REPORT NUMBER: SINCAP-CAL-18-006

NEW CAR ASSESSMENT PROGRAM (NCAP)
MOVING DEFORMABLE BARRIER SIDE IMPACT TEST

FCA US LLC
2018 Dodge Grand Caravan
Minivan

NHTSA No: M20180303

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

June 22, 2018

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

This final test report was prepared for the U.S. Department of Transportation, National Highway Traffic Administration, in response to Contract Number DTNH22-14-D-00352.

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

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

Prepared by: Vanessa Hansen Date: June 22, 2018
Vanessa Hansen, Project Engineer

Approved by: Edward Dutton Date: June 22, 2018
Edward Dutton, Test Engineer
Transportation Test Operations

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

TECHNICAL REPORT DOCUMENTATION PAGE

1. Report No. SINCAP-CAL-18-006	***2. Government Accession No.***
3. Recipient's Catalog No.	
4. Title and Subtitle Final Report of New Car Assessment Program Side Impact MDB Testing of a 2018 Dodge Grand Caravan Minivan NHTSA No.: M20180303	***5. Report Date*** June 22, 2018
	6. Performing Organization Code CAL
Vanessa Hansen, Senior Test Engineer Edward Dutton , Operations Manager	***8. Performing Organization Report No.*** CAL-DOT-2018-006
9. Performing Organization Name and Address Calspan Corporation Transportation Test Operations P.O. Box 400 Buffalo, New York 14225	***10. Work Unit No.***
	11. Contract or Grant No. DTNH22-14-D-00352
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards (NRM-110) 1200 New Jersey Ave., SE, Room W43-410 Washington, D.C. 20590	***13. Type of Report and Period Covered:*** Final Test Report May 11, 2017 - June 22, 2018
	14. Sponsoring Agency Code NRM-110
15. *Supplementary Notes*	

16. Abstract

A 55/28, (61.90kph / 38.5 mph), 90^0 Moving Deformable Barrier NCAP Side Impact Test was conducted on the subject 2018 Dodge Grand Caravan Minivan in accordance with the specifications of the Office of Crashworthiness Standards Test Procedure for the generation of consumer information on vehicle side crash protection. This test was conducted at Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on May 11, 2018.

The impact velocity of the Moving Deformable Barrier (MDB) was 62.07 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle at the time of impact was 21°C. The target vehicle's maximum post-test static crush was 264mm located at level 3. The test vehicle's occupant performance data is as follows:

Measurement Description	Driver ATD (ES-2re)		
	Units	IARV	Result
Head Injury Criteria (HIC_{36})	N/A	1000	43.787
Maximum Thoracic Rib Deflection	mm	44	25.225
Total Abdominal Force	N	2500	844.813
Pubic Symphysis Force	N	6000	1485.040

Measurement Description	Passenger ATD (SID-IIs)		
	Units	IARV	Result
Head Injury Criteria (HIC_{36})	N/A	1000	99.550
Lower Spine Resultant Acceleration	G	82	37.262
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	4177.601
Maximum Thoracic Rib Deflection	mm	38*	4.368
Maximum Abdominal Rib Deflection	mm	45*	0.916

* *Proposed IARV*

The two doors on the struck side of the vehicle did not separate from the body at the hinges or latches and the opposite doors did not open during the side impact event.

17. Key Words New Car Assessment Program (NCAP) Side Impact MDB ES-2re SID-IIs	***18. Distribution Statement*** Copies of this report are available from: National Highway Traffic Safety Administration Technical Information Services Division, NPO-411 1200 New Jersey Ave. SE Washington, D.C. 20590 e-mail: tis@nhtsa.dot.gov FAX: 202-493-2833

19. Security Class. (of this report)	***20. Security Class. (of this page)***	***21. No. of Pages***	***22. Price***
UNCLASSIFIED	UNCLASSIFIED	188	

TABLE OF CONTENTS

SECTION 1

TEST PURPOSE AND PROCEDURE

This moving deformable barrier side impact test is part of the MY 2018 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under contract number DTNH22-14-D-00352. The purpose of this test is to generate comparative side impact performance in a 2018 Dodge Grand Caravan Minivan. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Laboratory Test Procedure dated October 2015.

SECTION 2

SUMMARY OF TEST RESULTS

A 2018 Dodge Grand Caravan Minivan was impacted on the left (driver's) side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 62.07 km/h. The target vehicle was stationary and was positioned at an angle of 63° to the line of forward motion. The side impact test was conducted by the Calspan Corporation's Transportation Test Operations Center in Buffalo, New York on May 11, 2018. Pre-test and post-test photographs of the test vehicle, the MDB and the dummies (ES-2re and SID-IIs) are included in this report.

Dummies were placed in the driver and left rear designated seating positions according to instructions specified in the OCWS Side Impact Laboratory Test Procedure, dated October 2015. The side impact event was documented by 9 high-speed and 2 real-time cameras. Camera locations are included in this report.

The Dummies were instrumented in the following manner:

DRIVER ATD (ES-2re)
Primary and redundant head CG tri-axial accelerometers
Chest upper rib, middle rib, and lower rib y-axis displacement potentiometers
Abdomen forward, middle, and rear y-axis load cells
Lower spine (T12) tri-axial accelerometers
Public symphysis y-axis load cell

PASSENGER ATD (SID-IIs)
Primary and redundant head CG tri-axial accelerometers
Chest upper rib, middle rib, and lower rib y-axis displacement potentiometers
Abdomen upper rib and lower rib y-axis displacement potentiometers
Lower spine (T12) tri-axial accelerometers
Acetabulum and iliac wing y-axis load cells

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

DUMMY INJURY VALUES

Measurement Description	Driver ATD (ES-2re)		
	Units	Threshold	Result
Head Injury Criteria (HIC36)		1000	43.787
Maximum Thorax Rib Deflection	mm	44	25.225
Combined Abdominal Force	N	2500	844.813
Pubic Symphysis Force	N	6000	1485.040

Measurement Description	Passenger ATD (SID-IIs)		
	Units	Threshold	Result
Head Injury Criteria (HIC36)		1000	99.550
Lower Spine (T12) Resultant Acceleration	G	82	37.262
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	4177.601
Maximum Thoracic Rib Deflection	mm	38*	4.368
Maximum Abdominal Rib Deflection	mm	45*	0.916

*Proposed IARV

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 – F034
2. P4 serial number – 300

Data Anomalies:

The following channel was questionable for

- Rear Left Passenger Middle Thorax Rib Y Displacement,Questionable data 70.6ms to 95.6ms
- Left A-Pillar Middle Y Acceleration,Exceeded calibration range at 42ms
- Left B-Pillar Lower Y Acceleration,Exceeded calibration range 12.4ms, 22.4ms
- Left B-Pillar Middle Y Acceleration,Exceeded calibration range 10.8ms, 12.5ms
- Left Rear Sill Y Acceleration,Exceeded calibration range & saturated at 7.64ms
- Mobile Deformable Barrier Front Left Contact,Questionable data throughout

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 System 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 – Test Vehicle Accelerometer Locations

Data Sheet No. 7 – MDB Accelerometer Locations

Data Sheet No. 8 – Post-Test Observations

Data Sheet No. 9 – MDB Summary of Results

Data Sheet No. 10 – Test Vehicle Profile Measurements

Data Sheet No. 11 – Test Vehicle Exterior Crush Measurements

Data Sheet No. 12 – MDB Exterior Static Crush Measurements

Data Sheet No. 13 – Vehicle and MDB Damage Profile Distances

Data Sheet No. 14 – FMVSS No. 301 Static Rollover Results

Data Sheet No. 15 – Dummy/Vehicle Temperature and Humidity Stabilization Data

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2018 Dodge Grand Caravan Minivan NHTSA No.: M20180303
Test Program: NCAP Side MDB Impact Test Test Date: 5/11/2018

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20180303
Model Year	2018
Make	Dodge
Model	Grand Caravan
Body Style	Minivan
VIN	2C4RDGBGXJR134617
Body Color	Silver
Odometer Reading (km/mi)	138 miles
Engine Displacement (L)	3.6
Type/No. Cylinders	V6
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	6-Speed
Overdrive	Yes
Final Drive	Front Wheel Drive
Roof Rack	Yes
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 Pretensioners	Yes
Rear Pass. Seat Belt Pretensioners	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?	No

DATA FROM CERTIFICATION LABEL

Manufactured By	FCA US LLC
Date of Manufacture	11-17
Vehicle Type	MPV

GVWR (kg)	2745
GAWR Front (kg)	1339
GAWR Rear (kg)	1407

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	2	3	-	5	
Capacity Weight (VCW) (kg)				521	(A)
DSC X 68.04 kg				476.28	(B)
Cargo Weight (RCLW) (kg)				44.72	(A-B)

VEHICLE SEAT TYPE

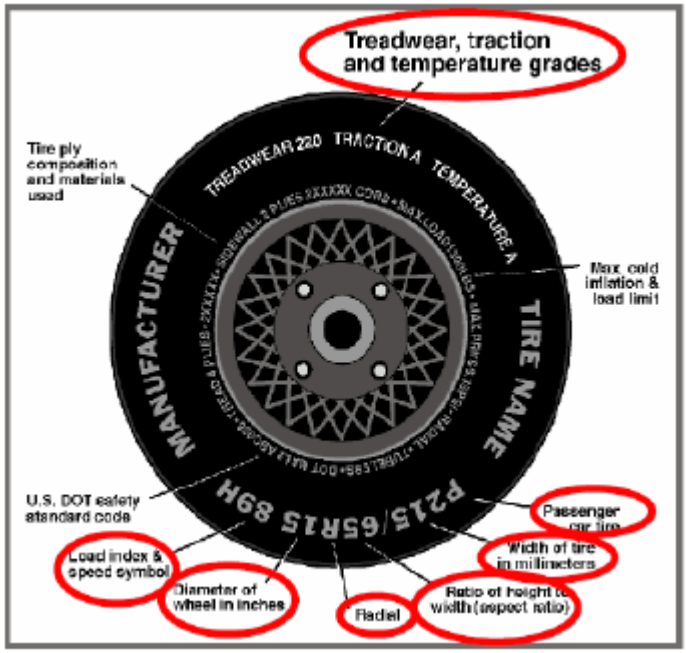
Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						W/ Lever	W/ Knob
Front Seat	X					X	
Rear or Second Row Seat		X				X	
Third Row seat			X		X		

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

Test Vehicle:	2018 Dodge Grand Caravan Minivan	NHTSA No.:	M20180303
Test Program:	NCAP Side MDB Impact Test	Test Date:	5/11/2018

VEHICLE TIRE INFORMATION

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



TIRE SIDEWALL INFORMATION

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	250	250
Recommended Tire Size	P225/65R17	P225/65R17
Tire Size on Vehicle	P225/65R17	P225/65R17
Tire Manufacturer	Kumho	Kumho
Tire Model	Solus KH16	Solus KH16
Treadwear	440	440
Traction	A	A
Temperature Grade	A	A
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Steel, 2 Polyester, 1 Nylon	2 Steel, 2 Polyester, 1 Nylon
Load Index/Speed Symbol	100H	100H
Tire Material	Rubber	Rubber
DOT Safety Code Left	27F6YP5M2517	27F6YP5M2517
DOT Safety Code Right	27F6YP5M2517	27F6YP5M2517

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

Test Vehicle: 2018 Dodge Grand Caravan Minivan NHTSA No.: M20180303
Test Program: NCAP Side MDB Impact Test Test Date: 5/11/2018

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	292	292	292	293
Tire Placard	kPa	250	250	250	250
Owner's Manual	kPa	250	250	250	250
As Tested	kPa	250	250	250	250

MDB TIRE SPECIFICATIONS

	Units	Requirement	LF	RF	LR	RR
Tire Size		P205/75R15	P205/75R15	P205/75R15	P205/75R15	P205/75R15
Tire Pressure	kPa	200 ± 21	207	207	207	207

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	589	437		635	509		638	507	
Right	kg	554	435		555	480		555	486	
Ratio	%	57	43		55	45		55	45	
Totals	kg	1143	872	2015	1190	989	2179	1193	993	2186

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	2015	(A)
Sum of Actual Weight of 1 ES2re and 1 P572 ATD (SID-IIs)	kg	127	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	44.72	(C)
Calculated Target Vehicle Test Weight (TVTW)	kg	2186.72	(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)? [X] **Yes** [ ] **No**

TEST VEHICLE ATTITUDES AND CG

Measurement Description	Units	Fully Loaded	As Tested	Meets Requirement**
LF	mm	779	779	Yes
RF	mm	790	789	Yes
RR	mm	790	785	Yes
LR	mm	784	778	Yes
Vehicle CG (Aft of Front Axle)	mm	1396	1395	
Vehicle CG (Left(+)/Right(-) from Longitudinal Centerline)	mm	39	40	

**** The "As Tested" vehicle attitude measurements must be equal to or within ± 10mm of the "Fully Loaded" vehicle attitude measurements at each wheel well. Indicate "Yes" or "No" for "Meets Requirements".*

Test height adjustable suspension setting, if applicable: N/A

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

Test Vehicle:	2018 Dodge Grand Caravan Minivan	NHTSA No.:	M20180303
Test Program:	NCAP Side MDB Impact Test	Test Date:	5/11/2018

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Trunk Carpeting	11
Tail Light	1
Passenger Side Door Internals	15
Ballast / Equipment Added	5

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

Test Vehicle:	2018 Dodge Grand Caravan Minivan	NHTSA No.:	M20180303
Test Program:	NCAP Side MDB Impact Test	Test Date:	5/11/2018

SEAT POSITIONING

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

SCRL ANGLE RANGE

Seat	SCRL (°)		
	Max	Min	Mid
Driver Seat	Not Adjustable		
Front Passenger Seat	Not Adjustable		
Front Center Seat*			
Struck Side Rear Seat	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed
Rear Center Seat*	Fixed	Fixed	Fixed

**if applicable*

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	Not Adjustable		Max	-	-	-
			Mid	-	-	-
			Min	-	-	-
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	-	-	-

**if applicable*

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

Test Vehicle: 2018 Dodge Grand Caravan Minivan NHTSA No.: M20180303
Test Program: NCAP Side MDB Impact Test Test Date: 5/11/2018

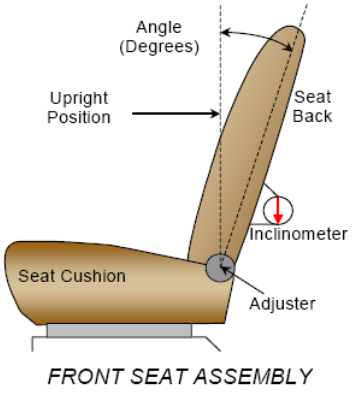
SEAT FORE / AFT POSITION

Seat	Total Fore / Aft Travel		Test Position from Forwardmost Position	
	mm	Detents*	mm	Detent*
Driver Seat	220	33 (0-32)	110	16
Front Passenger Seat	220	33 (0-32)	110	16
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

**if applicable*

SEAT BACK ANGLE ADJUSTMENT

The driver's seat back is positioned to the manufacturer's designated design angle. 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 seat back is positioned such that the dummy's head is level. The rear center and non-struck side rear outboard seat backs are positioned in a similar manner as the struck-side rear seat back.



FRONT SEAT ASSEMBLY

Seat	Total Seat Back Angle Range		Test Position from Most Upright	
	Degrees	Detents*	Degrees	Detents*
Driver Seat w/ Seated Dummy	61	-	8.4	-
Front Passenger Seat	66.3	-	8.6	-
Front Center Seat*	N/A	N/A	N/A	N/A
Struck Side Rear Seat w/ Seated Dummy	24.9	-	14.9	-
Non-Struck Side Rear Seat	24.9	-	14.9	-
Rear Center Seat*	N/A	N/A	N/A	N/A

**if applicable*

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

Test Vehicle: 2018 Dodge Grand Caravan Minivan NHTSA No.: M20180303
Test Program: NCAP Side MDB Impact Test Test Date: 5/11/2018

SEAT BELT ANCHORAGE ADJUSTMENT

Seat belt anchorages are adjusted in accordance with the information provided by the manufacturer on Form No. 1. For this test zero is defined as the uppermost position.

	Total # of Positions	Placed in Position #
Driver Seat	5	0
Rear Seat	5	0

HEAD RESTRAINT ADJUSTMENT

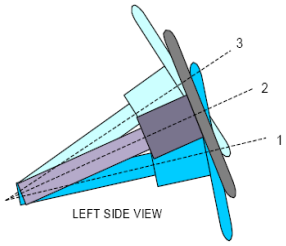
The driver's head restraint is adjusted to the highest and most full forward in-use position. The struck-side rear passenger's head restraint is adjusted to the lowest and most full forward in-use position.

	Total # of Positions	Placed in Position #
Driver Seat	3	0
Rear Seat	1	1

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	20	
Geometric Center – Position 2	23.1	
Uppermost – Position 3	26.2	
Telescoping Steering Wheel Travel		35
Test Position	23.1	17.5

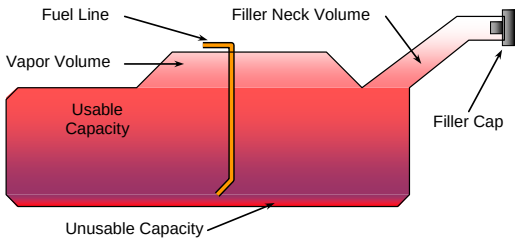


STEERING COLUMN ASSEMBLY

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.



VEHICLE FUEL TANK ASSEMBLY

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

Test Vehicle: 2018 Dodge Grand Caravan Minivan NHTSA No.: M20180303
Test Program: NCAP Side MDB Impact Test Test Date: 5/11/2018

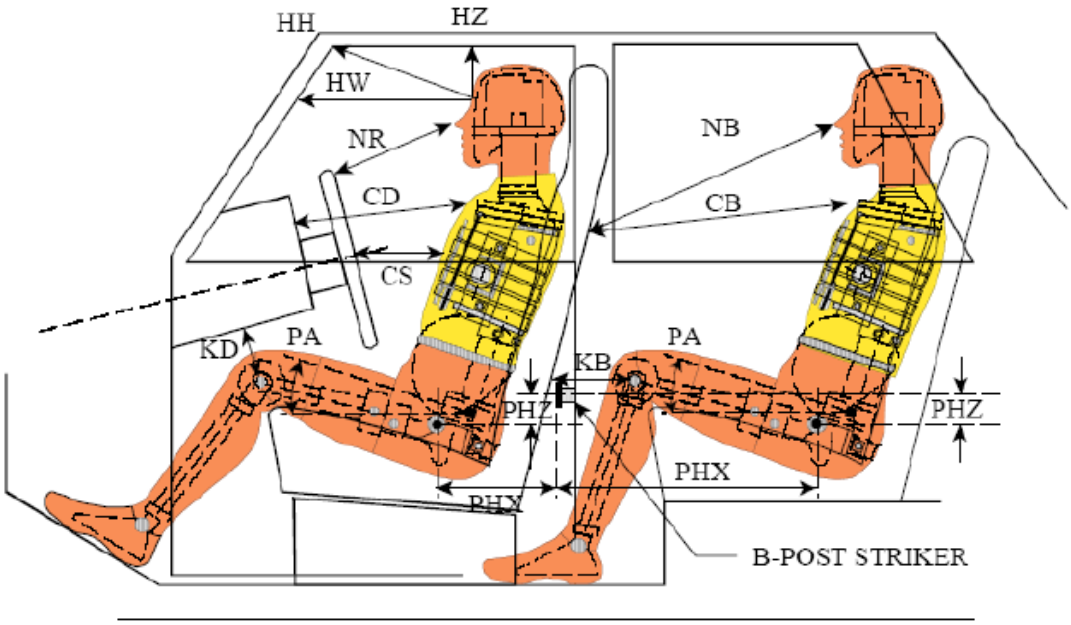
FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank" (see Form No. 1)	75.7
Usable Capacity of "Optional Tank" (see Form No. 1)	N/A
Usable Capacity of Standard Tank (see Owner's Manual)	75.7
Usable Capacity of Optional Tank (see Owner's Manual)	N/A
93% of Usable Capacity	70.4
Actual Amount of Solvent Used in Test	70.4
1/3 of Usable Capacity	25.23

Is the Actual Amount of Solvent Used in the test equal to 93% ± 1% of the Usable Capacity stated in Form No. 1? [X] **Yes** [ ] **No**

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle:	2018 Dodge Grand Caravan Minivan	NHTSA No.:	M20180303
Test Program:	NCAP Side MDB Impact Test	Test Date:	5/11/2018



NOTE: 2-DOOR VEHICLE SHOWN. REAR DUMMY PHX & PHZ MEASUREMENTS FOR A 4-DOOR VEHICLE WOULD USE THE C-POST STRIKER AS A REFERENCE POINT

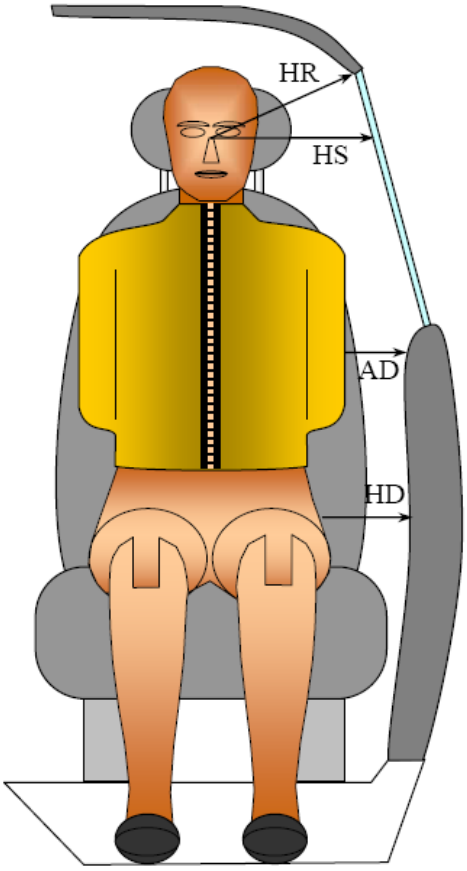
LEFT SIDE VIEW

DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Pass. Code	Description	Driver (Serial No. F034)		Passenger (Serial No.300)	
			Length (mm)	Angle	Length (mm)	Angle
HH		Header to Header	367			
HW		Header to Windshield	614			
HZ	HZ	Head to Roof Liner	141		292	
NR	NB	Nose to Rim/Seat Back	390		573	
CD	CB	Chest to Dash/Seat Back	526		588	
CS		Chest to Steering Wheel	301			
KD(L)/KDA(L)°	KB(L)/KBA(L)°	Left Knee to Dash/Seat Back	165	10.8	337	10.7
KD(R)/KDA(R)°	KB(R)/KBA(R)°	Right Knee to Dash/Seat Back	145	12.7	337	10.8
PAX°	PAX°	Pelvic Tilt Angle X		19.3		19.3
	PAY°	Pelvic Tilt Angle Y				0.2
PHX	PHX	Hip Point to Striker (X-Axis)	218		402	
PHZ	PHZ	Hip Point to Striker (Z-Axis)	18		88	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle:	2018 Dodge Grand Caravan Minivan	NHTSA No.:	M20180303
Test Program:	NCAP Side MDB Impact Test	Test Date:	5/11/2018



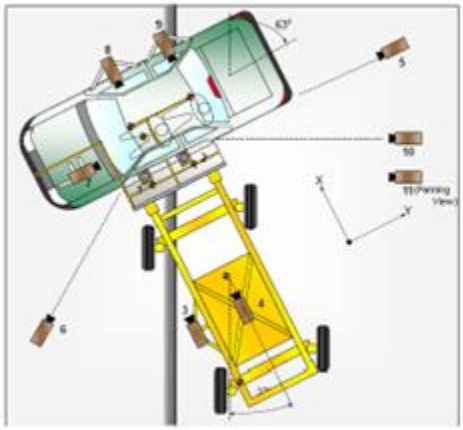
FRONT VIEW OF DUMMY

DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver (Serial No. F034)	Passenger (Serial No. 300)
HR	Head to Side Header	mm	235	264
HS	Head to Side Window	mm	380	440
AD	Arm to Door	mm	140	208
HD	Hip Point to Door	mm	160	275

DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2018 Dodge Grand Caravan Minivan NHTSA No.: M20180303
Test Program: NCAP Side MDB Impact Test Test Date: 5/11/2018



CAMERA LOCATIONS AND DATA

No.	Camera View	Coordinates (mm)			Lens Length (mm)	Operating Frame Rate (fps)
		X	Y	Z		
1	Overhead Overall	0	-729	-8337	12.5	1000
2	Overhead Close-up	0	-729	-8337	24	1000
3	Left Impact Point (MDB)	-1470	0	-847	25	1000
4	Side Overall (MDB)	-1140	838	-1587	12.5	1000
5	Rear	0	10662	-1381	24	1000
6	Left Front	-3364	-5131	1378	24	1000
7	Driver Front (OB)				25	1000
8	Driver Side (OB)				12.5	1000
9	Passenger Side (OB)				12.5	1000
10	Real-time Left Rear				Zoom	60
11	Real-time In run				Zoom	60

Notes: *Reference: Impact Point projected to Ground*
+X = To Front of MDB, +Y = To Right of MDB, +Z = Down
**All measurements accurate to ± 6 mm.*

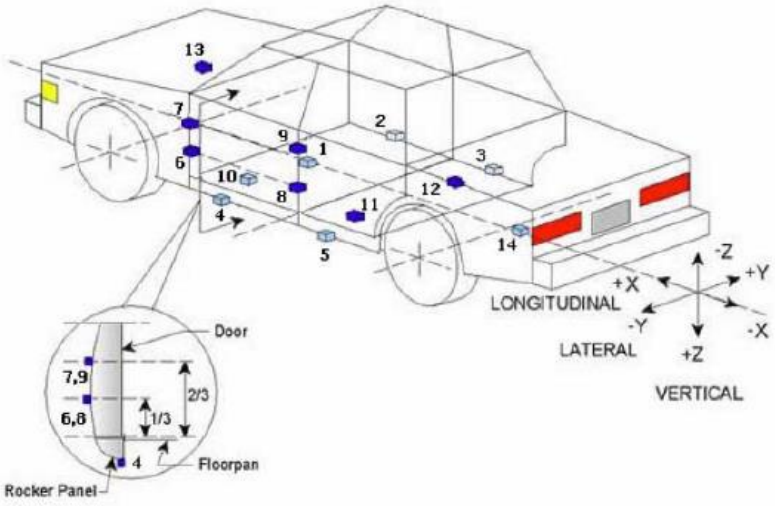
If applicable, explain why camera(s) did not operate as intended: All cameras operated normally

INSTRUMENTATION

Driver Dummy Channels	16
Passenger Dummy Channels	16
Vehicle Structure Accelerometers	23
MDB Accelerometers	7
Total	62

DATA SHEET NO. 6
TEST VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2018 Dodge Grand Caravan Minivan NHTSA No.: M20180303
Test Program: NCAP Side MDB Impact Test Test Date: 5/11/2018



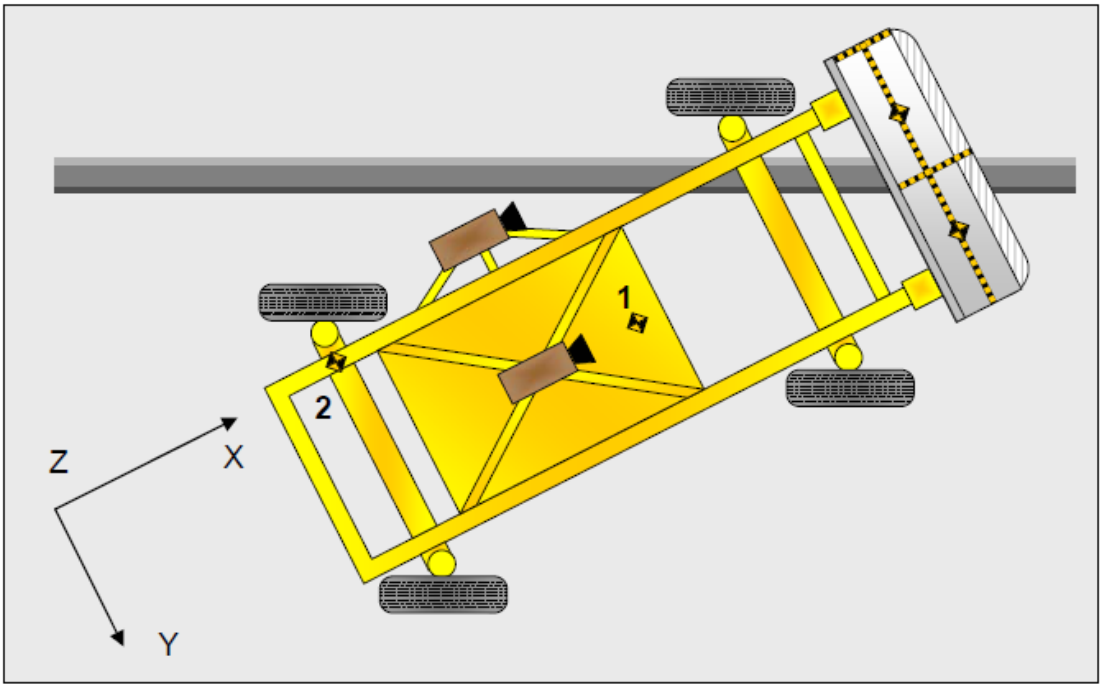
TEST VEHICLE ACCELEROMETER LOCATIONS

No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2822	7	36
2	Right Sill at Front Seat	3324	769	133
3	Right Sill at Rear Seat	2194	752	35
4	Left Sill at Front Door	3171	-762	132
5	Left Sill at Rear Door	2117	-749	33
6	A-Post Lower	3667	-716	-189
7	A-Post Middle	3667	-725	-681
8	B-Post Lower	2676	-723	-173
9	B-Post Middle	2659	-745	-396
10	Front Seat Track	2890	-647	6
11	Rear Seat Structure	2134	-534	-77
12	Rt. Rear Occ. Compartment	2076	510	11
13	Engine Block	4542	62	-409
14	Rear Above Axle	1054	128	-48

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

DATA SHEET NO. 7
MDB ACCELEROMETER LOCATIONS

Test Vehicle:	2018 Dodge Grand Caravan Minivan	NHTSA No.:	M20180303
Test Program:	NCAP Side MDB Impact Test	Test Date:	5/11/2018



MDB ACCELEROMETER LOCATIONS

No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	MDB CG	1859	0	-330
2	MDB Rear	386	-660	-660

Reference: X – Face of MDB (+ forward)
Y – MDB centerline (+ to right)
Z – Ground plane (+ down)

DATA SHEET NO. 8
POST-TEST OBSERVATIONS

Test Vehicle: 2018 Dodge Grand Caravan Minivan NHTSA No.: M20180303
Test Program: NCAP Side MDB Impact Test Test Date: 5/11/2018

TEST DUMMY INFORMATION AND CONTACT POINTS

Dummy Body Part	Front Seat Dummy (ES-2re)	Rear Seat Dummy (SID-IIs)
Face	Curtain Airbag	None
Top of Head	None	Curtain Airbag, Side Header & Right Rear Passenger headrest
Left Side of Head	Curtain Airbag	Curtain Airbag
Back of Head	Curtain Airbag & Headrest	Curtain Airbag & Headrest
Left Shoulder	Curtain Airbag	Curtain Airbag & Passenger Door
Upper Torso	Seatback & Torso/Pelvis Airbag	Passenger Door
Lower Torso	Seatback & Torso/Pelvis Airbag	Passenger Door
Left Hip	Seatpan & Torso/Pelvis Airbag	Passenger Door
Left Knee	Driver Door	Passenger 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

*Tailgate opened during impact but is still operational.

POST-TEST SEAT PERFORMANCE

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

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	B-Pillar Buckled
Sill Separation	None
Windshield Damage	None
Side Window Damage	None
Other Notable Effects	None

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

Test Vehicle: 2018 Dodge Grand Caravan Minivan NHTSA No.: M20180303
Test Program: NCAP Side MDB Impact Test Test Date: 5/11/2018

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

IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vehicle Wheel Base	mm		3073
Vertical Impact Reference Line (Aft of Front Axle - Intended Impact Point)	mm		508
Actual Impact Point (Aft of Frontal Axle)	mm		501
Horizontal Offset (+ forward / - rearward)	mm	+/- 50 of Intended Impact Point	+7
Vertical Offset (+ down / - up)	mm	+/- 20 of Intended Impact Point	0

DATA SHEET NO. 9
MDB SUMMARY OF RESULTS

Test Vehicle:	2018 Dodge Grand Caravan Minivan	NHTSA No.:	M20180303
Test Program:	NCAP Side MDB Impact Test	Test Date:	5/11/2018

MDB SPECIFICATIONS

Measurement Description	Length (mm)
Overall Width of Framework Carriage	1,250
Overall Length Including Honeycomb Frame	4,120
Wheelbase of Framework Carriage	2,600
CG Location of Front Axle	1,120

MDB WEIGHTS

	Units	Front Axle	Rear Axle	Total
Left	kg	392.5	297.5	690.0
Right	kg	386.0	291.5	677.5
Ratio	%	57.4%	42.6%	100.0%
Totals	kg	778.5	589.0	1367.5

SPEED AND ANGLE AT IMPACT DATA

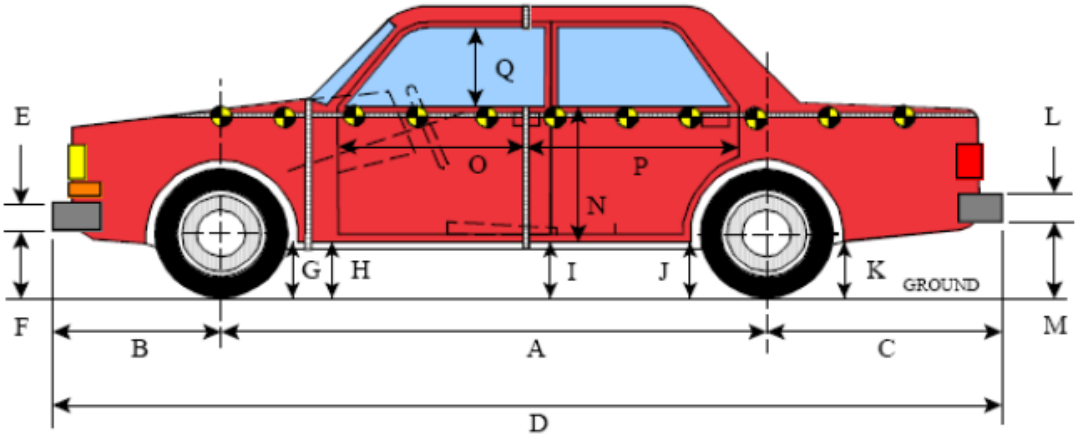
Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.10 to 62.70	62.07
Trap No. 2 Velocity (Redundant)	km/h	61.10 to 62.70	62.11
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	90.0
MDB Forward Line of Motion to Target Vehicle CL	degrees	62.5 to 63.5	63.0
MDB Crabbed angle to MDB Forward Line of Motion	degrees	26.0 to 28.0	27.0

MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE

Vertical Location			From Centerline		Maximum Crush (mm)
Row	Description	Height (mm)	Distance (mm)	Direction	
A	Center of Bumper	432	800	Right	235
B	Top of Bumper	533	700	Left	135
C	Mid-Level	686	800	Left	128
D	Top of Stack	813	800	Left	158

DATA SHEET NO. 10
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle:	2018 Dodge Grand Caravan Minivan	NHTSA No.:	M20180303
Test Program:	NCAP Side MDB Impact Test	Test Date:	5/11/2018



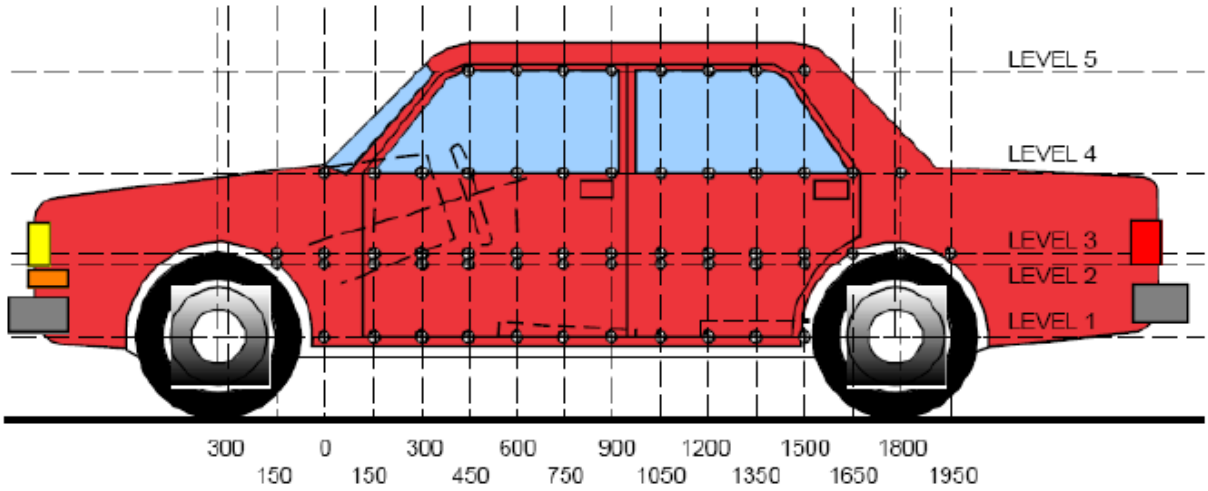
LEFT SIDE VIEW
All MEASUREMENTS IN (mm) WITH TOLERANCE OF ± 3mm

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Description	Pre-Test	Post-Test	Difference
A	Wheelbase	3073	3071	-2
B	Front Axle to FSOV	965	962	-3
C	Rear Axle to RSOV	1117	1118	1
D	Total Length at Centerline	5155	5151	-4
E	Front Bumper Thickness	160	160	0
F	Front Bumper Bottom to Ground	455	455	0
G	Sill Height at Front Wheel Well	219	223	4
H	Sill Height at Front Door Leading Edge	216	218	2
I	Sill Height at B Pillar	224	236	12
J1	Sill Height at Rear Wheel Well	236	240	4
J2	Pinch Weld Height at Rear Wheel Well	242	251	9
K	Sill Height Aft of Rear Wheel Well	250	267	17
L	Rear Bumper Thickness	130	130	0
M	Rear Bumper Bottom to Ground	344	360	16
N	Sill Height to Window Bottom of Front Window Sill	864	827	-37
O	Front Door Leading Edge to Impact CL	802	783	-19
P	Rear Door Trailing Edge to Impact CL	1368	1327	-41
Q	Front Window Opening	515	527	13
R	Right Side Length	5043	5044	1
S	Left Side Length	5041	5038	-3
T	Maximum Vehicle Width	1962	1784	-178

DATA SHEET NO. 11
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2018 Dodge Grand Caravan Minivan NHTSA No.: M20180303
Test Program: NCAP Side MDB Impact Test Test Date: 5/11/2018



LEFT SIDE VIEW

MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Units	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	mm	309	23	300
2	Driver Hip Point	mm	686	256	1200
3	Mid-Door	mm	790	264	1350
4	Window Sill	mm	1040	135	1050
5	Window Top	mm	1668	10	1050

*window top level bent outward from original position

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. 11 … (CONTINUED)
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2018 Dodge Grand Caravan Minivan NHTSA No.: M20180303
Test Program: NCAP Side MDB Impact Test Test Date: 5/11/2018

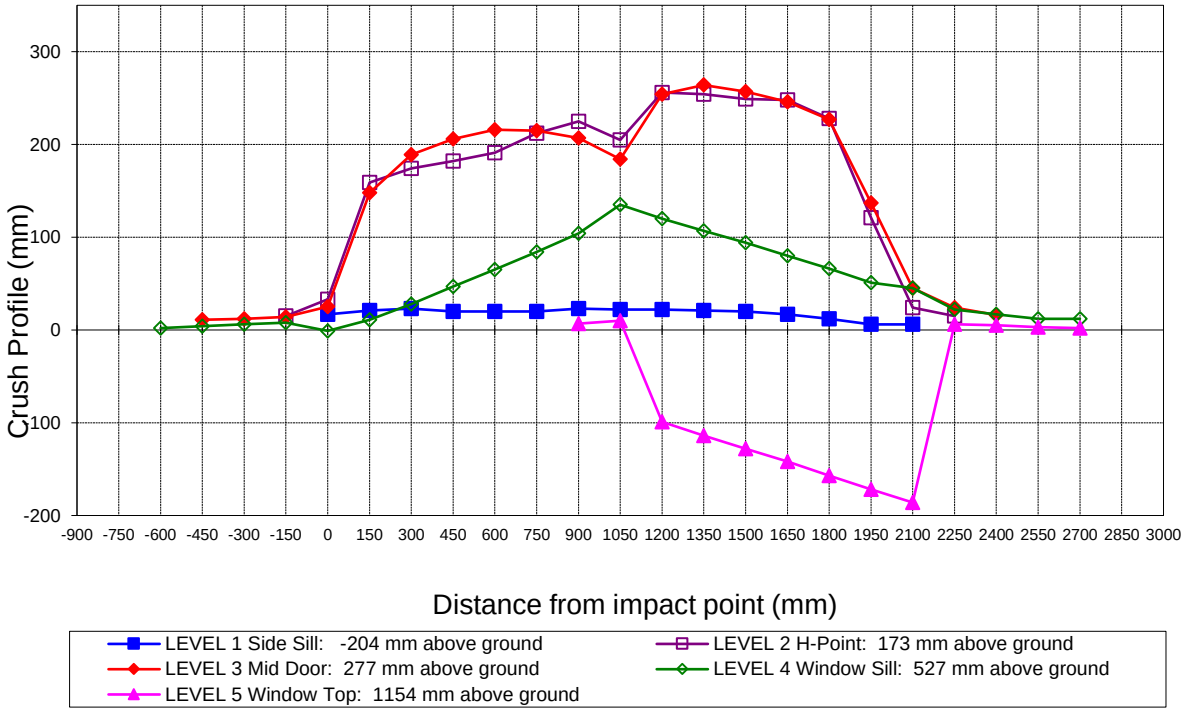
EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-900															
-750															
-600				854					852					2	
-450			965	875				954	871				11	4	
-300			962	891				950	885				12	6	
-150		962	950	907			947	936	899			15	14	8	
0	911	952	952	920		894	919	931	921		17	33	21	-1	
150	915	958	962	932		894	799	814	921		21	159	148	11	
300	921	963	967	942		898	789	778	914		23	174	189	28	
450	926	967	972	951		906	785	766	904		20	182	206	47	
600	931	971	976	957		911	780	760	892		20	191	216	65	
750	934	973	978	962		914	761	763	878		20	212	215	84	
900	935	975	980	965	734	912	750	773	861	727	23	225	207	104	7
1050	935	974	980	966	738	913	769	796	831	728	22	205	184	135	10
1200	934	973	978	967	745	912	717	724	847	844	22	256	254	120	-99
1350	932	972	977	966	747	911	718	713	859	861	21	254	264	107	-114
1500	929	969	975	965	749	909	720	718	871	877	20	249	257	94	-128
1650	926	966	973	963	749	909	718	727	883	891	17	248	246	80	-142
1800	923	962	969	961	747	911	734	742	895	904	12	228	227	66	-157
1950	919	958	965	957	745	913	837	828	906	917	6	121	137	51	-172
2100	915	953	959	952	741	909	929	914	907	927	6	24	45	45	-186
2250		971	960	947	738		956	936	925	732		15	24	22	6
2400			975	940	732			959	923	727			16	17	5
2550				932	726				920	723				12	3
2700				924	717				912	715				12	2
2850															
3000															

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 test based on an estimated impact point.

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

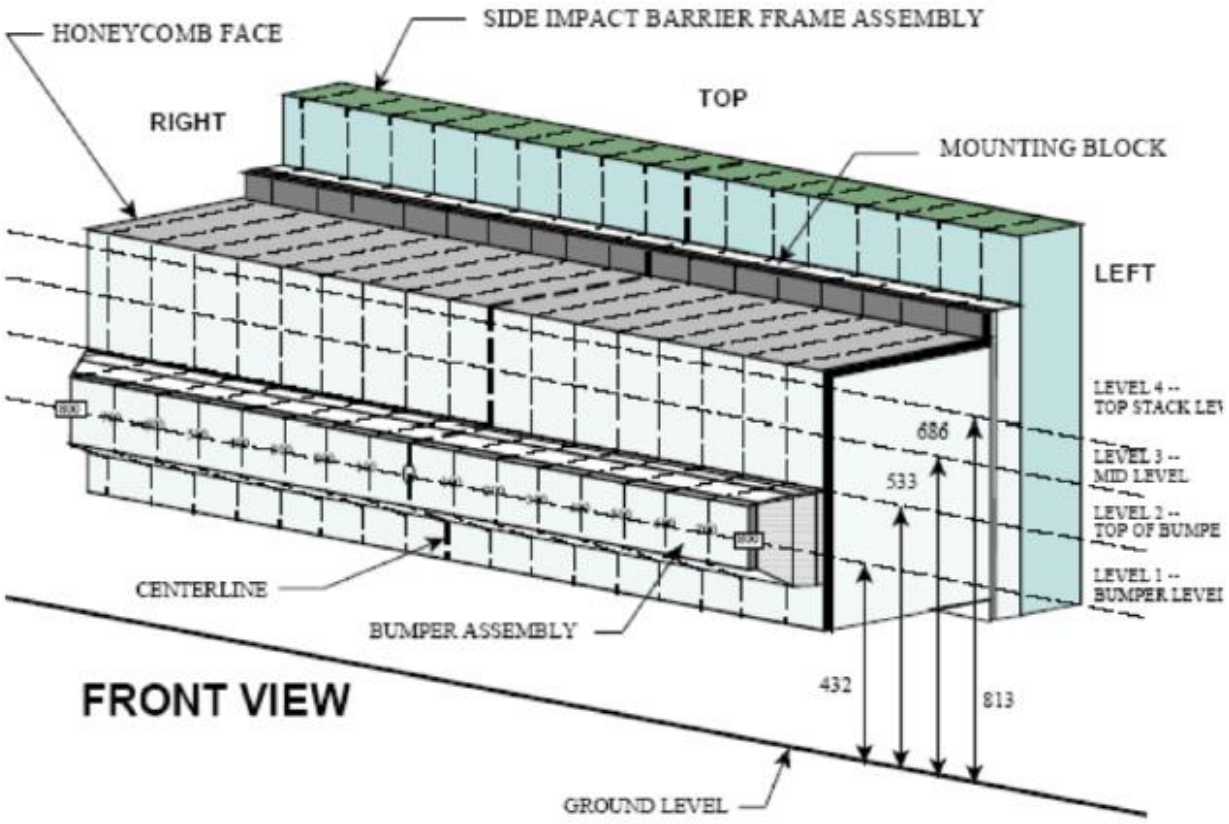
Test Vehicle:	2018 Dodge Grand Caravan Minivan	NHTSA No.:	M20180303
Test Program:	NCAP Side MDB Impact Test	Test Date:	5/11/2018



Vehicle Exterior Crush Measurements - Visual Representation

DATA SHEET NO. 12
MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle:	2018 Dodge Grand Caravan Minivan	NHTSA No.:	M20180303
Test Program:	NCAP Side MDB Impact Test	Test Date:	5/11/2018



NOTE: Dimensions are shown in millimeters, mm

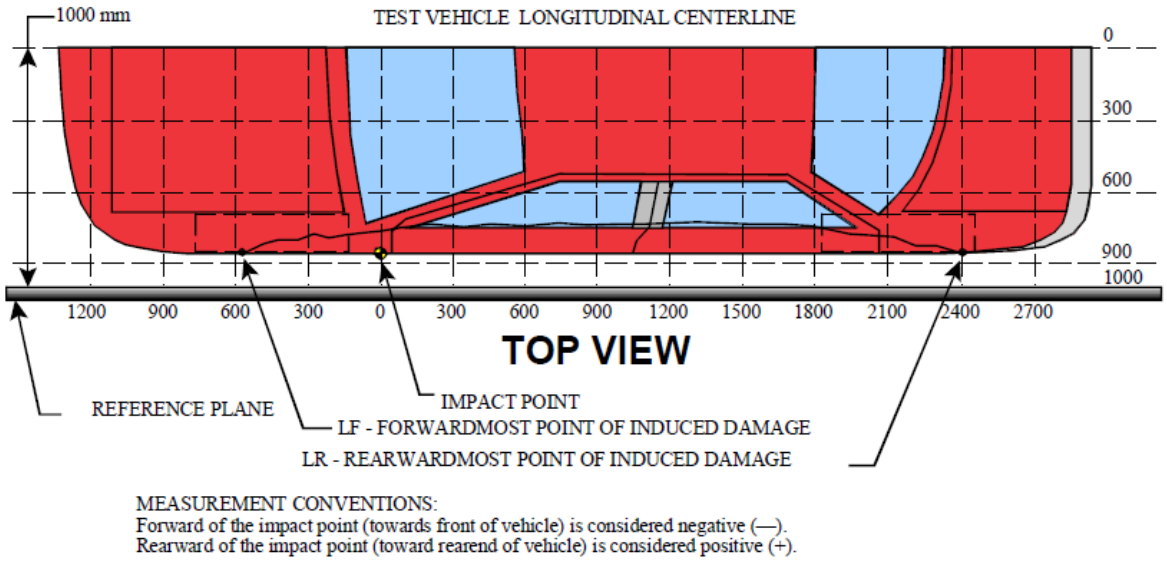
DEFORMABLE BARRIER STATIC CRUSH

Stack Level	Distance Right of Center								C/L	Distance Left of Center							
	800	700	600	500	400	300	200	100	0	100	200	300	400	500	600	700	800
1	208	210	212	216	219	225	235	234	229	222	220	221	222	222	224	226	233
2	118	121	122	120	122	119	120	111	123	123	123	122	123	124	125	126	135
3	83	71	64	56	51	49	78	98	90	76	79	82	74	74	85	102	128
4	119	103	86	71	69	72	86	132	119	95	94	108	121	125	128	139	158

DATA SHEET NO. 13
MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle:	2018 Dodge Grand Caravan Minivan	NHTSA No.:	M20180303
Test Program:	NCAP Side MDB Impact Test	Test Date:	5/11/2018

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



MEASUREMENT CONVENTIONS:
Forward of the impact point (towards front of vehicle) is considered negative (—).
Rearward of the impact point (toward rearend of vehicle) is considered positive (+).

VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance From Impact Point (mm)	Level	Post-Test (mm)	Pre-Test (mm)	Crush (mm)
1	-450	3	46	35	11
2	150	3	163	39	124
3	690	3	238	23	215
4	1260	3	280	22	258
5	1830	3	241	32	209
6	2400	3	41	25	16

MDB DAMAGE PROFILE DISTANCES

DPD	Distance From Center of MDB	Level	Post-Test (mm)*
1	800 mm left of center	1	233
2	480 mm left of center	1	222
3	160 mm left of center	1	221
4	160 mm right of center	1	235
5	480 mm right of center	1	217
6	800 mm right of center	1	208

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

Test Vehicle:	2018 Dodge Grand Caravan Minivan	NHTSA No.:	M20180303
Test Program:	NCAP Side MDB Impact Test	Test Date:	5/11/2018
Test Time:	10:58 AM	Temperature:	21˚C

A. From impact until vehicle motion ceases: (Maximum allowable is 1 oz.) — 0 oz.

B. For the 5-minute period after motion ceases: (Maximum allowable is 5 oz.) — 0 oz.

C. For the following 25 minutes: (Maximum allowable is 1 oz./minute) — 0 oz.

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°	69	300	369
90° to 180°	63	300	363
180° to 270°	67	300	367
270° to 360°	65	300	365

FMVSS NO. 301 ROLLOVER SPILLAGE TABLE

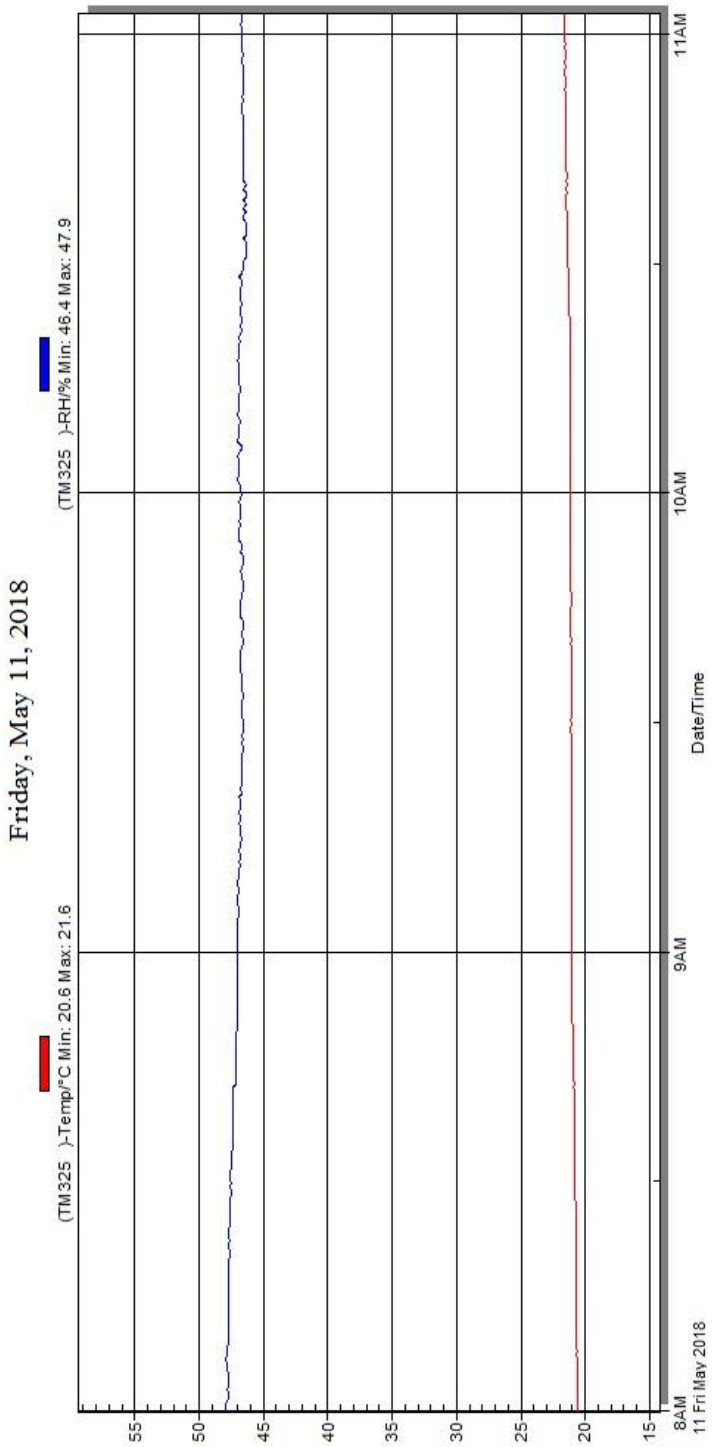
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0° to 90°	0	0	0	
90° to 180°	0	0	0	
180° to 270°	0	0	0	
270° to 360°	0	0	0	

ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

Test Phase	Spillage Location
0° to 90°	None
90° to 180°	None
180° to 270°	None
270° to 360°	None

DATA SHEET NO. 15
DUMMY/VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION DATA

Test Vehicle:	2018 Dodge Grand Caravan Minivan	NHTSA No.:	M20180303
Test Program:	NCAP Side MDB Impact Test	Test Date:	5/11/2018



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

APPENDIX A

PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

Figure A-1: As-Delivered Right Front 3/4 View of Test Vehicle

Figure A-2: As-Delivered Left Rear 3/4 View of Test Vehicle

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

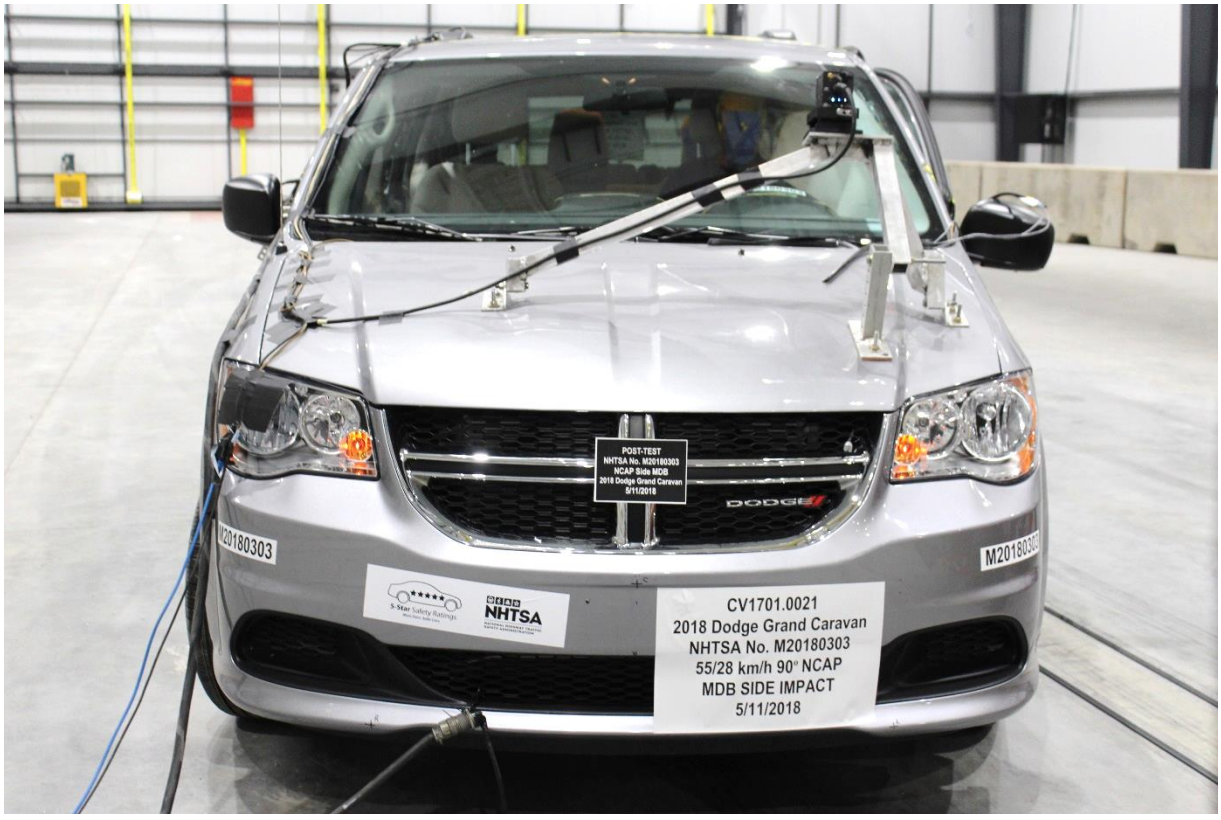


Figure A-4: Post-Test Frontal View of Test Vehicle

Figure A-5: Pre-Test Left Front ¾ View of Test Vehicle

Figure A-6: Post-Test Left Front ¾ View of Test Vehicle

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

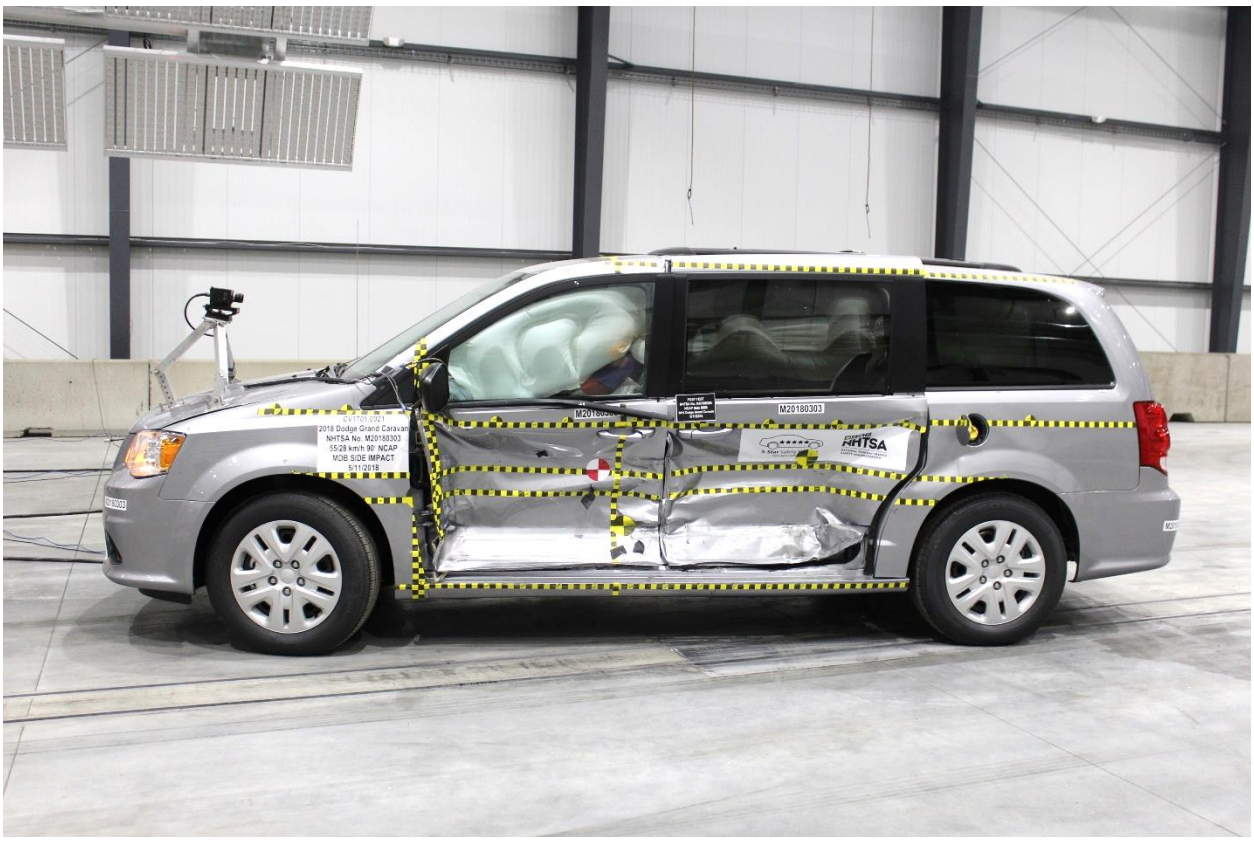


Figure A-8: Post-Test Left Side View of Test Vehicle

Figure A-9: Pre-Test Left Rear ¾ View of Test Vehicle

Figure A-10: Post-Test Left Rear ¾ View of Test Vehicle

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

Figure A-12: Post-Test Rear Side 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 the Test Area

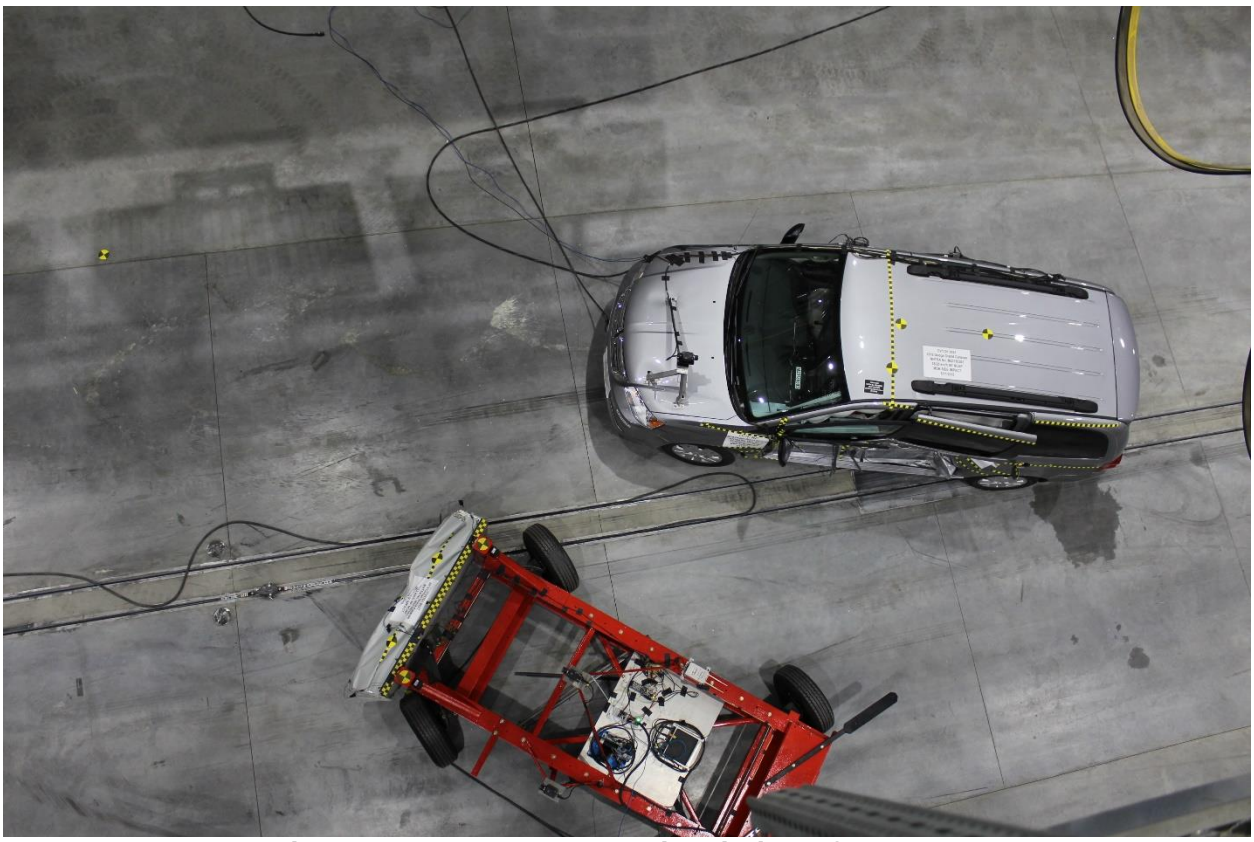


Figure A-16: Post-Test Overhead View of Test Area

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

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

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

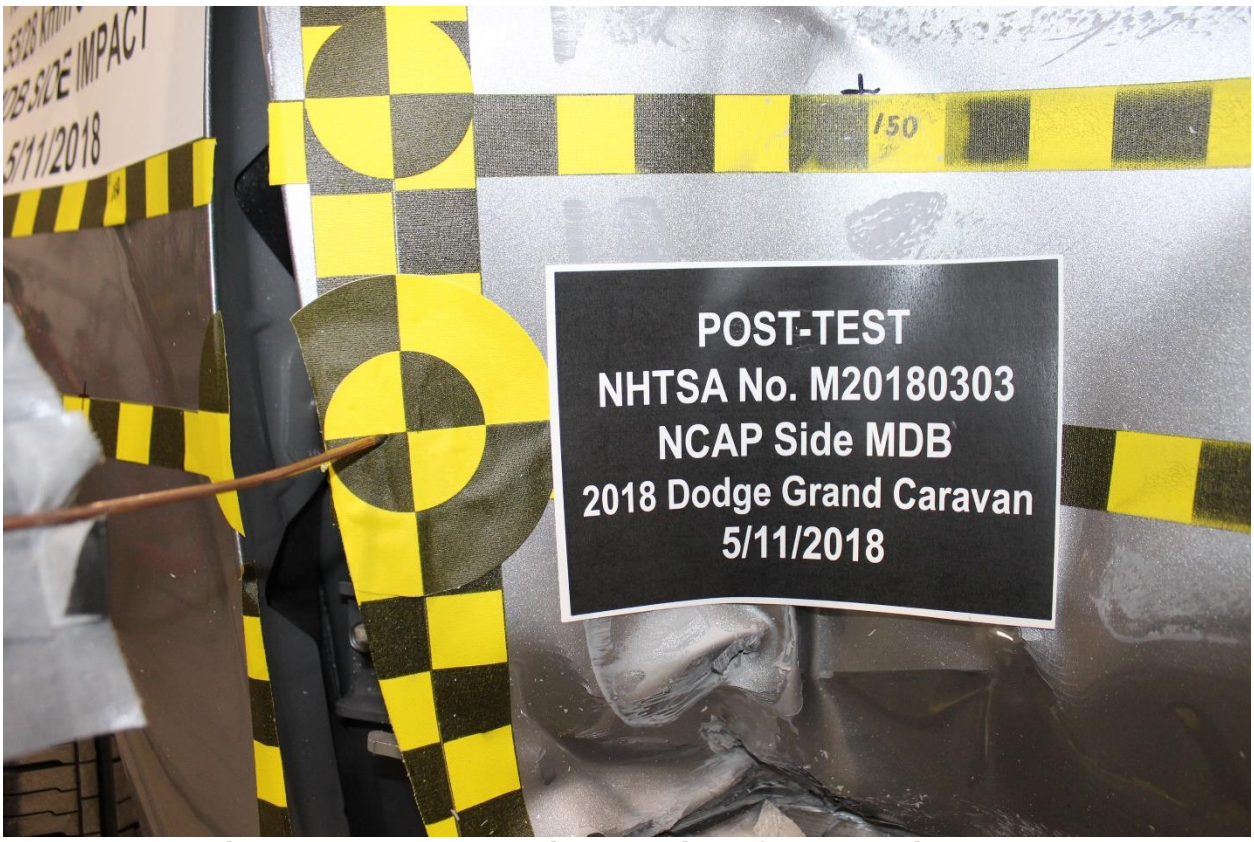


Figure A-20: Post-Test Close-up View of Impact Point Target

Figure A-21: Pre-Test Left Front Door Latch Close-Up

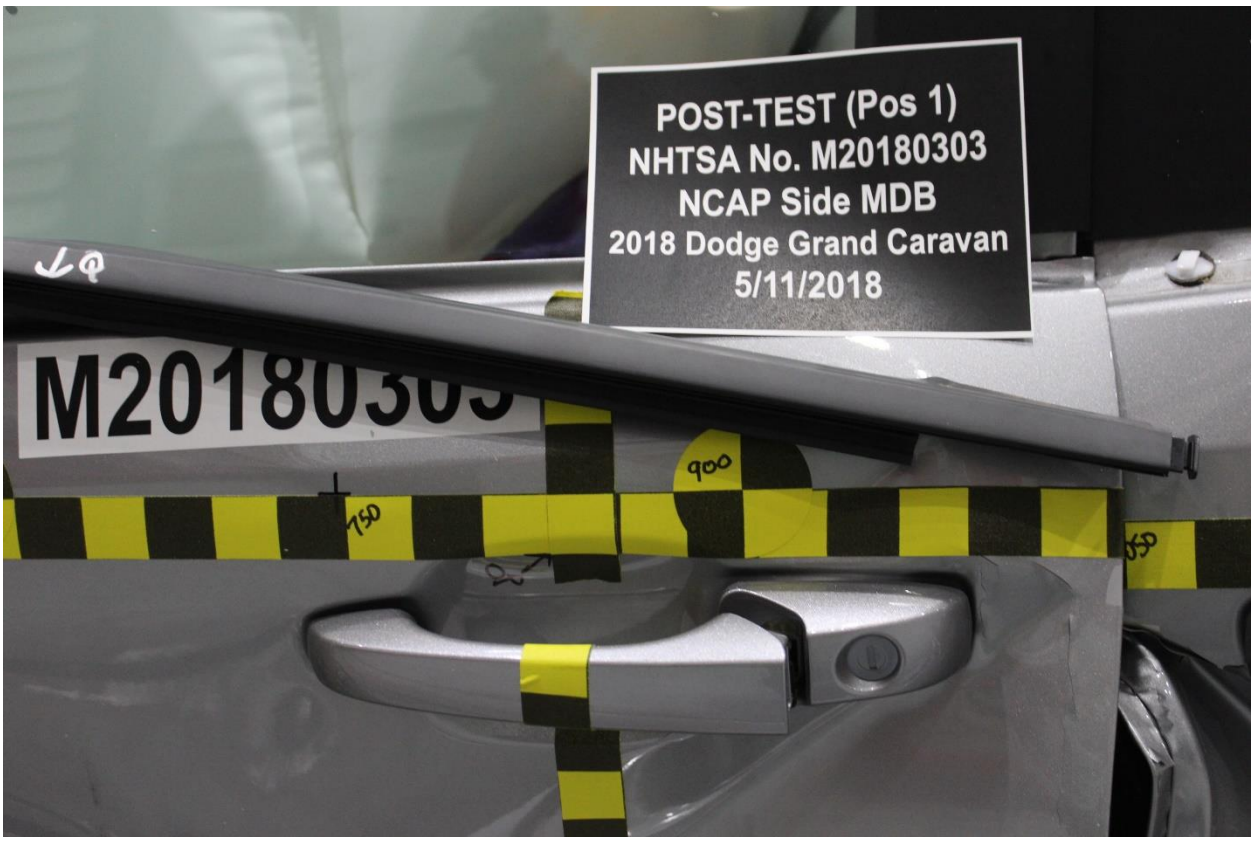


Figure A-22: Post-Test Left Front Door Latch Close-Up

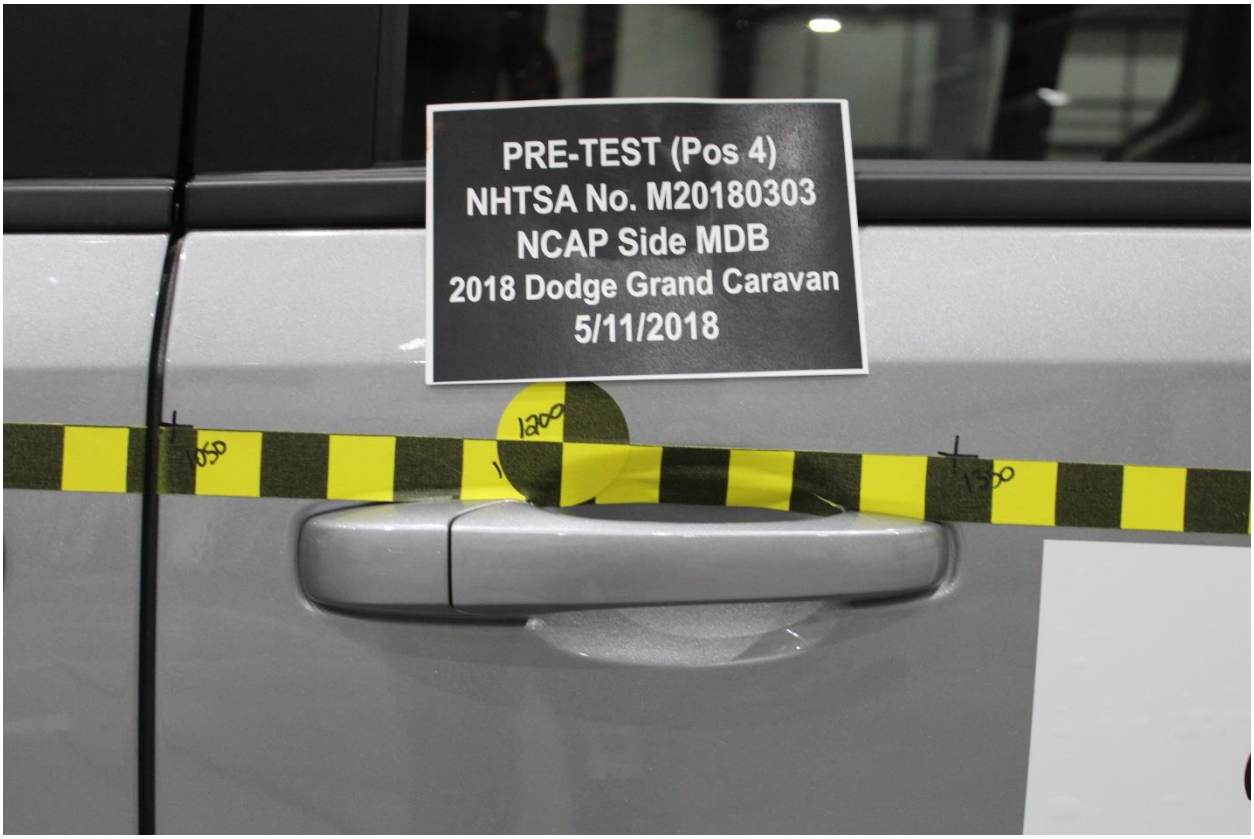


Figure A-23: Pre-Test Left Rear Door Latch Close-Up

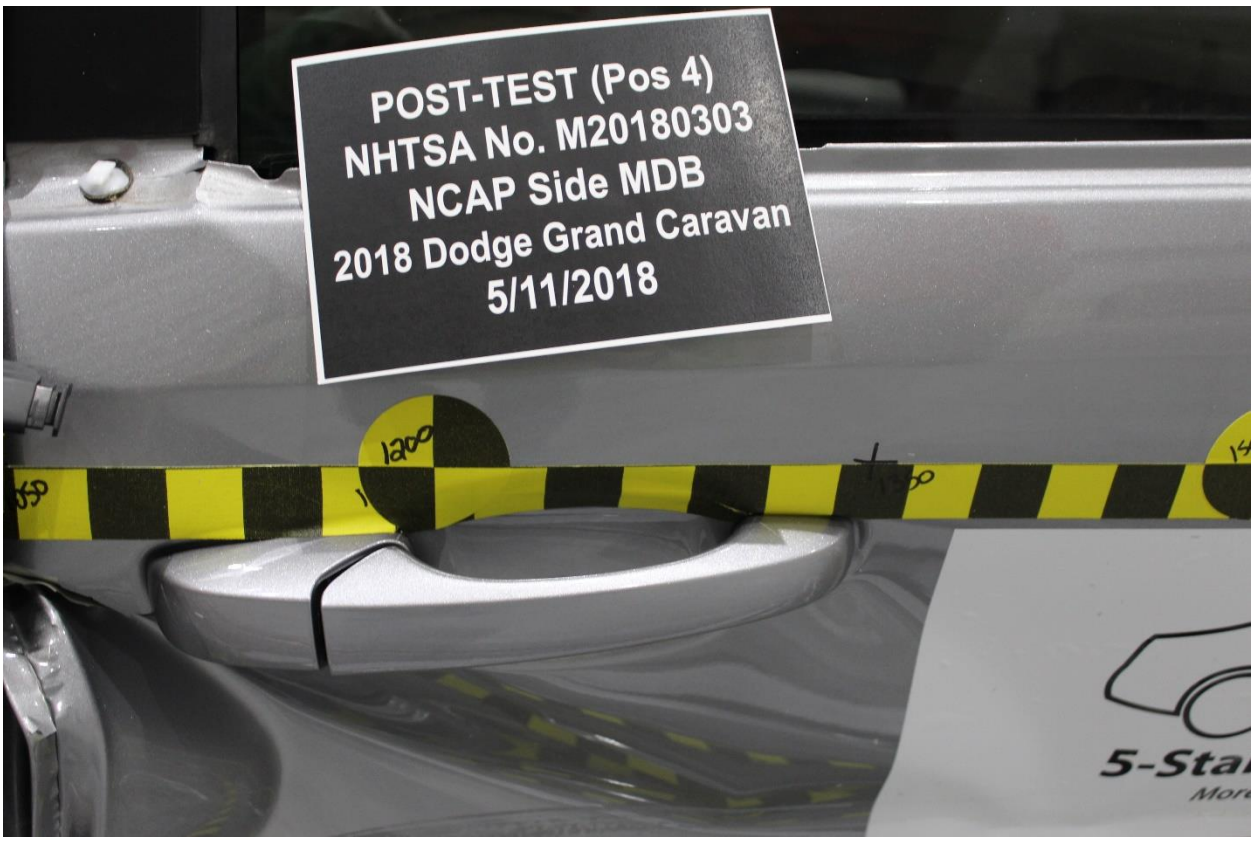


Figure A-24: Post-Test Left Rear Door Latch Close-Up

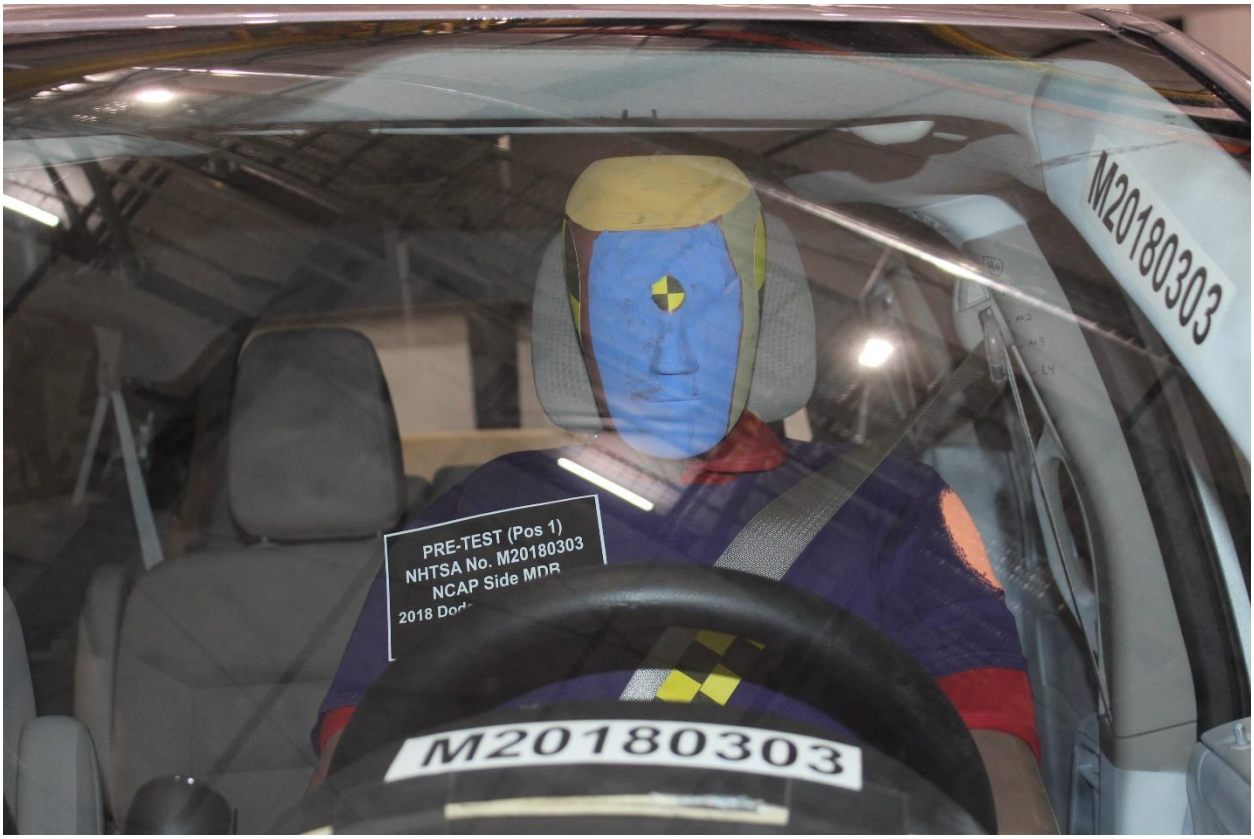


Figure A-25: Pre-Test Front Close-up View of Driver Dummy

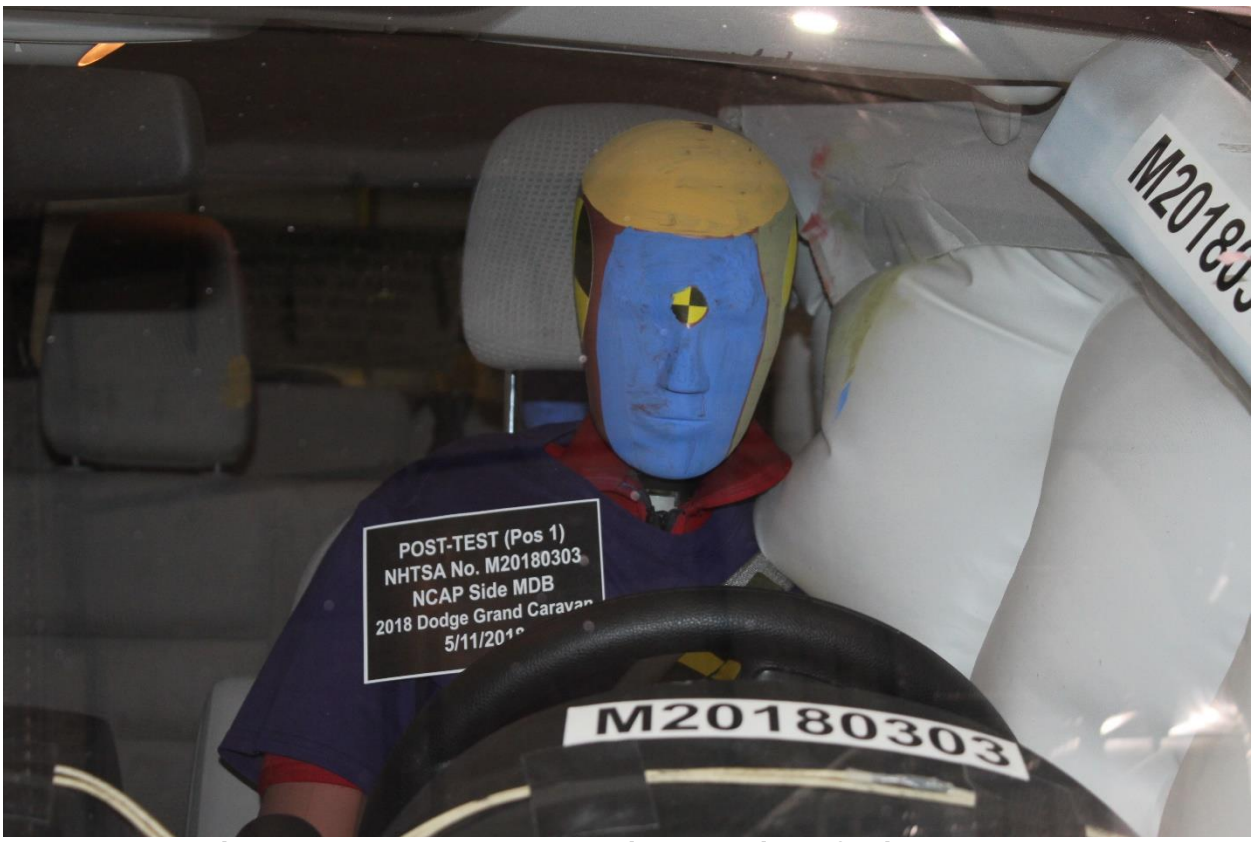


Figure A-26: Post-Test Front Close-up View of Driver Dummy

Figure A-27: Pre-Test Left Side View of Driver Dummy Showing Belt and Chalking

Figure A-28: Pre-Test Left Side View of Driver Dummy Shoulder and Door Top View

Figure A-29: Post-Test Left Side View of Driver Dummy Shoulder and Door Top View

Figure A-30: Pre-Test Frontal View of Driver Seat Back Prior to Dummy Positioning

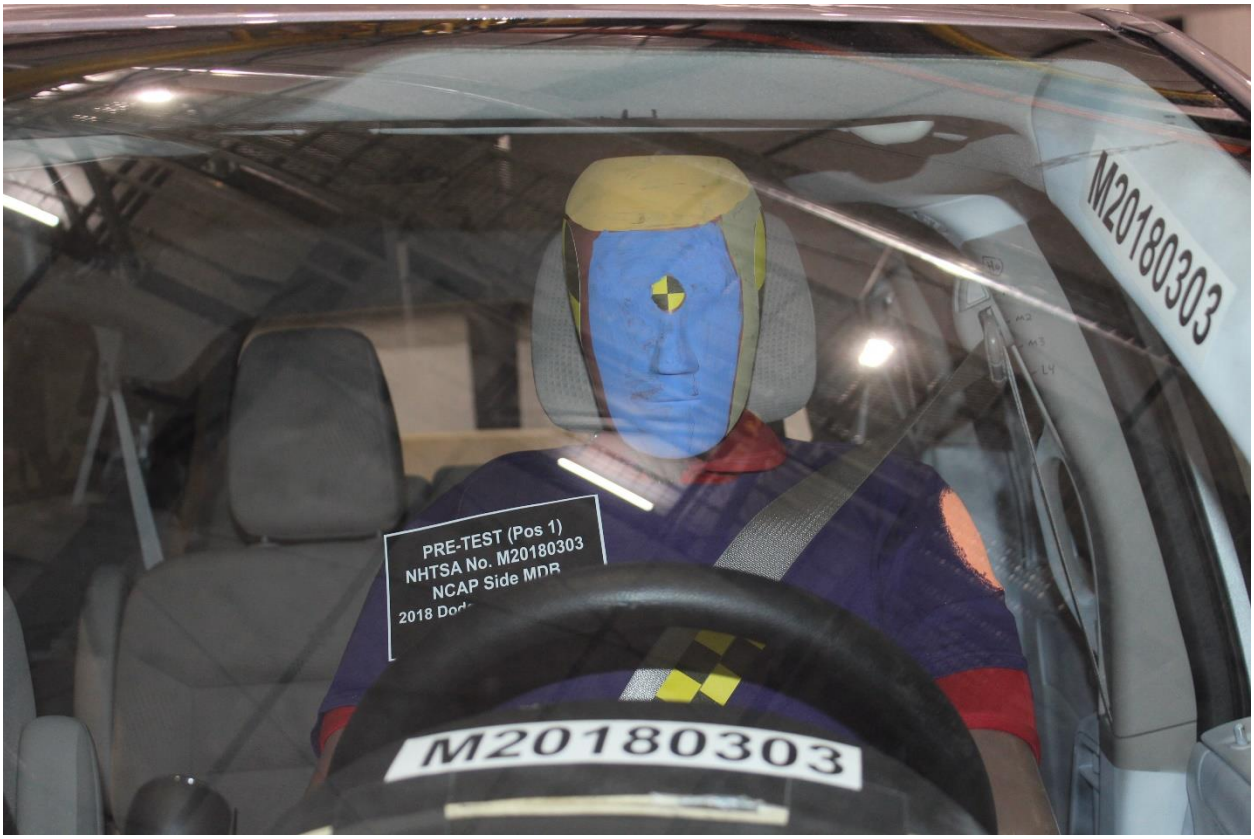


Figure A-31: Pre-Test Frontal View of Driver Dummy Head and Shoulders in Relation to Head Restraint

Figure A-32: Pre-Test Frontal View of Driver Seat Pan Prior to Dummy Positioning

Figure A-33: Pre-Test Overhead View of Driver Dummy Thighs on Seat Pan

Figure A-34: Pre-Test Placement of Driver Dummy's Feet

Figure A-35: Pre-Test View of Belt Anchorage for Driver Dummy

Figure A-36: Pre-Test Left Side View of Steering Wheel

Figure A-37: View of Disengaged Parking Brake

Figure A-38: Pre-Test View of Parking Brake

Figure A-39: Pre-test Close-Up Left Side View of Driver Seat Track

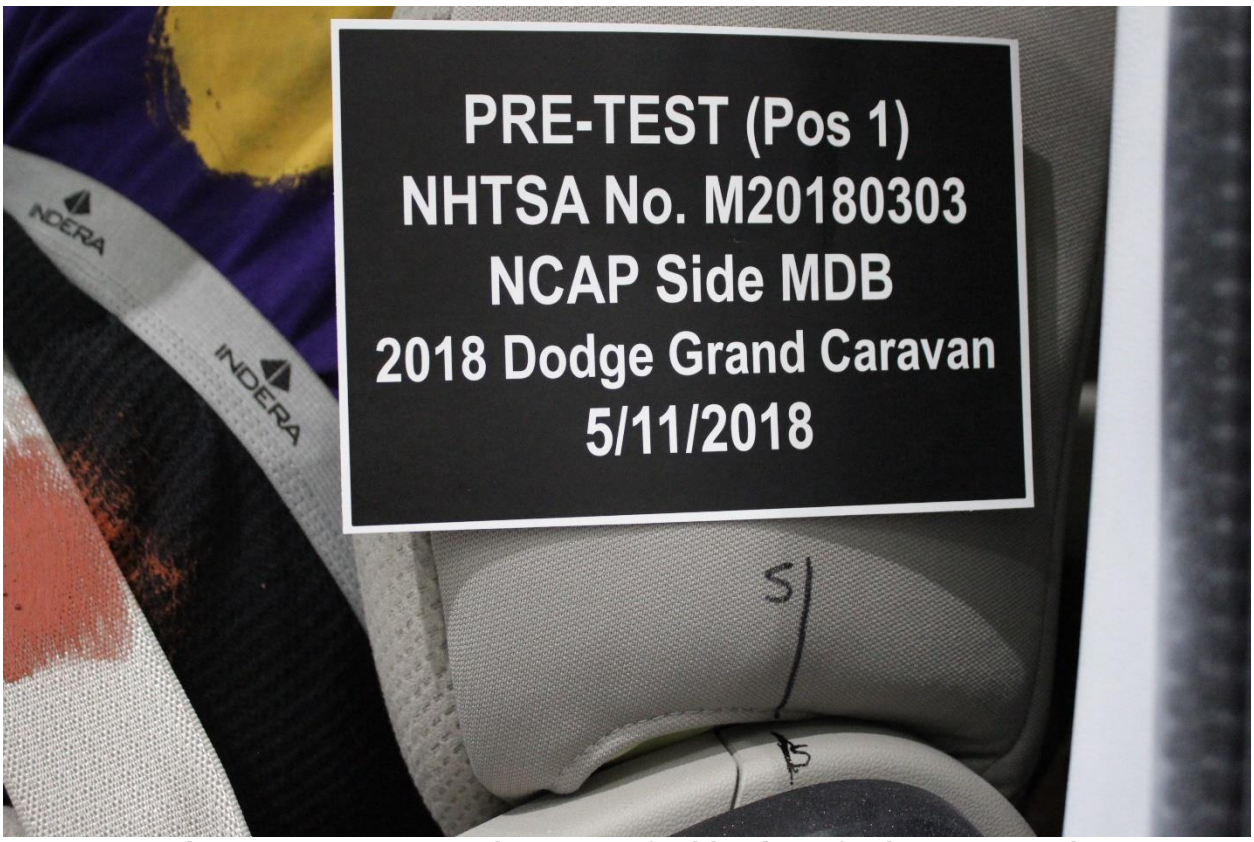


Figure A-40: Pre-Test Close-Up Left Side View of Driver Seat Back

Figure A-41: Pre-Test Close-Up View of Driver Seat Back or Head Restraint

Figure A-42: Pre-Test Driver Dummy and Door Clearance View

Figure A-43: Post-Test Driver Dummy and Door Clearance View

Figure A-44: Pre-Test Right Side View of Driver Dummy and Front Seat of Occupant Compartment

Figure A-45: Post-Test Right Side View of Driver Dummy and Front Seat of Occupant Compartment

Figure A-46: Pre-Test Driver Inner Door Panel View

Figure A-47: Post-Test Driver Inner Door Panel View

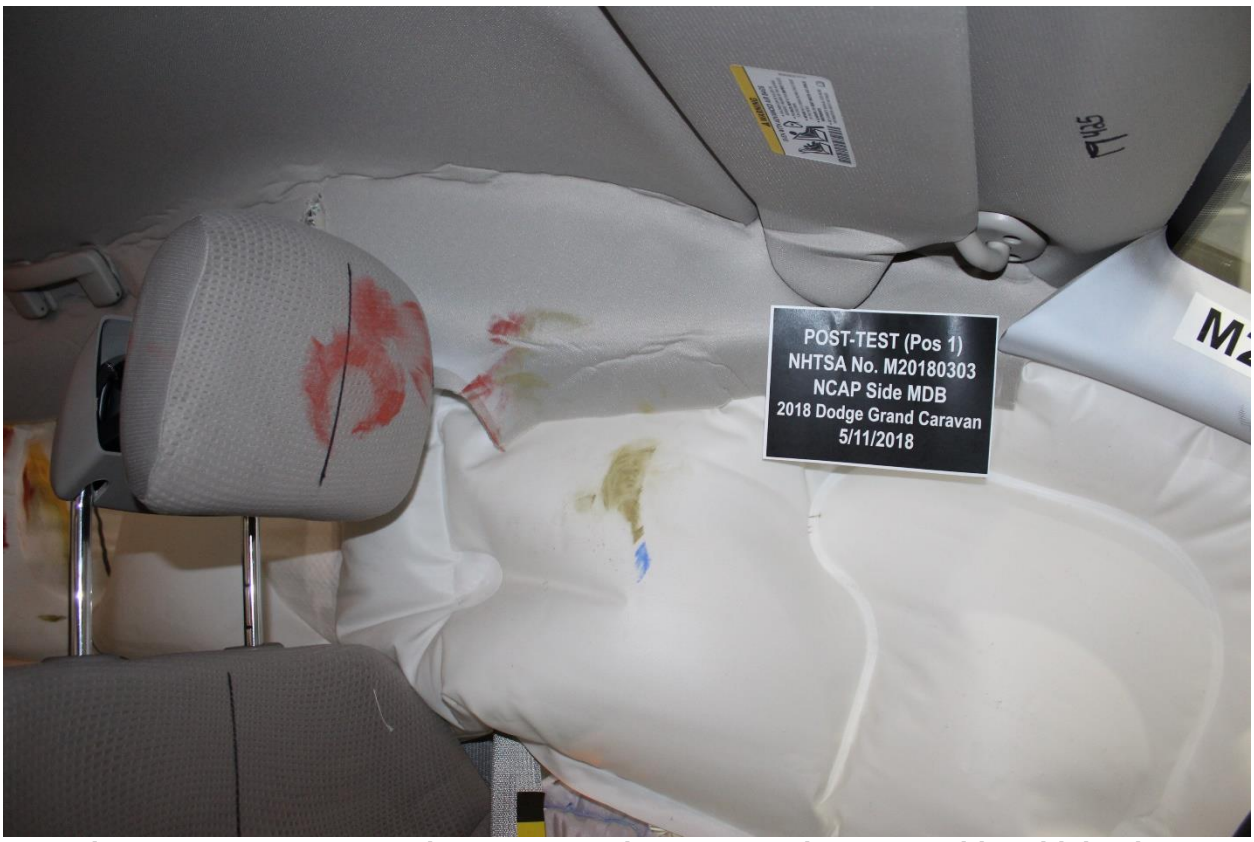


Figure A-48: Post-Test Driver Dummy Close-Up Head Contact with Vehicle View

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

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

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

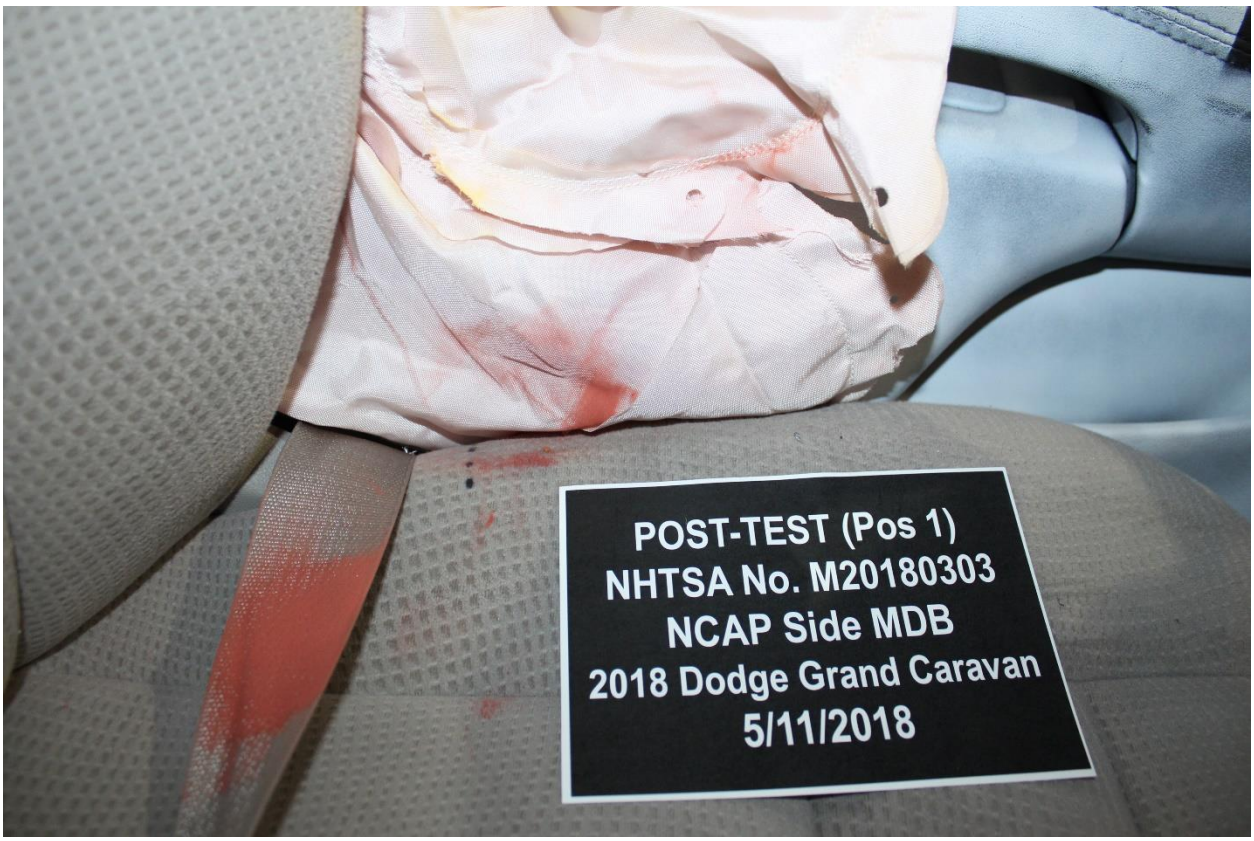


Figure A-52: Post-Test Driver Dummy Close-Up Pelvis Contact View

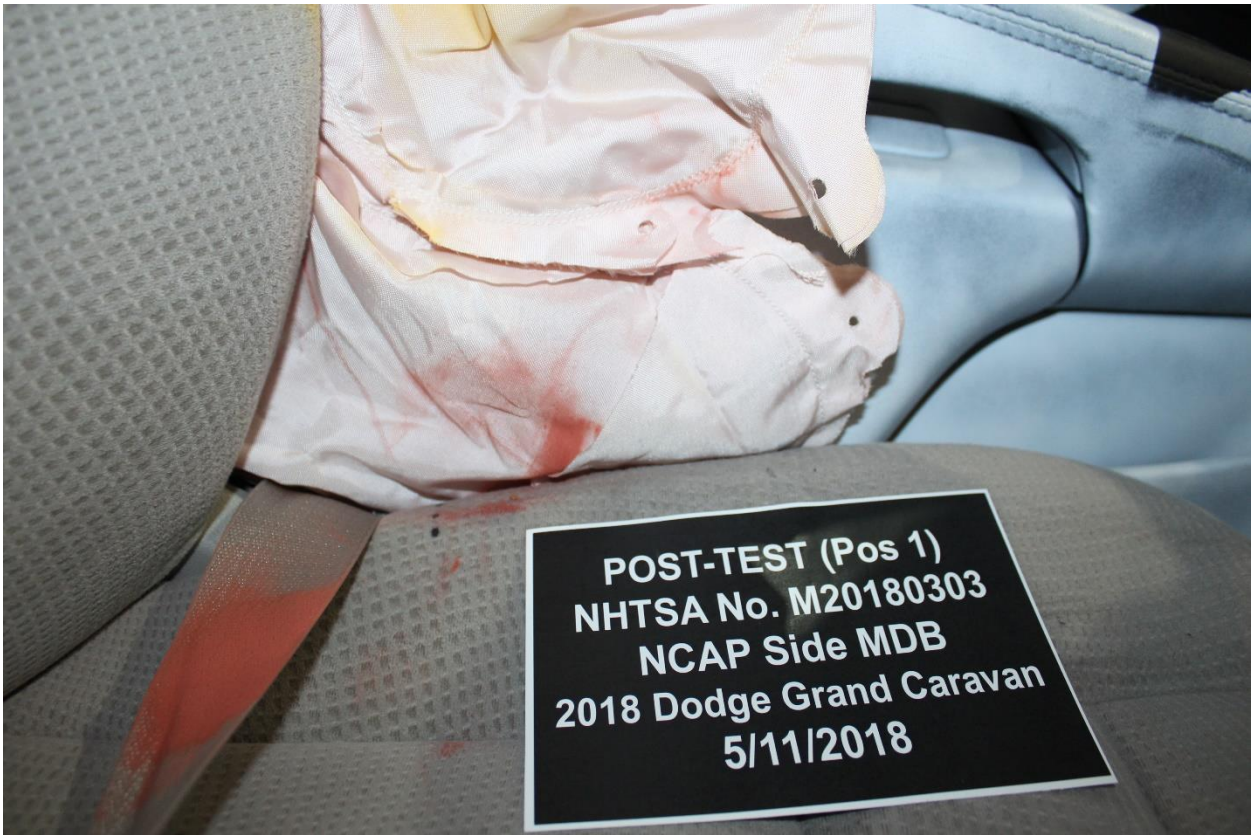


Figure A-53: Post-Test Driver Dummy Close-Up Pelvis Contact with Side Airbag View

Figure A-54: Post-Test Driver Dummy Close-Up Knee Contact View

Figure A-55: Pre-Test Left Side View of Passenger Dummy Showing Belt and Chalking

Figure A-56: Pre-Test Left Side View of Passenger Dummy Shoulder and Door Top View

Figure A-57: Post-Test Left Side View of Passenger Dummy Shoulder and Door Top View

Figure A-58: Pre-Test Frontal View of Rear Passenger Seat Back Prior to Dummy Positioning

Figure A-59: Pre-Test Frontal View of Rear Passenger Dummy Head and Shoulders in Relation to Head Restraint

Figure A-60: Pre-Test Overhead View of Rear Passenger Seat Pan Prior to Dummy Positioning

Figure A-61: Pre-Test Overhead View of Rear Passenger Dummy Thighs on Seat Pan

Figure A-62: Pre-Test View of Rear Passenger Dummy's Neck Showing Position of Adjustable Neck Bracket

Figure A-63: Pre-Test View of Rear Passenger Dummy's Head Showing Dummy's Head is Level

Figure A-64: Pre-Test Placement of Rear Passenger Dummy's Feet

Figure A-65: Pre-Test View of Belt Anchorage for Rear Passenger Dummy

Figure A-66: Pre-Test Close-Up Left Side View of Rear Passenger Seat Track

Figure A-67: Pre-Test Close-Up Left Side View of Rear Passenger Seat Back

Figure A-68: Pre-Test Close-Up View of Rear Passenger Seat Back or Head Restraint

Figure A-69: Pre-Test Passenger Dummy and Door Clearance View

Figure A-70: Post-Test Passenger Dummy and Door Clearance View

Figure A-71: Pre-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment

Figure A-72: Post-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment

Figure A-73: Pre-Test Passenger Inner Door Panel View

Figure A-74: Post-Test Passenger Inner Door Panel View

Figure A-75: Post-Test Rear Passenger Dummy Close-Up Head Contact with Vehicle View

Figure A-76: Post-Test Rear Passenger Dummy Close-Up Head Contact with Side Airbag View

Figure A-77: Post-Test Rear Passenger Dummy Close-Up Torso Contact with Vehicle Interior View

Photo Not Applicable

Figure A-78: Post-Test Rear Passenger Dummy Close-Up Torso Contact with Side Airbag View

Figure A-79: Post-Test Rear Passenger Dummy Close-Up Pelvis Contact View

Photo Not Applicable

Figure A-80: Post-Test Rear Passenger Dummy Close-Up Pelvis Contact with Side Airbag View

Figure A-81: Post-Test Rear Passenger Dummy Close-Up Knee Contact View

Figure A-82: Pre-Test View of Fuel Filler Cap or Fuel Filler Neck

Figure A-83: Post-Test View of Fuel Filler Cap or Fuel Filler Neck

Figure A-84: Pre-Test Front View of MDB Impactor Face

Figure A-85: Post-Test Front View of MDB Impactor Face

Figure A-86: Pre-Test Top View of MDB Impactor Face

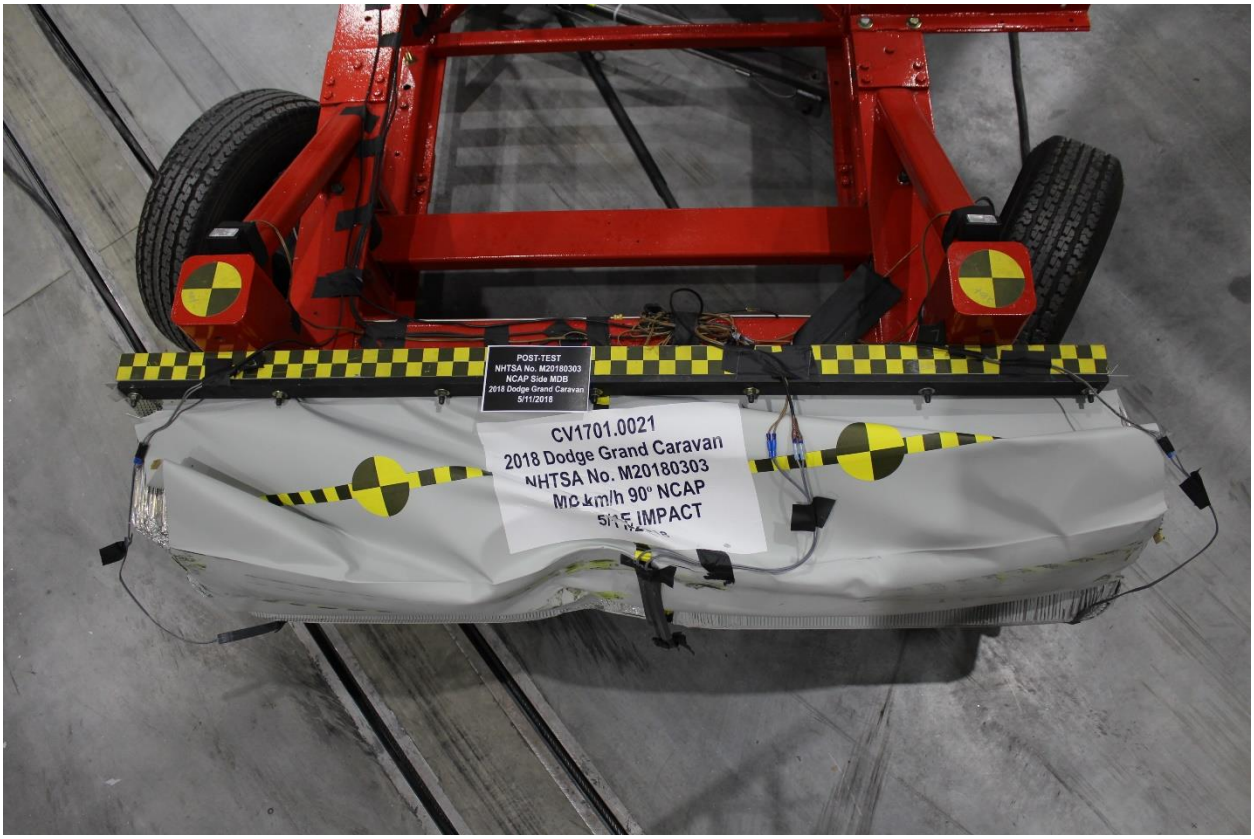


Figure A-87: Post-Test Top View of MDB Impactor Face

Figure A-88: Pre-Test Left Side View of MDB Impactor Face

Figure A-89: Post-Test Left Side View of MDB Impactor Face

Figure A-90: Pre-Test Right Side View of MDB Impactor Face

Figure A-91: Post-Test Right Side View of MDB Impactor Face

Figure A-92: Close-Up View of Vehicle's Certification Label

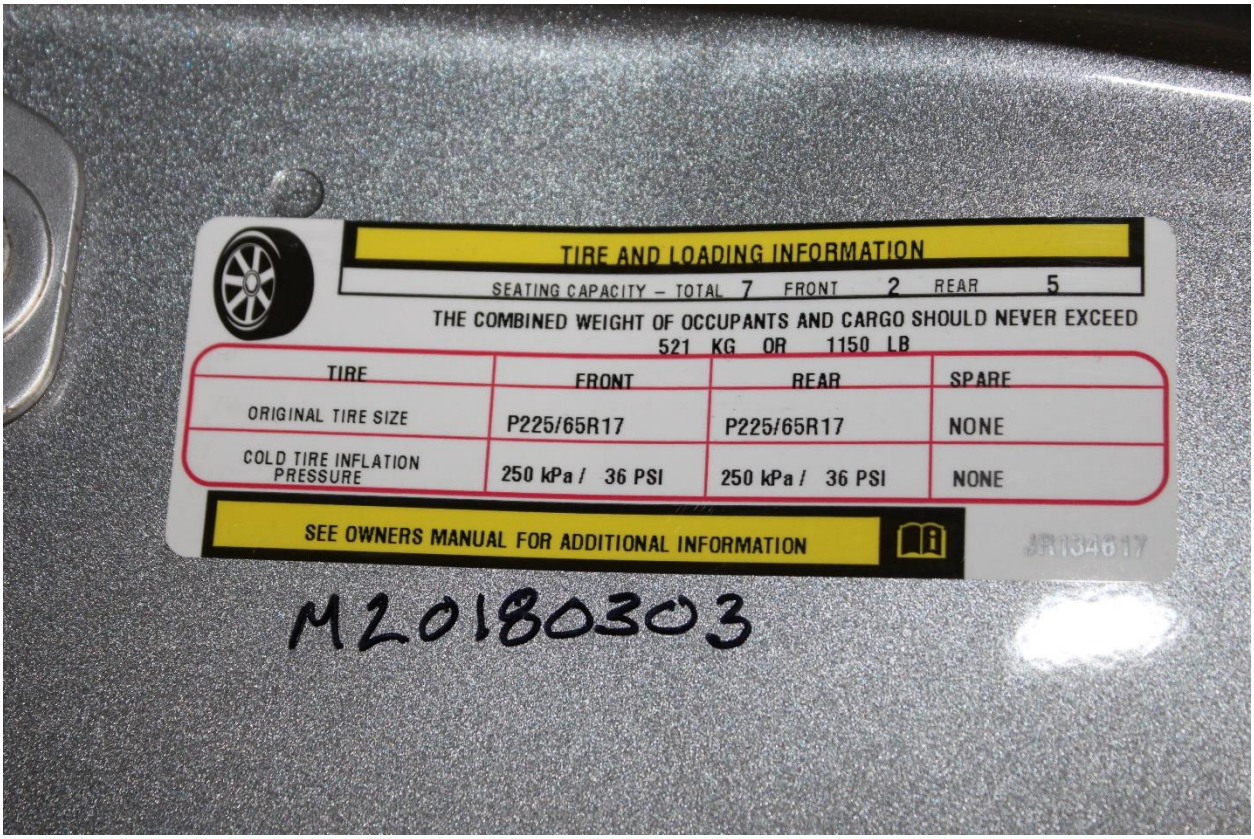


Figure A-93: Close-Up View of Vehicle's Tire Information Placard or Label

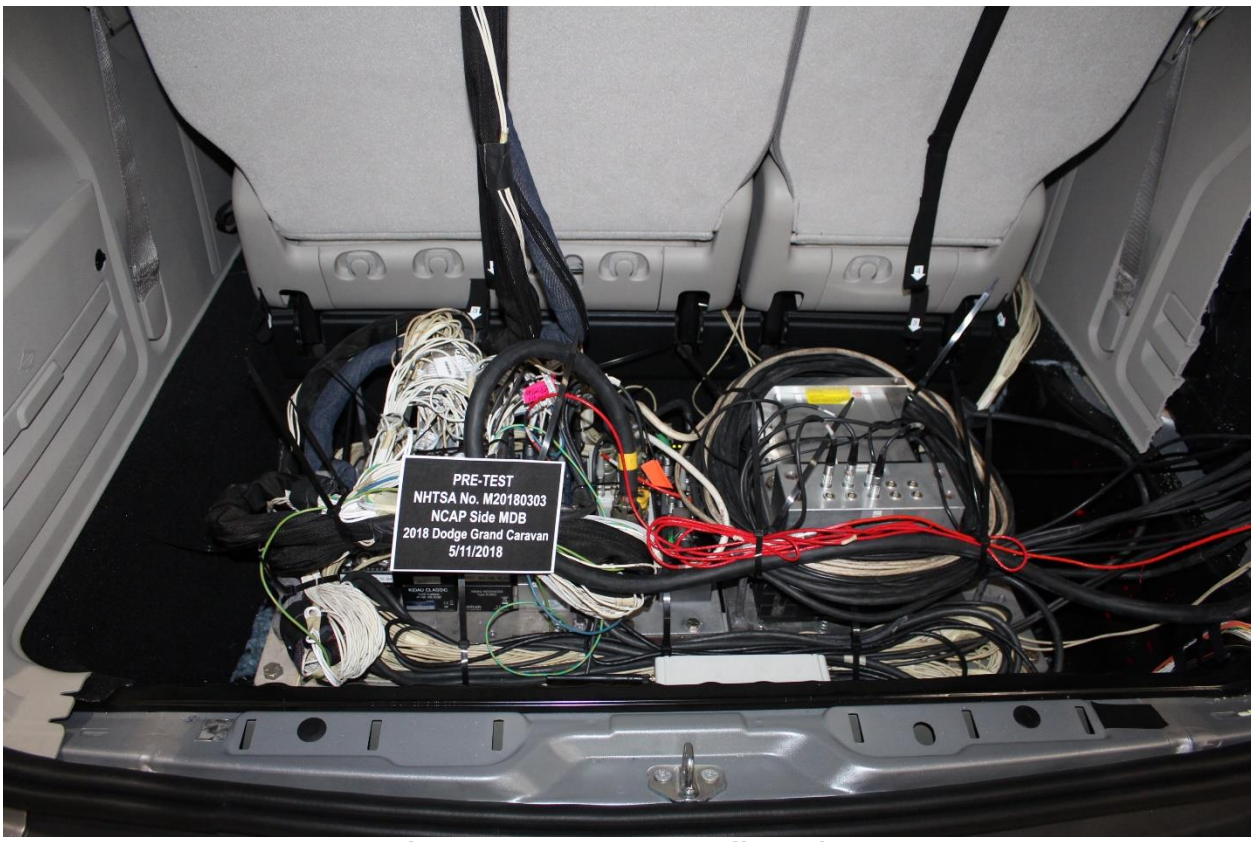


Figure A-94: Pre-Test Ballast View

Figure A-95: Post-Test Primary and Redundant Speed Trap Read-Out

Figure A-96: FMVSS No. 301 Static Rollover 0 Degrees

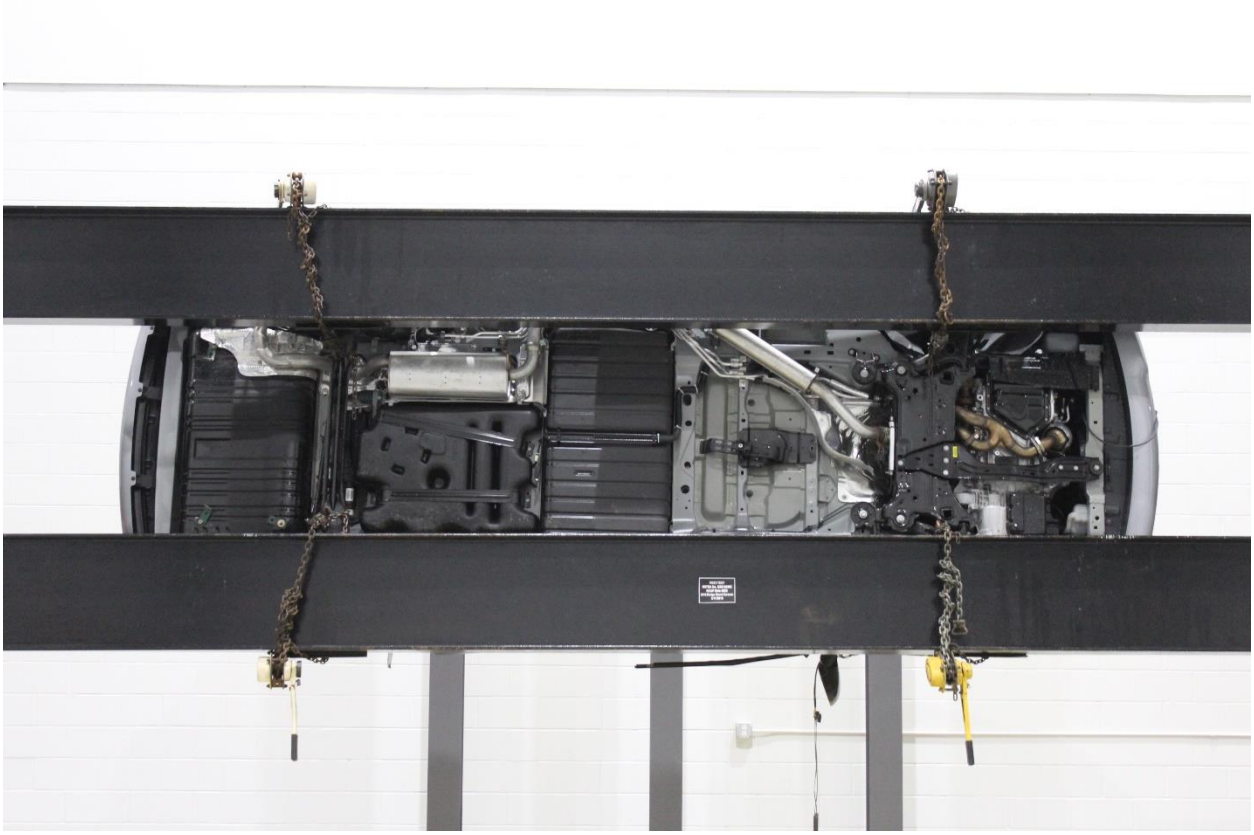


Figure A-97: FMVSS No. 301 Static Rollover 90 Degrees

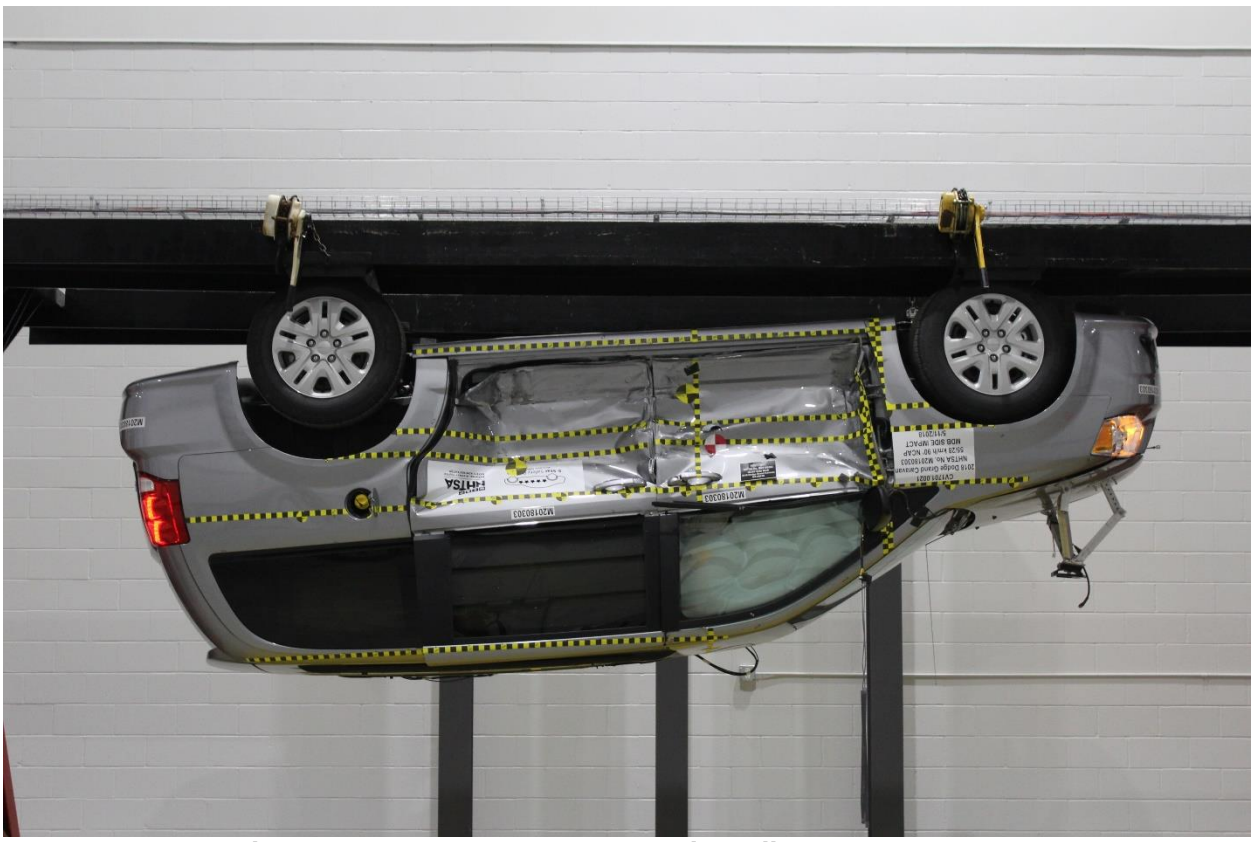


Figure A-98: FMVSS No. 301 Static Rollover 180 Degrees

Figure A-99: FMVSS No. 301 Static Rollover 270 Degrees

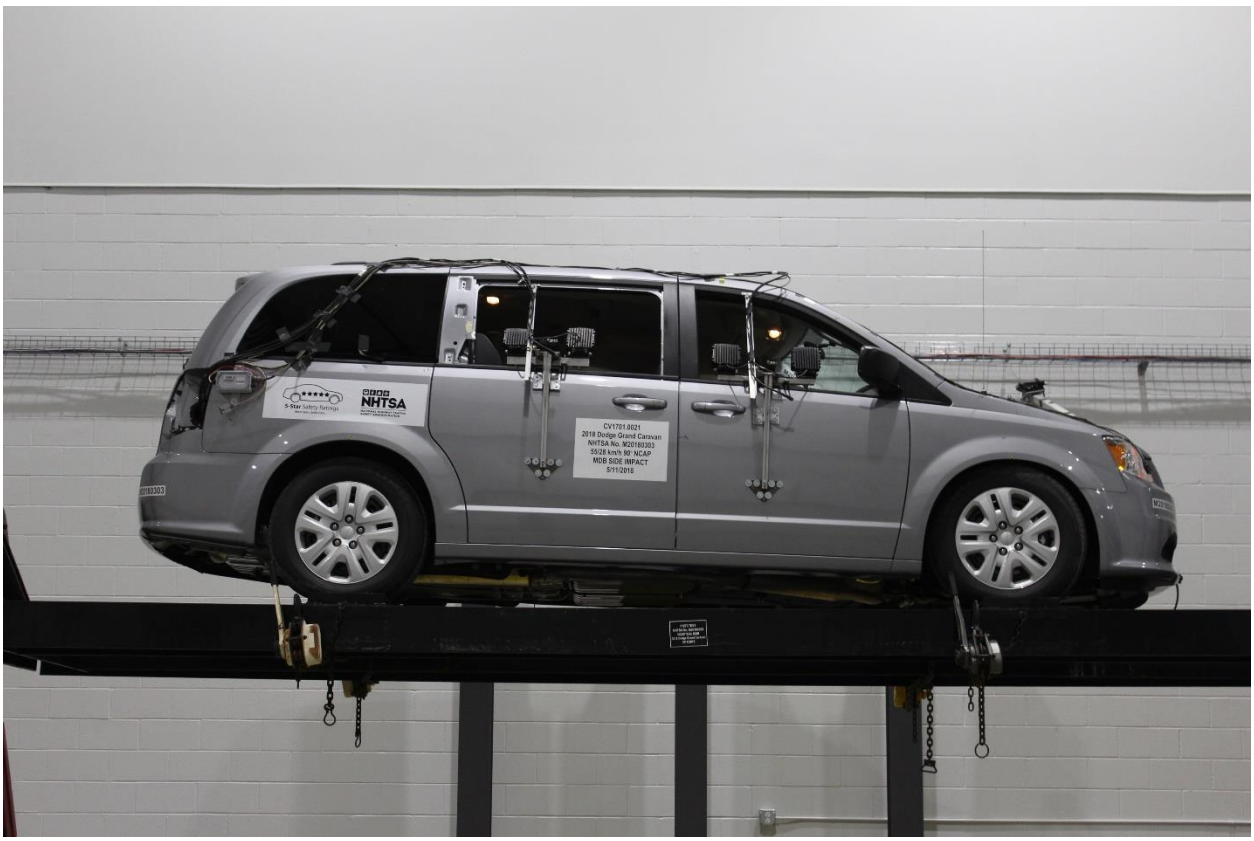


Figure A-100: FMVSS No. 301 Static Rollover 360 Degrees

Figure A-101: Impact Event

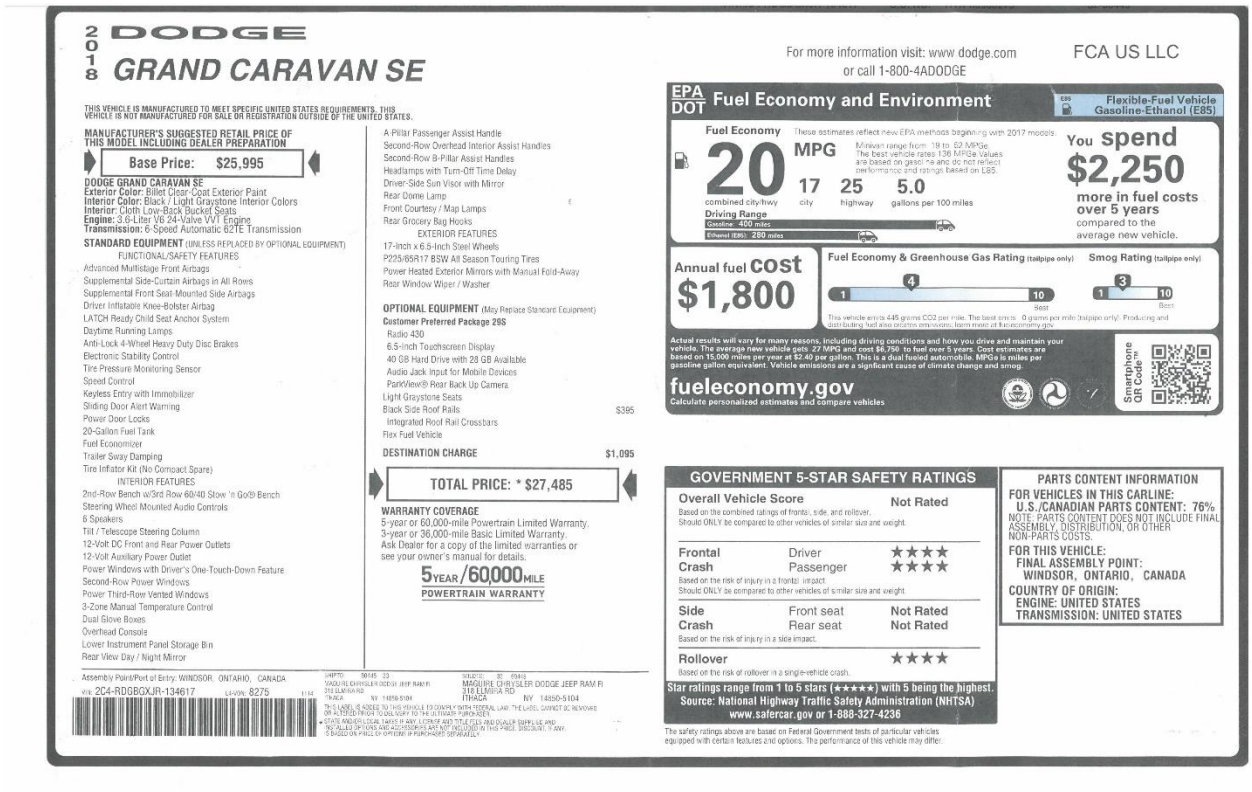
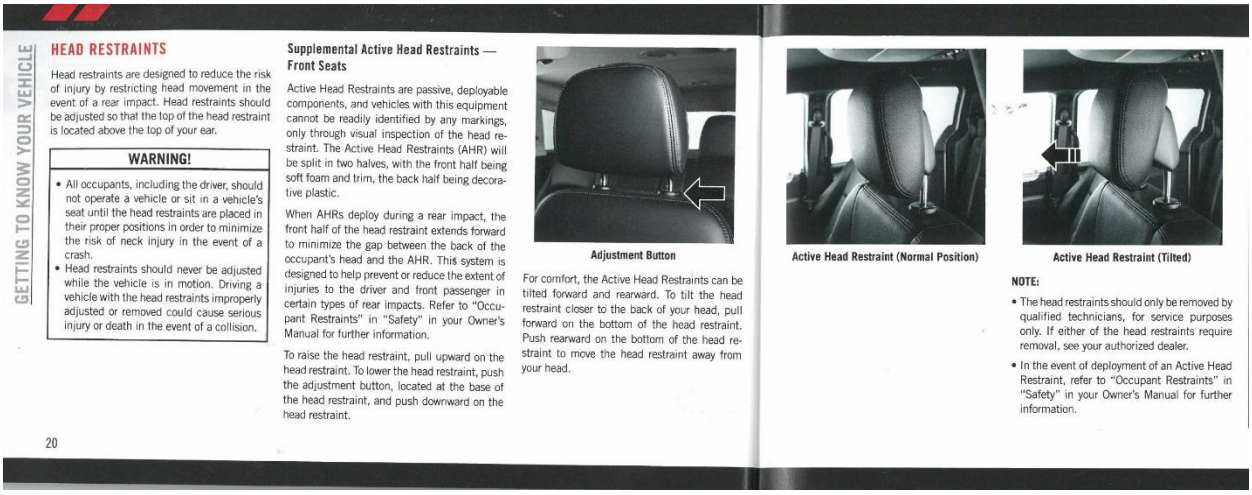


Figure A-102: Monroney Label



GETTING TO KNOW YOUR VEHICLE

HEAD RESTRAINTS

Head restraints are designed to reduce the risk of injury by restricting head movement in the event of a rear impact. Head restraints should be adjusted so that the top of the head restraint is located above the top of your ear.

WARNING!

- All occupants, including the driver, should not operate a vehicle or sit in a vehicle's seat until the head restraints are placed in their proper positions in order to minimize the risk of neck injury in the event of a crash.
- Head restraints should never be adjusted while the vehicle is in motion. Driving a vehicle with the head restraints improperly adjusted or removed could cause serious injury or death in the event of a collision.

Supplemental Active Head Restraints — Front Seats

Active Head Restraints are passive, deployable components, and vehicles with this equipment cannot be readily identified by any markings, only through visual inspection of the head restraint. The Active Head Restraints (AHR) will be split in two halves, with the front half being soft foam and trim, the back half being decorative plastic.

When AHRs deploy during a rear impact, the front half of the head restraint extends forward to minimize the gap between the back of the occupant's head and the AHR. This system is designed to help prevent or reduce the extent of injuries to the driver and front passenger in certain types of rear impacts. Refer to "Occupant Restraints" in "Safety" in your Owner's Manual for further information.

To raise the head restraint, pull upward on the head restraint. To lower the head restraint, push the adjustment button, located at the base of the head restraint, and push downward on the head restraint.

Adjustment Button

For comfort, the Active Head Restraints can be tilted forward and rearward. To tilt the head restraint closer to the back of your head, pull forward on the bottom of the head restraint. Push rearward on the bottom of the head restraint to move the head restraint away from your head.

Active Head Restraint (Normal Position)

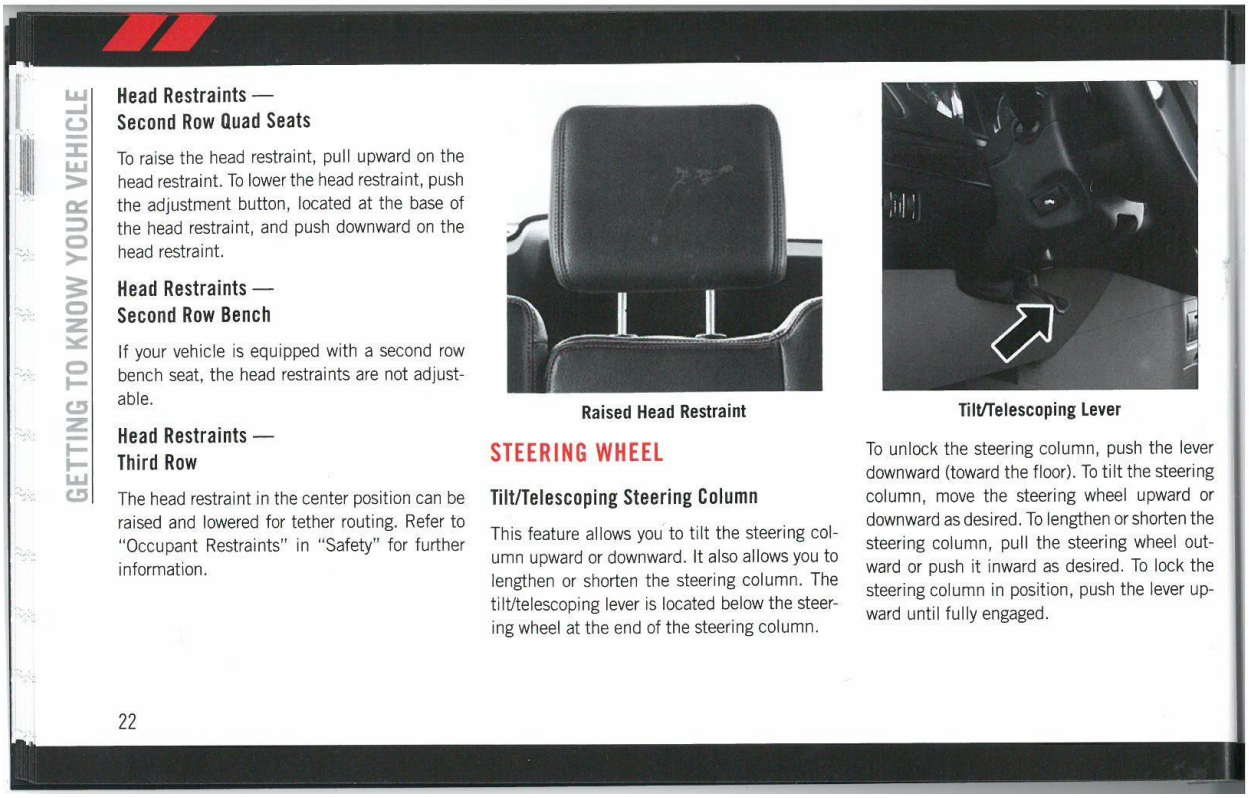
Active Head Restraint (Tilted)

NOTE:

- The head restraints should only be removed by qualified technicians, for service purposes only. If either of the head restraints require removal, see your authorized dealer.
- In the event of deployment of an Active Head Restraint, refer to "Occupant Restraints" in "Safety" in your Owner's Manual for further information.

20

Figure A-103: Driver Head Restraint Use and Adjustment Information from Vehicle Owner's Manual



GETTING TO KNOW YOUR VEHICLE

Head Restraints — Second Row Quad Seats

To raise the head restraint, pull upward on the head restraint. To lower the head restraint, push the adjustment button, located at the base of the head restraint, and push downward on the head restraint.

Head Restraints — Second Row Bench

If your vehicle is equipped with a second row bench seat, the head restraints are not adjustable.

Head Restraints — Third Row

The head restraint in the center position can be raised and lowered for tether routing. Refer to "Occupant Restraints" in "Safety" for further information.

Raised Head Restraint

Tilt/Telescoping Lever

STEERING WHEEL

Tilt/Telescoping Steering Column

This feature allows you to tilt the steering column upward or downward. It also allows you to lengthen or shorten the steering column. The tilt/telescoping lever is located below the steering wheel at the end of the steering column.

To unlock the steering column, push the lever downward (toward the floor). To tilt the steering column, move the steering wheel upward or downward as desired. To lengthen or shorten the steering column, pull the steering wheel outward or push it inward as desired. To lock the steering column in position, push the lever upward until fully engaged.

22

Figure A-104: Left Rear Passenger Head Restraint Use and Adjustment Information from Vehicle Owner's Manual-Rear Restraints Not Adjustable

APPENDIX B

VEHICLE AND DUMMY RESPONSE DATA PLOTS

TABLE OF DATA PLOTS

Driver & Passenger Dummy Instrumentation Plots

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

Additional Driver & Passenger Dummy Instrumentation Data

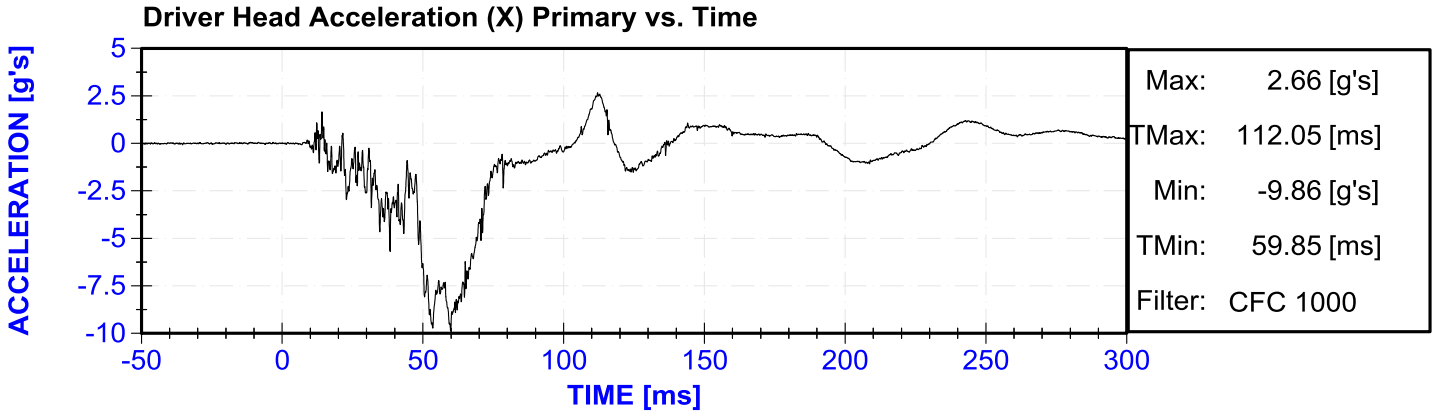
Driver Lower Spine T12 Acceleration (X)
Driver Lower Spine T12 Acceleration (Y)
Driver Lower Spine T12 Acceleration (Z)
Passenger Upper Thorax Rib Deflection (Y)
Passenger Middle Thorax Rib Deflection (Y)
Passenger Lower Thorax Rib Deflection (Y)
Passenger Upper Abdomen Rib Deflection (Y)
Passenger Lower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

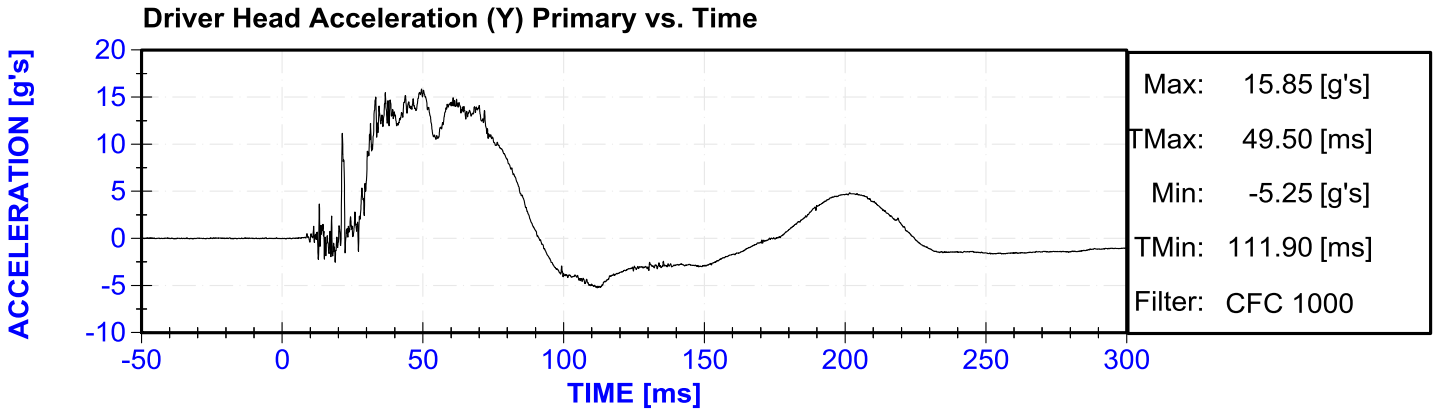
Vehicle Instrumentation Data

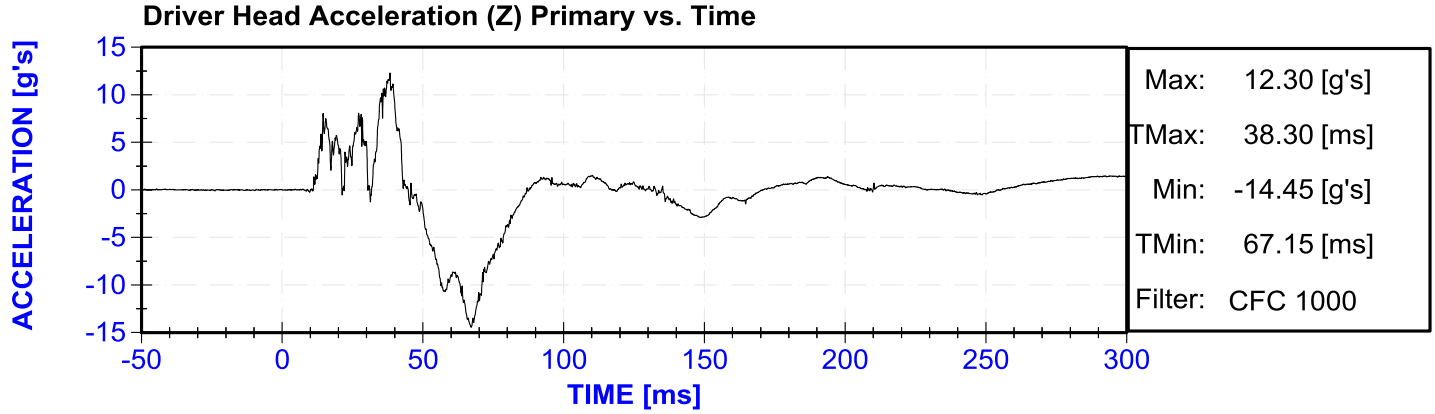
Vehicle Center of Gravity Acceleration (X)
Vehicle Center of Gravity Acceleration (Y)
Vehicle Center of Gravity Acceleration (Z)
Right Side Sill at Front Seat Acceleration (X)
Right Side Sill at Front Seat Acceleration (Y)
Right Side Sill at Front Seat Acceleration (Z)
Right Side Sill at Rear Seat Acceleration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

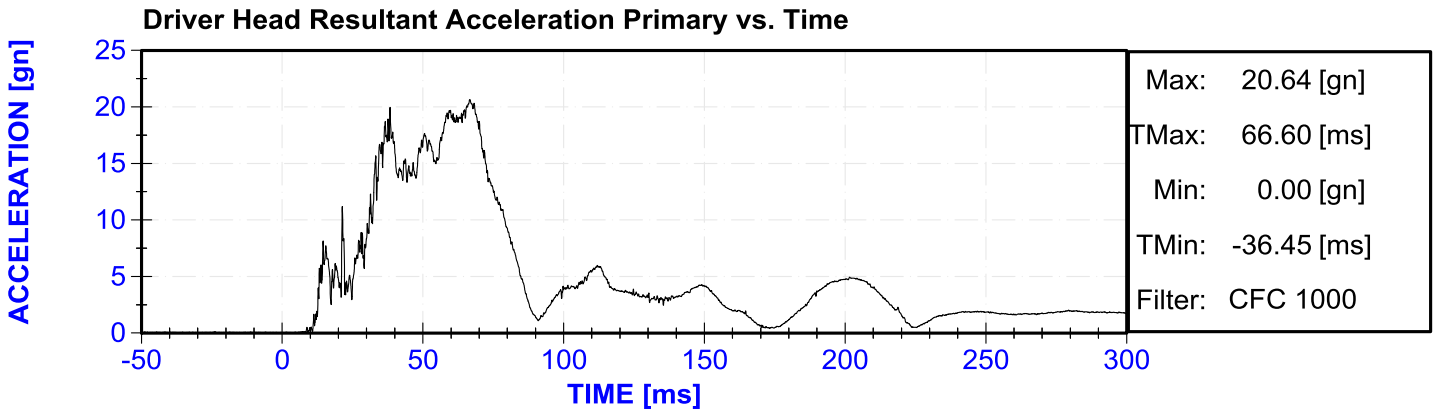
MDB Instrumentation Data

MDB Center of Gravity Acceleration (X)
MDB Center of Gravity Acceleration (Y)
MDB Center of Gravity Acceleration (Z)
MDB Rear Acceleration (X)
MDB Rear Acceleration (Y)
Left MDB Contact Switch
Right MDB Contact Switch

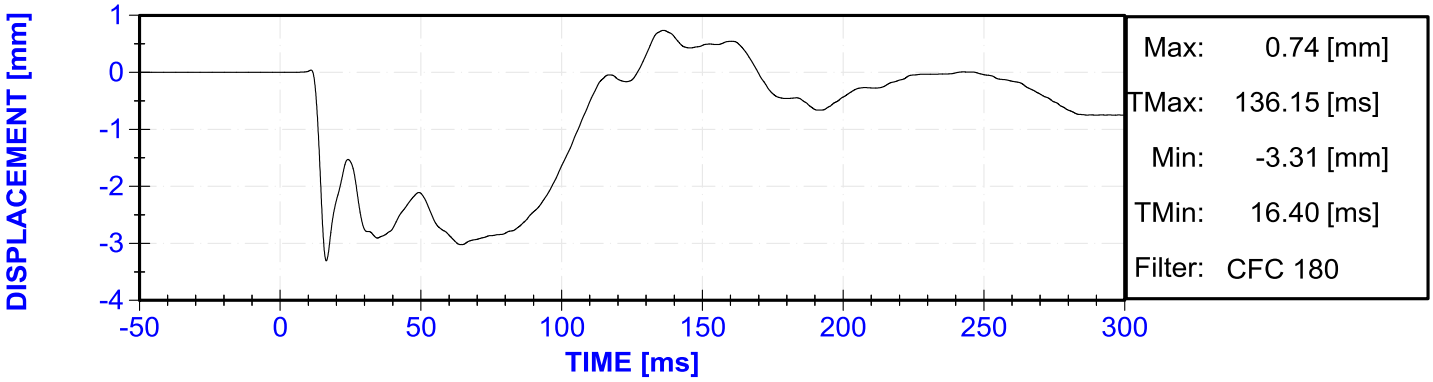

Driver Head Acceleration (X) Primary vs. Time
ACCELERATION [g's]
TIME [ms]
Max: 2.66 [g's]
TMax: 112.05 [ms]
Min: -9.86 [g's]
TMin: 59.85 [ms]
Filter: CFC 1000


Driver Head Acceleration (Y) Primary vs. Time
ACCELERATION [g's]
TIME [ms]
Max: 15.85 [g's]
TMax: 49.50 [ms]
Min: -5.25 [g's]
TMin: 111.90 [ms]
Filter: CFC 1000

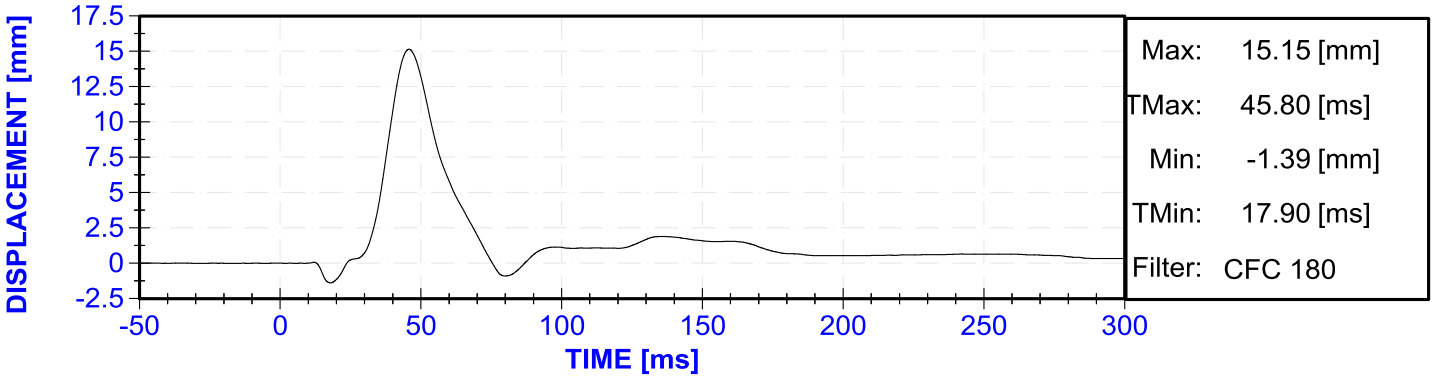

Driver Head Acceleration (Z) Primary vs. Time
ACCELERATION [g's]
TIME [ms]
Max: 12.30 [g's]
TMax: 38.30 [ms]
Min: -14.45 [g's]
TMin: 67.15 [ms]
Filter: CFC 1000


Driver Head Resultant Acceleration Primary vs. Time
ACCELERATION [gn]
TIME [ms]
Max: 20.64 [gn]
TMax: 66.60 [ms]
Min: 0.00 [gn]
TMin: -36.45 [ms]
Filter: CFC 1000

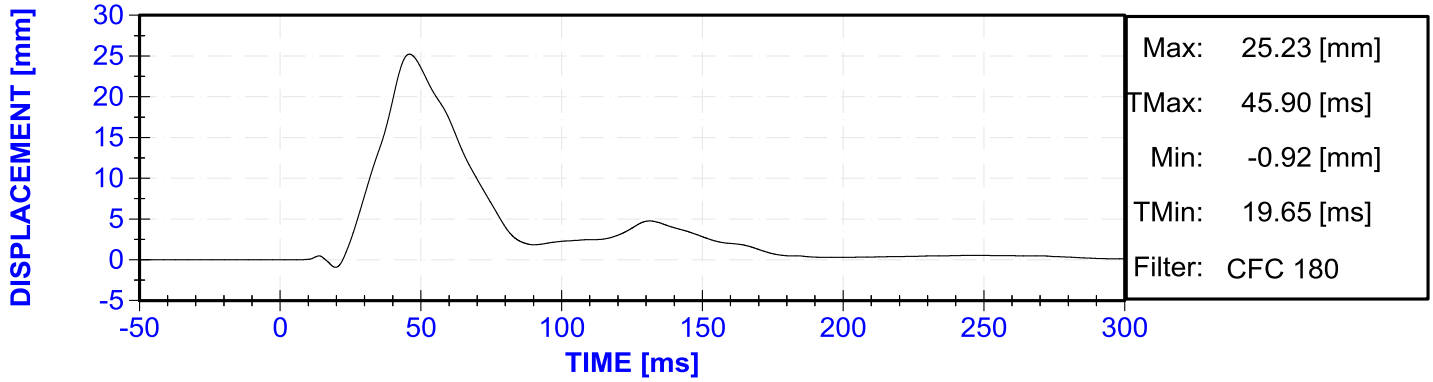
Driver Upper Thorax Rib Deflection (Y) vs. Time



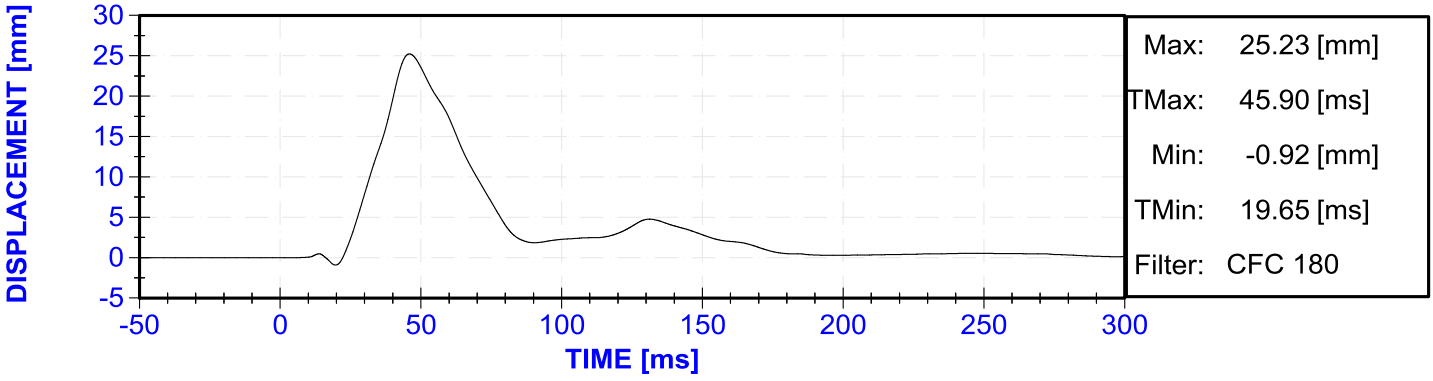
Driver Middle Thorax Rib Deflection (Y) vs. Time



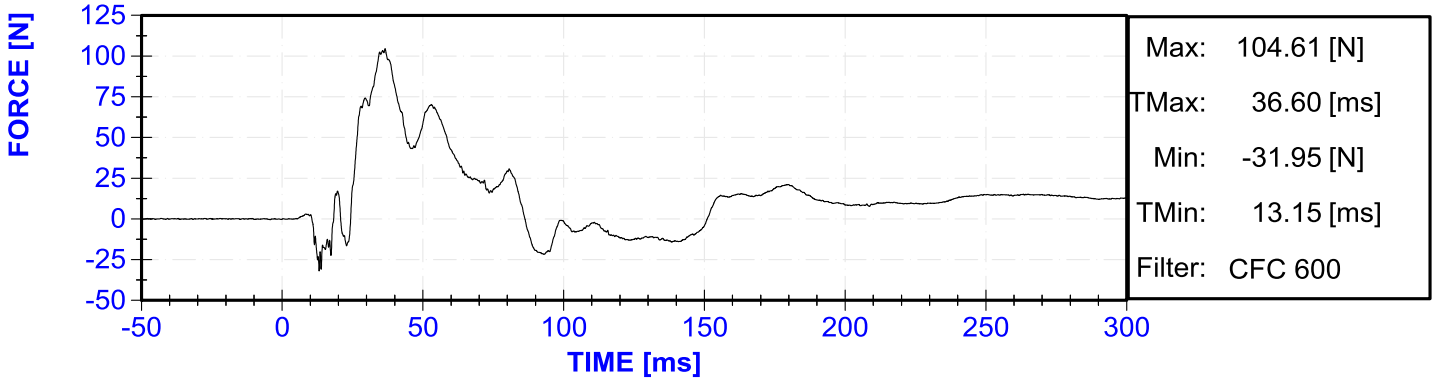
Driver Lower Thorax Rib Deflection (Y) vs. Time



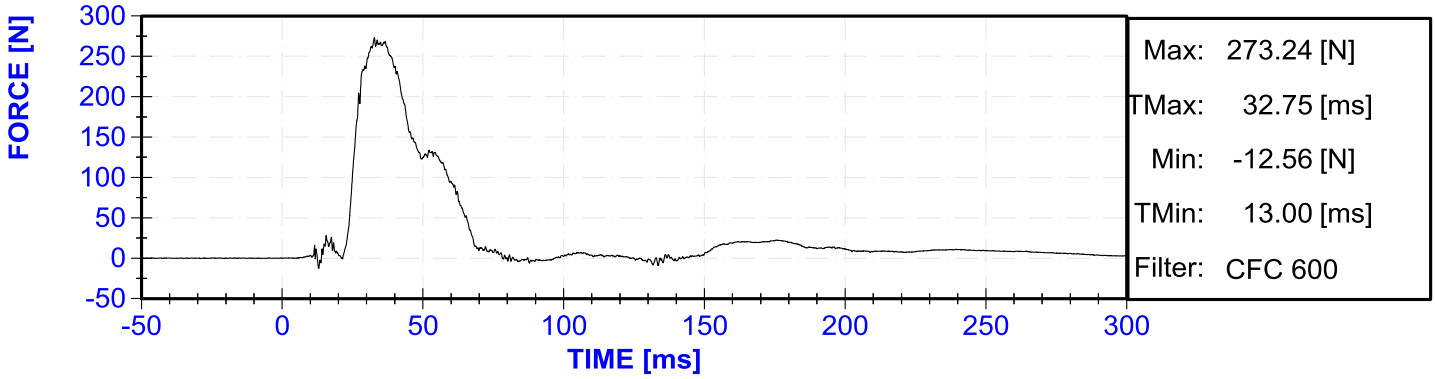
Driver Thorax Rib Deflection Maximum vs. Time



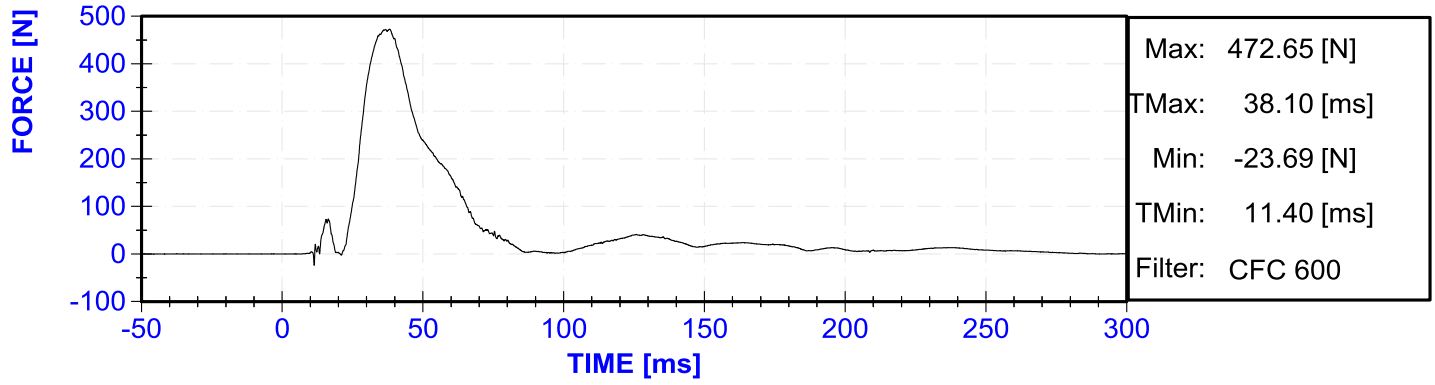
Driver Anterior Abdominal Force (Y) vs. Time



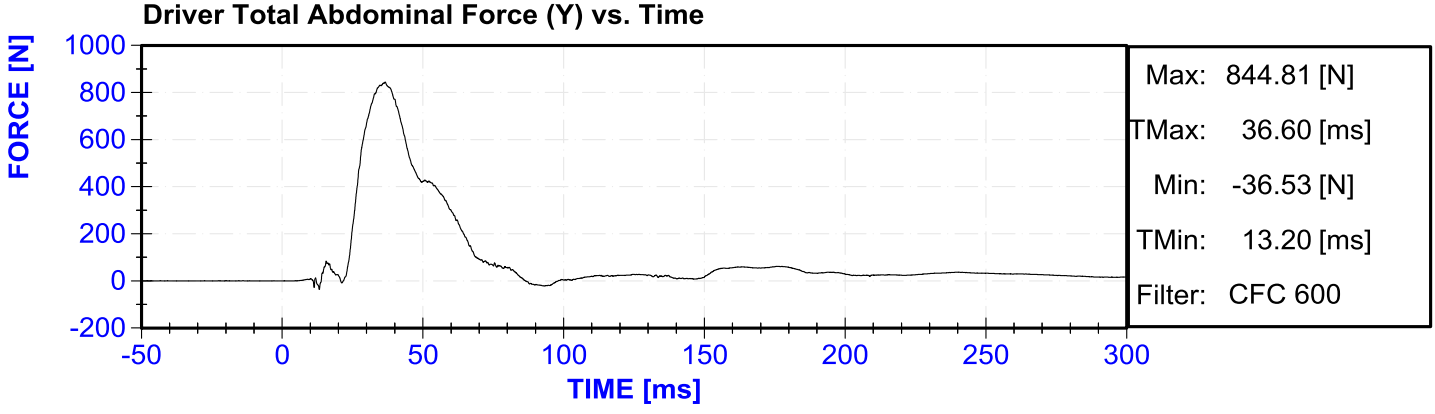
Driver Middle Abdominal Force (Y) vs. Time



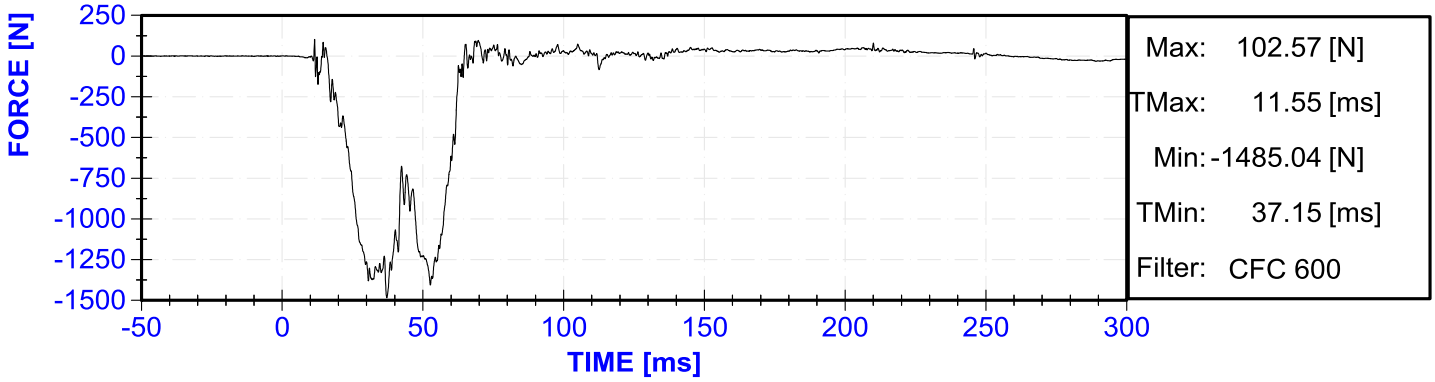
Driver Posterior Abdominal Force (Y) vs. Time



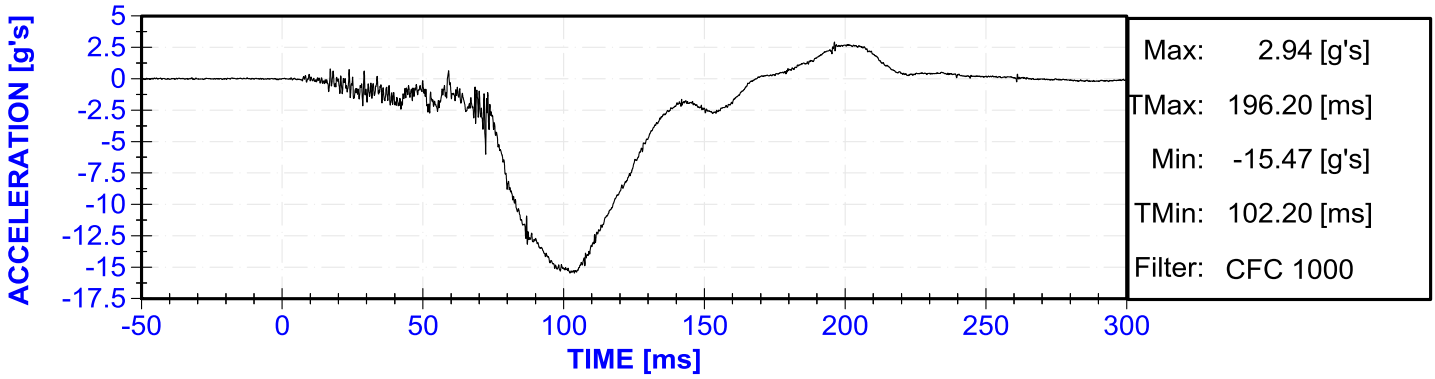
Driver Total Abdominal Force (Y) vs. Time



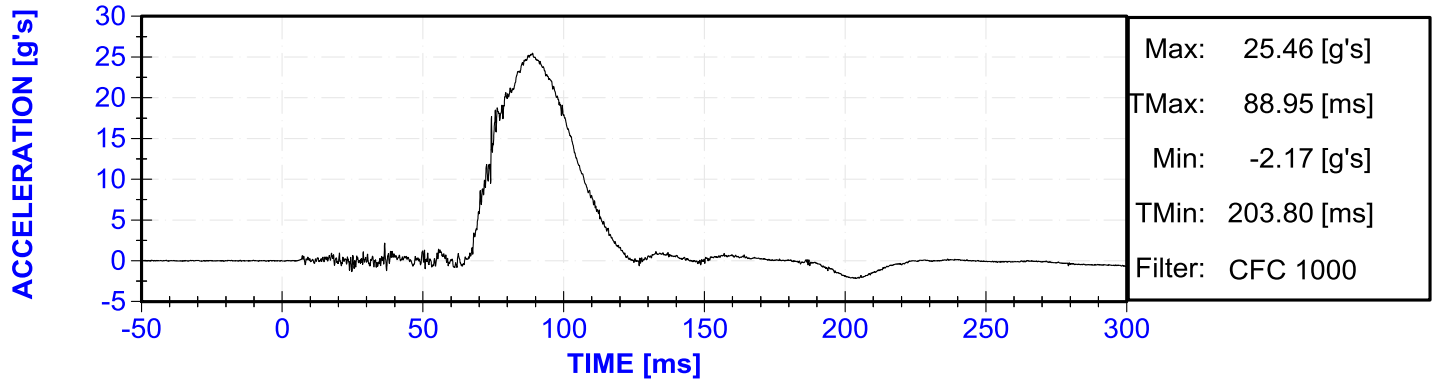
Driver Pubic Symphysis Force (Y) vs. Time



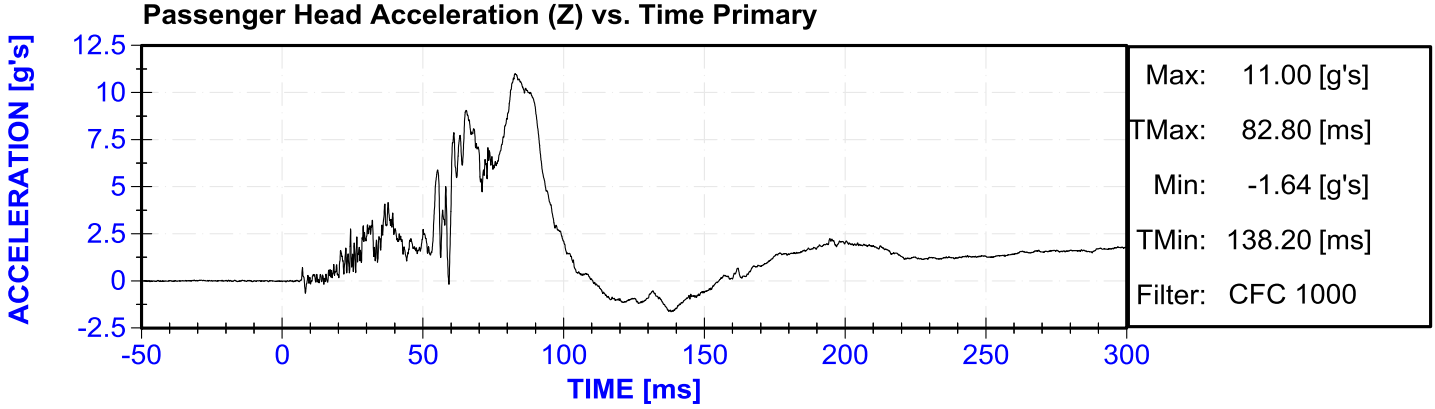
Passenger Head Acceleration (X) vs. Time Primary



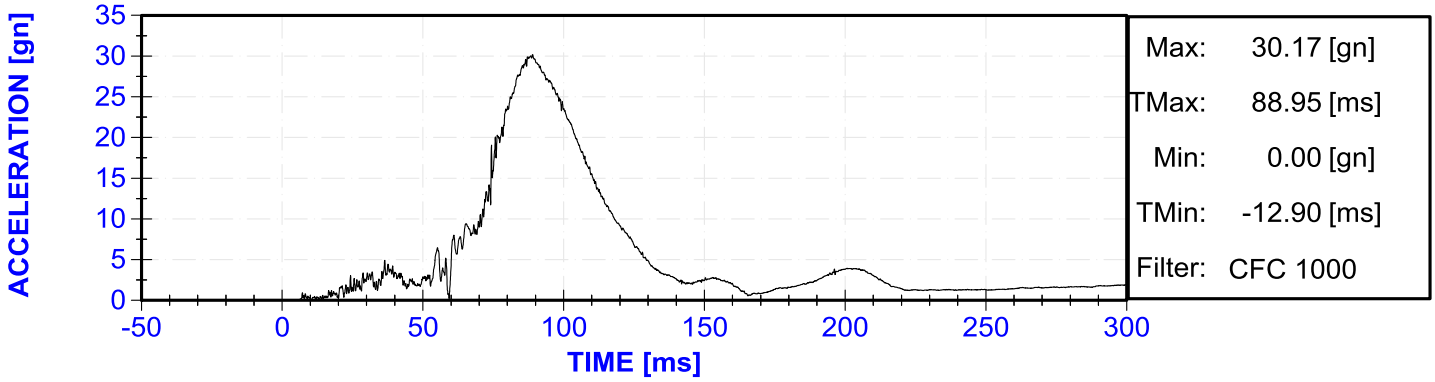
Passenger Head Acceleration (Y) vs. Time Primary



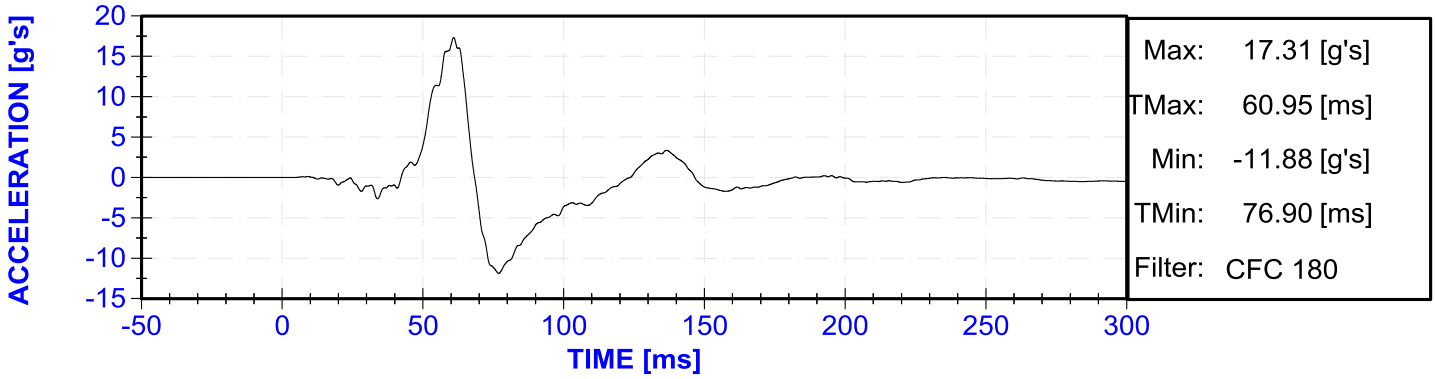
Passenger Head Acceleration (Z) vs. Time Primary



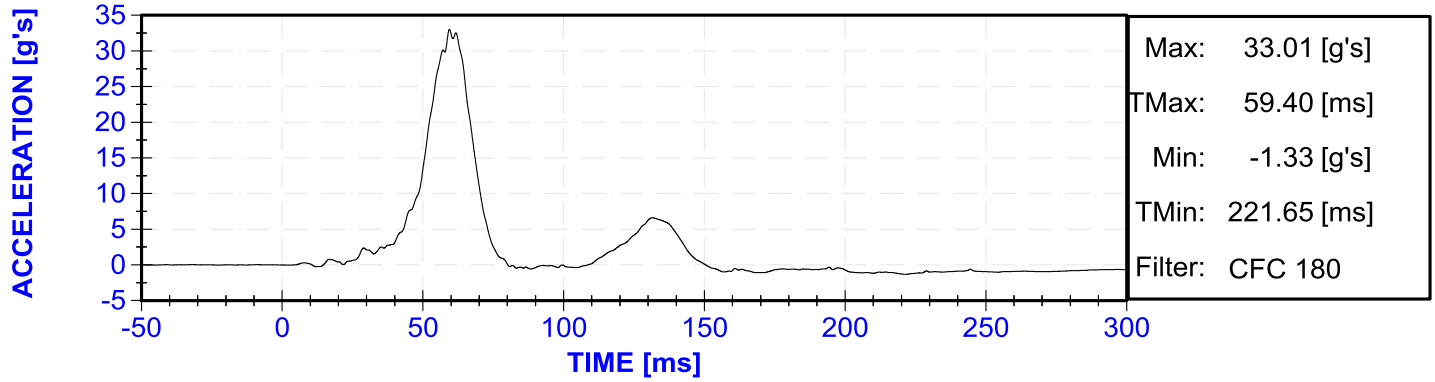
Passenger Head Resultant Acceleration Primary vs. Time



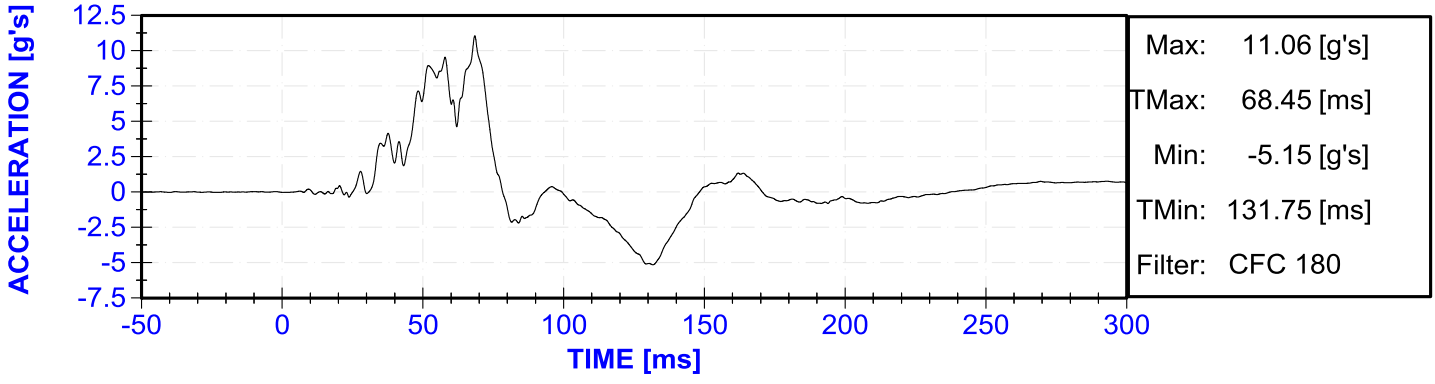
Passenger Lower Spine T12 Acceleration (X) vs. Time



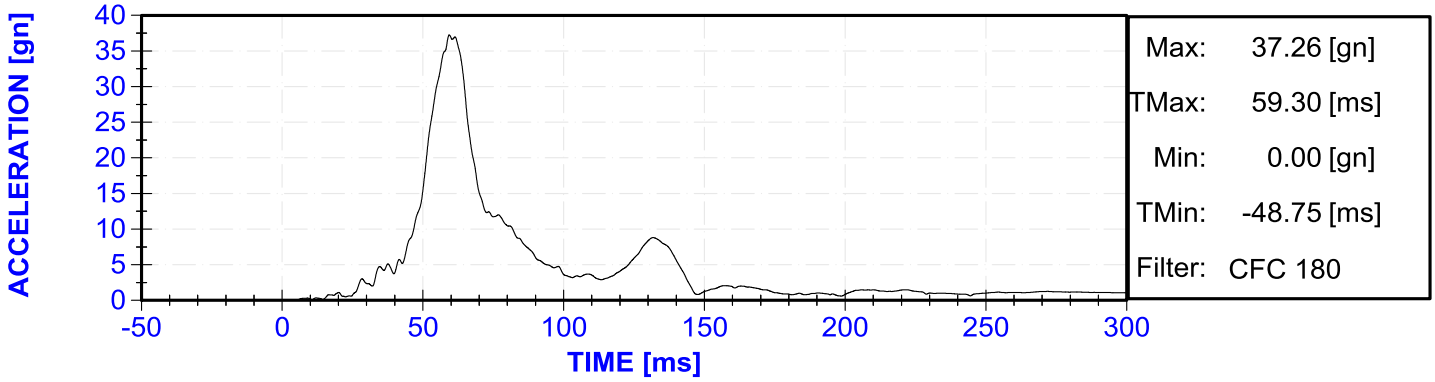
Passenger Lower Spine T12 Acceleration (Y) vs. Time



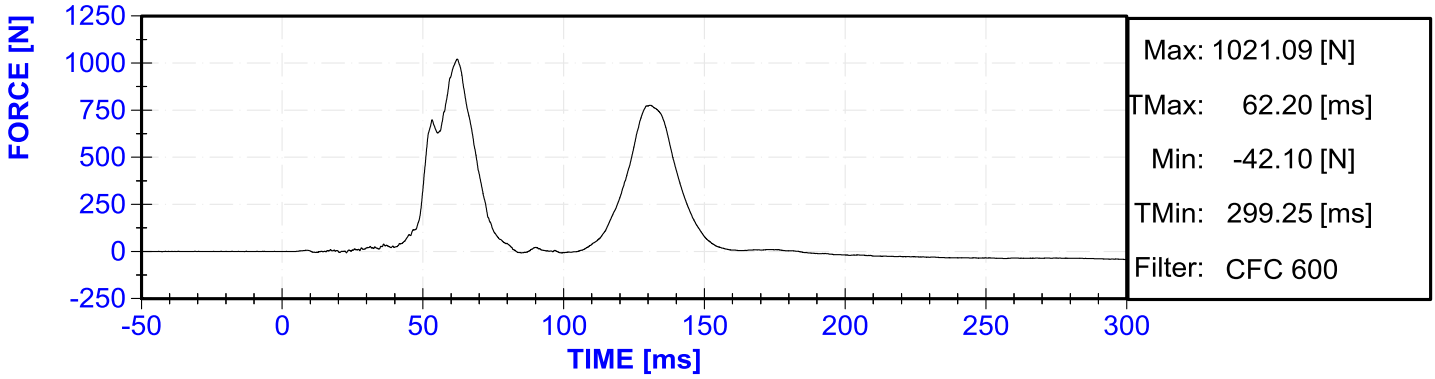
Passenger Lower Spine T12 Acceleration (Z) vs. Time



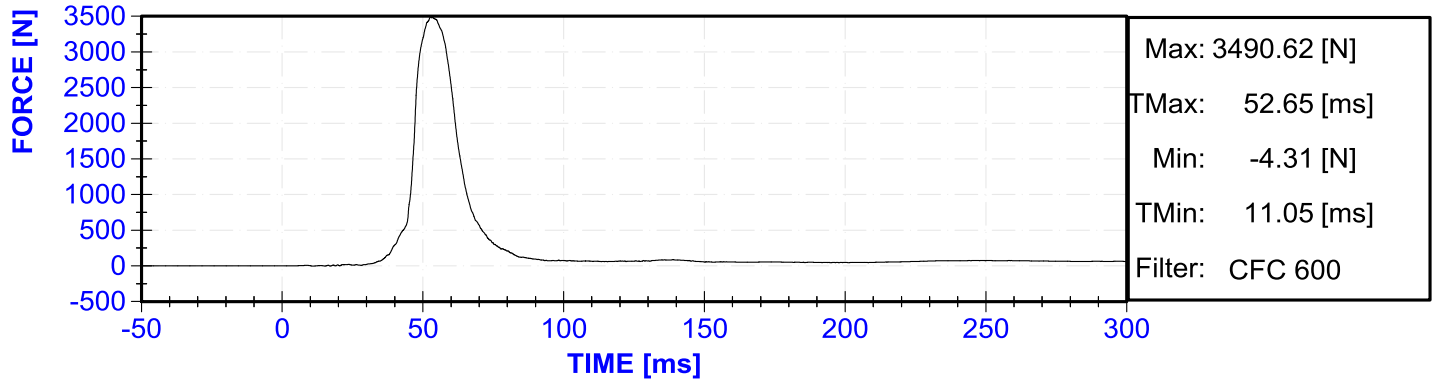
Passenger Lower Spine T12 Resultant Acceleration vs. Time



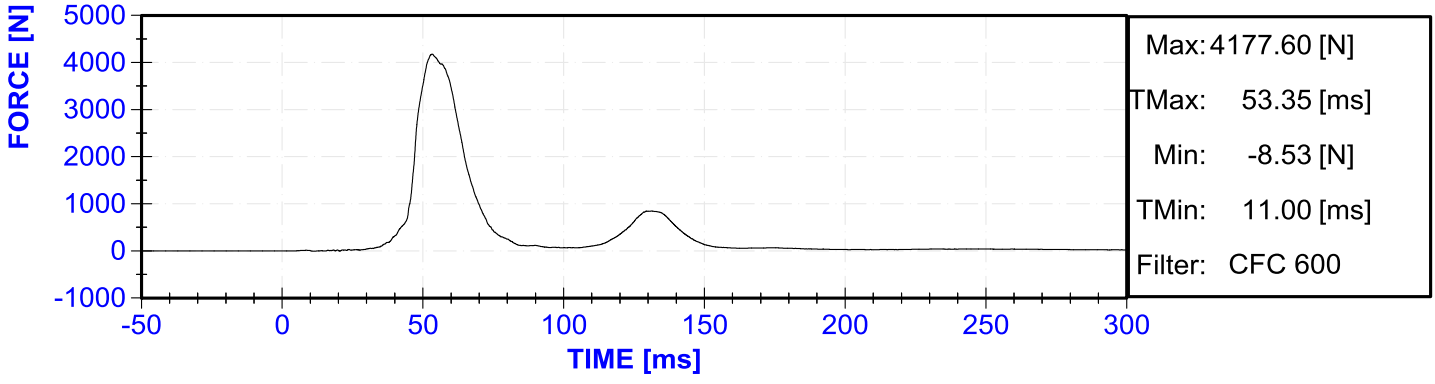
Passenger Iliac Force on Impact Side (Y) vs. Time



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



Passenger Total Pelvic Force on Impact Side (Y) vs. Time



APPENDIX C

DUMMY PERFORMANCE CALIBRATION TEST DATA

CALIBRATION TEST RESULTS

PRE-TEST

EUROSID 2 (ES-2RE) MALE – DRIVER ATD

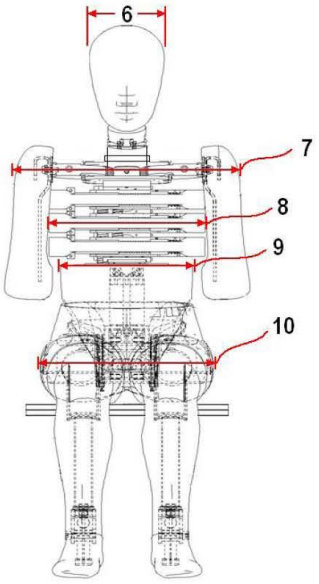
SERIAL NO: F034

(CONFIGURED FOR LEFT SIDE IMPACT)

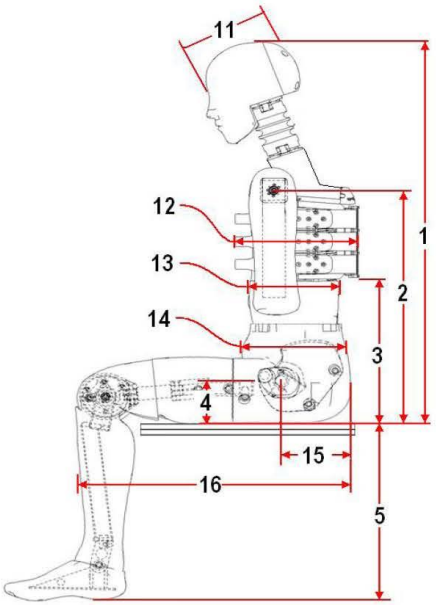
External Measurements - EuroSID-2re

Technician: K. Brogan Date: 5/3/2018

Dummy Serial Number: F034



FRONT VIEW



SIDE VIEW

Dim. No.	Description	Specification (mm)		Result (mm)	Pass/Fail
1	Sitting Height	900	918	910	Pass
2	Seat to Shoulder Joint	558	572	565	Pass
3	Seat to Lower Face of Thoracic Spine Box	346	356	350	Pass
4	Seat to Hip Joint (center of bolt)	97	103	100	Pass
5	Sole to Seat, Sitting	333	451	422	Pass
6	Head Width	152	158	155	Pass
7	Shoulder/Arm Width	461	479	469	Pass
8	Thorax Width	322	332	325	Pass
9	Abdomen Width	273	287	281	Pass
10	Pelvis Lap Width	359	373	368	Pass
11	Head Depth	196	206	200	Pass
12	Thorax Depth	262	272	268	Pass
13	Abdomen Depth	194	204	200	Pass
14	Pelvis Depth	235	245	241	Pass
15	Back of Buttocks to Hip Joint (center of bolt)	150	160	155	Pass
16	Back of Buttocks to Front Knee	597	615	602	Pass

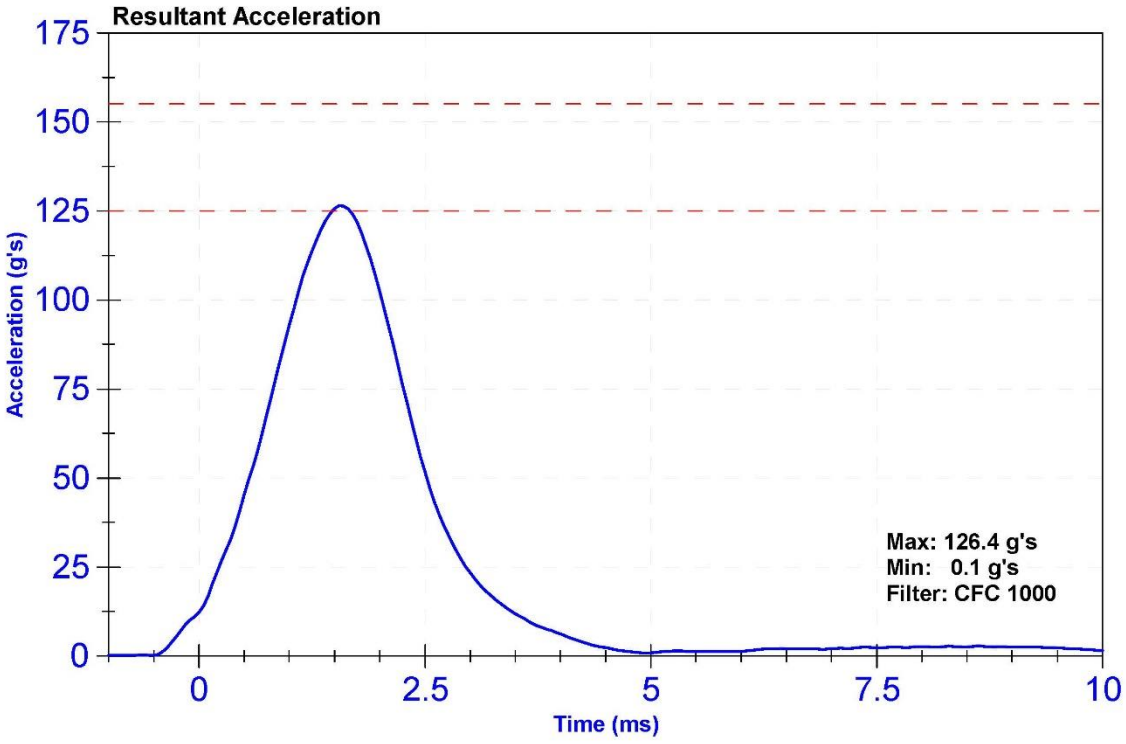
ATD Manufacturer	FTSS	Test Technician	J.Pericak
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

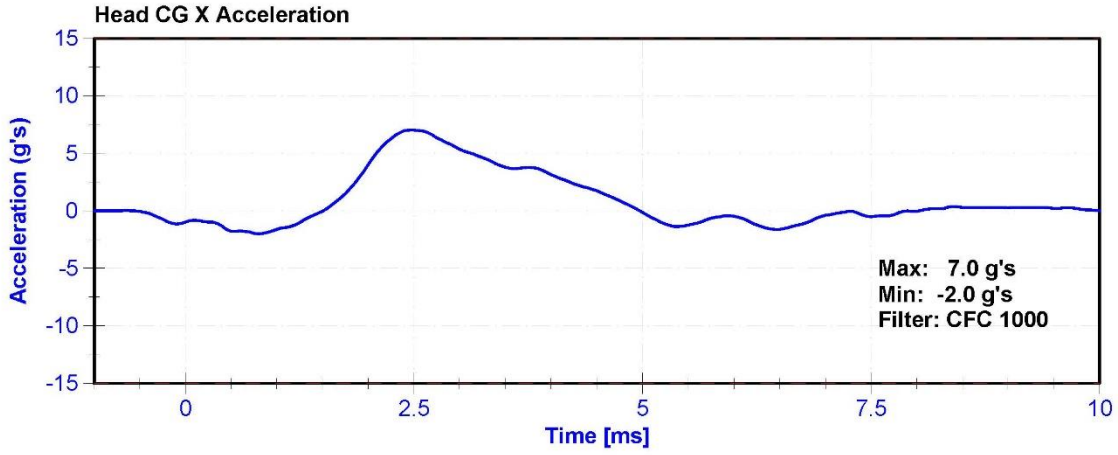
Results

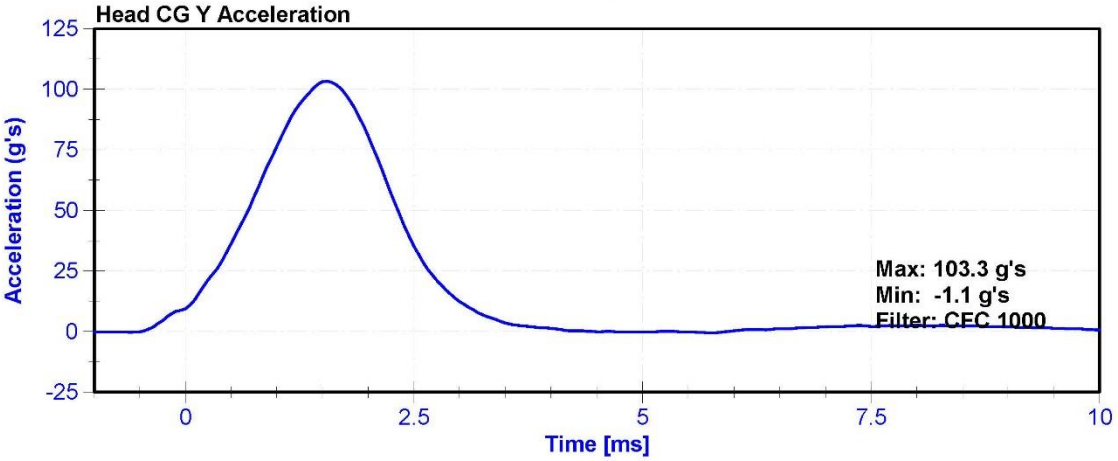
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.6	Pass
Humidity	10	70	%	33.5	Pass
Resultant Acceleration	125	155	g's	126.4	Pass
Oscillation	0	15	%	2.20	Pass
Fore-Aft Acceleration	-15	15	g's	7.0	Pass

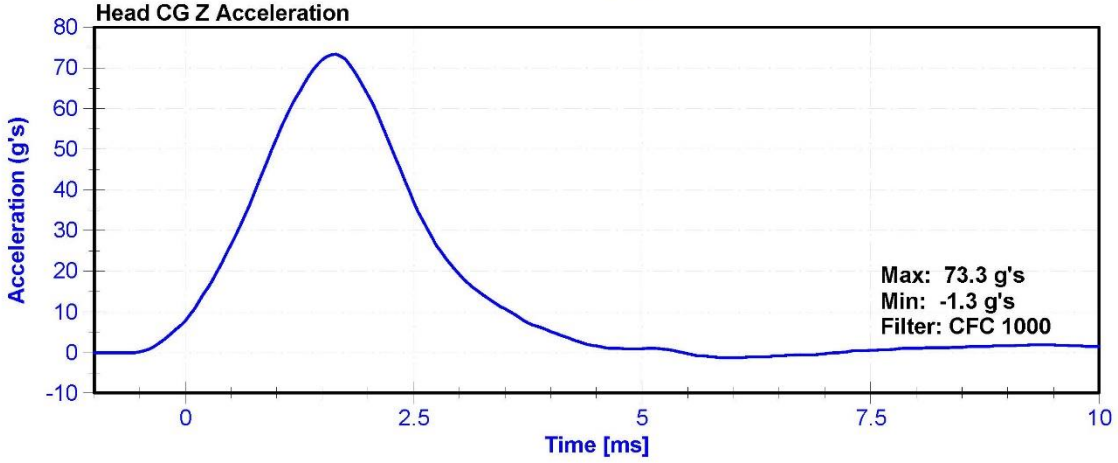
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264CT	AC-P58904	5/7/2018	11/5/2018
Y Accelerometer	ENDEVCO 7264CT	AC-P58911	5/7/2018	11/5/2018
Z Accelerometer	ENDEVCO 7264CT	AC-P58776	5/7/2018	11/5/2018




Head CG X Acceleration
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
5
7.5
10
Time [ms]
Max: 7.0 g's
Min: -2.0 g's
Filter: CFC 1000


Head CG Y Acceleration
Acceleration (g's)
125
100
75
50
25
0
-25
0
2.5
5
7.5
10
Time [ms]
Max: 103.3 g's
Min: -1.1 g's
Filter: CFC 1000


Head CG Z Acceleration
Acceleration (g's)
80
70
60
50
40
30
20
10
0
-10
0
2.5
5
7.5
10
Time [ms]
Max: 73.3 g's
Min: -1.3 g's
Filter: CFC 1000

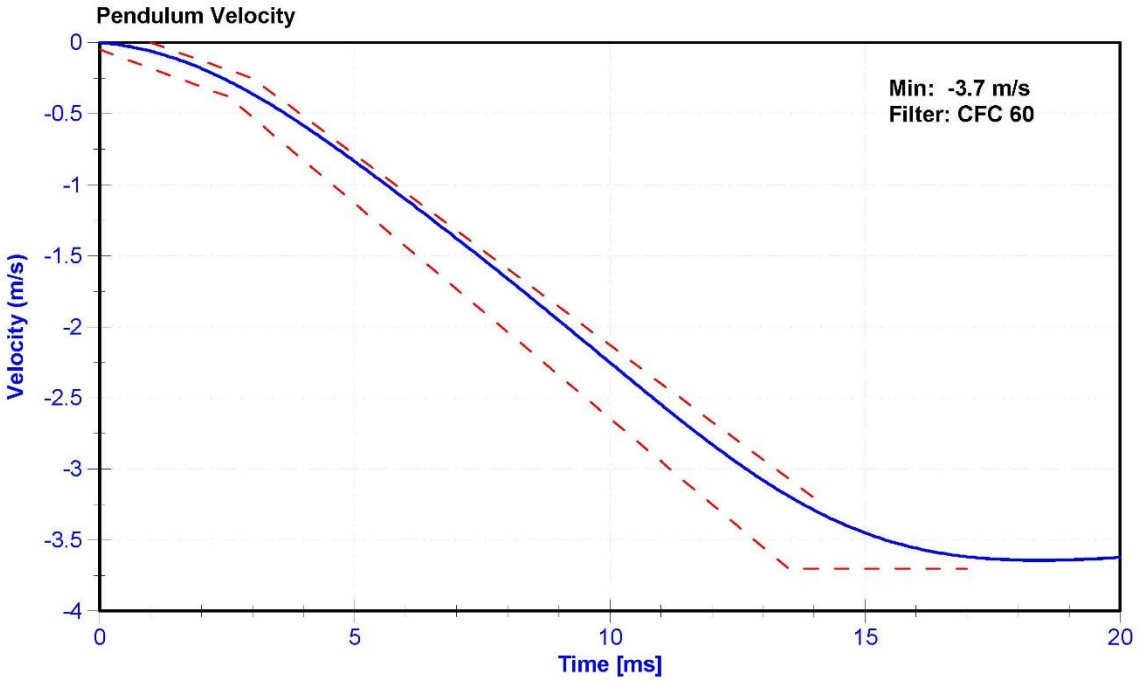
ATD Manufacturer	FTSS	Test Technician	J. Pericak
ATD Serial Number	F034	Laboratory Supervisor	K.Brogan

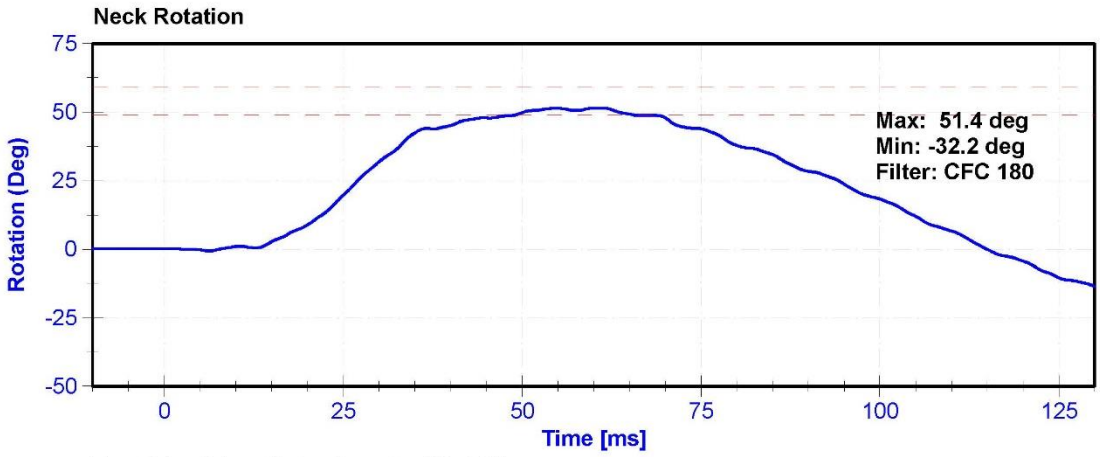
Results

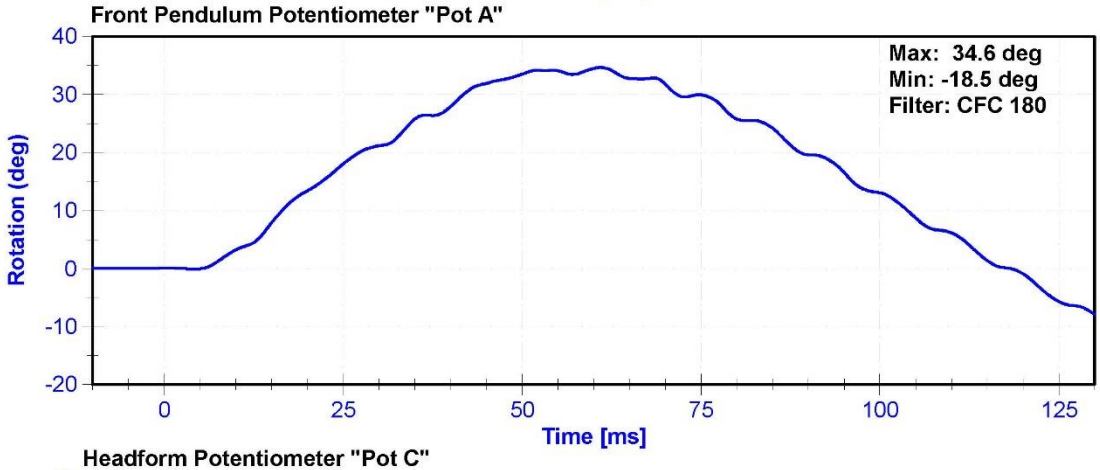
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.7	Pass
Humidity	10	70	%	55.5	Pass
Velocity	3.3	3.5	m/s	3.42	Pass
Lateral Neck Rotation	49	59	deg	51.4	Pass
Time at Maximum Rotation	54	66	ms	61.3	Pass
Time of Rotation Decay from Maximum	53	88	ms	53.6	Pass

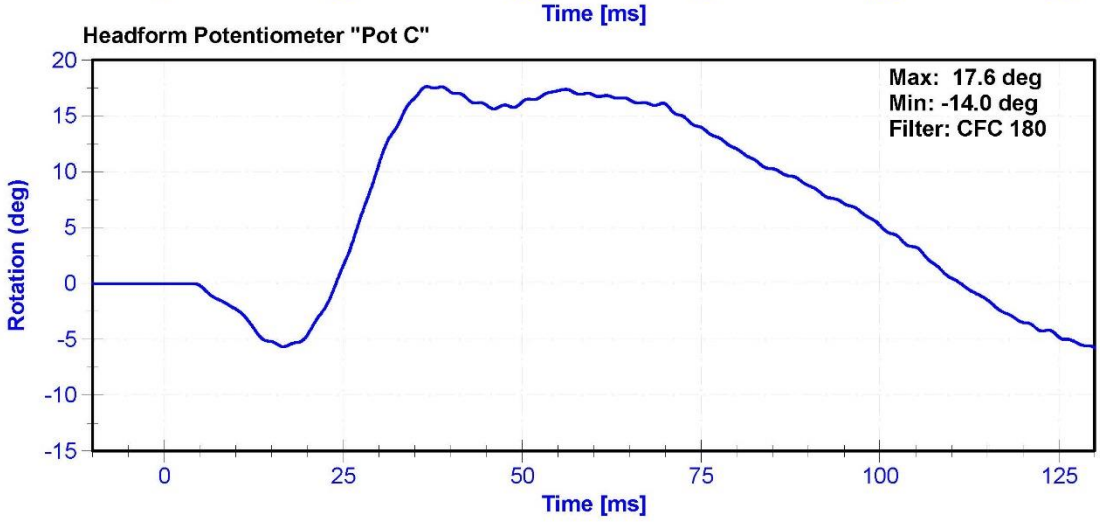
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/11/2017	5/11/2018
Front Pendulum Potentiometer	SP22G	DS-094	10/30/2017	10/30/2018
Headform Potentiometer	SP22G	DS-095	10/30/2017	10/30/2018




Neck Rotation
Rotation (Deg)
Time [ms]
Max: 51.4 deg
Min: -32.2 deg
Filter: CFC 180


Front Pendulum Potentiometer "Pot A"
Rotation (deg)
Time [ms]
Max: 34.6 deg
Min: -18.5 deg
Filter: CFC 180


Headform Potentiometer "Pot C"
Rotation (deg)
Time [ms]
Max: 17.6 deg
Min: -14.0 deg
Filter: CFC 180

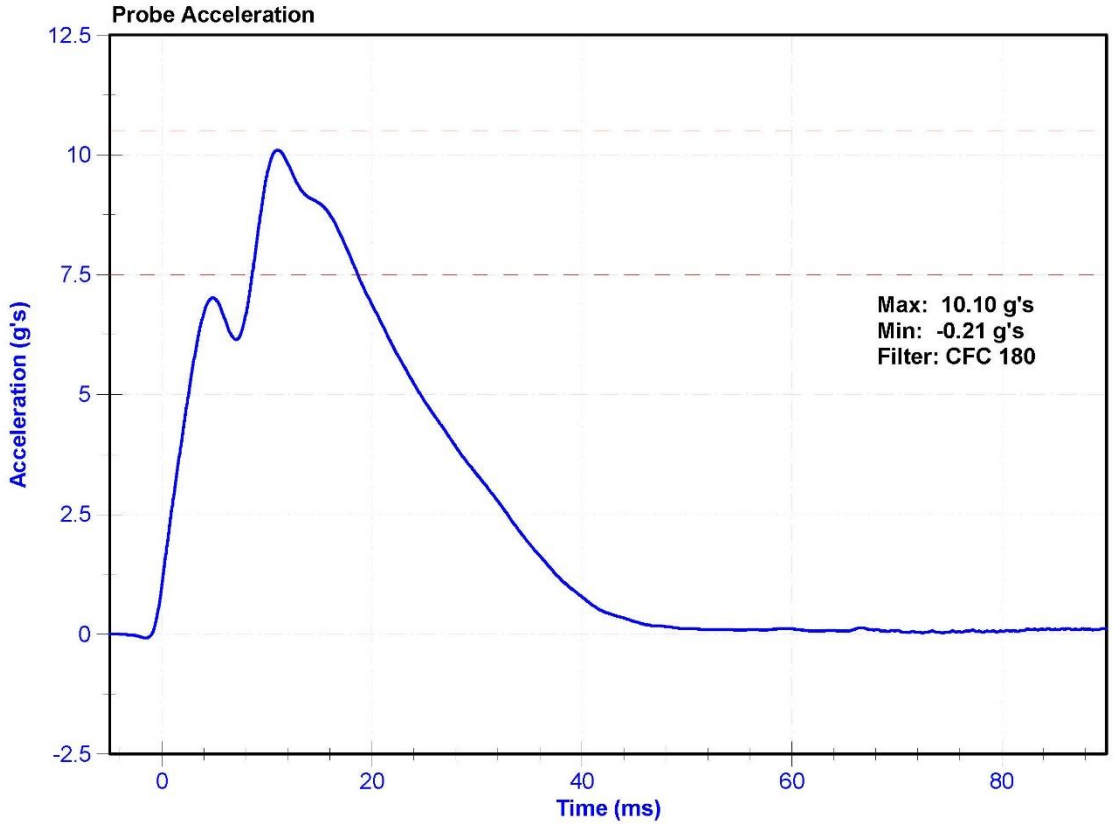
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.5	Pass
Humidity	10	70	%	39.8	Pass
Velocity	4.2	4.4	m/s	4.23	Pass
Probe Acceleration	7.5	10.5	g's	10.10	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018



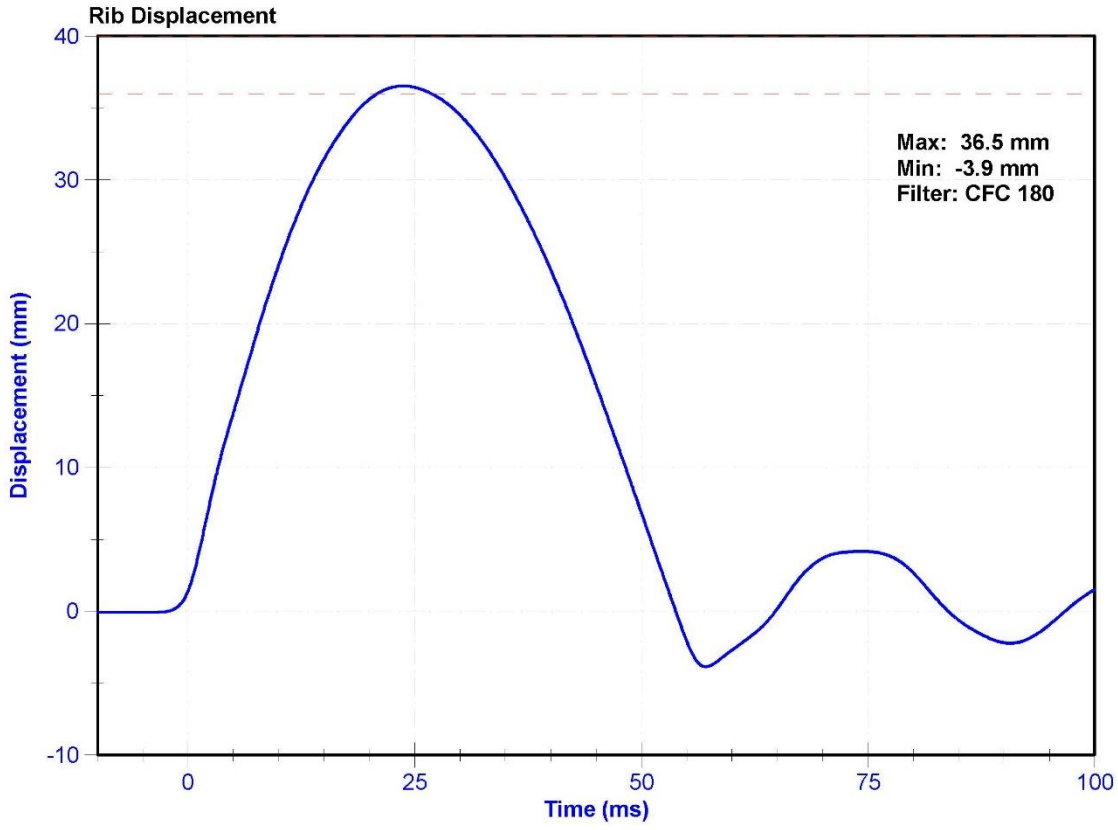
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	60.7	Pass
Rib Displacement	36	40	mm	36.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-183GFE	9/27/2017	9/27/2018



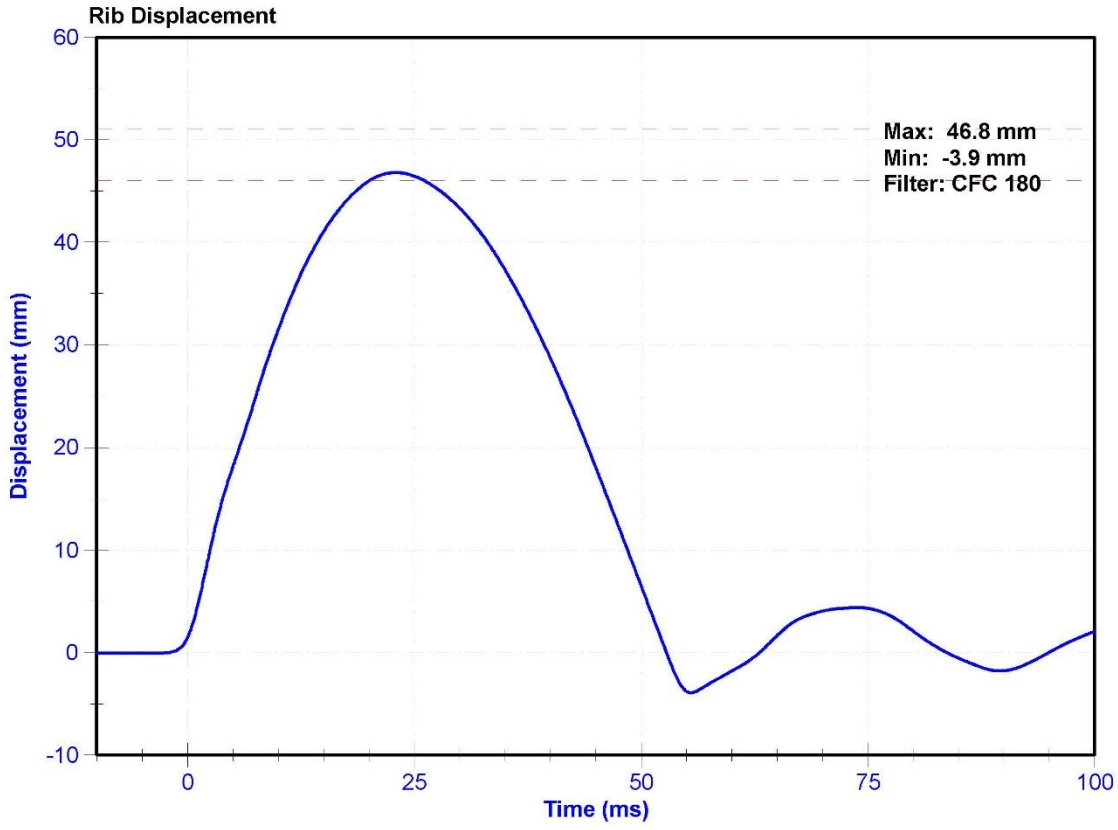
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	60.7	Pass
Rib Displacement	46	51	mm	46.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-183GFE	9/27/2017	9/27/2018



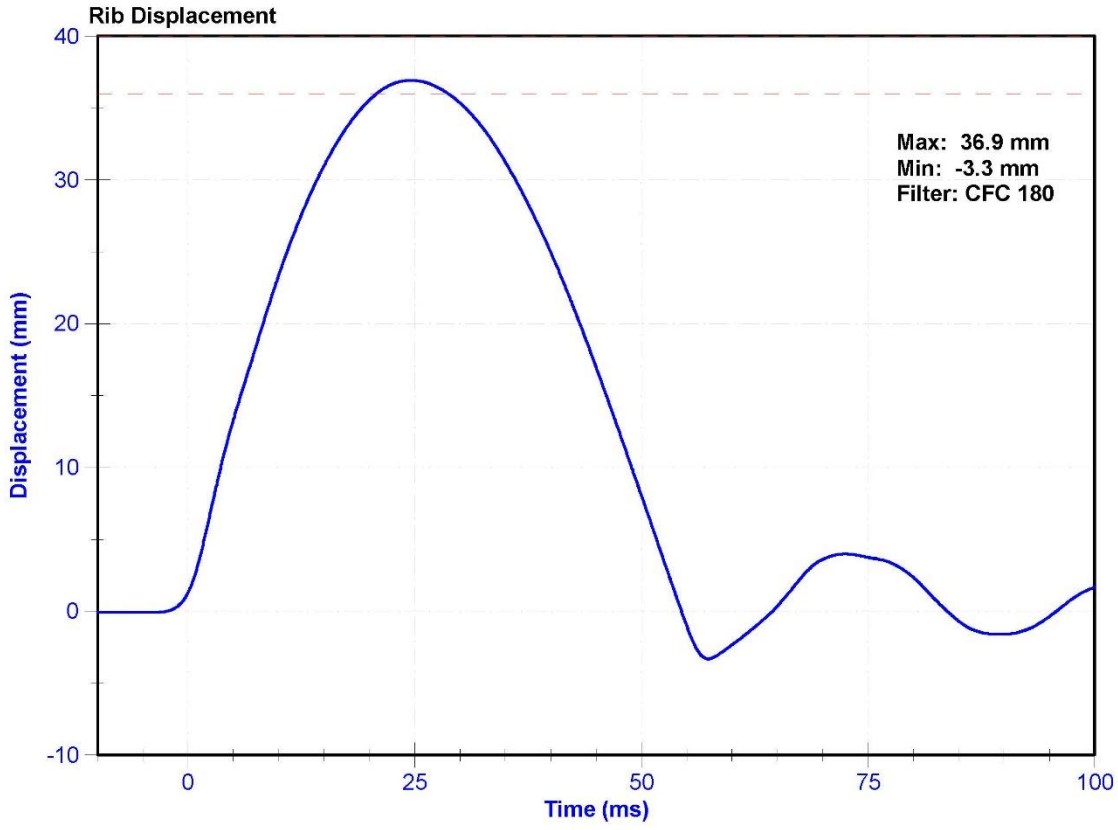
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.1	Pass
Humidity	10	70	%	59.4	Pass
Rib Displacement	36	40	mm	36.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-184GFE	9/27/2017	9/27/2018



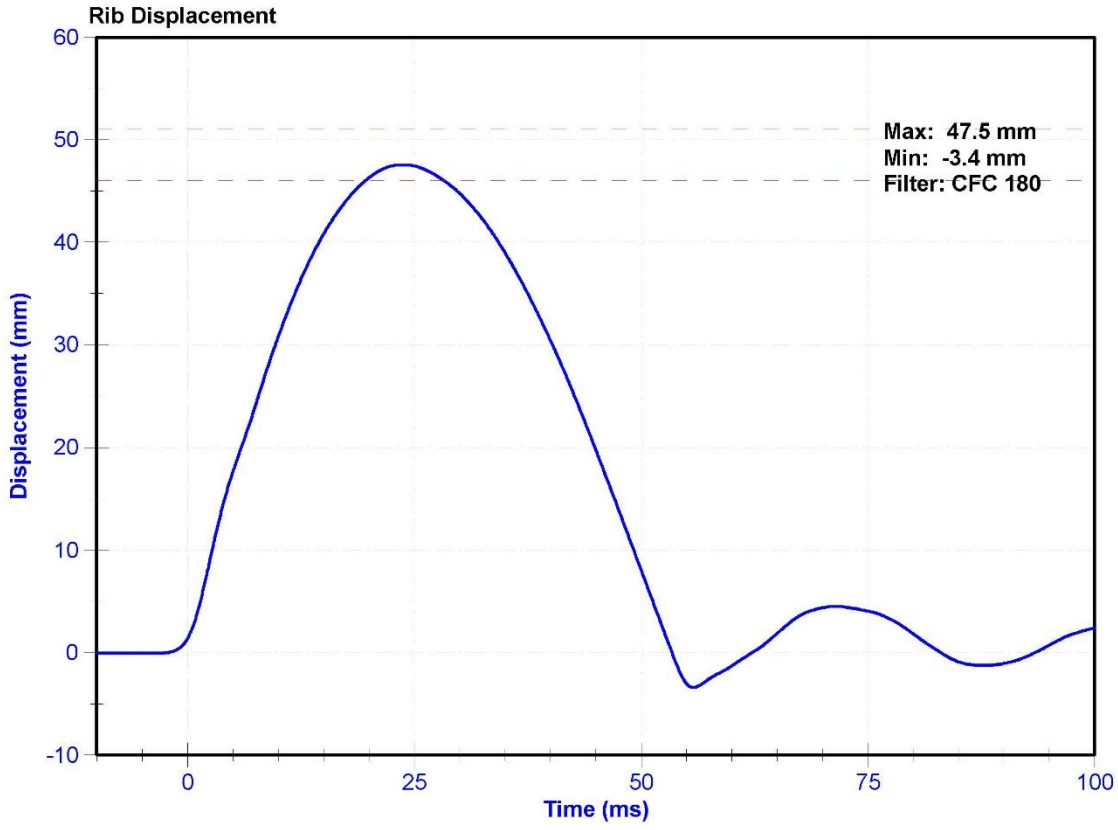
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.1	Pass
Humidity	10	70	%	59.4	Pass
Rib Displacement	46	51	mm	47.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-184GFE	9/27/2017	9/27/2018



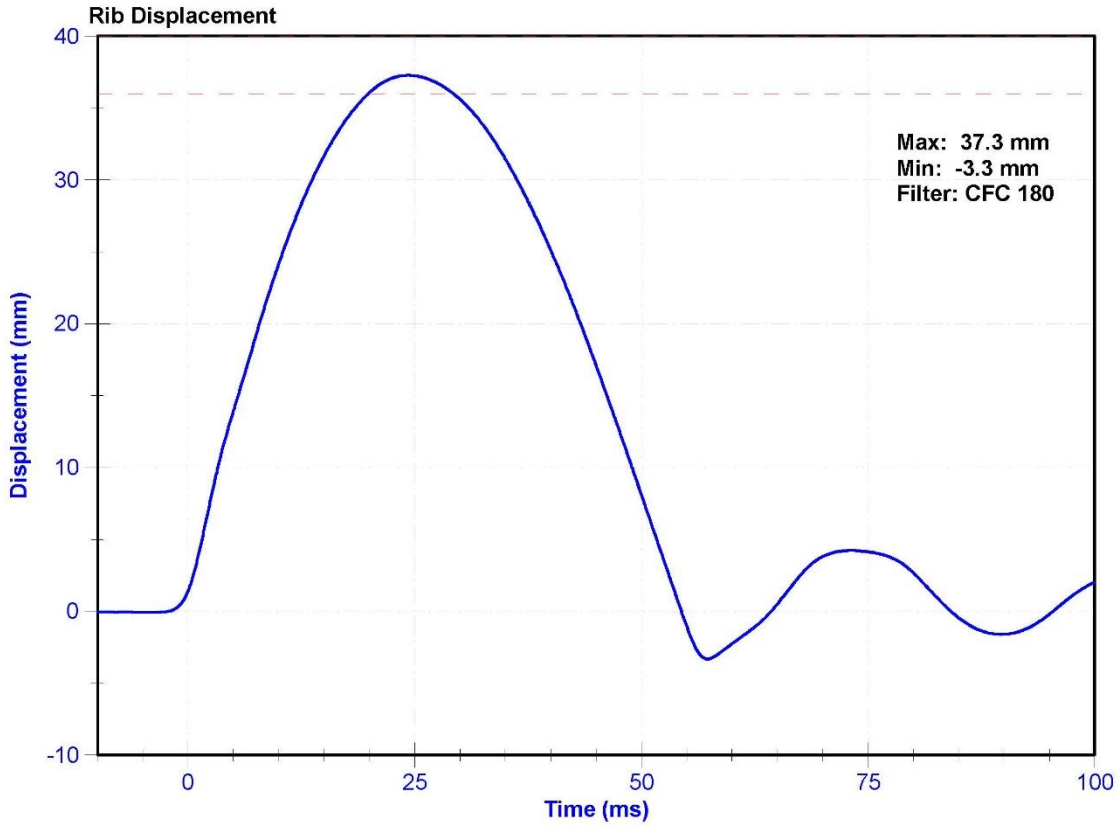
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.7	Pass
Humidity	10	70	%	50.9	Pass
Rib Displacement	36	40	mm	37.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-182GFE	9/27/2017	9/27/2018



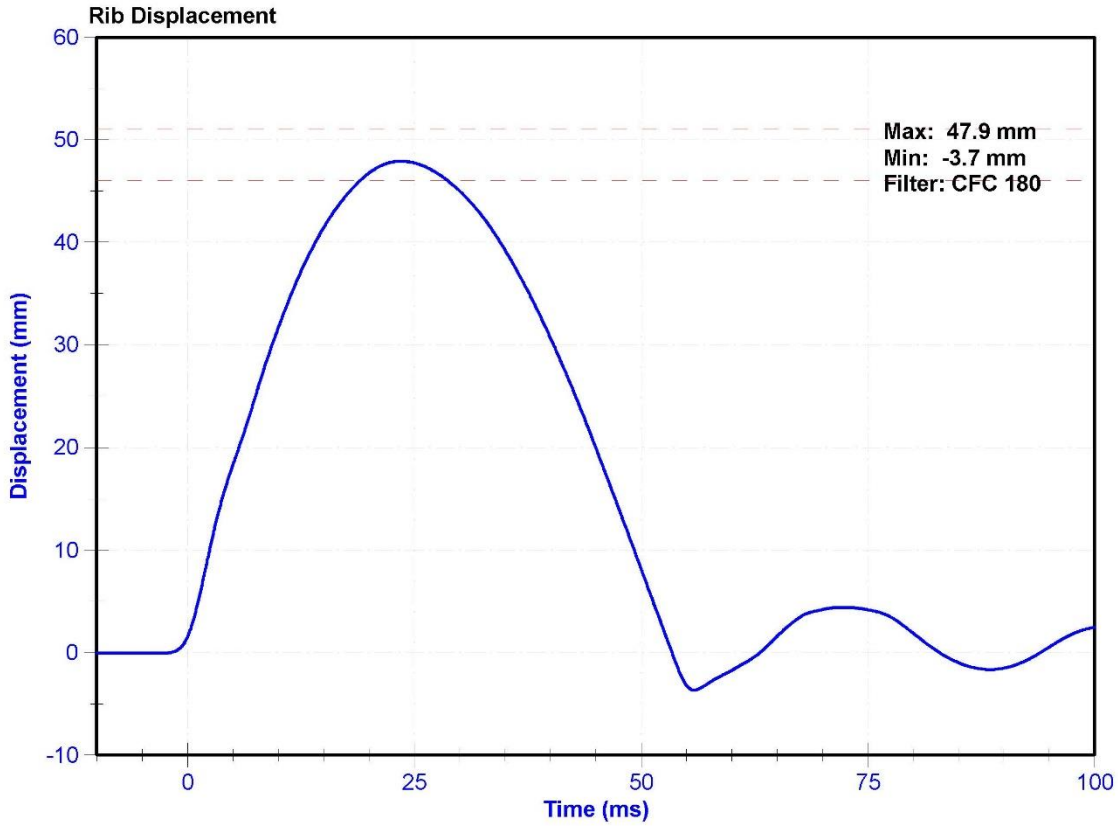
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.7	Pass
Humidity	10	70	%	50.9	Pass
Rib Displacement	46	51	mm	47.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-182GFE	9/27/2017	9/27/2018



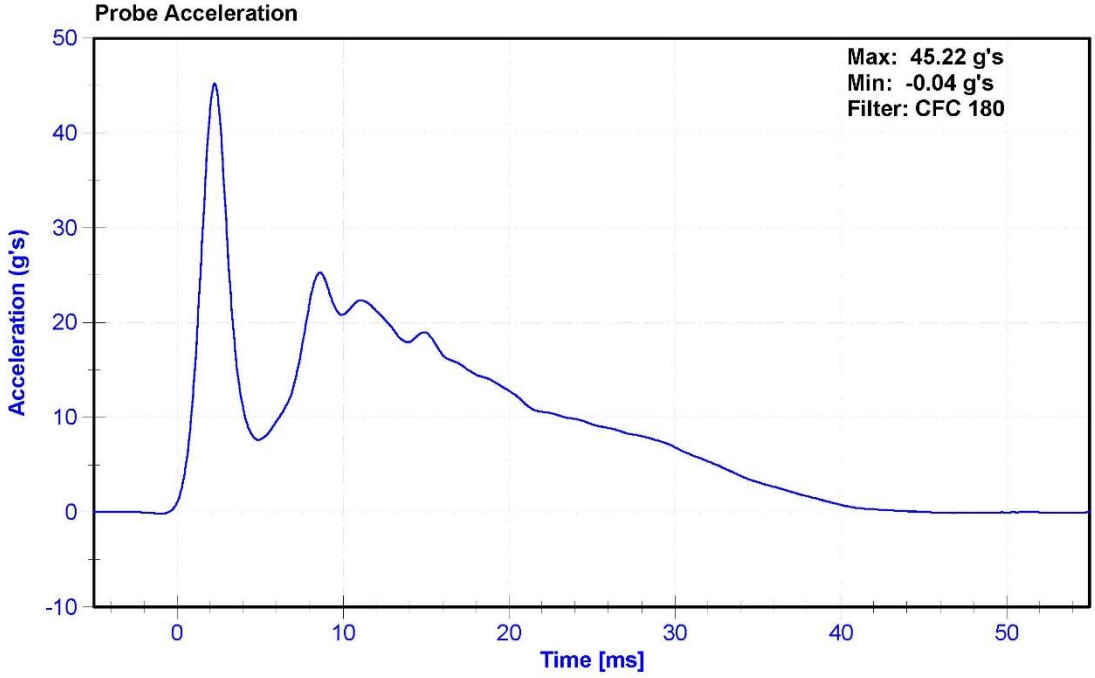
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

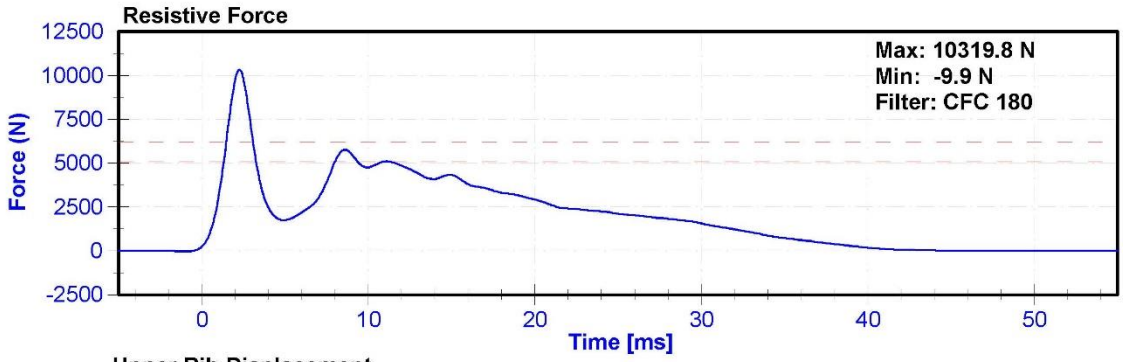
Results

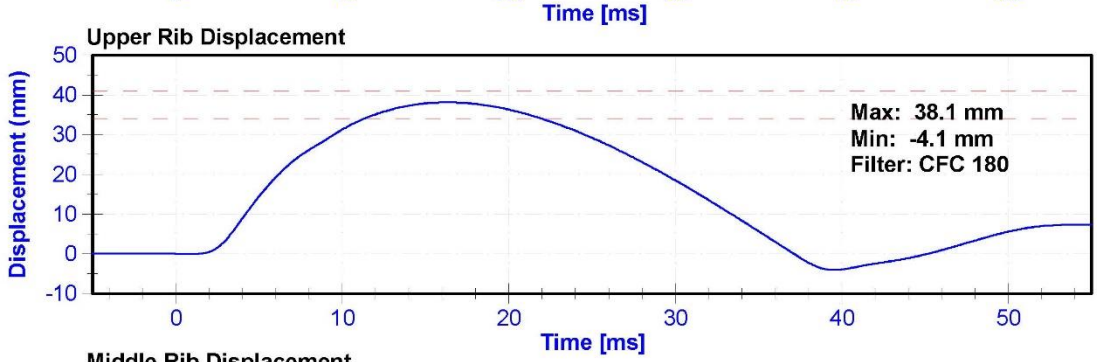
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.0	Pass
Humidity	10	70	%	41.2	Pass
Velocity	5.4	5.6	m/s	5.57	Pass
Resistive Force after 6ms	5100	6200	N	5768.1	Pass
Upper Thorax Rib Deflection	34	41	mm	38.1	Pass
Mid Thorax Rib Deflection	37	45	mm	42.3	Pass
Lower Thorax Rib Deflection	37	44	mm	41.5	Pass

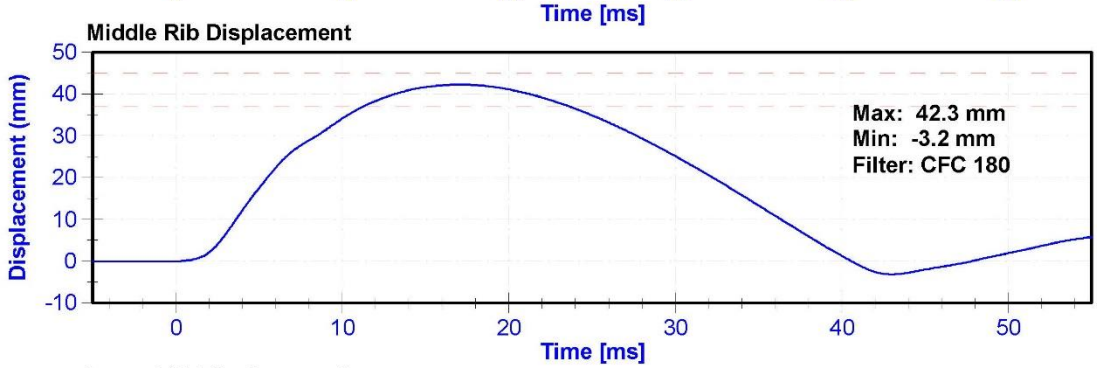
Transducer Calibrations

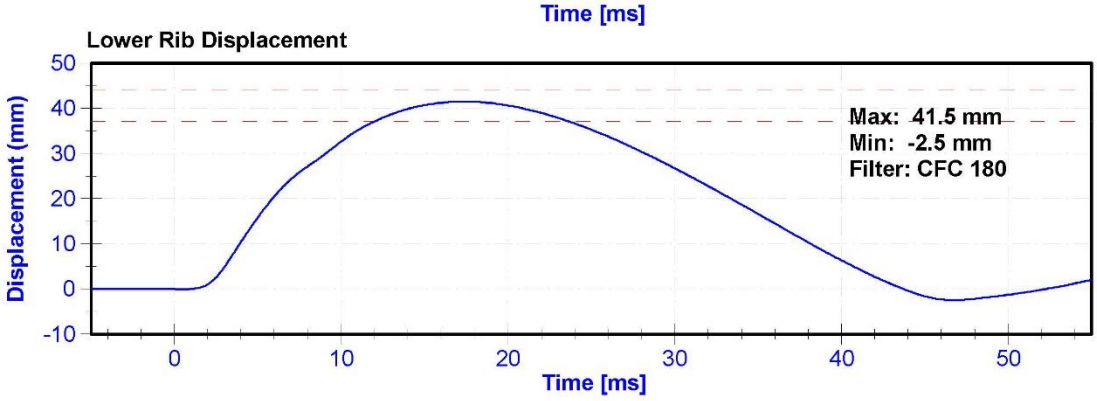
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Upper Thorax Rib Potentiometer	Honeywell MLT-38000203	DS-183GFE	9/27/2017	9/27/2018
Middle Thorax Rib Potentiometer	Honeywell MLT-38000203	DS-184GFE	9/27/2017	9/27/2018
Lower Thorax Rib Potentiometer	Honeywell MLT-38000203	DS-182GFE	9/27/2017	9/27/2018




Resistive Force
Force (N)
12500
10000
7500
5000
2500
0
-2500
0
10
20
30
40
50
Time [ms]
Max: 10319.8 N
Min: -9.9 N
Filter: CFC 180


Upper Rib Displacement
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 38.1 mm
Min: -4.1 mm
Filter: CFC 180


Middle Rib Displacement
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 42.3 mm
Min: -3.2 mm
Filter: CFC 180


Lower Rib Displacement
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 41.5 mm
Min: -2.5 mm
Filter: CFC 180

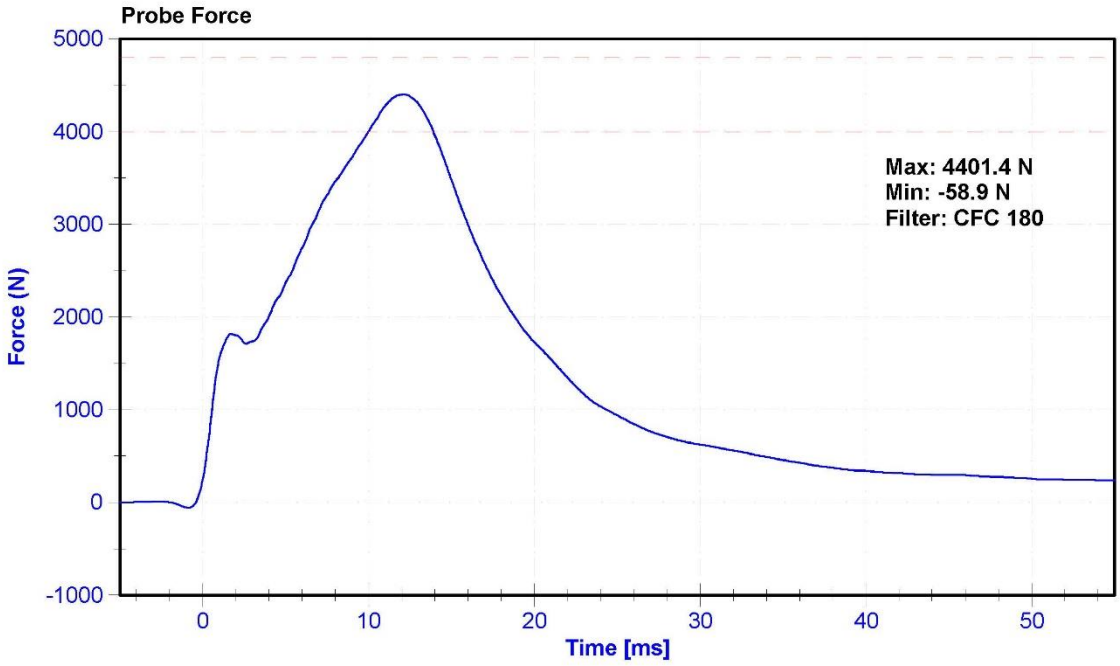
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

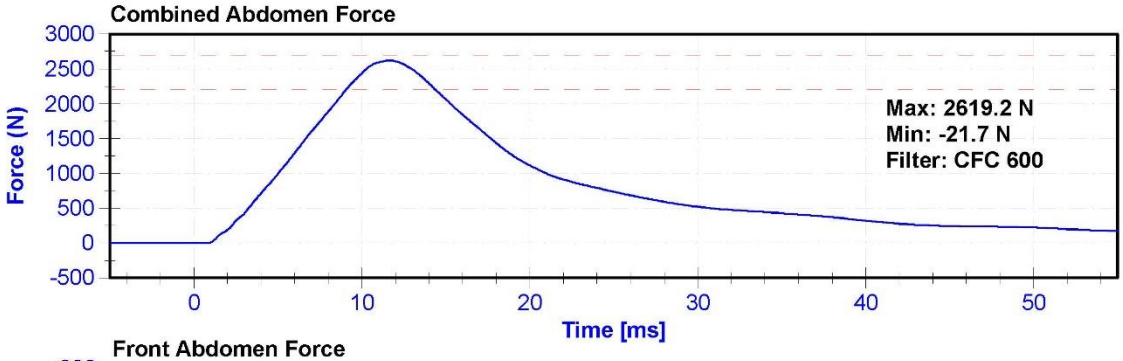
Results

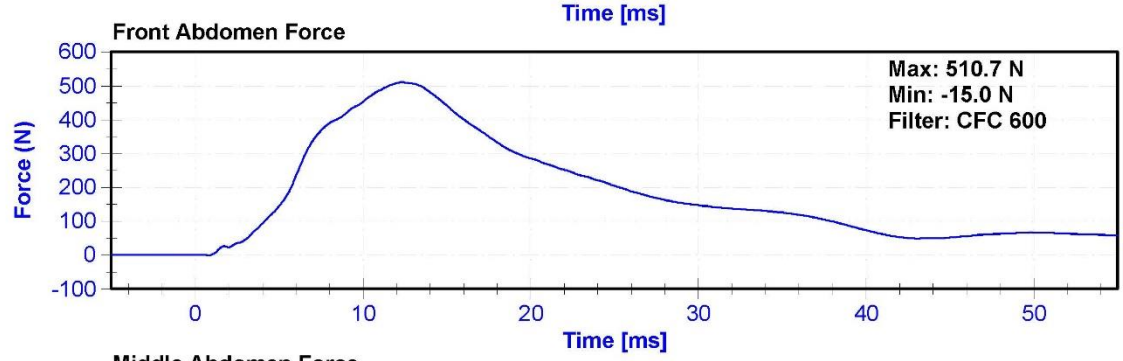
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	43.3	Pass
Velocity	3.9	4.1	m/s	4.07	Pass
Combined Abdomen Force	2200	2700	N	2619.2	Pass
Time at Peak Abdomen Force	10.0	12.3	ms	11.65	Pass
Resistive Probe Force	4000	4800	N	4401.4	Pass
Time at Peak Resistive Force	10.6	13.0	ms	12.10	Pass

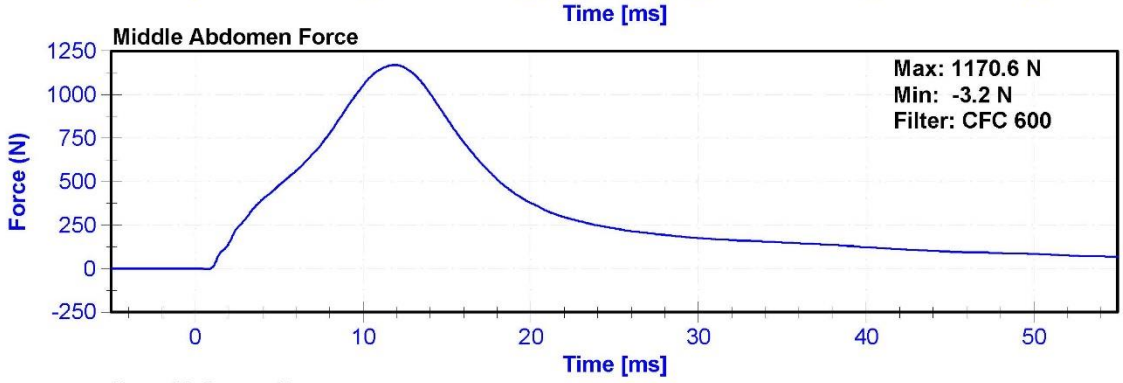
Transducer Calibrations

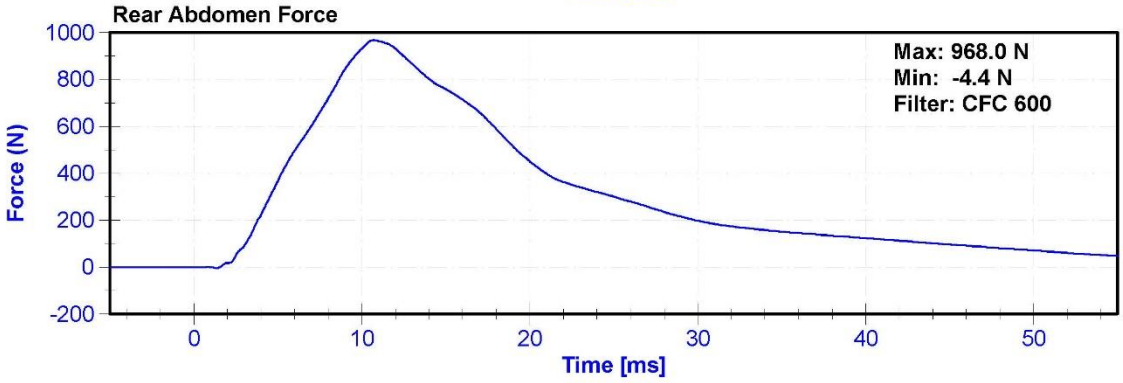
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Front Abdomen Load Cell	DENTON 2631	LC-1512	6/5/2017	6/5/2018
Middle Abdomen Load Cell	DENTON 2631	LC-1526	6/5/2017	6/5/2018
Rear Abdomen Load Cell	DENTON 2631	LC-1516	6/5/2017	6/5/2018




Combined Abdomen Force
Force (N)
Time [ms]
Max: 2619.2 N
Min: -21.7 N
Filter: CFC 600


Front Abdomen Force
Force (N)
Time [ms]
Max: 510.7 N
Min: -15.0 N
Filter: CFC 600


Middle Abdomen Force
Force (N)
Time [ms]
Max: 1170.6 N
Min: -3.2 N
Filter: CFC 600


Rear Abdomen Force
Force (N)
Time [ms]
Max: 968.0 N
Min: -4.4 N
Filter: CFC 600

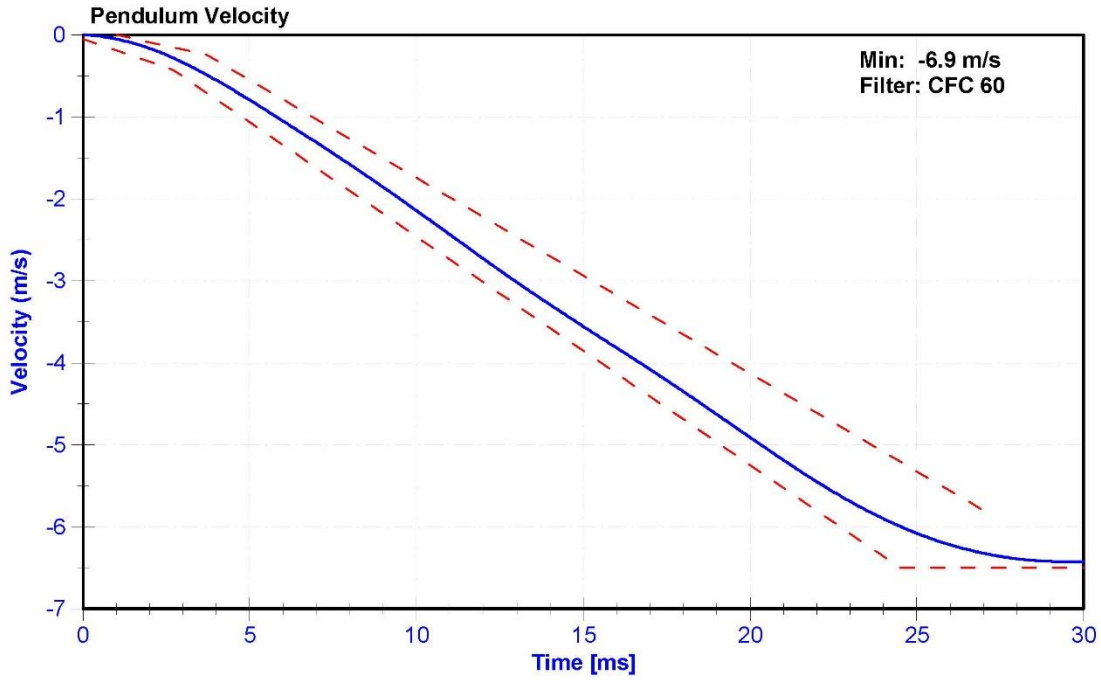
ATD Manufacturer	FTSS	Test Technician	J.Pericak
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

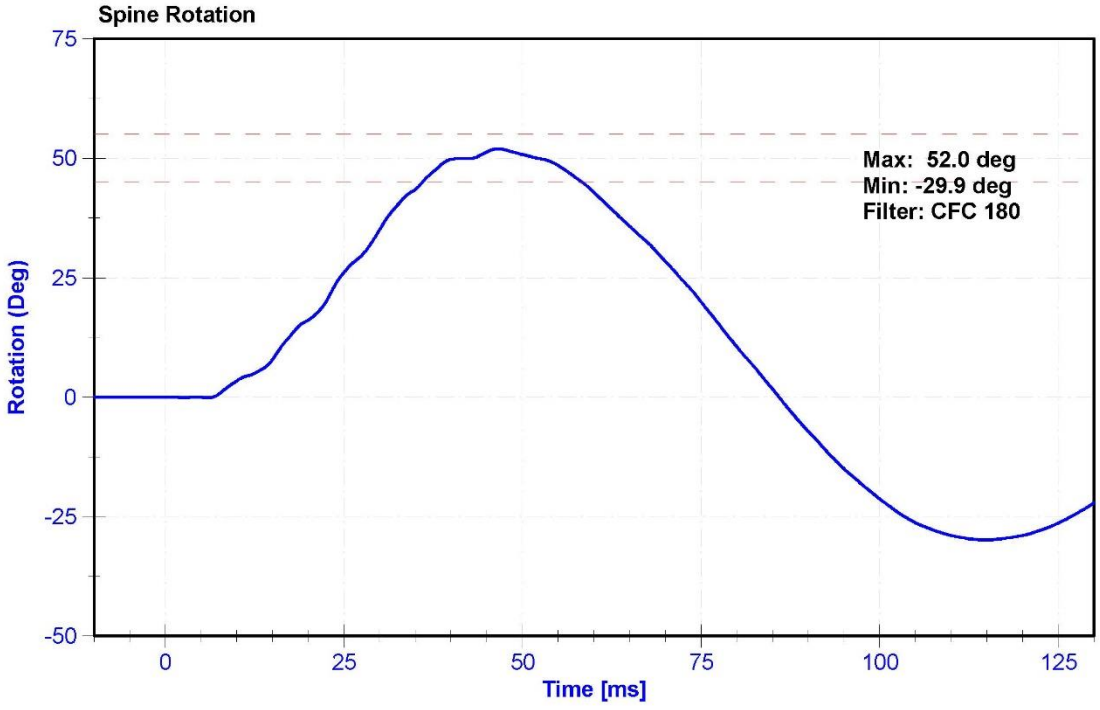
Results

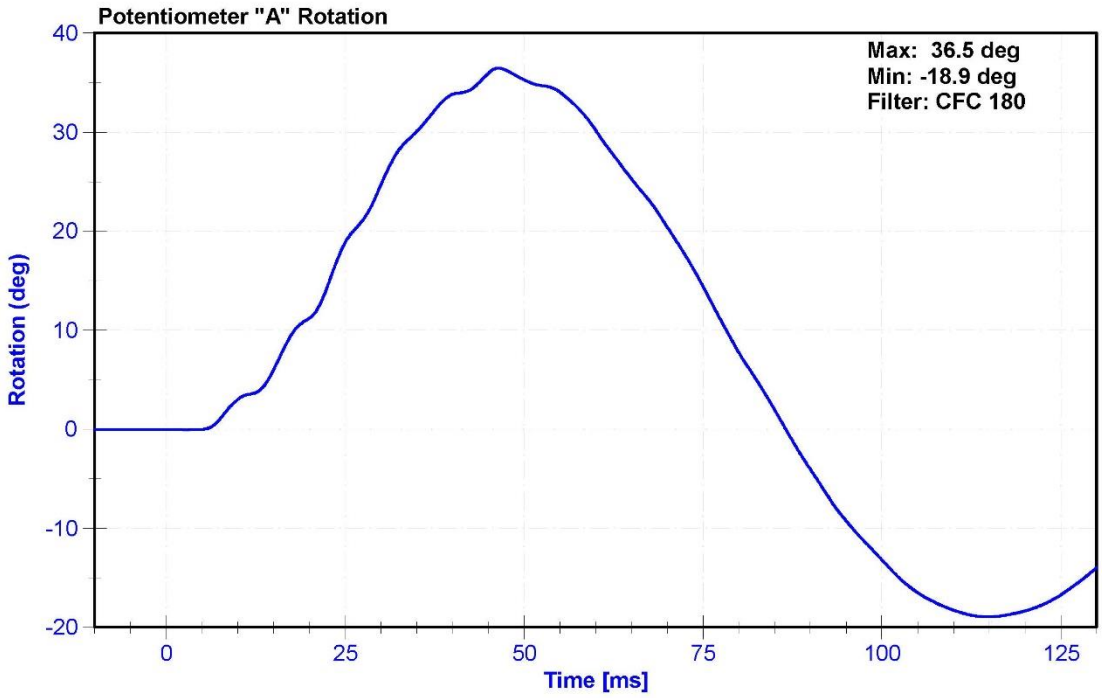
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	61.4	Pass
Velocity	5.95	6.15	m/s	6.113	Pass
Lateral Spine Rotation	45	55	deg	52.0	Pass
Time at Maximum Rotation	39	53	ms	46.5	Pass
Time of Decay to Zero Degrees	37	57	ms	39.4	Pass
Pulse within Corridor?	-	-	-		

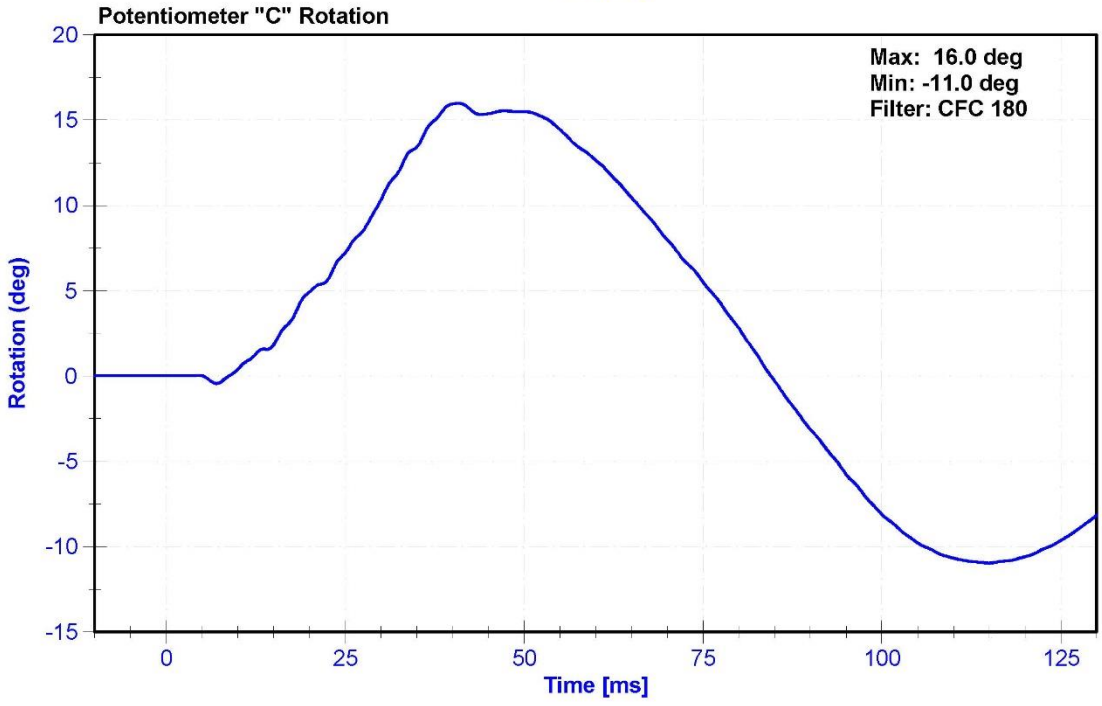
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/11/2017	5/11/2018
Pendulum "A" Potentiometer	SP22G	DS-094	10/30/2017	10/30/2018
Condyle "B" Potentiometer	SP22G	DS-095	10/30/2017	10/30/2018


Pendulum Velocity
Min: -6.9 m/s
Filter: CFC 60
Velocity (m/s)
0
-1
-2
-3
-4
-5
-6
-7
0
5
10
15
20
25
30
Time [ms]


Spine Rotation
Max: 52.0 deg
Min: -29.9 deg
Filter: CFC 180
Rotation (Deg)
75
50
25
0
-25
-50
0
25
50
75
100
125
Time [ms]


Potentiometer "A" Rotation
Max: 36.5 deg
Min: -18.9 deg
Filter: CFC 180
Rotation (deg)
40
30
20
10
0
-10
-20
0
25
50
75
100
125
Time [ms]


Potentiometer "C" Rotation
Max: 16.0 deg
Min: -11.0 deg
Filter: CFC 180
Rotation (deg)
20
15
10
5
0
-5
-10
-15
0
25
50
75
100
125
Time [ms]

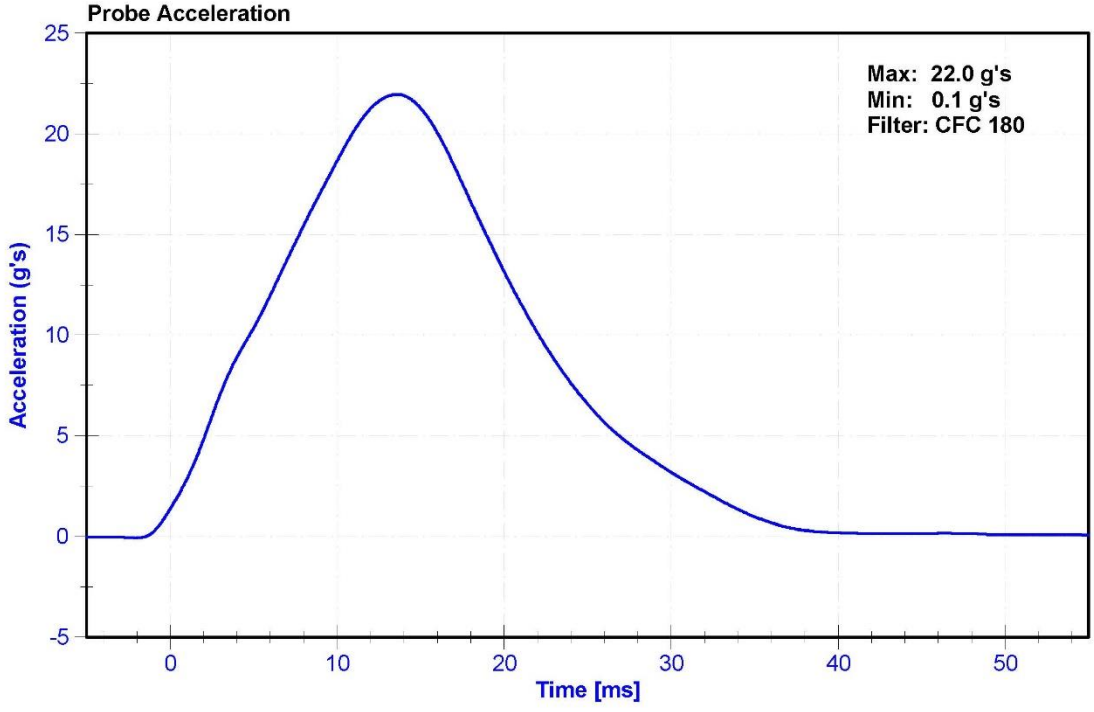
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

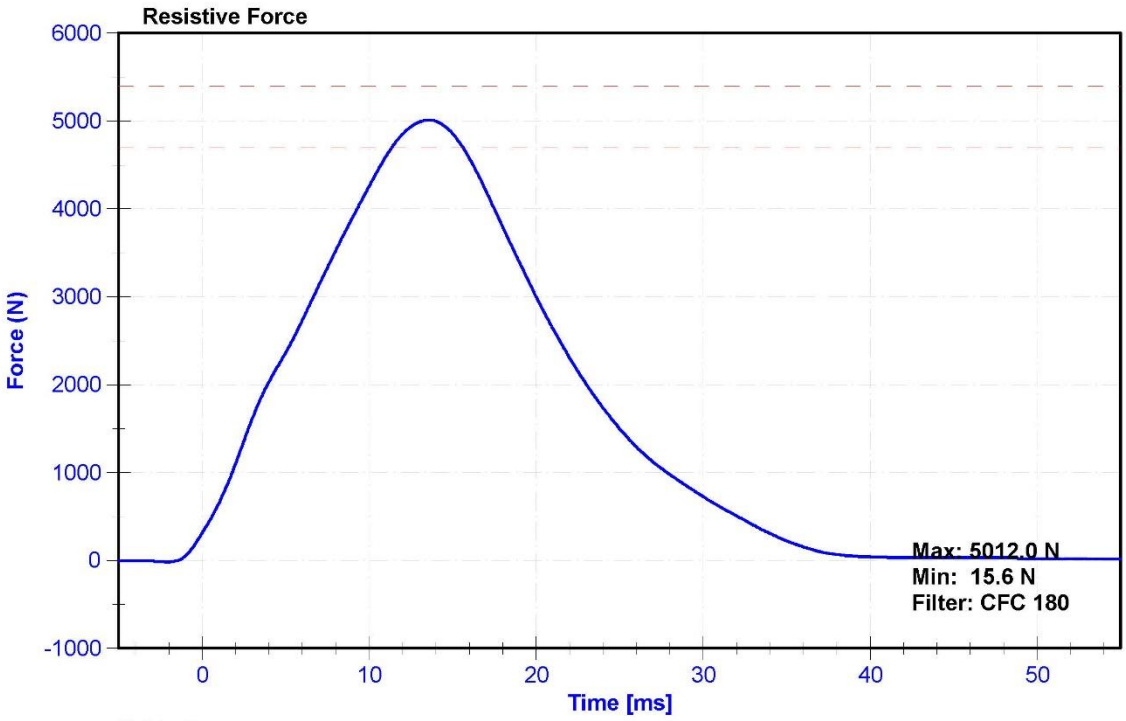
Results

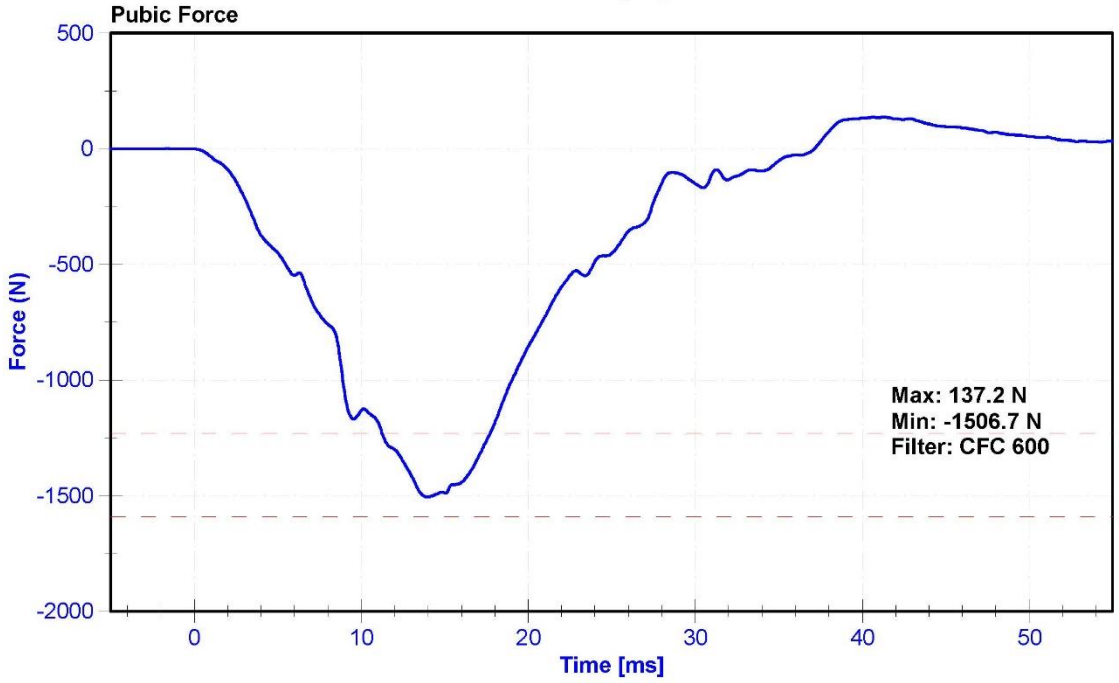
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.0	Pass
Humidity	10	70	%	34.9	Pass
Velocity	4.2	4.4	m/s	4.39	Pass
Resistive Force	4700	5400	N	5012.0	Pass
Time at Peak Resistive Force	11.8	16.1	ms	13.55	Pass
Pubic Force	-1590	-1230	N	-1506.7	Pass
Time at Peak Pubic Force	12.2	17.0	ms	13.95	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Pubic Load Cell	Denton 3096JFL	LC-465Fy	6/6/2017	6/6/2018




Resistive Force
Force (N)
6000
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]
Max: 5012.0 N
Min: 15.6 N
Filter: CFC 180


Pubic Force
Force (N)
500
0
-500
-1000
-1500
-2000
0
10
20
30
40
50
Time [ms]
Max: 137.2 N
Min: -1506.7 N
Filter: CFC 600

CALIBRATION TEST RESULTS

PRE-TEST

SID-IIS 5TH PERCENTILE FEMALE - PASSENGER ATD

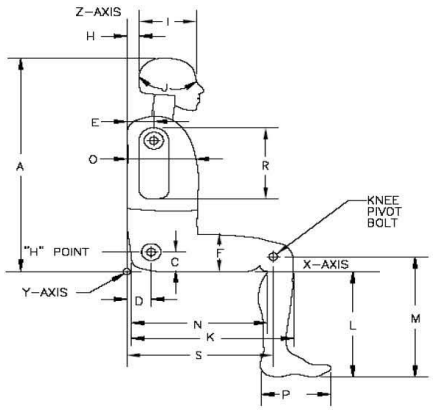
SERIAL No: 300

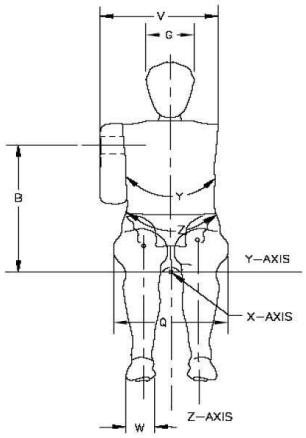
(CONFIGURED FOR LEFT SIDE IMPACT)

External Measurements - SID-IIs

Technician: K. Brogan Date: 5/7/2018

Dummy Serial Number: 300





Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	780	Pass
B	Shoulder Pivot Height	437	453	445	Pass
C	H-point Height	79	89	85	Pass
D	H-point from seatback	141	151	146	Pass
E	Shoulder Pivot from Backline	97	107	103	Pass
F	Thigh Clearance	119	135	124	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	548	Pass
K	Buttock to Knee Length	514	540	535	Pass
L	Popliteal Height	343	369	360	Pass
M	Knee Pivot to floor height	392	409	403	Pass
N	Buttock Popliteal Length	416	442	432	Pass
O	Chest Depth w/o jacket	195	211	205	Pass
P	Foot Length	216	232	221	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	318	Pass
R	Arm Length	249	259	252	Pass
S	Knee Joint to seatback	477	493	487	Pass
V	Shoulder Width	341	357	350	Pass
W	Foot Width	78	94	85	Pass
Y	Chest Circumference w/jacket	851	881	870	Pass
Z	Waist Circumference	761	791	770	Pass

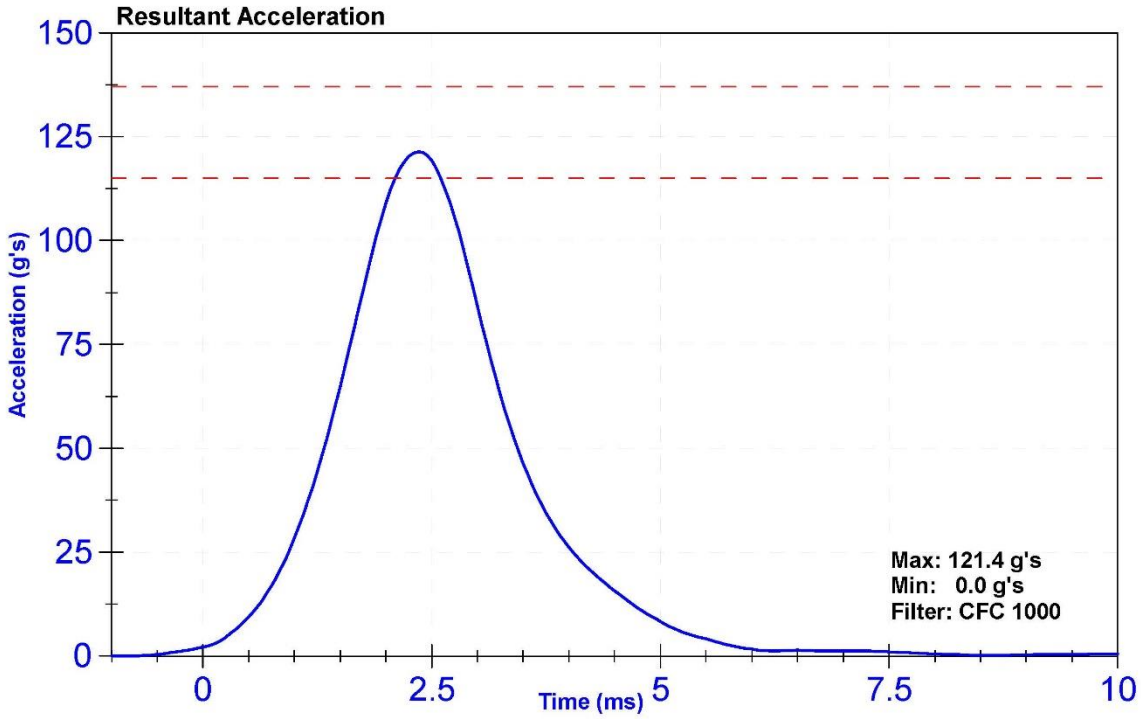
ATD Manufacturer	FTSS	Test Technician	J.Pericak
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

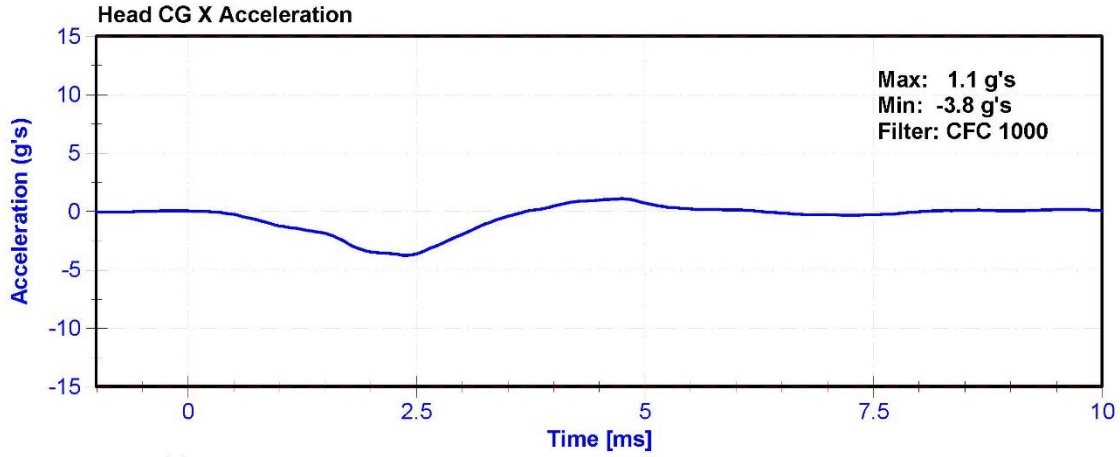
Results

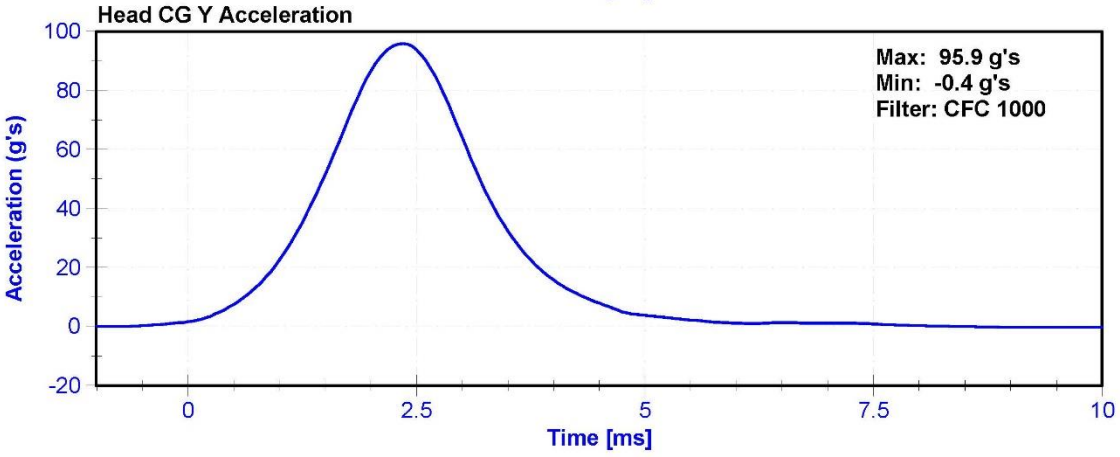
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21	Pass
Humidity	10	70	%	36.6	Pass
Resultant Acceleration	115	137	g's	121.4	Pass
Oscillation	0	15	%	1.1	Pass
Fore-Aft Acceleration	-15	15	g's	-3.8	Pass

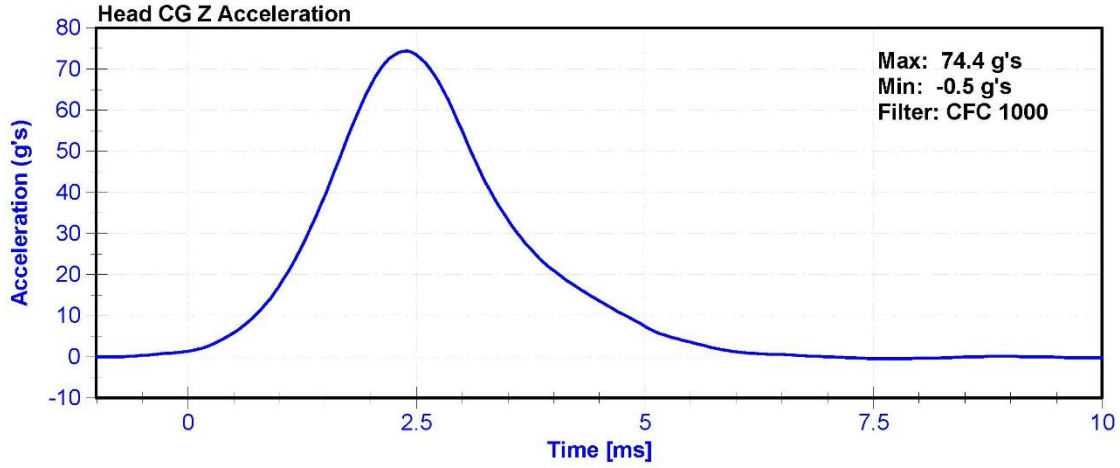
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264CT	AC-P58777	5/7/2018	11/5/2018
Y Accelerometer	ENDEVCO 7264CT	AC-P59018	5/7/2018	11/5/2018
Z Accelerometer	ENDEVCO 7264	AC-P79189	5/7/2018	11/5/2018




Head CG X Acceleration
Max: 1.1 g's
Min: -3.8 g's
Filter: CFC 1000
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
5
7.5
10
Time [ms]


Head CG Y Acceleration
Max: 95.9 g's
Min: -0.4 g's
Filter: CFC 1000
Acceleration (g's)
100
80
60
40
20
0
-20
0
2.5
5
7.5
10
Time [ms]


Head CG Z Acceleration
Max: 74.4 g's
Min: -0.5 g's
Filter: CFC 1000
Acceleration (g's)
80
70
60
50
40
30
20
10
0
-10
0
2.5
5
7.5
10
Time [ms]

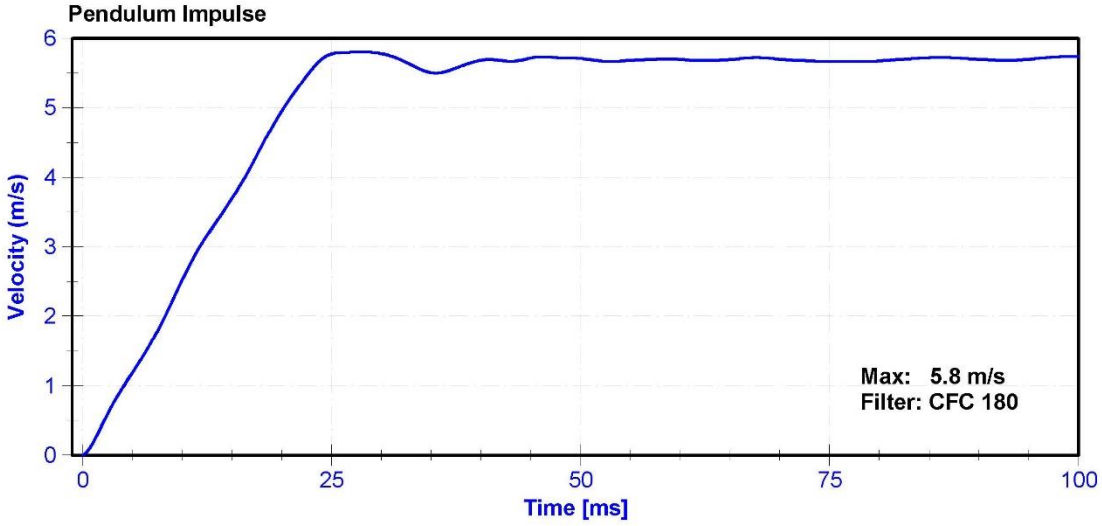
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

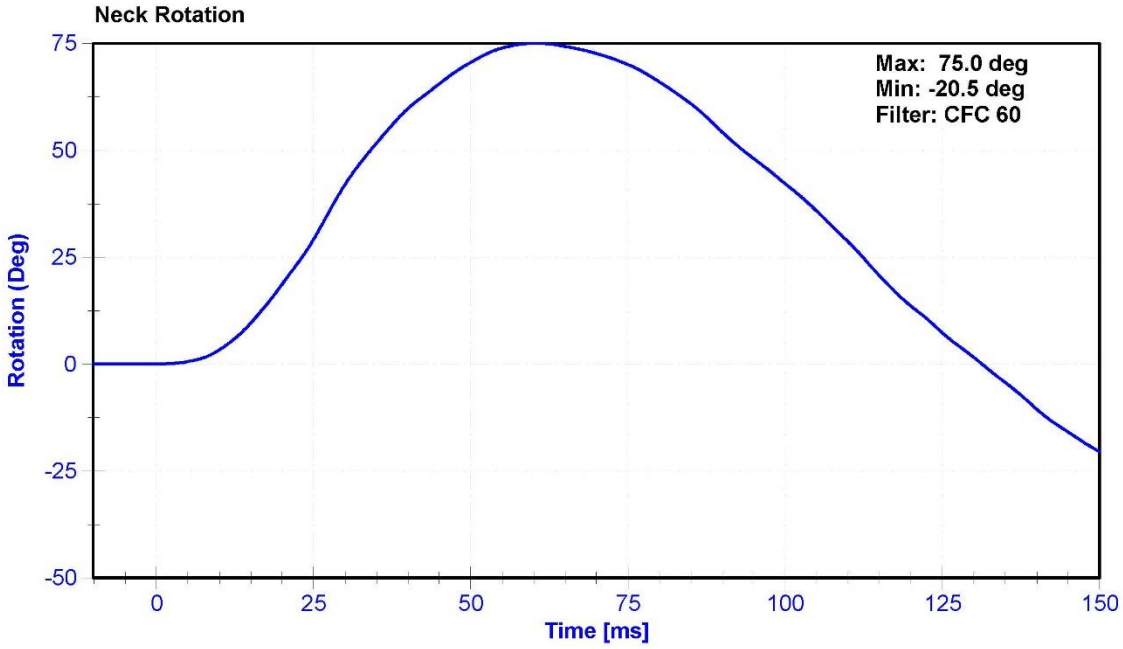
Results

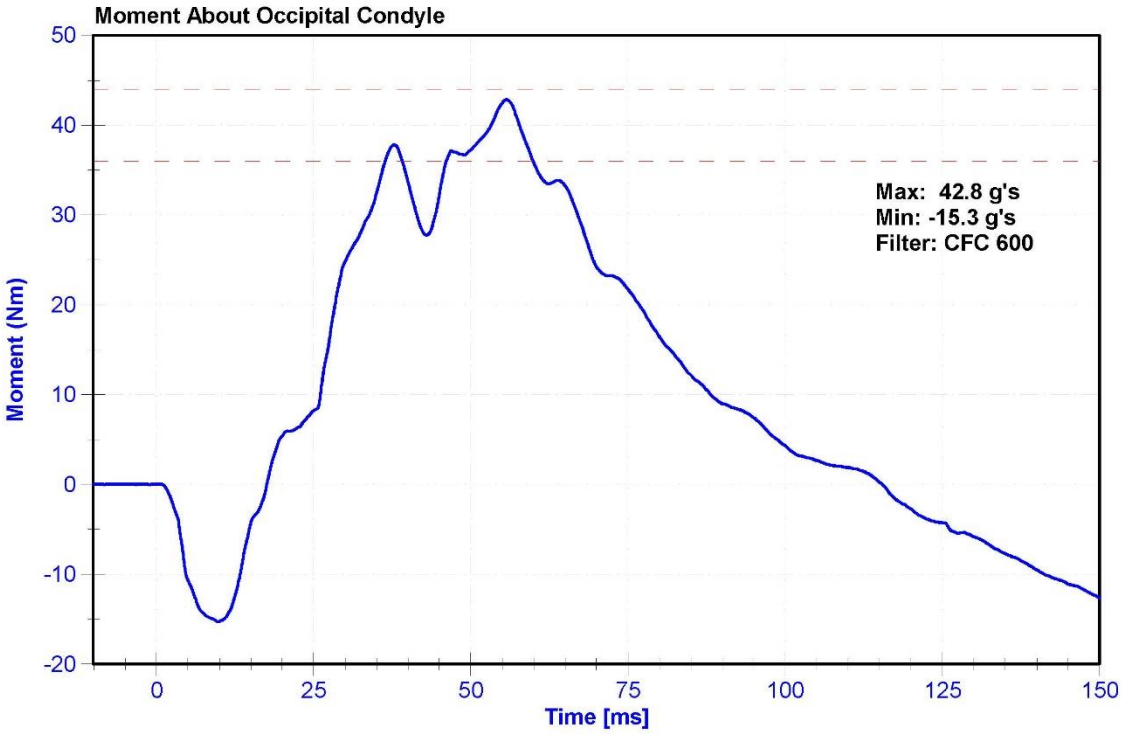
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21	Pass
Humidity	10	70	%	35.4	Pass
Velocity	5.51	5.63	m/s	5.546	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.52	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.70	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.95	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.78	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.81	Pass
Neck Rotation	71	81	deg	75.0	Pass
Time at Maximum Rotation	50	70	ms	60.3	Pass
Moment about the OC	36	44	Nm	42.8	Pass
Moment Decay to 0 Nm	102	126	ms	115.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/11/2017	5/11/2018
Pendulum Potentiometer	Denton 78051-342	DS-184Pend	10/27/2017	10/27/2018
Condyle Potentiometer	Denton 78051-342	DS-185Pend	10/27/2017	10/27/2018
Upper Neck Load Cell	Denton 1716	LC-1872 FY	7/26/2017	7/26/2018




Neck Rotation
Max: 75.0 deg
Min: -20.5 deg
Filter: CFC 60
Rotation (Deg)
75
50
25
0
-25
-50
0
25
50
75
100
125
150
Time [ms]


Moment About Occipital Condyle
Max: 42.8 g's
Min: -15.3 g's
Filter: CFC 600
Moment (Nm)
50
40
30
20
10
0
-10
-20
0
25
50
75
100
125
150
Time [ms]

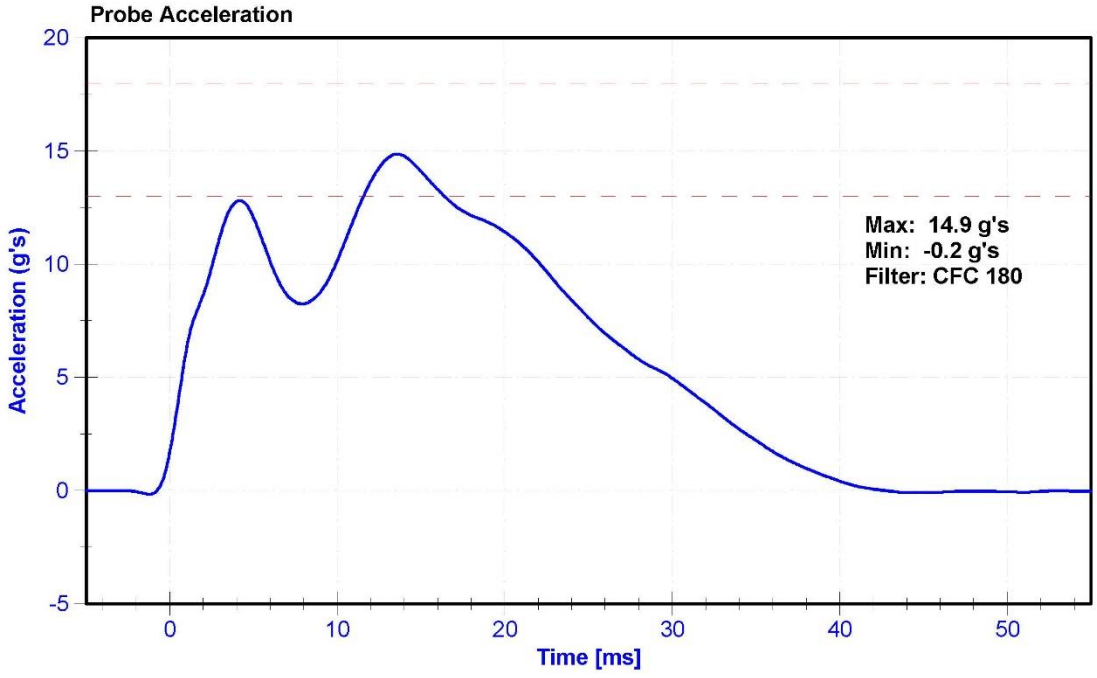
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

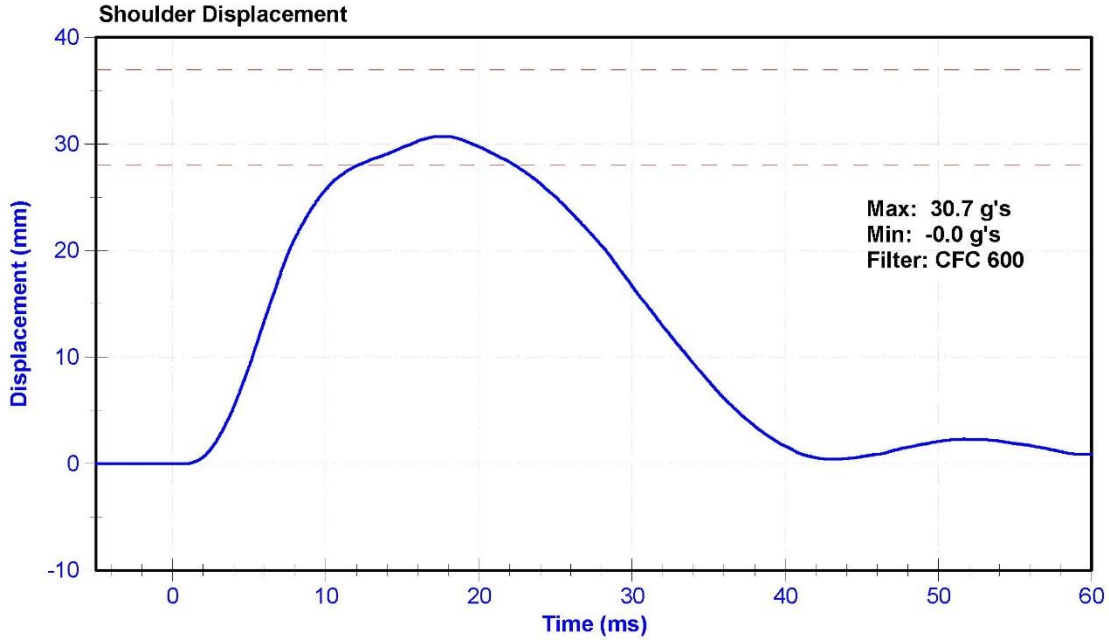
Results

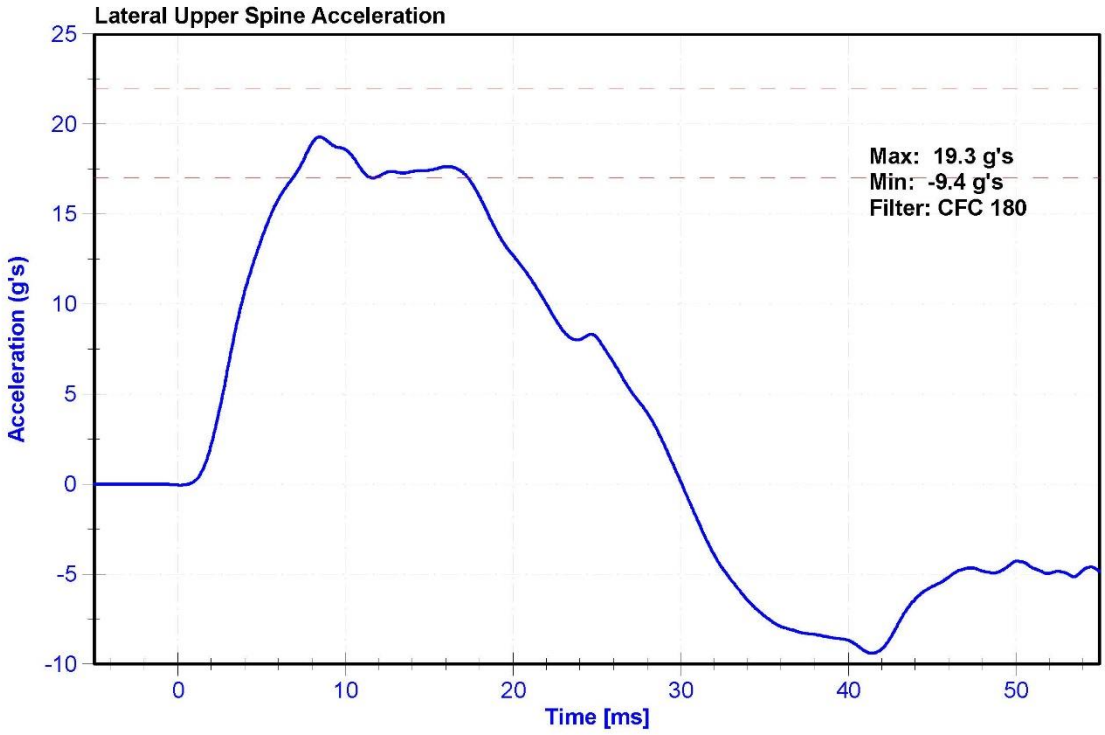
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.1	Pass
Humidity	10	70	%	47.7	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	13	18	g's	14.9	Pass
Shoulder Deflection	28	37	mm	30.7	Pass
Lateral Upper Spine Acceleration	17	22	g's	19.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Shoulder Potentiometer	Servo 08TC1-3725	DS-1063GFE	9/27/2017	9/27/2018
Upper Spine Y Accelerometer	ENDEVCO 7264	AC-P83320	5/7/2018	11/5/2018




Shoulder Displacement
Displacement (mm)
Time (ms)
Max: 30.7 g's
Min: -0.0 g's
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 19.3 g's
Min: -9.4 g's
Filter: CFC 180

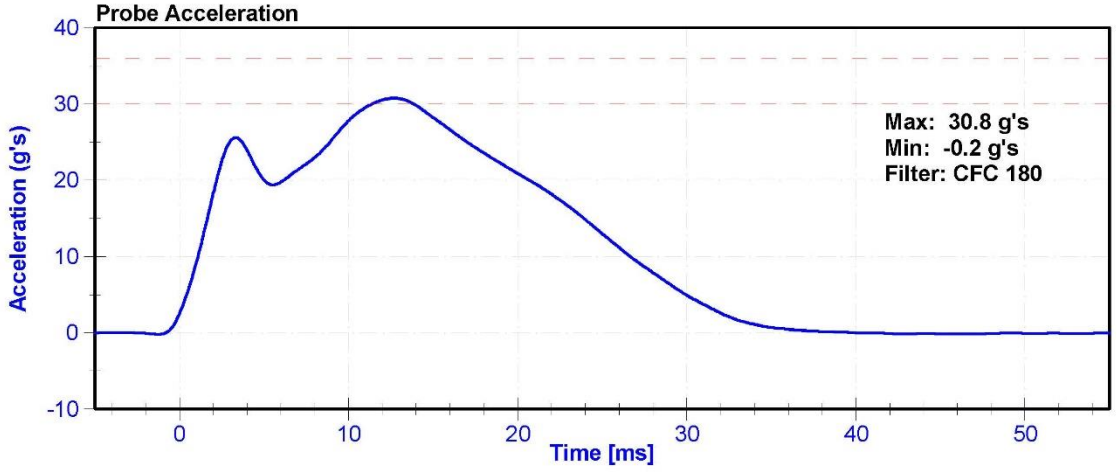
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

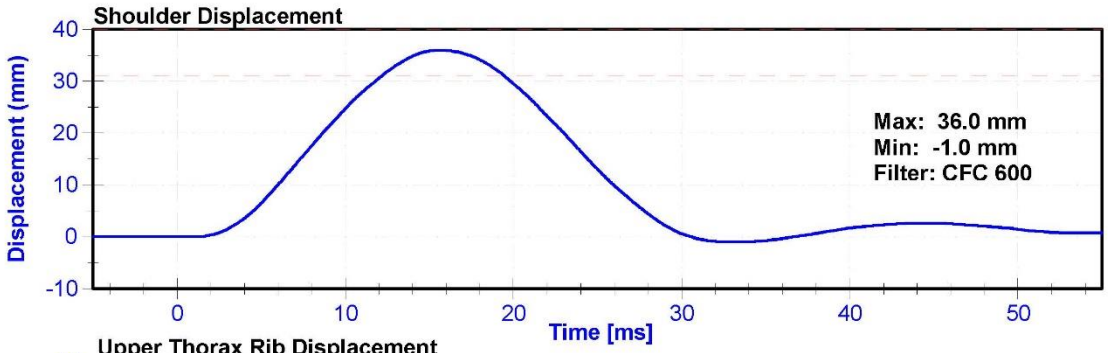
Results

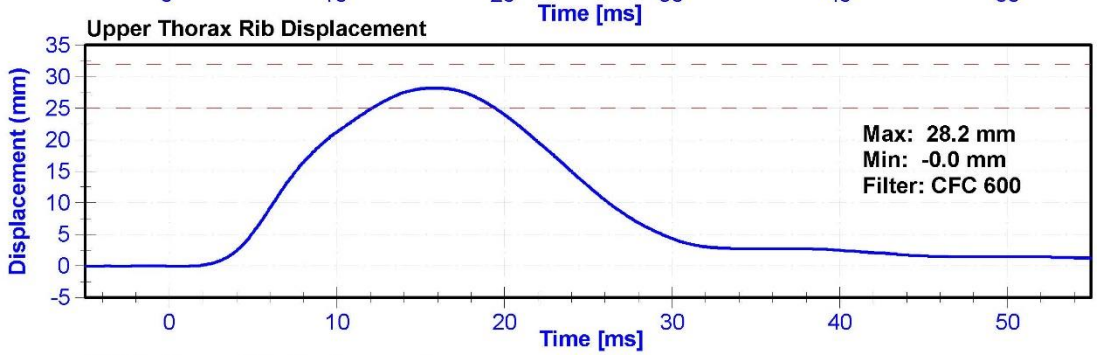
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.7	Pass
Humidity	10	70	%	47.8	Pass
Velocity	6.6	6.8	m/s	6.77	Pass
Probe Acceleration after 5 ms	30	36	g's	30.8	Pass
Lateral Upper Spine Acceleration	34	43	g's	38.5	Pass
Lateral Lower Spine Acceleration	29	37	g's	32.3	Pass
Shoulder Deflection	31	40	mm	36.0	Pass
Upper Thorax Rib Deflection	25	32	mm	28.2	Pass
Mid Thorax Rib Deflection	30	36	mm	32.7	Pass
Lower Thorax Rib Deflection	32	38	mm	34.1	Pass

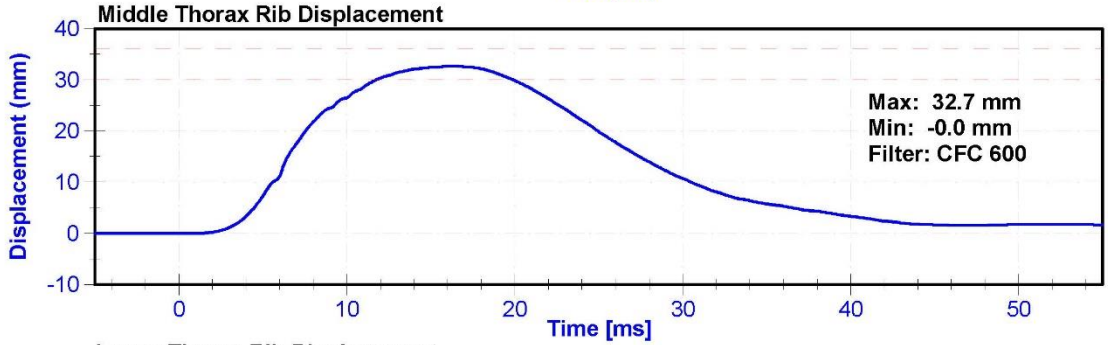
Transducer Calibrations

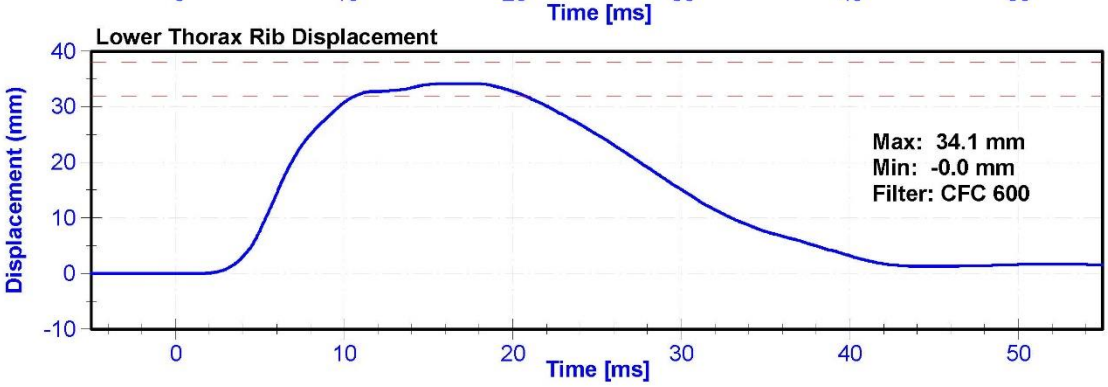
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Upper Spine T1 Y Accelerometer	ENDEVCO 7264	AC-P83320	5/7/2018	11/5/2018
Upper Spine T12 Y Accelerometer	ENDEVCO 7264	AC-P64147	5/7/2018	11/5/2018
Shoulder Potentiometer	Servo 08TC1-3725	DS-1063GFE	9/27/2017	9/27/2018
Upper Thorax Rib Potentiometer	Servo 08CT1-3725	DS-451GFE	9/27/2017	9/27/2018
Middle Thorax Rib Potentiometer	Servo 08TC1-3745	DS-1151GFE	9/27/2017	9/27/2018
Lower Thorax Rib Potentiometer	Servo 08TC1-3725	DS-1156GFE	9/27/2017	9/27/2018

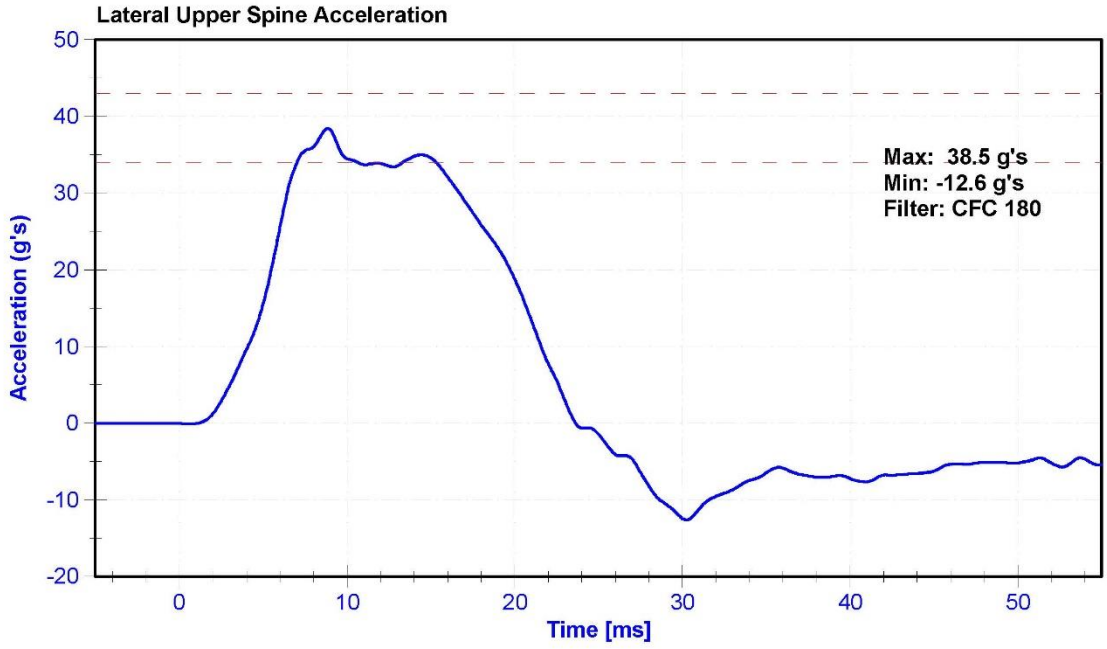


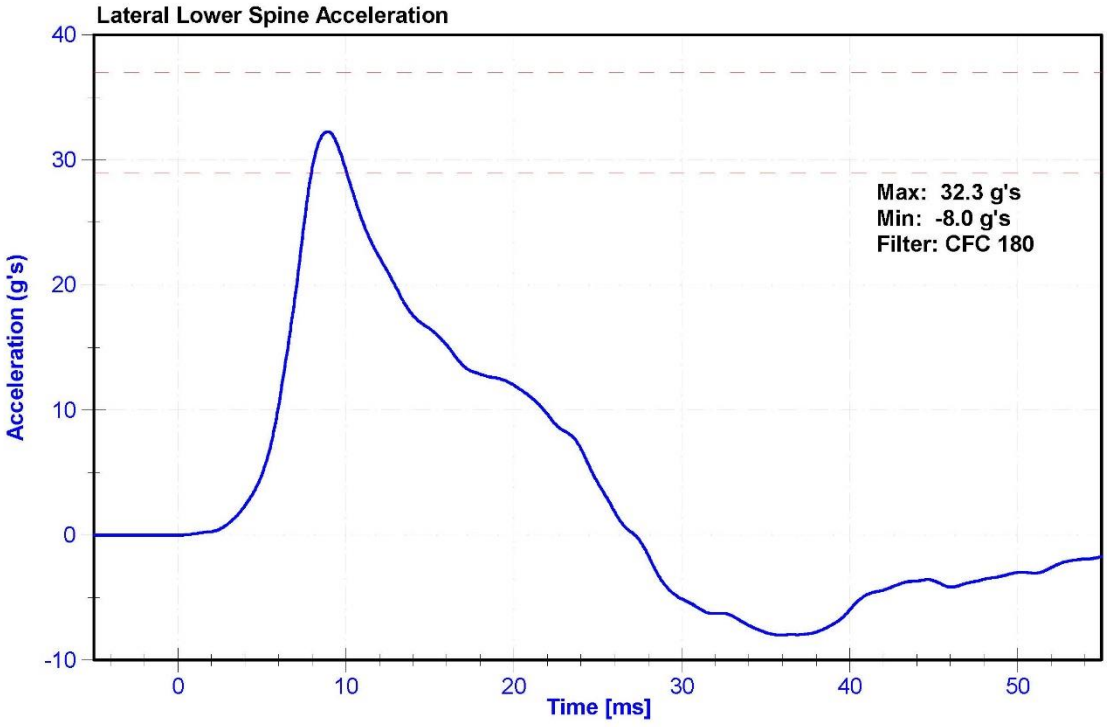

Shoulder Displacement
Displacement (mm)
Time [ms]
Max: 36.0 mm
Min: -1.0 mm
Filter: CFC 600


Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 28.2 mm
Min: -0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 32.7 mm
Min: -0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 34.1 mm
Min: -0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Max: 38.5 g's
Min: -12.6 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50


Lateral Lower Spine Acceleration
Max: 32.3 g's
Min: -8.0 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
40
30
20
10
0
-10
0
10
20
30
40
50

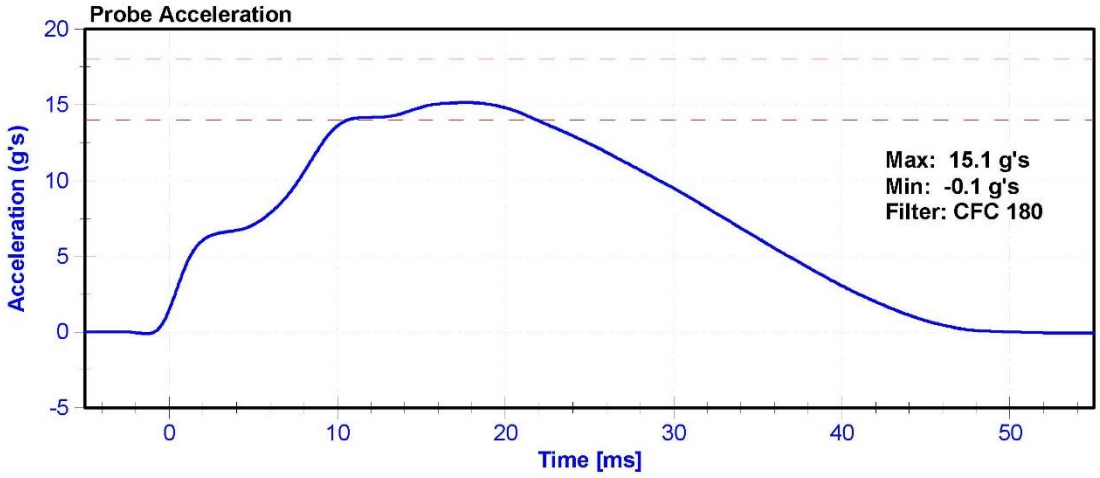
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

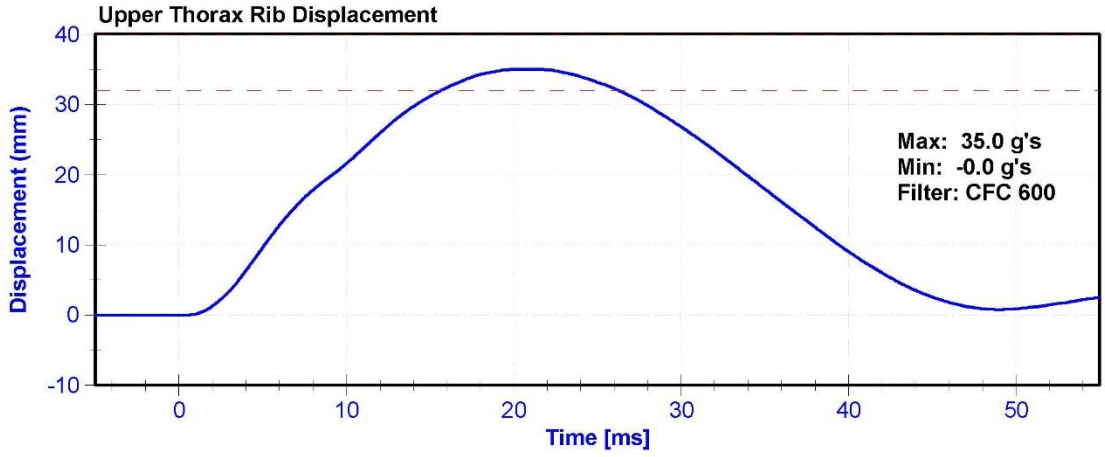
Results

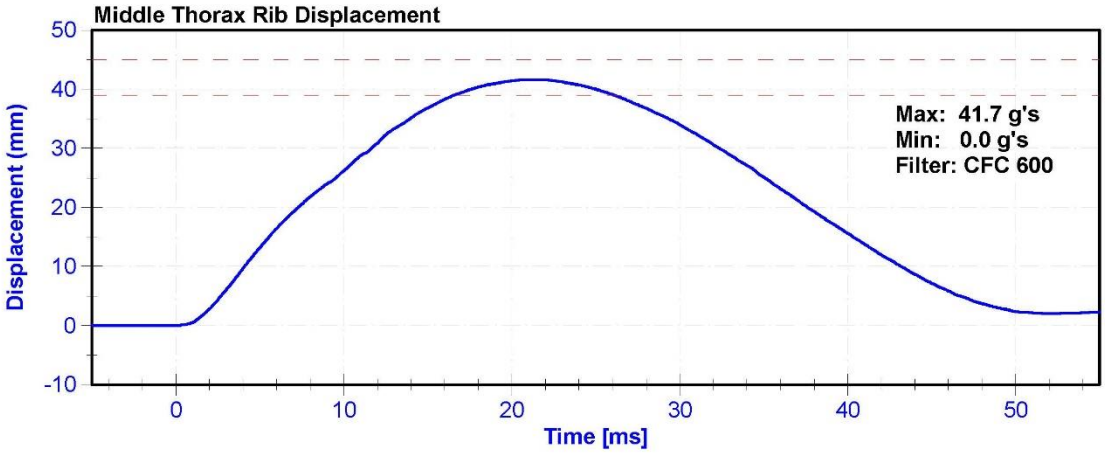
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.8	Pass
Humidity	10	70	%	33.4	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	14	18	g's	15.1	Pass
Lateral Upper Spine Acceleration	13	17	g's	13.7	Pass
Lateral Lower Spine Acceleration	7	11	g's	9.1	Pass
Upper Thorax Rib Deflection	32	40	mm	35.0	Pass
Middle Thorax Rib Deflection	39	45	mm	41.7	Pass
Lower Thorax Rib Deflection	35	43	mm	38.6	Pass

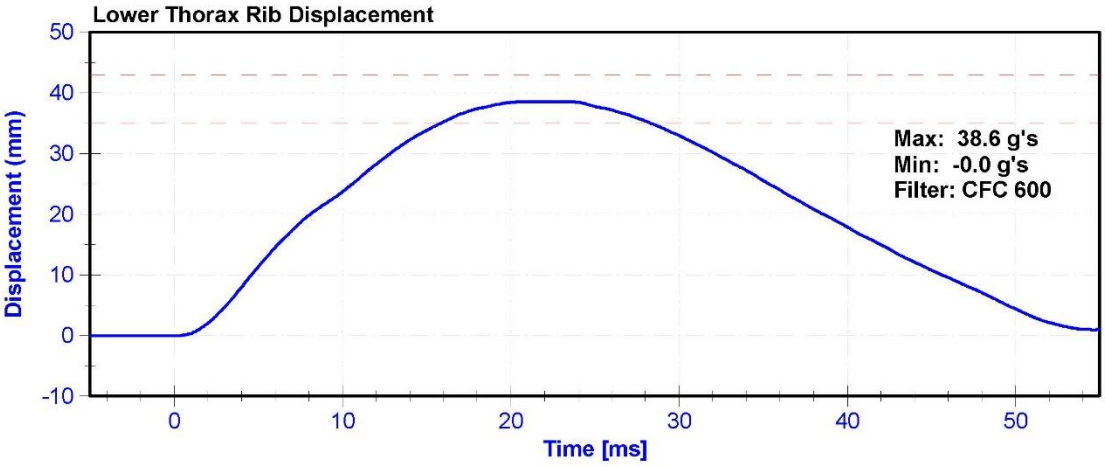
Transducer Calibrations

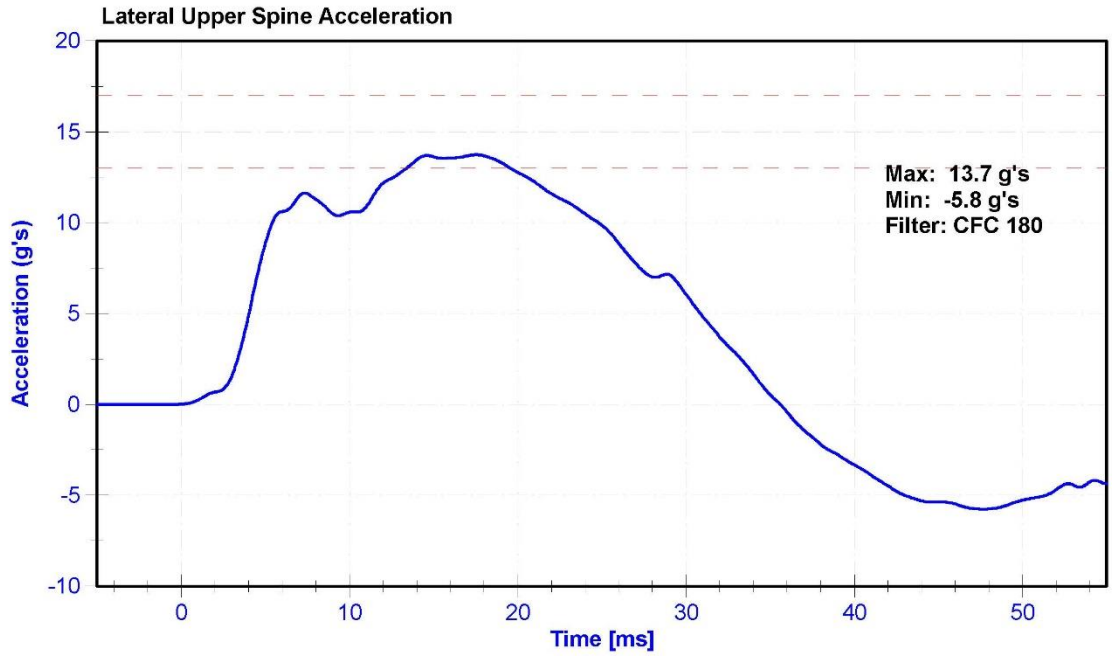
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Upper Spine Y Accelerometer	ENDEVCO 7264	AC-P83320	5/7/2018	11/5/2018
Lower Spine Y Accelerometer	ENDEVCO 7264	AC-P64147	5/7/2018	11/5/2018
Upper Thorax Rib Potentiometer	Servo 08CT1-3725	DS-451GFE	9/27/2017	9/27/2018
Middle Thorax Rib Potentiometer	Servo 08TC1-3745	DS-1151GFE	9/27/2017	9/27/2018
Lower Thorax Rib Potentiometer	Servo 08TC1-3725	DS-1156GFE	9/27/2017	9/27/2018

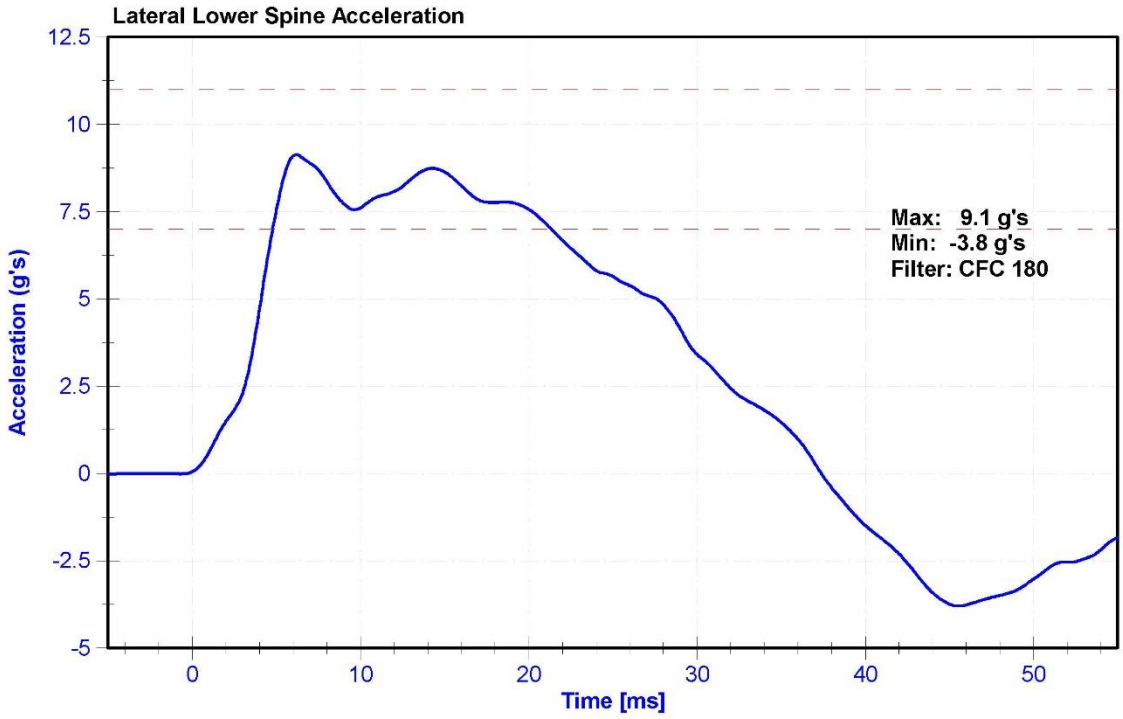



Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 35.0 g's
Min: -0.0 g's
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 41.7 g's
Min: 0.0 g's
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 38.6 g's
Min: -0.0 g's
Filter: CFC 600


Lateral Upper Spine Acceleration
Max: 13.7 g's
Min: -5.8 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
20
15
10
5
0
-5
-10
0
10
20
30
40
50


Lateral Lower Spine Acceleration
Max: 9.1 g's
Min: -3.8 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
12.5
10
7.5
5
2.5
0
-2.5
-5
0
10
20
30
40
50

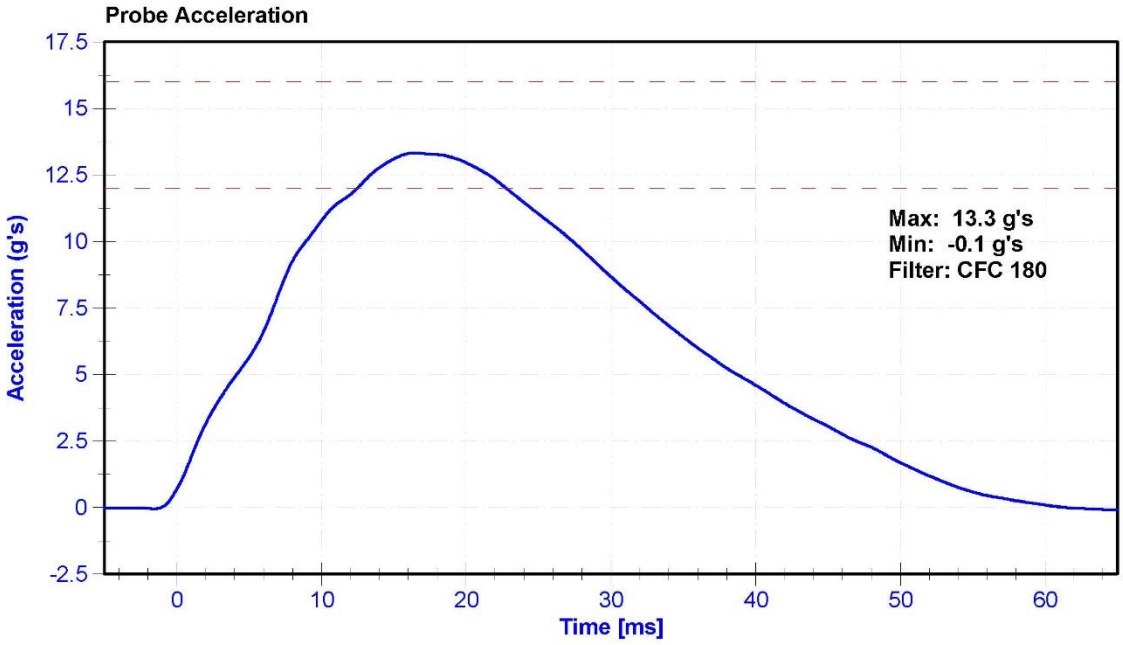
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

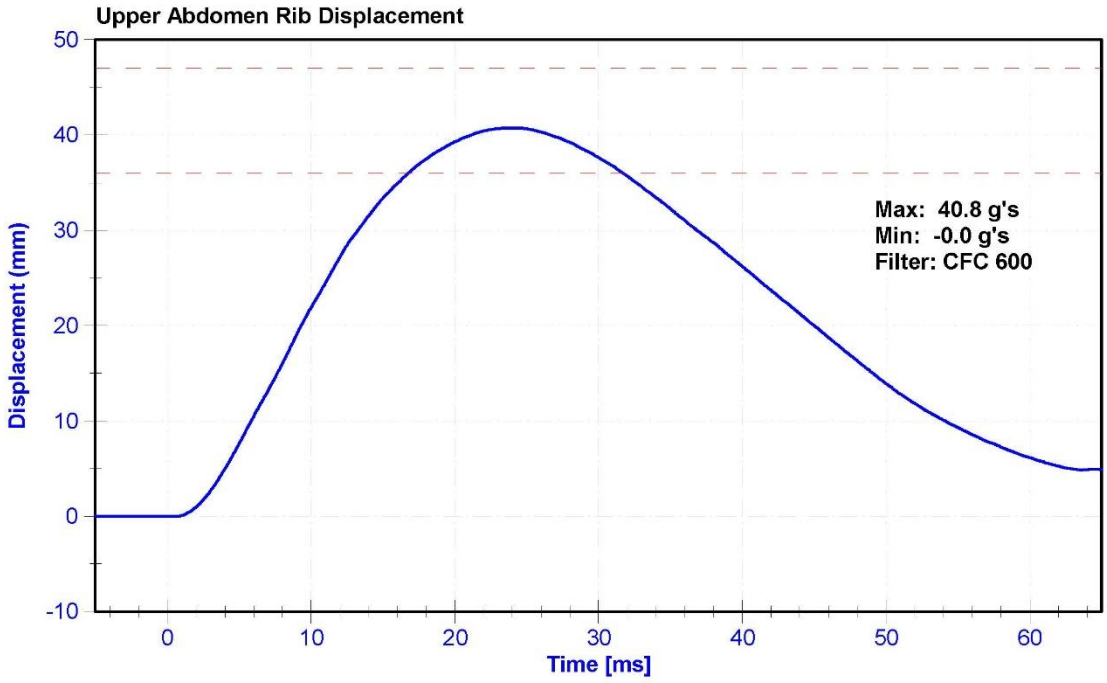
Results

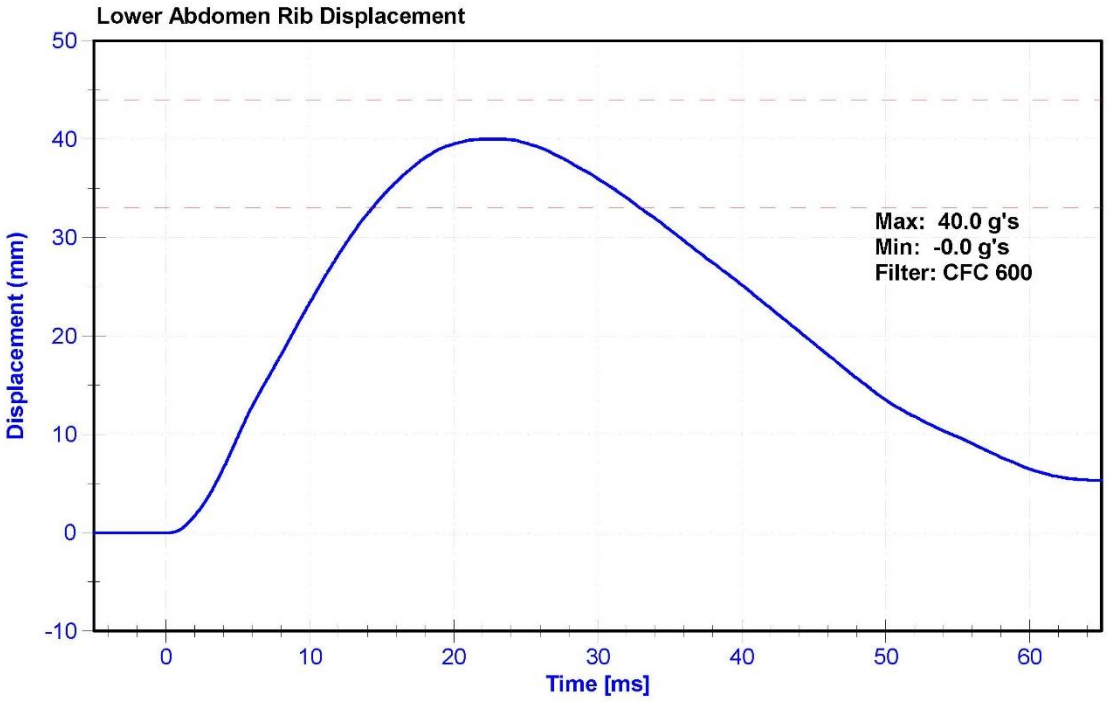
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.1	Pass
Humidity	10	70	%	40.6	Pass
Velocity	4.2	4.4	m/s	4.35	Pass
Probe Acceleration	12	16	g's	13.3	Pass
Lateral Lower Spine Acceleration	9	14	g's	11.0	Pass
Upper Abdomen Rib Deflection	36	47	mm	40.8	Pass
Lower Abdomen Rib Deflection	33	44	mm	40.0	Pass

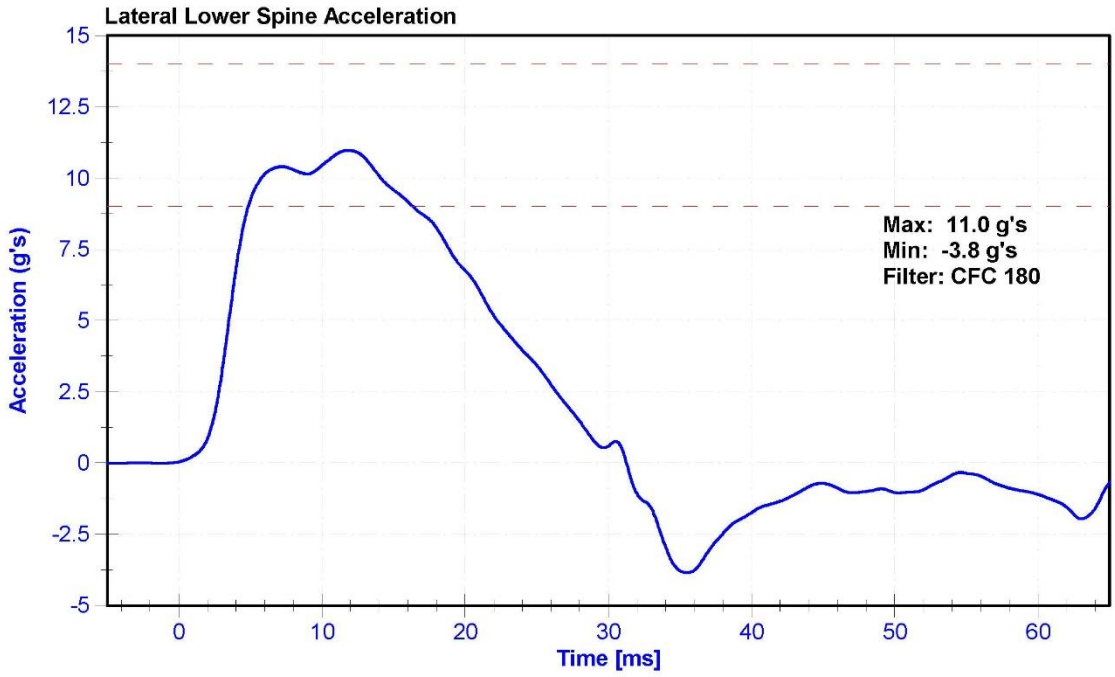
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Lower Spine Y Accelerometer	ENDEVCO 7264	AC-P64147	5/7/2018	11/5/2018
Upper Abdomen Rib Potentiometer	Servo 08CT1-3725	DS-308GFE	9/27/2017	9/27/2018
Lower Abdomen Rib Potentiometer	Servo 08CT1-3725	DS-307GFE	9/27/2017	9/27/2018




Upper Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 40.8 g's
Min: -0.0 g's
Filter: CFC 600


Lower Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 40.0 g's
Min: -0.0 g's
Filter: CFC 600


Lateral Lower Spine Acceleration
Acceleration (g's)
15
12.5
10
7.5
5
2.5
0
-2.5
-5
0
10
20
30
40
50
60
Time [ms]
Max: 11.0 g's
Min: -3.8 g's
Filter: CFC 180

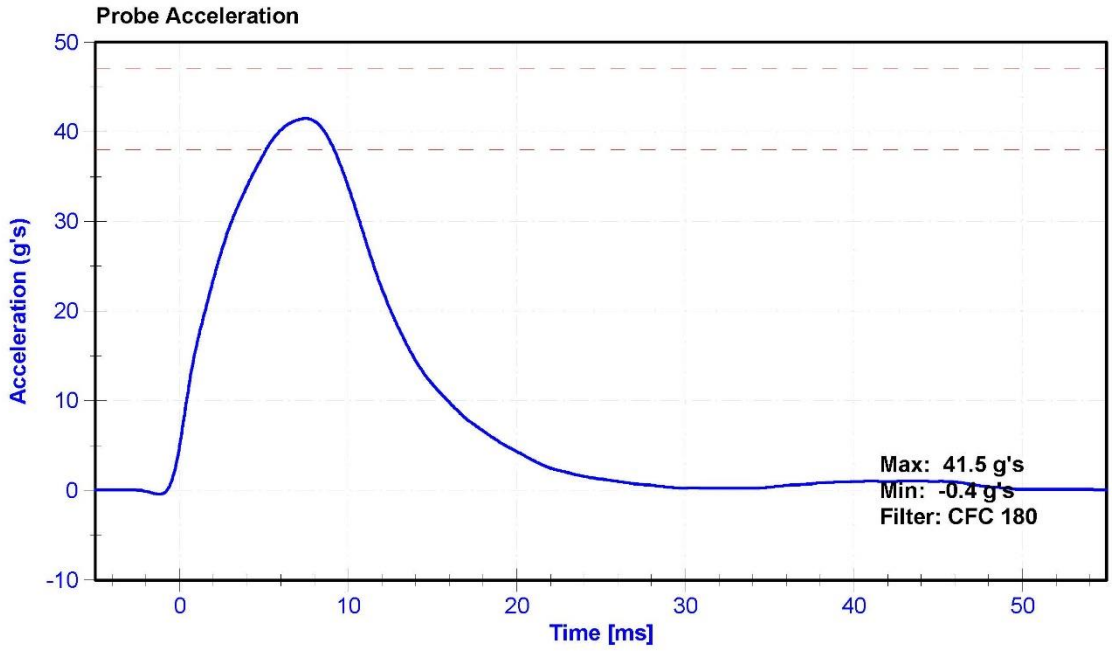
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

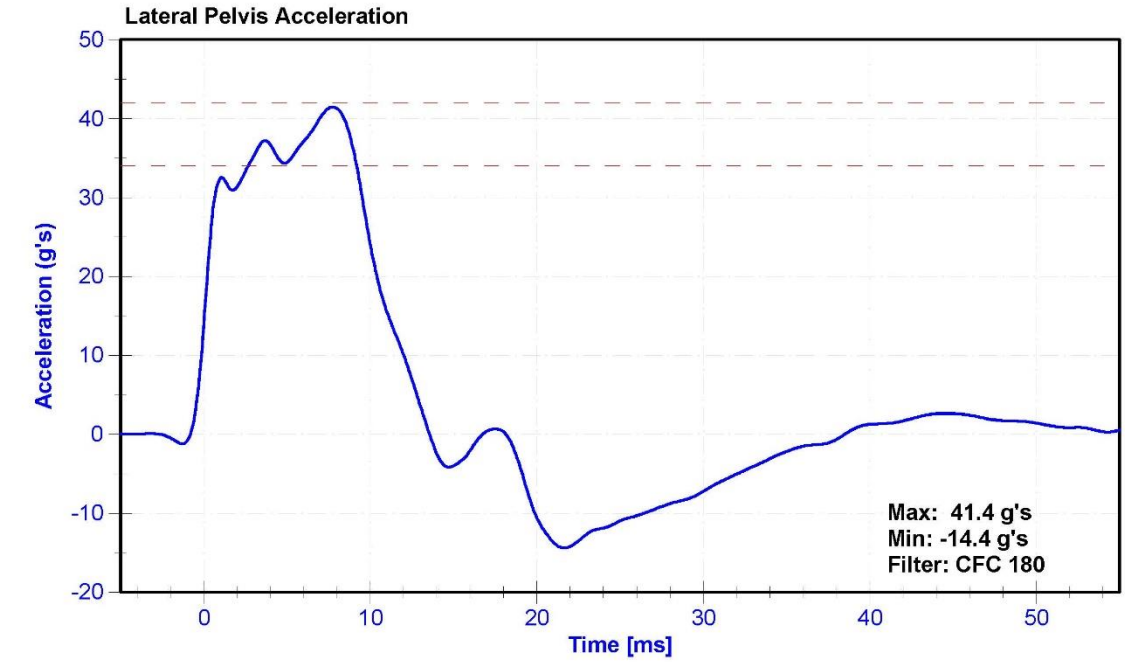
Results

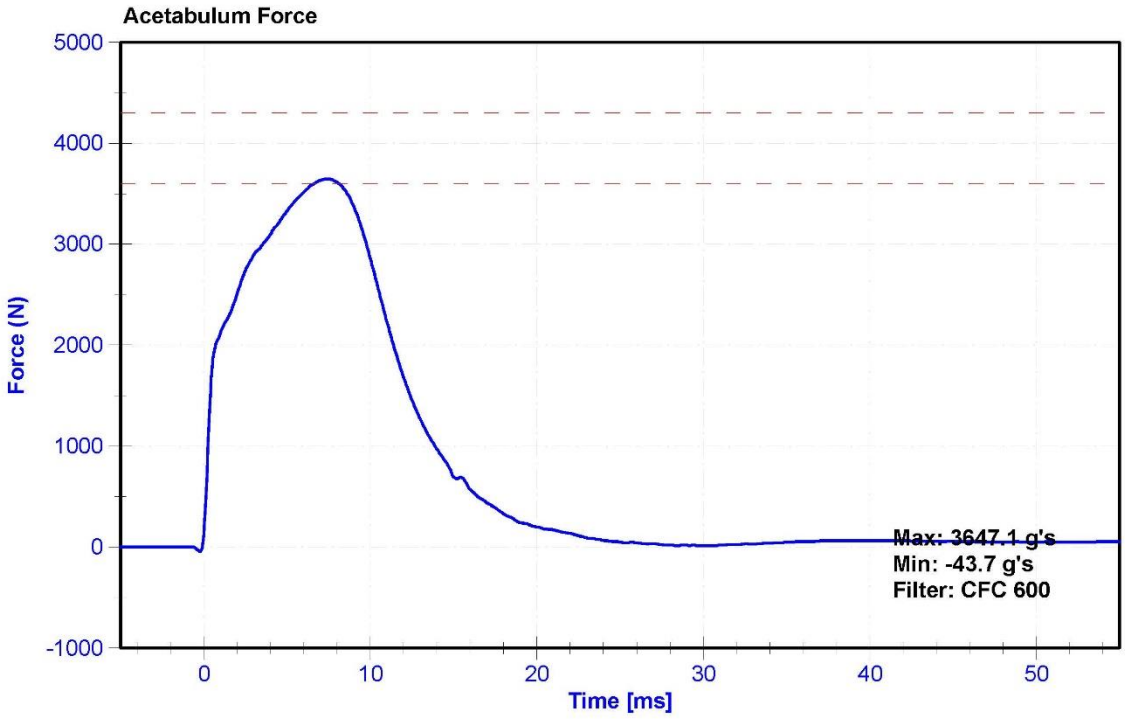
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	59..0	Pass
Velocity	6.6	6.8	m/s	6.60	
Probe Acceleration	38	47	g's	41.5	
Lateral Pelvis Acceleration after 6ms	34	42	g's	41.4	
Acetabulum Force	3600	4300	N	3647.1	

Transducer Calibrations

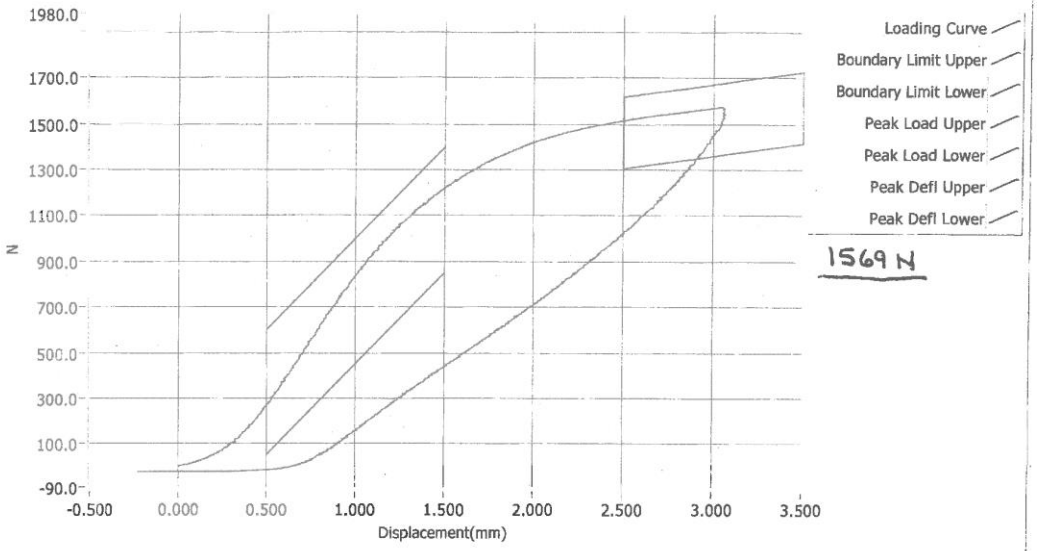
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P79602	5/7/2018	11/5/2018
Acetabulum Load Cell	DENTON 3249J	LC-275Fy	6/20/2017	6/20/2018
Certification Plug	Humanetics	63262	1/24/2013	N/A
Crash Test Plug	Humanetics	63068	1/19/2013	N/A




Lateral Pelvis Acceleration
Acceleration (g's)
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50
Time [ms]
Max: 41.4 g's
Min: -14.4 g's
Filter: CFC 180


Acetabulum Force
Force (N)
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]
Max: 3647.1 g's
Min: -43.7 g's
Filter: CFC 600

Resultant Data - SIDIIs Plug Compression



1569 N

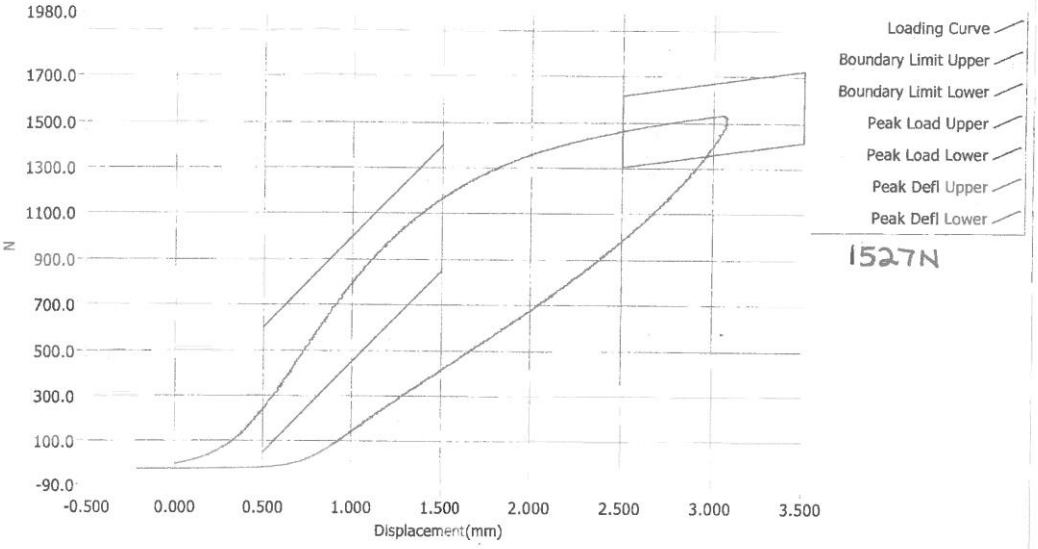
ATD Calibration Lab

CRASH

Test ID	Part Serial Number	Test Date	Test Time
	63068	1/19/2013	2:21 AM
Cert ID	ATD Serial Number	ATD Type	
	N/A	SIDIIs	

Current Date : 1/19/2013 Current Time : 02:21:57

Resultant Data - SIDIIs Plug Compression



ATD Calibration Lab

Cert

Test ID	Part Serial Number	Test Date	Test Time
	63063	1/19/2013	1:51 AM
Cert ID	ATD Serial Number	ATD Type	
	N/A	SIDIIs	

Current Date : 1/19/2013 Current Time : 01:51:53

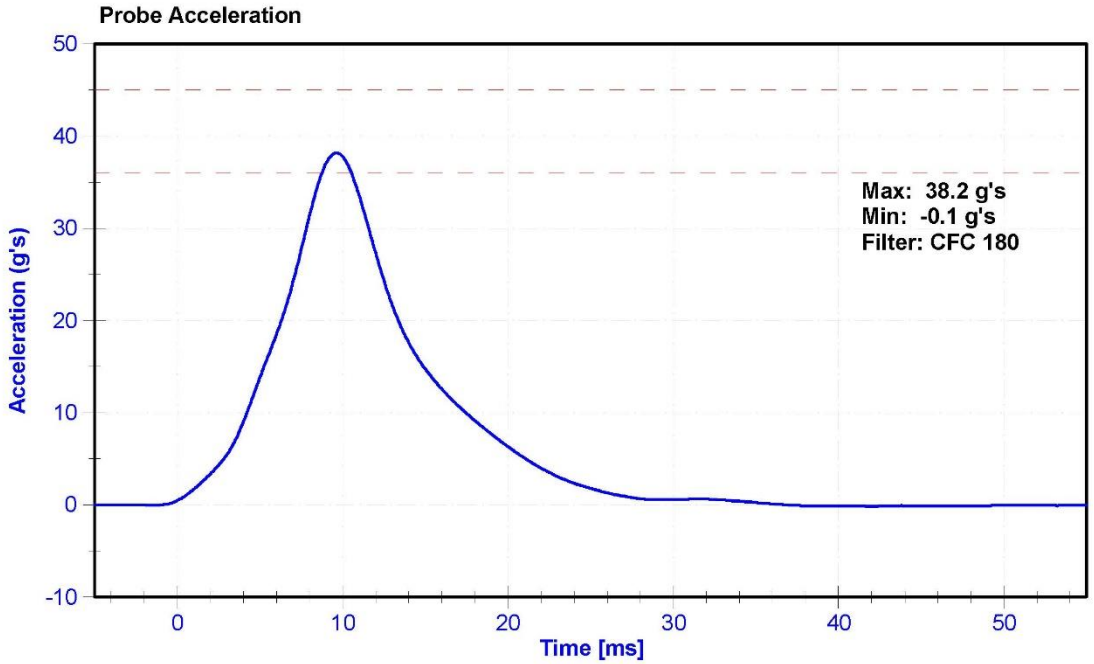
ATD Manufacturer	FTSS	Test Technician	K. Brogan
ATD Serial Number	300	Laboratory Supervisor	D. Reinhard

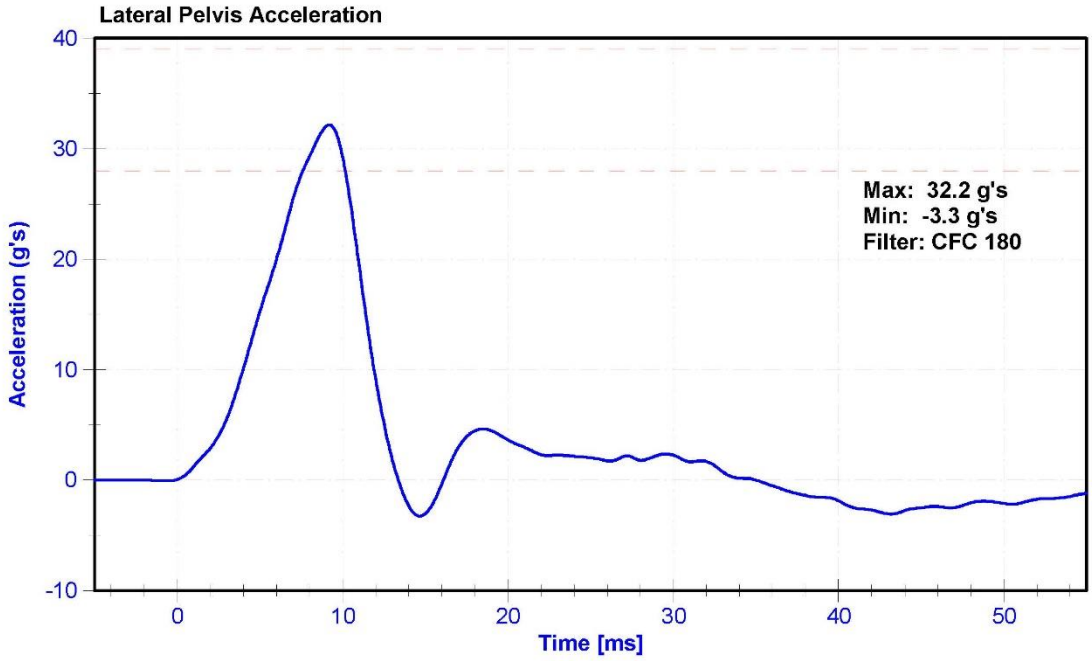
Results

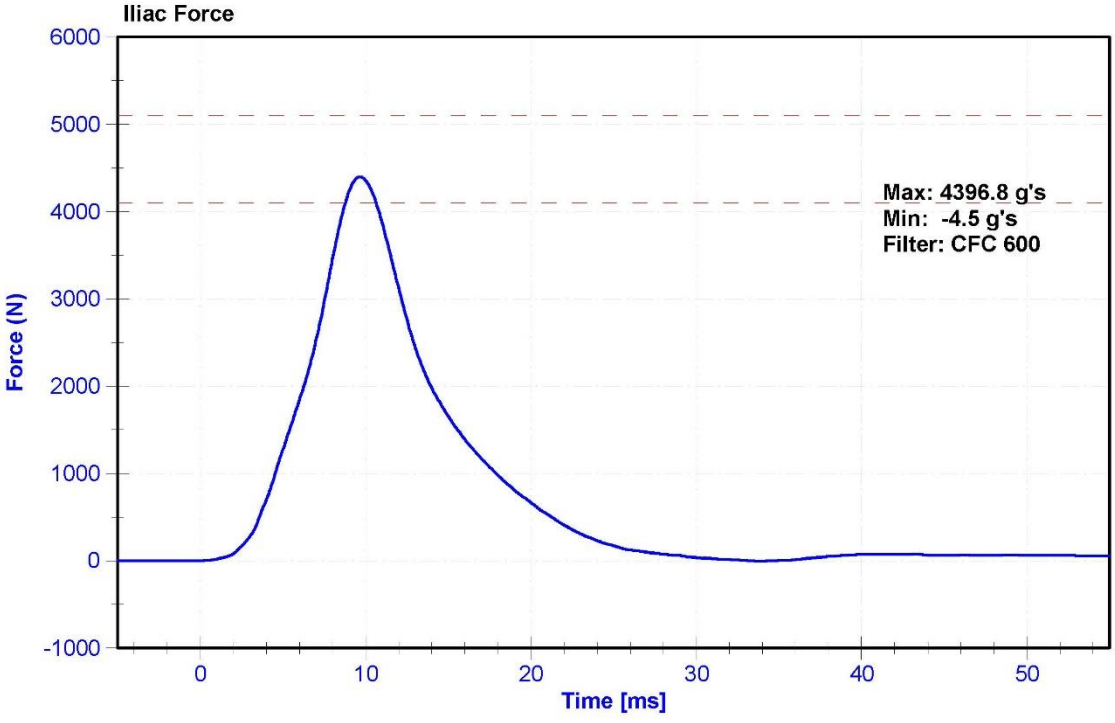
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.8	Pass
Humidity	10	70	%	51.0	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	36	45	g's	38.2	Pass
Lateral Pelvis Acceleration	28	39	g's	32.2	Pass
Iliac Force	4100	5100	N	4396.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P79602	5/7/2018	11/5/2018
Iliac Load Cell	DENTON 3228J	LC-279Fy	6/21/2017	6/21/2018




Lateral Pelvis Acceleration
Acceleration (g's)
Time [ms]
Max: 32.2 g's
Min: -3.3 g's
Filter: CFC 180


Iliac Force
Force (N)
Time [ms]
Max: 4396.8 g's
Min: -4.5 g's
Filter: CFC 600

CALIBRATION TEST RESULTS

POST-TEST

EUROSID 2 (ES-2RE) MALE – DRIVER ATD

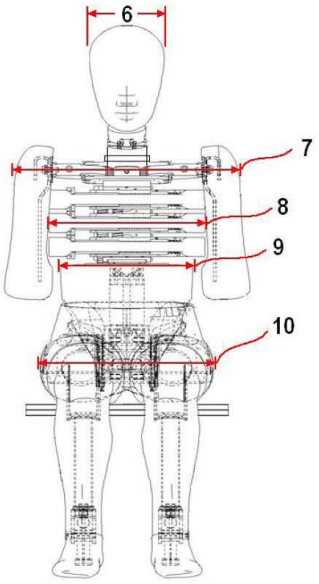
SERIAL NO: F034

(CONFIGURED FOR LEFT SIDE IMPACT)

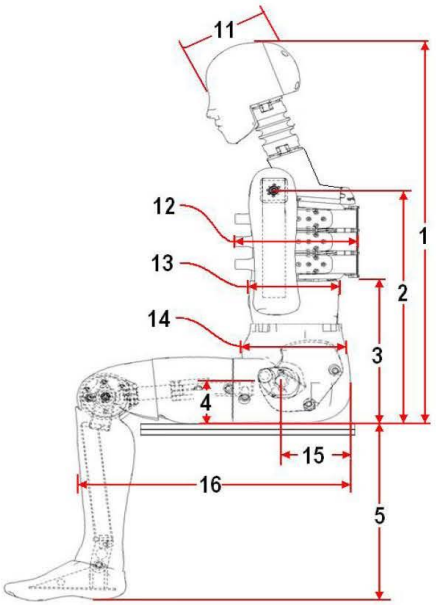
External Measurements - EuroSID-2re

Technician: K. Brogan Date: 5/14/2018

Dummy Serial Number: F034



FRONT VIEW



SIDE VIEW

Dim. No.	Description	Specification (mm)		Result (mm)	Pass/Fail
1	Sitting Height	900	918	912	Pass
2	Seat to Shoulder Joint	558	572	566	Pass
3	Seat to Lower Face of Thoracic Spine Box	346	356	349	Pass
4	Seat to Hip Joint (center of bolt)	97	103	99	Pass
5	Sole to Seat, Sitting	333	451	422	Pass
6	Head Width	152	158	155	Pass
7	Shoulder/Arm Width	461	479	470	Pass
8	Thorax Width	322	332	326	Pass
9	Abdomen Width	273	287	280	Pass
10	Pelvis Lap Width	359	373	368	Pass
11	Head Depth	196	206	200	Pass
12	Thorax Depth	262	272	267	Pass
13	Abdomen Depth	194	204	201	Pass
14	Pelvis Depth	235	245	240	Pass
15	Back of Buttocks to Hip Joint (center of bolt)	150	160	155	Pass
16	Back of Buttocks to Front Knee	597	615	601	Pass

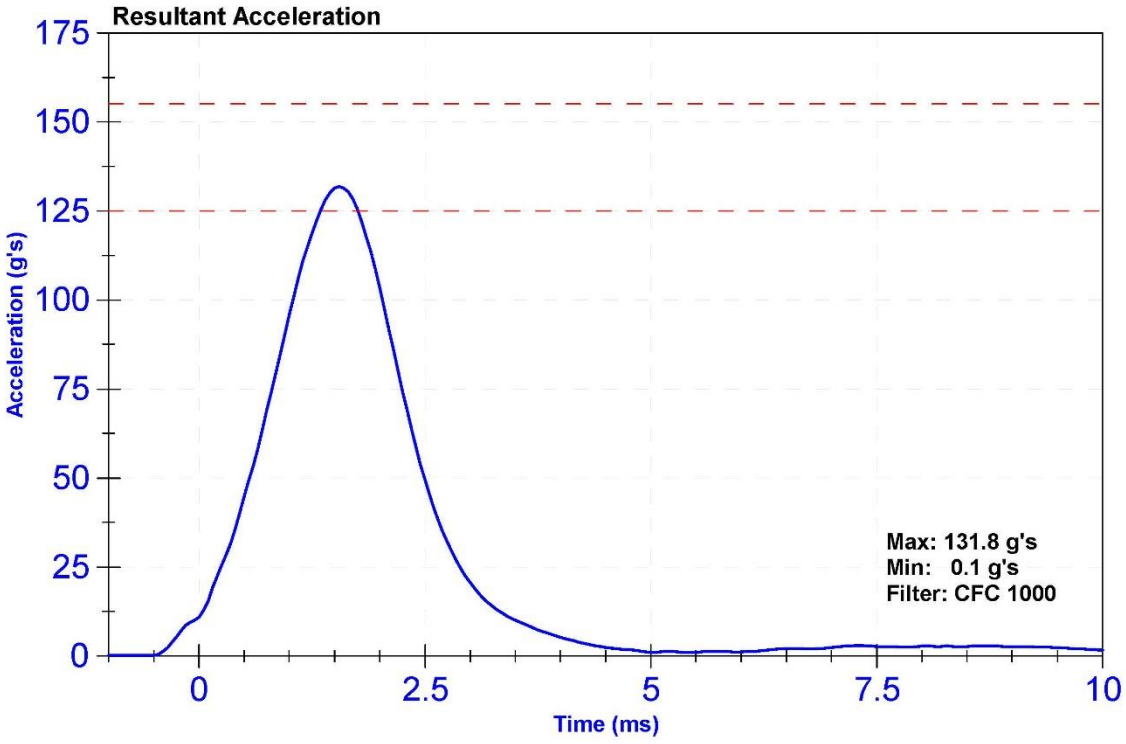
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

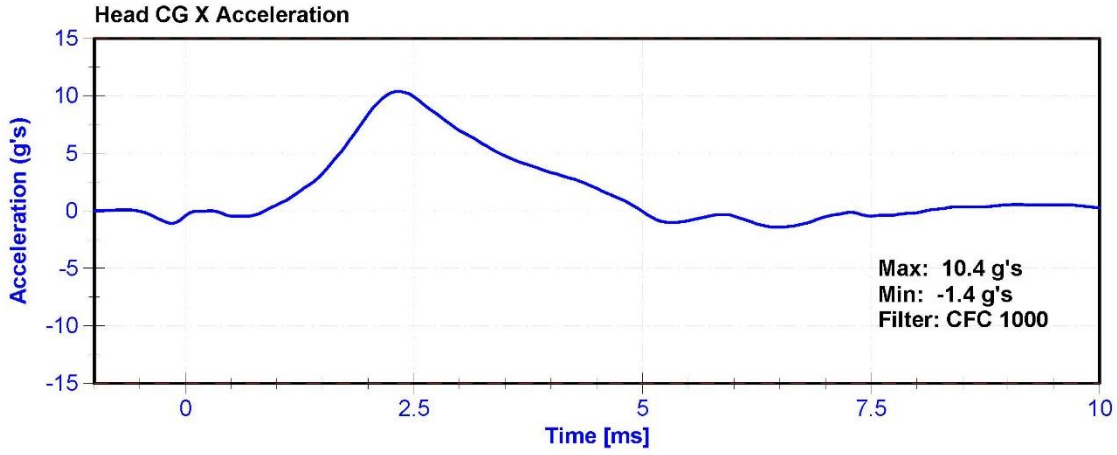
Results

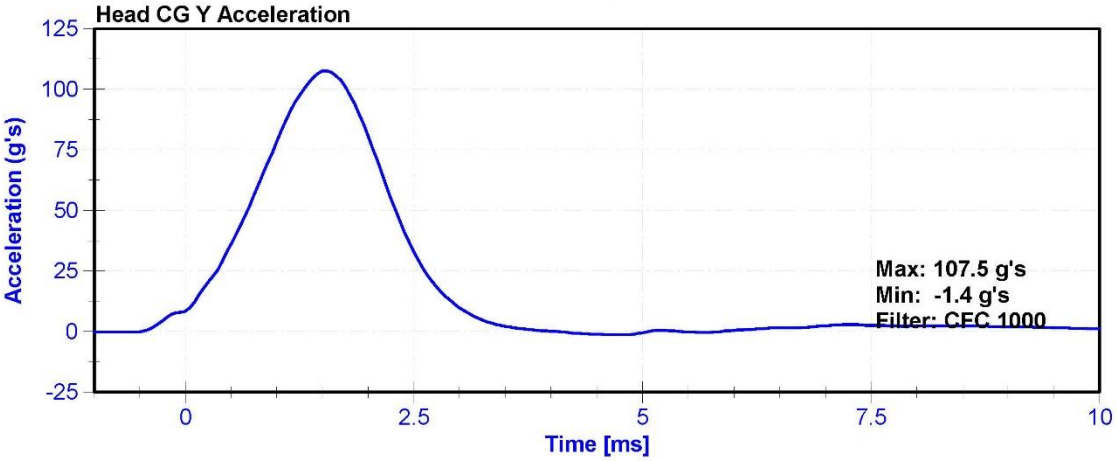
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.0	Pass
Humidity	10	70	%	29.8	Pass
Resultant Acceleration	125	155	g's	131.8	Pass
Oscillation	0	15	%	2.23	Pass
Fore-Aft Acceleration	-15	15	g's	10.4	Pass

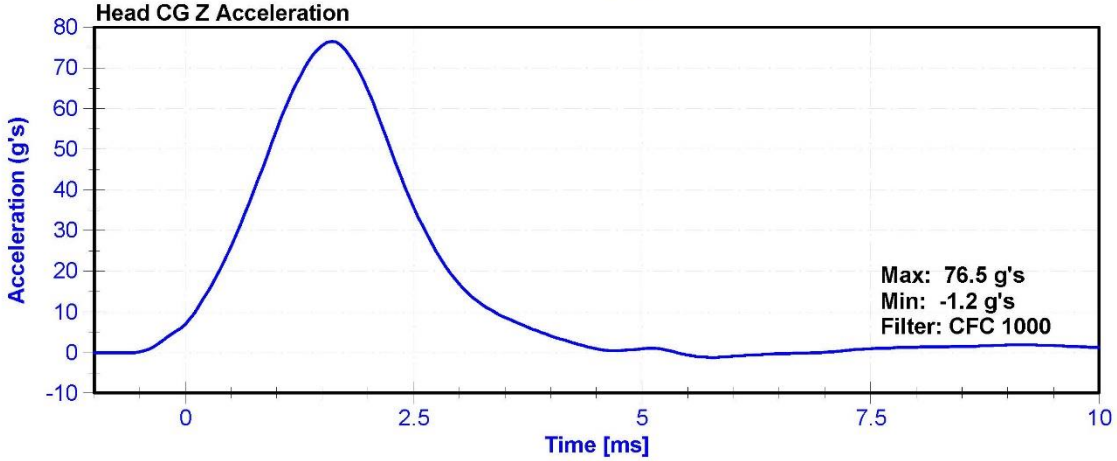
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264CT	AC-P58904	5/7/2018	11/5/2018
Y Accelerometer	ENDEVCO 7264CT	AC-P58911	5/7/2018	11/5/2018
Z Accelerometer	ENDEVCO 7264CT	AC-P58776	5/7/2018	11/5/2018




Head CG X Acceleration
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
5
7.5
10
Time [ms]
Max: 10.4 g's
Min: -1.4 g's
Filter: CFC 1000


Head CG Y Acceleration
Acceleration (g's)
125
100
75
50
25
0
-25
0
2.5
5
7.5
10
Time [ms]
Max: 107.5 g's
Min: -1.4 g's
Filter: CFC 1000


Head CG Z Acceleration
Acceleration (g's)
80
70
60
50
40
30
20
10
0
-10
0
2.5
5
7.5
10
Time [ms]
Max: 76.5 g's
Min: -1.2 g's
Filter: CFC 1000

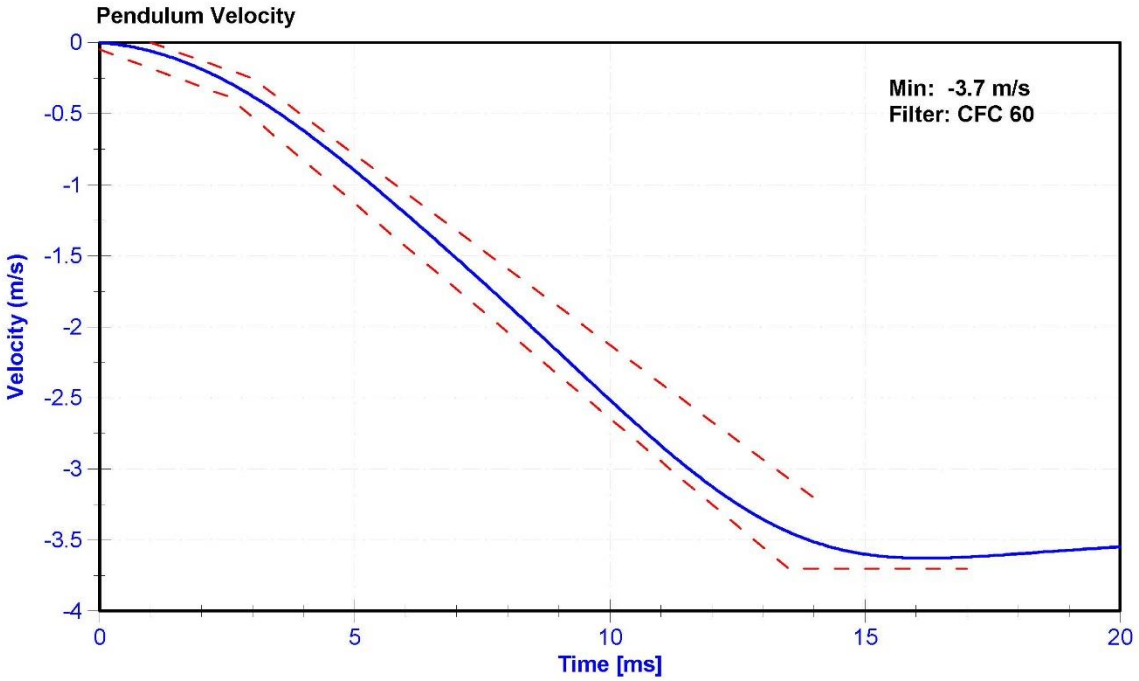
ATD Manufacturer	FTSS	Test Technician	J. Pericak
ATD Serial Number	F034	Laboratory Supervisor	K.Brogan

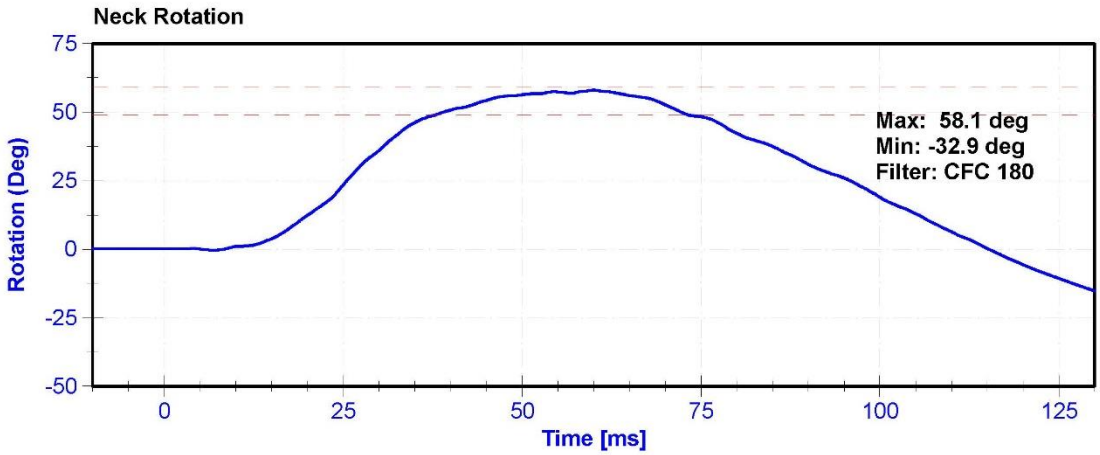
Results

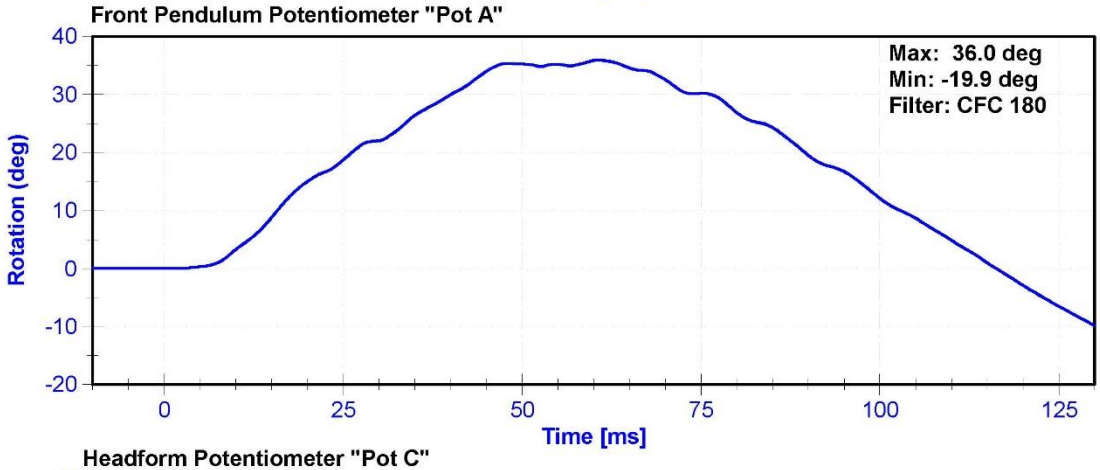
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.7	Pass
Humidity	10	70	%	50.7	Pass
Velocity	3.3	3.5	m/s	3.40	Pass
Lateral Neck Rotation	49	59	deg	58.1	Pass
Time at Maximum Rotation	54	66	ms	60.0	Pass
Time of Rotation Decay from Maximum	53	88	ms	55.2	Pass

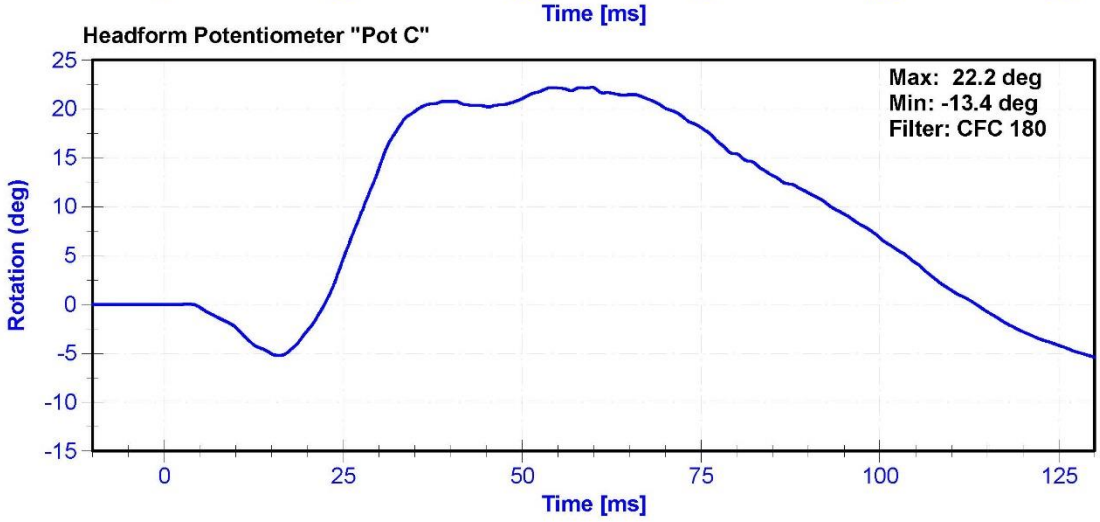
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/11/2018	5/11/2019
Front Pendulum Potentiometer	SP22G	DS-094	10/30/2017	10/30/2018
Headform Potentiometer	SP22G	DS-095	10/30/2017	10/30/2018




Neck Rotation
Rotation (Deg)
Time [ms]
Max: 58.1 deg
Min: -32.9 deg
Filter: CFC 180


Front Pendulum Potentiometer "Pot A"
Rotation (deg)
Time [ms]
Max: 36.0 deg
Min: -19.9 deg
Filter: CFC 180


Headform Potentiometer "Pot C"
Rotation (deg)
Time [ms]
Max: 22.2 deg
Min: -13.4 deg
Filter: CFC 180

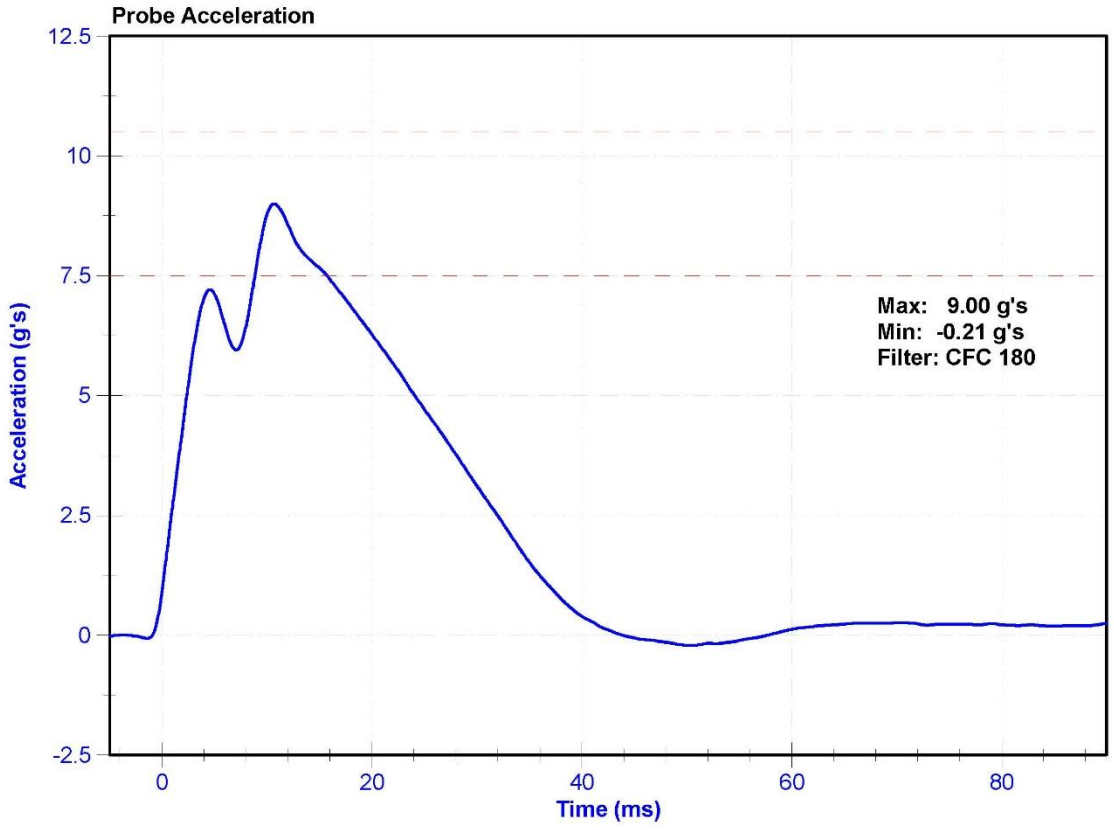
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.7	Pass
Humidity	10	70	%	60.5	Pass
Velocity	4.2	4.4	m/s	4.23	Pass
Probe Acceleration	7.5	10.5	g's	9.00	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018



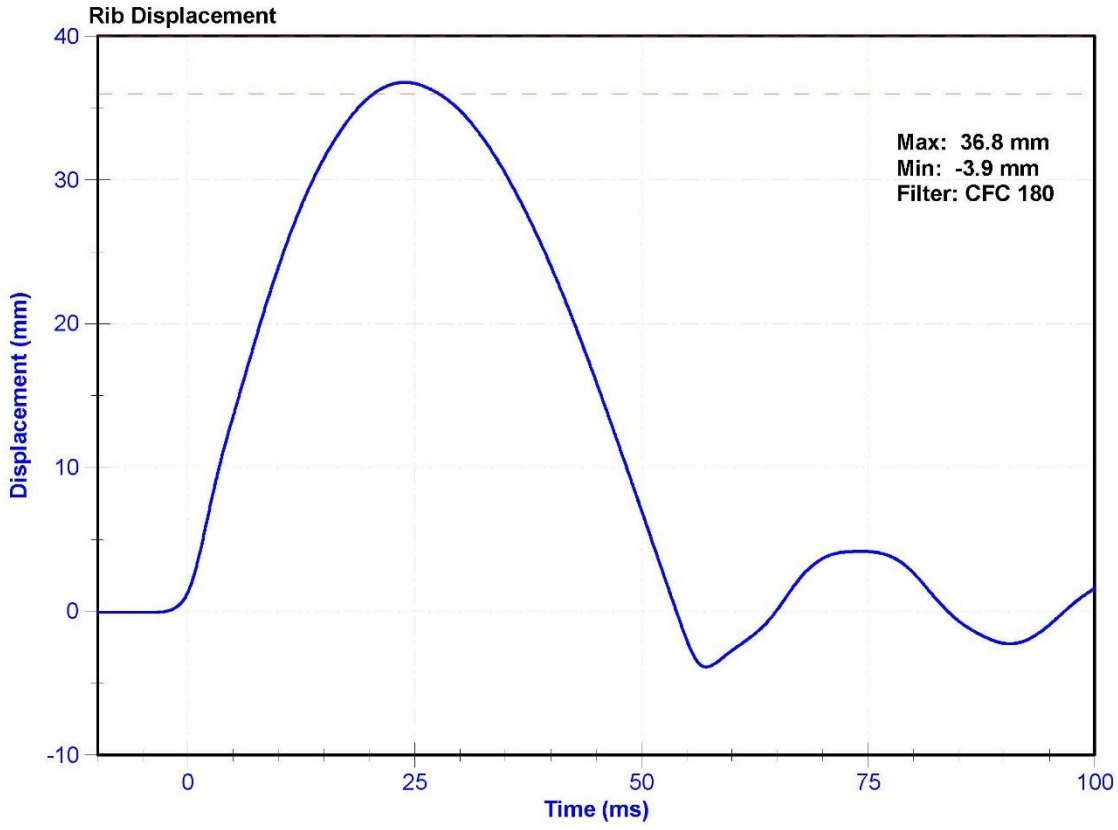
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.5	Pass
Humidity	10	70	%	54.6	Pass
Rib Displacement	36	40	mm	36.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-183GFE	9/27/2017	9/27/2018



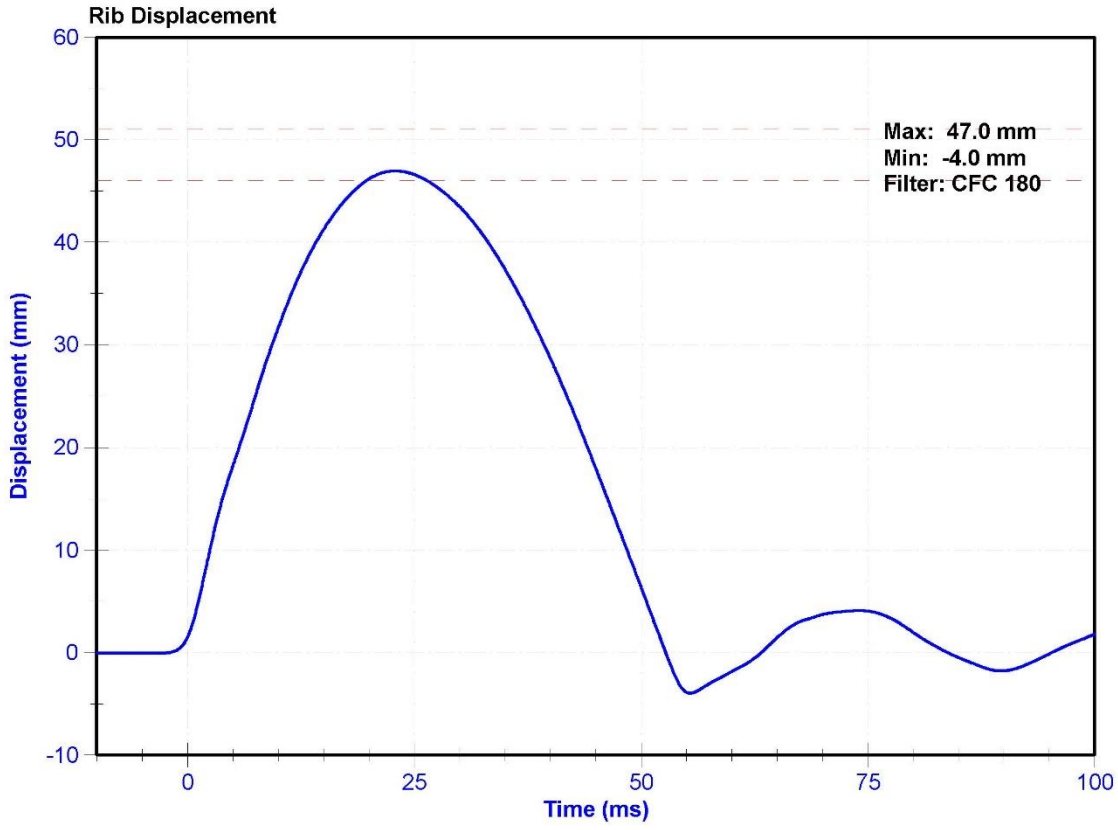
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.5	Pass
Humidity	10	70	%	55.0	Pass
Rib Displacement	46	51	mm	47.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-183GFE	9/27/2017	9/27/2018



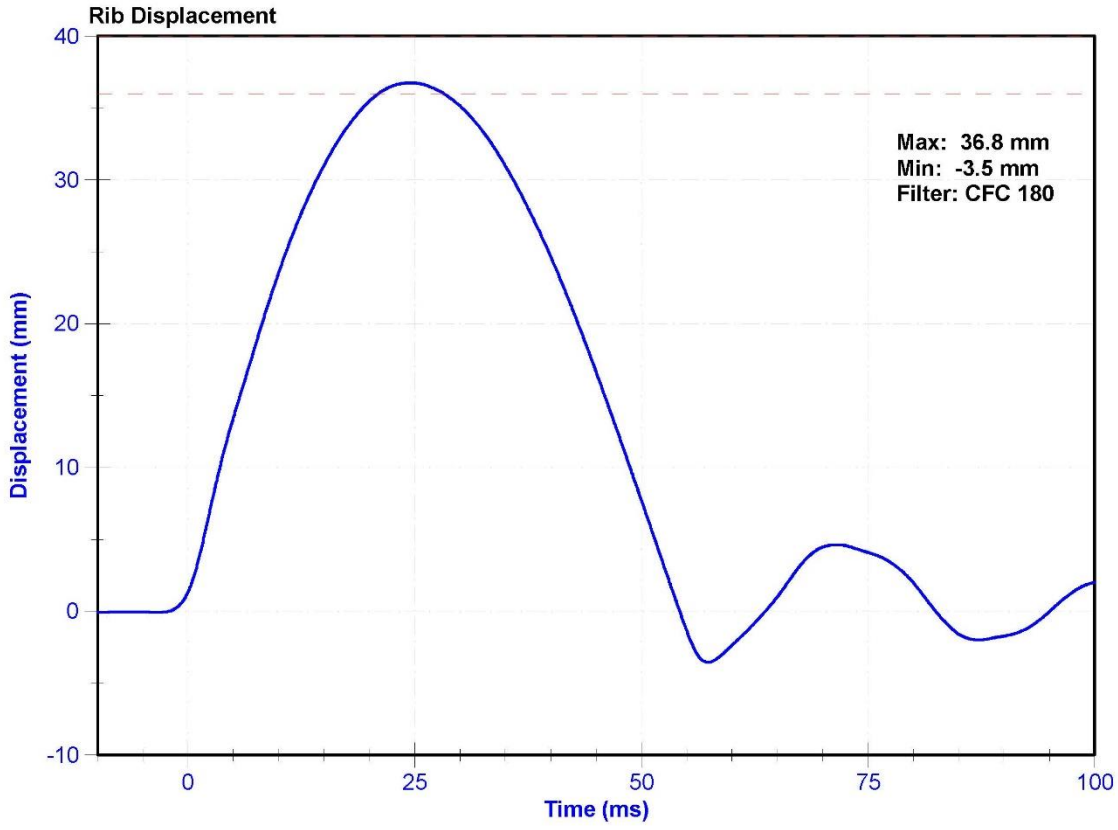
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.4	Pass
Humidity	10	70	%	48.7	Pass
Rib Displacement	36	40	mm	36.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-184GFE	9/27/2017	9/27/2018



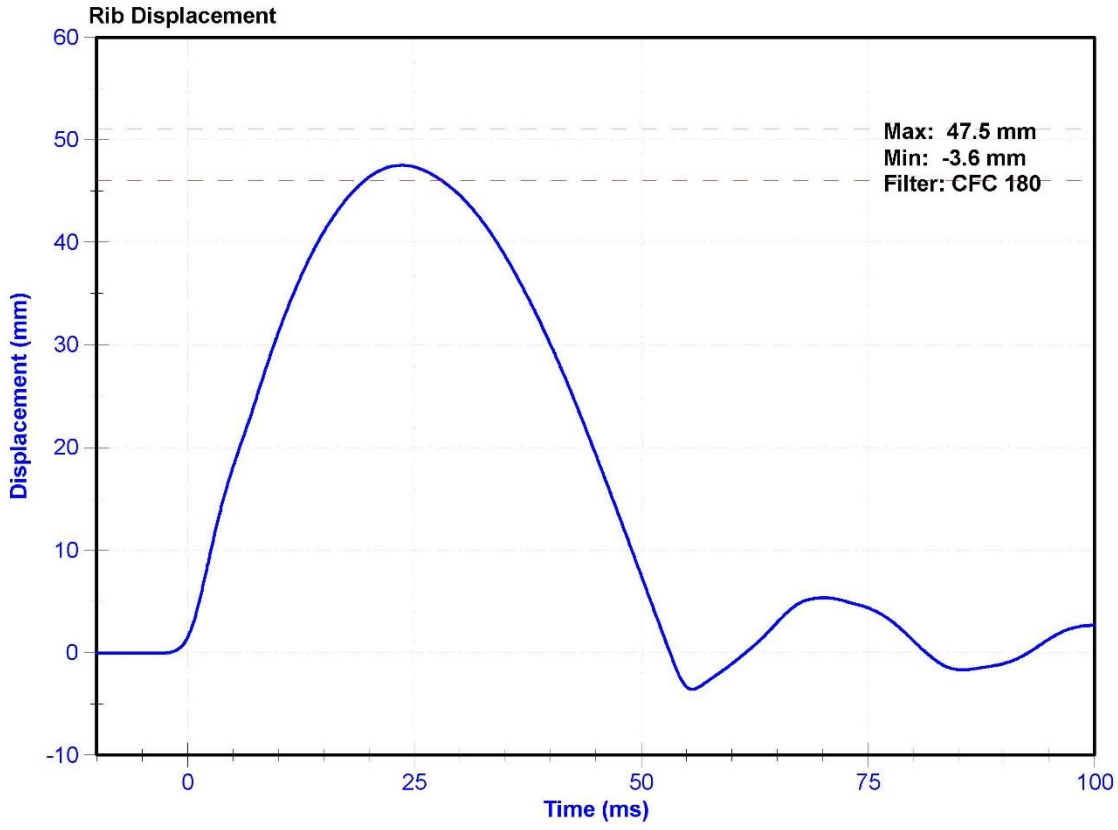
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	53.5	Pass
Rib Displacement	46	51	mm	47.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-184GFE	9/27/2017	9/27/2018



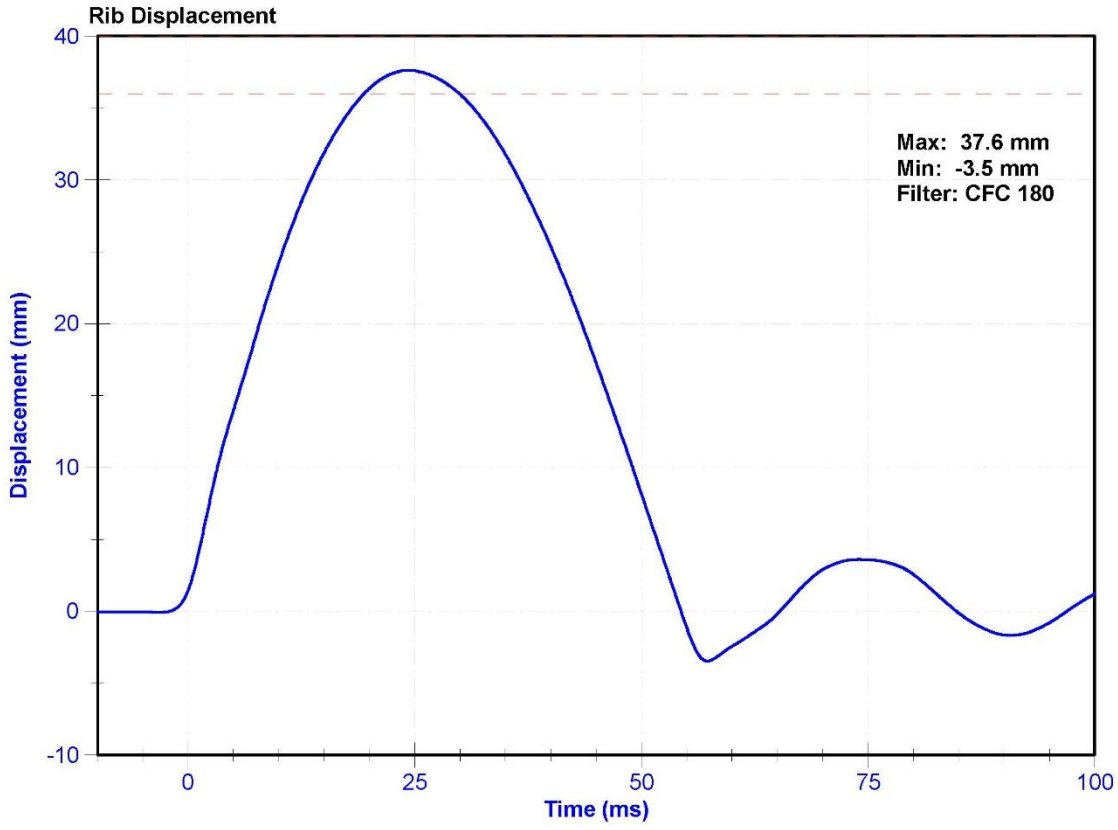
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.6	Pass
Humidity	10	70	%	55.3	Pass
Rib Displacement	36	40	mm	37.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-182GFE	9/27/2017	9/27/2018



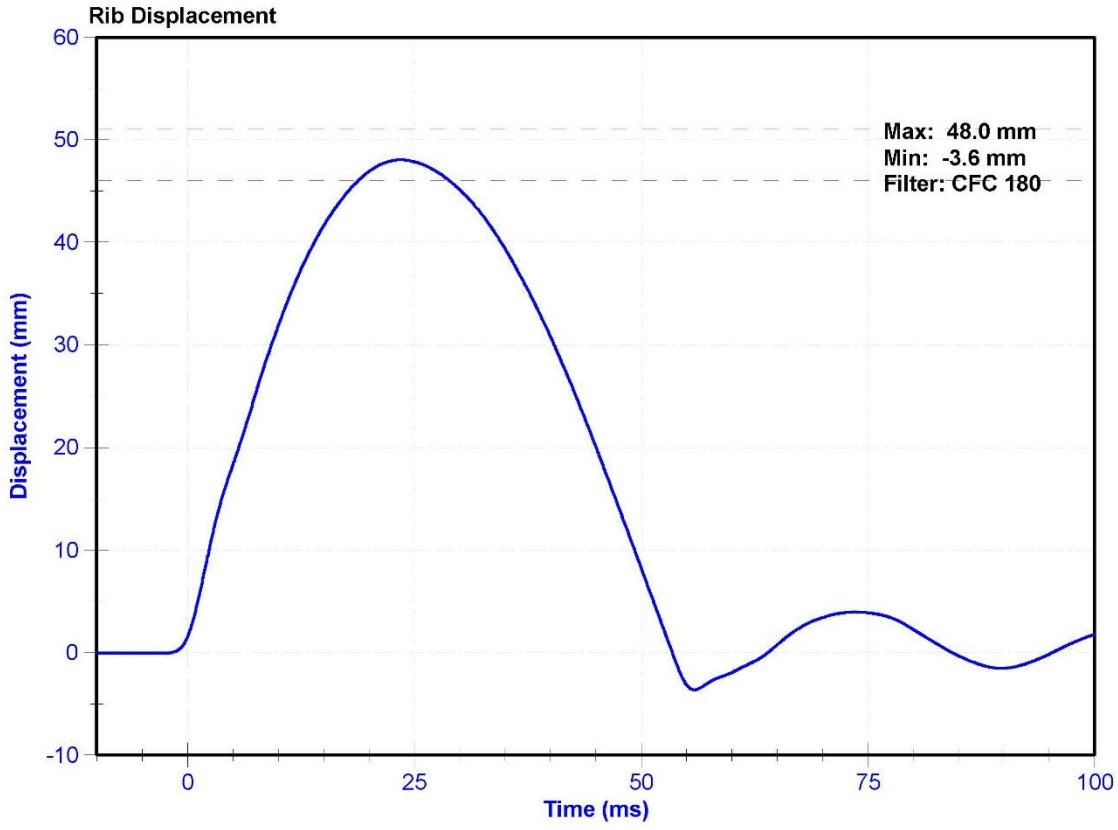
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.8	Pass
Humidity	10	70	%	56.5	Pass
Rib Displacement	46	51	mm	48.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-182GFE	9/27/2017	9/27/2018



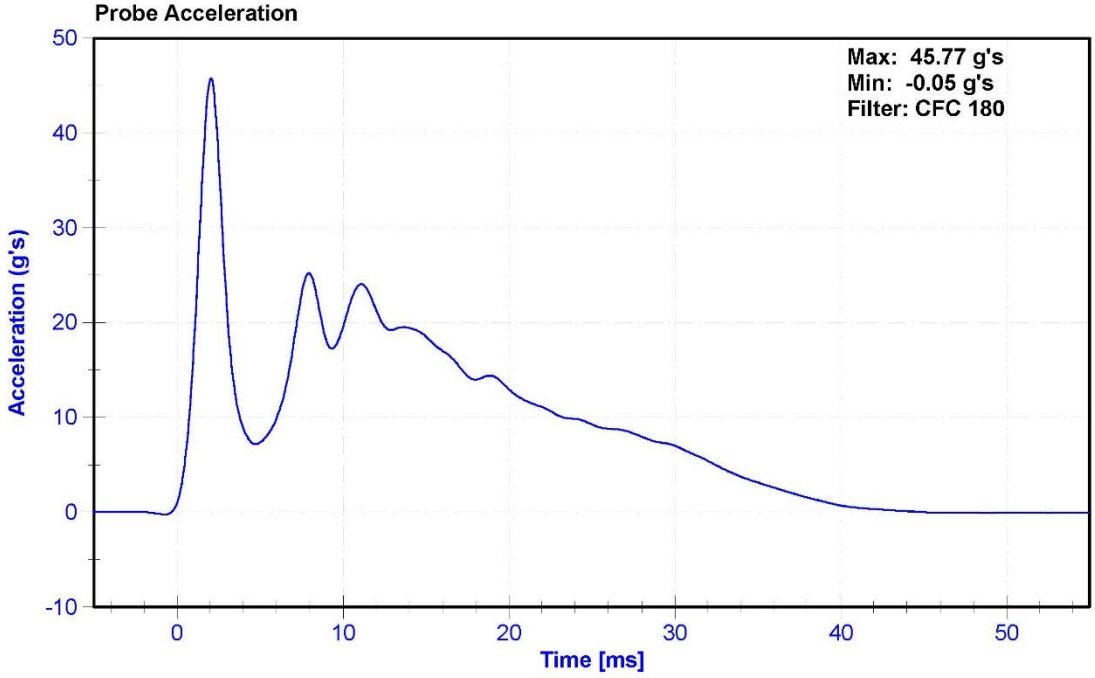
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

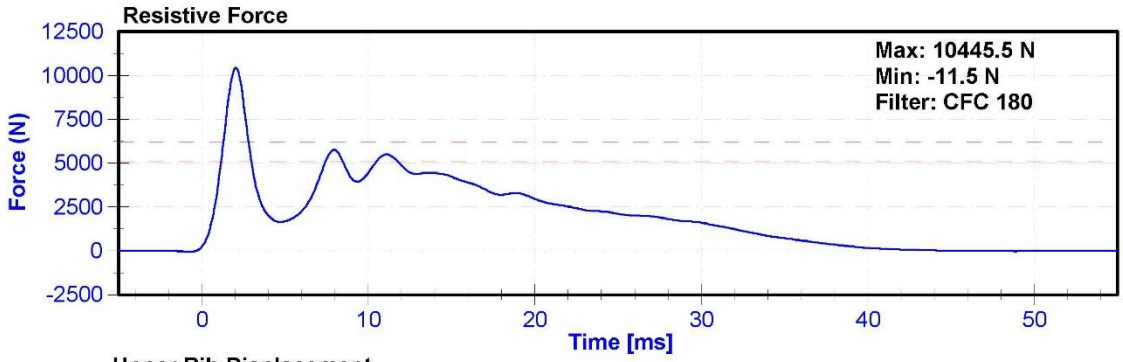
Results

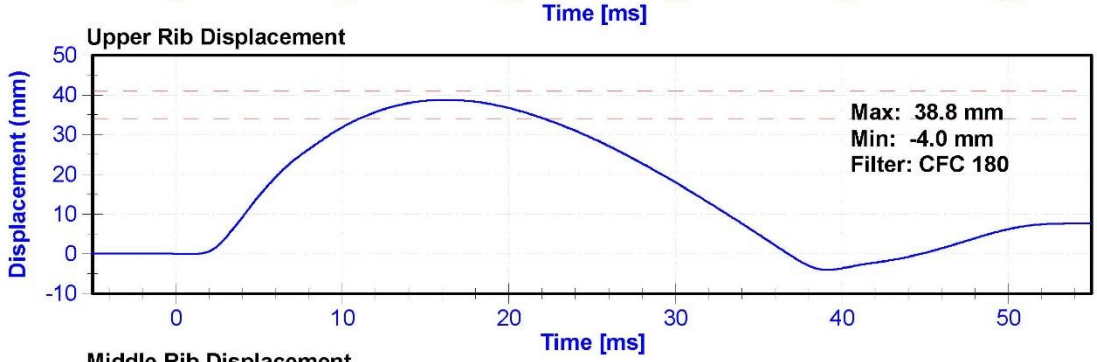
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.7	Pass
Humidity	10	70	%	39.9	Pass
Velocity	5.4	5.6	m/s	5.60	Pass
Resistive Force after 6ms	5100	6200	N	5755.0	Pass
Upper Thorax Rib Deflection	34	41	mm	38.8	Pass
Mid Thorax Rib Deflection	37	45	mm	42.8	Pass
Lower Thorax Rib Deflection	37	44	mm	42.5	Pass

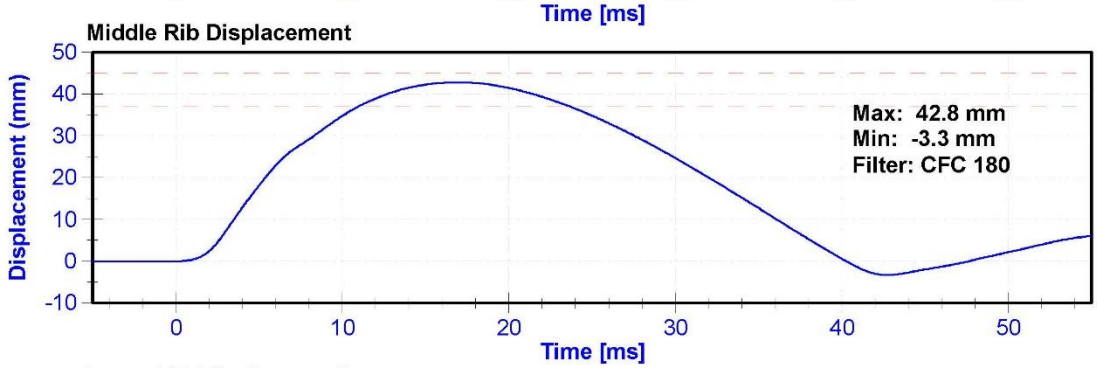
Transducer Calibrations

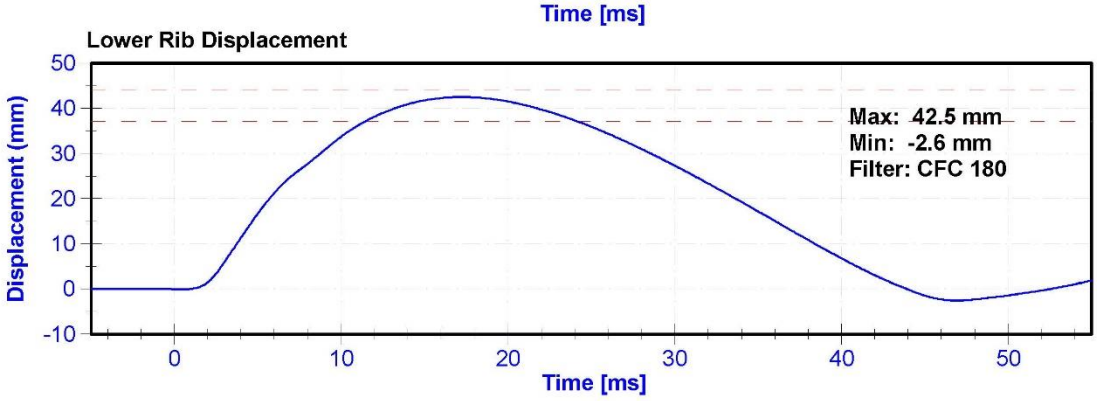
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Upper Thorax Rib Potentiometer	Honeywell MLT-38000203	DS-183GFE	9/27/2017	9/27/2018
Middle Thorax Rib Potentiometer	Honeywell MLT-38000203	DS-184GFE	9/27/2017	9/27/2018
Lower Thorax Rib Potentiometer	Honeywell MLT-38000203	DS-182GFE	9/27/2017	9/27/2018




Resistive Force
Force (N)
12500
10000
7500
5000
2500
0
-2500
0
10
20
30
40
50
Time [ms]
Max: 10445.5 N
Min: -11.5 N
Filter: CFC 180


Upper Rib Displacement
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 38.8 mm
Min: -4.0 mm
Filter: CFC 180


Middle Rib Displacement
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 42.8 mm
Min: -3.3 mm
Filter: CFC 180


Lower Rib Displacement
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 42.5 mm
Min: -2.6 mm
Filter: CFC 180

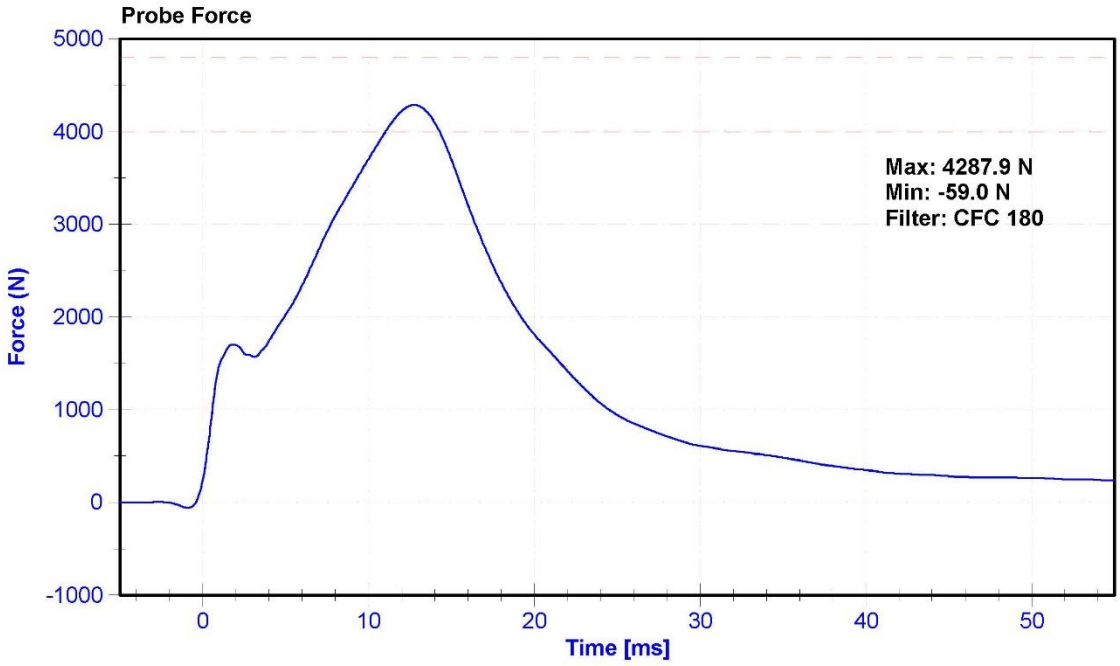
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

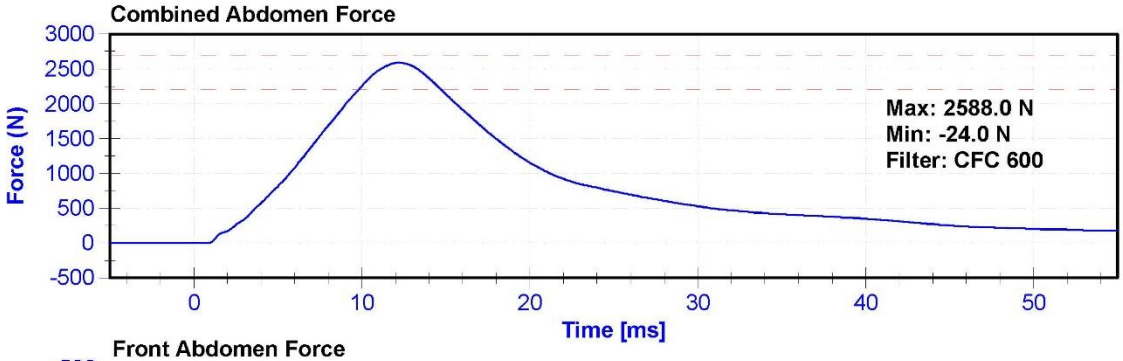
Results

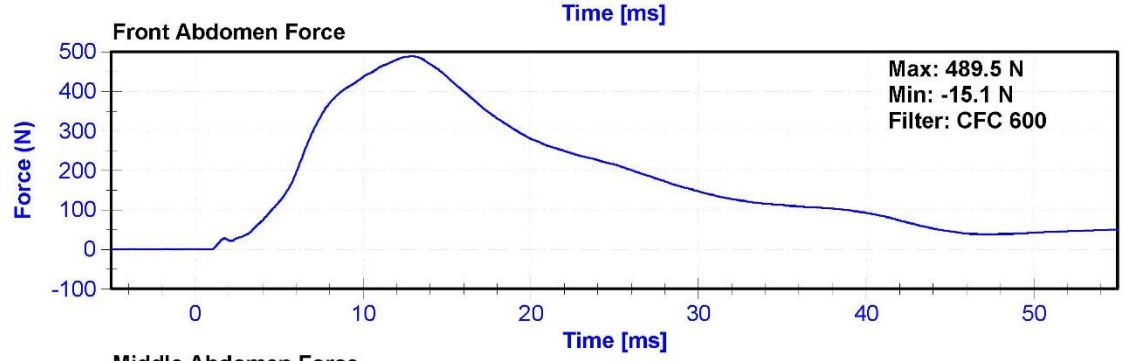
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.1	Pass
Humidity	10	70	%	53.1	Pass
Velocity	3.9	4.1	m/s	3.98	Pass
Combined Abdomen Force	2200	2700	N	2588.0	Pass
Time at Peak Abdomen Force	10.0	12.3	ms	12.15	Pass
Resistive Probe Force	4000	4800	N	4287.9	Pass
Time at Peak Resistive Force	10.6	13.0	ms	12.75	Pass

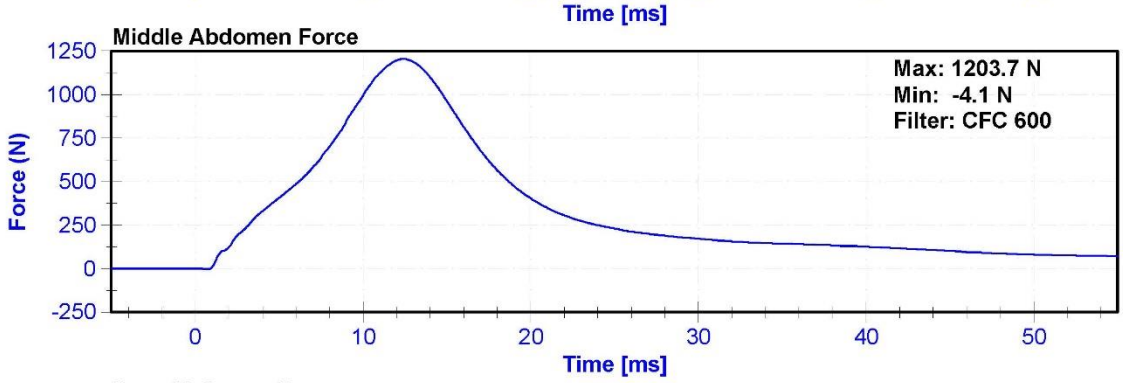
Transducer Calibrations

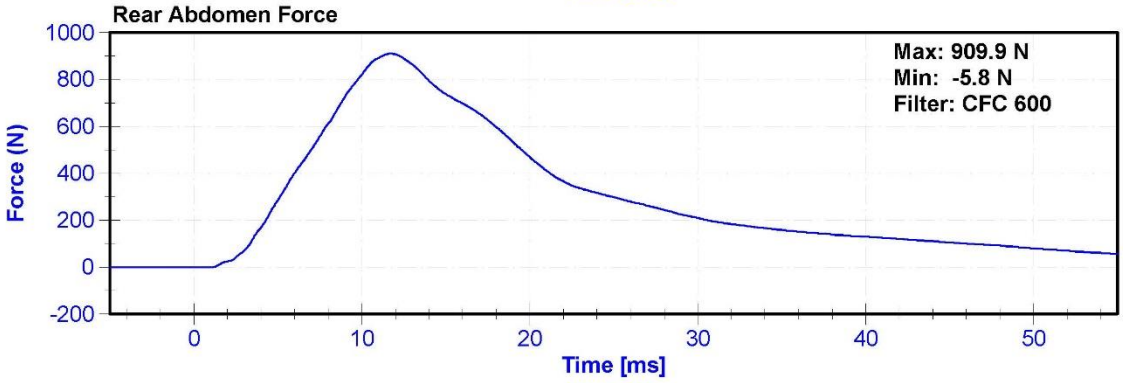
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Front Abdomen Load Cell	DENTON 2631	LC-1512	6/5/2017	6/5/2018
Middle Abdomen Load Cell	DENTON 2631	LC-1526	6/5/2017	6/5/2018
Rear Abdomen Load Cell	DENTON 2631	LC-1516	6/5/2017	6/5/2018




Combined Abdomen Force
Force (N)
Time [ms]
Max: 2588.0 N
Min: -24.0 N
Filter: CFC 600


Front Abdomen Force
Force (N)
Time [ms]
Max: 489.5 N
Min: -15.1 N
Filter: CFC 600


Middle Abdomen Force
Force (N)
Time [ms]
Max: 1203.7 N
Min: -4.1 N
Filter: CFC 600


Rear Abdomen Force
Force (N)
Time [ms]
Max: 909.9 N
Min: -5.8 N
Filter: CFC 600

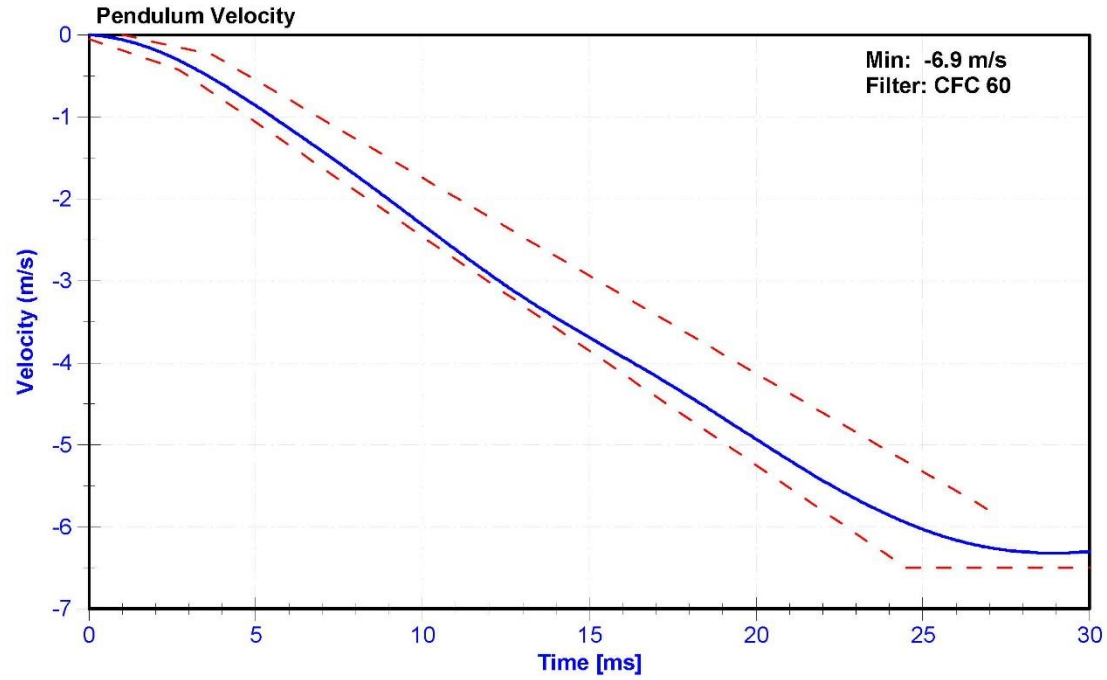
ATD Manufacturer	FTSS	Test Technician	J.Pericak
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

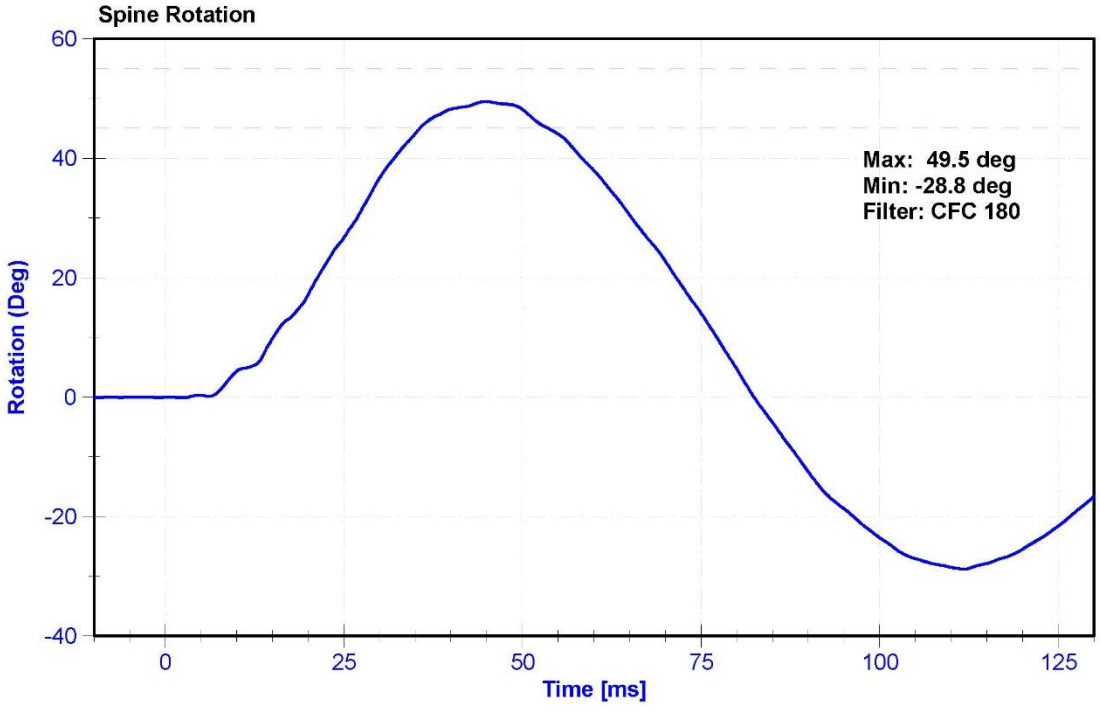
Results

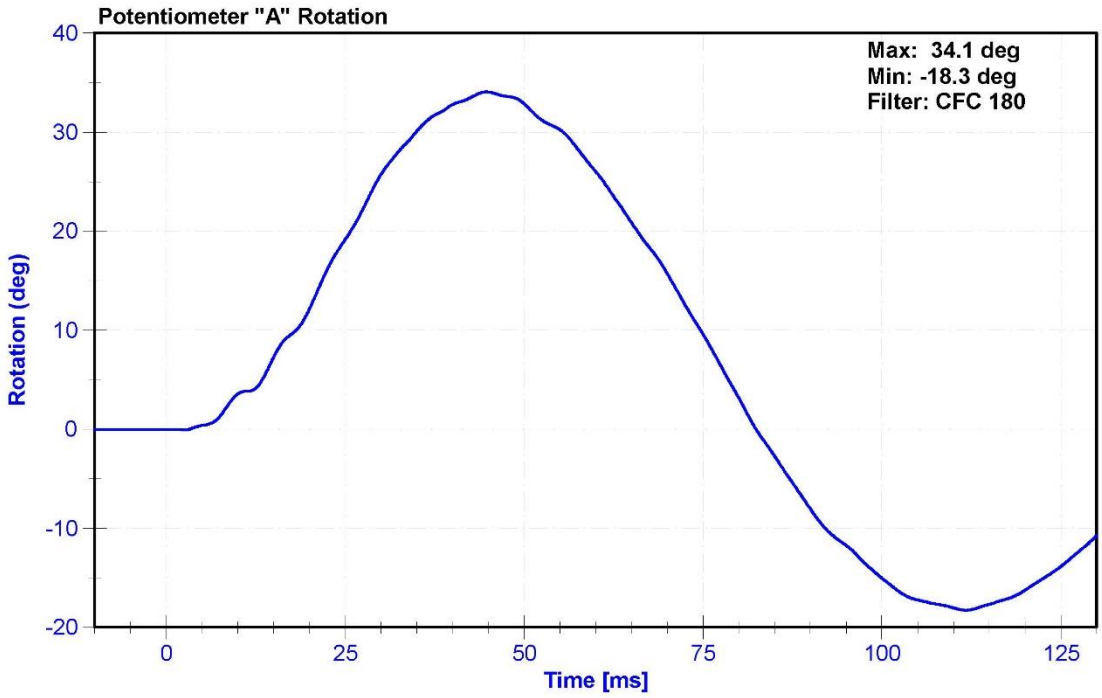
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	53.0	Pass
Velocity	5.95	6.15	m/s	6.113	Pass
Lateral Spine Rotation	45	55	deg	49.5	Pass
Time at Maximum Rotation	39	53	ms	44.8	Pass
Time of Decay to Zero Degrees	37	57	ms	37.6	Pass
Pulse within Corridor?	-	-	-		

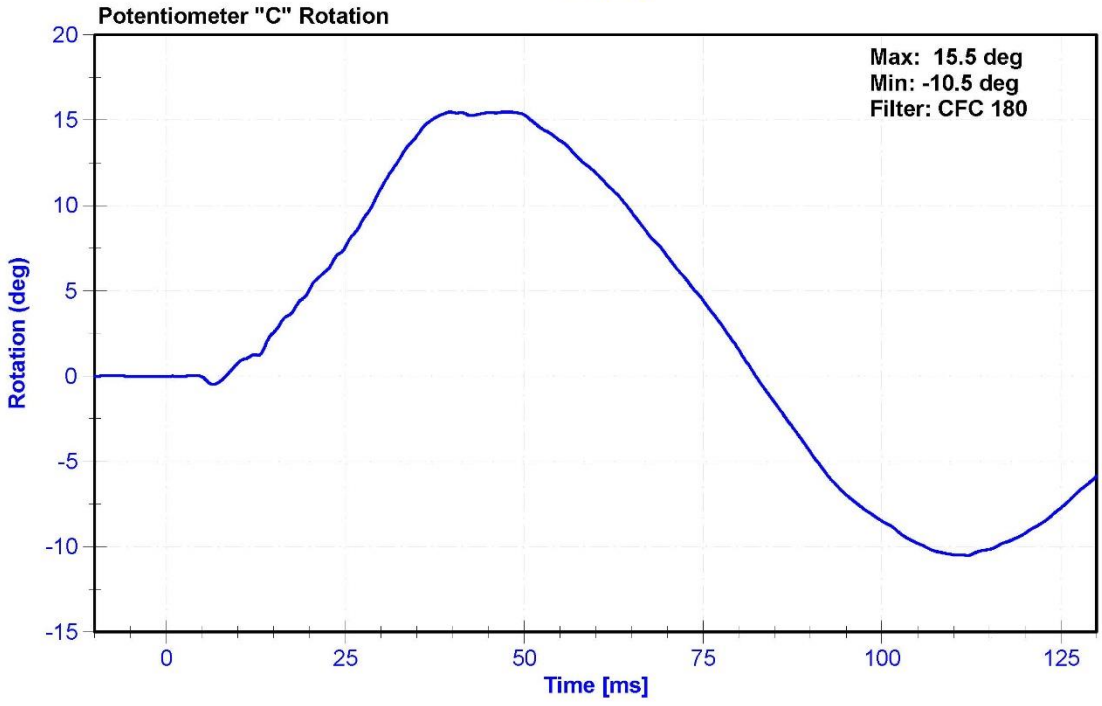
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/11/2018	5/11/2019
Pendulum "A" Potentiometer	SP22G	DS-094	10/30/2017	10/30/2018
Condyle "B" Potentiometer	SP22G	DS-095	10/30/2017	10/30/2018


Pendulum Velocity
Min: -6.9 m/s
Filter: CFC 60
Velocity (m/s)
0
-1
-2
-3
-4
-5
-6
-7
0
5
10
15
20
25
30
Time [ms]


Spine Rotation
Max: 49.5 deg
Min: -28.8 deg
Filter: CFC 180
Rotation (Deg)
60
40
20
0
-20
-40
0
25
50
75
100
125
Time [ms]


Potentiometer "A" Rotation
Max: 34.1 deg
Min: -18.3 deg
Filter: CFC 180
Rotation (deg)
40
30
20
10
0
-10
-20
0
25
50
75
100
125
Time [ms]


Potentiometer "C" Rotation
Max: 15.5 deg
Min: -10.5 deg
Filter: CFC 180
Rotation (deg)
20
15
10
5
0
-5
-10
-15
0
25
50
75
100
125
Time [ms]

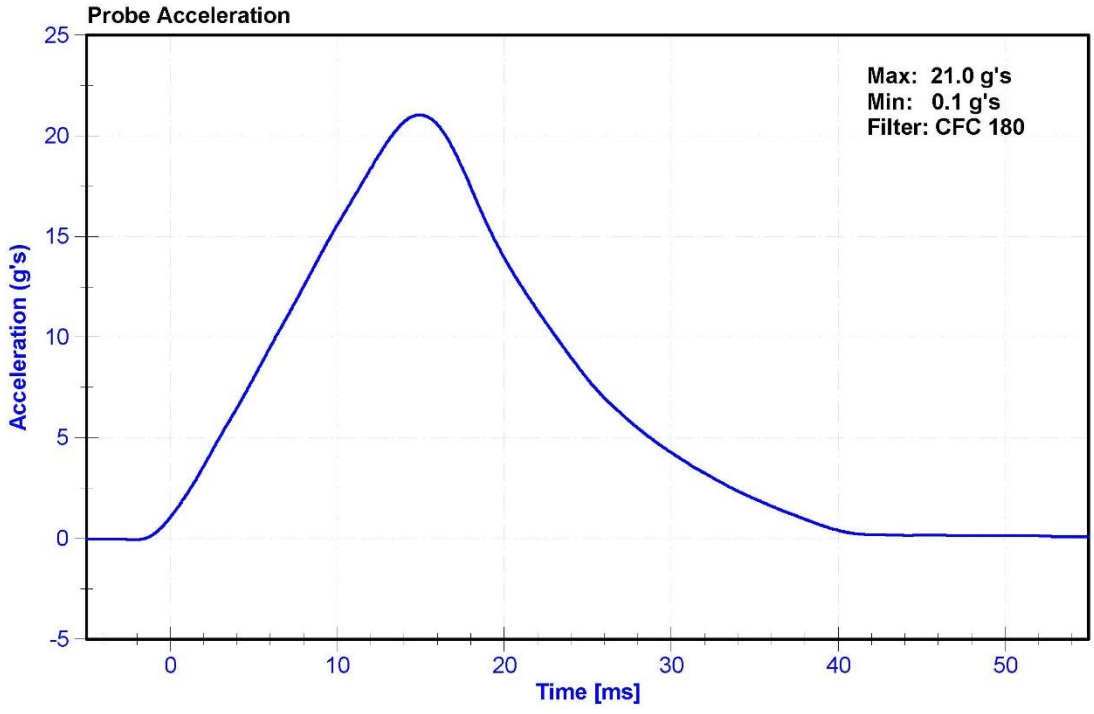
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	F034	Laboratory Supervisor	K. Brogan

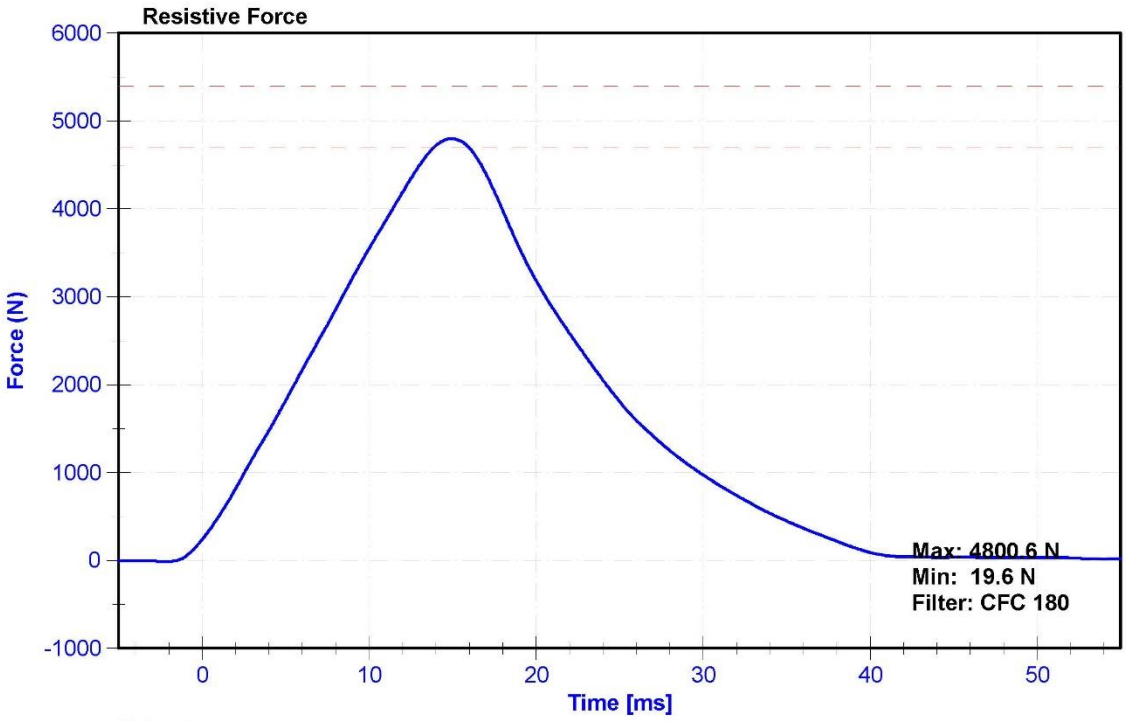
Results

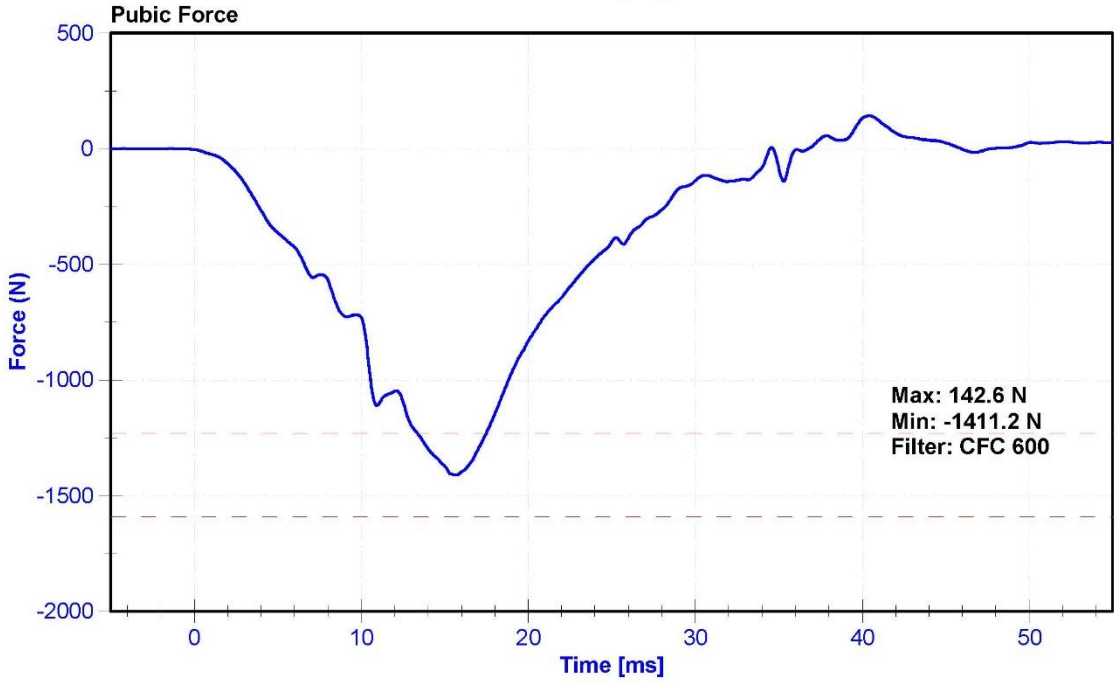
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.0	Pass
Humidity	10	70	%	54.3	Pass
Velocity	4.2	4.4	m/s	4.26	Pass
Resistive Force	4700	5400	N	4800.6	Pass
Time at Peak Resistive Force	11.8	16.1	ms	14.95	Pass
Pubic Force	-1590	-1230	N	-1411.2	Pass
Time at Peak Pubic Force	12.2	17.0	ms	15.65	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Pubic Load Cell	Denton 3096JFL	LC-465Fy	6/6/2017	6/6/2018




Resistive Force
Force (N)
Time [ms]
Max: 4800.6 N
Min: 19.6 N
Filter: CFC 180


Pubic Force
Force (N)
Time [ms]
Max: 142.6 N
Min: -1411.2 N
Filter: CFC 600

CALIBRATION TEST RESULTS

POST-TEST

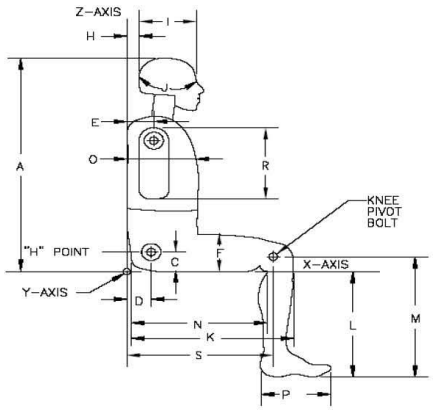
SID-IIS 5TH PERCENTILE FEMALE - PASSENGER ATD

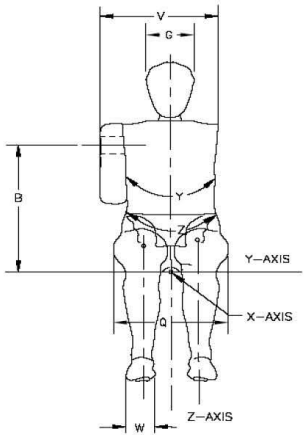
SERIAL No: 300

External Measurements - SID-IIs

Technician: K. Brogan Date: 5/14/2018

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	447	Pass
C	H-point Height	79	89	85	Pass
D	H-point from seatback	141	151	145	Pass
E	Shoulder Pivot from Backline	97	107	104	Pass
F	Thigh Clearance	119	135	123	Pass
G	Head Breadth	140	148	143	Pass
H	Head Back from Backline	40	46	45	Pass
I	Head Depth	178	188	182	Pass
J	Head Circumference	541	551	548	Pass
K	Buttock to Knee Length	514	540	529	Pass
L	Popliteal Height	343	369	360	Pass
M	Knee Pivot to floor height	392	409	400	Pass
N	Buttock Popliteal Length	416	442	433	Pass
O	Chest Depth w/o jacket	195	211	205	Pass
P	Foot Length	216	232	222	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	319	Pass
R	Arm Length	249	259	252	Pass
S	Knee Joint to seatback	477	493	485	Pass
V	Shoulder Width	341	357	349	Pass
W	Foot Width	78	94	85	Pass
Y	Chest Circumference w/jacket	851	881	870	Pass
Z	Waist Circumference	761	791	770	Pass

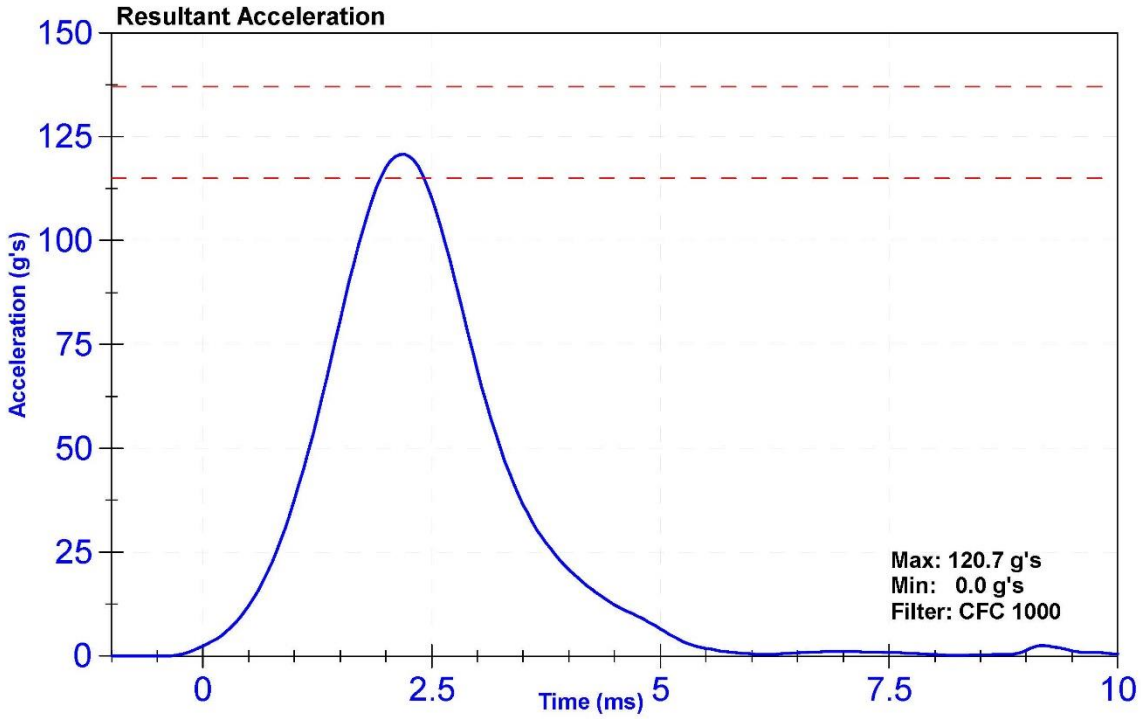
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

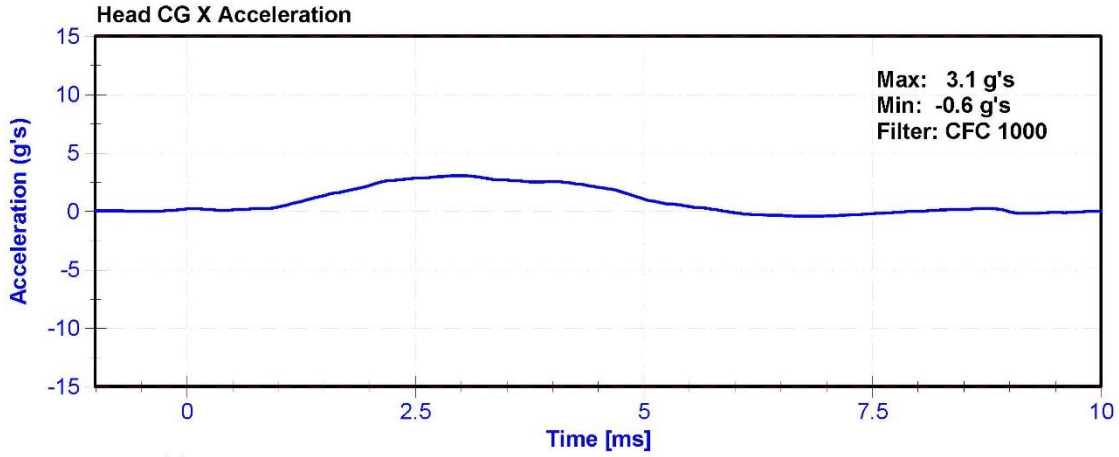
Results

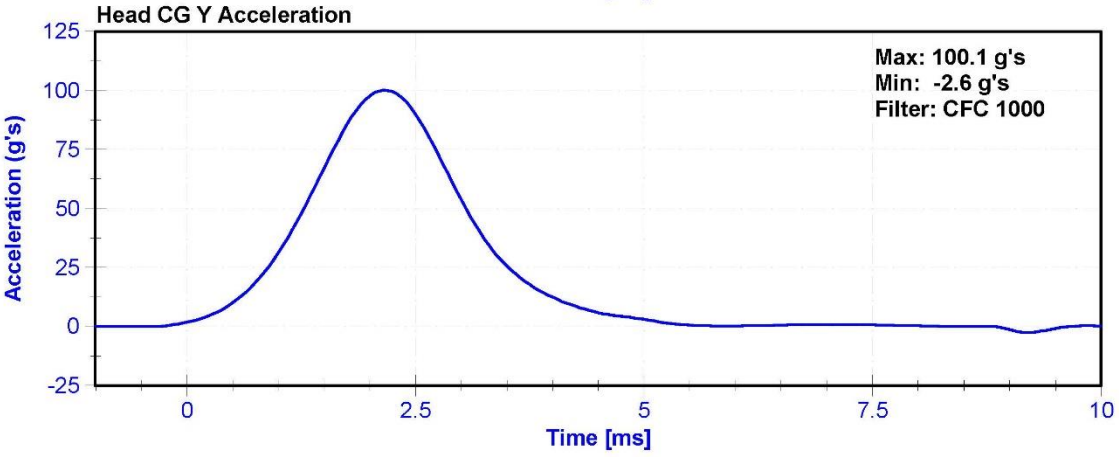
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	56	Pass
Resultant Acceleration	115	137	g's	120.7	Pass
Oscillation	0	15	%	2.1	Pass
Fore-Aft Acceleration	-15	15	g's	3.1	Pass

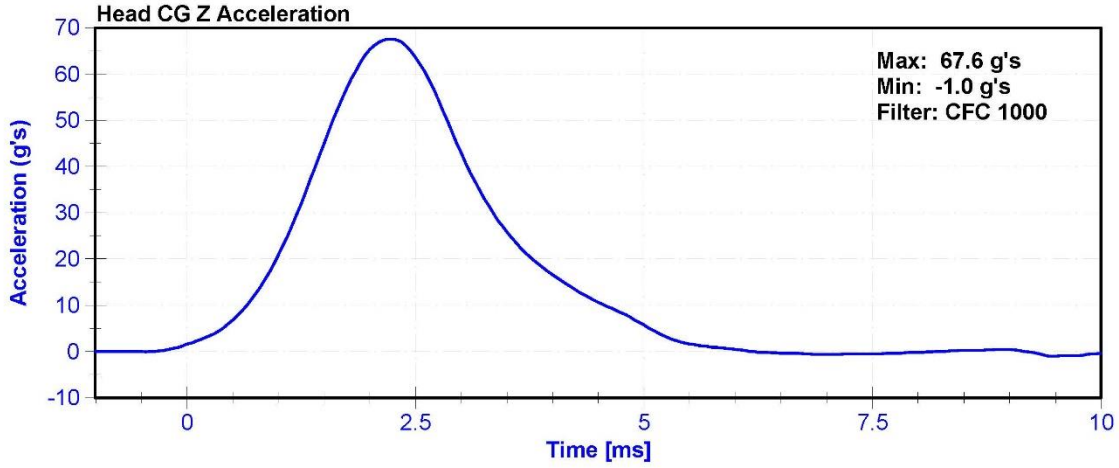
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264CT	AC-P58777	5/7/2018	11/5/2018
Y Accelerometer	ENDEVCO 7264CT	AC-P59018	5/7/2018	11/5/2018
Z Accelerometer	ENDEVCO 7264	AC-P79189	5/7/2018	11/5/2018




Head CG X Acceleration
Max: 3.1 g's
Min: -0.6 g's
Filter: CFC 1000
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
5
7.5
10
Time [ms]


Head CG Y Acceleration
Max: 100.1 g's
Min: -2.6 g's
Filter: CFC 1000
Acceleration (g's)
125
100
75
50
25
0
-25
0
2.5
5
7.5
10
Time [ms]


Head CG Z Acceleration
Max: 67.6 g's
Min: -1.0 g's
Filter: CFC 1000
Acceleration (g's)
70
60
50
40
30
20
10
0
-10
0
2.5
5
7.5
10
Time [ms]

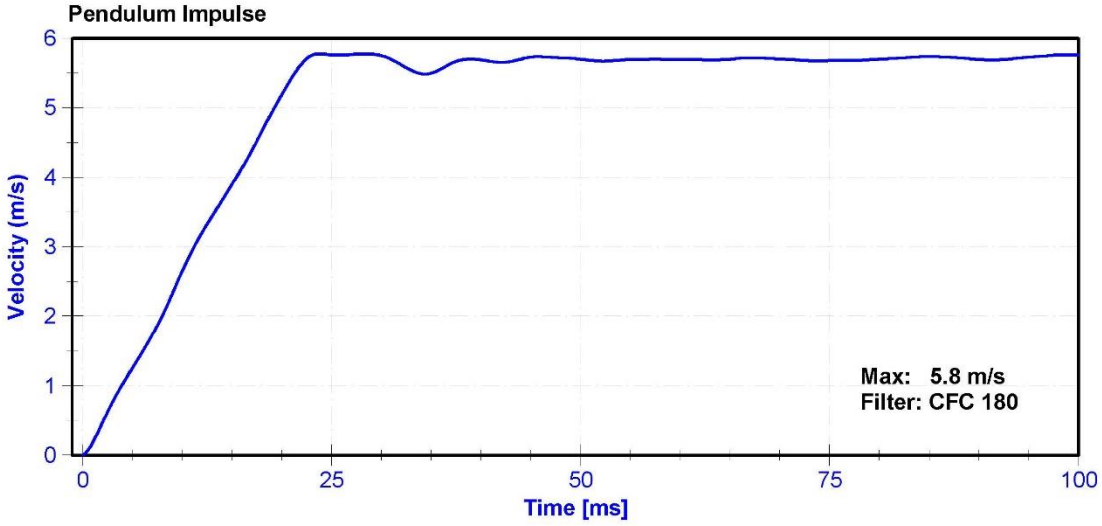
ATD Manufacturer	FTSS	Test Technician	S. Keller
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

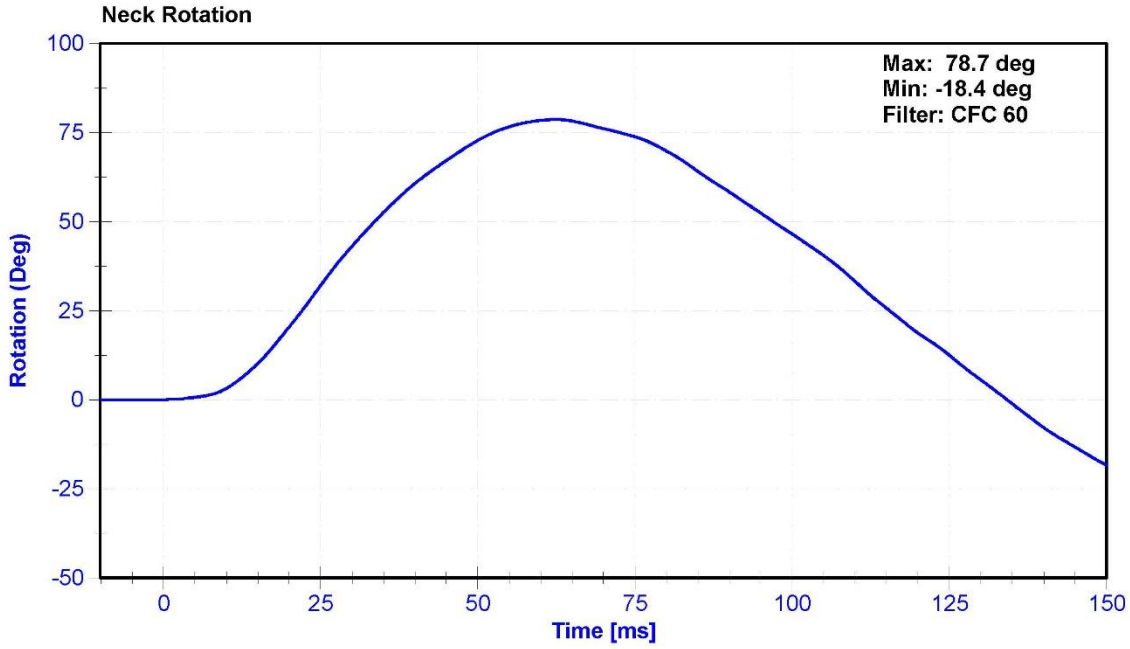
Results

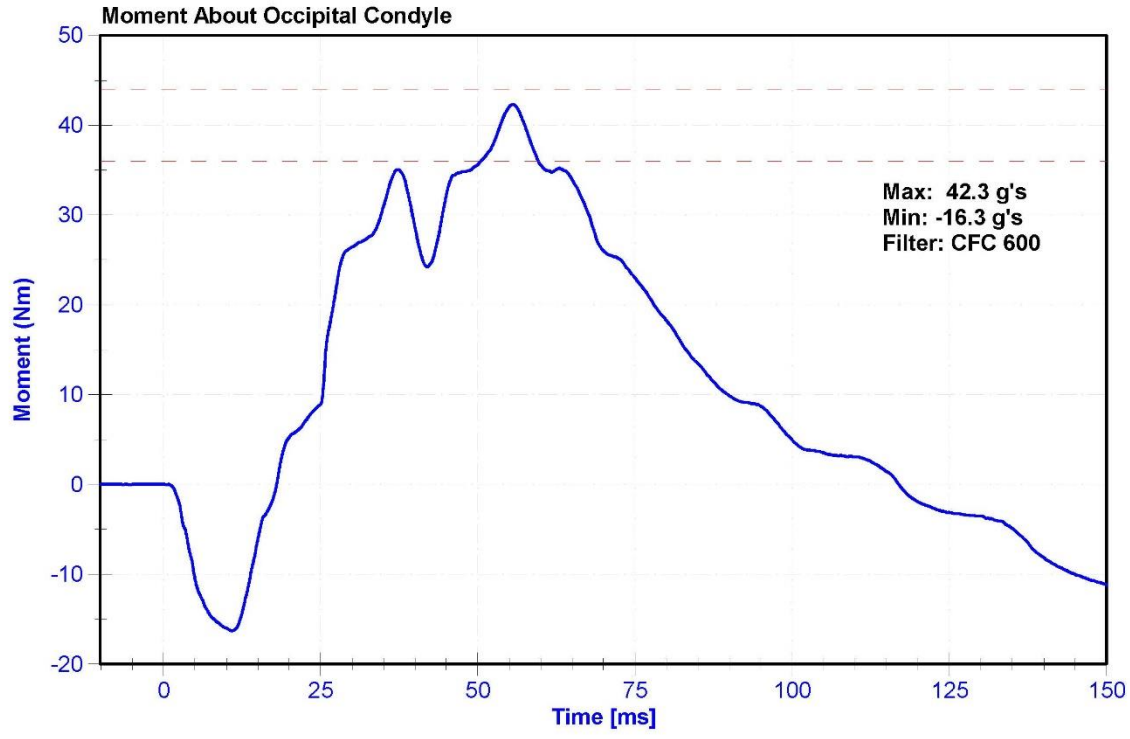
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.9	Pass
Humidity	10	70	%	52	Pass
Velocity	5.51	5.63	m/s	5.546	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.64	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.90	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	5.19	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.76	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.78	Pass
Neck Rotation	71	81	deg	78.7	Pass
Time at Maximum Rotation	50	70	ms	62.4	Pass
Moment about the OC	36	44	Nm	42.3	Pass
Moment Decay to 0 Nm	102	126	ms	116.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/11/2018	5/11/2019
Pendulum Potentiometer	Denton 78051-342	DS-184Pend	10/27/2017	10/27/2018
Condyle Potentiometer	Denton 78051-342	DS-185Pend	10/27/2017	10/27/2018
Upper Neck Load Cell	Denton 1716	LC-1872 FY	7/26/2017	7/26/2018




Neck Rotation
Max: 78.7 deg
Min: -18.4 deg
Filter: CFC 60
Rotation (Deg)
100
75
50
25
0
-25
-50
0
25
50
75
100
125
150
Time [ms]


Moment About Occipital Condyle
Max: 42.3 g's
Min: -16.3 g's
Filter: CFC 600
Moment (Nm)
50
40
30
20
10
0
-10
-20
0
25
50
75
100
125
150
Time [ms]

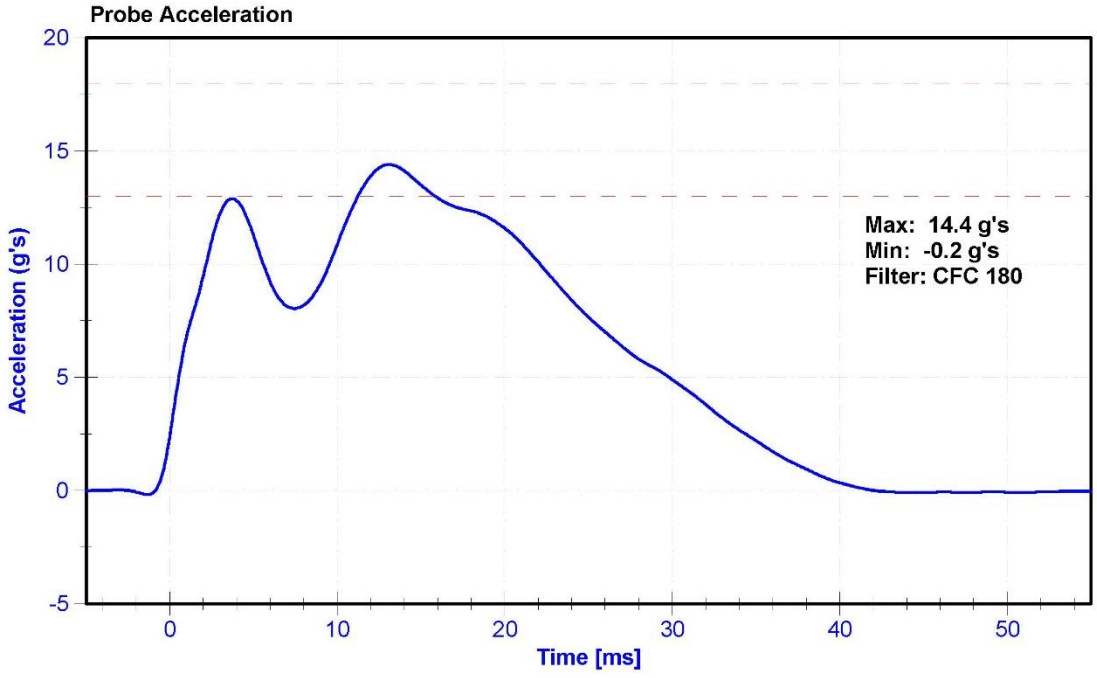
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

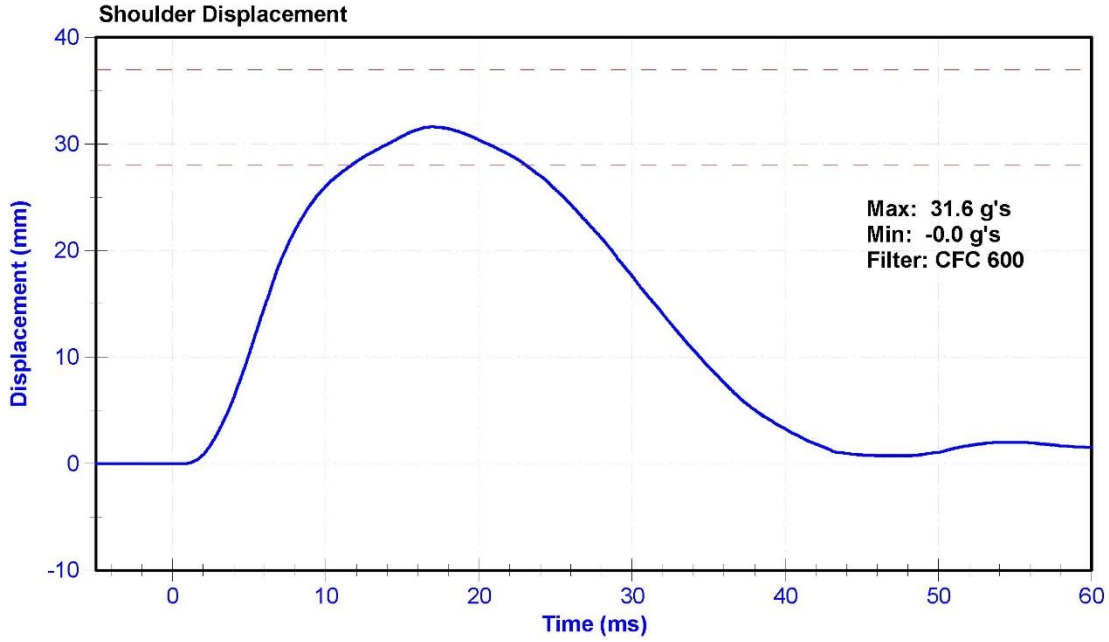
Results

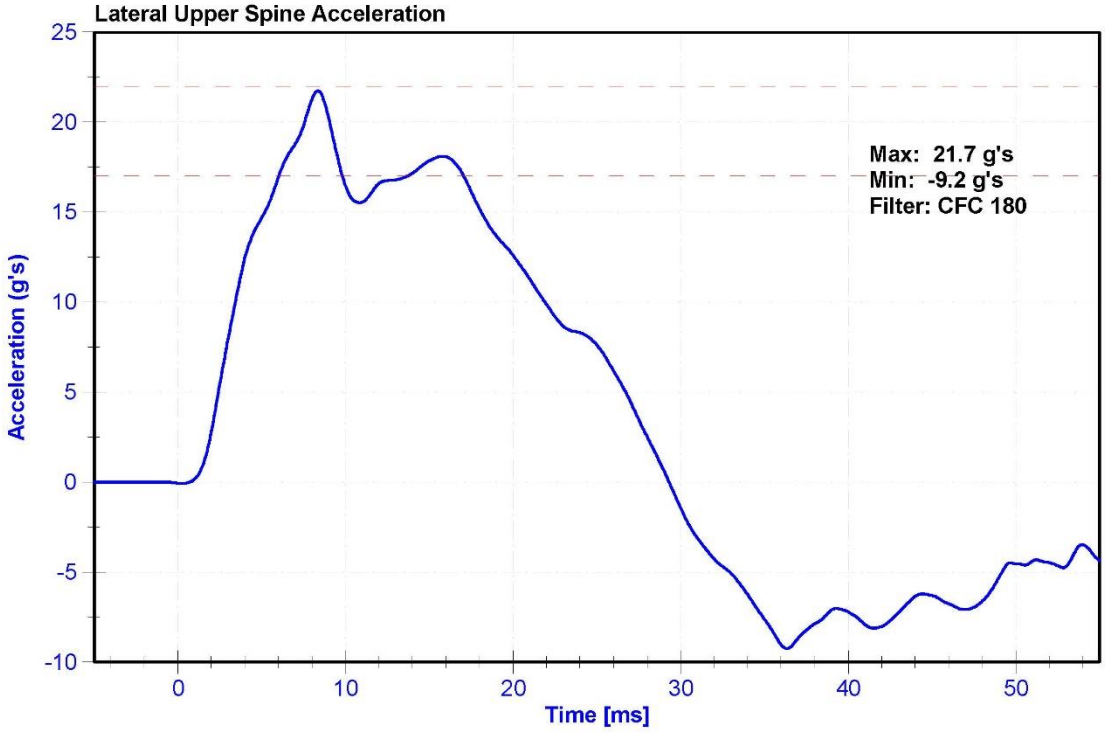
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.4	Pass
Humidity	10	70	%	54.4	Pass
Velocity	4.2	4.4	m/s	4.36	Pass
Probe Acceleration	13	18	g's	14.4	Pass
Shoulder Deflection	28	37	mm	31.6	Pass
Lateral Upper Spine Acceleration	17	22	g's	21.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Shoulder Potentiometer	Servo 08TC1-3725	DS-1063GFE	9/27/2017	9/27/2018
Upper Spine Y Accelerometer	ENDEVCO 7264	AC-P83320	5/7/2018	11/5/2018




Shoulder Displacement
Displacement (mm)
Time (ms)
Max: 31.6 g's
Min: -0.0 g's
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 21.7 g's
Min: -9.2 g's
Filter: CFC 180

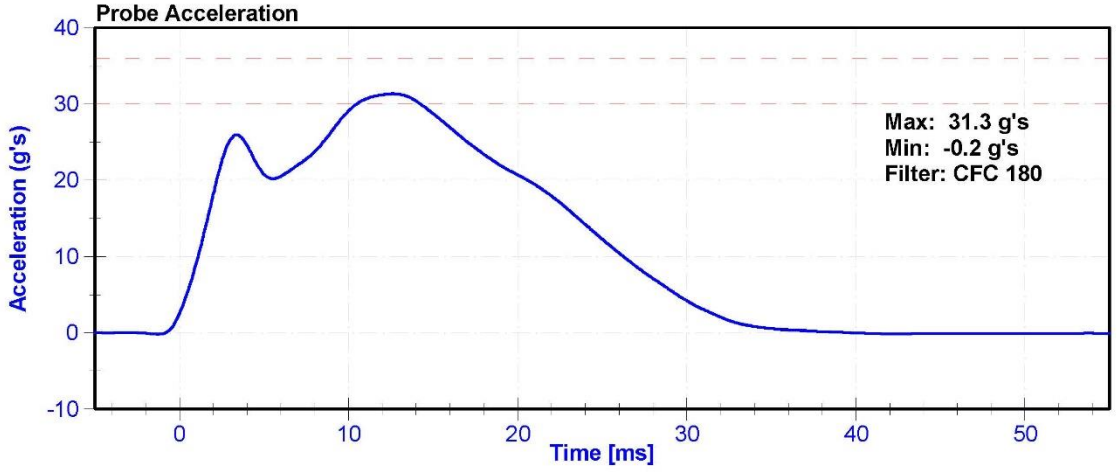
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

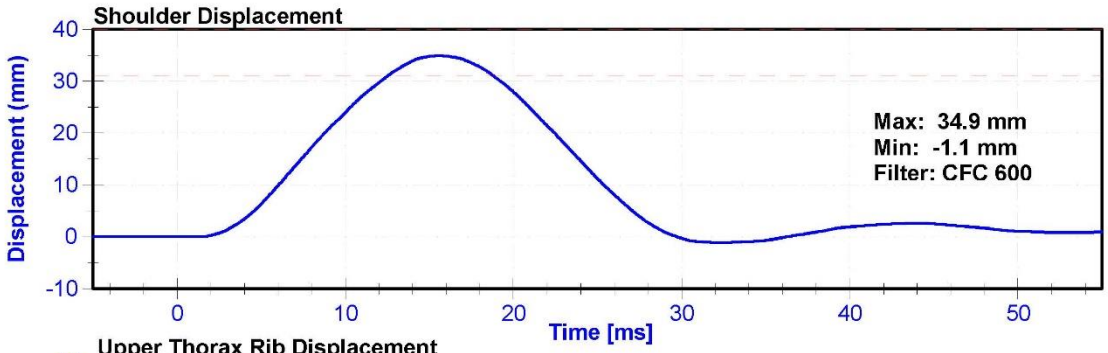
Results

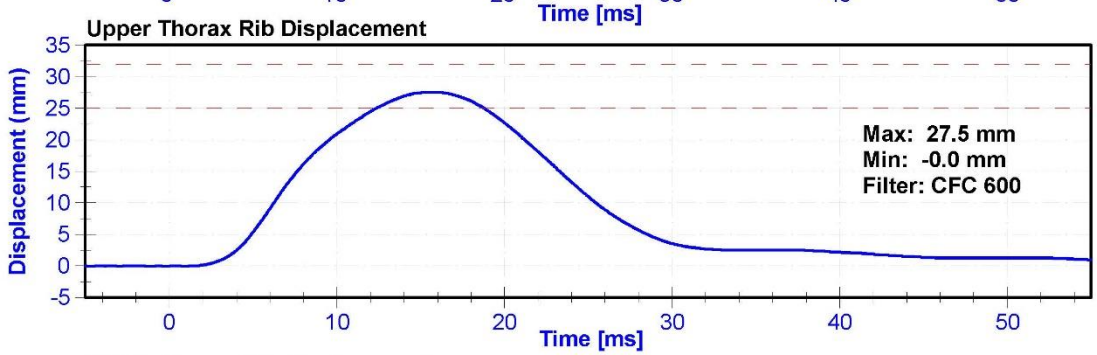
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	56.0	Pass
Velocity	6.6	6.8	m/s	6.76	Pass
Probe Acceleration after 5 ms	30	36	g's	31.3	Pass
Lateral Upper Spine Acceleration	34	43	g's	38.8	Pass
Lateral Lower Spine Acceleration	29	37	g's	33.4	Pass
Shoulder Deflection	31	40	mm	34.9	Pass
Upper Thorax Rib Deflection	25	32	mm	27.5	Pass
Mid Thorax Rib Deflection	30	36	mm	32.3	Pass
Lower Thorax Rib Deflection	32	38	mm	33.7	Pass

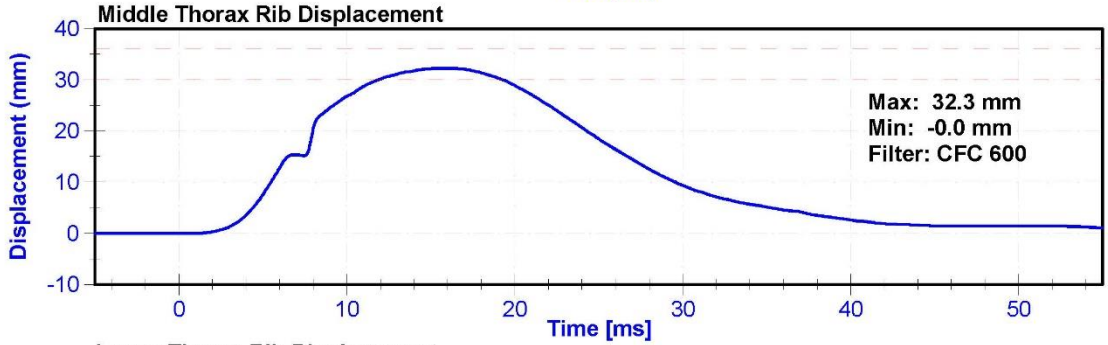
Transducer Calibrations

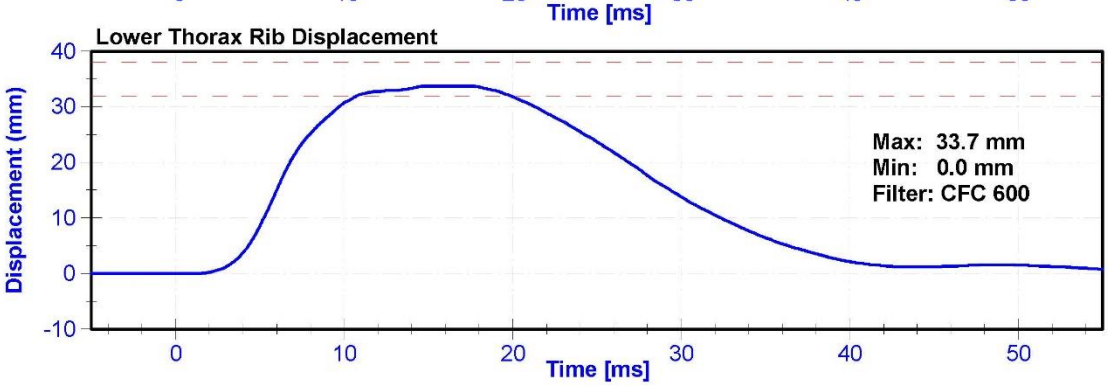
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Upper Spine T1 Y Accelerometer	ENDEVCO 7264	AC-P83320	5/7/2018	11/5/2018
Upper Spine T12 Y Accelerometer	ENDEVCO 7264	AC-P64147	5/7/2018	11/5/2018
Shoulder Potentiometer	Servo 08TC1-3725	DS-1063GFE	9/27/2017	9/27/2018
Upper Thorax Rib Potentiometer	Servo 08CT1-3725	DS-451GFE	9/27/2017	9/27/2018
Middle Thorax Rib Potentiometer	Servo 08TC1-3745	DS-1151GFE	9/27/2017	9/27/2018
Lower Thorax Rib Potentiometer	Servo 08TC1-3725	DS-1156GFE	9/27/2017	9/27/2018

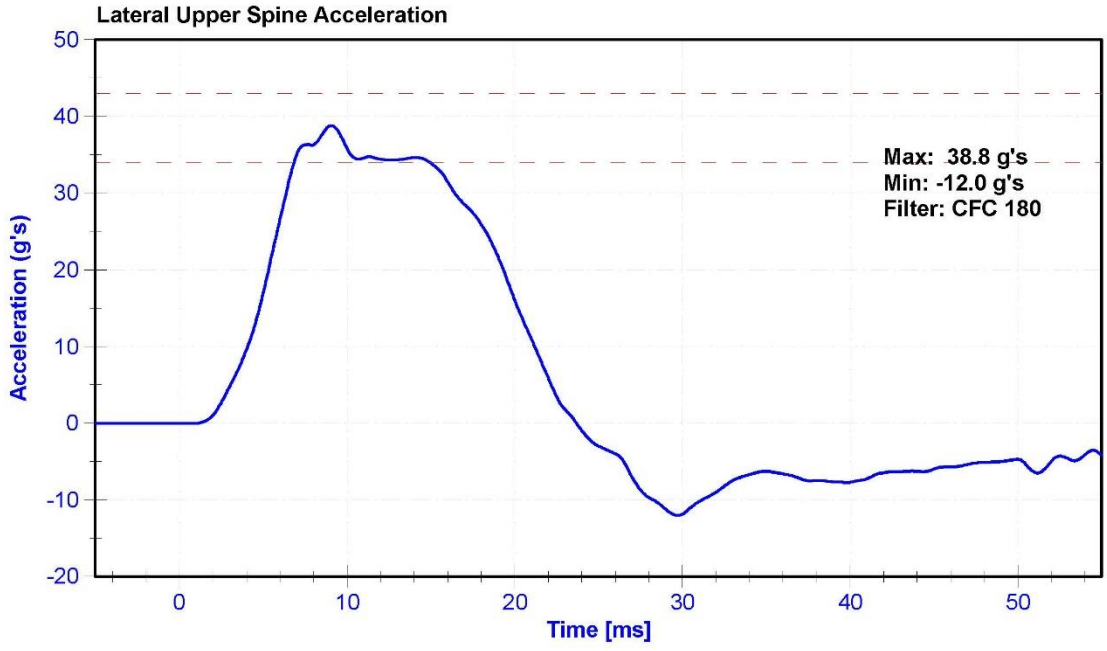


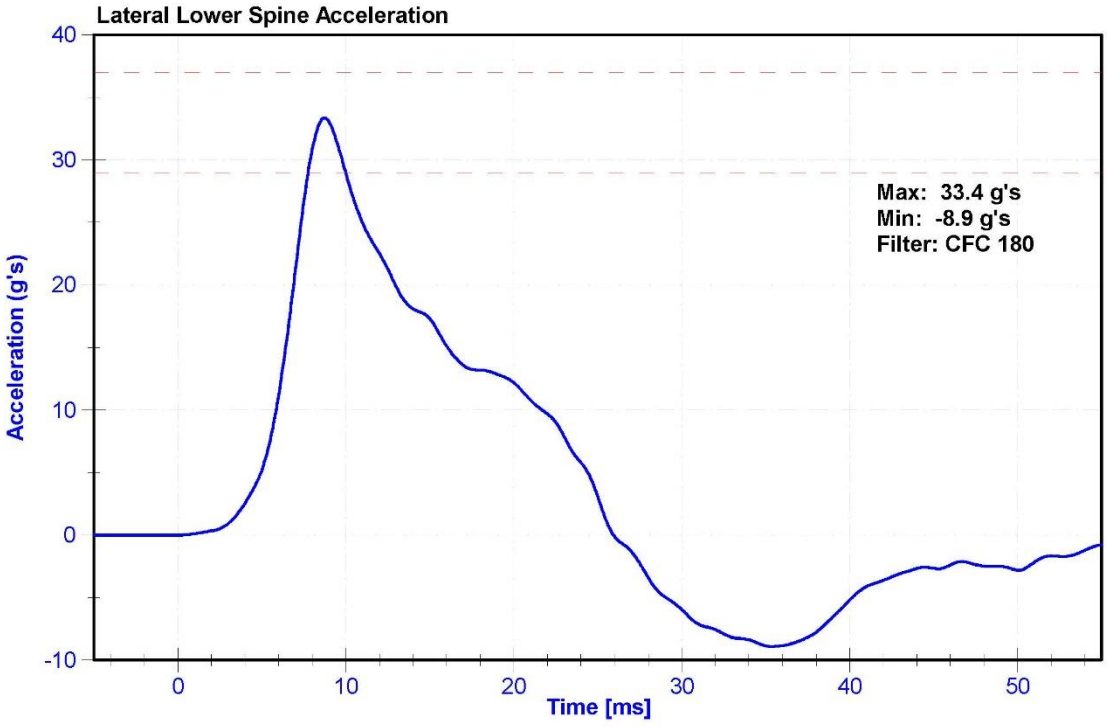

Shoulder Displacement
Displacement (mm)
Time [ms]
Max: 34.9 mm
Min: -1.1 mm
Filter: CFC 600


Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 27.5 mm
Min: -0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 32.3 mm
Min: -0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 33.7 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Max: 38.8 g's
Min: -12.0 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50


Lateral Lower Spine Acceleration
Max: 33.4 g's
Min: -8.9 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
40
30
20
10
0
-10
0
10
20
30
40
50

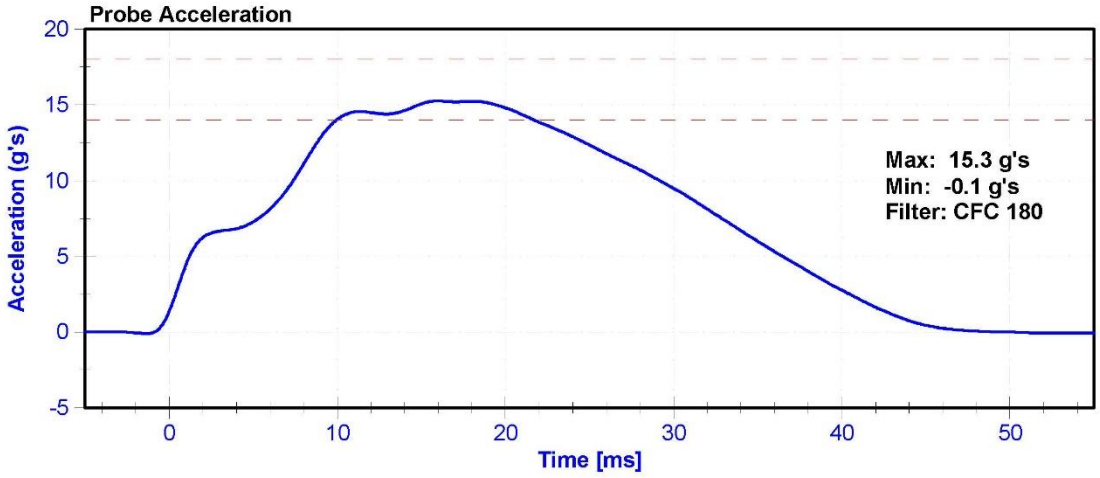
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

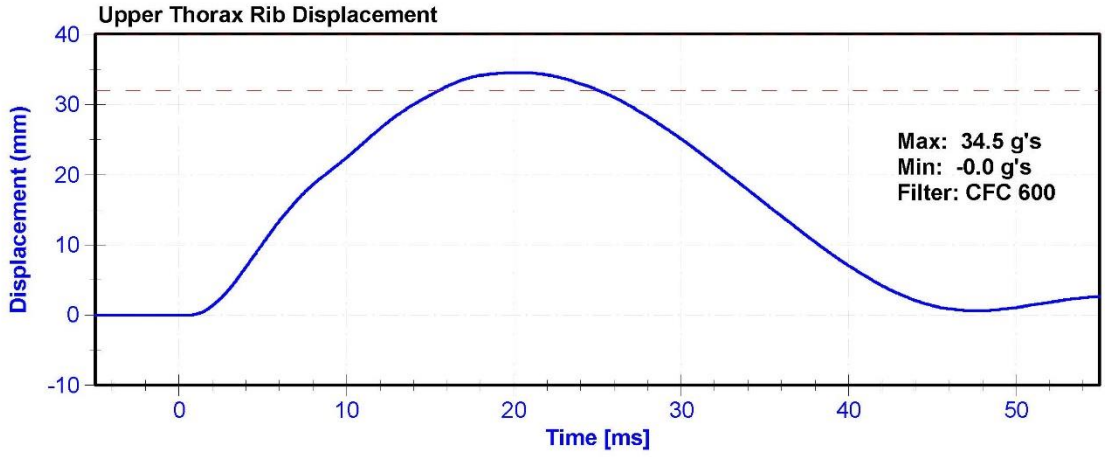
Results

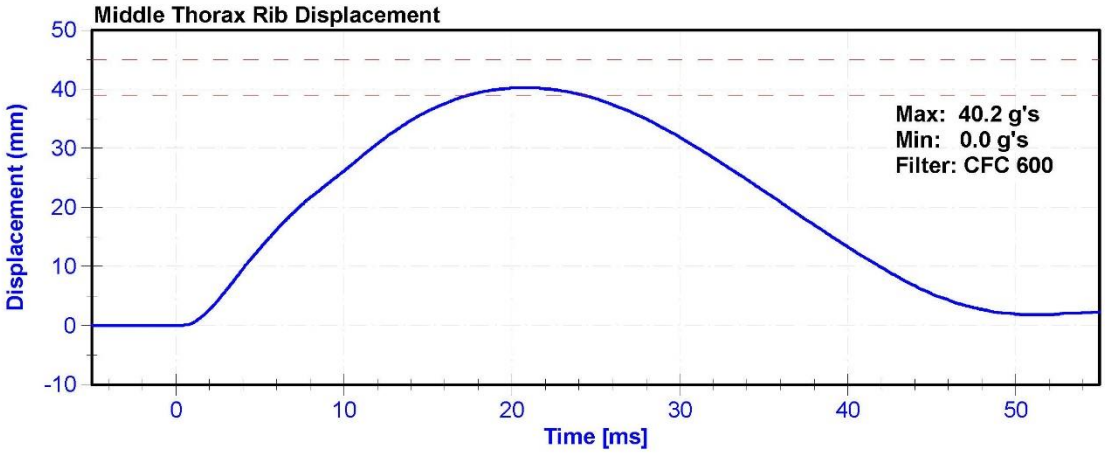
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	51.5	Pass
Velocity	4.2	4.4	m/s	4.35	Pass
Probe Acceleration	14	18	g's	15.3	Pass
Lateral Upper Spine Acceleration	13	17	g's	15.4	Pass
Lateral Lower Spine Acceleration	7	11	g's	9.2	Pass
Upper Thorax Rib Deflection	32	40	mm	34.5	Pass
Middle Thorax Rib Deflection	39	45	mm	40.2	Pass
Lower Thorax Rib Deflection	35	43	mm	37.0	Pass

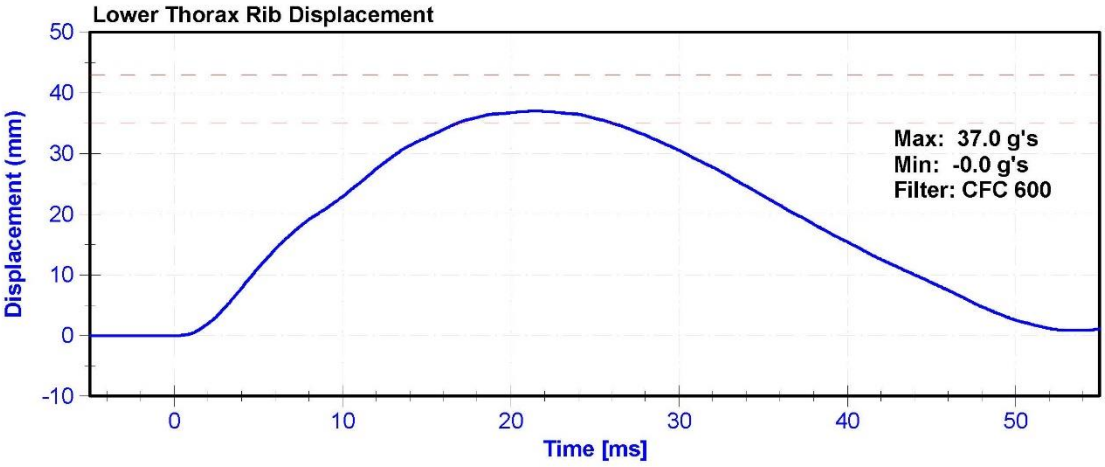
Transducer Calibrations

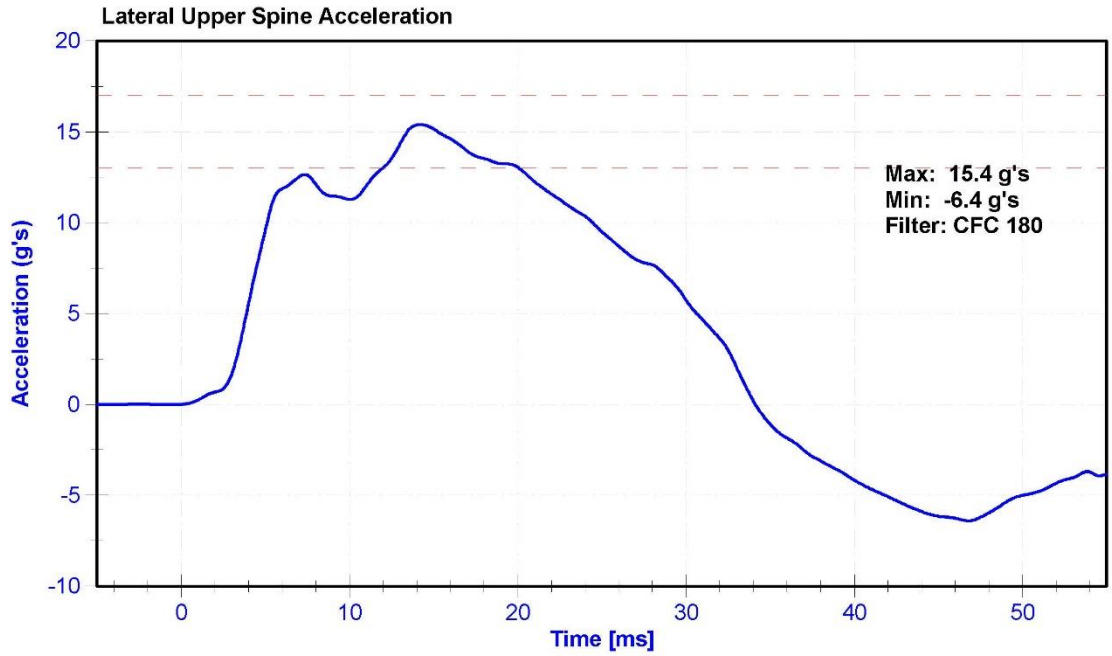
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Upper Spine Y Accelerometer	ENDEVCO 7264	AC-P83320	5/7/2018	11/5/2018
Lower Spine Y Accelerometer	ENDEVCO 7264	AC-P64147	5/7/2018	11/5/2018
Upper Thorax Rib Potentiometer	Servo 08CT1-3725	DS-451GFE	9/27/2017	9/27/2018
Middle Thorax Rib Potentiometer	Servo 08TC1-3745	DS-1151GFE	9/27/2017	9/27/2018
Lower Thorax Rib Potentiometer	Servo 08TC1-3725	DS-1156GFE	9/27/2017	9/27/2018

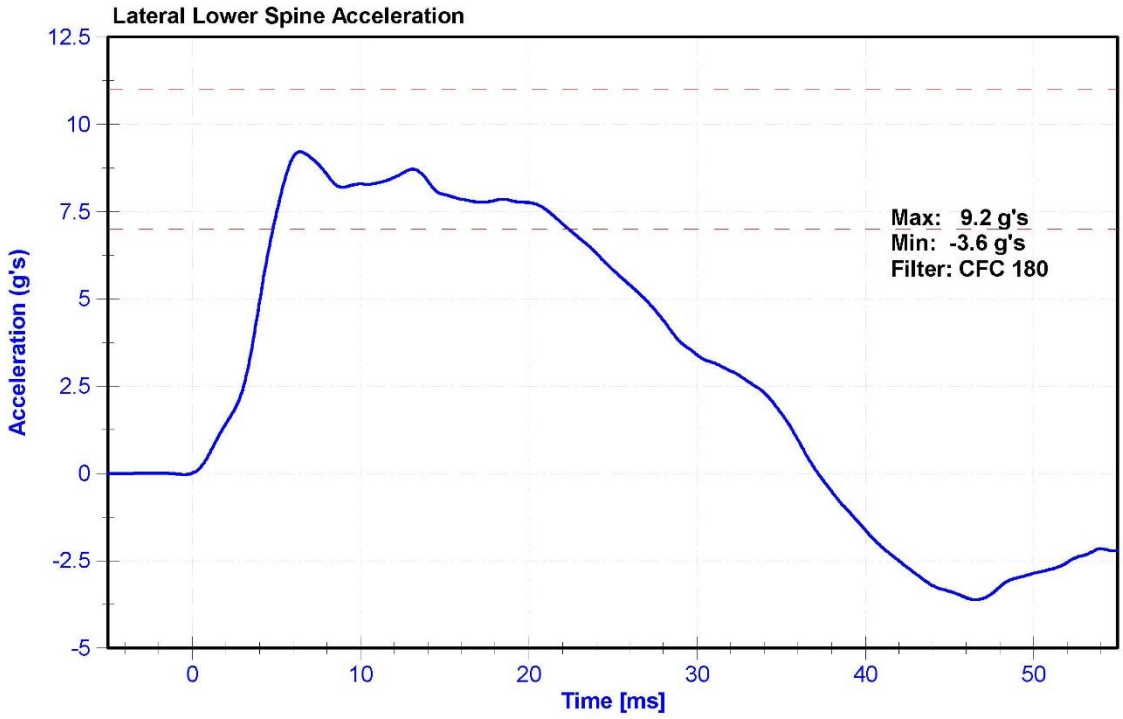



Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 34.5 g's
Min: -0.0 g's
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 40.2 g's
Min: 0.0 g's
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 37.0 g's
Min: -0.0 g's
Filter: CFC 600


Lateral Upper Spine Acceleration
Max: 15.4 g's
Min: -6.4 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
20
15
10
5
0
-5
-10
0
10
20
30
40
50


Lateral Lower Spine Acceleration
Max: 9.2 g's
Min: -3.6 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
12.5
10
7.5
5
2.5
0
-2.5
-5
0
10
20
30
40
50

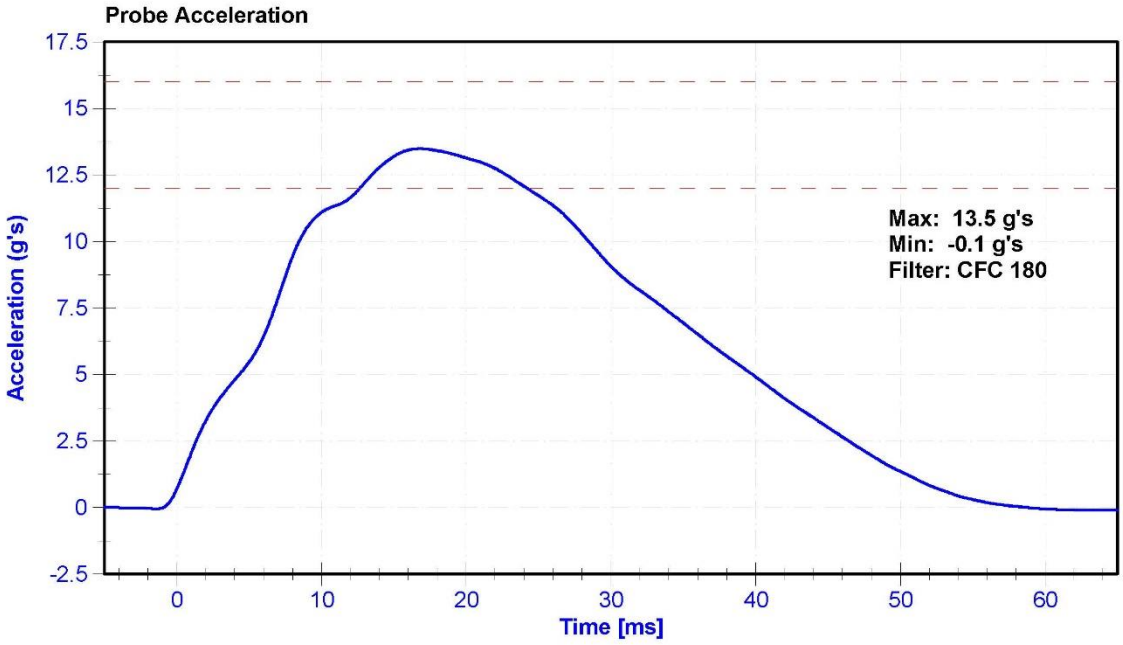
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

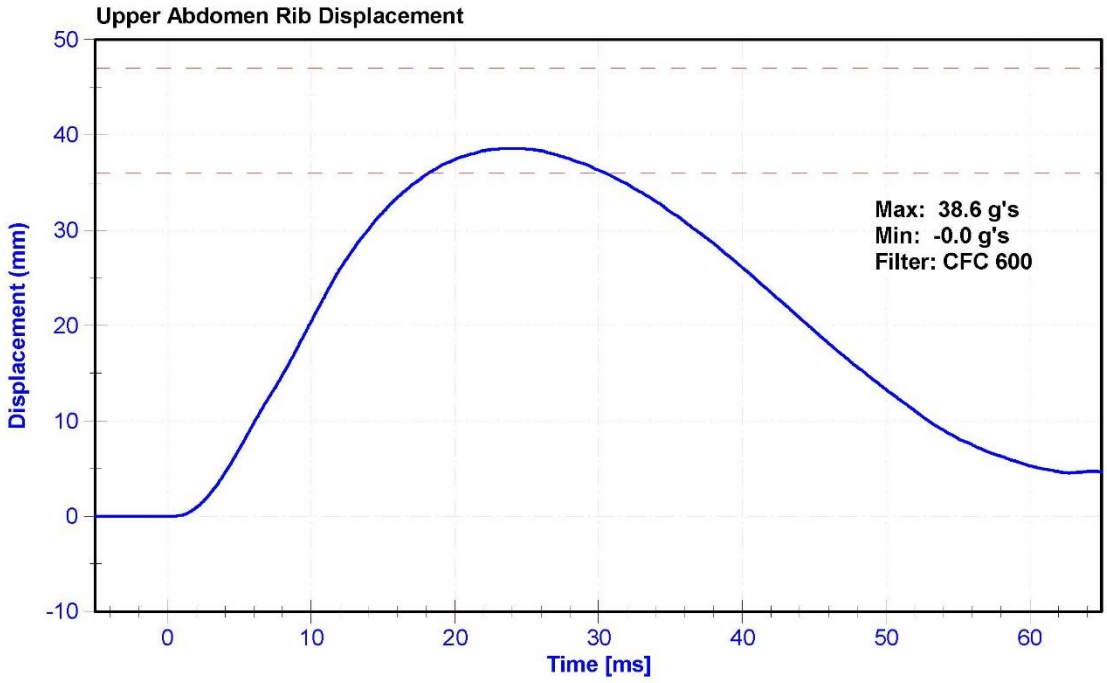
Results

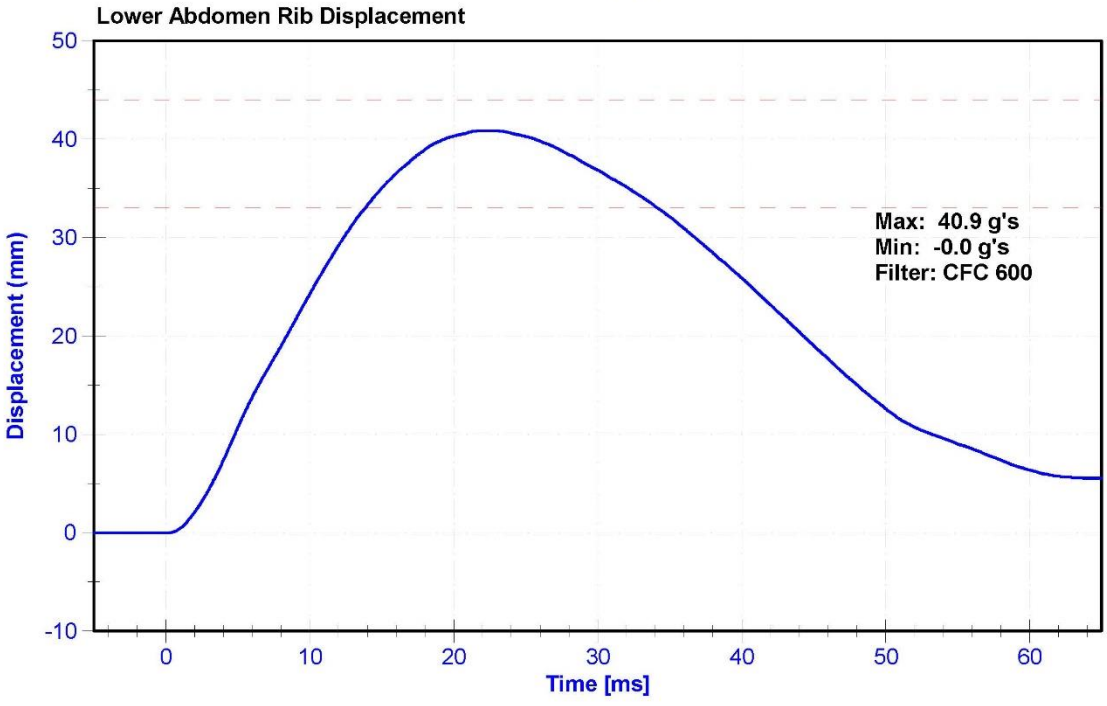
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.6	Pass
Humidity	10	70	%	47.1	Pass
Velocity	4.2	4.4	m/s	4.35	Pass
Probe Acceleration	12	16	g's	13.5	Pass
Lateral Lower Spine Acceleration	9	14	g's	11.8	Pass
Upper Abdomen Rib Deflection	36	47	mm	38.6	Pass
Lower Abdomen Rib Deflection	33	44	mm	40.9	Pass

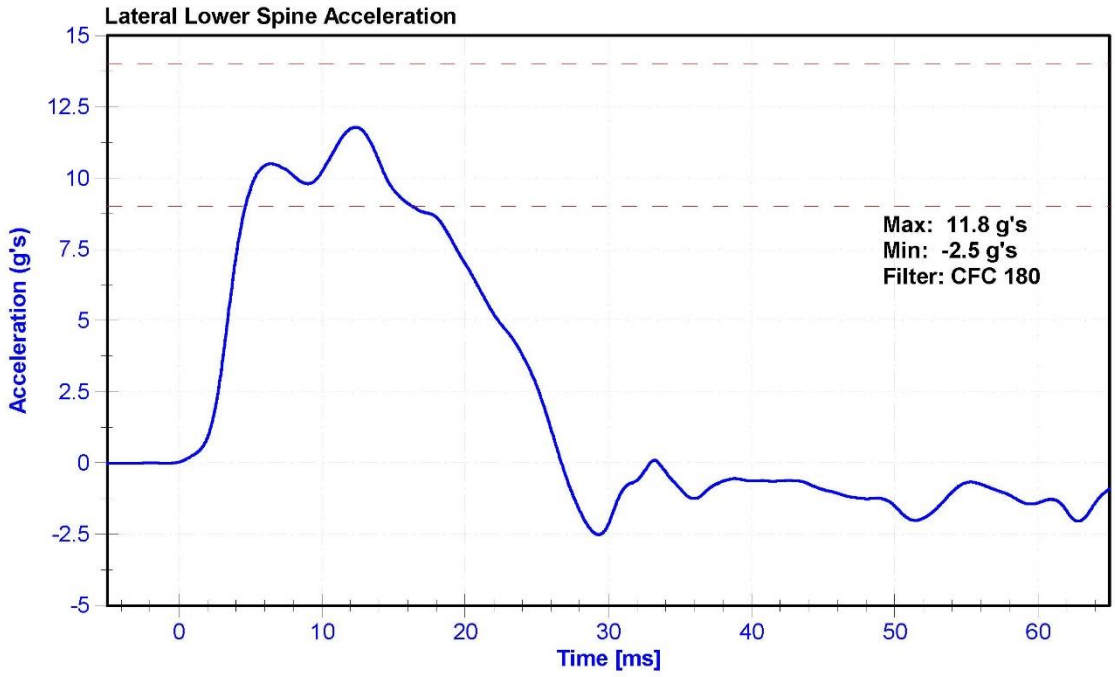
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Lower Spine Y Accelerometer	ENDEVCO 7264	AC-P64147	5/7/2018	11/5/2018
Upper Abdomen Rib Potentiometer	Servo 08CT1-3725	DS-308GFE	9/27/2017	9/27/2018
Lower Abdomen Rib Potentiometer	Servo 08CT1-3725	DS-307GFE	9/27/2017	9/27/2018




Upper Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 38.6 g's
Min: -0.0 g's
Filter: CFC 600


Lower Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 40.9 g's
Min: -0.0 g's
Filter: CFC 600


Lateral Lower Spine Acceleration
Acceleration (g's)
15
12.5
10
7.5
5
2.5
0
-2.5
-5
0
10
20
30
40
50
60
Time [ms]
Max: 11.8 g's
Min: -2.5 g's
Filter: CFC 180

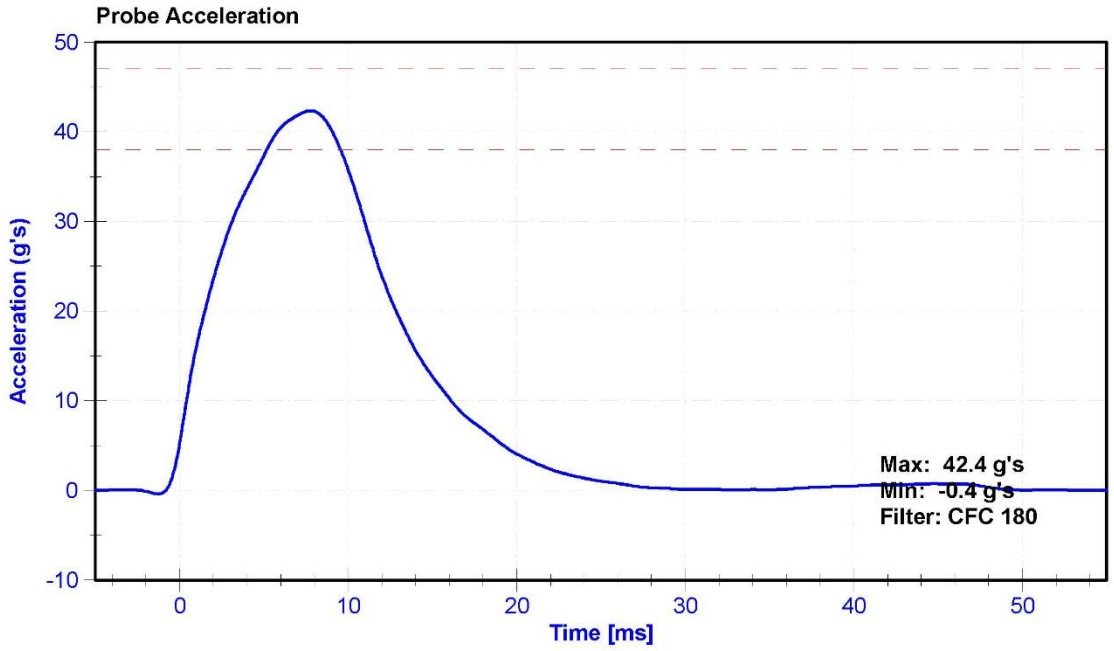
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

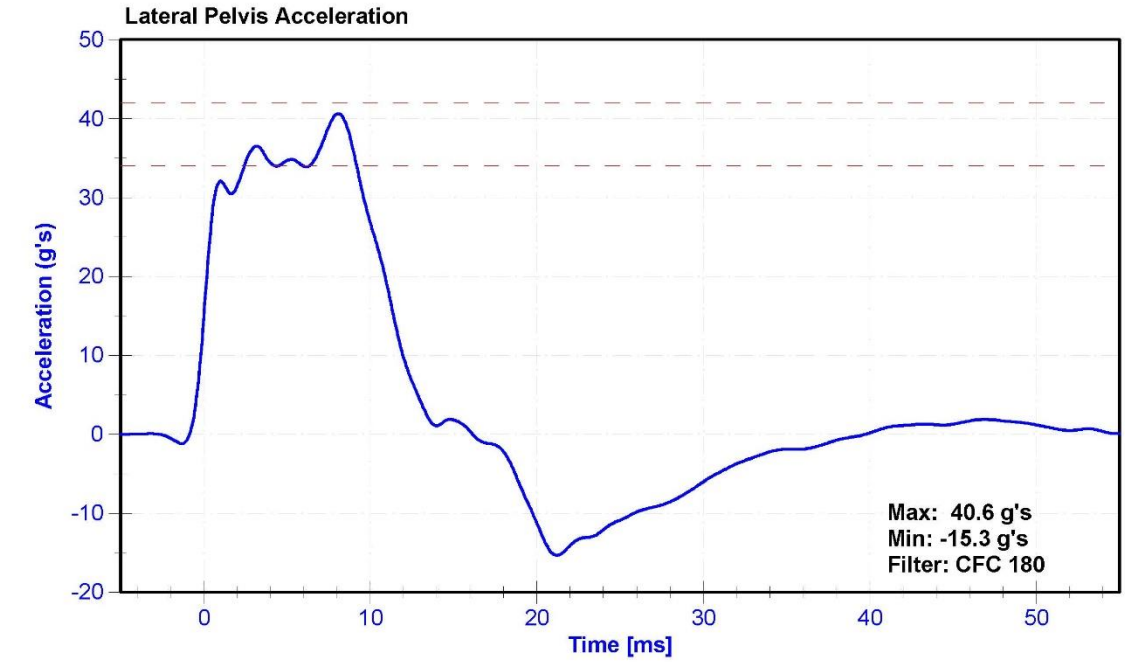
Results

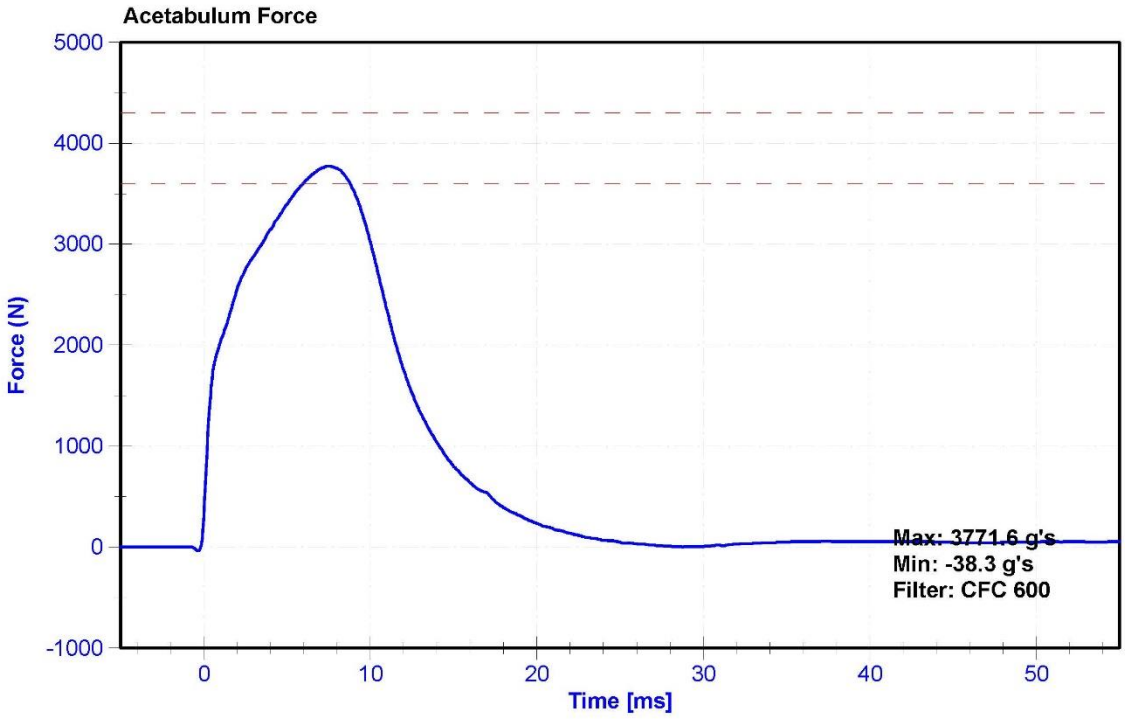
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	54.6	Pass
Velocity	6.6	6.8	m/s	6.60	Pass
Probe Acceleration	38	47	g's	42.4	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	40.6	Pass
Acetabulum Force	3600	4300	N	3771.6	Pass

Transducer Calibrations

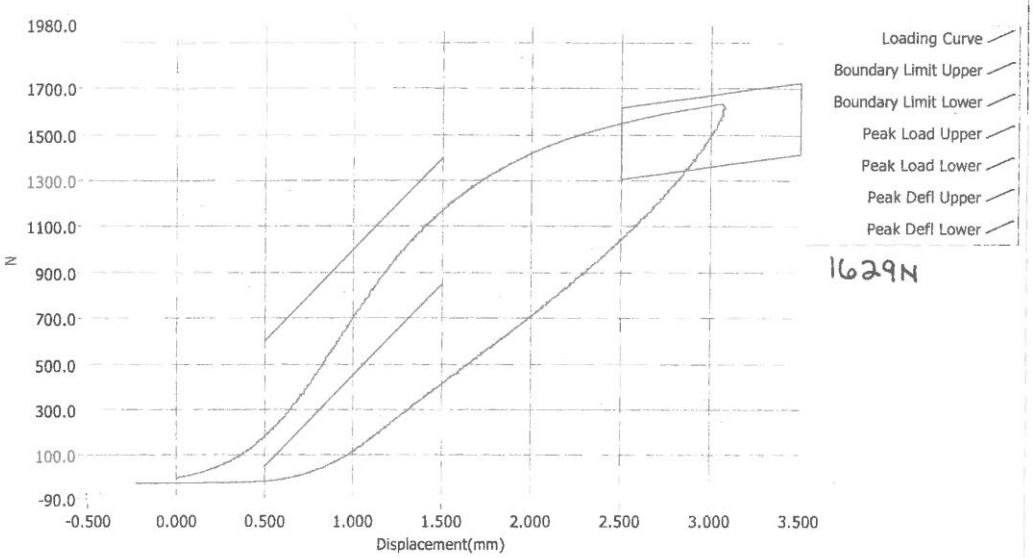
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P79602	5/7/2018	11/5/2018
Acetabulum Load Cell	DENTON 3249J	LC-275Fy	6/20/2017	6/20/2018
Certification Plug	Humanetics	63055	1/19/2013	N/A
Crash Test Plug	Humanetics	63217	1/23/2013	N/A




Lateral Pelvis Acceleration
Acceleration (g's)
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50
Time [ms]
Max: 40.6 g's
Min: -15.3 g's
Filter: CFC 180


Acetabulum Force
Force (N)
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]
Max: 3771.6 g's
Min: -38.3 g's
Filter: CFC 600

Resultant Data - SIDIIs Plug Compression



1629N

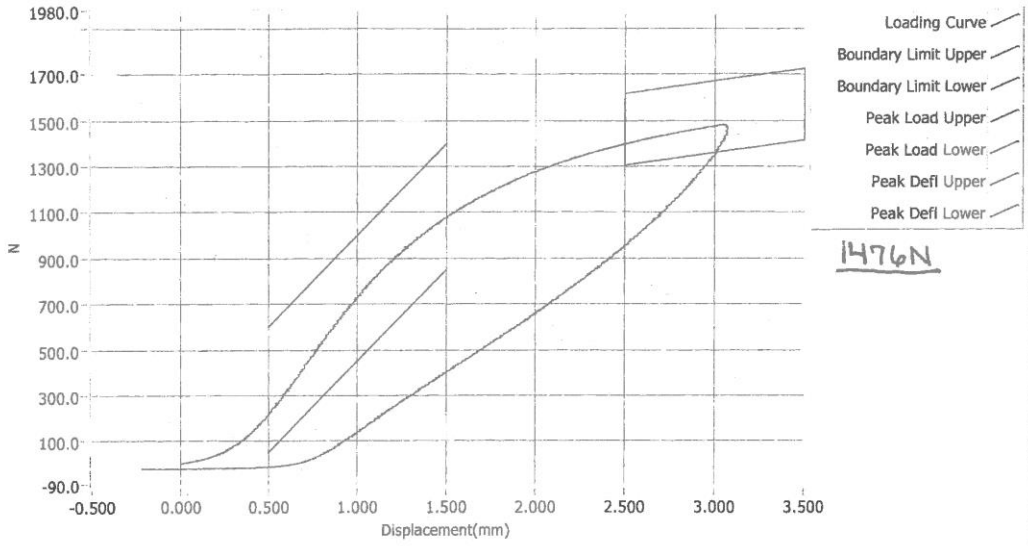
ATD Calibration Lab

Crash

Test ID	Part Serial Number	Test Date	Test Time
	63217	1/23/2013	8:52 PM
Cert ID	ATD Serial Number	ATD Type	
	N/A	SIDIIs	

Current Date : 1/23/2013 Current Time : 20:53:08

Resultant Data - SIDIIs Plug Compression



1476N

ATD Calibration Lab

Cert

Test ID	Part Serial Number	Test Date	Test Time
	63055	1/19/2013	1:40 AM
Cert ID	ATD Serial Number	ATD Type	
	N/A	SIDIIs	

Current Date : 1/19/2013 Current Time : 01:41:28

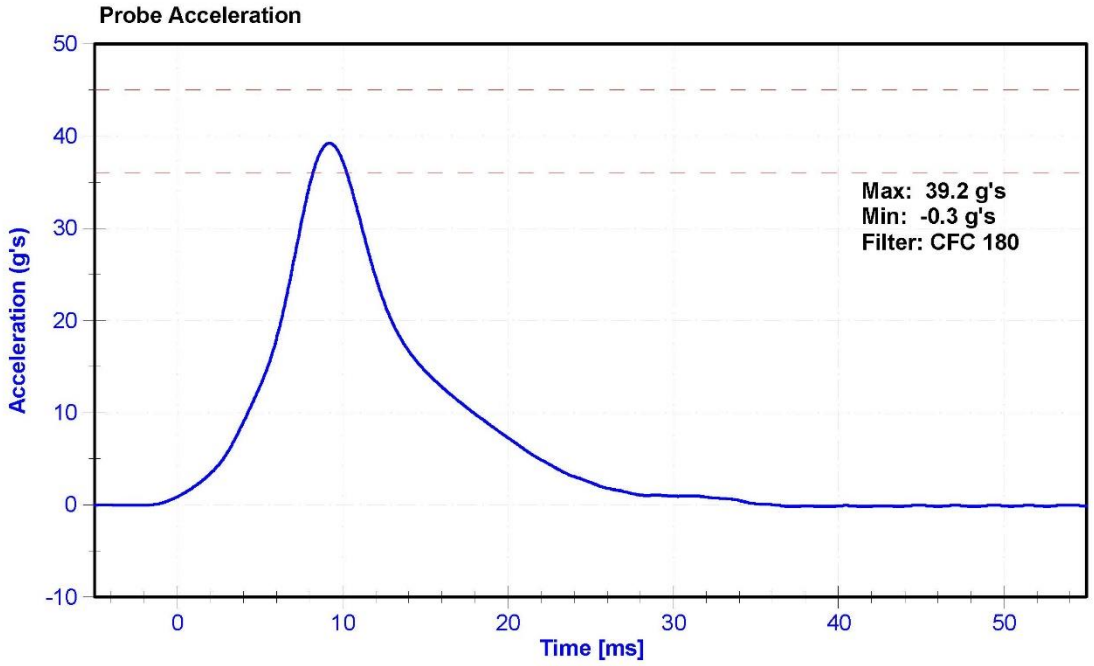
ATD Manufacturer	FTSS	Test Technician	K. Brogan
ATD Serial Number	300	Laboratory Supervisor	D. Reinhard

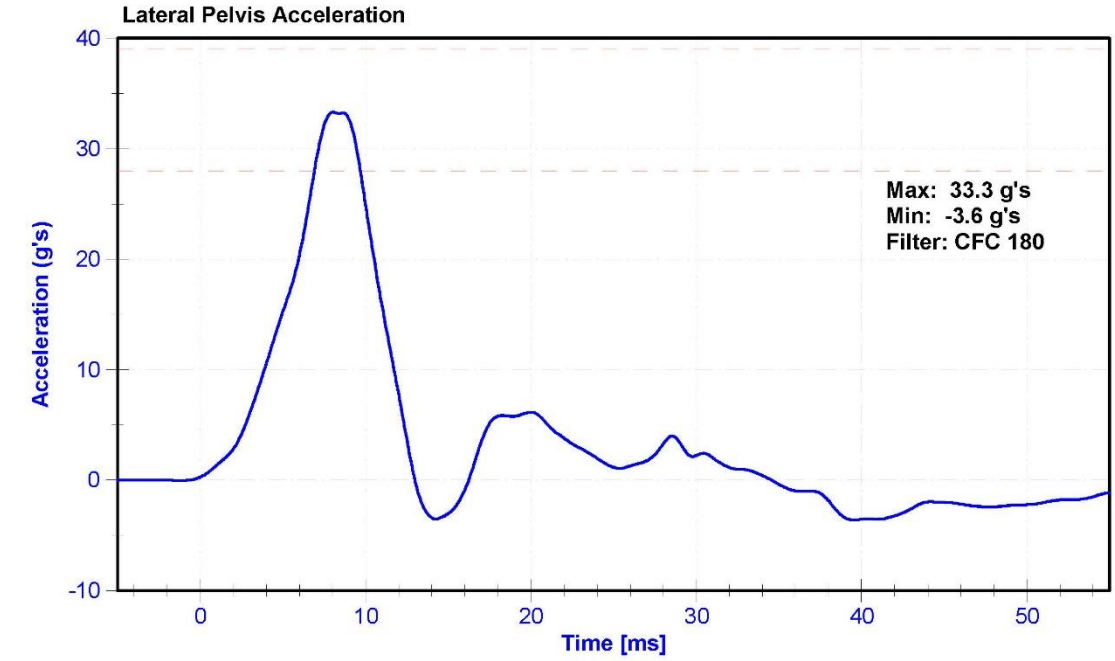
Results

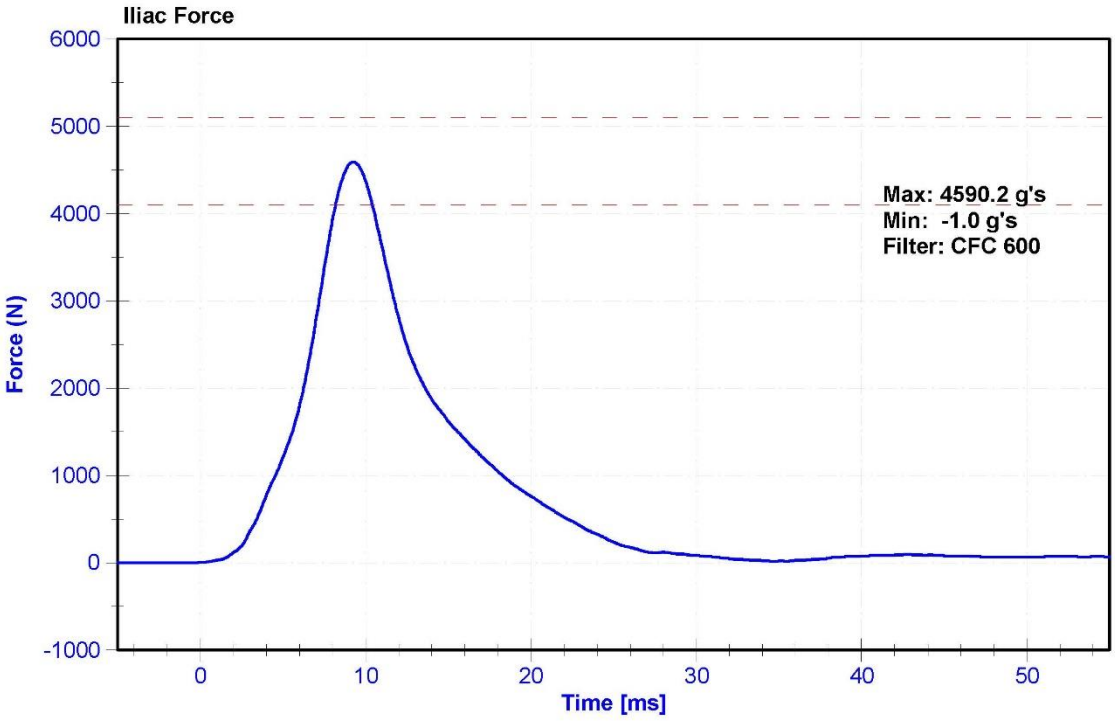
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	50.4	Pass
Velocity	4.2	4.4	m/s	4.35	Pass
Probe Acceleration	36	45	g's	39.2	Pass
Lateral Pelvis Acceleration	28	39	g's	33.3	Pass
Iliac Force	4100	5100	N	4590.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P79602	5/7/2018	11/5/2018
Iliac Load Cell	DENTON 3228J	LC-279Fy	6/21/2017	6/21/2018




Lateral Pelvis Acceleration
Acceleration (g's)
Time [ms]
Max: 33.3 g's
Min: -3.6 g's
Filter: CFC 180


Iliac Force
Force (N)
Time [ms]
Max: 4590.2 g's
Min: -1.0 g's
Filter: CFC 600

APPENDIX D

TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

Table 1 – Dummy Instrumentation (ES-2re)

			ES-2re S/N: F034		
			Serial Number	Manufacturer	Calibration Date
Head Accelerometers	Primary	X	AC-P58904	ENDEVCO	5/7/2018
		Y	AC-P58911	ENDEVCO	5/7/2018
		Z	AC-P58776	ENDEVCO	5/7/2018
	Redundant	X	AC-P58887	ENDEVCO	5/7/2018
		Y	AC-P58888	ENDEVCO	5/7/2018
		Z	AC-P51734	ENDEVCO	5/7/2018
Thorax Rib Displacement Potentiometers	Upper	Y	DS-183GFE	Honeywell	9/27/2017
	Middle	Y	DS-184GFE	Honeywell	9/27/2017
	Lower	Y	DS-182GFE	Honeywell	9/27/2017
Abdomen Load Cells	Forward	Y	LC-1512	DENTON	6/5/2017
	Middle	Y	LC-1526	DENTON	6/5/2017
	Rear	Y	LC-1516	DENTON	6/5/2017
Lower Spine Accelerometers (T12)		X	AC-P52079	ENDEVCO	5/8/2018
		Y	AC-P51948	ENDEVCO	5/8/2018
		Z	AC-P51269	ENDEVCO	5/8/2018
Pubic Symphysis Load Cell		Y	LC-465Fy	Denton	6/6/2017

Table 2 – Dummy Instrumentation (SID-IIs)

				SID-IIs S/N: 300		
				Serial Number	Manufacturer	Calibration Date
Head Accelerometers		Primary	X	AC-P58777	ENDEVCO	5/7/2018
			Y	AC-P59018	ENDEVCO	5/7/2018
			Z	AC-P79189	ENDEVCO	5/7/2018
		Redundant	X	AC-P52095	ENDEVCO	5/7/2018
			Y	AC-P58986	ENDEVCO	5/7/2018
			Z	AC-P68057	ENDEVCO	5/7/2018
Displacement Potentiometers	Thoracic Rib	Upper	Y	DS-451GFE	Servo	9/27/2017
		Middle	Y	DS-1151GFE	Servo	9/27/2017
		Lower	Y	DS-1156GFE	Servo	9/27/2017
	Abdominal Rib	Upper	Y	DS-308GFE	Servo	9/27/2017
		Lower	Y	DS-307GFE	Servo	9/27/2017
Lower Spine Accelerometers (T12)			X	AC-P58883	ENDEVCO	5/7/2018
			Y	AC-P64147	ENDEVCO	5/7/2018
			Z	AC-P58786	ENDEVCO	5/7/2018
Acetabulum Load Cell			Y	LC-275Fy	DENTON	6/20/2017
Iliac Wing Load Cell			Y	LC-279Fy	DENTON	6/21/2017
Pelvis Plug (struck side)				63068	Humanetics	1/19/2013
Pelvis Plug (non-struck side)				-	-	-

Table 3 – Vehicle Instrumentation

Vehicle Instrumentation			Serial Number	Manufacturer	Calibration Date
1	Vehicle Center of Gravity	X	AC-A250368	MSI 1201-1000	1/29/2018
	Vehicle Center of Gravity	Y	AC-A250354	MSI 1201-1000	1/29/2018
	Vehicle Center of Gravity	Z	AC-A250353	MSI 1201-1000	1/29/2018
2	Right Sill at Front Seat	X	AC-A250339	MSI 1201-1006	1/17/2018
	Right Sill at Front Seat	Y	AC-A250382	MSI 1201-1005	1/17/2018
	Right Sill at Front Seat	Z	AC-A250356	MSI 1201-1004	1/17/2018
3	Right Sill at Rear Seat	X	AC-A211494	MSI 1201-1000	4/2/2018
	Right Sill at Rear Seat	Y	AC-A222650	MSI 1201-1000	4/2/2018
	Right Sill at Rear Seat	Z	AC-A197052	MSI 1201-1000	4/2/2018
4	Left Sill at Front Door	Y	AC-A217576	MSI 1201-1000	2/2/2018
5	Left Sill at Rear Door	Y	AC-A192230	MSI 1201-1000	3/8/2018
6	Left A-Post Lower	Y	AC-A192193	MSI 1201-1000	4/2/2018
7	Left A-Post Middle	Y	AC-A192227	MSI 1201-1000	3/10/2018
8	Left B-Post Lower	Y	AC-A250378	MSI 1201-1016	1/17/2018
9	Left B-Post Middle	Y	AC-A250357	MSI 1201-1000	1/17/2018
10	Front Seat Track	Y	AC-A222641	MSI 1201-1000	1/23/2018
11	Rear Seat Track or Structure	Y	AC-A156921	MSI 1201	3/21/2018
12	Right Rear Occ. Compartment	Y	AC-A247195	MSI 1201-1000	4/2/2018
13	Engine Block	X	AC-A197002	MSI 1201-1000	4/2/2018
	Engine Block	Y	AC-A192196	MSI 1201-1000	4/2/2018
14	Rear Floorpan Above Axle	X	AC-A222646	MSI 1201-1000	4/3/2018
	Rear Floorpan Above Axle	Y	AC-A217559	MSI 1201-1000	4/3/2018
	Rear Floorpan Above Axle	Z	AC-A229243	MSI 1201-1000	2/2/2018

TABLE 4 – MDB Instrumentation

MDB Instrumentation		Serial Number	Manufacturer	Calibration Date
MDB Center of Gravity	X	AC-A247193	MSI 1201-1000	12/7/2017
MDB Center of Gravity	Y	AC-A247202	MSI 1201-1000	12/7/2017
MDB Center of Gravity	Z	AC-A247206	MSI 1201-1000	12/7/2017
Left Frame at Rear Axle Centerline	X	AC-A002415	MSI 1201	3/27/2018
Left Frame at Rear Axle Centerline	Y	AC-A197003	MSI 1201-1000	3/27/2018