

REPORT NUMBER: SPNCAP-MGA-2016-058

**NEW CAR ASSESSMENT PROGRAM (NCAP)
Side Impact Pole Test**

**SAIC GENERAL MOTORS CORPORATION LIMITED
2016 Buick Envision AWD Premium II 5-Door SUV
NHTSA No.: O20160106**

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



Test Date: September 28, 2016

Final Report Date: October 27, 2016

FINAL REPORT

**U.S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Office of Crashworthiness Standards
Mail Code: NRM-110
1200 New Jersey Ave, SE
Room W43-410
Washington, DC 20590**

This publication is distributed by the U.S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration. The United States Government assumes no liability for its contents or use thereof.

If trade or manufacturers' names or products are mentioned, it is only because they are considered essential to the object of the publication and should not be construed as an endorsement. The United States Government does not endorse products or manufacturers.

Prepared by: 
Ben Fischer, Project Engineer

Approved by: 
Robert Schnorenberg, Project Engineer

Approval Date: October 27, 2016

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. SPNCAP-MGA-2016-058	2. Government Accession No.	3. Recipient's Catalog No.																													
4. Title and Subtitle Final Report of New Car Assessment Program Side Impact Pole Testing of a 2016 Buick Envision AWD Premium II 5-Door SUV, NHTSA No.: O20160106		5. Report Date October 27, 2016																													
		6. Performing Organization Code MGA																													
7. Author(s) Ben Fischer, Project Engineer		8. Performing Organization Report No. SPNCAP-MGA-2016-058																													
9. Performing Organization Name and Address MGA Research Corporation 5000 Warren Road Burlington, WI 53105		10. Work Unit No.																													
		11. Contract or Grant No. DTNH22-14-D-00353																													
12. Sponsoring Agency Name and Address United States Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards (NRM-110) 1200 New Jersey Ave, SE, Room W43-410 Washington, DC 20590		13. Type of Report and Period Covered: Final Test Report September 28, 2016 to October 27, 2016																													
		14. Sponsoring Agency Code NRM-110																													
15. Supplementary Notes																															
16. Abstract A 32.20 km/h, 75° oblique impact Side NCAP Test was conducted on the subject 2016 Buick Envision AWD Premium II 5-Door SUV in accordance with the specifications of the Office of Crashworthiness Standards Side NCAP Pole Laboratory Test Procedure for the generation of consumer information on vehicle side pole crash protection. The test was conducted at MGA Research Corporation in Burlington, Wisconsin on September 28, 2016. The impact velocity was 32.18 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle at the time of impact was 21.7°C. The test vehicle post-test maximum crush was 298 mm at level 3. The test vehicle's performance was as follows: <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th></th> <th colspan="3" style="text-align: center;">Driver ATD (SID-IIs)</th> </tr> <tr> <th style="text-align: left;">Measurement Description</th> <th style="text-align: center;">Units</th> <th style="text-align: center;">Threshold</th> <th style="text-align: center;">Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₃₆)</td> <td style="text-align: center;">N/A</td> <td style="text-align: center;">1000</td> <td style="text-align: center;">247</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td style="text-align: center;">Gs</td> <td style="text-align: center;">82</td> <td style="text-align: center;">39</td> </tr> <tr> <td>Total Pelvic Force (sum of acetabular and iliac forces)</td> <td style="text-align: center;">N</td> <td style="text-align: center;">5525</td> <td style="text-align: center;">2124</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td style="text-align: center;">mm</td> <td style="text-align: center;">38*</td> <td style="text-align: center;">24</td> </tr> <tr> <td>Maximum Abdomen Rib Deflection</td> <td style="text-align: center;">mm</td> <td style="text-align: center;">45*</td> <td style="text-align: center;">24</td> </tr> </tbody> </table> *Proposed IARV					Driver ATD (SID-IIs)			Measurement Description	Units	Threshold	Result	Head Injury Criteria (HIC ₃₆)	N/A	1000	247	Resultant Lower Spine Acceleration	Gs	82	39	Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2124	Maximum Thoracic Rib Deflection	mm	38*	24	Maximum Abdomen Rib Deflection	mm	45*	24
	Driver ATD (SID-IIs)																														
Measurement Description	Units	Threshold	Result																												
Head Injury Criteria (HIC ₃₆)	N/A	1000	247																												
Resultant Lower Spine Acceleration	Gs	82	39																												
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2124																												
Maximum Thoracic Rib Deflection	mm	38*	24																												
Maximum Abdomen Rib Deflection	mm	45*	24																												
The door on the struck side of the vehicle did not separate from the body at the hinges or latches and the opposite door did not open during the side impact event.																															
17. Key Words New Car Assessment Program (NCAP) Side Impact Pole Part 572V SID-IIs		18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Administration Technical Information Services Division, NPO-411 1200 New Jersey Ave, SE Washington, DC 20590 e-mail: tis@nhtsa.dot.gov FAX: 202-493-2833																													
19. Security Classification of Report Unclassified	20. Security Classification of Page Unclassified	21. No. of Pages 136	22. Price																												

TABLE OF CONTENTS

<u>Section</u>		<u>Page No.</u>
----------------	--	-----------------

1	Test Purpose and Procedure	1
2	Summary of Test Results	2
3	Occupant and Vehicle Information	4

<u>Data Sheet No.</u>		<u>Page No.</u>
-----------------------	--	-----------------

1	General Test and Vehicle Parameter Data	5
2	Seat, Seat Belt, Steering Wheel Adjustment and Fuel System Data	8
3	Dummy Longitudinal Clearance Dimensions	11
4	Dummy Lateral Clearance Dimensions	12
5	Camera and Instrumentation Data	13
6	Vehicle Accelerometer Data	14
7	Rigid Pole Load Cell Data	15
8	Post-Test Observations	16
9	Vehicle Profile Measurements	18
10	Vehicle Exterior Crush Measurements	19
11	Vehicle Damage Profile Distances	22
12	FMVSS No. 301 Static Rollover Results	23
13	Dummy/Vehicle Temperature Stabilization Data	24

Appendix

A	Photographs	A
B	Vehicle and Dummy Response Data Plots	B
C	Dummy Configuration and Performance Verification Data	C
D	Test Equipment and Instrumentation Calibration Data	D

SECTION 1

TEST PURPOSE AND PROCEDURE

This side impact test is part of the MY 2016 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-14-D-00353. The purpose of this test is to generate comparative side impact performance in a 2016 Buick Envision AWD Premium II 5-Door SUV. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Side NCAP Pole Laboratory Test Procedure, dated October 2015.

SECTION 2 SUMMARY OF TEST RESULTS

A rigid pole side impact test was conducted on a 2016 Buick Envision AWD Premium II 5-Door SUV. The subject vehicle was towed into the rigid pole at an angle of 75° and a velocity of 32.18 km/h. The test was conducted by MGA Research Corporation in Burlington, Wisconsin on September 28, 2016. Pre-test and post-test photographs of the test vehicle and side impact dummy (SID-IIs) are included in Appendix A of this report.

One Part 572V (SID-IIs) dummy was placed in the driver designated seating position according to instructions specified in the OCWS Side NCAP Pole Laboratory Test Procedure dated October 2015. Camera locations and other pertinent camera information are included in this report.

The Part 572V (SID-IIs) dummy was instrumented accordingly:

Primary and Redundant Head CG Triaxial Accelerometers
Thorax Upper, Middle, and Lower Rib Displacement Potentiometers
Abdomen Upper Rib and Lower Rib Displacement Potentiometers
Lower Spine (T12) Triaxial Accelerometers
Iliac Load Cell
Acetabulum Load Cell

Appendix B contains the vehicle and 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.

Injury readings for the SID-IIs dummy were recorded as follows:

Measurement Description	Driver ATD (SID-IIs)		
	Units	Threshold	Result
Head Injury Criteria (HIC ₃₆)	N/A	1000	247
Resultant Lower Spine Acceleration	Gs	82	39
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2124
Maximum Thoracic Rib Deflection	mm	38*	24
Maximum Abdominal Rib Deflection	mm	45*	24

*Proposed IARV

Supplemental restraint information is given below:

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	Yes	Yes
Seat Belt Pretensioner	Yes	Yes	No	
Seat Belt Load Limiter	Yes		No	
Other				

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

GENERAL COMMENTS

Left Floor Sill Y recorded no valid data after 53ms.

Left B-Post @ Sill Y recorded no valid data after 24ms.

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

SECTION 3
OCCUPANT AND VEHICLE INFORMATION

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2016 Buick Envision AWD Premium II 5-Door SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No. O20160106
Test Date: 9/28/2016

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	O20160106	Traction Control System (TCS)	Yes
Model Year	2016	Auto-Leveling System	No
Make	Buick	Automatic Door Locks (ADL)	Yes
Model	Envision AWD Premium II	Power Window Auto-Reverse	Yes
Body Style	5-Door SUV	Other Optional Feature	N/A
VIN	LRBFXFSX6GD172666	Driver Front Airbag	Yes
Body Color	Midnight Amethyst Metallic	Driver Curtain Airbag	Yes
Odometer Reading (km/mi)	37km / 23mi	Driver Head/Torso Airbag	No
Engine Displacement (L)	2.0 L	Driver Torso Airbag	No
Type/No. Cylinders	I4	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	AWD	Rear Pass. Torso Airbag	No
Roof Rack	No	Rear Pass. Torso/Pelvis Airbag	Yes
Sunroof/T-Top	Yes	Rear Pass. Pelvis Airbag	No
Running Boards	No	Driver Seat Belt Pretensioner	Yes
Tilt Steering Wheel	Yes	Rear Pass. Seat Belt Pretensioner	No
Power Seats	Yes	Driver Load Limiter	Yes
Anti-Lock Brakes (ABS)	Yes	Rear Pass. Load Limiter	No
		Other Restraint Feature	N/A

Does owner's manual provide instructions to turn off automatic door locks?	No
--	----

DATA FROM CERTIFICATION LABEL

Manufactured By	SAIC GENERAL MOTORS CORPORATION LIMITED	GVWR (kg)	2380
Date of Manufacture	04/16	GAWR Front (kg)	1248
Vehicle Type	MPV	GAWR Rear (kg)	1300

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	2	3		5	(A)
Capacity Weight (VCW) (kg)				432	(B)
DSC x 68.04 kg				340	(A-B)
Rated Cargo and Luggage Weight (RCLW) (kg)				92	

VEHICLE SEAT TYPE

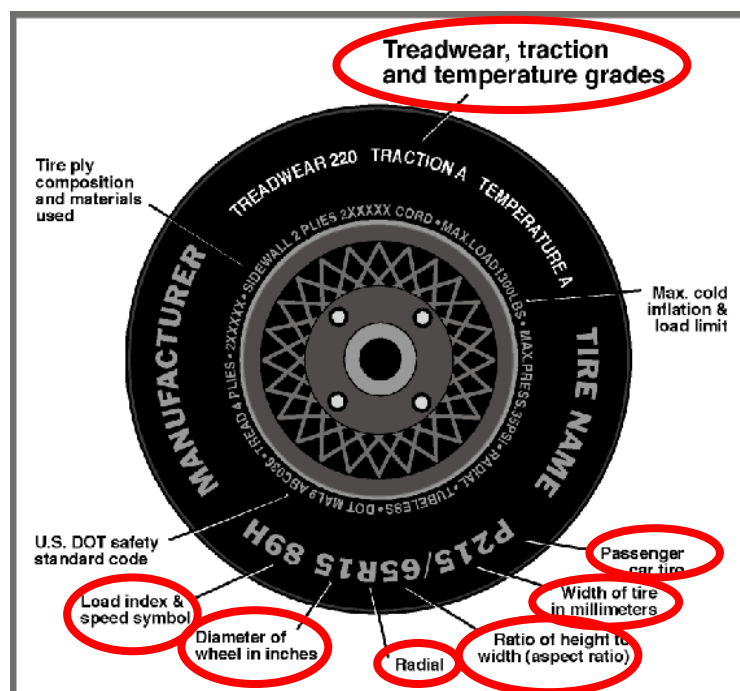
Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						Manual	Power
Front Seat	X						X
Rear or Second Row			X			w/ Lever	
Third Row Seat							

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

Test Vehicle: 2016 Buick Envision AWD Premium II 5-Door SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No. O20160106
 Test Date: 9/28/2016

VEHICLE TIRE INFORMATION



Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	240	240
Recommended Tire Size	235/50R19	235/50R19
Tire Size on Vehicle	235/50R19	235/50R19
Tire Manufacturer	Hankook	Hankook
Tire Model	Ventus Si Noble	Ventus Si Noble
Treadwear	500	500
Traction	A	A
Temperature Grade	A	A
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Steel, 2 Polyester, 2 Nylon	2 Steel, 2 Polyester, 2 Nylon
Load Index/Speed Symbol	99H	99H
Tire Material	Rubber	Rubber
DOT Safety Code Left	1G23 1AH 1316	1G23 1AH 1316
DOT Safety Code Right	1G23 1AH 1316	1G23 1AH 1316

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

Test Vehicle: 2016 Buick Envision AWD Premium II 5-Door SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No. O20160106
 Test Date: 9/28/2016

TEST PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kpa	214	220	220	228
Tire Placard	kpa	240	240	240	240
Owner's Manual	kpa	240	240	240	240
As Tested	kpa	240	240	240	240

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	541.5	392.5		554.0	453.0		562.5	463.5	
Right	kg	539.0	370.0		548.5	424.5		537.5	423.5	
Ratio	%	58.6%	41.4%		55.7%	44.3%		55.4%	44.6%	
Totals	kg	1080.5	762.5	1843.0	1102.5	877.5	1980.0	1100.0	887.0	1987.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1843.0	(A)
Actual Weight of 1 P572V ATD (SID-IIs) ATD Used	kg	52	(B)
Rated Cargo/Luggage Weight (RCLW)	kg	92	(C)
Calculated Vehicle Target Weight (TVTW)	kg	1987.0	(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	As Delivered	As Tested	Fully Loaded	Meets Requirement***
Driver Door Sill Angle (front-to-rear)*	deg	-0.1	0.3	0.6	Yes
Front Pass. Sill Angle (front-to-rear)*	deg	-0.7	-0.4	-0.3	Yes
Front Bumper Angle (left-to-right)**	deg	0.3	0.3	0.3	Yes
Rear Bumper Angle (left-to-right)**	deg	0.3	0.2	0.2	Yes
Vehicle CG (Aft of Front Axle)	mm	1139	1219	1227	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	11	16	29	

*ND=Nose Down (-), NU=Nose Up (+) ** LD=Left Down (-), LU=Left Up (+)

*** The "As Tested" vehicle attitude measurements must be equal to or between the "As Delivered" and "Fully Loaded" vehicle attitude measurements.

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Ballast (if any)	39
None	

Test height adjustable suspension setting, if applicable:	Not Applicable
---	----------------

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

Test Vehicle: 2016 Buick Envision AWD Premium II 5-Door SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No. O20160106
 Test Date: 9/28/2016

SEAT POSITIONING

The driver's seat, front center seat (if applicable), and right front passenger's seat should be set to the forward-most, mid-height, 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	20.2	10.1	15.2
Front Passenger Seat	22.4	11.4	16.9
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 SCRIP Height (mm)	SCRIP Height Position	SCRIP Height (mm)		
				Rear- most	Mid- Fore/Aft	Forward- Most
Driver Seat	15.2	32	Max	64	64	64
			Mid	32	32	32
			Min	0	0	0
Front Passenger Seat	16.9	32	Max	64	64	64
			Mid	32	32	32
			Min	0	0	0
Front Center Seat			Max			
			Mid			
			Min			
Struck Side Rear Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed

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

Test Vehicle: 2016 Buick Envision AWD Premium II 5-Door SUV
 Test Program: NCAP Side Pole Impact Test

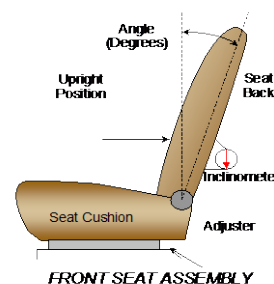
NHTSA No. O20160106
 Test Date: 9/28/2016

SEAT FORE/AFT POSITIONS

Seat	Total Fore/Aft Travel		Test Position from Forward-most Position	
	mm	Detents	mm	Detent
Driver Seat	245		0	
Front Passenger Seat	245		0	
Front Center Seat				
Struck Side Rear Seat	180	19 (1 st as 1)	180	18 th (1 st as 0)
Non-Struck Side Rear Seat	180	19 (1 st as 1)	180	18 th (1 st as 0)
Rear Center Seat	180	19 (1 st as 1)	180	18 th (1 st as 0)

SEAT BACK ANGLE ADJUSTMENT

The driver's seat back is positioned such that the dummy's head is level. The front center and front passenger's seat backs are positioned in a similar manner as the driver's seat back. The struck-side rear passenger seat back is positioned in accordance with the information provided by the manufacturer on Form No. 1 for the 5th percentile female dummy in a Side NCAP MDB test. The rear center and non-struck side rear passenger's seat back is set to match the struck-side rear seat back.



Seat	Total Seat Back Angle Range		Test Position from Vertical	
	Degrees	Detents	Degree	Detent
Driver Seat w/Seated Dummy	66.8		-8.6	
Front Passenger Seat	66.0		-8.6	
Front Center Seat				
Struck Side Rear Seat	18.0	10 (1 st as 1)	7.2	3 rd (1 st as 0)
Non-Struck Side Rear Seat	18.0	10 (1 st as 1)	7.2	3 rd (1 st as 0)
Rear Center Seat	18.0	10 (1 st as 1)	7.2	3 rd (1 st as 0)

Seat back angles measured on outboard headrest post.

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	0 (Uppermost as 0)

HEAD RESTRAINT ADJUSTMENT

Head restraints are adjusted to the lowest and most full forward in-use position.

	Total # of Positions	Placed in Position #
Driver Seat	7	0 (Lowest as 0) / Foremost

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

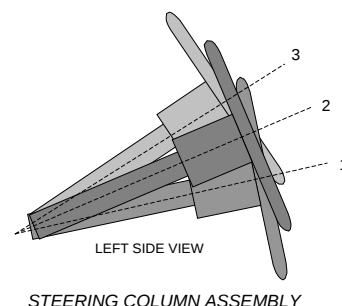
Test Vehicle: 2016 Buick Envision AWD Premium II 5-Door SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No. O20160106
 Test Date: 9/28/2016

STEERING COLUMN ADJUSTMENT

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

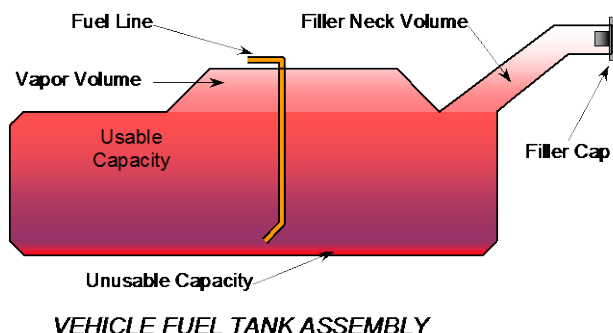
	Degrees	Fore/Aft Position (mm)
Lowermost, Position 1	69.2	217
Geometric Center, Position 2	66.6	242
Uppermost, Position 3	63.9	267
Telescoping Steering Wheel Travel		50
Test Position	66.6	242



FUEL PUMP

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

The test vehicle is equipped with an electronic fuel pump. Pump operates for 3.0 seconds after the ignition is switched to "ON", and afterwards only while the engine is cranking or running. The filler neck is located on the passenger's side.



FUEL TANK CAPACITY DATA

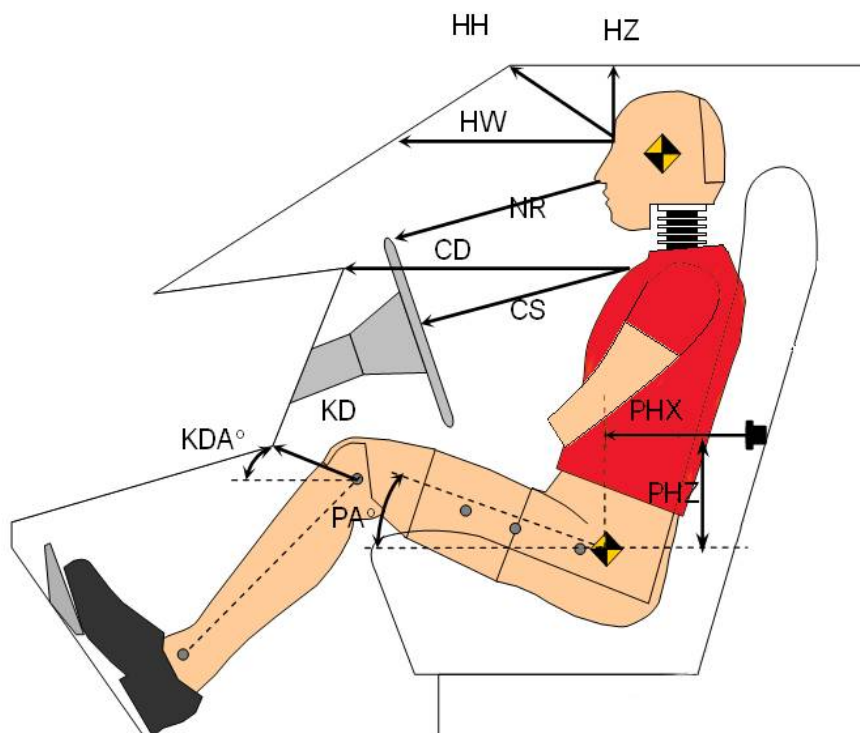
	Liters
Usable Capacity of "Standard Tank" (see Form No. 1)	65.5
Usable Capacity of "Optional Tank" (see Form No. 1)	
Usable Capacity of Standard Tank as Specified in Owner's Manual	65.5
Usable Capacity of Optional Tank as Specified in Owner's Manual	
93% of Usable Capacity	60.9
Actual Amount of Solvent Used	60.9
1/3 of Usable Capacity	21.8

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

.DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2016 Buick Envision AWD Premium II 5-Door SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No. O20160106
 Test Date: 9/28/2016



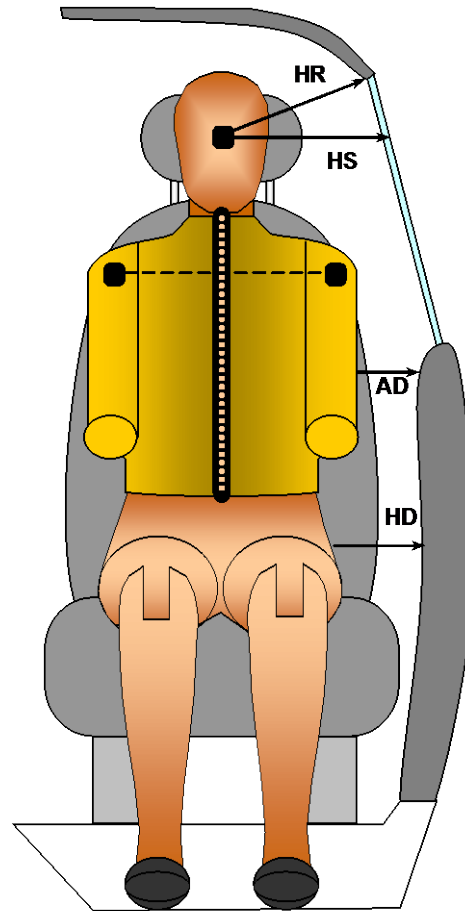
LEFT SIDE VIEW

Code	Measurement Description	Driver	
		Length (mm)	Angle (°)
HH	Head to Header	301	
HW	Head to Windshield	601	
HZ	Head to Roof Liner	206	
NR	Nose to Rim	258	
CD	Chest to Dashboard	414	
CS	Chest to Steering Wheel	193	
KDL/KDAL°	Left Knee to Dash	154	27.1
KDR/KDAR°	Right Knee to Dash	147	31.4
PAX°	Pelvic Tilt Angle (X-Axis)		19.1
PAY°	Pelvic Tilt Angle (Y-Axis)		-1.3
PHX	Hip Point to Striker (X-Axis)	288	
PHZ	Hip Point to Striker (Z-Axis)	80	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2016 Buick Envision AWD Premium II 5-Door SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No. O20160106
Test Date: 9/28/2016



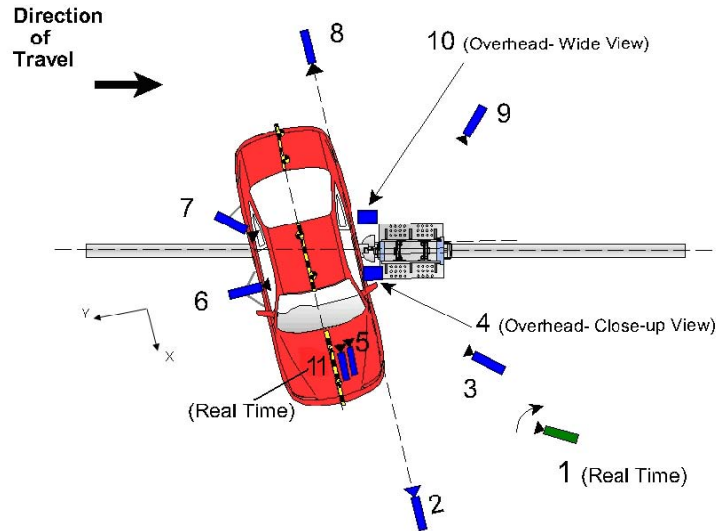
FRONT VIEW OF DUMMY

Code	Measurement Description	Driver
		Length (mm)
HR	Head to Side Header	226
HS	Head to Side Window	339
AD	Arm to Door	162
HD	Hip Point to Door	160

DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2016 Buick Envision AWD Premium II 5-Door SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No. O20160106
Test Date: 9/28/2016



Reference: (from Point of Impact for X and Y; from Ground for Z):
+X = Forward of Impact, + Y = Right of Impact, +Z = Down

Camera No.	View	Coordinates (mm)			Lens (mm)	Film Speed (fps)
		X*	Y*	Z*		
1	Real-Time Pan View					30
2	Front Ground Level	5990	30	-2070	24	1000
3	Impact Side 45° Forward	4220	-1780	-2050	20	1000
4	Overhead Closeup	0	0	-4890	50	1000
5	Onboard – Driver Front				16	1000
6	Onboard – Driver Side				8	1000
7	Onboard – Driver Rear				8	1000
8	Rear Ground Level	-6640	-1120	-2020	24	1000
9	Impact Side 45° Rearward	-3780	-3760	-2050	20	1000
10	Overhead Wide View	200	510	-4910	14	1000
11	Real-Time Dummy Front View					30

*All measurements accurate to ± 6 mm

Note: Vehicle was at a 75° angle to the rigid pole.

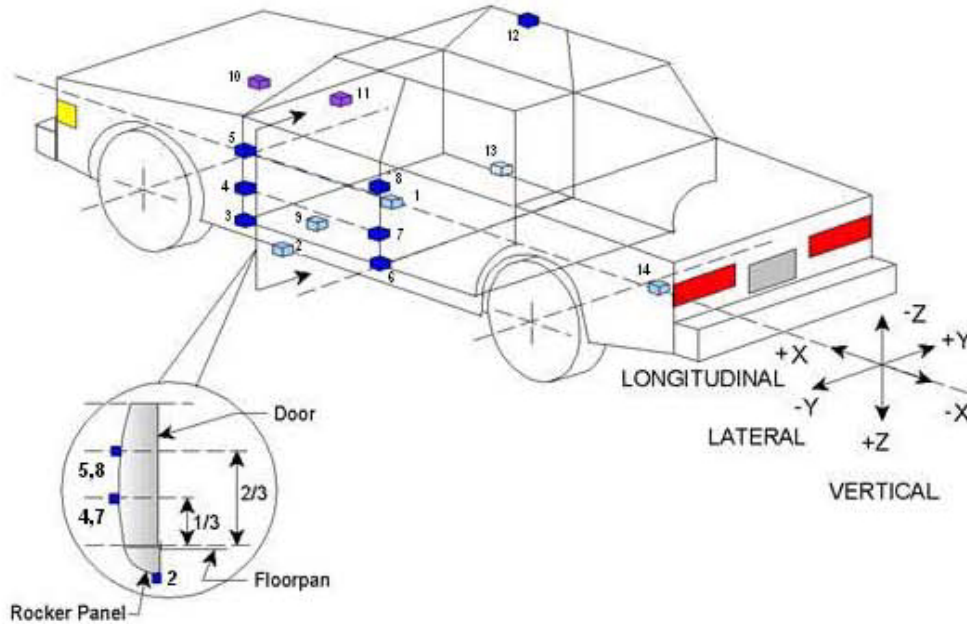
Explain why camera(s) did not operate as intended: None

INSTRUMENTATION	Number of Channels
Driver Dummy	19
Vehicle Structure	16
Pole Load Cells	8
TOTAL	43

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

Test Vehicle: 2016 Buick Envision AWD Premium II 5-Door SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No. O20160106
Test Date: 9/28/2016



	Accelerometer Location			
	ID	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2698	112	-466
2	Left Floor Sill	2748	-721	-270
3	A Pillar Sill	3135	-721	-257
4	A Pillar Low	3102	-838	-600
5	A Pillar Mid	3110	-823	-853
6	B Pillar Sill	2064	-721	-276
7	B Pillar Low	2098	-770	-680
8	B Pillar Mid	2022	-728	-934
9	Driver Seat Track	2200	-354	-347
10	Engine Top	3891	0	-888
11	Firewall	3560	0	-968
12	Right Roof	2118	559	-1650
13	Right Floor Sill	2754	721	-273
14	Rear Floorpan	880	0	-526

Reference:

X – Test Vehicle Rear Bumper (+forward)
Y – Test Vehicle Centerline (+ to right)
Z – Ground Plane (+ down)

DATA SHEET NO. 7
RIGID POLE LOAD CELL DATA

Test Vehicle: 2016 Buick Envision AWD Premium II 5-Door SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No. O20160106
Test Date: 9/28/2016



254 mm Diameter Rigid Pole

Load Cell Locations	
ID	Height From Impact Surface (mm)
1	182
2	470
3	698
4	986
5	1212
6	1641
7	1854
8	2053

DATA SHEET NO. 8
POST-TEST OBSERVATIONS

Test Vehicle: 2016 Buick Envision AWD Premium II 5-Door SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No. O20160106
Test Date: 9/28/2016

TEST DUMMY INFORMATION AND CONTACT POINTS

Description	Driver SID-IIs Dummy
Face	Curtain Airbag
Top of Head	Curtain Airbag
Left Side of Head	Curtain Airbag, Headrest
Back of Head	Curtain Airbag, Headrest, Seatback
Left Shoulder	Side Airbag
Upper Torso	Side Airbag
Lower Torso	Side Airbag
Left Hip	Side Airbag
Left Knee	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	Cracked
Side Window Damage	Left Front Window Cracked
Other Notable Effects	None

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

Test Vehicle: 2016 Buick Envision AWD Premium II 5-Door SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No. O20160106
 Test Date: 9/28/2016

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	Yes	Yes
Seat Belt Pretensioner	Yes	Yes	No	
Seat Belt Load Limiter	Yes		No	
Other				

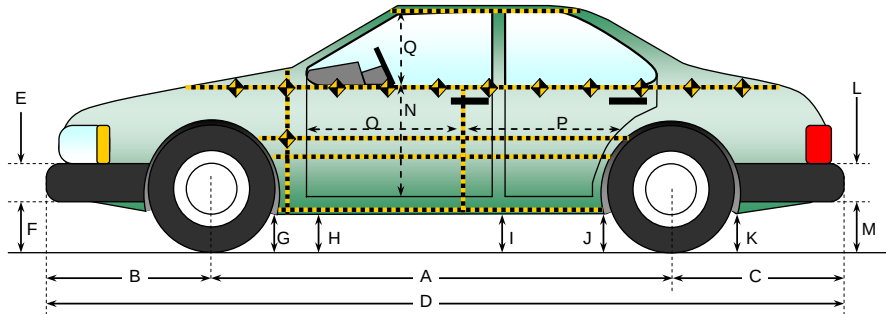
VEHICLE SPEED, VEHICLE ANGLE AT IMPACT, AND IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vertical Impact Reference Line (Aft of Front Axle) (Intended Impact Point)	mm		1123
Actual Impact Point (Aft of Front Axle)	mm		1124
Horizontal Offset (+forward / -rearward)	mm	+/- 38 of Intended Impact Point	-1
Angle Between Vehicle's Longitudinal Centerline and Line of Forward Motion	deg	75 +/- 3	75
Trap No. 1 Velocity (Primary)	km/h	31.4 to 33.0	32.18
Trap No. 2 Velocity (Redundant)	km/h	31.4 to 33.0	32.29

DATA SHEET NO. 9
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2016 Buick Envision AWD Premium II 5-Door SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No. O20160106
Test Date: 9/28/2016



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

LEFT SIDE VIEW

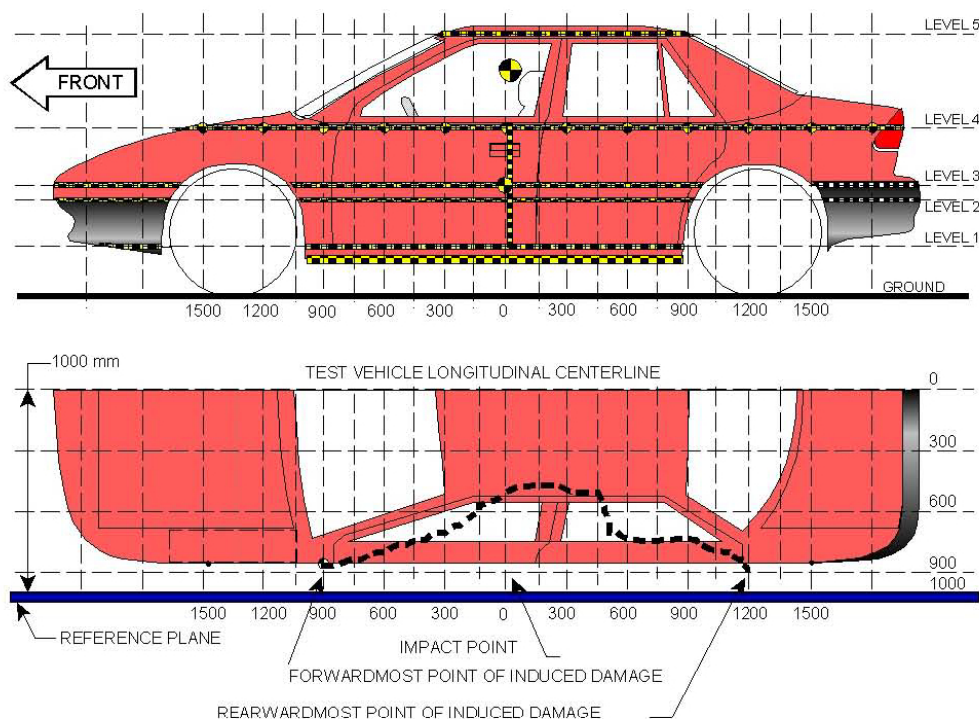
VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2752	2671	81
B	Front Axle to FSOV	1000	1047	-47
C	Rear Axle to RSOV	929	932	-3
D	Total Vehicle Length at Centerline	4681	4650	31
E	Front Bumper Thickness	100	100	0
F	Front Bumper Bottom to Ground	268	275	-7
G	Sill Height at Front Wheel Well	247	250	-3
H	Sill Height at Front Door Leading Edge	247	252	-5
I	Sill Height at B-Pillar	248	260	-12
J1	Sill Height at Rear Wheel Well	247	257	-10
J2	Pinch Weld Height at Rear Wheel Well	248	257	-9
K	Sill Height Aft of Rear Wheel Well	275	267	8
L	Rear Bumper Thickness	114	114	0
M	Rear Bumper Bottom to Ground	322	307	15
N	Sill Height to Bottom of Front Window Sill	874	873	1
O	Front Door Leading Edge to Impact CL	638	539	99
P	Rear Door Trailing Edge to Impact CL	1321	1221	100
Q	Front Window Opening	460	409	51
R	Right Side Length	3699	3711	-12
S	Left Side Length	3699	3614	85
T	Vehicle Width at B-Pillars	1810	1779	31

DATA SHEET NO. 10 **VEHICLE EXTERIOR CRUSH MEASUREMENTS**

Test Vehicle: 2016 Buick Envision AWD Premium II 5-Door SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No. O20160106
 Test Date: 9/28/2016



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

MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Height Above Ground (mm)	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	354	254	75
2	Occupant Hip Point	680	296	75
3	Mid Door	704	298	75
4	Window Sill	1056	266	75
5	Window Top	1590	59	75

DATA SHEET NO. 10 (CONTINUED)
VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2016 Buick Envision AWD Premium II 5-Door SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No. O20160106
 Test Date: 9/28/2016

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-2700															
-2550															
-2400															
-2250															
-2100															
-1950															
-1800															
-1650															
-1500															
-1350				318					299					-19	
-1200				306					291					-15	
-1050				295					287					-8	
-900				292					293					1	
-825															
-750		187	186	292			189	189	294			2	3	2	
-675	209	186	186	291		208	192	192	294		-1	6	6	3	
-600	211	190	193	289		269	183	184	295		58	-7	-9	6	
-525	220	199	202	286		290	222	221	301		70	23	19	15	
-450	225	207	209	283		307	264	263	319		82	57	54	36	
-375	227	210	210	277		321	300	301	342		94	90	91	65	
-300	228	210	210	274		335	325	328	361		107	115	118	87	
-225	227	210	209	269		353	347	350	390		126	137	141	121	
-150	226	208	203	268		375	388	388	424		149	180	185	156	
-75	226	208	206	264		441	438	440	466		215	230	234	202	
0	226	206	205	259	541	471	476	488	511	599	245	270	283	252	58
75	227	205	204	256	533	481	501	502	522	592	254	296	298	266	59
150	227	203	203	257	526	449	478	480	497	579	222	275	277	240	53
225	227	202	201	247	521	410	425	426	445	573	183	223	225	198	52
300	227	201	202	242	517	368	357	358	386	563	141	156	156	144	46
375	228	200	200	237	517	319	295	297	332	557	91	95	97	95	40
450	228	199	199	234	514	270	248	249	293	554	42	49	50	59	40
525	230	198	193	230	514	269	244	245	285	550	39	46	52	55	36
600	230	197	192	227	512	266	240	240	278	546	36	43	48	51	34
675															
750	228	196	196	221	511	256	230	229	263	537	28	34	33	42	26
825															
900	225	195	194	221	510	245	220	220	256	532	20	25	26	35	22
1050	215	194	193	225	511	222	207	208	246	526	7	13	15	21	15
1200		192	187	232	515		195	193	240	525		3	6	8	10
1350		181	181	233	522		199	208	226	528		18	27	-7	6
1500				238	529				254	533				16	4
1650				242	540				255	544				13	4
1800				248					259					11	
1950				258					266					8	
2100															
2250															
2400															
2550															
2700															

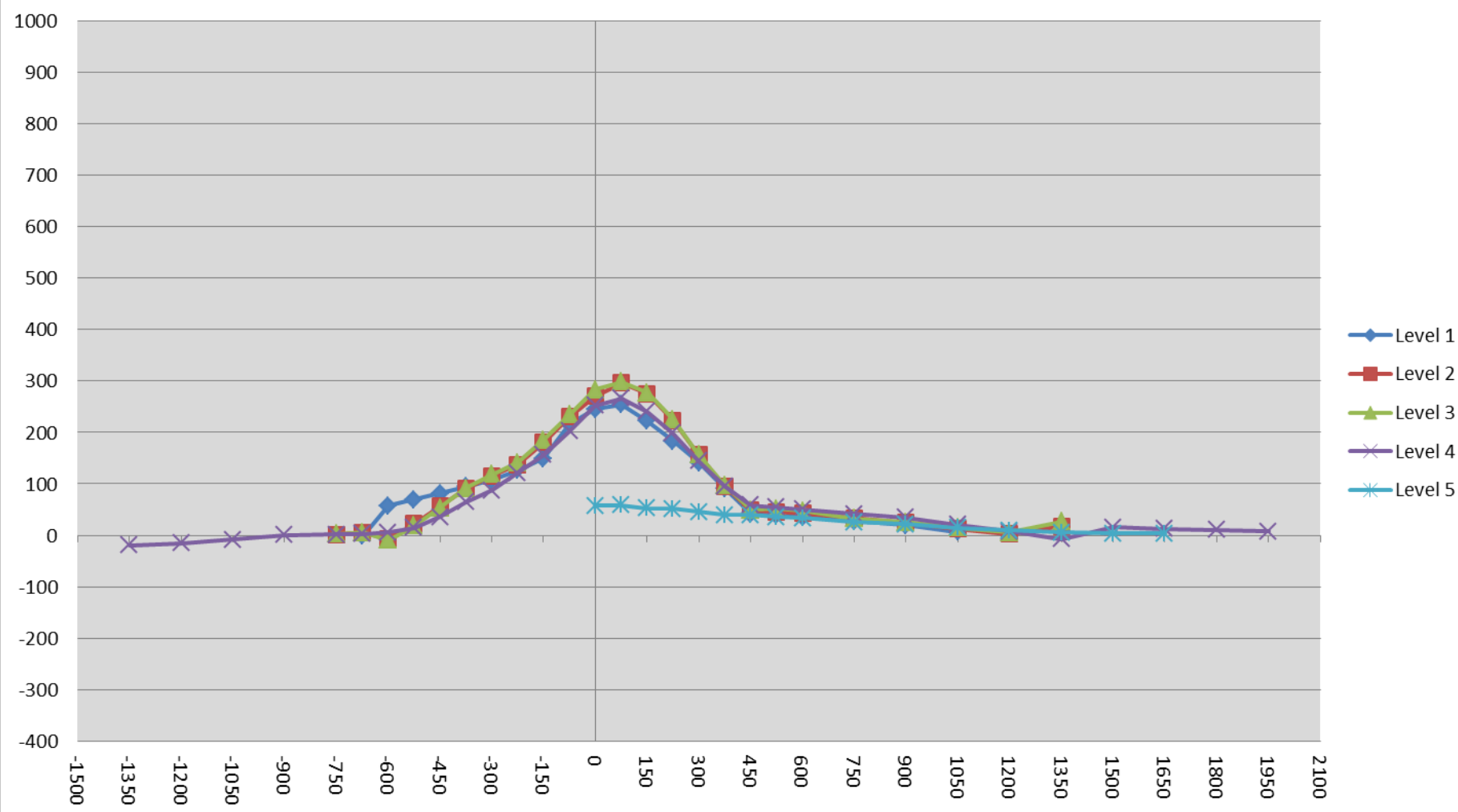
Pre-test measurements are taken when the vehicle is in the "As Tested" weight condition. Vehicle measurements forward of the vertical impact reference line are negative. The crush pile grid is established prior to the test based on an estimated impact point. The final distance from impact is determined after the final dummy positioning and the pole is aligned with the center of gravity of the dummy's head.

DATA SHEET NO. 10 (CONTINUED)
VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2016 Buick Envision AWD Premium II 5-Door SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No. O20160106
Test Date: 9/28/2016

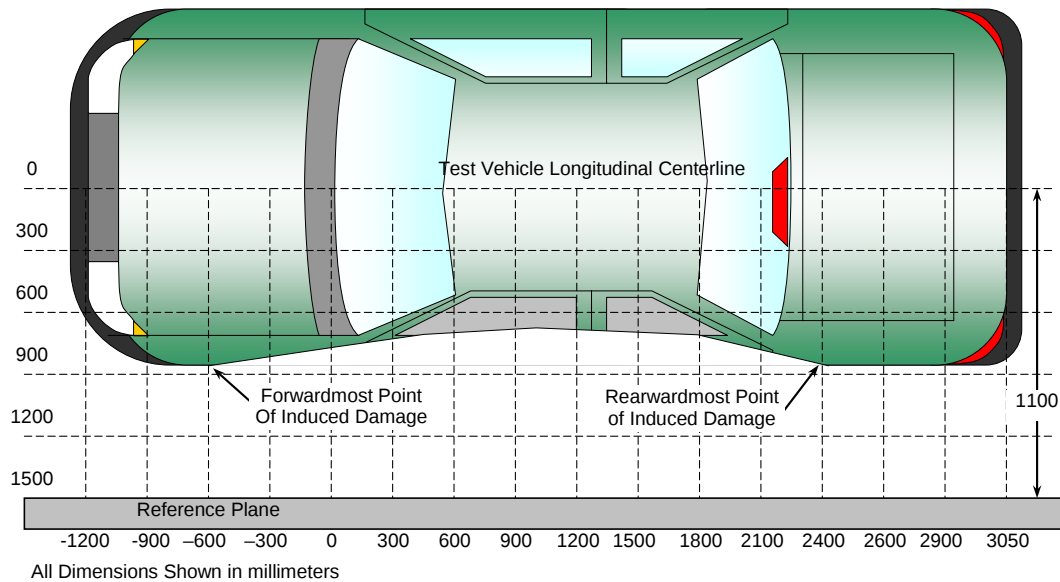
21



DATA SHEET NO. 11 **VEHICLE DAMAGE PROFILE DISTANCES**

Test Vehicle: 2016 Buick Envision AWD Premium II 5-Door SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No. O20160106
 Test Date: 9/28/2016



TOP VIEW

DAMAGE PROFILE DISTANCES

DPD	Distance from Impact Point (mm)	Level	Pre-Test (mm)	Post-Test (mm)	Crush (mm)
1	438	3	199	249	50
2	310	3	201	440	239
3	-19	3	205	481	276
4	-247	3	210	343	133
5	-476	3	207	251	44
6	-704	3	186	192	6

DATA SHEET NO. 12
FMVSS NO. 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2016 Buick Envision AWD Premium II 5-Door SUV
 Test Program: NCAP Side Pole Impact Test

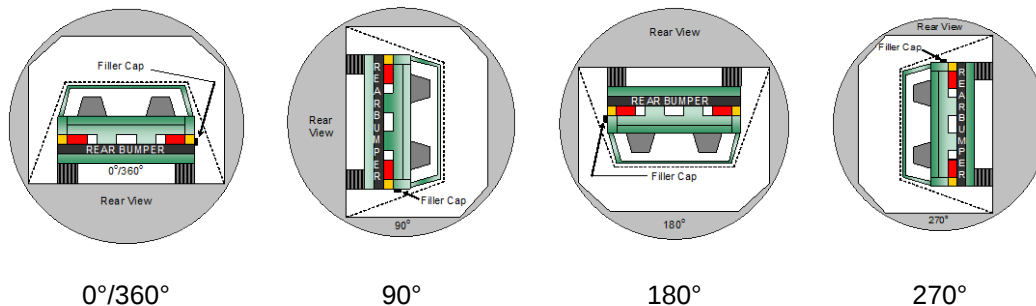
NHTSA No. O20160106
 Test Date: 9/28/2016

Test Time: 9:59 a.m.

Temperature: 21.7°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°	116	300	416
90° to 180°	116	300	416
180° to 270°	112	300	412
270° to 360°	112	300	412

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

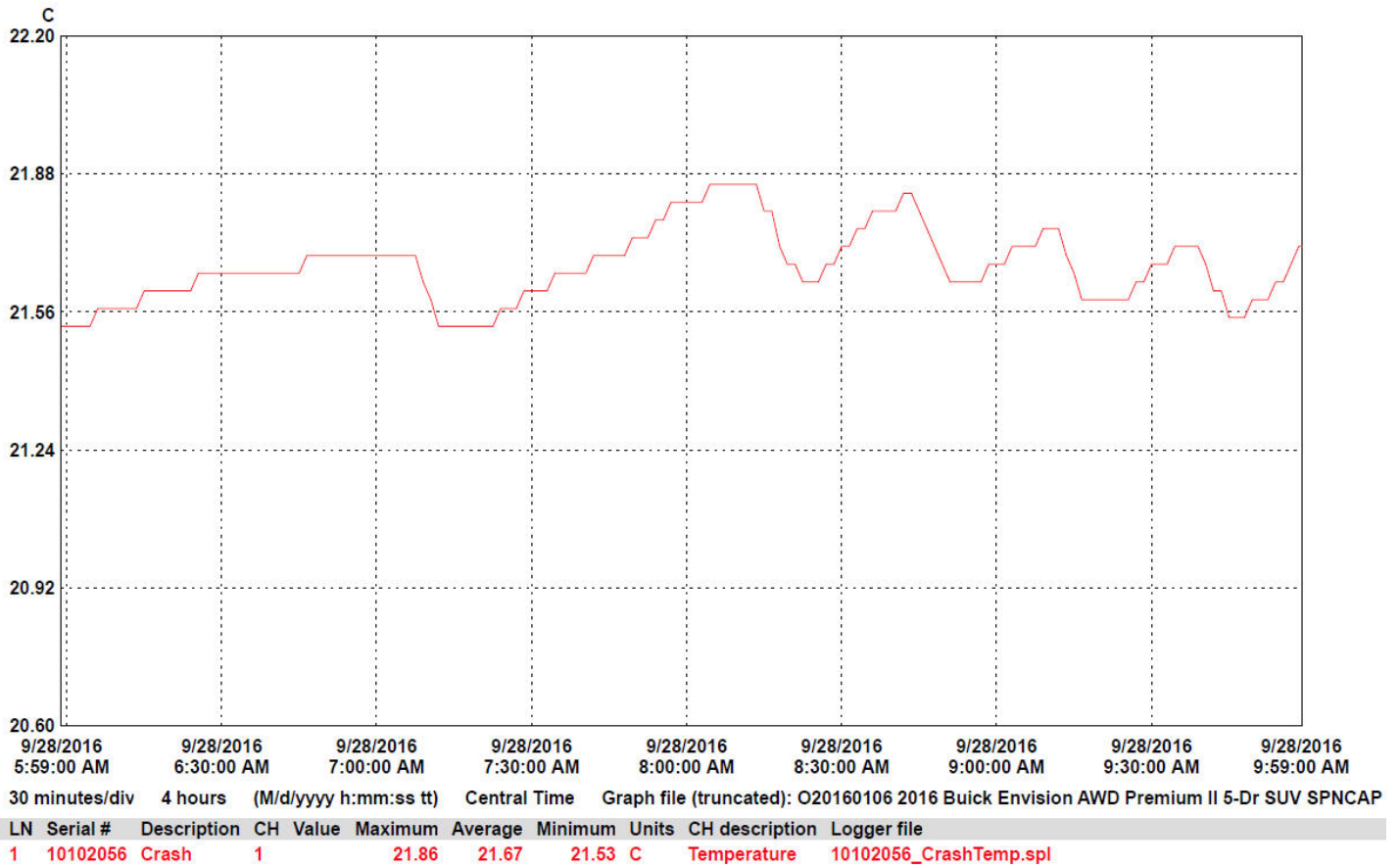
ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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

DATA SHEET NO. 13
DUMMY/VEHICLE TEMPERATURE STABILIZATION DATA

Test Vehicle: 2016 Buick Envision AWD Premium II 5-Door SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No. O20160106
 Test Date: 9/28/2016



**APPENDIX A
PHOTOGRAPHS**

TABLE OF PHOTOGRAPHS

		<u>Page No.</u>
Photo No. 001	As Delivered Right Front $\frac{3}{4}$ View of Test Vehicle	A-1
Photo No. 002	As Delivered Left Rear $\frac{3}{4}$ View of Test Vehicle	A-1
Photo No. 003	Pre-Test Frontal View of Test Vehicle	A-2
Photo No. 004	Post-Test Frontal View of Test Vehicle	A-2
Photo No. 005	Pre-Test Left Front $\frac{3}{4}$ View of Test Vehicle	A-3
Photo No. 006	Post-Test Left Front $\frac{3}{4}$ View of Test Vehicle	A-3
Photo No. 007	Pre-Test Left Side View of Test Vehicle	A-4
Photo No. 008	Post-Test Left Side View of Test Vehicle	A-4
Photo No. 009	Pre-Test Left Rear $\frac{3}{4}$ View of Test Vehicle	A-5
Photo No. 010	Post-Test Left Rear $\frac{3}{4}$ View of Test Vehicle	A-5
Photo No. 011	Pre-Test Rear View of Test Vehicle	A-6
Photo No. 012	Post-Test Rear View of Test Vehicle	A-6
Photo No. 013	Pre-Test Right Side View of Test Vehicle	A-7
Photo No. 014	Post-Test Right Side View of Test Vehicle	A-7
Photo No. 015	Pre-Test Overhead View of Test Area	A-8
Photo No. 016	Post-Test Overhead View of Test Area	A-8
Photo No. 017	Pre-Test Left Side View of Pole Positioned Against Side of Vehicle	A-9
Photo No. 018	Pre-Test Right Side View of Pole Positioned Against Side of Vehicle	A-9
Photo No. 019	Pre-Test Close-Up View of Impact Point Target	A-10
Photo No. 020	Post-Test Close-Up View of Impact Point Target Showing Impact Location	A-10
Photo No. 021	Pre-Test Front Close-Up View of Dummy Head and Chest	A-11
Photo No. 022	Post-Test Front Close-Up View of Dummy	A-11
Photo No. 023	Pre-Test Left Side View of Dummy Showing Belt and Chalking	A-12
Photo No. 024	Pre-Test Left Side View of Dummy Shoulder and Door Top View	A-12
Photo No. 025	Post-Test Left Side View of Dummy Shoulder and Door Top View	A-13

		<u>Page No.</u>
Photo No. 026	Pre-Test Front View of Seat Back Prior to Dummy Positioning	A-13
Photo No. 027	Pre-Test Front Close-Up View of Dummy Head and Shoulders in Relation to Head Restraint	A-14
Photo No. 028	Pre-Test Front View of Seat Pan Prior to Dummy Positioning	A-14
Photo No. 029	Pre-Test Overhead View of Dummy Thighs on Seat Pan	A-15
Photo No. 030	Pre-Test Left Side View of Dummy's Neck Showing Position of Adjustable Neck Bracket	A-15
Photo No. 031	Pre-Test Left Side View of Dummy's Head Showing Dummy's Head is Level	A-16
Photo No. 032	Pre-Test Placement of Dummy's Feet	A-16
Photo No. 033	Pre-Test View of Belt Anchorage for Dummy	A-17
Photo No. 034	Pre-Test Left Side View of Steering Wheel	A-17
Photo No. 035	Pre-Test View of Disengaged Parking Brake	A-18
Photo No. 036	Pre-Test View of Parking Brake	A-18
Photo No. 037	Pre-Test Close-Up Left Side View of Driver Seat Track	A-19
Photo No. 038	Pre-Test Close-Up Left Side View of Driver Seat Back	A-19
Photo No. 039	Pre-Test Close-Up View of Driver Seat Back or Head Restraint	A-20
Photo No. 040	Pre-Test Dummy and Door Clearance View	A-20
Photo No. 041	Post-Test Dummy and Door Clearance View	A-21
Photo No. 042	Pre-Test Right Side View of Dummy and Front Seat of Occupant Compartment	A-21
Photo No. 043	Post-Test Right Side View of Dummy and Front Seat of Occupant Compartment	A-22
Photo No. 044	Pre-Test Inner Door Panel View	A-22
Photo No. 045	Post-Test Inner Door Panel View Showing Dummy Contact Location	A-23
Photo No. 046	Post-Test Dummy Close-Up Head Contact with Vehicle Interior View	A-23
Photo No. 047	Post-Test Dummy Close-Up Head Contact with Side Air Bag View	A-24
Photo No. 048	Post-Test Dummy Close-Up Torso Contact with Vehicle Interior View	A-24
Photo No. 049	Post-Test Dummy Close-Up Torso Contact with Side Air Bag View	A-25
Photo No. 050	Post-Test Dummy Close-Up Pelvis Contact with Vehicle Interior View	A-25
Photo No. 051	Post-Test Dummy Close-Up Pelvis Contact with Side Air Bag View	A-26

		<u>Page No.</u>
Photo No. 052	Post-Test Dummy Close-Up Knee Contact with Vehicle Interior View	A-26
Photo No. 053	Pre-Test View of Fuel Filler Cap or Fuel Filler Neck	A-27
Photo No. 054	Post-Test View of Fuel Filler Cap or Fuel Filler Neck	A-27
Photo No. 055	Close-Up View of Vehicle's Certification Label	A-28
Photo No. 056	Close-Up View of Vehicle's Tire Information Placard or Label	A-28
Photo No. 057	Pre-Test Pole Barrier Front View	A-29
Photo No. 058	Post-Test Pole Barrier Front View	A-29
Photo No. 059	Pre-Test Pole Barrier Side View	A-30
Photo No. 060	Post-Test Pole Barrier Side View	A-30
Photo No. 061	Pre-Test Ballast View	A-31
Photo No. 062	Post-Test Primary and Redundant Speed Trap Read-Out	A-31
Photo No. 063	FMVSS No. 301 Static Rollover 0 Degrees	A-32
Photo No. 064	FMVSS No. 301 Static Rollover 90 Degrees	A-32
Photo No. 065	FMVSS No. 301 Static Rollover 180 Degrees	A-33
Photo No. 066	FMVSS No. 301 Static Rollover 270 Degrees	A-33
Photo No. 067	FMVSS No. 301 Static Rollover 360 Degrees	A-34
Photo No. 068	Impact Event	A-34
Photo No. 069	Monroney Label	A-35
Photo No. 070	Head Restraint Use and Adjustment Information from Vehicle Owner's Manual	A-35
Photo No. 071	Post-Test View of Shattered Vehicle Inner Door Panel	A-36



Photo No. 001 - As Delivered Right Front 3-4 View of Test Vehicle



Photo No. 002 - As Delivered Left Rear 3-4 View of Test Vehicle



Photo No. 003 - Pre-Test Frontal View of Test Vehicle



Photo No. 004 - Post-Test Frontal View of Test Vehicle



Photo No. 005 - Pre-Test Left Front 3-4 View of Test Vehicle



Photo No. 006 - Post-Test Left Front 3-4 View of Test Vehicle



Photo No. 007 - Pre-Test Left Side View of Test Vehicle



Photo No. 008 - Post-Test Left Side View of Test Vehicle



Photo No. 009 - Pre-Test Left Rear 3-4 View of Test Vehicle



Photo No. 010 - Post-Test Left Rear 3-4 View of Test Vehicle



Photo No. 011 - Pre-Test Rear View of Test Vehicle



Photo No. 012 - Post-Test Rear View of Test Vehicle

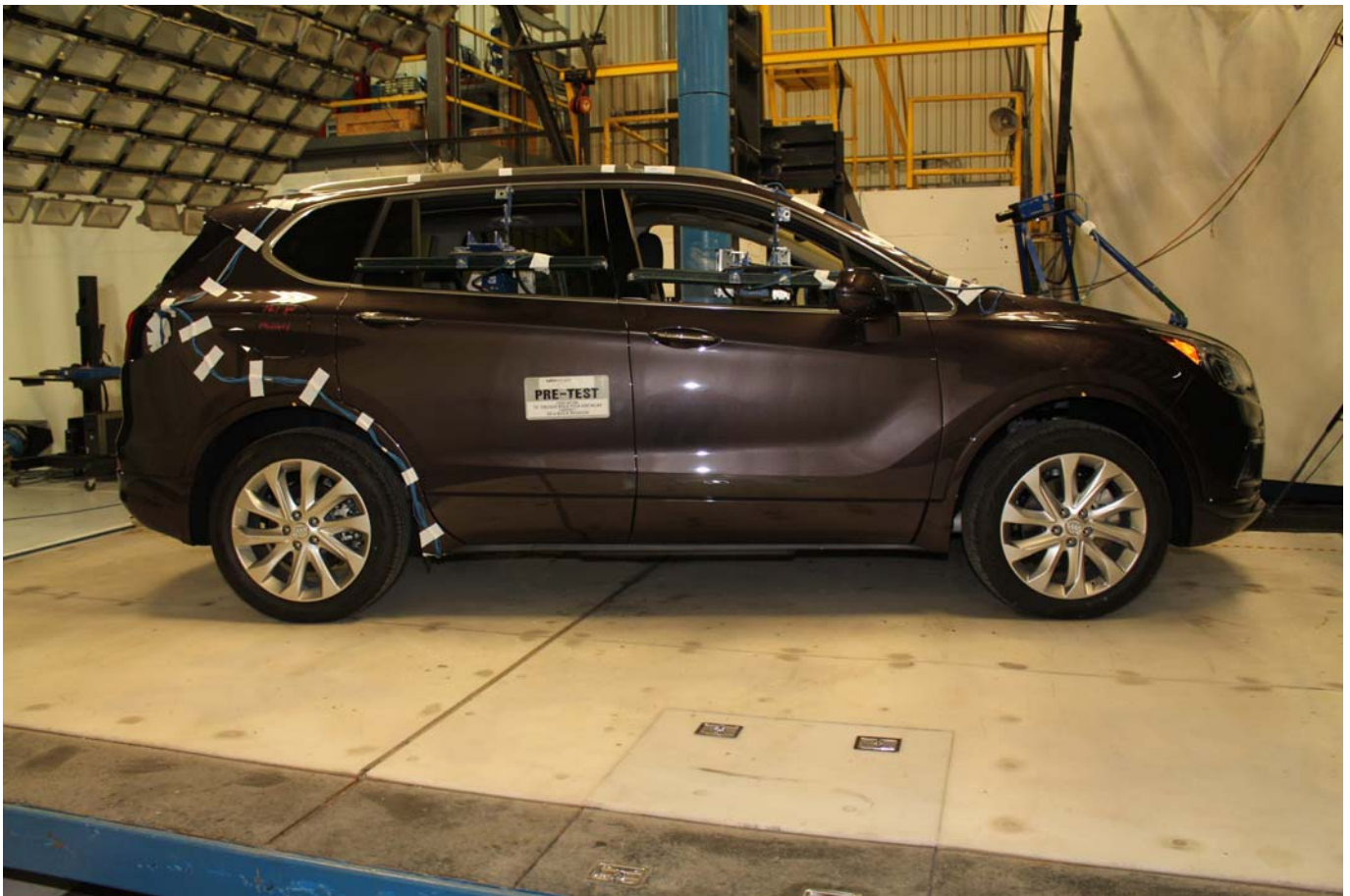


Photo No. 013 - Pre-Test Right Side View of Test Vehicle



Photo No. 014 - Post-Test Right Side View of Test Vehicle

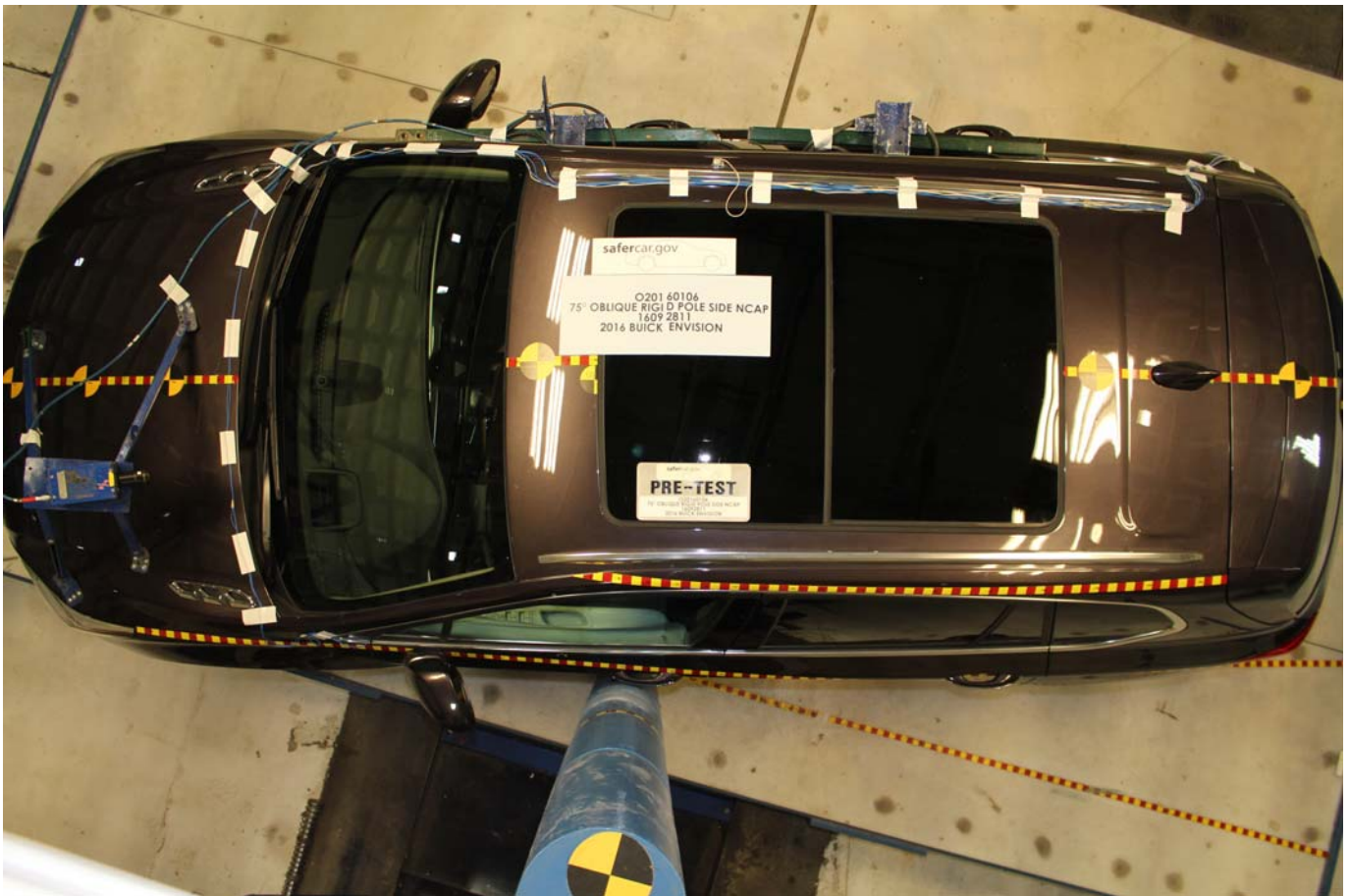


Photo No. 015 - Pre-Test Overhead View of Test Area



Photo No. 016 - Post-Test Overhead View of Test Area



Photo No. 017 - Pre-Test Left Side View of Pole Positioned Against Side of Vehicle



Photo No. 018 - Pre-Test Right Side View of Pole Positioned Against Side of Vehicle



Photo No. 019 - Pre-Test Close-Up View of Impact Point Target

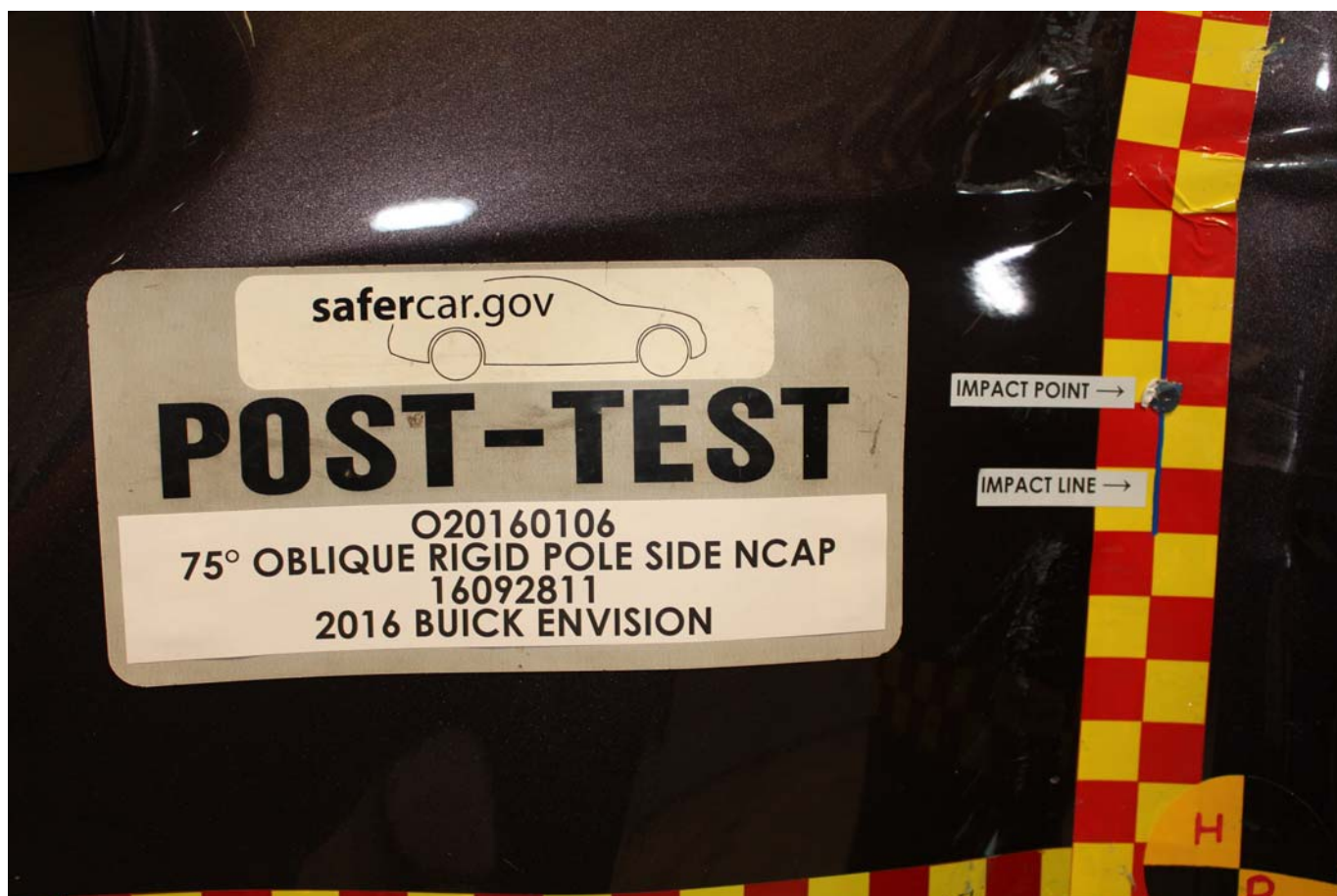


Photo No. 020 - Post-Test Close-Up View of Impact Point Target Showing Impact Location



Photo No. 021 - Pre-Test Front Close-Up View of Dummy Head and Chest



Photo No. 022 - Post-Test Front Close-Up View of Dummy



Photo No. 023 - Pre-Test Left Side View of Dummy Showing Belt and Chalking



Photo No. 024 - Pre-Test Left Side View of Dummy Shoulder and Door Top View



Photo No. 025 - Post-Test Left Side View of Dummy Shoulder and Door Top View



Photo No. 026 - Pre-Test Front View of Seat Back Prior to Dummy Positioning

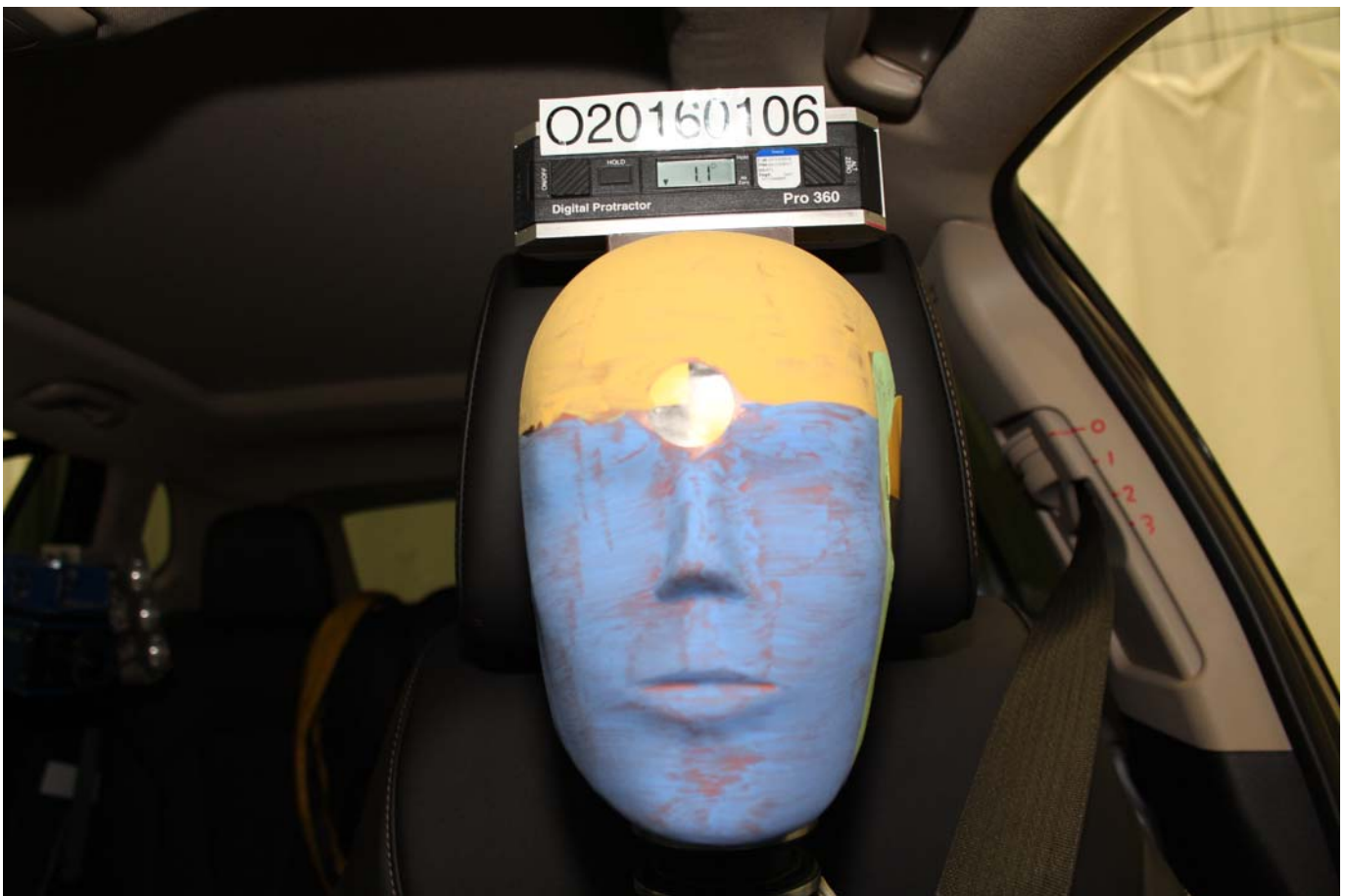


Photo No. 027 - Pre-Test Front Close-Up View of Dummy Head and Shoulders in Relation to Head Restraint



Photo No. 028 - Pre-Test Front View of Seat Pan Prior to Dummy Positioning

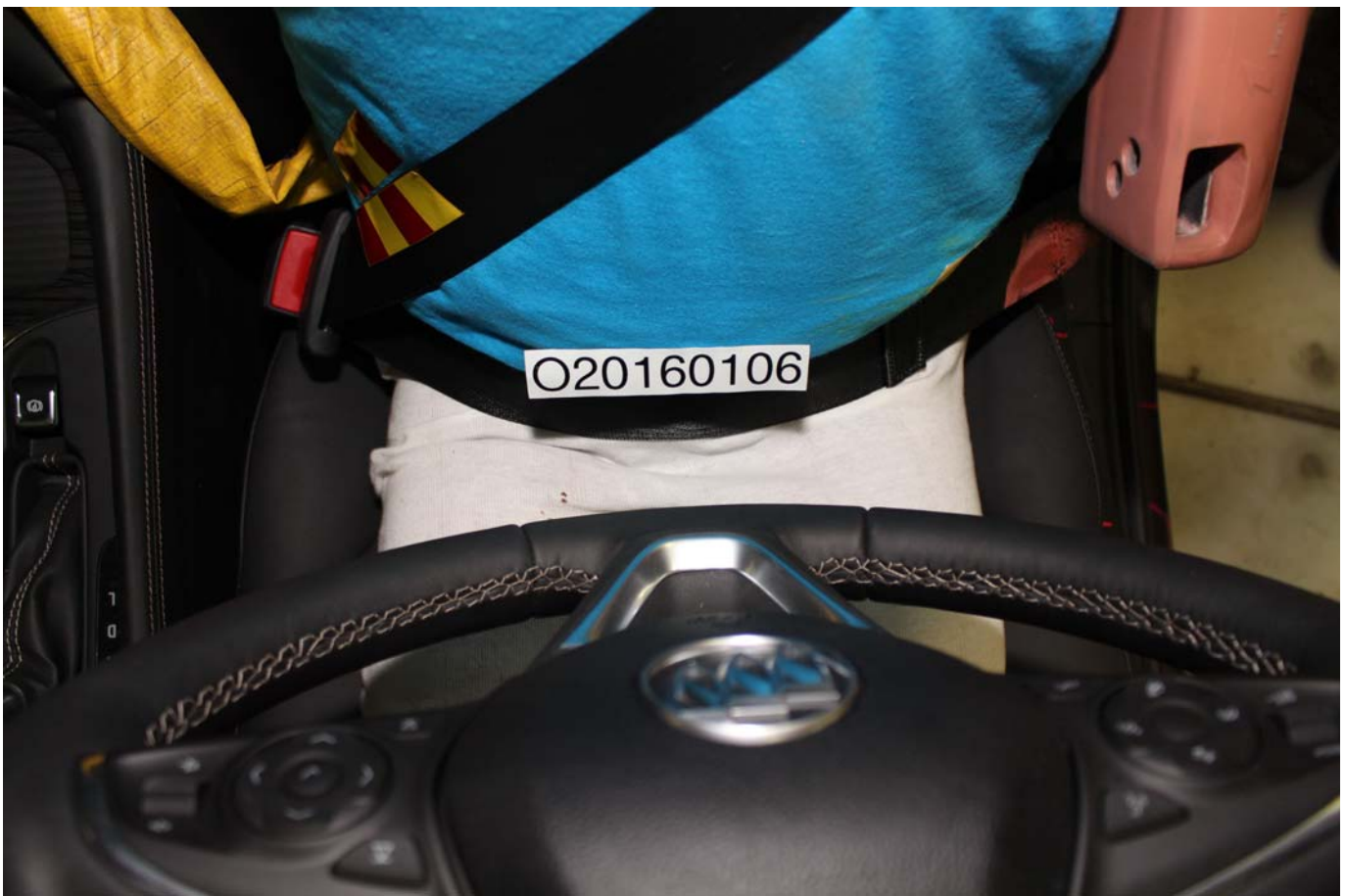


Photo No. 029 - Pre-Test Overhead View of Dummy Thighs on Seat Pan



Photo No. 030 - Pre-Test Left Side View of Dummy Neck Showing Position of Adjustable Neck Bracket



Photo No. 031 - Pre-Test Left Side View of Dummy Head Showing Dummy Head is Level



Photo No. 032 - Pre-Test Placement of Dummy Feet



Photo No. 033 - Pre-Test View of Belt Anchorage for Dummy



Photo No. 034 - Pre-Test Left Side View of Steering Wheel

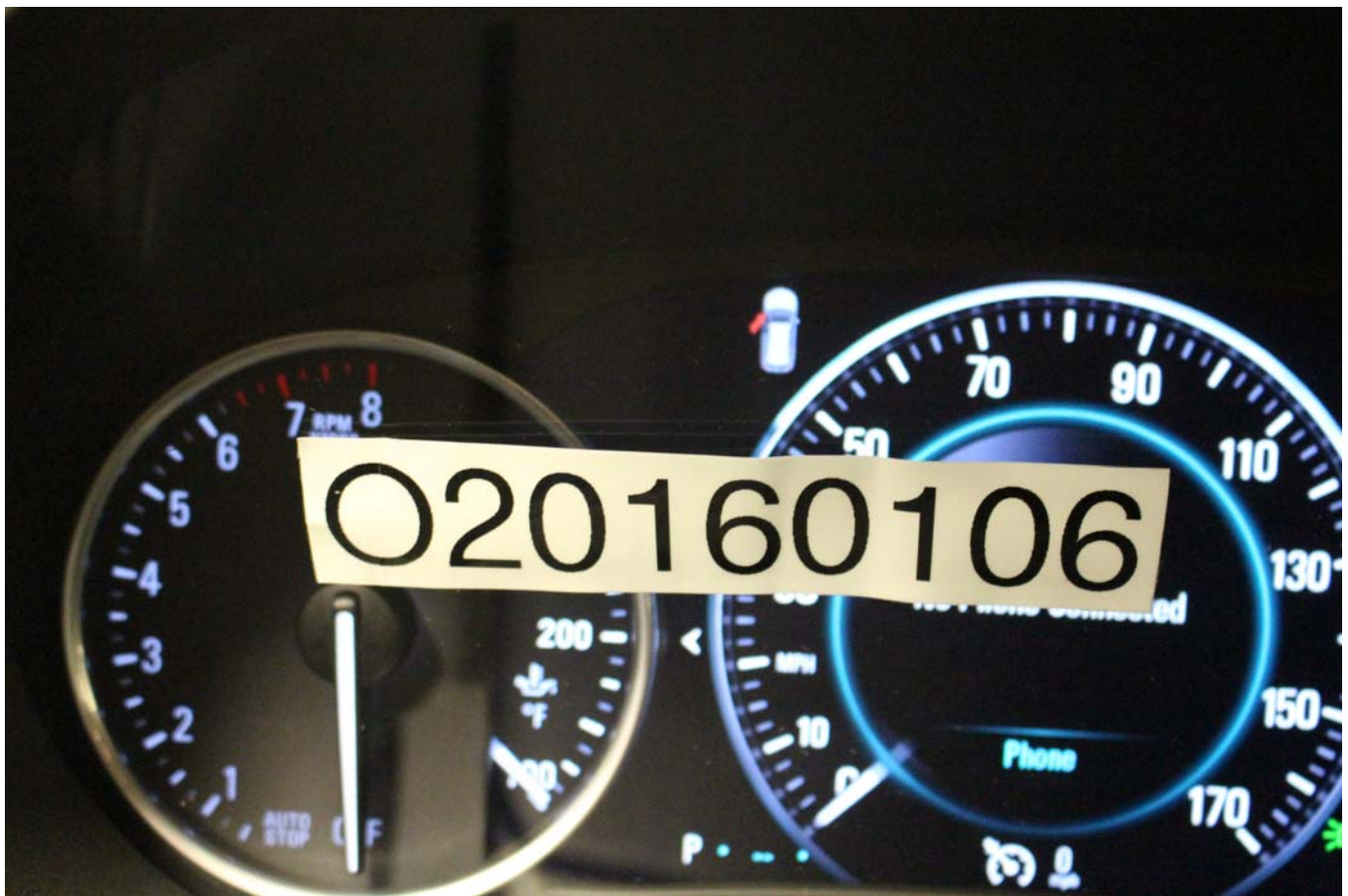


Photo No. 035 - Pre-Test View of Disengaged Parking Brake

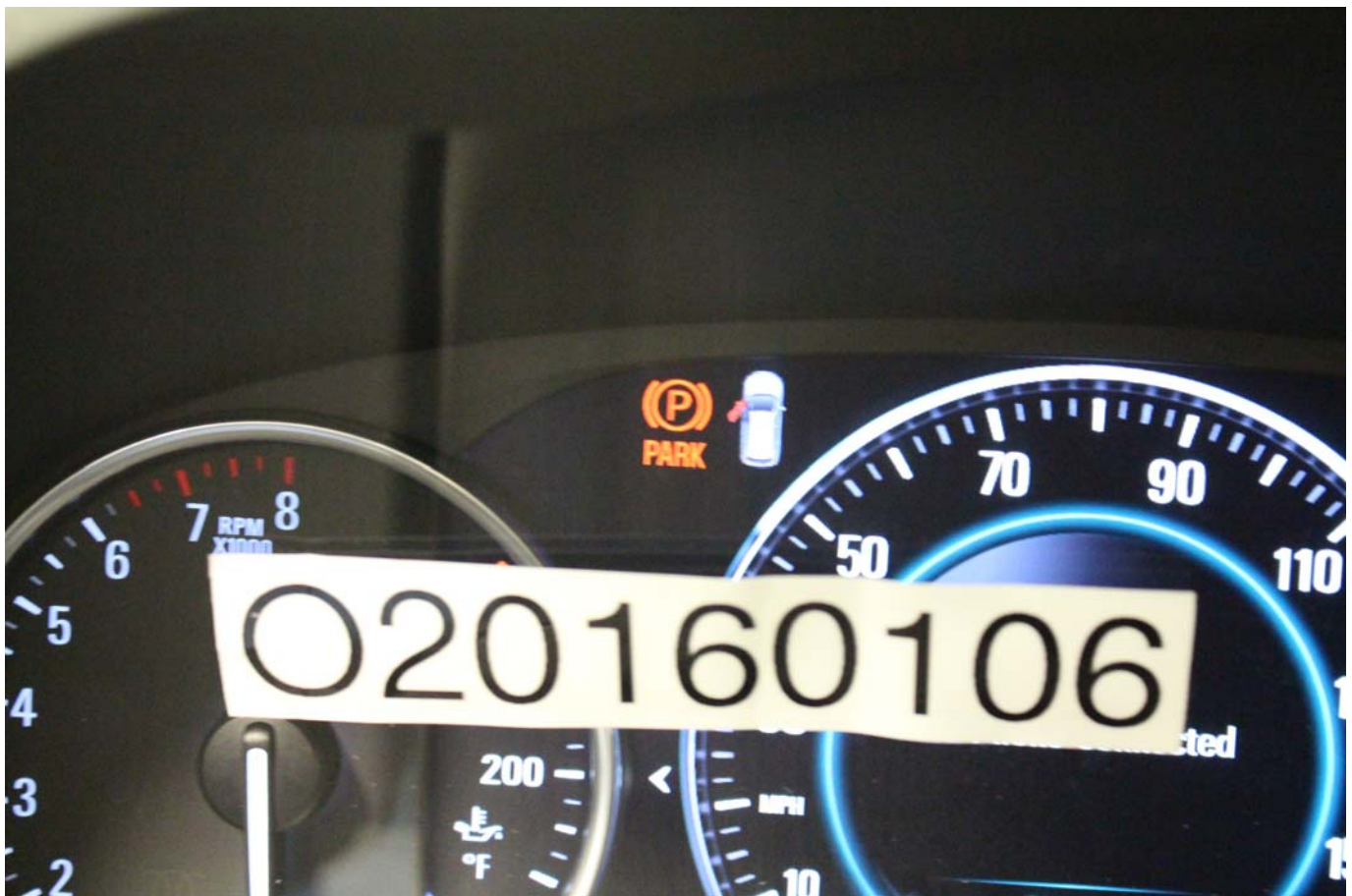


Photo No. 036 - Pre-Test View of Parking Brake



Photo No. 037 - Pre-Test Close-Up Left Side View of Driver Seat Track



Photo No. 038 - Pre-Test Close-Up Left Side View of Driver Seat Back



Photo No. 039 - Pre-Test Close-Up View of Driver Seat Back or Head Restraint



Photo No. 040 - Pre-Test Dummy and Door Clearance View



Photo No. 041 - Post-Test Dummy and Door Clearance View



Photo No. 042 - Pre-Test Right Side View of Dummy and Front Seat of Occupant Compartment



Photo No. 043 - Post-Test Right Side View of Dummy and Front Seat of Occupant Compartment



Photo No. 044 - Pre-Test Inner Door Panel View



Photo No. 045 - Post-Test Inner Door Panel View Showing Dummy Contact Location



Photo No. 046 - Post-Test Dummy Close-Up Head Contact with Vehicle Interior View



Photo No. 047 - Post-Test Dummy Close-Up Head Contact with Side Air Bag View



Photo No. 048 - Post-Test Dummy Close-Up Torso Contact with Vehicle Interior View



Photo No. 049 - Post-Test Dummy Close-Up Torso Contact with Side Air Bag View



Photo No. 050 - Post-Test Dummy Close-Up Pelvis Contact with Vehicle Interior View



Photo No. 051 - Post-Test Dummy Close-Up Pelvis Contact with Side Air Bag View



Photo No. 052 - Post-Test Dummy Close-Up Knee Contact with Vehicle Interior View



Photo No. 053 - Pre-Test View of Fuel Filler Cap or Fuel Filler Neck

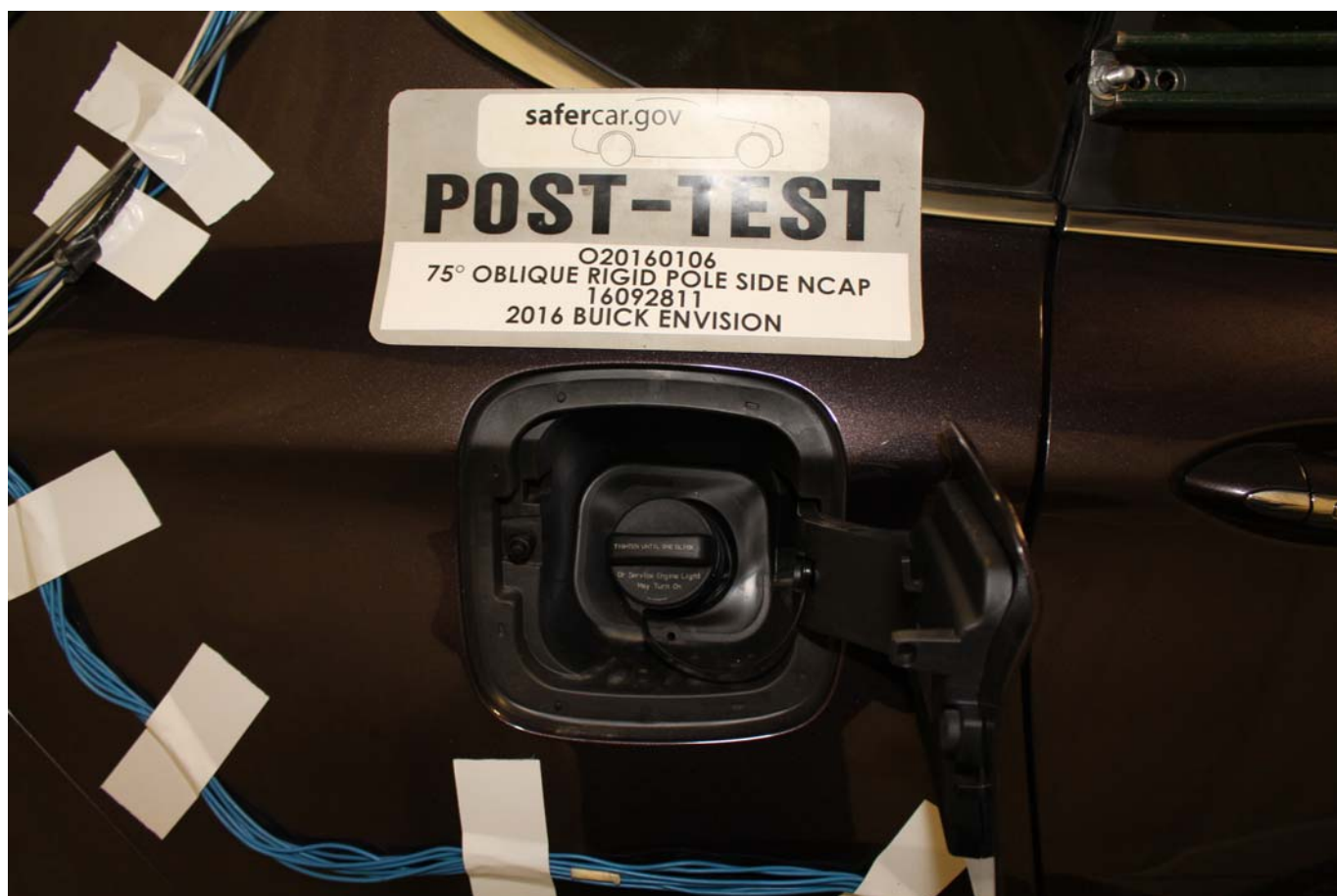


Photo No. 054 - Post-Test View of Fuel Filler Cap or Fuel Filler Neck



Photo No. 055 - Close-Up View of Vehicle Certification Label

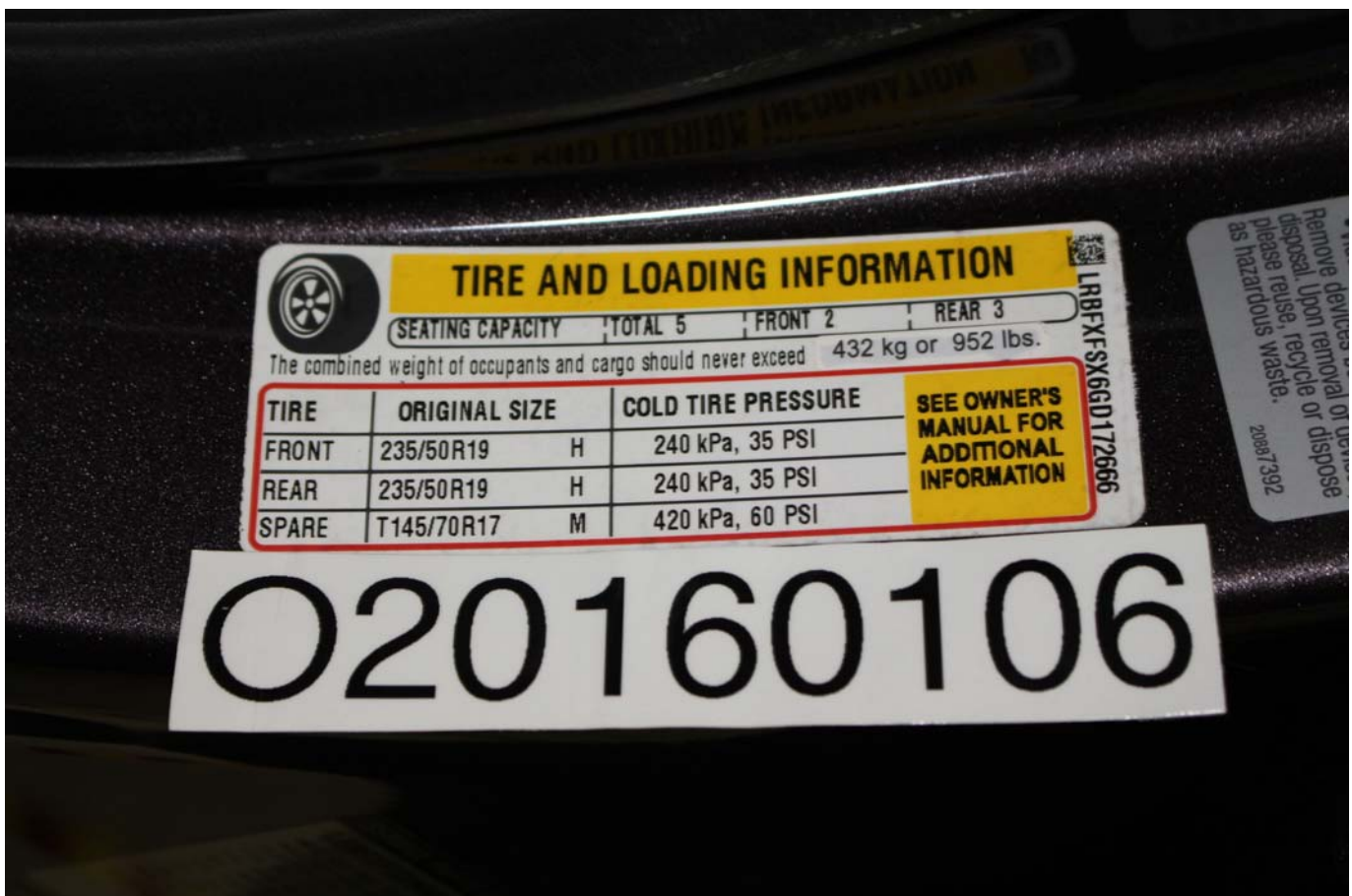


Photo No. 056 - Close-Up View of Vehicle Tire Information Placard or Label

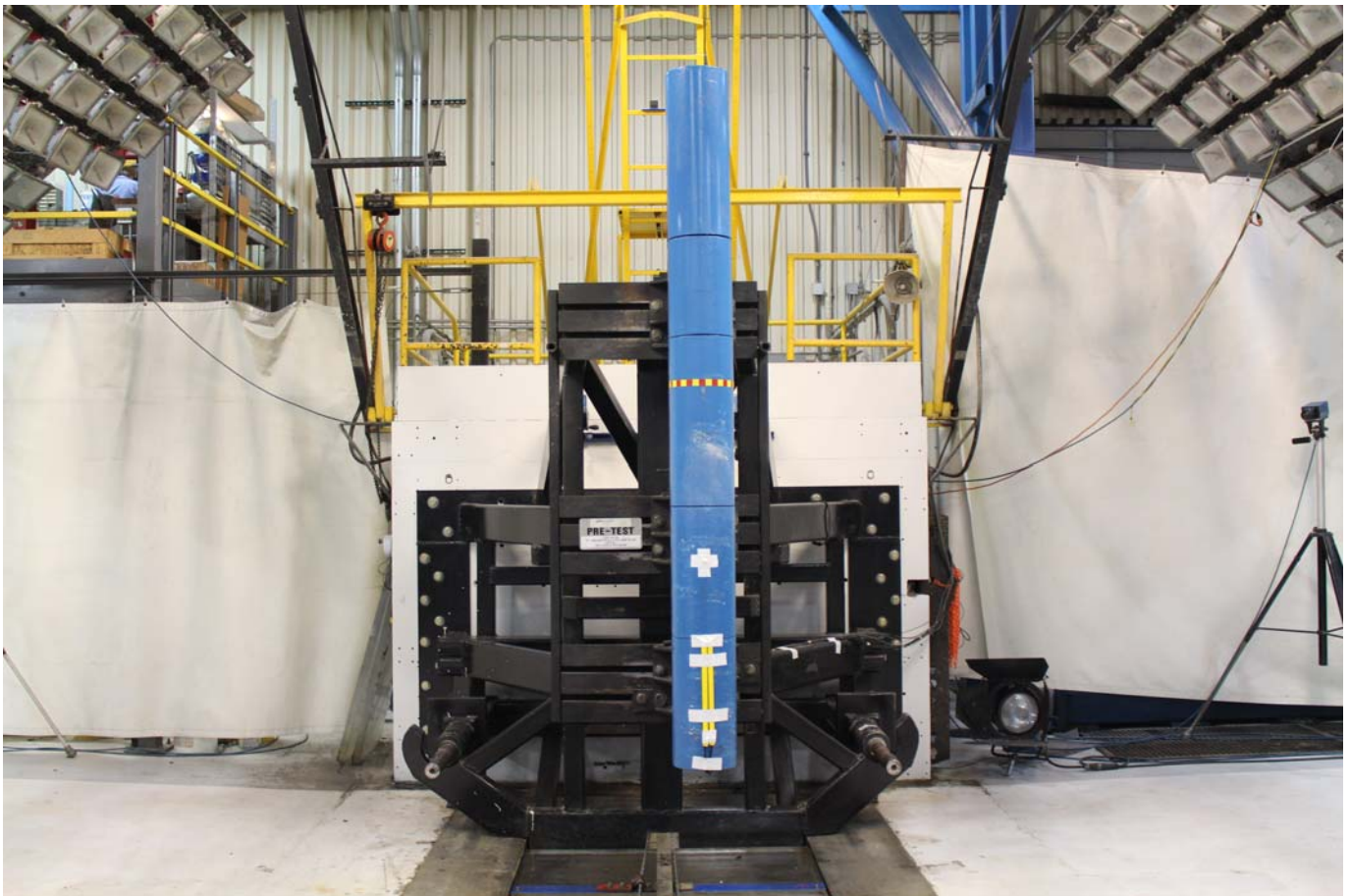


Photo No. 057 - Pre-Test Pole Barrier Front View



Photo No. 058 - Post-Test Pole Barrier Front View



Photo No. 059 - Pre-Test Pole Barrier Side View

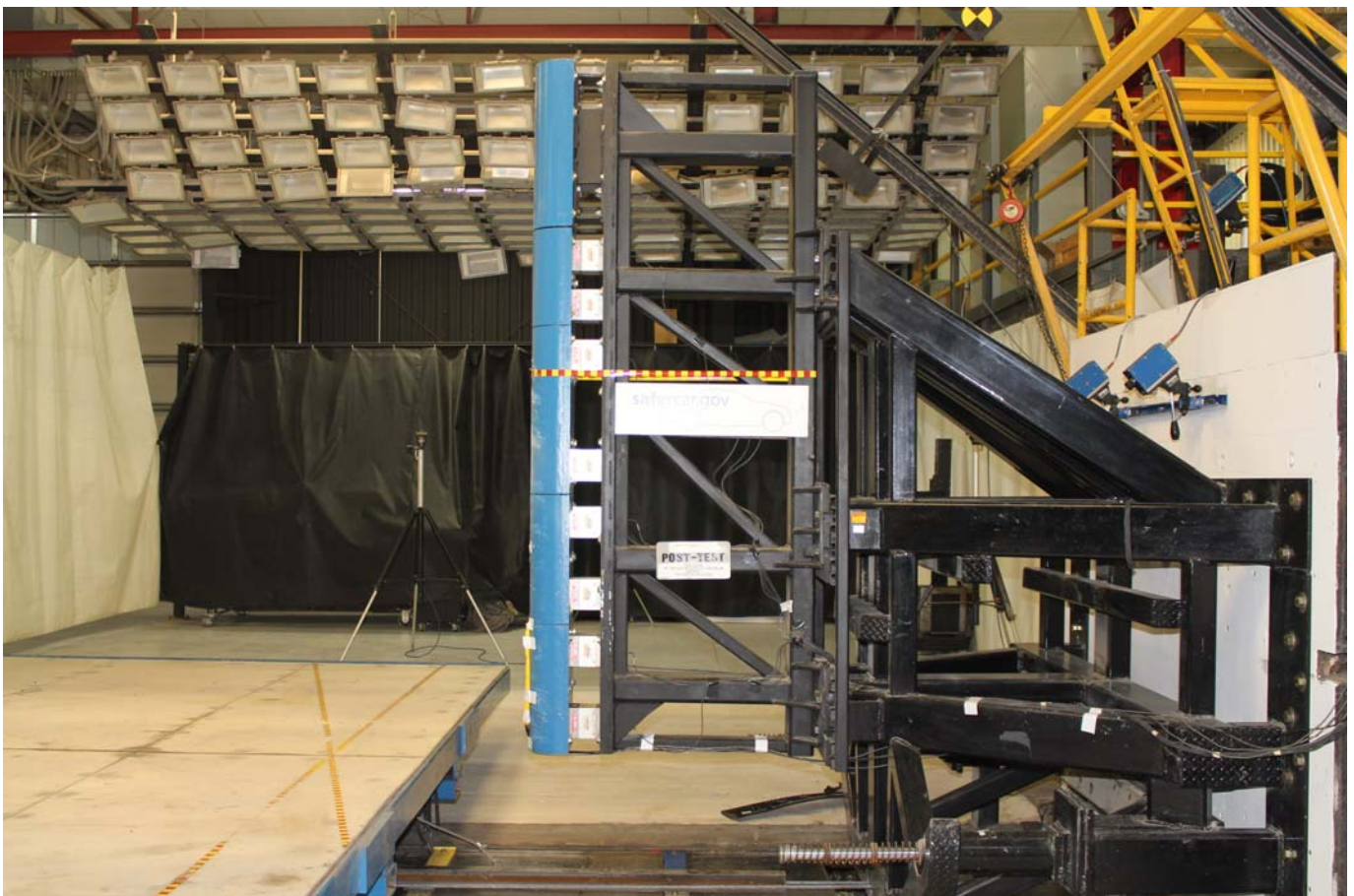


Photo No. 060 - Post-Test Pole Barrier Side View

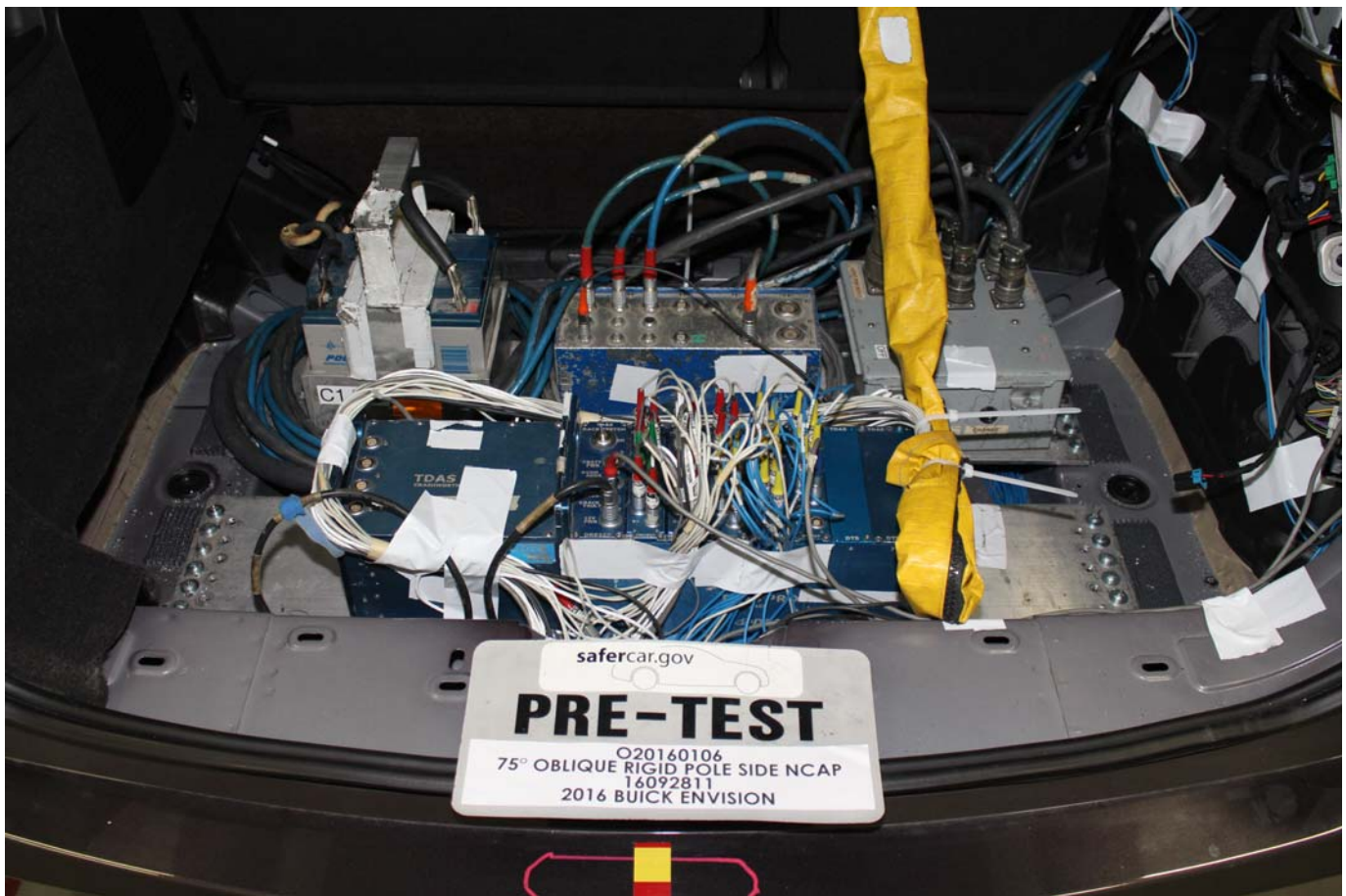


Photo No. 061 - Pre-Test Ballast View



Photo No. 062 - Post-Test Primary and Redundant Speed Trap Read-Out

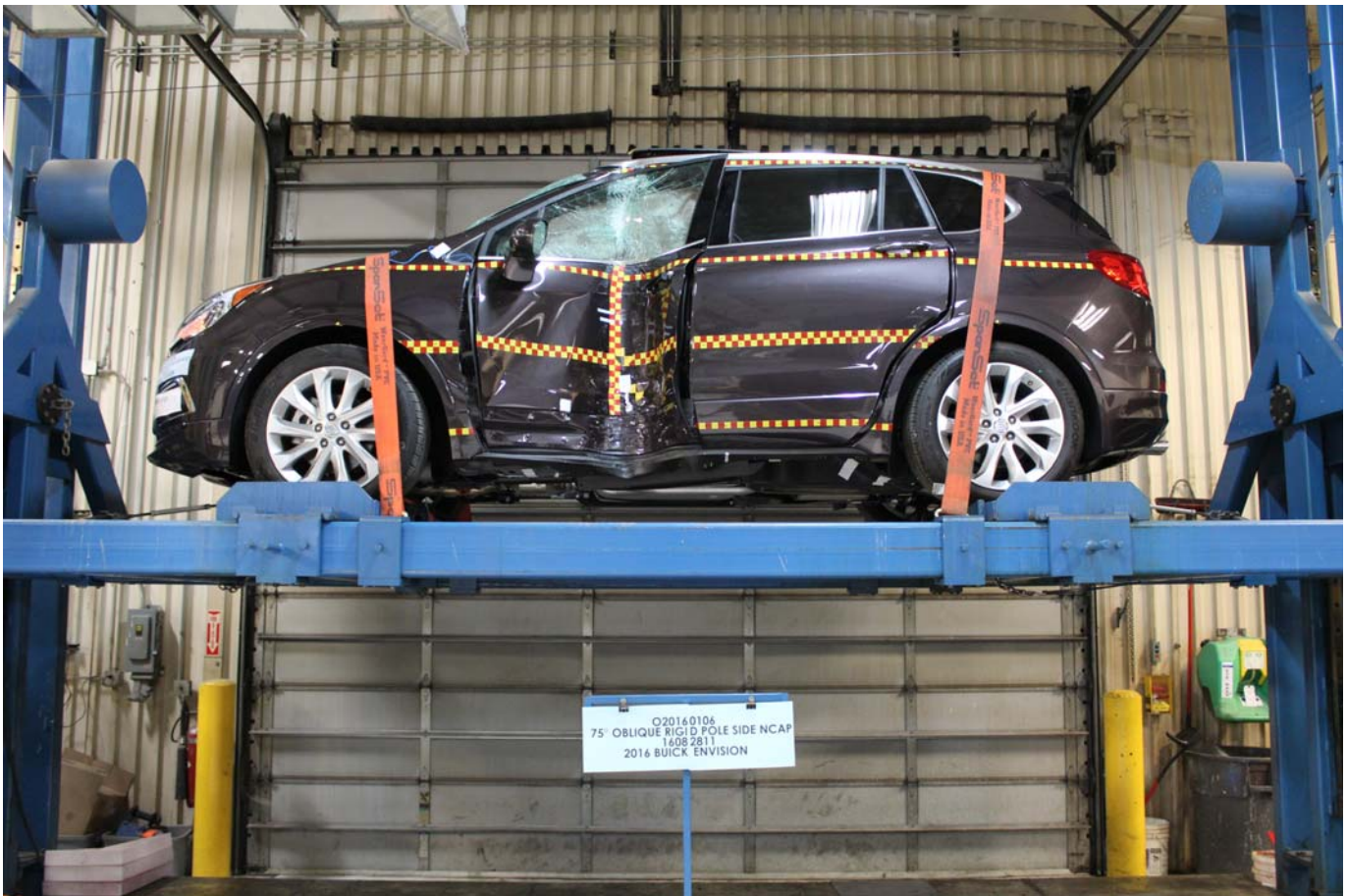


Photo No. 063 - FMVSS No. 301 Static Rollover 0 Degrees

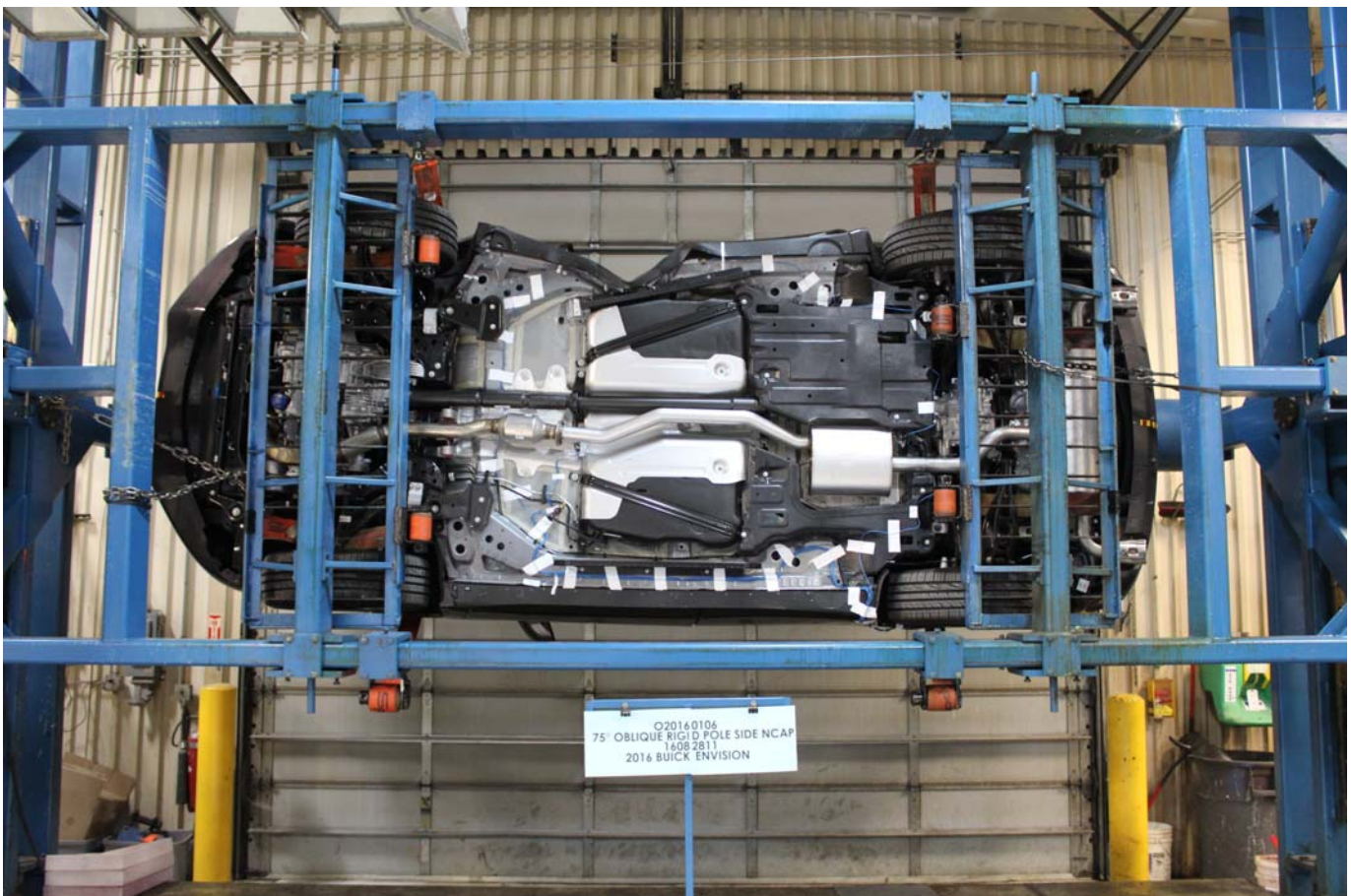


Photo No. 064 - FMVSS No. 301 Static Rollover 90 Degrees



Photo No. 065 - FMVSS No. 301 Static Rollover 180 Degrees



Photo No. 066 - FMVSS No. 301 Static Rollover 270 Degrees



Photo No. 067 - FMVSS No. 301 Static Rollover 360 Degrees



Photo No. 068 - Impact Event



2016 ENVISION AWD
PREMIUM II



EXTERIOR: METALLIC
INTERIOR: EBONY

TRANSMISSION, 6-SPD AUTOMATIC

Visit us at www.buick.com

STANDARD EQUIPMENT

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

• DESIGN AND ENGINEERING LED BY BUICK IN THE UNITED STATES OF AMERICA

• 6 YEAR / 70,000 MILE POWERTRAIN LIMITED WARRANTY SEE DEALER FOR DETAILS

• TWO MAINTENANCE VISITS OIL & FILTER

• 4 WHEEL TIRE ROTATION SEE WWW.BUICK.COM OR DEALER FOR DETAILS

• 4 YEAR / 50,000 MILE LIMITED BUMPER-TO-BUMPER WARRANTY SEE DEALER FOR DETAILS

SAFETY & SECURITY

• AIRBAGS: FRONTAL, SINGLE-STAGE DRIVER & DUAL-STAGE FRONT PASSENGER; DRIVER & FRONT PASSENGER; FRONT & REAR SEAT-MOUNTED SIDE-IMPACT; & HEAD-

CURTAIN FOR OUTBOARD SEATING POSITIONS

• THEFT DETERRENT SYSTEM

• ANTILOCK BRAKE SYSTEM

• STABILITRAK® STABILITY CONTROL SYSTEM W/ TRACTION CONTROL

• EZ KEY PASSIVE ENTRY SYSTEM

• KEYLESS START

• REAR VISION CAMERA

• SIDE BLIND ZONE ALERT WITH LANE CHANGE ALERT

• LANE KEEP ASSIST WITH LANE DEPARTURE WARNING

• FORWARD COLLISION ALERT

• REAR CROSS TRAFFIC ALERT

• FOLLOWING DISTANCE INDICATOR

• SAFETY ALERT SEAT

• TIRE PRESSURE MONITOR (EXCL SPARE TIRE)

INTERIOR

• BUICK QUIET TUNING

• LEATHER APPOINTED SEATING

• POWER SEAT ADJUSTER, FRONT DRIVER AND PASSENGER, 8-WAY

• SEATS, HEATED FRONT

• SEATS, COOLED FRONT

• SEATS, HEATED REAR OUTBOARD POSITIONS

• SEAT, REAR 60-40 SPLIT-FOLD, RECLINING AND SLIDING

• SEAT, REAR, 1-TOUCH FLAT-FOLD

• MEMORY SETTINGS, DRIVER SEAT, OUTSIDE MIRRORS

• POWER WINDOW W/ EXPRESS DRIVER UP/DOWN

• POWER WINDOW WITH FRONT PASSENGER EXPRESS DOWN

• PWR WINDOWS, REAR EXPRESS DOWN

• DISPLAY, DRIVER INSTRUMENT INFO, 8" COLOR CONFIGURABLE

• CLIMATE CONTROL, TRI-ZONE AUTO

• INSIDE REARVIEW MIRROR, AUTO DIMMING

• LEATHER WRAP STEERING WHEEL, HEATED, WITH AUDIO CONTROLS

• BOSE PREMIUM 7-SPEAKER SYSTEM

• HEAD-UP DISPLAY

• UNIVERSAL HOME REMOTE

EXTERIOR

• WHEELS, 19" 10-SPOKE ALUMINUM

• PRISM MANDOLIAN SILVER FINISH

• LIFTGATE, POWER, HANDS FREE, PROGRAMMABLE

• HEADLAMPS, HIGH INTENSITY DISCHARGE

• HEADLAMPS, ARTICULATING

• HEADLAMPS, INTELLIBEAM AUTO HIGH BEAM CONTROL

• REMOTE VEHICLE STARTER SYSTEM

• MIRRORS, OUTSIDE HEATED POWER ADJUSTABLE & AUTO-DIM, MANUAL FOLD W/TURN SIGNAL INDICATORS

• AUTOMATIC PARKING ASSIST

CONNECTIVITY FEATURES

• ONSTAR® INCLUDES 5 YR BASIC PLAN PLUS 6 MTH SERVICE W/ AUTOMATIC CRASH RESPONSE,

NAVIGATION & MORE (SUBJECT TO TERMS SEE ONSTAR.COM)
• AUDIO - BUICK INTELLILINK® RADIO W/ NAV, CD PLAYER, 8" DIAGONAL COLOR TOUCH SCREEN
• XM RADIO + SERVICE SUBSCRIPTION SOLD SEPARATELY BY XM/SPIN AFTER 3 MTHS
• 4G LTE W/ 4G+ HOTSPOT WITH LIMITED DATA TRIAL AND MORE. (SUBJECT TO TERMS SEE ONSTAR.COM)

OPTIONS & PRICING

MANUFACTURER'S SUGGESTED RETAIL PRICE
STANDARD VEHICLE PRICE \$44,710.00

OPTIONS INSTALLED BY THE MANUFACTURER (WAY REPLACES STANDARD EQUIPMENT SHOWN)

PANORAMIC MOONROOF 1,495.00
MIDNIGHT AMETHYST METALLIC 395.00

TOTAL OPTIONS \$1,890.00
TOTAL VEHICLE & OPTIONS \$46,600.00
DESTINATION CHARGE 925.00

TOTAL VEHICLE PRICE* \$47,525.00

EPA DOT Fuel Economy and Environment

Fuel Economy

22 MPG
combined city/hwy

20 city 26 highway

4.5 gallons per 100 miles

You spend \$2,250 more in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost \$2,250

Fuel Economy & Greenhouse Gas Rating (tailpipe city)

5

Smog Rating (tailpipe city)

6

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 23 MPG and costs \$2,290 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at \$3.00 per gallon. EPA's is miles per gallon, not dollars. Vehicle emissions are a significant cause of climate change and smog.

fuel economy.gov

Calculate personalized estimates and compare vehicles.

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.

Source: National Highway Traffic Safety Administration (NHTSA)
www.safercar.gov or 1-888-327-4236

Equipped with the safety and connectivity of OnStar®

Visit onstar.com for details.
onstar.com/inquiry

PARTS CONTENT INFORMATION

FOR VEHICLES IN THIS CARLINE:
U.S./CANADIAN PARTS CONTENT: 5%
MAJOR SOURCES OF FOREIGN PARTS CONTENT: CHINA 85%

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

FOR THIS VEHICLE:
FINAL ASSEMBLY POINT: YANTAI ETDZ, P.R., CHINA
COUNTRY OF ORIGIN: CHINA
ENGINE: CHINA
TRANSMISSION: CHINA

UNDER NO CIRCUMSTANCES SHALL THE MANUFACTURER BE LIABLE FOR ANY LOSS OF PROFITS, SPECIAL DAMAGES, OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES.

SALES CODE: P
SALES MODEL CODE: 0000
COUNTRY CODE: 000
VIN: 1LBFXFX6GD172666
VIN LABEL: 1LBFXFX6GD172666

SEALER TO WHOM DELIVERED
WIN KELLY CHEVROLET BUICK GMC
12421 AUTO DR
CLARKSVILLE, MD 21029-1266

R2

Photo No. 069 - Monroney Label

50 Seats and Restraints

Head Restraints

Front Seats

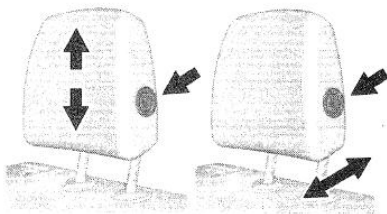
The vehicle's front seats have adjustable head restraints in the outboard seating positions.

Warning

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



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



To raise or lower the head restraint, press the button located on the side of the head restraint, and pull up or

push the head restraint down, and release the button. Pull and push on the head restraint after the button is released to make sure that it is locked in place.

To adjust the head restraint forward and rearward, press the button located on the side facing of the head restraint and move it forward or rearward until the desired locking position is reached. Try to move the head restraint after the button is released to make sure that it is locked in place.

The front seat outboard head restraints are not removable.

Rear Seats

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

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

Photo No. 070 - Head Restraint Use and Adjustment Information from Vehicle Owners Manual



Photo No. 071 - Post-Test View of Shattered Vehicle Inner Door Panel

APPENDIX B
DUMMY RESPONSE DATA PLOTS

TABLE OF DATA PLOTS
Driver Dummy Instrumentation Plots

		<u>Page No.</u>
Figure No. 1.	Driver Head CG Acceleration (X) vs. Time	B-1
Figure No. 2.	Driver Head CG Acceleration (Y) vs. Time	B-1
Figure No. 3.	Driver Head CG Acceleration (Z) vs. Time	B-1
Figure No. 4.	Driver Head CG Resultant Acceleration (X) vs. Time	B-1
Figure No. 5.	Driver Lower Spine T12 Acceleration (X) vs. Time	B-2
Figure No. 6.	Driver Lower Spine T12 Acceleration (Y) vs. Time	B-2
Figure No. 7.	Driver Lower Spine T12 Acceleration (Z) vs. Time	B-2
Figure No. 8.	Driver Lower Spine T12 Resultant Acceleration vs. Time	B-2
Figure No. 9.	Driver Iliac Wing Force on Impact Side (Y) vs. Time	B-3
Figure No. 10.	Driver Acetabulum Force on Impact Side (Y) vs. Time	B-3
Figure No. 11.	Driver Total Pelvis Force on Impact Side (Y) vs. Time	B-3

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 Dummy Instrumentation Data

Driver Head CG Redundant Acceleration (X) vs. Time
Driver Head CG Redundant Acceleration (Y) vs. Time
Driver Head CG Redundant Acceleration (Z) vs. Time
Driver Head Angular Velocity X (Deg/Sec) vs. Time
Driver Head Angular Velocity Y (Deg/Sec) vs. Time
Driver Head Angular Velocity Z (Deg/Sec) vs. Time
Driver Upper Thorax Rib Deflection (Y)
Driver Middle Thorax Rib Deflection (Y)
Driver Lower Thorax Rib Deflection (Y)
Driver Upper Abdomen Rib Deflection (Y)
Driver Lower Abdomen Rib Deflection (Y)

Vehicle Instrumentation Data

Vehicle Center of Gravity Acceleration (X)

Vehicle Center of Gravity Acceleration (Y)

Vehicle Center of Gravity Acceleration (Z)

Left Floor Sill Acceleration (Y)

Left A-Pillar Sill Acceleration (Y)

Left Lower A-Pillar Acceleration (Y)

Left Mid A-Pillar Acceleration (Y)

Left B-Pillar Sill Acceleration (Y)

Left Lower B-Pillar Acceleration (Y)

Left Mid B-Pillar Acceleration (Y)

Driver Seat Track at Dummy Hip Point Acceleration (Y)

Engine Top Acceleration (X)

Engine Top Acceleration (Y)

Firewall Center Acceleration (Y)

Right Roof at Vertical Impact Reference Line Acceleration (Y)

Right Sill at Vertical Impact Reference Line Acceleration (Y)

Rear Floorpan Behind Rear Axle at Centerline Acceleration (X)

Rear Floorpan Behind Rear Axle at Centerline Acceleration (Y)

Pole Instrumentation Data

Load Cell Pole Barrier #1 Force (Y)

Load Cell Pole Barrier #2 Force (Y)

Load Cell Pole Barrier #3 Force (Y)

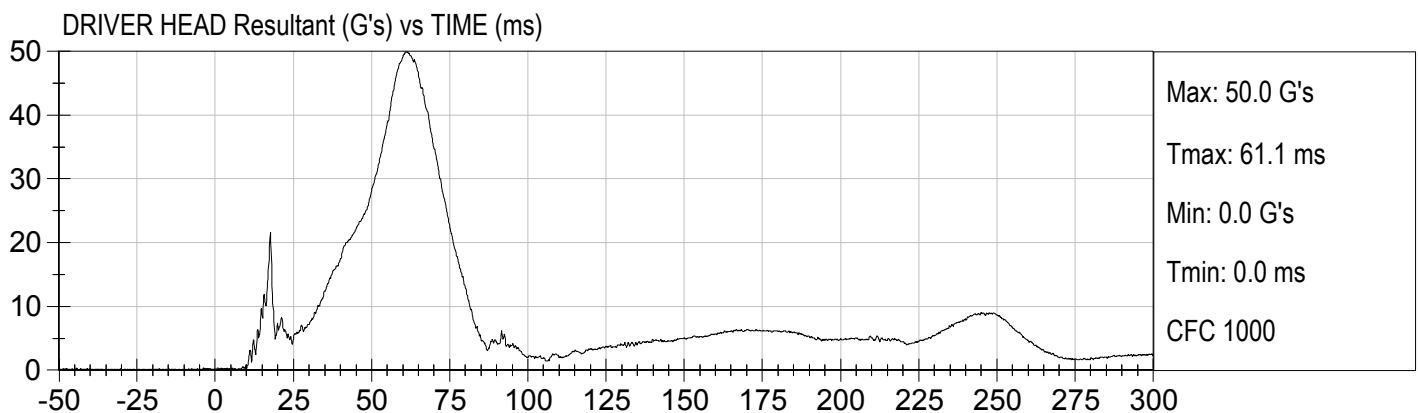
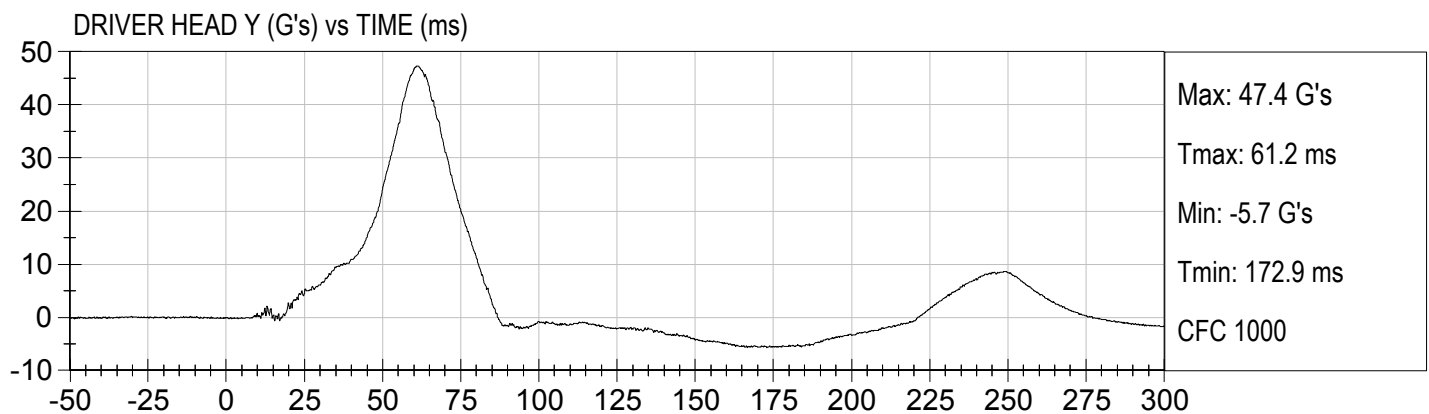
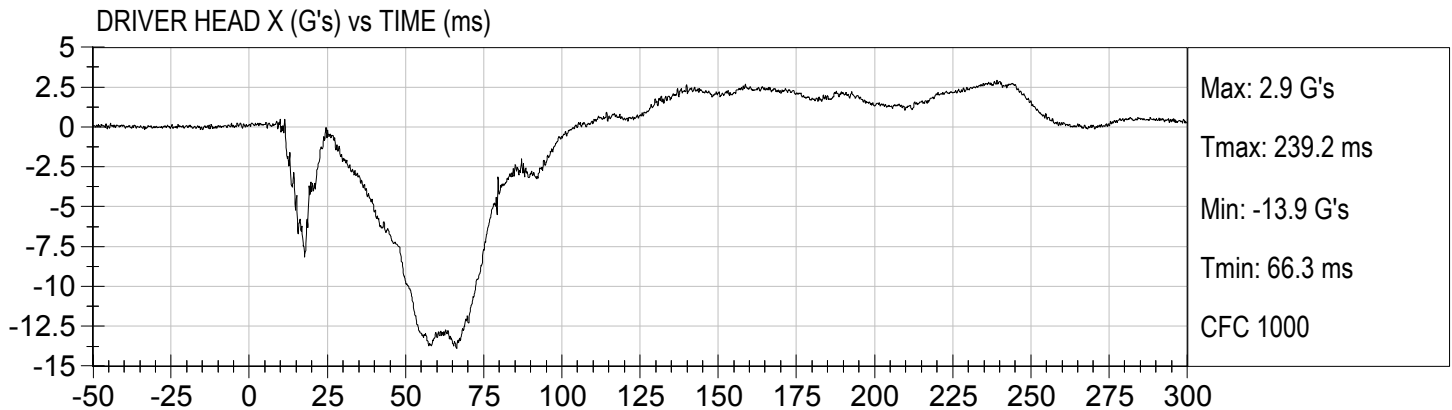
Load Cell Pole Barrier #4 Force (Y)

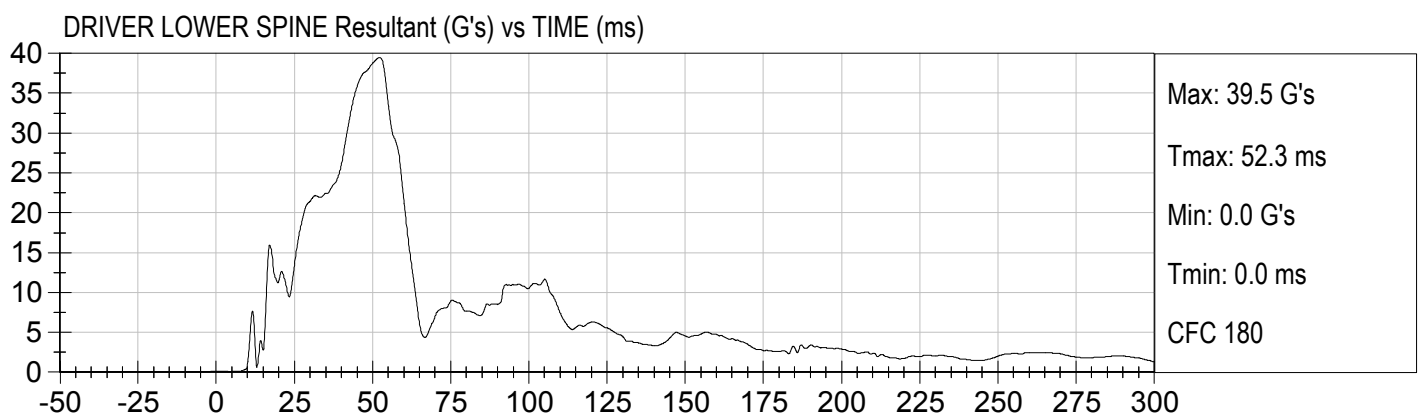
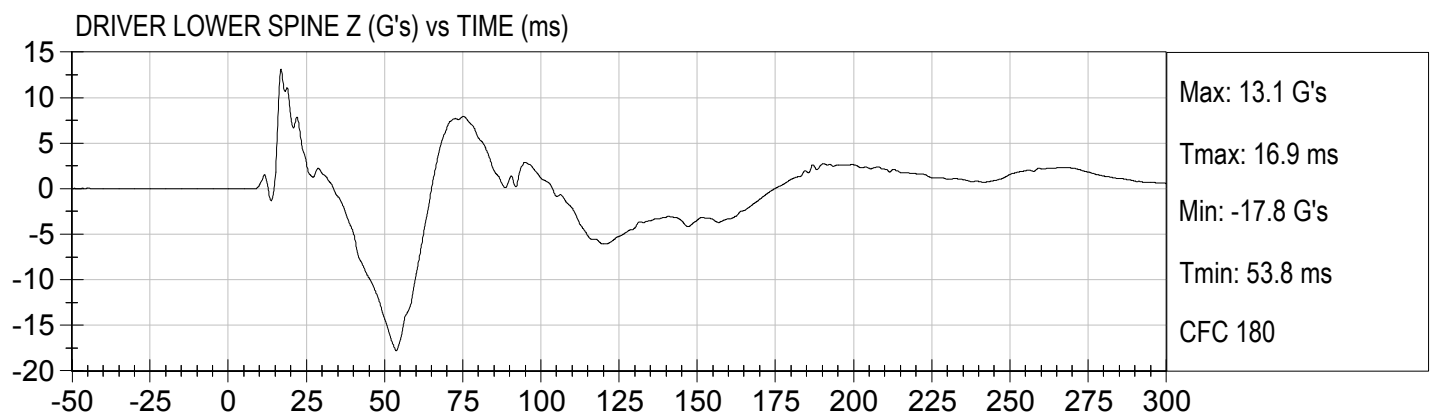
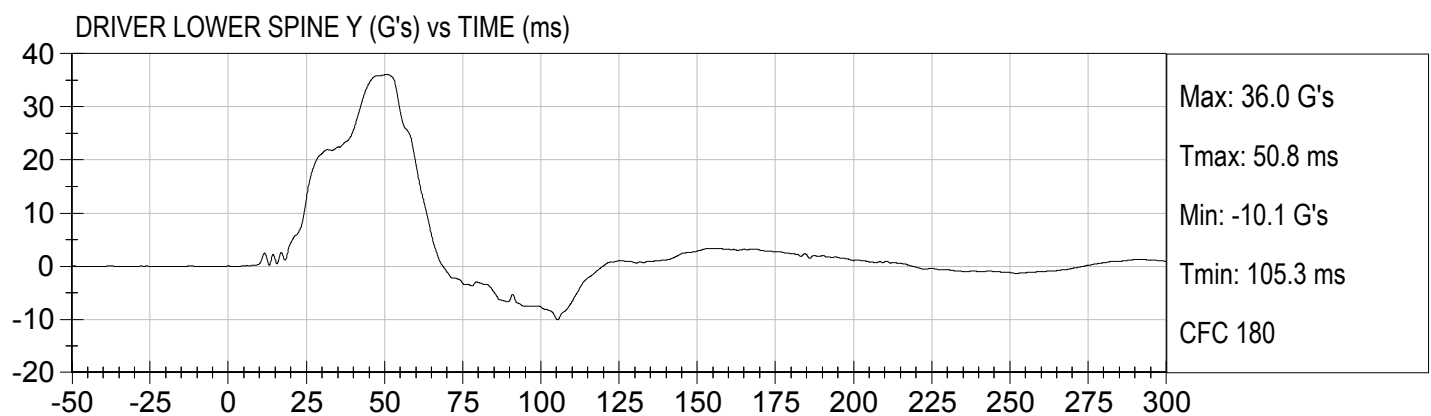
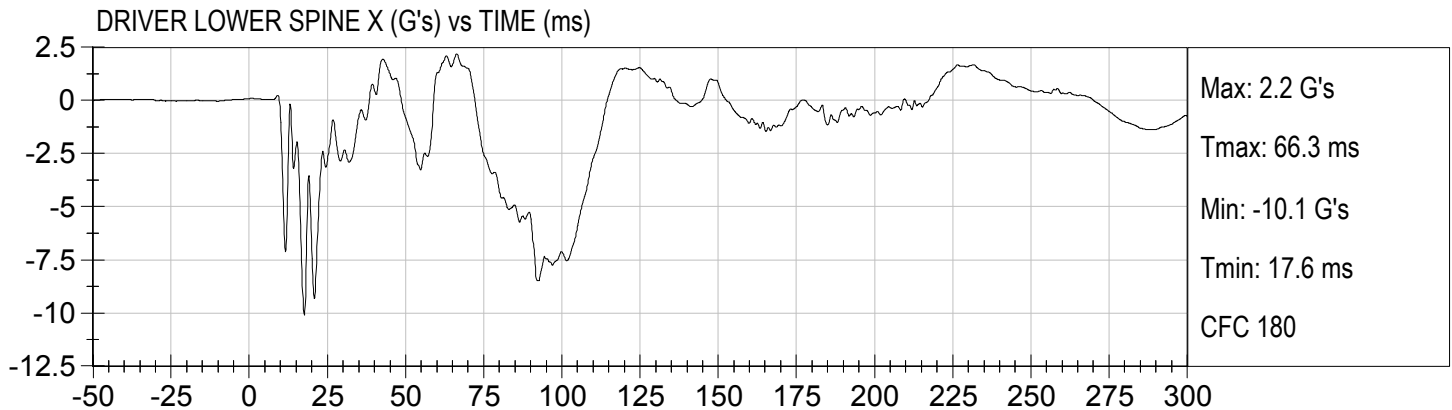
Load Cell Pole Barrier #5 Force (Y)

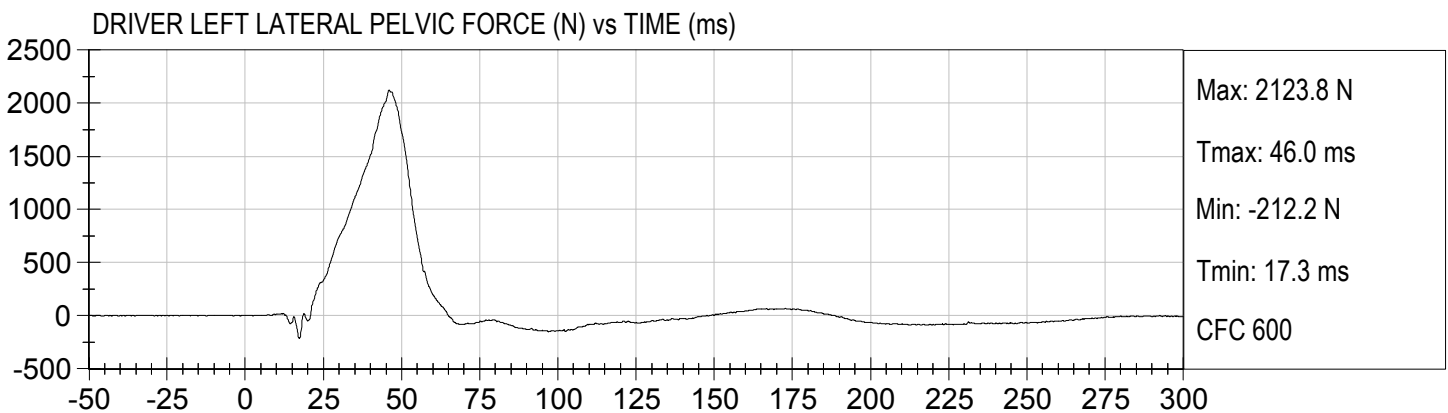
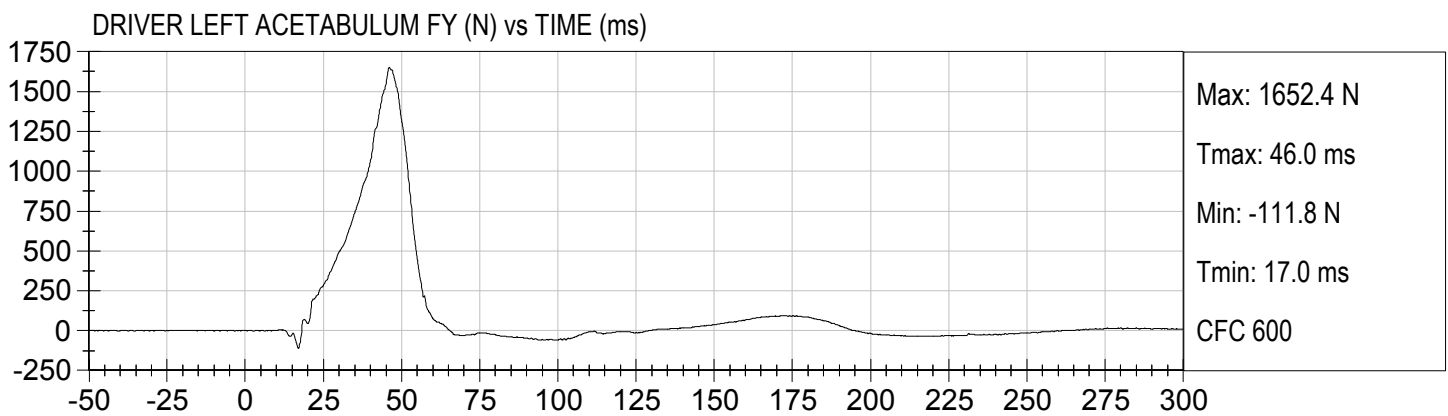
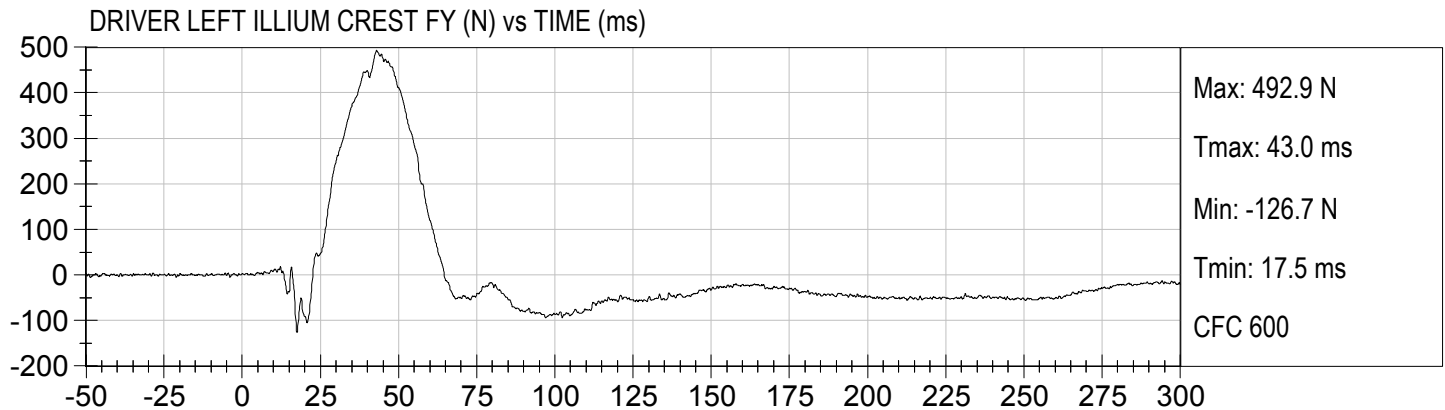
Load Cell Pole Barrier #6 Force (Y)

Load Cell Pole Barrier #7 Force (Y)

Load Cell Pole Barrier #8 Force (Y)







APPENDIX C
DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

SID-IIsD External Measurements
SN: 296

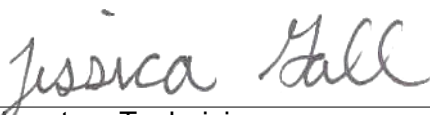
No.	Name	Spec. (mm)	Result	Pass/Fail
A	Sitting Height	772 - 788	784	Pass
B	Shoulder Pivot Height	437 - 453	442	Pass
C	H-point Height	79 - 89	83	Pass
D	H-point from Seatback	141 - 151	145	Pass
E	Shoulder Pivot from Backline	97 - 107	99	Pass
F	Thigh Clearance	119 -135	121	Pass
G	Head Breadth	140 - 148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

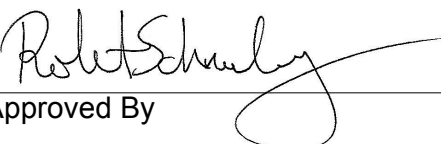
ATD Serial No: 296

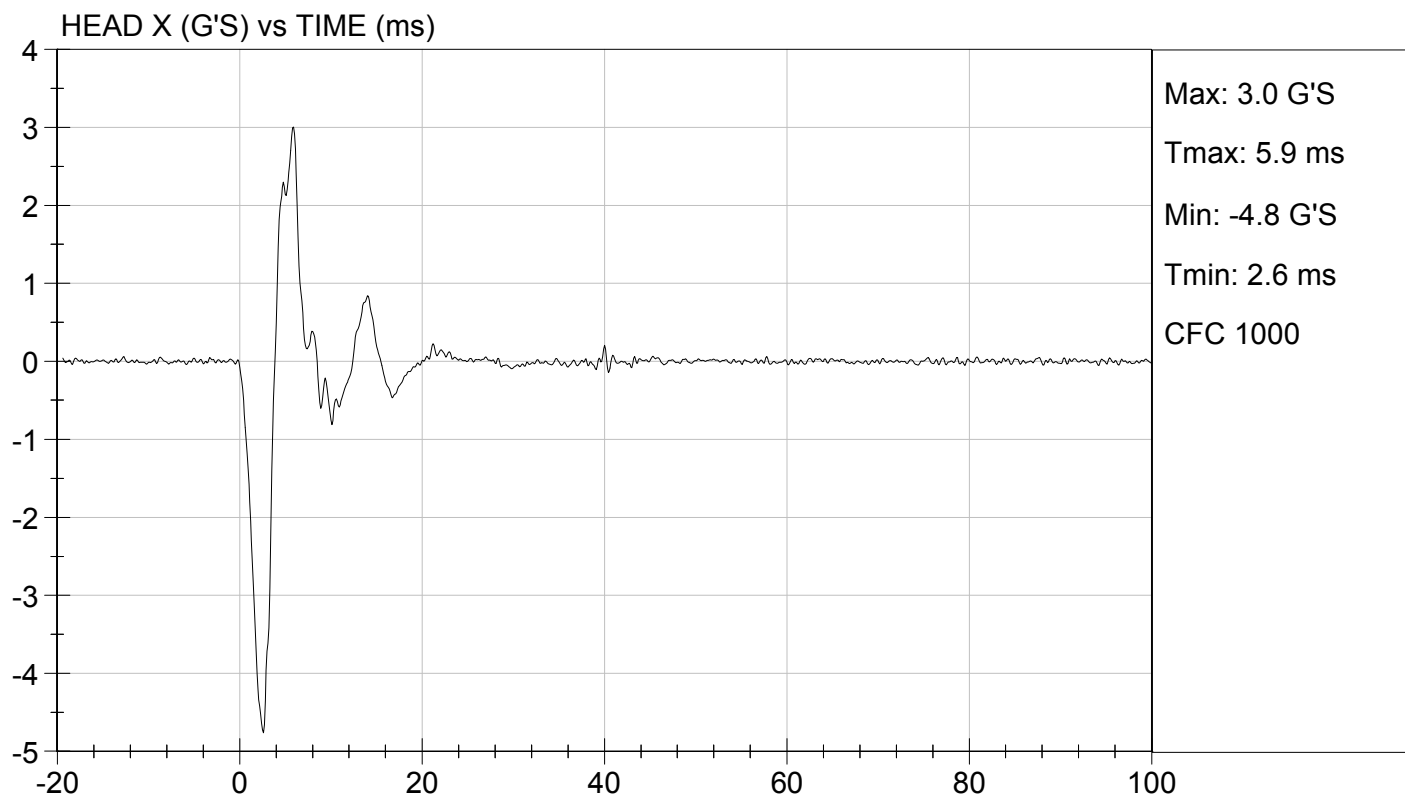
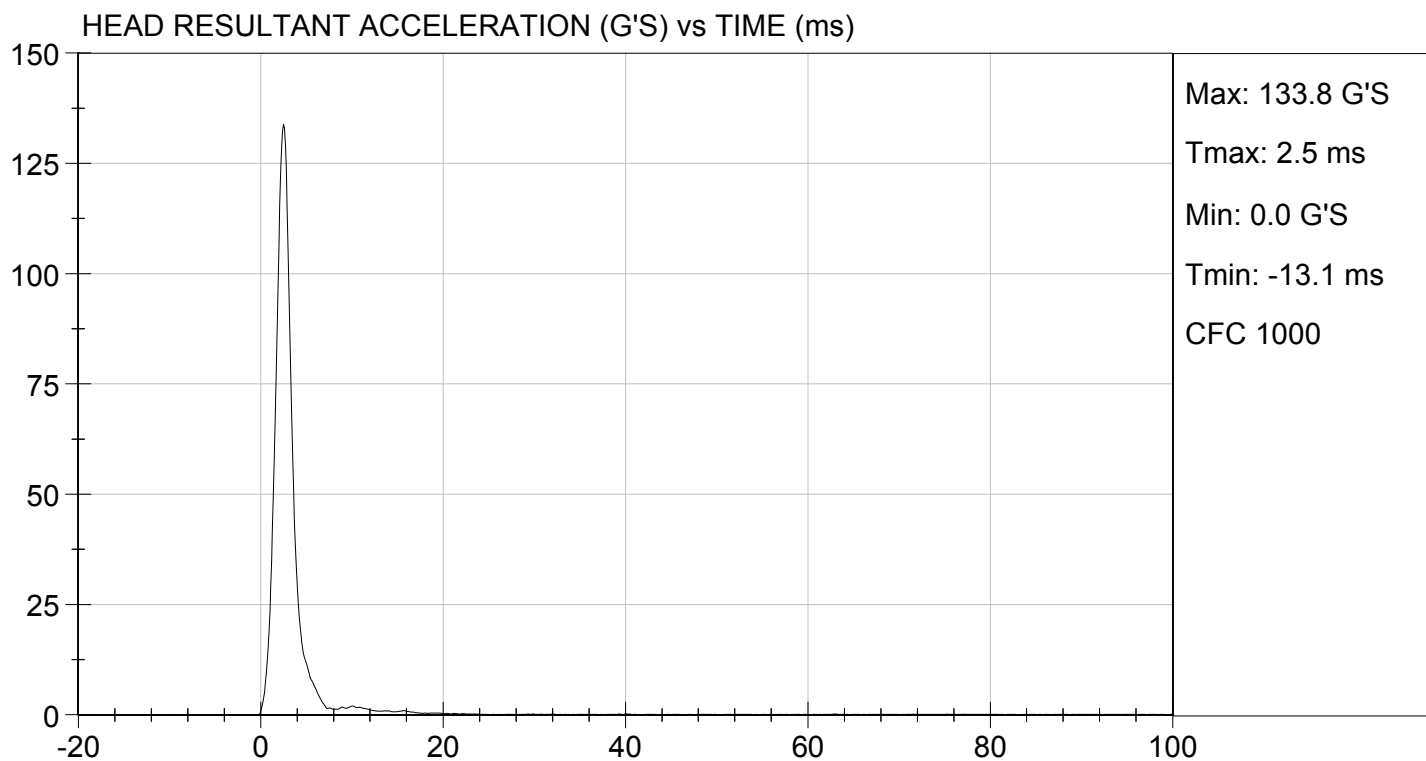
Test ID: D162841

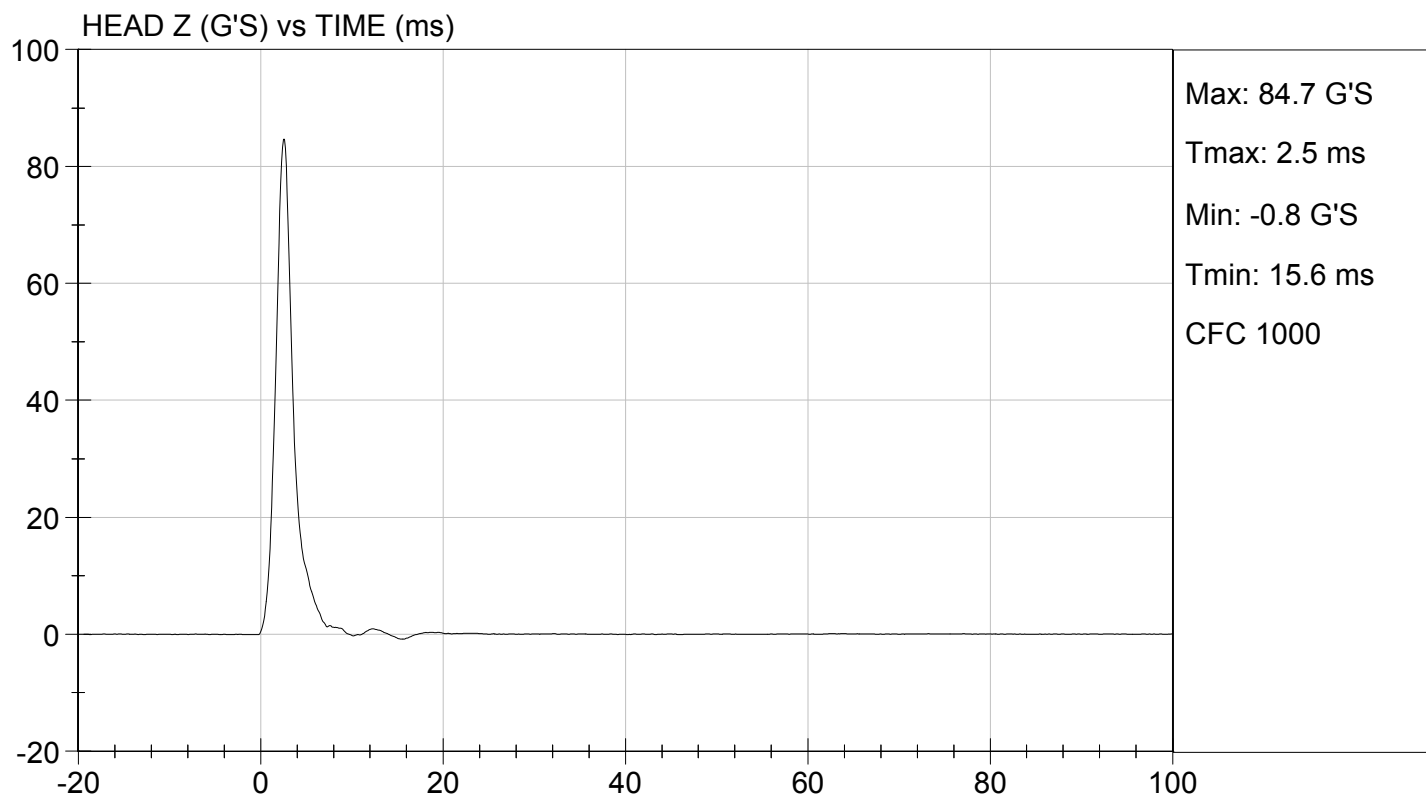
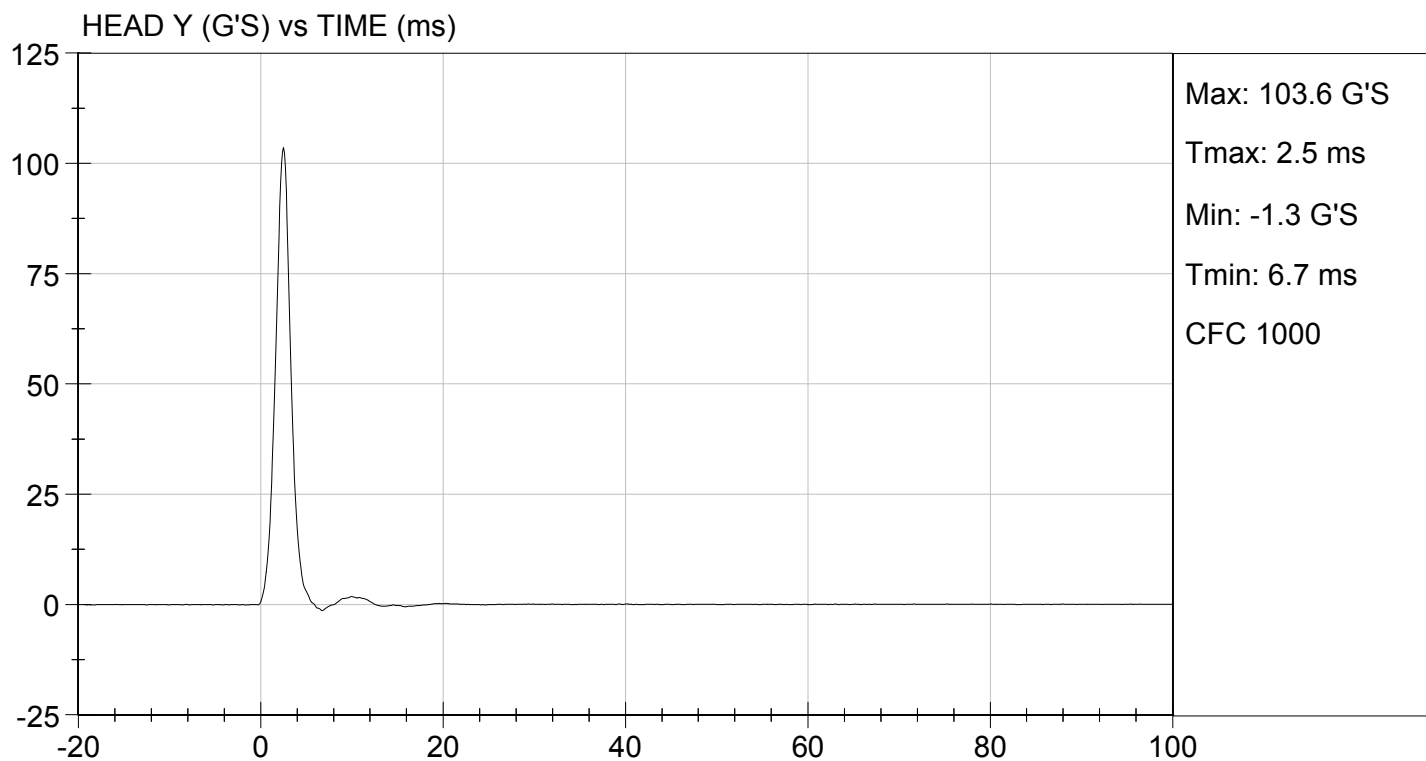
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	49	Pass
Peak Resultant Acceleration	G's	115 to 137	134	Pass
Peak Longitudinal Acceleration	G's	+/- 15	-4.8	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	<15%	Yes	Pass
Overall Test Results			Pass	


Laboratory Technician

08/24/2016
Test Date


Approved By





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

ATD Serial No: 296

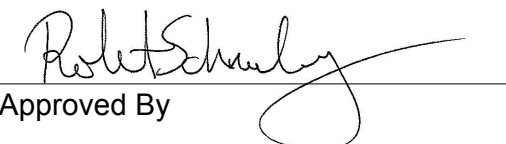
Test I.D: D162842

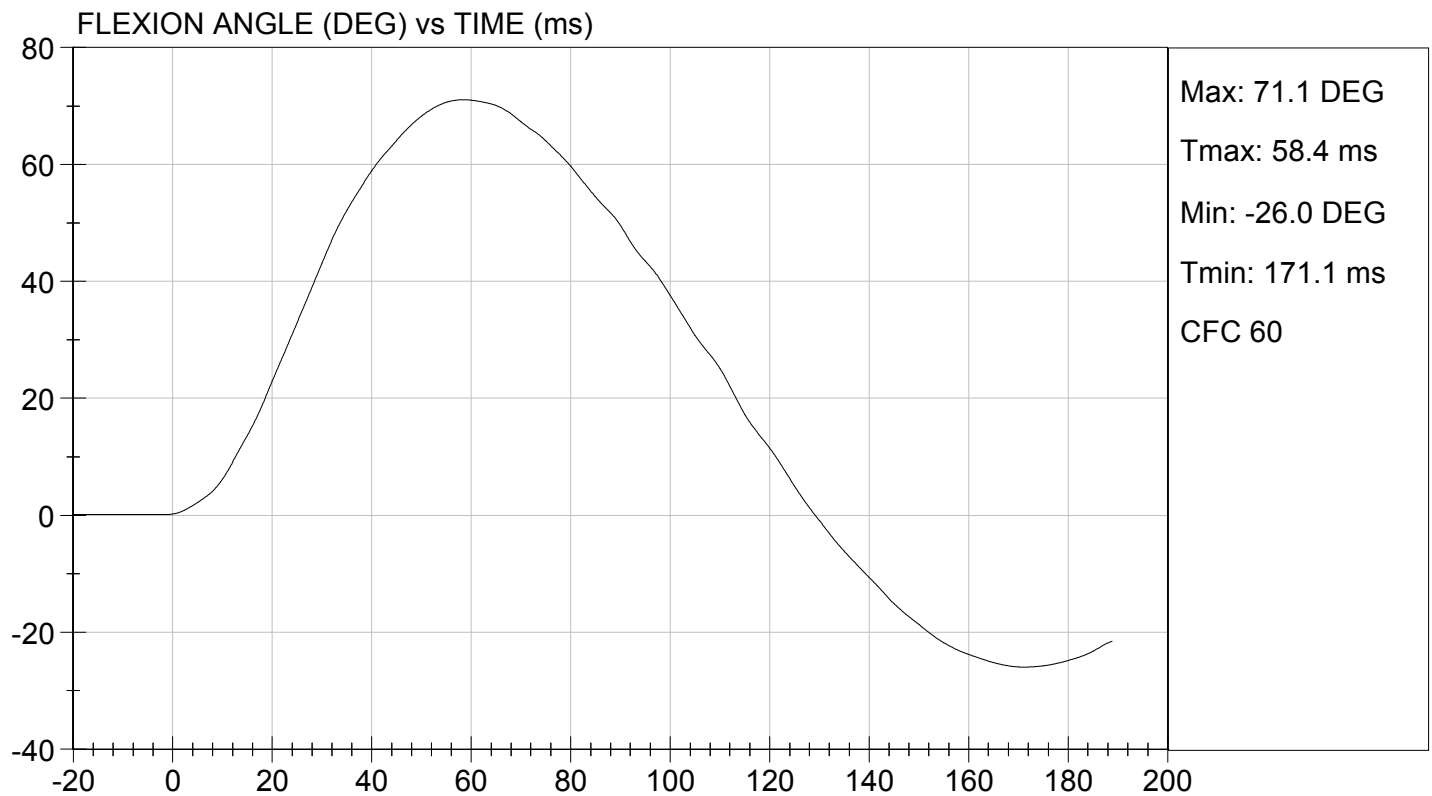
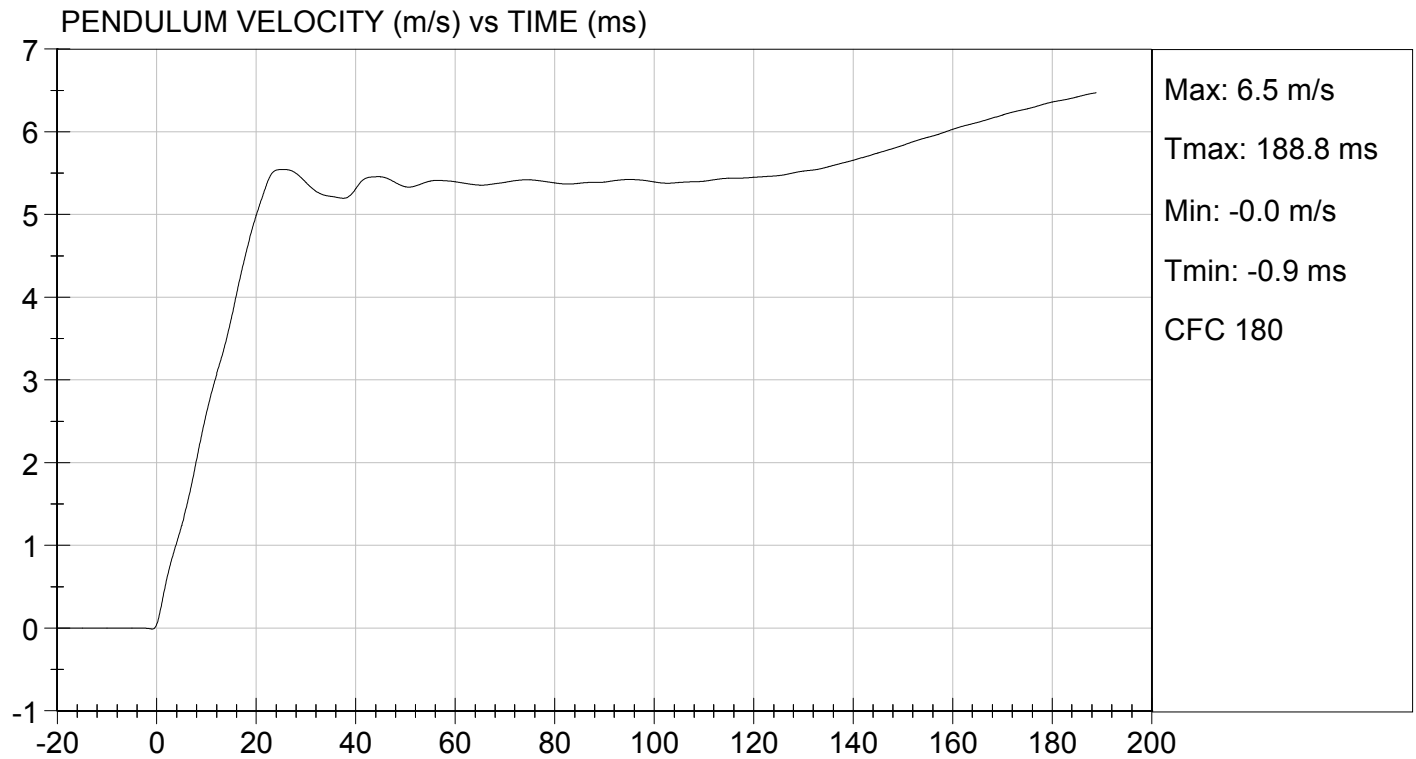
Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21.5	Pass
Humidity		%	10 to 70	50	Pass
Impact Velocity		m/s	5.51 to 5.63	5.58	Pass
Pendulum Velocity	10 ms	m/s	2.20 to 2.80	2.61	Pass
	15 ms	m/s	3.30 to 4.10	3.75	Pass
	20 ms	m/s	4.40 to 5.40	4.99	Pass
	25 ms	m/s	5.40 to 6.10	5.54	Pass
	25-100 ms	m/s	5.50 to 6.20	5.54	Pass
Maximum D-Plane Rotation		deg	71 to 81	71	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	58	Pass
Maximum Occipital Condyle Moment		Nm	-44 to -36	-41	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	109	Pass
Overall Test Results					Pass


 Laboratory Technician

08/24/2016

Test Date

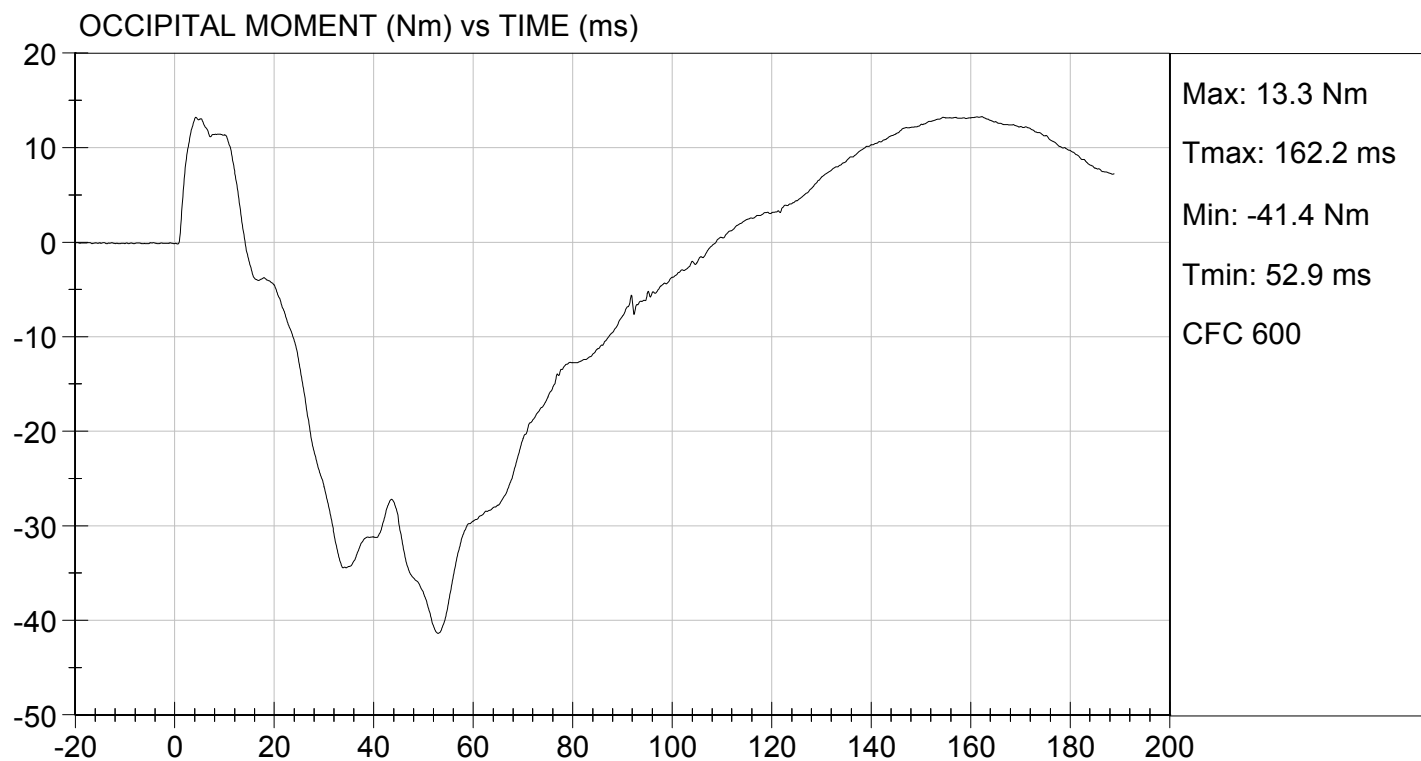

 Approved By





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

TEST DATE: 08/24/2016
TEST #: D162842

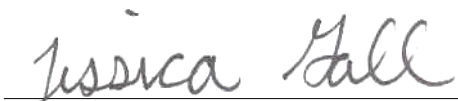


MGA RESEARCH CORPORATION
SHOULDER IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

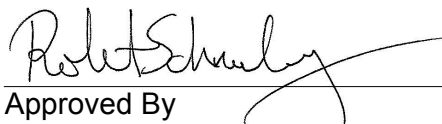
ATD Serial No: 296

Test ID: D162843

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	51	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	30	Pass
Upper Spine (T1) Y Acceleration	G's	17 to 22	18	Pass
			Overall Test Results	Pass


Laboratory Technician

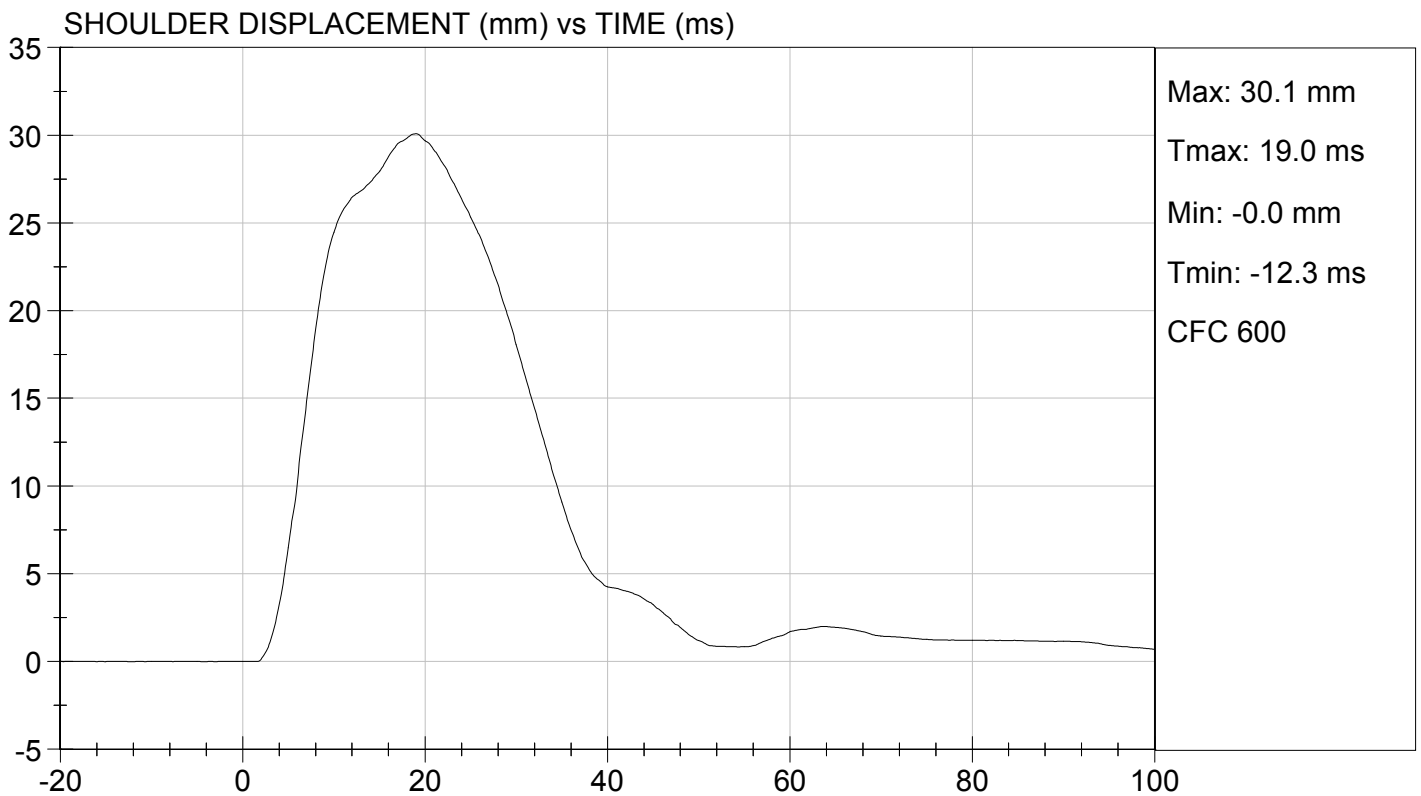
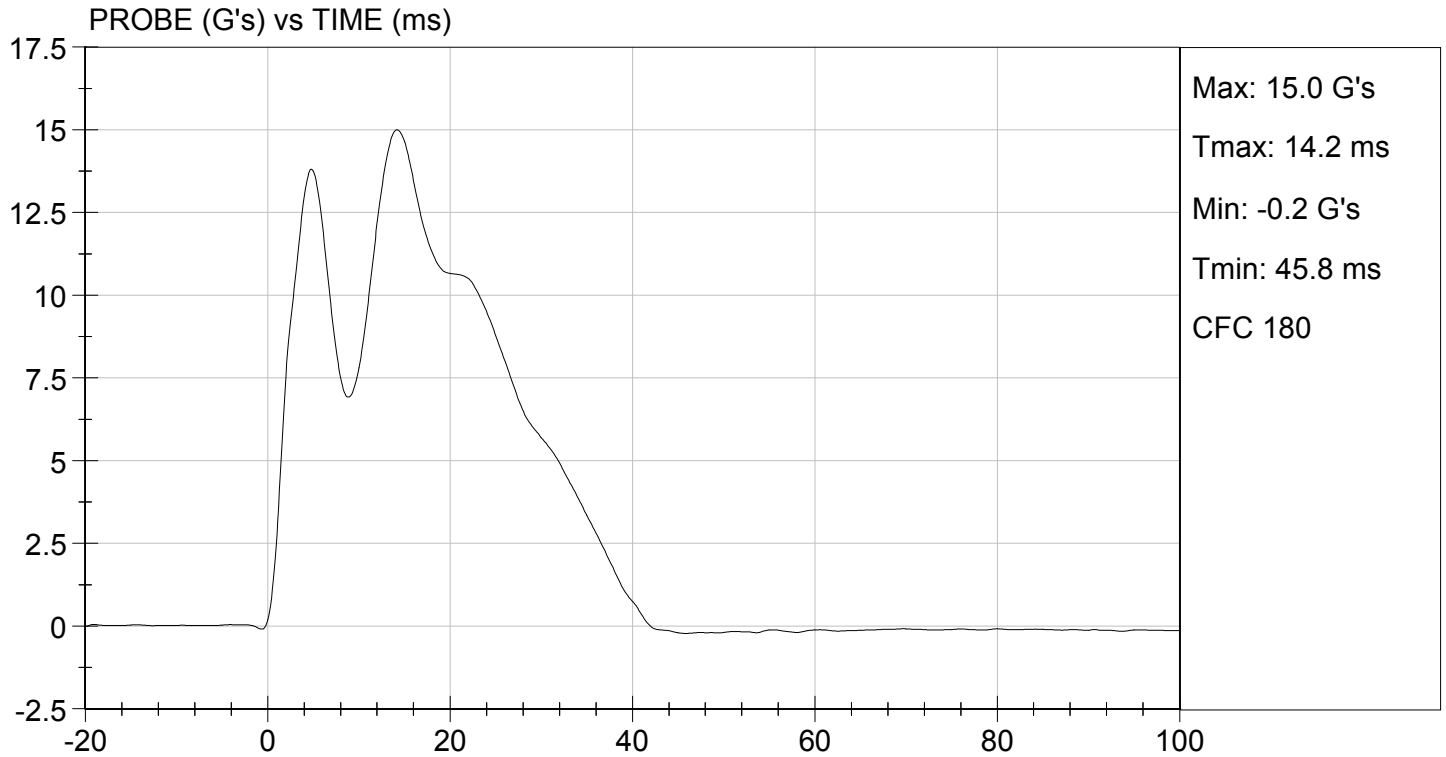
08/24/2016
Test Date


Approved By



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

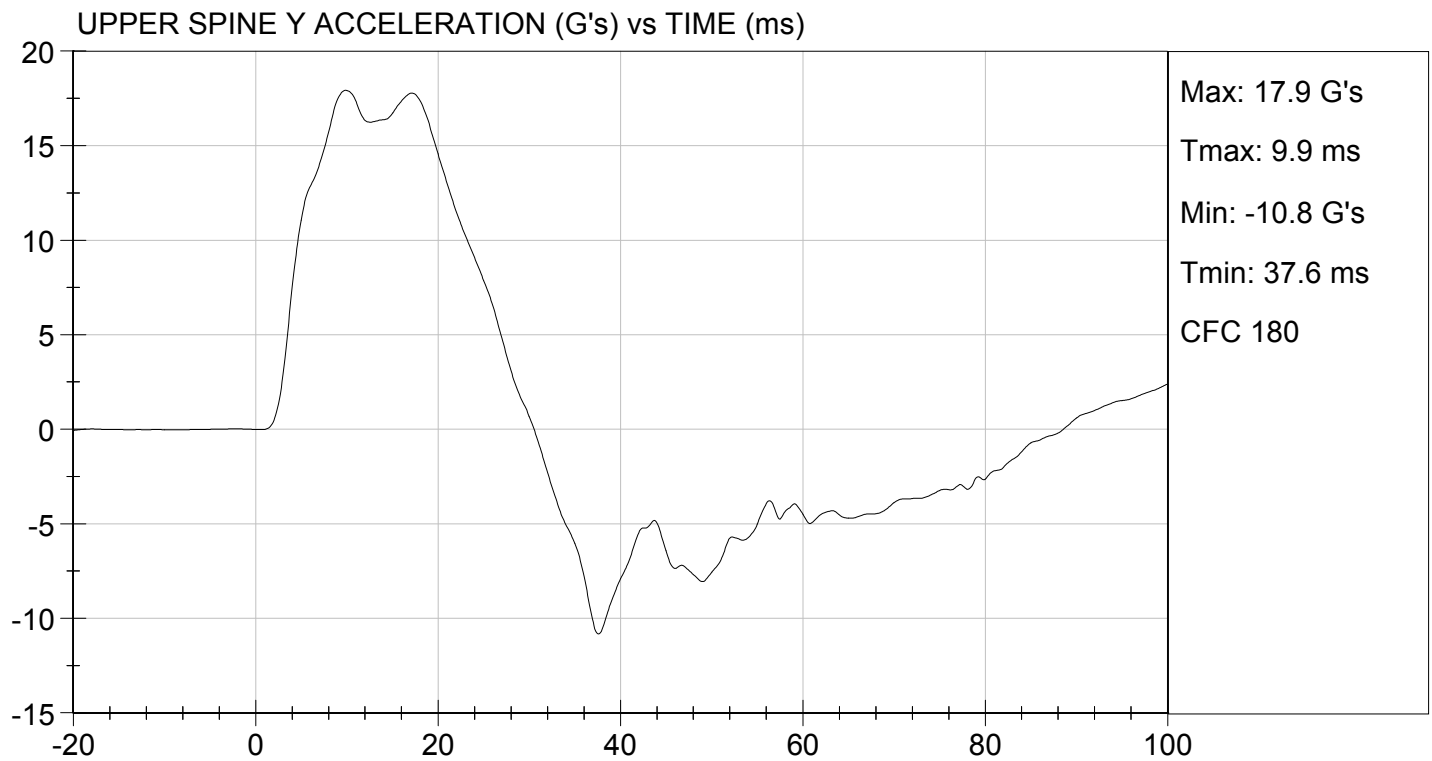
TEST DATE: 08/24/2016
TEST #: D162843





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

TEST DATE: 08/24/2016
TEST #: D162843



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

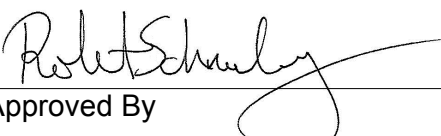
ATD Serial No: 296

Test I.D: D162844

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	51	Pass
Impact Velocity	m/s	6.60 to 6.80	6.77	Pass
Maximum Probe Acceleration	G's	30 to 36	31	Pass
Shoulder Displacement	mm	31 to 40	37	Pass
Upper Rib Displacement	mm	25 to 32	28	Pass
Middle Rib Displacement	mm	30 to 36	31	Pass
Lower Rib Displacement	mm	32 to 38	33	Pass
Upper Spine (T1) Y Acceleration	G's	34 to 43	37	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	31	Pass
Overall Test Results				Pass


 Laboratory Technician

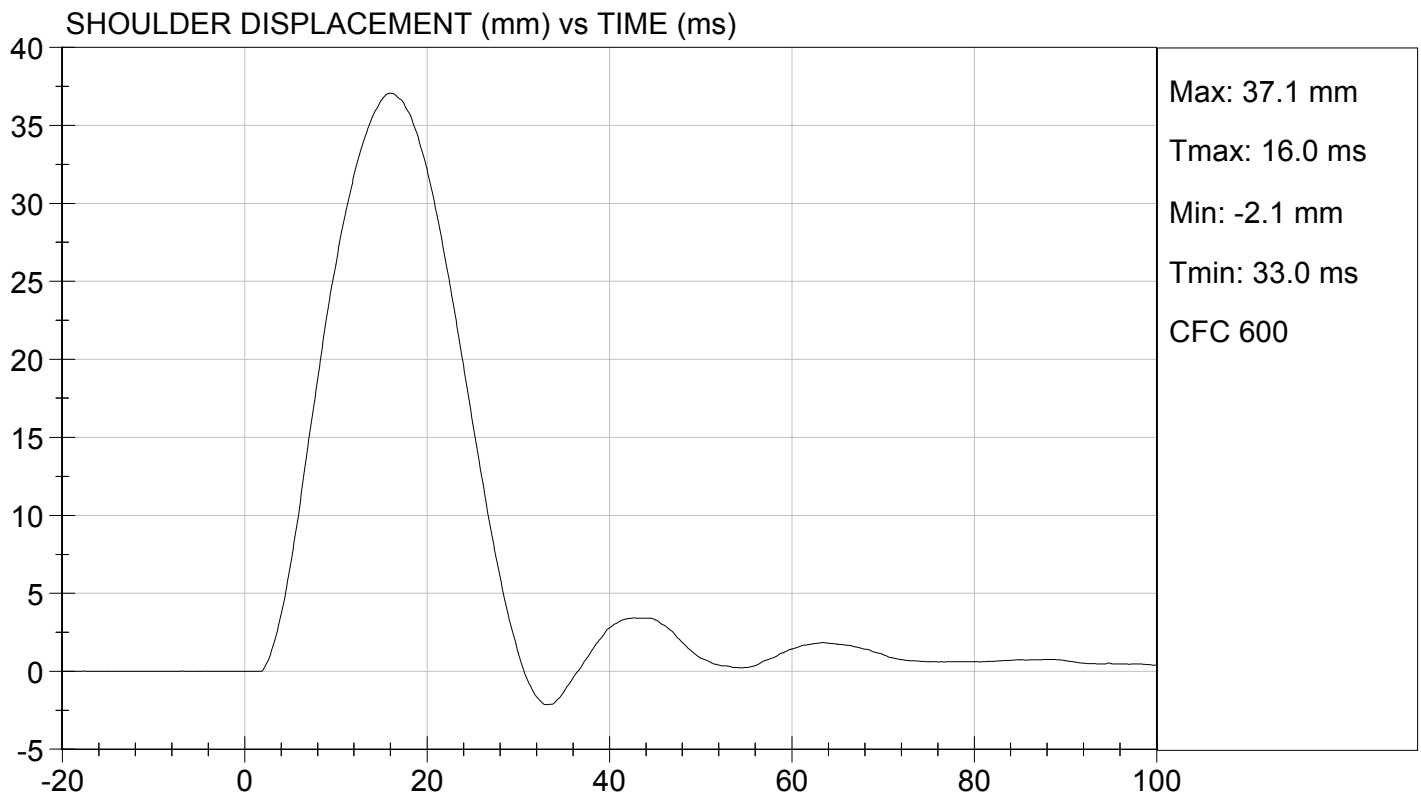
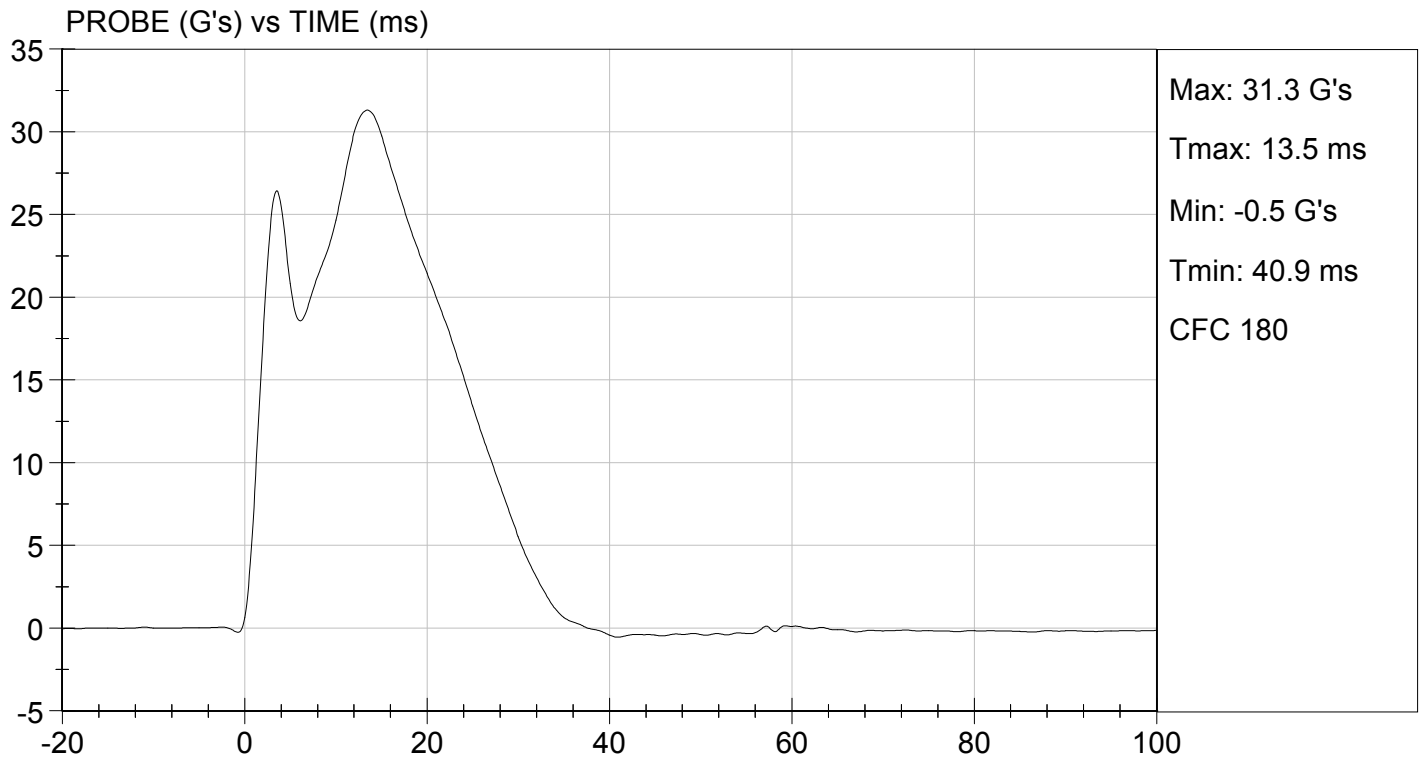
08/24/2016
 Test Date


 Approved By



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

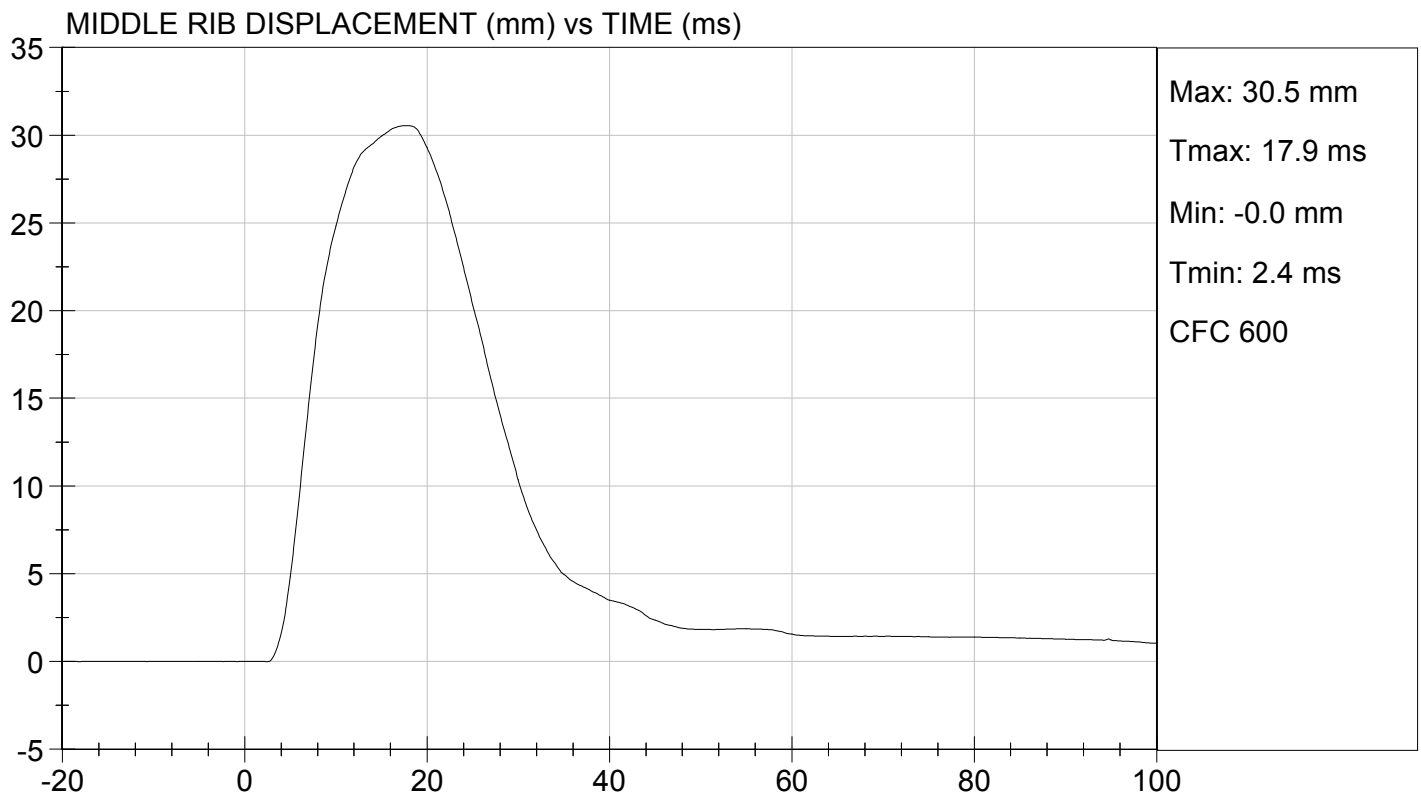
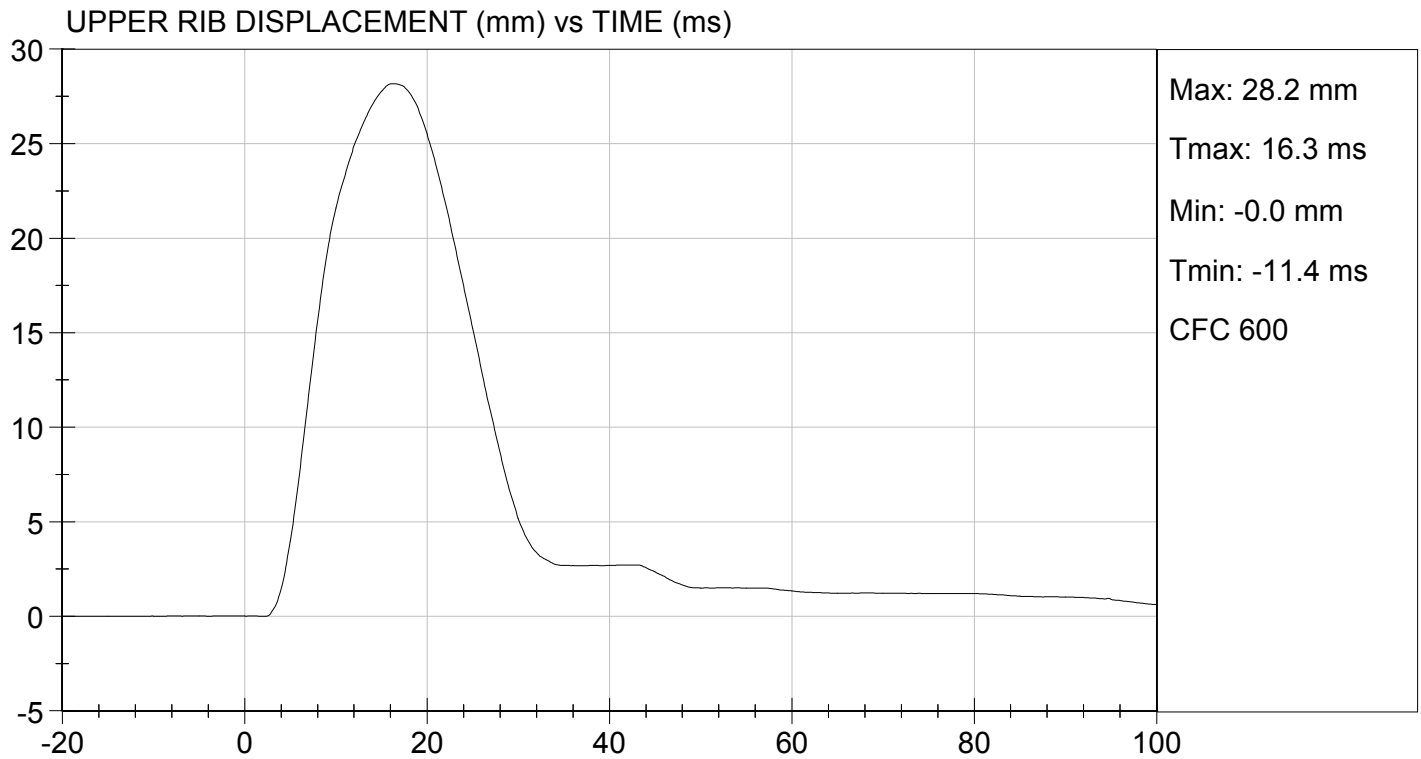
TEST DATE: 08/24/2016
TEST #: D162844





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

TEST DATE: 08/24/2016
TEST #: D162844

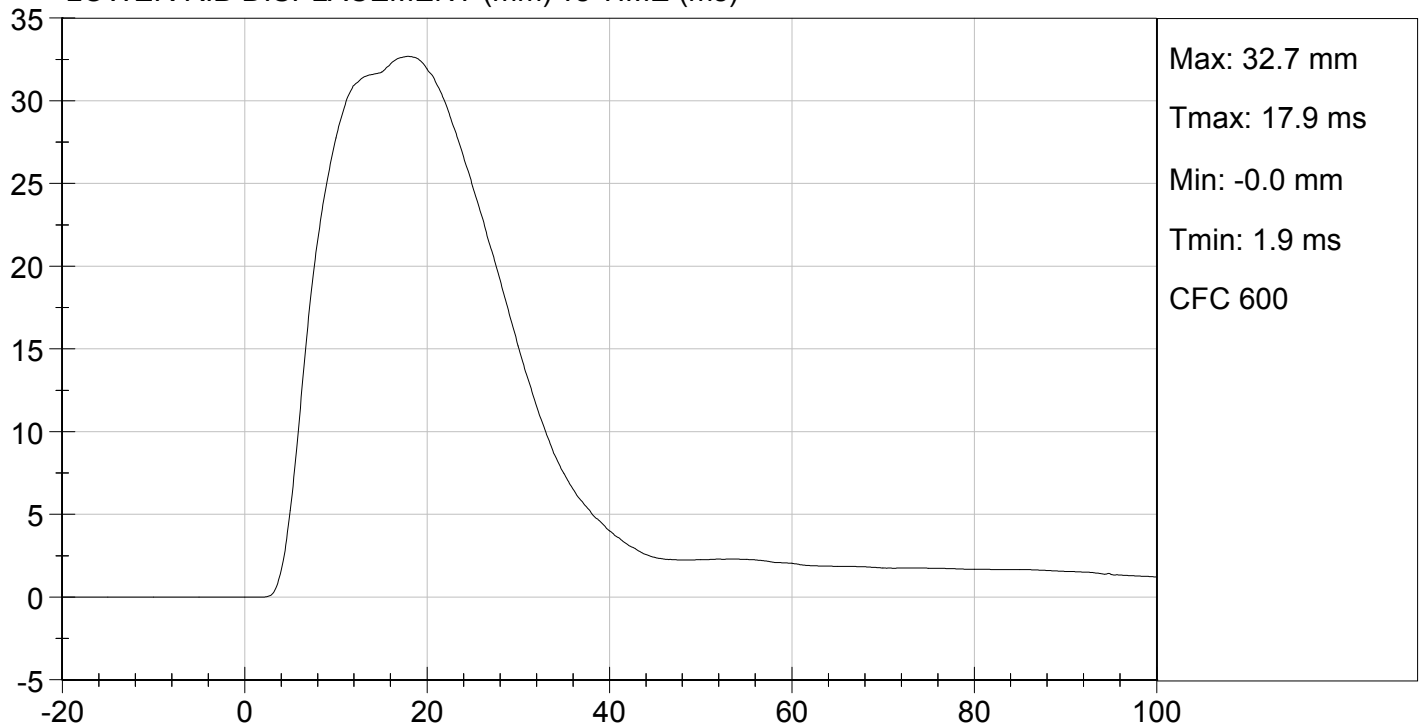




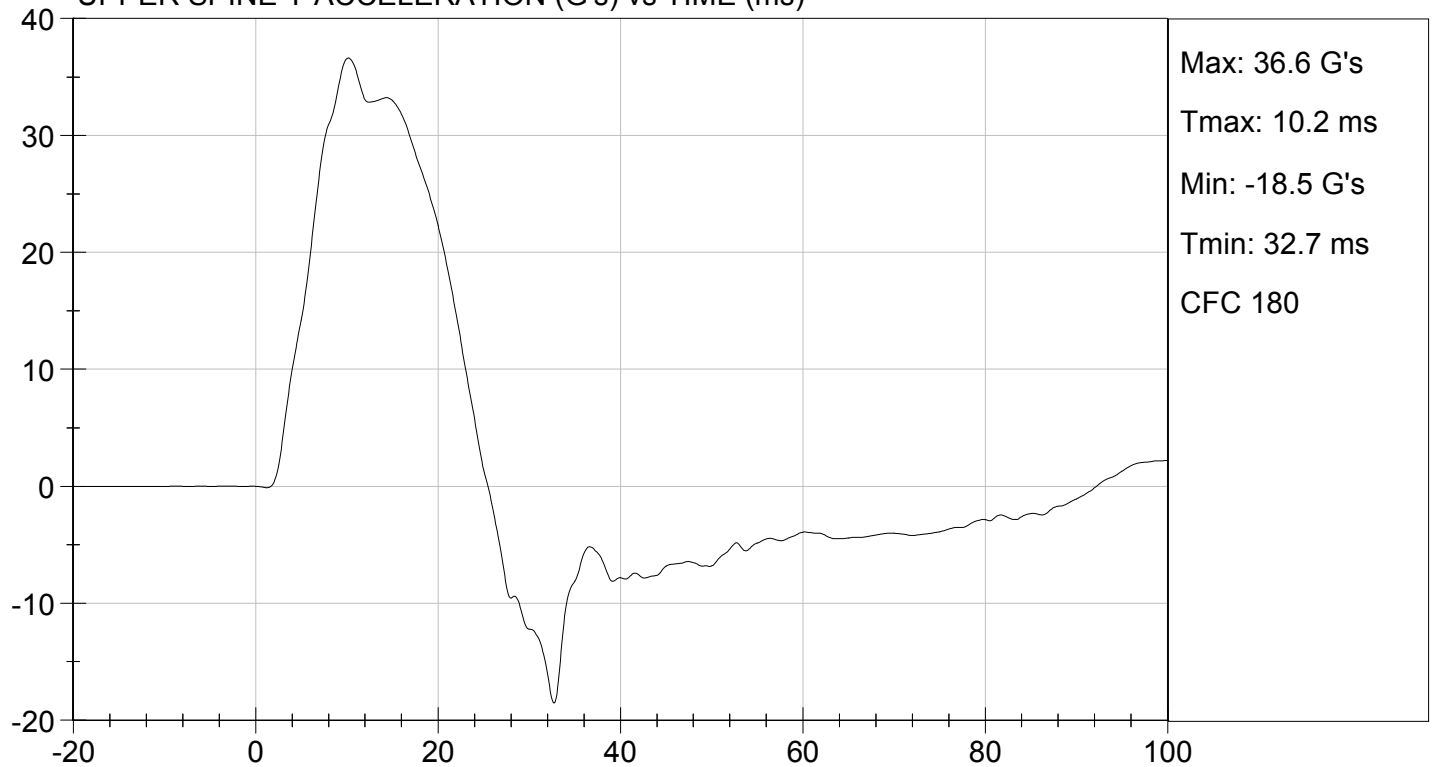
TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.22 ft/s, 6.77 m/s

TEST DATE: 08/24/2016
TEST #: D162844

LOWER RIB DISPLACEMENT (mm) vs TIME (ms)



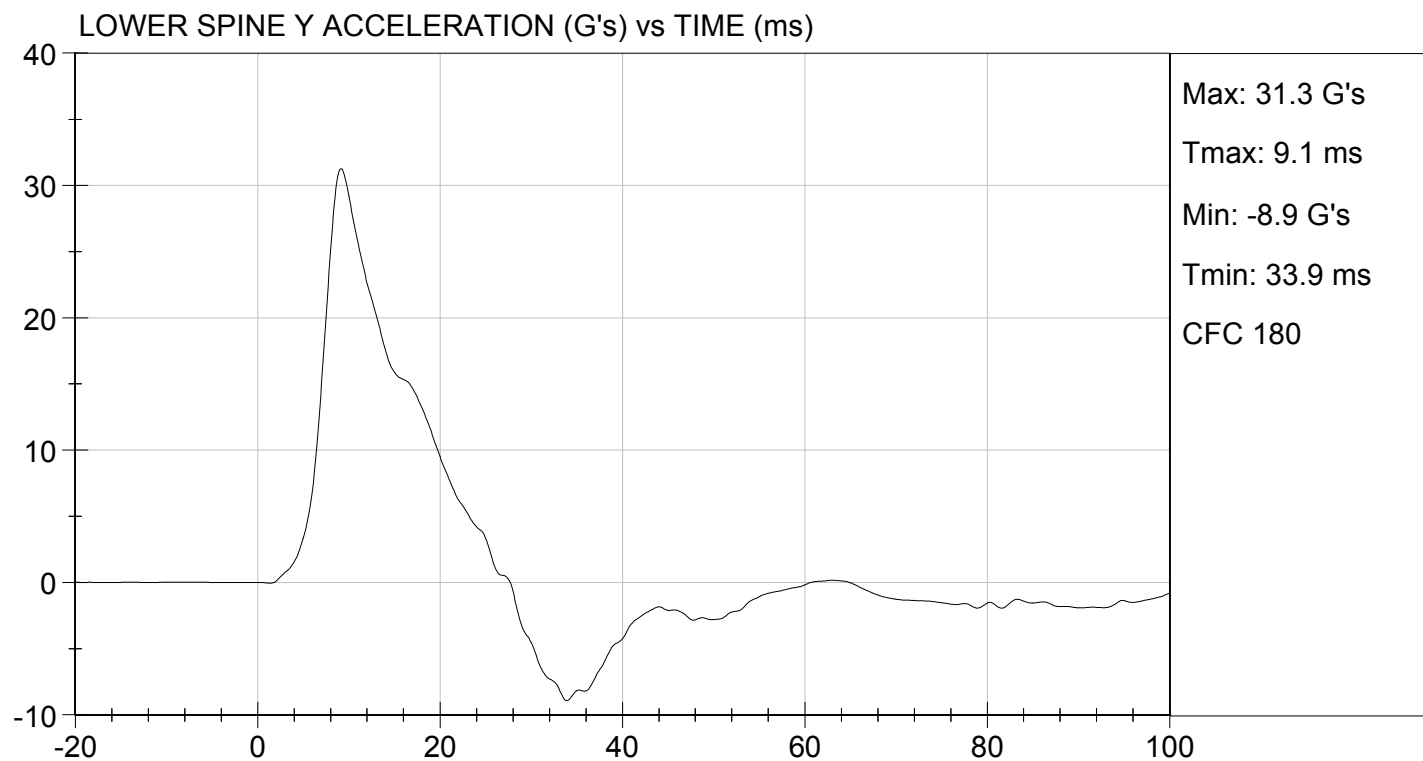
UPPER SPINE Y ACCELERATION (G's) vs TIME (ms)





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

TEST DATE: 08/24/2016
TEST #: D162844

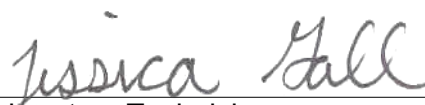


MGA RESEARCH CORPORATION
THORAX (WITHOUT ARM) IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

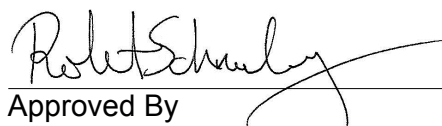
Test I.D: D162845

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	51	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	41	Pass
Lower Rib Displacement	mm	35 to 43	39	Pass
Upper Spine (T1) Y Acceleration	G's	13 to 17	15	Pass
Lower Spine (T12) Y Acceleration	G's	7 to 11	9	Pass
Overall Test Results				Pass


 Laboratory Technician

08/24/2016

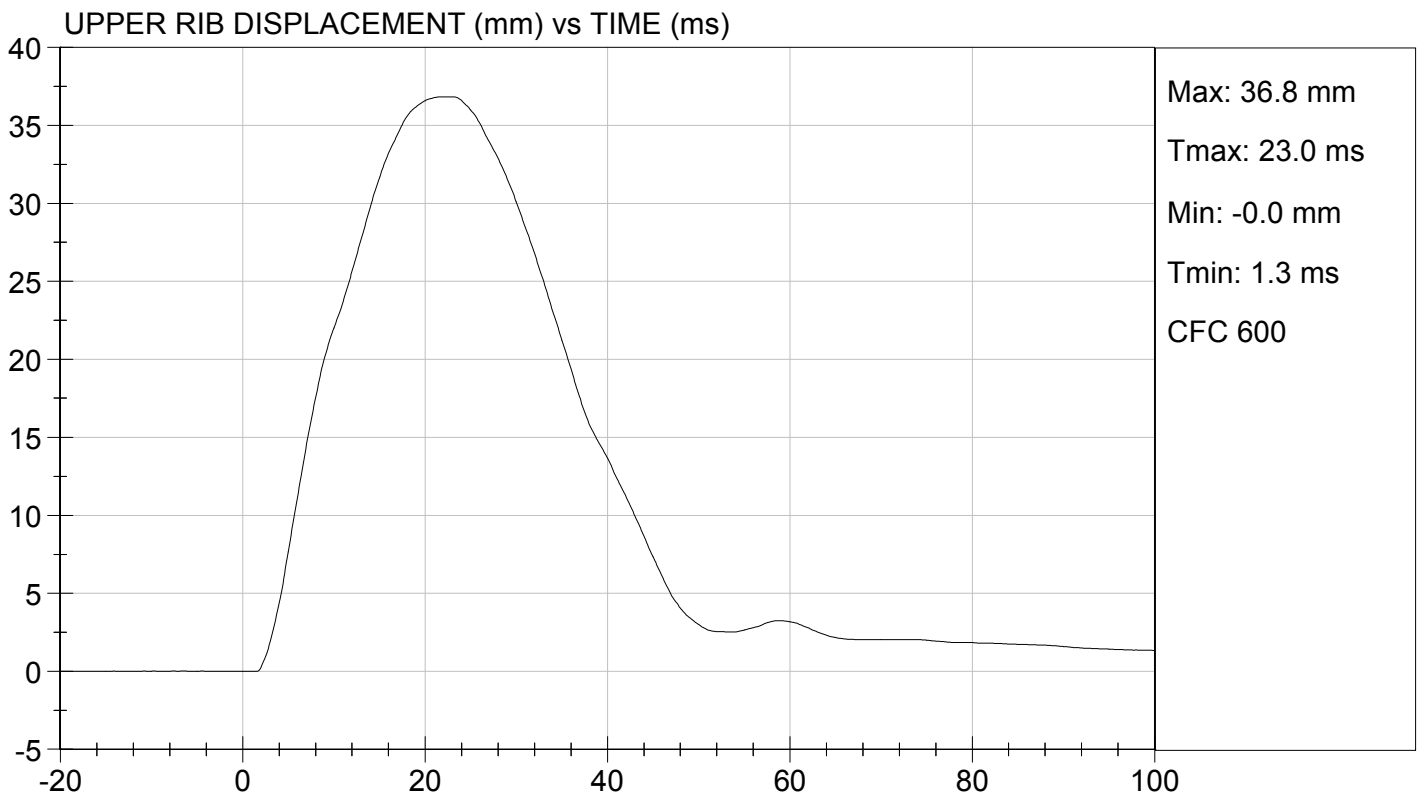
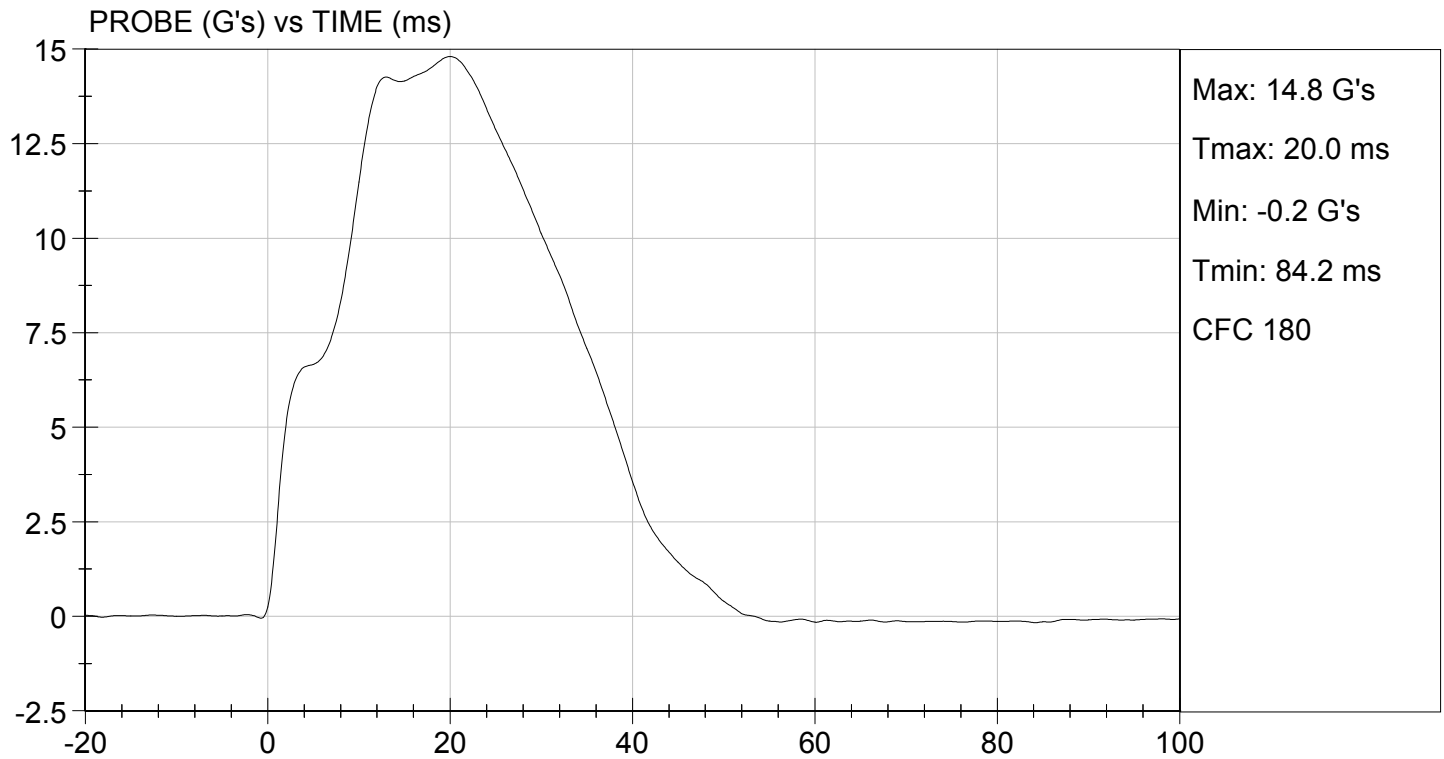
Test Date


 Approved By



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

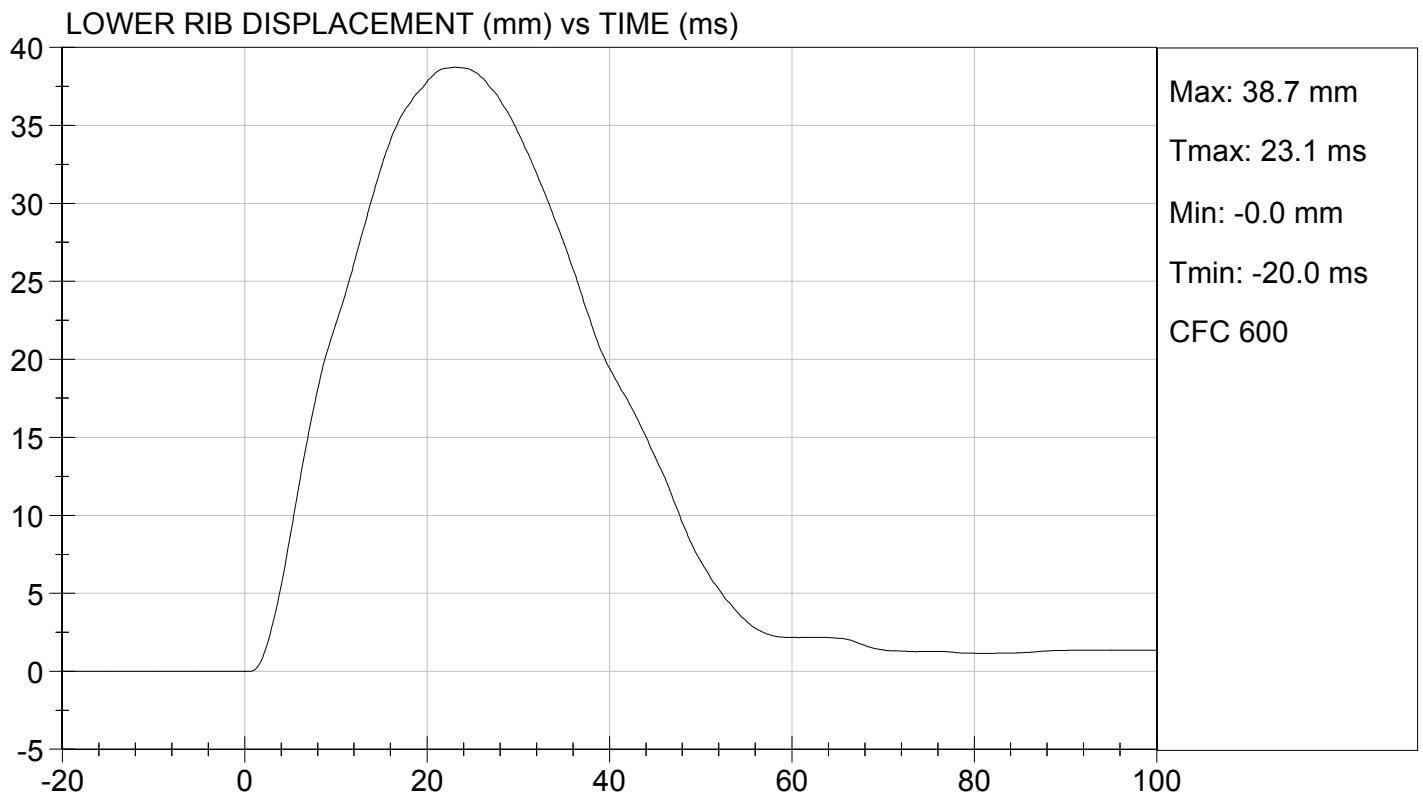
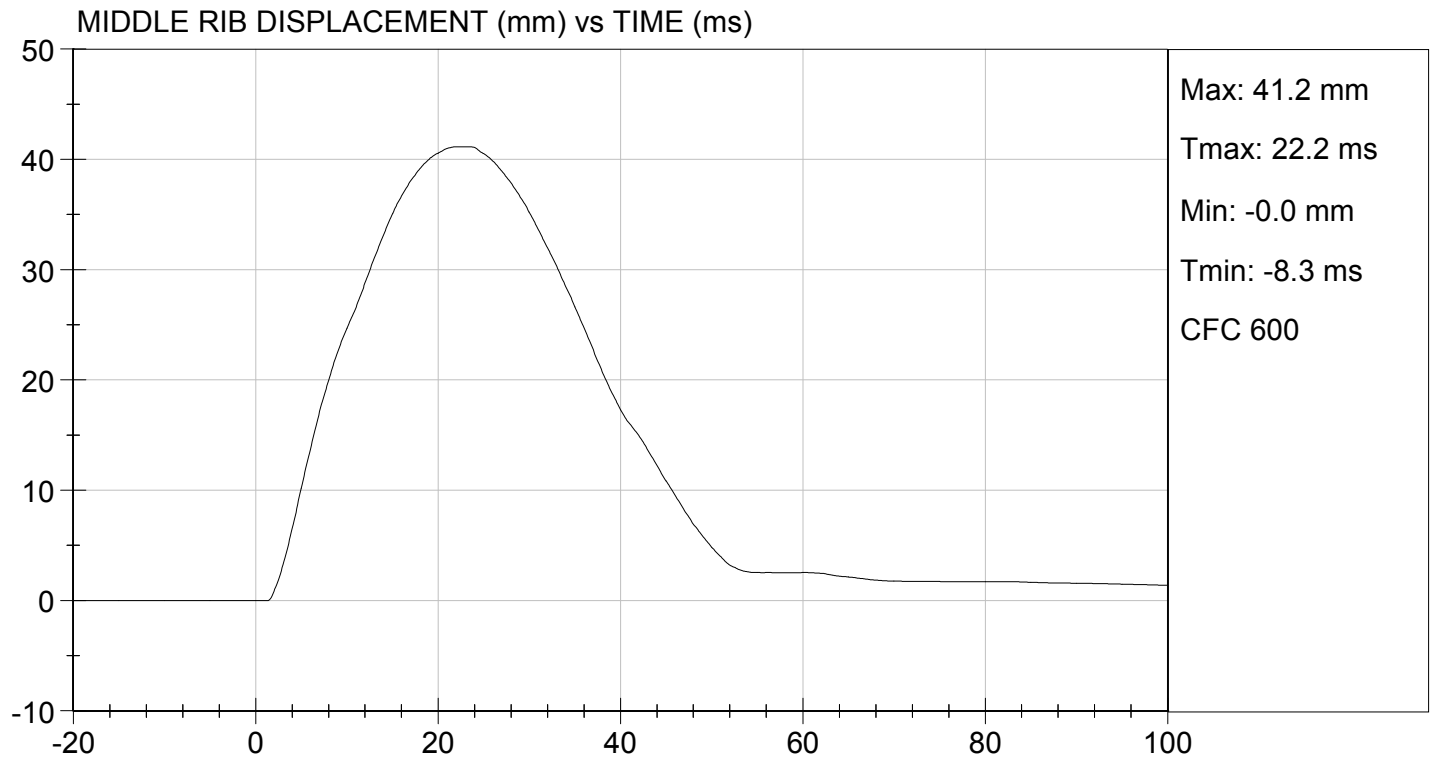
TEST DATE: 08/24/2016
TEST #: D162845





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

TEST DATE: 08/24/2016
TEST #: D162845

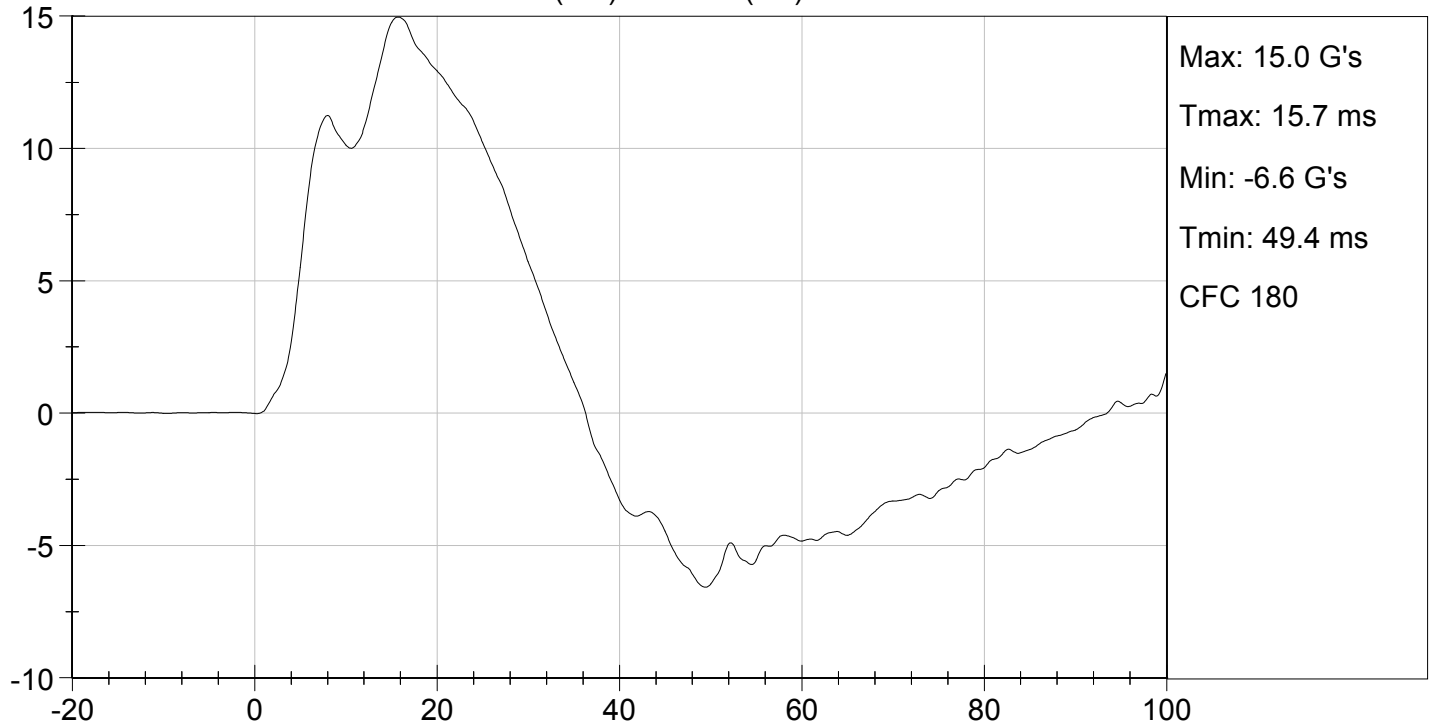




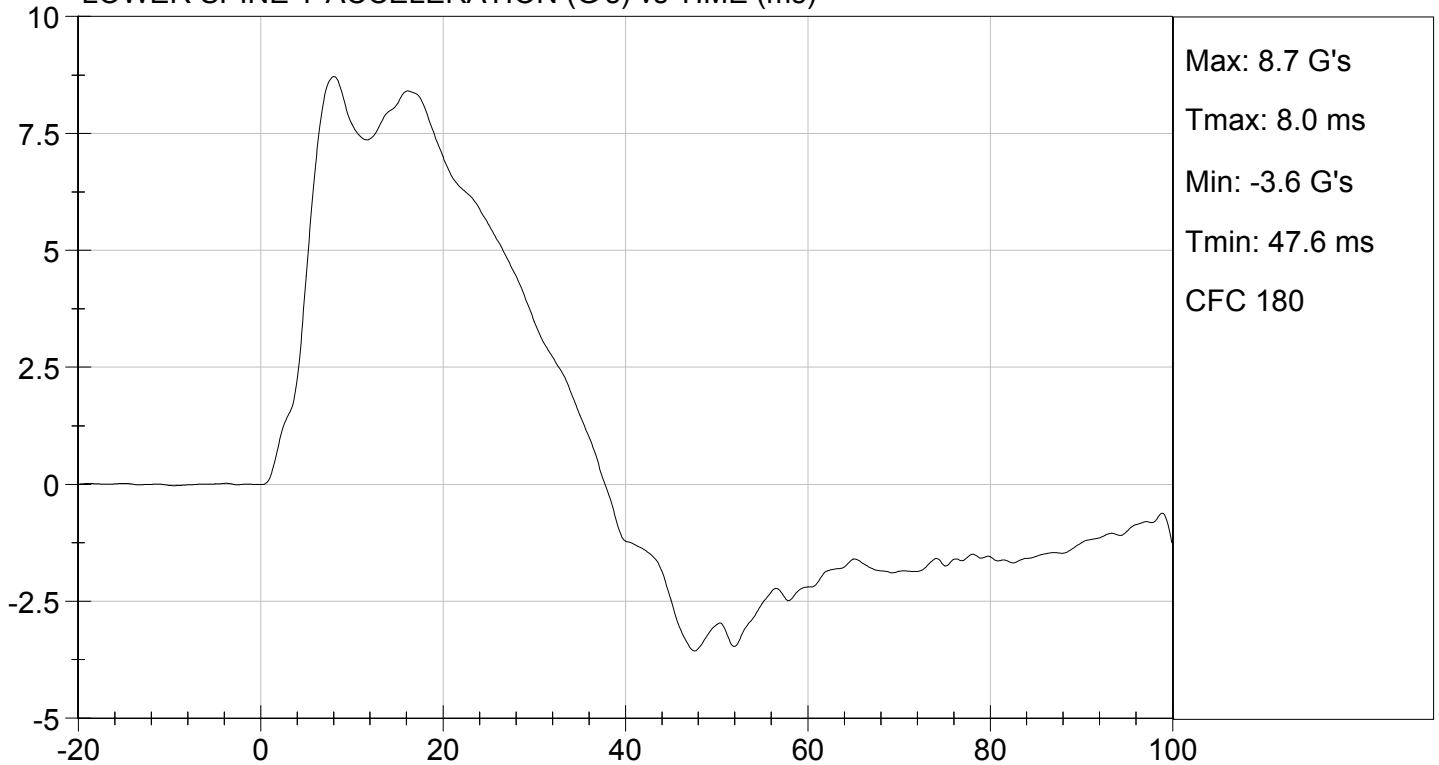
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 08/24/2016
TEST #: D162845

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



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



MGA RESEARCH CORPORATION

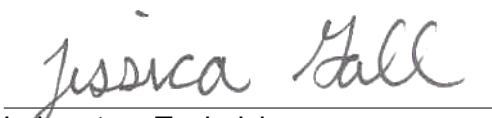
ABDOMINAL IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

Test I.D: D162846

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	51	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	41	Pass
Lower Abdomen Rib Displacement	mm	33 to 44	39	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	11	Pass
Overall Test Results				Pass


Laboratory Technician

08/24/2016

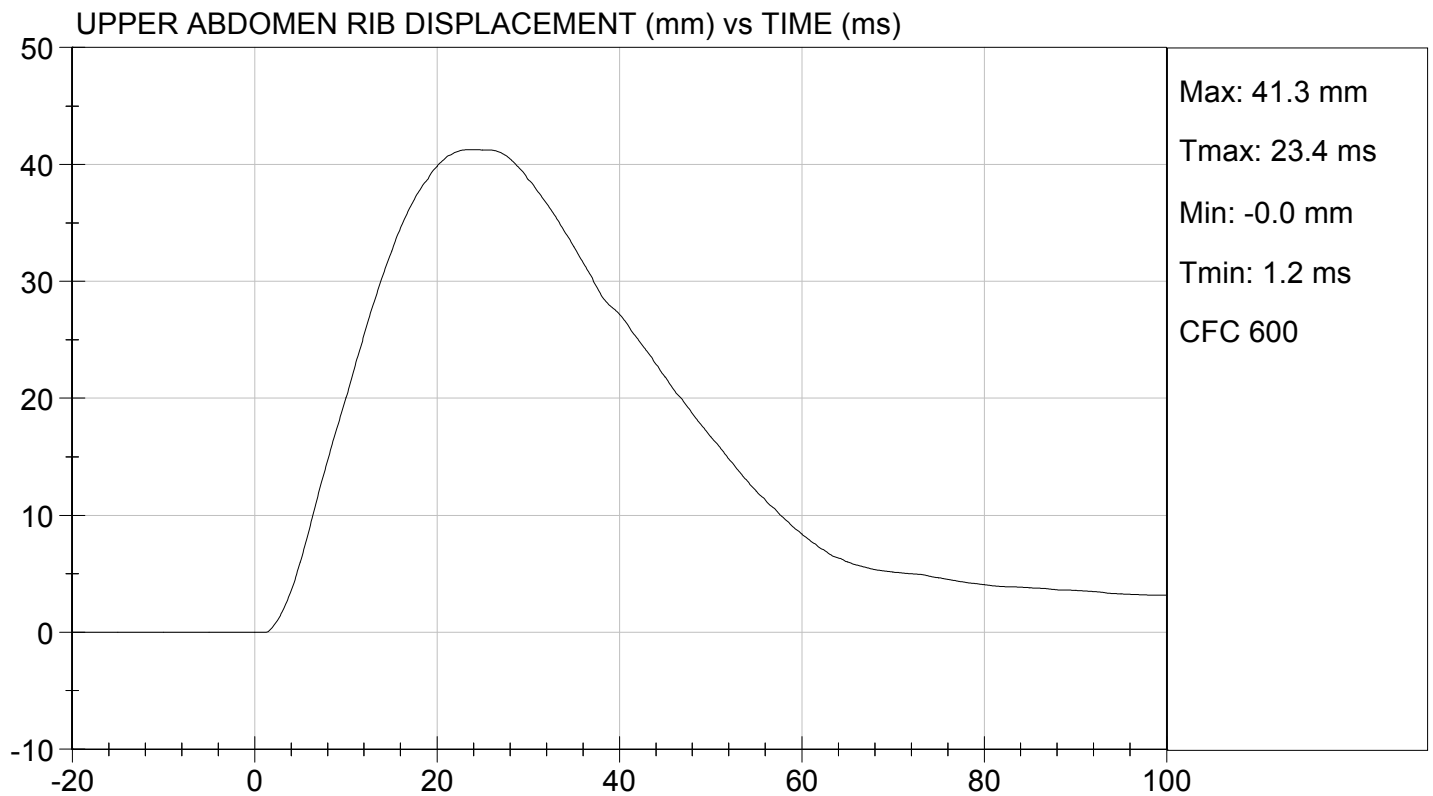
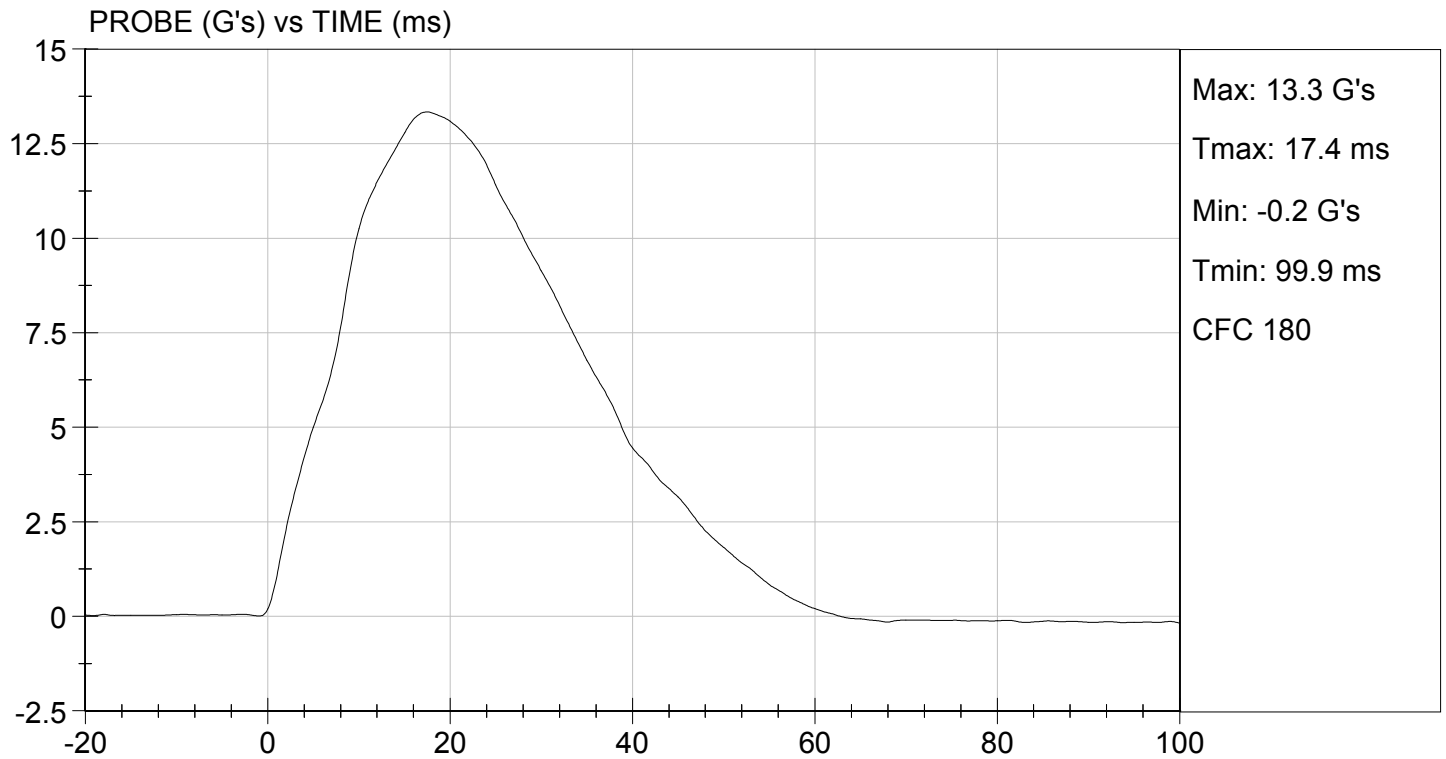
Test Date


Approved By



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

TEST DATE: 08/24/2016
TEST #: D162846

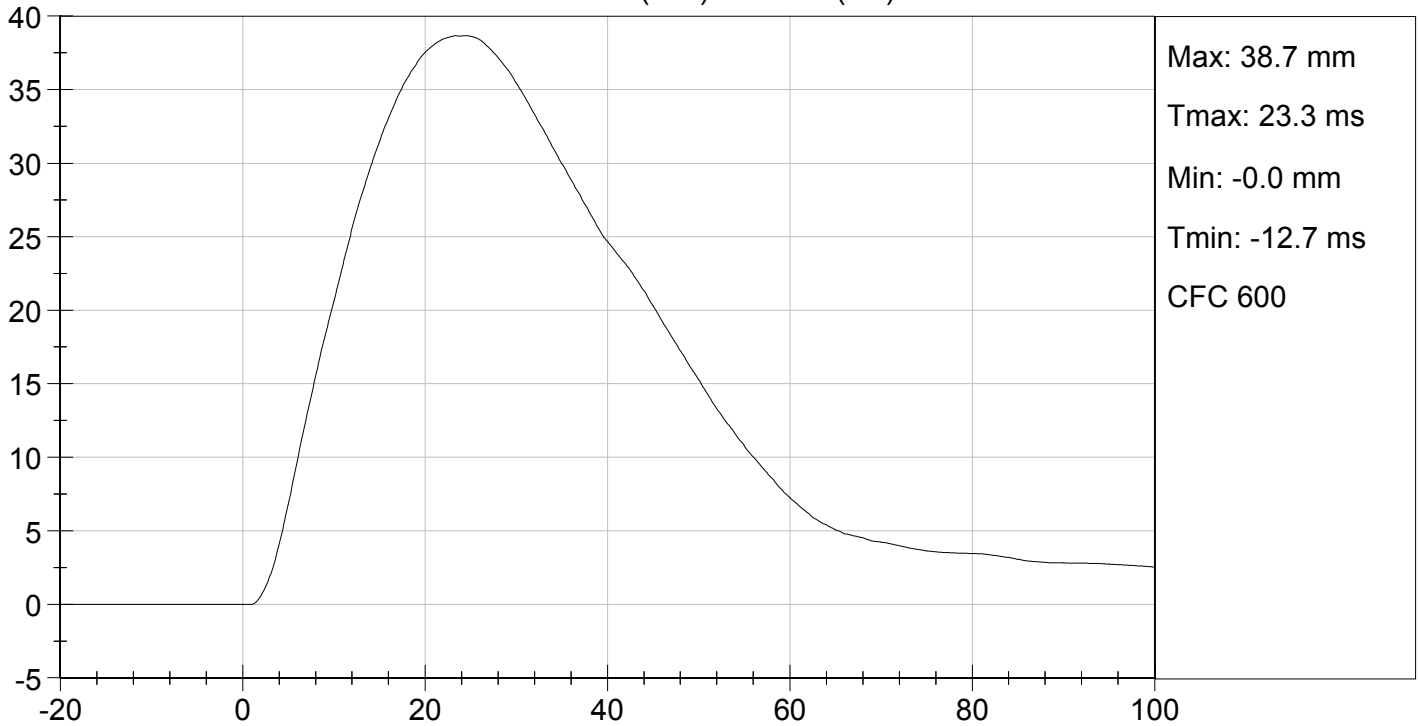




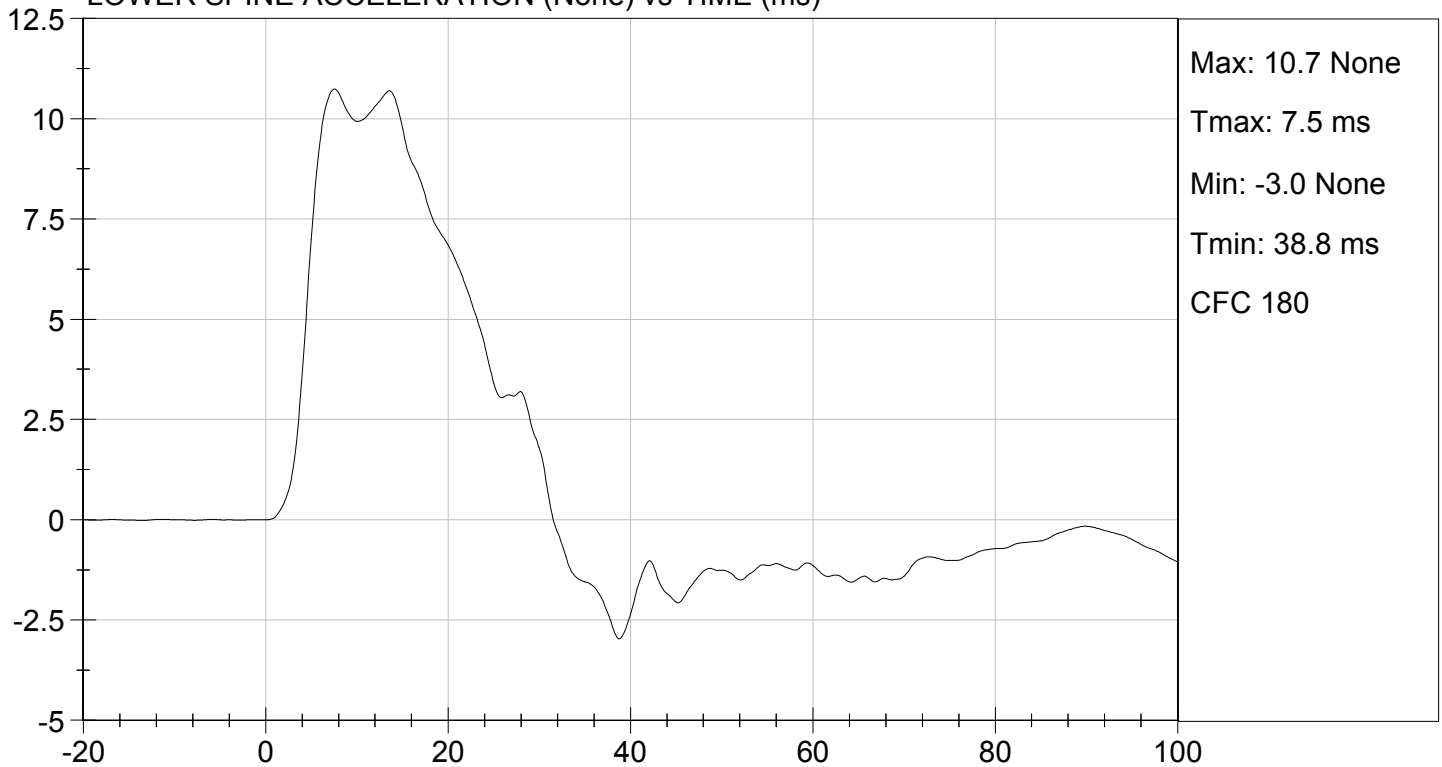
TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.37 ft/s, 4.38 m/s

TEST DATE: 08/24/2016
TEST #: D162846

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



LOWER SPINE ACCELERATION (None) vs TIME (ms)



MGA RESEARCH CORPORATION

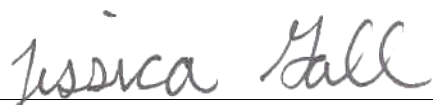
PELVIS IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

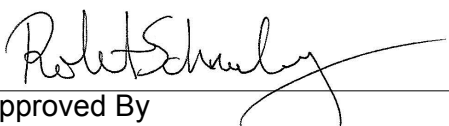
Test I.D: D162847

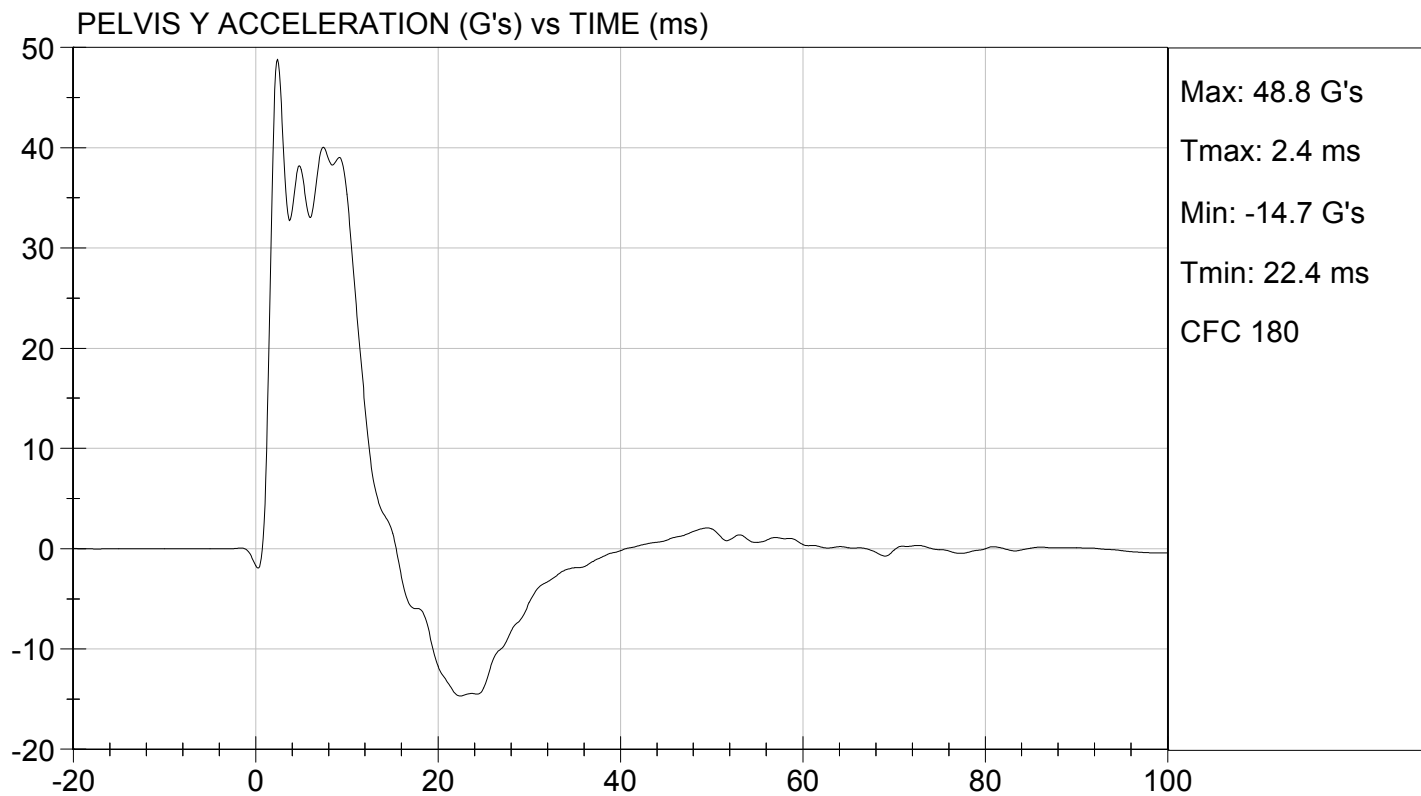
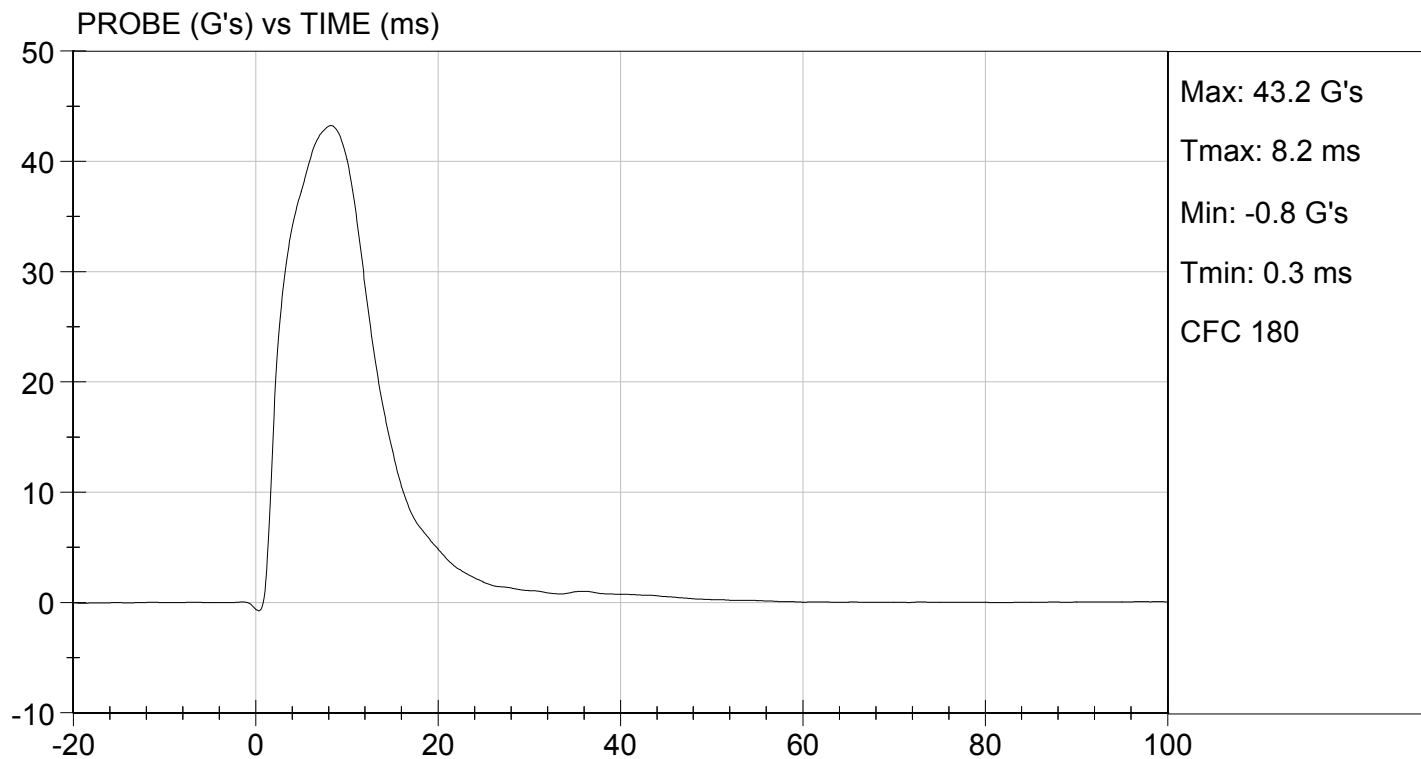
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	51	Pass
Impact Velocity	m/s	6.60 to 6.80	6.68	Pass
Maximum Probe Acceleration	G's	38 to 47	43	Pass
Pelvis Y Acceleration After 6 ms	G's	34 to 42	40	Pass
Peak Acetabulum Force	N	3600 to 4300	4,103	Pass
Overall Test Results				Pass

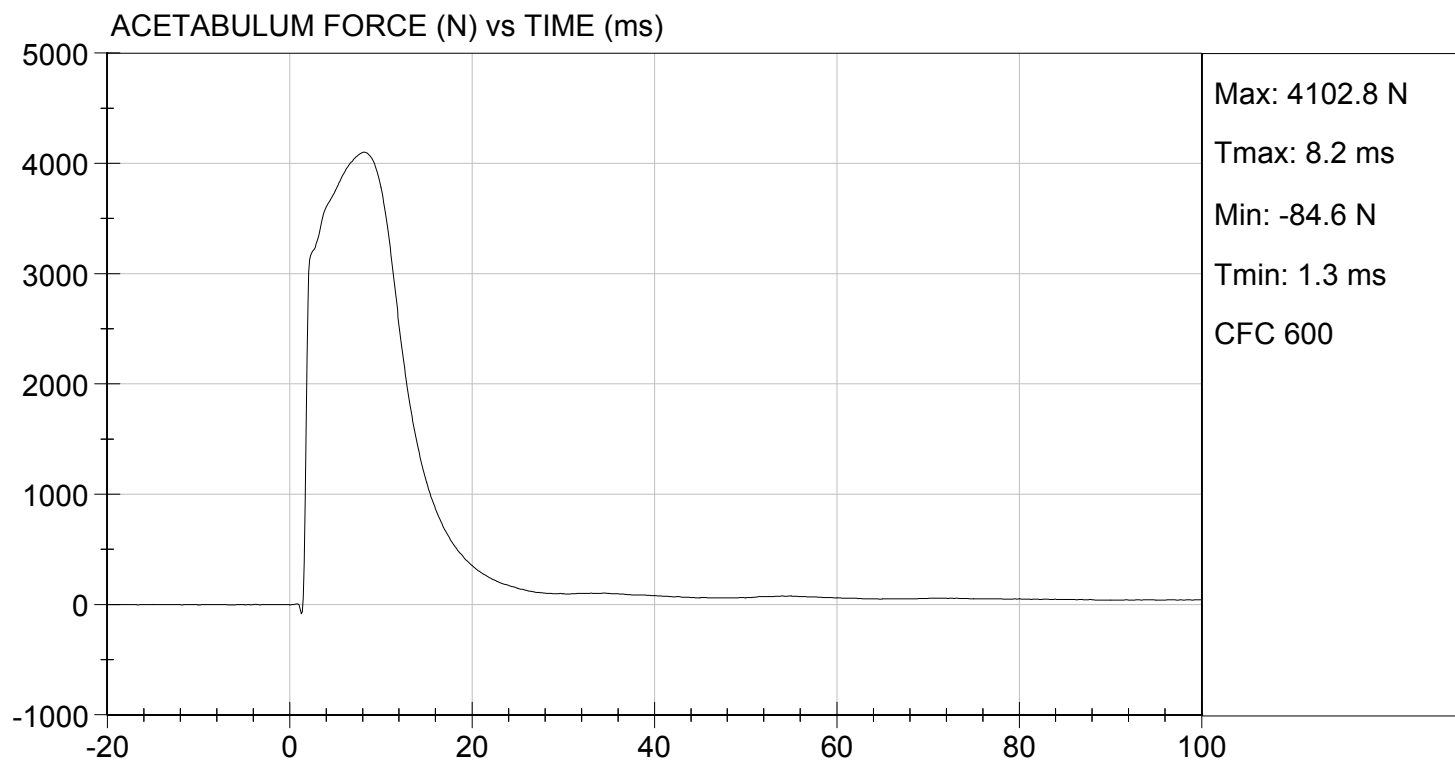

Laboratory Technician

08/24/2016

Test Date


Approved By





MGA RESEARCH CORPORATION

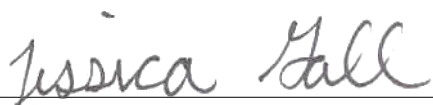
ILIAC IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

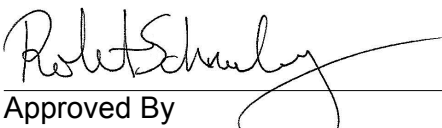
Test I.D: D162848

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Humidity	%	10 to 70	51	Pass
Impact Velocity	m/s	4.20 to 4.40	4.30	Pass
Maximum Probe Acceleration	G's	36 to 45	38	Pass
Pelvis Y Acceleration	G's	28 to 39	30	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4,294	Pass
Overall Test Results				Pass


Laboratory Technician

08/24/2016

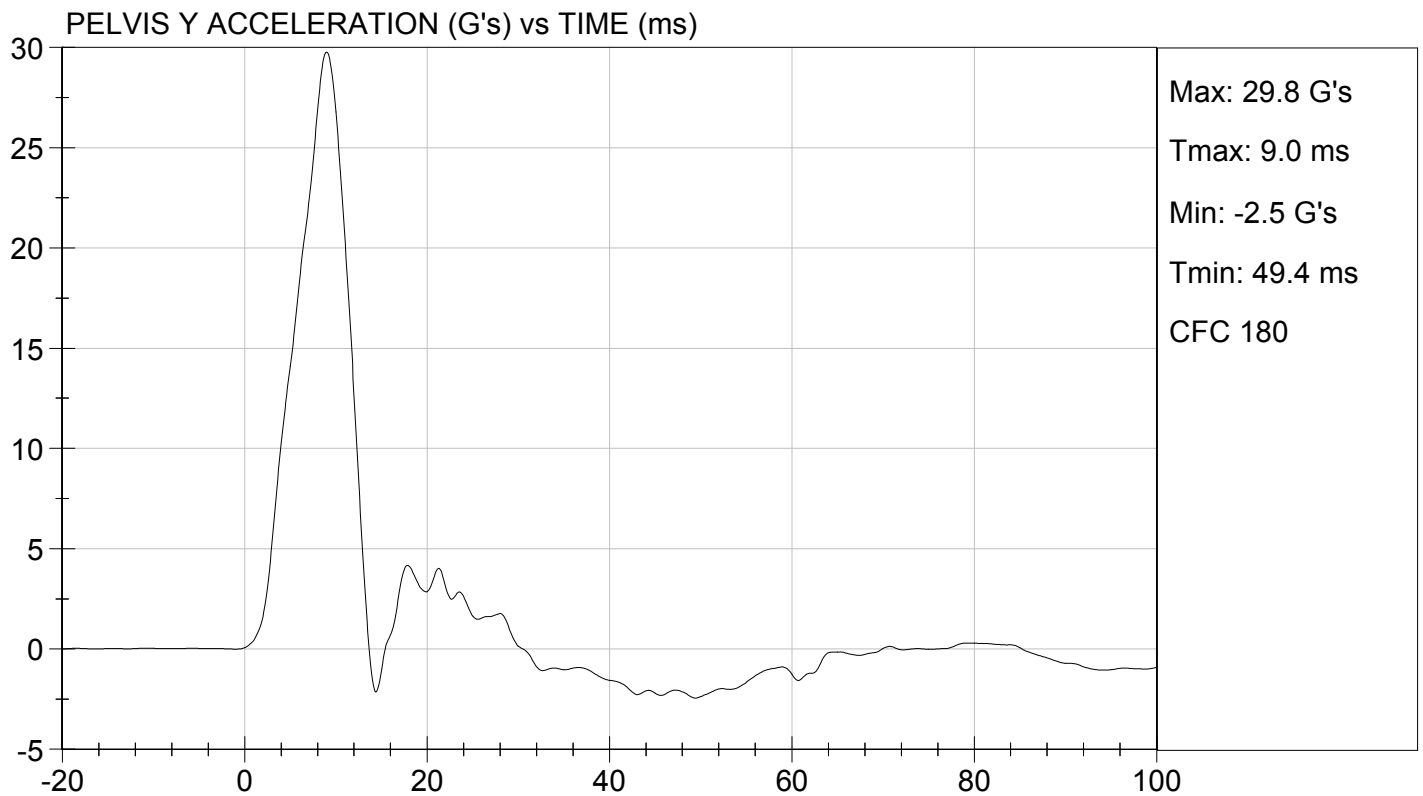
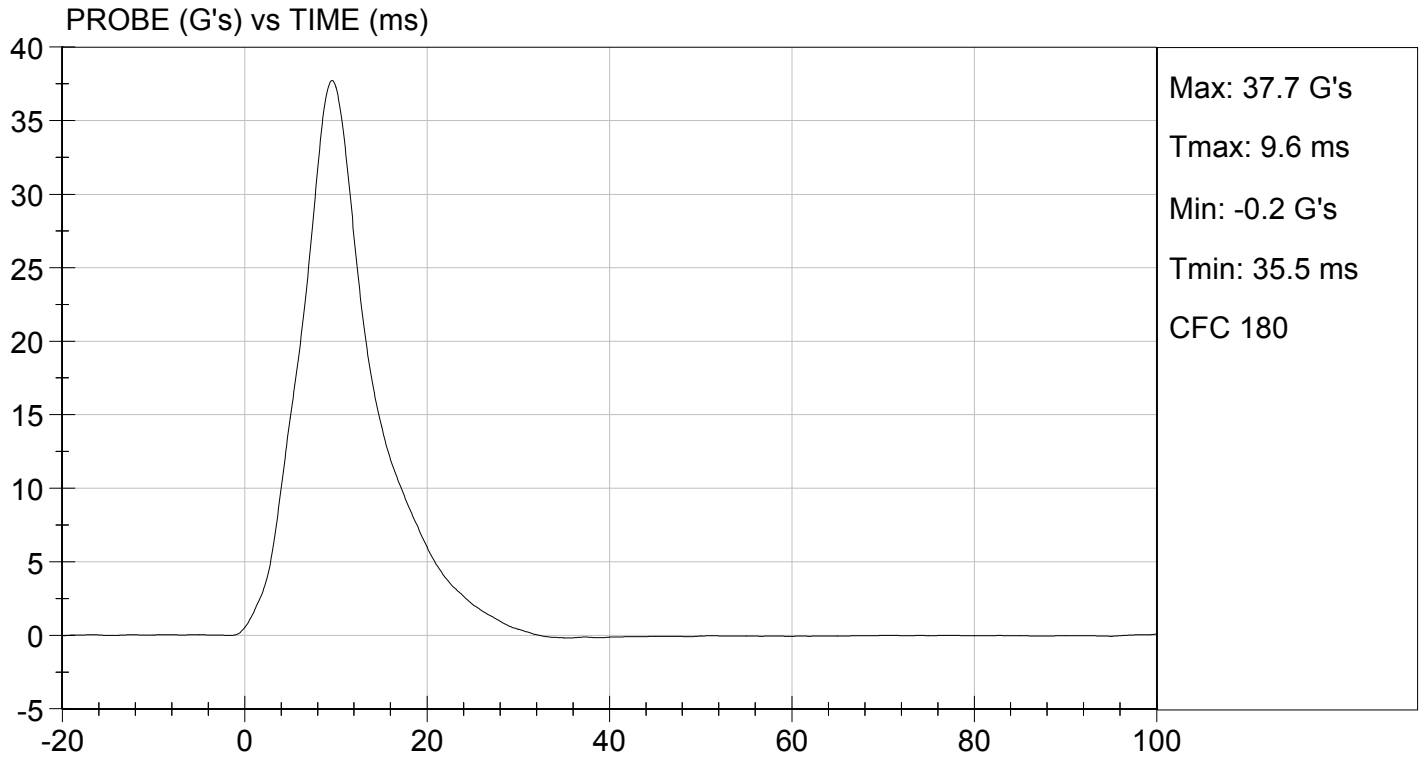
Test Date


Approved By



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

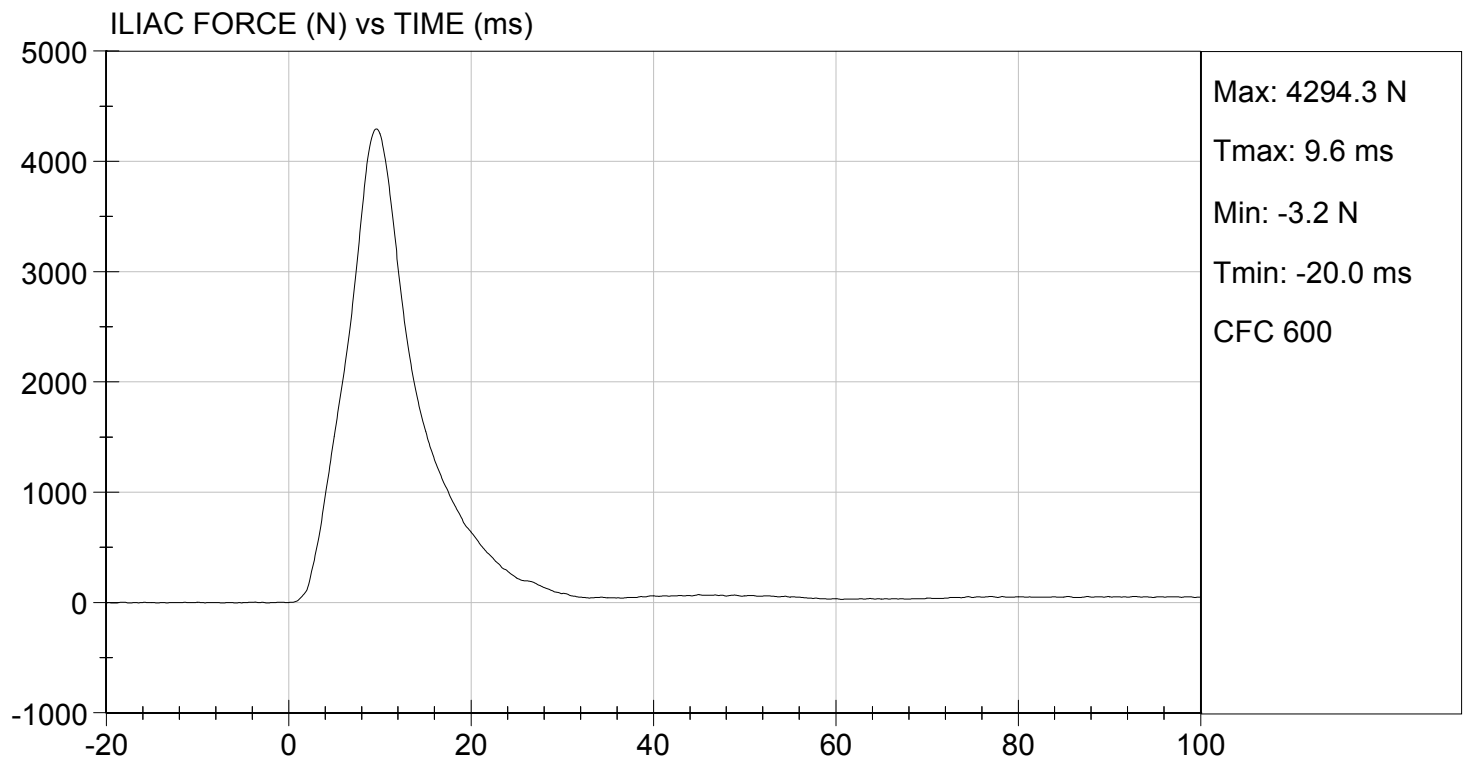
TEST DATE: 08/24/2016
TEST #: D162848





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

TEST DATE: 08/24/2016
TEST #: D162848



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

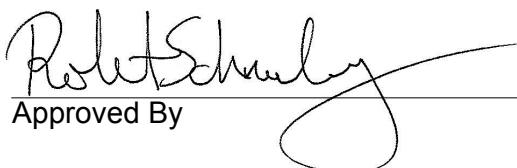
ATD Serial No: 296

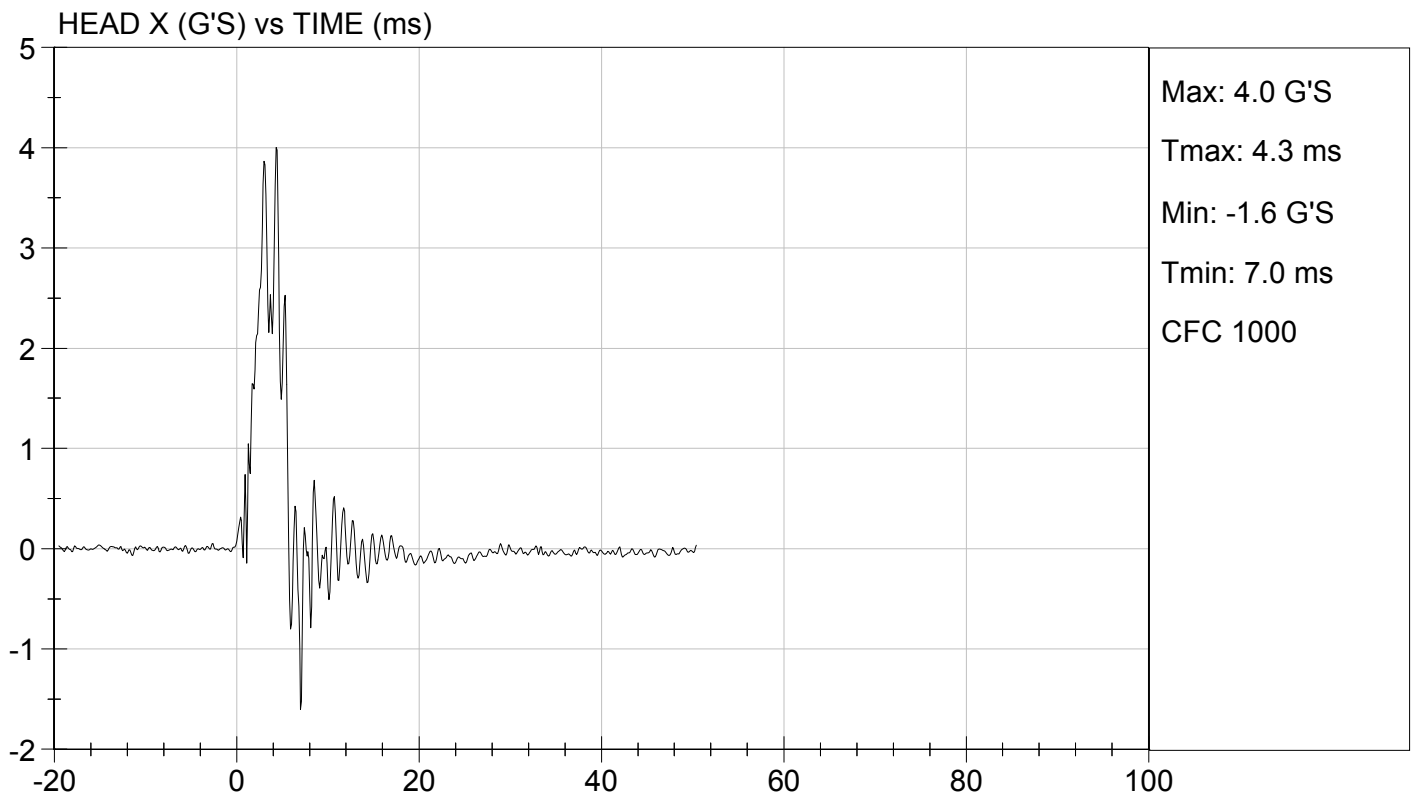
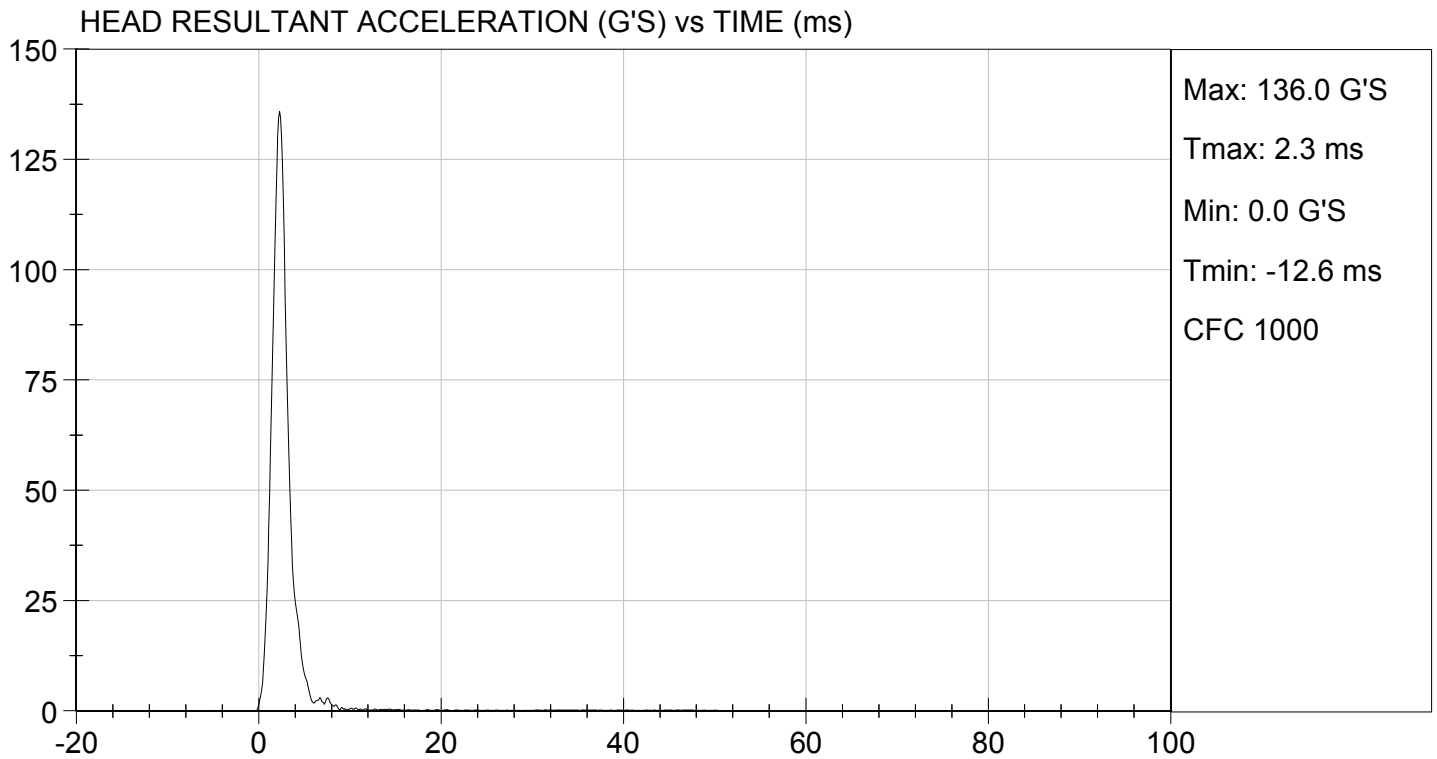
Test ID: D163291

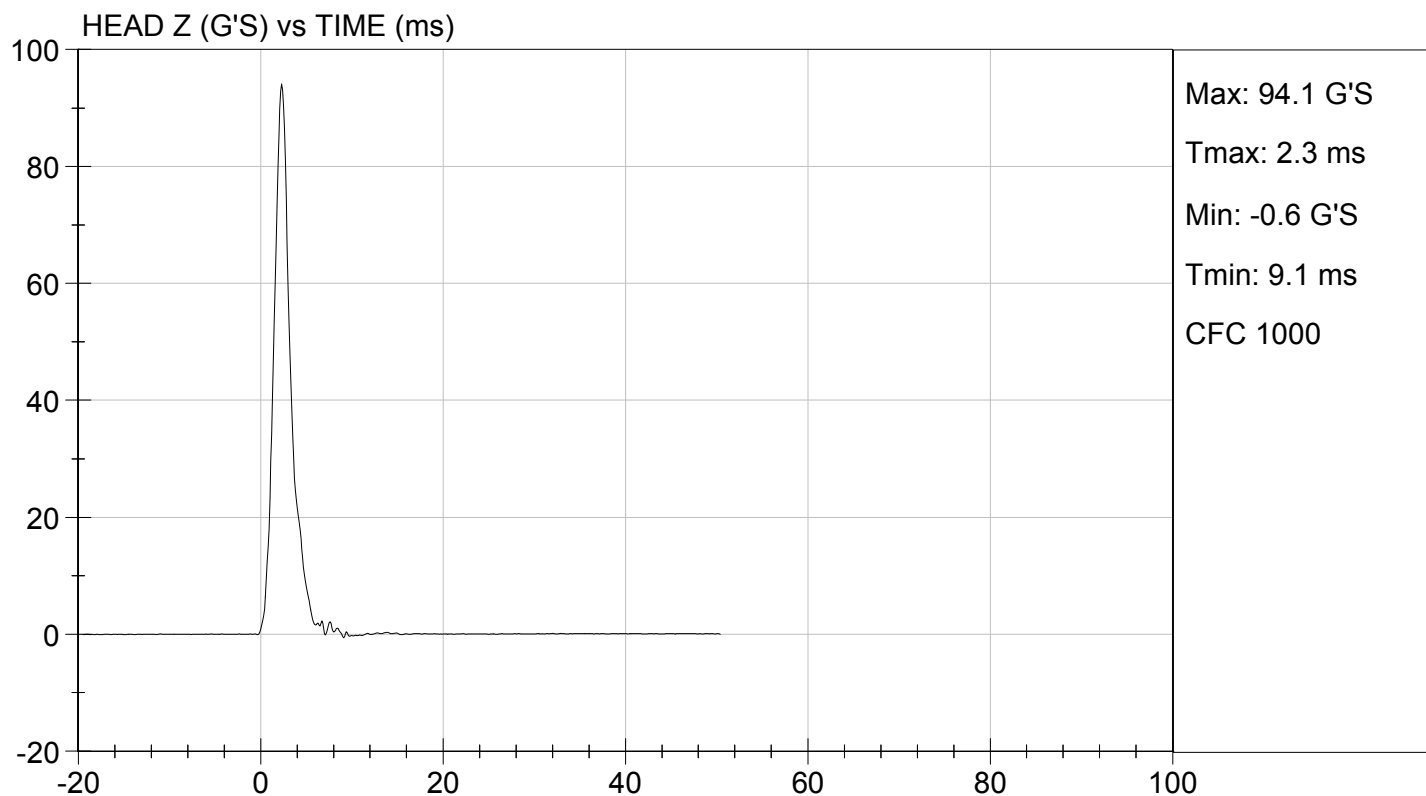
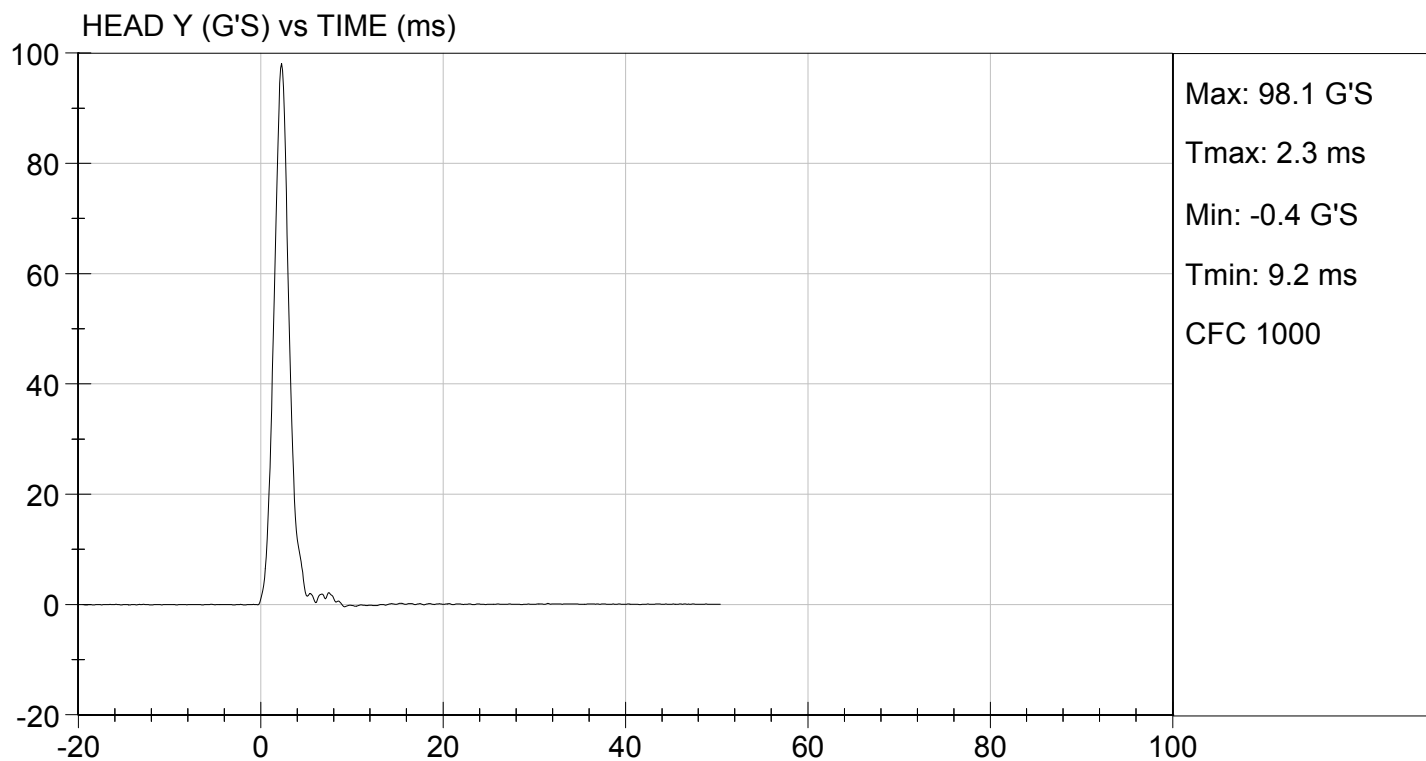
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	42	Pass
Peak Resultant Acceleration	G's	115 to 137	136	Pass
Peak Longitudinal Acceleration	G's	+/- 15	4.0	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	<15%	Yes	Pass
			Overall Test Results	Pass


Laboratory Technician

09/28/2016
Test Date


Approved By





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

ATD Serial No: 296

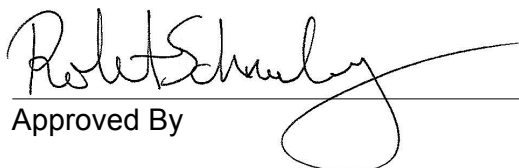
Test I.D: D163292

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	21.8	Pass
Humidity		%	10 to 70	43	Pass
Impact Velocity		m/s	5.51 to 5.63	5.58	Pass
Pendulum Velocity	10 ms	m/s	2.20 to 2.80	2.60	Pass
	15 ms	m/s	3.30 to 4.10	3.82	Pass
	20 ms	m/s	4.40 to 5.40	5.17	Pass
	25 ms	m/s	5.40 to 6.10	5.48	Pass
	25-100 ms	m/s	5.50 to 6.20	5.51	Pass
Maximum D-Plane Rotation		deg	71 to 81	72	Pass
Time of Maximum D-Plane Rotation		ms	50 to 70	61	Pass
Maximum Occipital Condyle Moment		Nm	-44 to -36	-41	Pass
Time of Moment Decay to 0 Nm		ms	102 to 126	112	Pass
Overall Test Results					Pass


 Laboratory Technician

09/28/2016

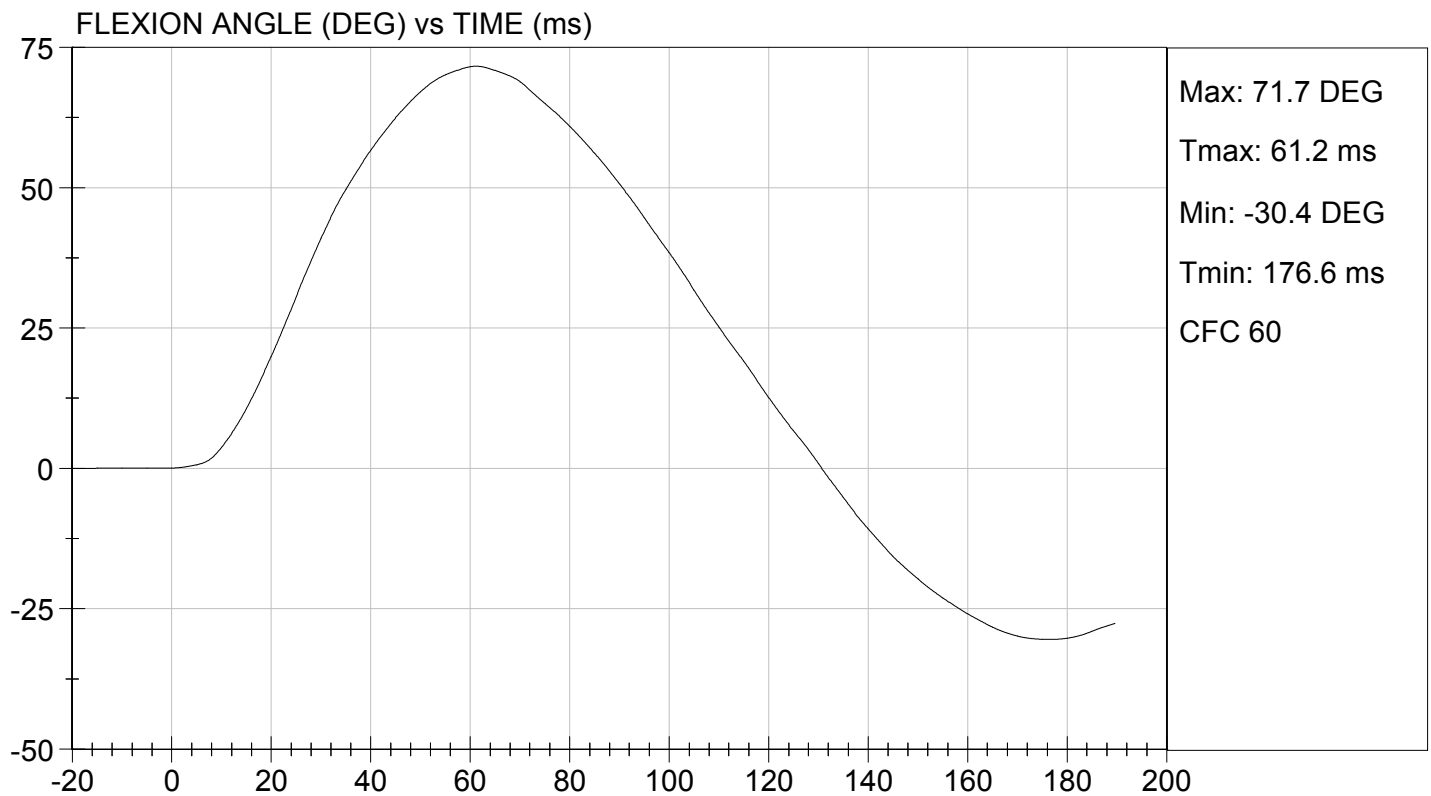
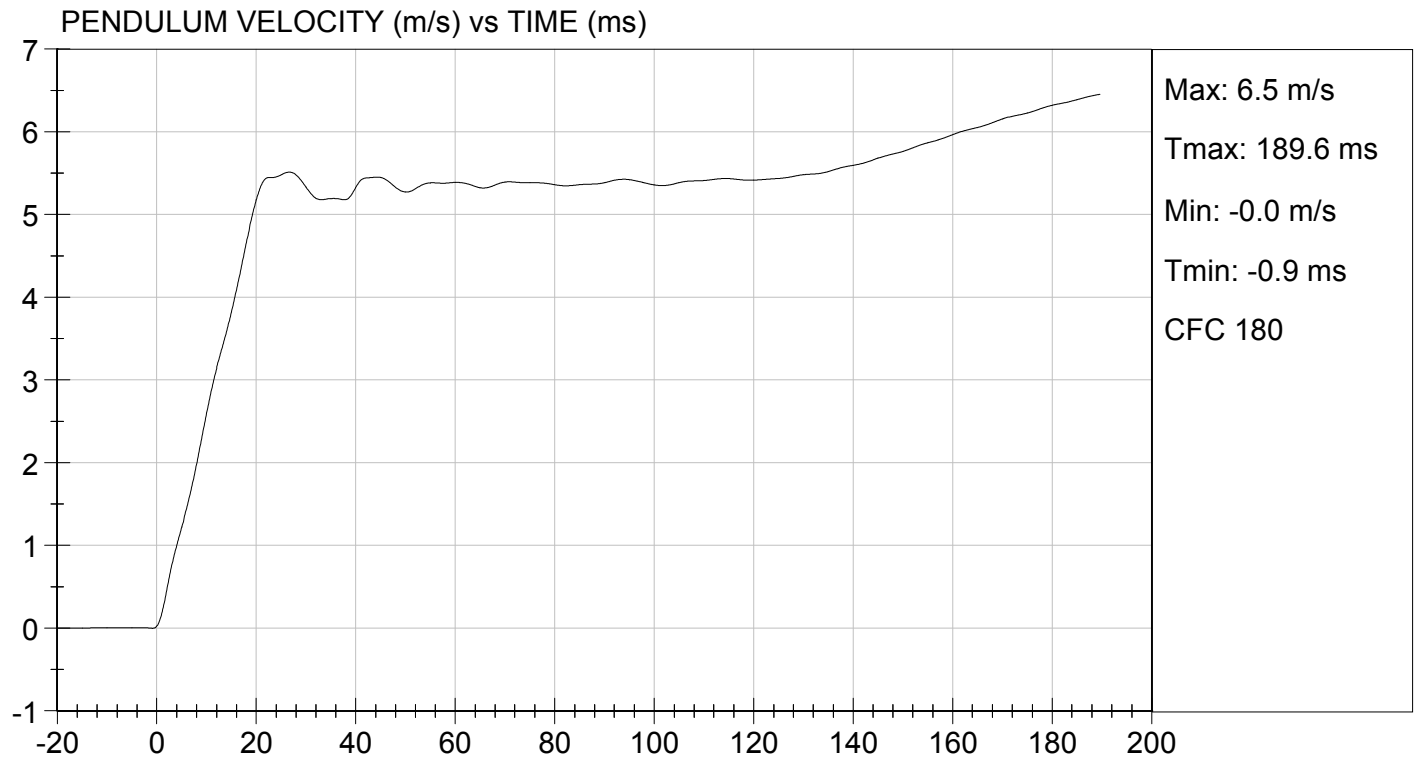
Test Date


 Approved By



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

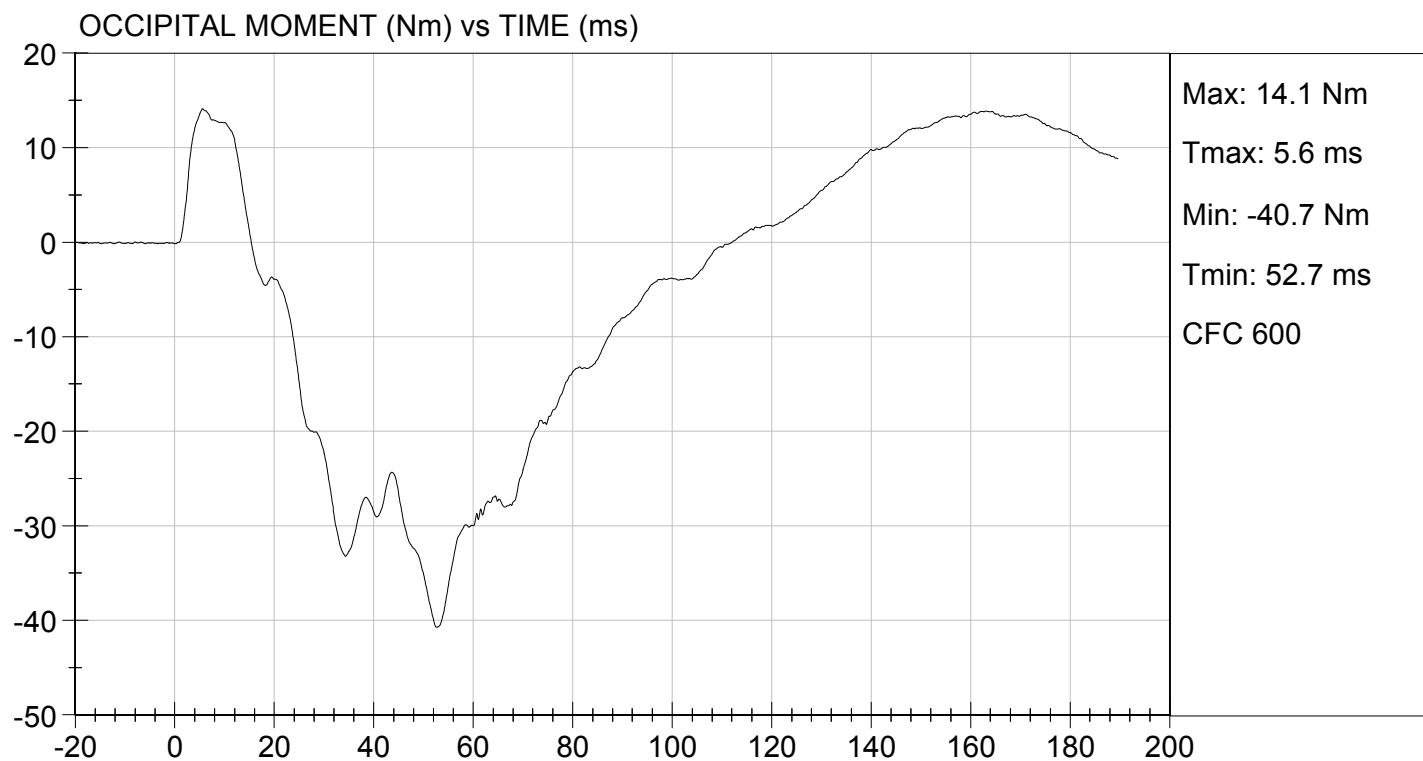
TEST DATE: 09/28/2016
TEST #: D163292





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

TEST DATE: 09/28/2016
TEST #: D163292

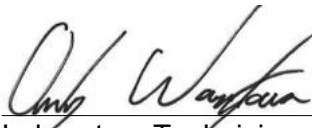


MGA RESEARCH CORPORATION
SHOULDER IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

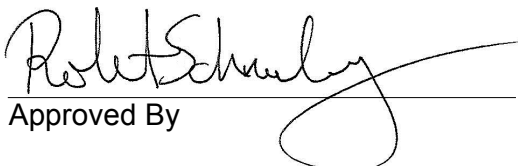
ATD Serial No: 296

Test ID: D163293

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	42	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	


Laboratory Technician

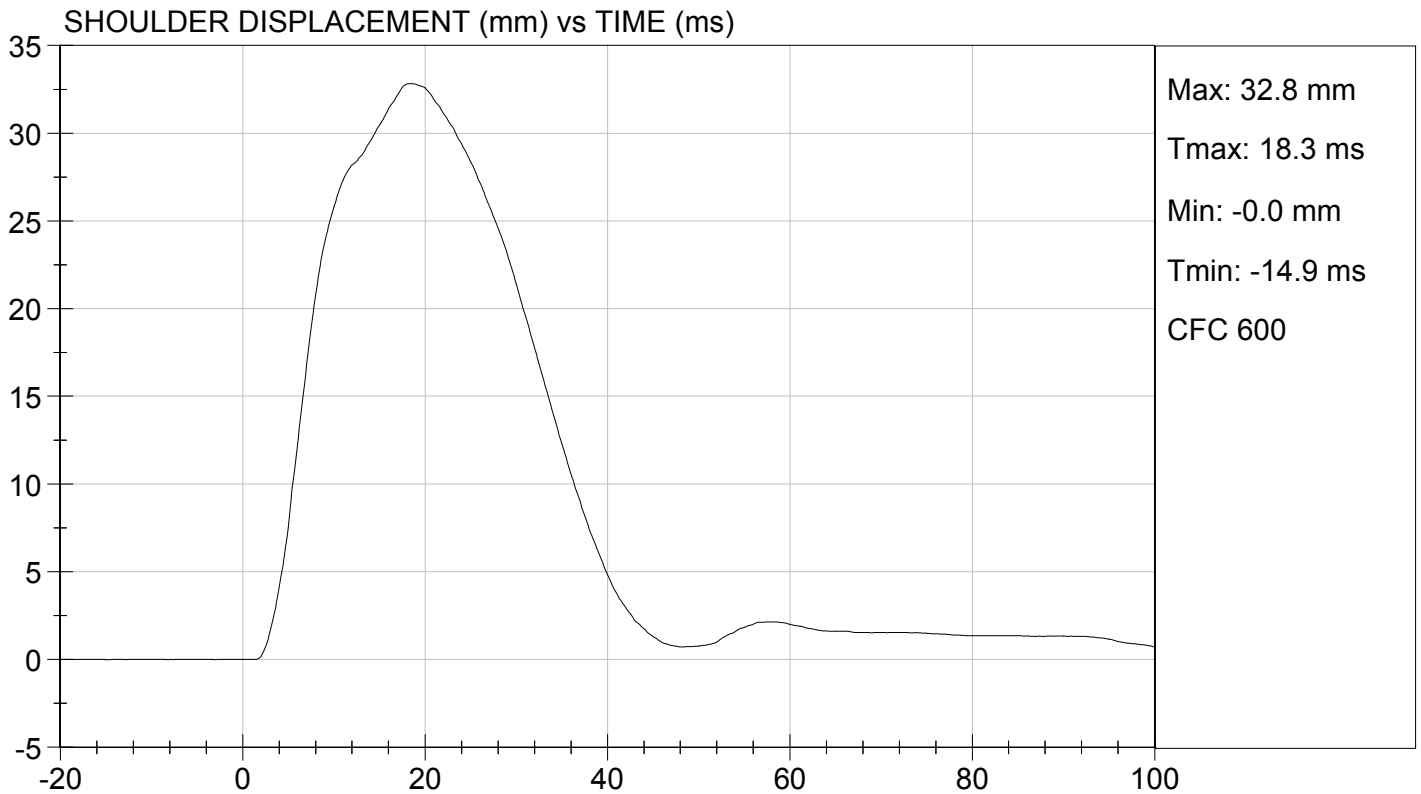
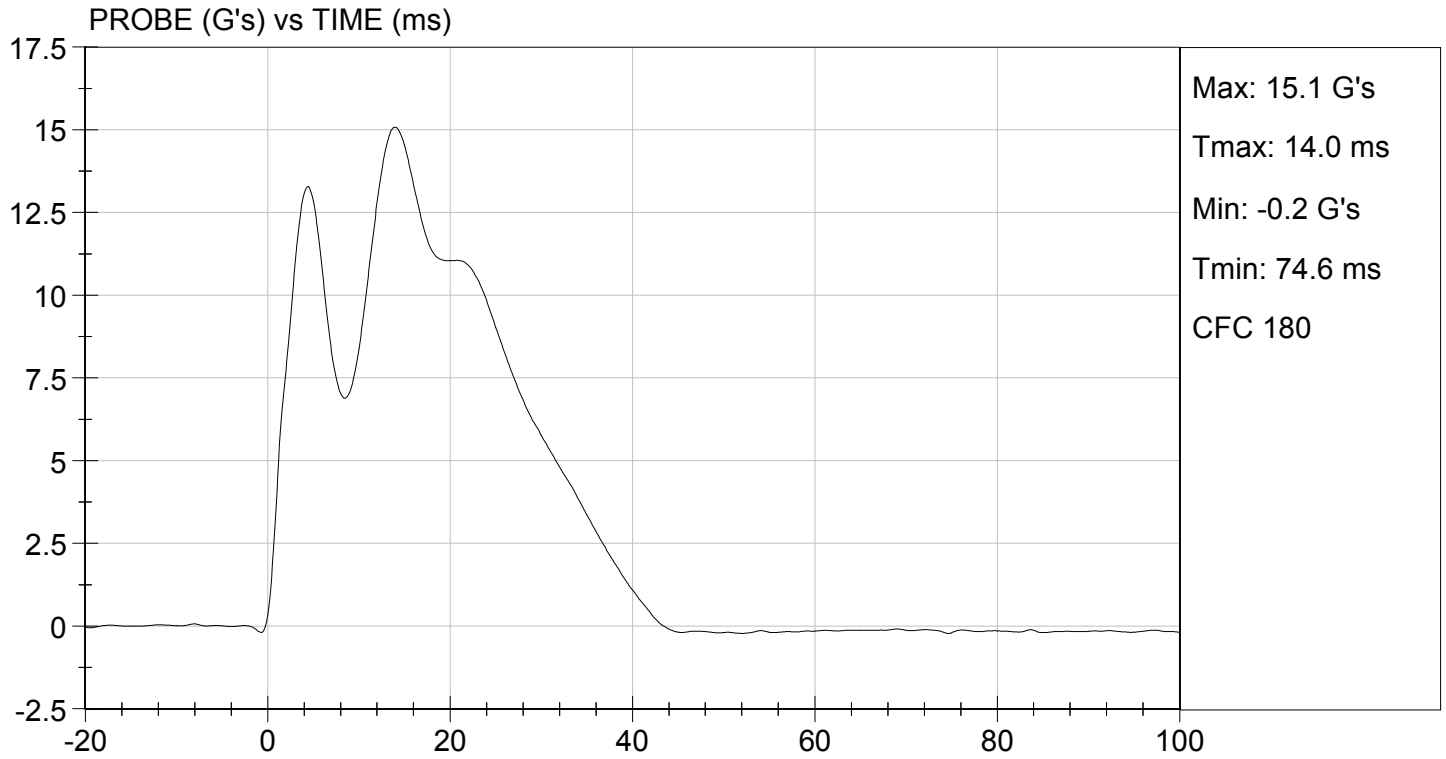
09/28/2016
Test Date


Approved By



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

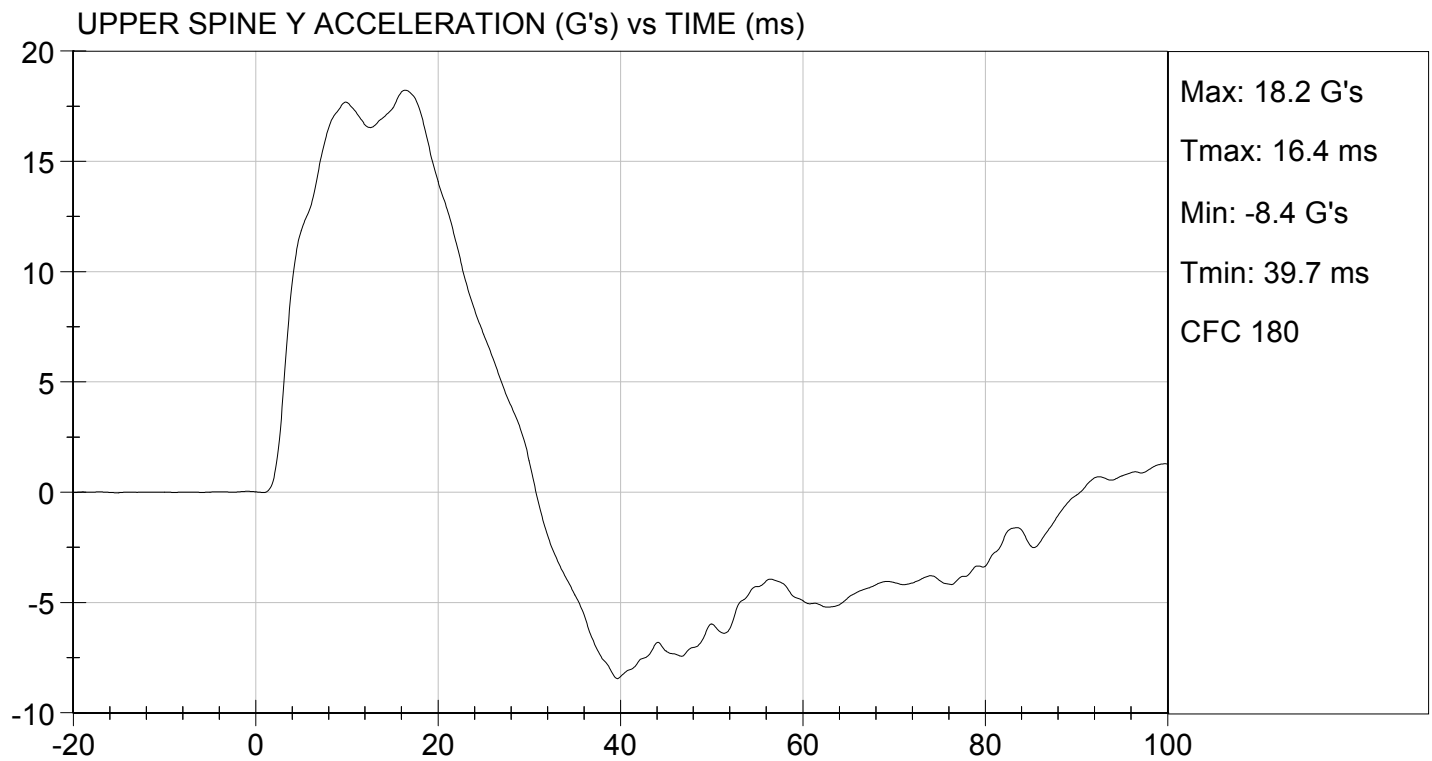
TEST DATE: 09/28/2016
TEST #: D163293





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

TEST DATE: 09/28/2016
TEST #: D163293

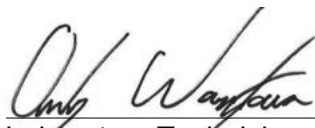


MGA RESEARCH CORPORATION
THORAX (WITH ARM) IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

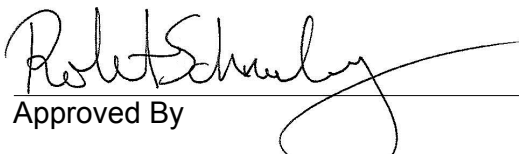
Test I.D: D163294

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.8	Pass
Humidity	%	10 to 70	42	Pass
Impact Velocity	m/s	6.60 to 6.80	6.60	Pass
Maximum Probe Acceleration	G's	30 to 36	31	Pass
Shoulder Displacement	mm	31 to 40	40	Pass
Upper Rib Displacement	mm	25 to 32	29	Pass
Middle Rib Displacement	mm	30 to 36	31	Pass
Lower Rib Displacement	mm	32 to 38	32	Pass
Upper Spine (T1) Y Acceleration	G's	34 to 43	36	Pass
Lower Spine (T12) Y Acceleration	G's	29 to 37	32	Pass
Overall Test Results				Pass


Laboratory Technician

09/28/2016

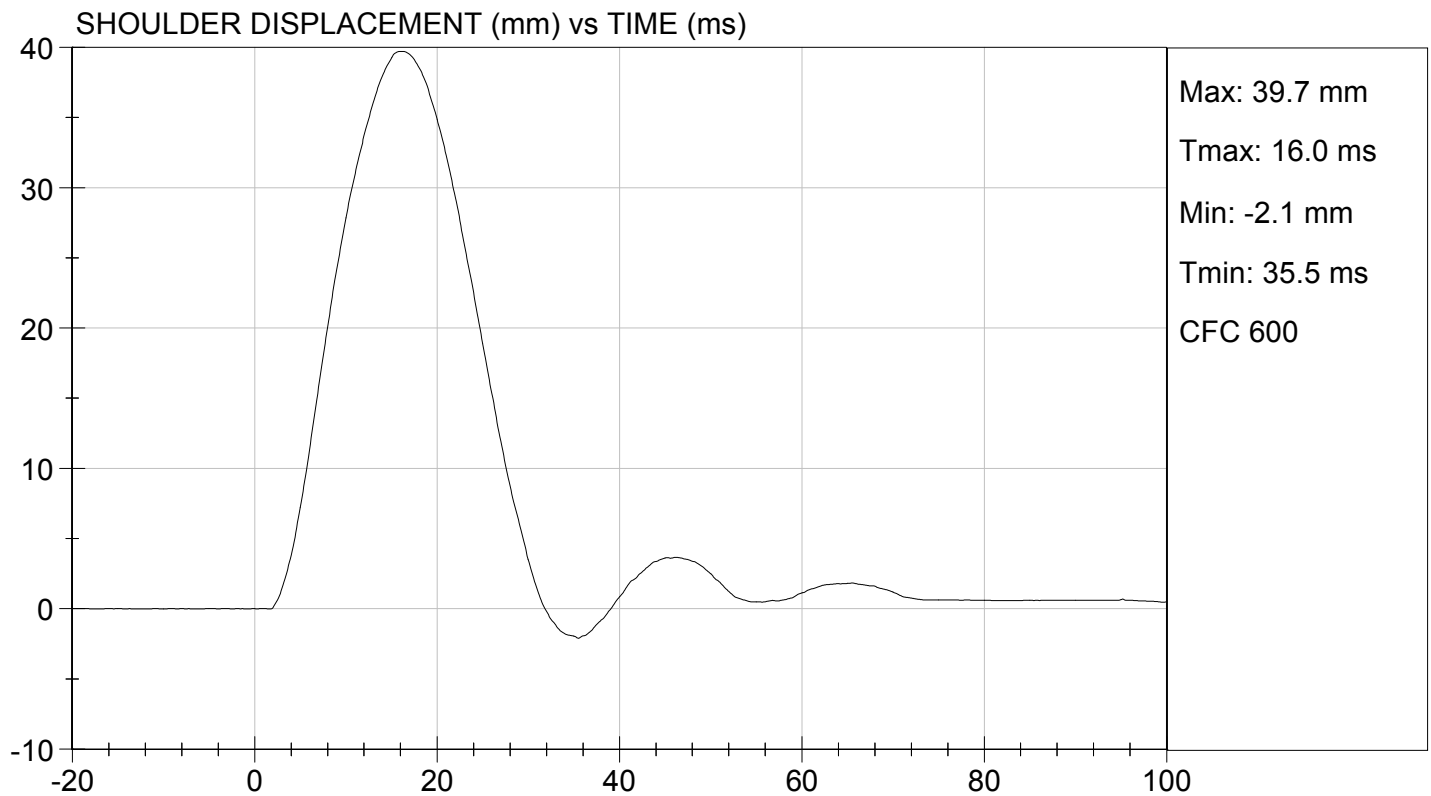
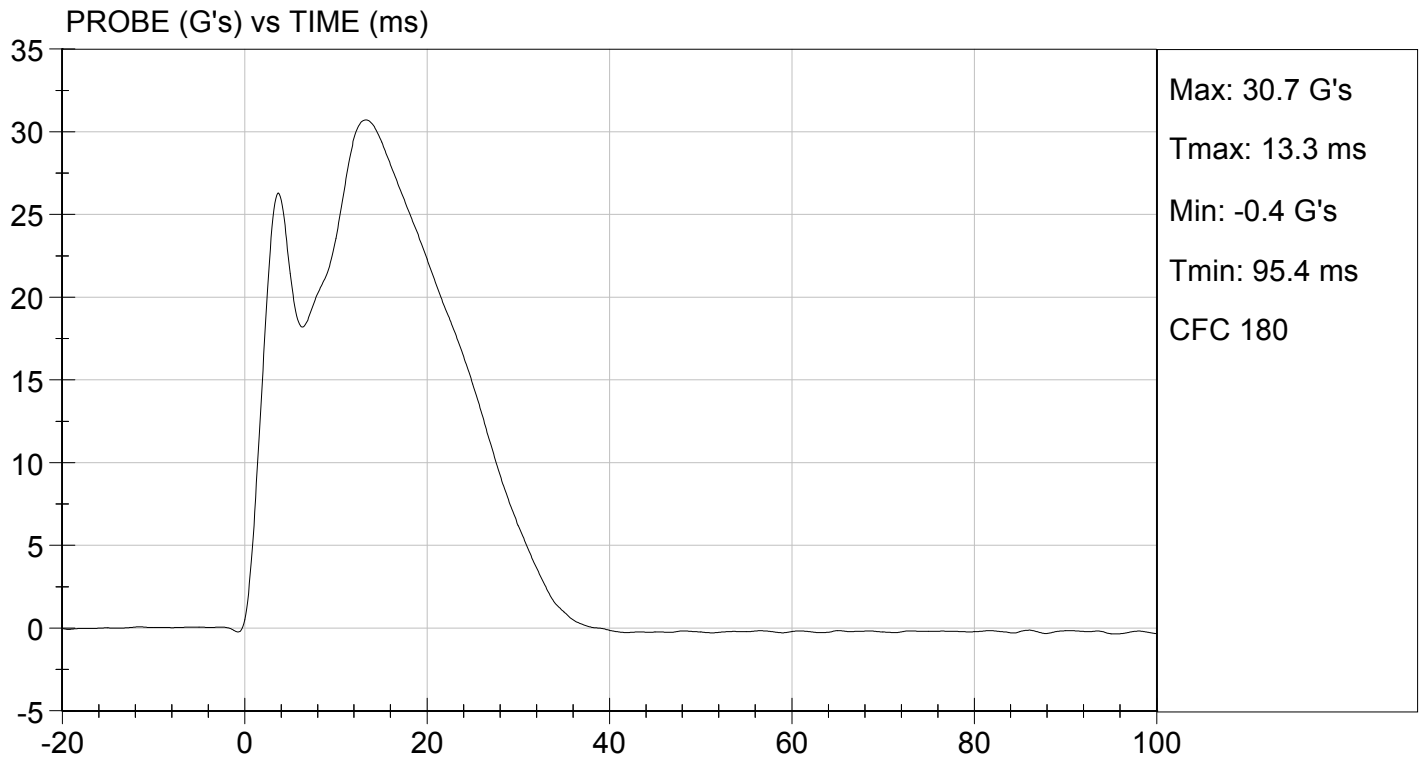
Test Date


Approved By



TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 21.65 ft/s, 6.60 m/s

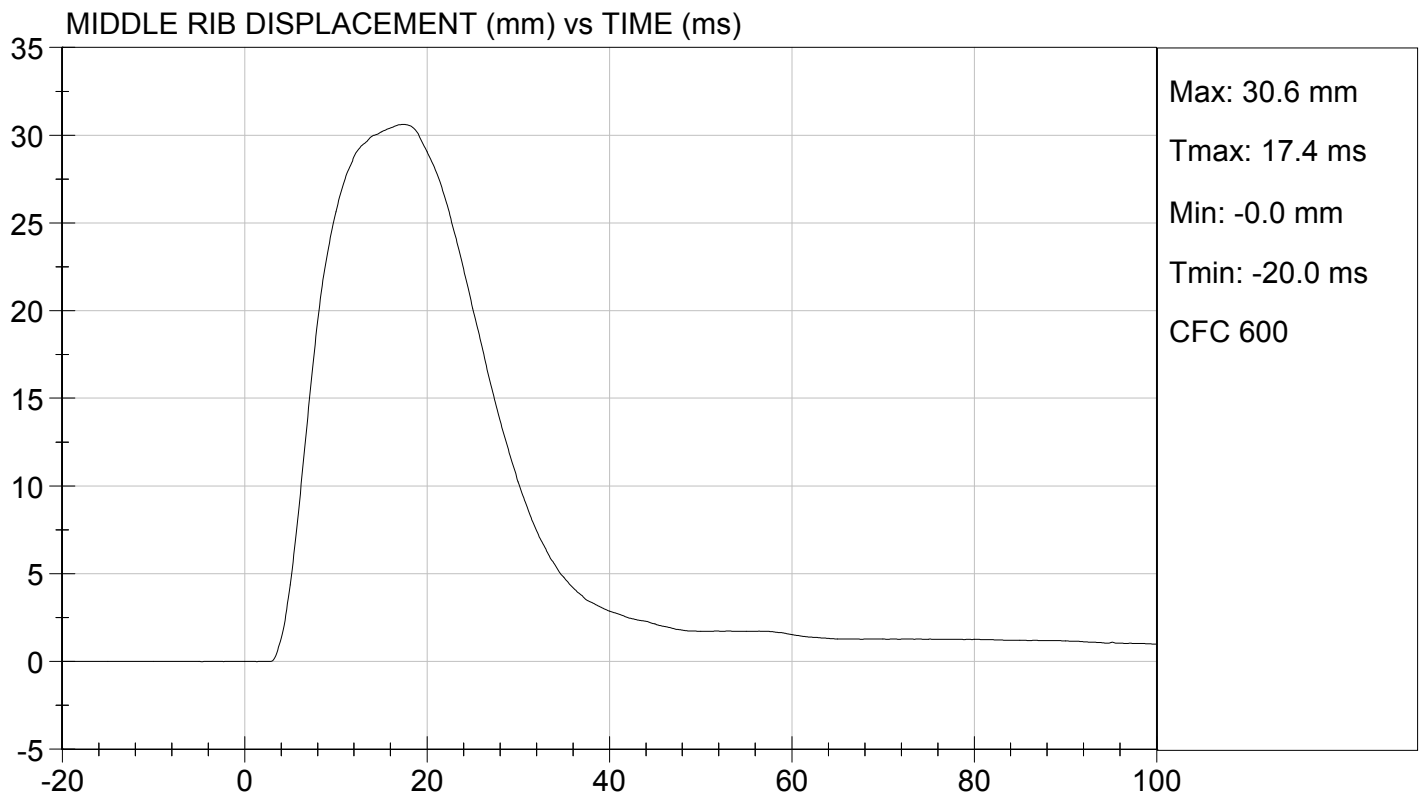
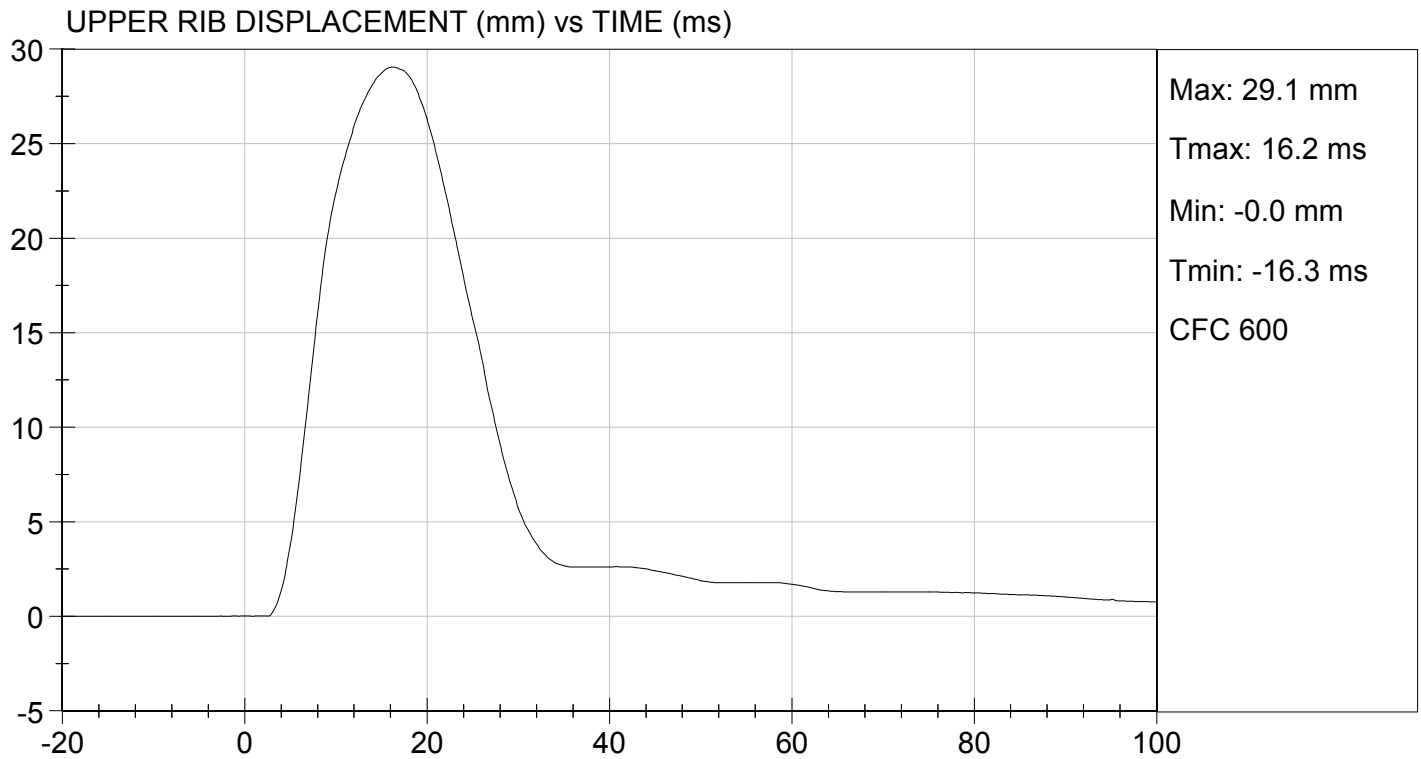
TEST DATE: 09/28/2016
TEST #: D163294





TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 21.65 ft/s, 6.60 m/s

TEST DATE: 09/28/2016
TEST #: D163294

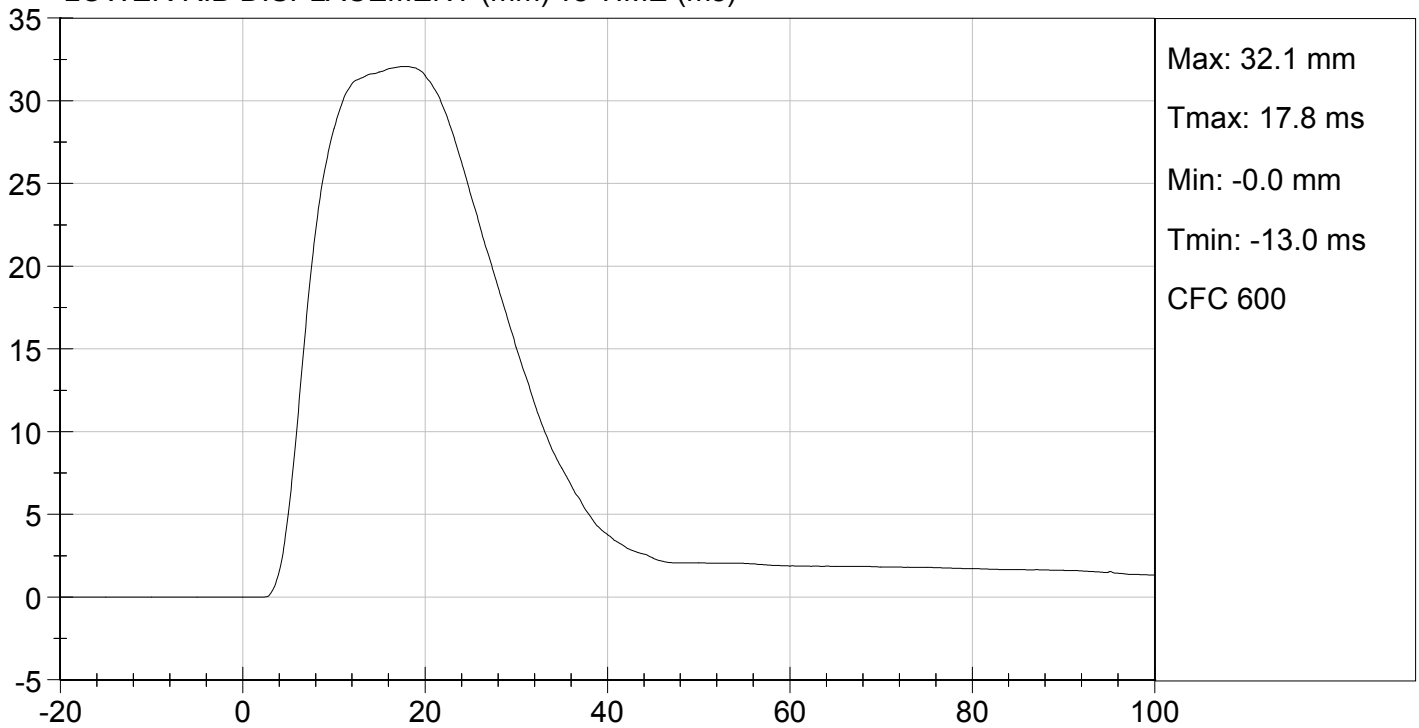




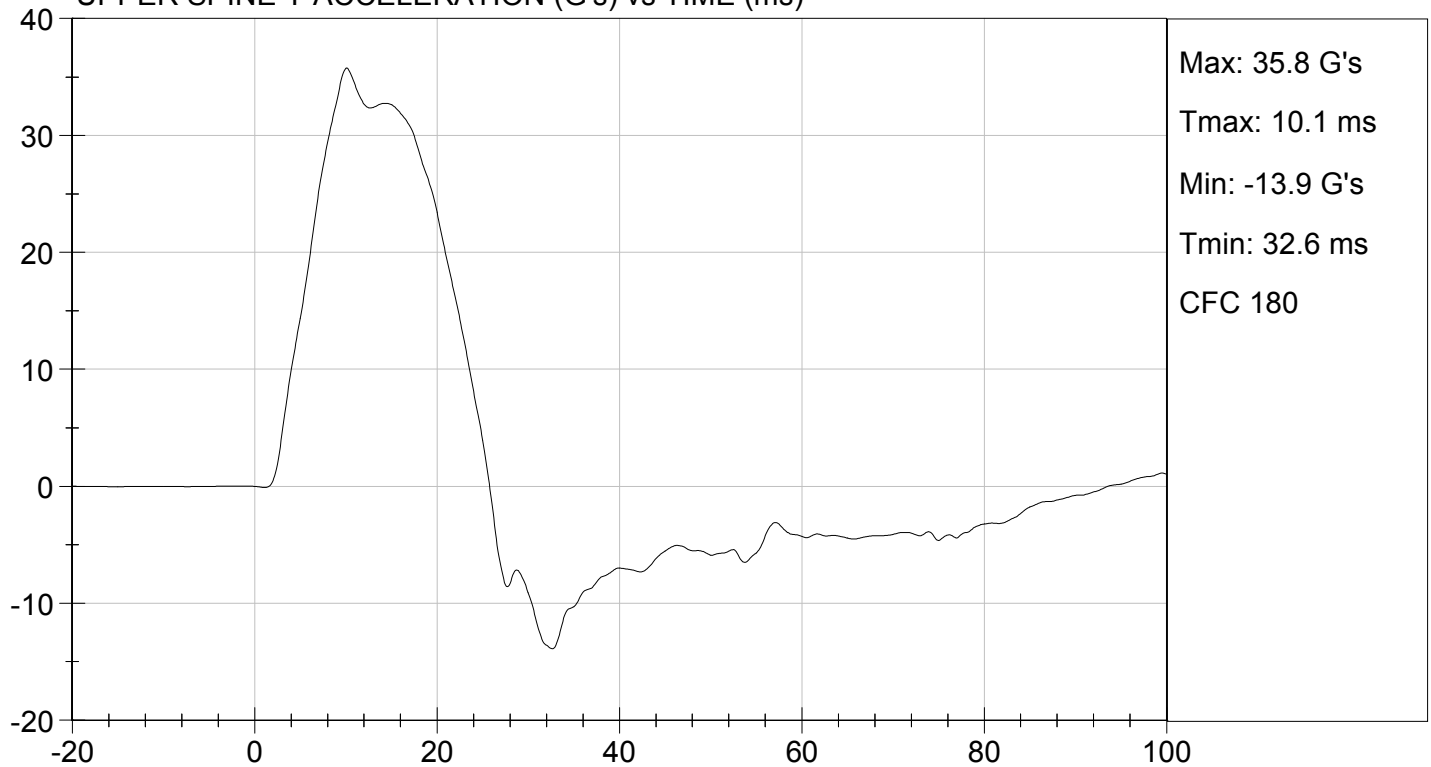
TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 21.65 ft/s, 6.60 m/s

TEST DATE: 09/28/2016
TEST #: D163294

LOWER RIB DISPLACEMENT (mm) vs TIME (ms)



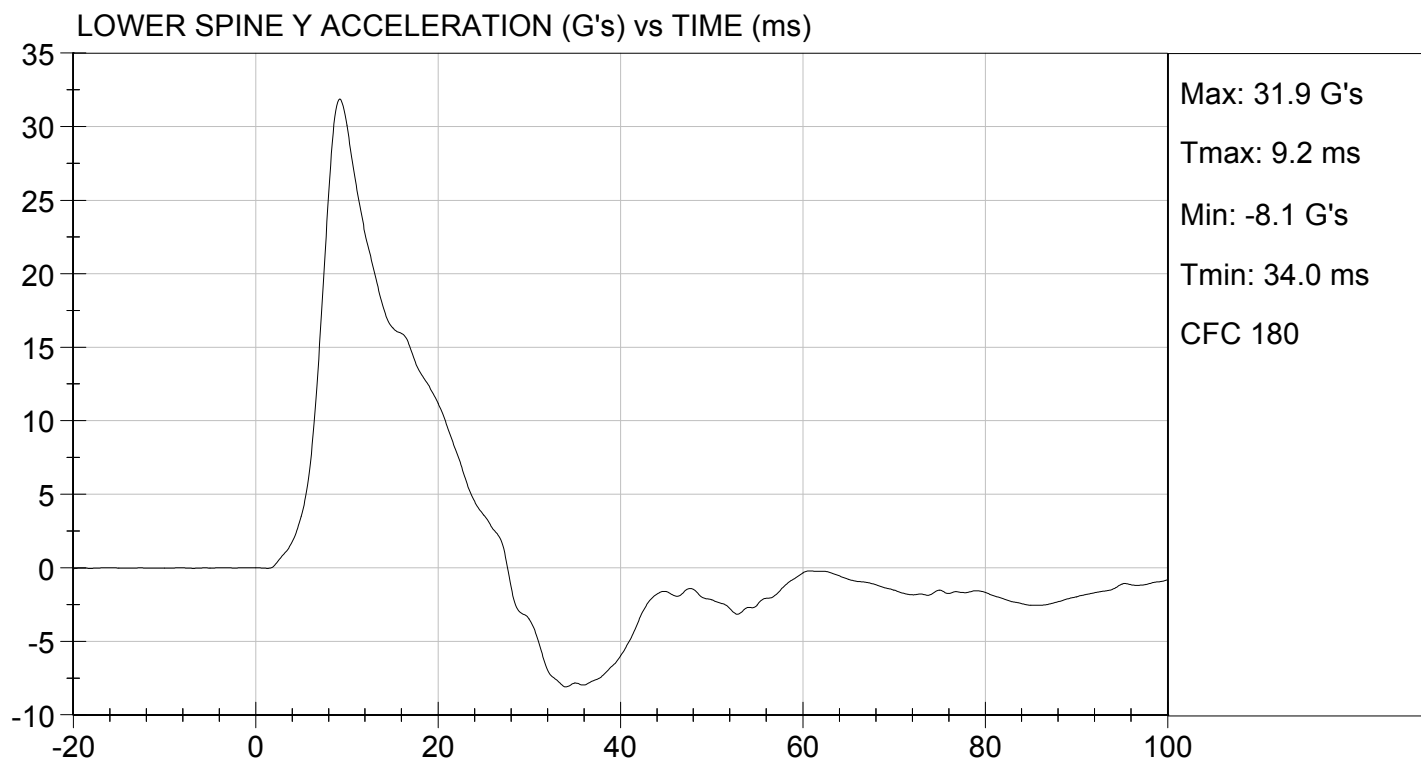
UPPER SPINE Y ACCELERATION (G's) vs TIME (ms)





TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 21.65 ft/s, 6.60 m/s

TEST DATE: 09/28/2016
TEST #: D163294

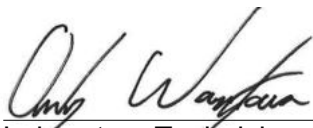


MGA RESEARCH CORPORATION
THORAX (WITHOUT ARM) IMPACT TEST
SID-IIs BUILD LEVEL D DUMMY

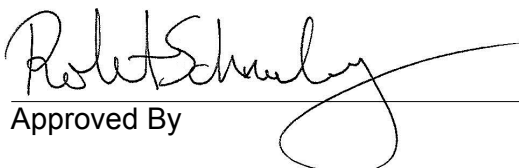
ATD Serial No: 296

Test I.D: D163295

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.8	Pass
Humidity	%	10 to 70	42	Pass
Impact Velocity	m/s	4.20 to 4.40	4.23	Pass
Maximum Probe Acceleration	G's	14 to 18	15	Pass
Upper Rib Displacement	mm	32 to 40	35	Pass
Middle Rib Displacement	mm	39 to 45	40	Pass
Lower Rib Displacement	mm	35 to 43	39	Pass
Upper Spine (T1) Y Acceleration	G's	13 to 17	14	Pass
Lower Spine (T12) Y Acceleration	G's	7 to 11	9	Pass
Overall Test Results				Pass


Laboratory Technician

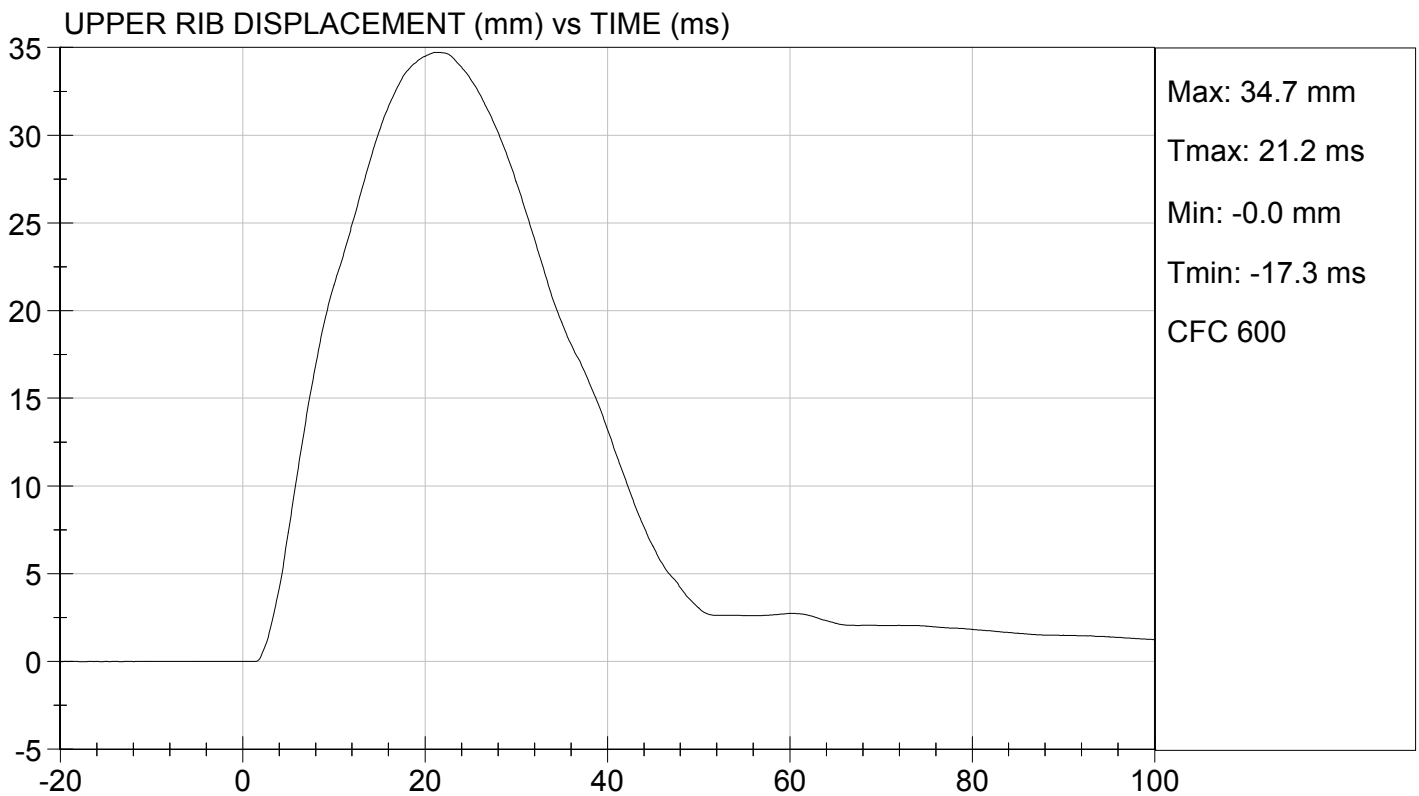
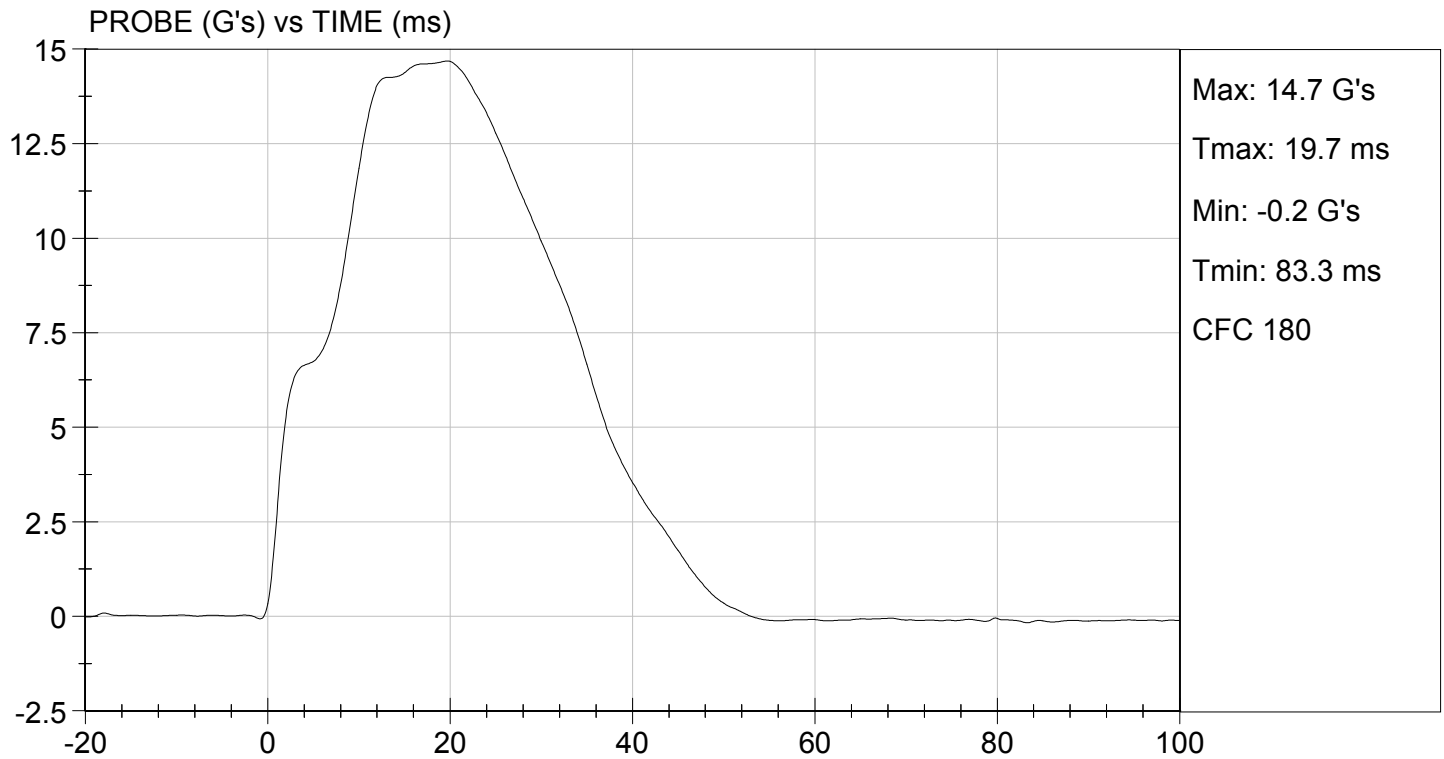
09/28/2016
Test Date


Approved By



TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 13.89 ft/s, 4.23 m/s

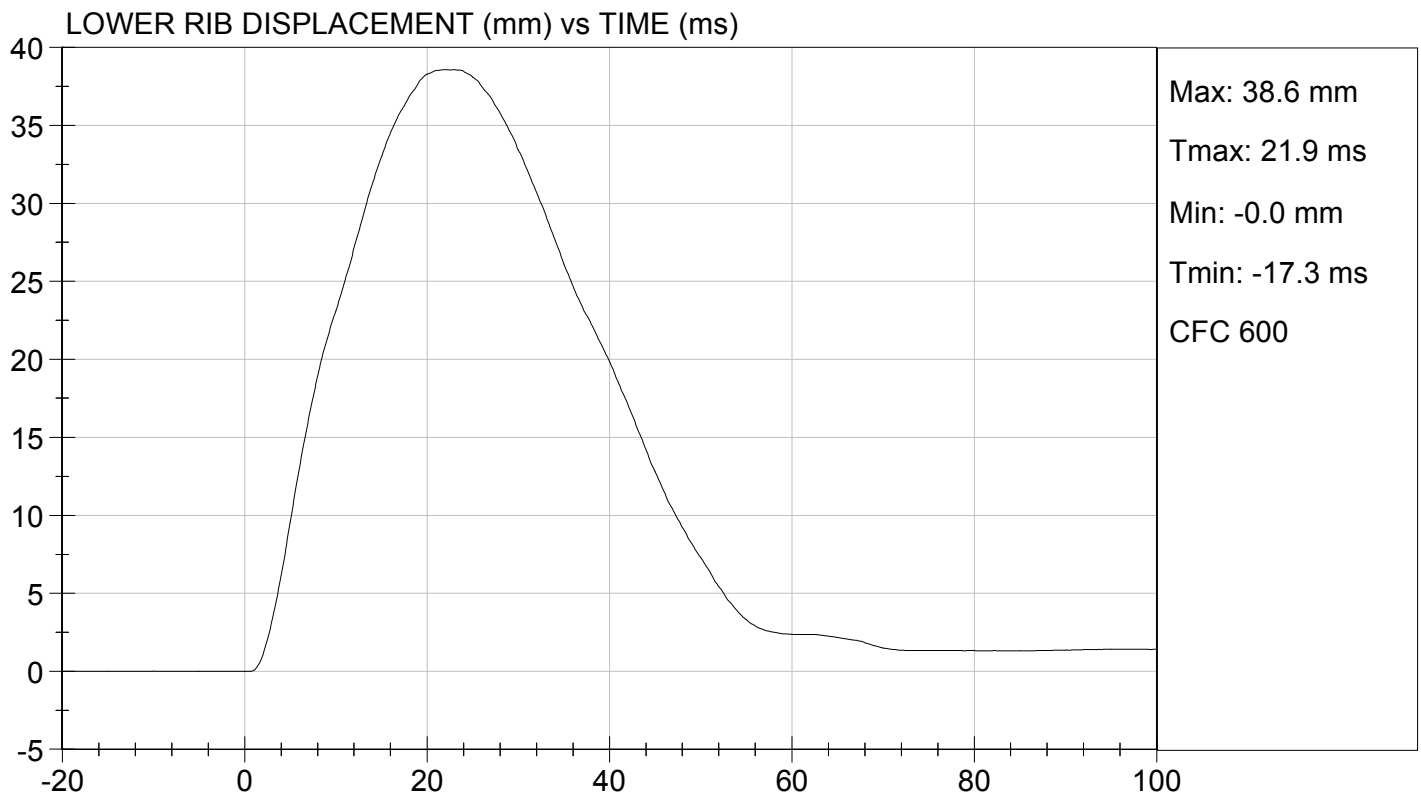
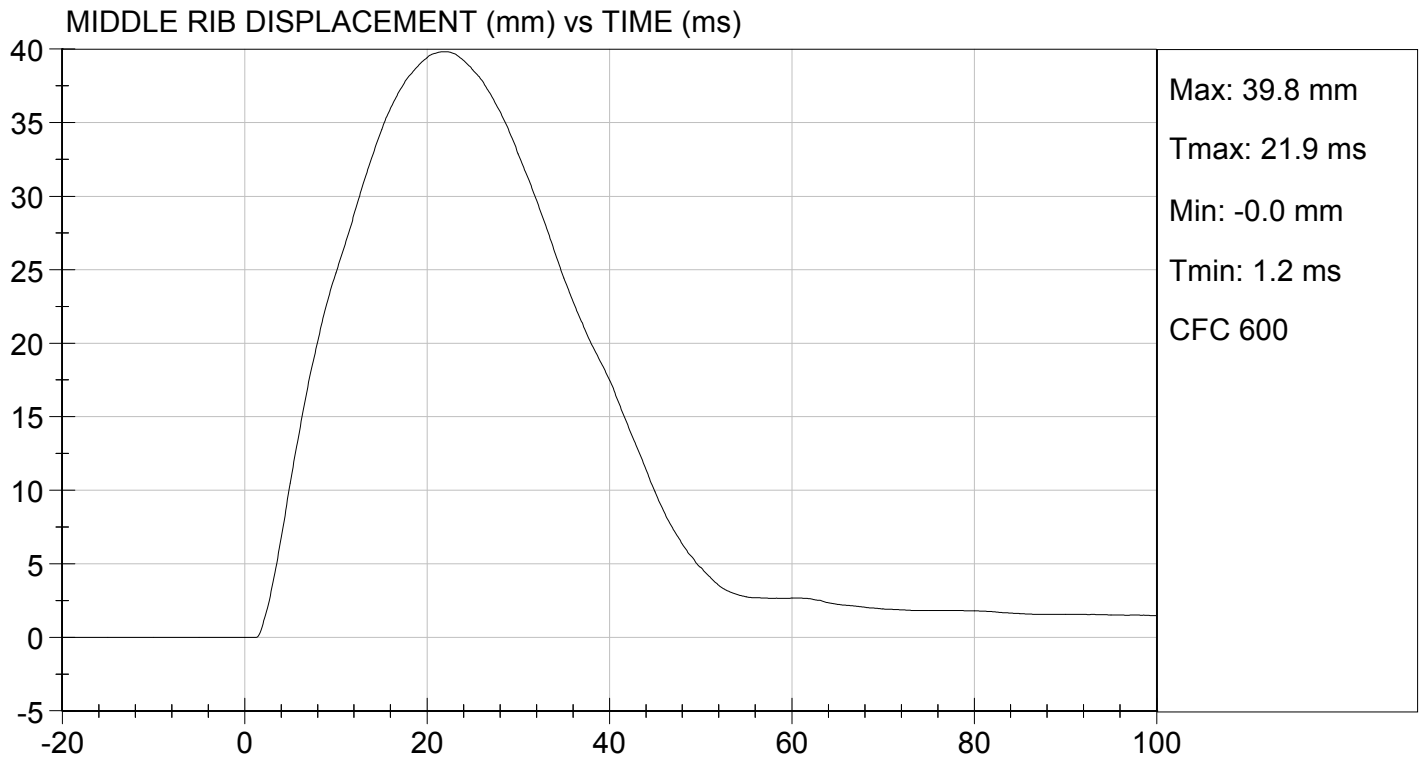
TEST DATE: 09/28/2016
TEST #: D163295





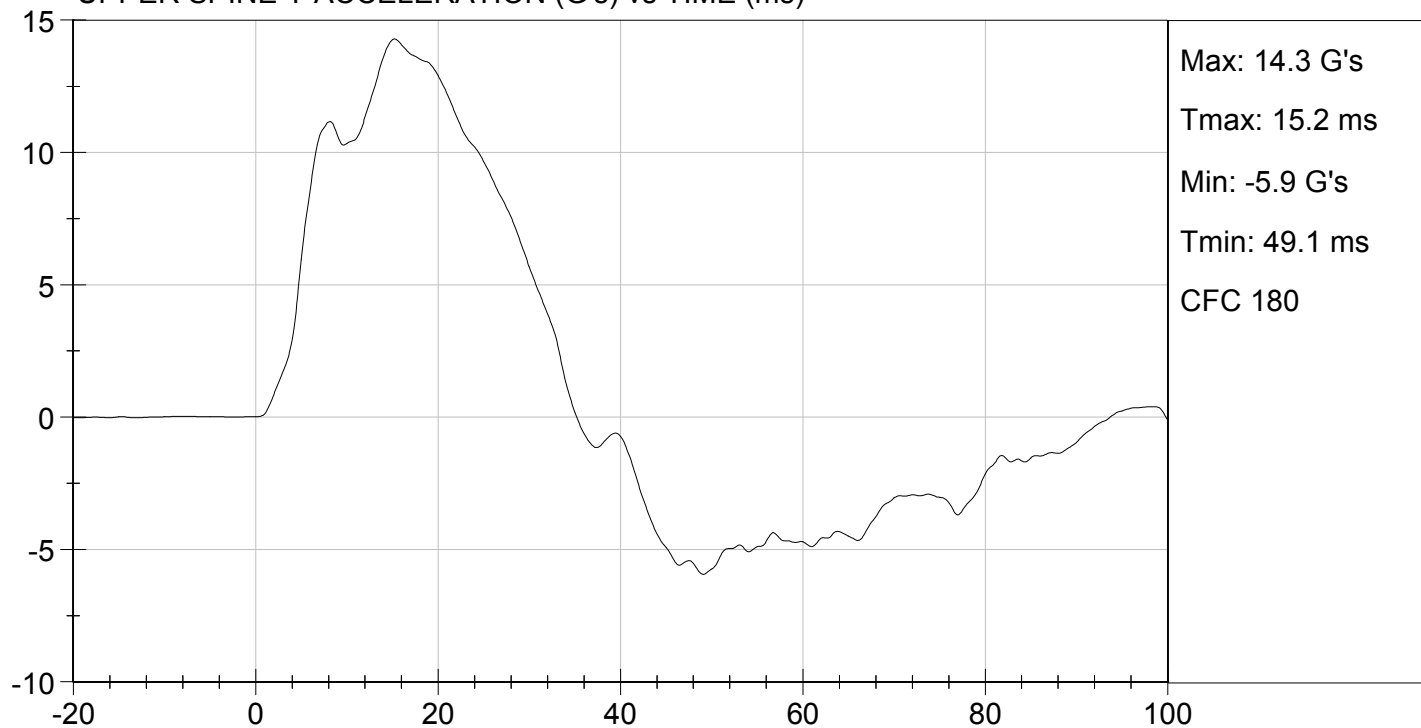
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 13.89 ft/s, 4.23 m/s

TEST DATE: 09/28/2016
TEST #: D163295

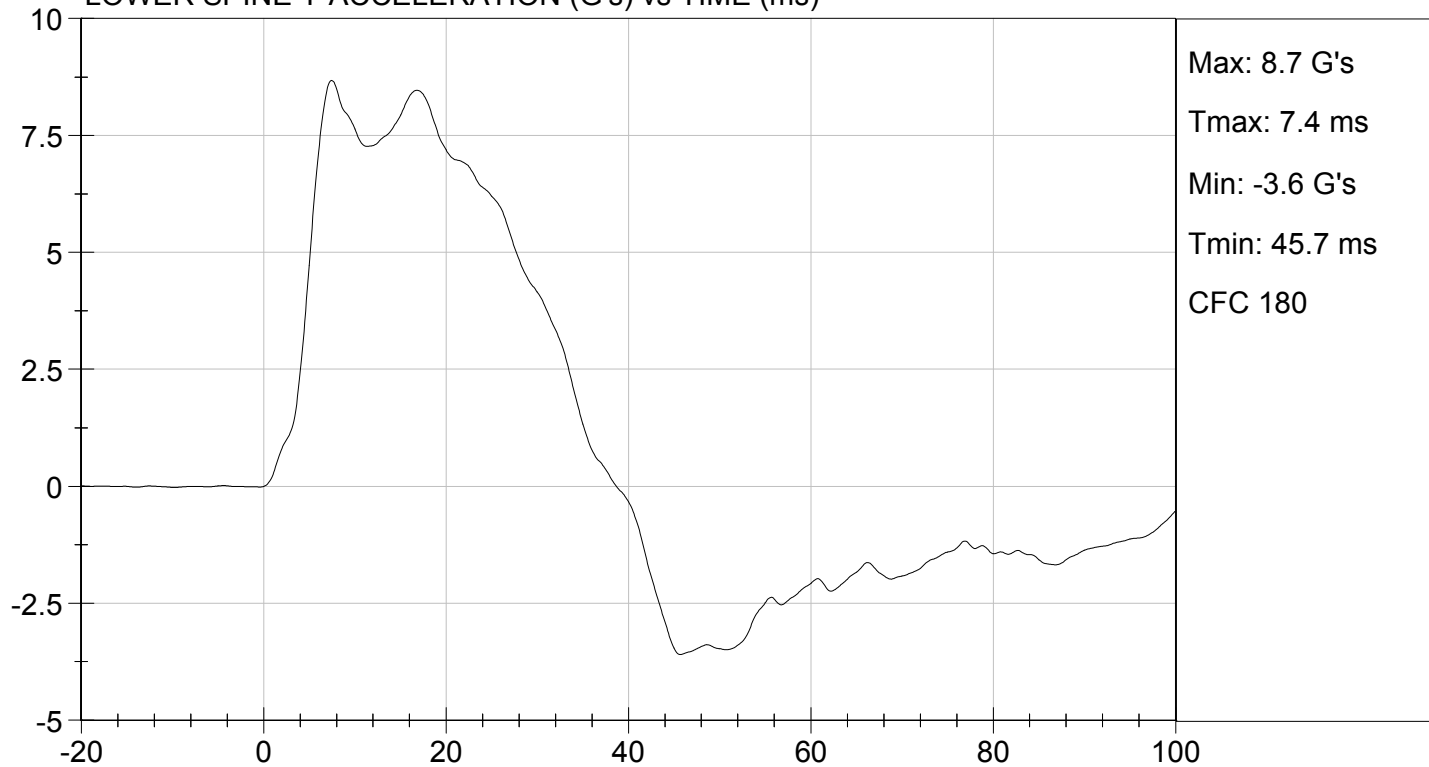




UPPER SPINE Y ACCELERATION (G's) vs TIME (ms)



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: D163296

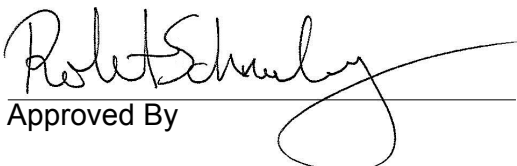
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.8	Pass
Humidity	%	10 to 70	42	Pass
Impact Velocity	m/s	4.20 to 4.40	4.34	Pass
Maximum Probe Acceleration	G's	12 to 16	14	Pass
Upper Abdomen Rib Displacement	mm	36 to 47	40	Pass
Lower Abdomen Rib Displacement	mm	33 to 44	39	Pass
Lower Spine (T12) Y Acceleration	G's	9 to 14	11	Pass
Overall Test Results				Pass



Laboratory Technician

09/28/2016

Test Date

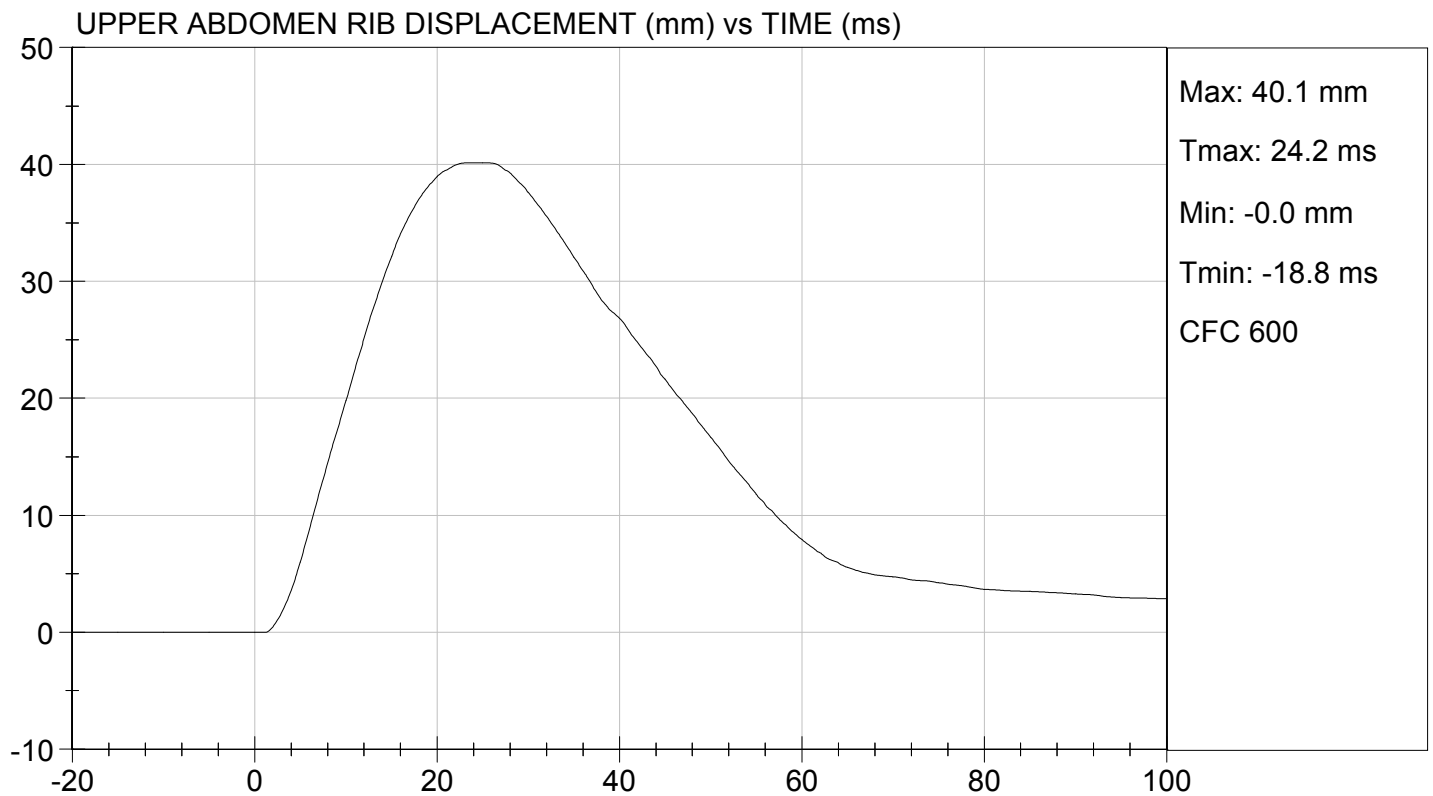
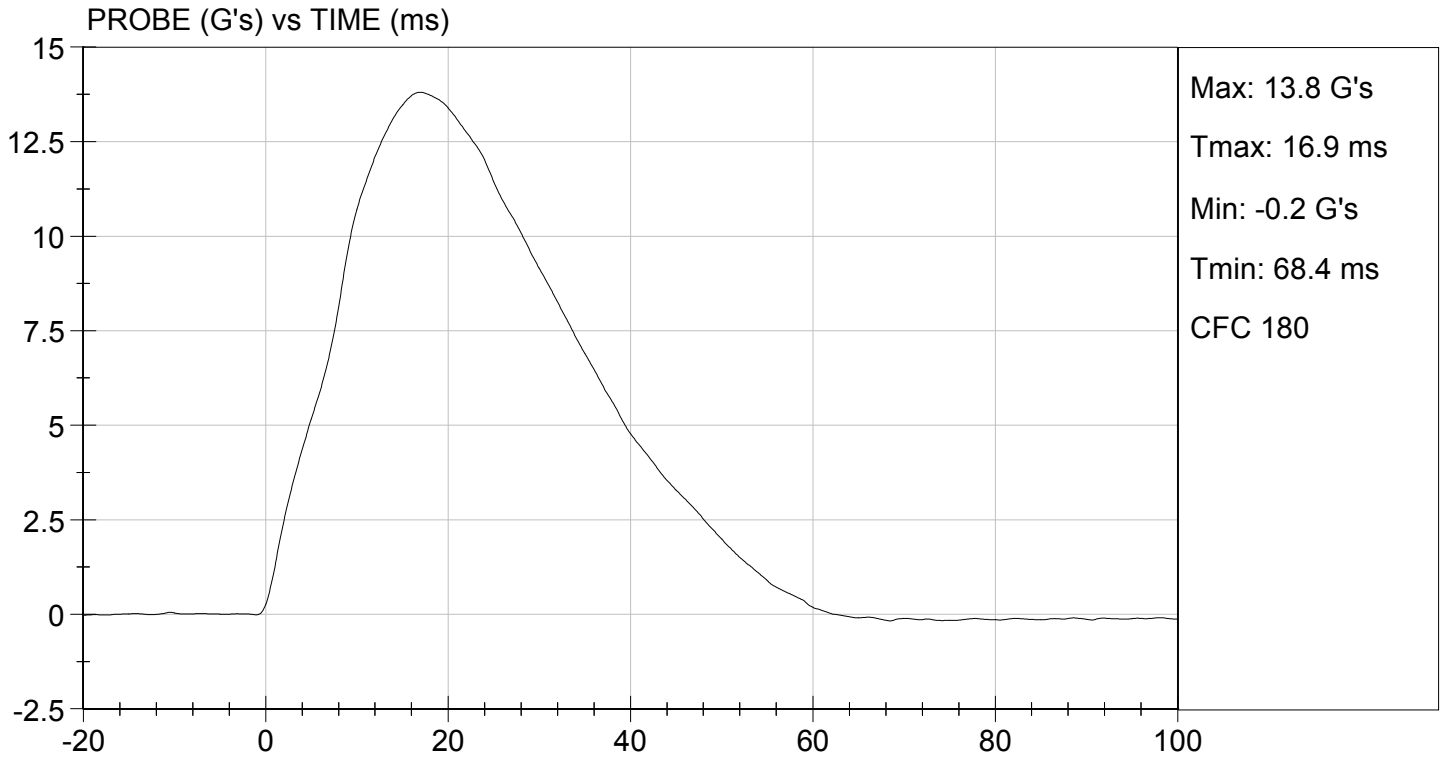


Approved By



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

TEST DATE: 09/28/2016
TEST #: D163296

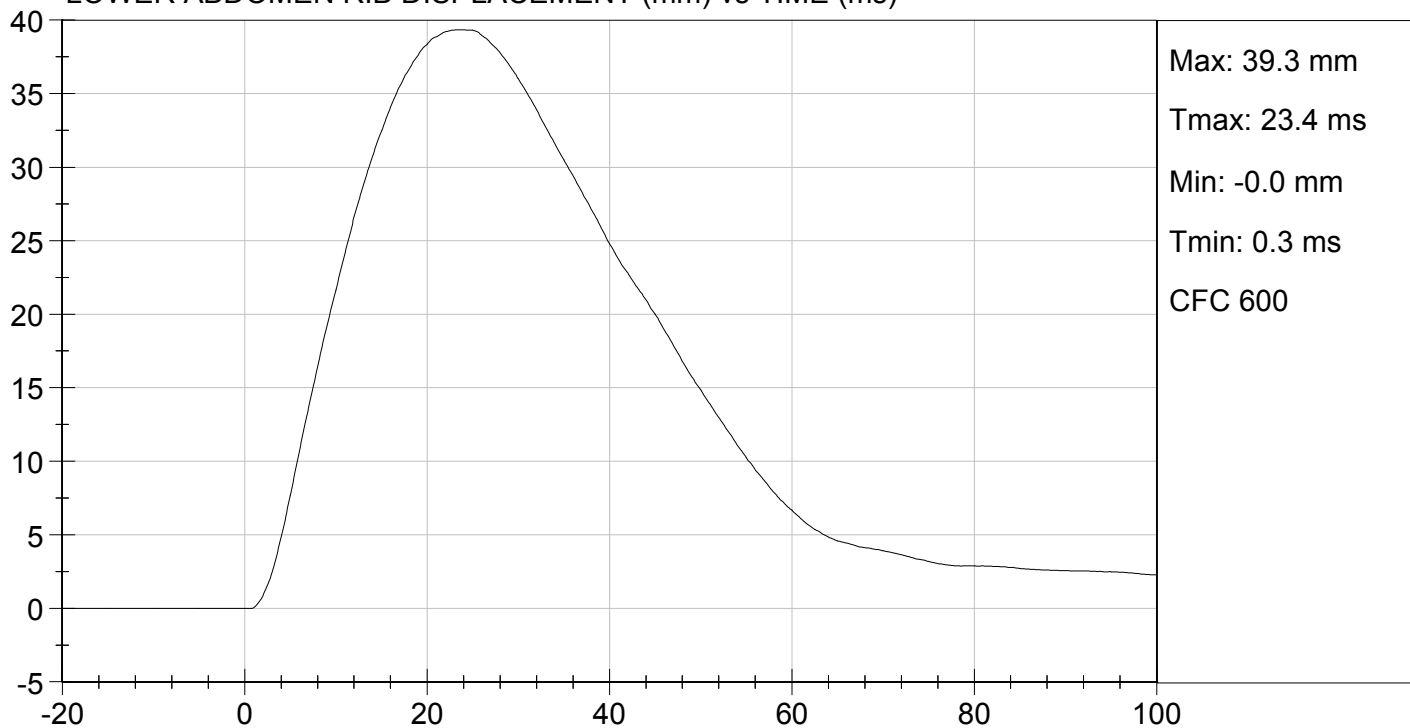




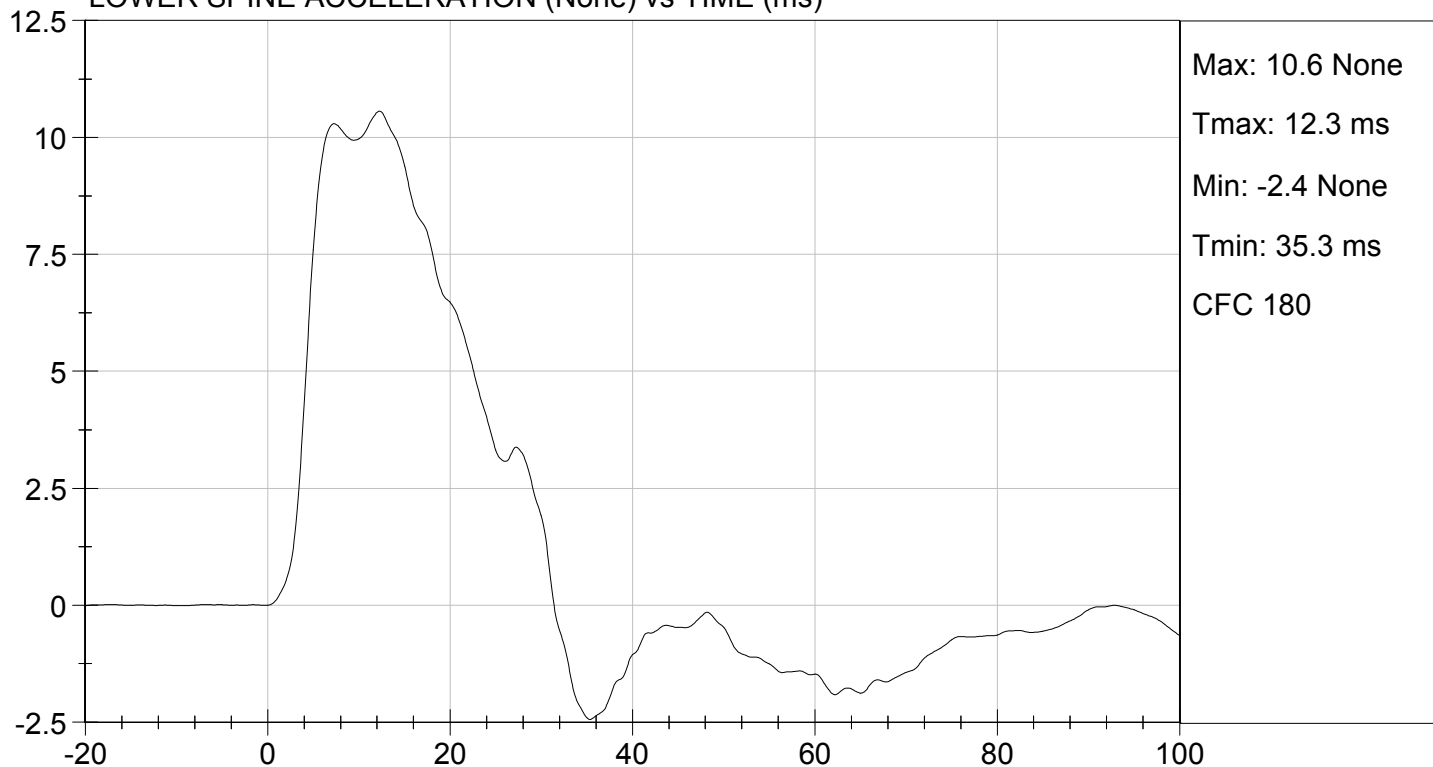
TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 09/28/2016
TEST #: D163296

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



LOWER SPINE ACCELERATION (None) vs TIME (ms)



MGA RESEARCH CORPORATION

PELVIS IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

Test I.D: D163297

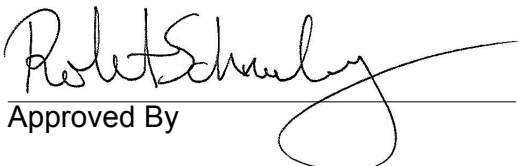
Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.8	Pass
Humidity	%	10 to 70	42	Pass
Impact Velocity	m/s	6.60 to 6.80	6.68	Pass
Maximum Probe Acceleration	G's	38 to 47	44	Pass
Pelvis Y Acceleration After 6 ms	G's	34 to 42	42	Pass
Peak Acetabulum Force	N	3600 to 4300	4,108	Pass
Overall Test Results				Pass



Laboratory Technician

09/28/2016

Test Date

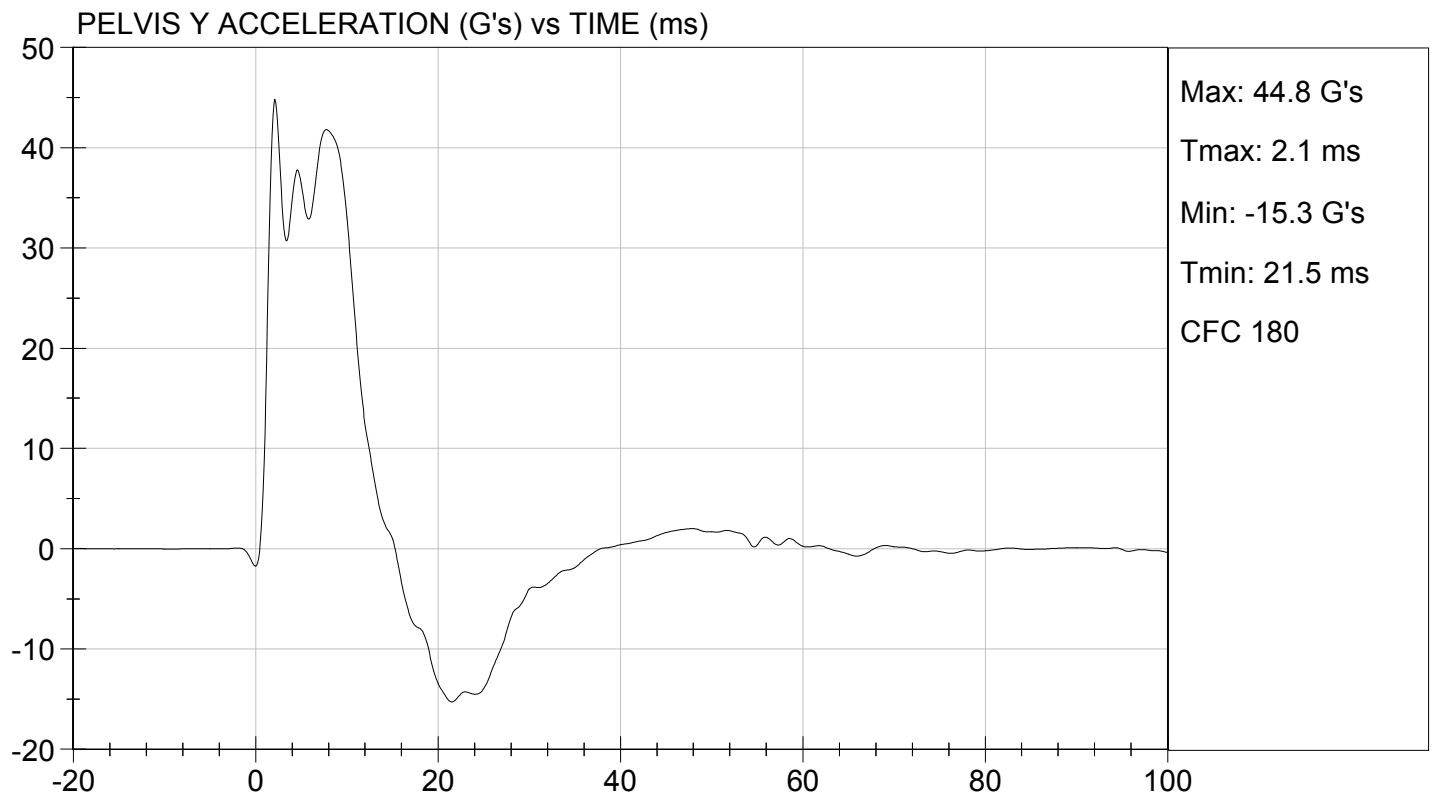
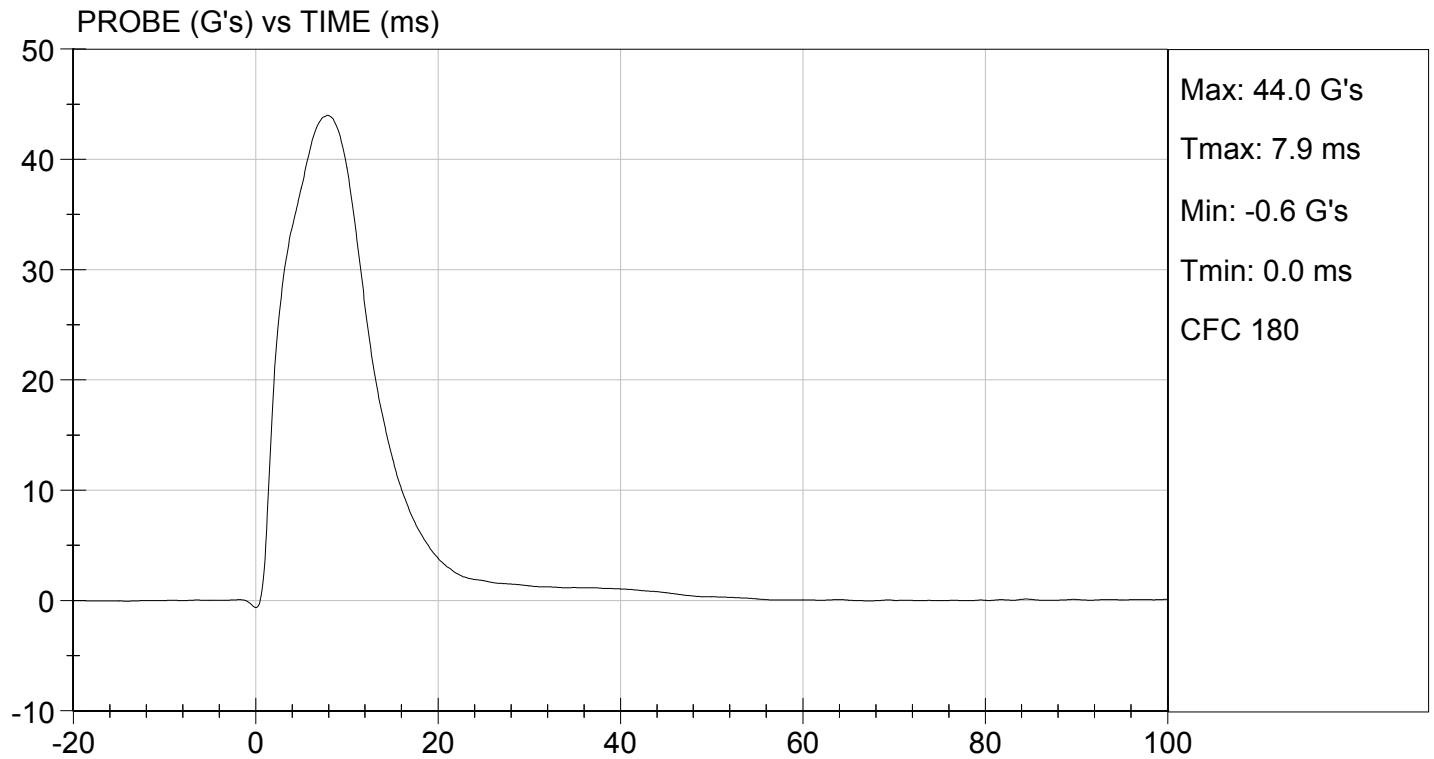


Approved By



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

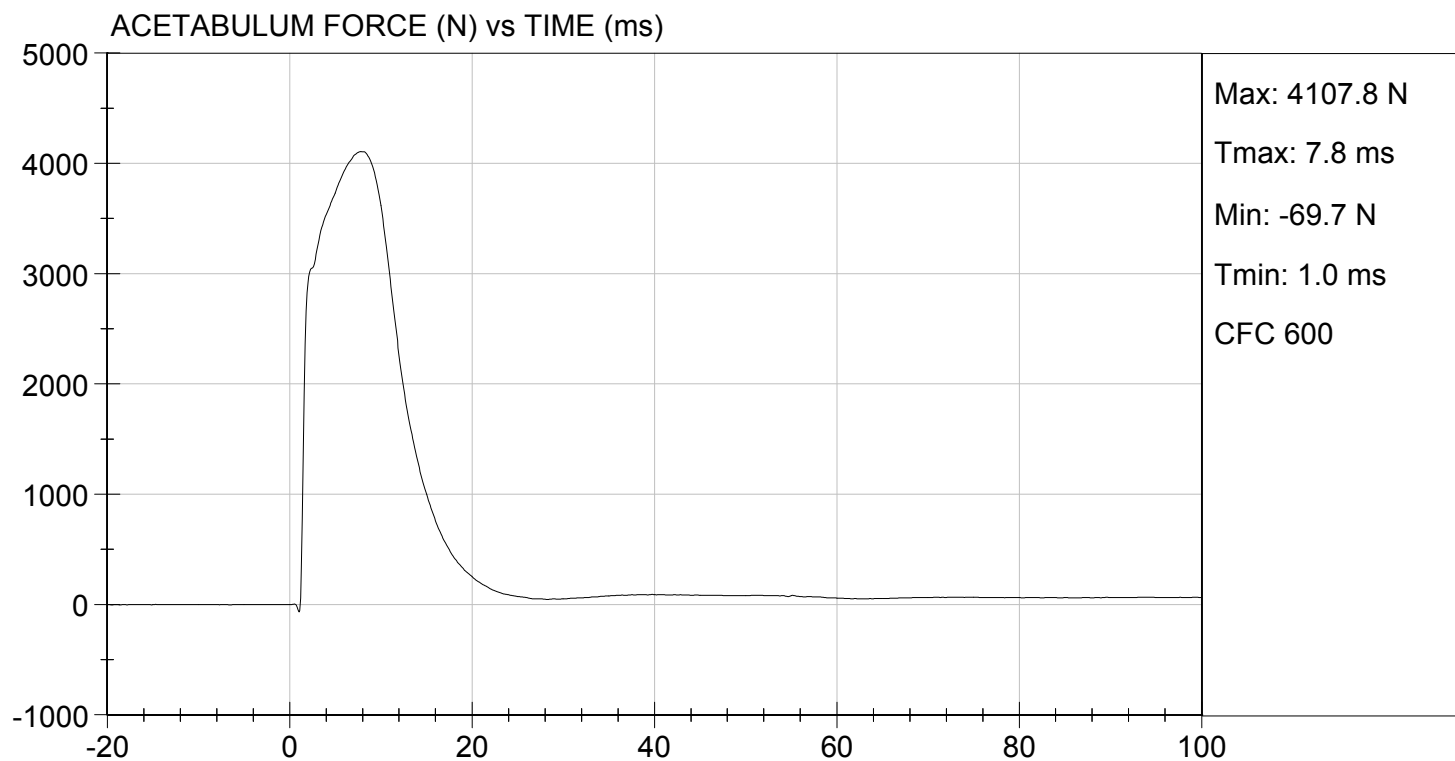
TEST DATE: 09/28/2016
TEST #: D163297





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

TEST DATE: 09/28/2016
TEST #: D163297



MGA RESEARCH CORPORATION

ILIAC IMPACT TEST

SID-IIs BUILD LEVEL D DUMMY

ATD Serial No: 296

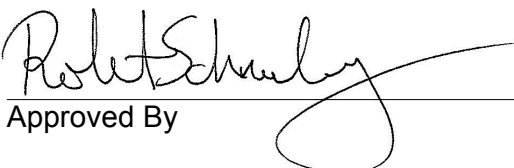
Test I.D: D163298

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.8	Pass
Humidity	%	10 to 70	42	Pass
Impact Velocity	m/s	4.20 to 4.40	4.23	Pass
Maximum Probe Acceleration	G's	36 to 45	37	Pass
Pelvis Y Acceleration	G's	28 to 39	30	Pass
Peak Pelvis Iliac Force	N	4100 to 5100	4,238	Pass
Overall Test Results				Pass


Laboratory Technician

09/28/2016

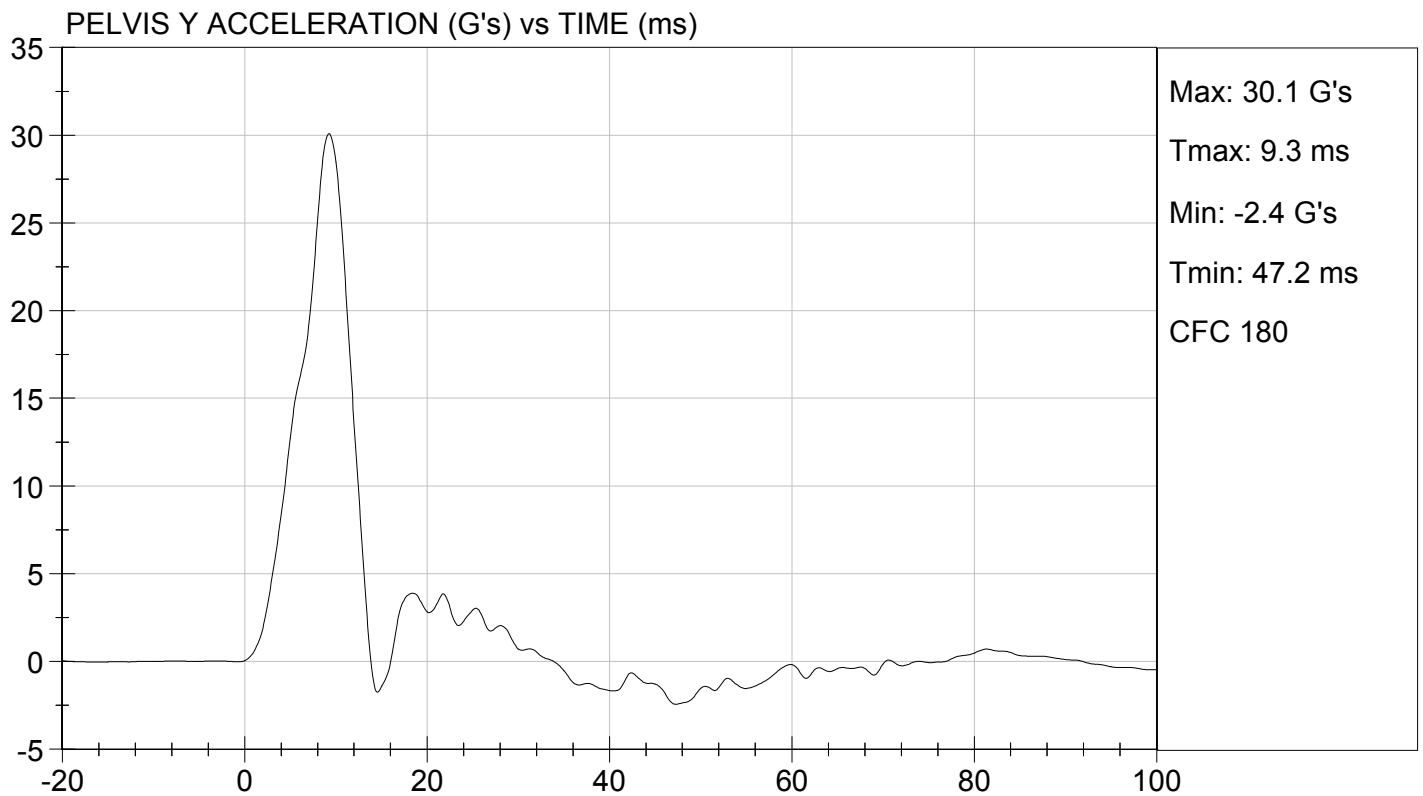
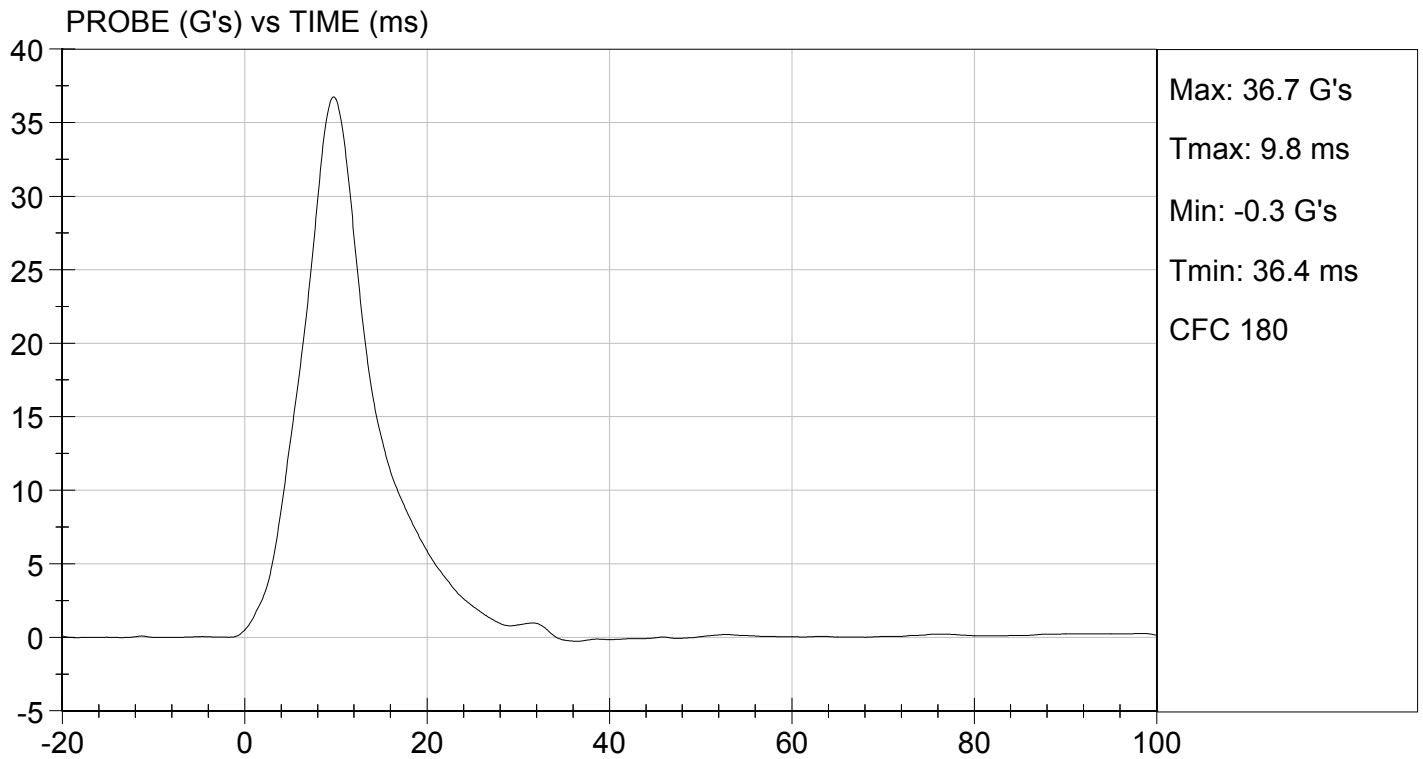
Test Date


Approved By



TEST DESC: ILLIAC
VELOCITY: 13.89 ft/s, 4.23 m/s

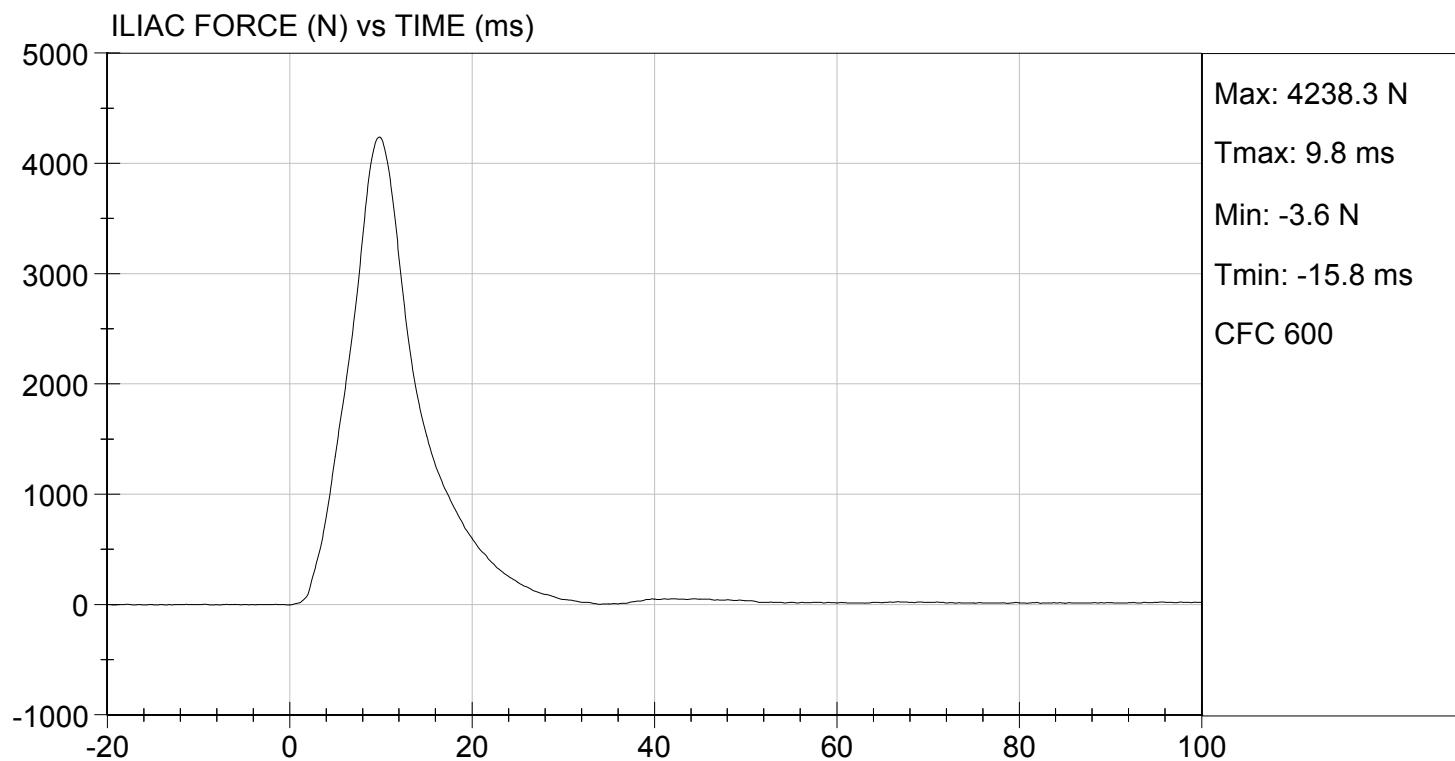
TEST DATE: 09/28/2016
TEST #: D163298



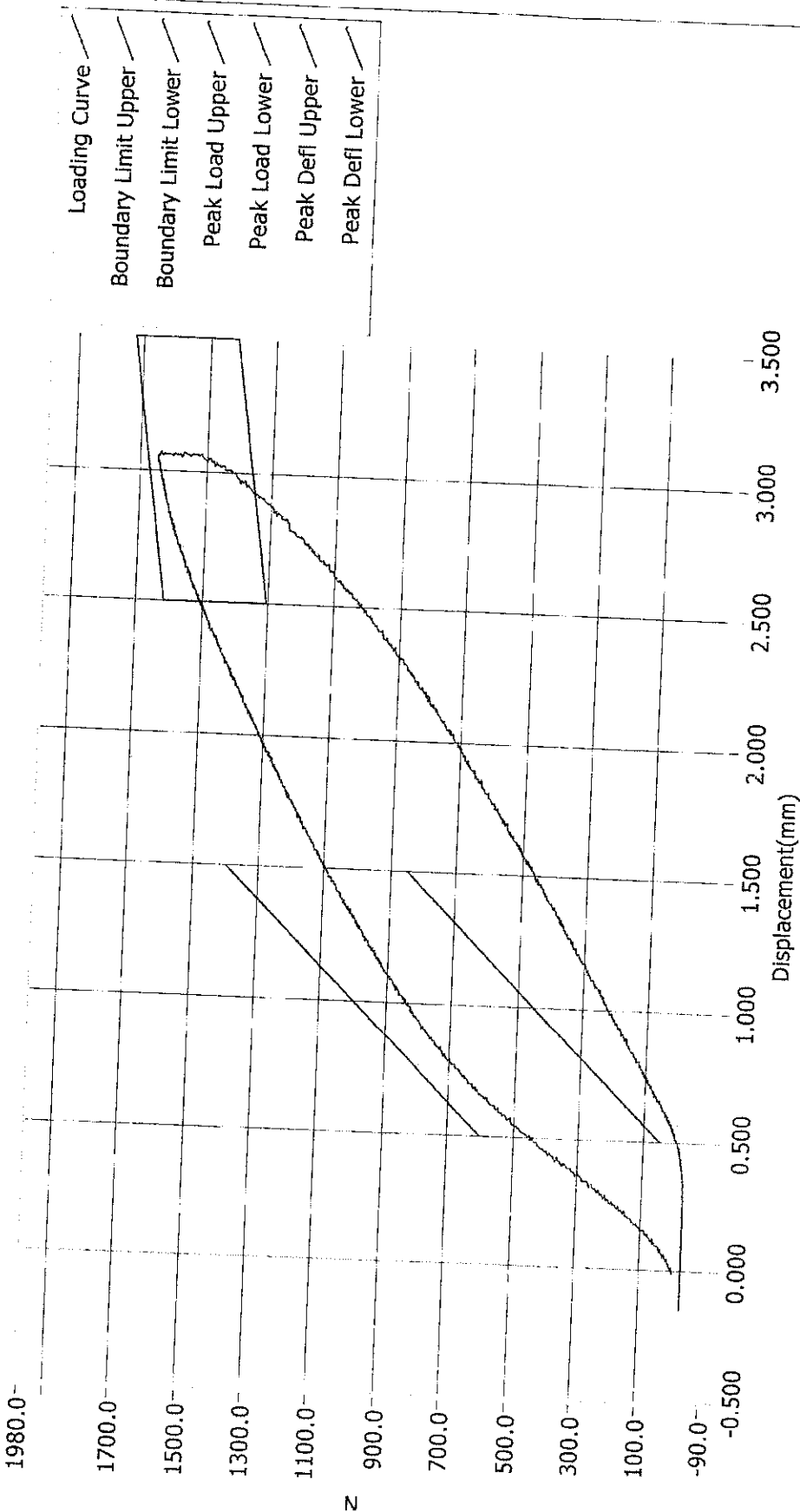


TEST DESC: ILLIAC
VELOCITY: 13.89 ft/s, 4.23 m/s

TEST DATE: 09/28/2016
TEST #: D163298



Resultant Data - SIDIIs Plug Compression

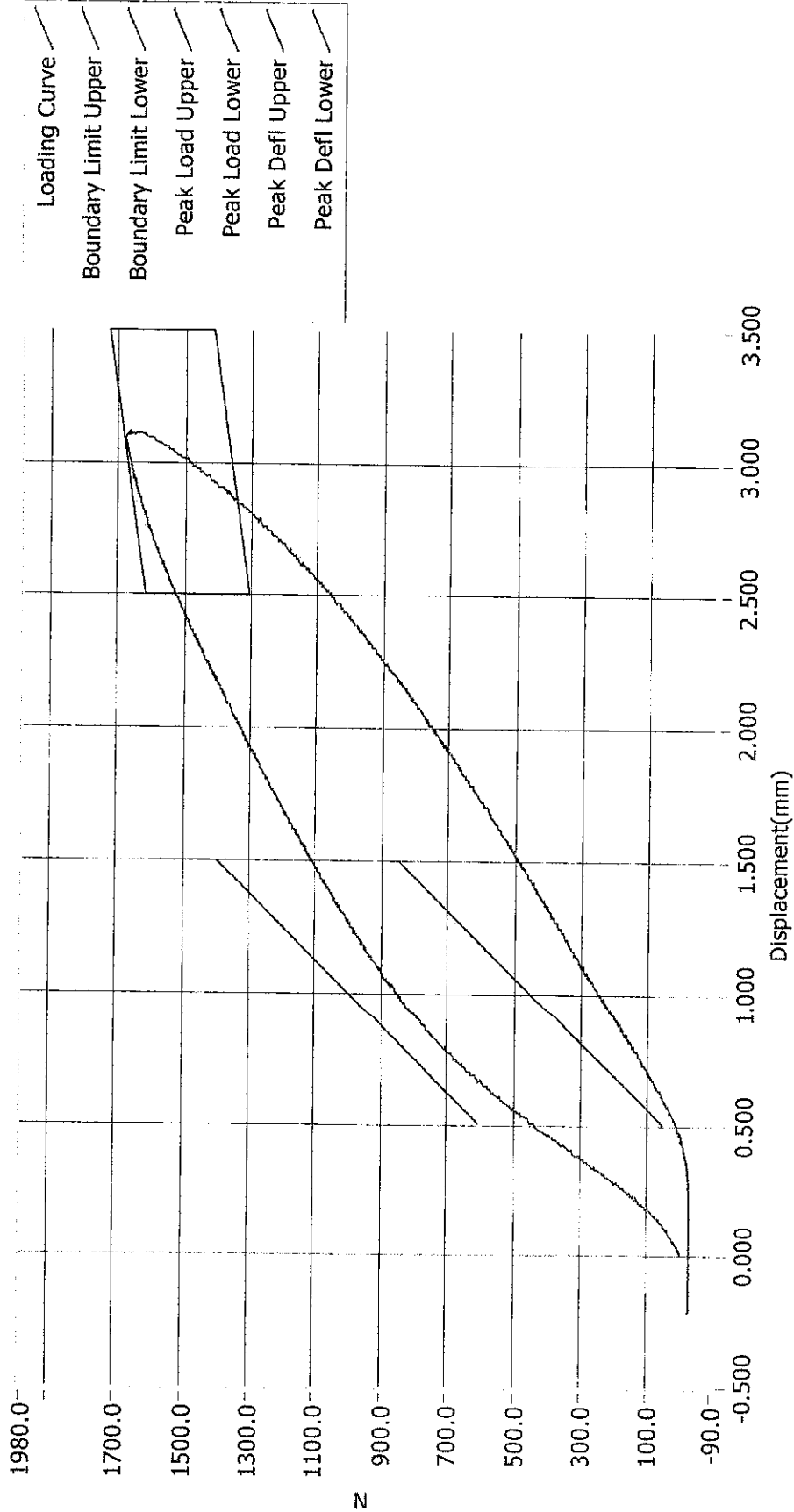


ATD Calibration Lab

<u>Test ID</u>	<u>Part Serial Number</u>	<u>Test Date</u>	<u>Test Time</u>
	80987	12/2/2014	6:12 PM
<u>Cert ID</u>	<u>ATD Serial Number</u>	<u>ATD Type</u>	
	N/A	SIDIIs	

Current Date : 12/2/2014 Current Time : 18:15:09

Resultant Data - SIDIIs Plug Compression



ATD Calibration Lab

Test ID	Part Serial Number	Test Date	Test Time
	80994	12/3/2014	10:53 PM
Cert ID	ATD Serial Number	ATD Type	
	N/A	SIDIIs	

Current Date : 12/3/2014

Current Time : 22:55:27

APPENDIX D
TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

Table 1 – Dummy Instrumentation

				SID-IIs S/N 296			
				Serial Number	Manufacturer	Calibration Date	
Head CG Accelerometers				X	P79001	Endevco	06/30/16
				Y	P79004	Endevco	06/30/16
				Z	P88681	Endevco	06/30/16
				Xr	P79003	Endevco	06/30/16
				Yr	P88680	Endevco	06/30/16
				Zr	P88682	Endevco	06/30/16
Head Angular Rate Sensors				X	ARS7413	DTS	07/15/14
				Y	ARS7421	DTS	07/15/14
				Z	ARS7423	DTS	07/15/14
Displacement Potentiometers	Thoracic Rib	Upper	Y	G012	FTSS	07/01/16	
		Middle	Y	G1163	FTSS	07/01/16	
		Lower	Y	G1158	FTSS	07/01/16	
	Abdominal Rib	Upper	Y	G1146	FTSS	07/01/16	
		Lower	Y	G1126	FTSS	07/01/16	
Lower Spine Accelerometers (T12)				X	P86724	Endevco	06/30/16
				Y	P86725	Endevco	06/30/16
				Z	P86726	Endevco	06/30/16
Acetabulum Load Cell				Y	ACG4285	FTSS	12/22/15
Iliac Wing Load Cell				Y	IWG3023	FTSS	12/22/15
Pelvis Plug (struck side)					80987	FTSS	12/02/14
Pelvis Plug (non-struck side)					80994	FTSS	12/03/14

Table 2 – Vehicle Instrumentation

		Serial Number	Manufacturer	Calibration Date
Vehicle Center of Gravity	X	PCB331	PCB	08/02/16
Vehicle Center of Gravity	Y	PCB330	PCB	08/02/16
Vehicle Center of Gravity	Z	PCB329	PCB	08/02/16
Left Floor Sill	Y	PCB372	PCB	04/25/16
A-Pillar Sill	Y	PCB159	PCB	04/12/16
A-Pillar Low	Y	PCB539	PCB	06/20/16
A-Pillar Mid	Y	PCB540	PCB	06/20/16
B-Pillar Sill	Y	PCB592	PCB	05/26/16
B-Pillar Low	Y	PCB863	PCB	07/19/16
B-Pillar Mid	Y	PCB862	PCB	07/19/16
Driver Seat	Y	P78936	Endevco	08/11/16
Engine Top	X	PCB394	PCB	06/06/16
Engine Top	Y	PCB396	PCB	06/06/16
Firewall	Y	P90601	Endevco	08/22/16
Right Roof	Y	P87519	Endevco	07/18/16
Right Floor Sill	Y	PCB414	PCB	09/06/16
Rear Floorpan	X	PCB338	PCB	04/15/16
Rear Floorpan	Y	PCB337	PCB	04/15/16

Table 3 – Pole Instrumentation

	Serial Number	Manufacturer	Calibration Date
Load Cell 1	DG6277	FTSS	07/25/16
Load Cell 2	DG6278	FTSS	07/25/16
Load Cell 3	DG6279	FTSS	07/25/16
Load Cell 4	DG6280	FTSS	07/25/16
Load Cell 5	DG6281	FTSS	07/25/16
Load Cell 6	DG6283	FTSS	07/25/16
Load Cell 7	DG6284	FTSS	07/25/16
Load Cell 8	DG6582	FTSS	07/25/16