

REPORT NUMBER: SPNCAP-CAL-15-003

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

**Toyota Motor Corporation
2015 Toyota RAV-4
SUV**

NHTSA No: M20155310

**PREPARED BY:
CALSPAN CORPORATION
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April 2, 2015

FINAL REPORT

**PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF CRASHWORTHINESS STANDARDS
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Date: April 2, 2015

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Date: April 2, 2015

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 2015 Toyota RAV-4 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. This test was conducted at Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on January 27, 2015. The impact velocity of the vehicle was 32.63 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 380 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. 300)</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>426.553</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td>G</td> <td>82</td> <td>38.740</td> </tr> <tr> <td>Total Pelvic Force (sum of acetabular and iliac forces)</td> <td>N</td> <td>5525</td> <td>3218.723</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td>mm</td> <td>38</td> <td>19.543</td> </tr> <tr> <td>Maximum Abdomen Rib Deflection</td> <td>mm</td> <td>45</td> <td>17.608</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. 300)			Units	Threshold	Result	Head Injury Criteria (HIC ₃₆)		1000	426.553	Resultant Lower Spine Acceleration	G	82	38.740	Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3218.723	Maximum Thoracic Rib Deflection	mm	38	19.543	Maximum Abdomen Rib Deflection	mm	45	17.608
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SECTION 1

TEST PURPOSE AND PROCEDURE

This side impact test was conducted as part of the MY 2015 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-14-D-00352. The purpose of this test is to generate comparative side impact performance in a 2015 Toyota RAV-4 SUV. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Side NCAP Pole Laboratory Test Procedure, dated September 2013.

SECTION 2

SUMMARY OF TEST RESULTS

A rigid pole side impact test was conducted on a 2015 Toyota RAV-4 SUV. The subject vehicle was towed into the rigid pole at an angle of 75° and a velocity of 32.63 km/h. The test was conducted by Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on January 27, 2015. 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 September 2013. 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	426.553
Resultant Lower Spine Acceleration	g	82	38.740
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3218.723
Maximum Thoracic Rib Deflection	mm	38*	19.543
Maximum Abdominal Rib Deflection	mm	45*	17.608

*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 Airbag	Yes	Yes	No	N/A
Seat Belt Pretensioner	Yes	Yes	No	N/A
Seat Belt Load Limiter	Yes	Yes	No	N/A
Other				

GENERAL COMMENTS:

1. P1 serial number - 300

Data Anomalies:

- None

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: 2015 Toyota RAV-4 SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20155310
Test Date: 1/27/2015

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20155310
Model Year	2015
Make	Toyota
Model	RAV-4
Body Style	SUV
VIN	JTMZFREV8FD047647
Body Color	Brown
Odometer Reading (km/mi)	36 km / 57.9 mi
Engine Displacement (L)	2.5
Type / No. Cylinders	I4
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	No
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	No
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 Corporation
Date of Manufacture	11/14
Vehicle Type	Passenger

GVWR (kg)	2055
GAWR Front (kg)	1150
GAWR Rear (kg)	1150

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total
Designated Seating Capacity (DSC)	2	3	-	5
Capacity Weight (VCW) (kg)				405
DSC X 68.04 kg				340.2
Cargo Weight (RCLW) (kg)				64.8

(A)

(B)

(A-B)

VEHICLE SEAT TYPE

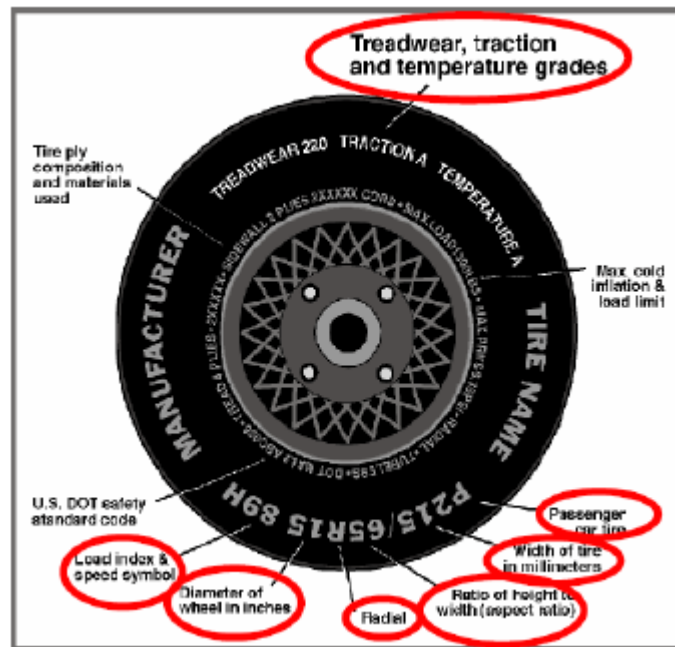
Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable W/ Lever	W/ Knob
Front Seat	X					X	
Rear or Second Row Seat			X			X	
Third Row seat	-	-	-	-	-	-	-

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

Test Vehicle:	2015 Toyota RAV-4 SUV
Test Program:	NCAP Side Pole Impact Test

NHTSA No.: M20155310
Test Date: 1/27/2015

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)	275	275
Cold Pressure (kPa)	230	230
Recommended Tire Size	P225/65R17	P225/65R17
Tire Size on Vehicle	P225/65R17	P225/65R17
Tire Manufacturer	Yokohama	Yokohama
Tire Model	Geolander G91	Geolander G91
Treadwear	280	280
Traction	B	B
Temperature Grades	A	A
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	1Polyester, 2 Steel, 1 Nylon	1Polyester, 2 Steel, 1 Nylon
Load Index/Speed Symbol	102H	102H
Tire Material	Rubber	Rubber
DOT Safety Code Left	FDFSPEK4514	FDFSPEK4514
DOT Safety Code Right	FDFSPEK4514	FDFSPEK4514

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

Test Vehicle: 2015 Toyota RAV-4 SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20155310
 Test Date: 1/27/2015

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	238	234	234	238
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	475	341		487	385		493	395	
Right	kg	462	300		470	346		460	352	
Ratio	%	59.4%	40.6%		57%	43%		56.1%	43.9%	
Totals	kg	937	641	1578	957	731	1688	958	747	1700

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total As Delivered Weight (UVW)	kg	1578.0	(A)
Actual Weight of 1 P572V (SID-IIs) ATD Used	kg	51.0	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	64.8	(C)
Calculated Vehicle Target Weight (TVTW)	kg	1693.8	(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	-0.5	-0.4	-0.2	Yes
Front Passenger Sill Angle (front-to-rear)*	Deg	-0.5	-0.5	-0.3	Yes
Front Bumper-Line Angle (left-to-right)**	Deg	-0.2	-0.3	-0.4	Yes
Rear Bumper-Line Angle (left-to-right)**	Deg	-0.1	-0.2	-0.2	Yes
Vehicle CG (Aft of Front Axle)	mm	1081	1152	1169	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	27	1	35	

* 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: 2015 Toyota RAV-4 SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20155310
Test Date: 1/27/2015

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Trim Panel	10
Trunk Carpeting	2
Spare Tire / Jack	20
Ballast / Equipment Added	39

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: 2015 Toyota RAV-4 SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20155310
 Test Date: 1/27/2015

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	17.3	10.5	13.9
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	13.9	20	Max	33	35	37
			Mid	16	18	20
			Min	0	2	4
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: 2015 Toyota RAV-4 SUV
 Test Program: NCAP Side Pole Impact Test

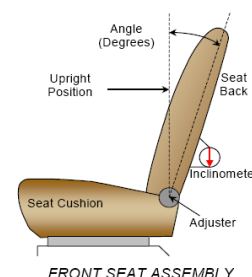
NHTSA No.: M20155310
 Test Date: 1/27/2015

SEAT FORE / AFT POSITION

Seat	Total Fore / Aft Travel		Test Position from Forwardmost Position	
	mm	Detents*	mm	Detents*
Driver Seat	240	25 (0-24)	0	0
Front Passenger Seat	260	27 (0-26)	0	0
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	-8.7 to 44.6	N/A	-4.7	N/A
Front Passenger Seat	-7.4 to 44.7	N/A	-5.4	N/A
Front Center Seat	N/A	N/A	N/A	N/A
Struck Side Rear Seat	2.9 to 26.5	-	2.9	0
Non-Struck Side Rear Seat	1.9 to 27.1	-	1.9	0
Rear Center Seat	2.9 to 26.5	-	2.9	0

SEAT BELT ANCHORAGE ADJUSTMENT

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

Seat	Total # of Positions	Placed in Position #
Driver Seat	4	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	3 (0-2)	2 – Lowest

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

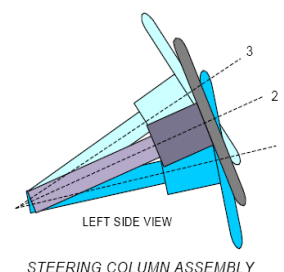
Test Vehicle: 2015 Toyota RAV-4 SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20155310
 Test Date: 1/27/2015

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.

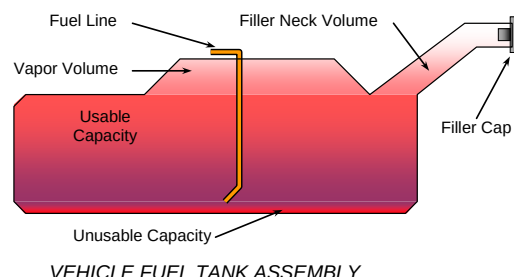
	Degrees	Fore / Aft Position (mm)
Lowermost – Position 1	23	
Geometric Center – Position 2	25	
Uppermost – Position 3	27	
Telescoping Steering Wheel Travel		40
Test Position	25	20



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	60.18
Usable Capacity of "Optional Tank" - see Form No. 1	N/A
Usable Capacity of "Standard Tank" - see Owner's Manual	60.18
Usable Capacity of "Optional Tank" - see Owner's Manual	N/A
93% of Usable Capacity	55.97
Actual Amount of Solvent Used in Test	55.97
1/3 of Usable Capacity	19.86

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

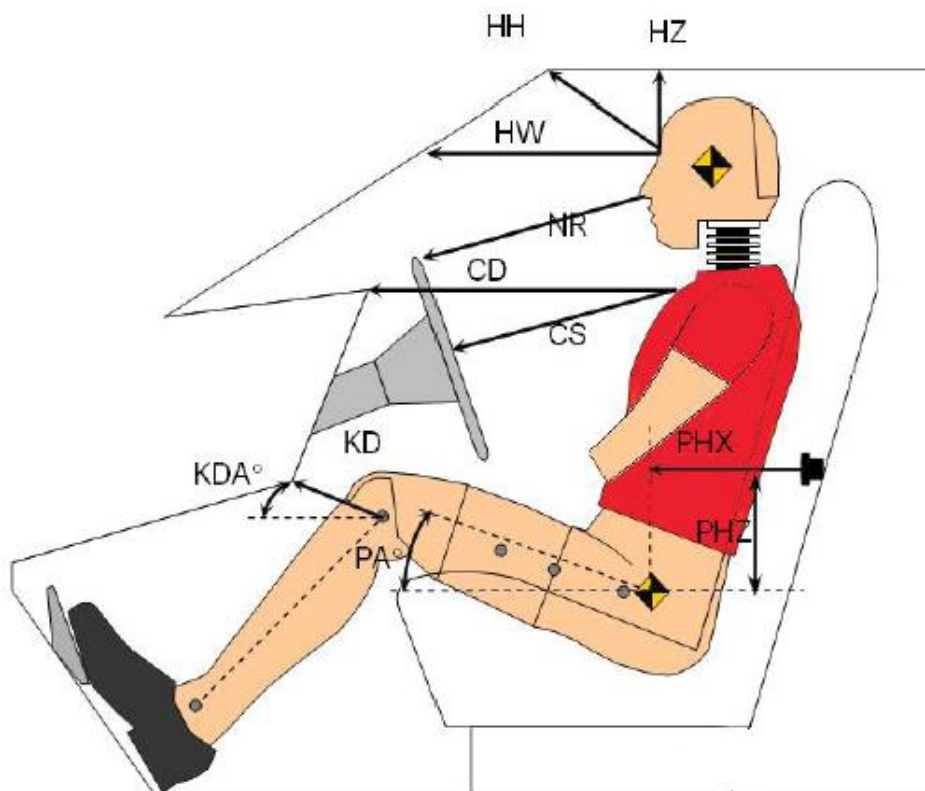


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DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2015 Toyota RAV-4 SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20155310
 Test Date: 1/27/2015



Left Side View

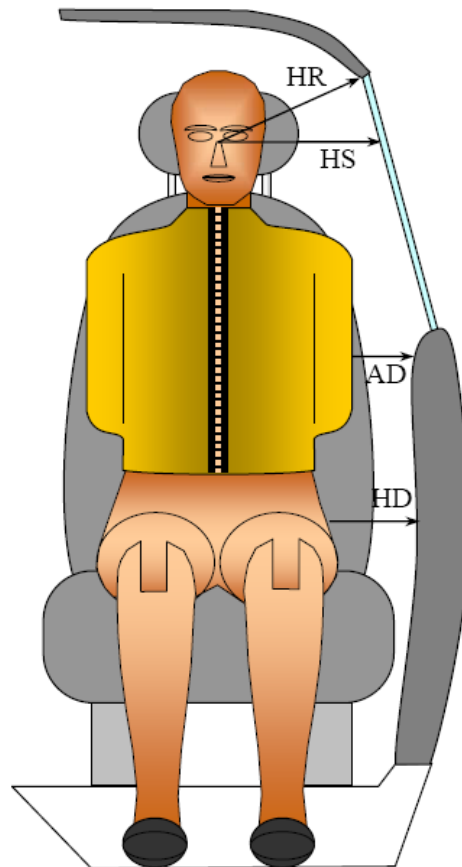
DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Description	Driver (Serial No. 300)	
		Length (mm)	Angle (°)
HH	Head to Header	280	
HW	Head to Windshield	598	
HZ	Head to Roof Liner	206	
NR	Nose to Rim	239	
CD	Chest to Dash	386	
CS	Chest to Steering Wheel	180	
KD(L) / KDA(L)°	Left Knee to Dash	108	28.6
KD(R) / KDA(R)°	Right Knee to Dash	95	29.2
PAX°	Pelvic Tilt Angle (X-Axis)		18.1
PAY°	Pelvic Tilt Angle (Y-Axis)		0.3
PHX	Hip Point to Striker (X-Axis)	313	
PHZ	Hip Point to Striker (Z-Axis)	198	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2015 Toyota RAV-4 SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20155310
 Test Date: 1/27/2015



FRONT VIEW OF DUMMY

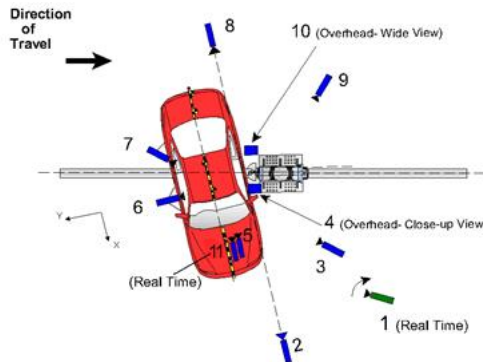
DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver - Length (Serial No. 300)
HR	Head To Side Header	mm	262
HS	Head to Side Window	mm	387
AD	Arm to Door	mm	95
HD	Hip Point to Door	mm	162

DATA SHEET NO. 5 CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2015 Toyota RAV-4 SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20155310
Test Date: 1/27/2015



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	1720	6502	-1179	24	1000
3	Impact side 45° - forward pole view	3180	3207	-1694	28	1000
4	Overhead Close-up view of impact	0	0	-5203	20	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	-1896	-6957	-1197	24	1000
9	Impact side 45° - rearward pole view	-3005	-3367	-1737	28	1000
10	Overhead wide - view of impact	-290	0	-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.

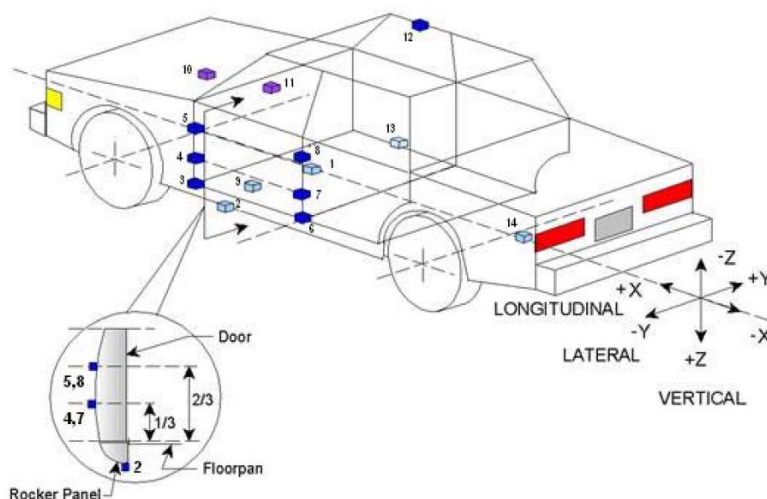
INSTRUMENTATION

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: 2015 Toyota RAV-4 SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20155310
 Test Date: 1/27/2015



TEST VEHICLE ACCELEROMETER LOCATIONS

No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2490	41	597
2	Left Floor Sill	2710	-664	427
3	A-Pillar Sill	3115	-637	454
4	A-Pillar Low	3151	-628	647
5	A-Pillar Mid	3096	-667	1160
6	B-Pillar Sill	2173	-665	433
7	B-Pillar Low	2165	-685	714
8	B-Pillar Mid	2138	-686	965
9	Driver Seat Track	2438	-547	484
10	Engine Top	3859	-83	873
11	Firewall	3450	17	798
12	Right Roof	2219	608	1612
13	Right Floor Sill	2682	684	438
14	Rear Floorpan	1068	3	607

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: 2015 Toyota RAV-4 SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20155310
Test Date: 1/27/2015

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: 2015 Toyota RAV-4 SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20155310
Test Date: 1/27/2015

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	Curtain Airbag
Back of Head	Head Rest
Left Shoulder	Torso/Pelvis Airbag
Upper Torso	Seatback
Lower Torso	Seatback
Left Hip	Seatback and Torso/Pelvis Airbag
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	0	0	0	0	0
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: 2015 Toyota RAV-4 SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20155310
Test Date: 1/27/2015

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	A-Pillar Buckled
Sill Separation	Sill Bent inwards
Windshield Damage	Cracks throughout with separation along driver's A-Pillar
Side Window Damage	Driver's window shattered during impact
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	No	N/A
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

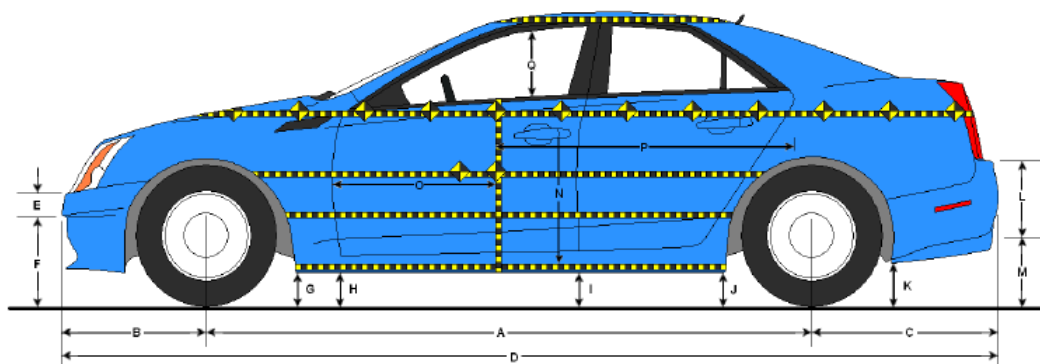
Measured Parameter	Units	Tolerance	Value
Vertical Impact Ref Line - Aft of Front Axle, Intended Impact Pt	mm		1047
Actual Impact Point - Aft of Front Axle	mm		1040
Horizontal Offset (+ forward / - rearward)	mm	+/- 38 *	+7
Angle Between Vehicle's Longitudinal Centerline and Line of Forward Motion	deg	75 +/- 3	75.0
Trap No. 1 Velocity - Primary	kph	31.4 to 33.0	32.63
Trap No. 2 Velocity - Redundant	kph	31.4 to 33.0	32.63

* Of Intended Impact Point

DATA SHEET NO. 9
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2015 Toyota RAV-4 SUV
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20155310
Test Date: 1/27/2015



LEFT SIDE VIEW

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

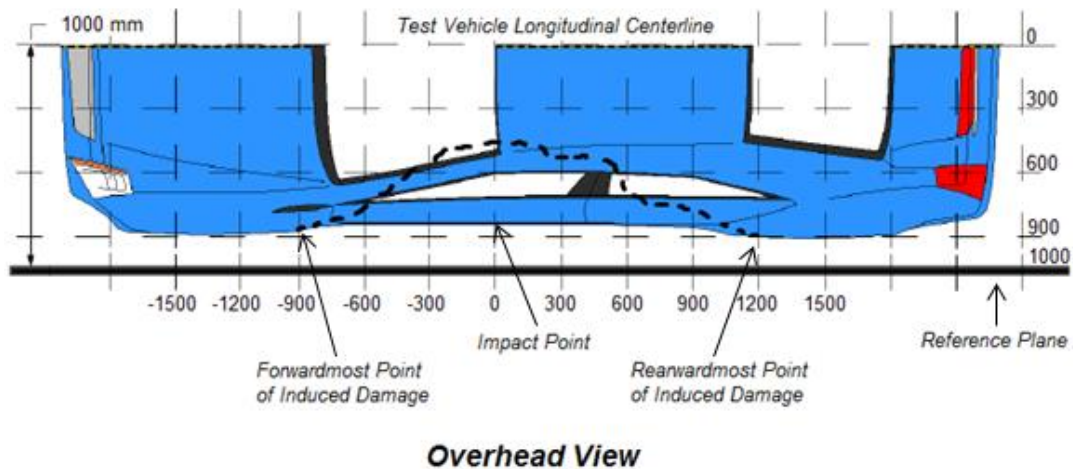
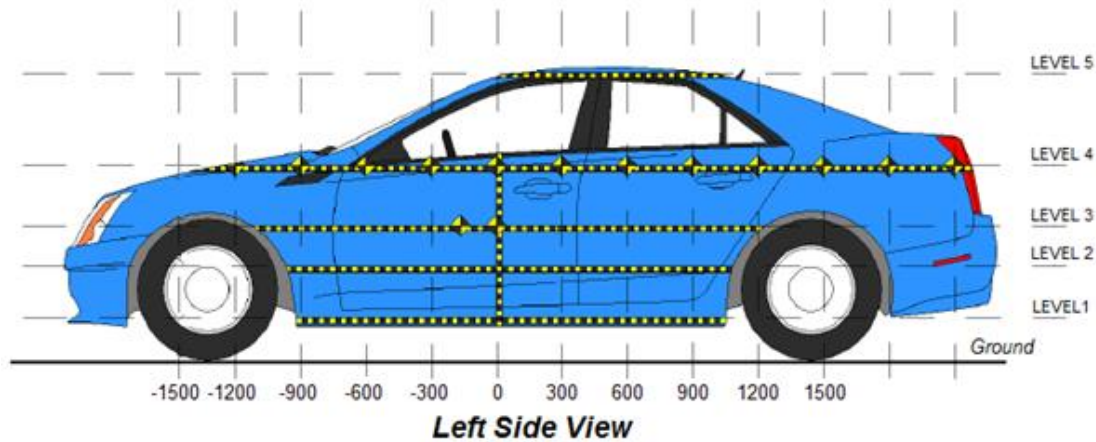
Code	Description	Pre-Test	Post-Test	Difference
A	Vehicle Wheelbase	2661	2594	67
B	Front Axle to FSOV	911	944	-34
C	Rear Axle to RSOV	1000	1002	-2
D	Total Length at Centerline	4572	4540	32
E	Front Bumper Thickness	90	90	0
F	Front Bumper Bottom to Ground	510	513	-3
G	Sill Height at Front Wheel Well	268	263	5
H	Sill Height at Front Door Leading Edge	267	265	2
I	Sill Height at B-Pillar	288	316	-28
J1	Sill Height at Rear Wheel Well	270	290	-20
J2	Pinch Weld Height at Rear Wheel Well	242	266	-24
K	Sill Height Aft of Rear Wheel Well	312	313	-1
L	Rear Bumper Thickness	110	110	0
M	Rear Bumper Bottom to Ground	427	421	6
N	Sill Height to Bottom of Front Window Sill	-820	-823	3
O	Front Door Leading Edge to Impact CL	602	478	124
P	Rear Door Trailing Edge to Impact CL	1518	1419	99
Q	Front Window Opening	-350	-357	8
R	Right Side Length	4476	4472	4
S	Left Side Length	4475	4410	64
T	Vehicle Width at B-Pillars	1823	1742	82

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

DATA SHEET NO. 10
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2015 Toyota RAV-4 SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20155310
 Test Date: 1/27/2015



MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Units	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	mm	370	308	0
2	Occupant Hip Point	mm	717	376	0
3	Mid - Door	mm	762	380	0
4	Window Sill	mm	1044	341	0
5	Window Top	mm	1609	59	150

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: 2015 Toyota RAV-4 SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20155310
 Test Date: 1/27/2015

EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

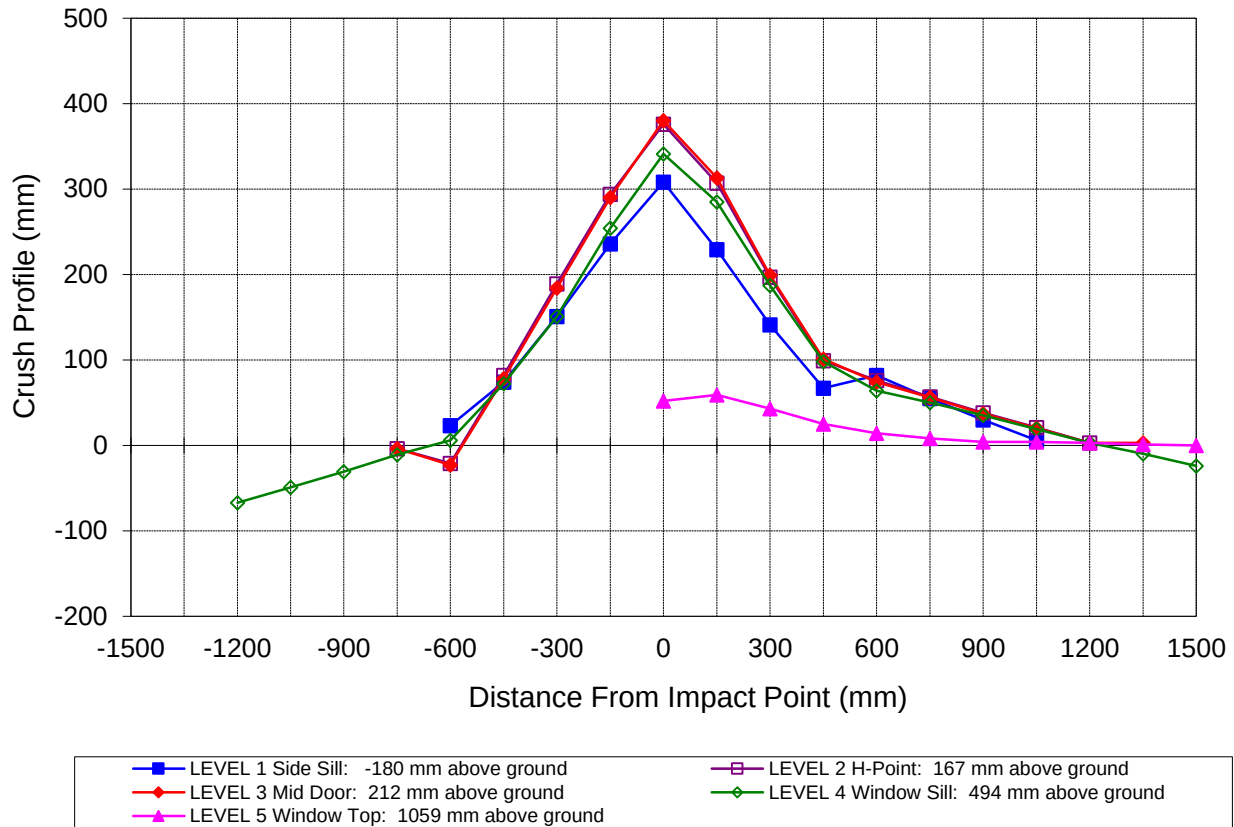
	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-1500															
-1350															
-1200				800					867					-67	
-1050				811					860					-49	
-900				814					845					-31	
-750		907	909	815			911	913	826			-4	-4	-11	
-600	859	905	903	818		836	926	926	812		23	-21	-23	6	
-450	849	899	898	828		775	817	820	756		74	82	78	72	
-300	846	900	901	844		695	711	717	693		151	189	184	151	
-150	846	901	903	859		610	607	613	605		236	294	290	254	
0	846	902	905	867	524	538	526	525	526	472	308	376	380	341	52
150	847	903	906	873	571	618	596	593	588	512	229	307	313	285	59
300	849	903	906	875	593	708	706	707	688	550	141	197	199	187	43
450	849	903	907	876	601	782	804	806	778	576	67	99	101	98	25
600	848	902	906	876	605	766	826	832	812	591	82	76	74	64	14
750	846	901	905	876	606	791	844	849	826	598	55	57	56	50	8
900	854	899	903	875	603	824	861	866	840	599	30	38	37	35	4
1050	870	900	902	874	599	864	879	882	855	595	6	21	20	19	4
1200		906	907	870	592		903	904	867	589		3	3	3	3
1350			907	902	581			904	912	580			3	-10	1
1500				862	562				886	562				-24	0

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: 2015 Toyota RAV-4 SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20155310
 Test Date: 1/27/2015



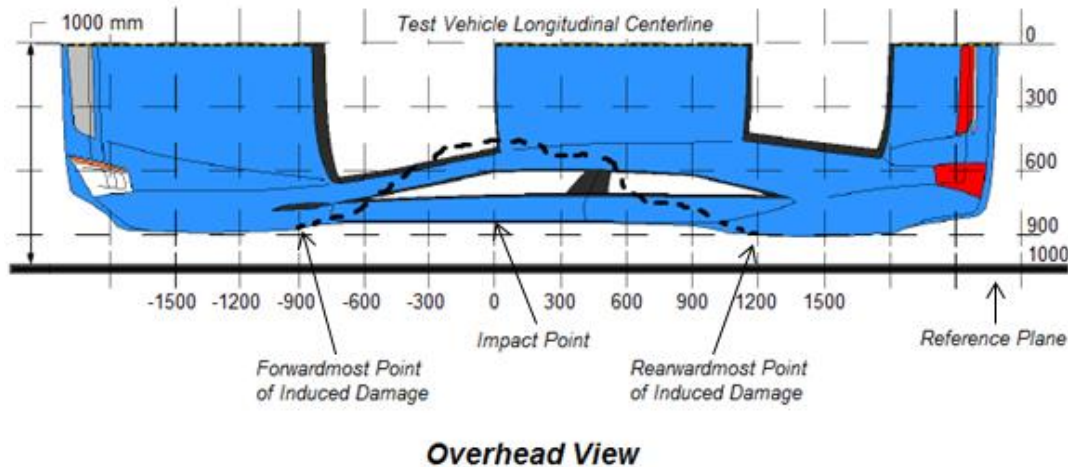
Vehicle Exterior Crush Measurements - Visual Representation

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

Test Vehicle: 2015 Toyota RAV-4 SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20155310
 Test Date: 1/27/2015

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	87	91	-4
2	-330	3	262	100	162
3	90	3	434	94	340
4	510	3	184	93	91
5	930	3	131	97	34
6	1350	3	96	93	3

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

Test Vehicle: <u>2015 Toyota RAV-4 SUV</u>	NHTSA No.: <u>M20155310</u>
Test Program: <u>NCAP Side MDB Impact Test</u>	Test Date: <u>1/27/2015</u>
Test Time: <u>1:45 PM</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°	74	300	374
90° to 180°	67	300	367
180° to 270°	62	300	362
270° to 360°	70	300	370

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

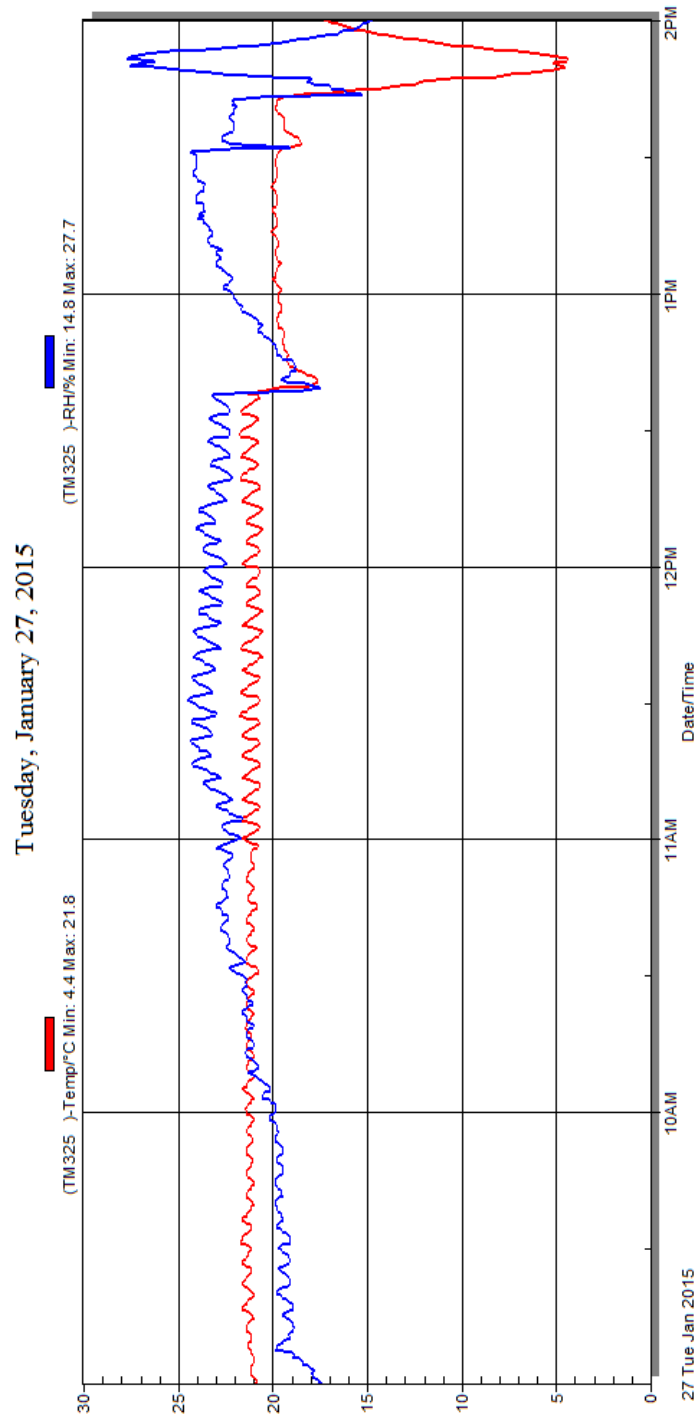
ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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: 2015 Toyota RAV-4 SUV
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20155310
 Test Date: 1/27/2015



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

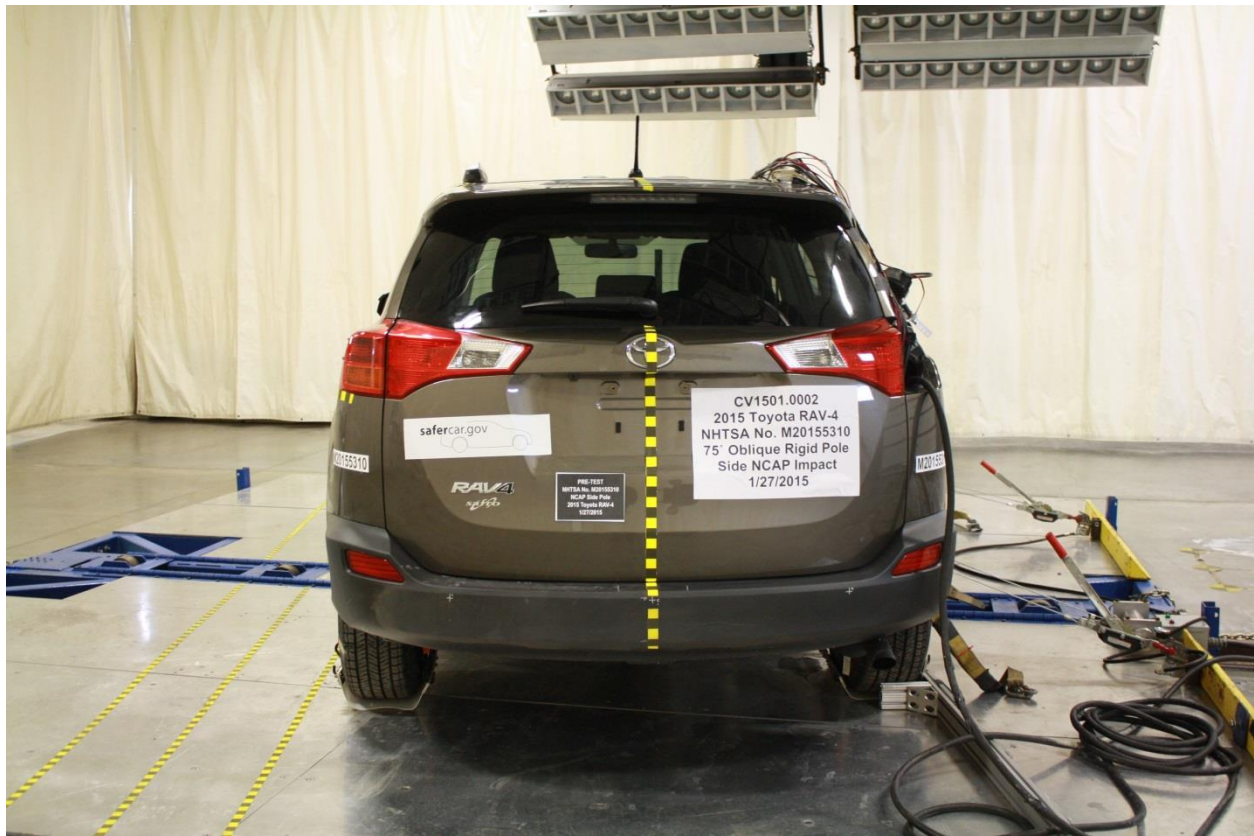


Figure A-11: Pre-Test Rear View of Test Vehicle



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

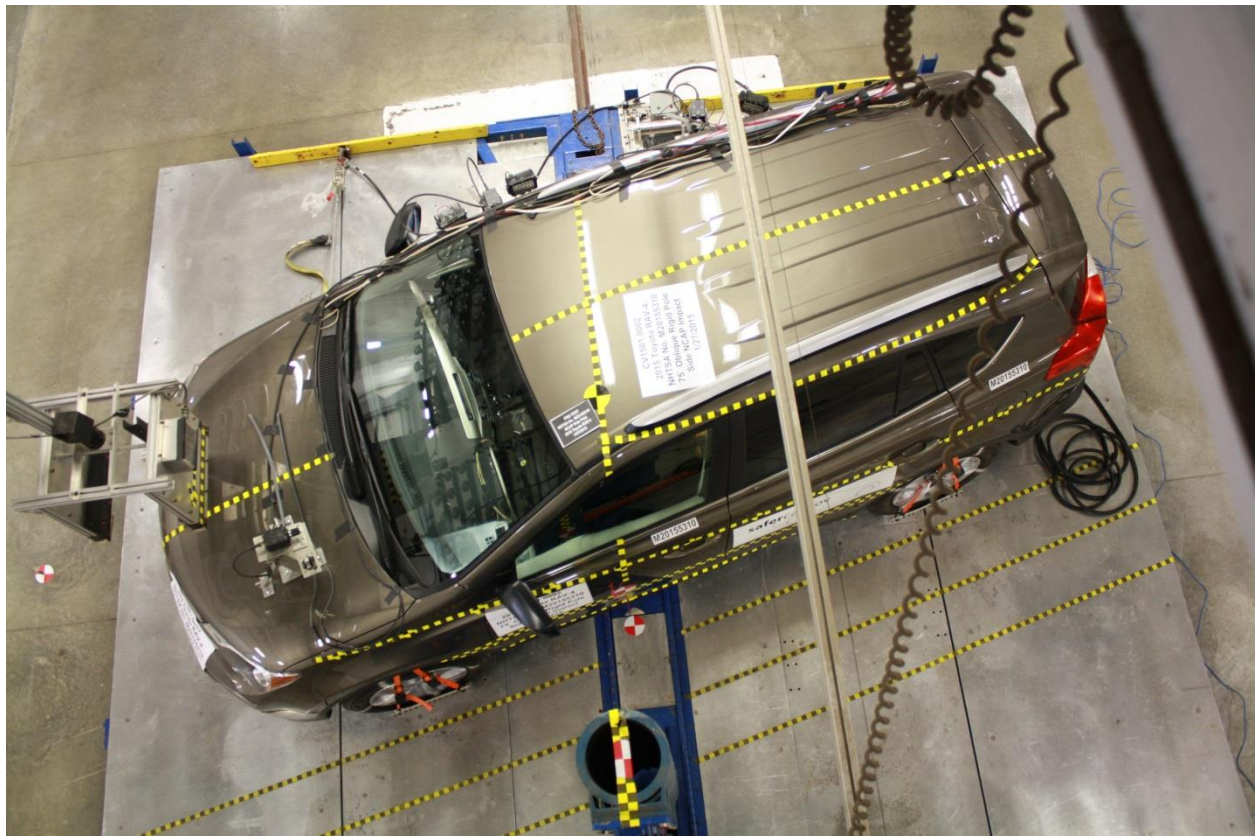


Figure A-15: Pre-Test Overhead View of Test Area



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

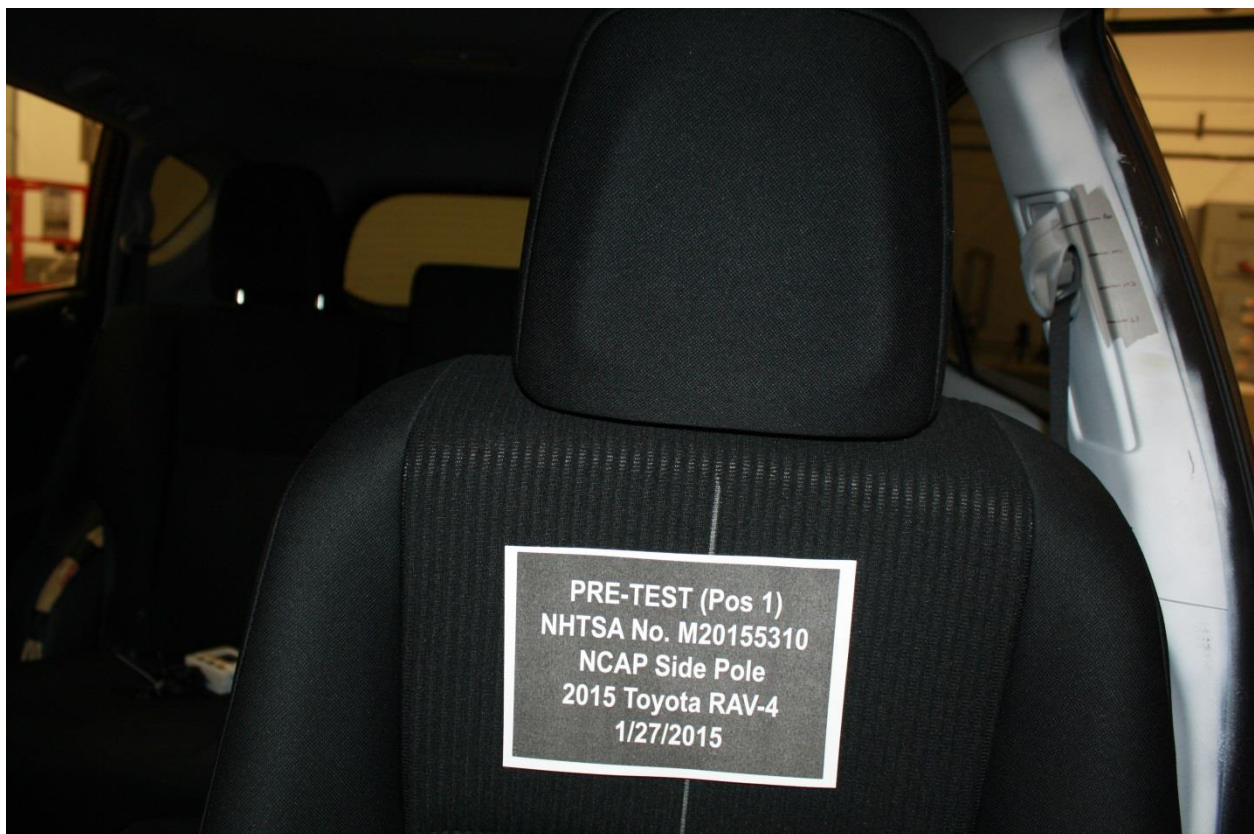


Figure A-26: Pre-Test Frontal View of Seat Back Prior to Dummy Positioning

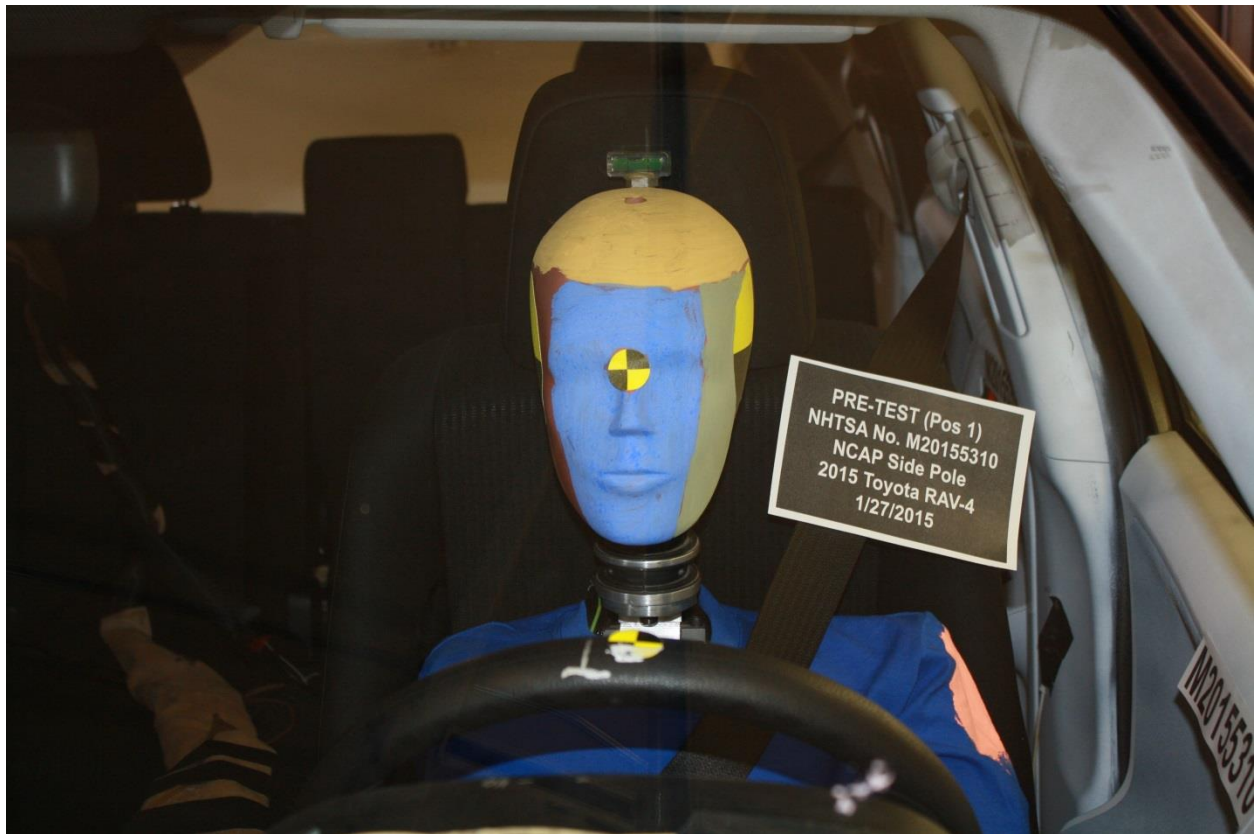


Figure A-27: Pre-Test Frontal Close-Up View of Dummy Head / Shoulders in Relation to Head Restraint



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

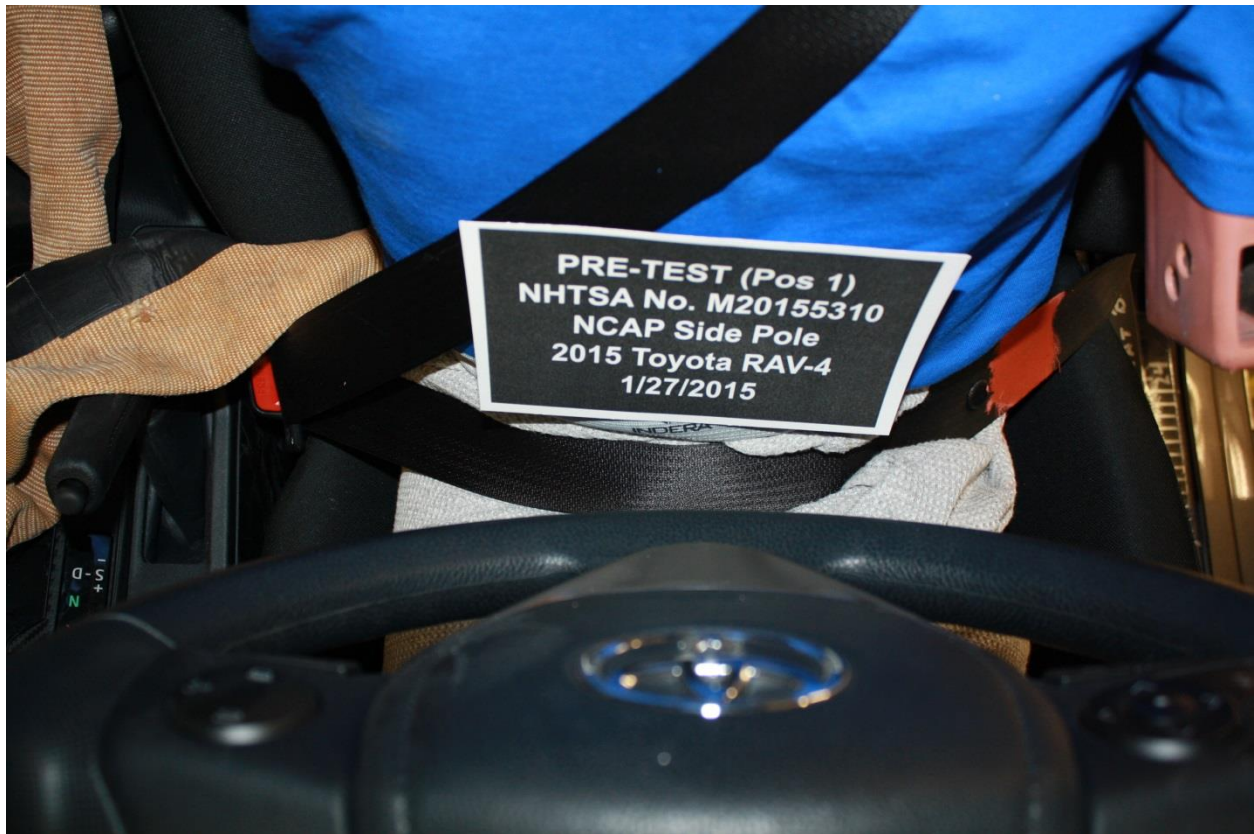


Figure A-29: Pre-Test Overhead View of Dummy Thighs on Seat Pan

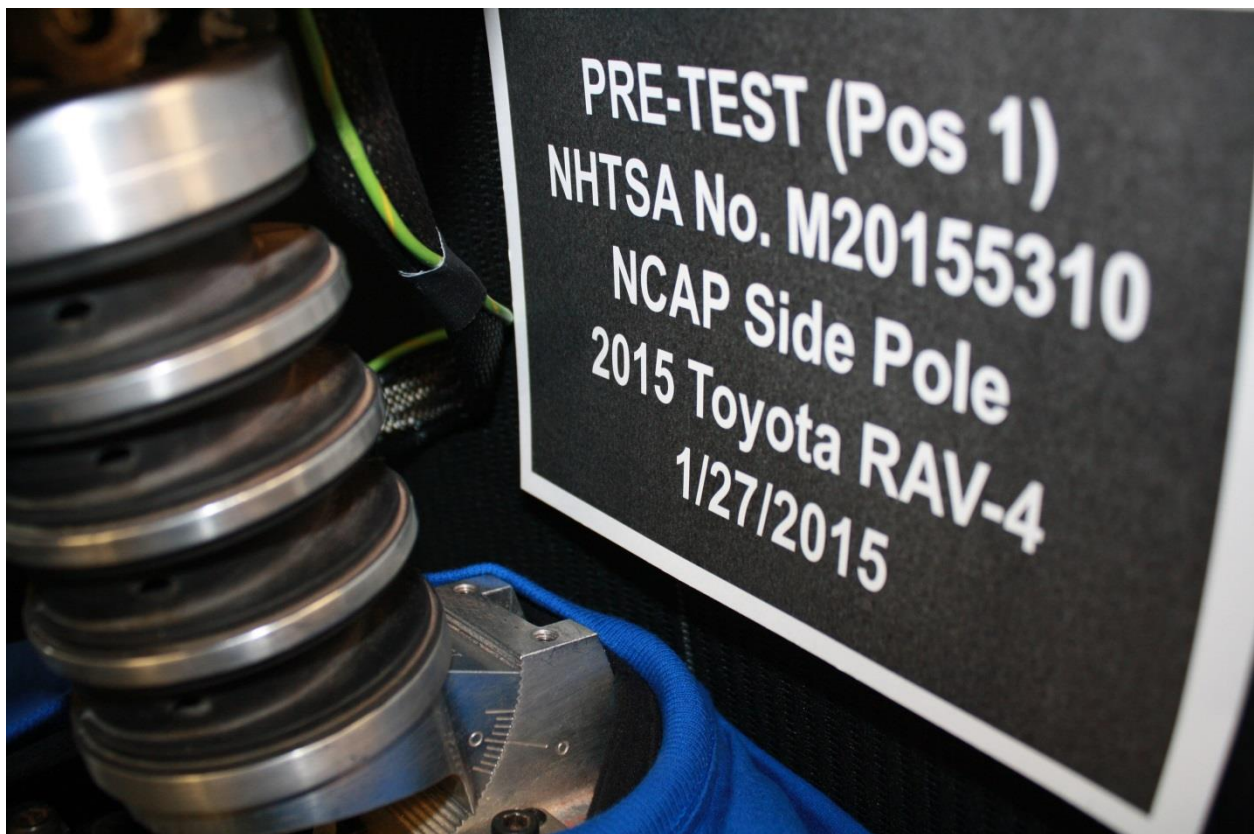


Figure A-30: Pre-Test Left Side View of Dummy's Neck Showing Position of Adjustable Neck Bracket



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

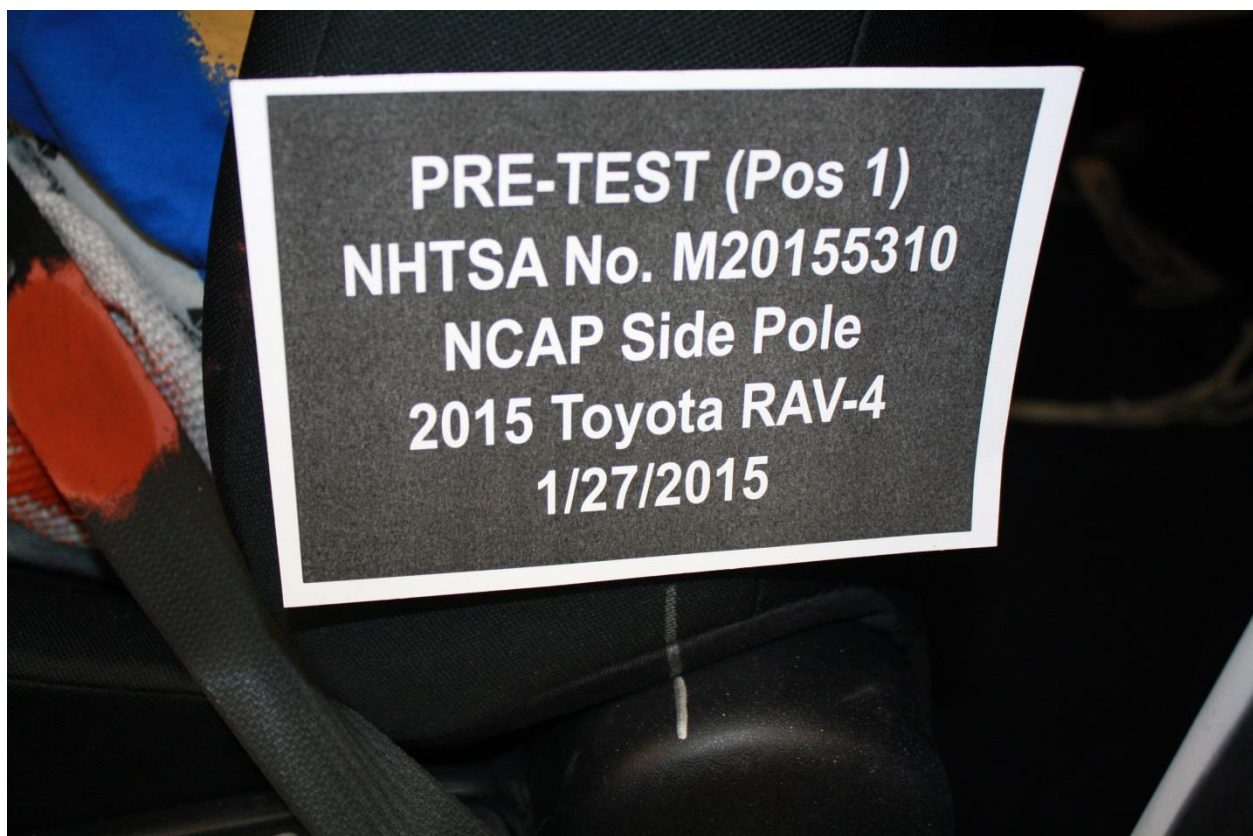


Figure A-38: Pre-Test Close-Up Left Side View of Driver Seat Back



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

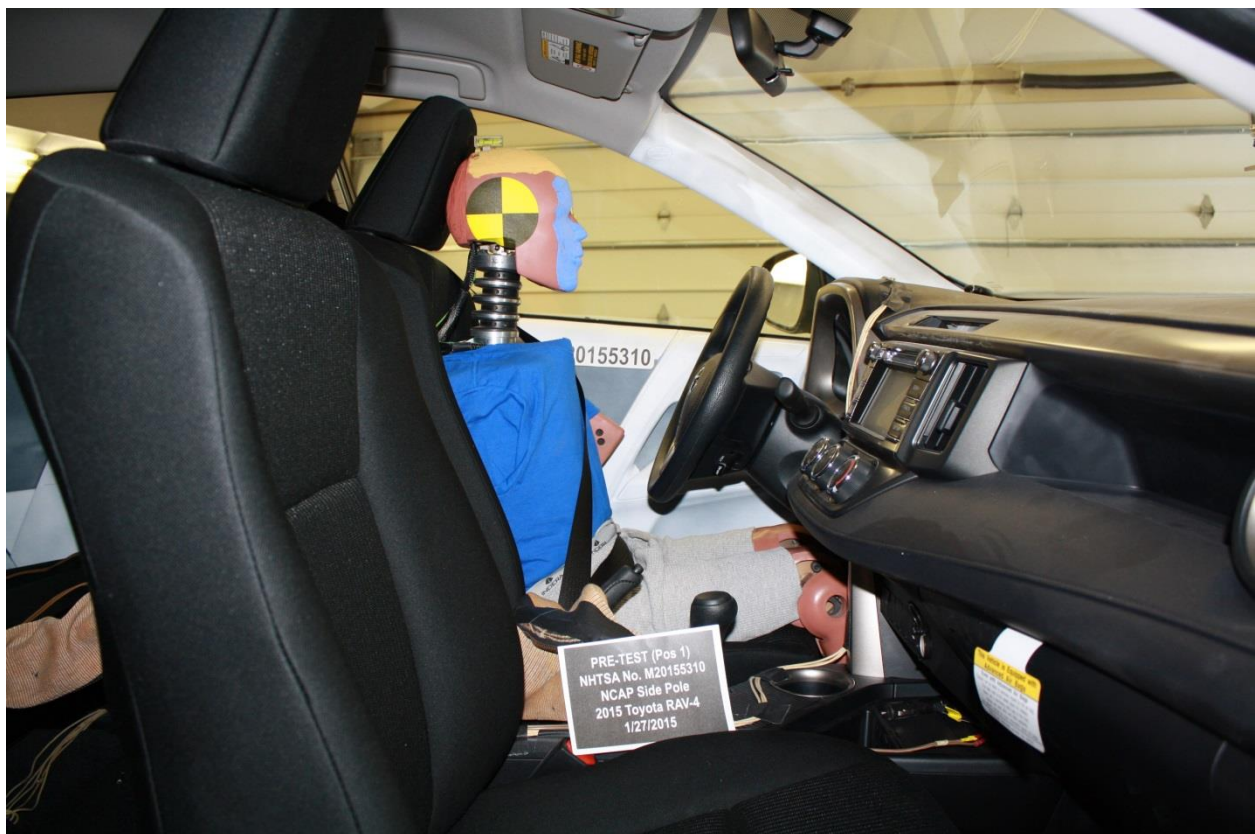


Figure A-42: Pre-Test Right Side View of Dummy and Front Seat of Occupant Compartment



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

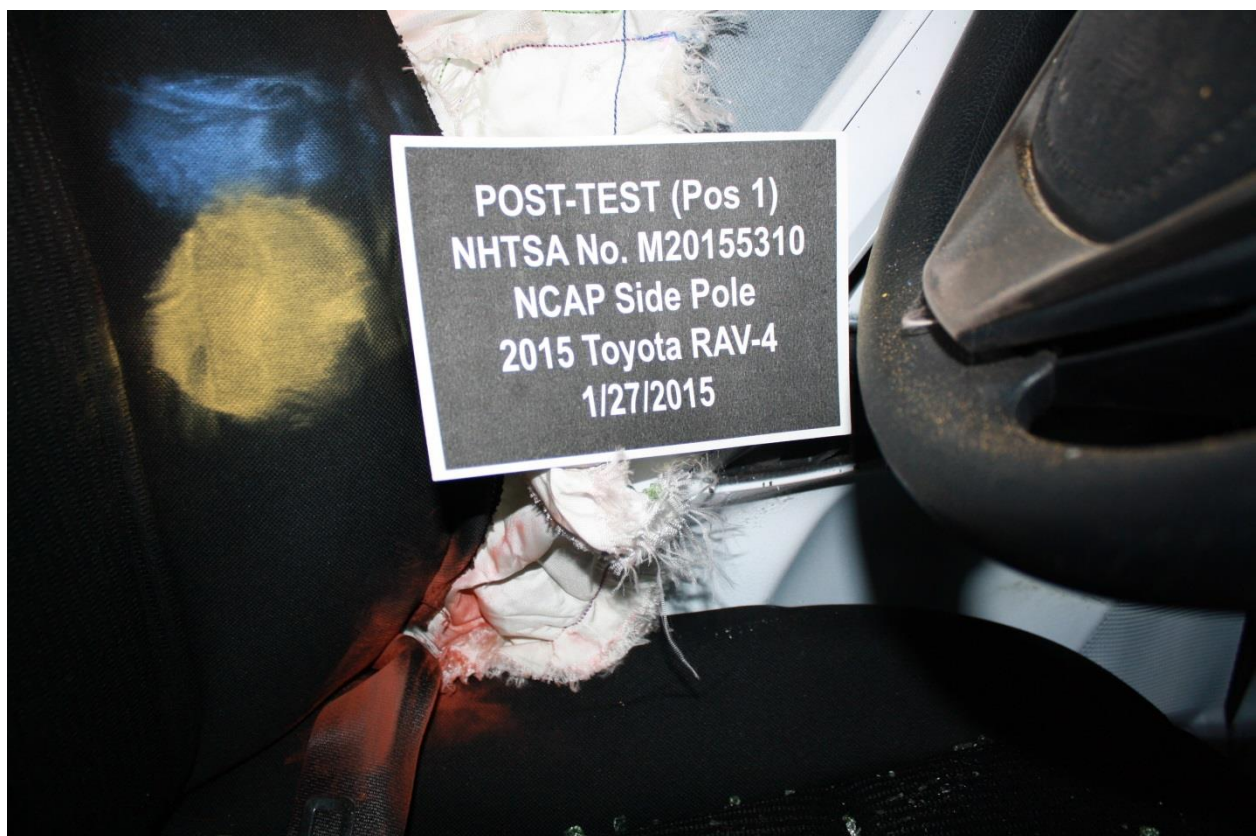


Figure A-48: Post-Test Dummy Close-Up Torso Contact with Vehicle Interior View



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



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



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

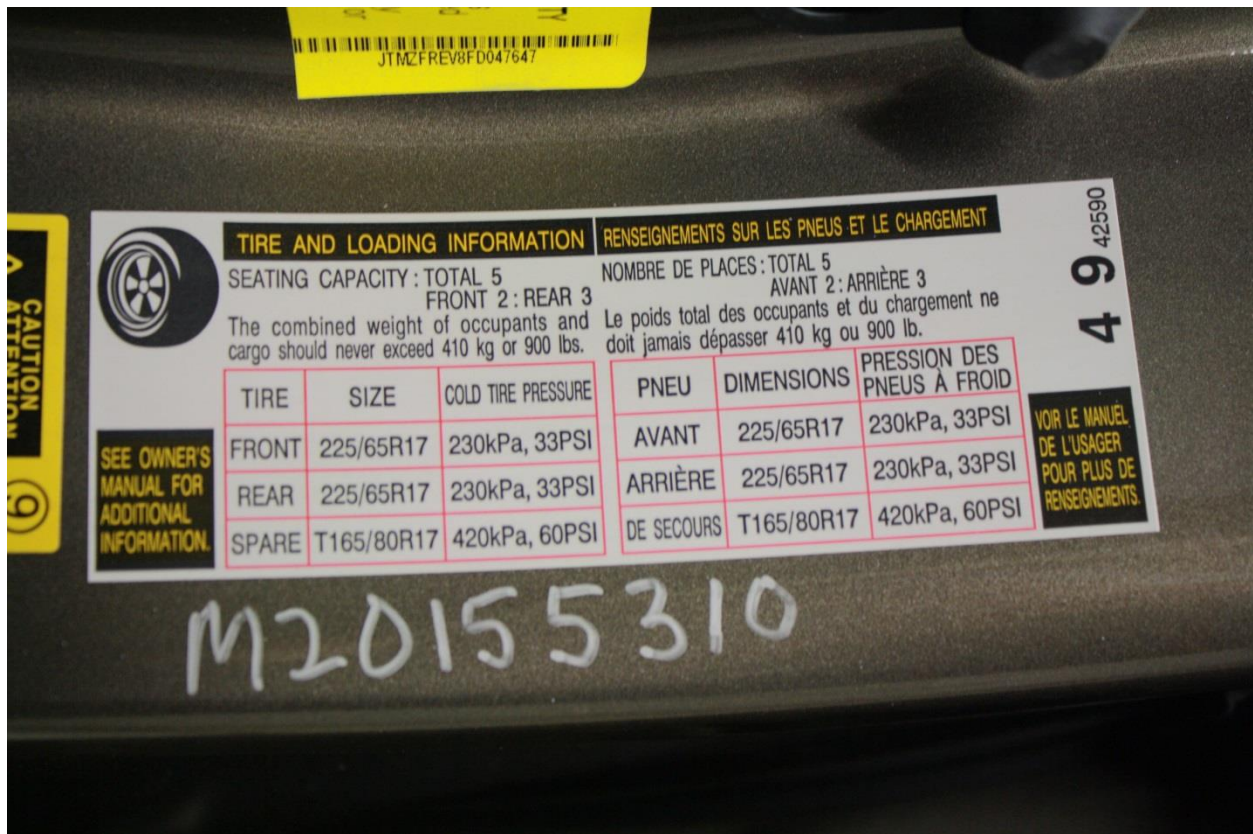


Figure A-56: Close-Up View of Vehicle's Tire Information Placard or Label

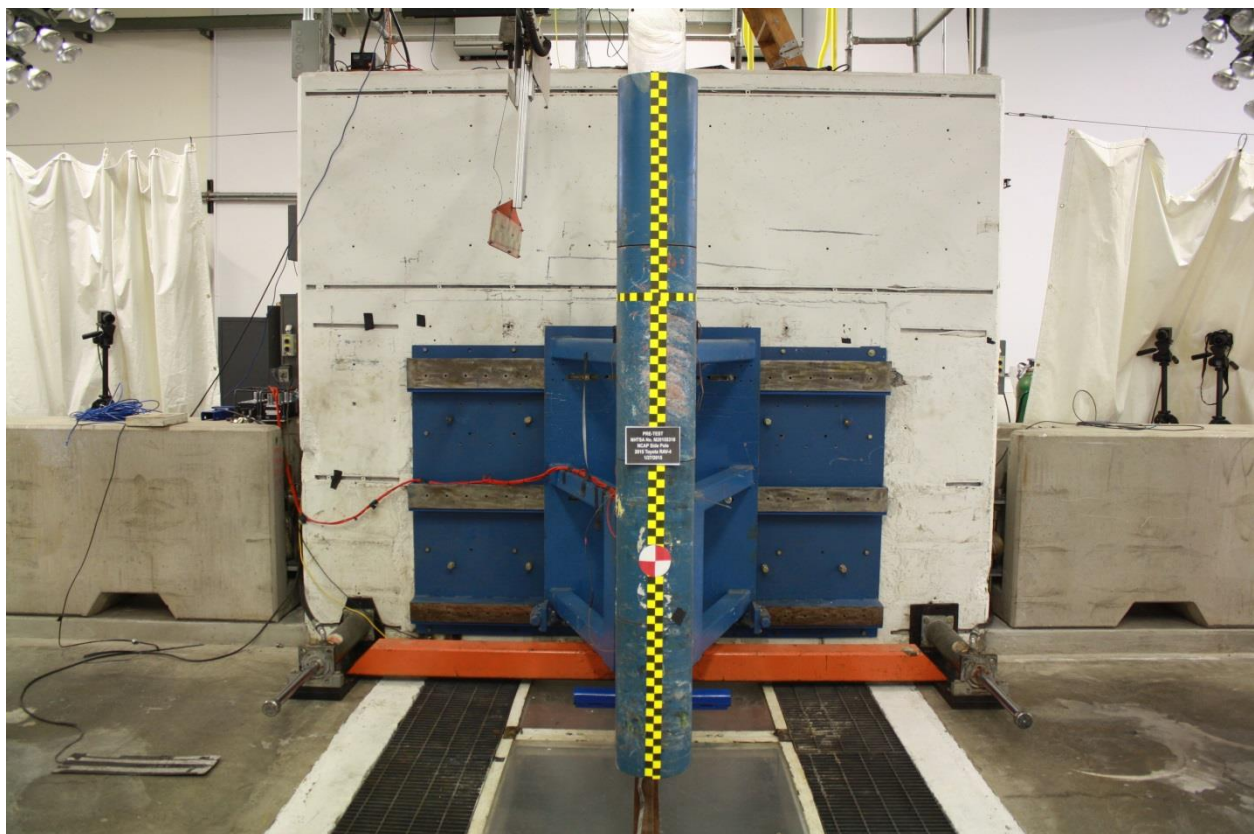


Figure A-57: Pre-Test Pole Barrier Front View

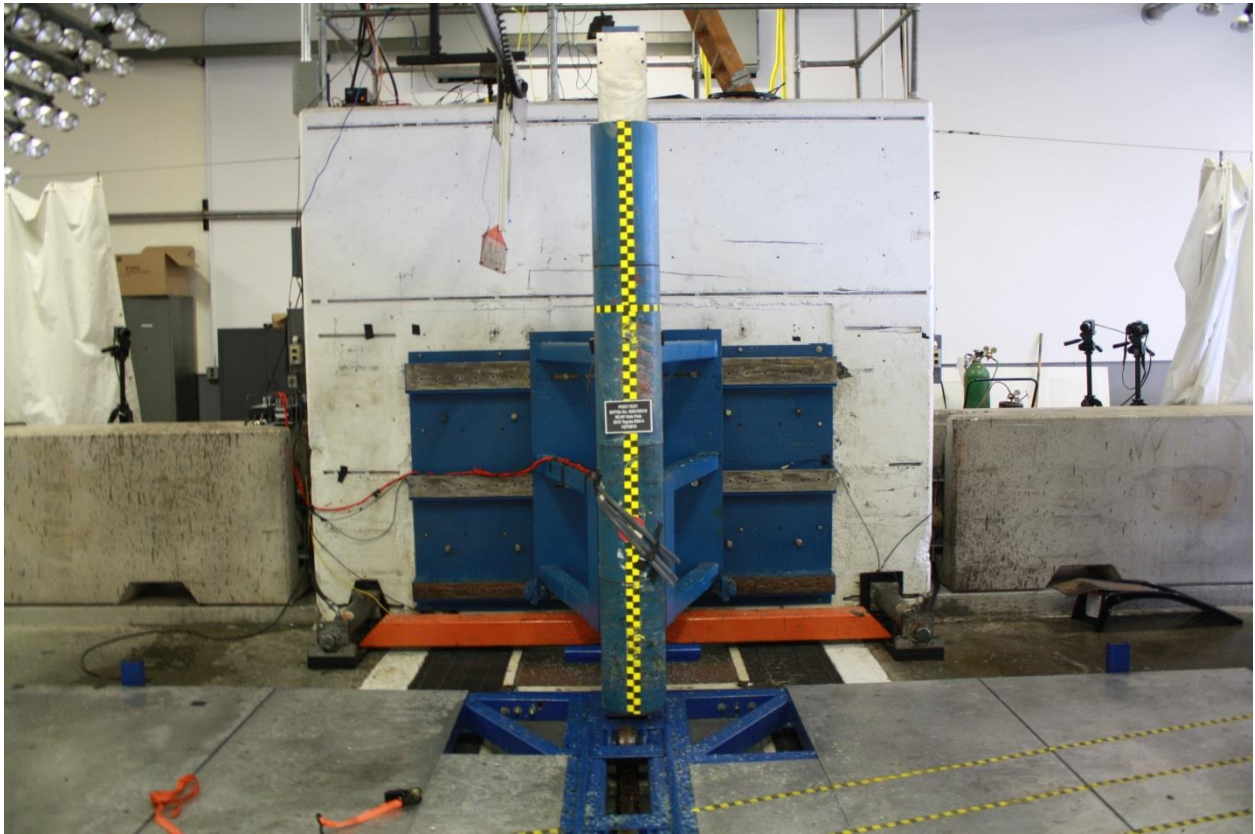


Figure A-58: Post-Test Pole Barrier Front View



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



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

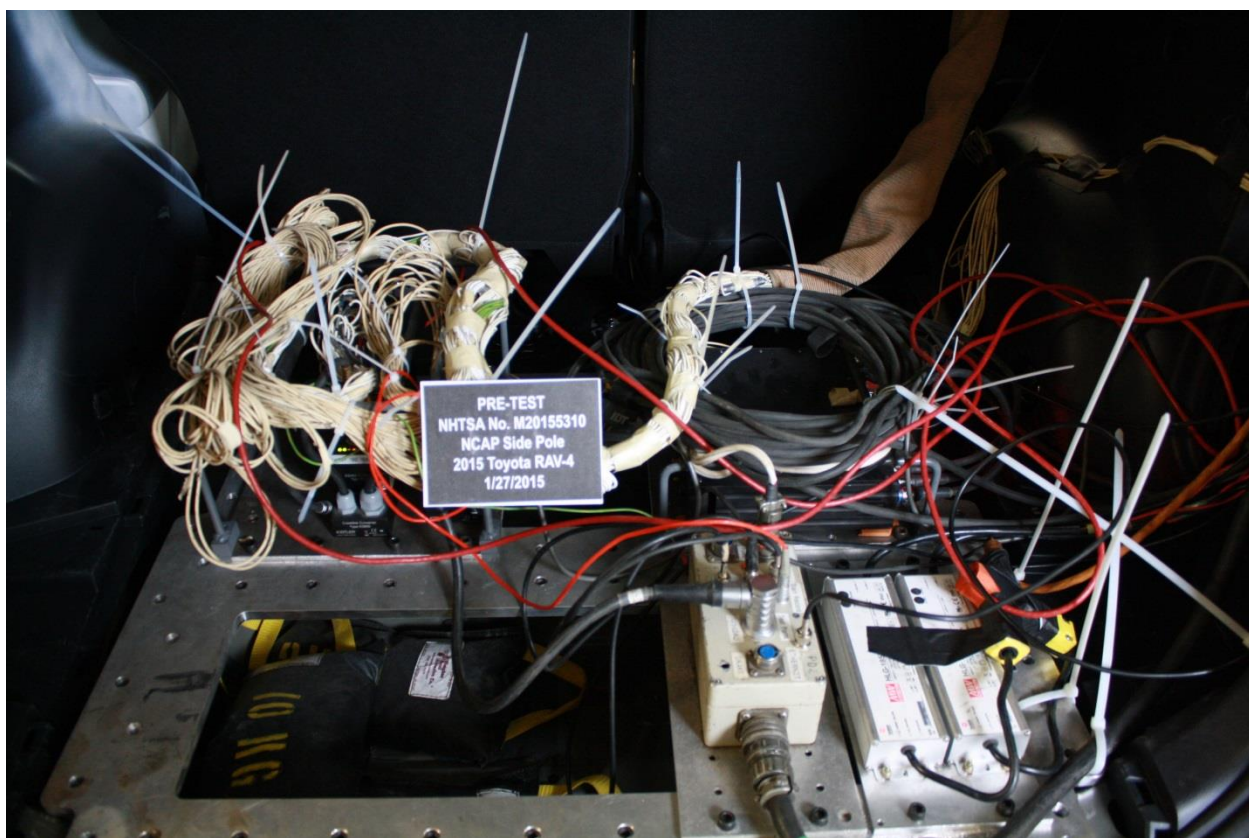


Figure A-61: Pre-Test Ballast View

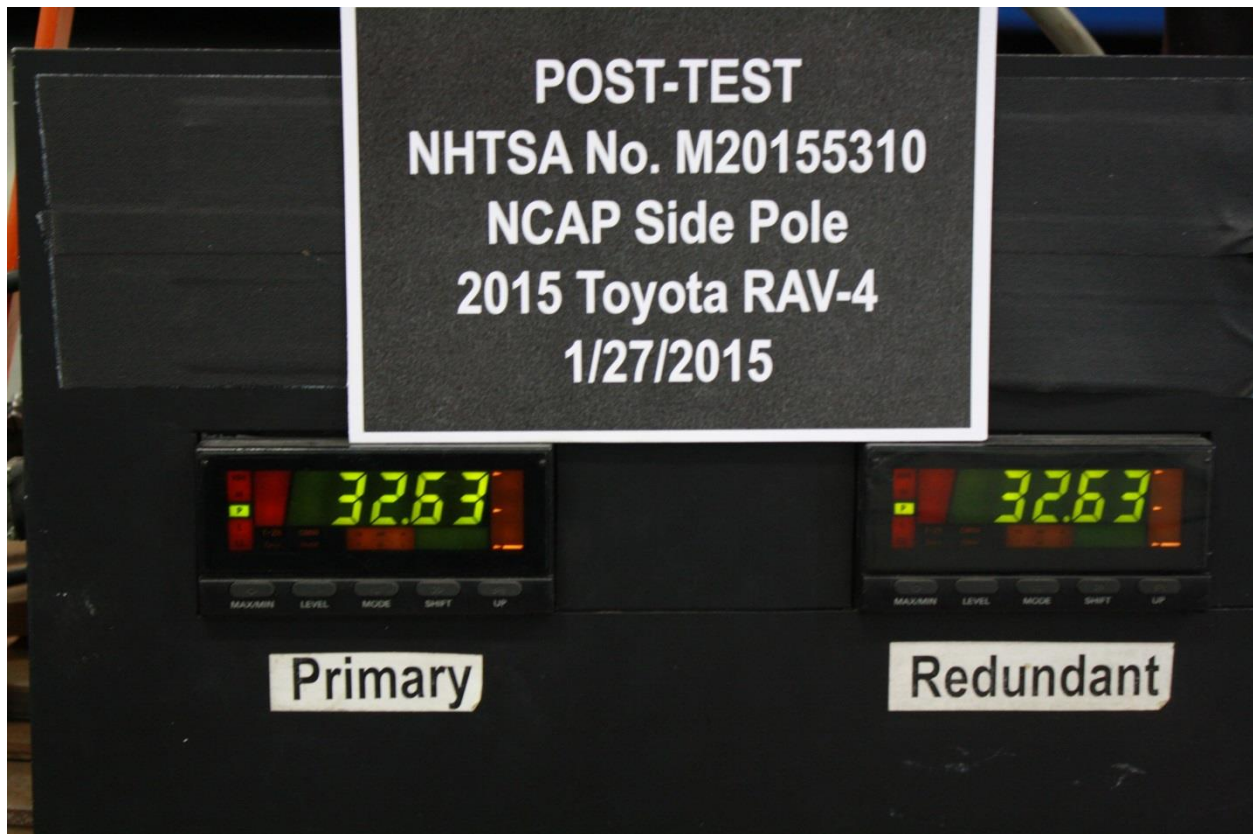


Figure A-62: Post-Test Primary and Redundant Speed Trap Read-Out



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: **RAV4** LE FWD SUV
VIN: **JTMZFREV8FD047647**
YR/MDL: 2015/4430C
CLR: PYRITE MICA/FB20 (04T3/20)
PORT/PLANT: Portland, OR RAILHEAD:

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.	Driver Passenger	Not Rated
Side Crash Based on the risk of injury in a side impact.	Front seat Rear seat	Not Rated
Rollover Based on the risk of rollover in a single-vehicle crash.		Not Rated

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

STANDARD EQUIPMENT

MECHANICAL & PERFORMANCE

- 2.5L D4HC 4-Cylinder Engine w/Dual VVT-i
- 176 hp @ 6000 rpm / 172 lb-ft @ 4100 rpm
- 6-Speed Automatic Transmission
- Front Wheel Drive (FWD)
- Eco and Sport Modes

SAFETY & CONVENIENCE

- Star Safety System: Enhanced Vehicle Stability Control, Traction Control, Anti-Lock Brakes, Electronic Brake Force Distribution, Brake Assist and Smart Stop Technology
- LATCH-Lower Anchor & Tether for Children

EXTERIOR

- 17" Steel Wheels with Wide Vent Covers
- Power Outside Mirrors
- Rear Spoiler
- Privacy Glass- Rear Side, Qtr & Liftgate

INTERIOR

- Entune Audio, 6.1" Touch-screen Display
- Steering Wheel Audio/Bluetooth Controls
- Backup Camera
- Reclining & Fold-Flat 2nd Row Seats
- Remote Keyless Entry System
- 12V Power Outlets (2), USB Port (1)

Full Tank of Gas

MANUFACTURER'S SUGGESTED RETAIL PRICE \$23,680.00

OPTIONAL EQUIPMENT

FE	50 State Emissions	150.00
RR	R xof Rails	90.00
TC	Tonnneau Cover	225.00
CF	Carpet Floor Mats/Cargo Mat	

DELIVERY PROCESSING AND HANDLING FEE 885.00

TOTAL \$25,030.00

fuel economy.gov
Calculate personalized estimates and compare vehicles

Fuel Economy and Environment

Fuel Economy

26 MPG
combined city/hwy
24 city
31 highway
3.8 gallons per 100 miles

You save \$1,000 in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost \$2,000

Fuel Economy & Greenhouse Gas Rating (subject to EPA)

6 (Best) 10 (Worst)

Smog Rating (subject to EPA)

5 (Best) 10 (Worst)

The vehicle emits 330 grams CO2 per mile. The fuel emits 0 grams per mile (subject to EPA). Producing and distributing fuel also emits CO2.

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

The New Vehicle Limited Warranty provides 3-year/50,000-mile basic coverage, 5-year/100,000-mile powertrain coverage, and 5-year/unlimited-mile corrosion/perforation coverage. See Warranty and Maintenance Guide for details. As detailed service contract may be available for the vehicle.

Manufacturer's suggested retail price includes manufacturer's recommended pre-delivery service. Destination charge and title/tax, optional features, and one local dealer and dealer's distributor related options and accessories are not included in the manufacturer's suggested retail price.

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

Dealer Name / Address: DON JACOBS TOYOTA
5727 S. 27TH STREET
MILWAUKEE WI 53221

Ship to: 48032

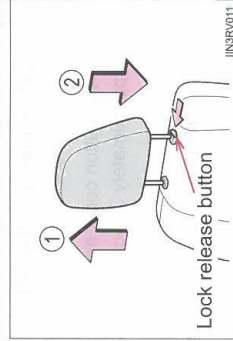
Figure A-69: Monroney Label

Head restraints

Head restraints are provided for all seats.

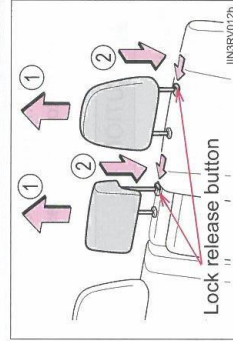
Front seats

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



Rear seats

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



Folding the head restraints (outboard rear seats only)

- ① To use
Lift up the head restraint until it locks.
- ② To fold
Push the head restraint lock release button to fold the head restraint.

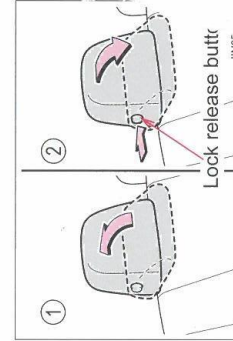


Figure A-70: Head Restraint Use and Adjustment Information from Vehicle Owner's Manual



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

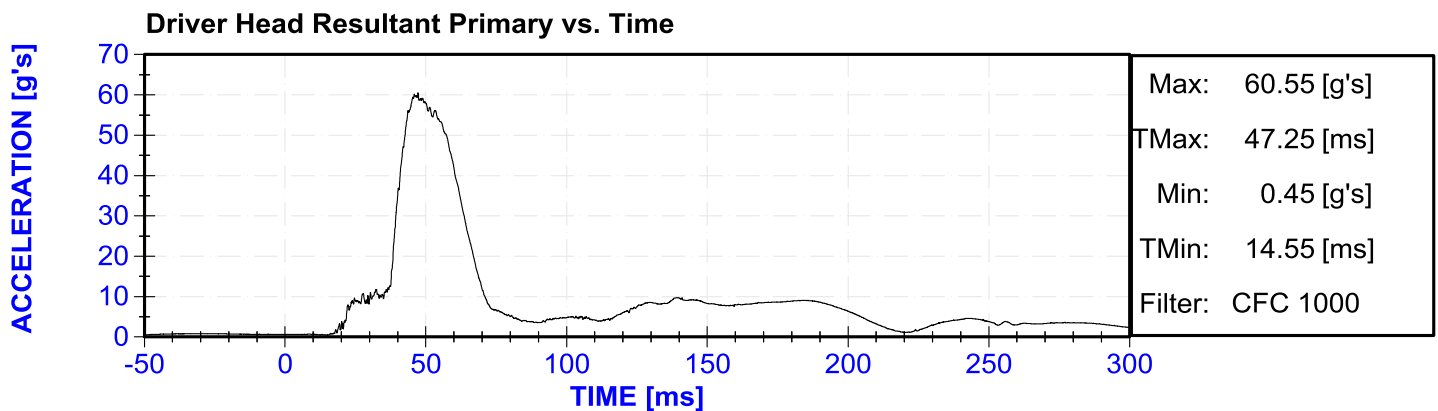
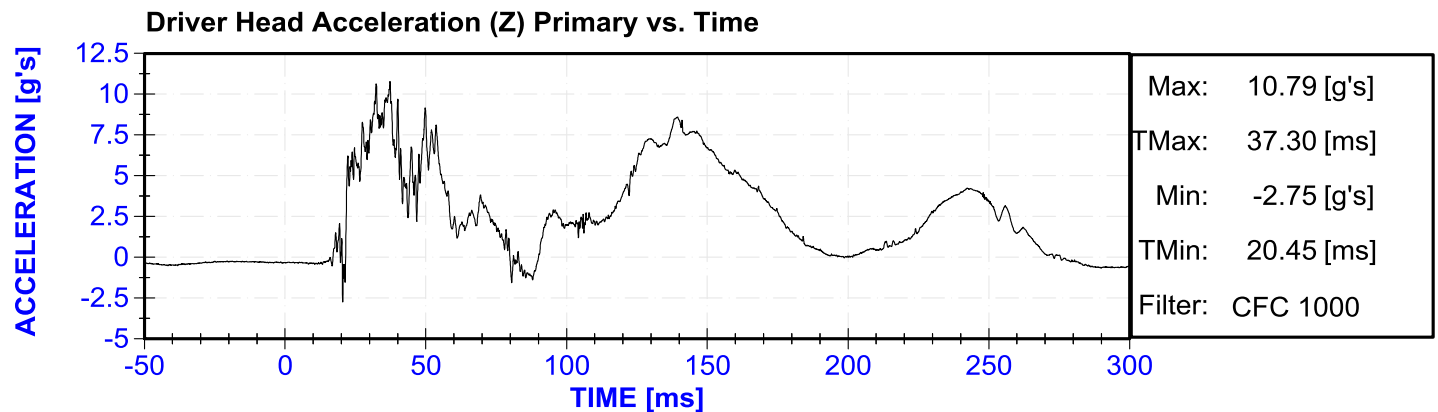
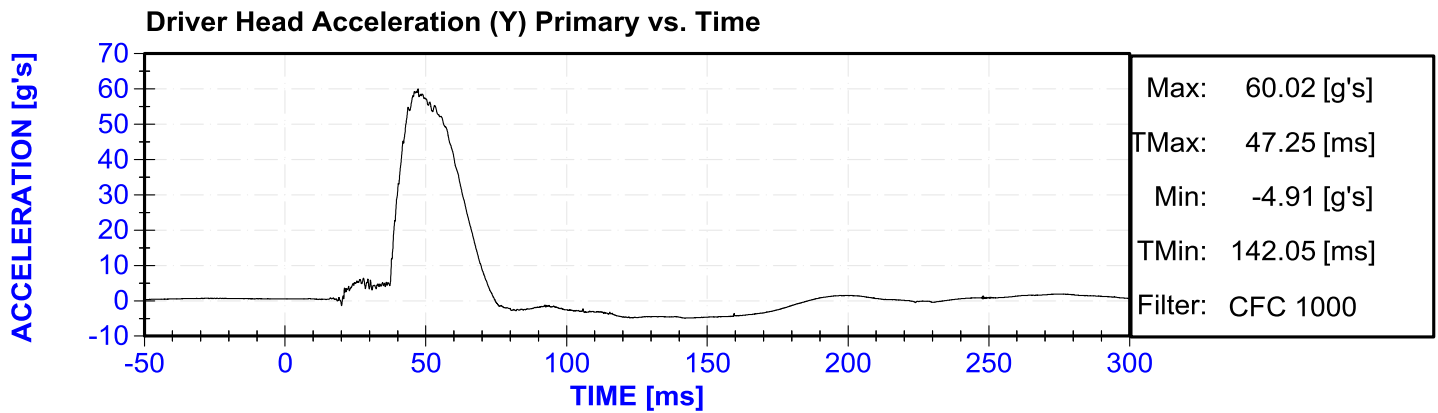
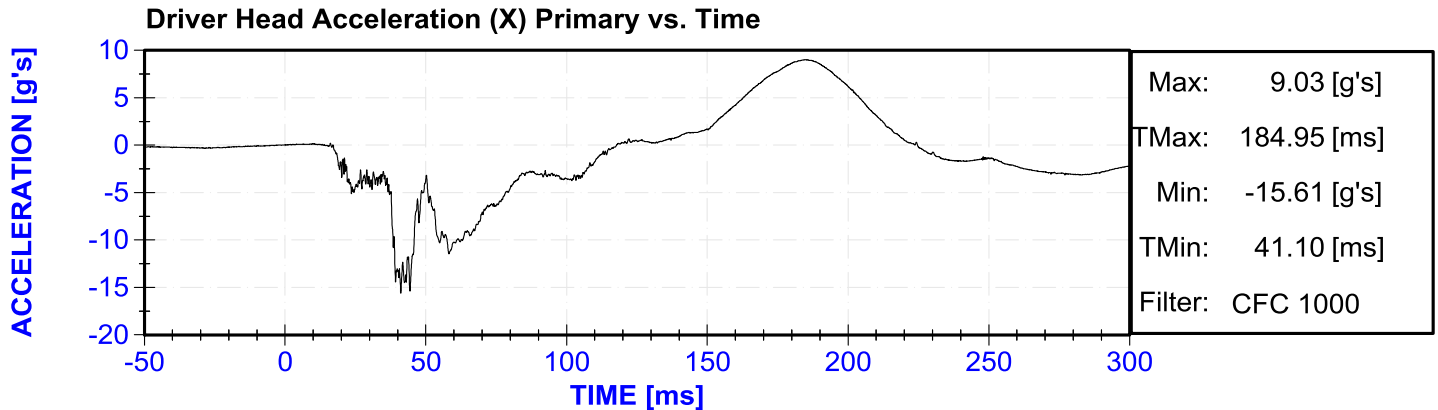
Driver Head Acceleration Redundant (X)
Driver Head Acceleration Redundant (Y)
Driver Head Acceleration Redundant (Z)
Driver Upper Thorax Rib Deflection (Y)
Driver Middle Thorax Rib Deflection (Y)
Driver Lower Thorax Rib Deflection (Y)
Driver Upper Abdomen Rib Deflection (Y)
Driver Lower Abdomen Rib Deflection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

Vehicle Instrumentation Data

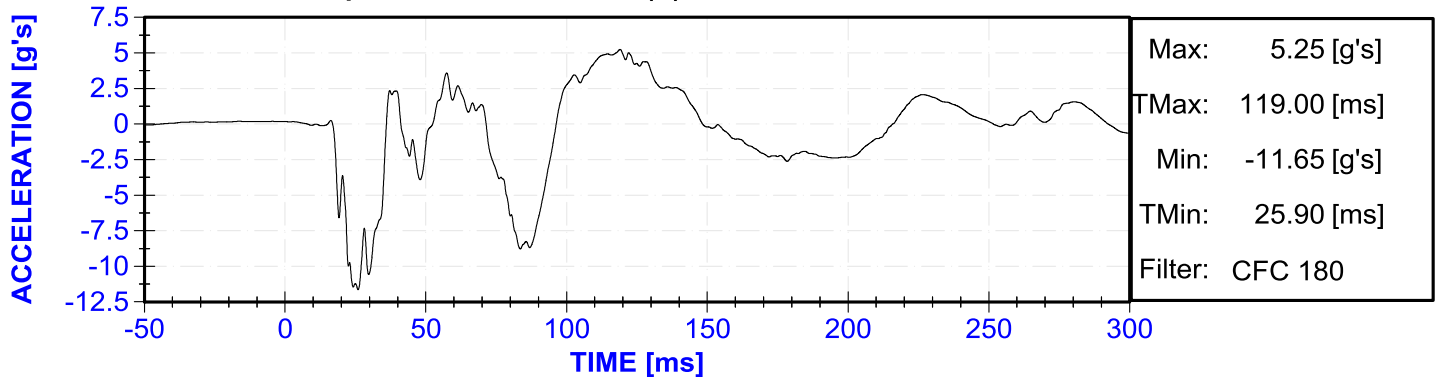
Vehicle Center of Gravity Acceleration (X)
Vehicle Center of Gravity Acceleration (Y)
Vehicle Center of Gravity Acceleration (Z)
Left Floor Sill Acceleration (Y)
Left A-Pillar Sill Acceleration (Y)
Left Lower A-Pillar Acceleration (Y)
Left Mid A-Pillar Acceleration (Y)
Left B-Pillar Sill Acceleration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

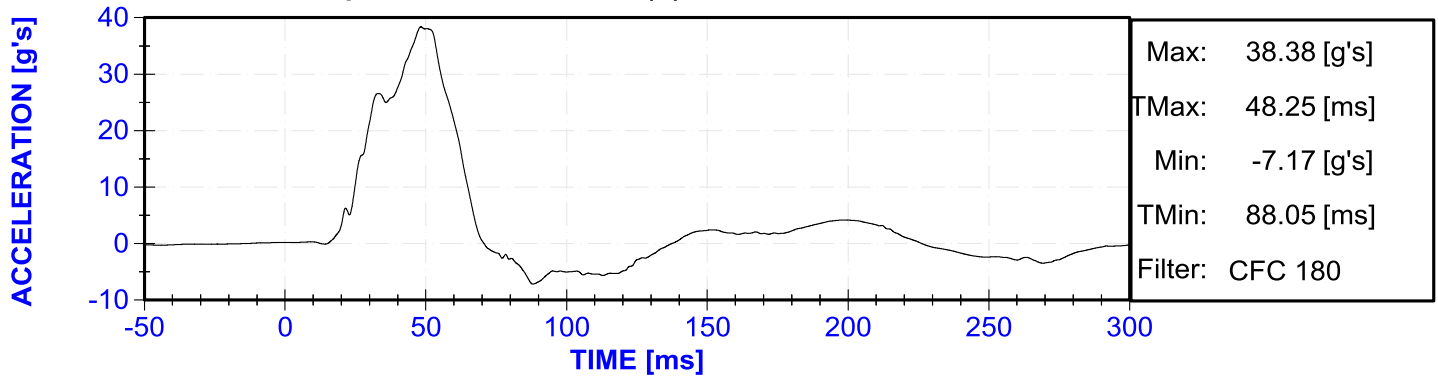
Load Cell Pole Barrier #1 Force (Y)
Load Cell Pole Barrier #2 Force (Y)
Load Cell Pole Barrier #3 Force (Y)
Load Cell Pole Barrier #4 Force (Y)
Load Cell Pole Barrier #5 Force (Y)
Load Cell Pole Barrier #6 Force (Y)
Load Cell Pole Barrier #7 Force (Y)
Load Cell Pole Barrier #8 Force (Y)



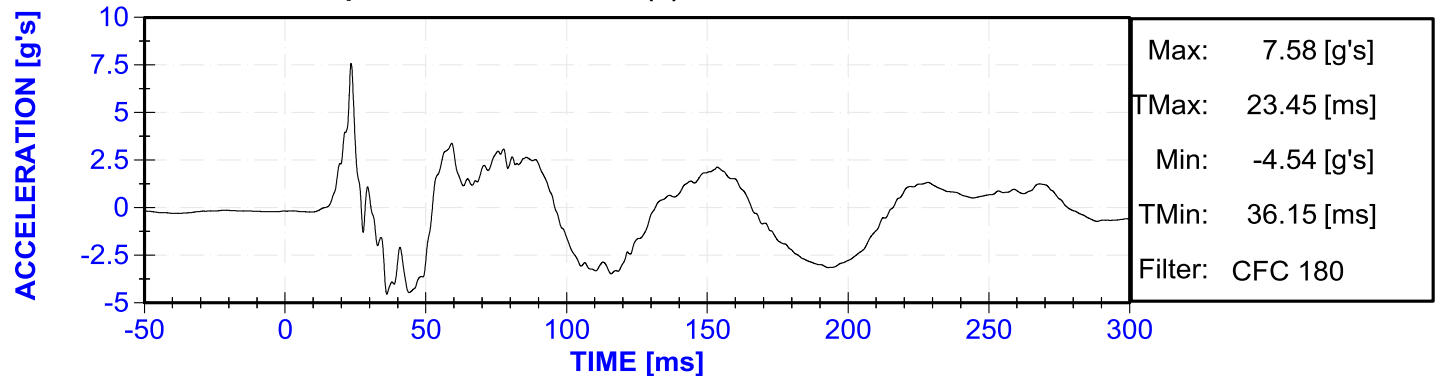
Driver Lower Spine T12 Acceleration (X) vs. Time



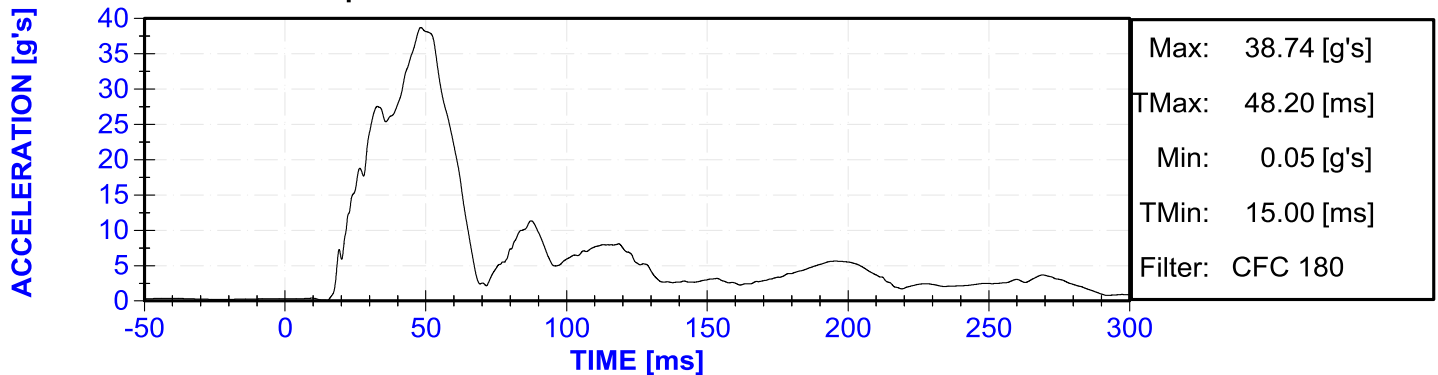
Driver Lower Spine T12 Acceleration (Y) vs. Time



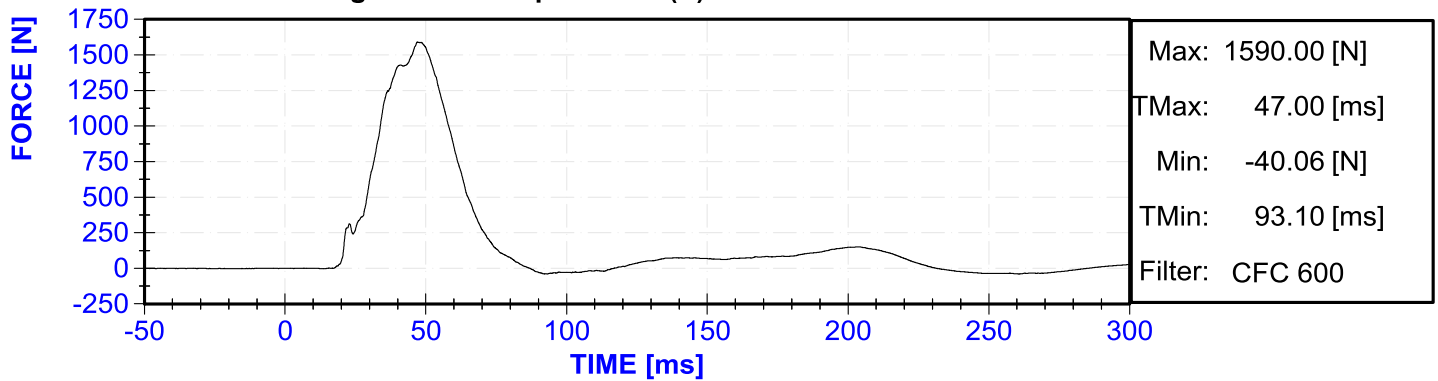
Driver Lower Spine T12 Acceleration (Z) vs. Time



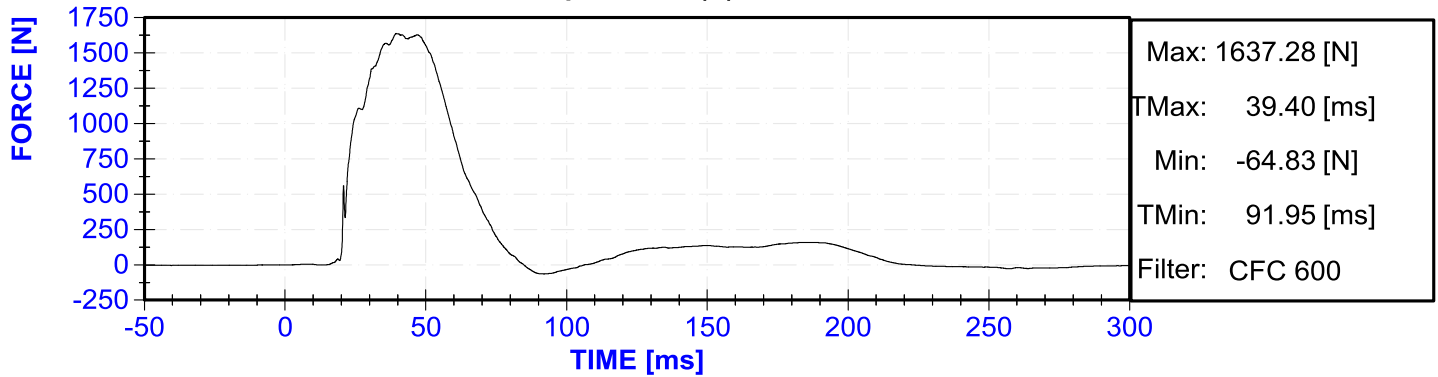
Driver Lower Spine T12 Resultant Acceleration vs. Time



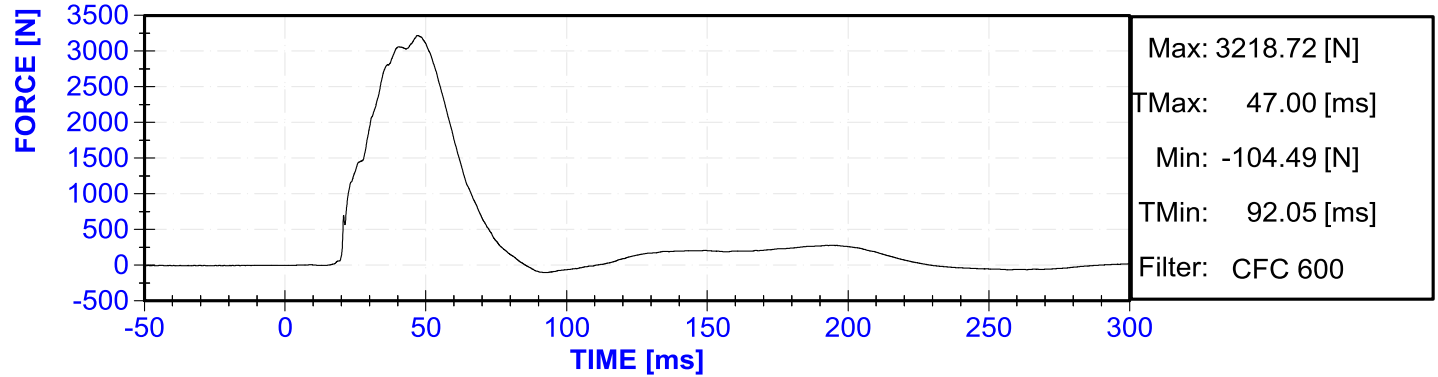
Driver Iliac Wing Force on Impact Side (Y) vs. Time



Driver Acetabulum Force on Impact Side (Y) vs. Time



Driver Total Pelvis Force on Impact Side (Y) vs. Time



APPENDIX C

DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

CALIBRATION TEST RESULTS

PRE-TEST

SID-IIS 5TH PERCENTILE FEMALE - DRIVER ATD

SERIAL NO: 300

(CONFIGURED FOR LEFT SIDE IMPACT)

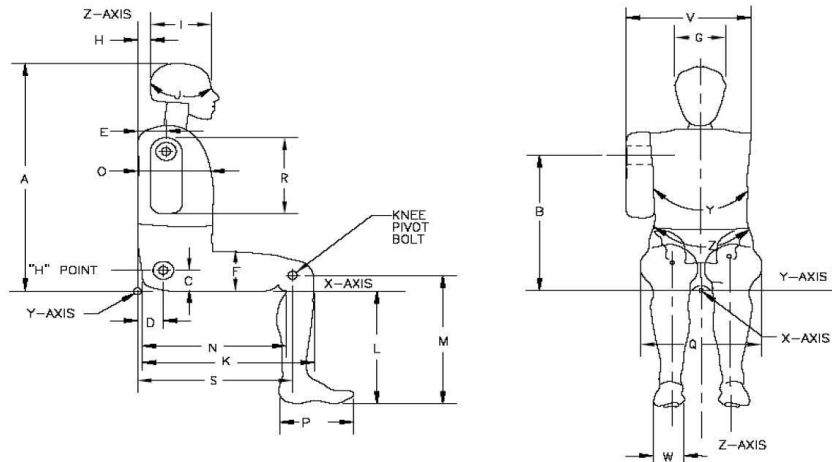


External Measurements - SID-IIs

Technician: M. Geesey

Date: 12/17/2014

Dummy Serial Number: 300



Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	782	Pass
B	Shoulder Pivot Height	437	453	448	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	105	Pass
F	Thigh Clearance	119	135	123	Pass
G	Head Breadth	140	148	143	Pass
H	Head Back from Backline	40	46	43	Pass
I	Head Depth	178	188	183	Pass
J	Head Circumference	541	551	549	Pass
K	Buttock to Knee Length	514	540	538	Pass
L	Popliteal Height	343	369	358	Pass
M	Knee Pivot to floor height	392	409	403	Pass
N	Buttock Popliteal Length	416	442	437	Pass
O	Chest Depth w/o jacket	195	211	204	Pass
P	Foot Length	216	232	218	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	317	Pass
R	Arm Length	249	259	250	Pass
S	Knee Joint to seatback	477	493	487	Pass
V	Shoulder Width	341	357	348	Pass
W	Foot Width	78	94	82	Pass
Y	Chest Circumference w/jacket	851	881	870	Pass
Z	Waist Circumference	761	791	770	Pass



VERIFICATION REPORT

Test Name:	Head Drop	Revision:	12/14/2006
Sub Test Name:			
ATD Type:	SID-IIs		
ATD Serial Number:	300		
Test ID:	Head Drop	Test Date:	12/16/2014
		Test Time:	8:13:05 AM

Test Parameters	Test Specifications			Test Results	
Temperature	20.6	--	22.2	21.3 deg C	P
Humidity	10	--	70	28 %RH	P
Resultant Acceleration	115.0	--	137.0	132.5 g	P
Oscillation	0.0	--	15.0	2.7 %	P
Fore-Aft Acceleration	-15.0	--	15.0	-6.5 g	P

All test parameters are within specifications

Technician: **M. Geesey**
Supervisor: **M. Goehle**



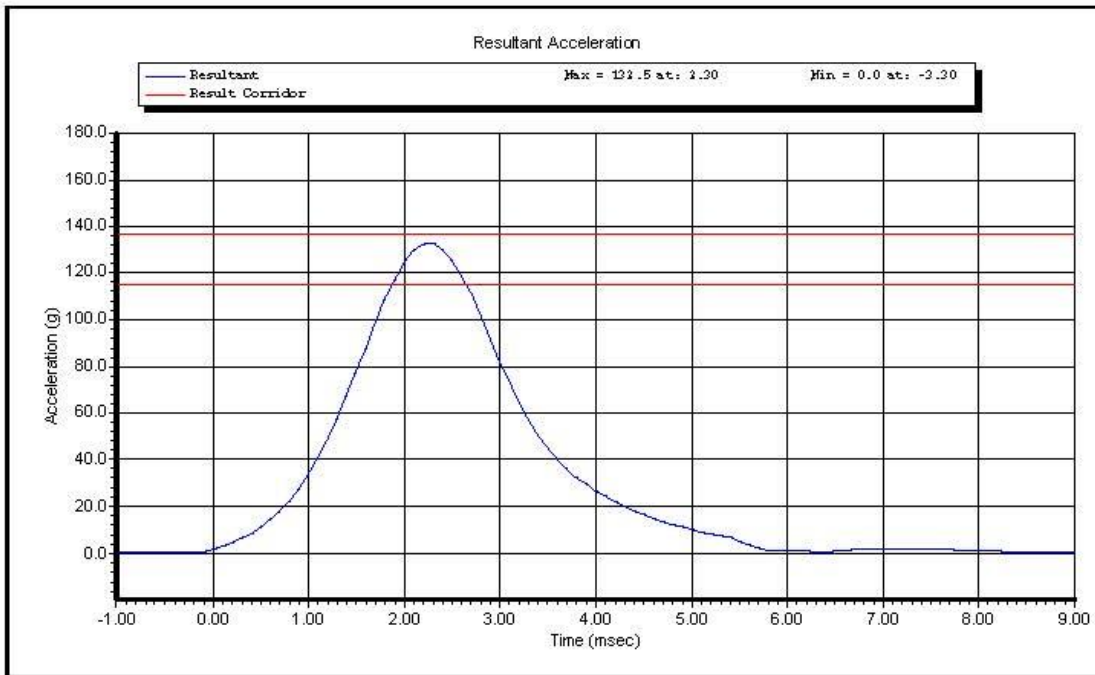
VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Endevco	7264-2000	P58777	8/28/2014
Endevco	7264-2000	P59018	8/28/2014
Endevco	7264-2000	P68608	8/28/2014



Test Name:	Head Drop
Sub Test Name:	
ATD Type:	SID-IIs
ATD Serial Number:	300

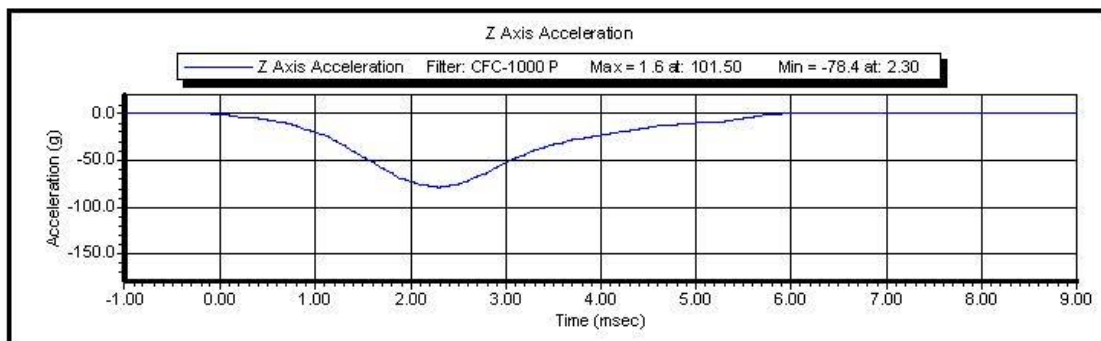
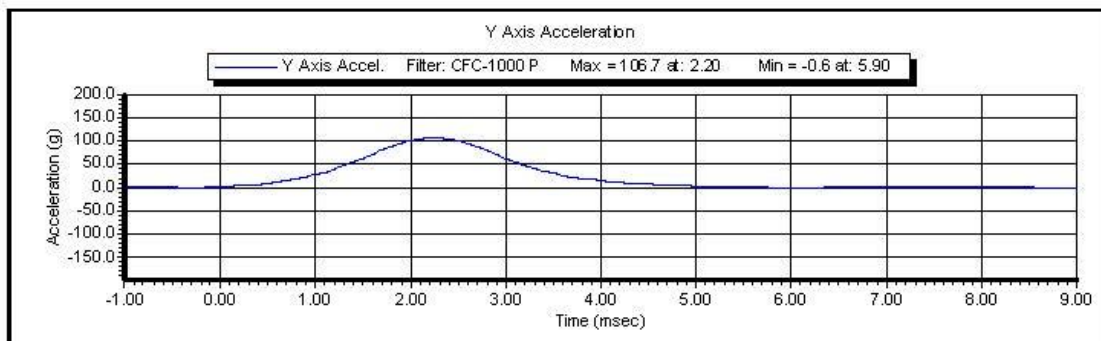
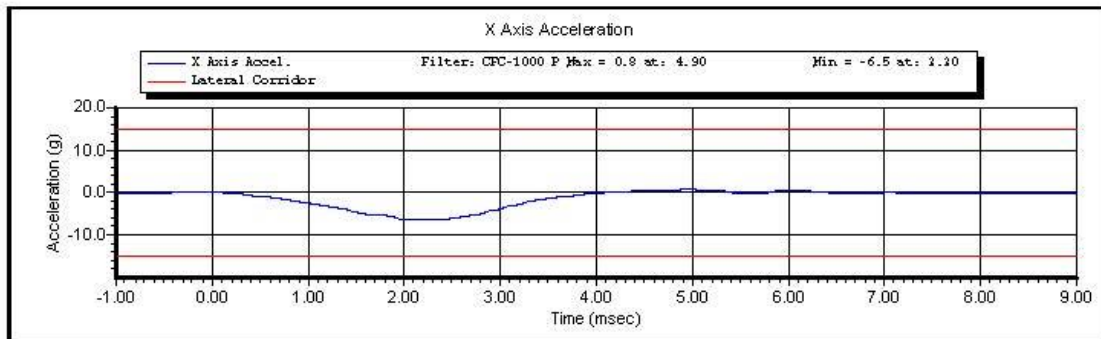


Test ID: **Head Drop**

Test Time: **8:13:05 AM**

Test Date: **12/16/2014**

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0



Test ID: **Head Drop**

Test Time: **8:13:05 AM**

Test Date: **12/16/2014**

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0



VERIFICATION REPORT

Test Name:	Neck Pendulum	Revision:	8/24/2009
Sub Test Name:	Left Side		
ATD Type:	SID-IIs		
ATD Serial Number:	300		
Test ID:	Neck Flexion	Test Date:	12/16/2014
		Test Time:	9:59:48 AM

Test Parameters		Test Specifications		Test Results	
Temperature		20.6	-- 22.2	21.3	deg C P
Humidity		10	-- 70	29.4	%RH P
Velocity		5.51	-- 5.63	5.562	m/s P
Pendulum Impulse at	10 ms	2.2	-- 2.8	2.33	m/s P
Pendulum Impulse at	15 ms	3.3	-- 4.1	3.44	m/s P
Pendulum Impulse at	20 ms	4.4	-- 5.4	4.66	m/s P
Pendulum Impulse at	25 ms	5.4	-- 6.1	5.66	m/s P
Pendulum Impulse between 25 and	100 ms	5.5	-- 6.2	5.88	m/s P
Max D Plane Rotation		71	-- 81	73.5	degrees P
Time at Max Rotation		50	-- 70	60.4	ms P
Moment about OC		36	-- 44	39.6	Nm P
Moment Decay to Zero		102	-- 126	113.5	ms P

All test parameters are within specifications

Technician: **M. Geesey**

Supervisor: **M. Goehle**



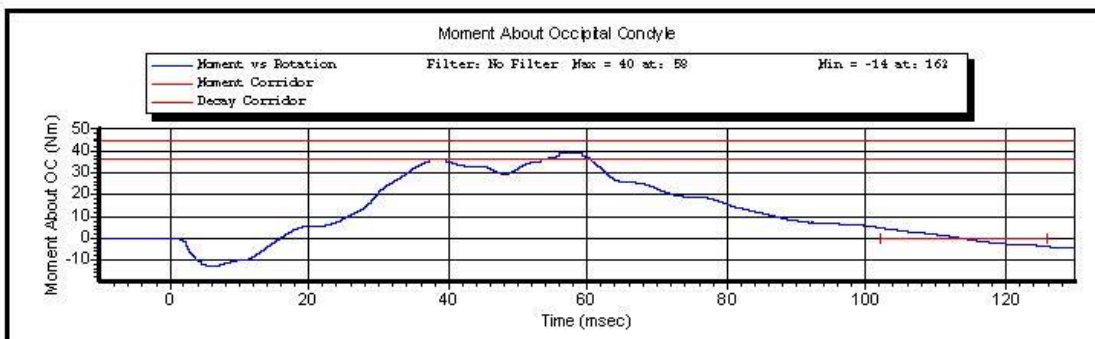
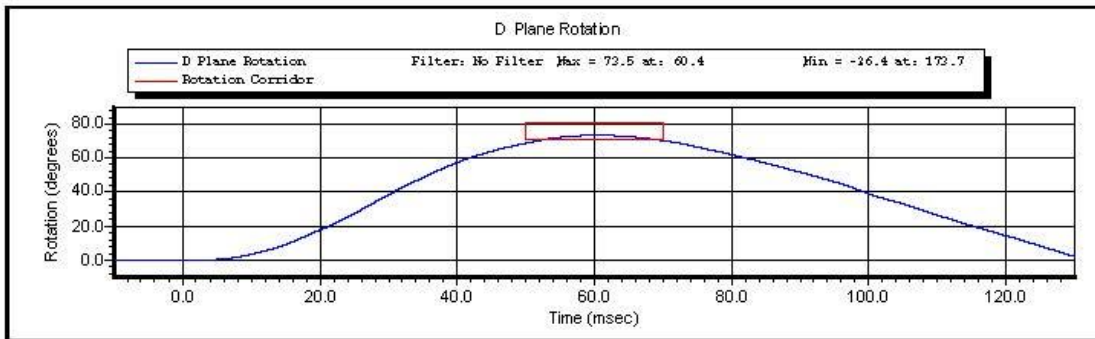
VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2014
Endevco	7231CT	AH5F3	11/6/2014
Denton	1716A	LC-440 Fy	5/19/2014
Denton	1716A	LC-440 Mx	5/19/2014
DentonATD	78051-342	184	11/13/2014
DentonATD	78051-342	174	11/13/2014
DentonATD	78051-342	185	11/13/2014

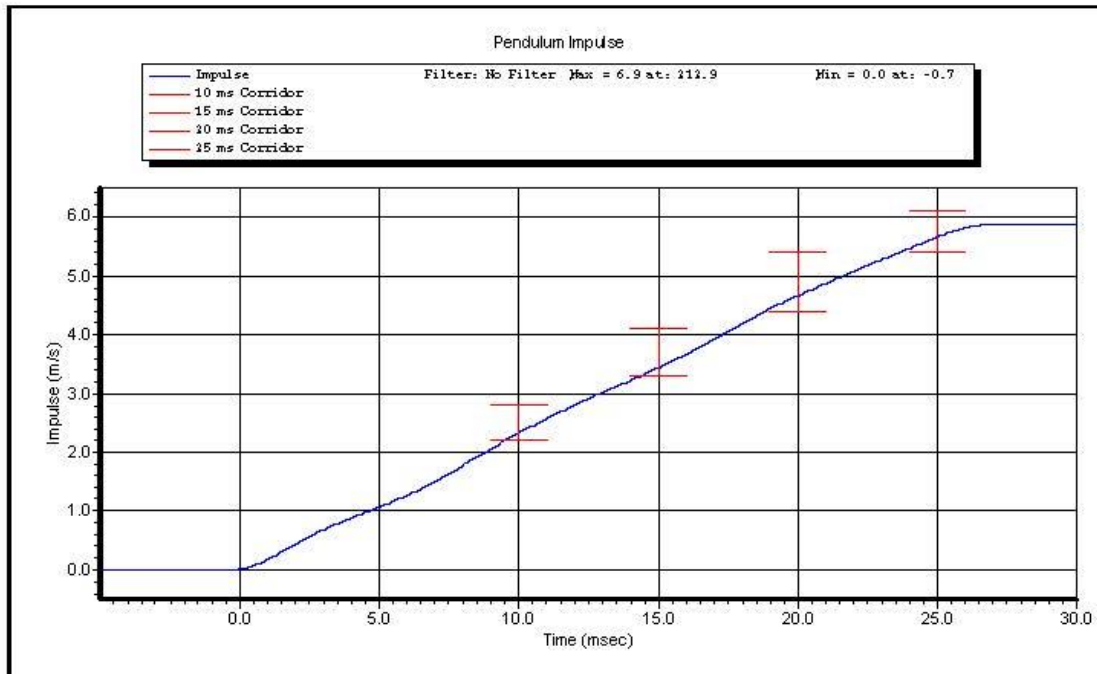


Test Name:	Neck Pendulum
Sub Test Name:	Left Side
ATD Type:	SID-IIs
ATD Serial Number:	300



Test ID: Neck Flexion Test Time: 9:59:48 AM Test Date: 12/16/2014

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0



Test ID: **Neck Flexion** Test Time: **9:59:48 AM**

Test Date: **12/16/2014**

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0



VERIFICATION REPORT

Test Name:	Shoulder Impact	Revision:	8/24/2009
Sub Test Name:			
ATD Type:	SID-IIs		
ATD Serial Number:	300		
Test ID:	Shoulder Impact	Test Date:	12/16/2014
		Test Time:	3:33:59 PM

Test Parameters	Test Specifications			Test Results	
Temperature	20.6	--	22.2	21.40 deg C	P
Humidity	10	--	70	36.0 %RH	P
Velocity	4.2	--	4.4	4.32 m/s	P
Probe Acceleration	13	--	18	15.0 g	P
Shoulder Deflection	28	--	37	28.4 mm	P
T1 Acceleration	17	--	22	19.4 g	P

All test parameters are within specifications

Technician: **M. Geesey**

Supervisor: **M. Goehle**



VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2014
Endevco	7231CT	C14953	7/30/2014
Servo	180-3885	DS-1063GFE	8/7/2014
Endevco	7264-2000	P51915	8/28/2014

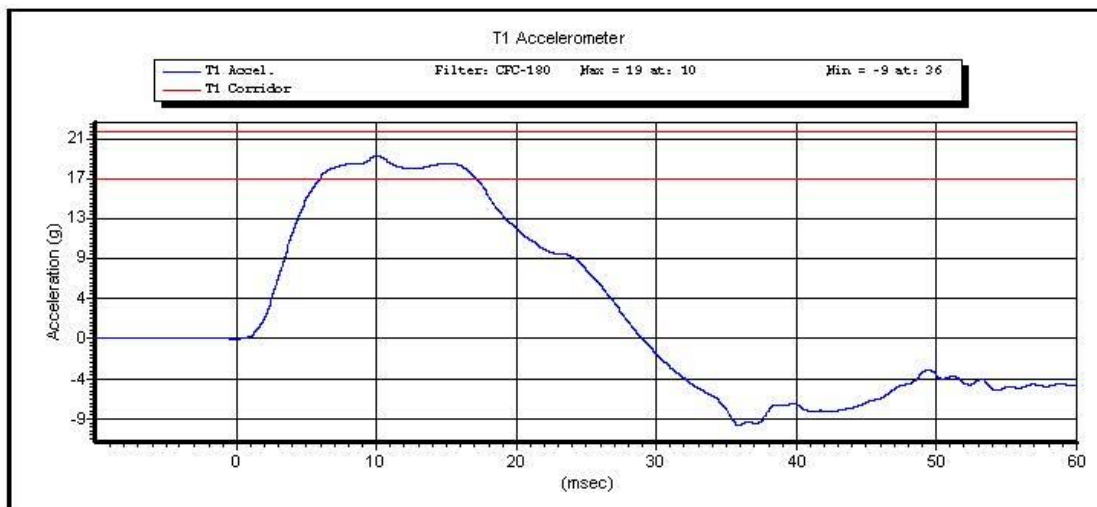
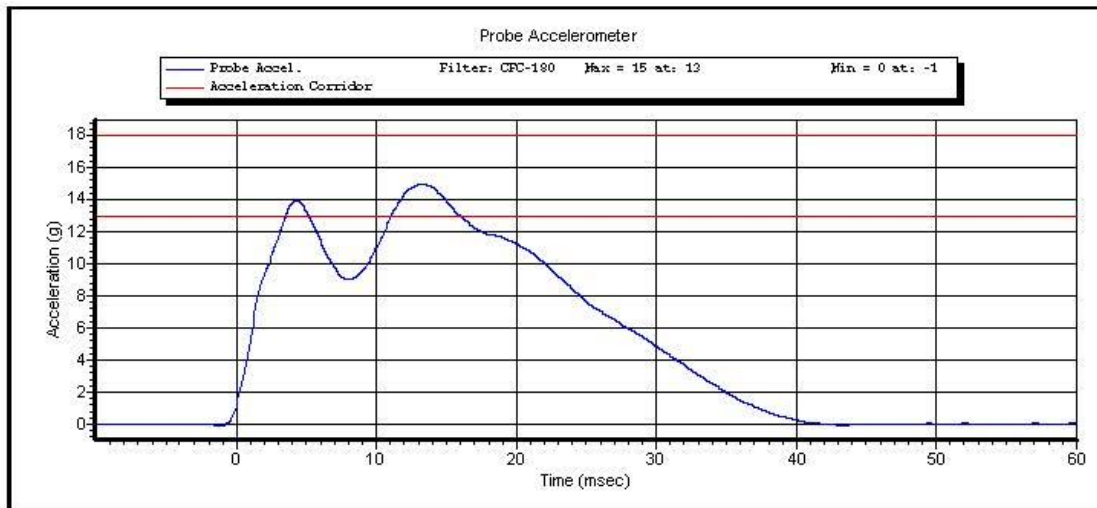


Test Name:	Shoulder Impact
Sub Test Name:	
ATD Type:	SID-IIs
ATD Serial Number:	300



Test ID: **Shoulder Impact** Test Time: **3:33:59 PM**
Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

Test Date: **12/16/2014**



Test ID: **Shoulder Impact** Test Time: **3:33:59 PM**

Test Date: **12/16/2014**

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0



VERIFICATION REPORT

Test Name:	Thorax Impact with Arm	Revision:	8/24/2009
Sub Test Name:			
ATD Type:	SID-11s		
ATD Serial Number:	300		
Test ID:	Thorax w/Arm Impact	Test Date:	12/17/2014
		Test Time:	9:25:30 AM

Test Parameters	Test Specifications			Test Results	
Temperature	20.6	--	22.2	21.2 deg C	P
Humidity	10	--	70	31.6 %RH	P
Velocity	6.6	--	6.8	6.69 m/s	P
Probe Acceleration after 5ms	30	--	36	34.0 g	P
Upper Thorax Rib Deflection	25	--	32	26.7 mm	P
Mid Thorax Rib Deflection	30	--	36	31.0 mm	P
Lower Thorax Rib Deflection	32	--	38	32.3 mm	P
Upper Spine Acceleration ("y")	34	--	43	37.8 g	P
Lower Spine Acceleration ("y")	29	--	37	36.4 g	P
Shoulder Deflection	31	--	40	33.6 mm	P

All test parameters are within specifications

Technician: **M. Geesey**
Supervisor: **M. Goehle**



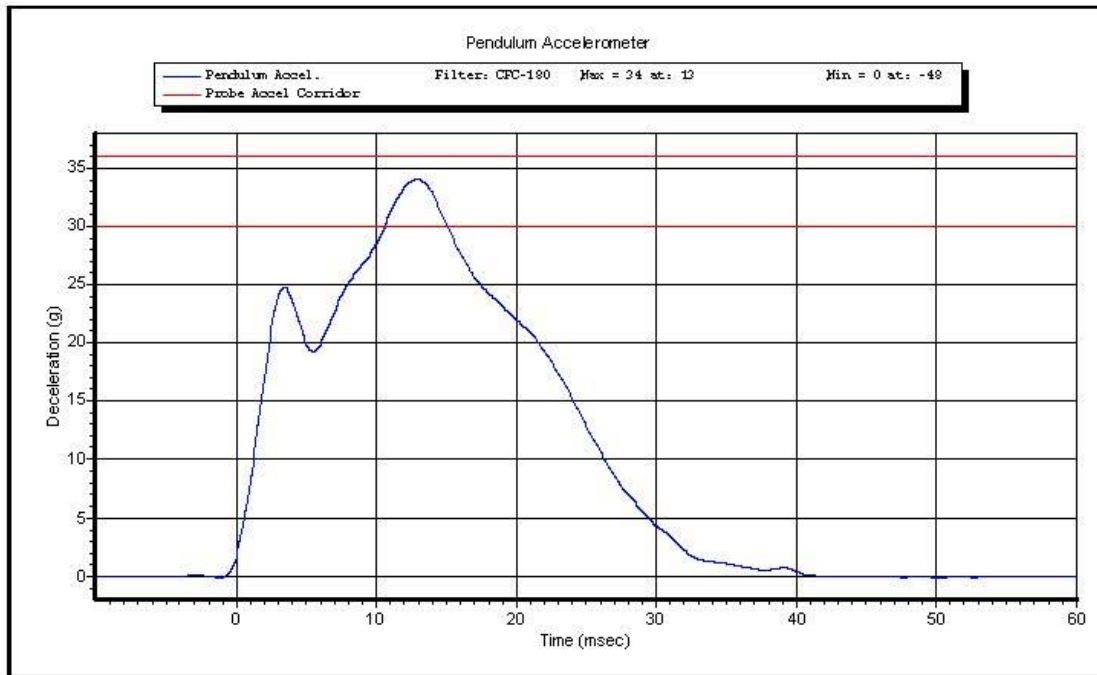
VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2014
Endevco	7231CT	C14953	7/30/2014
Servo	180-3885	DS-451GFE	8/12/2014
Servo	180-3885	DS-1151GFE	8/12/2014
Servo	180-3885	DS-1156GFE	8/12/2014
Endevco	7264-2000	P51915	8/28/2014
Endevco	7264-2000	P64147	8/28/2014
Servo	180-3885	DS-1063GFE	8/7/2014

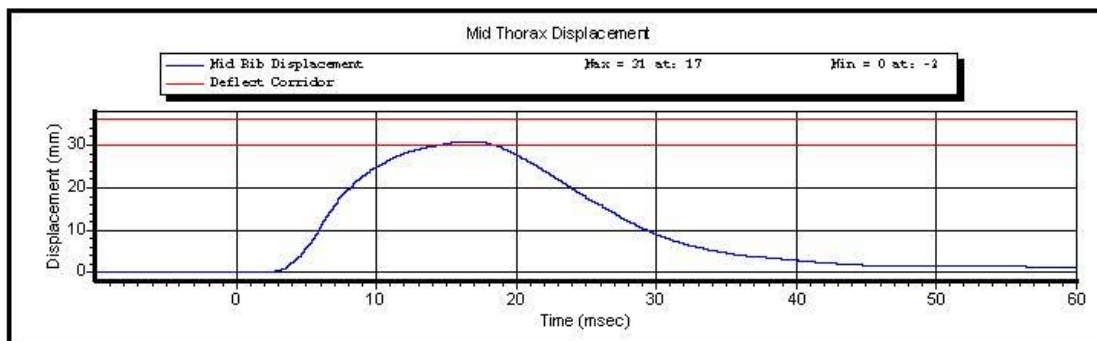
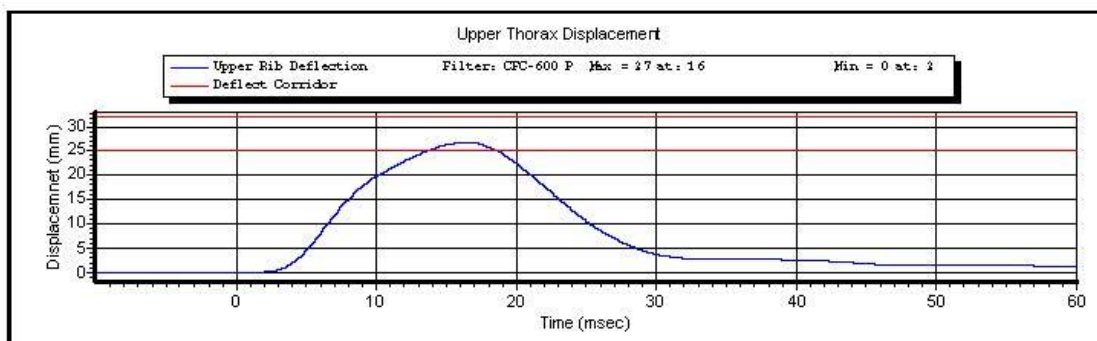
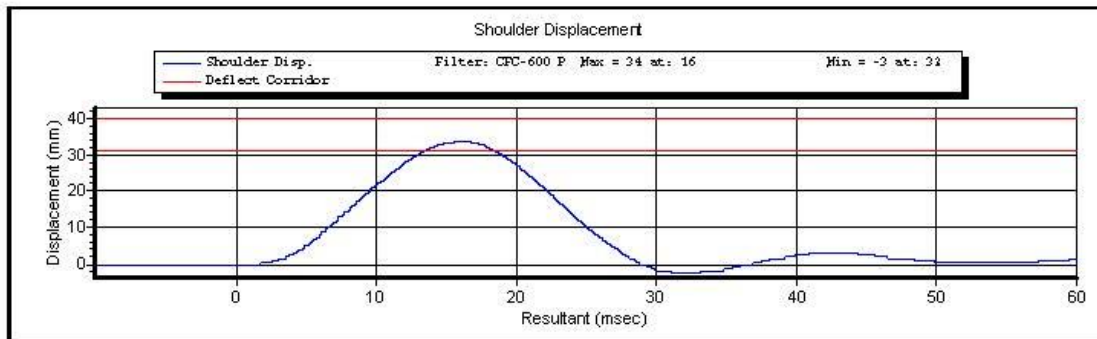


Test Name:	Thorax Impact with Arm
Sub Test Name:	
ATD Type:	SID-IIs
ATD Serial Number:	300



Test ID: **Thorax w/Arm Impact** Test Time: **9:25:30 AM**
Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

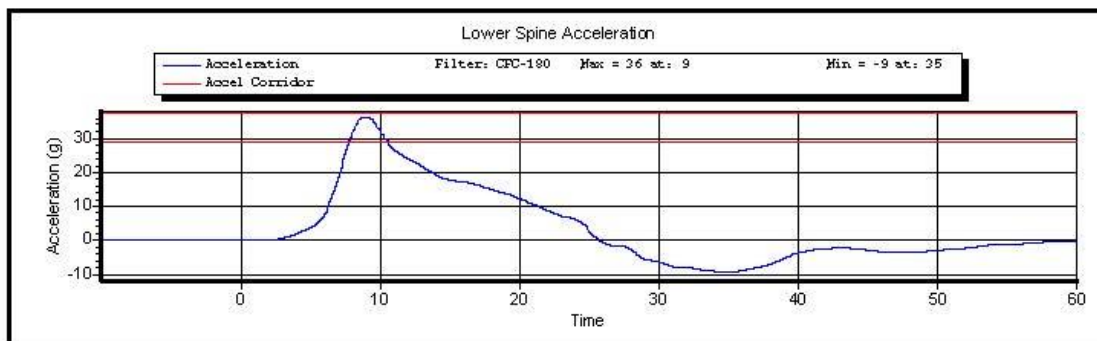
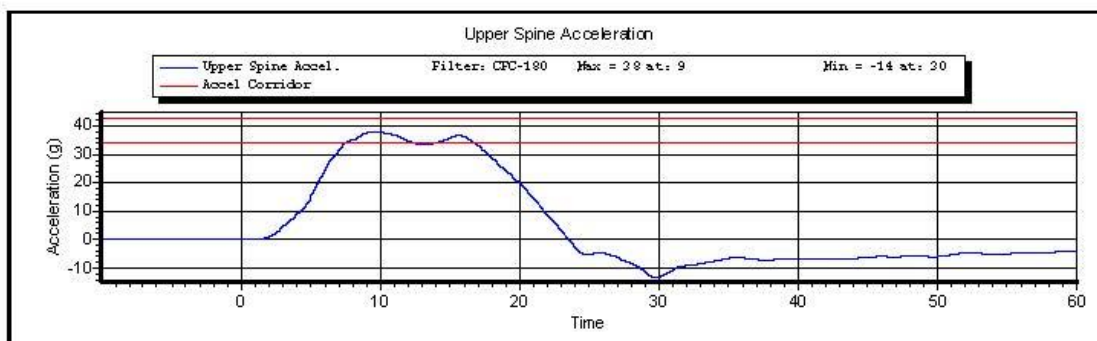
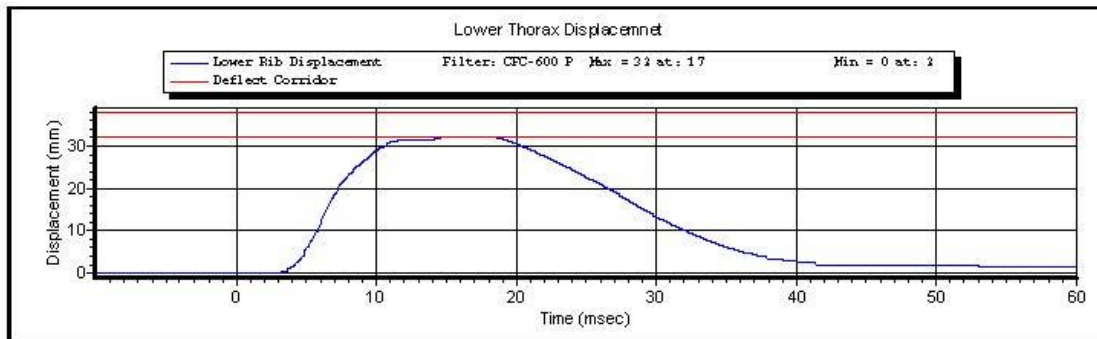
Test Date: **12/17/2014**



Test ID: Thorax w/Arm Impact Test Time: 9:25:30 AM

Test Date: 12/17/2014

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0



Test ID: **Thorax w/Arm Impact** Test Time: **9:25:30 AM**
Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

Test Date: **12/17/2014**



VERIFICATION REPORT

Test Name:	Thorax Impact without Arm	Revision:	8/24/2009
Sub Test Name:			
ATD Type:	SID-11s		
ATD Serial Number:	300		
Test ID:	Thorax w/o Arm	Test Date:	12/16/2014
		Test Time:	3:17:11 PM

Test Parameters	Test Specifications			Test Results	
Temperature	20.6	--	22.2	21.4 deg C	P
Humidity	10	--	70	35.9 %RH	P
Velocity	4.2	--	4.4	4.31 m/s	P
Probe Acceleration	14	--	18	16.4 g	P
Upper Thorax Rib Deflection	32	--	40	35.1 mm	P
Mid Thorax Rib Deflection	39	--	45	40.1 mm	P
Lower Thorax Rib Deflection	35	--	43	35.8 mm	P
Upper Spine Acceleration T1	13	--	17	16.1 g	P
Lower Spine Acceleration T12	7	--	11	9.9 g	P

All test parameters are within specifications

Technician: **M. Geesey**

Supervisor: **M. Geesey**



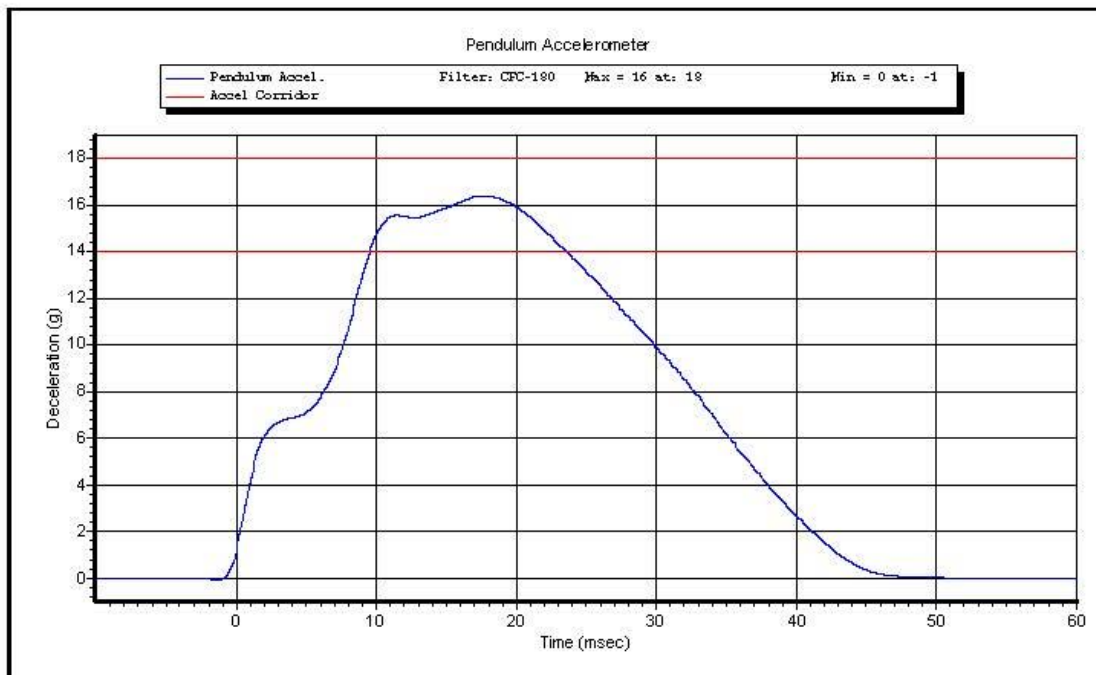
VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2014
Endevco	7231CT	C14953	7/30/2014
Servo	180-3885	DS-451GFE	8/12/2014
Servo	180-3885	DS-1151GFE	8/12/2014
Servo	180-3885	DS-1156GFE	8/12/2014
Endevco	7264-2000	P51915	8/28/2014
Endevco	7264-2000	P64147	8/28/2014

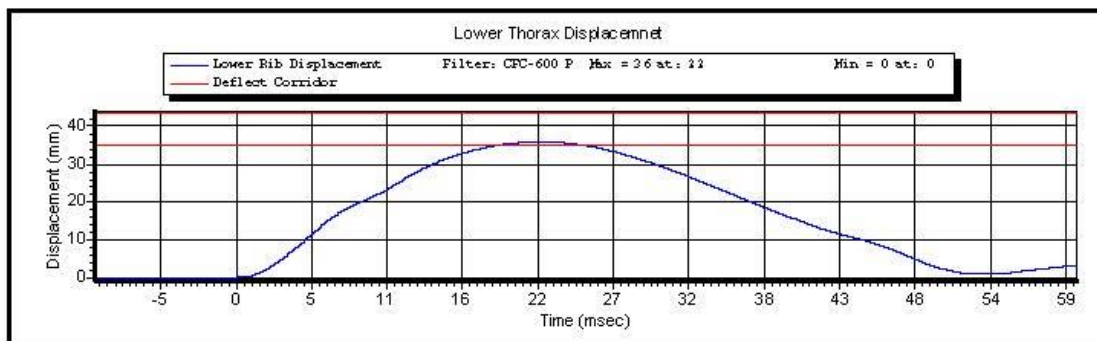
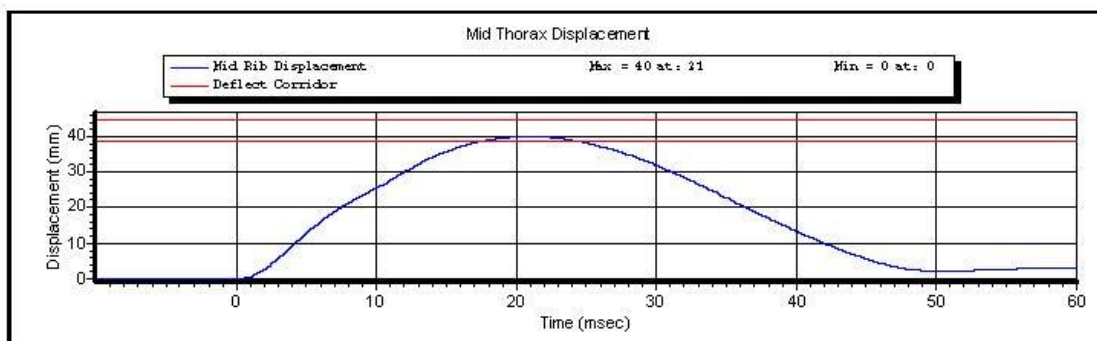
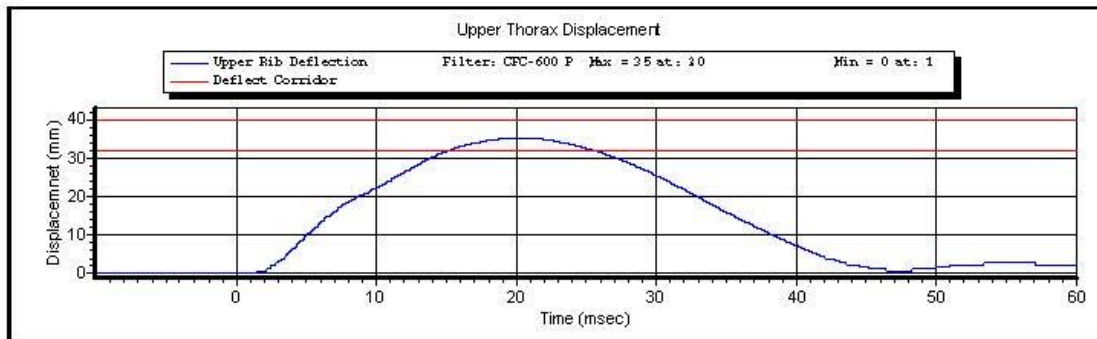


Test Name:	Thorax Impact without Arm
Sub Test Name:	
ATD Type:	SID-IIs
ATD Serial Number:	300



Test ID: **Thorax w/o Arm** Test Time: **3:17:11 PM**
Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

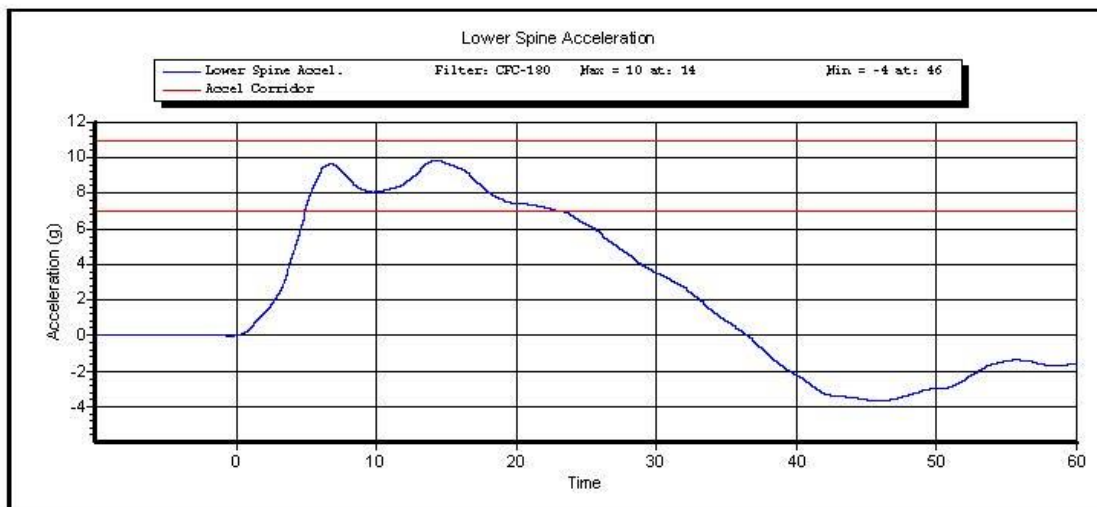
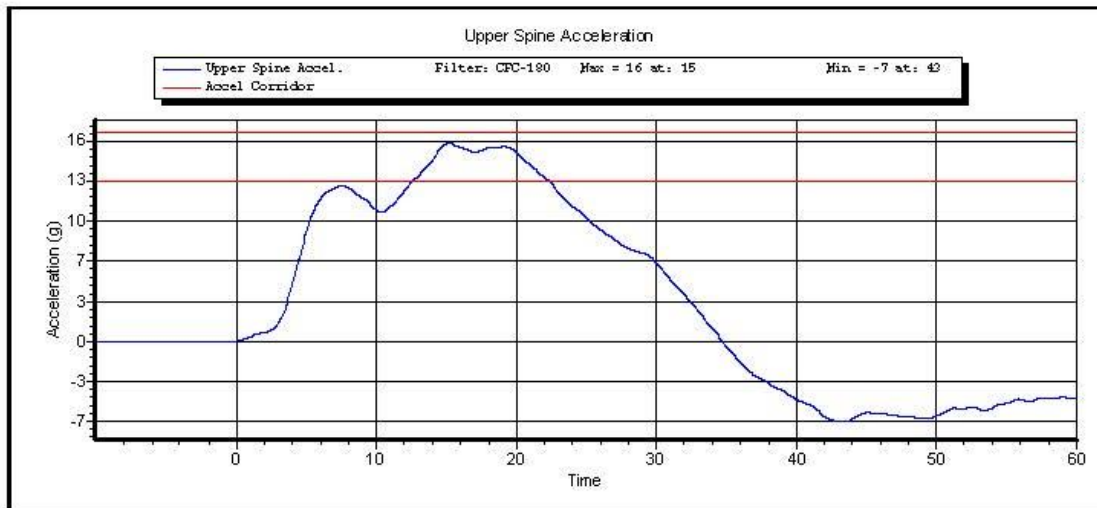
Test Date: **12/16/2014**



Test ID: Thorax w/o Arm Test Time: 3:17:11 PM

Test Date: 12/16/2014

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Test ID: **Thorax w/o Arm** Test Time: **3:17:11 PM**

Test Date: **12/16/2014**

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VERIFICATION REPORT

Test Name:	Abdominal Impact	Revision:	8/24/2009
Sub Test Name:			
ATD Type:	SID-IIs		
ATD Serial Number:	300		
Test ID:	Abdomen Impact	Test Date:	12/17/2014
		Test Time:	9:50:30 AM

Test Parameters	Test Specifications			Test Results	
Temperature	20.6	--	22.2	20.90 deg C	P
Humidity	10	--	70	32.20 %RH	P
Velocity	4.2	--	4.4	4.33 m/s	P
Probe Deceleration	12	--	16	15.5 G's	P
Upper Abdominal Rib Deflection	36	--	47	39.5 mm	P
Lower Abdominal Rib Deflection	33	--	44	33.9 mm	P
Lower Spine Acceleration - T12	9	--	14	12.0 G's	P

All test parameters are within specifications

Technician: **M. Geesey**

Supervisor: **M. Goehle**



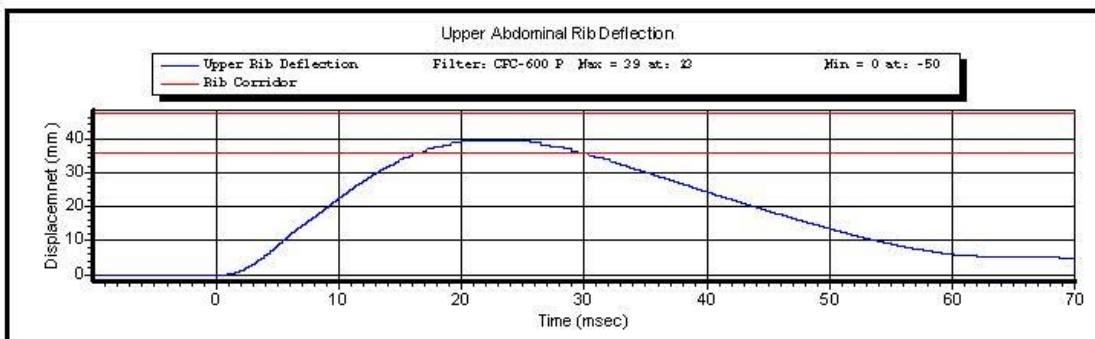
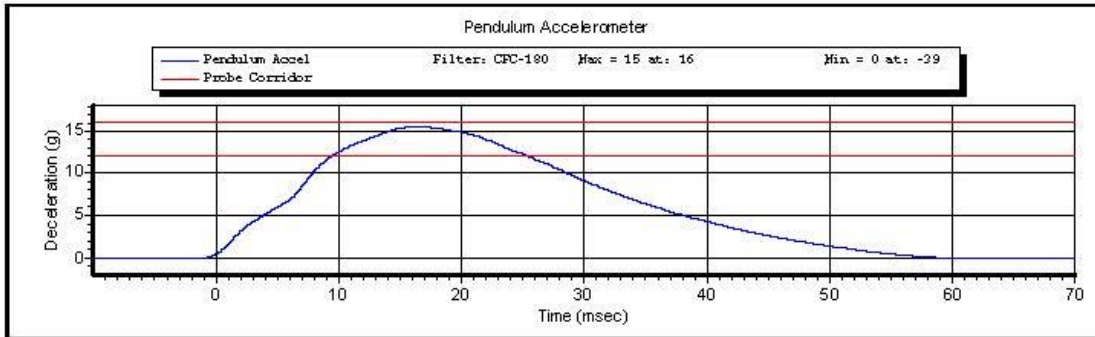
VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2014
Endevco	7231CT	C14953	7/30/2014
Servo	180-3885	DS-308GFE	8/12/2014
Servo	180-3885	DS-307GFE	8/7/2014
Endevco	7264-2000	P64147	8/28/2014

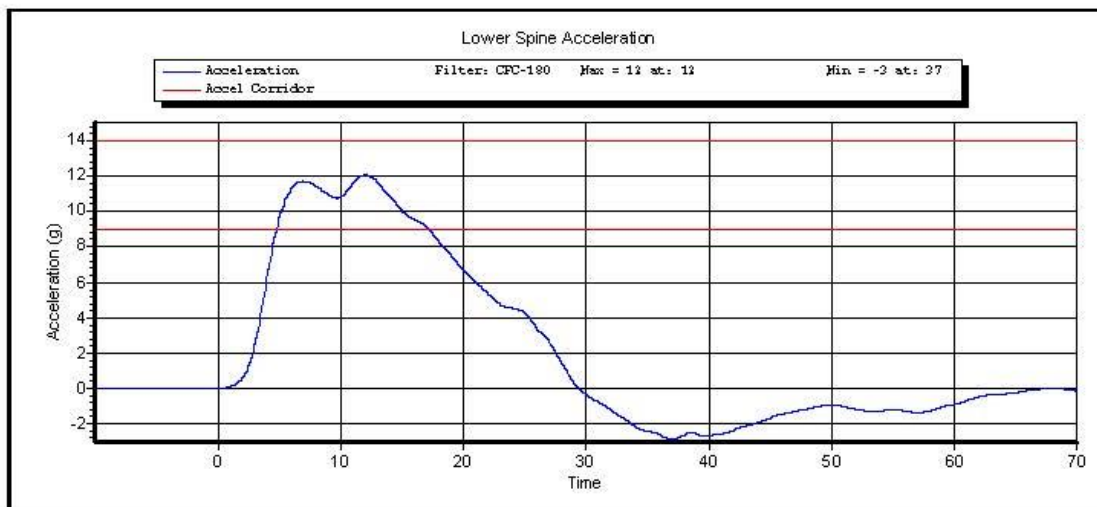
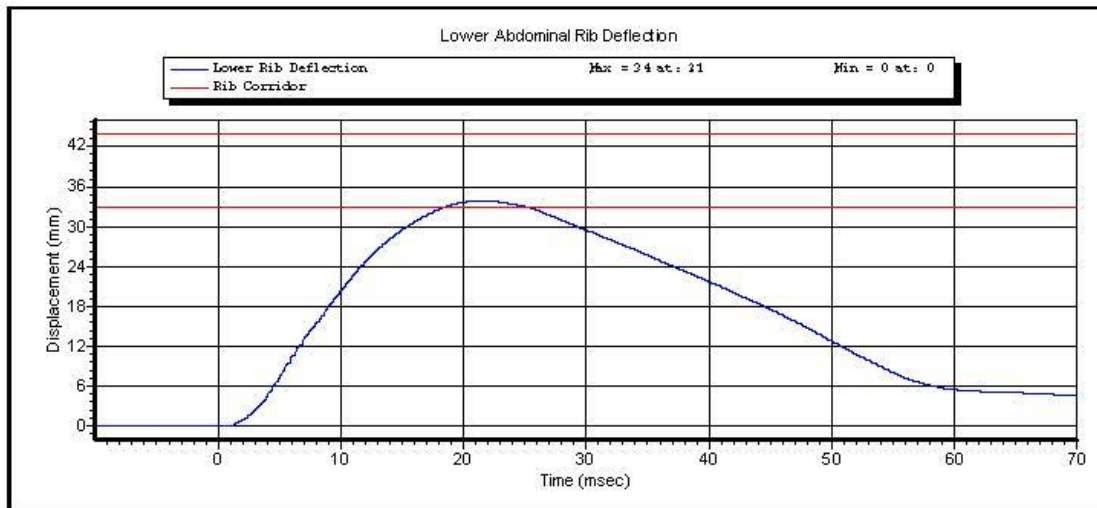


Test Name:	Abdominal Impact
Sub Test Name:	
ATD Type:	SID-IIs
ATD Serial Number:	300



Test ID: **Abdomen Impact** Test Time: **9:50:30 AM** Test Date: **12/17/2014**

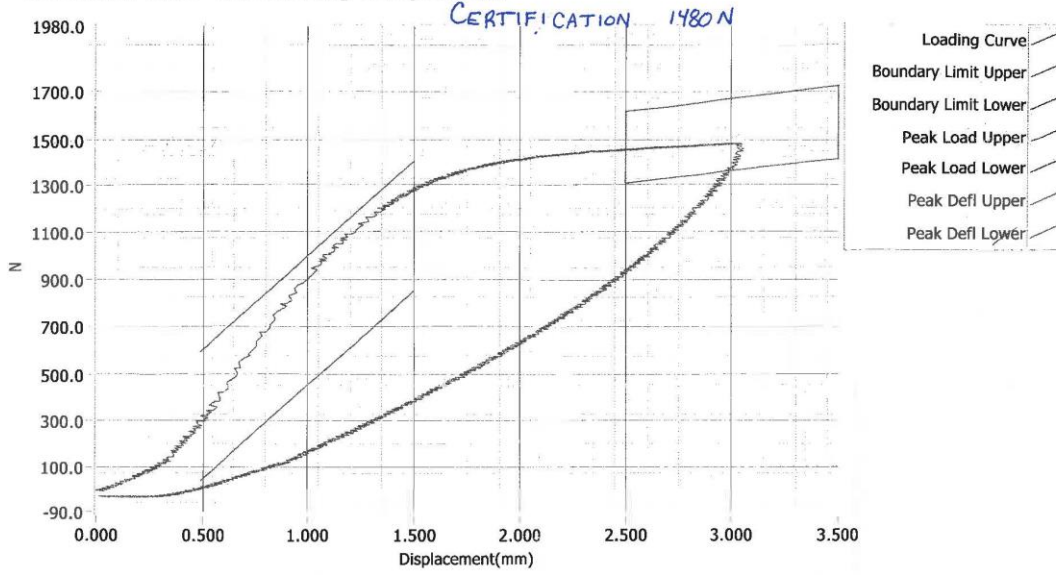
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Test ID: **Abdomen Impact** Test Time: **9:50:30 AM**
Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

Test Date: **12/17/2014**

Resultant Data - SIDIIs Plug Compression



ATD Calibration Lab

Test ID

Part Serial Number

Test Date

Test Time

9/27/2010

6:45 PM

Cert ID

ATD Serial Number

ATD Type

36645

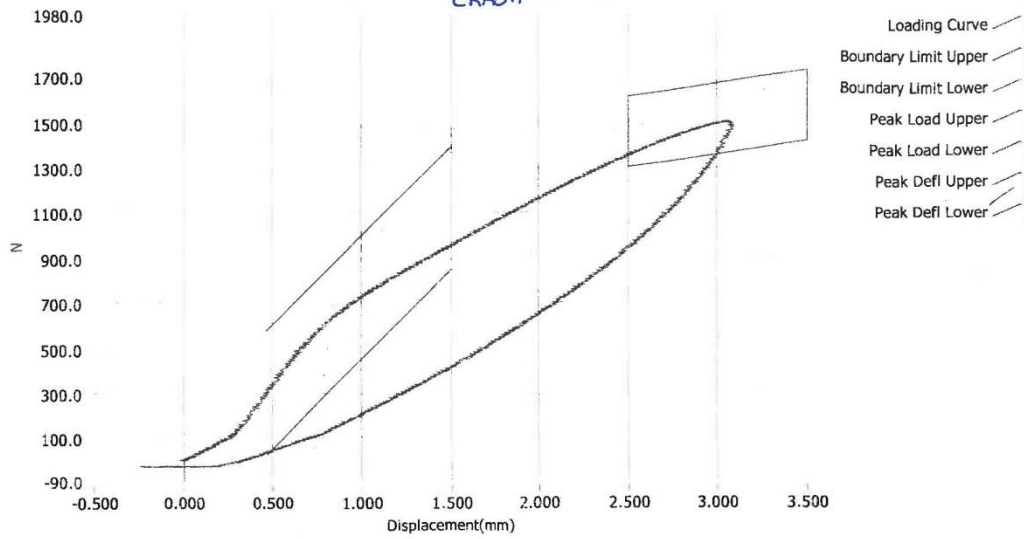
SIDIIs

Current Date : 9/27/2010

Current Time : 18:46:32

Resultant Data - SIDIIs Plug Compression

CRASH 1496N



ATD Calibration Lab

Test ID	Part Serial Number	Test Date	Test Time
		10/6/2010	7:47 PM
Cert ID	ATD Serial Number	ATD Type	
	36924	SIDIIs	

Current Date : 10/6/2010

Current Time : 19:47:54



VERIFICATION REPORT

Test Name:	Pelvis	Revision:	8/24/2009
Sub Test Name:	Acetabulum Impact		
ATD Type:	SID-11s		
ATD Serial Number:	300		
Test ID:	Acetabulum Impact	Test Date:	12/17/2014
		Test Time:	2:28:29 PM

Test Parameters	Test Specifications			Test Results	
Temperature	20.6	--	22.2	21.8 deg C	P
Humidity	10	--	70	30.0 %RH	P
Velocity	6.6	--	6.8	6.67 m/s	P
Peak Probe Acceleration	38	--	47	42.0 g	P
Peak Pelvis Acceleration	34	--	42	34.8 g	P
Peak Acetabulum Force	3.6	--	4.3	3.70 kN	P

All test parameters are within specifications

Technician: **M. Geesey**

Supervisor: **M. Goehle**



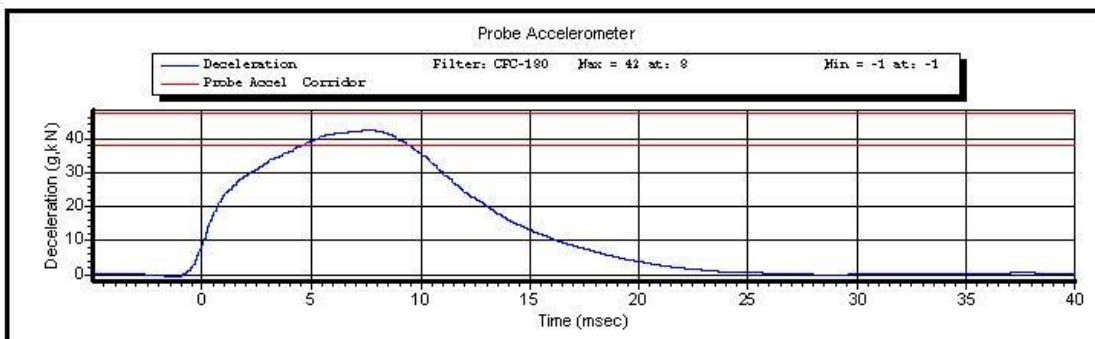
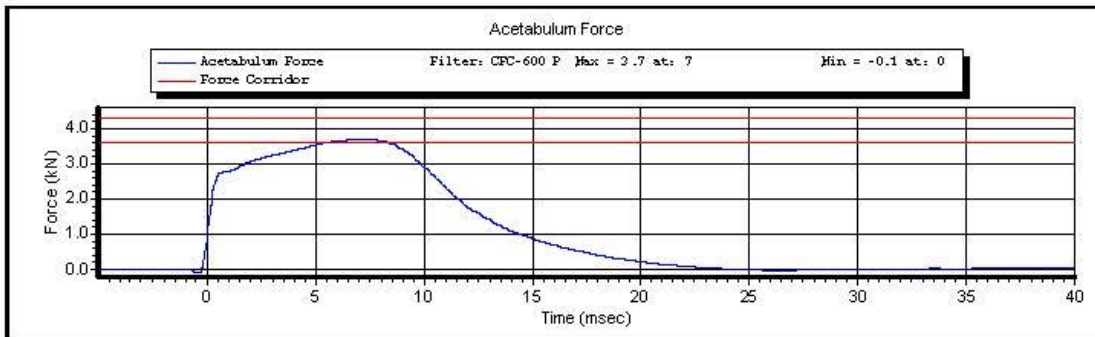
VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2014
Endevco	7231CT	C14953	7/30/2014
Endevco	7264-2000	P51740	12/17/2014
DentonATD	3249J	LC-275 Fy	5/13/2014



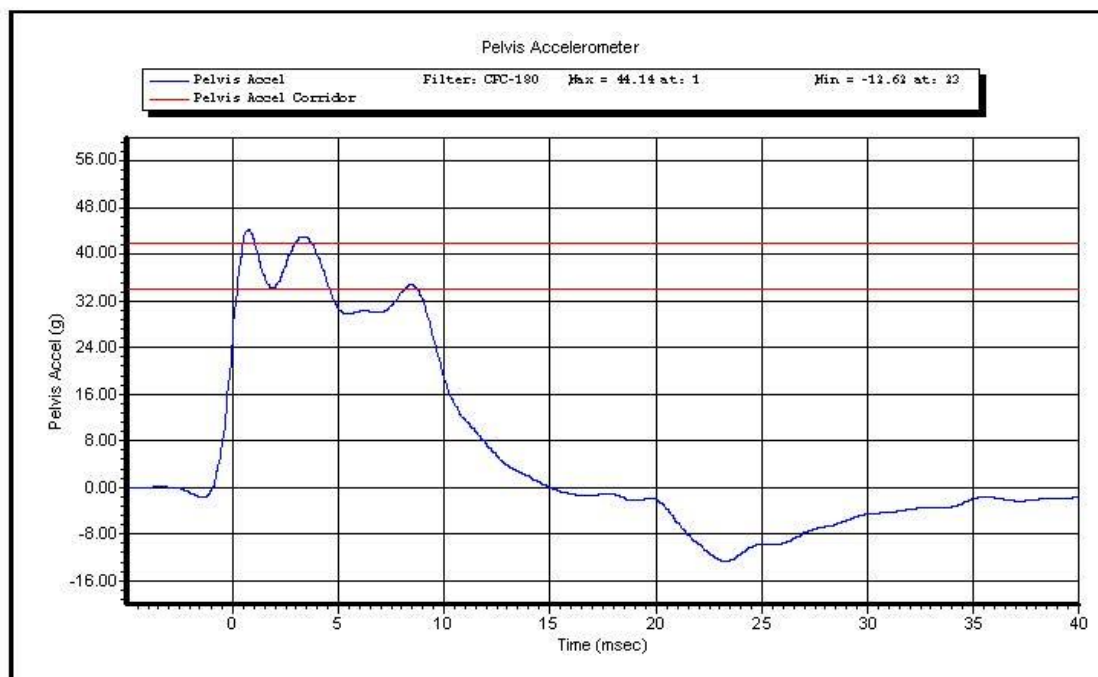
Test Name:	Pelvis
Sub Test Name:	Acetabulum Impact
ATD Type:	SID-IIs
ATD Serial Number:	300



Test ID: **Acetabulum Impact** Test Time: **2:28:29 PM**

Test Date: **12/17/2014**

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Test ID: **Acetabulum Impact** Test Time: **2:28:29 PM**

Test Date: **12/17/2014**

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0



VERIFICATION REPORT

Test Name:	Pelvis	Revision:	8/24/2009
Sub Test Name:	Iliac Impact		
ATD Type:	SID-IIs		
ATD Serial Number:	300		
Test ID:	Pelvis Iliac Impact	Test Date:	12/16/2014
		Test Time:	12:26:25 PM

Test Parameters	Test Specifications			Test Results	
Temperature	20.6	--	22.2	20.6 deg C	P
Humidity	10	--	70	35.0 %RH	P
Velocity	4.2	--	4.4	4.36 m/s	P
Peak Probe Acceleration	36	--	45	39.8 g	P
Peak Pelvis Acceleration	28	--	39	34.3 g	P
Peak Iliac Force	4.1	--	5.1	4.39 kN	P

All test parameters are within specifications

Technician: **M. Geesey**

Supervisor: **M. Goehle**



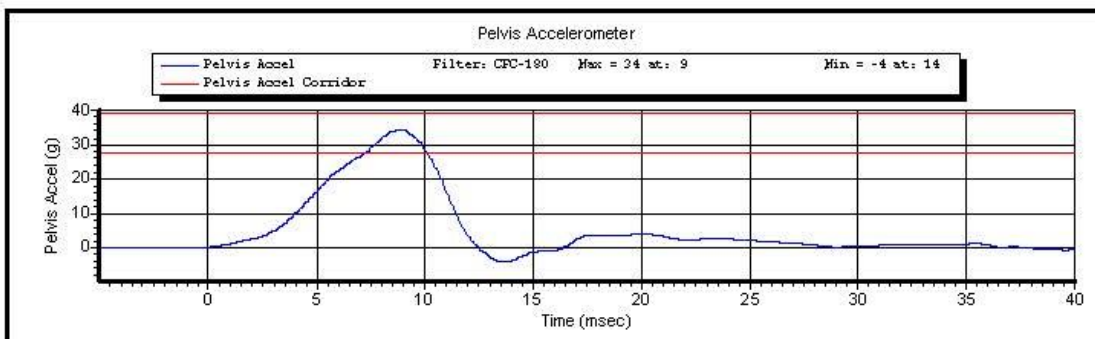
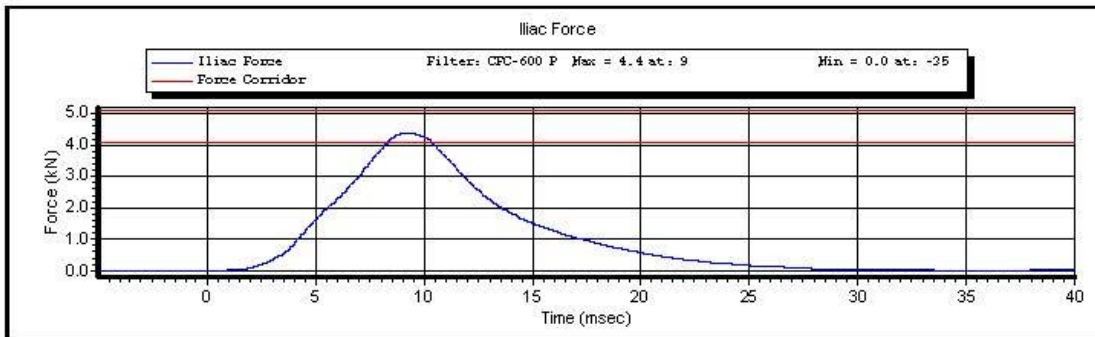
VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2014
Endevco	7231CT	C14953	7/30/2014
Endevco	7264-2000	P32139	12/15/2014
DentonATD	3228J	LC-279 Fy	5/14/2014



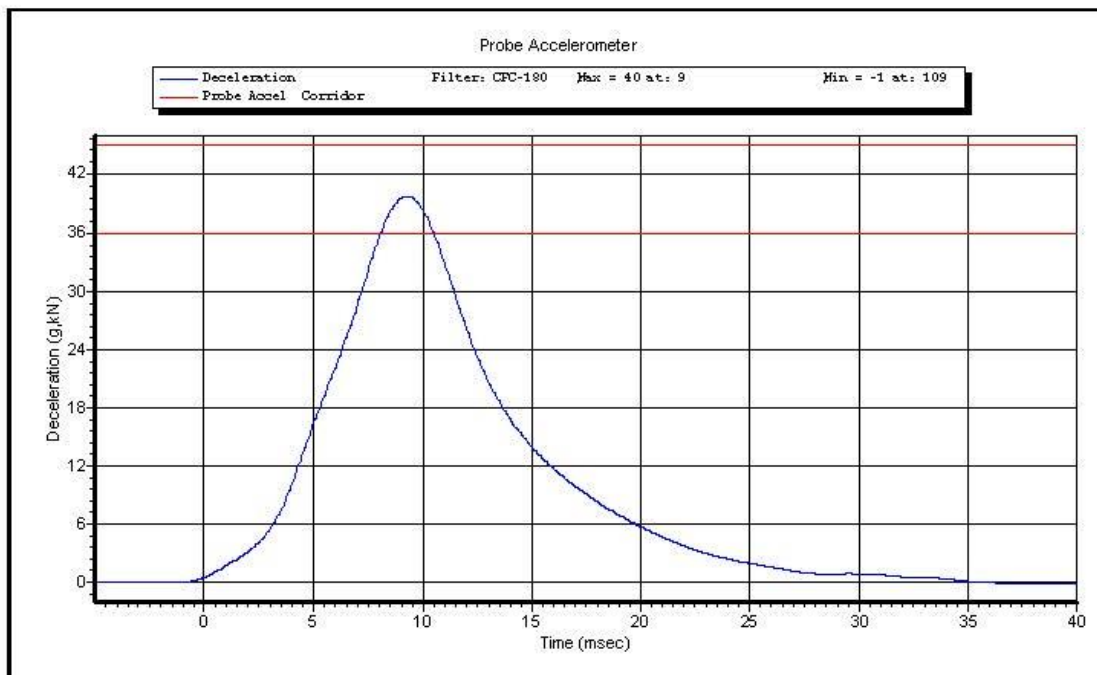
Test Name:	Pelvis
Sub Test Name:	Iliac Impact
ATD Type:	SID-IIs
ATD Serial Number:	300



Test ID: Pelvis Iliac Impact Test Time: 12:26:25 PM

Test Date: 12/16/2014

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Test ID: **Pelvis Iliac Impact** Test Time: **12:26:25 PM**

Test Date: **12/16/2014**

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CALIBRATION TEST RESULTS

POST-TEST

SID-IIS 5TH PERCENTILE FEMALE - DRIVER ATD

SERIAL NO: 300

(CONFIGURED FOR LEFT SIDE IMPACT)

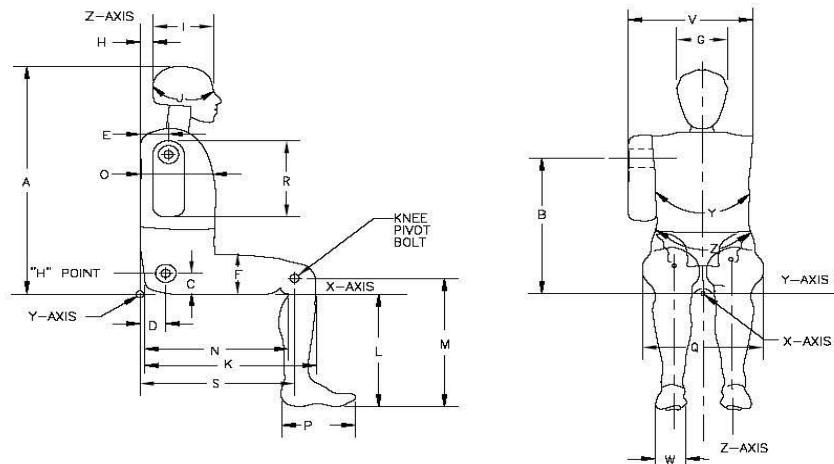


External Measurements - SID-IIs

Technician: M. Hartung

Date: 1/28/2015

Dummy Serial Number: 300



Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	781	Pass
B	Shoulder Pivot Height	437	453	449	Pass
C	H-point Height	79	89	85	Pass
D	H-point from seatback	141	151	147	Pass
E	Shoulder Pivot from Backline	97	107	104	Pass
F	Thigh Clearance	119	135	122	Pass
G	Head Breadth	140	148	144	Pass
H	Head Back from Backline	40	46	43	Pass
I	Head Depth	178	188	182	Pass
J	Head Circumference	541	551	547	Pass
K	Buttock to Knee Length	514	540	538	Pass
L	Popliteal Height	343	369	357	Pass
M	Knee Pivot to floor height	392	409	404	Pass
N	Buttock Popliteal Length	416	442	437	Pass
O	Chest Depth w/o jacket	195	211	205	Pass
P	Foot Length	216	232	218	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	318	Pass
R	Arm Length	249	259	250	Pass
S	Knee Joint to seatback	477	493	487	Pass
V	Shoulder Width	341	357	348	Pass
W	Foot Width	78	94	82	Pass
Y	Chest Circumference w/jacket	851	881	869	Pass
Z	Waist Circumference	761	791	770	Pass

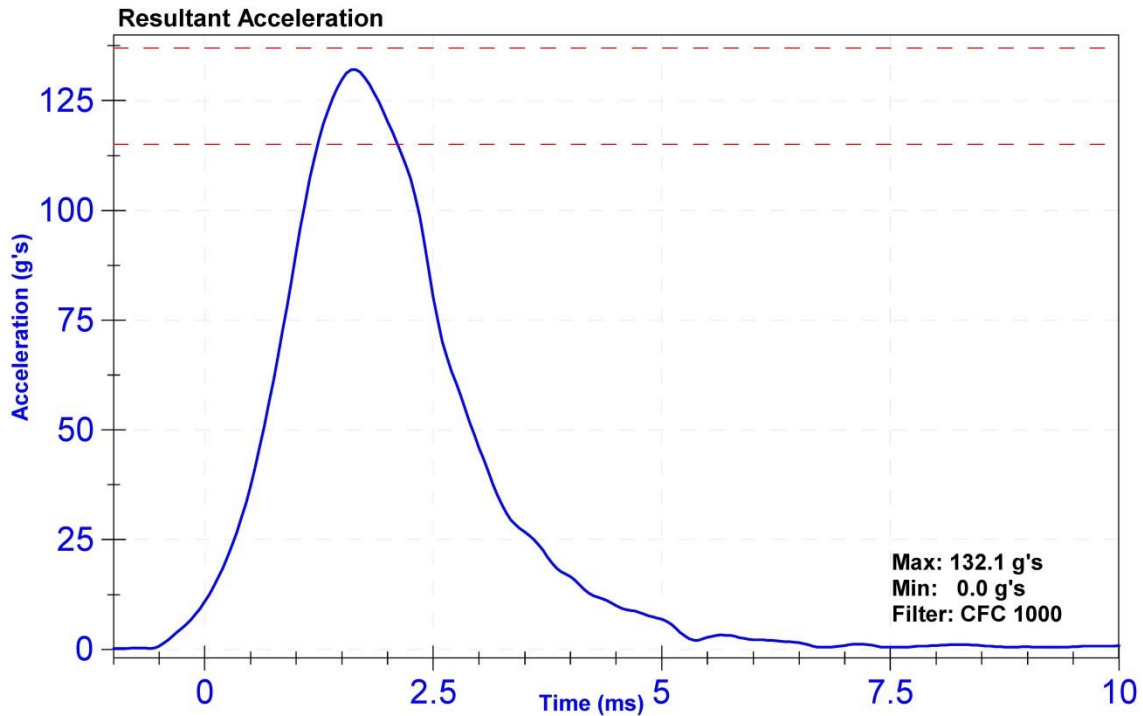
ATD Manufacturer	FTSS	Test Technician	M. Hartung
ATD Serial Number	300	Laboratory Supervisor	M. Goehle

Results

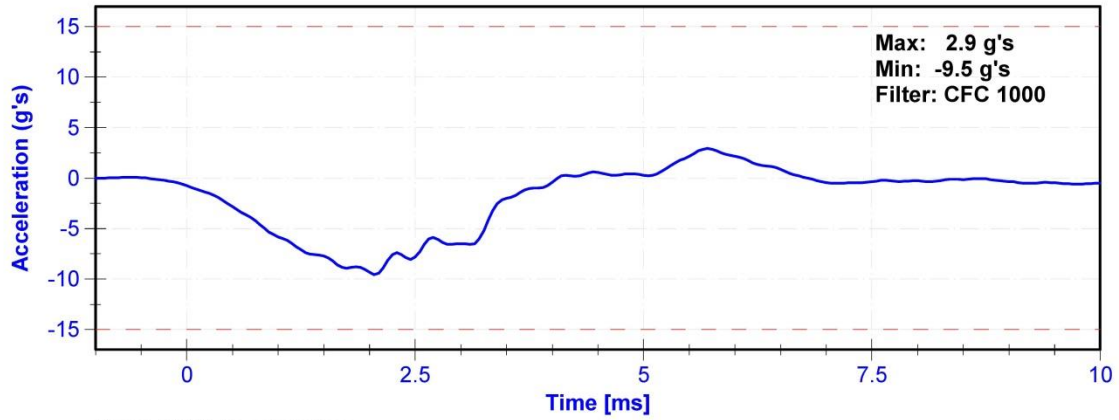
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.6	Pass
Humidity	10	70	%	11.9	Pass
Resultant Acceleration	115	137	g's	132.1	Pass
Oscillation	0	15	%	2.48	Pass
Fore-Aft Acceleration	-15	15	g's	-9.5	Pass

Transducer Calibrations

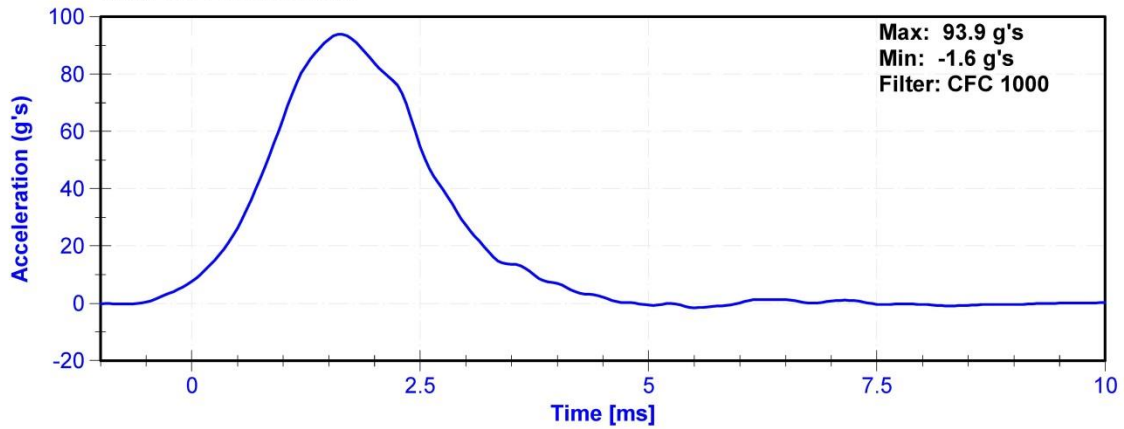
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264CT	AC-P58777	8/28/2014	2/26/2015
Y Accelerometer	ENDEVCO 7264CT	AC-P59018	8/28/2014	2/26/2015
Z Accelerometer	ENDEVCO 7264CT	AC-P68608	8/28/2014	2/26/2015



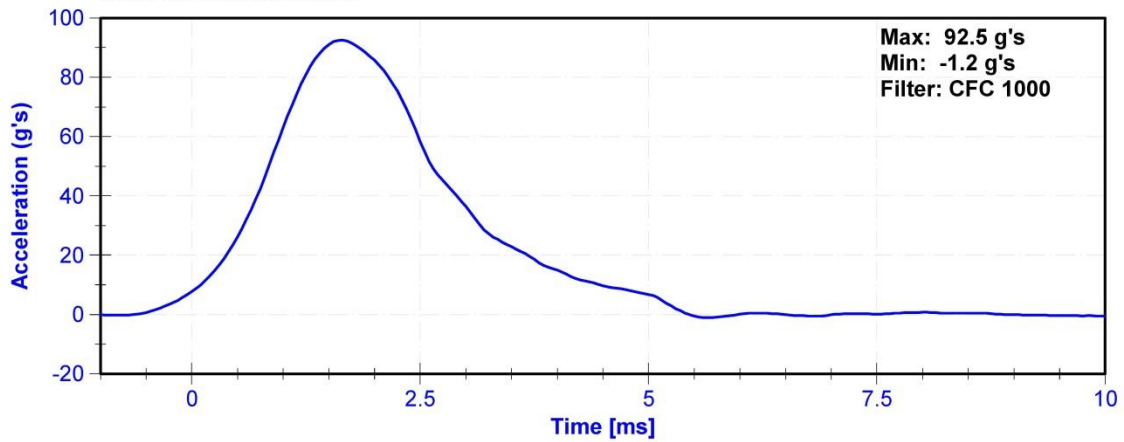
Head CG X Acceleration



Head CG Y Acceleration



Head CG Z Acceleration



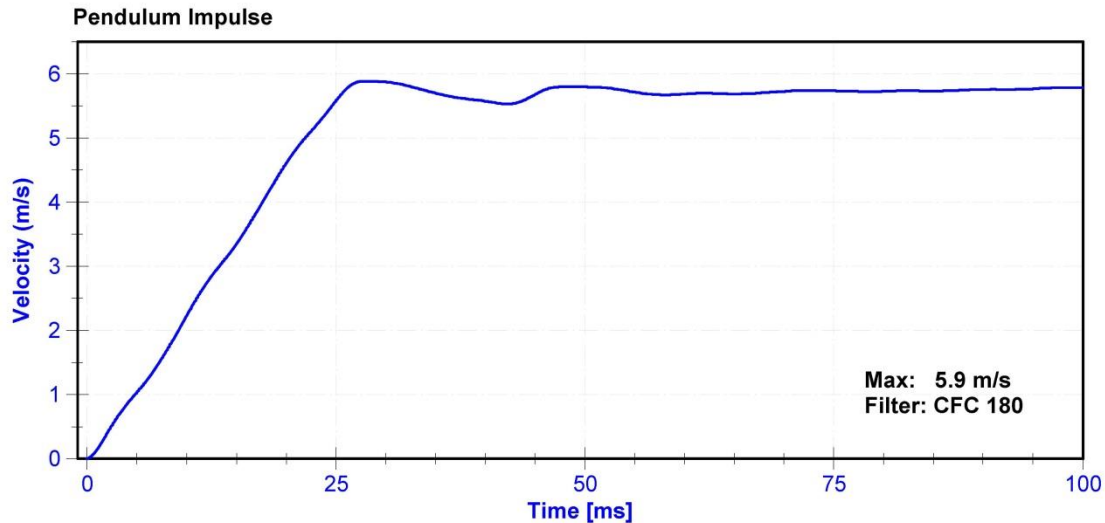
ATD Manufacturer	FTSS	Test Technician	M. Goehle
ATD Serial Number	300	Laboratory Supervisor	M. Goehle

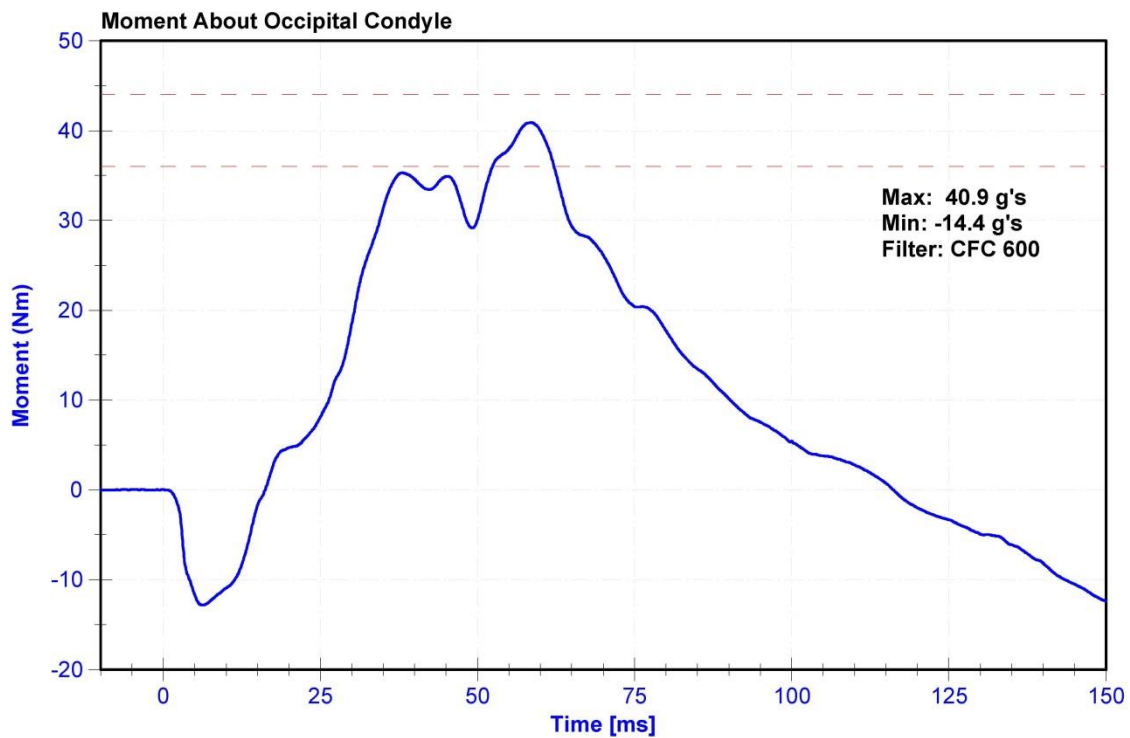
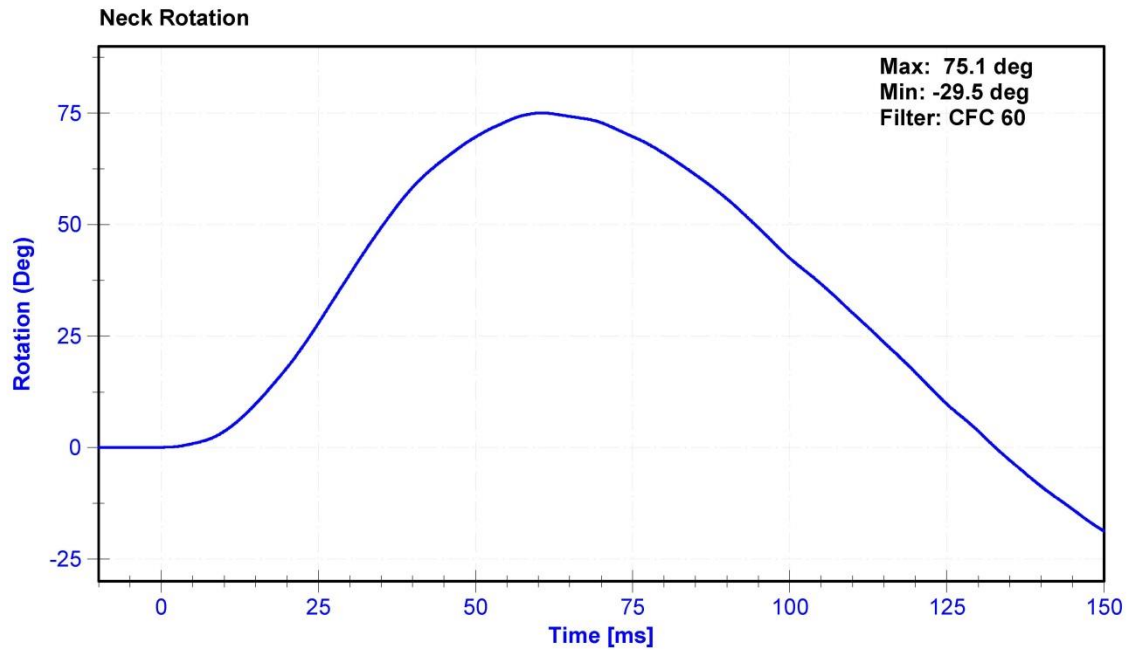
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.5	Pass
Humidity	10	70	%	13.5	Pass
Velocity	5.51	5.63	m/s	5.583	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.23	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.35	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.61	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.58	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.89	Pass
Neck Rotation	71	81	deg	75.1	Pass
Time at Maximum Rotation	50	70	ms	60.6	Pass
Moment about the OC	36	44	Nm	40.9	Pass
Moment Decay to 0 Nm	102	126	ms	116.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	11/6/2014	11/6/2015
Pendulum Potentiometer	Denton 78051-342	DS-184Pend	11/13/2014	11/13/2015
Condyle Potentiometer	Denton 78051-342	DS-185Pend	11/13/2014	11/13/2015
Upper Neck Load Cell	DENTON 1716A	LC-130Fy	9/12/2014	9/12/2015





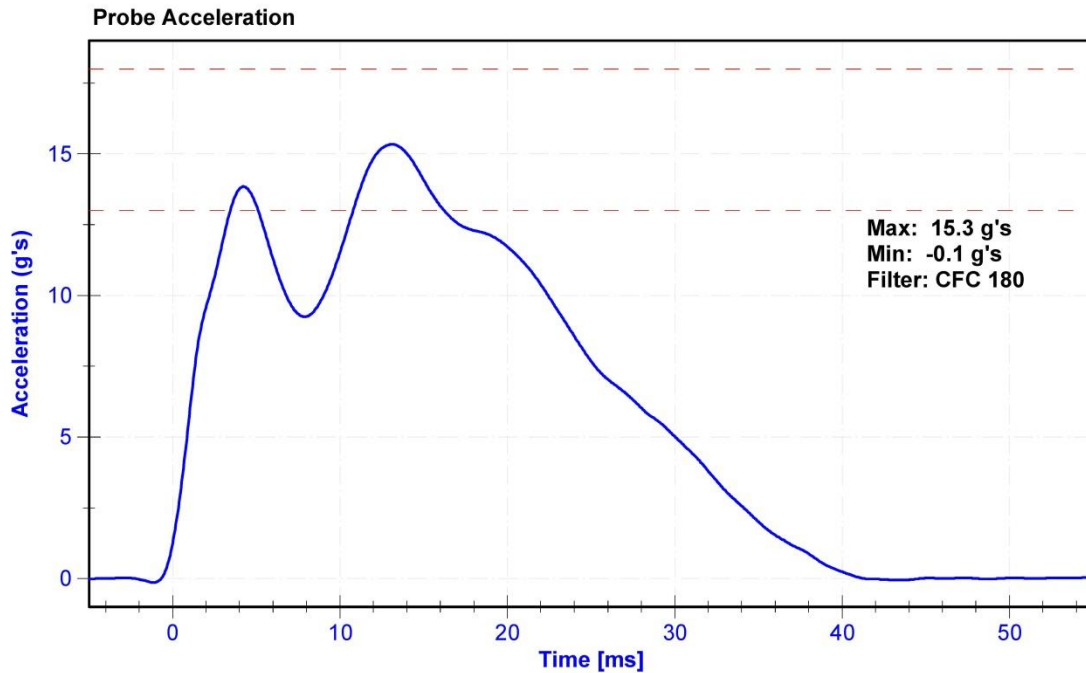
ATD Manufacturer	FTSS	Test Technician	M. Hartung
ATD Serial Number	300	Laboratory Supervisor	M. Goehle

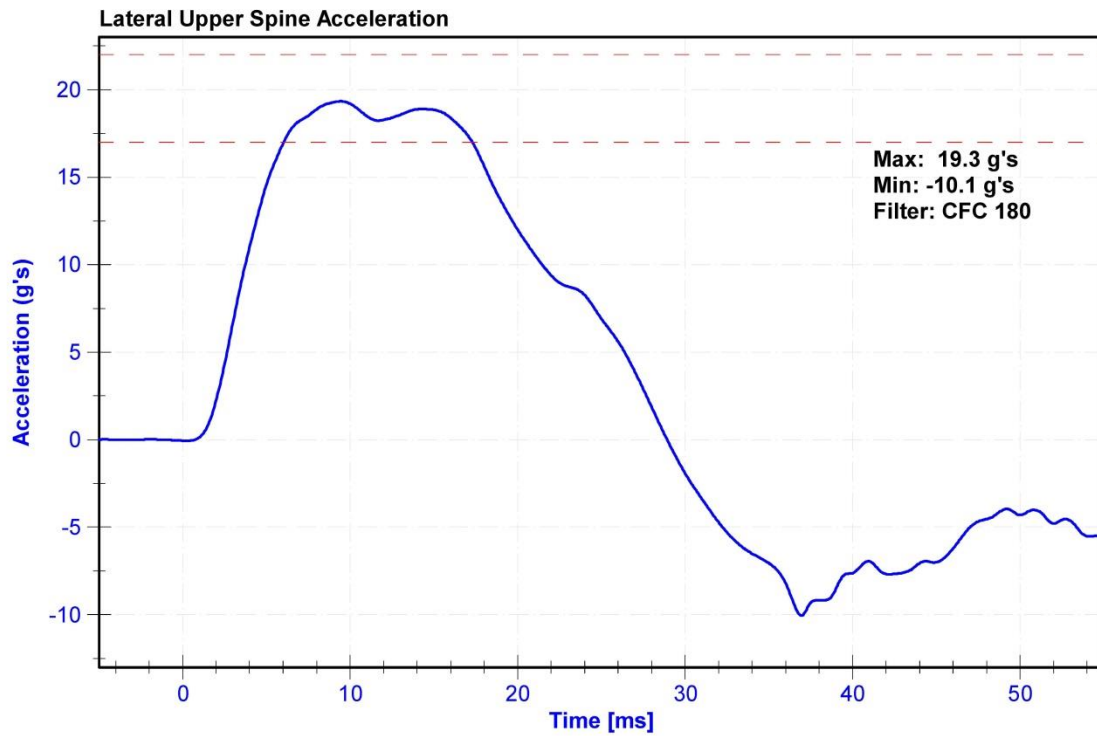
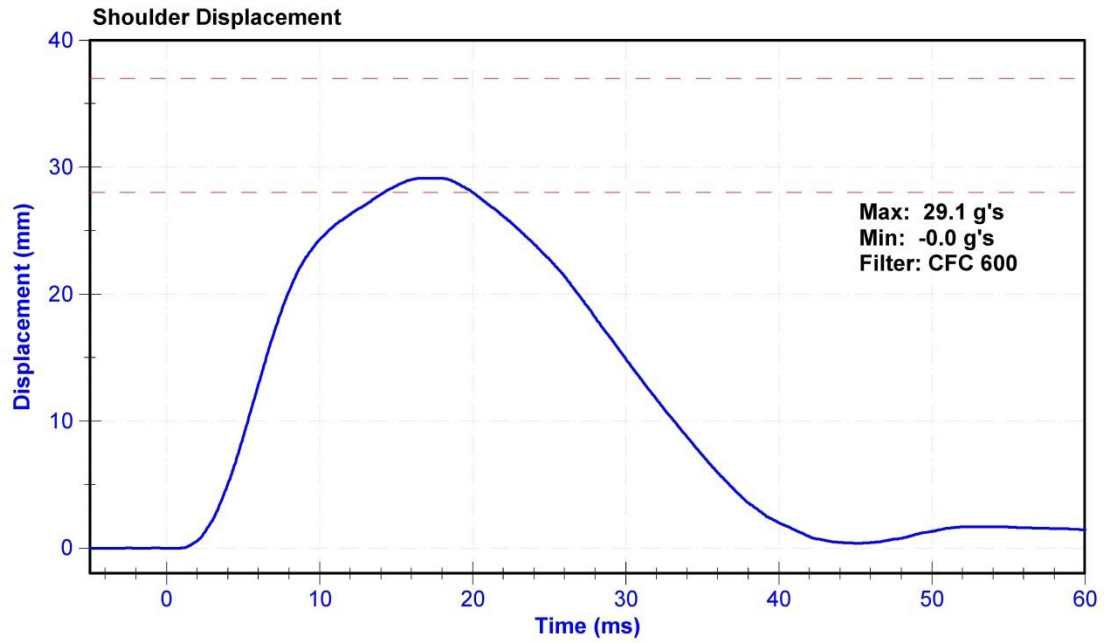
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	13.3	Pass
Velocity	4.2	4.4	m/s	4.33	Pass
Probe Acceleration	13	18	g's	15.3	Pass
Shoulder Deflection	28	37	mm	29.1	Pass
Lateral Upper Spine Acceleration	17	22	g's	19.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C14953	7/30/2014	1/28/2015
Shoulder Potentiometer	Servo 08TC1-3725	DS-1063GFE	8/7/2014	8/7/2015
Upper Spine Y Accelerometer	ENDEVCO 7264	AC-P51915	8/28/2014	8/28/2015





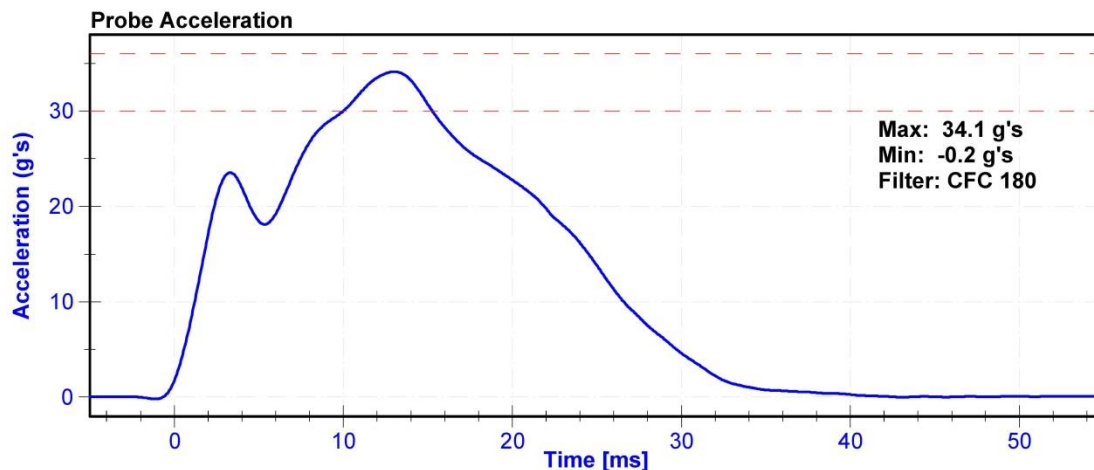
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	300	Laboratory Supervisor	M. Goehle

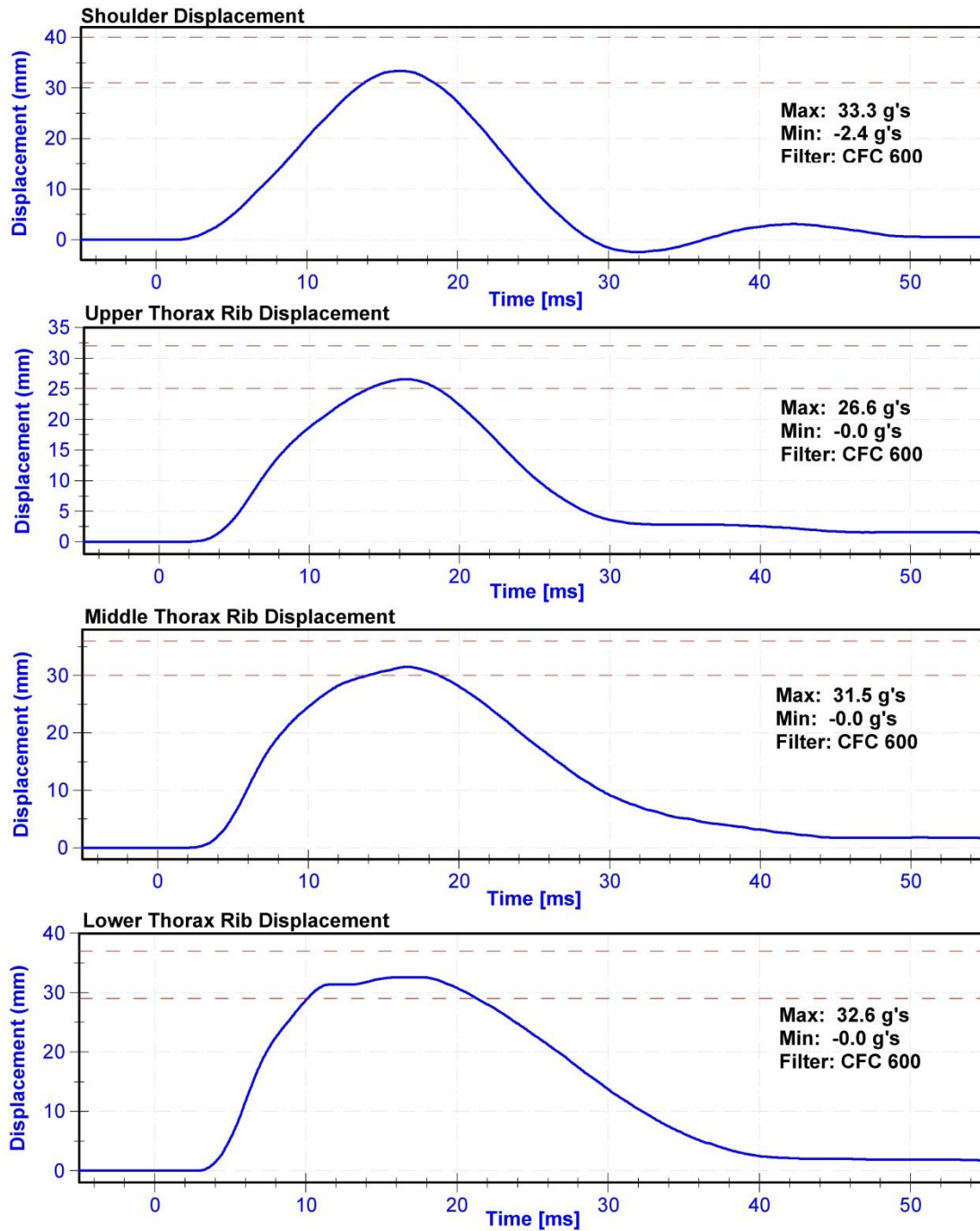
Results

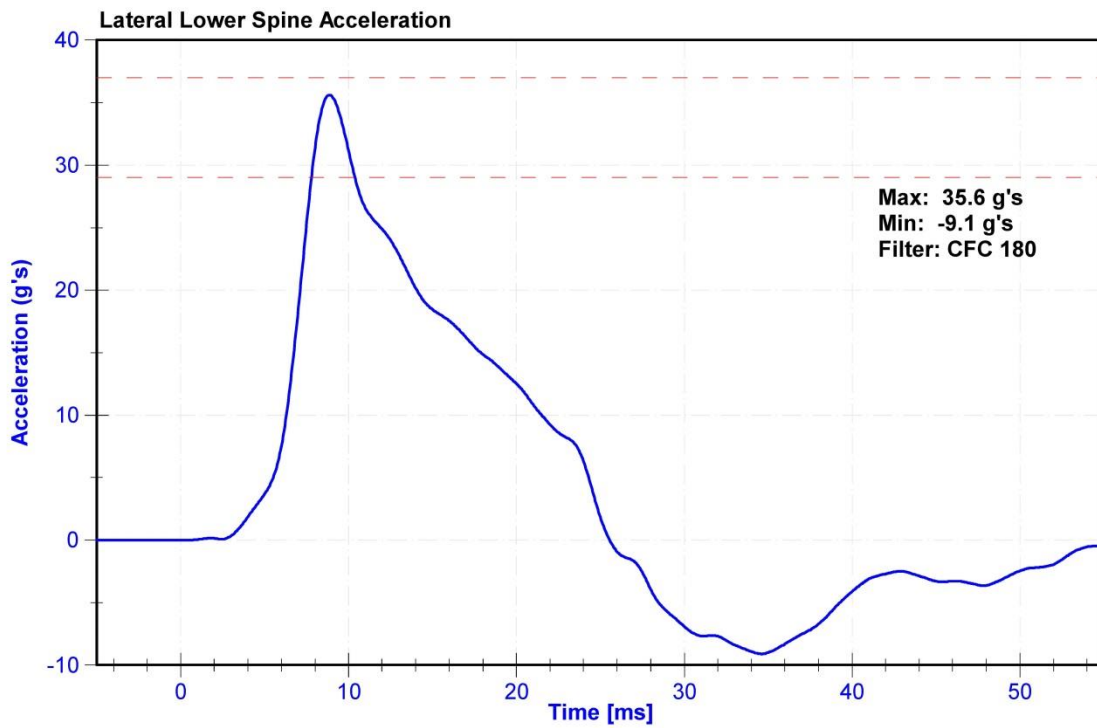
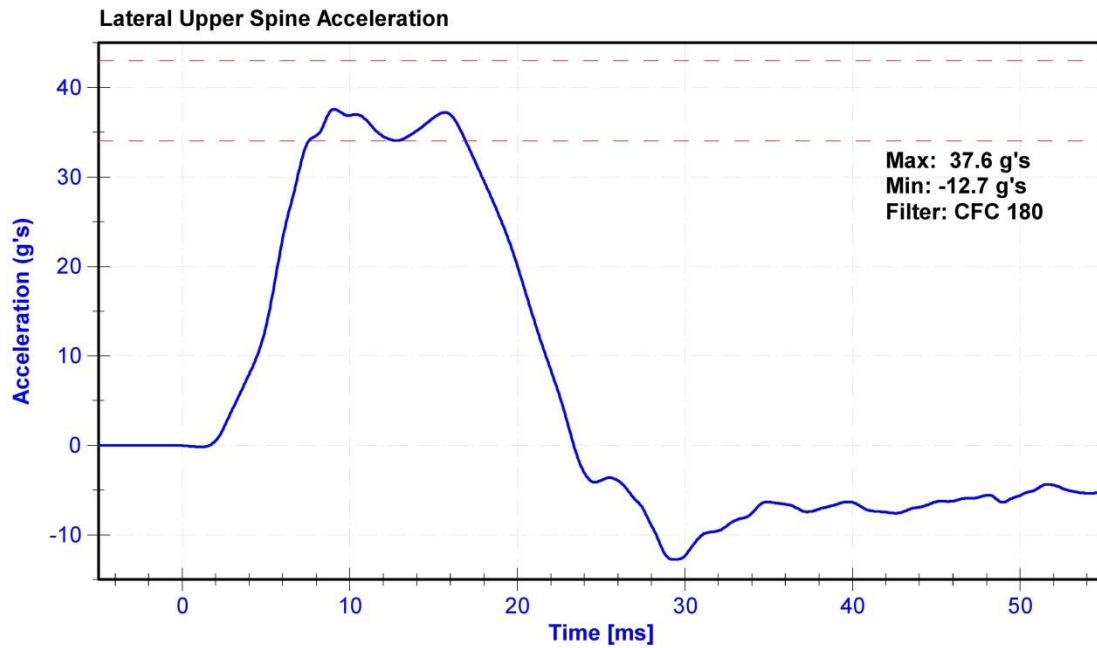
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	13.5	Pass
Velocity	6.6	6.8	m/s	6.68	Pass
Probe Acceleration after 5 ms	30	36	g's	34.1	Pass
Lateral Upper Spine Acceleration	34	43	g's	37.6	Pass
Lateral Lower Spine Acceleration	29	37	g's	35.6	Pass
Shoulder Deflection	31	40	mm	33.3	Pass
Upper Thorax Rib Deflection	25	32	mm	26.6	Pass
Mid Thorax Rib Deflection	30	36	mm	31.5	Pass
Lower Thorax Rib Deflection	32	38	mm	32.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C14953	7/30/2014	1/28/2015
Upper Spine T1 Y Accelerometer	ENDEVCO 7264	AC-P51915	8/28/2014	8/28/2015
Upper Spine T12 Y Accelerometer	ENDEVCO 7264	AC-P64147	8/28/2014	2/26/2015
Shoulder Potentiometer	Servo 08TC1-3725	DS-1063GFE	8/7/2014	8/7/2015
Upper Thorax Rib Potentiometer	Servo 08TC1-3725	DS-451GFE	8/12/2014	8/12/2015
Middle Thorax Rib Potentiometer	Servo 08TC1-3725	DS-1151GFE	8/12/2014	8/12/2015
Lower Thorax Rib Potentiometer	Servo 08TC1-3725	DS-1156GFE	8/12/2014	8/12/2015







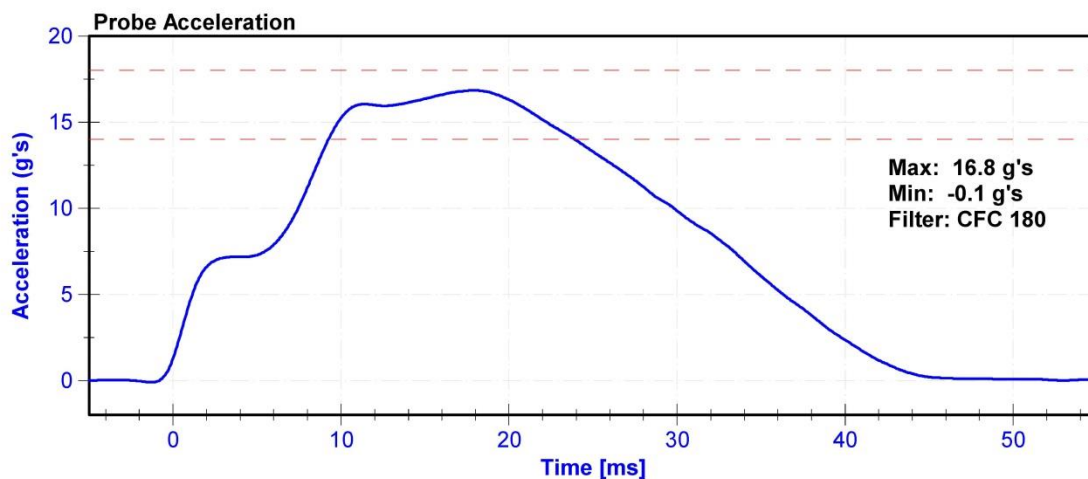
ATD Manufacturer	FTSS	Test Technician	M. Hartung
ATD Serial Number	300	Laboratory Supervisor	M. Goehle

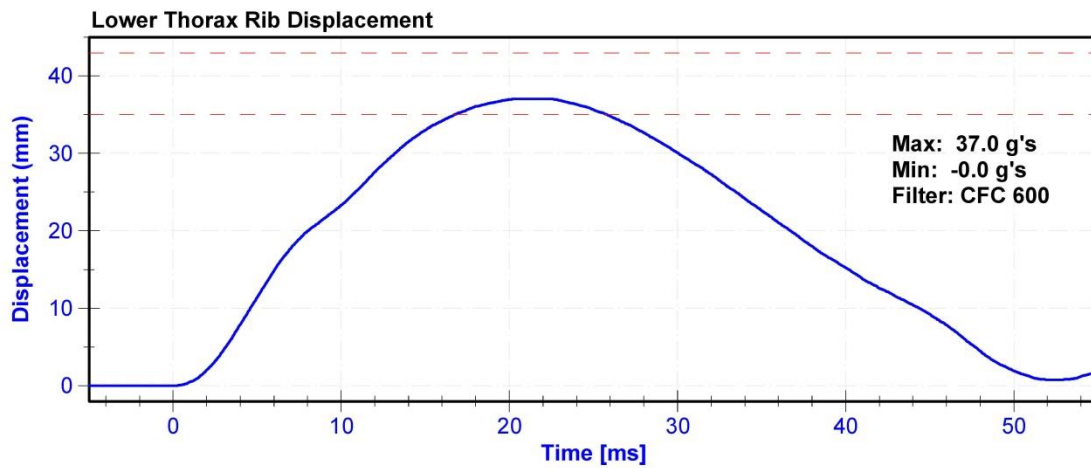
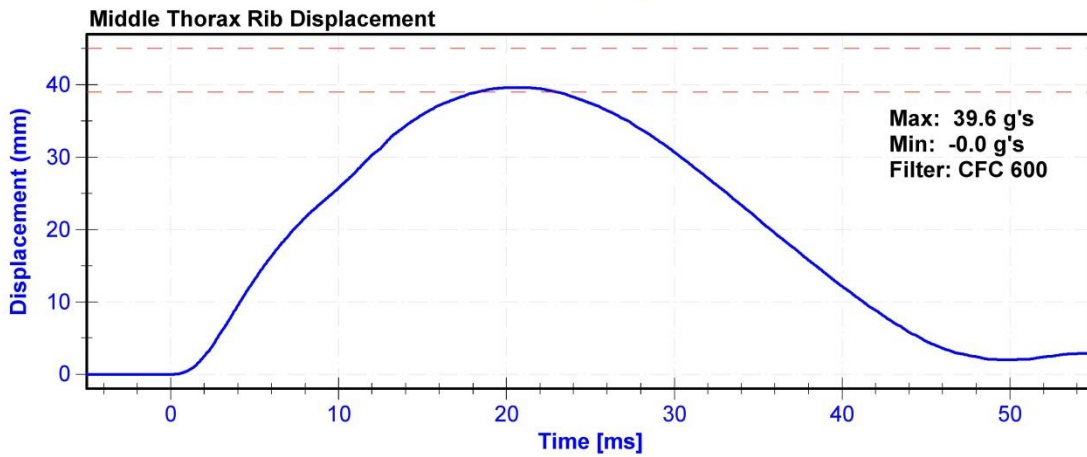
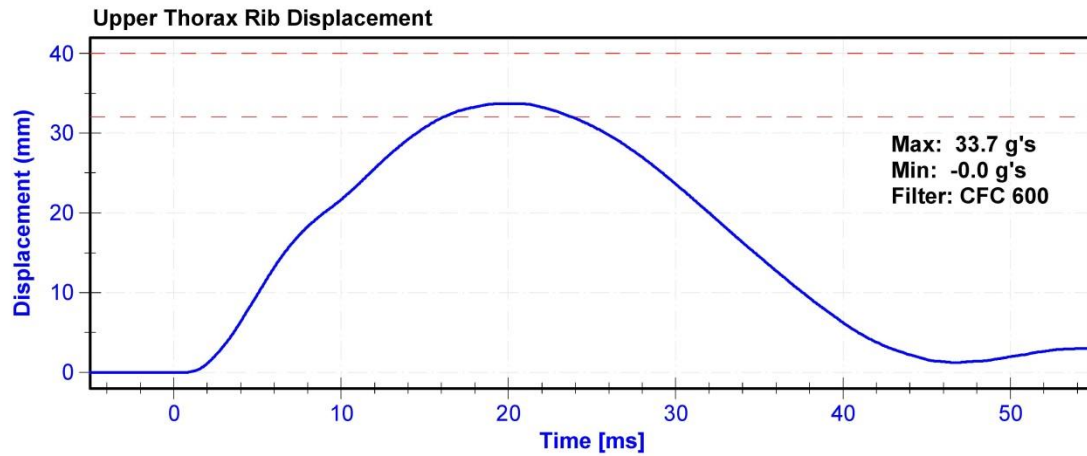
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	13.1	Pass
Velocity	4.2	4.4	m/s	4.32	Pass
Probe Acceleration	14	18	g's	16.8	Pass
Lateral Upper Spine Acceleration	13	17	g's	16.2	Pass
Lateral Lower Spine Acceleration	7	11	g's	10.2	Pass
Upper Thorax Rib Deflection	32	40	mm	33.7	Pass
Middle Thorax Rib Deflection	39	45	mm	39.6	Pass
Lower Thorax Rib Deflection	35	43	mm	37.0	Pass

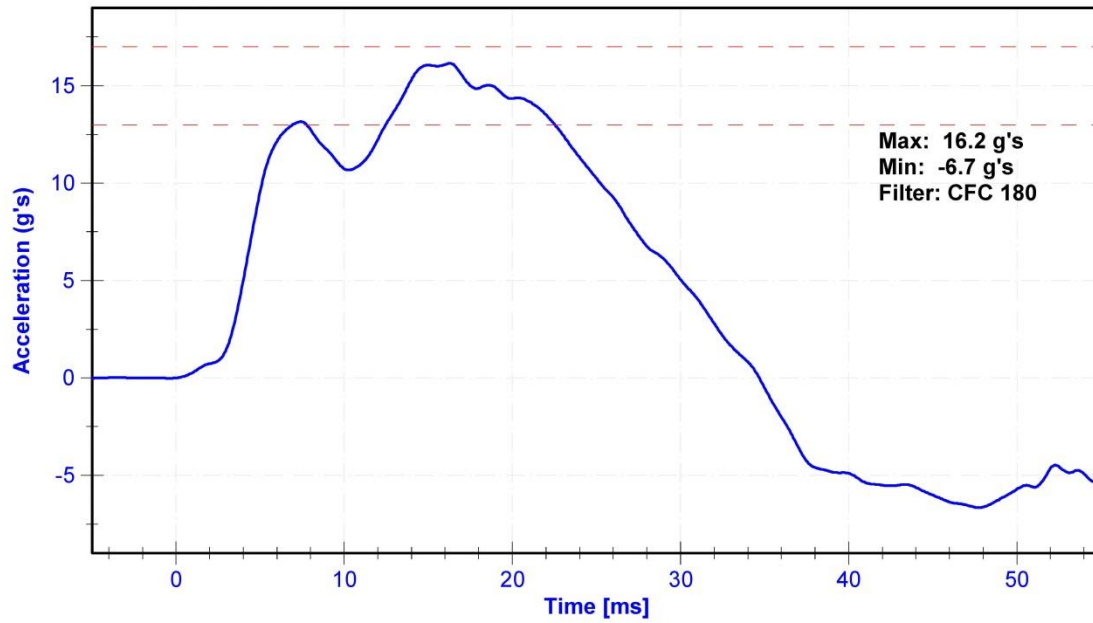
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C14953	7/30/2014	1/28/2015
Upper Spine Y Accelerometer	ENDEVCO 7264	AC-P51915	8/28/2014	8/28/2015
Lower Spine Y Accelerometer	ENDEVCO 7264	AC-P64147	8/28/2014	2/26/2015
Upper Thorax Rib Potentiometer	Servo 08CT1-3725	DS-451GFE	8/12/2014	8/12/2015
Middle Thorax Rib Potentiometer	Servo 08TC1-3725	DS-1151GFE	8/12/2014	8/12/2015
Lower Thorax Rib Potentiometer	Servo 08TC1-3725	DS-1156GFE	8/12/2014	8/12/2015

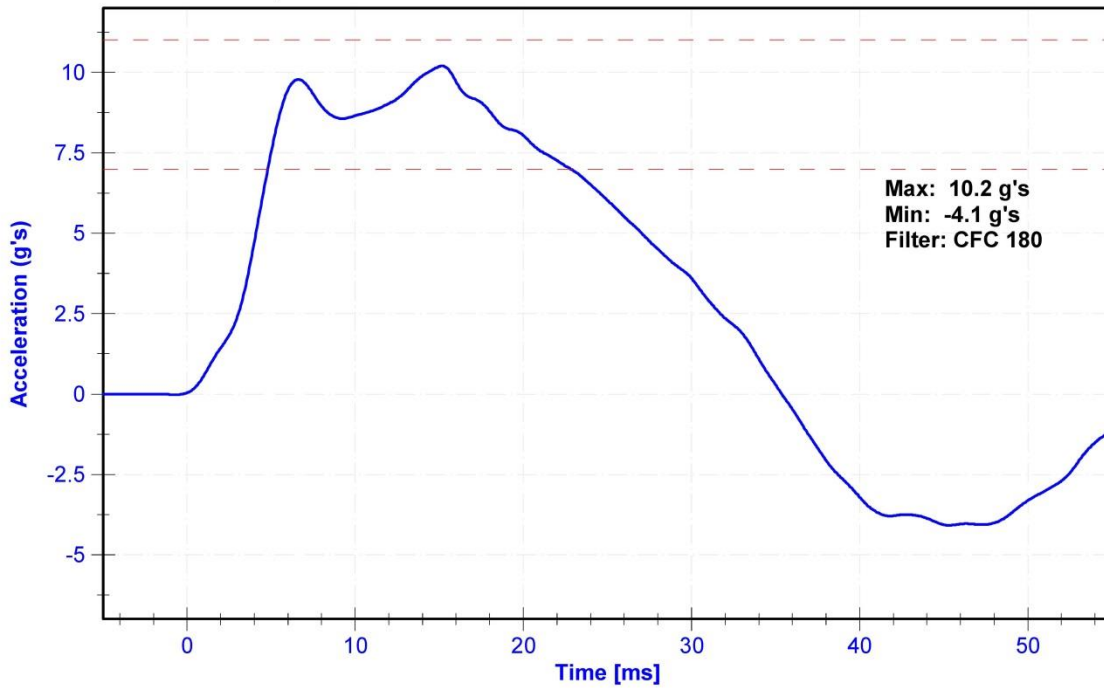




Lateral Upper Spine Acceleration



Lateral Lower Spine Acceleration



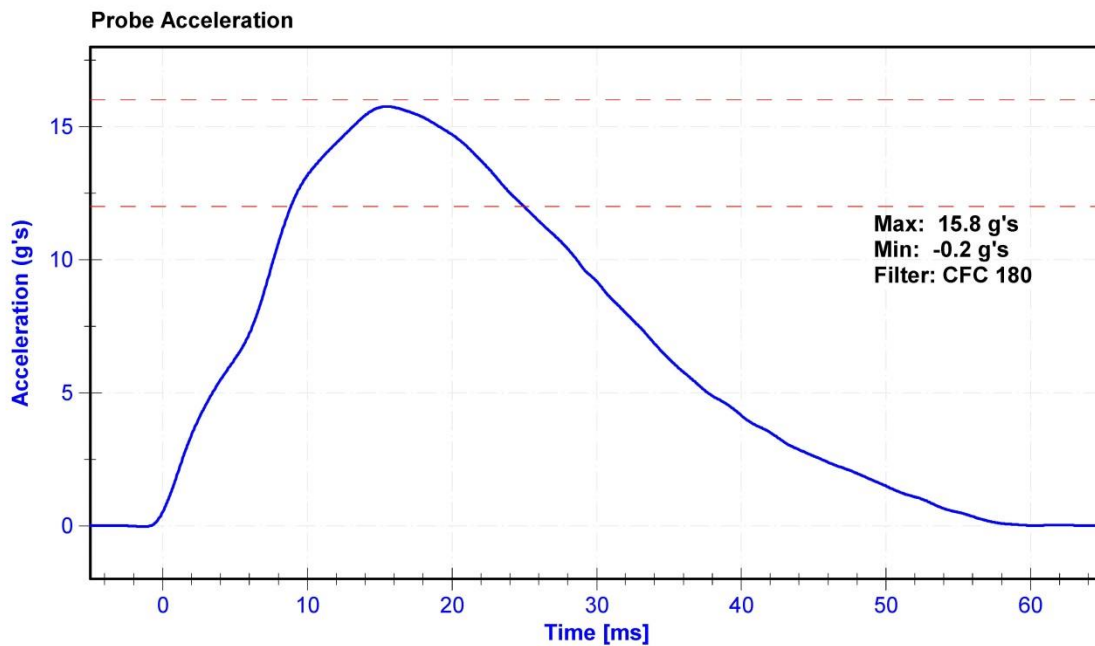
ATD Manufacturer	FTSS	Test Technician	M. Hartung
ATD Serial Number	300	Laboratory Supervisor	M. Goehle

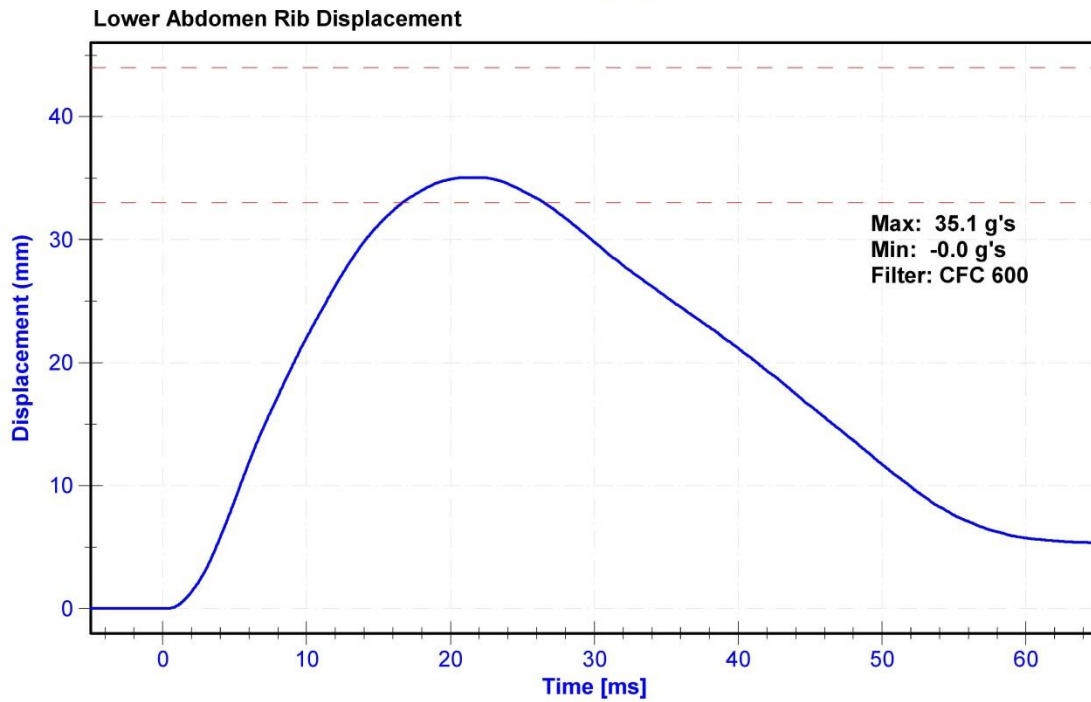
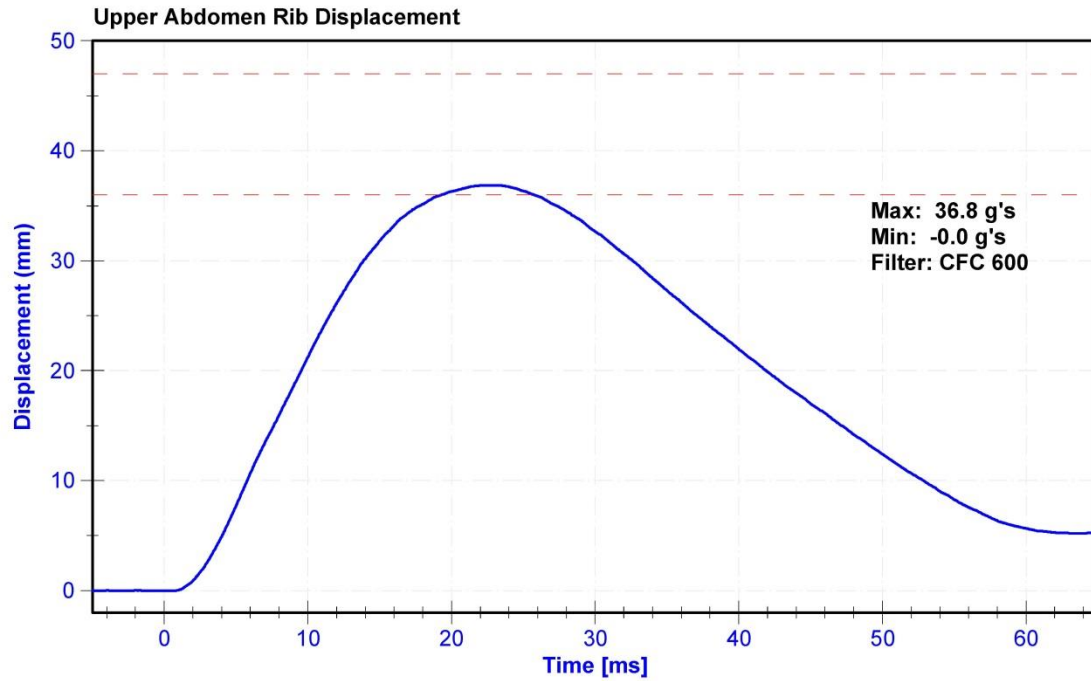
Results

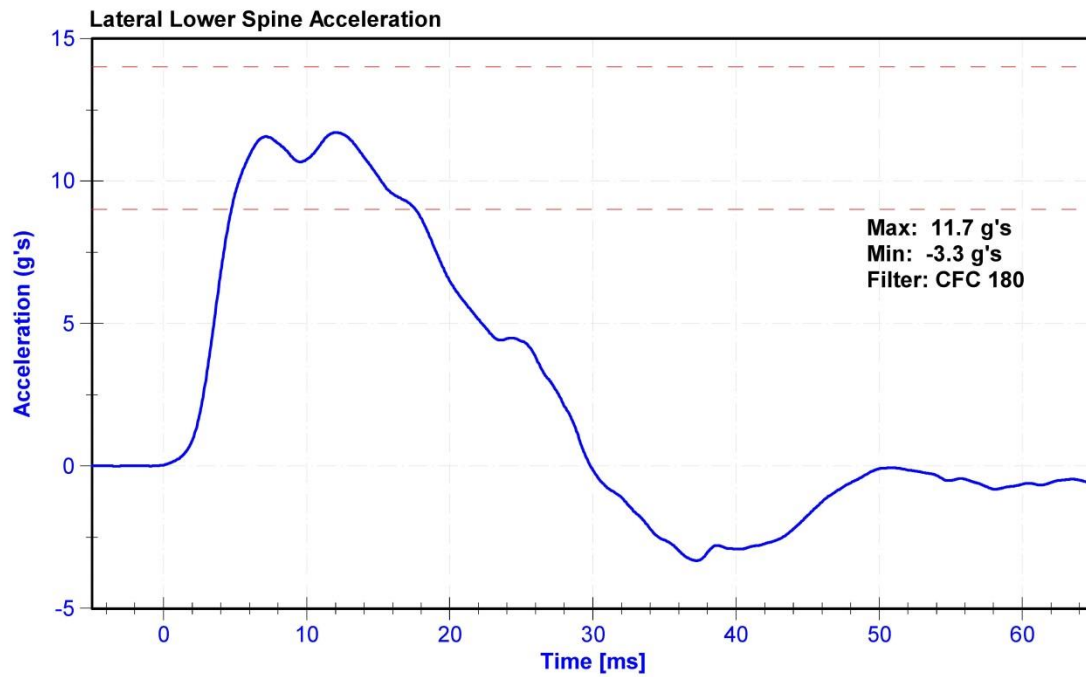
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	13.6	Pass
Velocity	4.2	4.4	m/s	4.32	Pass
Probe Acceleration	12	16	g's	15.8	Pass
Lateral Lower Spine Acceleration	9	14	g's	11.7	Pass
Upper Abdomen Rib Deflection	36	47	mm	36.8	Pass
Lower Abdomen Rib Deflection	33	44	mm	35.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	ENDEVCO 7231CT	AC-C14953	7/30/2014	1/28/2015
Lower Spine Y Accelerometer	ENDEVCO 7264	AC-P64147	8/28/2014	2/26/2015
Upper Abdomen Rib Potentiometer	Servo 08CT1-3725	DS-308GFE	8/12/2014	8/12/2015
Lower Abdomen Rib Potentiometer	Servo 08CT1-3725	DS-307GFE	8/7/2014	8/7/2015







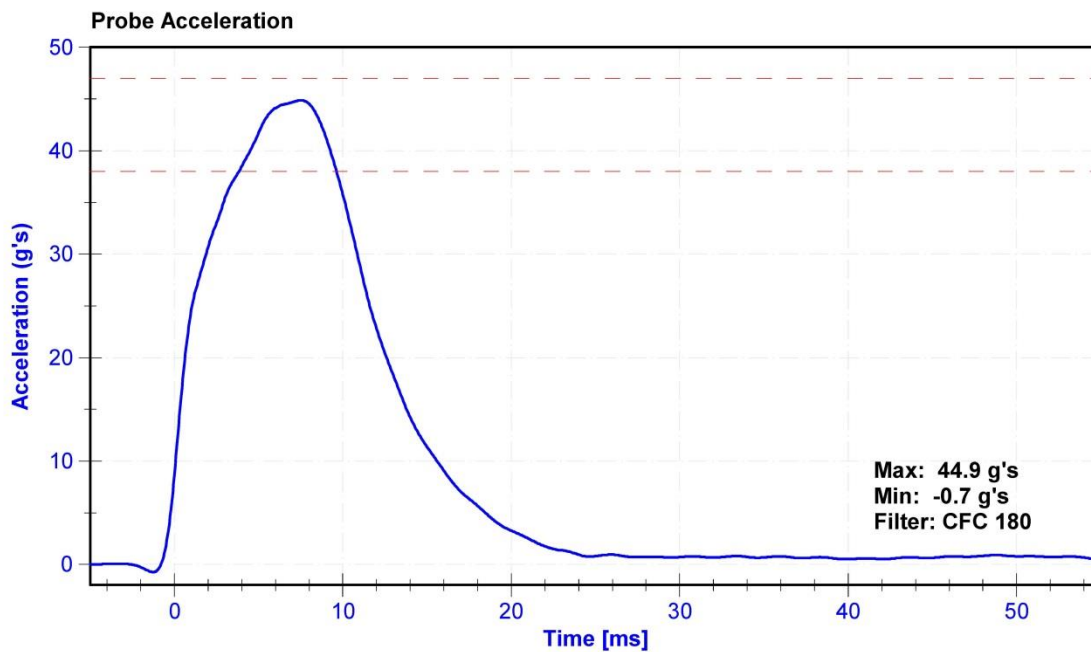
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	300	Laboratory Supervisor	M.Goehle

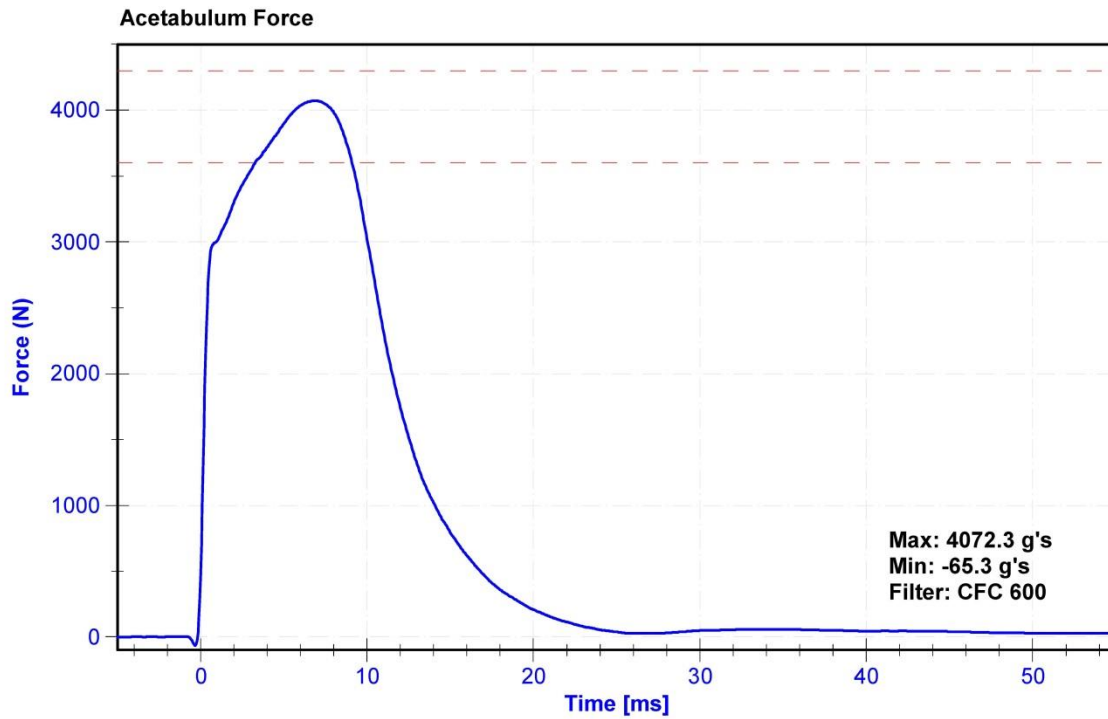
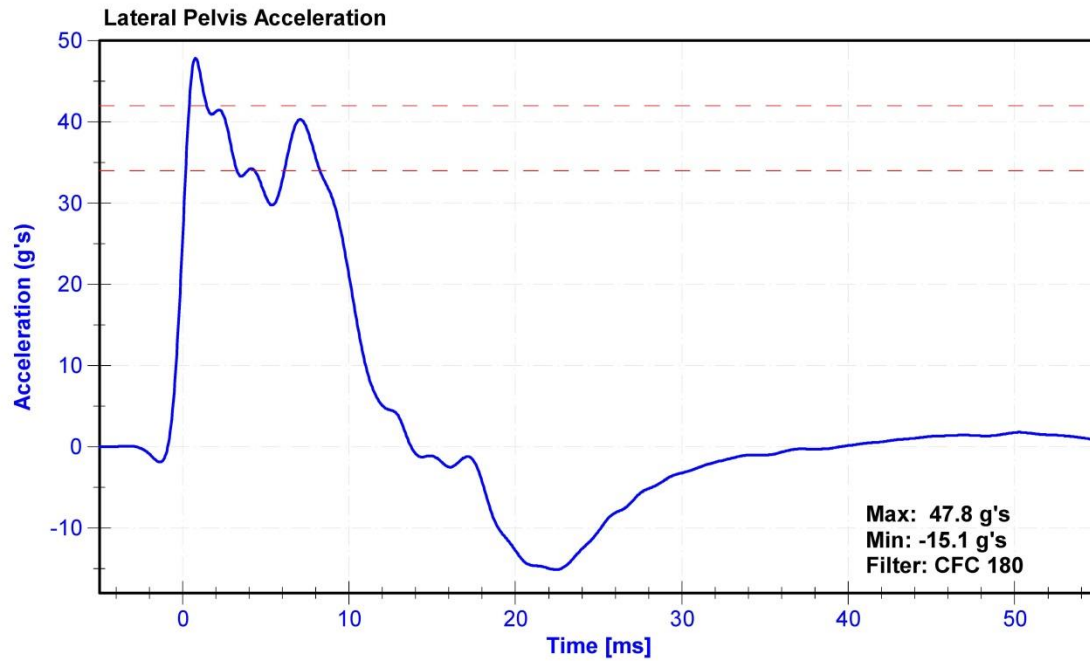
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.6	Pass
Humidity	10	70	%	14.7	Pass
Velocity	6.6	6.8	m/s	6.70	Pass
Probe Acceleration	38	47	g's	44.9	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	40.3	Pass
Acetabulum Force	3,600	4,300	N	4072.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C14953	1/29/2015	7/30/2015
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P35797	11/24/2014	5/25/2015
Acetabulum Load Cell	DENTON 3249J	LC-275Fy	5/13/2014	5/13/2015





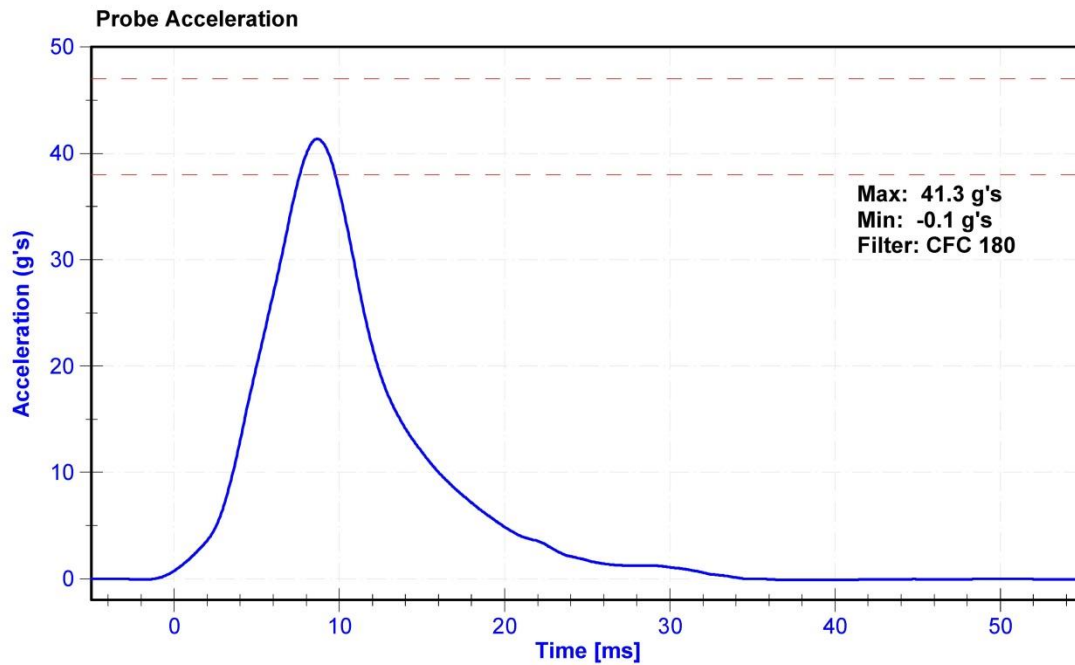
ATD Manufacturer	FTSS	Test Technician	M. Hartung
ATD Serial Number	300	Laboratory Supervisor	M. Goehle

Results

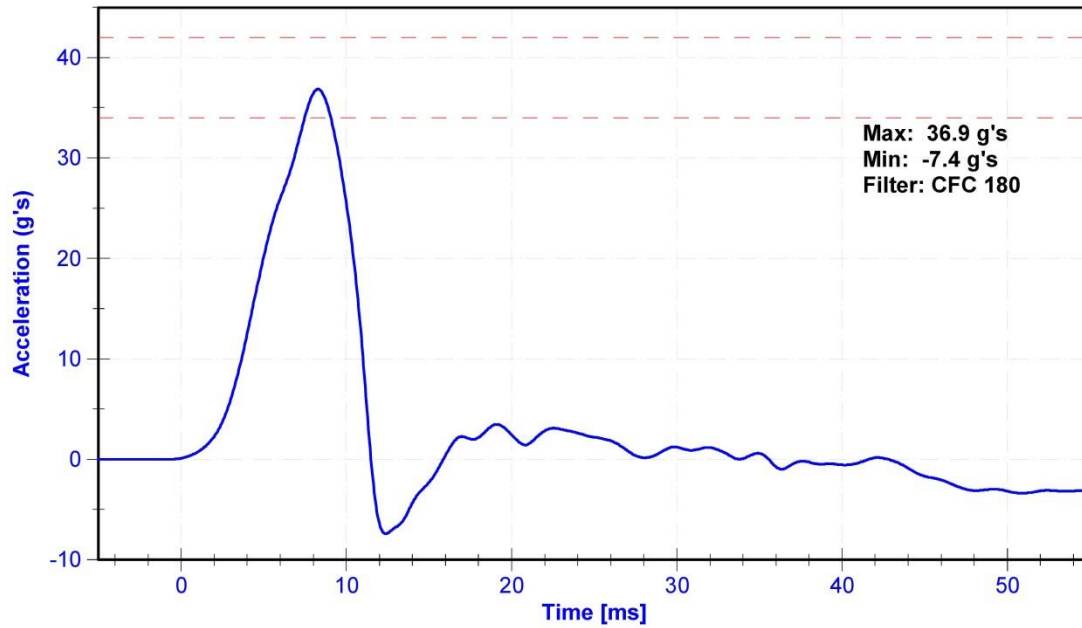
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	13.0	Pass
Velocity	4.2	4.4	m/s	4.32	Pass
Probe Acceleration	36	45	g's	41.3	Pass
Lateral Pelvis Acceleration	28	39	g's	36.9	Pass
Iliac Force	4,100	5,100	N	4632.5	Pass

Transducer Calibrations

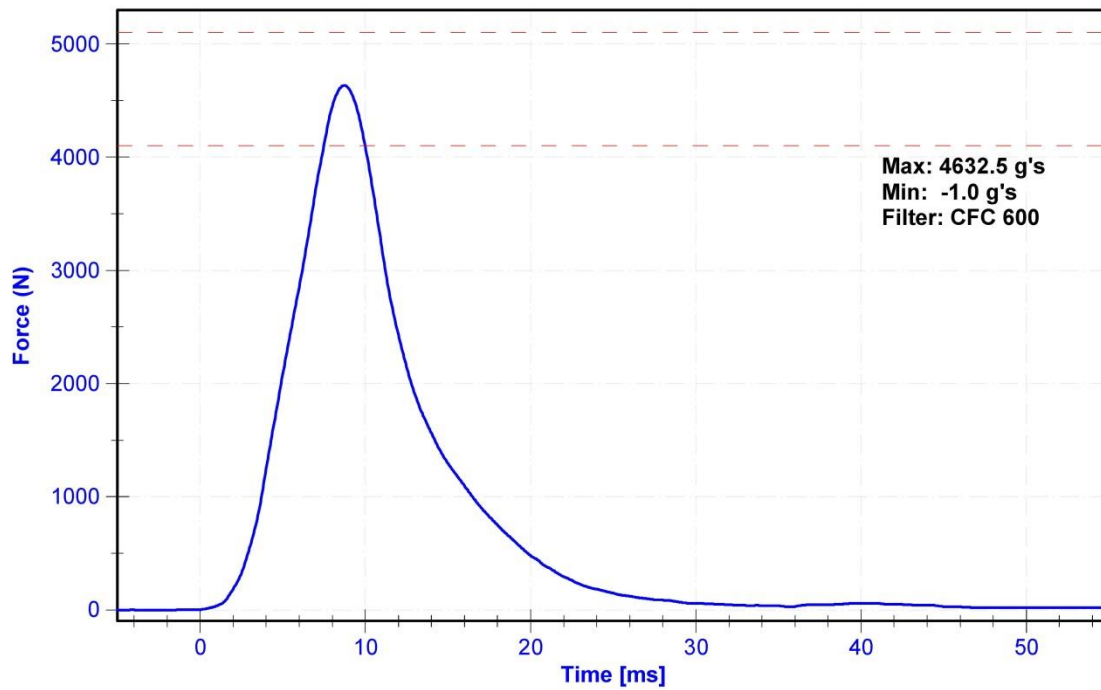
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C14953	7/30/2014	1/28/2015
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P51740	12/17/2014	6/17/2015
Iliac Load Cell	DENTON 3228J	LC-279Fy	5/14/2014	5/14/2015



Lateral Pelvis Acceleration



Iliac Force



APPENDIX D

TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

Table 1 – Dummy Instrumentation (SID-IIs)

			SID-IIs S/N: 300			
			Serial Number	Manufacturer	Calibration Date	
Head Accelerometers			X	AC-P58777	ENDEVCO	8/28/2014
			Y	AC-P59018	ENDEVCO	8/28/2014
			Z	AC-P68608	ENDEVCO	8/28/2014
Head Accelerometers - Redundant			X	AC-P52095	ENDEVCO	8/28/2014
			Y	AC-P58986	ENDEVCO	8/28/2014
			Z	AC-P68057	ENDEVCO	10/16/2014
Displacement Potentiometer	Shoulder		Y			
	Thoracic Rib	Upper	Y	DS-451GFE	SERVO	8/12/2014
		Middle	Y	DS-1151GFE	SERVO	8/12/2014
		Lower	Y	DS-1156GFE	SERVO	8/12/2014
	Abdominal Rib	Upper	Y	DS-308GFE	SERVO	8/12/2014
		Lower	Y	DS-307GFE	SERVO	8/7/2014
Lower Spine Accelerometers (T12)			X	AC-P58883	ENDEVCO	8/28/2014
			Y	AC-P64147	ENDEVCO	8/28/2014
			Z	AC-P58786	ENDEVCO	8/28/2014
Acetabulum Load Cell			Y	LC-275Fy	DENTON	5/13/2014
Lilac Wing Load Cell			Y	LC-279Fy	DENTON	5/14/2014
Pelvis Plug (Struck Side)				36924	Humanetics	10/6/2010
Pelvis Plug (Non-Struck Side)						

Table 2 – Vehicle Instrumentation

Vehicle Instrumentation		Serial Number	Manufacturer	Calibration Date
Vehicle Center of Gravity	X	AC-A120605	MSI 1201	9/18/2014
Vehicle Center of Gravity	Y	AC-A002415	MSI 1201	9/18/2014
Vehicle Center of Gravity	Z	AC-A120607	MSI 1201	9/18/2014
Left Floor Sill	Y	AC-A127667	MSI 1201	9/18/2014
A-Pillar Sill	Y	AC-A120608	MSI 1201	9/18/2014
A-Pillar Low	Y	AC-A120623	MSI 1201	9/19/2014
A-Pillar Mid	Y	AC-A126828	MSI 1201	9/18/2014
B-Pillar Sill	Y	AC-A120612	MSI 1201	9/26/2014
B-Pillar Low	Y	AC-A127671	MSI 1201	9/19/2014
B-Pillar Mid	Y	AC-A112918	MSI 1201	9/19/2014
Driver Seat	Y	AC-A127659	MSI 1201	9/18/2014
Engine Top	X	AC-A081439	MSI 1201	11/5/2014
Engine Top	Y	AC-A126786	MSI 1201	11/5/2014
Firewall	Y	AC-A127655	MSI 1201	9/19/2014
Right Roof	Y	AC-A120630	MSI 1201	9/25/2014
Right Floor Sill	Y	AC-A127673	MSI 1201	9/16/2014
Rear Floorpan	X	AC-A126803	MSI 1201	9/19/2014
Rear Floorpan	Y	AC-A126783	MSI 1201	9/19/2014

Table 3 – Pole Instrumentation

Pole Instrumentation	Serial Number	Manufacturer	Calibration Date
Load Cell 1	LC-18867	INTERFACE	8/25/2014
Load Cell 2	LC-18850	INTERFACE	8/25/2014
Load Cell 3	LC-46979	INTERFACE	8/25/2014
Load Cell 4	LC-18882	INTERFACE	8/25/2014
Load Cell 5	LC-62094	INTERFACE	8/25/2014
Load Cell 6	LC-46933	INTERFACE	8/25/2014
Load Cell 7	LC-18866	INTERFACE	8/25/2014
Load Cell 8	LC-46949	INTERFACE	8/25/2014