

REPORT NUMBER: SINCAP-MGA-2015-017

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

**GENERAL MOTORS LLC
2015 Cadillac ATS 4-Dr Sedan
NHTSA No.: M20150116**

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



Test Date: September 22, 2014

Final Report Date: October 17, 2014

FINAL REPORT

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

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Approval Date: October 17, 2014

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

Technical Report Documentation Page

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15. Supplementary Notes																																																							
16. Abstract A 55/28 km/h 90° Moving Deformable Barrier NCAP Side Impact Test was conducted on the 2015 Cadillac ATS 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 September 22, 2014. The impact velocity of the Moving Deformable Barrier (MDB) was 61.9 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle at the time of impact was 21.8° C. The target vehicle post-test maximum crush was 201 mm at level 3. 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>116</td> </tr> <tr> <td>Maximum Thorax Rib Deflection</td> <td>mm</td> <td>44</td> <td>28</td> </tr> <tr> <td>Total Abdominal Force</td> <td>N</td> <td>2500</td> <td>932</td> </tr> <tr> <td>Pubic Symphysis Force</td> <td>N</td> <td>6000</td> <td>1444</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>251</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td>Gs</td> <td>82</td> <td>64</td> </tr> <tr> <td>Total Pelvic Force (sum of acetabular and iliac forces)</td> <td>N</td> <td>5525</td> <td>3952</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td>mm</td> <td>38*</td> <td>31</td> </tr> <tr> <td>Maximum Abdomen Rib Deflection</td> <td>mm</td> <td>45*</td> <td>22</td> </tr> </tbody> </table>					Driver ATD (ES-2re)			Measurement Description	Units	Threshold	Result	Head Injury Criteria (HIC ₃₆)	N/A	1000	116	Maximum Thorax Rib Deflection	mm	44	28	Total Abdominal Force	N	2500	932	Pubic Symphysis Force	N	6000	1444		Passenger ATD (SID-IIs)			Measurement Description	Units	Threshold	Result	Head Injury Criteria (HIC ₃₆)	N/A	1000	251	Resultant Lower Spine Acceleration	Gs	82	64	Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3952	Maximum Thoracic Rib Deflection	mm	38*	31	Maximum Abdomen Rib Deflection	mm	45*	22
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17. Key Words New Car Assessment Program (NCAP) Side Impact MDB ES-2re SID-IIs		18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Administration Technical Information Services Division, NPO-411 1200 New Jersey Ave, SE Washington, DC 20590 e-mail: tis@nhtsa.dot.gov FAX: 202-493-2833																																																					
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SECTION 1

TEST PURPOSE AND PROCEDURE

This moving deformable barrier side impact test is part of the MY 2015 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 2015 Cadillac ATS 4-Dr Sedan. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Side NCAP Laboratory Test Procedure dated September 2013.

SECTION 2 SUMMARY OF TEST RESULTS

A 2015 Cadillac ATS 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 61.9 km/h. 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 September 22, 2014. Pre-test 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 September 2013. The side impact event was documented by eleven (11) cameras. Camera locations are included in this report.

The dummies were instrumented in the following manner:

DRIVER ATD (ES-2re)

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

PASSENGER ATD (SID-IIs)

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

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

Dummy Injury readings were recorded as follows:

DUMMY INJURY VALUES

	Driver ATD (ES-2re)		
Measurement Description	Units	Threshold	Result
Head Injury Criteria (HIC ₃₆)	N/A	1000	116
Maximum Thorax Rib Deflection	mm	44	28
Total Abdominal Force	N	2500	932
Pubic Symphysis Force	N	6000	1444

	Passenger ATD (SID-IIs)		
Measurement Description	Units	Threshold	Result
Head Injury Criteria (HIC ₃₆)	N/A	1000	251
Resultant Lower Spine Acceleration	Gs	82	64
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3952
Maximum Thoracic Rib Deflection	mm	38*	31
Maximum Abdomen Rib Deflection	mm	45*	22

*Proposed IARV

Supplemental restraint information is given below:

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

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

GENERAL COMMENTS

Left Front Sill Y has no valid data after 5 ms.
Left Rear Sill Y has questionable data from 6-16 ms.
Left Lower A-Post Y has no valid data after 2 ms.
Left Lower B-Post Y has no valid data after 20 ms.
Left Mid B-Post Y has no valid data after 5 ms.

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

SECTION 3
OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2015 Cadillac ATS 4-Dr Sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No. M20150116
Test Date: 9/22/2014

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20150116	Traction Control System (TCS)	Yes
Model Year	2015	Auto-Leveling System	No
Make	Cadillac	Automatic Door Locks (ADL)	Yes
Model	ATS	Power Window Auto-Reverse	Yes
Body Style	Sedan	Other Optional Feature	N/A
VIN	1G6AA5RX3F0100958	Driver Front Airbag	Yes
Body Color	Phantom Gray Metallic	Driver Curtain Airbag	Yes
Odometer Reading (km/mi)	51 / 32	Driver Head/Torso Airbag	No
Engine Displacement (L)	2.0	Driver Torso Airbag	No
Type/No. Cylinders	4	Driver Torso/Pelvis Airbag	Yes
Engine Placement	Longitudinal	Driver Pelvis Airbag	No
Transmission Type	Automatic	Driver Knee Airbag	Yes
Transmission Speeds	6	Rear Pass. Curtain Airbag	Yes
Overdrive	Yes	Rear Pass. Head/Torso Airbag	No
Final Drive	Rear	Rear Pass. Torso Airbag	No
Roof Rack	No	Rear Pass. Torso/Pelvis Airbag	No
Sunroof/T-Top	No	Rear Pass. Pelvis Airbag	No
Running Boards	No	Driver Seat Belt Pretensioner	Yes
Tilt Steering Wheel	Yes	Rear Pass. Seat Belt Pretensioner	No
Power Seats	Yes	Driver Load Limiter	Yes
Anti-Lock Brakes (ABS)	Yes	Rear Pass. Load Limiter	No
		Other Restraint Feature	N/A

Does owner's manual provide instruction to turn off automatic door locks?	No
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DATA FROM CERTIFICATION LABEL

Manufactured By	General Motors LLC	GVWR (kg)	1956
Date of Manufacture	06/14	GAWR Front (kg)	879
Vehicle Type	Passenger Car	GAWR Rear (kg)	1077

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	2	3		5	(A)
Capacity Weight (VCW) (kg)				396	(B)
DSC x 68.04 kg				340	(A-B)
Rated Cargo and Luggage Weight (RCLW)				56	

VEHICLE SEAT TYPE

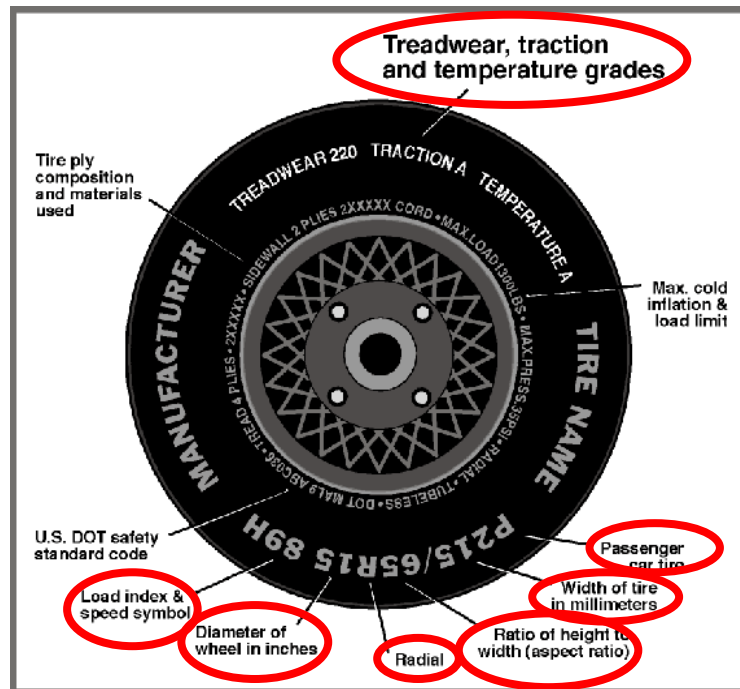
Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						Manual	Power
Front Seat	X						X
Rear or Second Row			X		X		
Third Row Seat							

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

Test Vehicle: 2015 Cadillac ATS 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No. M20150116
 Test Date: 9/22/2014

VEHICLE TIRE INFORMATION



Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	220	240
Recommended Tire Size	P225/45R17	P225/45R17
Tire Size on Vehicle	P225/45R17	P225/45R17
Tire Manufacturer	Michelin	Michelin
Tire Model	Primacy MXM4	Primacy MXM4
Treadwear	500	500
Traction	A	A
Temperature Grade	A	A
Tire Plies Sidewall	2 Rayon	2 Rayon
Tire Plies Body	2 Rayon, 1 Polyamide, 2 Steel	2 Rayon, 1 Polyamide, 2 Steel
Load Index/Speed Symbol	90V	90V
Tire Material	Rubber	Rubber
DOT Safety Code Left	B98A 023X 2214	B98A 023X 2214
DOT Safety Code Right	B98A 023X 2214	B98A 023X 2214

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

Test Vehicle: 2015 Cadillac ATS 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No. M20150116
 Test Date: 9/22/2014

TEST PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	240	248	255	248
Tire Placard	kPa	220	220	240	240
Owner's Manual	kPa				
As Tested	kPa	220	220	240	240

MDB TIRE SPECIFICATIONS

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

TEST VEHICLE AXLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	411.0	370.5		443.0	447.5		444.0	459.5	
Right	kg	378.0	380.5		392.0	436.0		377.0	444.5	
Ratio	%	51.2	48.8		48.6	51.4		47.6	52.4	
Totals	kg	789.0	751.0	1540.0	835.0	883.5	1718.5	821.0	904.0	1725.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1540.0	(A)
Sum of Actual Weight of 2 P572 ATDs Used	kg	129.3	(B)
Rated Cargo/Luggage Weight (RCLW)	kg	56	(C)
Calculated Test Vehicle Target Weight (TVTW)	kg	1725.3	(A+B+C)

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

TEST VEHICLE ATTITUDES AND CG

	Units	Fully Loaded	As Tested	Meets Requirement***
Left Front	mm	678	668	Yes
Right Front	mm	670	668	Yes
Right Rear	mm	655	661	Yes
Left Rear	mm	663	660	Yes
Vehicle CG (Aft of Front Axle)	mm	1455	1428	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	37	28	

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

Test height adjustable suspension setting, if applicable:

Not Applicable

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

Test Vehicle: 2015 Cadillac ATS 4-Dr Sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No. M20150116
Test Date: 9/22/2014

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Weight of Ballast, if any	15.9
None	0.0

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

Test Vehicle: 2015 Cadillac ATS 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No. M20150116
 Test Date: 9/22/2014

SEAT POSITIONING

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

SCRL ANGLE RANGE

Seat	SCRL (°)		
	Max	Min	Mid
Driver Seat	14.9	10.4	12.7
Front Passenger Seat	15.4	10.6	13.0
Front Center Seat			
Struck Side Rear Seat	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed

SEAT HEIGHT AND ANGLE

Seat	As Tested SCRL Angle (Mid) (°)	As Tested SCR Height (mm)	SCR Height Position	SCR Height (mm)		
				Rear- most	Mid- Fore/Aft	Forward- Most
Driver Seat	12.7	Fixed	Max	Fixed	Fixed	Fixed
	12.7	Fixed	Mid	Fixed	Fixed	Fixed
	12.7	Fixed	Min	Fixed	Fixed	Fixed
Front Passenger Seat	13.0	Fixed	Max	Fixed	Fixed	Fixed
	13.0	Fixed	Mid	Fixed	Fixed	Fixed
	13.0	Fixed	Min	Fixed	Fixed	Fixed
Front Center Seat			Max			
			Mid			
			Min			
Struck Side Rear Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
	Fixed	Fixed	Mid	Fixed	Fixed	Fixed
	Fixed	Fixed	Min	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
	Fixed	Fixed	Mid	Fixed	Fixed	Fixed
	Fixed	Fixed	Min	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
	Fixed	Fixed	Mid	Fixed	Fixed	Fixed
	Fixed	Fixed	Min	Fixed	Fixed	Fixed

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

Test Vehicle: 2015 Cadillac ATS 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

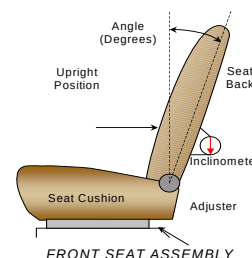
NHTSA No. M20150116
 Test Date: 9/22/2014

SEAT FORE/AFT POSITIONS

Seat	Total Fore/Aft Travel		Test Position from Forward-most Position	
	mm	Detents	mm	Detent
Driver Seat	242		121	
Front Passenger Seat	242		121	
Front Center Seat				
Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Non-Struck Side	Fixed	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed	Fixed

SEAT BACK ANGLE ADJUSTMENT

The driver's seat back is positioned to the manufacturer's designated design angle. The front passenger's seat back is positioned in a similar manner as the driver's seat back. The struck side rear seat back is adjusted following Appendix C, "Positioning Dummies in the Test Vehicle" in the NCAP Laboratory Test Procedure dated September 2013. The rear center and non-struck side rear outboard seat backs are positioned to match the struck side rear seat back.



Seat	Total Seat Back Angle Range		Test Position from Vertical	
	Degrees	Detents	Degrees	Detent
Driver Seat w/Seated Dummy	52.5		5.6	
Front Passenger Seat	52.8		5.6	
Front Center Seat				
Struck Side Rear Seat			22.4	
Non-Struck Side Rear Seat			22.4	
Rear Center Seat			22.4	

Seat back angles measured on headrest post.

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

Test Vehicle: 2015 Cadillac ATS 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No. M20150116
 Test Date: 9/22/2014

SEAT BELT ANCHORAGE ADJUSTMENT

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

	Total # of Positions	Placed in Position #
Driver Seat	Fixed	Not Applicable
Rear Seat	Fixed	Not Applicable

HEAD RESTRAINT ADJUSTMENT

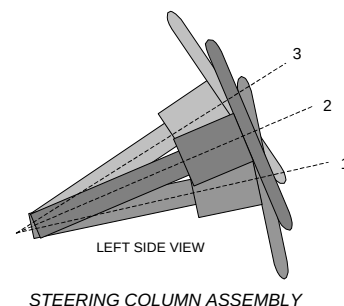
The driver's head restraint is adjusted to the highest and most full forward in-use position. The struck-side rear passenger's head restraint is adjusted to the lowest and most full forward in-use position.

	Total # of Positions	Placed in Position #
Driver Seat	4	Highest / Forwardmost
Rear Seat	Fixed	Not Applicable

STEERING COLUMN ADJUSTMENT

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

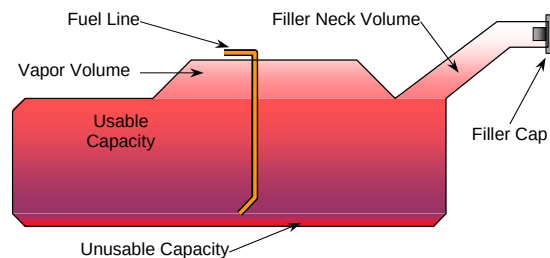
	Degrees	Fore/Aft Position (mm)
Lowermost, Position 1	72.2	218
Geometric Center, Position 2	70.0	199
Uppermost, Position 3	67.8	180
Telescoping Steering Wheel Travel		38
Test Position	70.0	199



FUEL PUMP

Describe the fuel pump type, details about how it operates and the location of the fuel filler pipe.

The vehicle is equipped with an electric fuel pump. If the ignition is at "On" setting and engine is not running, the fuel pump only operates for a short duration to prime the fuel system. If the engine is running the fuel pump operates continuously. The fuel pipe is on the right side.



VEHICLE FUEL TANK ASSEMBLY

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

Test Vehicle: 2015 Cadillac ATS 4-Dr Sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No. M20150116
Test Date: 9/22/2014

FUEL TANK CAPACITY DATA

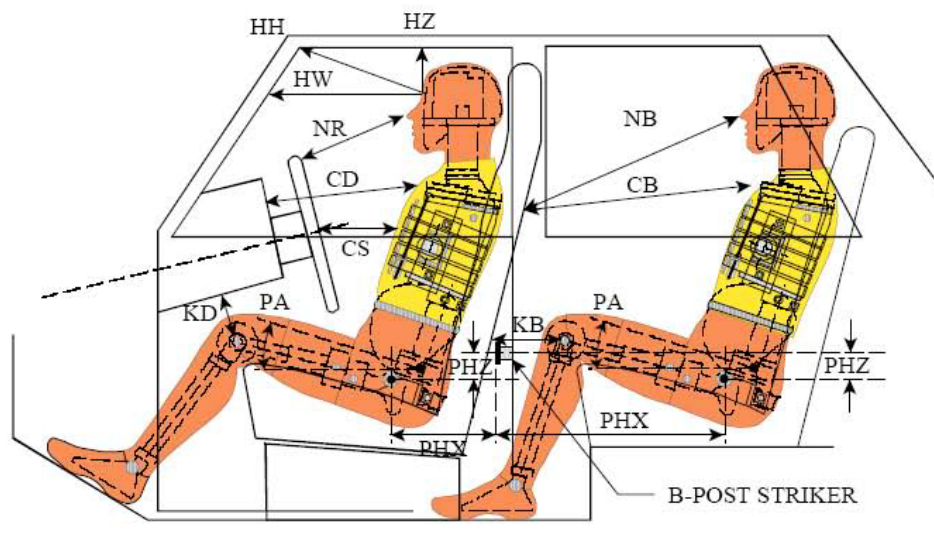
	Liters
Usable Capacity of "Standard" Tank (see Form No. 1)	62.5
Usable Capacity of "Optional" Tank (see Form No. 1)	
Usable Capacity of Standard Tank as Specified in Owner's Manual	62.5
Usable Capacity of Optional Tank as Specified in Owner's Manual	
93% of Usable Capacity	58.1
Actual Amount of Solvent Used	58.1
1/3 of Usable Capacity	20.8

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

DATA SHEET NO. 3 DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2015 Cadillac ATS 4-Dr Sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No. M20150116
Test Date: 9/22/2014



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

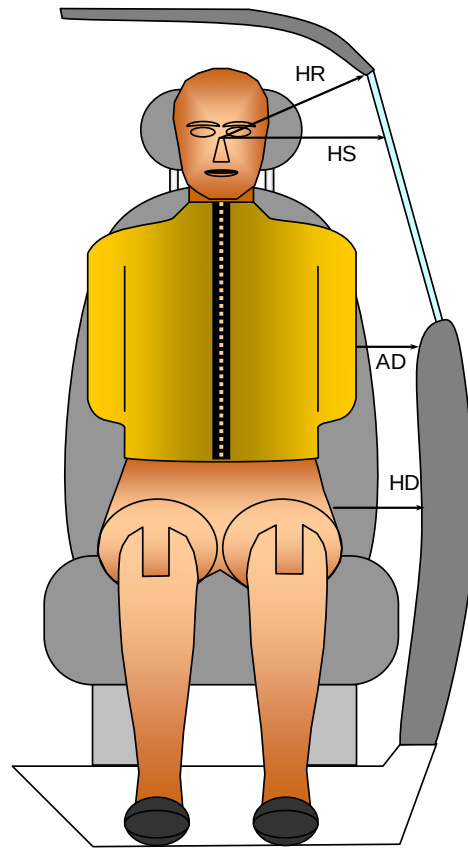
DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Pass. Code	Measurement Description	Driver		Passenger	
			Length (mm)	Angle(°)	Length (mm)	Angle(°)
HH		Head to Header	361	14.7		
HW		Head to Windshield	585			
HZ	HZ	Head to Roof Liner	181		252	
NR	NB	Nose to Rim/Seat Back	425	14.0	472	10.6
CD	CB	Chest to Dashboard/Seat Back	550	9.1	476	11.1
CS		Chest to Steering Wheel	374	3.4		
KDL	KBL	Left Knee to Dash/Seat Back	201	26.6	203	26.2
KDR	KBR	Right Knee to Dash/Seat Back	190	30.5	199	23.2
PAX	PAX	Pelvic Tilt Angle X		22.9		27.8
	PAY	Pelvic Tilt Angle Y		-1.1		-0.3
PHX	PHX	Hip Point to Striker (X-Axis)	112		127	
PHZ	PHZ	Hip Point to Striker (Z-Axis)	176		252	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2015 Cadillac ATS 4-Dr Sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No. M20150116
Test Date: 9/22/2014



FRONT VIEW OF DUMMY

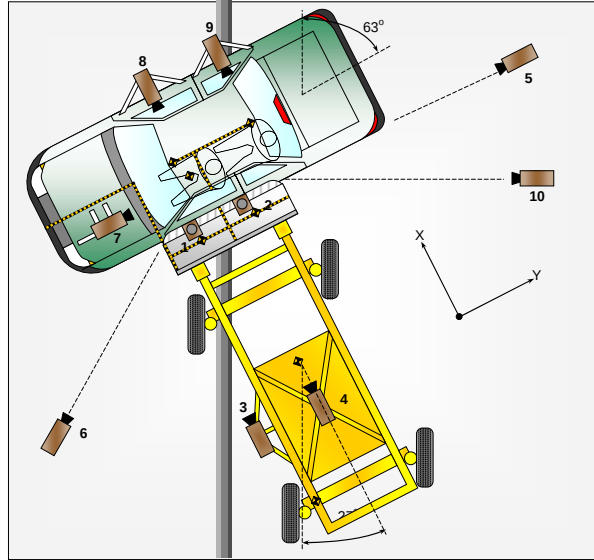
DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver	Passenger
HR	Head to Side Header	mm	173	273
HS	Head to Side Window	mm	305	400
AD	Arm to Door	mm	83	196
HD	Hip Point to Door	mm	157	204

DATA SHEET NO. 5 CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2015 Cadillac ATS 4-Dr Sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No. M20150116
Test Date: 9/22/2014



CAMERA LOCATIONS AND DATA

No.	Camera View	Coordinates (mm)			Lens Length (mm)	Operating Frame Rate (fps)
		X*	Y*	Z*		
1	Overhead Overall	-130	190	-5050	14	1000
2	Overhead Close-Up	90	50	-5050	20	1000
3	Left Impact Point (MDB)				50	See Note
4	Side Overall (MDB)				16	See Note
5	Rear	60	4900	-1060	24	1000
6	Left Front	4000	-4220	-1110	24	1000
7	Driver Front (OB)				16	1000
8	Driver Side (OB)				8	1000
9	Passenger Side (OB)				8	1000
10	Real Time Left Rear					30
11	Real Time Inrun					30

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

* All measurements accurate to ± 6 mm

Explain why camera(s) did not operate as intended:
MDB cameras lost power during event and did not record.

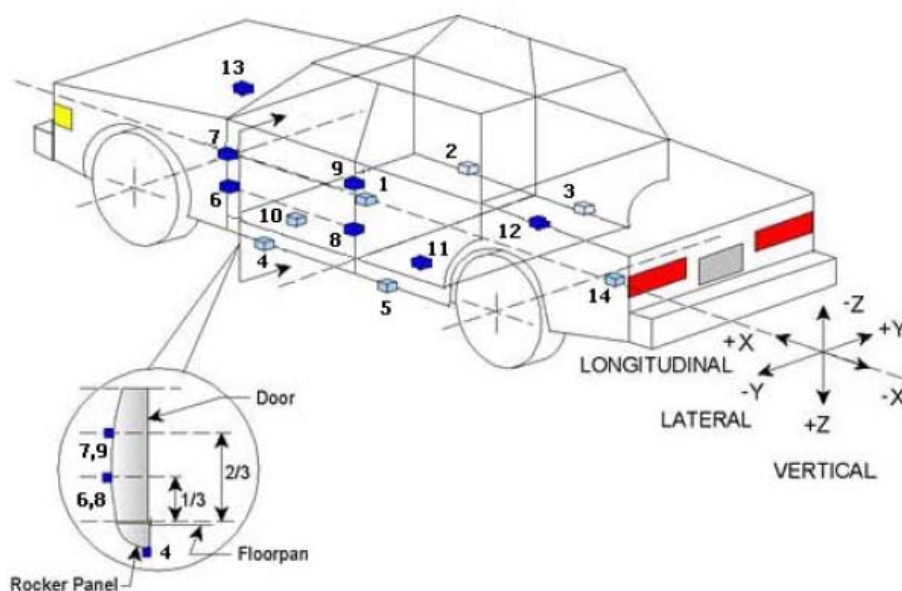
INSTRUMENTATION

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

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

Test Vehicle: 2015 Cadillac ATS 4-Dr Sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No. M20150116
Test Date: 9/22/2014



TEST VEHICLE ACCELEROMETER LOCATIONS

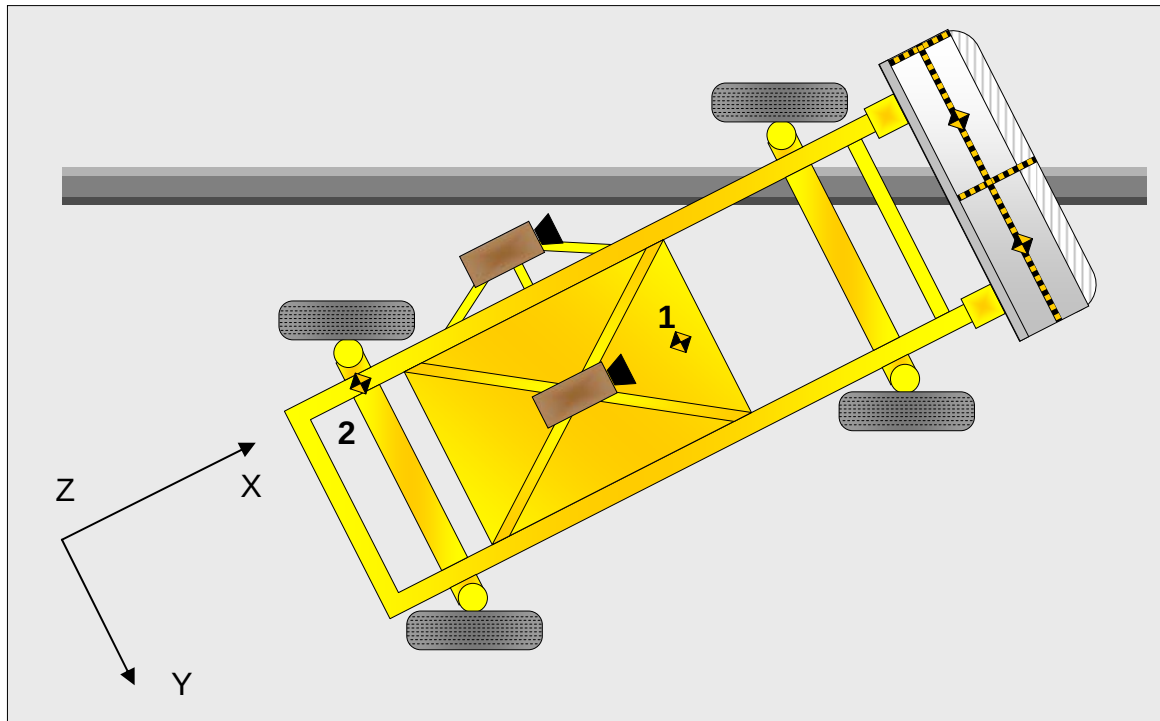
Accelerometer Location				
No.	ID	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2300	171	-165
2	Right Sill at Front Seat	2235	751	-190
3	Right Sill at Rear Seat	1485	750	-200
4	Left Sill at Front Door	2590	-753	-180
5	Left Sill at Rear Door	1465	-750	-190
6	Left Lower A-Post	3103	-756	-503
7	Left Middle A-Post	3128	-754	-759
8	Left Lower B-Post	2156	-732	-569
9	Left Middle B-Post	2086	-704	-779
10	Front Seat Track	2200	-346	-154
11	Rear Seat Structure	1823	-308	-328
12	Rt. Rear Occ. Compartment	1857	326	-229
13	Engine Block	3568	25	-871
14	Rear Above Axle	1000	0	-511

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

DATA SHEET NO. 7
MDB ACCELEROMETER LOCATIONS

Test Vehicle: 2015 Cadillac ATS 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No. M20150116
 Test Date: 9/22/2014



MDB ACCELEROMETER LOCATIONS

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

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

DATA SHEET NO. 8
POST-TEST OBSERVATIONS

Test Vehicle: 2015 Cadillac ATS 4-Dr Sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No. M20150116
Test Date: 9/22/2014

TEST DUMMY INFORMATION AND CONTACT POINTS

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

POST-TEST DOOR PERFORMANCE

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

POST-TEST SEAT PERFORMANCE

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

POST-TEST STRUCTURAL OBSERVATIONS

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

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

Test Vehicle: 2015 Cadillac ATS 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No. M20150116
 Test Date: 9/22/2014

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vehicle Wheel Base	mm		2777
Vertical Impact Reference Line (Aft of Front Axle) (Intended Impact Point)	mm		449
Actual Impact Point (Aft of Front Axle)	mm		448
Horizontal Offset (+forward / -rearward)	mm	+/- 50 of intended impact point	+1
Vertical Offset (+down / -up)	mm	+/- 20 of intended impact point	+5

DATA SHEET NO. 9
MDB SUMMARY OF RESULTS

Test Vehicle: 2015 Cadillac ATS 4-Dr Sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No. M20150116
Test Date: 9/22/2014

MDB SPECIFICATIONS

Measurement Description	Length (mm)
Overall Width of Framework Carriage	1251
Overall Length Including Honeycomb Face	4115
Wheelbase of Framework Carriage	2595
CG Location aft of Front Axle	1134

MDB WEIGHTS

	Units	Front Axle	Rear Axle	Total
Left	kg	390.0	300.1	
Right	kg	376.8	294.7	
Ratio	%	56.3	43.7	
Totals	kg	766.8	594.8	1361.6

SPEED AND ANGLE AT IMPACT DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.1 to 62.7	61.9
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	62.0
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	90.6
MDB Forward Line of Motion to Target Vehicle CL	degrees	62.5 to 63.5	62.5
MDB Crabbed Angle to MDB Forward Line of Motion	degrees	26 to 28	26.9

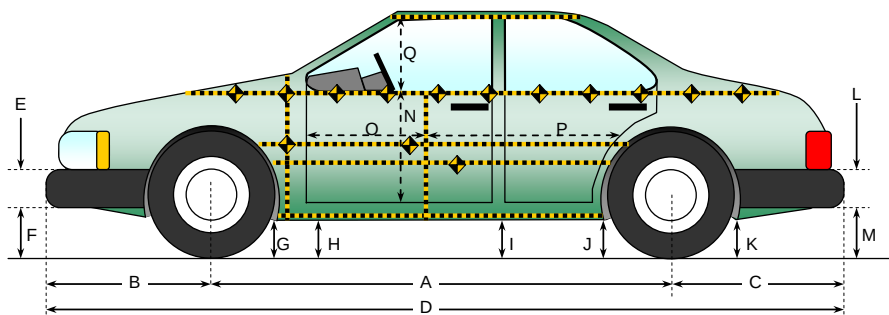
MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE

Vertical Location			From Centerline		Maximum Crush
Row	Description	Height	Distance	Direction	
A	Center of Bumper	432	700	Right	207
B	Top of Bumper	533	800	Right	131
C	Mid-Level	686	800	Left	166
D	Top of Stack	813	800	Left	191

DATA SHEET NO. 10
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2015 Cadillac ATS 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No. M20150116
 Test Date: 9/22/2014



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

LEFT SIDE VIEW

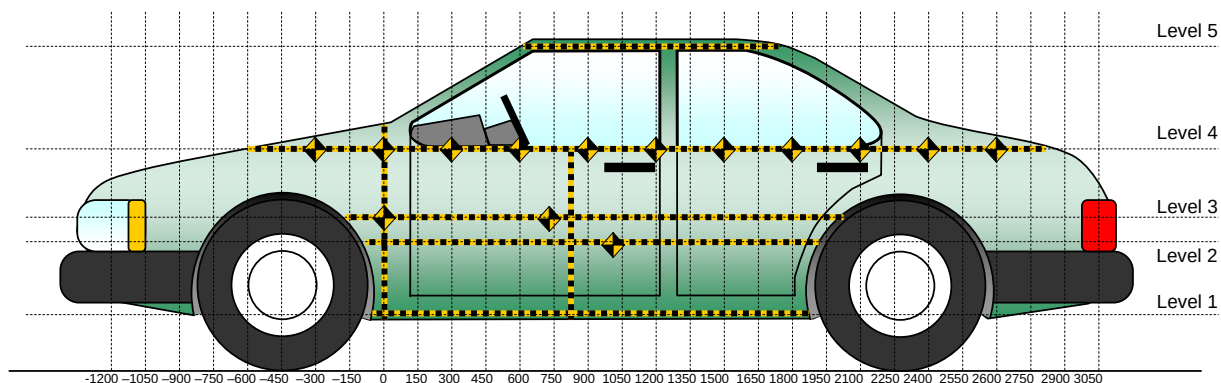
VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2777	2812	-35
B	Front Axle to FSOV	839	811	28
C	Rear Axle to RSOV	1041	1037	4
D	Total Length at Centerline	4657	4660	-3
E	Front Bumper Thickness	100	100	0
F	Front Bumper Bottom to Ground	204	173	31
G	Sill Height at Front Wheel Well	167	157	10
H	Sill Height at Front Door Leading Edge	164	174	-10
I	Sill Height at B Pillar	170	154	16
J1	Sill Height at Rear Wheel Well	164	155	9
J2	Pinch Weld Height at Rear Wheel Well	160	153	7
K	Sill Height Aft of Rear Wheel Well	210	193	17
L	Rear Bumper Thickness	102	102	0
M	Rear Bumper Bottom to Ground	247	247	0
N	Sill Height to Window Bottom Sill	716	682	34
O	Front Door Leading Edge to Impact CL	714	708	6
P	Rear Door Trailing Edge to Impact CL	1176	1037	139
Q	Front Window Opening	372	374	-2
R	Right Side Length	3428	3428	0
S	Left Side Length	3428	3405	23
T	Vehicle Width at B Post	1758	1613	145

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

Test Vehicle: 2015 Cadillac ATS 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No. M20150116
 Test Date: 9/22/2014



All Measurements Shown in mm

LEFT SIDE VIEW

MAXIMUM EXTERIOR CRUSH MEAUREMENTS

Level	Measurement Description	Height Above Ground (mm)	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	214	12	150
2	Occupant Hip Point	488	191	450
3	Mid Door	607	201	1650
4	Window Sill	904	172	1800
5	Window Top	1327	19	1500

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

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

Test Vehicle: 2015 Cadillac ATS 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No. M20150116
 Test Date: 9/22/2014

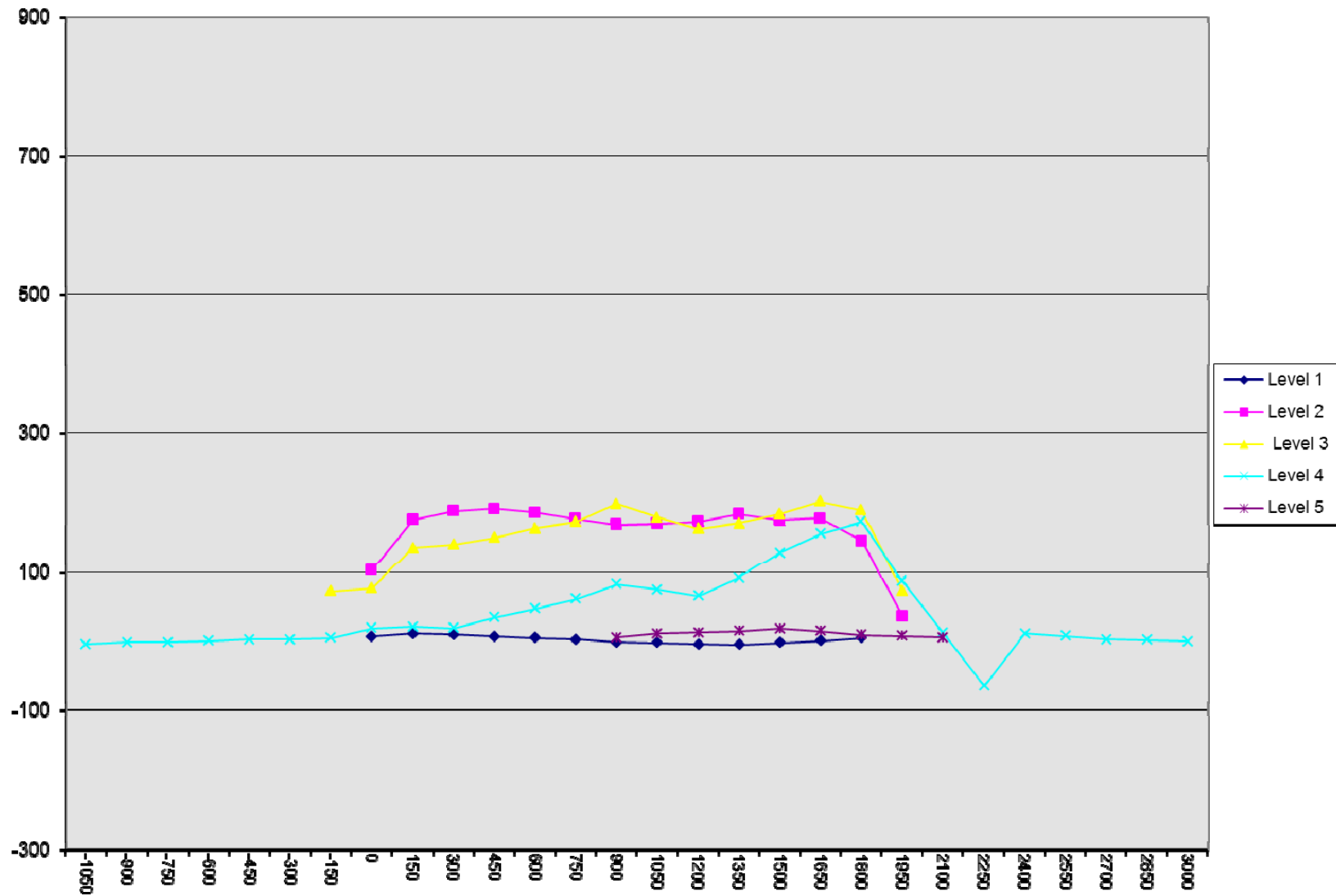
	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-1050				562					559					-3	
-900				511					511					0	
-750				470					470					0	
-600				435					437					2	
-450				403					407					4	
-300				374					378					4	
-150			216	350				289	356				73	6	
0	252	227	227	325		260	330	304	345		8	103	77	20	
150	249	234	230	312		261	409	365	334		12	175	135	22	
300	250	234	229	298		261	421	369	318		11	187	140	20	
450	252	234	228	288		260	425	378	323		8	191	150	35	
600	252	232	227	283		258	417	390	331		6	185	163	48	
750	253	230	225	278		257	406	397	340		4	176	172	62	
900	256	229	224	274	524	256	397	422	357	531	0	168	198	83	7
1050	256	228	223	273	510	255	397	401	348	522	-1	169	178	75	12
1200	257	228	223	269	508	254	400	385	335	522	-3	172	162	66	14
1350	260	229	225	270	509	256	412	395	362	525	-4	183	170	92	16
1500	261	229	226	266	511	260	403	409	394	530	-1	174	183	128	19
1650	261	227	226	265	515	263	404	427	420	531	2	177	201	155	16
1800	258	221	222	263	521	264	366	411	435	531	6	145	189	172	10
1950		207	208	261	529		244	281	348	538		37	73	87	9
2100				265	548				278	555				13	7
2250				272					210					-62	
2400				282					294					12	
2550				294					303					9	
2700				311					315					4	
2850				330					333					3	
3000				353					354					1	

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

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

Test Vehicle: 2015 Cadillac ATS 4-Dr Sedan
Test Program: NCAP Side MDB Impact Test

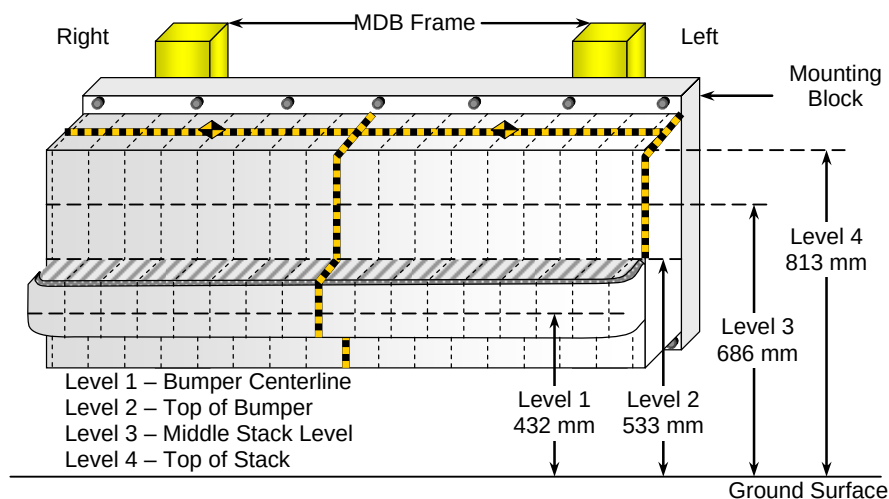
NHTSA No. M20150116
Test Date: 9/22/2014



DATA SHEET NO. 12
MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle: 2015 Cadillac ATS 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No. M20150116
 Test Date: 9/22/2014



FRONT VIEW

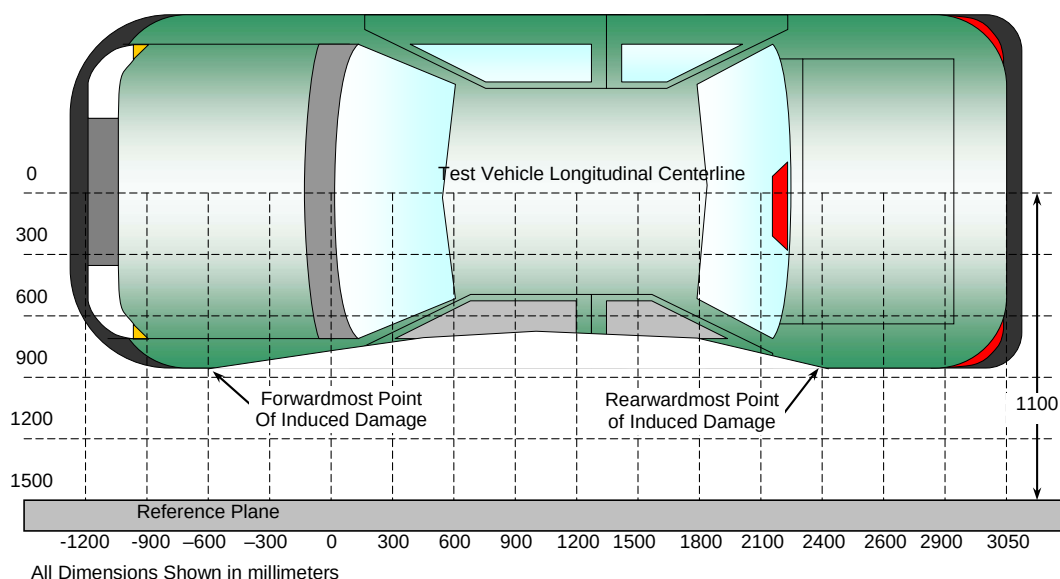
DEFORMABLE BARRIER STATIC CRUSH

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	31	5	12	33	70	77	70	67	58	65	78	90	92	105	121	136	191
3	27	14	18	28	47	61	65	35	21	20	22	29	40	57	78	120	166
2	131	127	120	98	76	93	78	88	90	95	96	97	97	97	101	111	127
1	200	207	188	177	169	161	159	154	149	150	150	152	152	156	160	182	175

DATA SHEET NO. 13 **VEHICLE AND MDB DAMAGE PROFILE DISTANCES**

Test Vehicle: 2015 Cadillac ATS 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No. M20150116
 Test Date: 9/22/2014



TOP VIEW

VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance from Impact Point (mm)	Level	Pre-Test (mm)	Post-Test (mm)	Max. Static Crush (mm)
1	2025	3	208	226	18
2	1620	3	226	423	197
3	1215	3	223	384	161
4	810	3	224	408	184
5	405	3	228	377	149
6	0	3	227	304	77

MDB DAMAGE PROFILE DISTANCES

DPD	Distance from Center of MDB	Level	Post-Test (mm)
1	800 mm right of center	1	200
2	480 mm right of center	1	175
3	160 mm right of center	1	156
4	160 mm left of center	1	150
5	480 mm left of center	1	155
6	800 mm left of center	1	175

DATA SHEET NO. 14
FMVSS NO. 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2015 Cadillac ATS 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

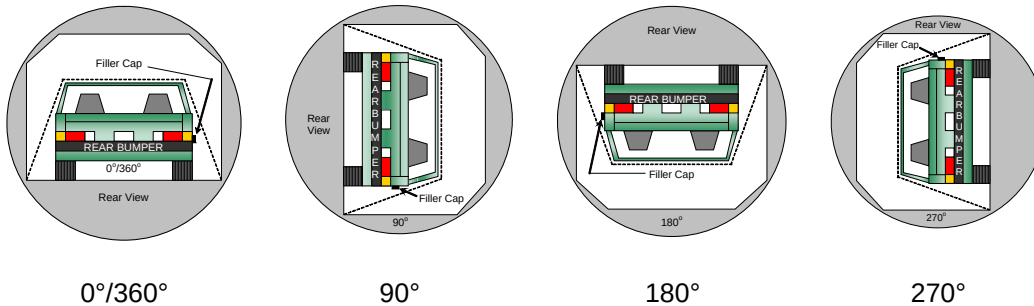
NHTSA No. M20150116
 Test Date: 9/22/2014

Test Time: 12:02 pm

Temperature: 21.8° 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°	114	300	414
90° to 180°	110	300	410
180° to 270°	105	300	405
270° to 360°	114	300	414

FMVSS 301 ROLLOVER SPILLAGE TABLE (units in ounces)

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

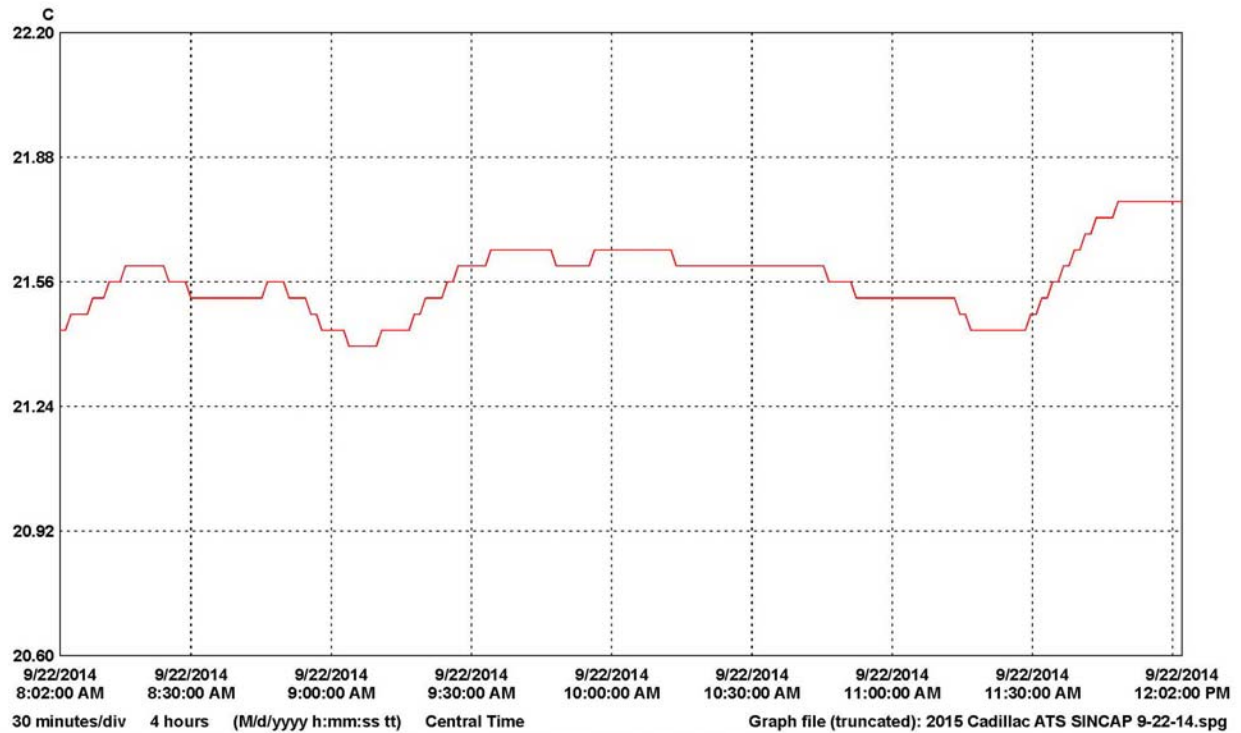
ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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

DATA SHEET NO. 15 **DUMMY/VEHICLE TEMPERATURE STABILIZATION DATA**

Test Vehicle: 2015 Cadillac ATS 4-Dr Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No. M20150116
 Test Date: 9/22/2014



LN	Serial #	Description	CH	Value	Maximum	Average	Minimum	Units	CH description	Logger file
1	10102162	MGATemp_10102162	1		21.77	21.56	21.39	C	Temperature	10102162_MGATemp_10102162.spl
LN Logger file										ID # Security Created by Creation time
1	C:\Program Files (x86)\Veriteq Instruments\Log 4.4\Prep 2014\10102162_MGATemp_10102162.spl									

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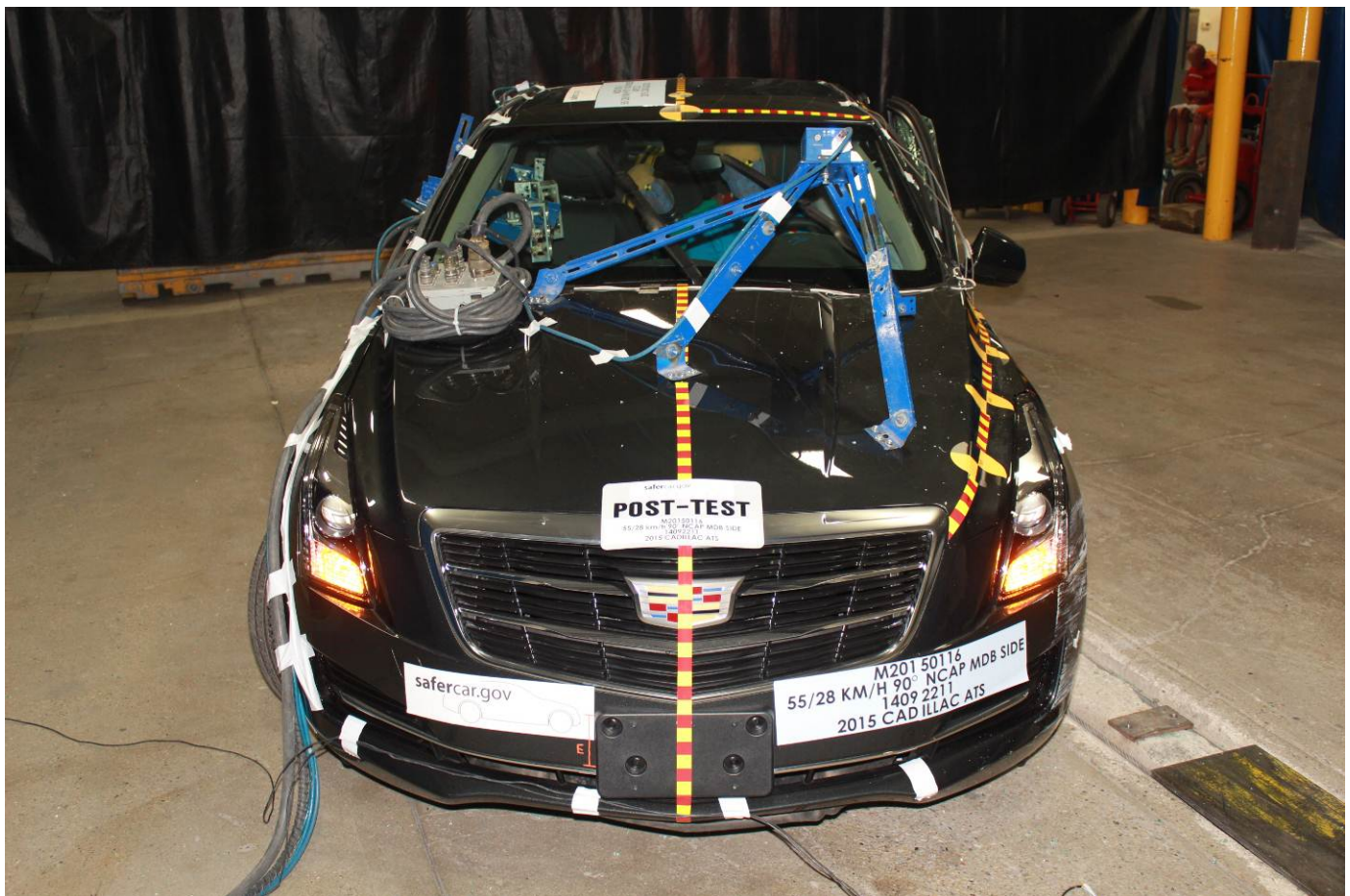
As Delivered Right Front Three-Quarter View of Test Vehicle



As Delivered Left Rear Three-Quarter View of Test Vehicle



Pre-Test Frontal View of Test Vehicle



Post-Test Frontal View of Test Vehicle



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



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



Pre-Test Left Side View of Test Vehicle



Post-Test Left Side View of Test Vehicle



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



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



Pre-Test Rear View of Test Vehicle



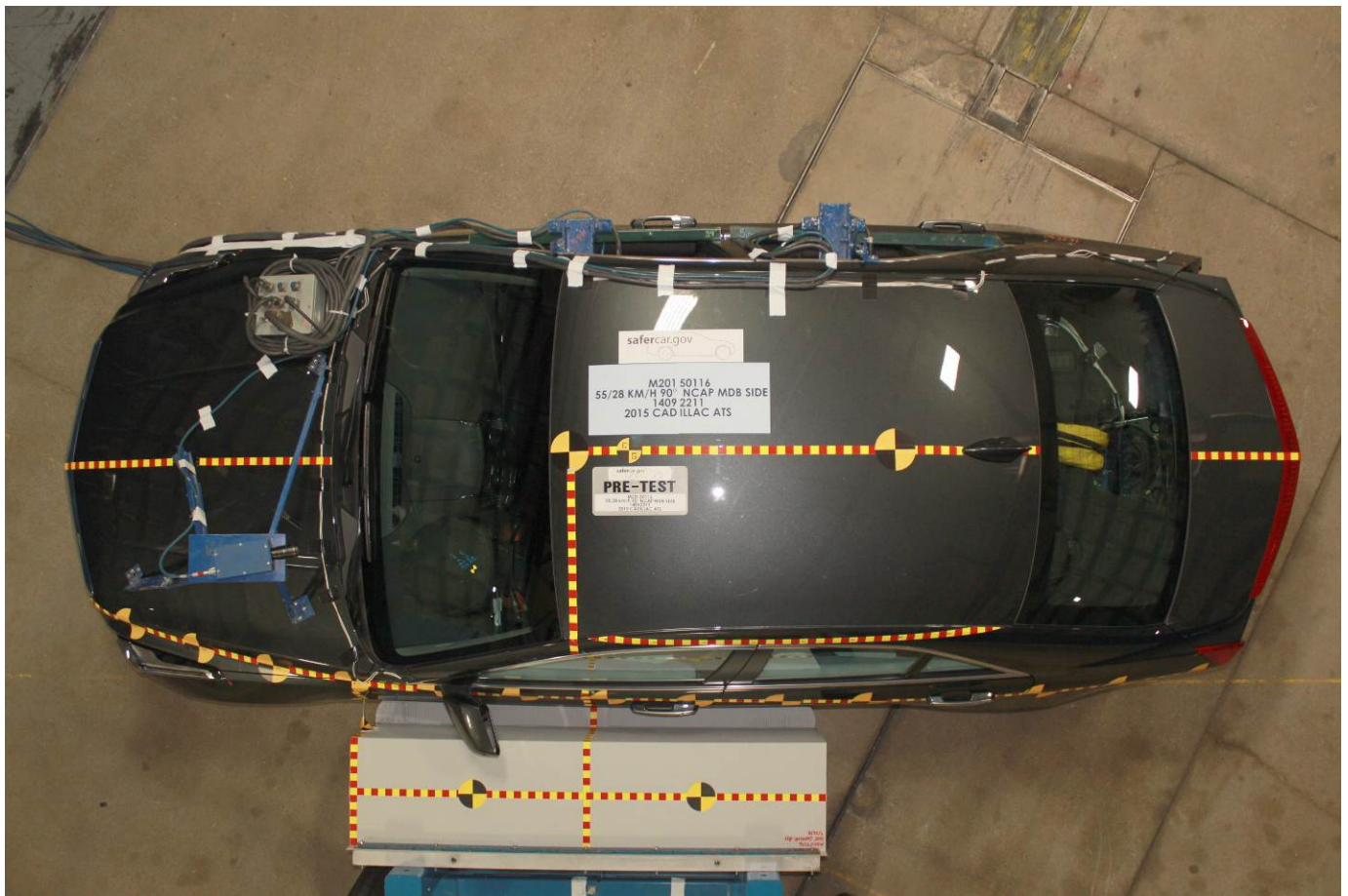
Post-Test Rear View of Test Vehicle



Pre-Test Right Side View of Test Vehicle



Post-Test Right Side View of Test Vehicle



Pre-Test Overhead View of Test Area



Post-Test Overhead View of Test Area



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



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



Pre-Test Close-Up View of Impact Point Target



Post-Test Close-Up View of Impact Point Target



Pre-Test Left Front Door Latch Close-Up



Post-Test Left Front Door Latch Close-Up



Pre-Test Left Rear Door Latch Close-Up



Post-Test Left Rear Door Latch Close-Up



Pre-Test Front Close-Up View of Driver Dummy



Post-Test Front Close-Up View of Driver Dummy



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



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



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



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



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



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



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



Pre-Test Placement of Driver Dummy's Feet



Pre-Test View of Belt Anchorage for Driver Dummy



Pre-Test Left Side View of Steering Wheel



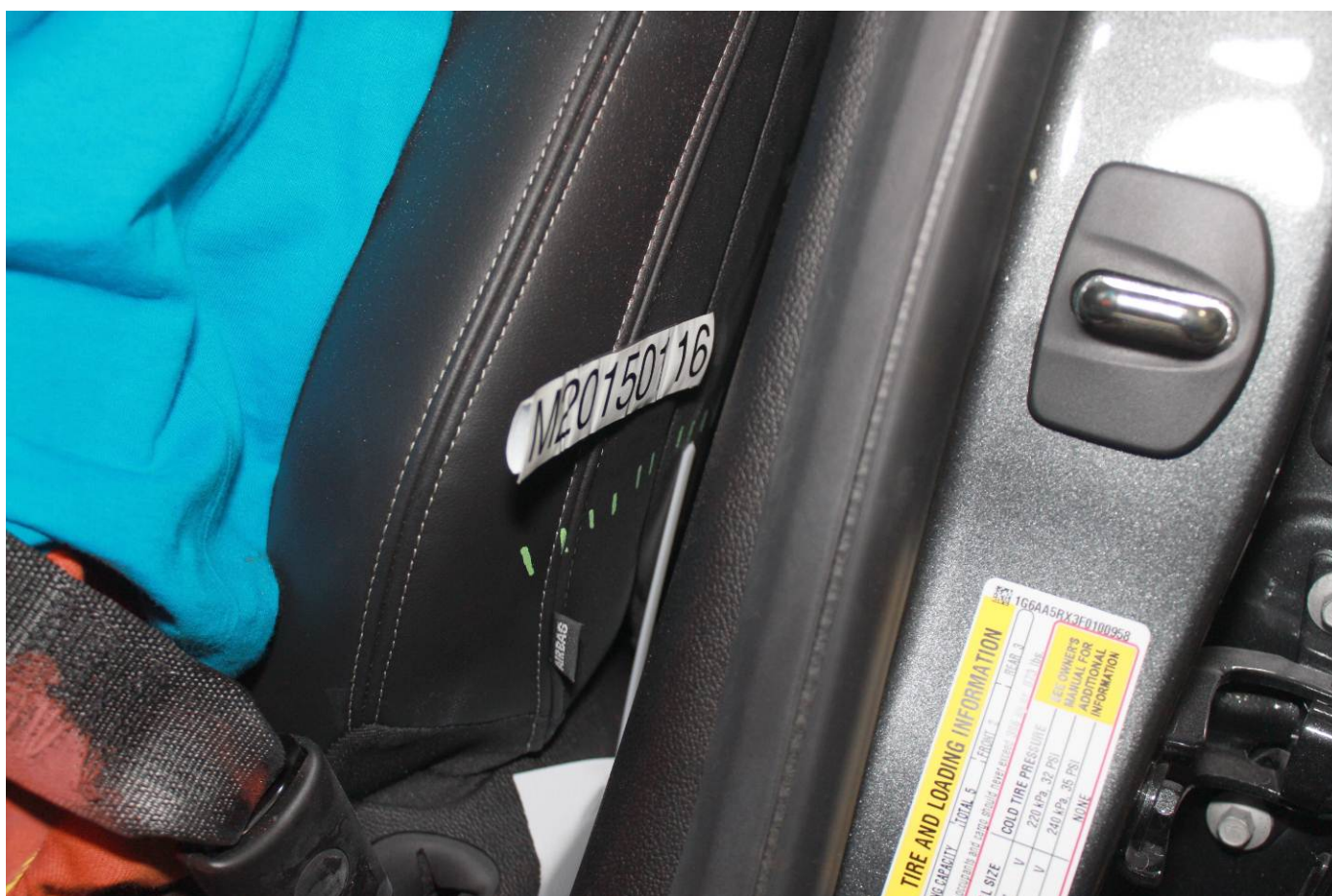
Pre-Test View of Disengaged Parking Brake



Pre-Test View of Parking Brake



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



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



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



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



Pre-Test Driver Dummy and Door Clearance View



Post-Test Driver Dummy and Door Clearance View



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



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



Pre-Test Driver Inner Door Panel View



Post-Test Driver Inner Door Panel View



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



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



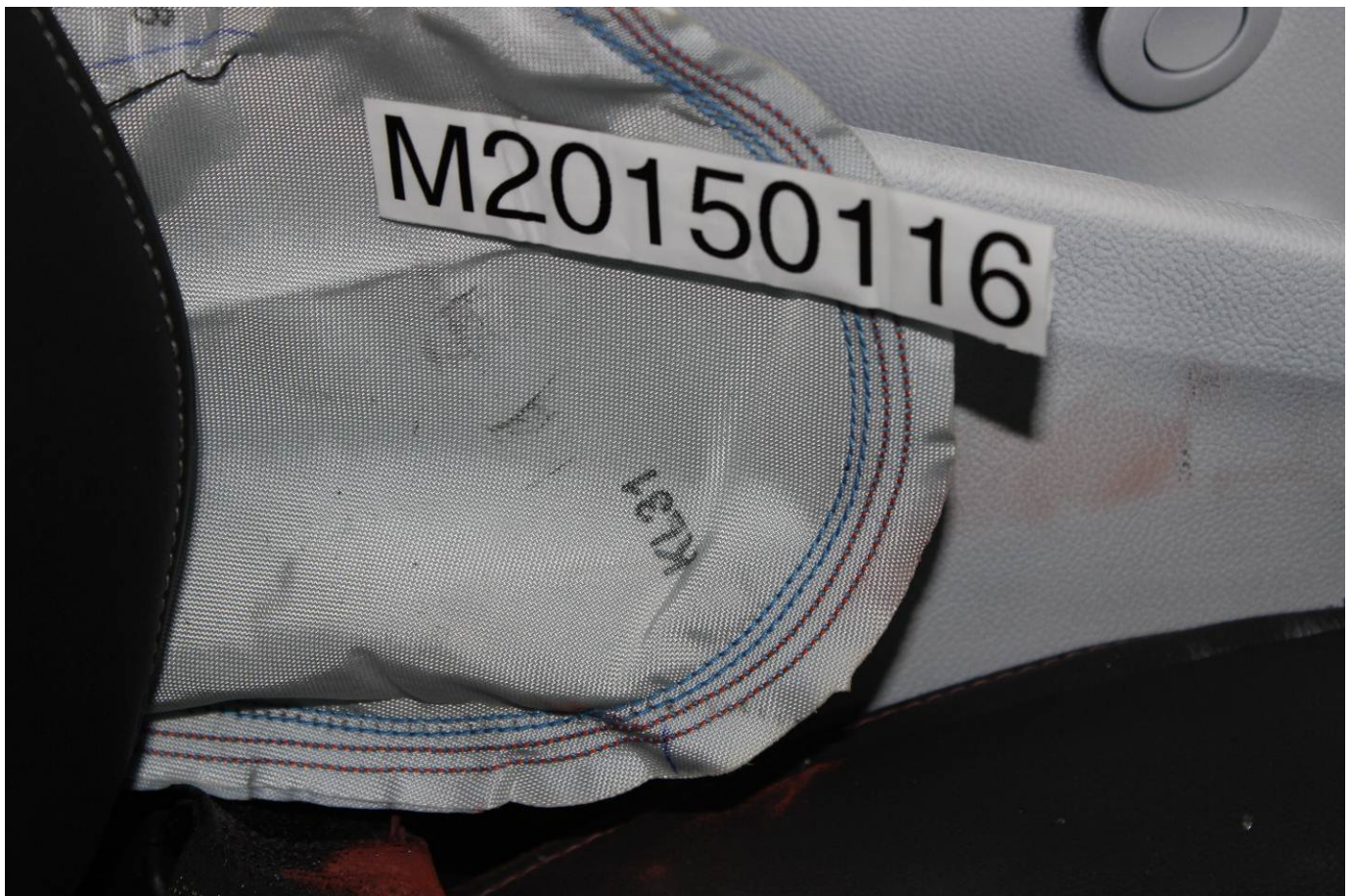
Post-Test Driver Dummy Close-up Torso Contact with Vehicle Interior View



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



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



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



Post-Test Driver Dummy Close-up Knee Contact View



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



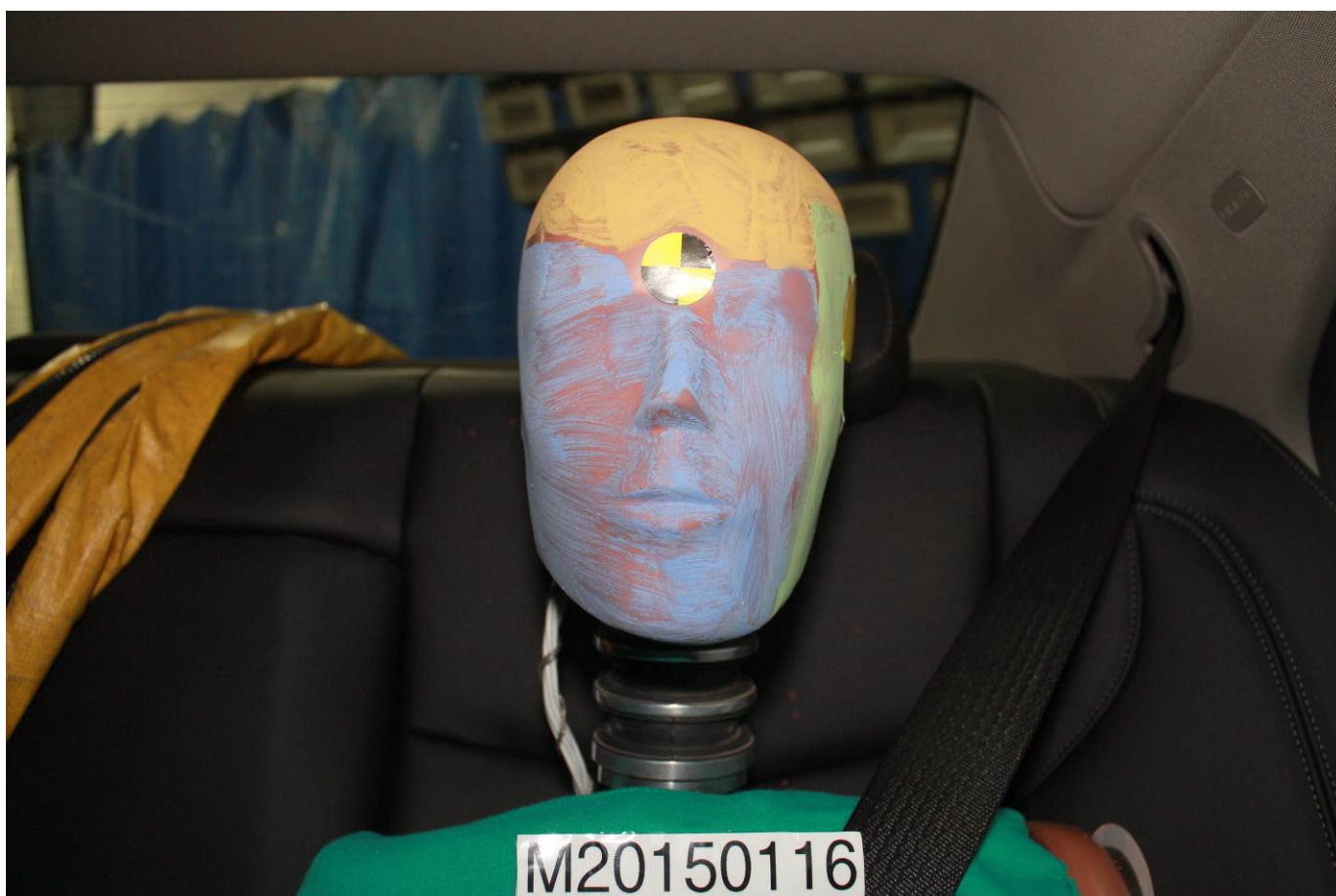
Pre-Test Left Side View of Rear Passenger Dummy Shoulder and Door Top View



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



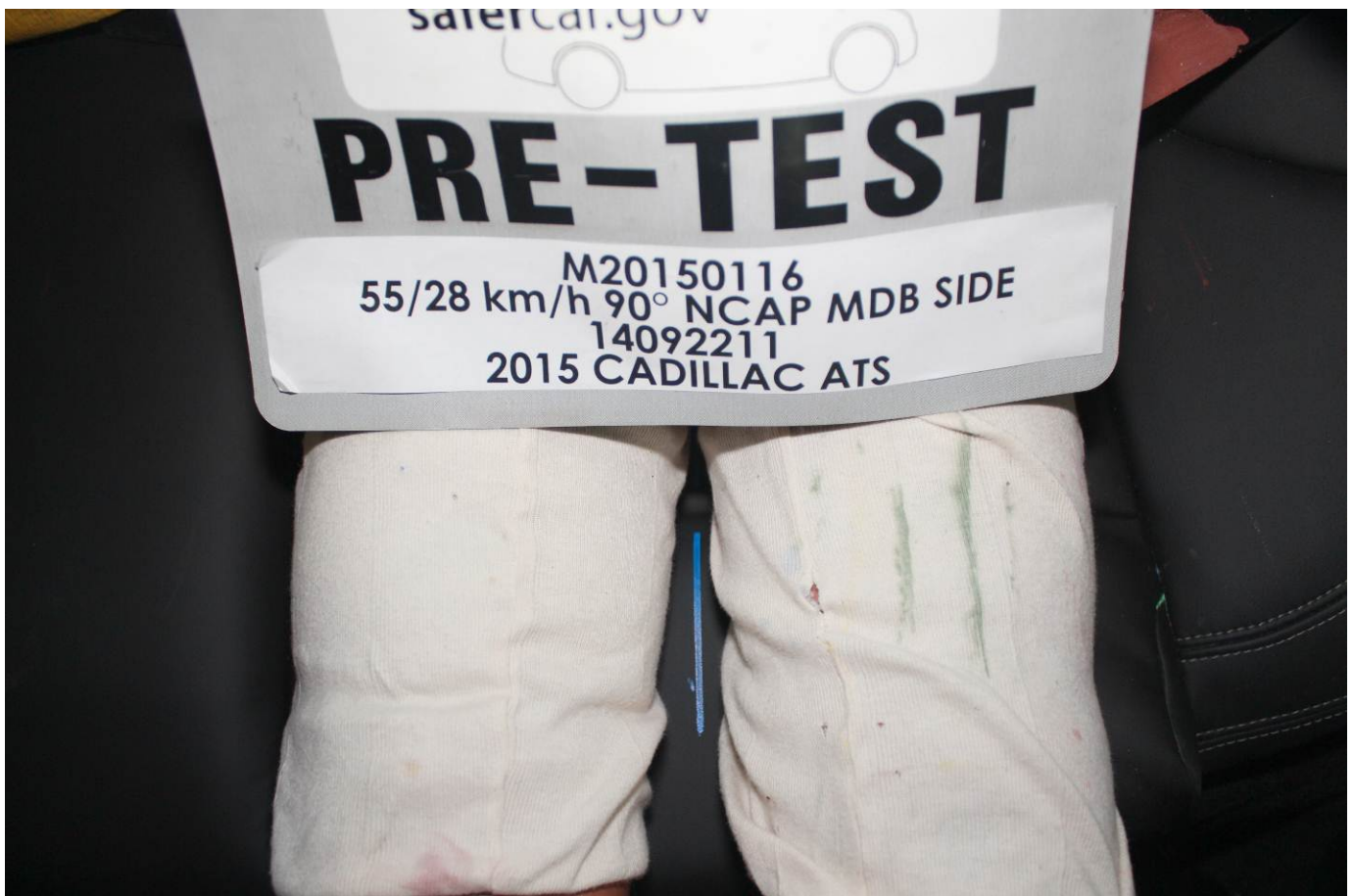
Pre-Test Frontal View of Rear Passenger Seat Back Prior to Dummy Positioning



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



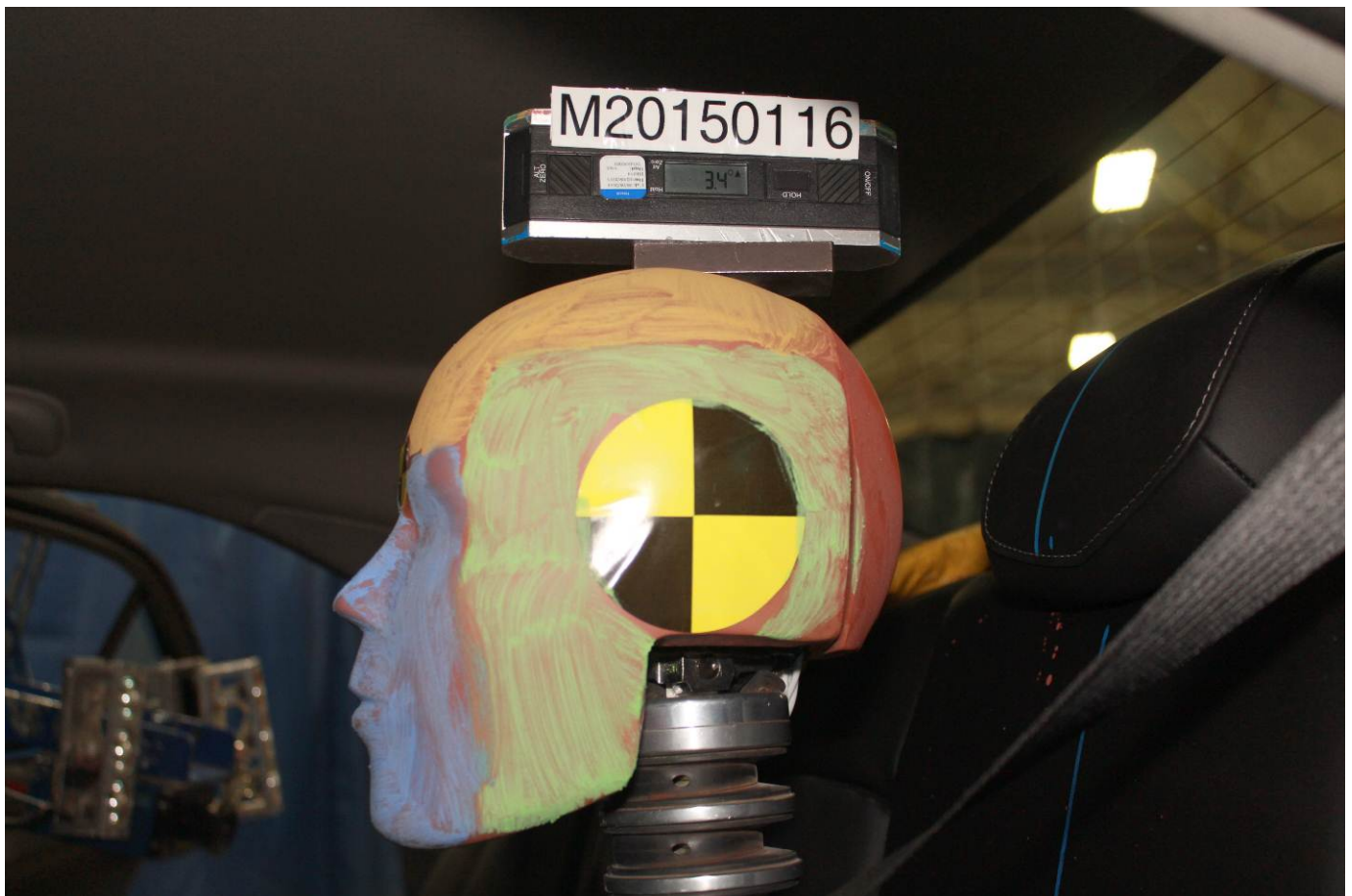
Pre-Test Overhead View of Rear Passenger Seat Pan Prior to Dummy Positioning



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



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



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



Pre-Test Placement of Rear Passenger Dummy's Feet



Pre-Test View of Belt Anchorage for Rear Passenger Dummy



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



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



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



Pre-Test Rear Passenger Dummy and Door Clearance View



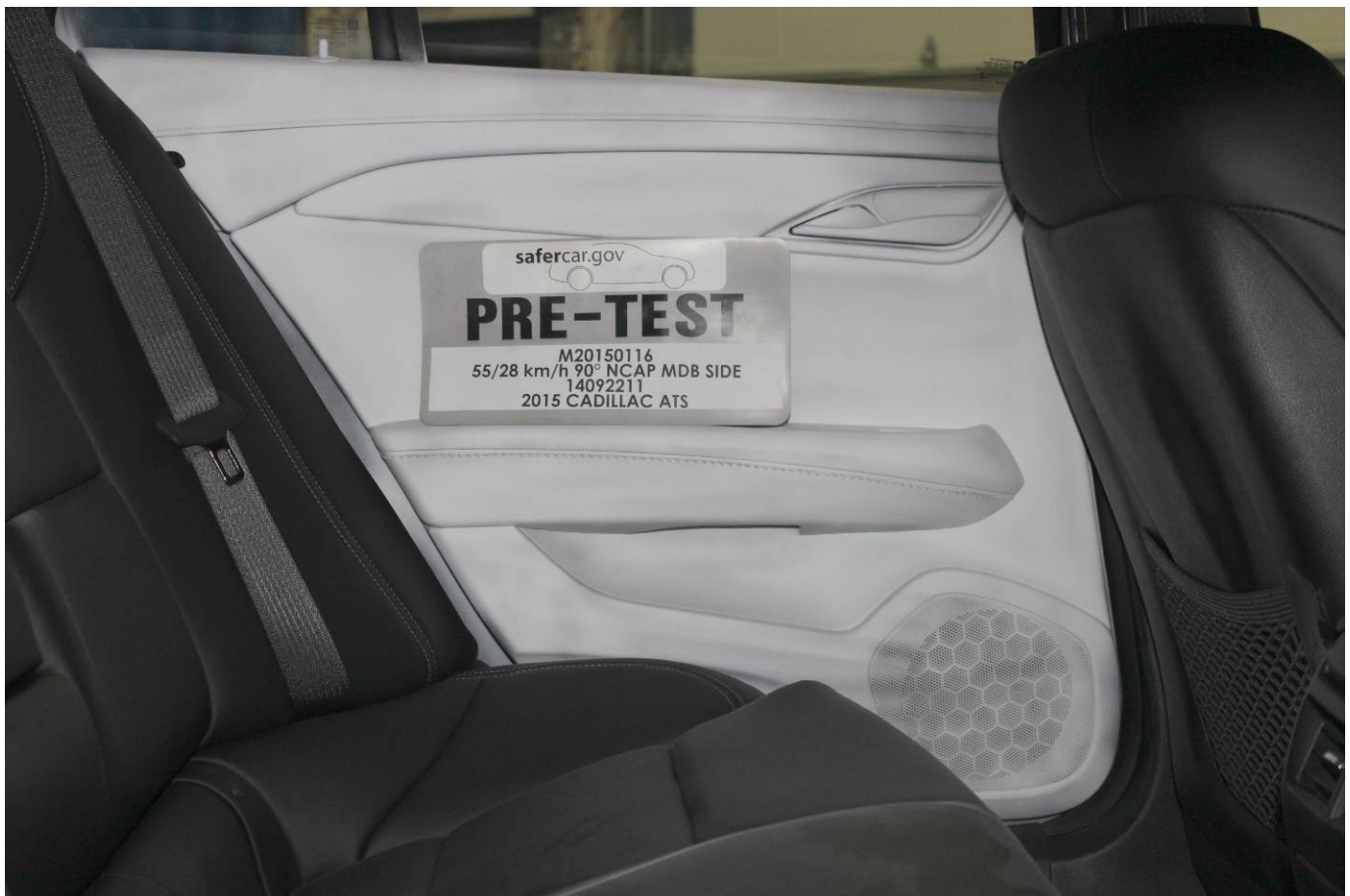
Post-Test Rear Passenger Dummy and Door Clearance View



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



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



Pre-Test Rear Passenger Inner Door Panel View



Post-Test Rear Passenger Inner Door Panel View



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



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



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

PHOTOGRAPH NOT APPLICABLE

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



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

PHOTOGRAPH NOT APPLICABLE

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



Post-Test Rear Passenger Dummy Close-up Knee Contact View



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



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



Pre-Test Front View of MDB Impactor Face



Post-Test Front View of MDB Impactor Face



Pre-Test Top View of MDB Impactor Face



Post-Test Top View of MDB Impactor Face



Pre-Test Left Side View of MDB Impactor Face



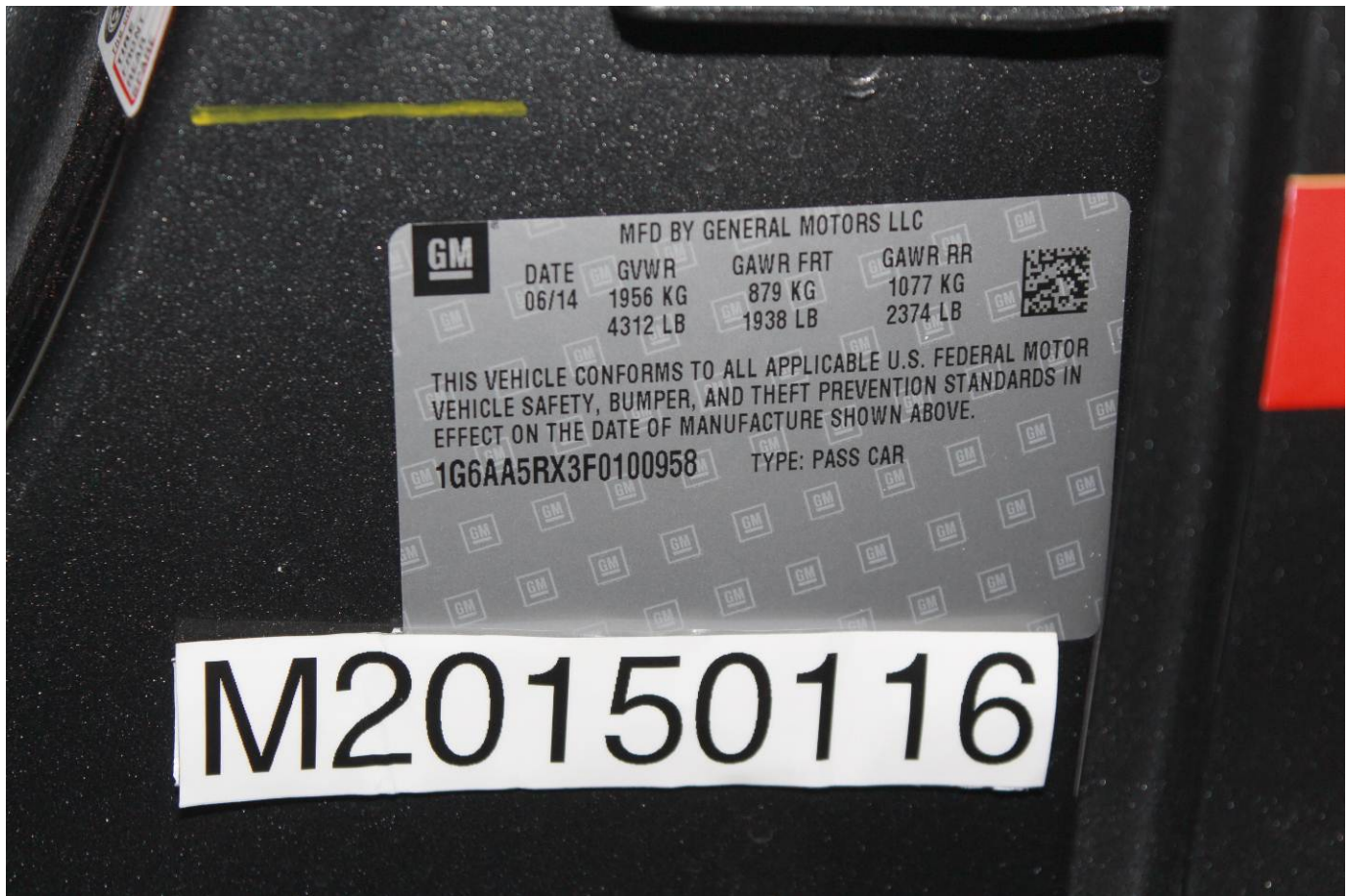
Post-Test Left Side View of MDB Impactor Face



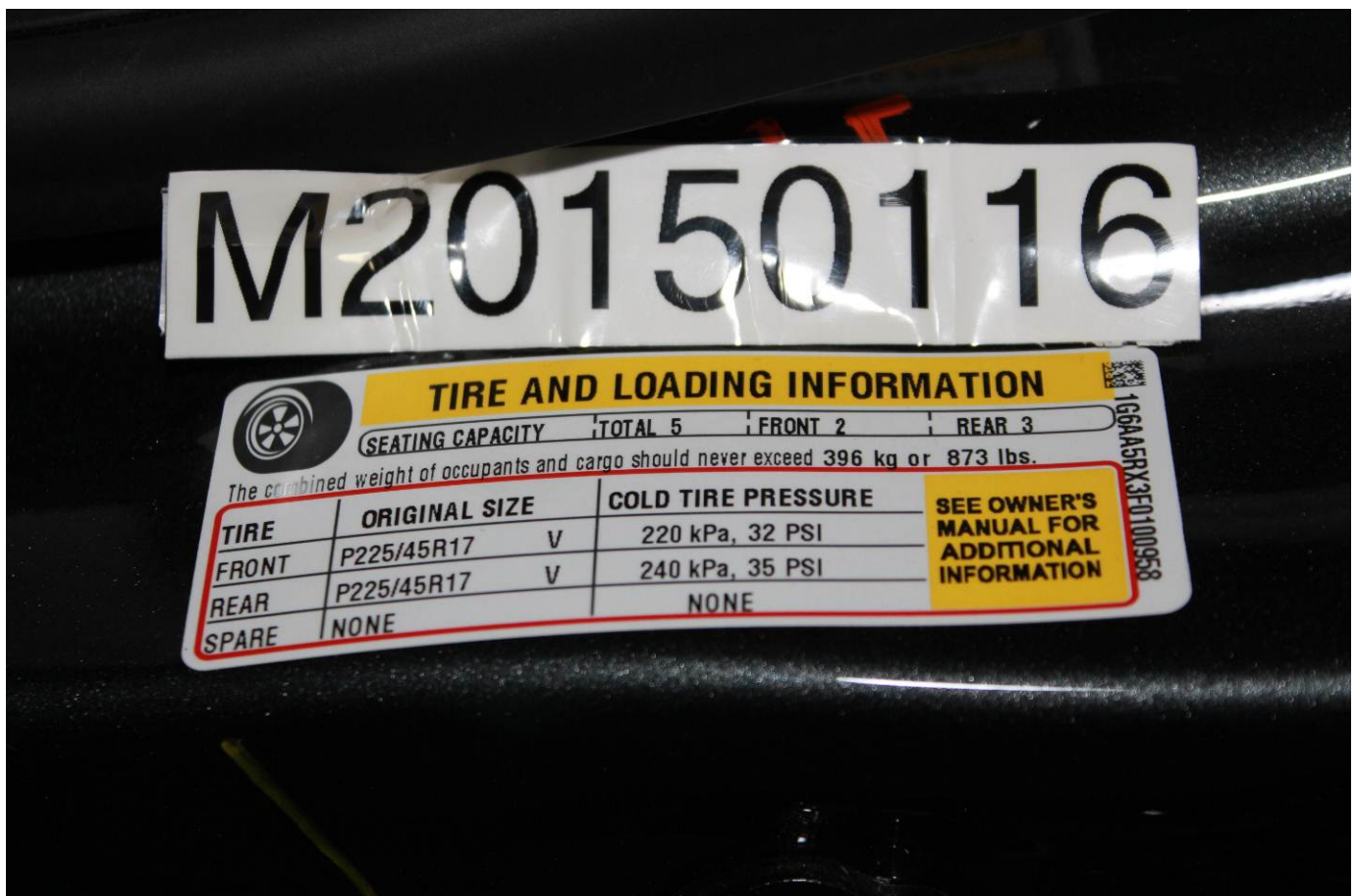
Pre-Test Right Side View of MDB Impactor Face



Post-Test Right Side View of MDB Impactor Face



Close-Up View of Vehicle's Certification Label



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



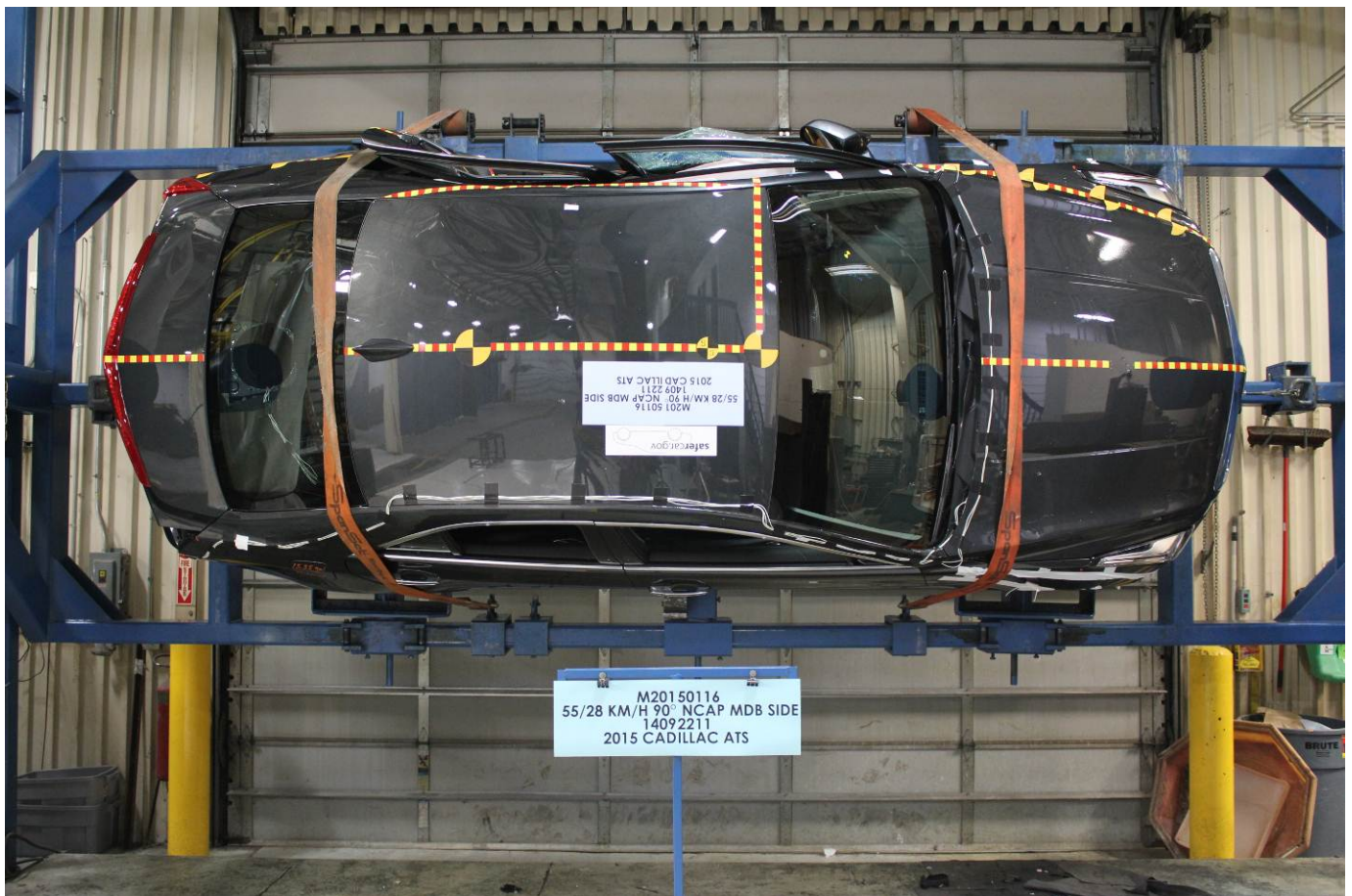
Pre-Test Ballast View



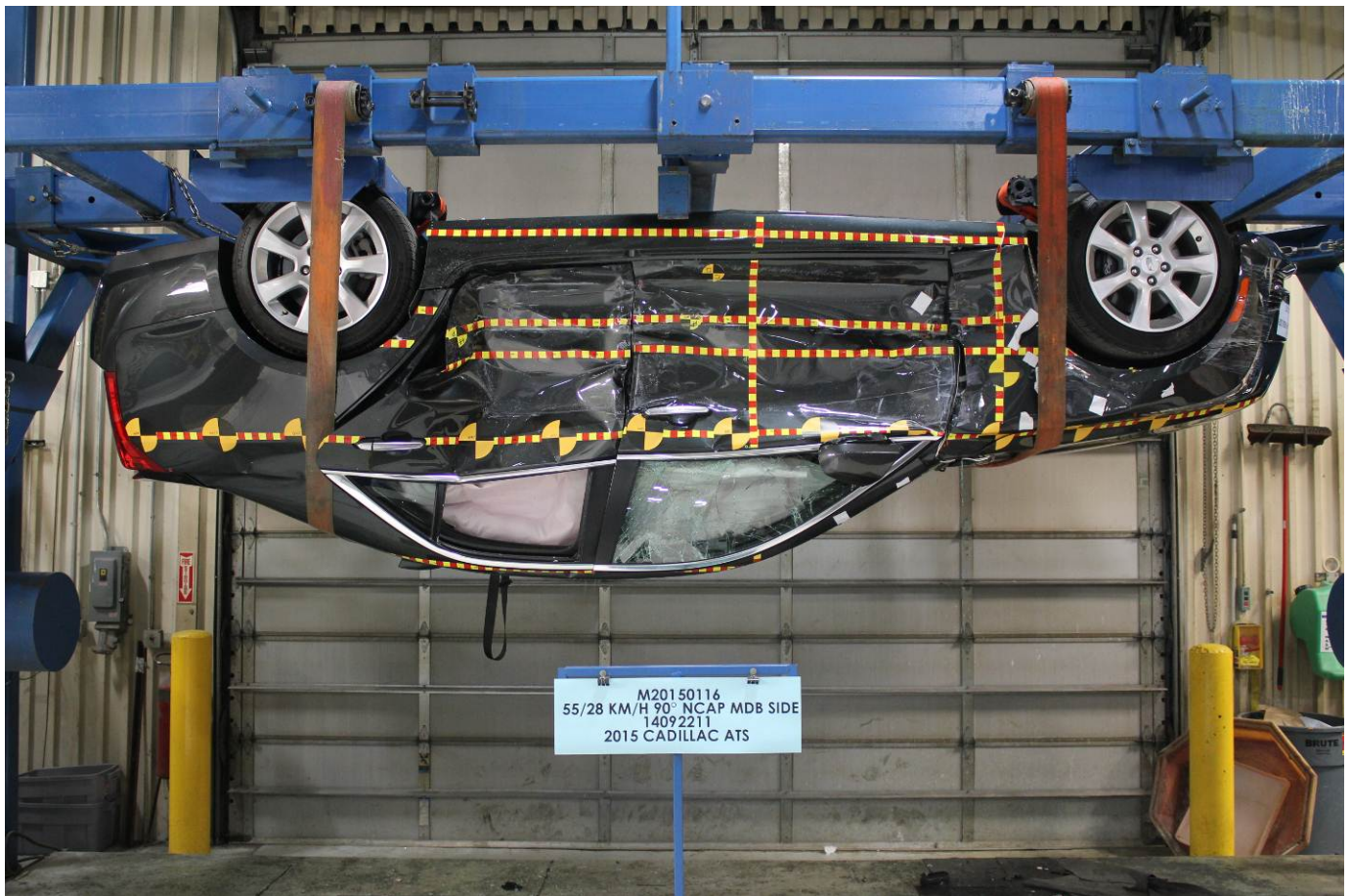
Post-Test Primary and Redundant Speed Trap Read-Out



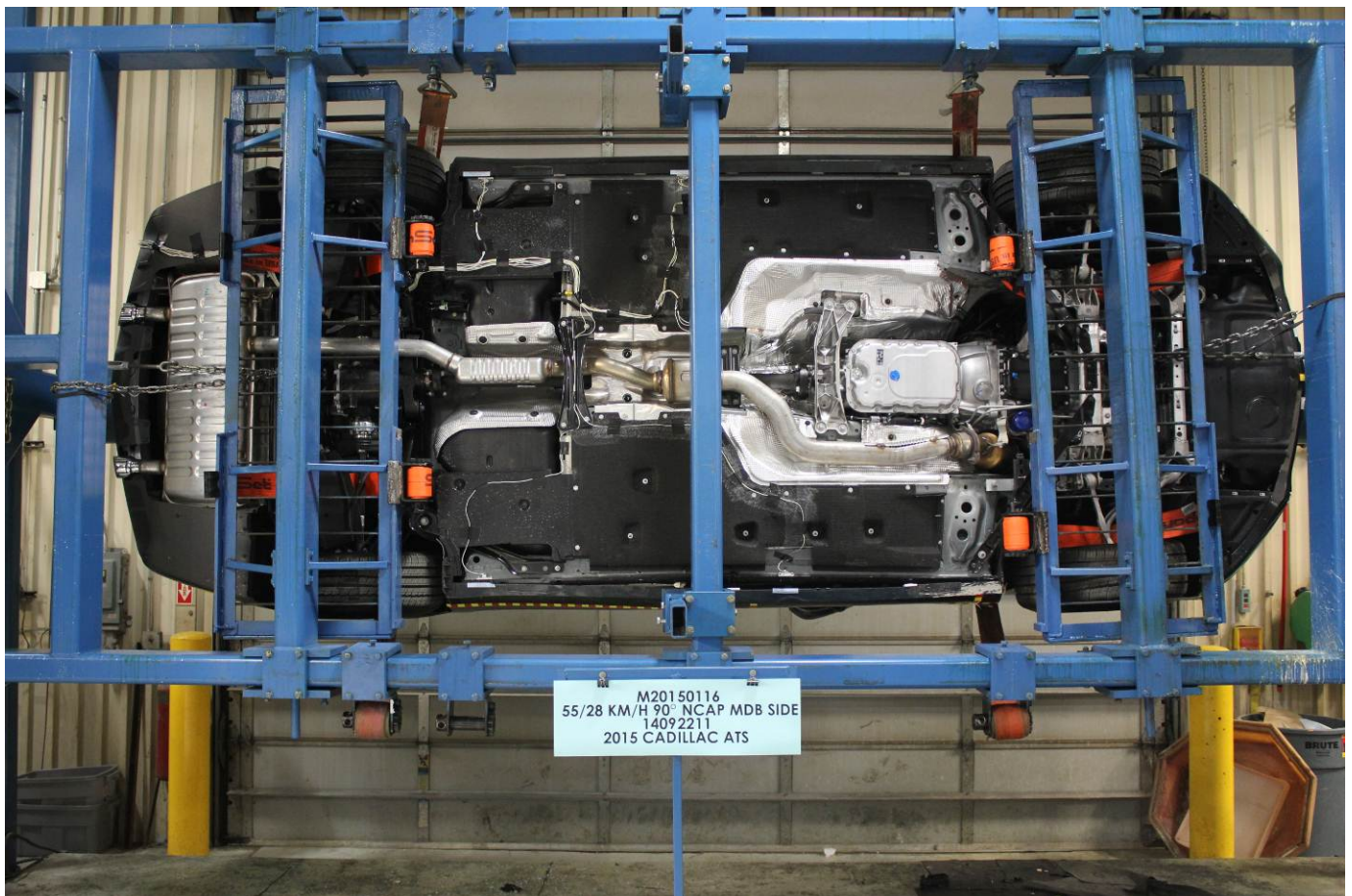
FMVSS No. 301 Static Rollover 0 Degrees



FMVSS No. 301 Static Rollover 90 Degrees



FMVSS No. 301 Static Rollover 180 Degrees



FMVSS No. 301 Static Rollover 270 Degrees



FMVSS No. 301 Static Rollover 360 Degrees



Impact Event



2015 ATS 2.0T SEDAN



EXTERIOR: PHANTOM GRAY METALLIC
INTERIOR: JET BLACK W/ JET BLACK
ACCENTS

ENGINE, 2.0L TURBO 4-CYL
TRANSMISSION, 6 SPD AUTOMATIC

Visit us at www.cadillac.com

STANDARD EQUIPMENT

ITEMS FEATURED BELOW ARE INCLUDED AT NO EXTRA CHARGE IN THE STANDARD VEHICLE PRICE SHOWN

CADILLAC OWNER BENEFITS

- 4 YEAR / 50,000 MILE* BUMPER-TO-BUMPER WARRANTY
- 6 YEAR / 70,000 MILE* POWERTRAIN LIMITED WARRANTY
- 4 YEAR / 50,000 MILE* PREMIUM CARE MAINTENANCE
- 6 YEAR / 70,000 MILE* COURTESY TRANSPORTATION
- 6 YEAR / 70,000 MILE* ROADSIDE ASSISTANCE
- WHICHEVER COMES FIRST, SEE DEALER FOR DETAILS.
- 1 YR. ONSTAR® DIRECTIONS & CONNECTIONS W/AUTOMATIC CRASH RESPONSE & TURN-BY-TURN NAV PLUS 5-YEAR ONSTAR BASIC PLAN (OMITS SAFETY, SECURITY & NAV) (SEE ONSTAR.COM)

PERFORMANCE

- ENGINE, 2.0L TURBO 4-CYL 272HP WITH DIRECT INJECTION
- TRANSMISSION, 6 SPD AUTOMATIC
- PERF. ALGORITHM TAPSHIFT
- SUSPENSION, SPORT
- 2F PREMIUM ELECTRIC VARIABLE STEERING
- EXHAUST, DUAL STAINLESS STEEL WITH BRIGHT POLISHED TIPS
- WHEELS, 17" PAINTED ALUMINUM
- TIRES, ALL SEASON RUN FLAT
- BREMBO PERFORMANCE FRT BRAKES
- STABILITRAK-STABILITY CONTROL W/ TRACTION CONTROL
- TIRE PRESSURE MONITOR
- LUXURY & CONVENIENCE**
- HANDCRAFTED CUT & SEWN INTERIOR
- LEATHERETTE SEATING SURFACES
- PWR SEAT ADJUST DRIVER AND FRONT PASSENGER 6-WAY

- LUMBAR FRT DRIVER/PASS PWR
- 6.7" FULL-COLOR DIC
- 4.2" FULL-COLOR RADIO DISPLAY
- STEREO, BOSE
- XM RADIO + SERVICE SUBSCRIPTION SOLD SEPARATELY BY SIRIUSXM AFTER 3 MTHS
- BLUETOOTH FOR PHONE
- LEATHER WRAP STRG WHL/SHIFTER
- DUAL ZONE CLIMATE CONTROL
- AIR FILTRATION SYSTEM
- MIRRORS, OUTSIDE HEATED & PWR
- LED INTERIOR LIGHTING ACCENTS
- KEYLESS PUSH-BUTTON START
- EZ KEY PASSIVE ENTRY SYSTEM
- SAFETY & SECURITY**
- AIRBAGS, DRIVER & PASSENGER
- FRONTAL, KNEE, AND SIDE FRT/OTDRD RR - HEAD CURTAIN
- 4-WAY ADJUSTABLE FRONT HEAD RESTRAINTS
- BRAKES, ABS W/ AUTO DRY

- HILL HOLD & START ASSIST
- DAYTIME RUNNING LAMPS
- POWER DOOR LOCKS-PROGRAMMABLE
- REAR DR LOCKS, CHILD SECURITY
- AUDIBLE THEFT DETERRENT W/ VEHICLE IMMOBILIZER

OPTIONS & PRICING

MANUFACTURER'S SUGGESTED RETAIL PRICE

STANDARD VEHICLE PRICE \$35,245.00

OPTIONS INSTALLED BY THE MANUFACTURER (MAY REPLACE STANDARD EQUIPMENT SHOWN)

DRIVER & FRONT PASSENGER HEATED SEATS 450.00

TOTAL OPTIONS \$450.00

TOTAL VEHICLE & OPTIONS \$35,695.00

DESTINATION CHARGE 995.00

TOTAL VEHICLE PRICE* \$36,690.00

EPA DOT Fuel Economy and Environment

Fuel Economy

24 MPG
combined city/highway

21 city
30 highway

4.2 gallons per 100 miles

You save \$0
in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost \$2,200

Fuel Economy & Greenhouse Gas Rating (tailpipe only)

6 (Best)

Smog Rating (tailpipe only)

6 (Best)

This vehicle emits 366 grams CO₂ per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also creates emissions. Learn more at fuelconomy.gov.

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 24 MPG and costs \$11,000 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at \$3.50 per gallon. MPG is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

fuelconomy.gov
Calculate personalized estimates and compare vehicles

Smartphone QR Code

GOVERNMENT 5-STAR SAFETY RATINGS

Overall Vehicle Score Not Rated
Based on the combined ratings of frontal, side and rollover. Should ONLY be compared to other vehicles of similar size and weight.

Frontal Crash Driver Passenger ★★★★★

Based on the risk of injury in a frontal impact. Should ONLY be compared to other vehicles of similar size and weight.

Side Crash Front seat Rear seat Not Rated Not Rated

Based on the risk of injury in a side impact.

Rollover ★★★★★

Based on the risk of rollover in a single-vehicle crash.

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

PARTS CONTENT INFORMATION

FOR VEHICLES IN THIS CARLINE: U.S./CANADIAN PARTS CONTENT: 65%

NOTE: PARTS CONTENT DOES NOT INCLUDE FINAL ASSEMBLY, DISTRIBUTION, OR OTHER NON-PARTS COSTS.

FOR THIS VEHICLE: FINAL ASSEMBLY POINT: LANSING, MI U.S.A. COUNTRY OF ORIGIN: ENGINE: UNITED STATES TRANSMISSION: FRANCE

ORDER NO. 101078 SALES CODE E
SALES MOODE, CODE 6489
DEALER NO. 98677
CHAL. ASSEMBLY: LANSING, MI U.S.A.
VIN 1G6AA5RX3F0100958 REISSUE

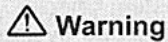
DEALER TO WHOM DELIVERED
PALMER BUICK GMC CADILLAC, INC.
7110 74TH PLACE
KENOSHA, WI 53142-3519

OnStar Equipped with the safety and connectivity of OnStar. Push your blue button or visit onstar.com for details.

Monroney Label

3-2 Seats and Restraints

Head Restraints



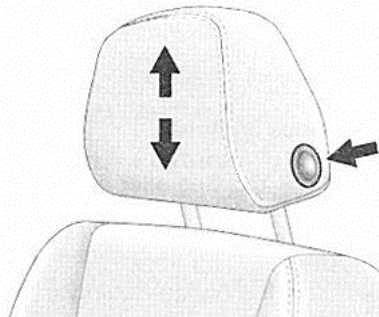
With head restraints that are not installed and adjusted properly, there is a greater chance that occupants will suffer a neck/spinal injury in a crash. Do not drive until the head restraints for all occupants are installed and adjusted properly.



Adjust the head restraint so that the top of the restraint is at the same height as the top of the occupant's head. This position reduces the chance of a neck injury in a crash.

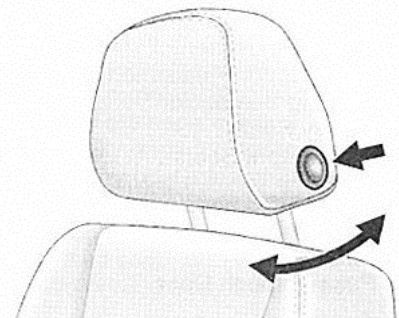
Front Seats

The vehicle's front seats have adjustable head restraints in the outboard seating positions.



The height of the head restraint can be adjusted.

To raise or lower the head restraint, press the button located on the side of the head restraint, and pull up or push the head restraint down and release the button. Pull and push on the head restraint after the button is released to make sure that it is locked in place.



To adjust the head restraint forward and rearward, press the button located on the side facing of the head restraint and move it forward or rearward until the desired locking position is reached. Try to move the

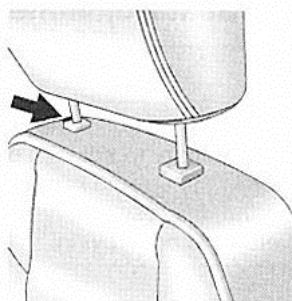
head restraint after the button is released to make sure that it is locked in place.

The front seat outboard head restraints are not removable.

Rear Seats

The vehicle's rear seats have adjustable head restraints in the outboard seating positions.

The height of the head restraint can be adjusted. Pull the head restraint up to raise it. Try to move the head restraint to make sure that it is locked in place.

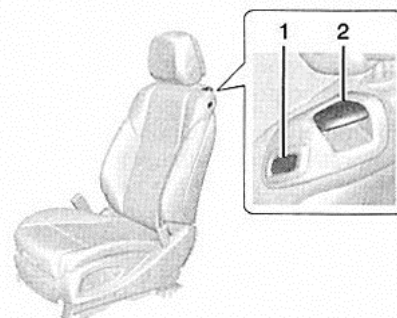


To lower the head restraint, press the button, located on the top of the seatback, and push the head restraint down. Try to move the head restraint after the button is released to make sure that it is locked in place.

Rear outboard head restraints are not removable.

Front Seats

Easy Entry Seat



Coupe

1. Seat Adjustment Switch
2. Folding Seatback Handle

If equipped, the front seats can be moved out of the way to make it easier to get in and out of the rear seat.

To fold the seatback, lift the handle (2) on top of the seatback. The seatback will fold forward.

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

APPENDIX B
DUMMY RESPONSE DATA PLOTS

TABLE OF DATA PLOTS
Driver Dummy Instrumentation Plots

<u>No.</u>	<u>Description</u>	<u>Page No.</u>
Figure No. 1.	Driver Head Acceleration (X) Primary vs. Time	B-1
Figure No. 2.	Driver Head Acceleration (Y) Primary vs. Time	B-1
Figure No. 3.	Driver Head Acceleration (Z) Primary vs. Time	B-1
Figure No. 4.	Driver Head Resultant Acceleration Primary vs. Time	B-1
Figure No. 5.	Driver Upper Thorax Rib Deflection (Y) vs. Time	B-2
Figure No. 6.	Driver Middle Thorax Rib Deflection (Y) vs. Time	B-2
Figure No. 7.	Driver Lower Thorax Rib Deflection (Y) vs. Time	B-2
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Figure No. 11.	Driver Posterior Abdomen Force (Y) vs. Time	B-3
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Figure No. 13.	Driver Pubic Symphysis Force (Y) vs. Time	B-4
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Figure No. 18.	Passenger Lower Spine T12 Acceleration (X) vs. Time	B-6
Figure No. 19.	Passenger Lower Spine T12 Acceleration (Y) vs. Time	B-6
Figure No. 20.	Passenger Lower Spine T12 Acceleration (Z) vs. Time	B-6
Figure No. 21.	Passenger Lower Spine T12 Resultant Acceleration vs. Time	B-6
Figure No. 22.	Passenger Iliac Force on Impact Side (Y) vs. Time	B-7
Figure No. 23.	Passenger Acetabulum Force on Impact Side (Y) vs. Time	B-7
Figure No. 24.	Passenger Total Pelvic Force on Impact Side (Y) vs. Time	B-7

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

Additional Driver & Passenger Dummy Instrumentation Data

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

Vehicle Instrumentation Data

Vehicle Center of Gravity Acceleration (X)

Vehicle Center of Gravity Acceleration (Y)

Vehicle Center of Gravity Acceleration (Z)

Right Side Sill at Front Seat Acceleration (X)

Right Side Sill at Front Seat Acceleration (Y)

Right Side Sill at Front Seat Acceleration (Z)

Right Side Sill at Rear Seat Acceleration (X)

Right Side Sill at Rear Seat Acceleration (Y)

Right Side Sill at Rear Seat Acceleration (Z)

Left Side Sill at Front Seat Acceleration (Y)

Left Side Sill at Rear Seat Acceleration (Y)

Lower A-Post Acceleration (Y)

Middle A-Post Acceleration (Y)

Lower B-Post Acceleration (Y)

Middle B-Post Acceleration (Y)

Front Seat Track Acceleration (Y)

Rear Seat Track Acceleration (Y)

Right Rear Occupant Compartment Acceleration (Y)

Engine Block (X)

Engine Block (Y)

Rear Floorpan Above Axle Acceleration (X)

Rear Floorpan Above Axle Acceleration (Y)

Rear Floorpan Above Axle Acceleration (Z)

MDB Instrumentation Data

MDB Center of Gravity Acceleration (X)

MDB Center of Gravity Acceleration (Y)

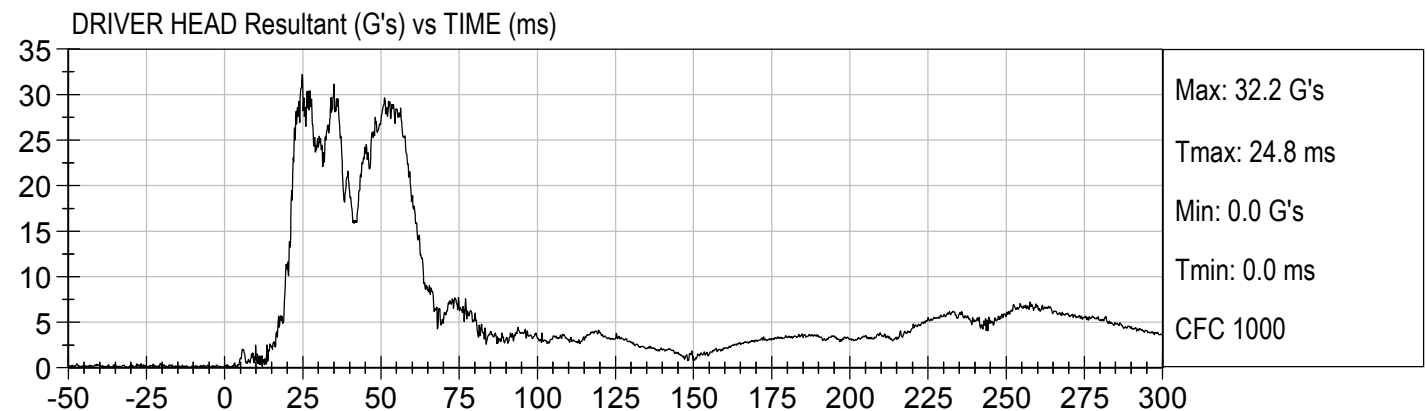
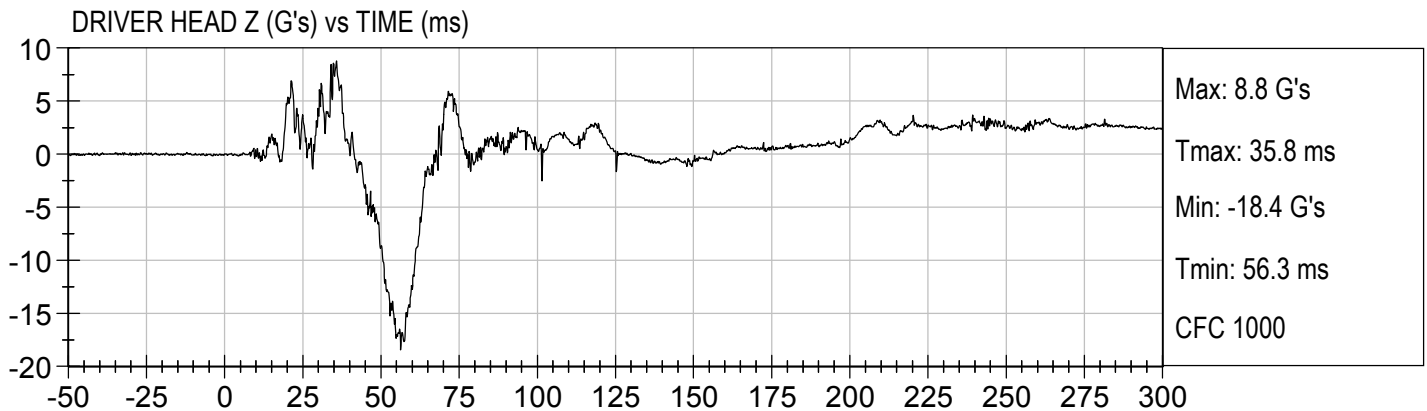
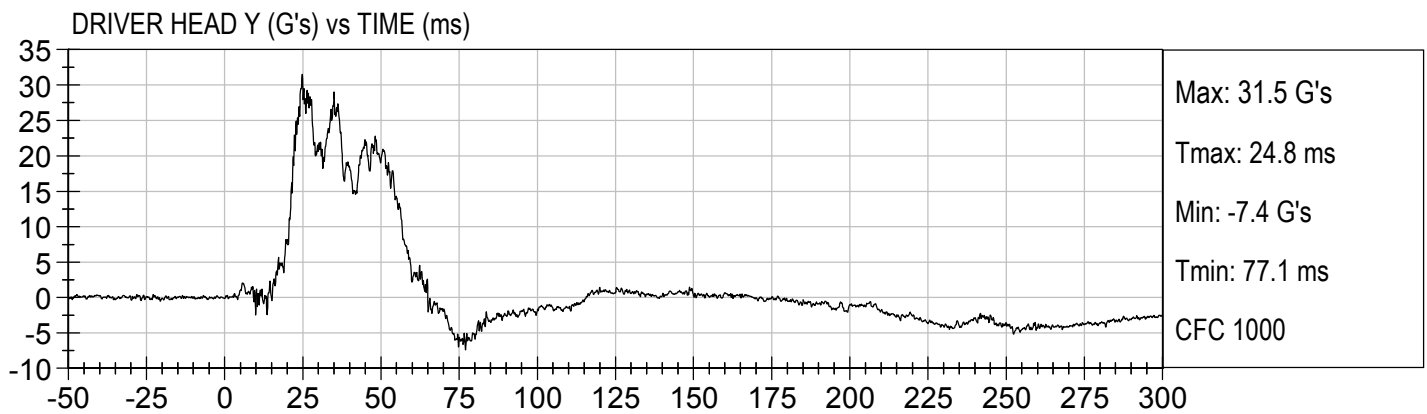
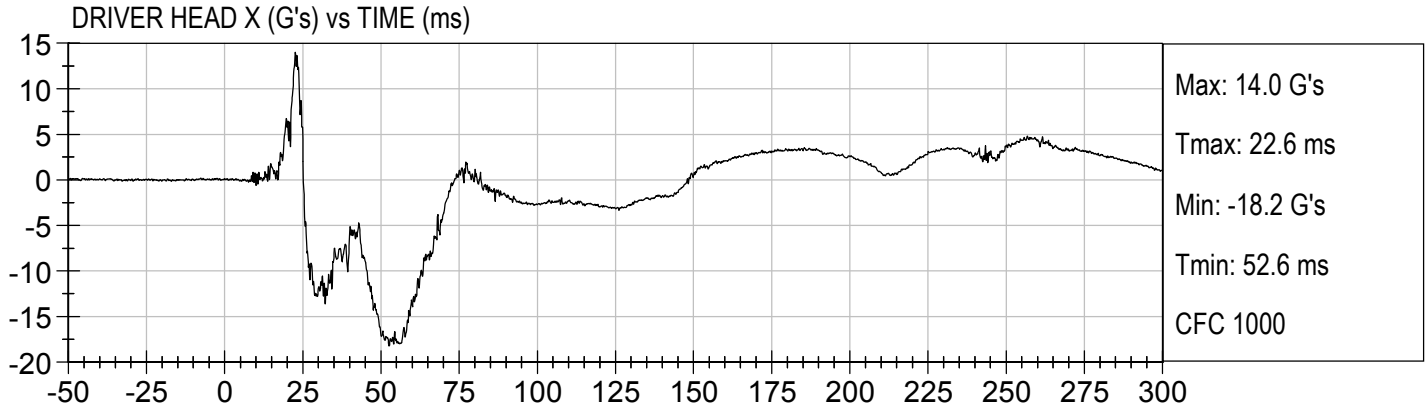
MDB Center of Gravity Acceleration (Z)

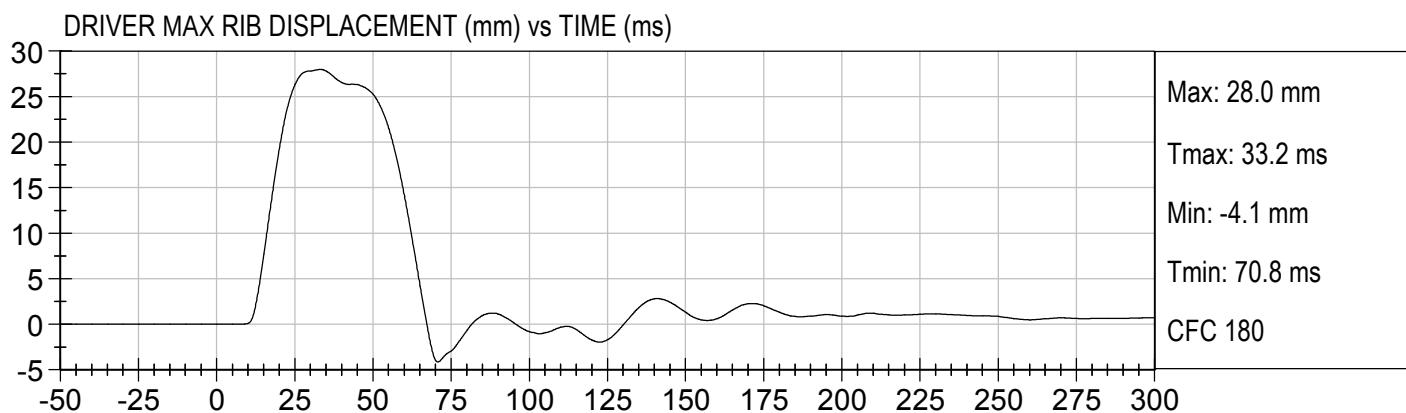
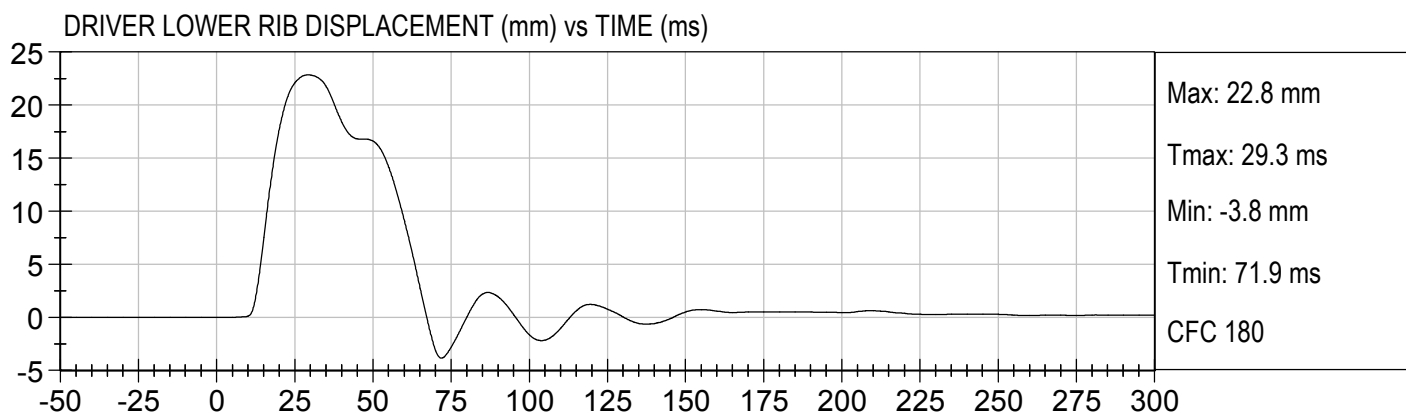
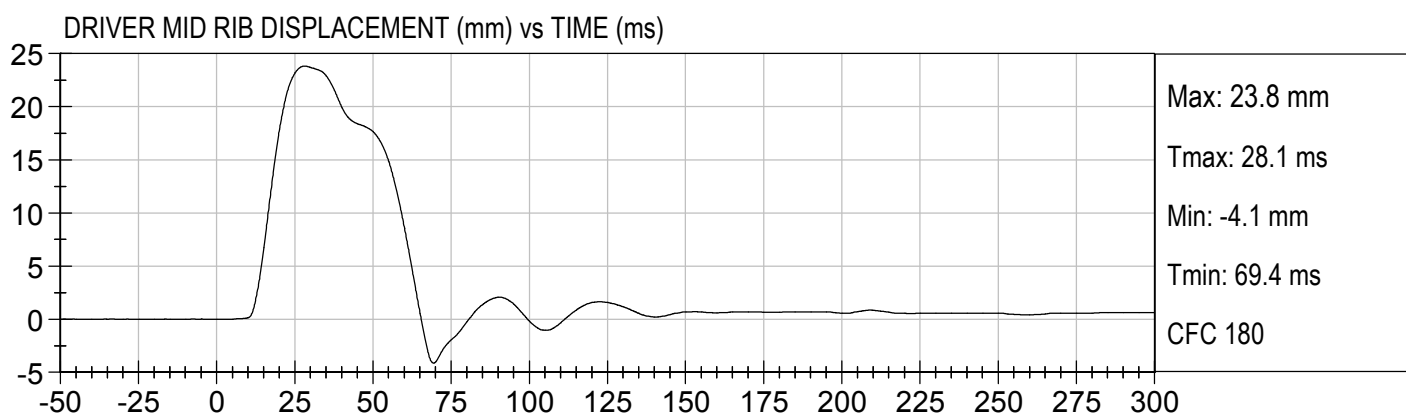
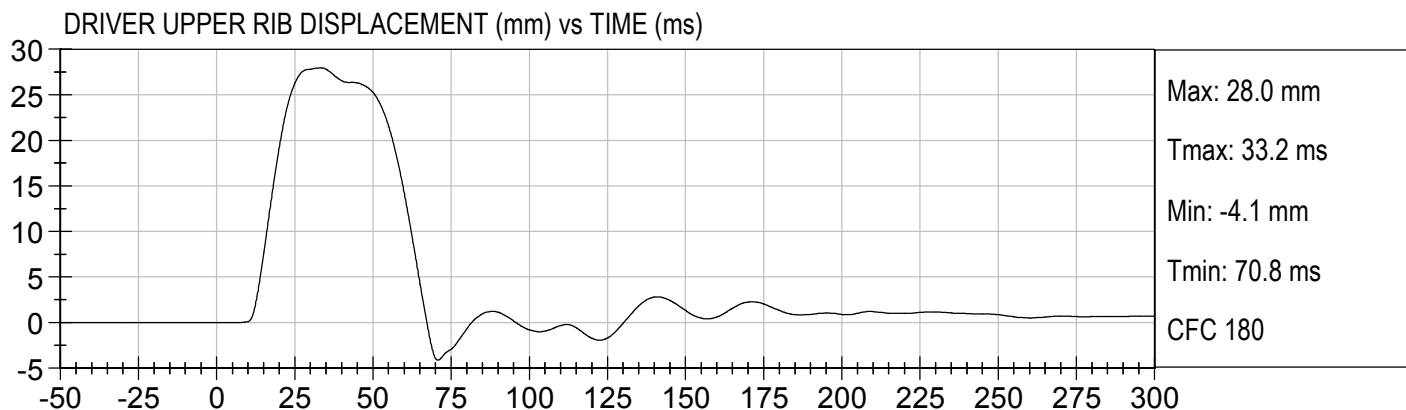
MDB Rear Acceleration (X)

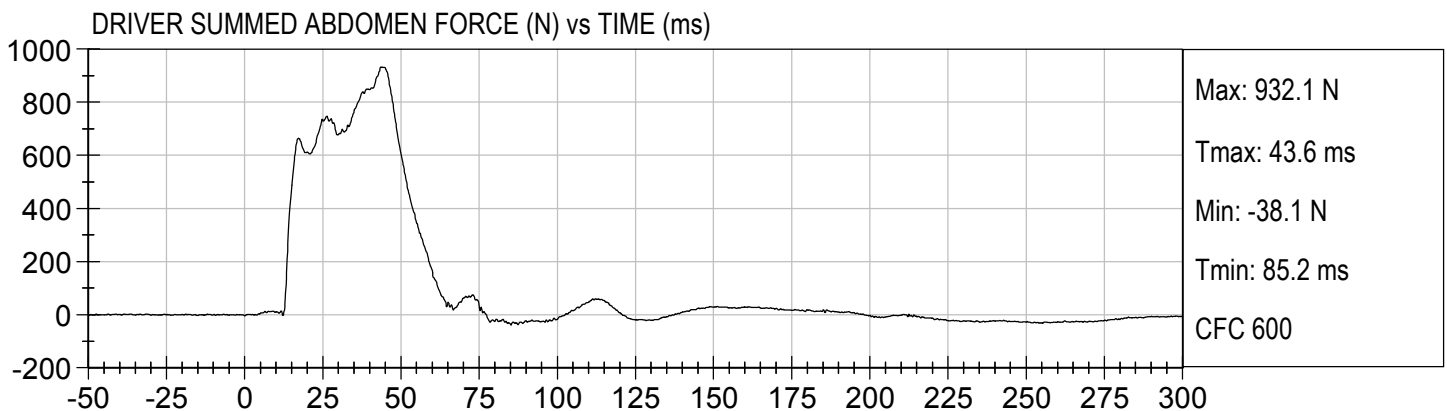
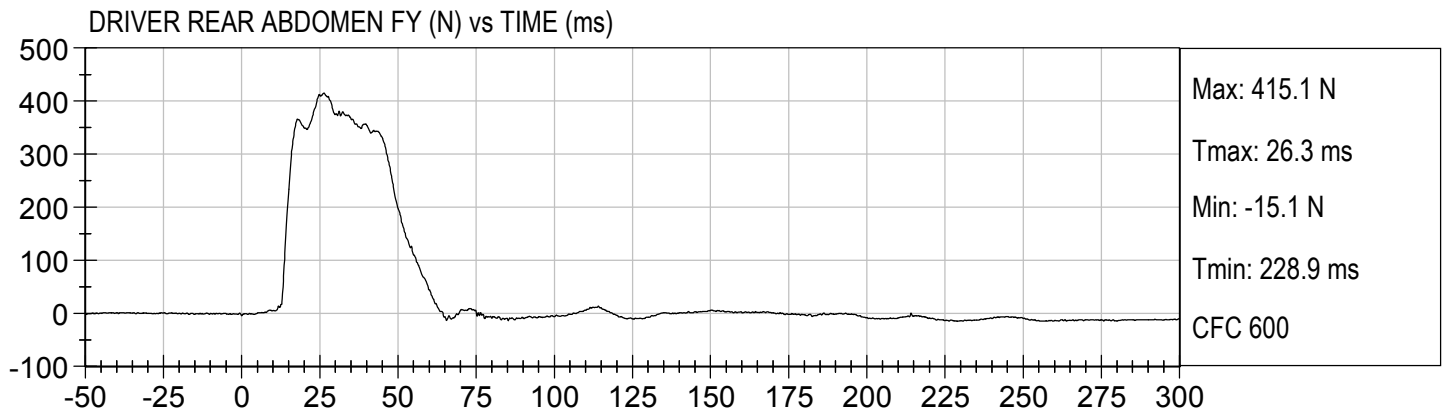
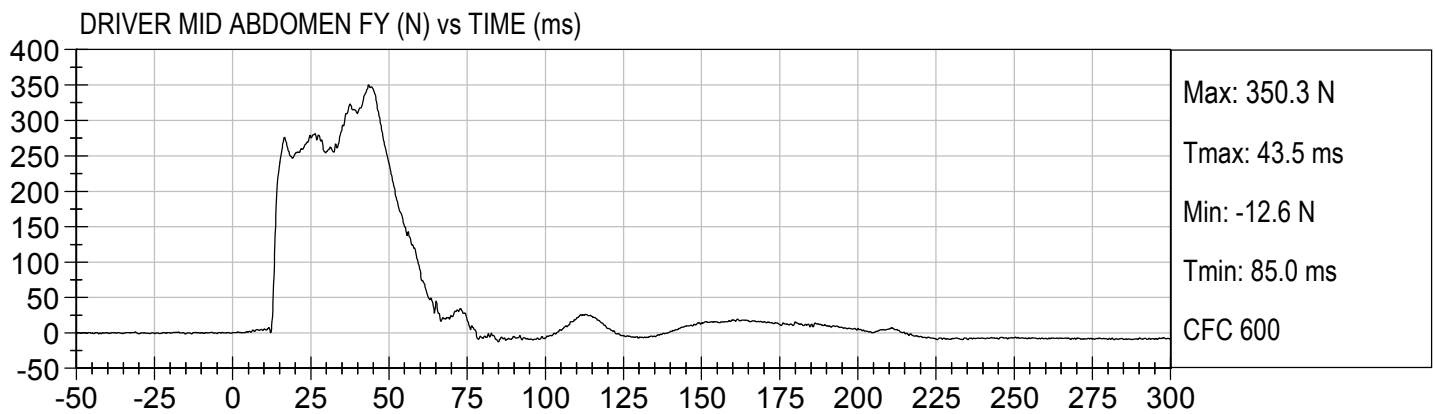
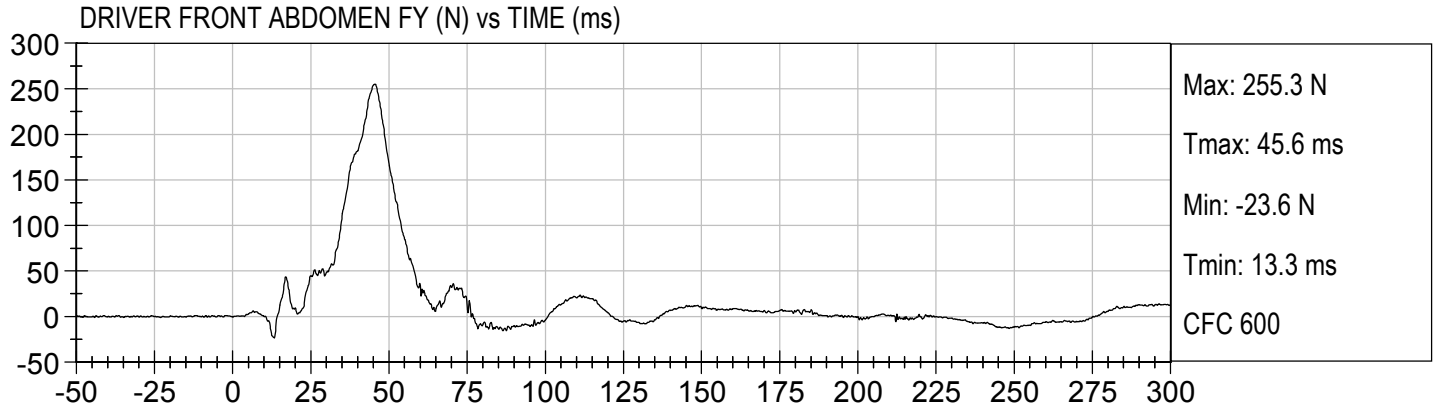
MDB Rear Acceleration (Y)

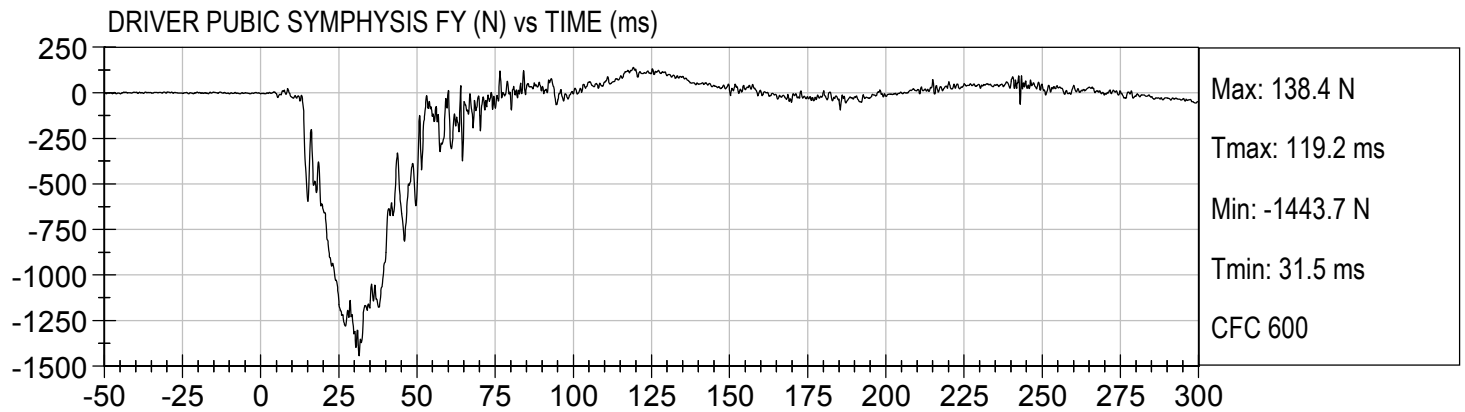
Left MDB Contact Switch

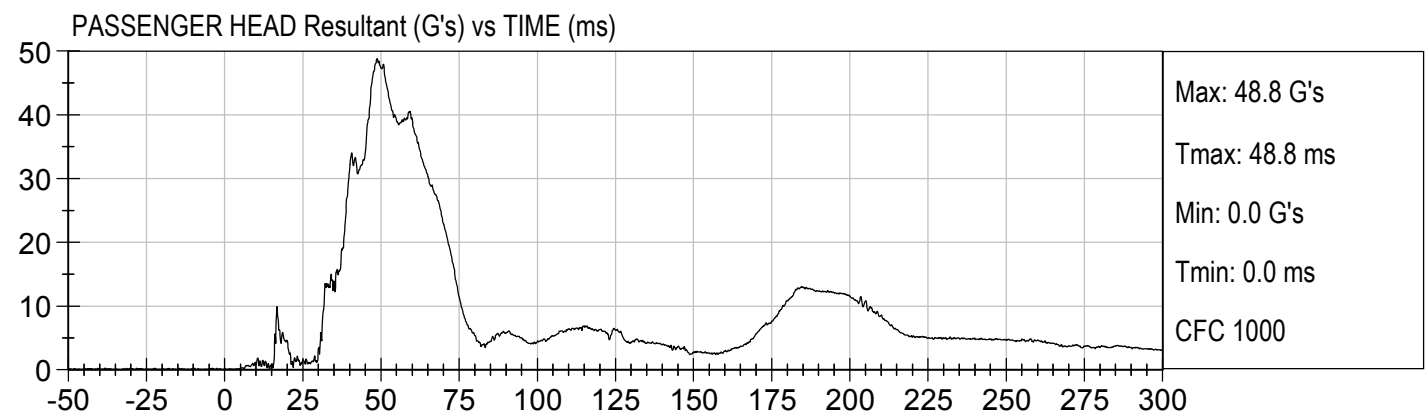
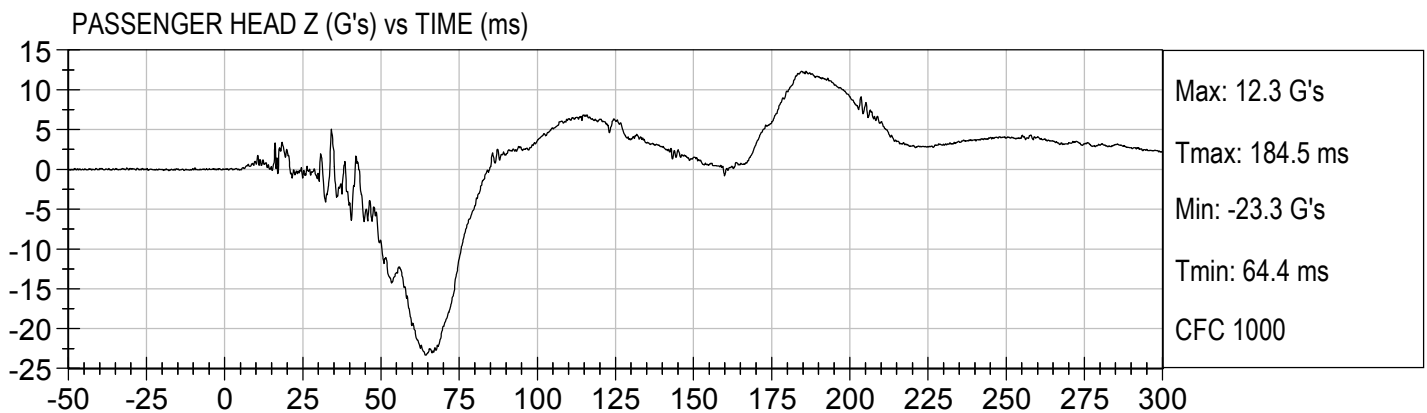
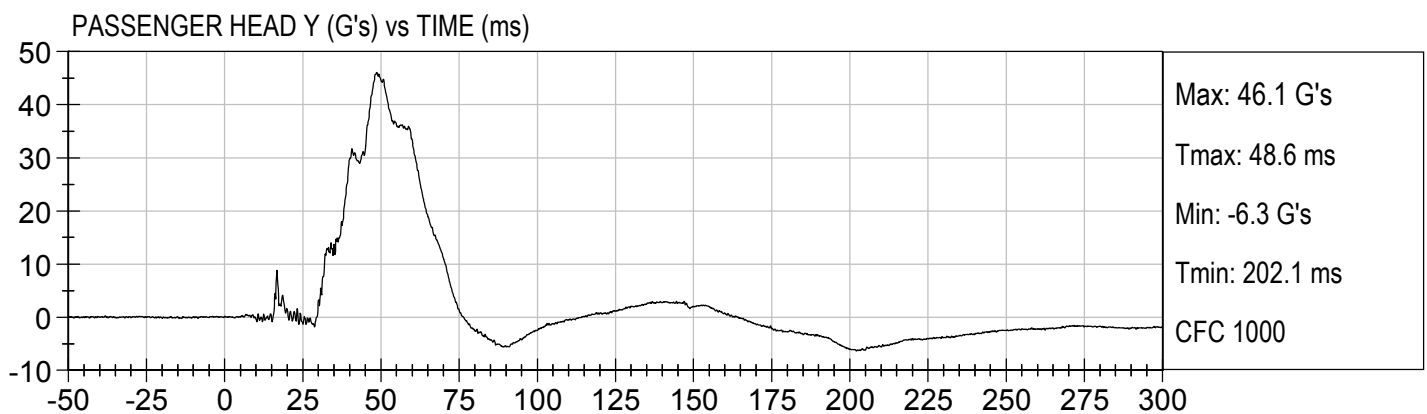
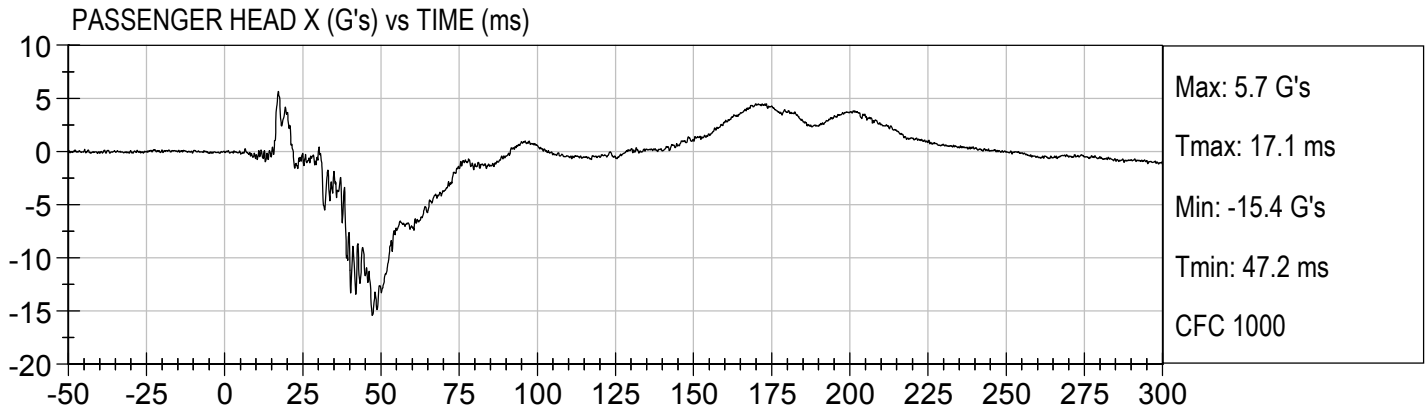
Right MDB Contact Switch

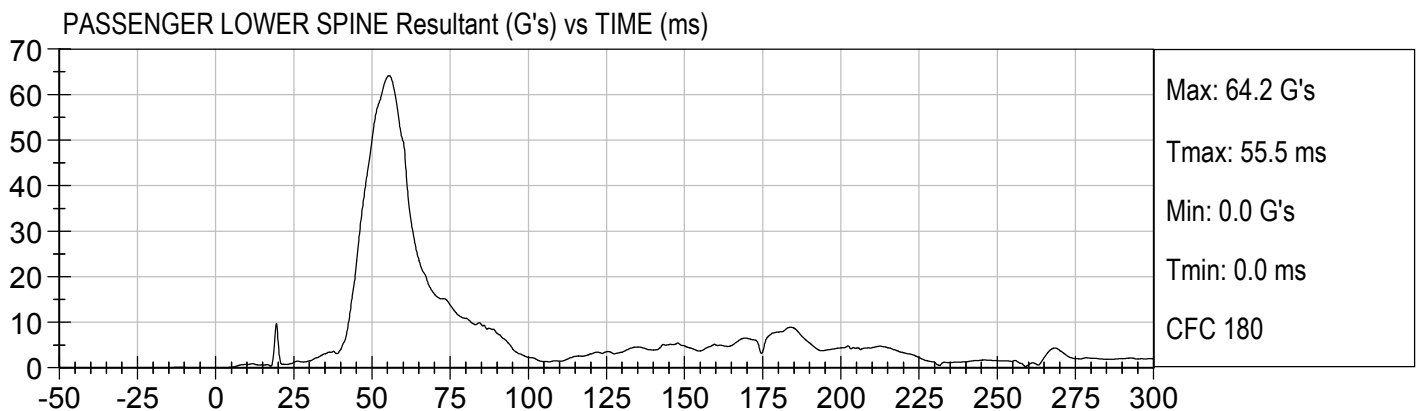
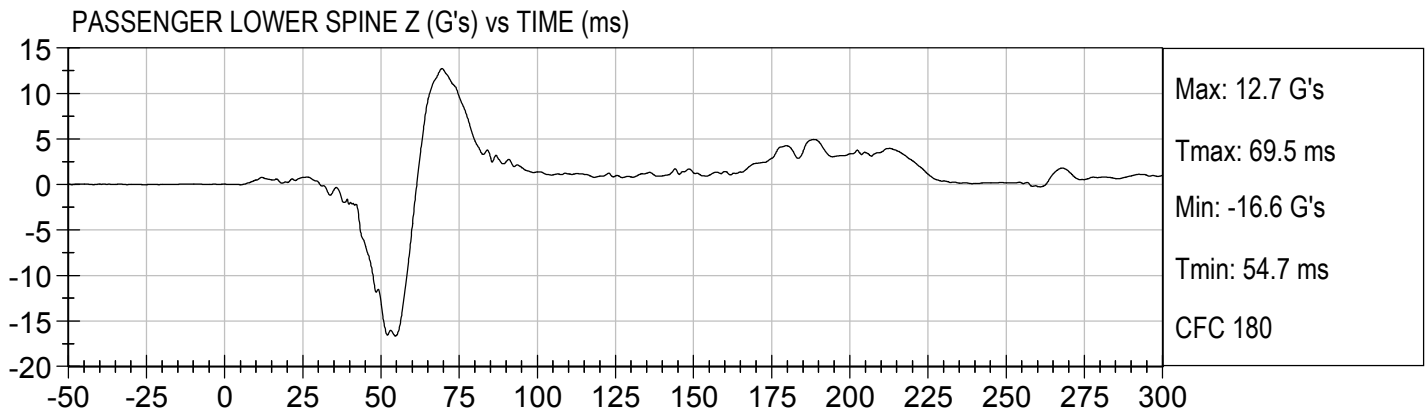
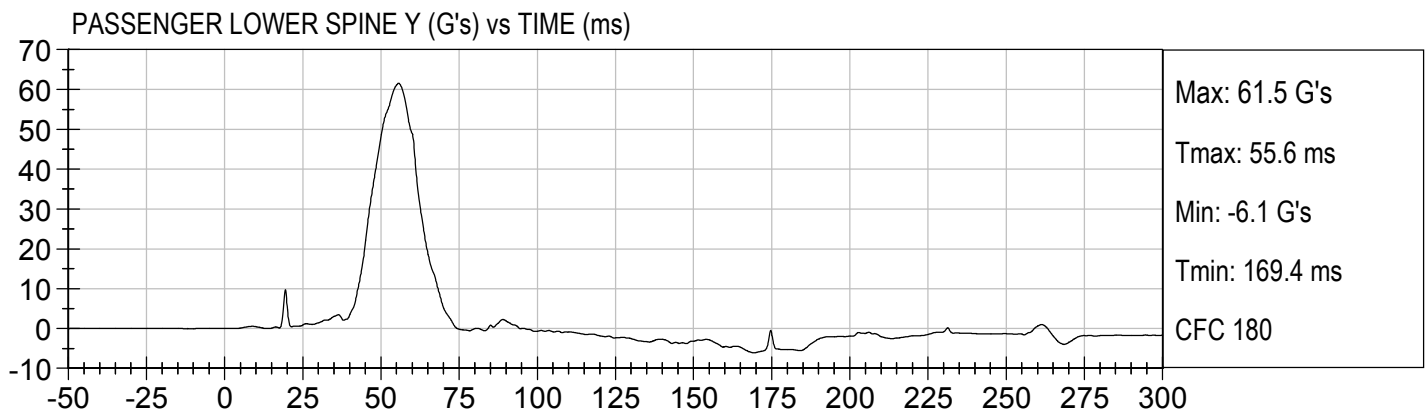
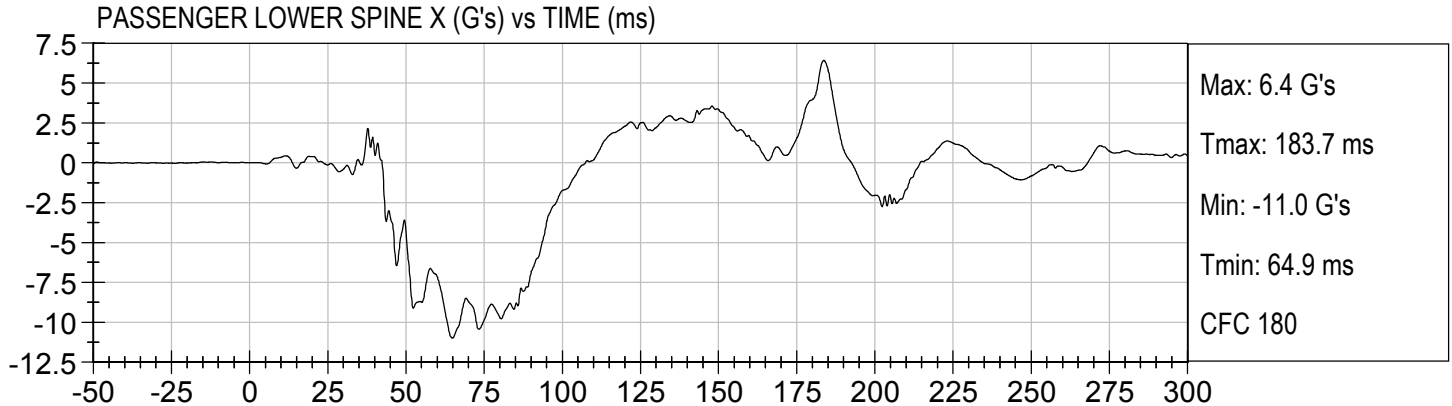


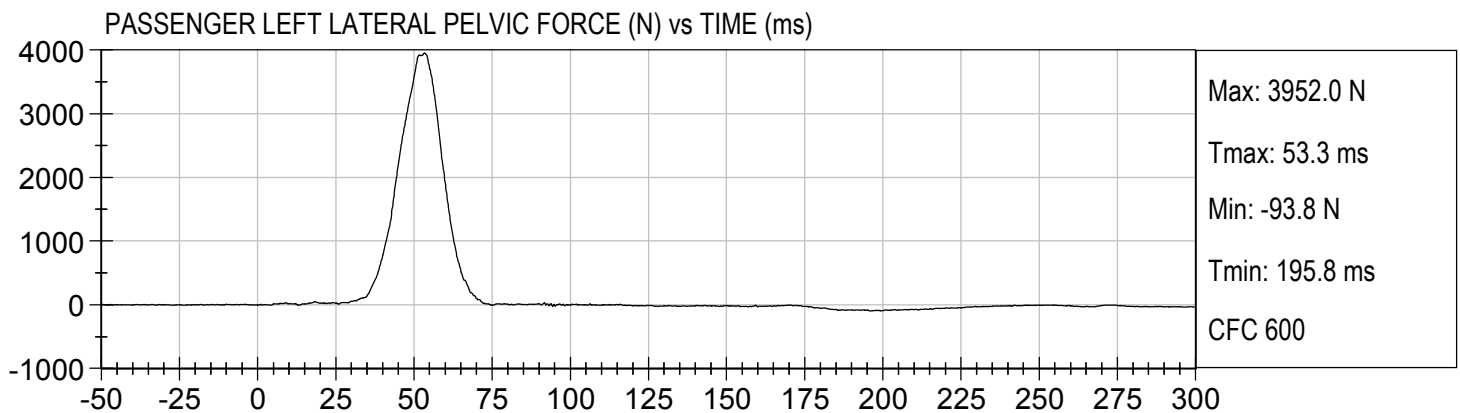
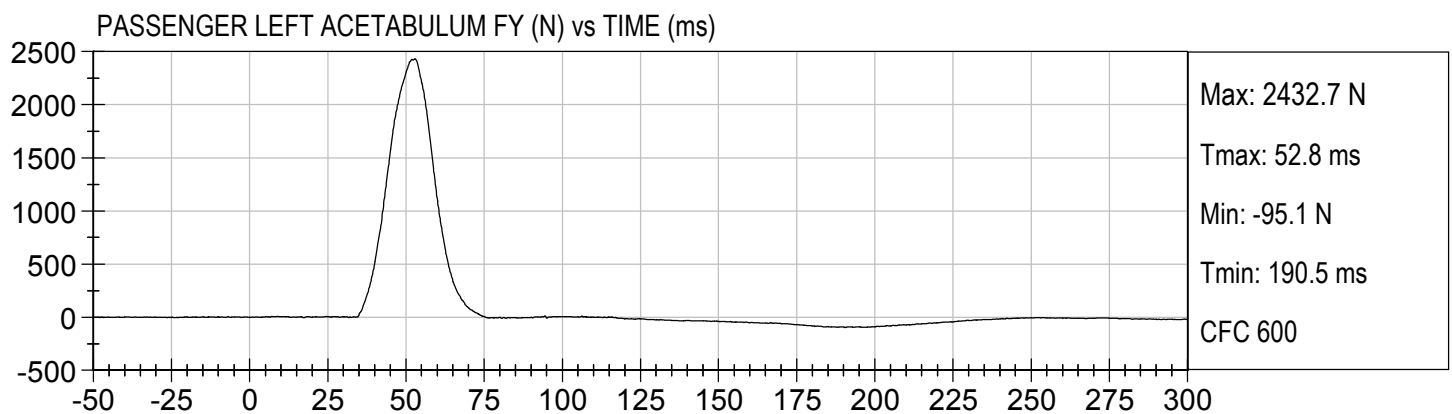
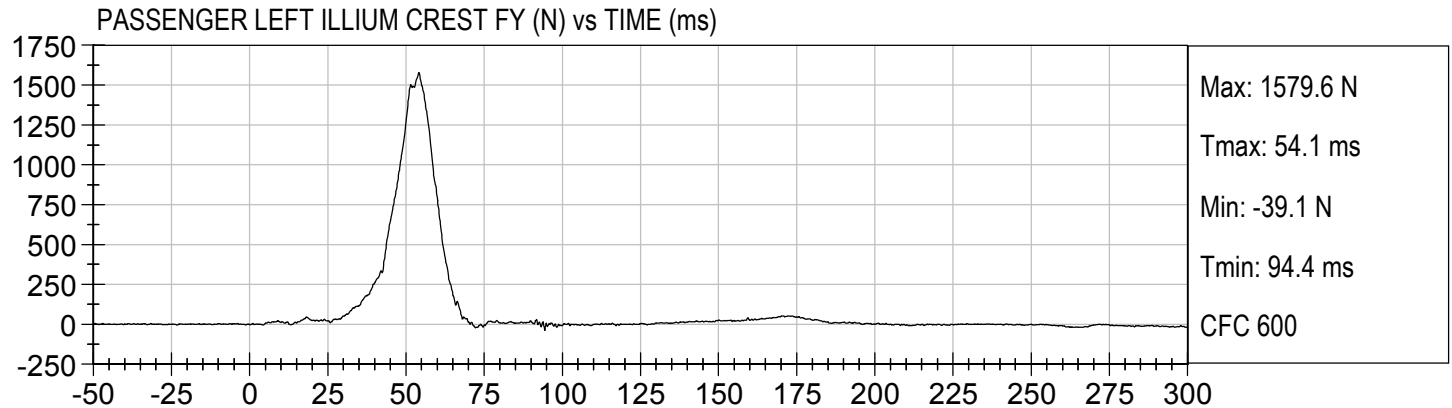












APPENDIX C
DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

ES-2re External Measurements
SN: 032

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

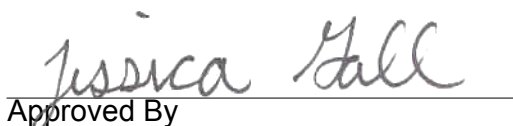
MGA RESEARCH CORPORATION**HEAD DROP TEST****ES-2re DUMMY**ATD Serial No: 032Test ID: D143101

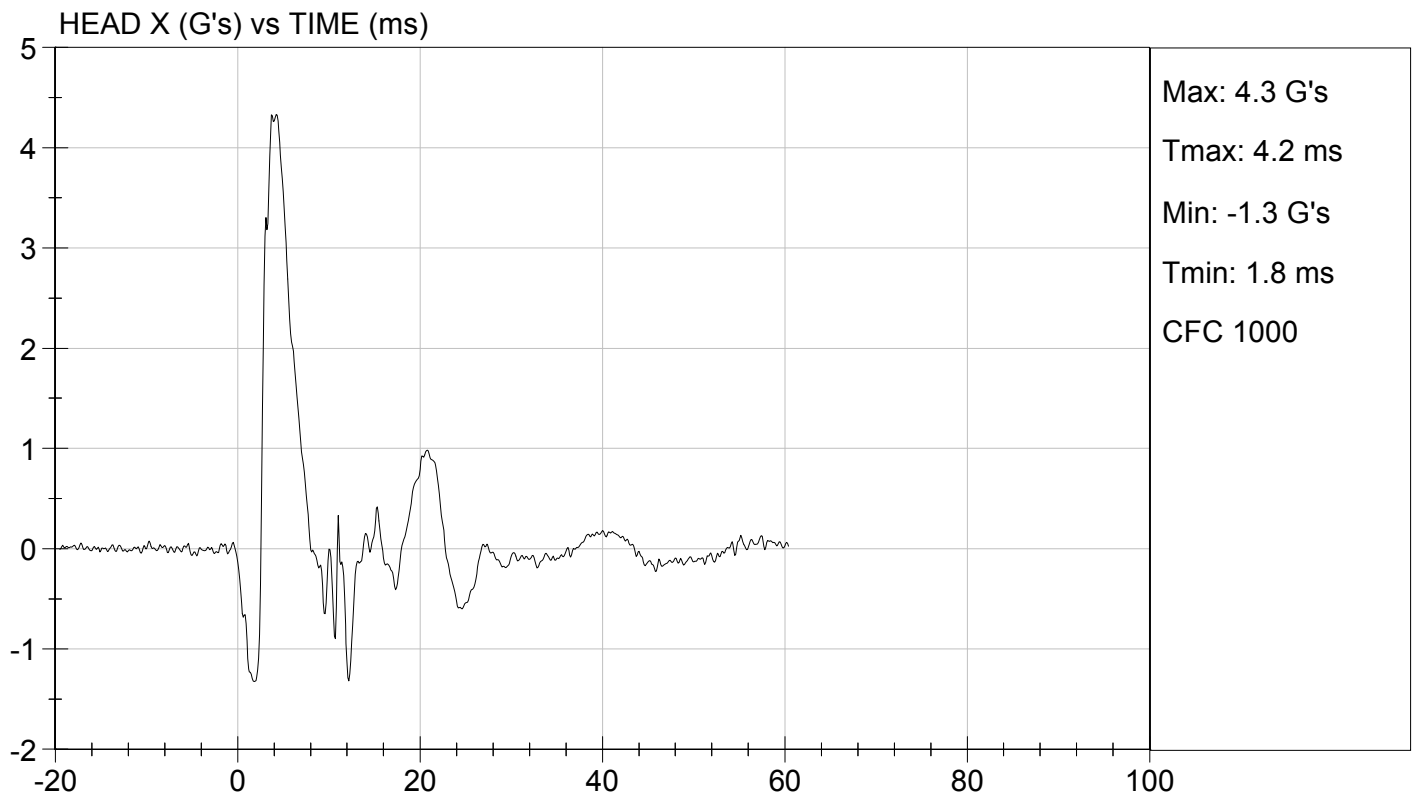
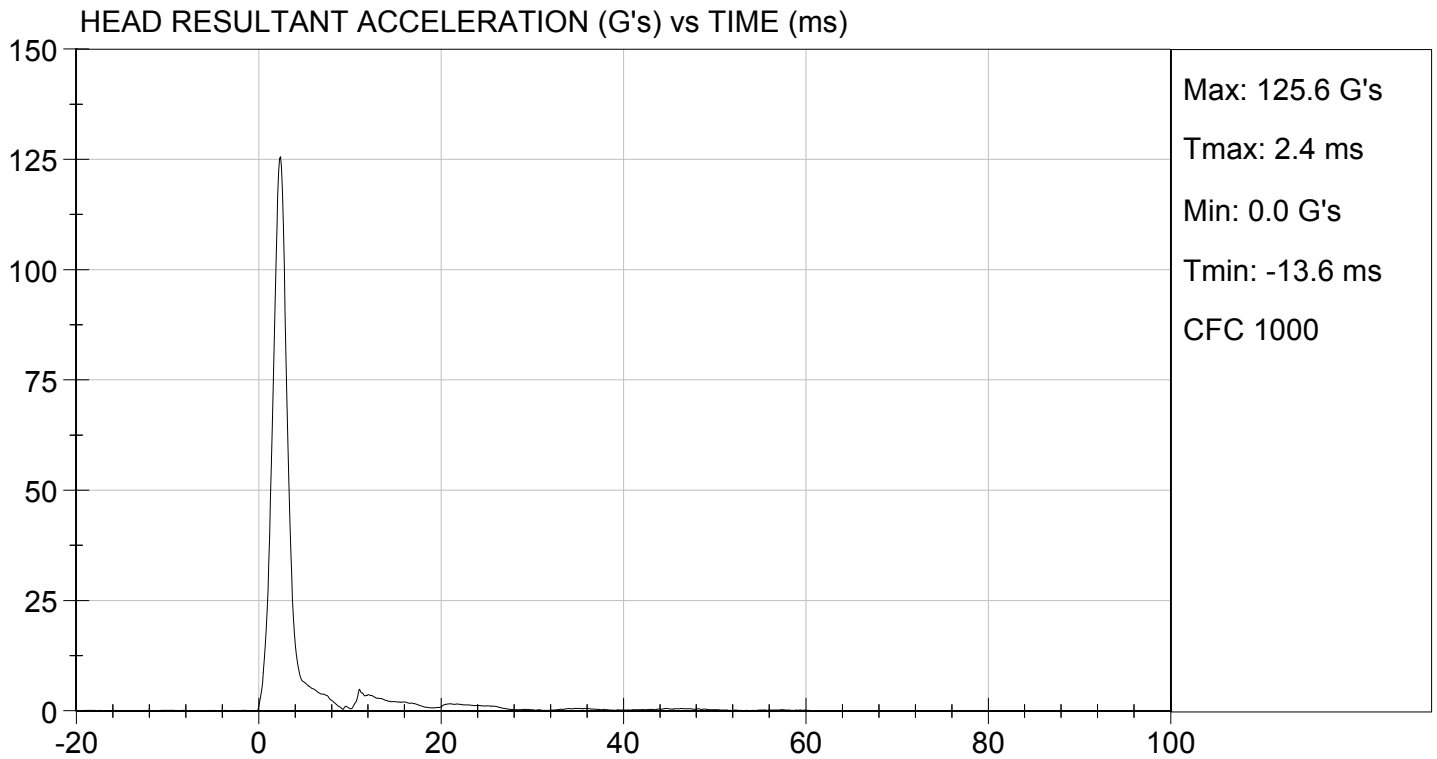
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	51	Pass
Peak Resultant Acceleration	G's	125 to 155	126	Pass
Peak Longitudinal Acceleration	G's	<= +/- 15.0	4.3	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 15% of peak	Yes	Pass
Overall Test Results				Pass

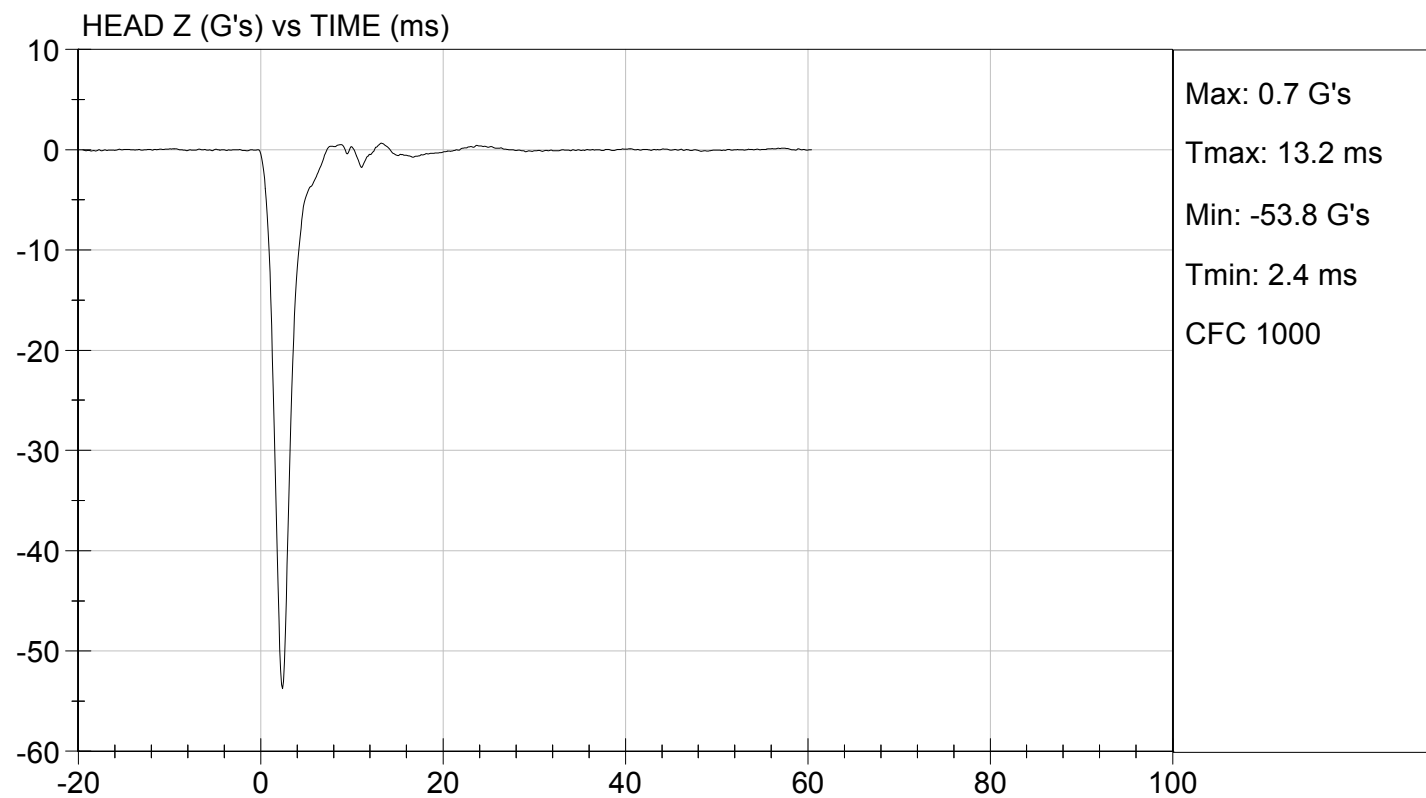
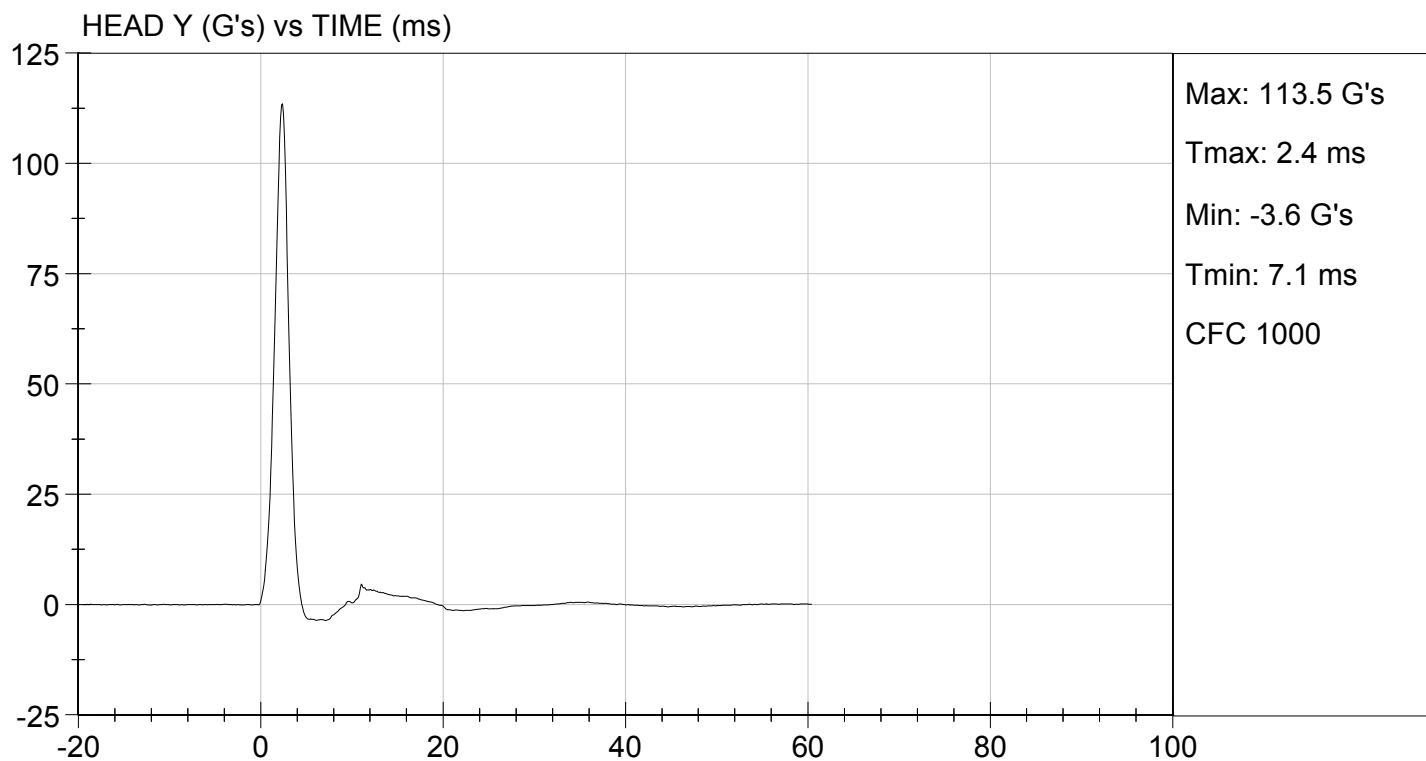

Laboratory Technician

09/09/2014

Test Date


Approved By





MGA RESEARCH CORPORATION
NECK PENDULUM TEST
ES-2re DUMMY

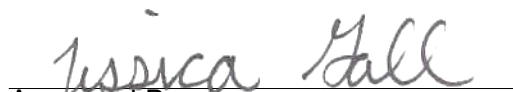
ATD Serial No: 032

Test I.D: D143102

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity		%	10 to 70	51	Pass
Pendulum Speed		m/s	3.30 to 3.50	3.41	Pass
Pendulum Velocity	1 ms	m/s	-0.05 to 0.00	-0.03	Pass
	3 ms	m/s	-0.25 to -0.375	-0.31	Pass
	14 ms	m/s	-3.20 to -3.70	-3.29	Pass
	17 ms	m/s	>= -3.70	-3.66	Pass
Maximum Flexion Angle		deg	49.0 to 59.0	51.9	Pass
Time of Maximum Flexion Angle		ms	54.0 to 66.0	61.2	Pass
Head Rotation Decay Time to 0 Degree		ms	53.0 to 88.0	62.6	Pass
Overall Results					Pass


 Laboratory Technician

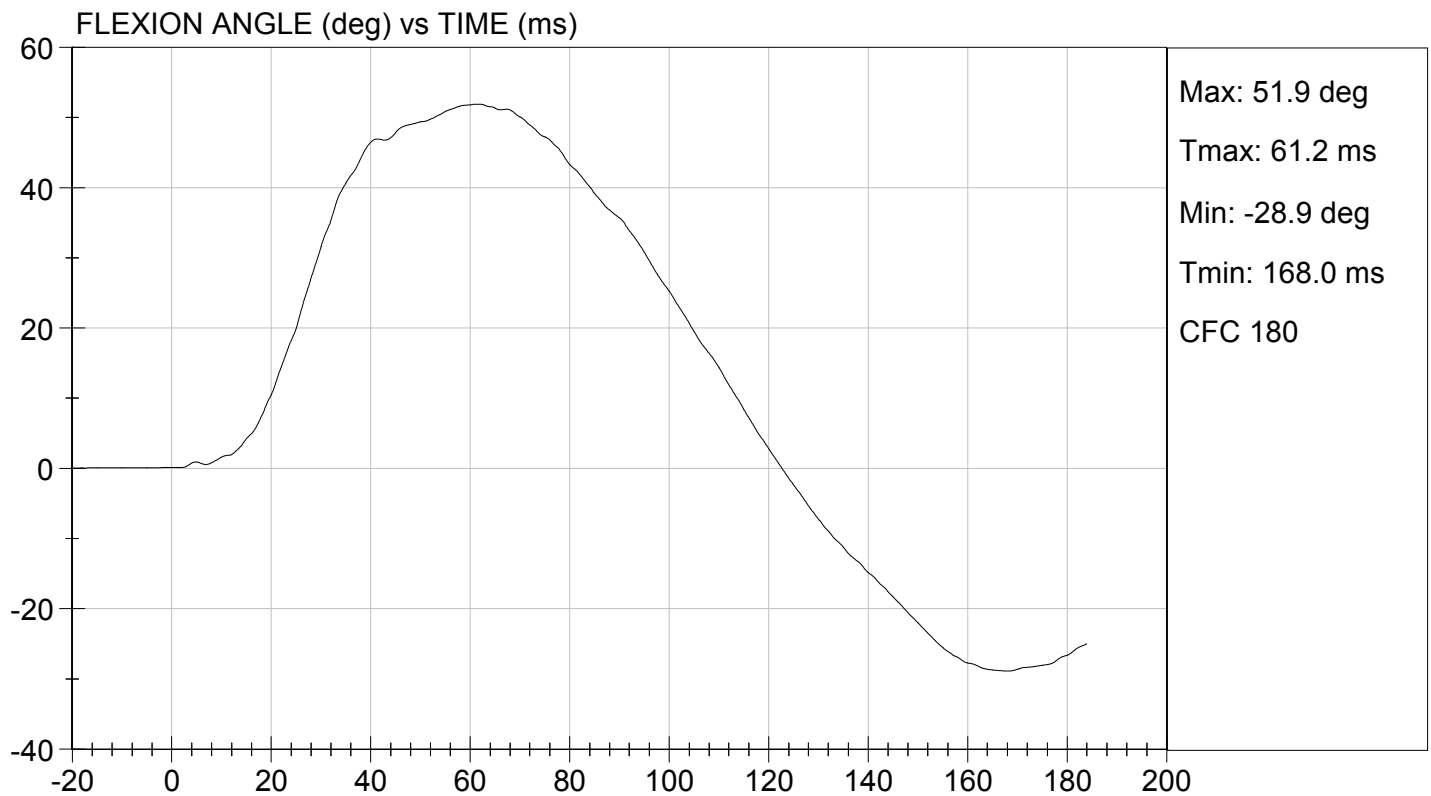
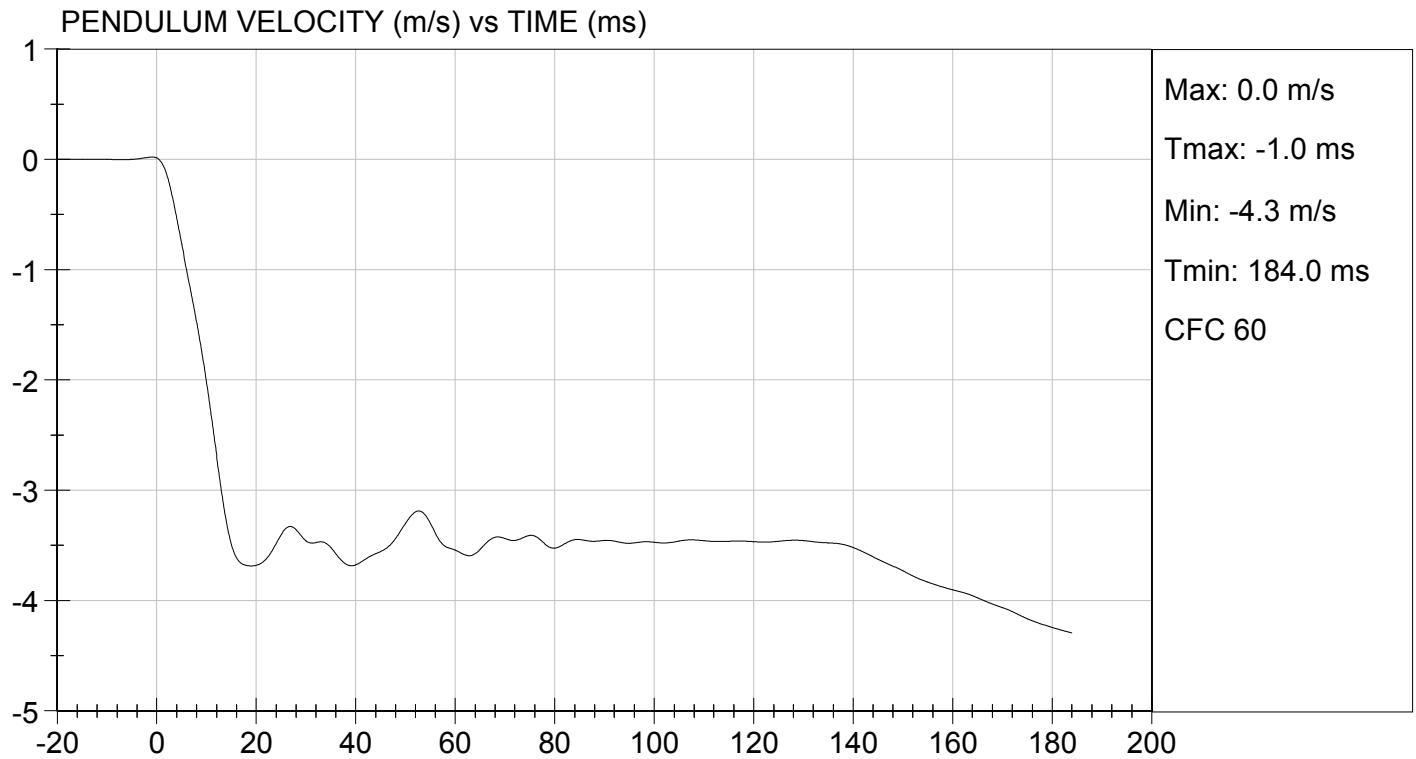
09/09/2014
 Test Date


 Approved By



TEST DESC: NECK BENDING
VELOCITY: 11.19 ft/s, 3.41 m/s

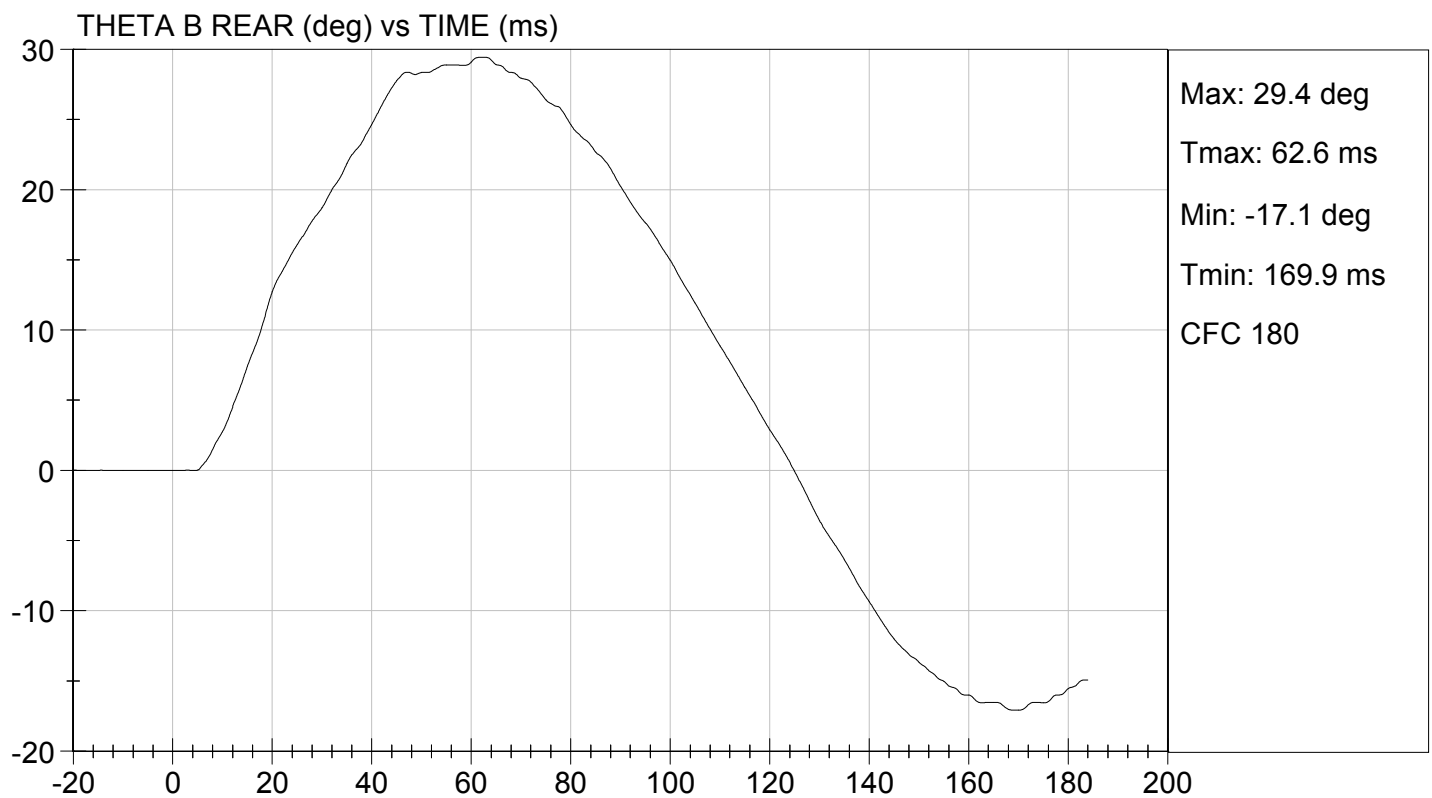
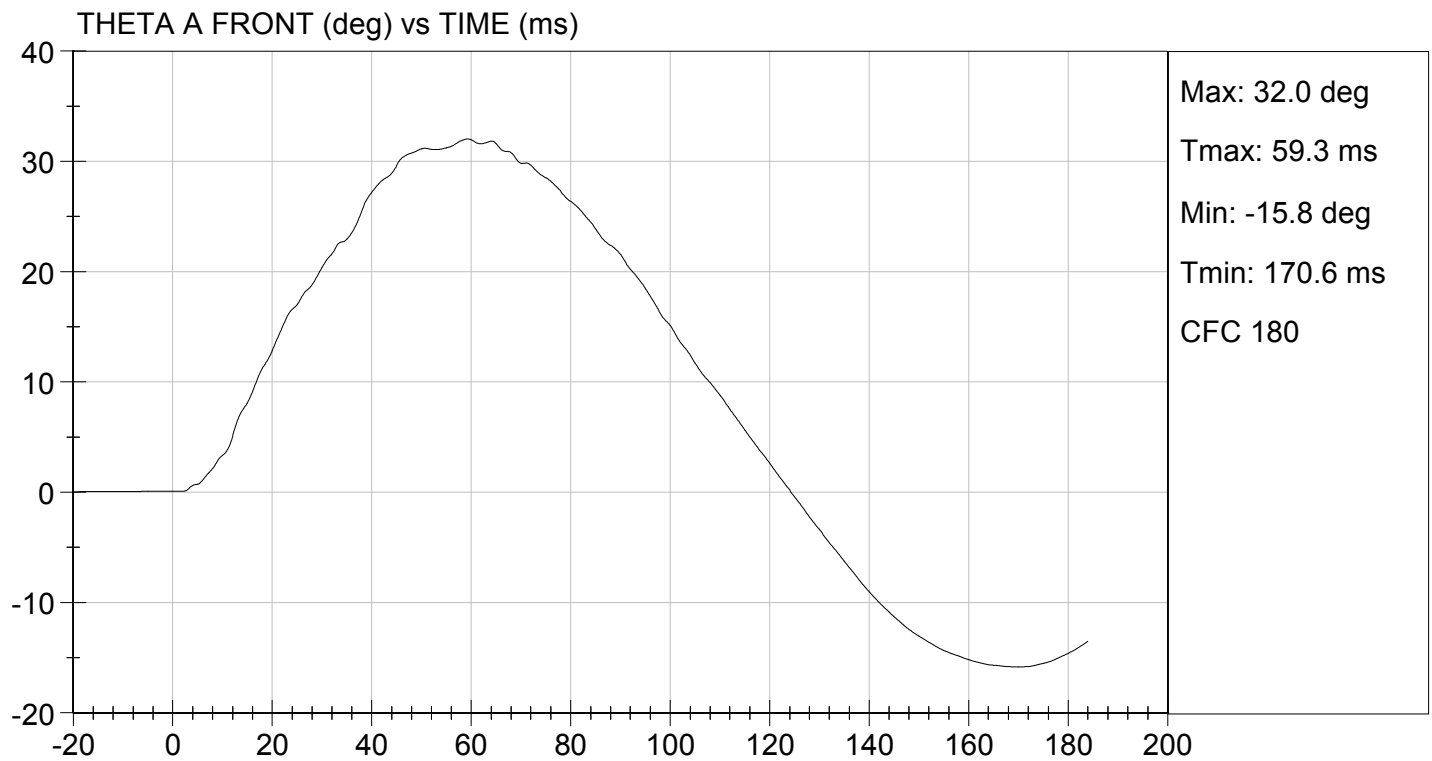
TEST DATE: 09/09/2014
TEST #: D143102





TEST DESC: NECK BENDING
VELOCITY: 11.19 ft/s, 3.41 m/s

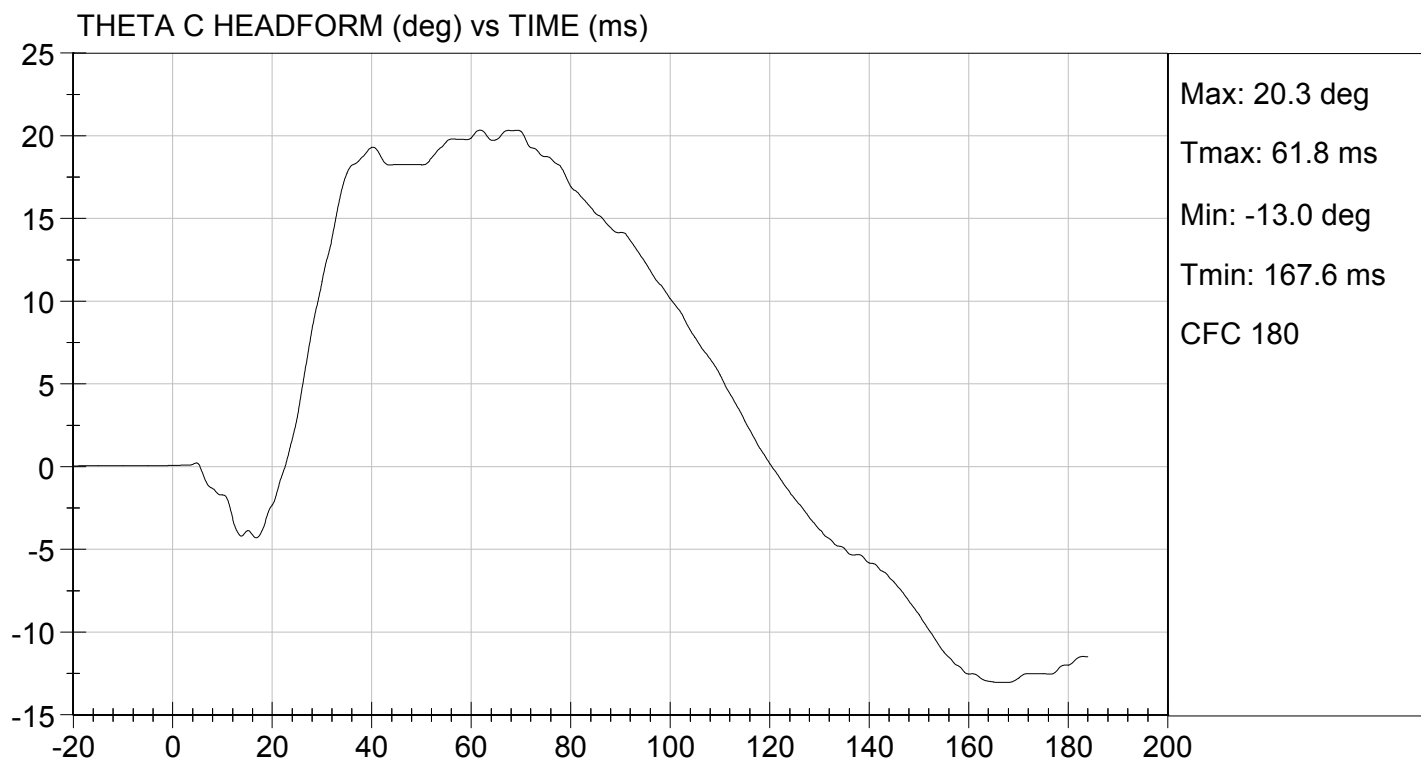
TEST DATE: 09/09/2014
TEST #: D143102





TEST DESC: NECK BENDING
VELOCITY: 11.19 ft/s, 3.41 m/s

TEST DATE: 09/09/2014
TEST #: D143102



MGA RESEARCH CORPORATION
SHOULDER IMPACT TEST
ES-2re DUMMY

ATD Serial No: 032

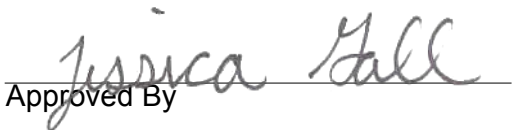
Test I.D: D143103

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	57	Pass
Pendulum Speed	m/s	4.20 to 4.40	4.20	Pass
Peak Impactor Acceleration	G's	7.5 to 10.5	9.7	Pass
Overall Test Results				Pass


Laboratory Technician

09/10/2014

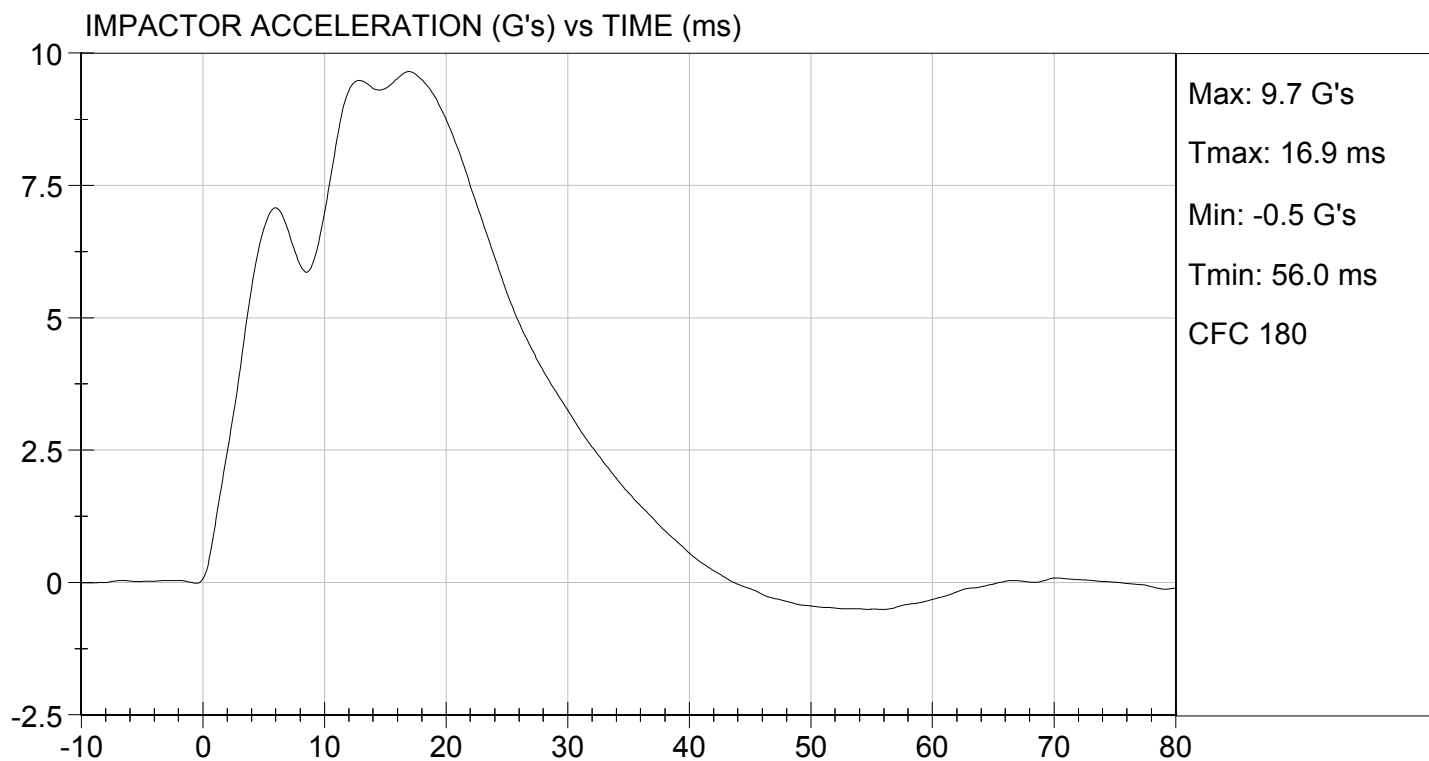
Test Date


Approved By



TEST DESC: SHOULDER IMPACT
VELOCITY: 13.78 ft/s, 4.20 m/s

TEST DATE: 09/10/2014
TEST #: D143103



MGA RESEARCH CORPORATION

UPPER RIB TEST

ES-2re DUMMY

ATD Serial No: 032

Test I.D: D143104

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	50	Pass
Displacement at 459 mm	mm	36.0 to 40.0	38.7	Pass
Displacement at 815 mm	mm	46.0 to 51.0	49.3	Pass
Overall Test Results				Pass


Laboratory Technician

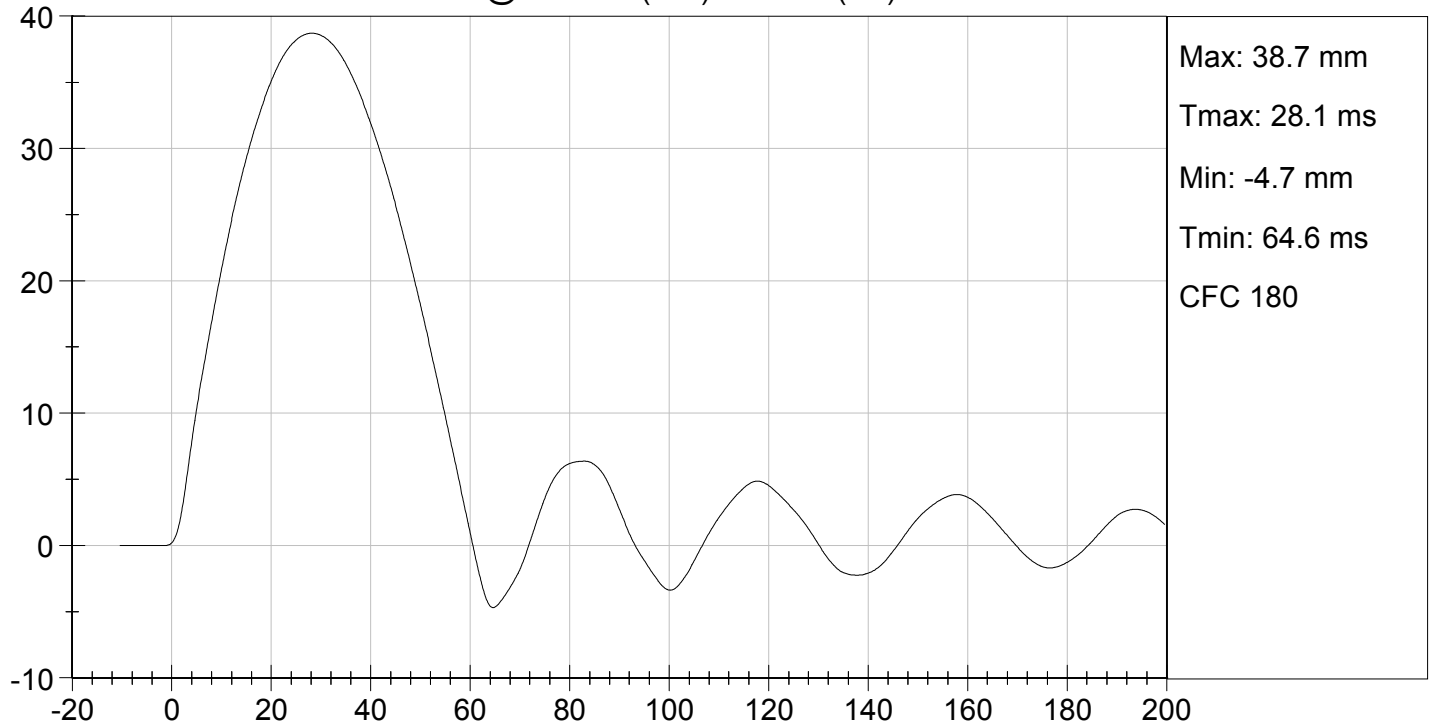
09/09/2014

Test Date

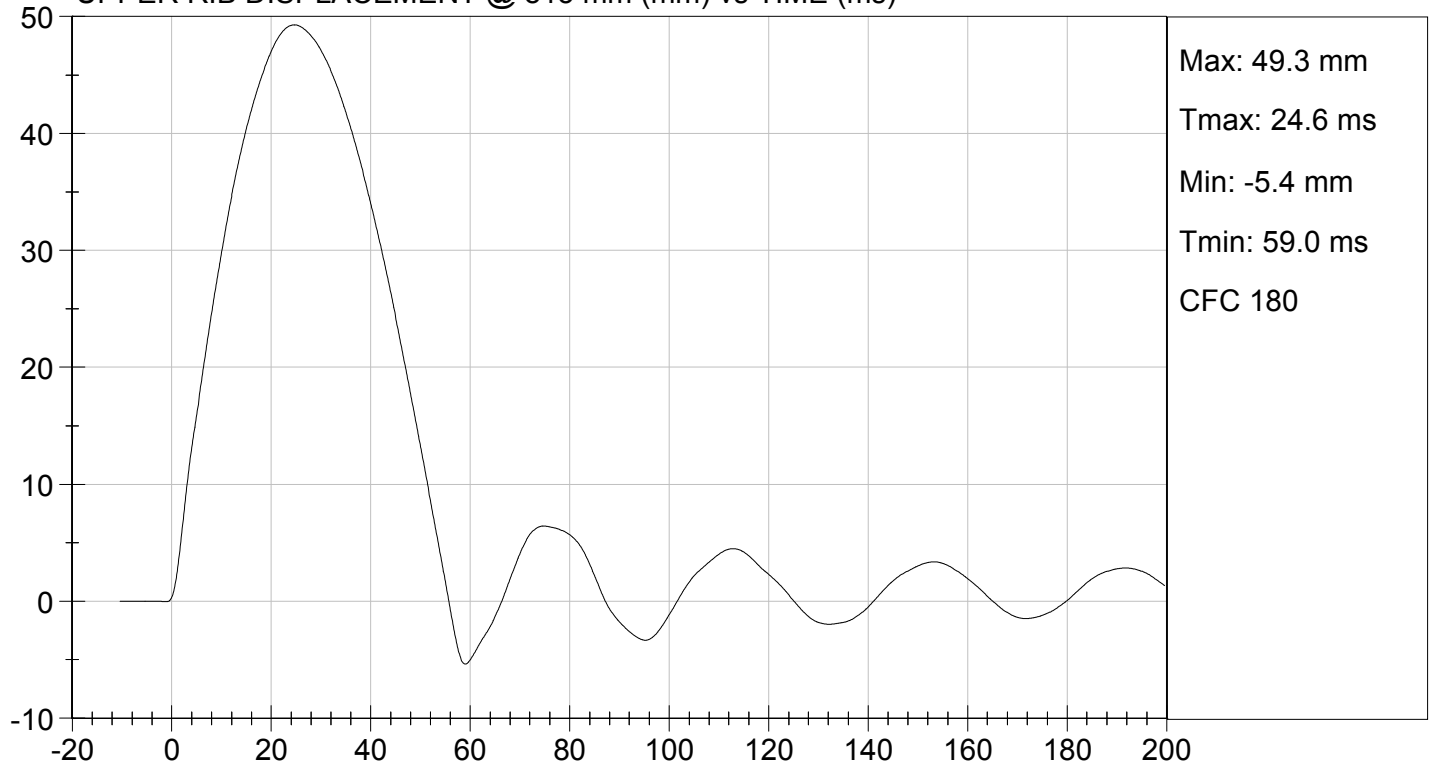

Approved By



UPPER RIB DISPLACEMENT @ 459 mm (mm) vs TIME (ms)



UPPER RIB DISPLACEMENT @ 815 mm (mm) vs TIME (ms)



MGA RESEARCH CORPORATION

MID RIB TEST

ES-2re DUMMY

ATD Serial No: 032

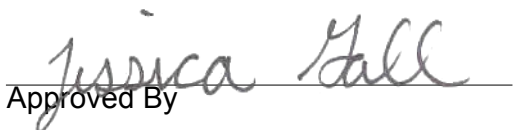
Test I.D: D143105

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	50	Pass
Displacement at 459 mm	mm	36.0 to 40.0	37.7	Pass
Displacement at 815 mm	mm	46.0 to 51.0	48.7	Pass
Overall Test Results				Pass


Laboratory Technician

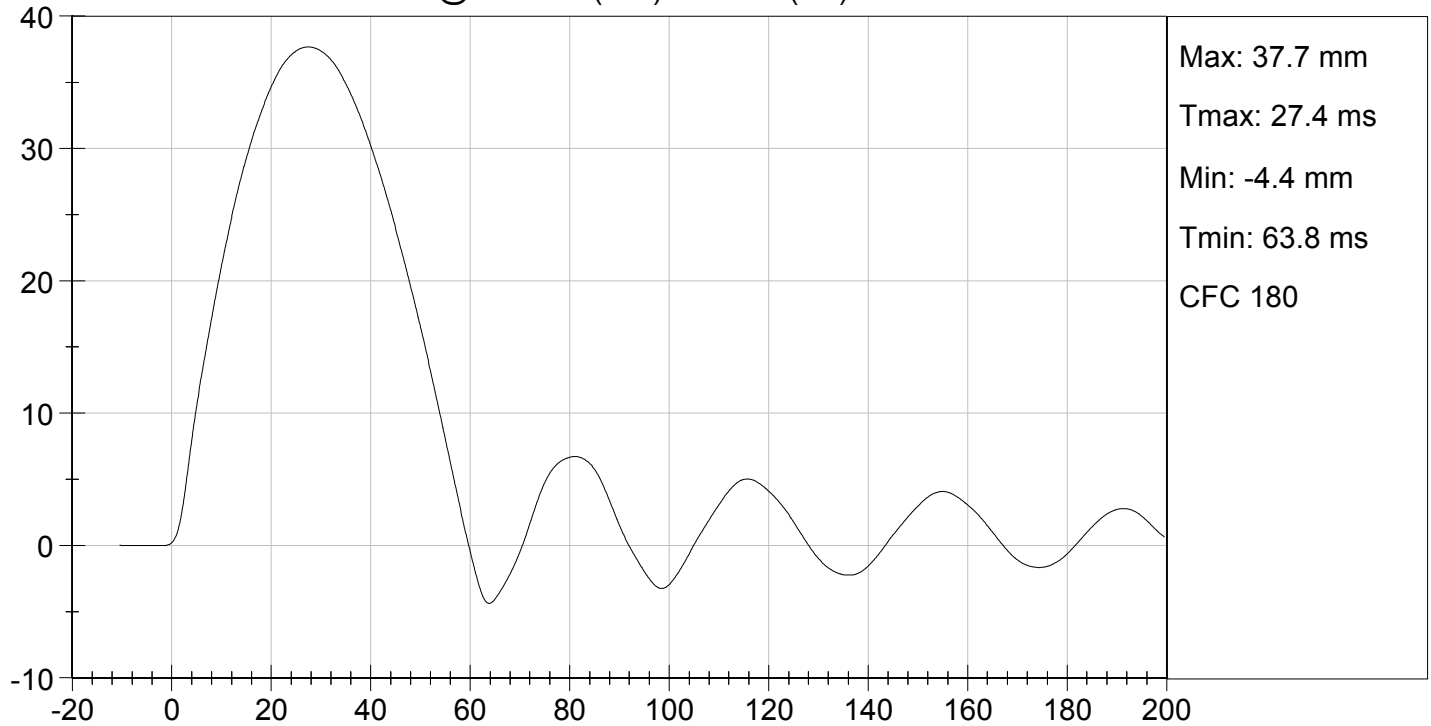
09/09/2014

Test Date

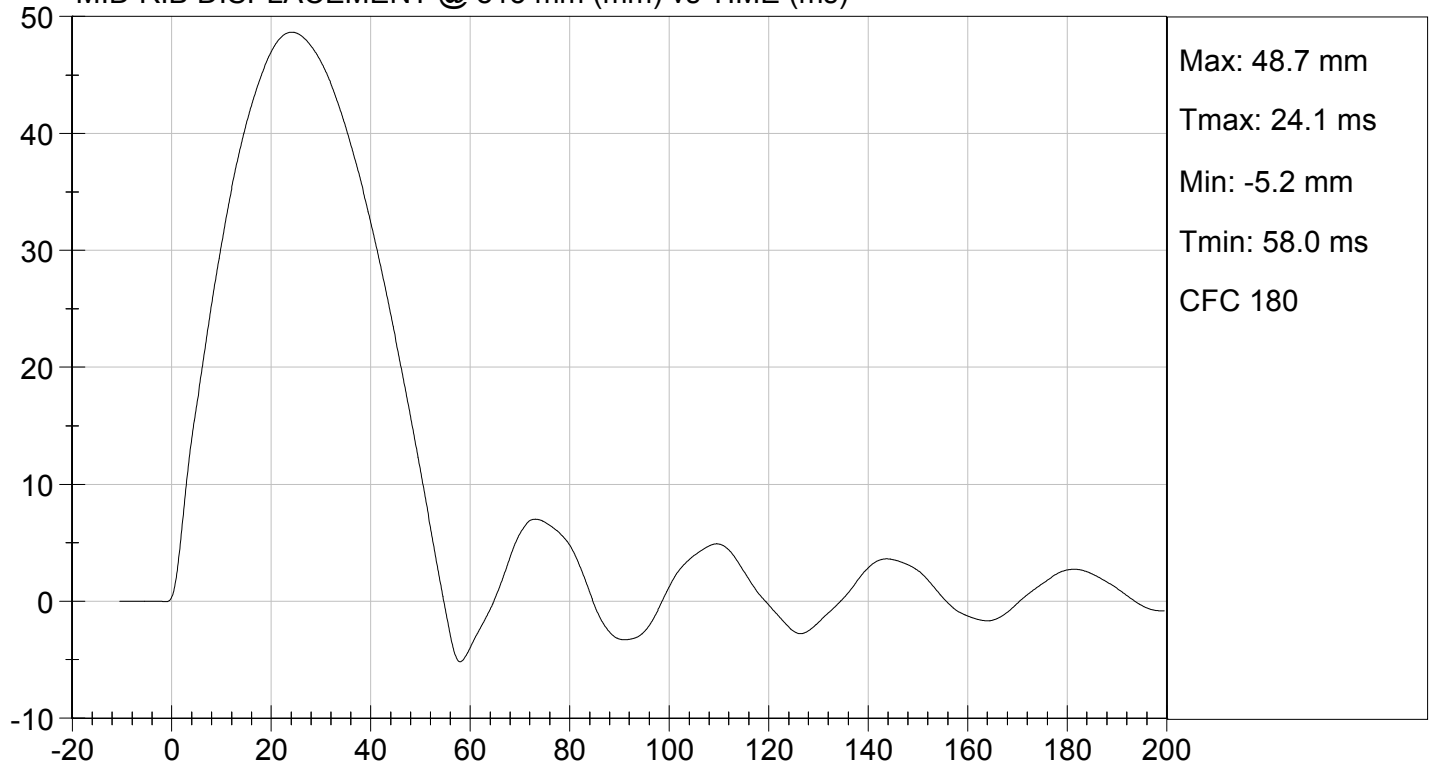

Approved By



MID RIB DISPLACEMENT @ 459 mm (mm) vs TIME (ms)



MID RIB DISPLACEMENT @ 815 mm (mm) vs TIME (ms)



MGA RESEARCH CORPORATION

LOWER RIB TEST

ES-2re DUMMY

ATD Serial No: 032

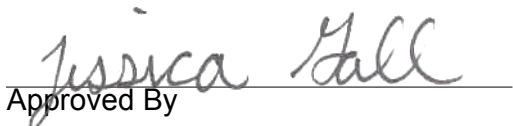
Test I.D: D143106

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	50	Pass
Displacement at 459 mm	mm	36.0 to 40.0	38.8	Pass
Displacement at 815 mm	mm	46.0 to 51.0	49.9	Pass
Overall Test Results				Pass

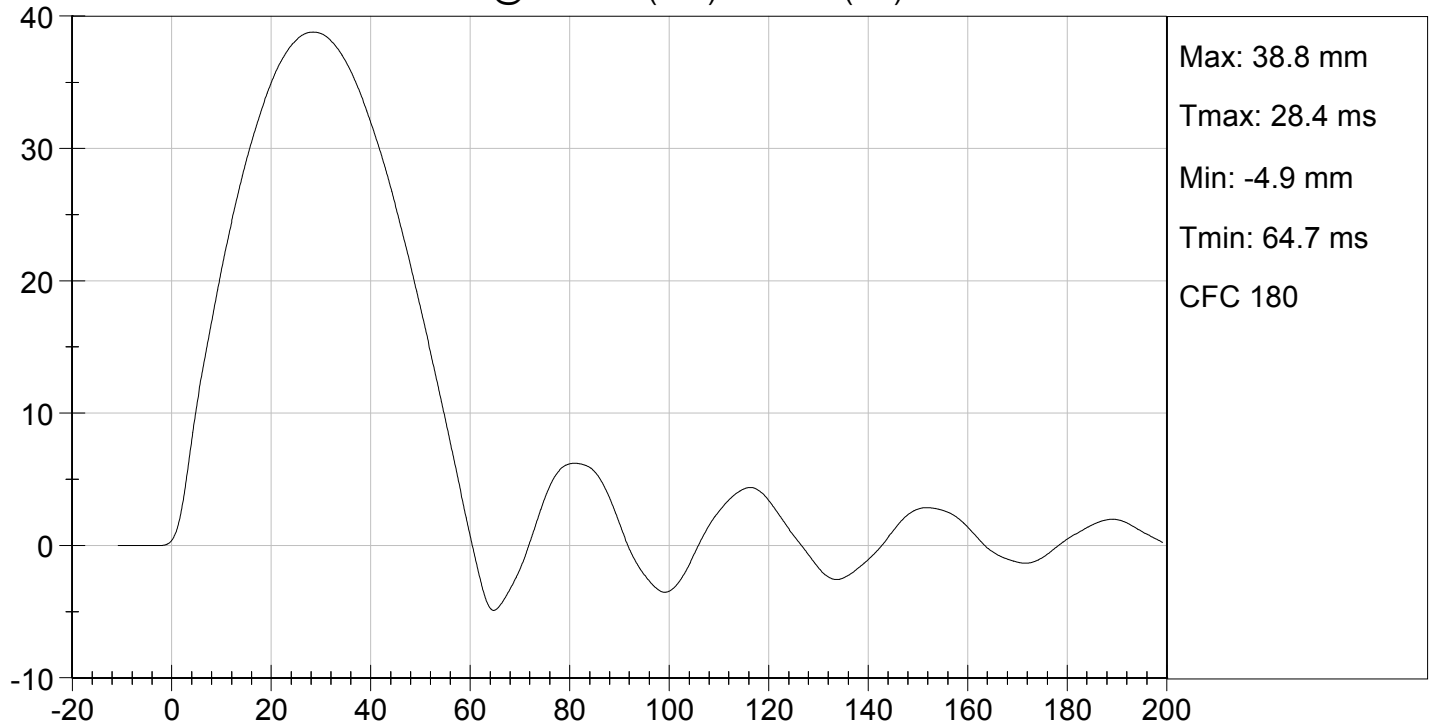

Laboratory Technician

09/09/2014

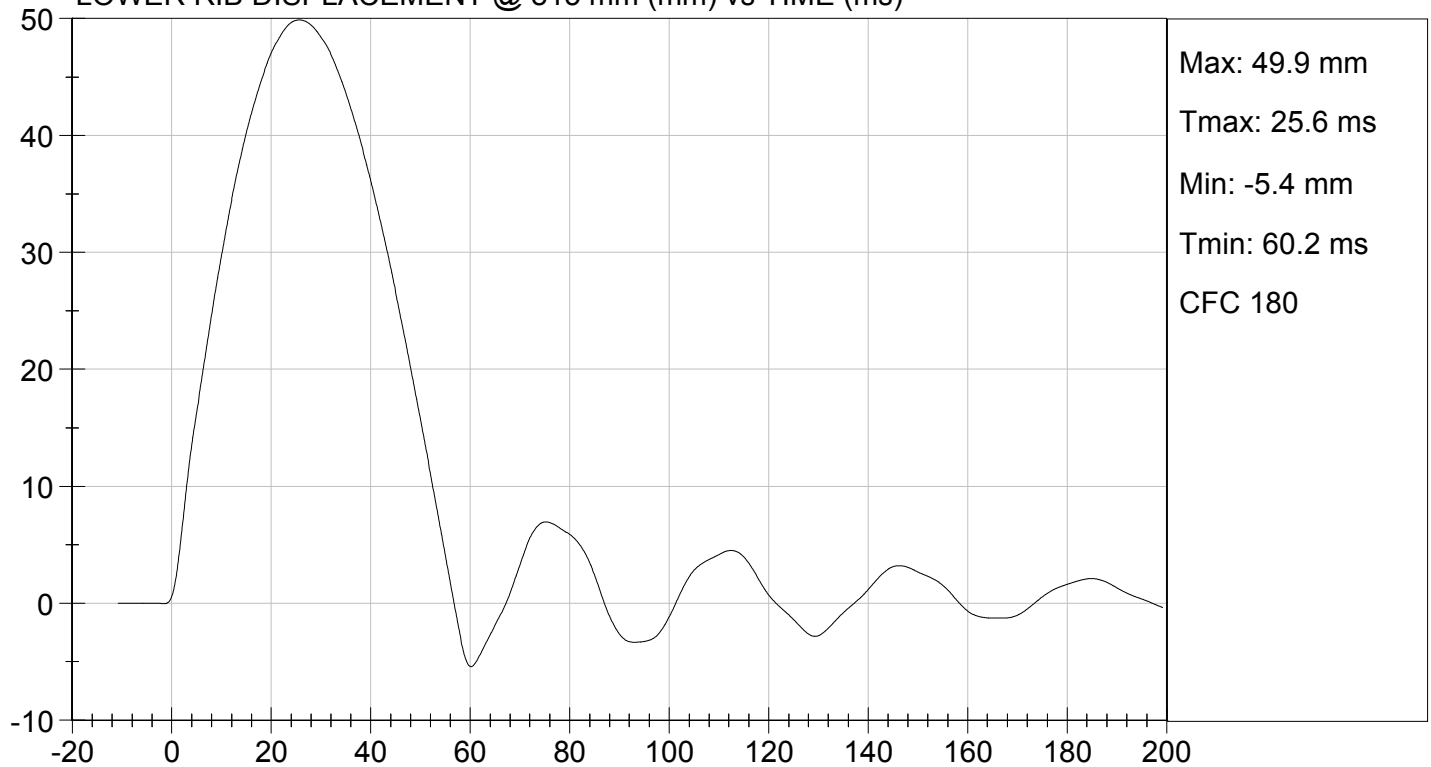
Test Date


Approved By

LOWER RIB DISPLACEMENT @ 459 mm (mm) vs TIME (ms)



LOWER RIB DISPLACEMENT @ 815 mm (mm) vs TIME (ms)



MGA RESEARCH CORPORATION

THORAX IMPACT TEST

ES-2re DUMMY

ATD Serial No: 032

Test I.D: D143100

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	57	Pass
Probe Speed	m/s	5.40 to 5.60	5.58	Pass
Maximum Impactor Force (after 6 ms)	N	5100 to 6200	5569	Pass
Upper Rib Displacement	mm	34.0 to 41.0	39.4	Pass
Middle Rib Displacement	mm	37.0 to 45.0	42.3	Pass
Lower Rib Displacement	mm	37.0 to 44.0	41.4	Pass
Overall Test Results				Pass


Laboratory Technician

09/10/2014

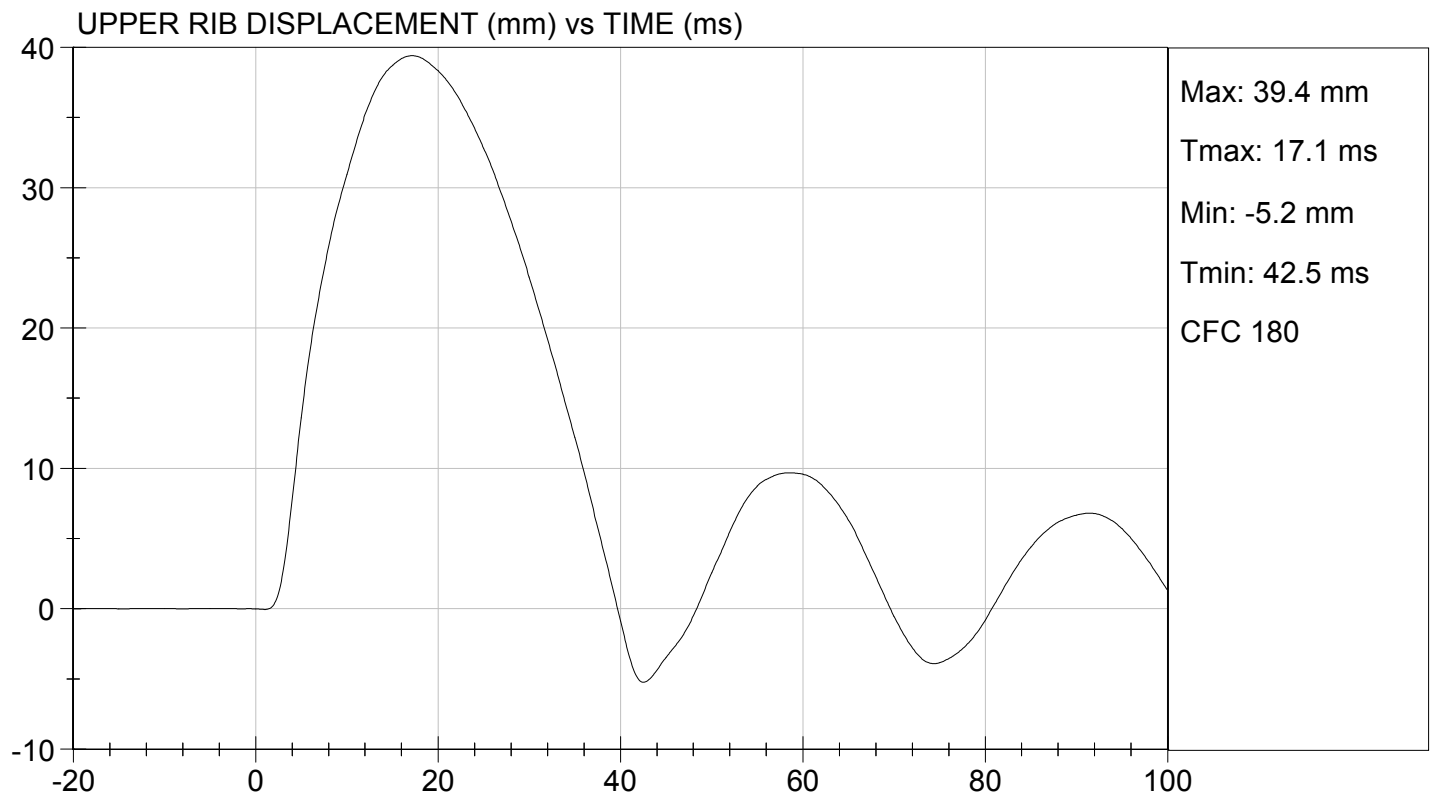
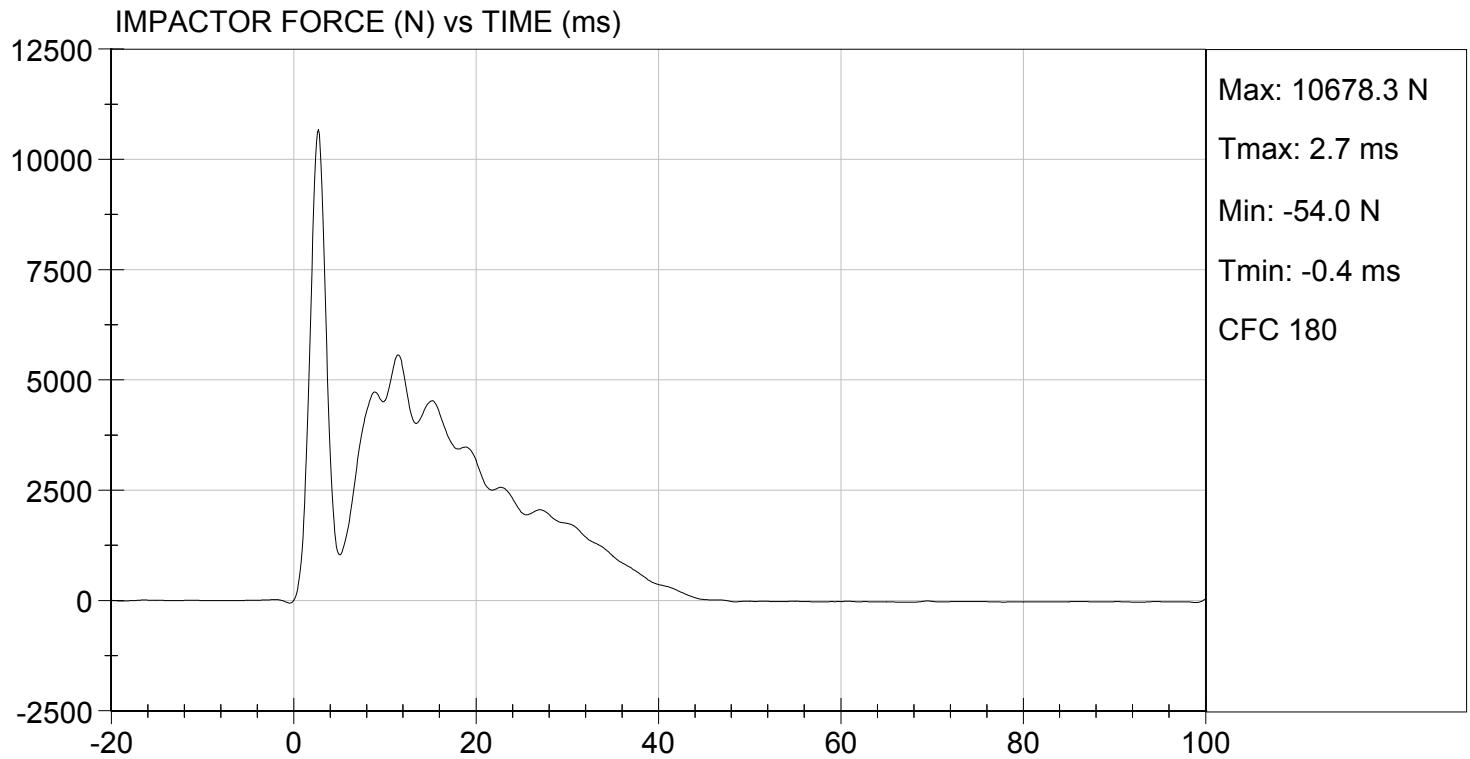
Test Date


Approved By



TEST DESC: THORAX IMPACT
VELOCITY: 18.32 ft/s, 5.58 m/s

TEST DATE: 09/10/2014
TEST #: D143100

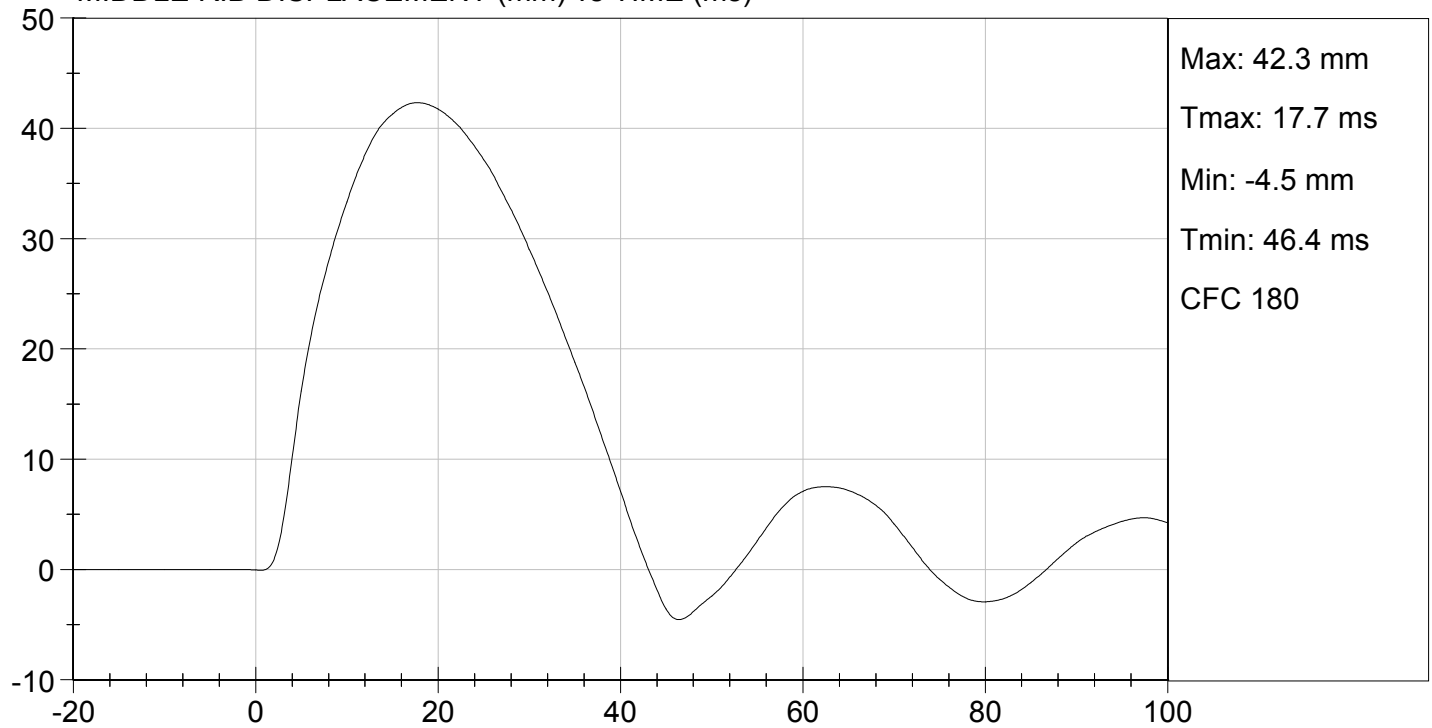




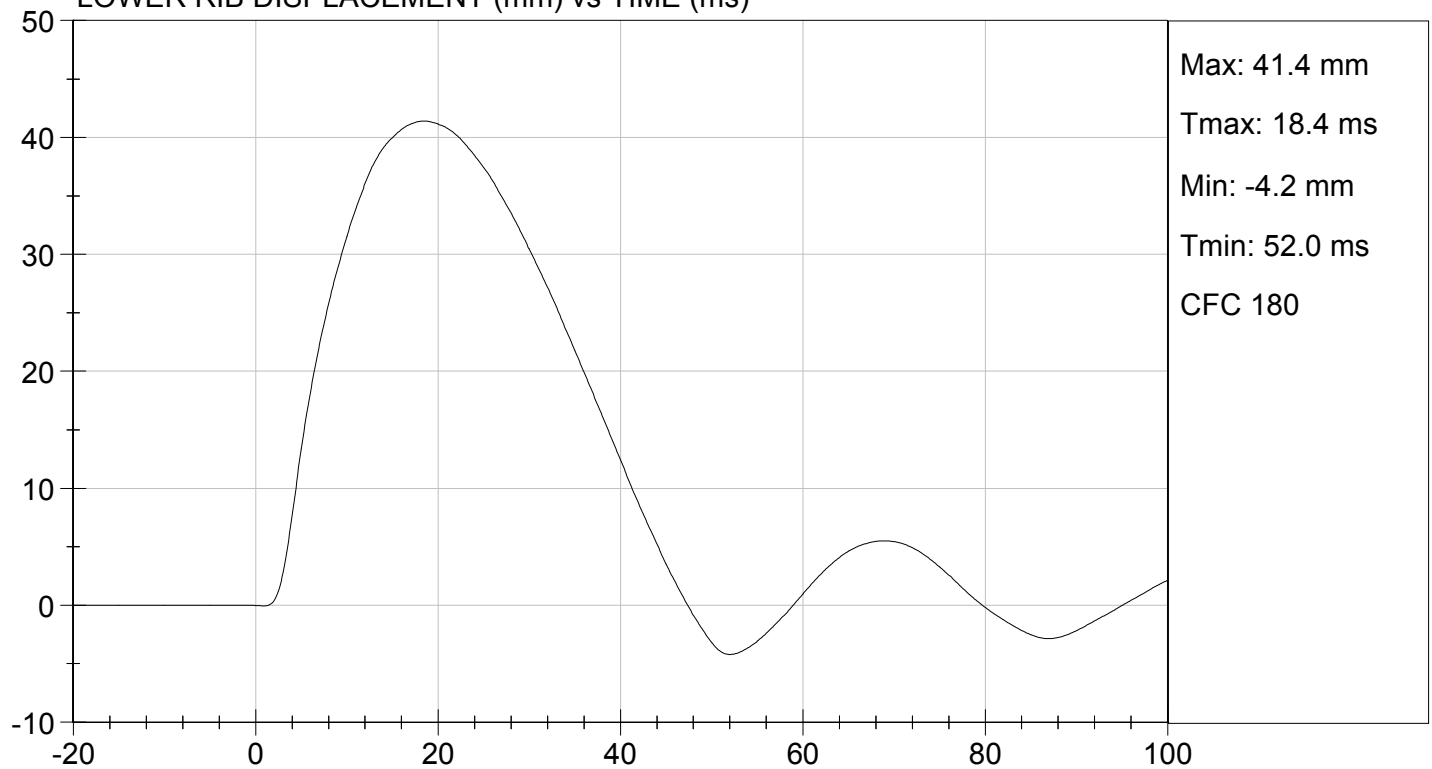
TEST DESC: THORAX IMPACT
VELOCITY: 18.32 ft/s, 5.58 m/s

TEST DATE: 09/10/2014
TEST #: D143100

MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



LOWER RIB DISPLACEMENT (mm) vs TIME (ms)



MGA RESEARCH CORPORATION

ABDOMEN TEST

ES-2re DUMMY

ATD Serial No: 032

Test I.D: D143107

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	57	Pass
Probe Speed	m/s	3.90 to 4.10	4.06	Pass
Maximum Impactor Force	N	4000 to 4800	4238	Pass
Time of Maximum Impactor Force	ms	10.6 to 13.0	10.6	Pass
Maximum Total Abdomen Force	N	2200 to 2700	2232	Pass
Time of Maximum Abdomen Force	ms	10.0 to 12.3	10.9	Pass
Overall Test Results				Pass


Laboratory Technician

09/10/2014

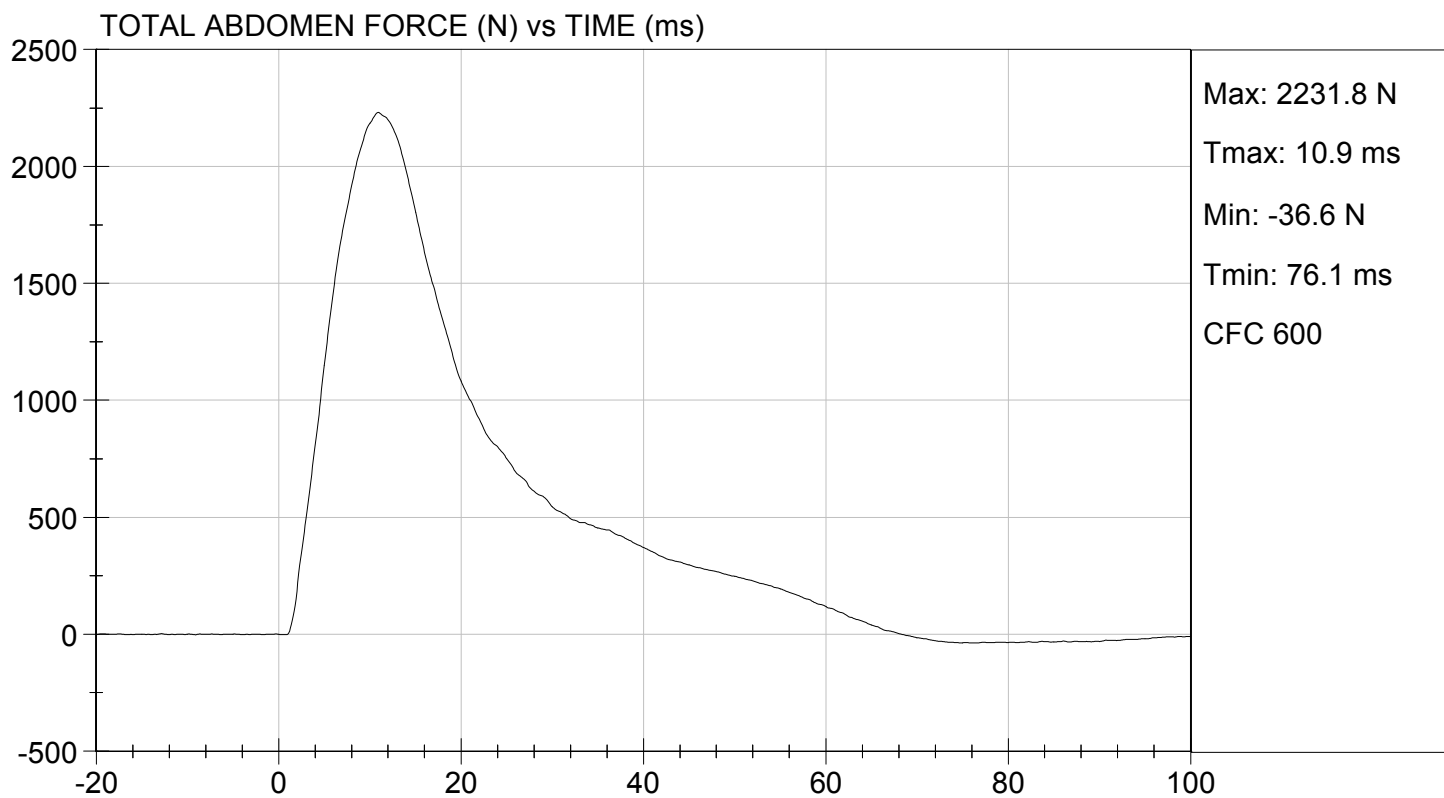
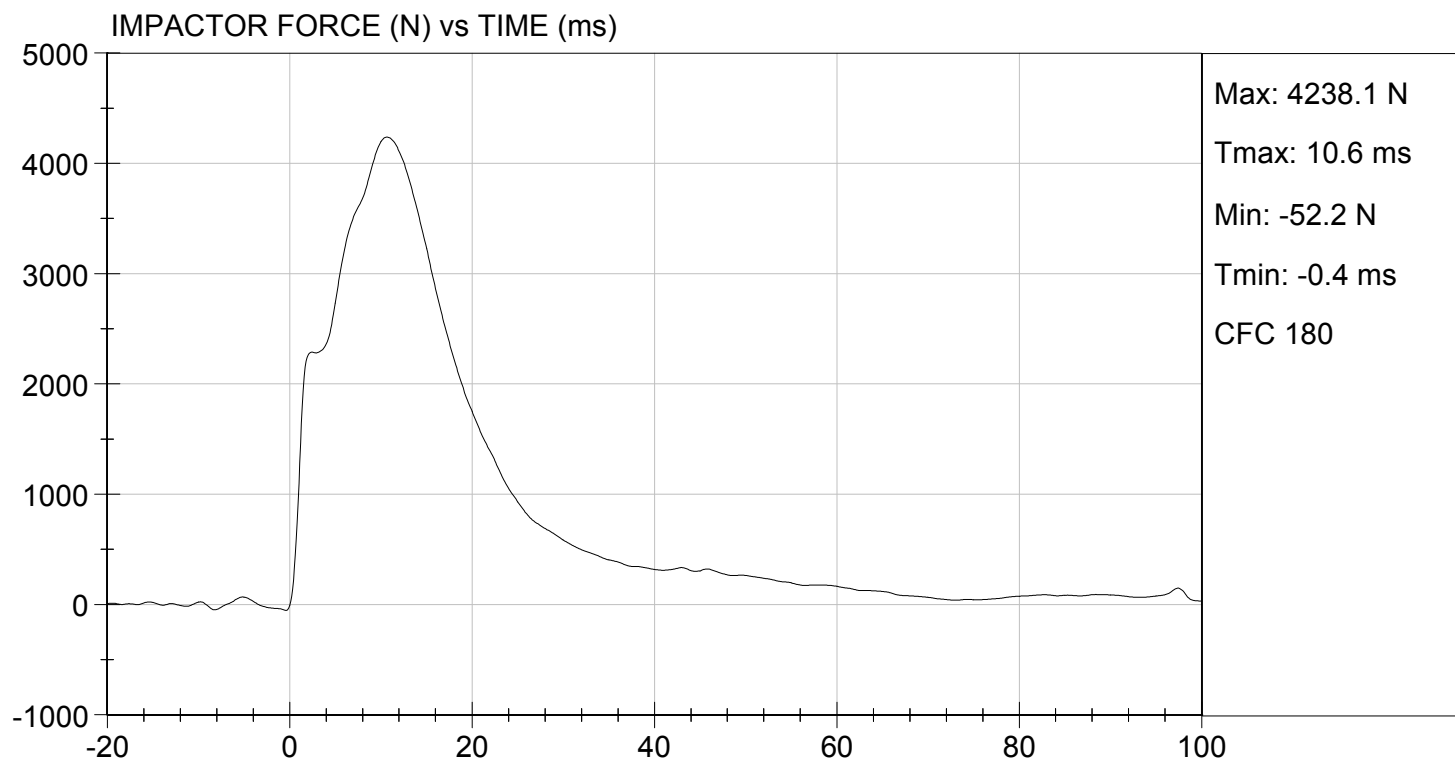
Test Date


Approved By



TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.33 ft/s, 4.06 m/s

TEST DATE: 09/10/2014
TEST #: D143107

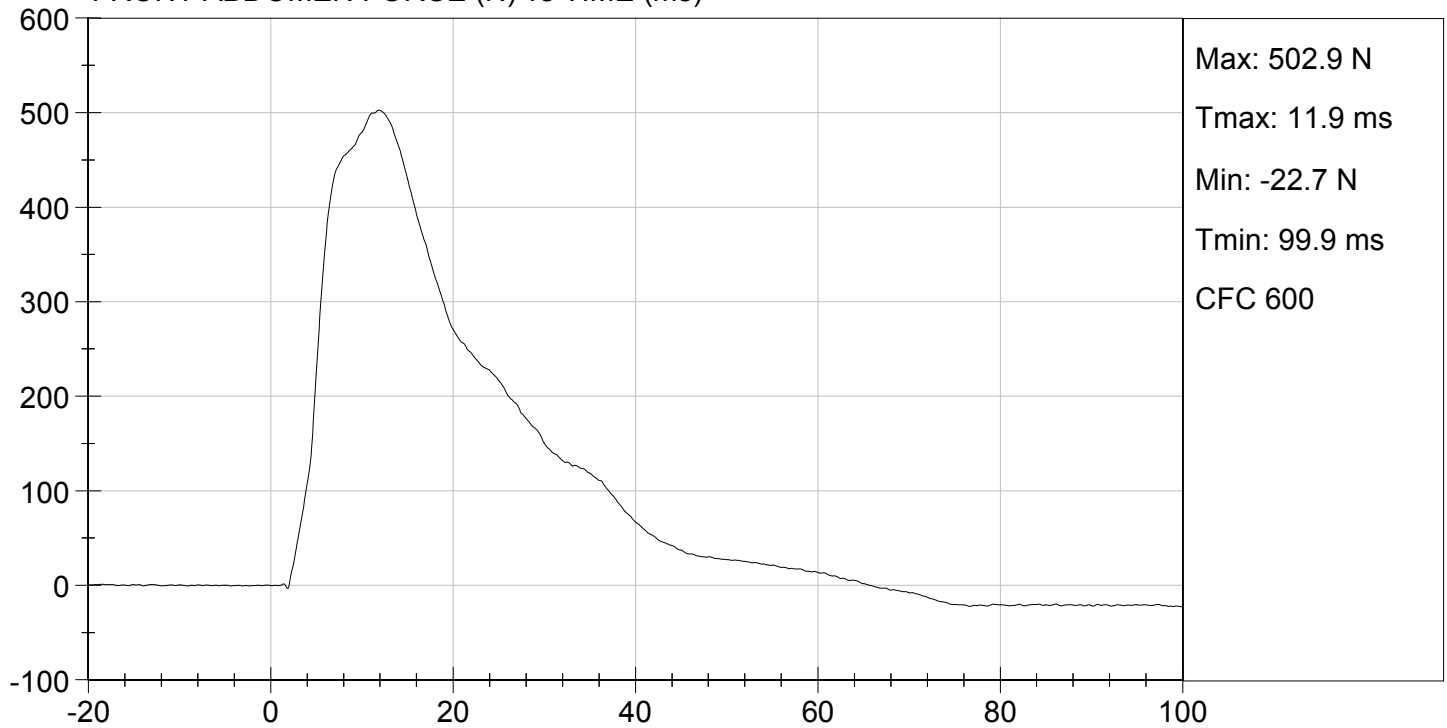




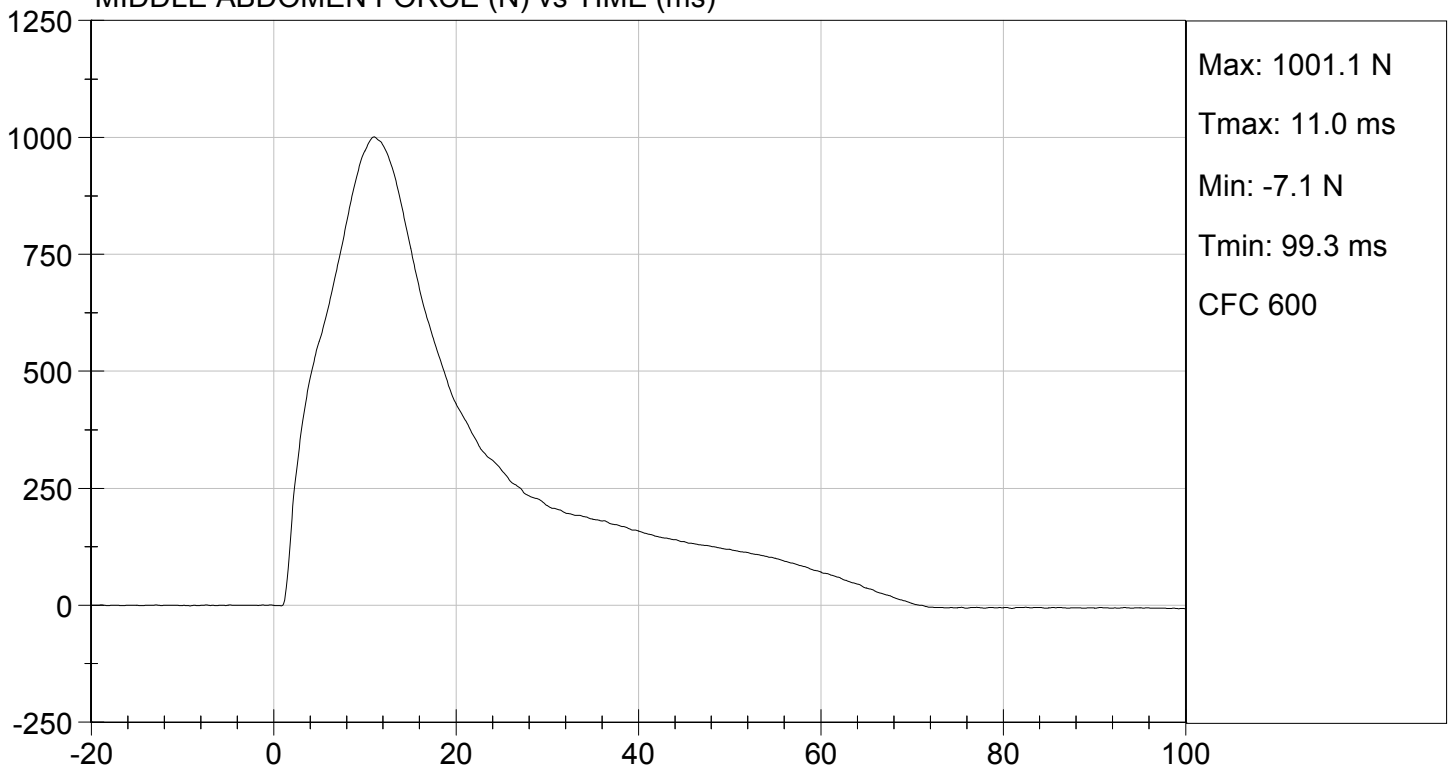
TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.33 ft/s, 4.06 m/s

TEST DATE: 09/10/2014
TEST #: D143107

FRONT ABDOMEN FORCE (N) vs TIME (ms)



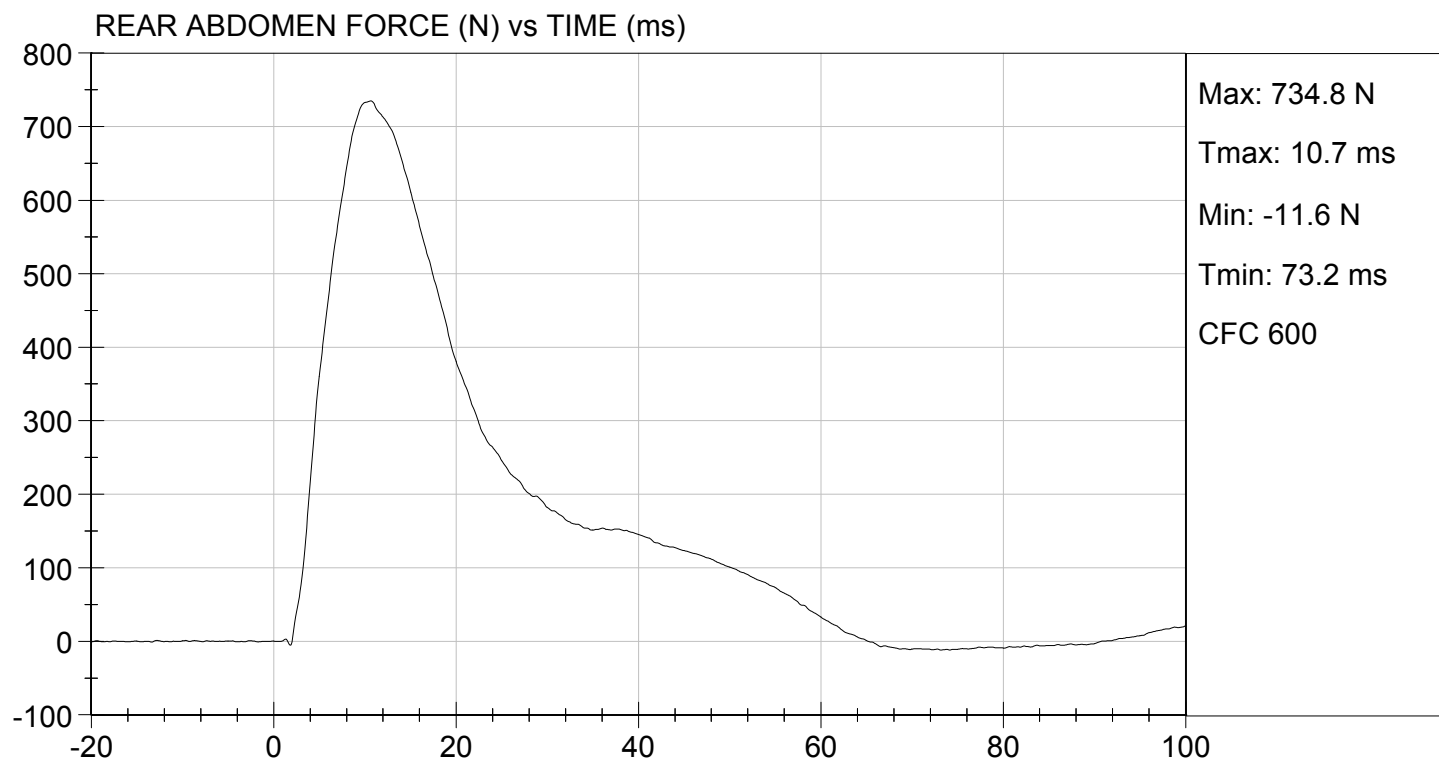
MIDDLE ABDOMEN FORCE (N) vs TIME (ms)





TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.33 ft/s, 4.06 m/s

TEST DATE: 09/10/2014
TEST #: D143107

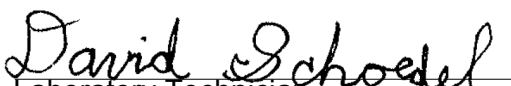


MGA RESEARCH CORPORATION
LUMBAR SPINE TEST
ES-2re DUMMY

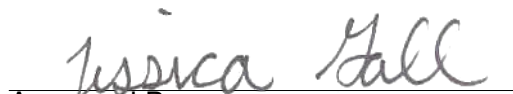
ATD Serial No: 032

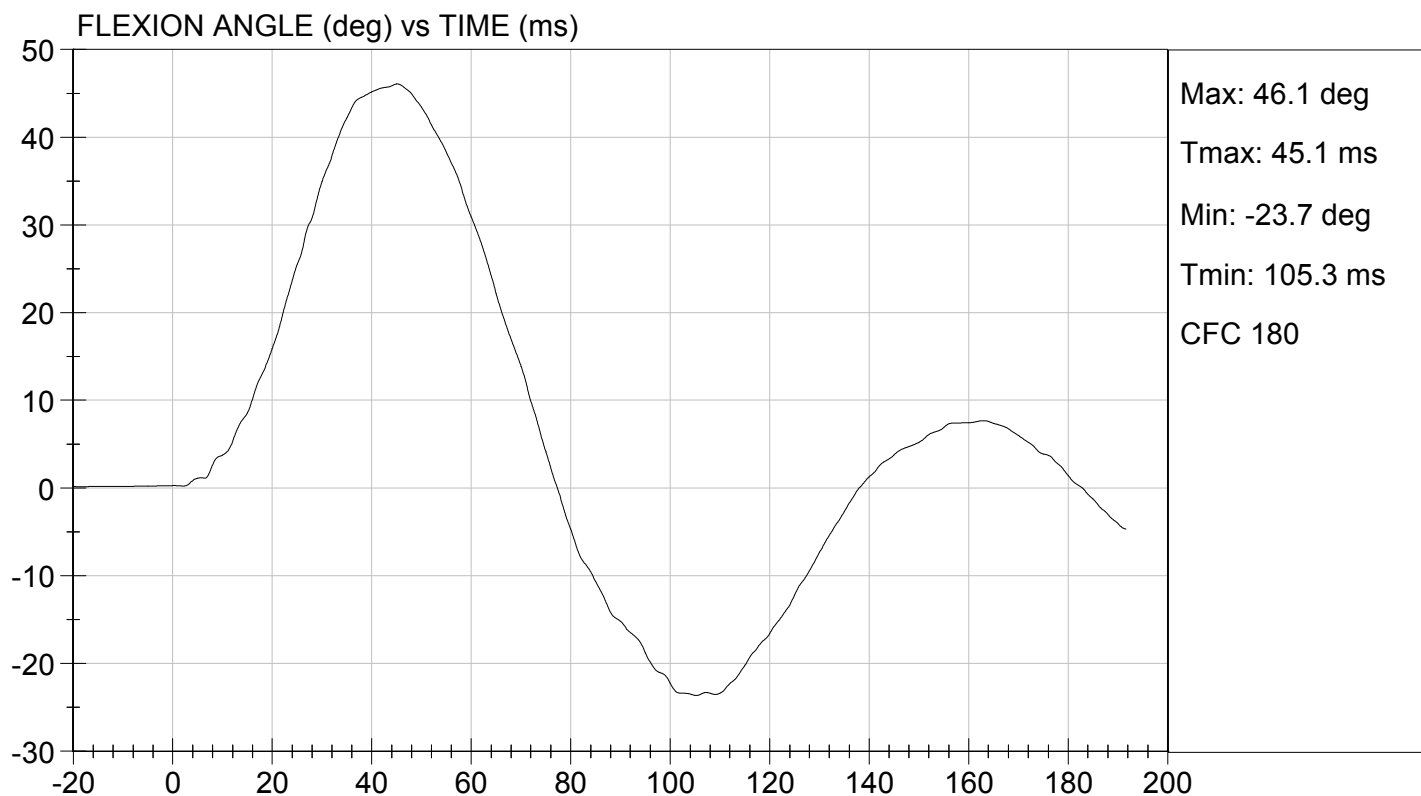
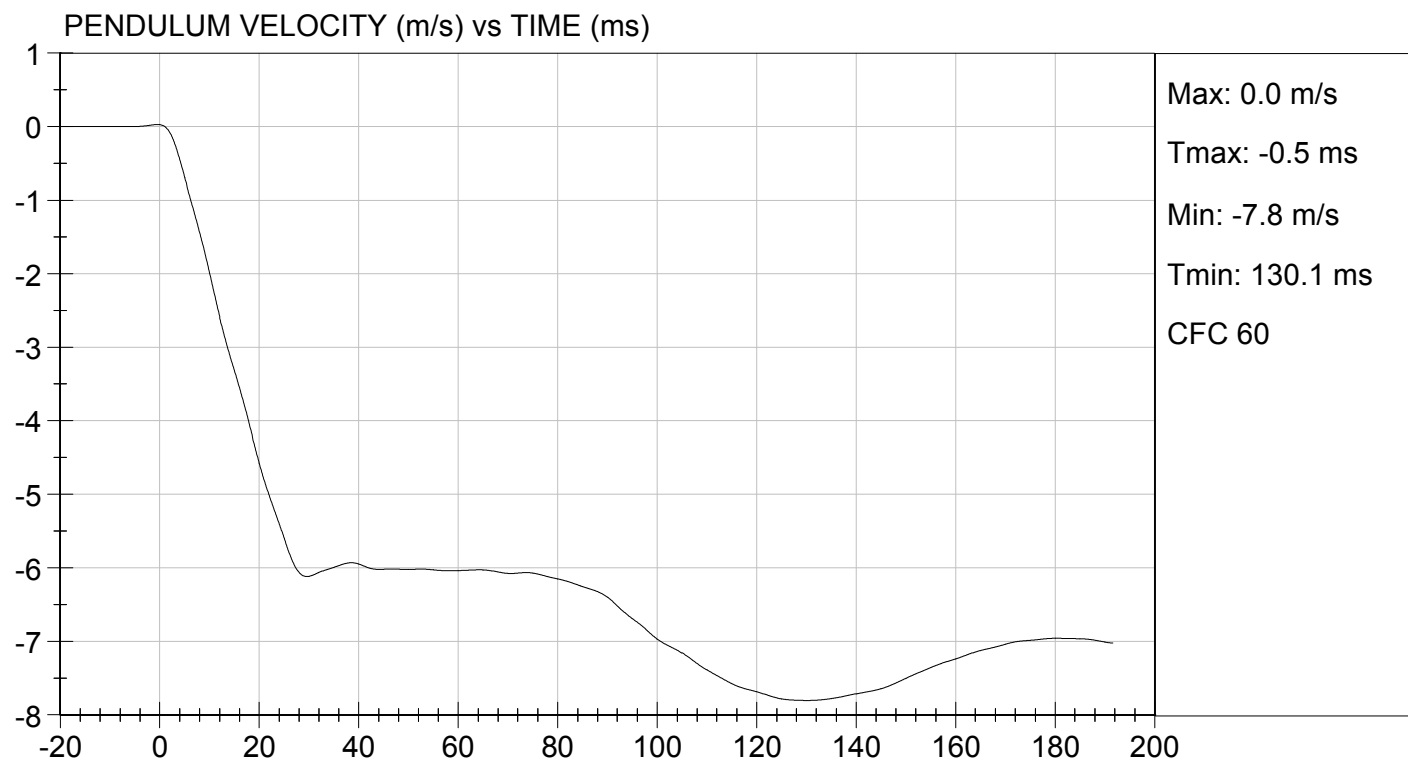
Test I.D: D143108

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity		%	10 to 70	51	Pass
Pendulum Speed		m/s	5.95 to 6.15	6.15	Pass
Pendulum Velocity	1 ms	m/s	-0.05 to 0.00	-0.00	Pass
	3.7 ms	m/s	-0.425 to -0.24	-0.379	Pass
	27 ms	m/s	-6.50 to -5.80	-5.95	Pass
	30 ms	m/s	>= -6.50	-6.12	Pass
Maximum Flexion Angle		deg	45.0 to 55.0	46.1	Pass
Time of Maximum Flexion Angle		ms	39.0 to 53.0	45.1	Pass
Headform Rotation Decay to Initial Position		ms	37 to 57	44	Pass
Overall Results					Pass


 Laboratory Technician

09/09/2014
 Test Date

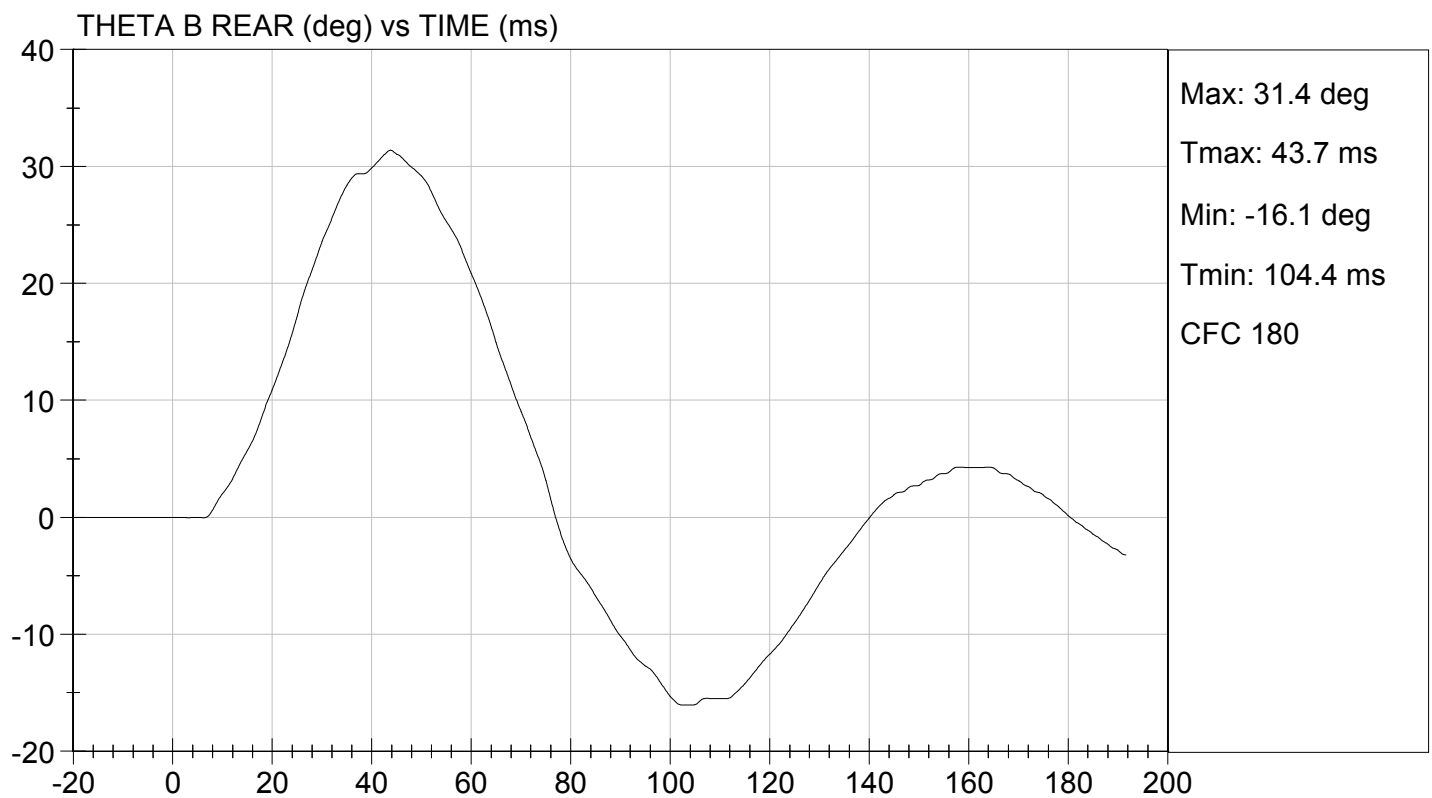
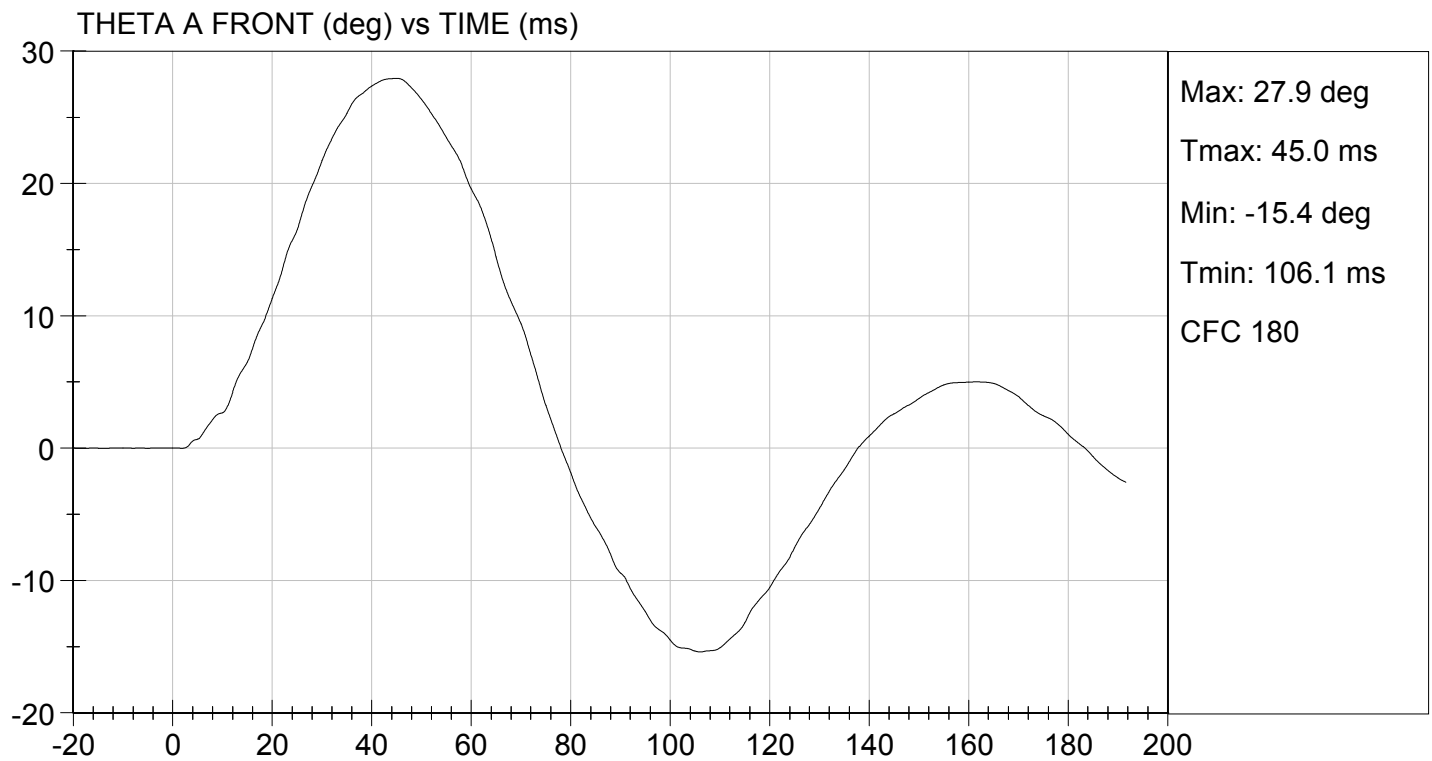

 Approved By





TEST DESC: LUMBAR BENDING
VELOCITY: 20.17 ft/s, 6.15 m/s

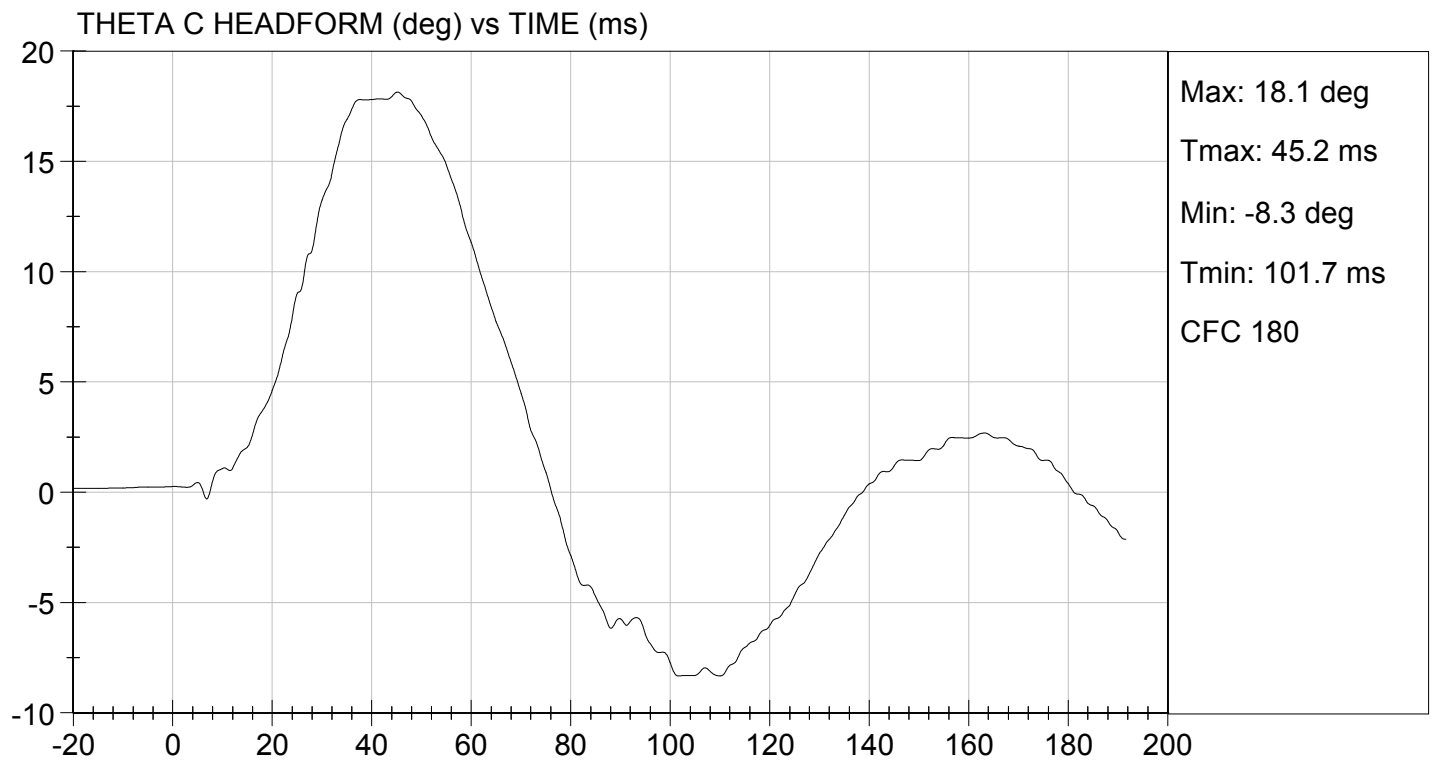
TEST DATE: 09/09/2014
TEST #: D143108





TEST DESC: LUMBAR BENDING
VELOCITY: 20.17 ft/s, 6.15 m/s

TEST DATE: 09/09/2014
TEST #: D143108



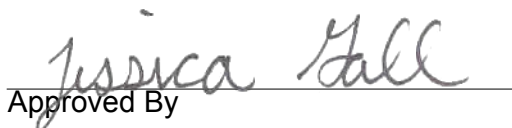
MGA RESEARCH CORPORATION**PELVIS TEST
ES-2re DUMMY****ATD Serial No:** 032**Test I.D:** D143109

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	57	Pass
Probe Speed	m/s	4.20 to 4.40	4.36	Pass
Maximum Impactor Force	N	4700 to 5400	4857	Pass
Time of Maximum Impactor Force	ms	11.8 to 16.1	14.6	Pass
Maximum Pubic Force	N	1230 to 1590	1283	Pass
Time of Maximum Pubic Force	ms	12.2 to 17.0	15.2	Pass
Overall Test Results				Pass


Laboratory Technician

09/10/2014

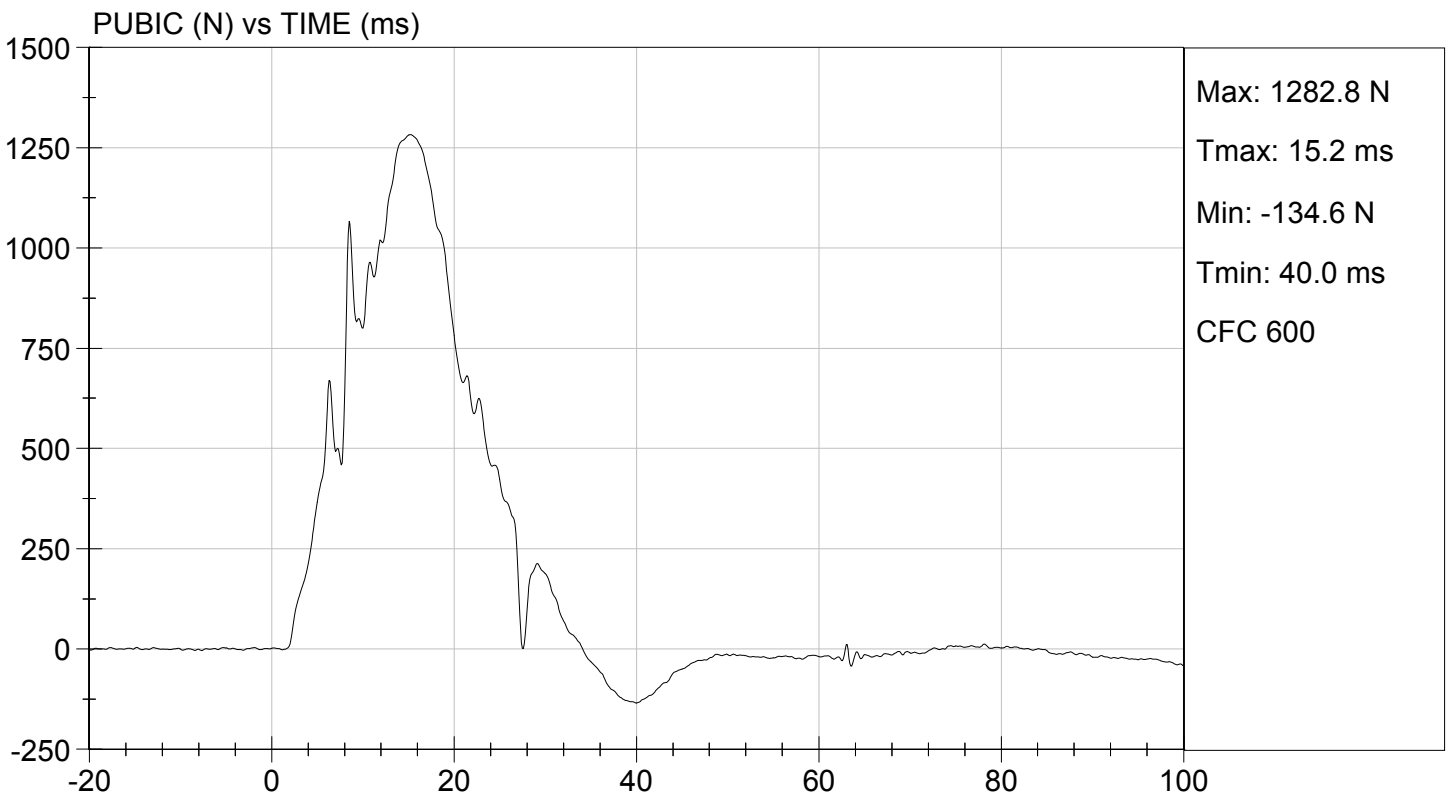
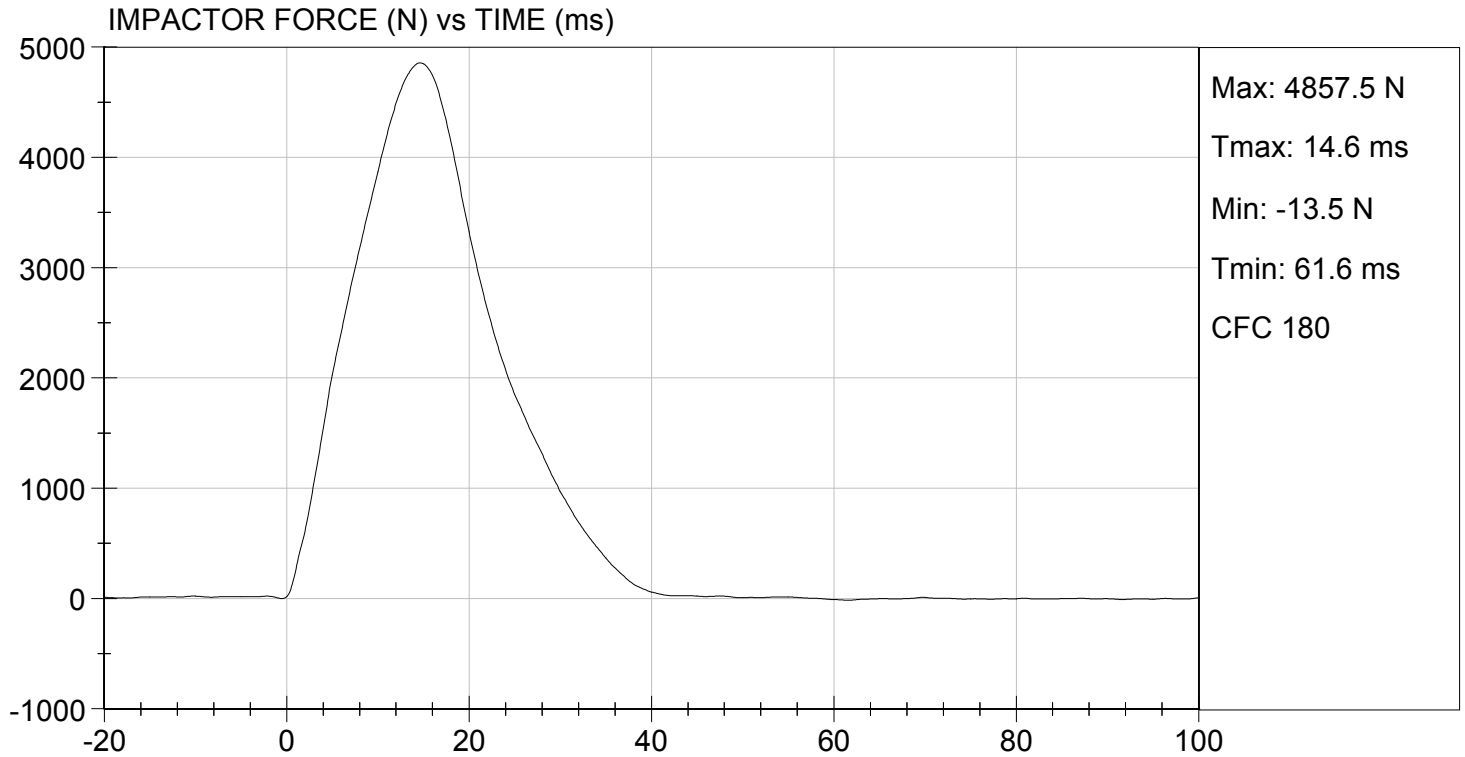
Test Date


Approved By



TEST DESC: PELVIS IMPACT
VELOCITY: 14.30 ft/s, 4.36 m/s

TEST DATE: 09/10/2014
TEST #: D143109



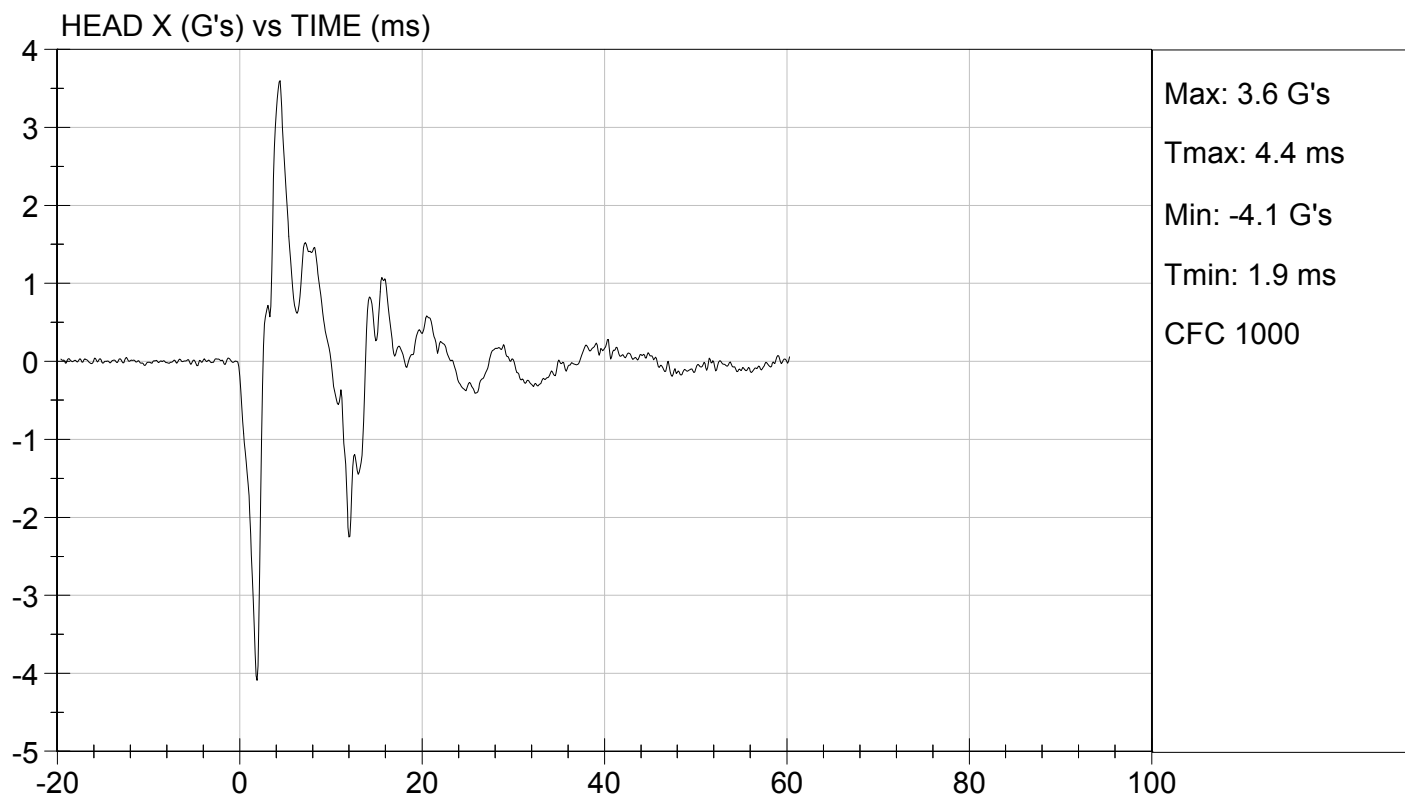
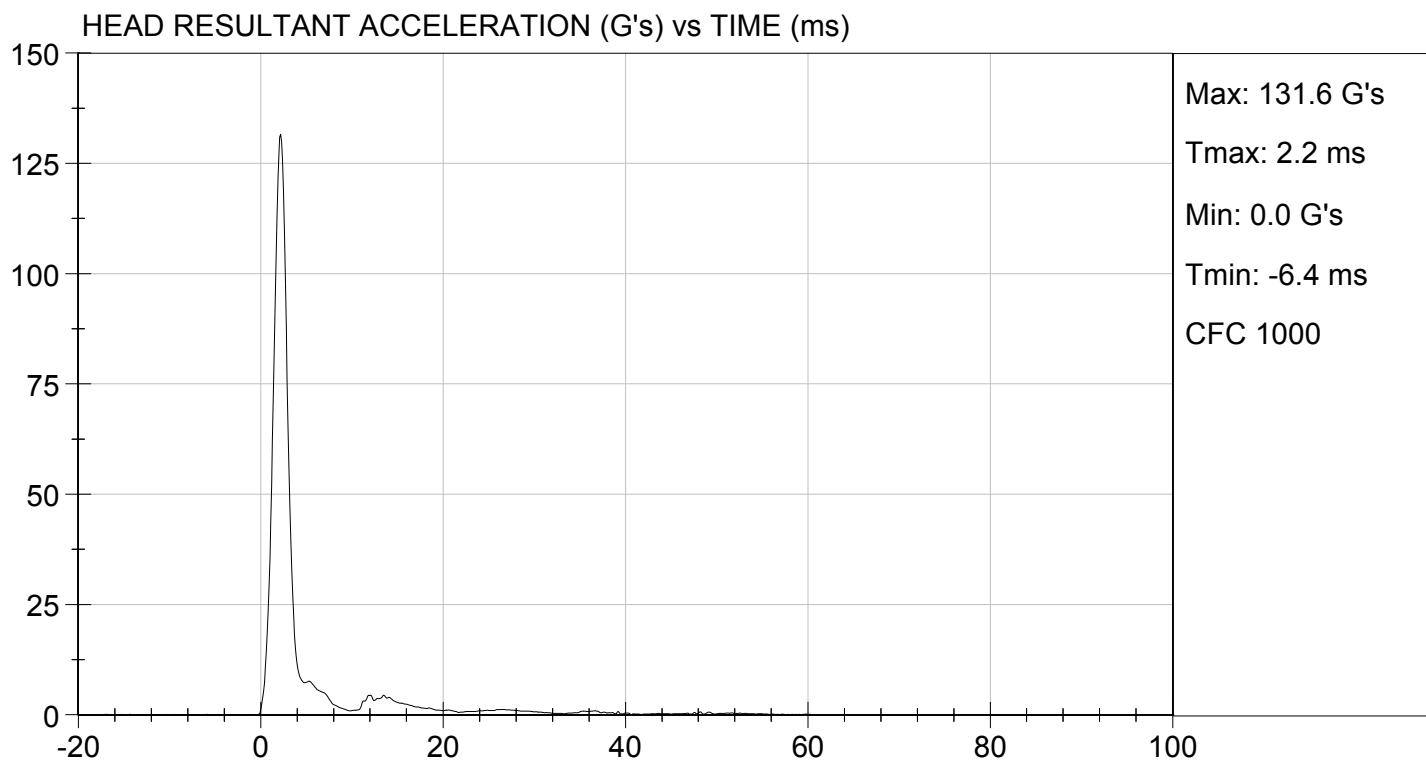
MGA RESEARCH CORPORATION**HEAD DROP TEST****ES-2re DUMMY****ATD Serial No:** 032**Test ID:** D143291

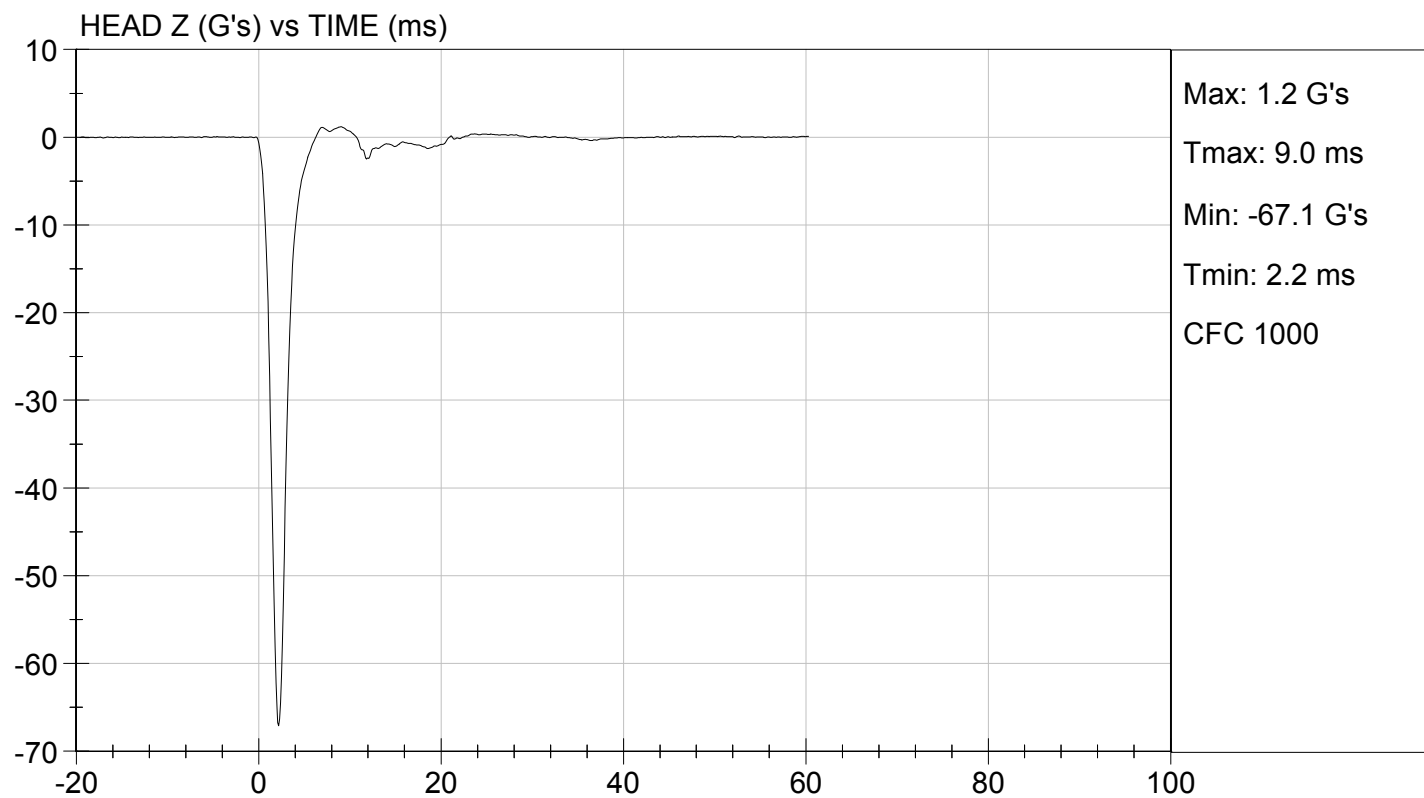
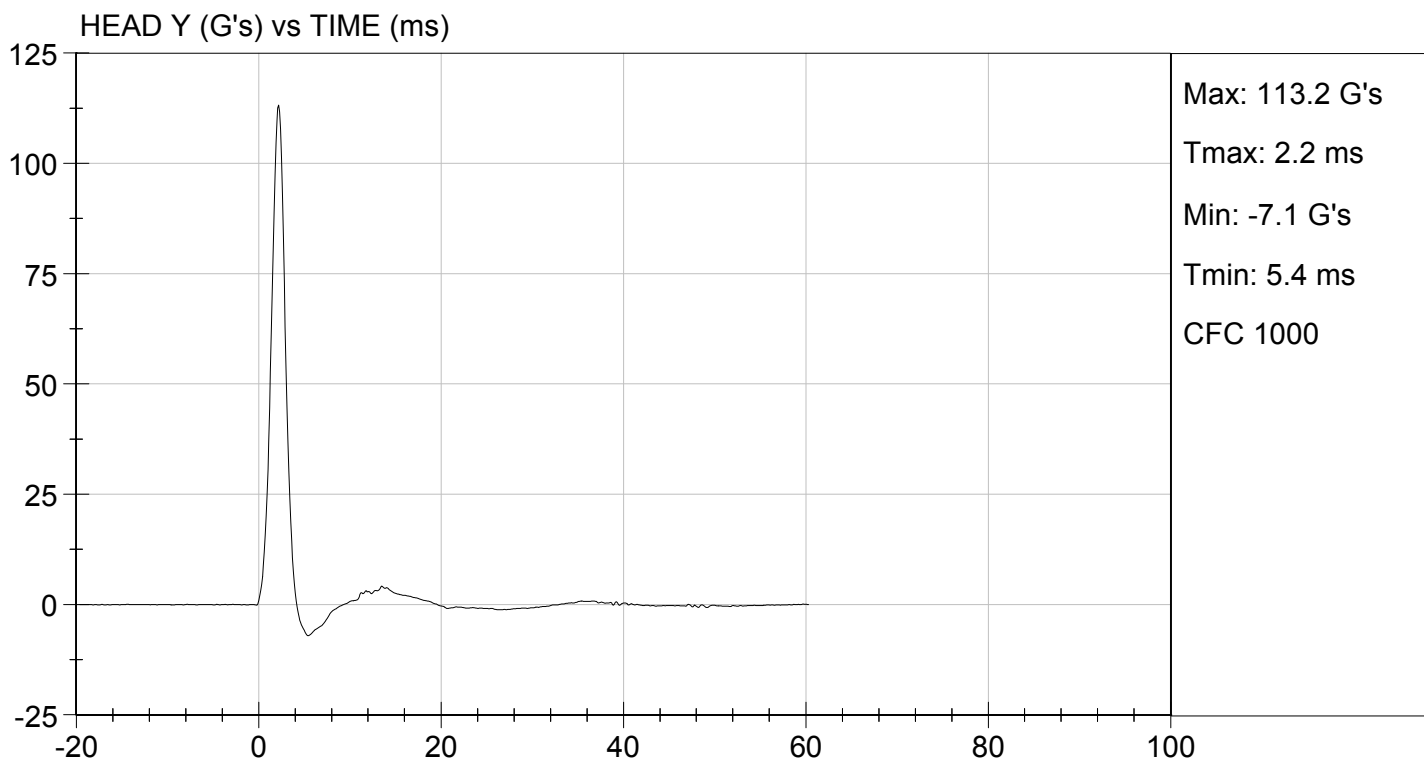
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	20.9	Pass
Laboratory Relative Humidity	%	10 to 70	45	Pass
Peak Resultant Acceleration	G's	125 to 155	132	Pass
Peak Longitudinal Acceleration	G's	<= +/- 15.0	-4.1	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 15% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

09/23/2014
Test Date


Approved By





MGA RESEARCH CORPORATION
NECK PENDULUM TEST
ES-2re DUMMY

ATD Serial No: 032

Test I.D: D143292

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	45	Pass
Pendulum Speed		m/s	3.30 to 3.50	3.50	Pass
Pendulum Velocity	1 ms	m/s	-0.05 to 0.00	-0.02	Pass
	3 ms	m/s	-0.25 to -0.375	-0.32	Pass
	14 ms	m/s	-3.20 to -3.70	-3.32	Pass
	17 ms	m/s	>= -3.70	-3.53	Pass
Maximum Flexion Angle		deg	49.0 to 59.0	55.4	Pass
Time of Maximum Flexion Angle		ms	54.0 to 66.0	59.1	Pass
Head Rotation Decay Time to 0 Degree		ms	53.0 to 88.0	63.7	Pass
Overall Results					Pass

David Schoedel
Laboratory Technician

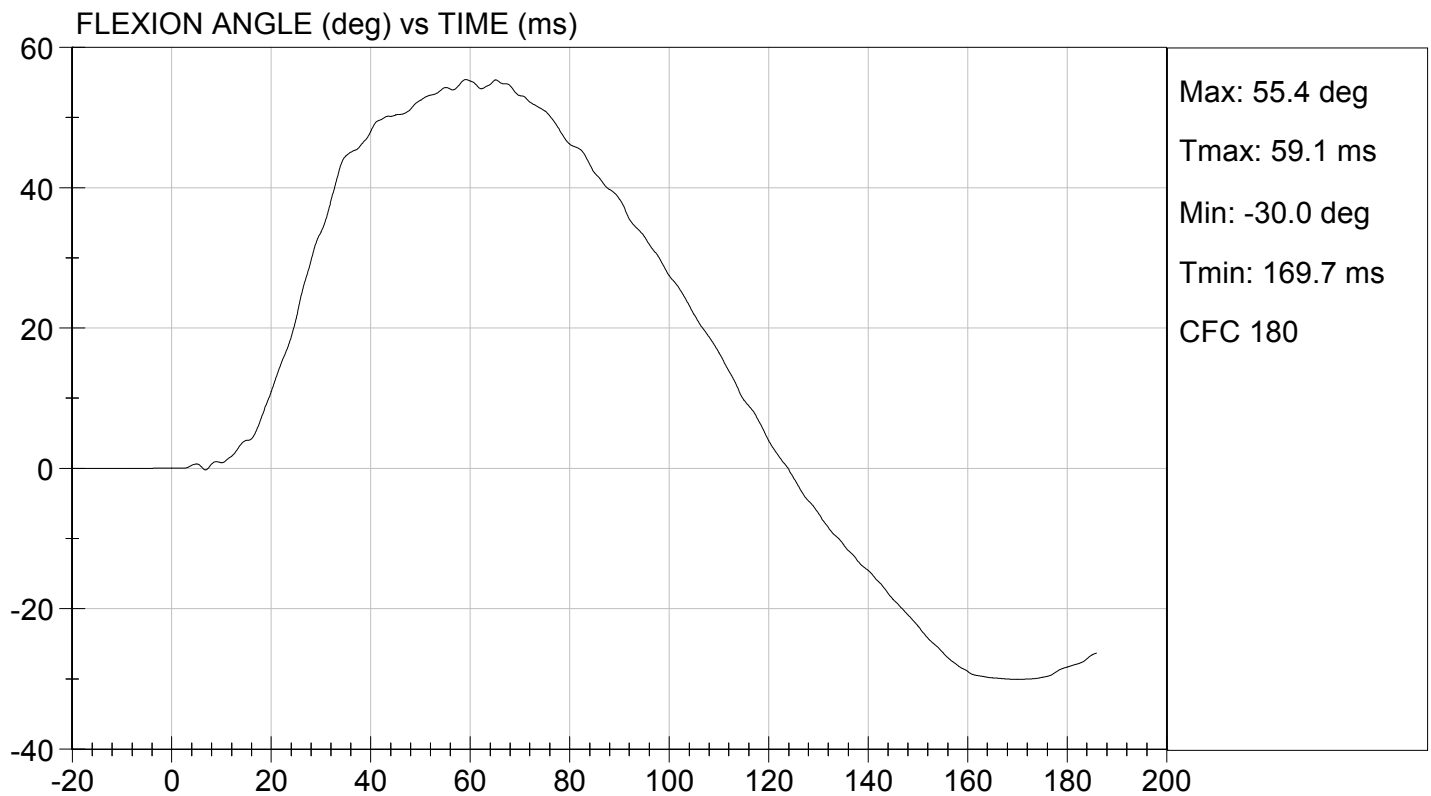
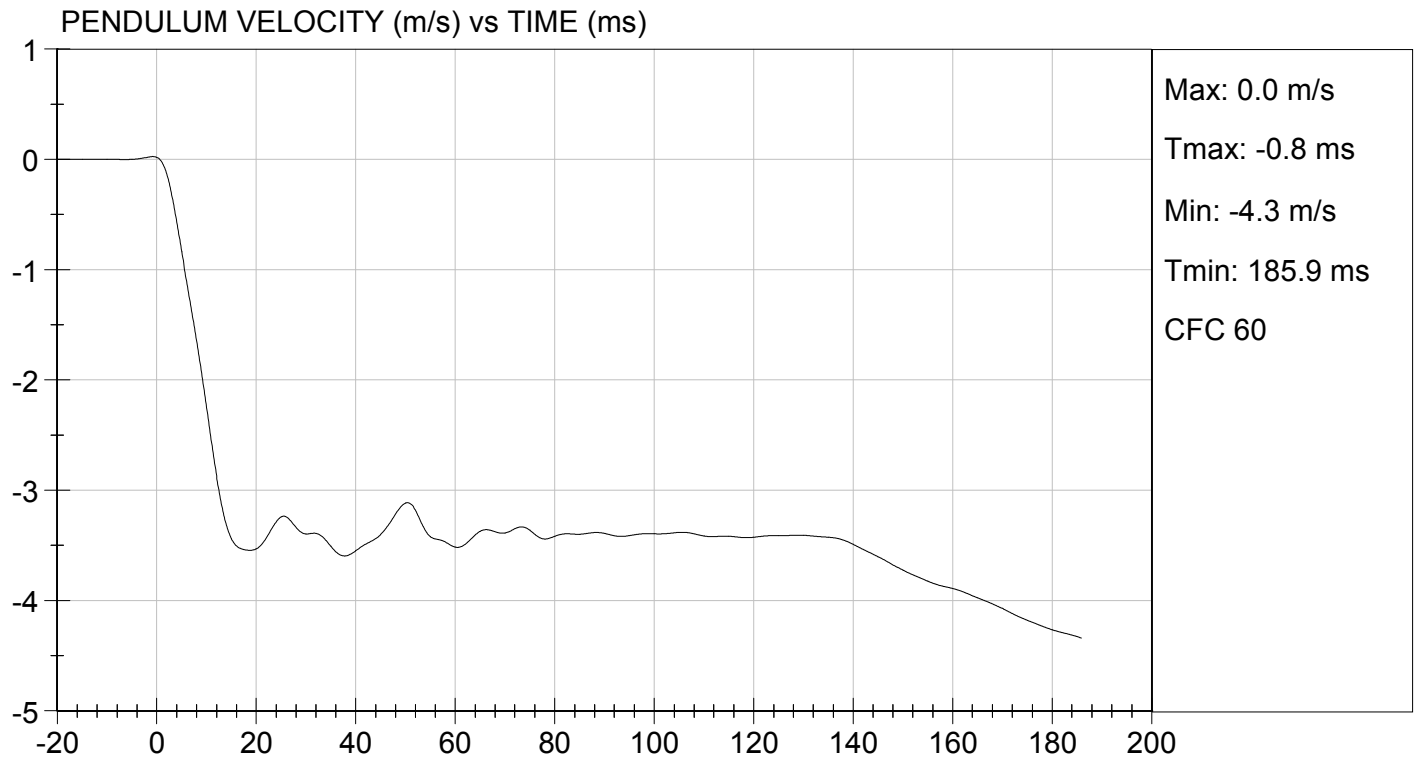
Jessica Hall
Approved By

09/23/2014
Test Date



TEST DESC: NECK BENDING
VELOCITY: 11.48 ft/s, 3.50 m/s

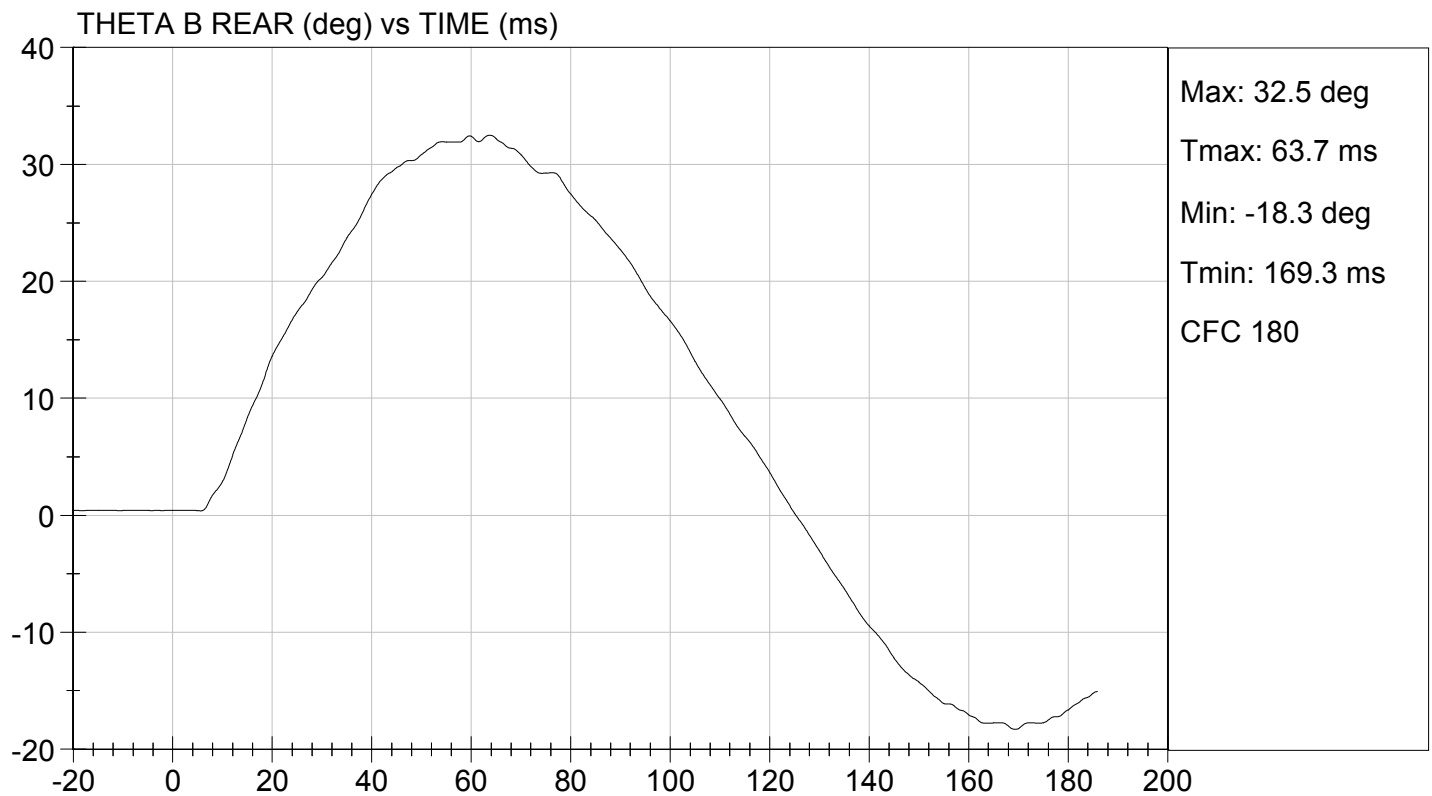
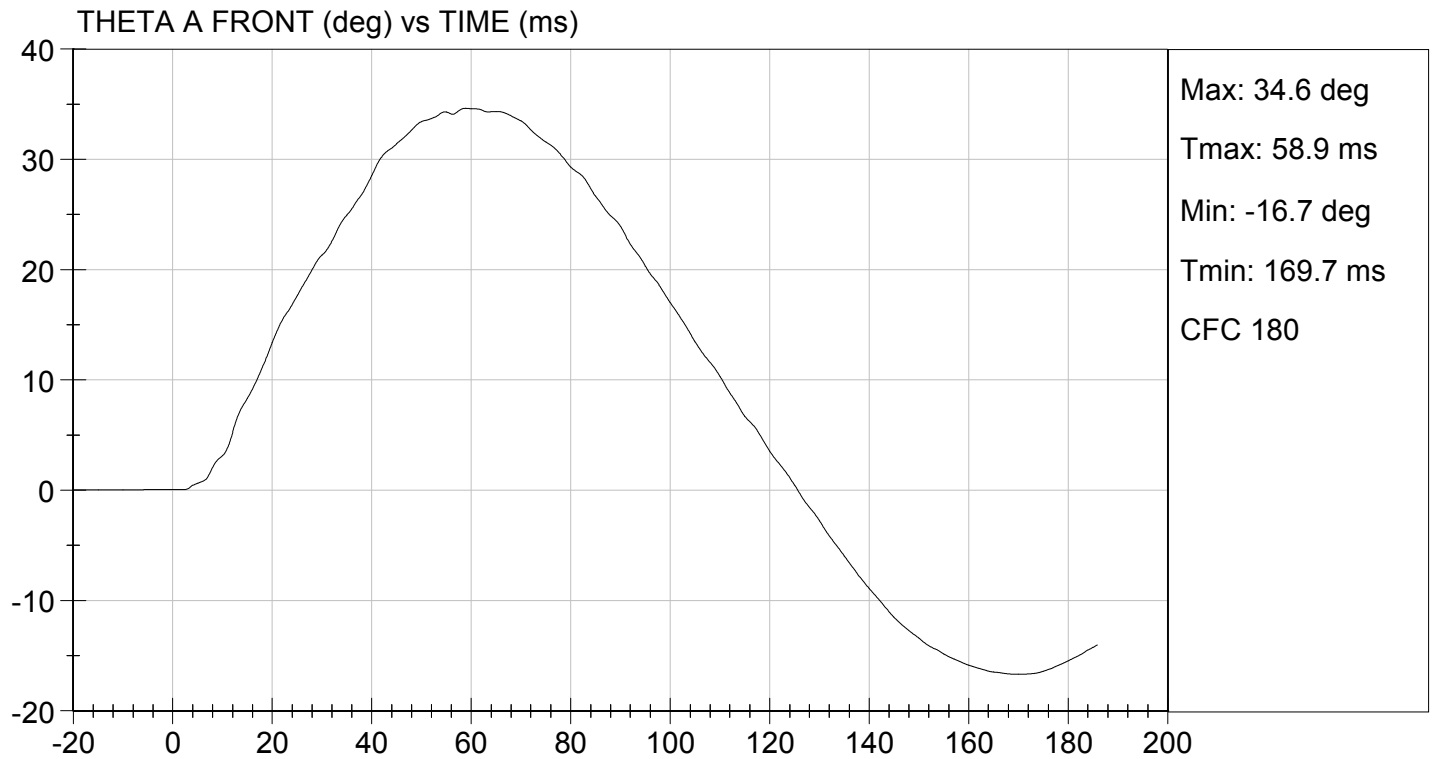
TEST DATE: 09/23/2014
TEST #: D143292





TEST DESC: NECK BENDING
VELOCITY: 11.48 ft/s, 3.50 m/s

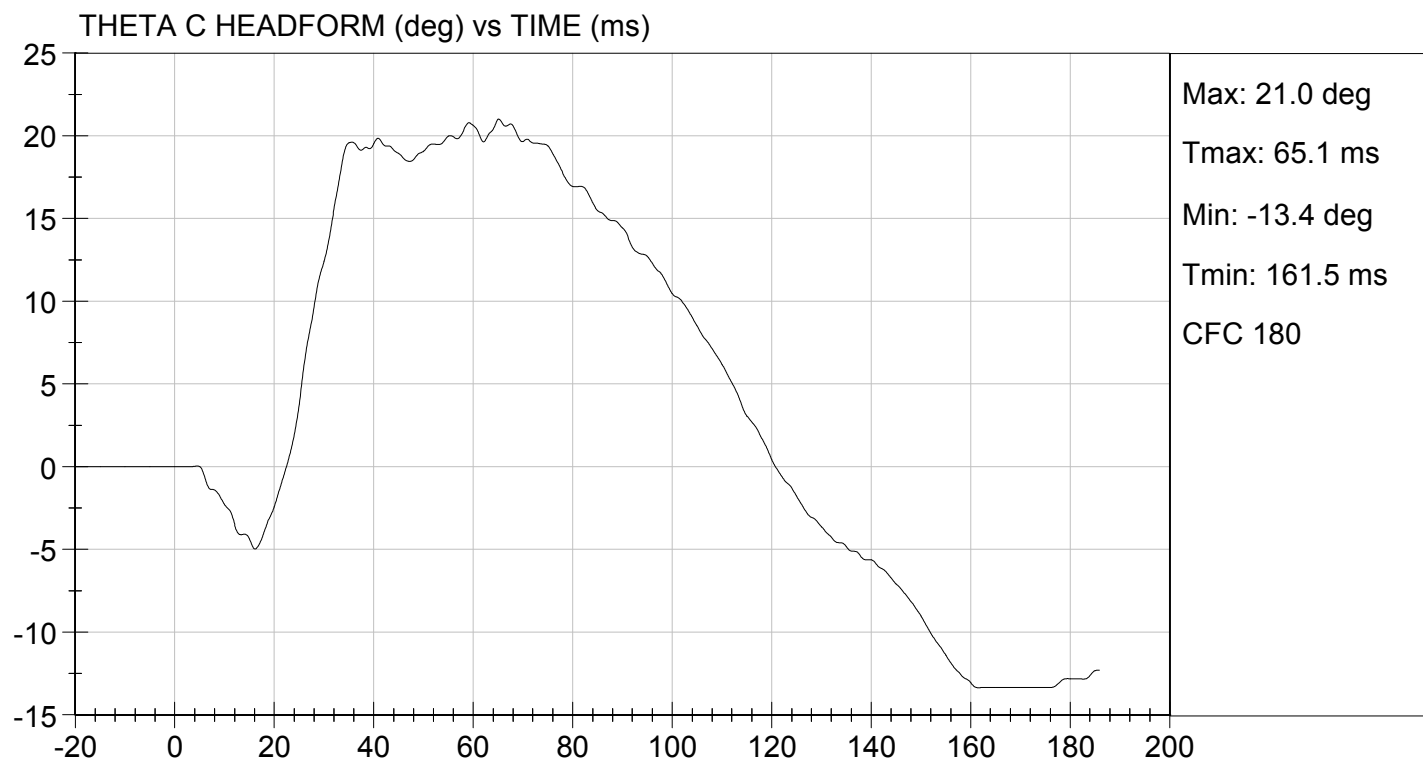
TEST DATE: 09/23/2014
TEST #: D143292





TEST DESC: NECK BENDING
VELOCITY: 11.48 ft/s, 3.50 m/s

TEST DATE: 09/23/2014
TEST #: D143292



MGA RESEARCH CORPORATION
SHOULDER IMPACT TEST
ES-2re DUMMY

ATD Serial No: 032

Test I.D: D143293

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	46	Pass
Pendulum Speed	m/s	4.20 to 4.40	4.30	Pass
Peak Impactor Acceleration	G's	7.5 to 10.5	9.5	Pass
Overall Test Results				Pass

Maxime Chamberland
Laboratory Technician

09/23/2014

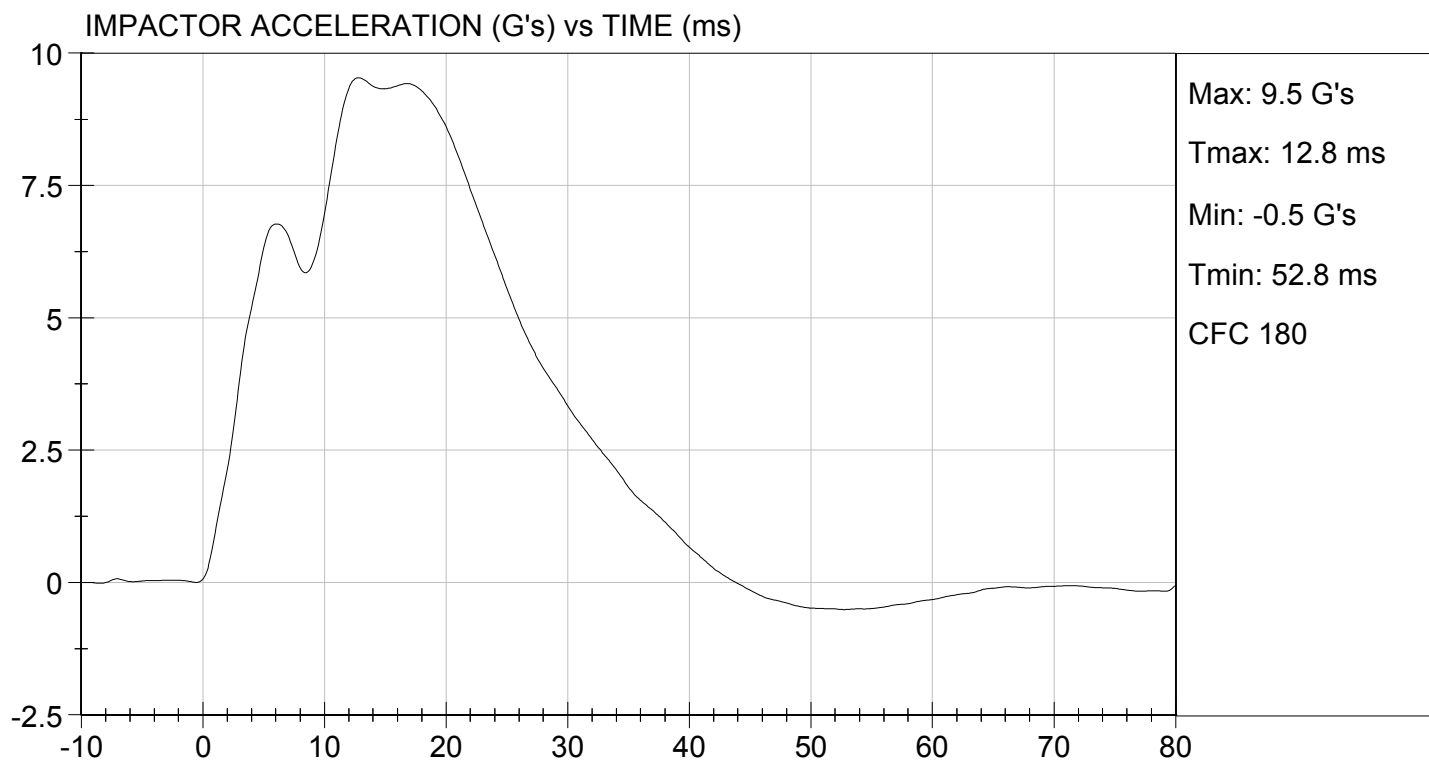
Test Date

Jessica Hall
Approved By



TEST DESC: SHOULDER IMPACT
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 09/23/2014
TEST #: D143293



MGA RESEARCH CORPORATION

UPPER RIB TEST

ES-2re DUMMY

ATD Serial No: 032

Test I.D: D143294

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	45	Pass
Displacement at 459 mm	mm	36.0 to 40.0	38.9	Pass
Displacement at 815 mm	mm	46.0 to 51.0	49.1	Pass
Overall Test Results				Pass

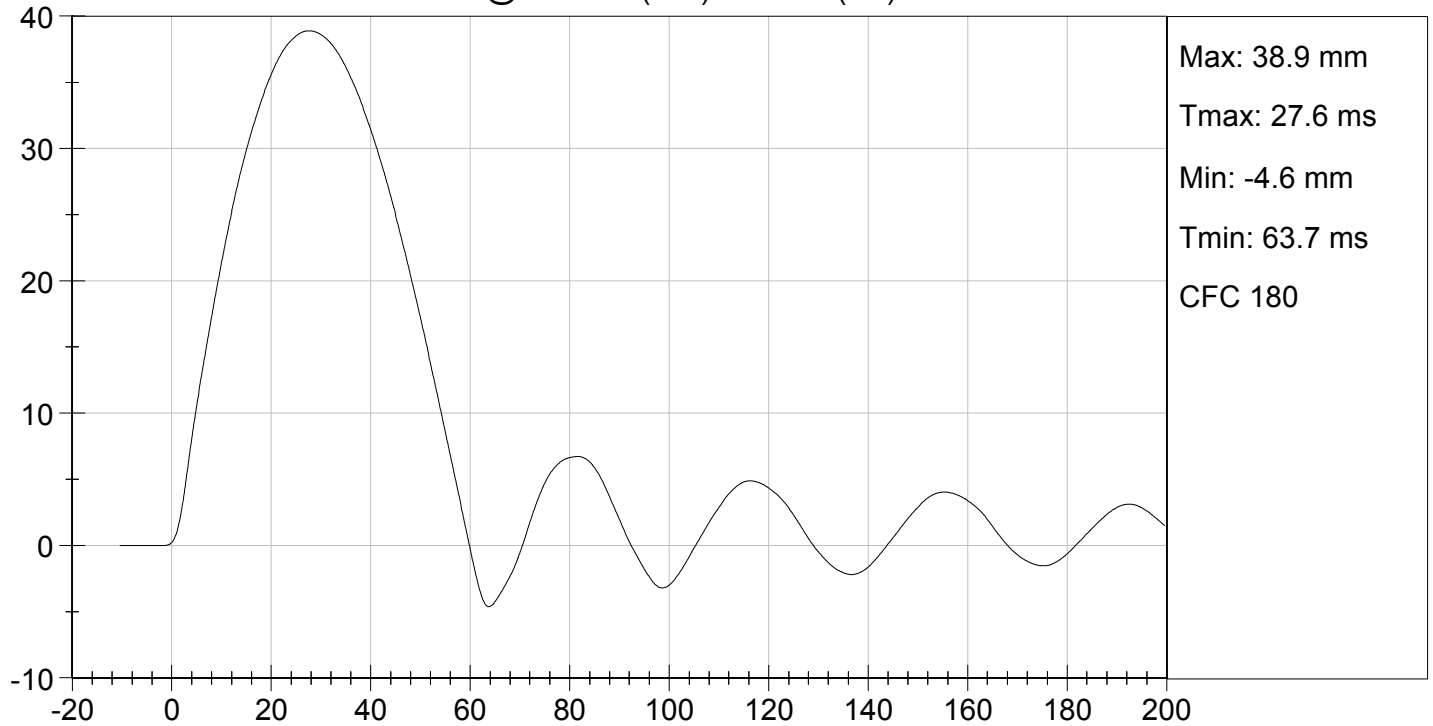
Maxime Chamberland
Laboratory Technician

09/23/2014
Test Date

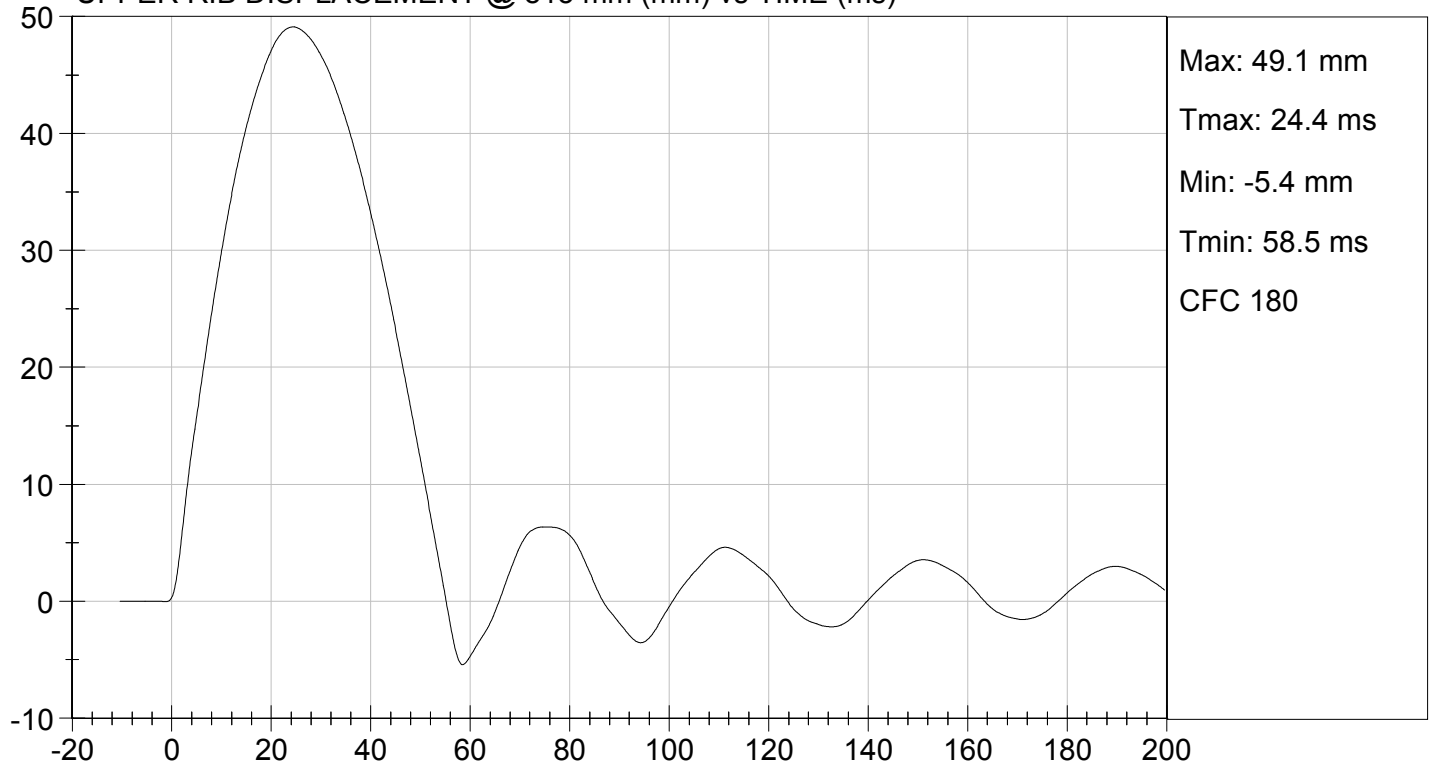
Jessica Hall
Approved By



UPPER RIB DISPLACEMENT @ 459 mm (mm) vs TIME (ms)



UPPER RIB DISPLACEMENT @ 815 mm (mm) vs TIME (ms)



MGA RESEARCH CORPORATION

MID RIB TEST

ES-2re DUMMY

ATD Serial No: 032

Test I.D: D143295

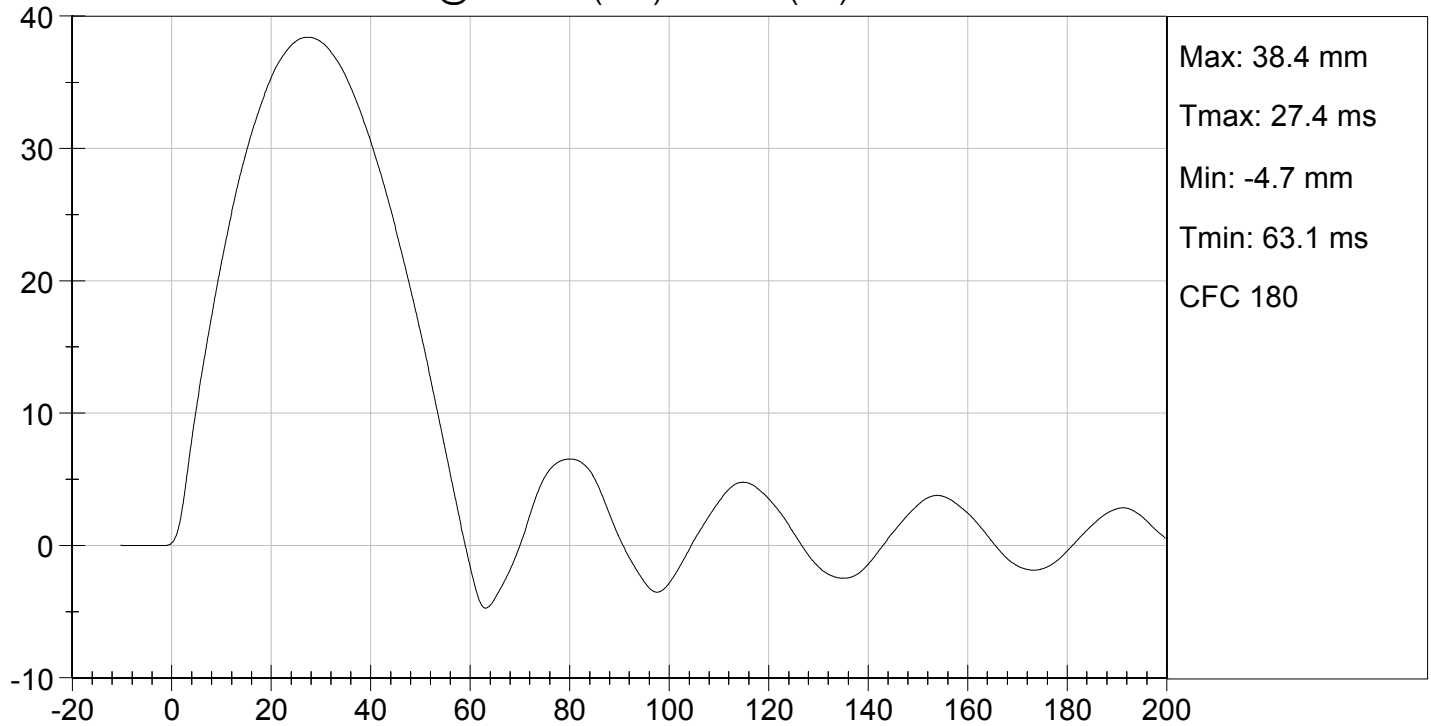
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	20.9	Pass
Laboratory Relative Humidity	%	10 to 70	45	Pass
Displacement at 459 mm	mm	36.0 to 40.0	38.4	Pass
Displacement at 815 mm	mm	46.0 to 51.0	48.8	Pass
Overall Test Results				Pass

Maxime Chamberland
Laboratory Technician

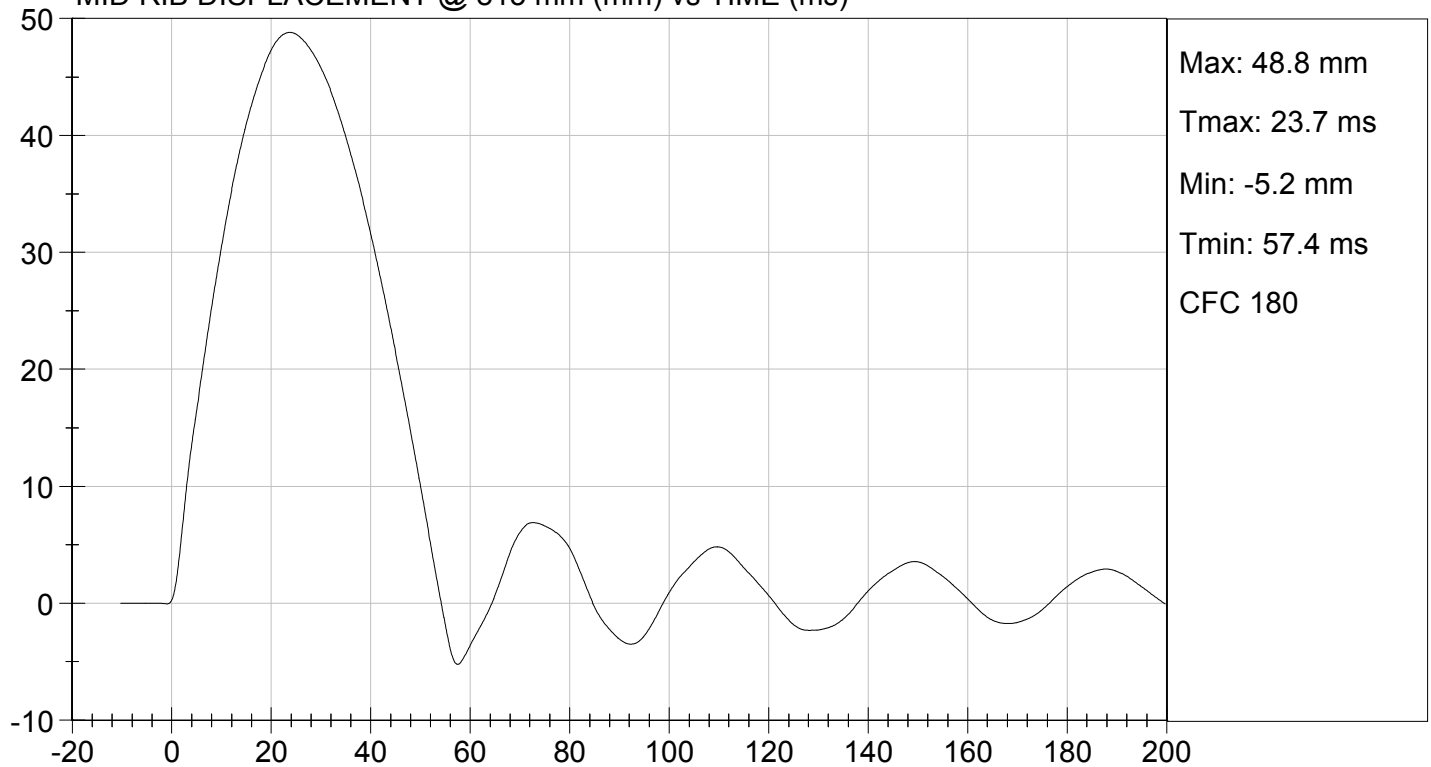
09/23/2014
Test Date

Jessica Hall
Approved By

MID RIB DISPLACEMENT @ 459 mm (mm) vs TIME (ms)



MID RIB DISPLACEMENT @ 815 mm (mm) vs TIME (ms)



MGA RESEARCH CORPORATION

LOWER RIB TEST

ES-2re DUMMY

ATD Serial No: 032

Test I.D: D143296

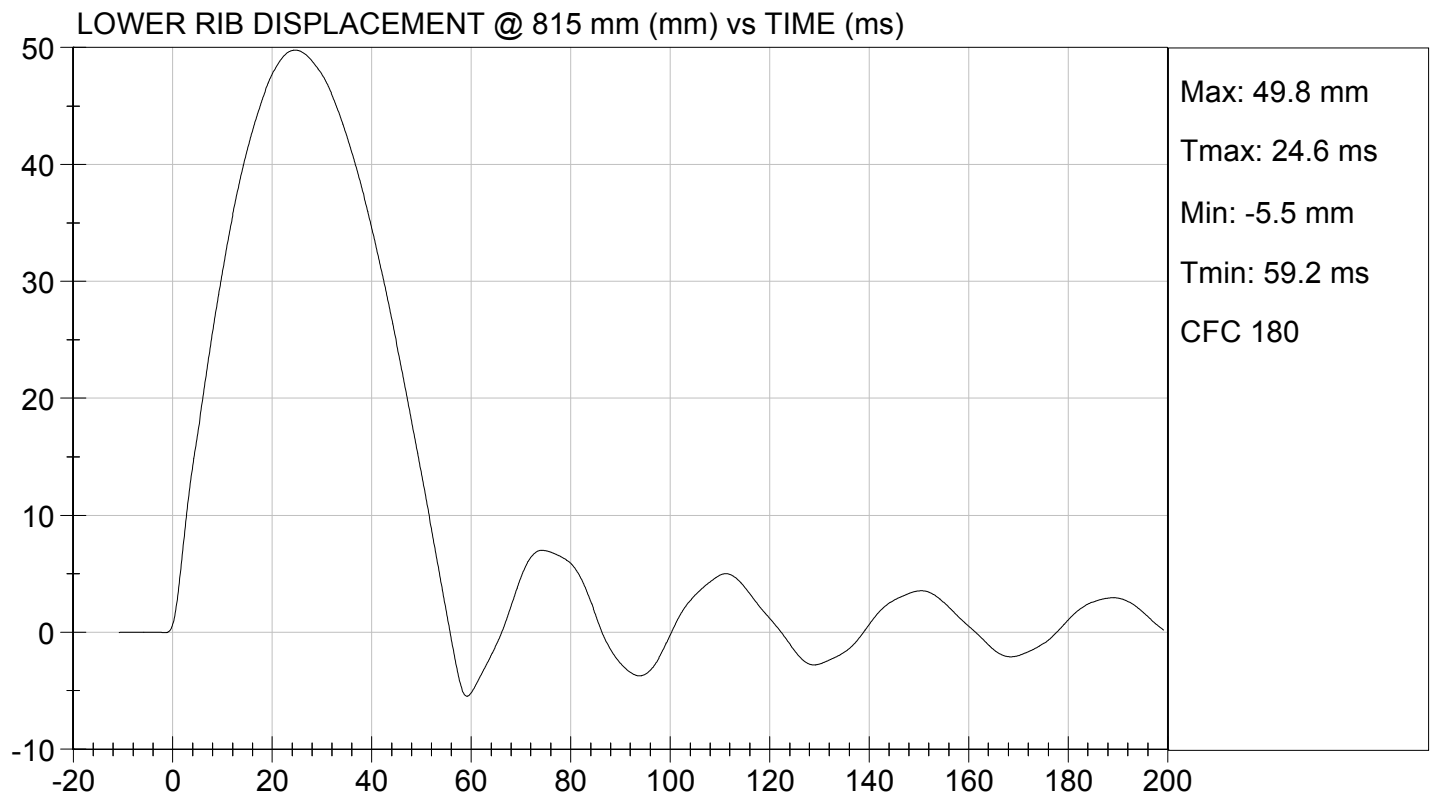
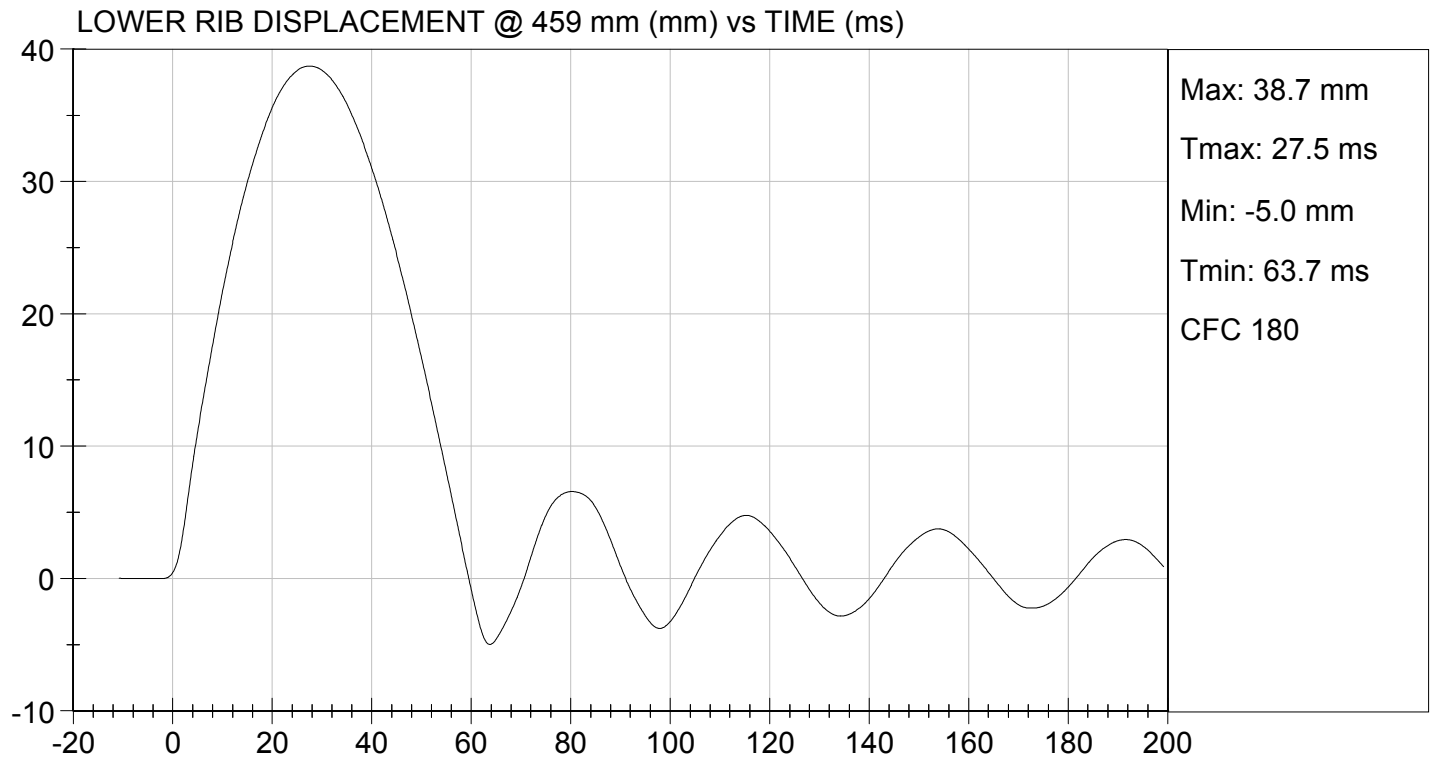
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	20.9	Pass
Laboratory Relative Humidity	%	10 to 70	45	Pass
Displacement at 459 mm	mm	36.0 to 40.0	38.7	Pass
Displacement at 815 mm	mm	46.0 to 51.0	49.8	Pass
Overall Test Results				Pass

Maxime Chamberland
Laboratory Technician

Jessica Hall
Approved By

09/23/2014

Test Date



MGA RESEARCH CORPORATION**THORAX IMPACT TEST****ES-2re DUMMY****ATD Serial No:** 032**Test I.D:** D143290

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Humidity	%	10 to 70	45	Pass
Probe Speed	m/s	5.40 to 5.60	5.58	Pass
Maximum Impactor Force (after 6 ms)	N	5100 to 6200	5476	Pass
Upper Rib Displacement	mm	34.0 to 41.0	38.8	Pass
Middle Rib Displacement	mm	37.0 to 45.0	41.8	Pass
Lower Rib Displacement	mm	37.0 to 44.0	40.9	Pass
Overall Test Results				Pass

Maxime Chamberland
Laboratory Technician

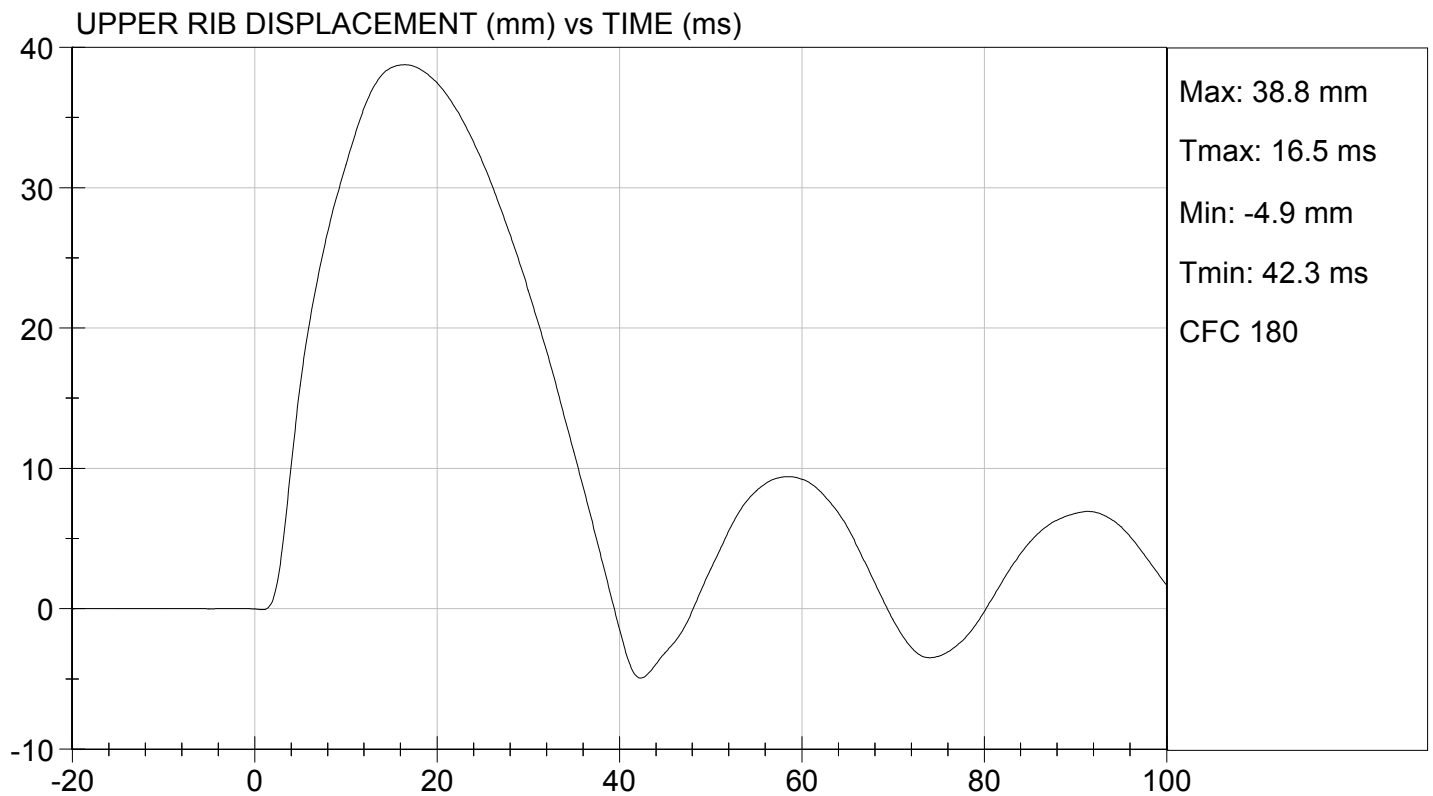
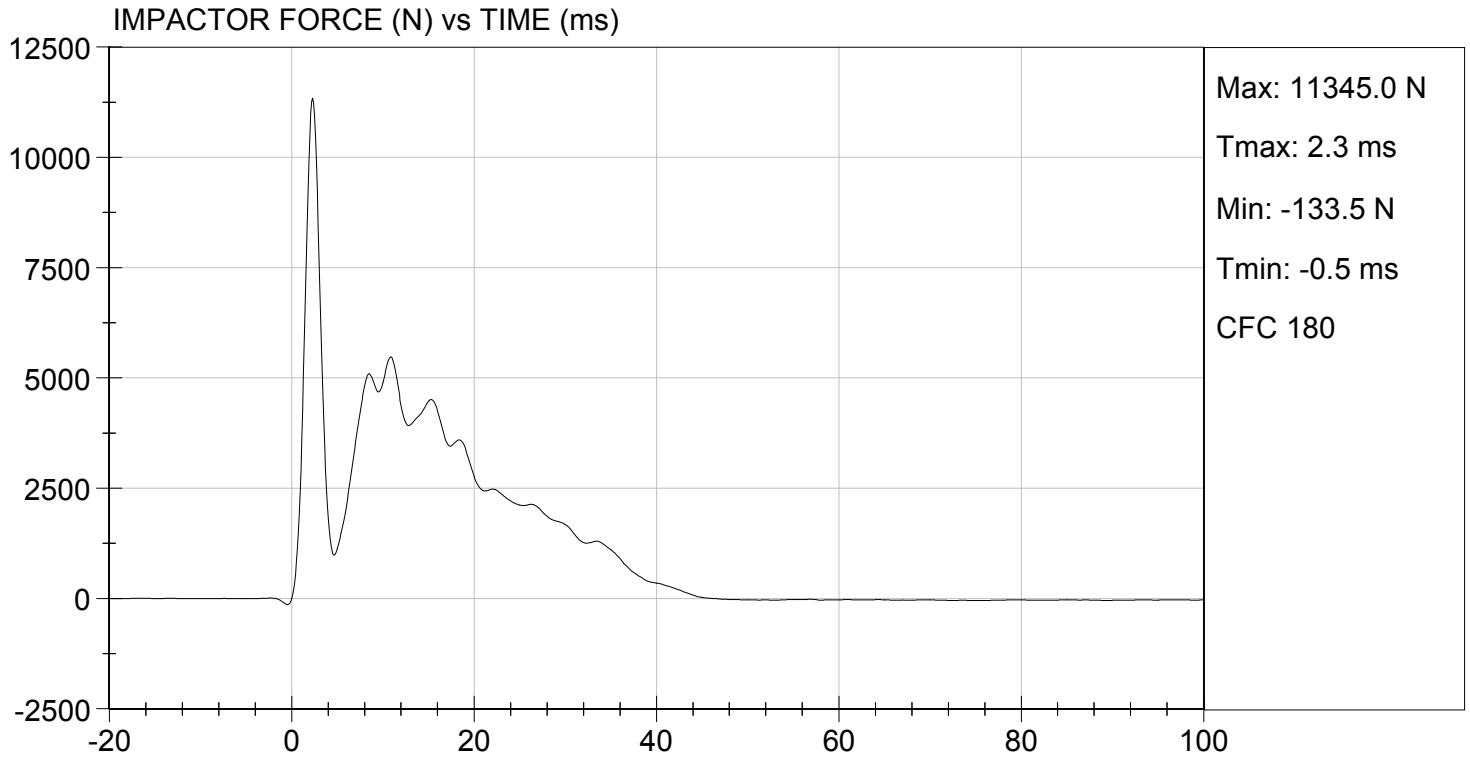
09/23/2014
Test Date

Jessica Hall
Approved By



TEST DESC: THORAX IMPACT
VELOCITY: 18.32 ft/s, 5.58 m/s

TEST DATE: 09/23/2014
TEST #: D143290

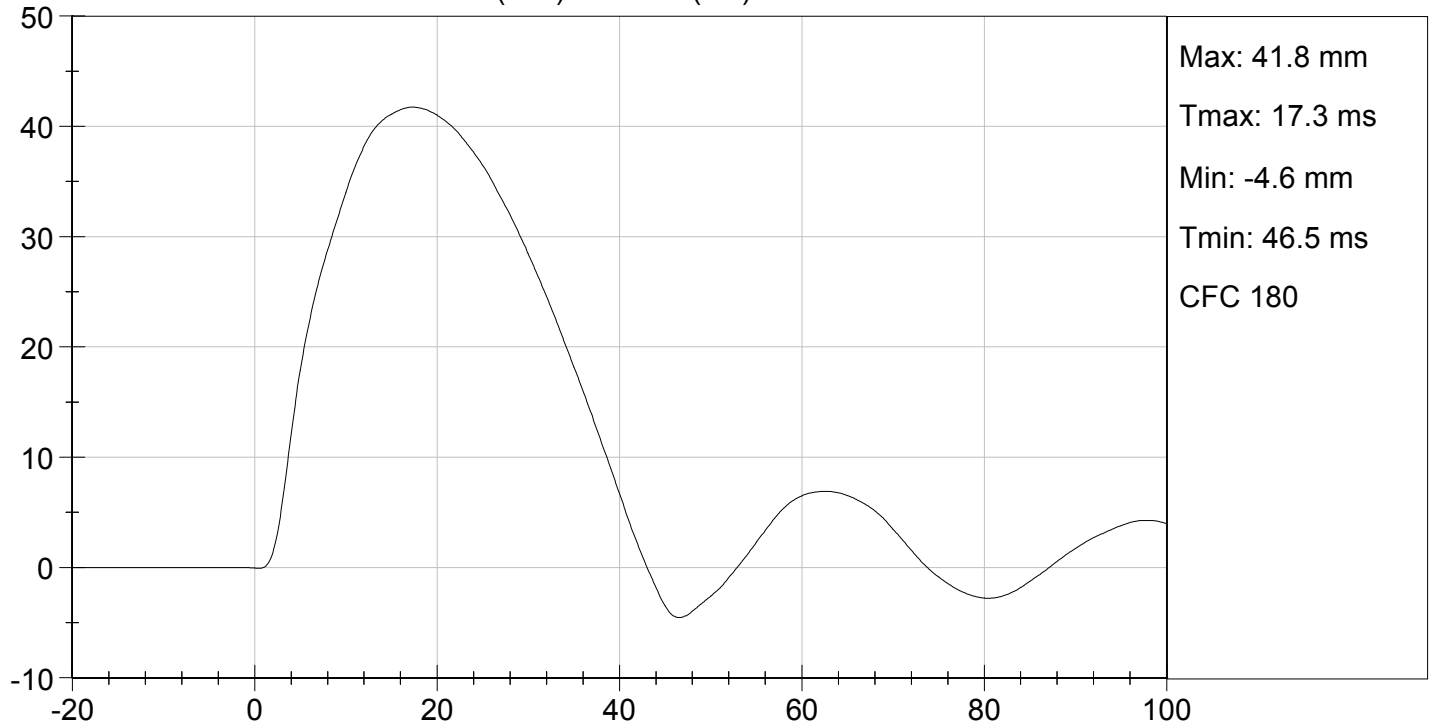




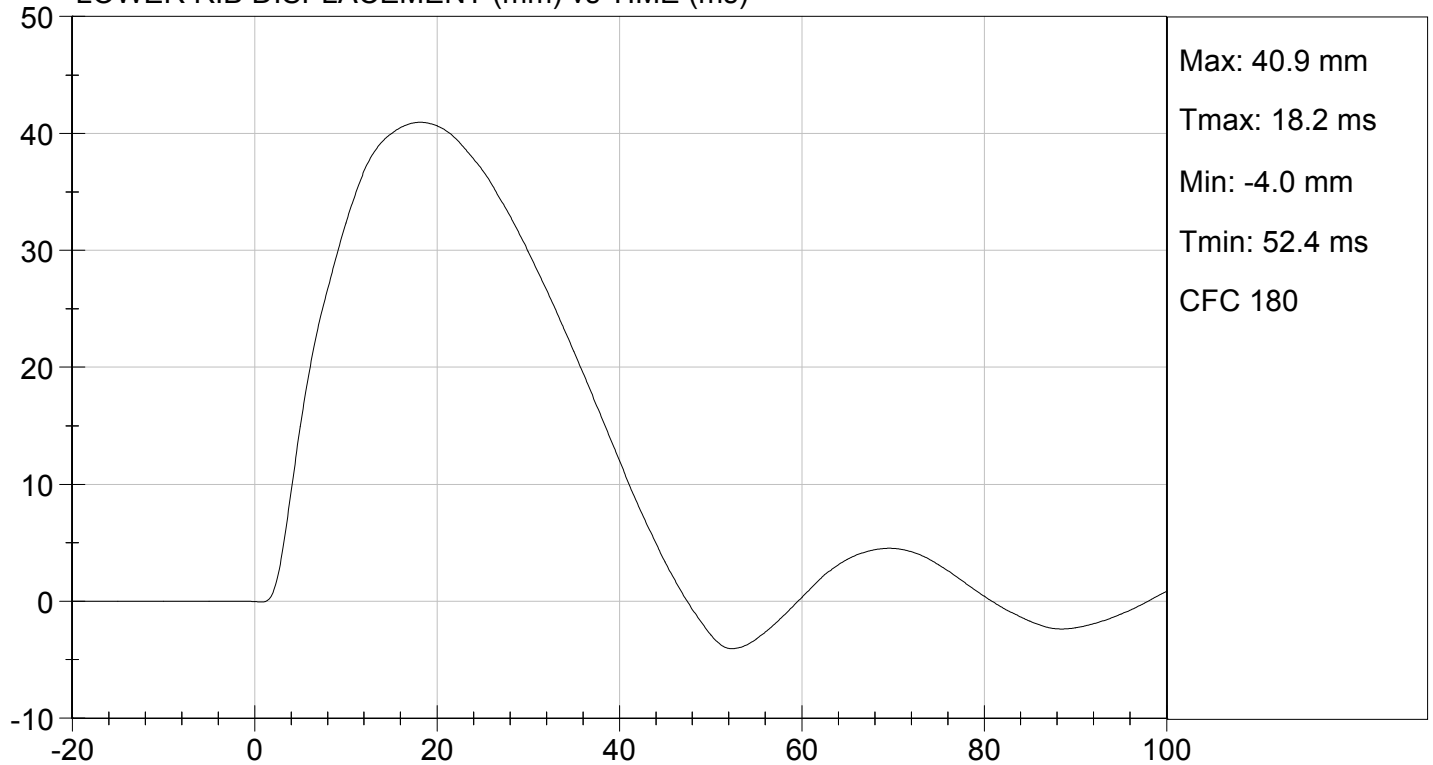
TEST DESC: THORAX IMPACT
VELOCITY: 18.32 ft/s, 5.58 m/s

TEST DATE: 09/23/2014
TEST #: D143290

MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



LOWER RIB DISPLACEMENT (mm) vs TIME (ms)



MGA RESEARCH CORPORATION**ABDOMEN TEST****ES-2re DUMMY**ATD Serial No: 032Test I.D: D143297

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	45	Pass
Probe Speed	m/s	3.90 to 4.10	4.06	Pass
Maximum Impactor Force	N	4000 to 4800	4268	Pass
Time of Maximum Impactor Force	ms	10.6 to 13.0	11.6	Pass
Maximum Total Abdomen Force	N	2200 to 2700	2239	Pass
Time of Maximum Abdomen Force	ms	10.0 to 12.3	11.5	Pass
Overall Test Results				Pass

Maxime Chamberland
Laboratory Technician

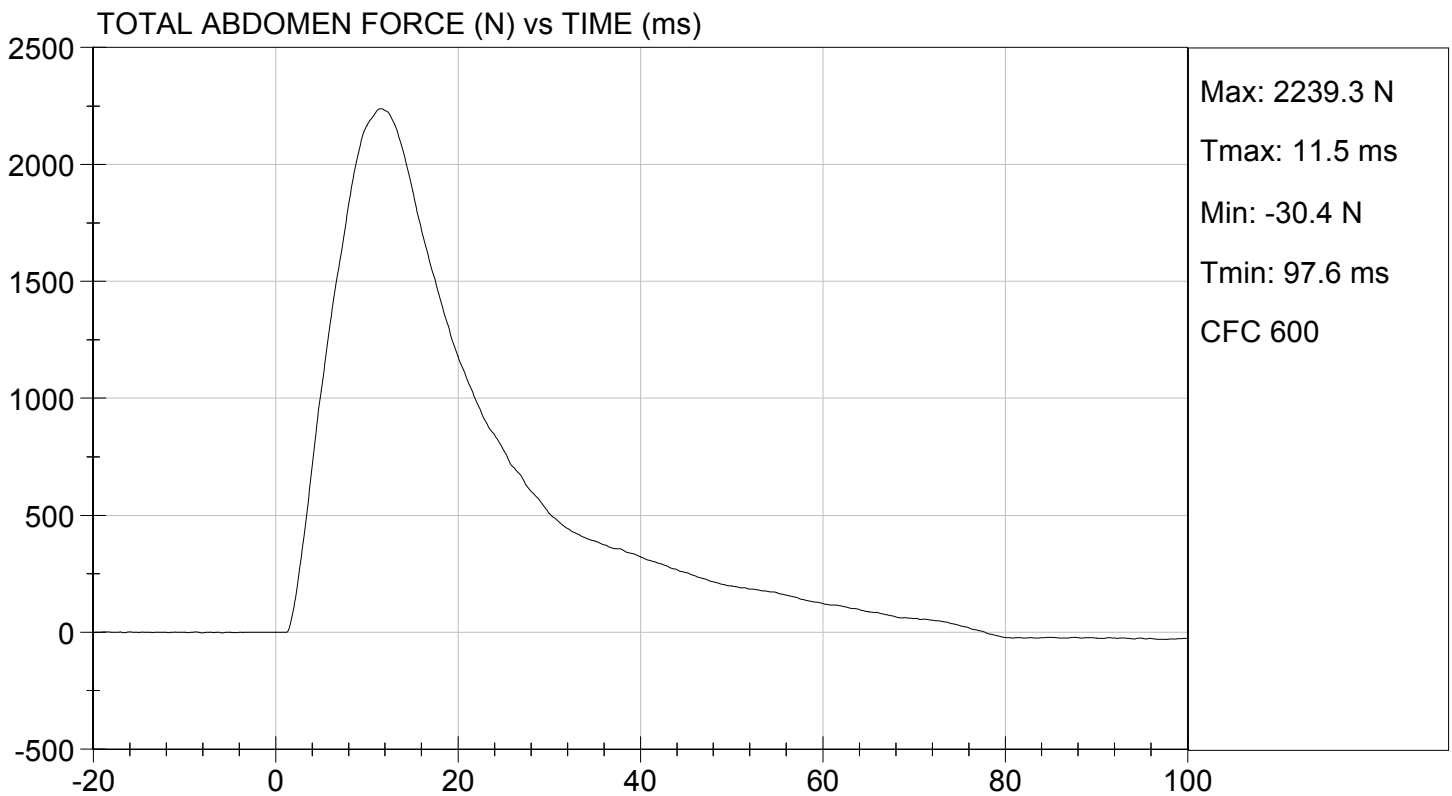
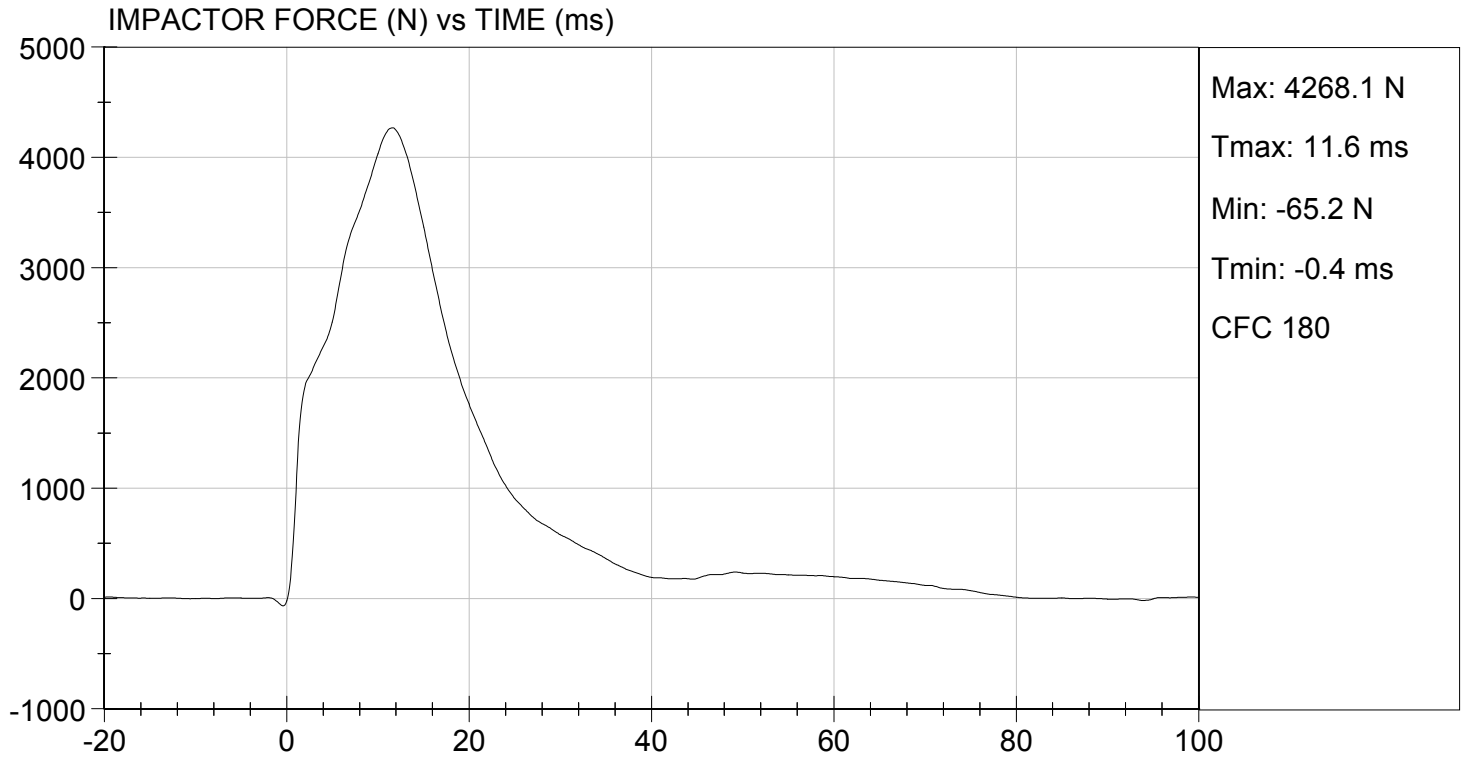
09/23/2014
Test Date

Jessica Hall
Approved By



TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.33 ft/s, 4.06 m/s

TEST DATE: 09/23/2014
TEST #: D143297

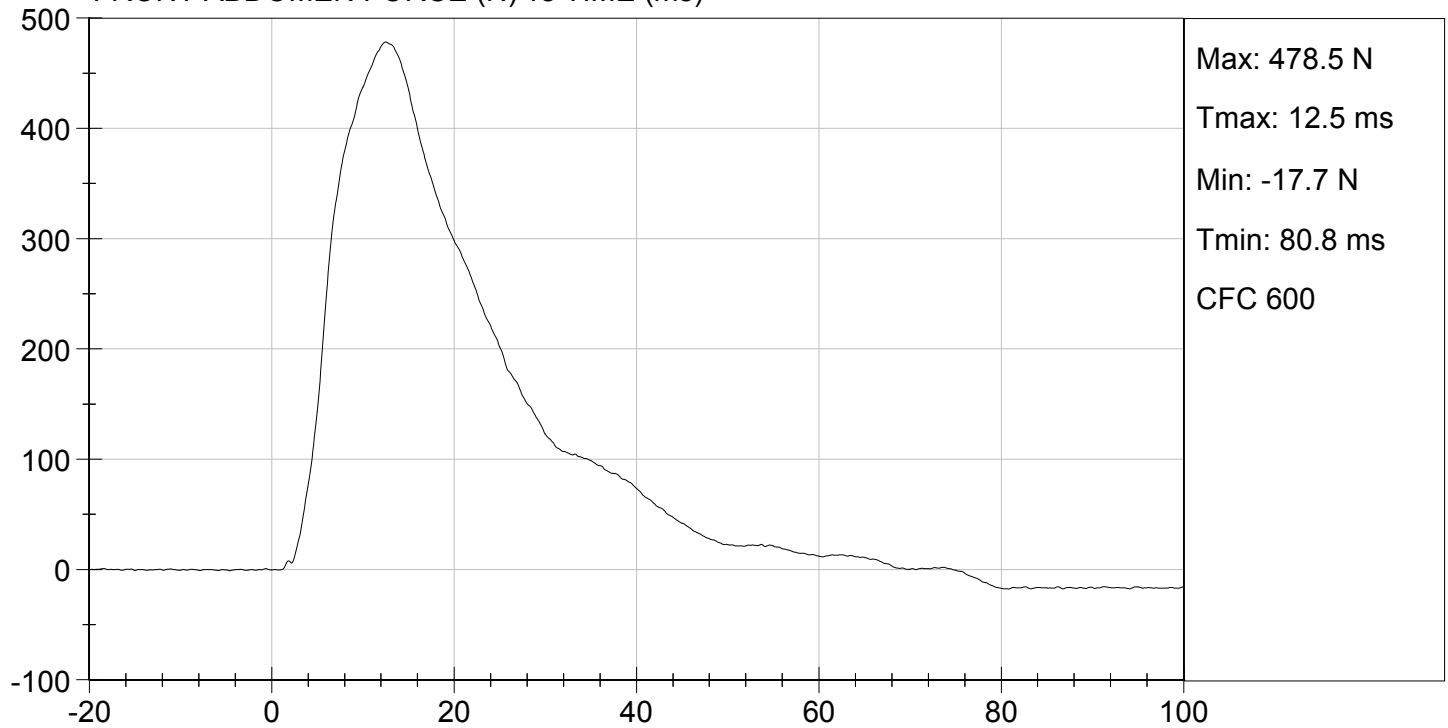




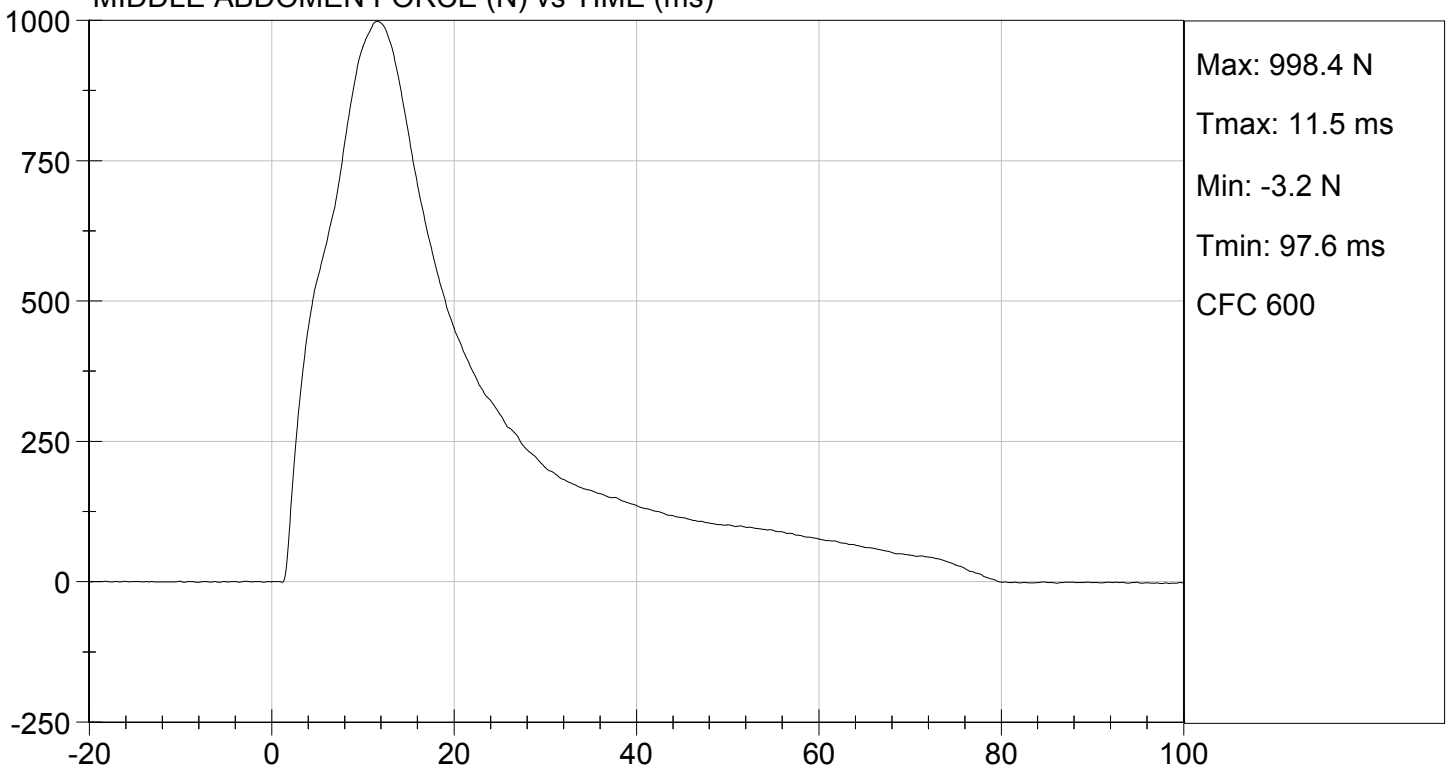
TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.33 ft/s, 4.06 m/s

TEST DATE: 09/23/2014
TEST #: D143297

FRONT ABDOMEN FORCE (N) vs TIME (ms)



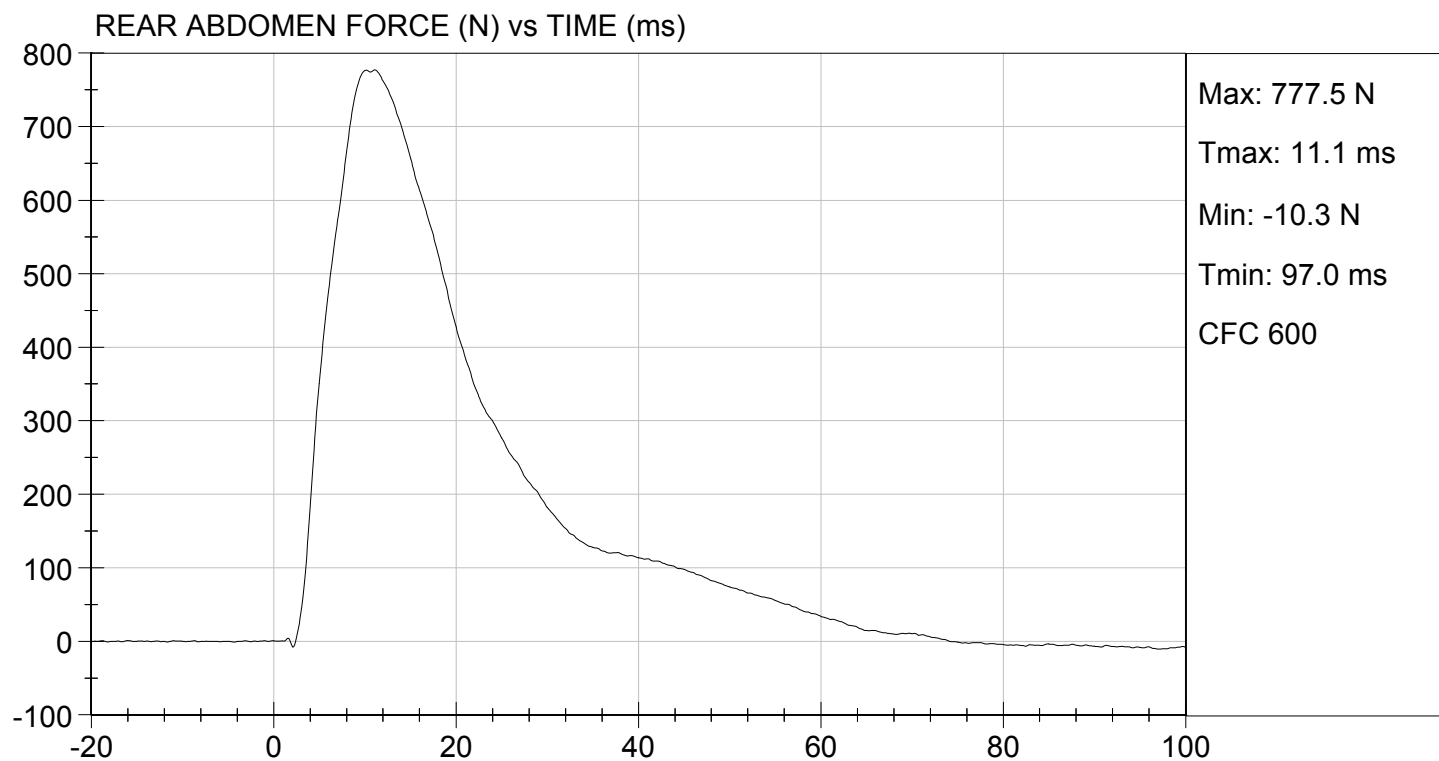
MIDDLE ABDOMEN FORCE (N) vs TIME (ms)





TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.33 ft/s, 4.06 m/s

TEST DATE: 09/23/2014
TEST #: D143297



MGA RESEARCH CORPORATION
LUMBAR SPINE TEST
ES-2re DUMMY

ATD Serial No: 032

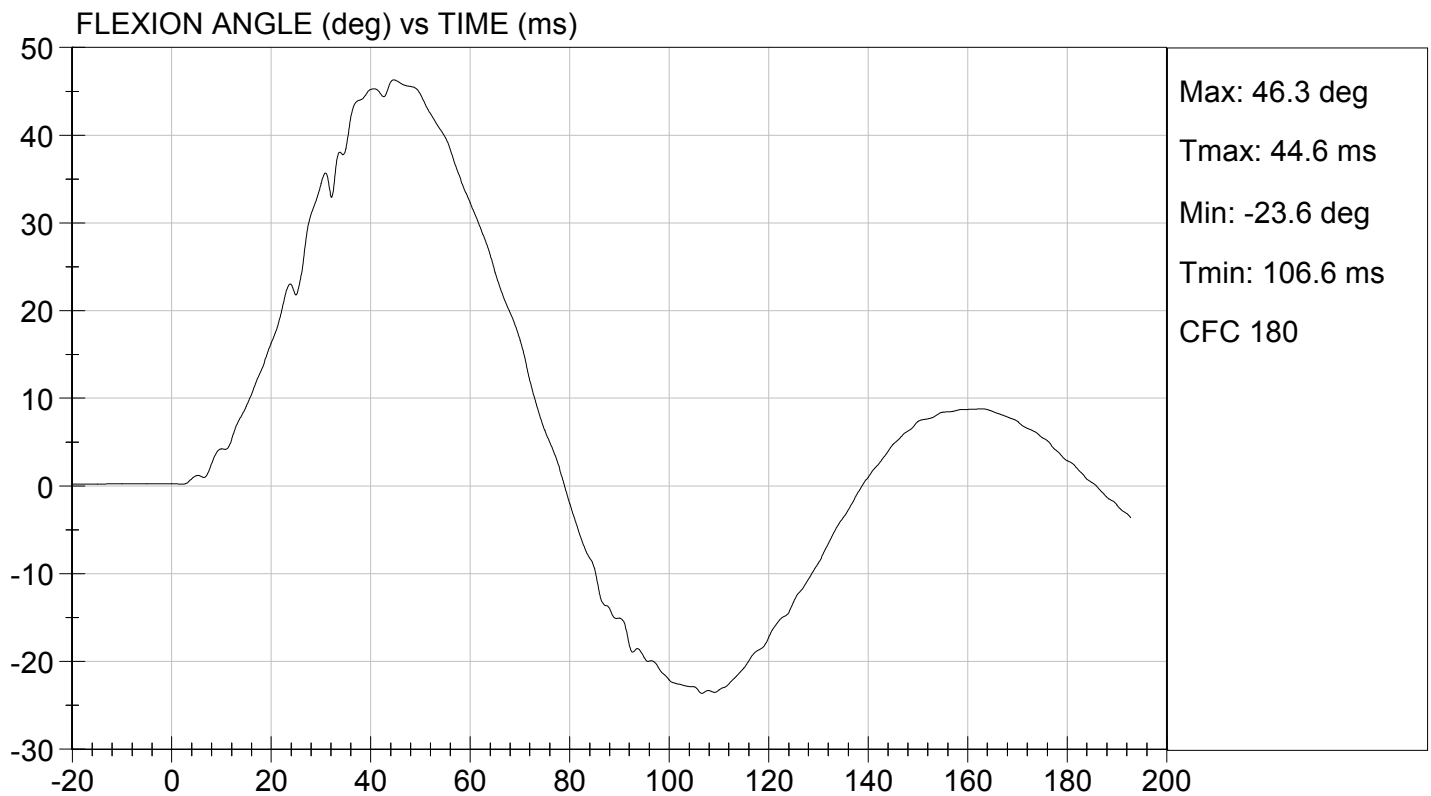
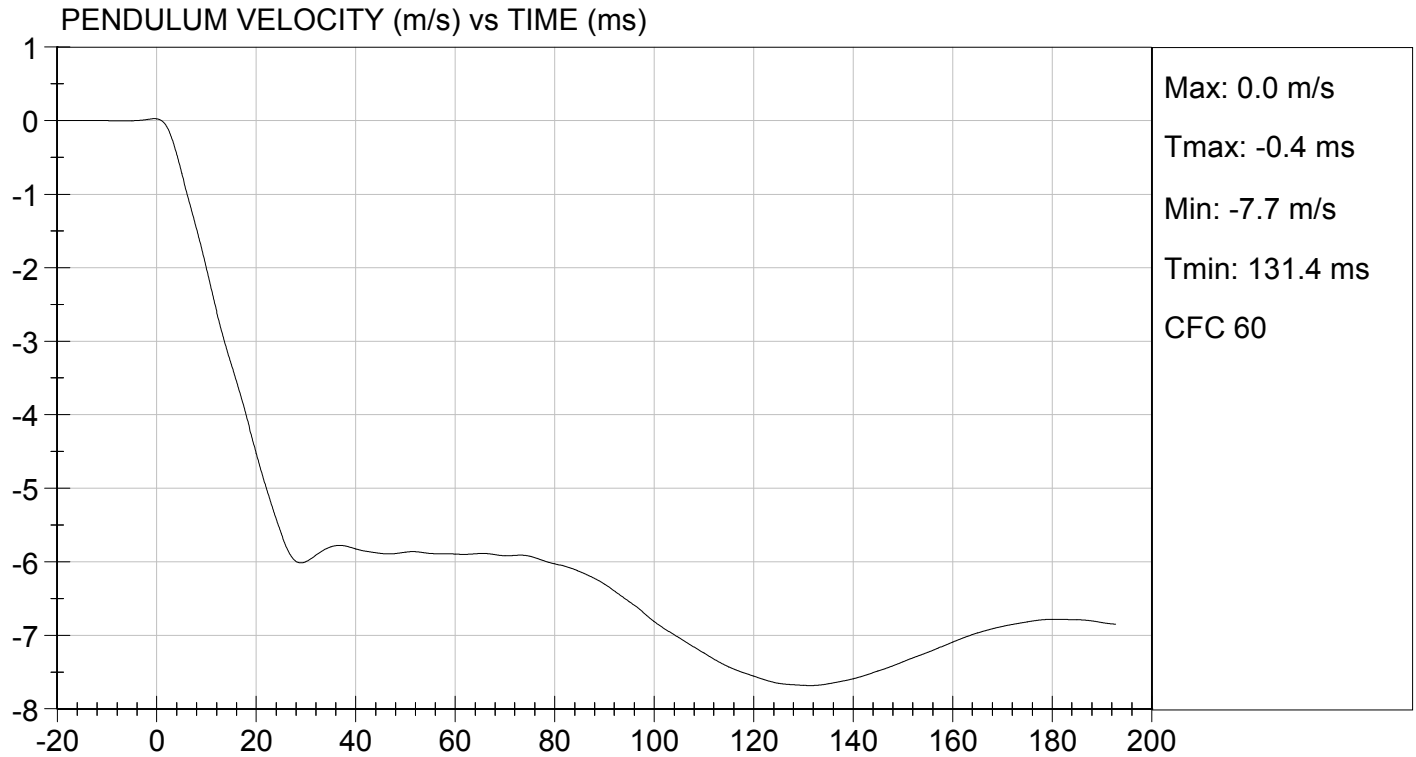
Test I.D: D143298

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	45	Pass
Pendulum Speed		m/s	5.95 to 6.15	6.14	Pass
Pendulum Velocity	1 ms	m/s	-0.05 to 0.00	-0.00	Pass
	3.7 ms	m/s	-0.425 to -0.24	-0.389	Pass
	27 ms	m/s	-6.50 to -5.80	-5.92	Pass
	30 ms	m/s	>= -6.50	-5.99	Pass
Maximum Flexion Angle		deg	45.0 to 55.0	46.3	Pass
Time of Maximum Flexion Angle		ms	39.0 to 53.0	44.6	Pass
Headform Rotation Decay to Initial Position		ms	37 to 57	44	Pass
Overall Results					Pass

Maxime Chamberland
Laboratory Technician

09/23/2014
Test Date

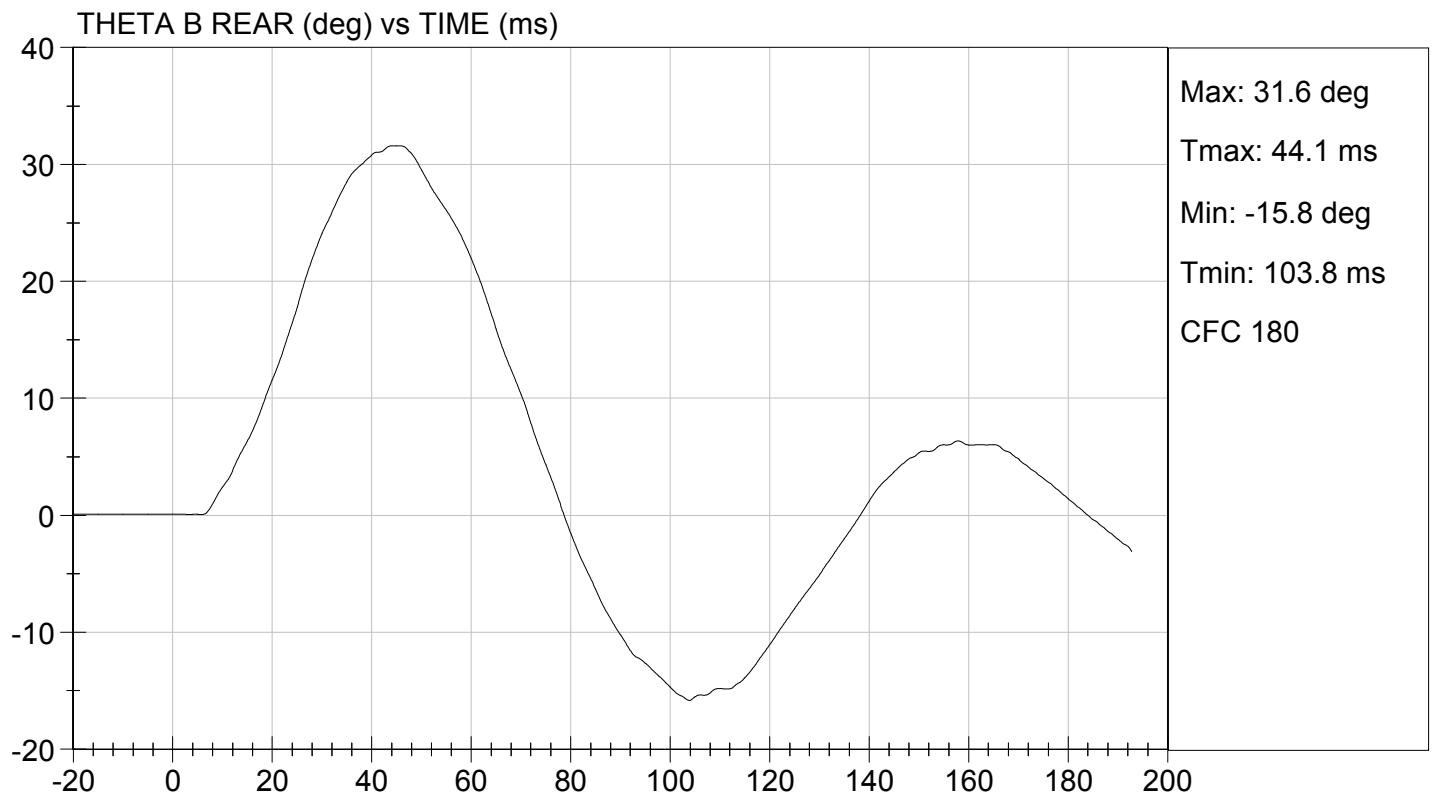
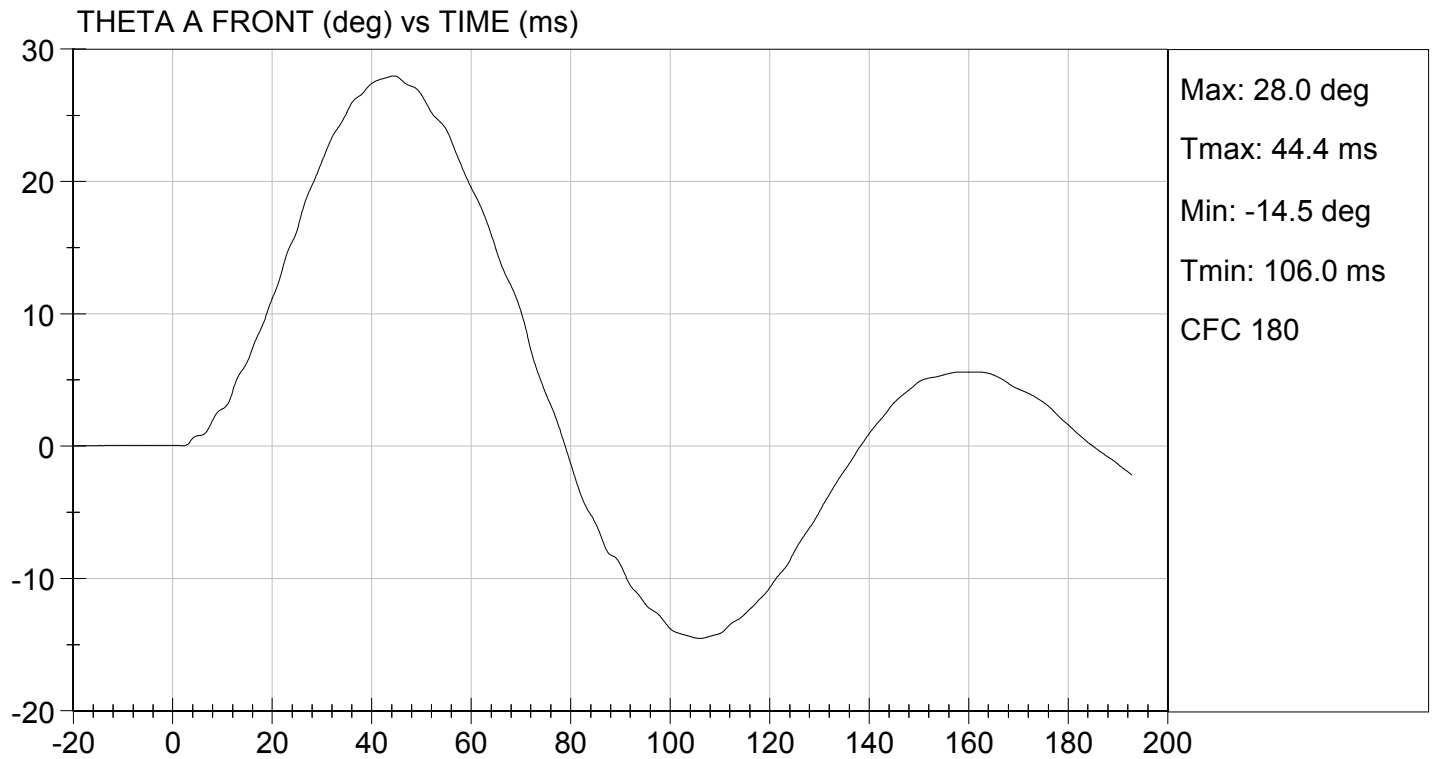
Jessica Hall
Approved By





TEST DESC: LUMBAR BENDING
VELOCITY: 20.15 ft/s, 6.14 m/s

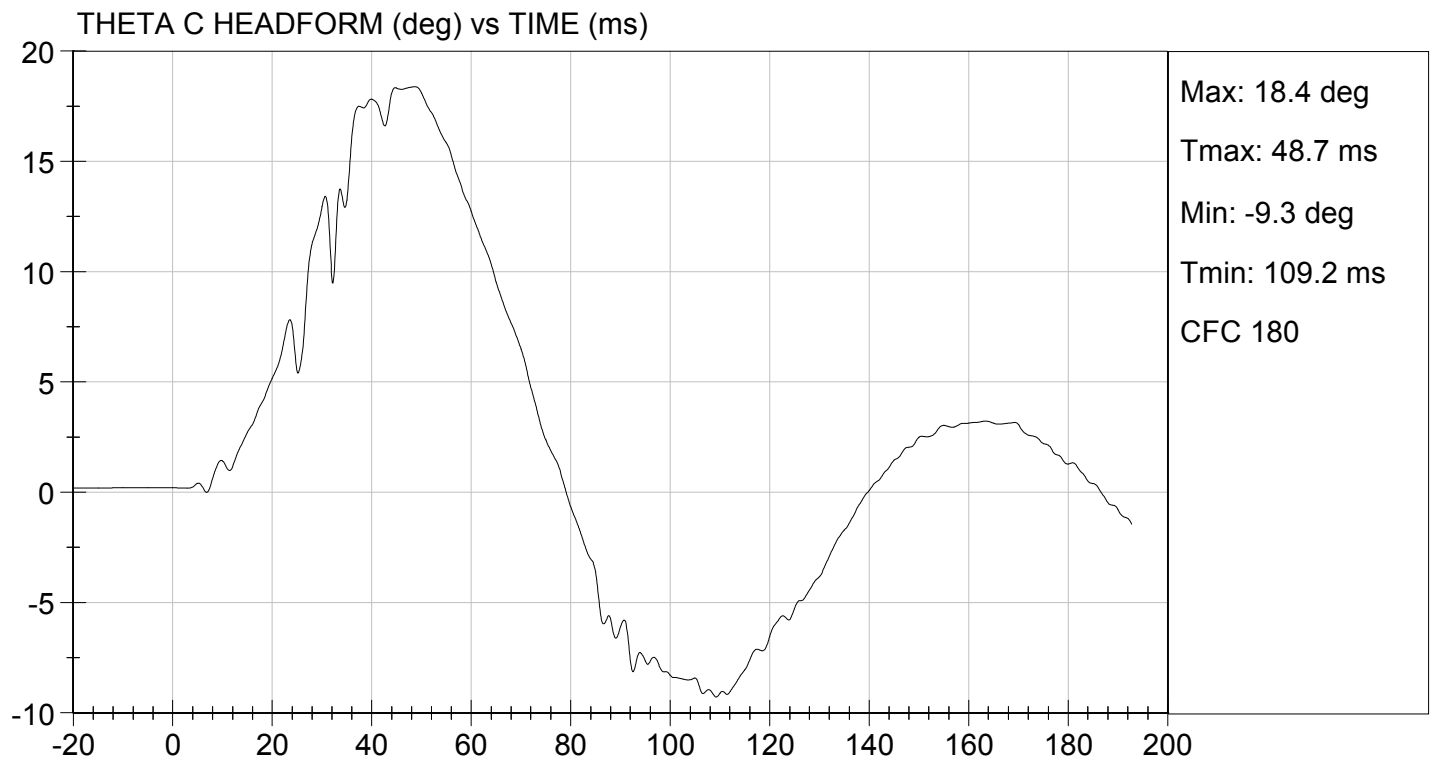
TEST DATE: 09/23/2014
TEST #: D143298





TEST DESC: LUMBAR BENDING
VELOCITY: 20.15 ft/s, 6.14 m/s

TEST DATE: 09/23/2014
TEST #: D143298



MGA RESEARCH CORPORATION

**PELVIS TEST
ES-2re DUMMY**

ATD Serial No: 032

Test I.D: D143299

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	44	Pass
Probe Speed	m/s	4.20 to 4.40	4.27	Pass
Maximum Impactor Force	N	4700 to 5400	4707	Pass
Time of Maximum Impactor Force	ms	11.8 to 16.1	14.6	Pass
Maximum Pubic Force	N	1230 to 1590	1279	Pass
Time of Maximum Pubic Force	ms	12.2 to 17.0	14.8	Pass
Overall Test Results				Pass

Maxime Chamberland
Laboratory Technician

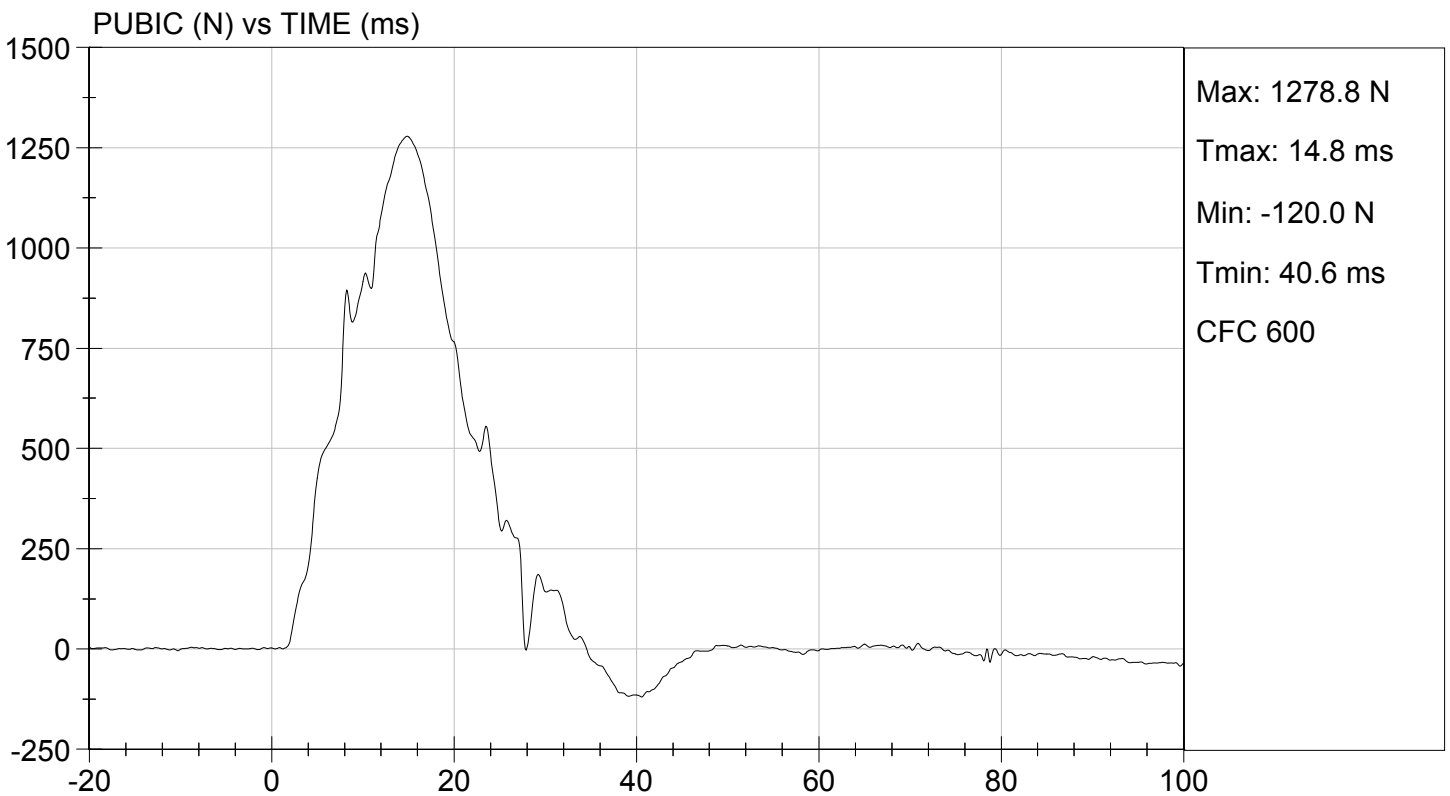
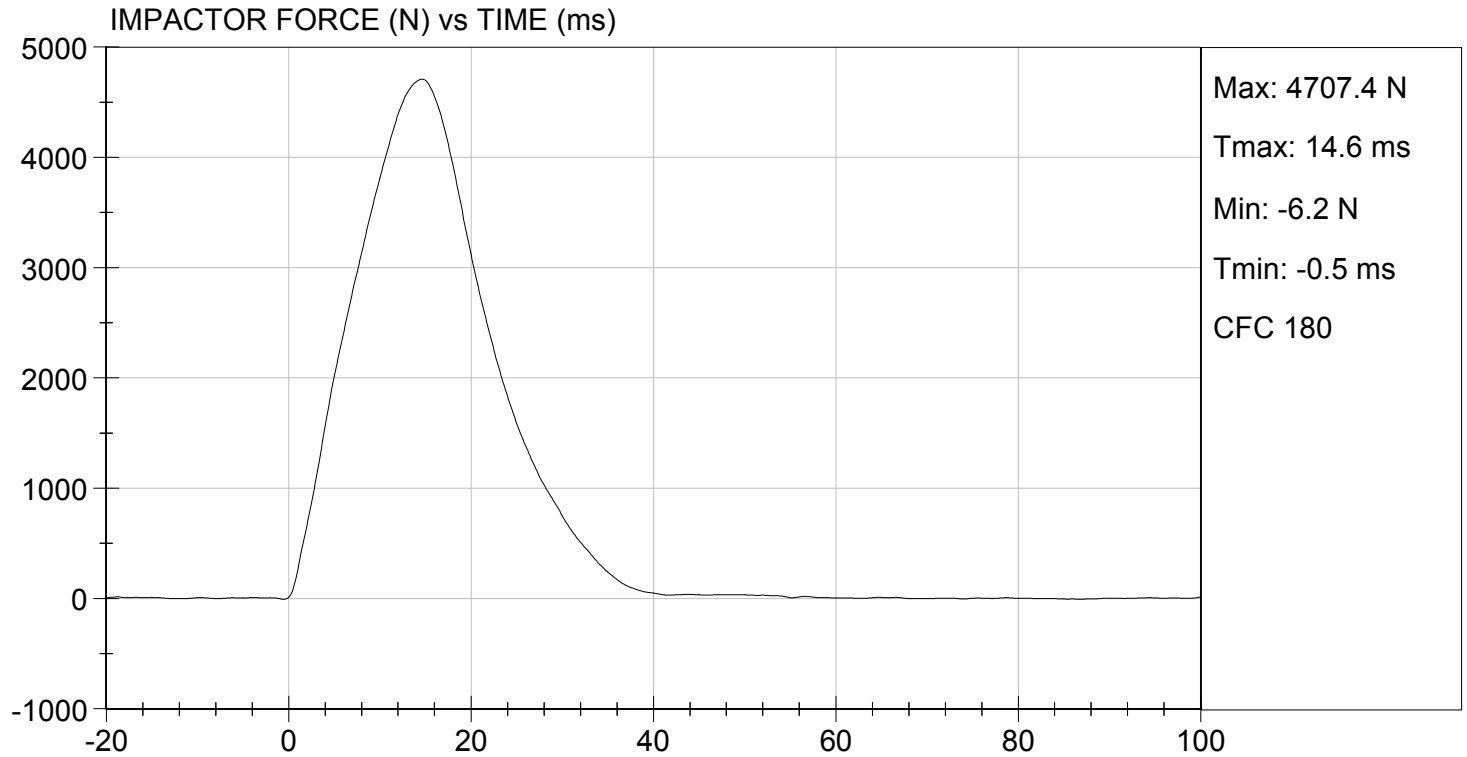
09/23/2014
Test Date

Jessica Hall
Approved By



TEST DESC: PELVIS IMPACT
VELOCITY: 14.00 ft/s, 4.27 m/s

TEST DATE: 09/23/2014
TEST #: D143299



SID-IIsD External Measurements
SN: 296

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

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

ATD Serial No: 296

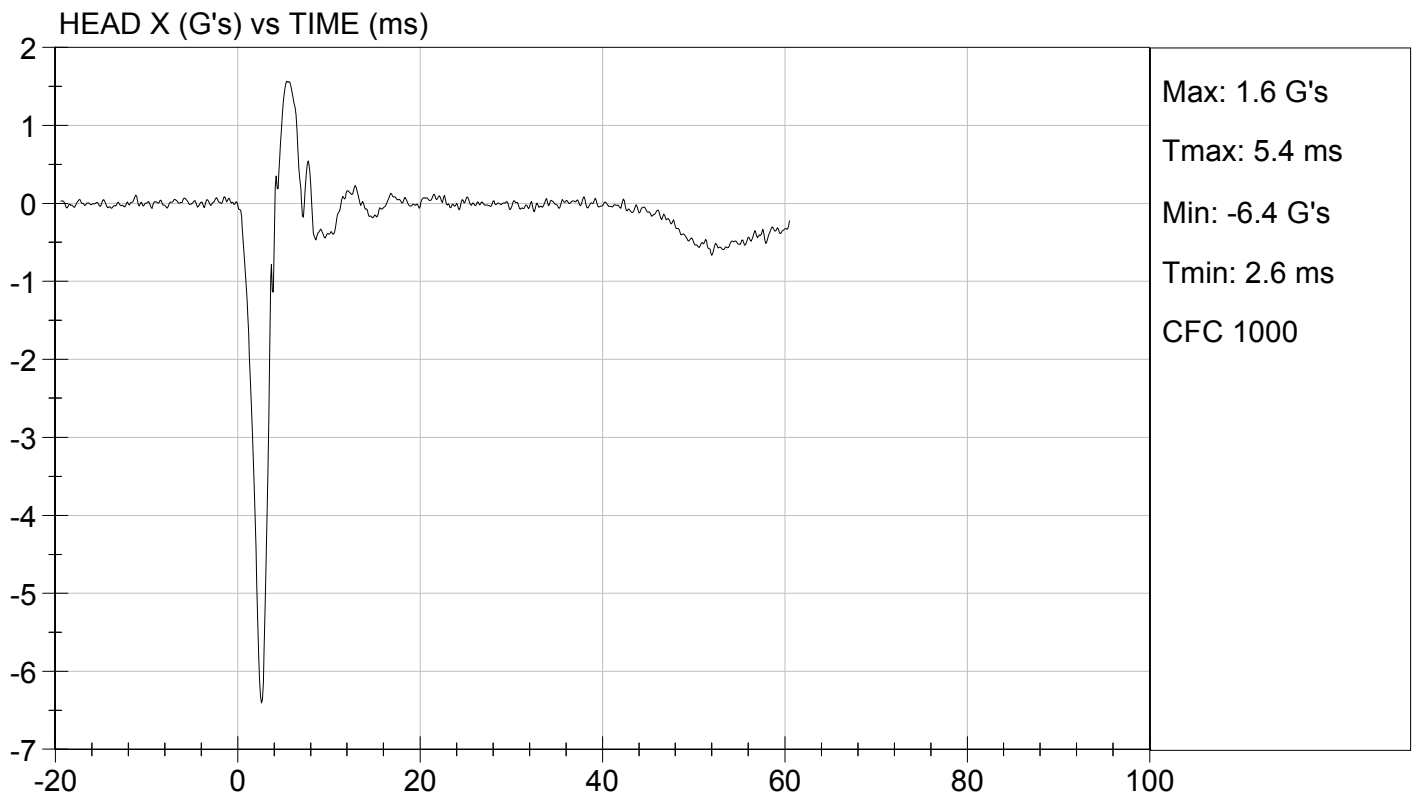
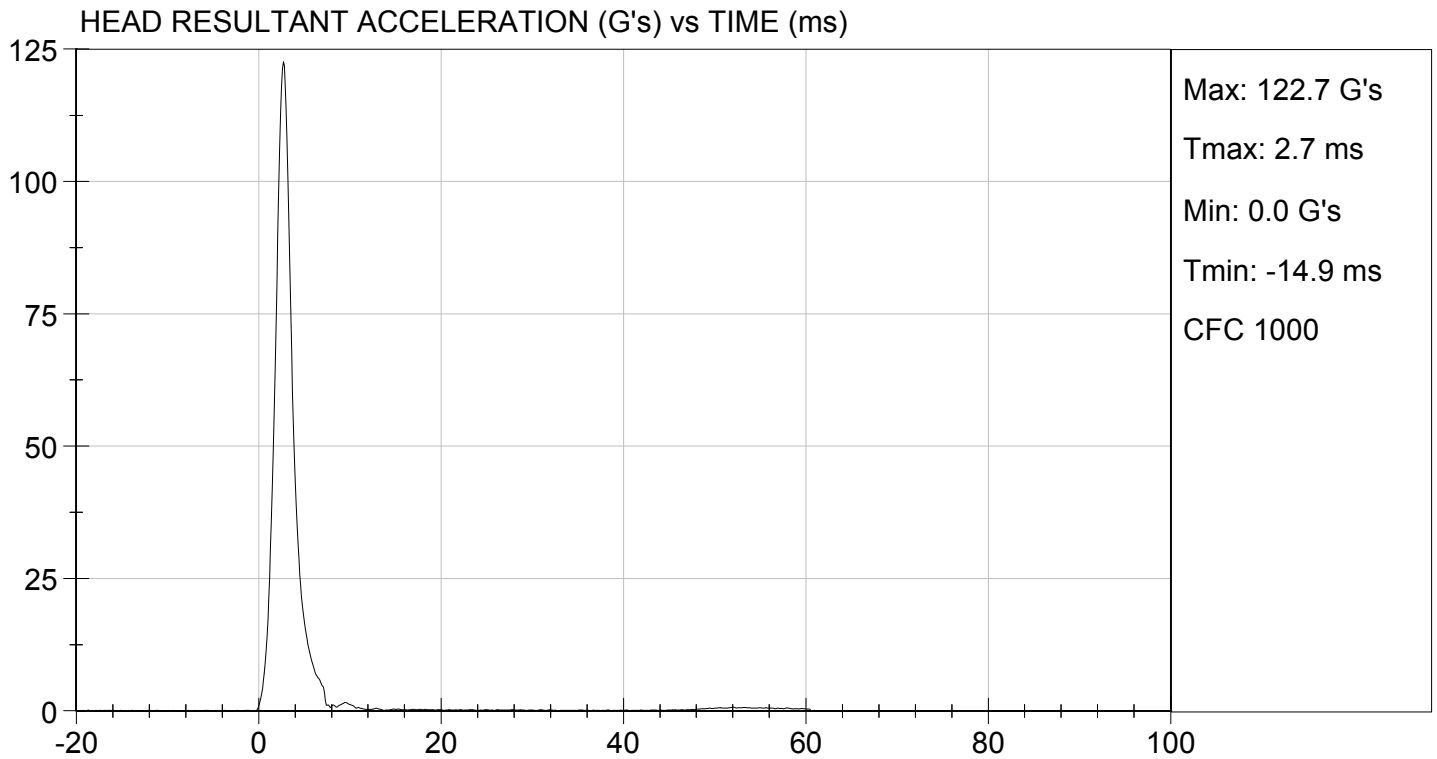
Test ID: D143091

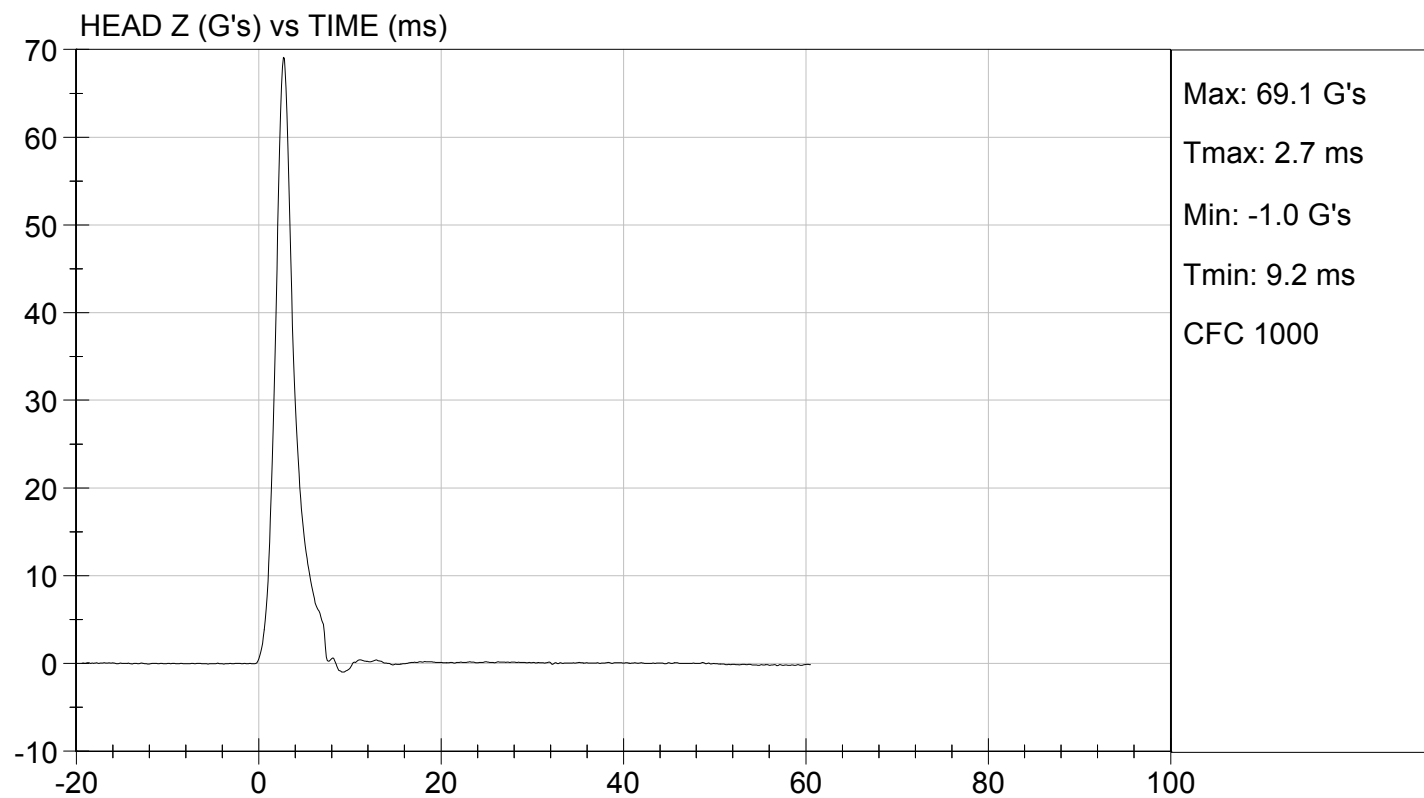
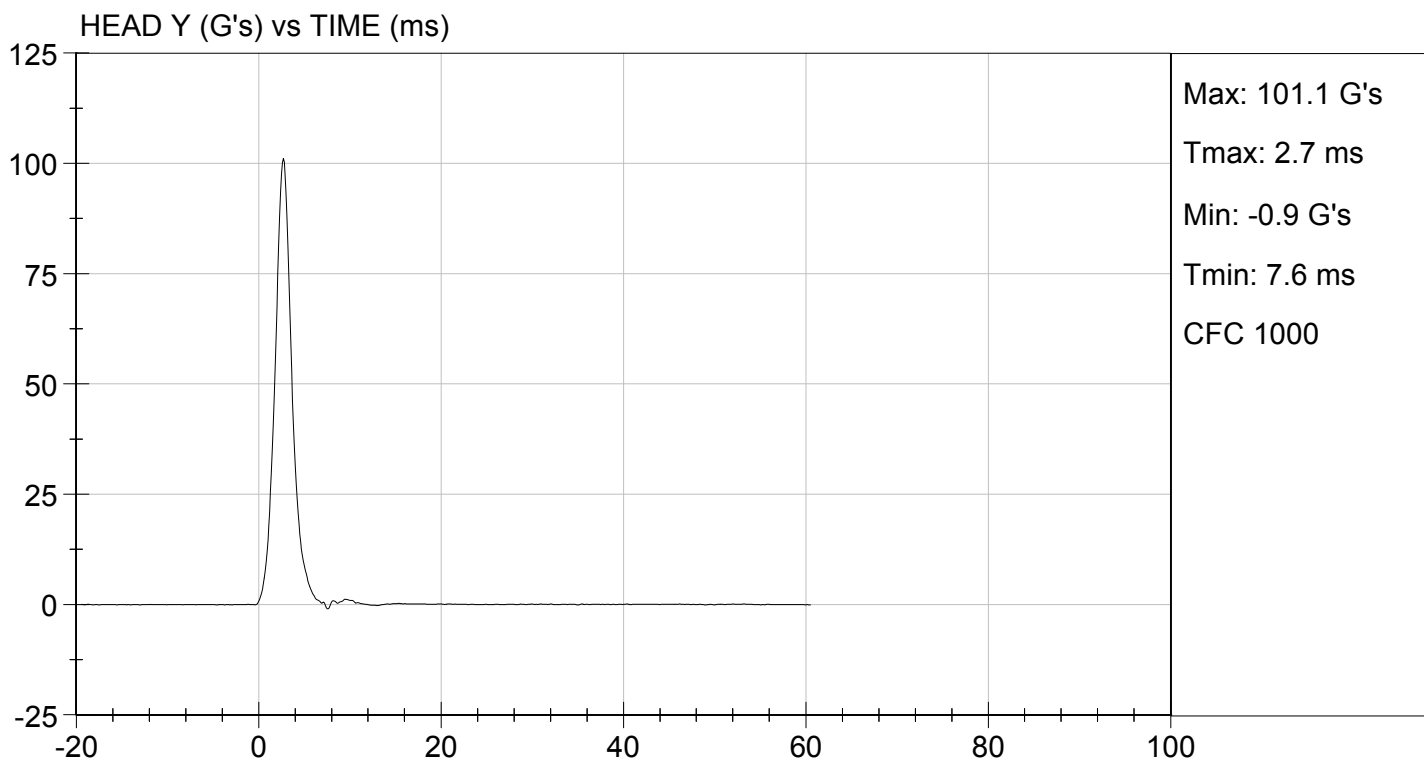
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	52	Pass
Peak Resultant Acceleration	G's	115 to 137	123	Pass
Peak Longitudinal Acceleration	G's	+/- 15	-6.4	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	<15%	Yes	Pass
Overall Test Results			Pass	

David Schoedel
Laboratory Technician

09/09/2014
Test Date

Jessica Hall
Approved By





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

ATD Serial No: 296

Test I.D: D143092

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21.3	Pass
Humidity		%	10 to 70	47	Pass
Impact Velocity		m/s	5.51 to 5.63	5.63	Pass
Pendulum Velocity	10 ms	m/s	2.20 to 2.80	2.45	Pass
	15 ms	m/s	3.30 to 4.10	3.49	Pass
	20 ms	m/s	4.40 to 5.40	4.67	Pass
	25 ms	m/s	5.40 to 6.10	5.49	Pass
	25-100 ms	m/s	5.50 to 6.20	5.53	Pass
Maximum D-Plane Rotation		deg	71 to 81	80	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	61	Pass
Maximum Occipital Condyle Moment		Nm	-44 to -36	-39	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	114	Pass
Overall Test Results					Pass

David Schoedel
Laboratory Technician

09/09/2014

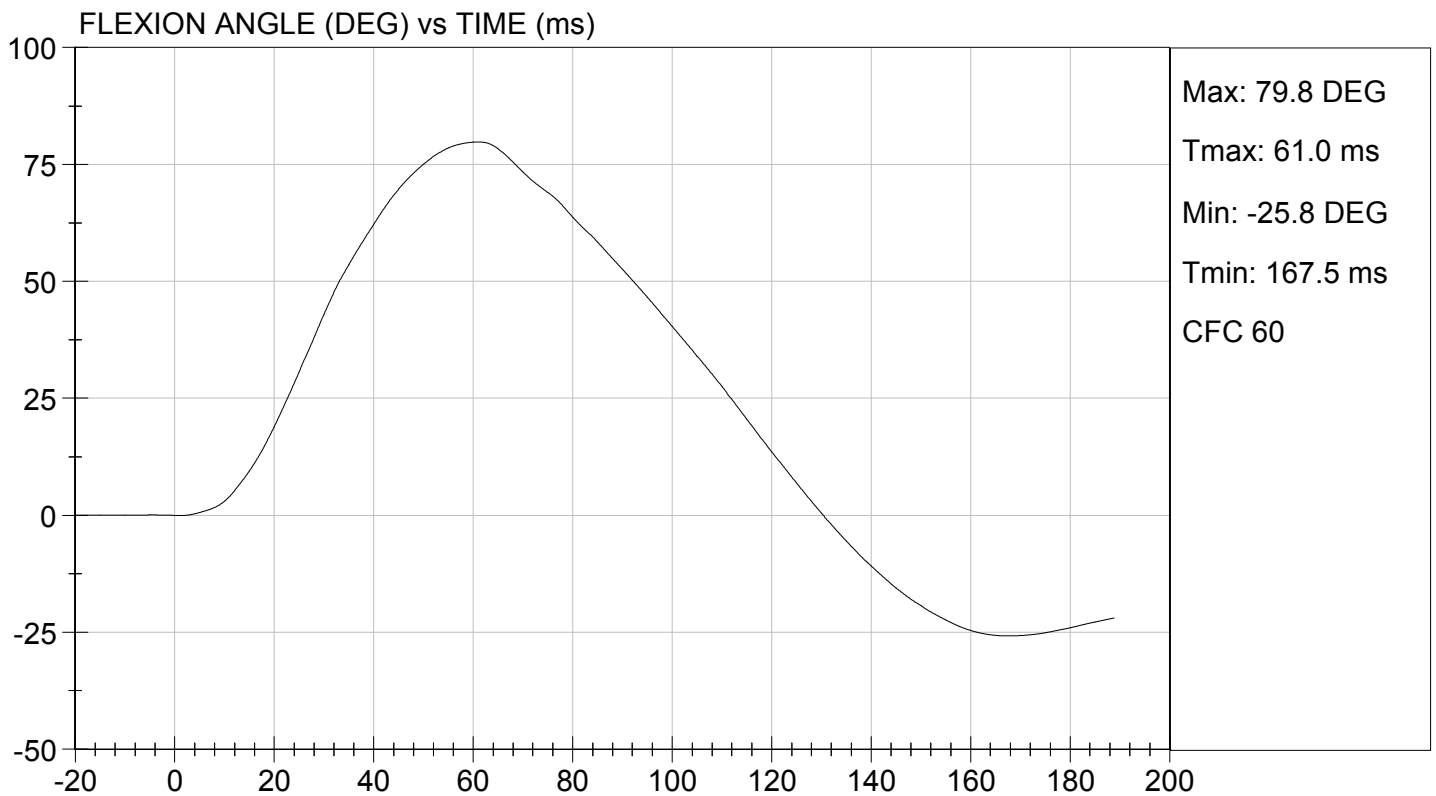
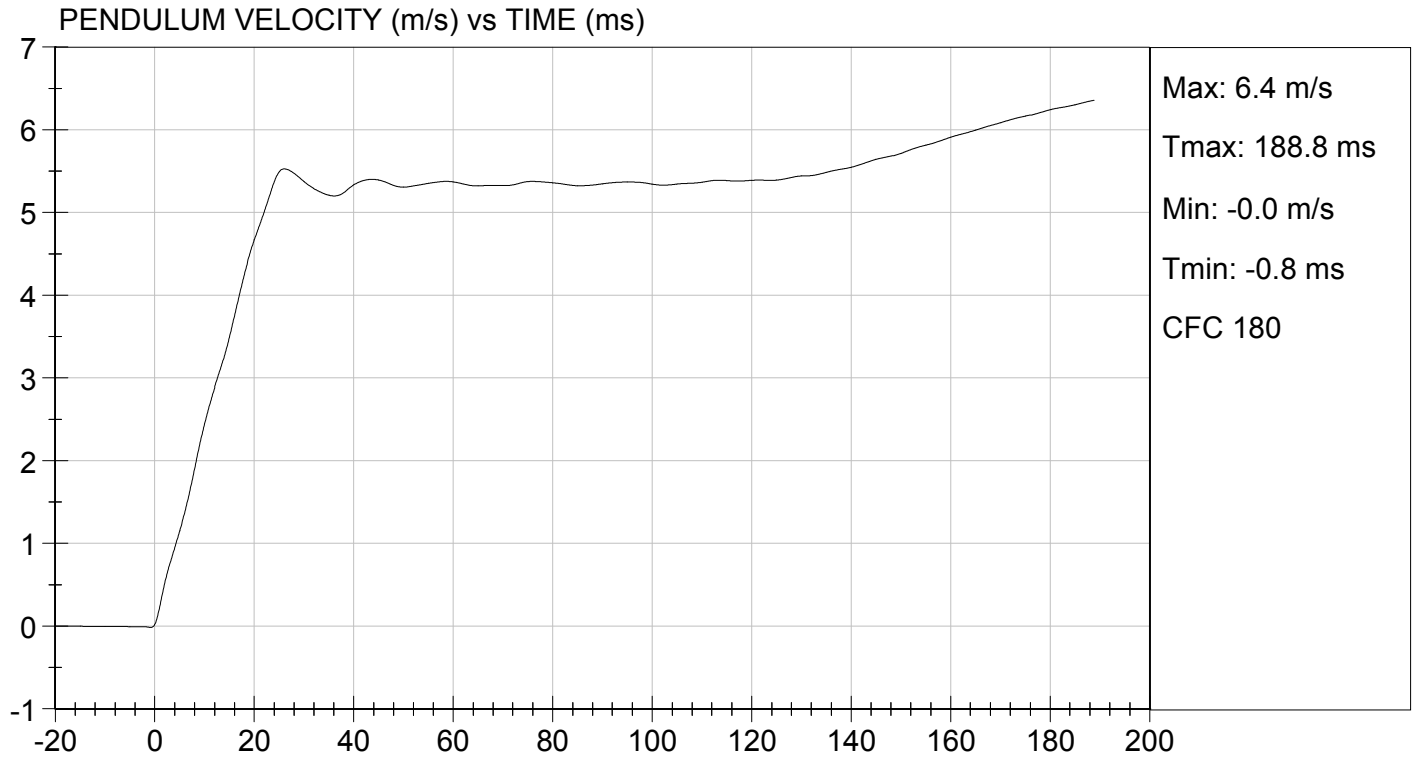
Test Date

Jessica Hall
Approved By



TEST DESC: NECK BENDING
VELOCITY: 18.47 ft/s, 5.63 m/s

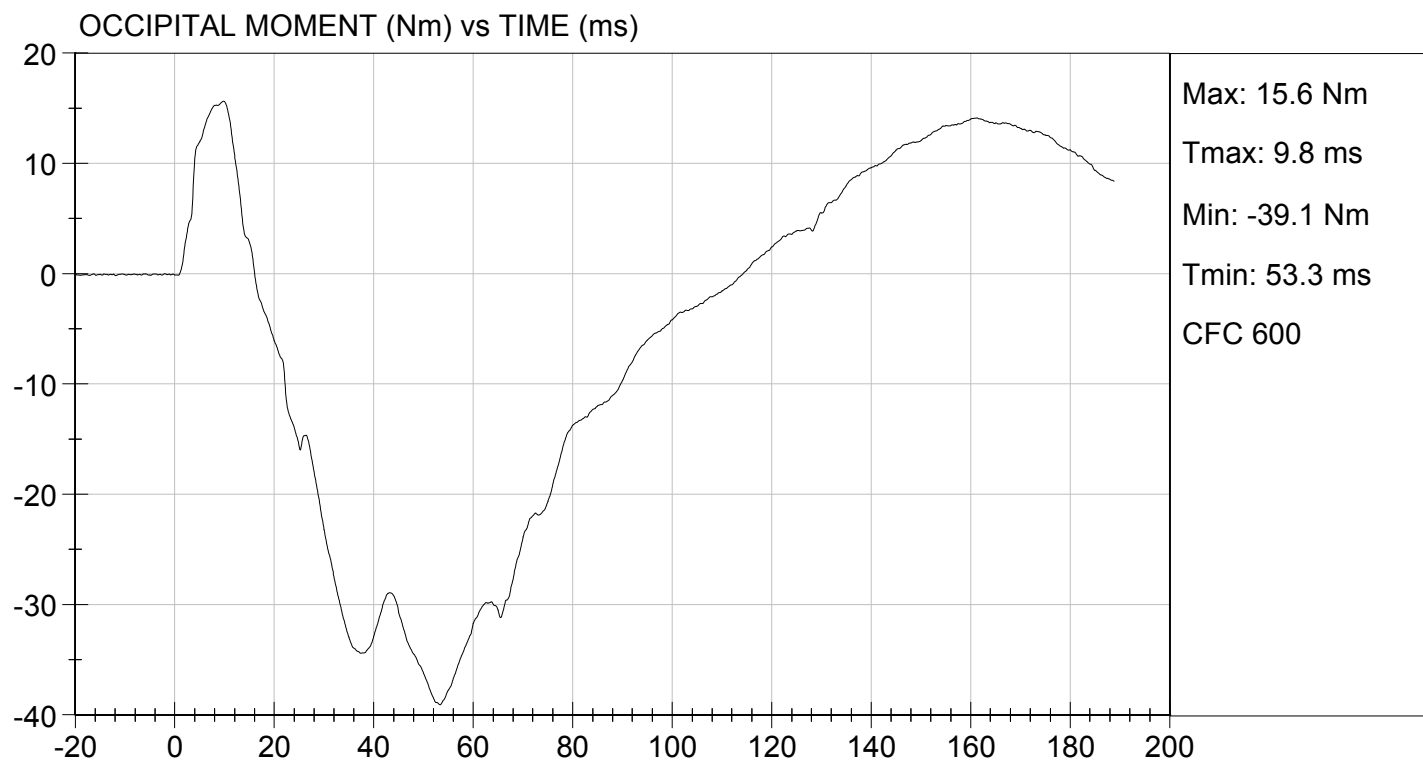
TEST DATE: 09/09/2014
TEST #: D143092





TEST DESC: NECK BENDING
VELOCITY: 18.47 ft/s, 5.63 m/s

TEST DATE: 09/09/2014
TEST #: D143092



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

ATD Serial No: 296

Test ID: D143093

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	53	Pass
Impact Velocity	m/s	4.20 to 4.40	4.20	Pass
Maximum Probe Acceleration	G's	13 to 18	14	Pass
Shoulder Displacement	mm	28 to 37	33	Pass
Upper Spine (T1) Y Acceleration	G's	17 to 22	17	Pass
Overall Test Results			Pass	

David Schoedel
Laboratory Technician

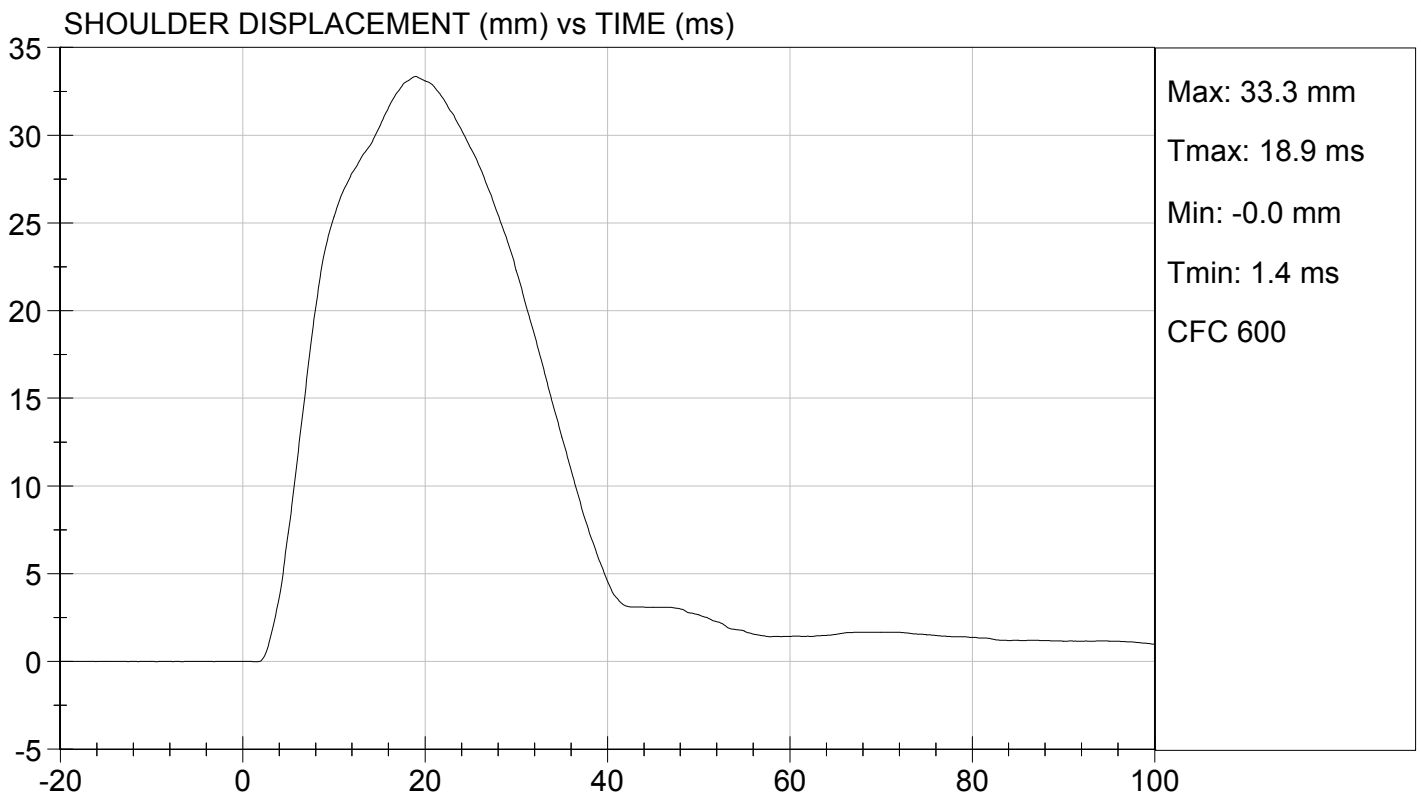
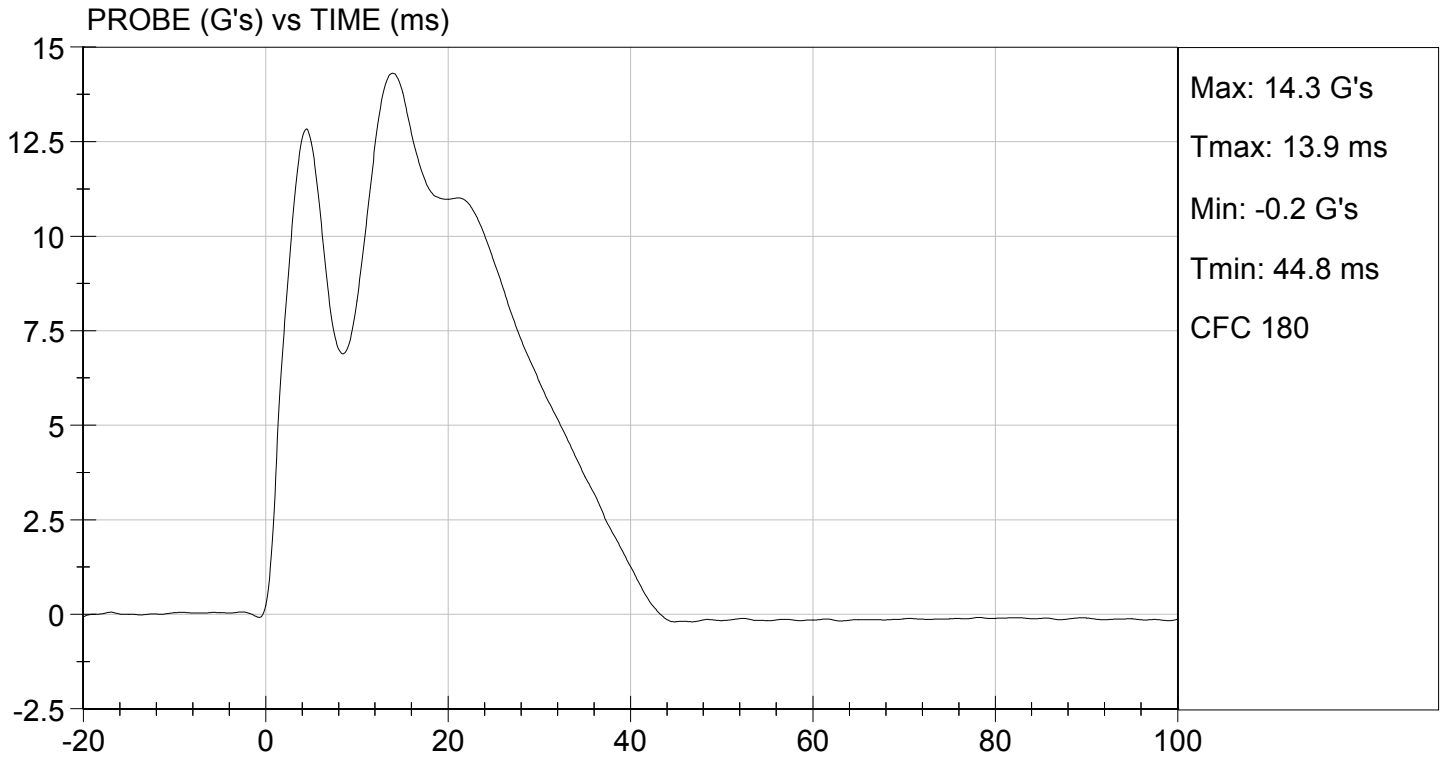
09/09/2014
Test Date

Jessica Hall
Approved By



TEST DESC: SHOULDER IMPACT
VELOCITY: 13.78 ft/s, 4.20 m/s

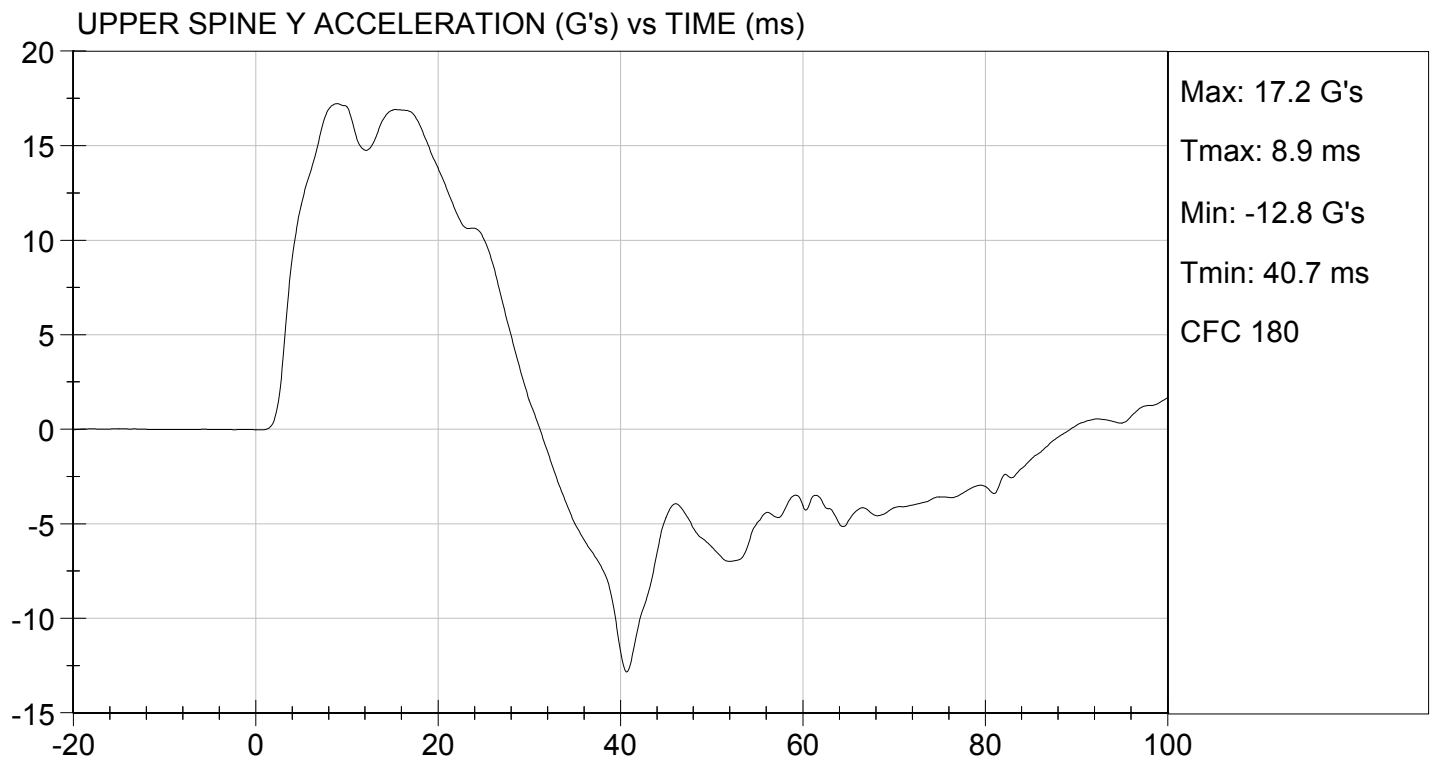
TEST DATE: 09/09/2014
TEST #: D143093





TEST DESC: SHOULDER IMPACT
VELOCITY: 13.78 ft/s, 4.20 m/s

TEST DATE: 09/09/2014
TEST #: D143093



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

ATD Serial No: 296

Test I.D: D143094

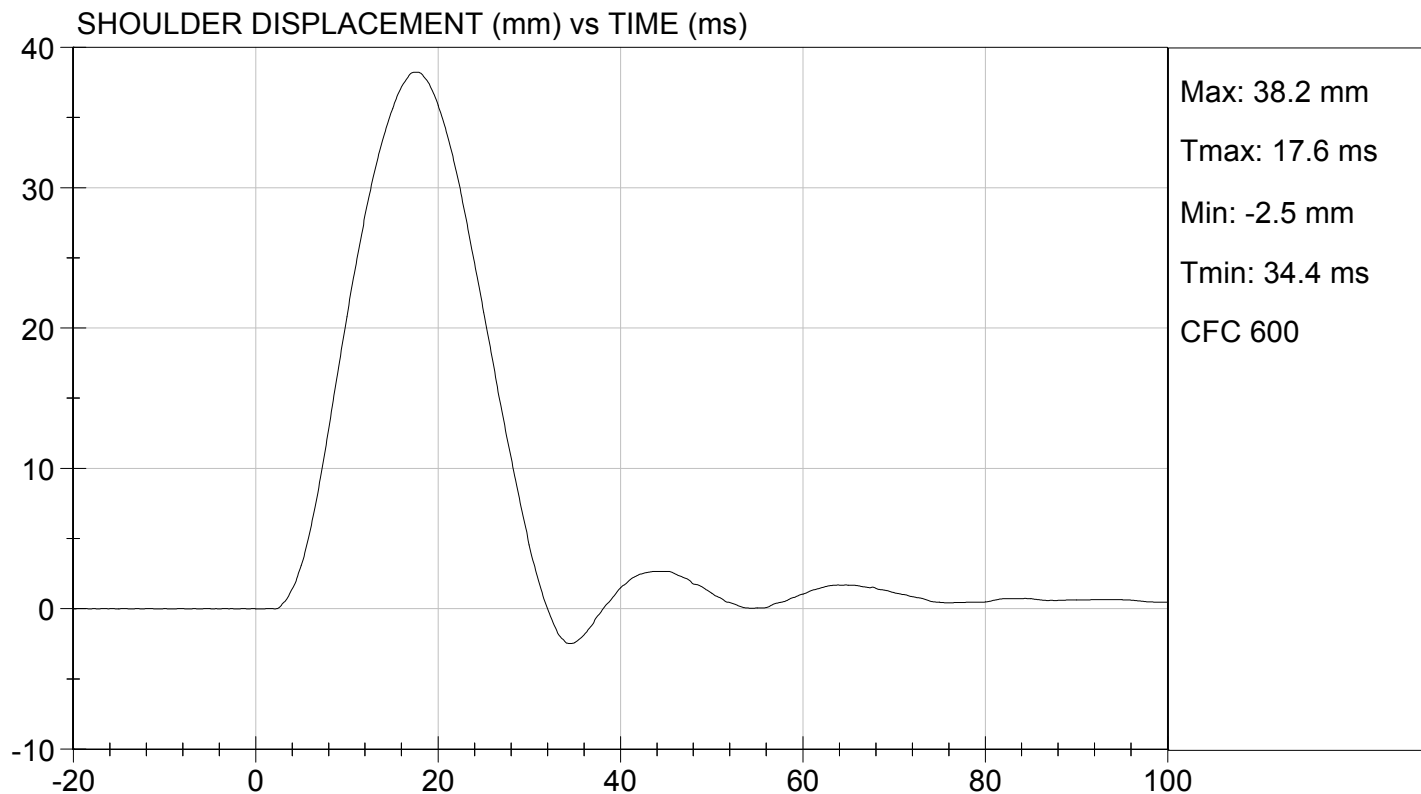
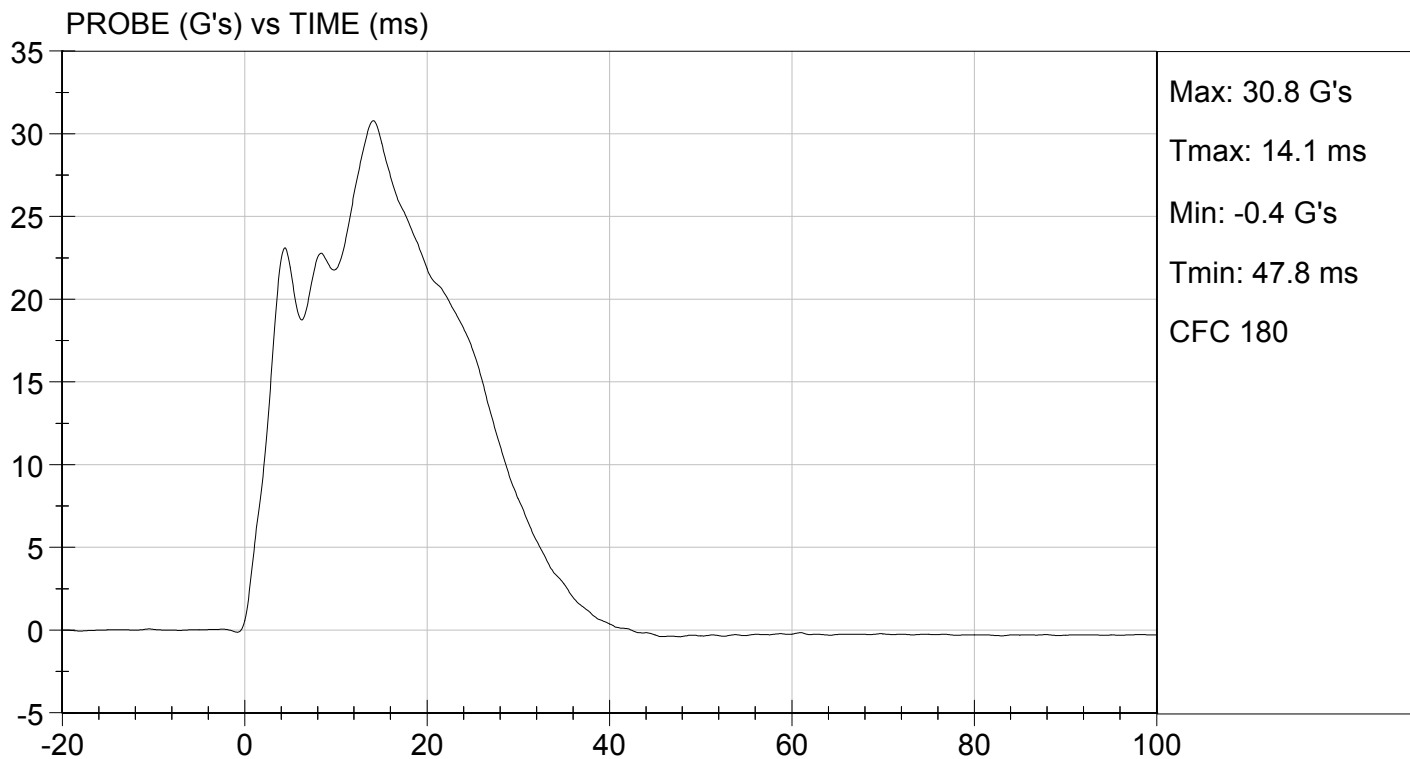
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	53	Pass
Impact Velocity	m/s	6.60 to 6.80	6.68	Pass
Maximum Probe Acceleration	G's	30 to 36	31	Pass
Shoulder Displacement	mm	31 to 40	38	Pass
Upper Rib Displacement	mm	25 to 32	29	Pass
Middle Rib Displacement	mm	30 to 36	33	Pass
Lower Rib Displacement	mm	32 to 38	35	Pass
Upper Spine (T1) Y Acceleration	G's	34 to 43	36	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	29	Pass
Overall Test Results				Pass

David Schoedel
Laboratory Technician

09/09/2014

Test Date

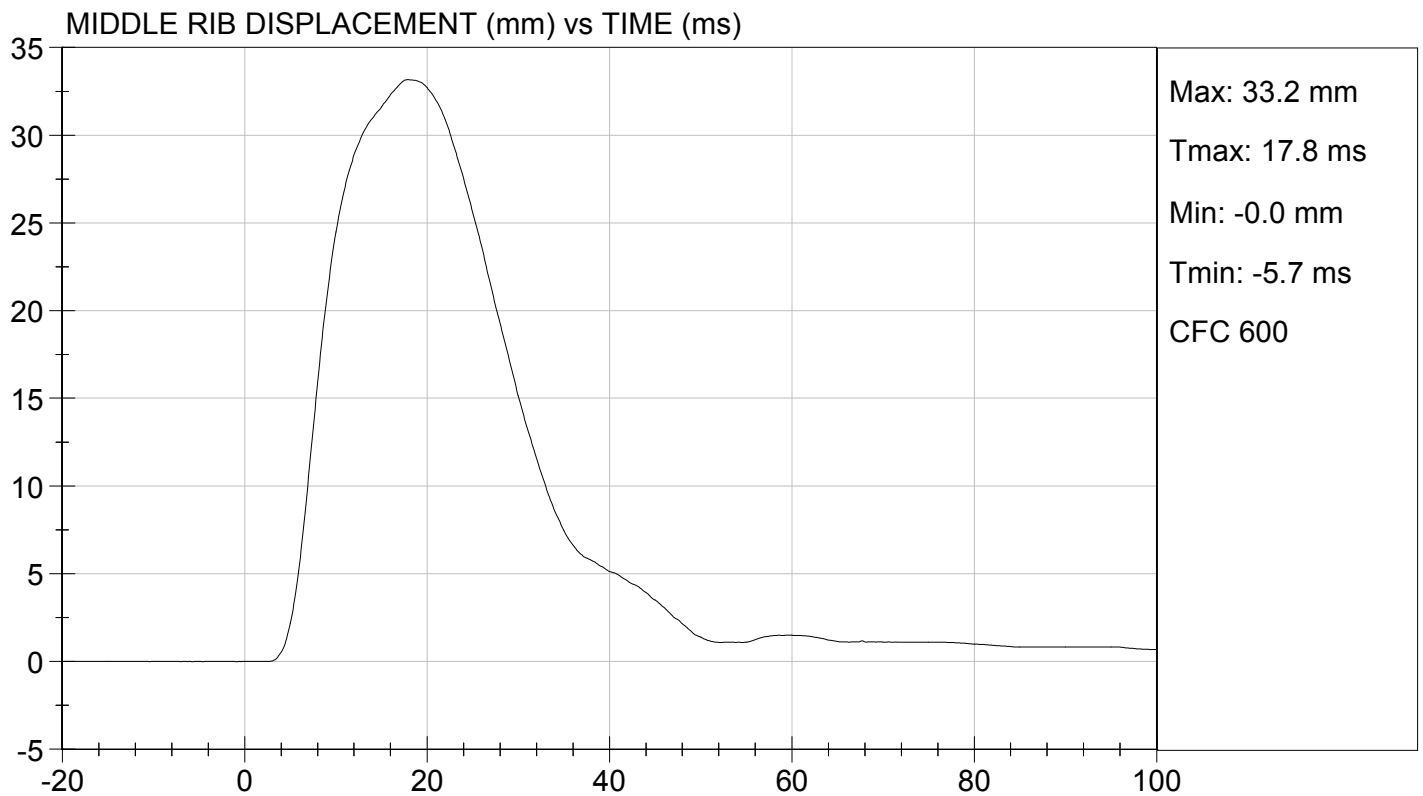
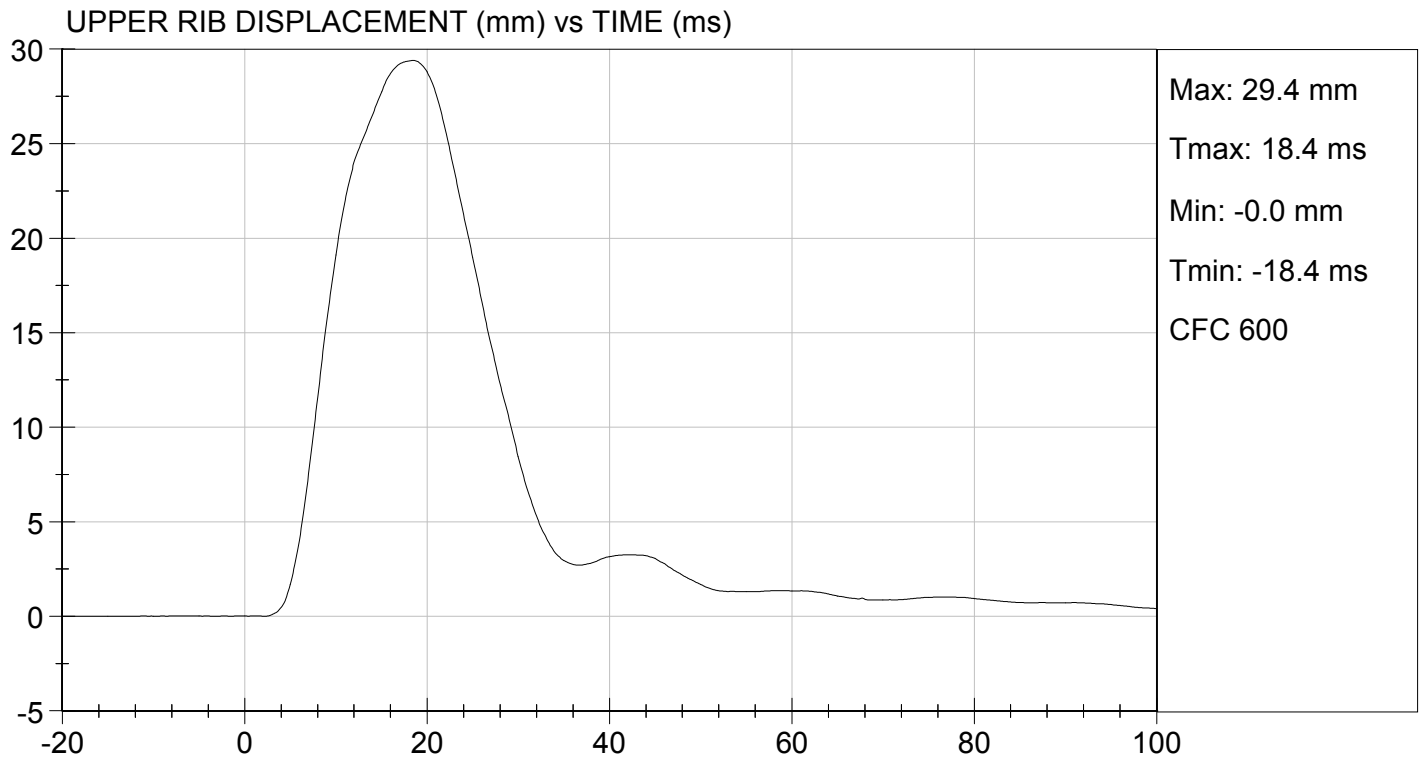
Jessica Hall
Approved By





TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 21.93 ft/s, 6.68 m/s

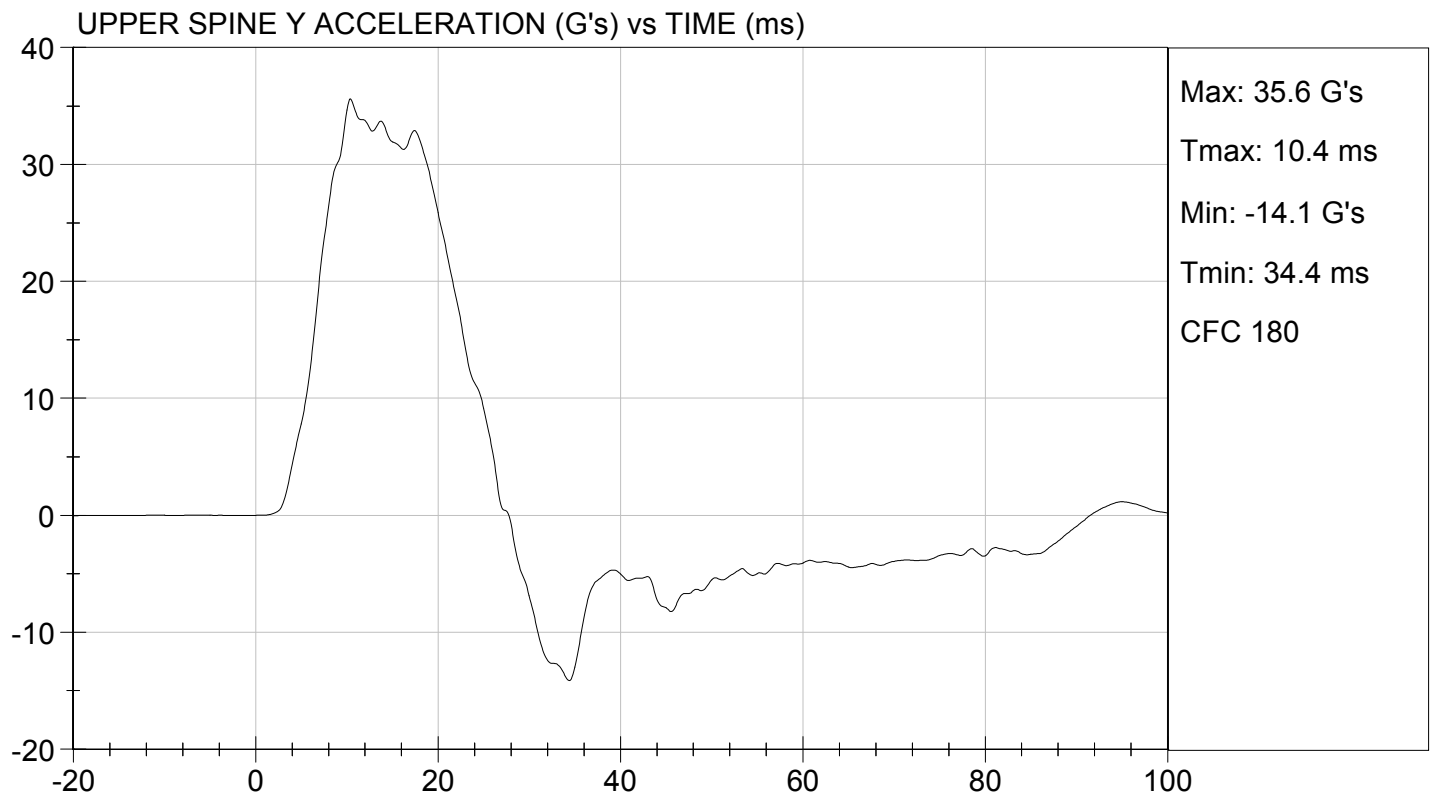
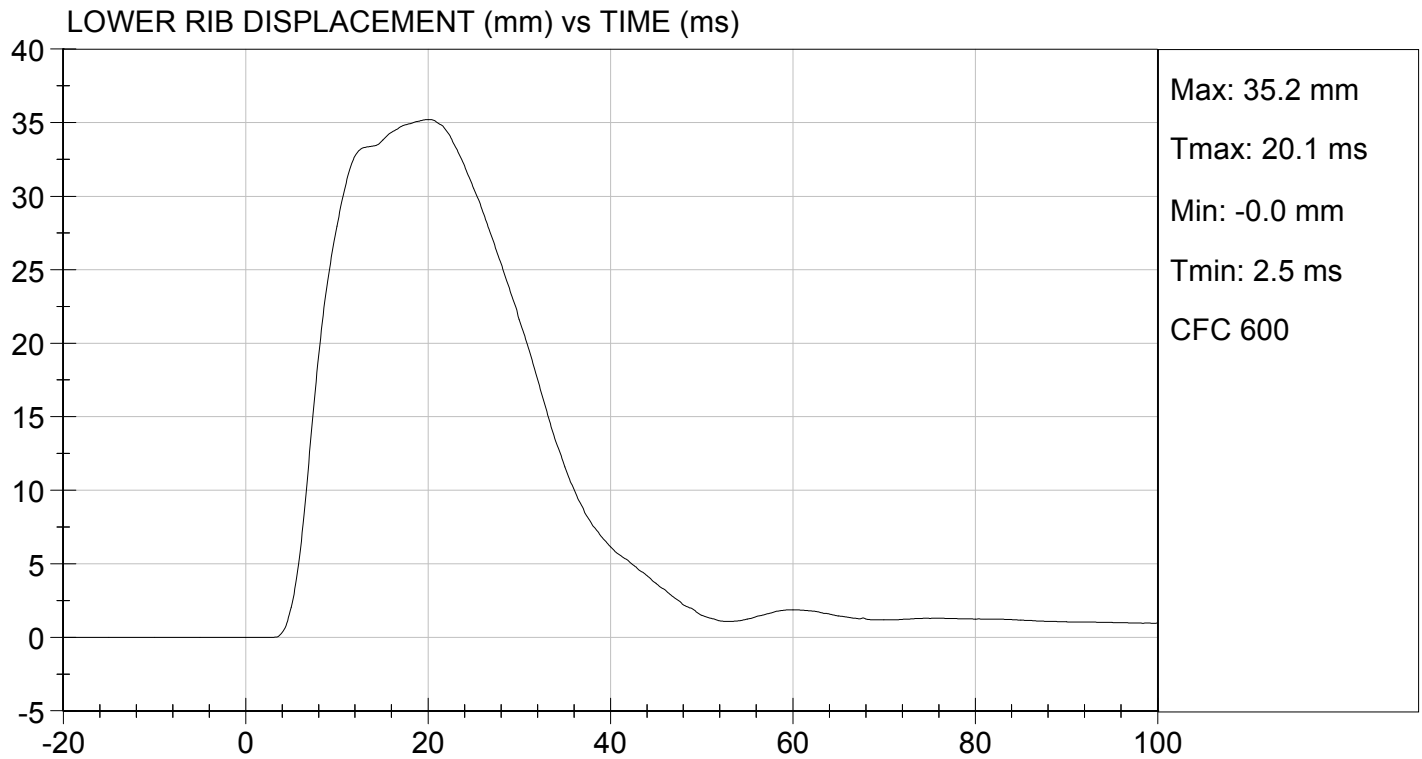
TEST DATE: 09/09/2014
TEST #: D143094





TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 21.93 ft/s, 6.68 m/s

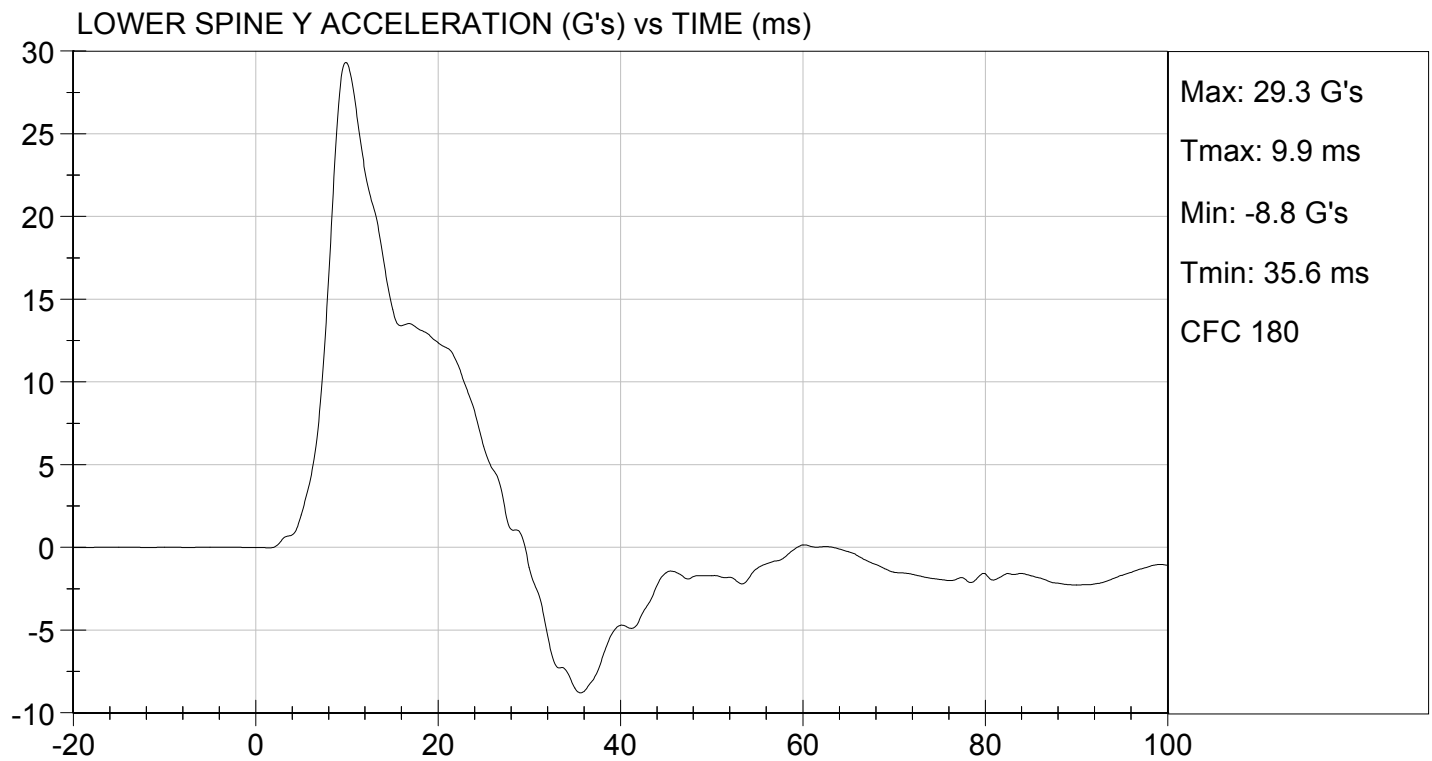
TEST DATE: 09/09/2014
TEST #: D143094





TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 21.93 ft/s, 6.68 m/s

TEST DATE: 09/09/2014
TEST #: D143094



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

ATD Serial No: 296

Test I.D: D143095

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	53	Pass
Impact Velocity	m/s	4.20 to 4.40	4.30	Pass
Maximum Probe Acceleration	G's	14 to 18	15	Pass
Upper Rib Displacement	mm	32 to 40	40	Pass
Middle Rib Displacement	mm	39 to 45	43	Pass
Lower Rib Displacement	mm	35 to 43	38	Pass
Upper Spine (T1) Y Acceleration	G's	13 to 17	14	Pass
Lower Spine (T12) Y Acceleration	G's	7 to 11	8	Pass
Overall Test Results				Pass

David Schoedel
Laboratory Technician

09/09/2014

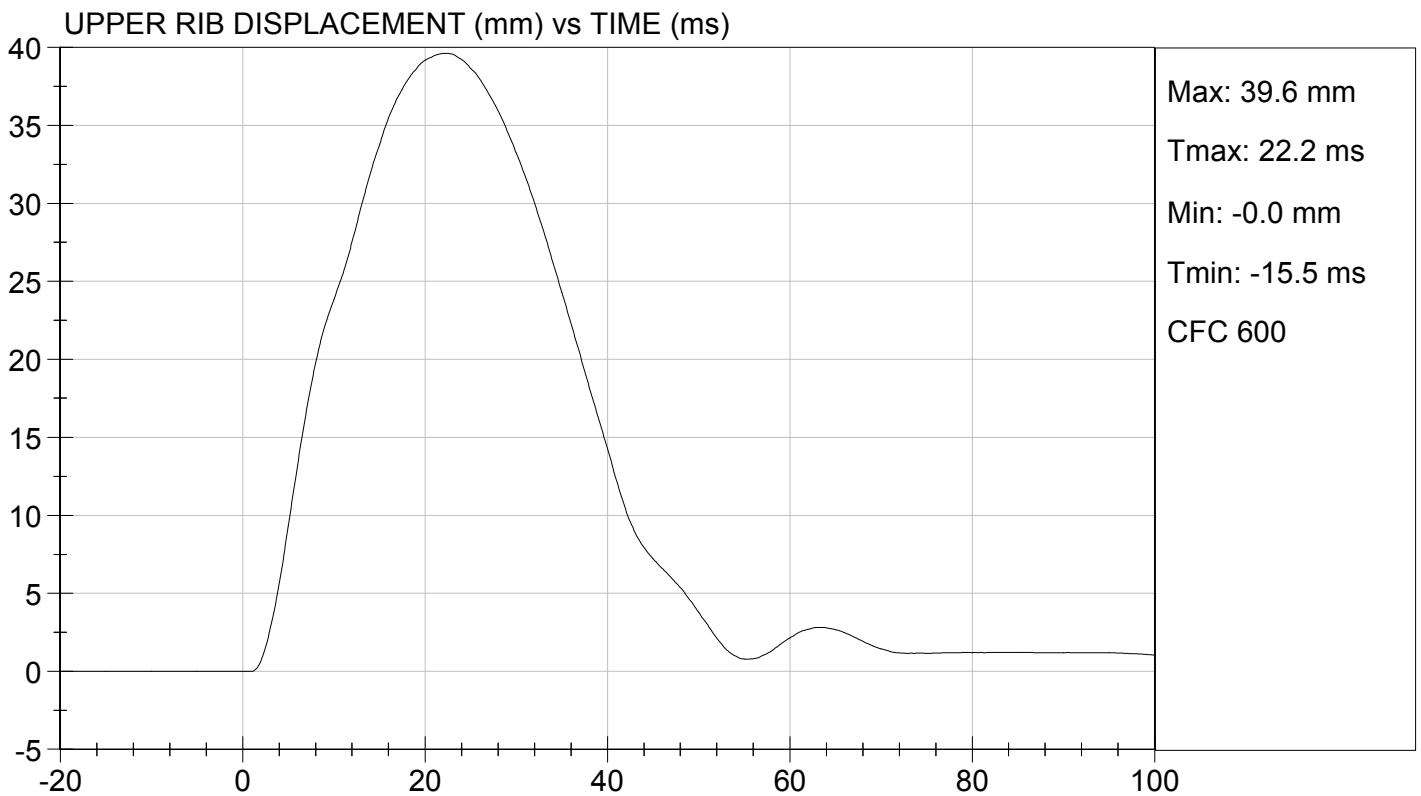
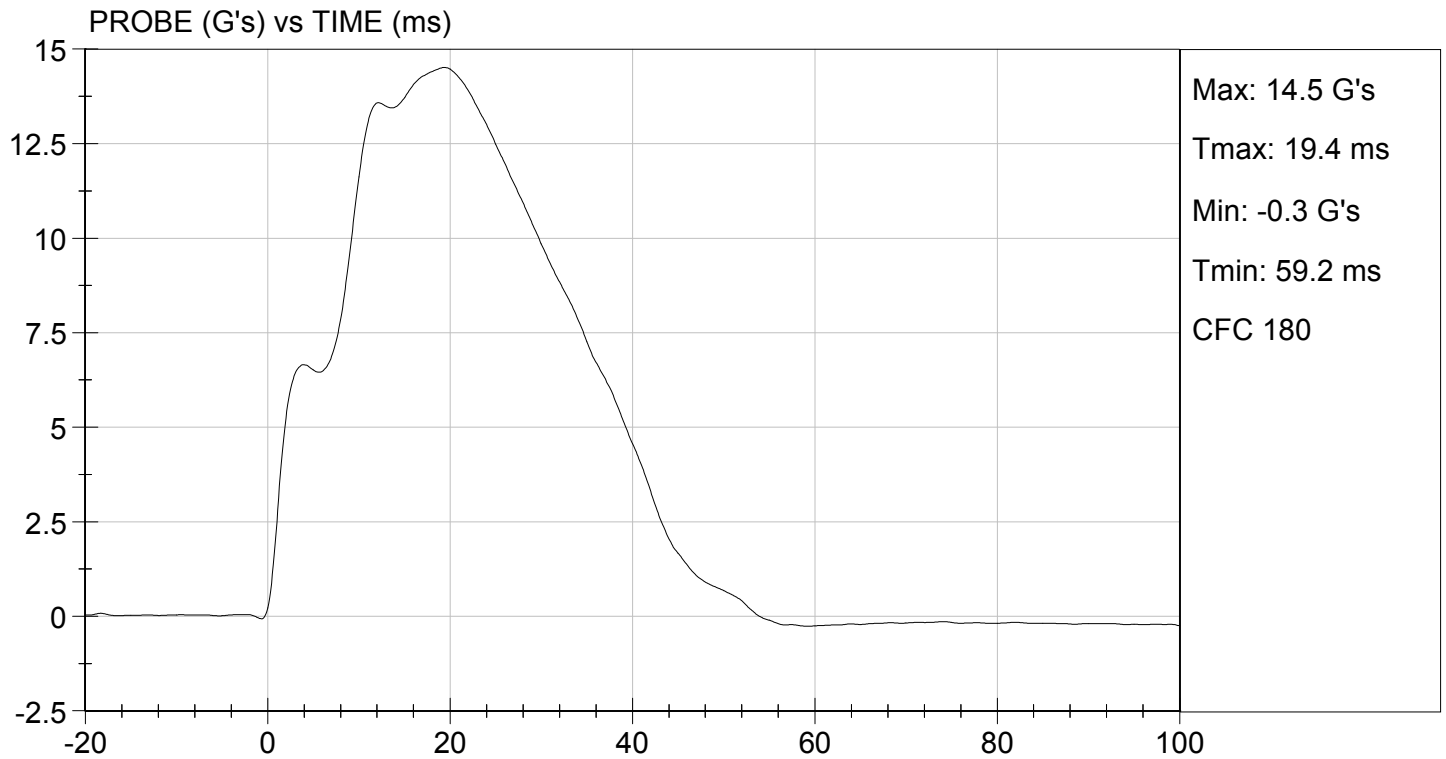
Test Date

Jessica Hall
Approved By



TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.12 ft/s, 4.30 m/s

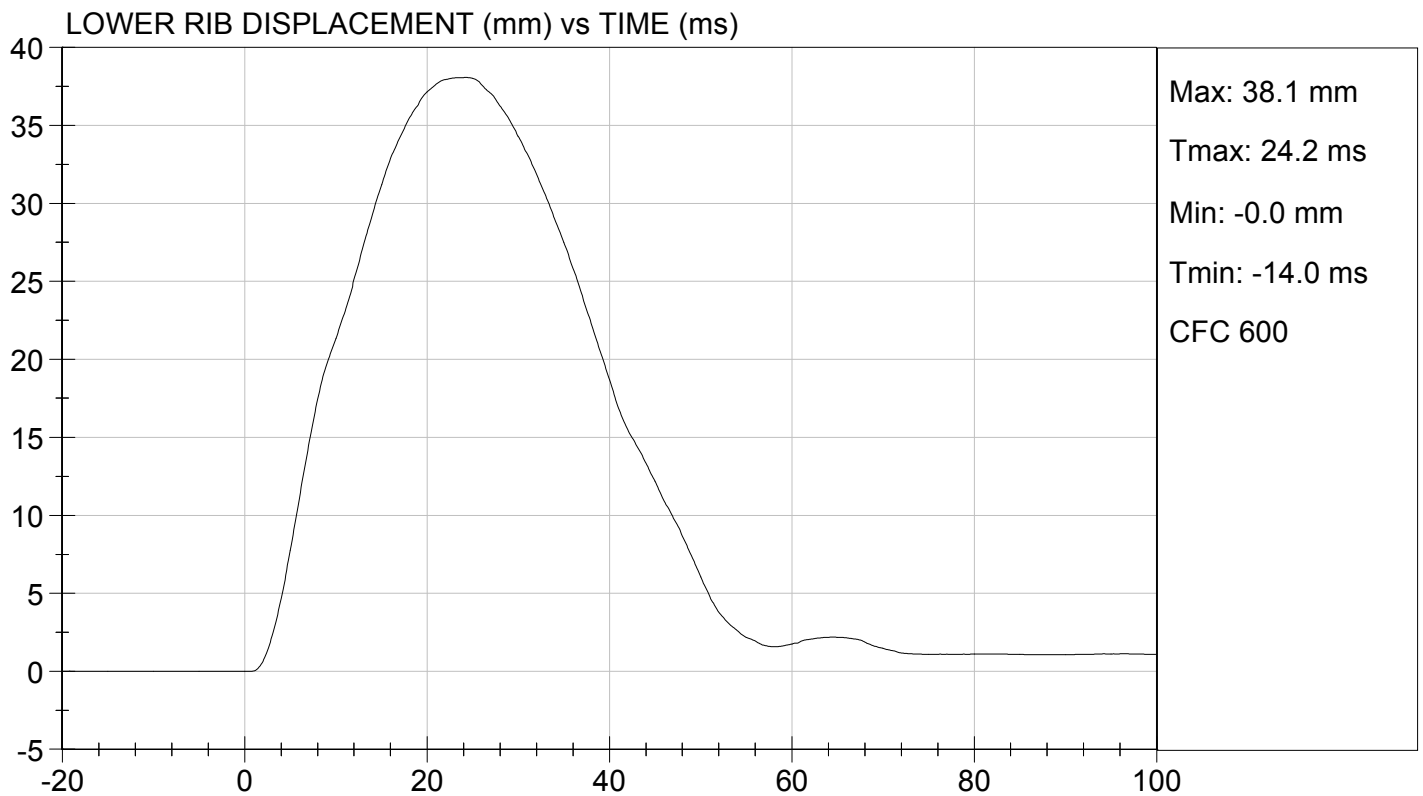
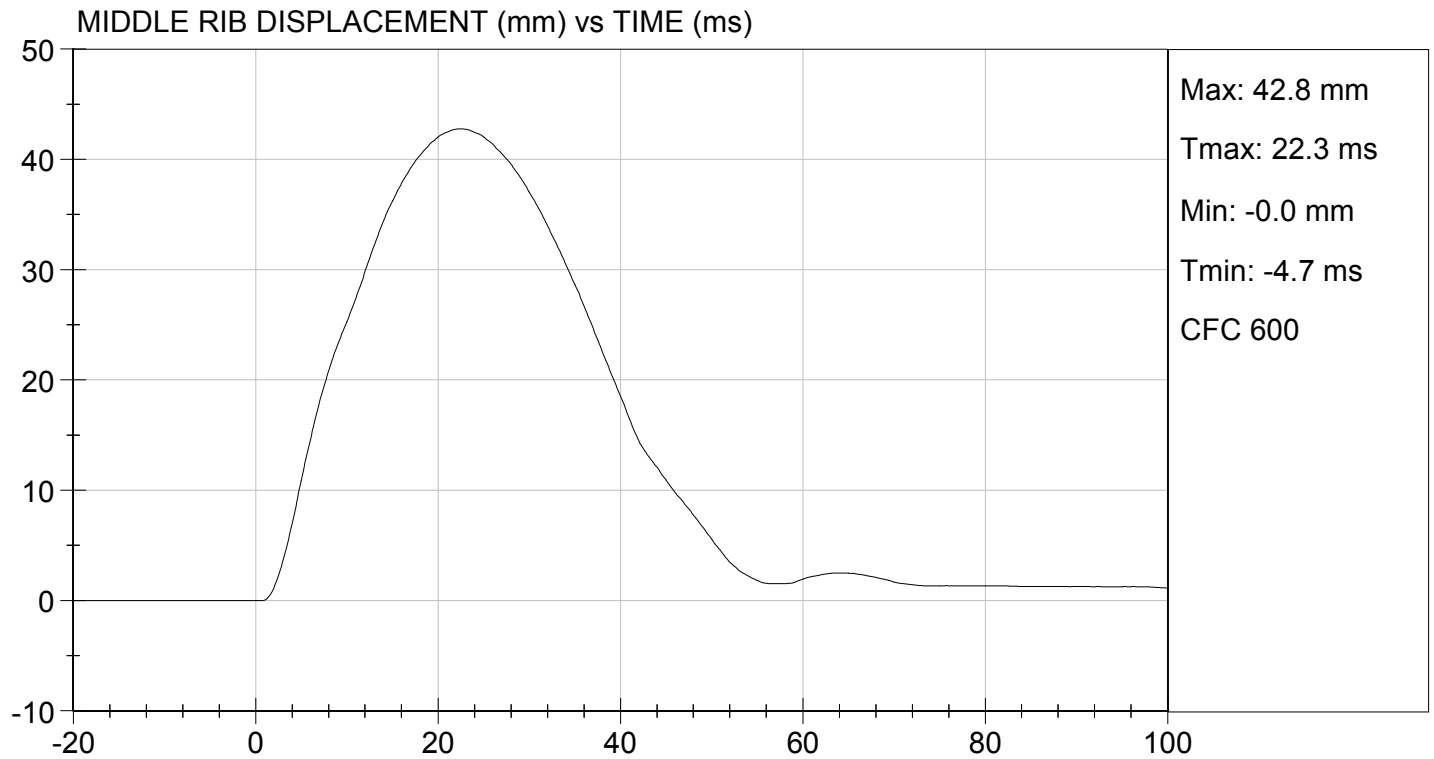
TEST DATE: 09/09/2014
TEST #: D143095





TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 09/09/2014
TEST #: D143095

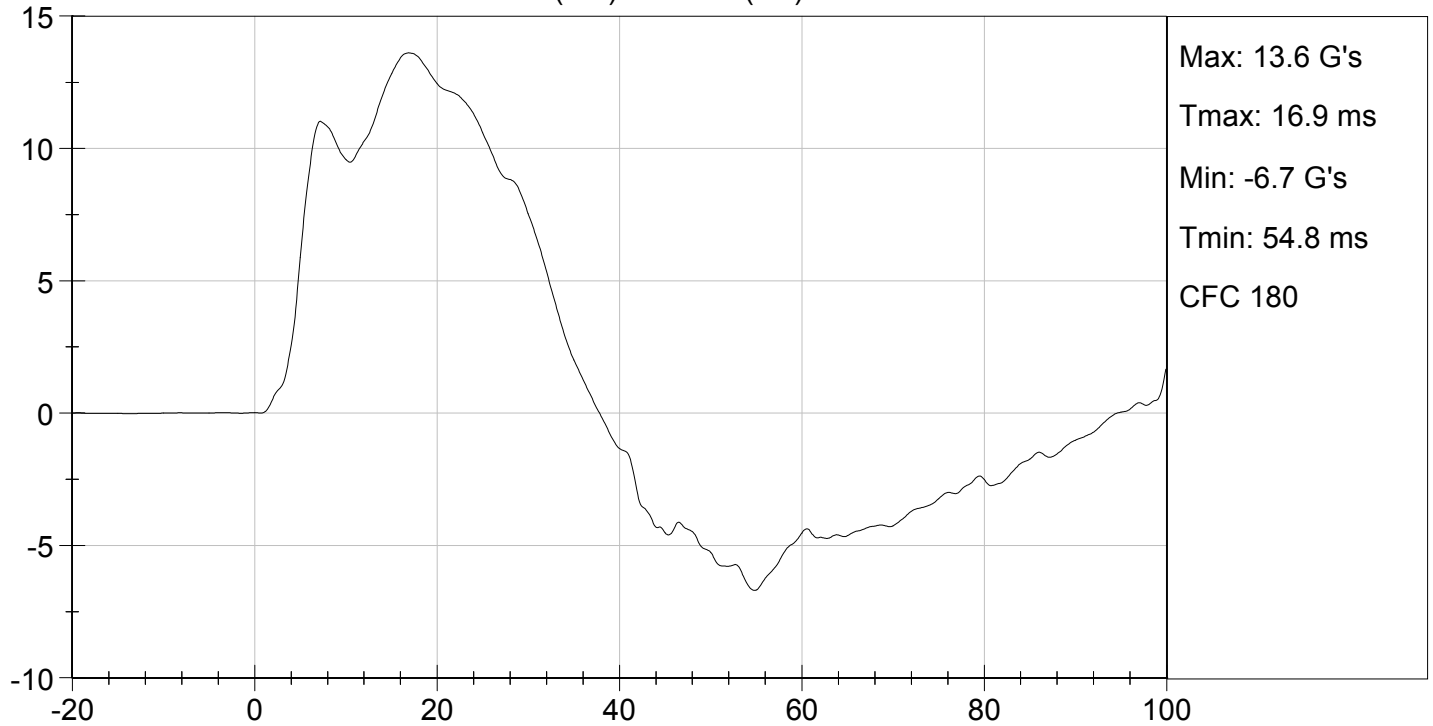




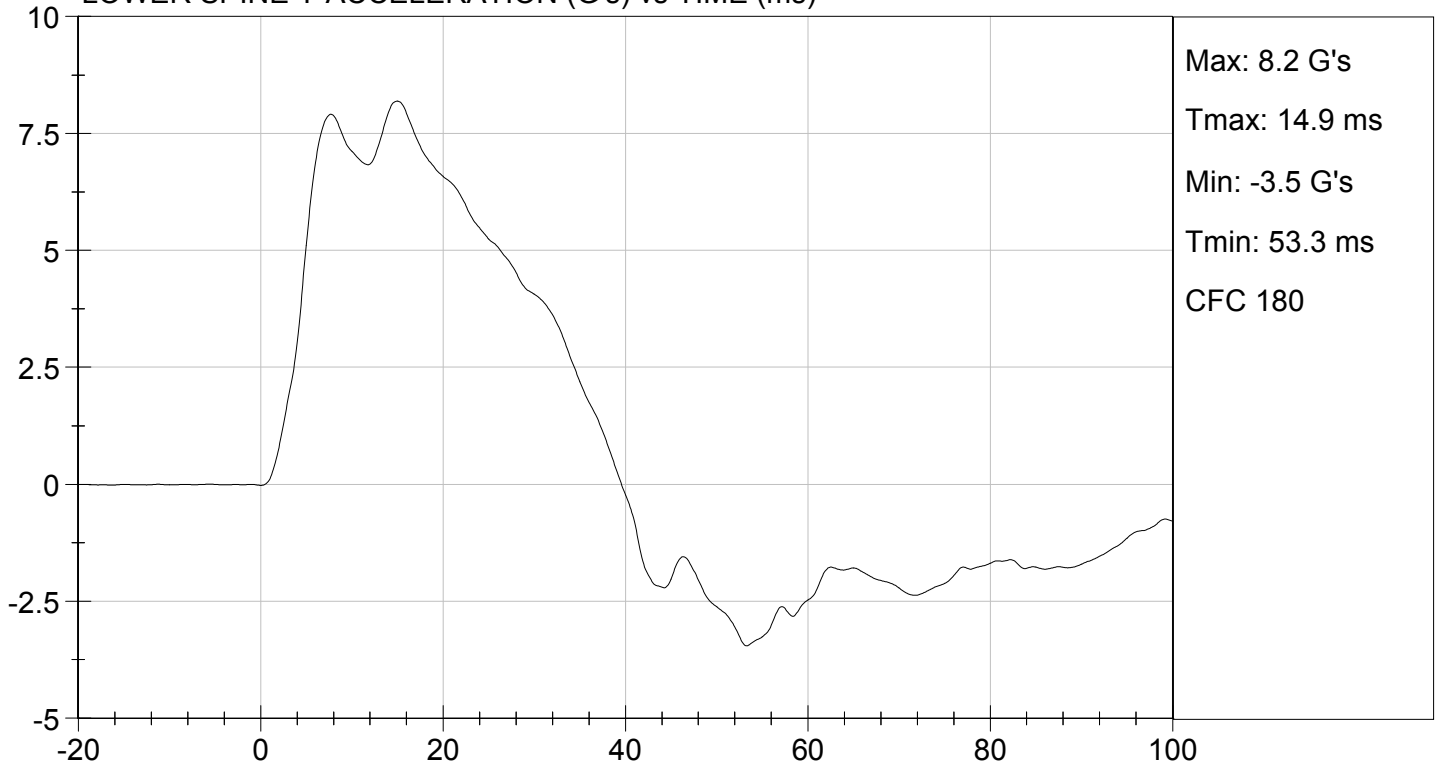
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 09/09/2014
TEST #: D143095

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



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



MGA RESEARCH CORPORATION

ABDOMINAL IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

Test I.D: D143096

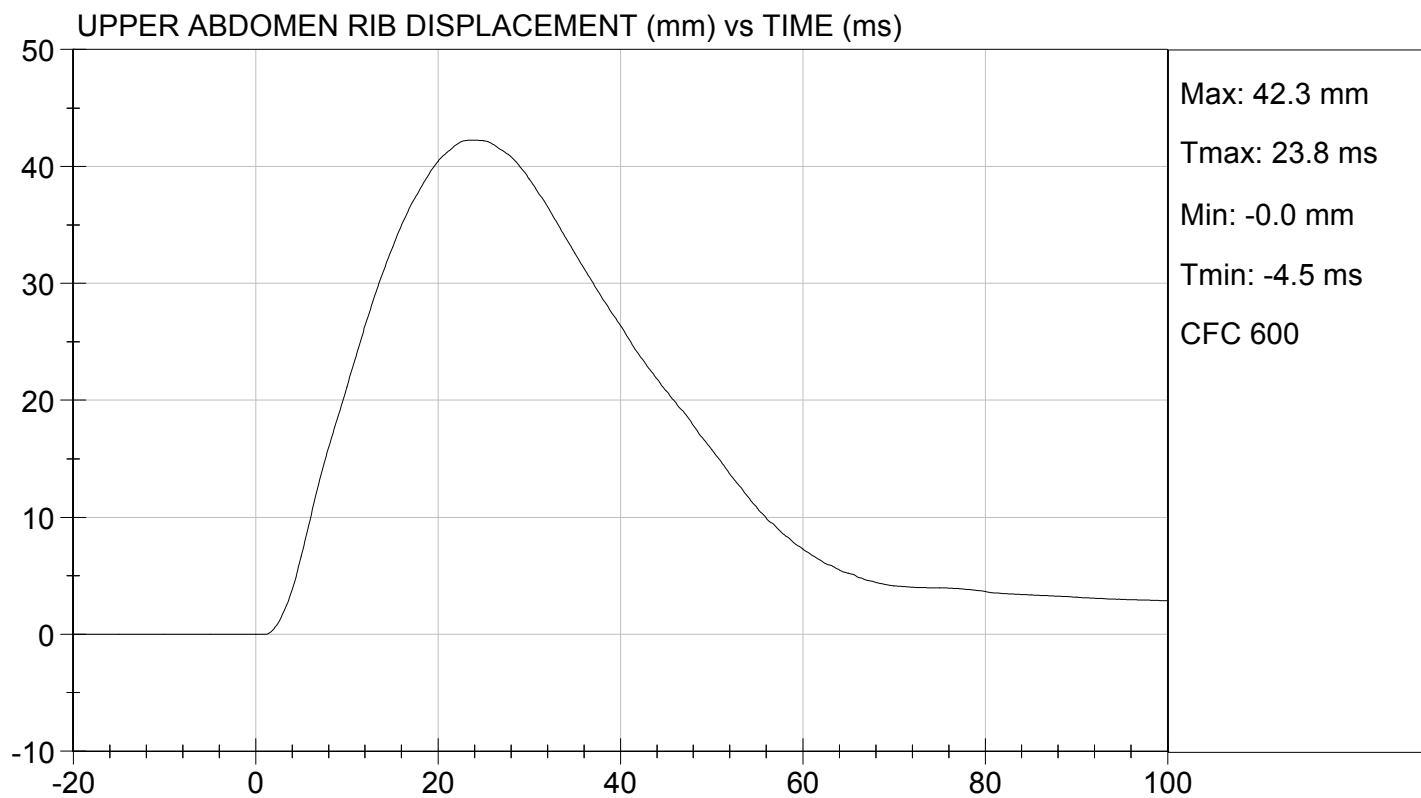
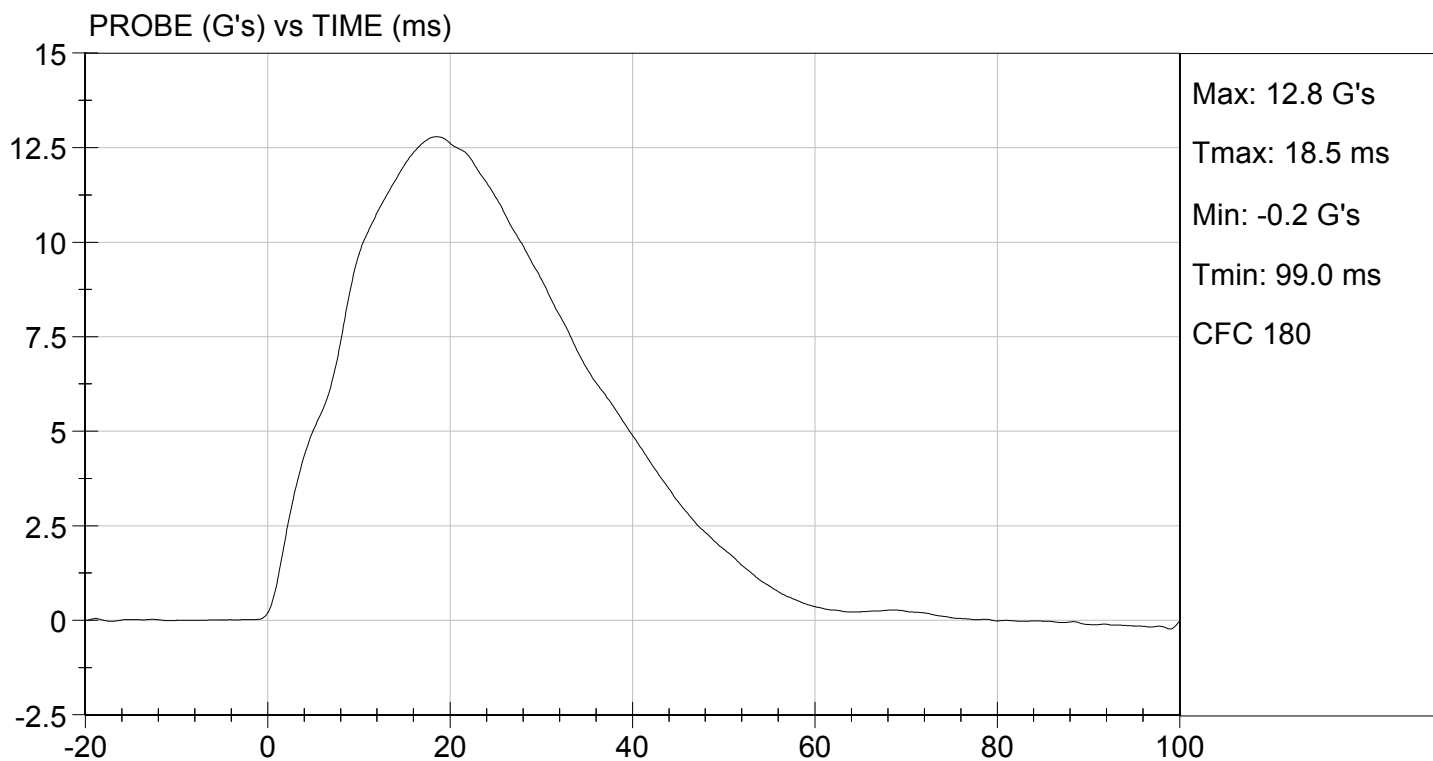
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	53	Pass
Impact Velocity	m/s	4.20 to 4.40	4.27	Pass
Maximum Probe Acceleration	G's	12 to 16	13	Pass
Upper Abdomen Rib Displacement	mm	36 to 47	42	Pass
Lower Abdomen Rib Displacement	mm	33 to 44	37	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	10	Pass
Overall Test Results				Pass

David Schoedel
Laboratory Technician

09/09/2014

Test Date

Jessica Hall
Approved By

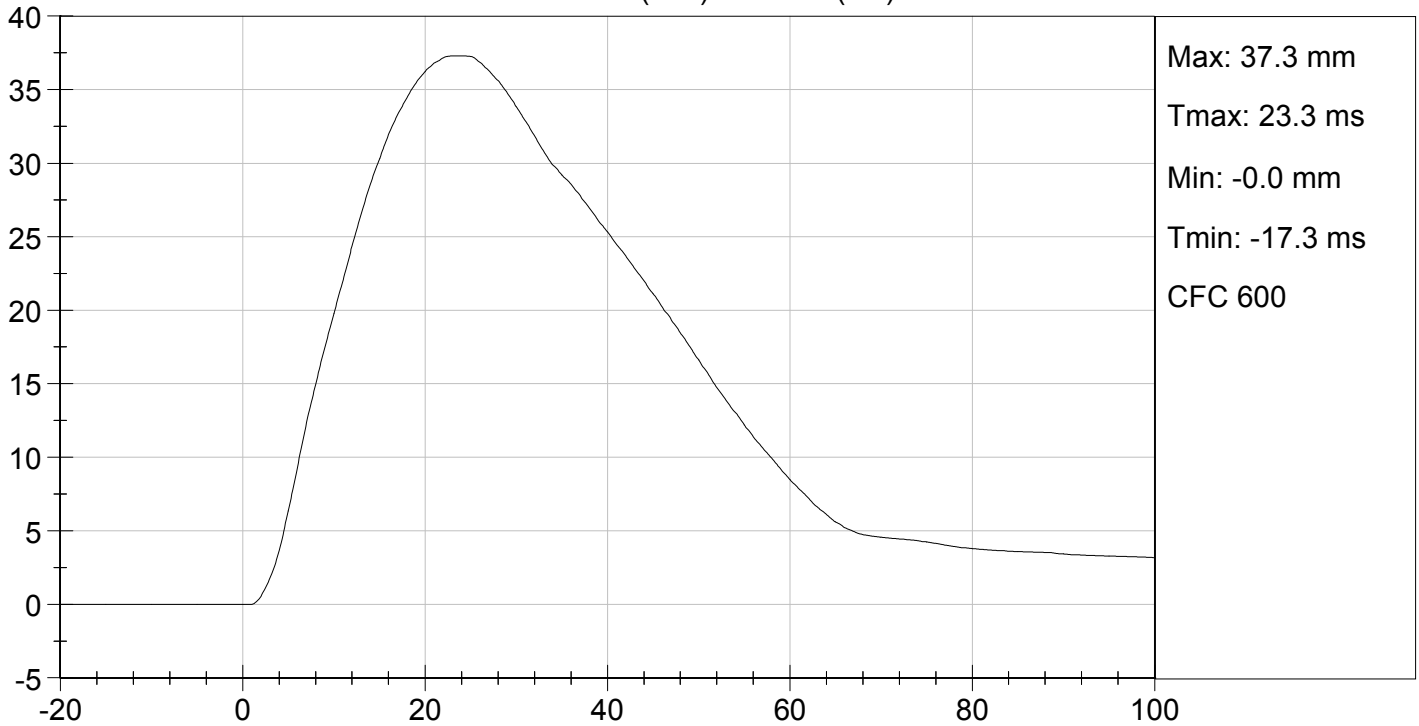




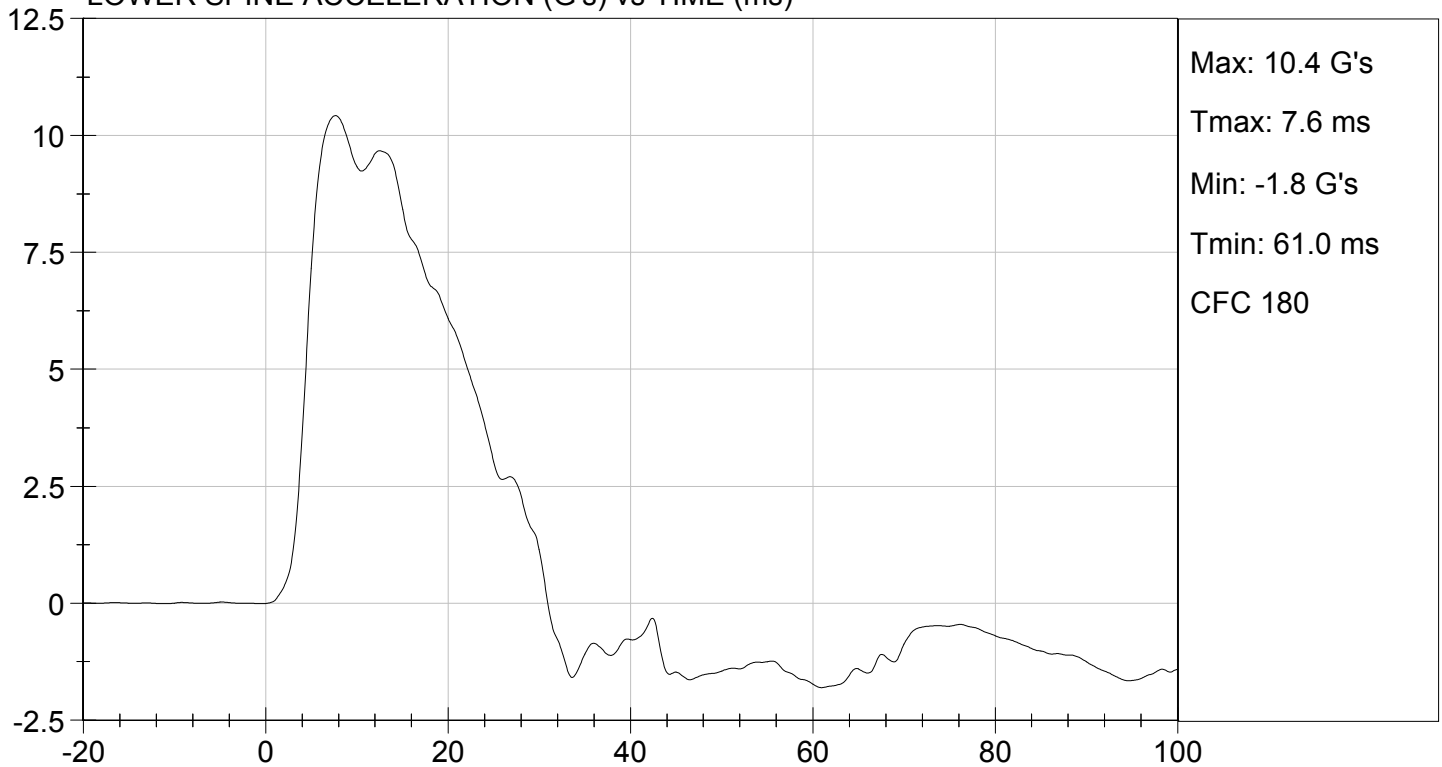
TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.01 ft/s, 4.27 m/s

TEST DATE: 09/09/2014
TEST #: D143096

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



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



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

Test I.D: D143097

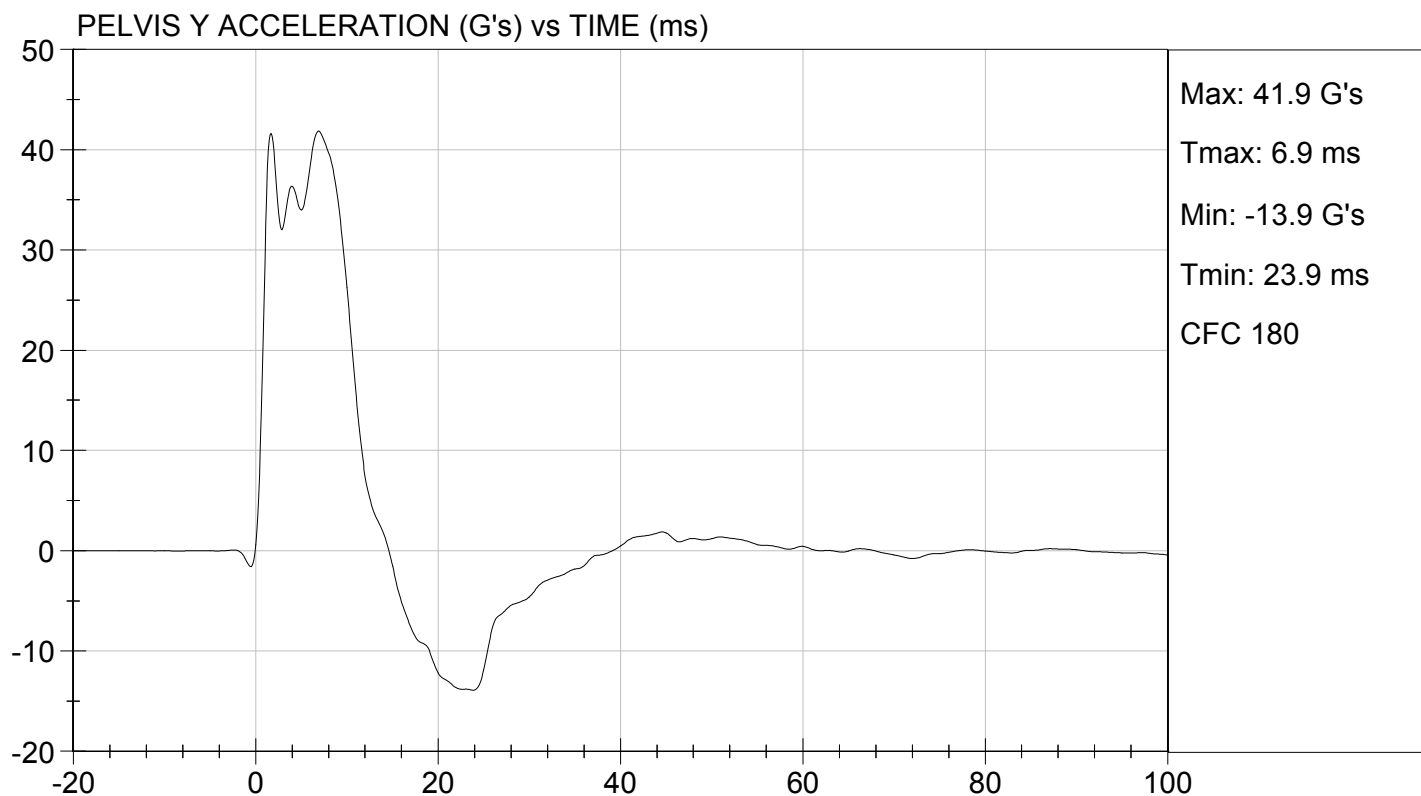
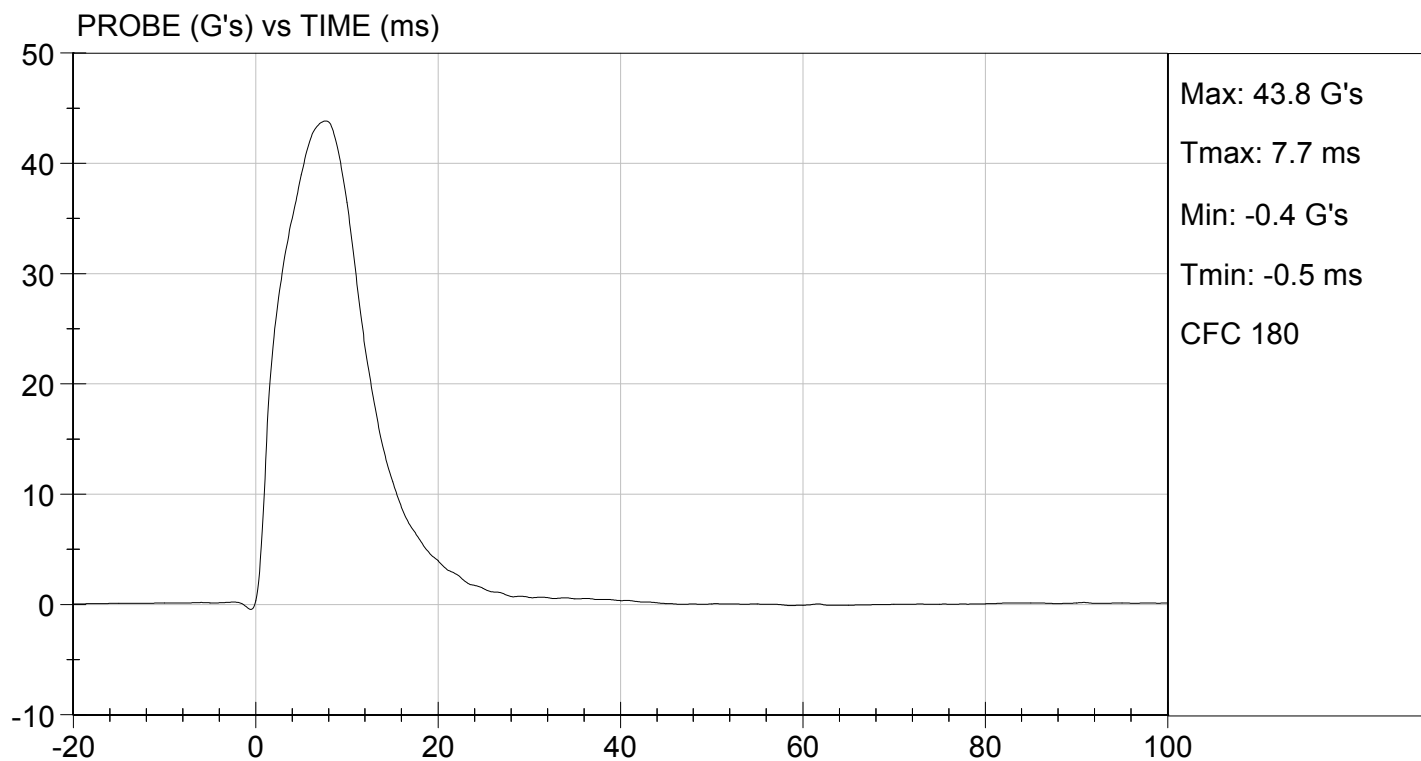
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	53	Pass
Impact Velocity	m/s	6.60 to 6.80	6.68	Pass
Maximum Probe Acceleration	G's	38 to 47	44	Pass
Pelvis Y Acceleration After 6 ms	G's	34 to 42	42	Pass
Peak Acetabulum Force	N	3600 to 4300	4,182	Pass
Overall Test Results				Pass

David Schoedel
Laboratory Technician

09/09/2014

Test Date

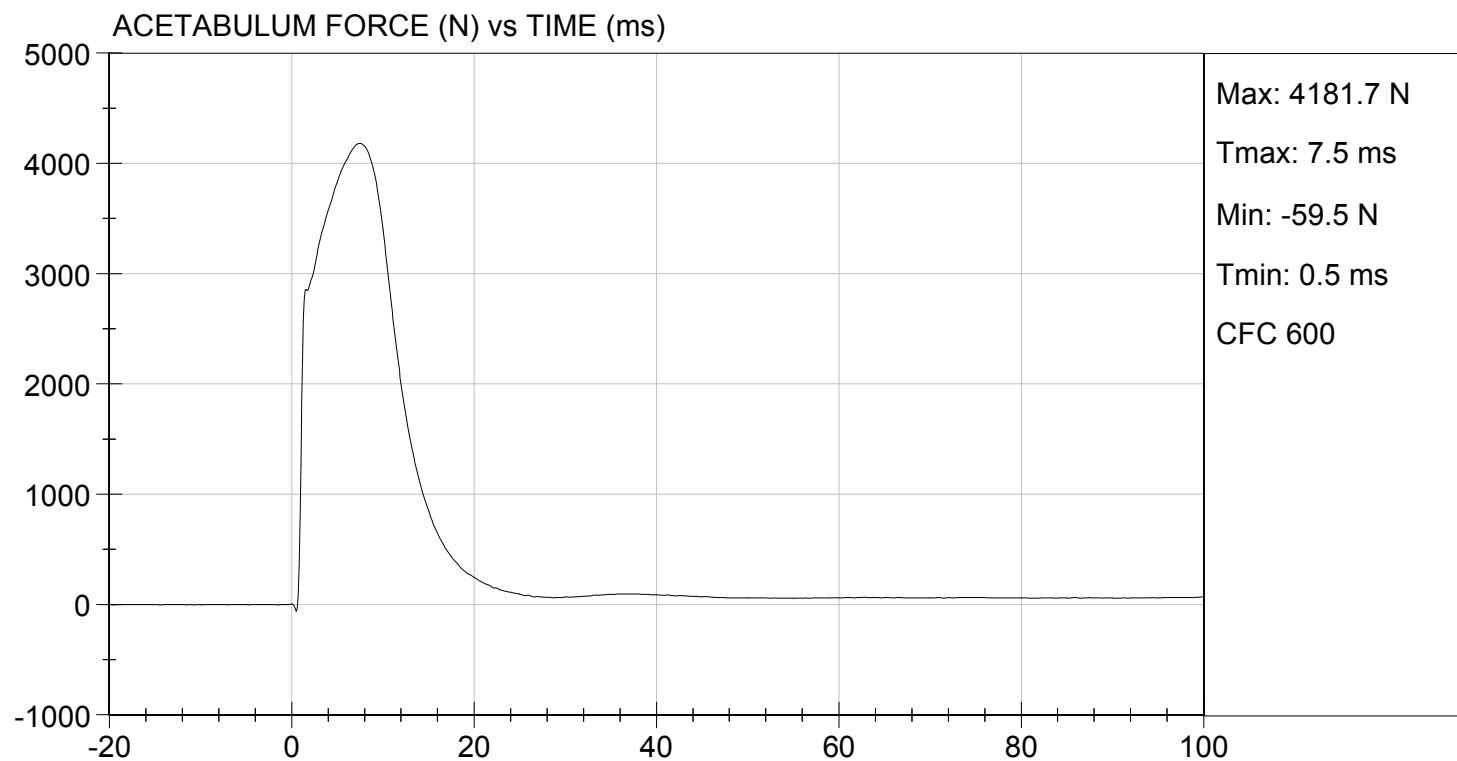
Jessica Hall
Approved By





TEST DESC: PELVIS IMPACT
VELOCITY: 21.93 ft/s, 6.68 m/s

TEST DATE: 09/09/2014
TEST #: D143097



MGA RESEARCH CORPORATION

ILIAC IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

Test I.D: D143098

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	53	Pass
Impact Velocity	m/s	4.20 to 4.40	4.20	Pass
Maximum Probe Acceleration	G's	36 to 45	40	Pass
Pelvis Y Acceleration	G's	28 to 39	31	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4,795	Pass
Overall Test Results				Pass

David Schoedel
Laboratory Technician

09/09/2014

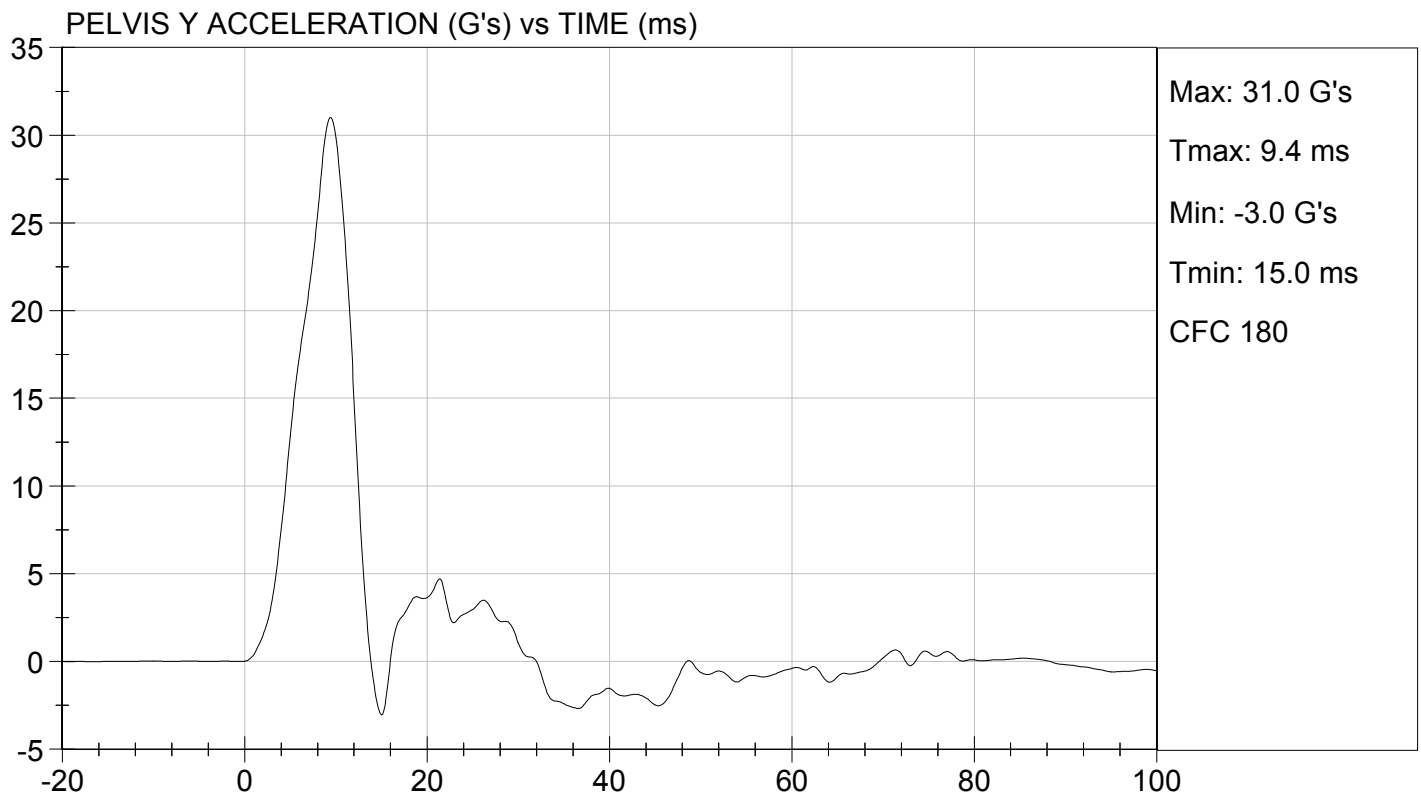
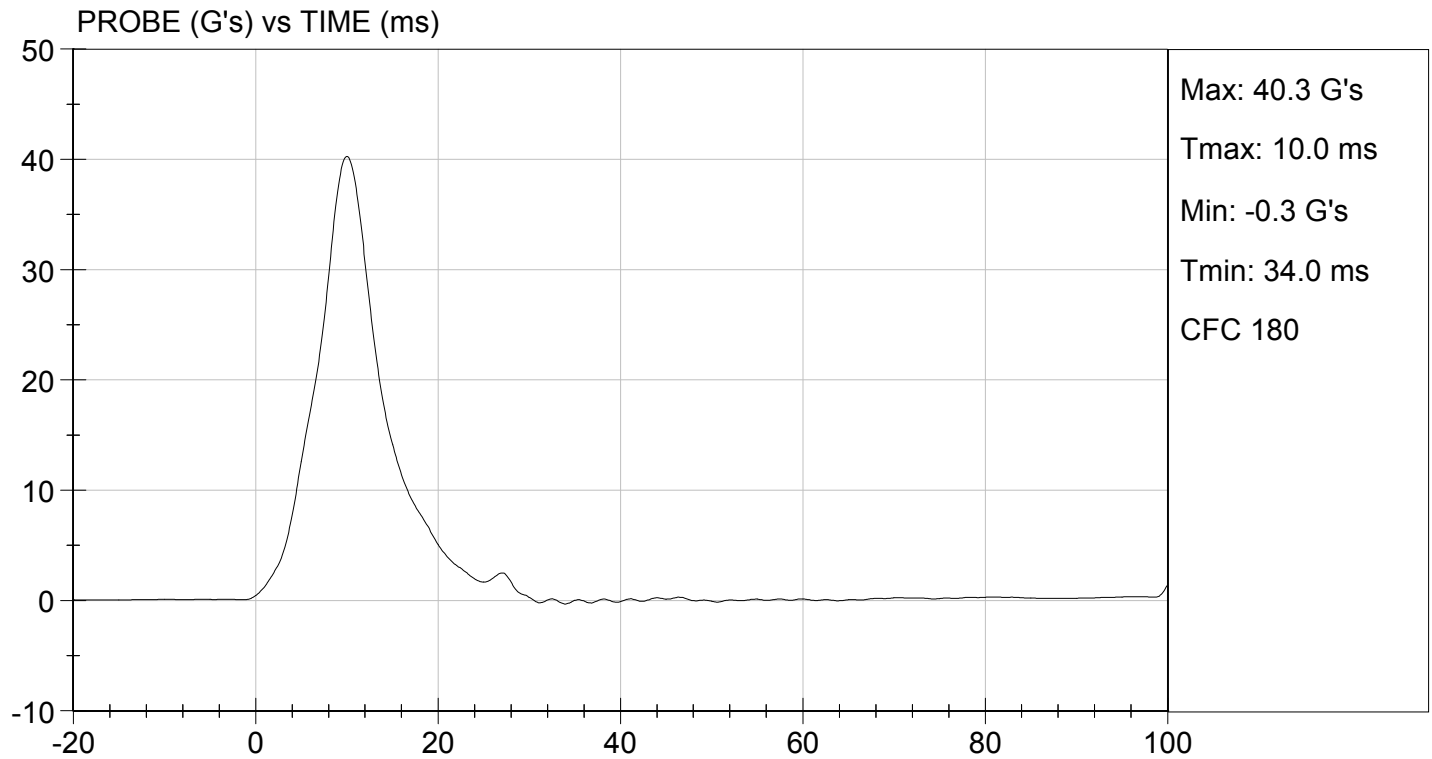
Test Date

Jessica Hall
Approved By



TEST DESC: ILLIAC
VELOCITY: 13.78 ft/s, 4.20 m/s

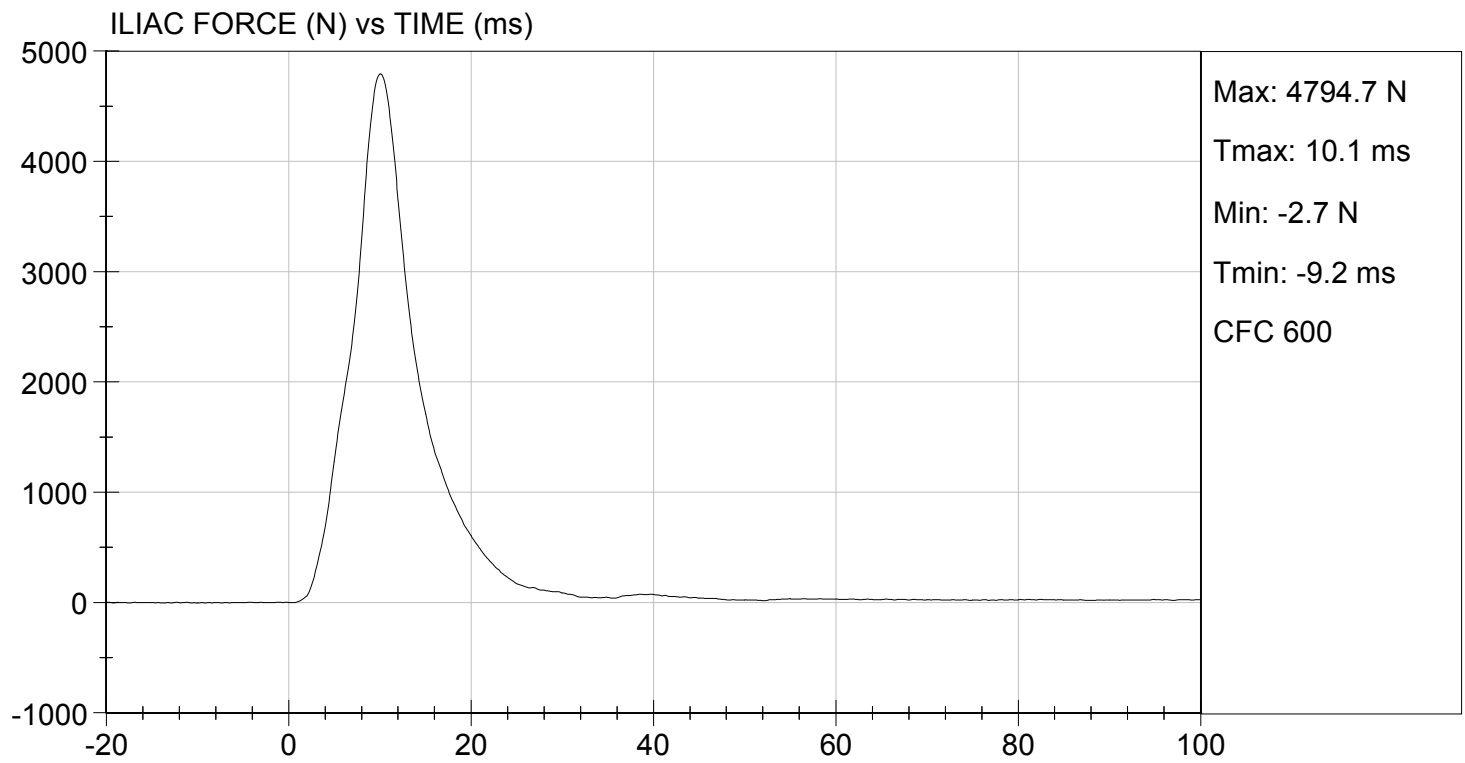
TEST DATE: 09/09/2014
TEST #: D143098





TEST DESC: ILLIAC
VELOCITY: 13.78 ft/s, 4.20 m/s

TEST DATE: 09/09/2014
TEST #: D143098



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

ATD Serial No: 296

Test ID: D143281

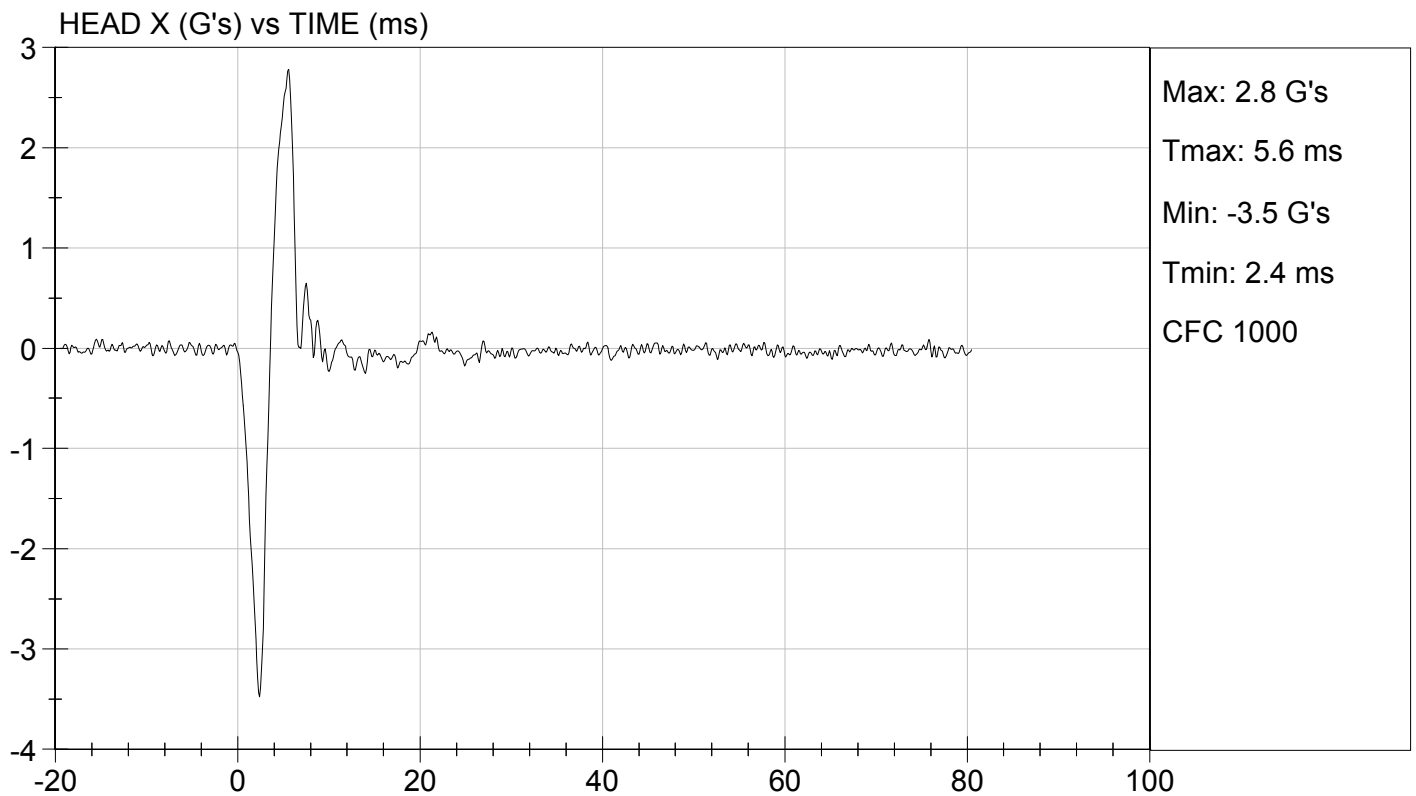
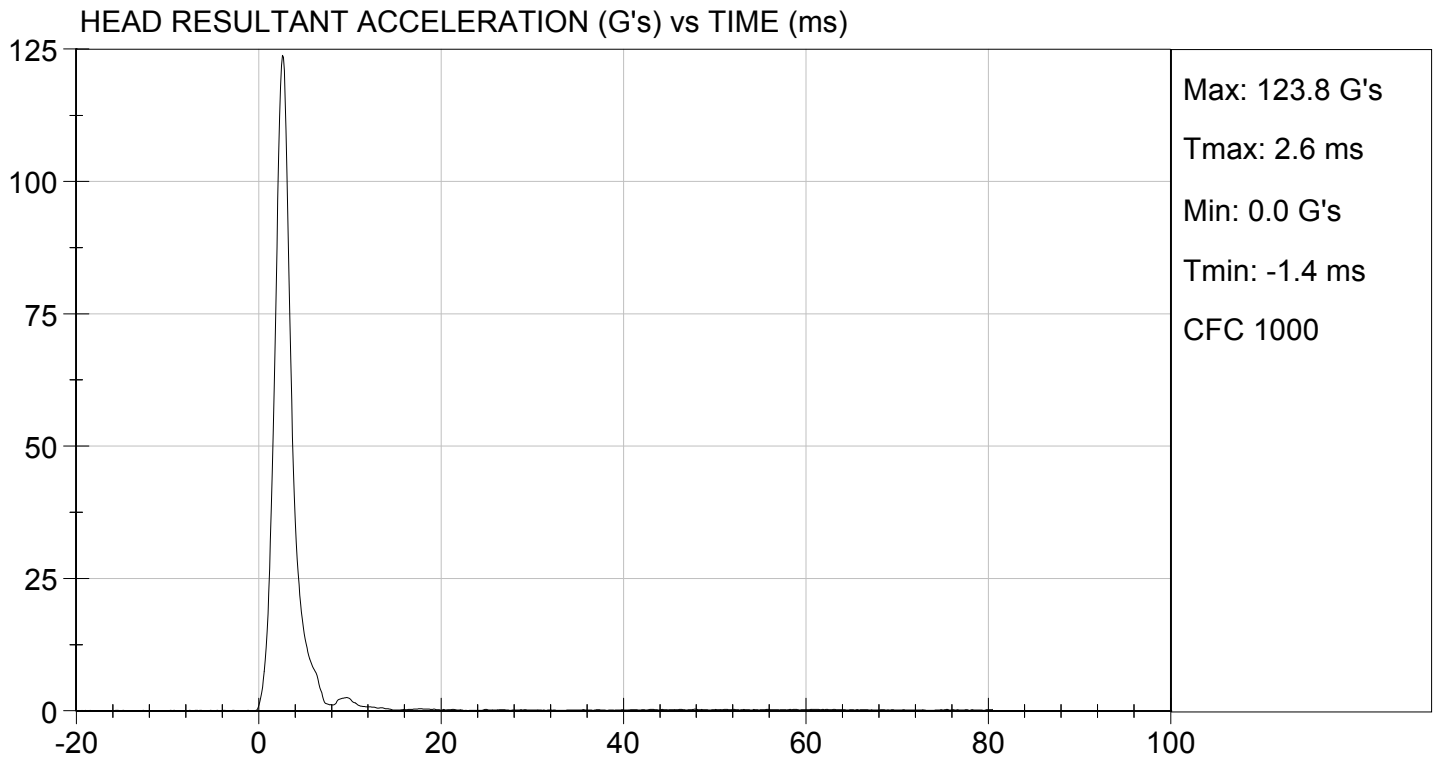
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	44	Pass
Peak Resultant Acceleration	G's	115 to 137	124	Pass
Peak Longitudinal Acceleration	G's	+/- 15	-3.5	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	<15%	Yes	Pass
Overall Test Results			Pass	

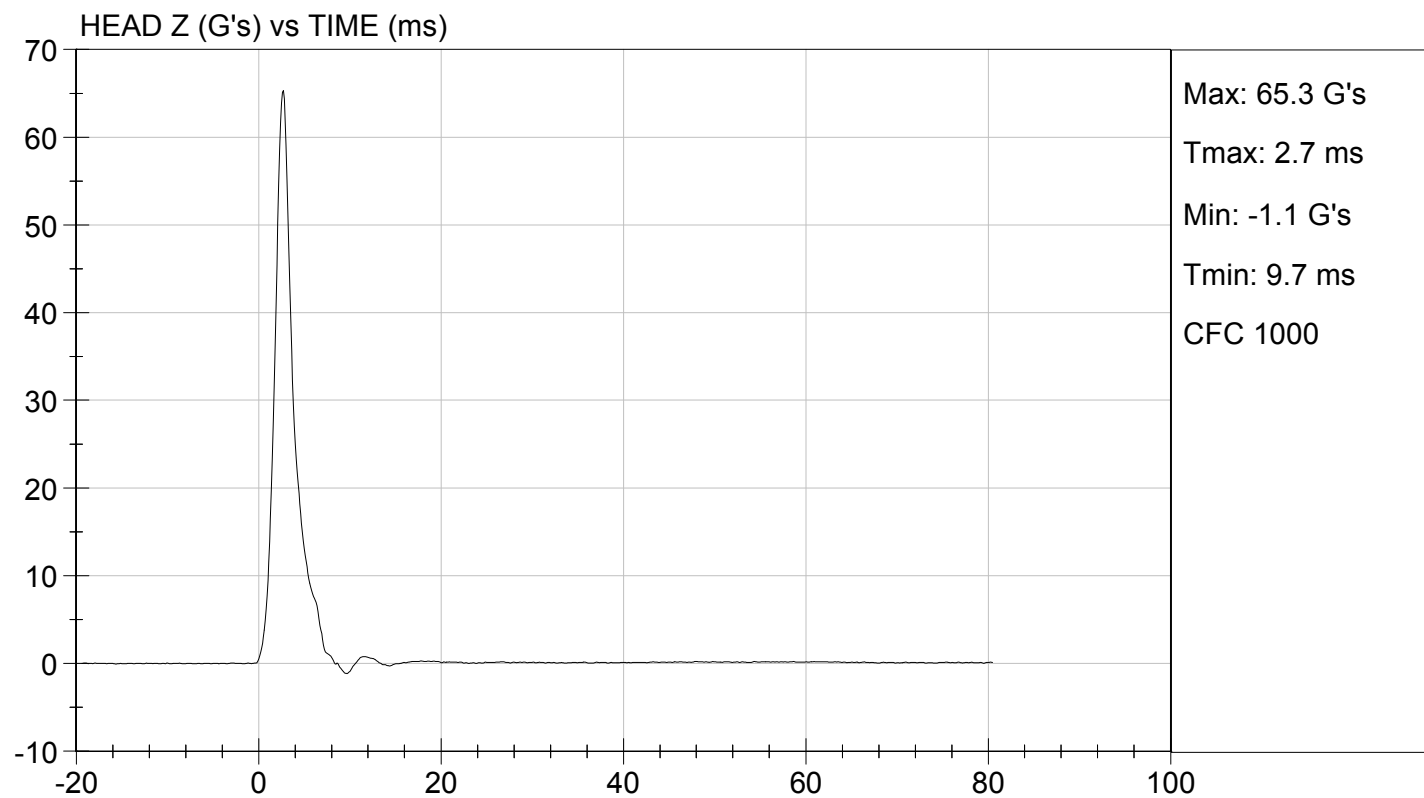
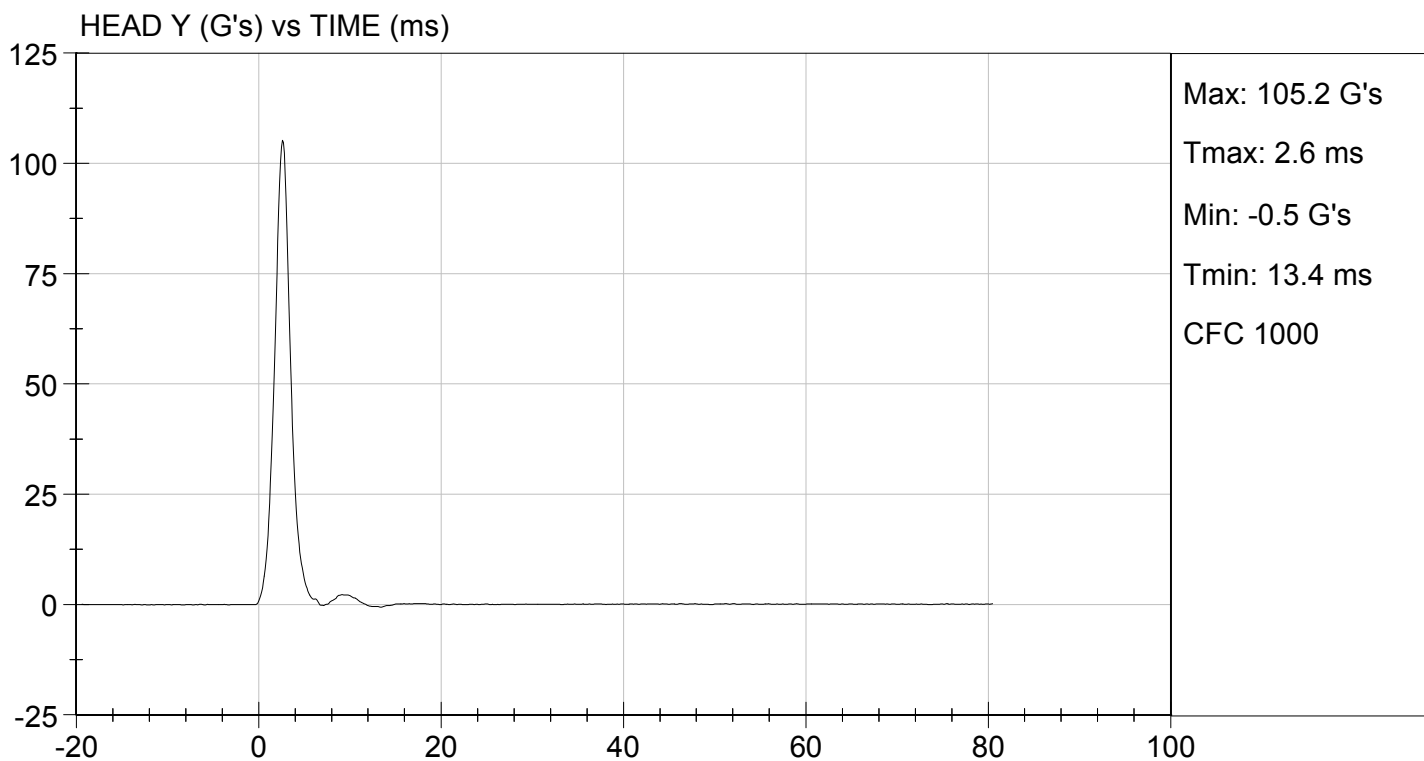
Maxime Chamberland
Laboratory Technician

09/22/2014

Test Date

Jessica Hall
Approved By





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

ATD Serial No: 296

Test I.D: D143282

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21.3	Pass
Humidity		%	10 to 70	46	Pass
Impact Velocity		m/s	5.51 to 5.63	5.60	Pass
Pendulum Velocity	10 ms	m/s	2.20 to 2.80	2.52	Pass
	15 ms	m/s	3.30 to 4.10	3.54	Pass
	20 ms	m/s	4.40 to 5.40	4.70	Pass
	25 ms	m/s	5.40 to 6.10	5.61	Pass
	25-100 ms	m/s	5.50 to 6.20	5.84	Pass
Maximum D-Plane Rotation		deg	71 to 81	73	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	60	Pass
Maximum Occipital Condyle Moment		Nm	-44 to -36	-39	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	114	Pass
Overall Test Results					Pass

David Schoedel
Laboratory Technician

09/22/2014

Test Date

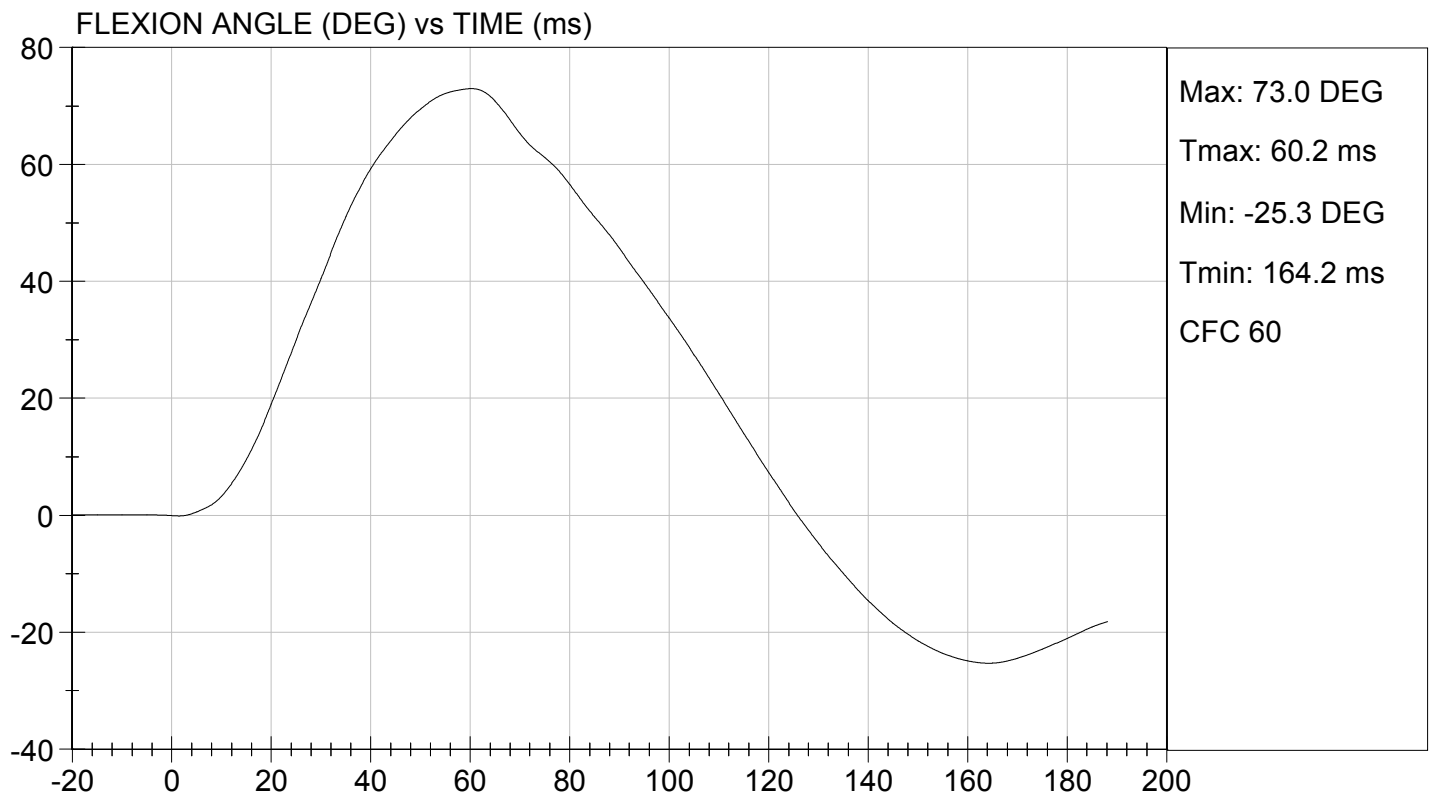
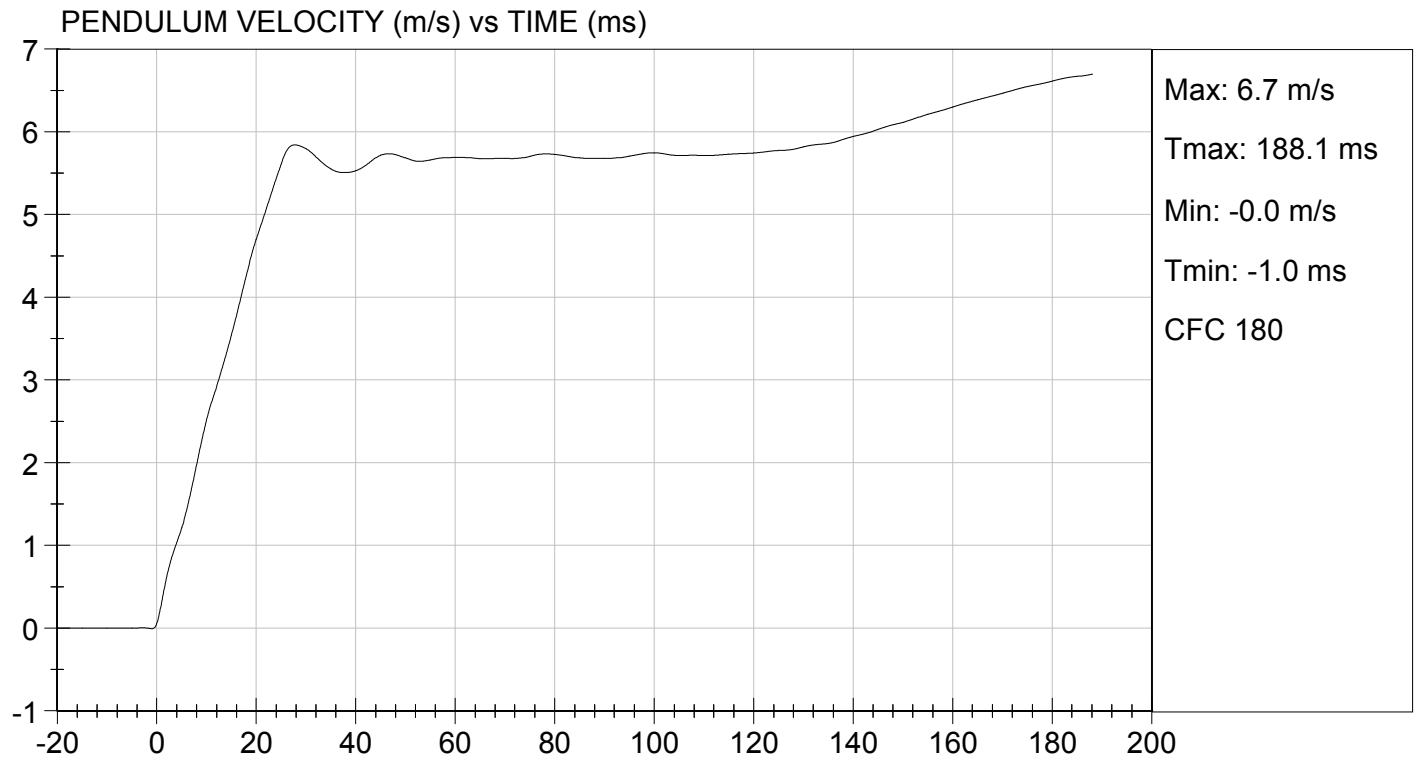
Jessica Hall
Approved By



TEST DESC: NECK BENDING
VELOCITY: 18.36 ft/s, 5.60 m/s

TEST DATE: 09/22/2014

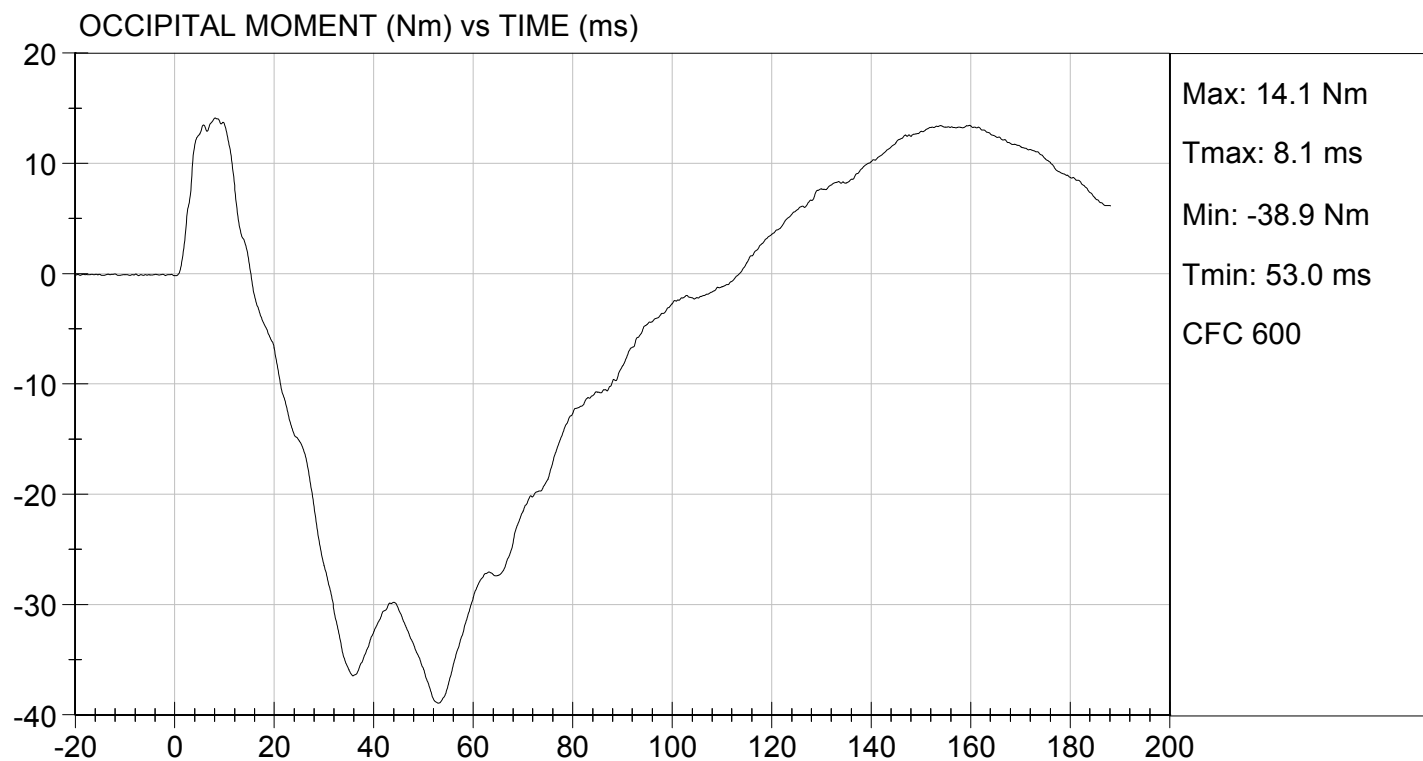
TEST #: D143282





TEST DESC: NECK BENDING
VELOCITY: 18.36 ft/s, 5.60 m/s

TEST DATE: 09/22/2014
TEST #: D143282



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

ATD Serial No: 296

Test ID: D143283

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	45	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Maximum Probe Acceleration	G's	13 to 18	14	Pass
Shoulder Displacement	mm	28 to 37	33	Pass
Upper Spine (T1) Y Acceleration	G's	17 to 22	18	Pass
Overall Test Results			Pass	

Maxime Chamberland
Laboratory Technician

09/22/2014

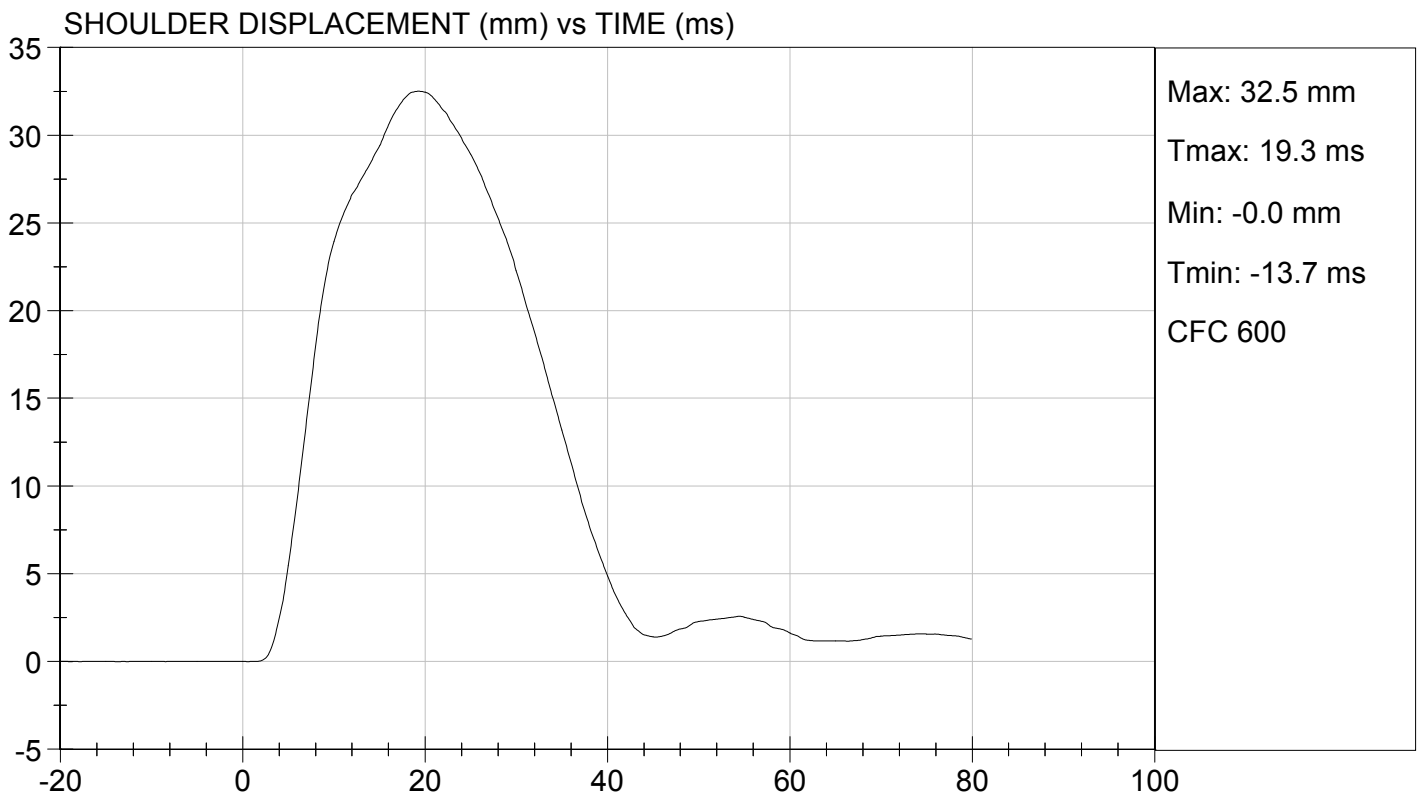
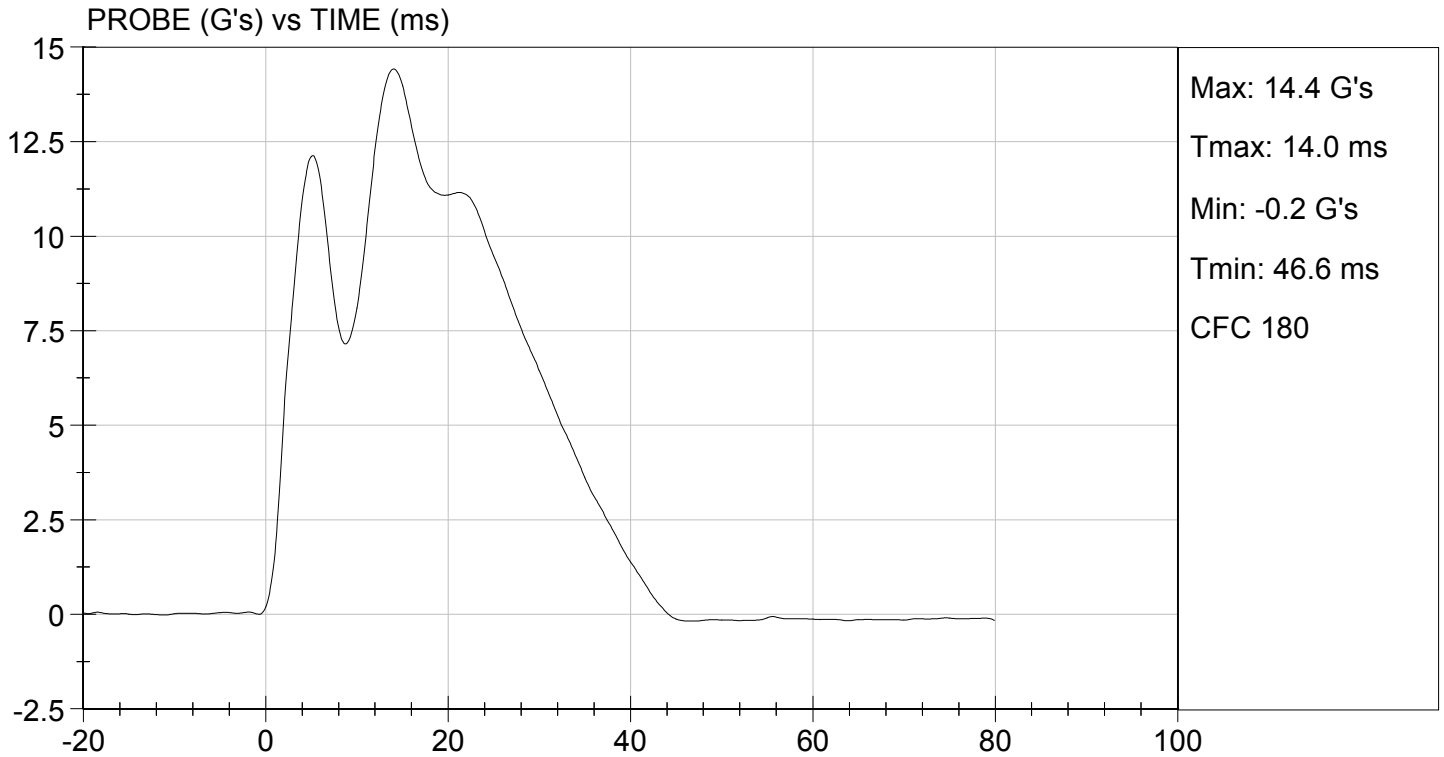
Test Date

Jessica Hall
Approved By



TEST DESC: SHOULDER IMPACT
VELOCITY: 14.37 ft/s, 4.38 m/s

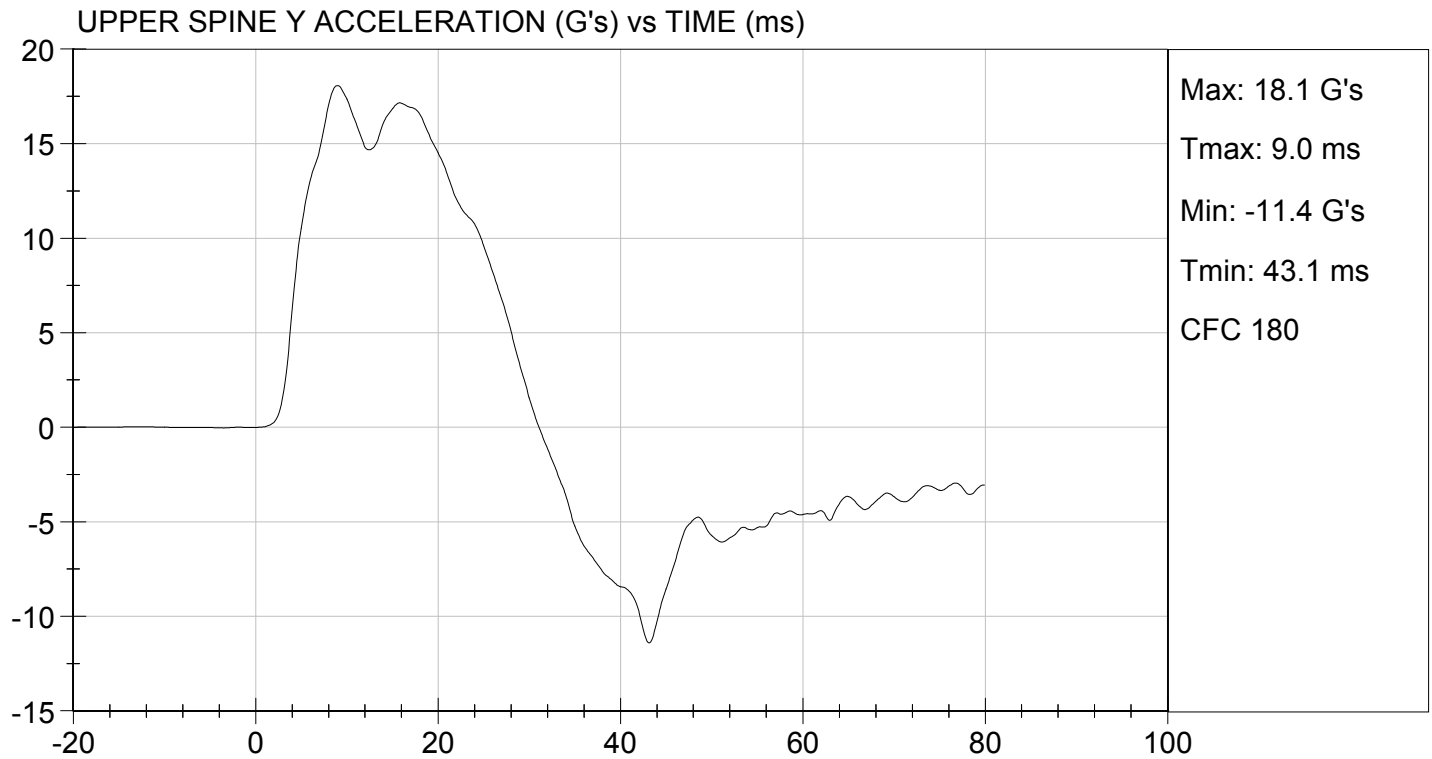
TEST DATE: 09/22/2014
TEST #: D143283





TEST DESC: SHOULDER IMPACT
VELOCITY: 14.37 ft/s, 4.38 m/s

TEST DATE: 09/22/2014
TEST #: D143283



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

ATD Serial No: 296

Test I.D: D143284

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.6	Pass
Humidity	%	10 to 70	47	Pass
Impact Velocity	m/s	6.60 to 6.80	6.77	Pass
Maximum Probe Acceleration	G's	30 to 36	30	Pass
Shoulder Displacement	mm	31 to 40	38	Pass
Upper Rib Displacement	mm	25 to 32	29	Pass
Middle Rib Displacement	mm	30 to 36	32	Pass
Lower Rib Displacement	mm	32 to 38	34	Pass
Upper Spine (T1) Y Acceleration	G's	34 to 43	39	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	30	Pass
Overall Test Results				Pass

Maxime Chamberland
Laboratory Technician

09/23/2014

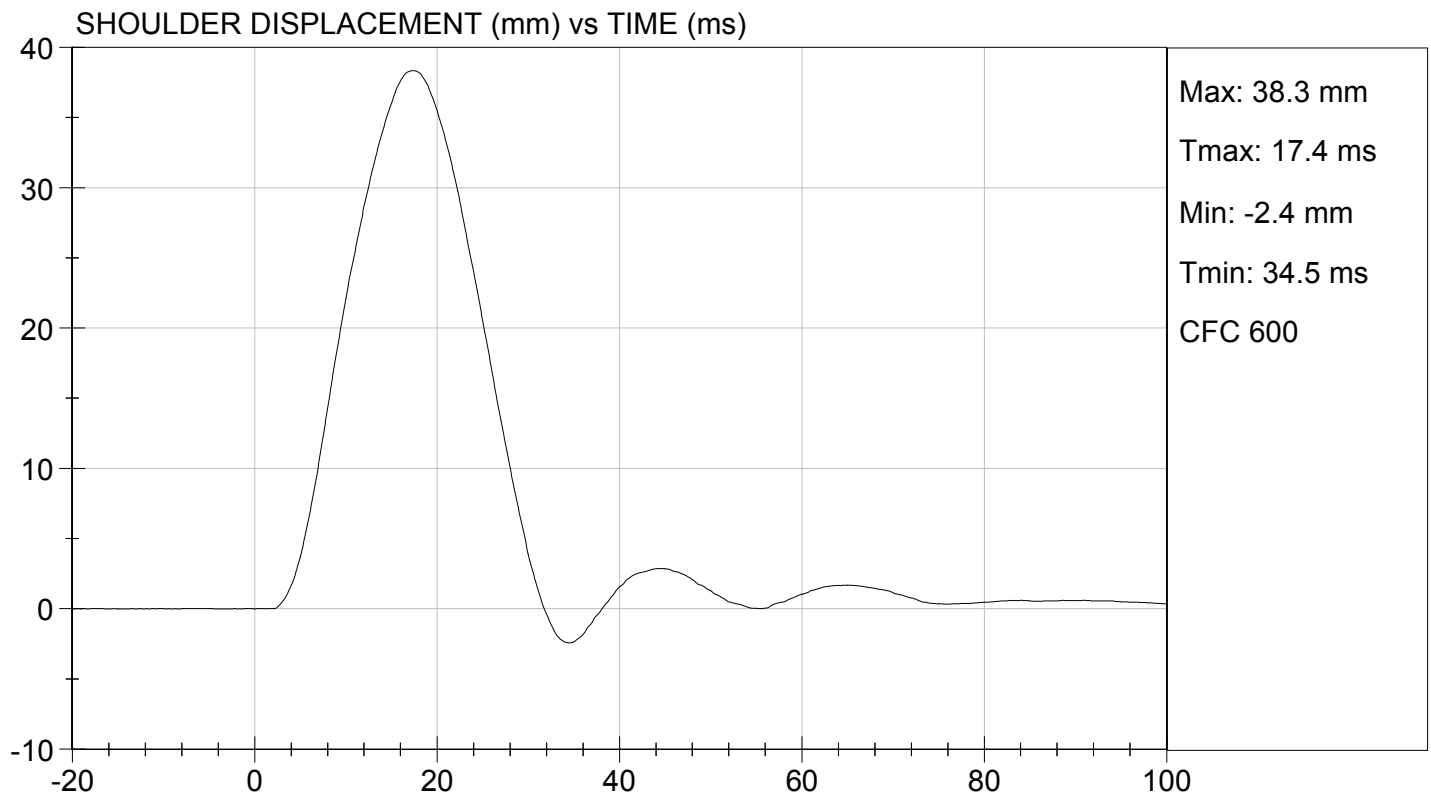
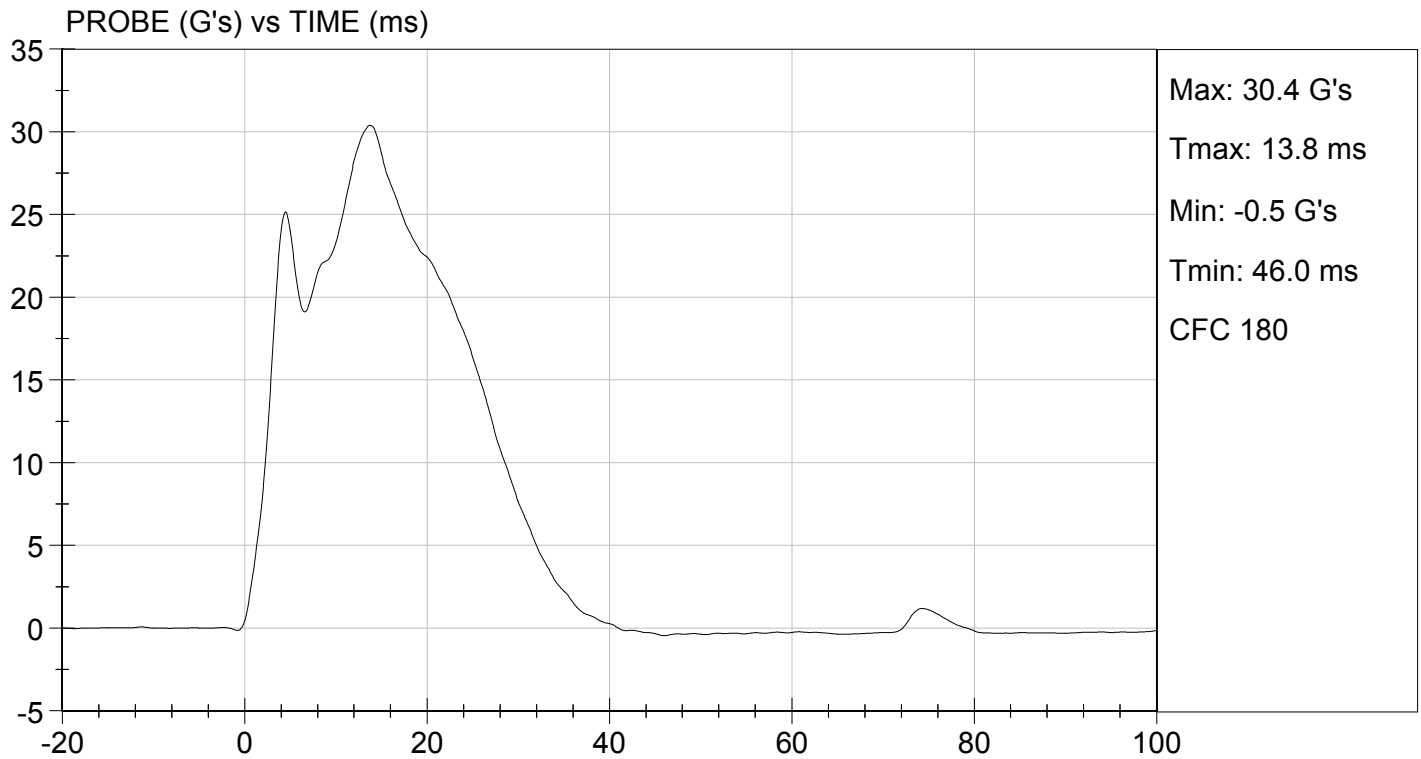
Test Date

Jessica Hall
Approved By



TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.22 ft/s, 6.77 m/s

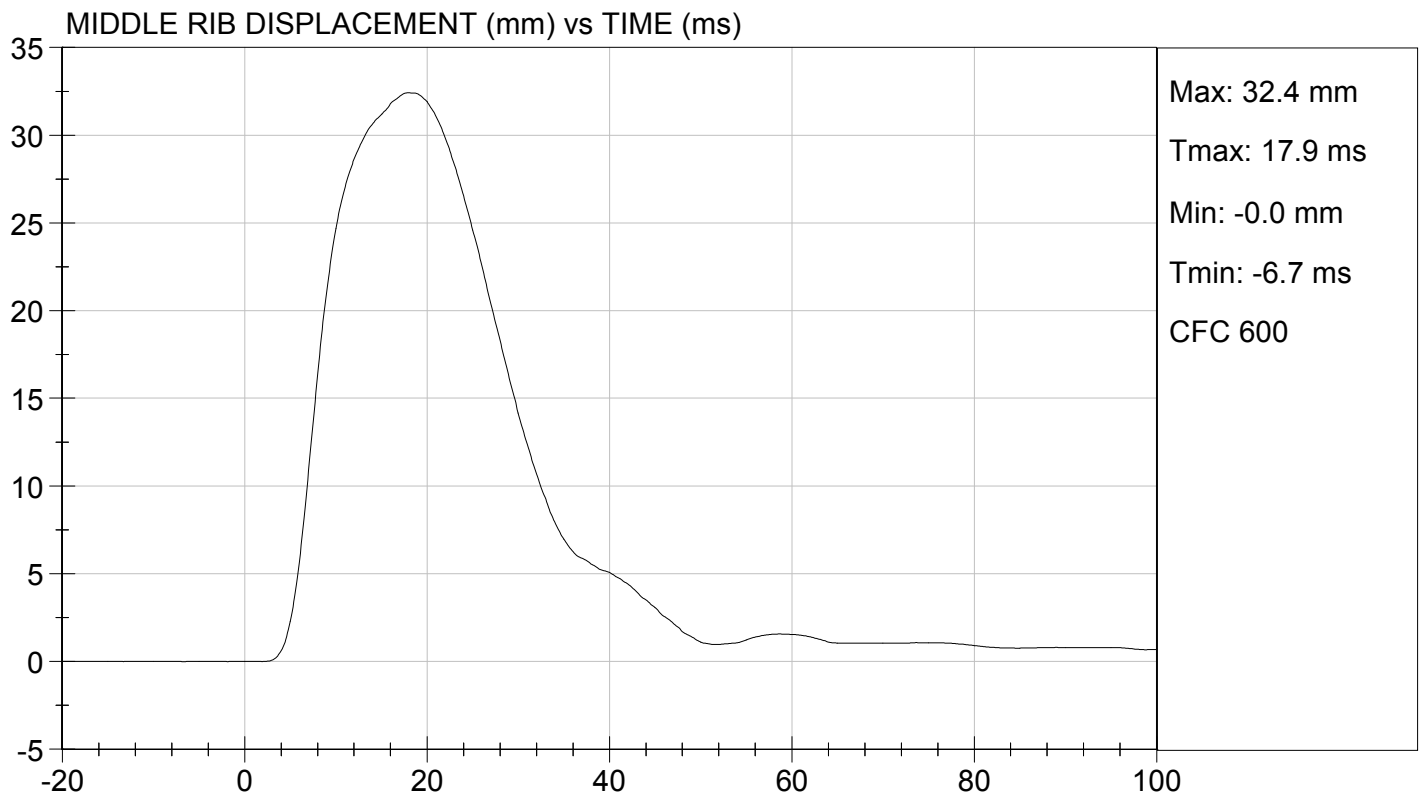
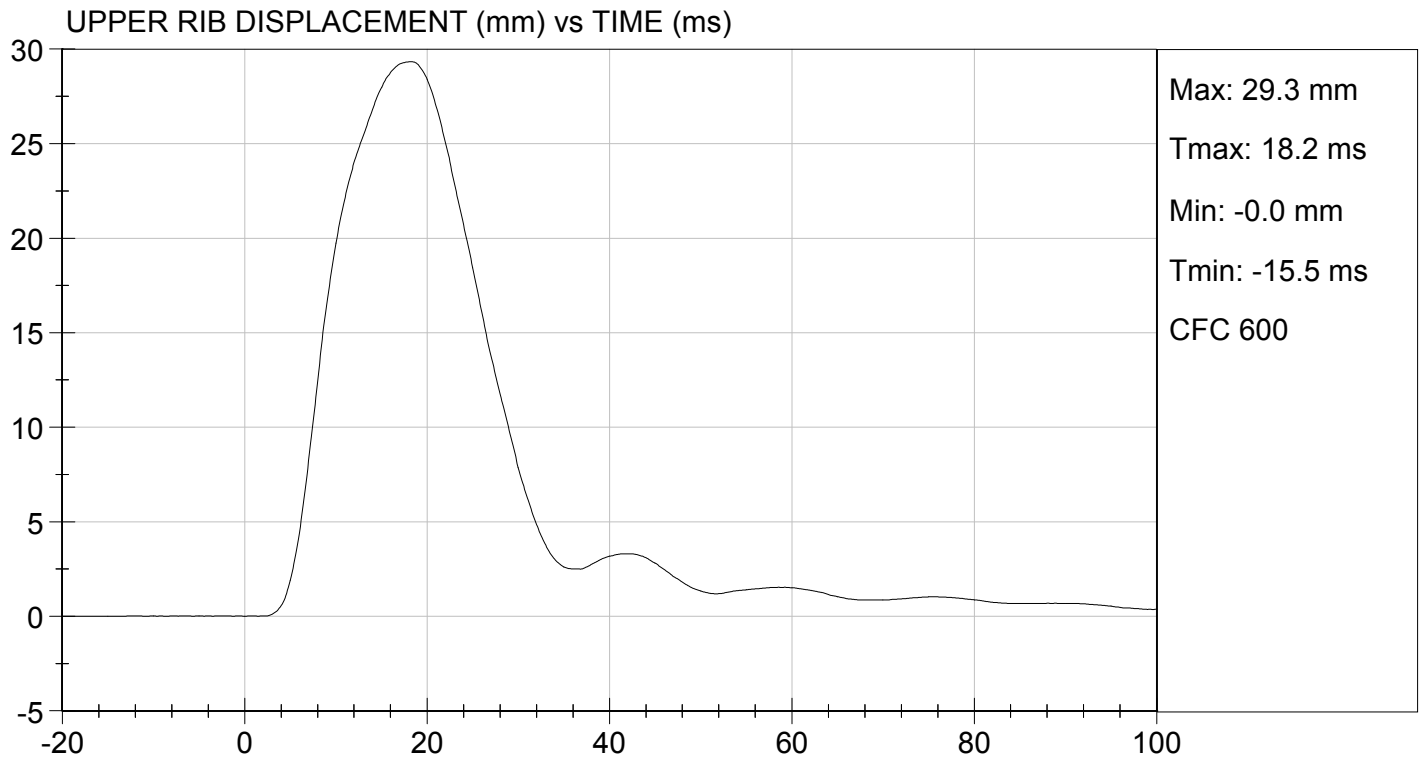
TEST DATE: 09/23/2014
TEST #: D143284





TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.22 ft/s, 6.77 m/s

TEST DATE: 09/23/2014
TEST #: D143284

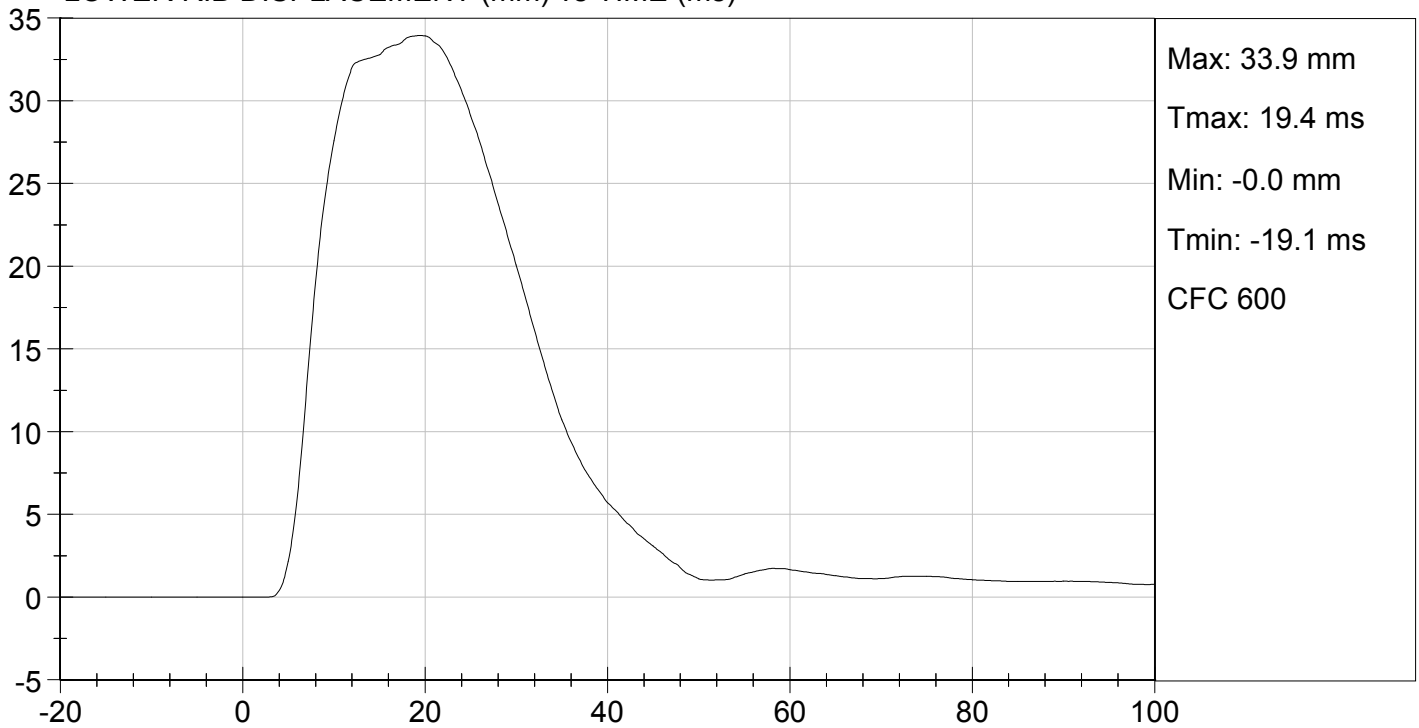




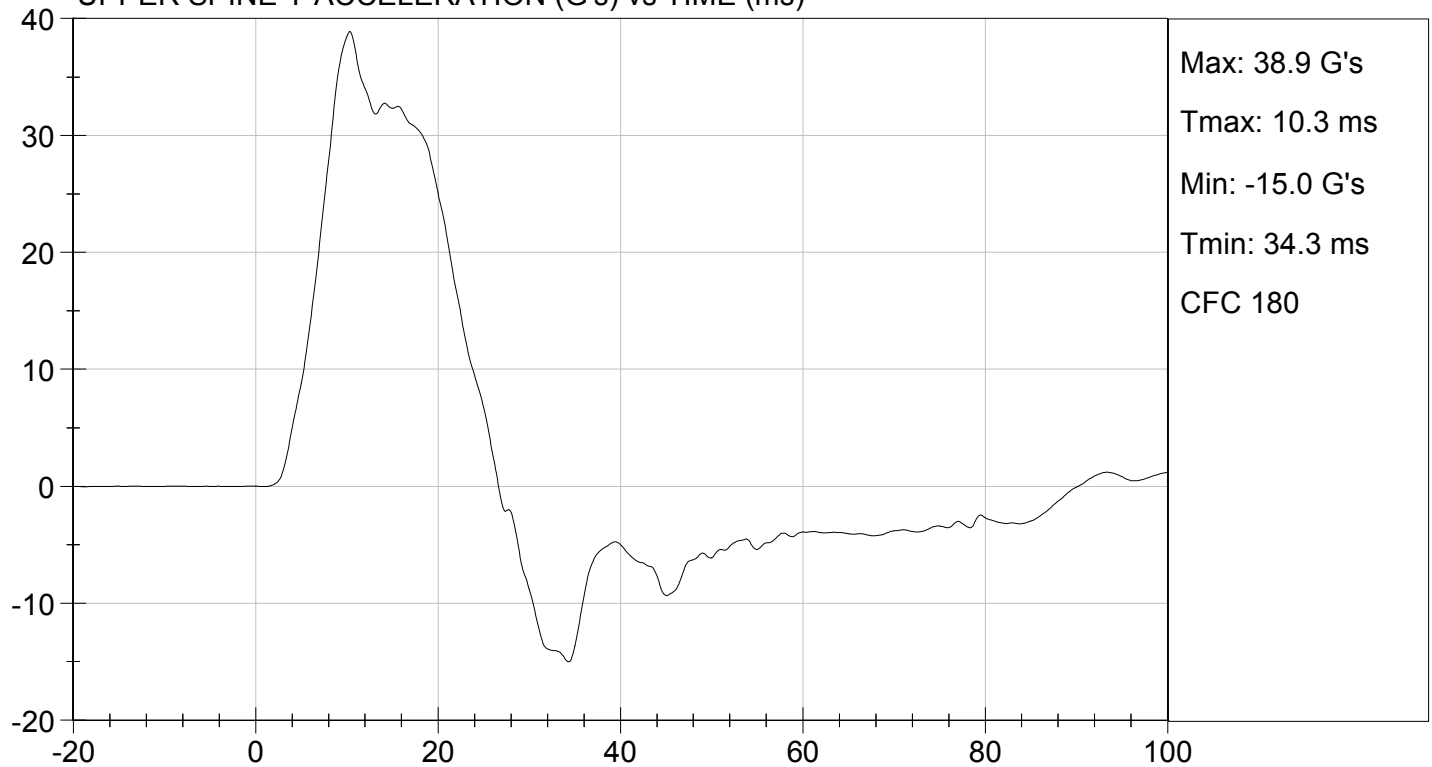
TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.22 ft/s, 6.77 m/s

TEST DATE: 09/23/2014
TEST #: D143284

LOWER RIB DISPLACEMENT (mm) vs TIME (ms)



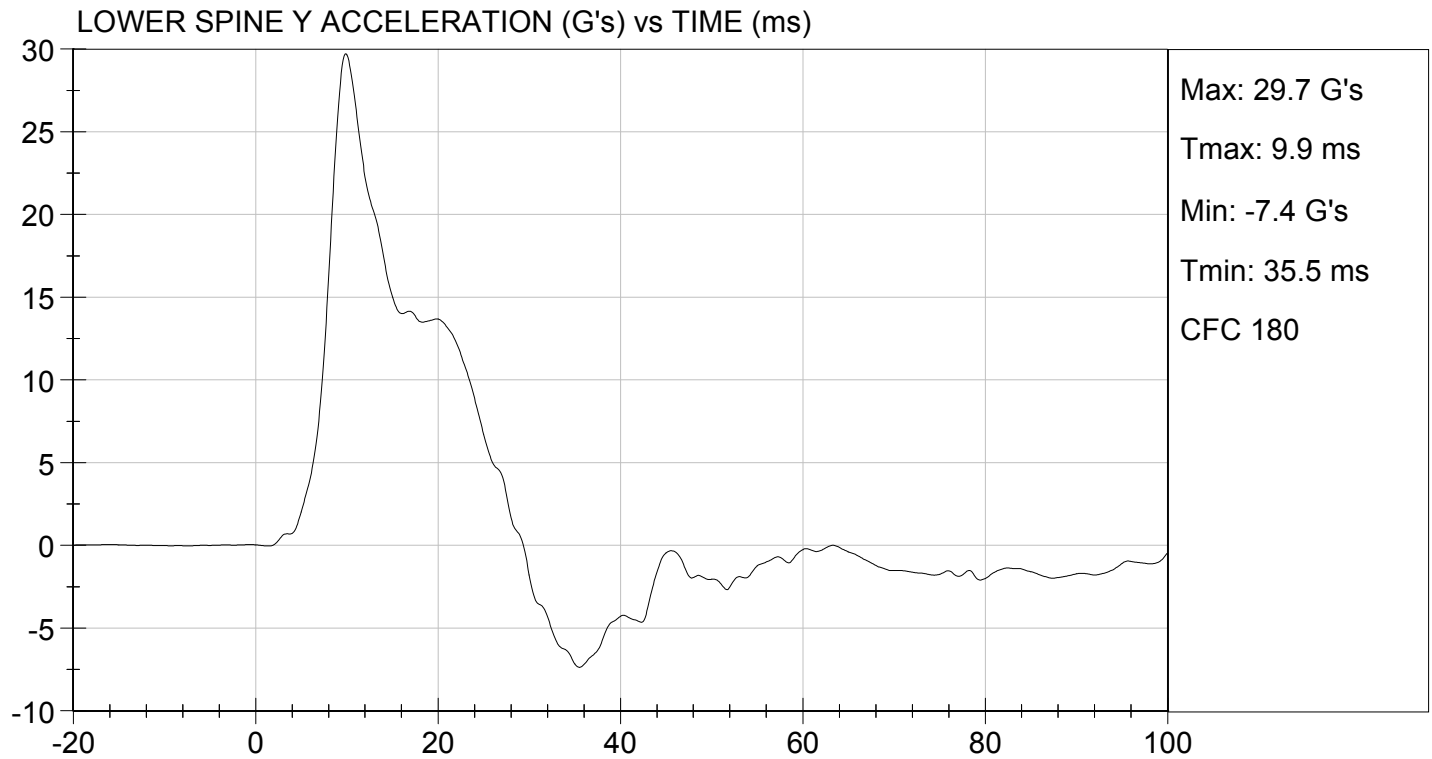
UPPER SPINE Y ACCELERATION (G's) vs TIME (ms)





TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.22 ft/s, 6.77 m/s

TEST DATE: 09/23/2014
TEST #: D143284



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

ATD Serial No: 296

Test I.D: D143285

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.6	Pass
Humidity	%	10 to 70	47	Pass
Impact Velocity	m/s	4.20 to 4.40	4.30	Pass
Maximum Probe Acceleration	G's	14 to 18	14	Pass
Upper Rib Displacement	mm	32 to 40	37	Pass
Middle Rib Displacement	mm	39 to 45	42	Pass
Lower Rib Displacement	mm	35 to 43	39	Pass
Upper Spine (T1) Y Acceleration	G's	13 to 17	13	Pass
Lower Spine (T12) Y Acceleration	G's	7 to 11	8	Pass
Overall Test Results				Pass

Maxime Chamberland
Laboratory Technician

09/23/2014

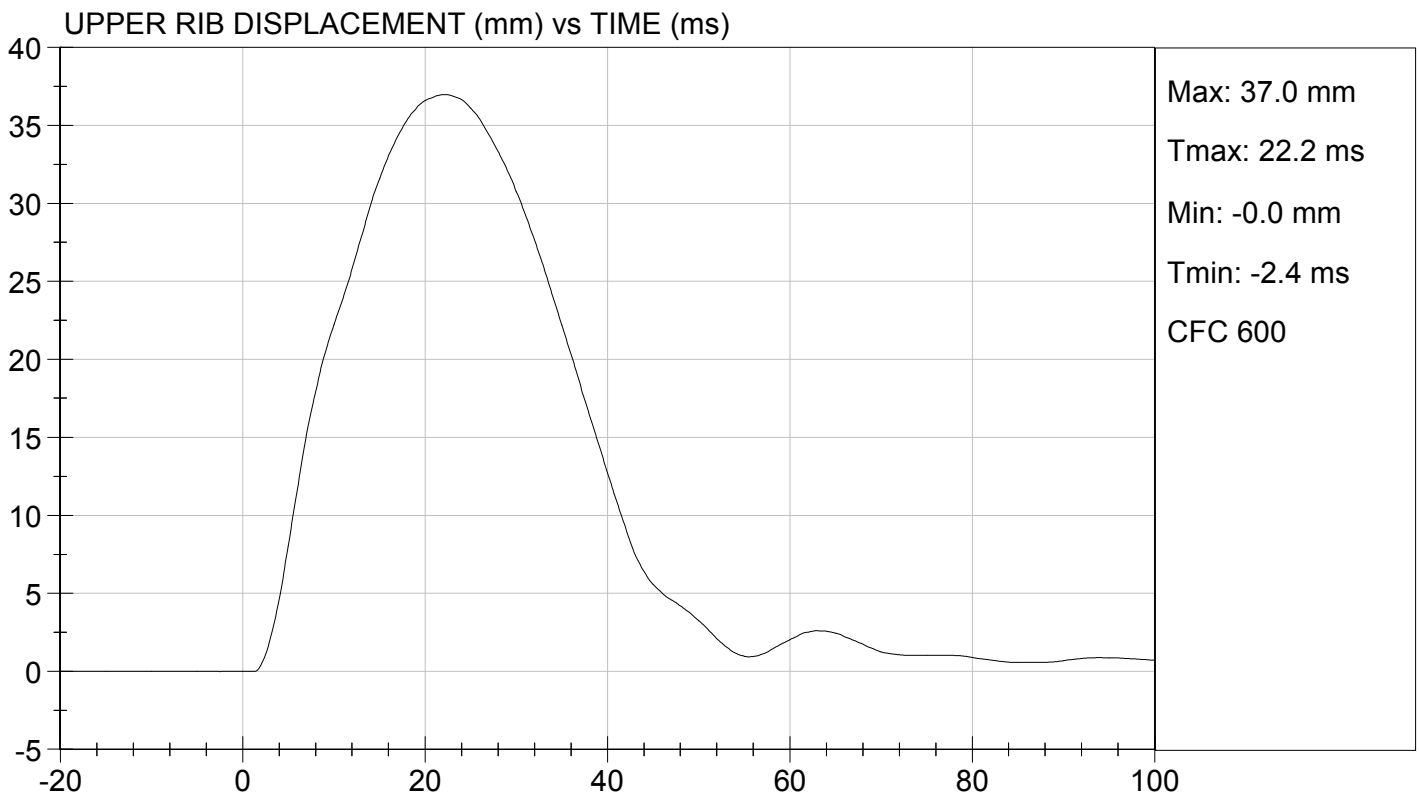
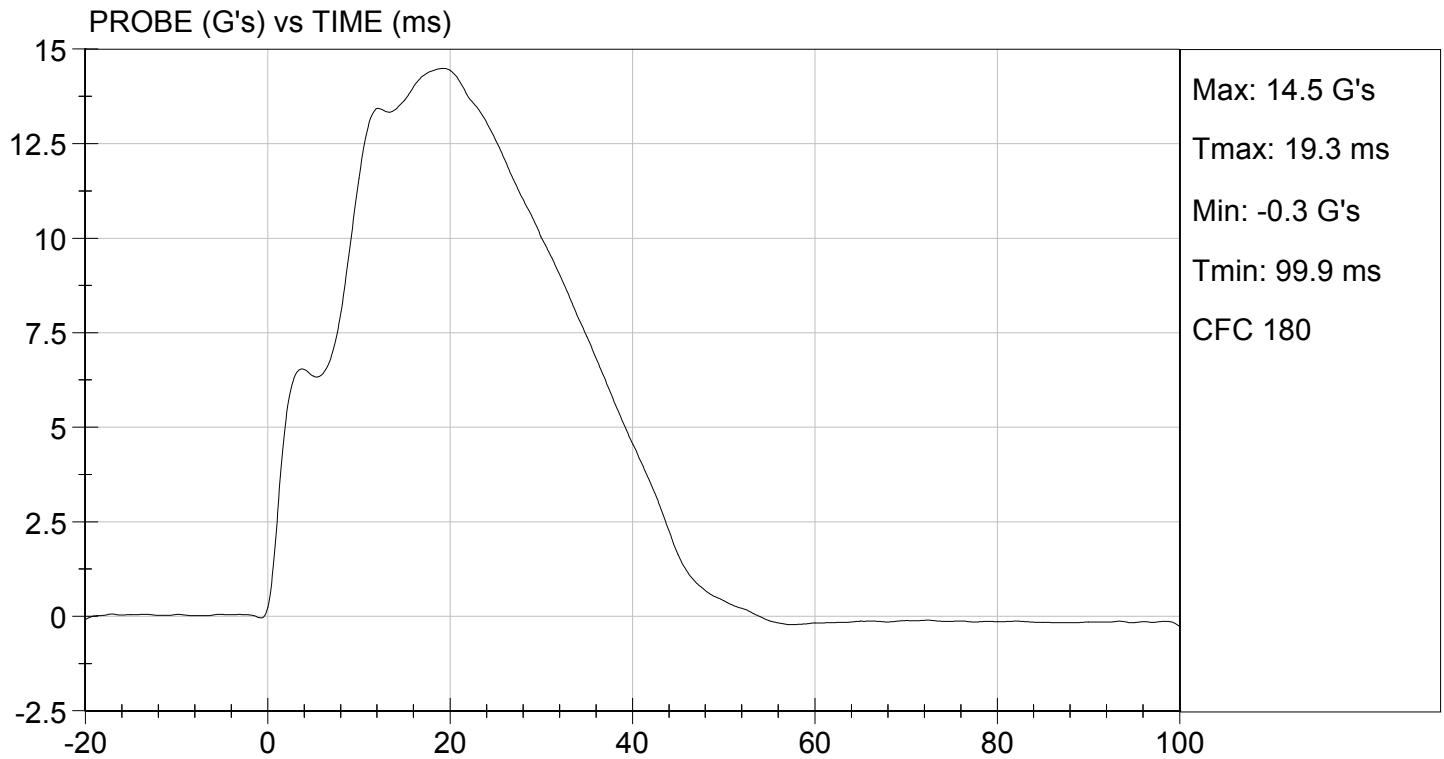
Test Date

Jessica Hall
Approved By



TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 09/23/2014
TEST #: D143285

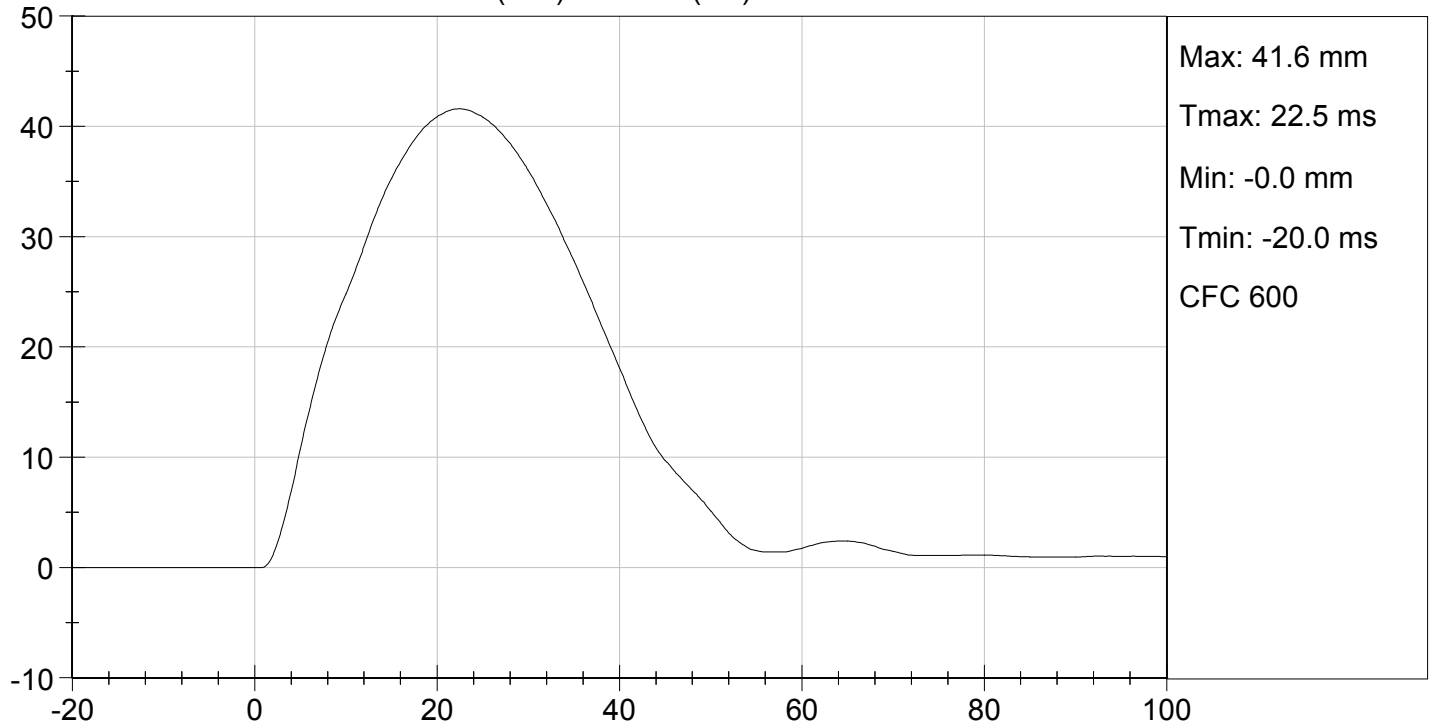




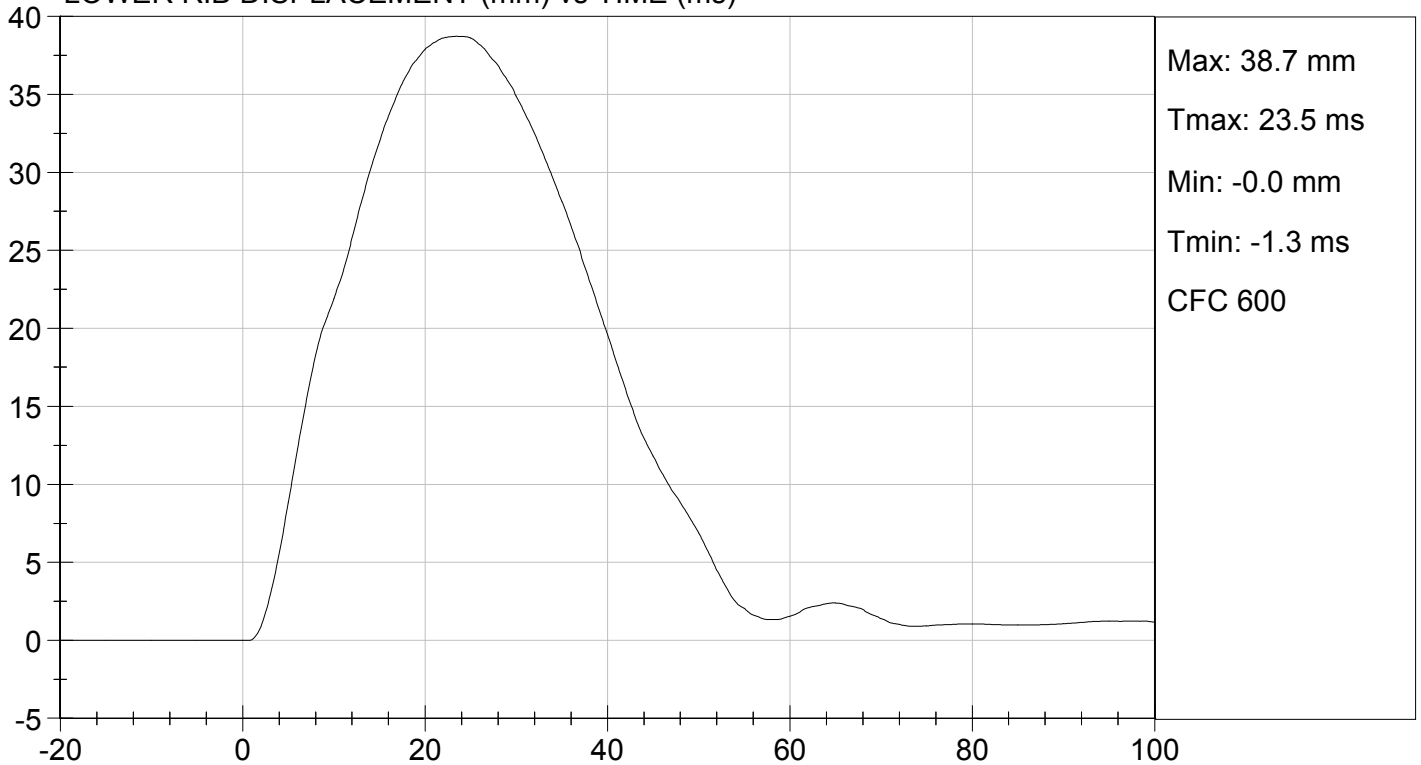
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 09/23/2014
TEST #: D143285

MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)

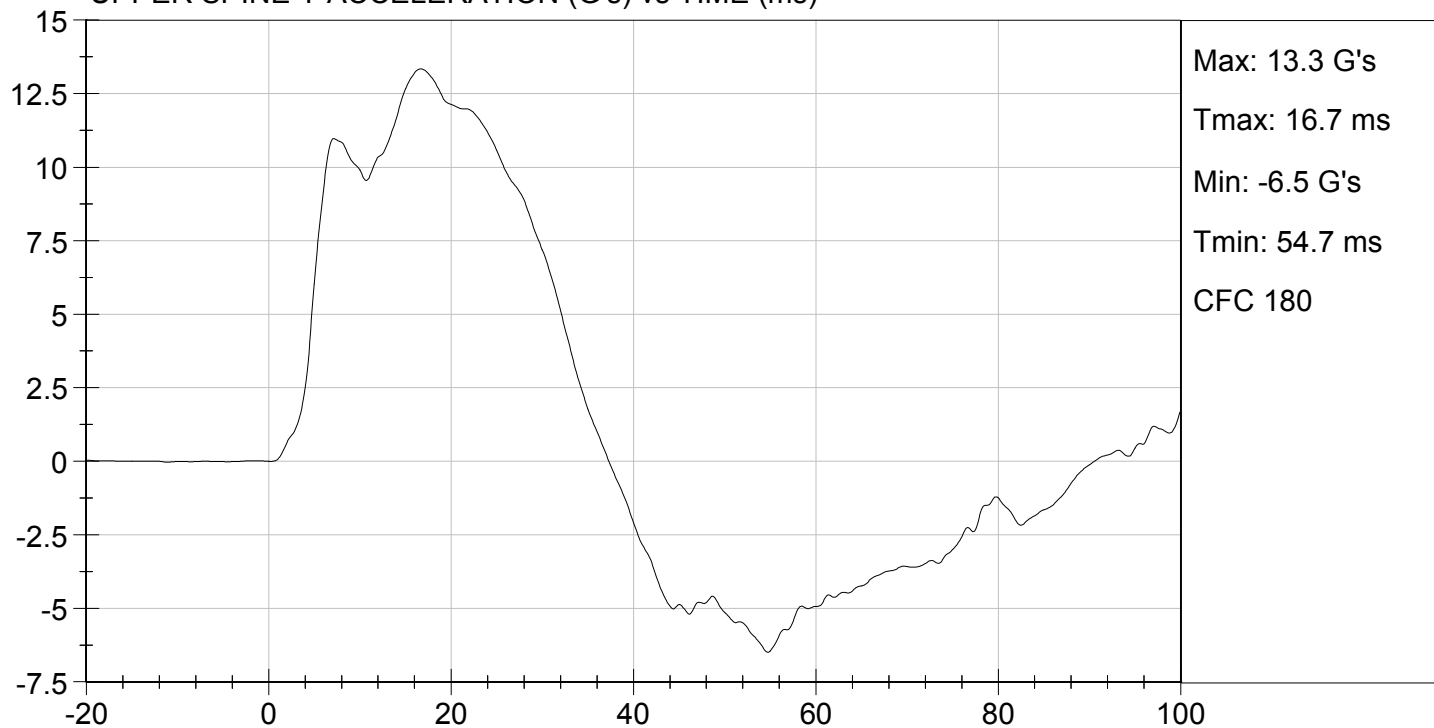


LOWER RIB DISPLACEMENT (mm) vs TIME (ms)

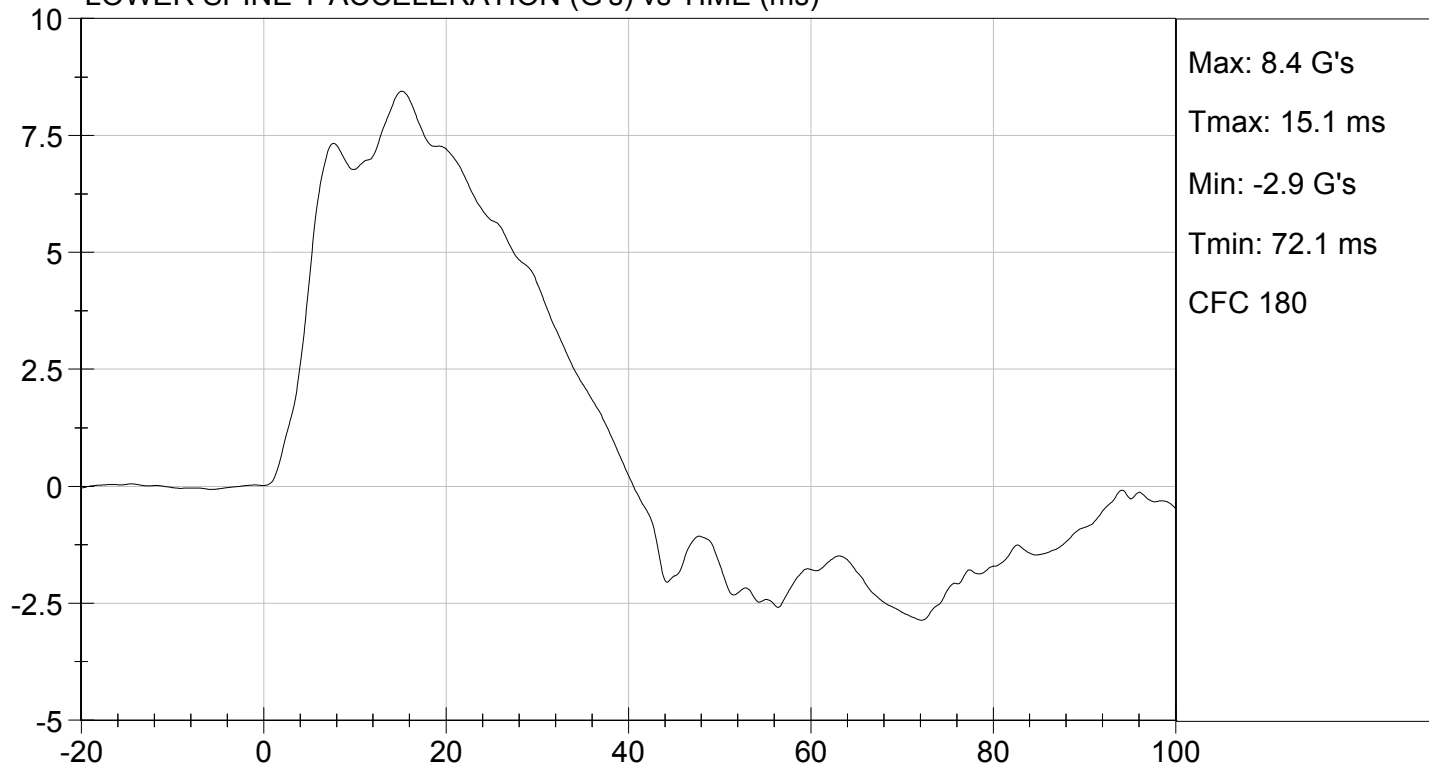




UPPER SPINE Y ACCELERATION (G's) vs TIME (ms)



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



MGA RESEARCH CORPORATION

ABDOMINAL IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

Test I.D: D143286

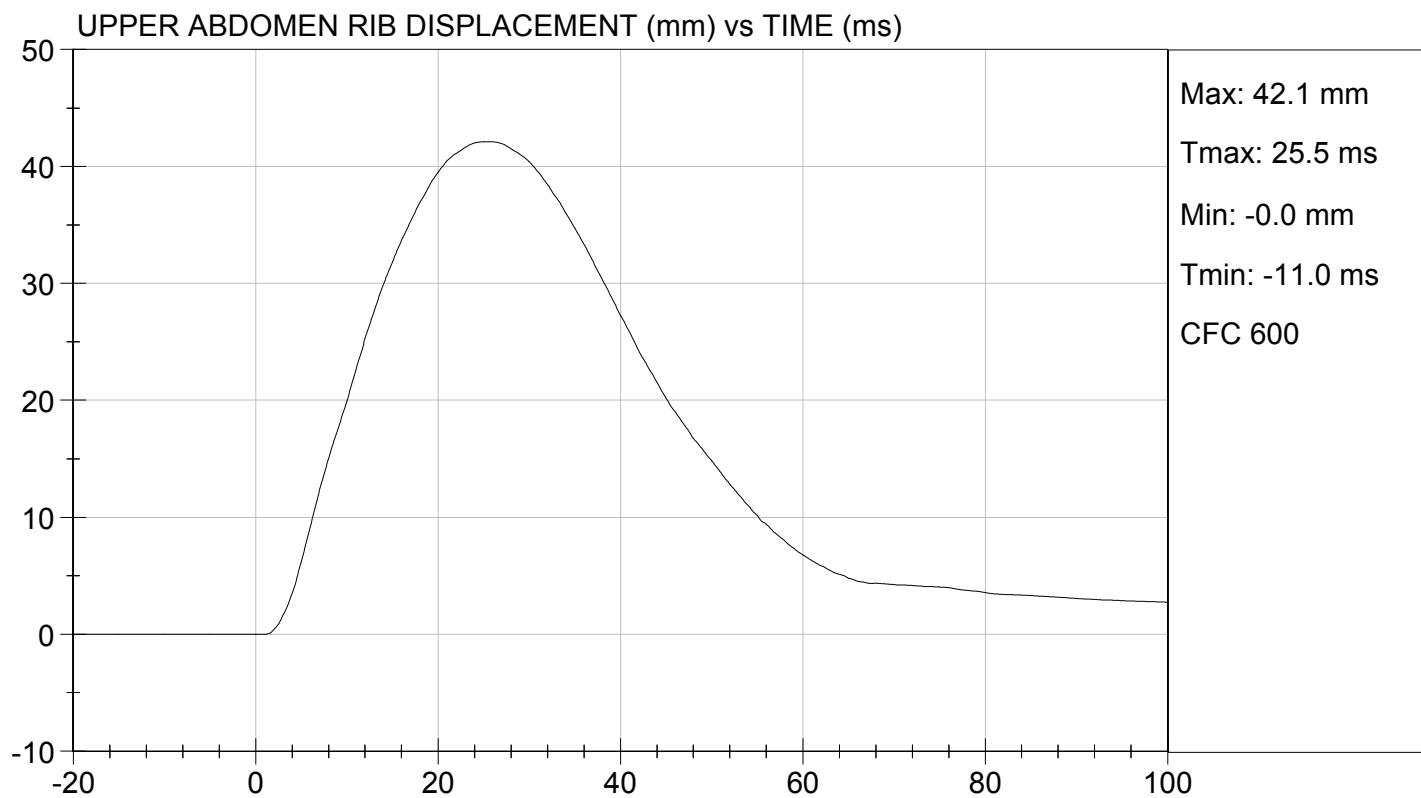
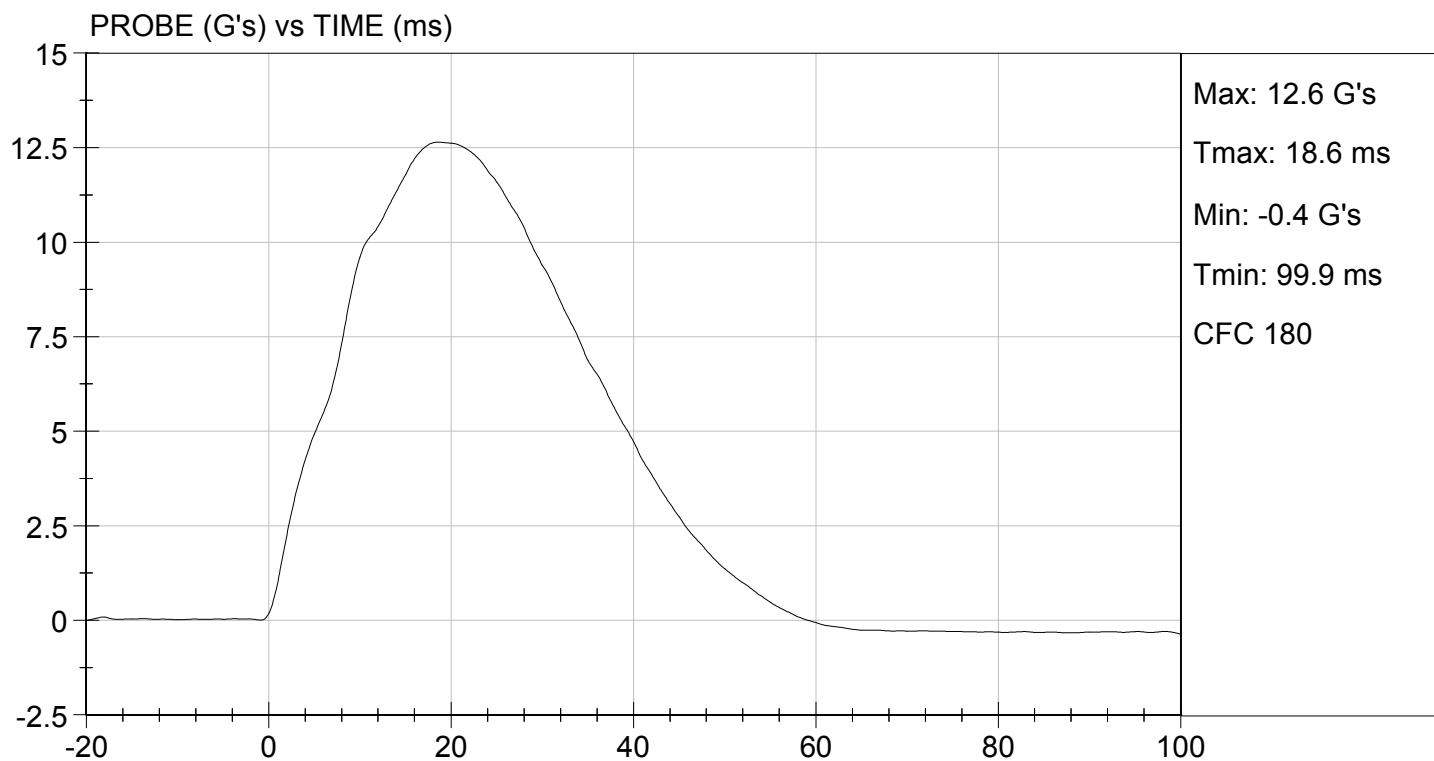
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	22.1	Pass
Humidity	%	10 to 70	47	Pass
Impact Velocity	m/s	4.20 to 4.40	4.27	Pass
Maximum Probe Acceleration	G's	12 to 16	13	Pass
Upper Abdomen Rib Displacement	mm	36 to 47	42	Pass
Lower Abdomen Rib Displacement	mm	33 to 44	39	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	10	Pass
Overall Test Results				Pass

Maxime Chamberland
Laboratory Technician

09/23/2014

Test Date

Jessica Hall
Approved By

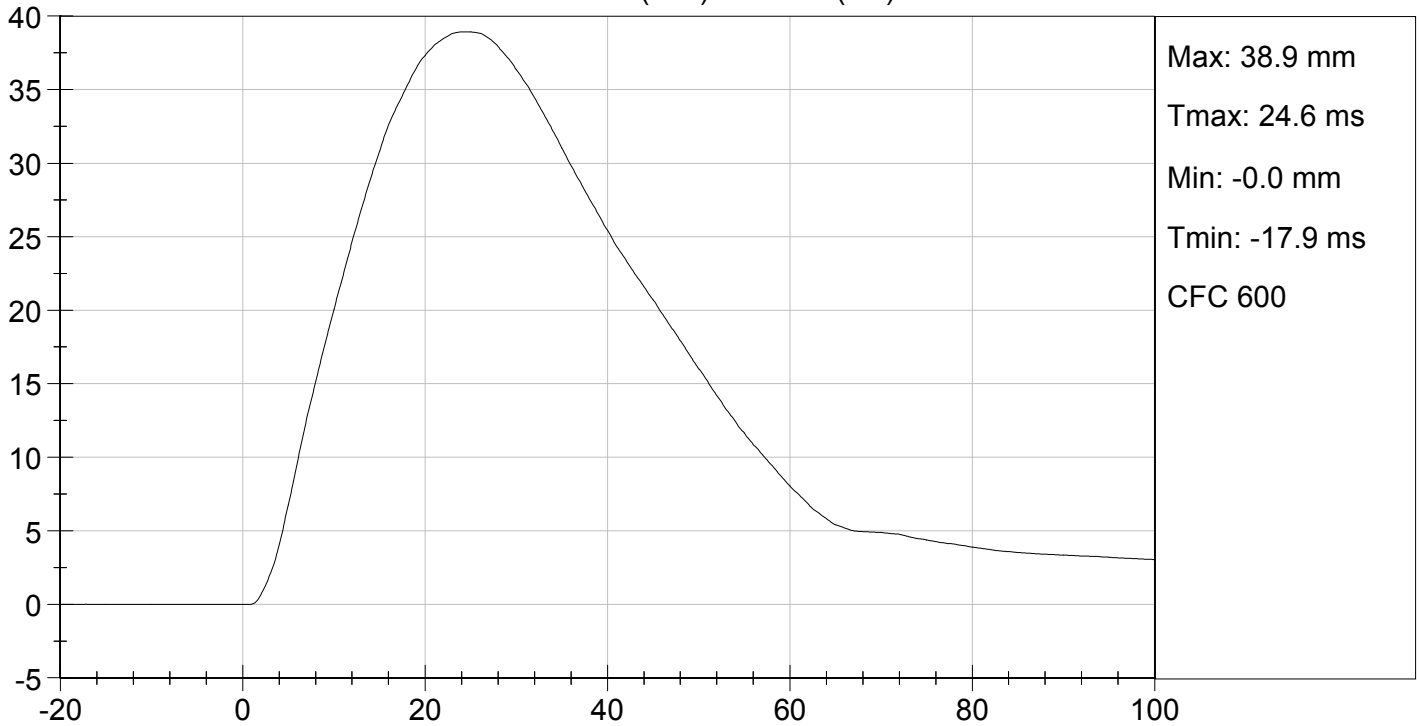




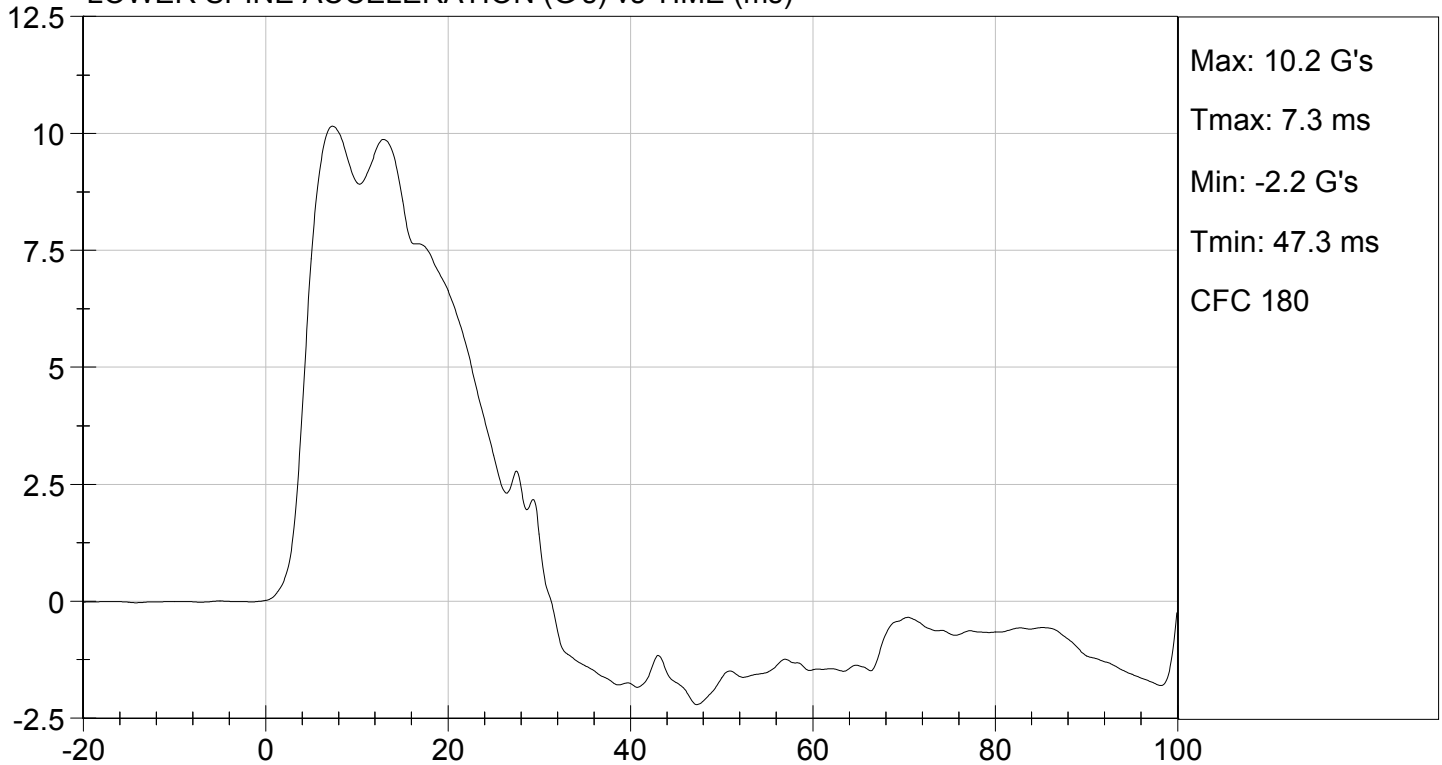
TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.01 ft/s, 4.27 m/s

TEST DATE: 09/23/2014
TEST #: D143286

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



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



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

Test I.D: D143287

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.2	Pass
Humidity	%	10 to 70	47	Pass
Impact Velocity	m/s	6.60 to 6.80	6.68	Pass
Maximum Probe Acceleration	G's	38 to 47	45	Pass
Pelvis Y Acceleration After 6 ms	G's	34 to 42	37	Pass
Peak Acetabulum Force	N	3600 to 4300	4,207	Pass
Overall Test Results				Pass

Maxime Chamberland
Laboratory Technician

09/23/2014

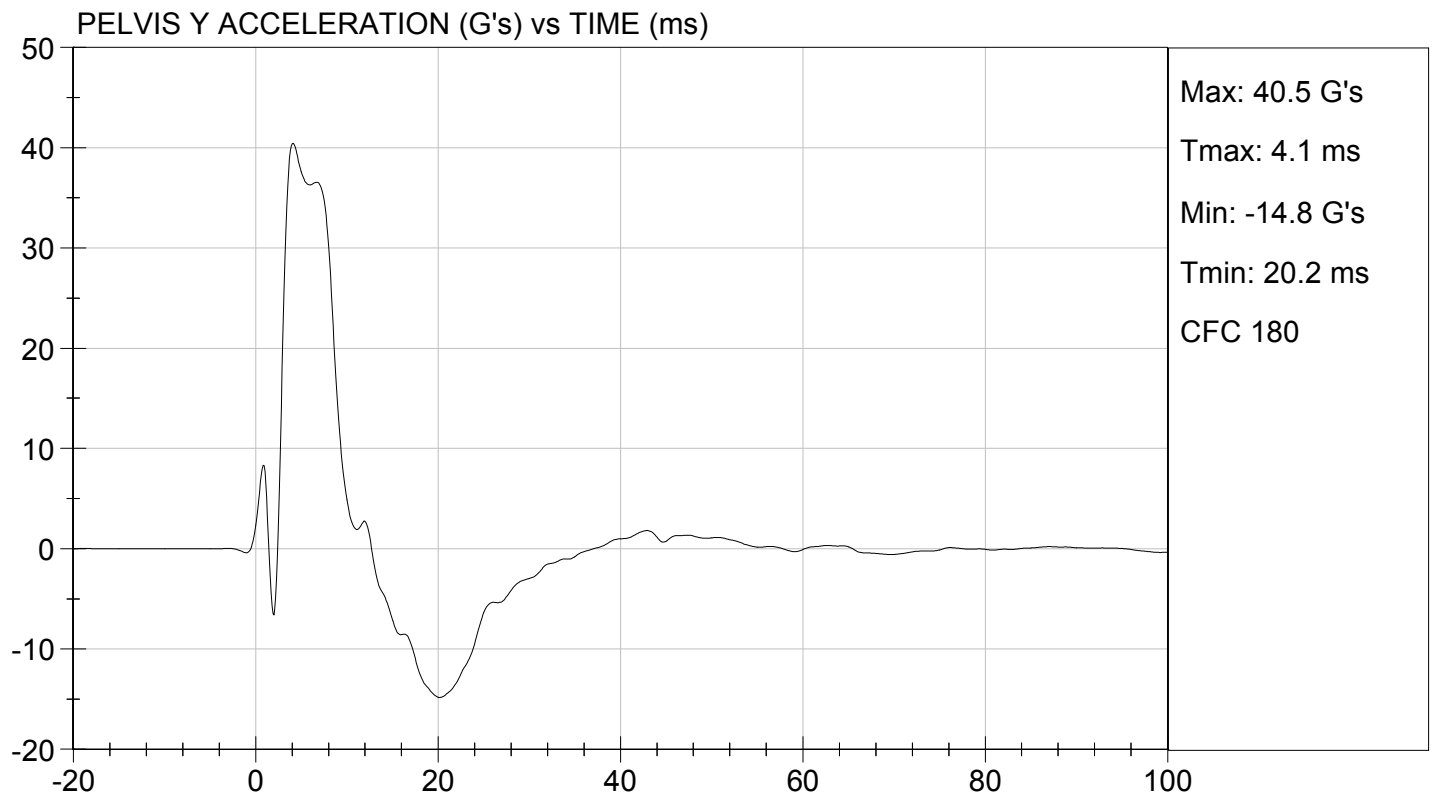
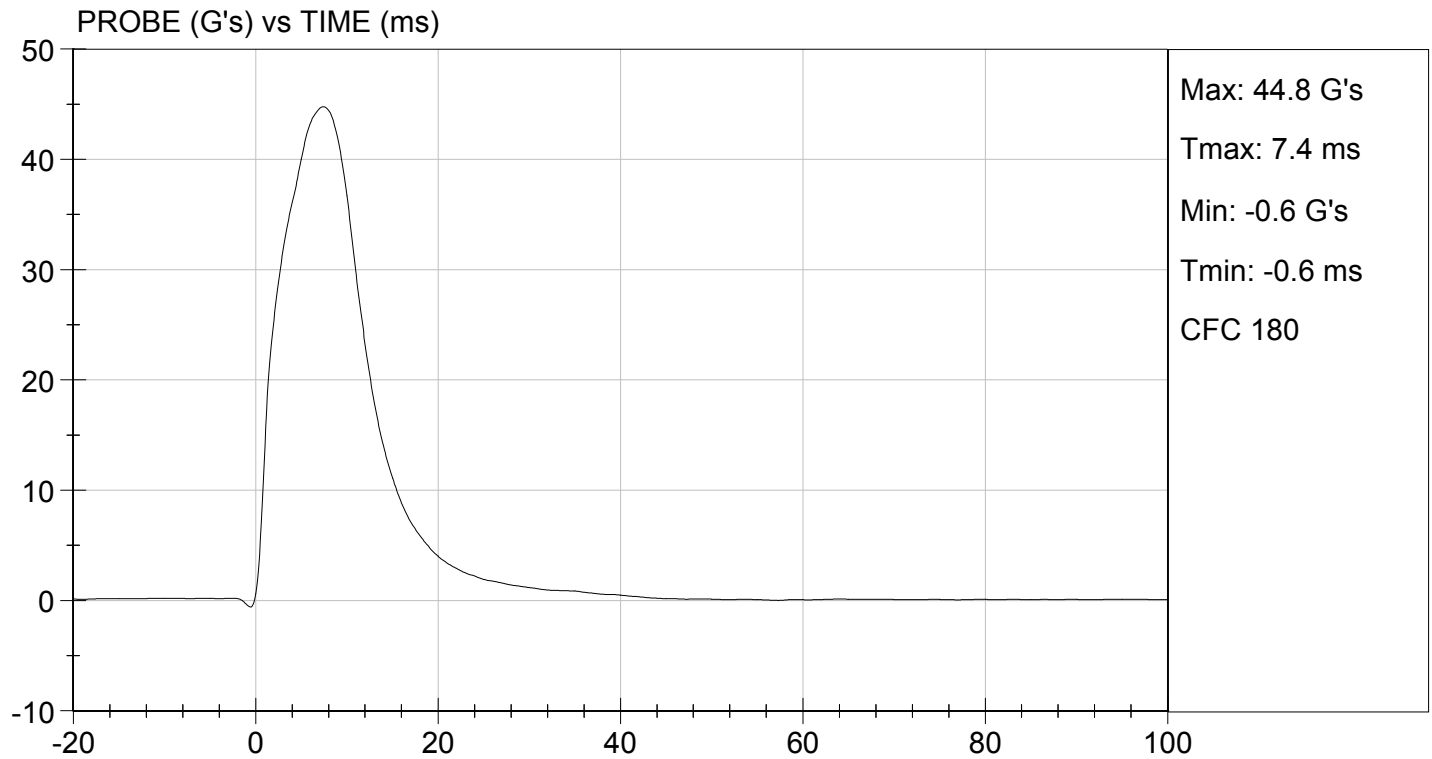
Test Date

Jessica Hall
Approved By



TEST DESC: PELVIS IMPACT
VELOCITY: 21.93 ft/s, 6.68 m/s

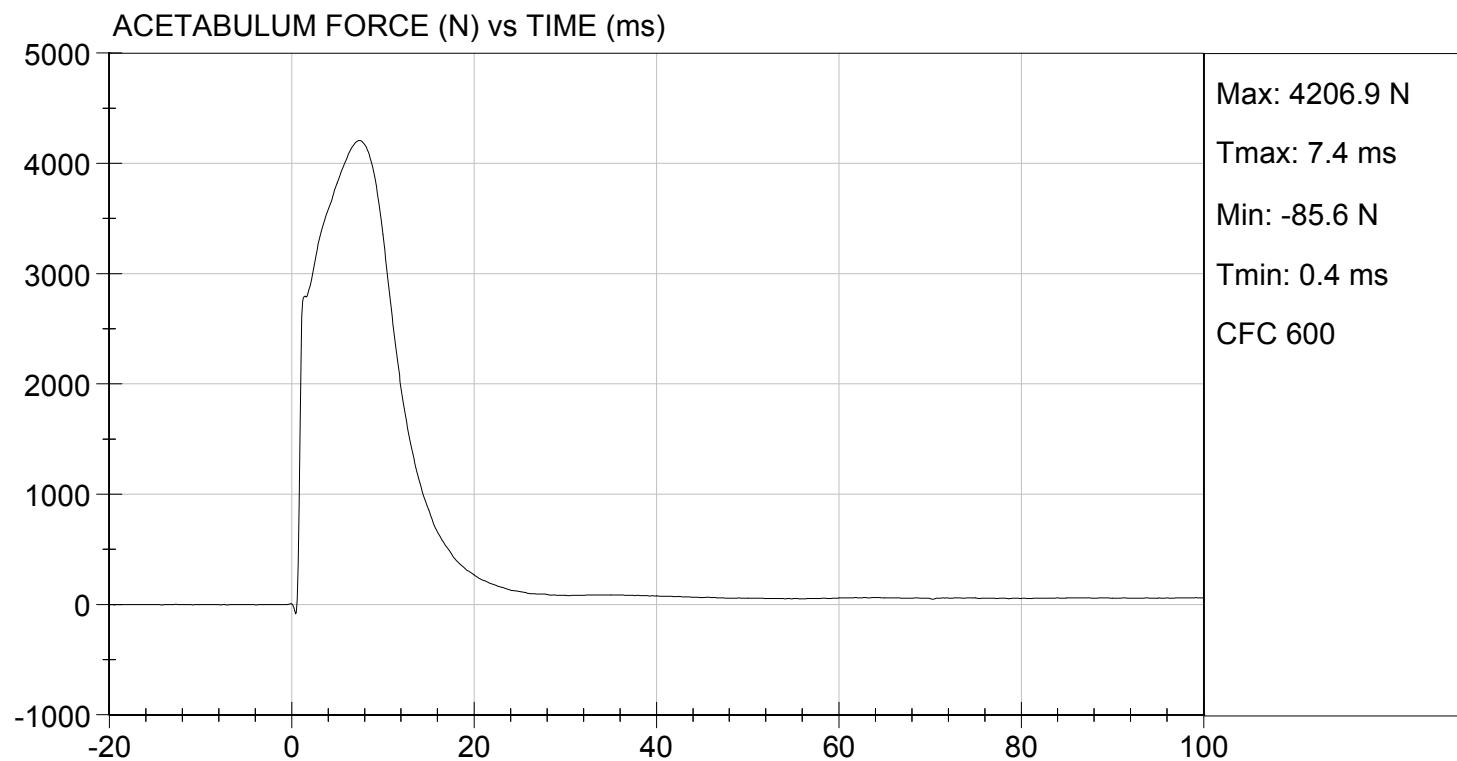
TEST DATE: 09/23/2014
TEST #: D143287





TEST DESC: PELVIS IMPACT
VELOCITY: 21.93 ft/s, 6.68 m/s

TEST DATE: 09/23/2014
TEST #: D143287



MGA RESEARCH CORPORATION

ILIAC IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

Test I.D: D143288

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.2	Pass
Humidity	%	10 to 70	46	Pass
Impact Velocity	m/s	4.20 to 4.40	4.30	Pass
Maximum Probe Acceleration	G's	36 to 45	39	Pass
Pelvis Y Acceleration	G's	28 to 39	30	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4,746	Pass
Overall Test Results				Pass

Maxime Chamberland
Laboratory Technician

09/23/2014

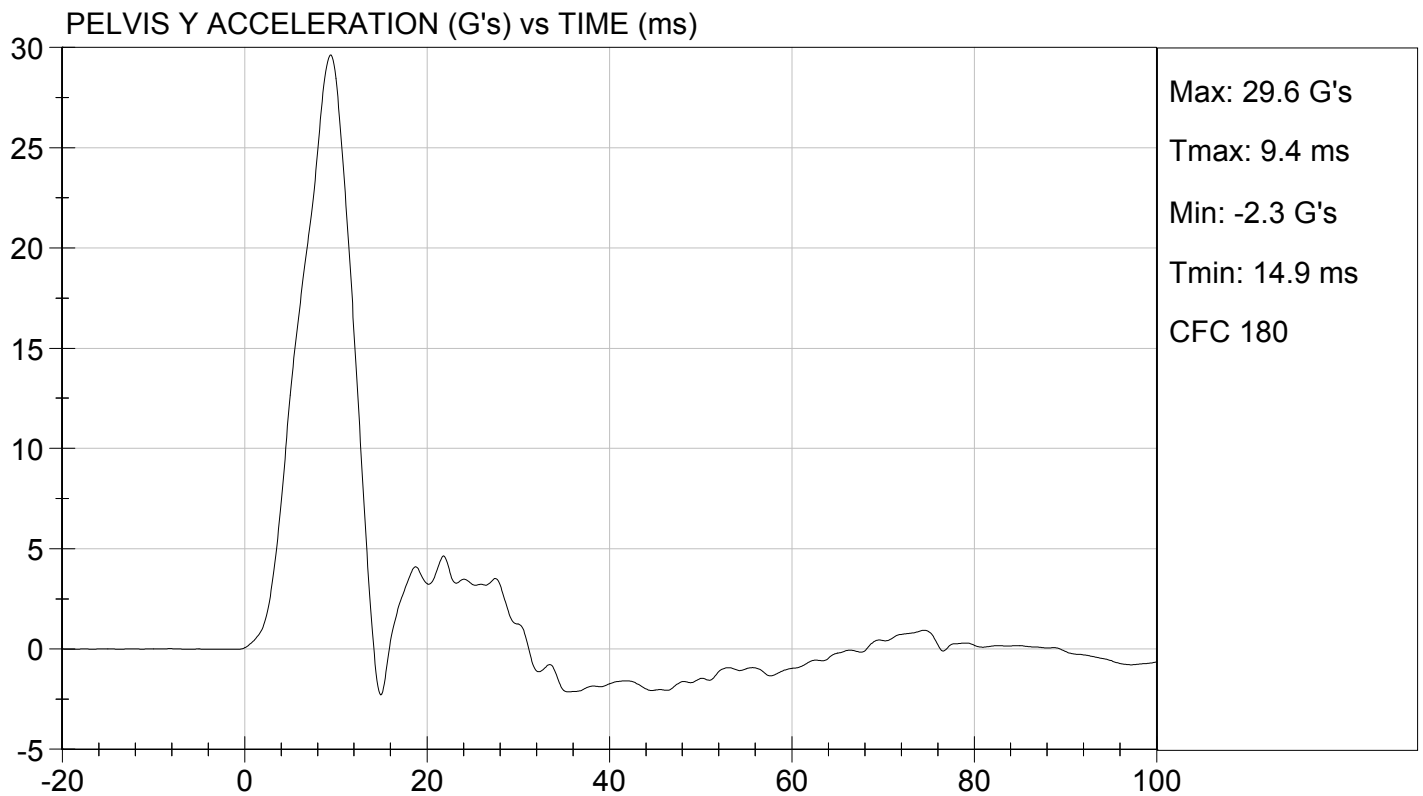
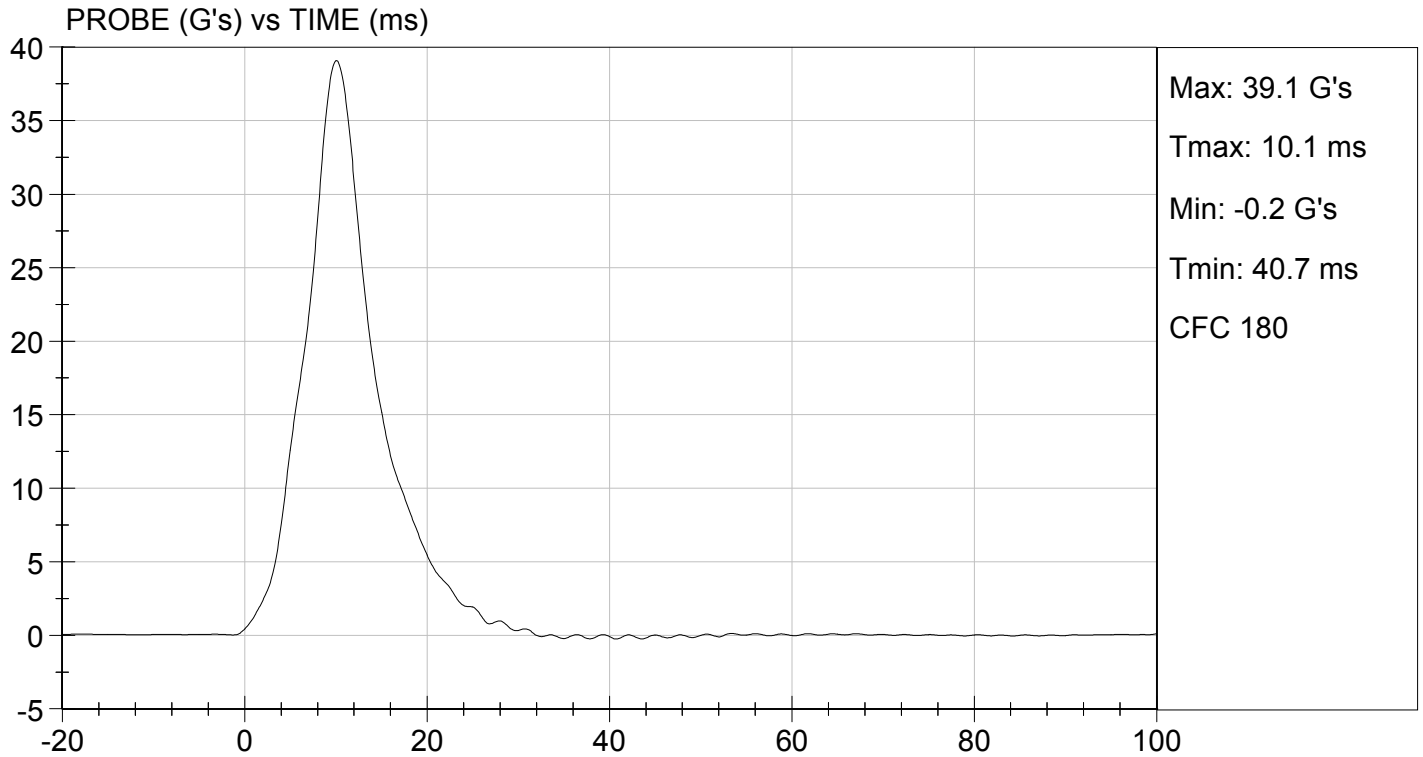
Test Date

Jessica Hall
Approved By



TEST DESC: ILLIAC
VELOCITY: 14.12 ft/s, 4.30 m/s

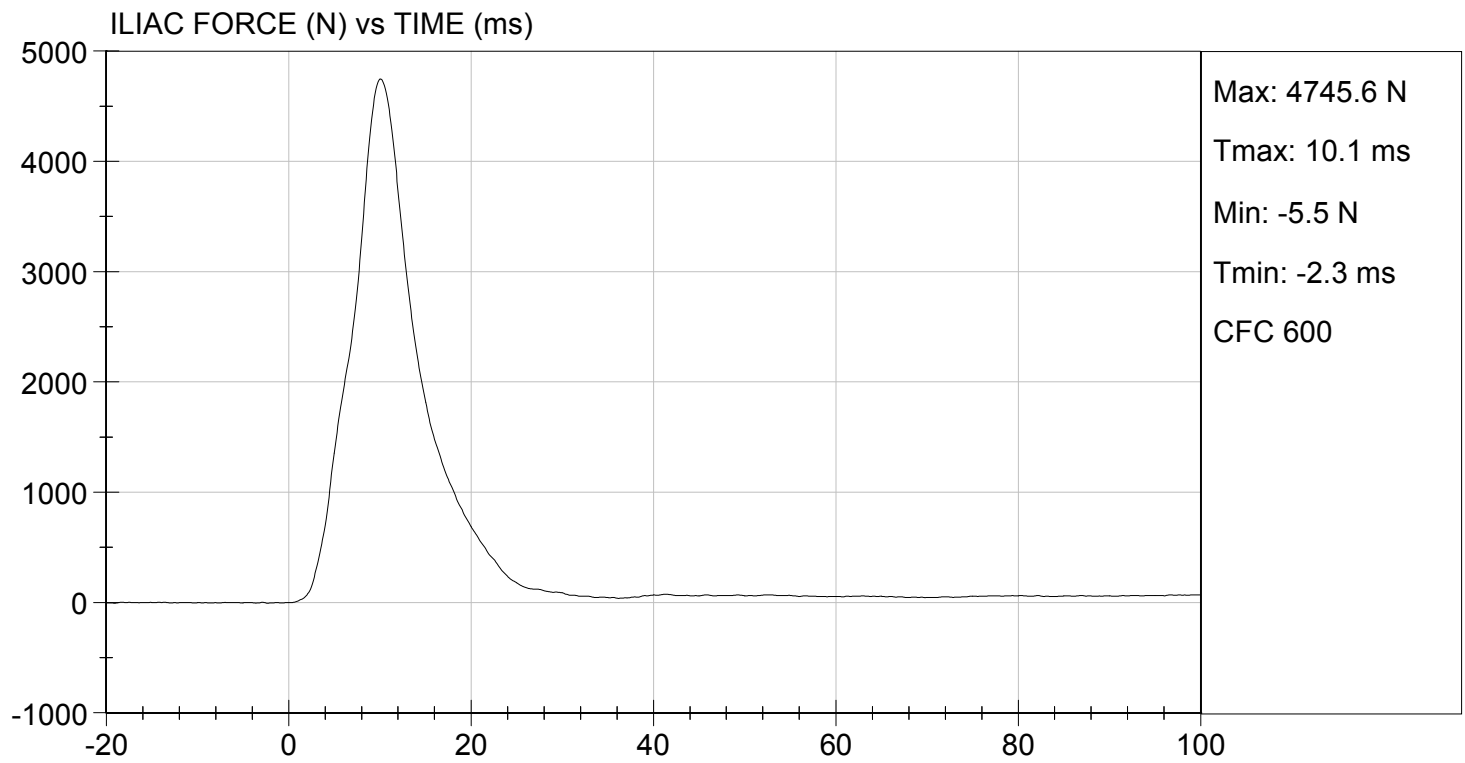
TEST DATE: 09/23/2014
TEST #: D143288



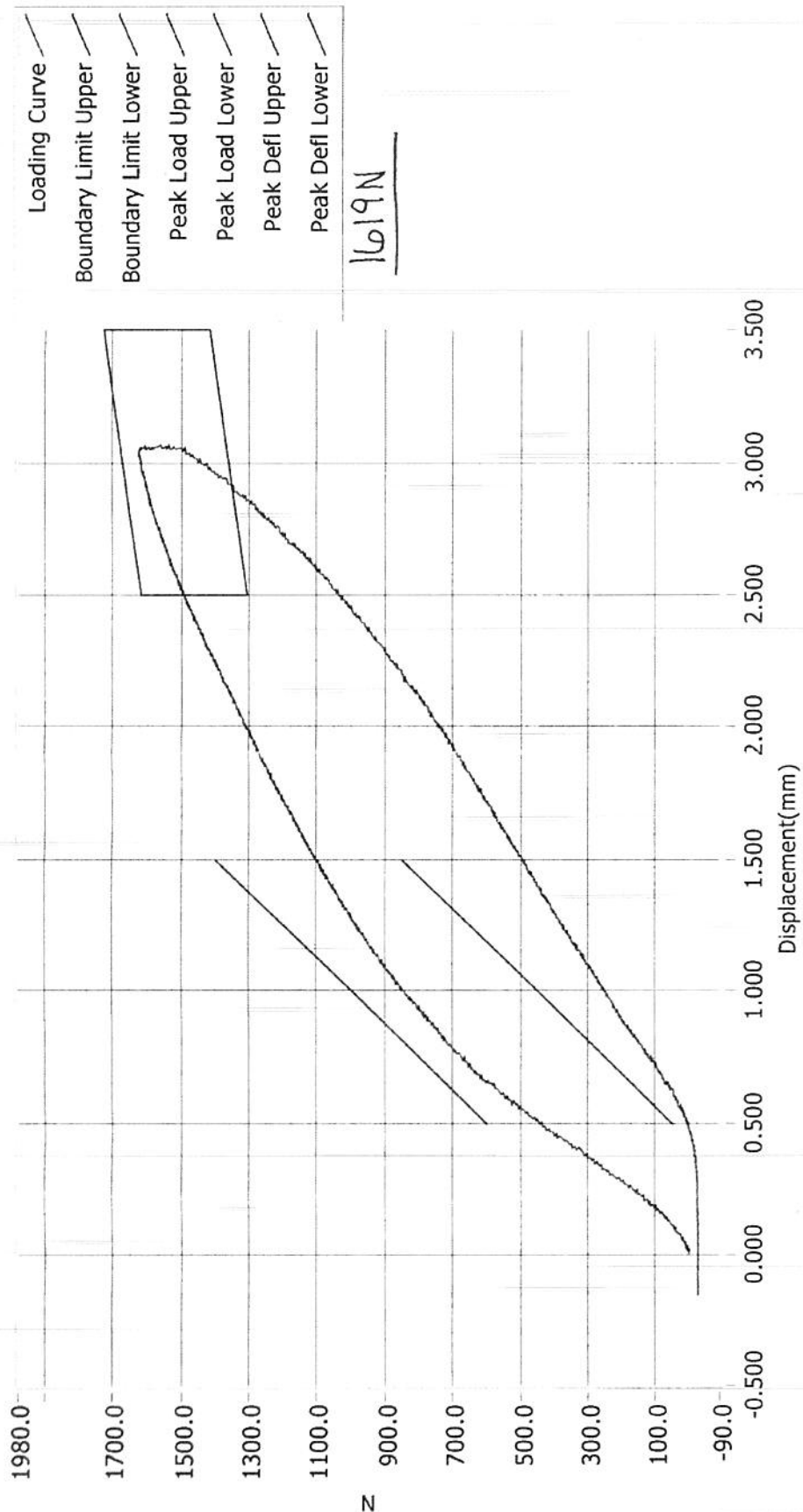


TEST DESC: ILLIAC
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 09/23/2014
TEST #: D143288



Resultant Data - SIDIIs Plug Compression

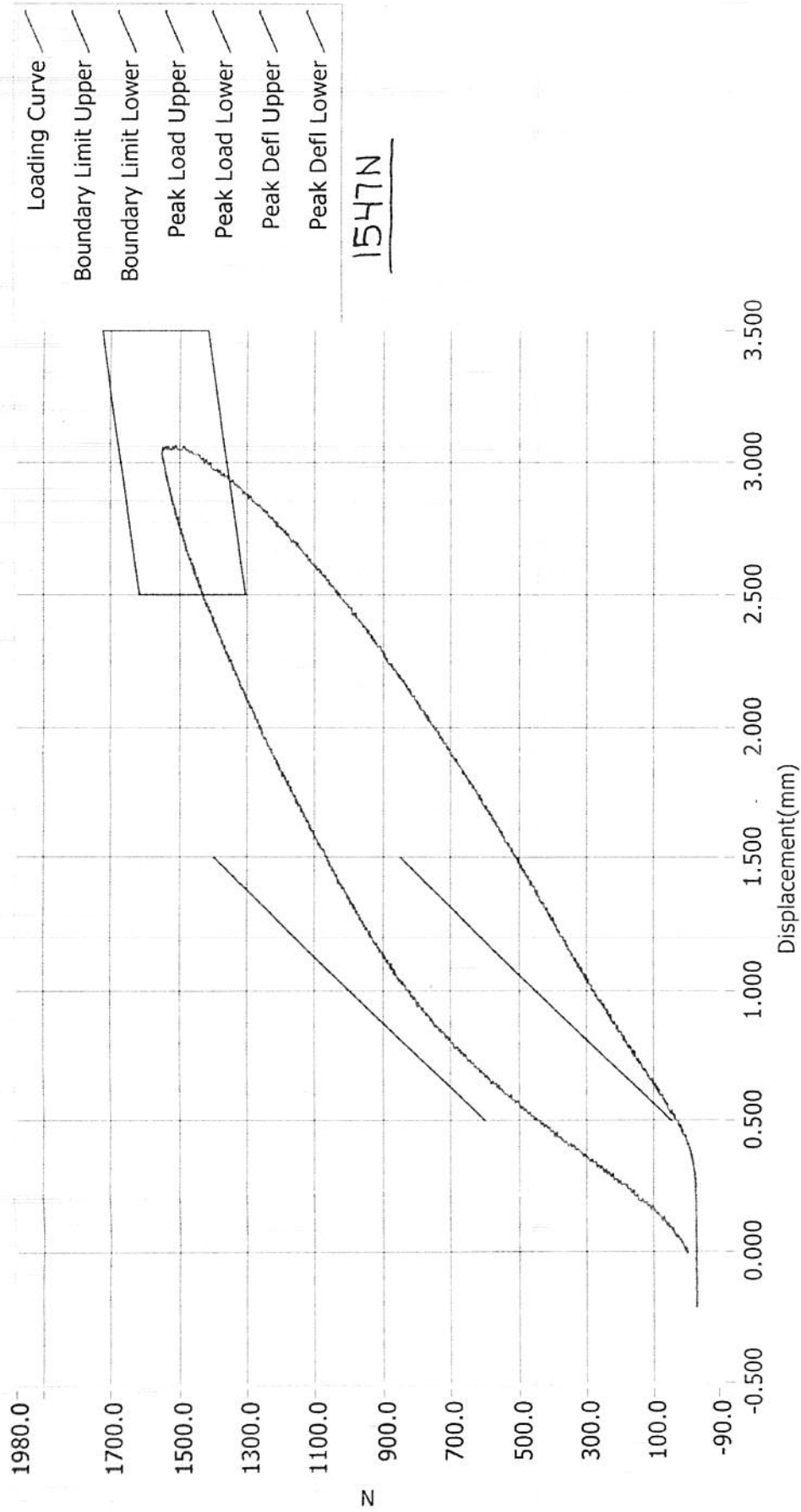


ATD Calibration Lab

Test ID	Part Serial Number	Test Date	Test Time
	70709	12/12/2013	10:12 PM
Cert ID	ATD Serial Number	ATD Type	
	N/A	SIDIIs	

Current Date : 12/12/2013 Current Time : 22:12:49

Resultant Data - SIDIIs Plug Compression



ATD Calibration Lab

Test ID	Part Serial Number	Test Date	Test Time
	70582	12/12/2013	7:14 PM
Cert ID	ATD Serial Number	ATD Type	
	N/A	SIDIIs	

Current Date : 12/12/2013

Current Time : 19:14:56

APPENDIX D
TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

Table 1 – Dummy Instrumentation (ES-2re)

			ES-2re S/N 032		
			Serial Number	Manufacturer	Calibration Date
Head CG Accelerometers		X	P79575	Endevco	08/11/14
		Y	P79577	Endevco	08/11/14
		Z	P79578	Endevco	08/11/14
		Xr	P79799	Endevco	08/11/14
		Yr	P79802	Endevco	08/11/14
		Zr	P79803	Endevco	08/11/14
Thorax Rib Displacement Potentiometers	Upper	Y	G176	Honeywell	08/11/14
	Middle	Y	G169	Honeywell	08/11/14
	Lower	Y	G164	Honeywell	08/11/14
Abdomen Load Cells	Forward	Y	ABG1532	Denton	01/09/14
	Middle	Y	ABG1534	Denton	01/09/14
	Rear	Y	ABG1535	Denton	01/09/14
Lower Spine Accelerometers (T12)		X	P78853	Endevco	08/08/14
		Y	P78861	Endevco	08/08/14
		Z	P78863	Endevco	08/08/14
Public Symphysis Load Cell		Y	PG461	Denton	01/09/14

Table 2 – Dummy Instrumentation (SID-IIs)

				SID-IIs S/N 296			
				Serial Number	Manufacturer	Calibration Date	
Head CG Accelerometers				X	P84436	Endevco	08/11/14
				Y	P84439	Endevco	08/11/14
				Z	P84440	Endevco	08/11/14
				Xr	P84450	Endevco	08/11/14
				Yr	P84456	Endevco	08/11/14
				Zr	P84457	Endevco	08/11/14
Displacement Potentiometers	Thoracic Rib	Upper	Y	G012	Servo	08/12/14	
		Middle	Y	G1163	FTSS	08/12/14	
		Lower	Y	G1158	FTSS	08/12/14	
	Abdominal Rib	Upper	Y	G1146	FTSS	08/12/14	
		Lower	Y	G1126	FTSS	08/12/14	
Lower Spine Accelerometers (T12)				X	P84437	Endevco	08/11/14
				Y	P84442	Endevco	08/11/14
				Z	P84443	Endevco	08/11/14
Acetabulum Load Cell				Y	ACG268	Denton	01/09/14
Iliac Wing Load Cell				Y	IWG282	Denton	01/09/14
Pelvis Plug (struck side)					70709	FTSS	12/12/13
Pelvis Plug (non-struck side)					70582	FTSS	12/12/13

Table 3 – Vehicle Instrumentation

			Serial Number	Manufacturer	Calibration Date
1	Vehicle Center of Gravity	X	P74606	Endevco	09/04/14
	Vehicle Center of Gravity	Y	P74605	Endevco	09/04/14
	Vehicle Center of Gravity	Z	P74604	Endevco	09/04/14
2	Right Sill at Front Seat	X	P66752	Endevco	07/01/14
	Right Sill at Front Seat	Y	P66753	Endevco	07/01/14
	Right Sill at Front Seat	Z	P66754	Endevco	07/01/14
3	Right Sill at Rear Seat	X	P77626	Endevco	08/25/14
	Right Sill at Rear Seat	Y	P77627	Endevco	08/25/14
	Right Sill at Rear Seat	Z	P77625	Endevco	08/25/14
4	Left Sill at Front Door	Y	P78955	Endevco	05/07/14
5	Left Sill at Rear Door	Y	P74700	Endevco	07/28/14
6	Left A-Post Lower	Y	P84656	Endevco	08/21/14
7	Left A-Post Middle	Y	P75551	Endevco	08/21/14
8	Left B-Post Lower	Y	P84648	Endevco	08/21/14
9	Left B-Post Middle	Y	P85031	Endevco	08/21/14
10	Front Seat Track	Y	P67878	Endevco	07/28/14
11	Rear Seat Track or Structure	Y	P78875	Endevco	07/16/14
12	Right Rear Occ. Compartment	Y	P74653	Endevco	07/16/14
13	Engine Block	X	P77616	Endevco	08/25/14
	Engine Block	Y	P77615	Endevco	08/25/14
14	Rear Floorpan Above Axle	X	P85121	Endevco	08/08/14
	Rear Floorpan Above Axle	Y	P85120	Endevco	08/08/14
	Rear Floorpan Above Axle	Z	P85119	Endevco	08/08/14

Table 4 – MDB Instrumentation

		Serial Number	Manufacturer	Calibration Date
MDB Center of Gravity	X	P85036	Endevco	08/08/14
MDB Center of Gravity	Y	P85038	Endevco	08/08/14
MDB Center of Gravity	Z	P85037	Endevco	08/08/14
Left Frame at Rear Axle Centerline	X	P67517	Endevco	08/18/14
Left Frame at Rear Axle Centerline	Y	P67518	Endevco	08/18/14