

REPORT NUMBER: SPNCAP-CAL-16-005

**NEW CAR ASSESSMENT PROGRAM (NCAP)
SIDE IMPACT POLE TEST**

**Toyota Motor Manufacturing, Kentucky, INC.
2016 Toyota Avalon
Four Door Sedan**

NHTSA No: M20165106

**PREPARED BY:
CALSPAN CORPORATION
P.O. BOX 400
BUFFALO, NEW YORK 14225**



May 10, 2016

FINAL REPORT

**PREPARED FOR:
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, D.C. 20590**

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Date: May 10, 2016

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Transportation Test Operations

Date: May 10, 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: _____

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16. Abstract A 32.20 km/h (20 mph), 75° oblique impact Side NCAP Test was conducted on the subject 2016 Toyota Avalon four door sedan 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. This test was conducted at Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on March 18, 2016. The impact velocity of the vehicle was 32.52 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle was 21°C. The target vehicle's maximum post-test static crush was 387 mm located at level 3. The test vehicle's occupant performance data is as follows: <table border="1"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th colspan="3">Driver ATD (SID-IIs) (Serial No. DG8012)</th> </tr> <tr> <th>Units</th> <th>Threshold</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₃₆)</td> <td></td> <td>1000</td> <td>365.404</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td>G</td> <td>82</td> <td>44.517</td> </tr> <tr> <td>Total Pelvic Force (sum of acetabular and iliac forces)</td> <td>N</td> <td>5525</td> <td>4017.610</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td>mm</td> <td>38</td> <td>21.971</td> </tr> <tr> <td>Maximum Abdomen Rib Deflection</td> <td>mm</td> <td>45</td> <td>23.455</td> </tr> </tbody> </table> The two doors on the struck side of the vehicle did not separate from the body at the hinges or latches and the opposite doors did not open during the side impact event.				Measurement Description	Driver ATD (SID-IIs) (Serial No. DG8012)			Units	Threshold	Result	Head Injury Criteria (HIC ₃₆)		1000	365.404	Resultant Lower Spine Acceleration	G	82	44.517	Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	4017.610	Maximum Thoracic Rib Deflection	mm	38	21.971	Maximum Abdomen Rib Deflection	mm	45	23.455
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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, D.C. 20590 e-mail: tis@nhtsa.dot.gov FAX: 202-493-2833																												
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SECTION 1

TEST PURPOSE AND PROCEDURE

This side impact test was conducted as 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-00352. The purpose of this test is to generate comparative side impact performance in a 2016 Toyota Avalon four door sedan. 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 Toyota Avalon four door sedan. The subject vehicle was towed into the rigid pole at an angle of 75° and a velocity of 32.52 km/h. The test was conducted by Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on March 18, 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 on page 3-11 in this report.

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

Head CG tri-axial accelerometers

Thorax upper, middle, and lower rib displacement potentiometers

Abdomen upper and lower rib displacement potentiometers

Lower spine tri-axial accelerometers

Iliac load cell

Acetabulum load cell

Appendix B contains the dummy response data. Dummy configuration and performance verification data can be found in Appendix C of this report. Appendix D identifies all serial numbers, manufacturers, and calibration dates for test equipment, dummy sensors, potentiometers, and load cells used to collect data during the test.

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

INJURY READINGS

Measurement Description	Driver ATD (SID-IIs)		
	Units	IARV	Result
Head Injury Criteria (HIC ₃₆)		1000	365.404
Resultant Lower Spine Acceleration	g	82	44.517
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	4017.610
Maximum Thoracic Rib Deflection	mm	38*	21.971
Maximum Abdominal Rib Deflection	mm	45*	23.455

*Proposed IARV

Supplemental restraint information was recorded as follows:

SUPPLEMENTAL RESTRAINT INFORMATION

Restraint Type	Left Front (Driver) Occupant Location 1		Left Rear (Passenger) Occupant Location 4	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	No		
Knee Airbag	Yes	No		
Side Airbag 1 - Curtain	Yes	Yes	Yes	Yes
Side Airbag 2 – Torso/Pelvis	Yes	Yes	Yes	Yes
Seat Belt Pretensioner	Yes	Yes	No	N/A
Seat Belt Load Limiter	Yes	Yes	No	N/A
Other				

GENERAL COMMENTS:

1. P1 serial number – DG8012

Data Anomalies:

- Left Sill A-Pillar Y Acceleration , Questionable spike at 57ms

SECTION 3

OCCUPANT AND VEHICLE INFORMATION

This section contains information reporting for the following Data Sheets:

Data Sheet No. 1 – General Test and Vehicle Parameter Data

Data Sheet No. 2 – Seat, Seat Belt, Steering Wheel Adjustment and Fuel Systems Data

Data Sheet No. 3 – Dummy Longitudinal Clearance Dimensions

Data Sheet No. 4 – Dummy Lateral Clearance Dimensions

Data Sheet No. 5 – Camera and instrumentation Data

Data Sheet No. 6 – Vehicle Accelerometer Data

Data Sheet No. 7 – Rigid Pole Load Cell Data

Data Sheet No. 8 – Post-Test Observations

Data Sheet No. 9 – Test Vehicle Profile Measurements

Data Sheet No. 10 – Test Vehicle Exterior Crush Measurements

Data Sheet No. 11 – Vehicle Damage Profile Distances

Data Sheet No. 12 – FMVSS No. 301 Static Rollover Results

Data Sheet No. 13 – Dummy / Vehicle Temperature and Humidity Stabilization Data

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2016 Toyota Avalon four door sedan
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20165106
Test Date: 3/18/2016

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20165106
Model Year	2016
Make	Toyota
Model	Avalon
Body Style	Four Door Sedan
VIN	4T1BK1EBXGU198538
Body Color	Red
Odometer Reading (km/mi)	313.8 km / 195 mi
Engine Displacement (L)	3.5
Type / No. Cylinders	V6
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	6-Speed
Overdrive	Yes
Final Drive	Front Wheel Drive
Roof Rack	No
Sunroof / T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	Yes
Anti-Lock Brakes (ABS)	Yes

Traction Control System (TCS)	Yes
Auto-Leveling System	No
Automatic Door Locks (ADL)	Yes
Power Window Auto-Reverse	No
Other Optional Feature	--
Driver Front Airbag	Yes
Driver Curtain Airbag	Yes
Driver Head/Torso Airbag	No
Driver Torso Airbag	No
Driver Torso / Pelvis Airbag	Yes
Driver Pelvis Airbag	No
Driver Knee Airbag	Yes
Rear Pass. Curtain Airbag	Yes
Rear Pass. Head / Torso Airbag	No
Rear Pass. Torso Airbag	No
Rear Pass. Torso / Pelvis Airbag	Yes
Rear Pass. Pelvis Airbag	No
Driver Seat Belt Pretensioner	Yes
Rear Pass. Seat Belt Pretensioner	No
Driver Load Limiter	Yes
Rear Pass. Load Limiter	No
Other Safety Restraint	-

Does owner's manual provide instructions to turn off automatic door locks?

Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Toyota Motor Manufacturing, Kentucky, Inc
Date of Manufacture	11/15
Vehicle Type	Passenger

GVWR (kg)	2082
GAWR Front (kg)	1190
GAWR Rear (kg)	1134

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total
Designated Seating Capacity (DSC)	2	3	-	5
Capacity Weight (VCW) (kg)				415
DSC X 68.04 kg				340.2
Cargo Weight (RCLW) (kg)				74.8

(A)

(B)

(A-B)

VEHICLE SEAT TYPE

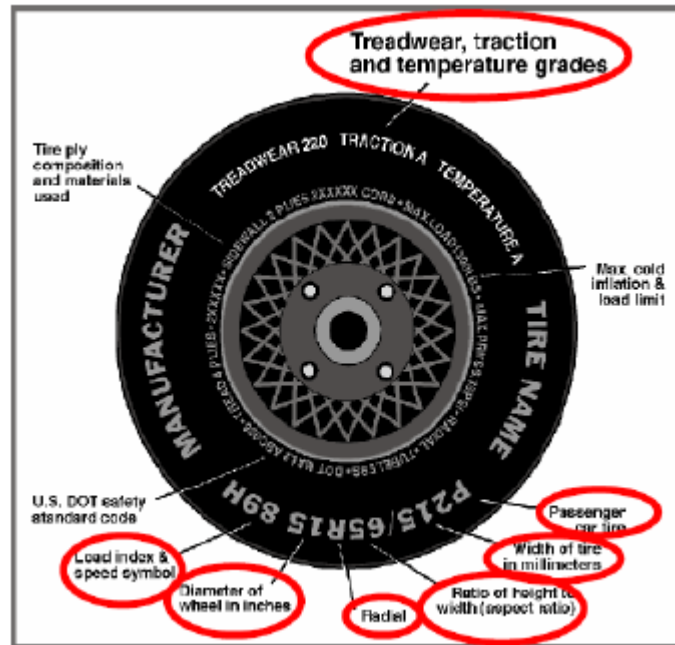
Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						W/ Lever	W/ Knob
Front Seat	X						X
Rear or Second Row Seat		X			X		
Third Row seat							

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

Test Vehicle:	2016 Toyota Avalon four door sedan
Test Program:	NCAP Side Pole Impact Test

NHTSA No.: M20165106
Test Date: 3/18/2016

Collected for year, make, model, & VIN, all items circled in red, tire manufacturer and tire name.



VEHICLE TIRE INFORMATION

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	230	230
Recommended Tire Size	P215/55R17	P215/55R17
Tire Size on Vehicle	P215/55R17	P215/55R17
Tire Manufacturer	Michelin	Michelin
Tire Model	Primacy MXV4	Primacy MXV4
Treadwear	500	500
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	1 Polyester, 1 Polyamide, 1 Steel	1 Polyester, 1 Polyamide, 1 Steel
Load Index/Speed Symbol	93V	93V
Tire Material	Rubber	Rubber
DOT Safety Code Left	M33F009X4415	M33F009X4415
DOT Safety Code Right	M33F009X4415	M33F009X4415

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

Test Vehicle: 2016 Toyota Avalon four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20165106
 Test Date: 3/18/2016

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	232	236	238	234
Tire Placard	kPa	230	230	230	230
Owner's Manual	kPa	230	230	230	230
As Tested	kPa	230	230	230	230

TEST VEHICLE AXLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	498	315		520	359		518	374	
Right	kg	481	294		485	343		479	345	
Ratio	%	62%	38%		59%	41%		58%	42%	
Totals	kg	979	609	1588	1005	702	1707	997	719	1716

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total As Delivered Weight (UVW)	kg	1588	(A)
Actual Weight of 1 P572V (SID-IIs) ATD Used	kg	51	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	74.8	(C)
Calculated Vehicle Target Weight (TVTW)	kg	1713.8	(A+B+C)

Does the measured As Test Vehicle Weight lie within the required weight range
 (i.e. Calculated Test Vehicle Target Weight – 4.5 kg to – 9 kg)? ☒ Yes ☐ No

TEST VEHICLE ATTITUDES AND CG

Measurement Description	Units	As Delivered	As Tested	Fully Loaded	Meets Rqmt***
Driver Door Sill Angle (front-to-rear)*	Deg	-0.1	0.2	0.2	Yes
Front Passenger Sill Angle (front-to-rear)*	Deg	-0.1	0.0	0.0	Yes
Front Bumper-Line Angle (left-to-right)**	Deg	0.0	-0.1	-0.3	Yes
Rear Bumper-Line Angle (left-to-right)**	Deg	-0.1	-0.2	-0.4	Yes
Vehicle CG (Aft of Front Axle)	mm	1078	1156	1428	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	18	23	31	

* 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. Indicate "Yes" or "No" for Meets Requirement

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

Test Vehicle: 2016 Toyota Avalon four door sedan
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20165106
Test Date: 3/18/2016

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Trunk Carpeting	8
Spare Tire	15
Jack	4
Rear Speaker	1
Tail Light	1
Passenger Windows	9
Ballast / Equipment Added	25

Test Height – Adjustable Suspension Setting, if Applicable	N/A
--	-----

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

Test Vehicle: 2016 Toyota Avalon four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20165106
 Test Date: 3/18/2016

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	16.7	10.9	13.8
Front Passenger Seat	Not Adjustable		
Front Center Seat	N/A	N/A	N/A
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 SCRP Height (mm)	SCRP Height Position	SCRP Height (mm)		
				Rearmost	Mid-Fore / Aft	Forward- Most
Driver Seat	13.8	43	Max	52	63	73
			Mid	26	36	43
			Min	0	10	20
Front Passenger Seat	Not Adjustable		Max	-	-	-
			Mid	-	-	-
			Min	-	-	-
Front Center Seat	N/A	N/A	Max	-	-	-
			Mid	-	-	-
			Min	-	-	-
Struck Side Rear Seat	Fixed	Fixed	Max	-	-	-
			Mid	-	-	-
			Min	-	-	-
Non-Struck Side Rear Seat	Fixed	Fixed	Max	-	-	-
			Mid	-	-	-
			Min	-	-	-
Rear Center Seat	Fixed	Fixed	Max	-	-	-
			Mid	-	-	-
			Min	-	-	-

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

Test Vehicle: 2016 Toyota Avalon four door sedan
 Test Program: NCAP Side Pole Impact Test

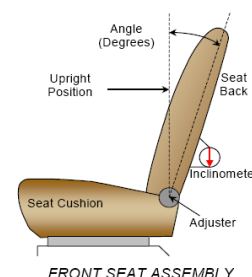
NHTSA No.: M20165106
 Test Date: 3/18/2016

SEAT FORE / AFT POSITION

Seat	Total Fore / Aft Travel		Test Position from Forwardmost Position	
	mm	Detents*	mm	Detents*
Driver Seat	240	N/A	0	N/A
Front Passenger Seat	240	N/A	0	N/A
Front Center Seat	N/A	N/A	N/A	N/A
Struck Side Rear Seat	FIXED	FIXED	FIXED	FIXED
Non-Struck Side Rear Seat	FIXED	FIXED	FIXED	FIXED
Rear Center Seat	FIXED	FIXED	FIXED	FIXED

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 are set to match the struck-side rear seat back.



Seat	Total Seat Back Angle Range		Test Position from Most Upright	
	Degrees	Detents*	Degrees	Detents*
Driver Seat w/Seated Dummy	-9.7 to 46.3	N/A	-6.8	N/A
Front Passenger Seat	-9.7 to 46.3	N/A	-6.8	N/A
Front Center Seat	N/A	N/A	N/A	N/A
Struck Side Rear Seat	FIXED	FIXED	FIXED	FIXED
Non-Struck Side Rear Seat	FIXED	FIXED	FIXED	FIXED
Rear Center Seat	FIXED	FIXED	FIXED	FIXED

SEAT BELT ANCHORAGE ADJUSTMENT

Seat belt anchorages are adjusted in accordance with the information provided by the manufacturer on Form No. 1. Zero is defined as the uppermost detent

Seat	Total # of Positions	Placed in Position #
Driver Seat	4 (0-3)	0 - Uppermost

HEAD RESTRAINT ADJUSTMENT

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

Seat	Total # of Positions	Placed in Position #
Driver Seat	2	2 – Lowest

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

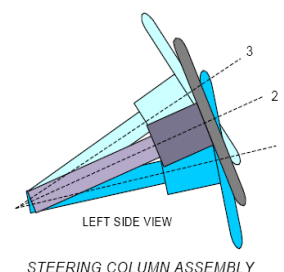
Test Vehicle: 2016 Toyota Avalon four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20165106
 Test Date: 3/18/2016

STEERING COLUMN ADJUSTMENT

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

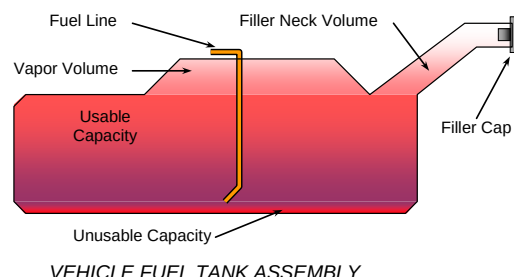
	Degrees	Fore / Aft Position (mm)
Lowermost – Position 1	26.6	
Geometric Center – Position 2	24.6	
Uppermost – Position 3	22.6	
Telescoping Steering Wheel Travel		40
Test Position	24.6	20



FUEL PUMP

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

The vehicle is equipped with an electric fuel pump.
The fuel filler neck is on the left side of the vehicle.
The pump creates positive pressure in the fuel lines, pushing the gasoline to the engine. See form 1 for more information.



FUEL TANK CAPACITY DATA

Description	Liters
Usable Capacity of "Standard Tank" - see Form No. 1	63.44
Usable Capacity of "Optional Tank" - see Form No. 1	
Usable Capacity of "Standard Tank" - see Owner's Manual	64.35
Usable Capacity of "Optional Tank" - see Owner's Manual	
93% of Usable Capacity	59.0
Actual Amount of Solvent Used in Test	59.0
1/3 of Usable Capacity	21.15

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

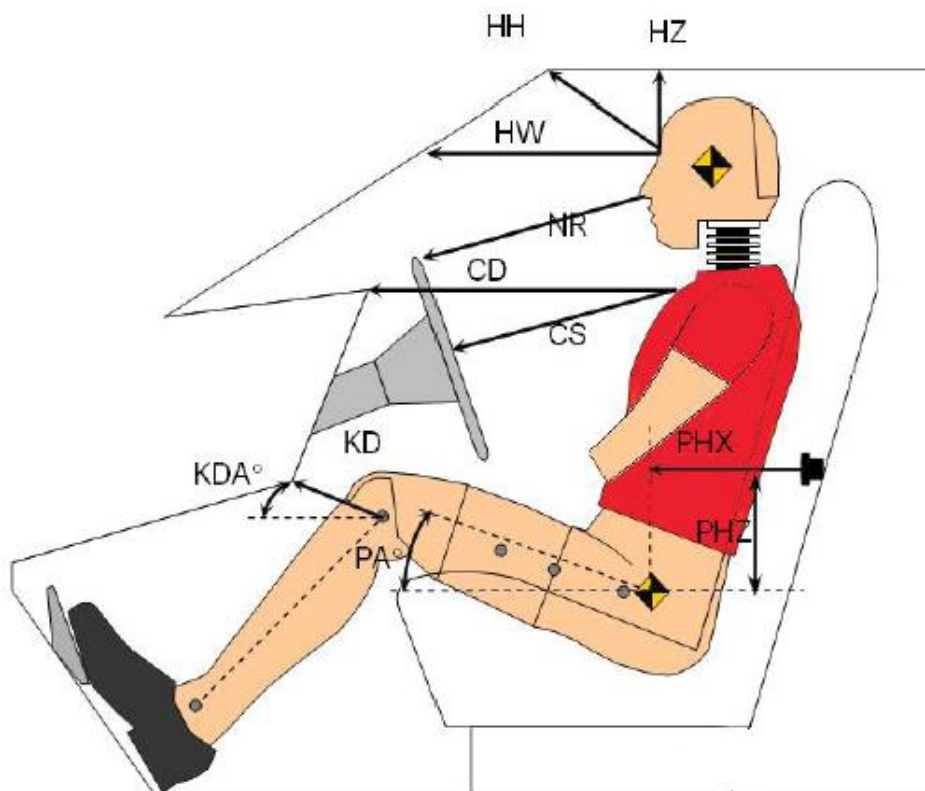


No

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2016 Toyota Avalon four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20165106
 Test Date: 3/18/2016



Left Side View

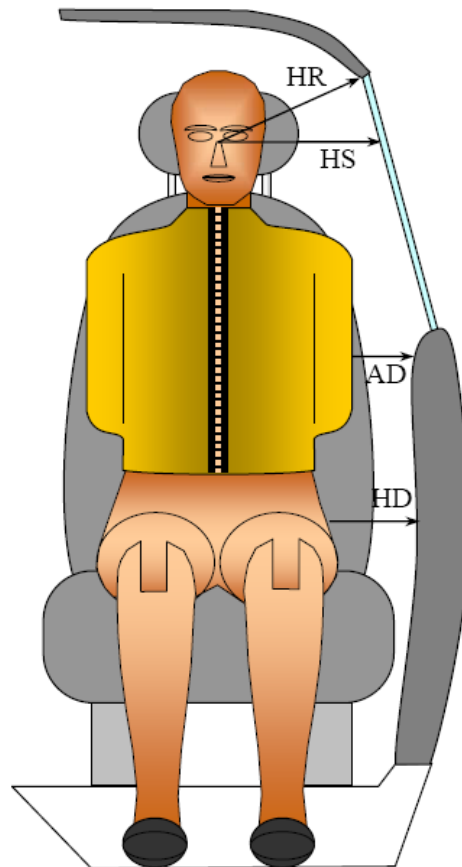
DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Description	Driver (Serial No. DG8012)	
		Length (mm)	Angle (°)
HH	Head to Header	277	
HW	Head to Windshield	627	
HZ	Head to Roof Liner	177	
NR	Nose to Rim	258	
CD	Chest to Dash	410	
CS	Chest to Steering Wheel	200	
KD(L) / KDA(L)°	Left Knee to Dash	127	33.1
KD(R) / KDA(R)°	Right Knee to Dash	115	7.4
PAX°	Pelvic Tilt Angle (X-Axis)		18.4
PAY°	Pelvic Tilt Angle (Y-Axis)		0.2
PHX	Hip Point to Striker (X-Axis)	352	
PHZ	Hip Point to Striker (Z-Axis)	186	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2016 Toyota Avalon four door sedan
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20165106
Test Date: 3/18/2016



FRONT VIEW OF DUMMY

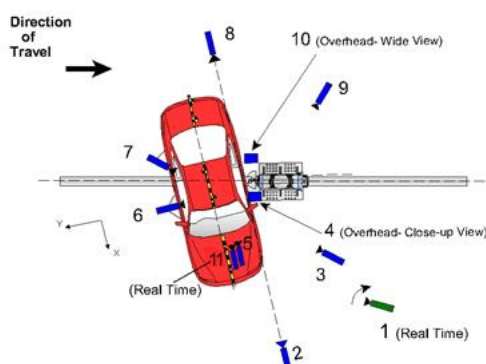
DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver - Length (Serial No. DG8012)
HR	Head To Side Header	mm	230
HS	Head to Side Window	mm	370
AD	Arm to Door	mm	155
HD	Hip Point to Door	mm	175

DATA SHEET NO. 5 CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2016 Toyota Avalon four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20165106
 Test Date: 3/18/2016



CAMERA LOCATIONS AND DATA

No.	Camera View	Coordinates (mm)			Lens Length (mm)	Operating Frame Rate (fps)
		X	Y	Z		
1	Real-time (24 - 30 fps) pan view of impact				Zoom	60
2	Front ground level - impact view	6590	0	-1112	24	1000
3	Impact side 45° - forward pole view	4347	-2264	-1642	24	1000
4	Overhead Close-up view of impact	0	0	-5203	24	1000
5	Onboard - dummy front view				25	1000
6	Onboard - dummy side view				12.5	1000
7	Onboard - dummy rear oblique view				12.5	1000
8	Rear ground level - impact view	-7156	0	-1147	24	1000
9	Impact side 45° - rearward pole view	-2033	-4046	-1631	24	1000
10	Overhead wide - view of impact	-80	305	-5203	14	1000
11	Real-time (24 - 30 fps) - dummy front view				Zoom	60

Notes: Reference - From Point of Impact for X and Y; from Ground for Z
 +X = Forward of vehicle, +Y = Right of vehicle, +Z = Down
 * All measurements accurate to ± 6 mm. Vehicle is at a 75° angle to the rigid pole.

Comments: All cameras operated as intended.

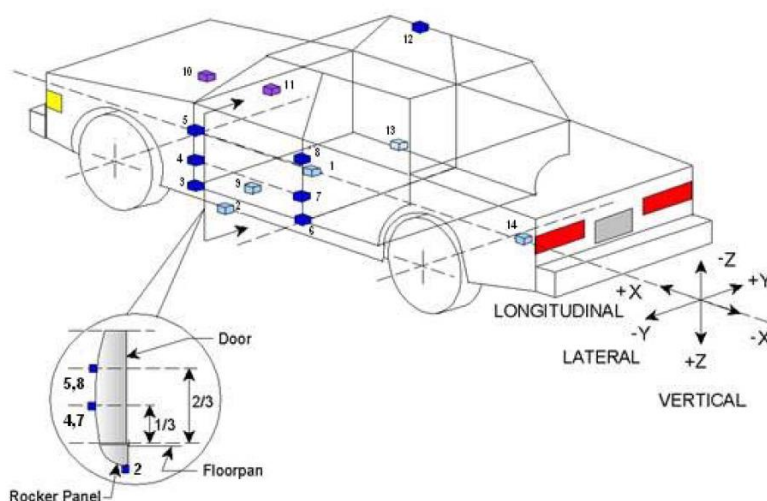
INSTRUMENTATION

Description	Number of Channels
Driver Dummy Channels	16
Vehicle Structure Accelerometers	18
Pole Load Cells	8
Total	42

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

Test Vehicle: 2016 Toyota Avalon four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20165106
 Test Date: 3/18/2016



TEST VEHICLE ACCELEROMETER LOCATIONS

No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2630	1	-110
2	Left Floor Sill	3191	-691	-229
3	A-Pillar Sill	3484	-643	-223
4	A-Pillar Low	3504	-639	-33
5	A-Pillar Mid	3425	-670	434
6	B-Pillar Sill	2427	-685	-211
7	B-Pillar Low	2395	-695	138
8	B-Pillar Mid	2347	-675	433
9	Driver Seat Track	2682	-560	-242
10	Engine Top	4284	-48	199
11	Firewall	3869	-74	284
12	Right Roof	2301	602	837
13	Right Floor Sill	3067	693	-224
14	Rear Floorpan	1198	7	-85

Reference: X – Rear surface of vehicle (+ forward)
 Y – Vehicle centerline (+ to right)
 Z – Ground plane (+ down)

DATA SHEET NO. 7
RIGID POLE LOAD CELL DATA

Test Vehicle: 2016 Toyota Avalon four door sedan
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20165106
Test Date: 3/18/2016

POLE BARRIER



RIGID POLE LOAD CELL LOCATIONS

ID	Units	Height From Ground
1	mm	200
2	mm	590
3	mm	750
4	mm	1075
5	mm	1260
6	mm	1740
7	mm	1920
8	mm	2300

**DATA SHEET NO. 8
POST-TEST OBSERVATIONS**

Test Vehicle: 2016 Toyota Avalon four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20165106
 Test Date: 3/18/2016

TEST DUMMY INFORMATION AND CONTACT POINTS

Dummy Body Part	Driver Seat Dummy (SID-IIs)
Face	Curtain Airbag
Top of Head	Curtain Airbag & Side Headliner
Left Side of Head	Side Curtain Airbag
Back of Head	Curtain Airbag, Driver Headrest, Driver Seat
Left Shoulder	Torso/Pelvis Airbag, Seatback
Upper Torso	Torso/Pelvis Airbag, Seatback
Lower Torso	Seatback
Left Hip	Torso/Pelvis Airbag, Seatpan
Left Knee	Driver's Door

POST-TEST DOOR PERFORMANCE

Description	Struck Side		Non-Struck Side		Rear Hatch/ Other
	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, Width of Opening at Striker (mm)	0	0	0	0	0

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

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

Test Vehicle: 2016 Toyota Avalon four door sedan
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20165106
Test Date: 3/18/2016

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	A-Pillar Buckled
Sill Separation	None
Windshield Damage	Front Windshield separated along A-Pillar
Side Window Damage	Driver window cracked throughout
Other Notable Effects	None

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 Airbag 1 - Curtain	Yes	Yes	Yes	Yes
Side Airbag 2 – Torso/Pelvis	Yes	Yes	Yes	Yes
Seat Belt Pretensioner	Yes	Yes	No	N/A
Seat Belt Load Limiter	Yes	Yes	No	N/A
Other				

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

Measured Parameter	Units	Tolerance	Value
Vertical Impact Ref Line - Aft of Front Axle, Intended Impact Pt	mm		1106
Actual Impact Point - Aft of Front Axle	mm		1103
Horizontal Offset (+ forward / - rearward)	mm	+/- 38 *	+3
Angle Between Vehicle's Longitudinal Centerline and Line of Forward Motion	deg	75 +/- 3	75.0
Trap No. 1 Velocity - Primary	kph	31.4 to 33.0	32.52
Trap No. 2 Velocity - Redundant	kph	31.4 to 33.0	32.54

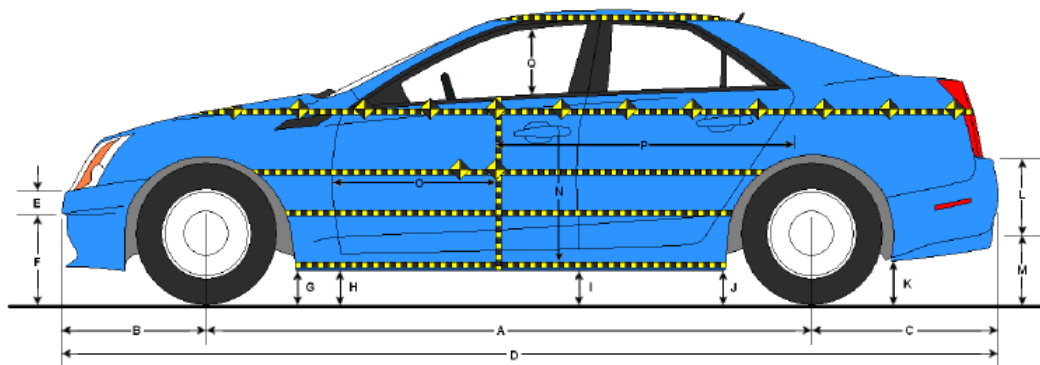
* Of Intended Impact Point

** Speed Determined from video analysis

DATA SHEET NO. 9
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2016 Toyota Avalon four door sedan
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20165106
Test Date: 3/18/2016



LEFT SIDE VIEW

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

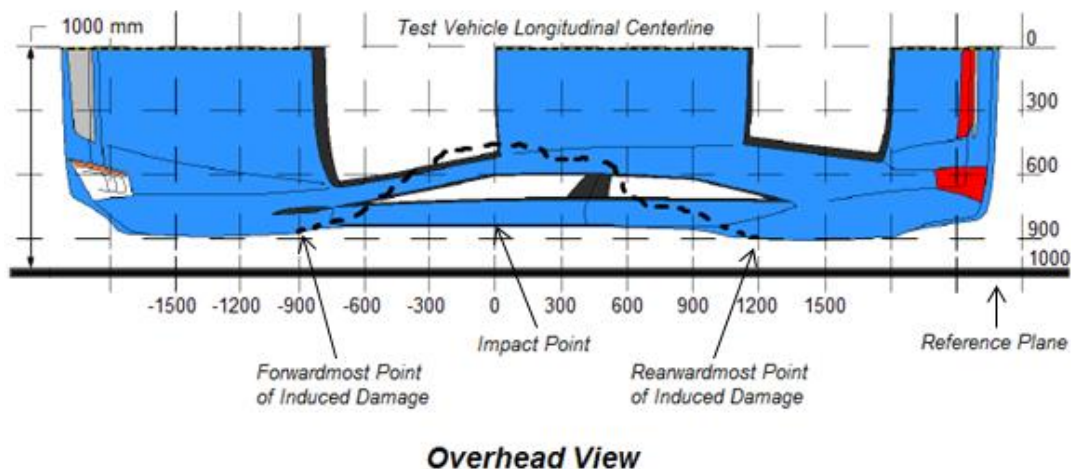
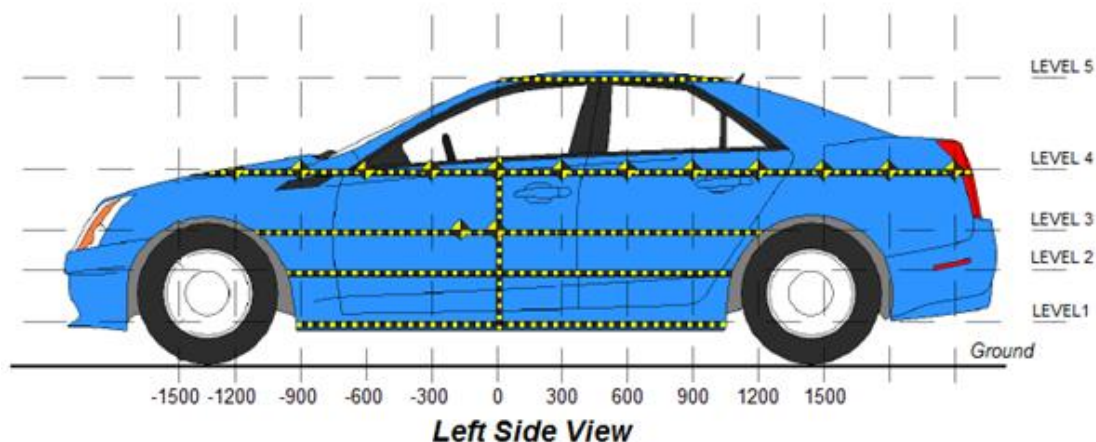
Code	Description	Pre-Test	Post-Test	Difference
A	Vehicle Wheelbase	2812	2694	118
B	Front Axle to FSOV	993	1063	-71
C	Rear Axle to RSOV	1163	1167	-4
D	Total Length at Centerline	4967	4923	44
E	Front Bumper Thickness	140	140	0
F	Front Bumper Bottom to Ground	416	445	-29
G	Sill Height at Front Wheel Well	170	159	11
H	Sill Height at Front Door Leading Edge	175	168	7
I	Sill Height at B-Pillar	198	228	-30
J1	Sill Height at Rear Wheel Well	190	216	-26
J2	Pinch Weld Height at Rear Wheel Well	209	233	-24
K	Sill Height Aft of Rear Wheel Well	233	232	1
L	Rear Bumper Thickness	155	155	0
M	Rear Bumper Bottom to Ground	471	455	16
N	Sill Height to Bottom of Front Window Sill	717	720	-2
O	Front Door Leading Edge to Impact CL	656	554	102
P	Rear Door Trailing Edge to Impact CL	1598	1512	86
Q	Front Window Opening	363	359	4
R	Right Side Length	4846	4832	13
S	Left Side Length	4844	4763	81
T	Vehicle Width at B-Pillars	1833	1738	95

* All measurements in mm with tolerance of $\pm 3\text{mm}$

DATA SHEET NO. 10
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2016 Toyota Avalon four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20165106
 Test Date: 3/18/2016



MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Units	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	mm	296	314	0
2	Occupant Hip Point	mm	590	384	0
3	Mid - Door	mm	646	387	0
4	Window Sill	mm	916	345	0
5	Window Top	mm	1399	116	0

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

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

Test Vehicle: 2016 Toyota Avalon four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20165106
 Test Date: 3/18/2016

EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

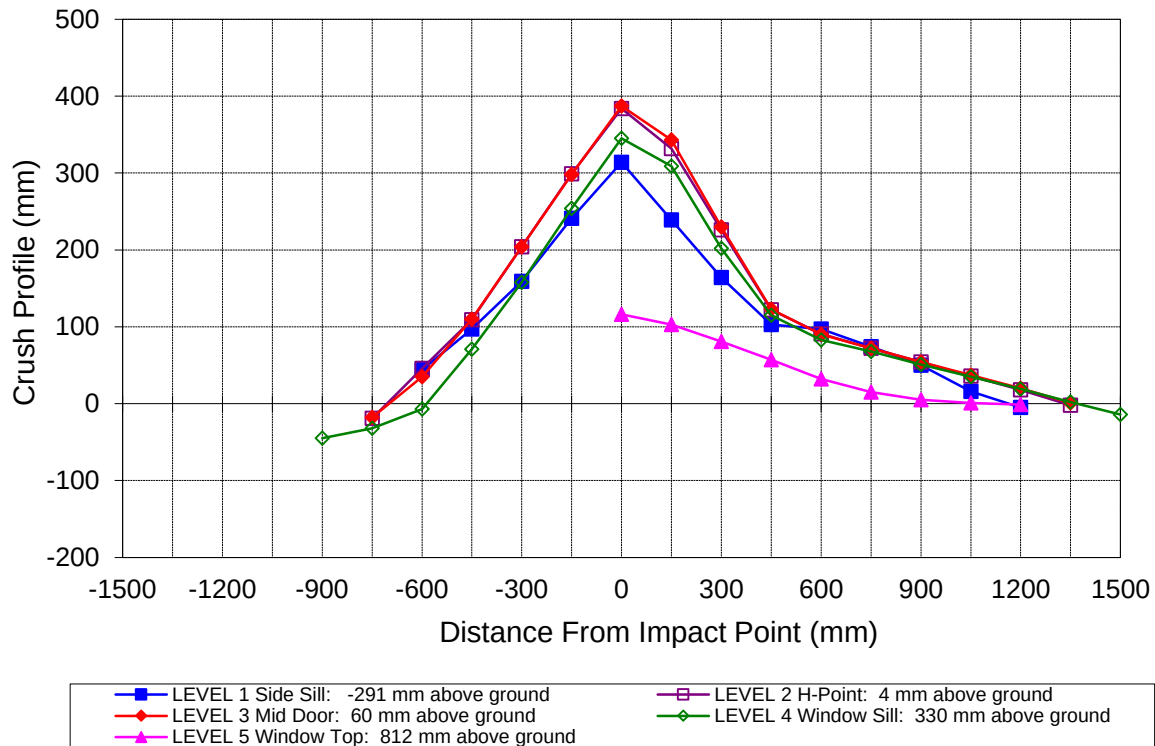
	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-1500															
-1350															
-1200															
-1050															
-900				809					854					-45	
-750		918	913	823			937	931	855			-19	-18	-32	
-600	880	909	908	834		836	863	873	841		44	46	35	-7	
-450	864	910	912	842		767	801	802	771		97	109	110	71	
-300	860	911	914	850		701	707	710	692		159	204	204	158	
-150	856	912	915	859		615	613	617	605		241	299	298	254	
0	854	913	916	868	572	540	529	529	523	456	314	384	387	345	116
150	853	913	916	876	617	614	581	573	567	514	239	332	343	309	103
300	853	914	917	879	625	689	688	687	677	544	164	226	230	202	81
450	853	914	916	880	629	750	792	793	765	572	103	122	123	115	57
600	852	912	915	881	629	755	821	825	798	597	97	91	90	83	32
750	851	910	913	881	629	777	838	841	813	614	74	72	72	68	15
900	851	908	910	879	626	801	854	856	828	621	50	54	54	51	5
1050	852	905	907	878	621	836	869	870	843	620	16	36	37	35	1
1200	866	905	906	876	607	871	887	886	857	608	-5	18	20	19	-1
1350		911	912	887			913	911	885			-2	1	2	
1500				882					896					-14	

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

Test Vehicle: 2016 Toyota Avalon four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20165106
 Test Date: 3/18/2016



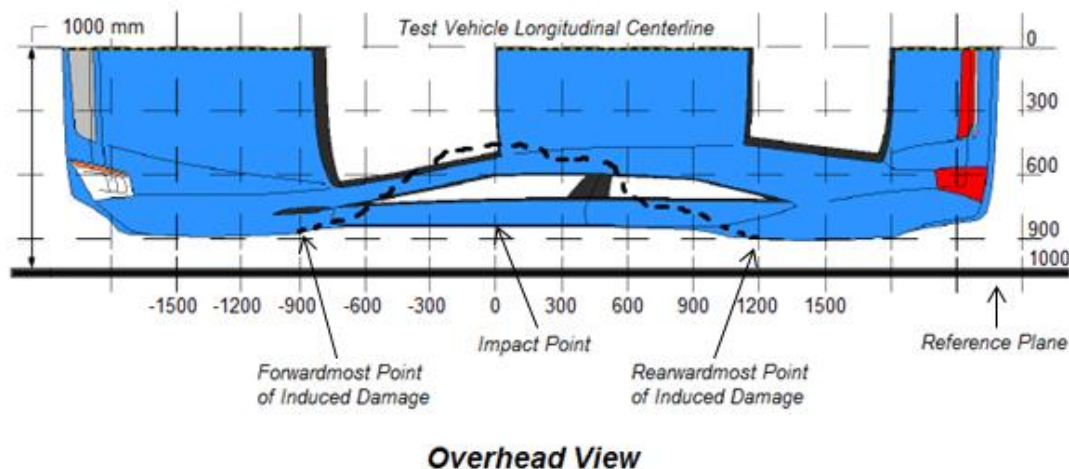
Vehicle Exterior Crush Measurements - Visual Representation

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

Test Vehicle: 2016 Toyota Avalon four door sedan
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20165106
 Test Date: 3/18/2016

For guidance regarding damage profile distance measurements, please refer to the latest version of the *NHTSA Test Reference Guide, Volume 1: Vehicle Tests*.



VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance From Impact Point (mm)	Level	Post-Test (mm)	Pre-Test (mm)	Crush (mm)
1	-750	3	69	87	-18
2	-330	3	272	86	186
3	90	3	445	84	361
4	510	3	194	84	110
5	930	3	141	91	50
6	1350	3	89	88	1

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

Test Vehicle:	<u>2016 Toyota Avalon four door sedan</u>	NHTSA No.:	<u>M20165106</u>
Test Program:	<u>NCAP Side MDB Impact Test</u>	Test Date:	<u>3/18/2016</u>
Test Time:	<u>11:50 AM</u>	Temperature:	<u>21° C</u>

- A. From impact until vehicle motion ceases: 0 oz.
 (Maximum allowable is 1 oz.)
- B. For the 5-minute period after motion ceases: 0 oz.
 (Maximum allowable is 5 oz.)
- C. For the following 25 minutes: 0 oz.
 (Maximum allowable is 1 oz./minute)
- D. Spillage Details: No Spillage Occurred

FMVSS NO. 301 STATIC ROLLOVER DATA



ROLLOVER SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	73	300	373
90° to 180°	64	300	364
180° to 270°	62	300	362
270° to 360°	68	300	368

FMVSS NO. 301 ROLLOVER SPILLAGE TABLE

Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth 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

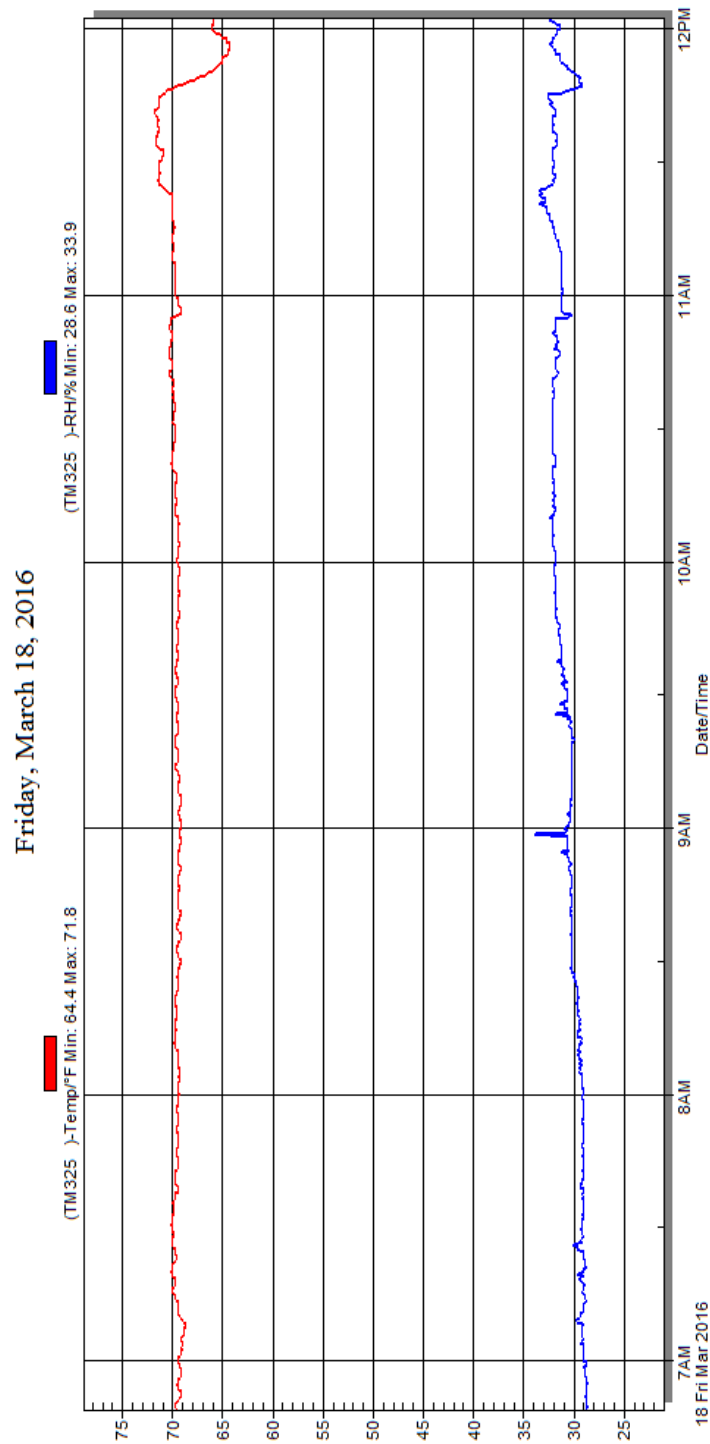
ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

Test Phase	Spillage Location
0° to 90°	No Spillage Occurred
90° to 180°	No Spillage Occurred
180° to 270°	No Spillage Occurred
270° to 360°	No Spillage Occurred

DATA SHEET NO. 13
DUMMY / VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION DATA

Test Vehicle: 2016 Toyota Avalon four door sedan
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20165106
Test Date: 3/18/2016



Temperature and Humidity Stabilization Chart / Data for Dummies and Test Vehicle

APPENDIX A
PHOTOGRAPHS

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Figure A-1: As Delivered Right Front $\frac{3}{4}$ View of Test Vehicle



Figure A-2: As Delivered Left Rear $\frac{3}{4}$ View of Test Vehicle



Figure A-3: Pre-Test Frontal View of Test Vehicle

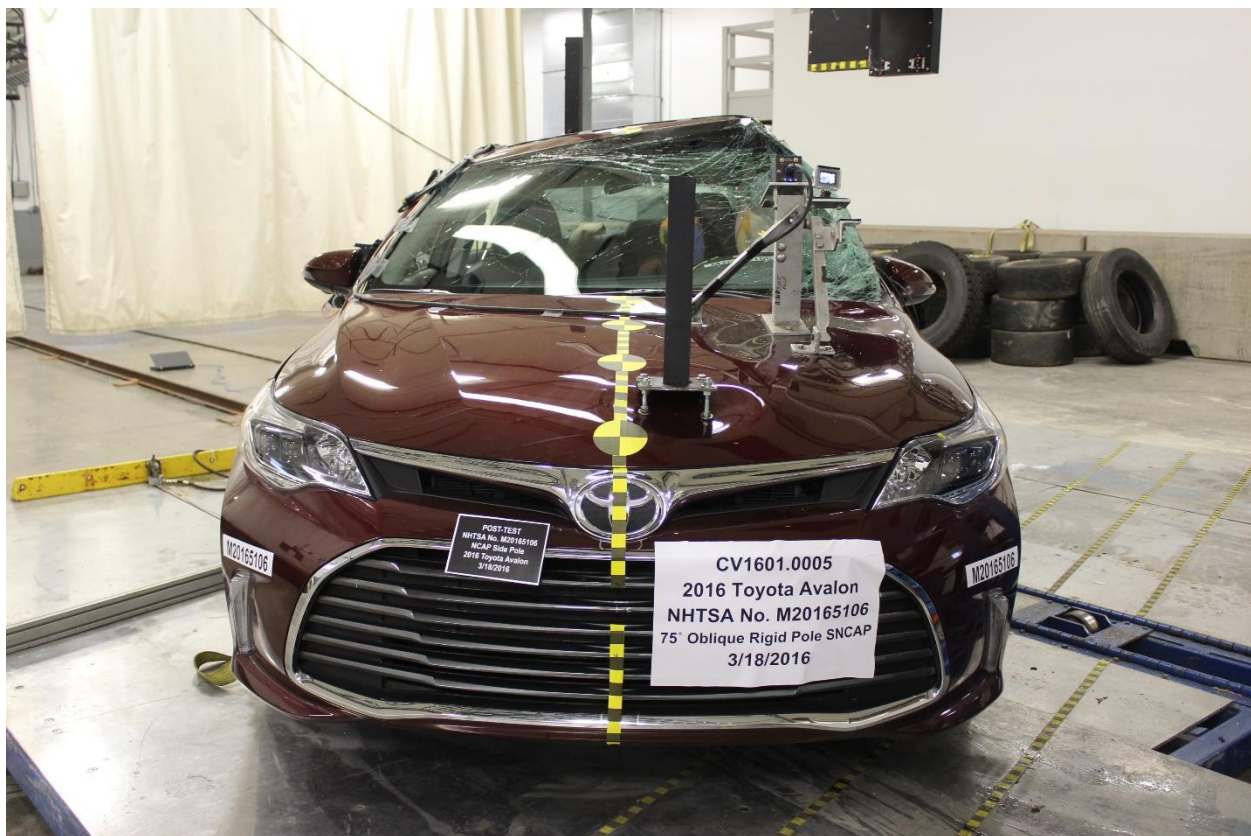


Figure A-4: Post-Test Frontal View of Test Vehicle



Figure A-5: Pre-Test Left Front $\frac{3}{4}$ View of Test Vehicle



Figure A-6: Post-Test Left Front $\frac{3}{4}$ View of Test Vehicle



Figure A-7: Pre-Test Left Side View of Test Vehicle



Figure A-8: Post-Test Left Side View of Test Vehicle



Figure A-9: Pre-Test Left Rear $\frac{3}{4}$ View of Test Vehicle



Figure A-10: Post-Test Left Rear $\frac{3}{4}$ View of Test Vehicle



Figure A-11: Pre-Test Rear View of Test Vehicle



Figure A-12: Post-Test Rear View of Test Vehicle



Figure A-13: Pre-Test Right Side View of Test Vehicle



Figure A-14: Post-Test Right Side View of Test Vehicle



Figure A-15: Pre-Test Overhead View of Test Area

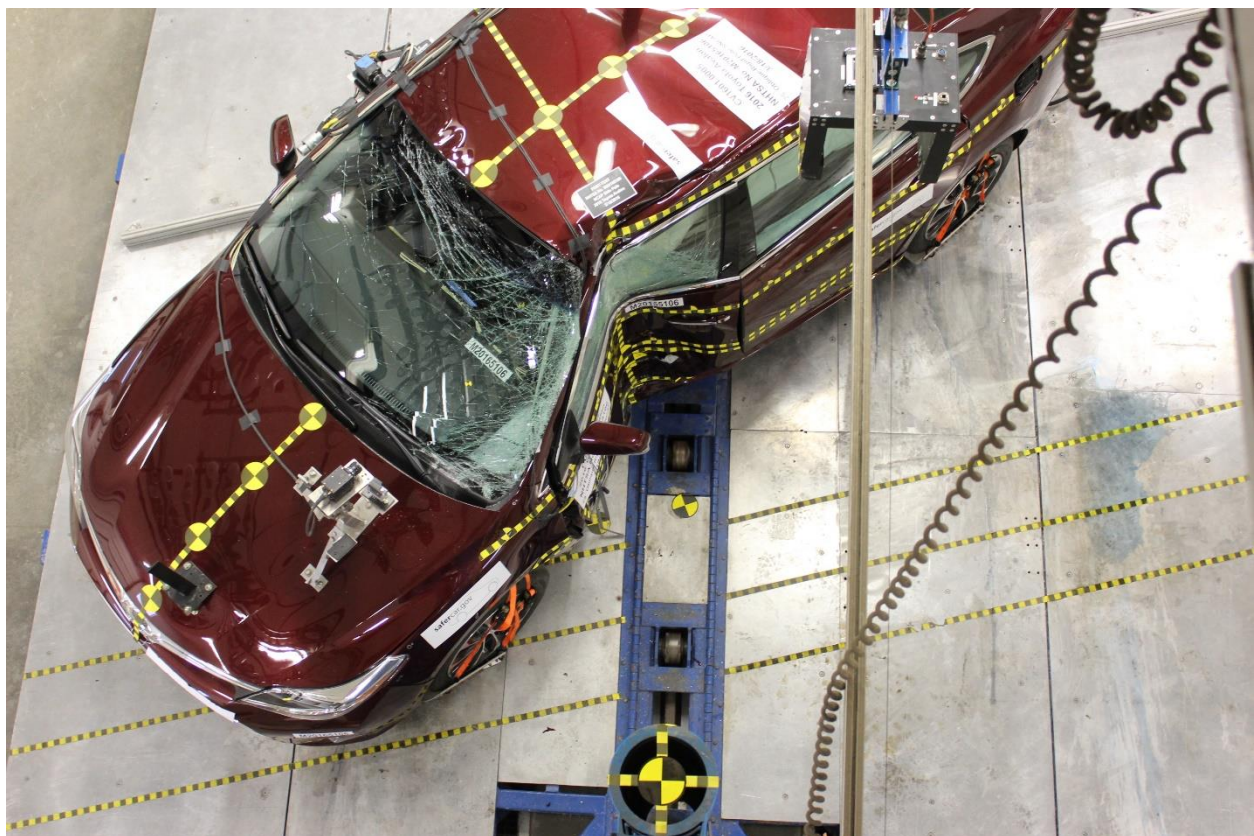


Figure A-16: Post-Test Overhead View of Test Area

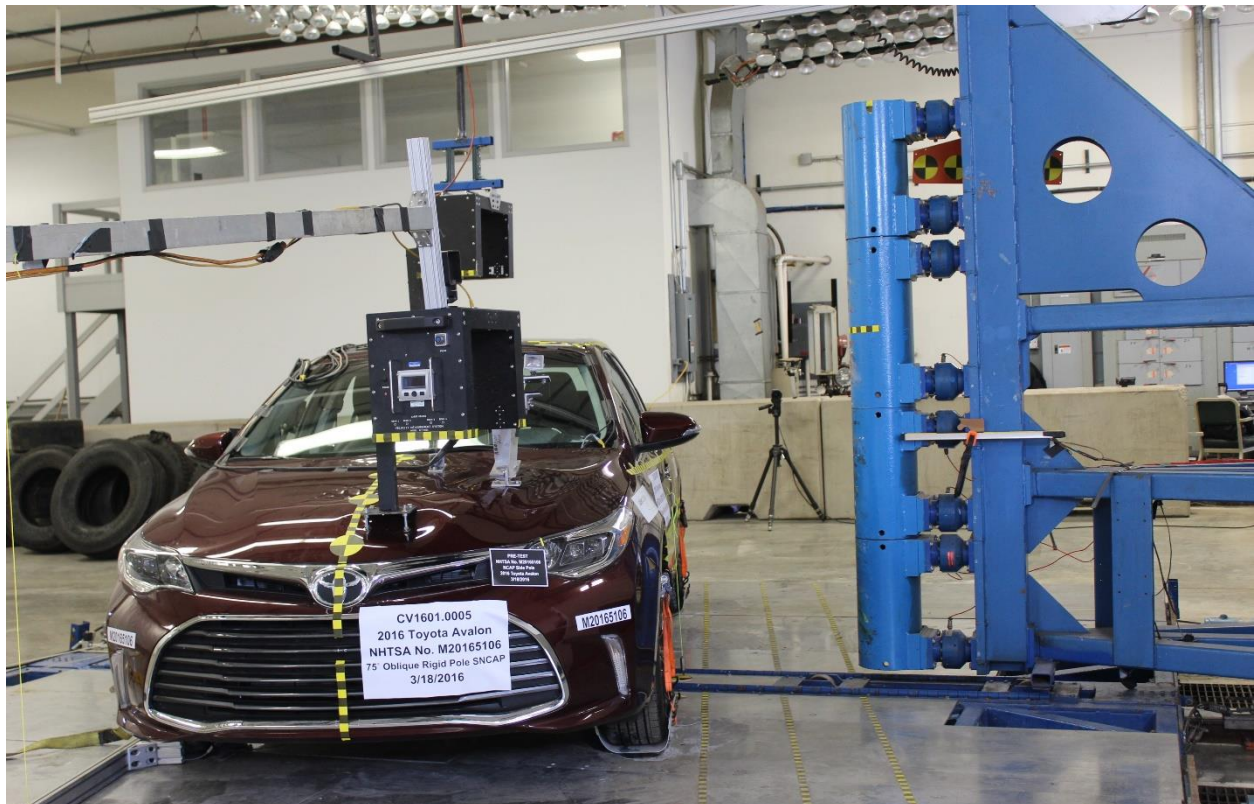


Figure A-17: Pre-Test Left Side View of Pole Positioned Against Side of Vehicle



Figure A-18: Pre-Test Right Side View of Pole Positioned Against Side of Vehicle



Figure A-19: Pre-Test Close-Up View of Impact Point Target



Figure A-20: Post-Test Close-Up View of Impact Point Target Showing Impact Location

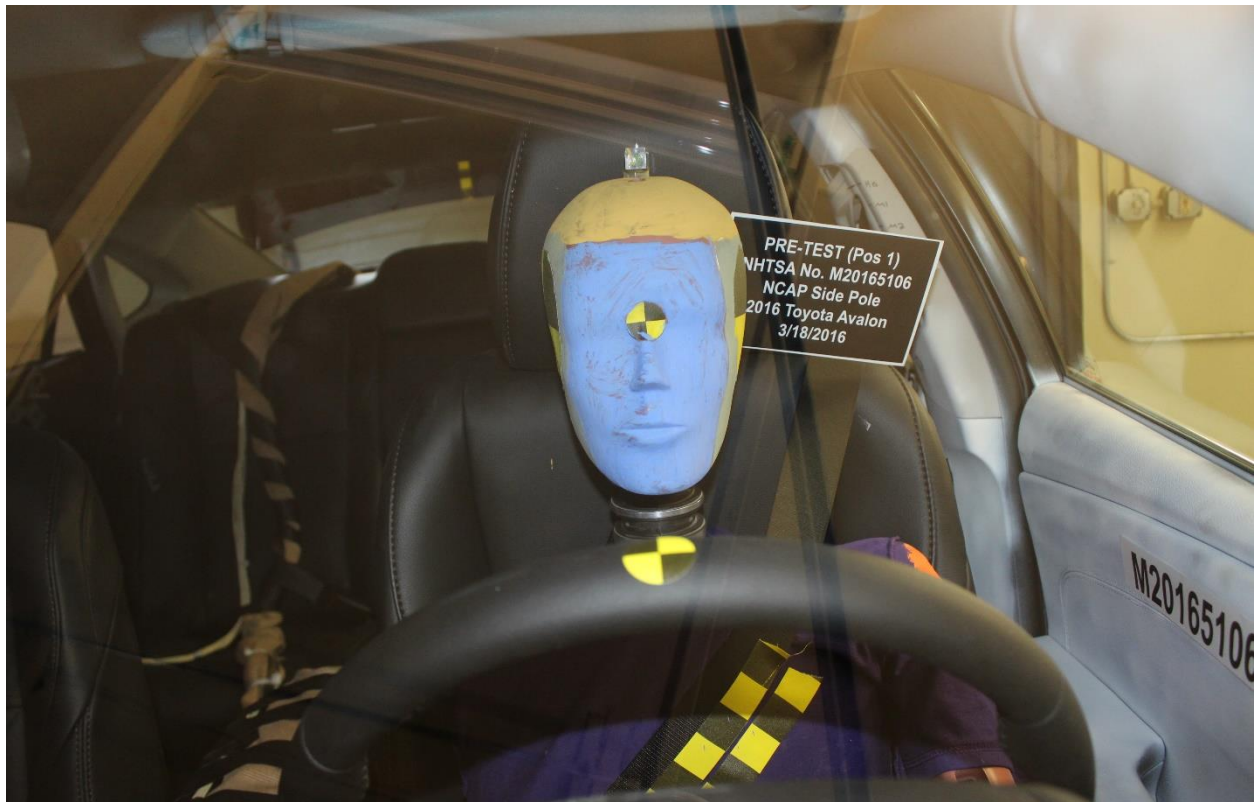


Figure A-21: Pre-Test Front Close-Up View of Dummy Head and Chest



Figure A-22: Post-Test Front Close-Up View of Dummy



Figure A-23: Pre-Test Left Side View of Dummy Showing Belt and Chalking



Figure A-24: Pre-Test Left Side View of Dummy Shoulder and Door Top View



Figure A-25: Post-Test Left Side View of Dummy Shoulder and Door Top View



Figure A-26: Pre-Test Frontal View of Seat Back Prior to Dummy Positioning

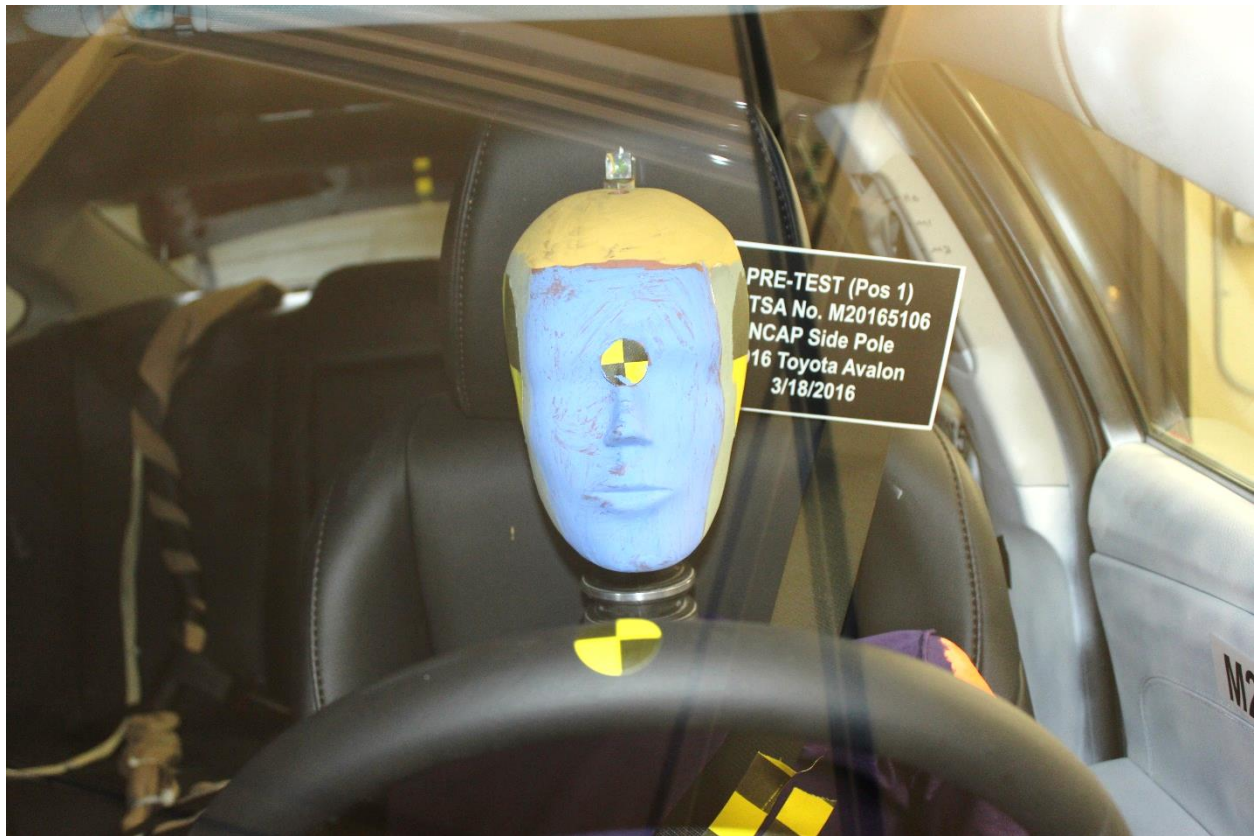


Figure A-27: Pre-Test Frontal Close-Up View of Dummy Head / Shoulders in Relation to Head Restraint



Figure A-28: Pre-Test Frontal View of Seat Pan Prior to Dummy Positioning

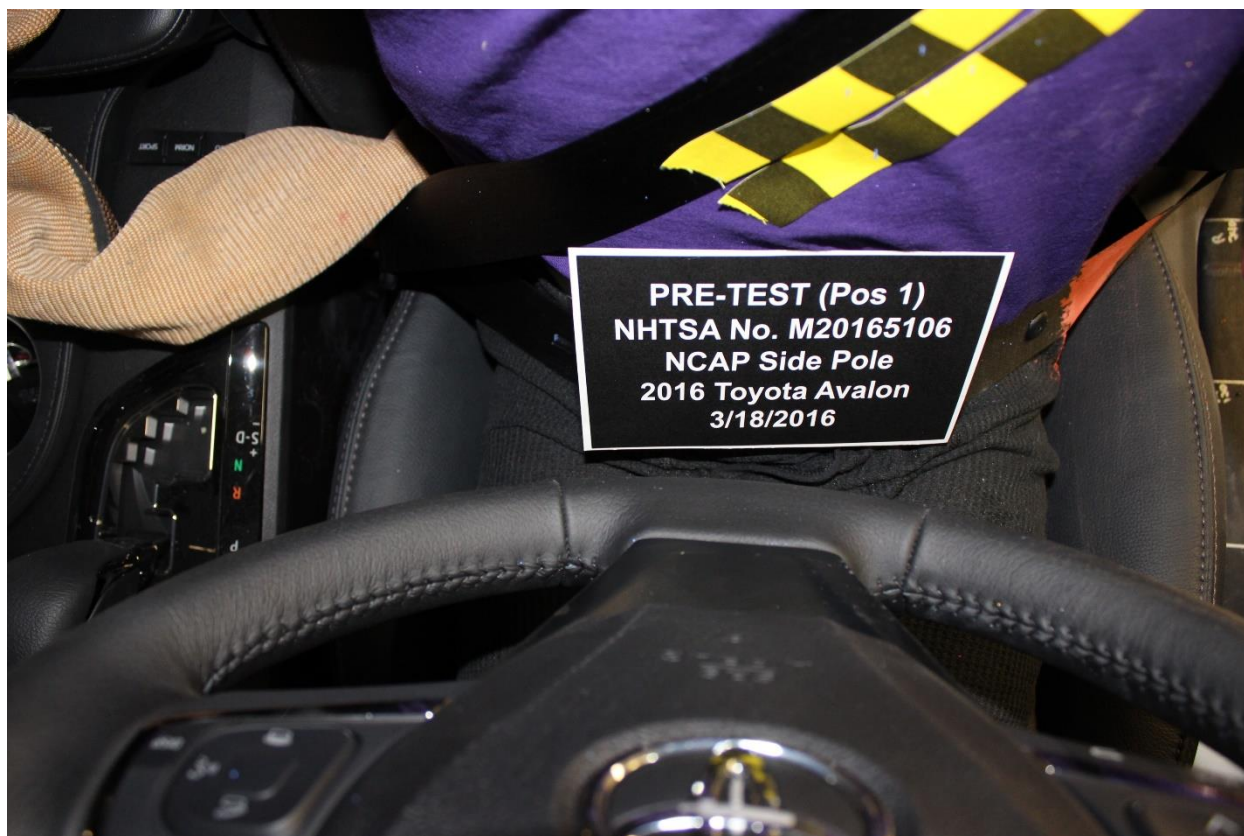


Figure A-29: Pre-Test Overhead View of Dummy Thighs on Seat Pan

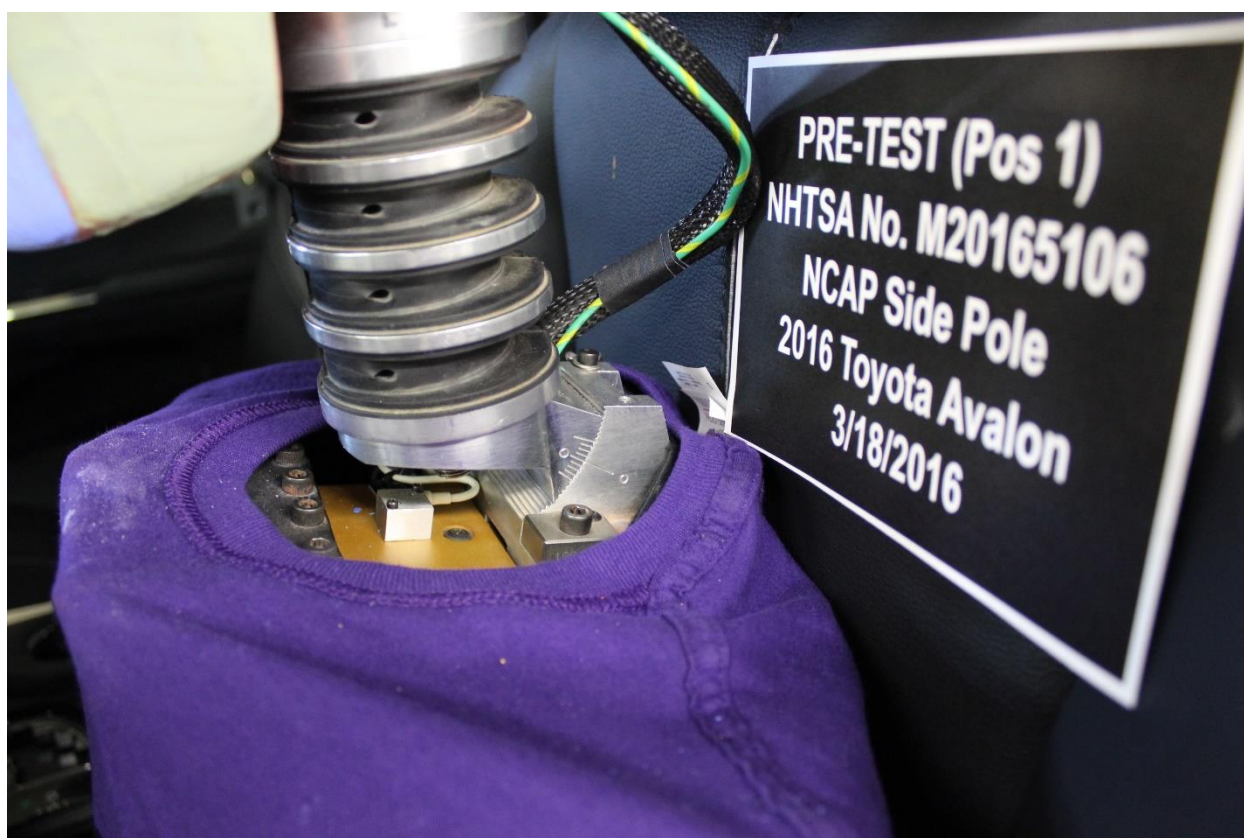


Figure A-30: Pre-Test Left Side View of Dummy's Neck Showing Position of Adjustable Neck Bracket



Figure A-31: Pre-Test Left Side View of Dummy's Head Showing Dummy's Head is Level



Figure A-32: Pre-Test Placement of Dummy's Feet

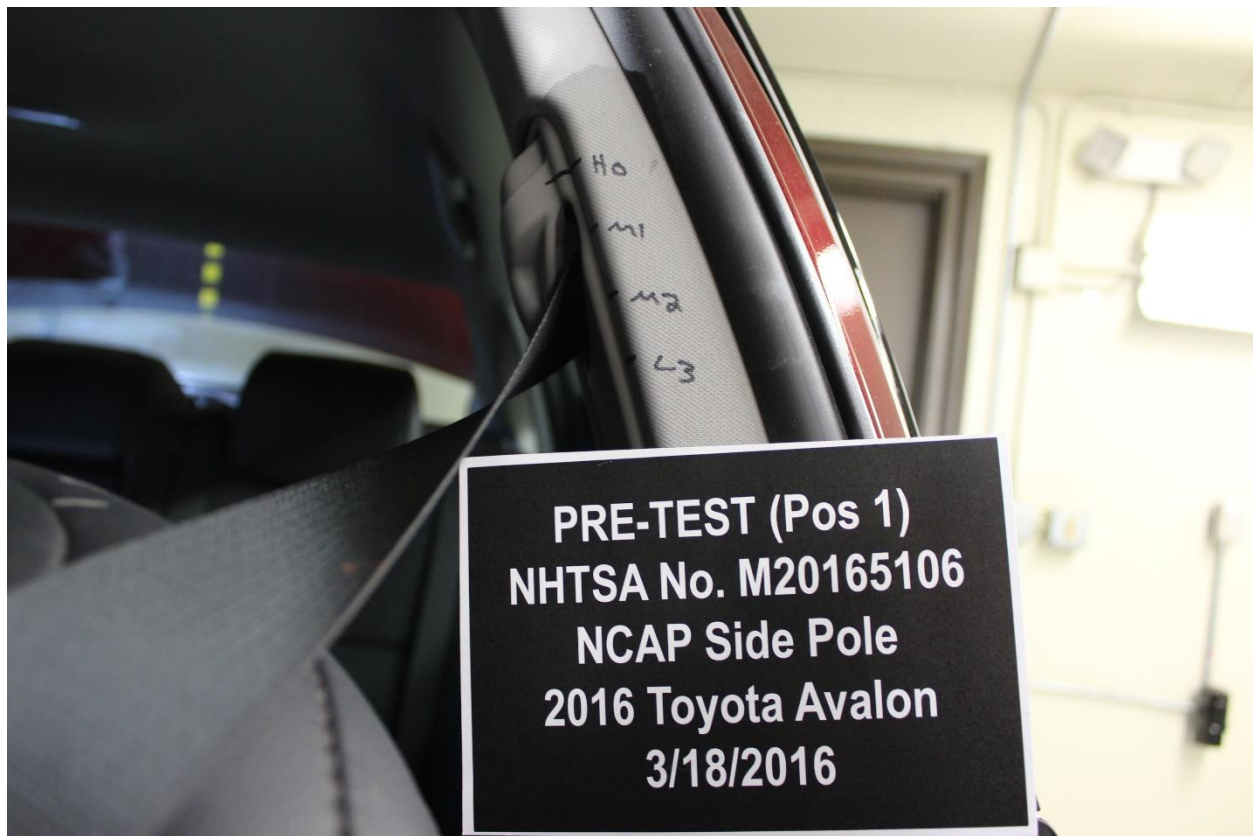


Figure A-33: Pre-Test View of Belt Anchorage for Dummy



Figure A-34: Pre-Test Left Side View of Steering Wheel



Figure A-35: Pre-Test View of Disengaged Parking Brake



Figure A-36: Pre-Test View of Parking Brake



Figure A-37: Pre-Test Close-Up Left Side View of Driver Seat Track

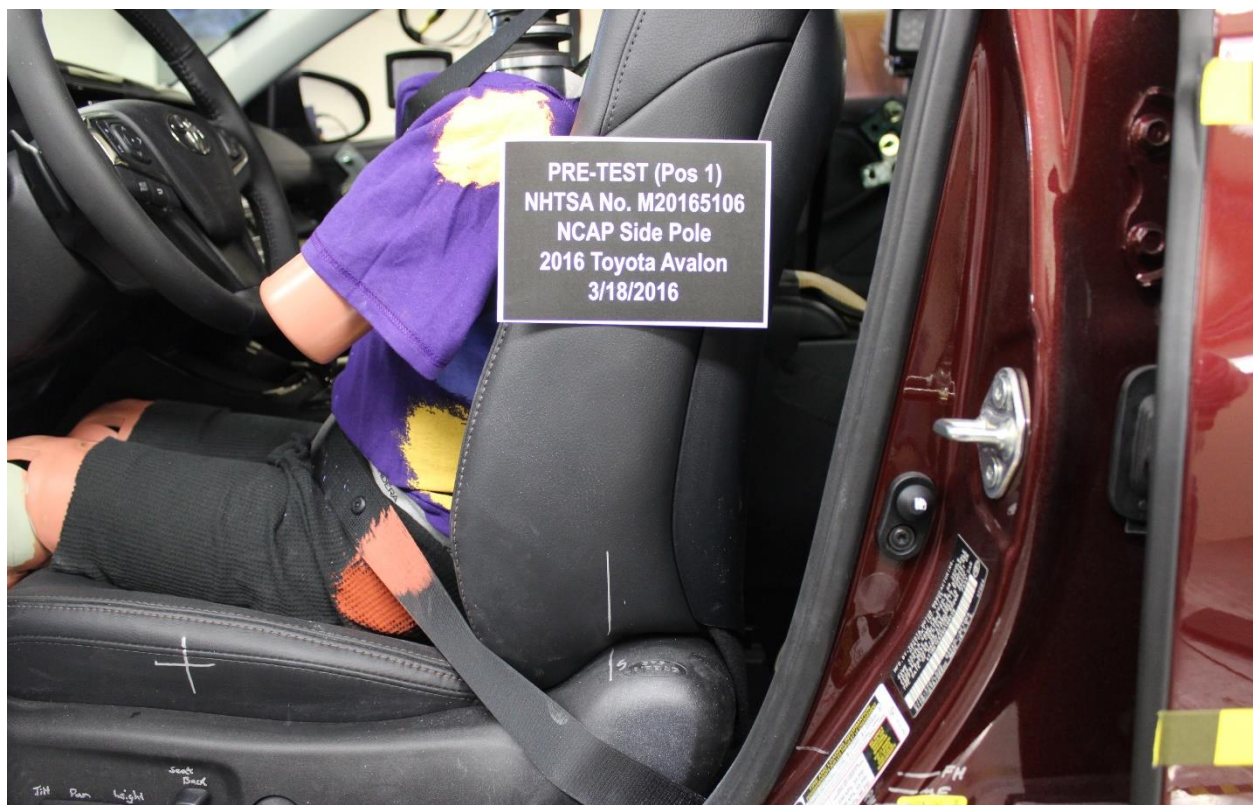


Figure A-38: Pre-Test Close-Up Left Side View of Driver Seat Back



Figure A-39: Pre-Test Close-Up View of Driver Seat Back or Head Restraint



Figure A-40: Pre-Test Dummy and Door Clearance View



Figure A-41: Post-Test Dummy and Door Clearance View



Figure A-42: Pre-Test Right Side View of Dummy and Front Seat of Occupant Compartment



Figure A-43: Post-Test Right Side View of Dummy and Front Seat of Occupant Compartment

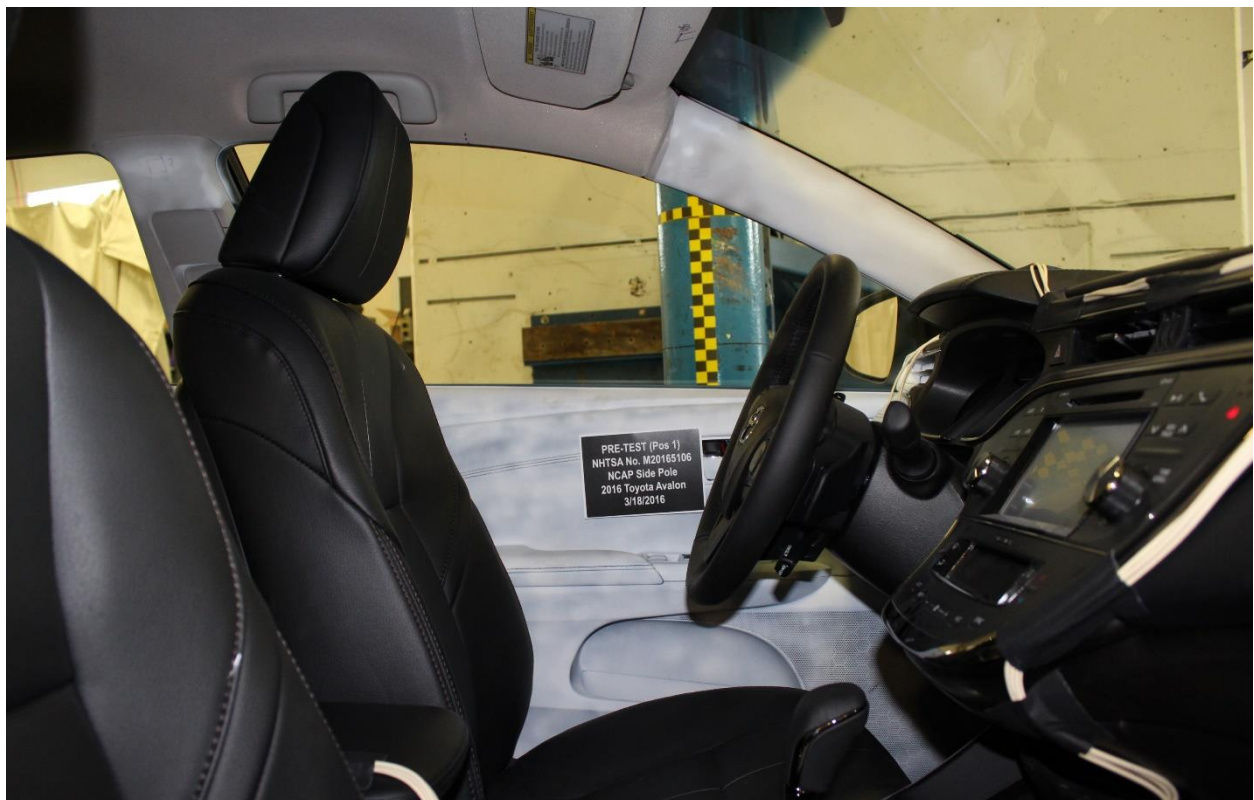


Figure A-44: Pre-Test Inner Door Panel View



Figure A-45: Post-Test Inner Door Panel View Showing Dummy Contact Location



Figure A-46: Post-Test Dummy Close-Up Head Contact with Vehicle Interior View



Figure A-47: Post-Test Dummy Close-Up Head Contact with Side Airbag View



Figure A-48: Post-Test Dummy Close-Up Torso Contact with Vehicle Interior View



Figure A-49: Post-Test Dummy Close-Up Torso Contact with Side Airbag View



Figure A-50: Post-Test Dummy Close-Up Pelvis Contact with Vehicle Interior View

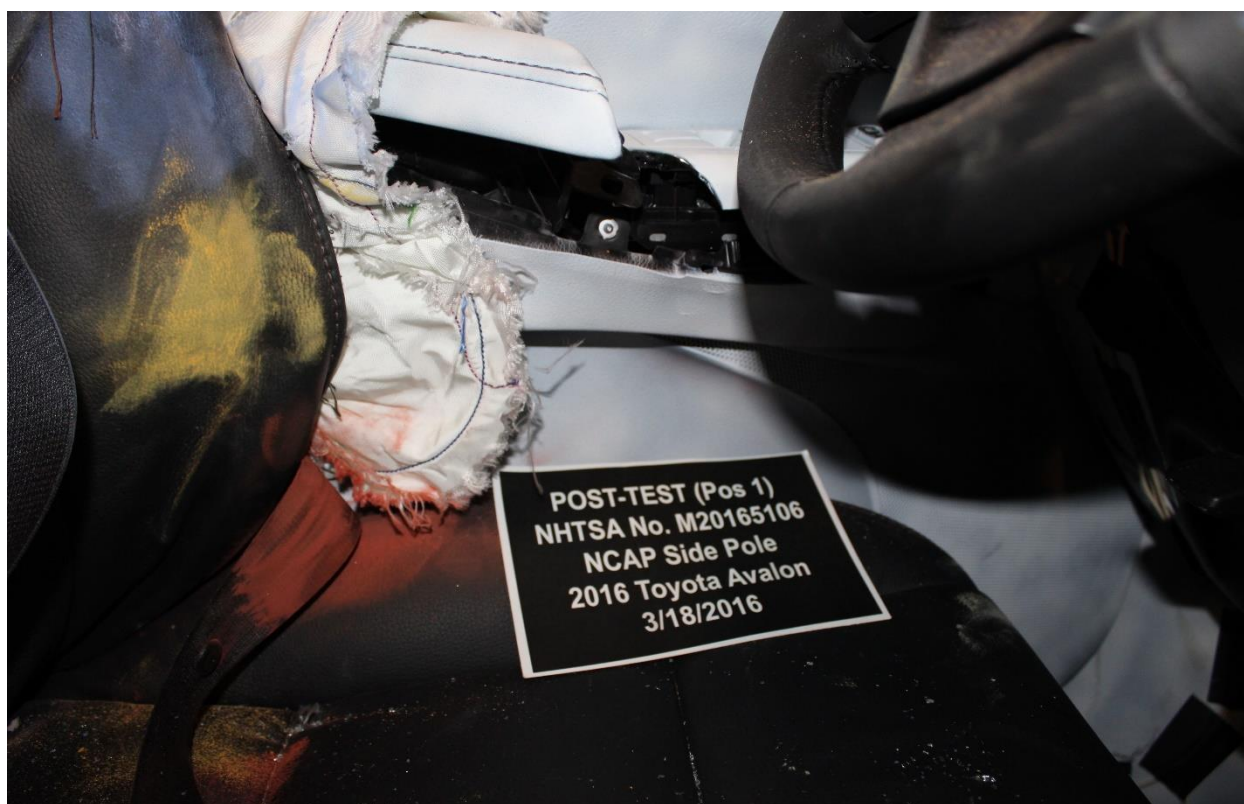


Figure A-51: Post-Test Dummy Close-Up Pelvis Contact with Side Airbag View

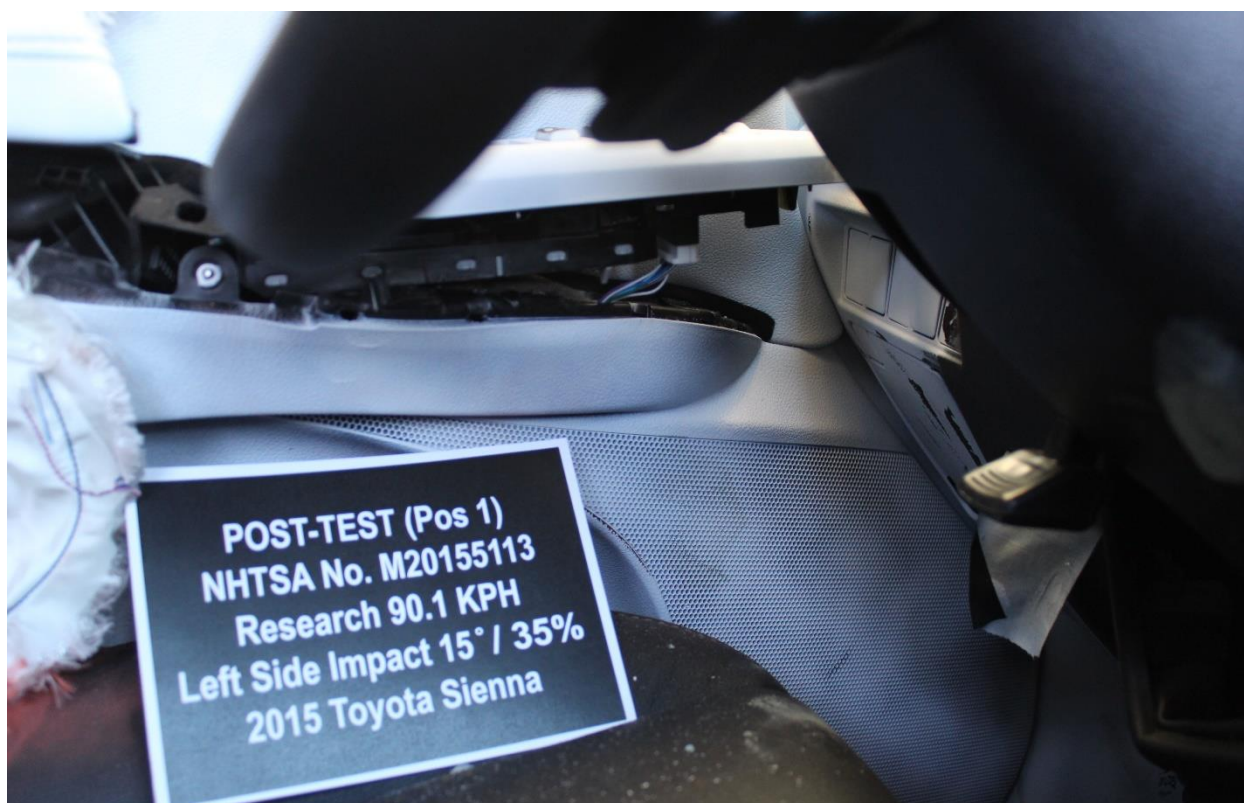


Figure A-52: Post-Test Dummy Close-Up Knee Contact with Vehicle Interior View



Figure A-53: Pre-Test View of Fuel Filler Cap or Fuel Filler Neck

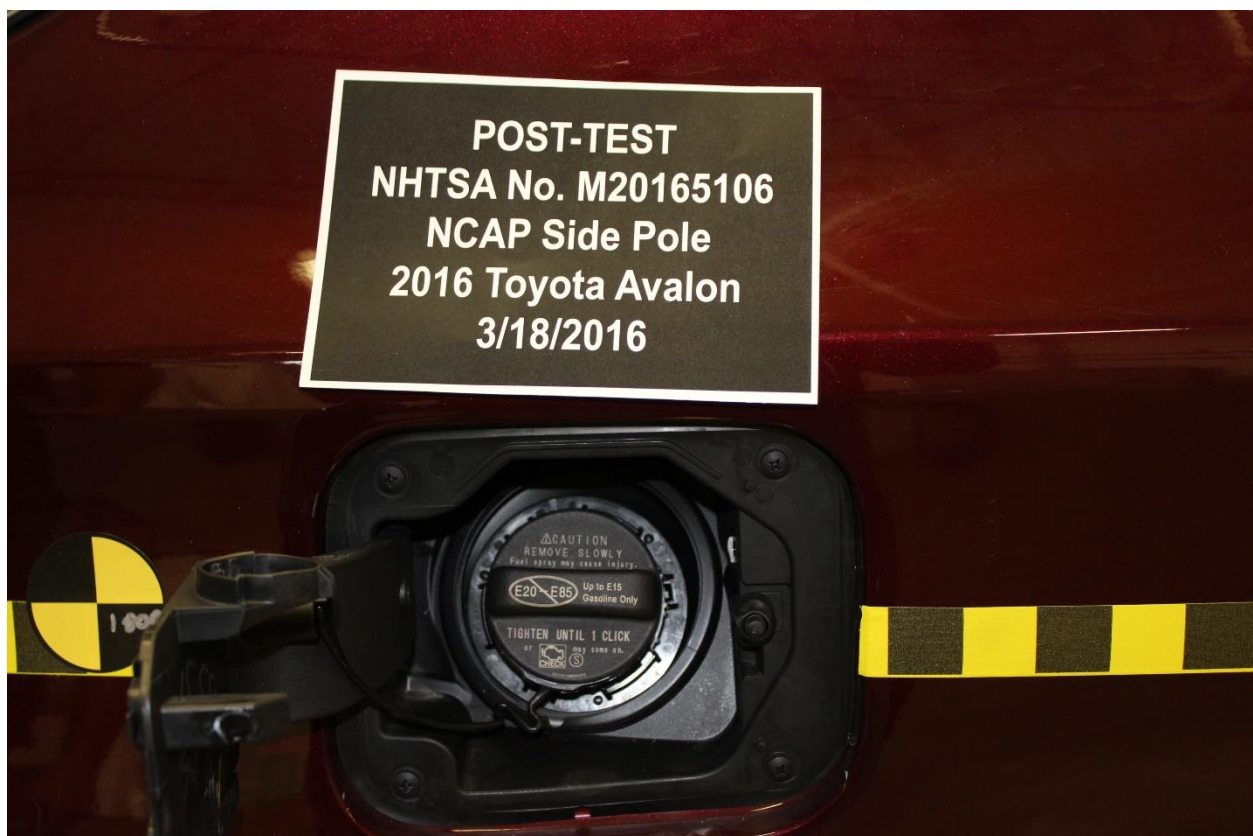
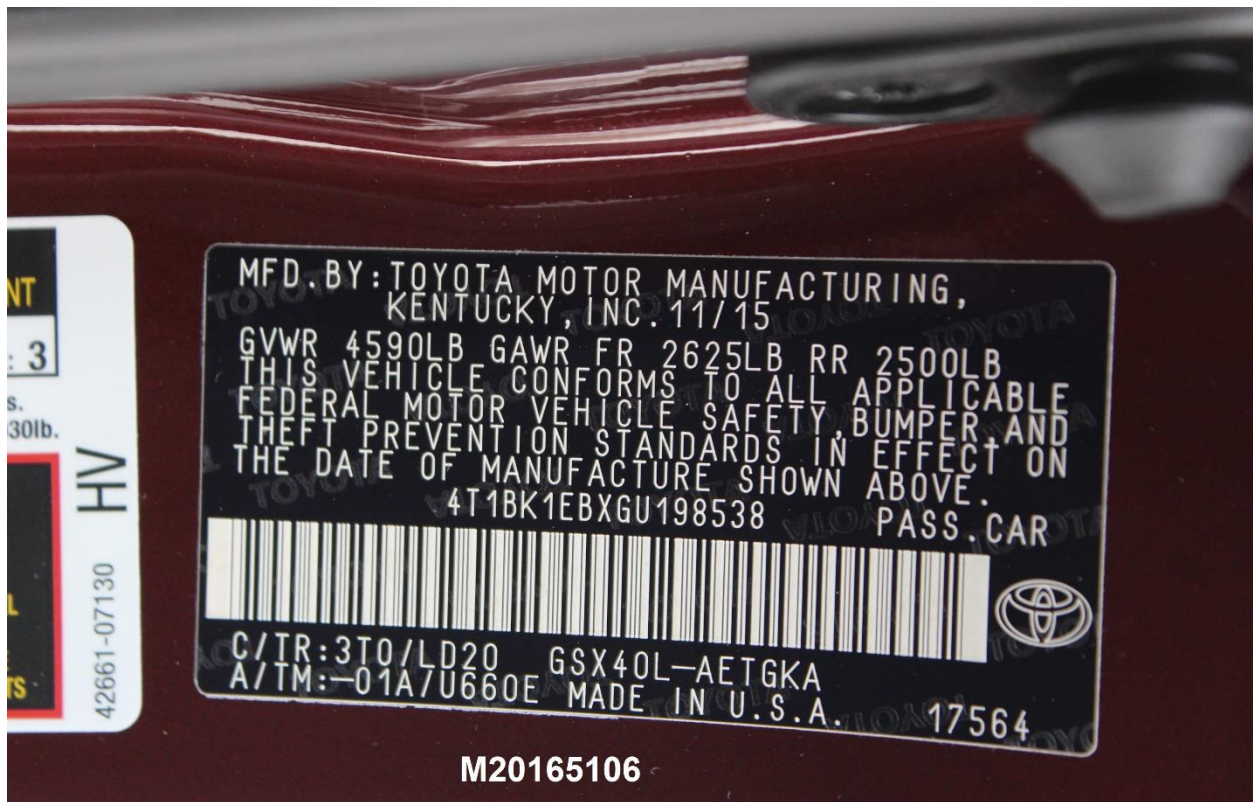


Figure A-54: Post-Test View of Fuel Filler Cap or Fuel Filler Neck



M20165106

Figure A-55: Close-Up View of Vehicle's Certification Label



Figure A-55a: Close-Up View of Reduced Load Capacity Label



Figure A-56: Close-Up View of Vehicle's Tire Information Placard or Label



Figure A-57: Pre-Test Pole Barrier Front View

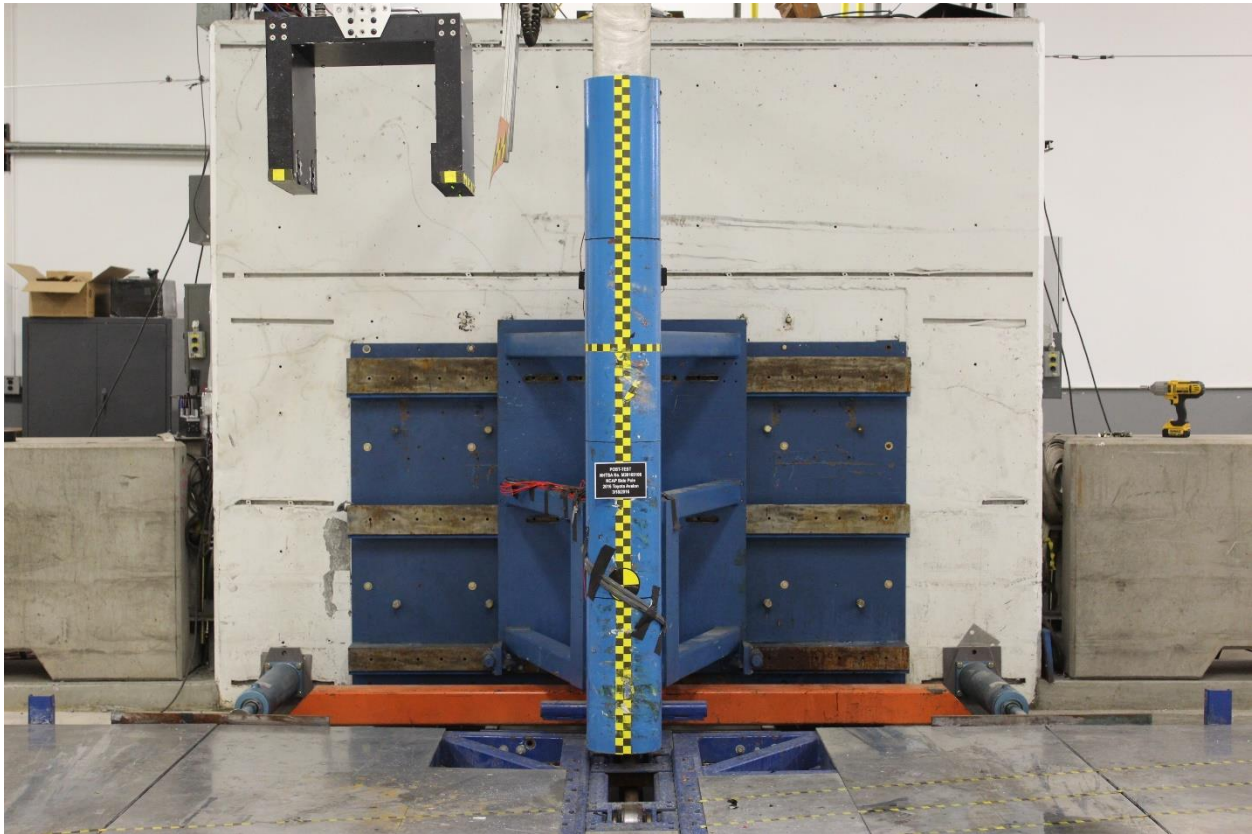


Figure A-58: Post-Test Pole Barrier Front View

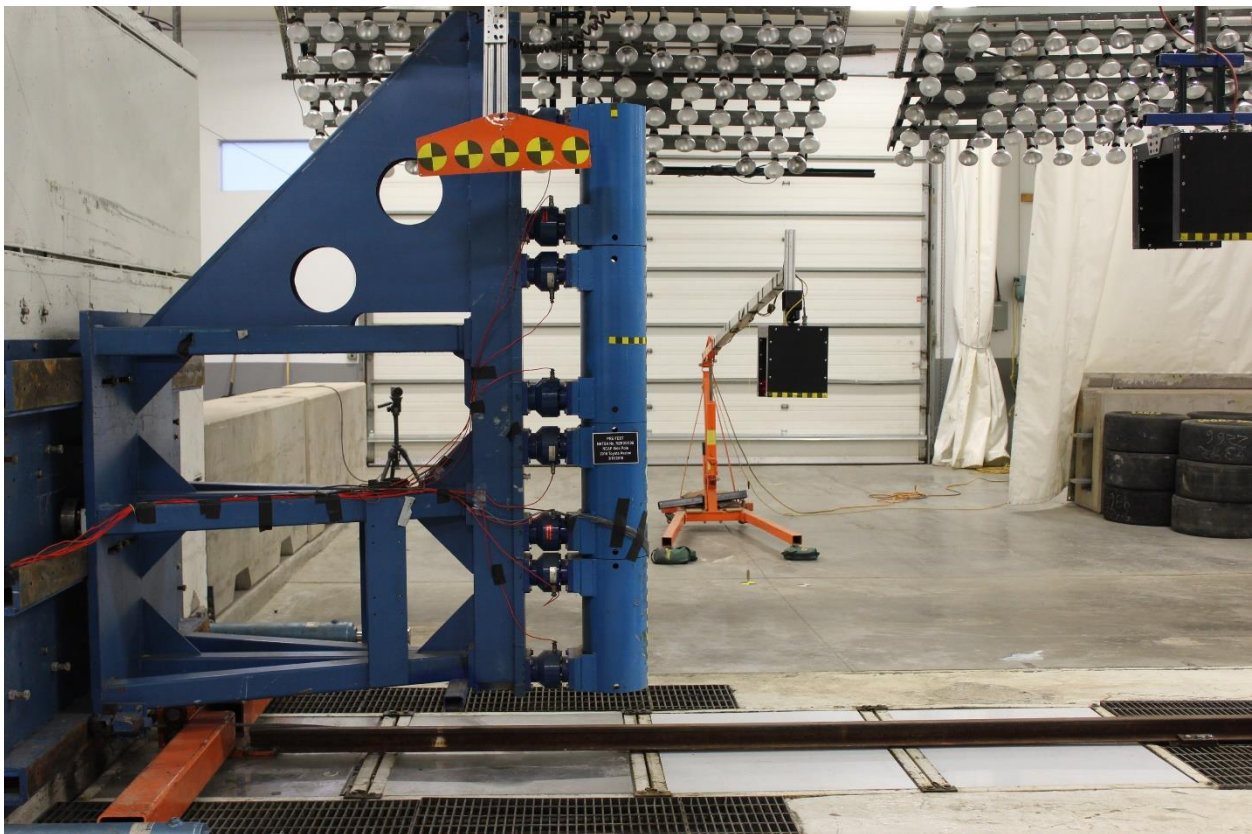


Figure A-59: Pre-Test Pole Barrier Side View



Figure A-60: Post-Test Pole Barrier Side View

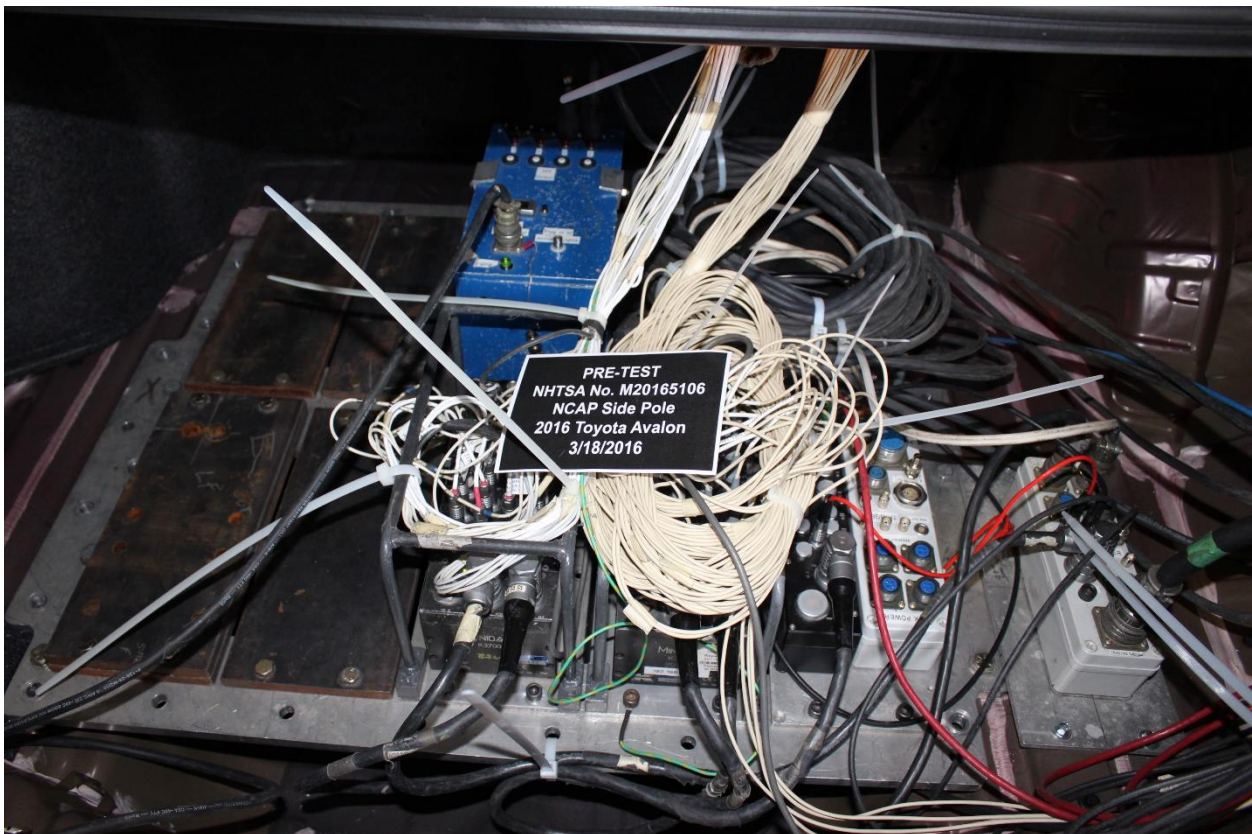


Figure A-61: Pre-Test Ballast View



Figure A-62: Post-Test Primary and Redundant Speed Trap Read-Out



Figure A-63: FMVSS No. 301 Static Rollover 0 Degrees



Figure A-64: FMVSS No. 301 Static Rollover 90 Degrees



Figure A-65: FMVSS No. 301 Static Rollover 180 Degrees



Figure A-66: FMVSS No. 301 Static Rollover 270 Degrees



Figure A-67: FMVSS No. 301 Static Rollover 360 Degrees



Figure A-68: Impact Event

TOYOTA
Let's Go Places

DESC.: **AVALON** 4-DR XLE
VIN: **4T1BK1EBXGU198538**
YR/MDL: 2016/3544A
CLR: OOH LA LA ROUGE MICA/BLACK (0379/20)
FINAL ASSEMBLY POINT: GEORGETOWN, KENTUCKY, U.S.A.

GOVERNMENT 5-STAR SAFETY RATINGS

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

Frontal Crash Based on the risk of injury in a frontal impact. Should ONLY be compared to other vehicles of similar size and weight.	Driver Passenger	★★★★
Side Crash Based on the risk of injury in a side impact.	Front seat Rear seat	Not Rated Not Rated
Rollover Based on the risk of rollover in a single-vehicle crash.		★★★★

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

STANDARD EQUIPMENT

MECHANICAL & PERFORMANCE

- 3.5L 268HP V6 DCHC 24V w/ Dual VVT-i
- 8-Spd ECT-i A/T w/ Sport Shift Mode
- 17" Alloy Wheels w/P215/65R17 Tires
- Power-Assisted Front/Disc Rear Disc Brakes

SAFETY & CONVENIENCE

- Star Safety System Includes: VSC, TRAC, ABS, EBD, BA, & Smart Stop Technology
- 10 Airbags
- LATCH/Likar Anchor & Tethers for Children for Outboard Rear Seating Positions
- Anti-Theft System w/ Engine Immobilizer

EXTERIOR

- Quad-beam Halogen Headlights w/ Auto On/Off & DRL
- Heated Outside Mirrors w/ Turn Signals
- Dual Chrome-Tipped Exhaust

INTERIOR

- Dual Zone Auto Climate Control w/Air Filter and Rear-Seat Vents
- Entune Audio Plus 7" Touch-Screen, AM/FM/CD, 6 Speakers, Aux/iUSB, Bluetooth, XM Radio w/4-Month Trial, HD Radio, Sport® GPS Link App, & Backup Camera Display
- Leather Steering Wheel w/Paddle Shifters & Audio, MID, Bluetooth® & Voice Command Controls
- Leather-Trimmed, Multi-Stage Htd Front Seats, 8-Way Power Driver Seat w/Power Lumbar Support & 4-Way Power Pass Seat
- Smart Key System with Push Button Start
- Day/Night Rearview Mirror
- 12V Aux Power Outlets
- **Full Tank of Gas**

MANUFACTURER'S SUGGESTED RETAIL PRICE \$32,650.00

OPTIONAL EQUIPMENT

FE	50 State Emissions	
CF	Carpet Floor Mats/Trunk Mat	229.00

EPA DOT Fuel Economy and Environment

Fuel Economy

24 MPG combined city/hwy
21 city 31 highway
4.2 gallons per 100 miles

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

Annual fuel Cost \$1,900

Fuel Economy & Greenhouse Gas Rating (tailpipe only)

Smog Rating (tailpipe only)

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 \$9,000 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at \$3.00 per gallon. MPG is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

fuel economy.gov
Calculate personalized estimates and compare vehicles

DELIVERY PROCESSING AND HANDLING FEE 835.00

TOTAL \$33,710.00

The New Vehicle Limited Warranty provides 3-year/36,000 mile basic coverage. 5-year/50,000 mile powertrain coverage. See dealer for details. An extended service contract may be available for the vehicle.

Manufacturer's suggested retail price includes manufacturer's recommended pre-delivery service. Gasoline, tires and city, state, and federal taxes, title and license fees and dealer and distributor handling options and accessories are not included in the manufacturer's suggested retail price.

ToyotaCare, which covers normal battery scheduled maintenance for two years or 25,000 miles. Vehicle accident risk is included as part of the sales price of the vehicle for qualifying buyers. See participating dealer for eligibility and coverage details.

Delivered by Truck to: 31068
BURDICK TOYOTA
5947 EAST CIRCLE DRIVE
CICERO, NY 13038

Figure A-69: Monroney Label

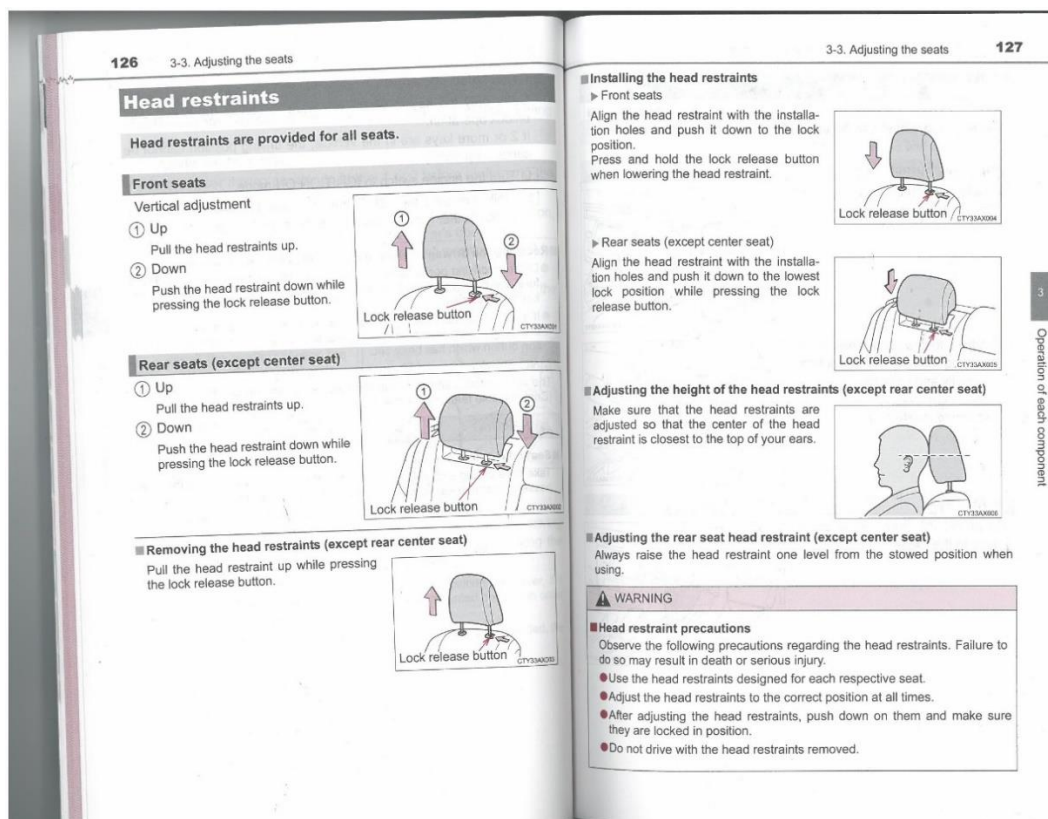


Figure A-70: Head Restraint Use and Adjustment Information from Vehicle Owner's Manual

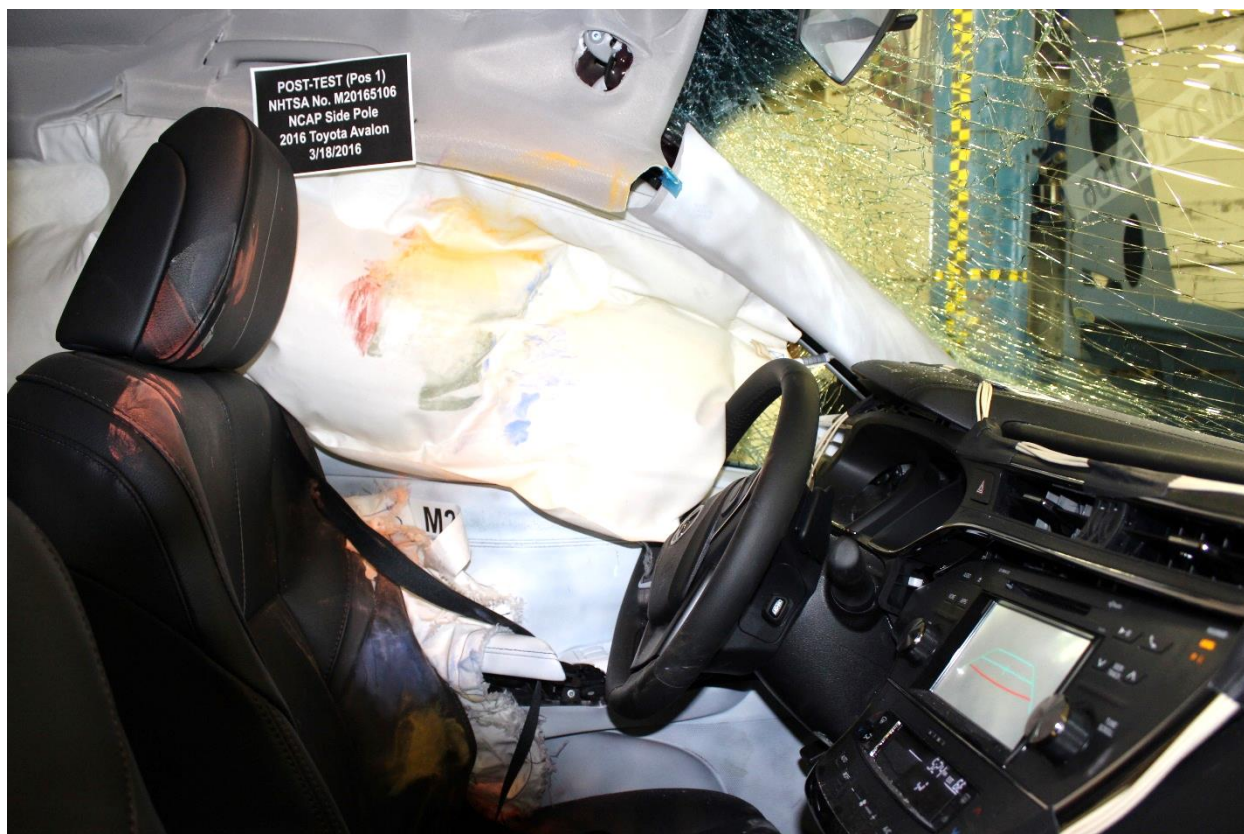


Figure A-71: Post-Test View of Shattered Vehicle Inner Door Panel (if applicable)

APPENDIX B

VEHICLE AND DUMMY RESPONSE DATA PLOTS

TABLE OF DATA PLOTS

Driver Dummy Instrumentation Plots

Fig.	Description	Page
1	Driver Head Acceleration (X) Primary vs. Time	B-4
2	Driver Head Acceleration (Y) Primary vs. Time	B-4
3	Driver Head Acceleration (Z) Primary vs. Time	B-4
4	Driver Head Resultant Acceleration Primary vs. Time	B-4
5	Driver Lower Spine T12 Acceleration (X) vs. Time	B-5
6	Driver Lower Spine T12 Acceleration (Y) vs. Time	B-5
7	Driver Lower Spine T12 Acceleration (Z) vs. Time	B-5
8	Driver Lower Spine T12 Resultant Acceleration vs. Time	B-5
9	Driver Iliac Wing Force on Impact Side (Y) vs. Time	B-6
10	Driver Acetabulum Force on Impact Side (Y) vs. Time	B-6
11	Driver Total Pelvis Force on Impact Side (Y) vs. Time	B-6

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

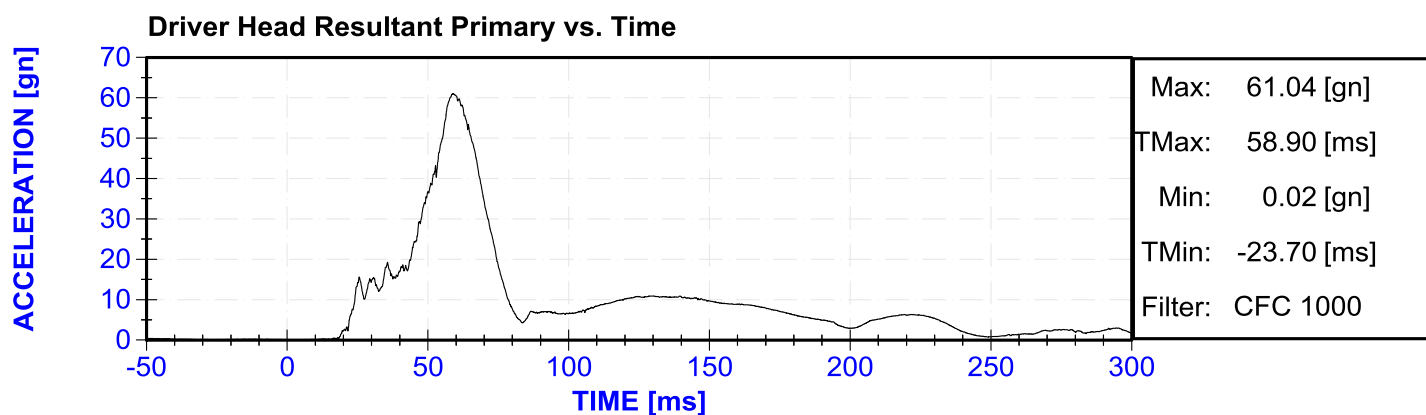
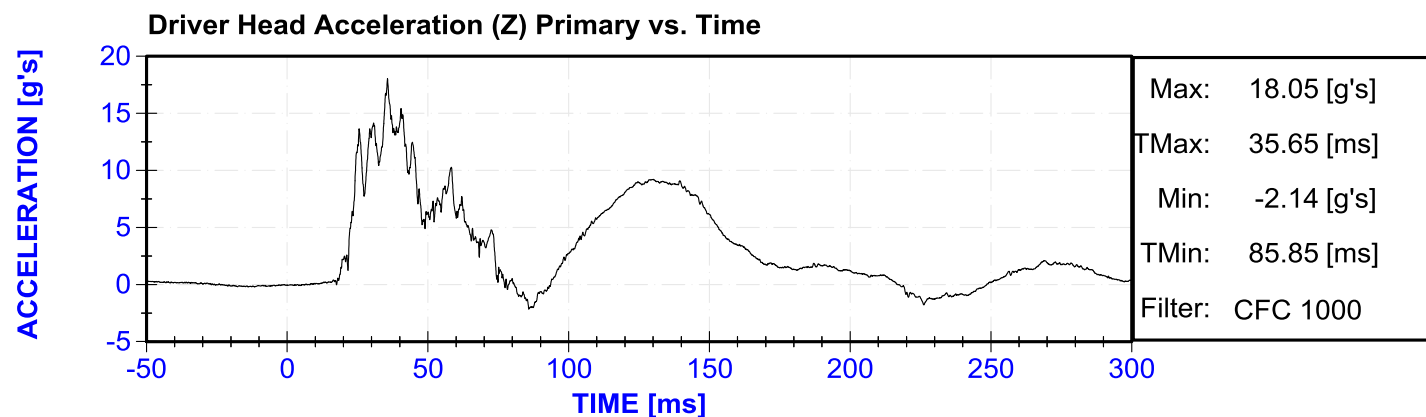
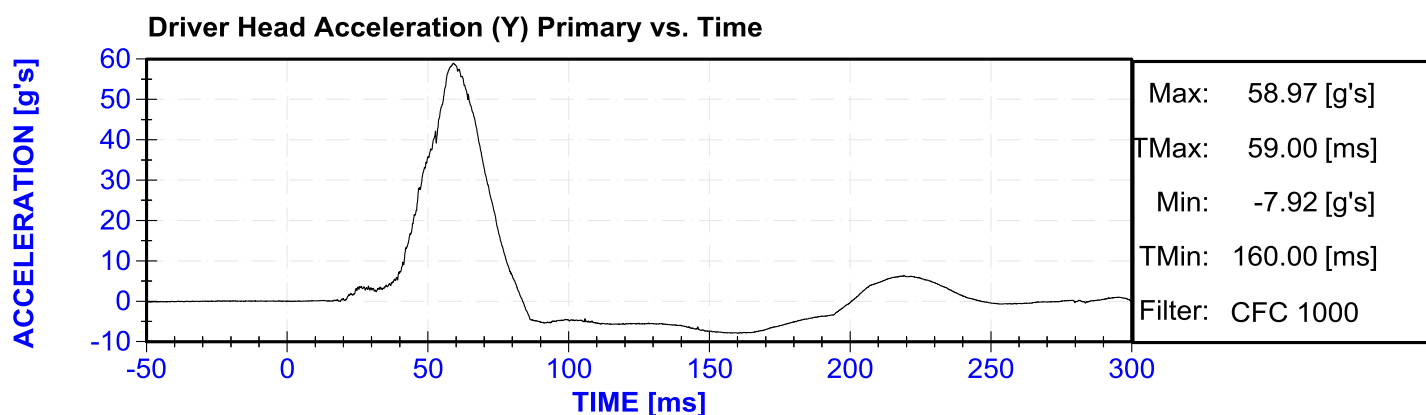
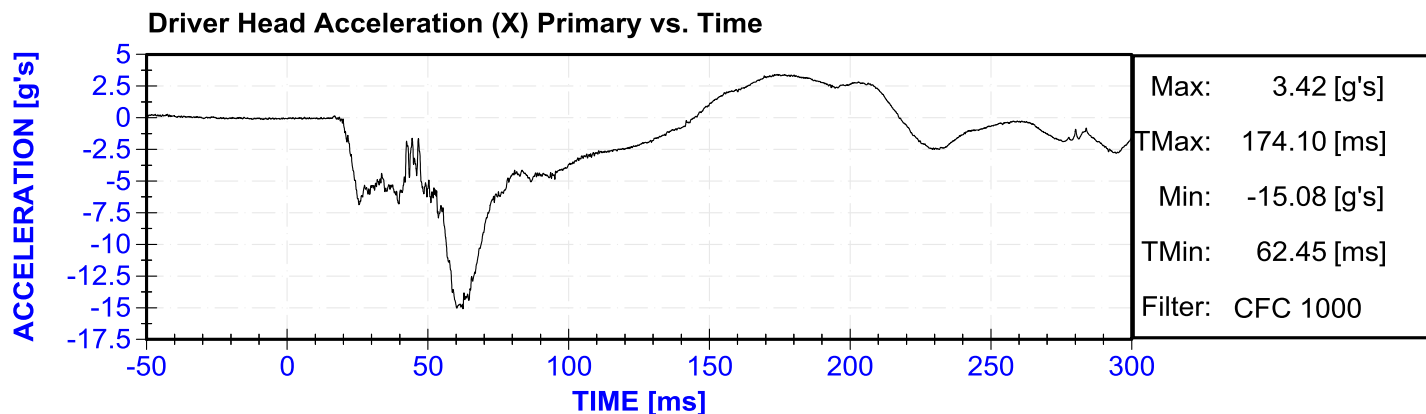
Driver Head Acceleration Redundant (X)
Driver Head Acceleration Redundant (Y)
Driver Head Acceleration Redundant (Z)
Driver Upper Thorax Rib Deflection (Y)
Driver Middle Thorax Rib Deflection (Y)
Driver Lower Thorax Rib Deflection (Y)
Driver Upper Abdomen Rib Deflection (Y)
Driver Lower Abdomen Rib Deflection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

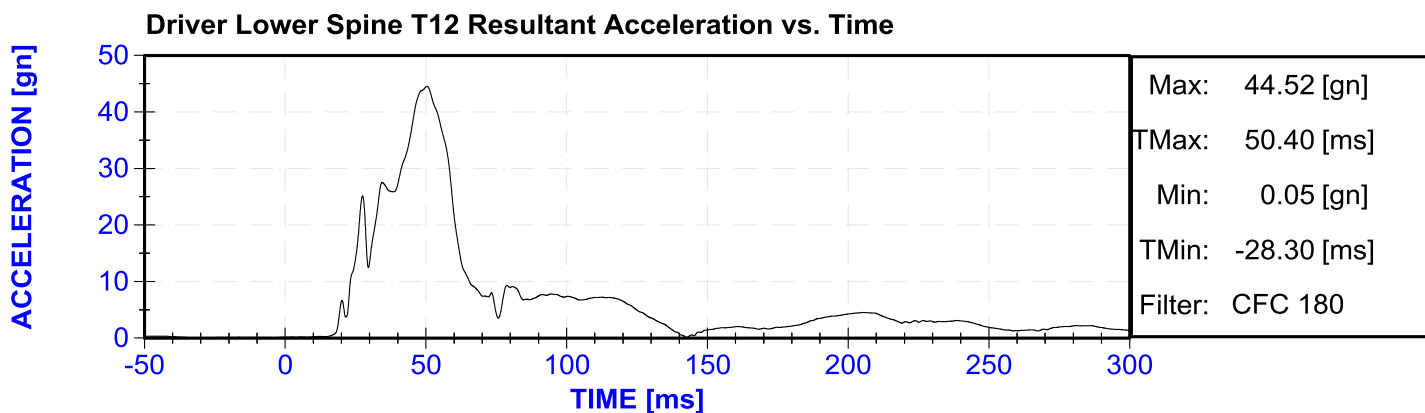
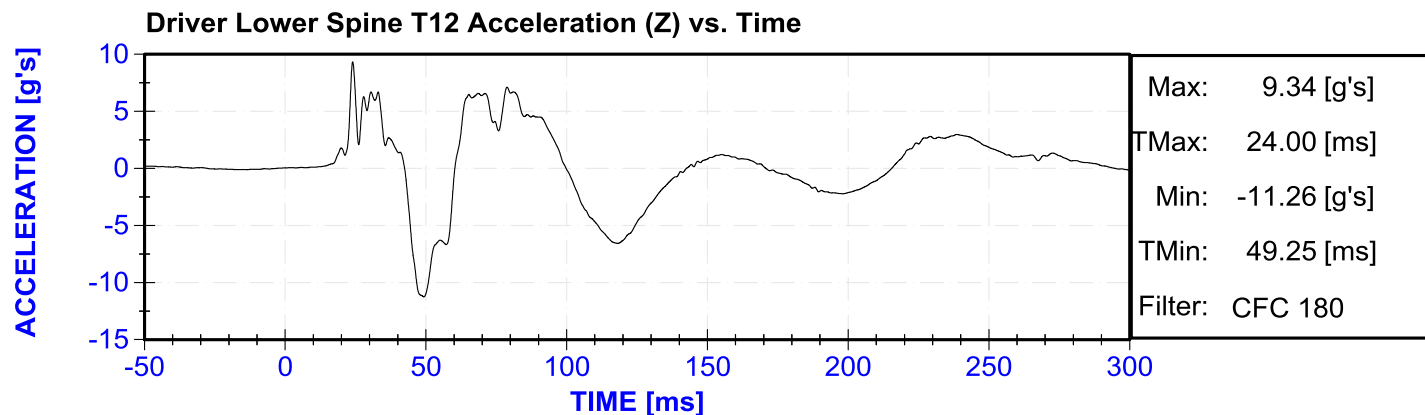
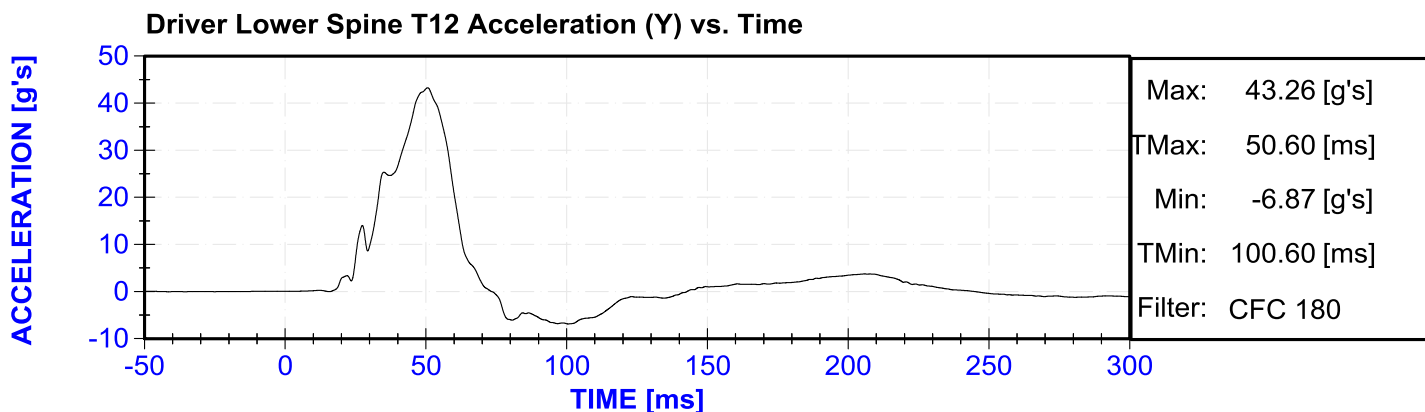
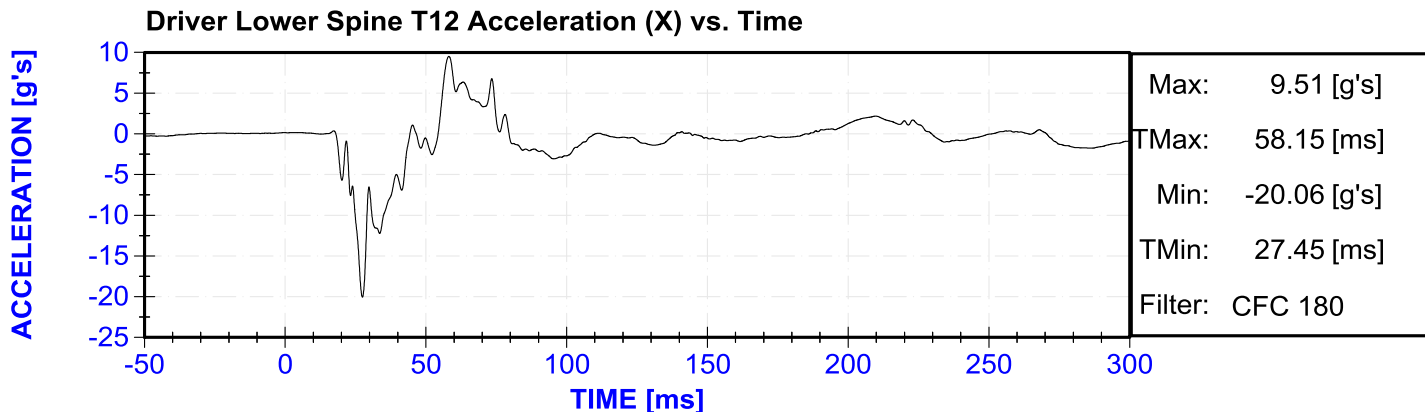
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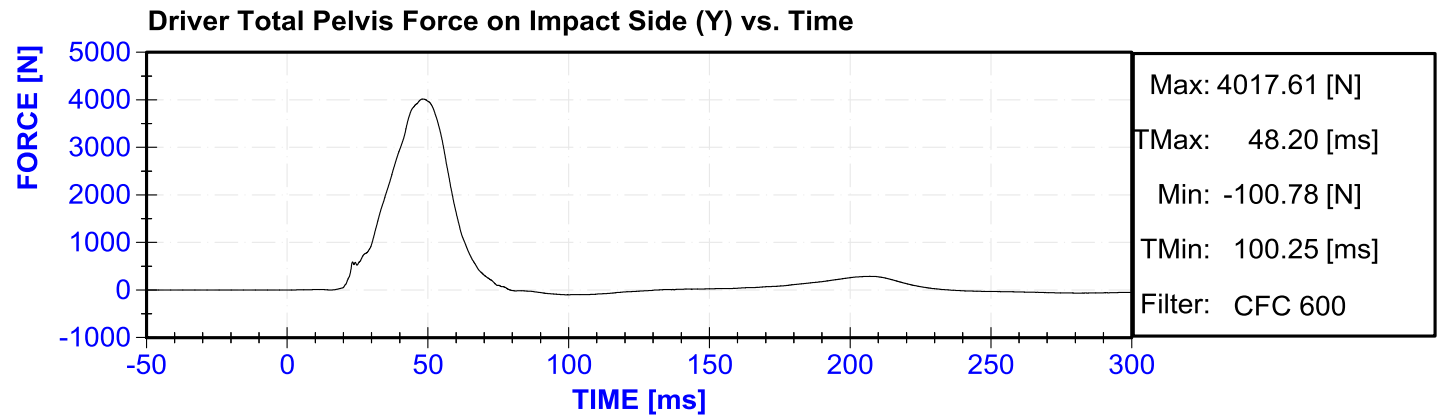
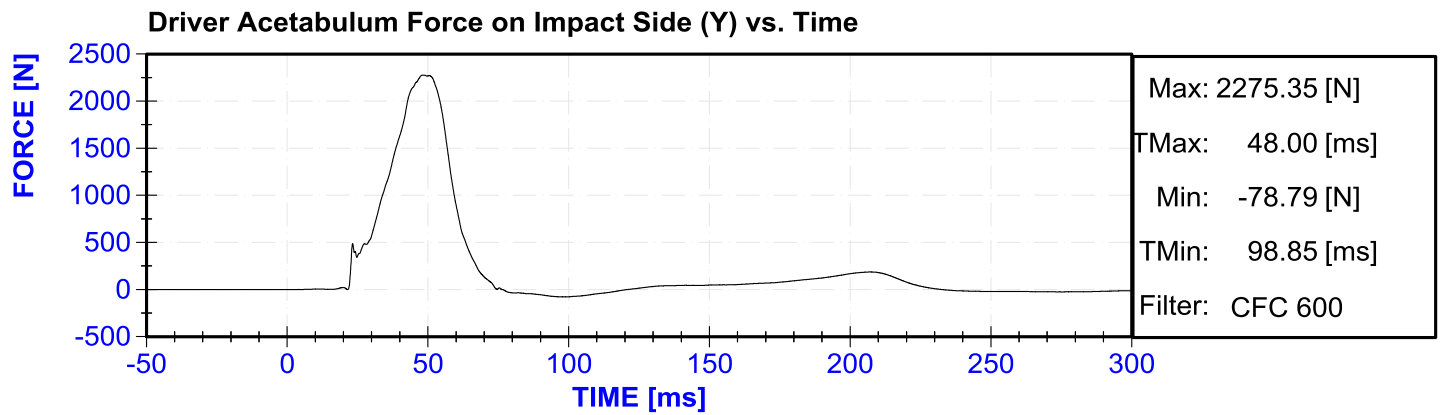
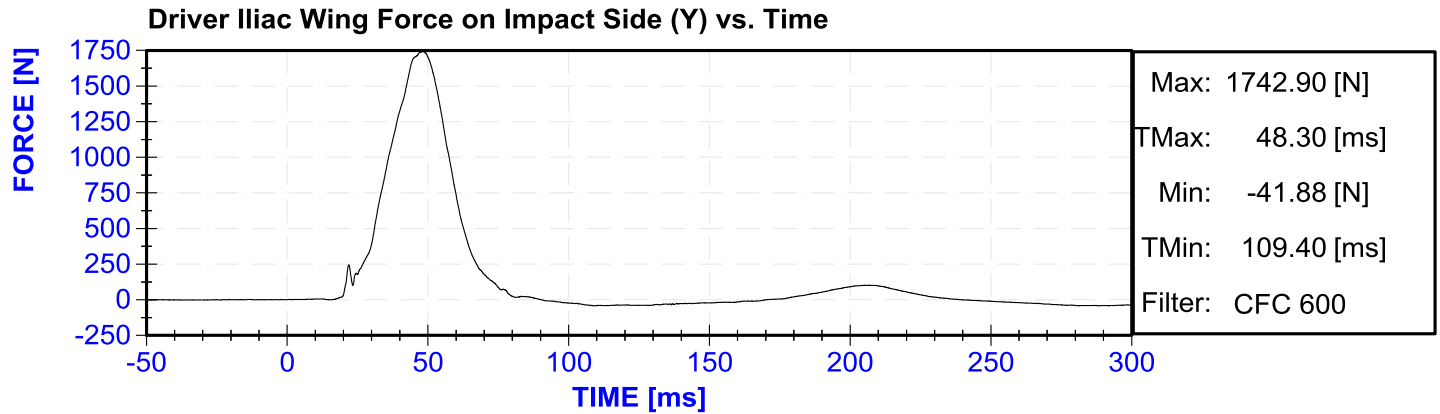
Vehicle Center of Gravity Acceleration (X)
Vehicle Center of Gravity Acceleration (Y)
Vehicle Center of Gravity Acceleration (Z)
Left Floor Sill Acceleration (Y)
Left A-Pillar Sill Acceleration (Y)
Left Lower A-Pillar Acceleration (Y)
Left Mid A-Pillar Acceleration (Y)
Left B-Pillar Sill Acceleration (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

CALIBRATION TEST RESULTS

PRE-TEST

SID-IIS 5TH PERCENTILE FEMALE - DRIVER ATD

SERIAL NO: DG8012

(CONFIGURED FOR LEFT SIDE IMPACT)

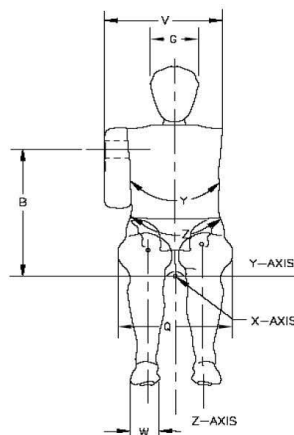
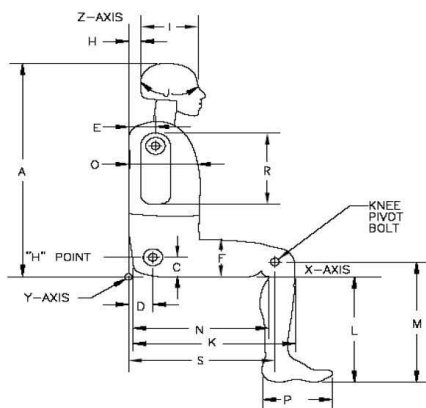


External Measurements - SID-IIs

Technician: **M. Geesey**

Date: **2/9/2016**

Dummy Serial Number: **DG8012**



Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	781	Pass
B	Shoulder Pivot Height	437	453	445	Pass
C	H-point Height	79	89	86	Pass
D	H-point from seatback	141	151	147	Pass
E	Shoulder Pivot from Backline	97	107	103	Pass
F	Thigh Clearance	119	135	128	Pass
G	Head Breadth	140	148	145	Pass
H	Head Back from Backline	40	46	43	Pass
I	Head Depth	178	188	183	Pass
J	Head Circumference	541	551	546	Pass
K	Buttock to Knee Length	514	540	529	Pass
L	Popliteal Height	343	369	351	Pass
M	Knee Pivot to floor height	392	409	400	Pass
N	Buttock Popliteal Length	416	442	430	Pass
O	Chest Depth w/o jacket	195	211	207	Pass
P	Foot Length	216	232	221	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	319	Pass
R	Arm Length	249	259	253	Pass
S	Knee Joint to seatback	477	493	481	Pass
V	Shoulder Width	341	357	352	Pass
W	Foot Width	78	94	84	Pass
Y	Chest Circumference w/jacket	851	881	861	Pass
Z	Waist Circumference	761	791	770	Pass

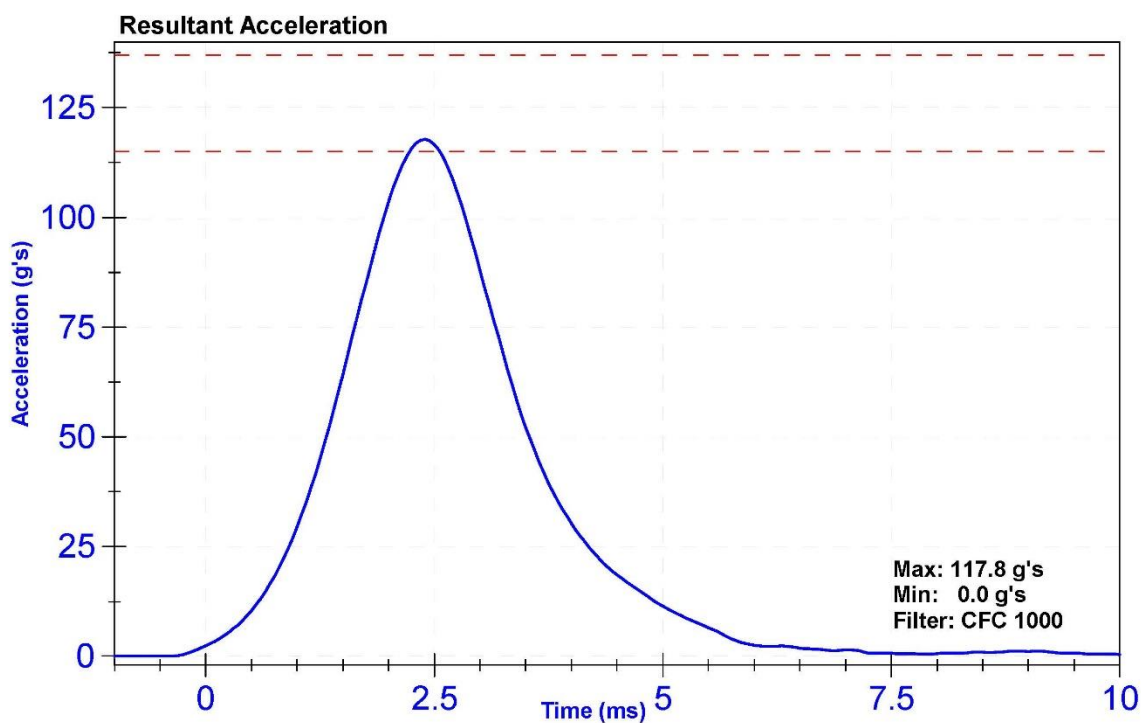
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ATD Serial Number	DG8012	Laboratory Supervisor	M. Goehle

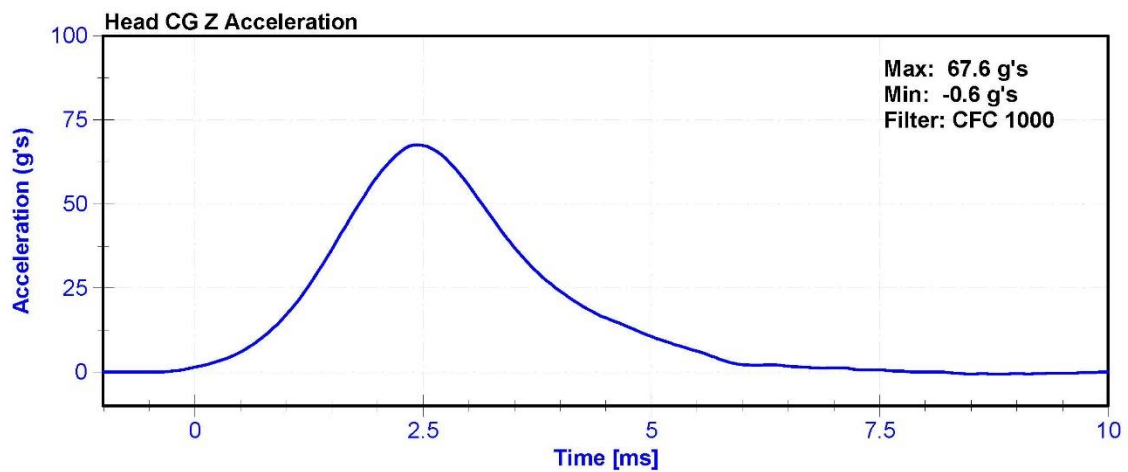
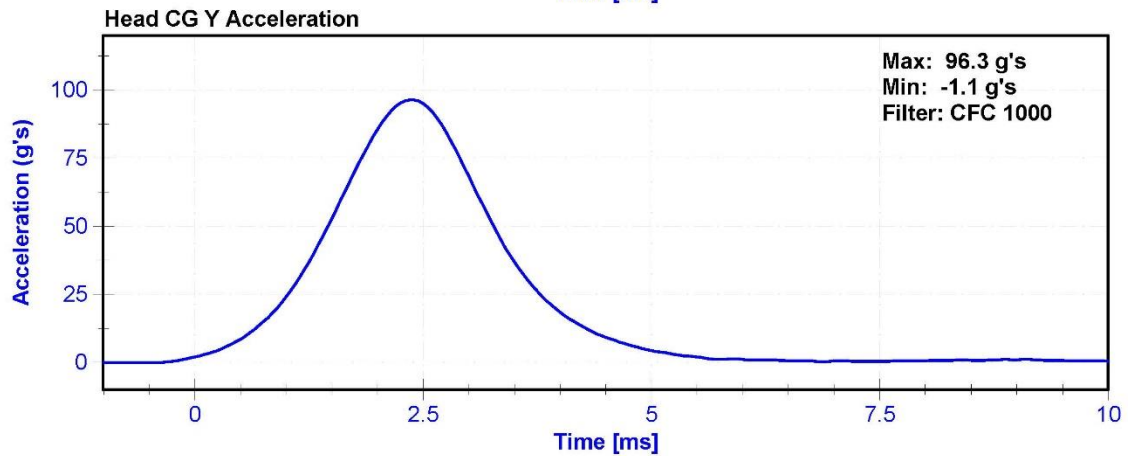
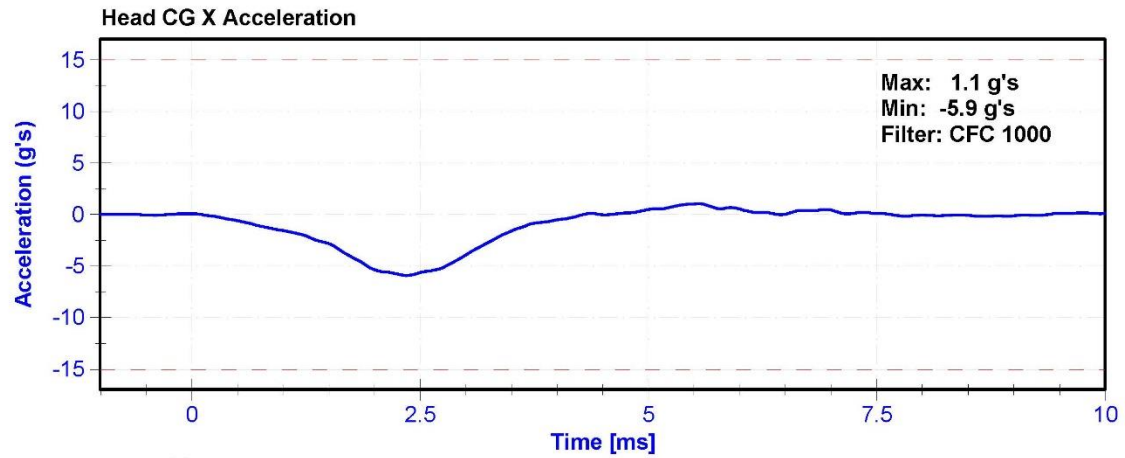
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22	Pass
Humidity	10	70	%	22.4	Pass
Resultant Acceleration	115	137	g's	117.8	Pass
Oscillation	0	15	%	2.0	Pass
Fore-Aft Acceleration	-15	15	g's	-5.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264CT	AC-P51685	11/12/2015	5/12/2016
Y Accelerometer	ENDEVCO 7264CT	AC-P51682	11/12/2015	5/12/2016
Z Accelerometer	ENDEVCO 7264CT	AC-P51699	11/12/2015	5/12/2016





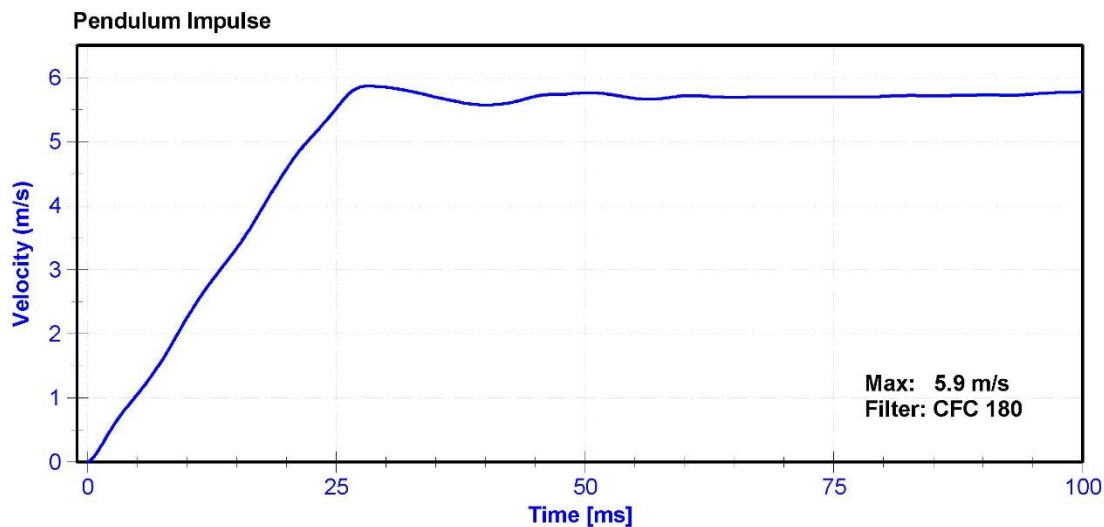
ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	DG8012	Laboratory Supervisor	M.Goehle

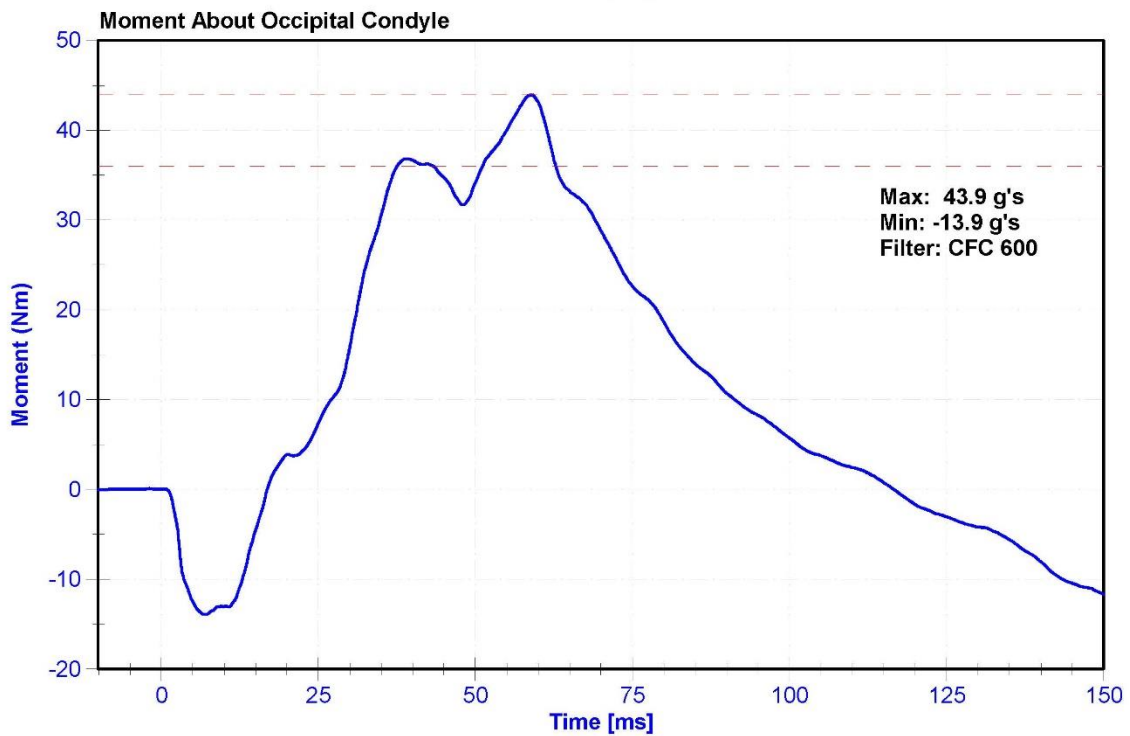
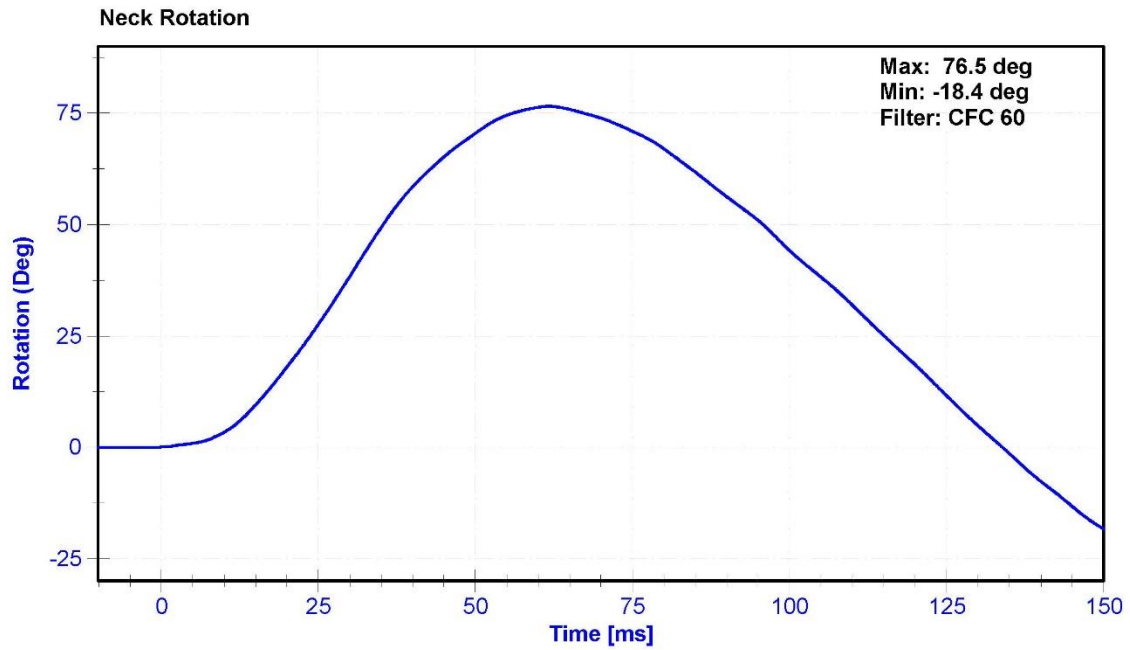
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	31.1	Pass
Velocity	5.51	5.63	m/s	5.583	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.25	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.34	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.57	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.52	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.87	Pass
Neck Rotation	71	81	deg	76.5	Pass
Time at Maximum Rotation	50	70	ms	61.6	Pass
Moment about the OC	36	44	Nm	43.9	Pass
Moment Decay to 0 Nm	102	126	ms	116.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/7/2015	5/6/2016
Pendulum Potentiometer	Denton 78051-342	DS-184Pend	9/24/2015	9/23/2016
Condyle Potentiometer	Denton 78051-342	DS-185Pend	9/25/2015	9/24/2016
Upper Neck Load Cell	Denton 1716A	LC-1916Fy	6/29/2015	6/28/2016





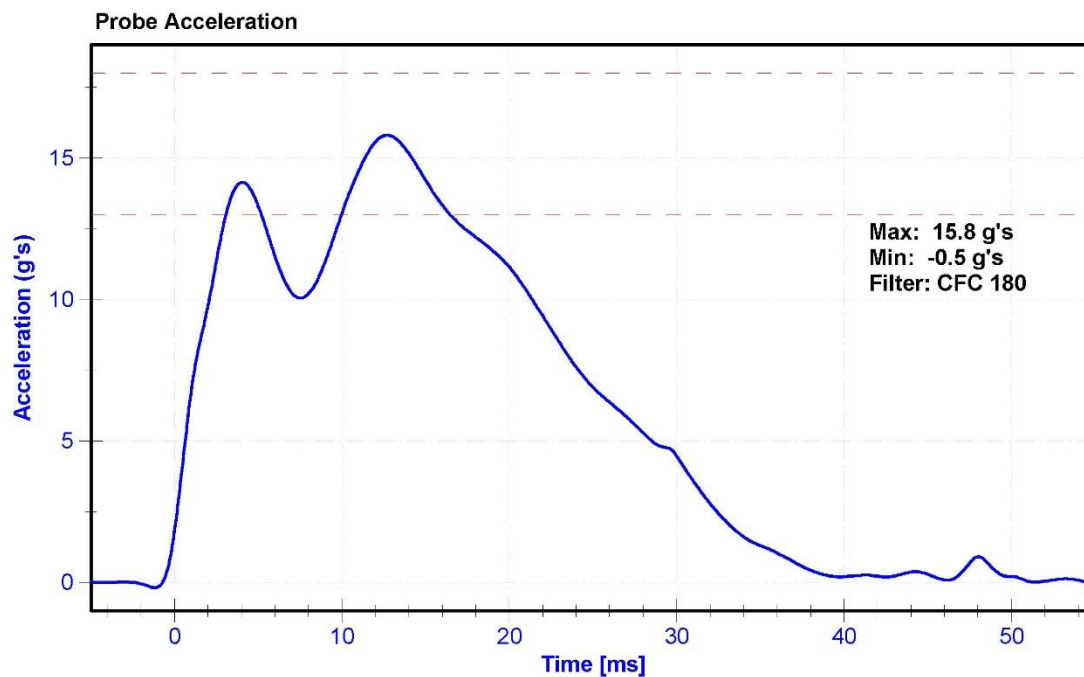
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ATD Serial Number	DG8012	Laboratory Supervisor	M. Goehle

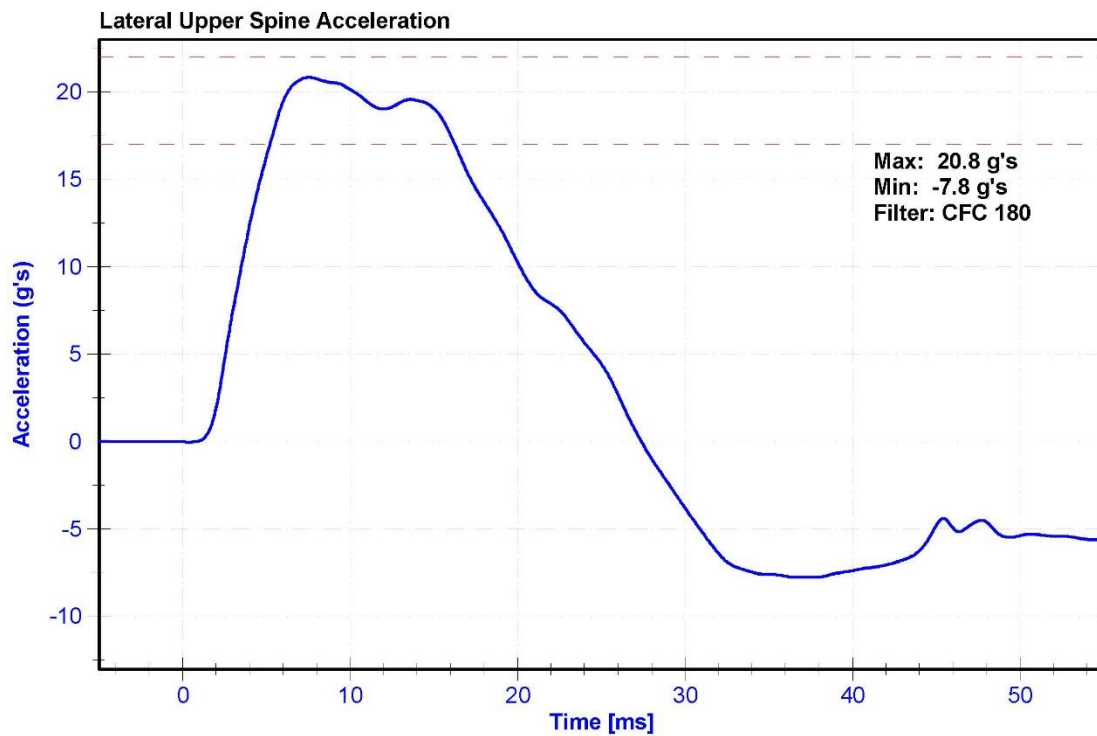
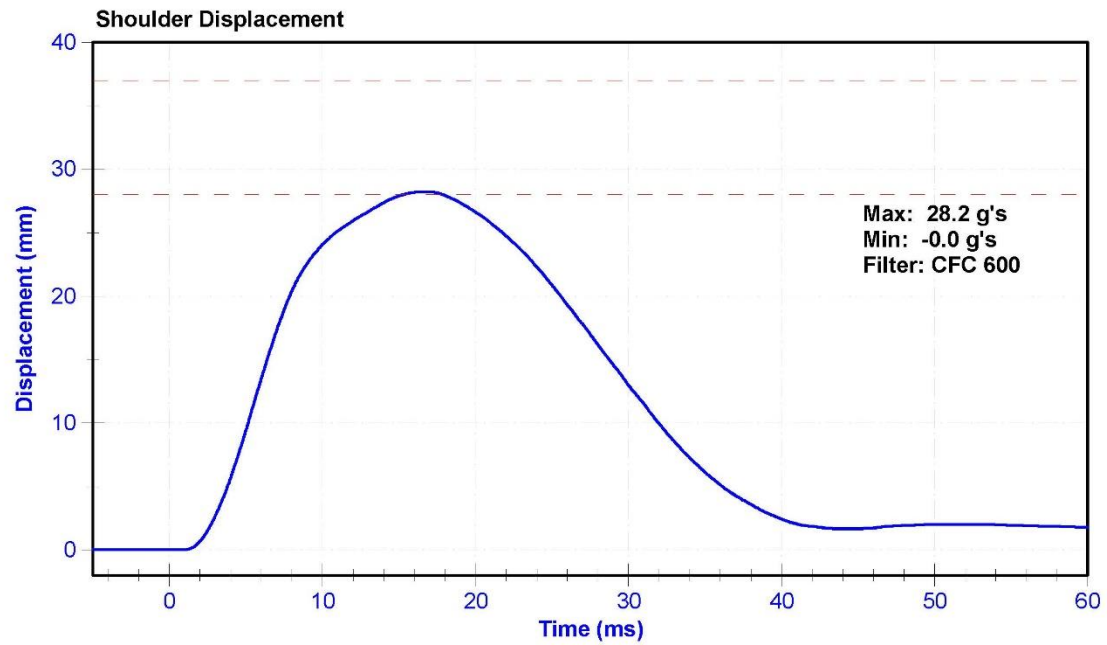
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.7	Pass
Humidity	10	70	%	24.6	Pass
Velocity	4.2	4.4	m/s	4.33	Pass
Probe Acceleration	13	18	g's	15.8	Pass
Shoulder Deflection	28	37	mm	28.2	Pass
Lateral Upper Spine Acceleration	17	22	g's	20.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016
Shoulder Potentiometer	Servo 08TC1-3745	DS-1845GFE	9/24/2015	9/23/2016
Upper Spine Y Accelerometer	ENDEVCO 7264CT	AC-P51875	9/3/2015	3/3/2016





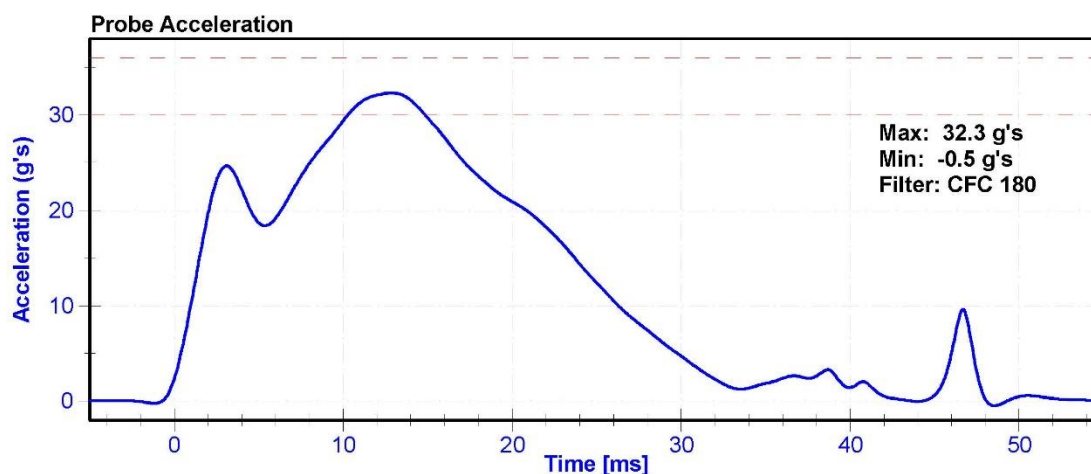
ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	DG8012	Laboratory Supervisor	M. Goehle

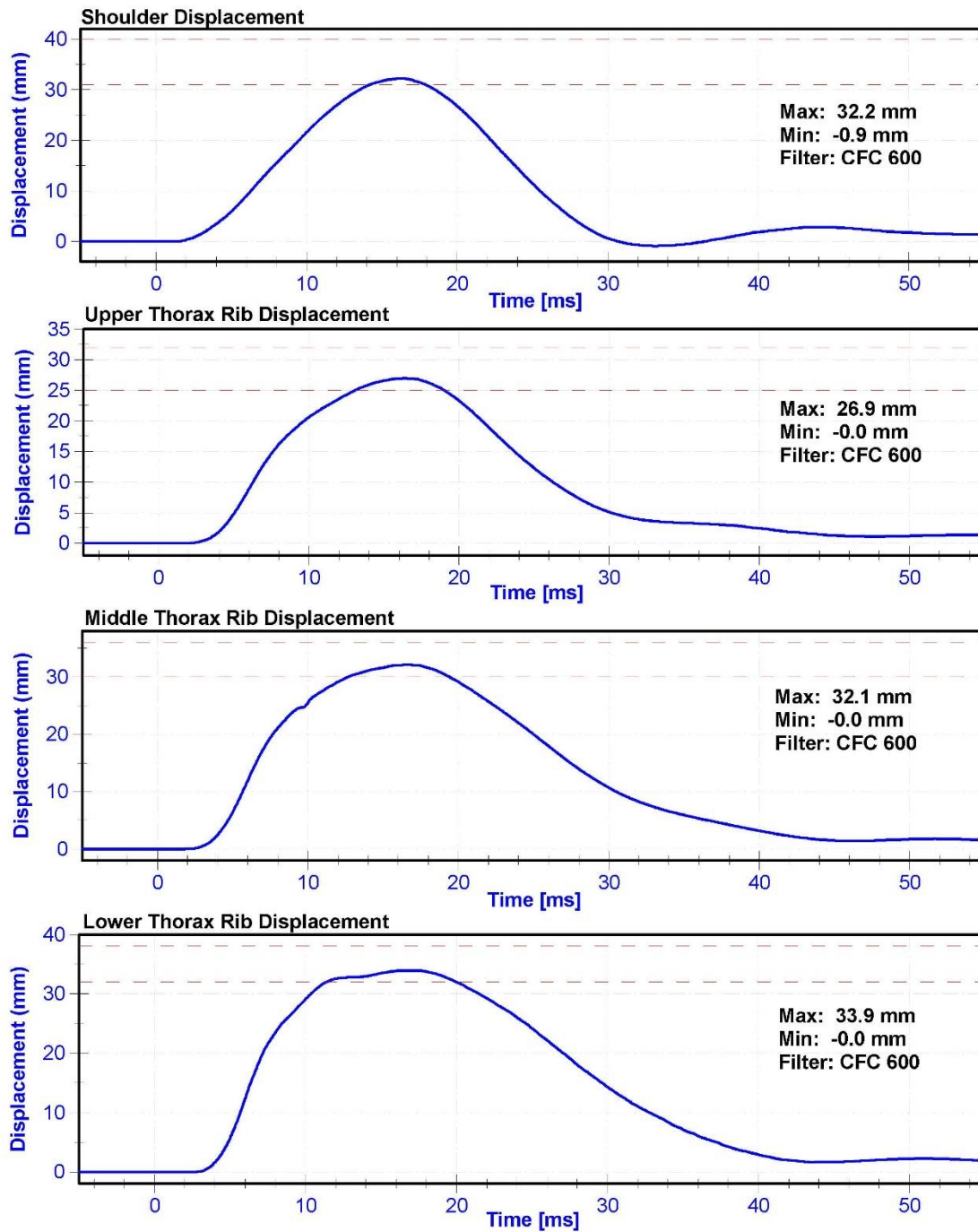
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.9	Pass
Humidity	10	70	%	29.9	Pass
Velocity	6.6	6.8	m/s	6.68	Pass
Probe Acceleration after 5 ms	30	36	g's	32.3	Pass
Lateral Upper Spine Acceleration	34	43	g's	39.1	Pass
Lateral Lower Spine Acceleration	29	37	g's	33.5	Pass
Shoulder Deflection	31	40	mm	32.2	Pass
Upper Thorax Rib Deflection	25	32	mm	26.9	Pass
Mid Thorax Rib Deflection	30	36	mm	32.1	Pass
Lower Thorax Rib Deflection	32	38	mm	33.9	Pass

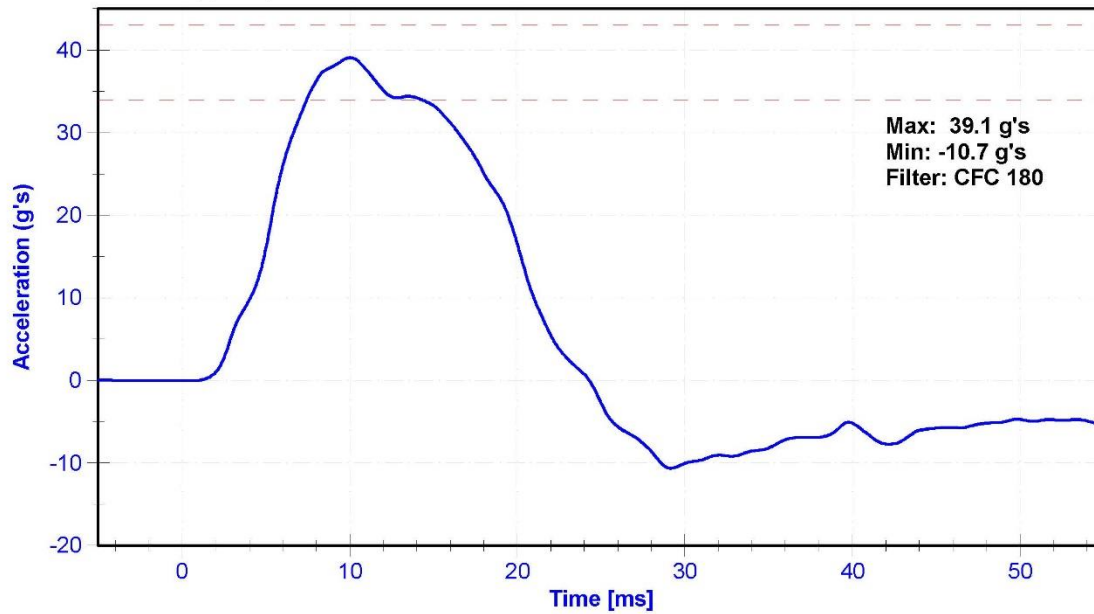
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
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Upper Spine T1 Y Accelerometer	ENDEVCO 7264CT	AC-P51875	9/3/2015	3/3/2016
Upper Spine T12 Y Accelerometer	ENDEVCO 7264	AC-P83319	9/23/2015	3/23/2016
Shoulder Potentiometer	Servo 08TC1-3745	DS-1845GFE	9/24/2015	9/23/2016
Upper Thorax Rib Potentiometer	Servo 08TC1-3621	DS-808GFE	9/24/2015	9/23/2016
Middle Thorax Rib Potentiometer	Servo 08TC1-3745	DS-1514GFE	9/24/2015	9/23/2016
Lower Thorax Rib Potentiometer	Servo 08TC1-3787	DS-011GFE	9/24/2015	9/23/2016

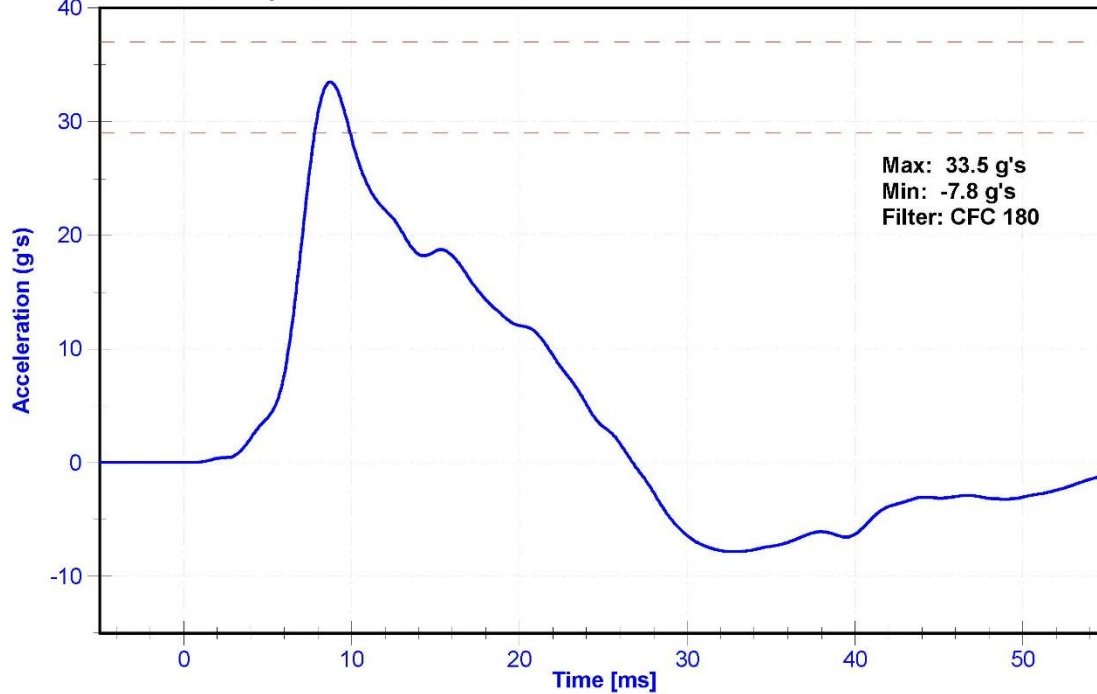




Lateral Upper Spine Acceleration



Lateral Lower Spine Acceleration



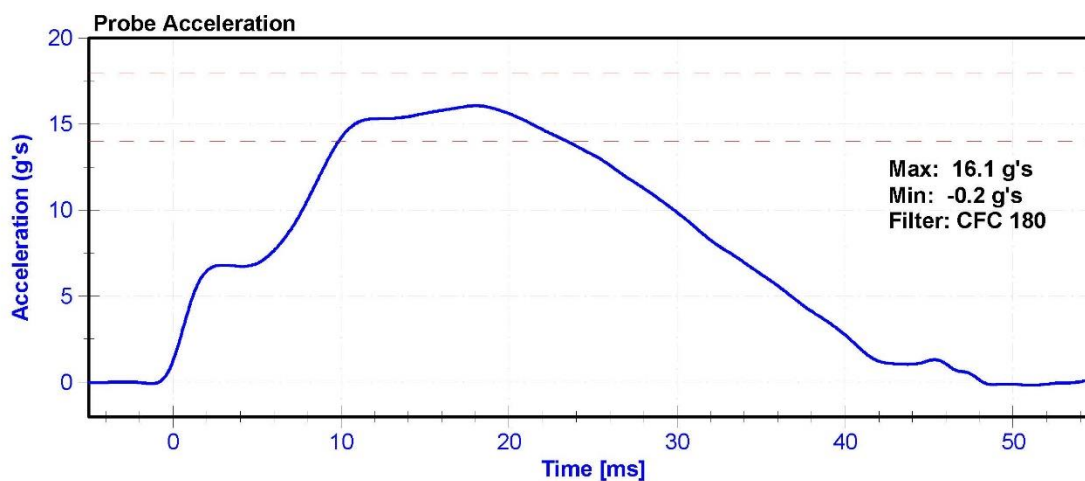
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ATD Serial Number	DG8012	Laboratory Supervisor	M.Goehle

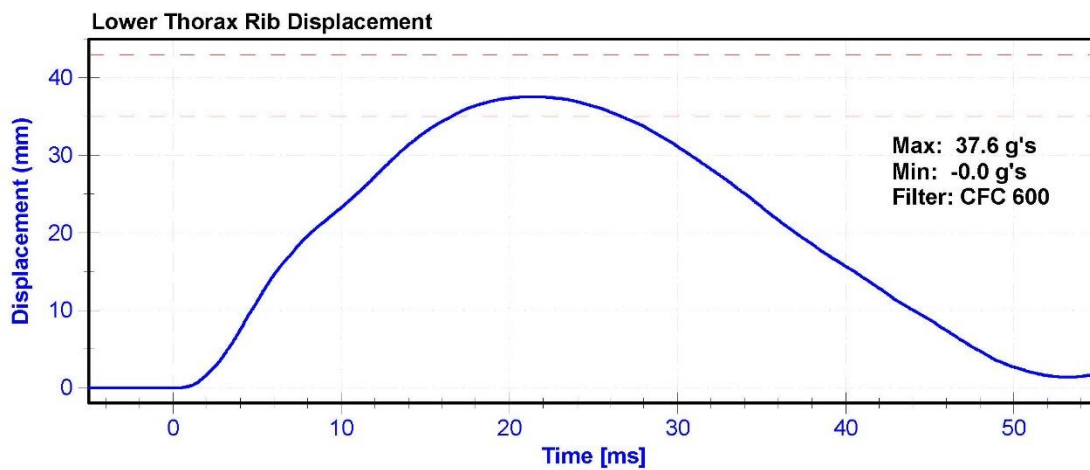
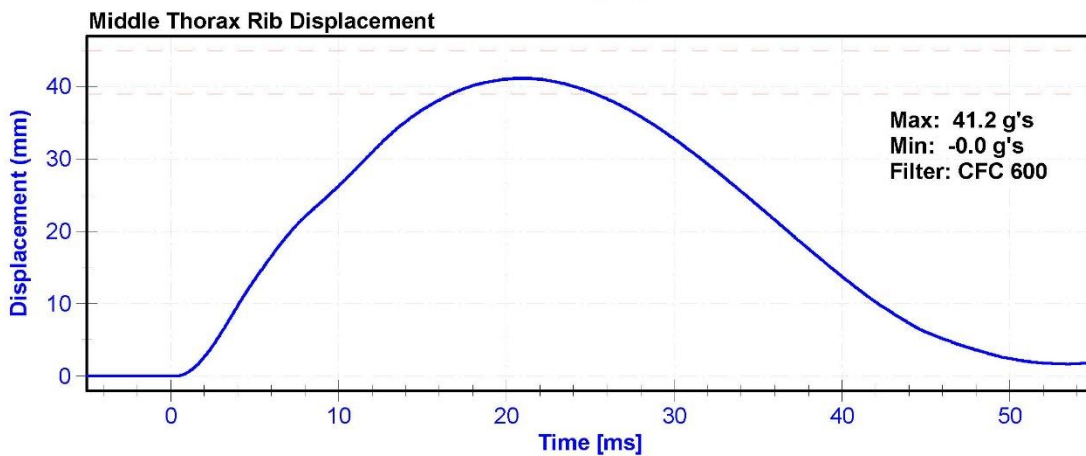
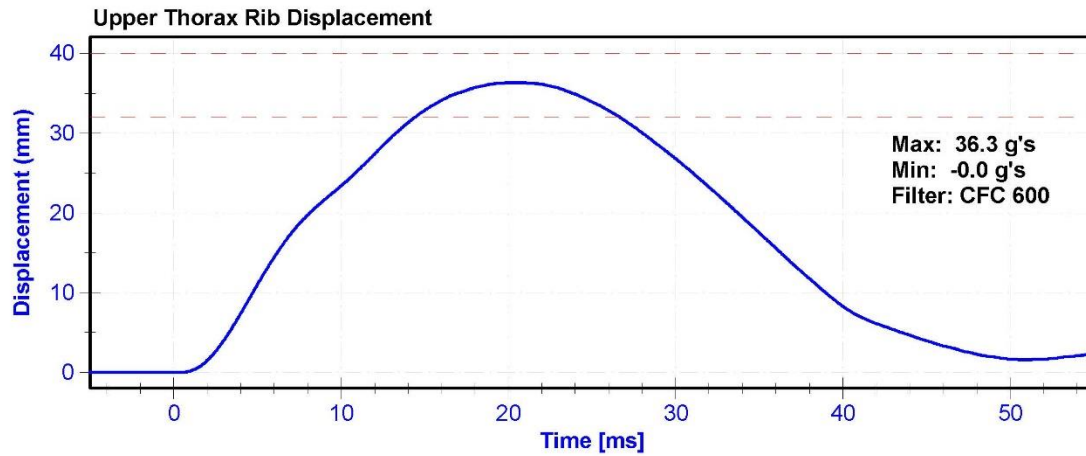
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	27.8	Pass
Velocity	4.2	4.4	m/s	4.33	Pass
Probe Acceleration	14	18	g's	16.1	Pass
Lateral Upper Spine Acceleration	13	17	g's	15.7	Pass
Lateral Lower Spine Acceleration	7	11	g's	9.8	Pass
Upper Thorax Rib Deflection	32	40	mm	36.3	Pass
Middle Thorax Rib Deflection	39	45	mm	41.2	Pass
Lower Thorax Rib Deflection	35	43	mm	37.6	Pass

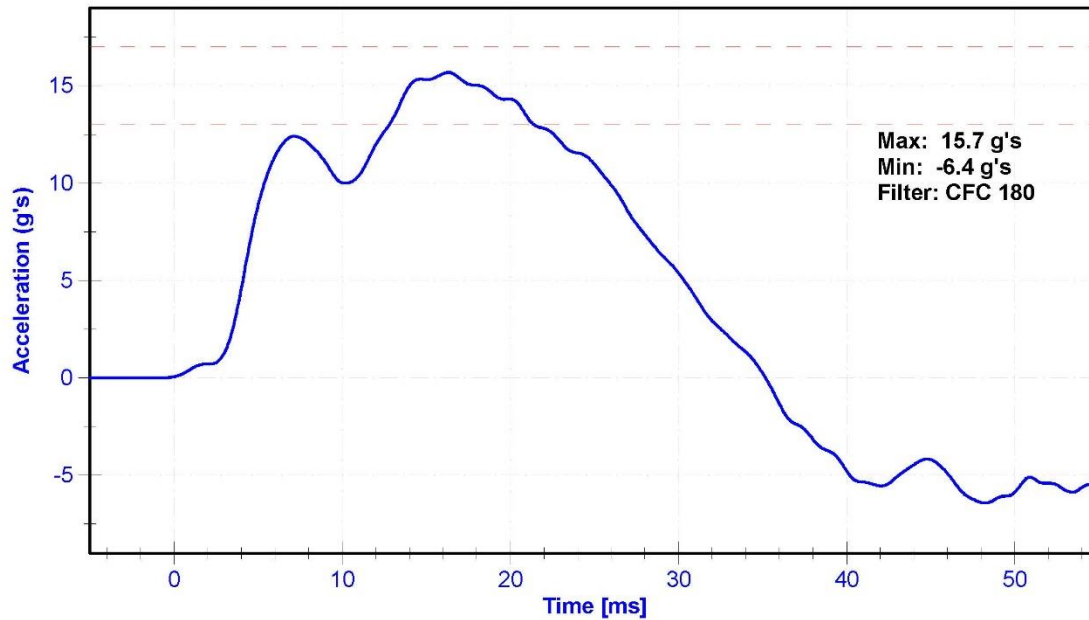
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016
Upper Spine Y Accelerometer	ENDEVCO 7264CT	AC-P51875	9/3/2015	3/3/2016
Lower Spine Y Accelerometer	ENDEVCO 7264	AC-P83322	9/23/2015	3/23/2016
Upper Thorax Rib Potentiometer	Servo 08TC1-3621	DS-808GFE	9/24/2015	9/23/2016
Middle Thorax Rib Potentiometer	Servo 08TC1-3745	DS-1514GFE	9/24/2015	9/23/2016
Lower Thorax Rib Potentiometer	Servo 08TC1-3787	DS-011GFE	9/24/2015	9/23/2016

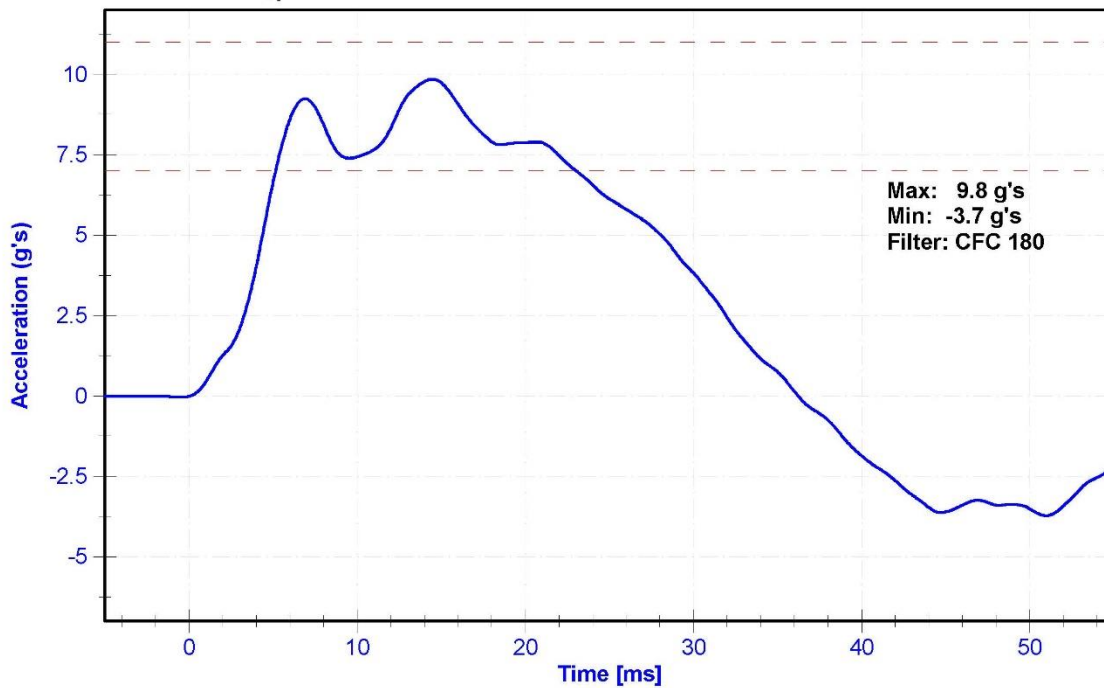




Lateral Upper Spine Acceleration



Lateral Lower Spine Acceleration



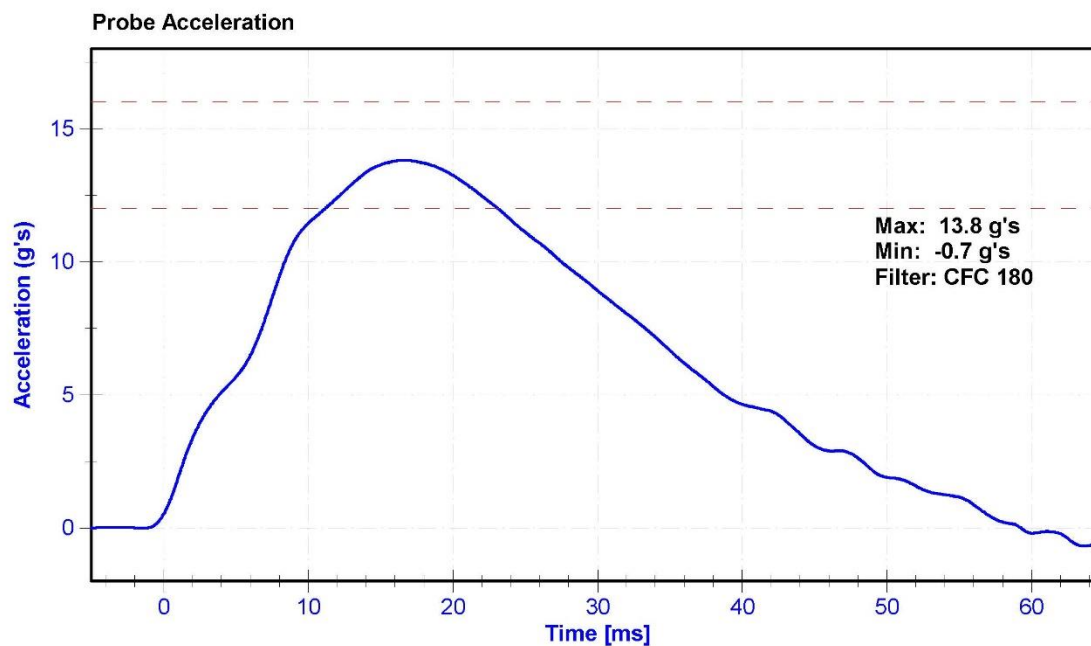
ATD Manufacturer	FTSS	Test Technician	M. Goehle
ATD Serial Number	DG8012	Laboratory Supervisor	M. Goehle

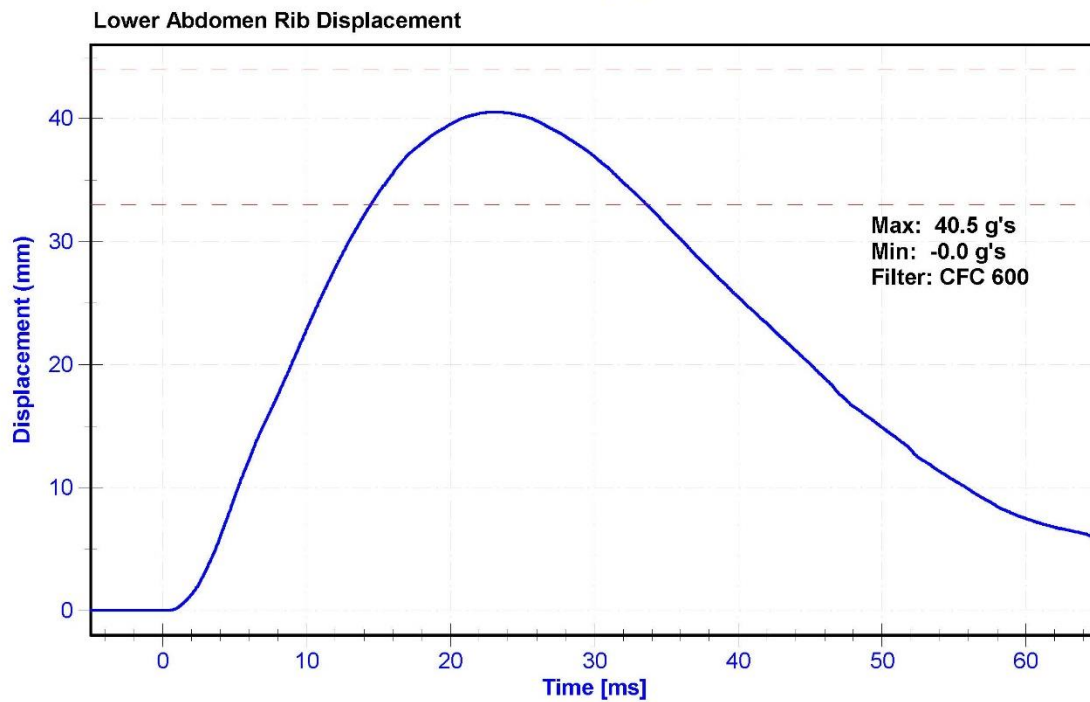
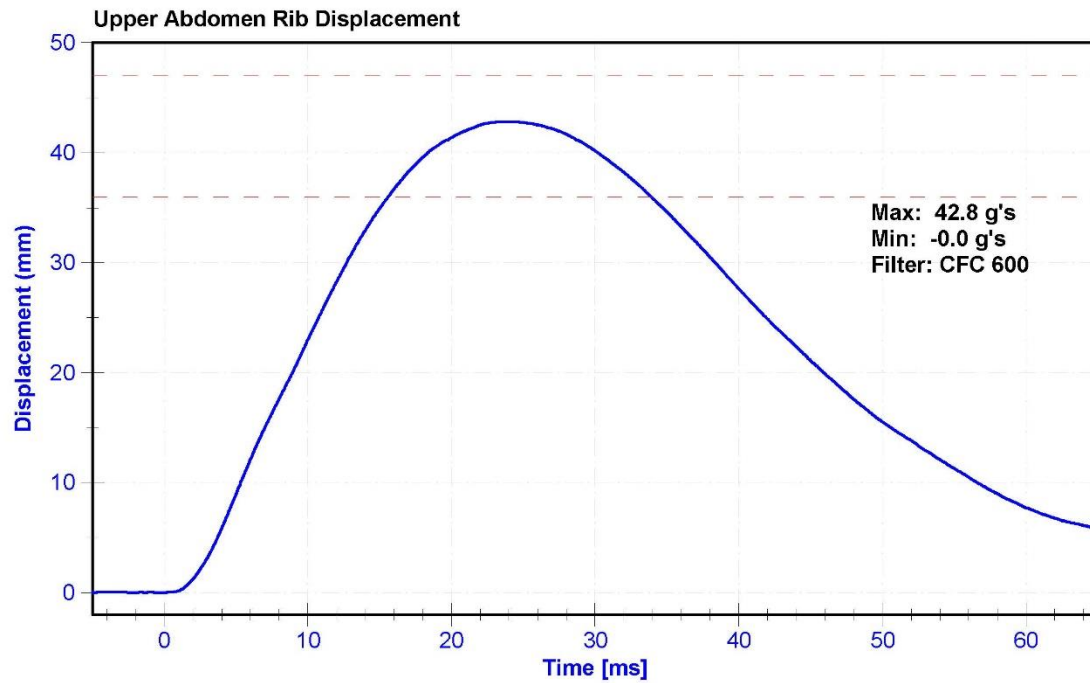
Results

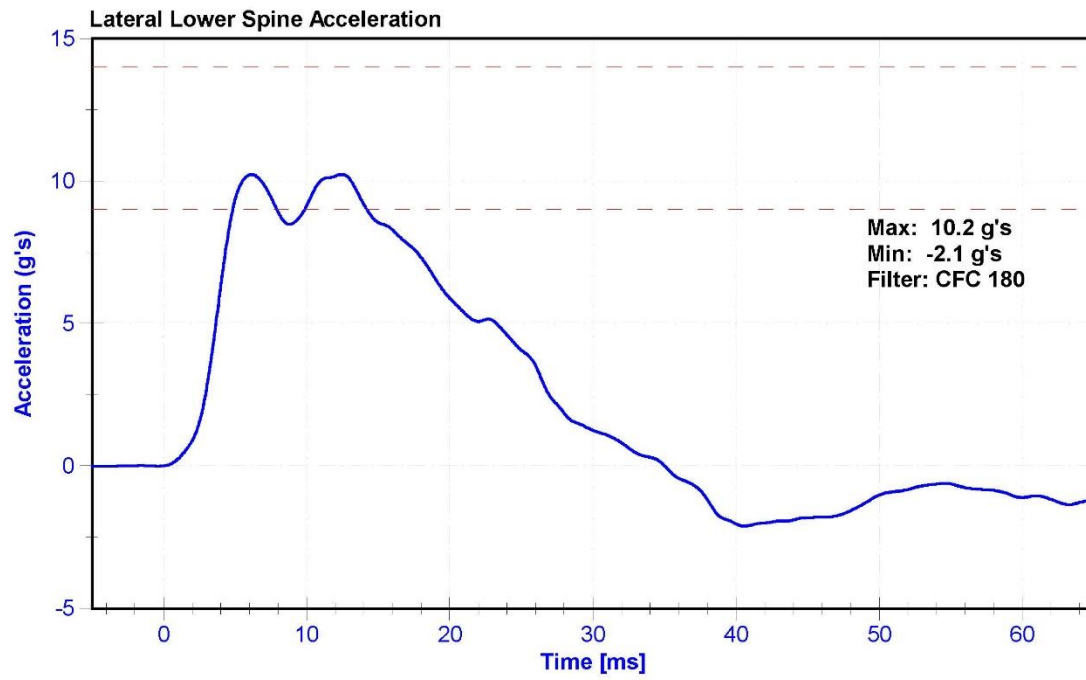
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.7	Pass
Humidity	10	70	%	24.8	Pass
Velocity	4.2	4.4	m/s	4.33	Pass
Probe Acceleration	12	16	g's	13.8	Pass
Lateral Lower Spine Acceleration	9	14	g's	10.2	Pass
Upper Abdomen Rib Deflection	36	47	mm	42.8	Pass
Lower Abdomen Rib Deflection	33	44	mm	40.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016
Lower Spine Y Accelerometer	ENDEVCO 7264	AC-P83319	9/23/2015	3/23/2016
Upper Abdomen Rib Potentiometer	Servo 08TC1-3787	DS-015GFE	9/24/2015	9/23/2016
Lower Abdomen Rib Potentiometer	Servo 08TC1-3745	DS-1774GFE	9/24/2015	9/23/2016







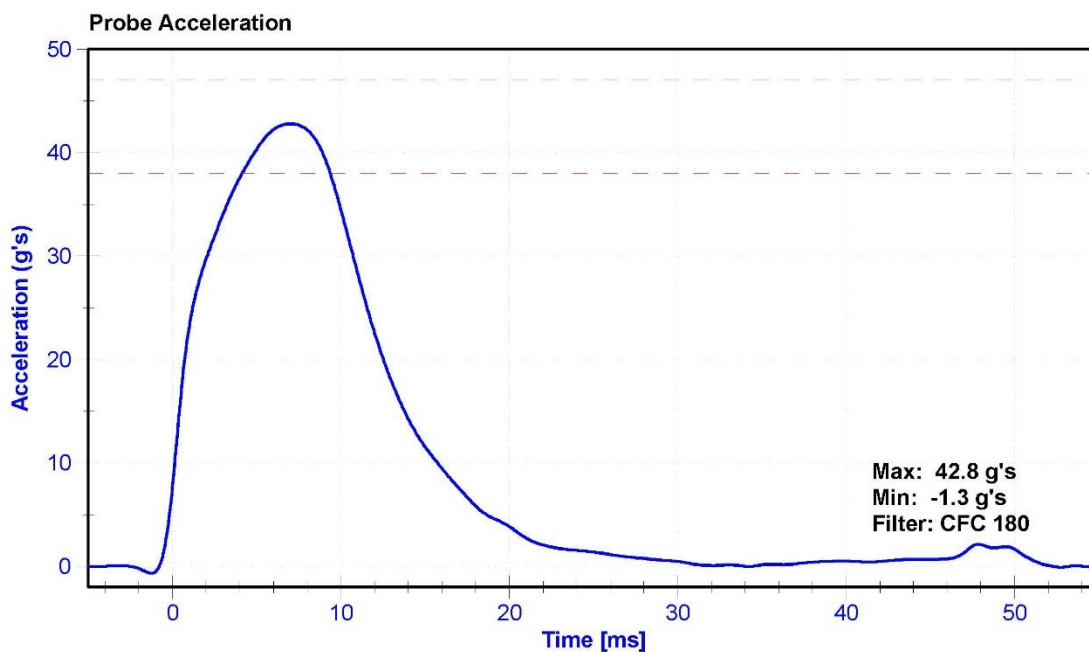
ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	DG8012	Laboratory Supervisor	M. Goehle

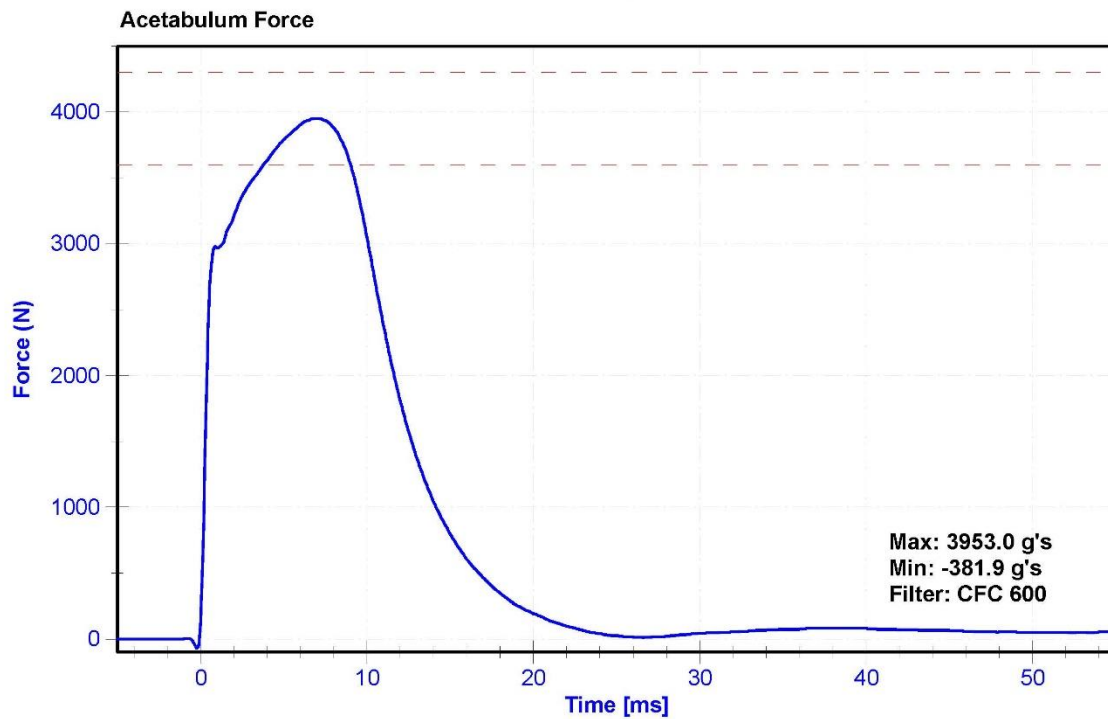
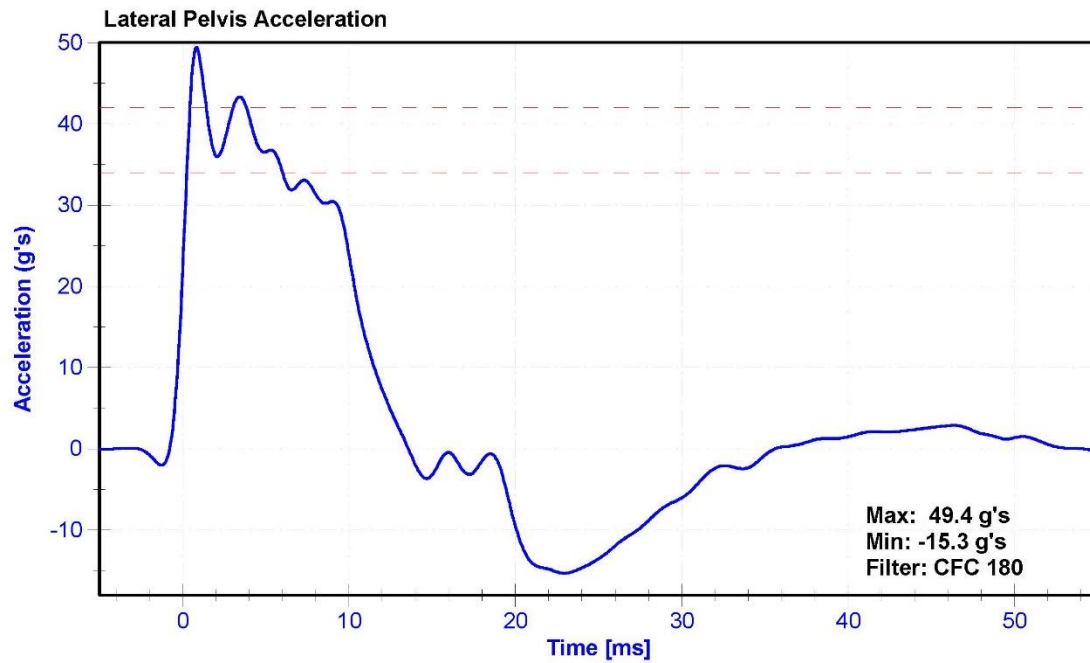
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.6	Pass
Humidity	10	70	%	32.7	Pass
Velocity	6.6	6.8	m/s	6.67	Pass
Probe Acceleration	38	47	g's	42.8	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	34.0	Pass
Acetabulum Force	3600	4300	N	3953.0	Pass

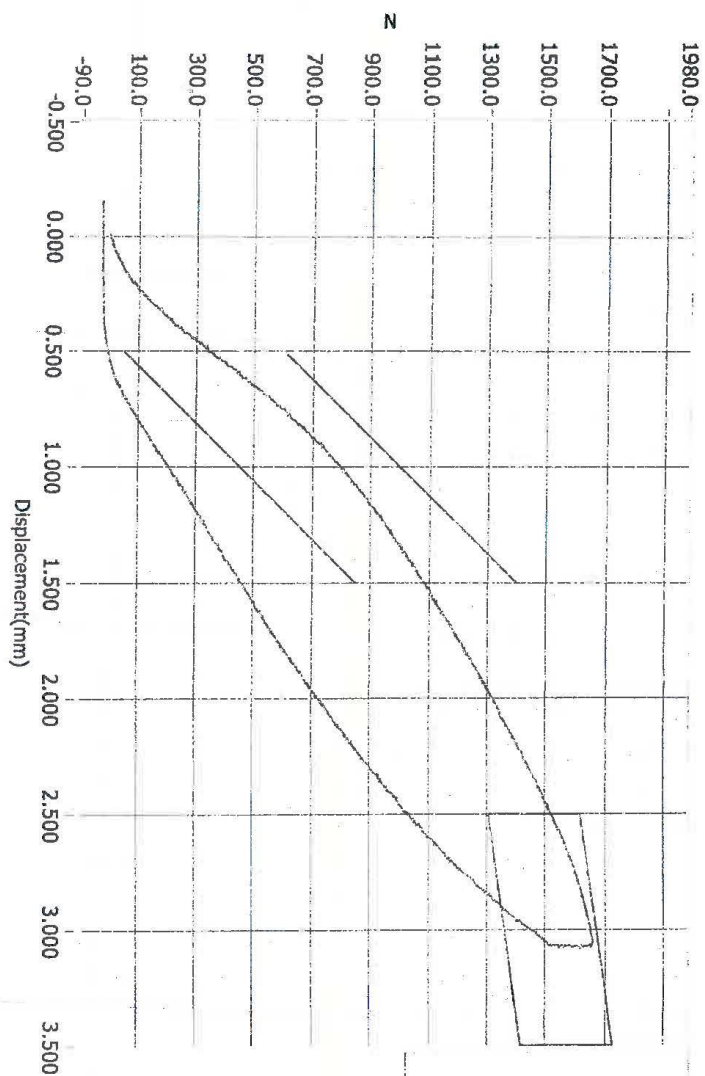
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P63561	9/3/2015	3/3/2016
Acetabulum Load Cell	Denton 3249J	LC-267Fy	6/30/2015	6/29/2016
Certification Plug	Humanetics	79530	11/05/2014	N/A
Crash Test Plug	Humanetics	79574	11/05/2014	N/A





Resultant Data - SIDiTs Plug Compression



1654N
CERTIFICATION

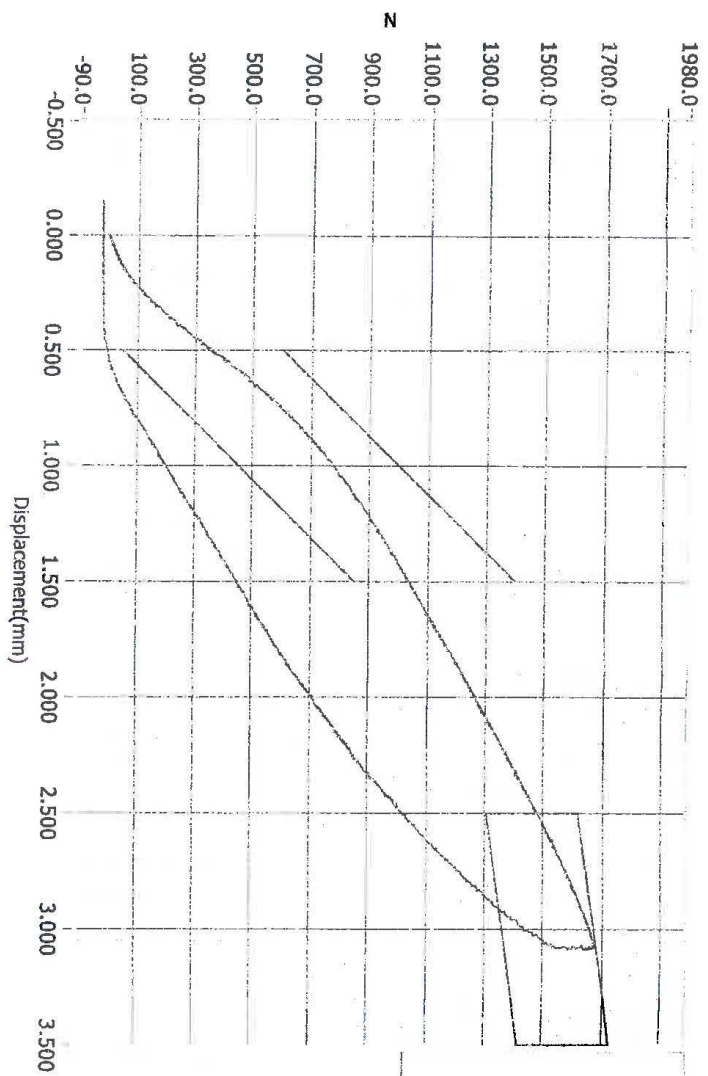
ATD Calibration Lab

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79530	11/5/2014	6:24 PM	
Cert ID	ATD Serial Number	ATD Type	
N/A	N/A	SIDiTs	

Current Date : 11/5/2014

Current Time : 18:25:31

Resultant Data - SIDIIs Plug Compression



Loading Curve ✓
 Boundary Limit Upper ✓
 Boundary Limit Lower ✓
 Peak Load Upper ✓
 Peak Load Lower ✓
 Peak Defl Upper ✓
 Peak Defl Lower ✓

Ilacon
 CRASII

ATD Calibration Lab

Test ID	Part Serial Number	Test Date	Test Time
	79574	11/5/2014	8:30 PM
Cert ID	ATD Serial Number	ATD Type	
	N/A	SIDIIs	

Current Date : 11/5/2014

Current Time : 20:32:03

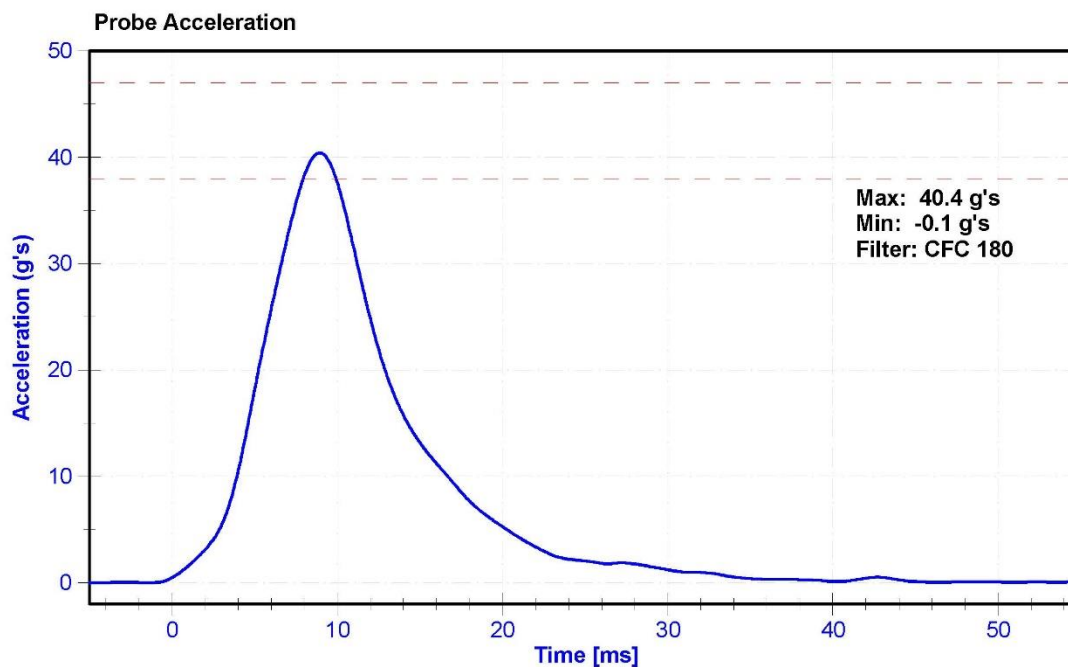
ATD Manufacturer	FTSS	Test Technician	M. Geesey
ATD Serial Number	DG8012	Laboratory Supervisor	M. Goehle

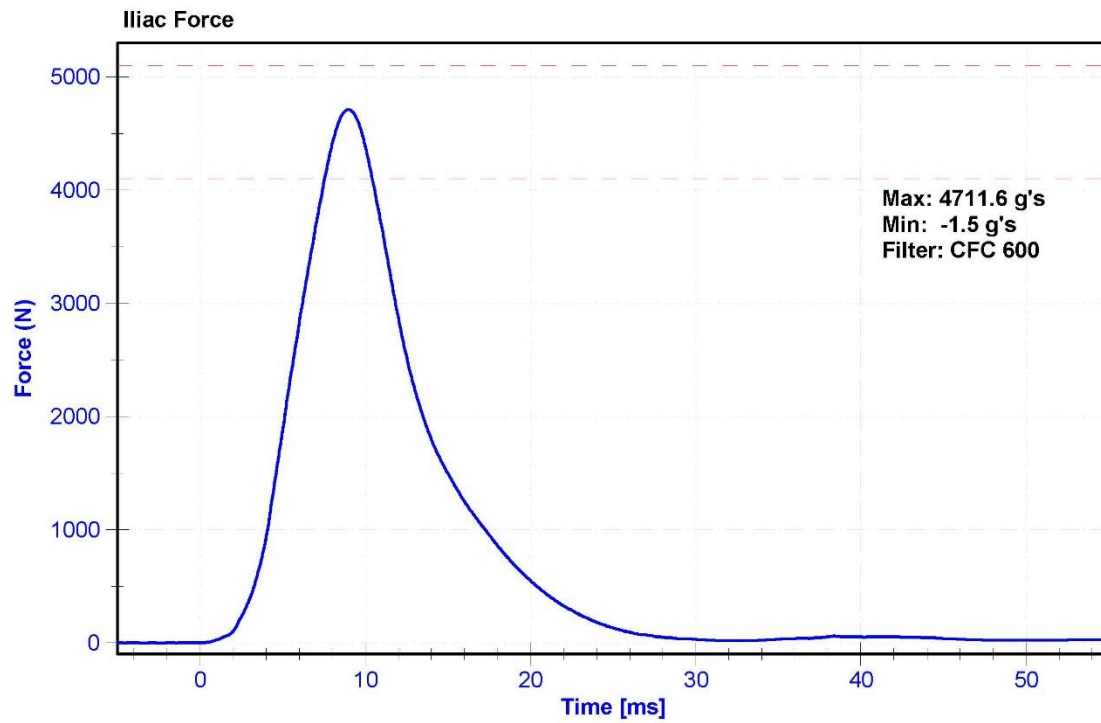
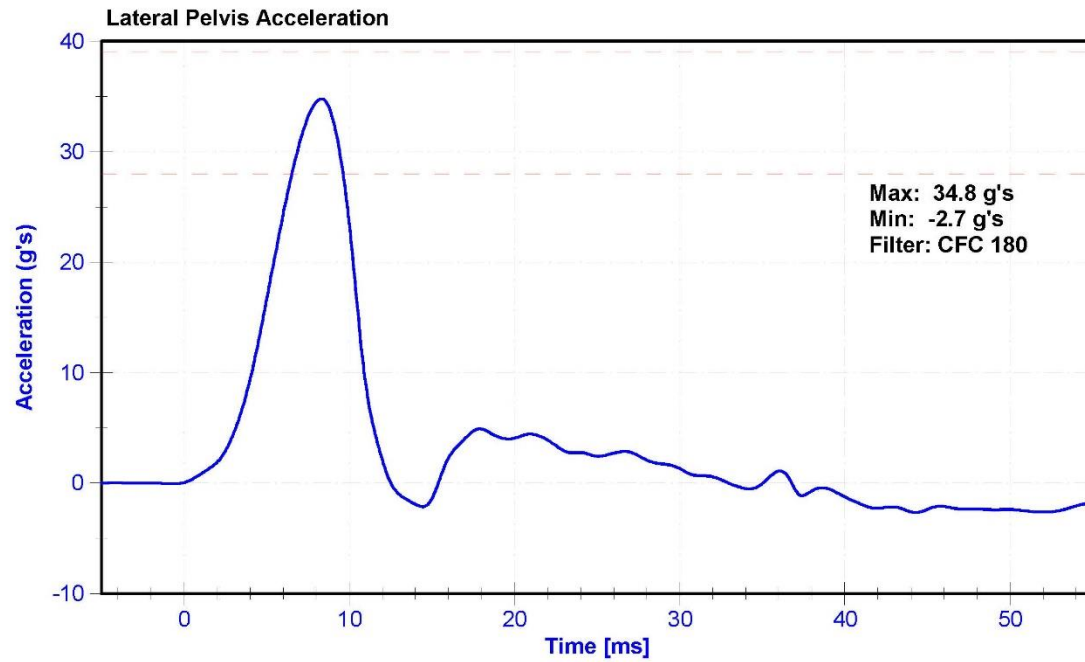
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.6	Pass
Humidity	10	70	%	33.6	Pass
Velocity	4.2	4.4	m/s	4.39	Pass
Probe Acceleration	36	45	g's	40.4	Pass
Lateral Pelvis Acceleration	28	39	g's	34.8	Pass
Iliac Force	4100	5100	N	4711.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P63561	9/3/2015	3/3/2016
Iliac Load Cell	DENTON 3228J	LC-281Fy	6/30/2015	6/29/2016





CALIBRATION TEST RESULTS

POST-TEST

SID-IIS 5TH PERCENTILE FEMALE - DRIVER ATD

SERIAL NO: DG8012

(CONFIGURED FOR LEFT SIDE IMPACT)

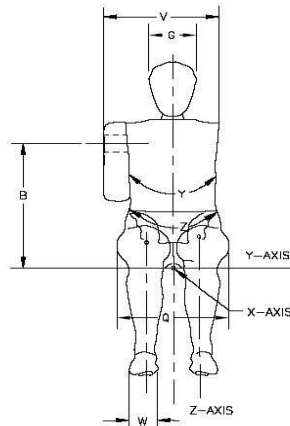
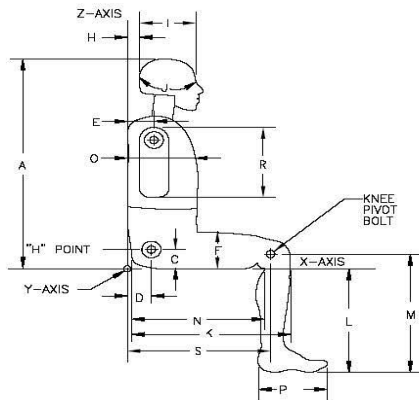


External Measurements - SID-IIs

Technician: M. Goehle

Date: 3/22/2016

Dummy Serial Number: DG8012



Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	781	Pass
B	Shoulder Pivot Height	437	453	445	Pass
C	H-point Height	79	89	86	Pass
D	H-point from seatback	141	151	147	Pass
E	Shoulder Pivot from Backline	97	107	103	Pass
F	Thigh Clearance	119	135	128	Pass
G	Head Breadth	140	148	144	Pass
H	Head Back from Backline	40	46	43	Pass
I	Head Depth	178	188	183	Pass
J	Head Circumference	541	551	547	Pass
K	Buttock to Knee Length	514	540	539	Pass
L	Popliteal Height	343	369	351	Pass
M	Knee Pivot to floor height	392	409	400	Pass
N	Buttock Popliteal Length	416	442	430	Pass
O	Chest Depth w/o jacket	195	211	207	Pass
P	Foot Length	216	232	221	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	319	Pass
R	Arm Length	249	259	253	Pass
S	Knee Joint to seatback	477	493	481	Pass
V	Shoulder Width	341	357	352	Pass
W	Foot Width	78	94	84	Pass
Y	Chest Circumference w/jacket	851	881	863	Pass
Z	Waist Circumference	761	791	771	Pass

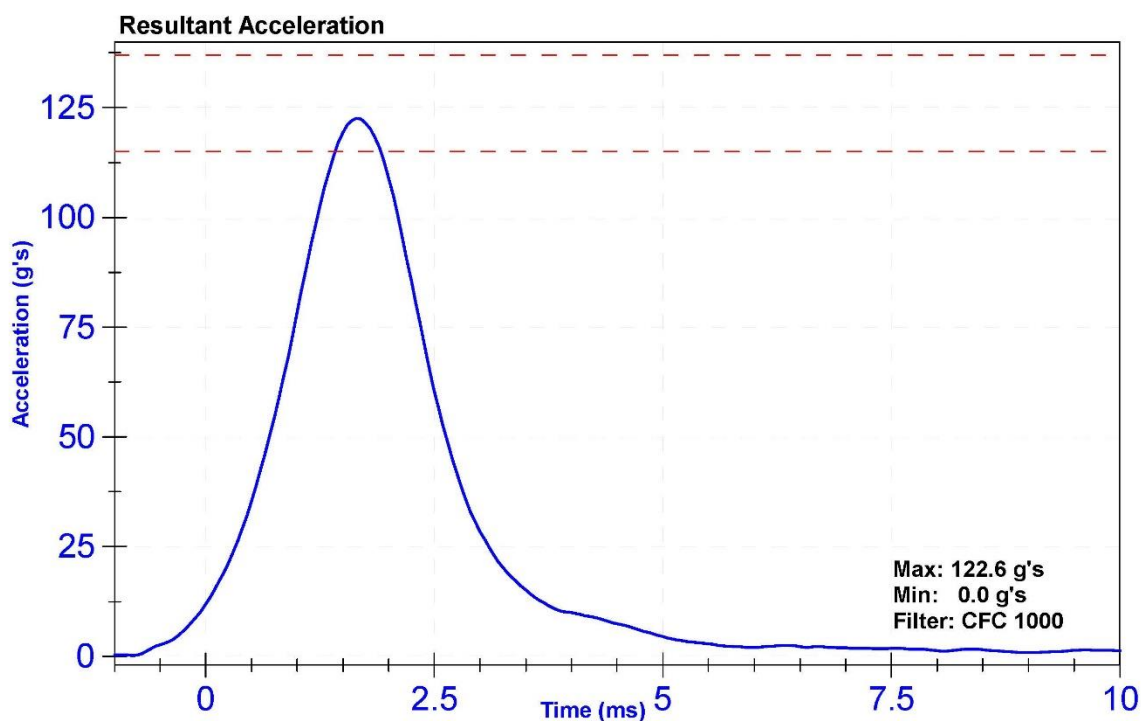
ATD Manufacturer	FTSS	Test Technician	M. Goehle
ATD Serial Number	DG8012	Laboratory Supervisor	M. Goehle

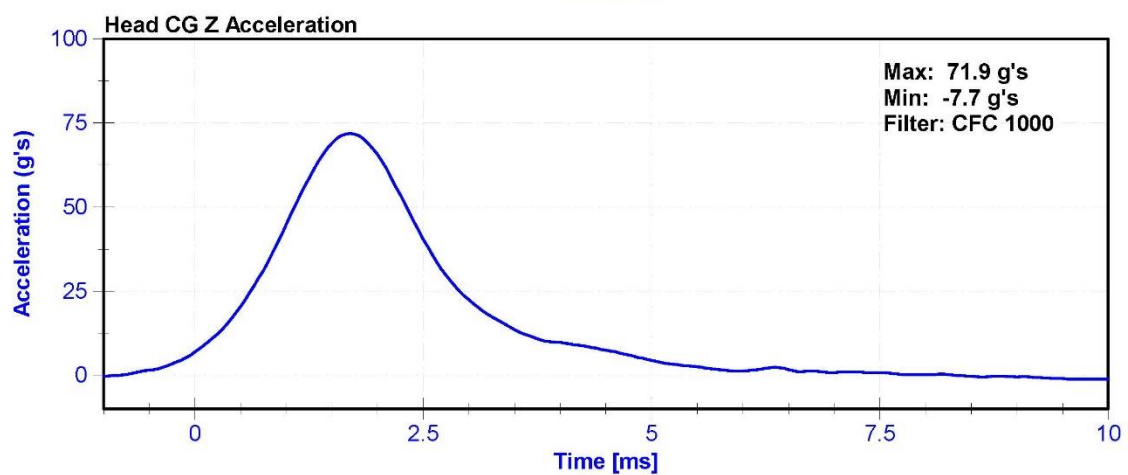
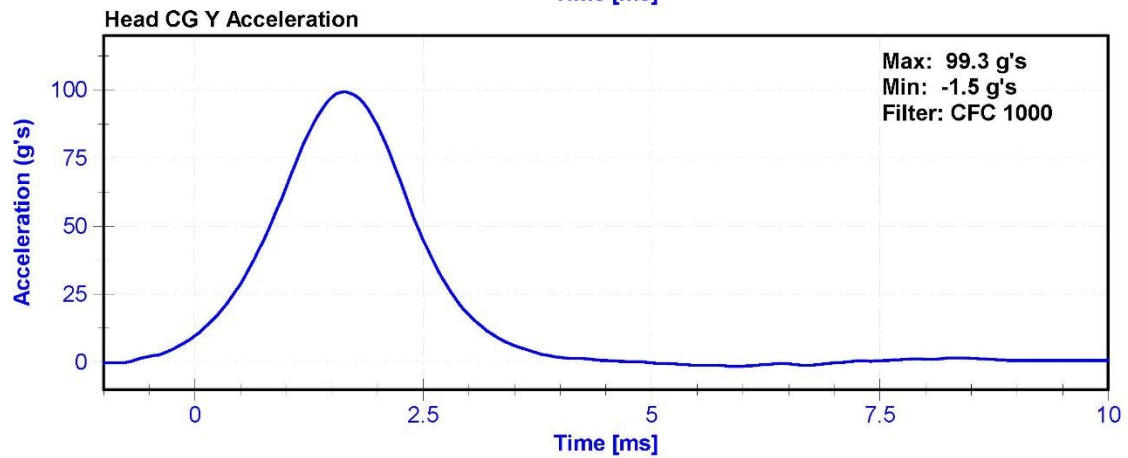
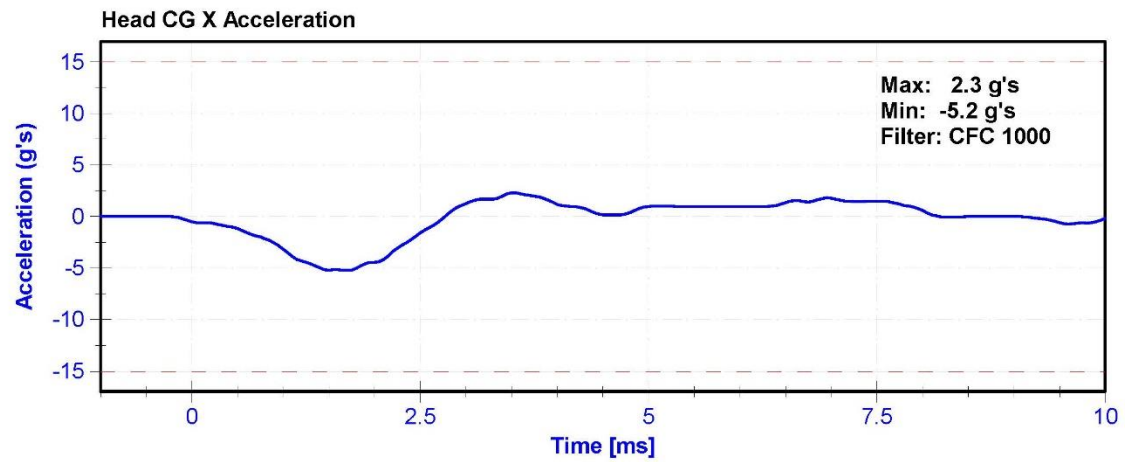
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.8	Pass
Humidity	10	70	%	25.4	Pass
Resultant Acceleration	115	137	g's	122.6	Pass
Oscillation	0	15	%	12.5	Pass
Fore-Aft Acceleration	-15	15	g's	-5.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264CT	AC-P51685	11/12/2015	5/12/2016
Y Accelerometer	ENDEVCO 7264CT	AC-P51682	11/12/2015	5/12/2016
Z Accelerometer	ENDEVCO 7264CT	AC-P51699	11/12/2015	5/12/2016





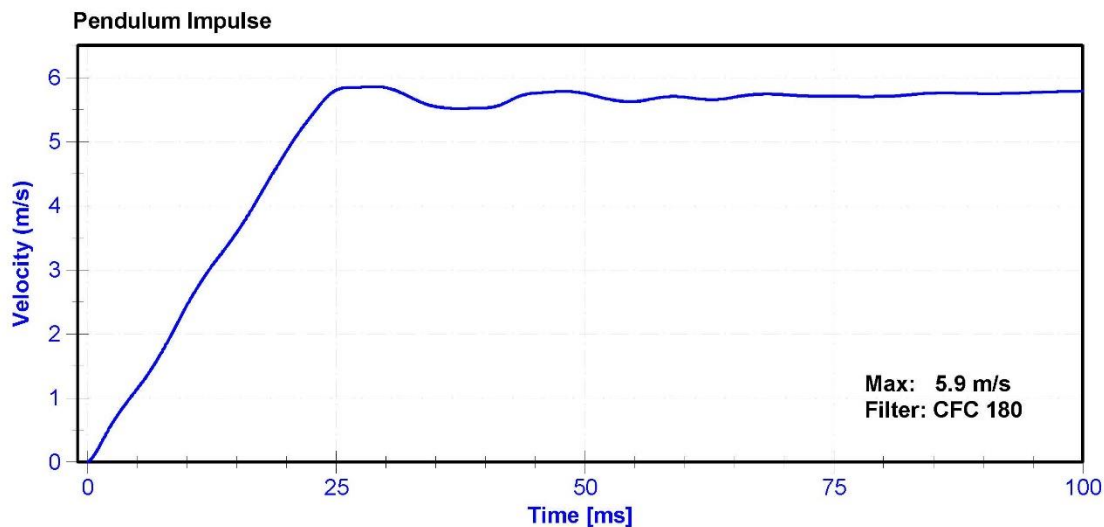
ATD Manufacturer	FTSS	Test Technician	M. Goehle
ATD Serial Number	DG8012	Laboratory Supervisor	M. Goehle

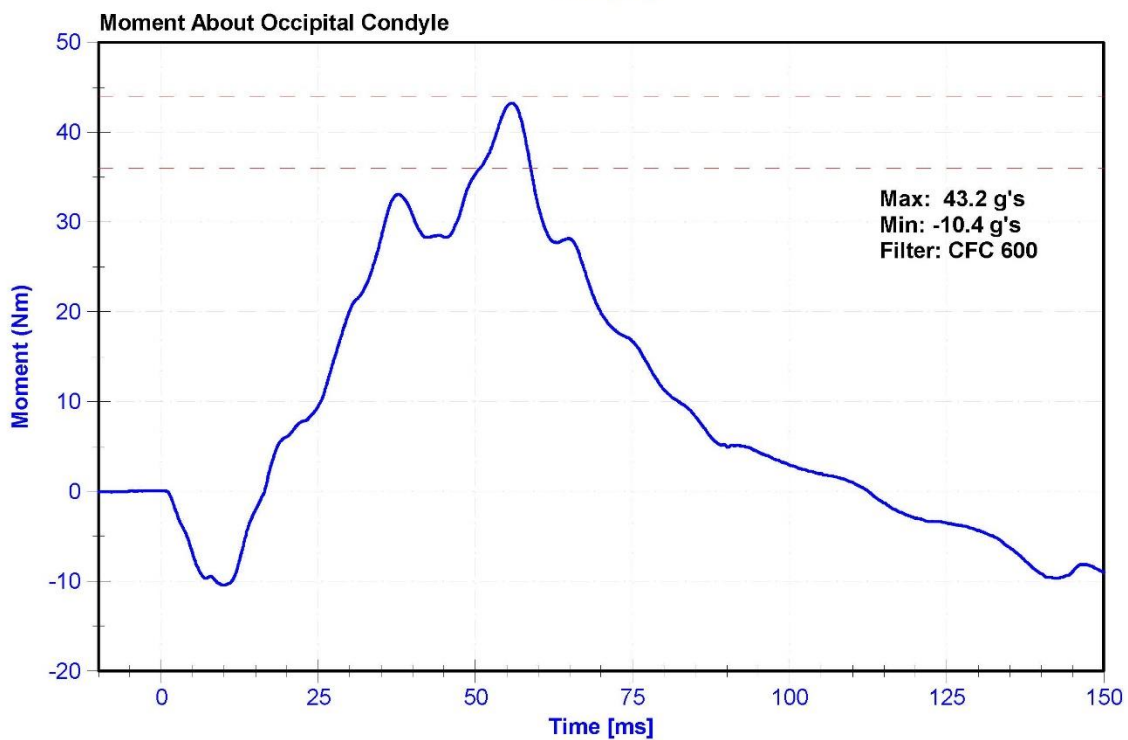
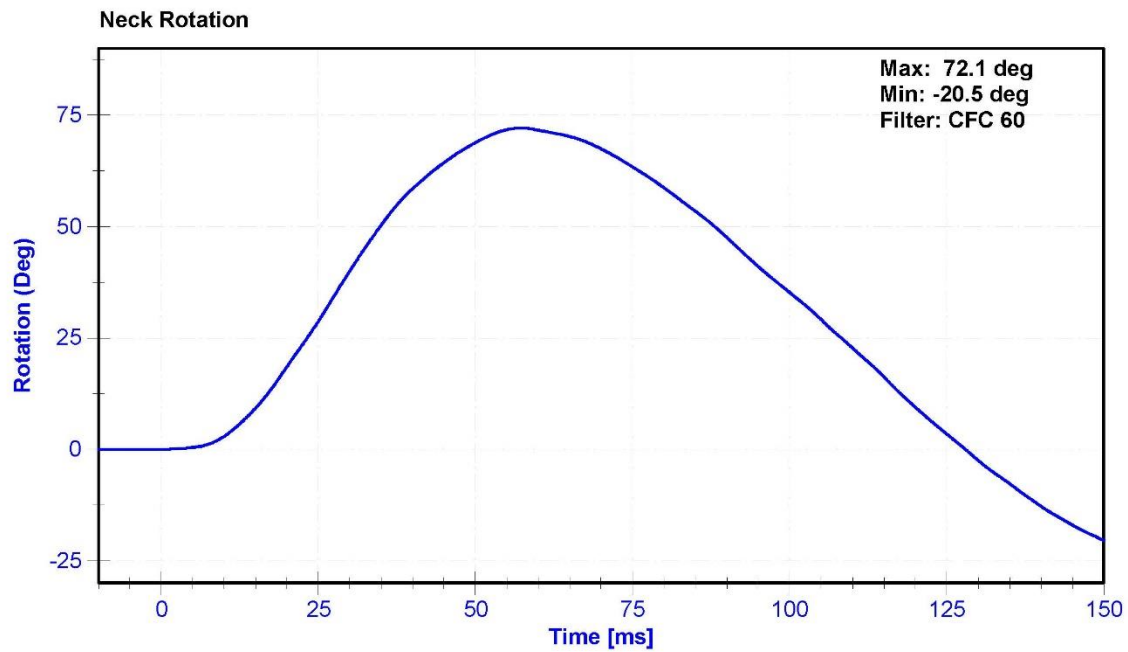
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.8	Pass
Humidity	10	70	%	25.6	Pass
Velocity	5.51	5.63	m/s	5.583	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.45	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.58	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.85	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.81	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.86	Pass
Neck Rotation	71	81	deg	72.1	Pass
Time at Maximum Rotation	50	70	ms	57.3	Pass
Moment about the OC	36	44	Nm	43.2	Pass
Moment Decay to 0 Nm	102	126	ms	112.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/7/2015	5/6/2016
Pendulum Potentiometer	Denton 78051-342	DS-174Pend	9/24/2015	9/23/2016
Condyle Potentiometer	Denton 78051-342	DS-185Pend	9/25/2015	9/24/2016
Upper Neck Load Cell	Denton 1716A	LC-1916Fy	6/29/2015	6/28/2016





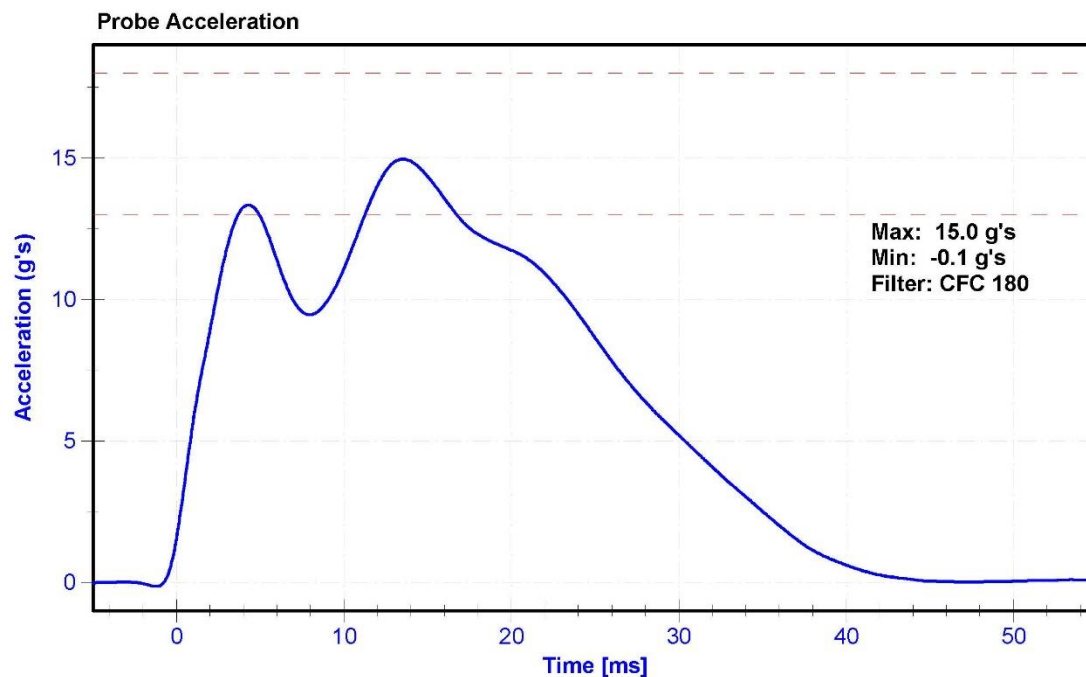
ATD Manufacturer	FTSS	Test Technician	M. Goehle
ATD Serial Number	DG8012	Laboratory Supervisor	M. Goehle

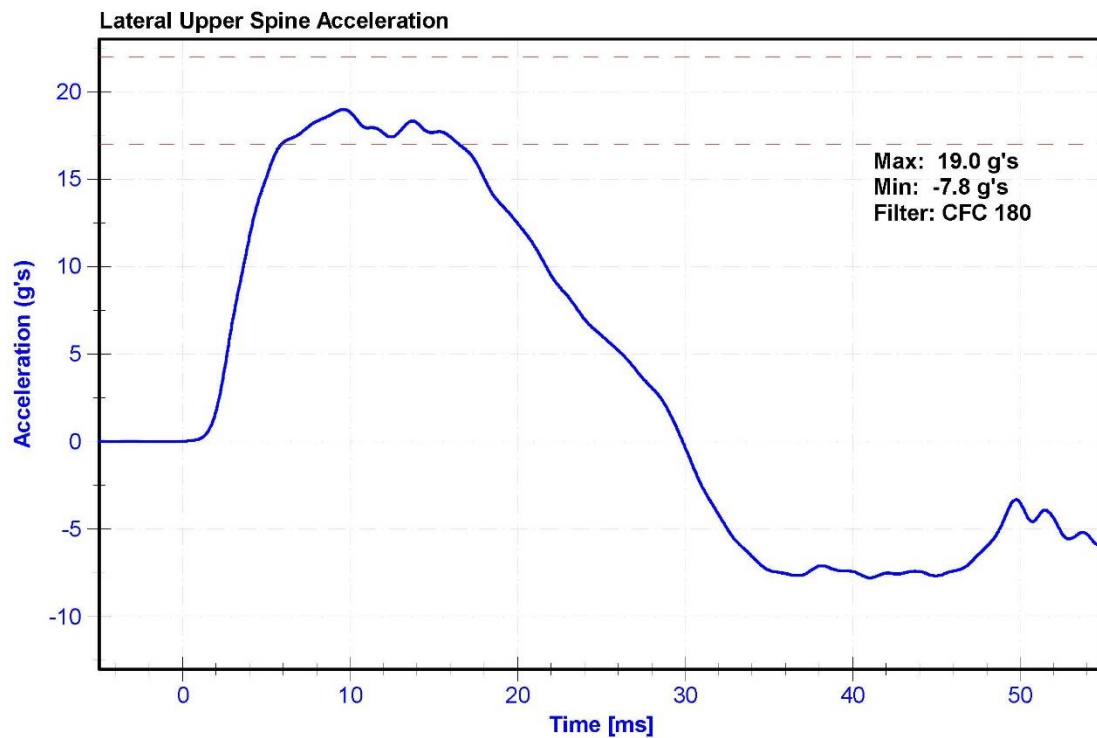
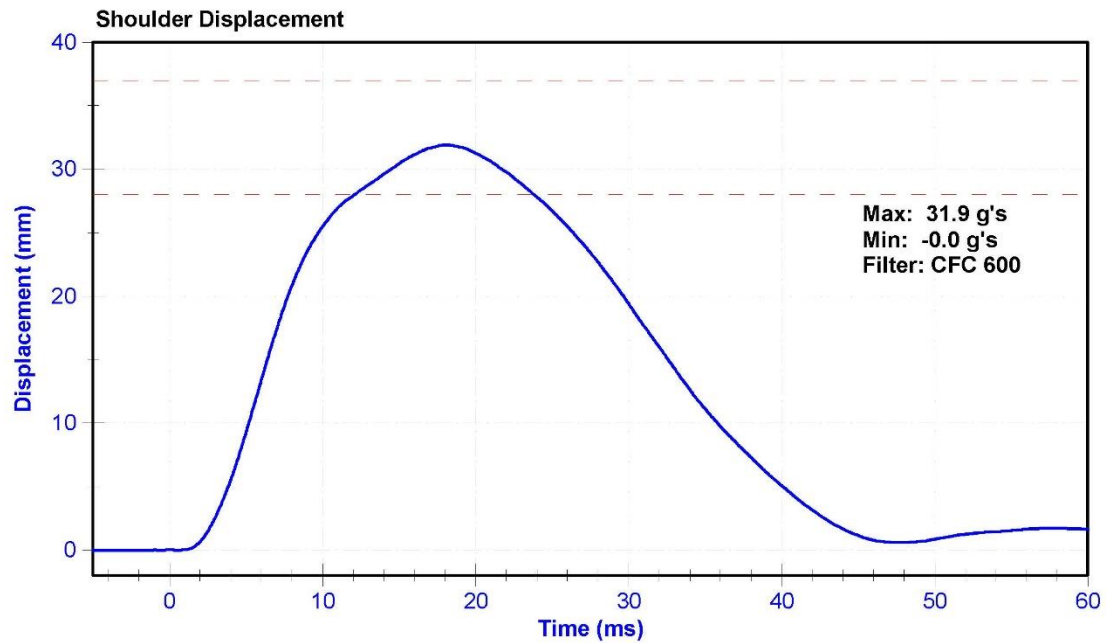
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.5	Pass
Humidity	10	70	%	30.6	Pass
Velocity	4.2	4.4	m/s	4.35	Pass
Probe Acceleration	13	18	g's	15.0	Pass
Shoulder Deflection	28	37	mm	31.9	Pass
Lateral Upper Spine Acceleration	17	22	g's	19.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016
Shoulder Potentiometer	Servo 08TC1-3745	DS-1845GFE	9/24/2015	9/23/2016
Upper Spine Y Accelerometer	ENDEVCO 7264CT	AC-P51875	3/23/2016	9/23/2016





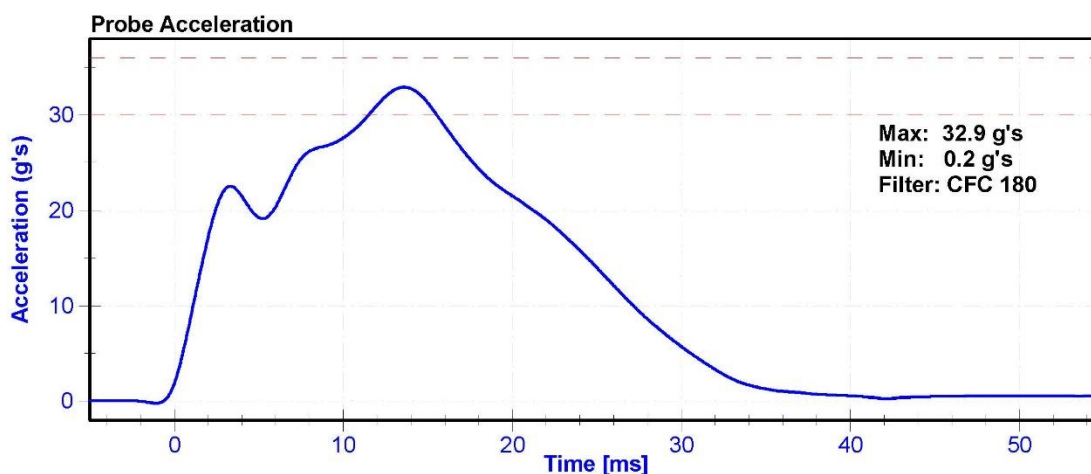
ATD Manufacturer	FTSS	Test Technician	M. Goehle
ATD Serial Number	DG8012	Laboratory Supervisor	M. Goehle

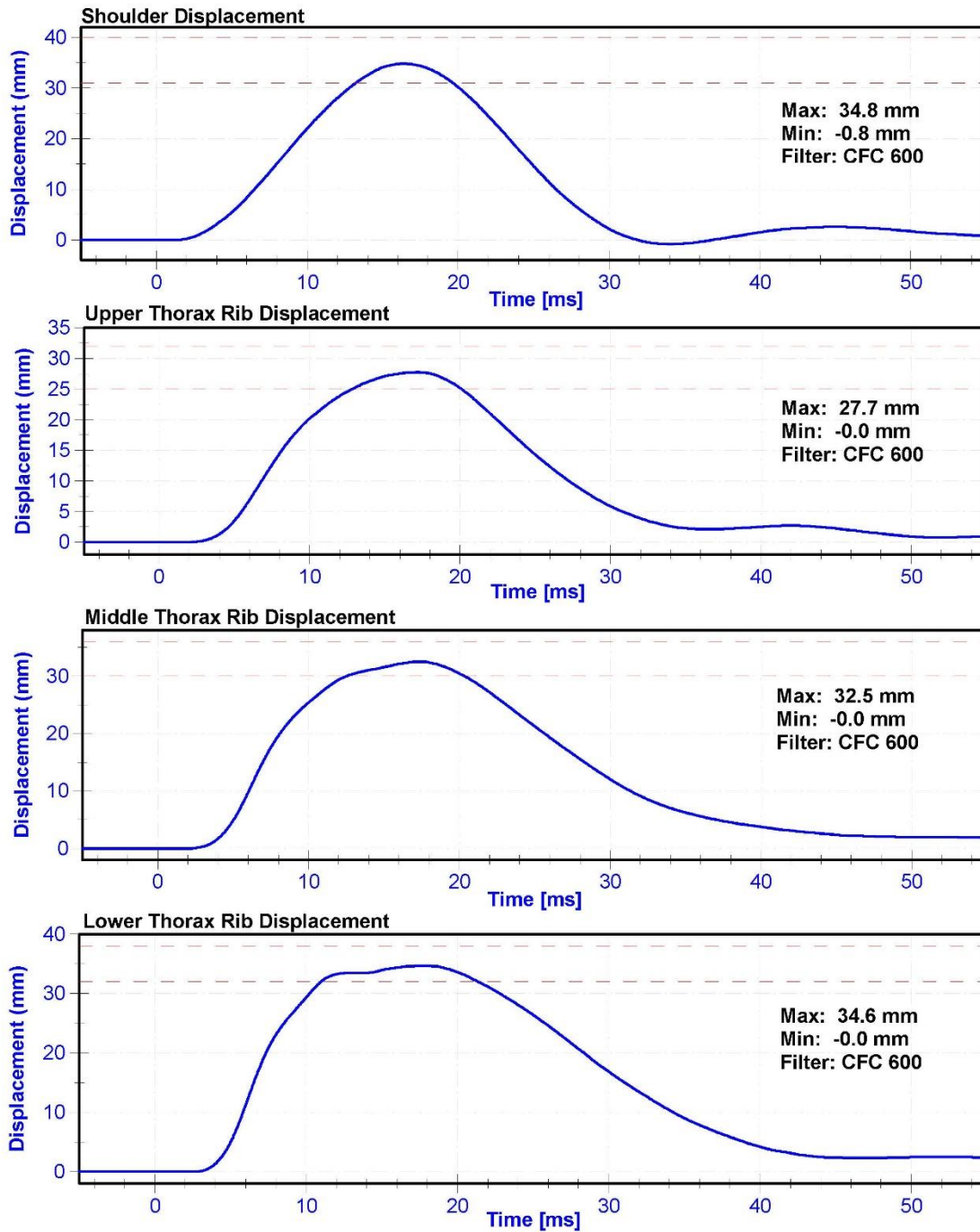
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.5	Pass
Humidity	10	70	%	28.8	Pass
Velocity	6.6	6.8	m/s	6.67	Pass
Probe Acceleration after 5 ms	30	36	g's	32.9	Pass
Lateral Upper Spine Acceleration	34	43	g's	39.2	Pass
Lateral Lower Spine Acceleration	29	37	g's	34.1	Pass
Shoulder Deflection	31	40	mm	34.8	Pass
Upper Thorax Rib Deflection	25	32	mm	27.7	Pass
Mid Thorax Rib Deflection	30	36	mm	32.5	Pass
Lower Thorax Rib Deflection	32	38	mm	34.6	Pass

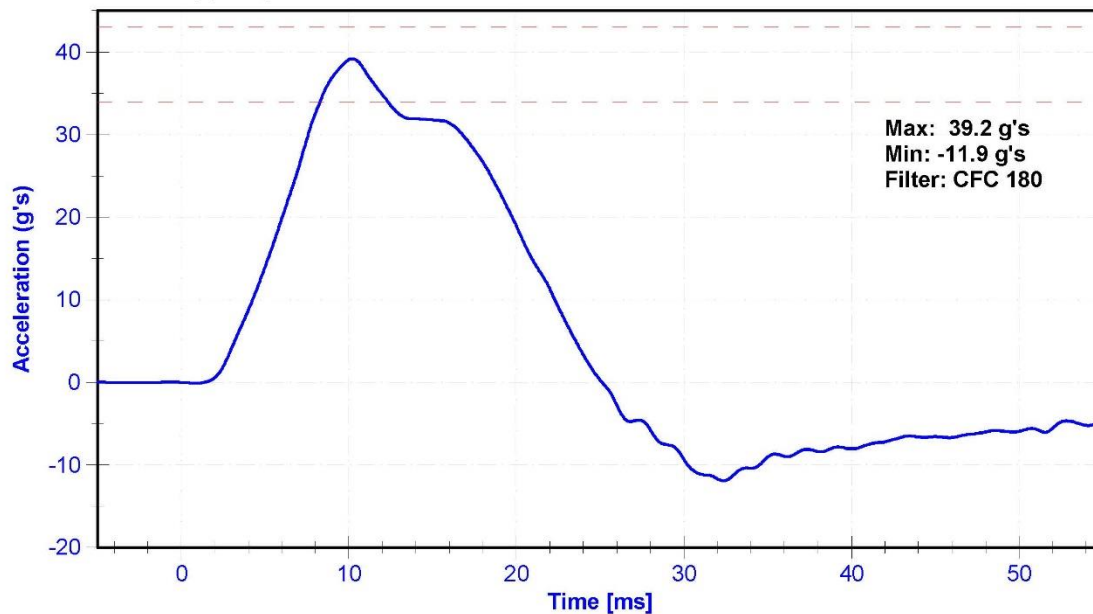
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016
Upper Spine T1 Y Accelerometer	ENDEVCO 7264CT	AC-P51875	3/23/2016	9/23/2016
Upper Spine T12 Y Accelerometer	ENDEVCO 7264	AC-P83319	3/23/2016	9/23/2016
Shoulder Potentiometer	Servo 08TC1-3745	DS-1845GFE	9/24/2015	9/23/2016
Upper Thorax Rib Potentiometer	Servo 08TC1-3621	DS-808GFE	9/24/2015	9/23/2016
Middle Thorax Rib Potentiometer	Servo 08TC1-3745	DS-1514GFE	9/24/2015	9/23/2016
Lower Thorax Rib Potentiometer	Servo 08TC1-3787	DS-011GFE	9/24/2015	9/23/2016

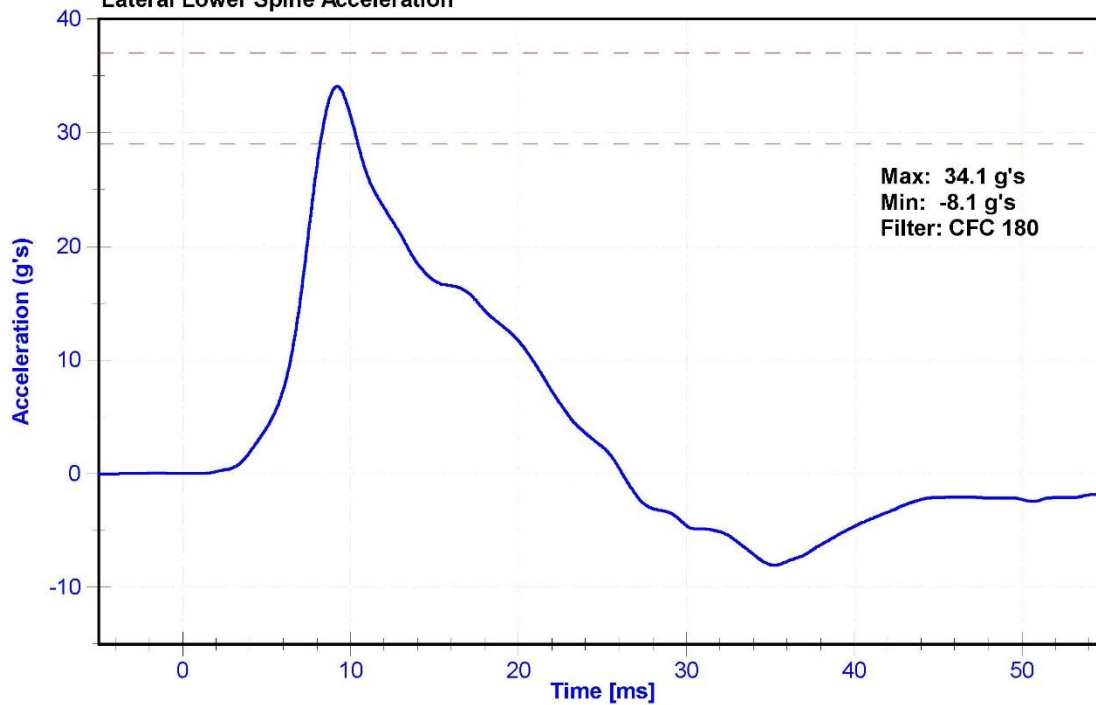




Lateral Upper Spine Acceleration



Lateral Lower Spine Acceleration



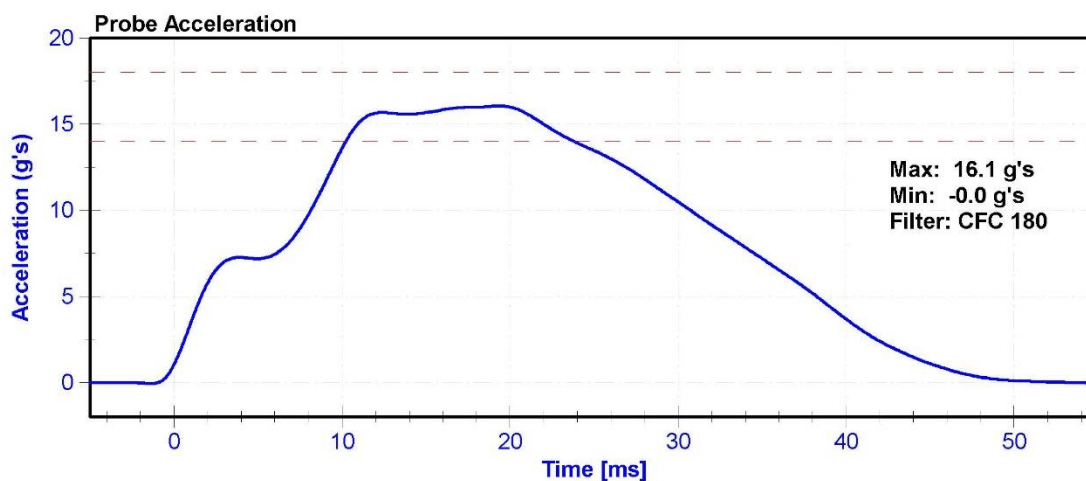
ATD Manufacturer	FTSS	Test Technician	M. Goehle
ATD Serial Number	DG8012	Laboratory Supervisor	M. Goehle

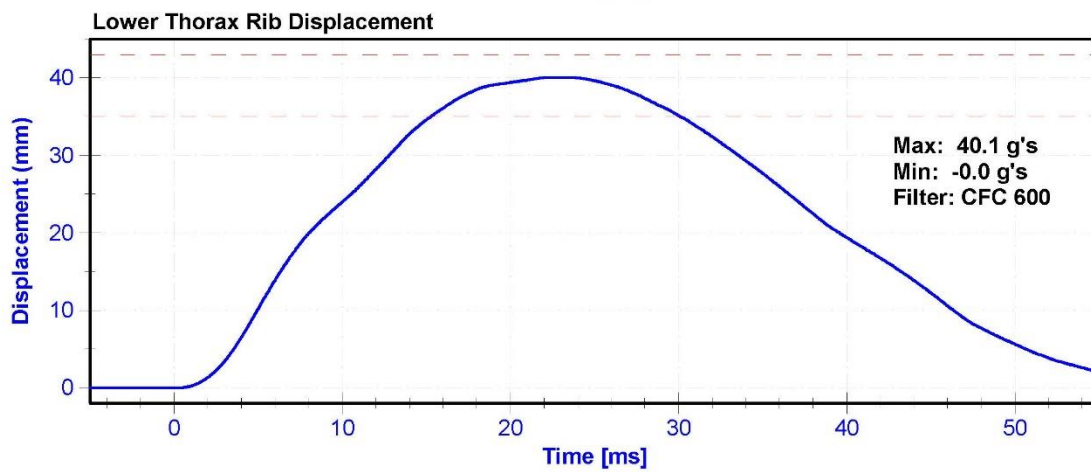
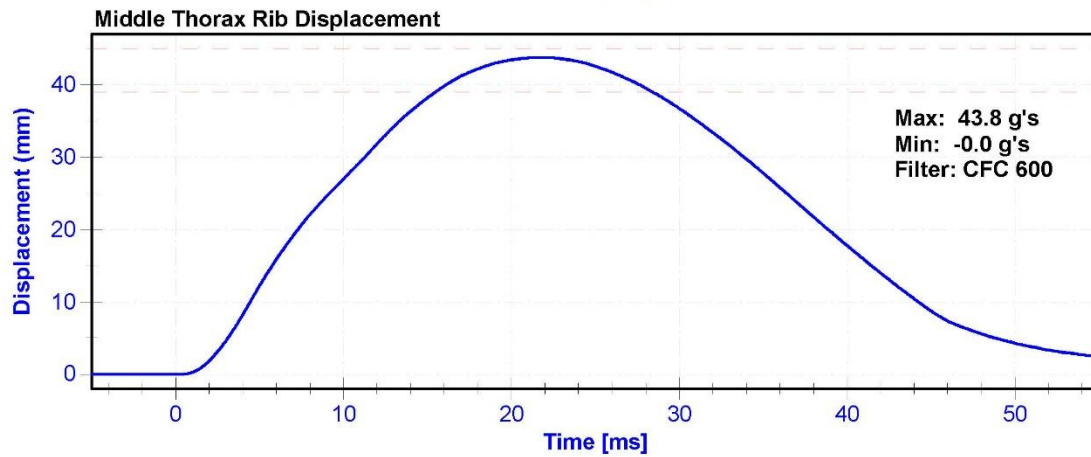
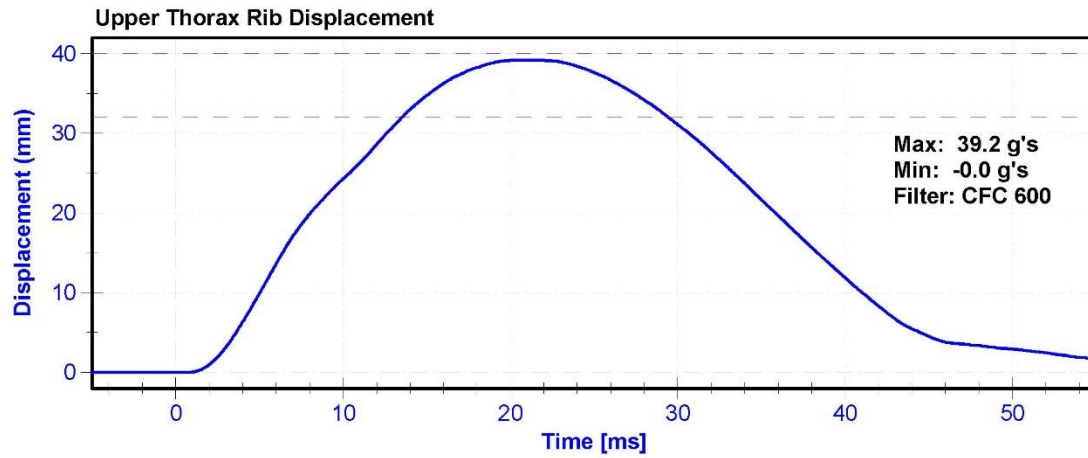
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.6	Pass
Humidity	10	70	%	30.5	Pass
Velocity	4.2	4.4	m/s	4.35	Pass
Probe Acceleration	14	18	g's	16.1	Pass
Lateral Upper Spine Acceleration	13	17	g's	16.0	Pass
Lateral Lower Spine Acceleration	7	11	g's	9.9	Pass
Upper Thorax Rib Deflection	32	40	mm	39.2	Pass
Middle Thorax Rib Deflection	39	45	mm	43.8	Pass
Lower Thorax Rib Deflection	35	43	mm	40.1	Pass

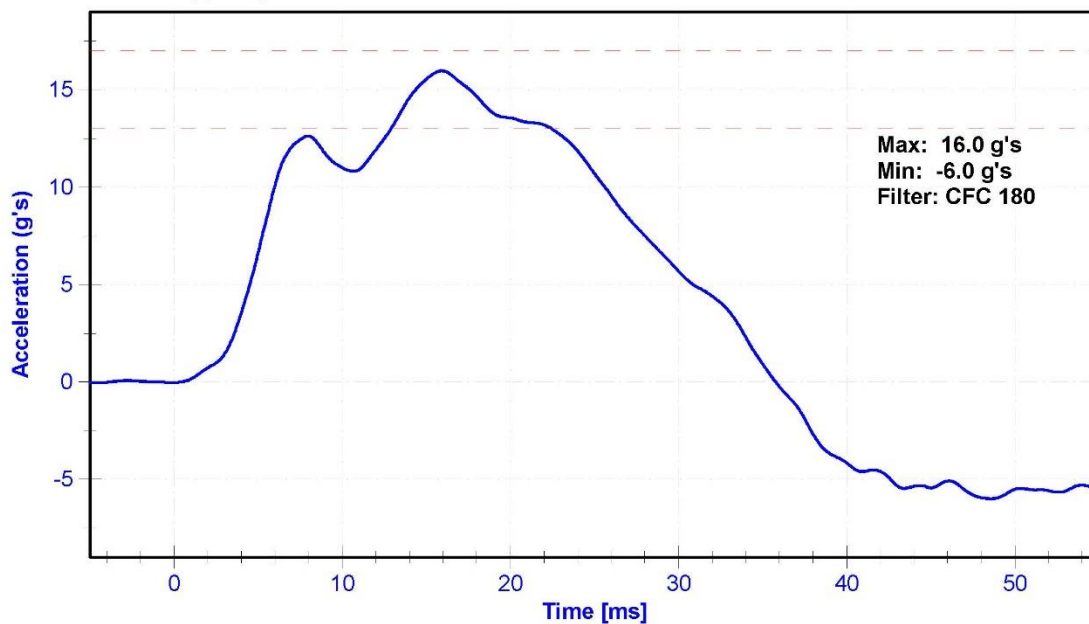
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016
Upper Spine Y Accelerometer	ENDEVCO 7264CT	AC-P51875	3/23/2016	9/23/2016
Lower Spine Y Accelerometer	ENDEVCO 7264	AC-P83322	3/23/2016	9/23/2016
Upper Thorax Rib Potentiometer	Servo 08TC1-3621	DS-808GFE	9/24/2015	9/23/2016
Middle Thorax Rib Potentiometer	Servo 08TC1-3745	DS-1514GFE	9/24/2015	9/23/2016
Lower Thorax Rib Potentiometer	Servo 08TC1-3787	DS-011GFE	9/24/2015	9/23/2016

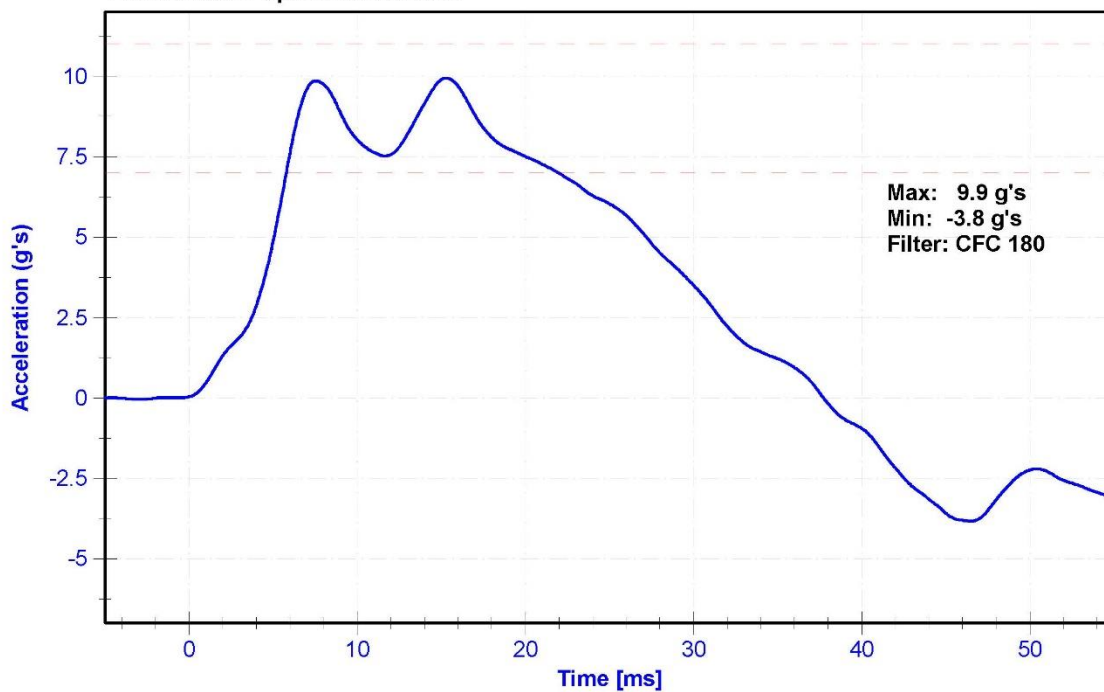




Lateral Upper Spine Acceleration



Lateral Lower Spine Acceleration



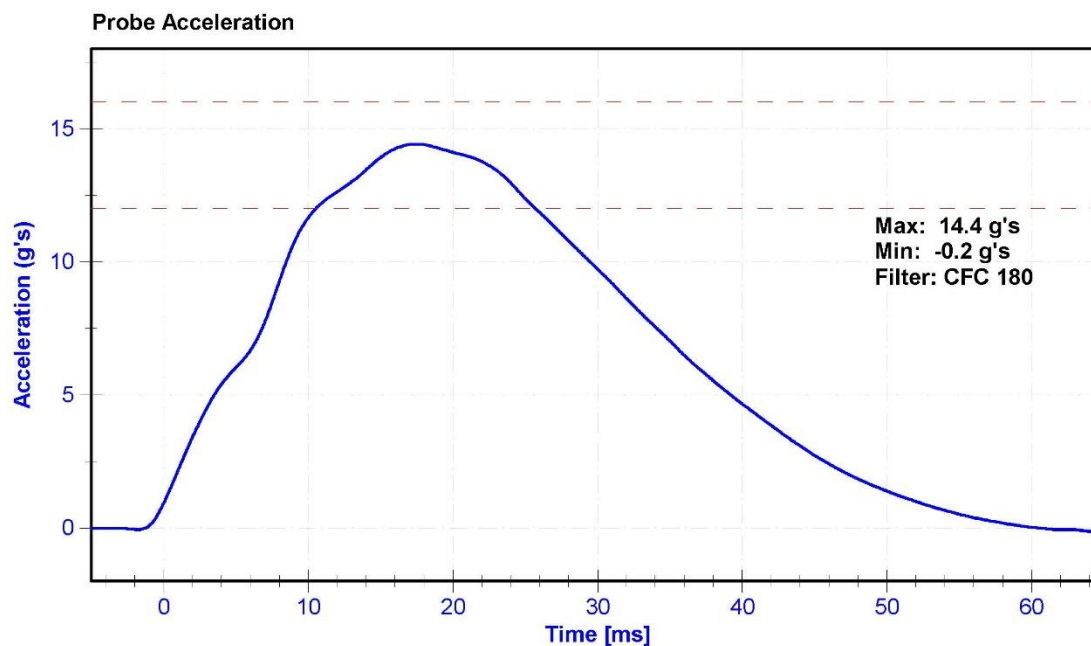
ATD Manufacturer	FTSS	Test Technician	M. Goehle
ATD Serial Number	DG8012	Laboratory Supervisor	M. Goehle

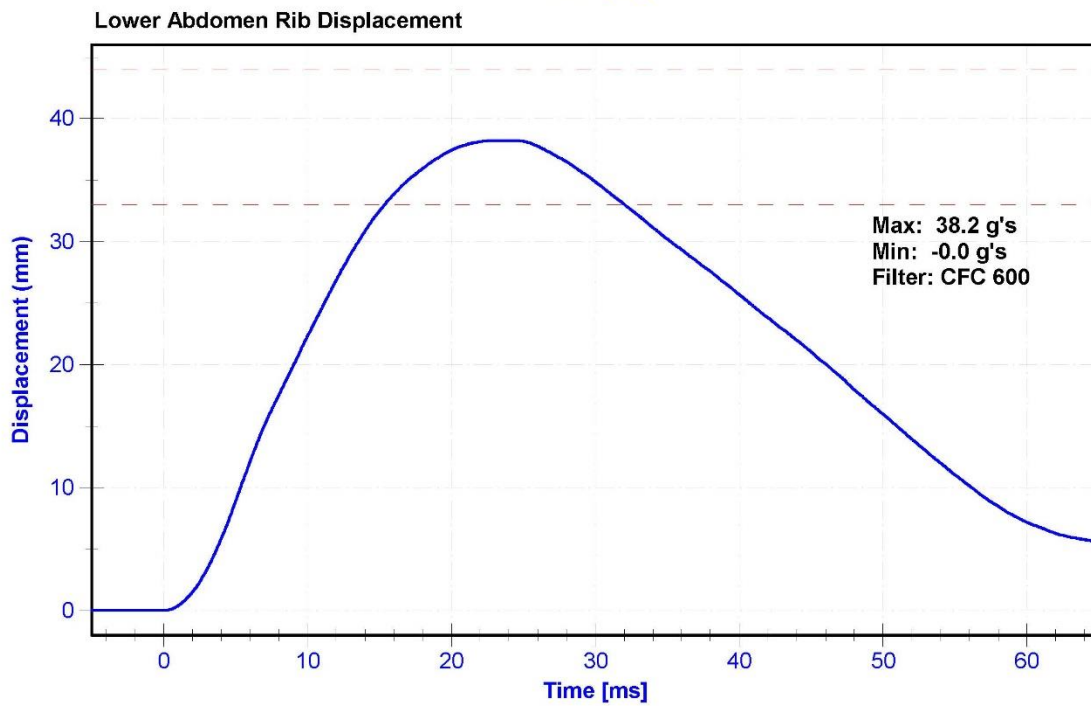
Results

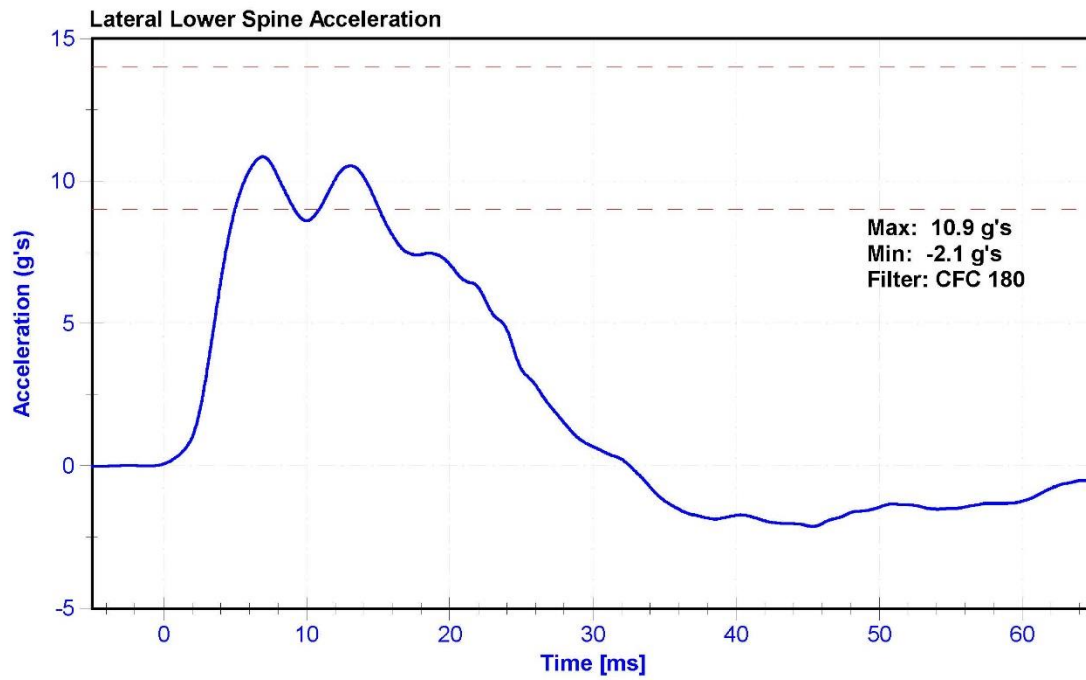
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.6	Pass
Humidity	10	70	%	30.5	Pass
Velocity	4.2	4.4	m/s	4.35	Pass
Probe Acceleration	12	16	g's	14.4	Pass
Lateral Lower Spine Acceleration	9	14	g's	10.9	Pass
Upper Abdomen Rib Deflection	36	47	mm	44.7	Pass
Lower Abdomen Rib Deflection	33	44	mm	38.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016
Lower Spine Y Accelerometer	ENDEVCO 7264	AC-P83319	3/23/2016	9/23/2016
Upper Abdomen Rib Potentiometer	Servo 08TC1-3787	DS-015GFE	9/24/2015	9/23/2016
Lower Abdomen Rib Potentiometer	Servo 08TC1-3745	DS-1774GFE	9/24/2015	9/23/2016







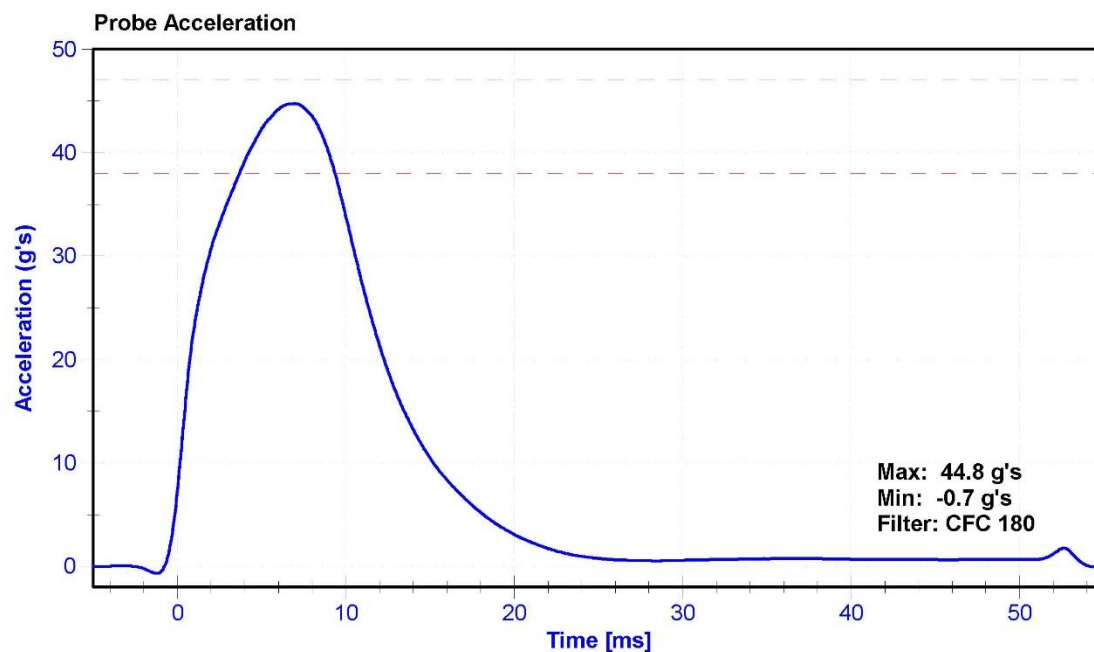
ATD Manufacturer	FTSS	Test Technician	M. Goehle
ATD Serial Number	DG8012	Laboratory Supervisor	M. Goehle

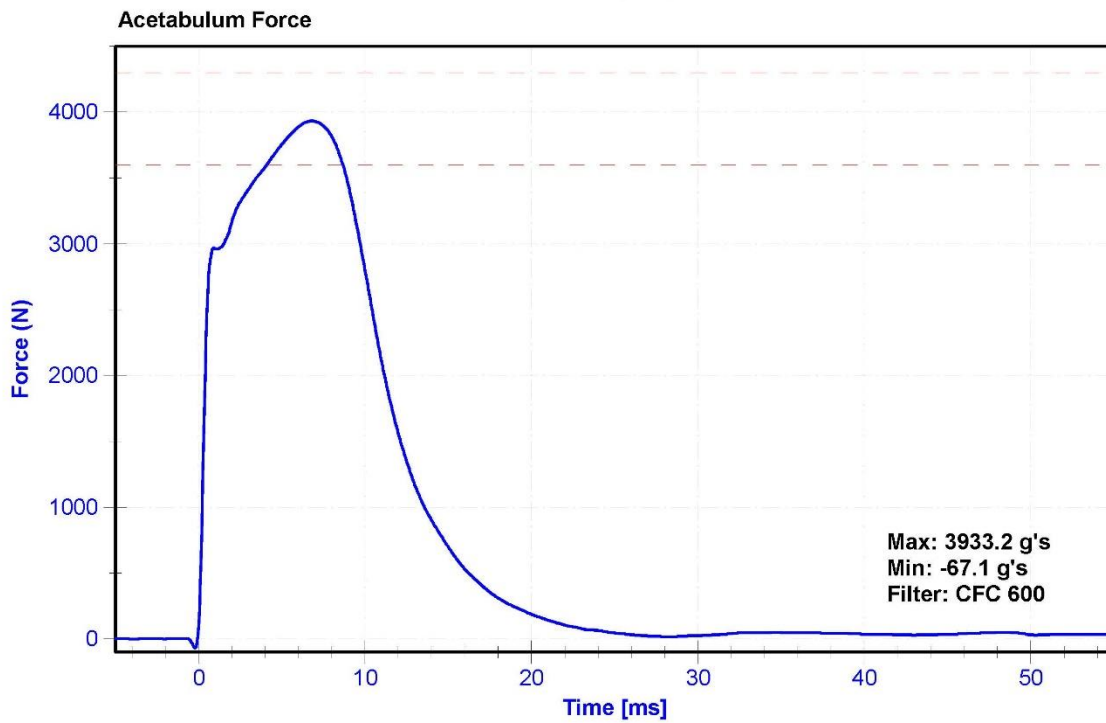
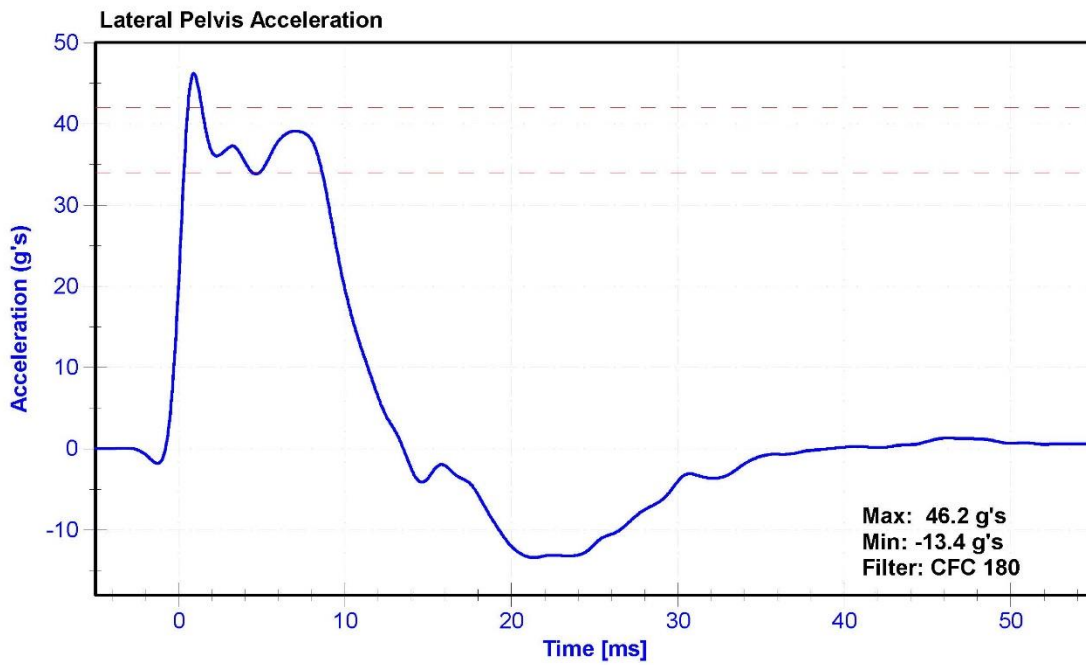
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.7	Pass
Humidity	10	70	%	31.2	Pass
Velocity	6.6	6.8	m/s	6.60	Pass
Probe Acceleration	38	47	g's	44.8	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	39.1	Pass
Acetabulum Force	3600	4300	N	3933.2	Pass

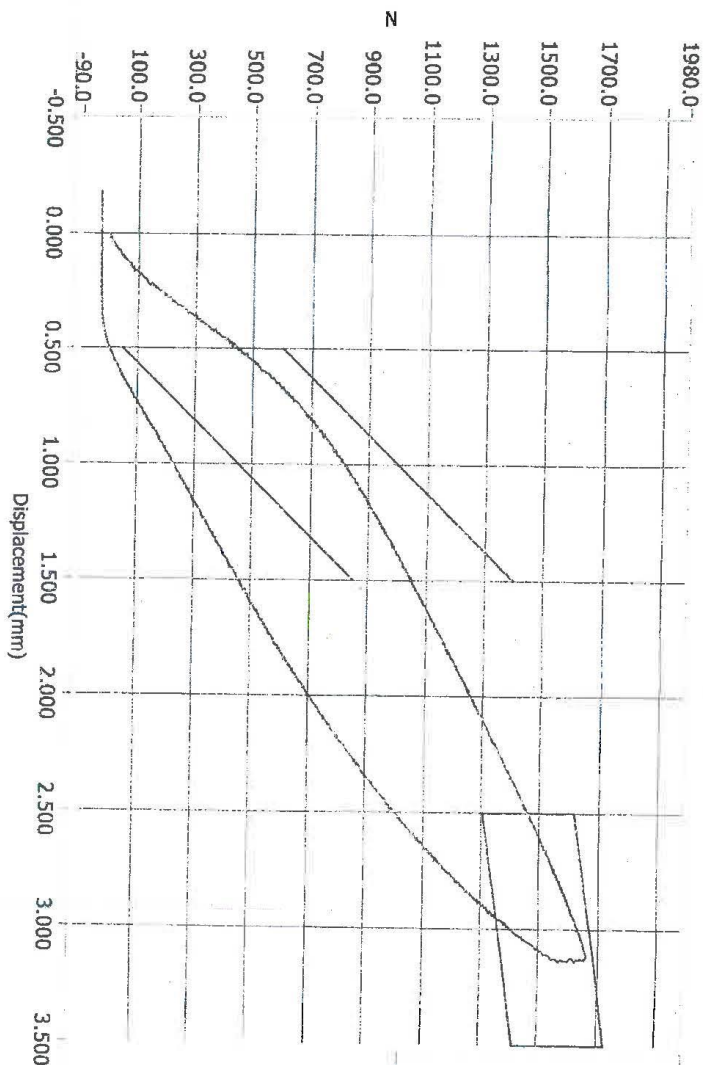
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P63561	3/23/2016	9/23/2016
Acetabulum Load Cell	Denton 3249J	LC-267Fy	6/30/2015	6/29/2016
Certification Plug	Humanetics	70961	12/13/2013	N/A
Crash Test Plug	Humanetics	78189	10/1/2014	N/A





Resultant Data - SIDIIS Plug Compression



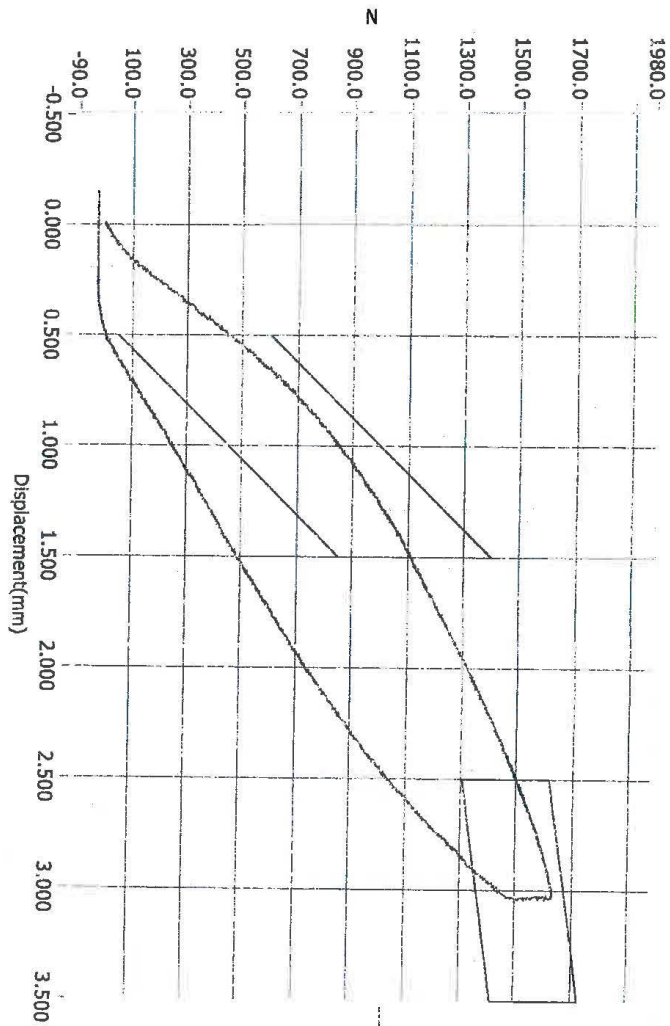
ATD Calibration Lab

Test ID	Part Serial Number	Test Date	Test Time
78189	78189	10/1/2014	11:57 AM
Cell ID	ATD Serial Number	ATD Type	
	N/A	SIDIIS	

Current Date : 10/1/2014

Current Time : 12:00:14

Resultant Data - SIDIIS Plug Compression



Loading Curve ✓
 Boundary Limit Upper ✓
 Boundary Limit Lower ✓
 Peak Load Upper ✓
 Peak Load Lower ✓
 Peak Defl Upper ✓
 Peak Defl Lower ✓

1628N
 Cert
 D68012

ATD Calibration Lab

Test ID	Part Serial Number	Test Date	Test Time
Cert ID	70961	12/13/2013	10:30 PM
	ATD Serial Number	ATD Type	
	N/A	SIDIIS	

Current Date : 12/13/2013

Current Time : 22:31:09

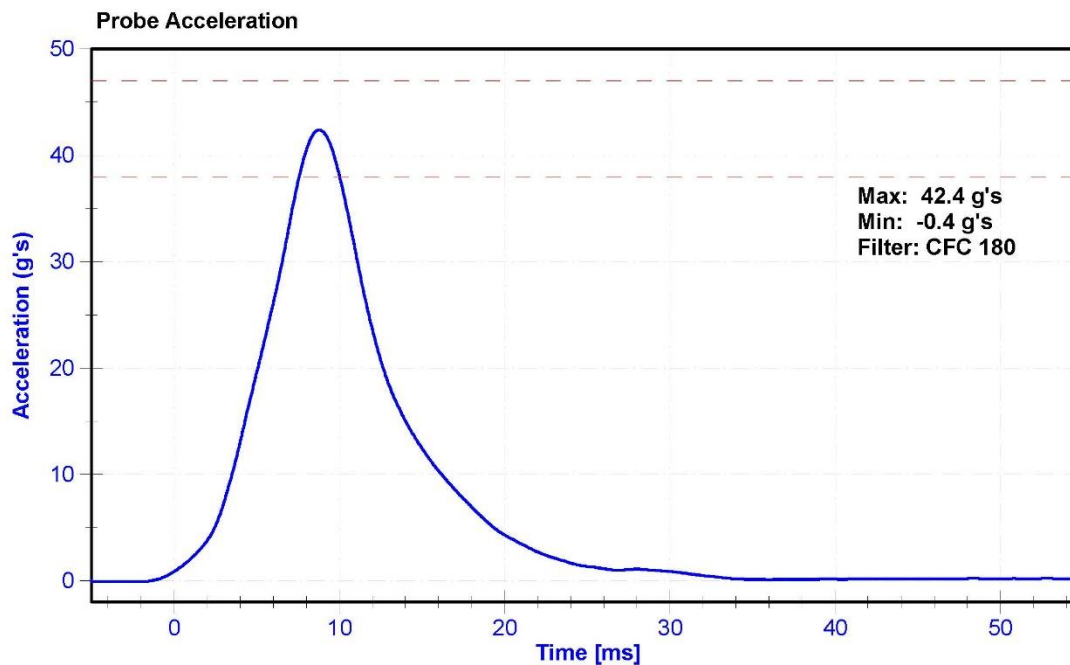
ATD Manufacturer	FTSS	Test Technician	M. Goehle
ATD Serial Number	DG8012	Laboratory Supervisor	M. Goehle

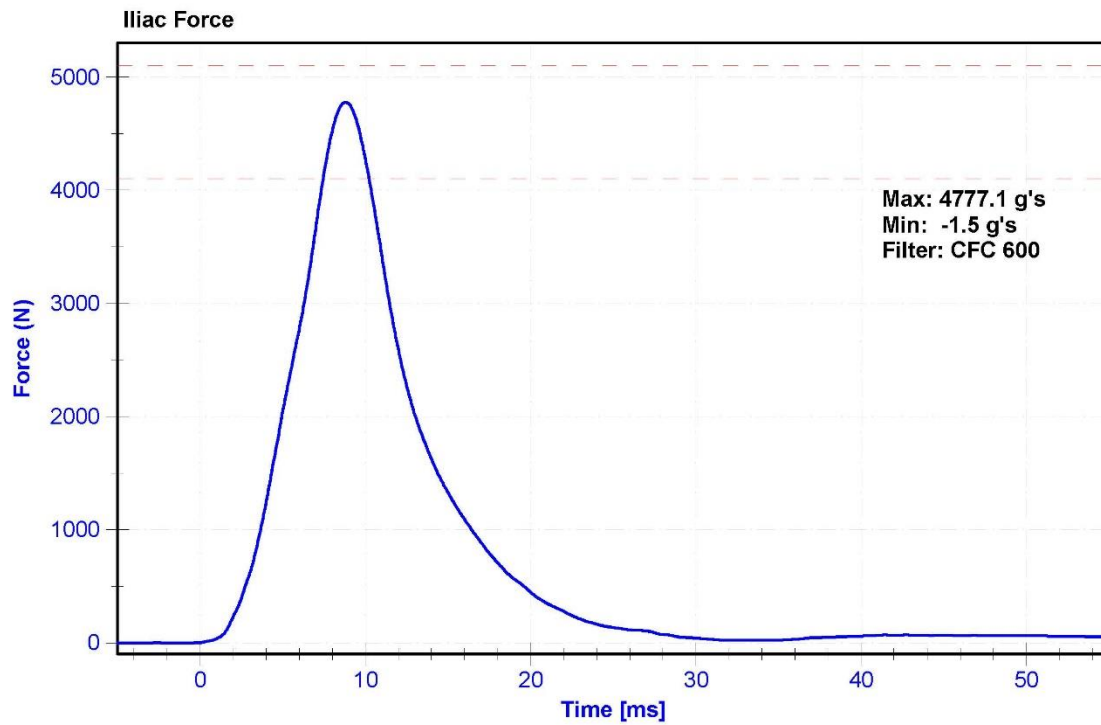
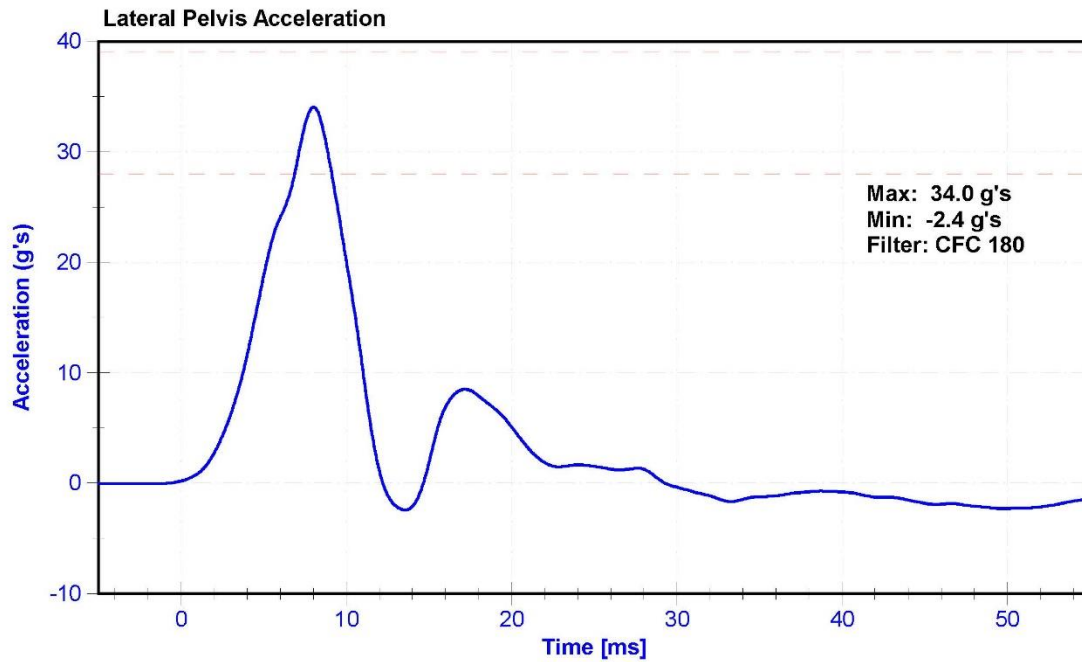
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.5	Pass
Humidity	10	70	%	31.6	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	36	45	g's	42.4	Pass
Lateral Pelvis Acceleration	28	39	g's	34.0	Pass
Iliac Force	4100	5100	N	4777.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P23155	1/13/2016	7/14/2016
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P63561	3/23/2016	9/23/2016
Iliac Load Cell	DENTON 3228J	LC-281Fy	6/30/2015	6/29/2016





APPENDIX D

TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

Table 1 – Dummy Instrumentation (SID-IIs)

			SID-IIs S/N: DG8012			
			Serial Number	Manufacturer	Calibration Date	
Head Accelerometers			X	AC-P51685	ENDEVCO	11/12/2015
			Y	AC-P51682	ENDEVCO	11/12/2015
			Z	AC-P51699	ENDEVCO	11/12/2015
Head Accelerometers - Redundant			X	AC-P51701	ENDEVCO	11/12/2015
			Y	AC-P45019	ENDEVCO	11/12/2015
			Z	AC-P51690	ENDEVCO	11/12/2015
Displacement Potentiometer	Shoulder		Y			
	Thoracic Rib	Upper	Y	DS-808GFE	SERVO	9/24/2015
		Middle	Y	DS-1514GFE	SERVO	9/24/2015
		Lower	Y	DS-011GFE	SERVO	9/24/2015
	Abdominal Rib	Upper	Y	DS-015GFE	SERVO	9/24/2015
		Lower	Y	DS-1774GFE	SERVO	9/24/2015
Lower Spine Accelerometers (T12)			X	AC-P74788	ENDEVCO	9/23/2015
			Y	AC-P83319	ENDEVCO	9/23/2015
			Z	AC-P83432	ENDEVCO	9/23/2015
Acetabulum Load Cell			Y	LC-267Fy	DENTON	6/30/2015
Lilac Wing Load Cell			Y	LC-281Fy	DENTON	6/30/2015
Pelvis Plug (Struck Side)				78189	Humanetics	10/1/2014
Pelvis Plug (Non-Struck Side)						

Table 2 – Vehicle Instrumentation

Vehicle Instrumentation		Serial Number	Manufacturer	Calibration Date
Vehicle Center of Gravity	X	AC-A189598	MSI 1201-1000	1/13/2016
Vehicle Center of Gravity	Y	AC-A189609	MSI 1201-1000	1/13/2016
Vehicle Center of Gravity	Z	AC-A189607	MSI 1201-1000	1/13/2016
Left Floor Sill	Y	AC-A189618	MSI 1201-1000	1/13/2016
A-Pillar Sill	Y	AC-A189623	MSI 1201-1000	1/13/2016
A-Pillar Low	Y	AC-A189594	MSI 1201-1000	1/13/2016
A-Pillar Mid	Y	AC-A189584	MSI 1201-1000	1/13/2016
B-Pillar Sill	Y	AC-A189610	MSI 1201-1000	1/13/2016
B-Pillar Low	Y	AC-A189601	MSI 1201-1000	1/13/2016
B-Pillar Mid	Y	AC-A189617	MSI 1201-1000	1/13/2016
Driver Seat	Y	AC-A189589	MSI 1201-1000	1/13/2016
Engine Top	X	AC-A189614	MSI 1201-1000	1/13/2016
Engine Top	Y	AC-A189588	MSI 1201-1000	1/13/2016
Firewall	Y	AC-A189599	MSI 1201-1000	1/13/2016
Right Roof	Y	AC-A189622	MSI 1201-1000	1/13/2016
Right Floor Sill	Y	AC-A189593	MSI 1201-1000	1/13/2016
Rear Floorpan	X	AC-A189603	MSI 1201-1000	1/13/2016
Rear Floorpan	Y	AC-A189600	MSI 1201-1000	1/13/2016

Table 3 – Pole Instrumentation

Pole Instrumentation	Serial Number	Manufacturer	Calibration Date
Load Cell 1	LC-18879	INTERFACE	6/5/2015
Load Cell 2	LC-18852	INTERFACE	6/5/2015
Load Cell 3	LC-46955	INTERFACE	6/5/2015
Load Cell 4	LC-18882	INTERFACE	6/5/2015
Load Cell 5	LC-18864	INTERFACE	6/5/2015
Load Cell 6	LC-18847	INTERFACE	6/5/2015
Load Cell 7	LC-62086	INTERFACE	6/5/2015
Load Cell 8	LC-46962	INTERFACE	6/5/2015