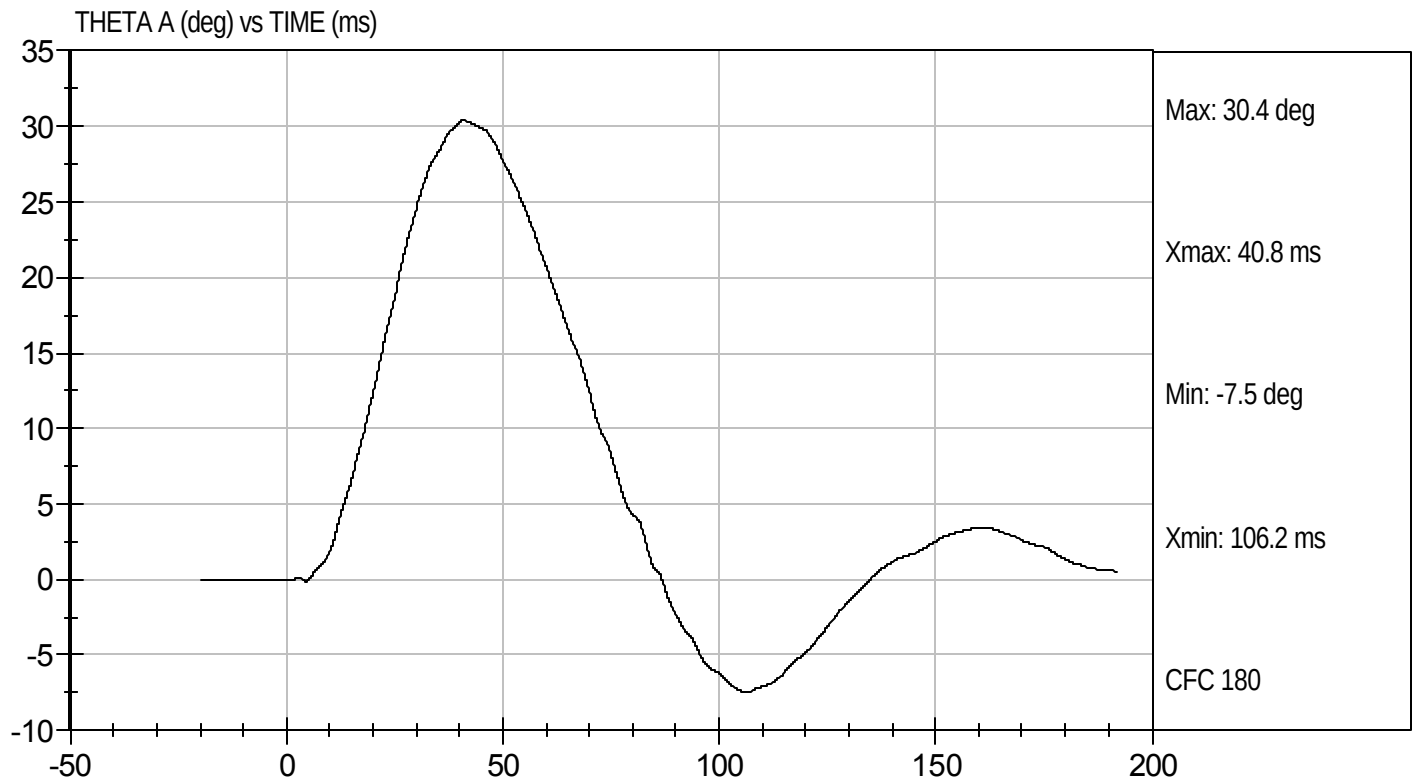
Test Date: 2/10/11
Velocity: 20.08 ft/s, 6.12 m/s





Test Desc: Lumbar Bending
Component ID: D11488

Test Date: 2/10/11
Velocity: 20.08 ft/s, 6.12 m/s



MGA RESEARCH CORPORATION

**PELVIS TEST
ES-2re DUMMY**

ATD Serial No: 032

Test I.D: D11489

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	20.9	Pass
Laboratory Relative Humidity	%	10 to 70	13	Pass
Probe Speed	m/s	4.20 to 4.40	4.27	Pass
Maximum Impactor Force	kN	4.70 to 5.40	4.85	Pass
Time of Maximum Impactor Force	ms	11.80 to 16.10	12.40	Pass
Maximum Pubic Force	kN	1.23 to 1.59	1.45	Pass
Time of Maximum Pubic Force	ms	12.20 to 17.00	14.80	Pass
Overall Test Results				Pass


Laboratory Technician

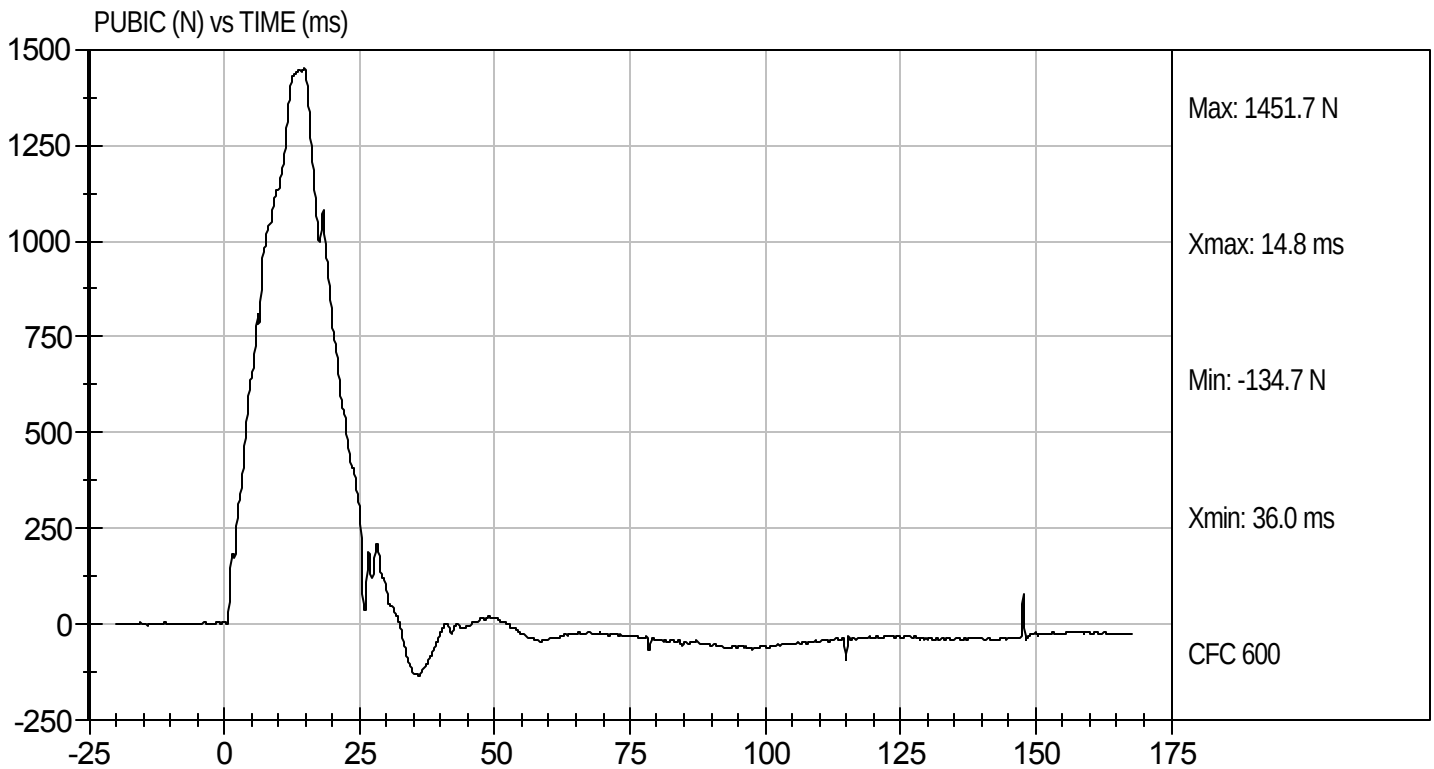
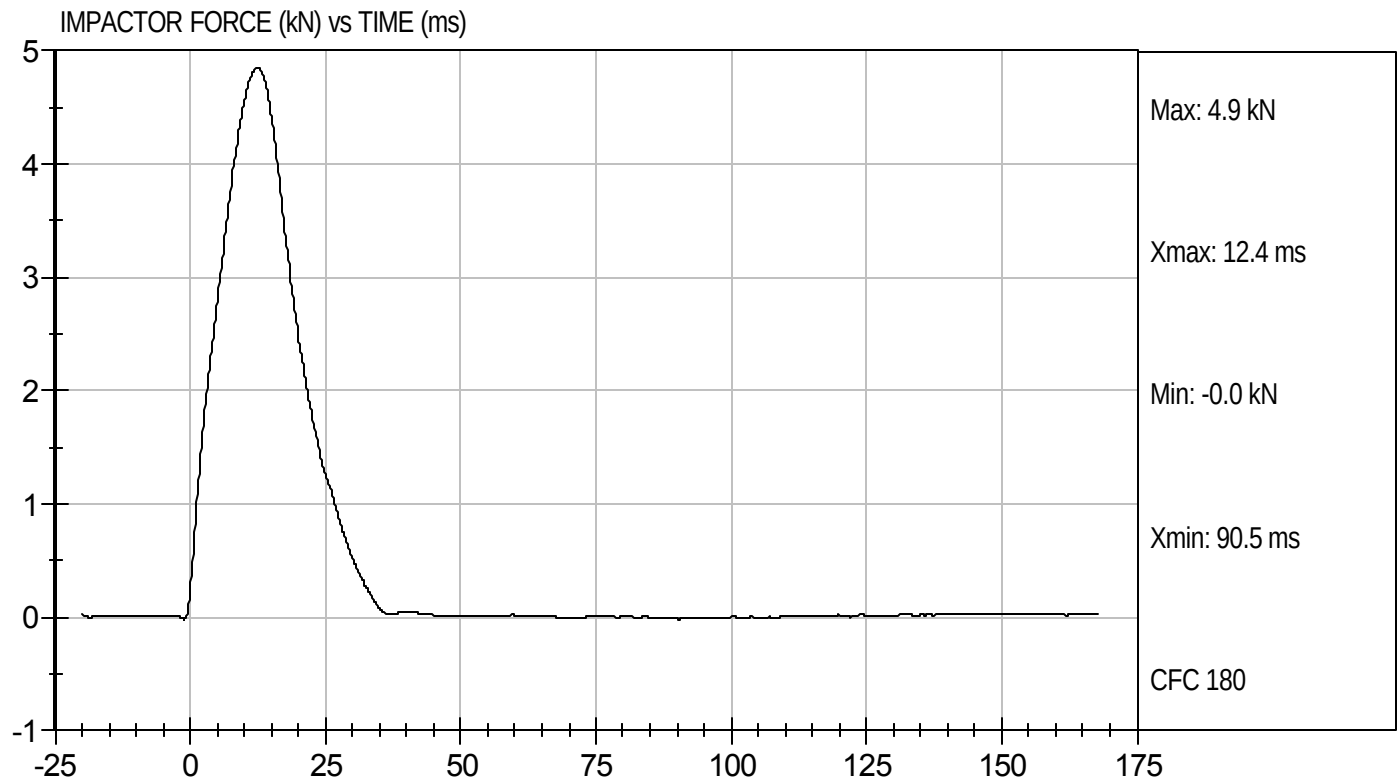
2/10/11
Test Date


Approved By



Test Desc: Pelvis Impact
Component ID: D11489

Test Date: 2/10/11
Velocity: 14.01 ft/s, 4.27 m/s



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

ATD Serial No: 032

Test I.D: D11480

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.2	Pass
Humidity	%	10 to 70	12	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	5.26	Pass
Upper Rib Displacement	mm	34.0 to 41.0	38.9	Pass
Middle Rib Displacement	mm	37.0 to 45.0	41.0	Pass
Lower Rib Displacement	mm	37.0 to 44.0	39.2	Pass
Overall Test Results			Pass	


Laboratory Technician

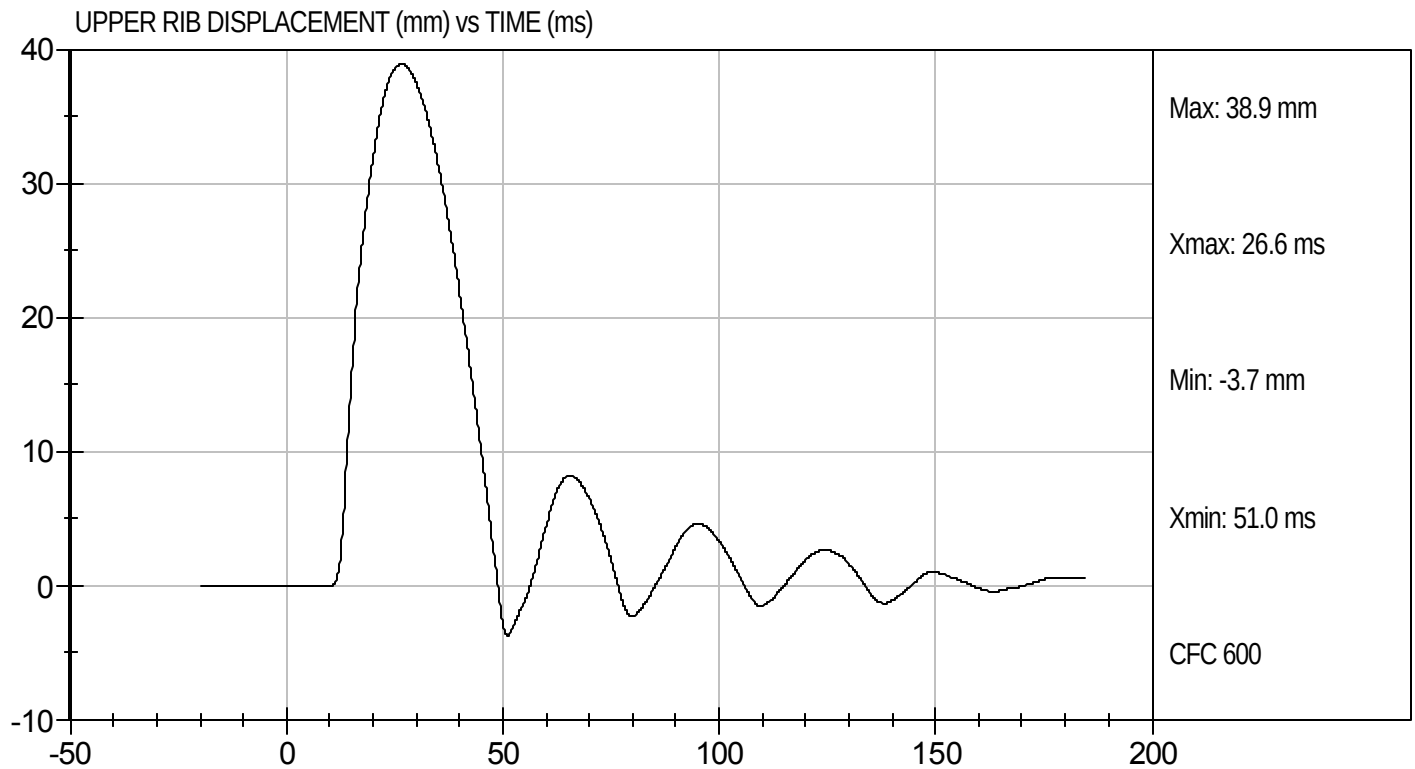
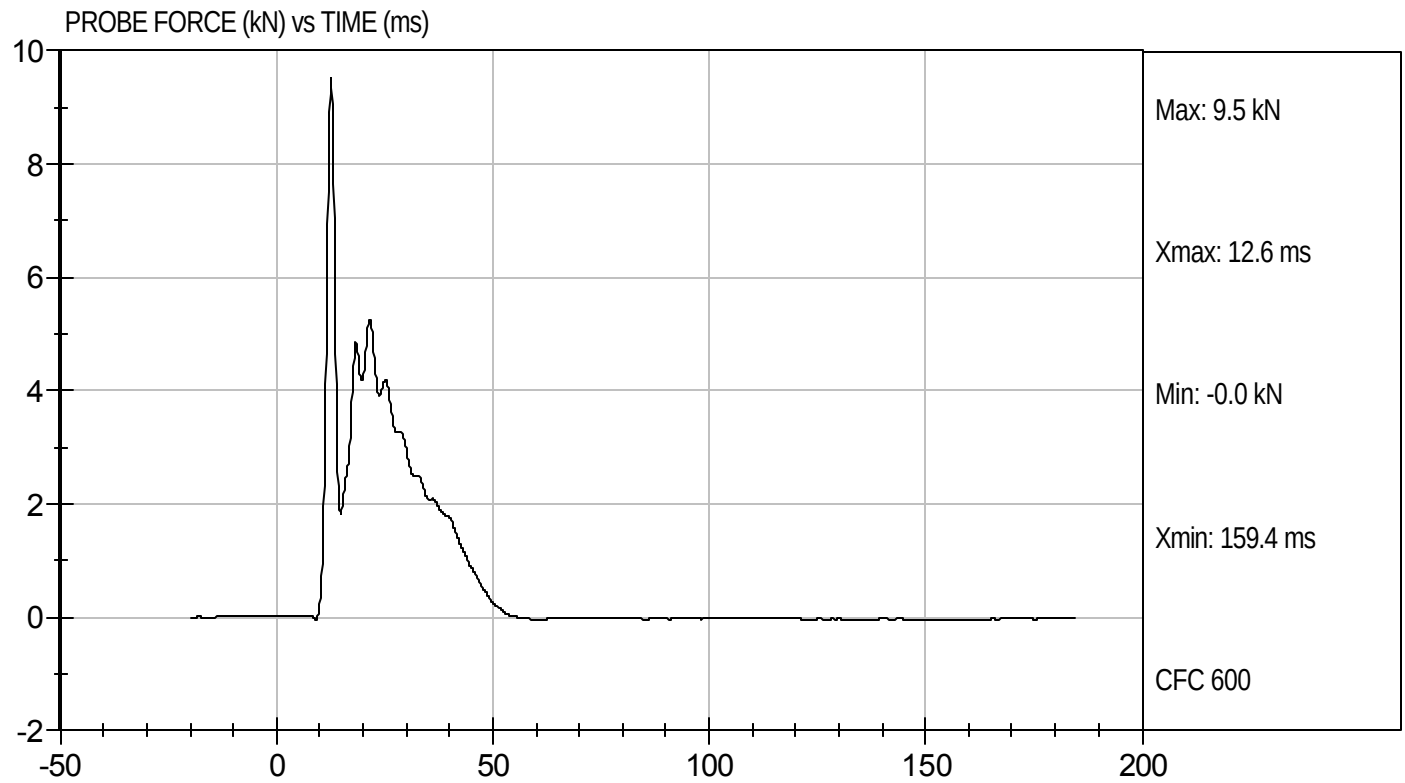
2/10/11
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D11480

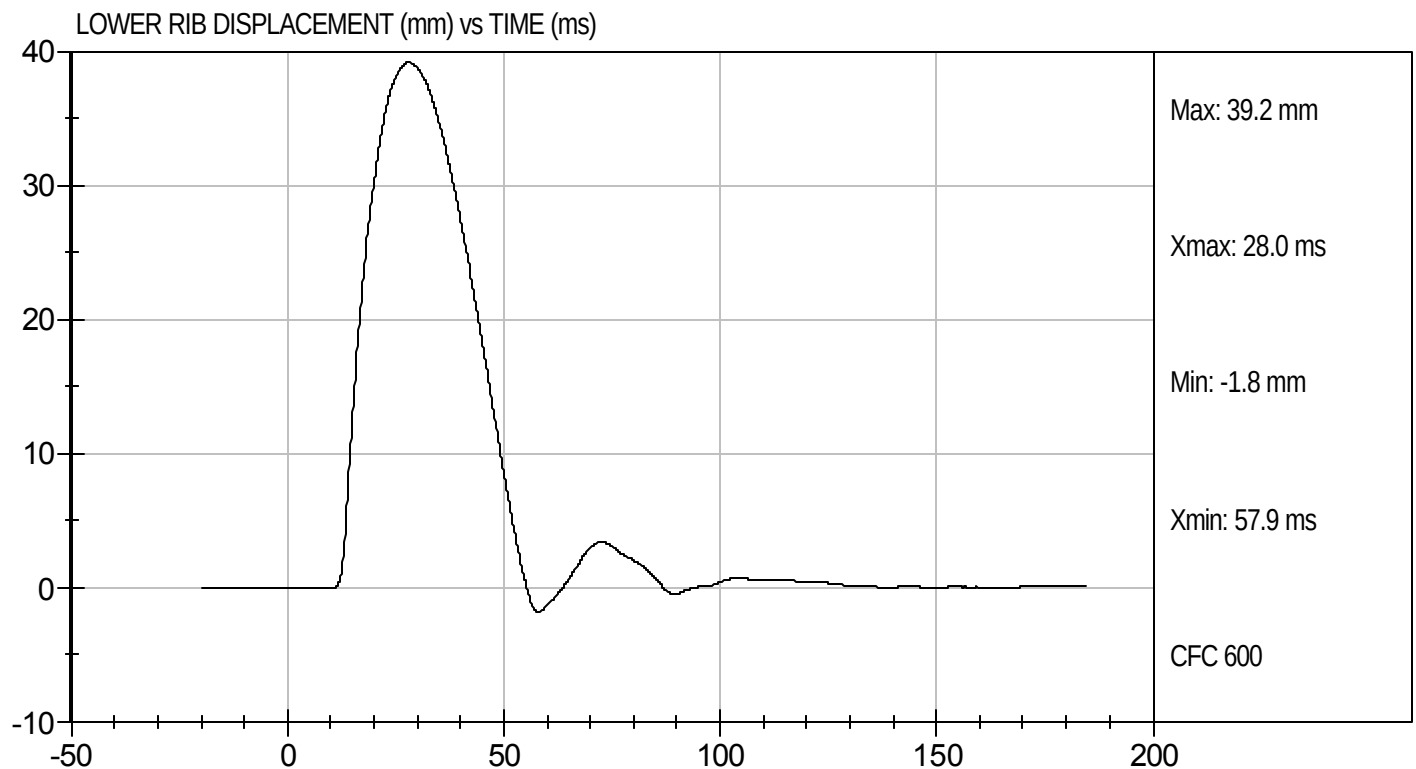
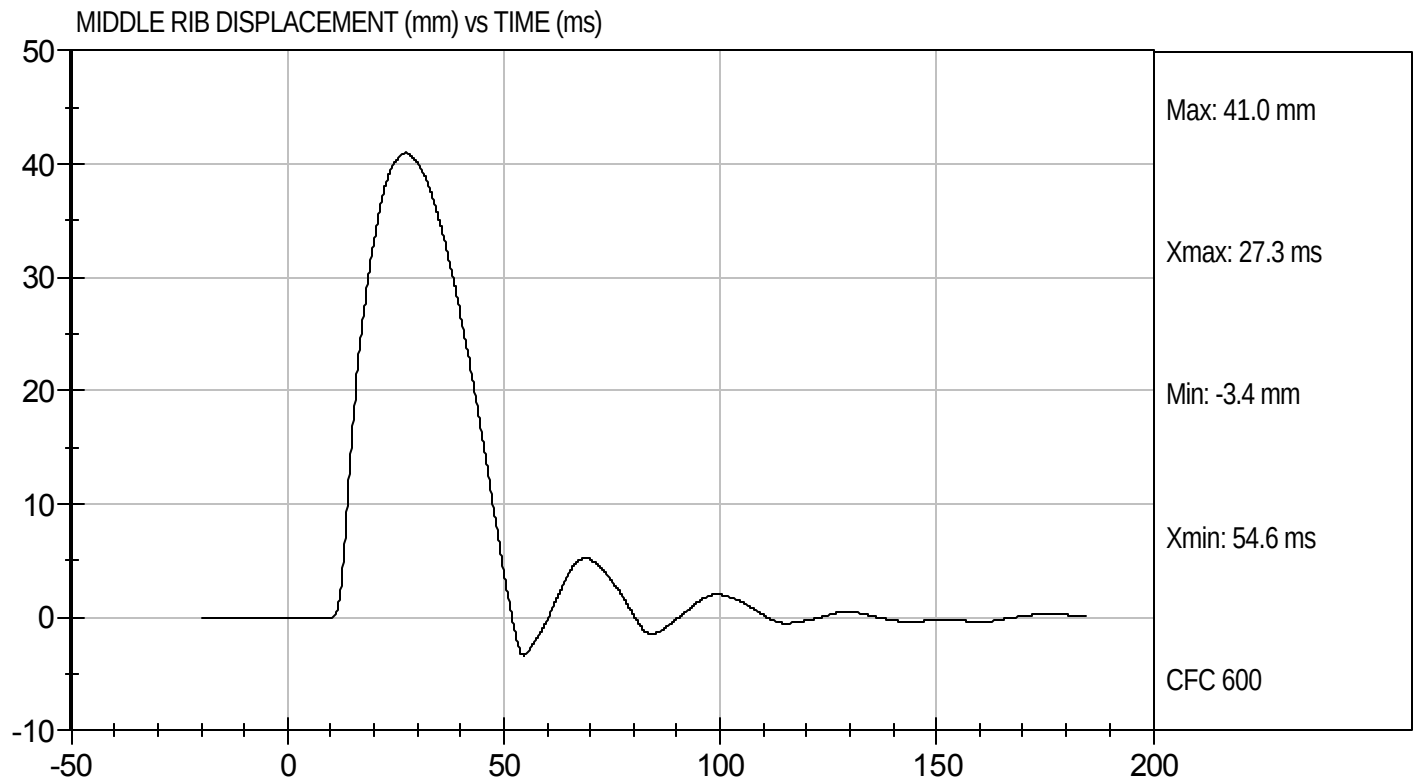
Test Date: 2/10/11
Velocity: 18.32 ft/s, 5.58 m/s





Test Desc: Thorax Impact
Component ID: D11480

Test Date: 2/10/11
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: D104501

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	15	Pass
Peak Resultant Acceleration	G's	115 to 137	118	Pass
Peak Lateral Acceleration	G's	+/- 15	-6.1	Pass
Unimodal	N/A	<15%	Yes	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

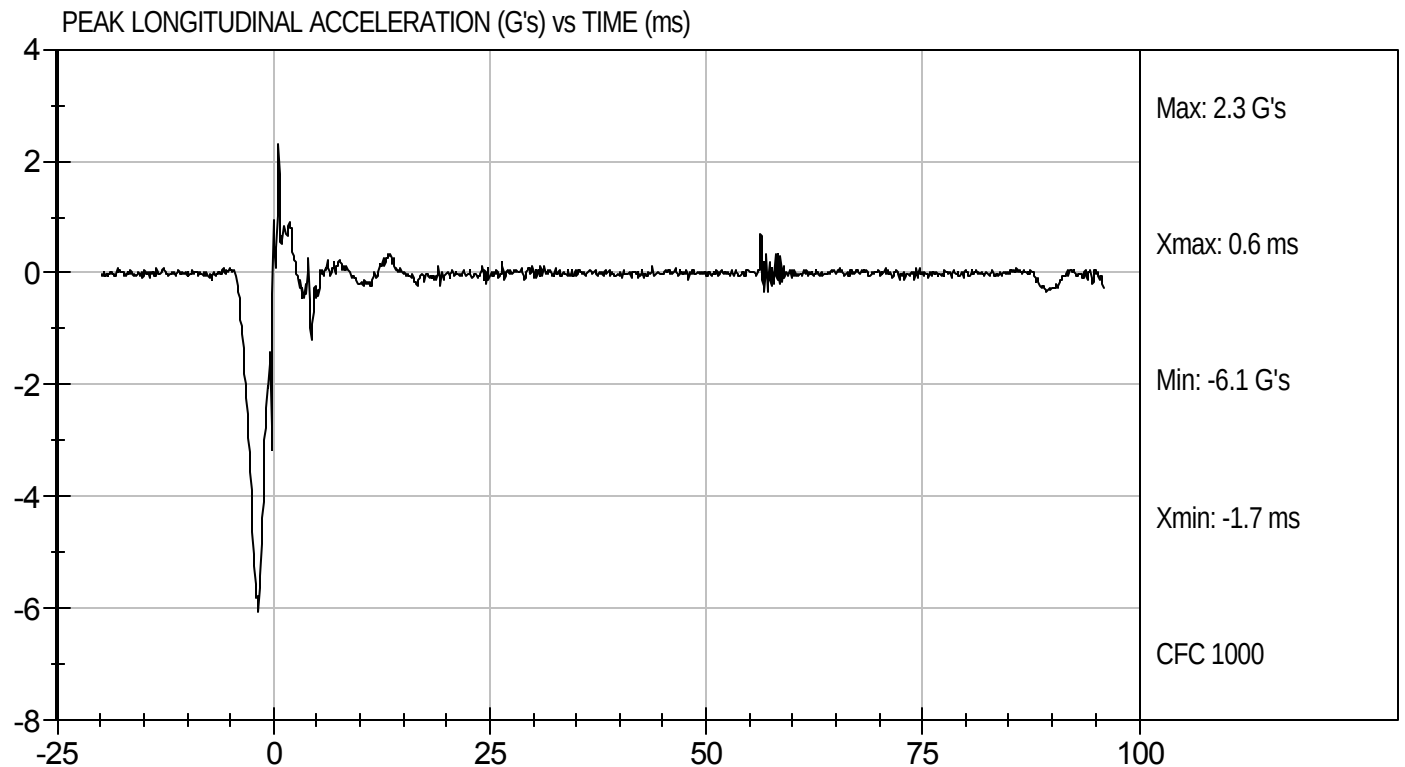
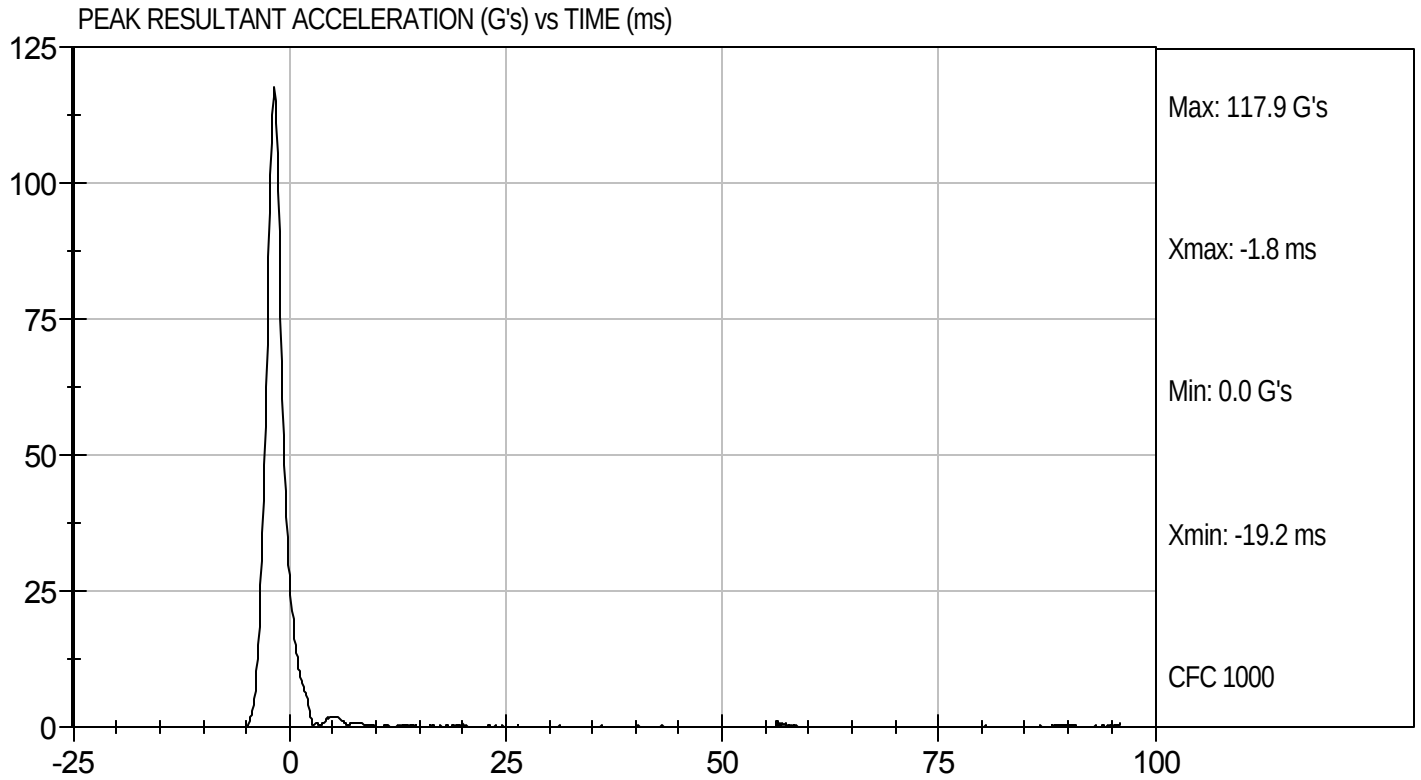
12/17/10
Test Date

David Winkelbauer
Approved By



Test Desc: Head Drop
Component ID: D104501

Test Date: 12/17/10
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.: D104502

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21.6	Pass
Humidity		%	10 to 70	15	Pass
Impact Velocity		m/s	5.51 to 5.63	5.58	Pass
Delta Velocity	10 ms	m/s	2.20 to 2.80	2.40	Pass
	15 ms	m/s	3.30 to 4.10	3.41	Pass
	20 ms	m/s	4.40 to 5.40	4.58	Pass
	25 ms	m/s	5.40 to 6.10	5.46	Pass
	25-100 ms	m/s	5.50 to 6.20	5.51	Pass
Maximum D-Plane Rotation		deg	71 to 81	71	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	62	Pass
Maximum Occipital Condyle Moment during Rotation Interval Nm			-44 to -36	-40	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	117	Pass
Overall Test Results				Pass	


 Laboratory Technician

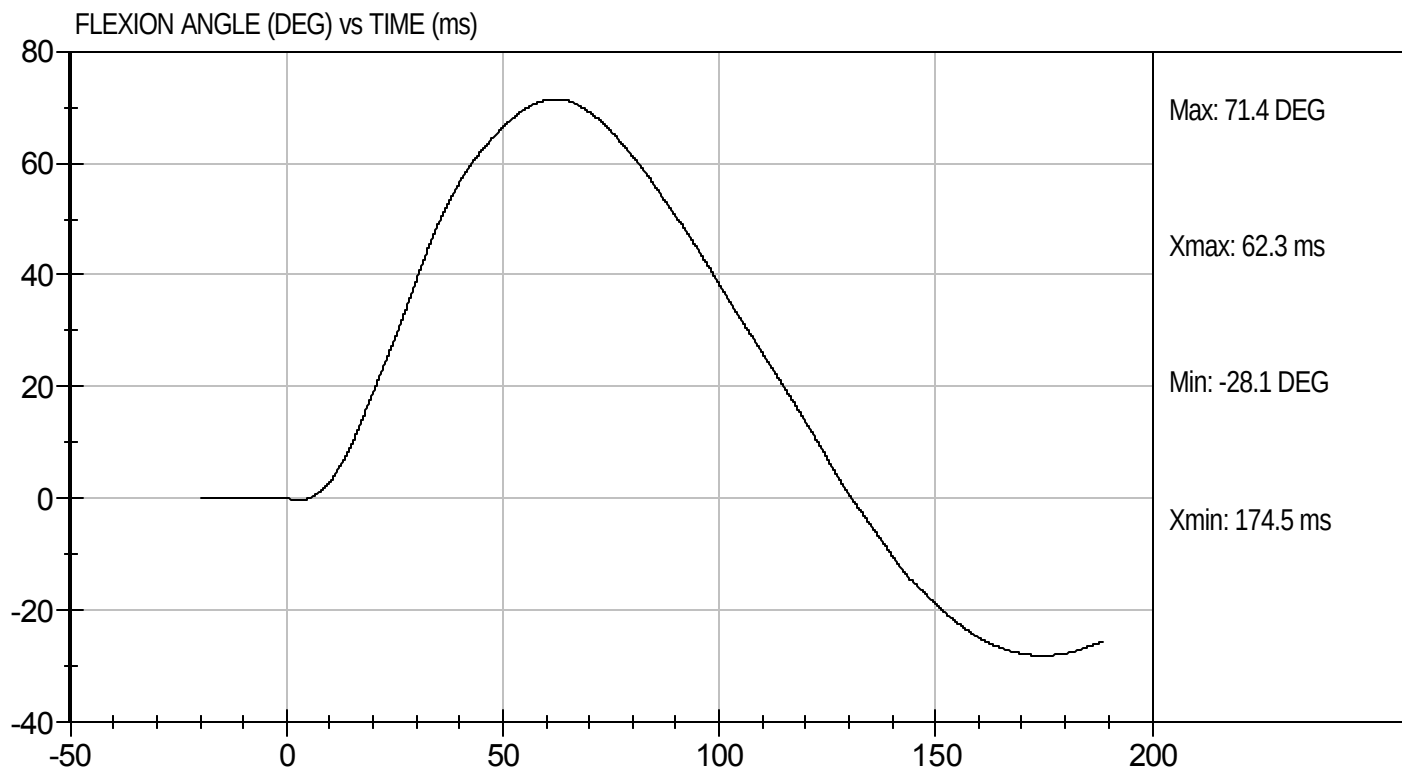
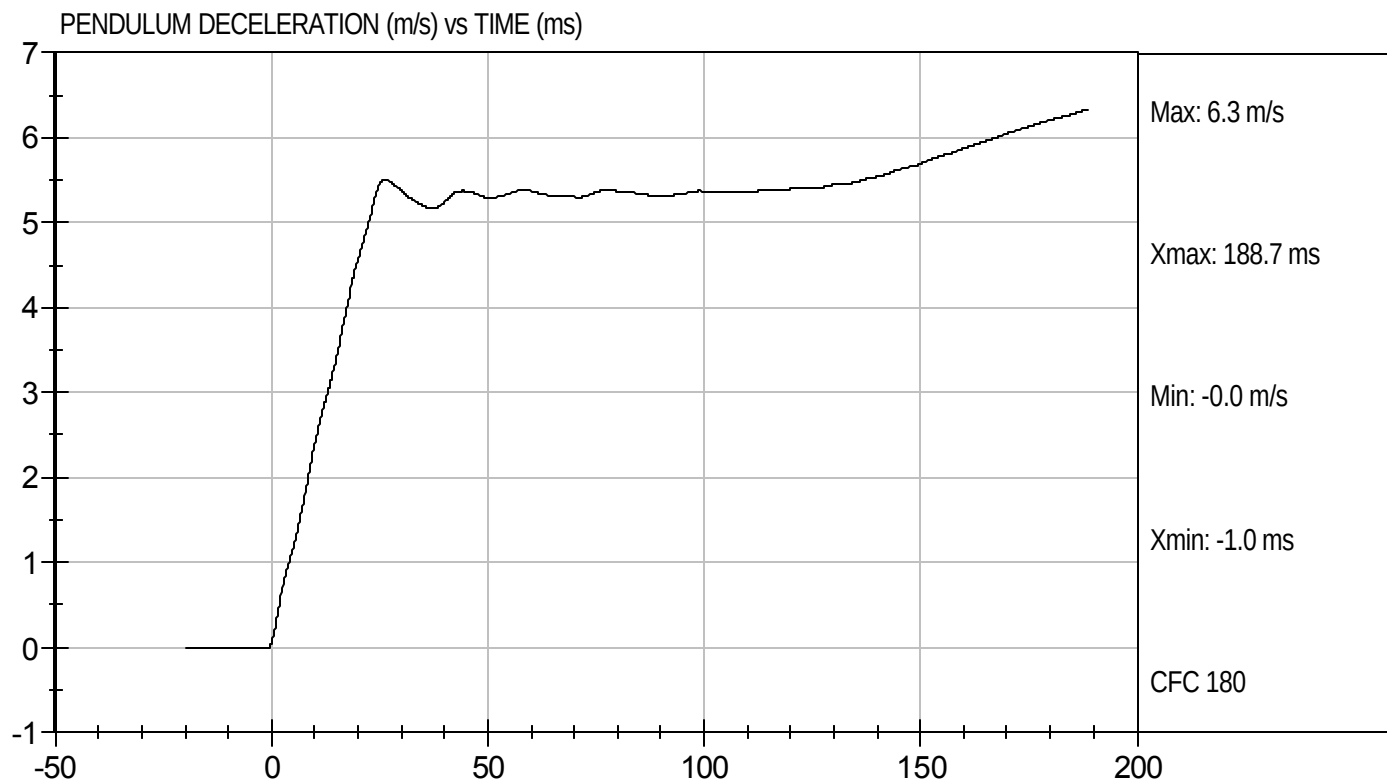
12/17/10
 Test Date


 Approved By



Test Desc: Neck Bending
Component ID: D104502

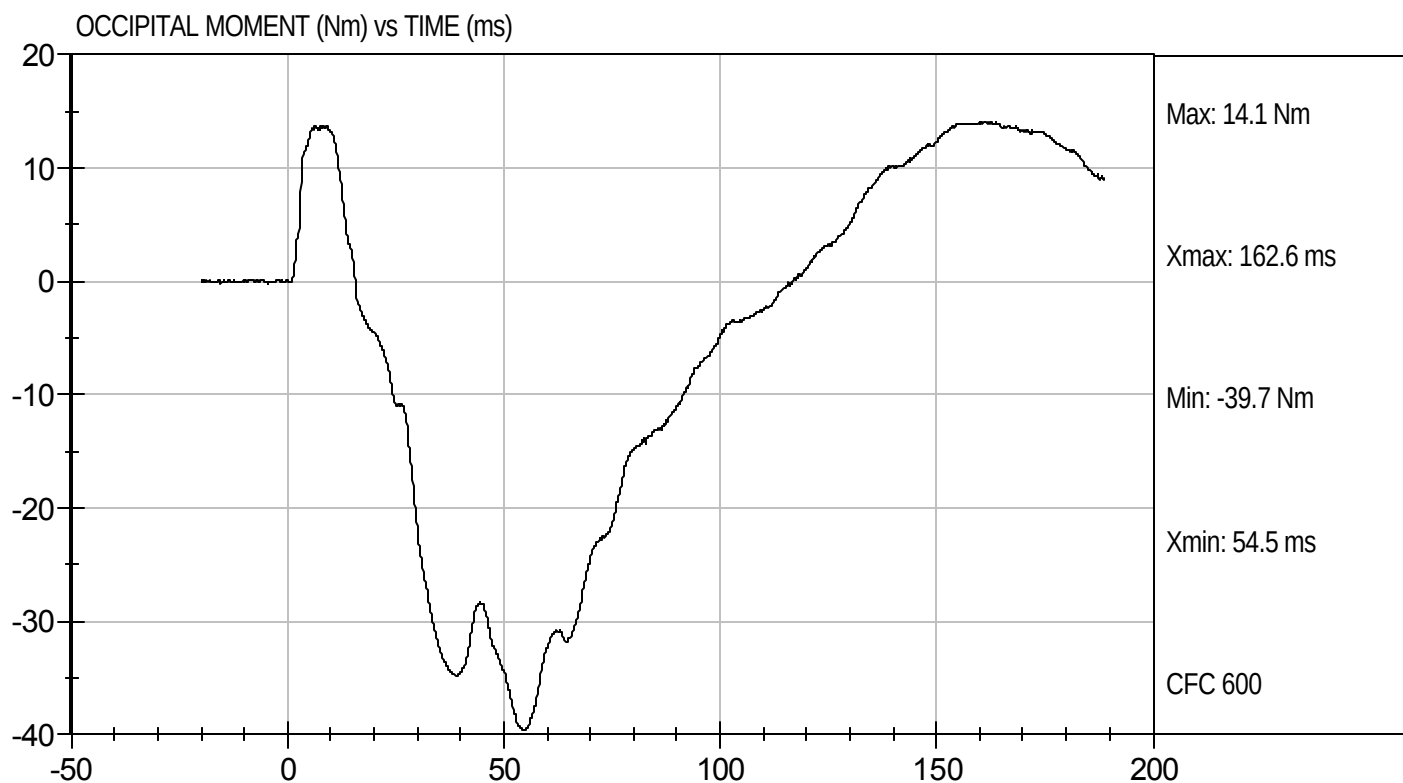
Test Date: 12/17/10
Velocity: 0 ft/s, 0 m/s





Test Desc: Neck Bending
Component ID: D104502

Test Date: 12/17/10
Velocity: 18.32 ft/s, 5.58 m/s

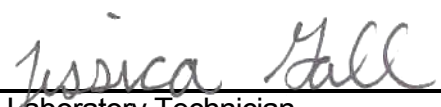


MGA RESEARCH CORPORATION
SHOULDER IMPACT TEST
SID-11s BUILD LEVEL D DUMMY

ATD Serial No: 306

Test ID: D104503

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	11	Pass
Impact Velocity	m/s	4.20 to 4.40	4.39	Pass
Maximum Probe Acceleration	G's	13 to 18	16	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

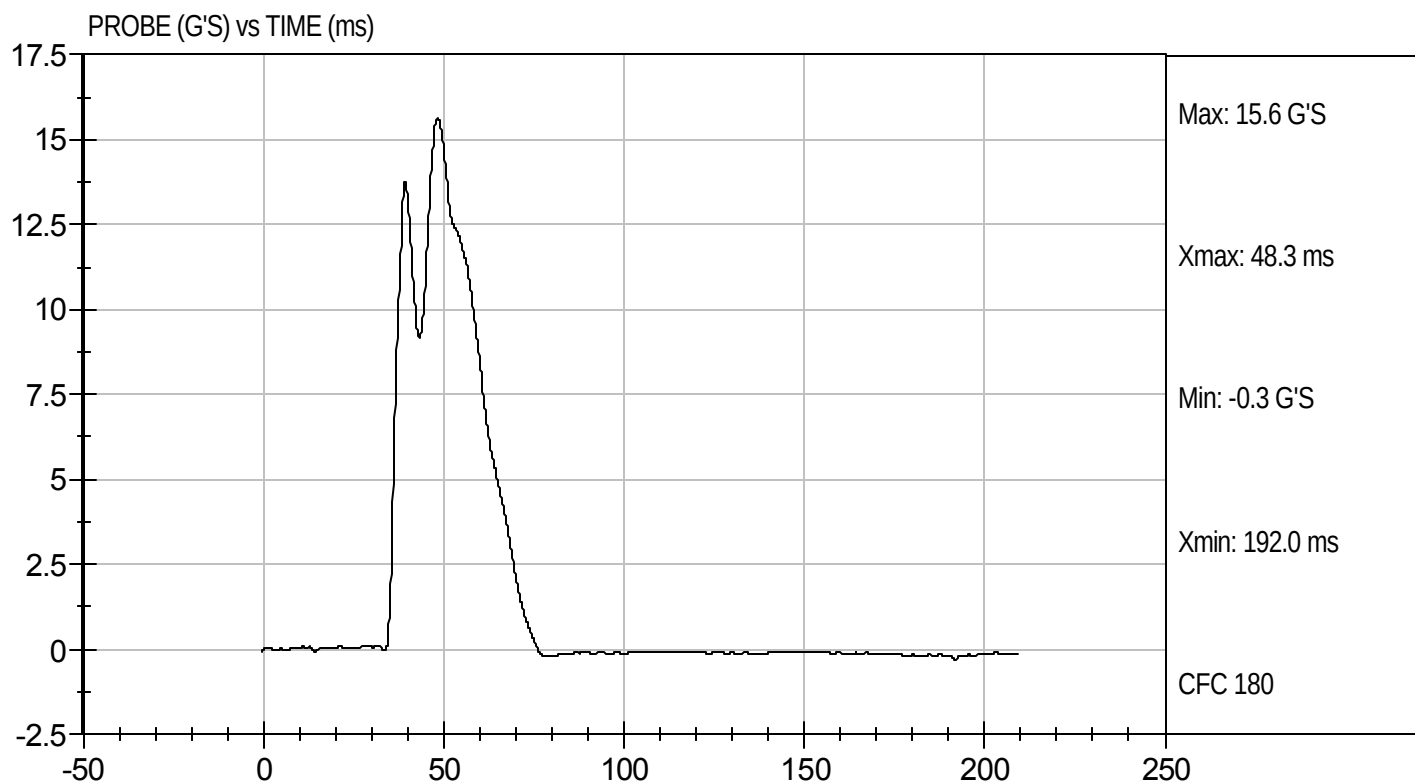
12/20/10
Test Date


Approved By



Test Desc: Shoulder Impact
Component ID: D104503

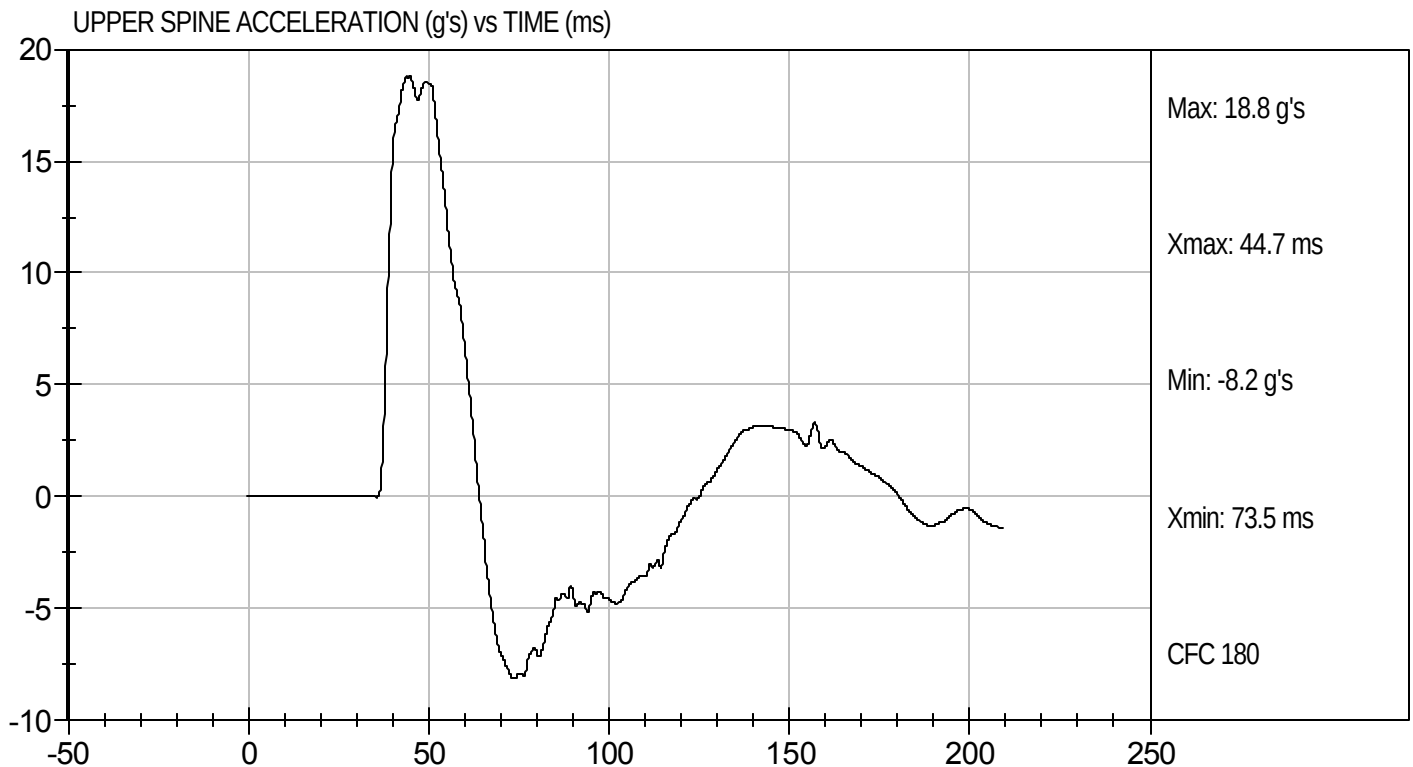
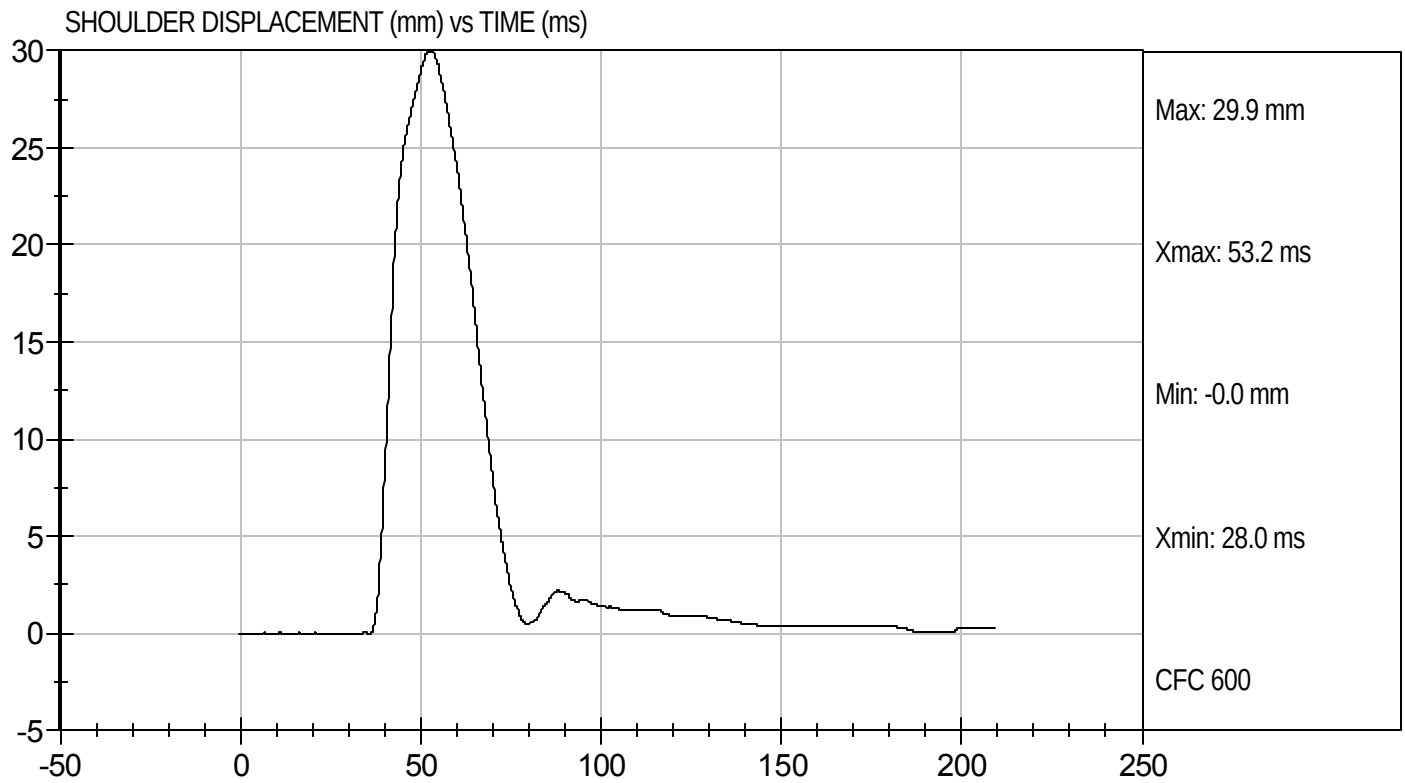
Test Date: 12/20/10
Velocity: 14.40 ft/s, 4.39 m/s





Test Desc: Shoulder Impact
Component ID: D104503

Test Date: 12/20/10
Velocity: 14.40 ft/s, 4.39 m/s



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

ATD Serial No: 306

Test I.D: D104504

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.6	Pass
Humidity	%	10 to 70	11	Pass
Impact Velocity	m/s	6.60 to 6.80	6.79	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	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

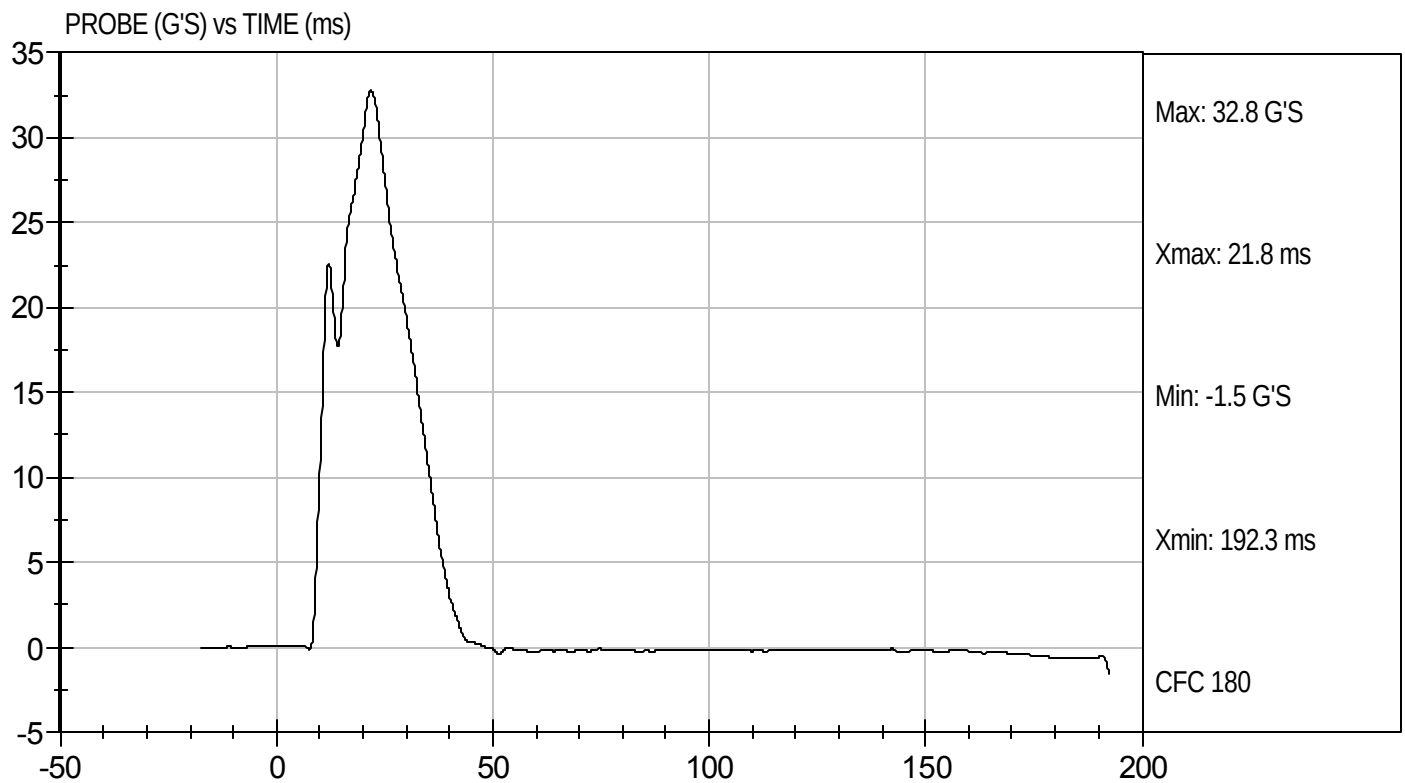
12/20/10
Test Date


Approved By



Test Desc: Thorax With Arm
Component ID: D104504

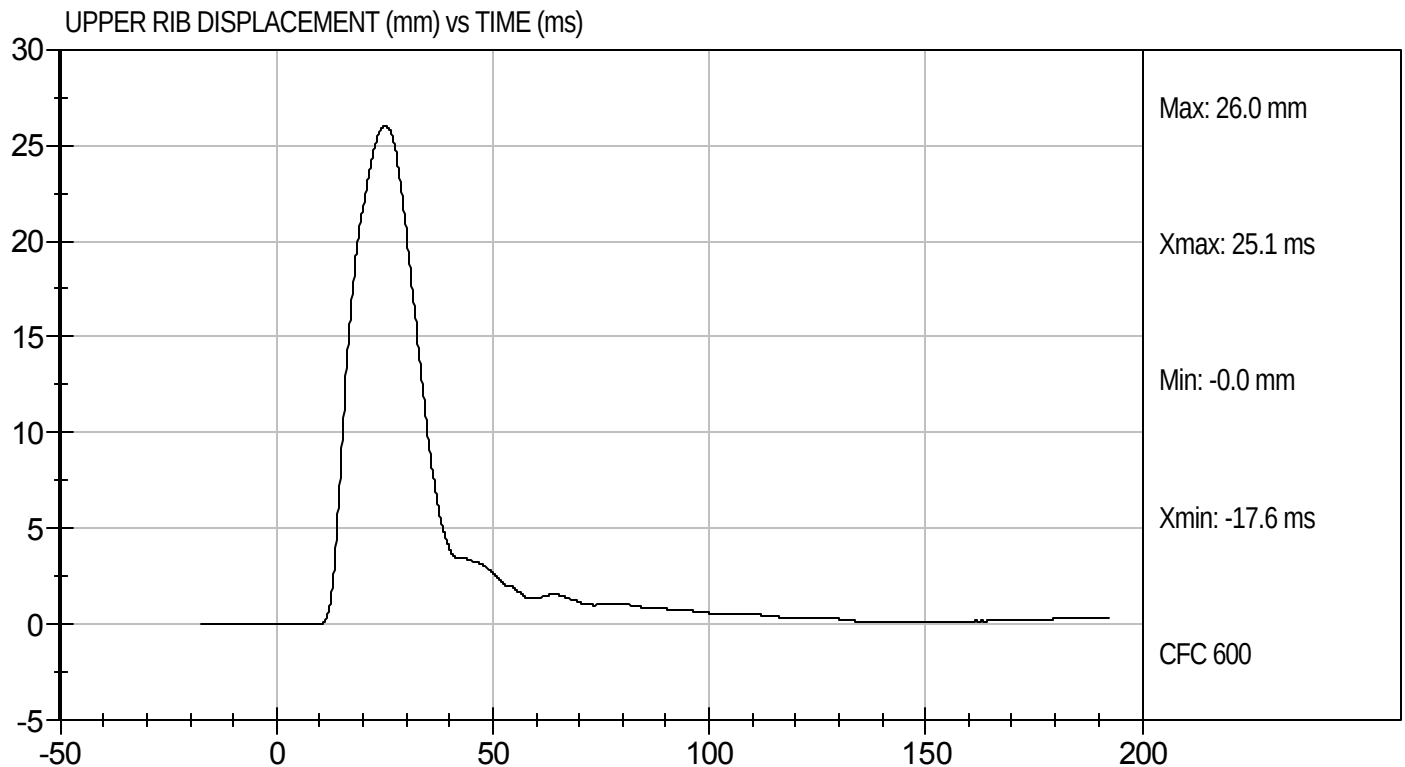
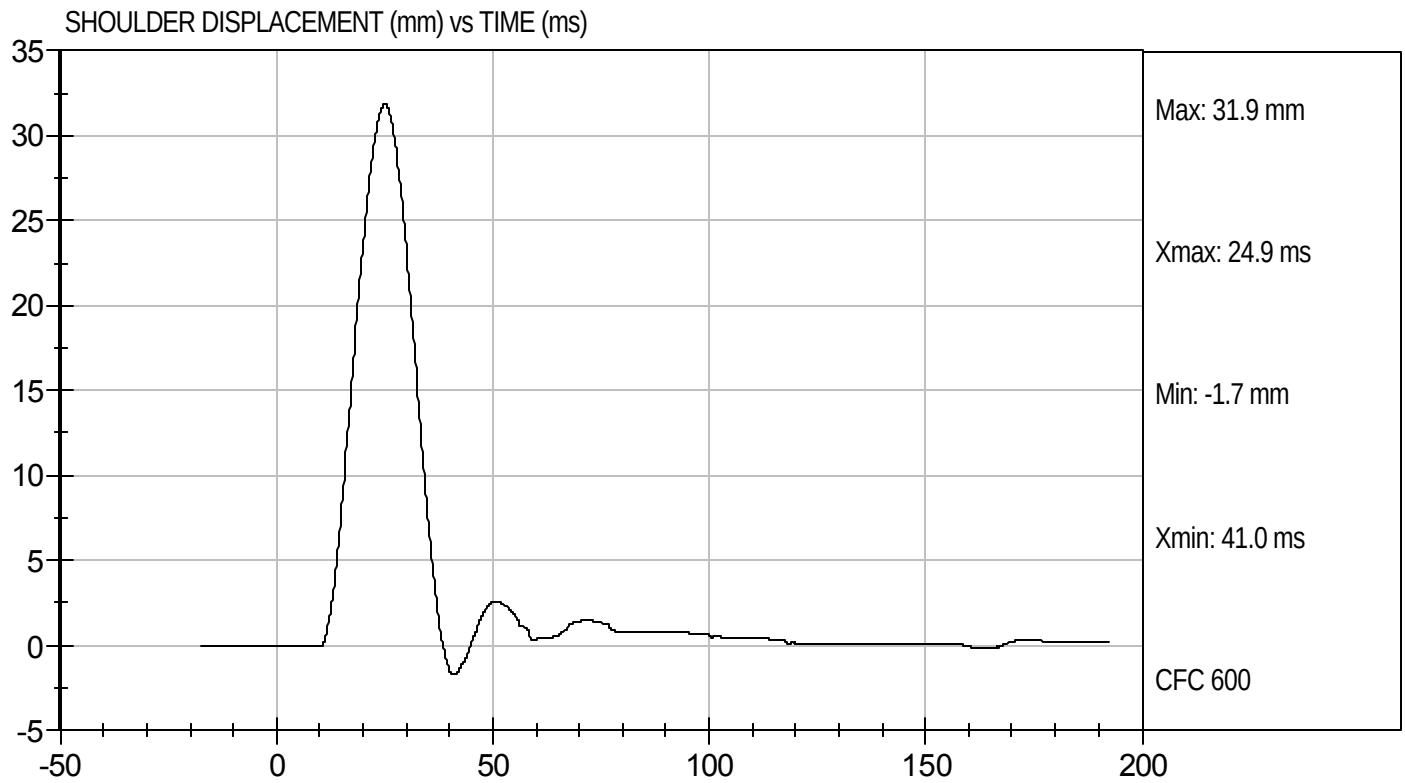
Test Date: 12/20/10
Velocity: 22.29 ft/s, 6.79 m/s





Test Desc: Thorax With Arm
Component ID: D104504

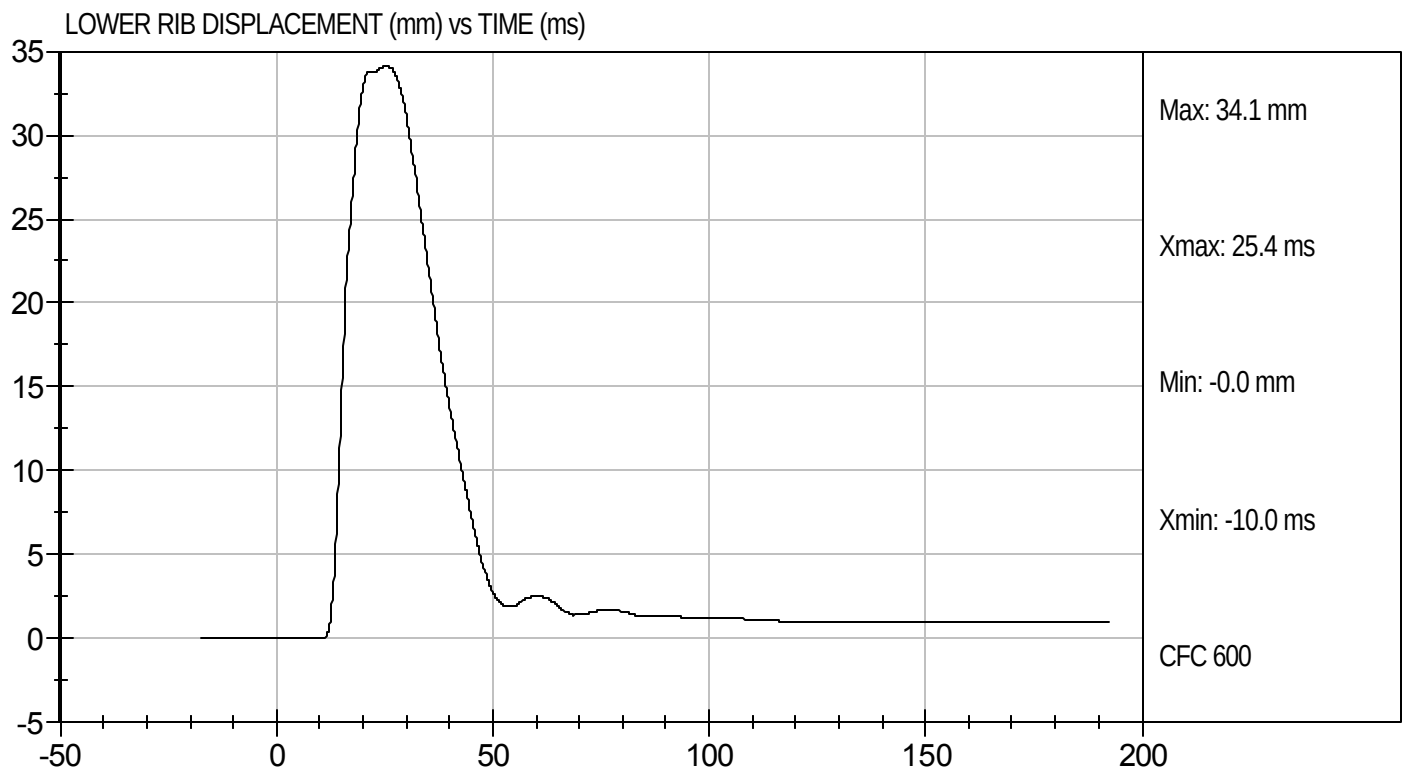
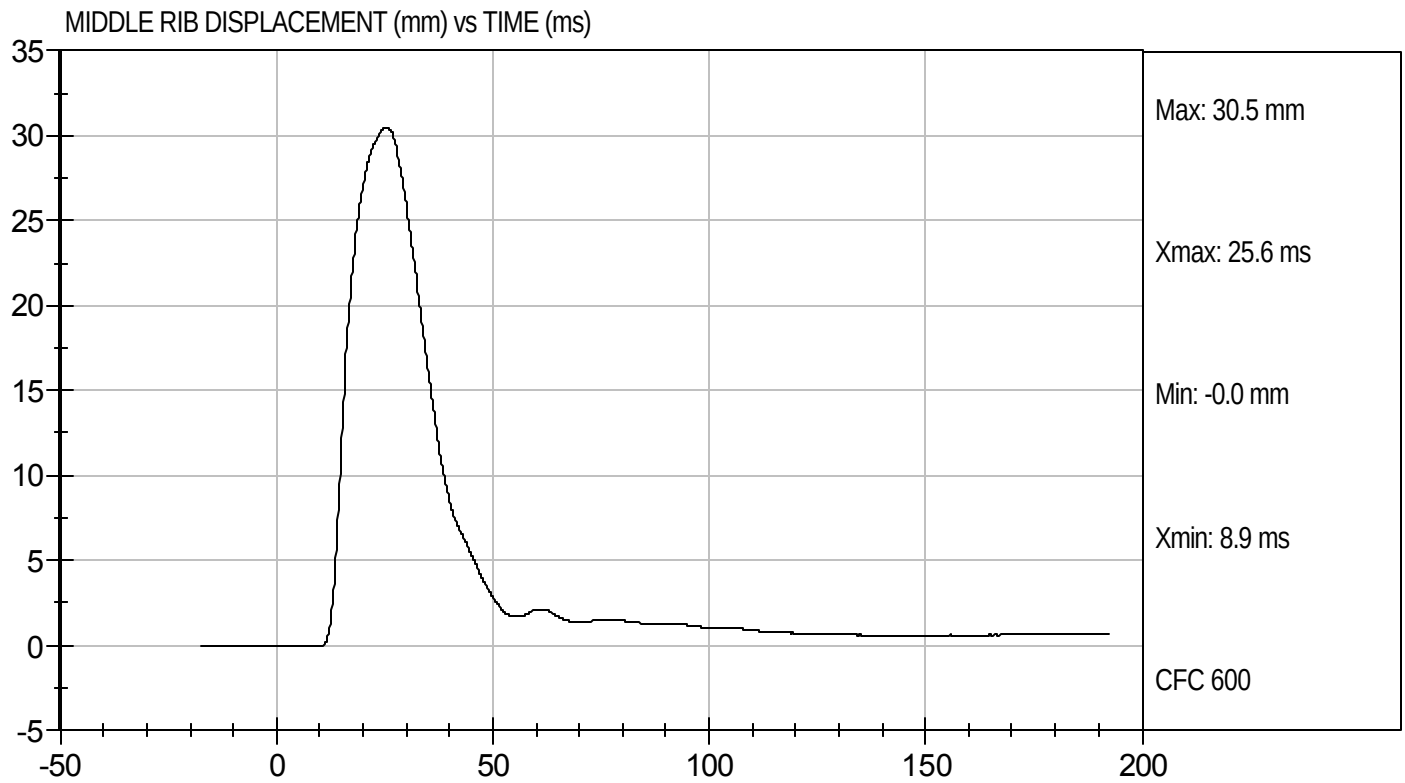
Test Date: 12/20/10
Velocity: 22.29 ft/s, 6.79 m/s





Test Desc: Thorax With Arm
Component ID: D104504

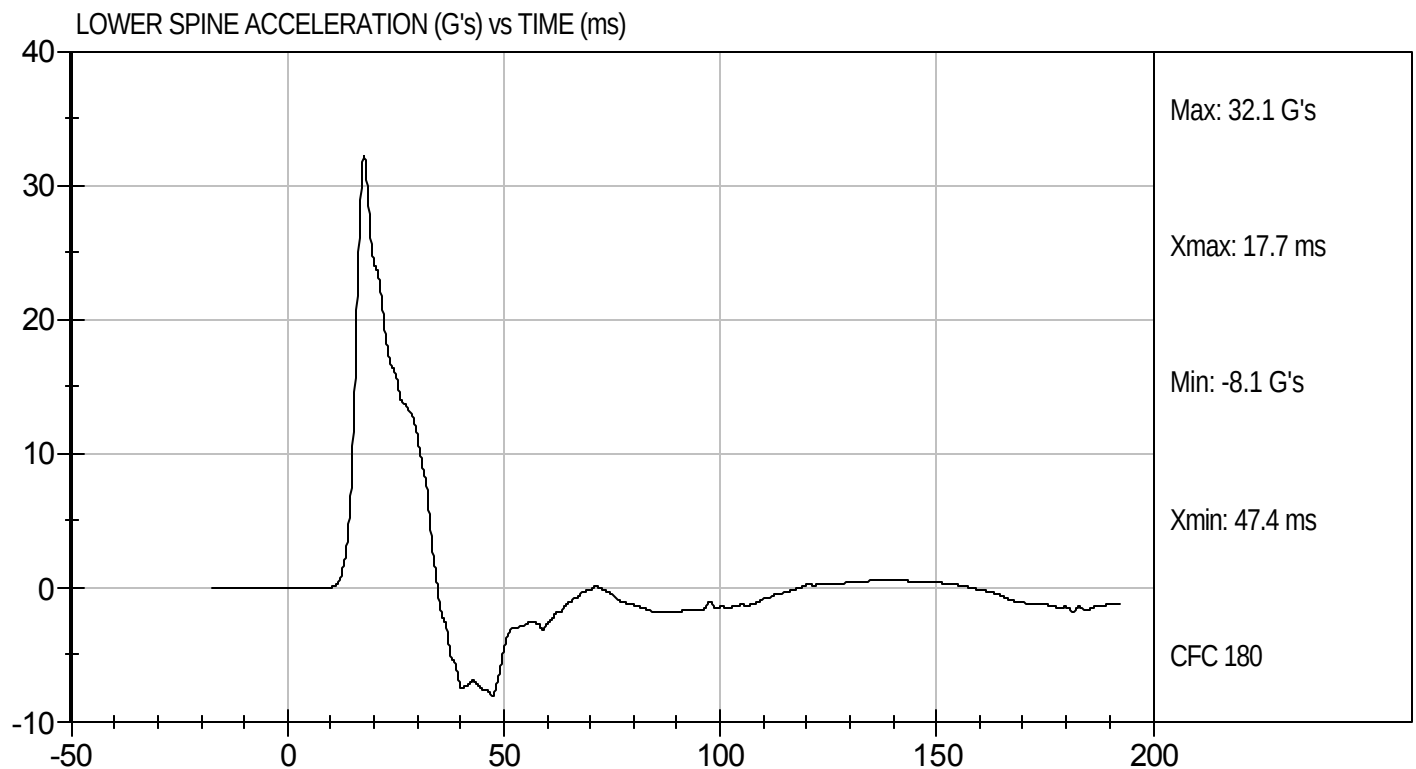
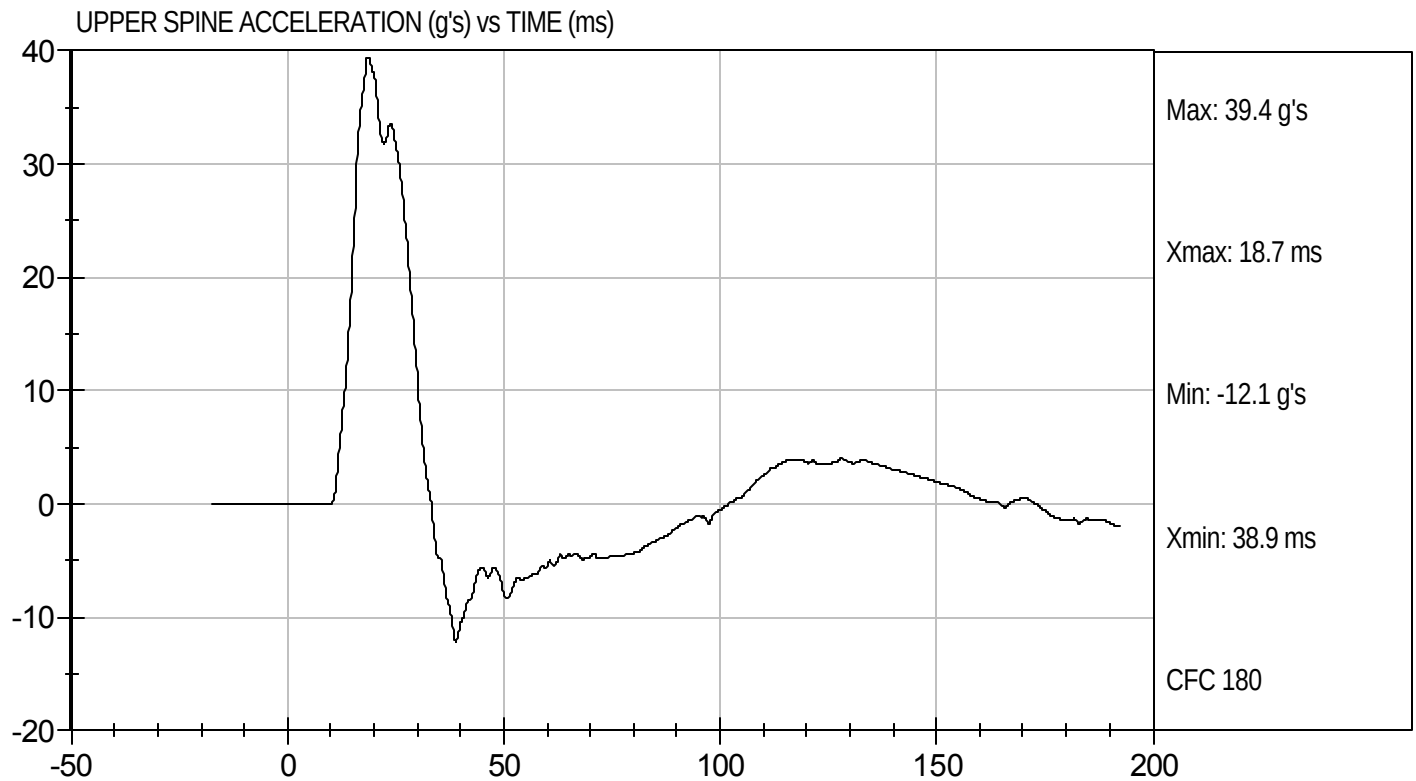
Test Date: 12/20/10
Velocity: 22.29 ft/s, 6.79 m/s





Test Desc: Thorax With Arm
Component ID: D104504

Test Date: 12/20/10
Velocity: 22.29 ft/s, 6.79 m/s



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

ATD Serial No: 306

Test I.D: D104505

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.6	Pass
Humidity	%	10 to 70	12	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Peak Impactor Force	G's	14 to 18	16	Pass
Upper Rib Displacement	mm	32 to 40	35	Pass
Middle Rib Displacement	mm	39 to 45	42	Pass
Lower Rib Displacement	mm	35 to 43	41	Pass
Upper Spine (T1) Y Acceleration	G's	13 to 17	15	Pass
Lower Spine (T12) Y Acceleration	G's	7 to 11	10	Pass
Overall Test Results			Pass	


Laboratory Technician

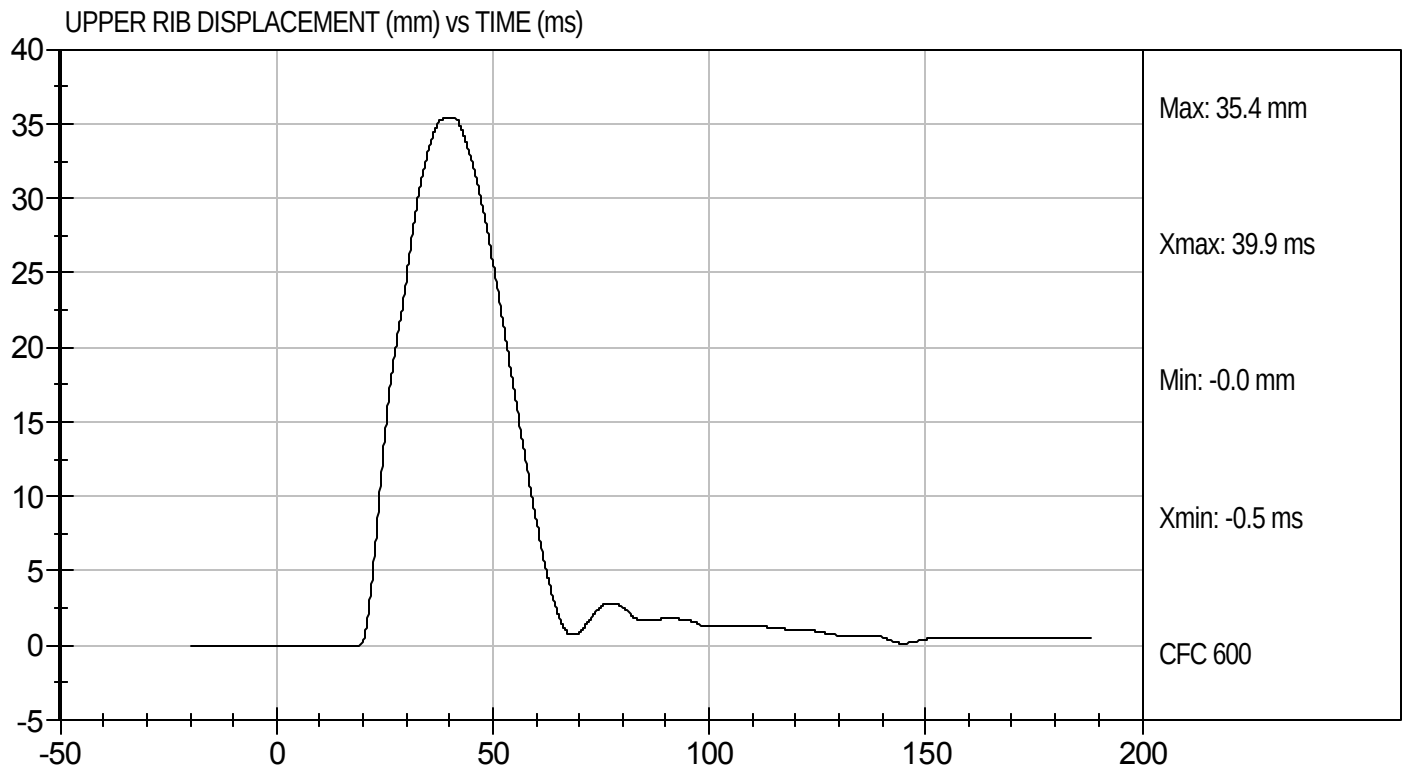
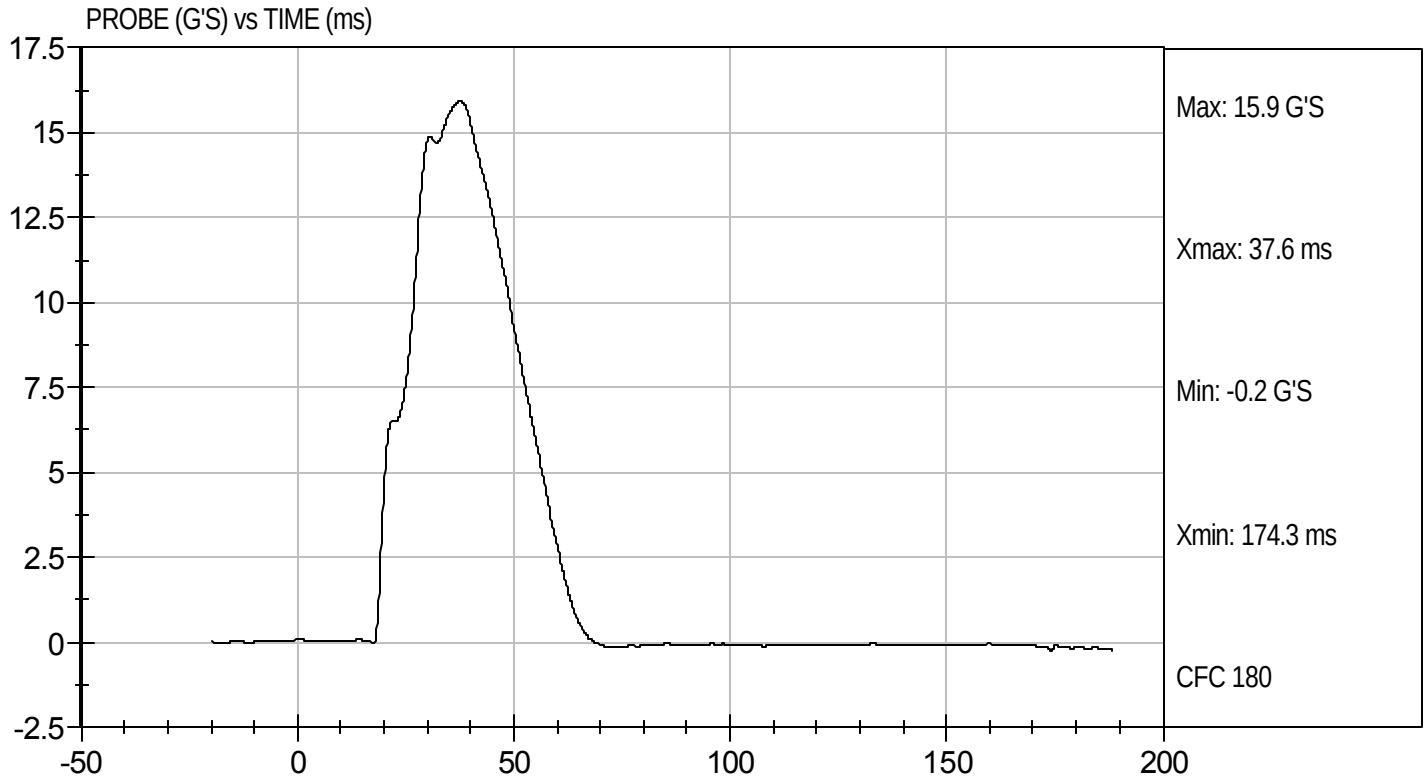
12/20/10
Test Date


Approved By



Test Desc: Thorax Without Arm
Component ID: D104505

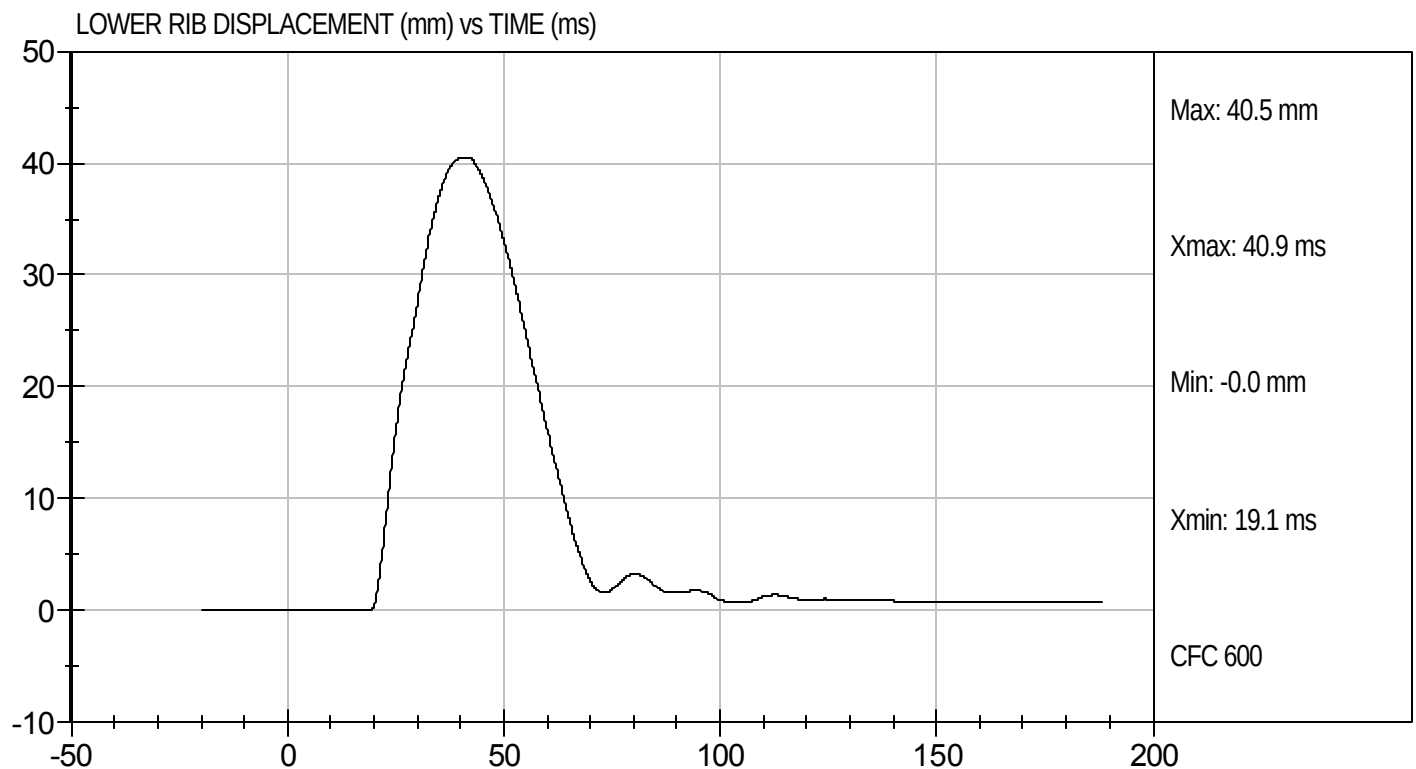
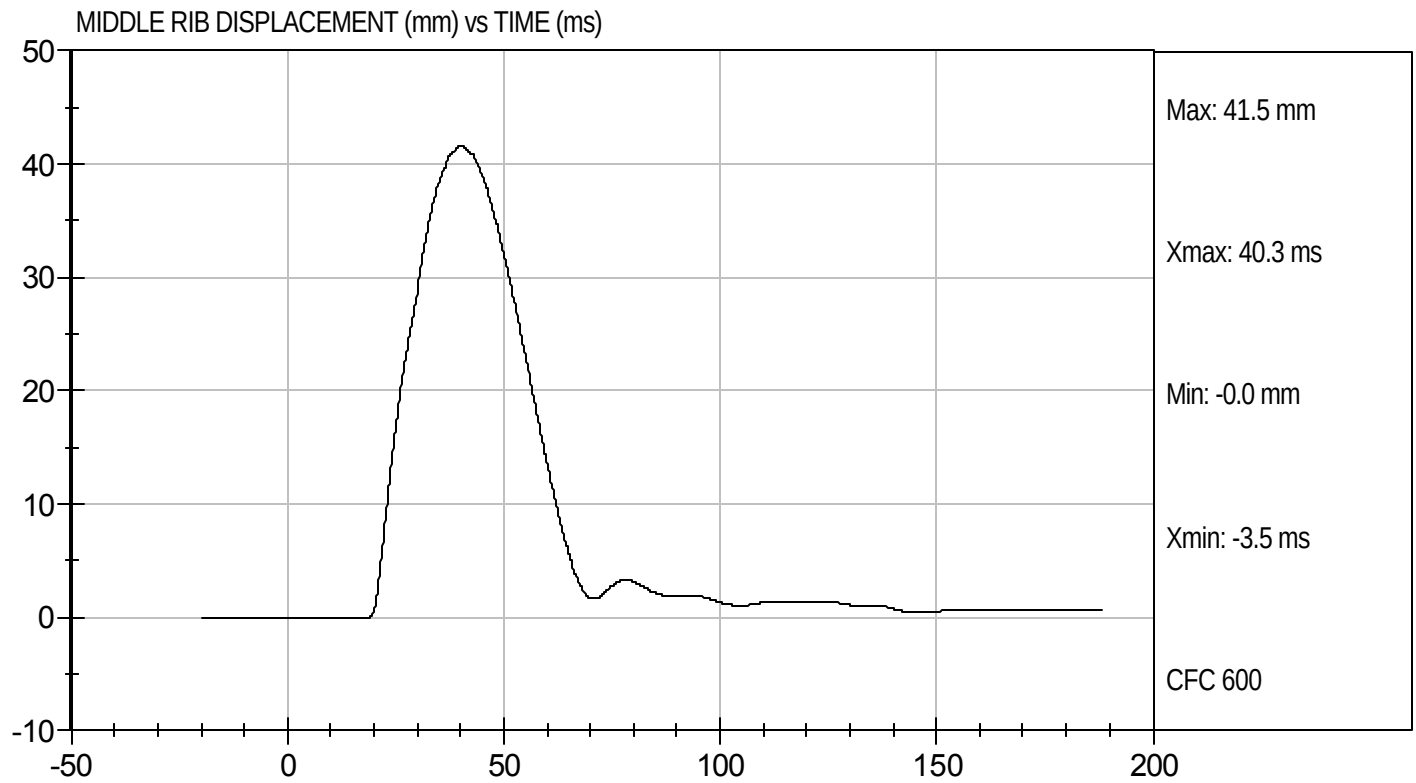
Test Date: 12/20/10
Velocity: 14.37 ft/s, 4.38 m/s





Test Desc: Thorax Without Arm
Component ID: D104505

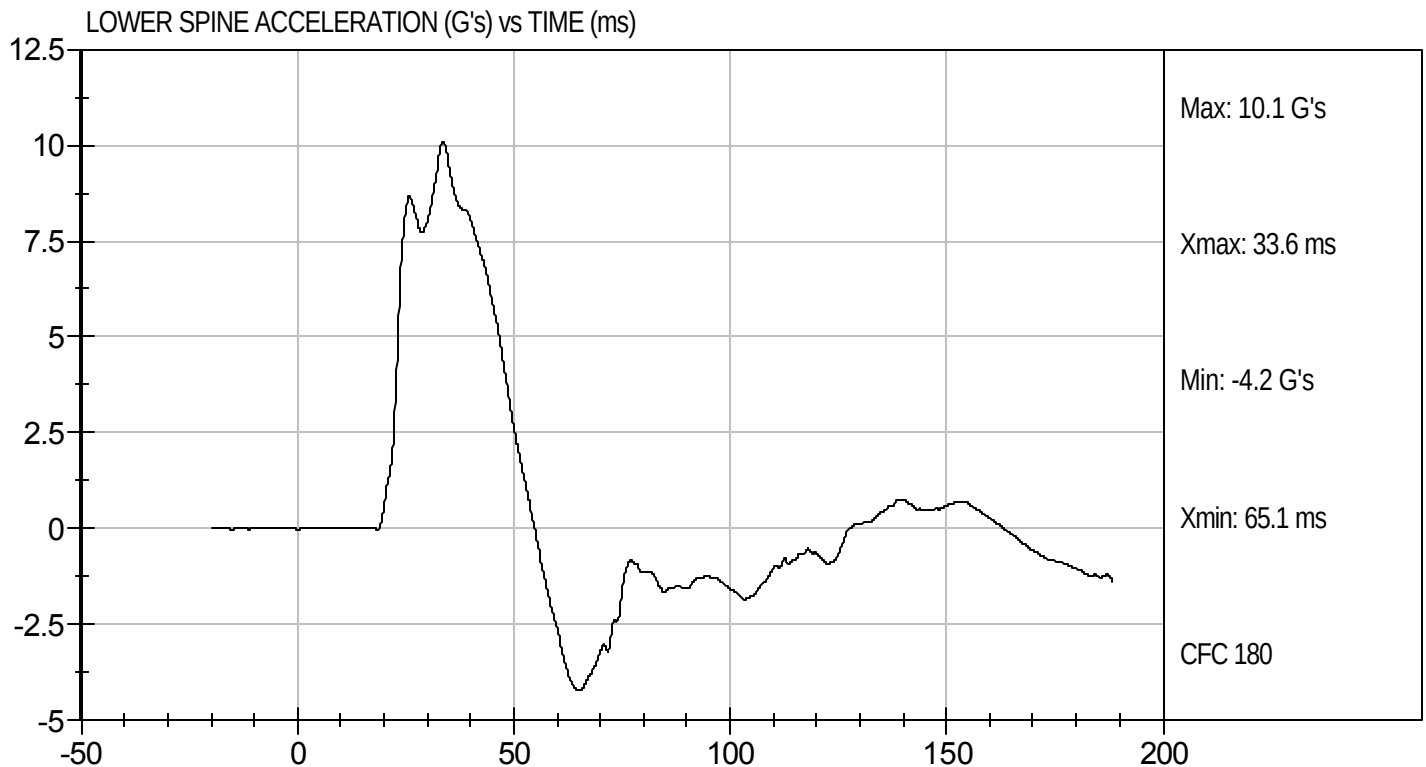
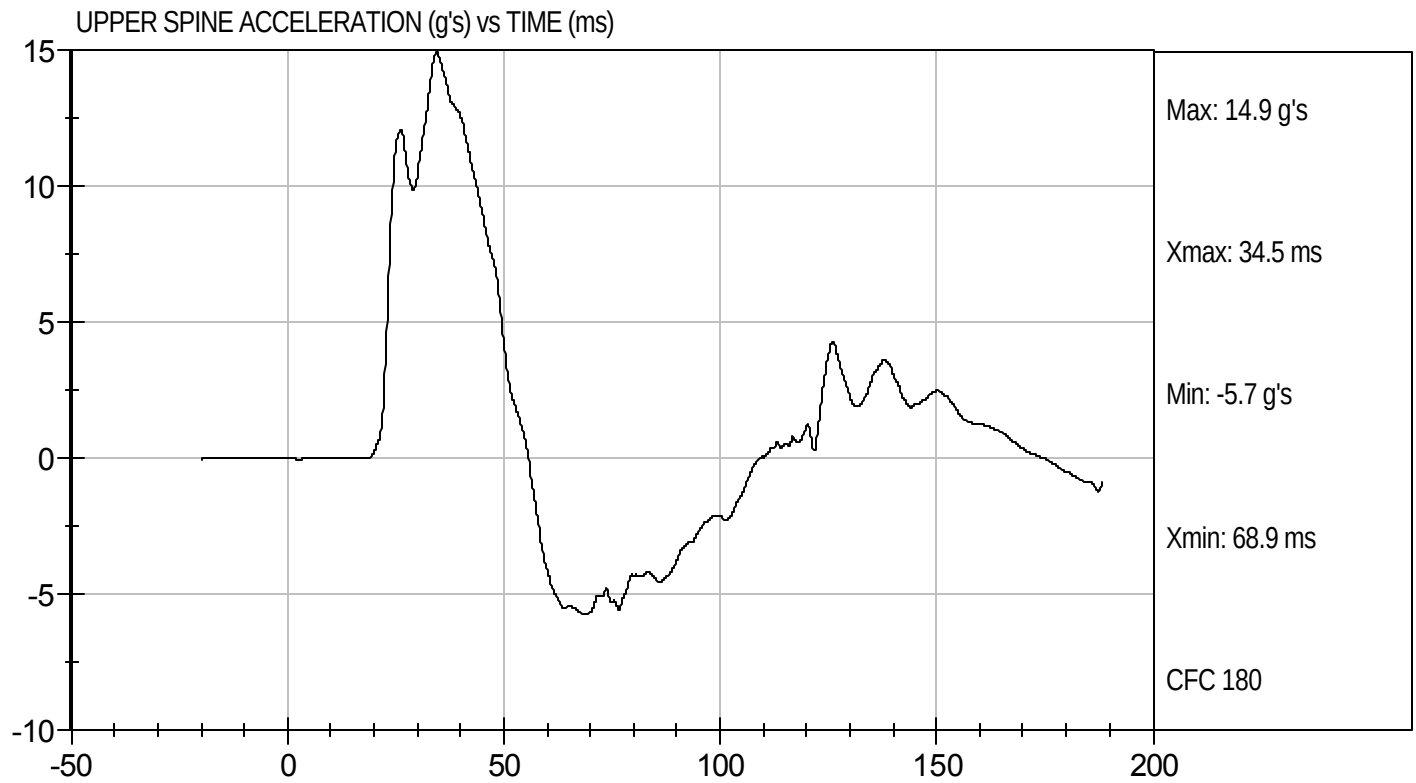
Test Date: 12/20/10
Velocity: 14.37 ft/s, 4.38 m/s





Test Desc: Thorax Without Arm
Component ID: D104505

Test Date: 12/20/10
Velocity: 14.37 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: D104506

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.6	Pass
Humidity	%	10 to 70	12	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Peak Impactor Acceleration	G's	12 to 16	14	Pass
Upper Rib Displacement	mm	36 to 47	41	Pass
Lower Rib Displacement	mm	33 to 44	37	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	11	Pass
			Overall Test Results	Pass


Laboratory Technician

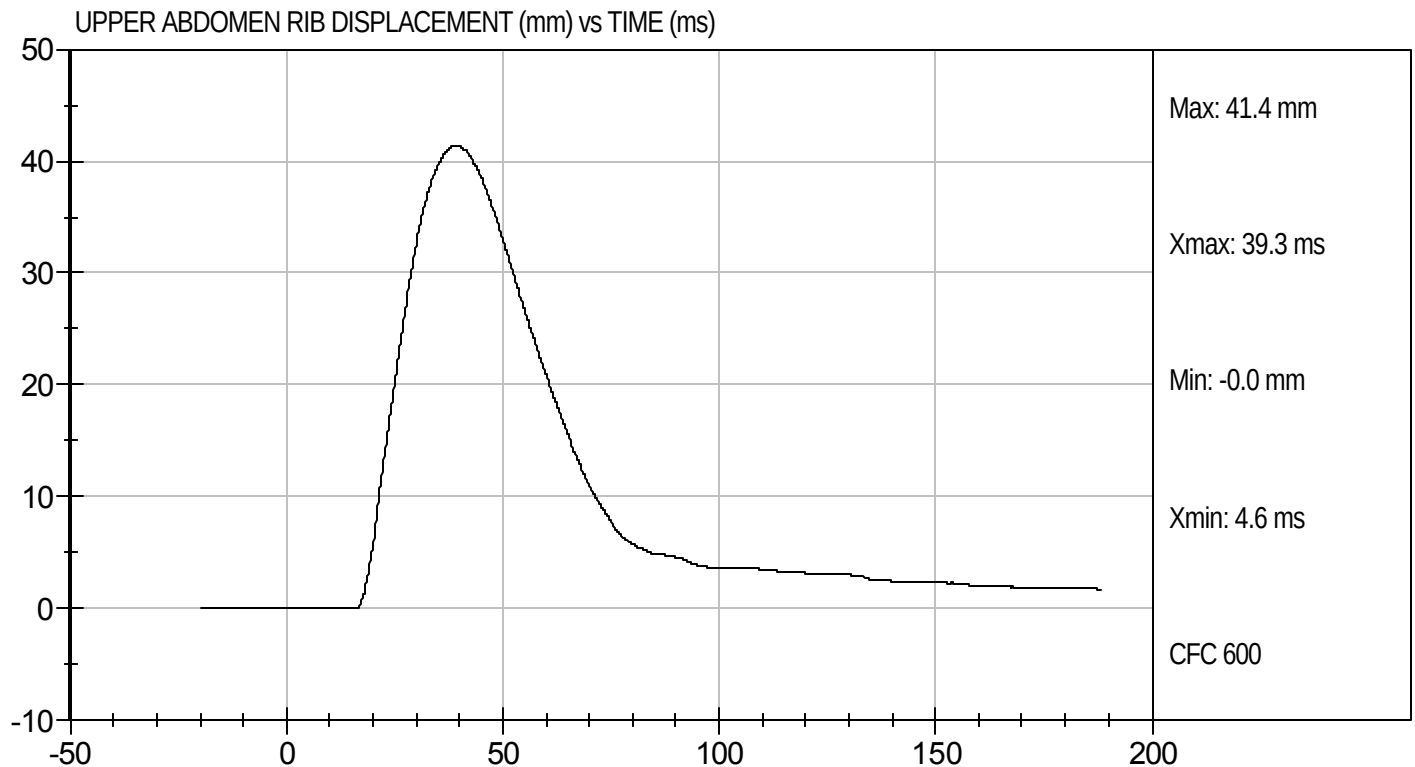
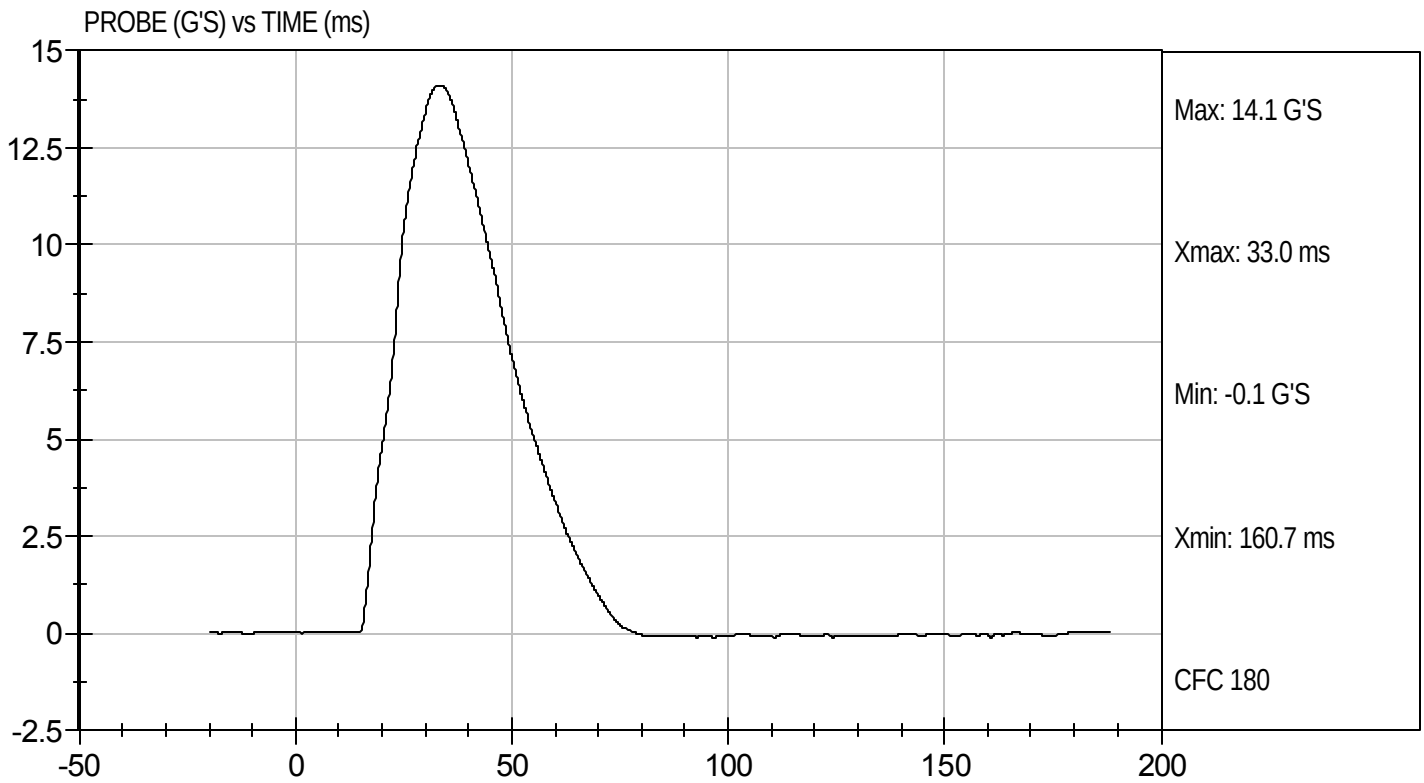
12/20/10
Test Date


Approved By



Test Desc: Abdomen Impact
Component ID: D104506

Test Date: 12/20/10
Velocity: 14.36 ft/s, 4.38 m/s

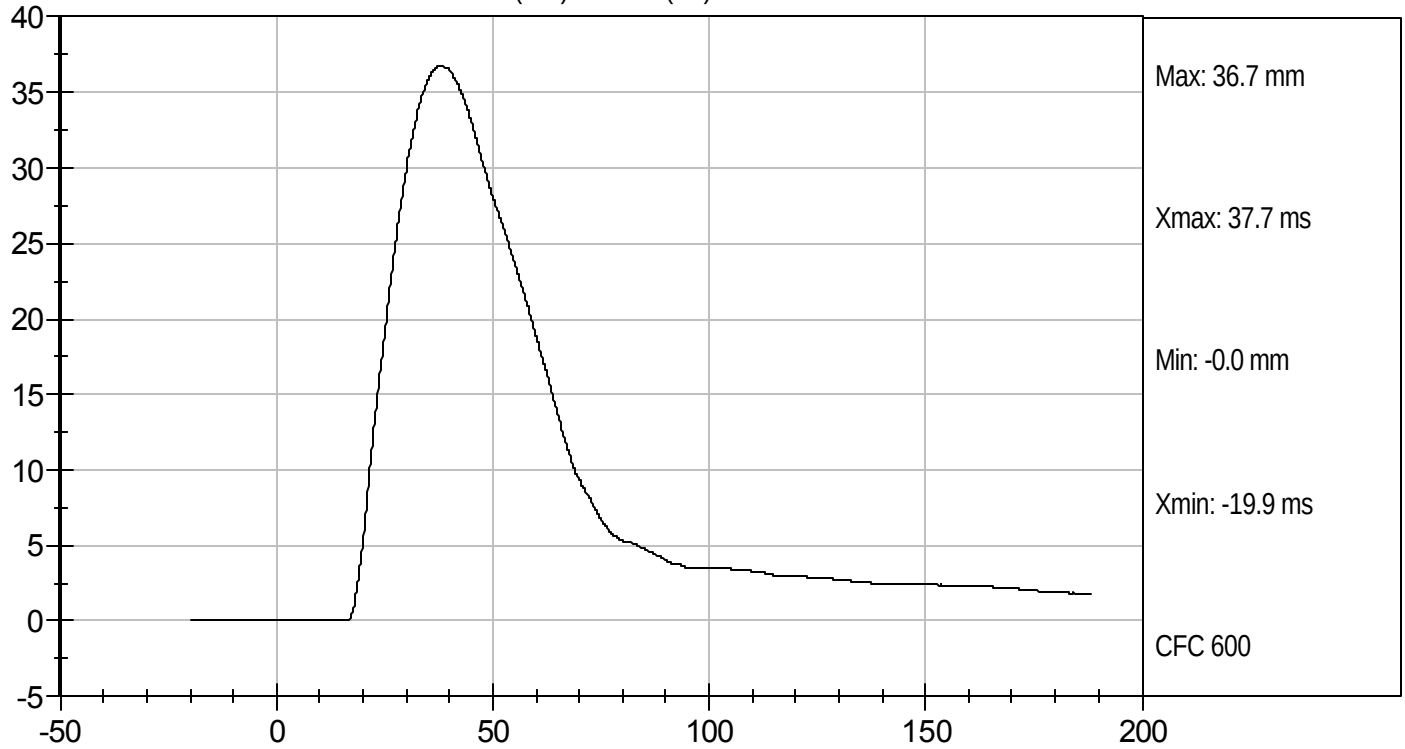




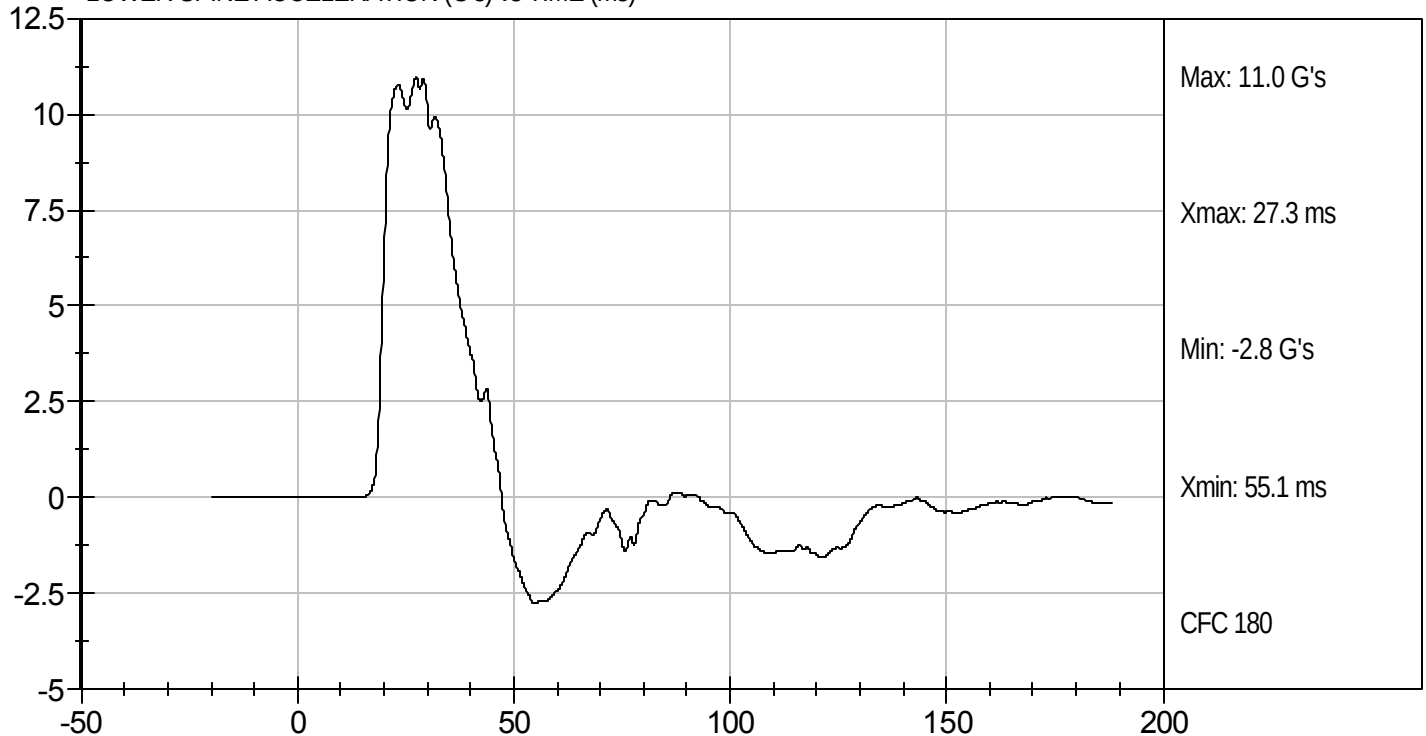
Test Desc: Abdomen Impact
Component ID: D104506

Test Date: 12/20/10
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: D104507

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.4	Pass
Humidity	%	10 to 70	13	Pass
Impact Velocity	m/s	6.60 to 6.80	6.77	Pass
Peak Impactor Acceleration	G's	38 to 47	43	Pass
Pelvis Y Acceleration after 6 ms	G's	34 to 42	41	Pass
Peak Acetabulum Force	N	3600 to 4300	4084	Pass
Overall Test Results			Pass	

Jessica Hall
Laboratory Technician

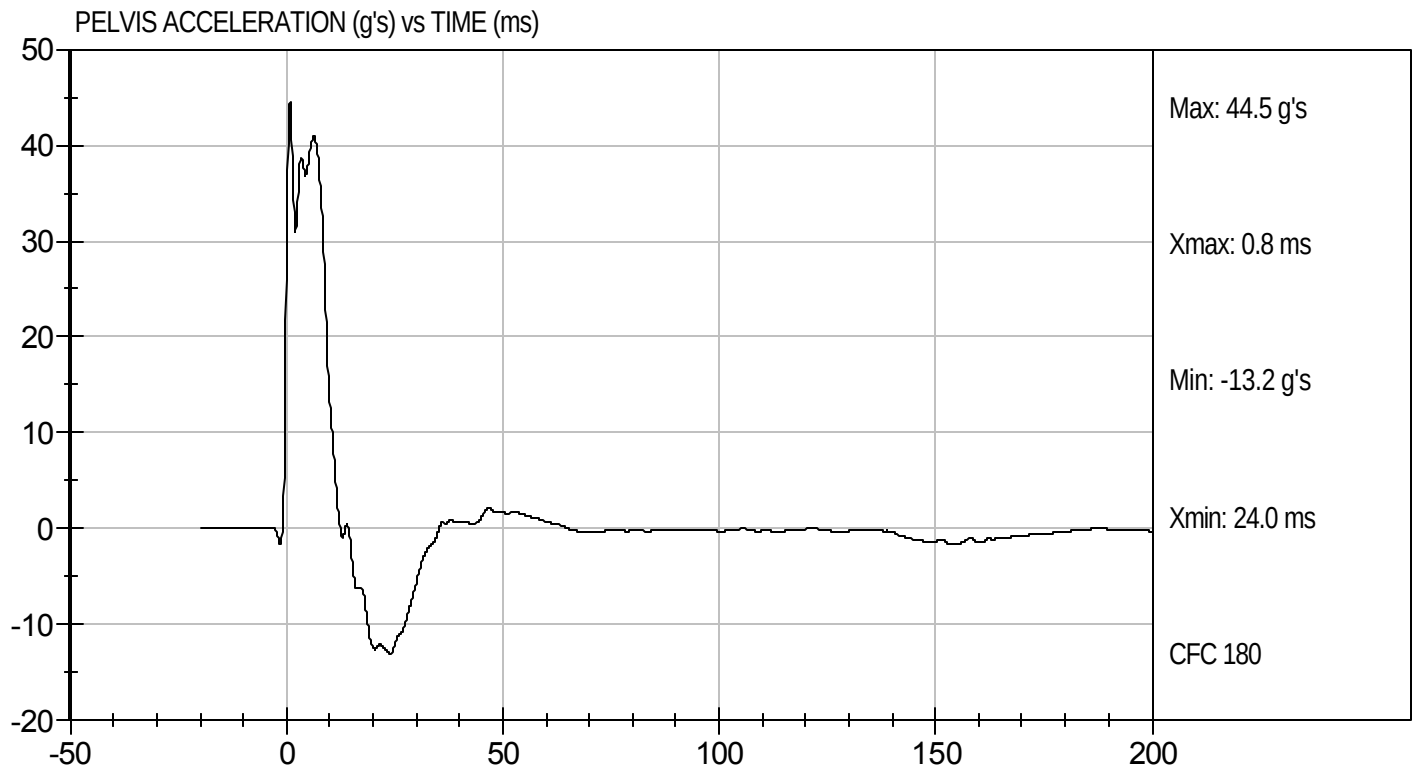
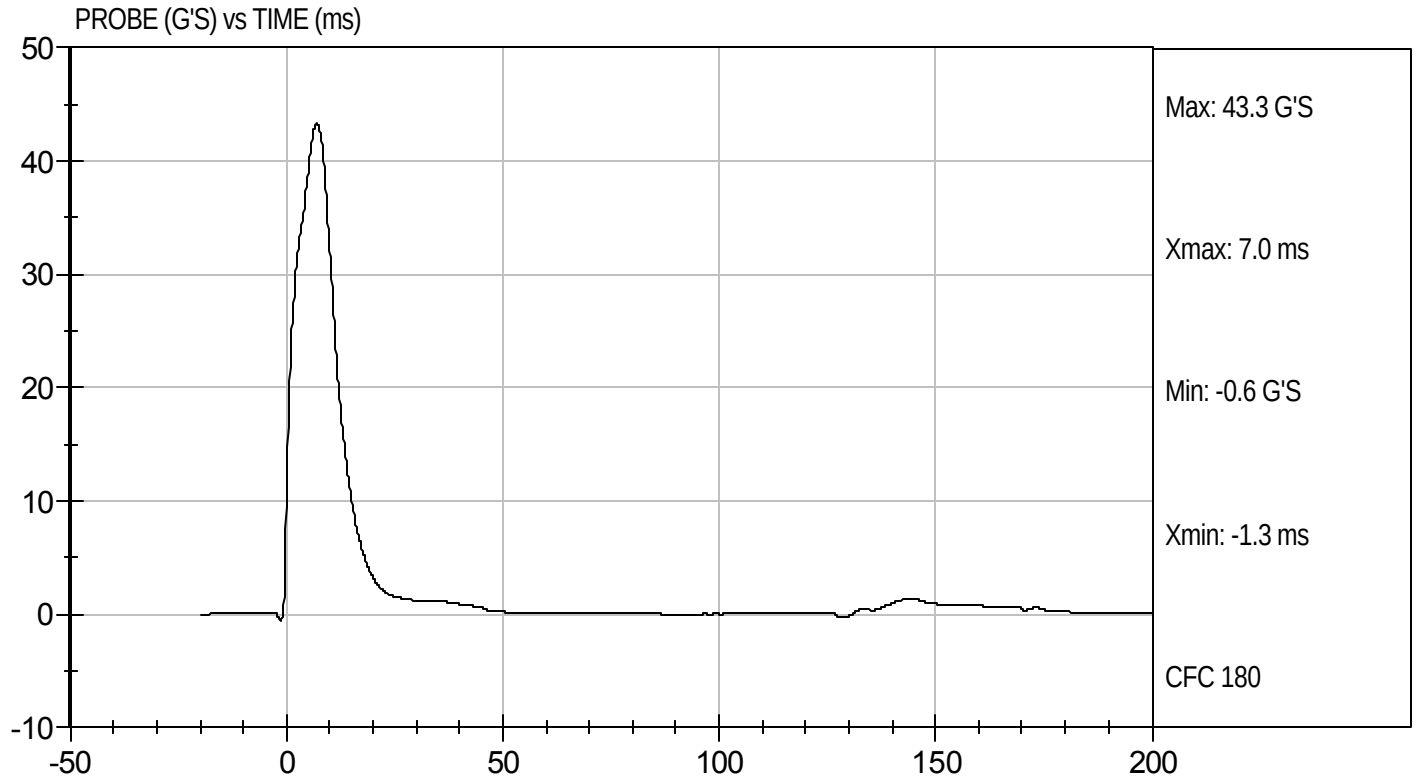
12/20/10
Test Date

David Winkelbauer
Approved By



Test Desc: Pelvis Impact
Component ID: D104507

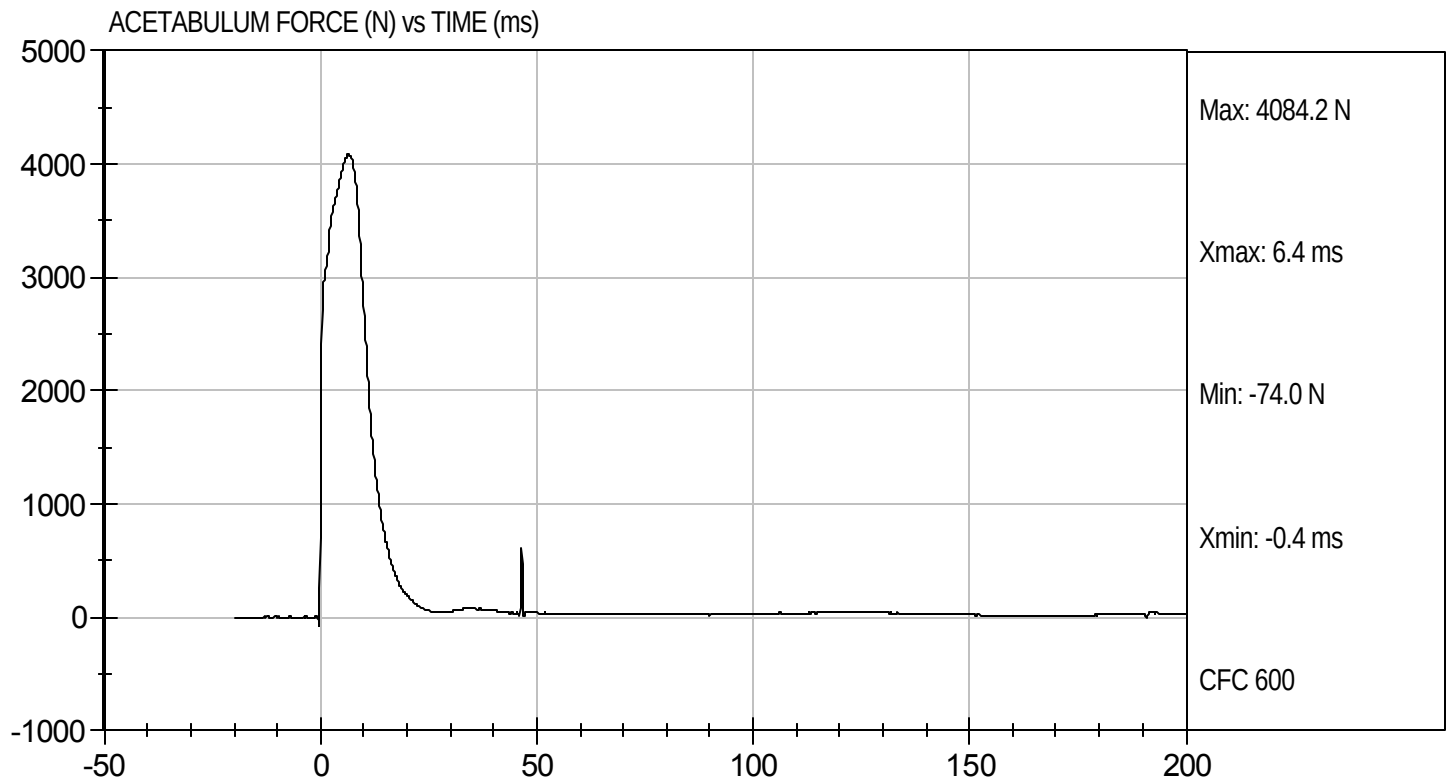
Test Date: 12/20/10
Velocity: 22.20 ft/s, 6.77 m/s





Test Desc: Pelvis Impact
Component ID: D104507

Test Date: 12/20/10
Velocity: 22.20 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: D104508

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.5	Pass
Humidity	%	10 to 70	13	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	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	4821	Pass
Overall Test Results			Pass	


Laboratory Technician

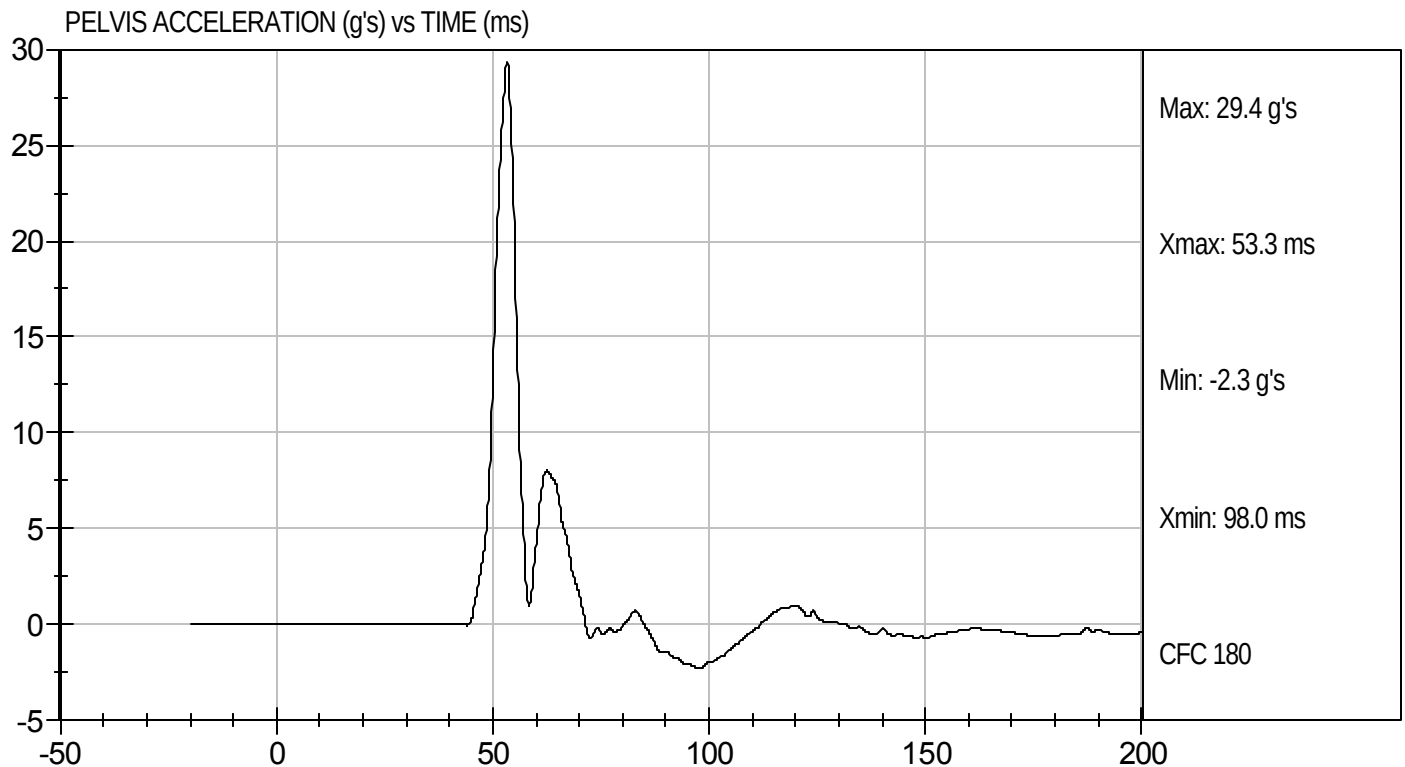
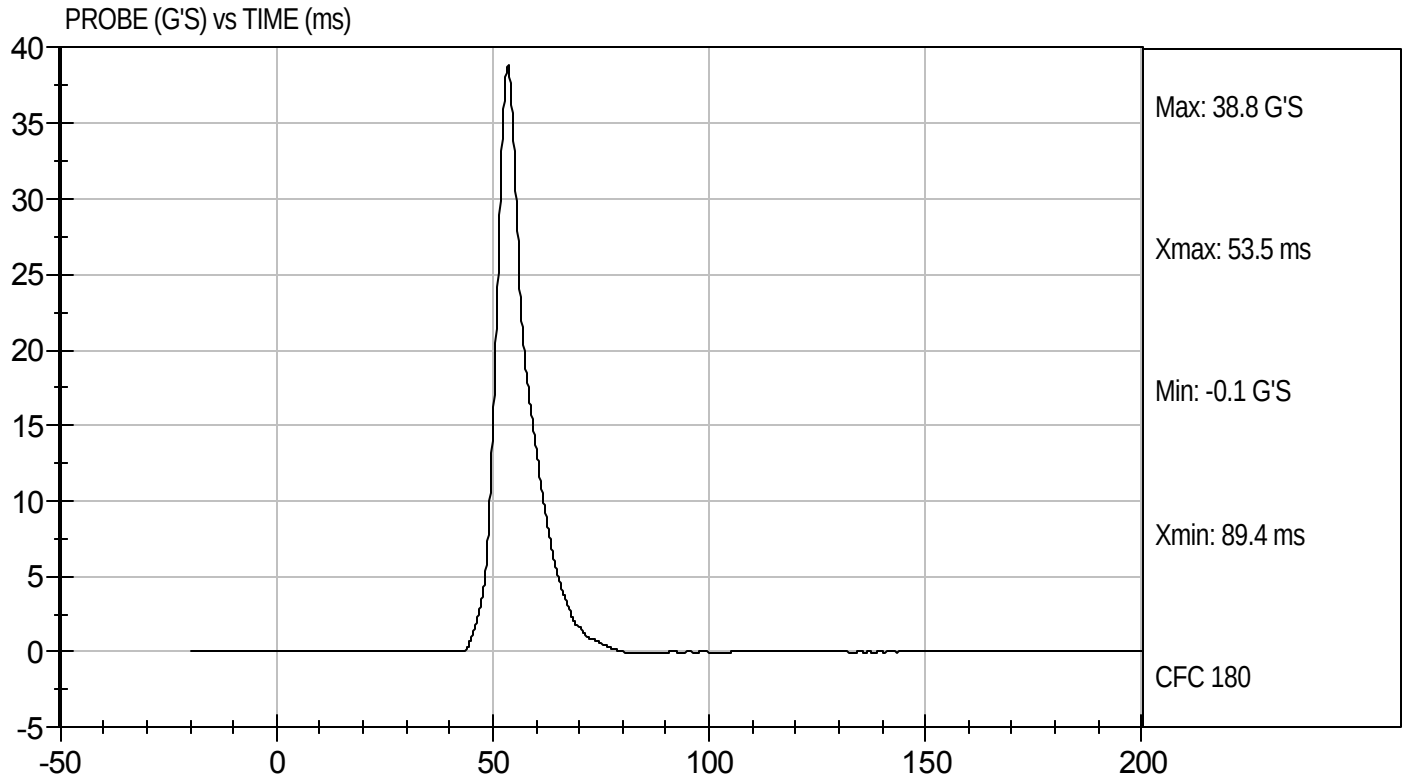
12/20/10
Test Date


Approved By



Test Desc: Iliac Impact
Component ID: D104508

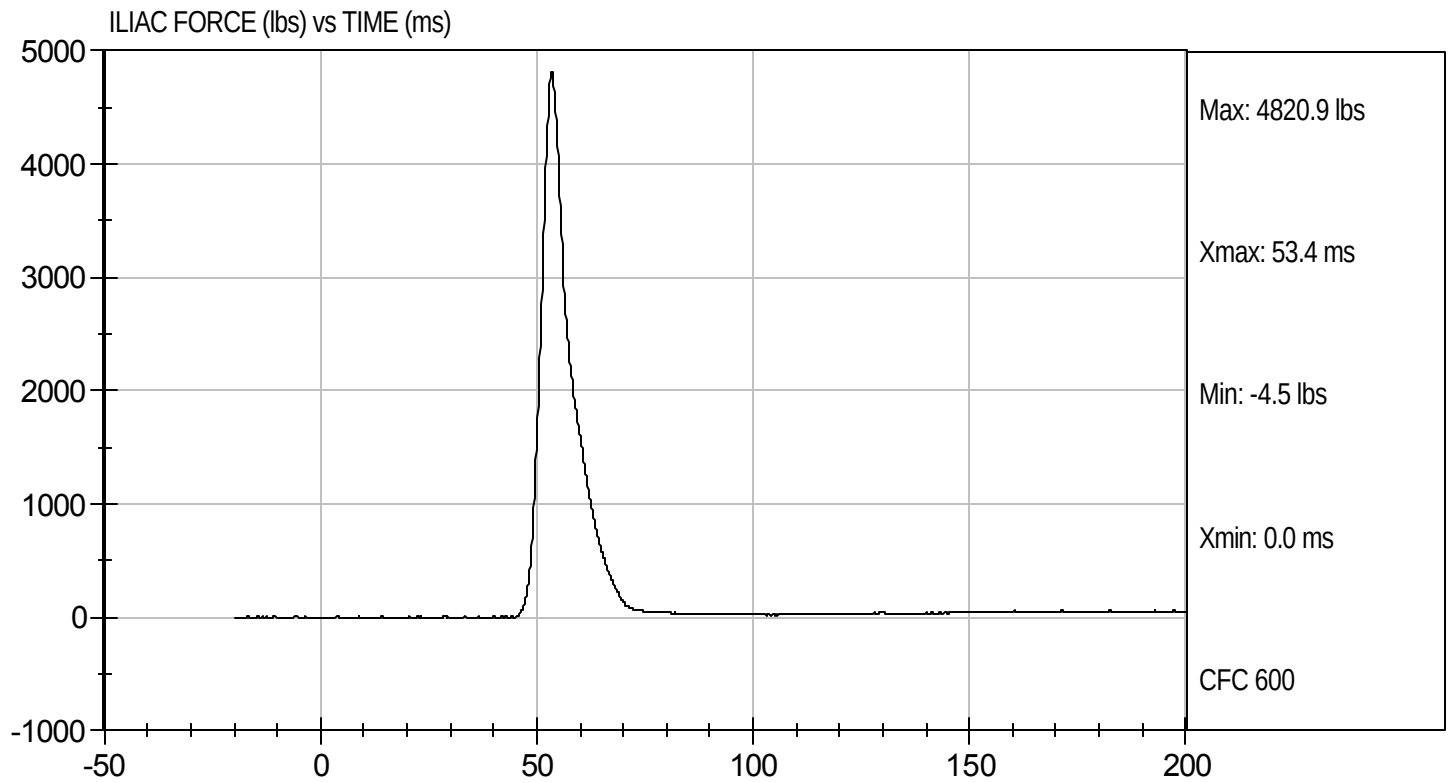
Test Date: 12/20/10
Velocity: 14.25 ft/s, 4.34 m/s





Test Desc: Iliac Impact
Component ID: D104508

Test Date: 12/20/10
Velocity: 14.25 ft/s, 4.34 m/s



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

ATD Serial No: 306

Test ID: D11491

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	22.0	Pass
Laboratory Relative Humidity	%	10 to 70	10	Pass
Peak Resultant Acceleration	G's	115 to 137	115	Pass
Peak Lateral Acceleration	G's	+/- 15	-8.1	Pass
Unimodal	N/A	<15%	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

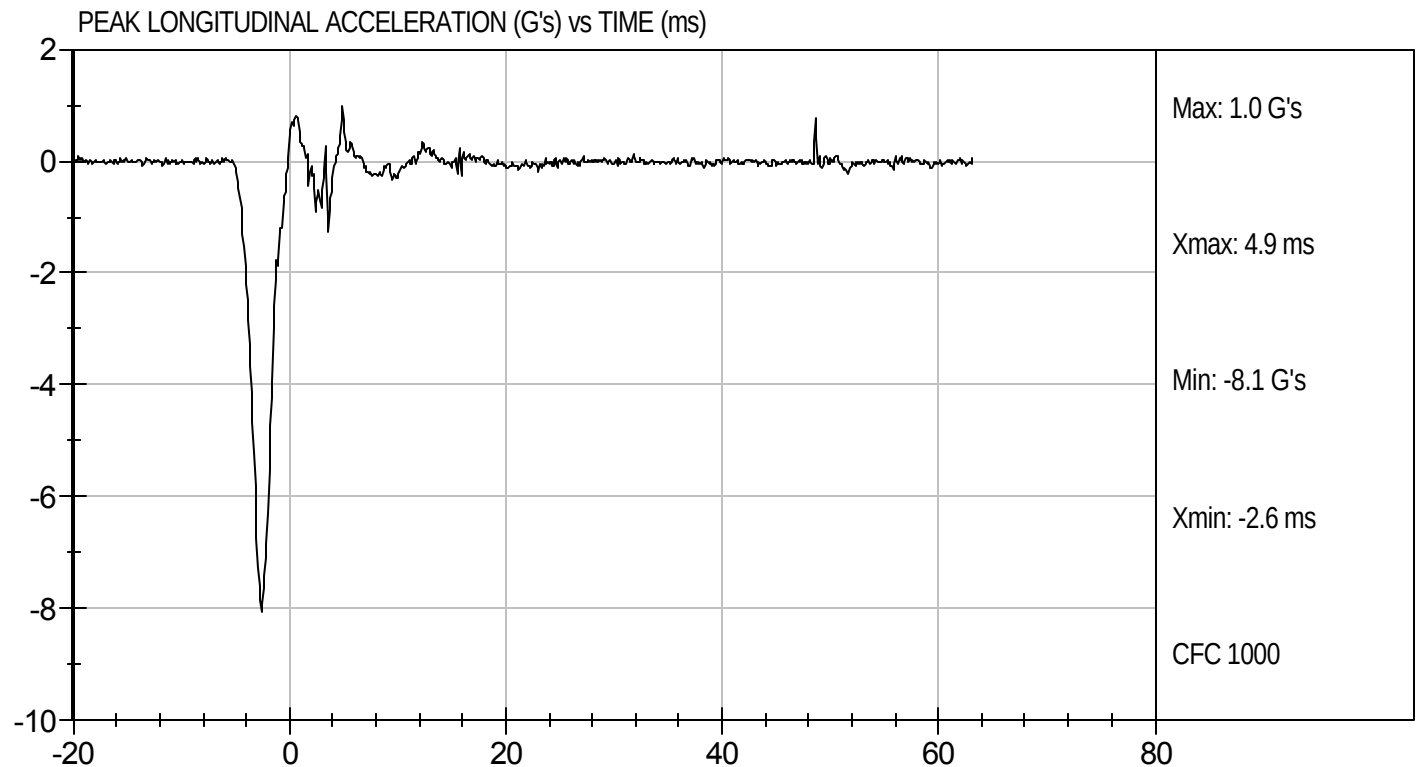
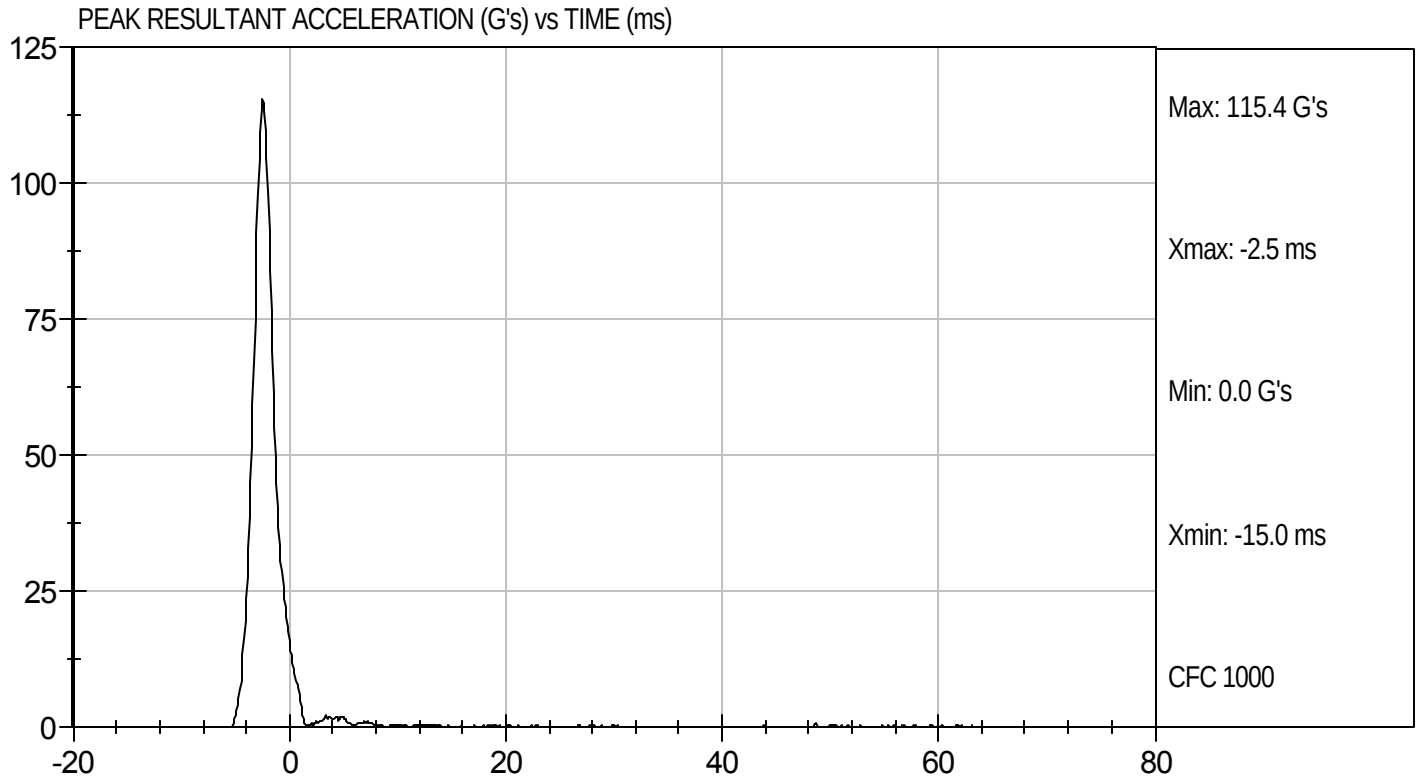
2/11/10
Test Date


Approved By



Test Desc: Head Drop
Component ID: D11491

Test Date: 2/11/10
Velocity: 0 ft/s, 0 m/s

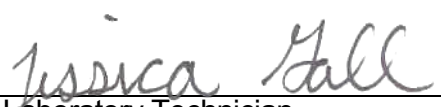


MGA RESEARCH CORPORATION
LATERAL NECK PENDULUM TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306

Test I.D: D11492

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21.9	Pass
Humidity		%	10 to 70	11	Pass
Impact Velocity		m/s	5.51 to 5.63	5.52	Pass
Delta Velocity	10 ms	m/s	2.20 to 2.80	2.45	Pass
	15 ms	m/s	3.30 to 4.10	3.45	Pass
	20 ms	m/s	4.40 to 5.40	4.54	Pass
	25 ms	m/s	5.40 to 6.10	5.43	Pass
	25-100 ms	m/s	5.50 to 6.20	5.61	Pass
Maximum D-Plane Rotation		deg	71 to 81	72	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	60	Pass
Maximum Occipital Condyle Moment during Rotation Interval Nm			-44 to -36	-42	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	116	Pass
Overall Test Results				Pass	


 Laboratory Technician

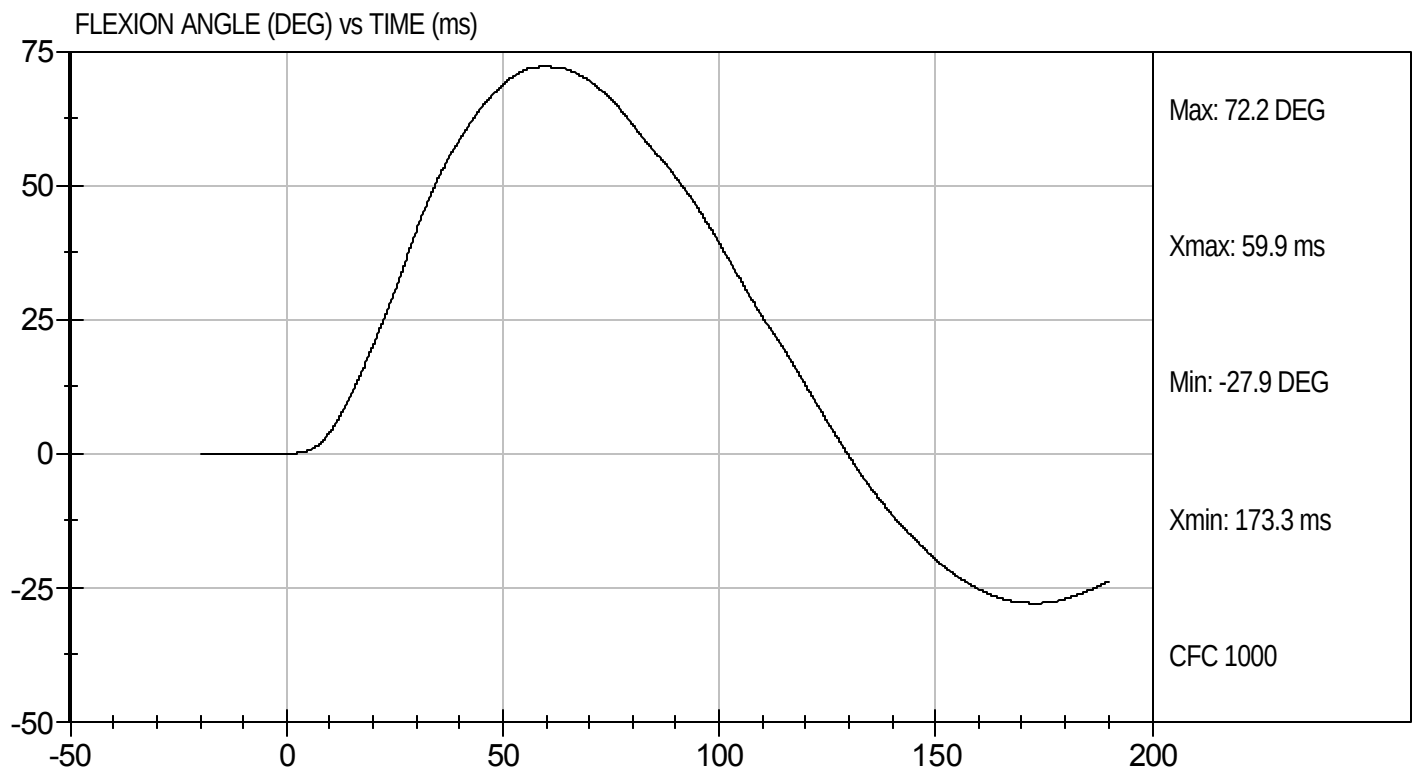
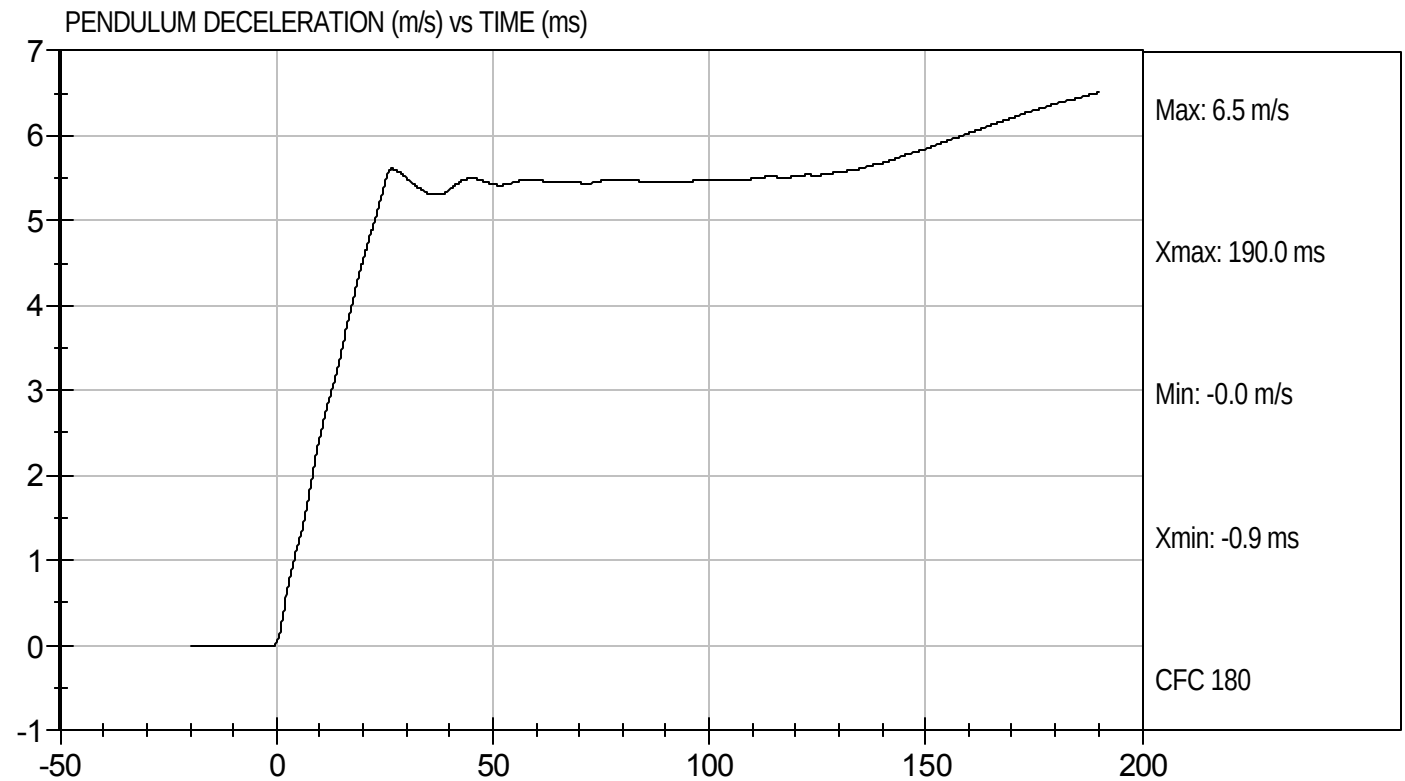
2/10/11
 Test Date


 Approved By



Test Desc: Neck Bending
Component ID: D11492

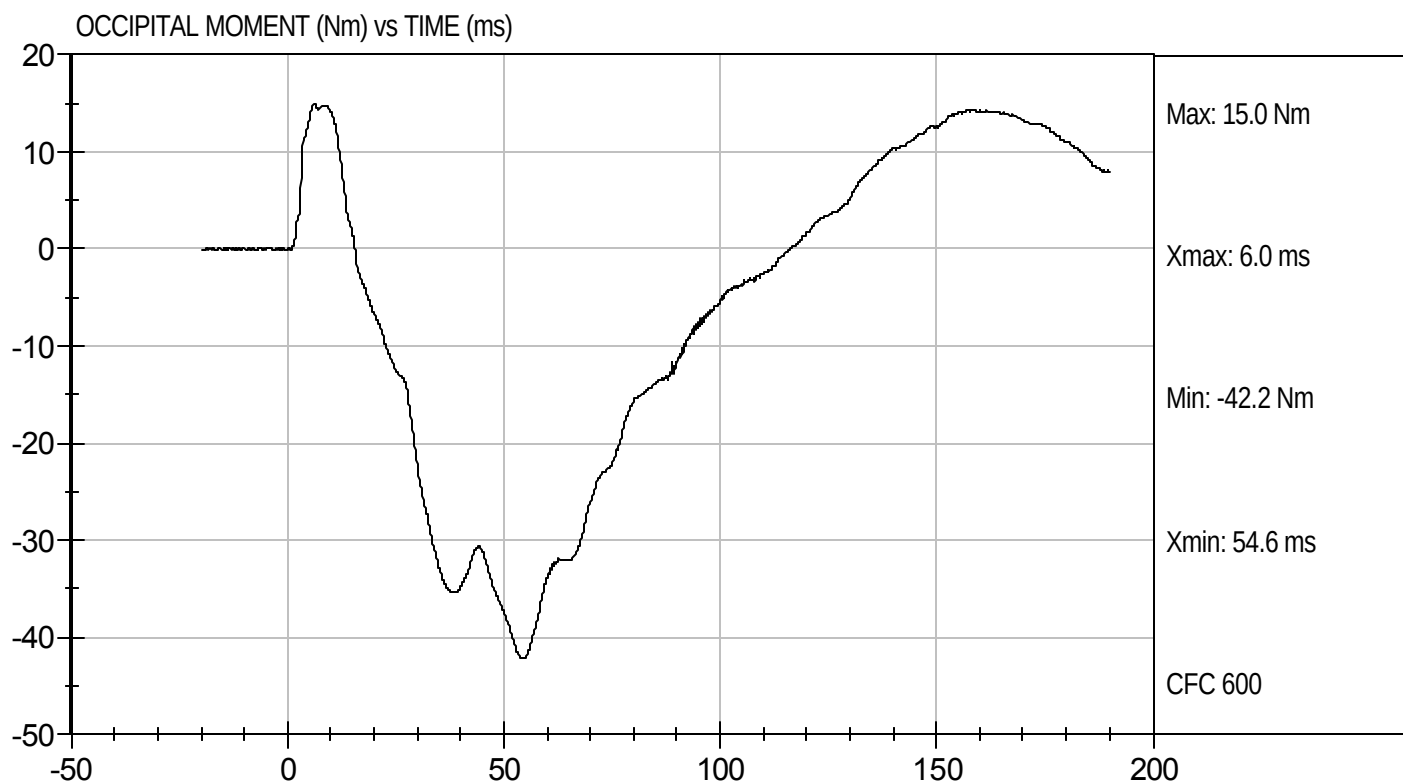
Test Date: 2/10/11
Velocity: 18.12 ft/s, 5.52 m/s





Test Desc: Neck Bending
Component ID: D11492

Test Date: 2/10/11
Velocity: 18.12 ft/s, 5.52 m/s



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

ATD Serial No: 306

Test ID: D11493

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	20.9	Pass
Laboratory Relative Humidity	%	10 to 70	13	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	18	Pass
Overall Test Results			Pass	

Jessica Hall
Laboratory Technician

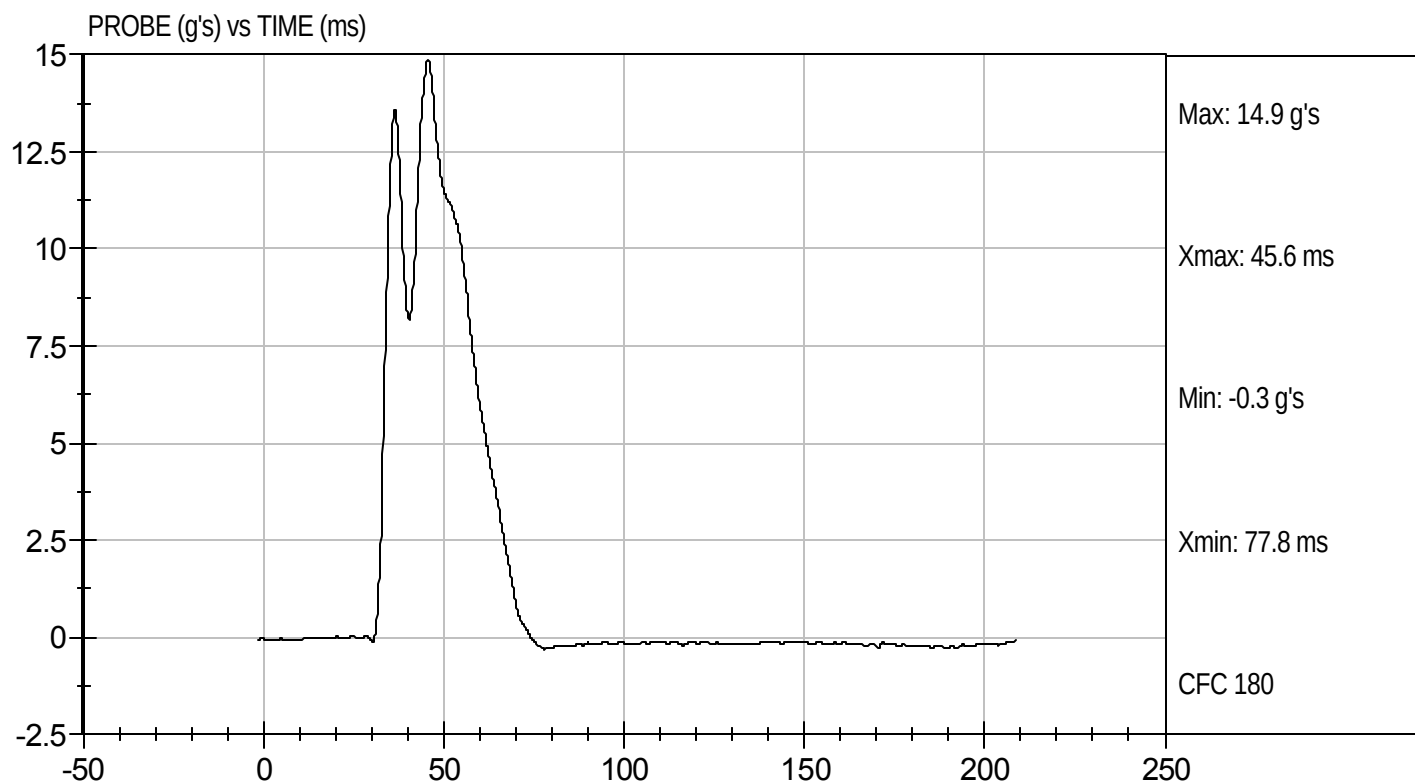
2/10/11
Test Date

David Winkelbauer
Approved By



Test Desc: Shoulder Impact
Component ID: D11493

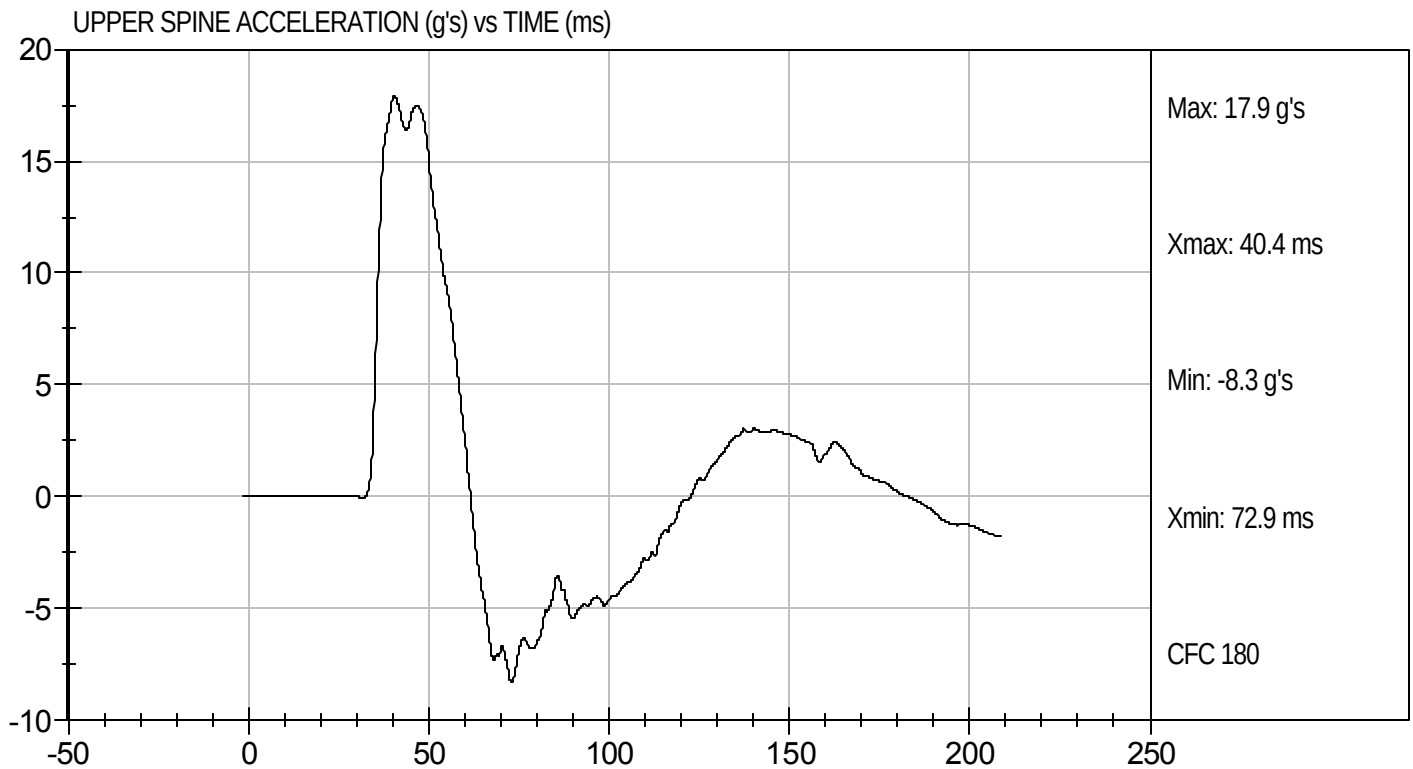
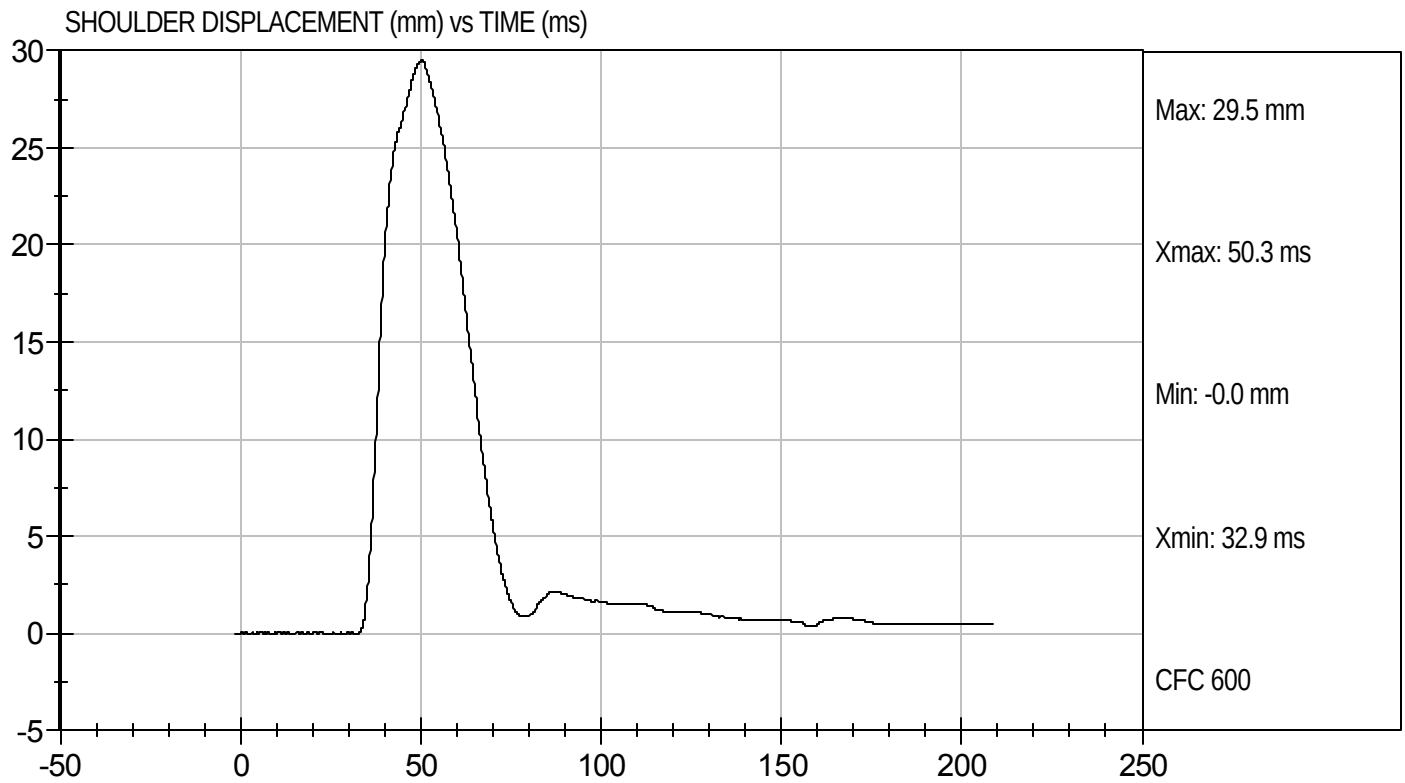
Test Date: 2/10/11
Velocity: 14.37 ft/s, 4.38 m/s





Test Desc: Shoulder Impact
Component ID: D11493

Test Date: 2/10/11
Velocity: 14.37 ft/s, 4.38 m/s



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

ATD Serial No: 306

Test I.D: D11494

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.0	Pass
Humidity	%	10 to 70	13	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	33	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	33	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

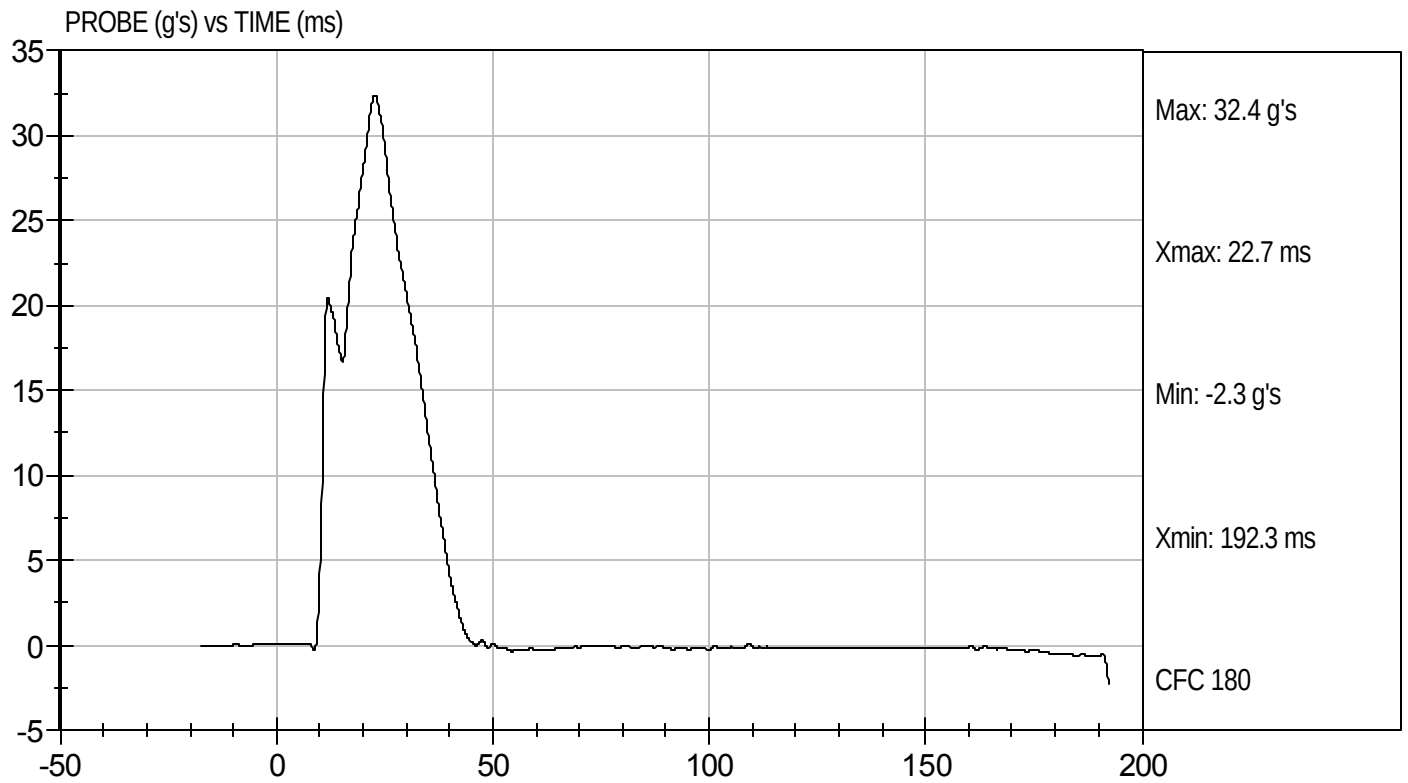
2/10/11
Test Date

David Winkelbauer
Approved By



Test Desc: Thorax With Arm
Component ID: D11494

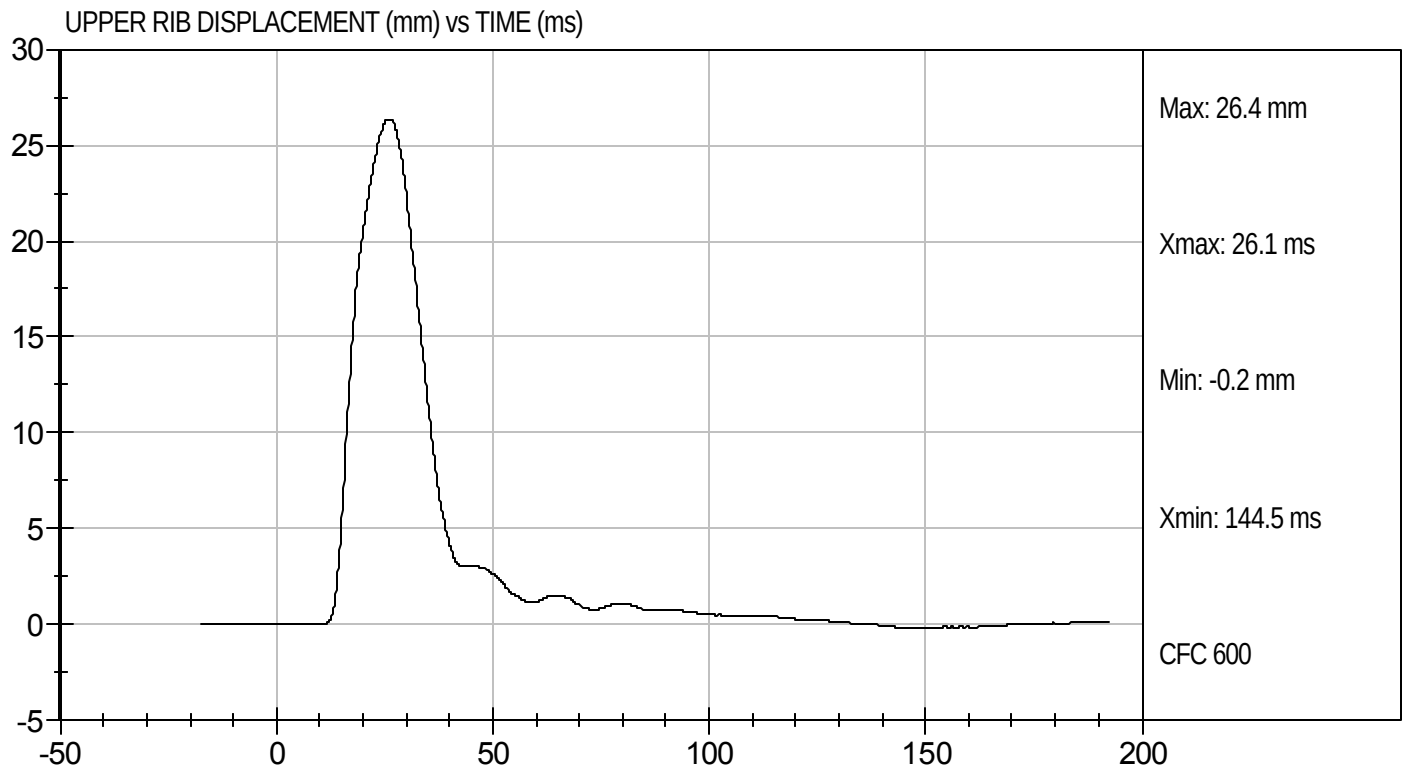
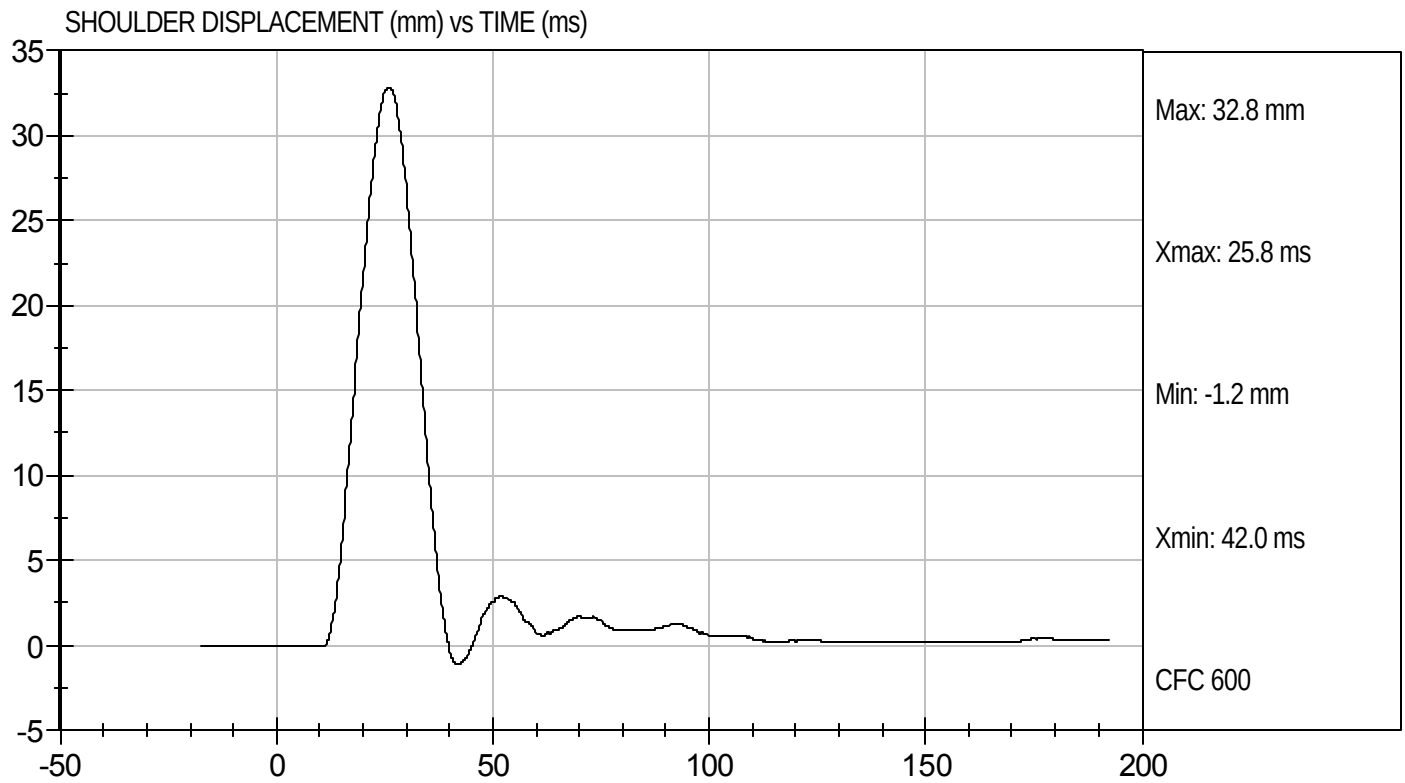
Test Date: 2/10/11
Velocity: 22.22 ft/s, 6.77 m/s





Test Desc: Thorax With Arm
Component ID: D11494

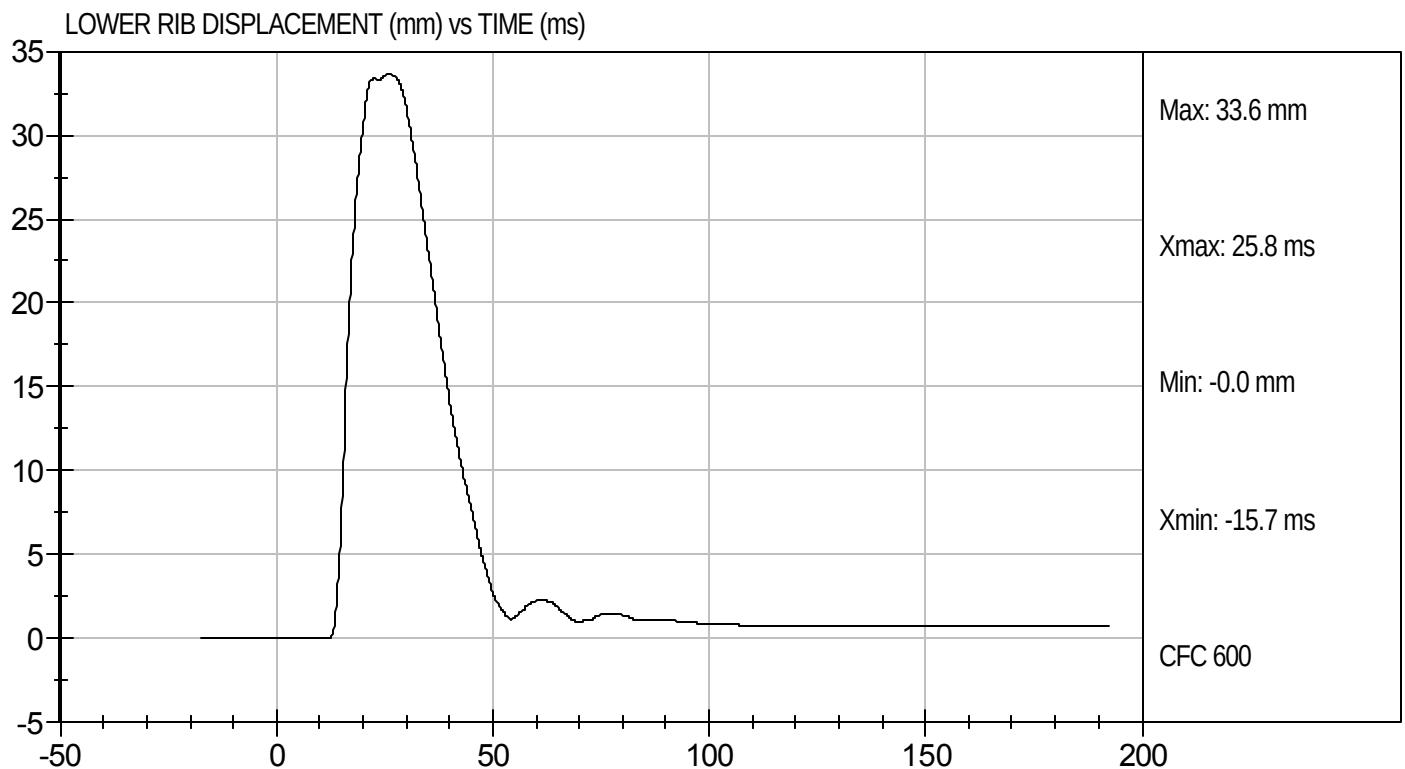
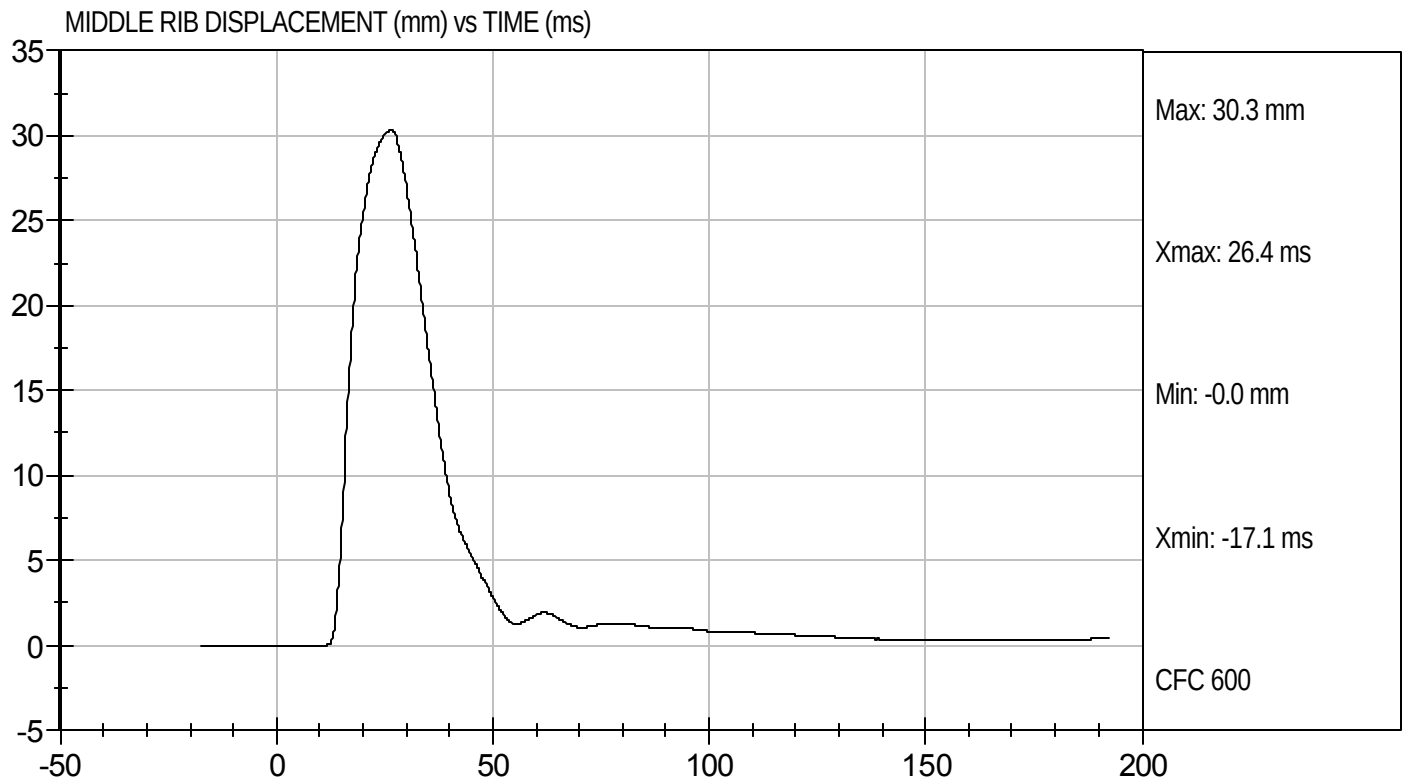
Test Date: 2/10/11
Velocity: 22.22 ft/s, 6.77 m/s





Test Desc: Thorax With Arm
Component ID: D11494

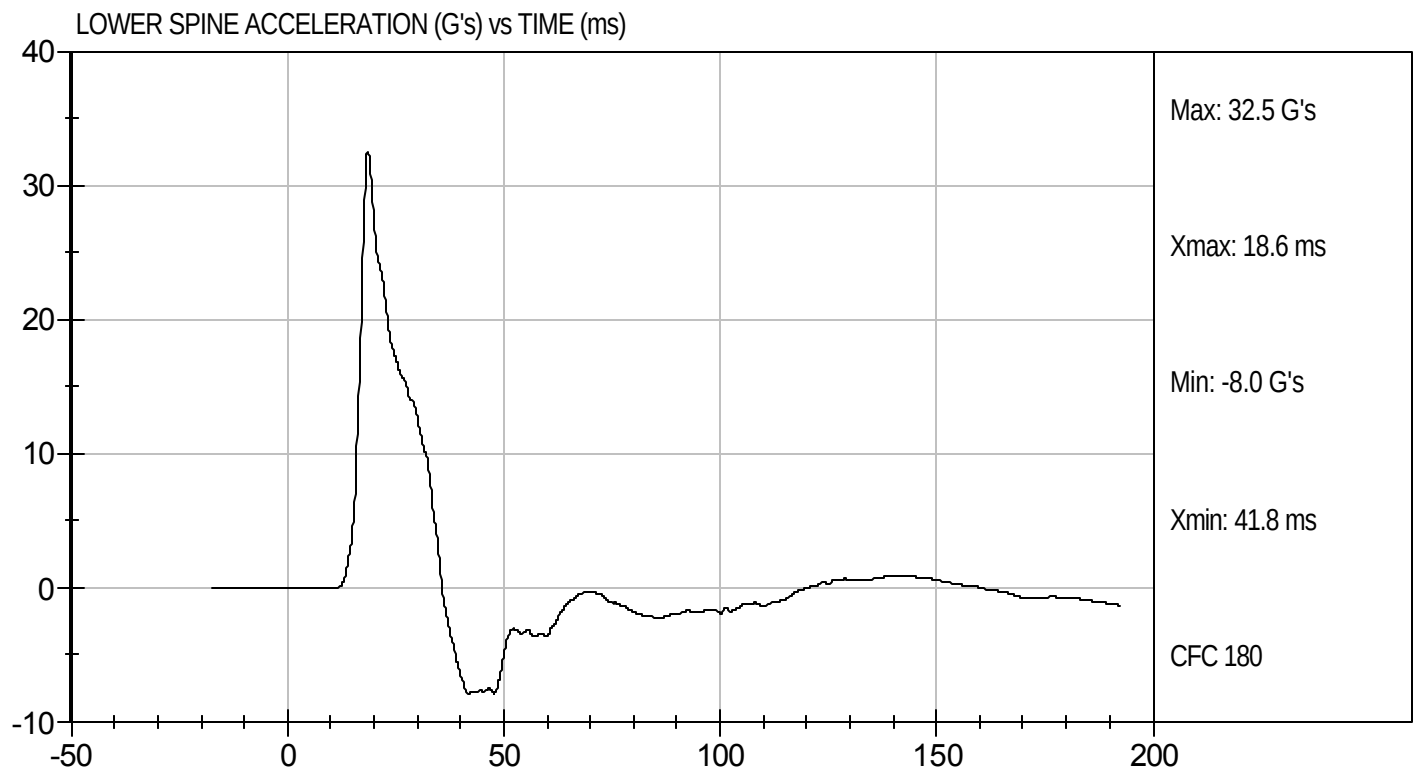
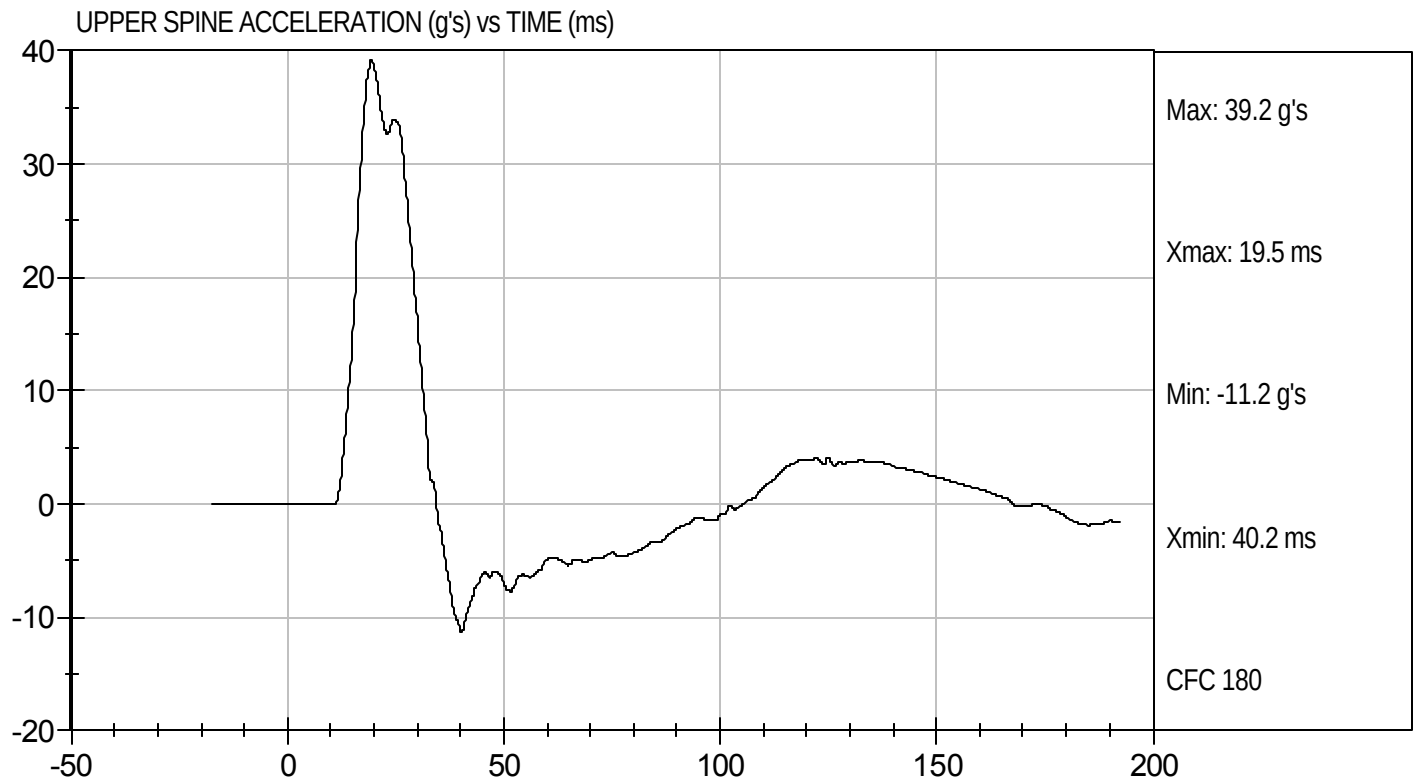
Test Date: 2/10/11
Velocity: 22.22 ft/s, 6.77 m/s





Test Desc: Thorax With Arm
Component ID: D11494

Test Date: 2/10/11
Velocity: 22.22 ft/s, 6.77 m/s

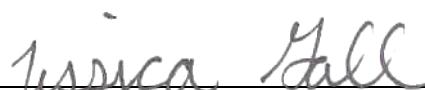


MGA RESEARCH CORPORATION
THORAX (WITHOUT ARM) IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306

Test I.D: D11495

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	20.9	Pass
Humidity	%	10 to 70	12	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Peak Impactor Force	G's	14 to 18	15	Pass
Upper Rib Displacement	mm	32 to 40	34	Pass
Middle Rib Displacement	mm	39 to 45	40	Pass
Lower Rib Displacement	mm	35 to 43	40	Pass
Upper Spine (T1) Y Acceleration	G's	13 to 17	15	Pass
Lower Spine (T12) Y Acceleration	G's	7 to 11	10	Pass
Overall Test Results			Pass	


Laboratory Technician

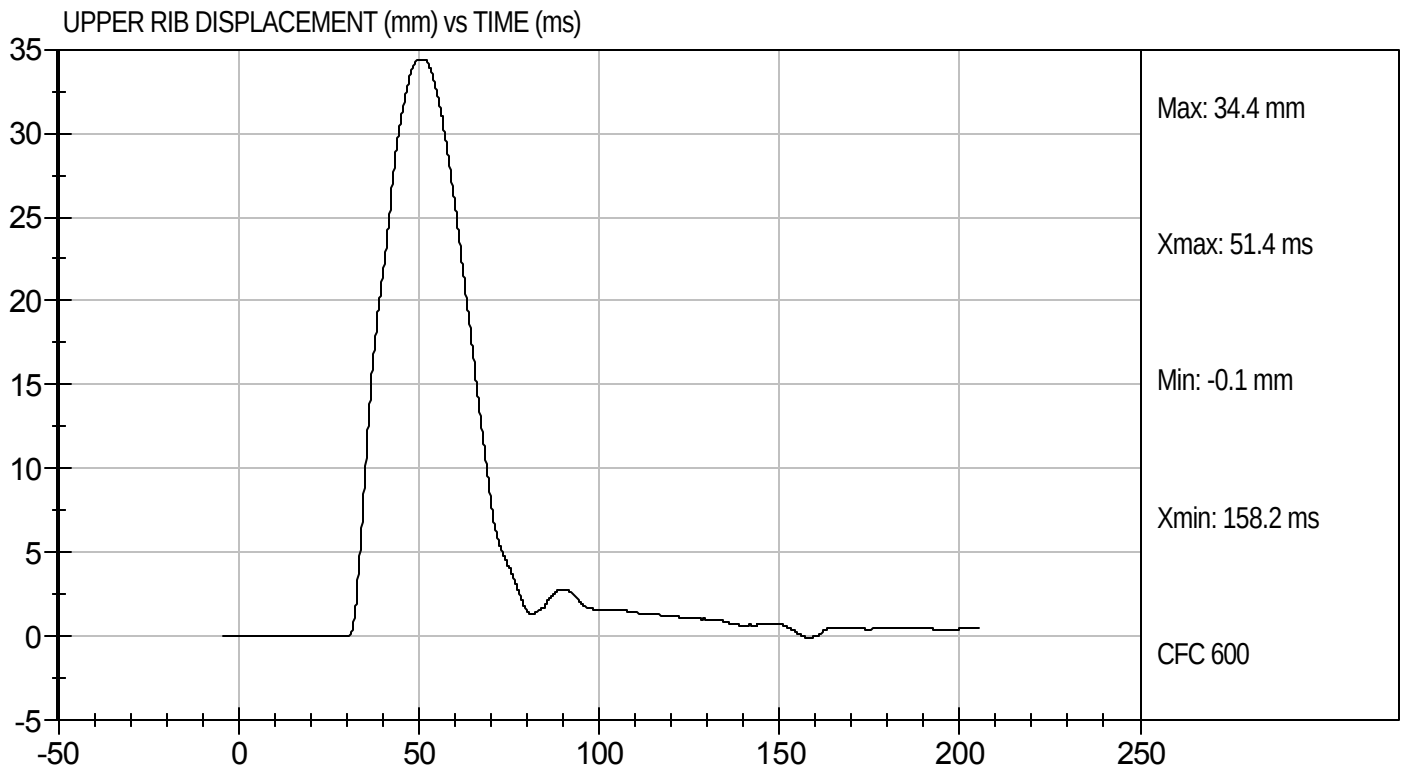
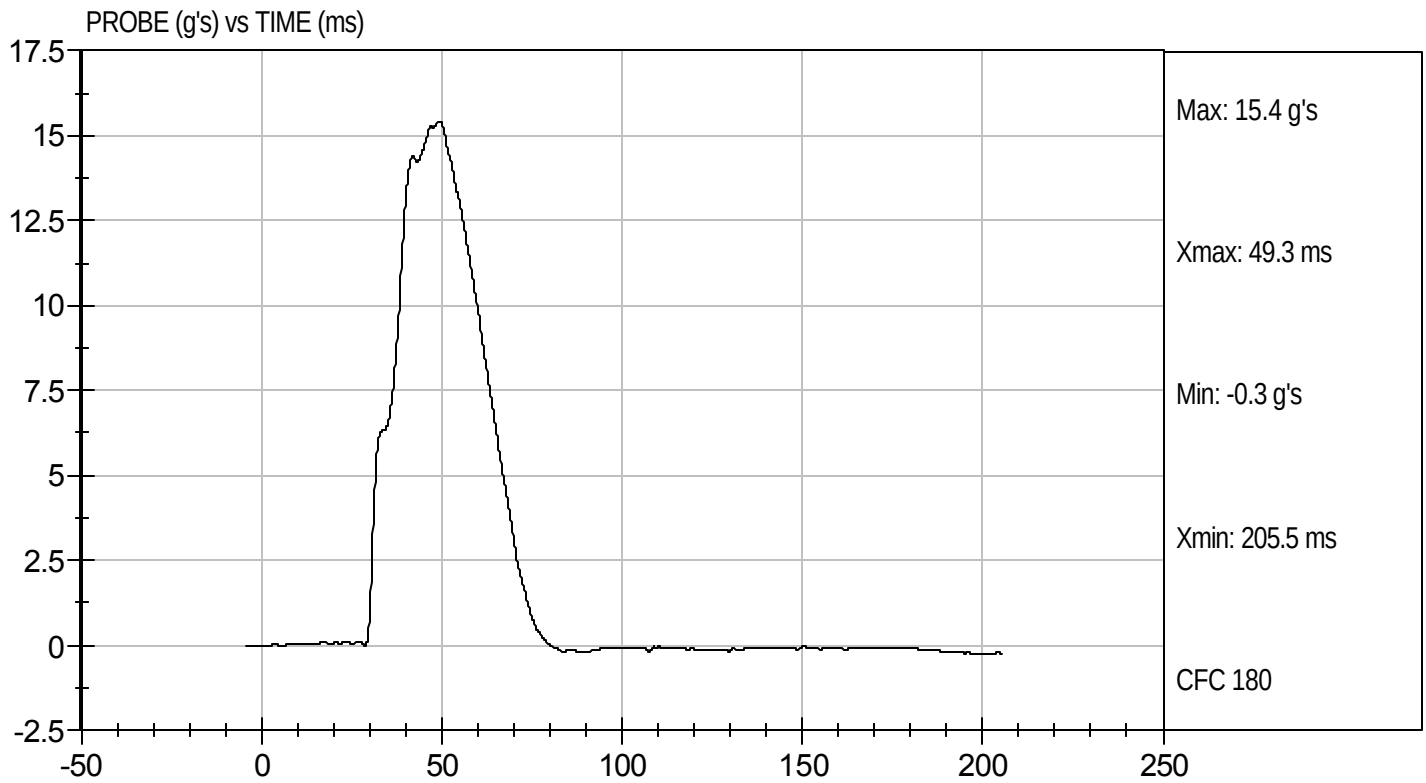
2/10/11
Test Date


Approved By



Test Desc: Thorax Without Arm
Component ID: D11495

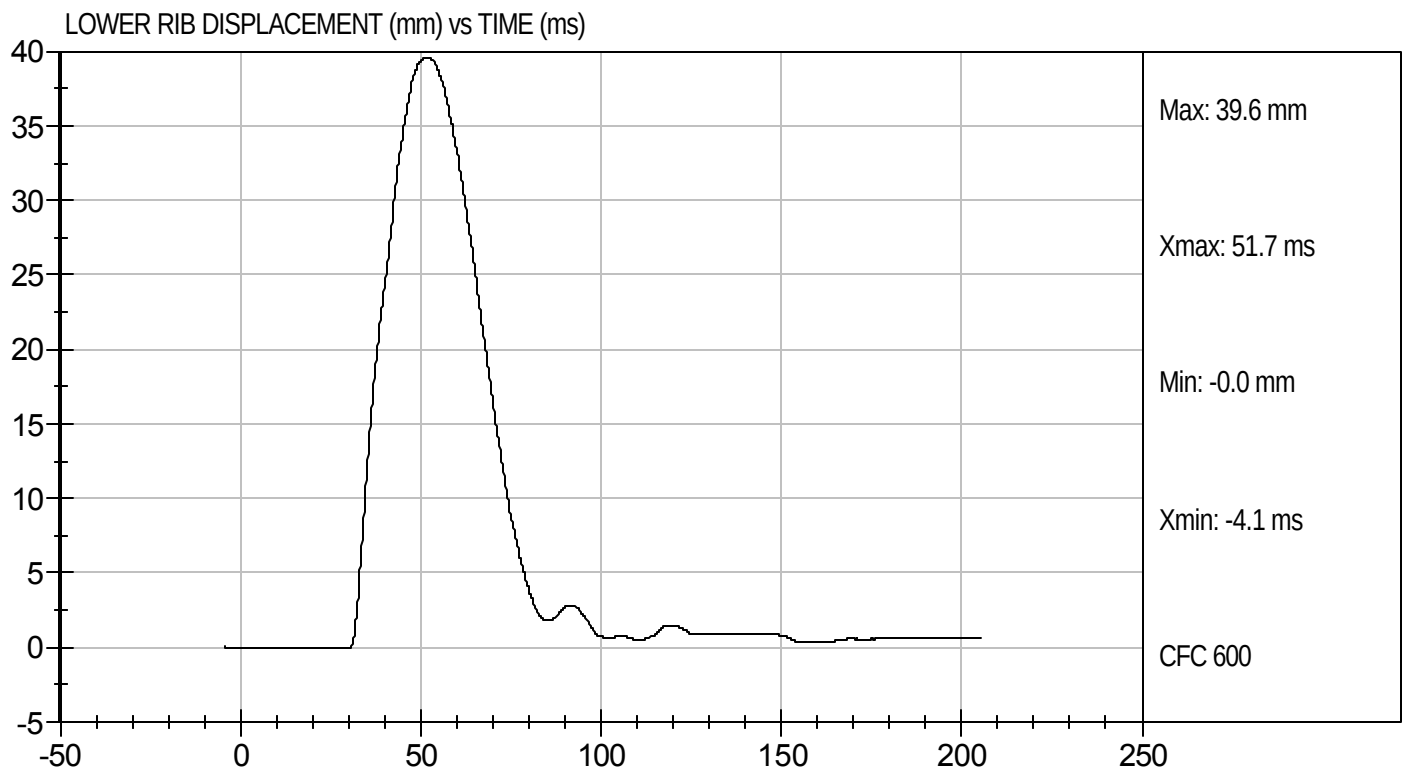
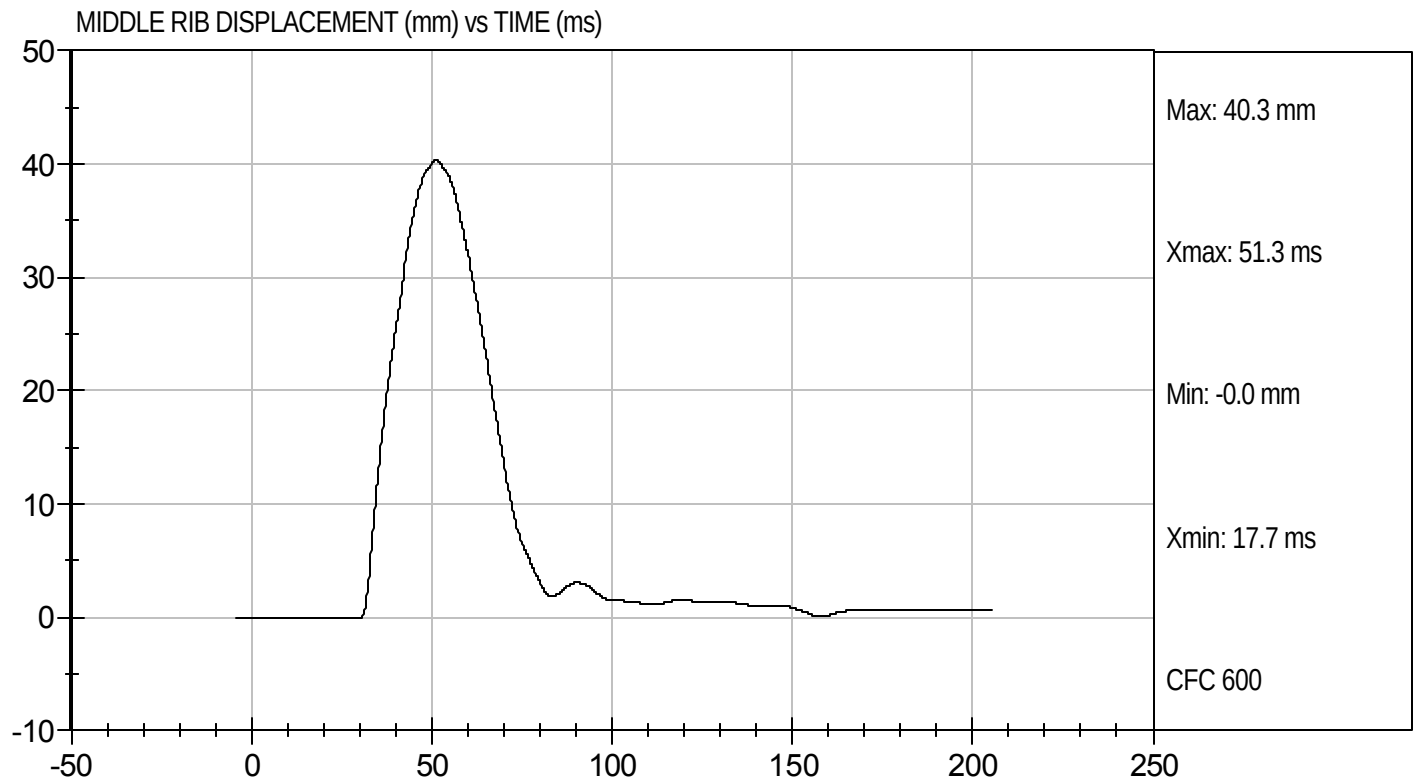
Test Date: 2/10/11
Velocity: 14.37 ft/s, 4.38 m/s





Test Desc: Thorax Without Arm
Component ID: D11495

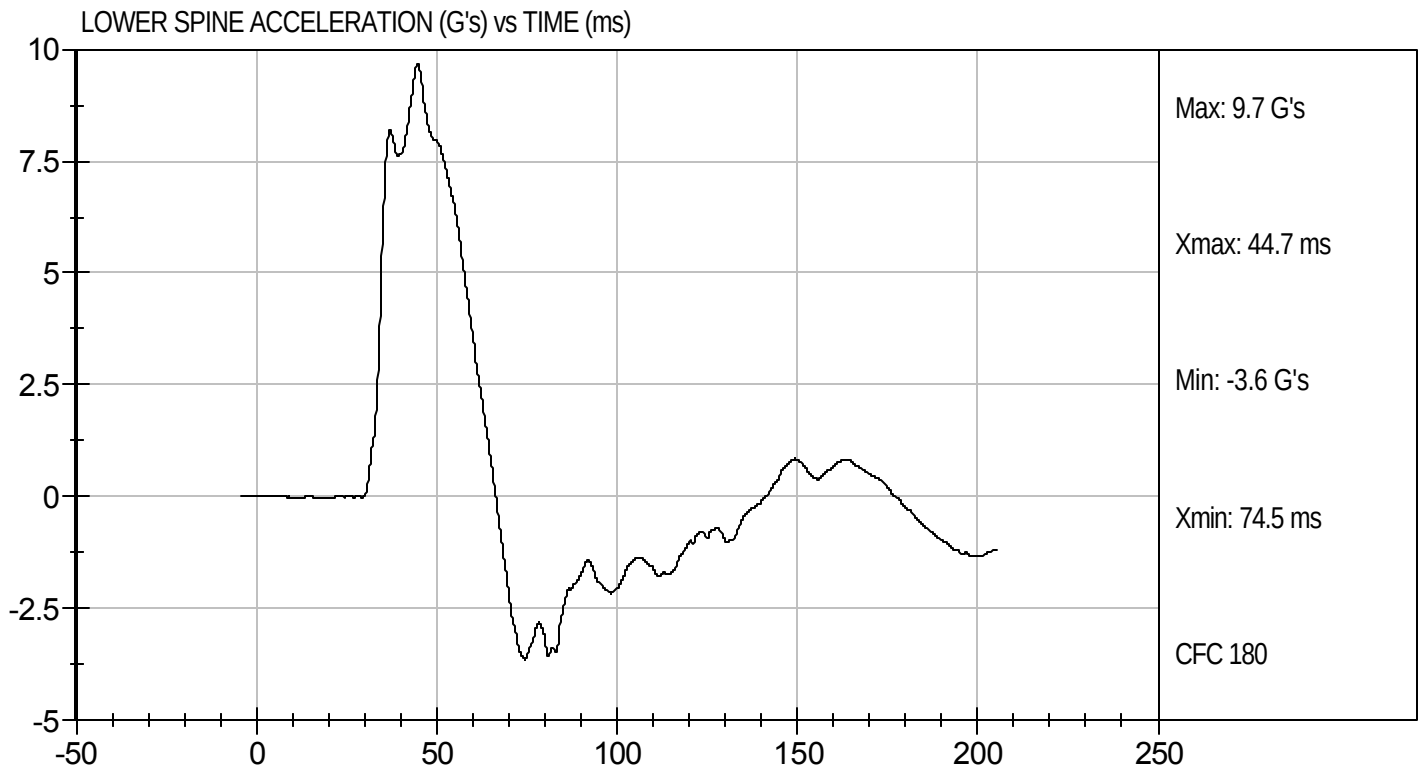
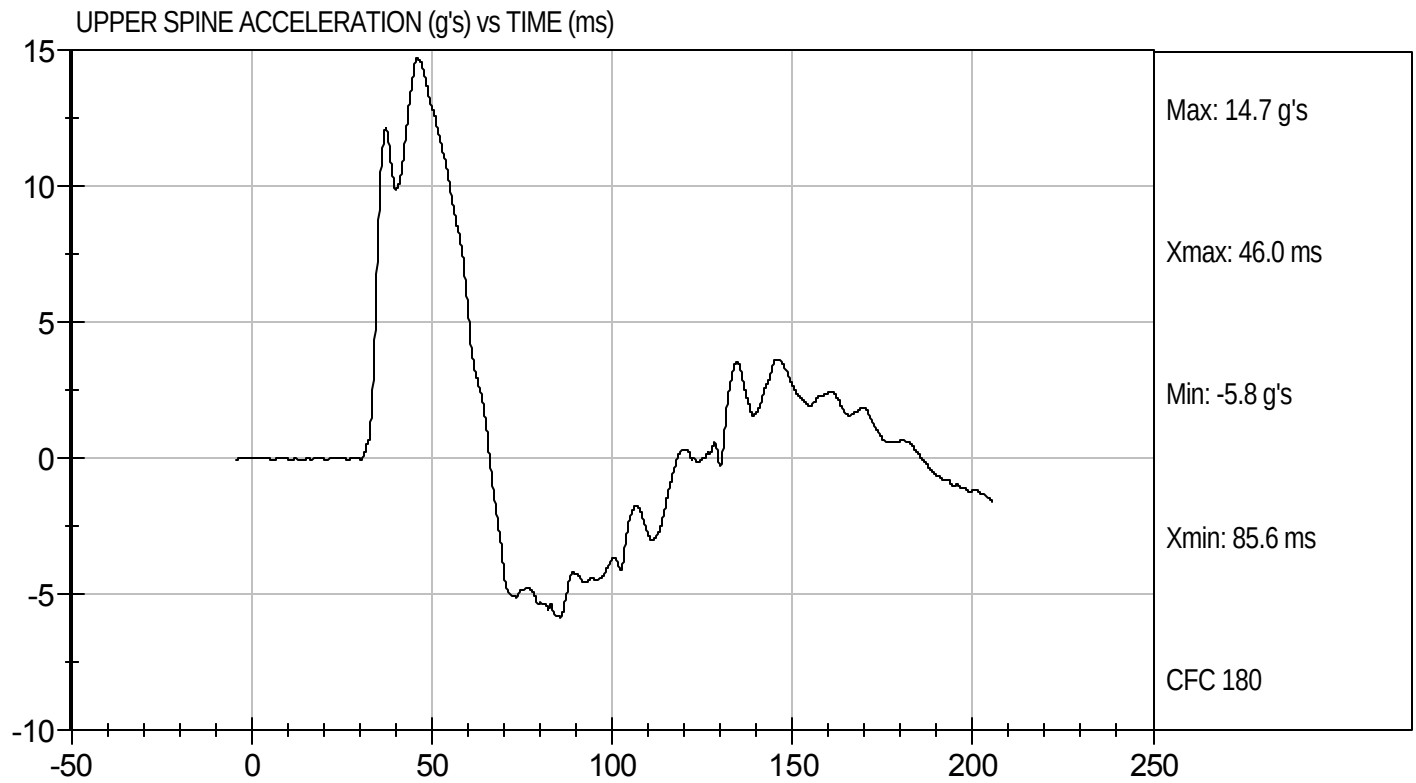
Test Date: 2/10/11
Velocity: 14.37 ft/s, 4.38 m/s





Test Desc: Thorax Without Arm
Component ID: D11495

Test Date: 2/10/11
Velocity: 14.37 ft/s, 4.38 m/s



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

ATD Serial No: 306

Test I.D: D11496

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.0	Pass
Humidity	%	10 to 70	12	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	Pass
Peak Impactor Acceleration	G's	12 to 16	14	Pass
Upper Rib Displacement	mm	36 to 47	39	Pass
Lower Rib Displacement	mm	33 to 44	36	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	11	Pass
			Overall Test Results	Pass


Laboratory Technician

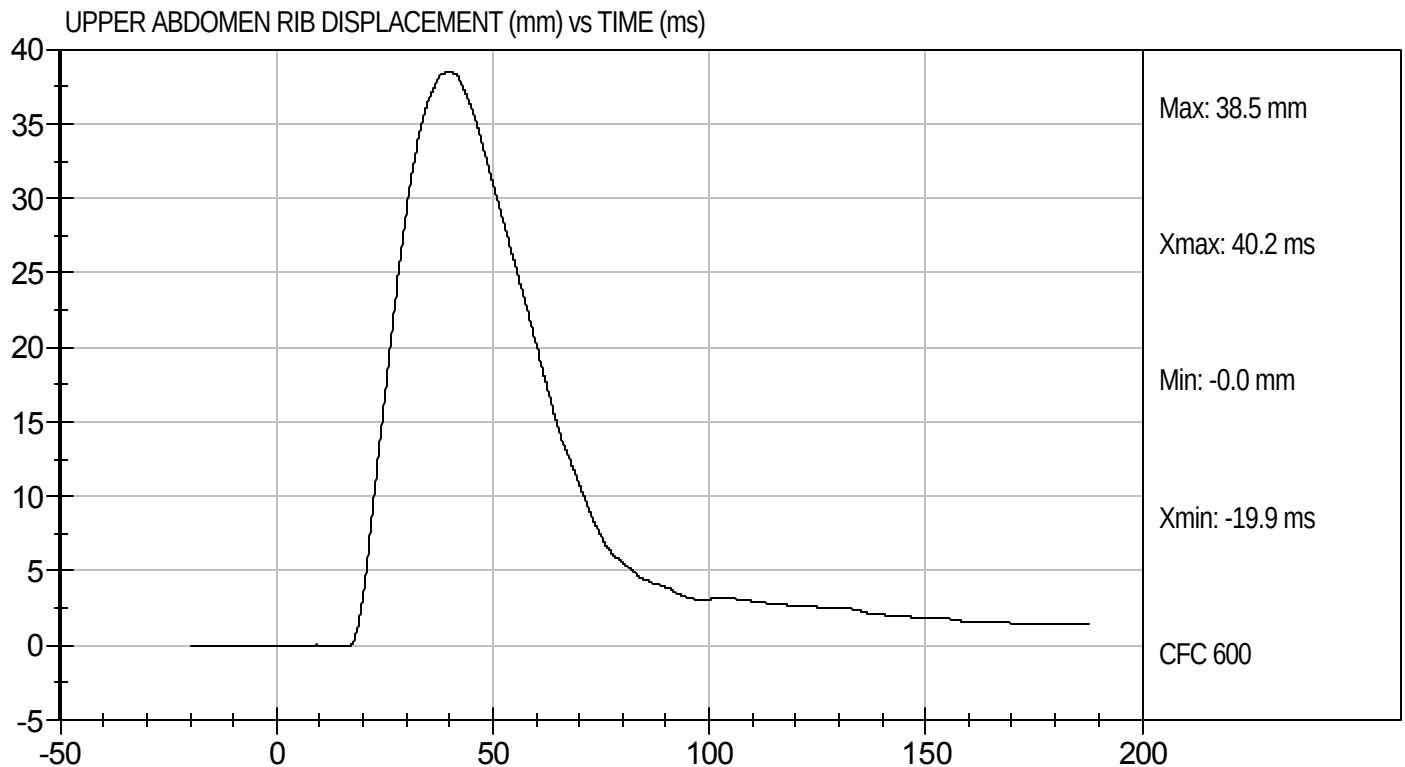
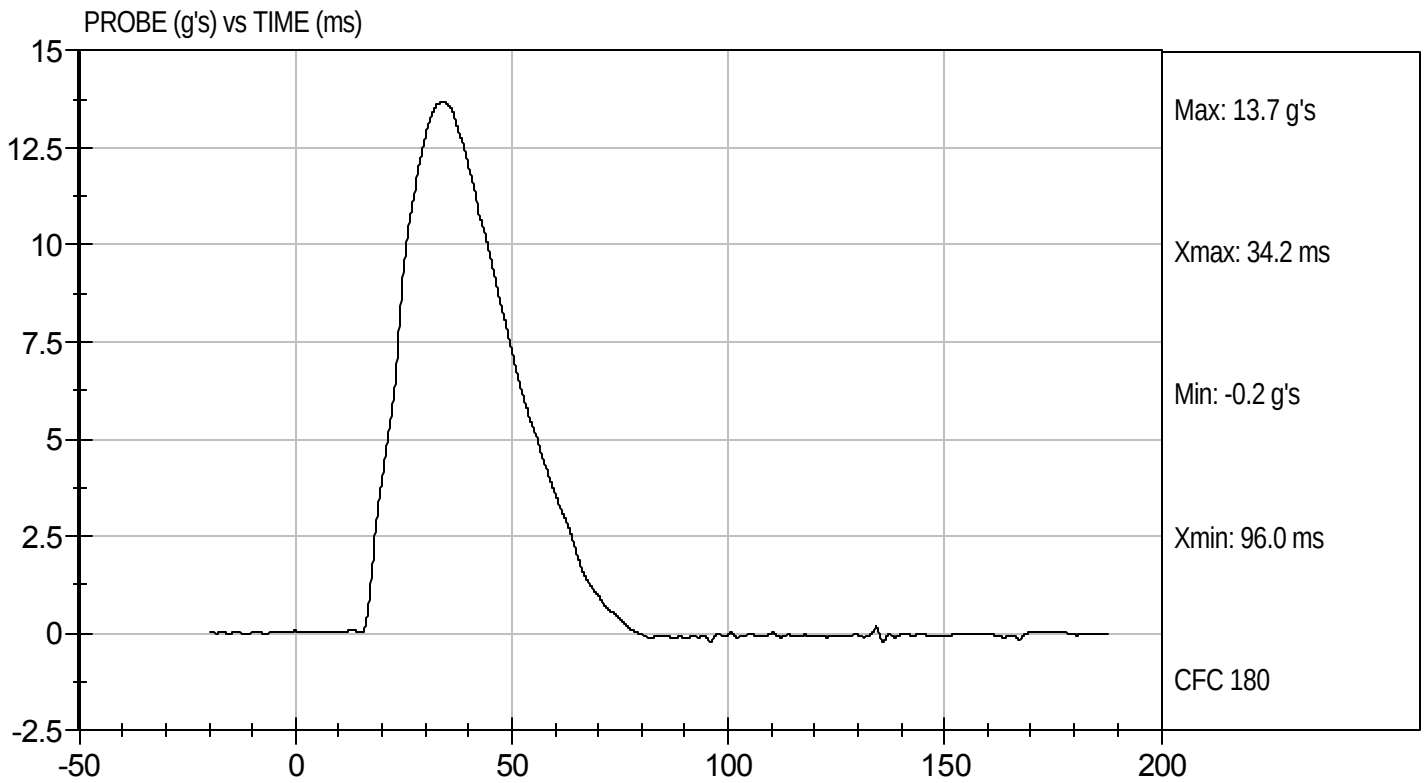
2/10/11
Test Date


Approved By



Test Desc: Abdomen Impact
Component ID: D11496

Test Date: 2/10/11
Velocity: 14.25 ft/s, 4.34 m/s

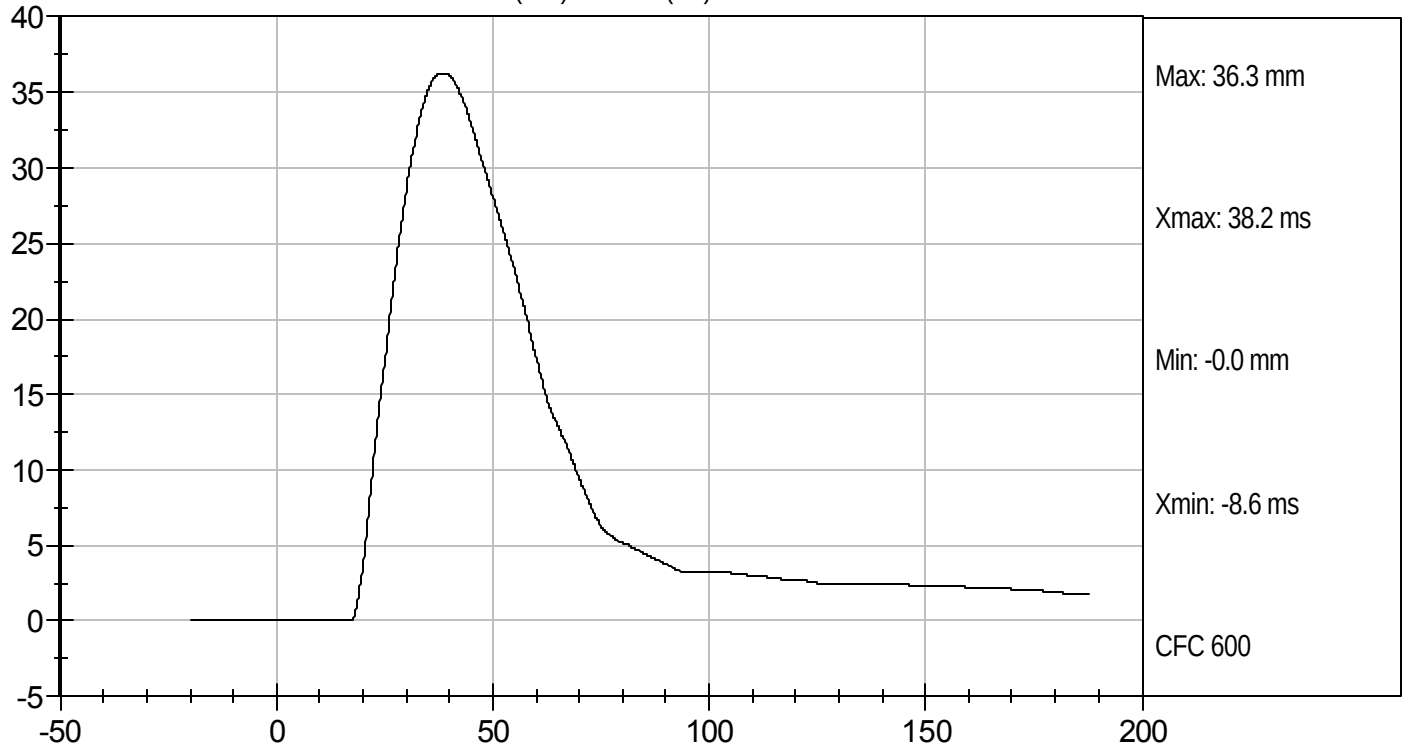




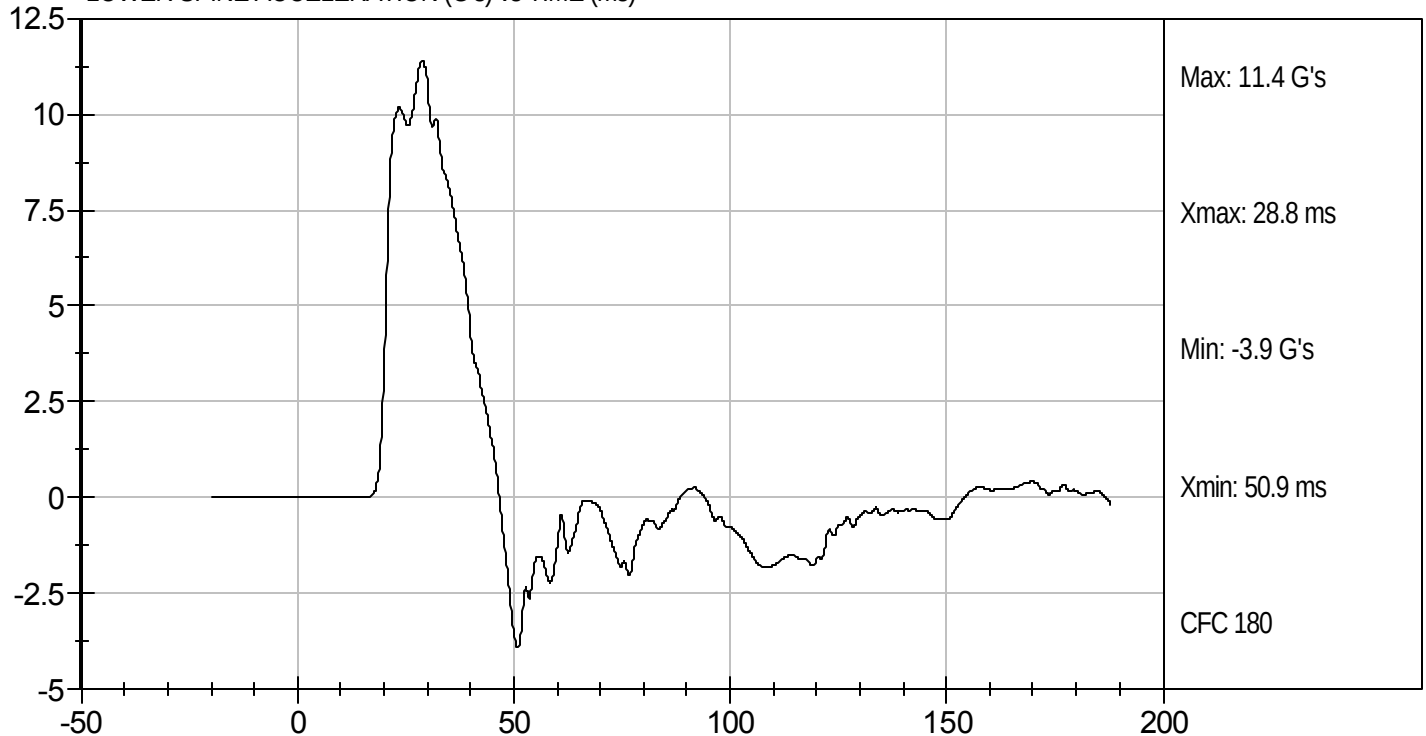
Test Desc: Abdomen Impact
Component ID: D11496

Test Date: 2/10/11
Velocity: 14.25 ft/s, 4.34 m/s

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



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

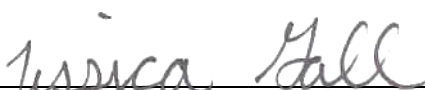


MGA RESEARCH CORPORATION
PELVIS IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306

Test I.D: D11497

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	20.8	Pass
Humidity	%	10 to 70	13	Pass
Impact Velocity	m/s	6.60 to 6.80	6.64	Pass
Peak Impactor Acceleration	G's	38 to 47	42	Pass
Pelvis Y Acceleration after 6 ms	G's	34 to 42	39	Pass
Peak Acetabulum Force	N	3600 to 4300	3955	Pass
Overall Test Results			Pass	


Laboratory Technician

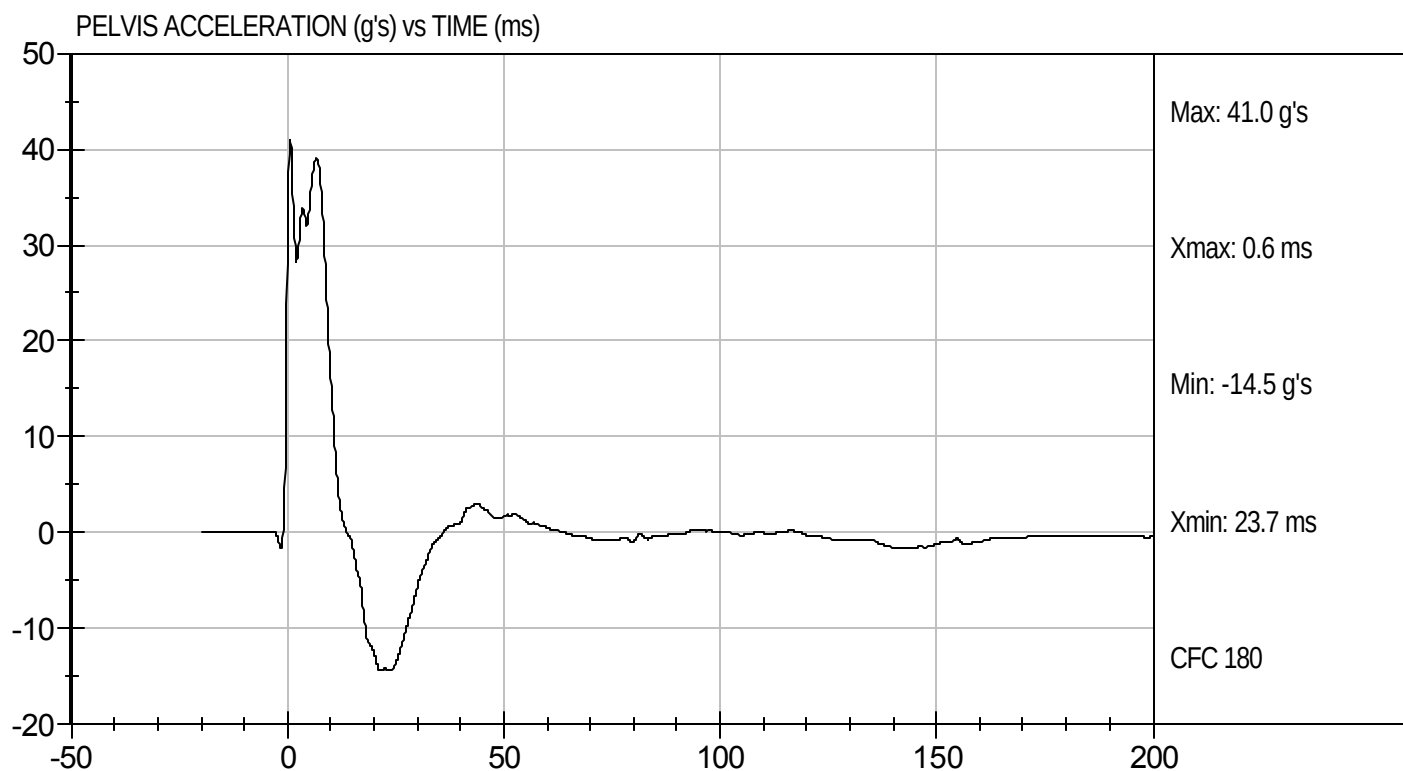
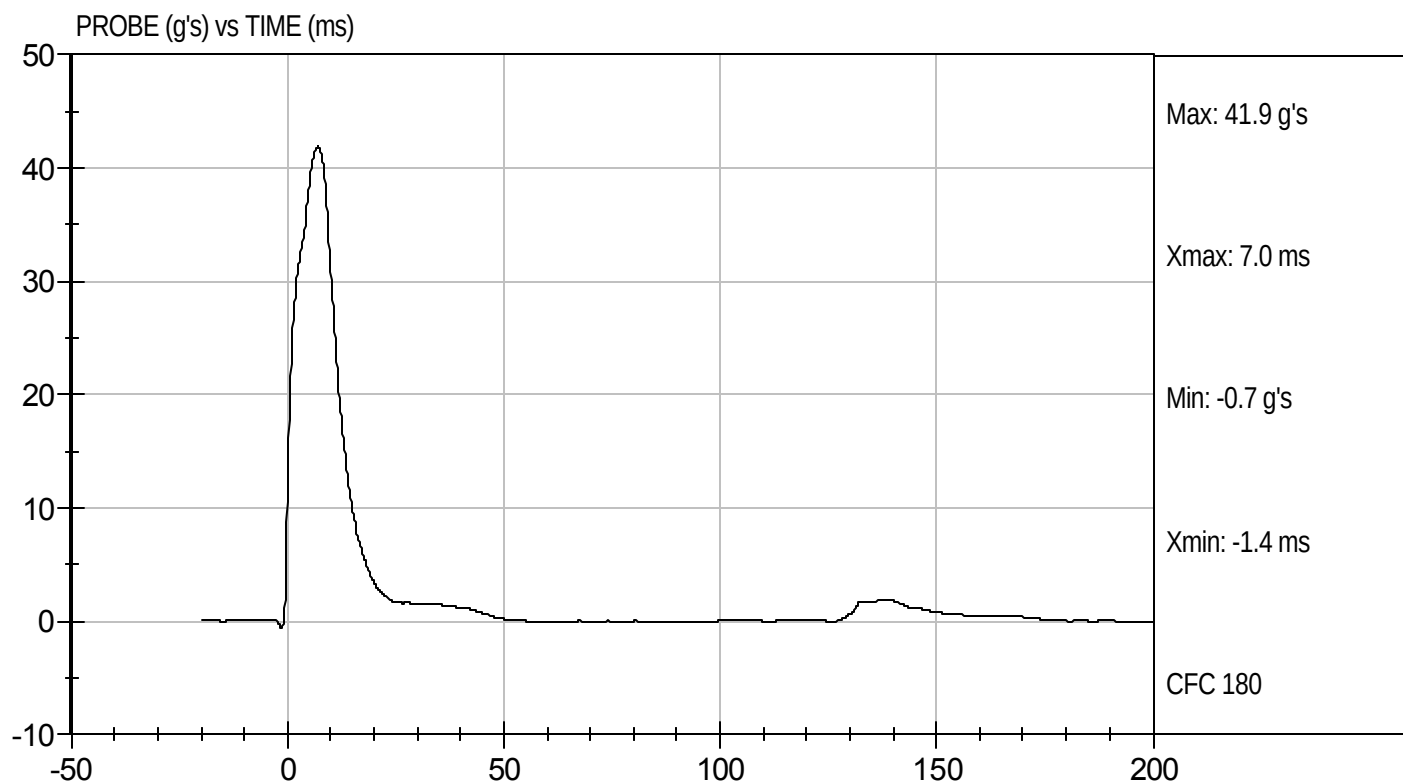
2/10/11
Test Date


Approved By



Test Desc: Pelvis Impact
Component ID: D11497

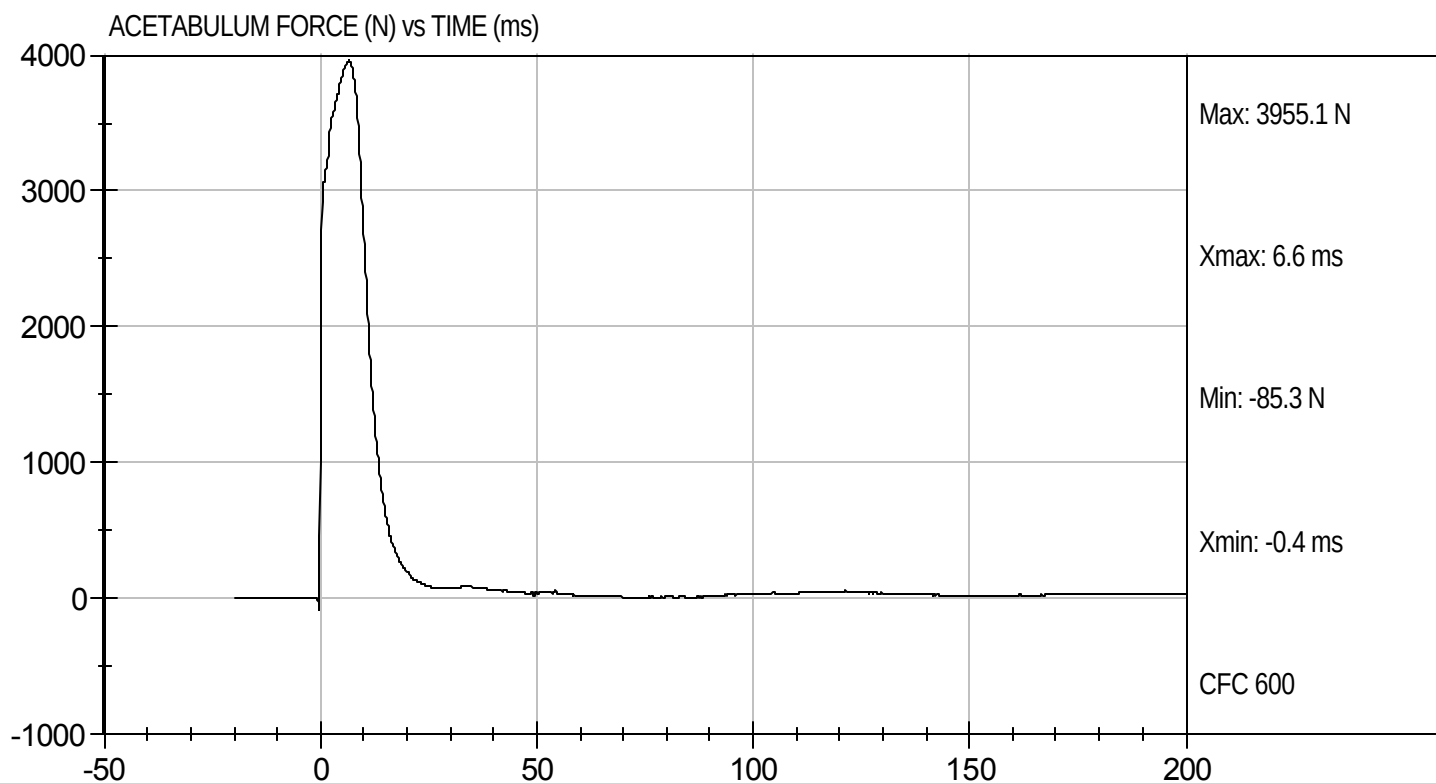
Test Date: 2/10/11
Velocity: 21.80 ft/s, 6.64 m/s





Test Desc: Pelvis Impact
Component ID: D11497

Test Date: 2/10/11
Velocity: 21.80 ft/s, 6.64 m/s

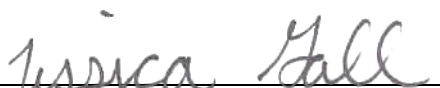


MGA RESEARCH CORPORATION
ILIAC IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 306

Test I.D: D11498

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	20.9	Pass
Humidity	%	10 to 70	13	Pass
Impact Velocity	m/s	4.20 to 4.40	4.39	Pass
Peak Impactor Acceleration	G's	36 to 45	39	Pass
Pelvis Y Acceleration	G's	28 to 39	32	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4962	Pass
Overall Test Results			Pass	


Laboratory Technician

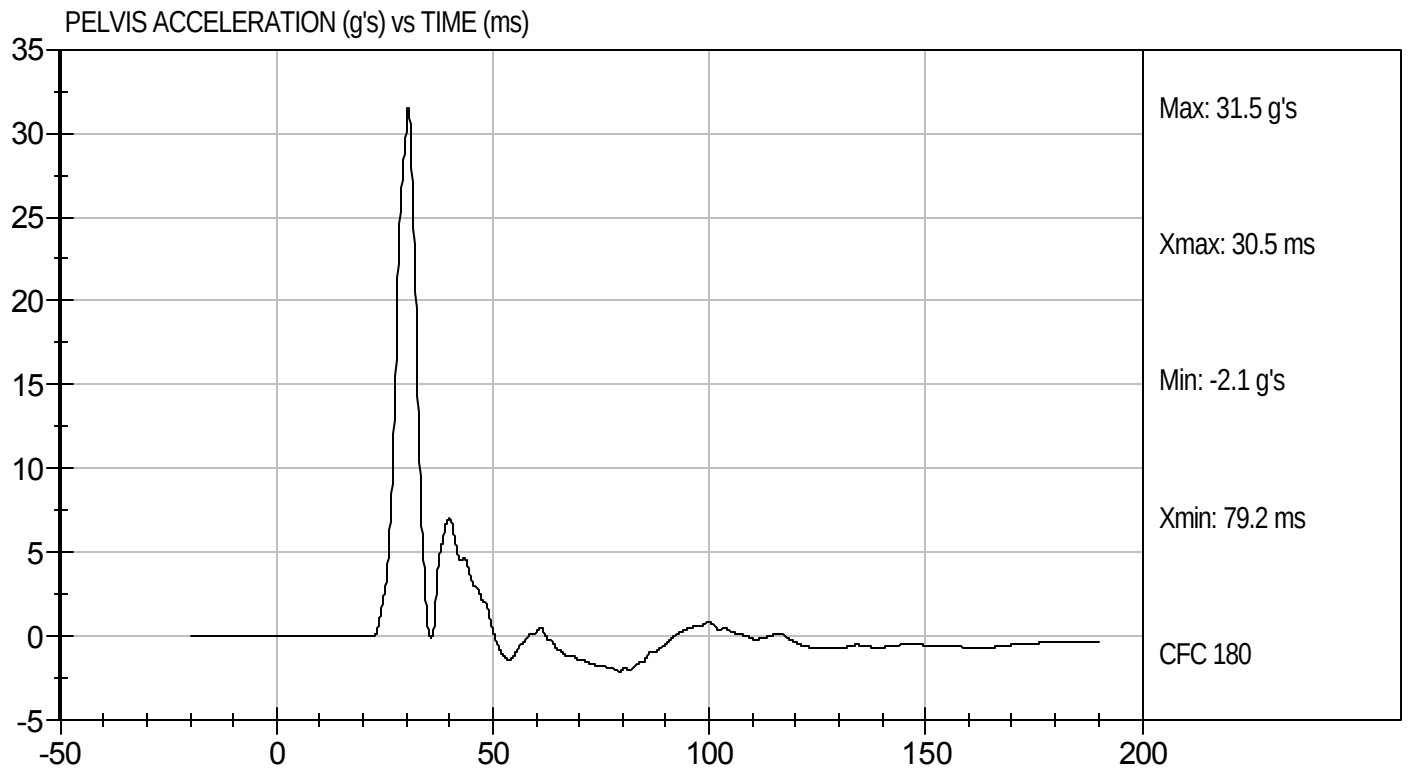
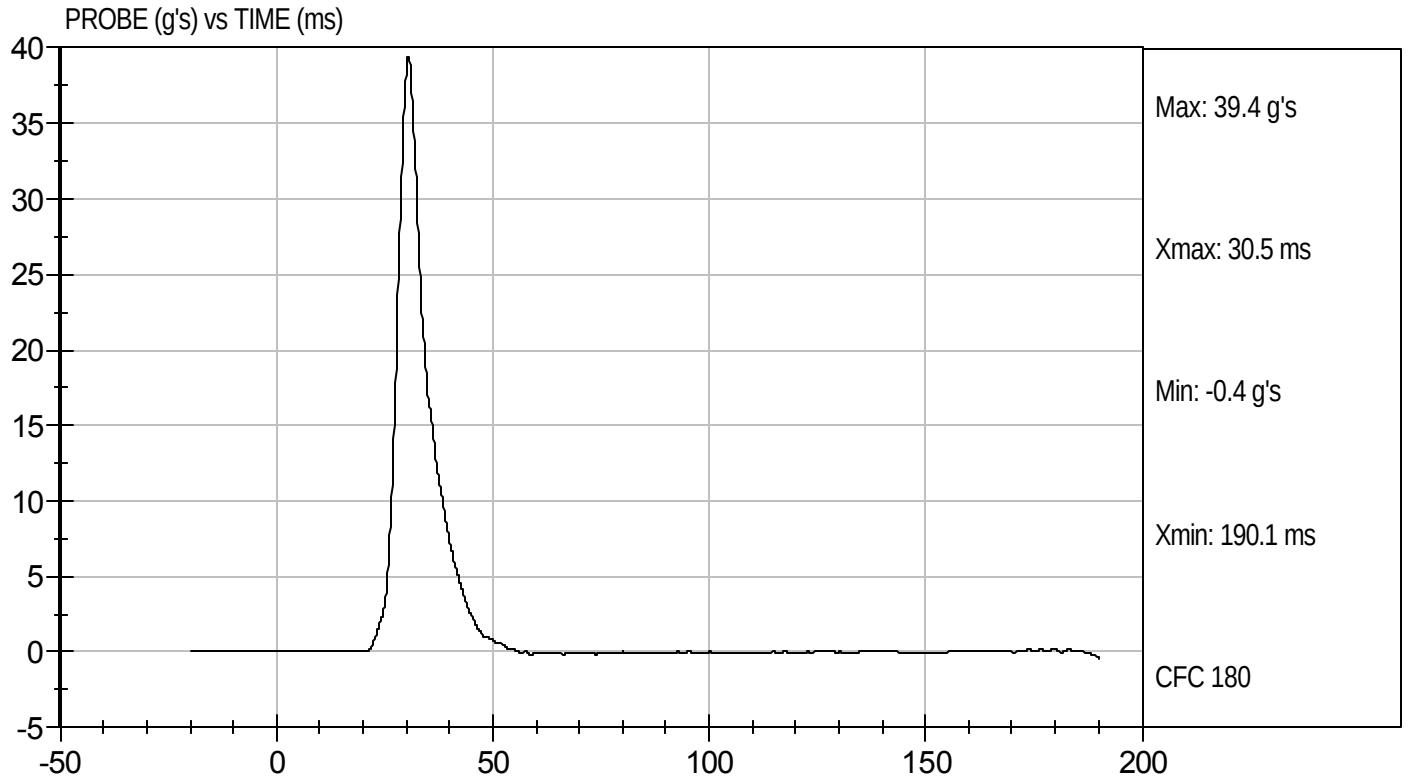
2/10/11
Test Date


Approved By



Test Desc: Iliac Impact
Component ID: D11498

Test Date: 2/10/11
Velocity: 14.39 ft/s, 4.39 m/s





Test Desc: Iliac Impact
Component ID: D11498

Test Date: 2/10/11
Velocity: 14.39 ft/s, 4.39 m/s

