

REPORT NUMBER: SINCAP-MGA-2014-051

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

**TOYOTA MOTOR MANUFACTURING, INDIANA, INC.
2014 Toyota Highlander LE 5-Dr SUV
NHTSA No.: O20145107**

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



Test Date: February 4, 2014

Final Report Date: March 21, 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: March 21, 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

1. Report No. SINCAP-MGA-2014-051	2. Government Accession No.	3. Recipient's Catalog No.																																																					
4. Title and Subtitle Final Report of New Car Assessment Program Side Impact MDB Testing of a 2014 Toyota Highlander LE 5-Dr SUV, NHTSA No.: O20145107		5. Report Date March 21, 2014																																																					
		6. Performing Organization Code MGA																																																					
7. Author(s) Donna Janovicz, Project Manager Ben Fischer, Project Engineer		8. Performing Organization Report No. SINCAP-MGA-2014-051																																																					
9. Performing Organization Name and Address MGA Research Corporation 5000 Warren Road Burlington, WI 53105		10. Work Unit No.																																																					
		11. Contract or Grant No. DTNH22-09-D-00124																																																					
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards (NVS-111) 1200 New Jersey Ave, SE, Room W43-410 Washington, D.C. 20590		13. Type of Report and Period Covered: Final Test Report February 4, 2014 to March 21, 2014																																																					
		14. Sponsoring Agency Code NVS-111																																																					
15. Supplementary Notes																																																							
16. Abstract A 55/28 km/h 90° Moving Deformable Barrier NCAP Side Impact Test was conducted on the 2014 Toyota Highlander LE 5-Dr SUV in accordance with the specifications of the Office of Crashworthiness Standards NCAP Side Laboratory Test Procedure for the generation of consumer information on vehicle side crash protection. The test was conducted at MGA Research Corporation, in Burlington, Wisconsin, on February 4, 2014. The impact velocity of the Moving Deformable Barrier (MDB) was 62.1 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle at the time of impact was 21.6° C. The target vehicle post-test maximum crush was 206 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>54</td> </tr> <tr> <td>Maximum Thorax Rib Deflection</td> <td>mm</td> <td>44</td> <td>14</td> </tr> <tr> <td>Total Abdominal Force</td> <td>N</td> <td>2500</td> <td>393</td> </tr> <tr> <td>Pubic Symphysis Force</td> <td>N</td> <td>6000</td> <td>1548</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>111</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td>Gs</td> <td>82</td> <td>41</td> </tr> <tr> <td>Total Pelvic Force (sum of acetabular and iliac forces)</td> <td>N</td> <td>5525</td> <td>1958</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td>mm</td> <td>38*</td> <td>11</td> </tr> <tr> <td>Maximum Abdomen Rib Deflection</td> <td>mm</td> <td>45*</td> <td>28</td> </tr> </tbody> </table> *Proposed IARV The two doors on the struck side of the vehicle did not separate from the body at the hinges or latches and the opposite doors did not open during the side impact event.					Driver ATD (ES-2re)			Measurement Description	Units	Threshold	Result	Head Injury Criteria (HIC ₃₆)	N/A	1000	54	Maximum Thorax Rib Deflection	mm	44	14	Total Abdominal Force	N	2500	393	Pubic Symphysis Force	N	6000	1548		Passenger ATD (SID-IIs)			Measurement Description	Units	Threshold	Result	Head Injury Criteria (HIC ₃₆)	N/A	1000	111	Resultant Lower Spine Acceleration	Gs	82	41	Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	1958	Maximum Thoracic Rib Deflection	mm	38*	11	Maximum Abdomen Rib Deflection	mm	45*	28
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19. Security Classification of Report Unclassified	20. Security Classification of Page Unclassified	21. No. of Pages 224	22. Price																																																				

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SECTION 1

TEST PURPOSE AND PROCEDURE

This moving deformable barrier side impact test is part of the MY 2014 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 2014 Toyota Highlander LE 5-Dr SUV. 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 2014 Toyota Highlander LE 5-Dr SUV was impacted on the left (driver's) side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 62.1 km/h. The target vehicle was stationary and was positioned at an angle of 63° to the line of forward motion. The side impact test was conducted by MGA Research Corporation in Burlington, Wisconsin, on February 4, 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	54
Maximum Thorax Rib Deflection	mm	44	14
Total Abdominal Force	N	2500	393
Pubic Symphysis Force	N	6000	1548

	Passenger ATD (SID-IIs)		
Measurement Description	Units	Threshold	Result
Head Injury Criteria (HIC ₃₆)	N/A	1000	111
Resultant Lower Spine Acceleration	Gs	82	41
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	1958
Maximum Thoracic Rib Deflection	mm	38*	11
Maximum Abdomen Rib Deflection	mm	45*	28

*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	No	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 questionable data from 4-12ms
Left Lower B-Post Y has questionable data
Left Mid B-Post Y has questionable data from 4-56ms
Driver Seat Track Y has questionable data from 13-18ms
MDB CG X has questionable data from 59-70 and 110-120ms
MDB CG Y has questionable data from 60-123ms

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: 2014 Toyota Highlander LE 5-Dr SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20145107
 Test Date: 2/4/2014

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	O20145107	Traction Control System (TCS)	Yes
Model Year	2014	Auto-Leveling System	No
Make	Toyota	Automatic Door Locks (ADL)	Yes
Model	Highlander	Power Window Auto-Reverse	Yes
Body Style	5-Dr SUV	Other Optional Feature	N/A
VIN	5TDZARFH1ES004763	Driver Front Airbag	Yes
Body Color	Silver Sky Metallic	Driver Curtain Airbag	Yes
Odometer Reading (km/mi)	129 / 80	Driver Head/Torso Airbag	No
Engine Displacement (L)	2.7	Driver Torso Airbag	No
Type/No. Cylinders	4	Driver Torso/Pelvis Airbag	Yes
Engine Placement	Lateral	Driver Pelvis Airbag	No
Transmission Type	Automatic	Driver Knee Airbag	Yes
Transmission Speeds	6	Rear Pass. Curtain Airbag	Yes
Overdrive	Yes	Rear Pass. Head/Torso Airbag	No
Final Drive	Front	Rear Pass. Torso Airbag	No
Roof Rack	No	Rear Pass. Torso/Pelvis Airbag	No
Sunroof/T-Top	No	Rear Pass. Pelvis Airbag	No
Running Boards	No	Driver Seat Belt Pretensioner	Yes
Tilt Steering Wheel	Yes	Rear Pass. Seat Belt Pretensioner	No
Power Seats	No	Driver Load Limiter	Yes
Anti-Lock Brakes (ABS)	Yes	Rear Pass. Load Limiter	No
		Front Pass. Seat Cushion Airbag	Yes

Does owner's manual provide instruction to turn off automatic door locks?	Yes
---	-----

DATA FROM CERTIFICATION LABEL

Manufactured By	Toyota Motor Manufacturing, Indiana, Inc.	GVWR (kg)	2565
Date of Manufacture	01/14	GAWR Front (kg)	1340
Vehicle Type	MPV	GAWR Rear (kg)	1485

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	2	3	3	8	
Capacity Weight (VCW) (kg)				660	(A)
DSC x 68.04 kg				544	(B)
Rated Cargo and Luggage Weight (RCLW)				116	(A-B)

VEHICLE SEAT TYPE

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

NHTSA No. O20145107
Test Date: 2/4/2014

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

Test Vehicle: 2014 Toyota Highlander LE 5-Dr SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20145107
 Test Date: 2/4/2014

TEST PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	193	200	207	207
Tire Placard	kPa	240	240	240	240
Owner's Manual	kPa	240	240	240	240
As Tested	kPa	240	240	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	514.8	440.0		565.6	559.3		548.4	565.2	
Right	kg	504.9	421.8		497.2	496.7		496.7	515.7	
Ratio	%	54.2	45.8		50.1	49.9		49.2	50.8	
Totals	kg	1019.7	861.8	1881.5	1062.8	1056.0	2118.8	1045.1	1080.9	2126.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1881.5	(A)
Sum of Actual Weight of 2 P572 ATDs Used	kg	129.3	(B)
Rated Cargo/Luggage Weight (RCLW)	kg	116	(C)
Calculated Test Vehicle Target Weight (TVTW)	kg	2126.8	(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	828	824	Yes
Right Front	mm	835	838	Yes
Right Rear	mm	804	813	Yes
Left Rear	mm	793	801	Yes
Vehicle CG (Aft of Front Axle)	mm	1418	1391	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	38	49	

*** 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: 2014 Toyota Highlander LE 5-Dr SUV
Test Program: NCAP Side MDB Impact Test

NHTSA No. O20145107
Test Date: 2/4/2014

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Weight of Ballast, if any	70.8
None	0.0

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

Test Vehicle: 2014 Toyota Highlander LE 5-Dr SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20145107
 Test Date: 2/4/2014

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	18.2	11.0	14.6
Front Passenger Seat	Fixed	Fixed	Fixed
Front Center Seat			
Struck Side Rear Seat	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed

SEAT HEIGHT AND ANGLE

Seat	As Tested SCRL Angle (Mid) (°)	As Tested SCR Height (mm)	SCR Height Position	SCR Height (mm)		
				Rear- most	Mid- Fore/Aft	Forward- Most
Driver Seat	14.6	Fixed	Max	Fixed	Fixed	Fixed
	14.6	Fixed	Mid	Fixed	Fixed	Fixed
	14.6	Fixed	Min	Fixed	Fixed	Fixed
Front Passenger Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
	Fixed	Fixed	Mid	Fixed	Fixed	Fixed
	Fixed	Fixed	Min	Fixed	Fixed	Fixed
Front Center Seat			Max			
			Mid			
			Min			
Struck Side Rear Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
	Fixed	Fixed	Mid	Fixed	Fixed	Fixed
	Fixed	Fixed	Min	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
	Fixed	Fixed	Mid	Fixed	Fixed	Fixed
	Fixed	Fixed	Min	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
	Fixed	Fixed	Mid	Fixed	Fixed	Fixed
	Fixed	Fixed	Min	Fixed	Fixed	Fixed

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

Test Vehicle: 2014 Toyota Highlander LE 5-Dr SUV
 Test Program: NCAP Side MDB Impact Test

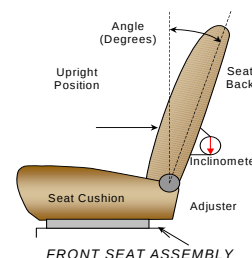
NHTSA No. O20145107
 Test Date: 2/4/2014

SEAT FORE/AFT POSITIONS

Seat	Total Fore/Aft Travel		Test Position from Forward-most Position	
	mm	Detents	mm	Detent
Driver Seat	260	26 (1 st as 0)	130	13 th (1 st as 0)
Front Passenger Seat	260	26 (1 st as 0)	130	13 th (1 st as 0)
Front Center Seat				
Struck Side Rear Seat	250	10 (1 st as 0)	250	10 th (1 st as 0)
Non-Struck Side	250	10 (1 st as 0)	250	10 th (1 st as 0)
Rear Center Seat	250	10 (1 st as 0)	250	10 th (1 st as 0)

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	52.8	27 (1 st as 1)	4.0	6 th (1 st as 0)
Front Passenger Seat	52.8	27 (1 st as 1)	3.0	6 th (1 st as 0)
Front Center Seat				
Struck Side Rear Seat	14.0	8 (1 st as 1)	6.1	0 (1 st as 0)
Non-Struck Side Rear Seat	14.0	8 (1 st as 1)	6.1	0 (1 st as 0)
Rear Center Seat	14.0	8 (1 st as 1)	6.1	0 (1 st as 0)

Seat back angles measured on headrest post.

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

Test Vehicle: 2014 Toyota Highlander LE 5-Dr SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20145107
 Test Date: 2/4/2014

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

HEAD RESTRAINT ADJUSTMENT

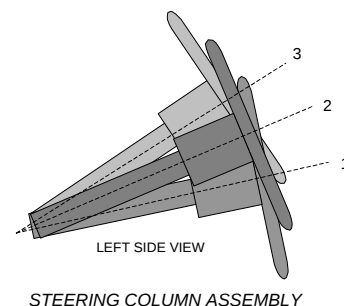
The driver's head restraint is adjusted to the highest and most full forward in-use position. The struck-side rear passenger's head restraint is adjusted to the lowest and most full forward in-use position.

	Total # of Positions	Placed in Position #
Driver Seat	3	Highest
Rear Seat	2	Lowest

STEERING COLUMN ADJUSTMENT

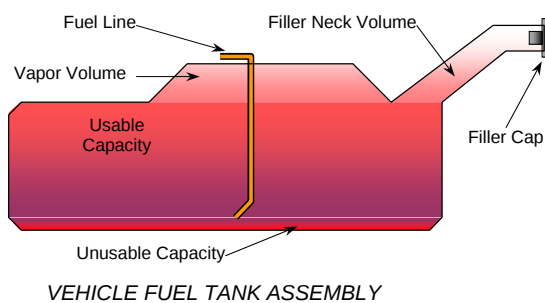
Steering wheel and column adjustments are made so that the steering wheel hub is at the center of its geometric locus it describes when it moves through its full range of motion.

	Degrees	Fore/Aft Position (mm)
Lowermost, Position 1	66.1	185
Geometric Center, Position 2	64.3	165
Uppermost, Position 3	62.5	145
Telescoping Steering Wheel Travel		40
Test Position	64.3	165



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.
The fuel pump is activated when the ignition is turned on.
The fuel pipe is on the left side.



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

Test Vehicle: 2014 Toyota Highlander LE 5-Dr SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20145107
 Test Date: 2/4/2014

FUEL TANK CAPACITY DATA

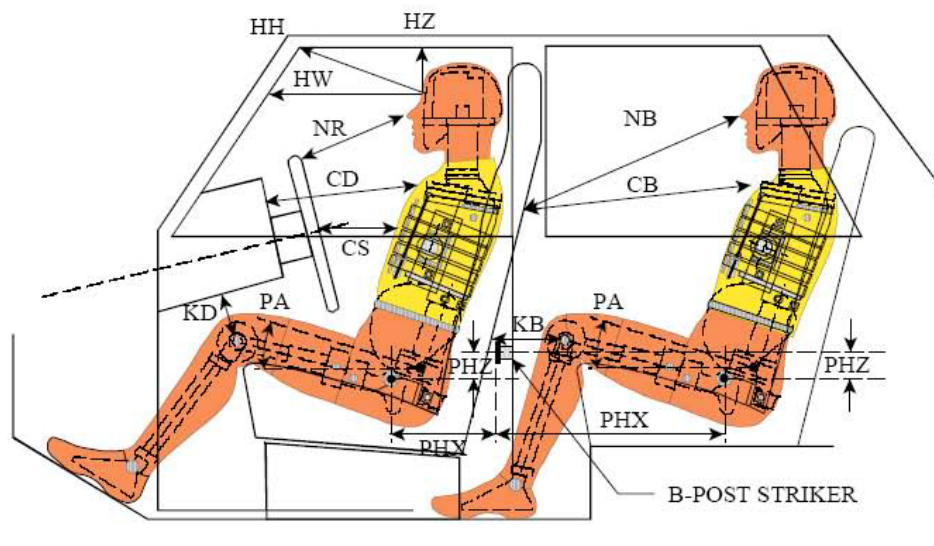
	Liters
Usable Capacity of "Standard" Tank (see Form No. 1)	72.4
Usable Capacity of "Optional" Tank (see Form No. 1)	
Usable Capacity of Standard Tank as Specified in Owner's Manual	72.5
Usable Capacity of Optional Tank as Specified in Owner's Manual	
93% of Usable Capacity	67.3
Actual Amount of Solvent Used	67.4
1/3 of Usable Capacity	24.1

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: 2014 Toyota Highlander LE 5-Dr SUV
Test Program: NCAP Side MDB Impact Test

NHTSA No. O20145107
Test Date: 2/4/2014



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

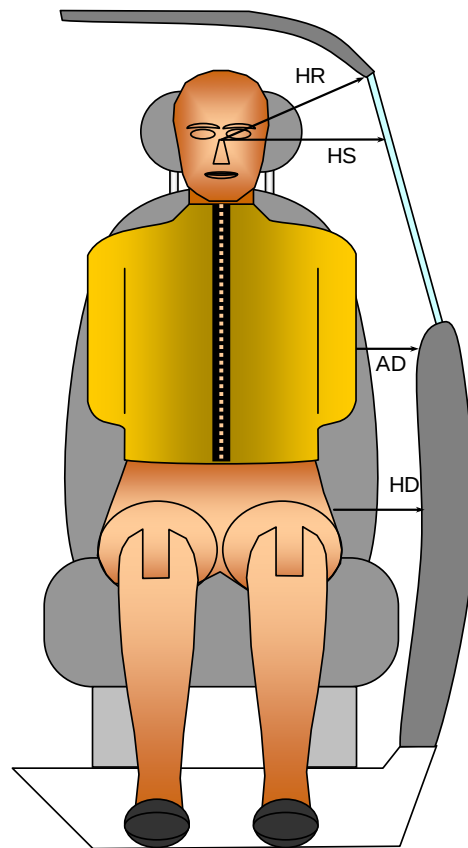
DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Pass. Code	Measurement Description	Driver		Passenger	
			Length (mm)	Angle(°)	Length (mm)	Angle(°)
HH		Head to Header	356	19.5		
HW		Head to Windshield	625			
HZ	HZ	Head to Roof Liner	184		306	
NR	NB	Nose to Rim/Seat Back	446	21.1	630	6.0
CD	CB	Chest to Dashboard/Seat Back	550	2.6	643	7.9
CS		Chest to Steering Wheel	345	16.0		
KDL	KBL	Left Knee to Dash/Seat Back	136	20.8	396	27.6
KDR	KBR	Right Knee to Dash/Seat Back	121	24.9	403	30.3
PAX	PAX	Pelvic Tilt Angle X		22.0		23.3
	PAY	Pelvic Tilt Angle Y		-0.6		-0.6
PHX	PHX	Hip Point to Striker (X-Axis)	244		300	
PHZ	PHZ	Hip Point to Striker (Z-Axis)	171		298	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2014 Toyota Highlander LE 5-Dr SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20145107
 Test Date: 2/4/2014



FRONT VIEW OF DUMMY

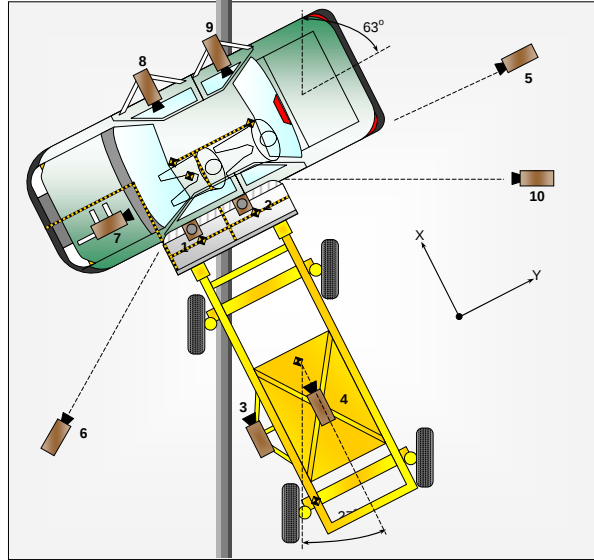
DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver	Passenger
HR	Head to Side Header	mm	200	279
HS	Head to Side Window	mm	327	383
AD	Arm to Door	mm	97	176
HD	Hip Point to Door	mm	153	178

DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2014 Toyota Highlander LE 5-Dr SUV
Test Program: NCAP Side MDB Impact Test

NHTSA No. O20145107
Test Date: 2/4/2014



CAMERA LOCATIONS AND DATA

No.	Camera View	Coordinates (mm)			Lens Length (mm)	Operating Frame Rate (fps)
		X*	Y*	Z*		
1	Overhead Overall	-120	190	-5050	14	1000
2	Overhead Close-Up	40	20	-5050	20	1000
3	Left Impact Point (MDB)				50	1000
4	Side Overall (MDB)				16	1000
5	Rear	30	5090	-1090	24	1000
6	Left Front	4210	-4390	-1080	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: None

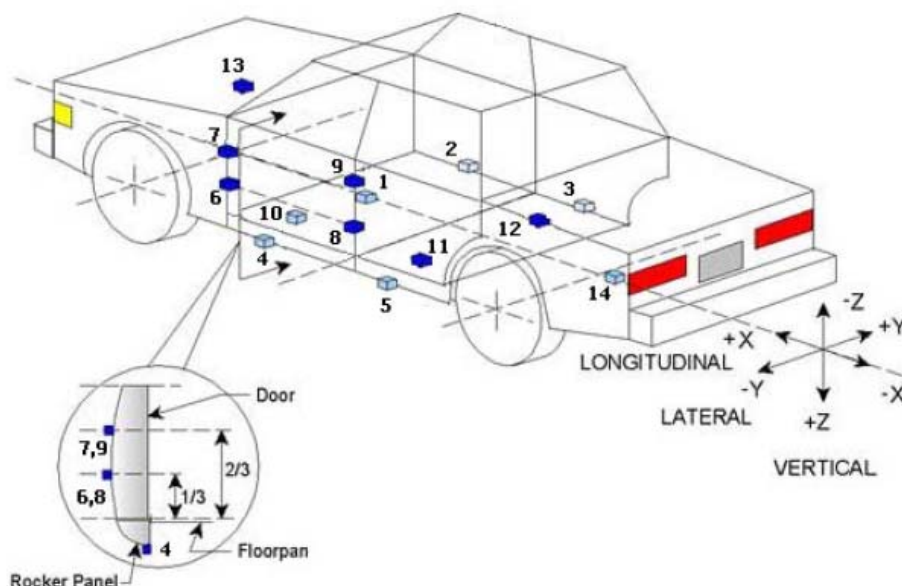
INSTRUMENTATION

	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: 2014 Toyota Highlander LE 5-Dr SUV
Test Program: NCAP Side MDB Impact Test

NHTSA No. O20145107
Test Date: 2/4/2014



TEST VEHICLE ACCELEROMETER LOCATIONS

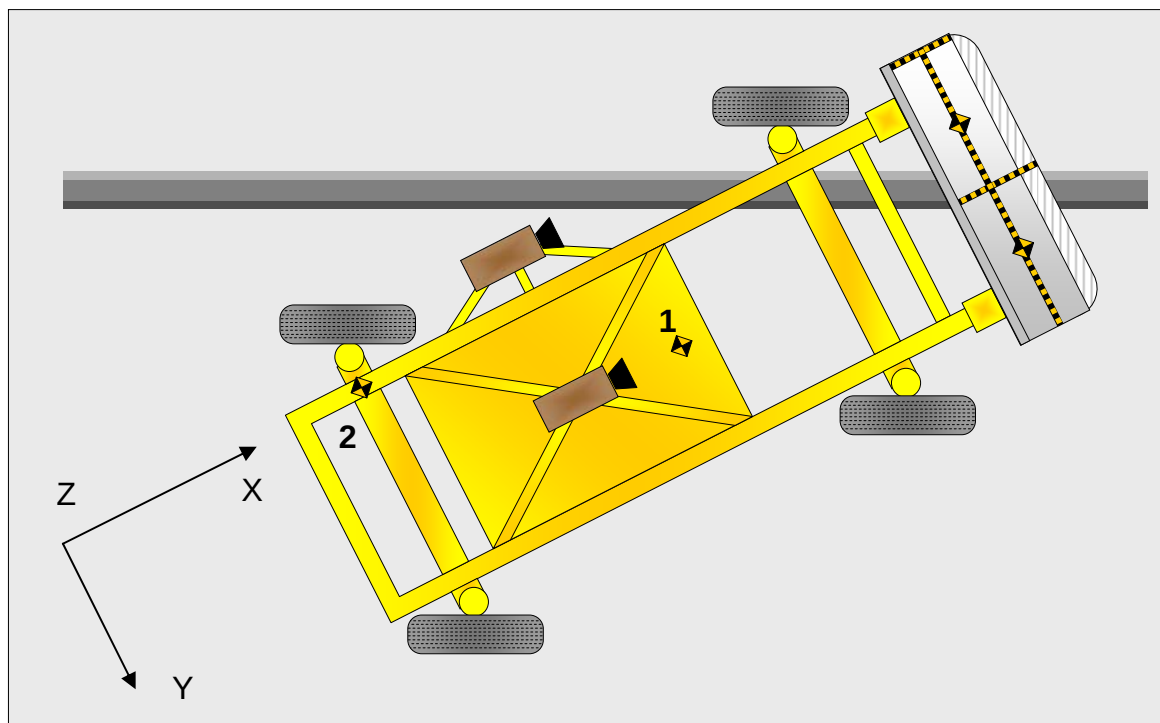
Accelerometer Location				
No.	ID	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2288	0	-389
2	Right Sill at Front Seat	2663	775	-315
3	Right Sill at Rear Seat	1843	775	-310
4	Left Sill at Front Door	2800	-775	-300
5	Left Sill at Rear Door	1855	-775	-294
6	Left Lower A-Post	3367	-859	-684
7	Left Middle A-Post	3372	-858	-897
8	Left Lower B-Post	2254	-767	-722
9	Left Middle B-Post	2262	-767	-990
10	Front Seat Track	2721	-390	-438
11	Rear Seat Structure	1982	-410	-476
12	Rt. Rear Occ. Compartment	2039	367	-420
13	Engine Block	4082	-85	-899
14	Rear Above Axle	674	50	-586

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: 2014 Toyota Highlander LE 5-Dr SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20145107
 Test Date: 2/4/2014



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: 2014 Toyota Highlander LE 5-Dr SUV
Test Program: NCAP Side MDB Impact Test

NHTSA No. O20145107
Test Date: 2/4/2014

TEST DUMMY INFORMATION AND CONTACT POINTS

Description	Front Seat Dummy (ES-2re)	Rear Seat Dummy (SID-IIs)
Face	Curtain Airbag	Curtain Airbag, Center Seatback
Top of Head	Curtain Airbag, Headliner	Curtain Airbag, Center Seatback
Left Side of Head	Curtain Airbag, Headliner	Curtain Airbag
Back of Head	Curtain Airbag, Headrest	Curtain Airbag, Seatback, Center Seatback
Left Shoulder	Curtain Airbag, Side Airbag	Door Panel
Upper Torso	Seatback	None
Lower Torso	Seatback	Door Panel
Left Hip	Side Airbag, Seatback	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	None
Other Notable Effects	None

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

Test Vehicle: 2014 Toyota Highlander LE 5-Dr SUV
Test Program: NCAP Side MDB Impact Test

NHTSA No. O20145107
Test Date: 2/4/2014

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	No	No	
Seat Belt Load Limiter	Yes		No	
Other				

IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vehicle Wheel Base	mm		2790
Vertical Impact Reference Line (Aft of Front Axle) (Intended Impact Point)	mm		455
Actual Impact Point (Aft of Front Axle)	mm		448
Horizontal Offset (+forward / -rearward)	mm	+/- 50 of intended impact point	+7
Vertical Offset (+down / -up)	mm	+/- 20 of intended impact point	+2

DATA SHEET NO. 9
MDB SUMMARY OF RESULTS

Test Vehicle: 2014 Toyota Highlander LE 5-Dr SUV
Test Program: NCAP Side MDB Impact Test

NHTSA No. O20145107
Test Date: 2/4/2014

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	62.1
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	62.1
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	90.0
MDB Forward Line of Motion to Target Vehicle CL	degrees	62.5 to 63.5	63.0
MDB Crabbed Angle to MDB Forward Line of Motion	degrees	26 to 28	27.0

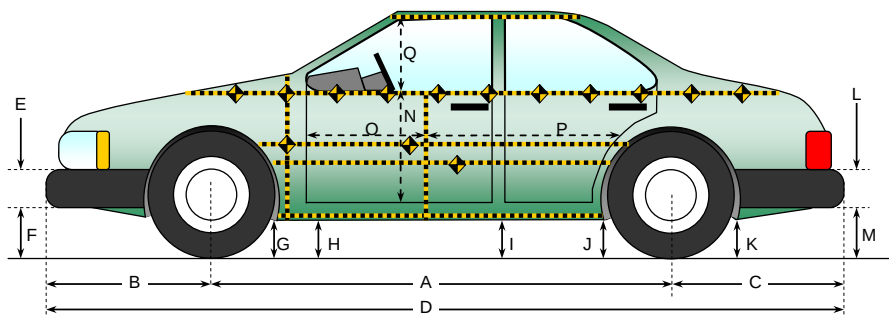
MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE

Vertical Location			From Centerline		Maximum Crush
Row	Description	Height	Distance	Direction	
A	Center of Bumper	432	800	Left	262
B	Top of Bumper	533	800	Left	161
C	Mid-Level	686	800	Left	159
D	Top of Stack	813	800	Left	168

DATA SHEET NO. 10
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2014 Toyota Highlander LE 5-Dr SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20145107
 Test Date: 2/4/2014



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

LEFT SIDE VIEW

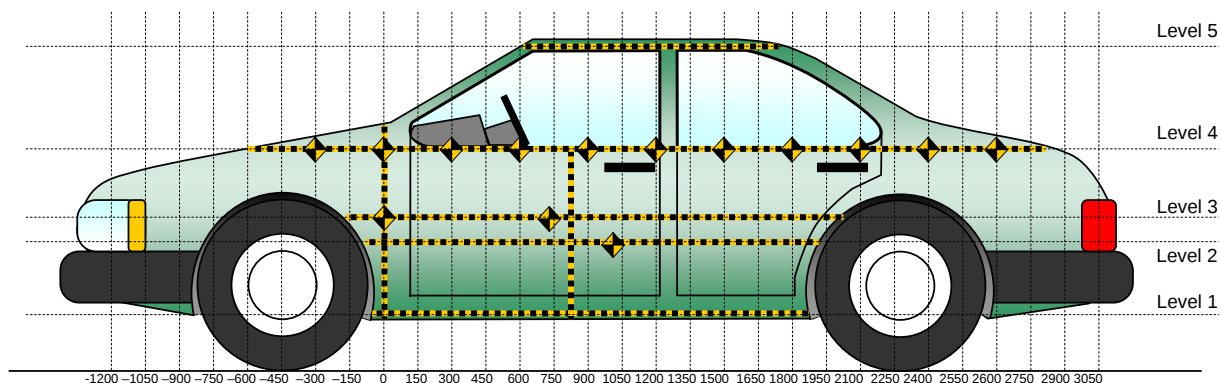
VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2790	2805	-15
B	Front Axle to FSOV	955	947	8
C	Rear Axle to RSOV	1110	1112	-2
D	Total Length at Centerline	4855	4864	-9
E	Front Bumper Thickness	112	112	0
F	Front Bumper Bottom to Ground	302	300	2
G	Sill Height at Front Wheel Well	282	293	-11
H	Sill Height at Front Door Leading Edge	290	294	-4
I	Sill Height at B Pillar	283	280	3
J1	Sill Height at Rear Wheel Well	276	280	-4
J2	Pinch Weld Height at Rear Wheel Well	277	276	1
K	Sill Height Aft of Rear Wheel Well	293	286	7
L	Rear Bumper Thickness	120	120	0
M	Rear Bumper Bottom to Ground	394	408	-14
N	Sill Height to Window Bottom Sill	786	700	86
O	Front Door Leading Edge to Impact CL	816	764	52
P	Rear Door Trailing Edge to Impact CL	1121	1072	49
Q	Front Window Opening	470	474	-4
R	Right Side Length	3504	3504	0
S	Left Side Length	3504	3497	7
T	Vehicle Width at B Post	1896	1808	88

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

Test Vehicle: 2014 Toyota Highlander LE 5-Dr SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20145107
 Test Date: 2/4/2014



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	441	124	1200
2	Occupant Hip Point	714	200	1350
3	Mid Door	738	206	1350
4	Window Sill	1120	59	1350
5	Window Top	1630	9	2400

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: 2014 Toyota Highlander LE 5-Dr SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20145107
 Test Date: 2/4/2014

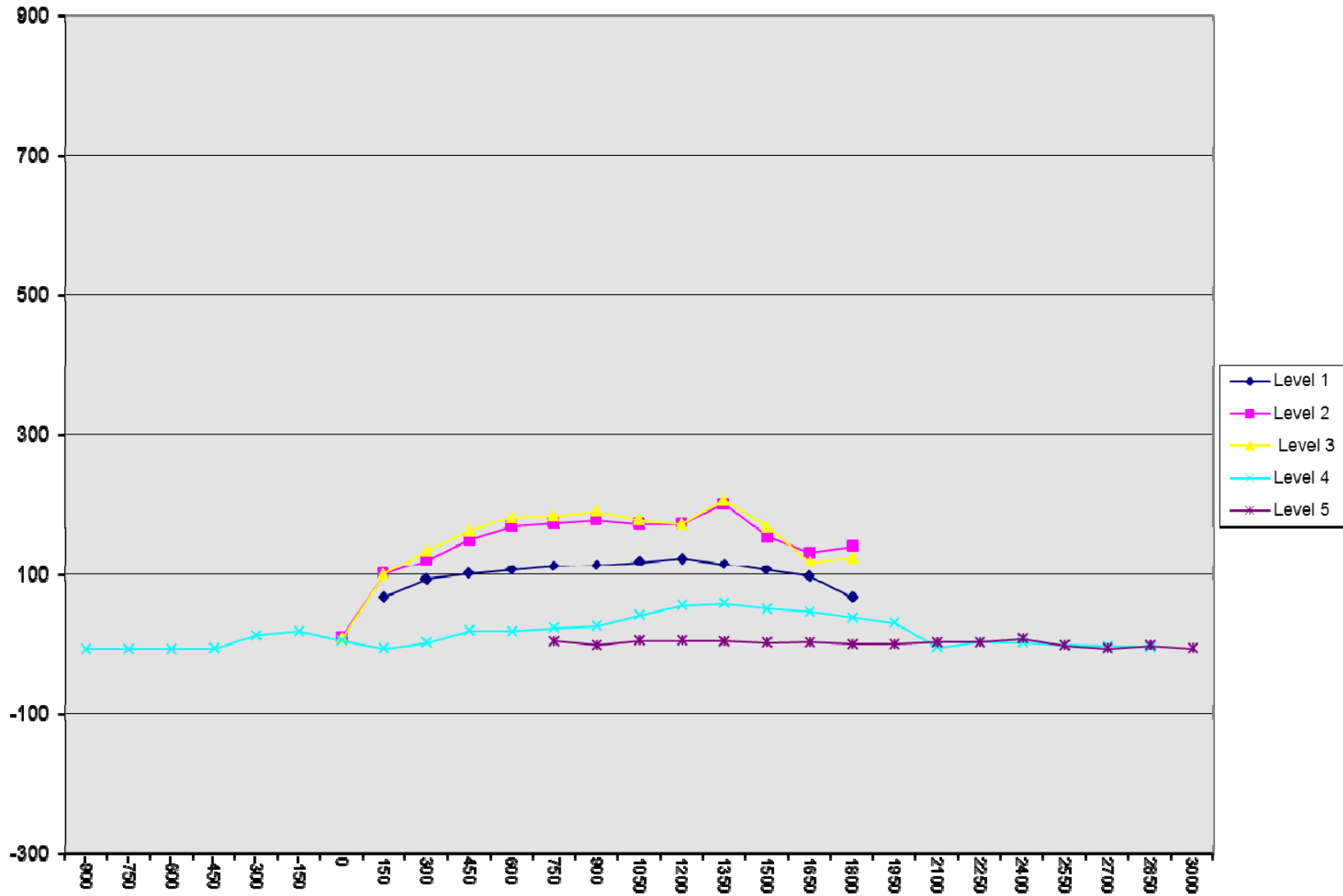
	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-900				341					335					-6	
-750				310					304					-6	
-600				286					280					-6	
-450				269					264					-5	
-300				256					270					14	
-150				250					269					19	
0		145	144	243			156	153	249			11	9	6	
150	175	154	153	243		243	255	253	238		68	101	100	-5	
300	174	159	156	242		267	280	291	245		93	121	135	3	
450	170	159	156	235		271	309	319	255		101	150	163	20	
600	167	159	156	230		273	328	337	249		106	169	181	19	
750	167	161	160	221	445	279	334	343	245	450	112	173	183	24	5
900	167	163	160	218	445	281	340	350	245	445	114	177	190	27	0
1050	167	166	163	208	438	286	338	340	250	442	119	172	177	42	6
1200	170	170	167	204	436	294	342	339	260	442	124	172	172	56	6
1350	171	175	172	195	437	286	375	378	254	442	115	200	206	59	5
1500	174	179	178	193	440	280	333	346	244	443	106	154	168	51	3
1650	175	179	179	193	441	272	311	298	240	445	97	132	119	47	4
1800	175	155	156	200	445	242	296	281	239	446	67	141	125	39	1
1950				205	446				236	447				31	1
2100				211	453				207	457				-4	4
2250				218	456				222	460				4	4
2400				225	464				228	473				3	9
2550				235	478				235	477				0	-1
2700				249	499				247	494				-2	-5
2850				263	516				260	515				-3	-1
3000					540					535					-5

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: 2014 Toyota Highlander LE 5-Dr SUV
Test Program: NCAP Side MDB Impact Test

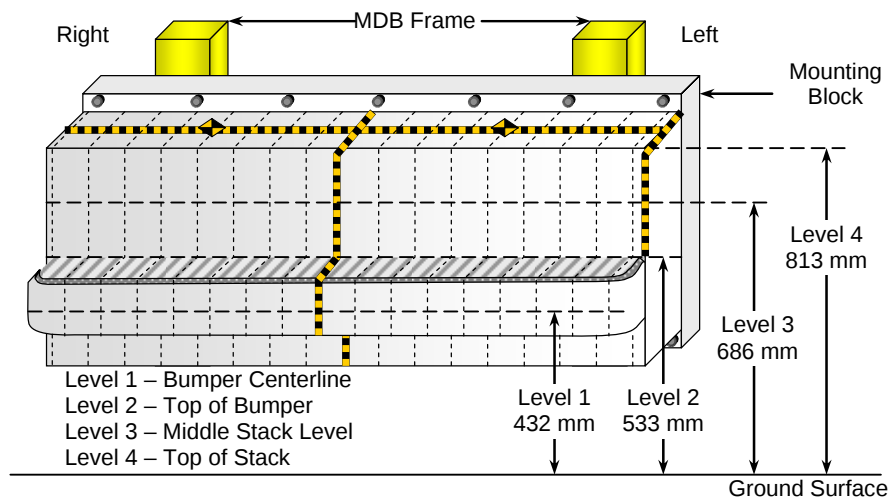
NHTSA No. O20145107
Test Date: 2/4/2014



DATA SHEET NO. 12
MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle: 2014 Toyota Highlander LE 5-Dr SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20145107
 Test Date: 2/4/2014



FRONT VIEW

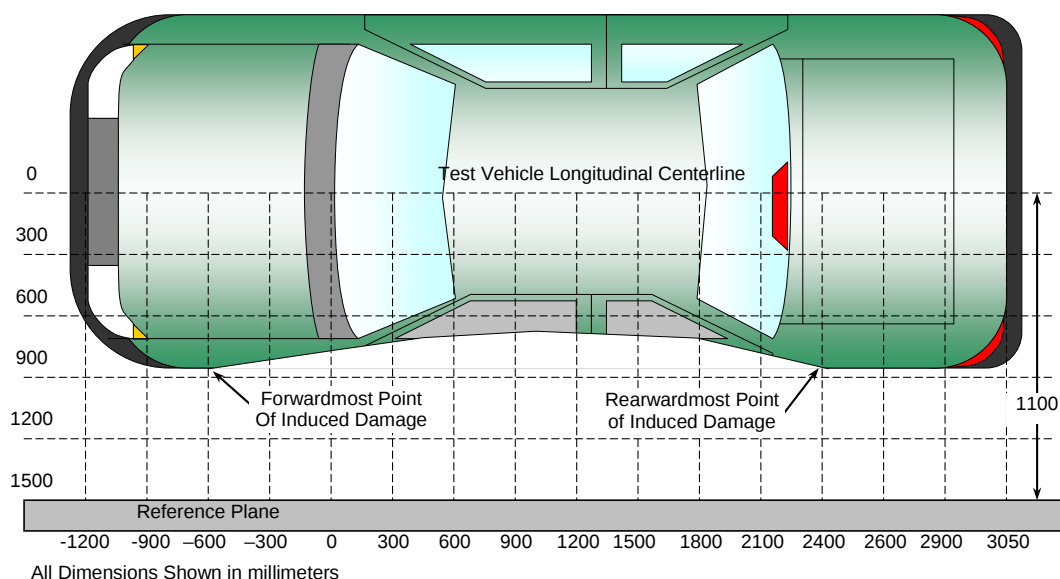
DEFORMABLE BARRIER STATIC CRUSH

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	154	121	94	73	70	90	117	106	88	76	79	81	90	105	116	131	168
3	125	107	95	81	69	78	118	104	83	80	81	77	82	88	104	128	159
2	130	131	144	131	124	119	128	127	127	125	131	139	144	146	146	149	161
1	248	248	243	249	258	255	253	253	253	254	249	253	250	251	248	260	262

DATA SHEET NO. 13
VEHICLE AND MDB DAMAGE PROFILE DISTANCES

Test Vehicle: 2014 Toyota Highlander LE 5-Dr SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20145107
 Test Date: 2/4/2014



TOP VIEW

VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance from Impact Point (mm)	Level	Pre-Test (mm)	Post-Test (mm)	Max. Static Crush (mm)
1	1950	3	156	215	59
2	1560	3	178	329	151
3	1170	3	166	341	175
4	780	3	160	344	184
5	390	3	156	390	153
6	0	3	144	153	9

MDB DAMAGE PROFILE DISTANCES

DPD	Distance from Center of MDB	Level	Post-Test (mm)
1	800 mm right of center	1	248
2	480 mm right of center	1	250
3	160 mm right of center	1	253
4	160 mm left of center	1	251
5	480 mm left of center	1	251
6	800 mm left of center	1	262

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

Test Vehicle: 2014 Toyota Highlander LE 5-Dr SUV
 Test Program: NCAP Side MDB Impact Test

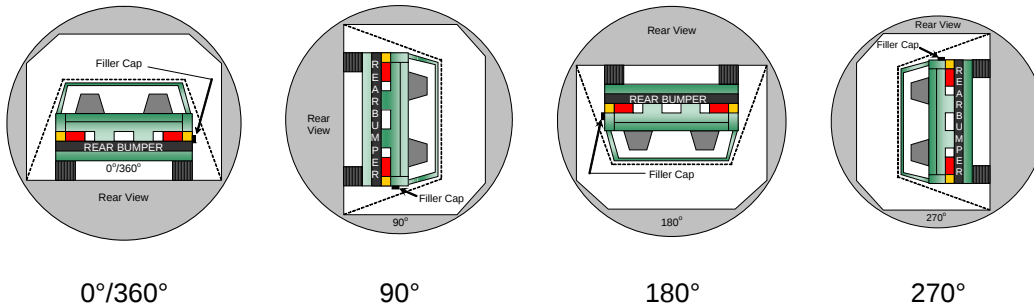
NHTSA No. O20145107
 Test Date: 2/4/2014

Test Time: 3:19 pm

Temperature: 21.6° C

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

FMVSS 301 STATIC ROLLOVER DATA



ROLLOVER SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	113	300	413
90° to 180°	111	300	411
180° to 270°	108	300	408
270° to 360°	109	300	409

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

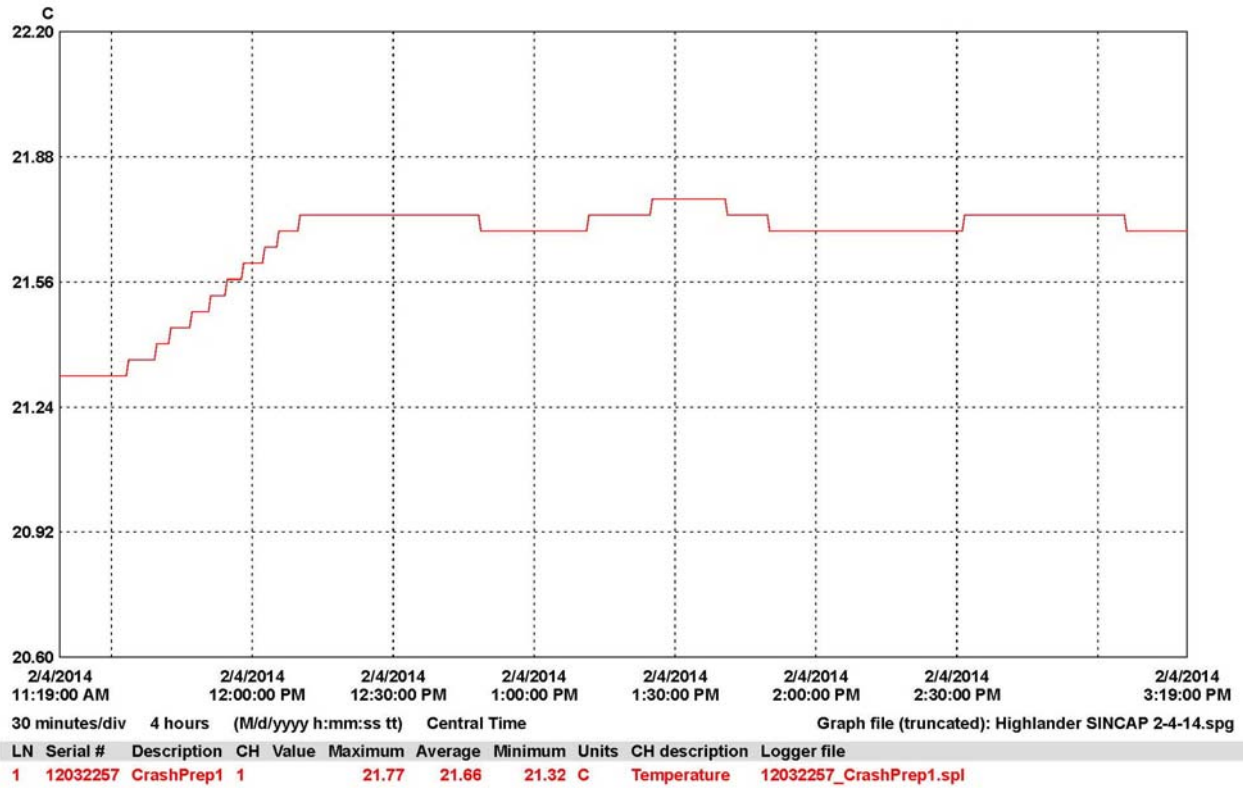
ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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: 2014 Toyota Highlander LE 5-Dr SUV
 Test Program: NCAP Side MDB Impact Test

NHTSA No. O20145107
 Test Date: 2/4/2014



APPENDIX A
PHOTOGRAPHS

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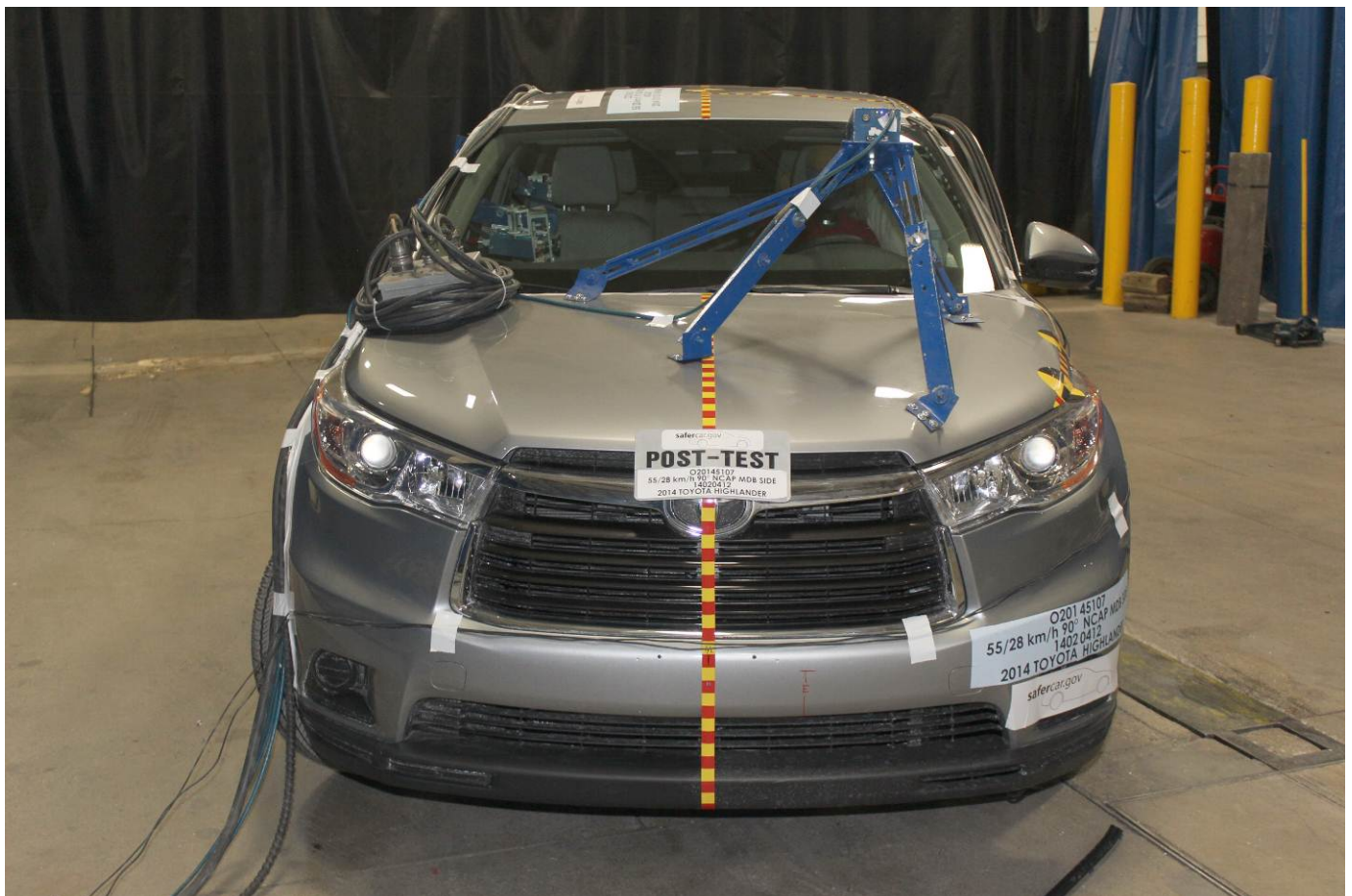
As Delivered Right Front Three-Quarter View of Test Vehicle



As Delivered Left Rear Three-Quarter View of Test Vehicle



Pre-Test Frontal View of Test Vehicle



Post-Test Frontal View of Test Vehicle



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



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



Pre-Test Left Side View of Test Vehicle



Post-Test Left Side View of Test Vehicle



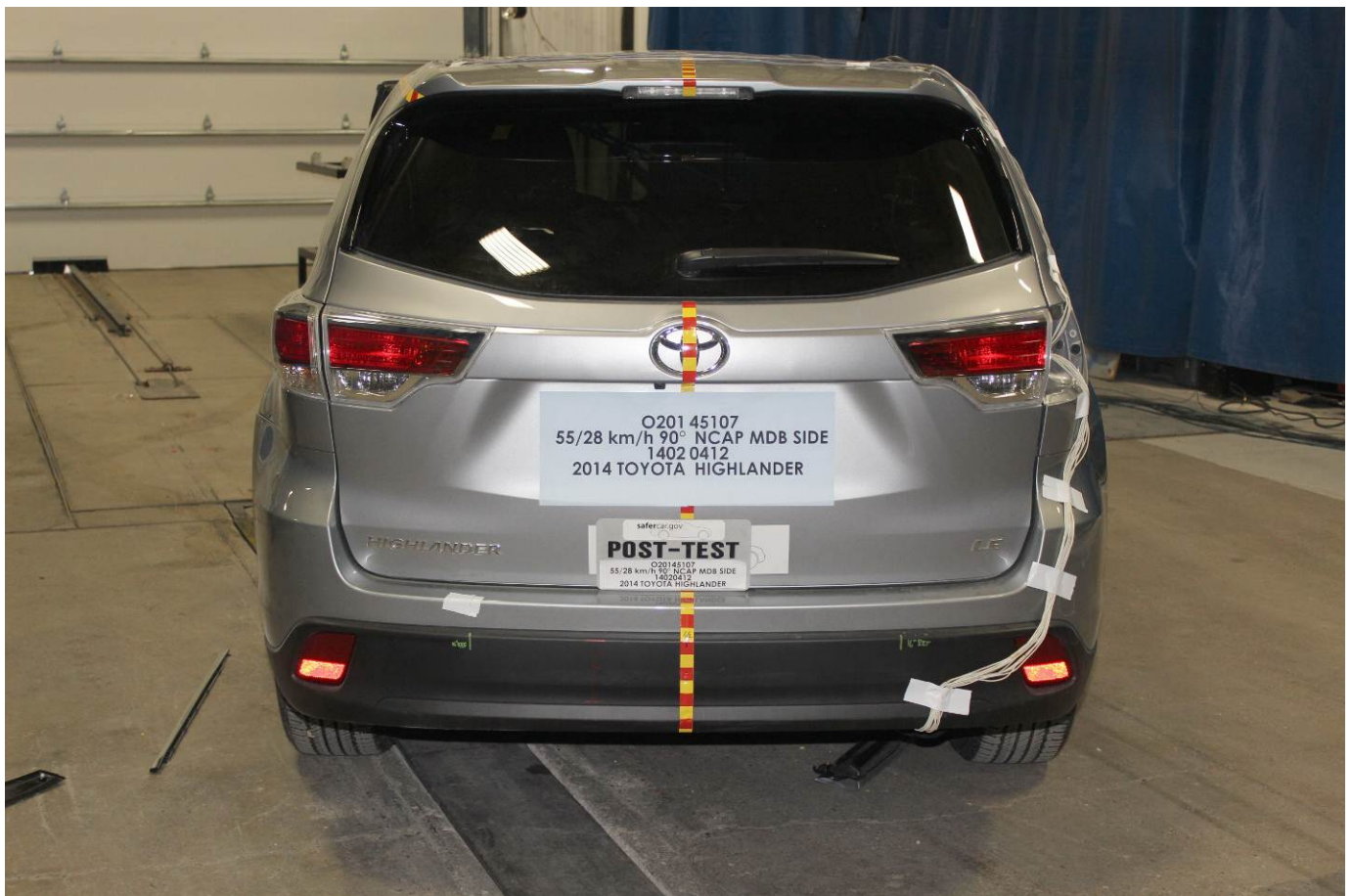
Pre-Test Left Three-Quarter Rear View of Test Vehicle



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



Pre-Test Rear View of Test Vehicle



Post-Test Rear View of Test Vehicle



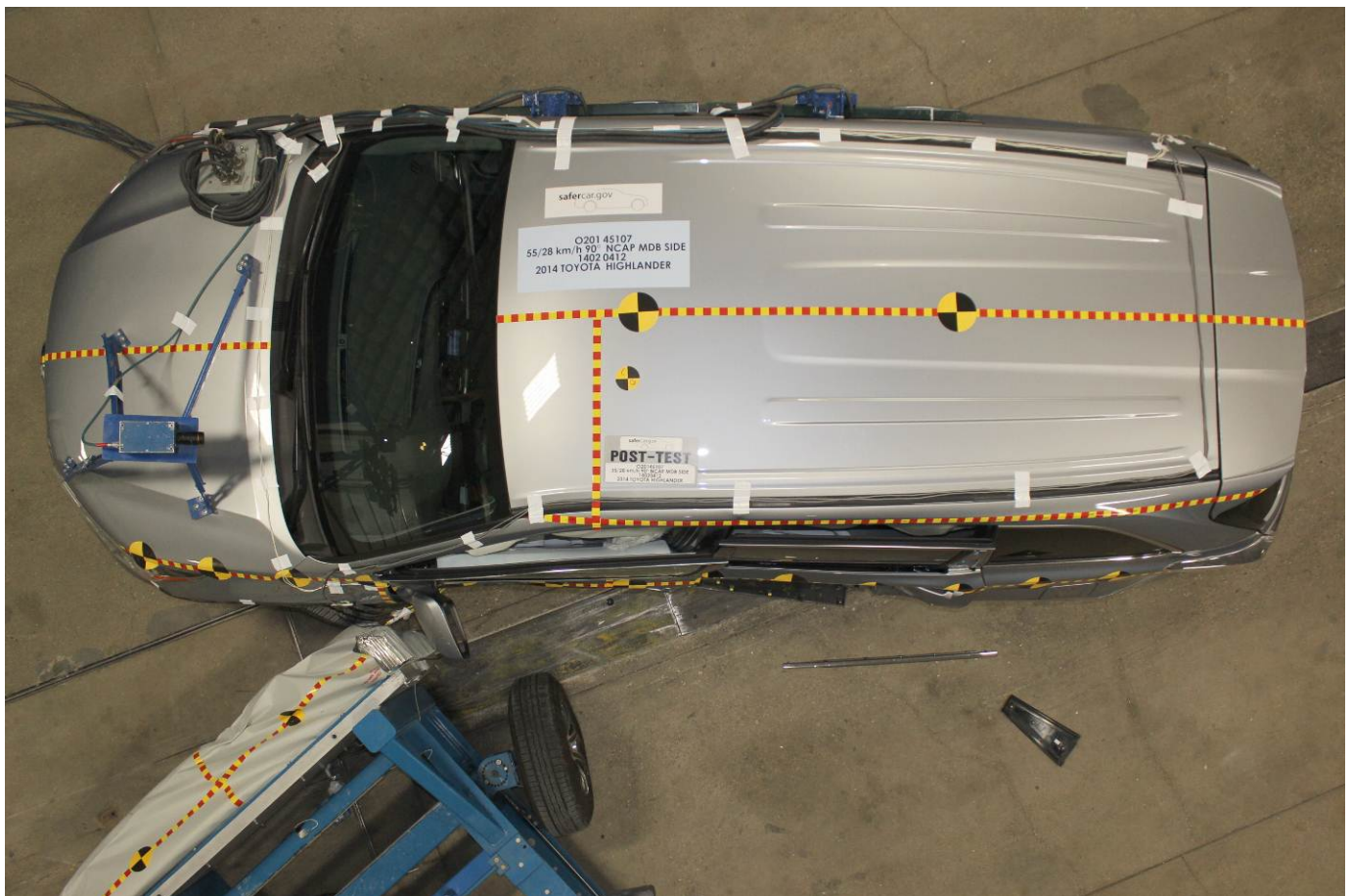
Pre-Test Right Side View of Test Vehicle



Post-Test Right Side View of Test Vehicle



Pre-Test Overhead View of Test Area



Post-Test Overhead View of Test Area



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



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



Pre-Test Close-Up View of Impact Point Target



Post-Test Close-Up View of Impact Point Target



Pre-Test Left Front Door Latch Close-Up



Post-Test Left Front Door Latch Close-Up



Pre-Test Left Rear Door Latch Close-Up



Post-Test Left Rear Door Latch Close-Up



Pre-Test Front Close-Up View of Driver Dummy



Post-Test Front Close-Up View of Driver Dummy



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



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



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



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



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



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



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



Pre-Test Placement of Driver Dummy's Feet



Pre-Test View of Belt Anchorage for Driver Dummy



Pre-Test Left Side View of Steering Wheel



Pre-Test View of Disengaged Parking Brake



Pre-Test View of Parking Brake



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



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



Pre-Test Close-Up 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 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



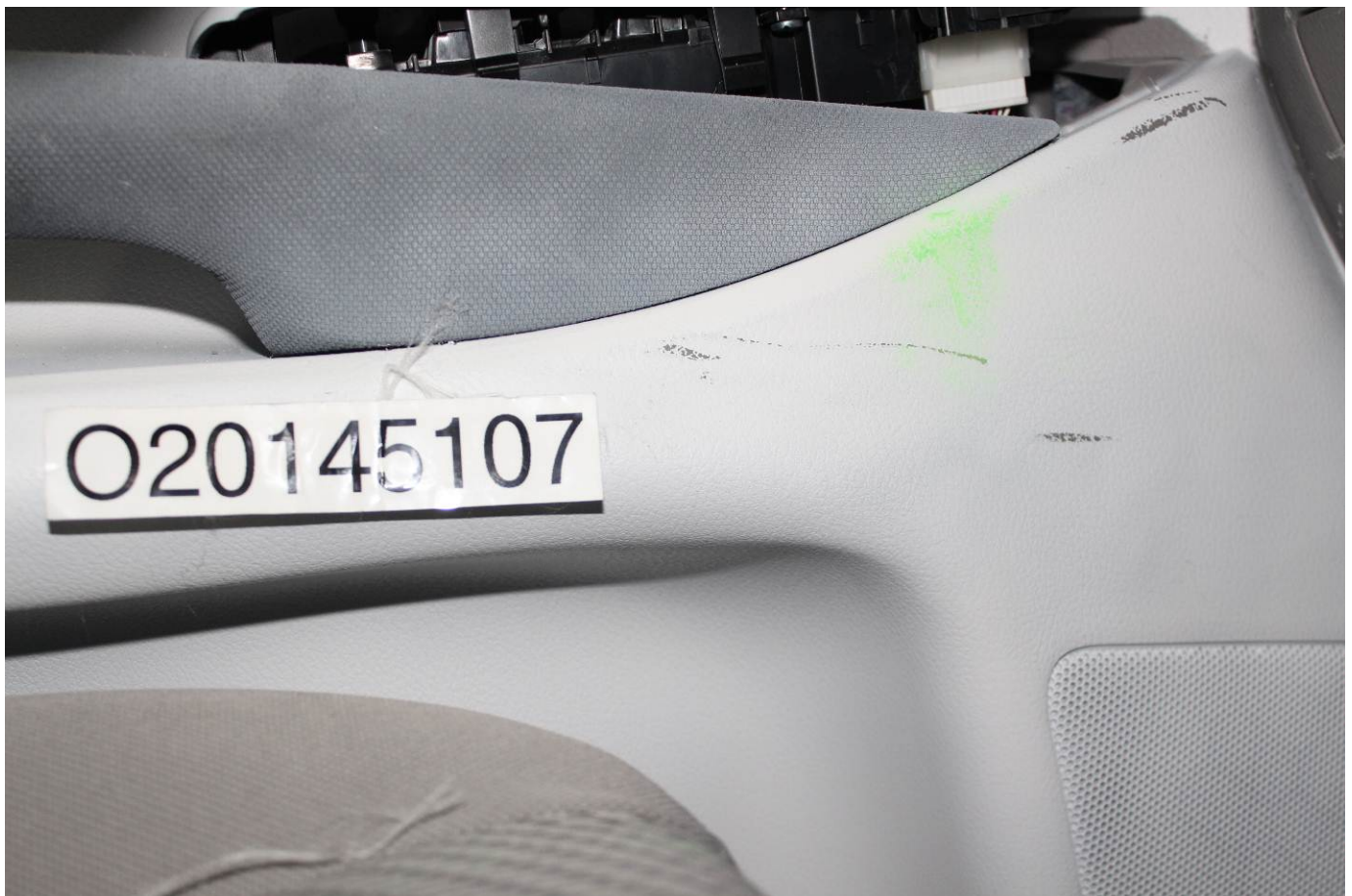
Post-Test Driver Dummy Close-up Torso Contact with Side Airbag View



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

PHOTOGRAPH NOT AVAILABLE

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



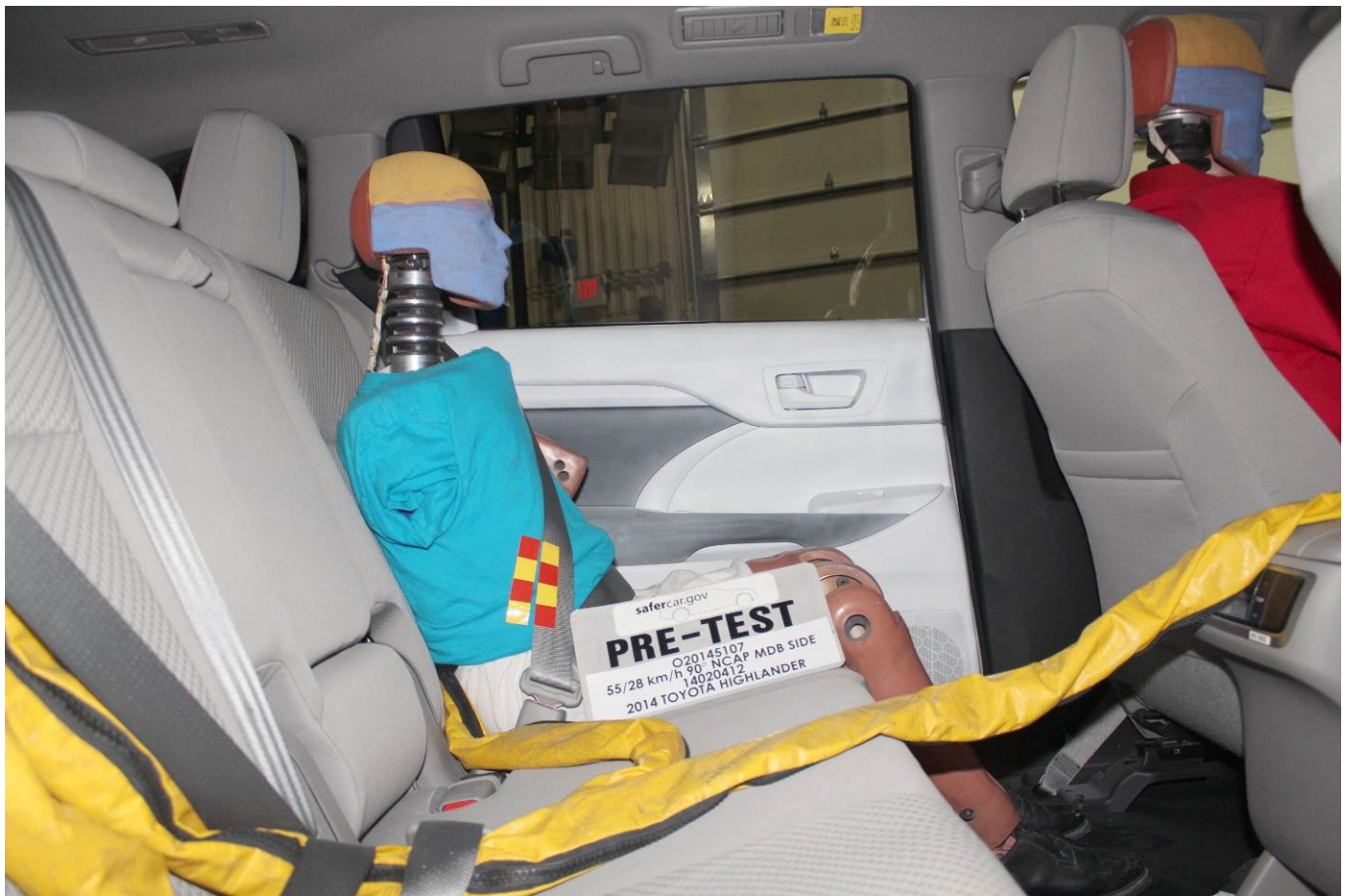
Pre-Test Close-up View of Rear Passenger Seat Back or Head Restraint



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



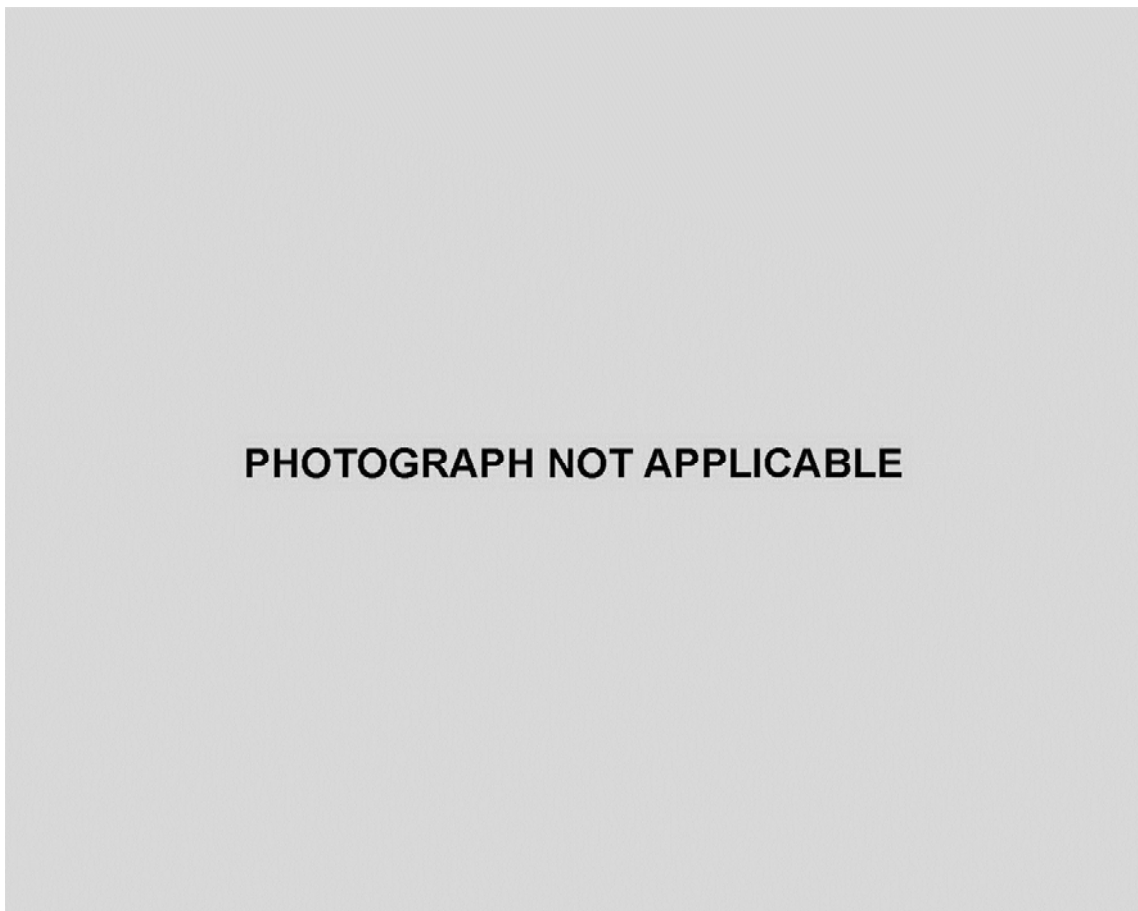
Post-Test Rear Passenger Dummy Close-up Torso Contact with Vehicle Interior View

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



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



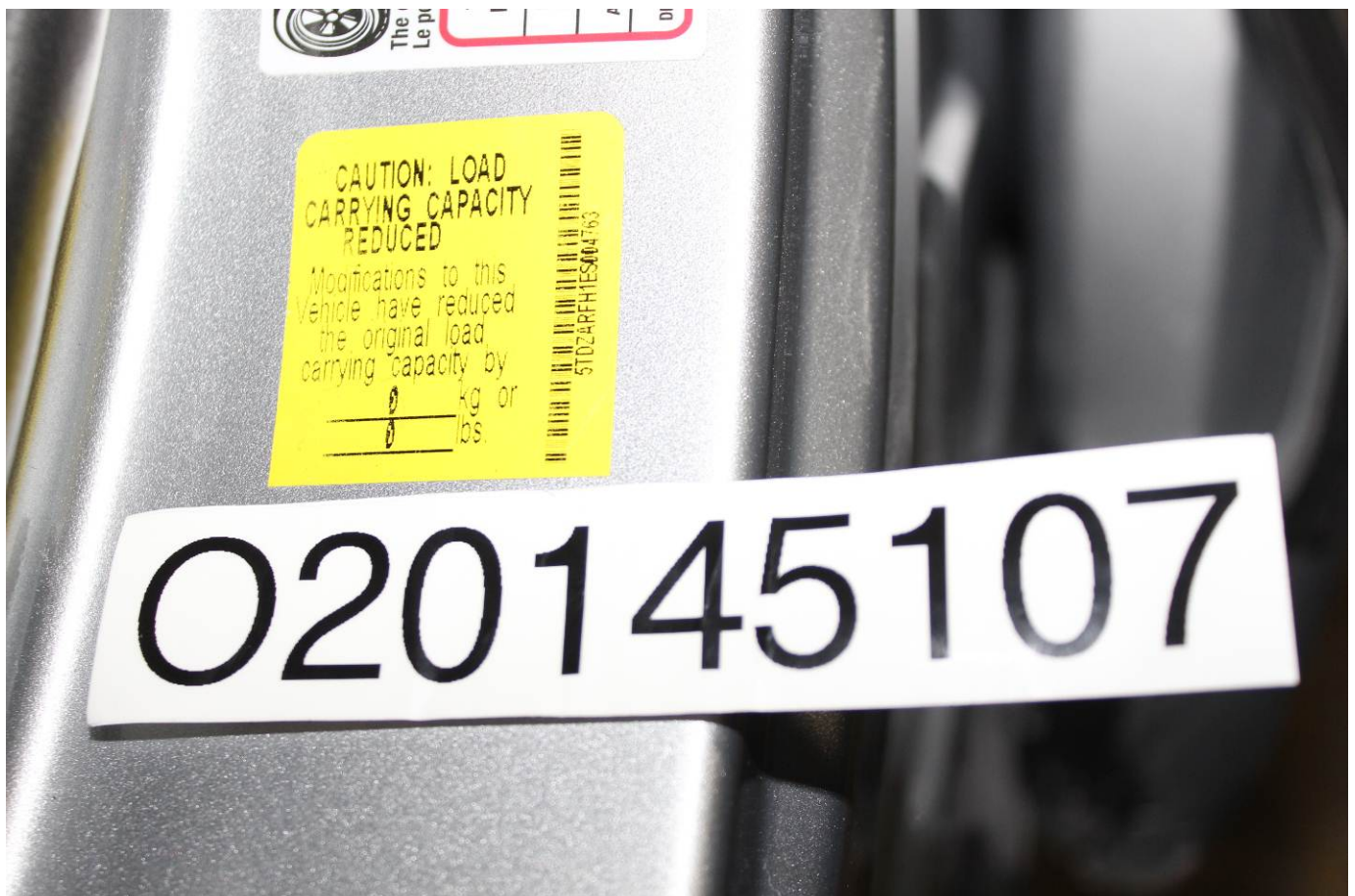
Post-Test Right Side View of MDB Impactor Face



Close-Up View of Vehicle's Certification Label



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



Close-Up View of Load Carrying Capacity Reduced Label



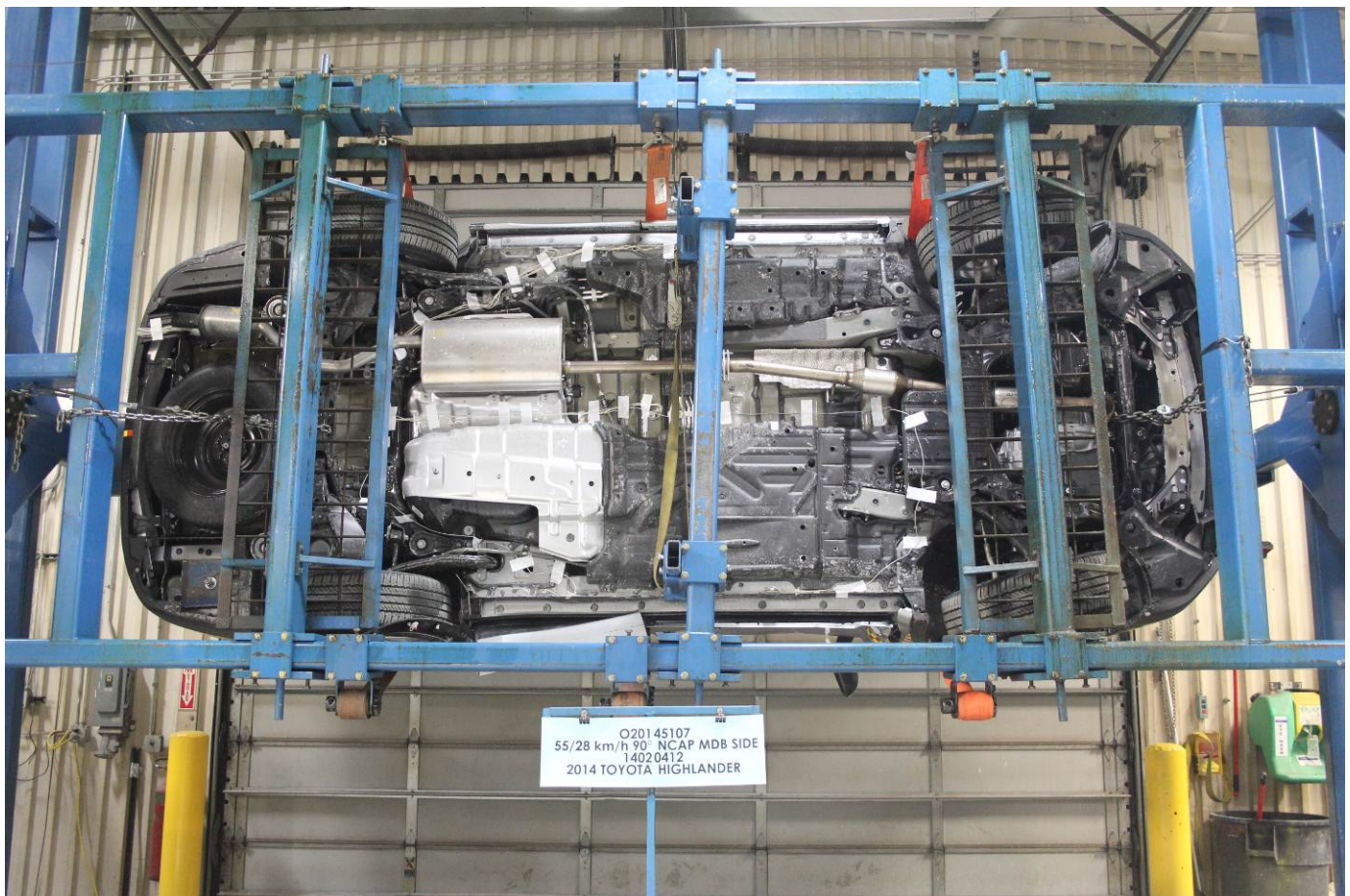
Pre-Test Ballast View



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

TOYOTA
Let's Go Places

DESC.: **HIGHLANDER** LE - L4 FWD
VIN: **5TDZARFH1ES004763**
YR/MDL: 2014/6942A
CLR: SILVER SKY METALLIC/1B10 (01D6/10)
PORT/PLANT: Princeton, IN/TMMI RAILHEAD:

GOVERNMENT 5-STAR SAFETY RATINGS

This vehicle has not been rated by the government for overall vehicle score, frontal crash, side crash or rollover risk.

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

STANDARD EQUIPMENT

MECHANICAL & PERFORMANCE

- 2.7L DOHC 4-Cylinder Engine w/Dual VVT-i
- 5-Speed Auto Trans 1,500-lb Tow Capacity
- Front Independent McPherson Strut & Rear Double Wishbone Suspension
- Ultra Low Emission Vehicle II (ULEV-II)
- Power Assisted 4-Wheel Disc Brakes
- 16" Alloy Wheels with P245/50R16 Tires
- Temporary Spare Tire on 16" Wheel

SAFETY & CONVENIENCE

- Star Safety System: Includes Enhanced Vehicle Stability Control, Traction Control, Anti-Lock Brake System, Electronic Brake-Force Distribution
- Brake Assist & Smart Stop Technology
- 8 Airbags: Dr & Fr For Adv Airbag Sys Dr & Fr For Seat-Mounted Side, Dr Knee, Pgr Seat-Cushion & 3-Way Side Curtain Airbags
- Whiplash Injury Lessening Front Seats
- Remote Keyless Entry; Engine Immobilizer
- LATCH-Lwr Anchors & Tethers for Children
- Child Protector Rear Door Locks

EXTERIOR

- Projector-Beam Headlights w/Auto On/Off
- UV Glass Windshield; Privacy Glass on Rear Side, Quarter & Hatch Windows
- Folding Heated Side Mirrors
- Windshield Wiper w/De-Icer; Rear Wiper

INTERIOR

- Seating for 8; Fabric 6-Way Driver Seat, 4-Way Passenger Seat, 2nd & 3rd Row
- 80/40 Split Fold-Flat Seats w/Recline
- Backup Camera with 6.1" display
- Entune w/6.1" Touch Screen; AM/FM/CD/MP3
- USB/AUX, Bluetooth Phone & Streaming Music, Voice Recognition
- 3.5-Inch Multi-Info Display w/Veh Info
- Fr & Rr Air Conditioning System w/Filtec
- Steering Whl w/Audio, Phone & VRec Ctrls
- Overhead Map Lights; Conversation Mirror
- Roll-Top Console/Arm Rest; In-Dash Shelf
- 2 Cup & 2 Bottle Holders; 2-12V Outlets
- **Full Tank of Gas**

MANUFACTURER'S SUGGESTED RETAIL PRICE \$29,215.00

OPTIONAL EQUIPMENT

FE 50 State Emissions

EPA DOT Fuel Economy and Environment

Fuel Economy

22 MPG
combined city/hwy
4.5 gallons per 100 miles

Small SUVs range from 16 to 76 MPG.
The best vehicle rates 119 MPG.

You spend \$500 more in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost \$2,400

Fuel Economy & Greenhouse Gas Rating (tailpipe only)

5

Smog Rating (tailpipe only)

5

The vehicle emits 296 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 22 MPG and costs \$11,600 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at \$3.55 per gallon. EPA's 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

QR Code

Smartphone QR Code

DELIVERY PROCESSING AND HANDLING FEE 860.00

TOTAL \$30,075.00

The New Vehicle Limited Warranty provides 3-year/50,000-mile basic coverage. Coverage 500-mile powertrain coverage, plus 5-year/unlimited-mile corrosion perforation coverage. See Warranty and Maintenance Guide for details. An extended service contract may be available for the vehicle.

Manufacturer's suggested retail price includes manufacturer's recommended pre-delivery service, gasoline, license and title fees, applicable federal, state and local taxes and dealer and distributor installed options and accessories are not included in the manufacturer's suggested retail price.

Toyota Care, which covers normal factory scheduled maintenance for two years or 25,000 miles, whichever occurs first, is included as part of the sales price of the vehicle for qualifying buyers. See participating dealer for eligibility and coverage details.

Dealer Name / Address: 12034
ELMHURST TOYOTA
440 WEST LAKE STREET
ELMHURST IL 60126

Ship to:

Monroney Label

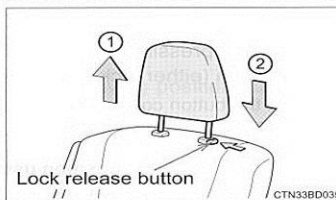
168 3-3. Adjusting the seats

Head restraints

Head restraints are provided for all seats.

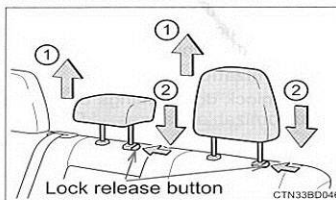
Front seats and second seats (with a side table)

- 1 Up
Pull the head restraints up.
- 2 Down
Push the head restraint down while pressing the lock release button.



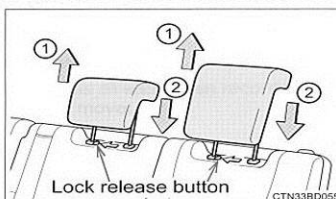
Second seats (without a side table)

- 1 Up
Pull the head restraints up.
- 2 Down
Push the head restraint down while pressing the lock release button.



Third seats

- 1 Up
Pull the head restraints up.
- 2 Down
Push the head restraint down while pressing the lock release button.

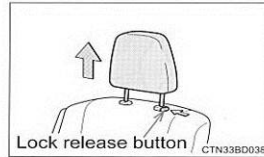


Head Restraint Use and Adjustment Information from Vehicle Owner's Manual

■ Removing the head restraints

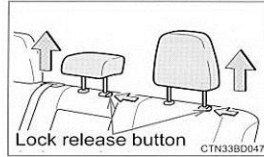
► Front seats and second seats (with a side table)

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



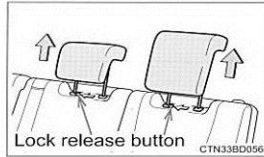
► Second seats (without a side table)

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



► Third seats

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



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

■ Installing the head restraints

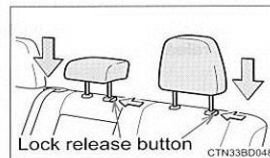
► Front seats and second seats (with a side table)

Align the head restraint with the installation holes and push it down while pressing the lock release button.



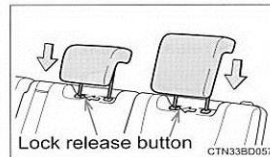
► Second seats (without a side table)

Align the head restraint with the installation holes and push it down while pressing the lock release button.



► Third seats

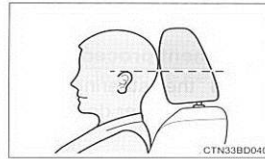
Align the head restraint with the installation holes and push it down while pressing the lock release button.



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

■ Adjusting the height of the head restraints

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



■ Adjusting the third seat head restraints

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

⚠ WARNING

■ Head restraint precautions

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

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

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
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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
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Figure No. 8.	Driver Thorax Rib Deflection Maximum vs. Time	B-2
Figure No. 9.	Driver Anterior Abdomen Force (Y) vs. Time	B-3
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Figure No. 13.	Driver Pubic Symphysis Force (Y) vs. Time	B-4
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Figure No. 17.	Passenger Head Resultant Acceleration Primary vs. Time	B-5
Figure No. 18.	Passenger Lower Spine T12 Acceleration (X) vs. Time	B-6
Figure No. 19.	Passenger Lower Spine T12 Acceleration (Y) vs. Time	B-6
Figure No. 20.	Passenger Lower Spine T12 Acceleration (Z) vs. Time	B-6
Figure No. 21.	Passenger Lower Spine T12 Resultant Acceleration vs. Time	B-6
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Figure No. 23.	Passenger Acetabulum Force on Impact Side (Y) vs. Time	B-7
Figure No. 24.	Passenger Total Pelvic Force on Impact Side (Y) vs. Time	B-7

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

Additional Driver & Passenger Dummy Instrumentation Data

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

Vehicle Instrumentation Data

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

MDB Instrumentation Data

MDB Center of Gravity Acceleration (X)

MDB Center of Gravity Acceleration (Y)

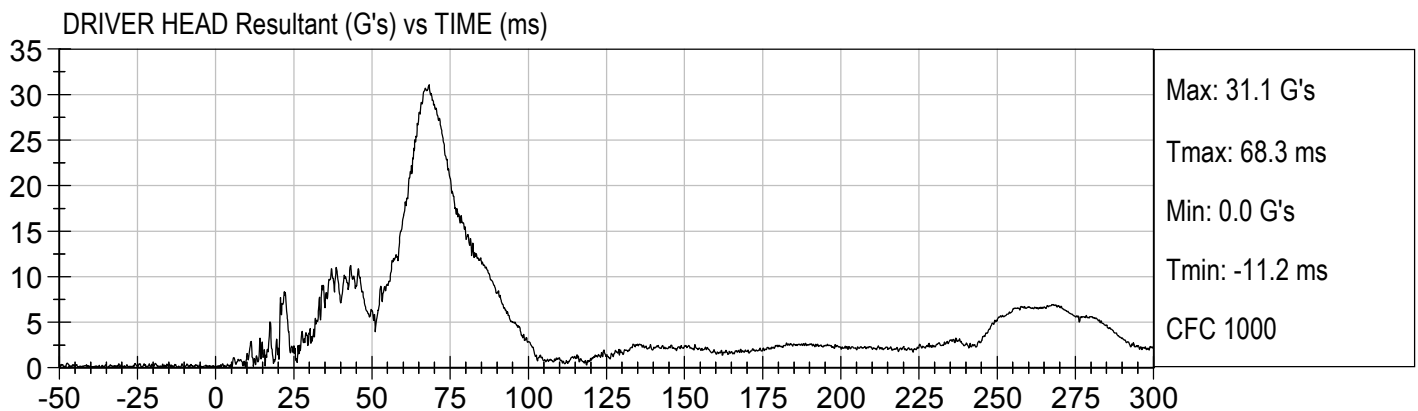
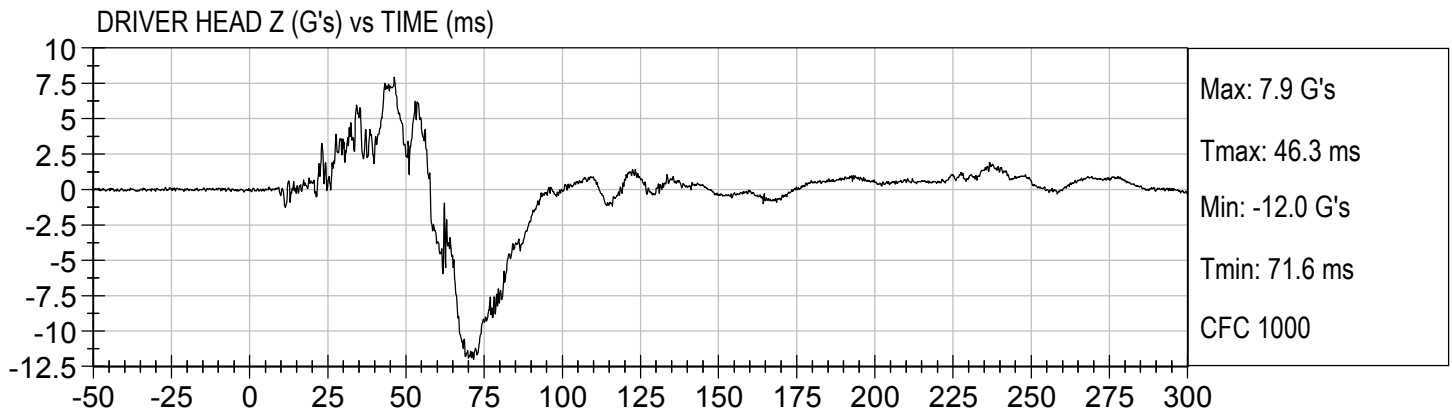
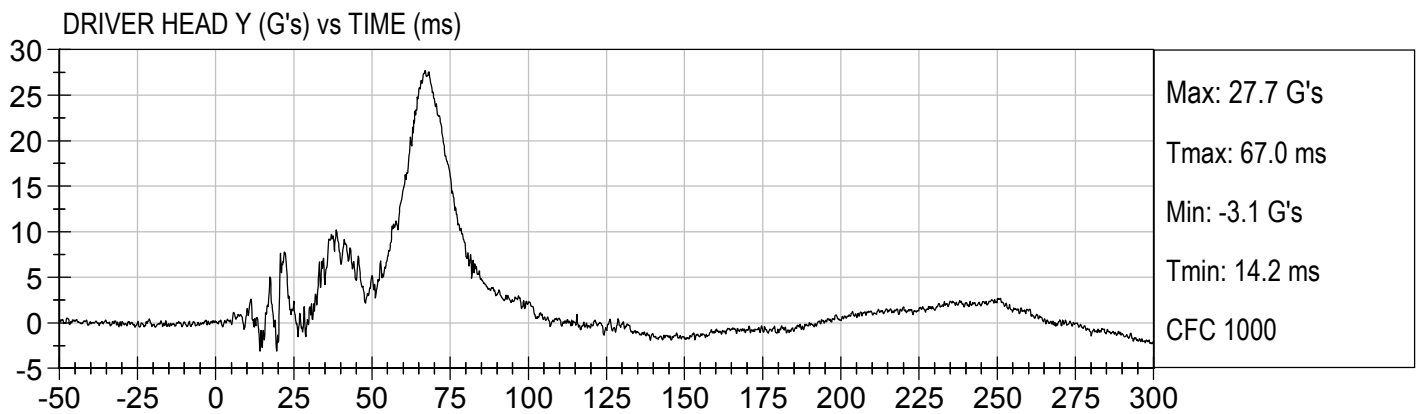
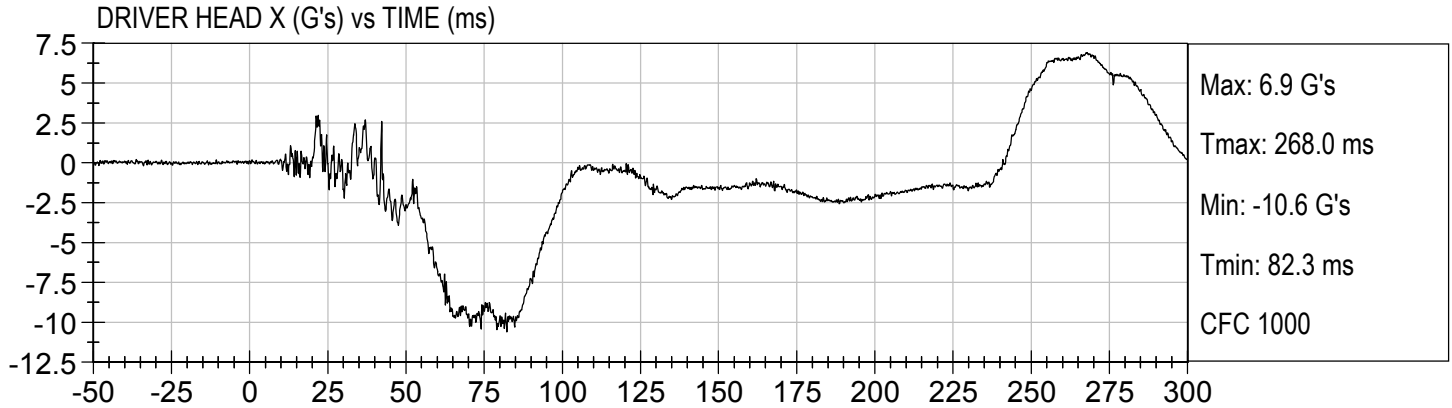
MDB Center of Gravity Acceleration (Z)

MDB Rear Acceleration (X)

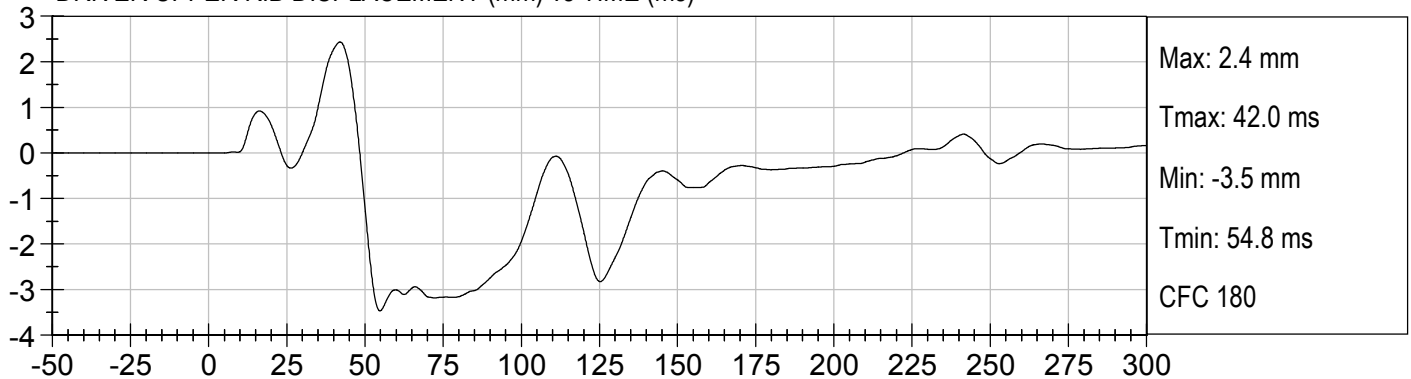
MDB Rear Acceleration (Y)

Left MDB Contact Switch

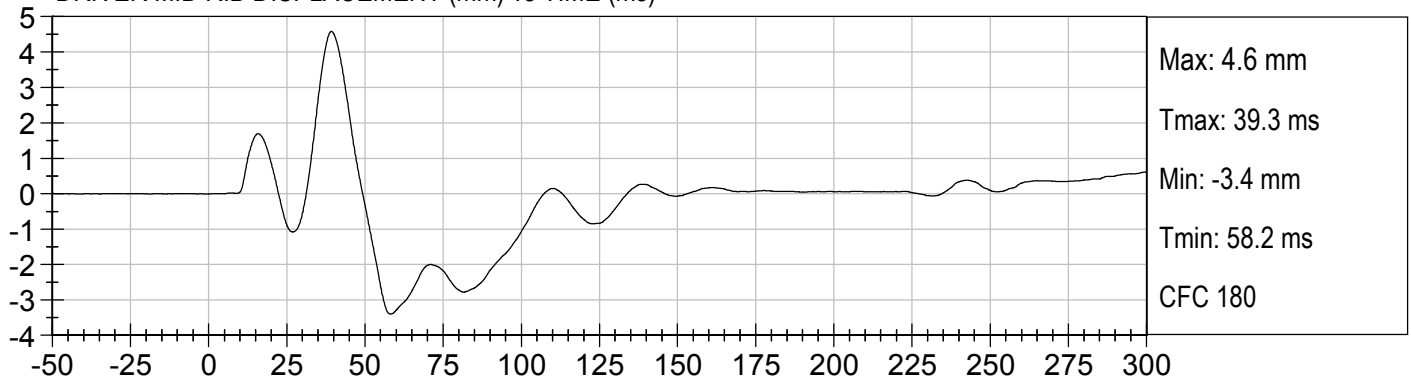
Right MDB Contact Switch



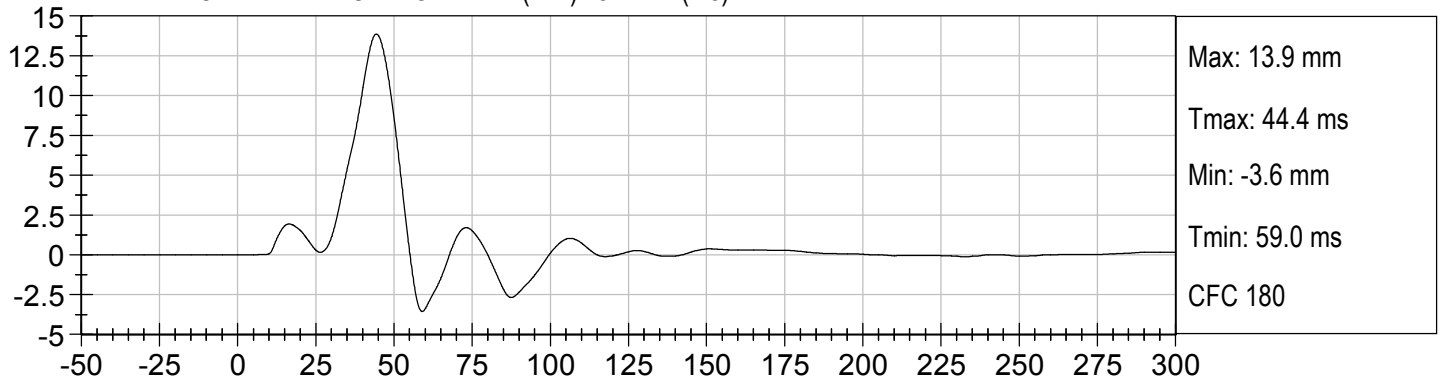
DRIVER UPPER RIB DISPLACEMENT (mm) vs TIME (ms)



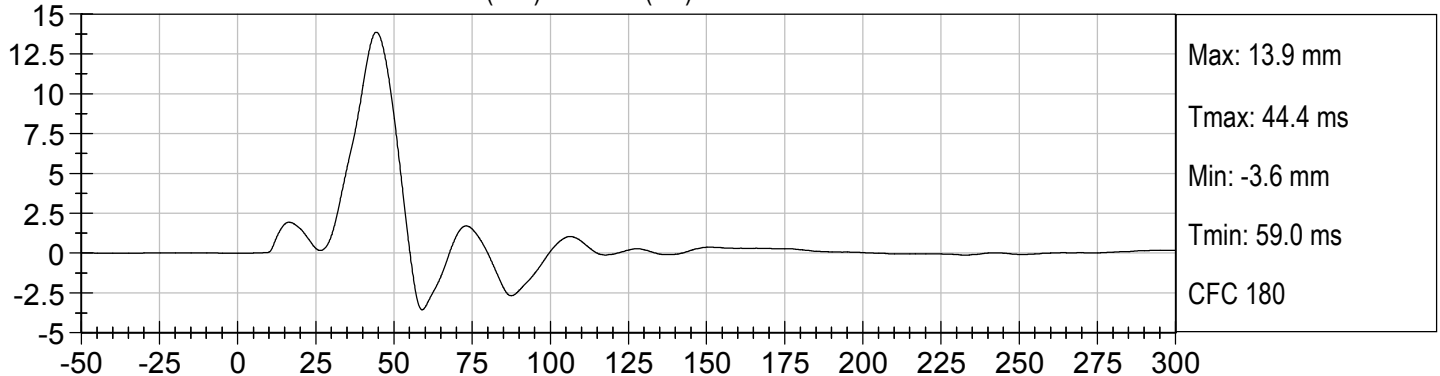
DRIVER MID RIB DISPLACEMENT (mm) vs TIME (ms)

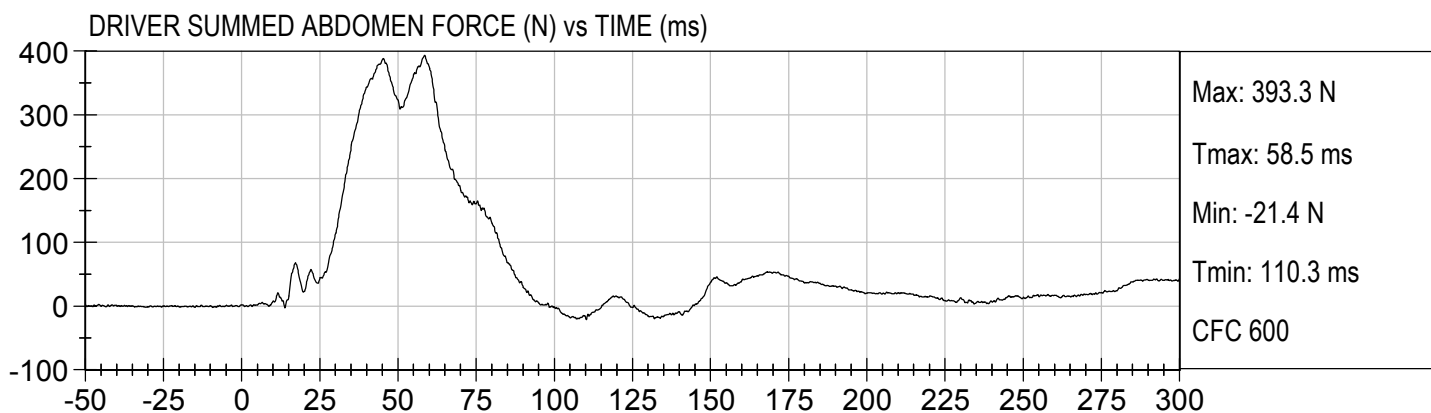
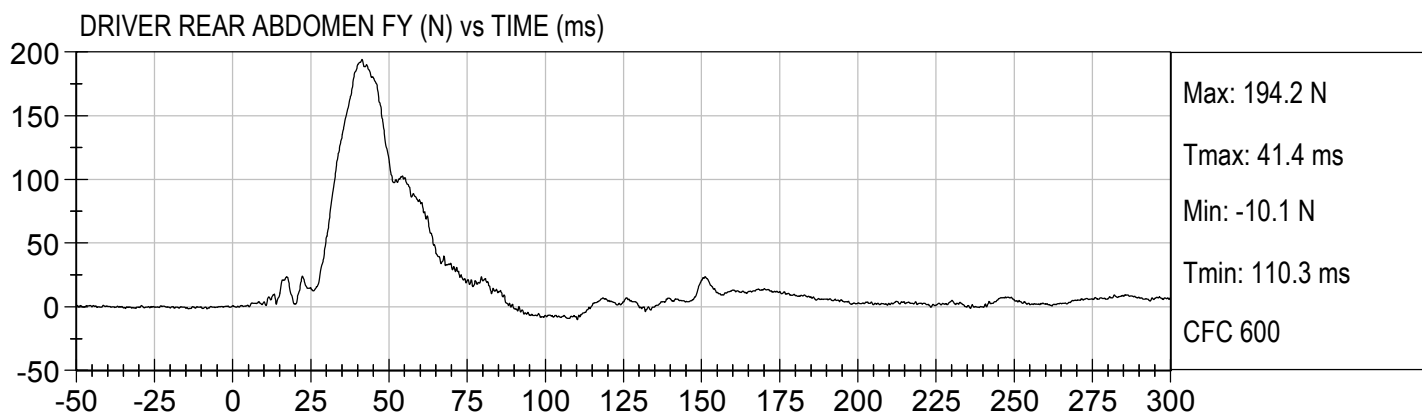
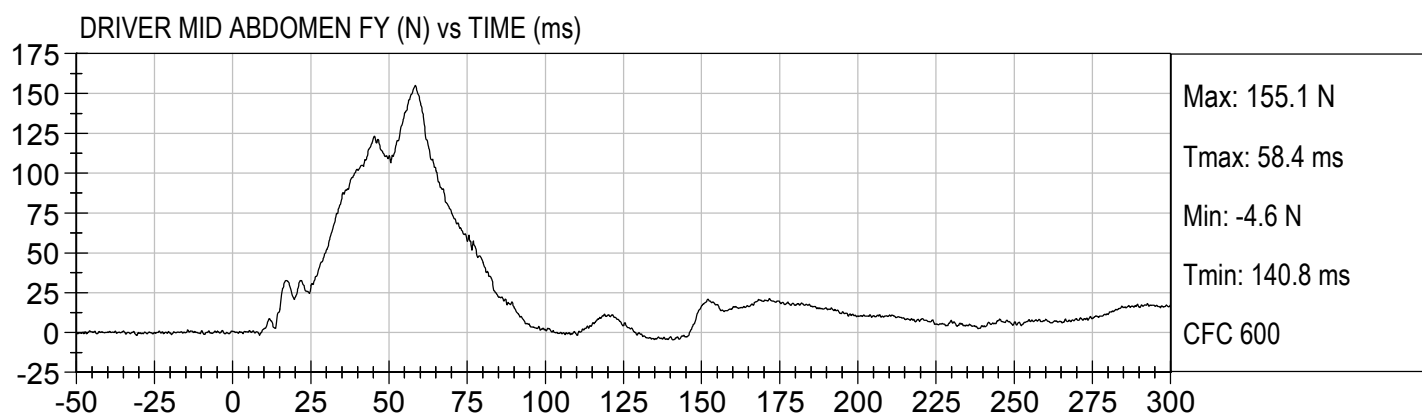
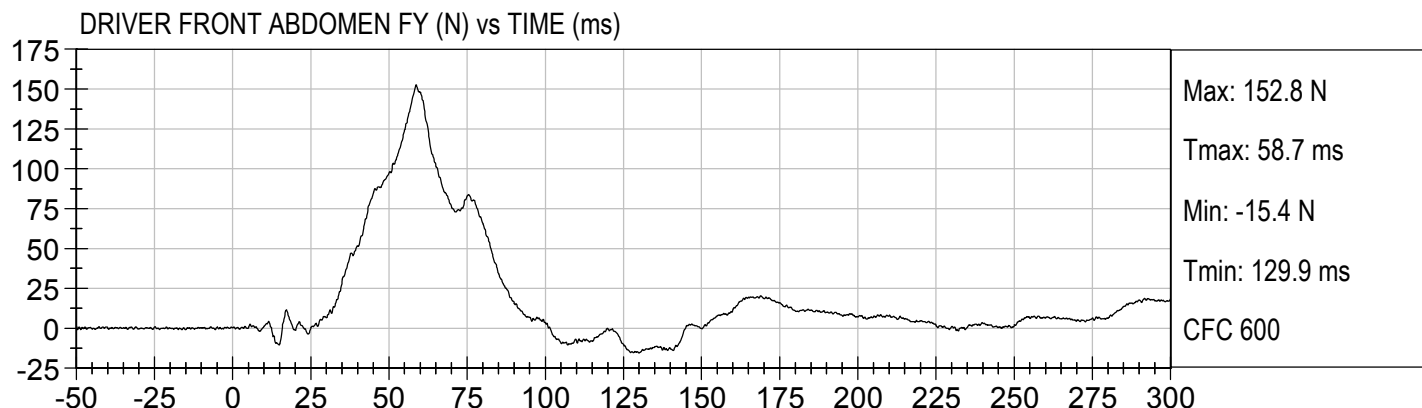


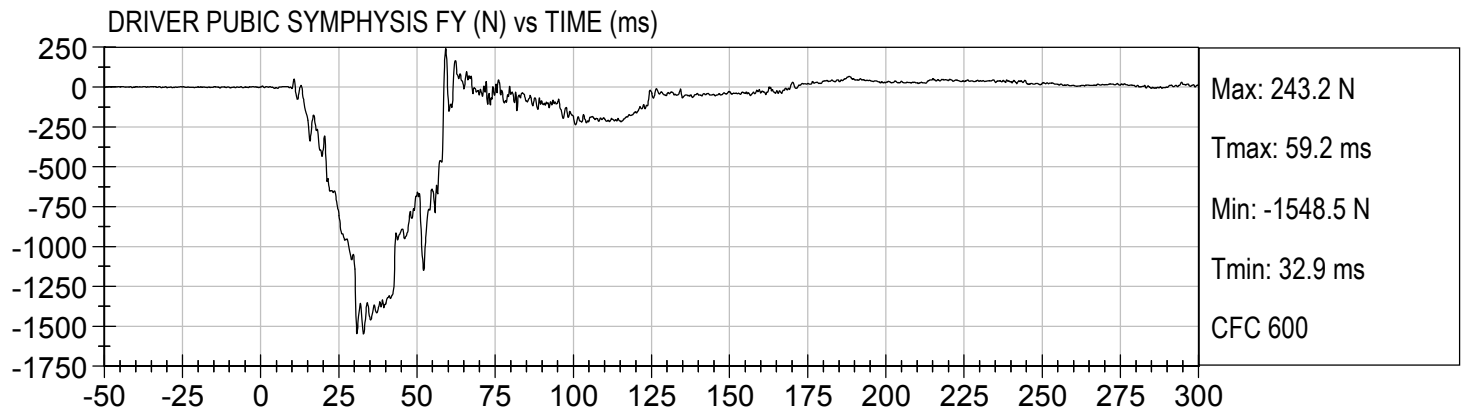
DRIVER LOWER RIB DISPLACEMENT (mm) vs TIME (ms)

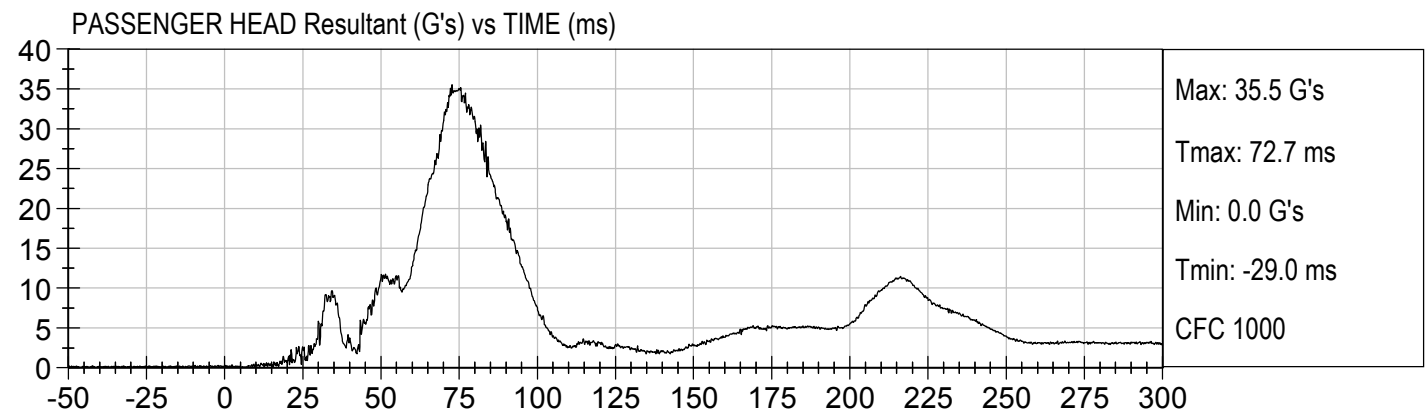
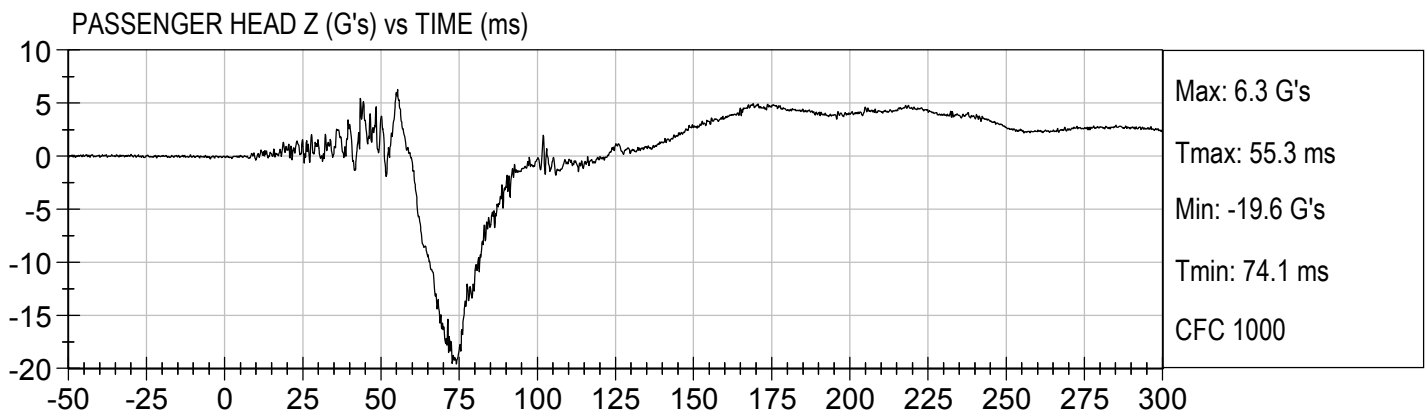
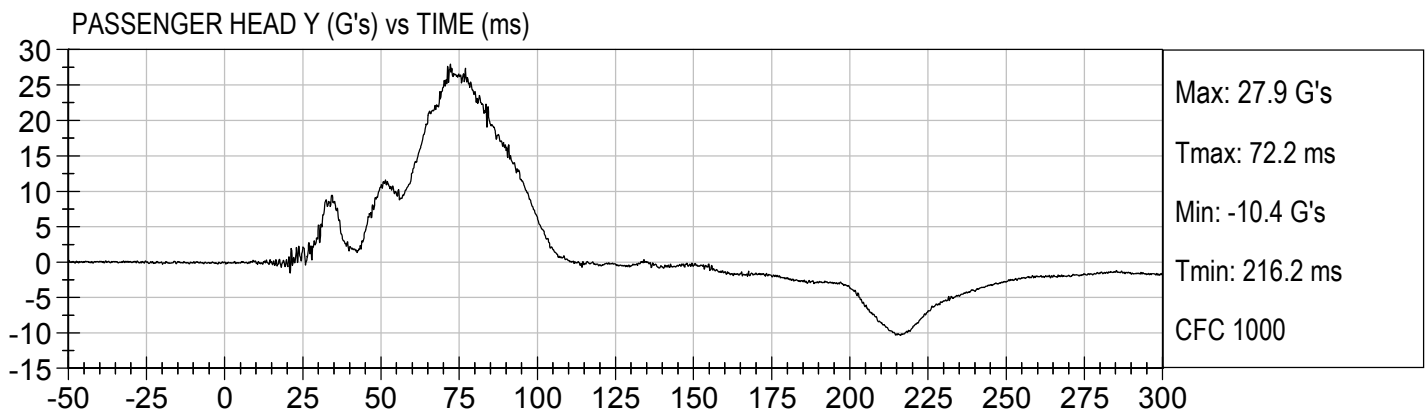
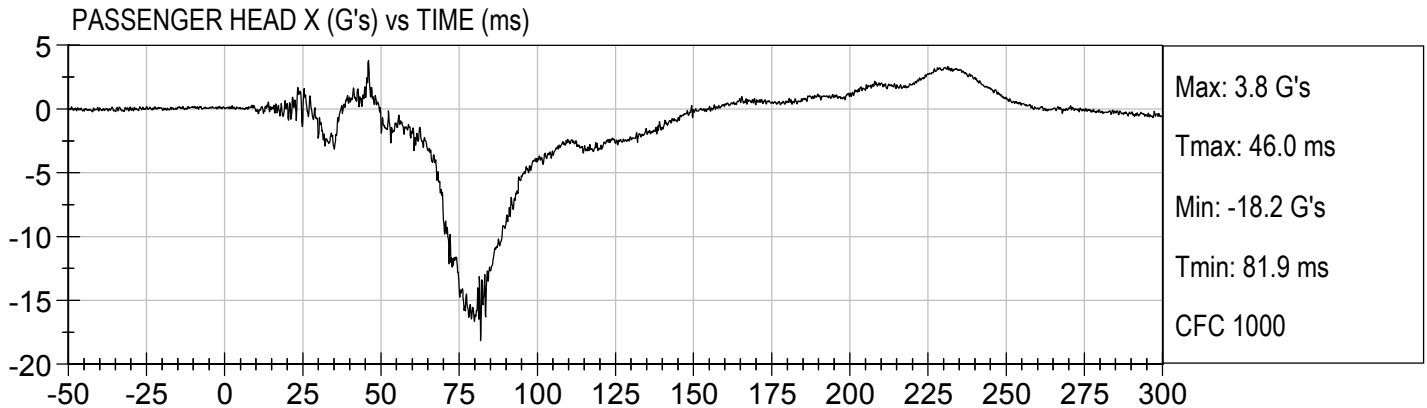


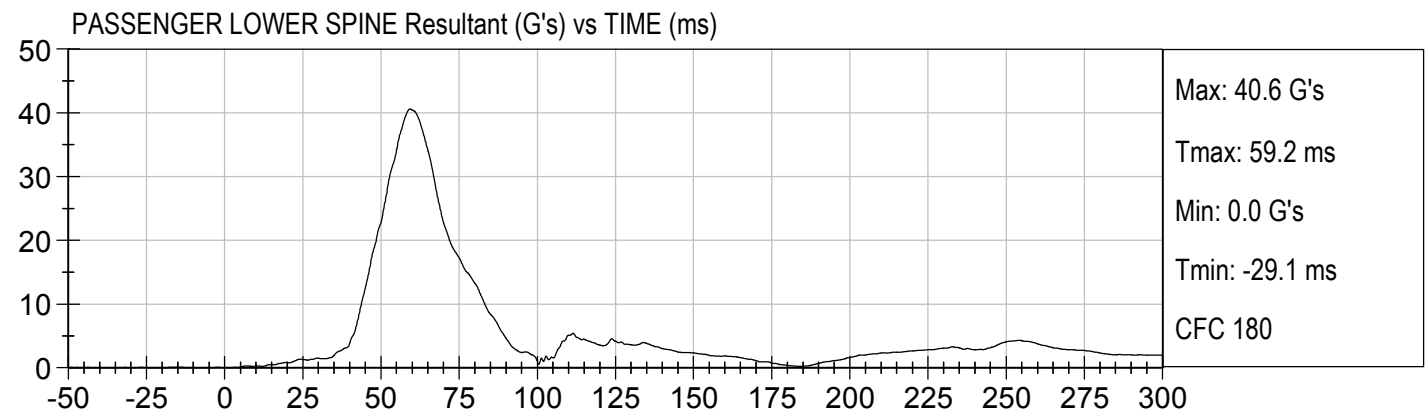
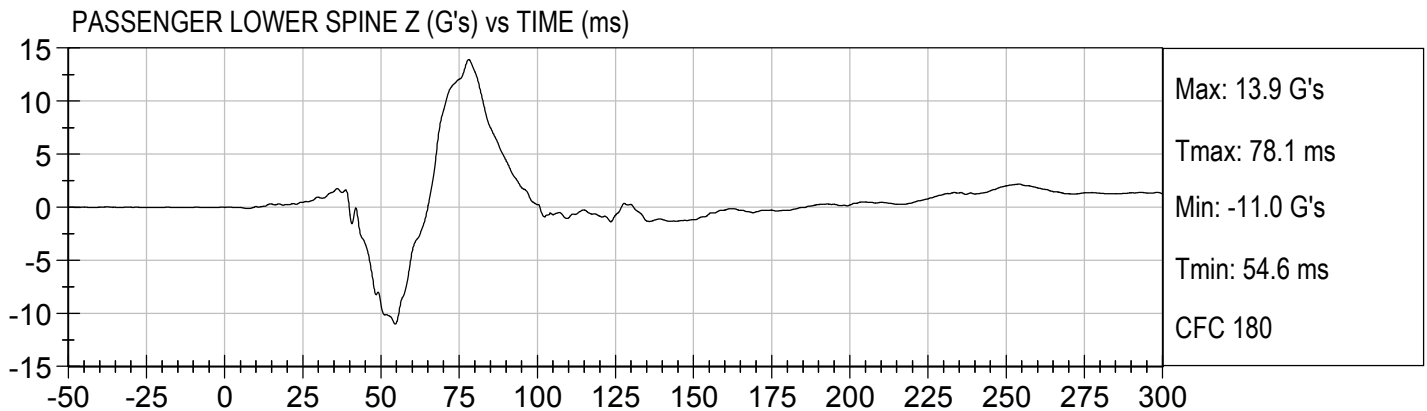
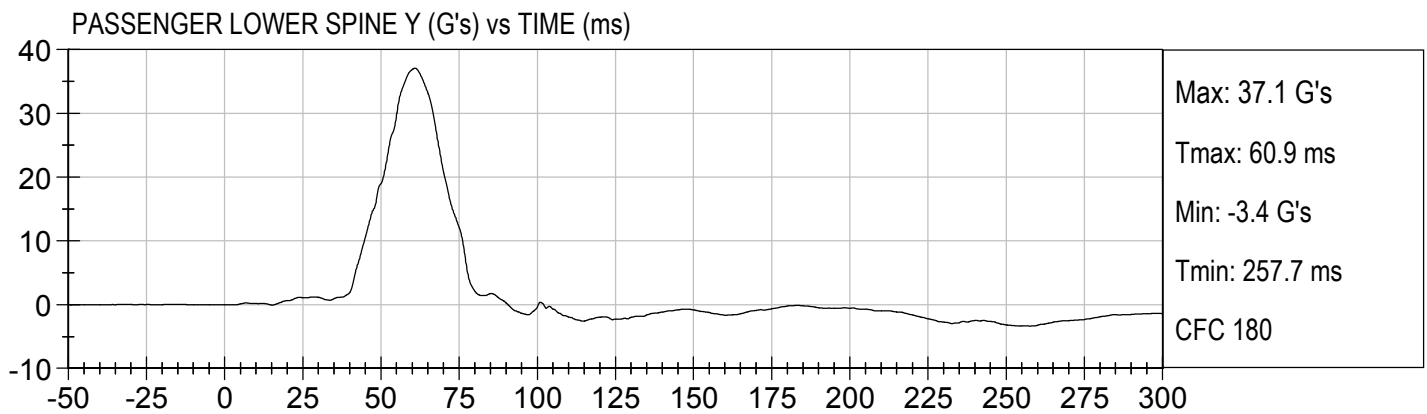
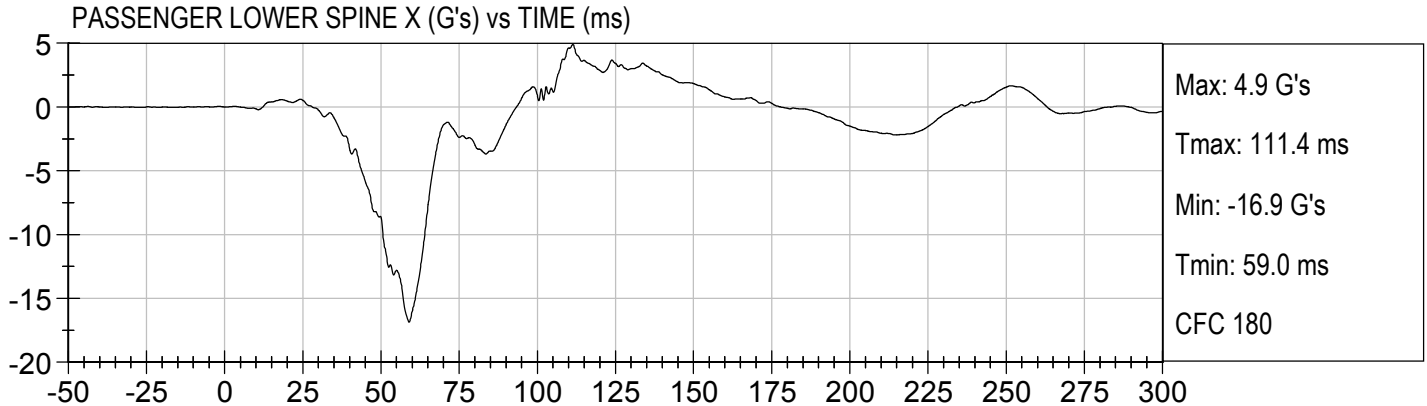
DRIVER MAX RIB DISPLACEMENT (mm) vs TIME (ms)

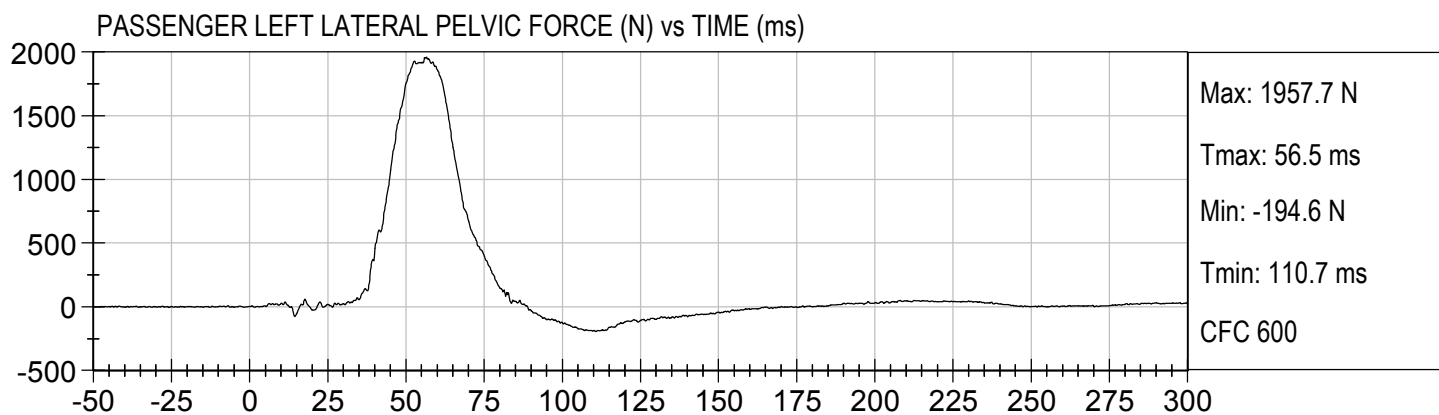
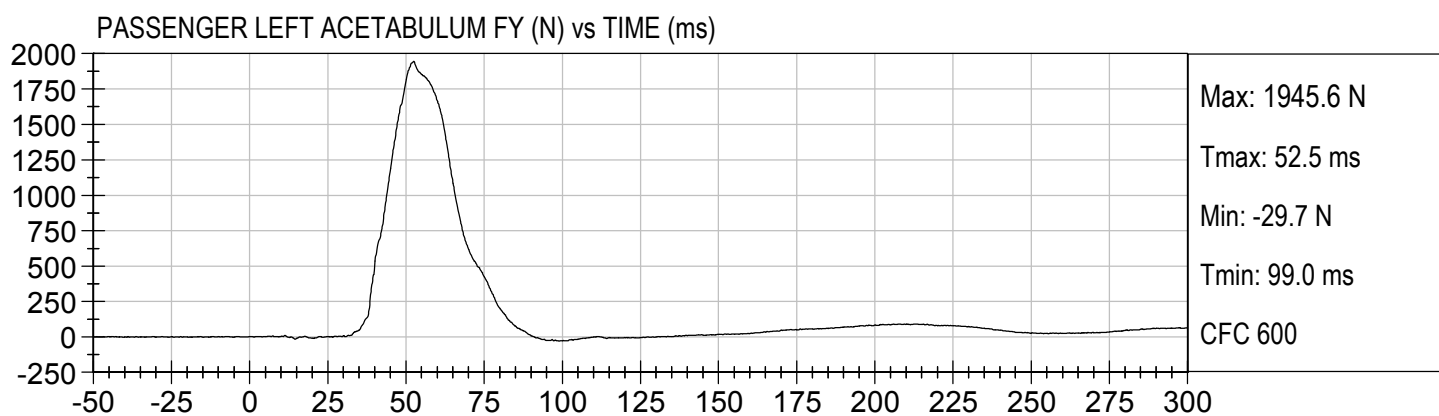
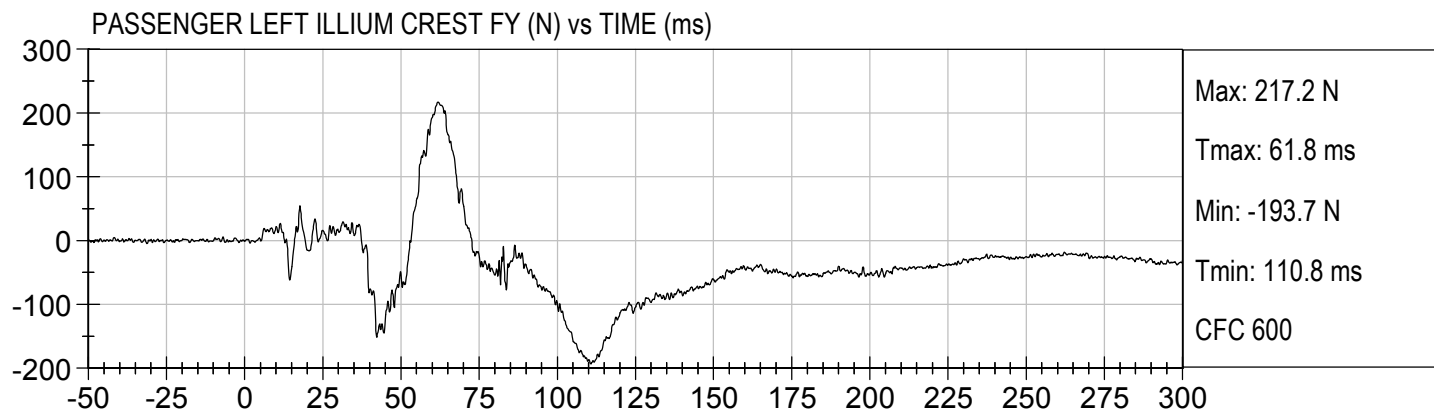












APPENDIX C
DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

ES-2re External Measurements
SN: 032

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

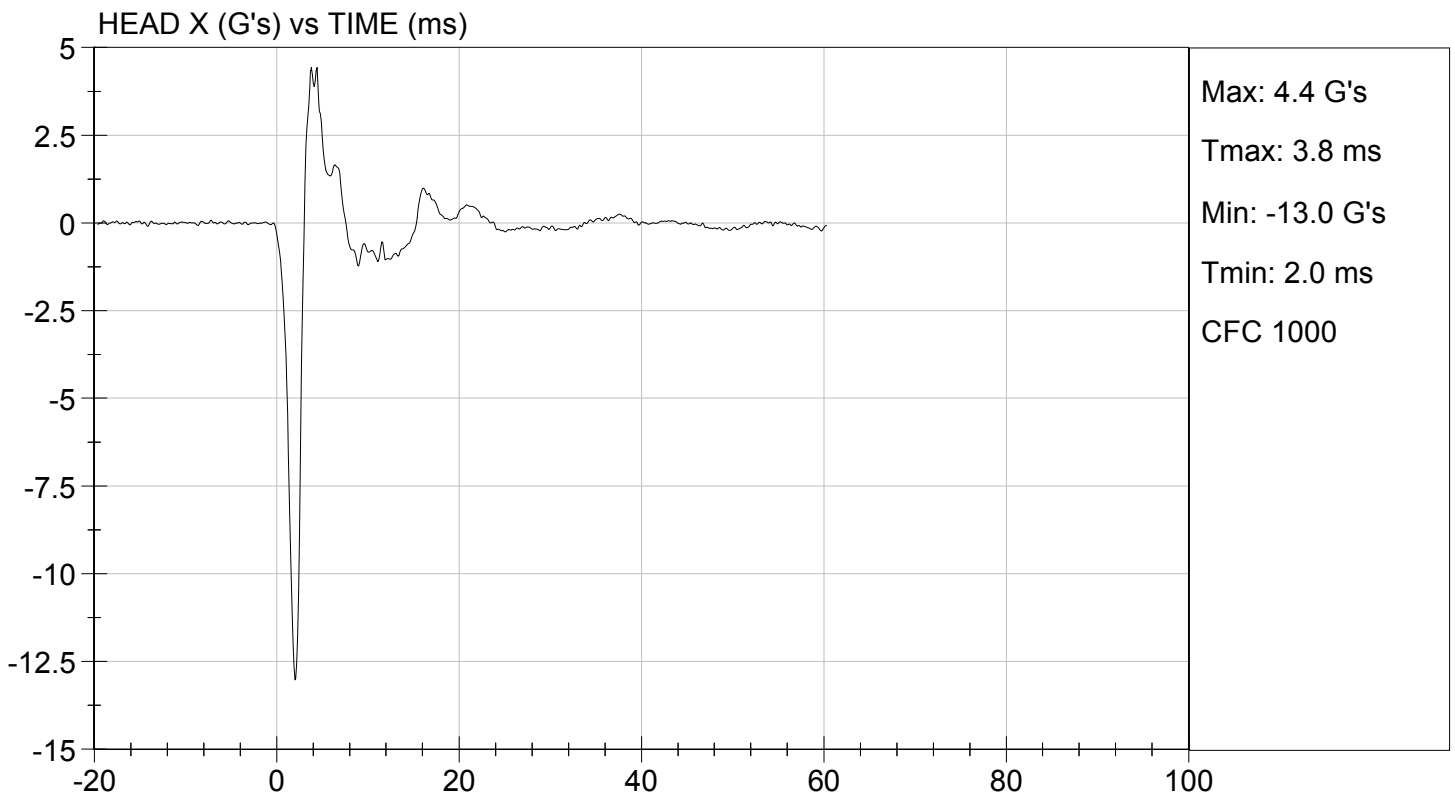
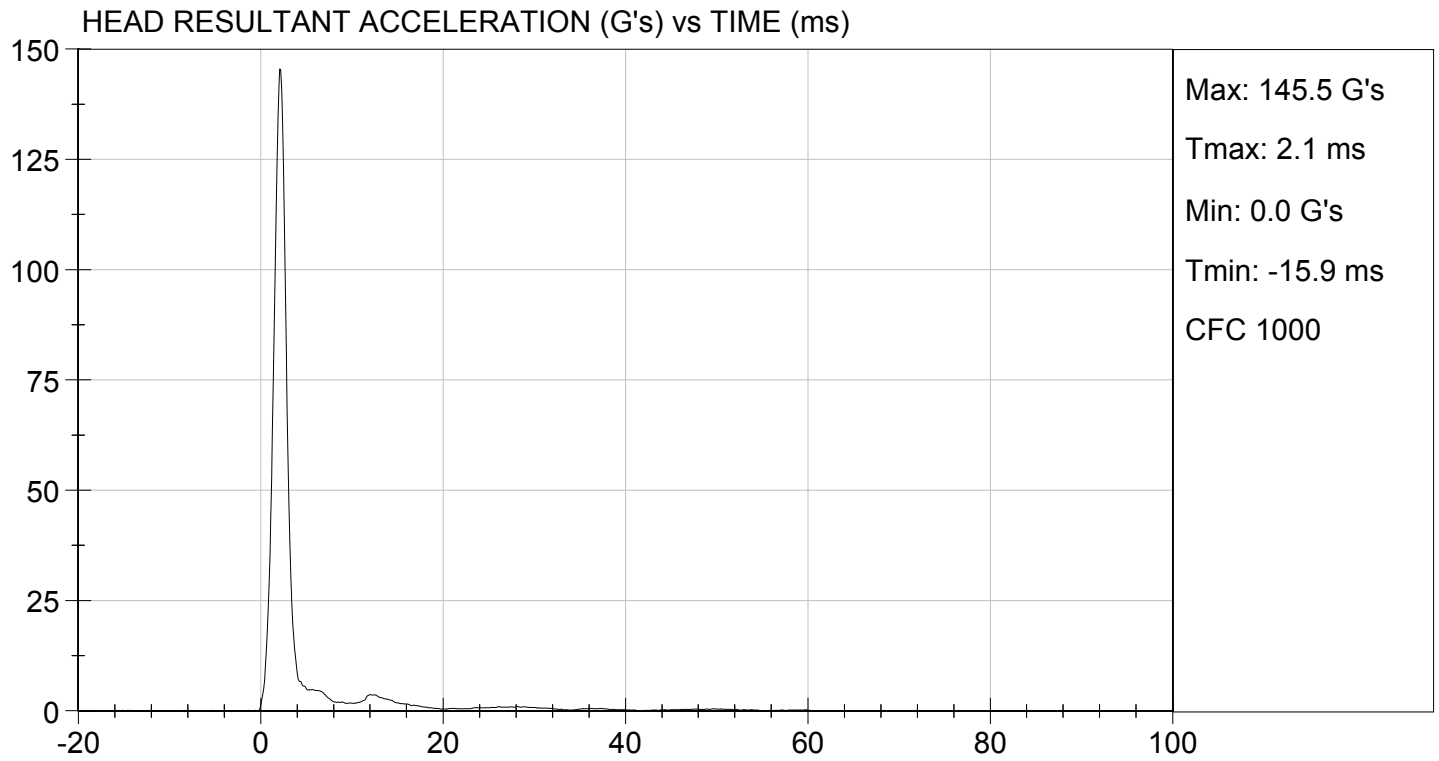
MGA RESEARCH CORPORATION**HEAD DROP TEST****ES-2re DUMMY****ATD Serial No:** 032**Test ID:** D14281

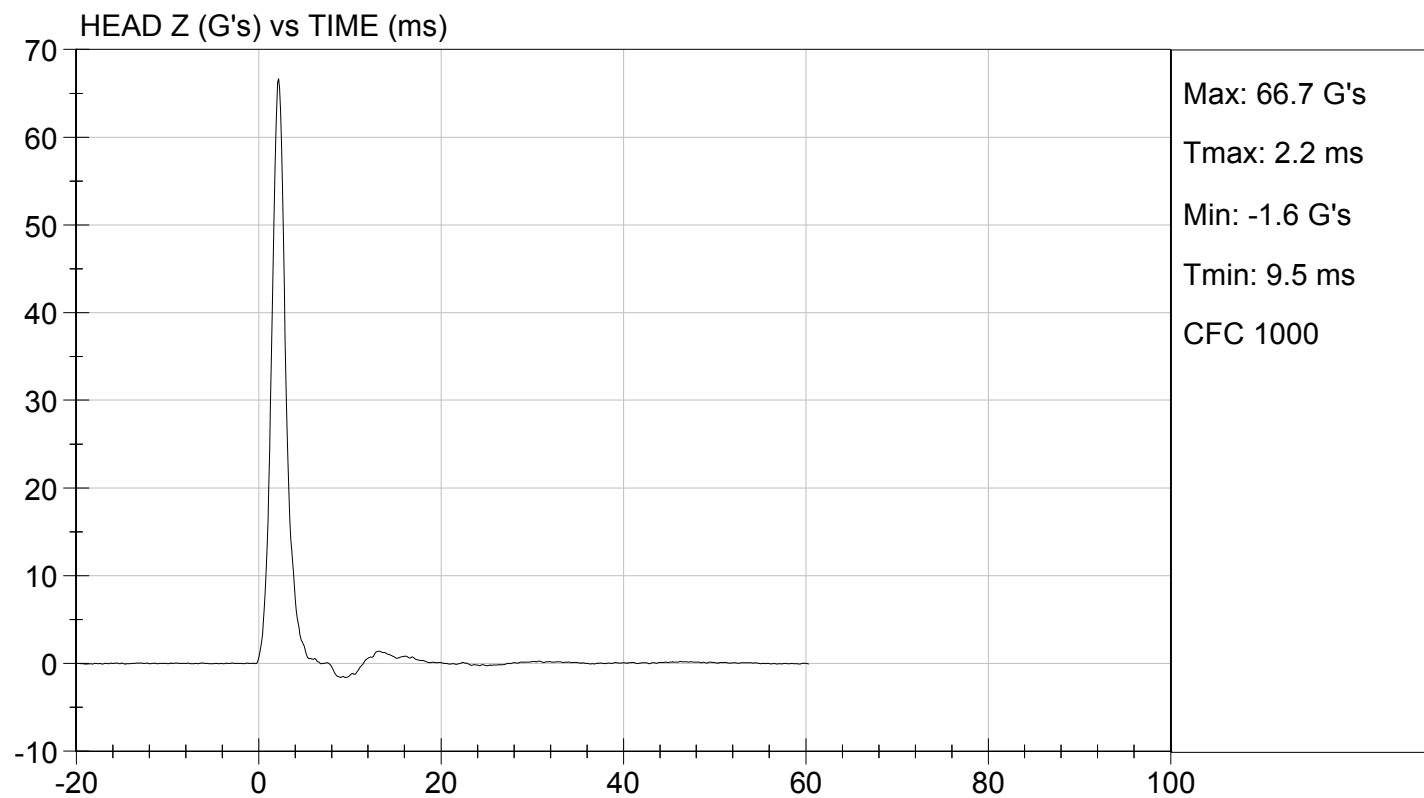
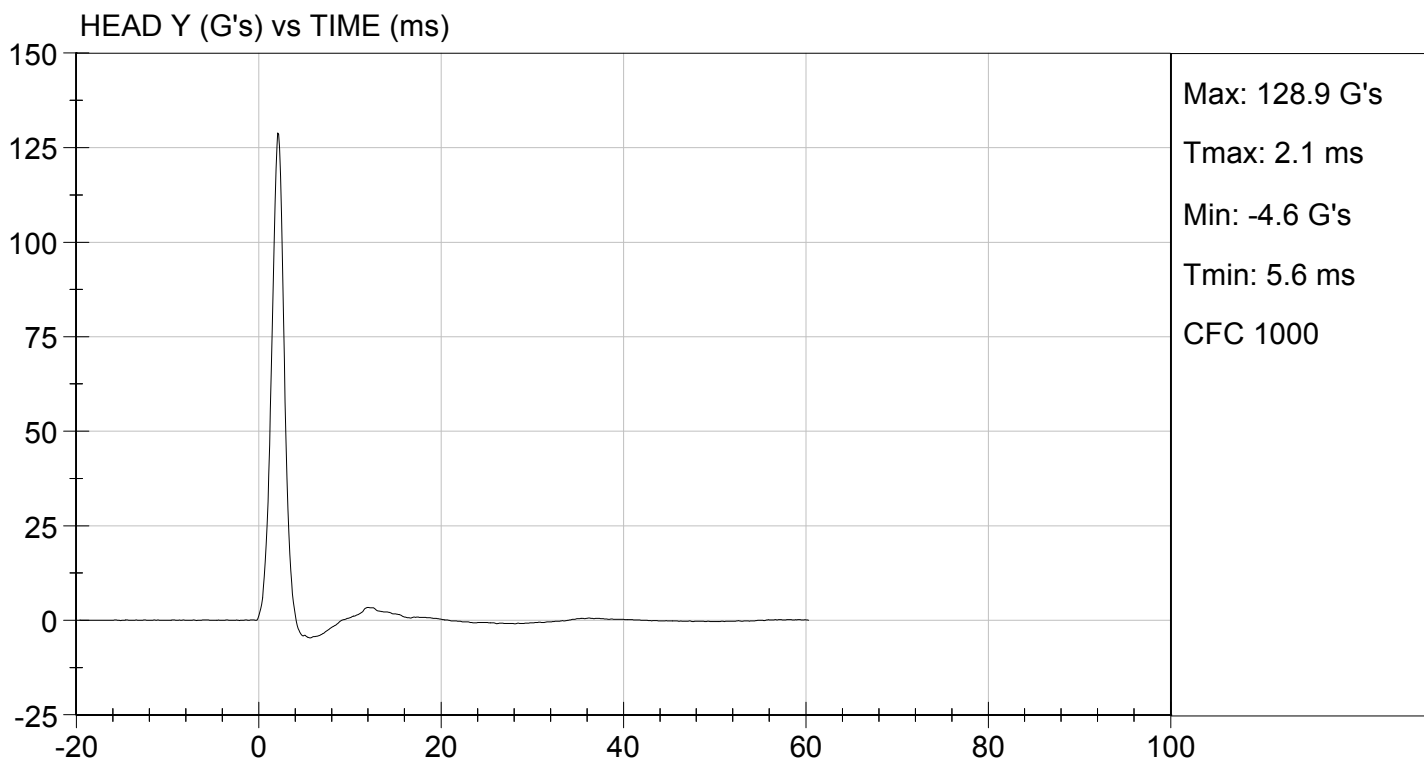
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	10	Pass
Peak Resultant Acceleration	G's	125 to 155	145	Pass
Peak Longitudinal Acceleration	G's	<= +/- 15.0	-13.0	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 15% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

01/28/2014
Test Date


Approved By



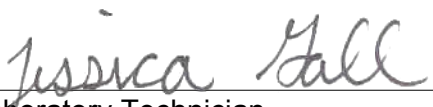


MGA RESEARCH CORPORATION
NECK PENDULUM TEST
ES-2re DUMMY

ATD Serial No: 032

Test I.D: D14282

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity		%	10 to 70	10	Pass
Pendulum Speed		m/s	3.30 to 3.50	3.46	Pass
Pendulum Velocity	1 ms	m/s	-0.05 to 0.00	-0.04	Pass
	3 ms	m/s	-0.25 to -0.375	-0.33	Pass
	14 ms	m/s	-3.20 to -3.70	-3.21	Pass
	17 ms	m/s	>= -3.70	-3.59	Pass
Maximum Flexion Angle		deg	49.0 to 59.0	51.8	Pass
Time of Maximum Flexion Angle		ms	54.0 to 66.0	62.6	Pass
Head Rotation Decay Time to 0 Degree		ms	53.0 to 88.0	56.9	Pass
Overall Results					Pass


 Laboratory Technician

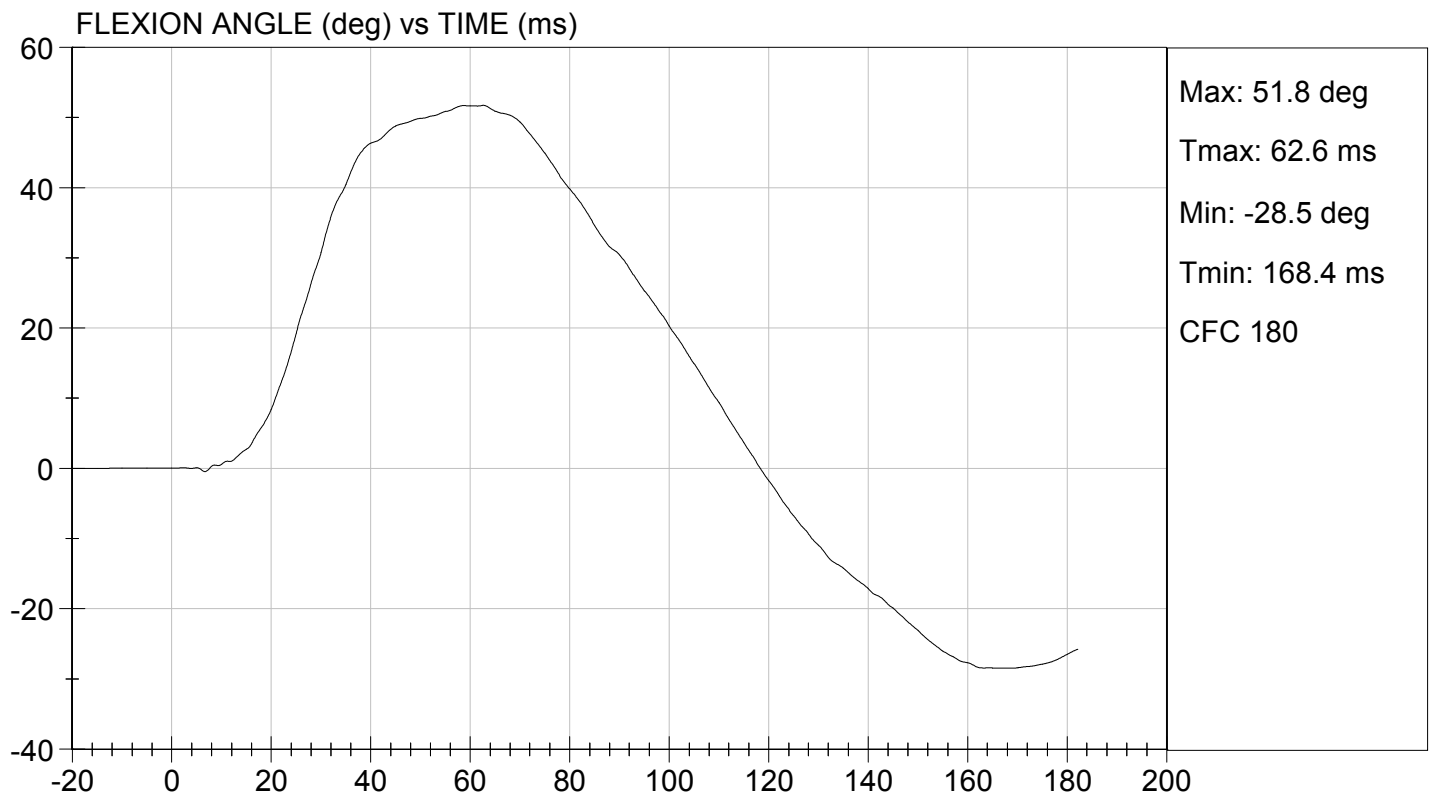
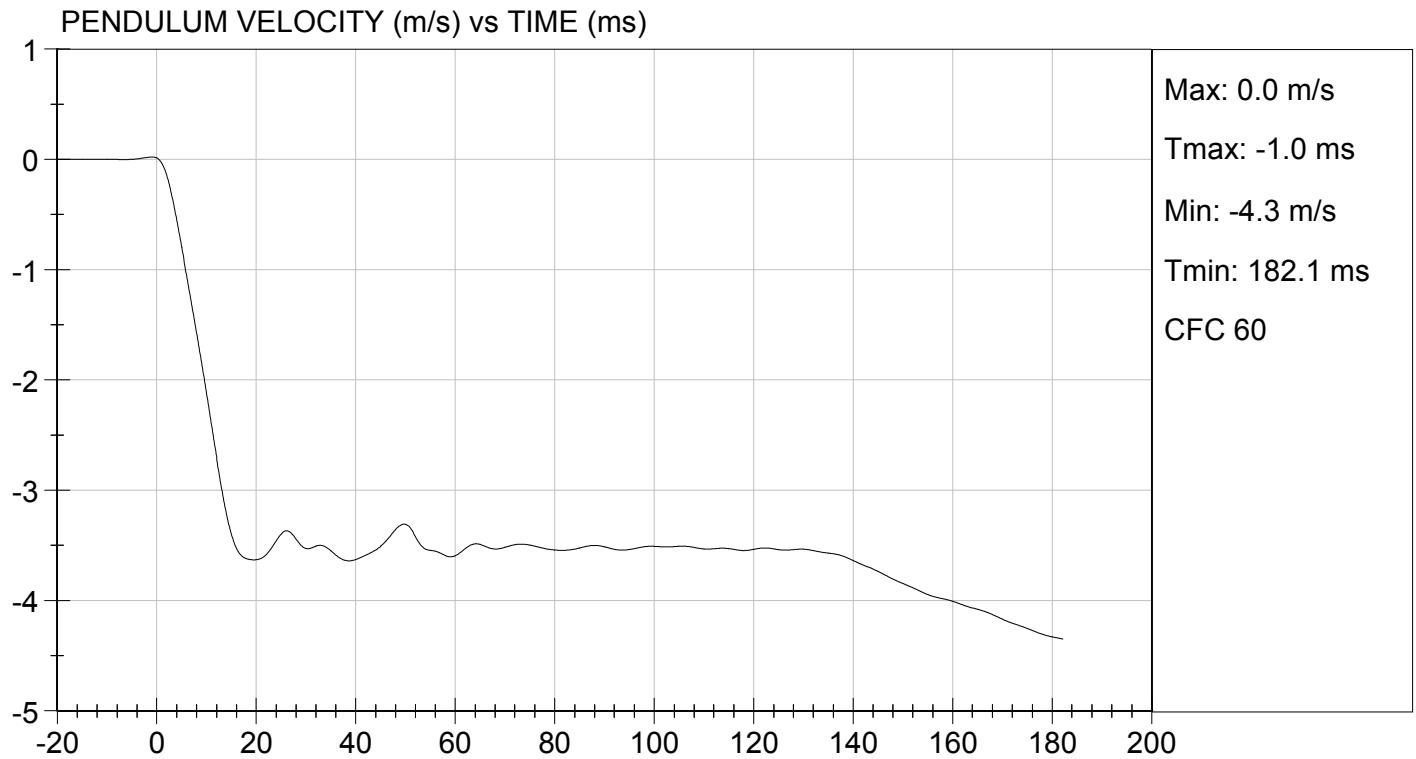
01/28/2014
 Test Date


 Approved By



TEST DESC: NECK BENDING
VELOCITY: 11.34 ft/s, 3.46 m/s

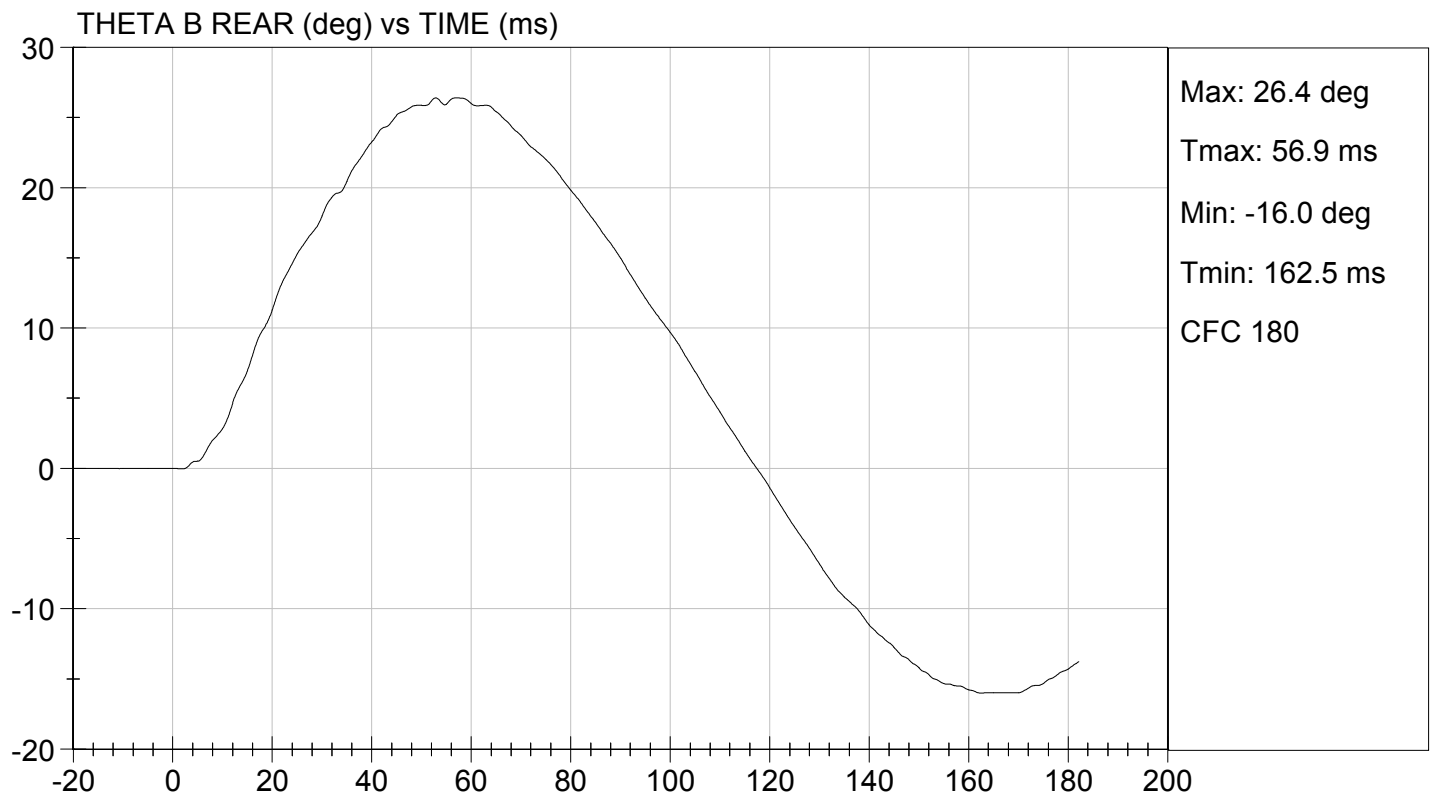
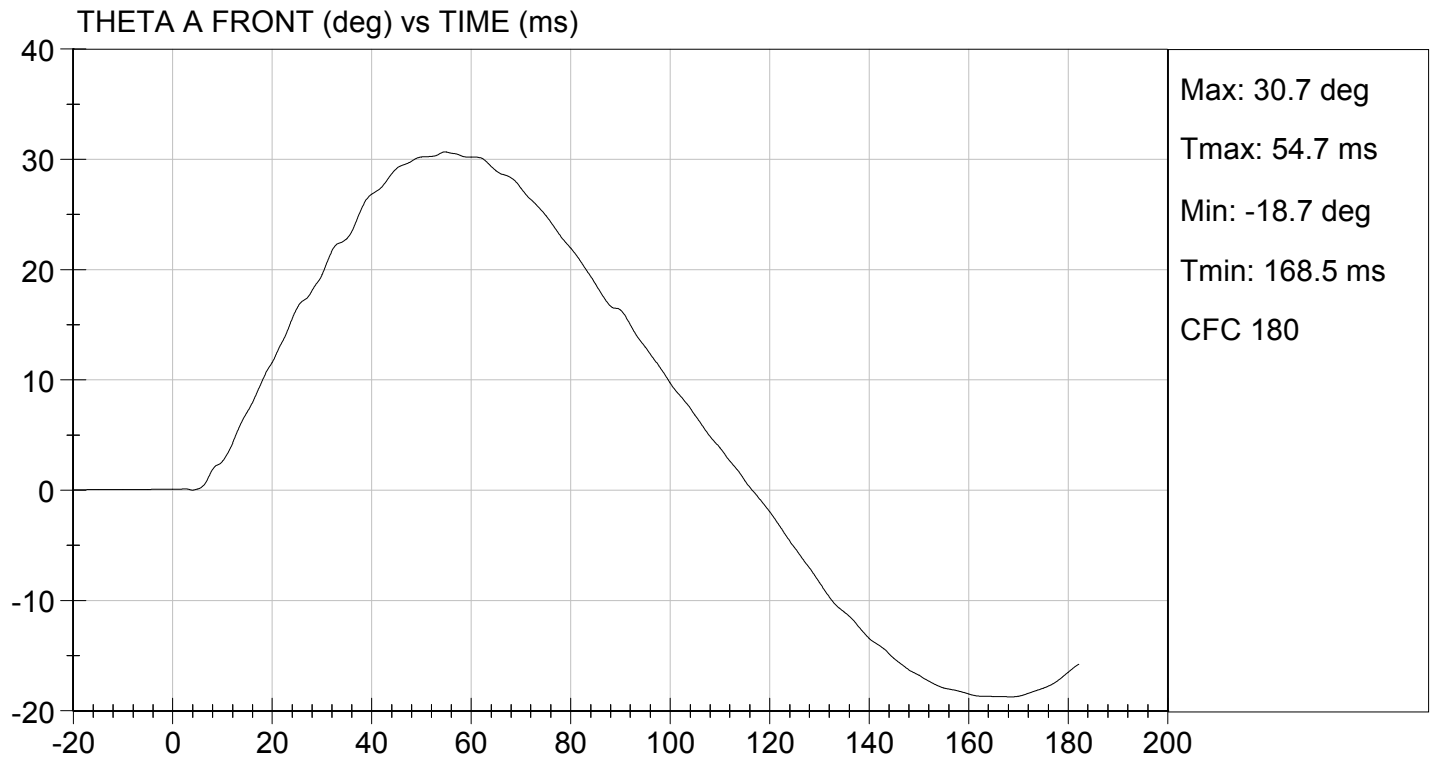
TEST DATE: 01/28/2014
TEST #: D14282





TEST DESC: NECK BENDING
VELOCITY: 11.34 ft/s, 3.46 m/s

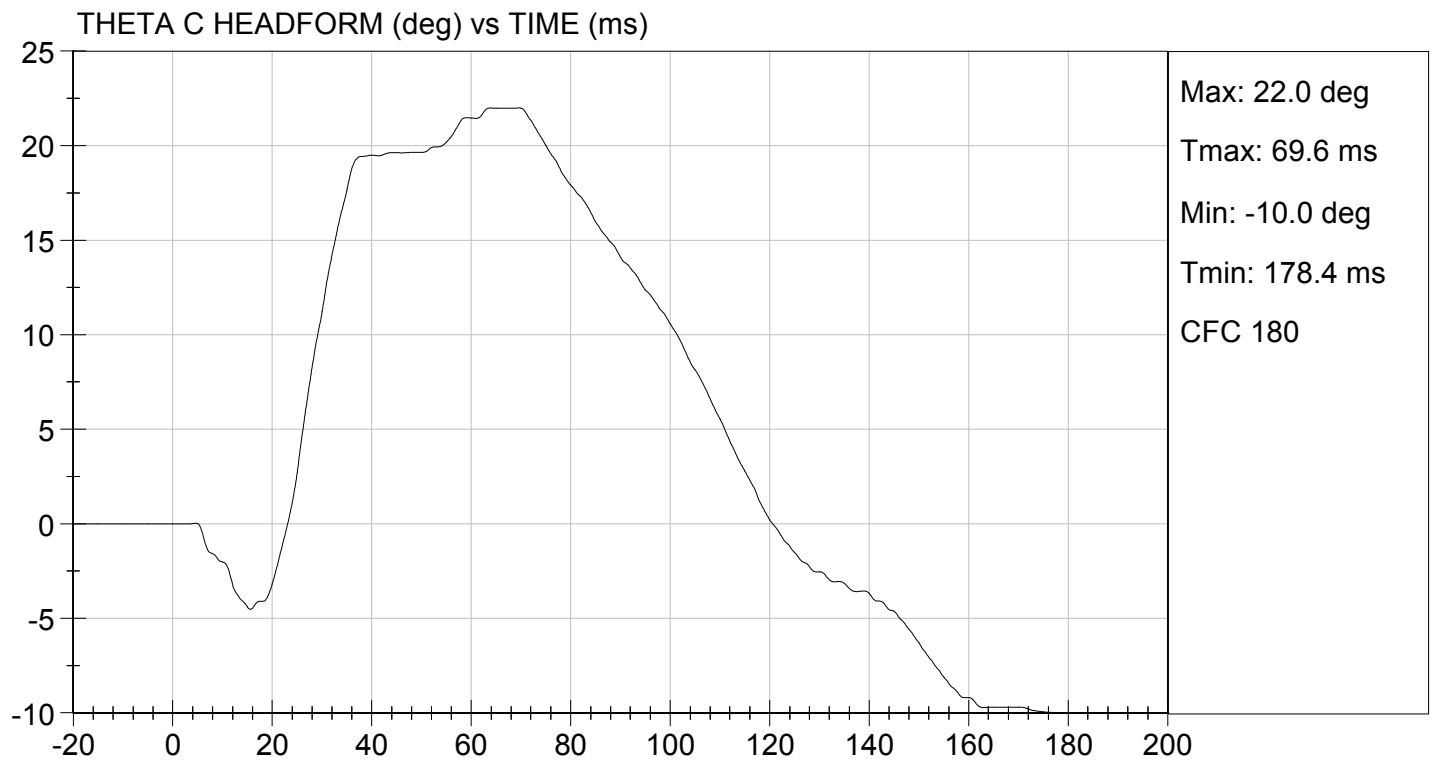
TEST DATE: 01/28/2014
TEST #: D14282





TEST DESC: NECK BENDING
VELOCITY: 11.34 ft/s, 3.46 m/s

TEST DATE: 01/28/2014
TEST #: D14282



MGA RESEARCH CORPORATION

SHOULDER IMPACT TEST

ES-2re DUMMY

ATD Serial No: 032

Test I.D: D14283

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	11	Pass
Pendulum Speed	m/s	4.20 to 4.40	4.39	Pass
Peak Impactor Acceleration	G's	7.5 to 10.5	10.1	Pass
Overall Test Results				Pass


Laboratory Technician

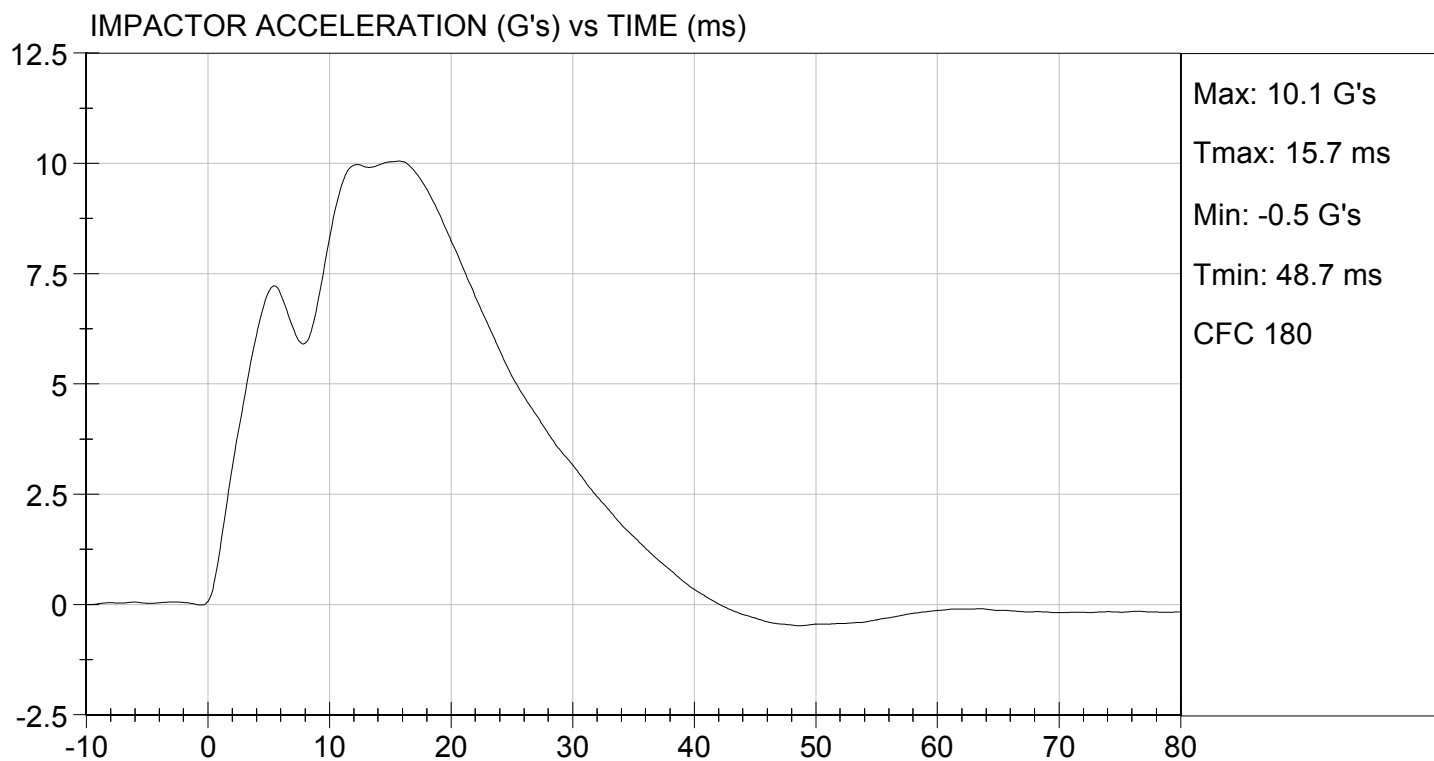
01/29/2014
Test Date


Approved By



TEST DESC: SHOULDER IMPACT
VELOCITY: 14.40 ft/s, 4.39 m/s

TEST DATE: 01/29/2014
TEST #: D14283



MGA RESEARCH CORPORATION

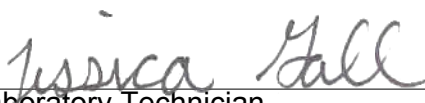
UPPER RIB TEST

ES-2re DUMMY

ATD Serial No: 032

Test I.D: D14284

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	10	Pass
Displacement at 459 mm	mm	36.0 to 40.0	38.9	Pass
Displacement at 815 mm	mm	46.0 to 51.0	49.9	Pass
Overall Test Results				Pass

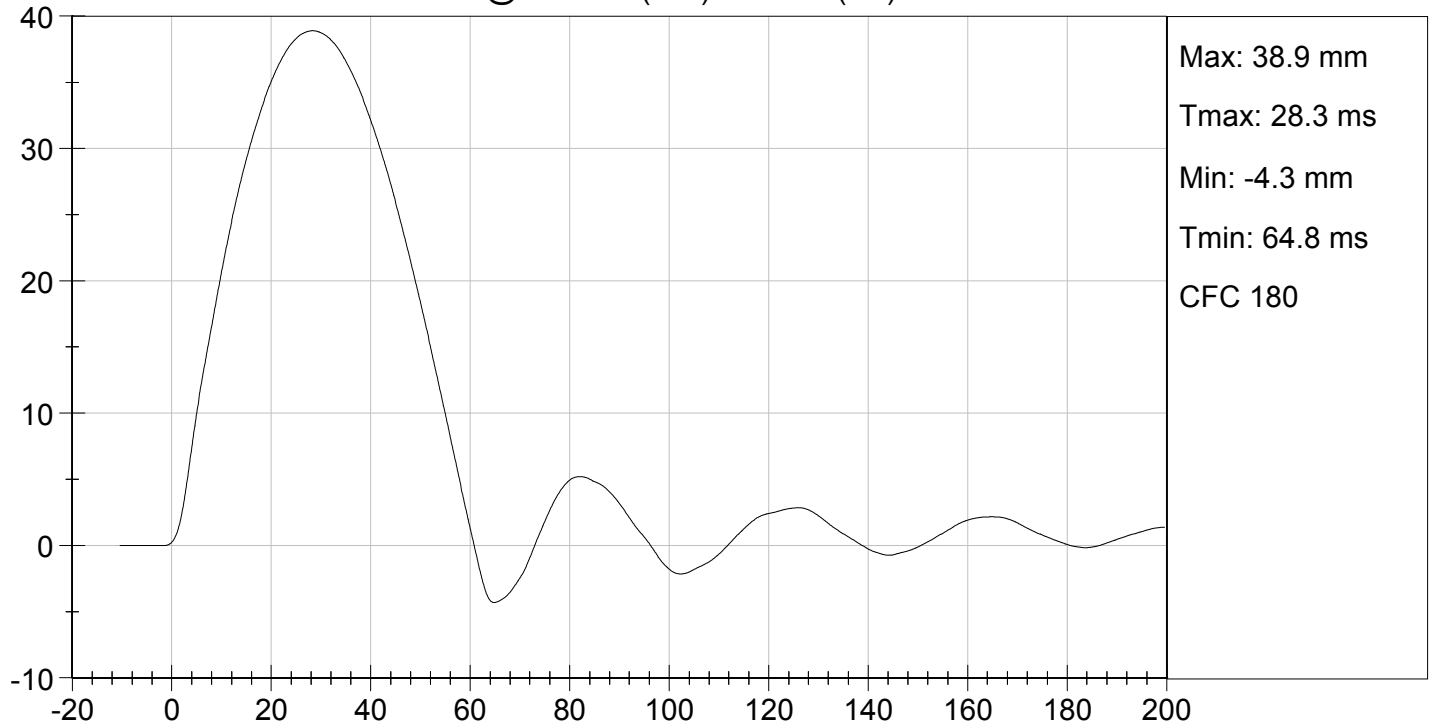

Laboratory Technician

01/28/2014
Test Date

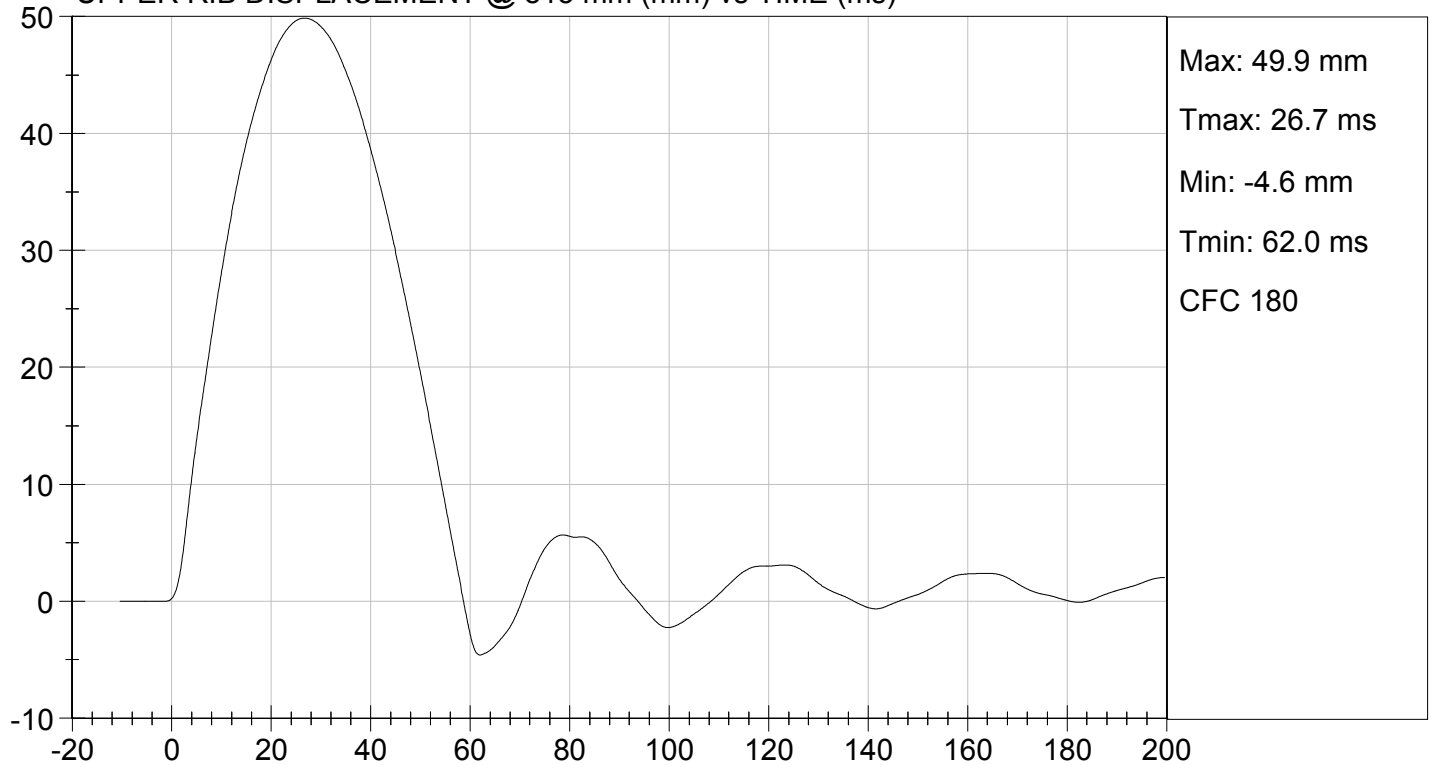

Approved By



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: D14285

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	10	Pass
Displacement at 459 mm	mm	36.0 to 40.0	37.3	Pass
Displacement at 815 mm	mm	46.0 to 51.0	48.2	Pass
Overall Test Results				Pass

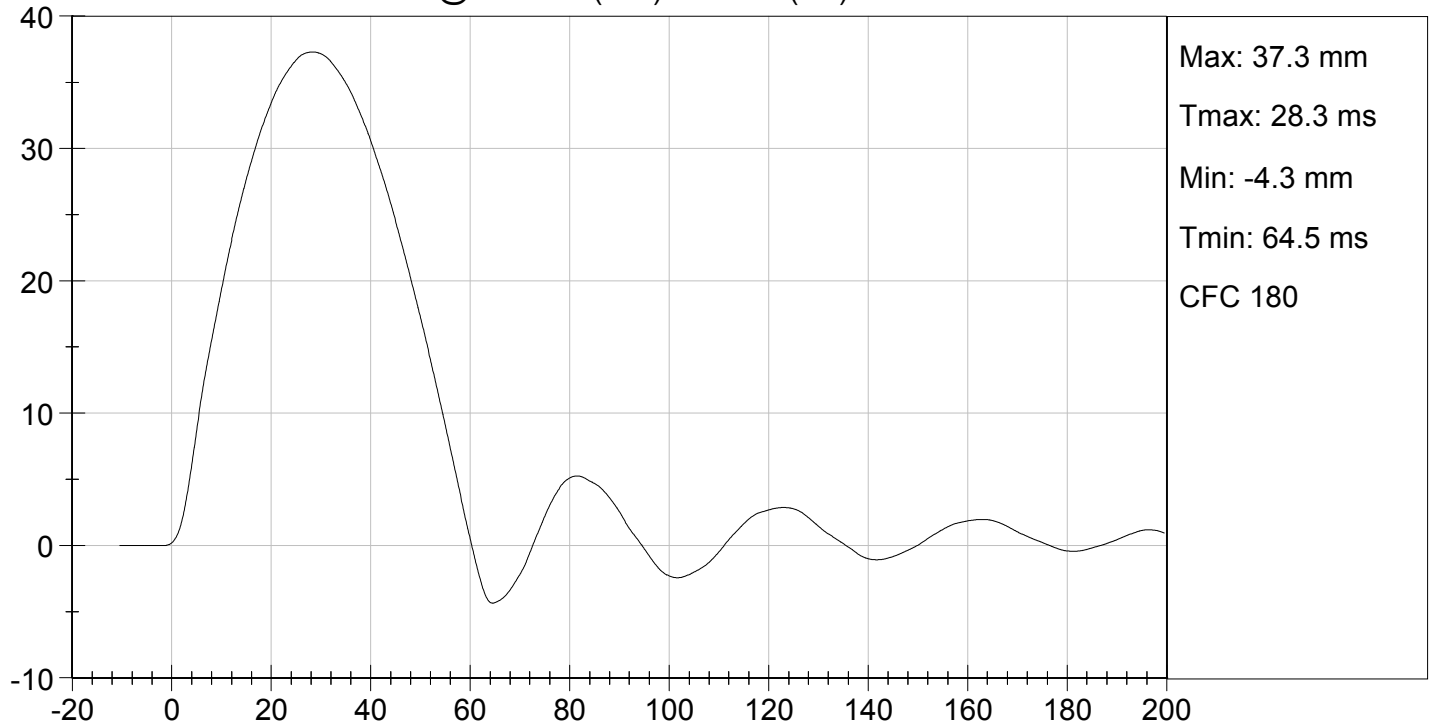

Laboratory Technician

01/28/2014
Test Date

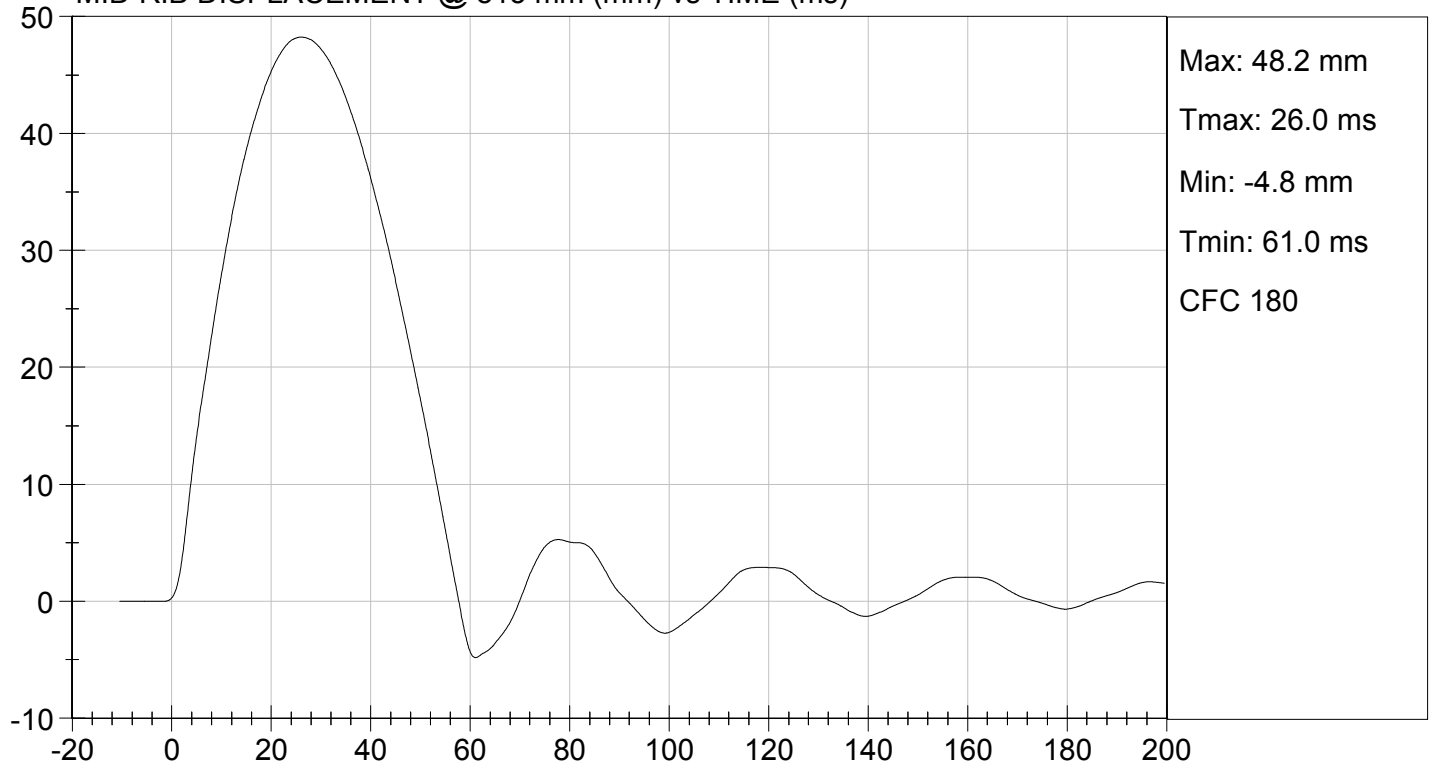

Approved By



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

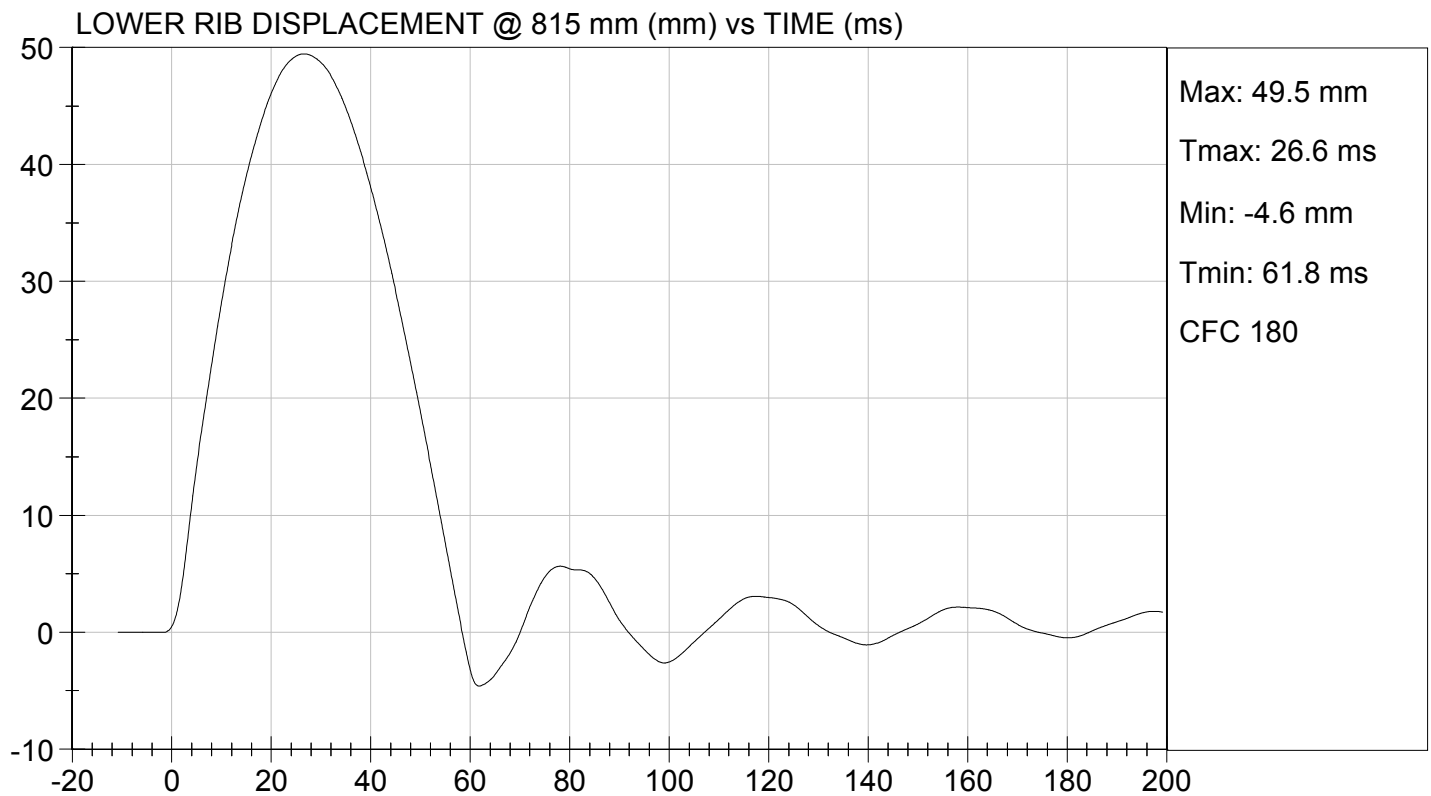
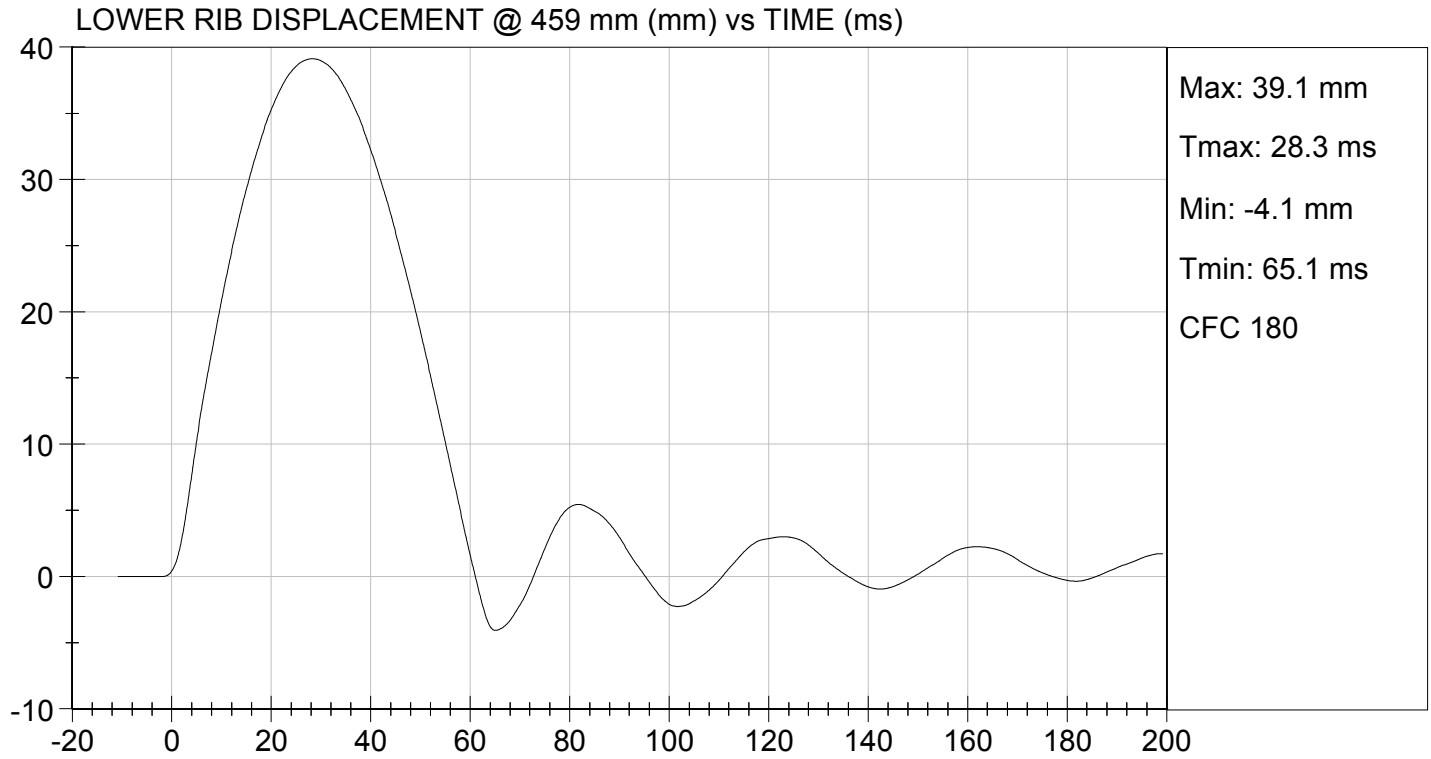
Test I.D: D14286

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	10	Pass
Displacement at 459 mm	mm	36.0 to 40.0	39.1	Pass
Displacement at 815 mm	mm	46.0 to 51.0	49.5	Pass
Overall Test Results				Pass


Laboratory Technician

01/28/2014
Test Date


Approved By



MGA RESEARCH CORPORATION**THORAX IMPACT TEST****ES-2re DUMMY****ATD Serial No:** 032**Test I.D:** D14280

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.4	Pass
Humidity	%	10 to 70	11	Pass
Probe Speed	m/s	5.40 to 5.60	5.58	Pass
Maximum Impactor Force (after 6 ms)	N	5100 to 6200	5176	Pass
Upper Rib Displacement	mm	34.0 to 41.0	38.6	Pass
Middle Rib Displacement	mm	37.0 to 45.0	41.4	Pass
Lower Rib Displacement	mm	37.0 to 44.0	40.6	Pass
Overall Test Results				Pass


Laboratory Technician

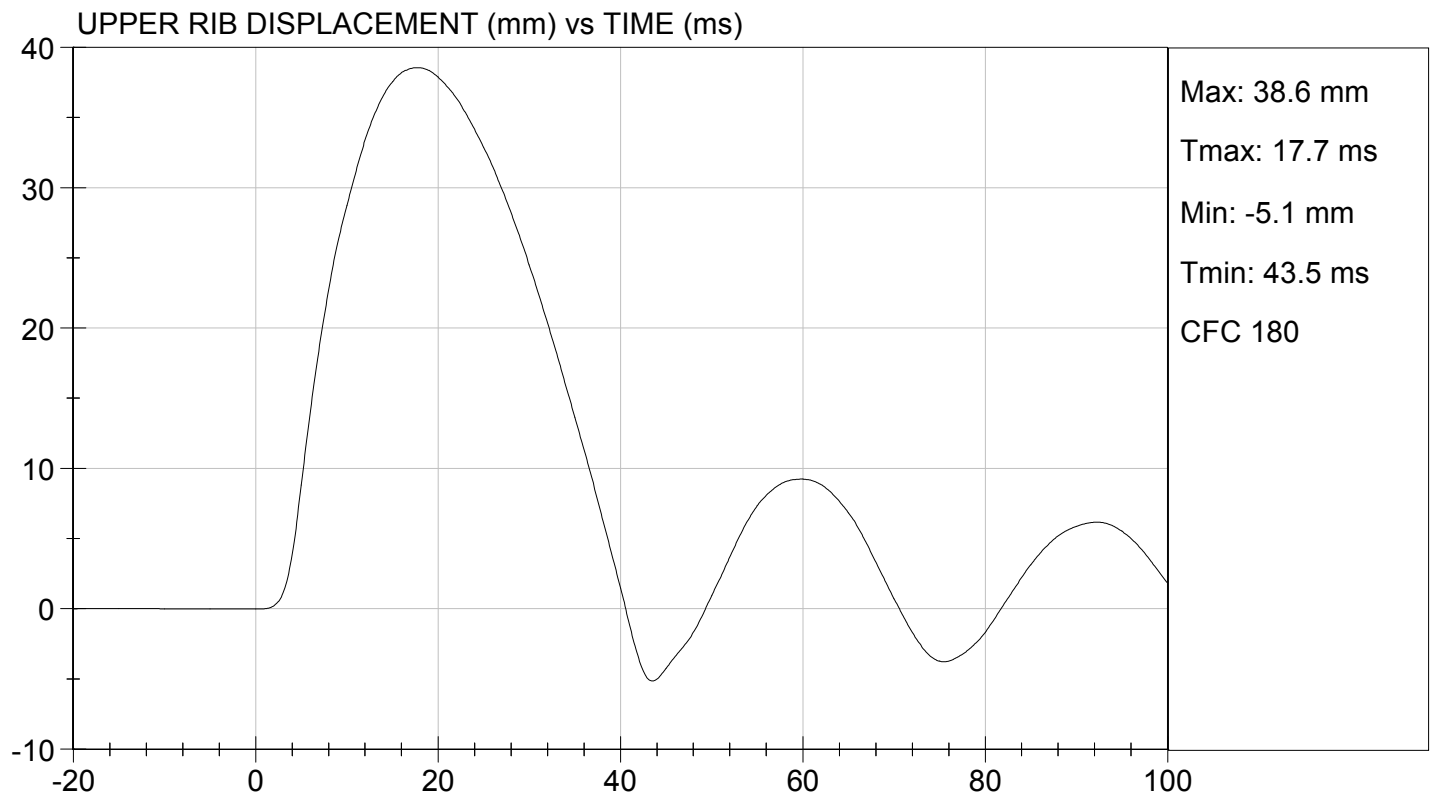
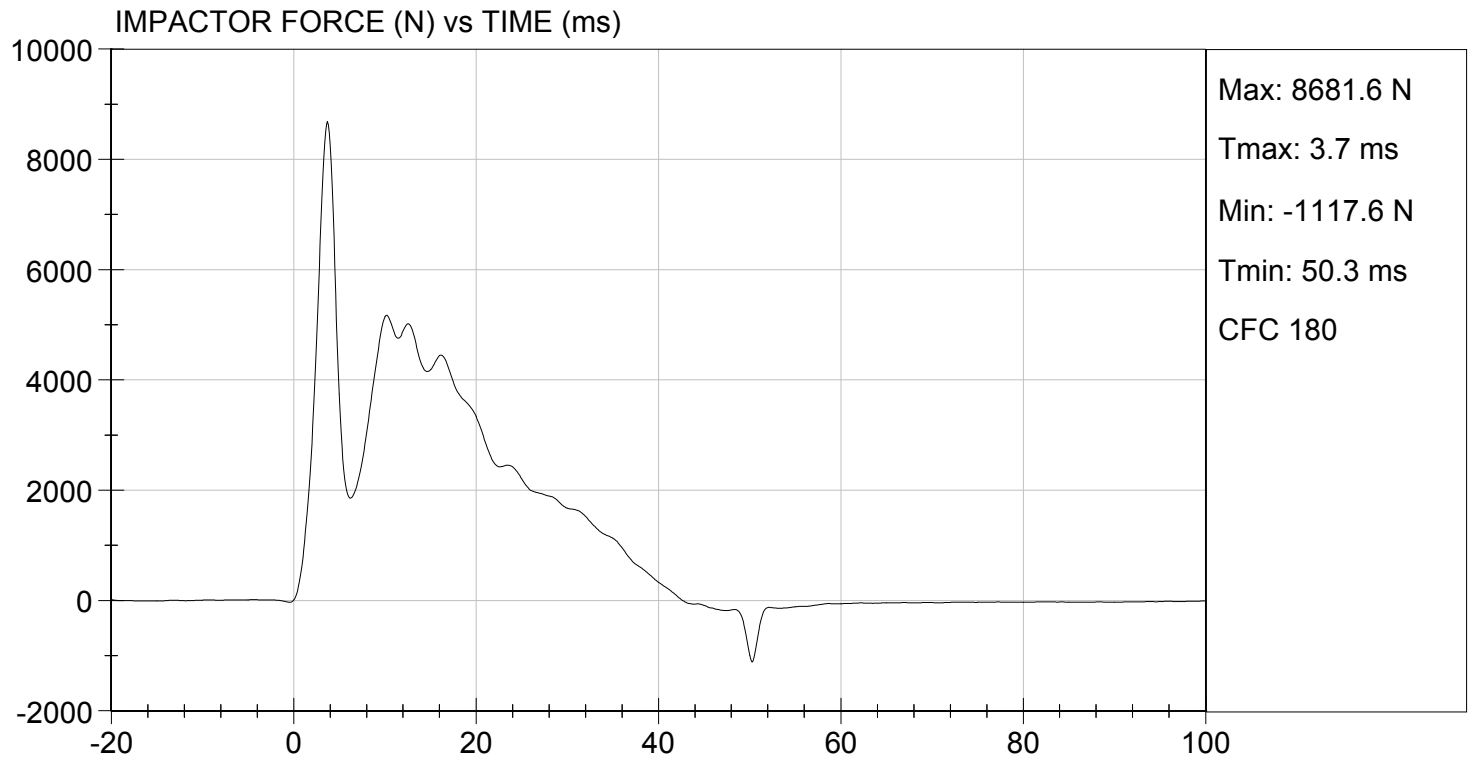
01/29/2014
Test Date


Approved By



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

TEST DATE: 01/29/2014
TEST #: D14280

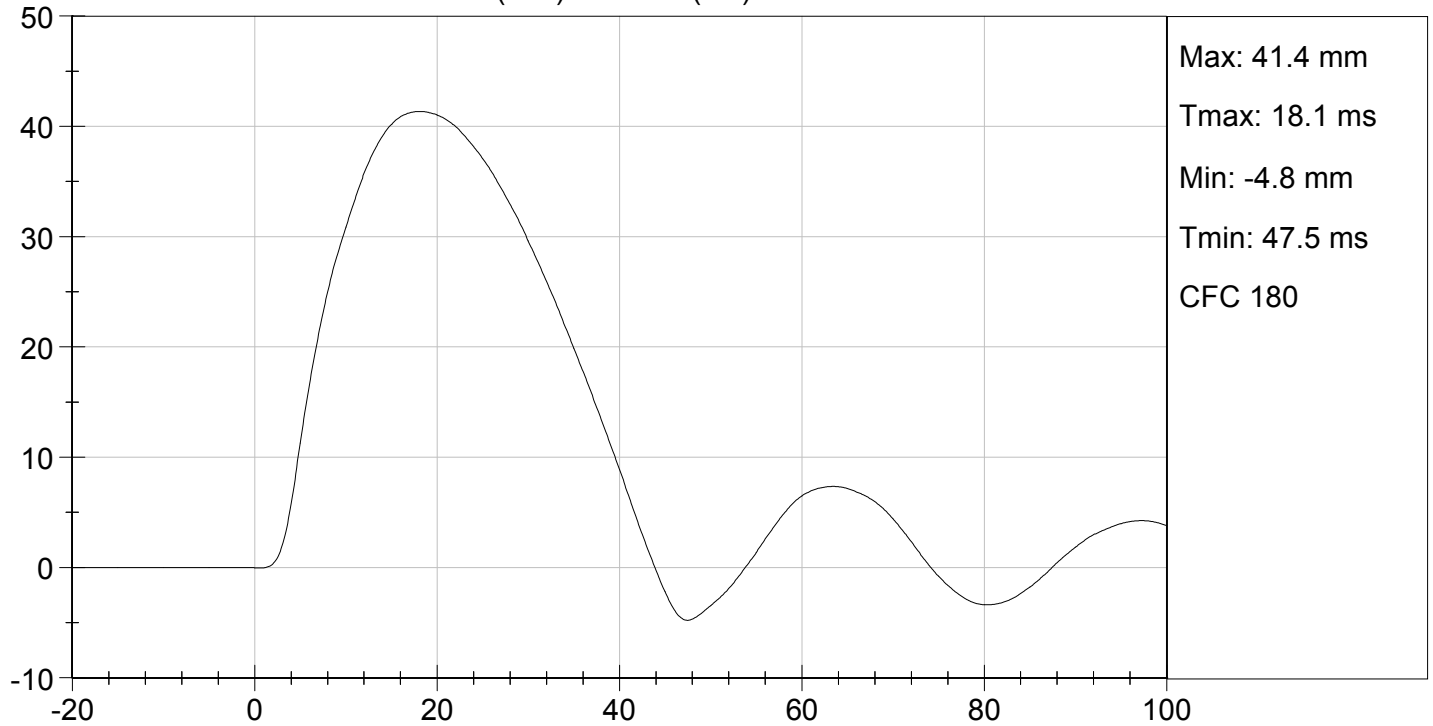




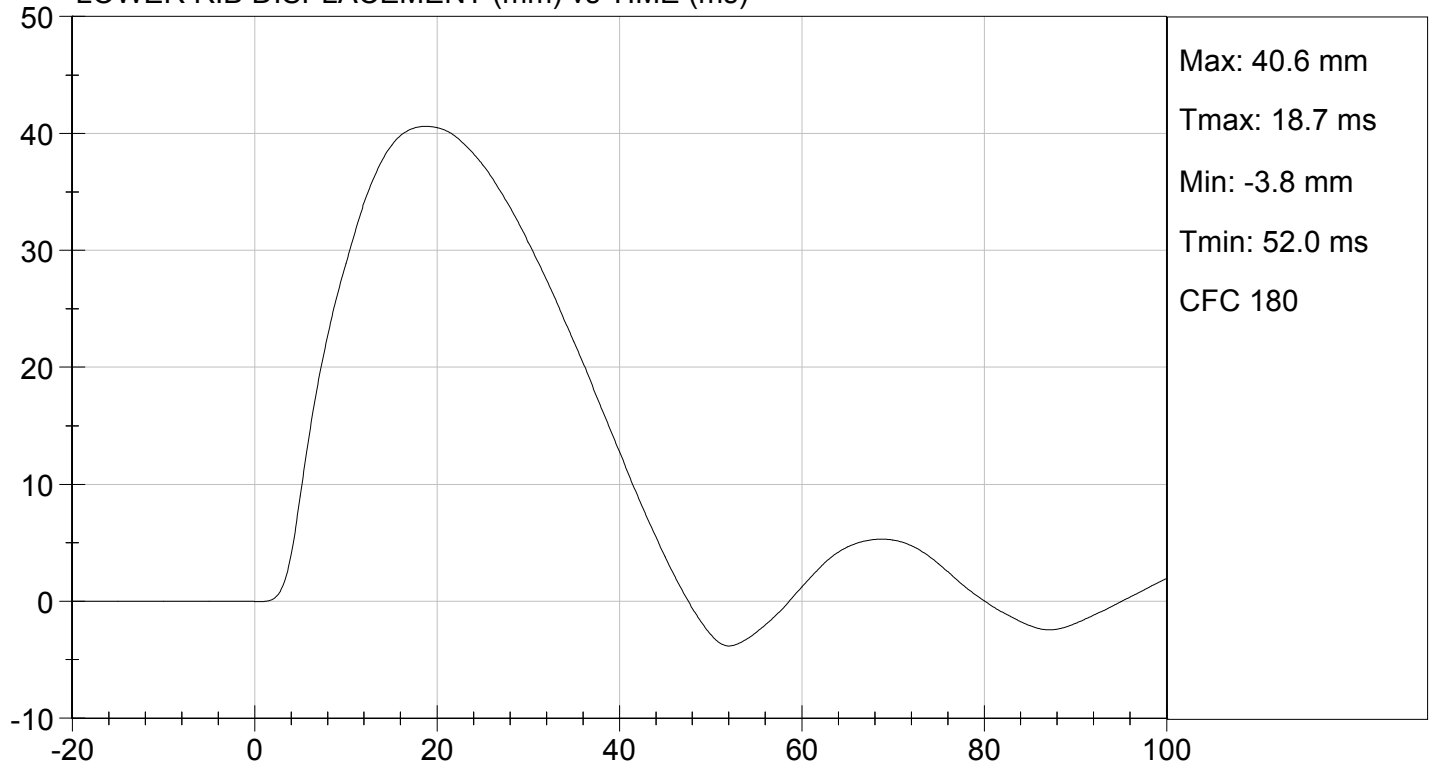
TEST DESC: THORAX IMPACT
VELOCITY: 18.32 ft/s, 5.58 m/s

TEST DATE: 01/29/2014
TEST #: D14280

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: D14287

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	11	Pass
Probe Speed	m/s	3.90 to 4.10	4.10	Pass
Maximum Impactor Force	N	4000 to 4800	4430	Pass
Time of Maximum Impactor Force	ms	10.6 to 13.0	12.0	Pass
Maximum Total Abdomen Force	N	2200 to 2700	2361	Pass
Time of Maximum Abdomen Force	ms	10.0 to 12.3	10.5	Pass
Overall Test Results				Pass


Laboratory Technician

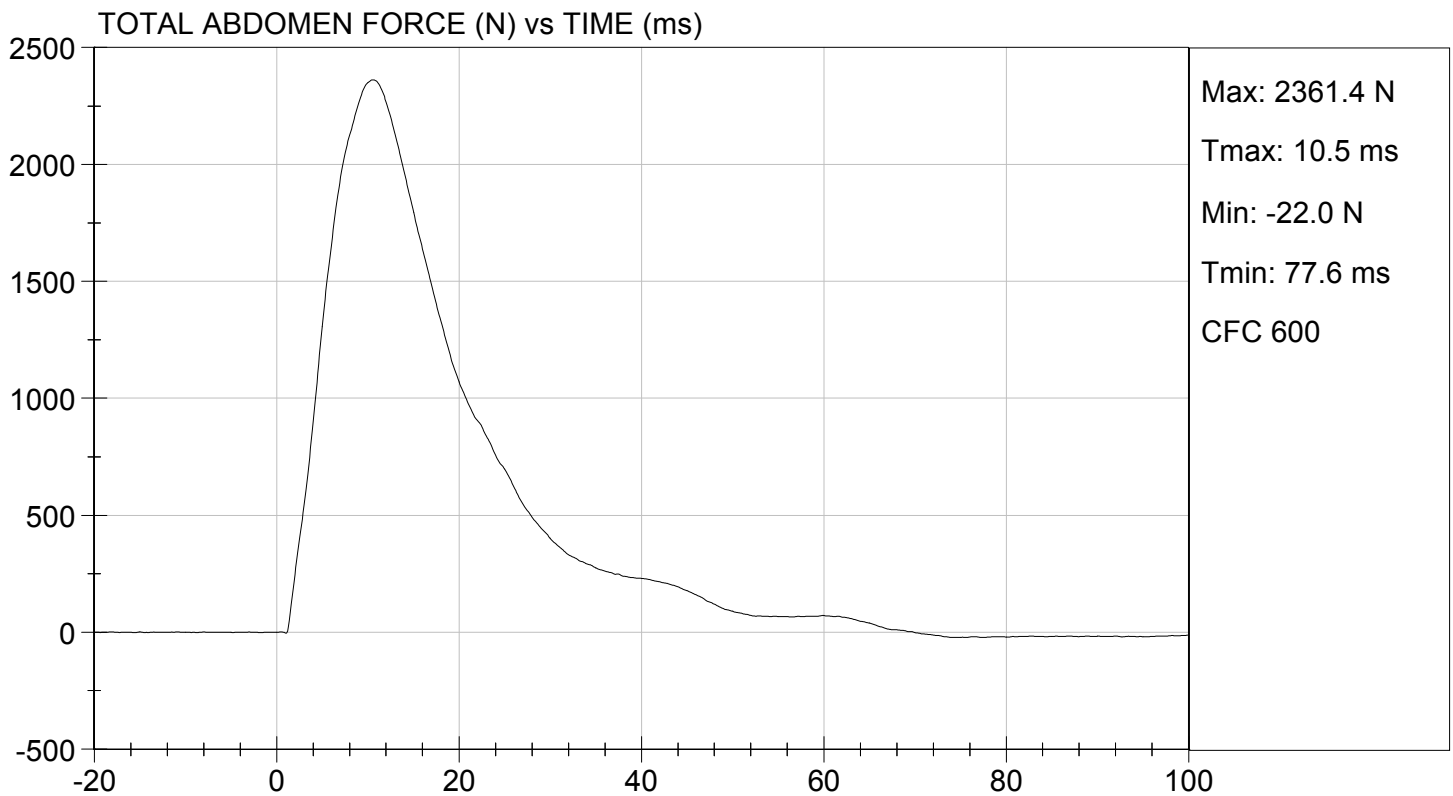
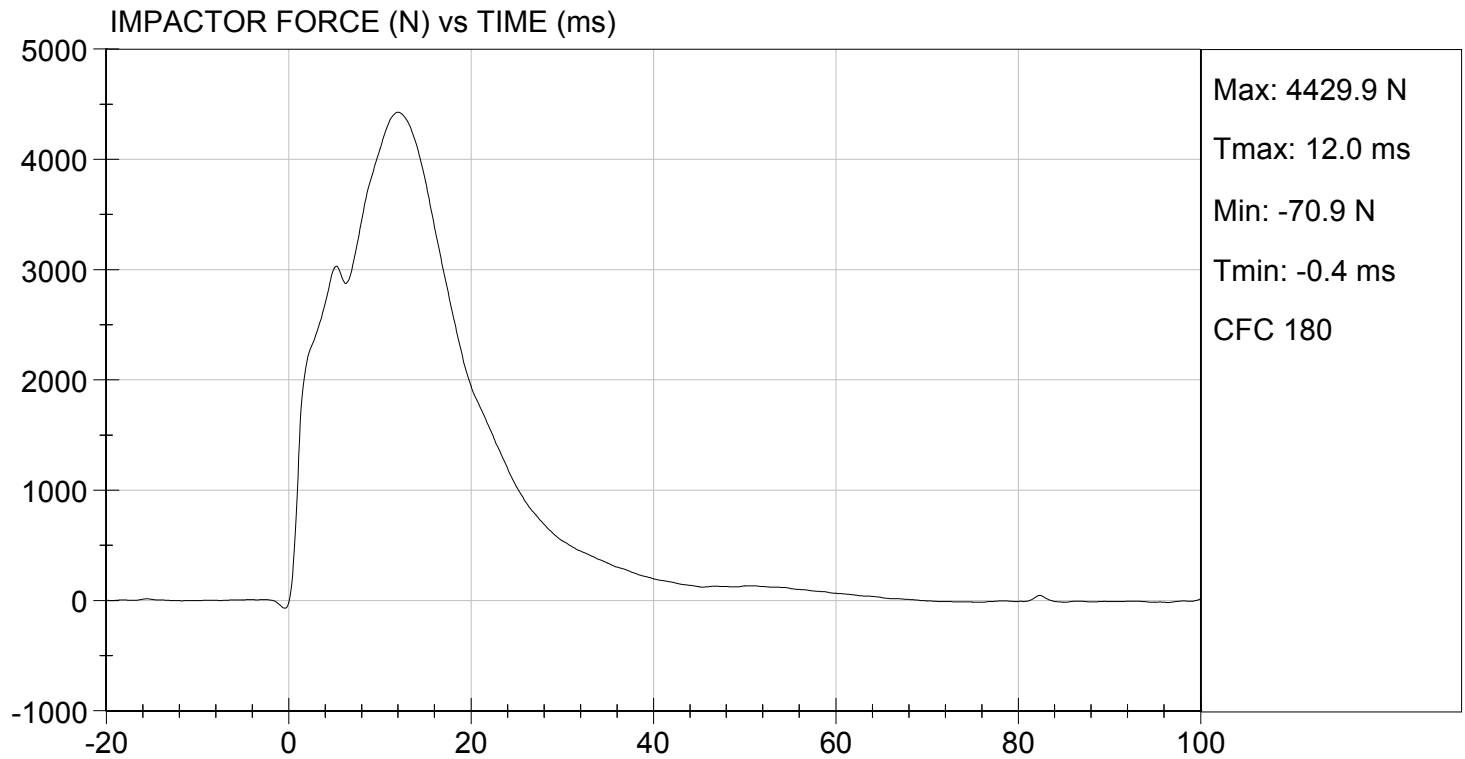
01/29/2014
Test Date


Approved By



TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.44 ft/s, 4.10 m/s

TEST DATE: 01/29/2014
TEST #: D14287

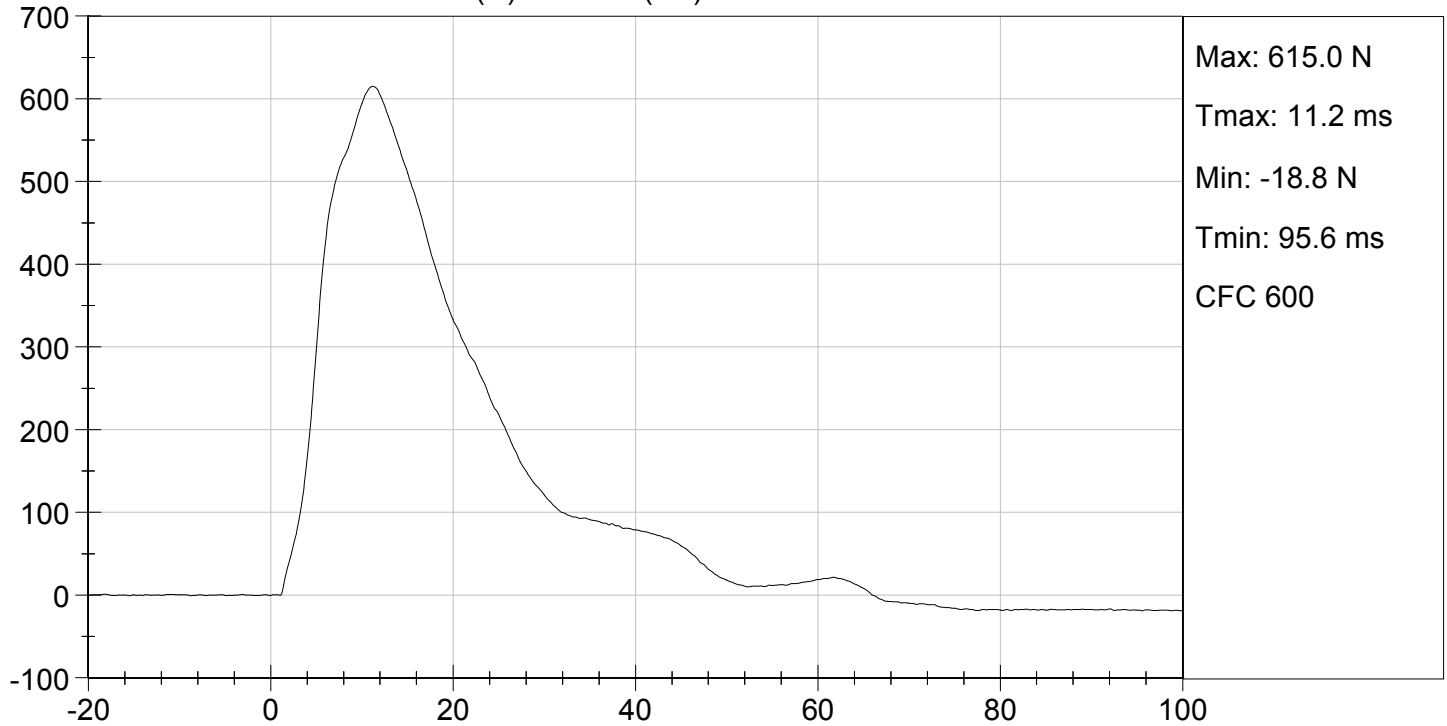




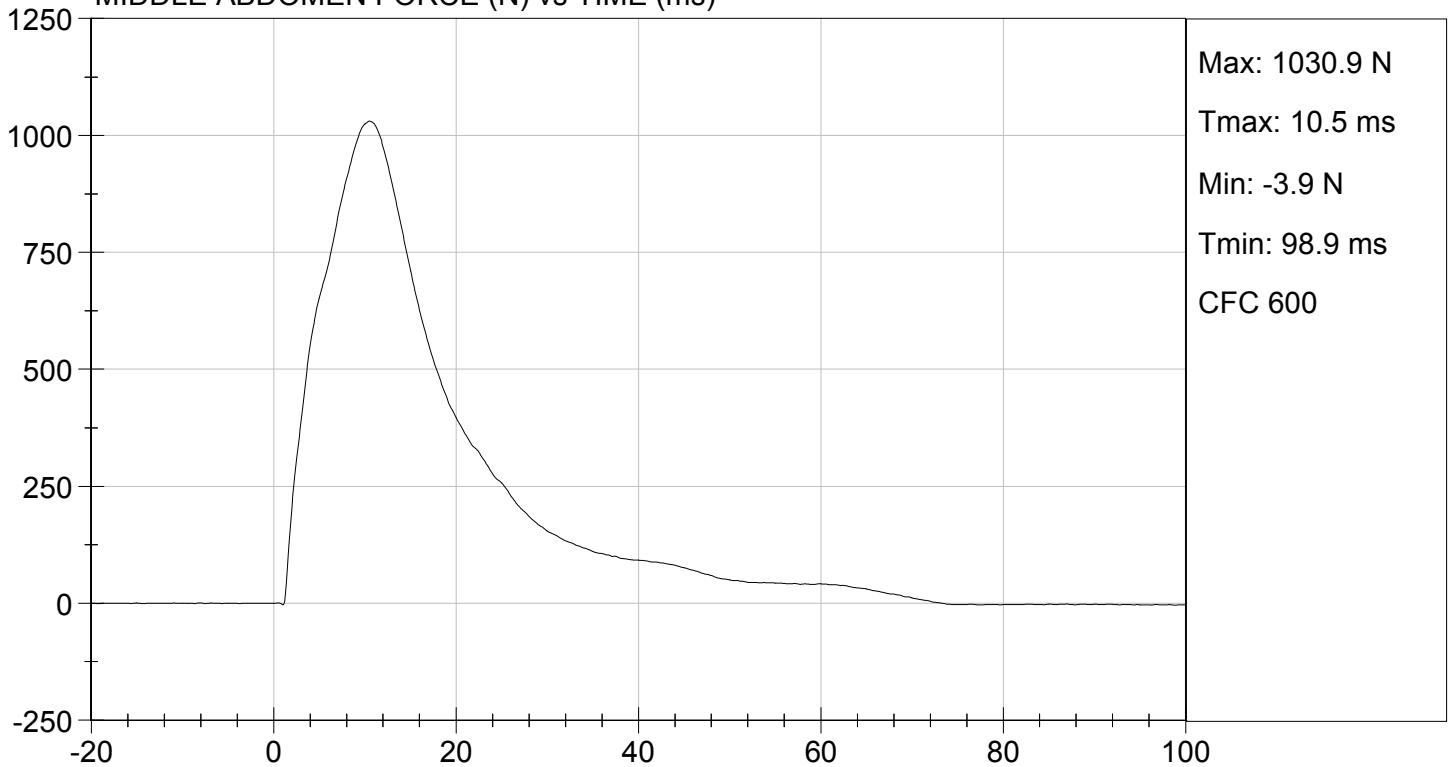
TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.44 ft/s, 4.10 m/s

TEST DATE: 01/29/2014
TEST #: D14287

FRONT ABDOMEN FORCE (N) vs TIME (ms)



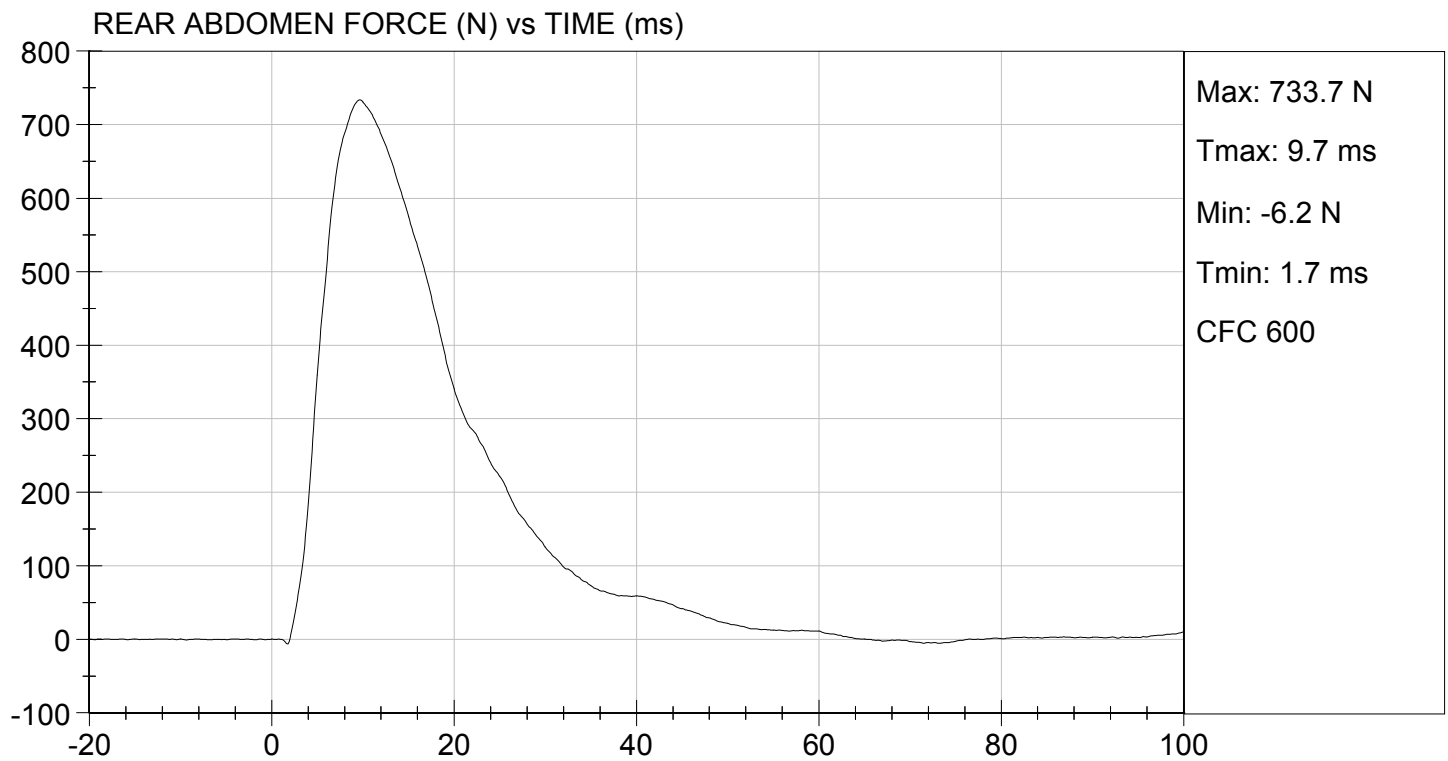
MIDDLE ABDOMEN FORCE (N) vs TIME (ms)





TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.44 ft/s, 4.10 m/s

TEST DATE: 01/29/2014
TEST #: D14287

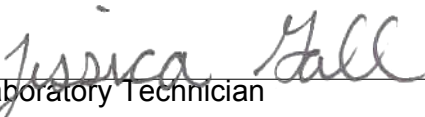


MGA RESEARCH CORPORATION
LUMBAR SPINE TEST
ES-2re DUMMY

ATD Serial No: 032

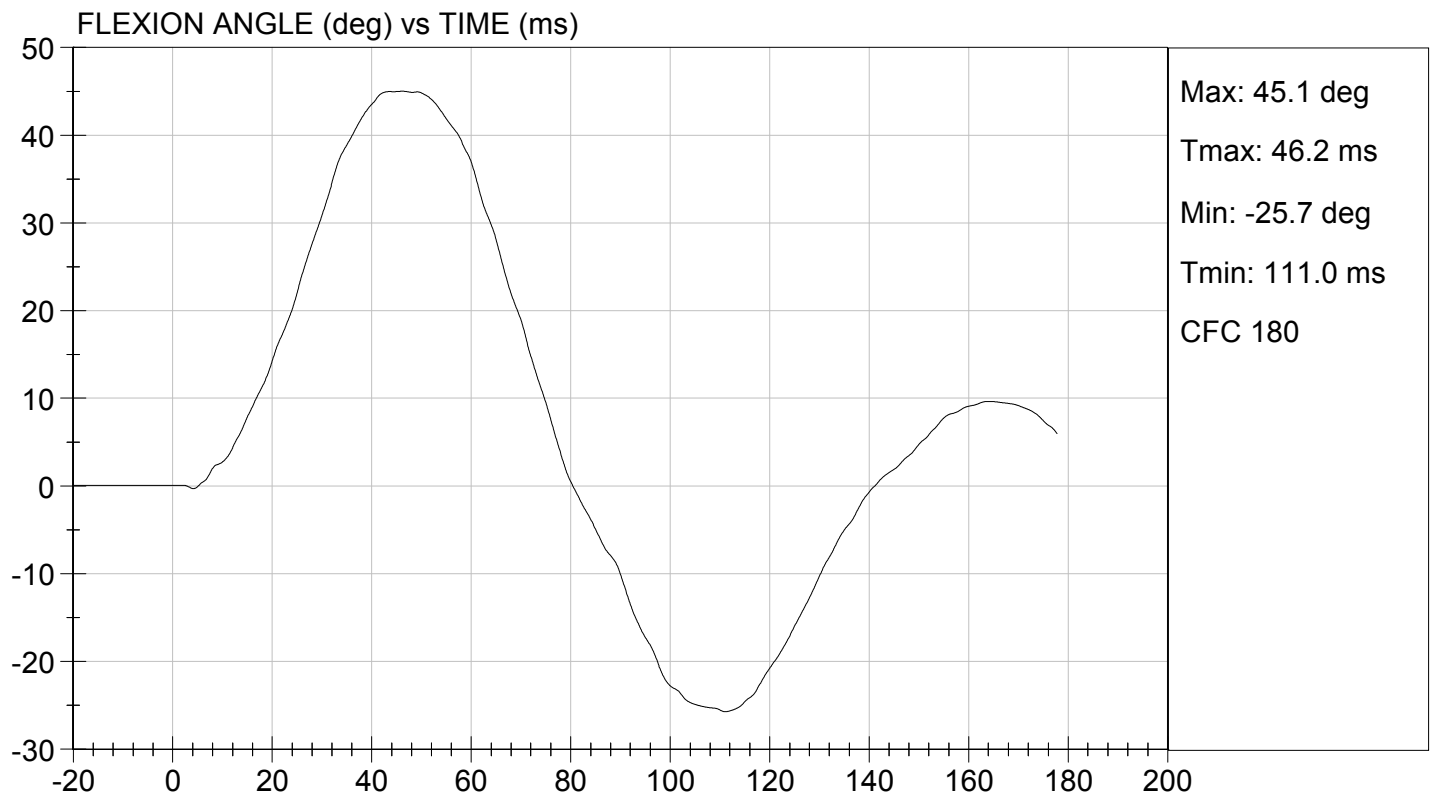
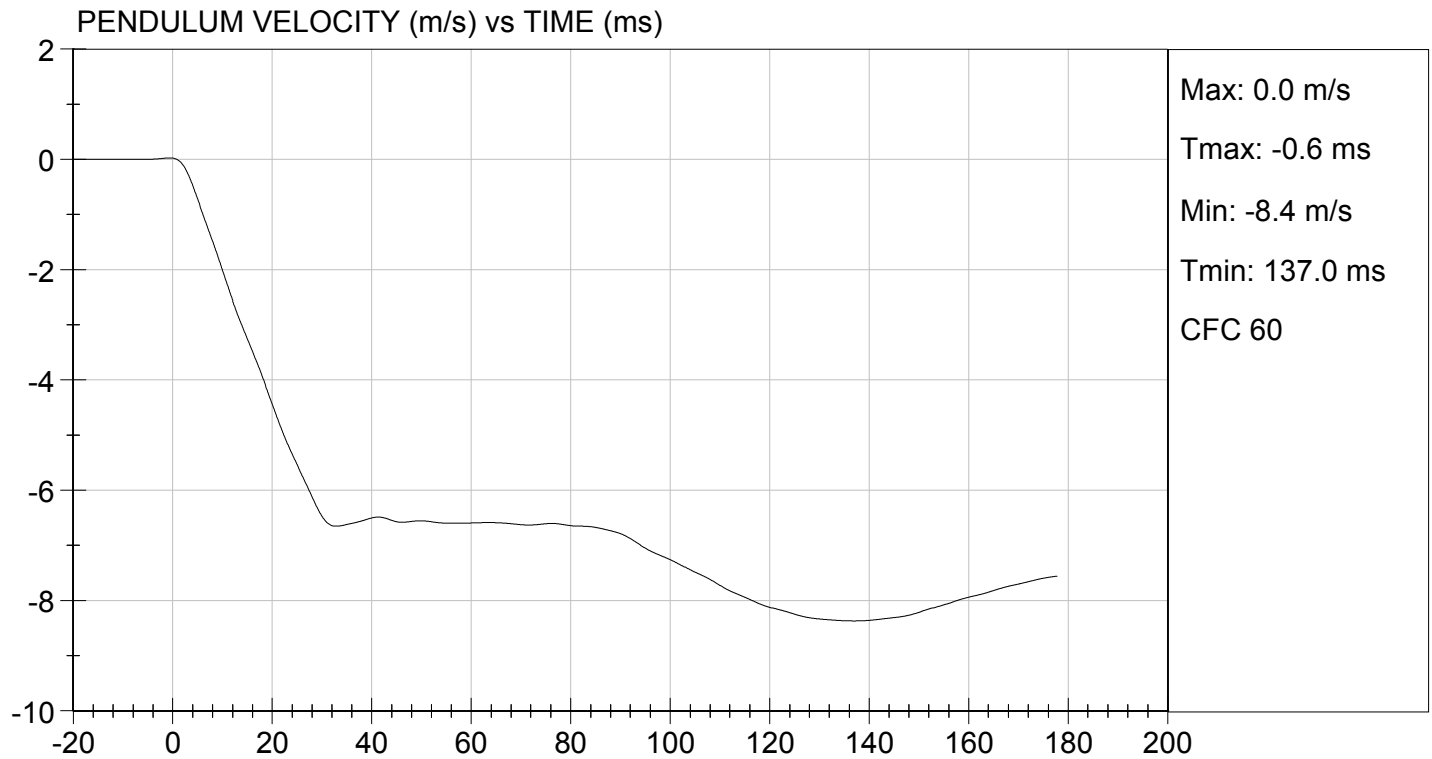
Test I.D: D14288

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity		%	10 to 70	10	Pass
Pendulum Speed		m/s	5.95 to 6.15	6.15	Pass
Pendulum Velocity	1 ms	m/s	-0.05 to 0.00	-0.01	Pass
	3.7 ms	m/s	-0.425 to -0.24	-0.405	Pass
	27 ms	m/s	-6.50 to -5.80	-5.92	Pass
	30 ms	m/s	>= -6.50	-6.47	Pass
Maximum Flexion Angle		deg	45.0 to 55.0	45.1	Pass
Time of Maximum Flexion Angle		ms	39.0 to 53.0	46.2	Pass
Headform Rotation Decay to Initial Position		ms	37 to 57	45	Pass
Overall Results					Pass


 Laboratory Technician

01/28/2014
 Test Date

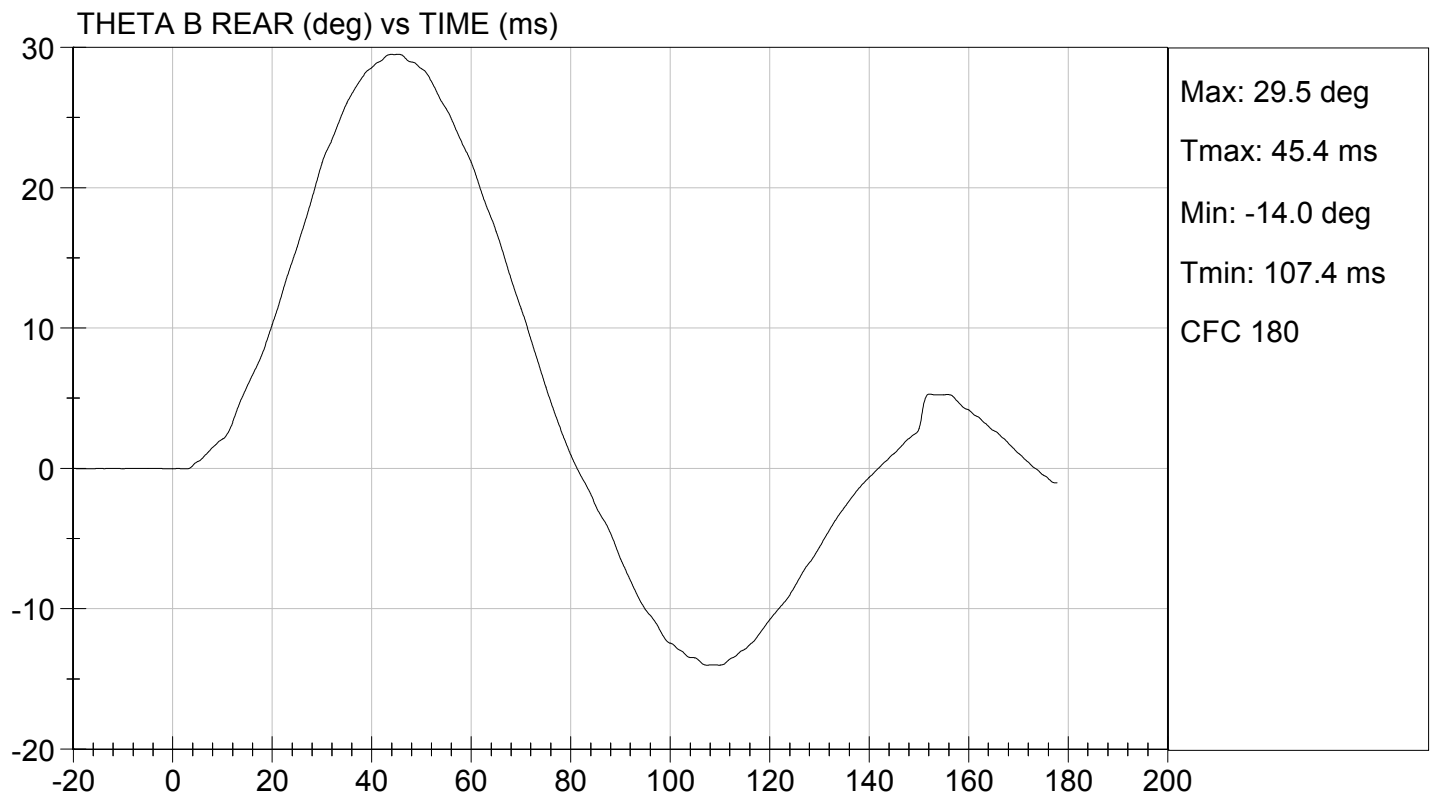
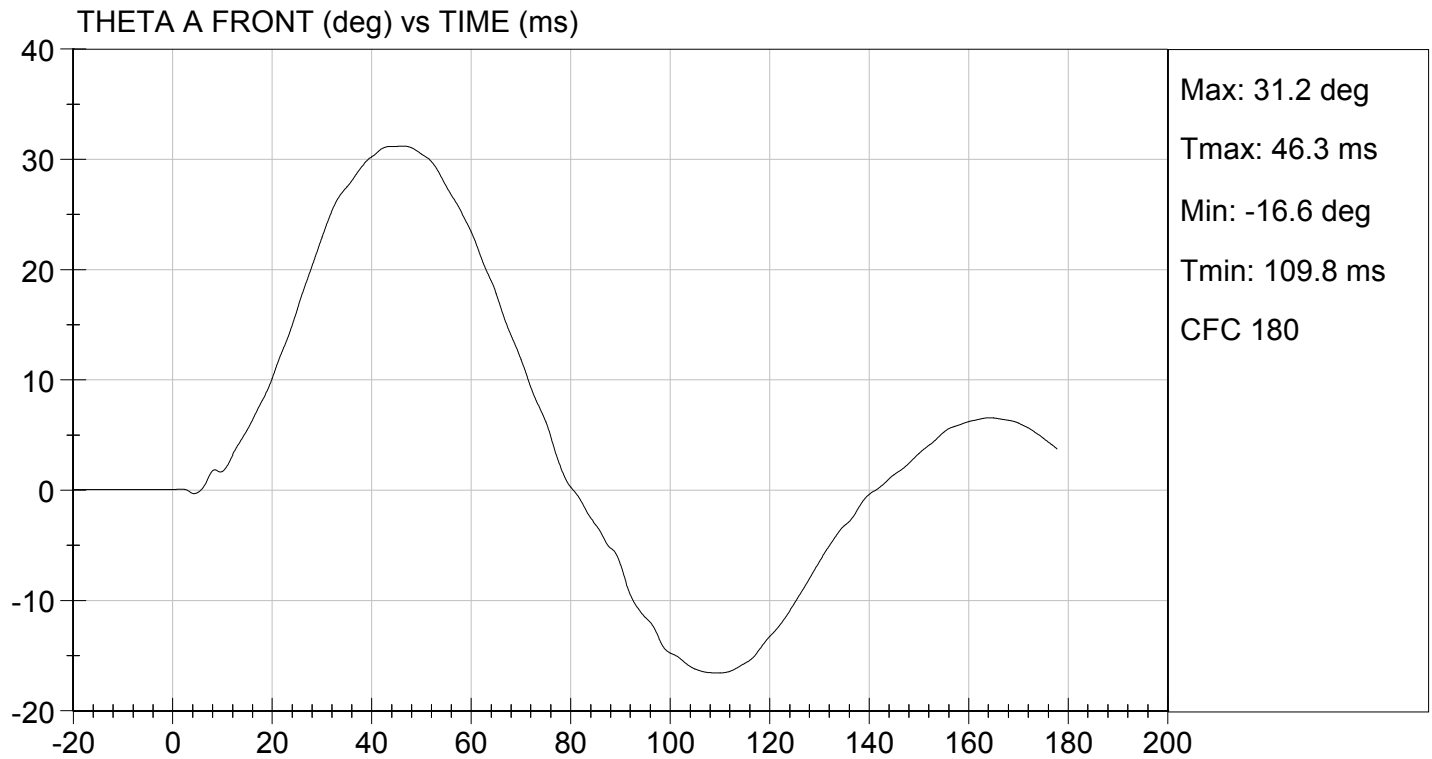

 Approved By





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

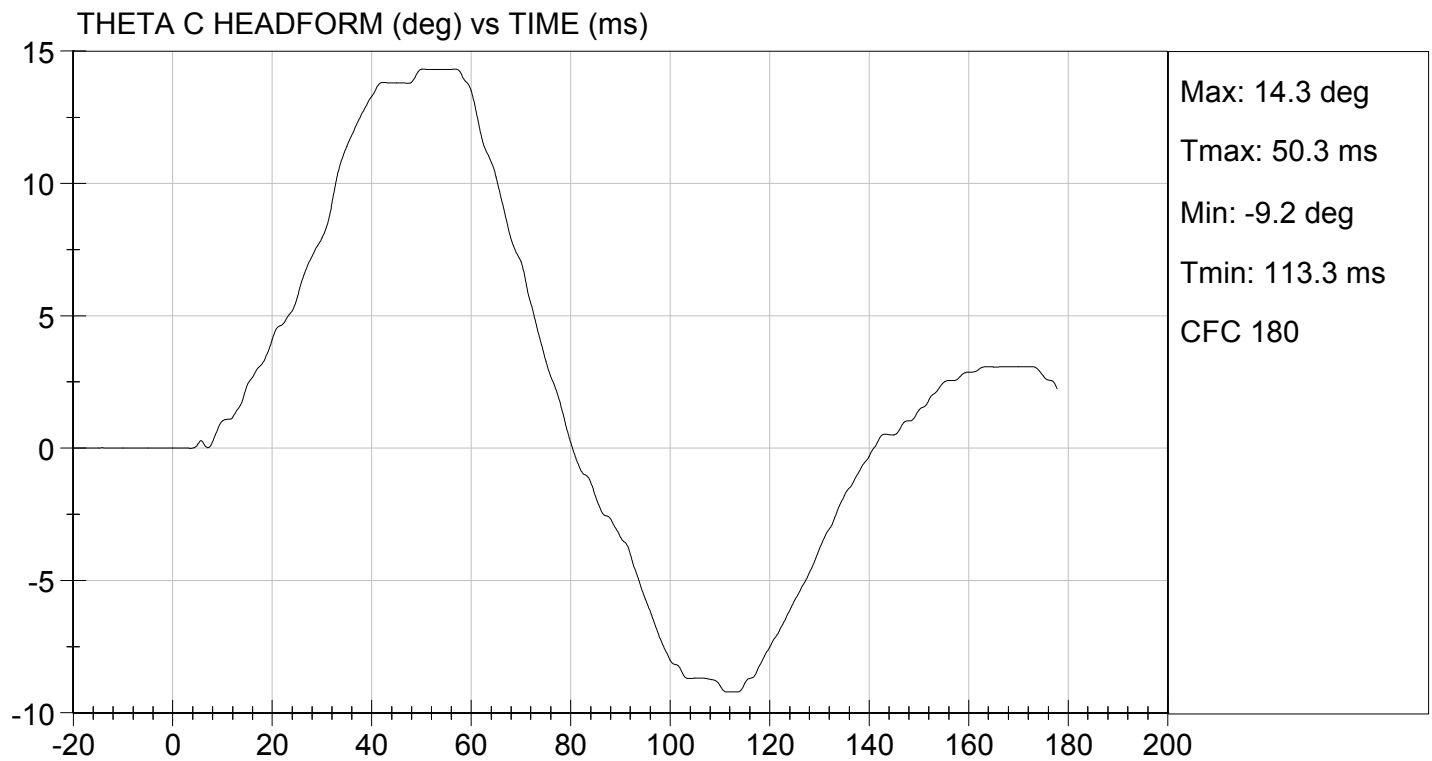
TEST DATE: 01/28/2014
TEST #: D14288





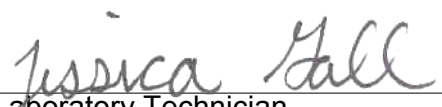
TEST DESC: LUMBAR BENDING
VELOCITY: 20.17 ft/s, 6.15 m/s

TEST DATE: 01/28/2014
TEST #: D14288



MGA RESEARCH CORPORATION**PELVIS TEST****ES-2re DUMMY****ATD Serial No:** 032**Test I.D:** D14289

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	11	Pass
Probe Speed	m/s	4.20 to 4.40	4.40	Pass
Maximum Impactor Force	N	4700 to 5400	4762	Pass
Time of Maximum Impactor Force	ms	11.8 to 16.1	12.2	Pass
Maximum Pubic Force	N	1230 to 1590	1265	Pass
Time of Maximum Pubic Force	ms	12.2 to 17.0	13.7	Pass
Overall Test Results				Pass


Laboratory Technician

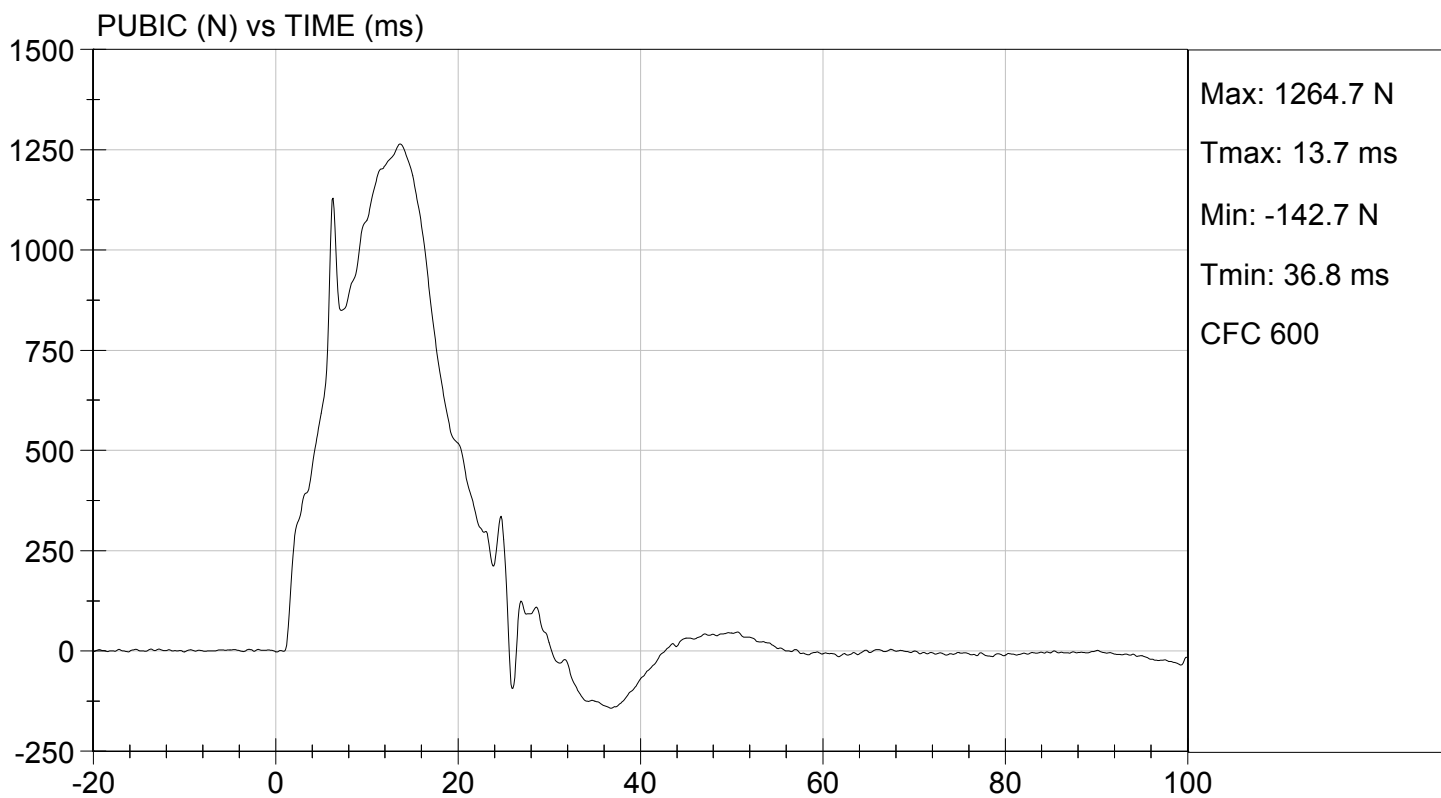
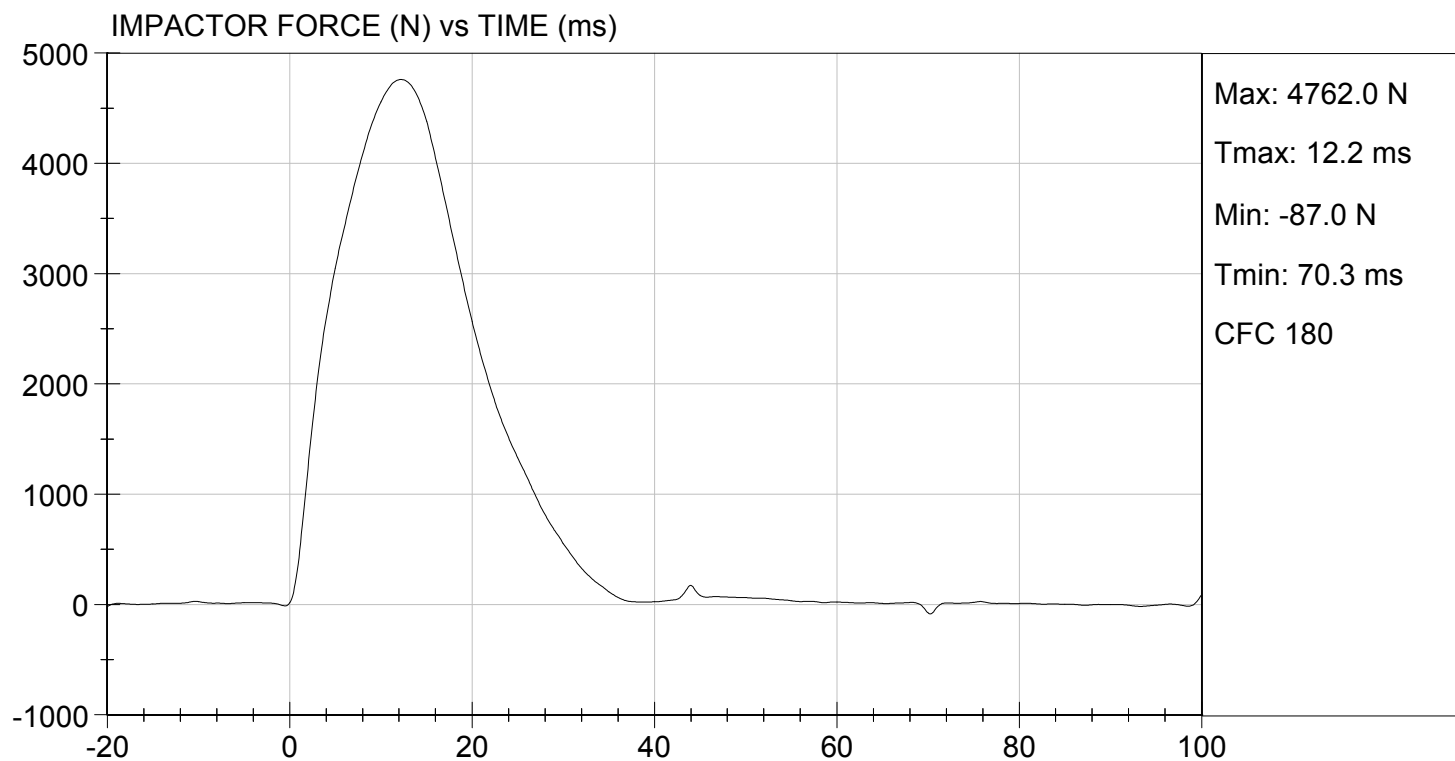
01/29/2014
Test Date


Approved By



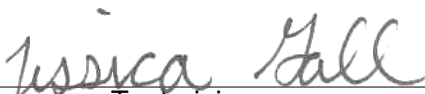
TEST DESC: PELVIS IMPACT
VELOCITY: 14.43 ft/s, 4.4 m/s

TEST DATE: 01/29/2014
TEST #: D14289



MGA RESEARCH CORPORATION**HEAD DROP TEST****ES-2re DUMMY**ATD Serial No: 032Test ID: D14411

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	18	Pass
Peak Resultant Acceleration	G's	125 to 155	150	Pass
Peak Longitudinal Acceleration	G's	<= +/- 15.0	-10.1	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 15% of peak	Yes	Pass
Overall Test Results				Pass

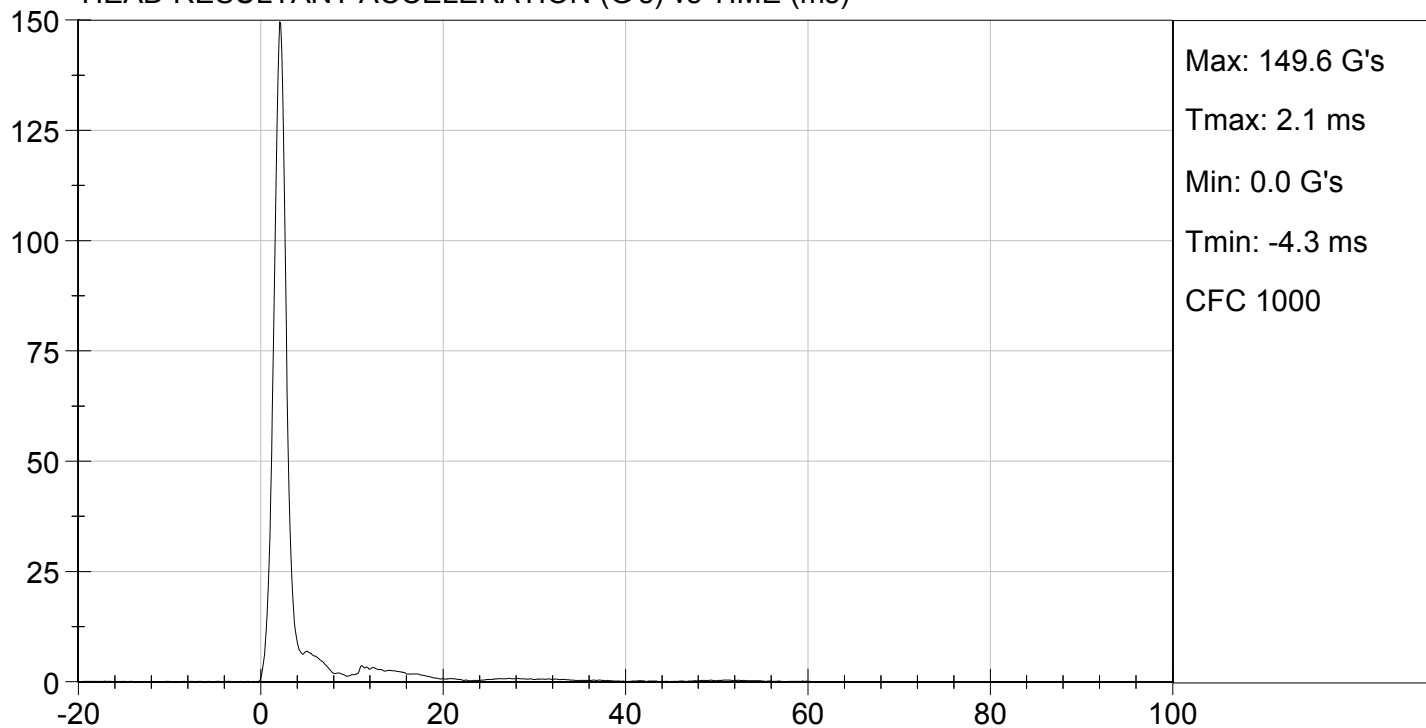

Laboratory Technician

02/05/2014
Test Date

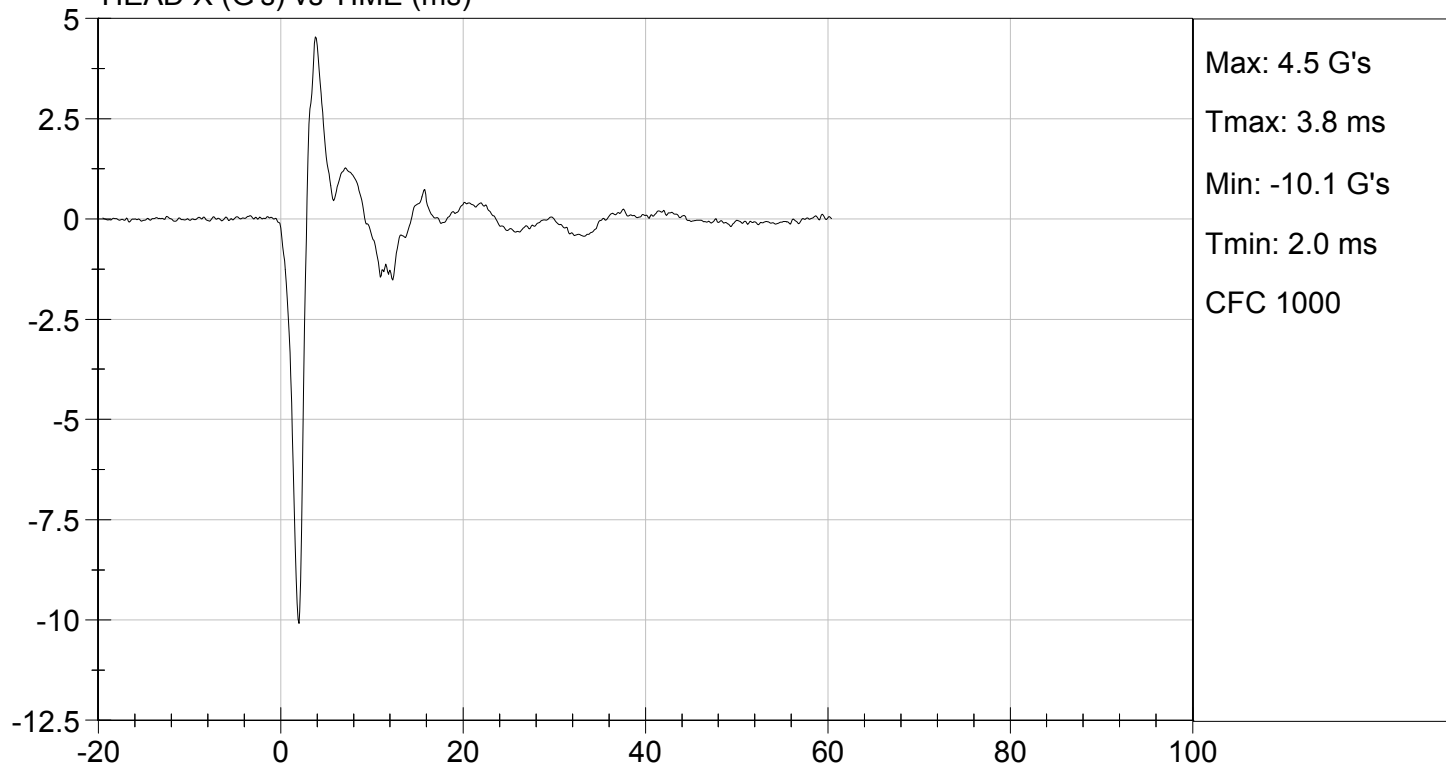

Approved By

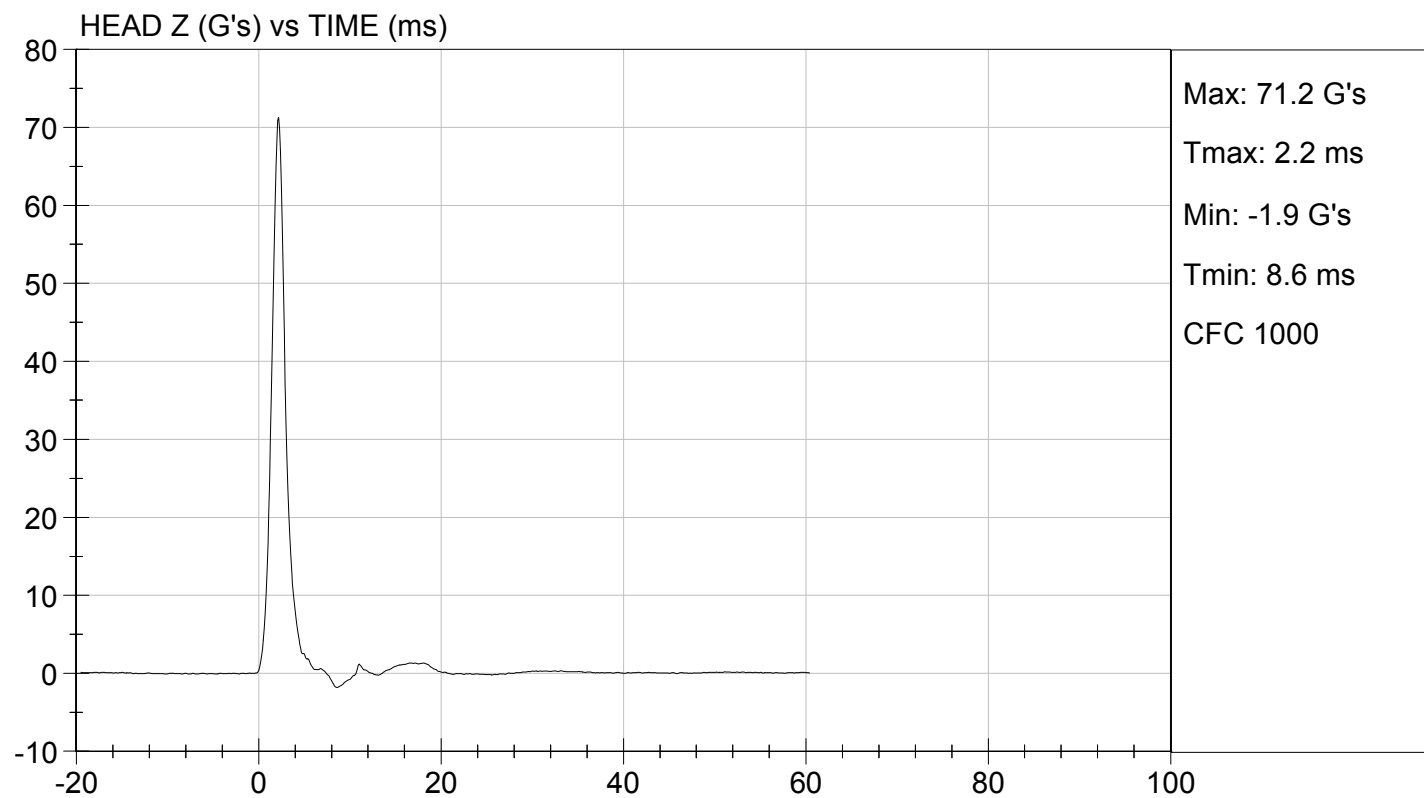
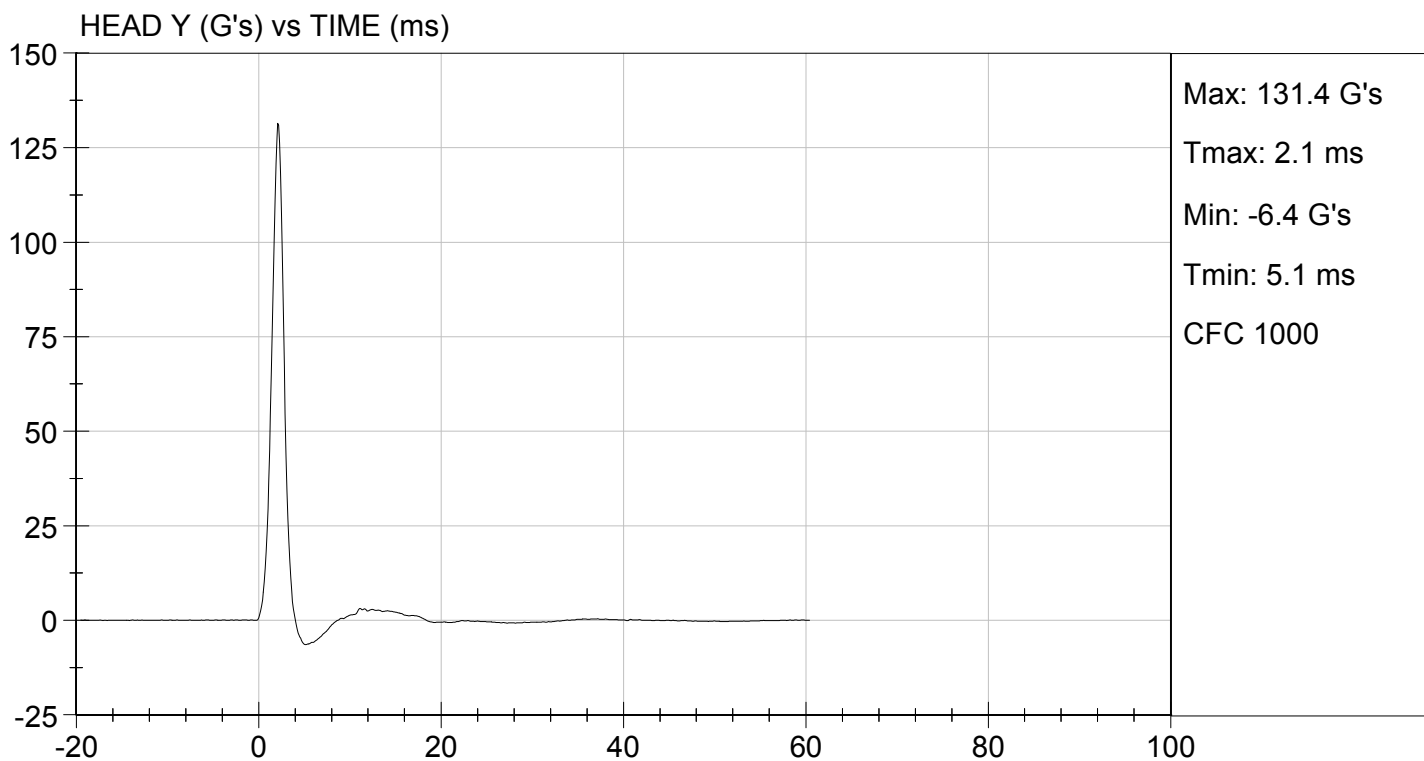


HEAD RESULTANT ACCELERATION (G's) vs TIME (ms)



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



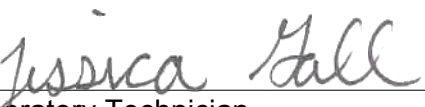


MGA RESEARCH CORPORATION
NECK PENDULUM TEST
ES-2re DUMMY

ATD Serial No: 032

Test I.D: D14412

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	20	Pass
Pendulum Speed		m/s	3.30 to 3.50	3.36	Pass
Pendulum Velocity	1 ms	m/s	-0.05 to 0.00	-0.02	Pass
	3 ms	m/s	-0.25 to -0.375	-0.31	Pass
	14 ms	m/s	-3.20 to -3.70	-3.24	Pass
	17 ms	m/s	>= -3.70	-3.32	Pass
Maximum Flexion Angle		deg	49.0 to 59.0	51.6	Pass
Time of Maximum Flexion Angle		ms	54.0 to 66.0	61.3	Pass
Head Rotation Decay Time to 0 Degree		ms	53.0 to 88.0	56.0	Pass
Overall Results					Pass


 Laboratory Technician

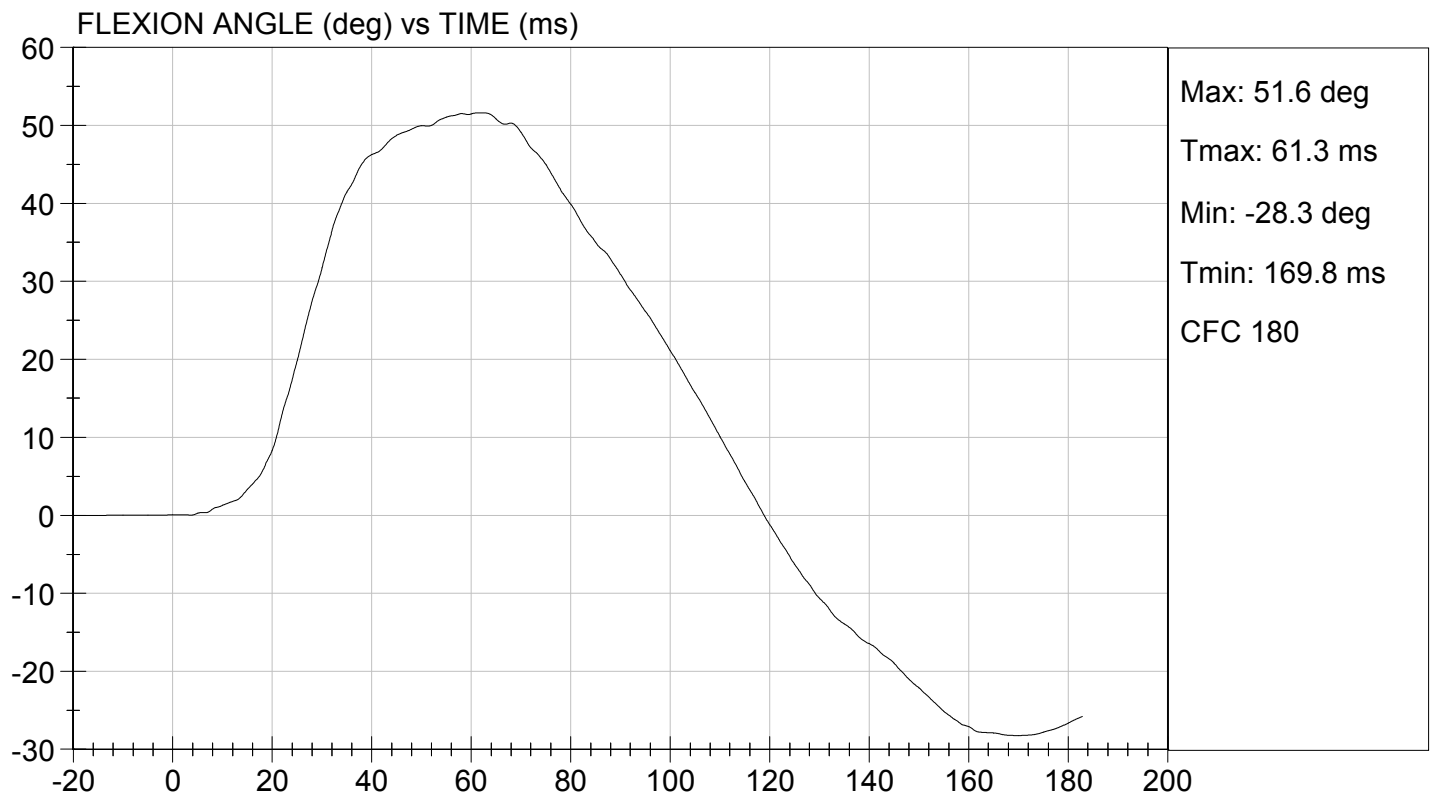
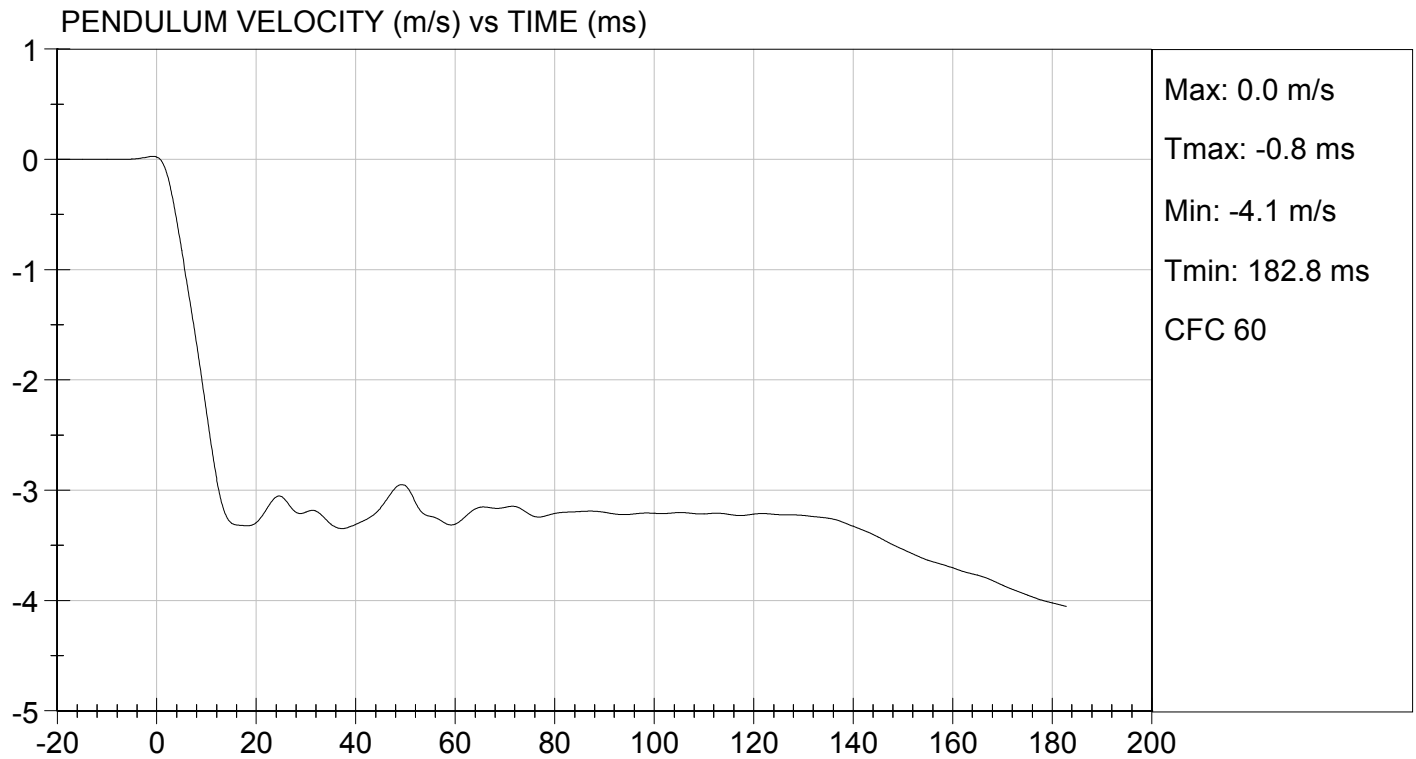

 Approved By

02/05/2014
 Test Date



TEST DESC: NECK BENDING
VELOCITY: 11.04 ft/s, 3.36 m/s

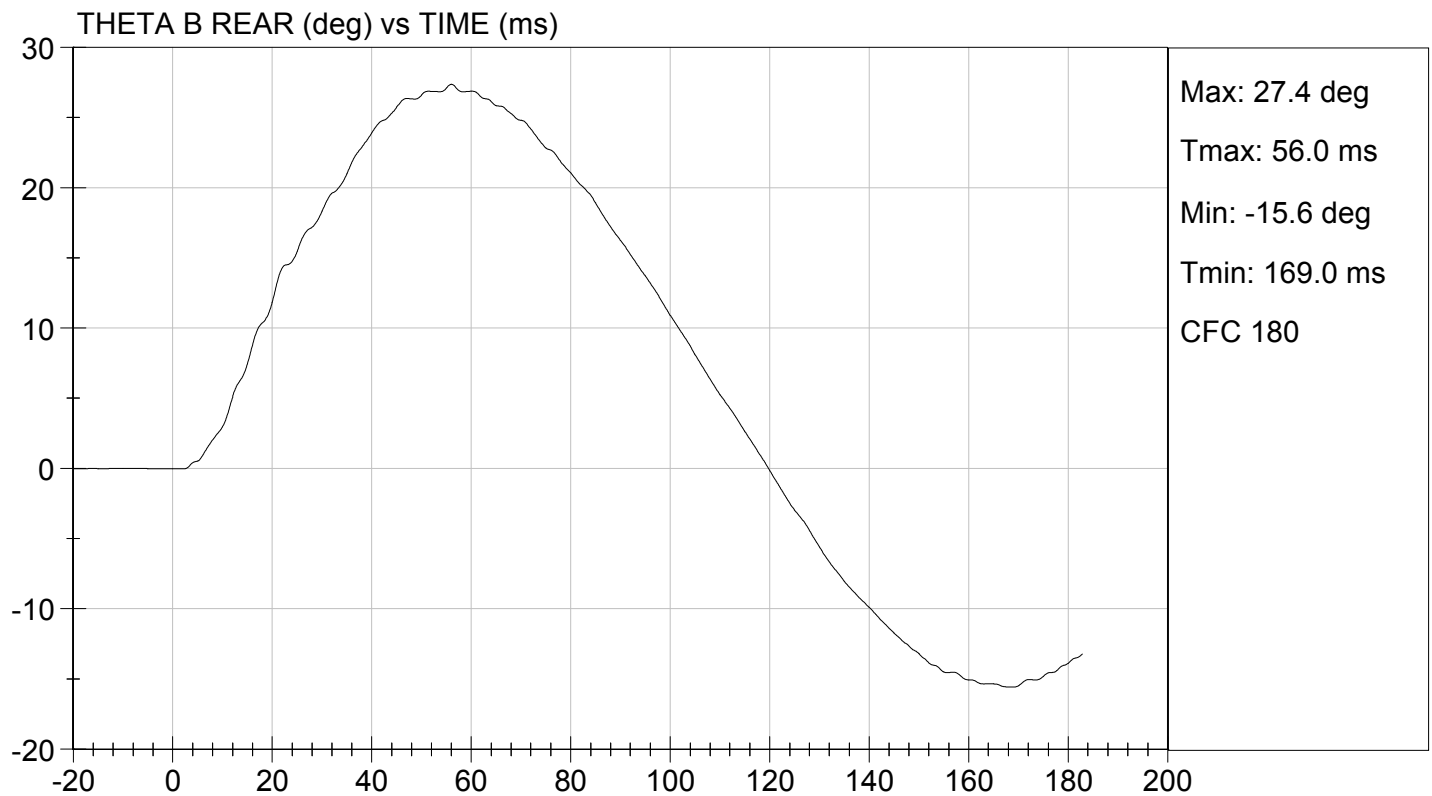
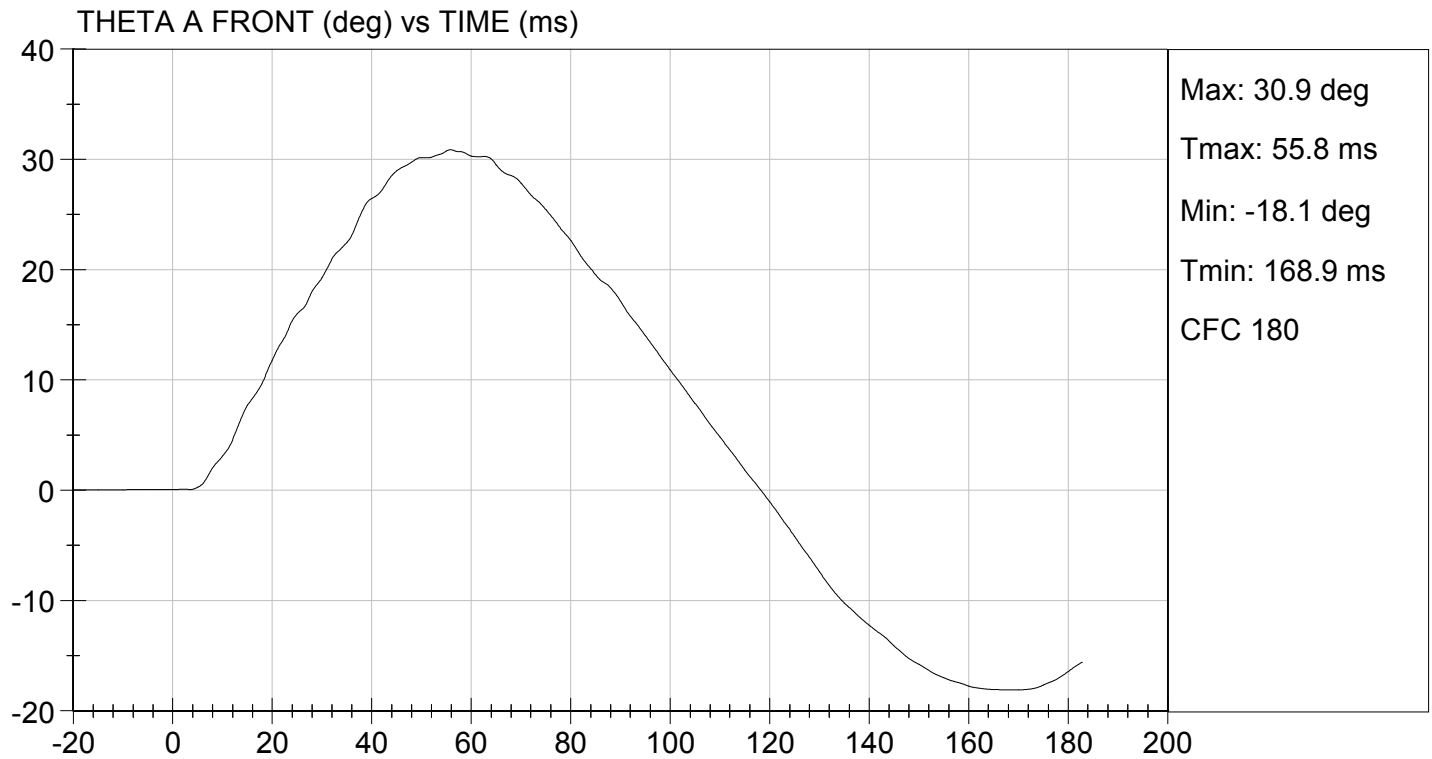
TEST DATE: 02/05/2014
TEST #: D14412





TEST DESC: NECK BENDING
VELOCITY: 11.04 ft/s, 3.36 m/s

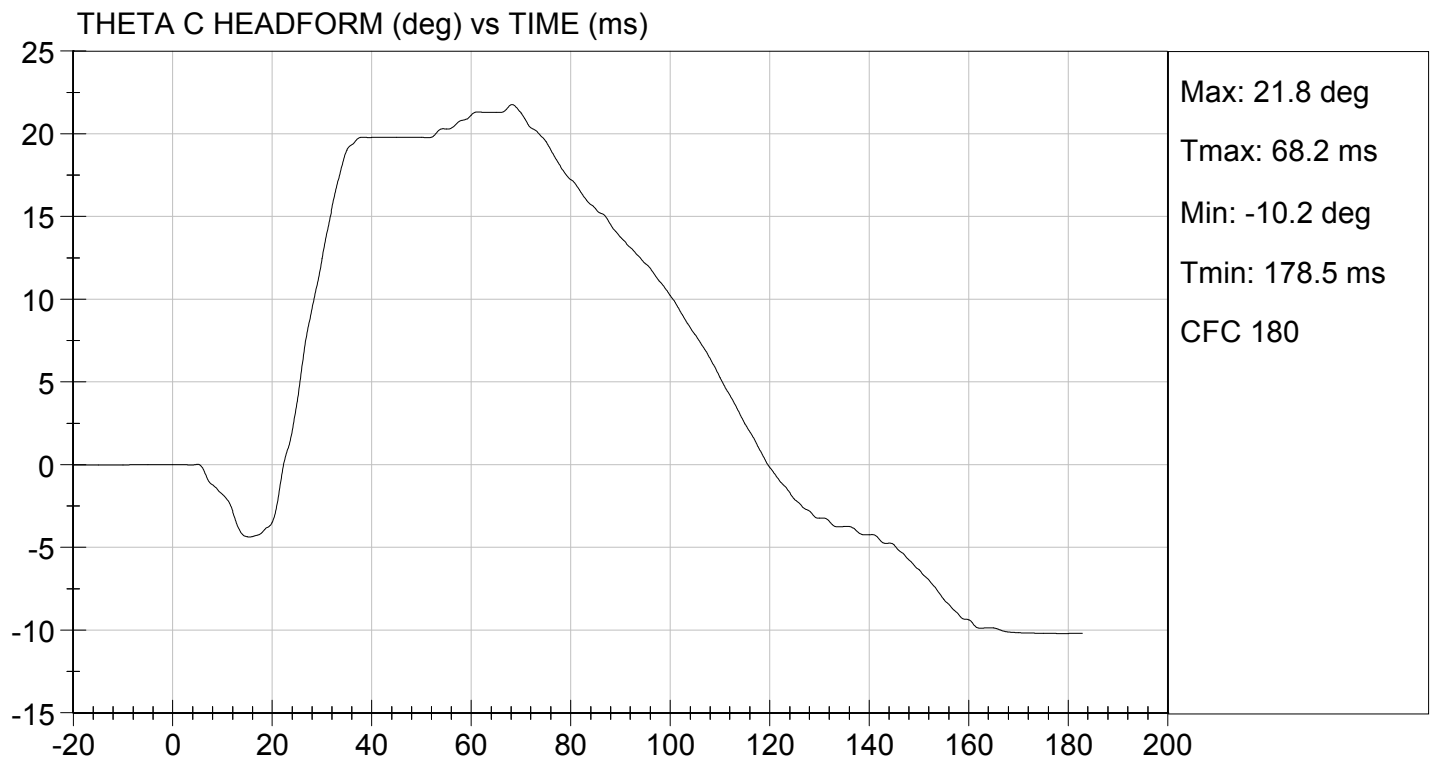
TEST DATE: 02/05/2014
TEST #: D14412





TEST DESC: NECK BENDING
VELOCITY: 11.04 ft/s, 3.36 m/s

TEST DATE: 02/05/2014
TEST #: D14412



MGA RESEARCH CORPORATION

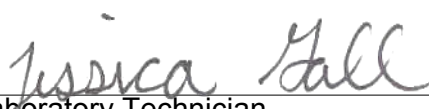
SHOULDER IMPACT TEST

ES-2re DUMMY

ATD Serial No: 032

Test I.D: D14413

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Pendulum Speed	m/s	4.20 to 4.40	4.3	Pass
Peak Impactor Acceleration	G's	7.5 to 10.5	9.1	Pass
Overall Test Results				Pass


Laboratory Technician

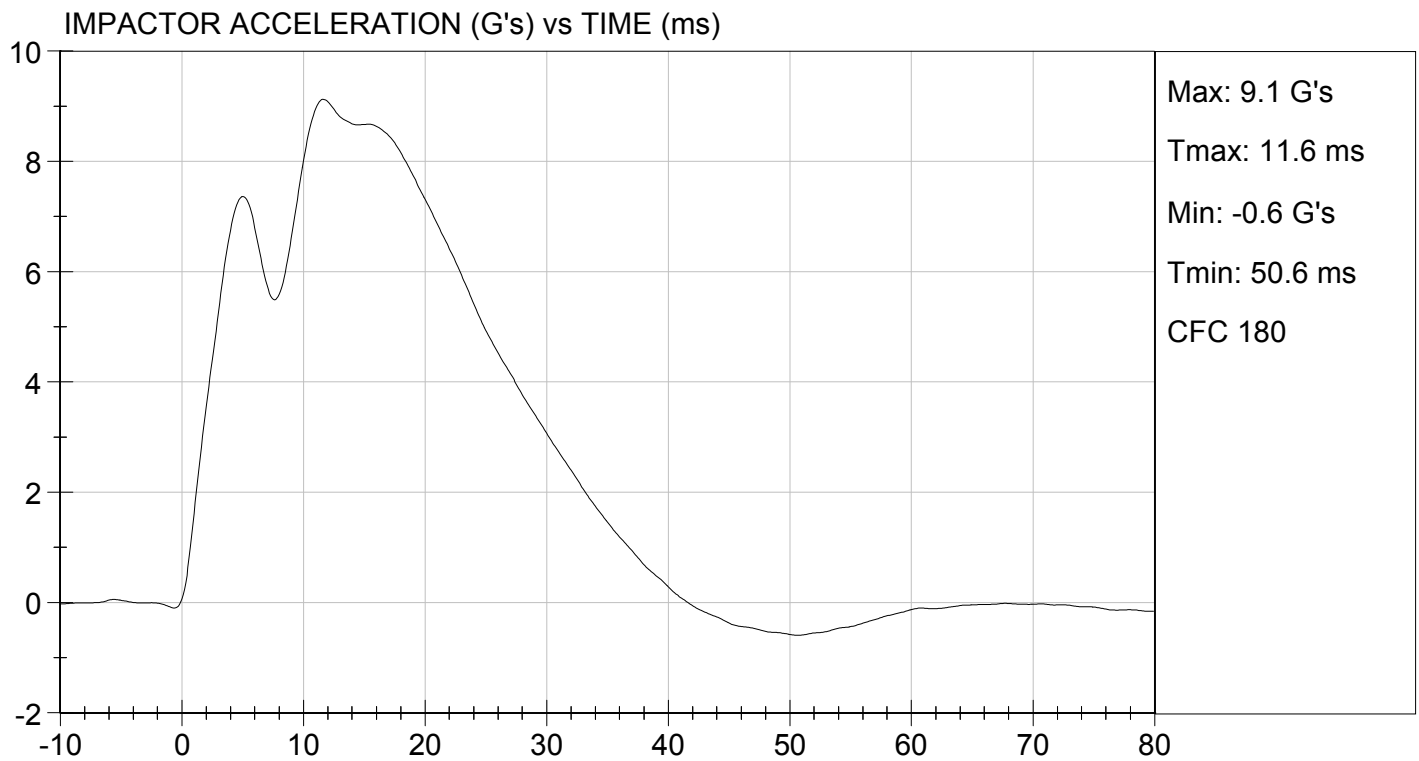
02/05/2014
Test Date


Approved By



TEST DESC: SHOULDER IMPACT
VELOCITY: 14.12 ft/s, 4.3 m/s

TEST DATE: 02/05/2014
TEST #: D14413



MGA RESEARCH CORPORATION

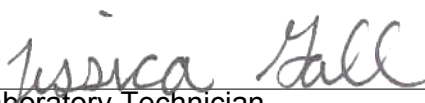
UPPER RIB TEST

ES-2re DUMMY

ATD Serial No: 032

Test I.D: D14414

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Displacement at 459 mm	mm	36.0 to 40.0	39.8	Pass
Displacement at 815 mm	mm	46.0 to 51.0	50.0	Pass
			Overall Test Results	Pass

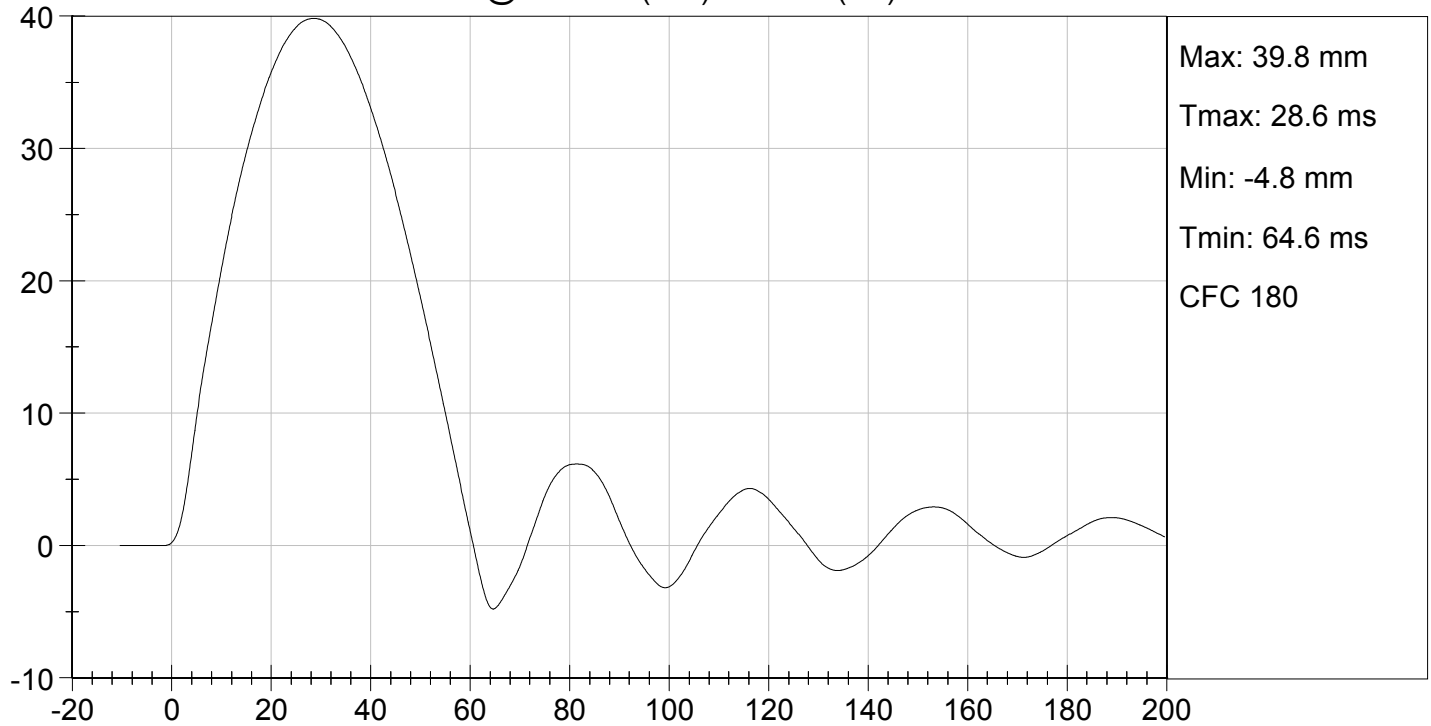

Laboratory Technician

02/05/2014
Test Date

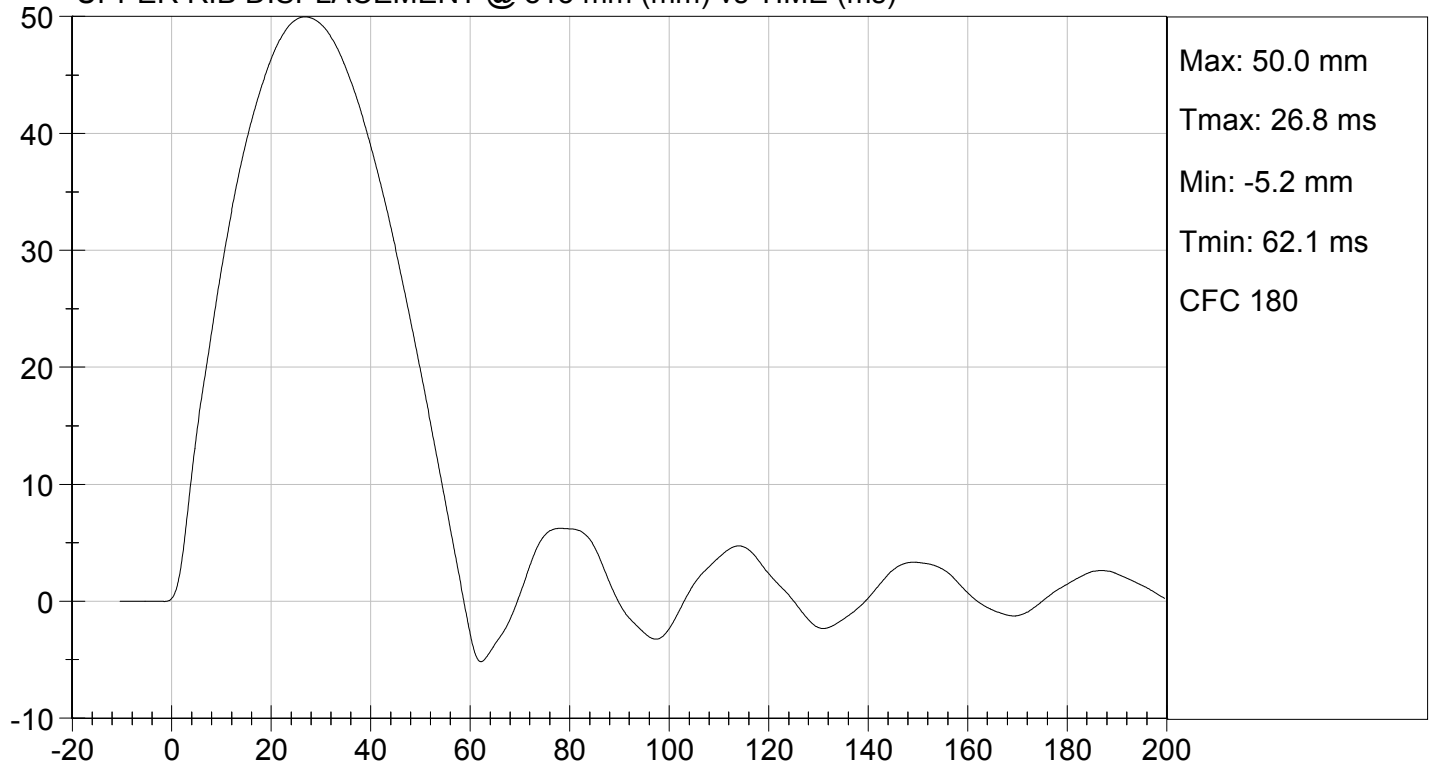

Approved By



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



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



MGA RESEARCH CORPORATION

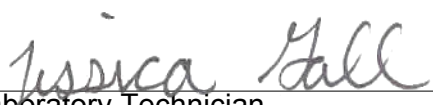
MID RIB TEST

ES-2re DUMMY

ATD Serial No: 032

Test I.D: D14415

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Displacement at 459 mm	mm	36.0 to 40.0	37.7	Pass
Displacement at 815 mm	mm	46.0 to 51.0	48.9	Pass
Overall Test Results				Pass

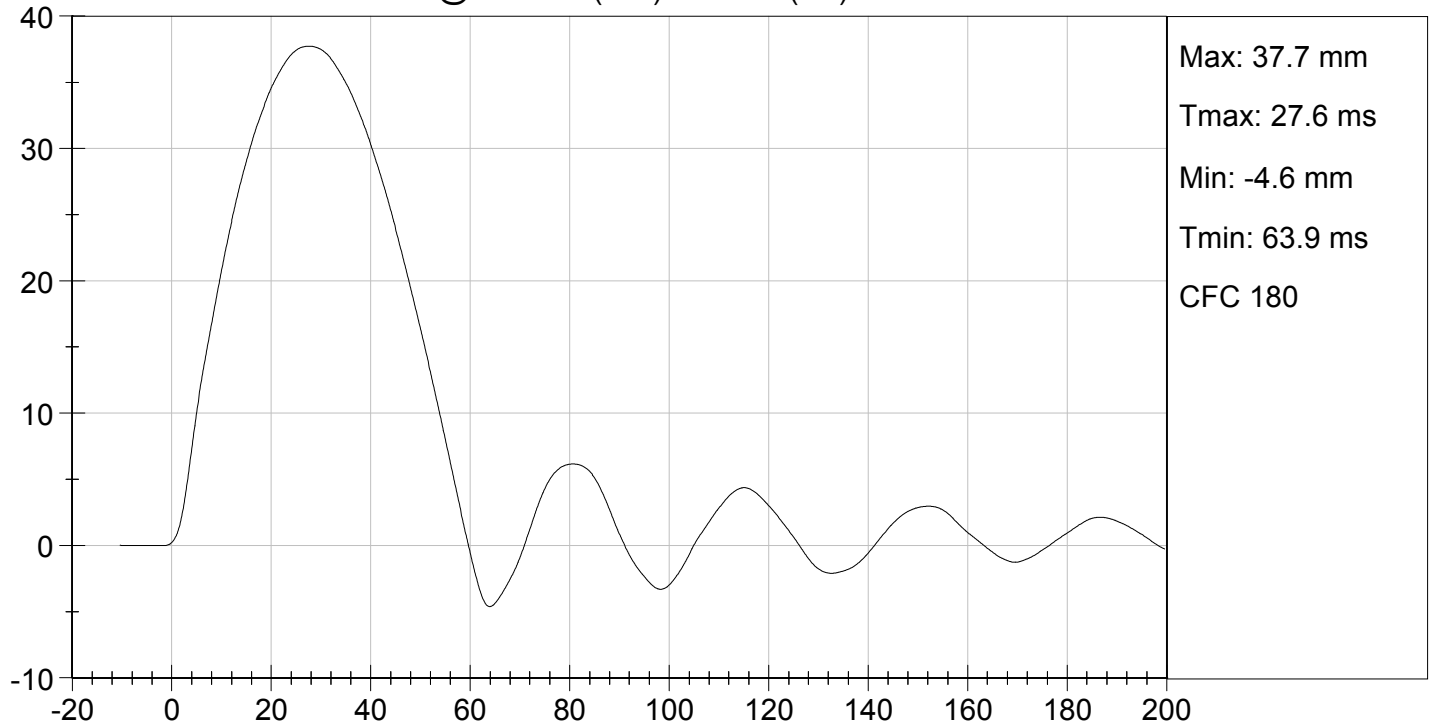

Laboratory Technician

02/05/2014
Test Date

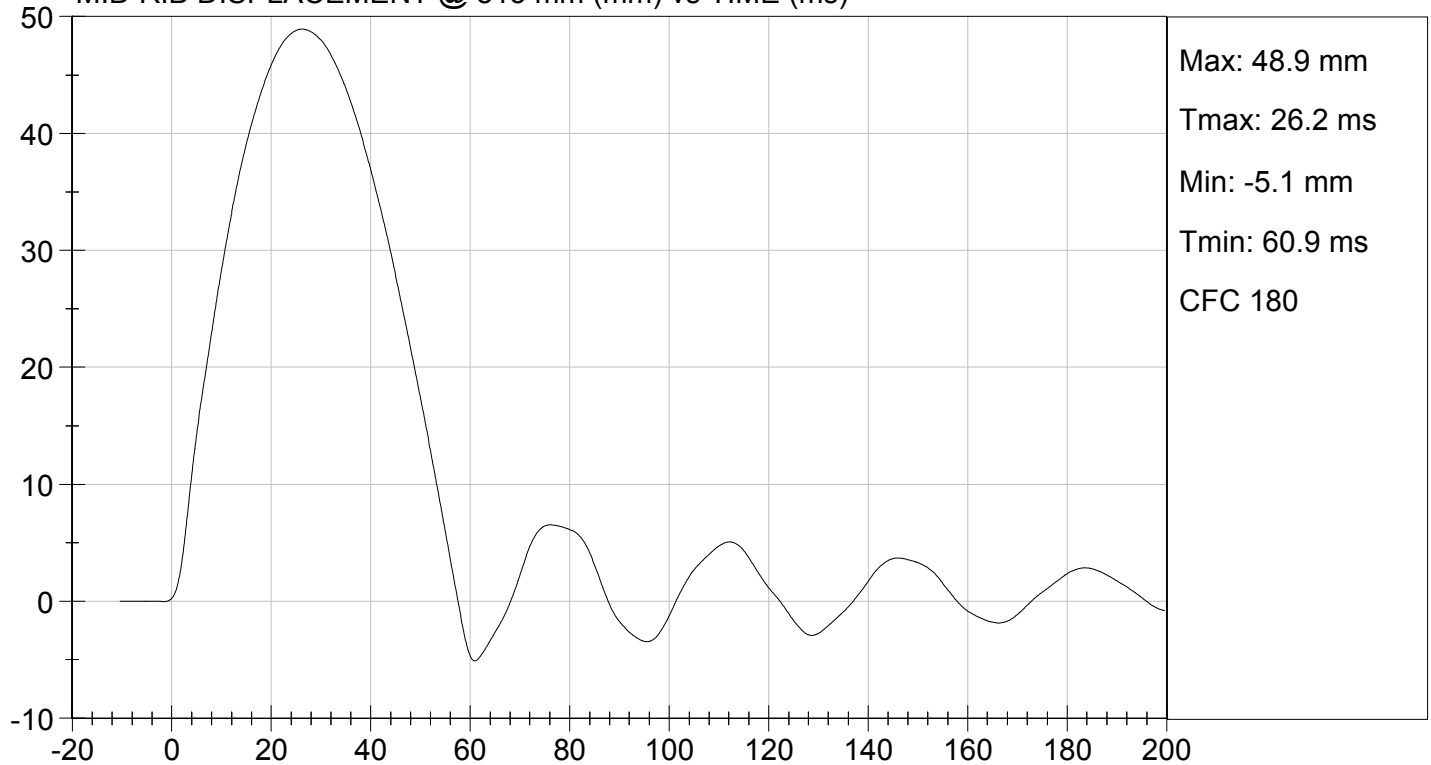

Approved By



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



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



MGA RESEARCH CORPORATION

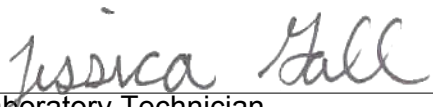
LOWER RIB TEST

ES-2re DUMMY

ATD Serial No: 032

Test I.D: D14416

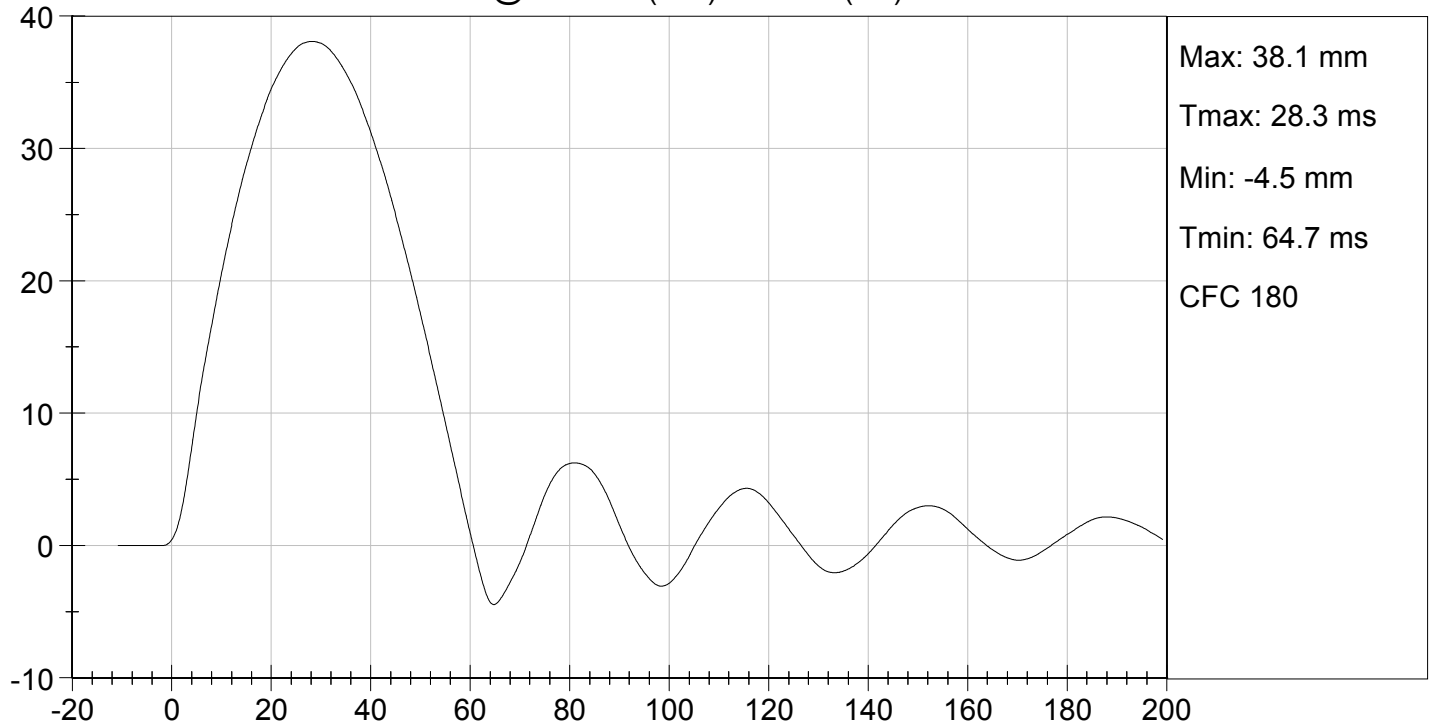
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Displacement at 459 mm	mm	36.0 to 40.0	38.1	Pass
Displacement at 815 mm	mm	46.0 to 51.0	50.2	Pass
Overall Test Results				Pass


Laboratory Technician

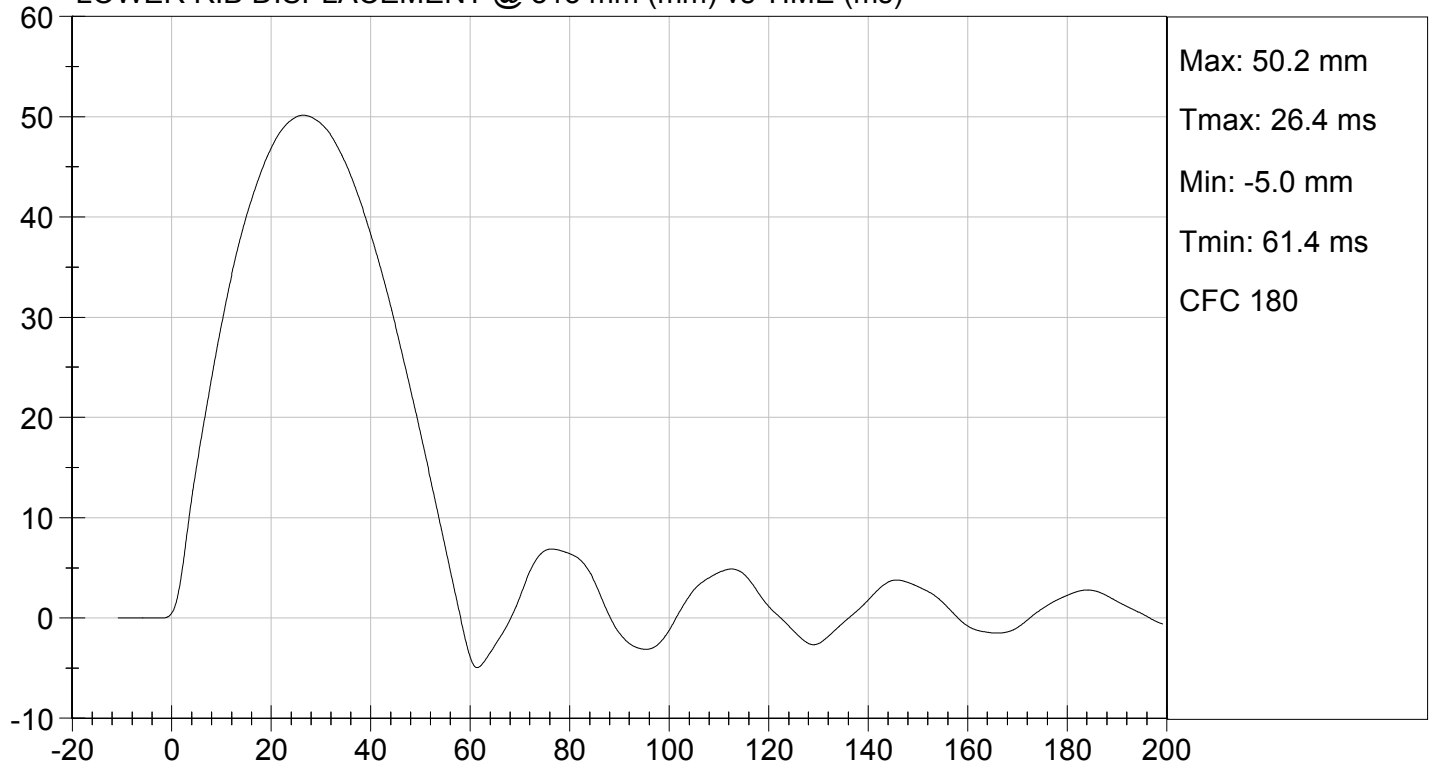
02/05/2014
Test Date


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:** D14410

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.0	Pass
Humidity	%	10 to 70	20	Pass
Probe Speed	m/s	5.40 to 5.60	5.60	Pass
Maximum Impactor Force (after 6 ms)	N	5100 to 6200	5523	Pass
Upper Rib Displacement	mm	34.0 to 41.0	39.7	Pass
Middle Rib Displacement	mm	37.0 to 45.0	41.3	Pass
Lower Rib Displacement	mm	37.0 to 44.0	40.4	Pass
Overall Test Results				Pass


Laboratory Technician

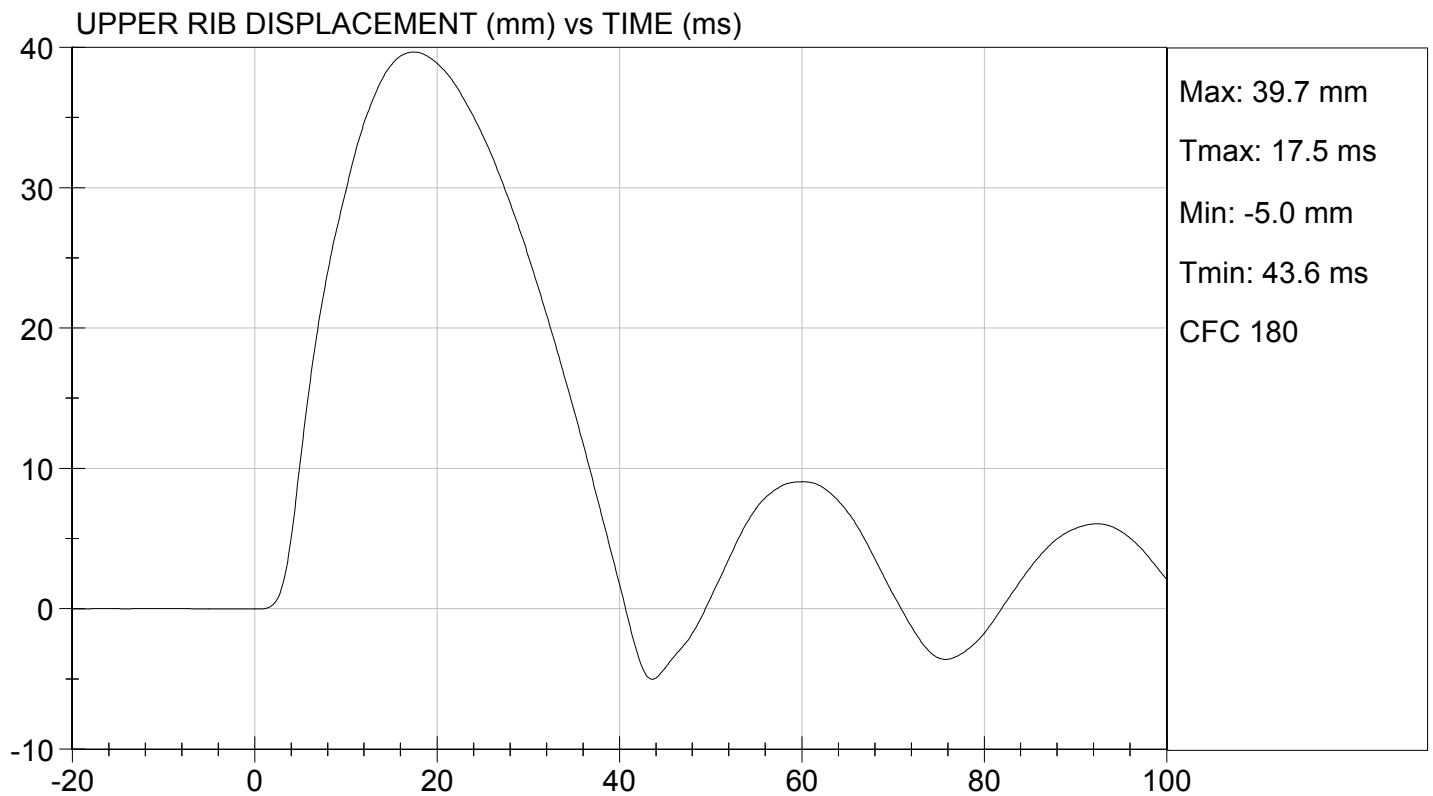
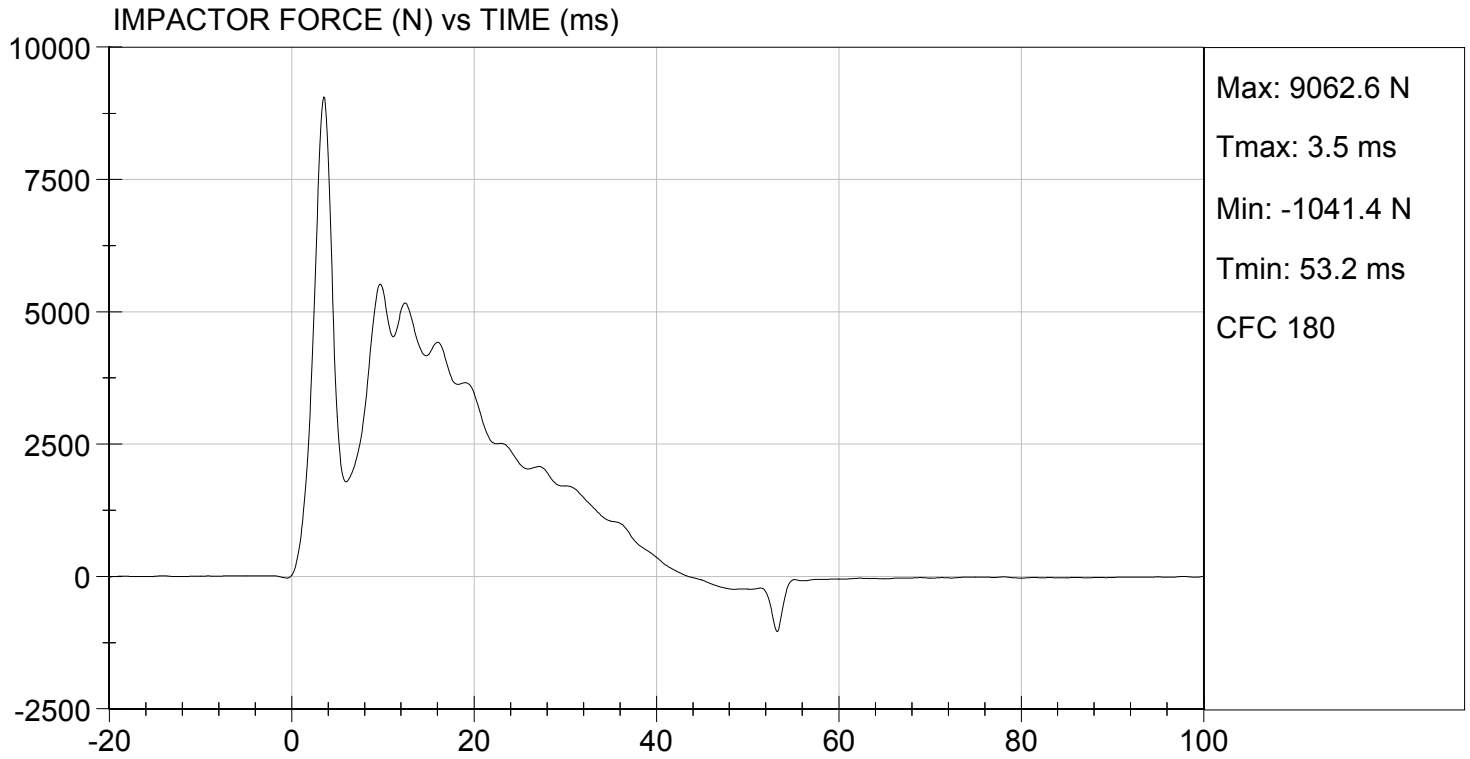
02/05/2014
Test Date


Approved By



TEST DESC: THORAX IMPACT
VELOCITY: 18.37 ft/s, 5.60 m/s

TEST DATE: 02/05/2014
TEST #: D14410

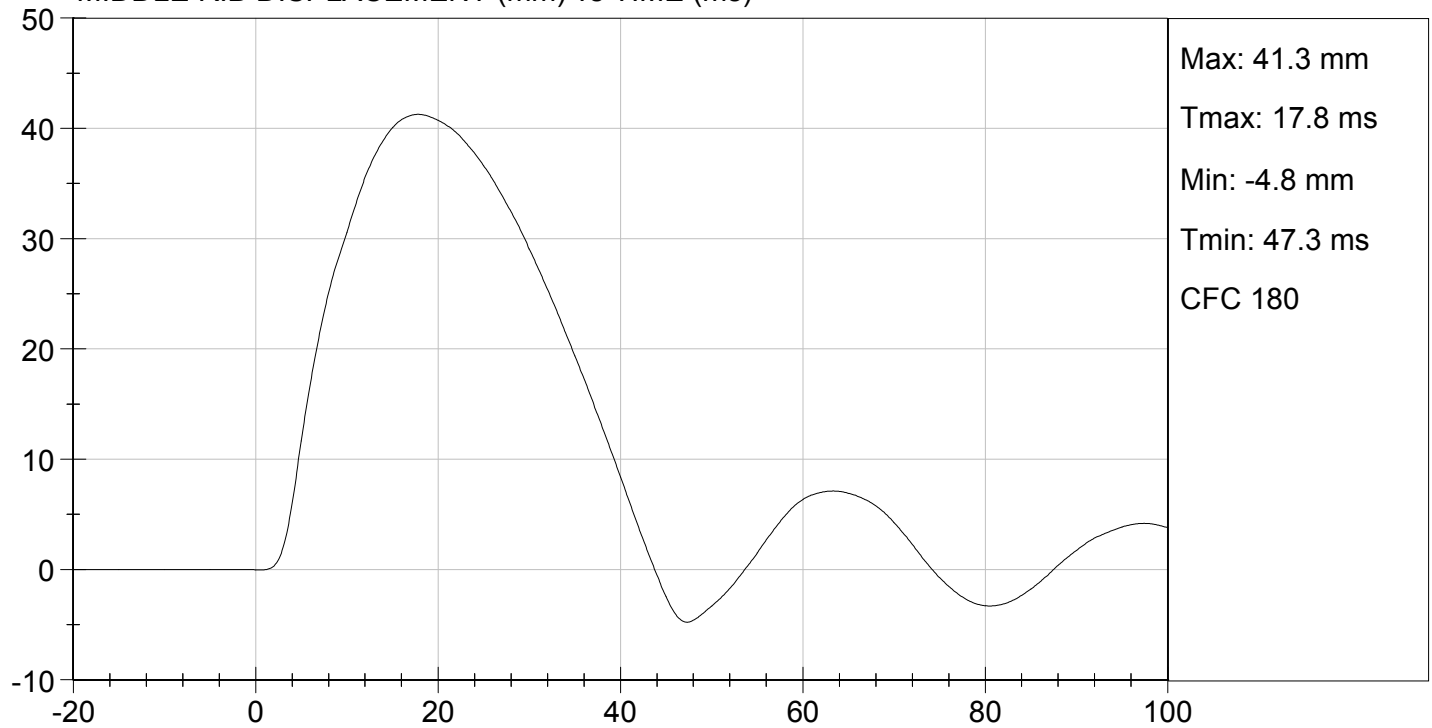




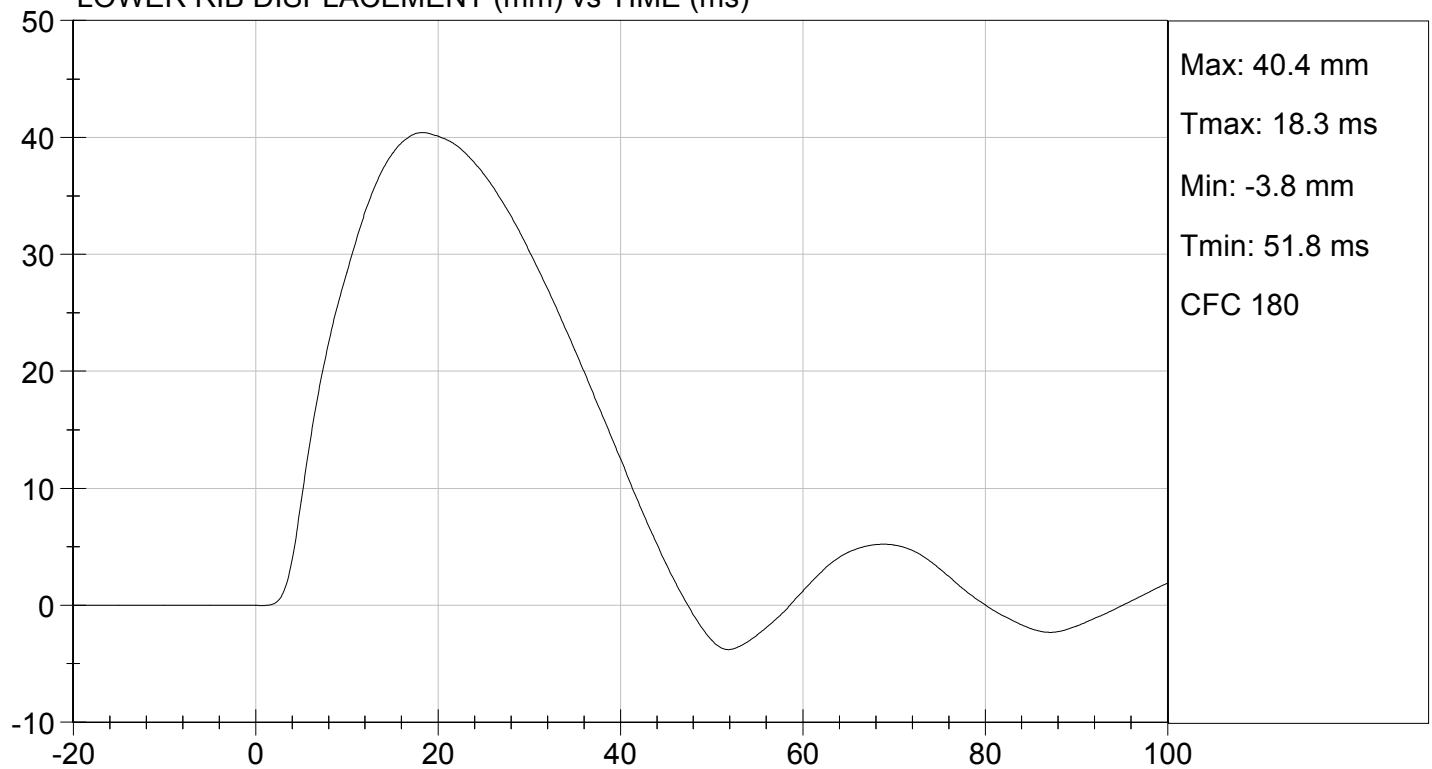
TEST DESC: THORAX IMPACT
VELOCITY: 18.37 ft/s, 5.60 m/s

TEST DATE: 02/05/2014
TEST #: D14410

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: D14417

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Probe Speed	m/s	3.90 to 4.10	4.03	Pass
Maximum Impactor Force	N	4000 to 4800	4402	Pass
Time of Maximum Impactor Force	ms	10.6 to 13.0	12.5	Pass
Maximum Total Abdomen Force	N	2200 to 2700	2271	Pass
Time of Maximum Abdomen Force	ms	10.0 to 12.3	10.6	Pass
Overall Test Results				Pass


Laboratory Technician

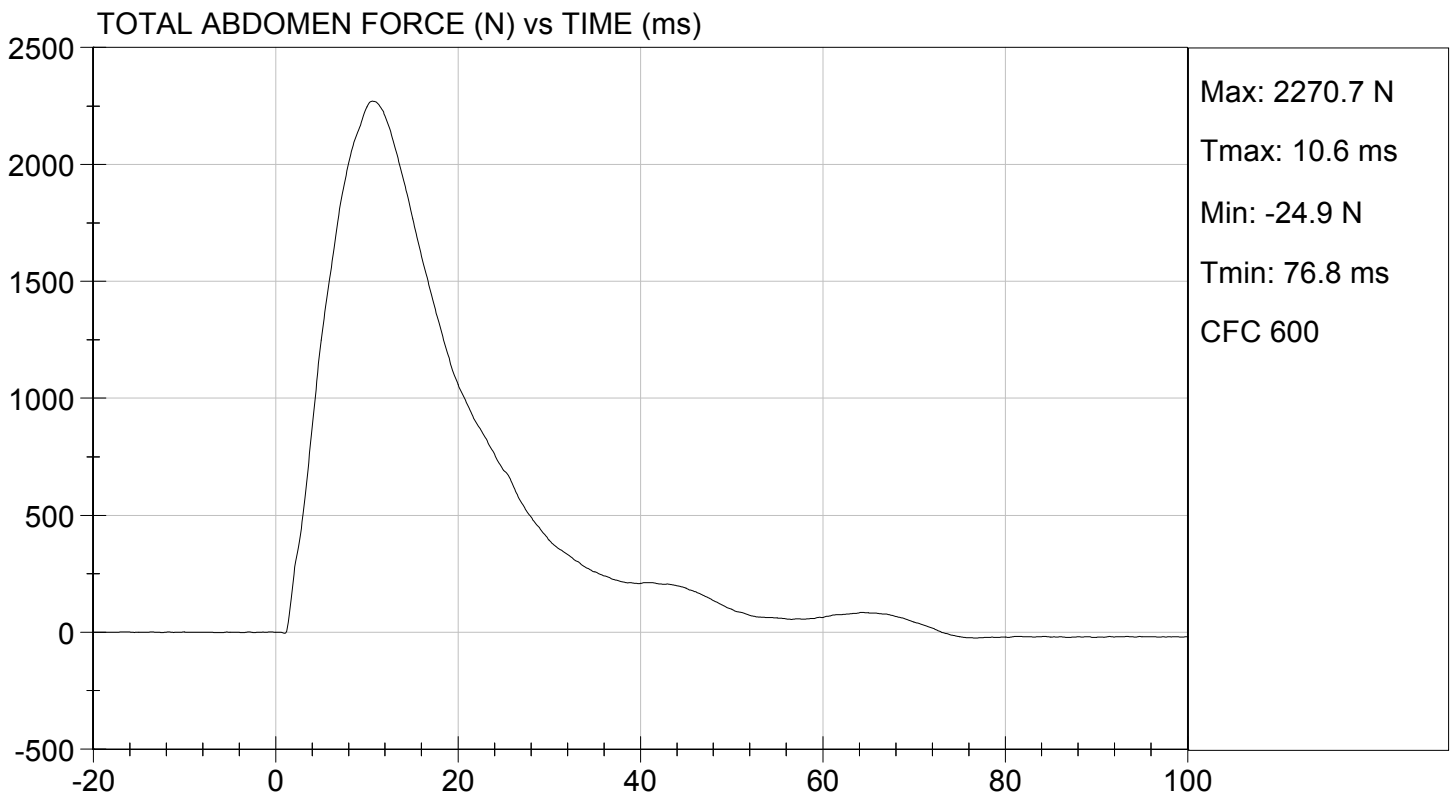
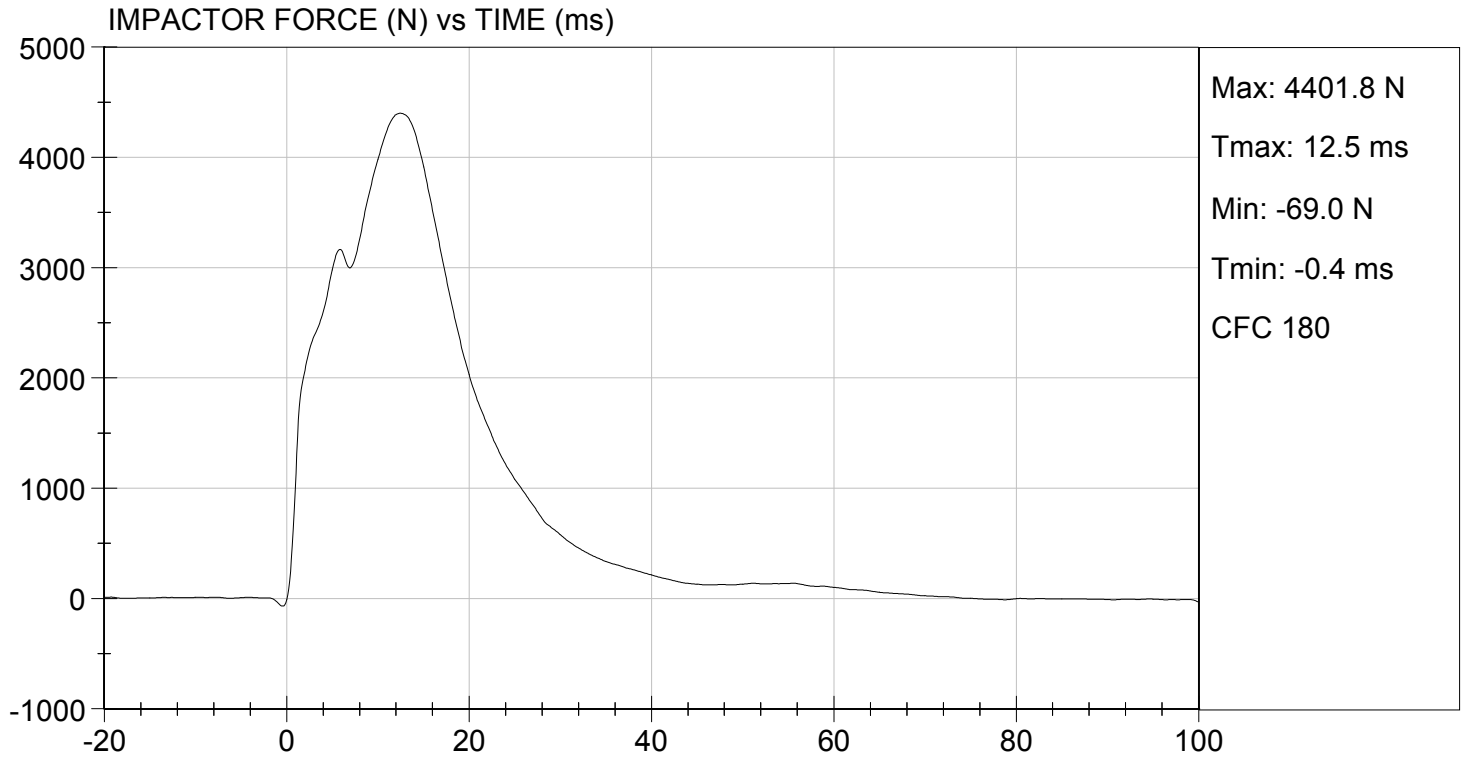
02/05/2014
Test Date


Approved By



TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.23 ft/s, 4.03 m/s

TEST DATE: 02/05/2014
TEST #: D14417

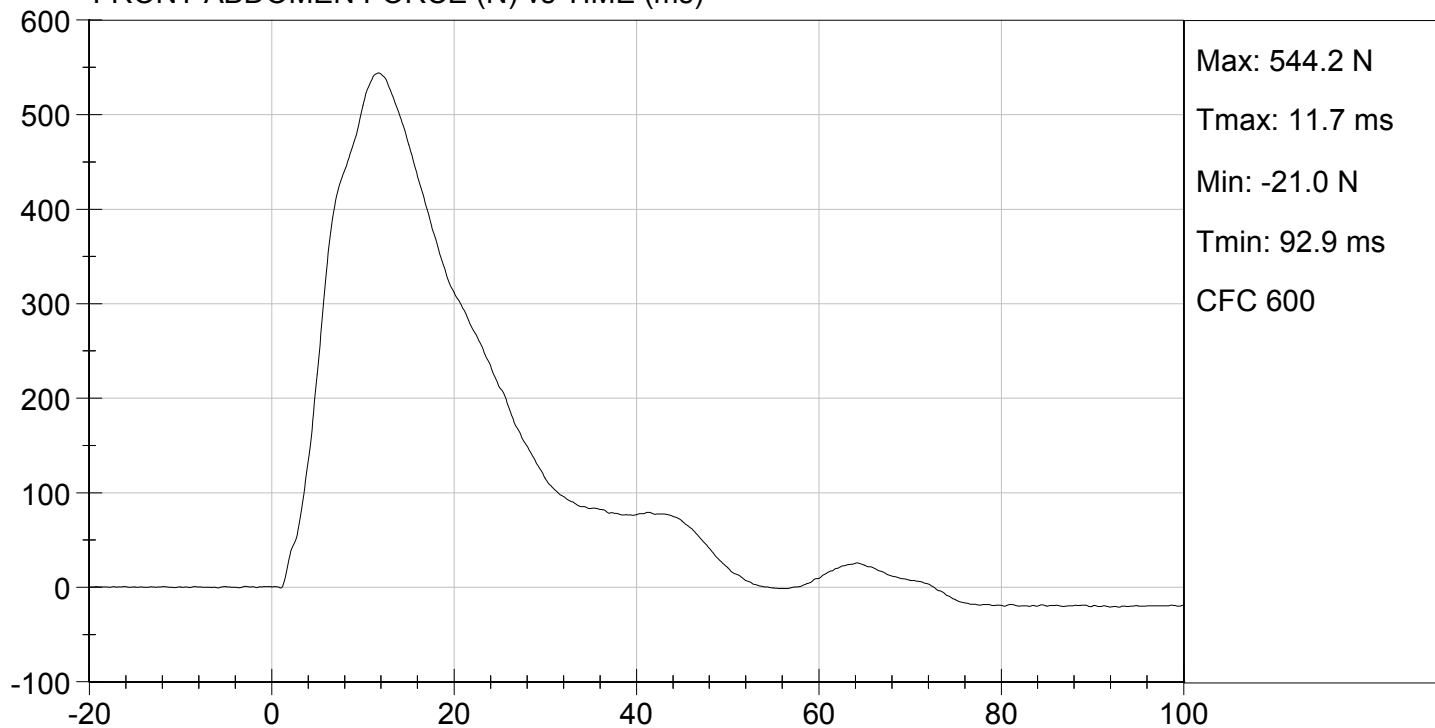




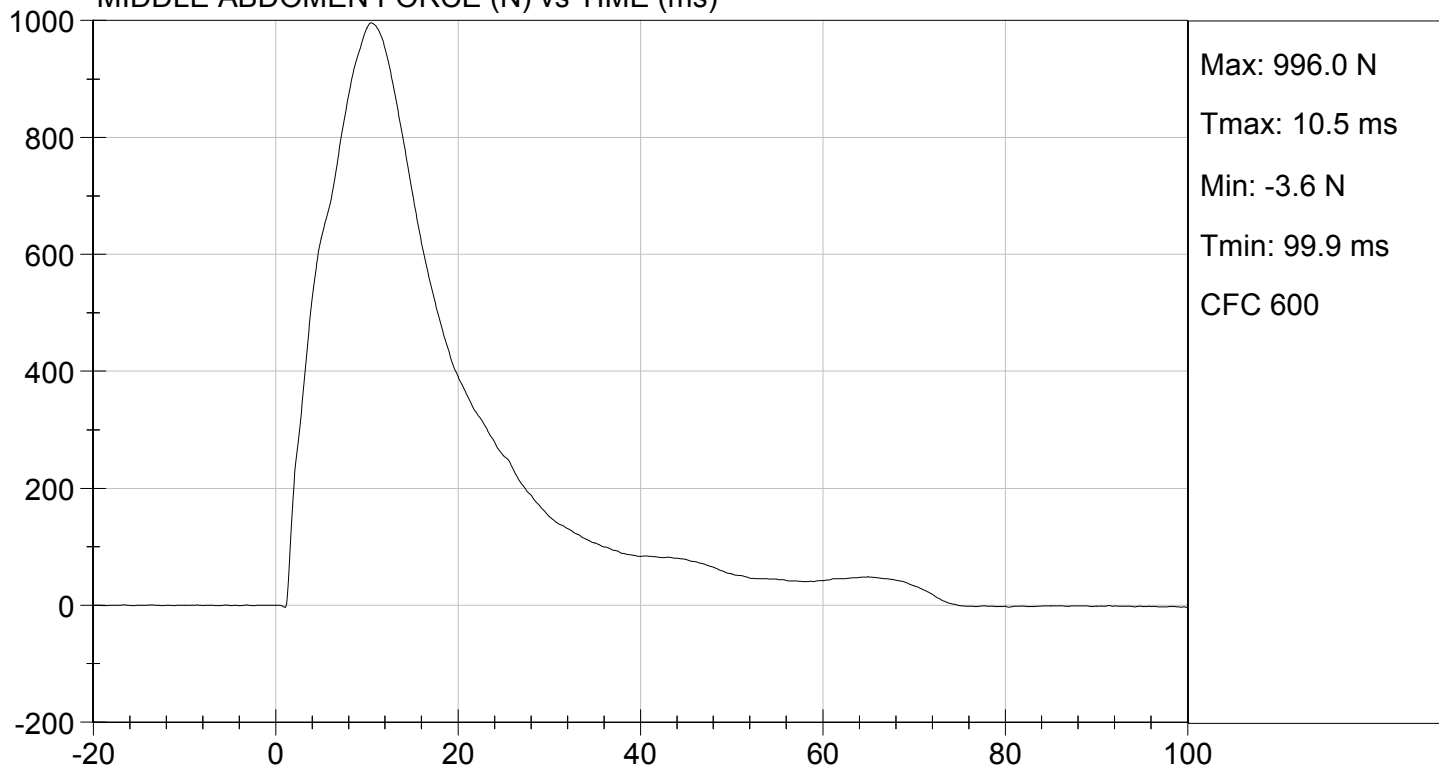
TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.23 ft/s, 4.03 m/s

TEST DATE: 02/05/2014
TEST #: D14417

FRONT ABDOMEN FORCE (N) vs TIME (ms)



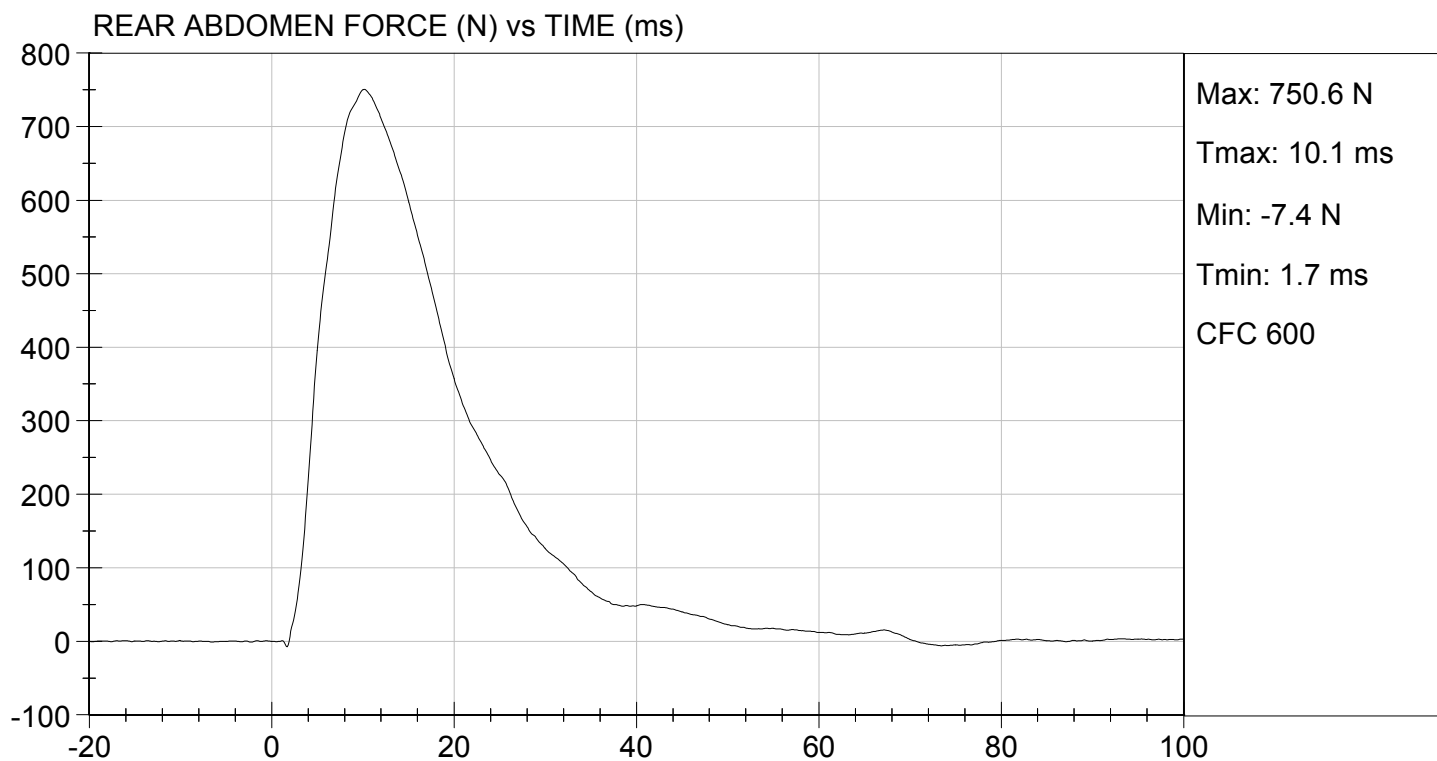
MIDDLE ABDOMEN FORCE (N) vs TIME (ms)





TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.23 ft/s, 4.03 m/s

TEST DATE: 02/05/2014
TEST #: D14417



MGA RESEARCH CORPORATION
LUMBAR SPINE TEST
ES-2re DUMMY

ATD Serial No: 032

Test I.D: D14418

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	20	Pass
Pendulum Speed		m/s	5.95 to 6.15	6.05	Pass
Pendulum Velocity	1 ms	m/s	-0.05 to 0.00	-0.03	Pass
	3.7 ms	m/s	-0.425 to -0.24	-0.424	Pass
	27 ms	m/s	-6.50 to -5.80	-5.80	Pass
	30 ms	m/s	>= -6.50	-6.48	Pass
Maximum Flexion Angle		deg	45.0 to 55.0	45.0	Pass
Time of Maximum Flexion Angle		ms	39.0 to 53.0	46.5	Pass
Headform Rotation Decay to Initial Position		ms	37 to 57	45	Pass
Overall Results					Pass


 Laboratory Technician

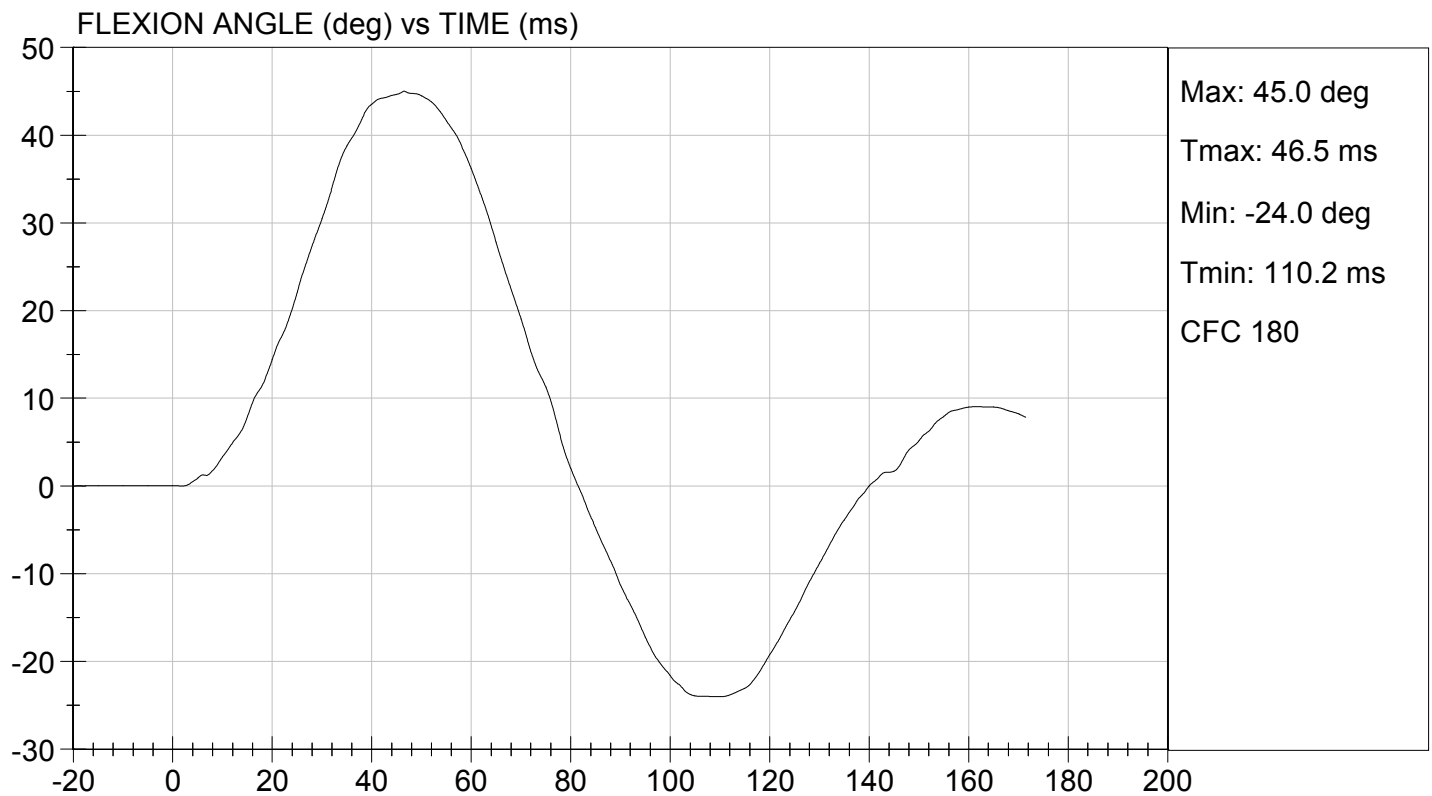
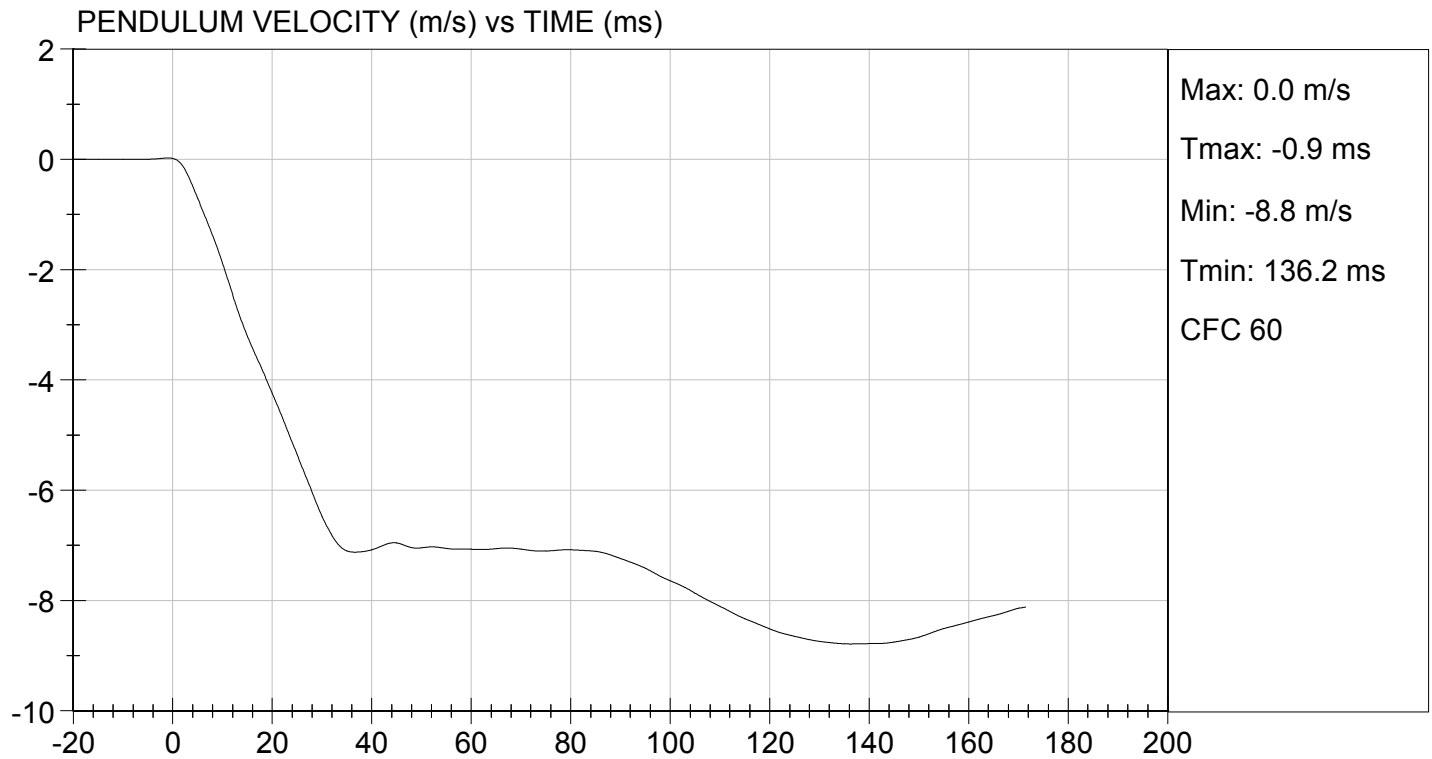
02/05/2014
 Test Date


 Approved By



TEST DESC: LUMBAR BENDING
VELOCITY: 19.84 ft/s, 6.05 m/s

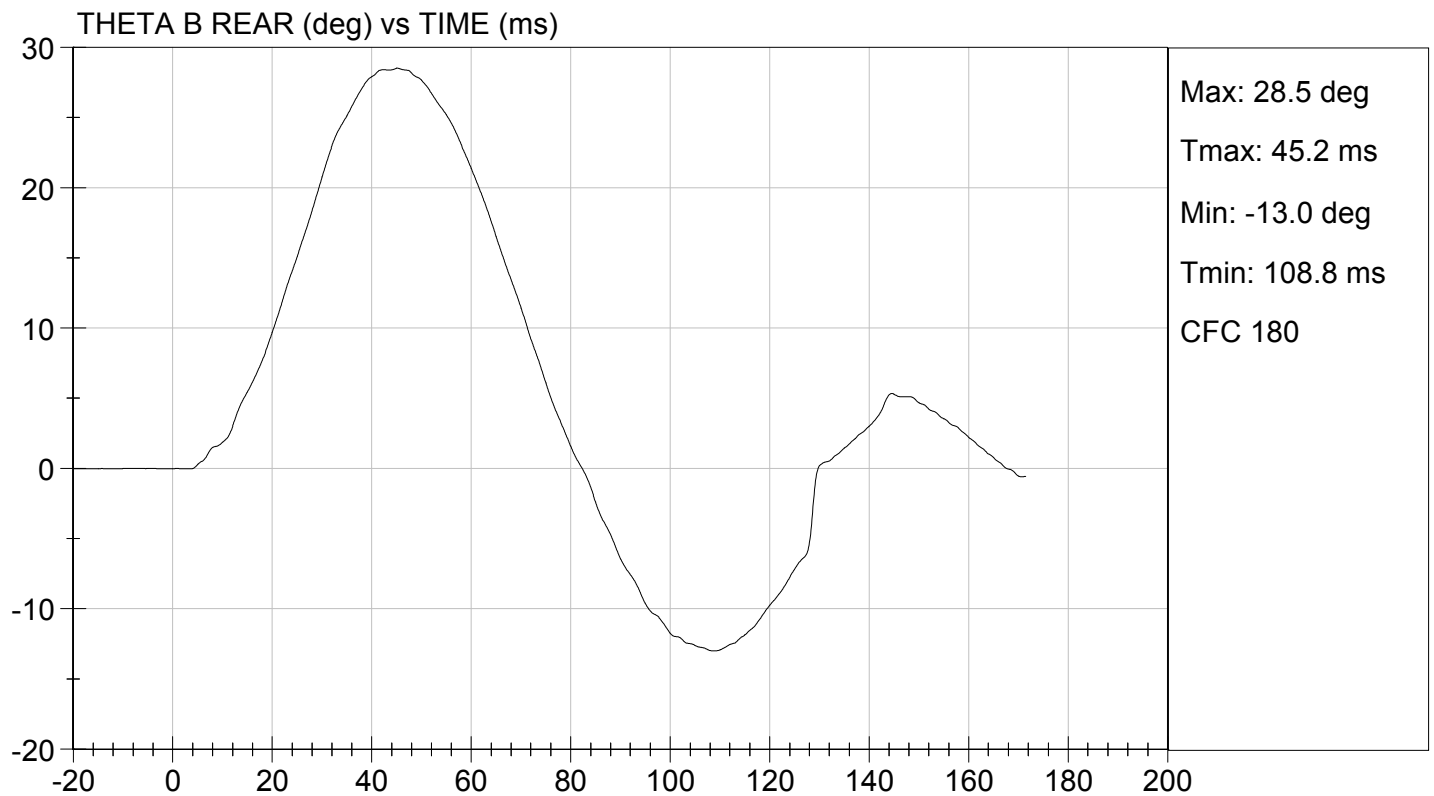
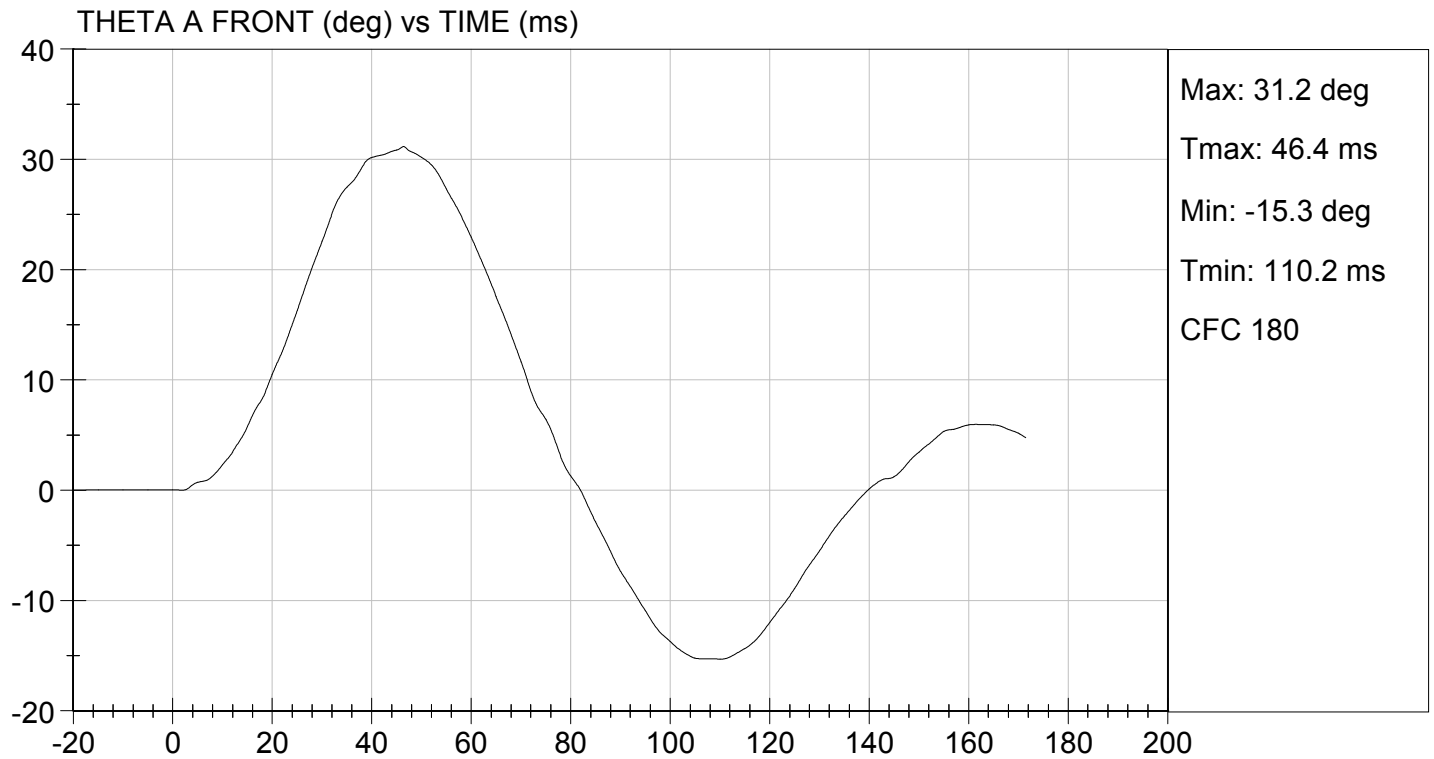
TEST DATE: 02/05/2014
TEST #: D14418





TEST DESC: LUMBAR BENDING
VELOCITY: 19.84 ft/s, 6.05 m/s

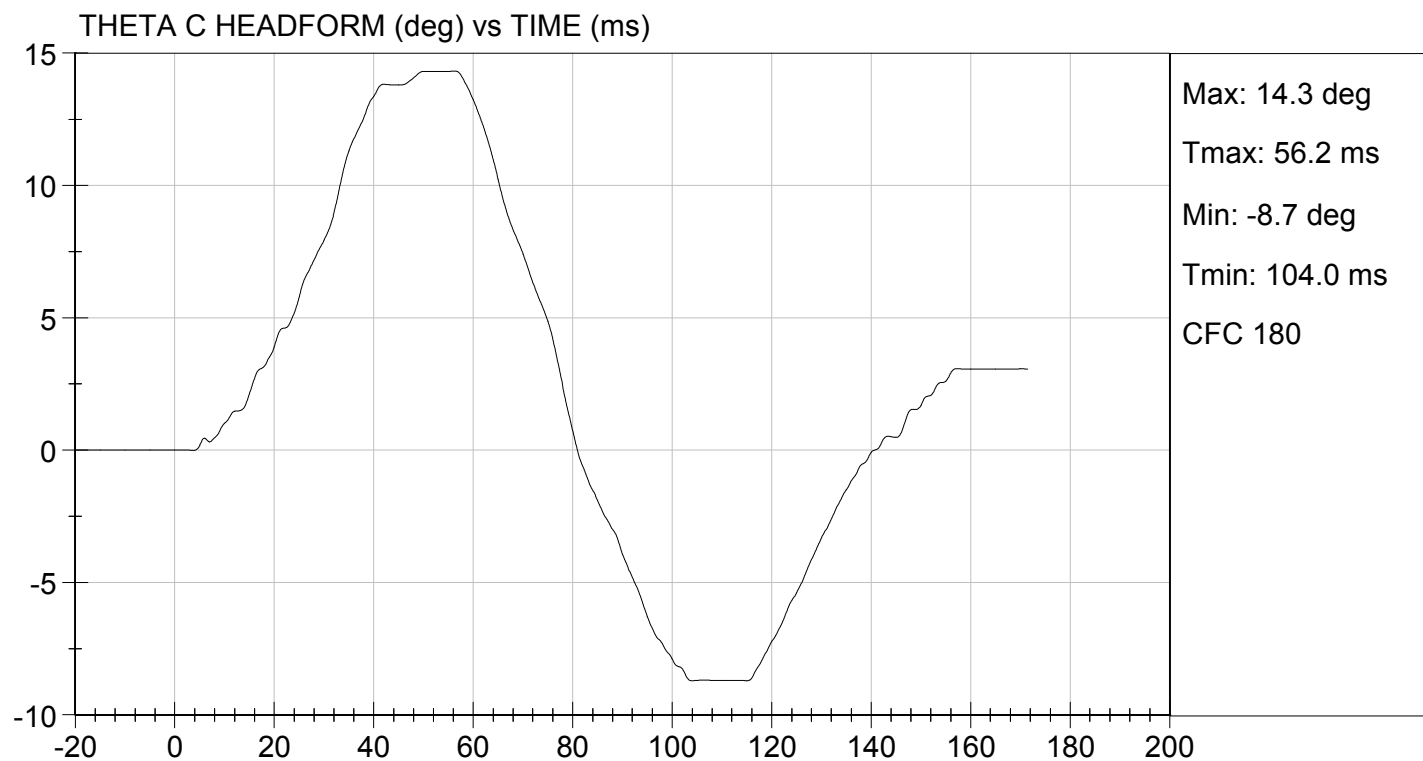
TEST DATE: 02/05/2014
TEST #: D14418





TEST DESC: LUMBAR BENDING
VELOCITY: 19.84 ft/s, 6.05 m/s

TEST DATE: 02/05/2014
TEST #: D14418



MGA RESEARCH CORPORATION**PELVIS TEST****ES-2re DUMMY****ATD Serial No:** 032**Test I.D:** D14419

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Probe Speed	m/s	4.20 to 4.40	4.40	Pass
Maximum Impactor Force	N	4700 to 5400	5037	Pass
Time of Maximum Impactor Force	ms	11.8 to 16.1	12.8	Pass
Maximum Pubic Force	N	1230 to 1590	1237	Pass
Time of Maximum Pubic Force	ms	12.2 to 17.0	13.1	Pass
Overall Test Results				Pass


Laboratory Technician

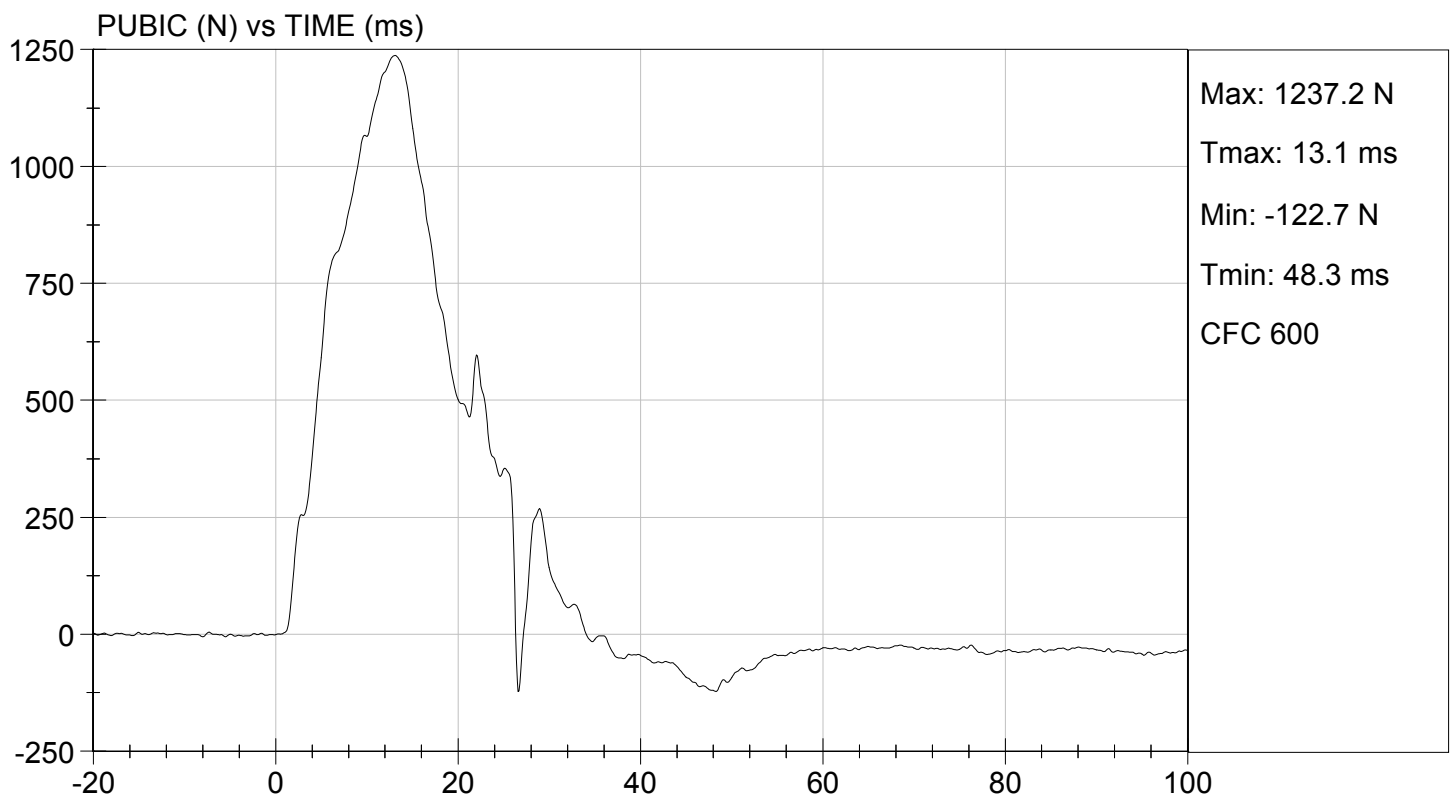
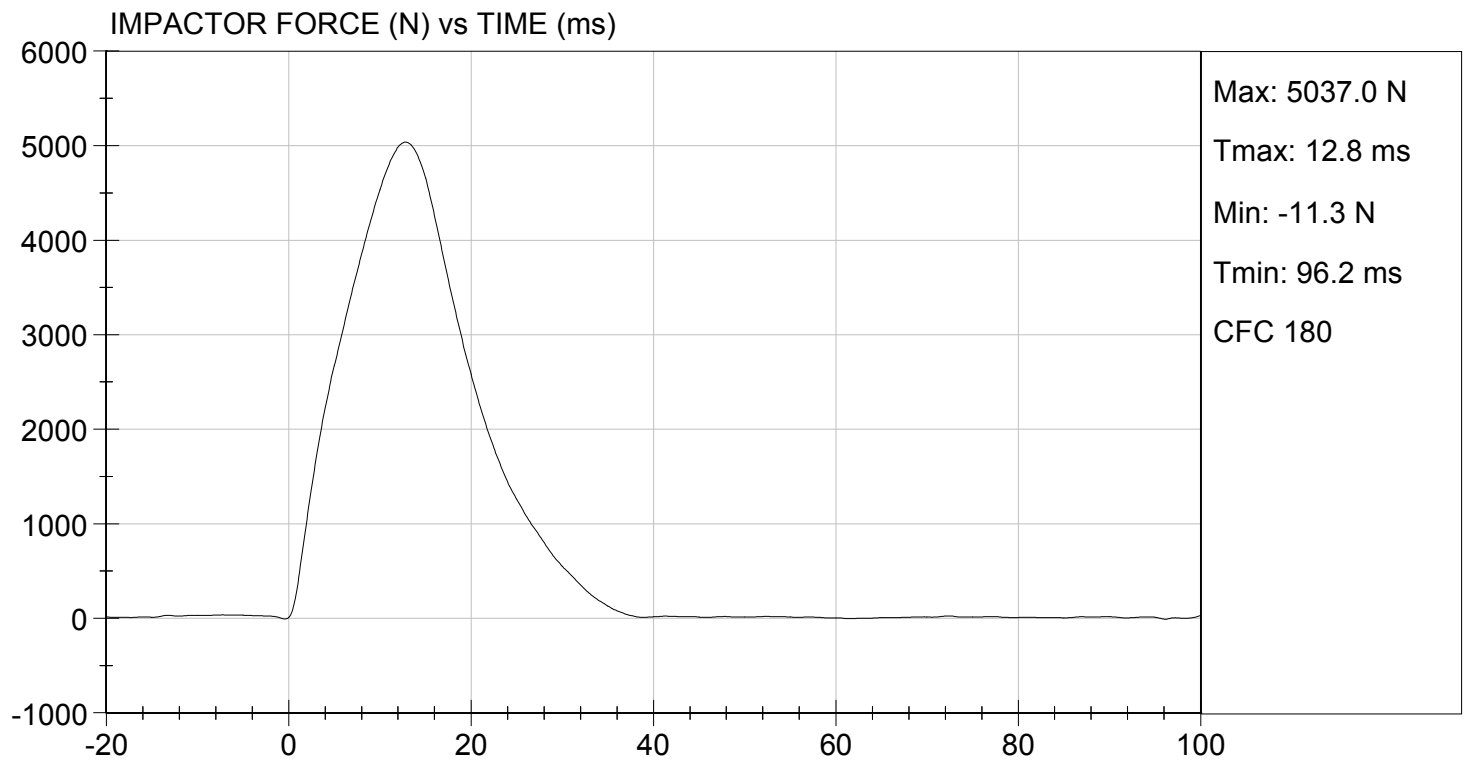
02/05/2014
Test Date


Approved By



TEST DESC: PELVIS IMPACT
VELOCITY: 14.43 ft/s, 4.4 m/s

TEST DATE: 02/05/2014
TEST #: D14419



SID-IIsD External Measurements
SN: 296

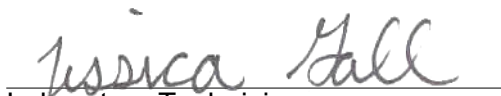
No.	Name	Spec. (mm)	Result	Pass/Fail
A	Sitting Height	772 - 788	784	Pass
B	Shoulder Pivot Height	437 - 453	442	Pass
C	H-point Height	79 - 89	83	Pass
D	H-point from Seatback	141 - 151	145	Pass
E	Shoulder Pivot from Backline	97 - 107	99	Pass
F	Thigh Clearance	119 -135	121	Pass
G	Head Breadth	140 - 148	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

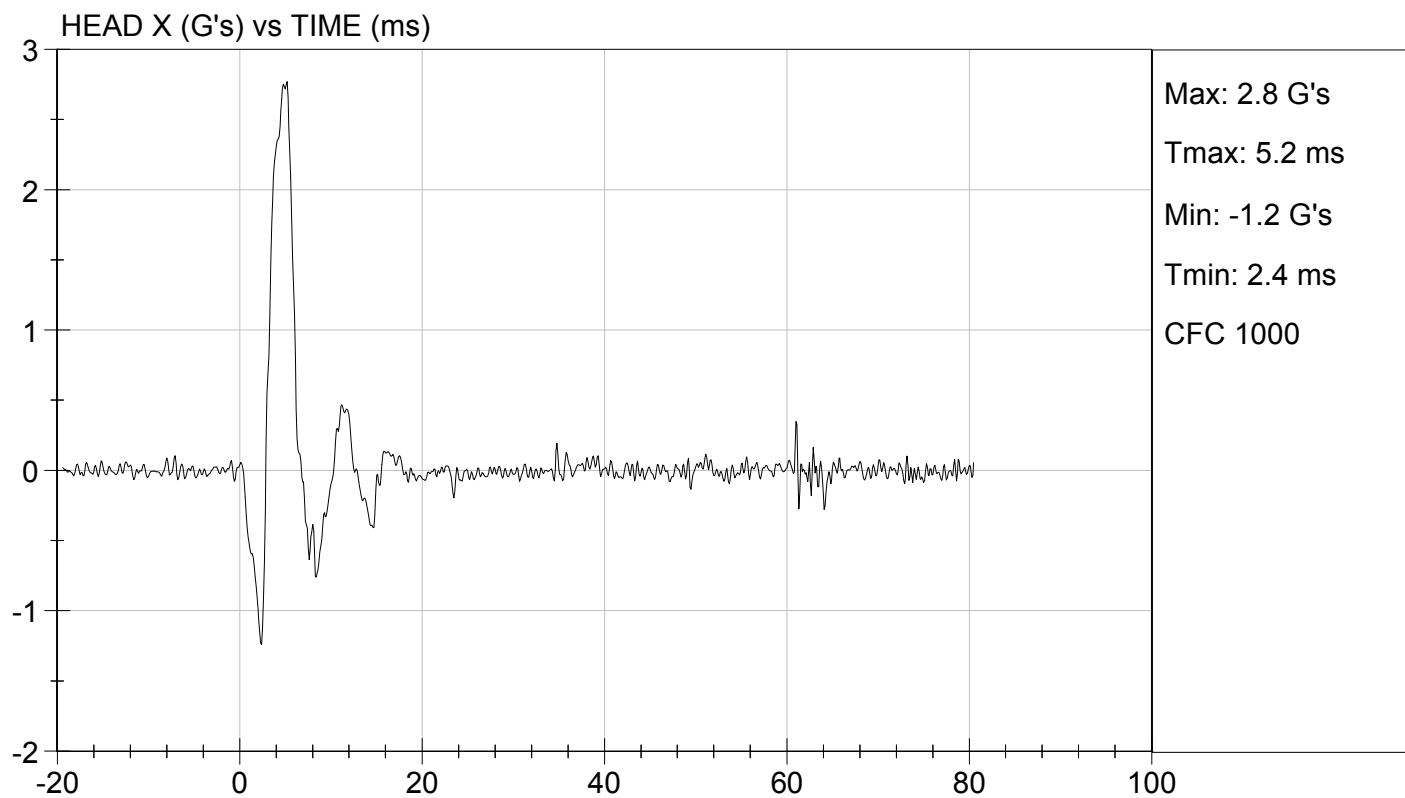
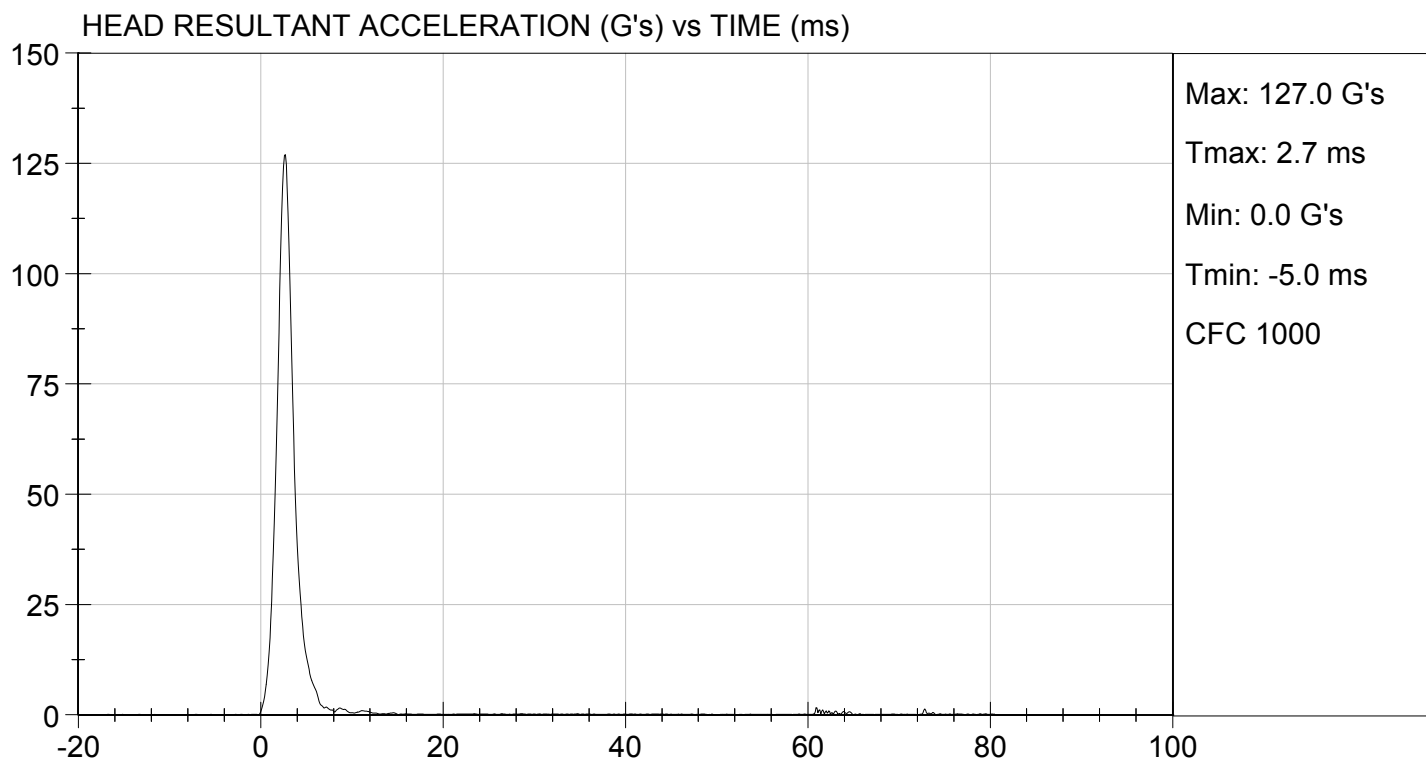
Test ID: D14291

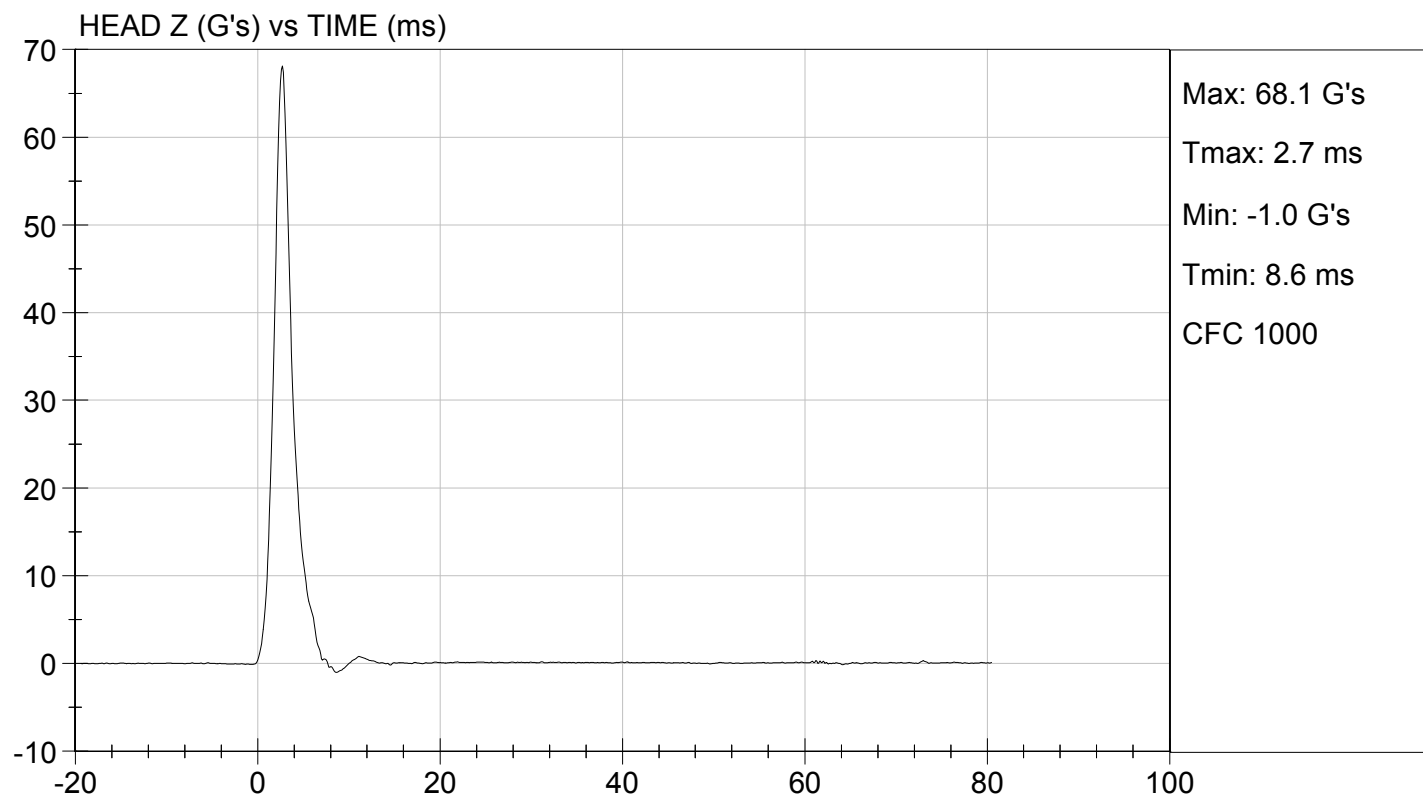
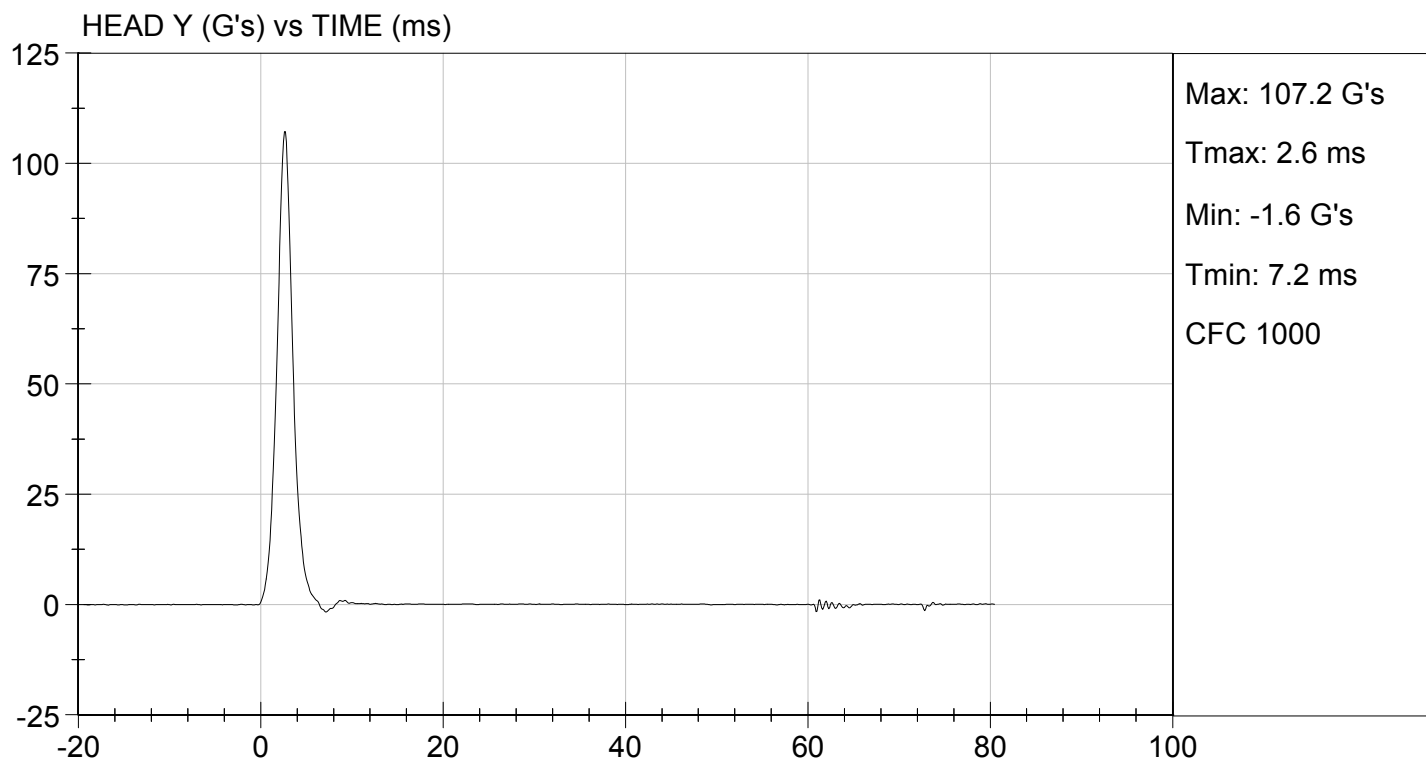
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	11	Pass
Peak Resultant Acceleration	G's	115 to 137	127	Pass
Peak Longitudinal Acceleration	G's	+/- 15	2.8	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	<15%	Yes	Pass
			Overall Test Results	Pass


Laboratory Technician

01/29/2014
Test Date


Approved By





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

ATD Serial No: 296

Test I.D: D14292

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21.6	Pass
Humidity		%	10 to 70	11	Pass
Impact Velocity		m/s	5.51 to 5.63	5.51	Pass
Pendulum Velocity	10 ms	m/s	2.20 to 2.80	2.41	Pass
	15 ms	m/s	3.30 to 4.10	3.44	Pass
	20 ms	m/s	4.40 to 5.40	4.57	Pass
	25 ms	m/s	5.40 to 6.10	5.51	Pass
	25-100 ms	m/s	5.50 to 6.20	5.55	Pass
Maximum D-Plane Rotation		deg	71 to 81	72	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	60	Pass
Maximum Occipital Condyle Moment		Nm	-44 to -36	-40	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	115	Pass
Overall Test Results				Pass	

Jessica Hall
Laboratory Technician

01/29/2014

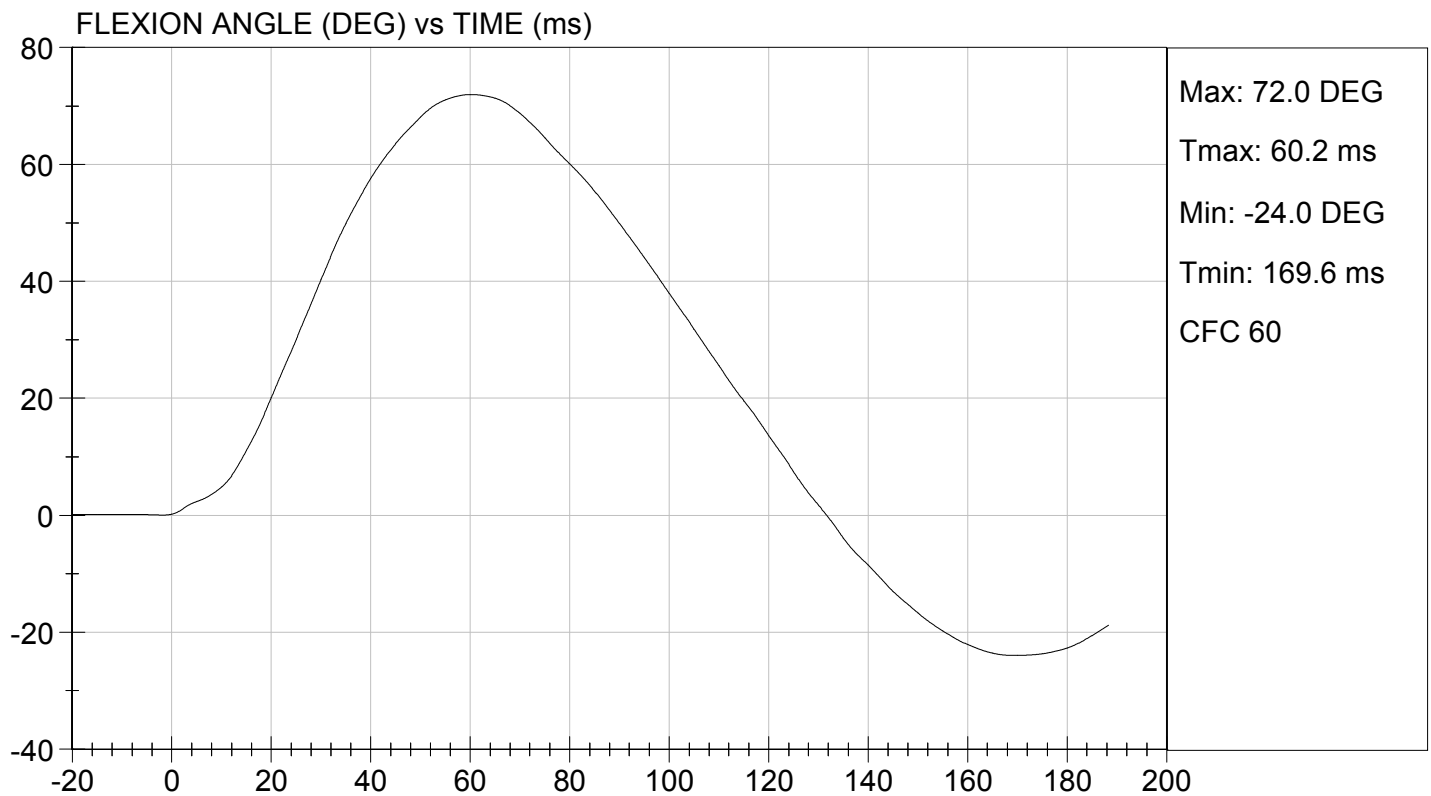
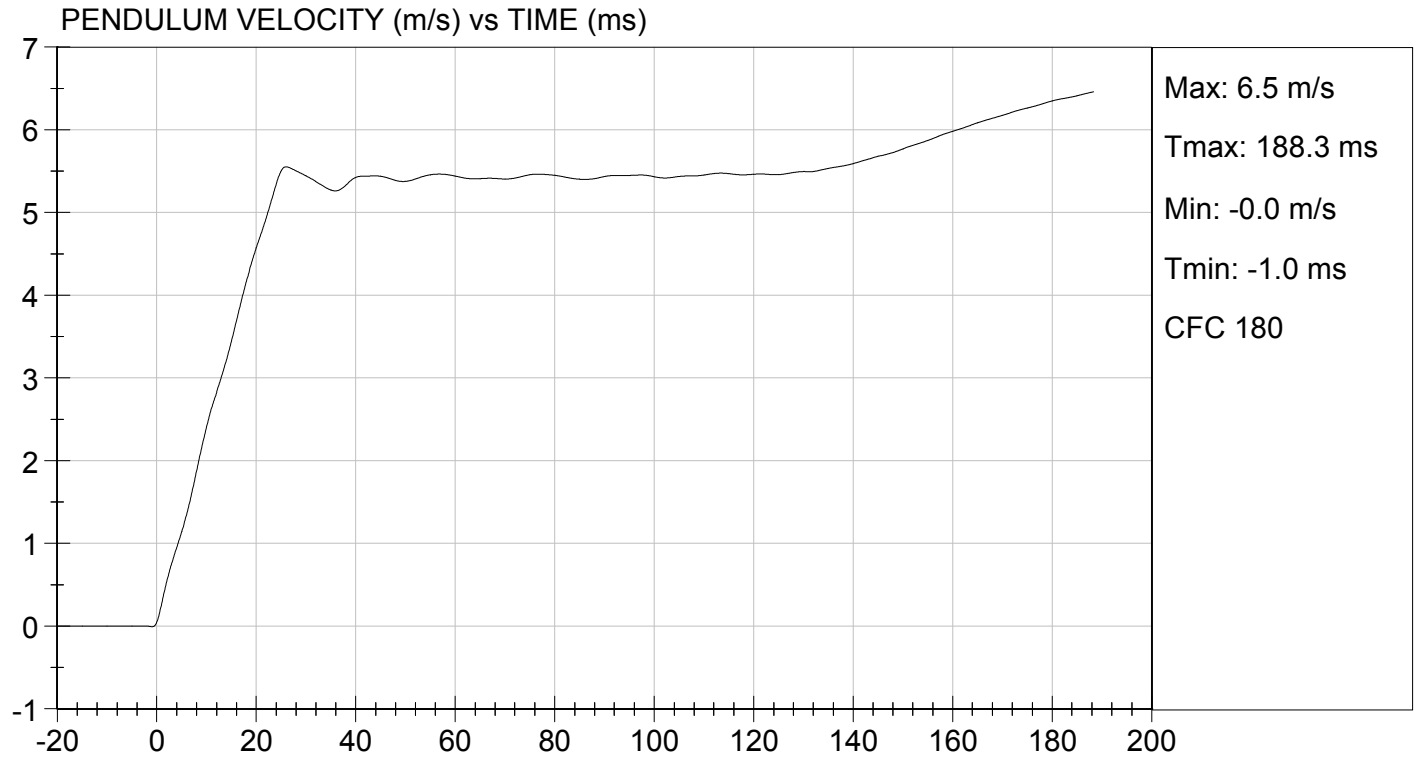
Test Date

David Winkelbauer
Approved By



TEST DESC: NECK BENDING
VELOCITY: 18.08 ft/s, 5.51 m/s

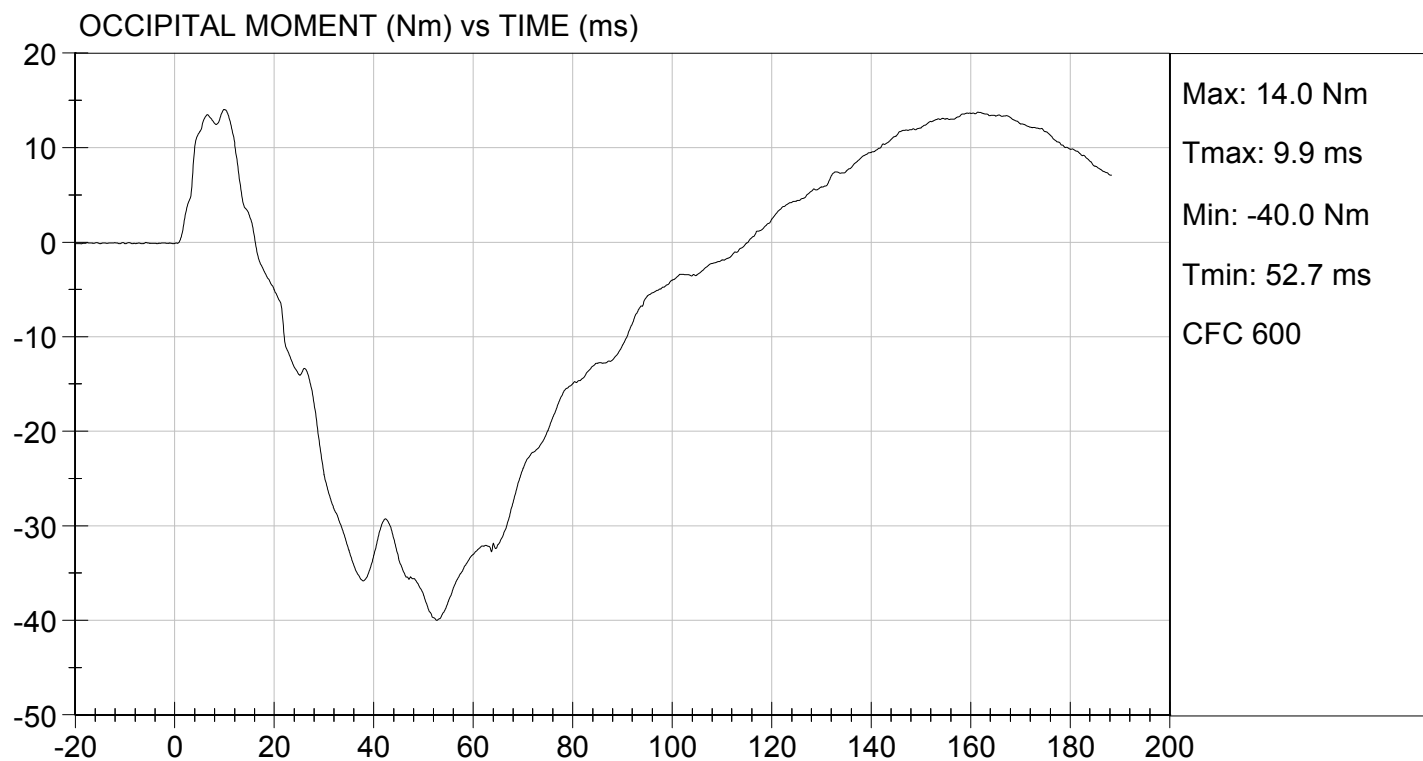
TEST DATE: 01/29/2014
TEST #: D14292





TEST DESC: NECK BENDING
VELOCITY: 18.08 ft/s, 5.51 m/s

TEST DATE: 01/29/2014
TEST #: D14292

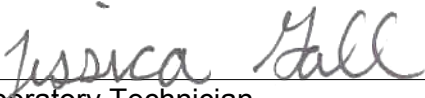


MGA RESEARCH CORPORATION
SHOULDER IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

Test ID: D14293

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	11	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	Pass
Maximum Probe Acceleration	G's	13 to 18	15	Pass
Shoulder Displacement	mm	28 to 37	31	Pass
Upper Spine (T1) Y Acceleration	G's	17 to 22	18	Pass
Overall Test Results				Pass


Laboratory Technician

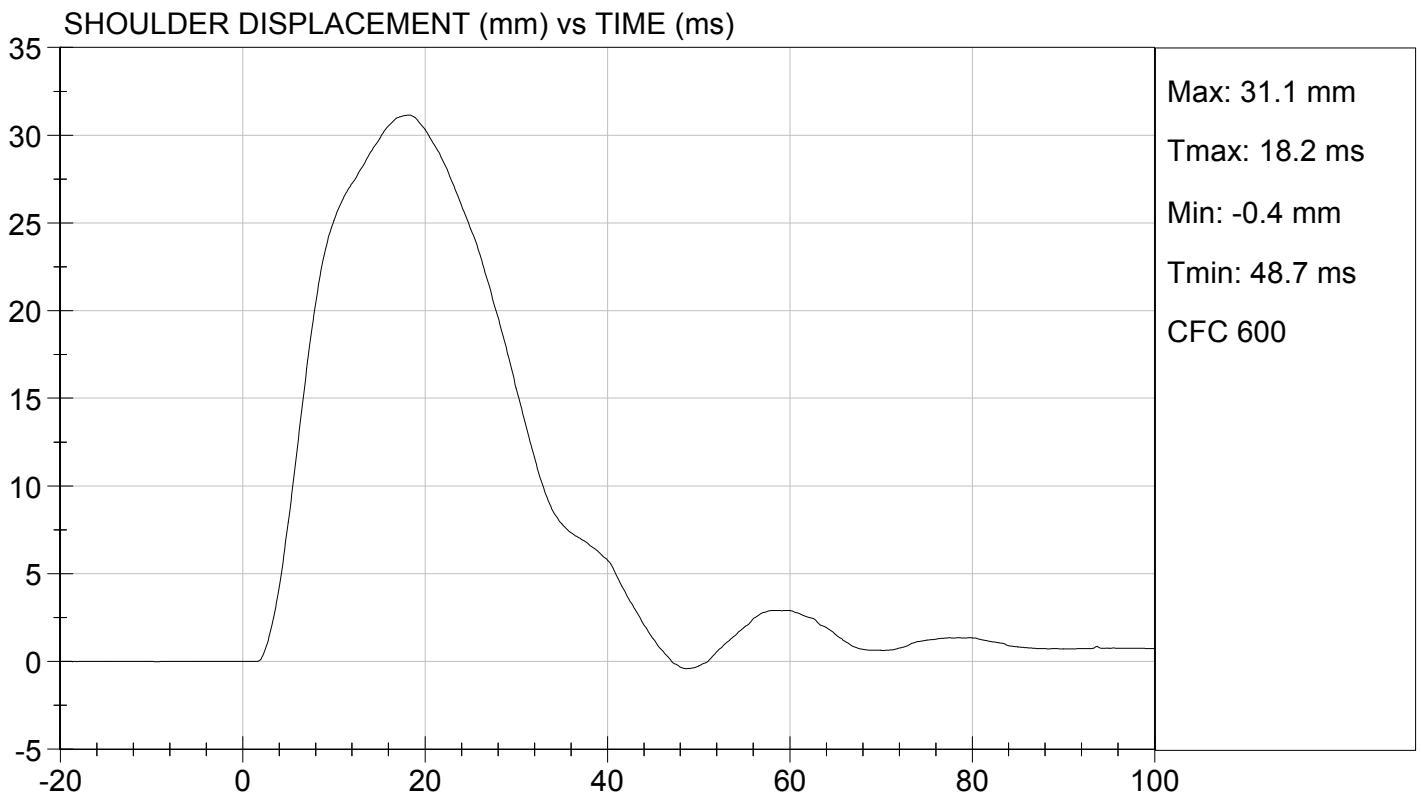
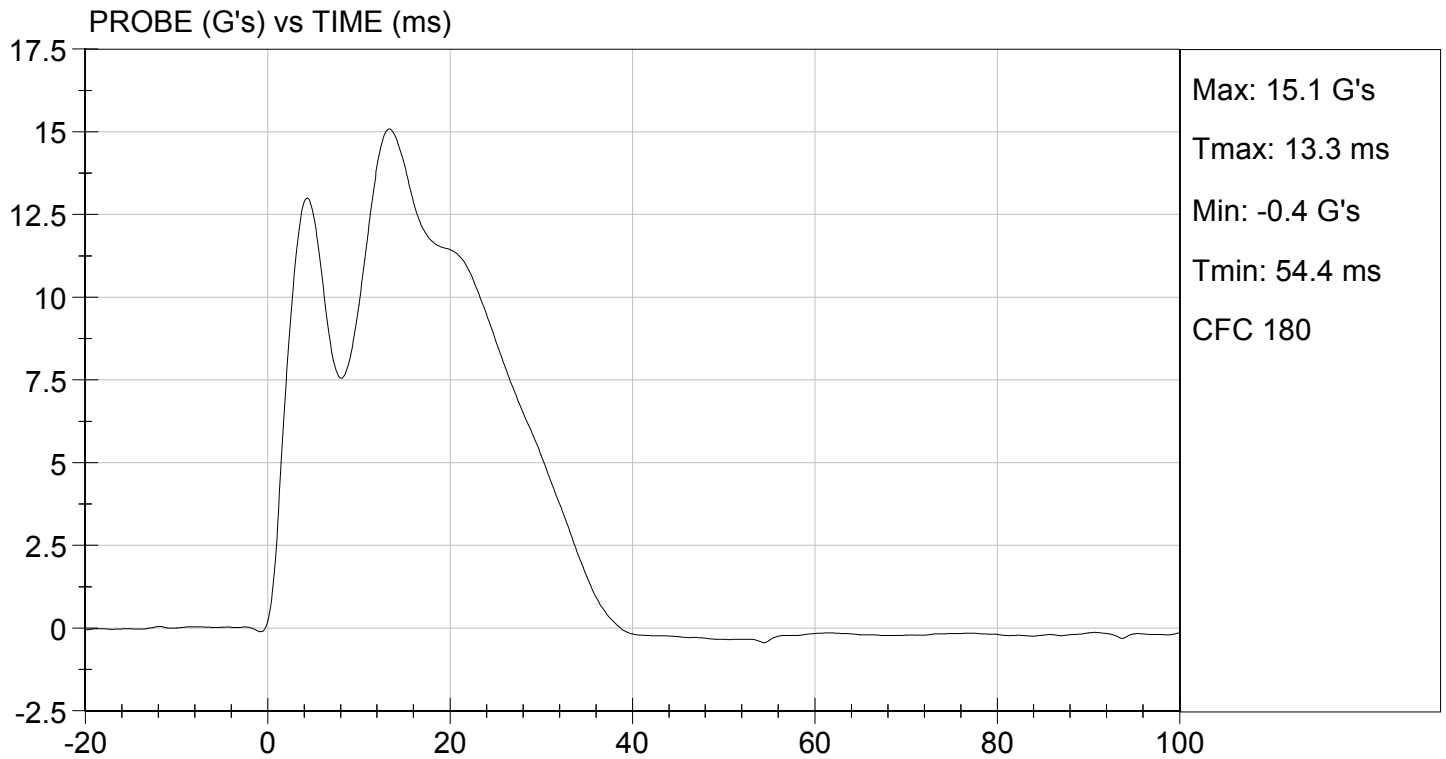
01/29/2014
Test Date


Approved By



TEST DESC: SHOULDER IMPACT
VELOCITY: 14.25 ft/s, 4.34 m/s

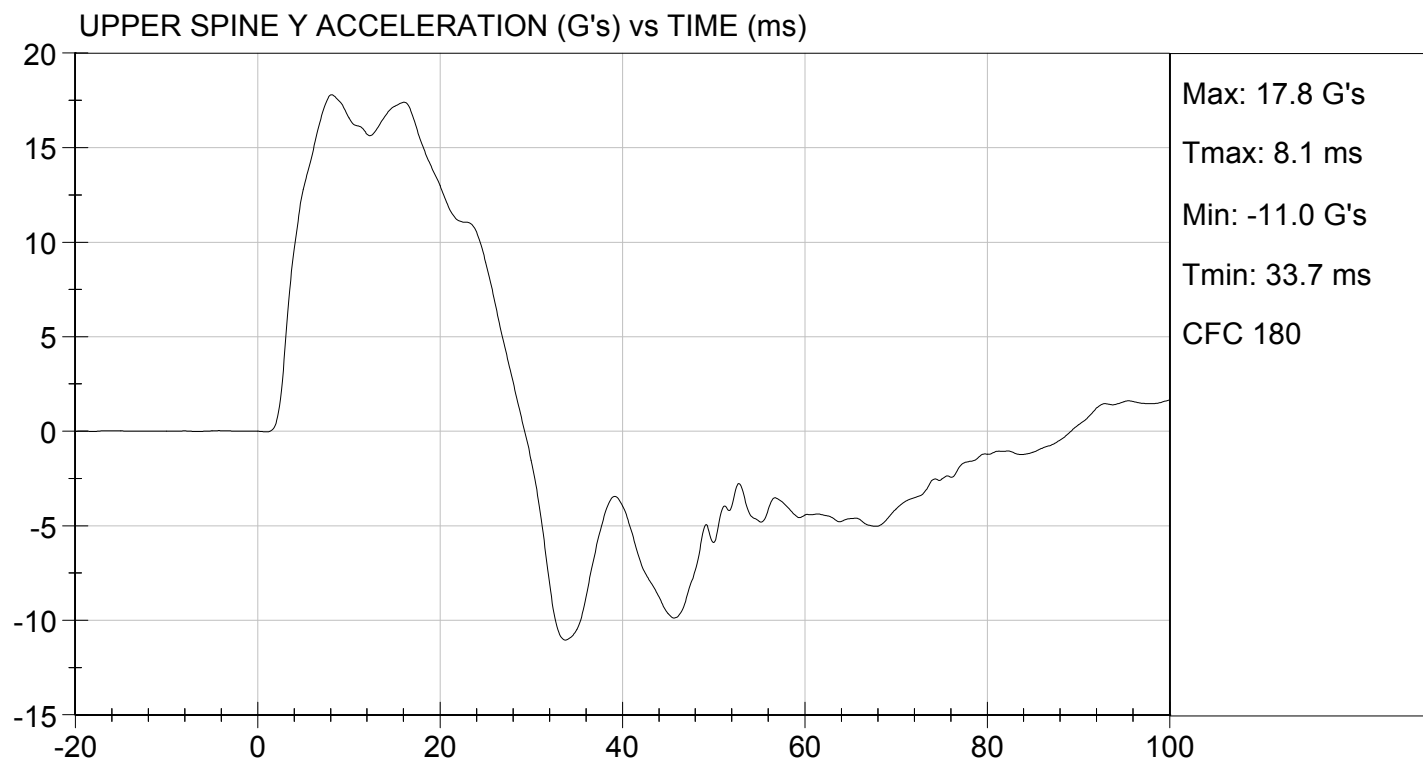
TEST DATE: 01/29/2014
TEST #: D14293





TEST DESC: SHOULDER IMPACT
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 01/29/2014
TEST #: D14293



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

ATD Serial No: 296

Test I.D: D14294

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.4	Pass
Humidity	%	10 to 70	11	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	34	Pass
Upper Rib Displacement	mm	25 to 32	27	Pass
Middle Rib Displacement	mm	30 to 36	32	Pass
Lower Rib Displacement	mm	32 to 38	36	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


 Laboratory Technician

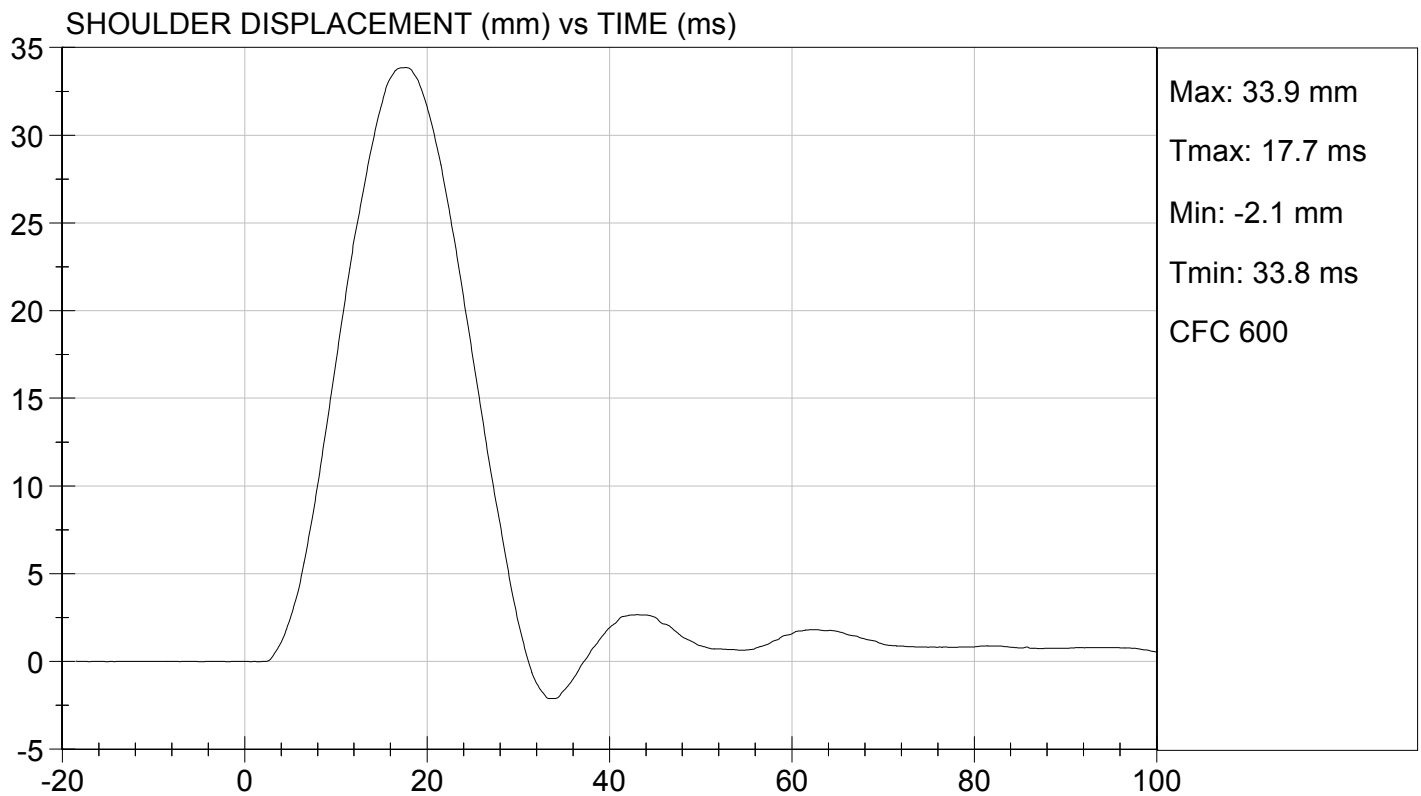
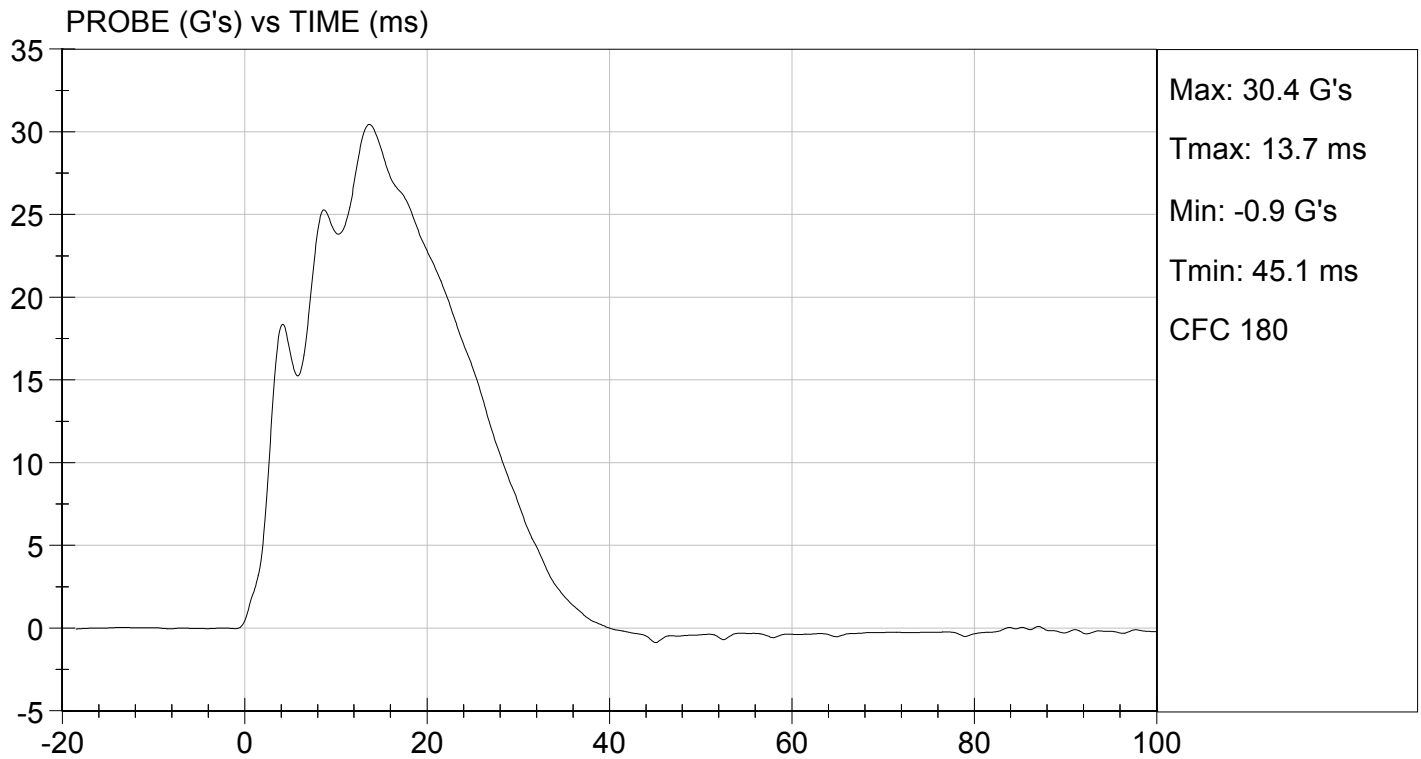
01/29/2014
 Test Date


 Approved By



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

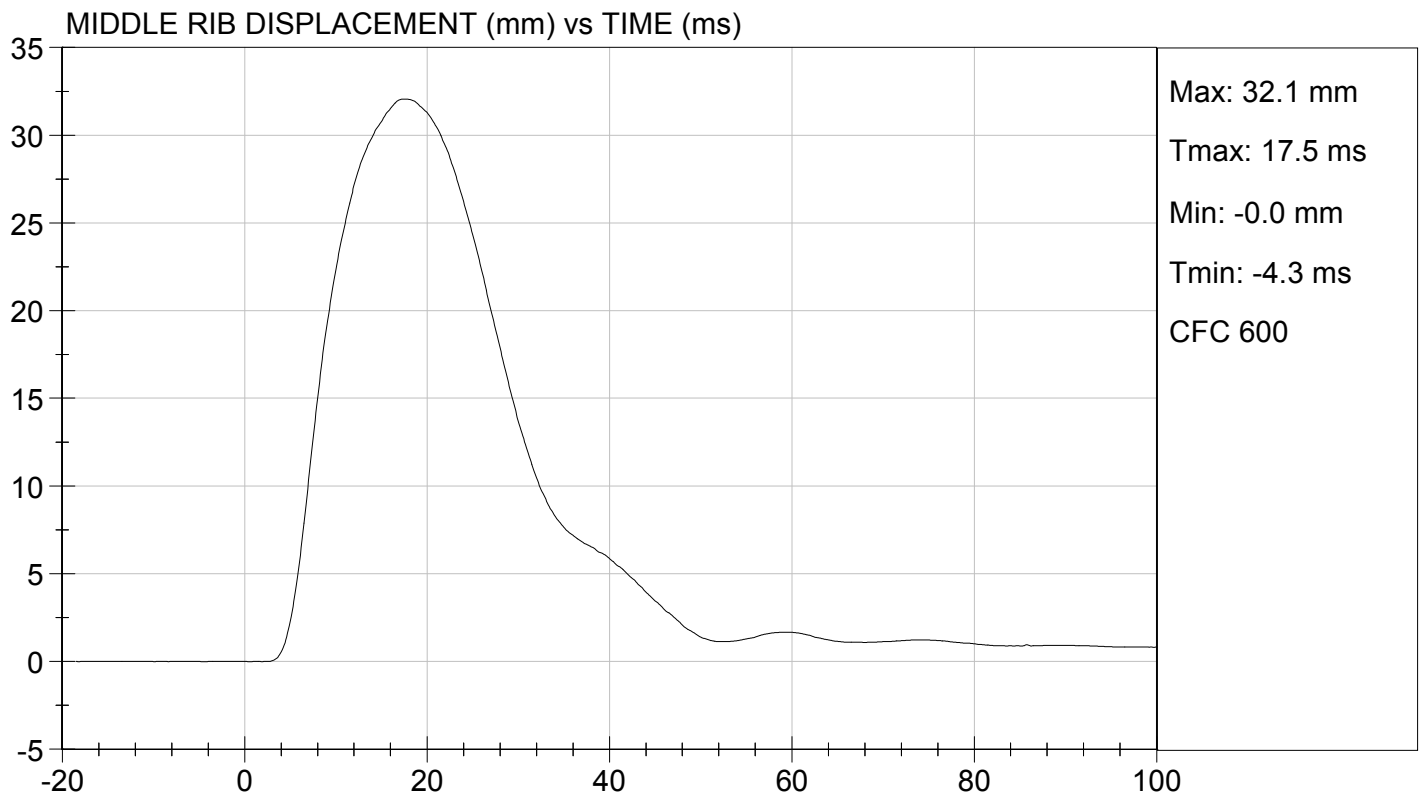
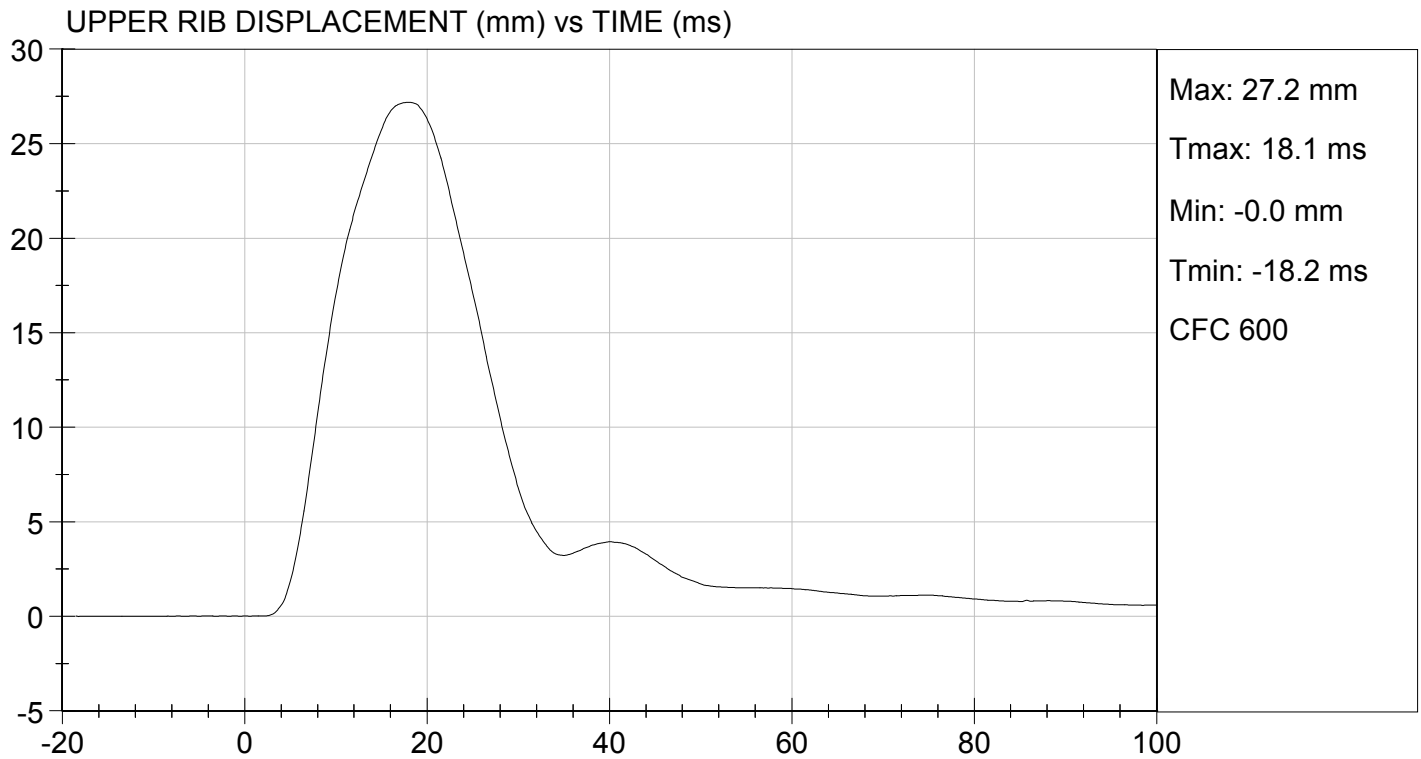
TEST DATE: 01/29/2014
TEST #: D14294





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

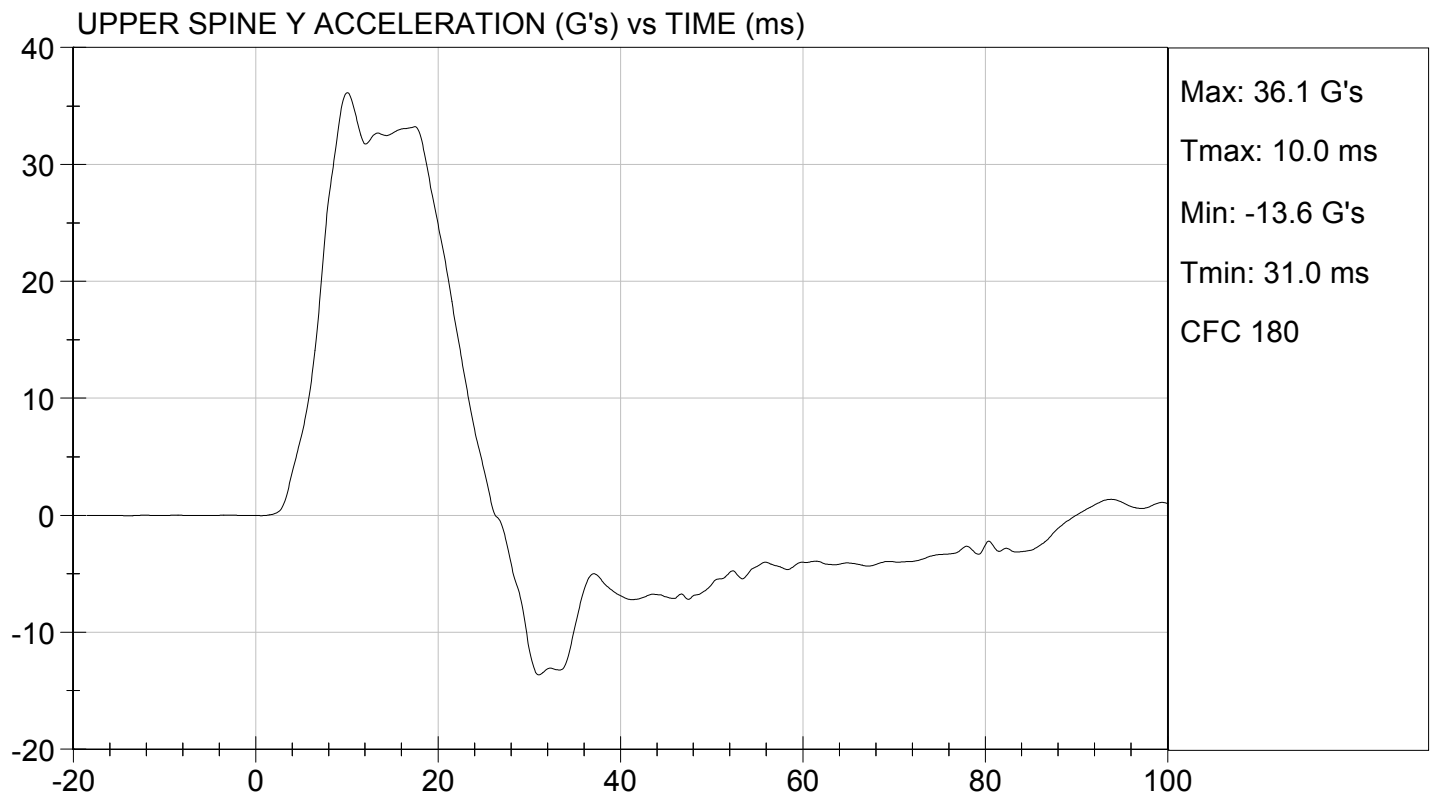
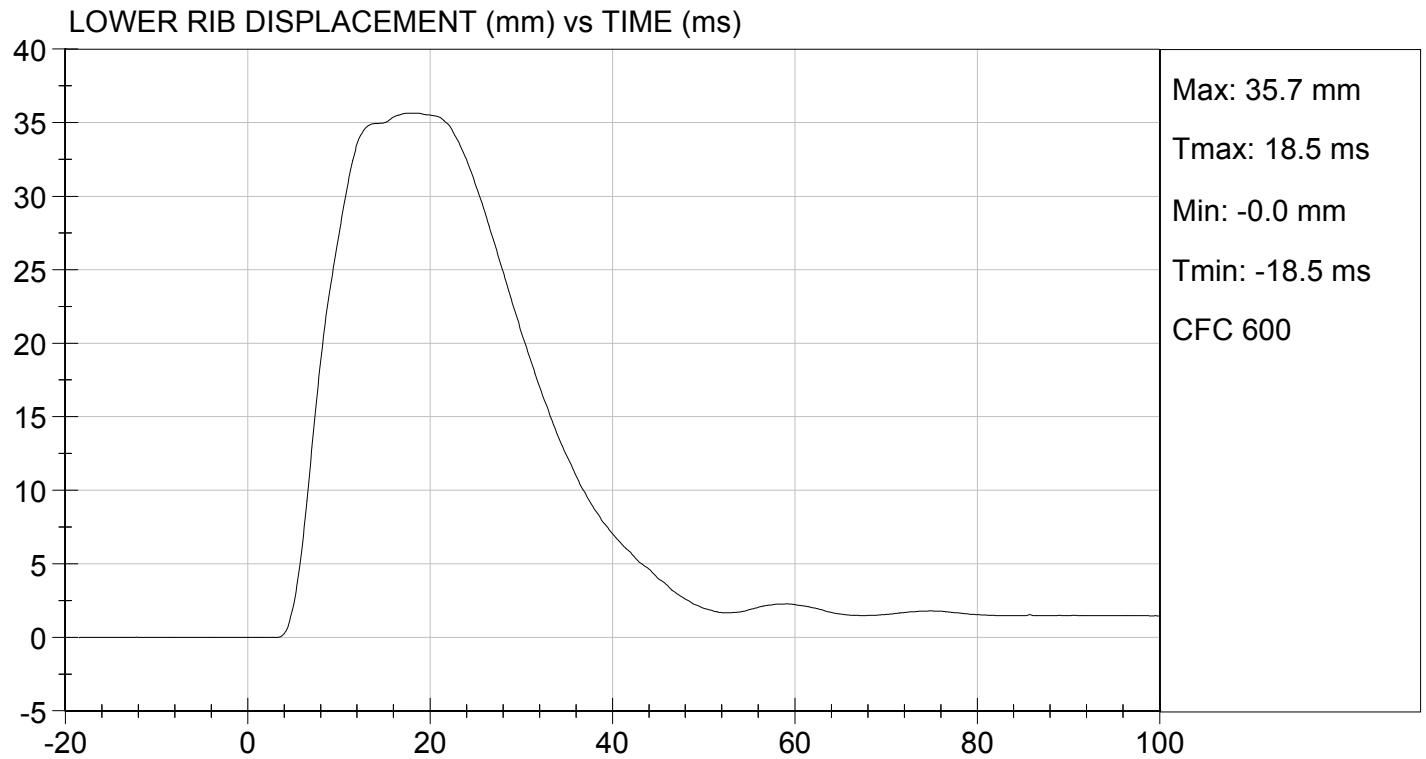
TEST DATE: 01/29/2014
TEST #: D14294





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

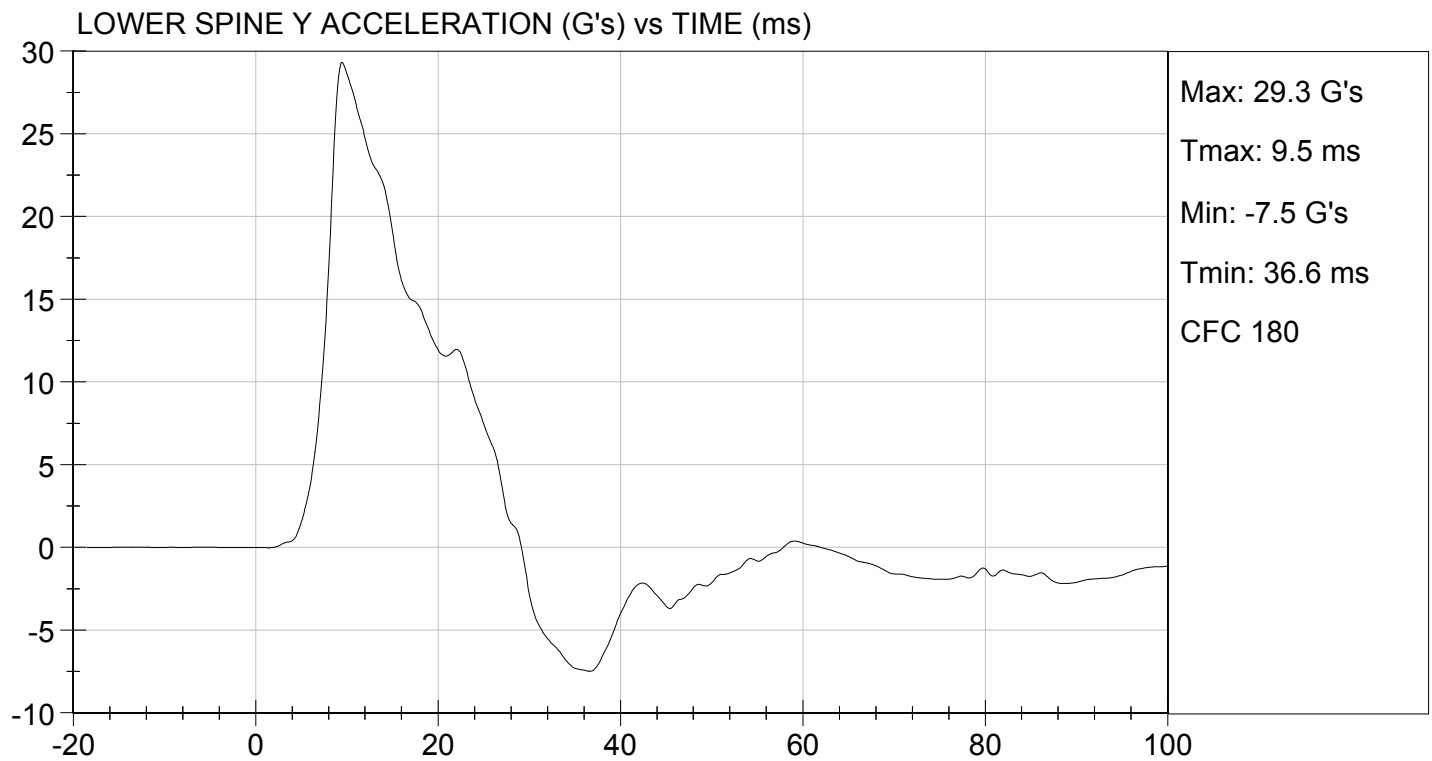
TEST DATE: 01/29/2014
TEST #: D14294





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

TEST DATE: 01/29/2014
TEST #: D14294

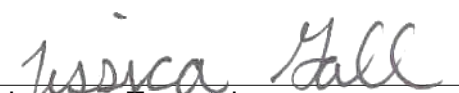


MGA RESEARCH CORPORATION
THORAX (WITHOUT ARM) IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

Test I.D: D14295

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.4	Pass
Humidity	%	10 to 70	11	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	37	Pass
Middle Rib Displacement	mm	39 to 45	42	Pass
Lower Rib Displacement	mm	35 to 43	40	Pass
Upper Spine (T1) Y Acceleration	G's	13 to 17	14	Pass
Lower Spine (T12) Y Acceleration	G's	7 to 11	9	Pass
Overall Test Results				Pass


 Laboratory Technician

01/29/2014

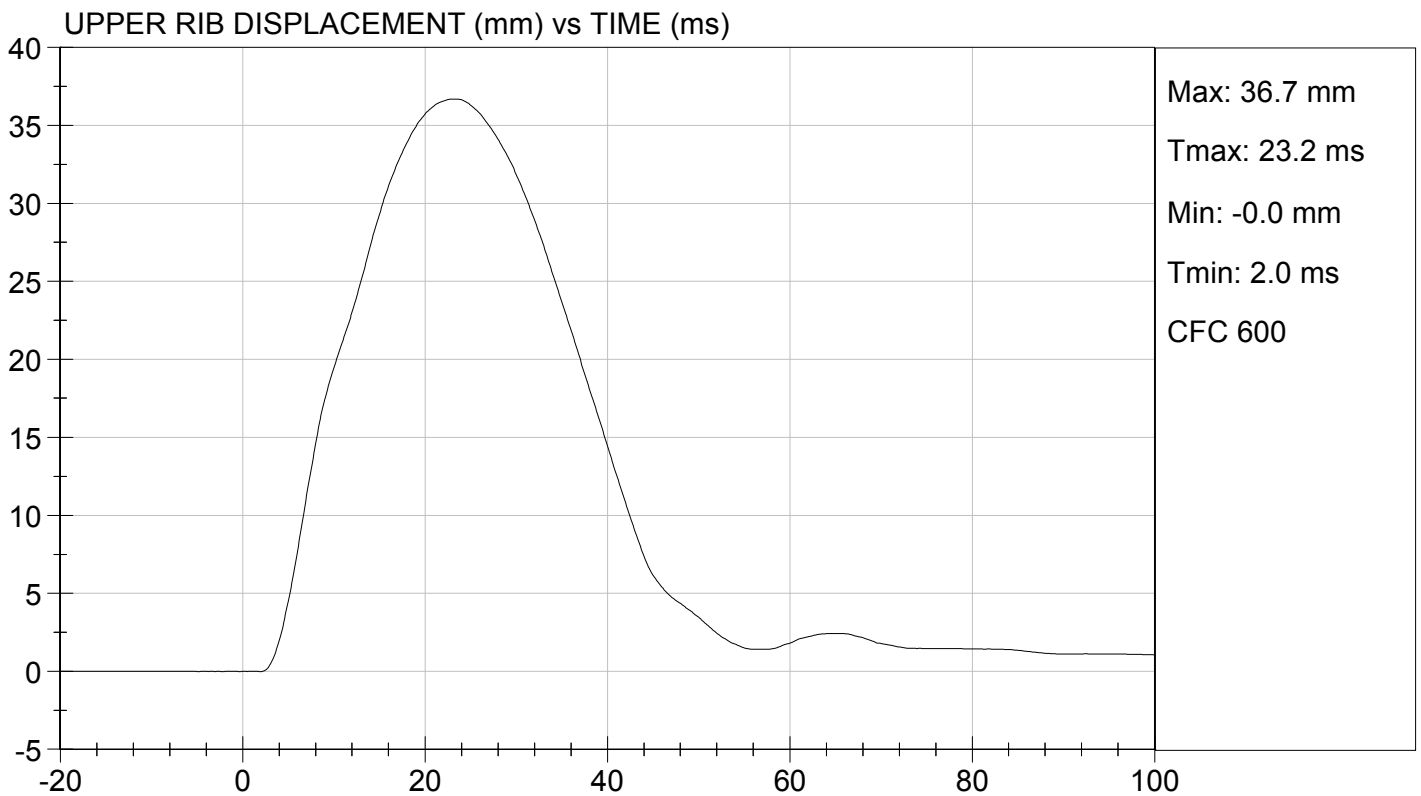
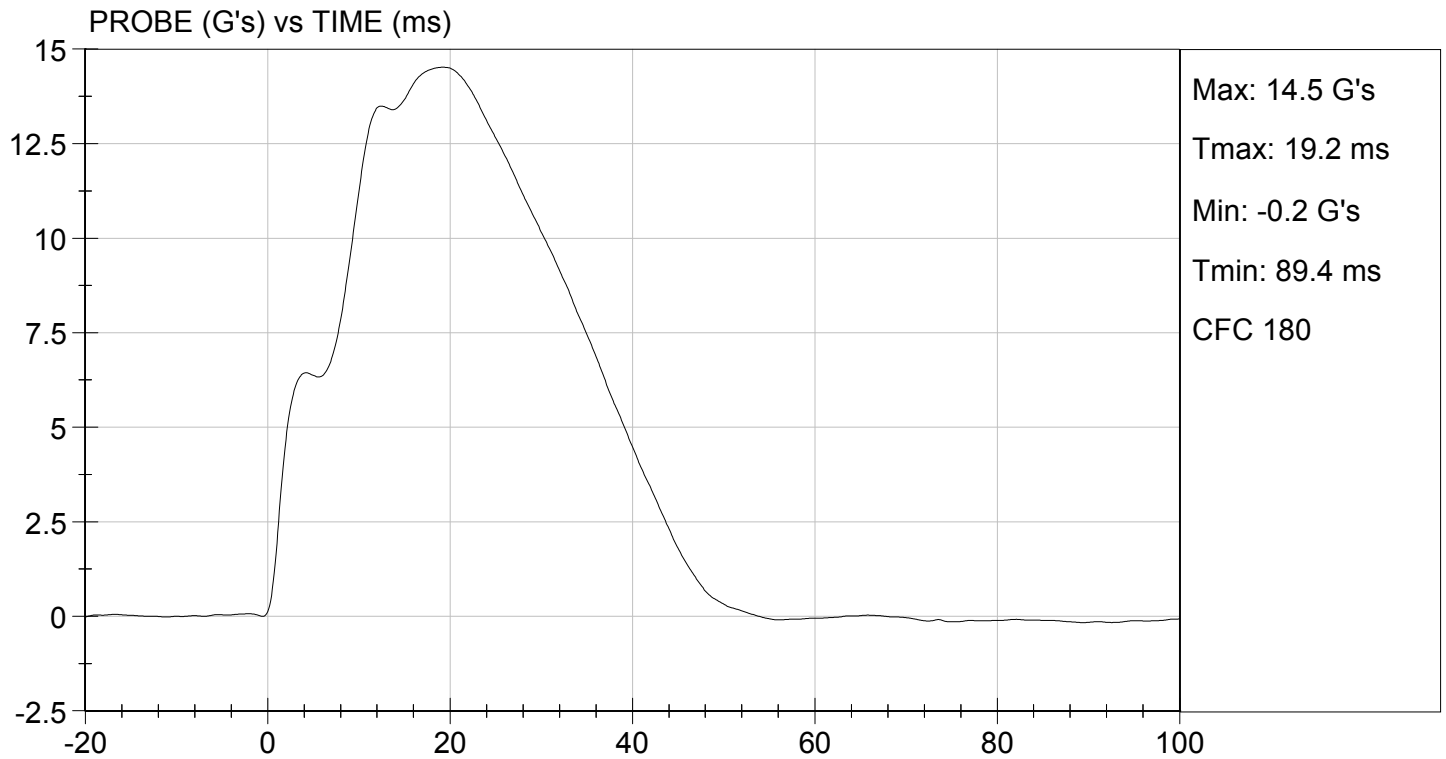
Test Date


 Approved By



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

TEST DATE: 01/29/2014
TEST #: D14295

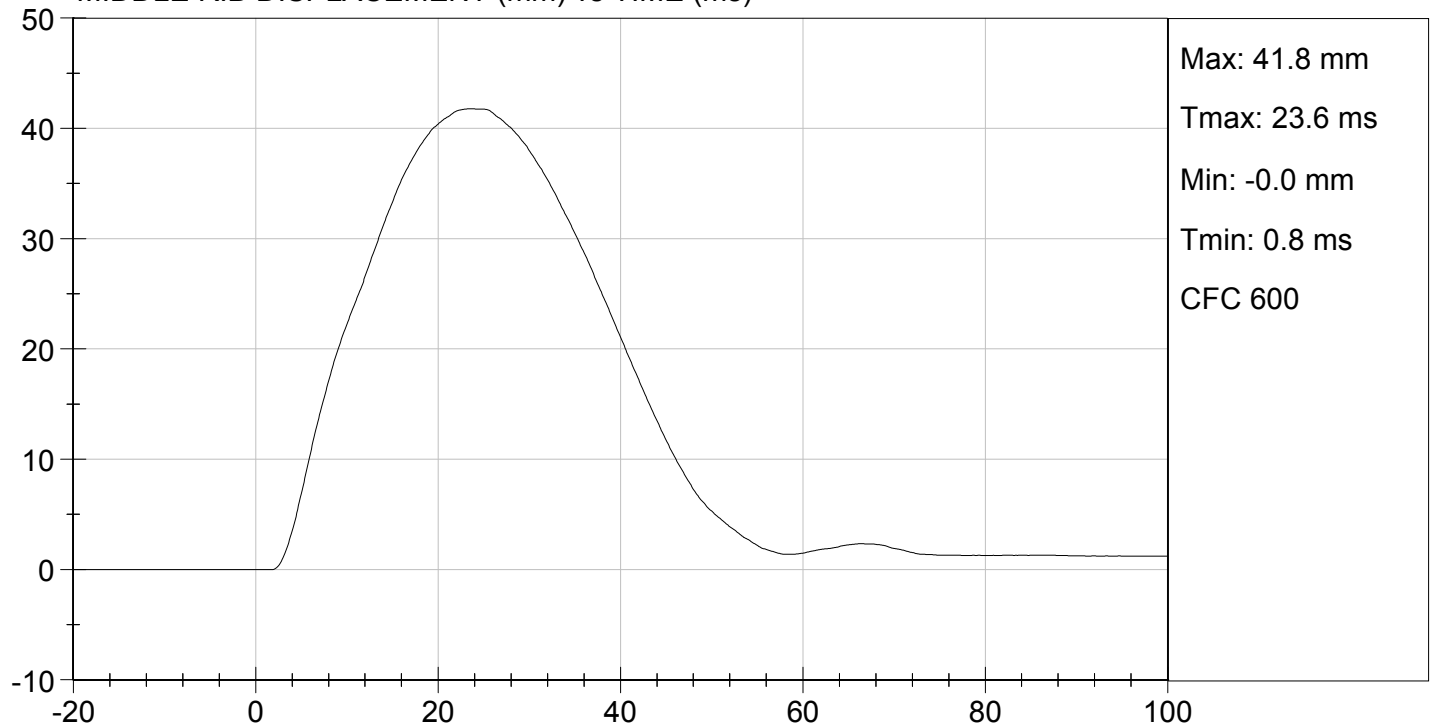




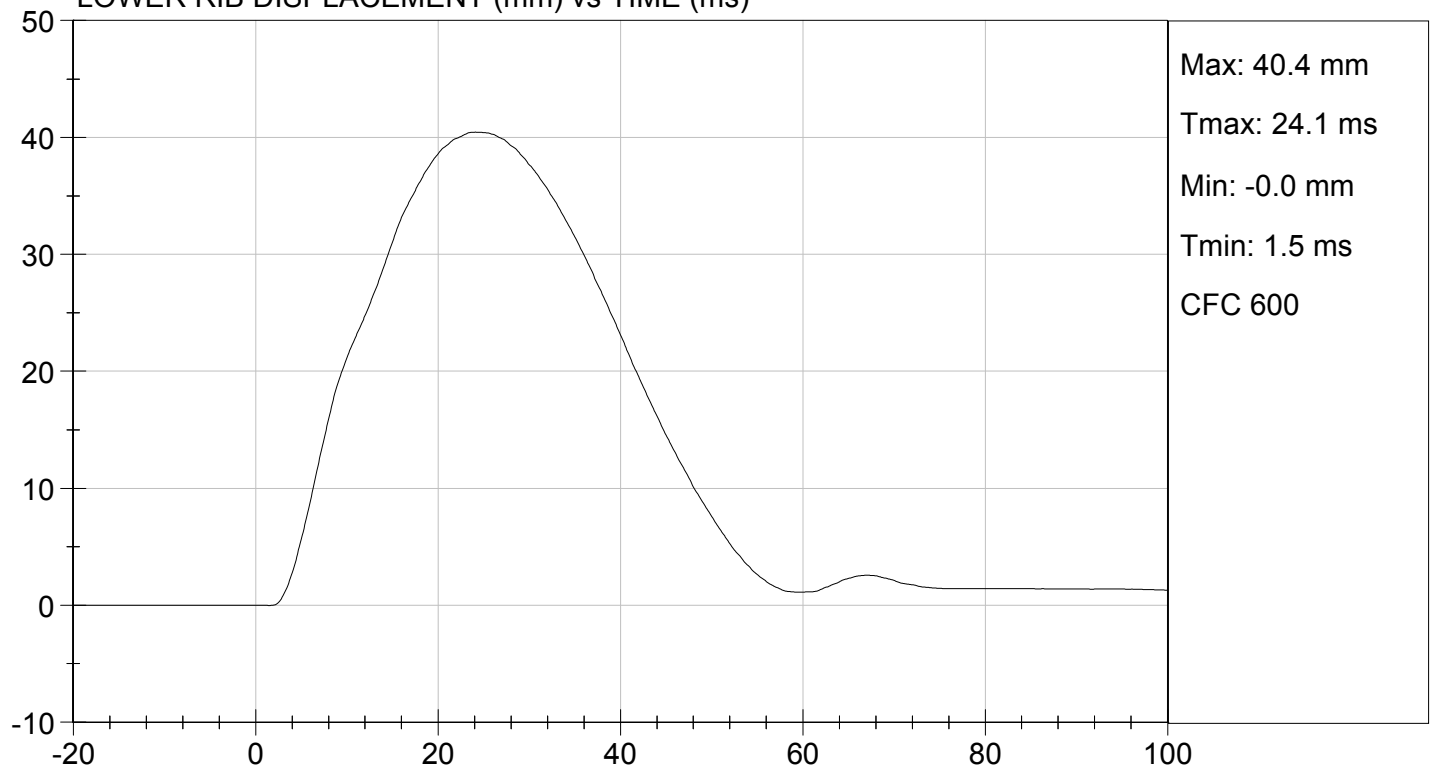
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 01/29/2014
TEST #: D14295

MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



LOWER RIB DISPLACEMENT (mm) vs TIME (ms)

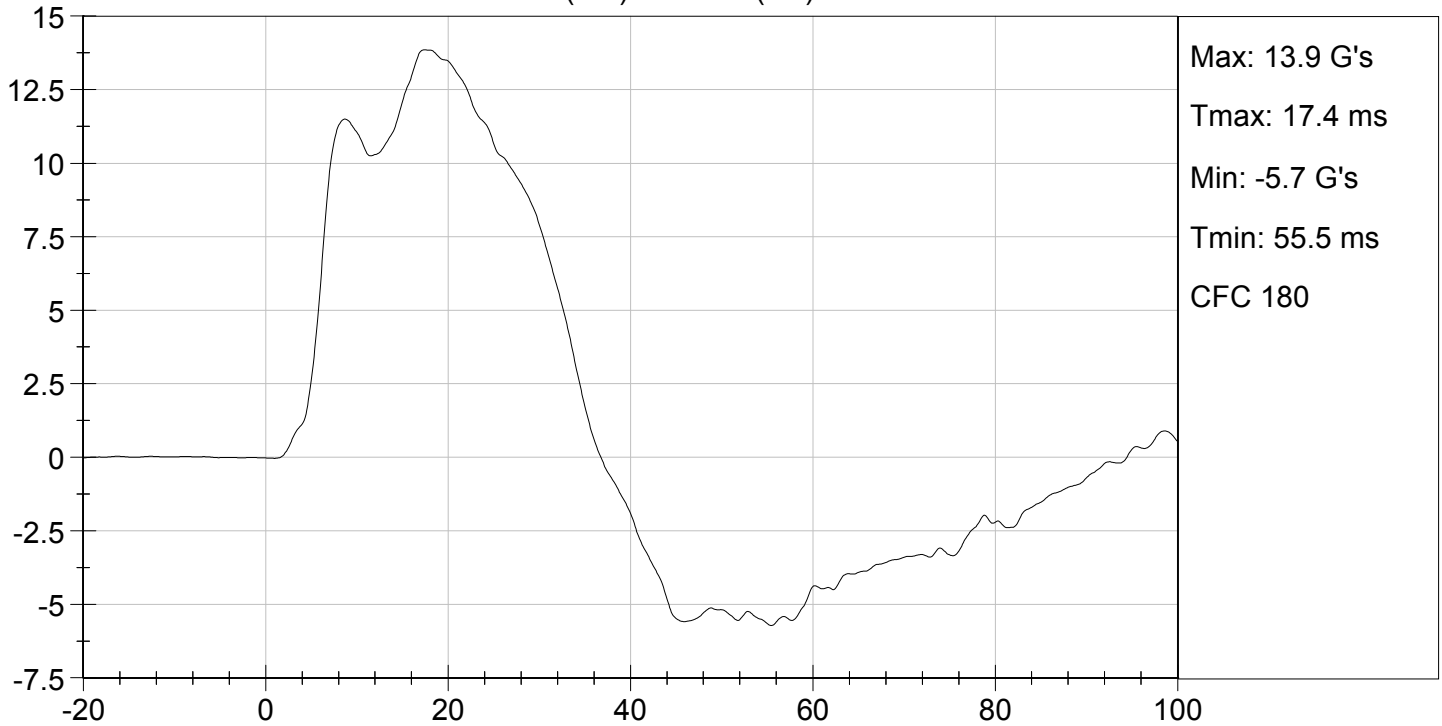




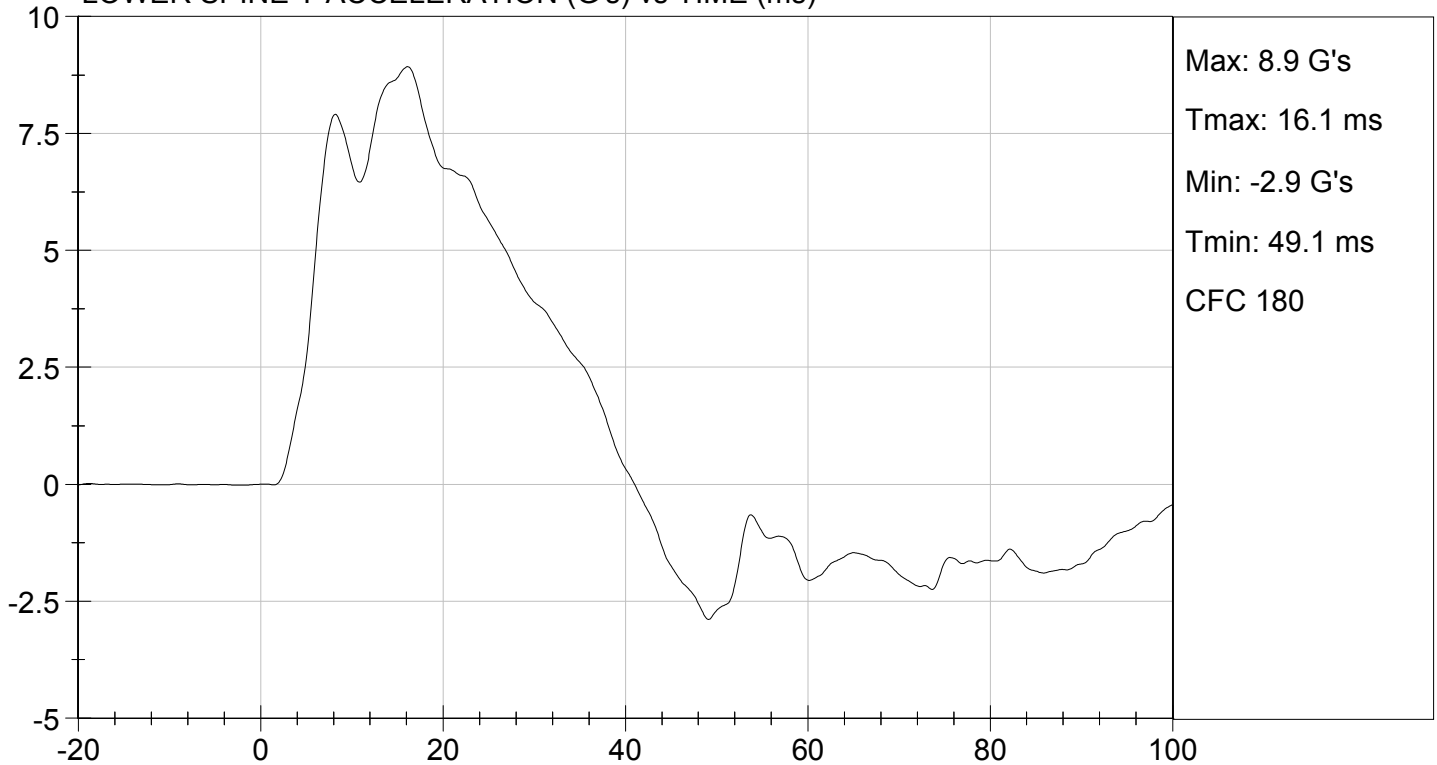
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 01/29/2014
TEST #: D14295

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:** D14296

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.4	Pass
Humidity	%	10 to 70	11	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	Pass
Maximum Probe Acceleration	G's	12 to 16	13	Pass
Upper Abdomen Rib Displacement	mm	36 to 47	43	Pass
Lower Abdomen Rib Displacement	mm	33 to 44	44	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	10	Pass
Overall Test Results				Pass


Laboratory Technician

01/29/2014

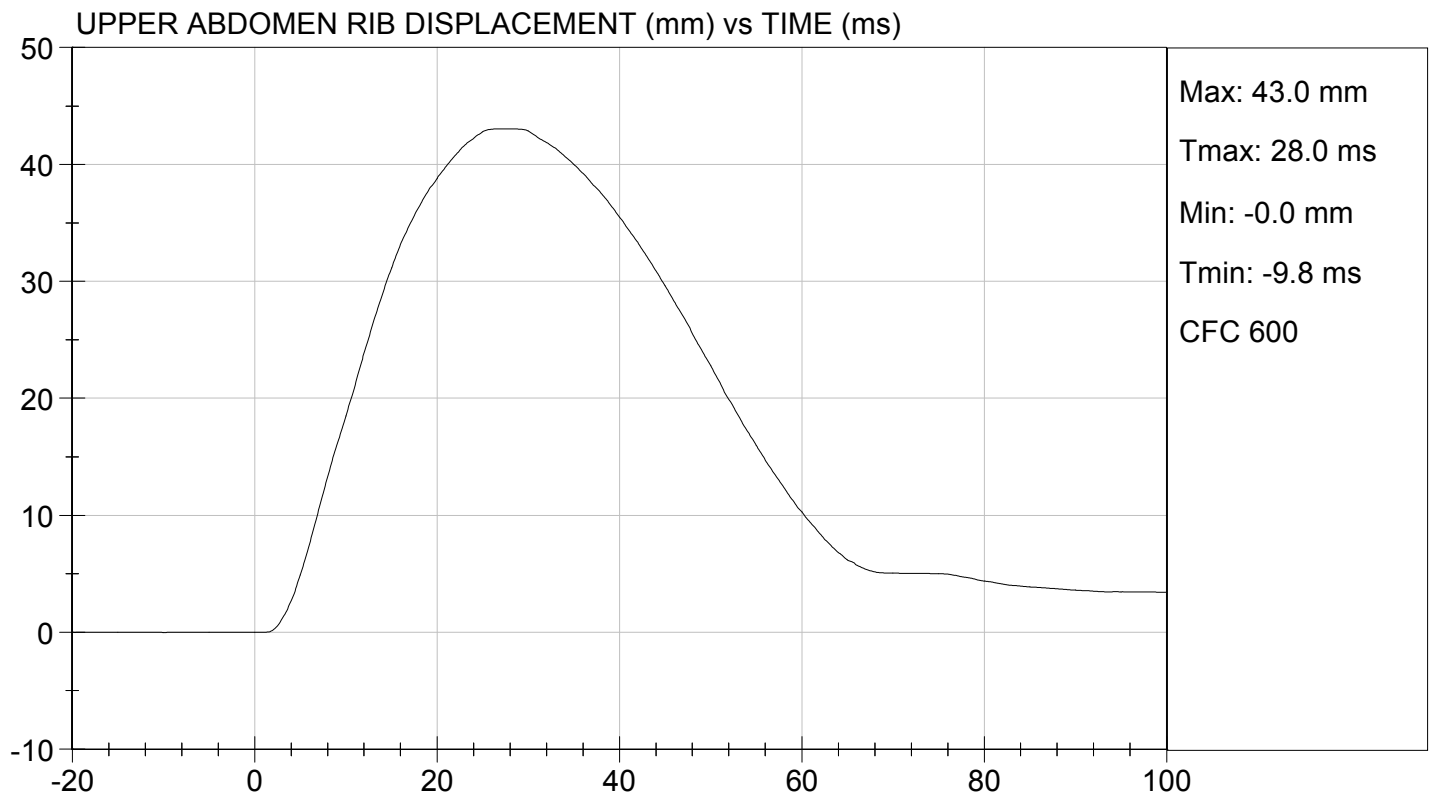
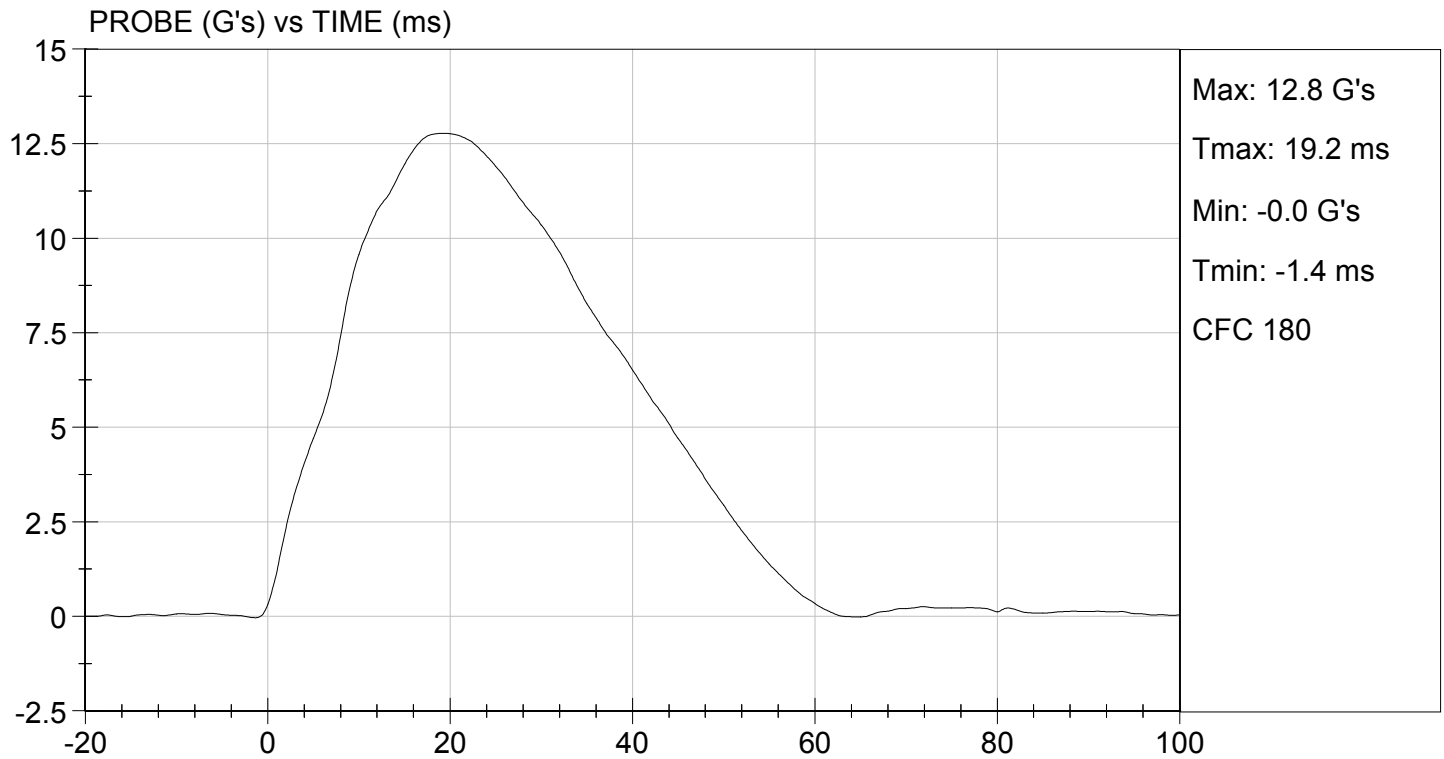
Test Date


Approved By



TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 01/29/2014
TEST #: D14296

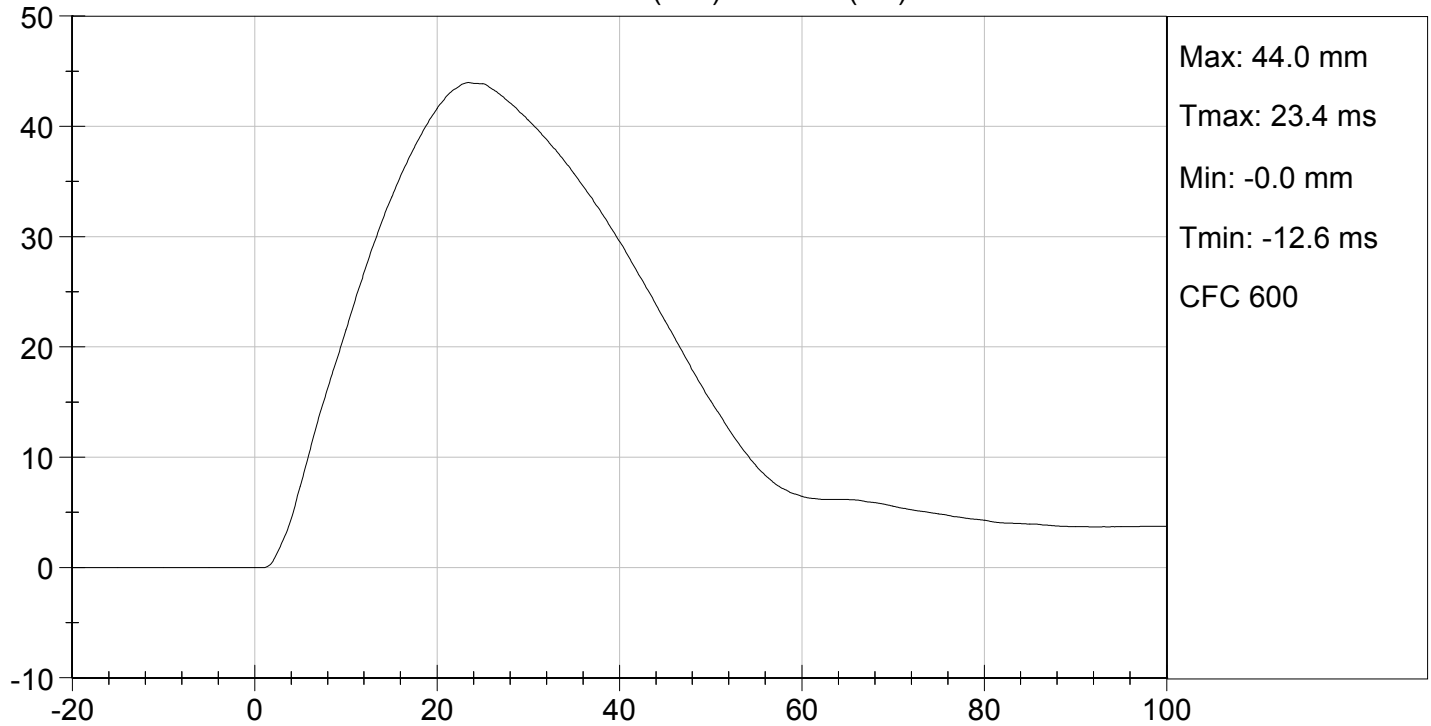




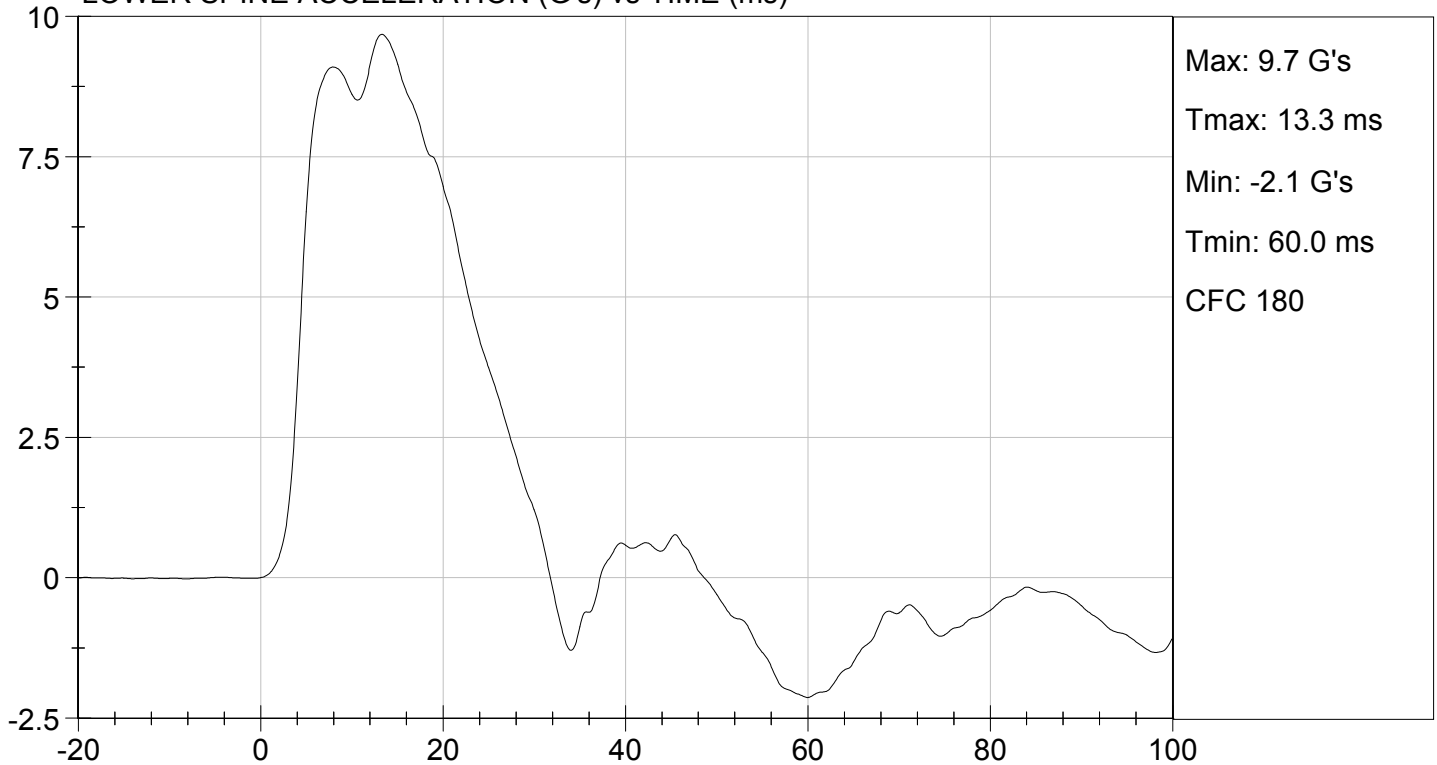
TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 01/29/2014
TEST #: D14296

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: D14297

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.4	Pass
Humidity	%	10 to 70	11	Pass
Impact Velocity	m/s	6.60 to 6.80	6.77	Pass
Maximum Probe Acceleration	G's	38 to 47	43	Pass
Pelvis Y Acceleration After 6 ms	G's	34 to 42	40	Pass
Peak Acetabulum Force	N	3600 to 4300	4,263	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

01/29/2014

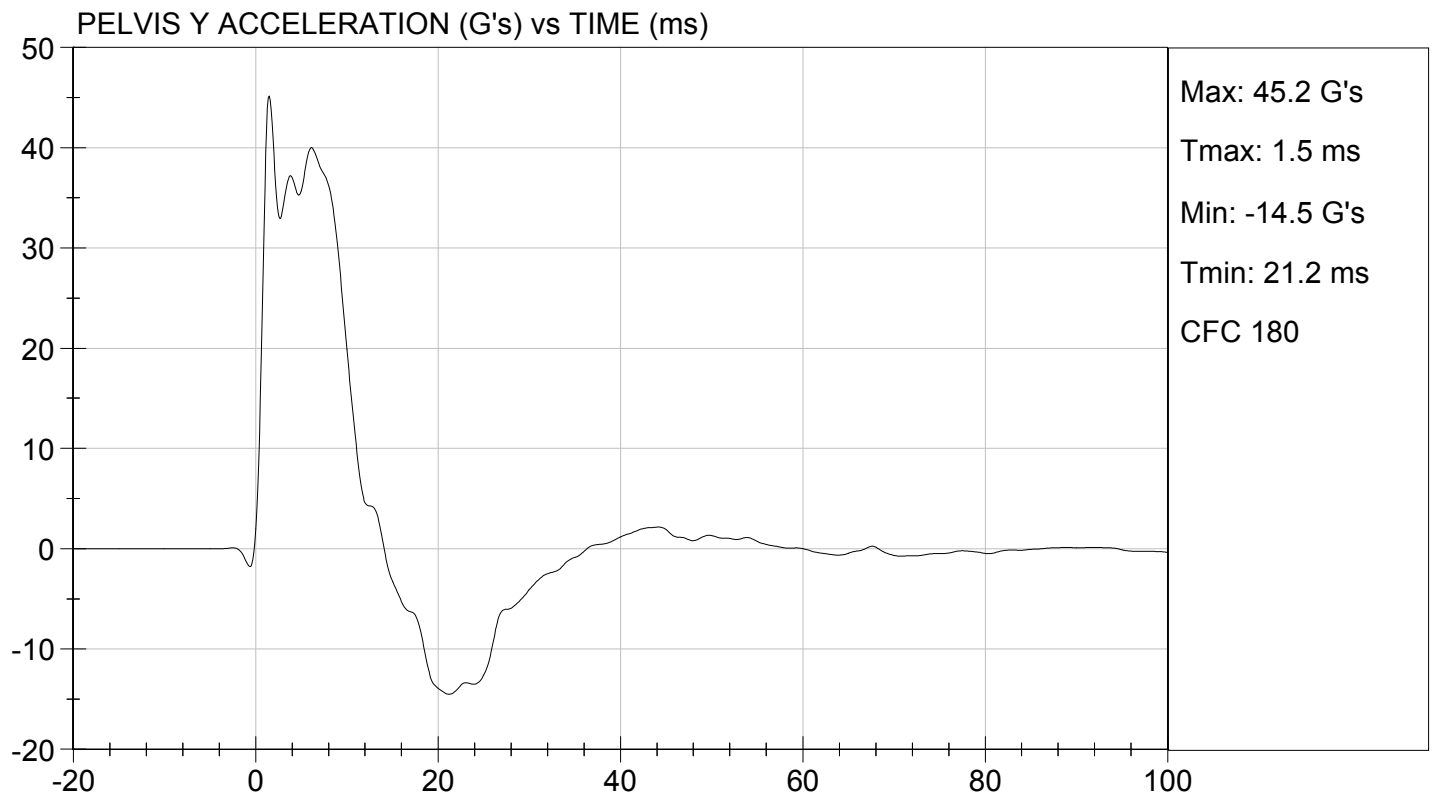
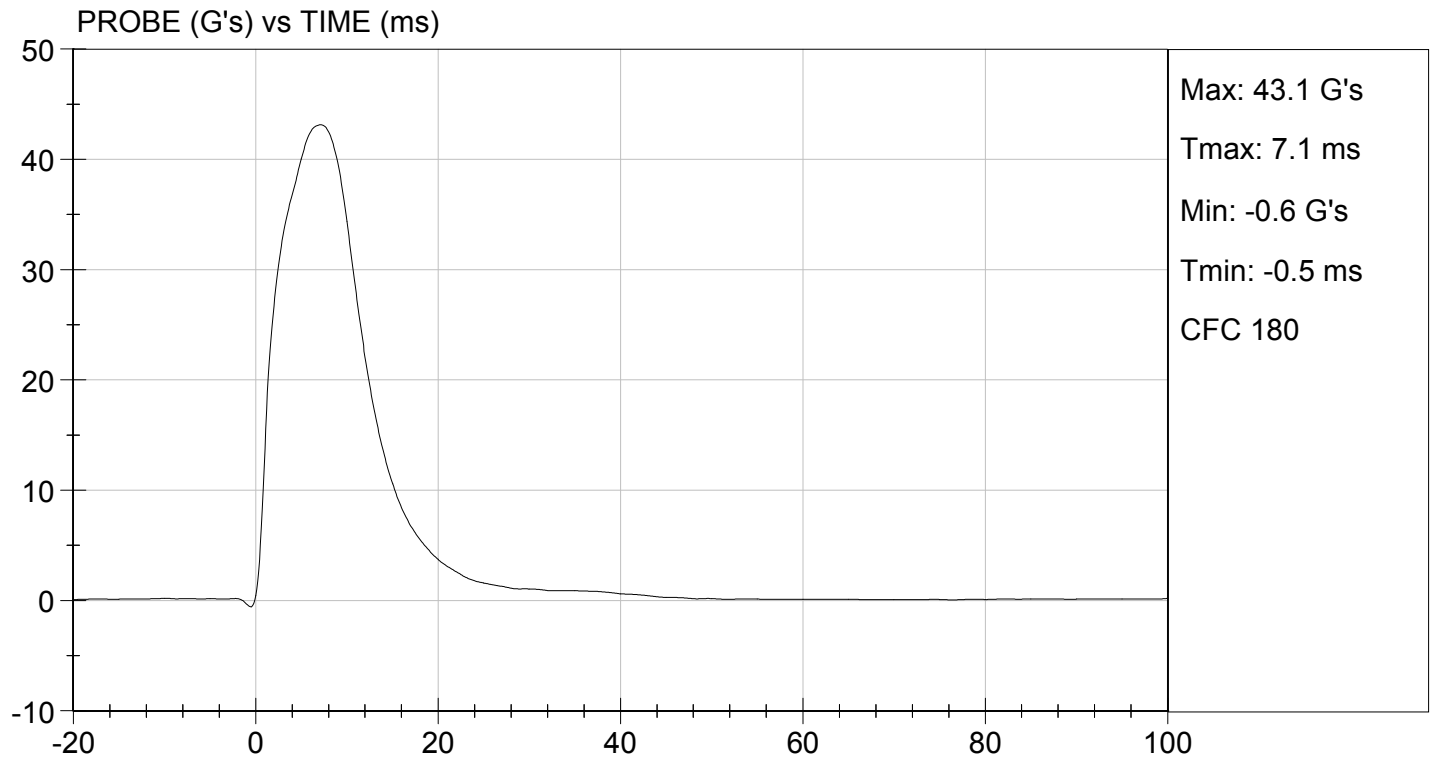
Test Date

David Winkelbauer
Approved By



TEST DESC: PELVIS IMPACT
VELOCITY: 22.22 ft/s, 6.77 m/s

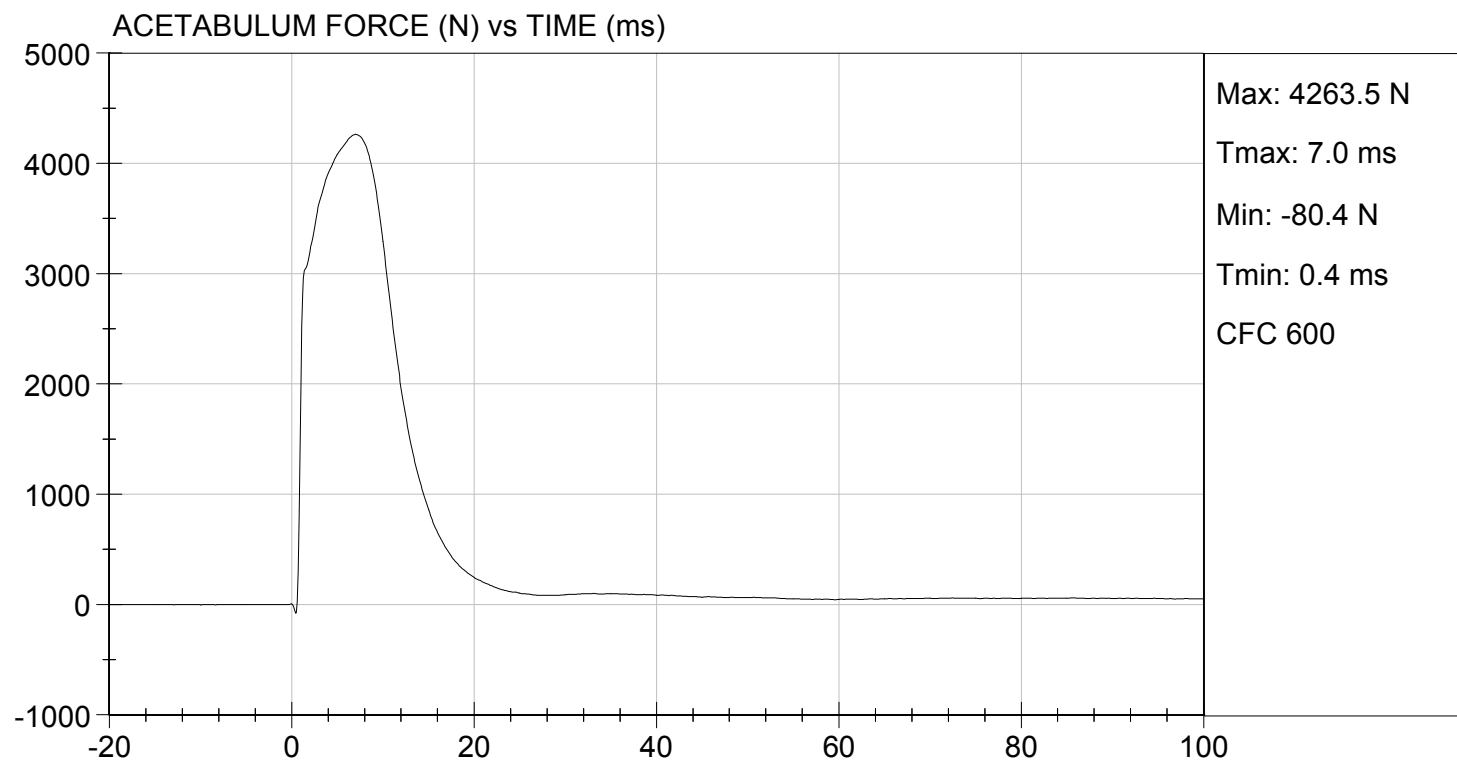
TEST DATE: 01/29/2014
TEST #: D14297





TEST DESC: PELVIS IMPACT
VELOCITY: 22.22 ft/s, 6.77 m/s

TEST DATE: 01/29/2014
TEST #: D14297



MGA RESEARCH CORPORATION

ILIAC IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

Test I.D: D14298

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.4	Pass
Humidity	%	10 to 70	11	Pass
Impact Velocity	m/s	4.20 to 4.40	4.30	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	4,711	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

01/29/2014

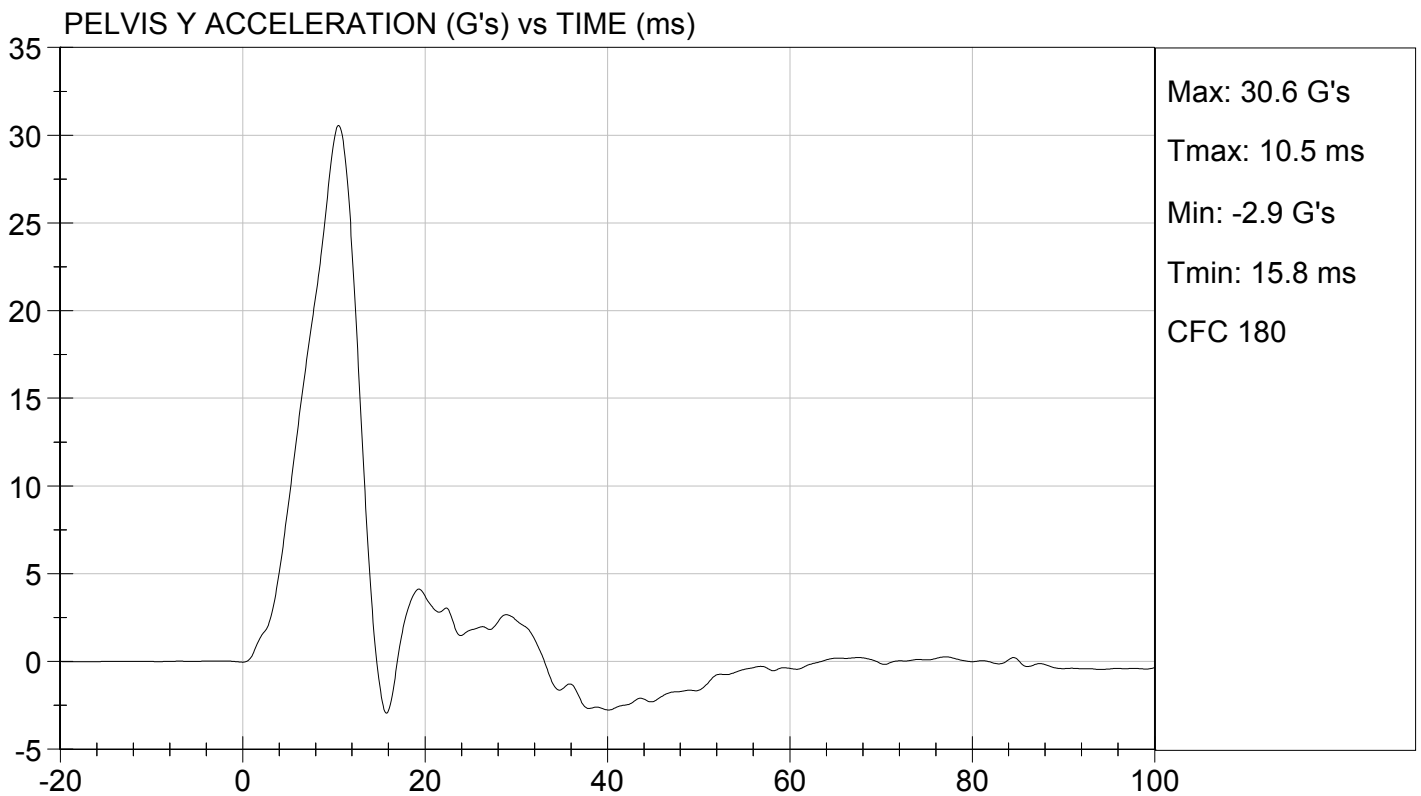
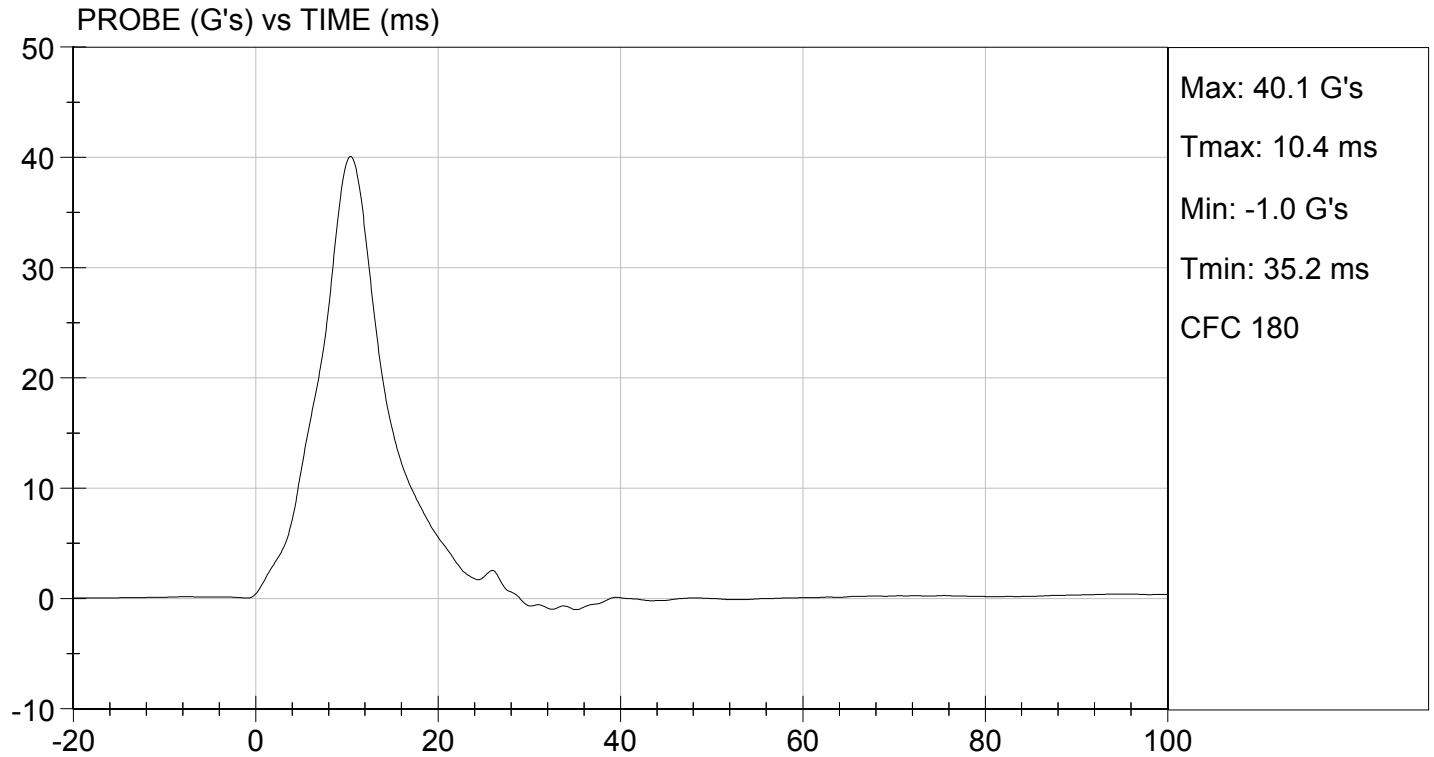
Test Date

David Winkelbauer
Approved By



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

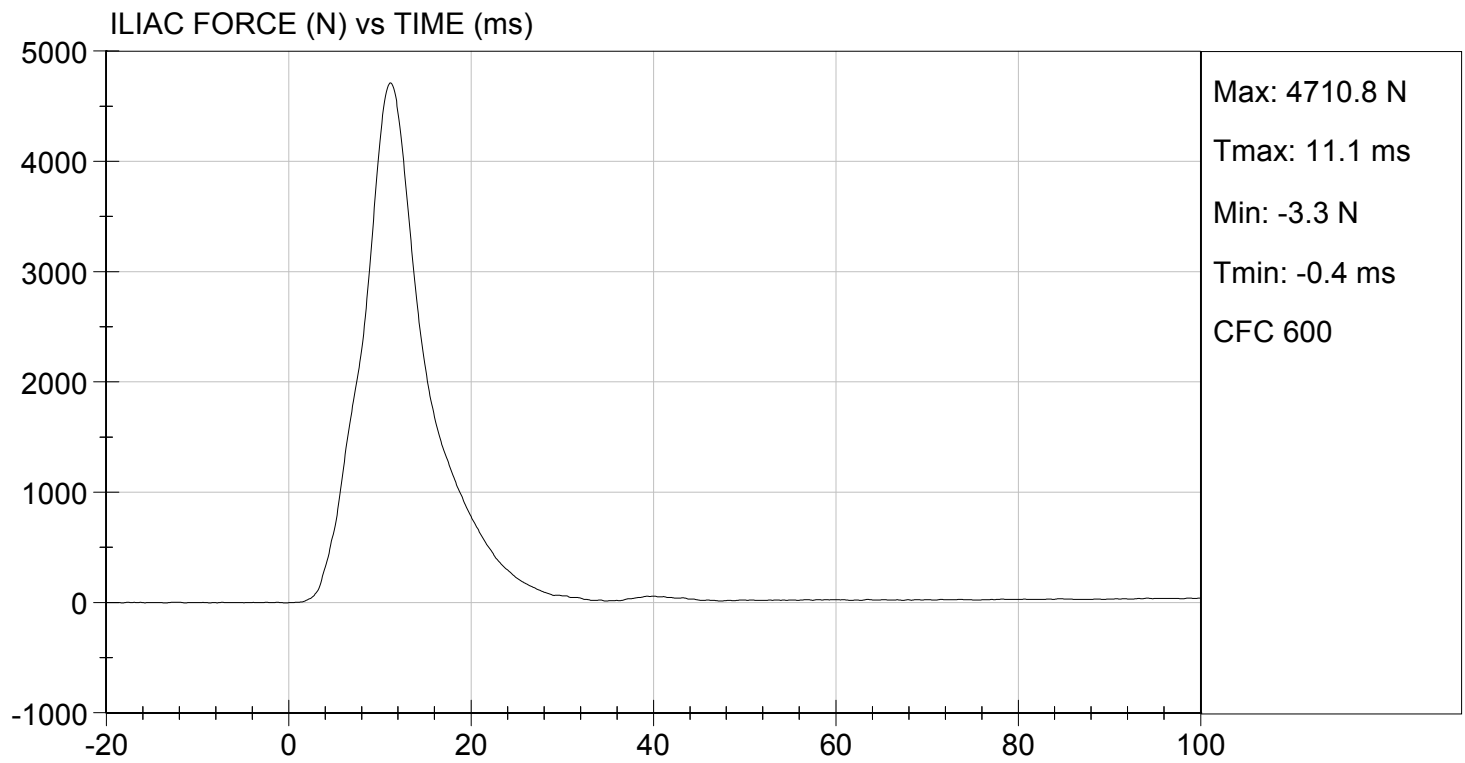
TEST DATE: 01/29/2014
TEST #: D14298





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

TEST DATE: 01/29/2014
TEST #: D14298

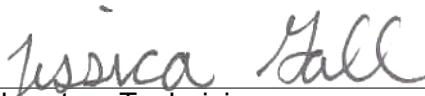


MGA RESEARCH CORPORATION
HEAD DROP TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

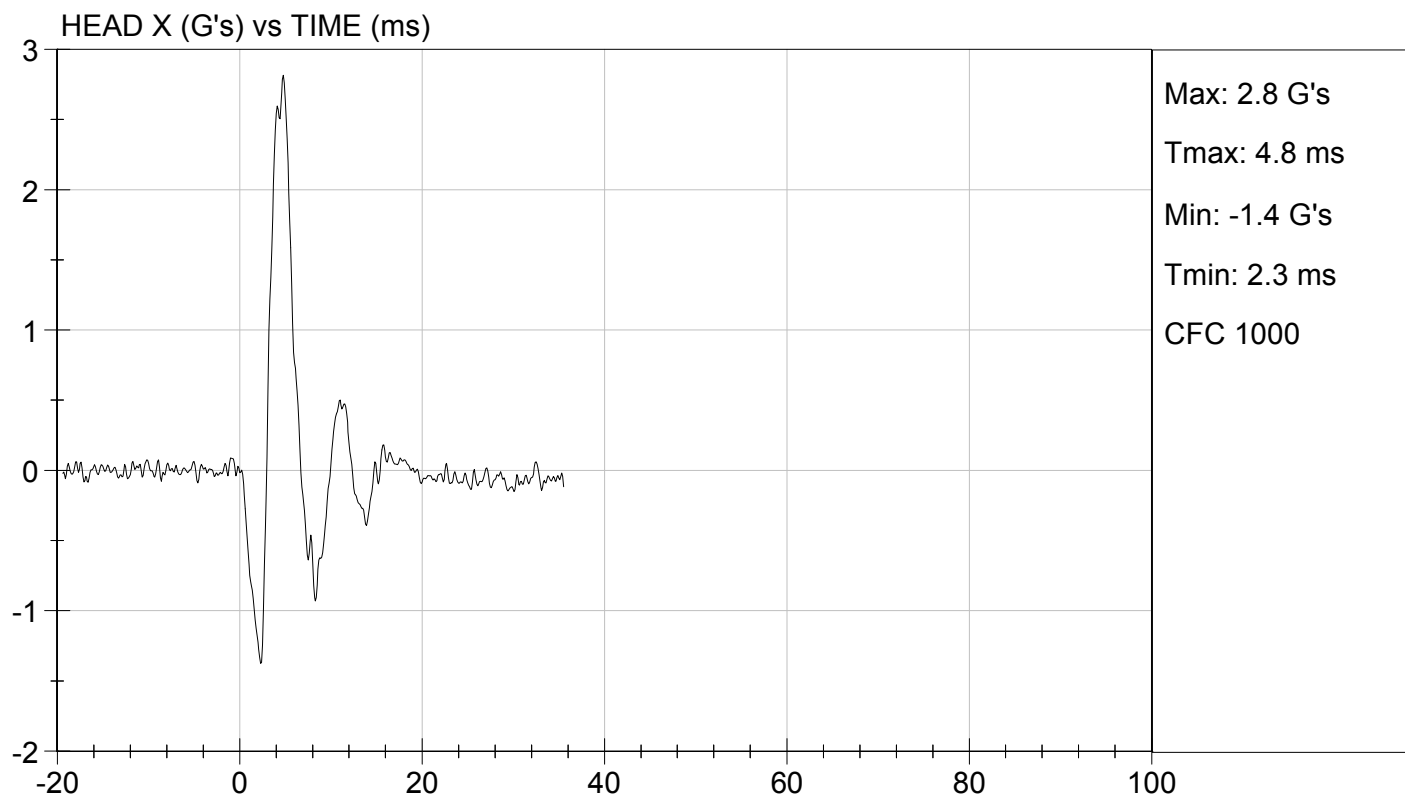
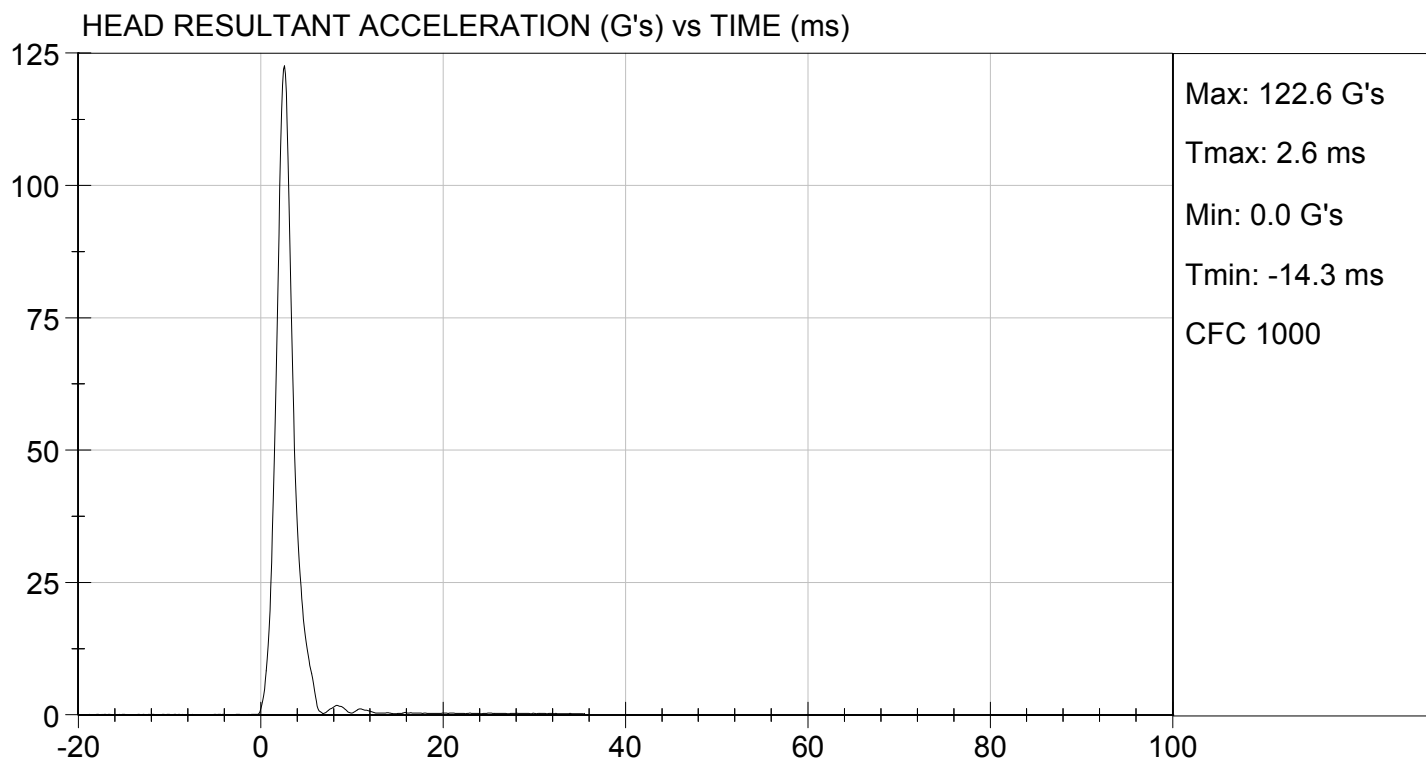
Test ID: D14421

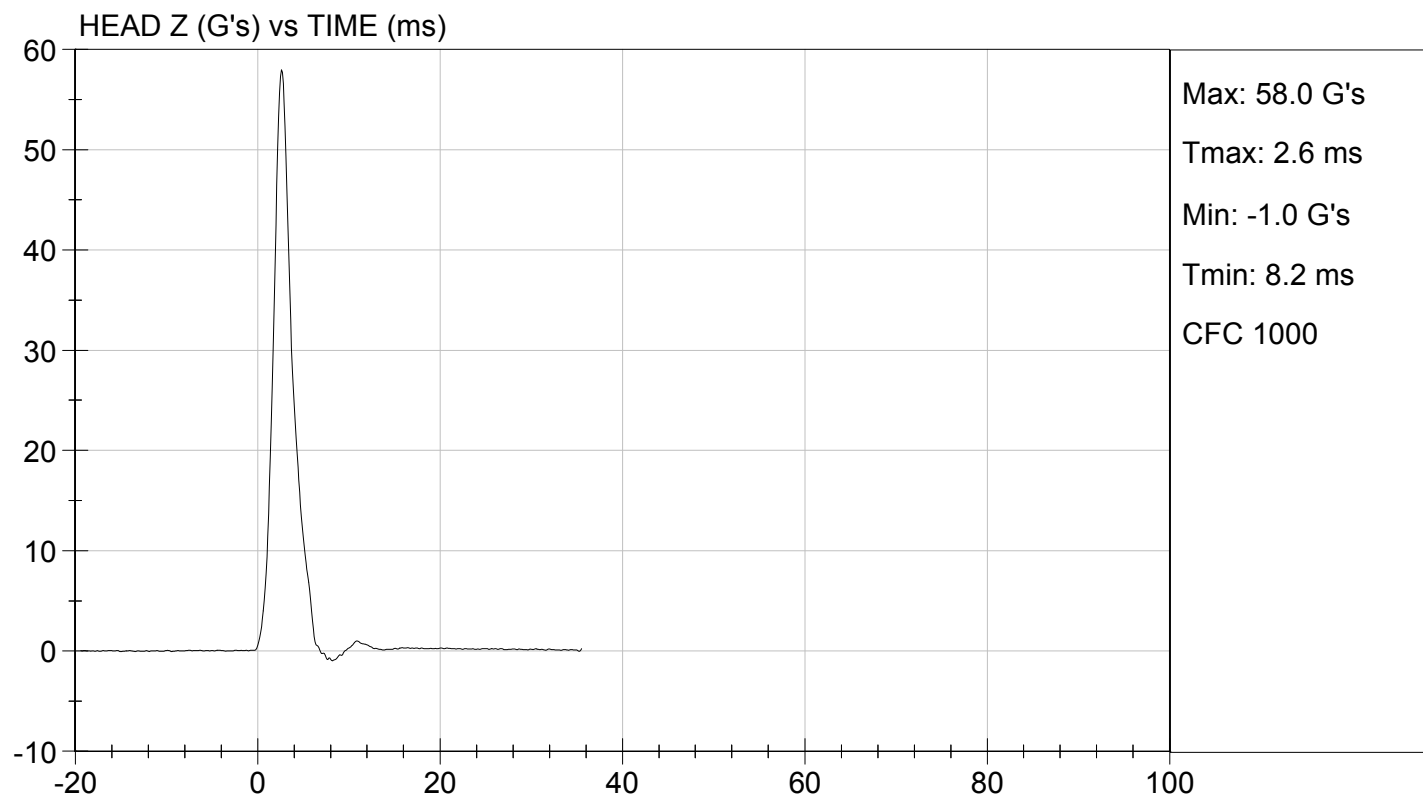
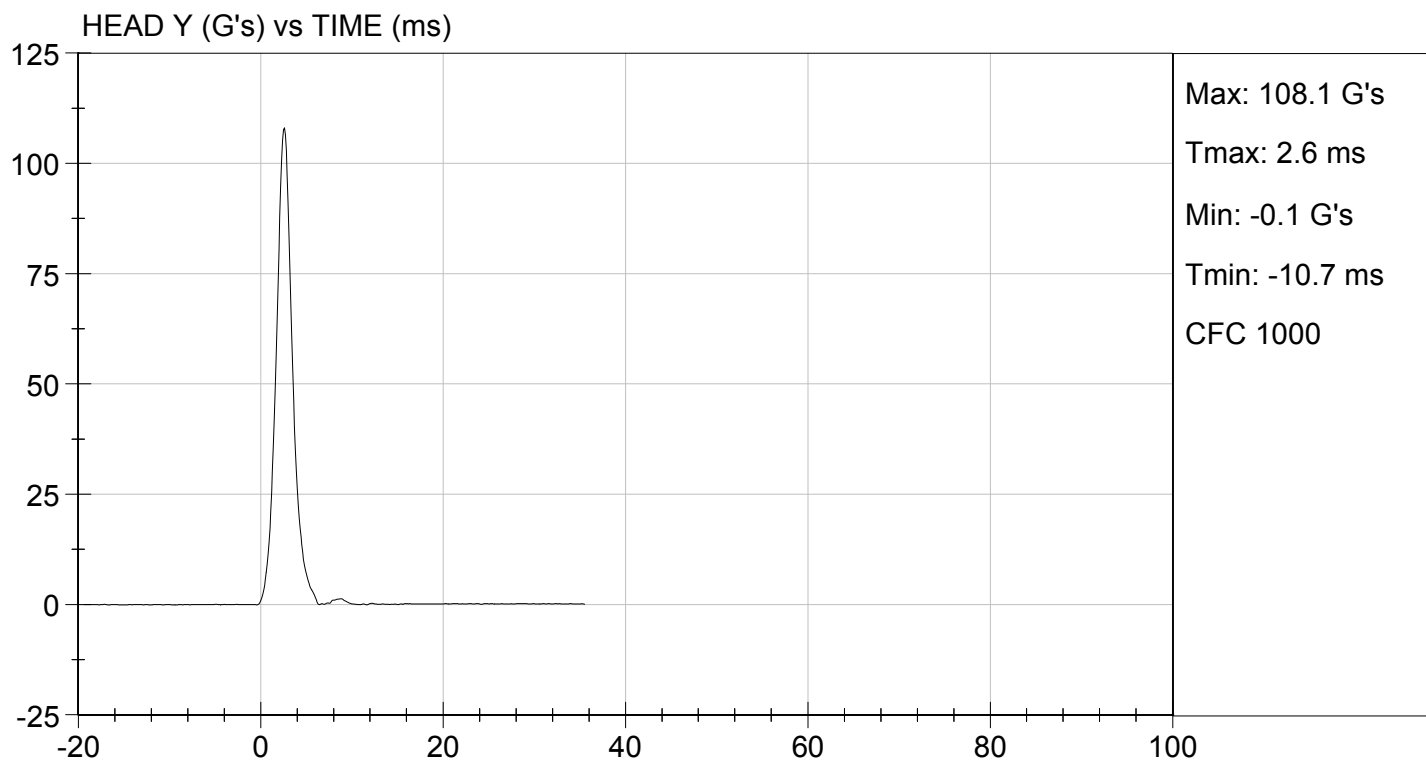
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Peak Resultant Acceleration	G's	115 to 137	123	Pass
Peak Longitudinal Acceleration	G's	+/- 15	2.8	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	<15%	Yes	Pass
Overall Test Results			Pass	


Laboratory Technician

02/05/2014
Test Date


Approved By





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

ATD Serial No: 296

Test I.D: D14422

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21.1	Pass
Humidity		%	10 to 70	20	Pass
Impact Velocity		m/s	5.51 to 5.63	5.58	Pass
Pendulum Velocity	10 ms	m/s	2.20 to 2.80	2.25	Pass
	15 ms	m/s	3.30 to 4.10	3.32	Pass
	20 ms	m/s	4.40 to 5.40	4.52	Pass
	25 ms	m/s	5.40 to 6.10	5.49	Pass
	25-100 ms	m/s	5.50 to 6.20	5.81	Pass
Maximum D-Plane Rotation		deg	71 to 81	72	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	63	Pass
Maximum Occipital Condyle Moment		Nm	-44 to -36	-39	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	118	Pass
Overall Test Results					Pass

Jessica Hall
Laboratory Technician

02/05/2014

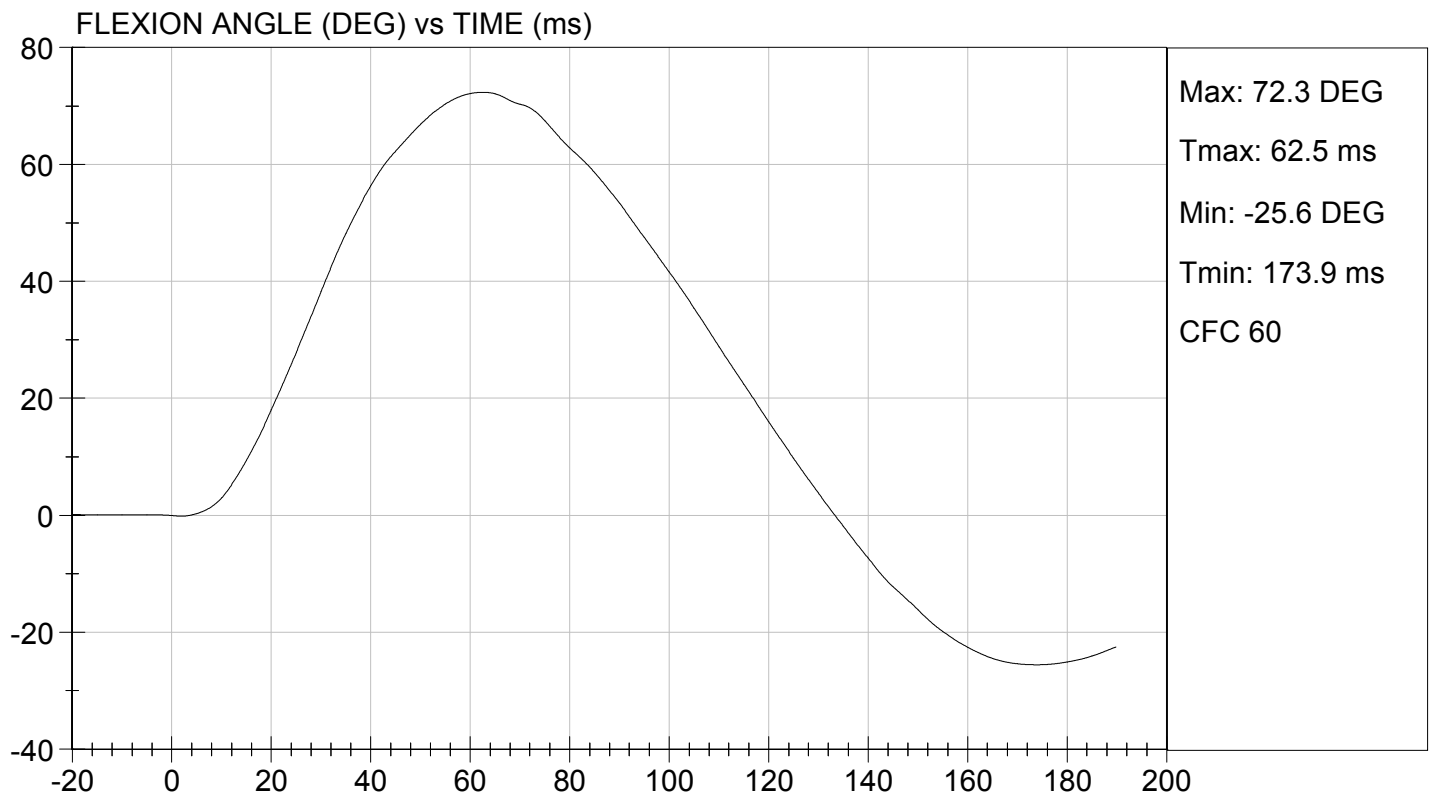
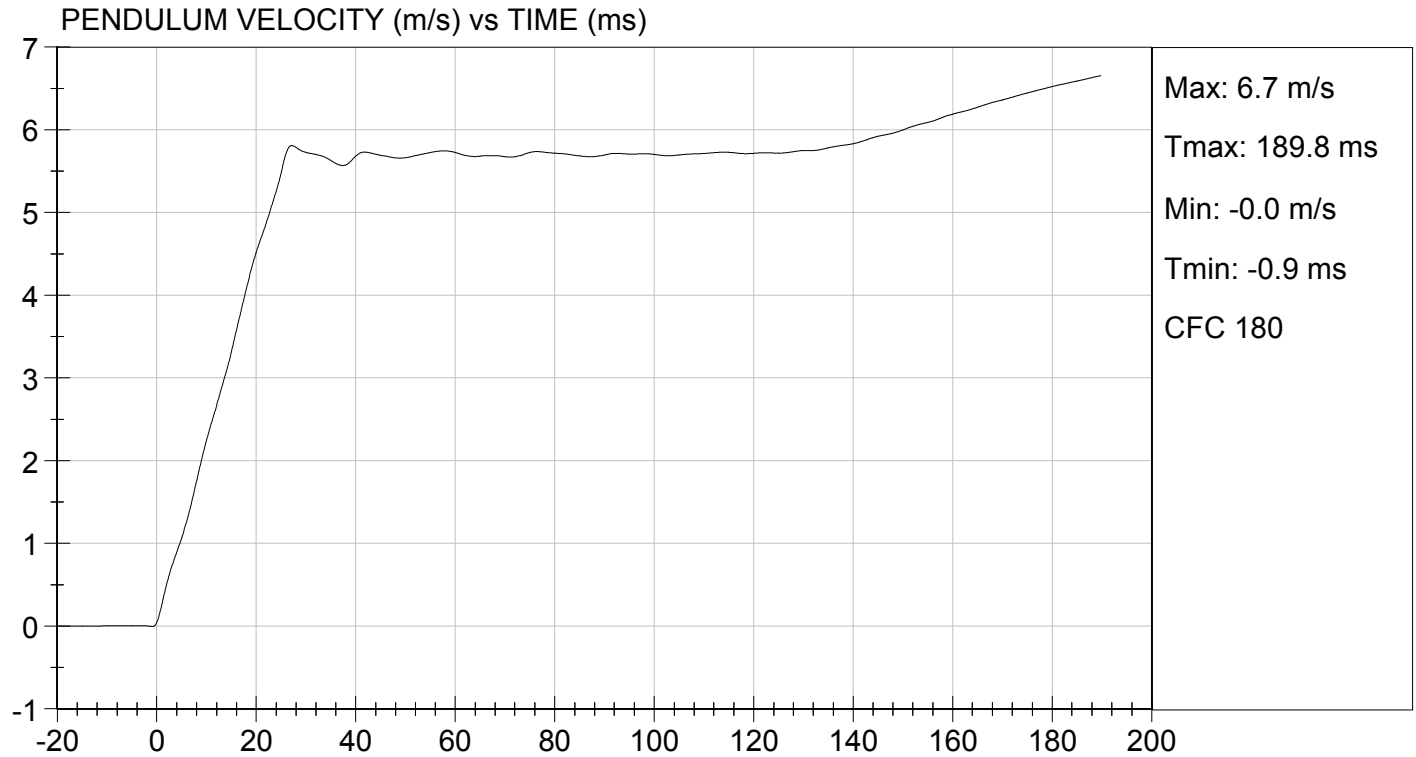
Test Date

David Winkelbauer
Approved By



TEST DESC: NECK BENDING
VELOCITY: 18.31 ft/s, 5.58 m/s

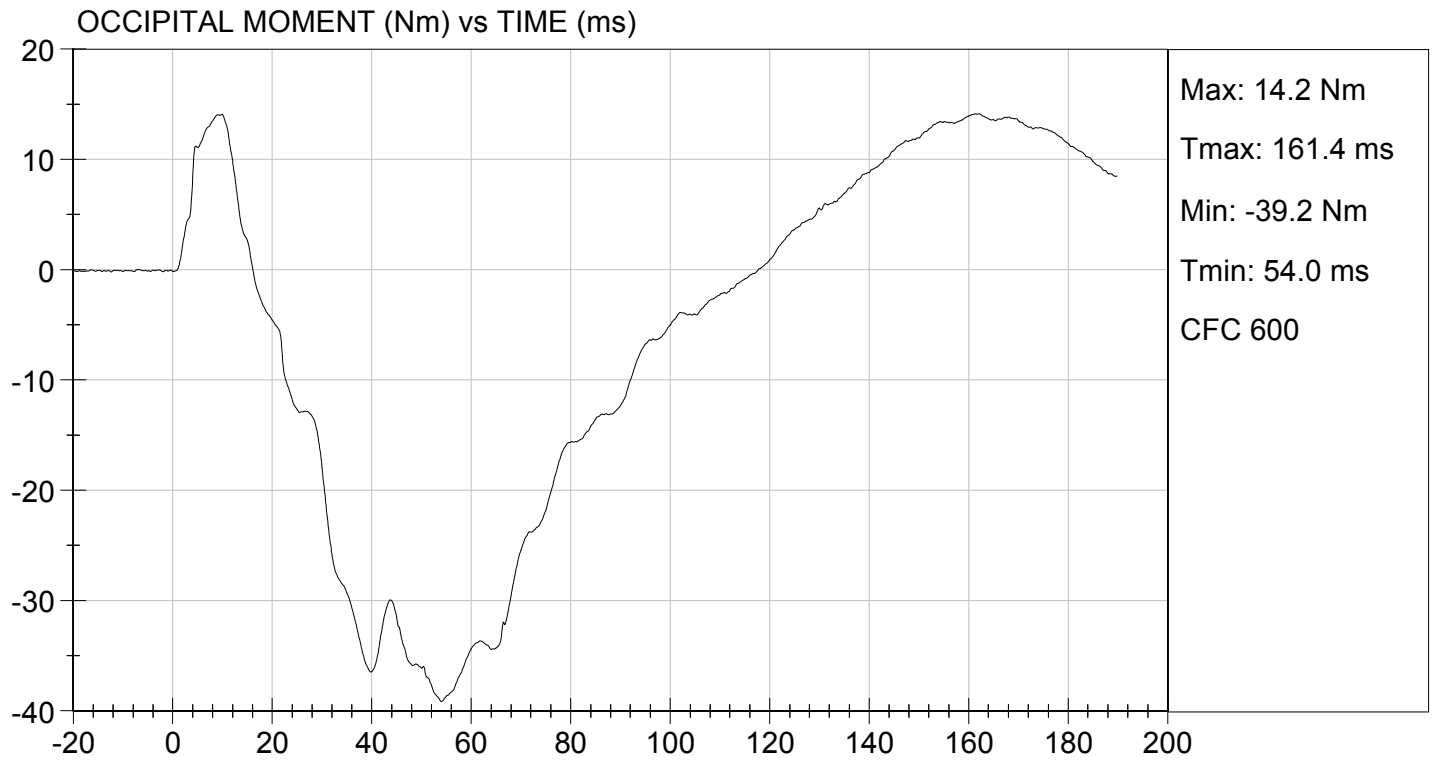
TEST DATE: 02/05/2014
TEST #: D14422





TEST DESC: NECK BENDING
VELOCITY: 18.31 ft/s, 5.58 m/s

TEST DATE: 02/05/2014
TEST #: D14422



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

ATD Serial No: 296

Test ID: D14423

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	Pass
Maximum Probe Acceleration	G's	13 to 18	15	Pass
Shoulder Displacement	mm	28 to 37	33	Pass
Upper Spine (T1) Y Acceleration	G's	17 to 22	18	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

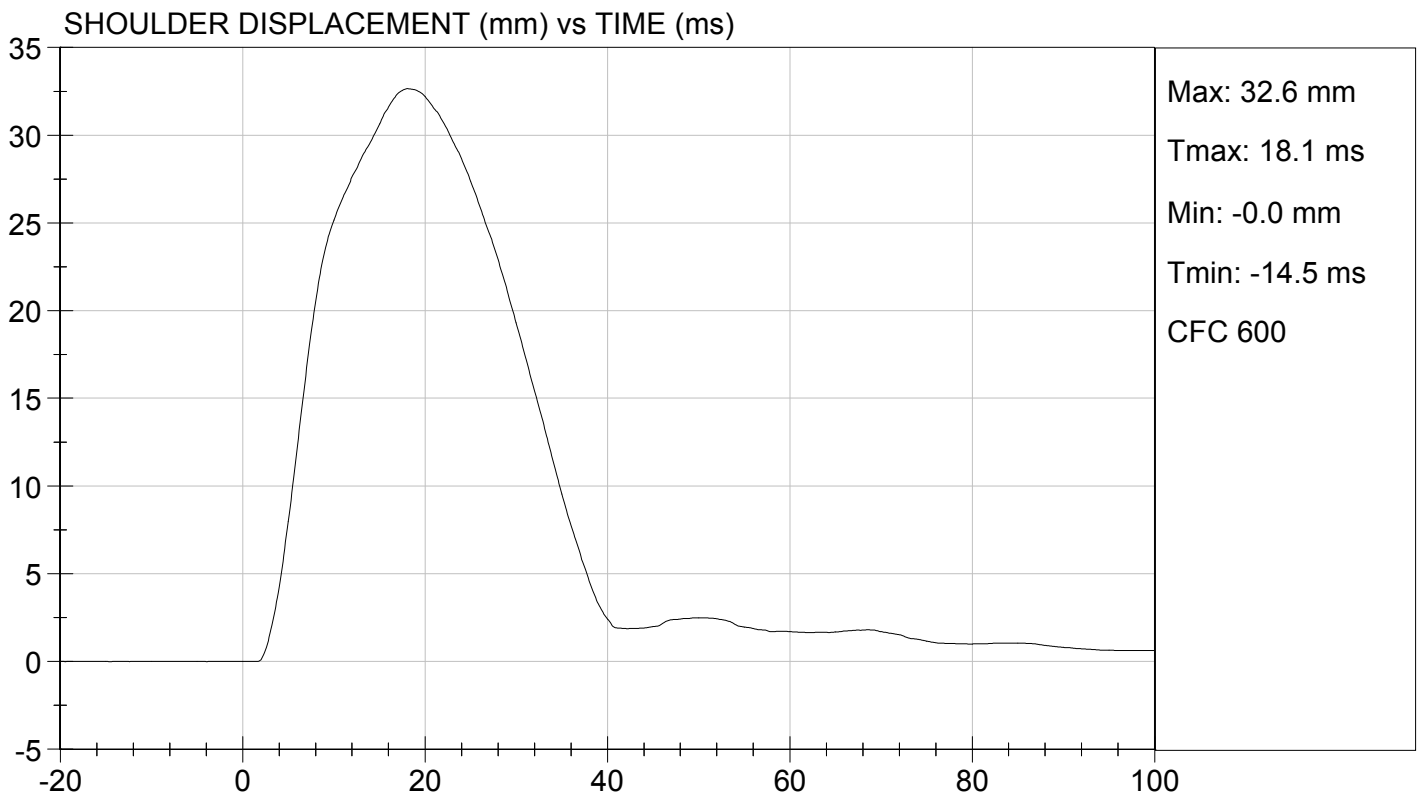
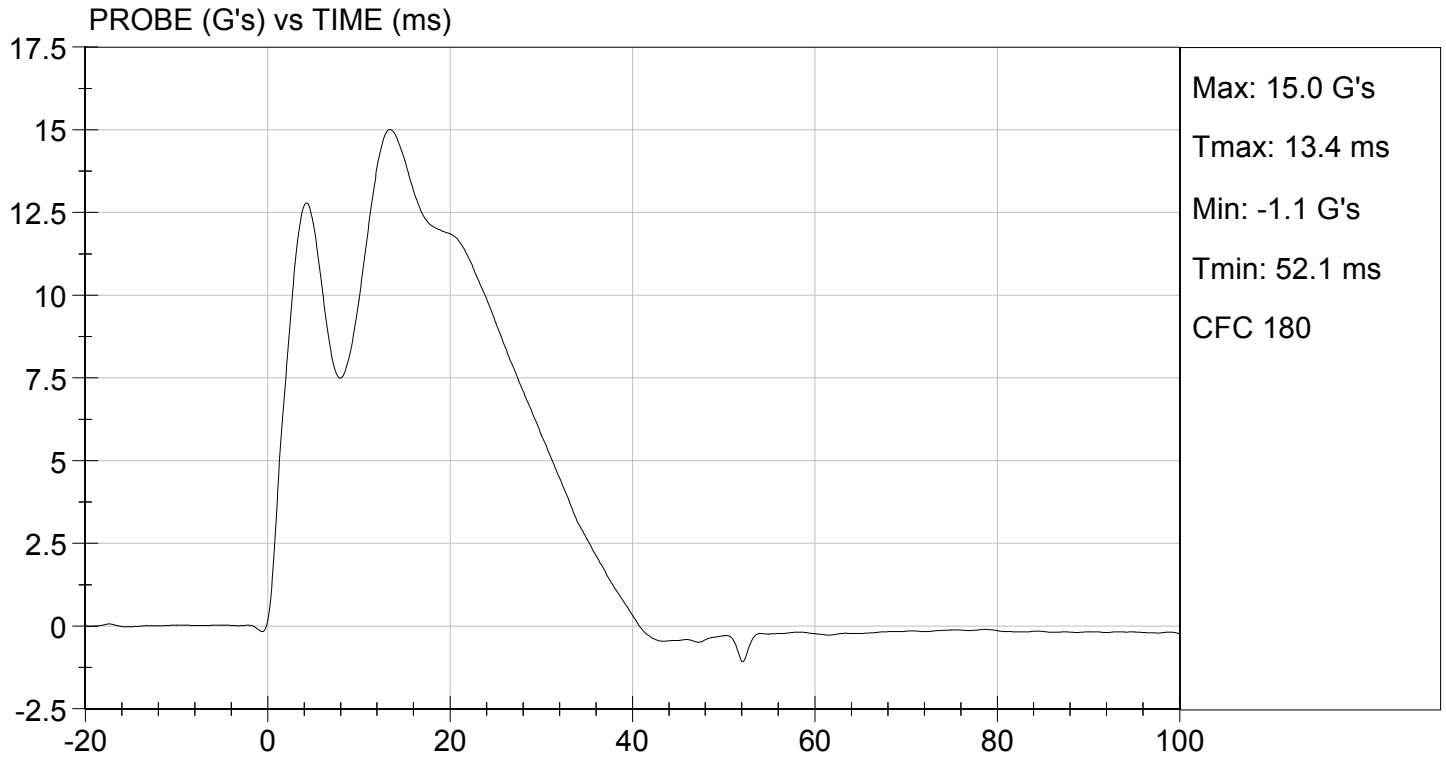
02/05/2014
Test Date

David Winkelbauer
Approved By



TEST DESC: SHOULDER IMPACT
VELOCITY: 14.25 ft/s, 4.34 m/s

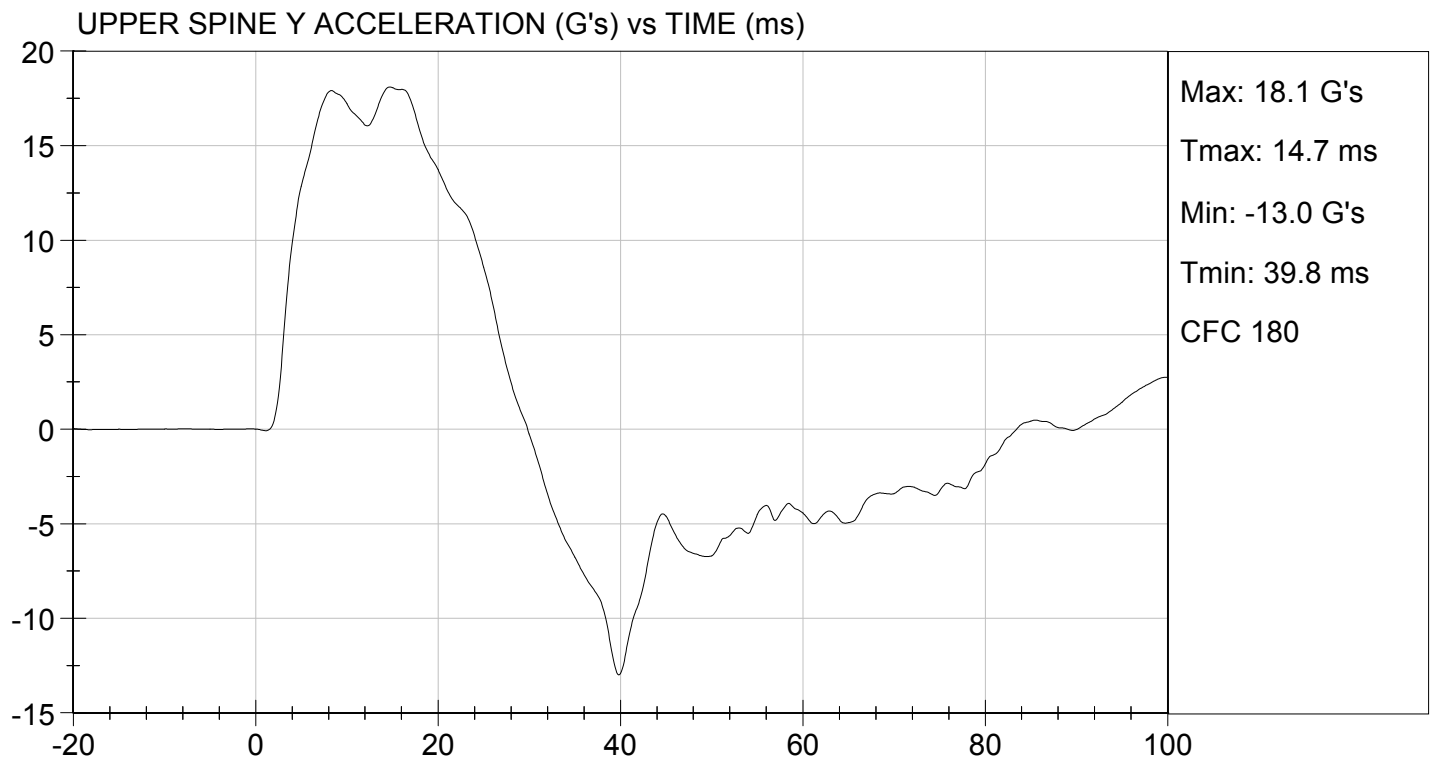
TEST DATE: 02/05/2014
TEST #: D14423





TEST DESC: SHOULDER IMPACT
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 02/05/2014
TEST #: D14423

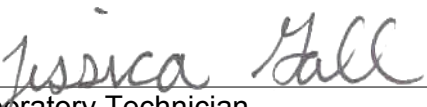


MGA RESEARCH CORPORATION
THORAX (WITH ARM) IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

Test I.D: D14424

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.0	Pass
Humidity	%	10 to 70	20	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	37	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	37	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	30	Pass
Overall Test Results				Pass


 Laboratory Technician

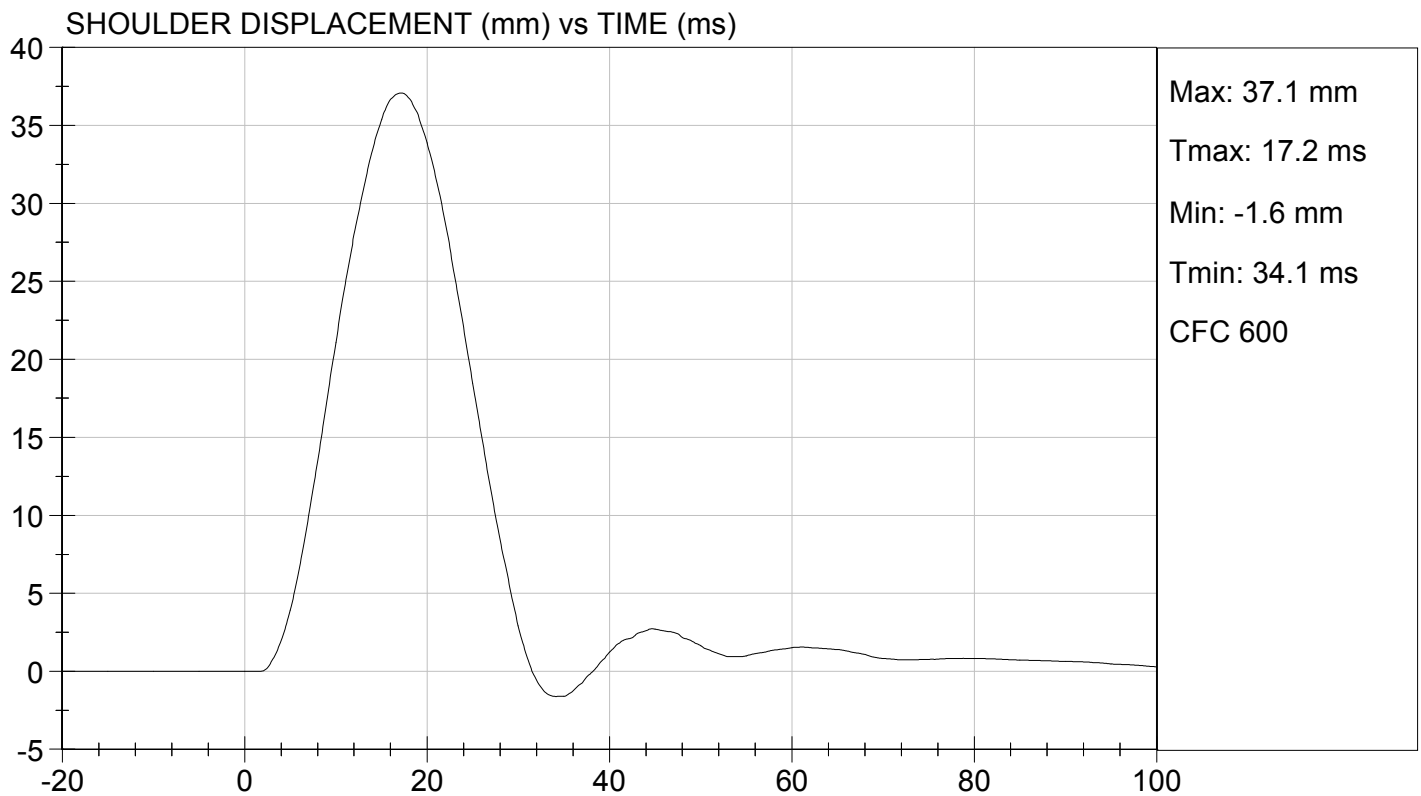
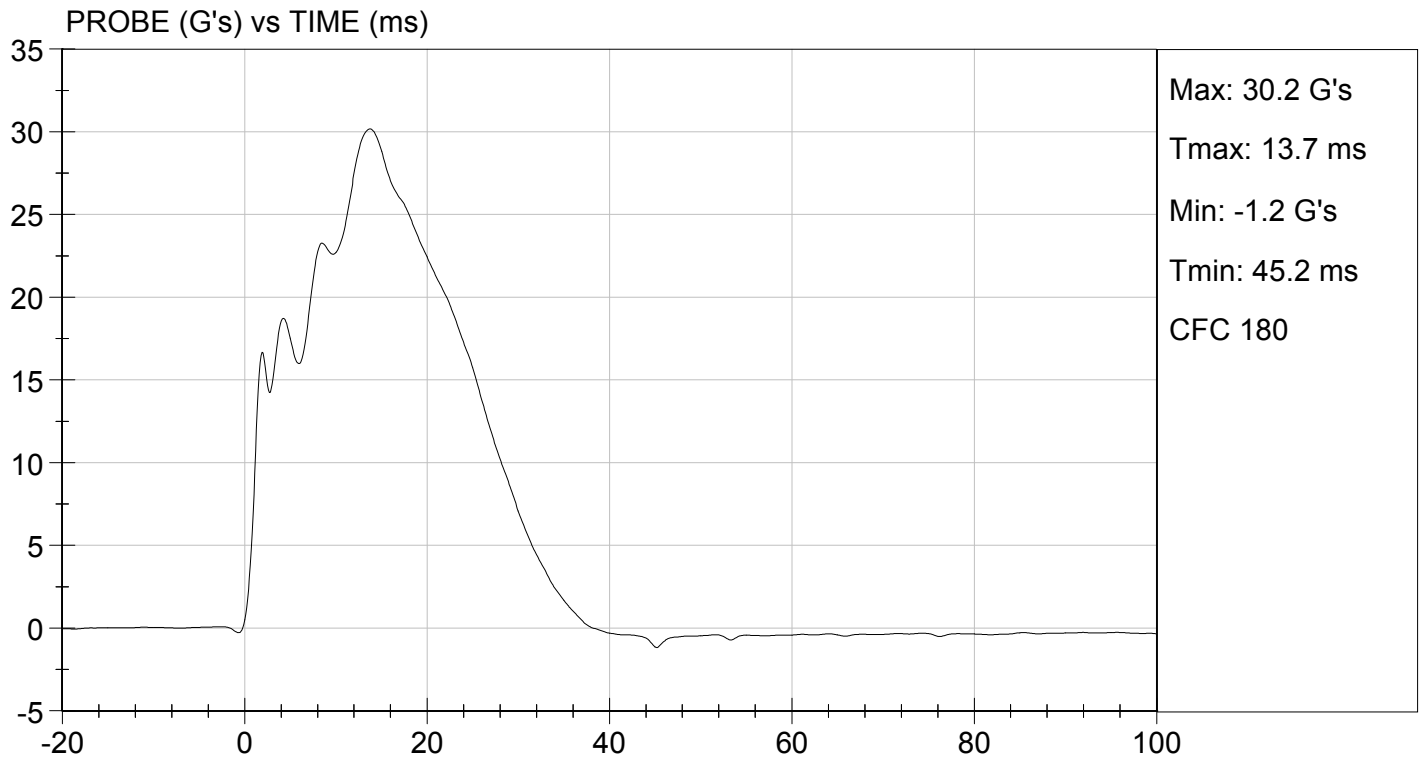
02/05/2014
 Test Date


 Approved By



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

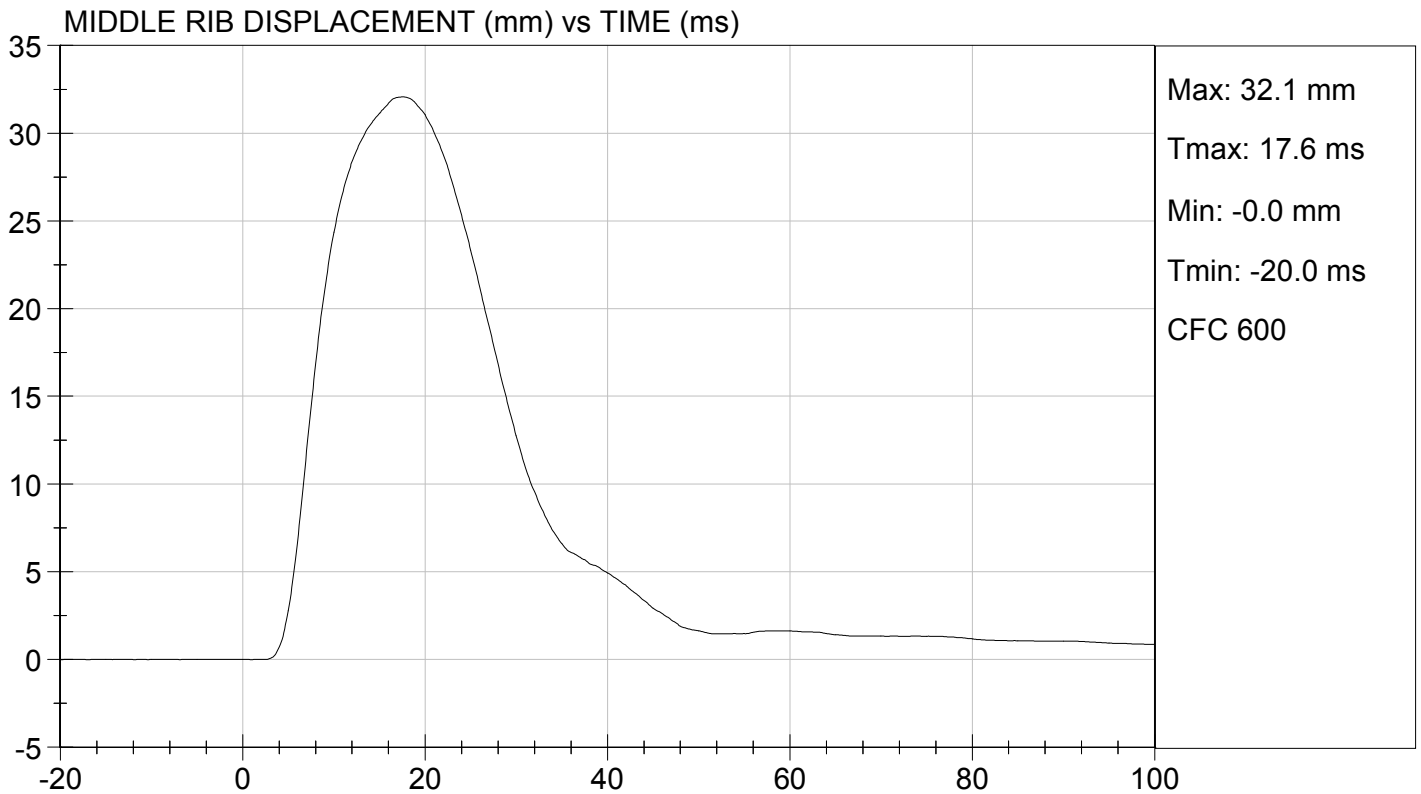
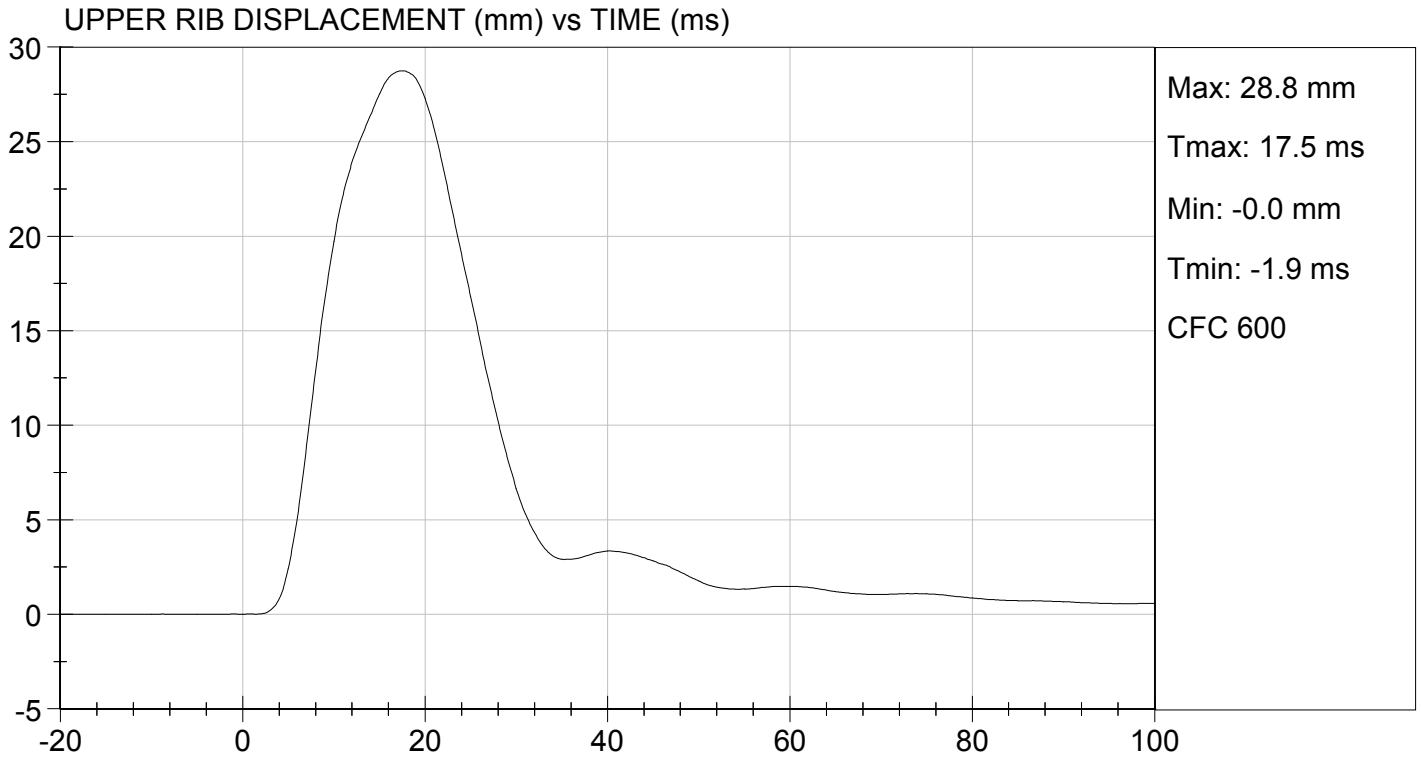
TEST DATE: 02/05/2014
TEST #: D14424





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

TEST DATE: 02/05/2014
TEST #: D14424

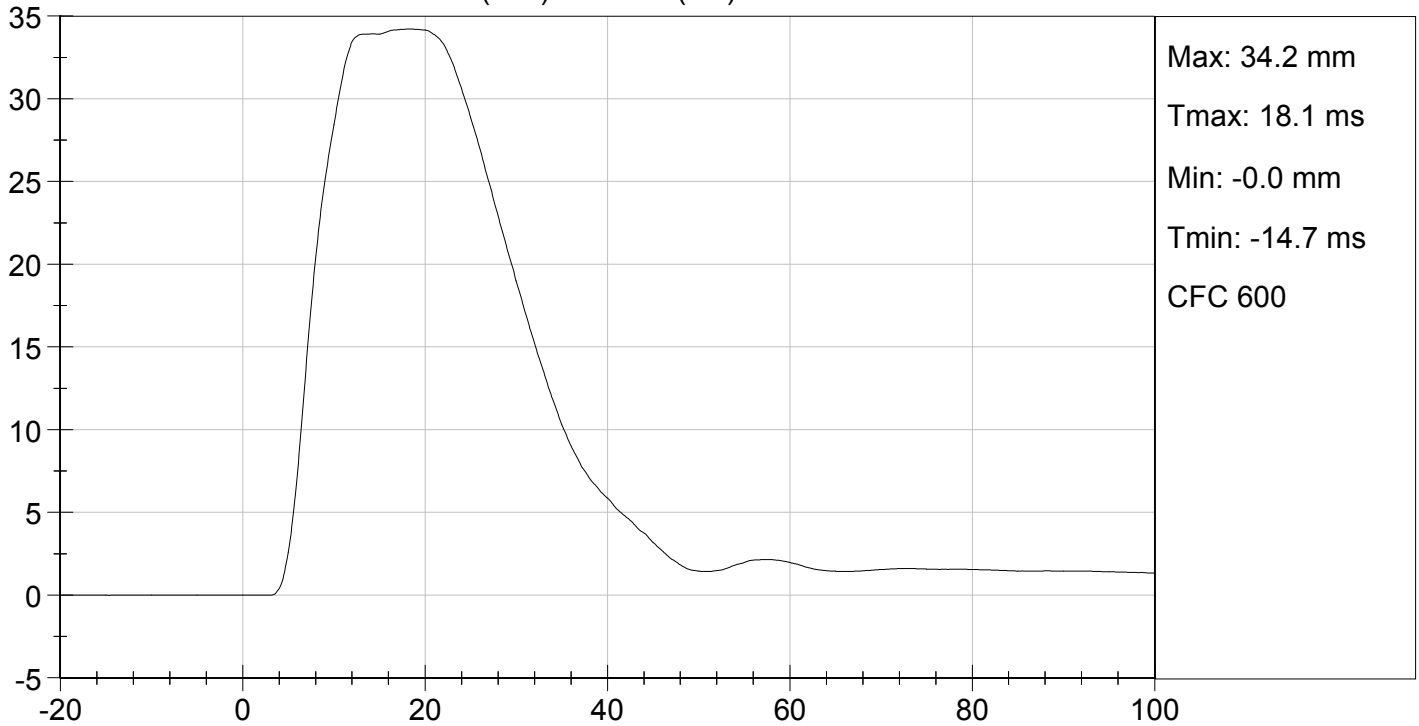




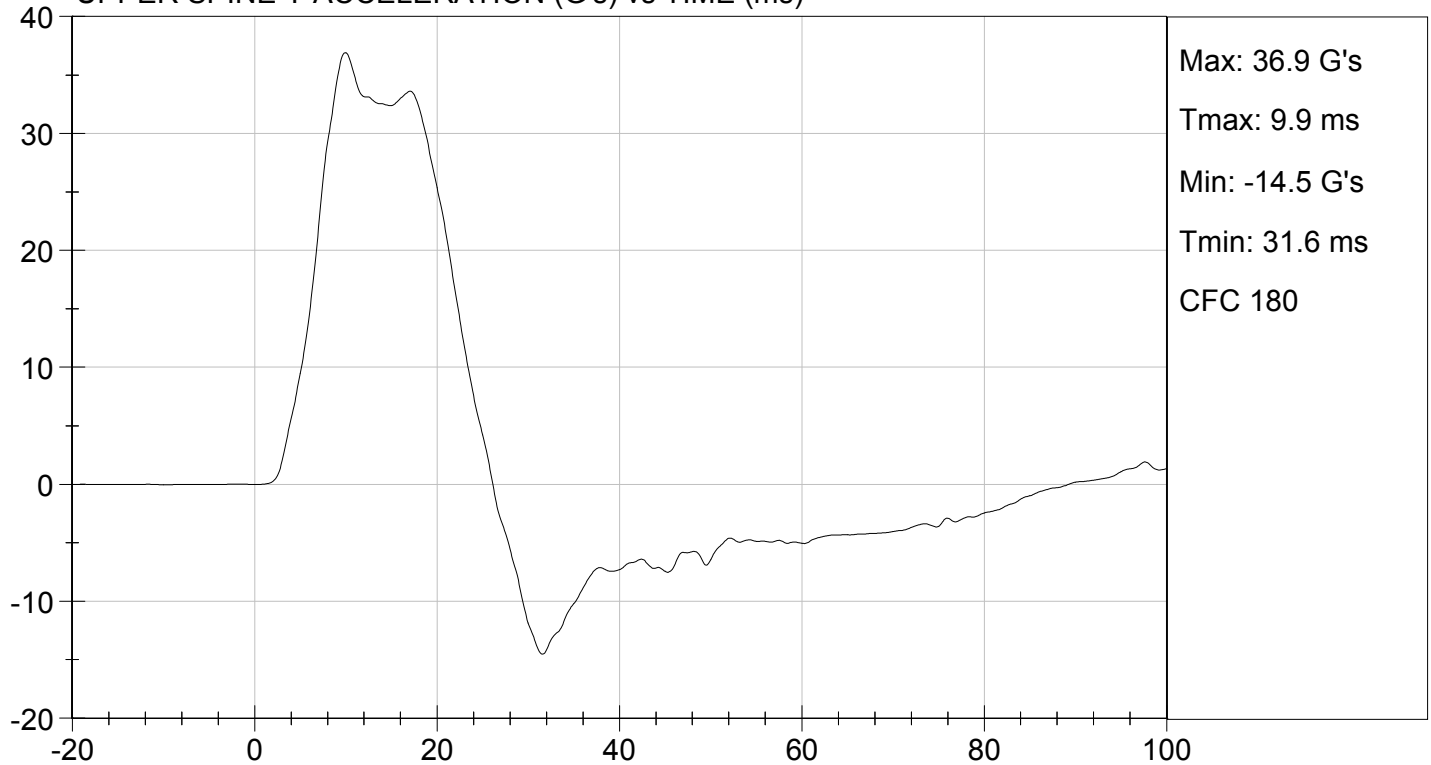
TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.22 ft/s, 6.77 m/s

TEST DATE: 02/05/2014
TEST #: D14424

LOWER RIB DISPLACEMENT (mm) vs TIME (ms)



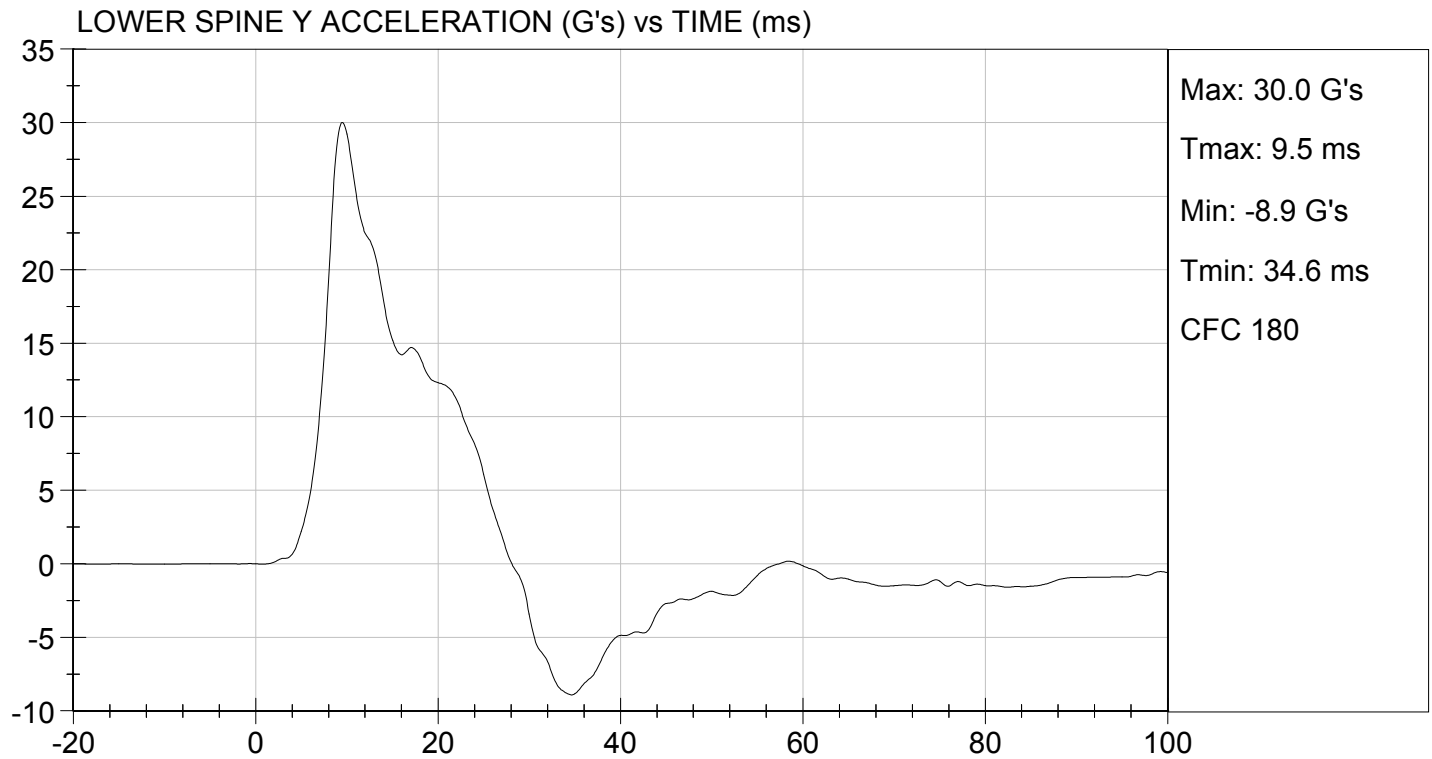
UPPER SPINE Y ACCELERATION (G's) vs TIME (ms)





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

TEST DATE: 02/05/2014
TEST #: D14424

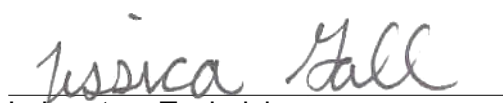


MGA RESEARCH CORPORATION
THORAX (WITHOUT ARM) IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

Test I.D: D14425

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.0	Pass
Humidity	%	10 to 70	20	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	Pass
Maximum Probe Acceleration	G's	14 to 18	15	Pass
Upper Rib Displacement	mm	32 to 40	39	Pass
Middle Rib Displacement	mm	39 to 45	43	Pass
Lower Rib Displacement	mm	35 to 43	40	Pass
Upper Spine (T1) Y Acceleration	G's	13 to 17	14	Pass
Lower Spine (T12) Y Acceleration	G's	7 to 11	8	Pass
Overall Test Results				Pass


 Laboratory Technician

02/05/2014

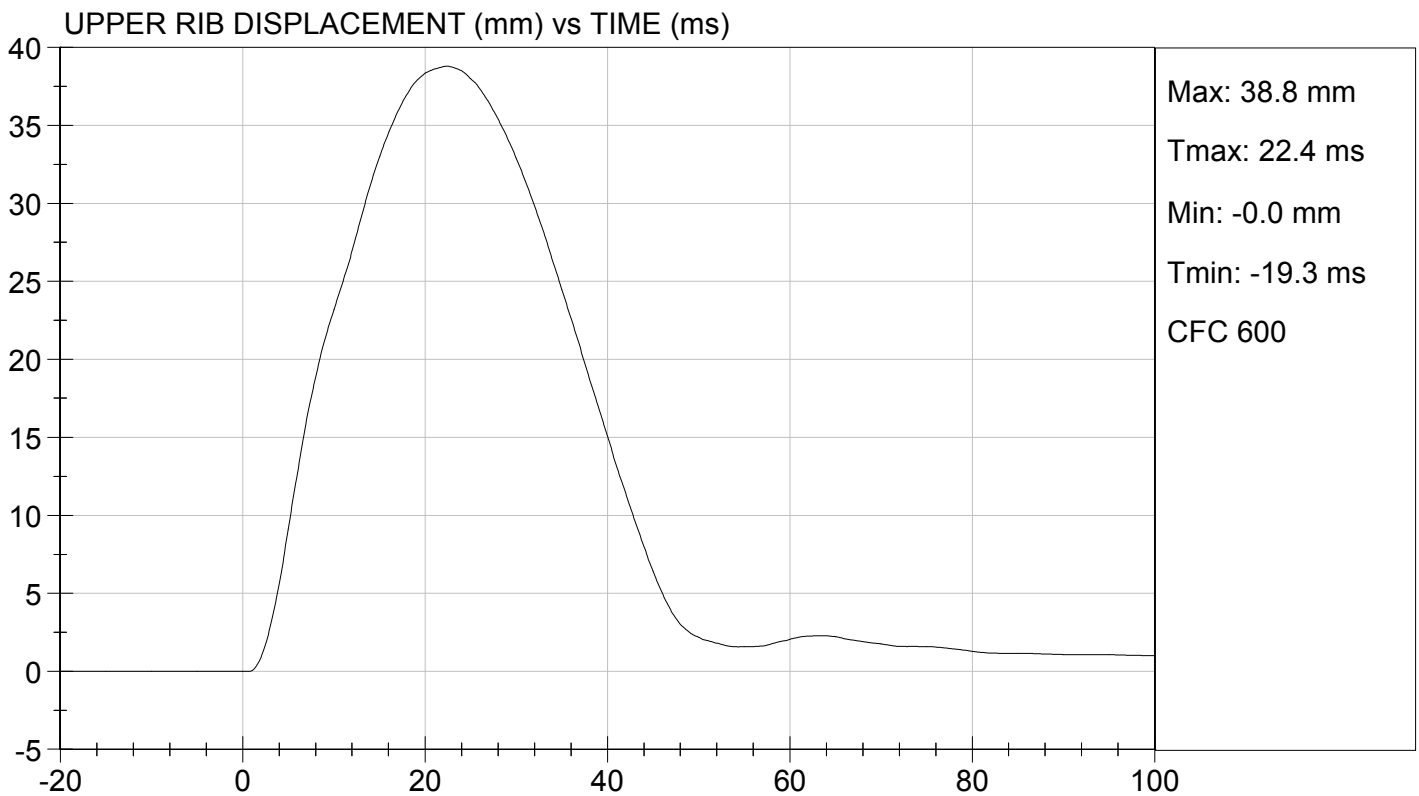
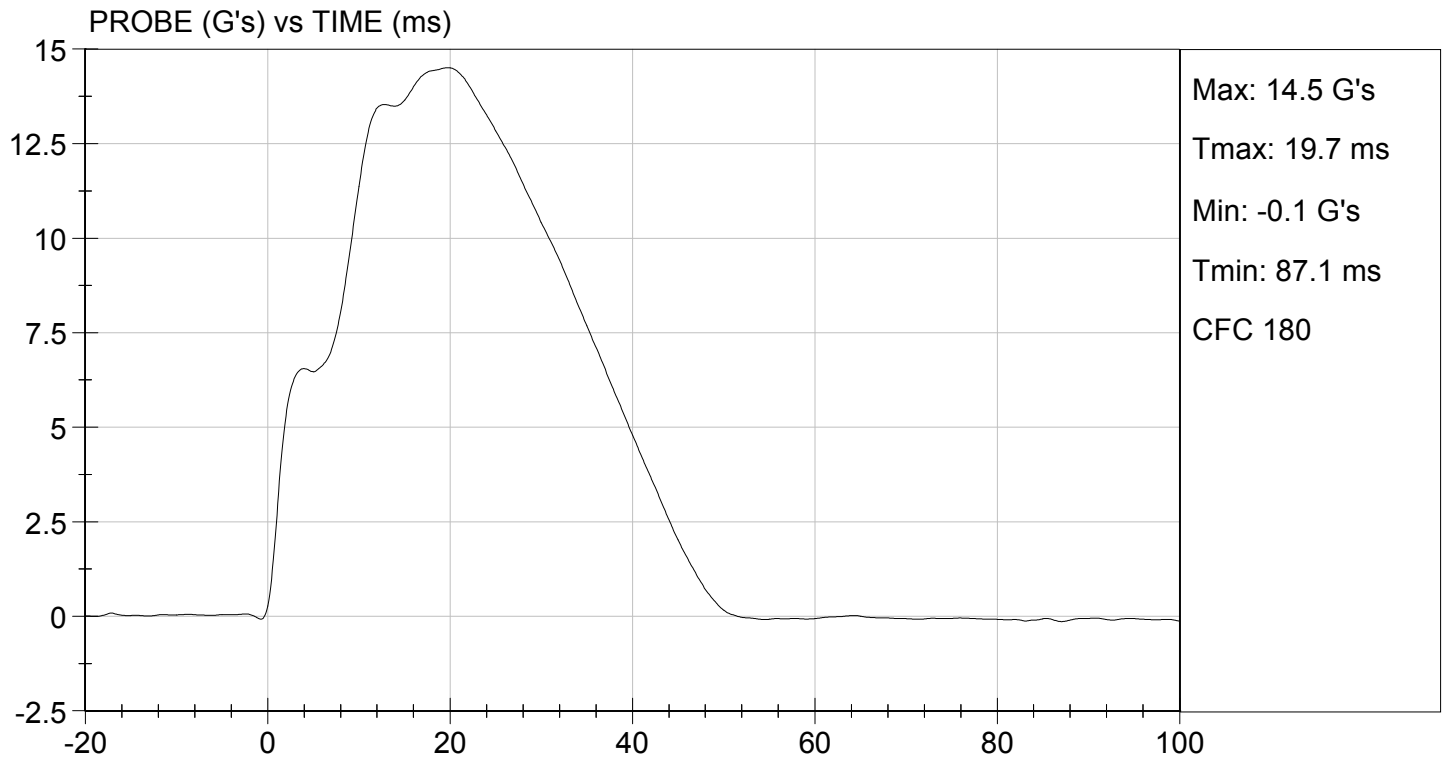
Test Date


 Approved By



TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 02/05/2014
TEST #: D14425

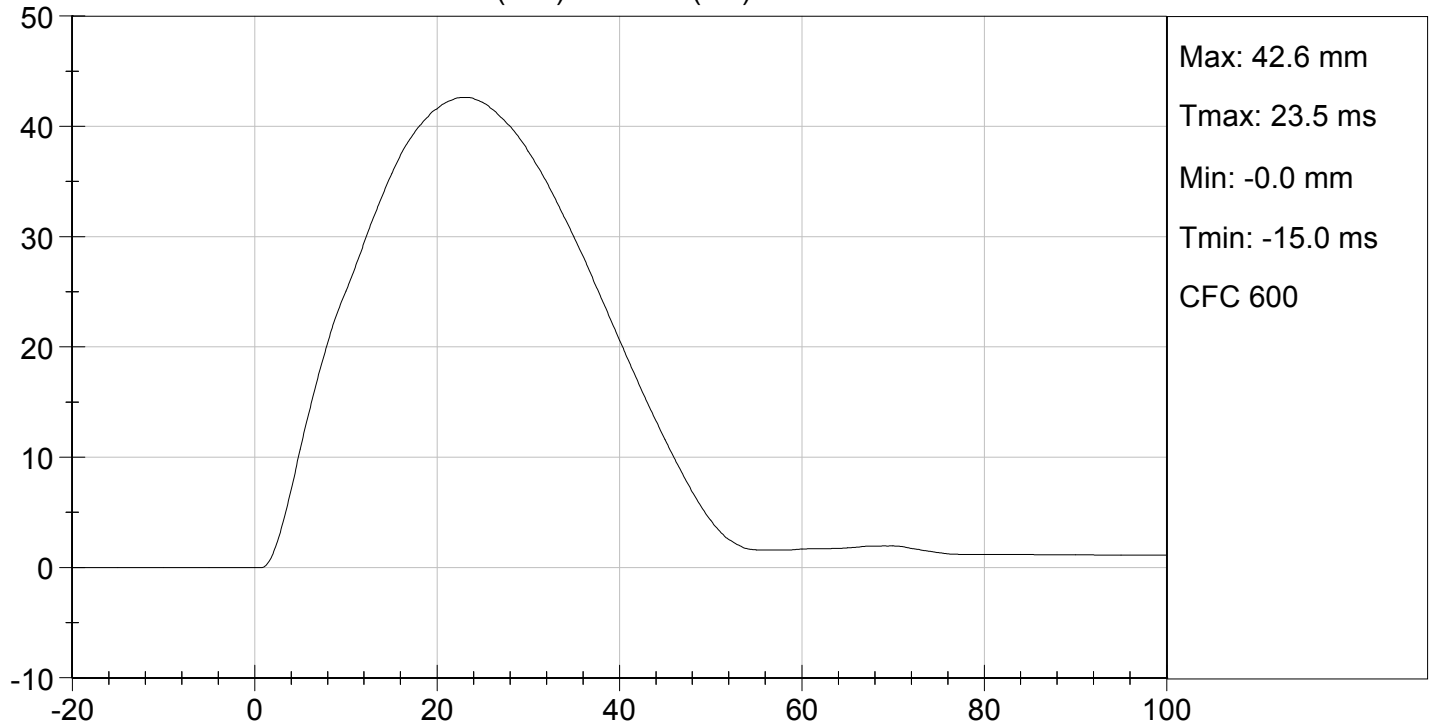




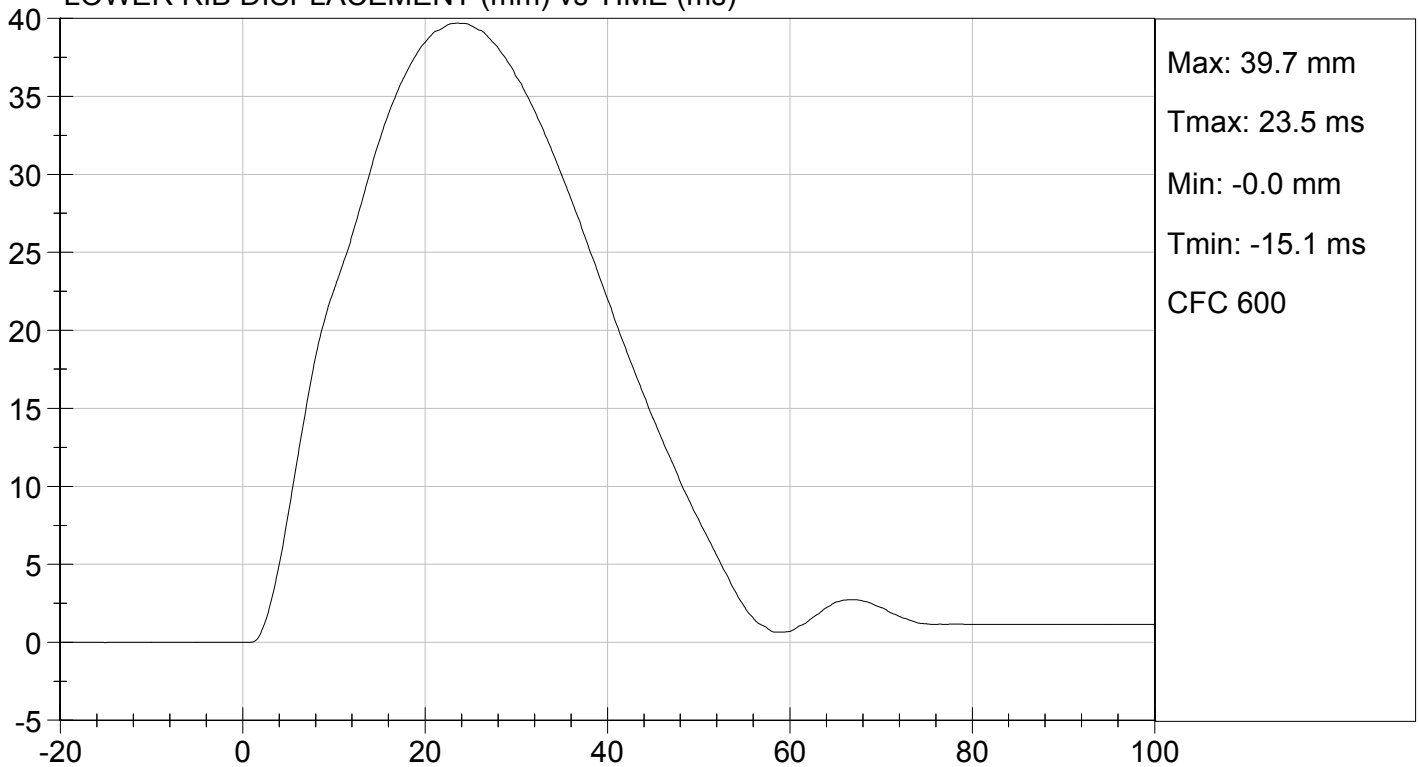
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.25 ft/s, 4.34 m/s

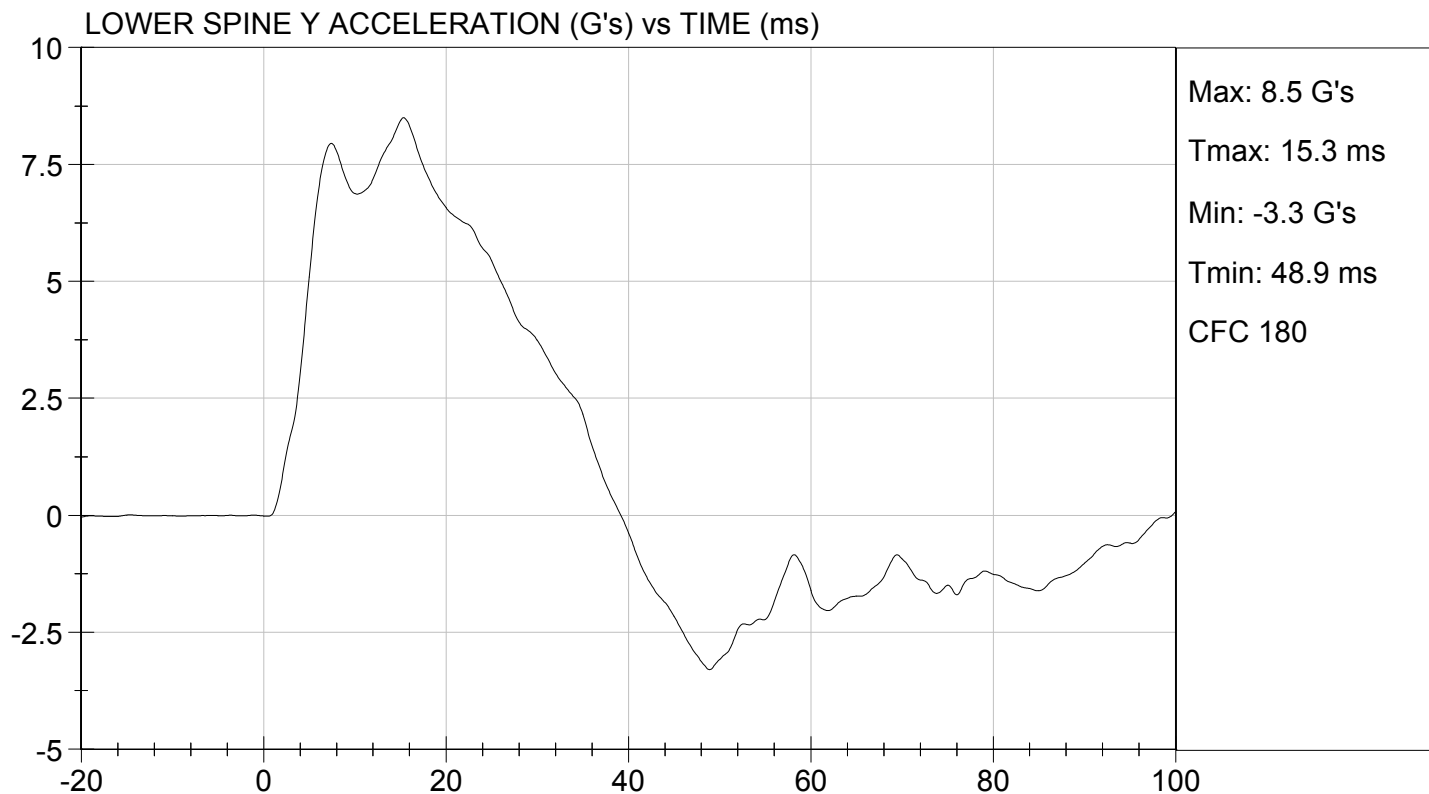
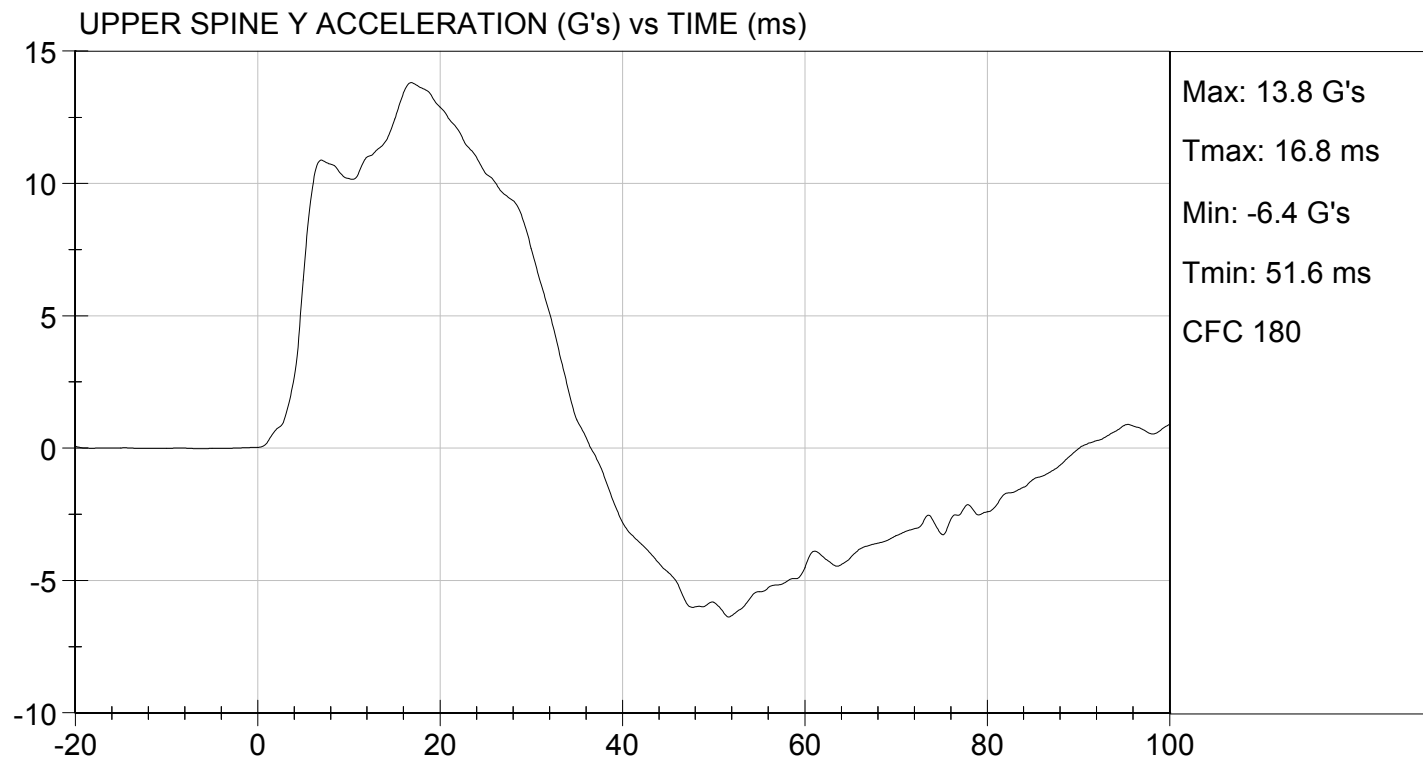
TEST DATE: 02/05/2014
TEST #: D14425

MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



LOWER RIB DISPLACEMENT (mm) vs TIME (ms)





MGA RESEARCH CORPORATION

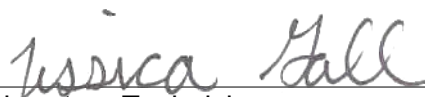
ABDOMINAL IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

Test I.D: D14426

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.0	Pass
Humidity	%	10 to 70	20	Pass
Impact Velocity	m/s	4.20 to 4.40	4.38	Pass
Maximum Probe Acceleration	G's	12 to 16	13	Pass
Upper Abdomen Rib Displacement	mm	36 to 47	40	Pass
Lower Abdomen Rib Displacement	mm	33 to 44	41	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	10	Pass
Overall Test Results				Pass


Laboratory Technician

02/05/2014

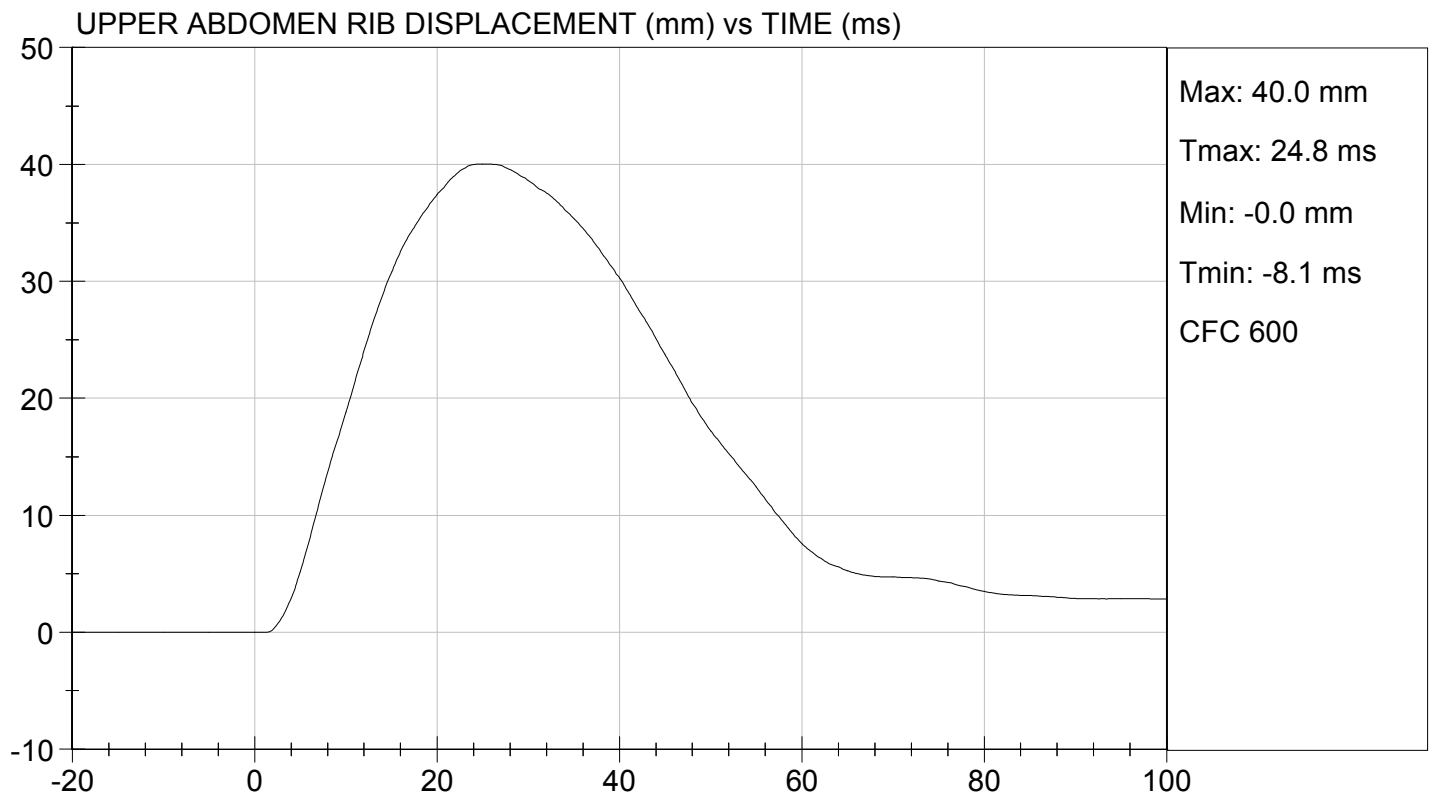
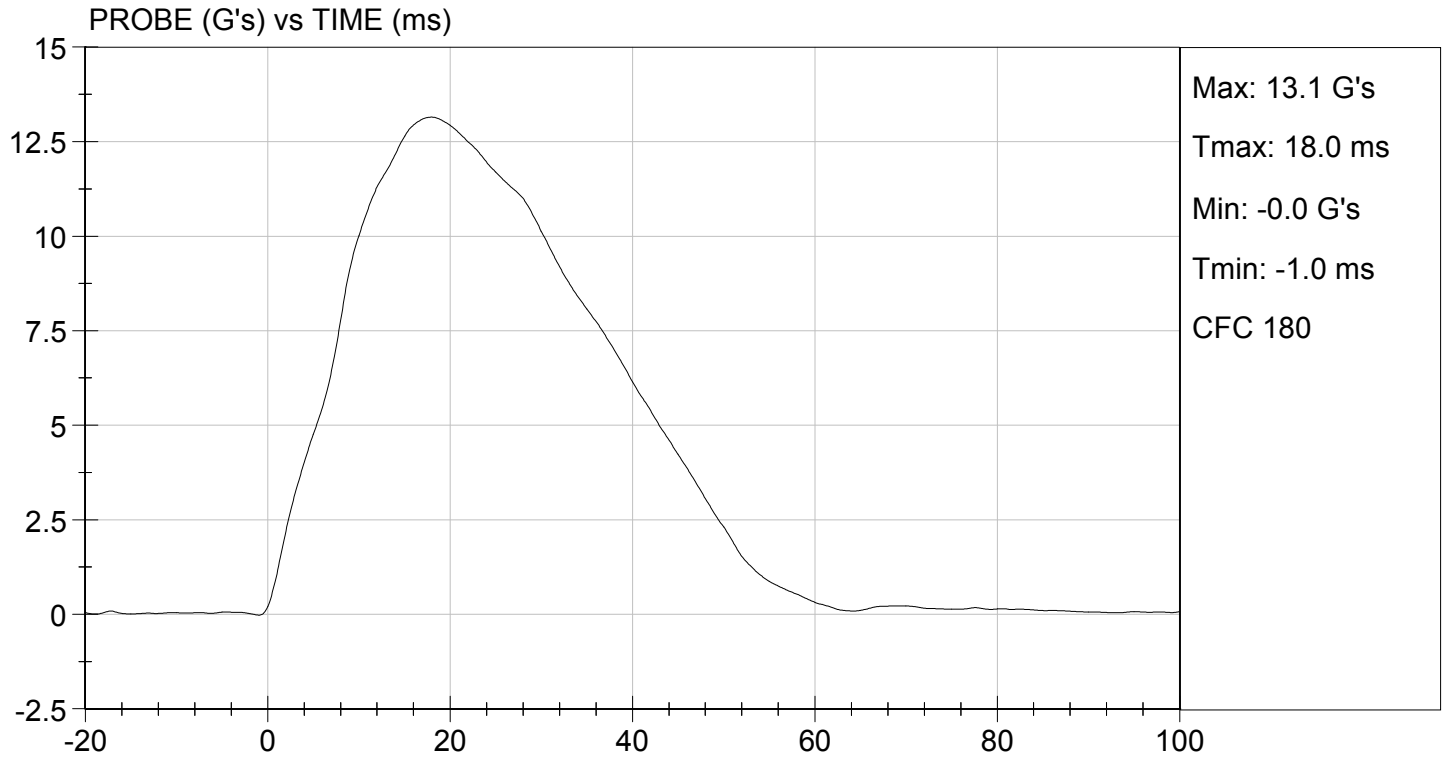
Test Date


Approved By



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

TEST DATE: 02/05/2014
TEST #: D14426

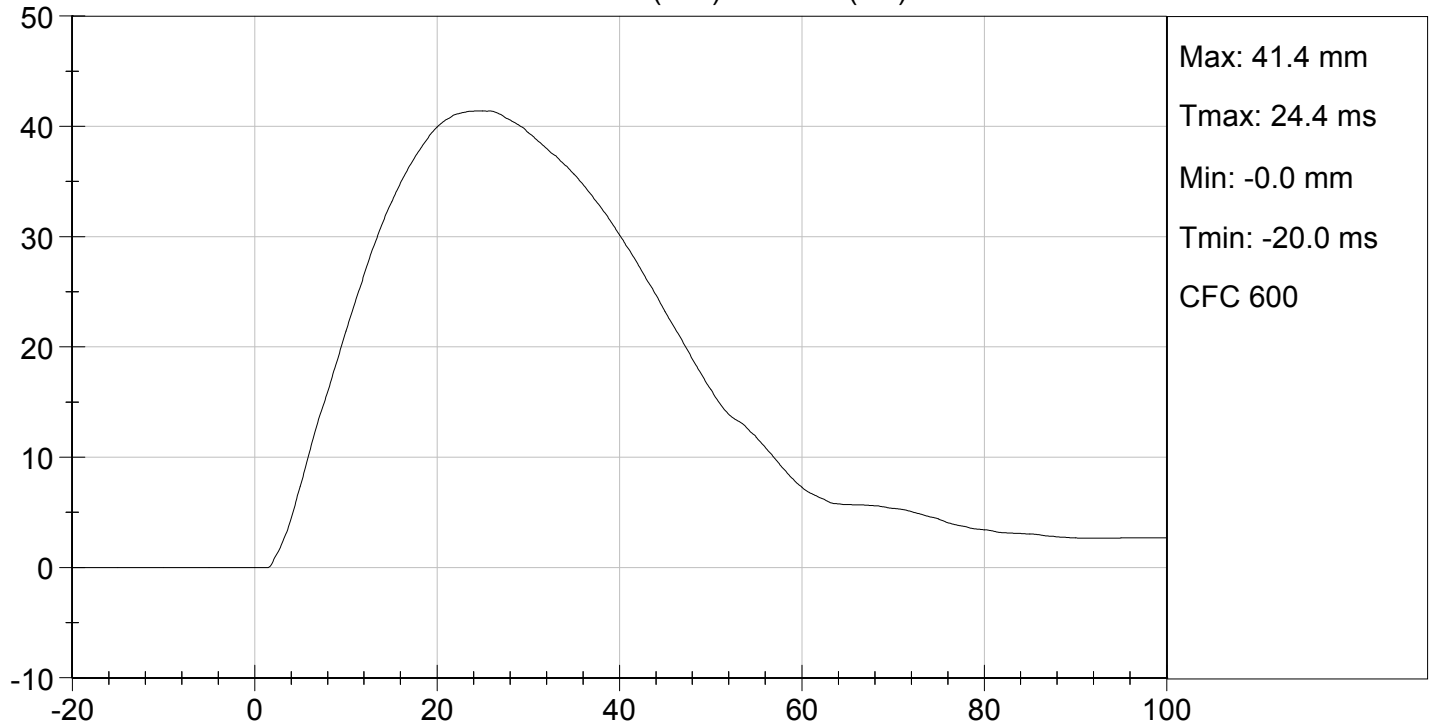




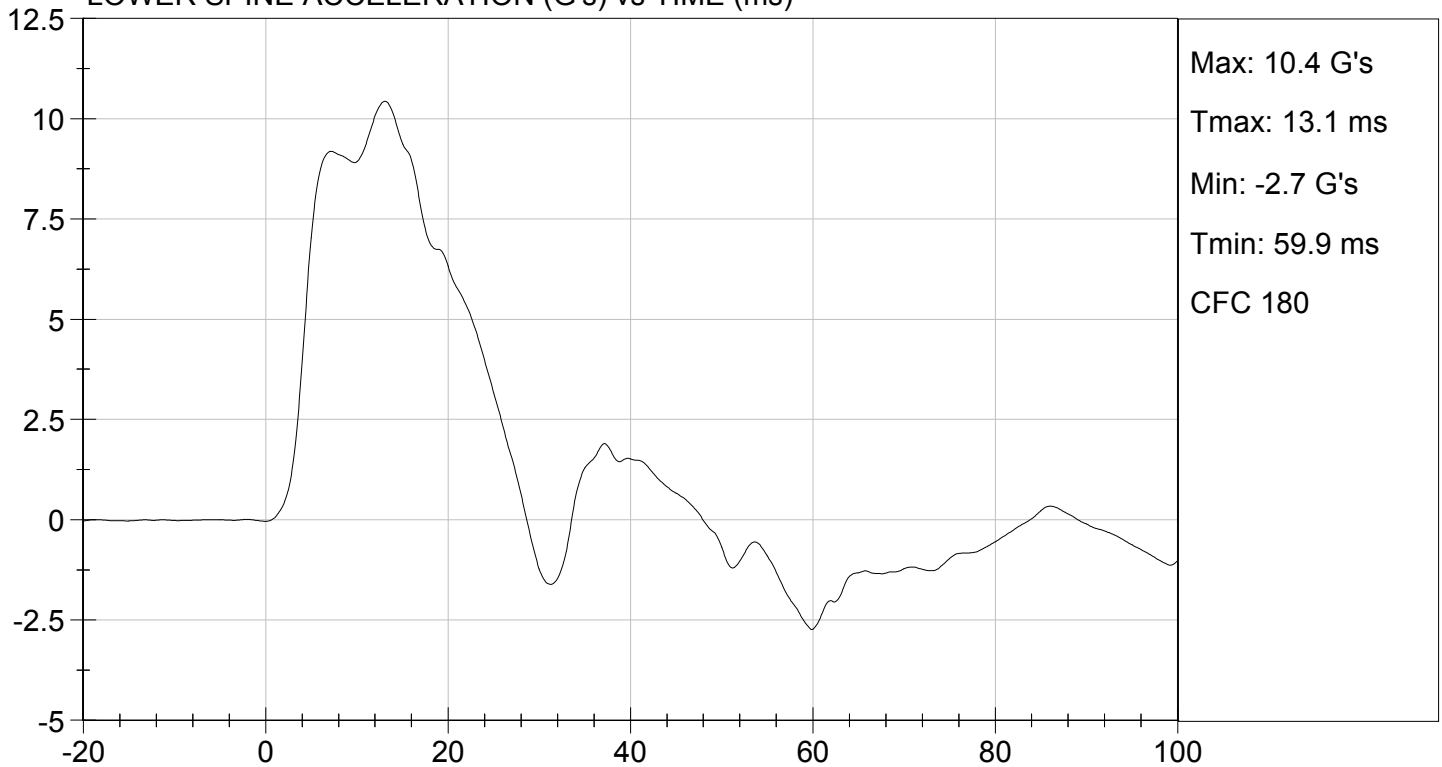
TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.37 ft/s, 4.38 m/s

TEST DATE: 02/05/2014
TEST #: D14426

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



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



MGA RESEARCH CORPORATION

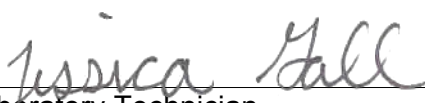
PELVIS IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

Test I.D: D14427

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.0	Pass
Humidity	%	10 to 70	20	Pass
Impact Velocity	m/s	6.60 to 6.80	6.68	Pass
Maximum Probe Acceleration	G's	38 to 47	41	Pass
Pelvis Y Acceleration After 6 ms	G's	34 to 42	40	Pass
Peak Acetabulum Force	N	3600 to 4300	4,170	Pass
Overall Test Results				Pass


Laboratory Technician

02/05/2014

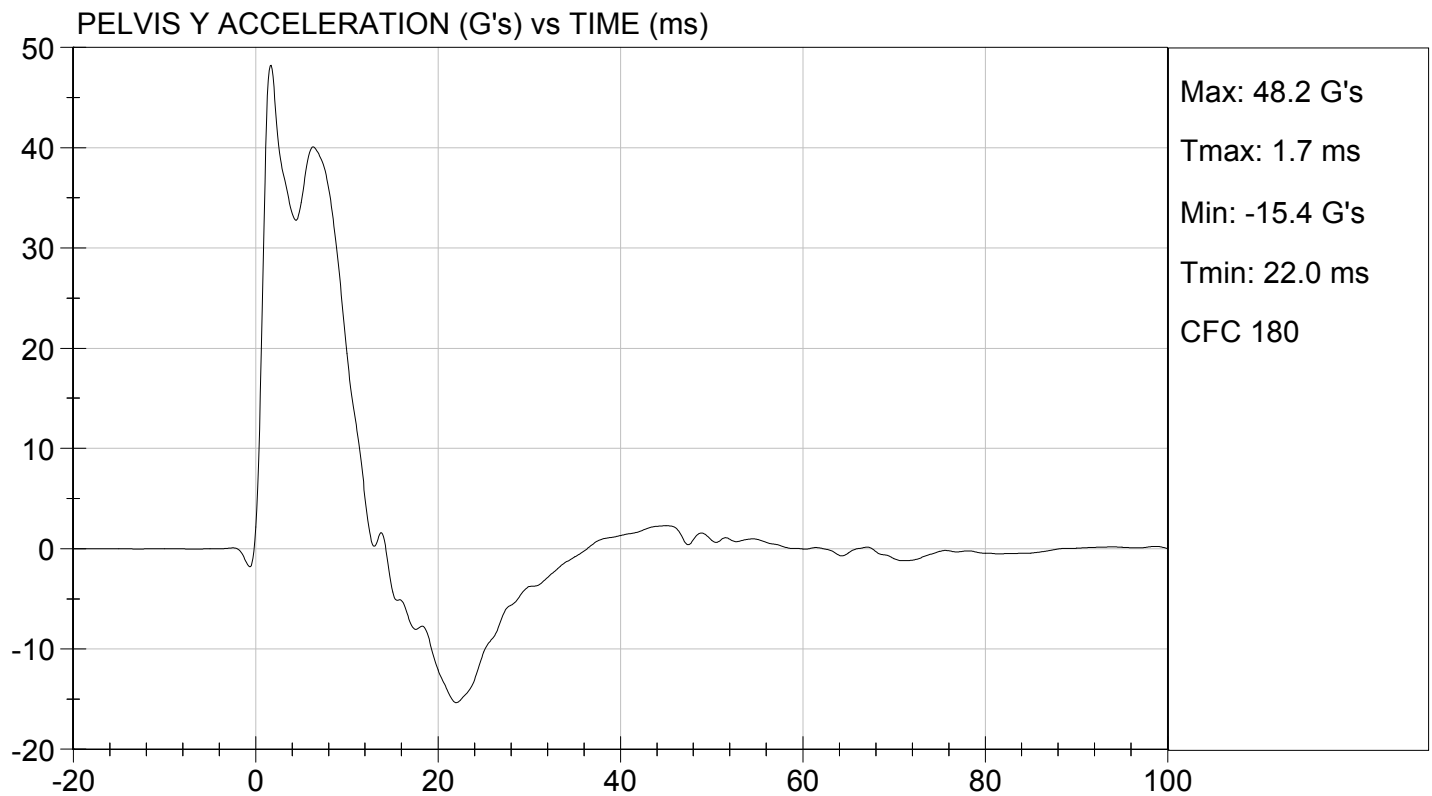
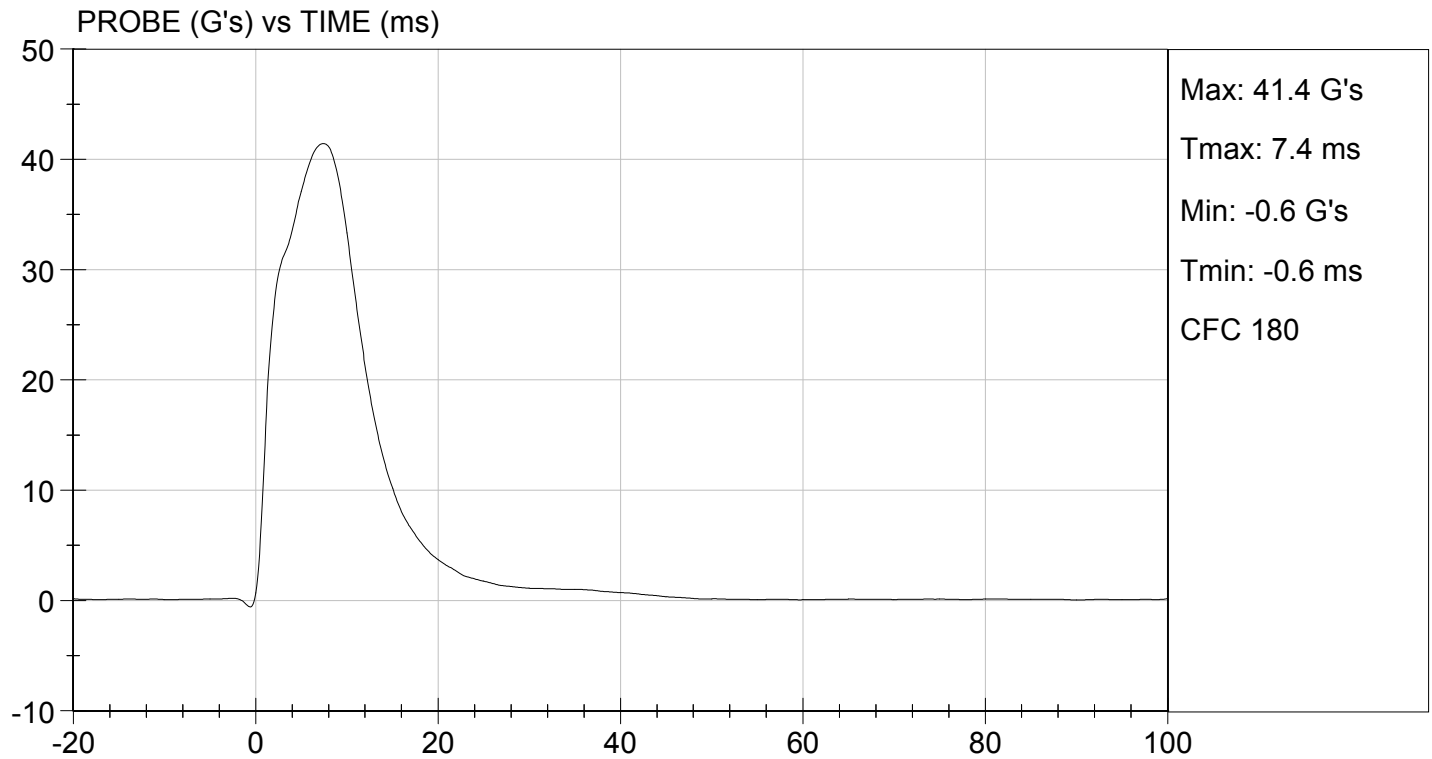
Test Date


Approved By



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

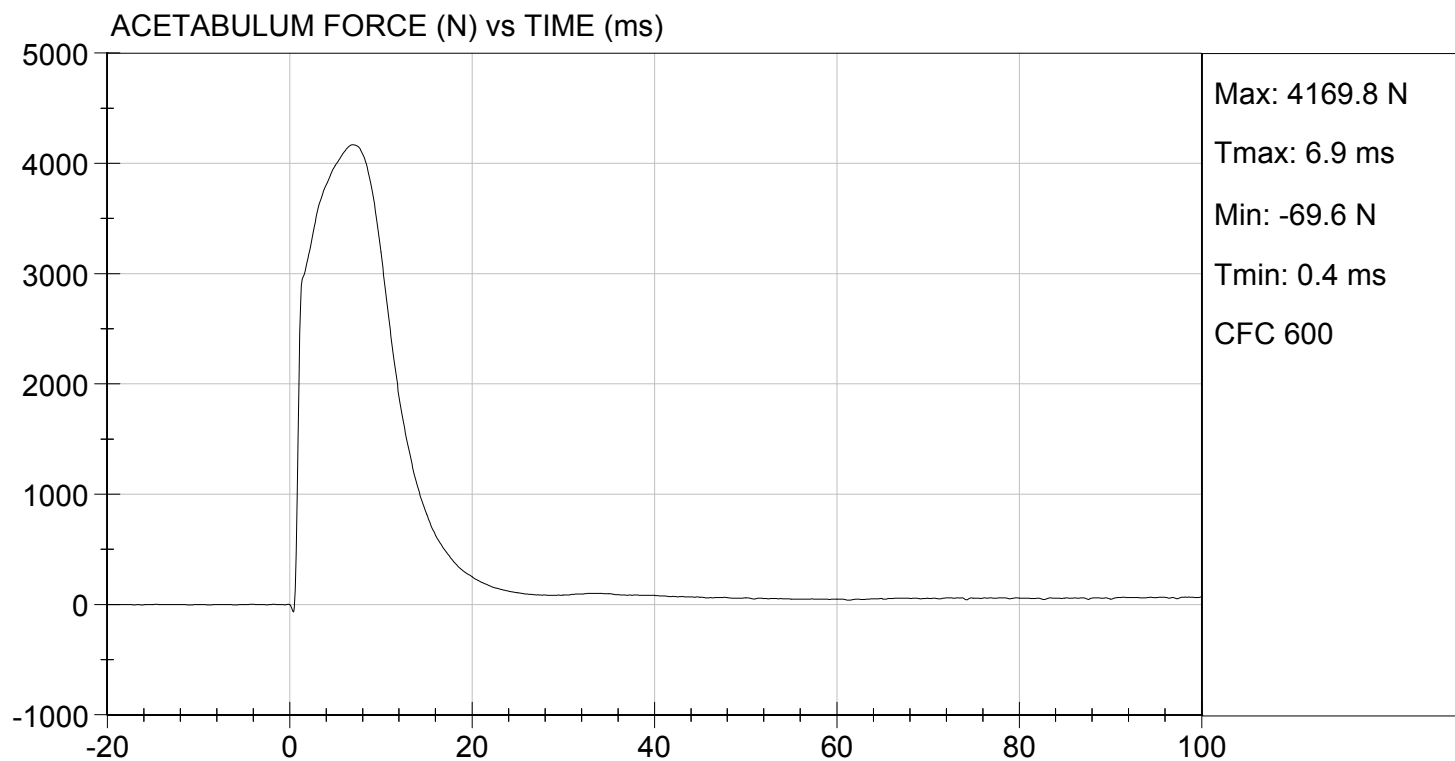
TEST DATE: 02/05/2014
TEST #: D14427





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

TEST DATE: 02/05/2014
TEST #: D14427



MGA RESEARCH CORPORATION

ILIAC IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

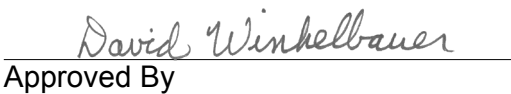
Test I.D: D14428

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.0	Pass
Humidity	%	10 to 70	20	Pass
Impact Velocity	m/s	4.20 to 4.40	4.30	Pass
Maximum Probe Acceleration	G's	36 to 45	42	Pass
Pelvis Y Acceleration	G's	28 to 39	34	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4,922	Pass
Overall Test Results				Pass


Laboratory Technician

02/05/2014

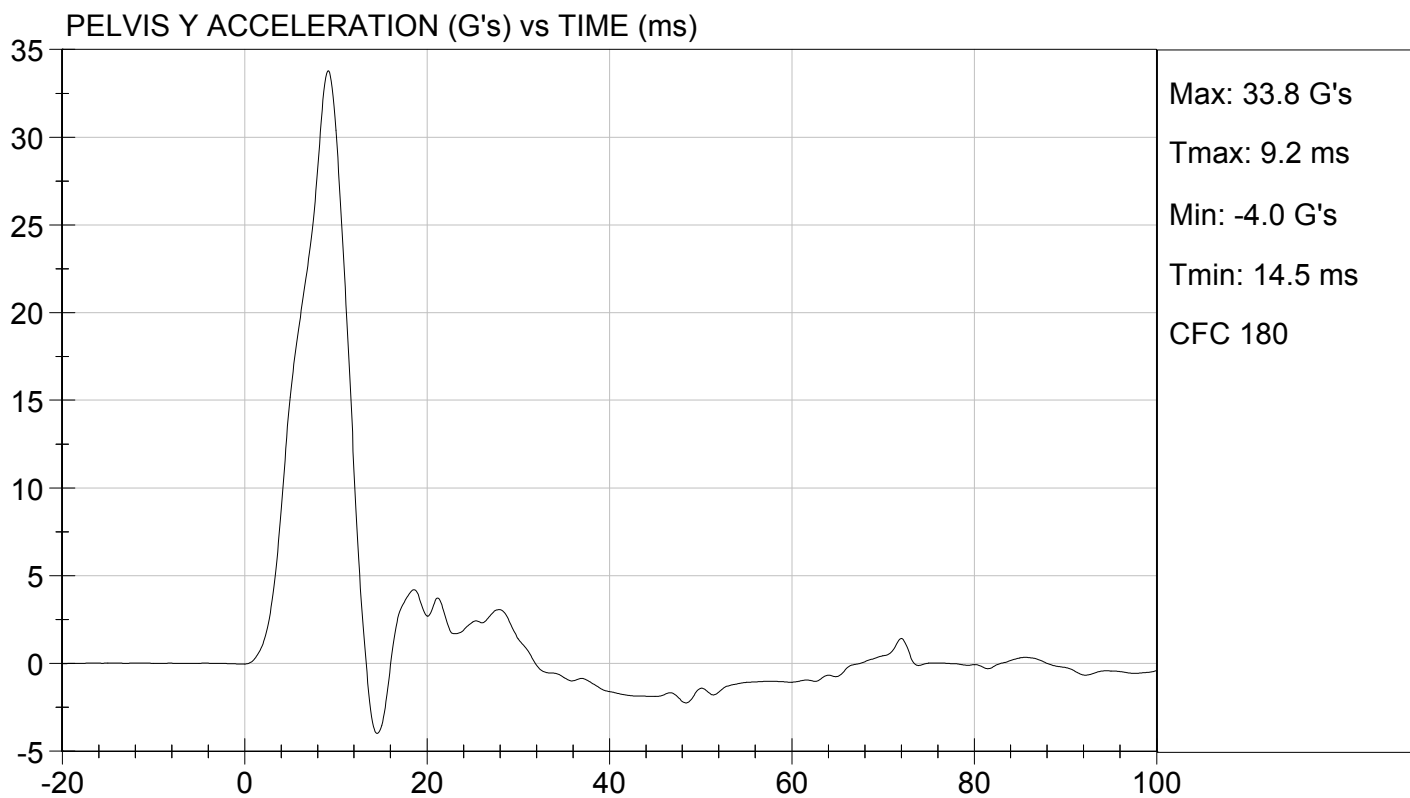
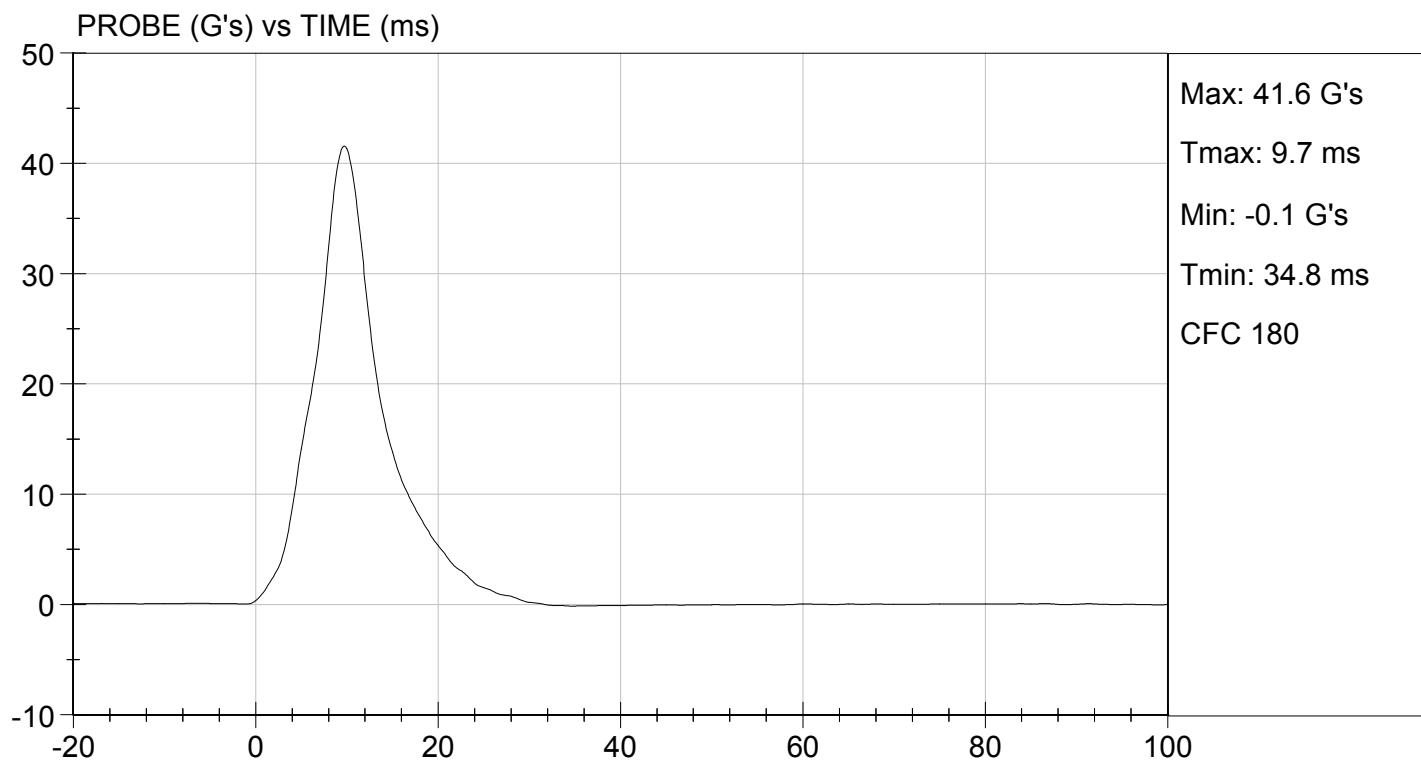
Test Date


Approved By



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

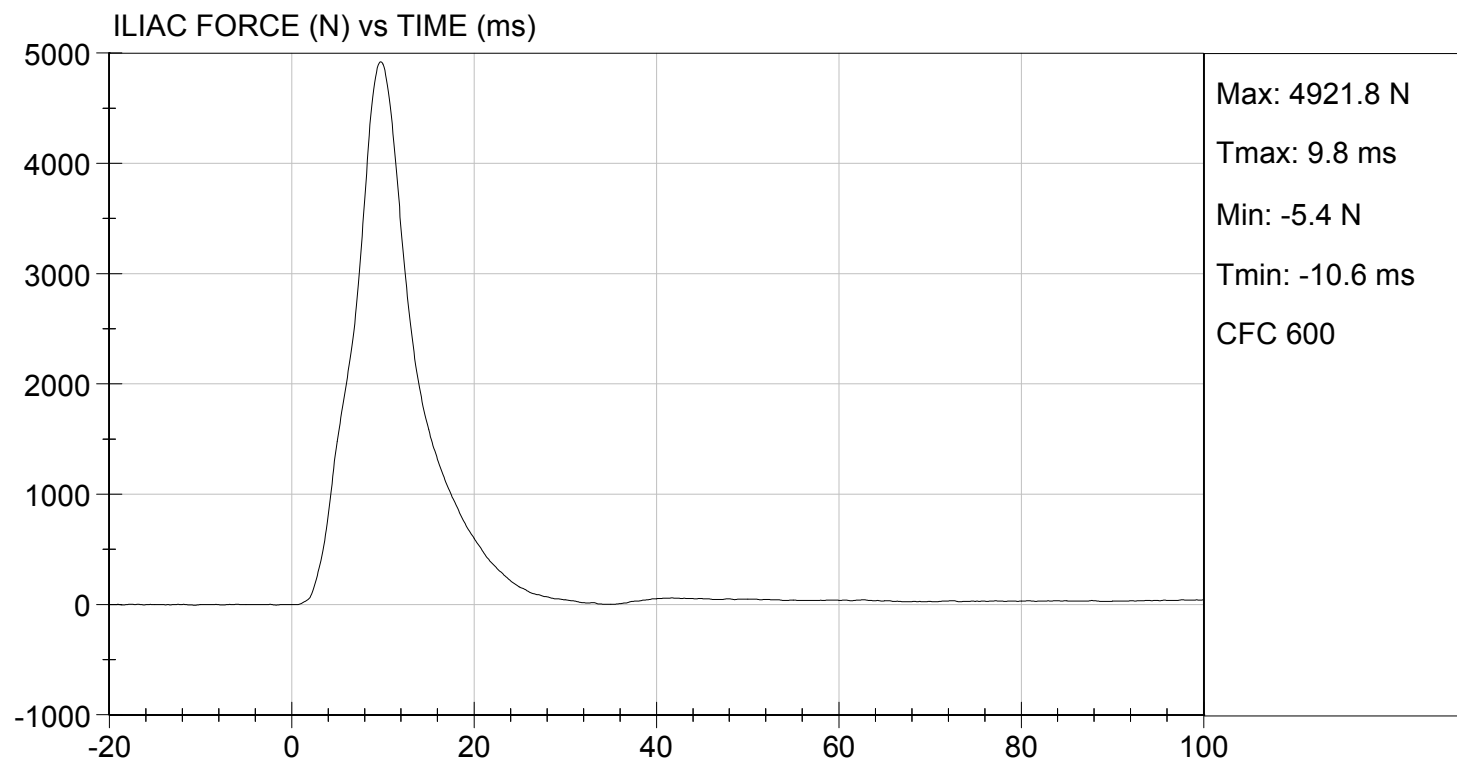
TEST DATE: 02/05/2014
TEST #: D14428



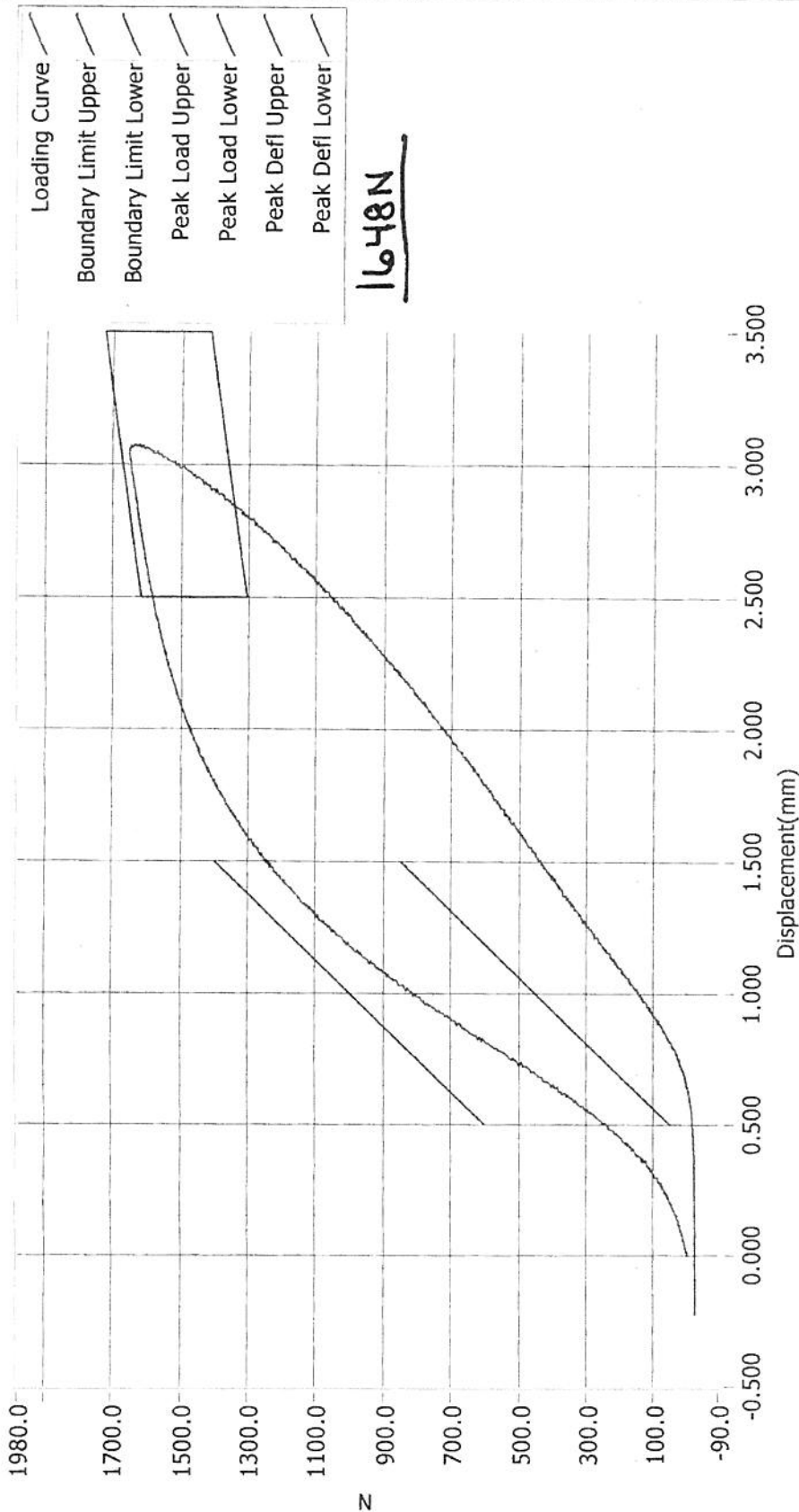


TEST DESC: ILLIAC
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 02/05/2014
TEST #: D14428



Resultant Data - SIDIIs Plug Compression

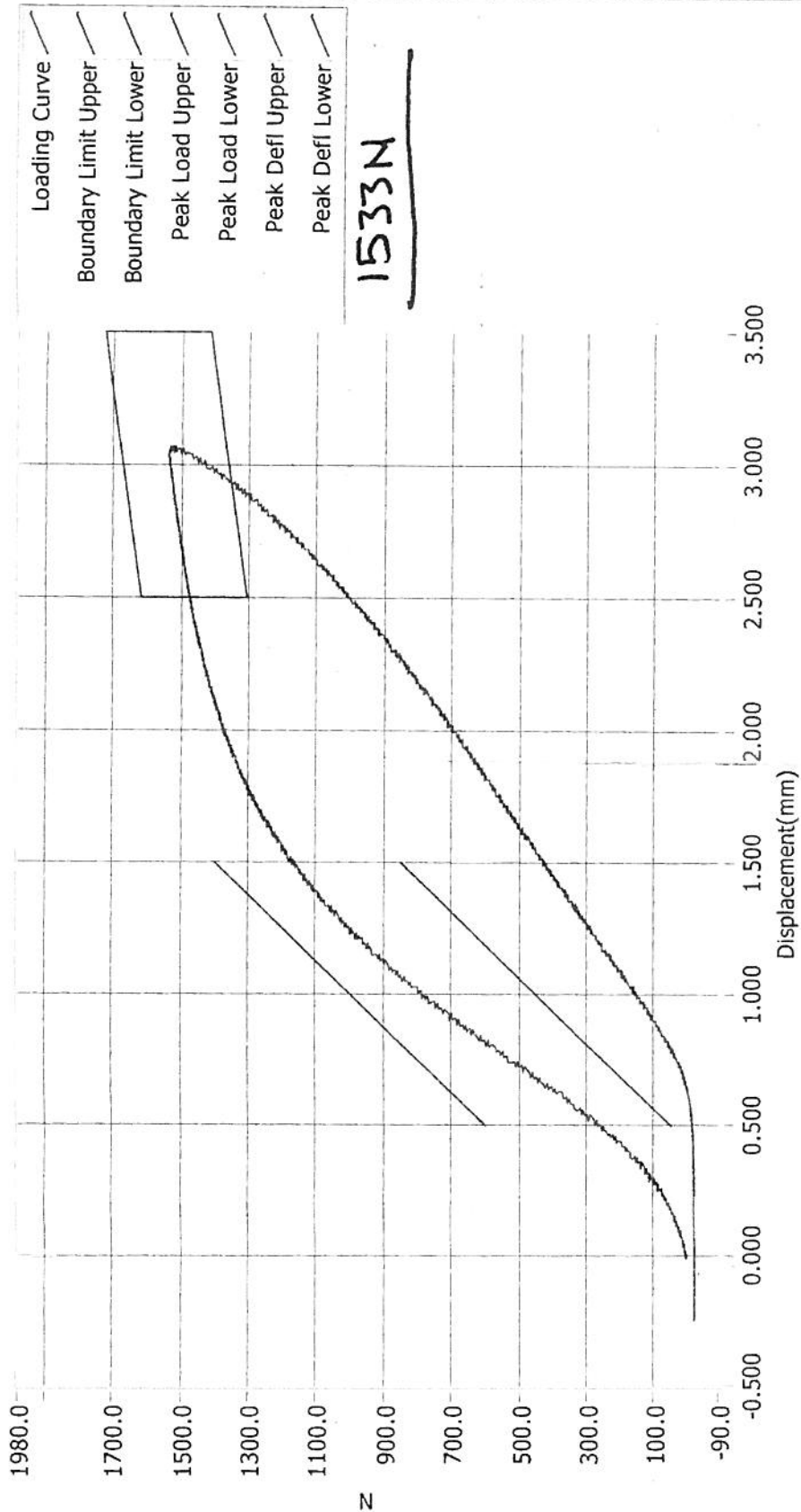


ATD Calibration Lab

<u>Test ID</u>	<u>Part Serial Number</u>	<u>Test Date</u>	<u>Test Time</u>
	63333	1/24/2013	11:31 PM
<u>Cert ID</u>	<u>ATD Serial Number</u>	<u>ATD Type</u>	
	N/A	SIDIIs	

Current Date : 1/24/2013 Current Time : 23:31:54

Resultant Data - SIDIIs Plug Compression



ATD Calibration Lab

Test ID	Part Serial Number	Test Date	Test Time
	63420	1/28/2013	7:47 PM
Cert ID	ATD Serial Number	ATD Type	
	N/A	SIDIIs	

Current Date : 1/28/2013 Current Time : 19:48:01

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	P79874	Endevco	09/17/13
		Y	P79875	Endevco	09/17/13
		Z	P79876	Endevco	09/17/13
		Xr	P79877	Endevco	09/17/13
		Yr	P79878	Endevco	09/17/13
		Zr	P79879	Endevco	09/17/13
Thorax Rib Displacement Potentiometers	Upper	Y	G176	Honeywell	09/19/13
	Middle	Y	G169	Honeywell	09/19/13
	Lower	Y	G164	Honeywell	09/19/13
Abdomen Load Cells	Forward	Y	ABG1513	Denton	04/22/13
	Middle	Y	ABG1531	Denton	04/22/13
	Rear	Y	ABG1536	Denton	04/22/13
Lower Spine Accelerometers (T12)		X	P78709	Endevco	09/17/13
		Y	P78710	Endevco	09/17/13
		Z	P78712	Endevco	09/17/13
Public Symphysis Load Cell		Y	PG462	Denton	04/22/13

Table 2 – Dummy Instrumentation (SID-IIs)

				SID-IIs S/N 296			
				Serial Number	Manufacturer	Calibration Date	
Head CG Accelerometers				X	P73999	Endevco	09/17/13
				Y	P74001	Endevco	09/17/13
				Z	P74002	Endevco	09/17/13
				Xr	P74003	Endevco	09/17/13
				Yr	P74004	Endevco	09/17/13
				Zr	P74005	Endevco	09/17/13
Displacement Potentiometers	Thoracic Rib	Upper	Y	G012	Servo	09/24/13	
		Middle	Y	G1163	FTSS	09/24/13	
		Lower	Y	G1158	FTSS	09/24/13	
	Abdominal Rib	Upper	Y	G1146	FTSS	09/24/13	
		Lower	Y	G1126	FTSS	09/24/13	
Lower Spine Accelerometers (T12)				X	P79445	Endevco	09/23/13
				Y	P79447	Endevco	09/23/13
				Z	P79448	Endevco	09/23/13
Acetabulum Load Cell				Y	ACG268	Denton	01/09/14
Iliac Wing Load Cell				Y	IWG282	Denton	01/09/14
Pelvis Plug (struck side)					63333	FTSS	01/24/13
Pelvis Plug (non-struck side)					63420	FTSS	01/28/13

Table 3 – Vehicle Instrumentation

			Serial Number	Manufacturer	Calibration Date
1	Vehicle Center of Gravity	X	P73134	Endevco	10/02/13
	Vehicle Center of Gravity	Y	P73135	Endevco	10/02/13
	Vehicle Center of Gravity	Z	P73133	Endevco	10/02/13
2	Right Sill at Front Seat	X	P59625	Endevco	01/15/14
	Right Sill at Front Seat	Y	P59624	Endevco	01/15/14
	Right Sill at Front Seat	Z	P59623	Endevco	01/15/14
3	Right Sill at Rear Seat	X	P73892	Endevco	08/13/13
	Right Sill at Rear Seat	Y	P73891	Endevco	08/13/13
	Right Sill at Rear Seat	Z	P73890	Endevco	08/13/13
4	Left Sill at Front Door	Y	P78706	Endevco	01/06/14
5	Left Sill at Rear Door	Y	P73757	Endevco	01/14/14
6	Left A-Post Lower	Y	P78733	Endevco	11/06/13
7	Left A-Post Middle	Y	P68872	Endevco	08/15/13
8	Left B-Post Lower	Y	P72856	Endevco	09/26/13
9	Left B-Post Middle	Y	P67884	Endevco	12/23/13
10	Front Seat Track	Y	P73128	Endevco	09/26/13
11	Rear Seat Track or Structure	Y	P78947	Endevco	01/06/14
12	Right Rear Occ. Compartment	Y	P67513	Endevco	12/23/13
13	Engine Block	X	P73696	Endevco	09/26/13
	Engine Block	Y	P73695	Endevco	09/26/13
14	Rear Floorpan Above Axle	X	P73140	Endevco	10/30/13
	Rear Floorpan Above Axle	Y	P73141	Endevco	10/30/13
	Rear Floorpan Above Axle	Z	P73142	Endevco	10/30/13

Table 4 – MDB Instrumentation

		Serial Number	Manufacturer	Calibration Date
MDB Center of Gravity	X	P66819	Endevco	12/11/13
MDB Center of Gravity	Y	P66820	Endevco	12/11/13
MDB Center of Gravity	Z	P66821	Endevco	12/11/13
Left Frame at Rear Axle Centerline	X	P74310	Endevco	12/11/13
Left Frame at Rear Axle Centerline	Y	P74311	Endevco	12/11/13