

REPORT NUMBER: NCAP-CAL-18-001

**NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST**

**Subaru Corporation
2018 Subaru Crosstrek
Four Door Station Wagon**

NHTSA No: M20185502

**PREPARED BY:
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December 6, 2017

FINAL REPORT

**PREPARED FOR:
U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF CRASHWORTHINESS STANDARDS
1200 NEW JERSEY AVE SE, ROOM W43-410
WASHINGTON, D.C. 20590**

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Date: December 6, 2017

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

COTR, New Car Assessment Program
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Date: _____

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16. Abstract A 56.30 km/h (35 mph), NCAP Frontal Impact Test was conducted on a 2018 Subaru Crosstrek four door station wagon in accordance with the specifications of the Office of Crashworthiness Standards Frontal NCAP Laboratory Test Procedure. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and foot well intrusion performance. The test was conducted at Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on October 31, 2017. The impact velocity of the vehicle was 56.28 km/h, and the ambient temperature at the barrier face at the time of impact was 21°C. The target vehicle's maximum post-test static crush was 498 mm at C3 to the left side of the front bumper. The test vehicle's occupant performance data is as follows: <table border="1"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th rowspan="2">Units</th> <th colspan="2">Driver ATD (Serial No. 142)</th> <th colspan="2">Passenger ATD (Serial No. 288)</th> </tr> <tr> <th>Threshold</th> <th>Result</th> <th>Threshold</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₁₅)</td> <td></td> <td>700</td> <td>120.908</td> <td>700</td> <td>122.293</td> </tr> <tr> <td>Maximum Chest Compression</td> <td>mm</td> <td>63</td> <td>-23.217</td> <td>52</td> <td>-17.011</td> </tr> <tr> <td>Nij</td> <td></td> <td>1</td> <td>0.360</td> <td>1</td> <td>0.446</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>4,170</td> <td>1354.337</td> <td>2,620</td> <td>869.491</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>4,000</td> <td>-184.962</td> <td>2,520</td> <td>-230.396</td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>10,008</td> <td>-1121.334</td> <td>6,805</td> <td>-1021.190</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>10,008</td> <td>-1614.074</td> <td>6,805</td> <td>-1899.562</td> </tr> </tbody> </table>						Measurement Description	Units	Driver ATD (Serial No. 142)		Passenger ATD (Serial No. 288)		Threshold	Result	Threshold	Result	Head Injury Criteria (HIC ₁₅)		700	120.908	700	122.293	Maximum Chest Compression	mm	63	-23.217	52	-17.011	Nij		1	0.360	1	0.446	Neck Tension	N	4,170	1354.337	2,620	869.491	Neck Compression	N	4,000	-184.962	2,520	-230.396	Left Femur Force	N	10,008	-1121.334	6,805	-1021.190	Right Femur Force	N	10,008	-1614.074	6,805	-1899.562
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SECTION 1

PURPOSE AND SUMMARY OF TEST

PURPOSE

This 56.3 km/h frontal barrier impact test is part of the Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-12-D-00260. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for consumer information purposes.

The 56.3 km/h frontal barrier impact test was conducted in accordance with the Office of Crashworthiness Standards Frontal NCAP Laboratory Test procedure, dated October 2015.

SUMMARY

A ridged fixed barrier was impacted by a 2018 Subaru Crosstrek four door station wagon at a velocity of 56.28 km/h. The test was performed at Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on October 31, 2017. Pre- and post-test photographs of the vehicle and dummies to document the test can be found in Appendix A. One real-time camera and 14 high-speed cameras were used to document the frontal barrier impact event. Camera locations and other pertinent camera information can be found in Data Sheet 6 of this report.

One Part 572E, 50th percentile male anthropomorphic test device (ATD), was placed in the driver seating position and one Part 572O 5th percentile female ATD was placed in the right-front passenger seating position according to dummy placement instructions specified in the Frontal NCAP Laboratory Test Procedure. Both ATDs were fully instrumented with head, chest and pelvis tri-axial accelerometers, chest displacement potentiometers, upper neck transducers, right / left femur load cells, and lower leg instrumentation. The driver (position 1) ATD (Serial No. 142) and the right-front passenger (position 2) ATD (Serial No. 288) were calibrated previous to this test. Certification details, along with instrumentation calibration data, can be found in Appendix C of this report.

The 136 channels of data were recorded on an on-board data acquisition system. Please refer to Appendix B for the dummy response data traces.

There was 100 percent windshield retention and no intrusion into the protected zone of the windshield during the event. There was a total of 0.0 grams of stoddard solvent leakage after the event and including all phases of the static rollover. The maximum static crush of the test vehicle was 498 mm at C3 to the left side of front bumper. During and after the impact event, the driver's and passenger's side doors were closed and operational.

The driver's visible contact points were as follows: The driver's head contacted the frontal airbag and then the head restraint. The upper torso contacted the frontal airbag. Both knees contacted the knee air bag.

The passenger's visible contact points were as follows: The passenger's head contacted the frontal airbag and then the head restraint. The upper torso contacted the frontal airbag. Both knees contacted the glove box.

The occupant data is summarized below.

ATD Position	HIC ₁₅	Nij	Neck Tension (N)	Neck Comp. (N)	3ms Chest Clip (Gs)	Chest Disp. (mm)	Left Femur (N)	Right Femur (N)
Driver (50 th)	120.908	0.360	1354.337	-184.962	45.434	-23.217	-1121.334	-1614.074
Passenger (5 th)	122.293	0.446	869.491	-230.396	40.840	-17.011	-1021.190	-1899.562

GENERAL COMMENTS:

1. P1 (Driver) serial number - 142
2. P2 (Passenger) serial number - 288

Data Anomalies:

- Engine Bottom X Acceleration, Exceeded calibration range & saturated at 36.2ms

SECTION 2

OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

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 Adjustment, Fuel System, and Steering Wheel Data

Data Sheet No. 3 – Dummy Longitudinal Clearance Dimensions

Data Sheet No. 4 – Dummy Lateral Clearance Dimensions

Data Sheet No. 5 – Seat Belt Positioning Data

Data Sheet No. 6 – High-Speed Camera Locations and Data

Data Sheet No. 7 – Vehicle Accelerometer Locations

Data Sheet No. 8 – Photographic Reference Target Locations

Data Sheet No. 9 – Load Cell Locations on Fixed Barrier

Data Sheet No. 10 – Test Vehicle Summary of Results

Data Sheet No. 11 – Post-Test Observations

Data Sheet No. 12 – Vehicle Profile Measurements

Data Sheet No. 13 – Accident Investigation Division Data

Data Sheet No. 14 – Vehicle Intrusion Measurements

Data Sheet No. 15 – Summary of FMVSS 212, 219 (Partial), and 301 Data

Data Sheet No. 16 – FMVSS 301 Static Rollover Results

Data Sheet No. 17 – Dummy/Vehicle Temperature Stabilization Chart

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2018 Subaru Crosstrek four door station wagon
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20185502
 Test Date: 10/31/2017

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20185502	Traction Control System (TCS)	Yes
Model Year	2018	Power Steering	Yes
Make	Subaru	Power Window Auto-Reverse	No
Model	Crosstrek	Driver Frontal Airbag	Yes
Body Style	Four door Station Wagon	Driver Curtain Airbag	Yes
VIN	JF2GTAAC3JH212058	Driver Head/Torso Airbag	No
Body Color	Blue	Driver Torso Airbag	No
Odometer Reading (km /mi)	41.8 km / 26 mi	Driver Torso/Pelvis Airbag	Yes
Engine Displacement (L)	2.0	Driver Pelvis Airbag	No
Type / No. Cylinders	I4	Driver Knee Airbag	Yes
Engine Placement	Transverse	Front Pass. Frontal Airbag	Yes
Transmission Type	Automatic	Front Pass. Curtain Airbag	Yes
Transmission Speeds	CVT	Front Pass. Head/Torso Airbag	No
Overdrive	Yes	Front Pass. Torso Airbag	No
Final Drive	All Wheel Drive	Front Pass. Torso/Pelvis Airbag	Yes
Roof Rack	No	Front Pass. Pelvis Airbag	No
Sunroof / T-Top	No	Front Pass. Knee Airbag	No
Running Boards	No	Driver Pretensioner	Yes
Tilt Steering Wheel	Yes	Driver Load Limiter	Yes
Power Seats	No	Front Pass. Pretensioner	Yes
Anti-Lock Brakes (ABS)	Yes	Front Pass. Load Limiter	Yes
Automatic Door Locks (ADLs)	No	Other	No

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

N/A

DATA FROM CERTIFICATION LABEL

Manufactured By	Subaru Corporation	GVWR (kg)	1970
Date of Manufacture	07/17	GAWR Front (kg)	1010
		GAWR Rear (kg)	1000

VEHICLE SEATING AND WEIGHT CAPACITY DATA

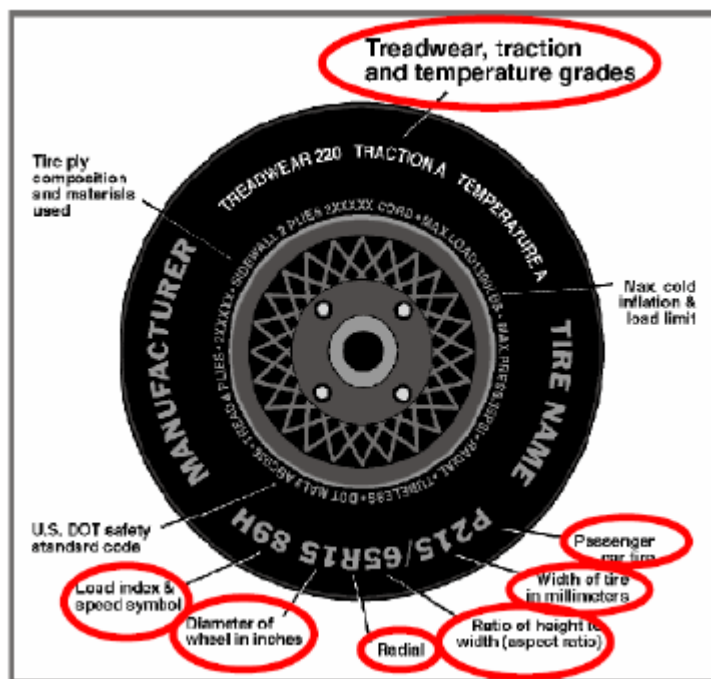
Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench	N/A	
Number of Occupants	2	3	N/A	5
Capacity Wt. (VCW) (kg)				408
Cargo Wt. (RCLW) (kg)				67.8

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

Test Vehicle: 2018 Subaru Crosstrek four door station wagon
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20185502
Test Date: 10/31/2017

Collect items circled in red, tire manufacturer, and tire name.



VEHICLE TIRE INFORMATION

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	230	220
Recommended Tire Size	P225/60R17	P225/60R17
Tire Size on Vehicle	P225/60R17	P225/60R17
Tire Manufacturer	Yokohama	Yokohama
Tire Model	Geolandar G91	Geolandar G91
Treadwear	320	320
Traction	B	B
Temperature Grades	A	A
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Polyester, 2 Steel	2 Polyester, 2 Steel
Load Index / Speed Symbol	98H	98H
Tire Material	Rubber	Rubber
DOT Safety Code Left	FDFCPE22717	FDFCPE22717
DOT Safety Code Right	FDFCPE22717	FDFCPE22717

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

Test Vehicle: 2018 Subaru Crosstrek four door station wagon
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20185502
 Test Date: 10/31/2017

TEST VEHICLE WEIGHTS

	Units	As Delivered Weights (UVW)			As Tested Weights (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	437	299		480	361	
Right	kg	410	297		435	369	
Ratio	%	59	41		55.6	44.4	
Totals	kg	847	596	1443	915	730	1645

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1443	(A)
Weight of 1 P572E ATD & 1 P572O ATD	kg	142	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	67.8	(C)
Calculated Vehicle Target Weight (TVTW)	kg	1652.8	(A+B+C)

TEST VEHICLE ATTITUDES AND CG

Condition	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	802	802	806	811	1103
As Tested	mm	789	793	778	779	1185
Post-Test	mm	888	882	780	774	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2671
Total Vehicle Length at Left Side	mm	4408
Total Vehicle Length at Centerline	mm	4462
Total Vehicle Length at Right Side	mm	4408
Weight of Ballast in Cargo Area	kg	17
Weight of Vehicle Components Removed	kg	27
Amount of Stoddard Solvent in Fuel Tank	L	58.6

LIST OF COMPONENTS REMOVED TO MEET TEST WEIGHT:

Trunk carpeting, spare tire, jack, tail lights

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

Test Vehicle: 2018 Subaru Crosstrek four door station wagon
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20185502
 Test Date: 10/31/2017

TARGET VEHICLE STRUCTURAL MEASUREMENT

No.	Description	Pre-Test
1	Total Length	4462
2	Total Width	1775
3*	Bumper Top Height	565
4*	Bumper Bottom Height	481
5*	Longitudinal Member Top Height	591
6	Distance Between Longitudinal Members	967
7	Longitudinal Member Width	59
8*	Engine Top Height	898
9*	Engine Bottom Height	267
10	Engine and Gearbox Width	736
11	Front Bumper-Engine Distance	543
12*	Front Shock Absorber Fixing Height	929
13*	Bonnet Leading Edge Height	881
14	Front Shock Absorber Fixing Width	1160
15	Front Bumper – Front Axle Distance	959
16	Front Axle – A Pillar Distance	466
17	A-Pillar – B-Pillar Distance	1153
18	B-Pillar – Rear Axle Distance	1053
19	B-Pillar – C-Pillar Distance	981
20*	Roof Sill Bottom Height	1419
21*	Roof Sill Top Height	1471
22*	Floor Sill Bottom Height	356
23*	Floor Sill Top Height	445

*Height Measurements are taken from the ground
 Note: All measurements are in millimeters

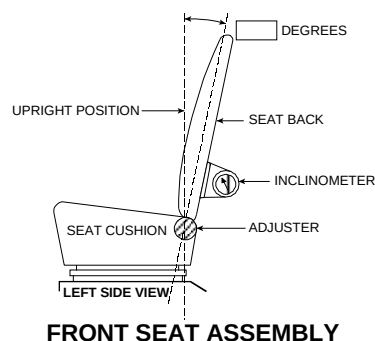
DATA SHEET NO. 2 SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

Test Vehicle: 2018 Subaru Crosstrek four door station wagon
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20185502
Test Date: 10/31/2017

NOMINAL DESIGN RIDING POSITION

The driver's seat back was set to the manufacturer's designated angle. The passenger's seat back was positioned in a similar manner as the driver's seat back. Seat back angles are measured at the headrest post bezel using a digital inclinometer.



Seating Position	Degrees
Driver Seat Back Angle	6.5
Passenger Seat Back Angle	7.6

SEAT FORE / AFT POSITIONS

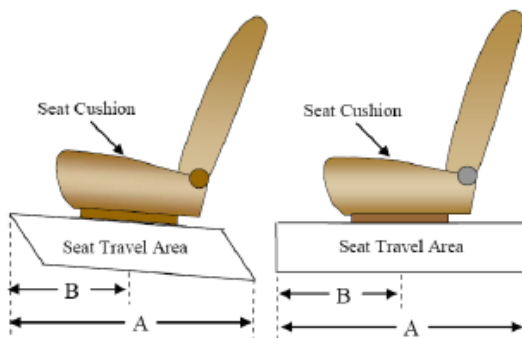
The driver's seat was positioned at the mid-point of fore/aft travel at its lowest position. The passenger's seat was positioned at the most forward position of fore/aft travel. Zero is defined as the forward most position.

Seating Position	Total Fore / Aft Travel	Placed in Position #
Driver Seat	27 (0-26)	11
Passenger Seat	27 (0-26)	0

SEAT BELT UPPER ANCHORAGE

The driver's seat belt anchorage was positioned according to the manufacturer's designated positioning for a 50th percentile adult male ATD. The passenger's seat belt anchorage was positioned according to the manufacturer's designated positioning for a 5th percentile adult female ATD. For this test zero is defined as the uppermost position.

Seating Position	Total # of Positions	Placed in Position #
Driver Seat	4	1
Passenger Seat	4	0



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

Test Vehicle: 2018 Subaru Crosstrek four door station wagon
 Test Program: NCAP Frontal Barrier Impact Test

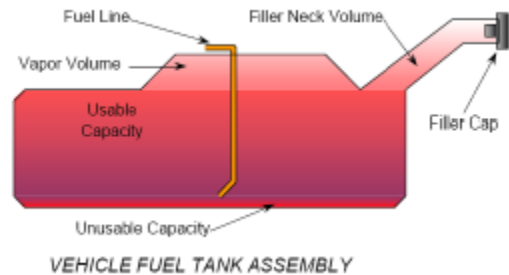
NHTSA No.: M20185502
 Test Date: 10/31/2017

FUEL TANK CAPACITY

Description	Liters
Usable Capacity of "Standard Tank"	63
Usable Capacity of "Optional Tank"	N/A
92%-94% of Usable Capacity	57.96 – 59.22
Actual Amount of Solvent Used	58.6
1/3 of Usable Capacity	21

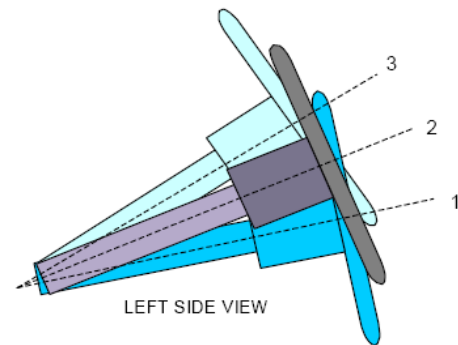
FUEL PUMP

The vehicle is equipped with an electric fuel pump. The fuel filler neck is on the right 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.



STEERING COLUMN ADJUSTMENT

Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when moved through its full range of motion. For angular measurements, a digital inclinometer was used to measure a plate which was placed across the steering wheel rim. A tape measure was used to measure the telescoping steering wheel travel.



STEERING COLUMN ASSEMBLY

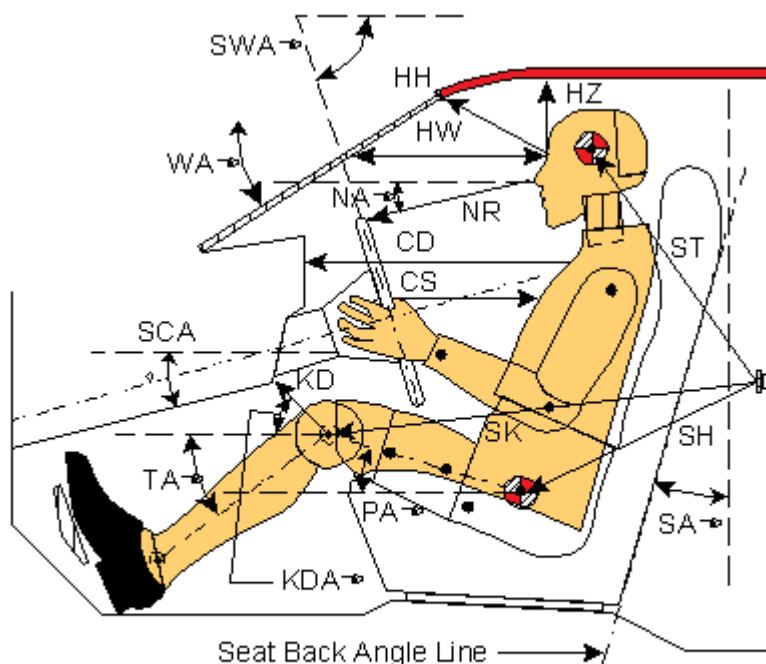
STEERING COLUMN POSITIONS

Description	Degrees	Fore / Aft Position (mm)
Lowermost position No. 1	21.8	
Geometric center position No. 2	23.7	
Uppermost position No. 3	25.6	
Telescoping Steering Wheel Travel		52
Test Position	23.7	26

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2018 Subaru Crosstrek four door station wagon
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20185502
 Test Date: 10/31/2017



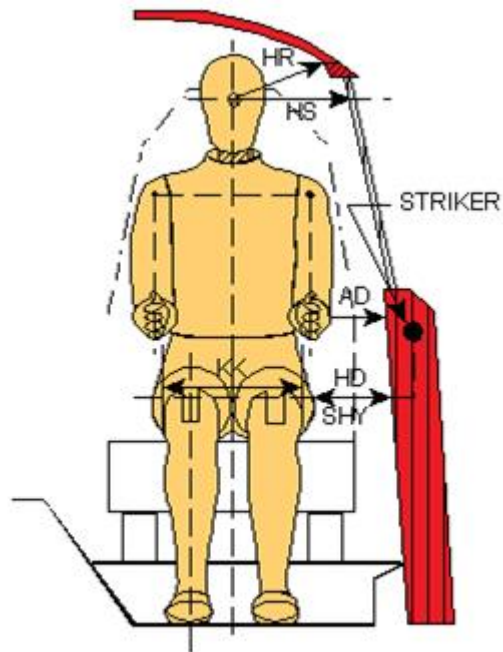
Left Side View

Code	Measurement Description	Driver (SN: 142)		Passenger (SN: 288)	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		27		
SWA°	Steering Wheel Angle		23.8		
SCA°	Steering Column Angle		66.2		
SA°	Seat Back Angle (on headrest post)		6.5		7.6
HZ	Head to Roof (Z)	223	90	236	90
HH	Head to Header	361	31.2	316	52.8
HW	Head to Windshield	698	0	679	0
NR	Nose to Rim	404	6.3	504	25.5
CD	Chest to Dash	562		443	
CS	Chest to Steering Hub	308	0		
RA	Rim to Abdomen	205	0		
KDL	Left Knee to Dash	200	17.4	120	36.4
KDR	Right Knee to Dash	190	8.6	120	36.5
PA°	Pelvic Angle		23.9		20.6
TA°	Tibia Angle		25		37.8
SK	Striker to Knee	624	15.4	722	11.1
ST	Striker to Head	447	71.5	445	55.6
SH	Striker to H-Point	342	50.8	440	28.3

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2018 Subaru Crosstrek four door station wagon
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20185502
 Test Date: 10/31/2017



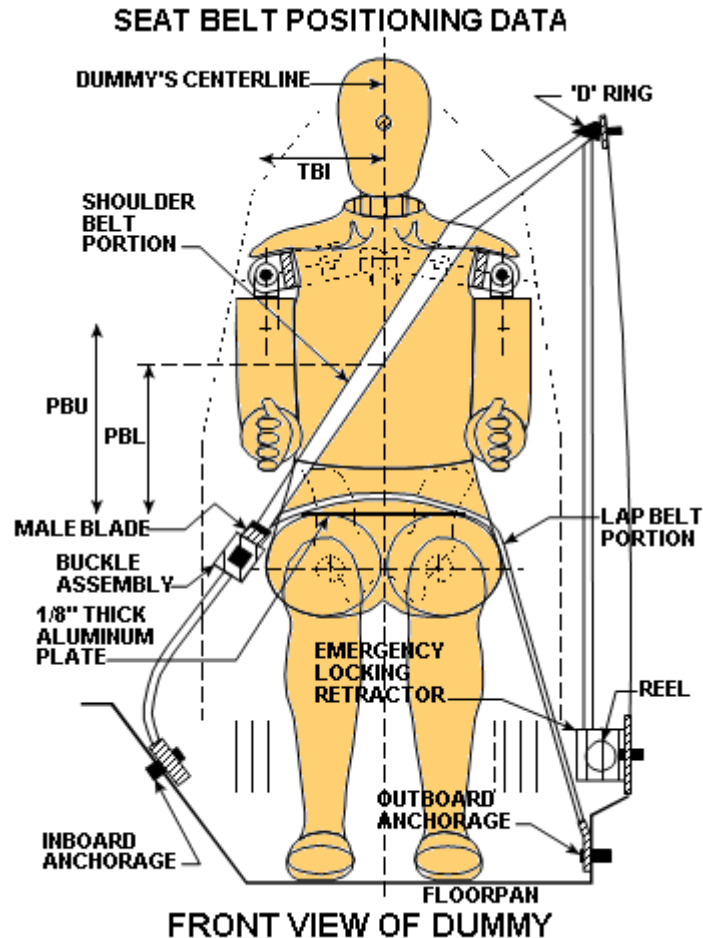
Front View

Code	Description	Driver (mm)	Passenger (mm)
AD	Arm to Door	160	90
HD	H-Point to Door	138	188
HR	Head to Side Header	244	269
HS	Head to Side Window	352	372
KK	Knee to Knee	315	165
SHY	Striker to H-Point (Y Direction)	240	270
AA	Ankle to Ankle	305	168

DATA SHEET NO. 5 **SEAT BELT POSITIONING DATA**

Test Vehicle: 2018 Subaru Crosstrek four door station wagon
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20185502
 Test Date: 10/31/2017



SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU — Top surface of reference to belt upper edge	mm	365	300
PBL — Top surface of reference to belt lower edge	mm	290	225

BELT LENGTH DATA

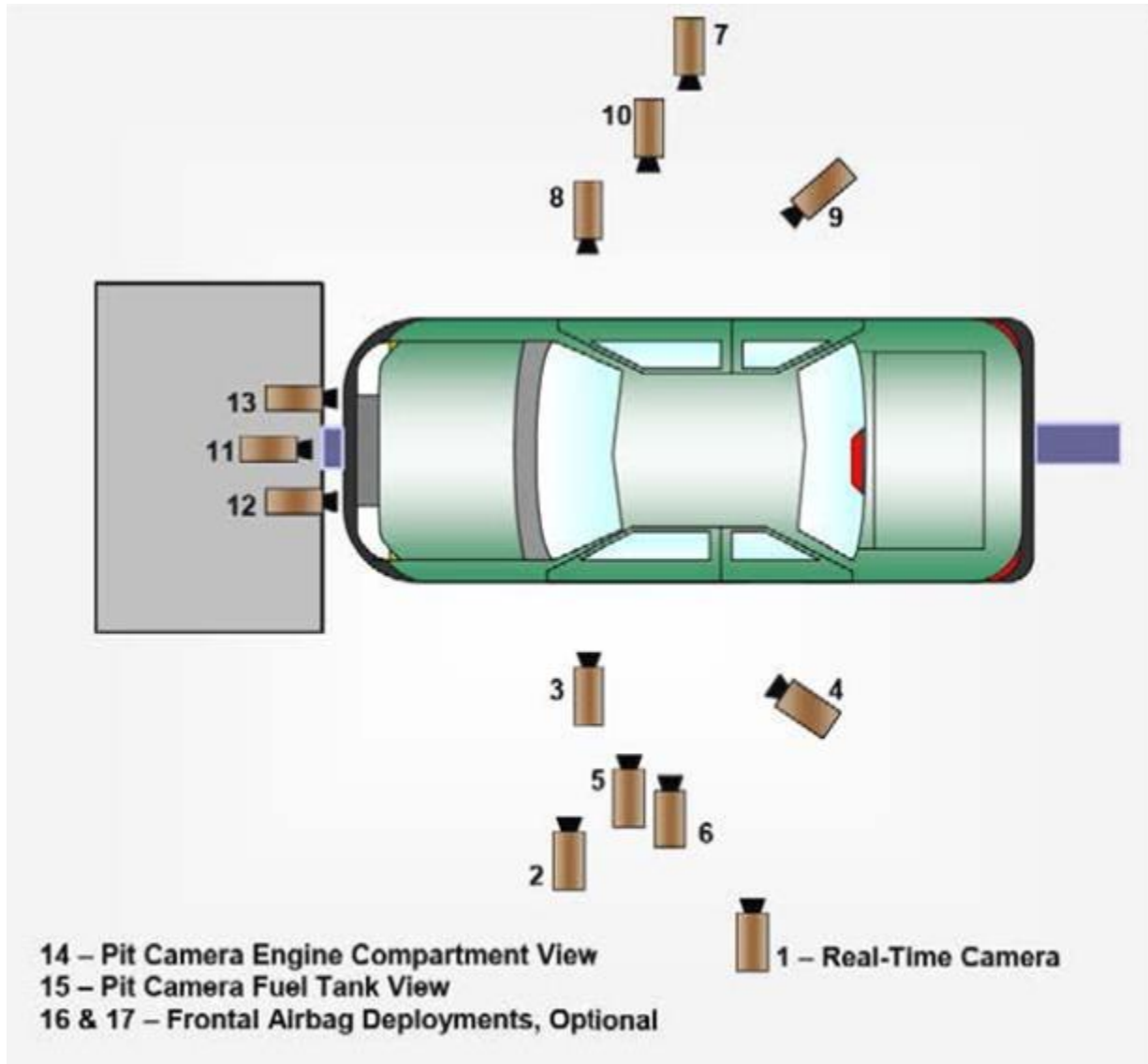
Measurement Description	Units	Driver	Passenger
Shoulder belt length as measured on ATD	mm	815	925
Lap Belt Length as measured on ATD	mm	770	855
Remainder of belt on reel	mm	1015	820
Total belt length for continuous webbing systems	mm	2600	2600

DATA SHEET NO. 6
HIGH-SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2018 Subaru Crosstrek four door station wagon
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20185502
Test Date: 10/31/2017

CAMERA POSITIONS FOR FRONTAL IMPACTS



Top View

DATA SHEET NO. 6 ... (CONTINUED)
HIGH-SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2018 Subaru Crosstrek four door station wagon
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20185502
 Test Date: 10/31/2017

CAMERA LOCATIONS

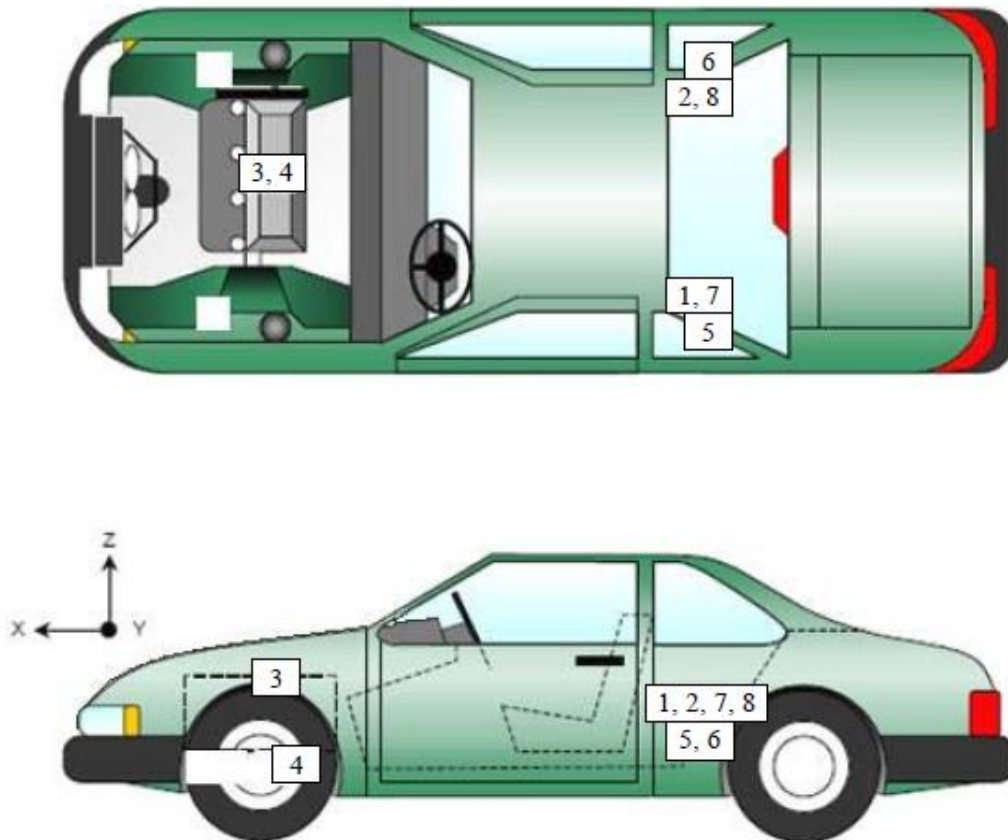
No.	Camera View	Location (mm)			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Overall	-	-	-		60
2	Driver Close-Up	1686	-8211	-1563	50	1000
3	Left Front Half	1230	-9252	-1609	50	1000
4	Left Angle	2842	-3078	-2221	24	1000
5	Steering Column - Top					
6	Steering Column - Bottom					
7	Right Overall	2353	9445	-1175	24	1000
8	Passenger Close-Up	1626	8604	-1543	50	1000
9	Right Front Half	981	7159	-1146	28	1000
10	Right Angle	2853	3204	-2187	24	1000
11	Windshield	960	0	-3505	20	1000
12	Driver Windshield	395	-600	-2051	25	1000
13	Passenger Windshield	395	600	-2051	25	1000
14	Pit Front	-871	0	1280	12.5	1000
15	Pit Rear	-2403	0	1280	12.5	1000
16	Onboard Driver Airbag (Optional)				8	1000
17	Onboard Passenger Airbag (Optional)				8	1000

* COORDINATES: +X = forward of impact plane
 +Y = right of monorail center
 +Z = into ground

DATA SHEET NO. 7 **VEHICLE ACCELEROMETER LOCATIONS**

Test Vehicle: 2018 Subaru Crosstrek four door station wagon
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20185502
 Test Date: 10/31/2017



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear Accelerometer – X Direction	1662	-481	129
2	Right Rear Accelerometer – X Direction	1660	485	128
3	Engine Top X	3724	80	-301
4	Engine Bottom X	4148	283	274
5	Left Rear Accelerometer – Z Direction	1662	-481	129
6	Right Rear Accelerometer – Z Direction	1660	485	128
7	Left Rear Accelerometer – X Direction Redundant	1662	-496	127
8	Right Rear Accelerometer – X Direction Redundant	1660	483	130

Reference Points: *X – Rear Surface of Vehicle (+ forward)*
 Y – Vehicle Centerline (+ to right)
 Z – Ground Plane (+ down)

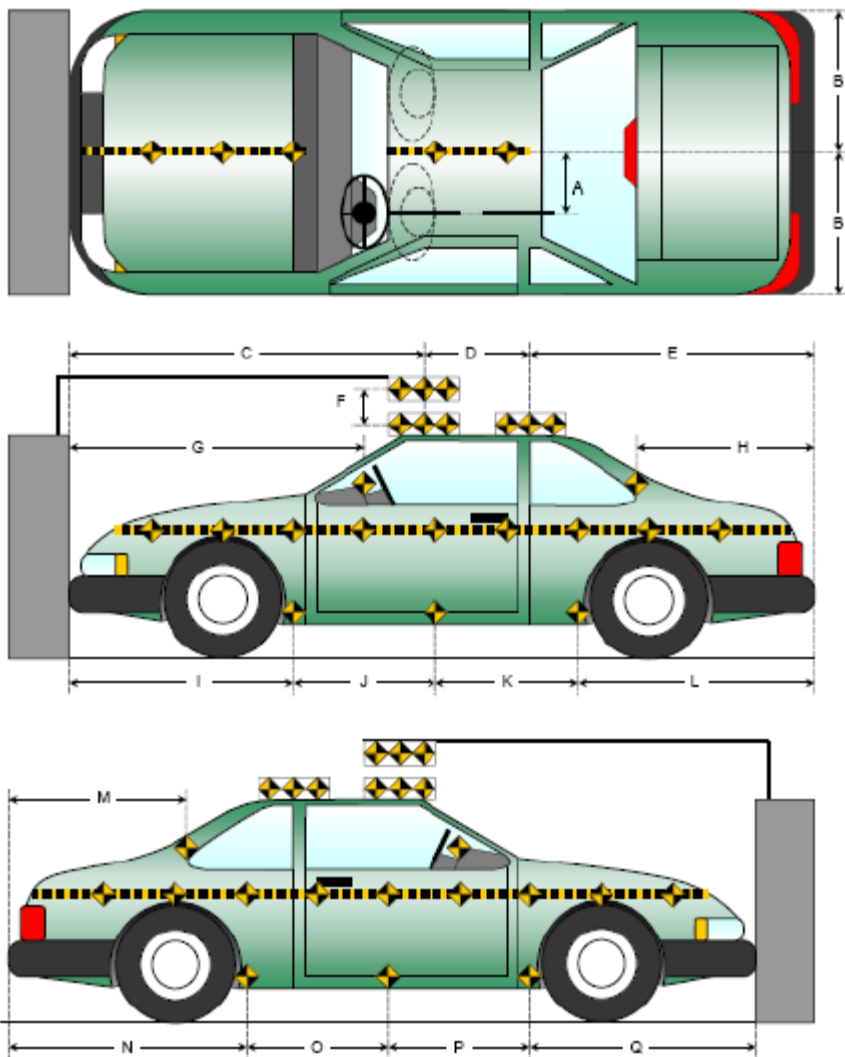
DATA SHEET NO. 8
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2018 Subaru Crosstrek four door station wagon
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20185502
Test Date: 10/31/2017

Item	Value
A	363
B	888
C	2903
D	611
E	948
F	147
G	1758
H	599
I	1410
J	882
K	884
L	1286
M	601
N	1290
O	875
P	888
Q	1409

All units in millimeters



DATA SHEET NO. 9 **LOAD CELL LOCATIONS ON FIXED BARRIER**

Test Vehicle: 2018 Subaru Crosstrek four door station wagon
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20185502
 Test Date: 10/31/2017

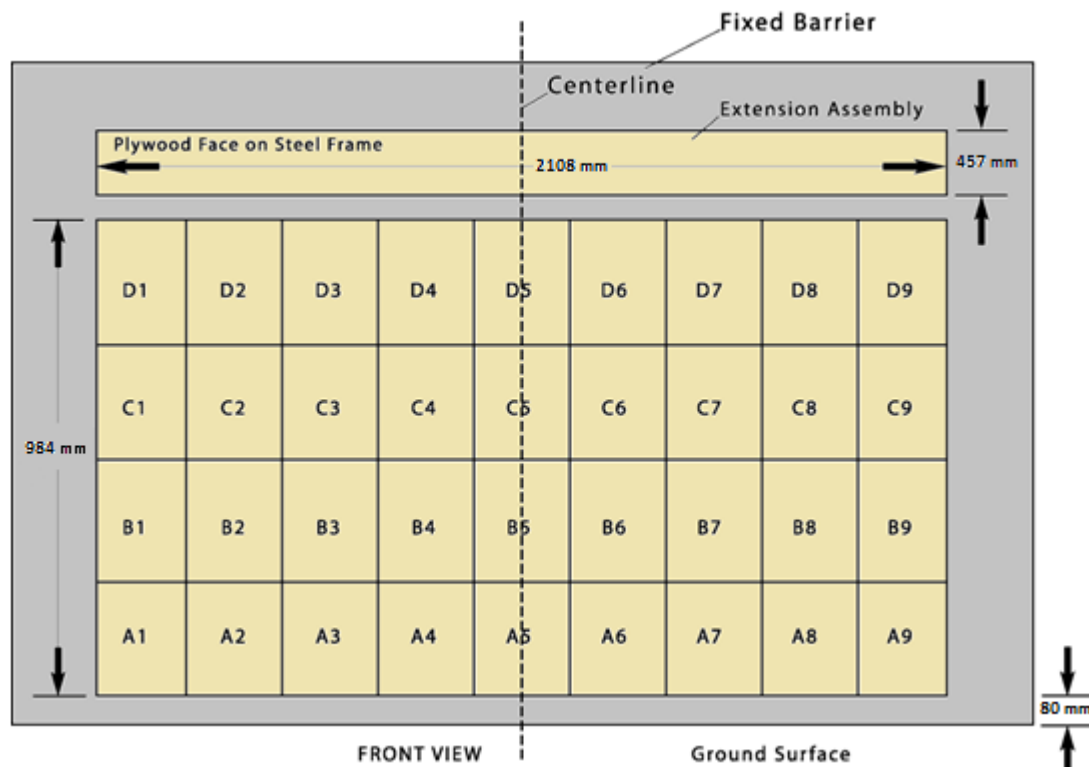


Figure 1 - Load Cell Locations on a 36-Load Cell Barrier with Plywood Height Extension*

DATA SHEET NO. 10
TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle: 2018 Subaru Crosstrek four door station wagon
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20185502
 Test Date: 10/31/2017

INSTRUMENTATION

Instrumentation	Number of Channels Collected
Driver Dummy Accelerometers	46
Passenger Dummy Accelerometers	46
Vehicle Structure Accelerometers	8
Load Cell Barrier	36
Total	136

CAMERA COVERAGE

Type of Camera	Number Used in this Test
High-Speed Vehicle Onboard	2
High-Speed Offboard	12
Real-Time Panning	1
Total	15

DATA SHEET NO. 11
POST-TEST OBSERVATIONS

Test Vehicle: 2018 Subaru Crosstrek four door station wagon
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20185502
Test Date: 10/31/2017

TEST DUMMY INFORMATION AND CONTACT LOCATIONS

Description	Driver	Passenger
Dummy Type / Serial No.	P572E 50 th Male / 142	P5720 5 th Female / 288
Head Contact	Front Airbag & Headrest	Front Airbag & Headrest
Upper Torso Contact	Front Airbag	Front Airbag
Lower Torso Contact	None	None
Left Knee Contact	Knee Airbag	Glove Box
Right Knee Contact	Knee Airbag	Glove Box

DOOR OPENING AND SEAT TRACK INFORMATION

Description	Driver	Passenger
Locked / Unlocked Doors	Unlocked	Unlocked
Front Door Opening	Closed & Operational	Closed & Operational
Rear Door Opening	Closed & Operational	Closed & Operational
Seat Track Shift (mm)	0	0
Seat Back Failure	No	No
Glazing Damage	None	None

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Windshield Damage	None
Window Damage	None
Other Notable Effects	None

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	820
Center	mm	903
Right Side	mm	886
Average	mm	870

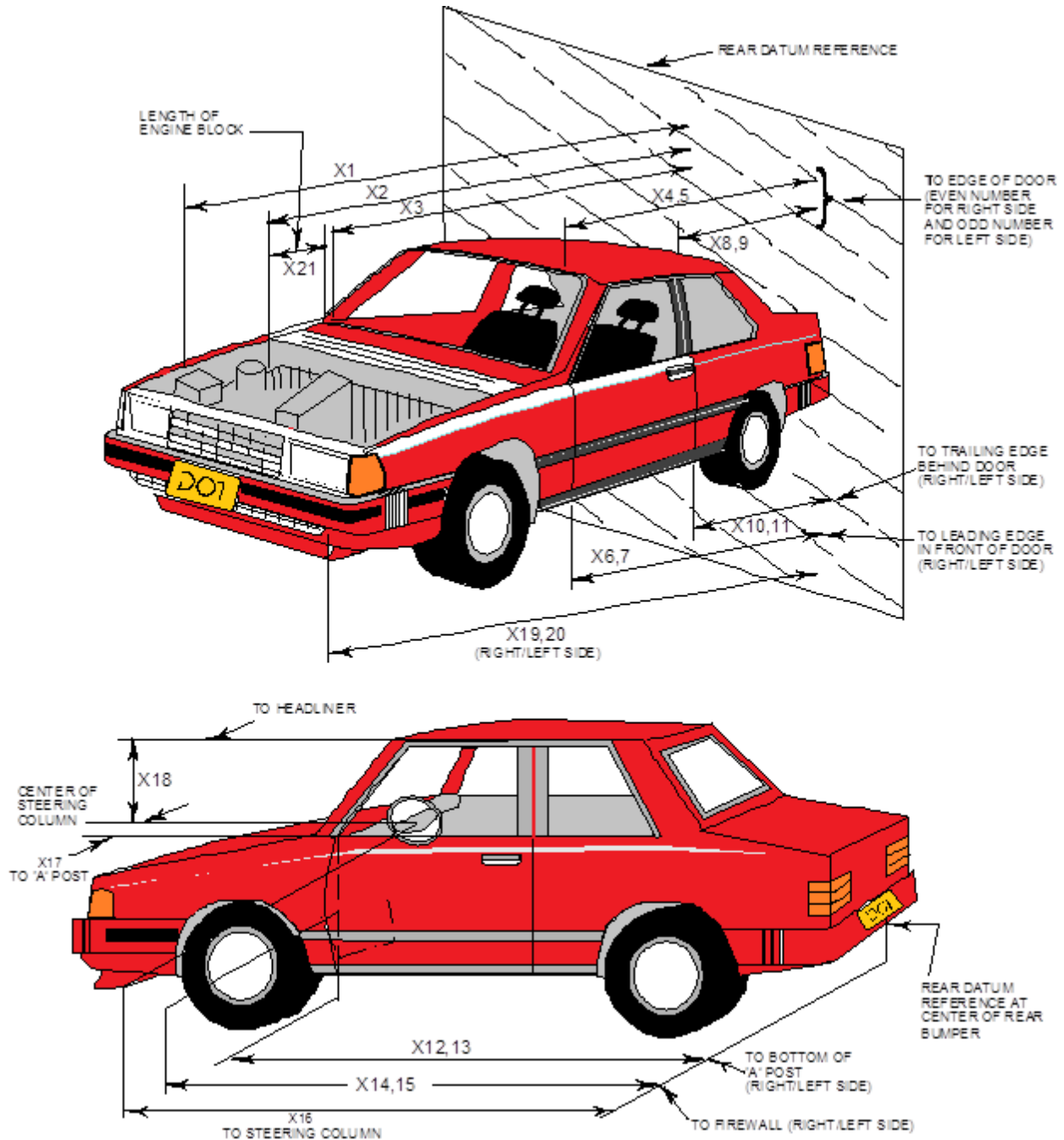
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Driver		Passenger	
	Installed	Deployed	Installed	Deployed
Front Airbag	Yes	Yes	Yes	Yes
Side Airbag 1 - Curtain	Yes	No	Yes	No
Side Airbag 2 - Torso/Pelvis Airbag	Yes	No	Yes	No
Knee Airbag	Yes	Yes	No	N/A
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load Limiter	Yes	Yes	Yes	Yes
Other				

DATA SHEET NO. 12
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2018 Subaru Crosstrek four door station wagon
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20185502
 Test Date: 10/31/2017



DATA SHEET NO. 12 ... (CONTINUED)
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2018 Subaru Crosstrek four door station wagon
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20185502
 Test Date: 10/31/2017

No.	Measurement Description	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	4462	3965	-497
2	Rear Surface of Vehicle (RSOV) to Front of Engine	3919	3680	-239
3	RSOV to Firewall	3404	3404	0
4	RSOV to Upper Leading Edge of Right Door	3038	3035	-3
5	RSOV to Upper Leading Edge of Left Door	3036	3036	0
6	RSOV to Lower Leading Edge of Right Door	2951	2951	-1
7	RSOV to Lower Leading Edge of Left Door	2952	2952	0
8	RSOV to Upper Trailing Edge of Right Door	1890	1890	0
9	RSOV to Upper Trailing Edge of Left Door	1888	1889	1
10	RSOV to Lower Trailing Edge of Right Door	1904	1904	0
11	RSOV to Lower Trailing Edge of Left Door	1904	1905	1
12	RSOV to Bottom of "A" Post of Right Side	3064	3062	-2
13	RSOV to Bottom of "A" Post of Left Side	3061	3061	0
14	RSOV to Firewall, Right Side	3552	3531	-21
15	RSOV to Firewall, Left Side	3551	3544	-7
16	RSOV to Steering Column	2526	2604	78
17	Center of Steering Column to "A" Post	301	288	-13
18	Center of Steering Column to Headliner	425	454	29
19	RSOV to Right Side of Front Bumper	4438	3975	-464
20	RSOV to Left Side of Front Bumper	4439	4013	-426
21	Length of Engine Block	322	322	0
RD	RSOV to Right Side of Dash Panel	2754	2753	-2
CD	RSOV to Center of Dash Panel	2676	2678	2
LD	RSOV to Left Side of Dash Panel	2755	2752	-3

*UR= Unrecoverable data point
 All Dimensions in mm

DATA SHEET NO. 13
ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2018 Subaru Crosstrek four door station wagon
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20185502
Test Date: 10/31/2017

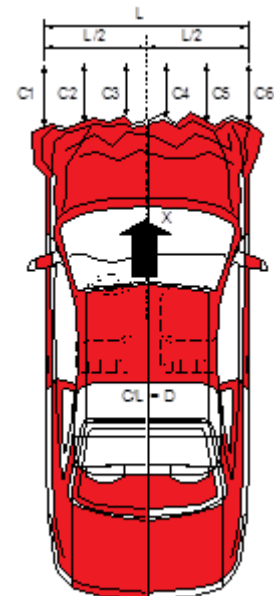
VEHICLE INFORMATION

VIN: JF2GTAAC3JH212058
Vehicle Size Category: MPV

Wheelbase (mm): 2671
Test Weight (kg): 1645

ACCELEROMETER DATA

Accelerometer Locations: Please See Data Sheet No. 7
Cal. Procedure / Interval: Calspan Procedure / 6 month
Integration Algorithm: Trapezoidal
Linearity: > 99%
Impact Velocity (km/h): 56.28
Velocity Change (km/h): 65.46
Time of Separation (ms): 129



CRUSH PROFILE

Collision Deformation Classification: 12FDEW3
Midpoint of Damage: C3
Damage Region Length (mm): 1365
Impact Mode: Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush Zone 1 at Left Side	mm	4278	3958	320
C2	Crush Zone 2 at Left Side	mm	4446	3971	475
C3	Crush Zone 3 at Left Side	mm	4461	3963	498
C4	Crush Zone 4 at Right Side	mm	4461	3974	487
C5	Crush Zone 5 at Right Side	mm	4445	3970	475
C6	Crush Zone 6 at Right Side	mm	4280	3884	396
L	C1 to C6	mm	1365	1458	-93

DATA SHEET NO. 14
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2018 Subaru Crosstrek four door station wagon
 Test Program: NCAP Frontal Barrier Impact Test

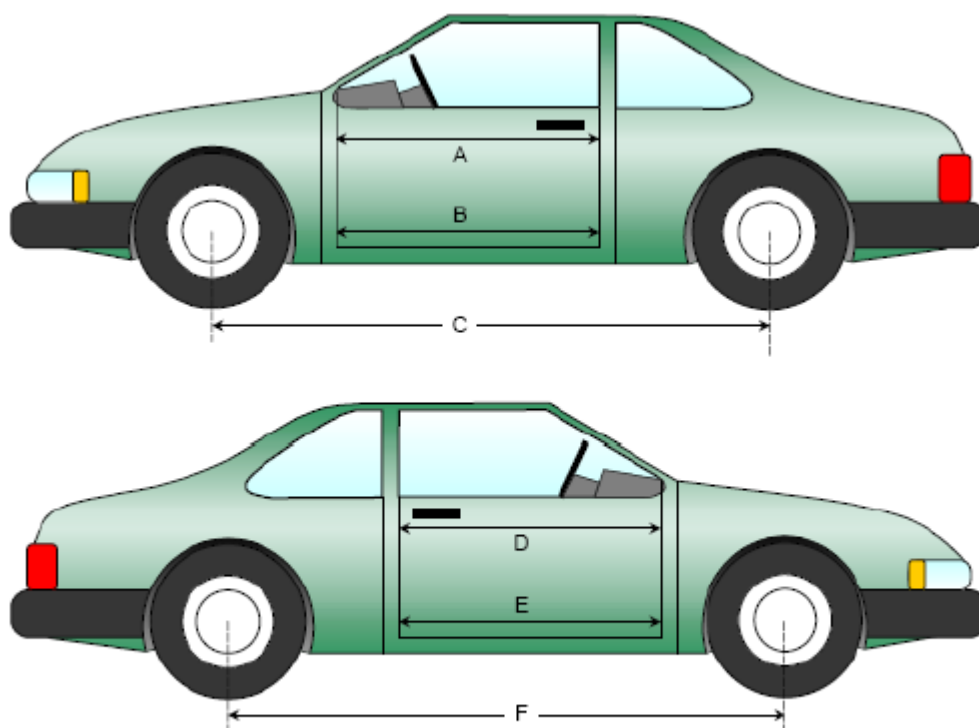
NHTSA No.: M20185502
 Test Date: 10/31/2017

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	1038	1037	-1
B	Left Side Lower	mm	861	861	0
D	Right Side Upper	mm	1039	1039	0
E	Right Side Lower	mm	859	858	-1

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2671	2658	-13
F	Right Side Wheelbase	mm	2671	2652	-19



Left & Right Side Views

DATA SHEET NO.14 ... (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

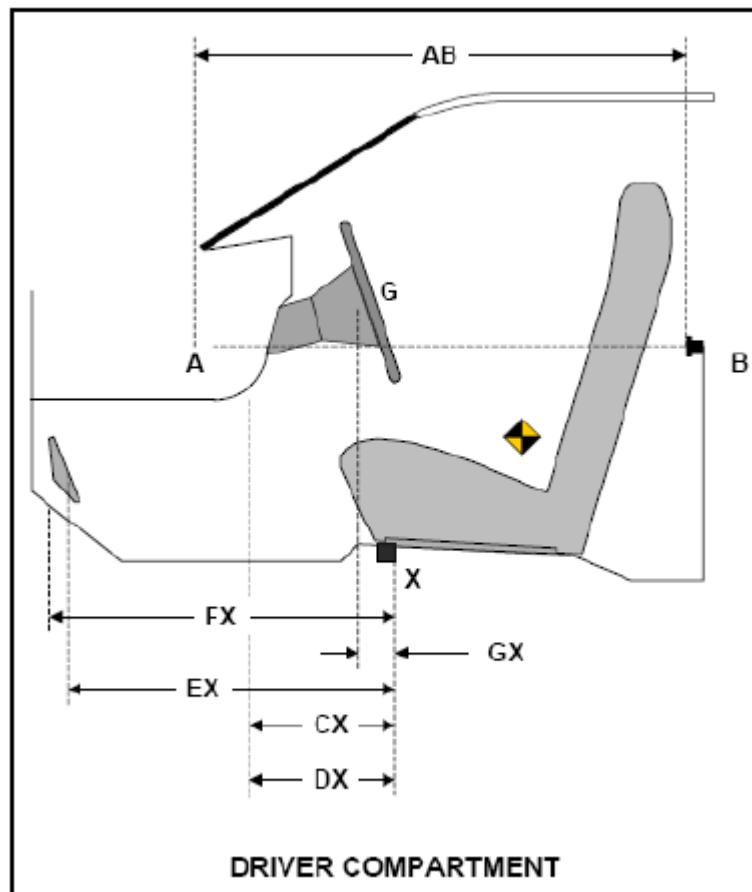
Test Vehicle: 2018 Subaru Crosstrek four door station wagon
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20185502
 Test Date: 10/31/2017

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	965	966	1
CX	Left Knee Bolster to X	mm	260	269	9
DX	Right Knee Bolster to X	mm	247	256	9
EX	Brake Pedal to X	mm	552	582	30
FX	Foot Rest to X	mm	602	586	-16
GX	Center of Steering Column Wheel Hub to X	mm	23	104	81

X = Front of Seat Track (Stationary)



DATA SHEET NO. 15
SUMMARY OF FMVSS 212, 219 (PARTIAL), AND 301 DATA

Test Vehicle: 2018 Subaru Crosstrek four door station wagon
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20185502
 Test Date: 10/31/2017

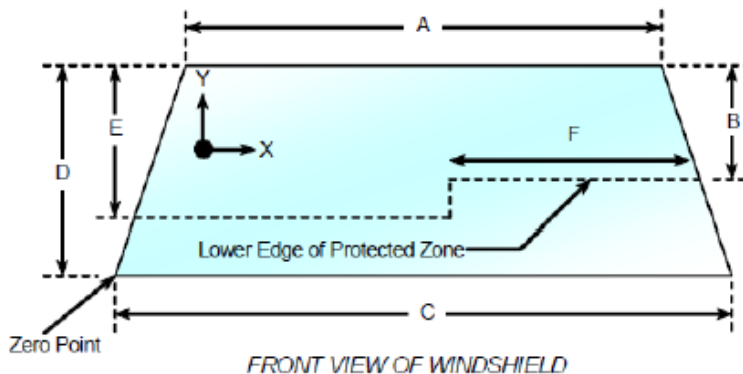
Windshield Mounting Details: A 0.8 mm trim surrounds the top and side of windshield while a plastic shroud is on the bottom.

The standard requires that the post-test retention measurement be a minimum of 75% of the pre-test total periphery measurement for vehicles not equipped with occupant passive restraints and 50% for each side of the windshield for vehicles which are equipped with occupant passive restraints.

Temperature of windshield molding during test: 21° C

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% Retention
Left Side	2214.5	2214.5	100
Right Side	2214.5	2214.5	100
Total	4429	4429	100



Item	Units	Value
A	mm	1225
B	mm	556
C	mm	1478
D	mm	863
E	mm	580
F	mm	528

AREAS OF PROTECTED ZONE FAILURES

A. *Provide coordinates of the area that the protected zone was penetrated more than .25 inches by a vehicle component other than one that is normally in contact with the windshield.*

- No Penetration

X	Y

B. *Provide coordinates of the area beneath the protected zone that the inner surface of the windshield was penetrated by a vehicle component.*

- No Penetration

X	Y

DATA SHEET NO. 15 ... (CONTINUED)
SUMMARY OF FMVSS 212, 219 (PARTIAL), AND 301 DATA

Test Vehicle: 2018 Subaru Crosstrek four door station wagon
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20185502
Test Date: 10/31/2017

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 21 ° C

Test Time: 11:15 AM

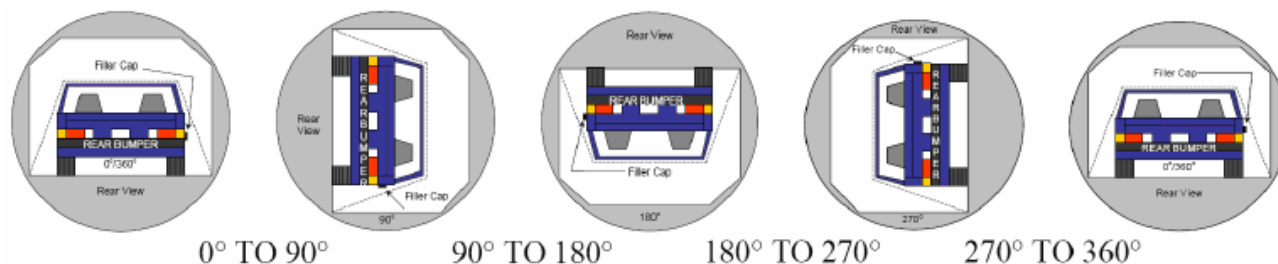
STODDARD SOLVENT SPILLAGE MEASUREMENTS

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

DATA SHEET NO. 16
FMVSS 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2018 Subaru Crosstrek four door station wagon
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20185502
 Test Date: 10/31/2017



1. The specified fixture rollover rate for each 90° of rotation is 60 to 180 seconds.
2. The position hold time at each position is 300 seconds (minimum).
3. Details of Stoddard Solvent Spillage: No Spillage Occurred

SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	72	300	372
90° to 180°	65	300	365
180° to 270°	62	300	362
270° to 360°	69	300	369

FMVSS 301 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	

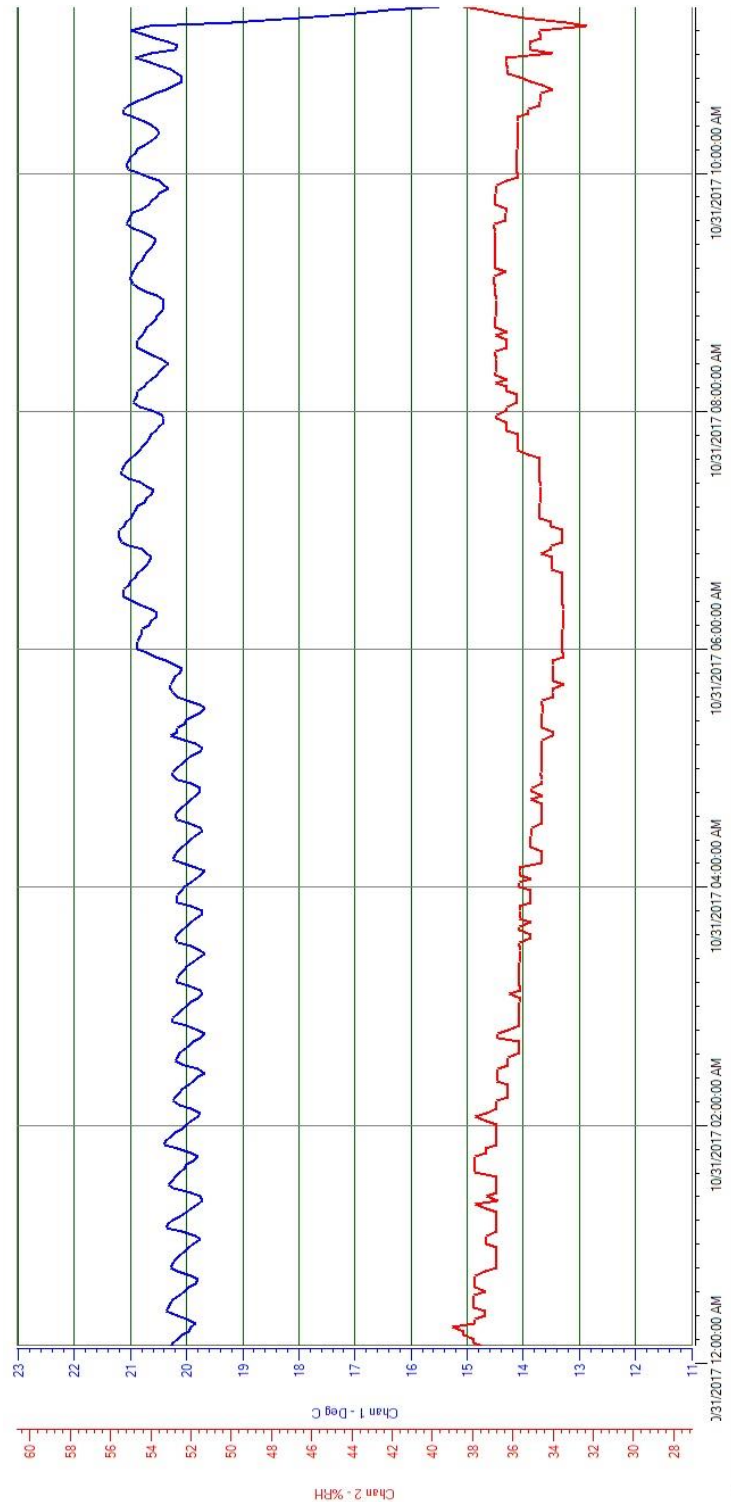
SOLVENT SPILLAGE LOCATION TABLE

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

DATA SHEET NO. 17
DUMMY / VEHICLE TEMPERATURE STABILIZATION CHART

Test Vehicle: 2018 Subaru Crosstrek four door station wagon
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20185502
Test Date: 10/31/2017



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

APPENDIX A
PHOTOGRAPHS

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Fig.	Description	Page
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65	Pre-Test Passenger's Side Floorpan	A-37
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¹**NOTE:** *The underbody views should include the following vehicle components: fuel pump, fuel lines, sender unit, fuel tank filler pipe and any other visible system components.*

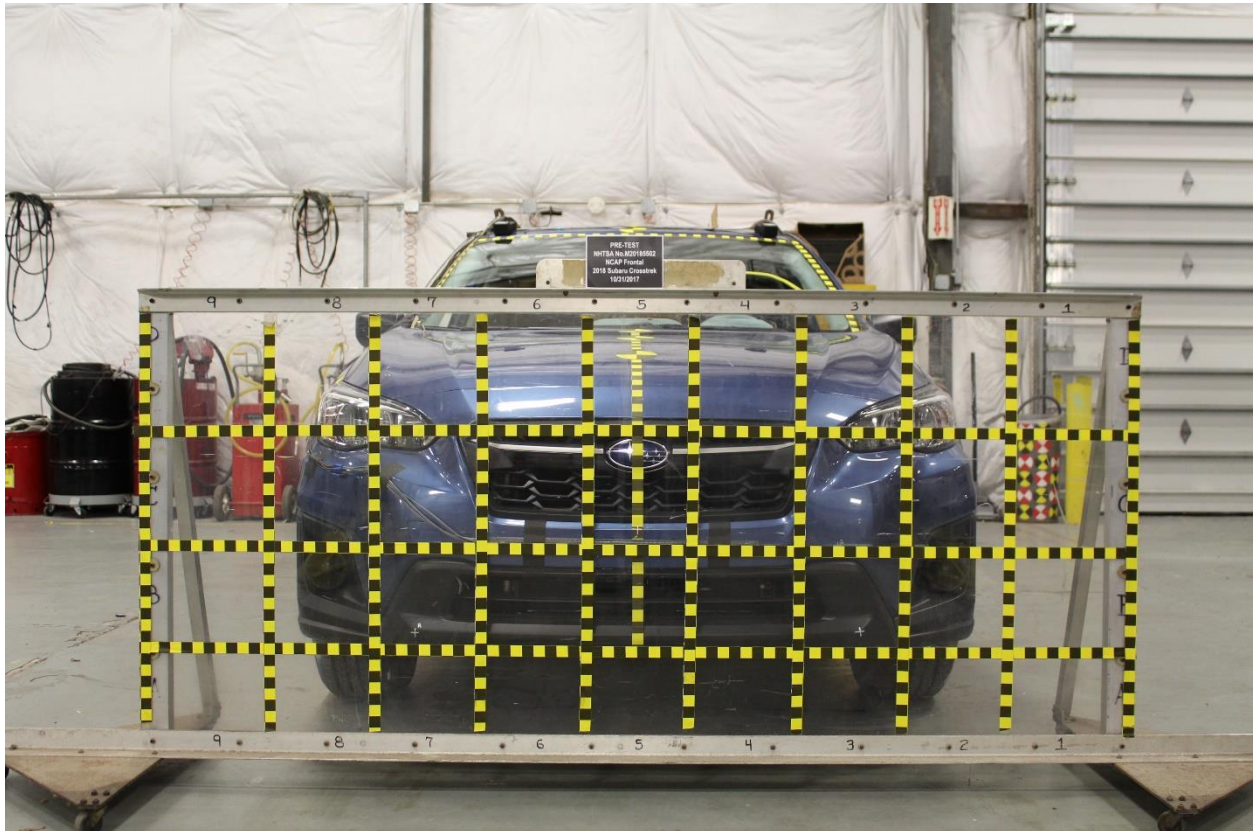


Figure A-1: Load Cell Location

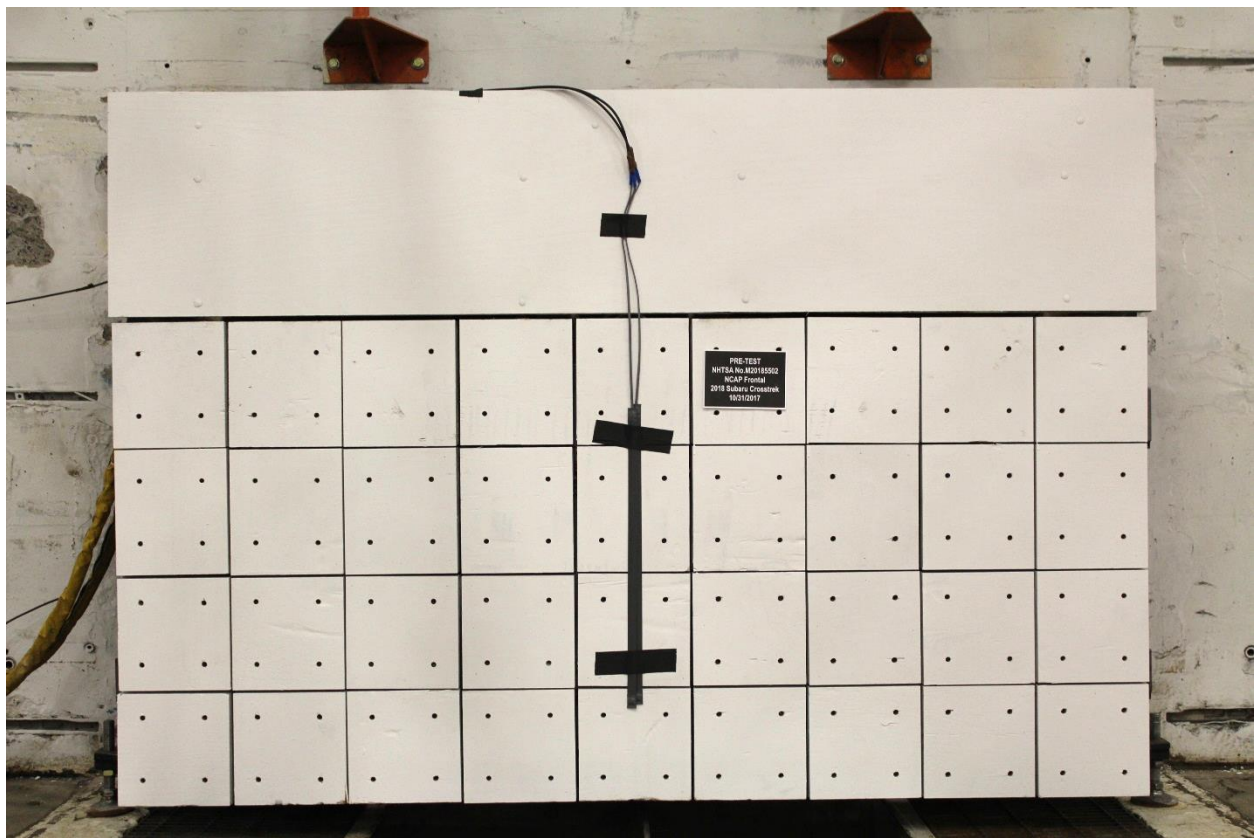


Figure A-2: Pre-Test Load Cell Wall

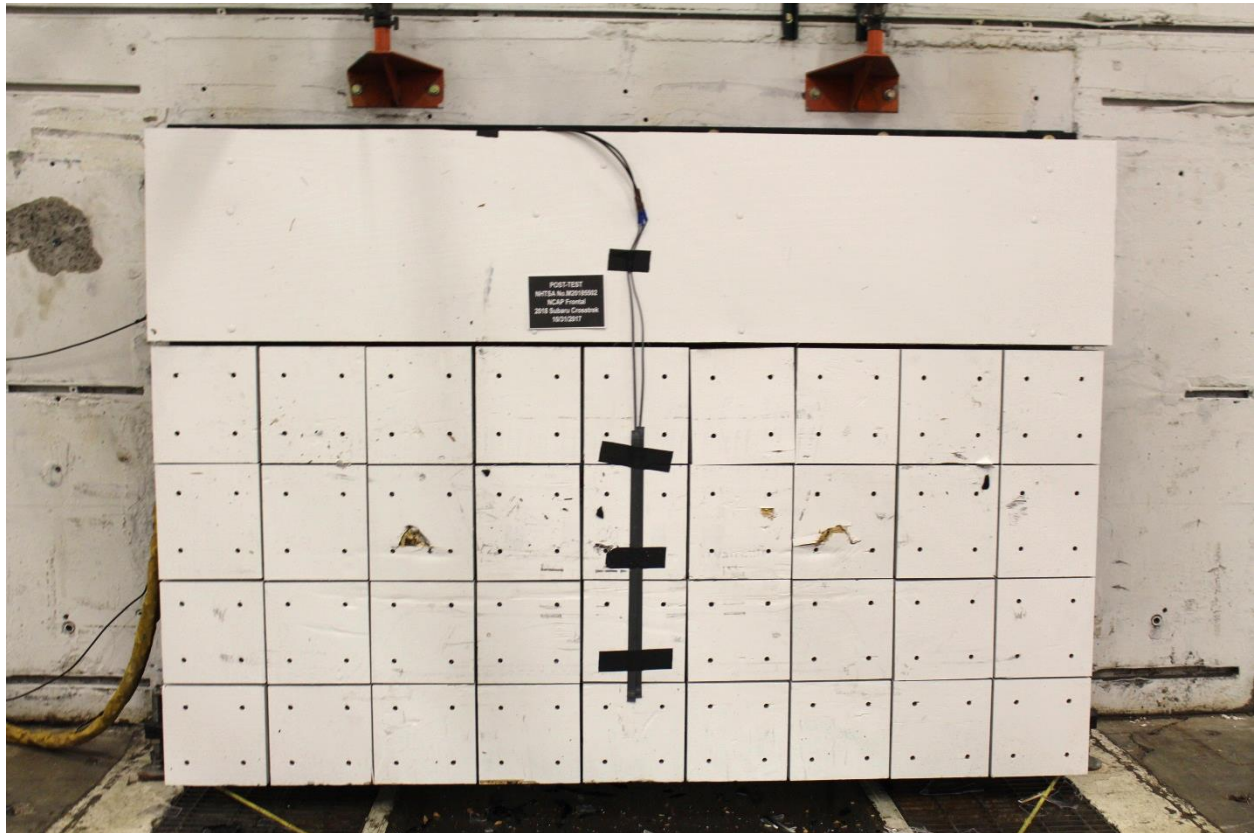


Figure A-3: Post-Test Load Cell Wall



Figure A-4: Manufacturer's Label



Figure A-5: Tire Placard



Figure A-6: 2018 Subaru Crosstrek Frontal As Delivered



Figure A-7: Left Rear 3-4 View, As Received



Figure A-8: Pre-Test Front View of Test Vehicle



Figure A-9: Post-Test Front View of Test Vehicle



Figure A-10: Pre-Test Left View of Test Vehicle



Figure A-11: Post-Test Left View of Test Vehicle



Figure A-12: Pre-Test Right View of Test Vehicle



Figure A-13: Post-Test Right View of Test Vehicle



Figure A-14: Pre-Test Right Front 3-4 View



Figure A-15: Post-Test Right Front 3-4 View



Figure A-16: Pre-Test Left Rear 3-4 View



Figure A-17: Post-Test Left Rear 3-4 View



Figure A-18: Pre-Test Windshield View



Figure A-19: Post-Test Windshield View

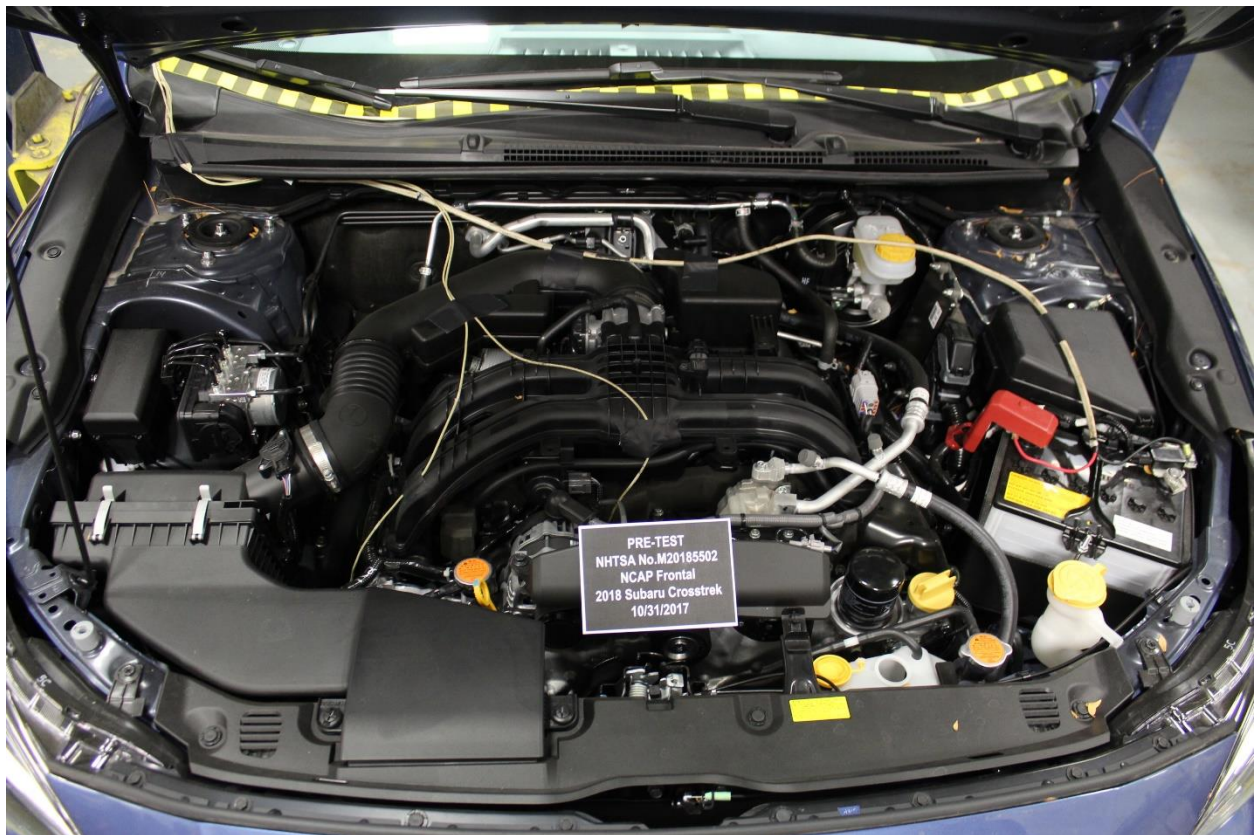


Figure A-20: Pre-Test Engine Compartment View

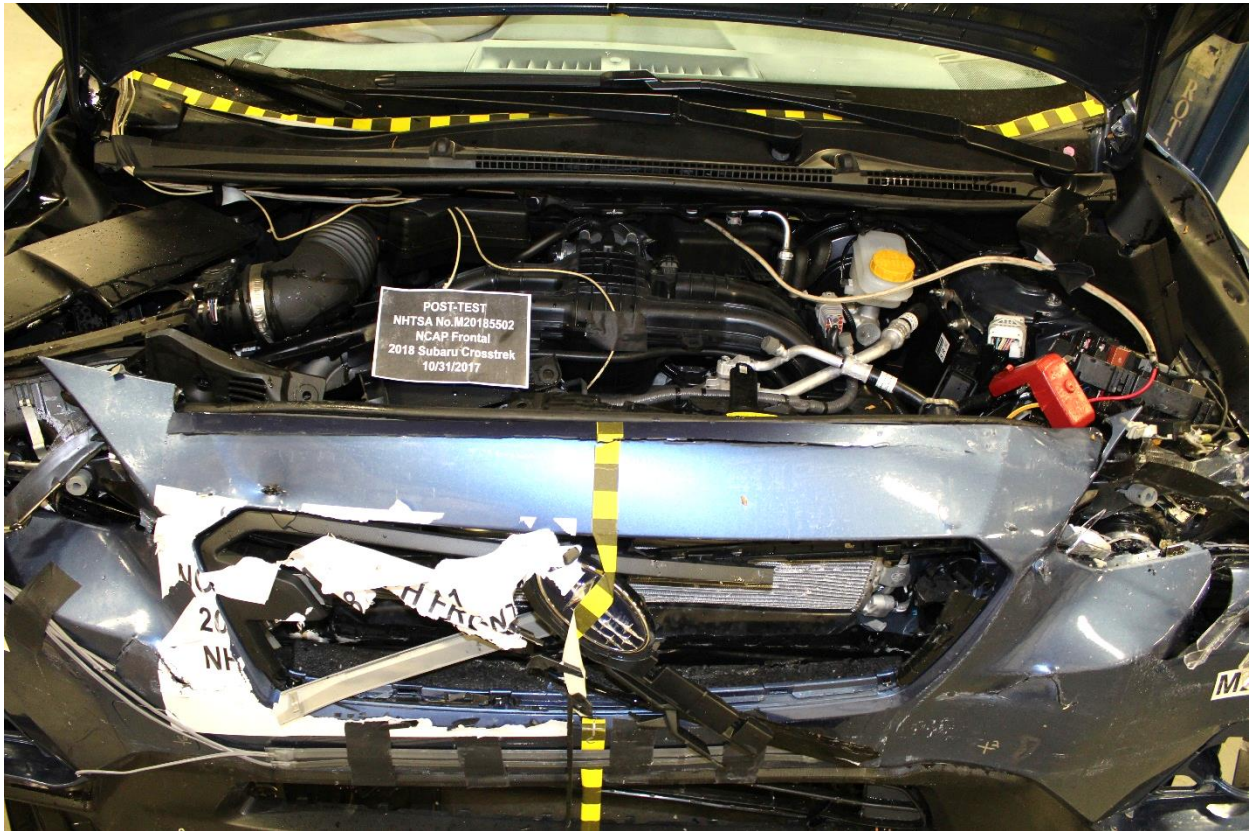


Figure A-21: Post-Test Engine Compartment View



Figure A-22: Pre-Test Fuel Filler Cap View



Figure A-23: Post-Test Fuel Filler Cap View

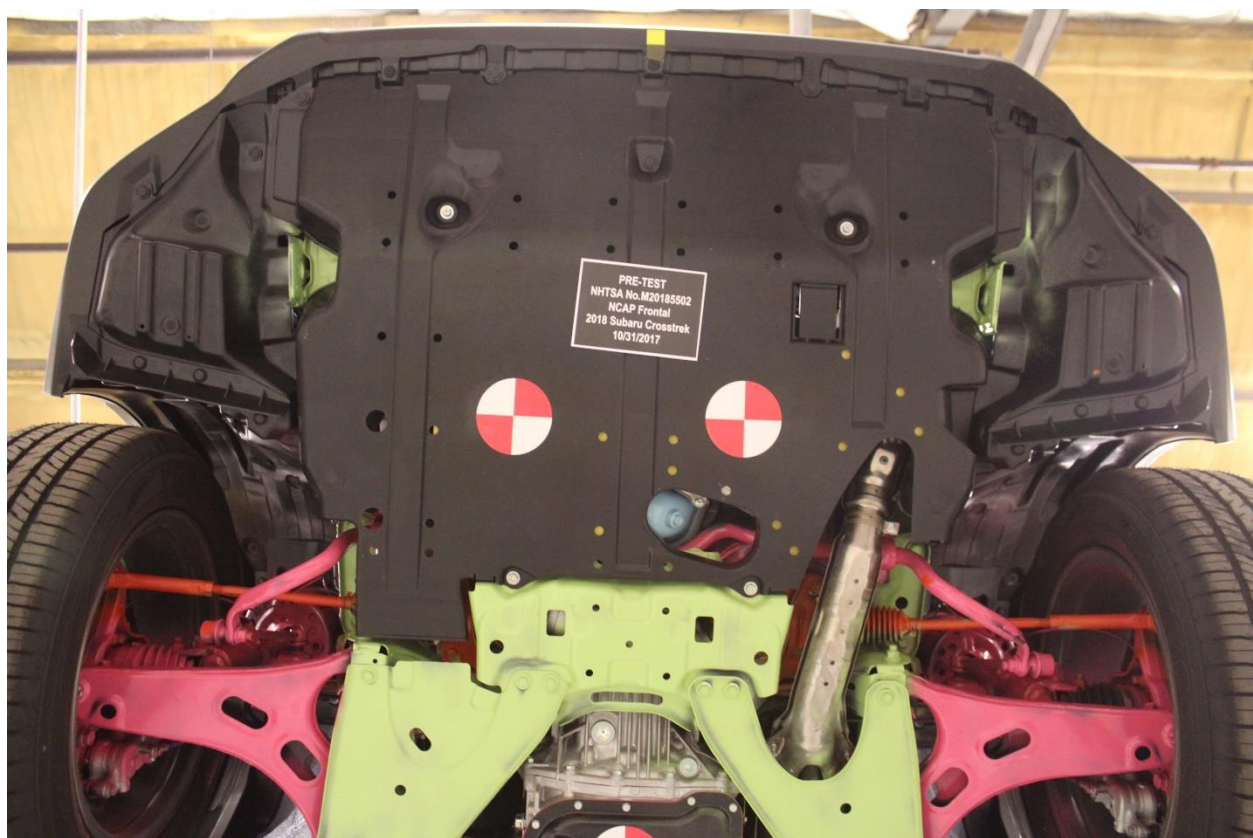


Figure A-24: Pre-Test Front Underbody View

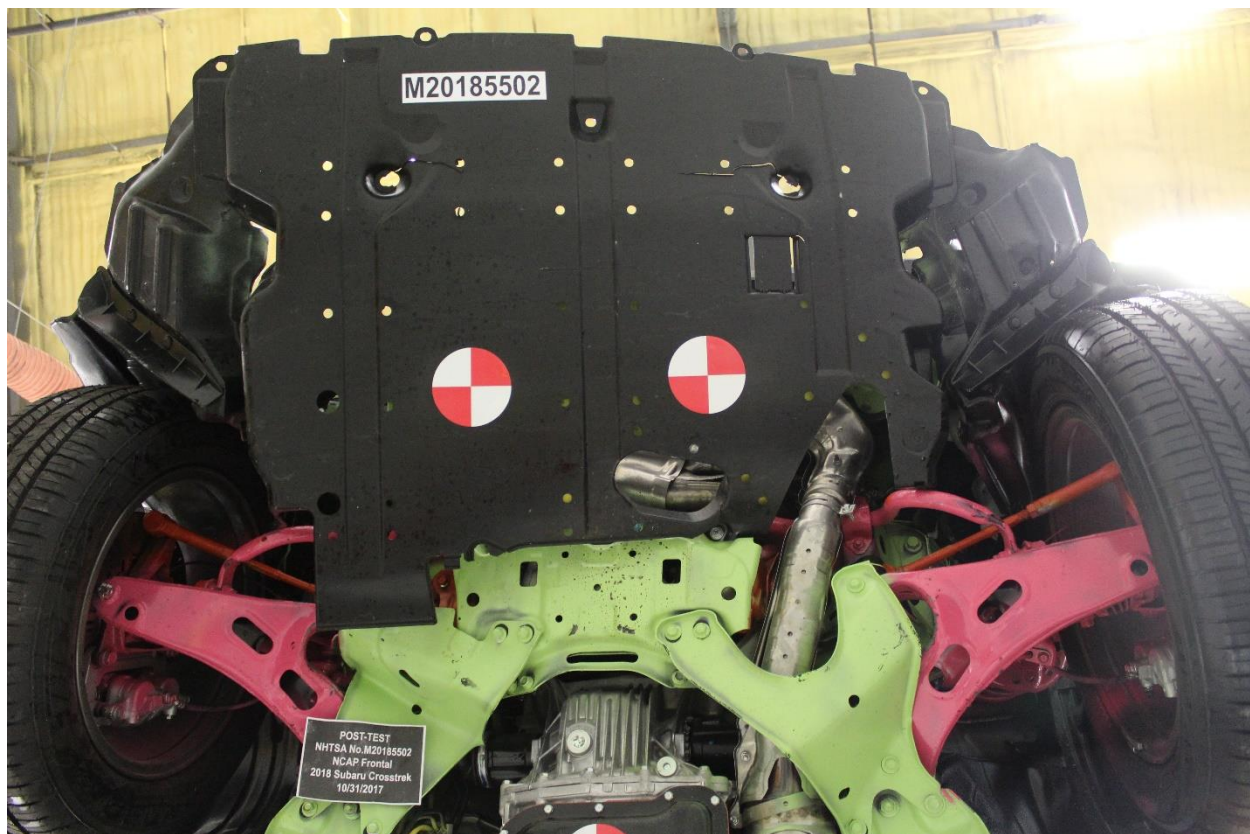


Figure A-25: Post-Test Front Underbody View

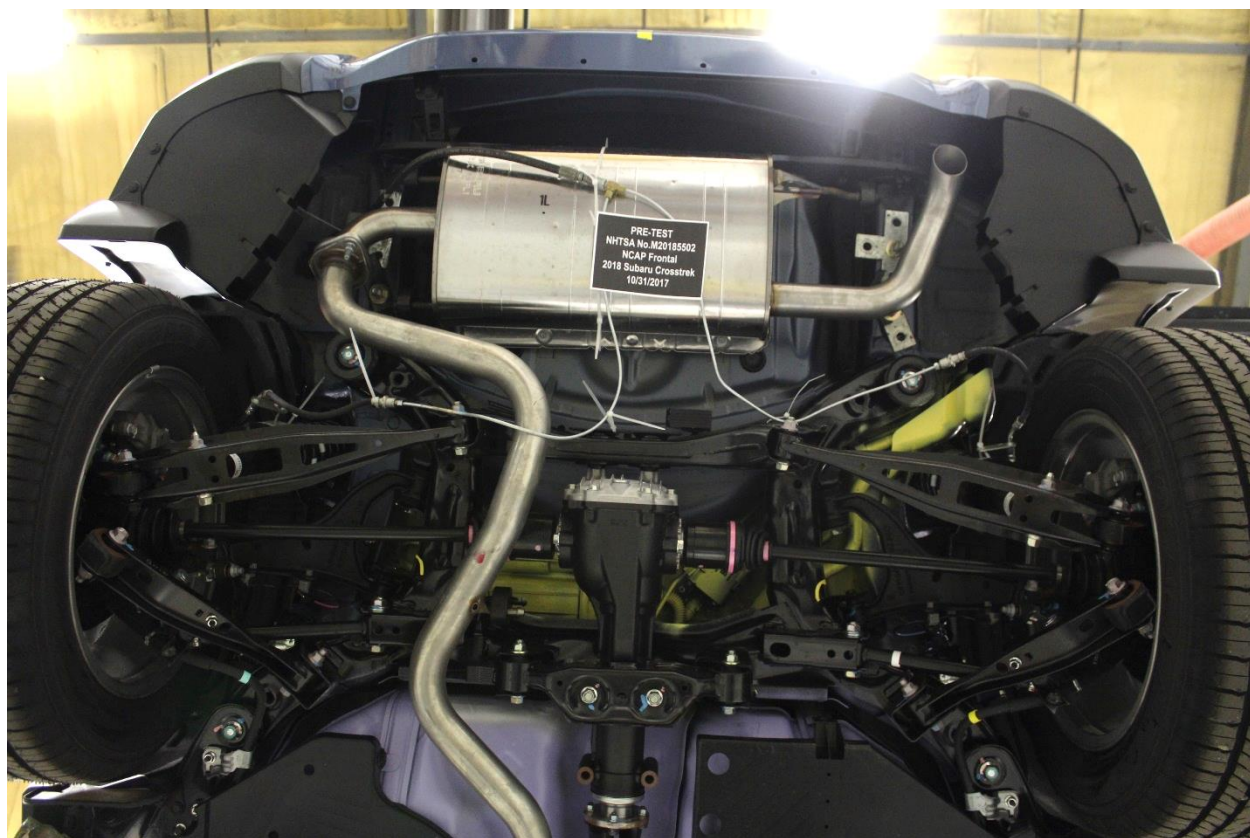


Figure A-26: Pre-Test Rear Underbody View

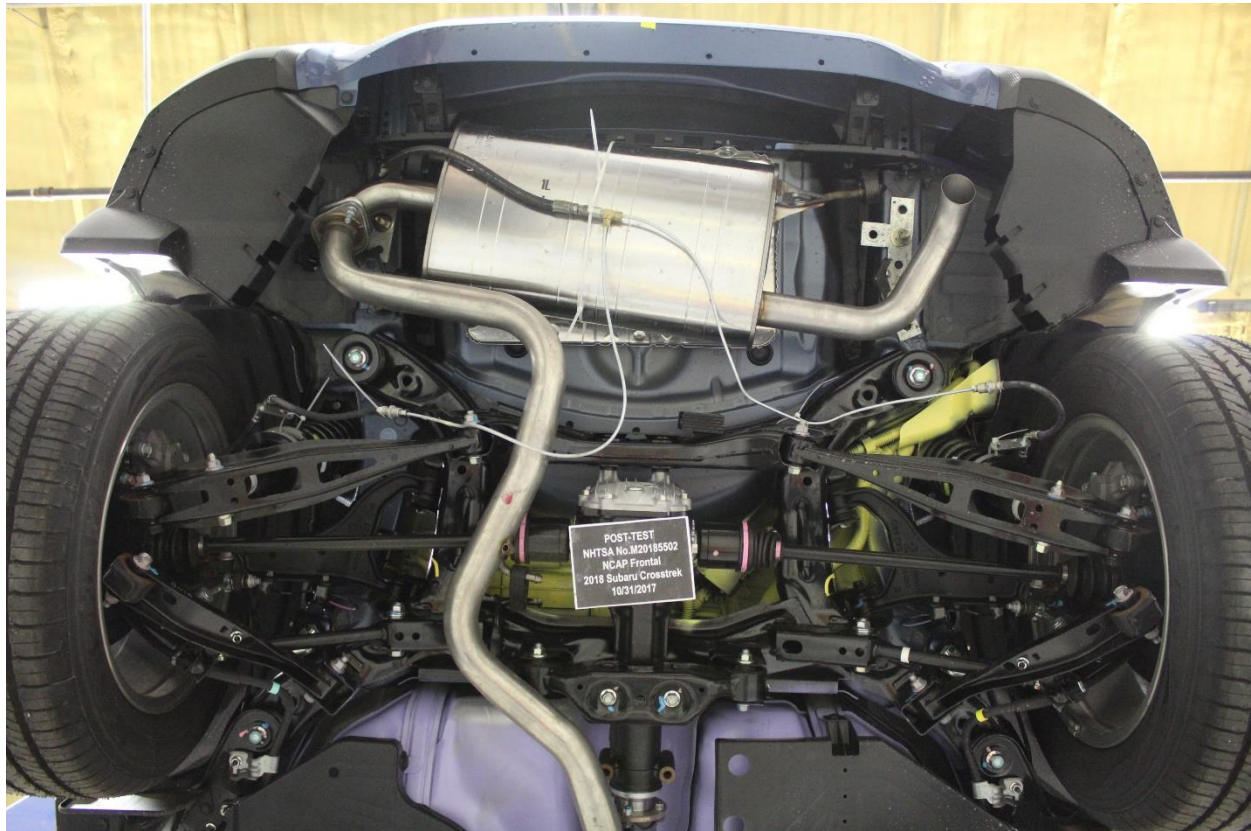


Figure A-27: Post-Test Rear Underbody View

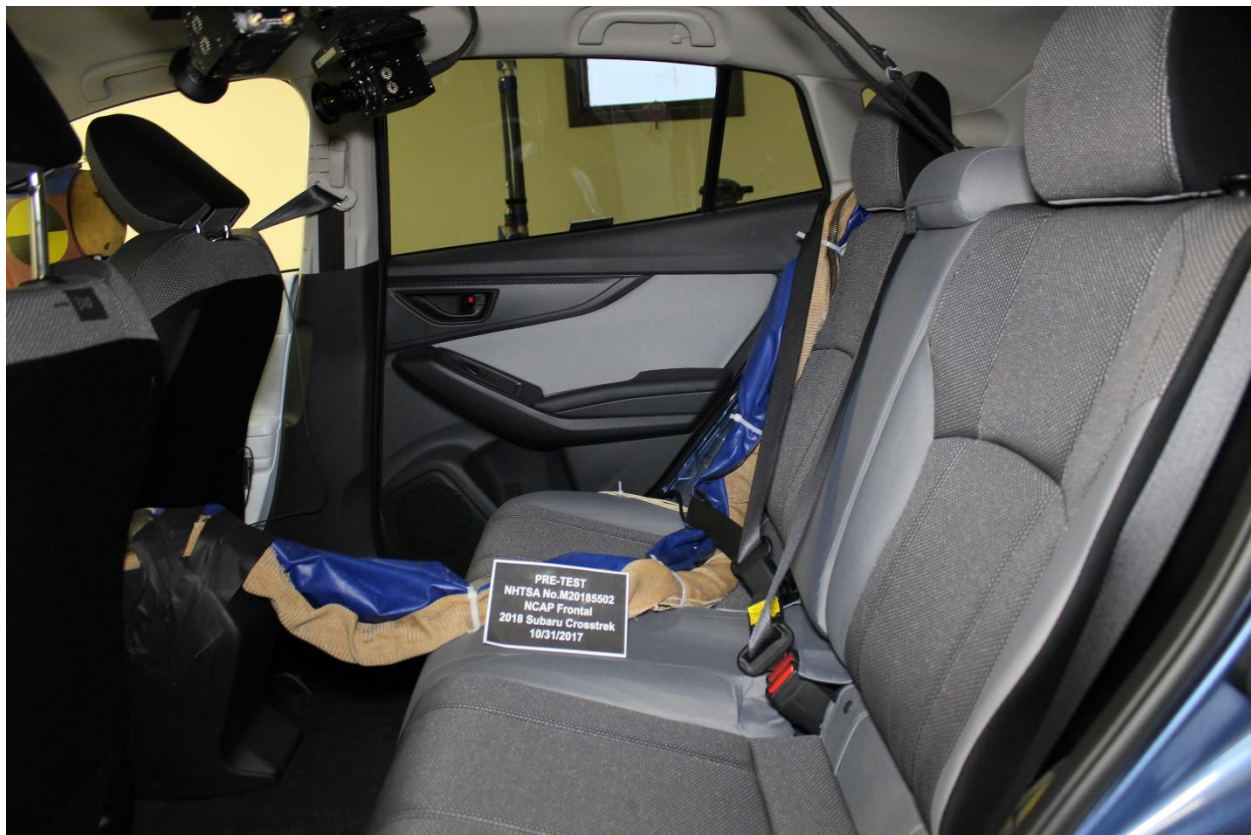


Figure A-28: Pre-Test Dummy Cable Routing

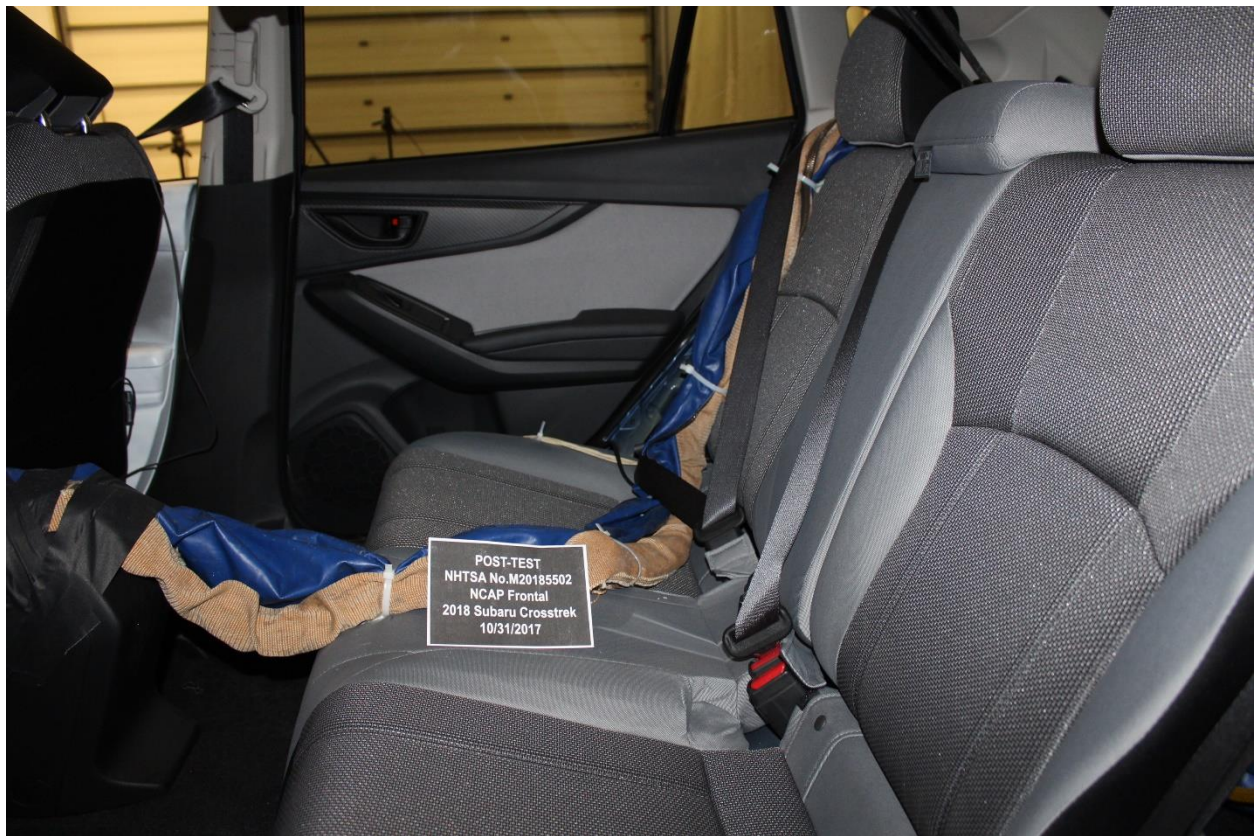


Figure A-29: Post-Test Dummy Cable Routing

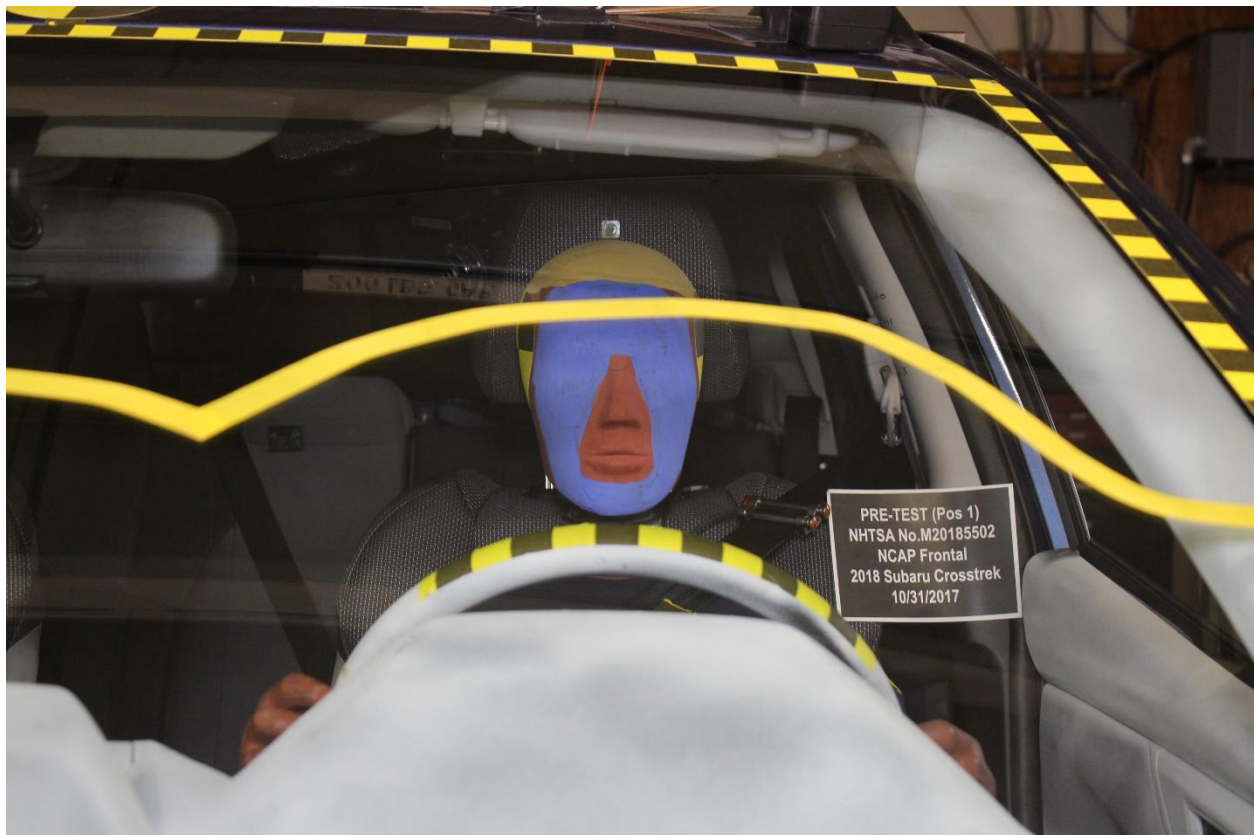


Figure A-30: Pre-Test Driver Dummy Front View



Figure A-31: Post-Test Driver Dummy Front View



Figure A-32: Pre-Test Driver Dummy Window View



Figure A-33: Post-Test Driver Dummy Window View



Figure A-34: Pre-Test Driver Dummy and Vehicle Interior View



Figure A-35: Post-Test Driver Dummy and Vehicle Interior View



Figure A-36: Pre-Test Driver's Seat Fore-Aft Markings



Figure A-37: Post-Test Driver's Seat Fore-Aft Markings



Figure A-38: Pre-Test View of Belt Anchorage for Driver Dummy



Figure A-39: Post-Test View of Belt Anchorage for Driver Dummy



Figure A-40: Pre-Test Driver Dummy Feet



Figure A-41: Post-Test Driver Dummy Feet



Figure A-42: Pre-Test Driver's Side Knee Bolster



Figure A-43: Post-Test Driver's Side Knee Bolster



Figure A-44: Pre-Test Driver's Side Floorpan



Figure A-45: Post-Test Driver's Side Floorpan



Figure A-46: Post-Test Driver Dummy Face



Figure A-47: Post-Test Driver Dummy Contact With Airbag



Figure A-48: Post-Test Driver Dummy Contact With Headrest



Figure A-49: Pre-Test View of the Steering Wheel



Figure A-50: Post-Test View of the Steering Wheel



Figure A-51: Pre-Test Passenger Dummy Front View



Figure A-52: Post-Test Passenger Dummy Front View



Figure A-53: Pre-Test Passenger Dummy Window View

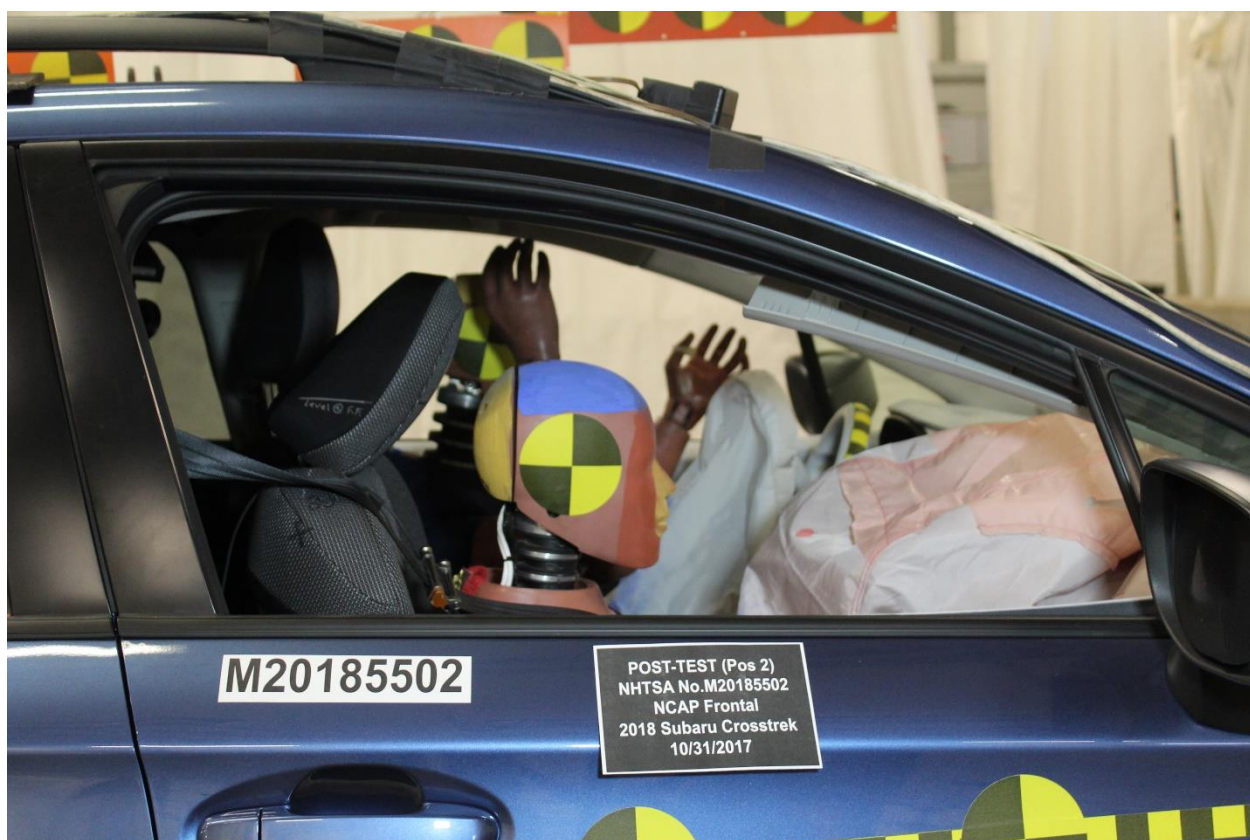


Figure A-54: Post-Test Passenger Dummy Window View



Figure A-55: Pre-Test Passenger Dummy and Vehicle Interior View



Figure A-56: Post-Test Passenger Dummy and Vehicle Interior View



Figure A-57: Pre-Test Passenger's Seat Fore-Aft Markings



Figure A-58: Post-Test Passenger's Seat Fore-Aft Markings



Figure A-59: Pre-Test View of Belt Anchorage for Passenger Dummy

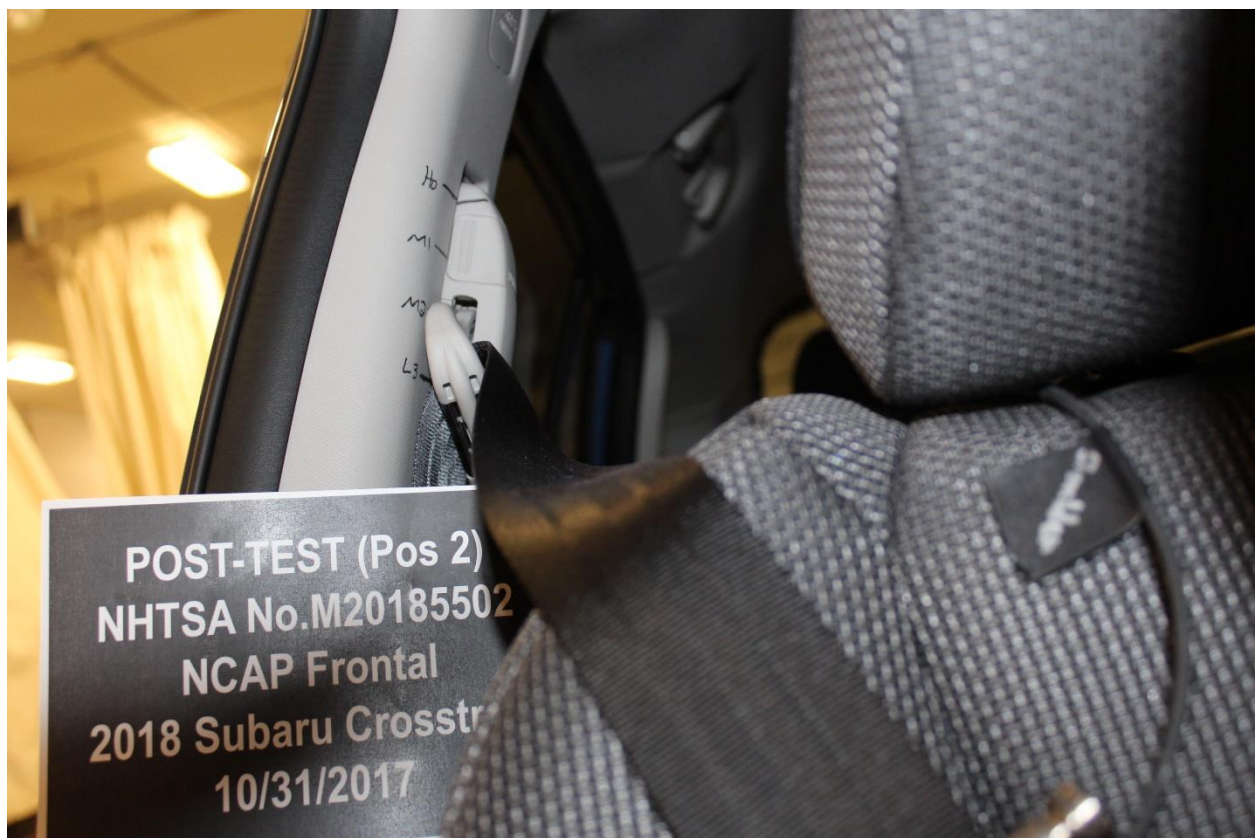


Figure A-60: Post-Test View of Belt Anchorage for Passenger Dummy



Figure A-61: Pre-Test Passenger Dummy Feet



Figure A-62: Post-Test Passenger Dummy Feet



Figure A-63: Pre-Test Passenger's Side Knee Bolster



Figure A-64: Post-Test Passenger's Side Knee Bolster



Figure A-65: Pre-Test Passenger's Side Floorpan



Figure A-66: Post-Test Passenger's Side Floorpan



Figure A-67: Post-Test Passenger Dummy Face



Figure A-68: Post-Test Passenger Dummy Contact With Airbag



Figure A-69: Post-Test Passenger Dummy Contact With Headrest

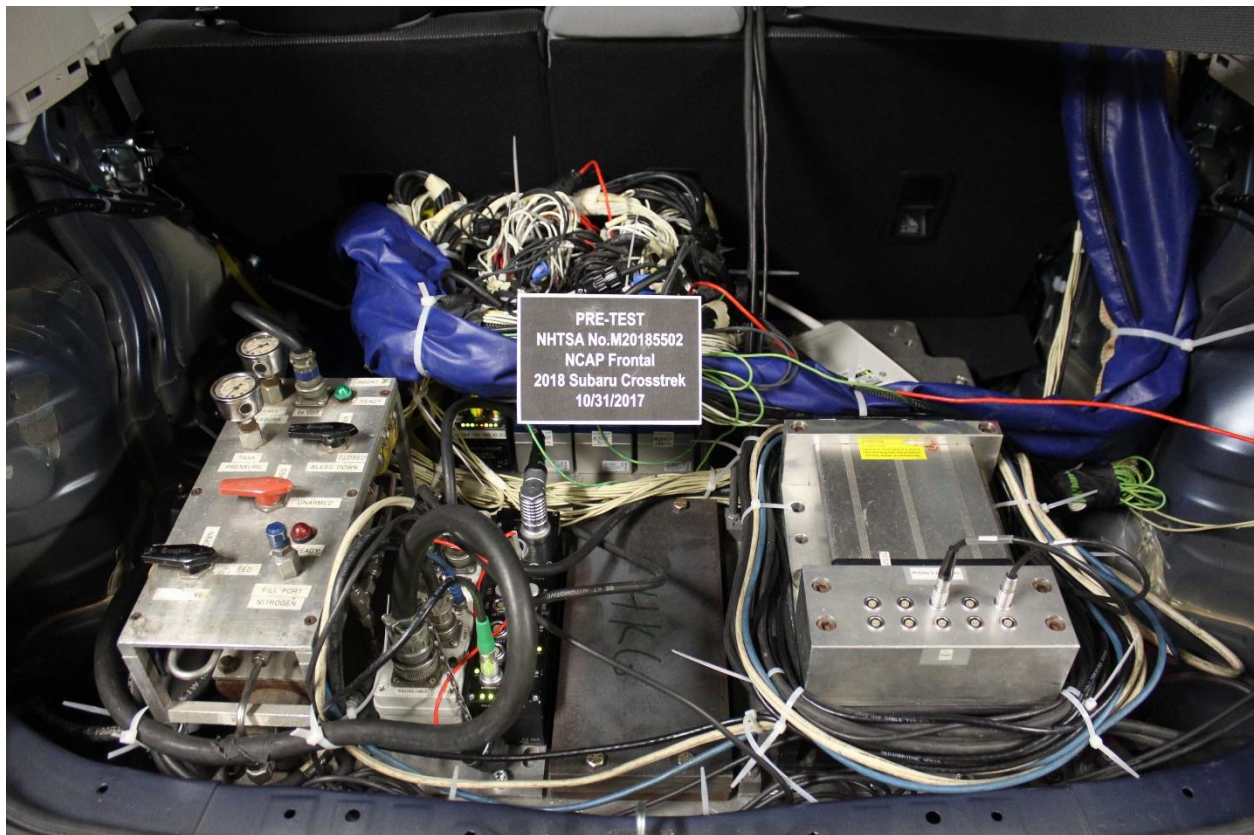


Figure A-70: Photograph of Ballast Installed in Vehicle

Photo Not Applicable

Figure A-71: Post-Test Stoddard Solvent Spillage Location View, If Required



Figure A-72: Post-Test Speed Trap Read-Out



Figure A-73: Vehicle at 0° on Static Rollover Device



Figure A-74: Vehicle at 90° on Static Rollover Device



Figure A-75: Vehicle at 180° on Static Rollover Device



Figure A-76: Vehicle at 270° on Static Rollover Device



Figure A-77: Vehicle at 360° on Static Rollover Device

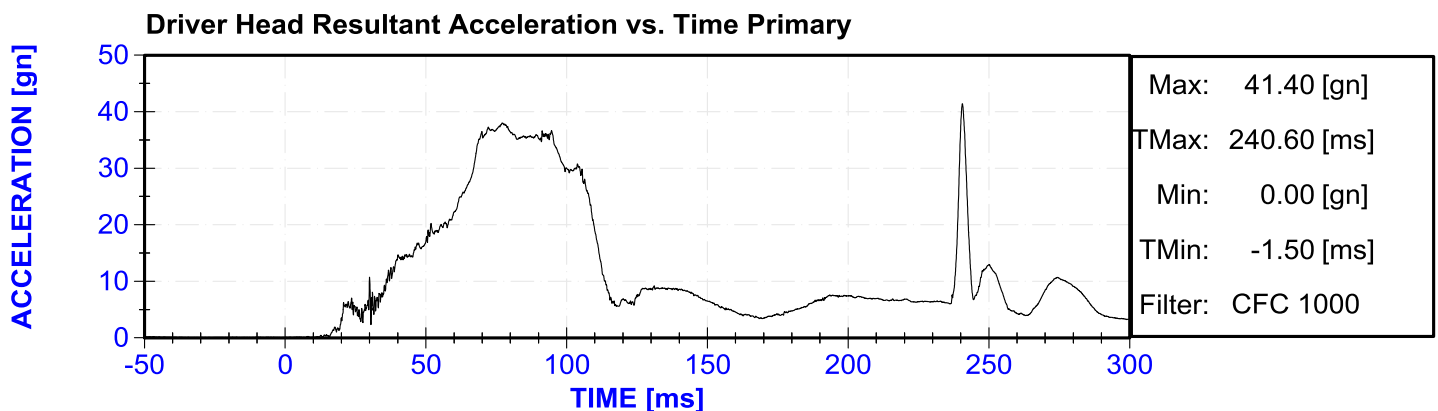
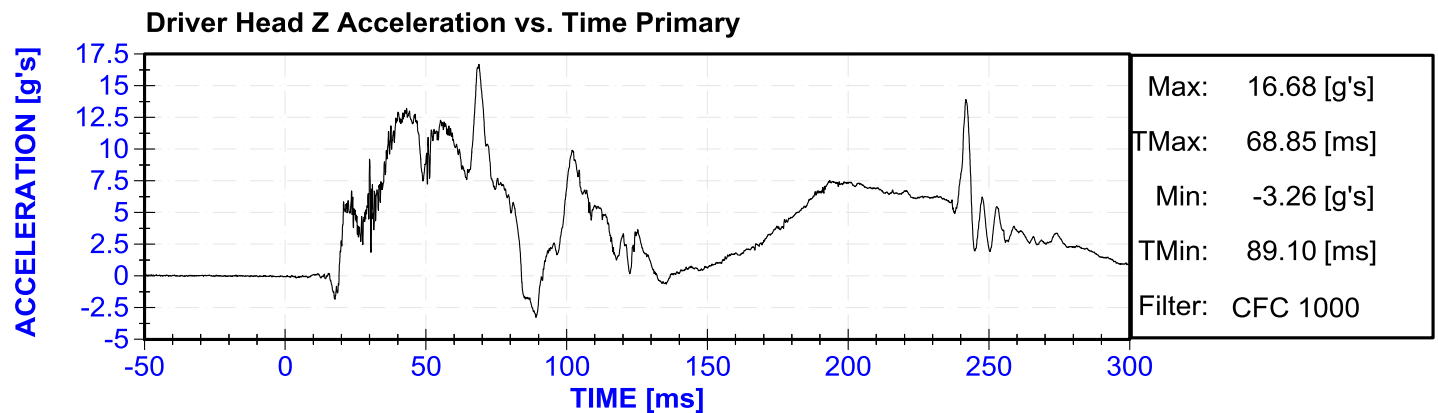
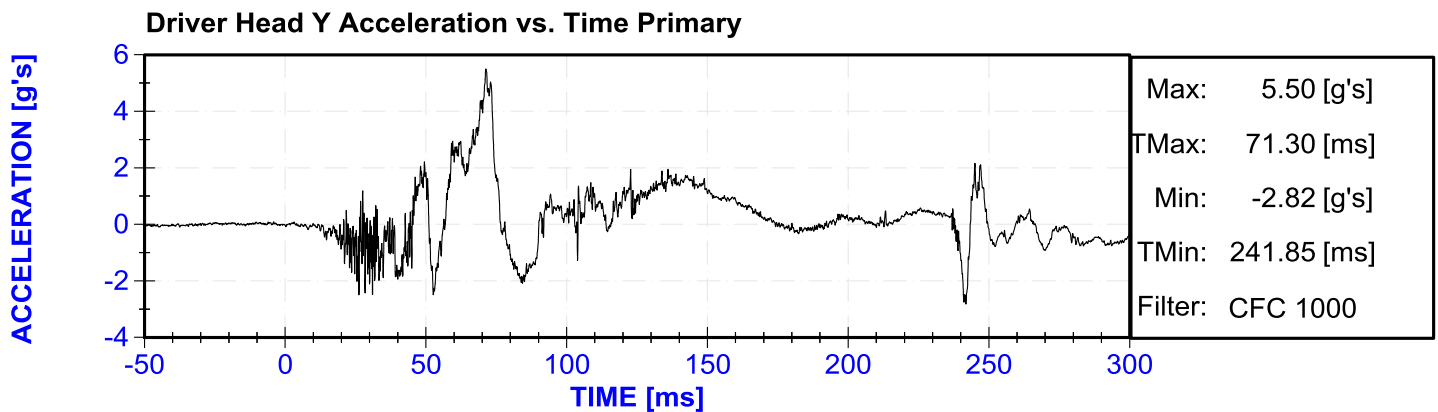
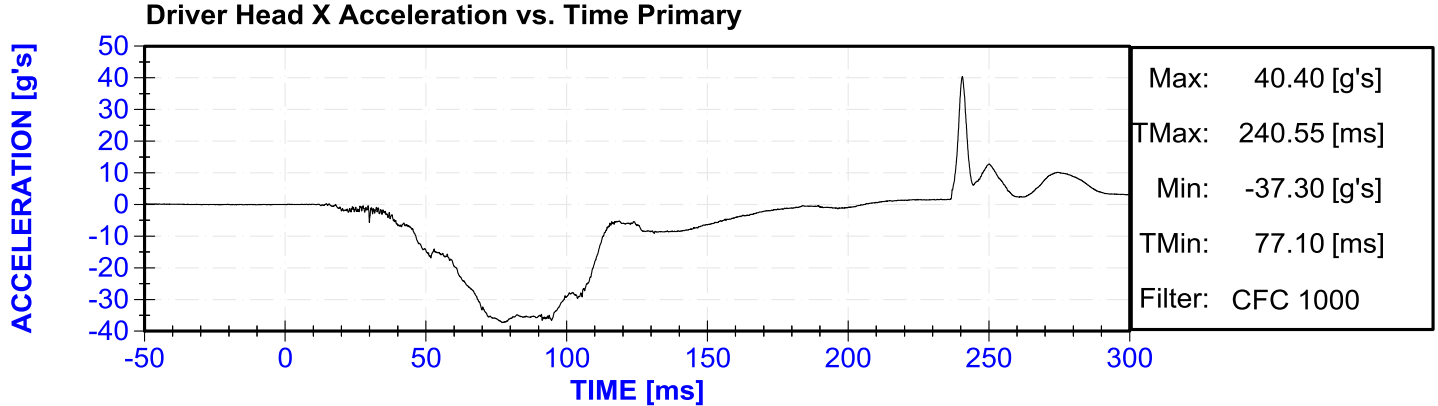


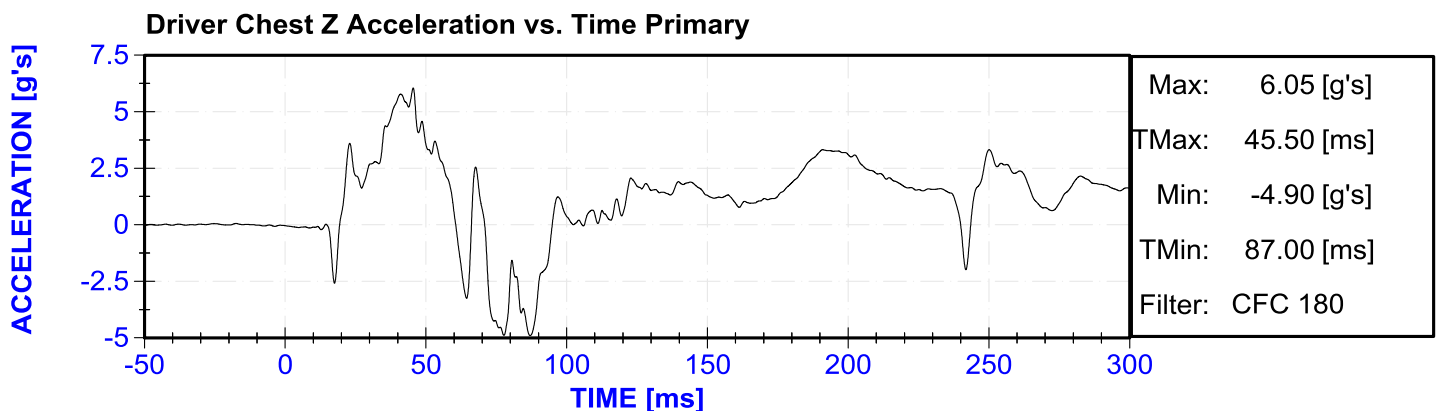
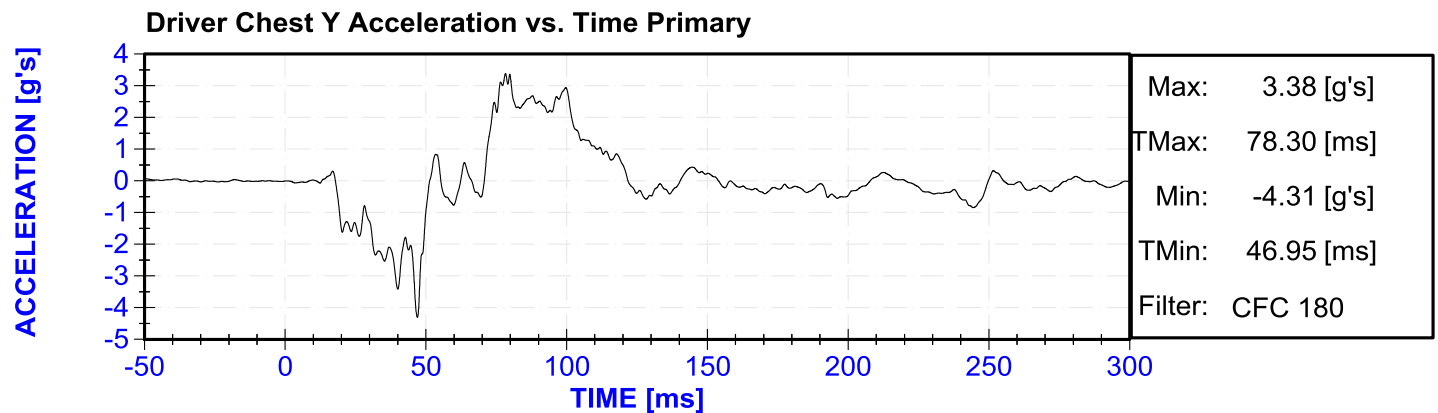
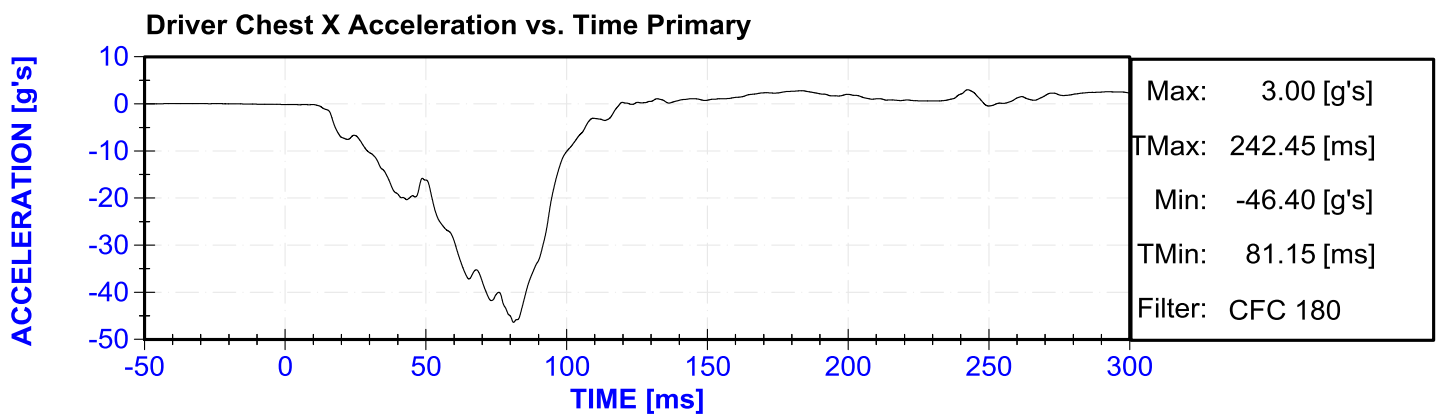
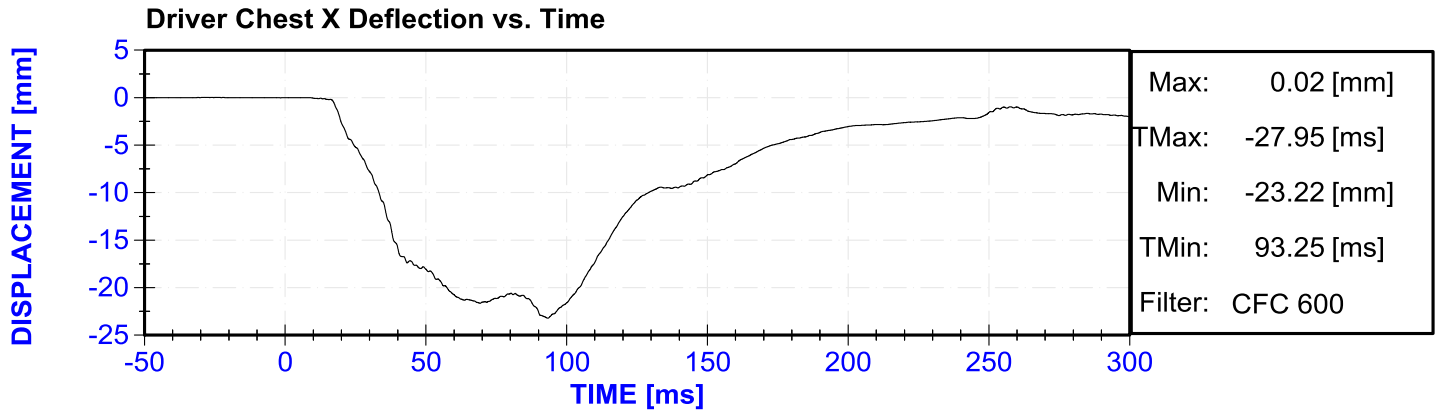
Figure A-78: 2018 Subaru Crosstrek Frontal Impact Event

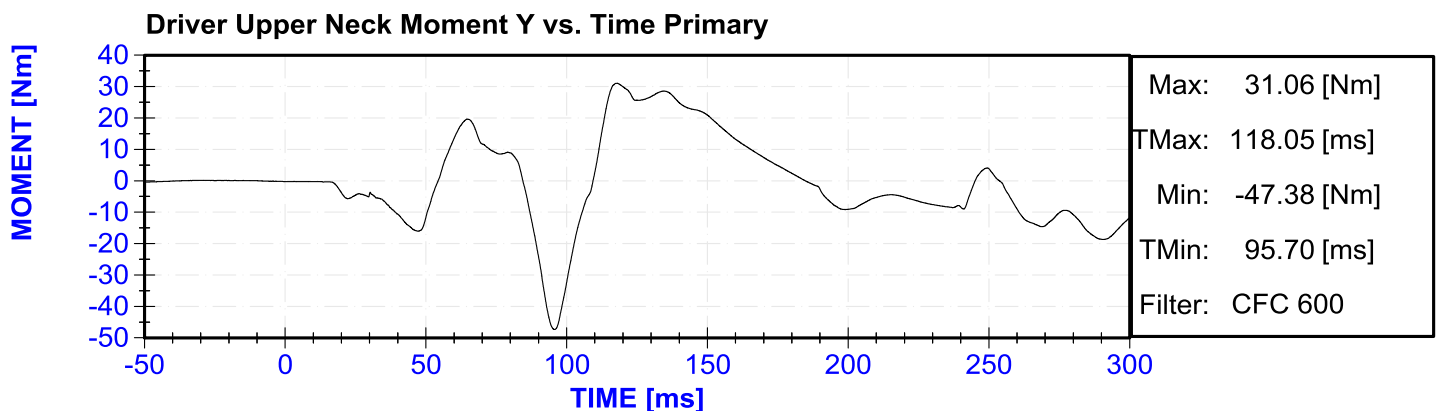
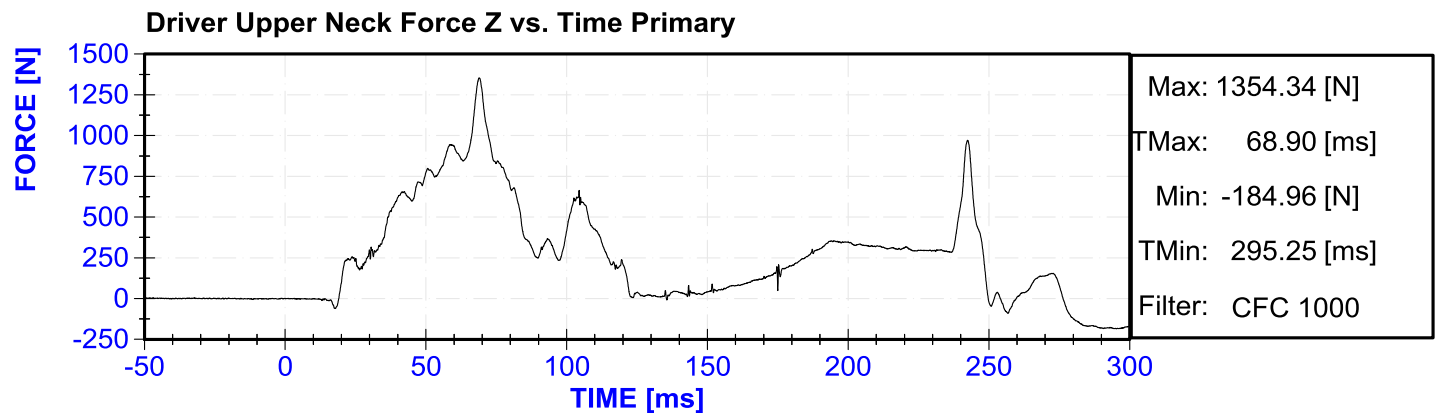
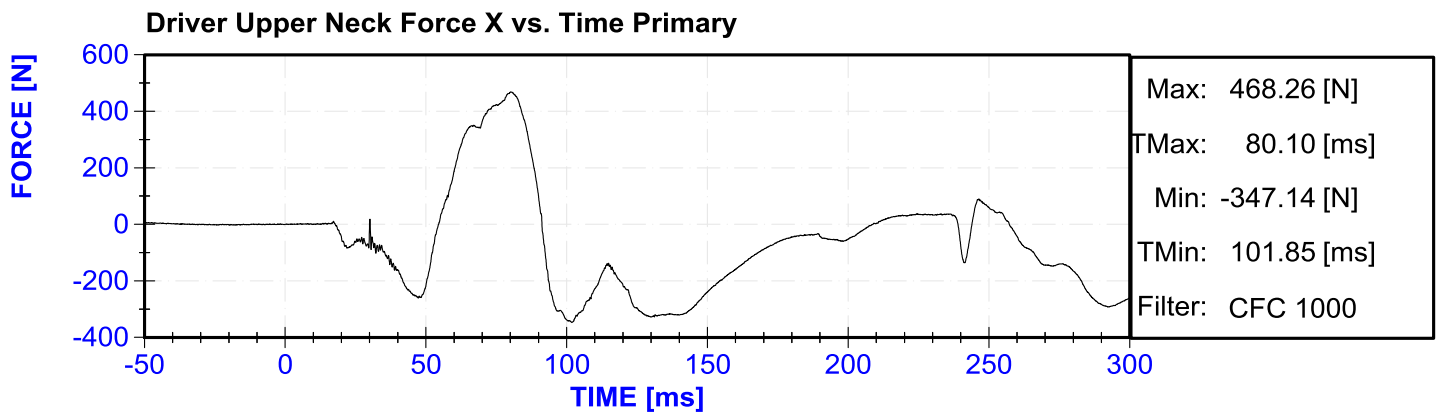
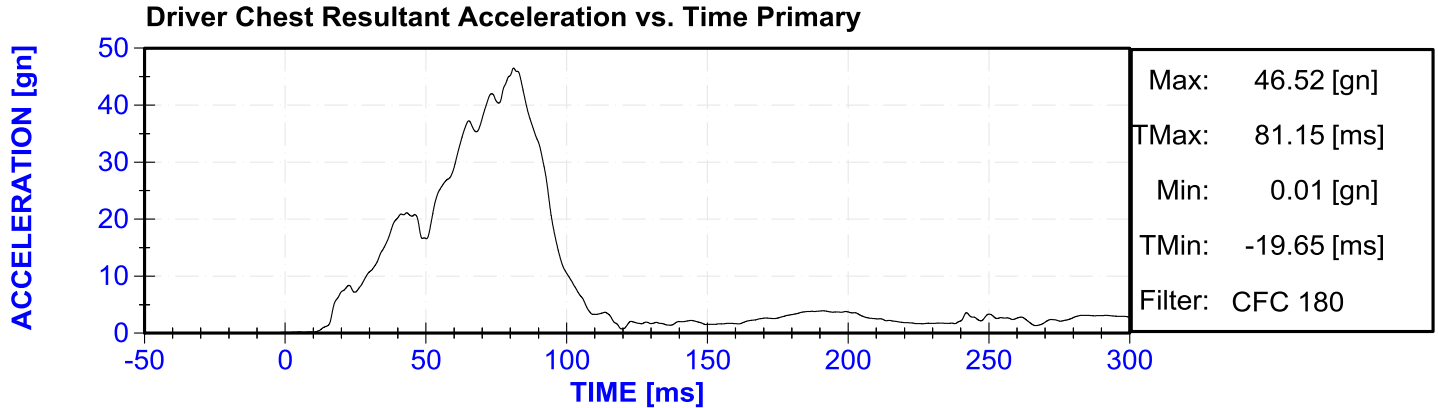
APPENDIX B
VEHICLE & DUMMY RESPONSE DATA TRACES

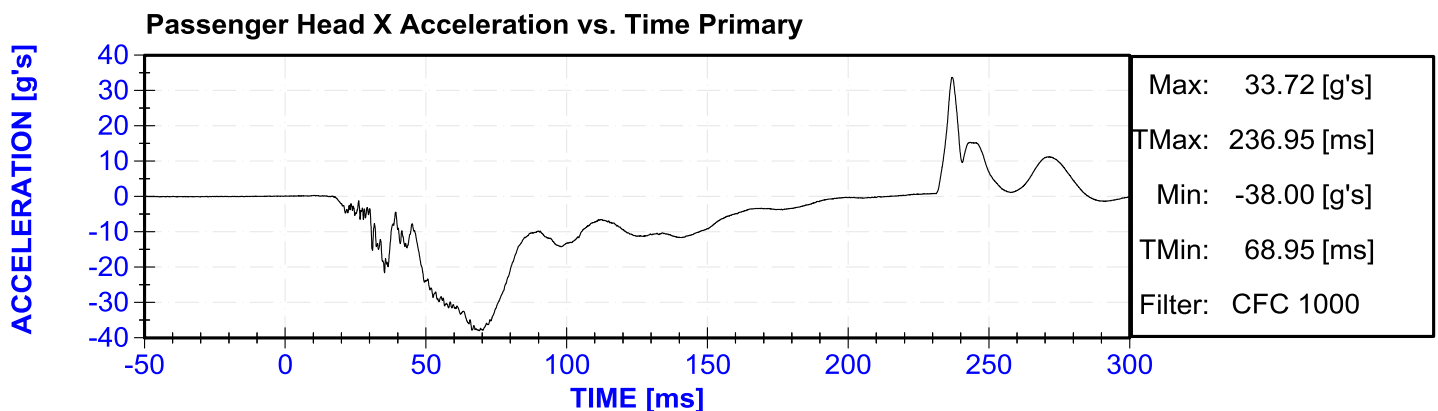
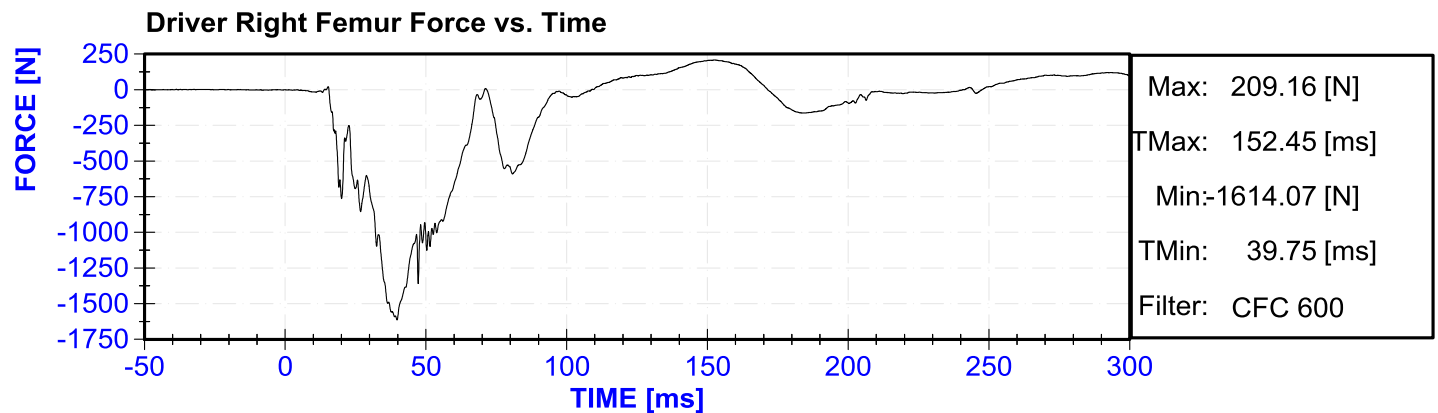
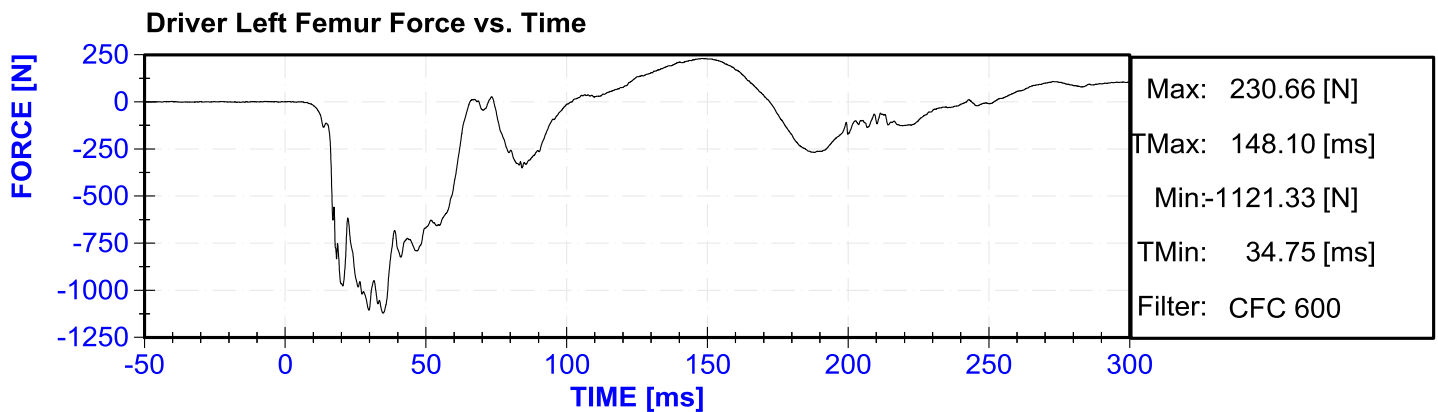
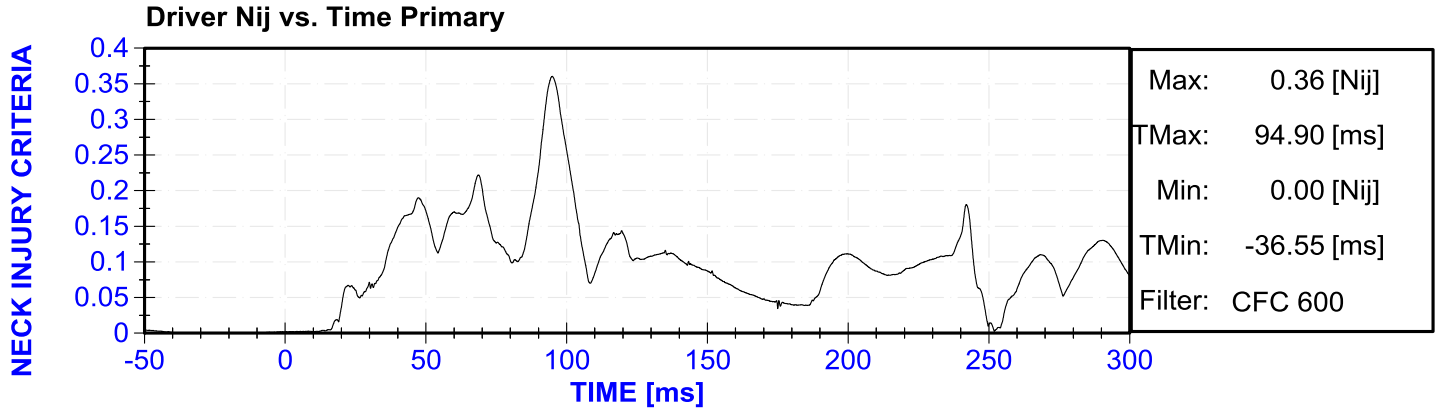
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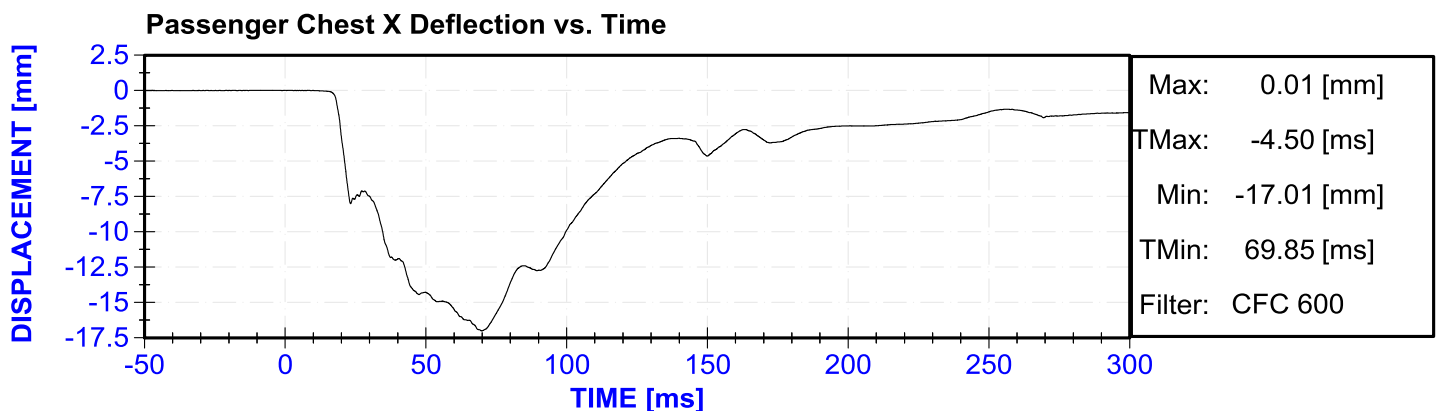
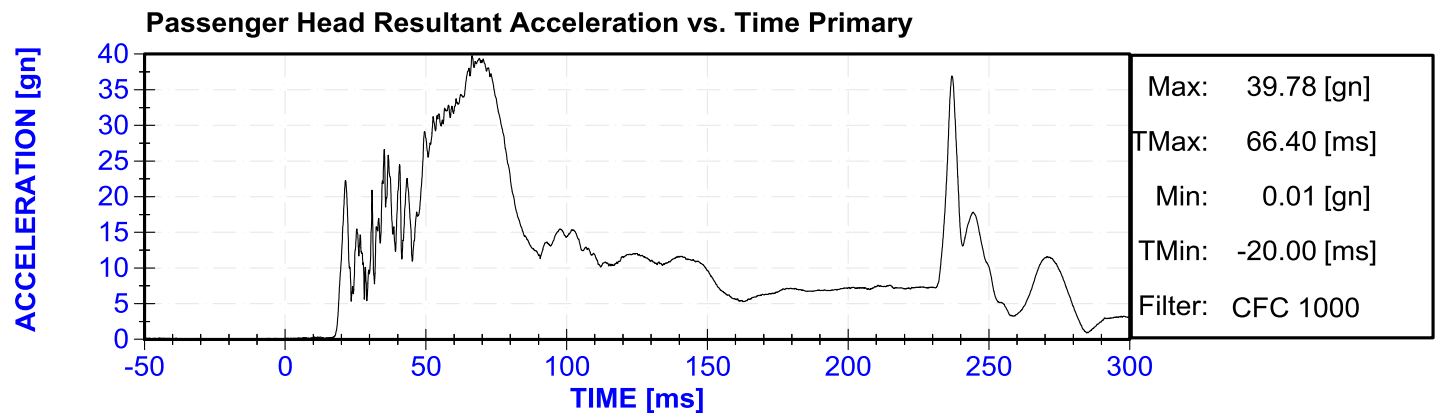
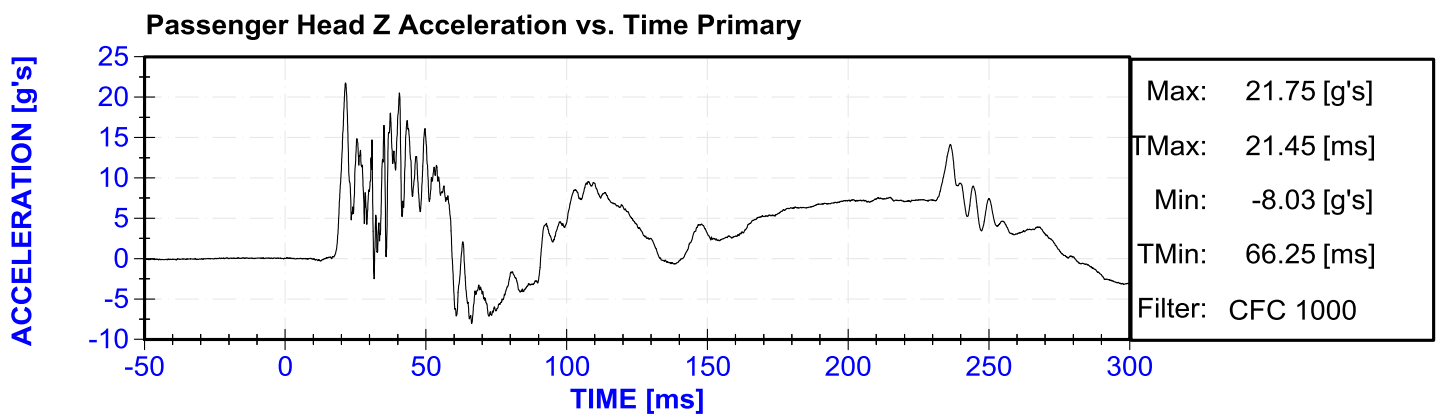
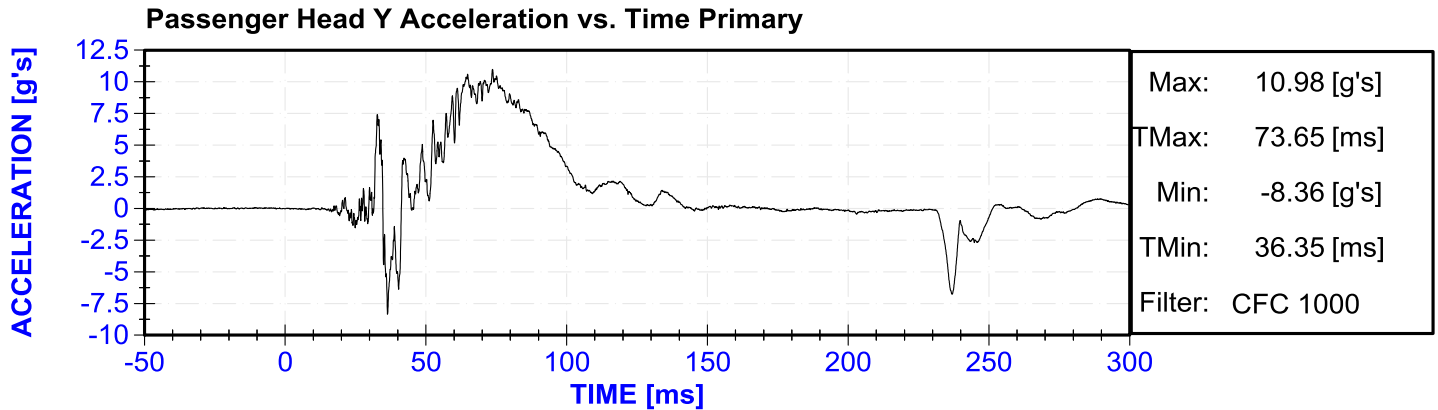
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Plot 2	Driver Head Y Acceleration vs. Time Primary	B-3
Plot 3	Driver Head Z Acceleration vs. Time Primary	B-3
Plot 4	Driver Head Resultant Acceleration vs. Time Primary	B-3
Plot 5	Driver Chest X Deflection vs. Time	B-4
Plot 6	Driver Chest X Acceleration vs. Time Primary	B-4
Plot 7	Driver Chest Y Acceleration vs. Time Primary	B-4
Plot 8	Driver Chest Z Acceleration vs. Time Primary	B-4
Plot 9	Driver Chest Resultant Acceleration vs. Time Primary	B-5
Plot 10	Driver Upper Neck Force X vs. Time Primary	B-5
Plot 11	Driver Upper Neck Force Z vs. Time Primary	B-5
Plot 12	Driver Upper Neck Moment Y vs. Time Primary	B-5
Plot 13	Driver Nij vs. Time Primary	B-6
Plot 14	Driver Left Femur Force vs. Time	B-6
Plot 15	Driver Right Femur Force vs. Time	B-6
Plot 16	Passenger Head X Acceleration vs. Time Primary	B-6
Plot 17	Passenger Head Y Acceleration vs. Time Primary	B-7
Plot 18	Passenger Head Z Acceleration vs. Time Primary	B-7
Plot 19	Passenger Head Resultant Acceleration vs. Time Primary	B-7
Plot 20	Passenger Chest X Deflection vs. Time	B-7
Plot 21	Passenger Chest X Acceleration vs. Time Primary	B-8
Plot 22	Passenger Chest Y Acceleration vs. Time Primary	B-8
Plot 23	Passenger Chest Z Acceleration vs. Time Primary	B-8
Plot 24	Passenger Chest Resultant Acceleration vs. Time Primary	B-8
Plot 25	Passenger Upper Neck Force X vs. Time Primary	B-9
Plot 26	Passenger Upper Neck Force Z vs. Time Primary	B-9
Plot 27	Passenger Upper Neck Moment Y vs. Time Primary	B-9
Plot 28	Passenger Nij vs. Time Primary	B-9
Plot 29	Passenger Left Femur Force vs. Time	B-10
Plot 30	Passenger Right Femur Force vs. Time	B-10

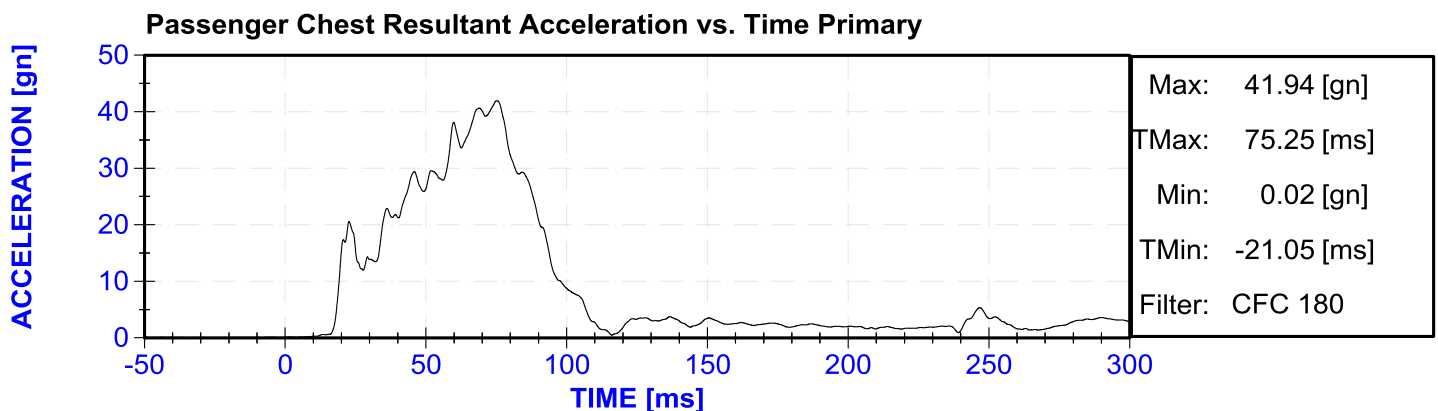
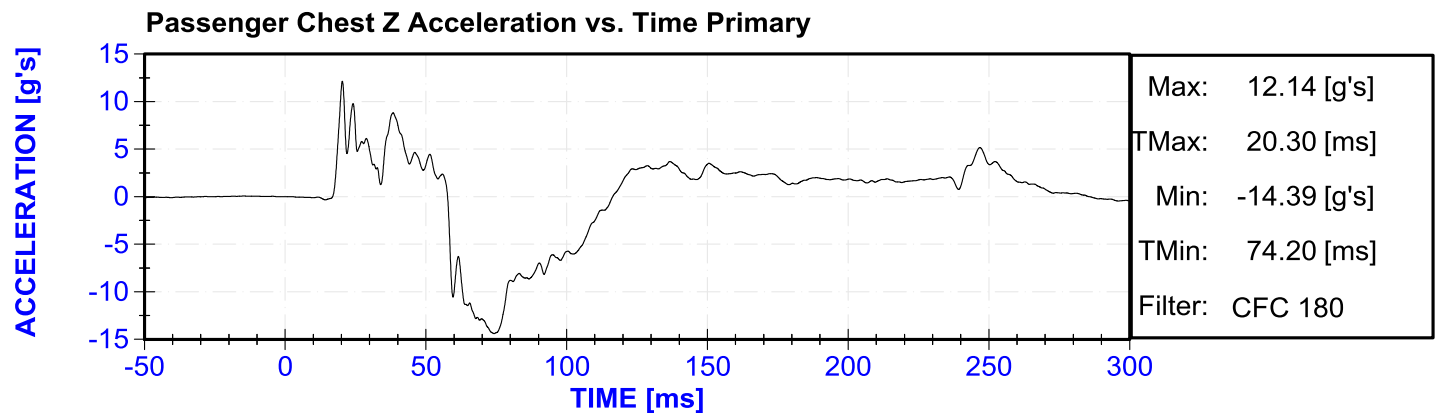
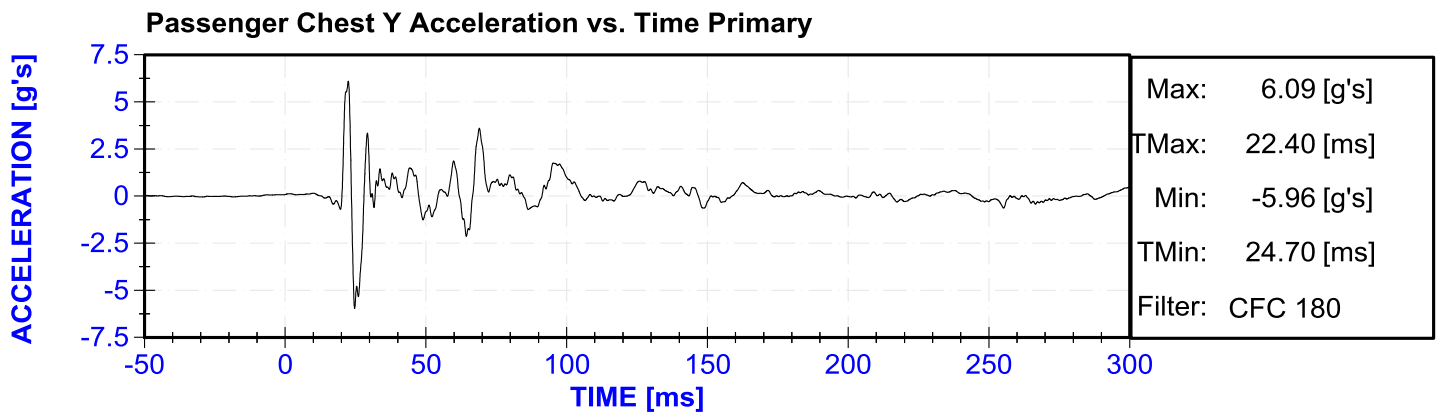
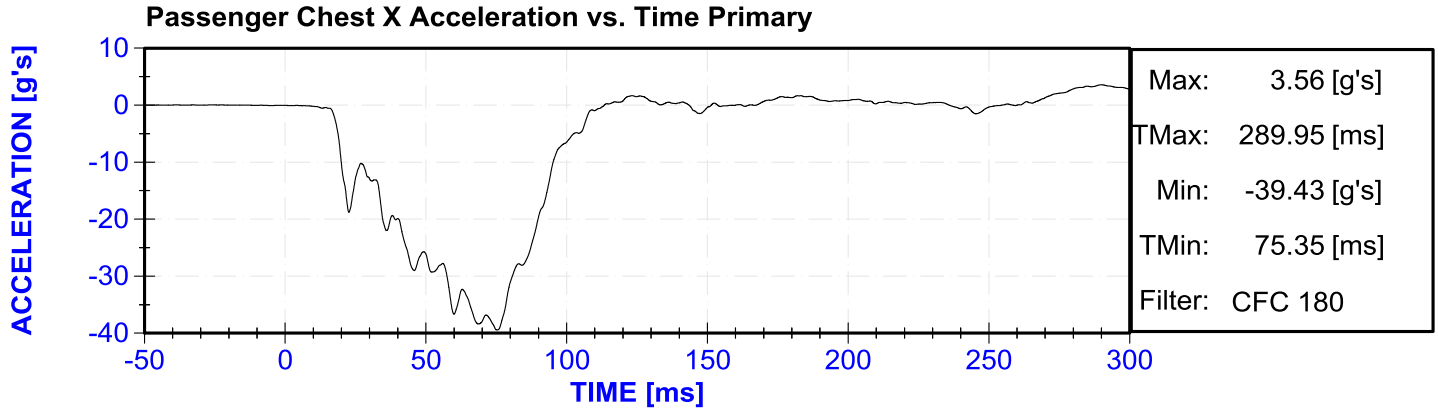


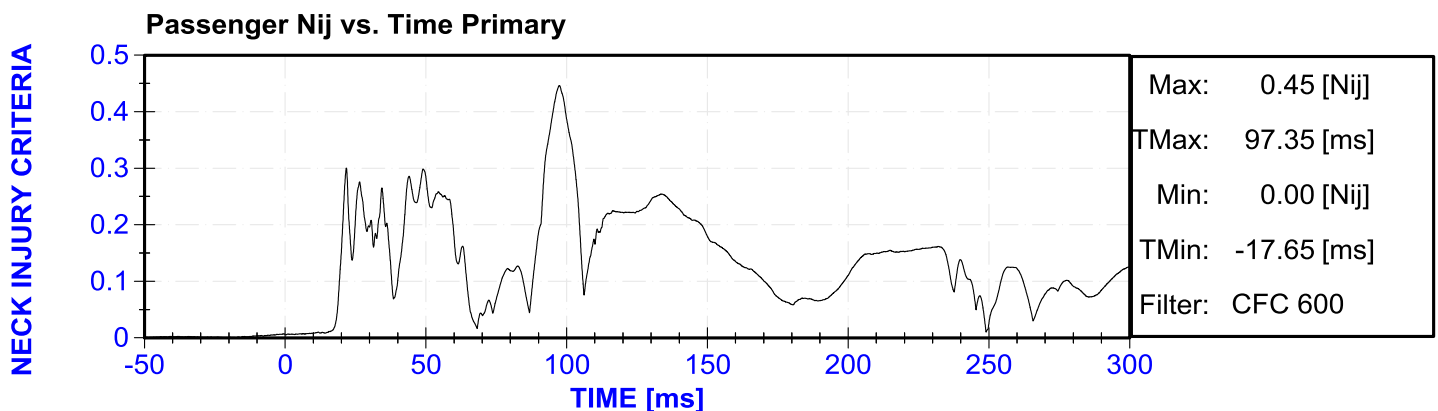
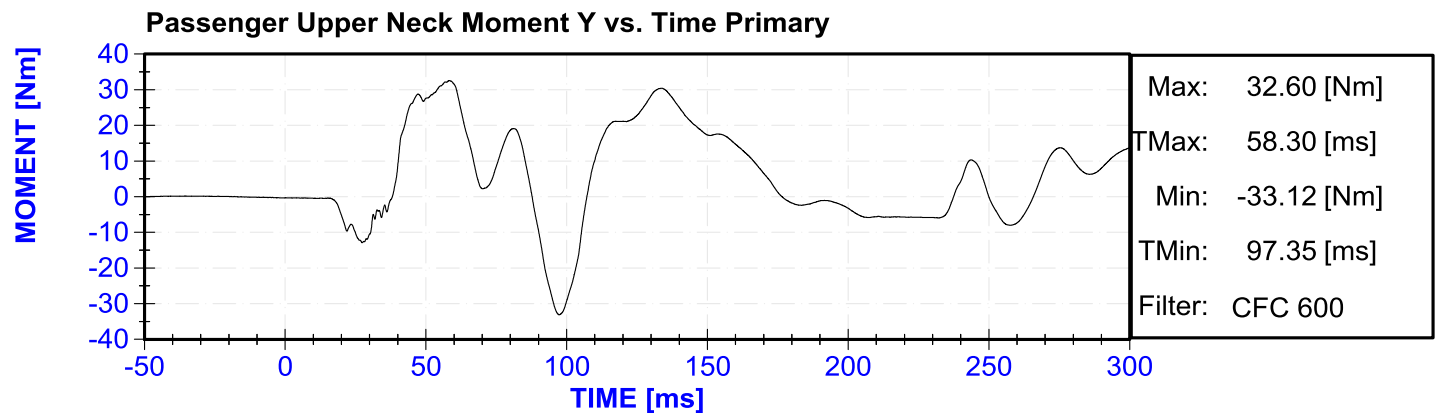
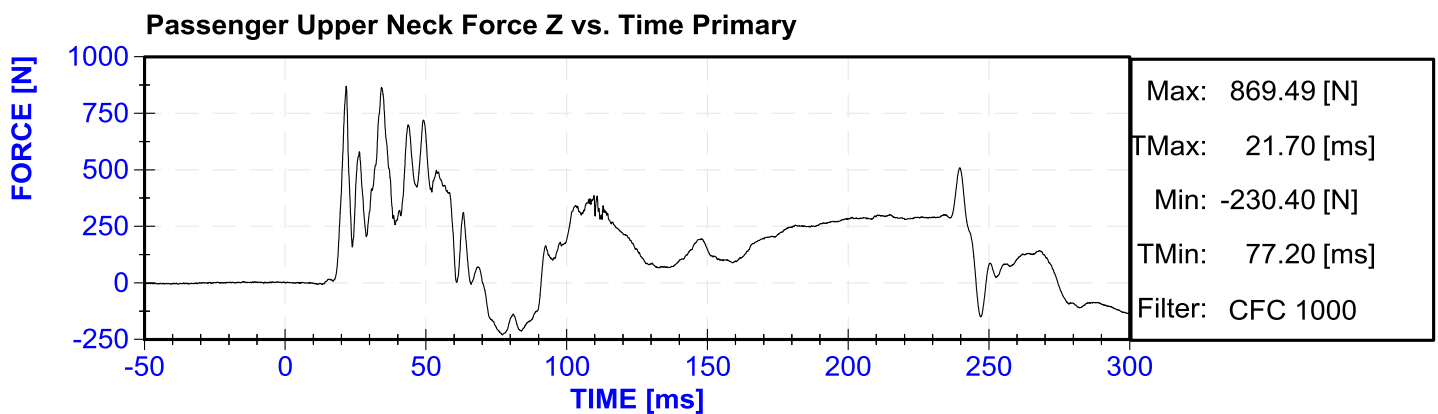
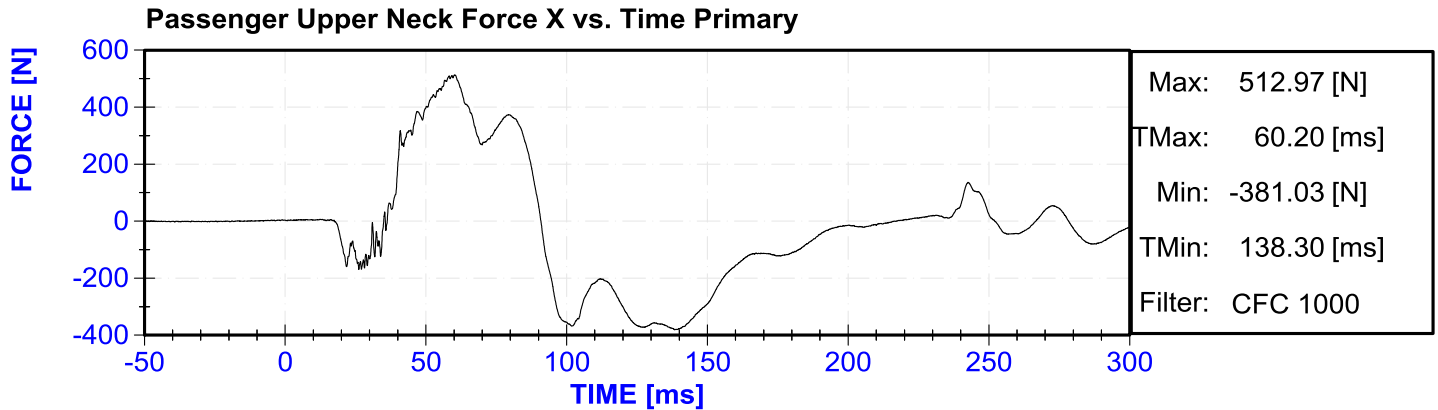


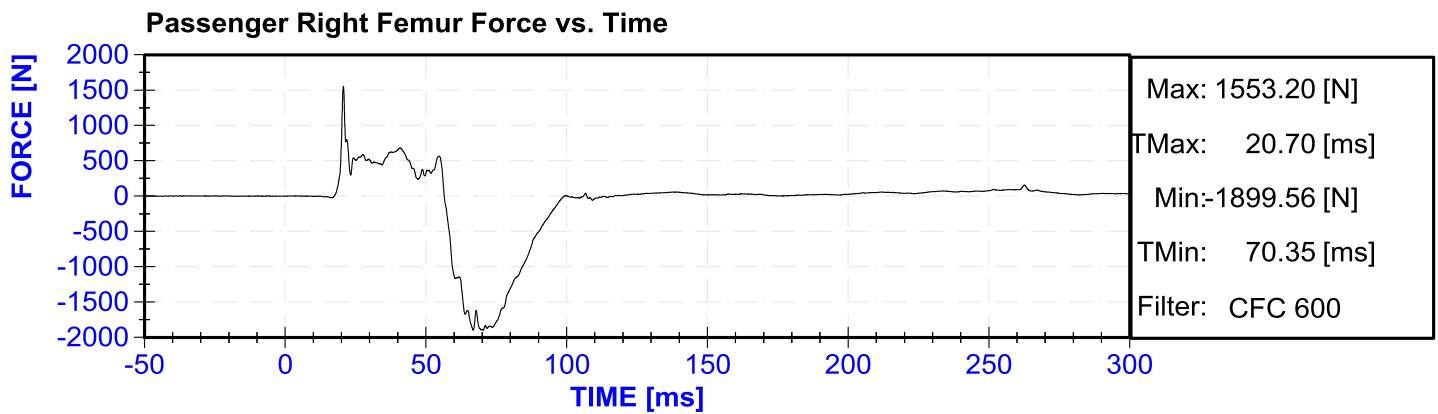
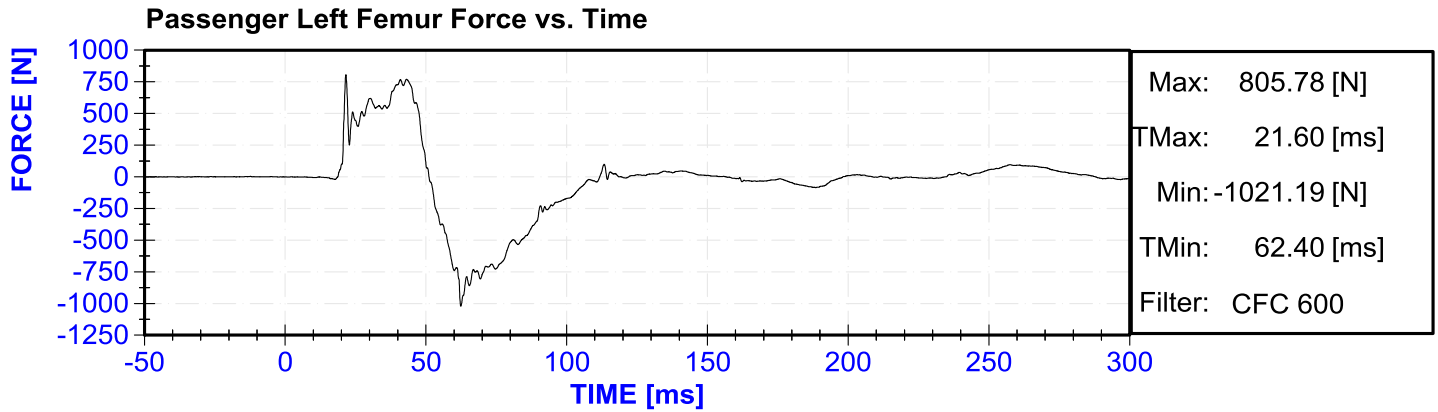












APPENDIX C

DUMMY CALIBRATION AND PERFORMANCE VERIFICATION DATA

CALIBRATION TEST RESULTS

PRE-TEST

HYBRID III 50TH PERCENTILE MALE - DRIVER ATD

SERIAL NO: 142

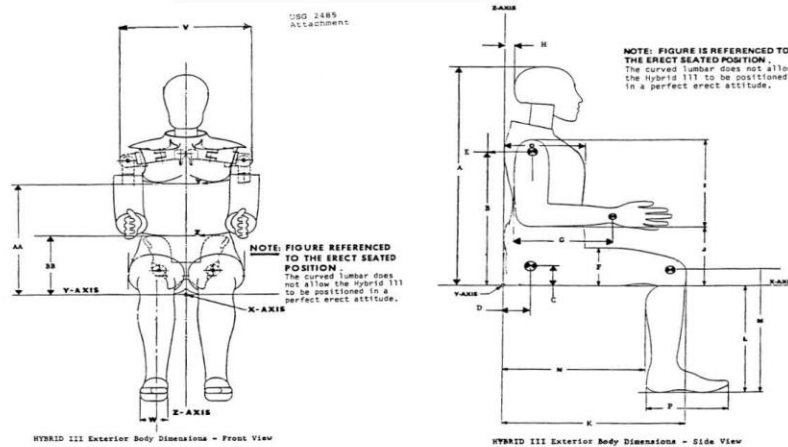


External Measurements - Hybrid 3 - 50th Male

Technician: M. Goehle

Date: 10/27/2017

Dummy Serial Number: 142



Symbol	Description	Specification (in)		Result (in)	Pass/Fail
A	Sitting Height	34.6	35.0	34.8	Pass
B	Shoulder Pivot Height	19.9	20.5	20.0	Pass
C	H-Point Height	3.3	3.5	3.5	Pass
D	H-Point from Backline	5.3	5.5	5.4	Pass
E	Shoulder Pivot from Backline	3.3	3.7	3.5	Pass
F	Thigh Clearance	5.5	6.1	6.0	Pass
G	Back of Elbow to Wrist Pivot	11.4	12.0	11.5	Pass
H	Head Back to Backline	1.6	1.8	1.7	Pass
I	Shoulder to Elbow Length	13.0	13.6	13.2	Pass
J	Elbow Rest Height	7.5	8.3	8.2	Pass
K	Buttock to Knee Length	22.8	23.8	23.0	Pass
L	Popliteal Height	16.9	17.9	17.8	Pass
M	Knee Pivot Height	19.1	19.7	19.6	Pass
N	Buttock Popliteal Length	17.8	18.8	18.3	Pass
O	Chest Depth without Jacket	8.4	9.0	8.5	Pass
P	Foot Length (right)	9.9	10.5	10.3	Pass
V	Shoulder Breadth	16.3	17.2	17.0	Pass
W	Foot Breadth	3.6	4.2	4.0	Pass
Y	Chest Circumference with Jacket	38.2	39.4	39.3	Pass
Z	Waist Circumference	32.9	34.1	34.0	Pass
AA	Reference Location (Chest Circumference)	16.9	17.1	17.0	Pass
BB	Reference Location (Waist Circumference)	8.9	9.1	9.0	Pass

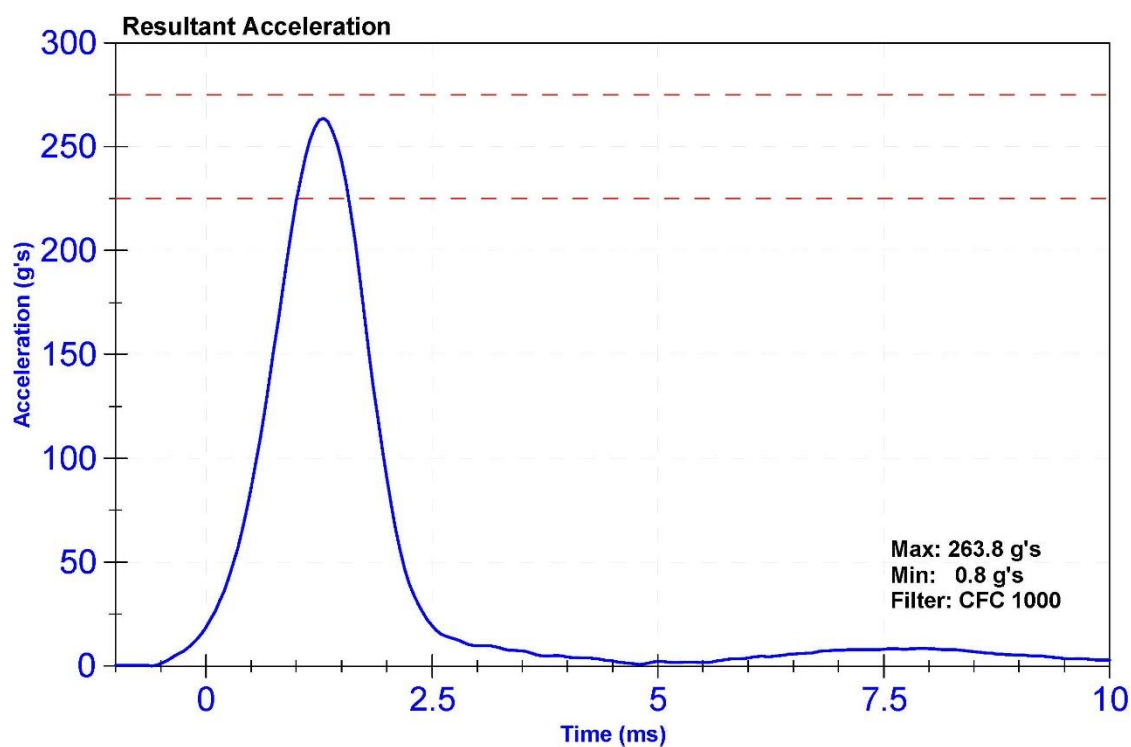
ATD Manufacturer	Humanetics	Test Technician	K. Brogan
ATD Serial Number	142	Laboratory Supervisor	M. Goehle

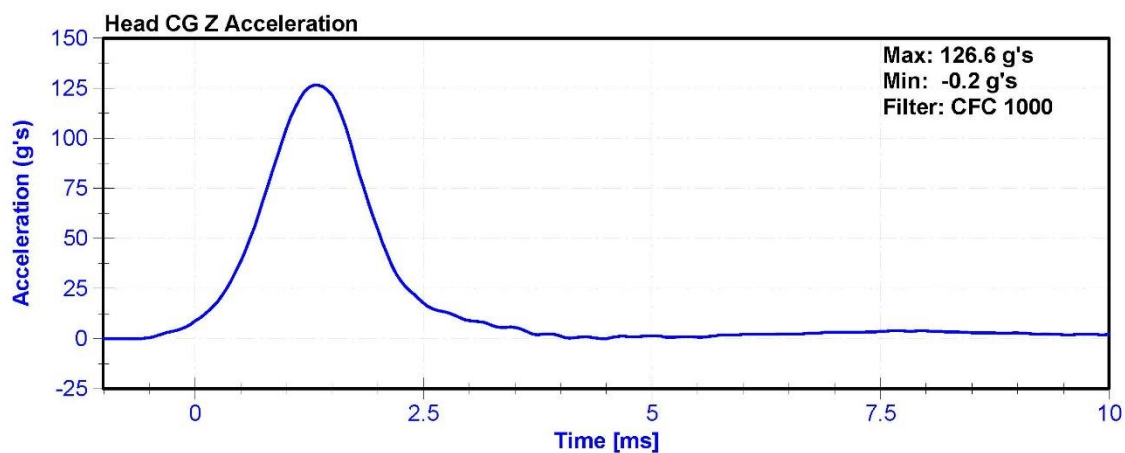
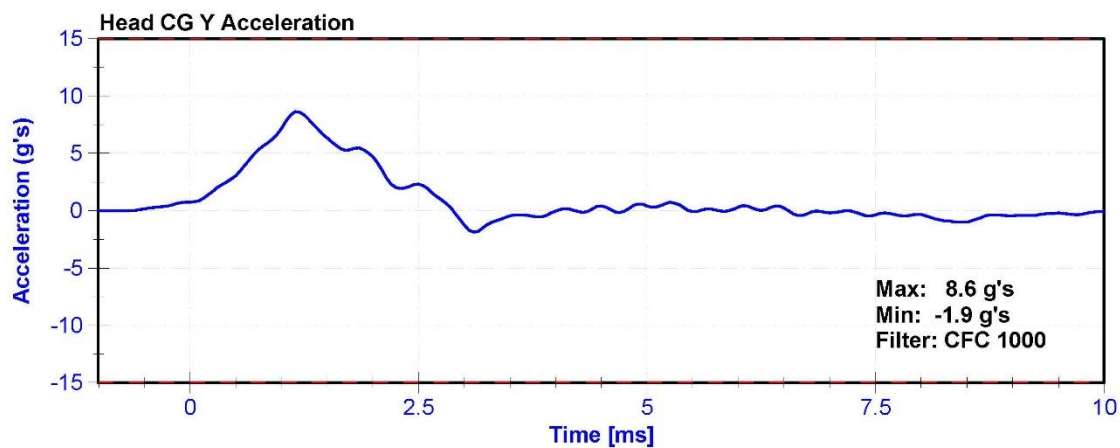
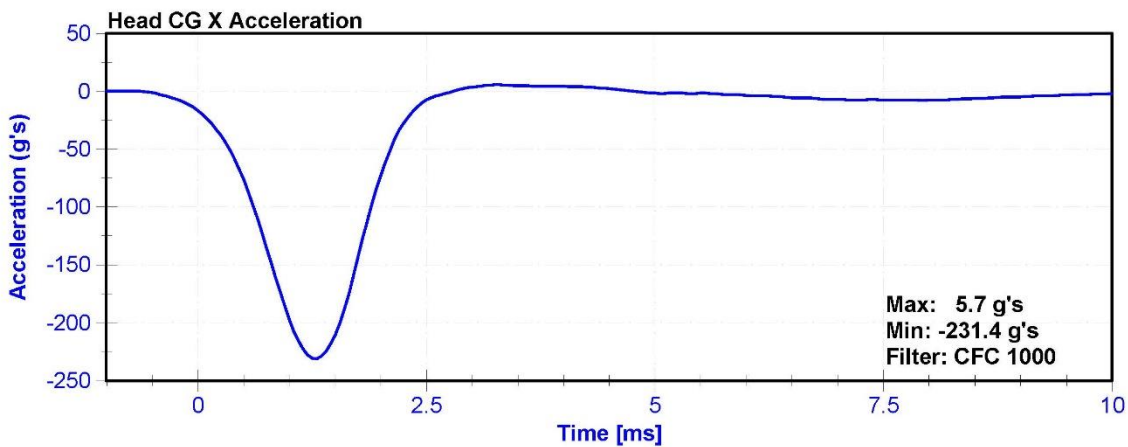
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.2	Pass
Humidity	10	70	%	40.9	Pass
Resultant Acceleration	225	275	g's	263.8	Pass
Oscillation	0	10	%	3.7	Pass
Lateral Acceleration	-15	15	g's	8.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264CT	AC-P58998	10/25/2017	4/25/2018
Y Accelerometer	ENDEVCO 7264CT	AC-P58912	10/25/2017	4/25/2018
Z Accelerometer	ENDEVCO 7264CT	AC-P58997	10/25/2017	4/25/2018





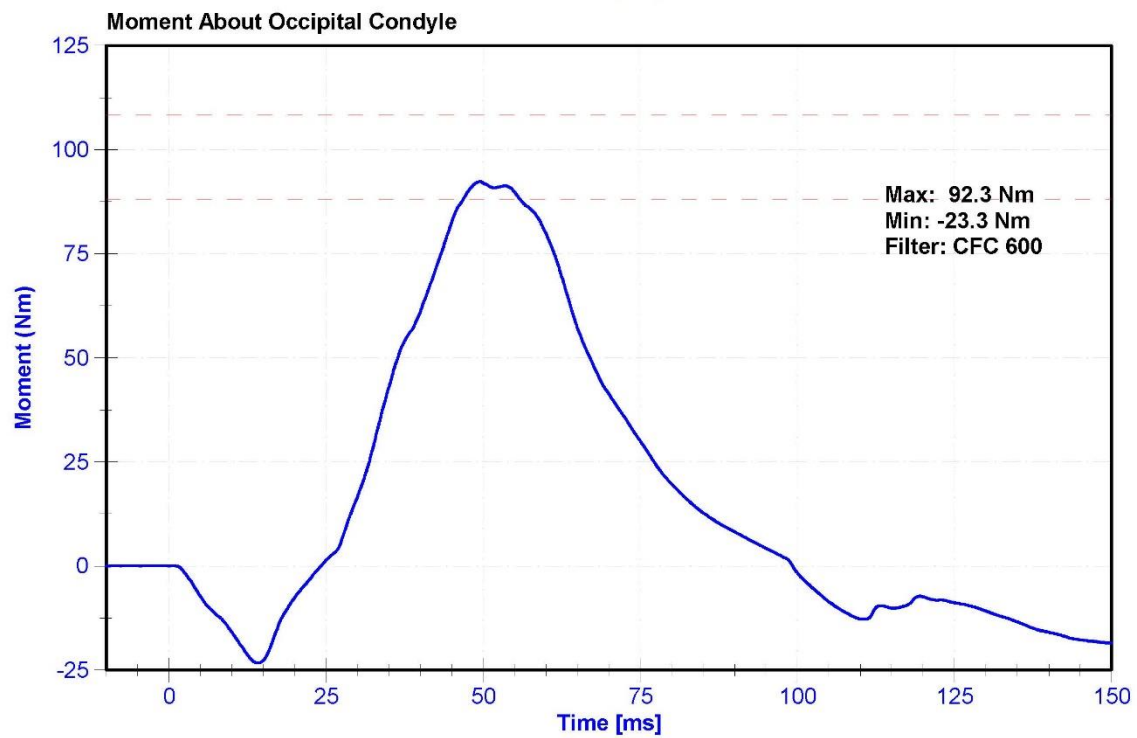
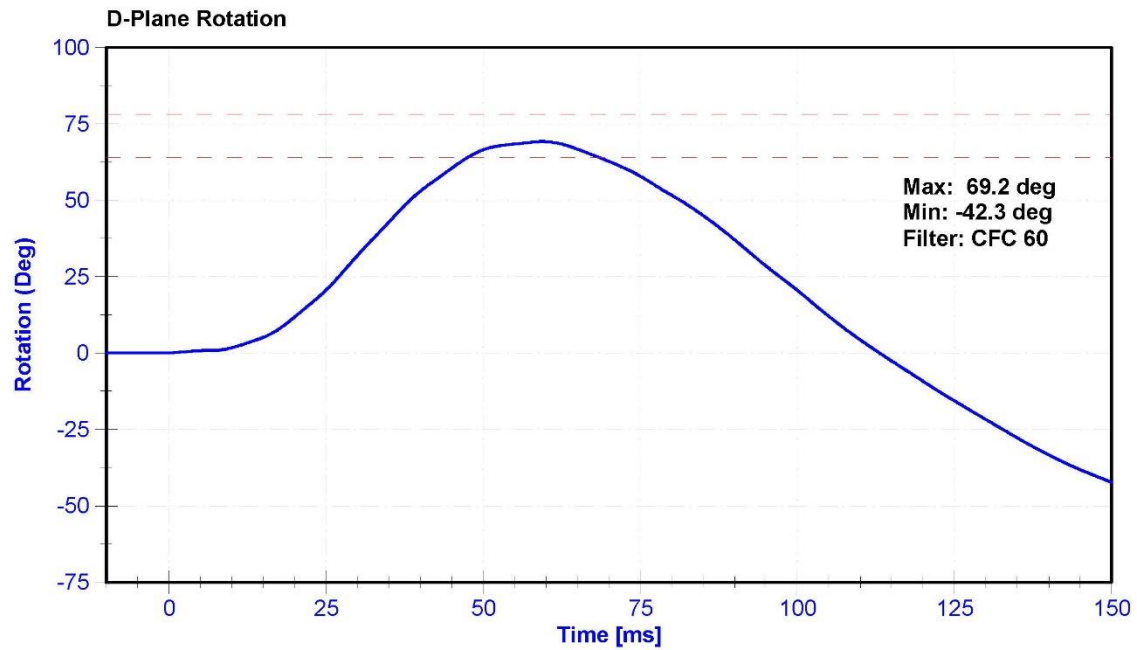
ATD Manufacturer	Humanetics	Test Technician	S. Keller
ATD Serial Number	142	Laboratory Supervisor	M. Goehle

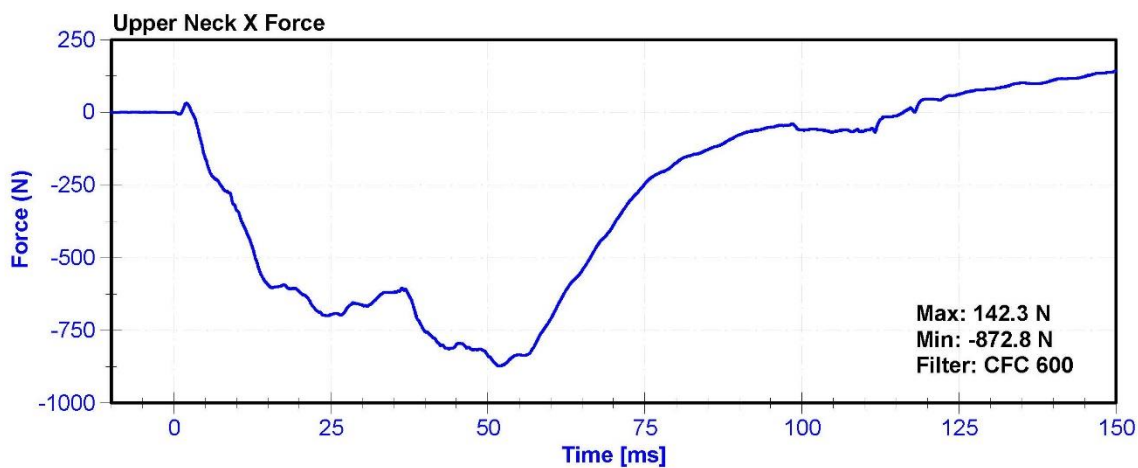
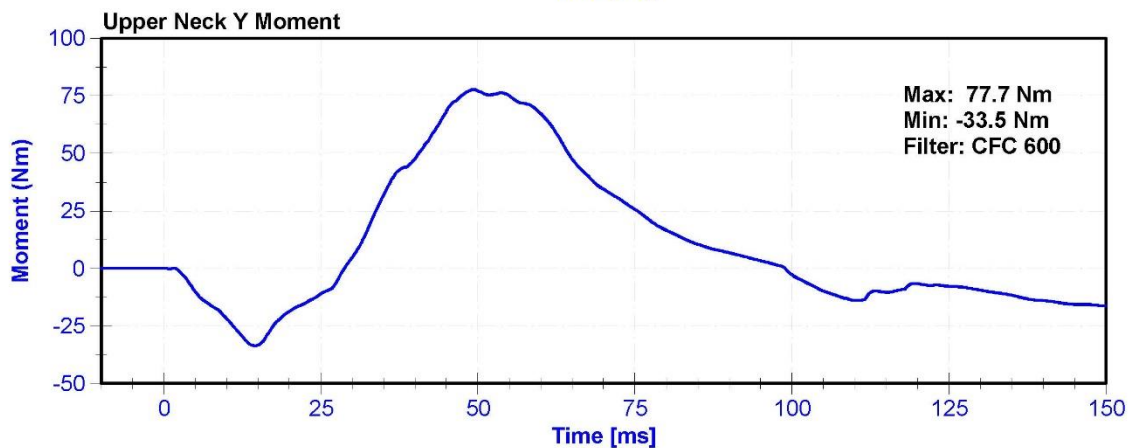
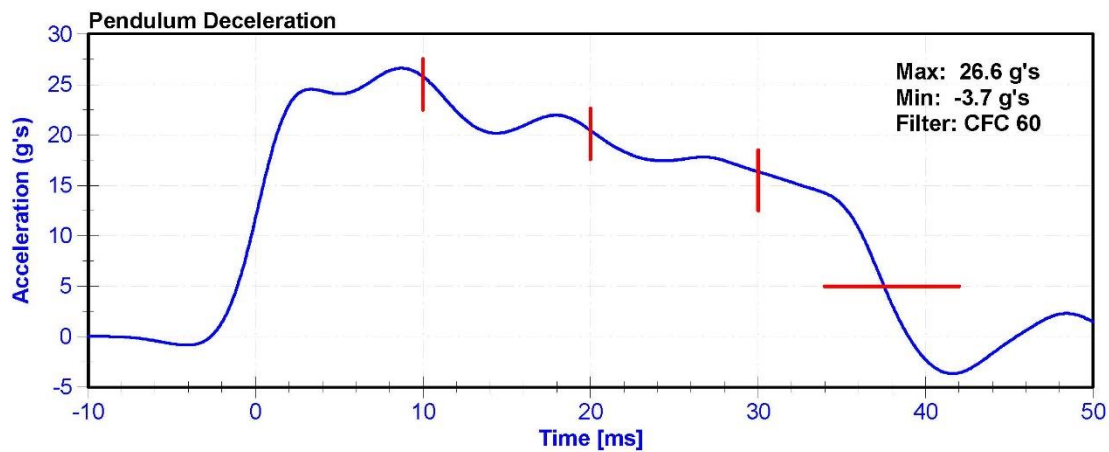
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.9	Pass
Humidity	10	70	%	37.2	Pass
Velocity	6.89	7.13	m/s	6.979	Pass
Pendulum Deceleration at 10ms	22.5	27.5	g's	25.79	Pass
Pendulum Deceleration at 20ms	17.6	22.6	g's	20.46	Pass
Pendulum Deceleration at 30ms	12.5	18.5	g's	16.36	Pass
Max. Pendulum Deceleration After 30ms	0	29	g's	26.6	Pass
Pendulum Deceleration Time to 5 g's	34	42	ms	37.5	Pass
Maximum D Plane Rotation	64	78	deg	69.2	Pass
Time to Maximum Rotation	57	64	ms	59.4	Pass
Rotation Decay to Zero	113	127	ms	113.1	Pass
Moment About Occipital Condyle	88.1	108.4	Nm	92.35	Pass
Time to Maximum Moment	47	58	ms	49.5	Pass
Moment Decay to Zero	97	107	ms	99.2	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	ETI SP22G	DS-PendPot	10/10/2017	10/10/2018
Condyle Potentiometer	ETI SP22G	DS-CondPot	10/10/2017	10/10/2018
Upper Neck Load Cell	FTSS IF-205	LC-161Fx	7/11/2017	7/11/2018





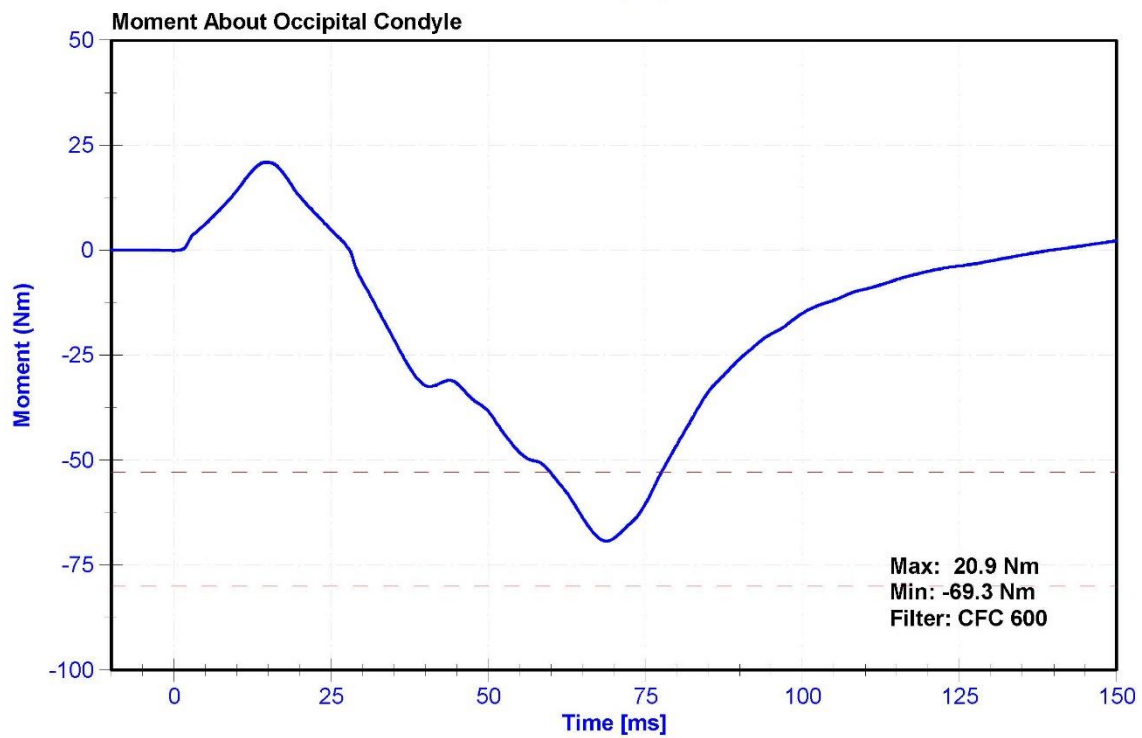
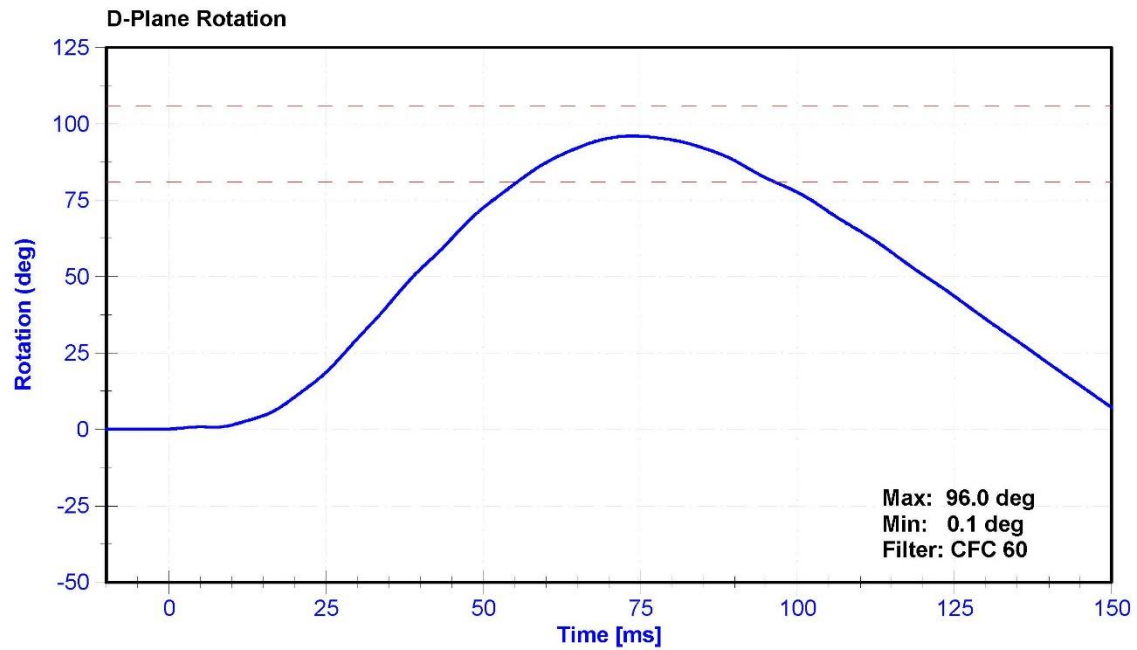
ATD Manufacturer	Humanetics	Test Technician	K. Brogan
ATD Serial Number	142	Laboratory Supervisor	M. Goehle

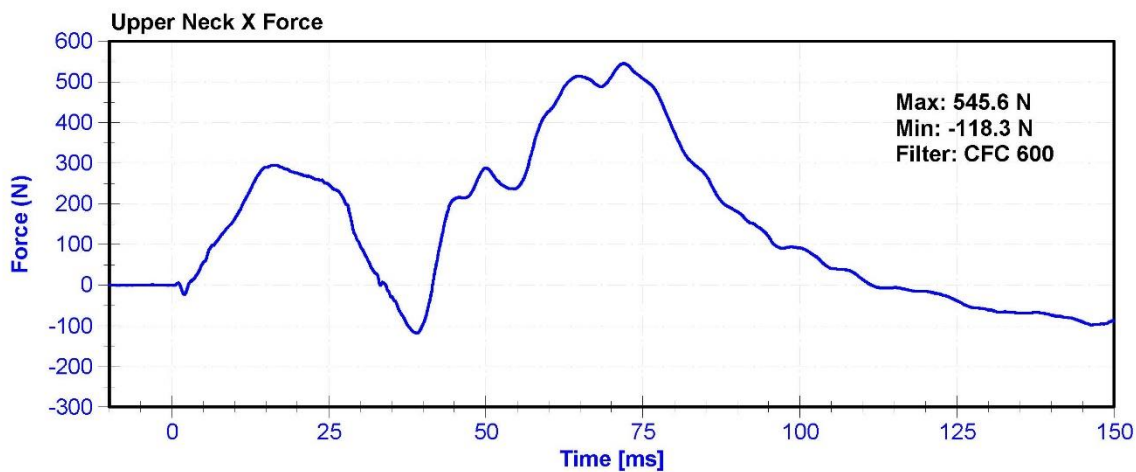
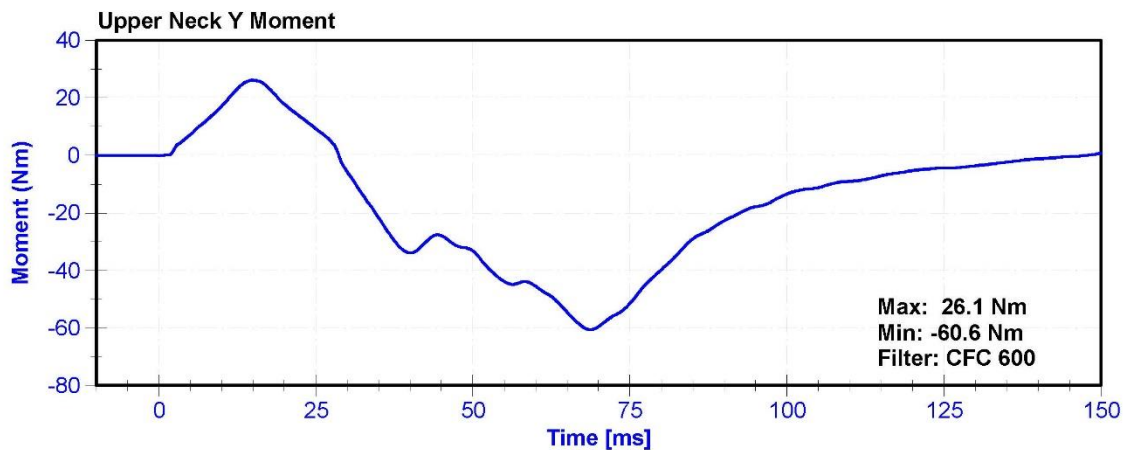
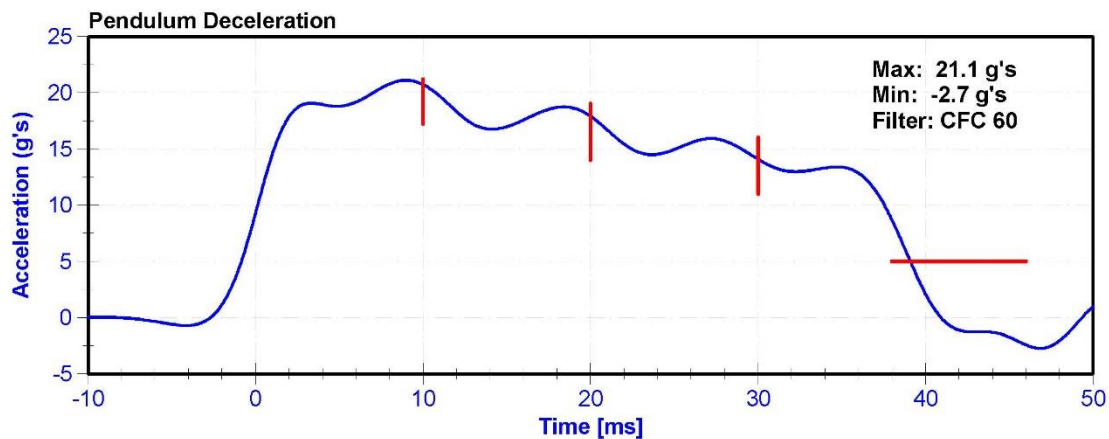
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21	Pass
Humidity	10	70	%	37.2	Pass
Velocity	5.94	6.19	m/s	6.068	Pass
Pendulum Deceleration at 10ms	17.2	21.2	g's	20.73	Pass
Pendulum Deceleration at 20ms	14	19	g's	17.9	Pass
Pendulum Deceleration at 30ms	11	16	g's	14.1	Pass
Max. Pendulum Deceleration After 30ms	0	22	g's	21.1	Pass
Pendulum Deceleration Time to 5 g's	38	46	ms	39.1	Pass
Maximum D Plane Rotation	81	106	deg	96.0	Pass
Time to Maximum Rotation	72	82	ms	73.7	Pass
Rotation Decay to Zero	147	174	ms	154.9	Pass
Minimum Moment About OC	-80	-52.9	Nm	-69.31	Pass
Time to Minimum Moment	65	79	ms	68.8	Pass
Moment Decay to Zero	120	148	ms	139.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/11/2017	5/11/2018
Pendulum Potentiometer	ETI SP22G	DS-PendPot	10/10/2017	10/10/2018
Condyle Potentiometer	ETI SP22G	DS-CondPot	10/10/2017	10/10/2018
Upper Neck Load Cell	FTSS IF-205	LC-161Fx	7/11/2017	7/11/2018





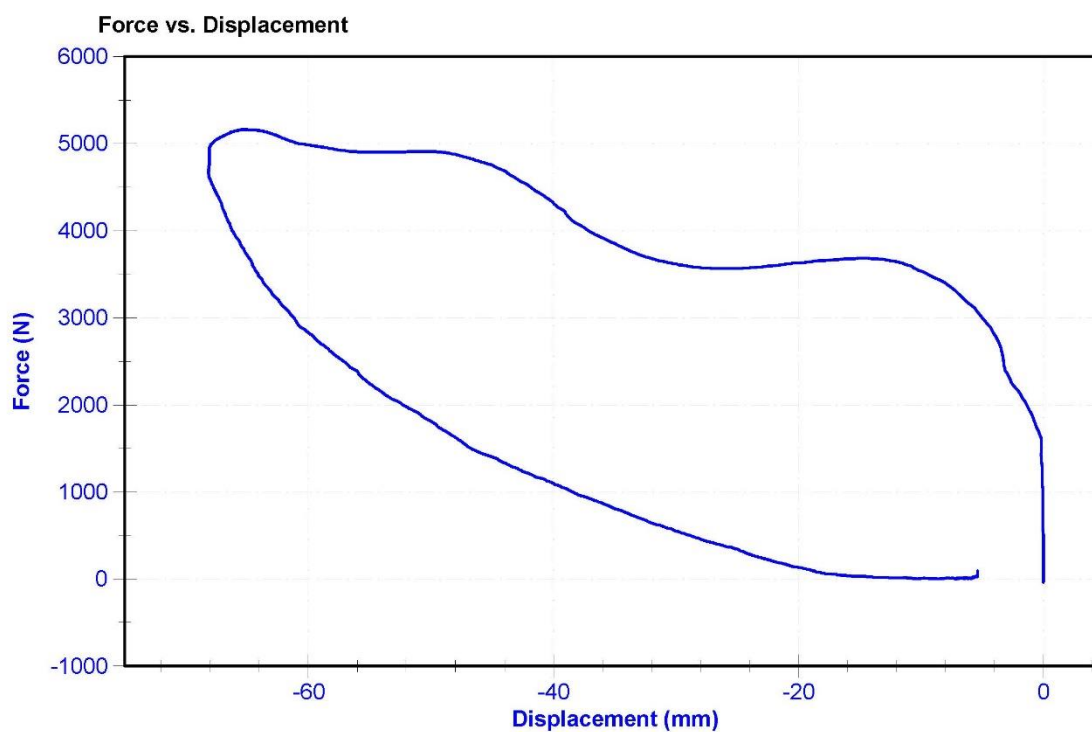
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ATD Serial Number	142	Laboratory Supervisor	M. Goehle

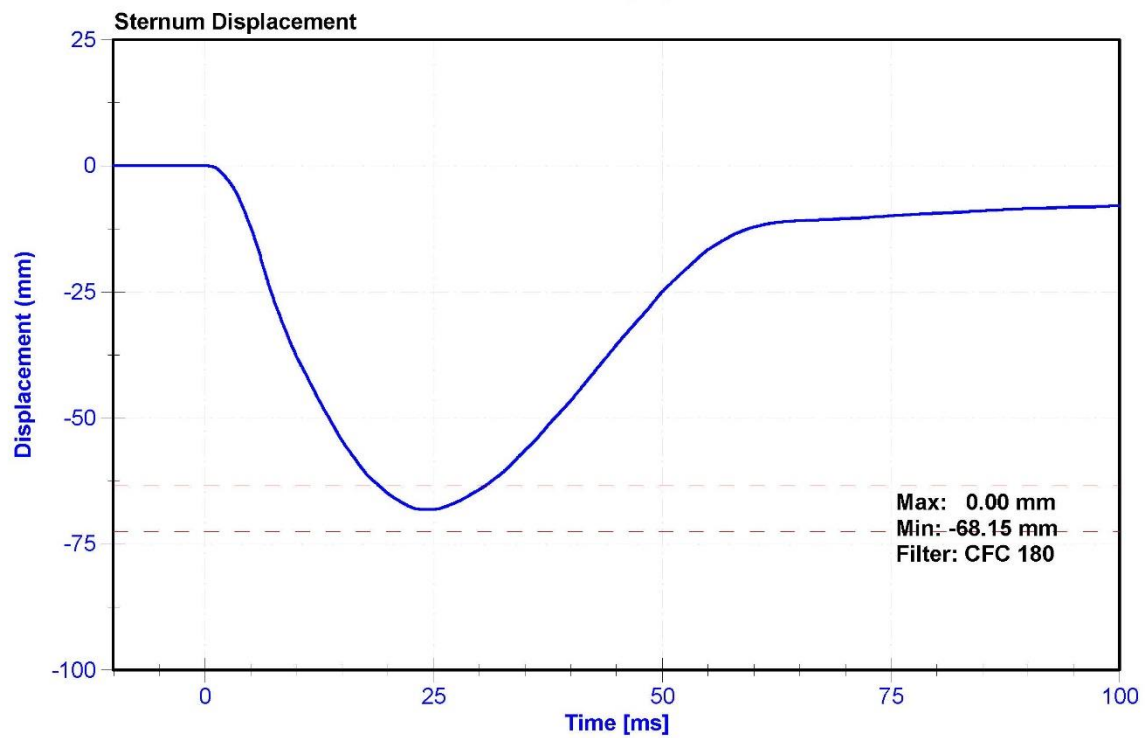
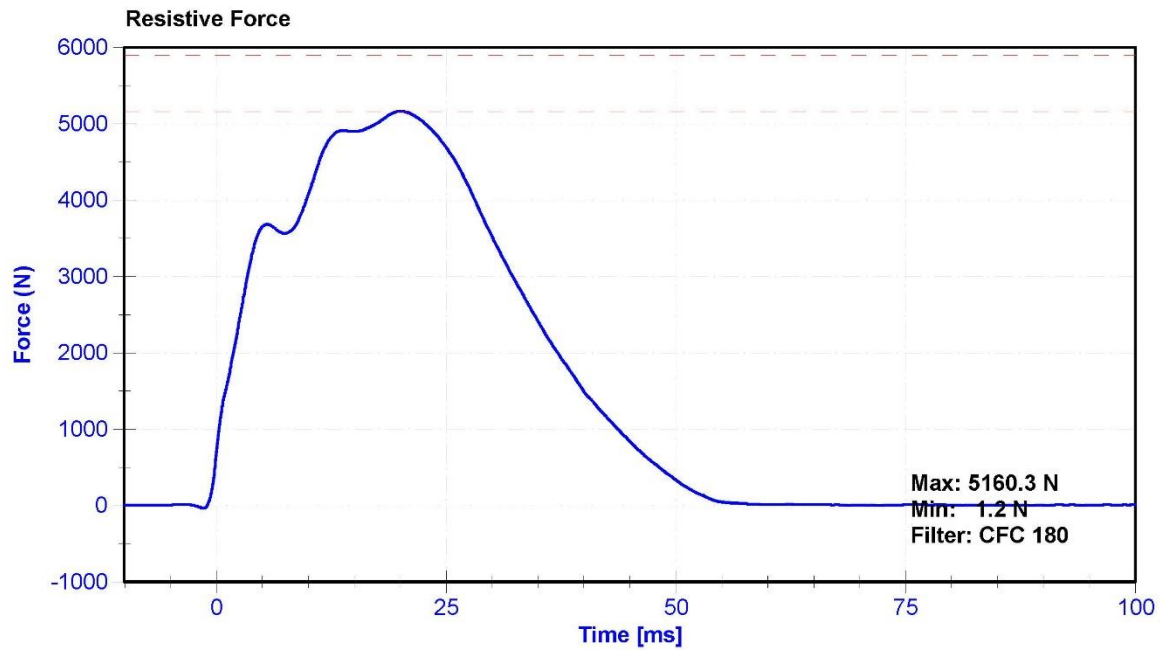
Results

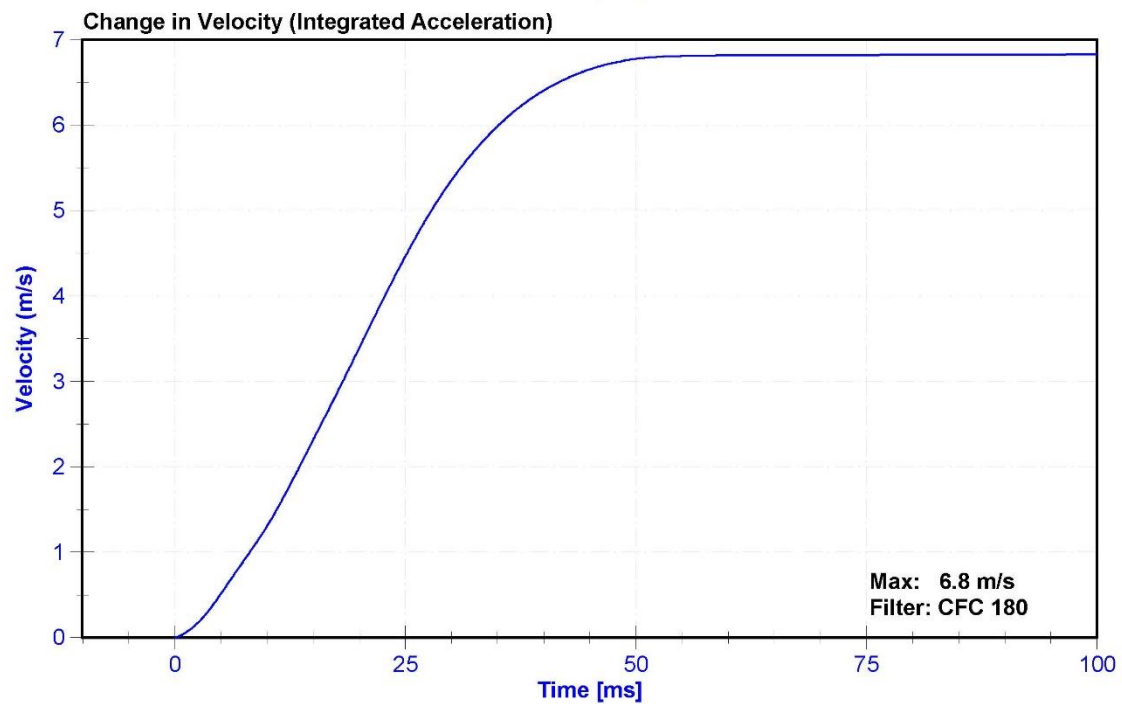
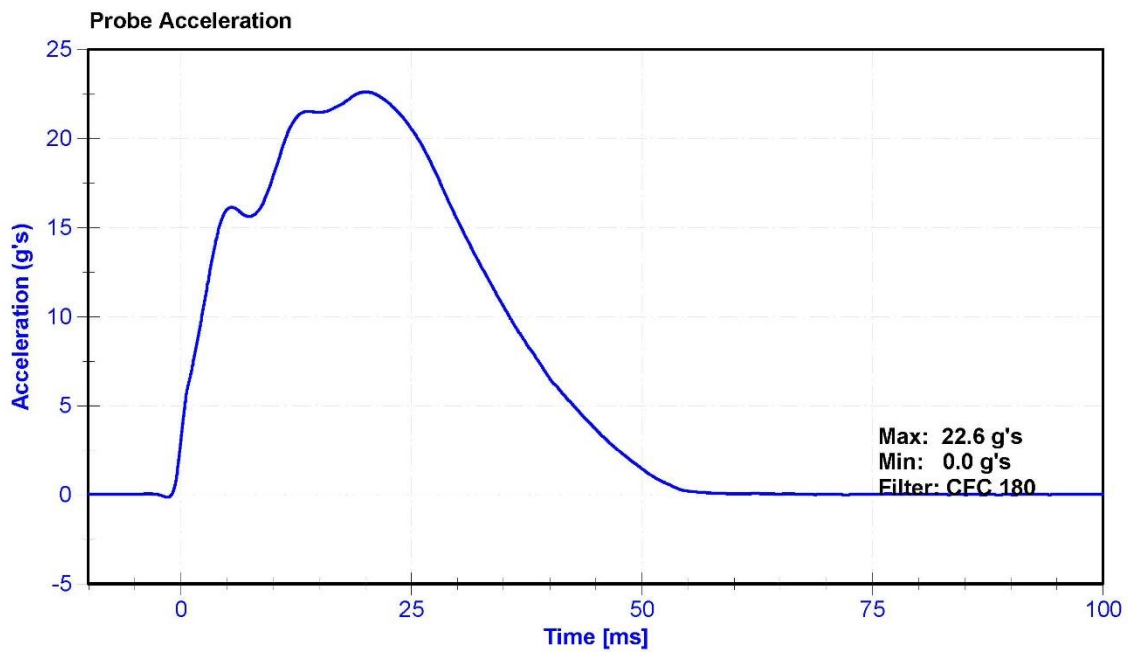
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.7	Pass
Humidity	10	70	%	39.8	Pass
Velocity	6.59	6.83	m/s	6.612	Pass
Chest Displacement	-72.6	-63.5	mm	-68.15	Pass
Resistive Force	5160	5894	N	5160.3	Pass
Hysteresis	65	85	%	71.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	4/17/2018
Chest Potentiometer	JDK 6209-2038	DS-142	9/27/2017	9/27/2018







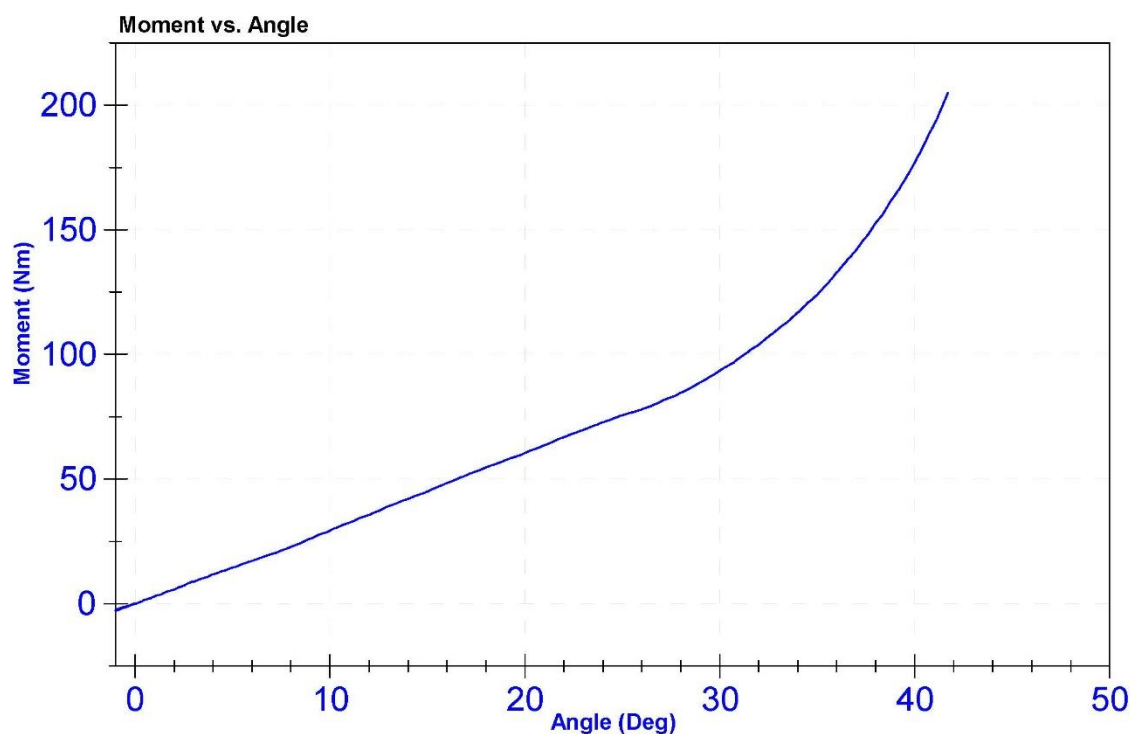
ATD Manufacturer	Humanetics	Test Technician	K. Brogan
ATD Serial Number	142	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.2	Pass
Humidity	10	70	%	37.7	Pass
Average Velocity	5	10	deg/s	7.1	Pass
Angle at 203Nm	40	50	deg	41.6	Pass
Moment at 30 degrees	0	94.9	Nm	93.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	ETI SP22	DS-0008	6/8/2017	6/8/2018
Load Cell	Key Trans 2301-02	LC-115 My	6/8/2017	6/8/2018



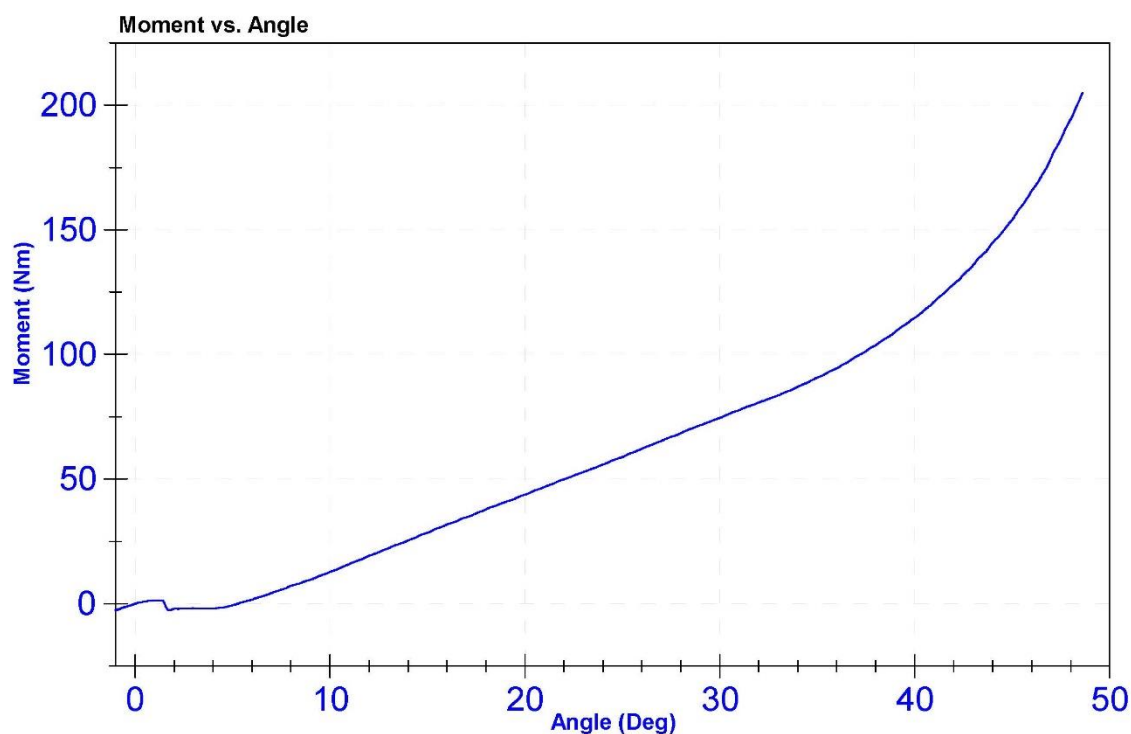
ATD Manufacturer	Humanetics	Test Technician	K. Brogan
ATD Serial Number	142	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.1	Pass
Humidity	10	70	%	38.8	Pass
Average Velocity	5	10	deg/s	7.0	Pass
Angle at 203Nm	40	50	deg	48.5	Pass
Moment at 30 degrees	0	94.9	Nm	74.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	ETI SP22	DS-0008	6/8/2017	6/8/2018
Load Cell	Key Trans 2301-02	LC-115 My	6/8/2017	6/8/2018



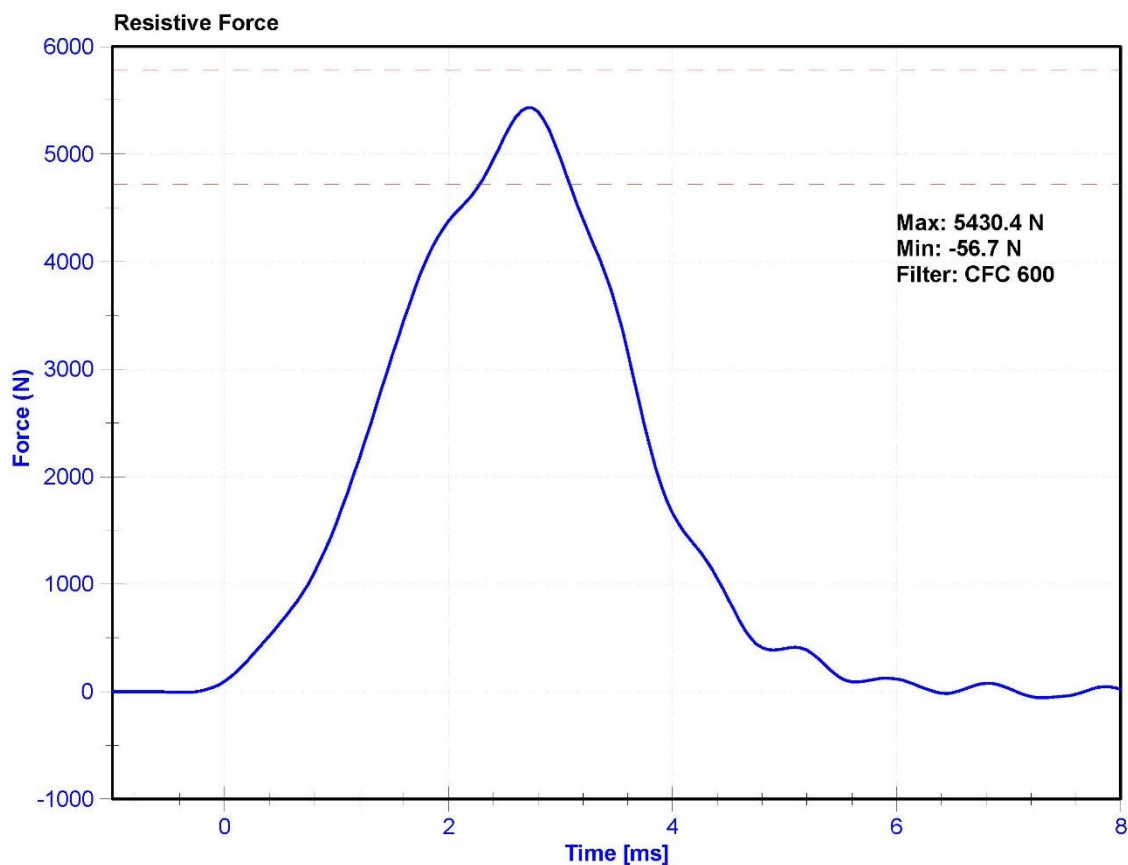
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ATD Serial Number	142	Laboratory Supervisor	M. Goehle

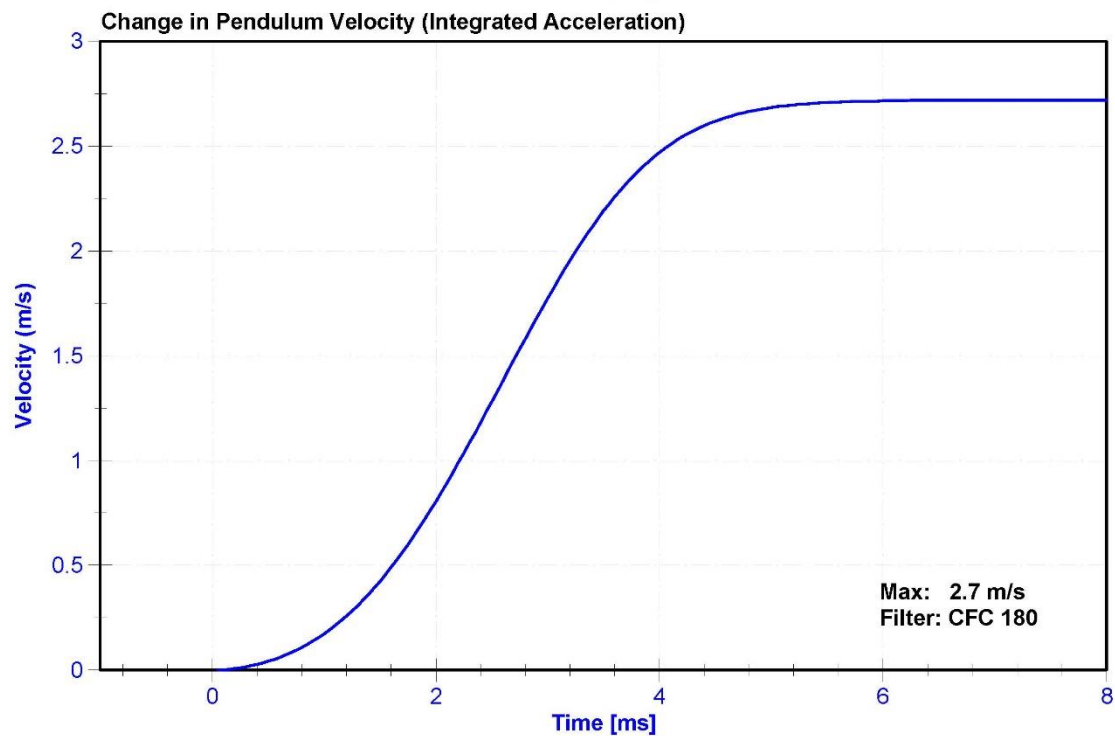
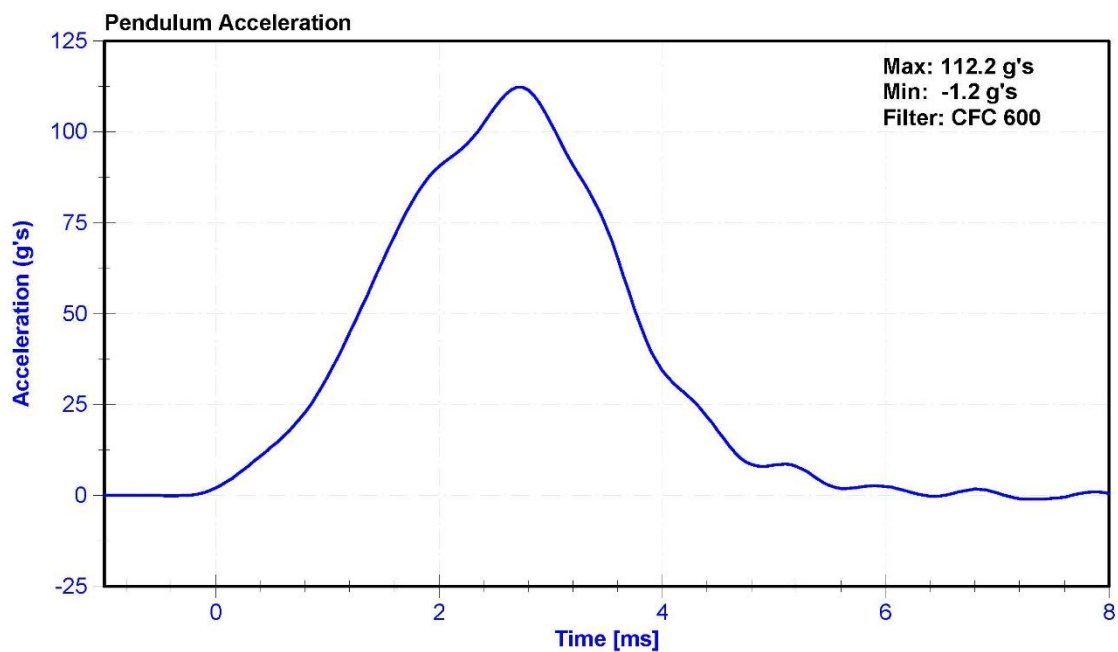
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	20.6	Pass
Humidity	10	70	%	41	Pass
Velocity	2.07	2.13	m/s	2.079	Pass
Maximum Resistive Force	4720	5780	N	5430.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	4/17/2018





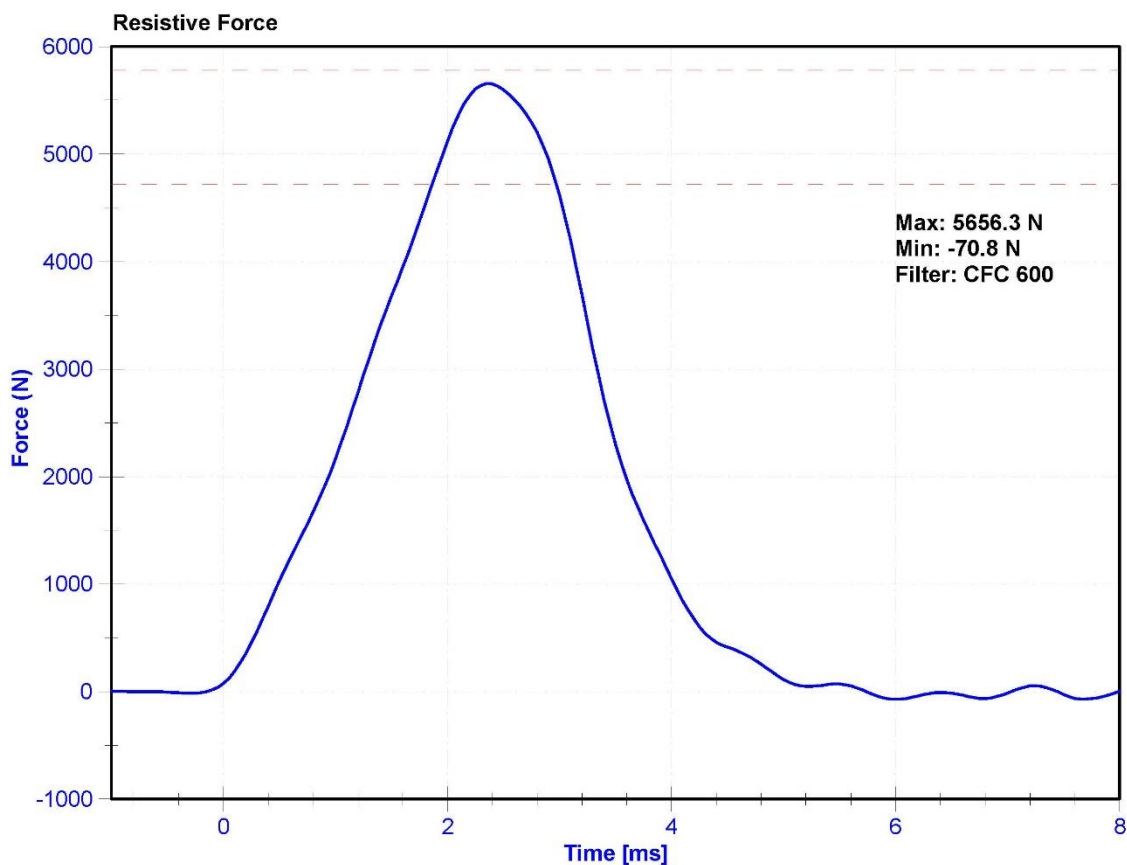
ATD Manufacturer	Humanetics	Test Technician	K. Brogan
ATD Serial Number	142	Laboratory Supervisor	M. Goehle

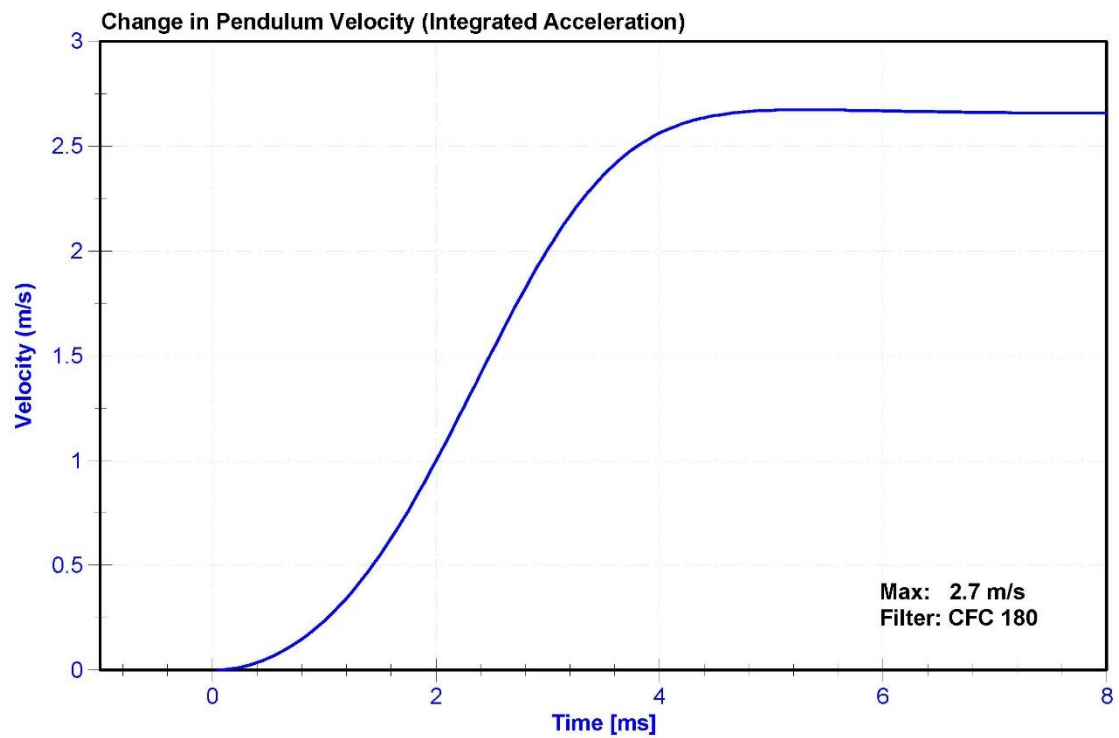
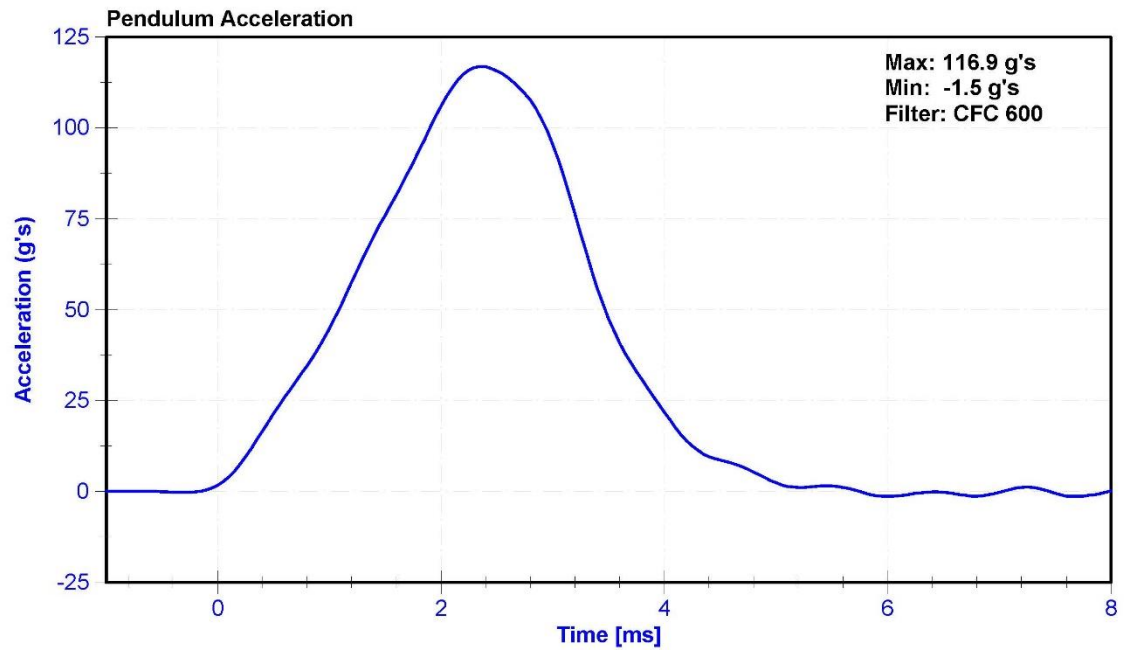
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	20.6	Pass
Humidity	10	70	%	40.3	Pass
Velocity	2.07	2.13	m/s	2.082	Pass
Maximum Resistive Force	4720	5780	N	5656.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	4/17/2018





CALIBRATION TEST RESULTS

PRE-TEST

HYBRID III 5TH PERCENTILE - PASSENGER ATD

SERIAL NO: 288

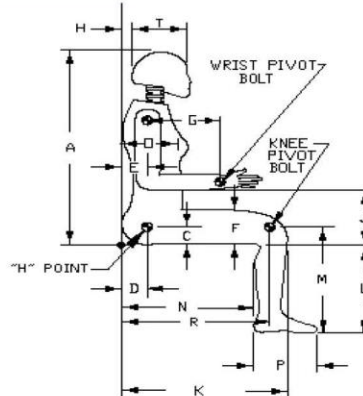
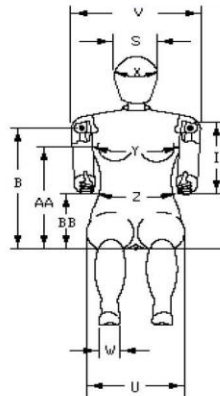


External Measurements - Hybrid 3 - 5th Female

Technician: M. Goehle

Date: 10/27/2017

Dummy Serial Number: 288



Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	775	800	781	Pass
B	Shoulder Pivot Height	432	457	440	Pass
C	H-Point Height	81	86	83	Pass
D	H-Point from Backline	145	150	147	Pass
E	Shoulder Pivot from Backline	69	84	75	Pass
F	Thigh Clearance	119	135	126	Pass
G	Back of Elbow to Wrist Pivot	244	259	249	Pass
H	Head Back to Backline	43	48	45	Pass
I	Shoulder to Elbow Length	277	297	285	Pass
J	Elbow Rest Height	183	203	188	Pass
K	Buttock to Knee Length	521	546	540	Pass
L	Popliteal Height	356	376	366	Pass
M	Knee Pivot Height	394	419	400	Pass
N	Buttock Popliteal Length	414	439	430	Pass
O	Chest Depth without Jacket	175	191	180	Pass
P	Foot Length (right)	219	234	220	Pass
R	Buttock To Knee Pivot Length	457	483	462	Pass
S	Head Breadth	137	147	142	Pass
T	Head Depth	178	188	182	Pass
U	Hip Breadth	300	315	306	Pass
V	Shoulder Breadth	351	366	361	Pass
W	Foot Breadth	79	94	85	Pass
X	Head Circumference	528	549	537	Pass
Y	Chest Circumference with Jacket	851	881	855	Pass
Z	Waist Circumference	460	790	777	Pass
AA	Reference Location (Chest Circumference)	333	358	345	Pass
BB	Reference Location (Waist Circumference)	160	170	165	Pass

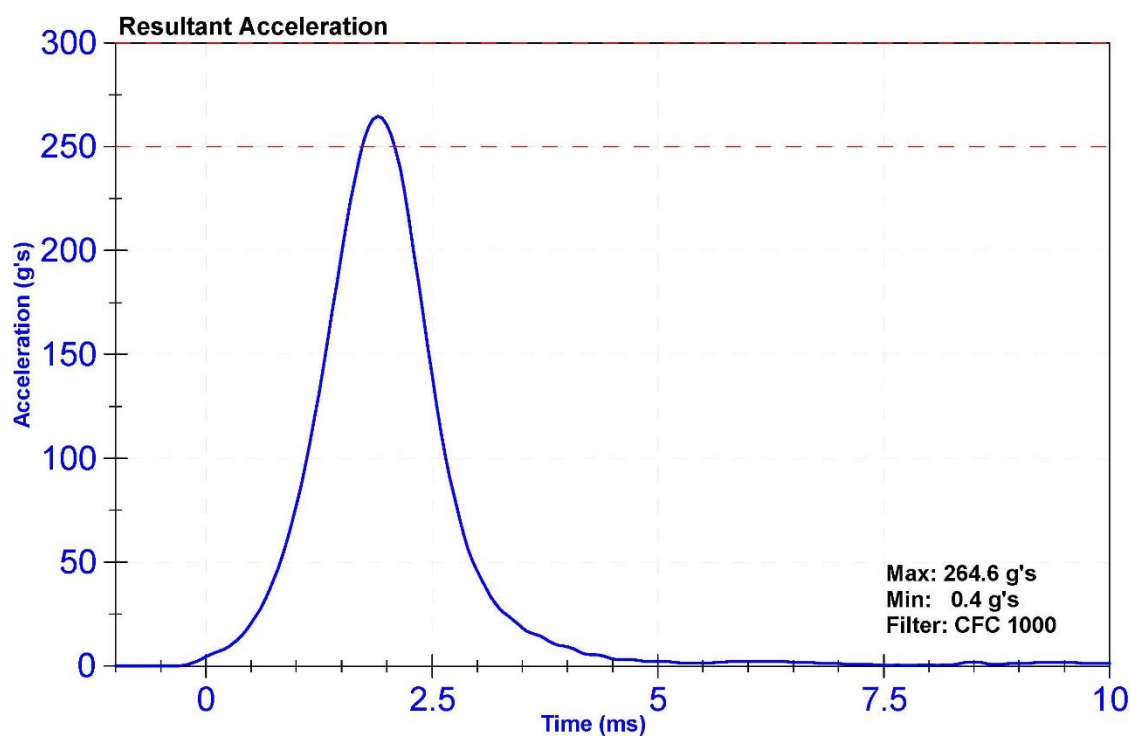
ATD Manufacturer	FTSS	Test Technician	S. Keller
ATD Serial Number	288	Laboratory Supervisor	M. Goehle

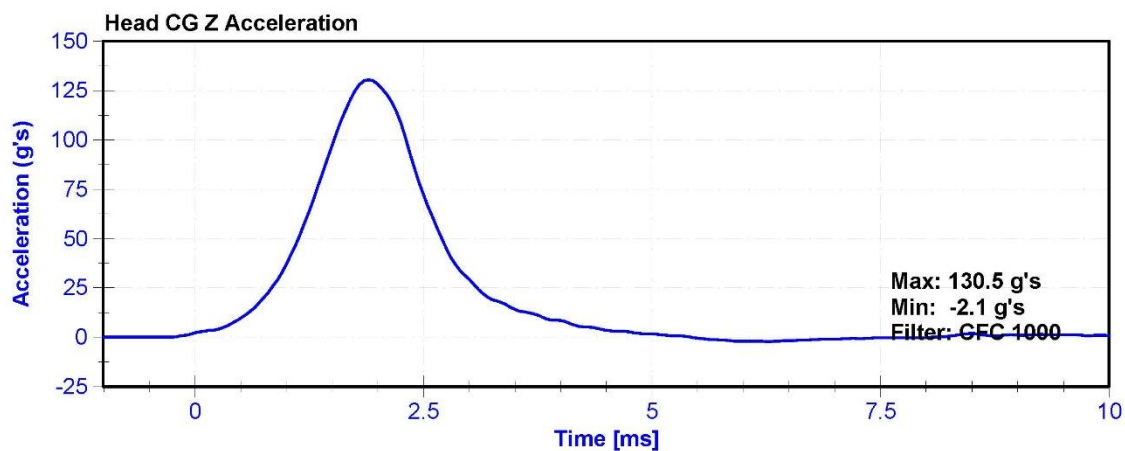
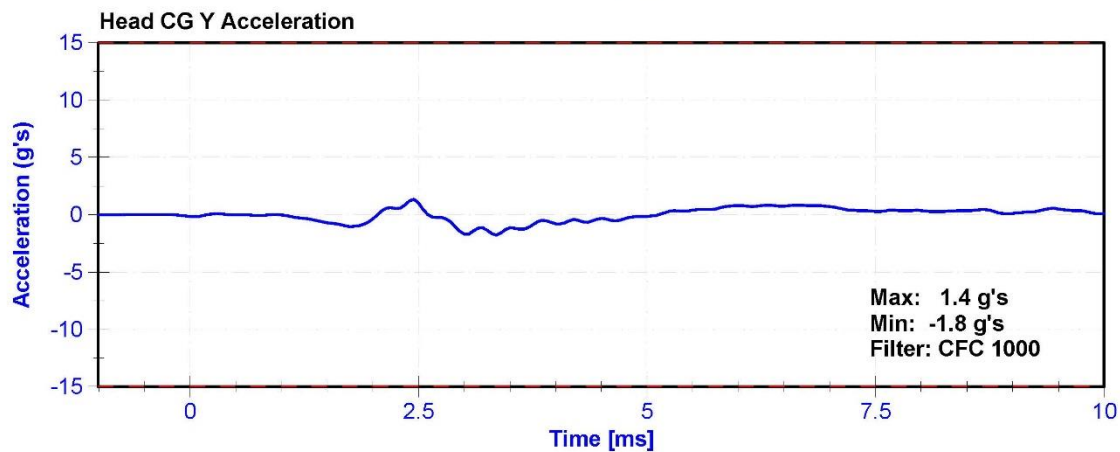
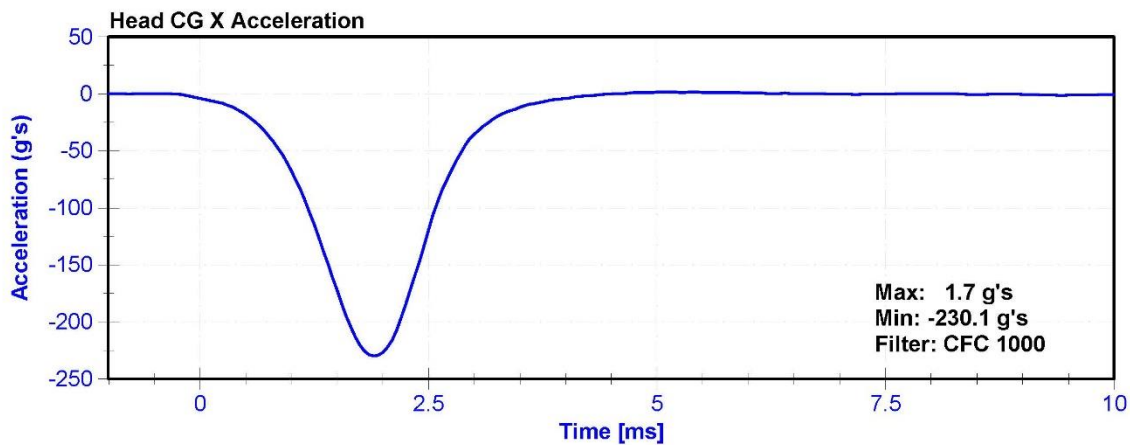
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.7	Pass
Humidity	10	70	%	33.6	Pass
Resultant Acceleration	250	300	g's	264.6	Pass
Oscillation	0	10	%	1.2	Pass
Lateral Acceleration	-15	15	g's	-1.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264	AC-P80337	10/10/2017	4/10/2018
Y Accelerometer	ENDEVCO 7264CT	AC-P80265	10/10/2017	4/10/2018
Z Accelerometer	ENDEVCO 7264CT	AC-P83418	10/10/2017	4/10/2018





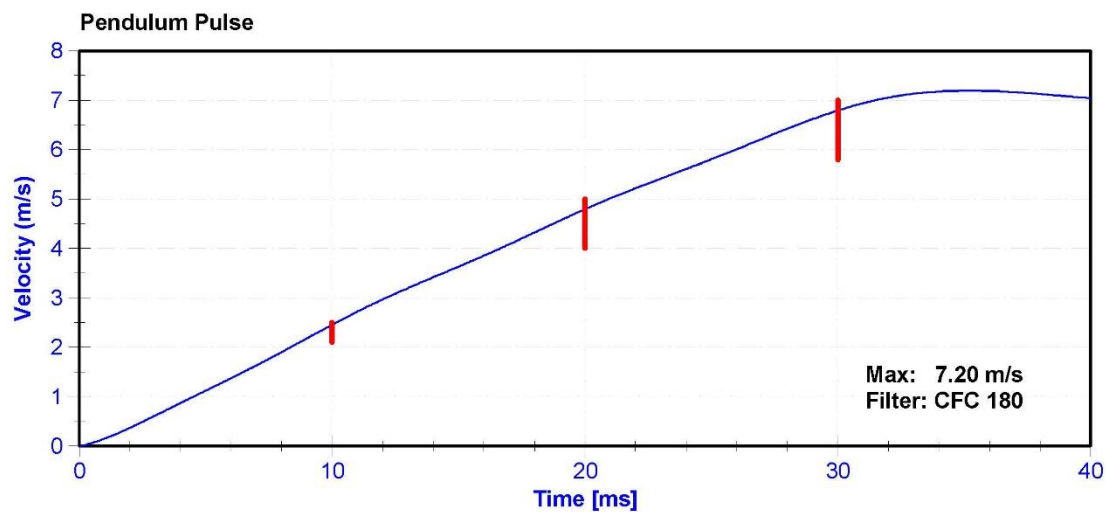
ATD Manufacturer	FTSS	Test Technician	S. Keller
ATD Serial Number	288	Laboratory Supervisor	M. Goehle

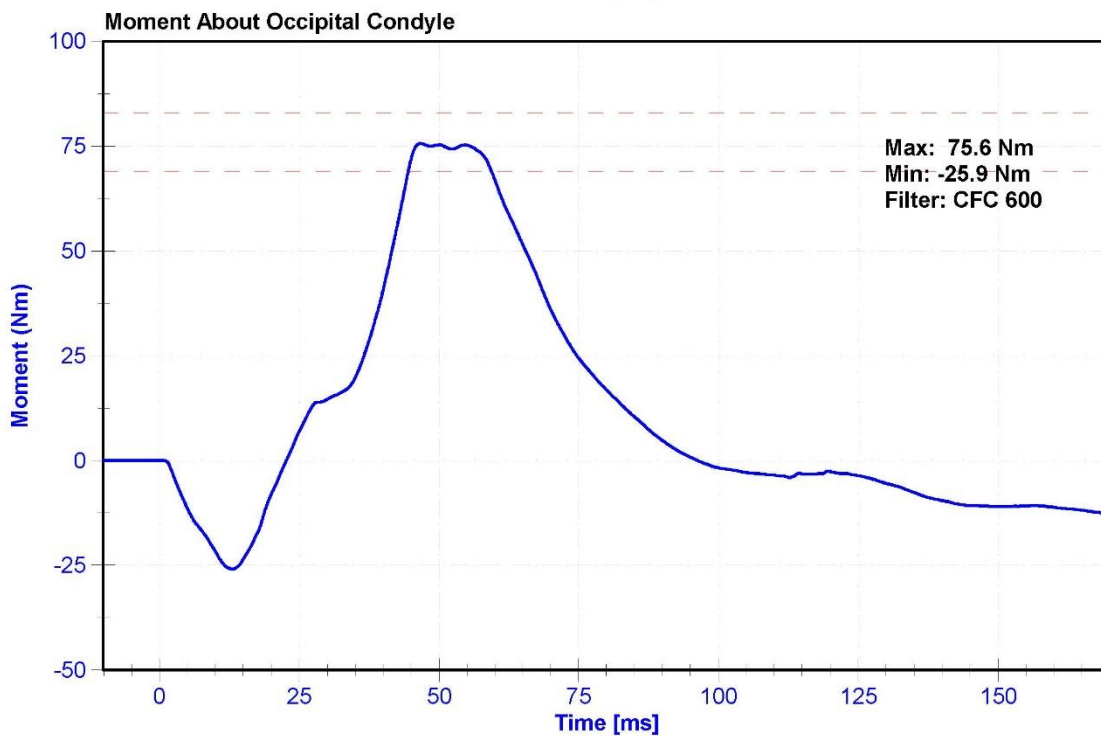
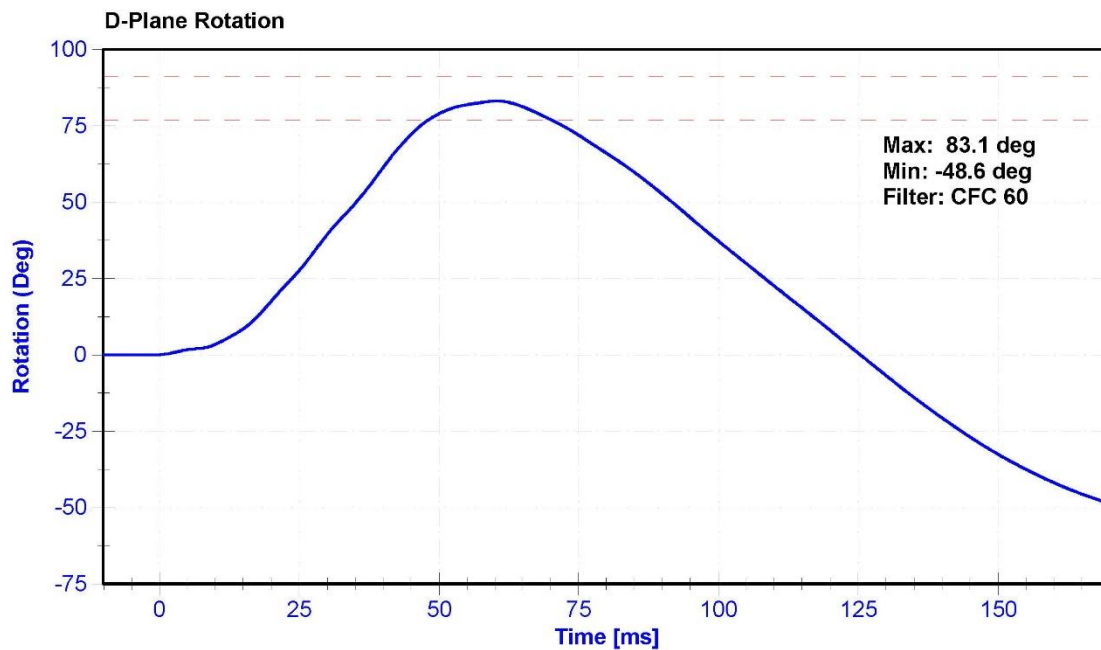
Results

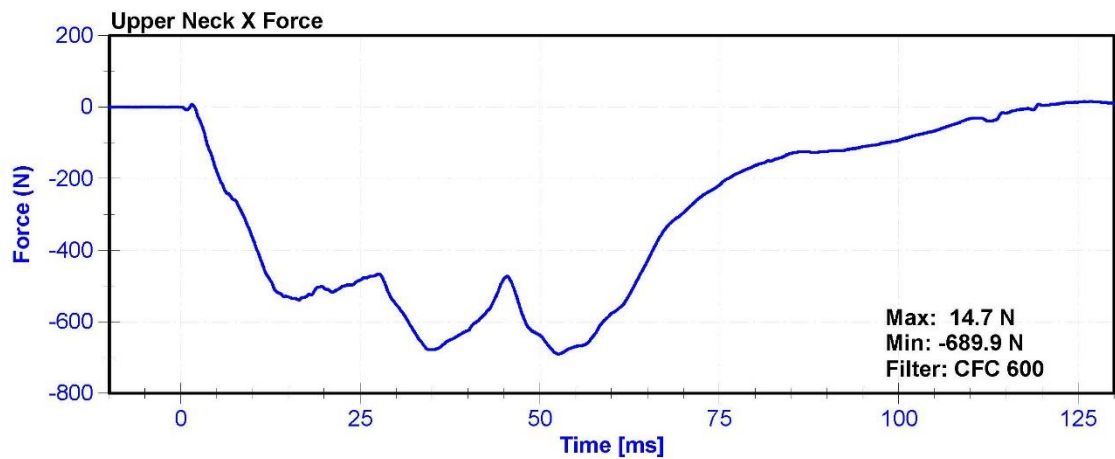
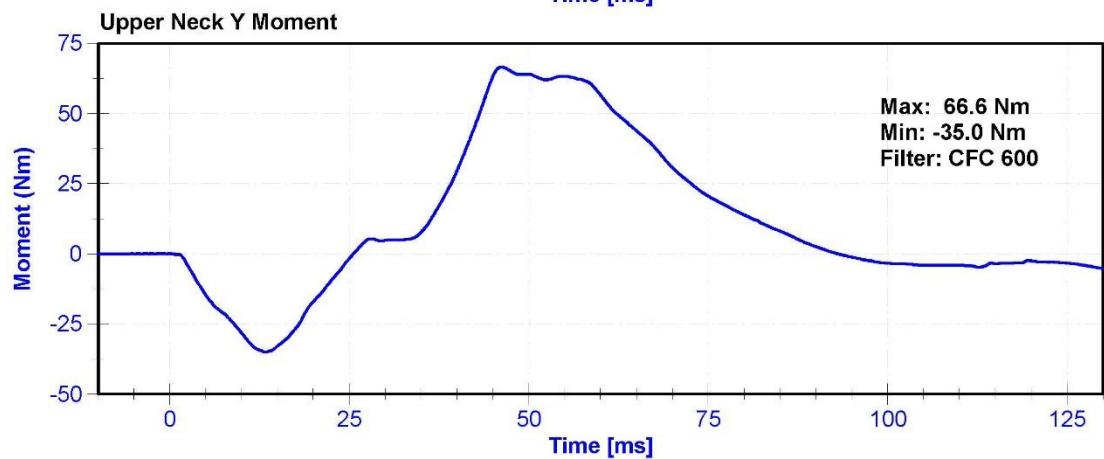
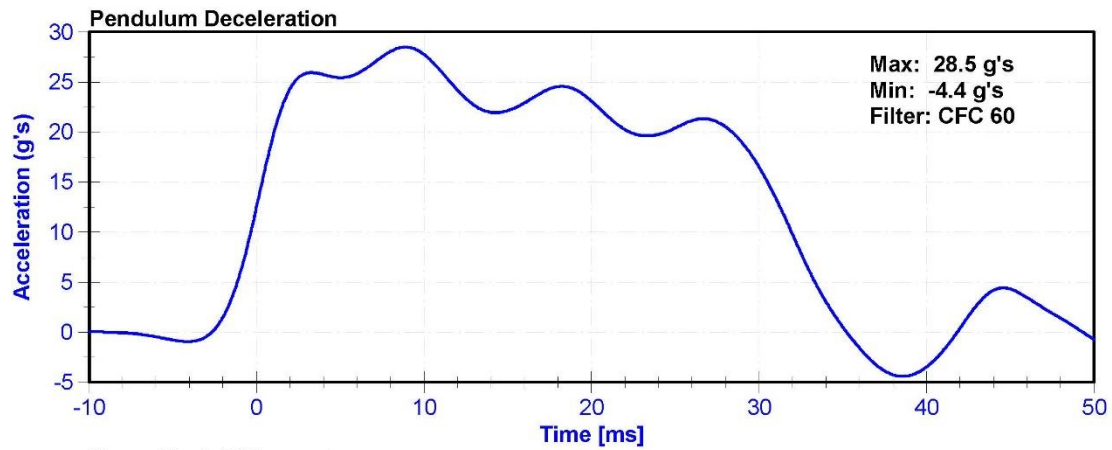
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.4	Pass
Humidity	10	70	%	34.5	Pass
Velocity	6.89	7.13	m/s	7.037	Pass
Pendulum Impulse at 10ms	2.1	2.5	m/s	2.46	Pass
Pendulum Impulse at 20ms	4.0	5.0	m/s	4.79	Pass
Pendulum Impulse at 30ms	5.8	7.0	m/s	6.79	Pass
Max D Plane Rotation	77	91	deg	83.1	Pass
Max Moment During Rotation Interval	69	83	Nm	75.6	Pass
Moment Decay to 10.0 Nm	80	100	ms	85.4	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	ETI SP22G	DS-PendPot	10/10/2017	10/10/2018
Condyle Potentiometer	ETI SP22G	DS-CondPot	10/10/2017	10/10/2018
Upper Neck Load Cell	DENTON 1716A	LC-2206Fx	7/12/2017	7/12/2018







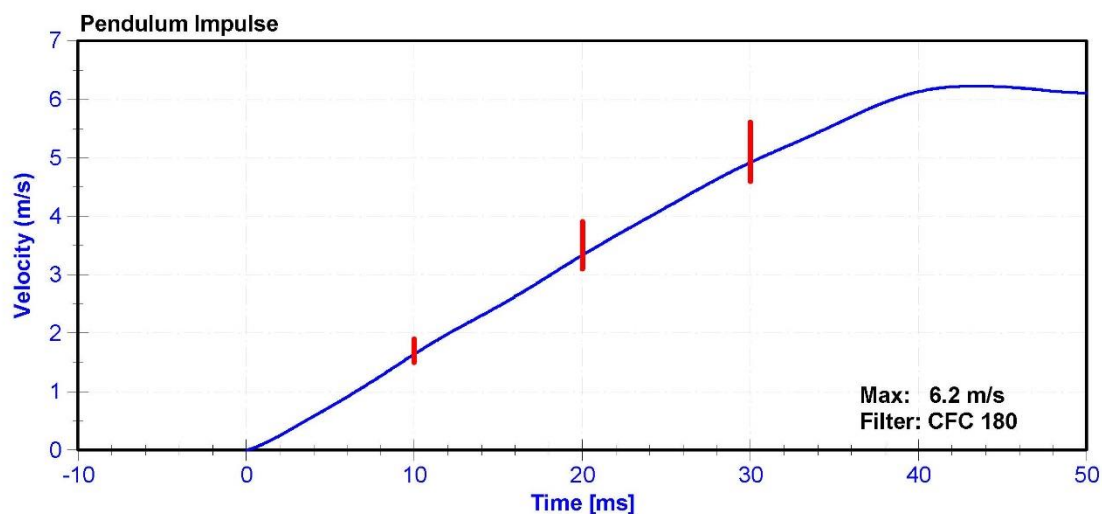
ATD Manufacturer	FTSS	Test Technician	S. Keller
ATD Serial Number	288	Laboratory Supervisor	M. Goehle

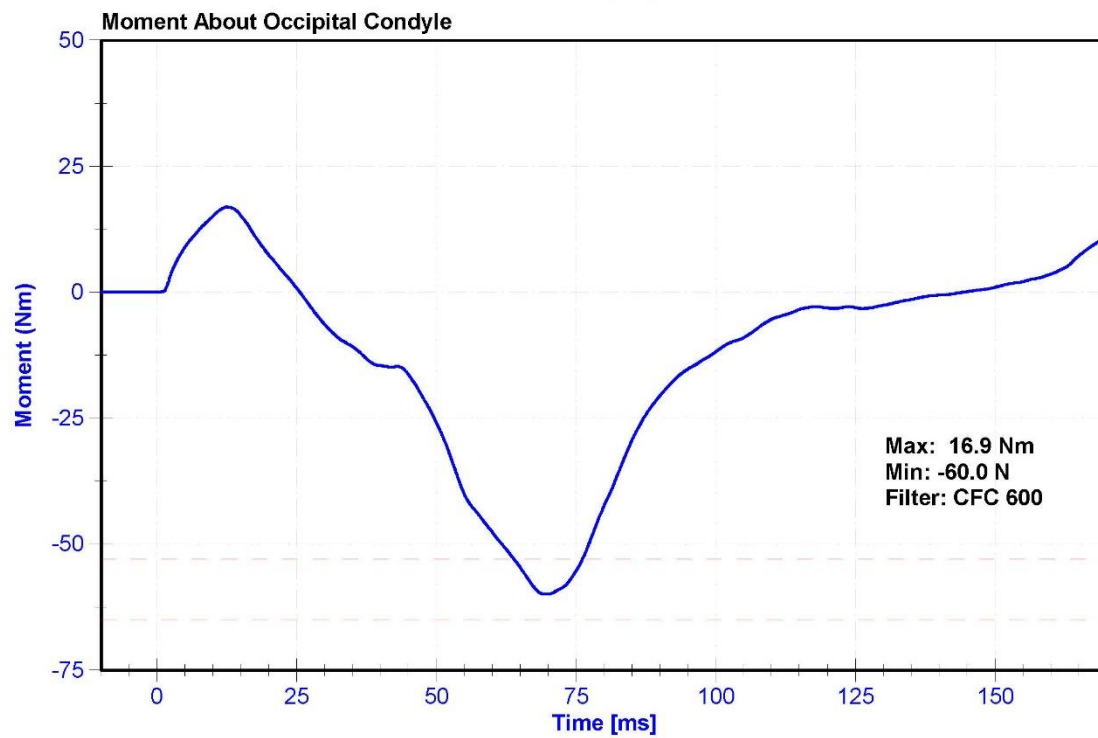
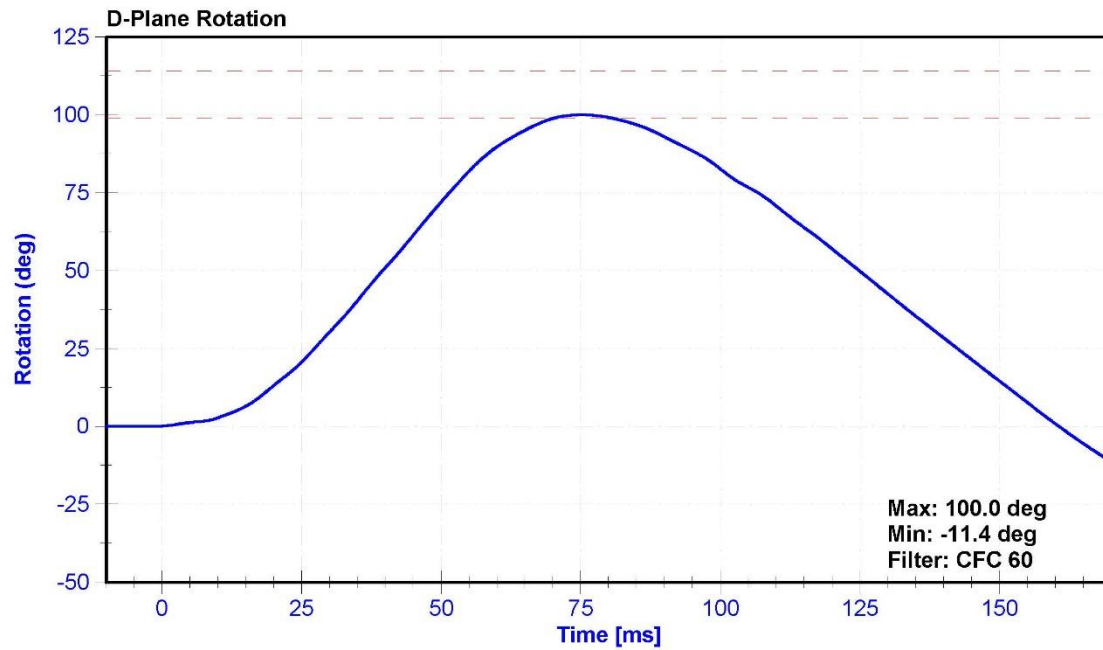
Results

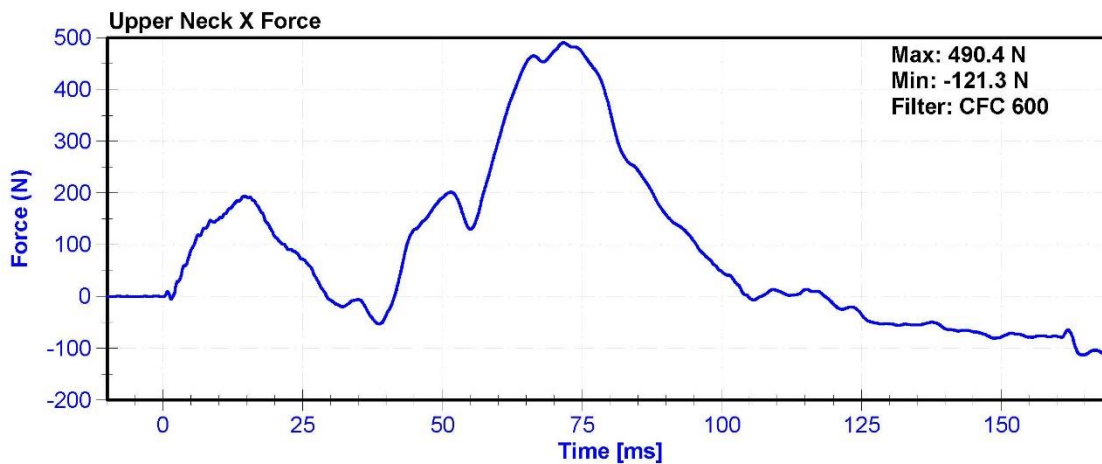
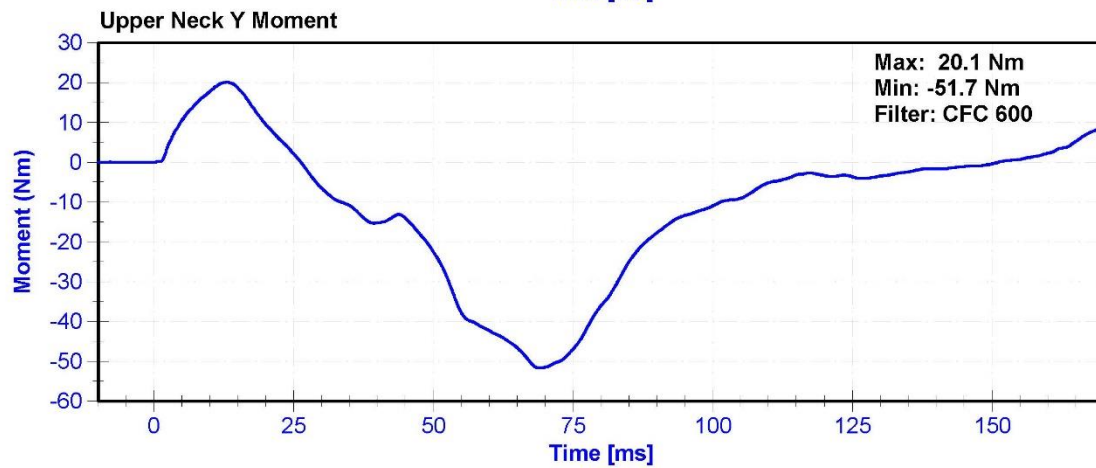
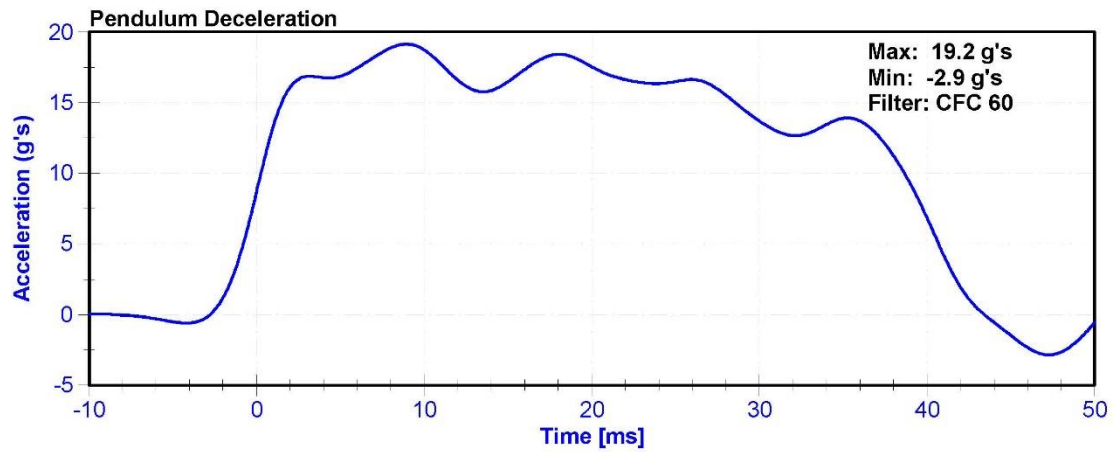
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.4	Pass
Humidity	10	70	%	34.5	Pass
Velocity	5.95	6.19	m/s	6.068	Pass
Pendulum Impulse at 10ms	1.5	1.9	m/s	1.64	Pass
Pendulum Impulse at 20ms	3.1	3.9	m/s	3.33	Pass
Pendulum Impulse at 30ms	4.6	5.6	m/s	4.92	Pass
D Plane Rotation	99	114	deg	100.0	Pass
Moment During Rotation Interval	-65	-53	Nm	-60.0	Pass
Moment Decay to -10Nm	94	114	ms	102.7	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	ETI SP22G	DS-PendPot	10/10/2017	10/10/2018
Condyle Potentiometer	ETI SP22G	DS-CondPot	10/10/2017	10/10/2018
Upper Neck Load Cell	DENTON 1716A	LC-2206Fx	7/12/2017	7/12/2018







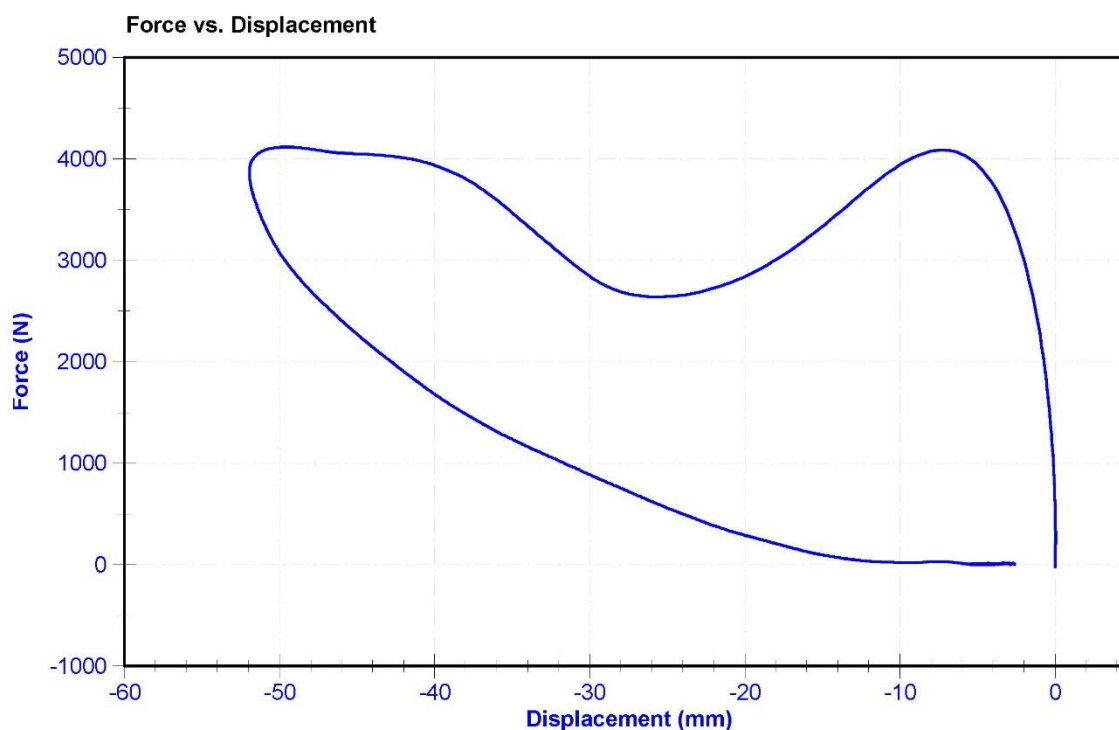
ATD Manufacturer	FTSS	Test Technician	S. Keller
ATD Serial Number	288	Laboratory Supervisor	M. Goehle

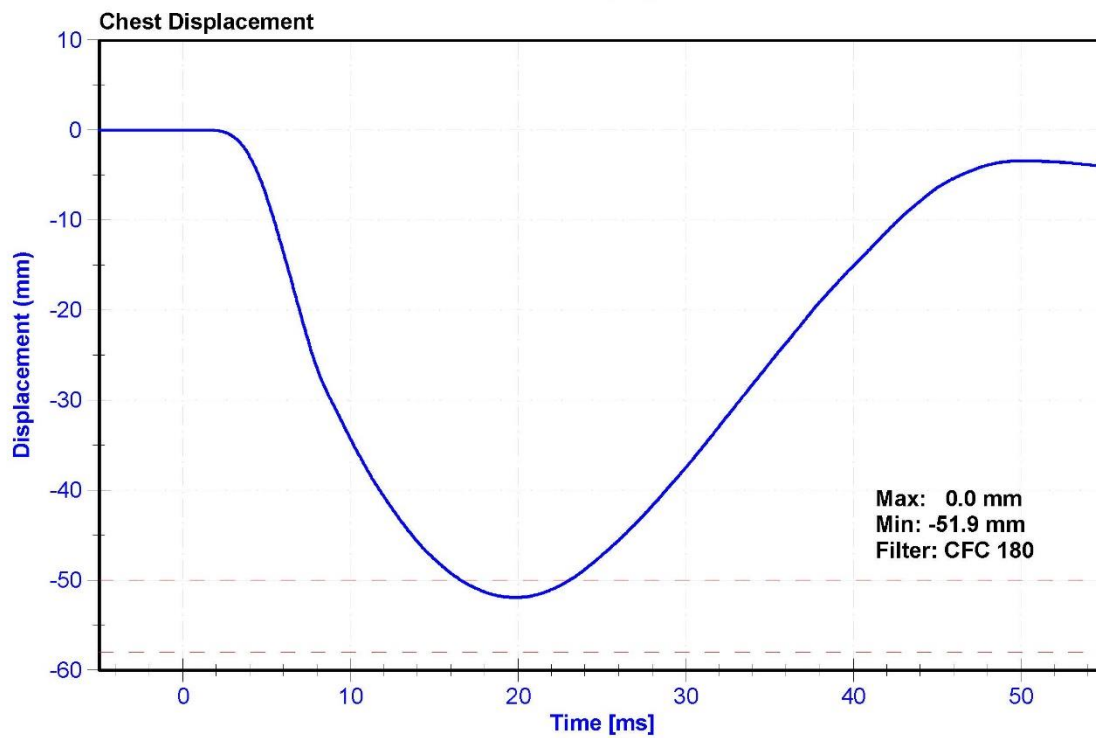
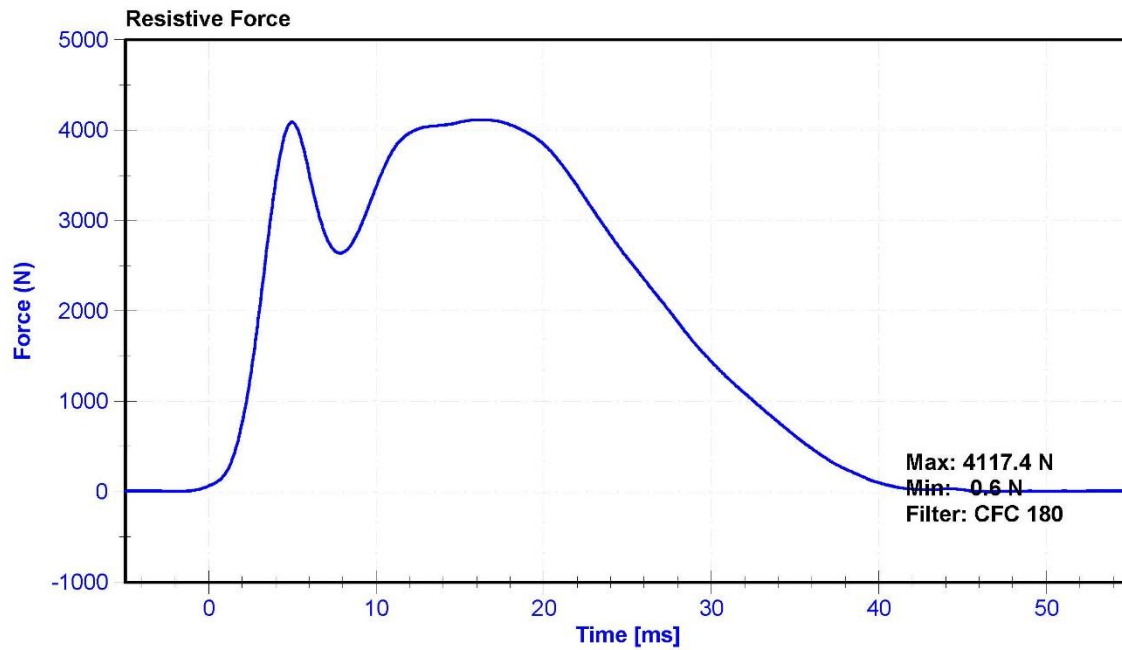
Results

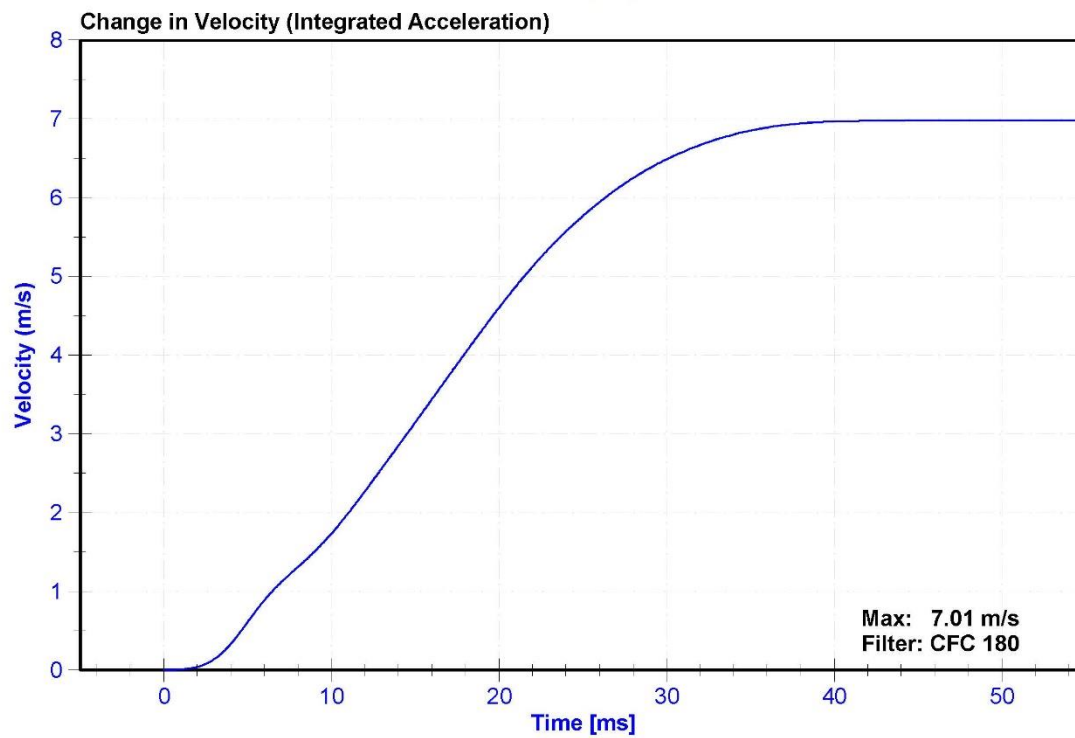
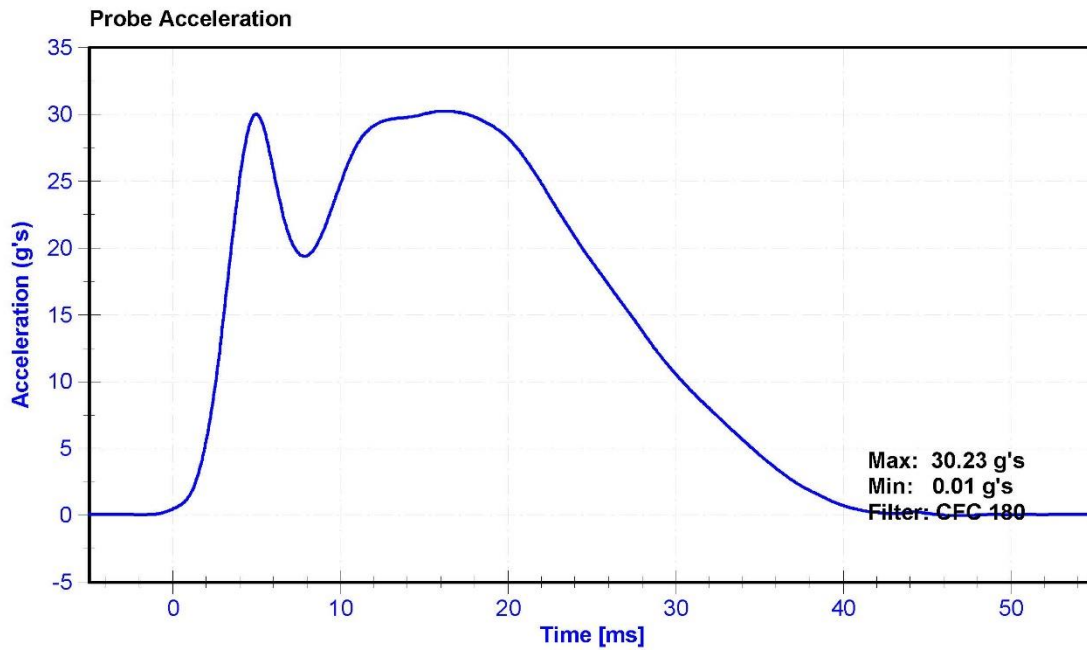
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.8	Pass
Humidity	10	70	%	41.1	Pass
Velocity	6.59	6.83	m/s	6.684	Pass
Chest Deflection	-58	-50	mm	-51.9	Pass
Maximum Resistive Force (50 to 58mm)	3900	4400	N	4115.8	Pass
Maximum Resistive Force (18 to 50mm)	0	4600	N	4117.4	Pass
Hysteresis	69	85	%	72.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	4/17/2018
Chest Potentiometer	SERVO 14CB1-2897	DS-288	10/25/2017	10/25/2018







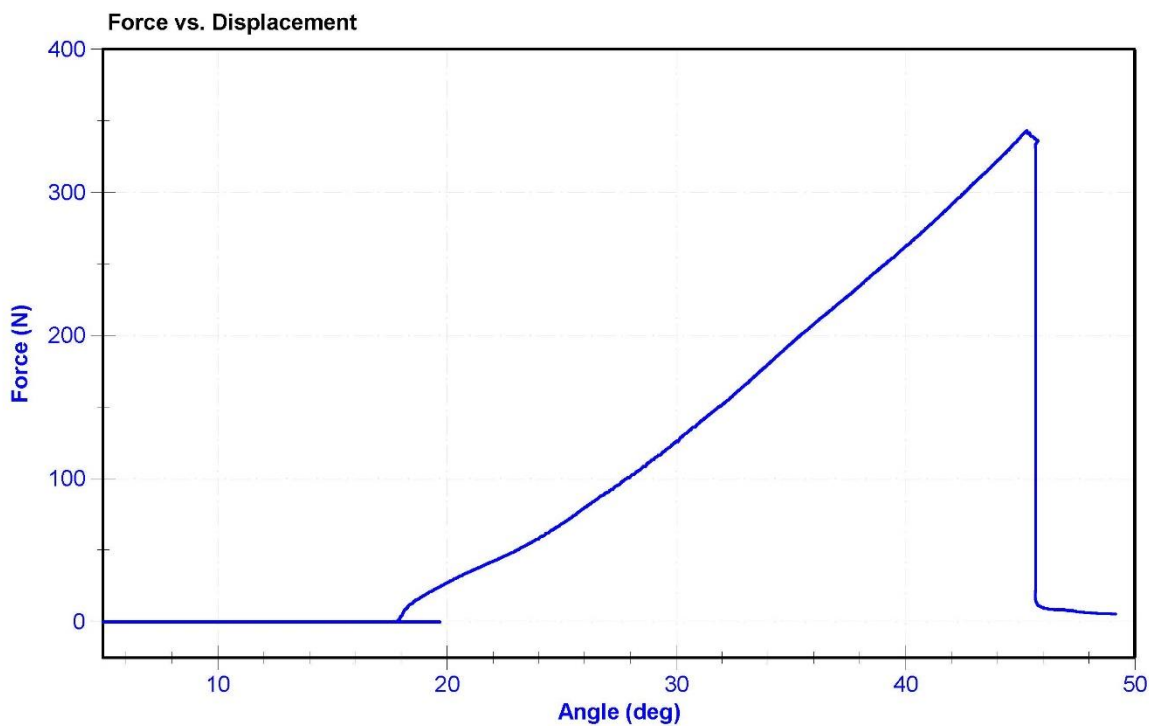
ATD Manufacturer	FTSS	Test Technician	S. Keller
ATD Serial Number	288	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.6	25.6	°C	21.2	Pass
Humidity	10	70	%	38.8	Pass
Initial Angle	0	20	deg	17.8	Pass
Force at 45 Degrees	320	390	N	343.2	Pass
Return Angle Relative to Initial	0	8	deg	6.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	Rieker N4C-1	DS-13051548	10/6/2017	10/6/2018
Load Cell	Interface SML-200	LC-493319	10/7/2017	10/7/2018



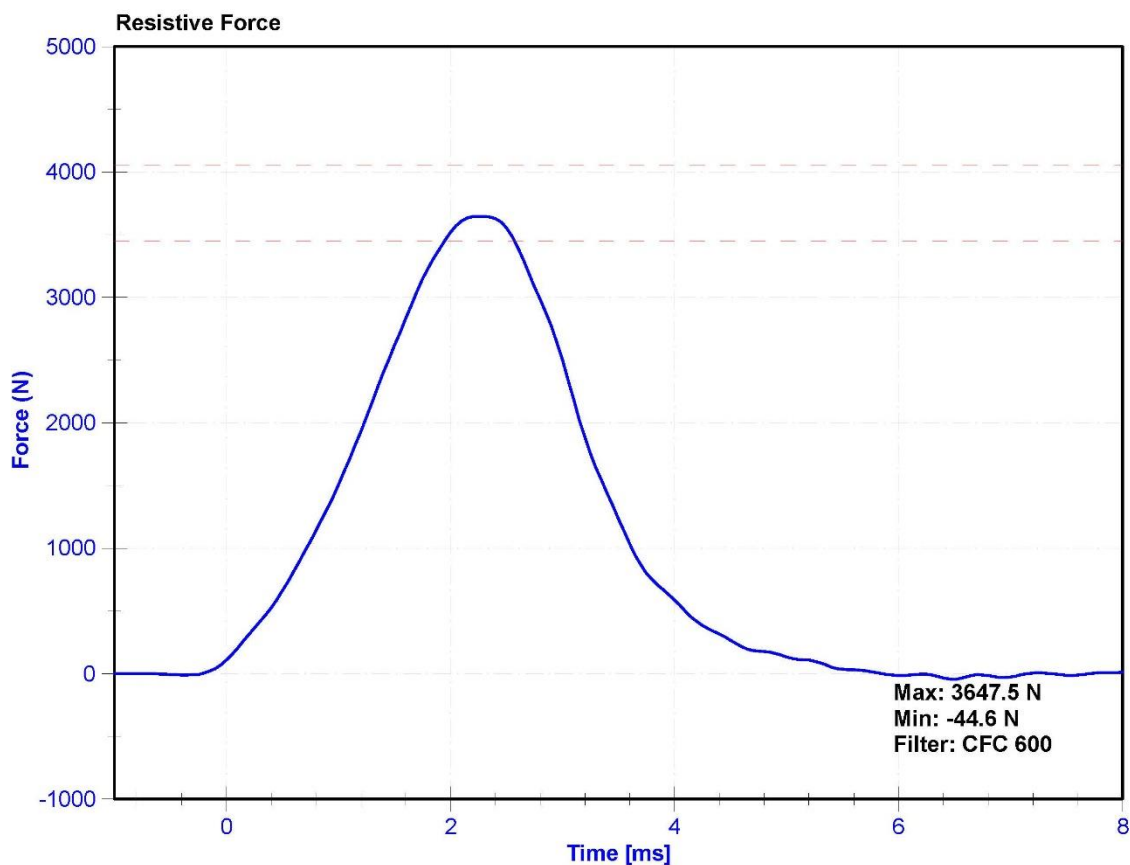
ATD Manufacturer	FTSS	Test Technician	S. Keller
ATD Serial Number	288	Laboratory Supervisor	M. Goehle

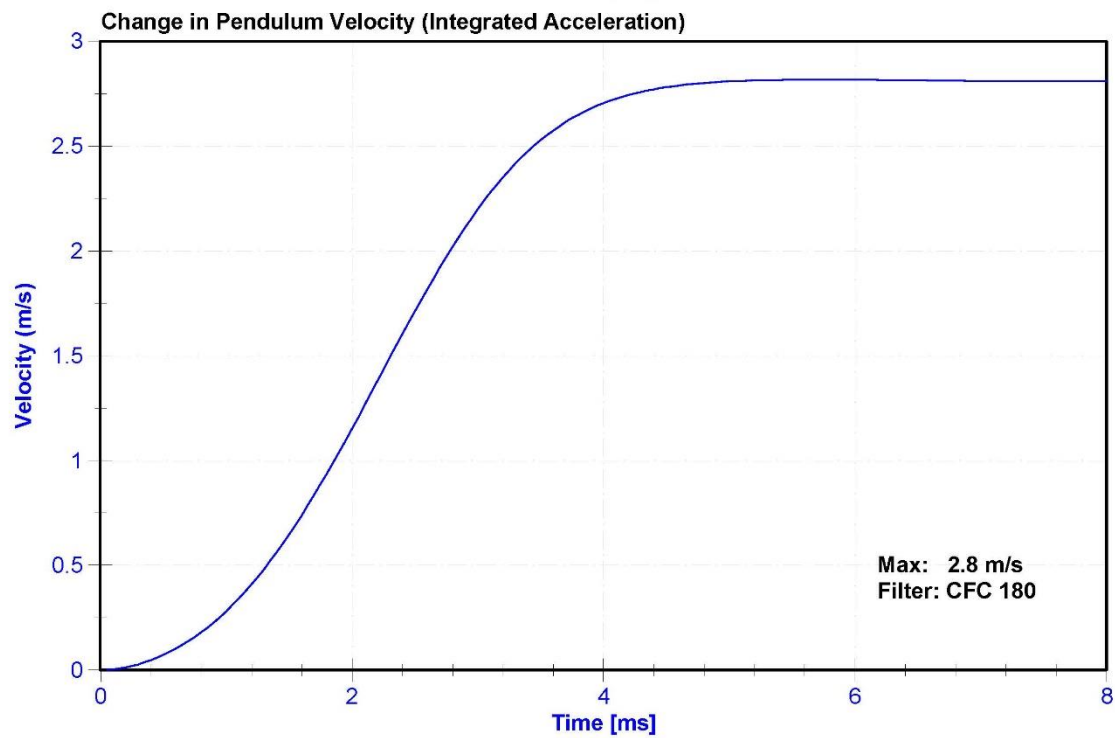
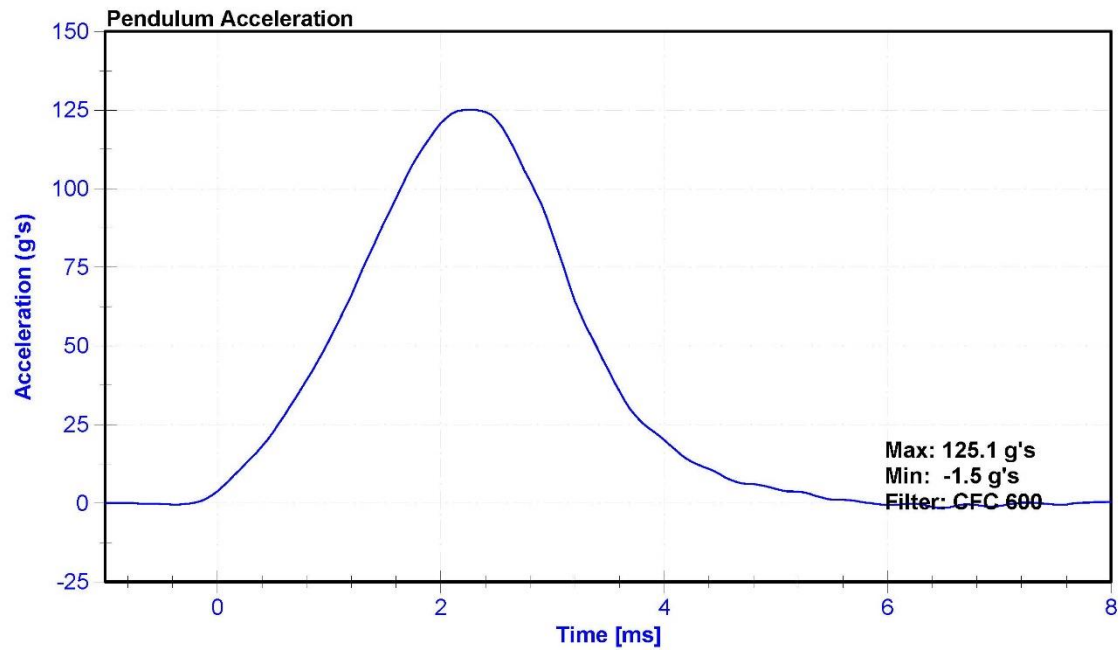
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	20.8	Pass
Humidity	10	70	%	44.0	Pass
Velocity	2.07	2.13	m/s	2.109	Pass
Resistive Force	3450	4060	N	3647.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	4/17/2018





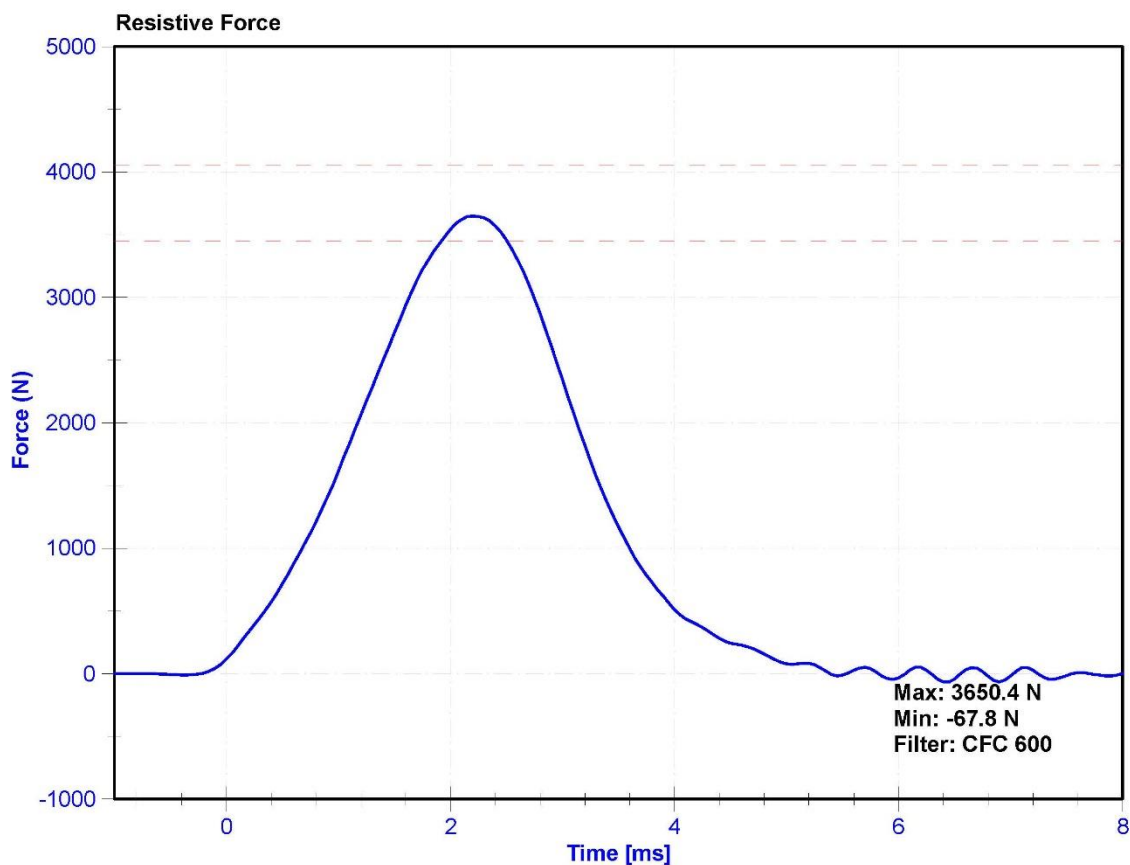
ATD Manufacturer	FTSS	Test Technician	S. Keller
ATD Serial Number	288	Laboratory Supervisor	M. Goehle

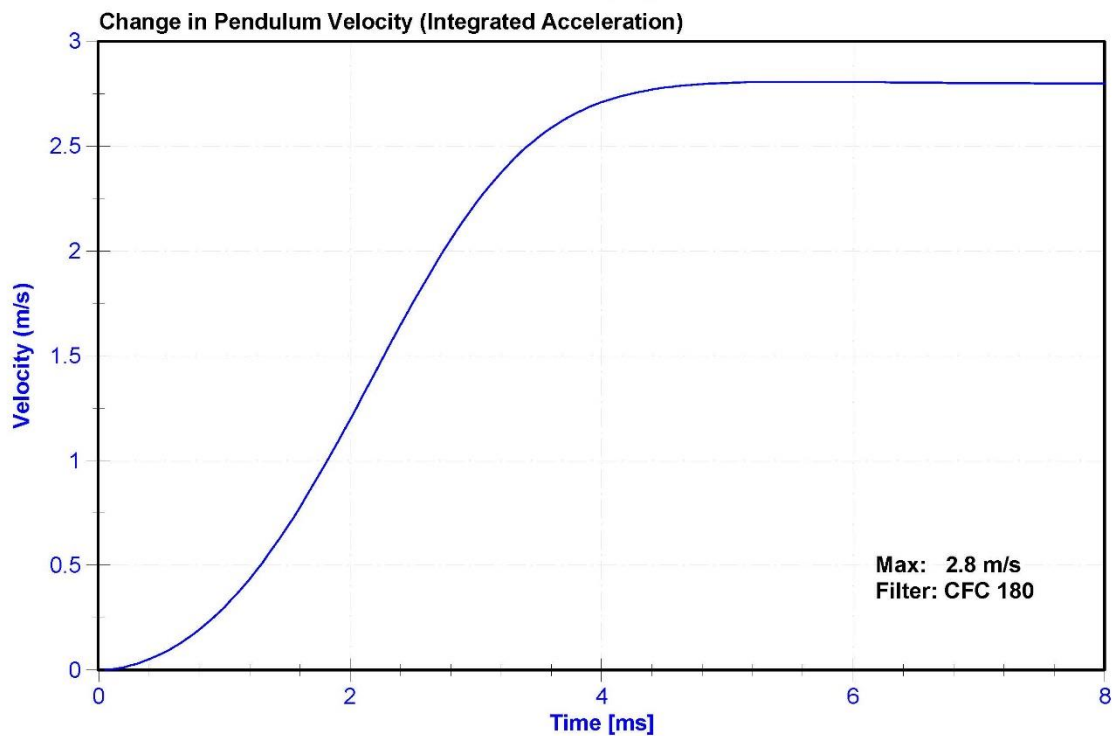
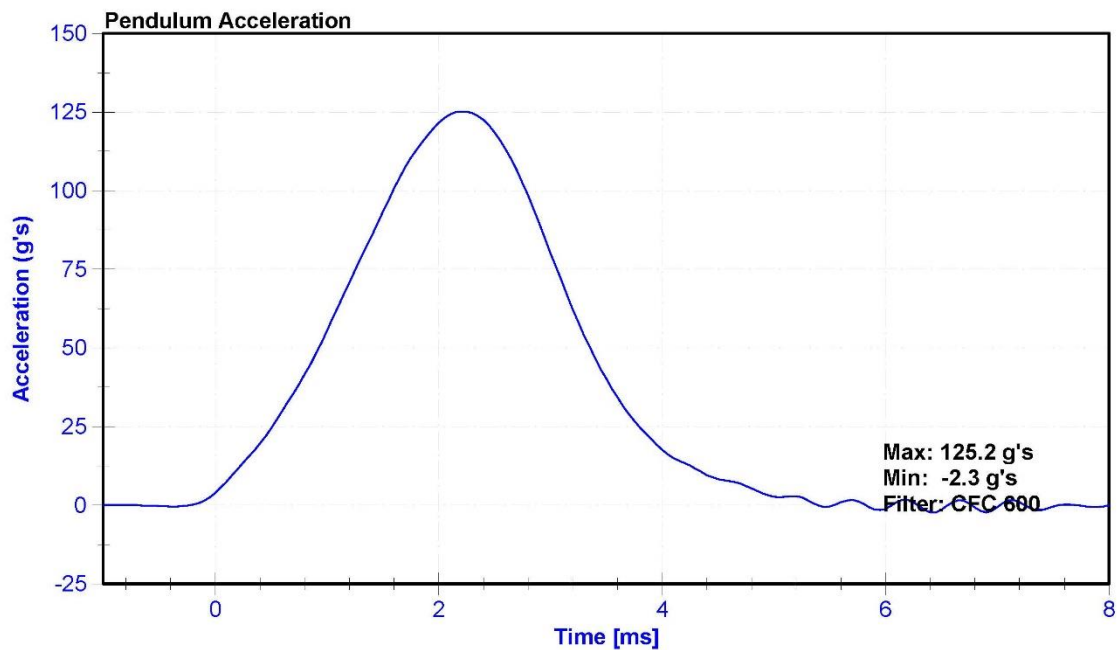
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	20.8	Pass
Humidity	10	70	%	45.0	Pass
Velocity	2.07	2.13	m/s	2.106	Pass
Resistive Force	3450	4060	N	3650.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	4/17/2018





CALIBRATION TEST RESULTS

POST-TEST

HYBRID III 50TH PERCENTILE MALE - DRIVER ATD

SERIAL NO: 142

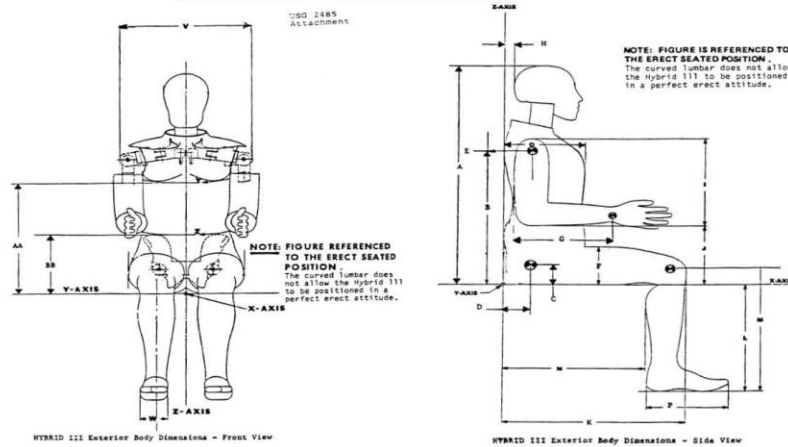


External Measurements - Hybrid 3 - 50th Male

Technician: K. Brogan

Date: 11/1/2017

Dummy Serial Number: 142



Symbol	Description	Specification (in)		Result (in)	Pass/Fail
A	Sitting Height	34.6	35.0	34.8	Pass
B	Shoulder Pivot Height	19.9	20.5	20.0	Pass
C	H-Point Height	3.3	3.5	3.5	Pass
D	H-Point from Backline	5.3	5.5	5.4	Pass
E	Shoulder Pivot from Backline	3.3	3.7	3.5	Pass
F	Thigh Clearance	5.5	6.1	6.0	Pass
G	Back of Elbow to Wrist Pivot	11.4	12.0	11.5	Pass
H	Head Back to Backline	1.6	1.8	1.7	Pass
I	Shoulder to Elbow Length	13.0	13.6	13.2	Pass
J	Elbow Rest Height	7.5	8.3	8.2	Pass
K	Buttock to Knee Length	22.8	23.8	23.1	Pass
L	Popliteal Height	16.9	17.9	17.8	Pass
M	Knee Pivot Height	19.1	19.7	19.6	Pass
N	Buttock Popliteal Length	17.8	18.8	18.3	Pass
O	Chest Depth without Jacket	8.4	9.0	8.5	Pass
P	Foot Length (right)	9.9	10.5	10.3	Pass
V	Shoulder Breadth	16.3	17.2	17.0	Pass
W	Foot Breadth	3.6	4.2	4.0	Pass
Y	Chest Circumference with Jacket	38.2	39.4	39.3	Pass
Z	Waist Circumference	32.9	34.1	34.0	Pass
AA	Reference Location (Chest Circumference)	16.9	17.1	17.0	Pass
BB	Reference Location (Waist Circumference)	8.9	9.1	9.0	Pass

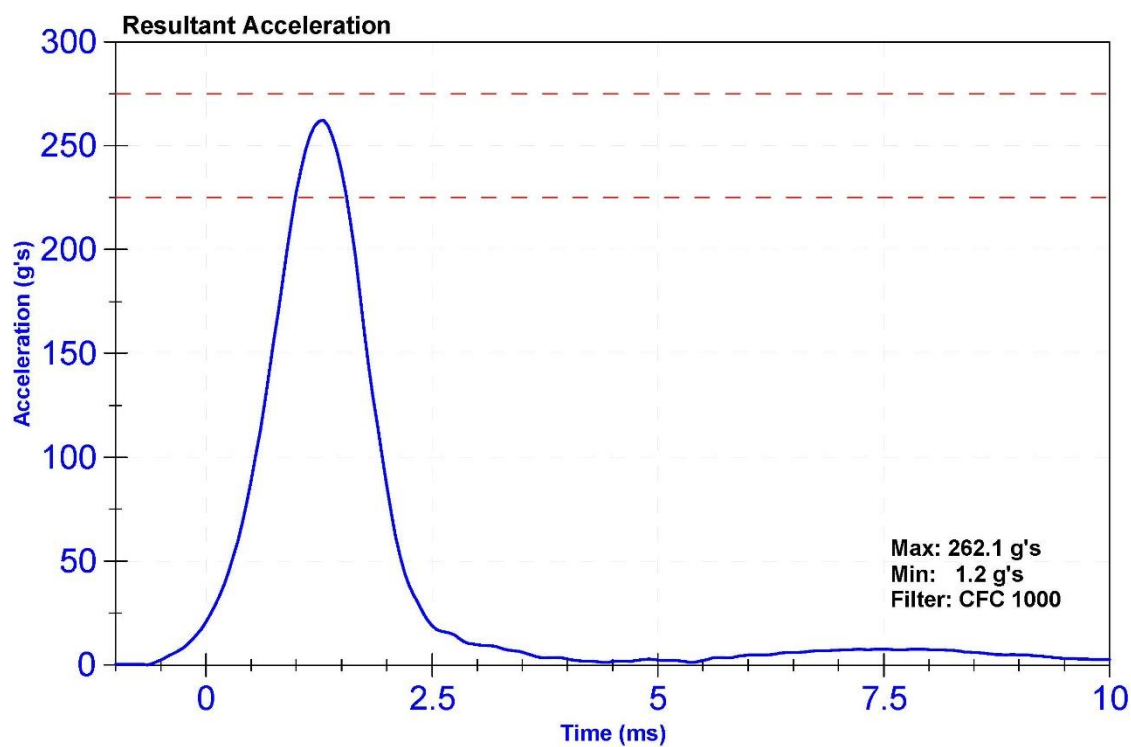
ATD Manufacturer	Humanetics	Test Technician	K. Brogan
ATD Serial Number	142	Laboratory Supervisor	M. Goehle

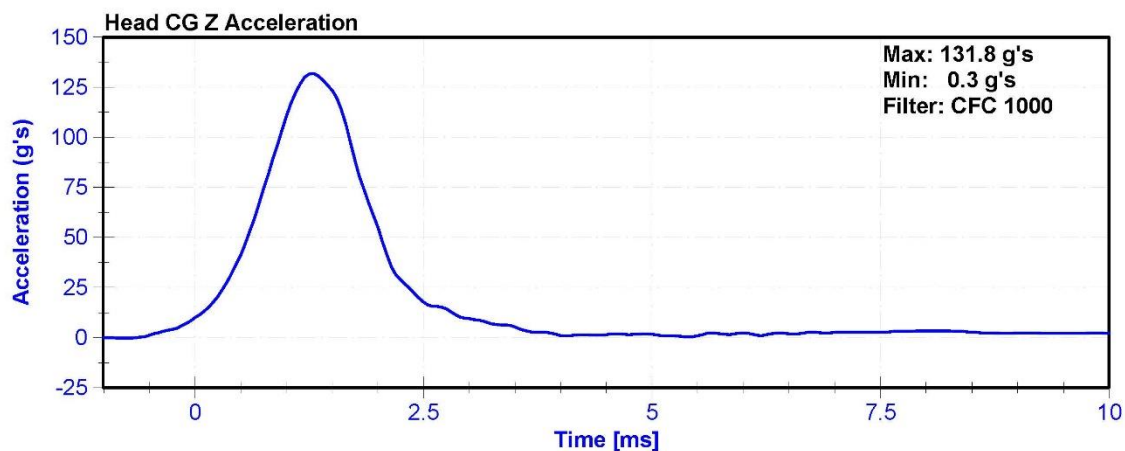
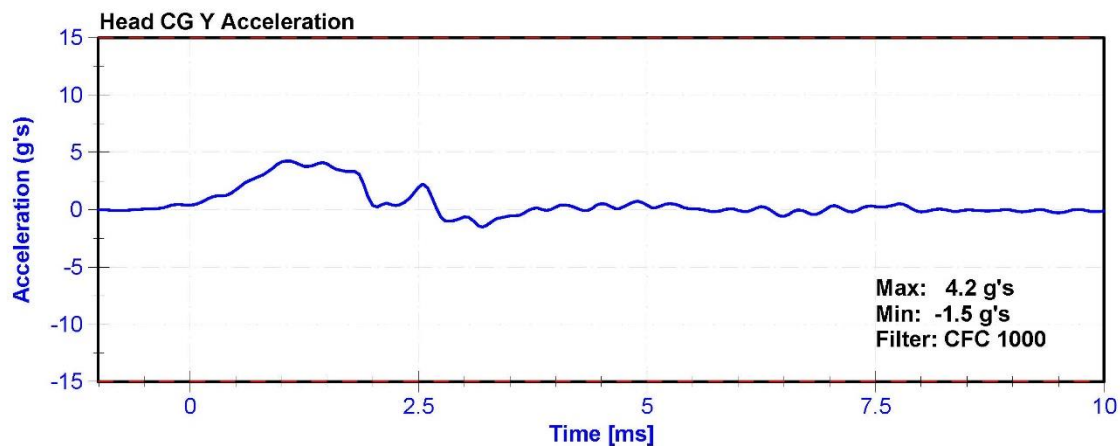
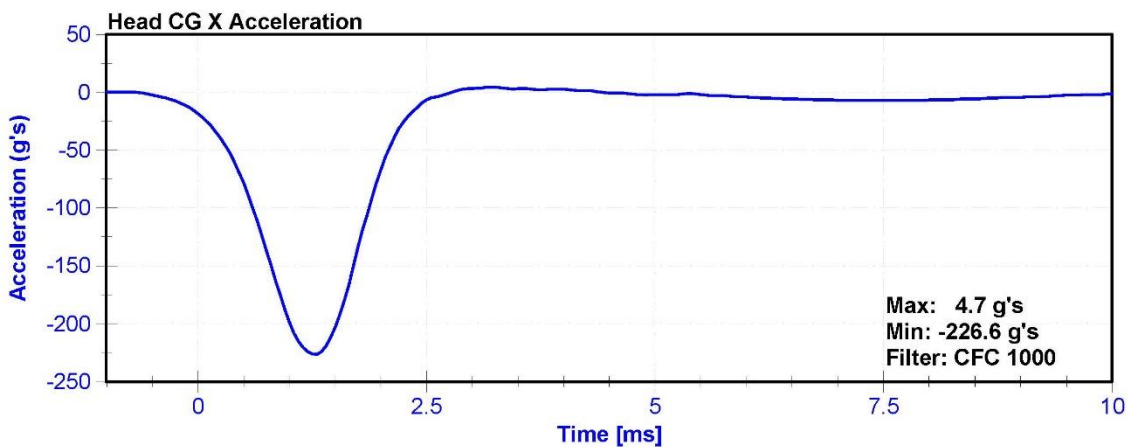
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	22.0	Pass
Humidity	10	70	%	33.6	Pass
Resultant Acceleration	225	275	g's	262.1	Pass
Oscillation	0	10	%	2.9	Pass
Lateral Acceleration	-15	15	g's	4.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264CT	AC-P58998	10/25/2017	4/25/2018
Y Accelerometer	ENDEVCO 7264CT	AC-P58912	10/25/2017	4/25/2018
Z Accelerometer	ENDEVCO 7264CT	AC-P58997	10/25/2017	4/25/2018





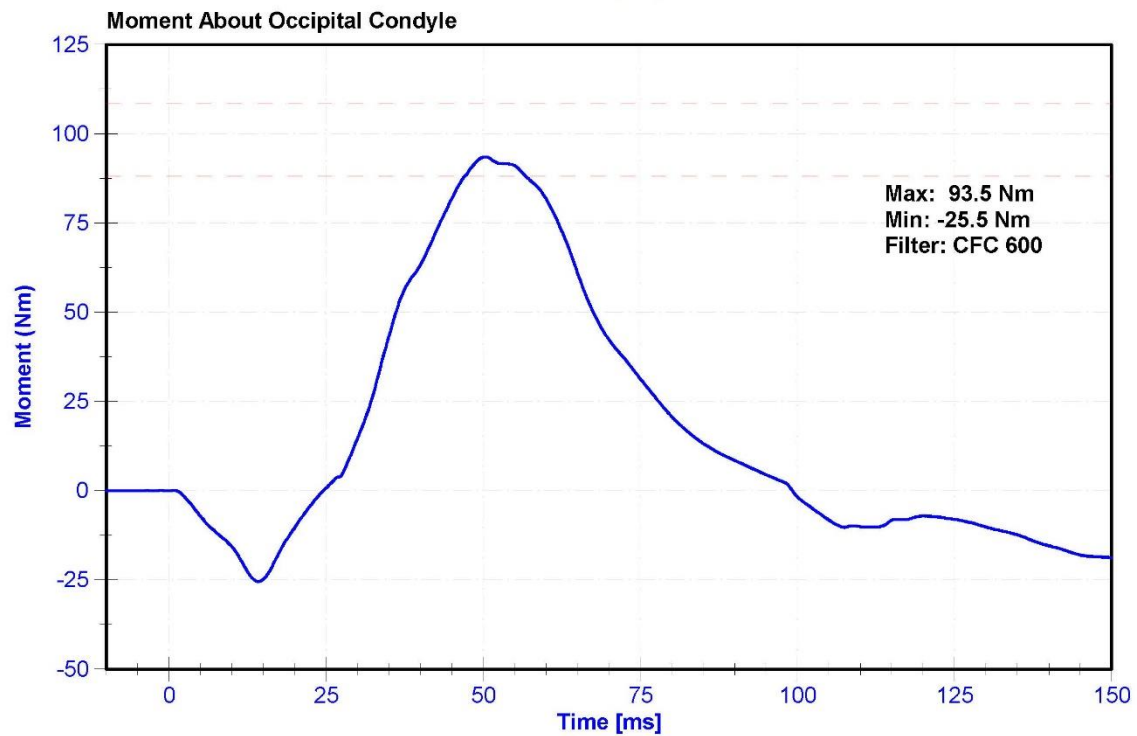
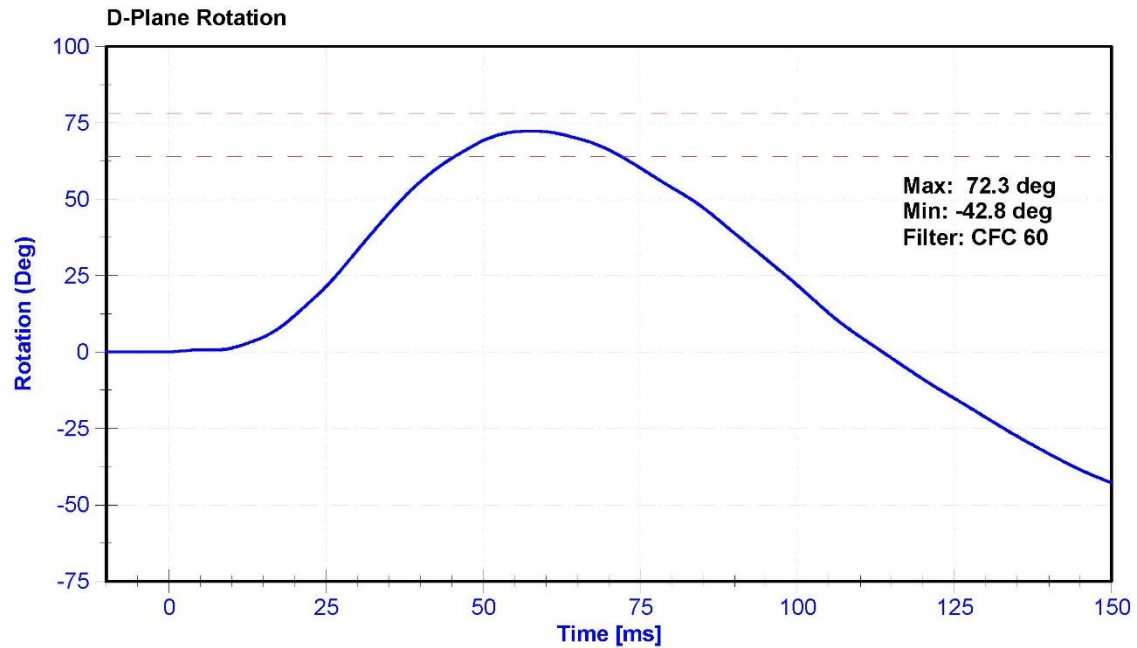
ATD Manufacturer	Humanetics	Test Technician	K. Brogan
ATD Serial Number	142	Laboratory Supervisor	M. Goehle

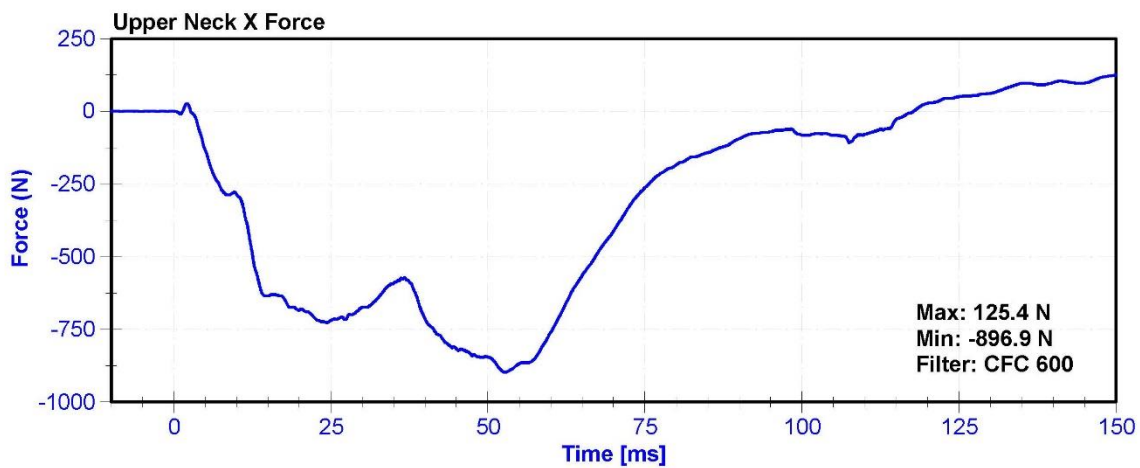
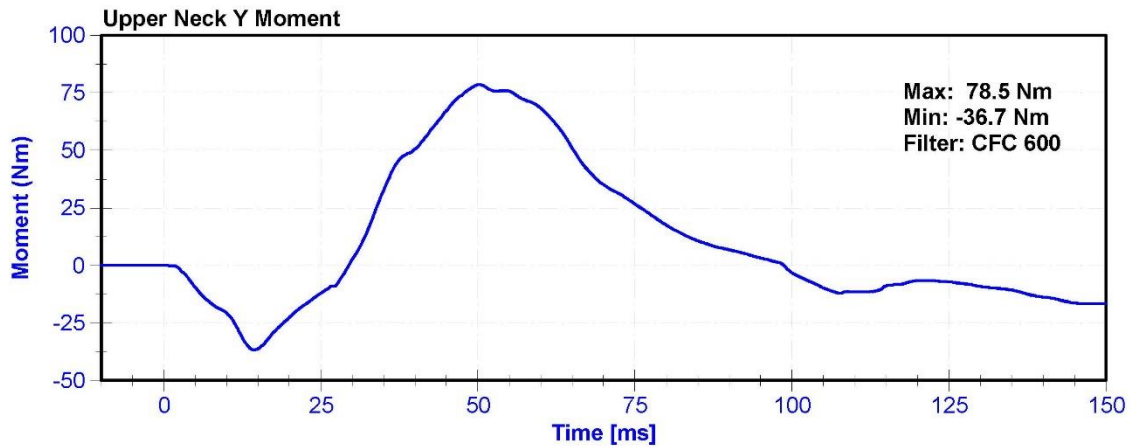
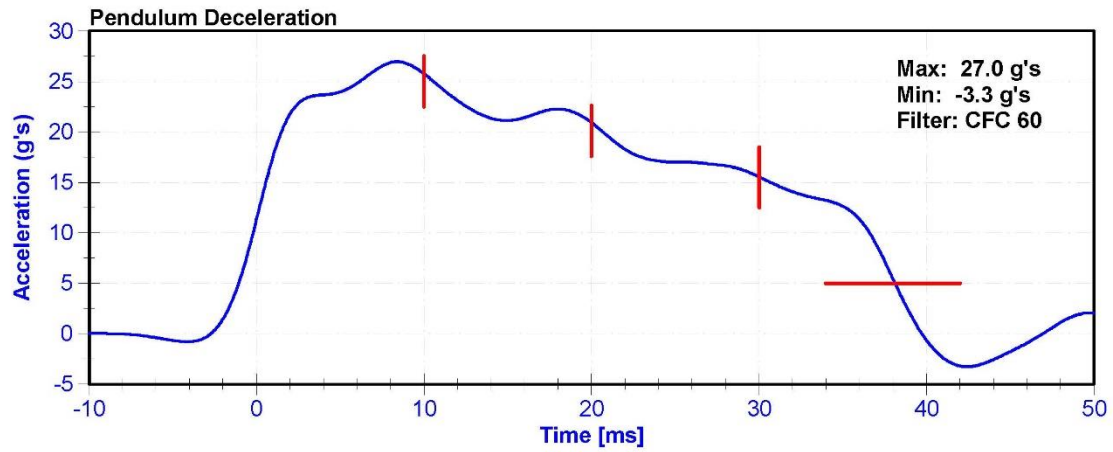
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	23.9	Pass
Velocity	6.89	7.13	m/s	7.037	Pass
Pendulum Deceleration at 10ms	22.5	27.5	g's	25.76	Pass
Pendulum Deceleration at 20ms	17.6	22.6	g's	20.93	Pass
Pendulum Deceleration at 30ms	12.5	18.5	g's	15.55	Pass
Max. Pendulum Deceleration After 30ms	0	29	g's	27.0	Pass
Pendulum Deceleration Time to 5 g's	34	42	ms	38.1	Pass
Maximum D Plane Rotation	64	78	deg	72.3	Pass
Time to Maximum Rotation	57	64	ms	57.6	Pass
Rotation Decay to Zero	113	127	ms	113.6	Pass
Moment About Occipital Condyle	88.1	108.4	Nm	93.54	Pass
Time to Maximum Moment	47	58	ms	50.3	Pass
Moment Decay to Zero	97	107	ms	99.2	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	ETI SP22G	DS-PendPot	10/10/2017	10/10/2018
Condyle Potentiometer	ETI SP22G	DS-CondPot	10/10/2017	10/10/2018
Upper Neck Load Cell	FTSS IF-205	LC-161Fx	7/11/2017	7/11/2018





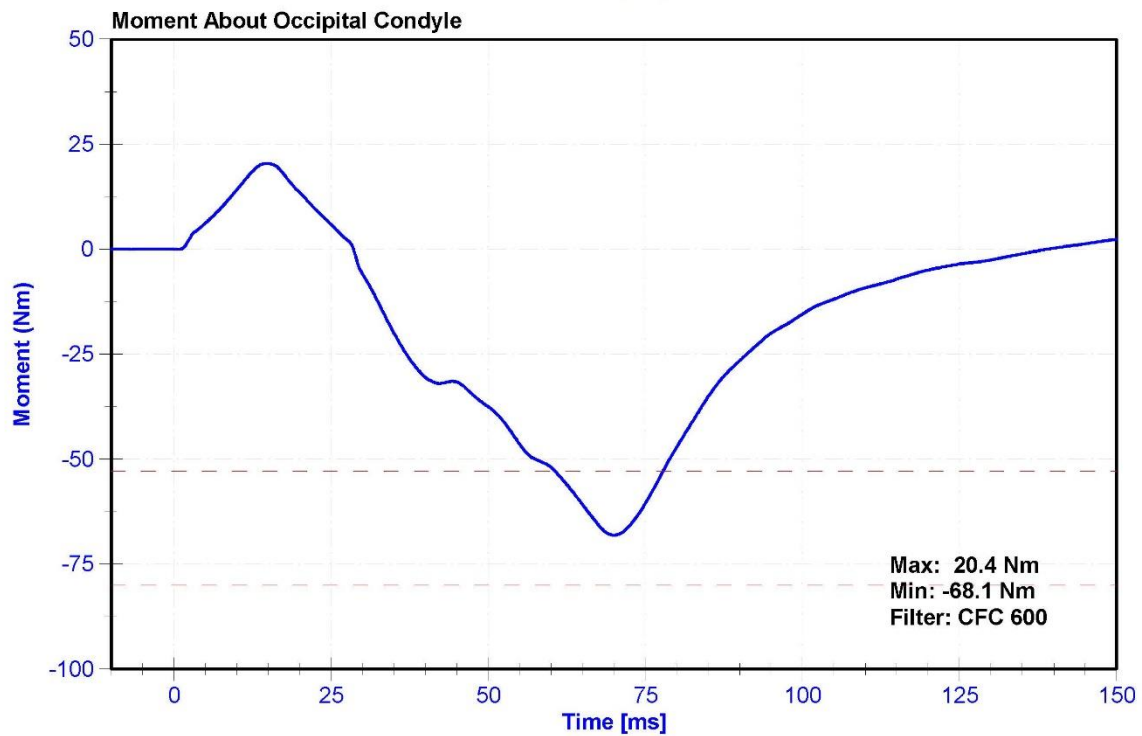
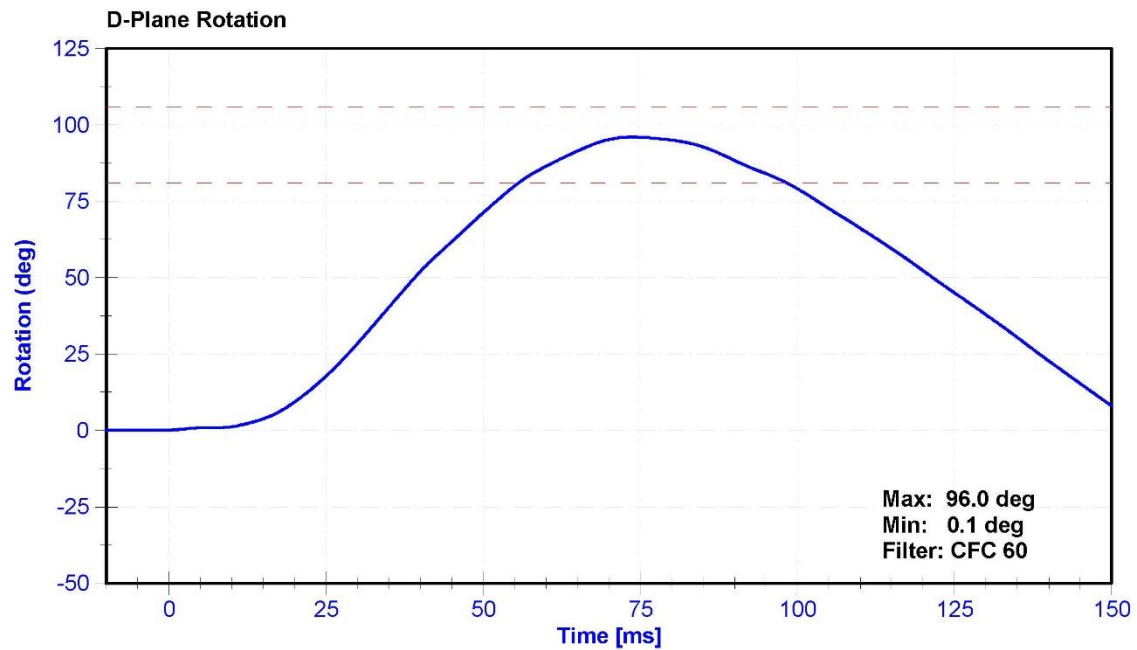
ATD Manufacturer	Humanetics	Test Technician	K. Brogan
ATD Serial Number	142	Laboratory Supervisor	M. Goehle

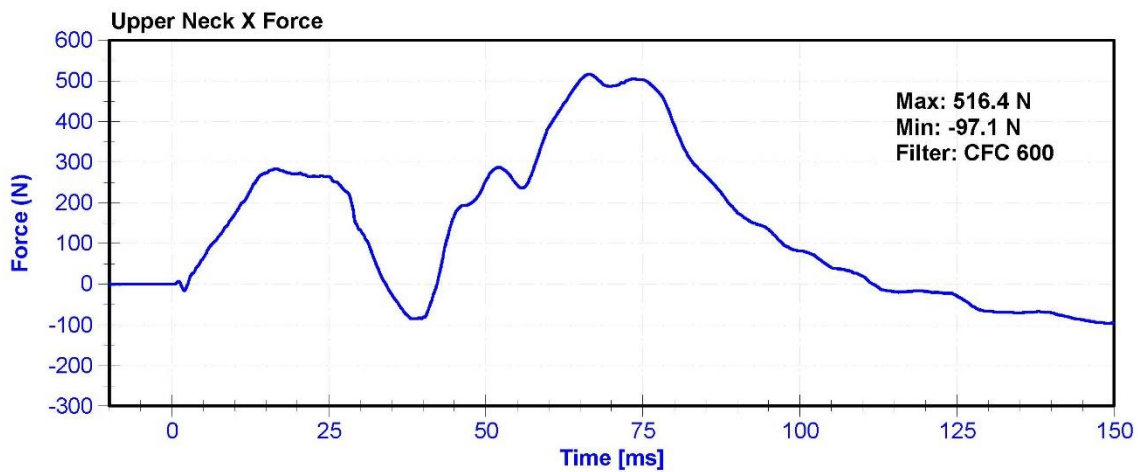
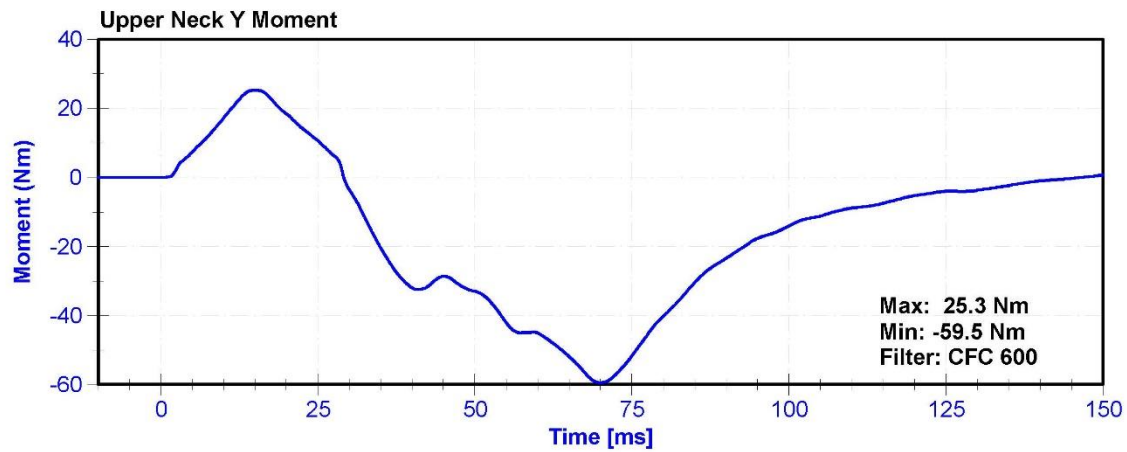
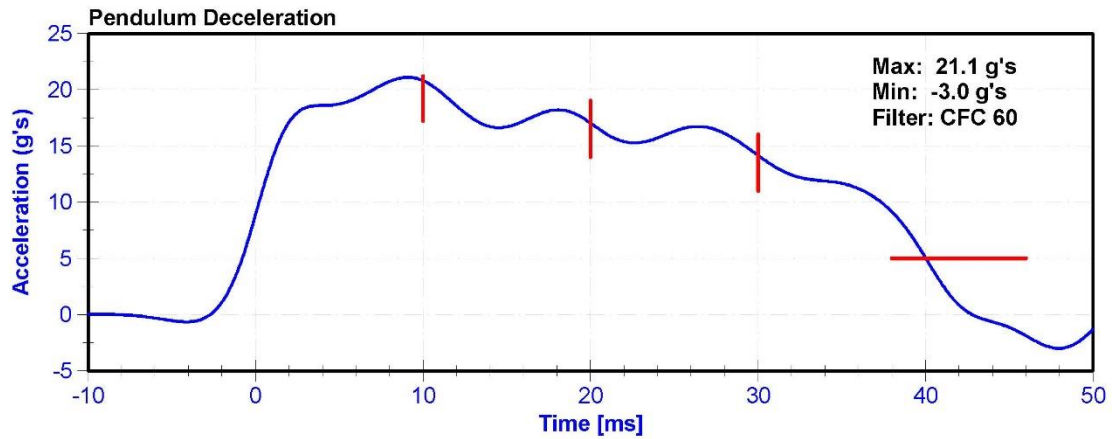
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21	Pass
Humidity	10	70	%	39.8	Pass
Velocity	5.94	6.19	m/s	6.068	Pass
Pendulum Deceleration at 10ms	17.2	21.2	g's	20.81	Pass
Pendulum Deceleration at 20ms	14	19	g's	17.0	Pass
Pendulum Deceleration at 30ms	11	16	g's	14.2	Pass
Max. Pendulum Deceleration After 30ms	0	22	g's	21.1	Pass
Pendulum Deceleration Time to 5 g's	38	46	ms	40.0	Pass
Maximum D Plane Rotation	81	106	deg	96.0	Pass
Time to Maximum Rotation	72	82	ms	73.7	Pass
Rotation Decay to Zero	147	174	ms	155.6	Pass
Minimum Moment About OC	-80	-52.9	Nm	-68.11	Pass
Time to Minimum Moment	65	79	ms	70.0	Pass
Moment Decay to Zero	120	148	ms	139.0	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	ETI SP22G	DS-PendPot	10/10/2017	10/10/2018
Condyle Potentiometer	ETI SP22G	DS-CondPot	10/10/2017	10/10/2018
Upper Neck Load Cell	FTSS IF-205	LC-161Fx	7/11/2017	7/11/2018





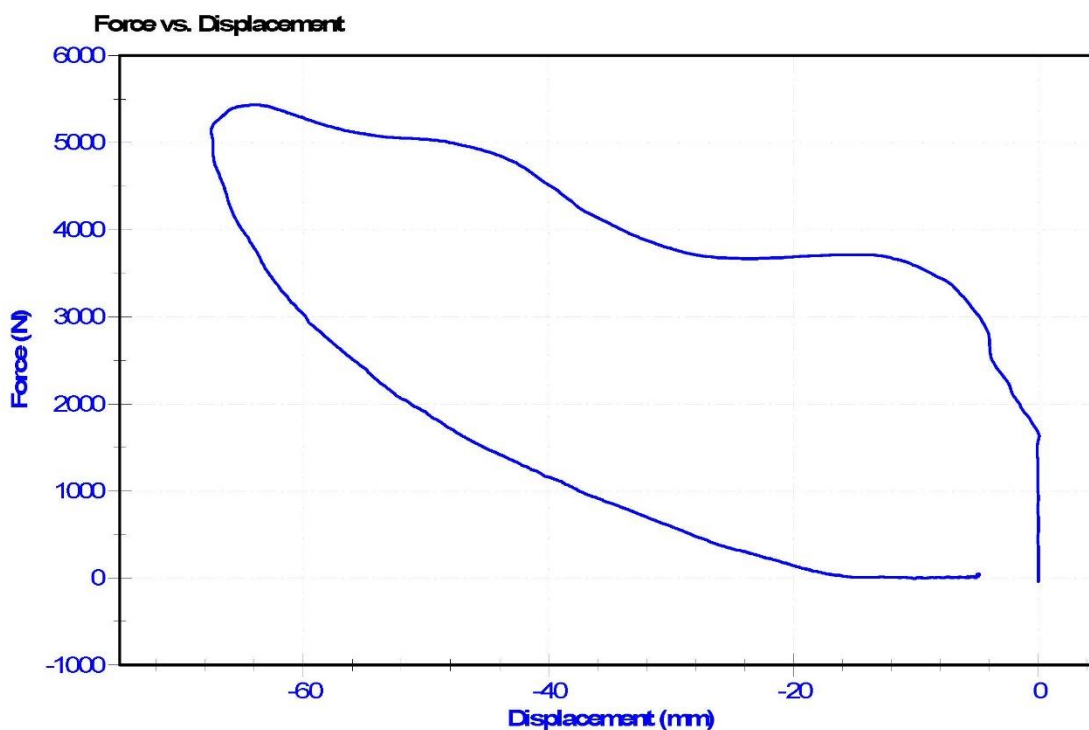
ATD Manufacturer	Humanetics	Test Technician	K Brogan
ATD Serial Number	142	Laboratory Supervisor	M Goehle

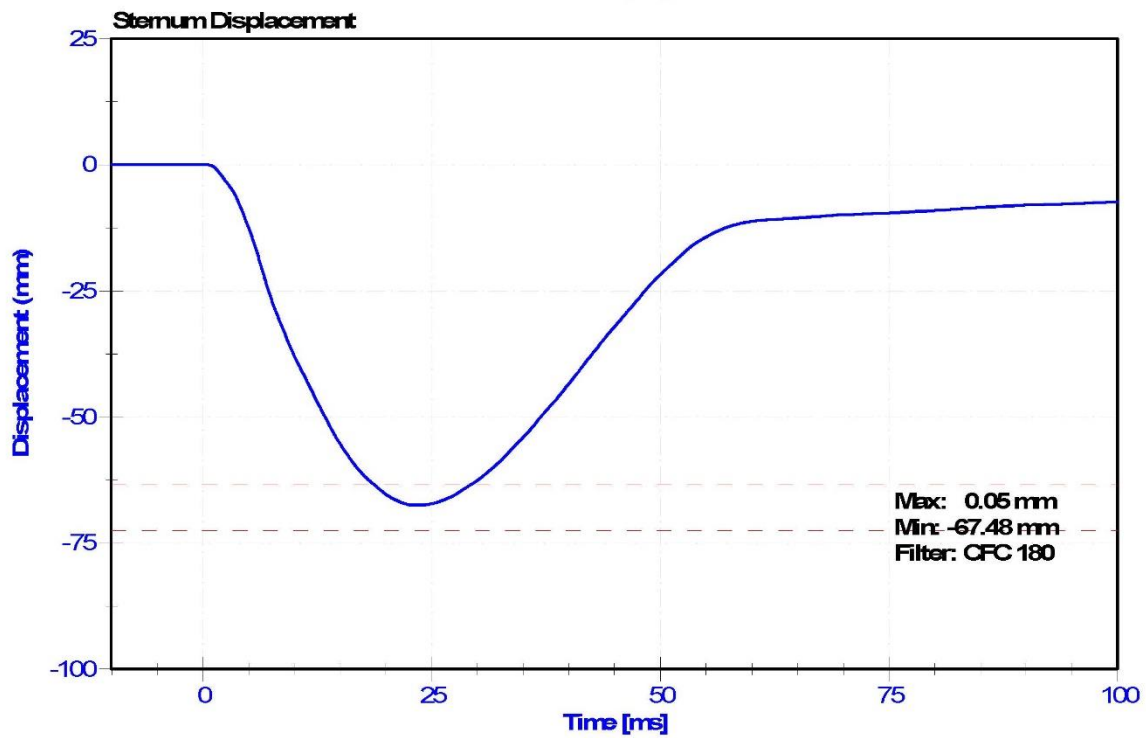
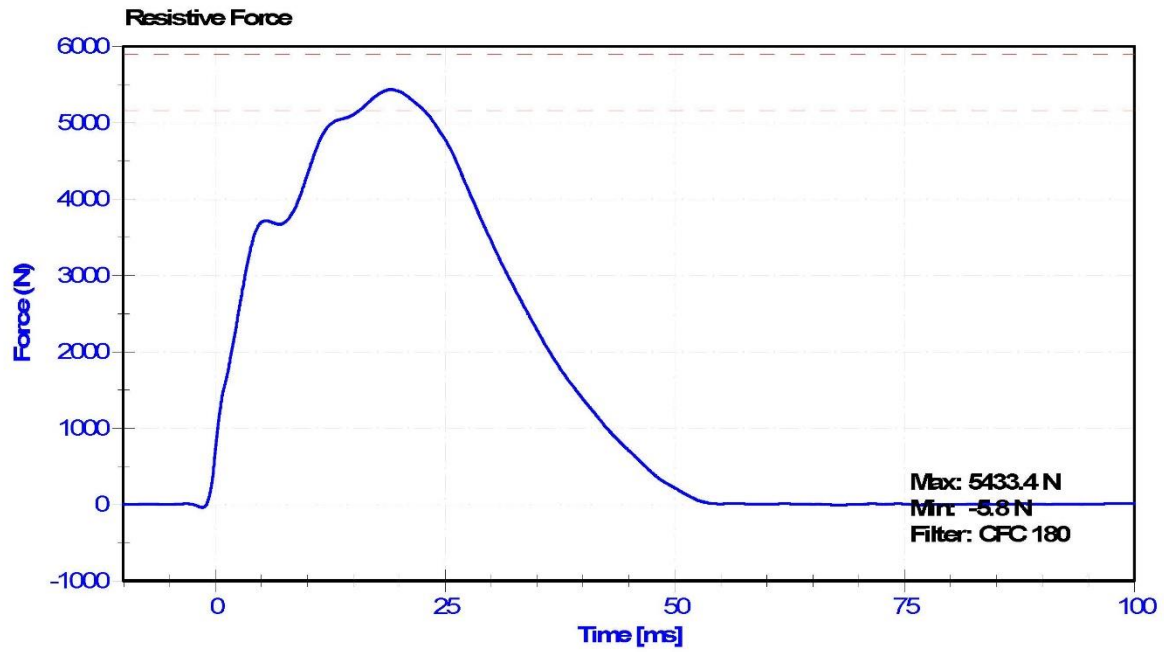
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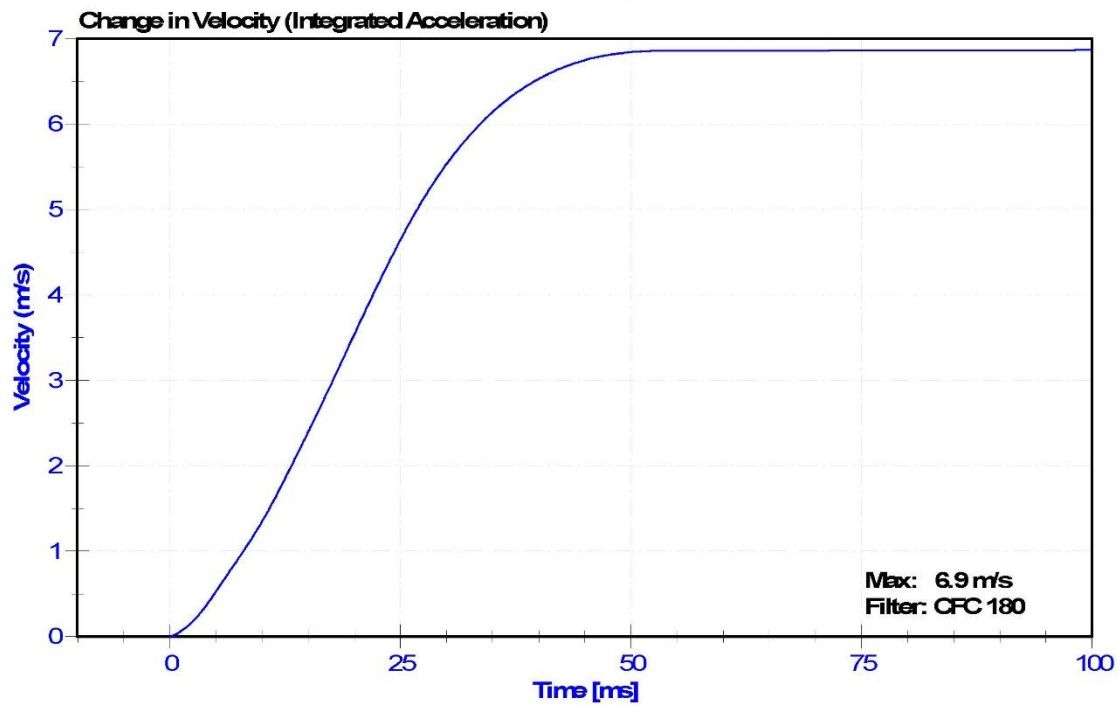
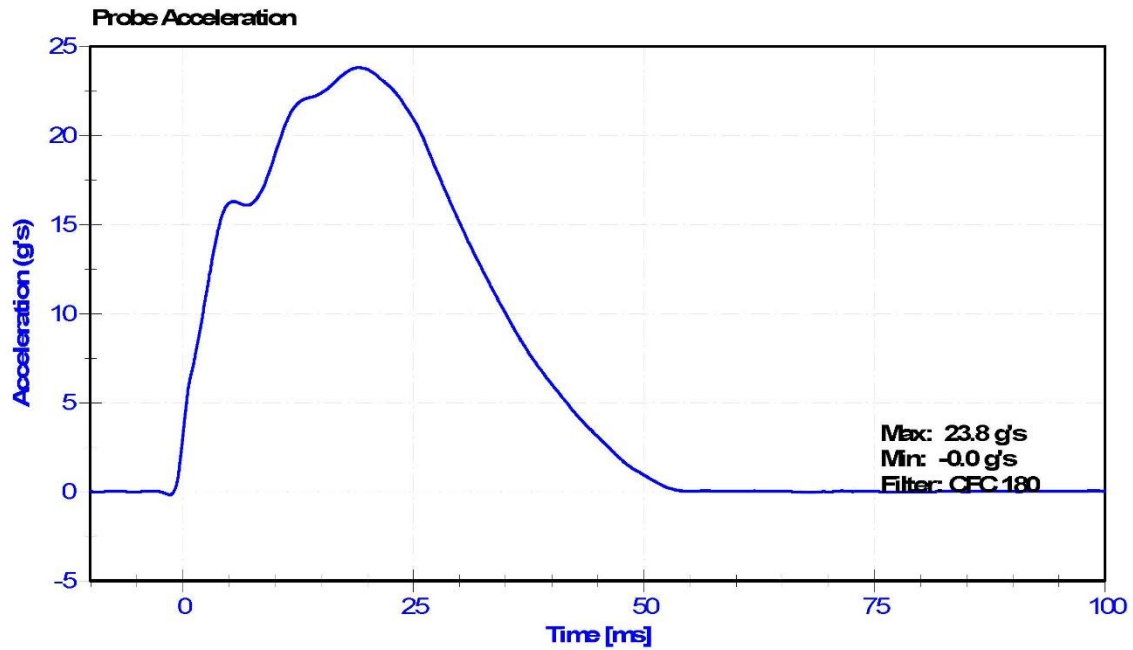
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.7	Pass
Humidity	10	70	%	37.1	Pass
Velocity	6.59	6.83	m/s	6.626	Pass
Chest Displacement	-72.6	-63.5	mm	-67.48	Pass
Resistive Force	5160	5894	N	5433.4	Pass
Hysteresis	65	85	%	71.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	4/17/2018
Chest Potentiometer	JDK 6209-2038	DS-142	9/27/2017	9/27/2018







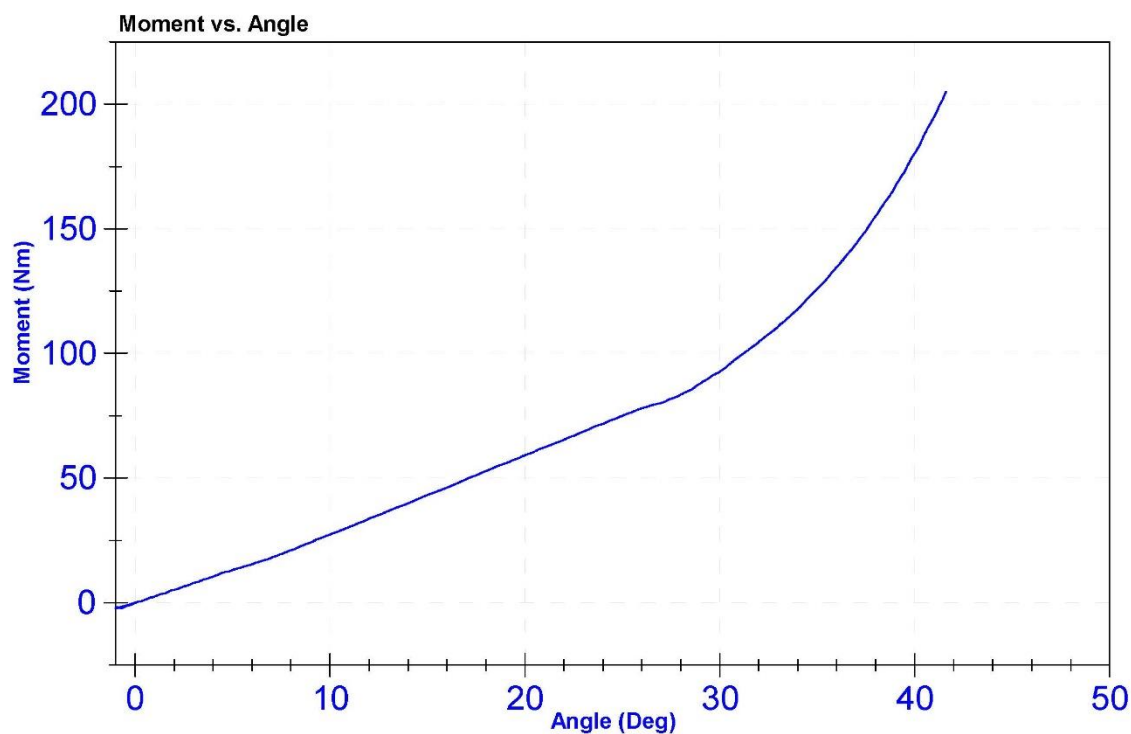
ATD Manufacturer	Humanetics	Test Technician	K. Brogan
ATD Serial Number	142	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.1	Pass
Humidity	10	70	%	36.2	Pass
Average Velocity	5	10	deg/s	7.1	Pass
Angle at 203Nm	40	50	deg	41.5	Pass
Moment at 30 degrees	0	94.9	Nm	92.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	ETI SP22	DS-0008	6/8/2017	6/8/2018
Load Cell	Key Trans 2301-02	LC-115 My	6/8/2017	6/8/2018



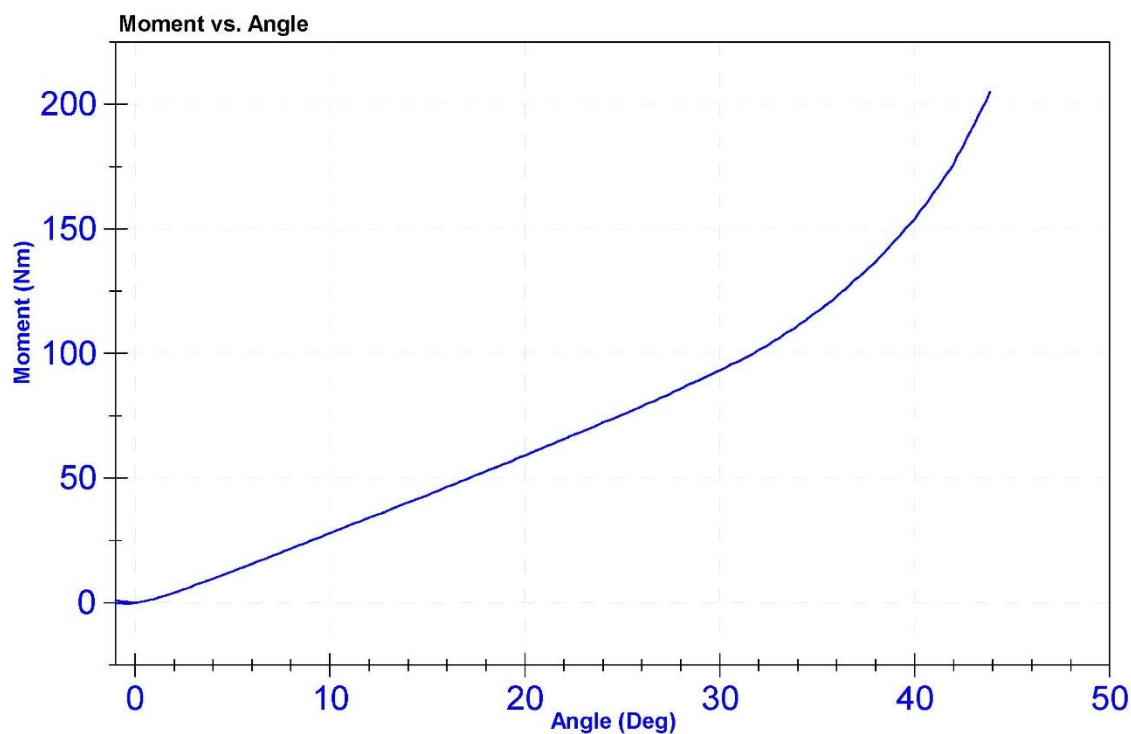
ATD Manufacturer	Humanetics	Test Technician	K. Brogan
ATD Serial Number	142	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.2	Pass
Humidity	10	70	%	34.6	Pass
Average Velocity	5	10	deg/s	7.2	Pass
Angle at 203Nm	40	50	deg	43.8	Pass
Moment at 30 degrees	0	94.9	Nm	93.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	ETI SP22	DS-0008	6/8/2017	6/8/2018
Load Cell	Key Trans 2301-02	LC-115 My	6/8/2017	6/8/2018



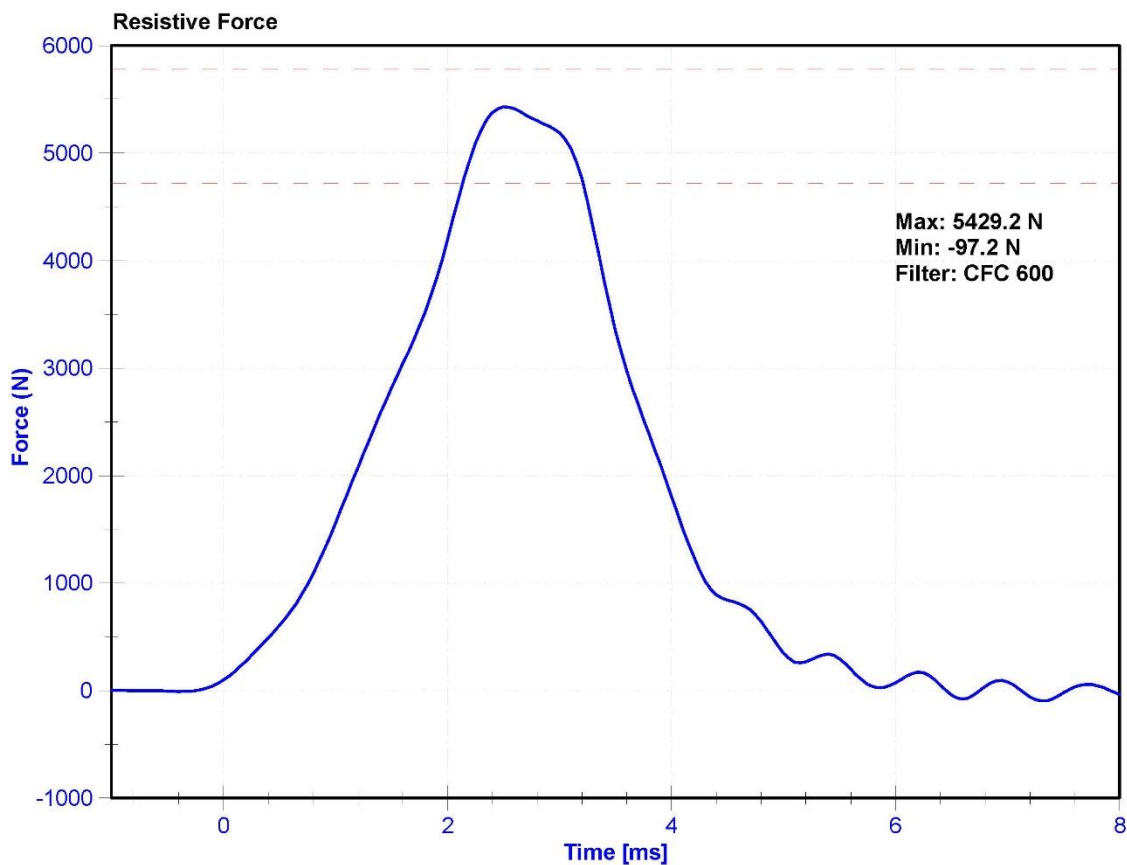
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ATD Serial Number	142	Laboratory Supervisor	M. Goehle

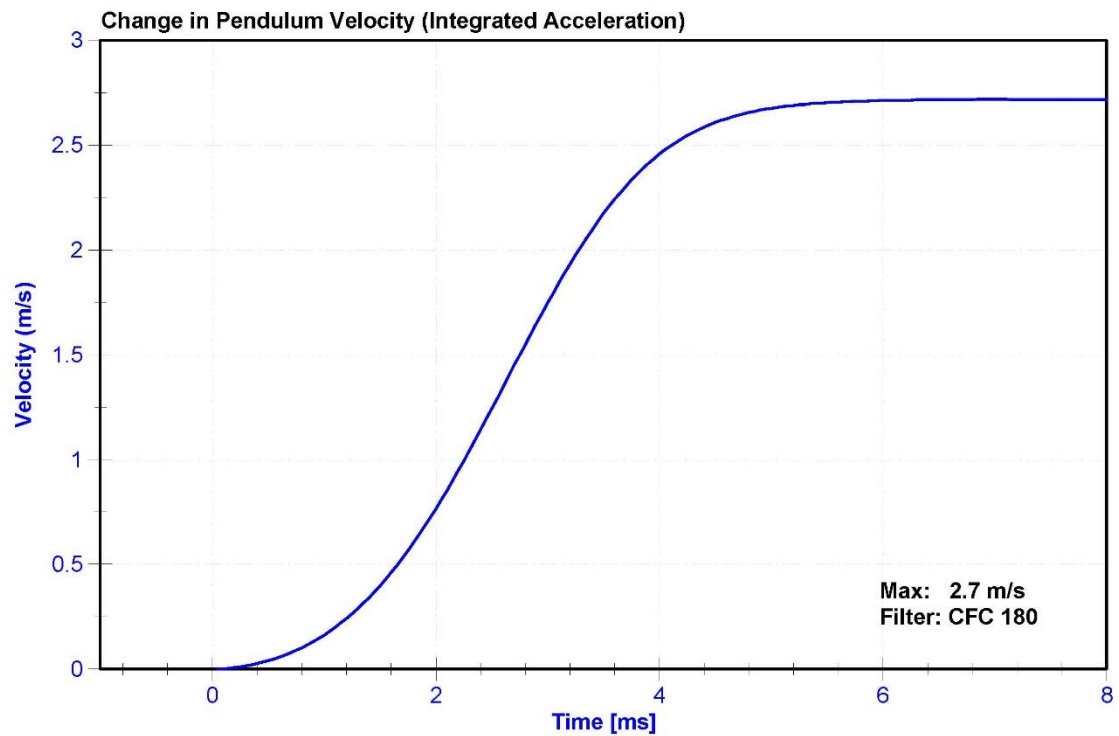
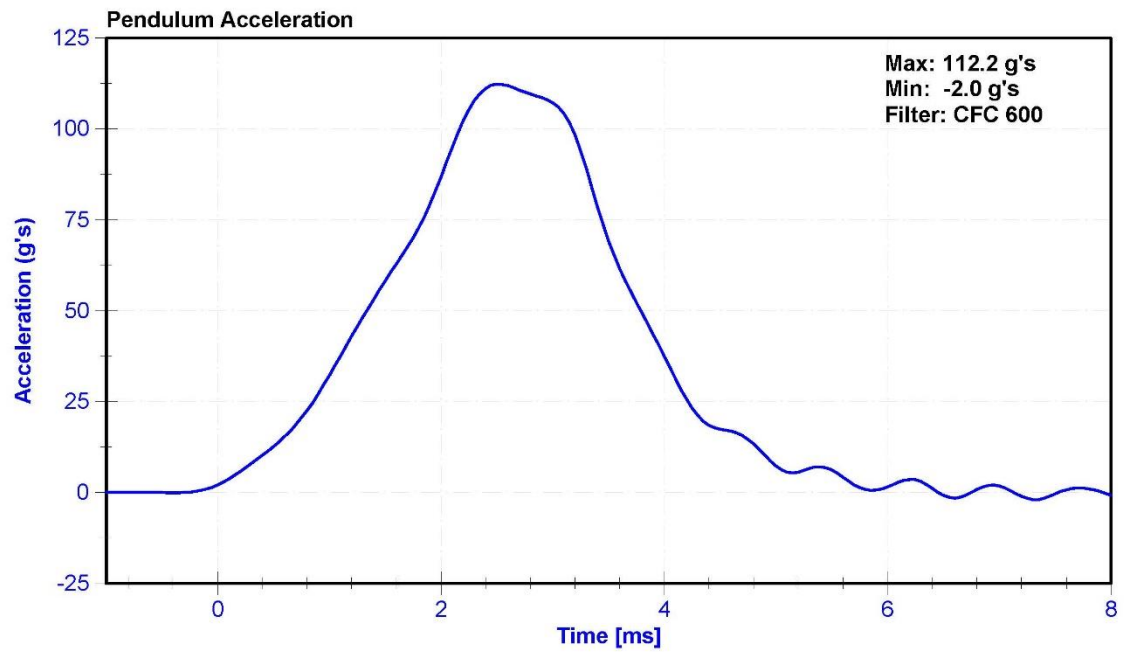
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.2	Pass
Humidity	10	70	%	37.7	Pass
Velocity	2.07	2.13	m/s	2.075	Pass
Maximum Resistive Force	4720	5780	N	5429.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	4/17/2018





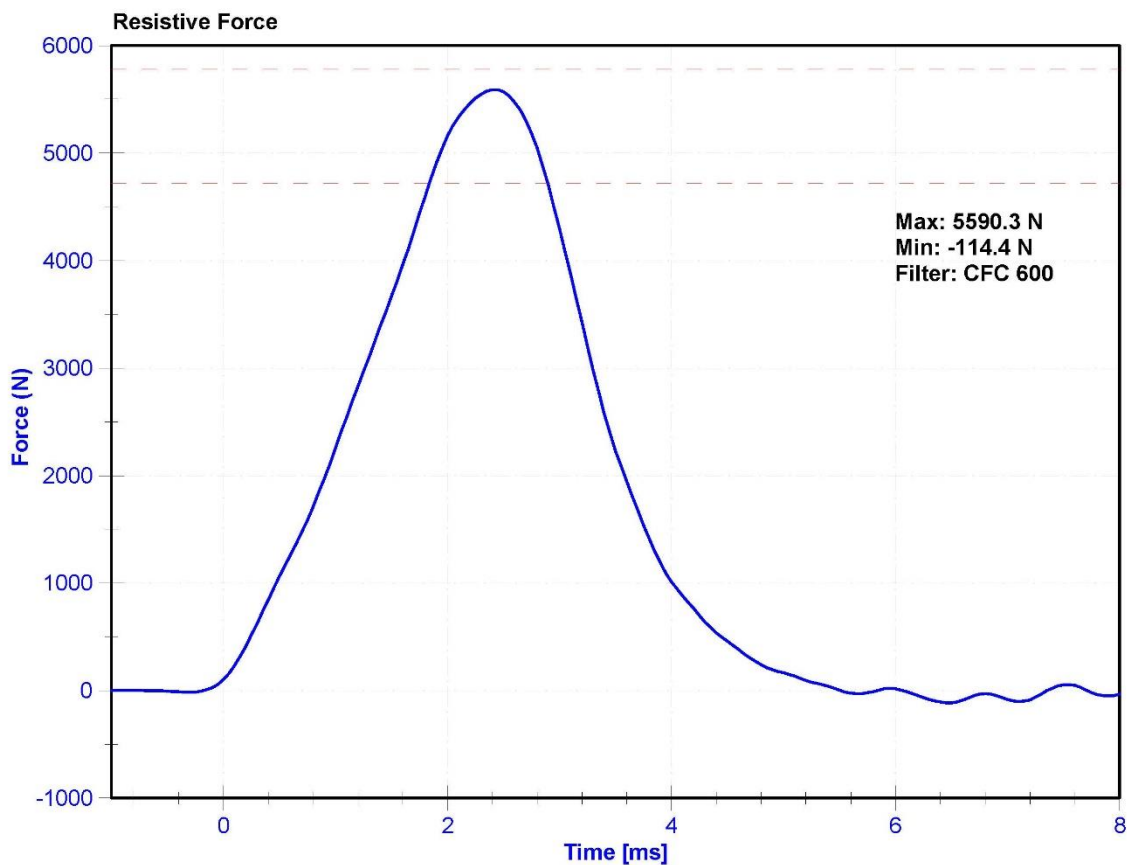
ATD Manufacturer	Humanetics	Test Technician	K. Brogan
ATD Serial Number	142	Laboratory Supervisor	M. Goehle

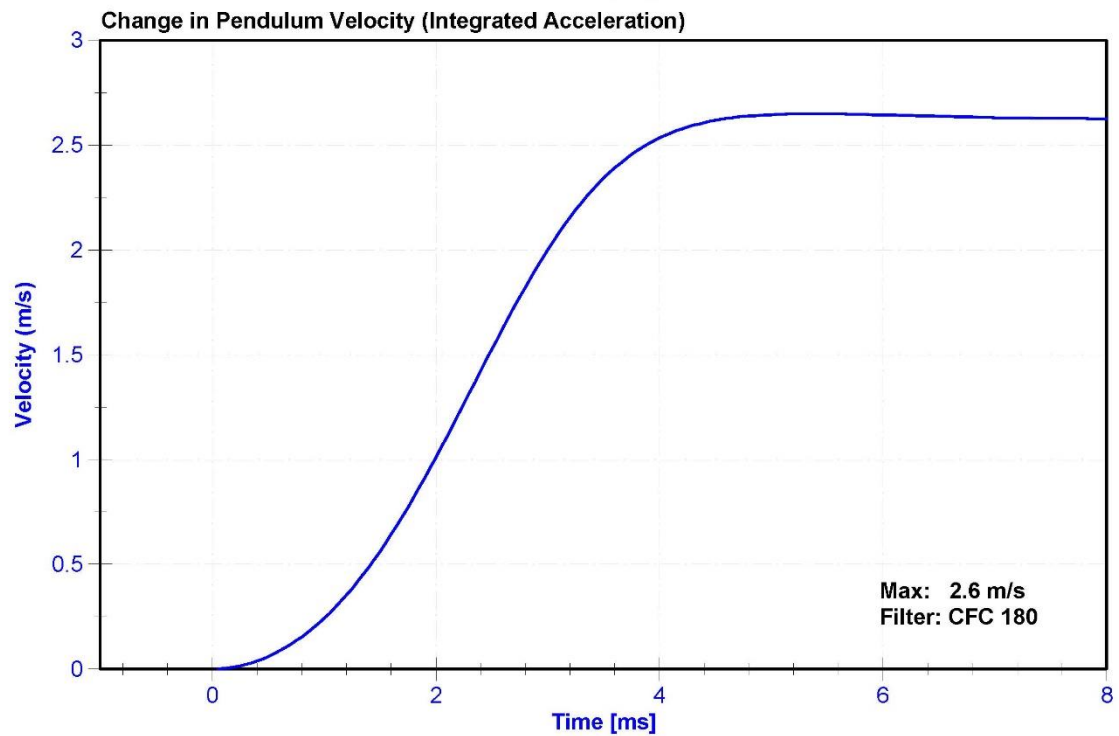
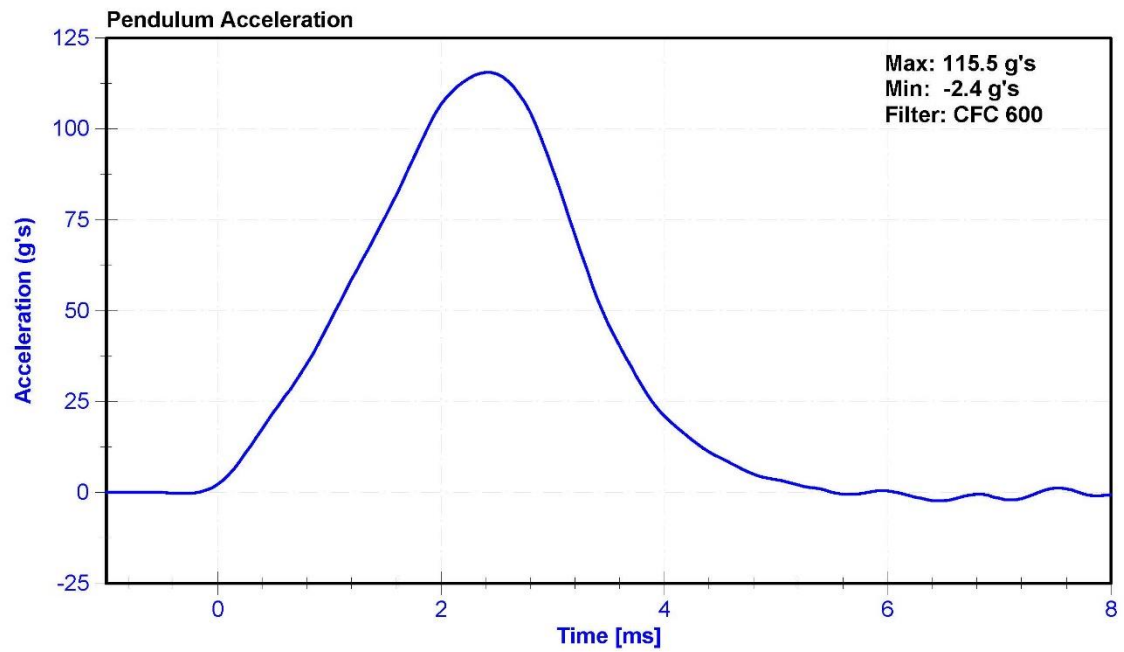
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21	Pass
Humidity	10	70	%	37.6	Pass
Velocity	2.07	2.13	m/s	2.078	Pass
Maximum Resistive Force	4720	5780	N	5590.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	4/17/2018





CALIBRATION TEST RESULTS

POST-TEST

HYBRID III 5TH PERCENTILE FEMALE - PASSENGER ATD

SERIAL NO: 288

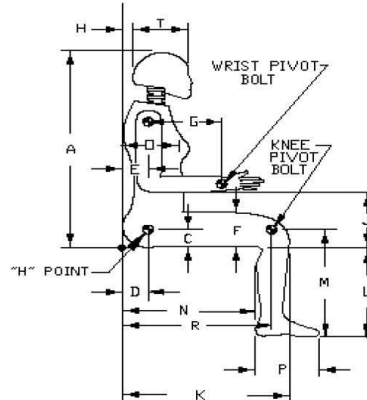
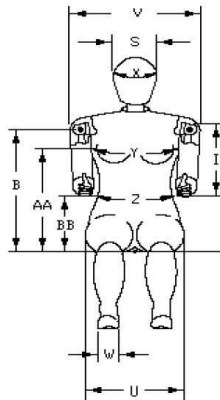


External Measurements - Hybrid 3 - 5th Female

Technician: Steve Keller

Date: 11/3/2017

Dummy Serial Number: 288



Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	775	800	782	Pass
B	Shoulder Pivot Height	432	457	440	Pass
C	H-Point Height	81	86	84	Pass
D	H-Point from Backline	145	150	147	Pass
E	Shoulder Pivot from Backline	69	84	75	Pass
F	Thigh Clearance	119	135	126	Pass
G	Back of Elbow to Wrist Pivot	244	259	250	Pass
H	Head Back to Backline	43	48	45	Pass
I	Shoulder to Elbow Length	277	297	285	Pass
J	Elbow Rest Height	183	203	188	Pass
K	Buttock to Knee Length	521	546	541	Pass
L	Popliteal Height	356	376	366	Pass
M	Knee Pivot Height	394	419	401	Pass
N	Buttock Popliteal Length	414	439	430	Pass
O	Chest Depth without Jacket	175	191	180	Pass
P	Foot Length (right)	219	234	220	Pass
R	Buttock To Knee Pivot Length	457	483	462	Pass
S	Head Breadth	137	147	142	Pass
T	Head Depth	178	188	182	Pass
U	Hip Breadth	300	315	307	Pass
V	Shoulder Breadth	351	366	361	Pass
W	Foot Breadth	79	94	85	Pass
X	Head Circumference	528	549	537	Pass
Y	Chest Circumference with Jacket	851	881	855	Pass
Z	Waist Circumference	460	790	776	Pass
AA	Reference Location (Chest Circumference)	333	358	345	Pass
BB	Reference Location (Waist Circumference)	160	170	165	Pass

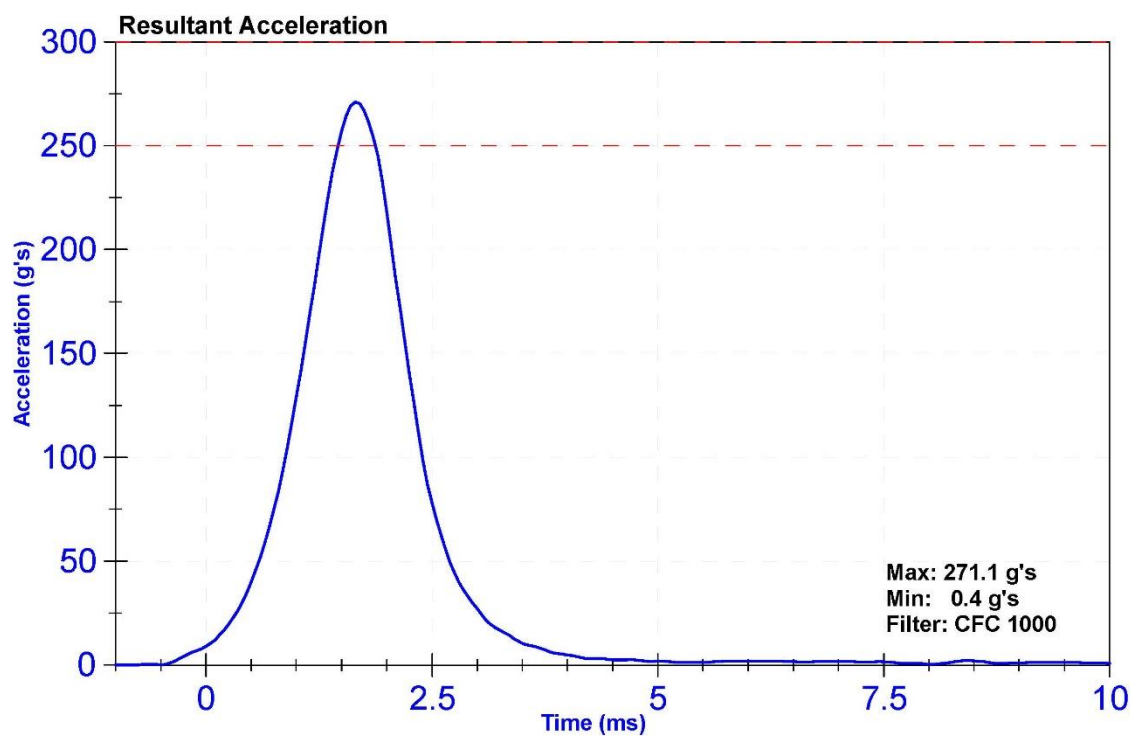
ATD Manufacturer	FTSS	Test Technician	S. Keller
ATD Serial Number	288	Laboratory Supervisor	M. Goehle

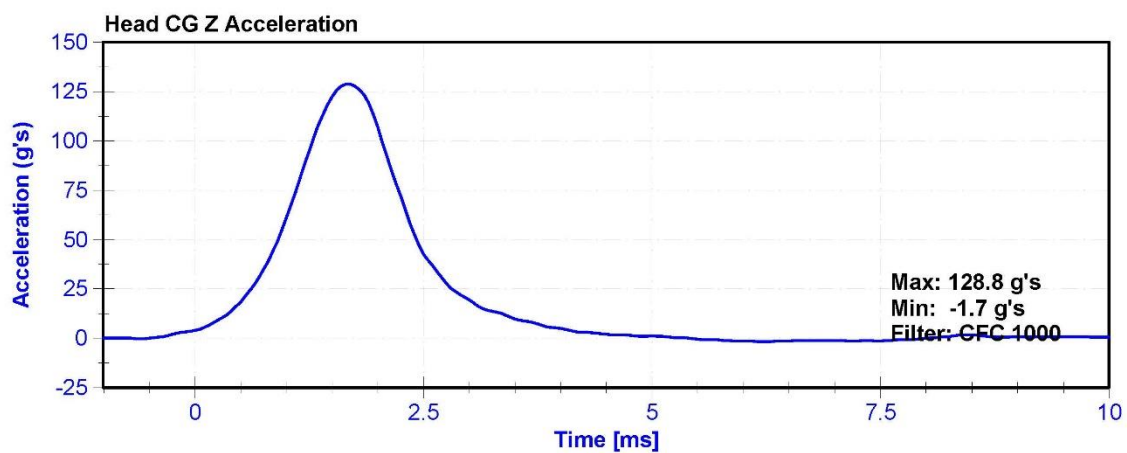
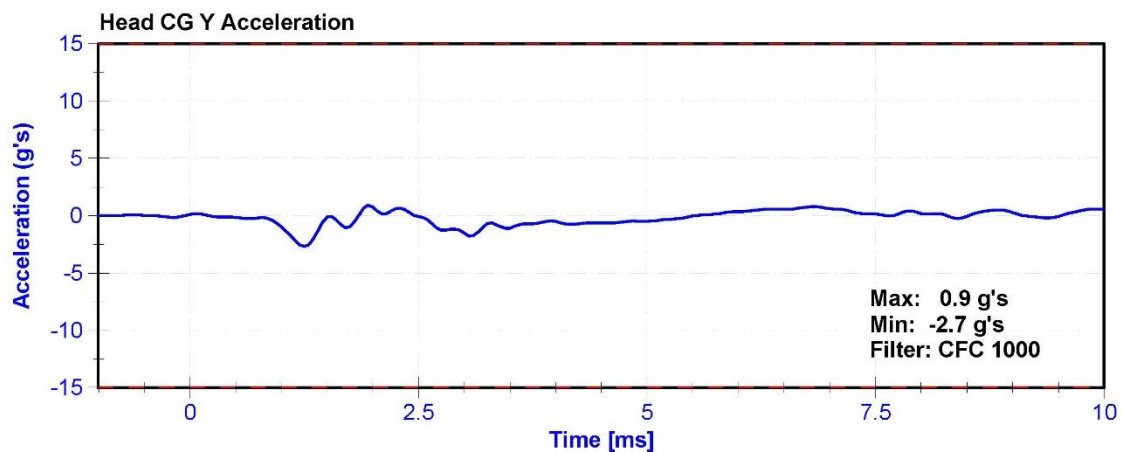
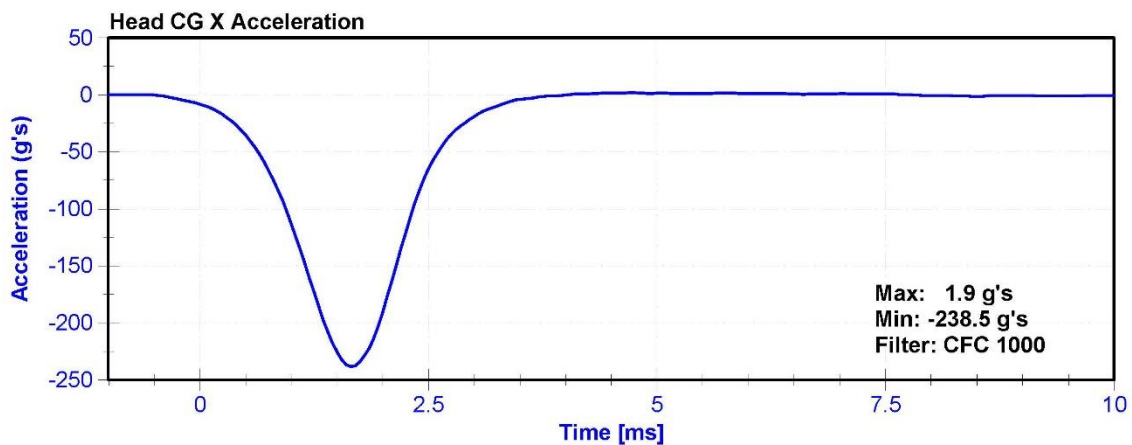
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.2	Pass
Humidity	10	70	%	49	Pass
Resultant Acceleration	250	300	g's	271.1	Pass
Oscillation	0	10	%	1.1	Pass
Lateral Acceleration	-15	15	g's	-2.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264	AC-P80337	10/10/2017	4/10/2018
Y Accelerometer	ENDEVCO 7264CT	AC-P80265	10/10/2017	4/10/2018
Z Accelerometer	ENDEVCO 7264CT	AC-P83418	10/10/2017	4/10/2018





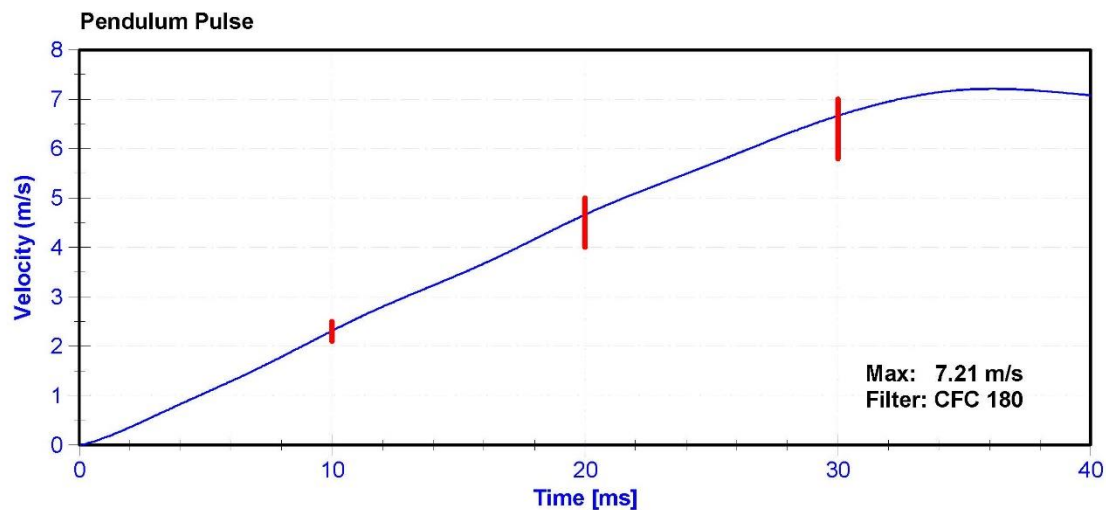
ATD Manufacturer	FTSS	Test Technician	K. Brogan
ATD Serial Number	288	Laboratory Supervisor	M. Goehle

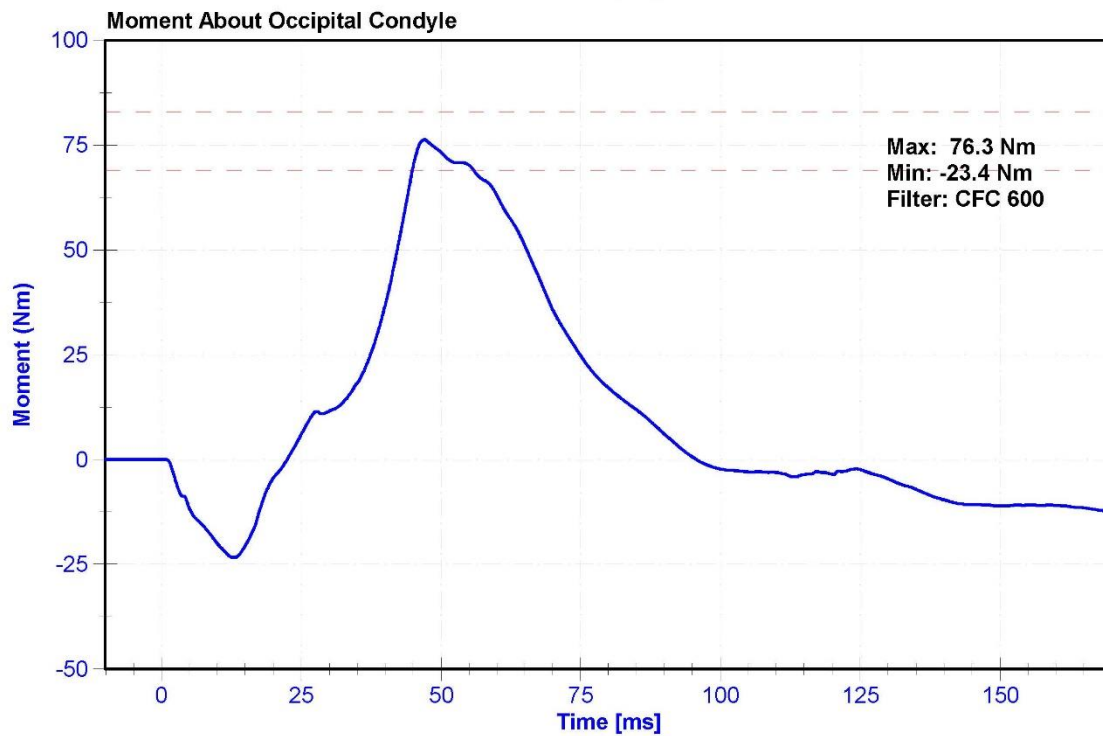
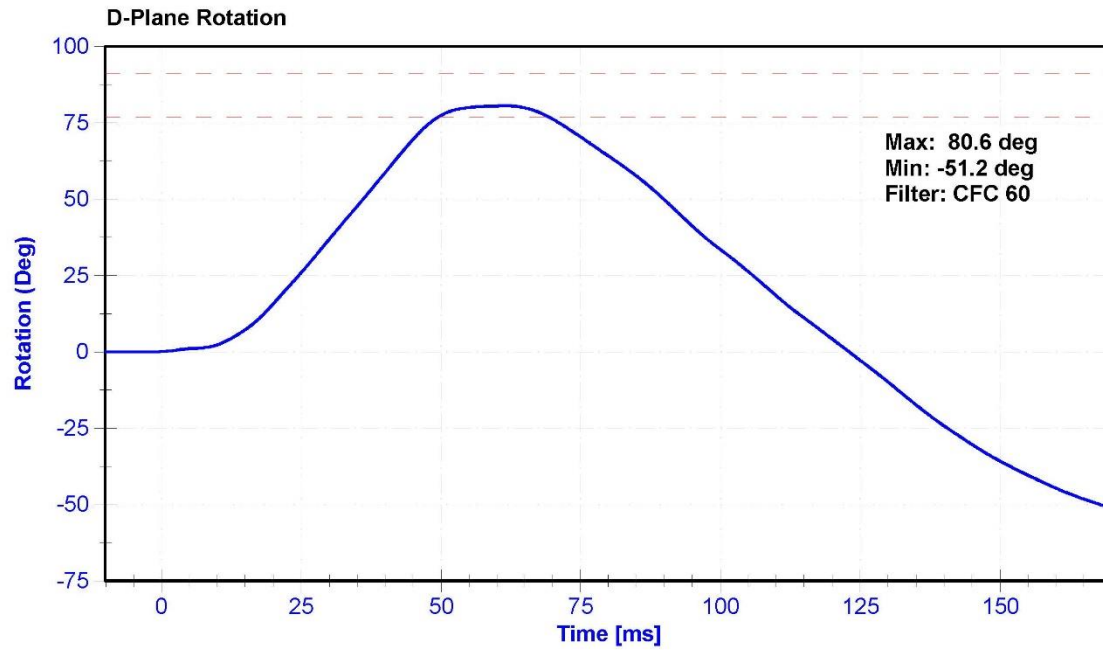
Results

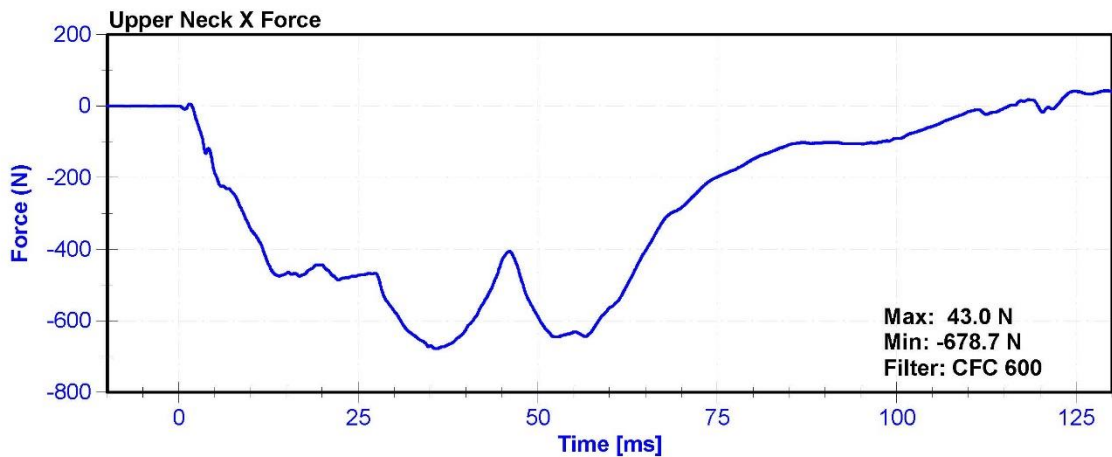
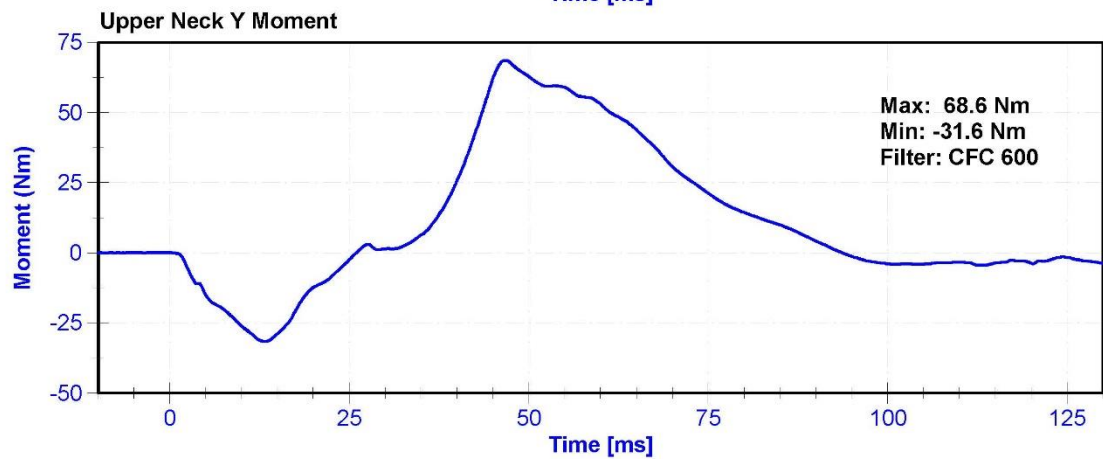
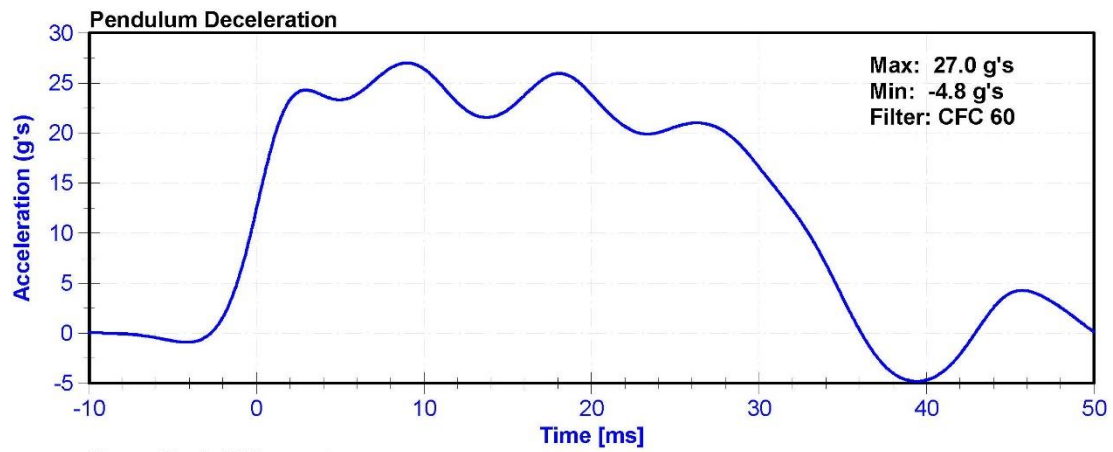
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	51.6	Pass
Velocity	6.89	7.13	m/s	7.037	Pass
Pendulum Impulse at 10ms	2.1	2.5	m/s	2.31	Pass
Pendulum Impulse at 20ms	4.0	5.0	m/s	4.66	Pass
Pendulum Impulse at 30ms	5.8	7.0	m/s	6.66	Pass
Max D Plane Rotation	77	91	deg	80.6	Pass
Max Moment During Rotation Interval	69	83	Nm	76.3	Pass
Moment Decay to 10.0 Nm	80	100	ms	86.8	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	ETI SP22G	DS-PendPot	10/10/2017	10/10/2018
Condyle Potentiometer	ETI SP22G	DS-CondPot	10/10/2017	10/10/2018
Upper Neck Load Cell	DENTON 1716A	LC-2206Fx	7/12/2017	7/12/2018







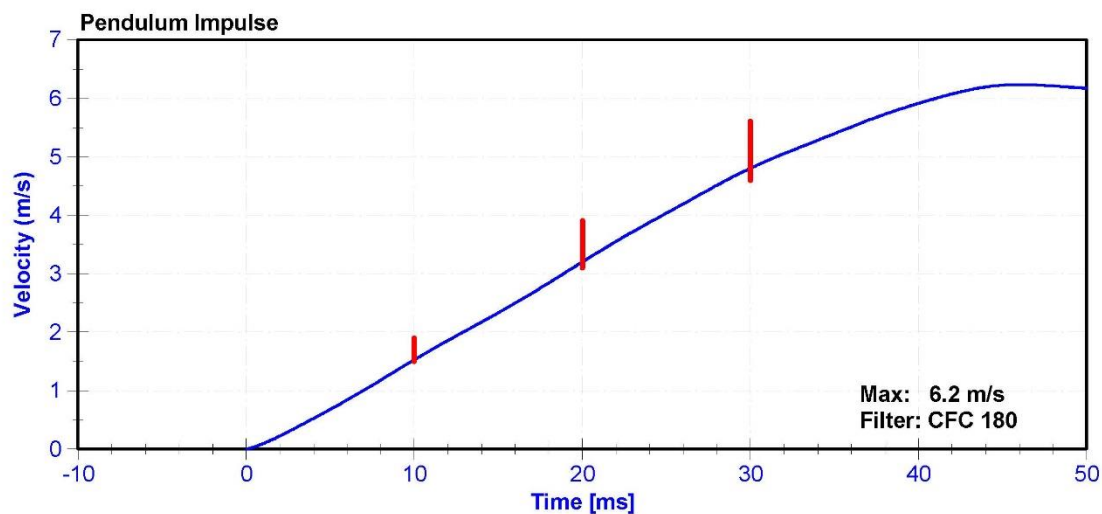
ATD Manufacturer	FTSS	Test Technician	K. Brogan
ATD Serial Number	288	Laboratory Supervisor	M. Goehle

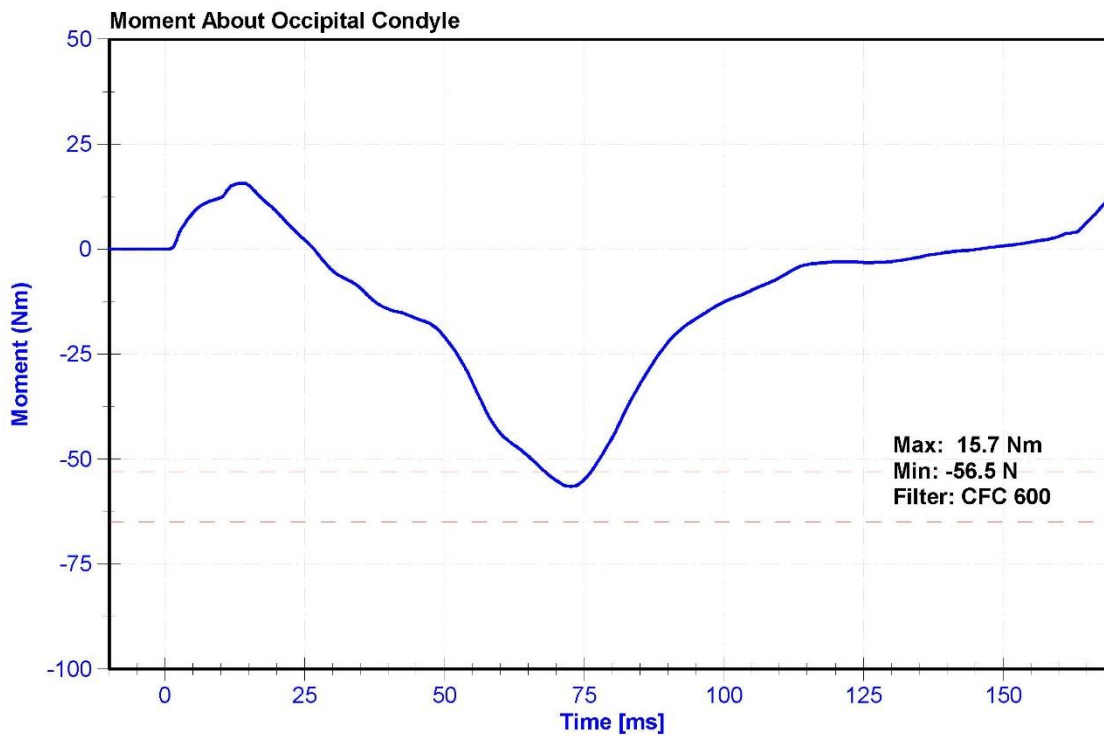
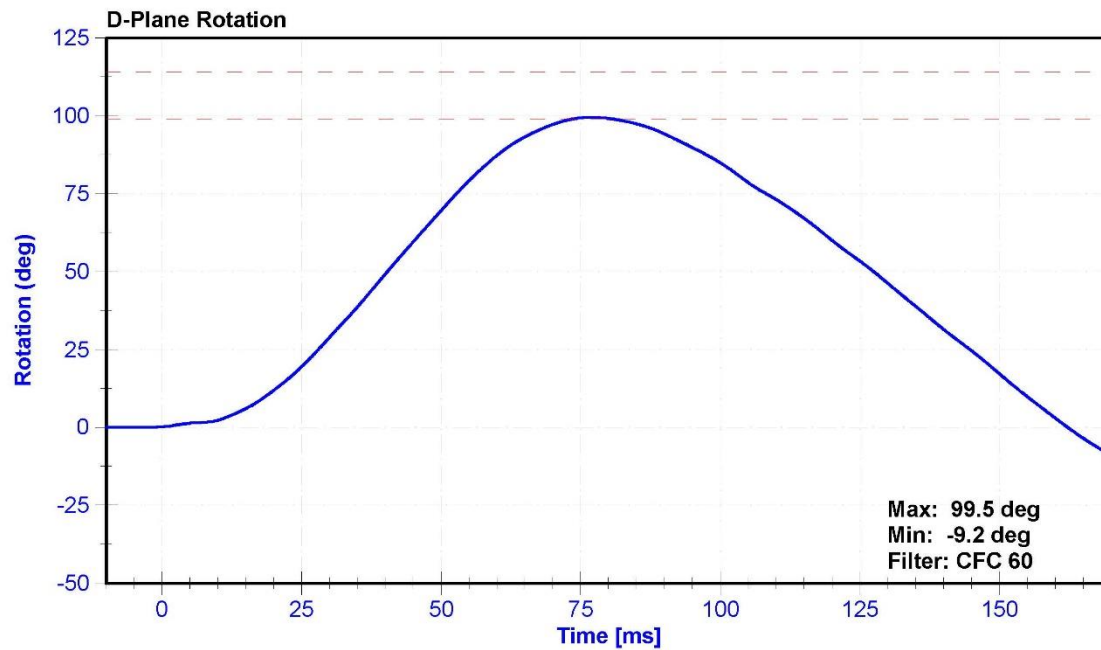
Results

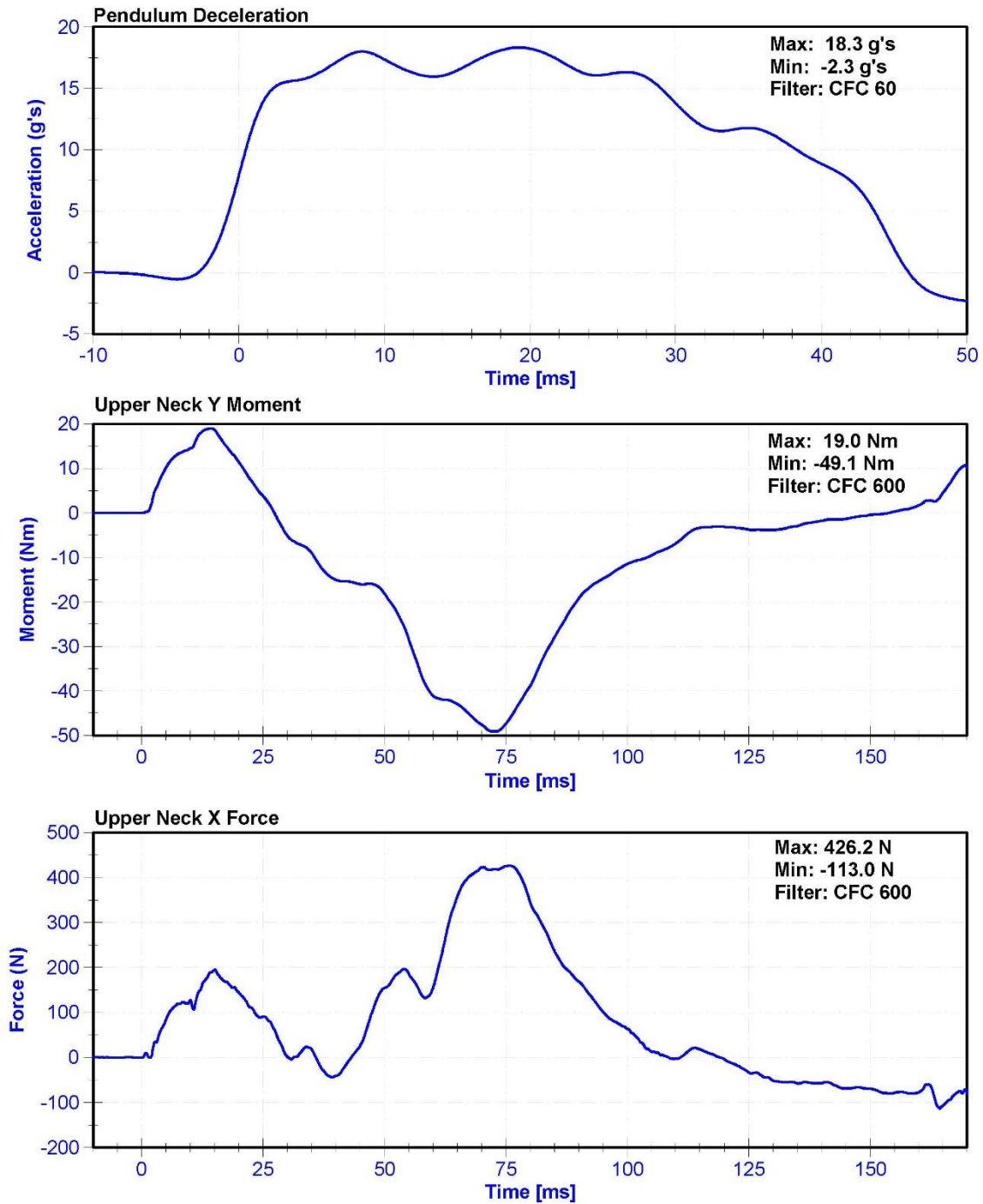
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	51.6	Pass
Velocity	5.95	6.19	m/s	6.068	Pass
Pendulum Impulse at 10ms	1.5	1.9	m/s	1.53	Pass
Pendulum Impulse at 20ms	3.1	3.9	m/s	3.20	Pass
Pendulum Impulse at 30ms	4.6	5.6	m/s	4.80	Pass
D Plane Rotation	99	114	deg	99.5	Pass
Moment During Rotation Interval	-65	-53	Nm	-56.5	Pass
Moment Decay to -10Nm	94	114	ms	104.7	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	ETI SP22G	DS-PendPot	10/10/2017	10/10/2018
Condyle Potentiometer	ETI SP22G	DS-CondPot	10/10/2017	10/10/2018
Upper Neck Load Cell	DENTON 1716A	LC-2206Fx	7/12/2017	7/12/2018







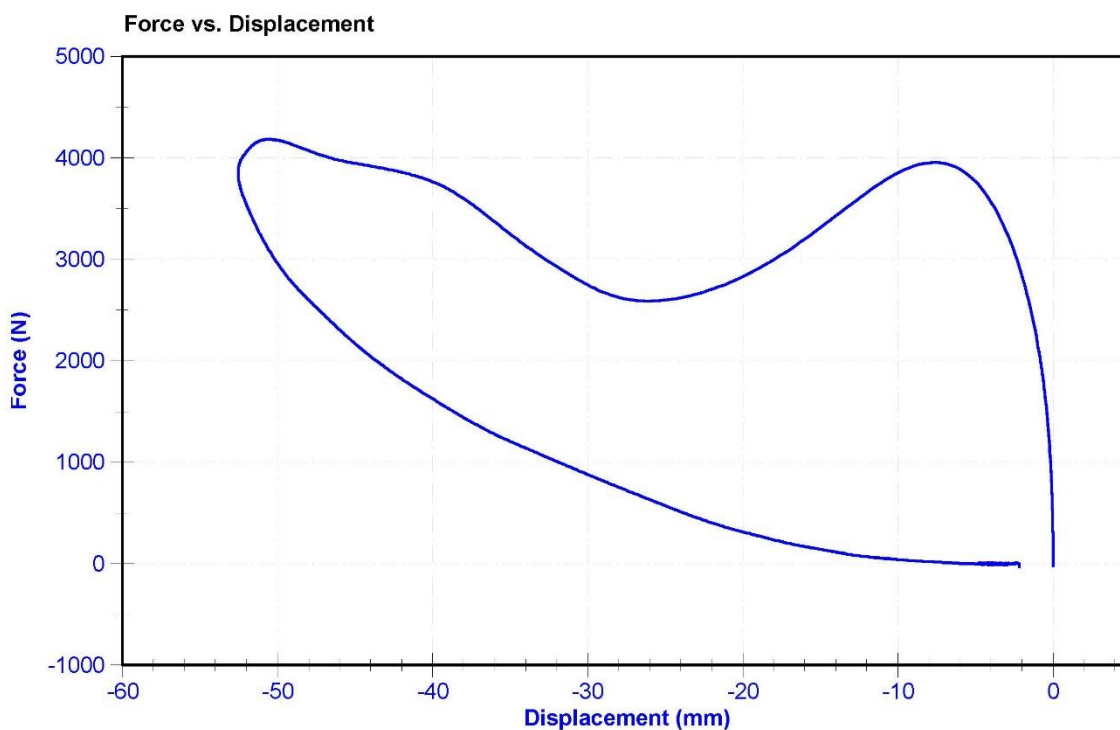
ATD Manufacturer	FTSS	Test Technician	K. Brogan
ATD Serial Number	288	Laboratory Supervisor	M. Goehle

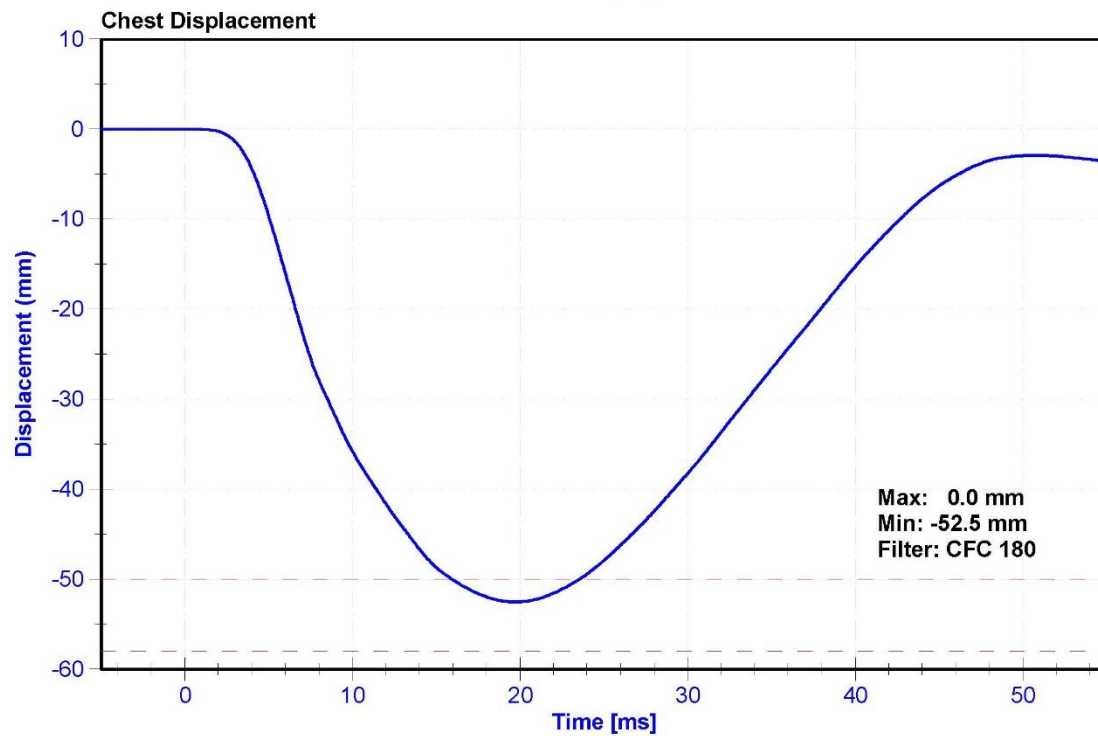
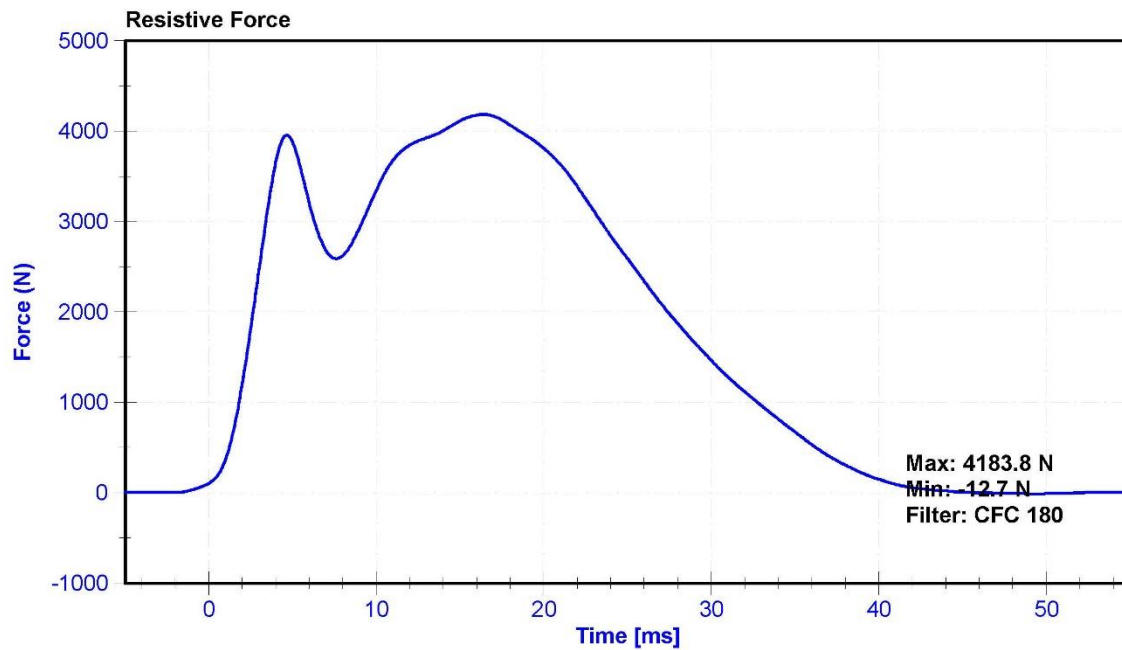
Results

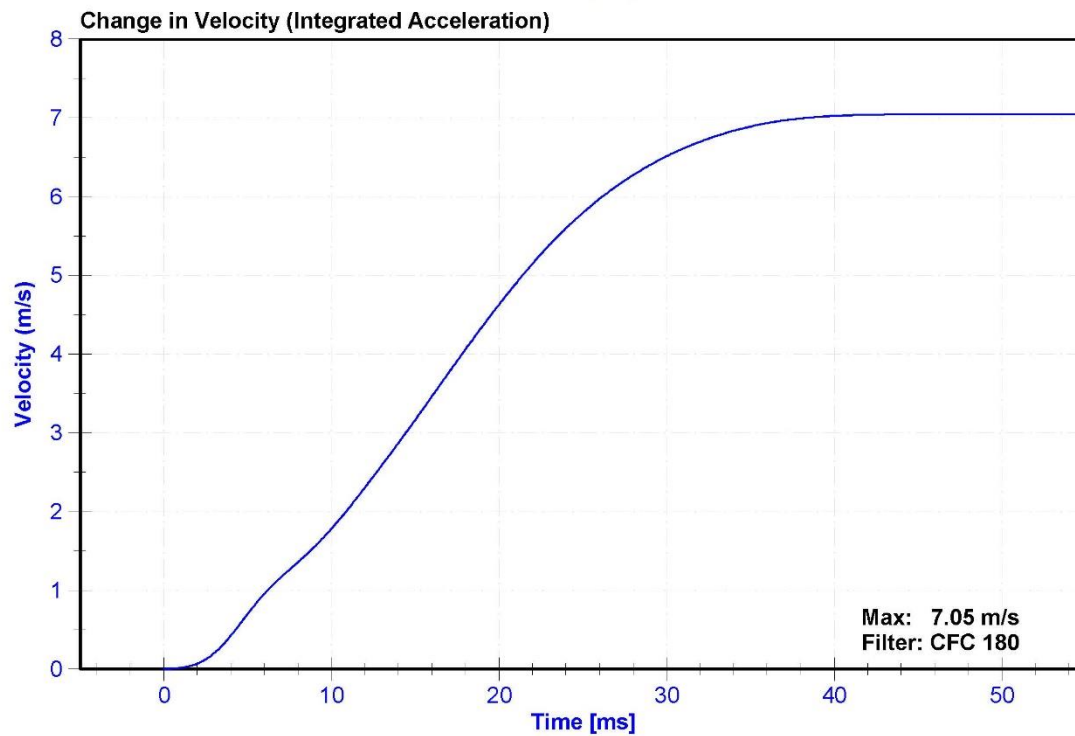
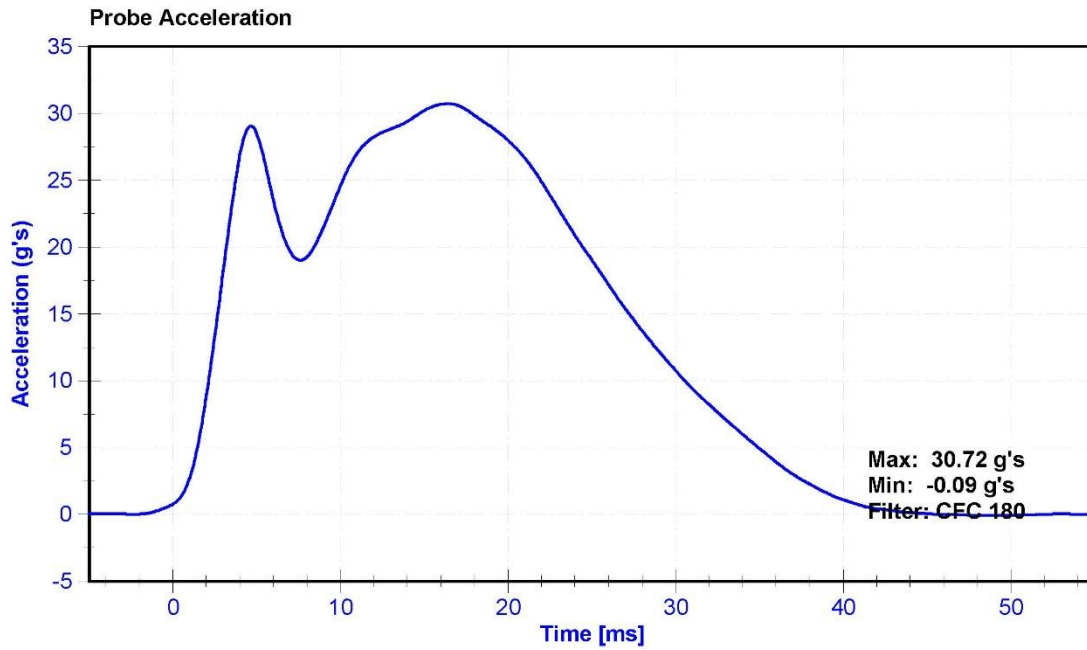
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.4	Pass
Humidity	10	70	%	40.2	Pass
Velocity	6.59	6.83	m/s	6.684	Pass
Chest Deflection	-58	-50	mm	-52.5	Pass
Maximum Resistive Force (50 to 58mm)	3900	4400	N	4183.8	Pass
Maximum Resistive Force (18 to 50mm)	0	4600	N	4174.9	Pass
Hysteresis	69	85	%	71.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	4/17/2018
Chest Potentiometer	SERVO 14CB1-2897	DS-288	10/25/2017	10/25/2018







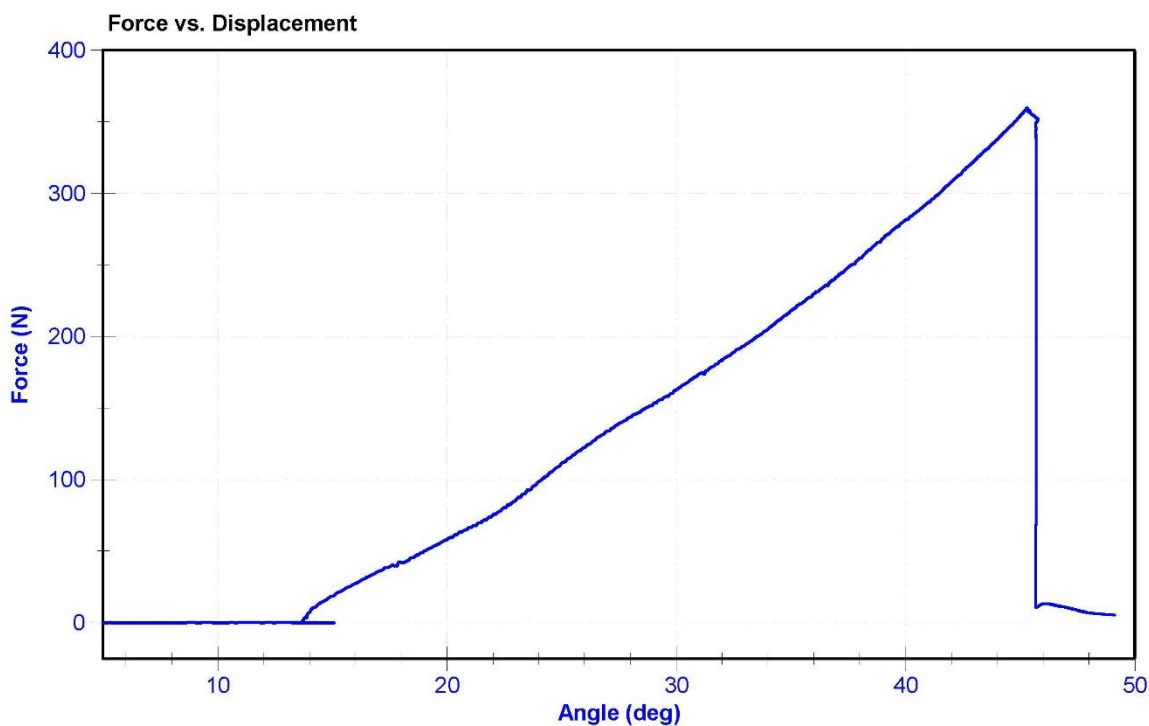
ATD Manufacturer	FTSS	Test Technician	K. Brogan
ATD Serial Number	288	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.6	25.6	°C	21.2	Pass
Humidity	10	70	%	49.6	Pass
Initial Angle	0	20	deg	13.6	Pass
Force at 45 Degrees	320	390	N	359.5	Pass
Return Angle Relative to Initial	0	8	deg	6.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	Rieker N4C-1	DS-13051548	10/6/2017	10/6/2018
Load Cell	Interface SML-200	LC-493319	10/7/2017	10/7/2018



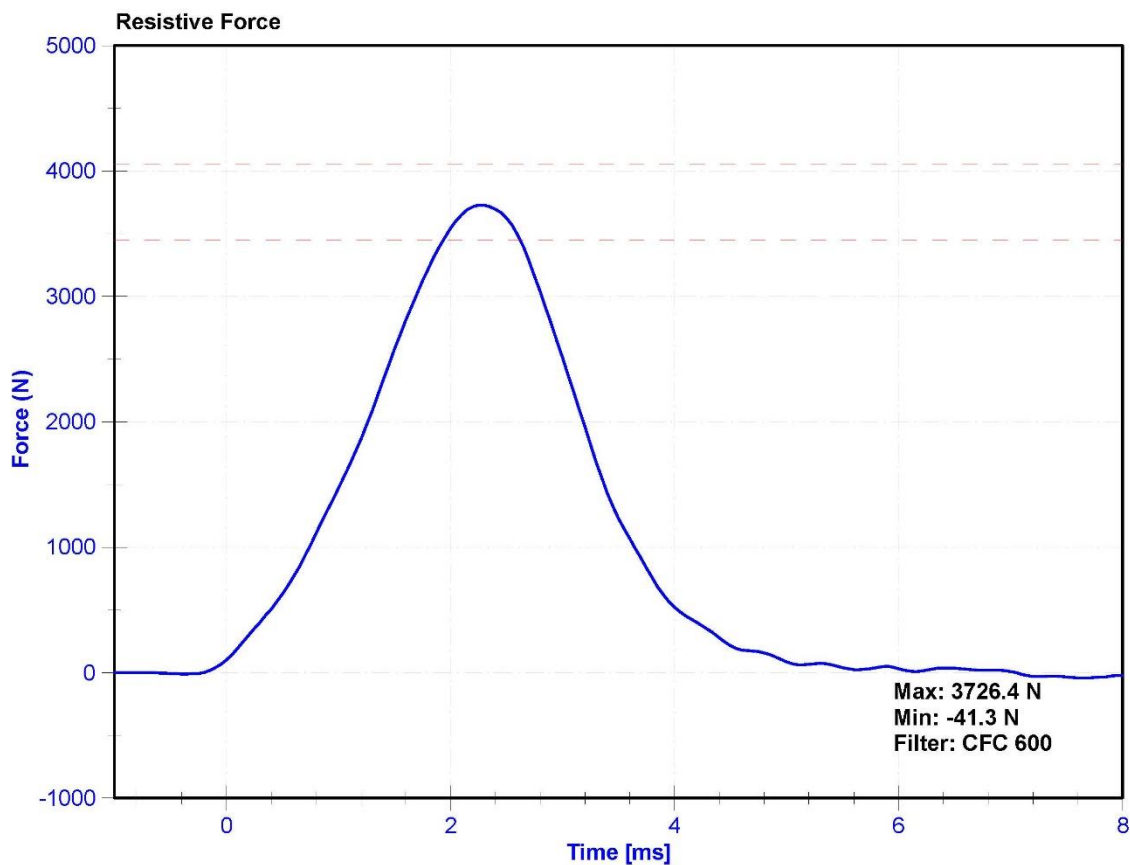
ATD Manufacturer	FTSS	Test Technician	M. Goehle
ATD Serial Number	288	Laboratory Supervisor	M. Goehle

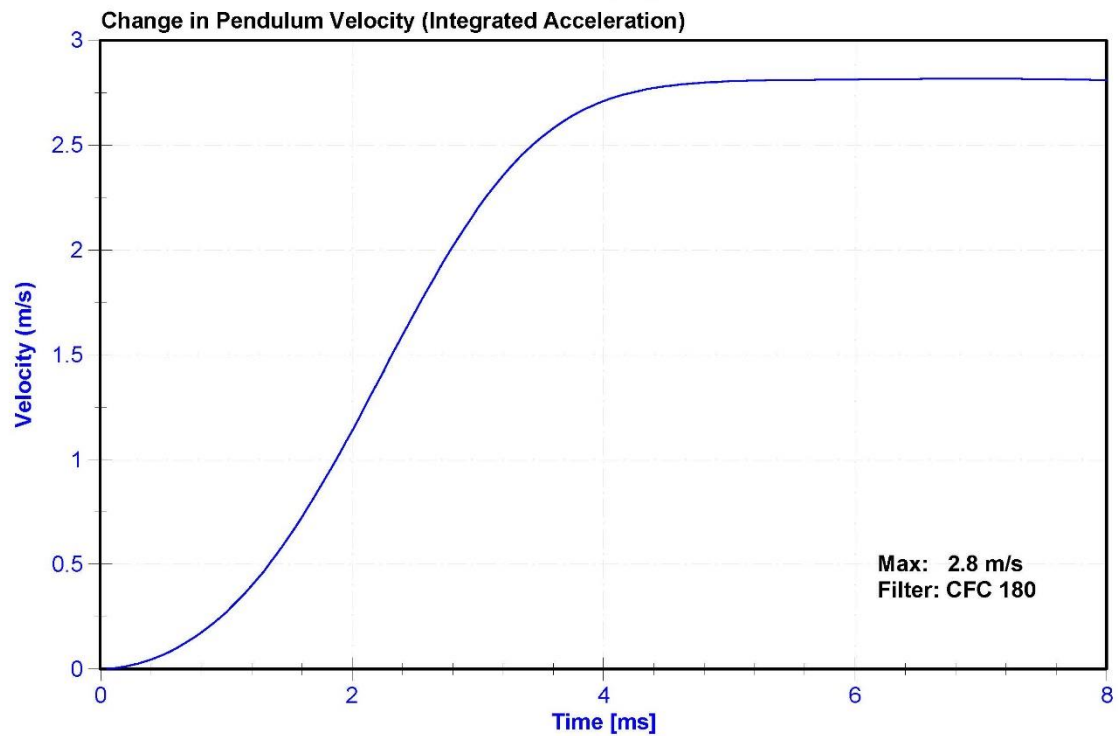
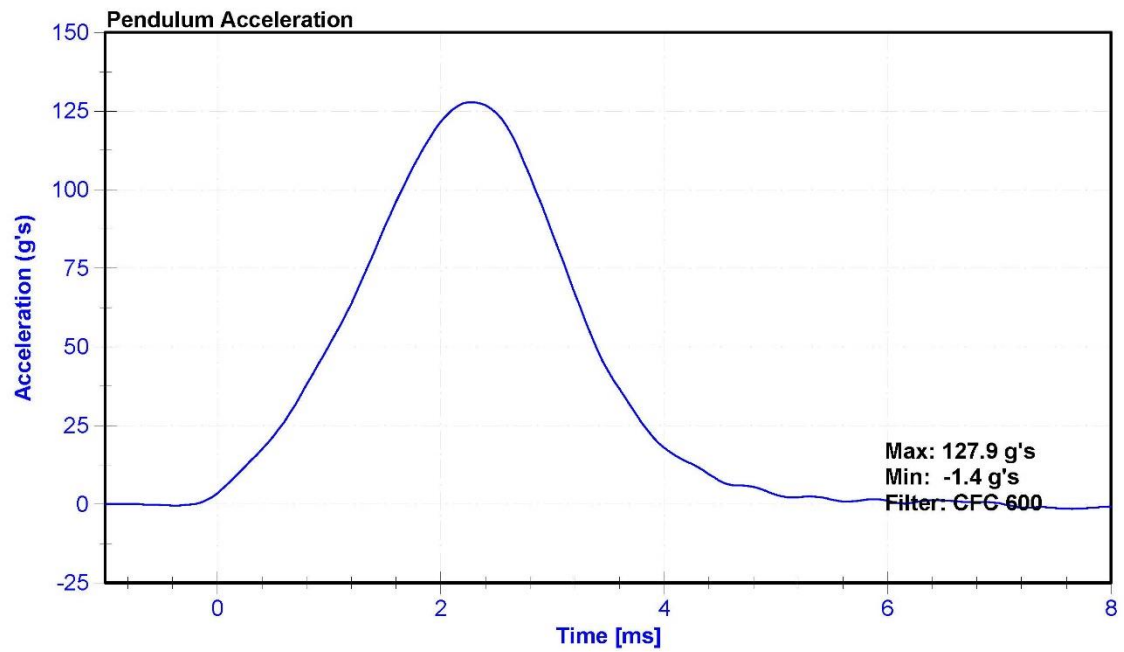
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	20.7	Pass
Humidity	10	70	%	34.4	Pass
Velocity	2.07	2.13	m/s	2.104	Pass
Resistive Force	3450	4060	N	3726.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	4/17/2018





ATD Manufacturer	FTSS	Test Technician	M. Goehle
ATD Serial Number	288	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	20.7	Pass
Humidity	10	70	%	34.4	Pass
Velocity	2.07	2.13	m/s	2.102	Pass
Resistive Force	3450	4060	N	3509.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	4/17/2018

