REPORT NUMBER: NCAP-CAL-15-006

NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST

Ford Motor Co.
2015 Ford Focus
Four Door Sedan

NHTSA No: M20150222

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

April 10, 2015

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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Prepared by:  Date: April 10, 2015
Vanessa Walsh, Project Engineer

Approved by:  Date: April 10, 2015
Edward J. Dutton, Test Engineer Director
Transportation Test Operations

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

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15. Supplementary Notes		

16. Abstract

A 56.30 km/h (35 mph), NCAP Frontal Impact Test was conducted on a 2015 Ford Focus four door sedan 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 February 13, 2015.

The impact velocity of the vehicle was 56.64 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 393 mm at C4 to right of the vehicles centerline. The test vehicle's occupant performance data is as follows:

Measurement Description	Units	Driver ATD (Serial No. 1046)		Passenger ATD (Serial No. 139)	
		Threshold	Result	Threshold	Result
Head Injury Criteria (HIC_{15})		700	201.312	700	207.157
Maximum Chest Compression	mm	63	-17.359	52	-15.838
Nij		1	0.313	1	0.395
Neck Tension	N	4,170	1064.823	2,620	768.727
Neck Compression	N	4,000	-238.292	2,520	-182.620
Left Femur Force	N	10,008	-745.233	6,805	-1798.465
Right Femur Force	N	10,008	-1111.461	6,805	-1008.790

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Form DOT F1700.7 (8-69)

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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 August 2013.

SUMMARY

A ridged fixed barrier was impacted by a 2015 Ford Focus four door sedan at a velocity of 56.64 km/h. The test was performed at Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on February 13, 2015. 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. 1046) and the right-front passenger (position 2) ATD (Serial No. 139) 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 393 mm at C4 to the right of the vehicles centerline. 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 airbag.

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})	201.312	0.313	1064.823	-238.292	49.840	-17.359	-745.233	-1111.461
Passenger (5^{th})	207.157	0.395	768.727	-182.620	54.059	-15.838	-1798.465	-1008.790

GENERAL COMMENTS:

1. P1 (Driver) serial number - 1046
2. P2 (Passenger) serial number - 139

Data Anomalies:

- None

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: 2015 Ford Focus four door sedan
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: M20150222
Test Date: 2/13/2015

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20150222
Model Year	2015
Make	Ford
Model	Focus
Body Style	Four Door Sedan
VIN	1FADP3F27FL200555
Body Color	Charcoal Gray
Odometer Reading (km /mi)	225.3 / 140 mi
Engine Displacement (L)	2.0
Type / No. Cylinders	I4
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	6-Speed
Overdrive	Yes
Final Drive	Front Wheel Drive
Roof Rack	No
Sunroof / T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	No
Anti-Lock Brakes (ABS)	Yes
Automatic Door Locks (ADLs)	Yes

Traction Control System (TCS)	Yes
Power Steering	Yes
Power Window Auto-Reverse	No
Driver Frontal Airbag	Yes
Driver Curtain Airbag	Yes
Driver Head/Torso Airbag	No
Driver Torso Airbag	No
Driver Torso/Pelvis Airbag	Yes
Driver Pelvis Airbag	No
Driver Knee Airbag	Yes
Front Pass. Frontal Airbag	Yes
Front Pass. Curtain Airbag	Yes
Front Pass. Head/Torso Airbag	No
Front Pass. Torso Airbag	No
Front Pass. Torso/Pelvis Airbag	Yes
Front Pass. Pelvis Airbag	No
Front Pass. Knee Airbag	No
Driver Pretensioner	Yes
Driver Load Limiter	Yes
Front Pass. Pretensioner	Yes
Front Pass. Load Limiter	Yes
Other	-

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

DATA FROM CERTIFICATION LABEL

Manufactured By	Ford Motor Co.
Date of Manufacture	12/14

GVWR (kg)	1810
GAWR Front (kg)	972
GAWR Rear (kg)	880

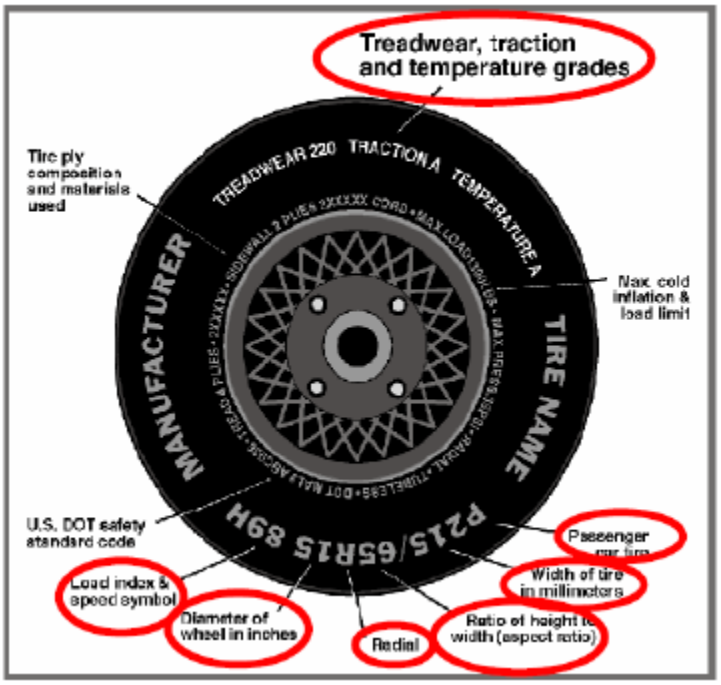
VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench	-	
Number of Occupants	2	3	-	5
Capacity Wt. (VCW) (kg)				375
Cargo Wt. (RCLW) (kg)				34.8

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

Test Vehicle:	2015 Ford Focus four door sedan	NHTSA No.:	M20150222
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	2/13/2015

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)	250	250
Recommended Tire Size	P215/55R16	P215/55R16
Tire Size on Vehicle	P215/55R16	P215/55R16
Tire Manufacturer	Continental	Continental
Tire Model	Conti Touring Contact	Conti Touring Contact
Treadwear	360	360
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	1 Polyester, 2 Steel, 1 Polyamide	1 Polyester, 2 Steel, 1 Polyamide
Load Index / Speed Symbol	93H	93H
Tire Material	Rubber	Rubber
DOT Safety Code Left	A3B347PB4814	A3B347PB4814
DOT Safety Code Right	A3B347PB4614	A3B347PB4814

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

Test Vehicle: 2015 Ford Focus four door sedan NHTSA No.: M20150222
Test Program: NCAP Frontal Barrier Impact Test Test Date: 2/13/2015

TEST VEHICLE WEIGHTS

	Units	As Delivered Weights (UVW)			As Tested Weights (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	415	266		452	323	
Right	kg	394	287		429	331	
Ratio	%	59%	41%		57%	43%	
Totals	kg	809	553	1362	881	654	1535

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1362	(A)
Weight of 1 P572E ATD & 1 P572O ATD	kg	147	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	34.8	(C)
Calculated Vehicle Target Weight (TVTW)	kg	1543.8	(A+B+C)

TEST VEHICLE ATTITUDES AND CG

Condition	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	683	679	689	686	1077
As Tested	mm	677	673	669	665	1130
Post-Test	mm	728	690	691	647	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2653
Total Vehicle Length at Left Side	mm	4409
Total Vehicle Length at Centerline	mm	4543
Total Vehicle Length at Right Side	mm	4410
Weight of Ballast in Cargo Area	kg	0
Weight of Vehicle Components Removed	kg	53
Amount of Stoddard Solvent in Fuel Tank	L	43.6

LIST OF COMPONENTS REMOVED TO MEET TEST WEIGHT:

Trunk carpeting, spare tire, jack, tail light, and rear seats.

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

Test Vehicle: 2015 Ford Focus four door sedan NHTSA No.: M20150222
Test Program: NCAP Frontal Barrier Impact Test Test Date: 2/13/2015

TARGET VEHICLE STRUCTURAL MEASUREMENT

No.	Description	Pre-Test
1	Total Length	4543
2	Total Width	1785
3*	Bumper Top Height	491
4*	Bumper Bottom Height	405
5*	Longitudinal Member Top Height	570
6	Distance Between Longitudinal Members	1086
7	Longitudinal Member Width	94
8*	Engine Top Height	793
9*	Engine Bottom Height	187
10	Engine and Gearbox Width	500
11	Front Bumper-Engine Distance	574
12*	Front Shock Absorber Fixing Height	852
13*	Bonnet Leading Edge Height	757
14	Front Shock Absorber Fixing Width	1098
15	Front Bumper – Front Axle Distance	901
16	Front Axle – A Pillar Distance	488
17	A-Pillar – B-Pillar Distance	1060
18	B-Pillar – Rear Axle Distance	1101
19	B-Pillar – C-Pillar Distance	941
20*	Roof Sill Bottom Height	1357
21*	Roof Sill Top Height	1405
22*	Floor Sill Bottom Height	329
23*	Floor Sill Top Height	353

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

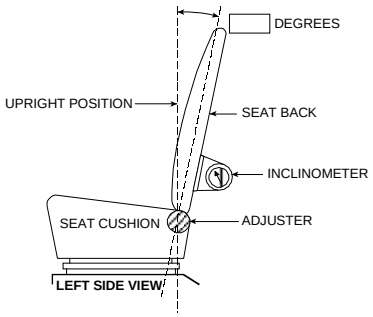
DATA SHEET NO. 2
SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

Test Vehicle:	2015 Ford Focus four door sedan	NHTSA No.:	M20150222
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	2/13/2015

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	4.5
Passenger Seat Back Angle	3.6



FRONT SEAT ASSEMBLY

SEAT FORE / AFT POSITIONS

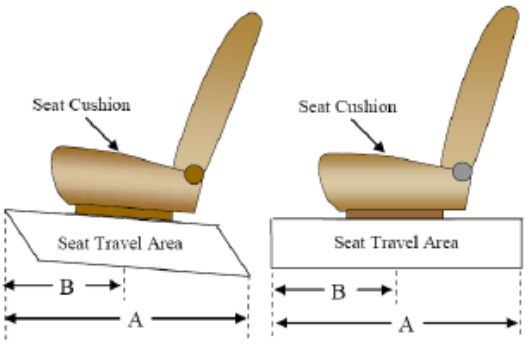
The driver's seat was positioned at the mid-point of fore/aft travel at its lowest position. The passenger's seat was positioned at the most forward position of fore/aft travel. Zero is defined as the forward most position.

Seating Position	Total Fore / Aft Travel	Placed in Position #
Driver Seat	38 (0-37)	15
Passenger Seat	38 (0-37)	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	0 – Uppermost
Passenger Seat	4	0 – Uppermost



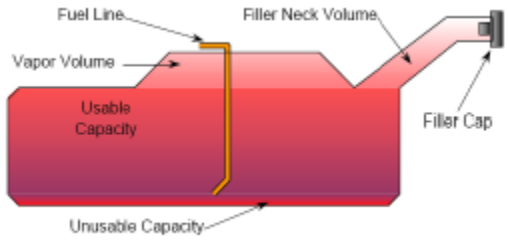
Test Vehicle: 2015 Ford Focus four door sedan NHTSA No.: M20150222
Test Program: NCAP Frontal Barrier Impact Test Test Date: 2/13/2015

FUEL TANK CAPACITY

Description	Liters
Usable Capacity of "Standard Tank"	46.9
Usable Capacity of "Optional Tank"	N/A
92%-94% of Usable Capacity	43.1 – 44.1
Actual Amount of Solvent Used	43.6
1/3 of Usable Capacity	15.6

FUEL PUMP

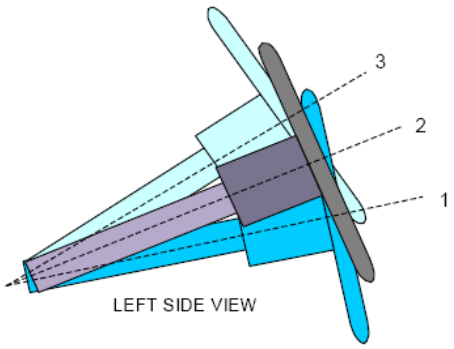
The vehicle is equipped with an electric fuel pump. The fuel filler neck is on the left side of the vehicle. The pump creates positive pressure in the fuel lines, pushing the gasoline to the engine. See form 1 for more information.



VEHICLE FUEL TANK ASSEMBLY

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

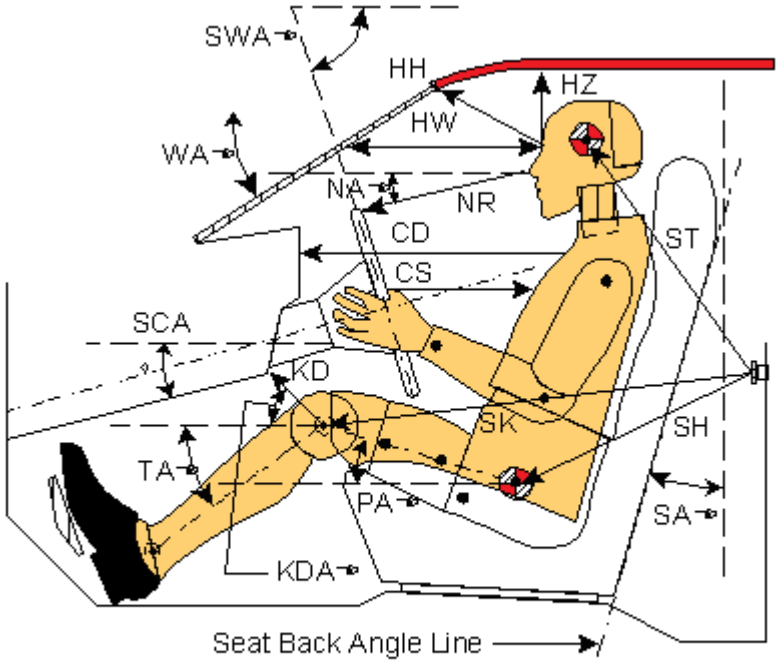
STEERING COLUMN POSITIONS

Description	Degrees	Fore / Aft Position (mm)
Lowermost position No. 1	19.9	
Geometric center position No. 2	22.9	
Uppermost position No. 3	25.9	
Telescoping Steering Wheel Travel		40
Test Position	22.9	20

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2015 Ford Focus four door sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20150222
Test Date: 2/13/2015



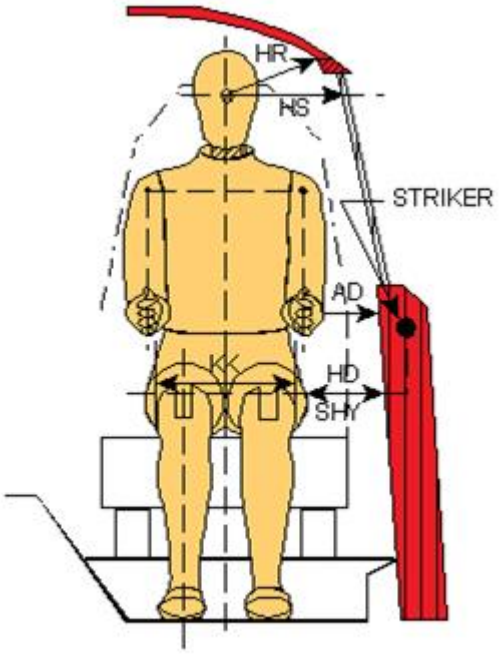
Left Side View

Code	Measurement Description	Driver (SN: 1046)		Passenger (SN: 139)	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		-22.6		
SWA°	Steering Wheel Angle		23		
SCA°	Steering Column Angle		67		
SA°	Seat Back Angle (on headrest post)		3.9		3.3
HZ	Head to Roof (Z)	224	90	226	90
HH	Head to Header	382	31.6	310	48.3
HW	Head to Windshield	796	0	729	0
NR	Nose to Rim	394	1.8	421	37.2
CD	Chest to Dash	555		355	
CS	Chest to Steering Hub	335	4.1		
RA	Rim to Abdomen	210	0		
KDL	Left Knee to Dash	155	36.7	85	38.3
KDR	Right Knee to Dash	165	37.5	95	38.2
PA°	Pelvic Angle		24.1		21.4
TA°	Tibia Angle		-32.5		-37.3
SK	Striker to Knee	523	0	648	-2.0
ST	Striker to Head	502	-85.9	508	-69.2
SH	Striker to H-Point	238	-44.4	346	-17.6

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2015 Ford Focus four door sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20150222
Test Date: 2/13/2015

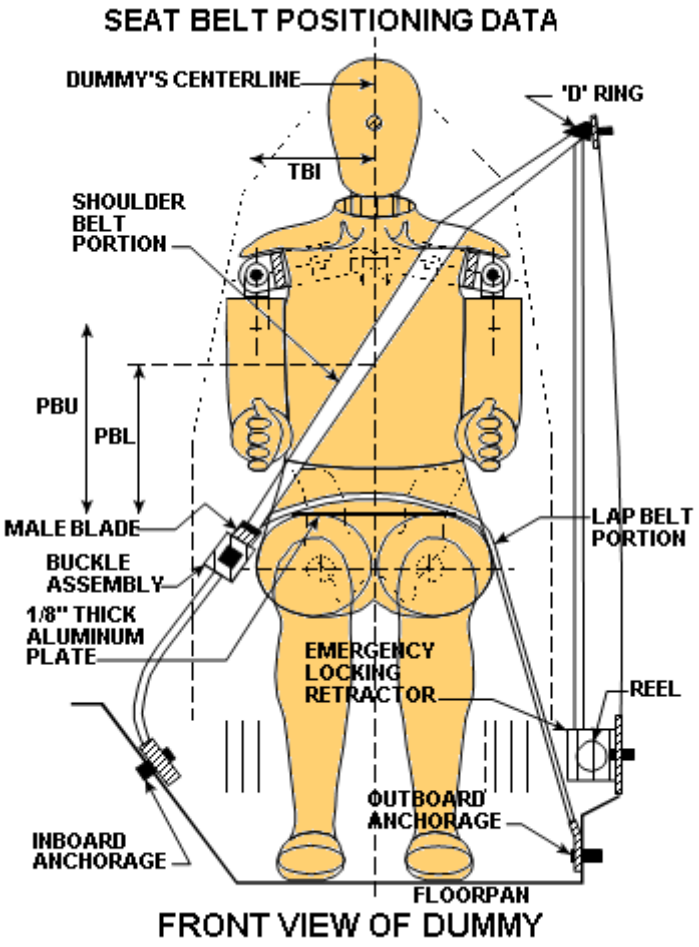


Front View

Code	Description	Driver (mm)	Passenger (mm)
AD	Arm to Door	122	84
HD	H-Point to Door	161	230
HR	Head to Side Header	227	250
HS	Head to Side Window	350	370
KK	Knee to Knee	315	165
SHY	Striker to H-Point (Y Direction)	240	250
AA	Ankle to Ankle	335	168

DATA SHEET NO. 5
SEAT BELT POSITIONING DATA

Test Vehicle:	2015 Ford Focus four door sedan	NHTSA No.:	M20150222
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	2/13/2015



SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU — Top surface of reference to belt upper edge	mm	340	310
PBL — Top surface of reference to belt lower edge	mm	260	235

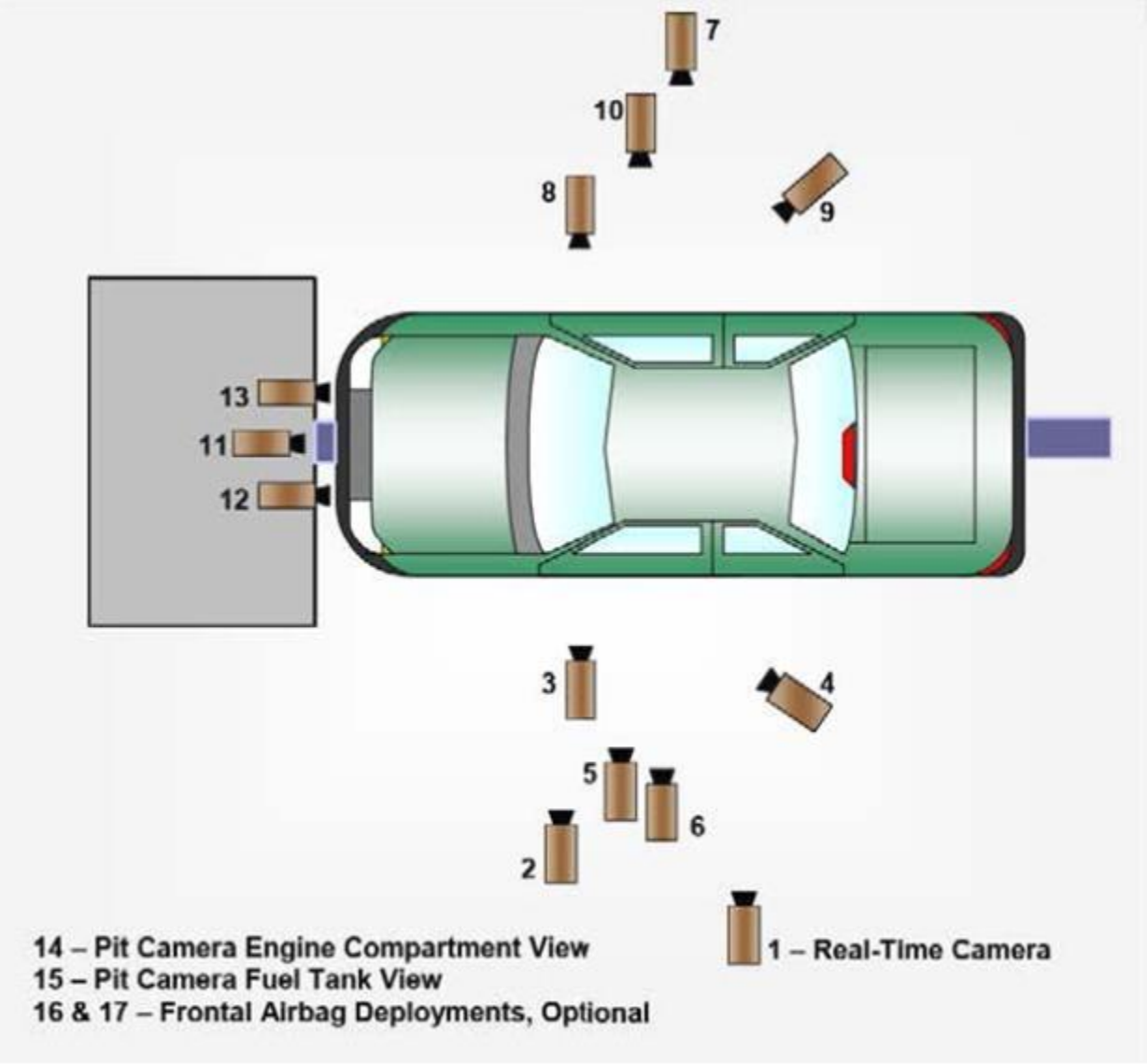
BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Shoulder belt length as measured on ATD	mm	810	895
Lap Belt Length as measured on ATD	mm	590	695
Remainder of belt on reel	mm	1150	910
Total belt length for continuous webbing systems	mm	2550	2500

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

Test Vehicle:	2015 Ford Focus four door sedan	NHTSA No.:	M20150222
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	2/13/2015

CAMERA POSITIONS FOR FRONTAL IMPACTS



Top View

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

Test Vehicle: 2015 Ford Focus four door sedan NHTSA No.: M20150222
Test Program: NCAP Frontal Barrier Impact Test Test Date: 2/13/2015

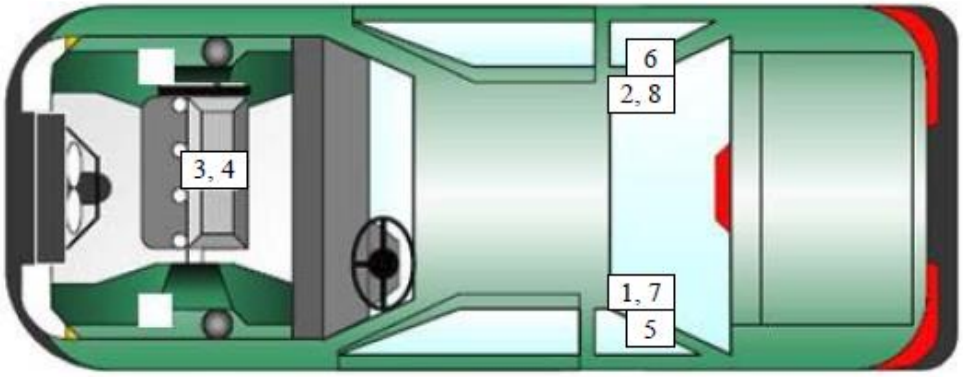
CAMERA LOCATIONS

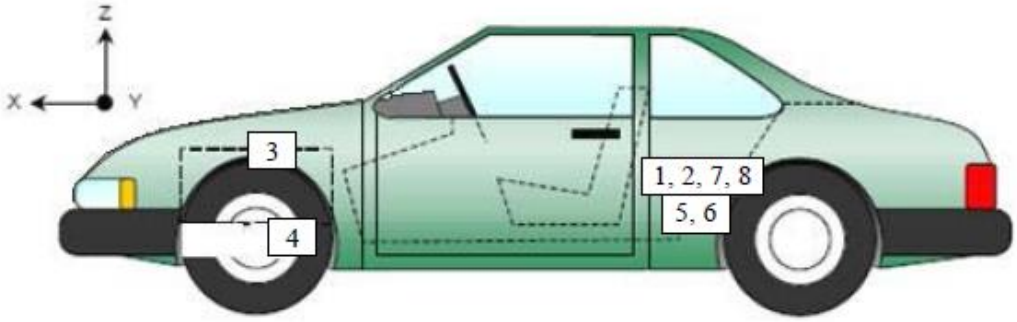
No.	Camera View	Location (mm)			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Overall	-	-	-		60
2	Driver Close-Up	-1717	-7962	-1591	50	1000
3	Left Front Half	-767	-8886	-1667	50	1000
4	Left Angle	-2725	-2926	-2155	24	1000
5	Steering Column - Top					
6	Steering Column - Bottom					
7	Right Overall	-2265	8752	-1192	28	1000
8	Passenger Close-Up	-1546	6879	-1149	50	1000
9	Right Front Half	-888	6435	-1114	28	1000
10	Right Angle	-2774	2869	-2235	24	1000
11	Windshield	954	0	-3505	20	1000
12	Driver Windshield	395	-600	-2051	25	1000
13	Passenger Windshield	395	600	-2051	25	1000
14	Pit Front	-967	0	2041	12.5	1000
15	Pit Rear	-2047	0	2050	12.5	1000
16	Onboard Driver Airbag (Optional)				12.5	1000
17	Onboard Passenger Airbag (Optional)				12.5	1000

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

DATA SHEET NO. 7
VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2015 Ford Focus four door sedan NHTSA No.: M20150222
Test Program: NCAP Frontal Barrier Impact Test Test Date: 2/13/2015





VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear Accelerometer – X Direction	1875	-584	219
2	Right Rear Accelerometer – X Direction	1869	553	233
3	Engine Top X	3944	298	-211
4	Engine Bottom X	4080	53	319
5	Left Rear Accelerometer – Z Direction	1868	-531	238
6	Right Rear Accelerometer – Z Direction	1877	558	219
7	Left Rear Accelerometer – X Direction Redundant	1875	-584	219
8	Right Rear Accelerometer – X Direction Redundant	1869	553	233

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

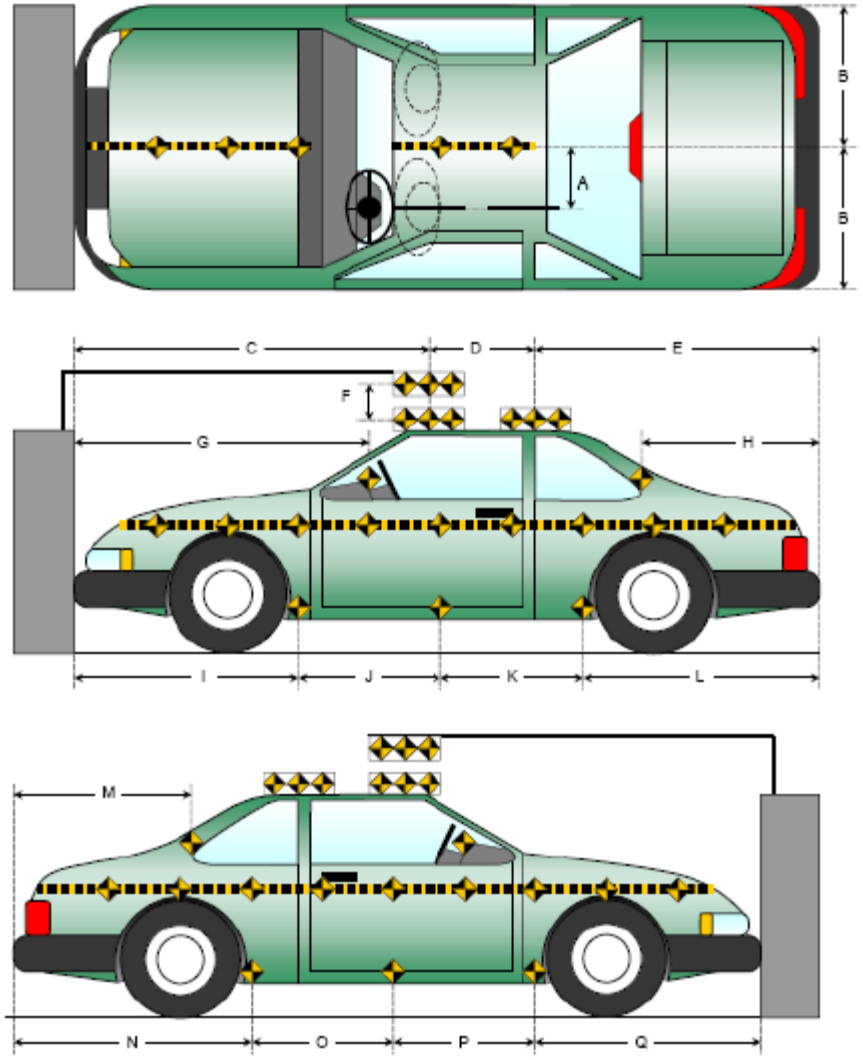
DATA SHEET NO. 8
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2015 Ford Focus four door sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20150222
Test Date: 2/13/2015

Item	Value
A	331
B	892
C	2107
D	609
E	1827
F	127
G	1729
H	1152
I	1331
J	885
K	902
L	1426
M	1155
N	1426
O	900
P	888
Q	1329

All units in millimeters



DATA SHEET NO. 9
LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle:	2015 Ford Focus four door sedan	NHTSA No.:	M20150222
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	2/13/2015

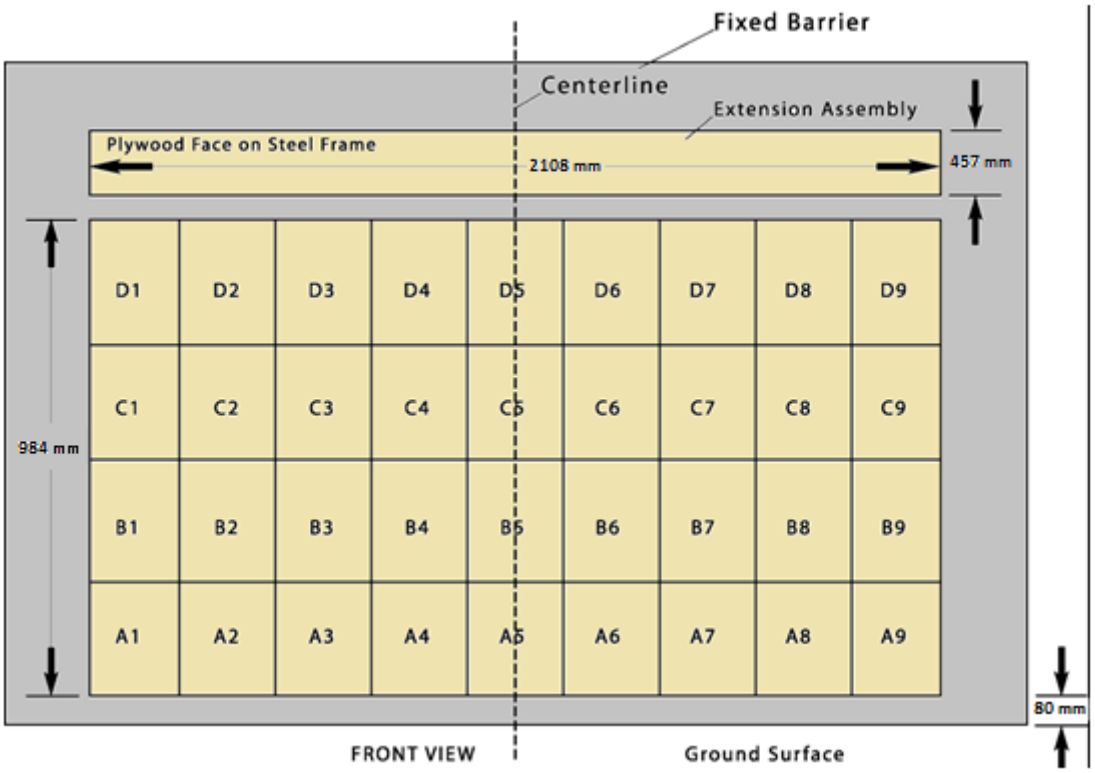


Figure 1 - Load Cell Locations on a 36-Load Cell Barrier with Plywood Height Extension*

DATA SHEET NO. 10
TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle: 2015 Ford Focus four door sedan NHTSA No.: M20150222
Test Program: NCAP Frontal Barrier Impact Test Test Date: 2/13/2015

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: 2015 Ford Focus four door sedan NHTSA No.: M20150222
Test Program: NCAP Frontal Barrier Impact Test Test Date: 2/13/2015

TEST DUMMY INFORMATION AND CONTACT LOCATIONS

Description	Driver	Passenger
Dummy Type / Serial No.	P572E 50th Male / 1046	P5720 5th Female / 139
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

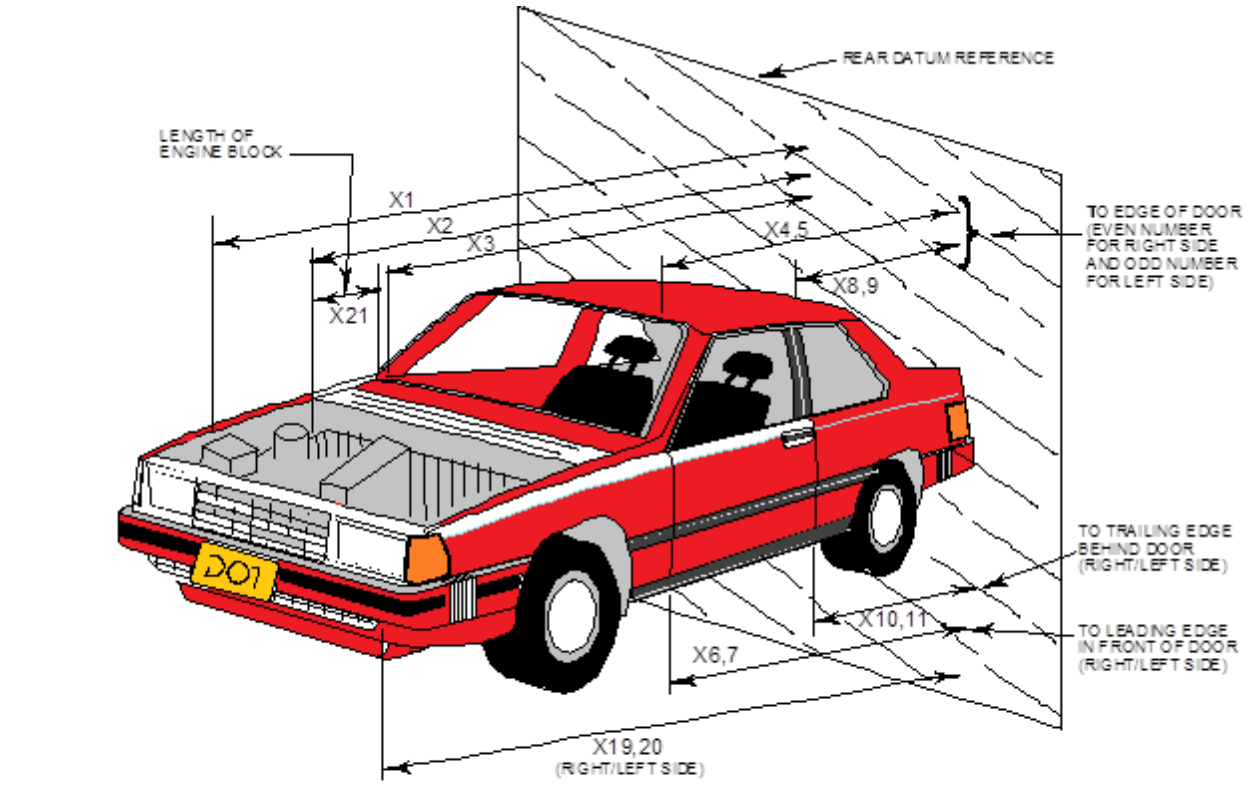
Measured Parameter	Units	Value
Left Side	mm	1045
Center	mm	1052
Right Side	mm	1038
Average	mm	1045

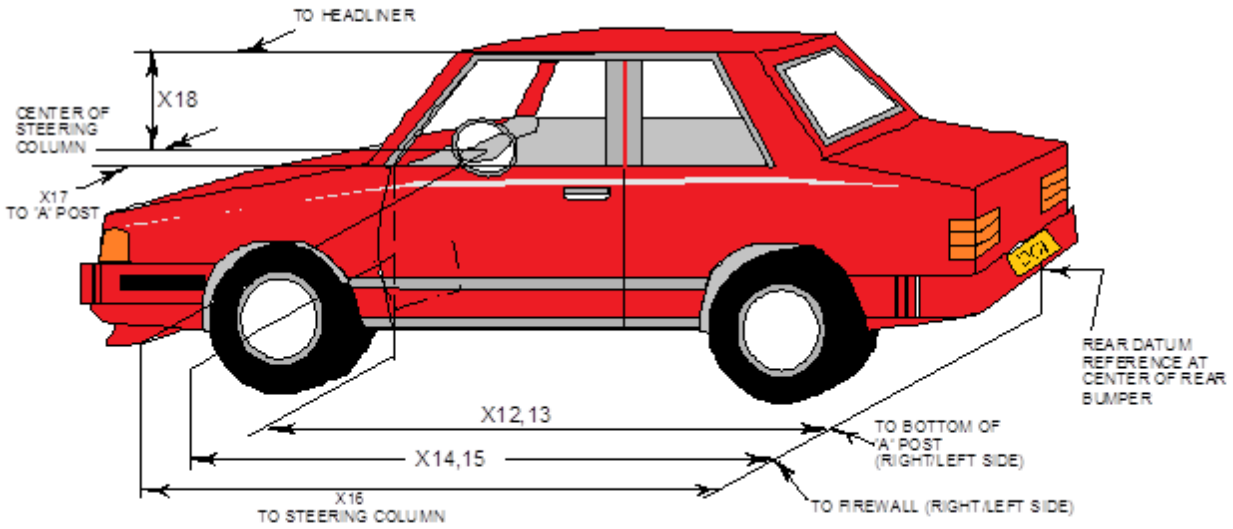
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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:	2015 Ford Focus four door sedan	NHTSA No.:	M20150222
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	2/13/2015





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

Test Vehicle: 2015 Ford Focus four door sedan NHTSA No.: M20150222
Test Program: NCAP Frontal Barrier Impact Test Test Date: 2/13/2015

No.	Measurement Description	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	4543	4153	-390
2	Rear Surface of Vehicle (RSOV) to Front of Engine	3969	3644	-325
3	RSOV to Firewall	3611	3593	-18
4	RSOV to Upper Leading Edge of Right Door	3149	3145	-4
5	RSOV to Upper Leading Edge of Left Door	3150	3151	1
6	RSOV to Lower Leading Edge of Right Door	3141	3134	-7
7	RSOV to Lower Leading Edge of Left Door	3138	3139	1
8	RSOV to Upper Trailing Edge of Right Door	2094	2091	-4
9	RSOV to Upper Trailing Edge of Left Door	2094	2096	2
10	RSOV to Lower Trailing Edge of Right Door	2109	2101	-8
11	RSOV to Lower Trailing Edge of Left Door	2107	2107	0
12	RSOV to Bottom of “A” Post of Right Side	3439	3435	-4
13	RSOV to Bottom of “A” Post of Left Side	3433	3433	0
14	RSOV to Firewall, Right Side	3588	3583	-5
15	RSOV to Firewall, Left Side	3588	3587	-1
16	RSOV to Steering Column	2686	2757	71
17	Center of Steering Column to “A” Post	289	278	-12
18	Center of Steering Column to Headliner	402	402	0
19	RSOV to Right Side of Front Bumper	4457	4097	-361
20	RSOV to Left Side of Front Bumper	4459	4125	-334
21	Length of Engine Block	214	214	0
RD	RSOV to Right Side of Dash Panel	2799	2799	-1
CD	RSOV to Center of Dash Panel	2738	2734	-4
LD	RSOV to Left Side of Dash Panel	2803	2800	-3

*UR= Unrecoverable data point
All Dimensions in mm

DATA SHEET NO. 13
ACCIDENT INVESTIGATION DIVISION DATA

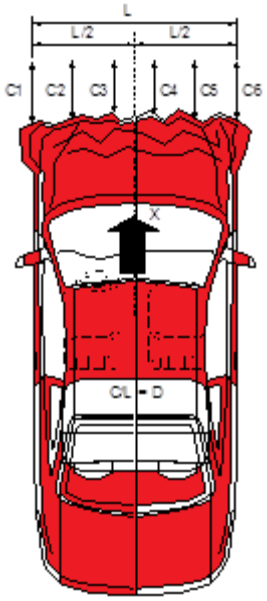
Test Vehicle:	2015 Ford Focus four door sedan	NHTSA No.:	M20150222
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	2/13/2015

VEHICLE INFORMATION

VIN:	1FADP3F27FL200555	Wheelbase (mm):	2653
Vehicle Size Category:	Passenger	Test Weight (kg):	1535

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):	56.64
Velocity Change (km/h):	56.64
Time of Separation (ms):	120



CRUSH PROFILE

Collision Deformation Classification:	12FDEW02
Midpoint of Damage:	Vehicle Centerline
Damage Region Length (mm):	1352
Impact Mode:	Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush Zone 1 at Left Side	mm	4310	4041	269
C2	Crush Zone 2 at Left Side	mm	4499	4149	350
C3	Crush Zone 3 at Left Side	mm	4533	4150	383
C4	Crush Zone 4 at Right Side	mm	4532	4139	393
C5	Crush Zone 5 at Right Side	mm	4496	4126	370
C6	Crush Zone 6 at Right Side	mm	4310	4022	288
L	C1 to C6	mm	1352	1434	-82

DATA SHEET NO. 14
VEHICLE INTRUSION MEASUREMENTS

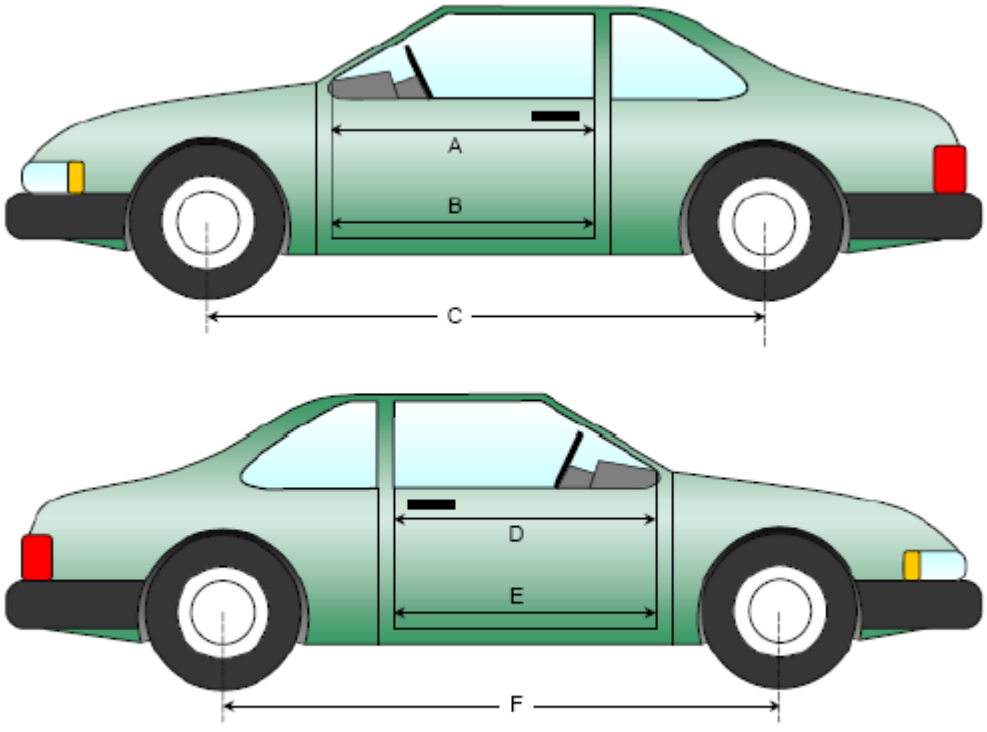
Test Vehicle: 2015 Ford Focus four door sedan
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: M20150222
Test Date: 2/13/2015

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	936	935	-1
B	Left Side Lower	mm	847	846	-1
D	Right Side Upper	mm	934	932	-2
E	Right Side Lower	mm	846	845	-1

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2653	2543	-110
F	Right Side Wheelbase	mm	2653	2556	-97



Left & Right Side Views

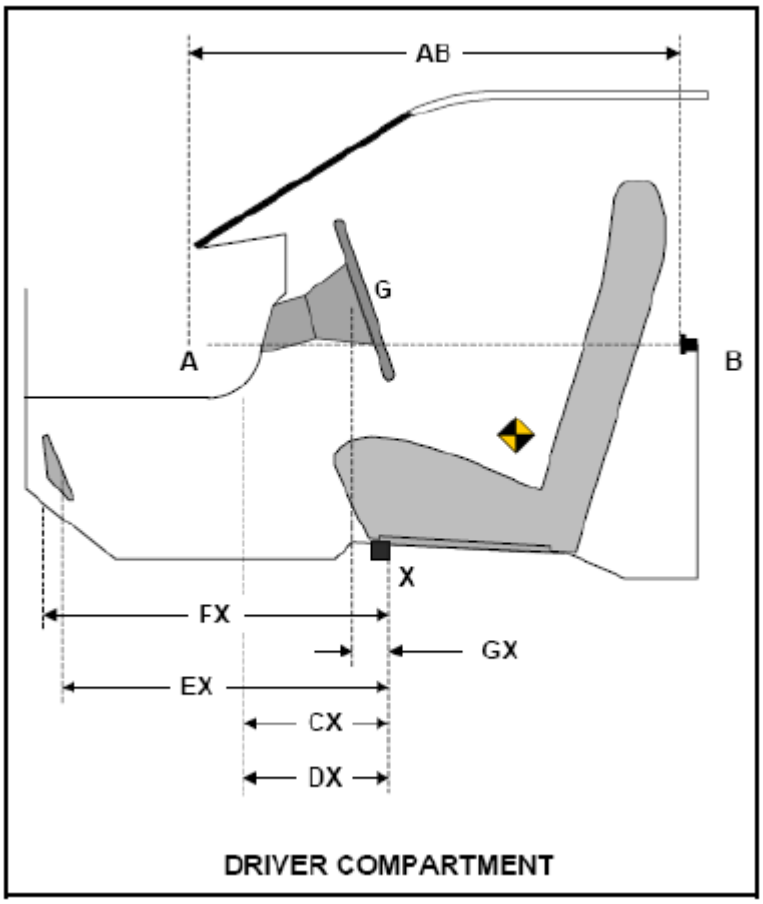
DATA SHEET NO.14 … (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2015 Ford Focus four door sedan
NHTSA No.: M20150222
Test Program: NCAP Frontal Barrier Impact Test
Test Date: 2/13/2015

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	764	763	-1
CX	Left Knee Bolster to X	mm	250	248	-2
DX	Right Knee Bolster to X	mm	246	240	-6
EX	Brake Pedal to X	mm	501	508	7
FX	Foot Rest to X	mm	578	566	-12
GX	Center of Steering Column Wheel Hub to X	mm	49	119	70

X = Front of Seat Track (Stationary)



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

Test Vehicle:	2015 Ford Focus four door sedan	NHTSA No.:	M20150222
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	2/13/2015

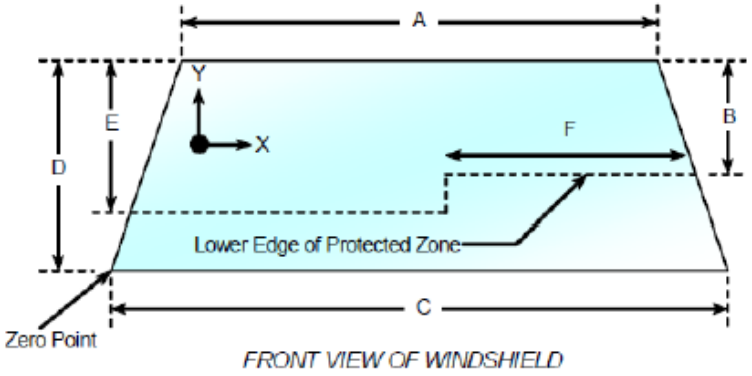
Windshield Mounting Details: A 0.8 mm trim surrounds the top and side of windshield while a plastic shroud is on the bottom.

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	2233	2233	100%
Right Side	2233	2233	100%
Total	4466	4466	100%



FRONT VIEW OF WINDSHIELD

Item	Units	Value
A	mm	1182
B	mm	534
C	mm	1472
D	mm	906
E	mm	596
F	mm	485

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: 2015 Ford Focus four door sedan NHTSA No.: M20150222
Test Program: NCAP Frontal Barrier Impact Test Test Date: 2/13/2015

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 21 ° C Test Time: 11:42 AM

STODDARD SOLVENT SPILLAGE MEASUREMENTS

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

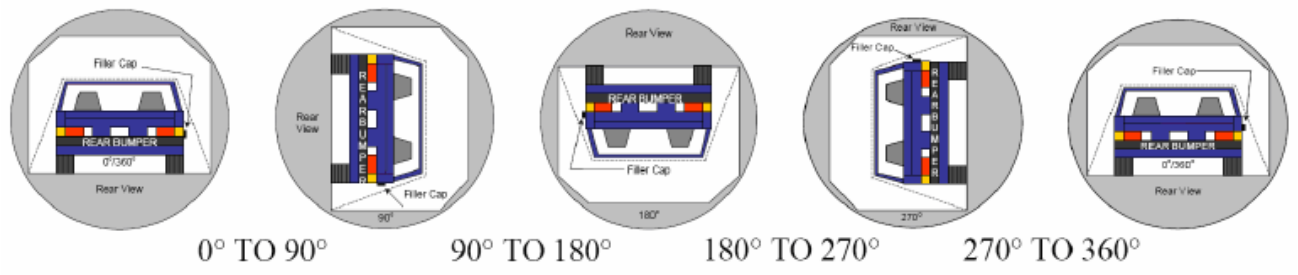
B. For the 5-minute period after motion ceases: 0 oz.
(Maximum allowable is 5 oz.)

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: 2015 Ford Focus four door sedan
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: M20150222
Test Date: 2/13/2015



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°	71	300	371
90° to 180°	69	300	369
180° to 270°	61	300	361
270° to 360°	70	300	370

FMVSS 301 SPILLAGE TABLE

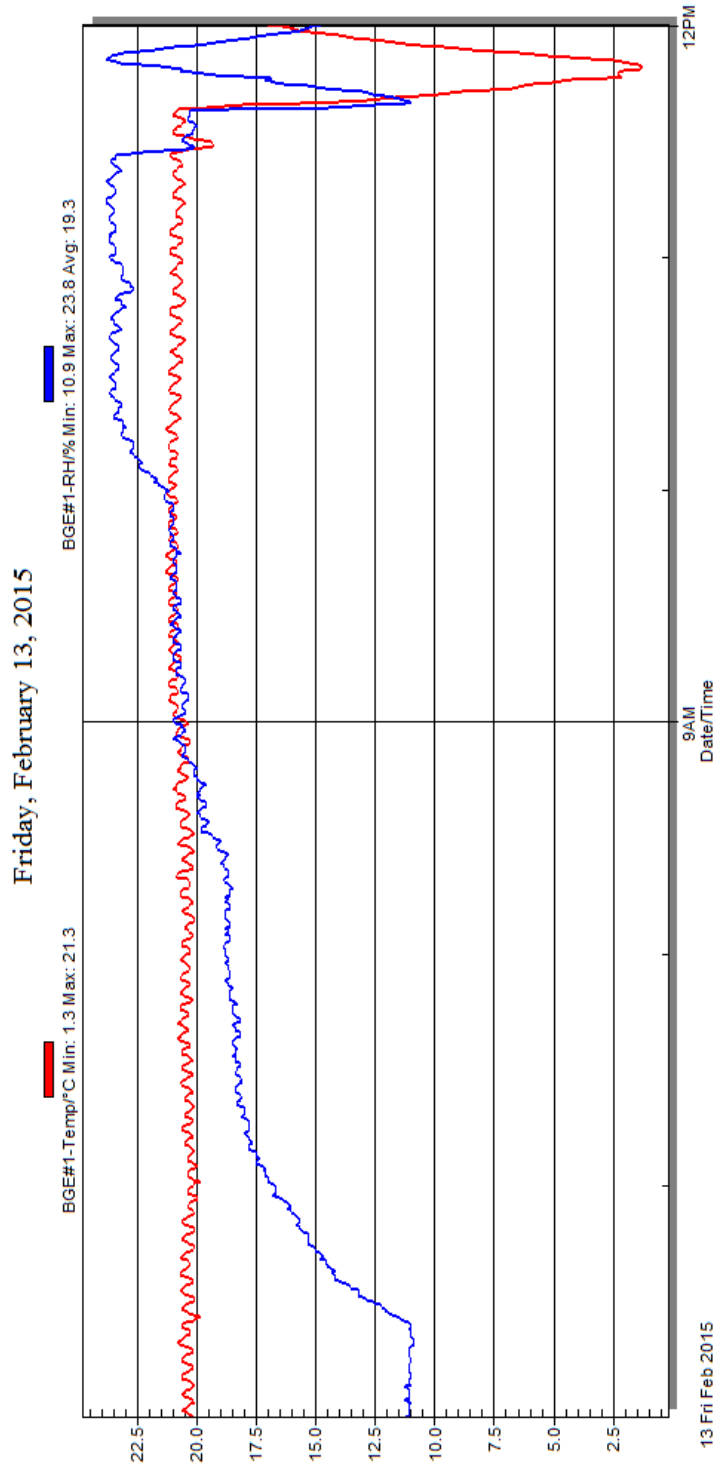
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0° to 90°	0	0	0	
90° to 180°	0	0	0	
180° to 270°	0	0	0	
270° to 360°	0	0	0	

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:	2015 Ford Focus four door sedan	NHTSA No.:	M20150222
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	2/13/2015



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

APPENDIX A

PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

[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.*

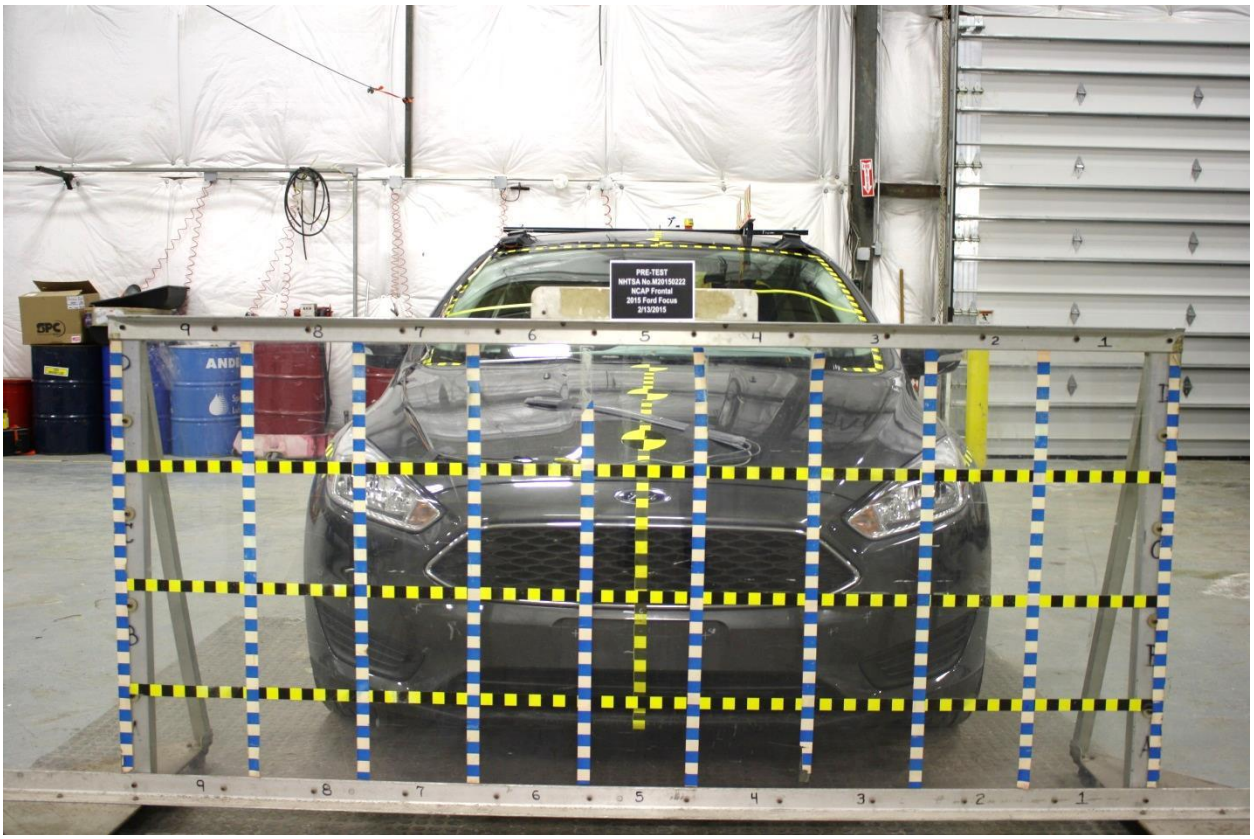


Figure A-1: Load Cell Location

Figure A-2: Load Cell Wall

Figure A-3: Manufacturer's Label

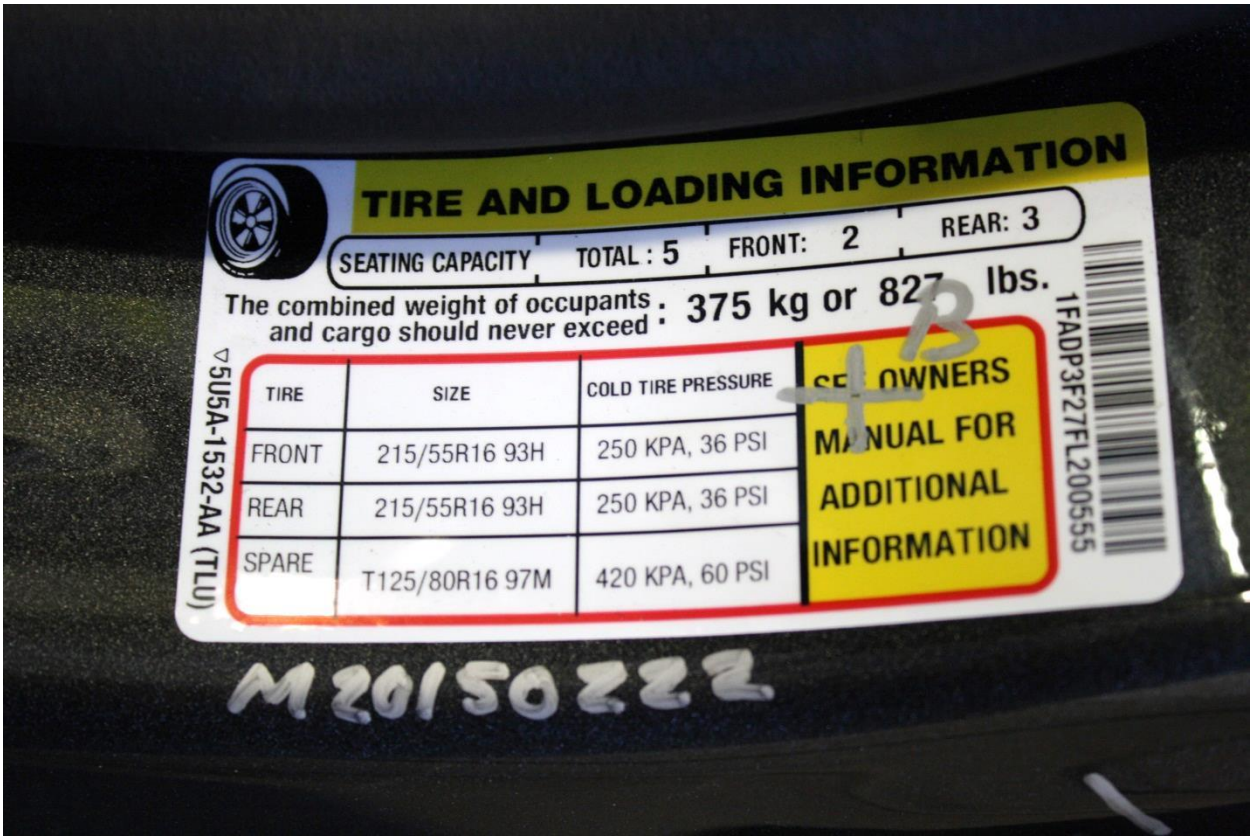


Figure A-4: Tire Placard

Figure A-5: 2015 Ford Focus Frontal As Delivered

Figure A-6: Left Rear 3-4 View, As Received

Figure A-7: Pre-Test Front View of Test Vehicle

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

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

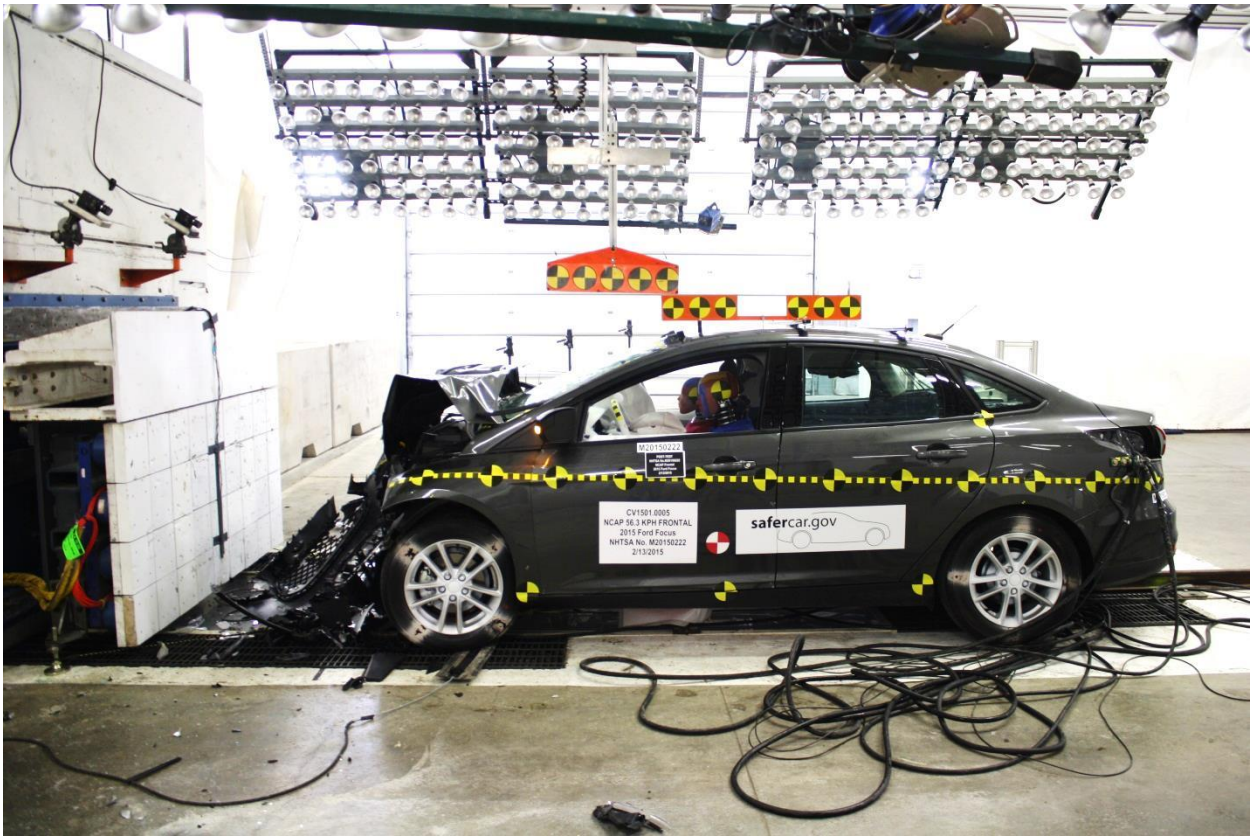


Figure A-10: Post-Test Left View of Test Vehicle

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

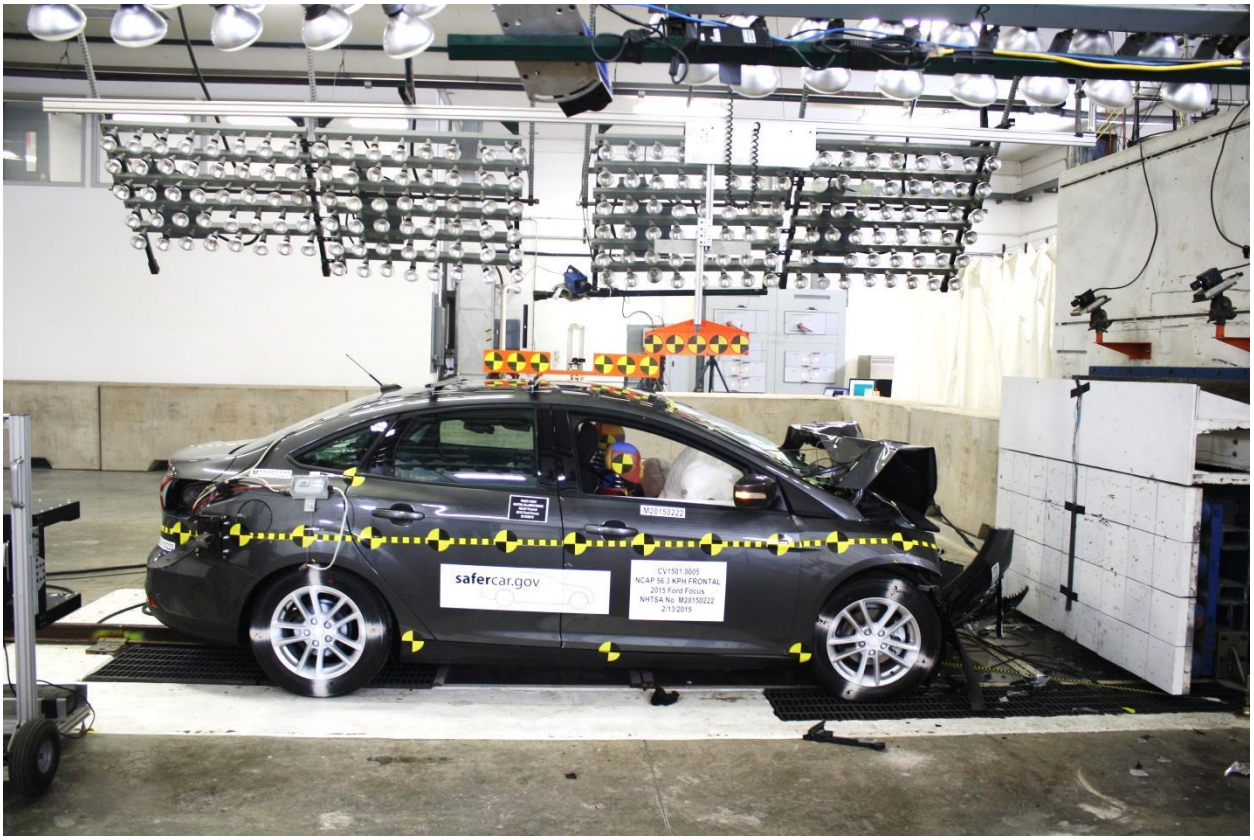


Figure A-12: Post-Test Right View of Test Vehicle

Figure A-13: Pre-Test Right Front 3-4 View

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

Figure A-15: Pre-Test Left Rear 3-4 View

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

Figure A-17: Pre-Test Windshield View

Figure A-18: Post-Test Windshield View

Figure A-19: Pre-Test Engine Compartment View

Figure A-20: Post-Test Engine Compartment View

Figure A-21: Pre-Test Fuel Filler Cap View

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

Figure A-23: Pre-Test Front Underbody View

Figure A-24: Post-Test Front Underbody View

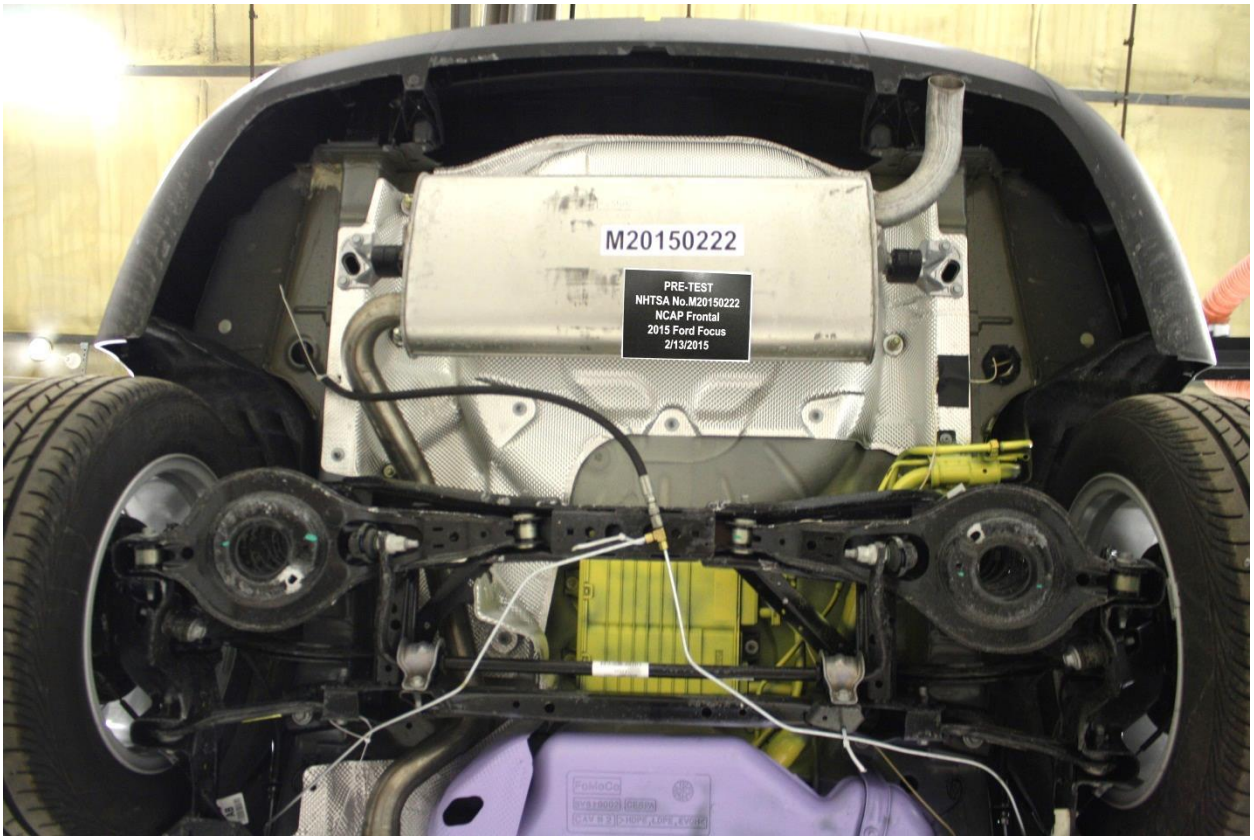


Figure A-25: Pre-Test Rear Underbody View

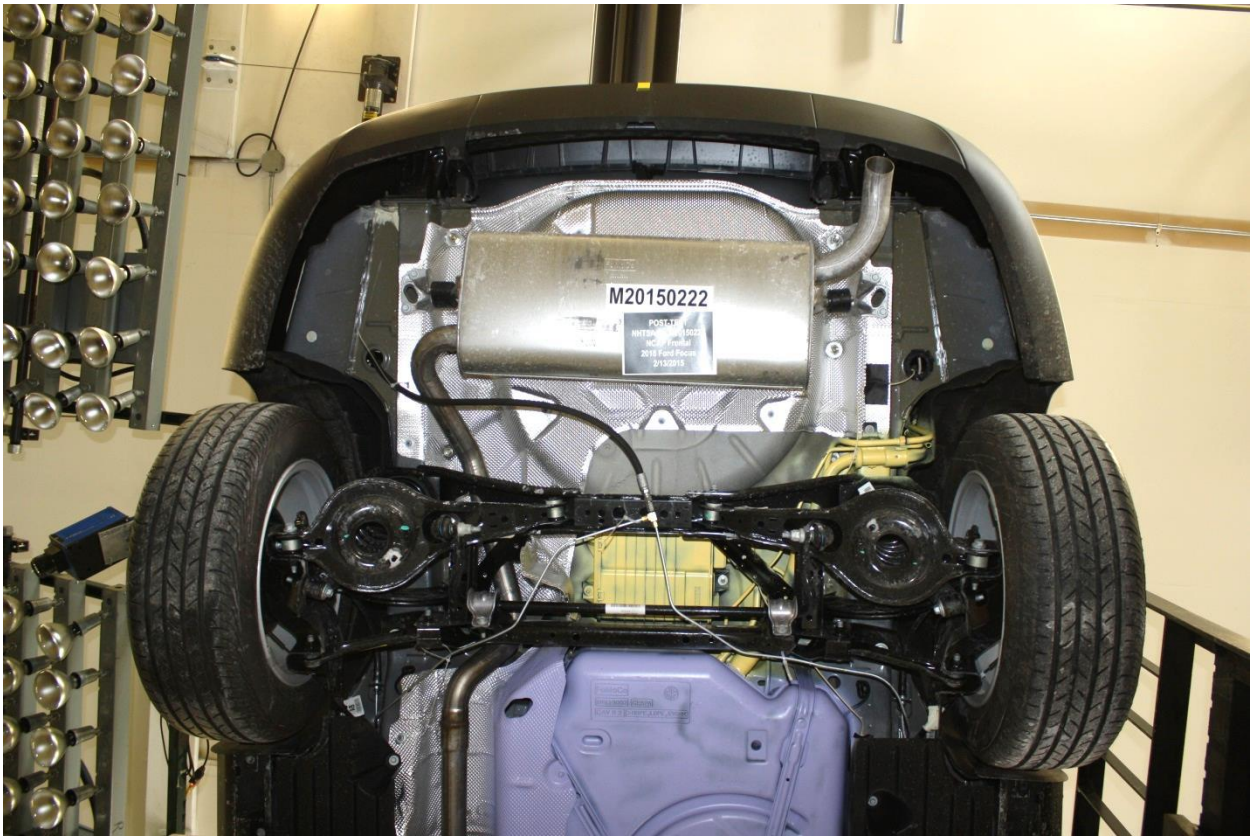


Figure A-26: Post-Test Rear Underbody View

Figure A-27: Pre-Test Dummy Cable Routing

Figure A-28: Post-Test Dummy Cable Routing

Figure A-29: Pre-Test Driver Dummy Front View

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

Figure A-31: Pre-Test Driver Dummy Window View

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

Figure A-33: Pre-Test Driver Dummy and Vehicle Interior View

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

Figure A-35: Pre-Test Driver's Seat Fore-Aft Markings

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

Figure A-37: Pre-Test View of Belt Anchorage for Driver Dummy

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

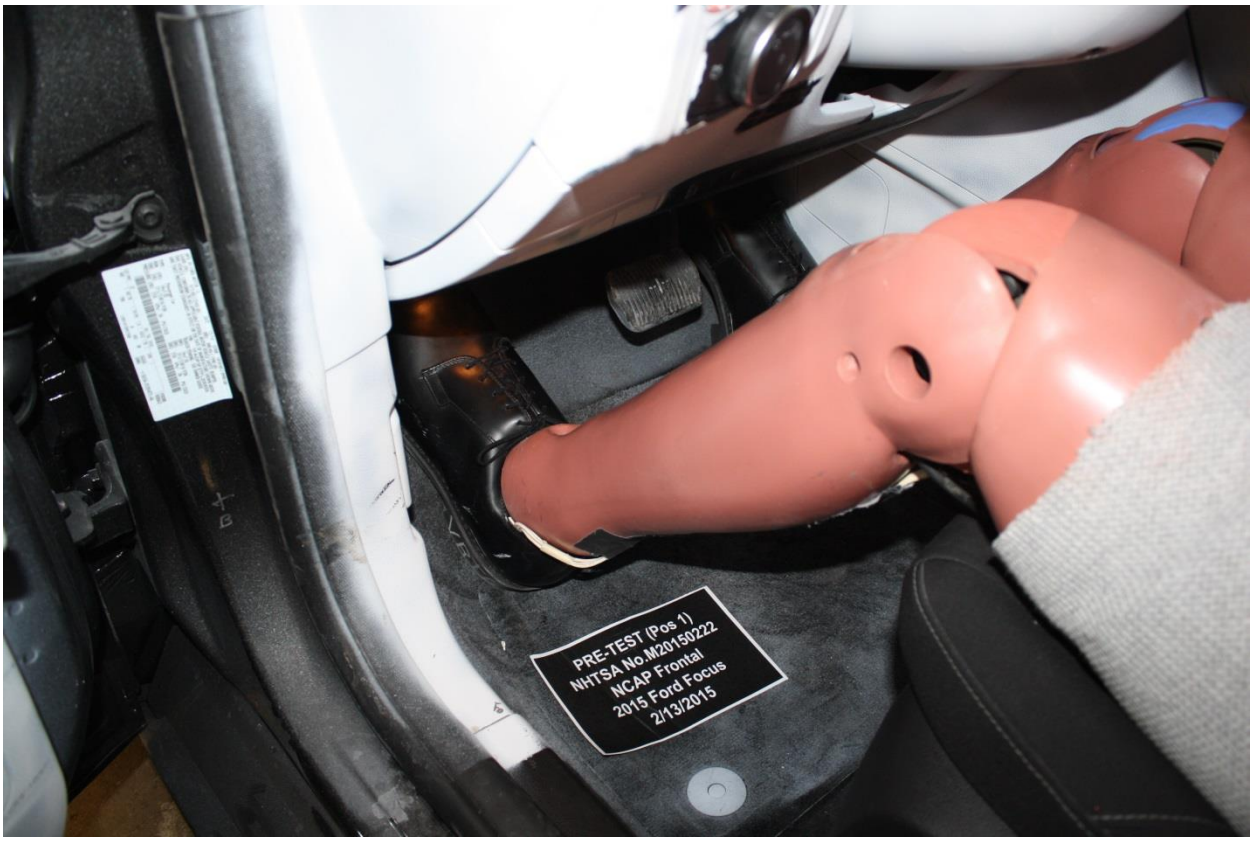


Figure A-39: Pre-Test Driver Dummy Feet

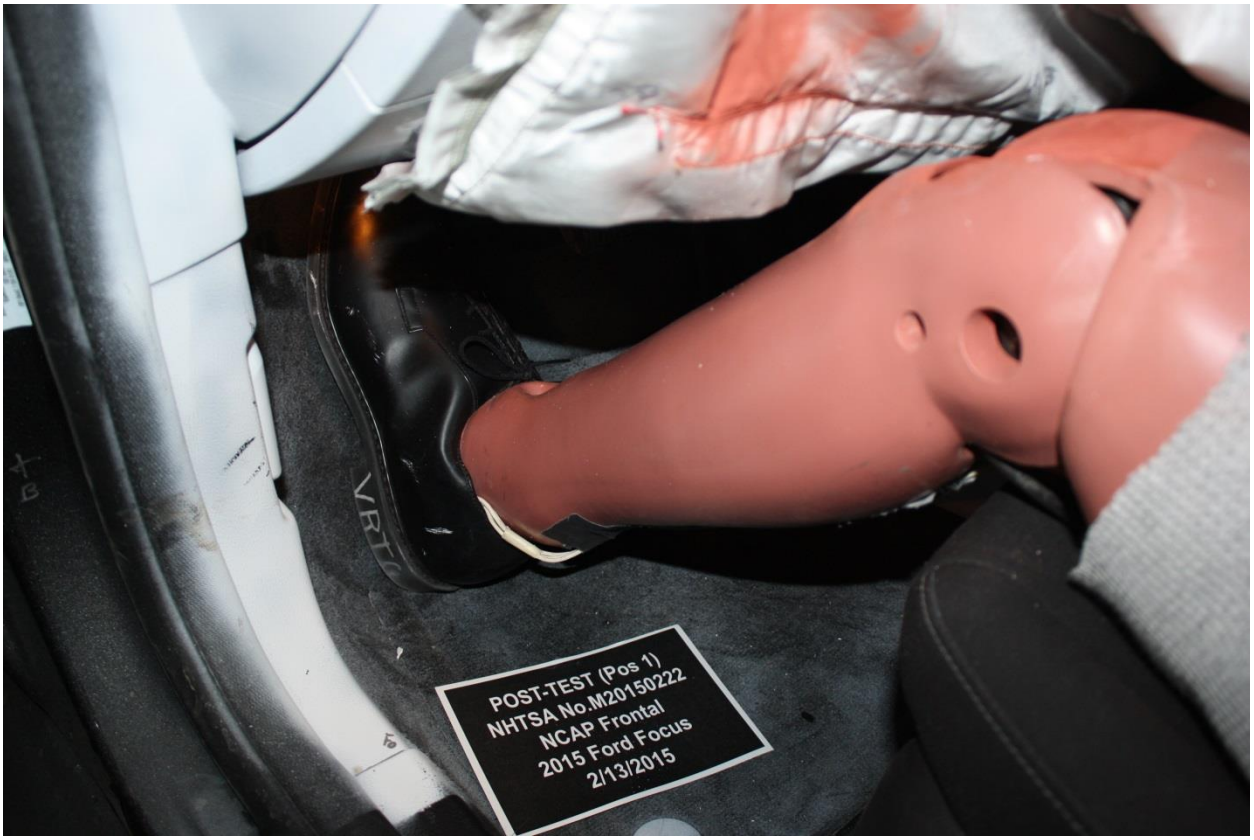


Figure A-40: Post-Test Driver Dummy Feet

Figure A-41: Pre-Test Driver's Side Knee Bolster

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

Figure A-43: Pre-Test Driver's Side Floorpan

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

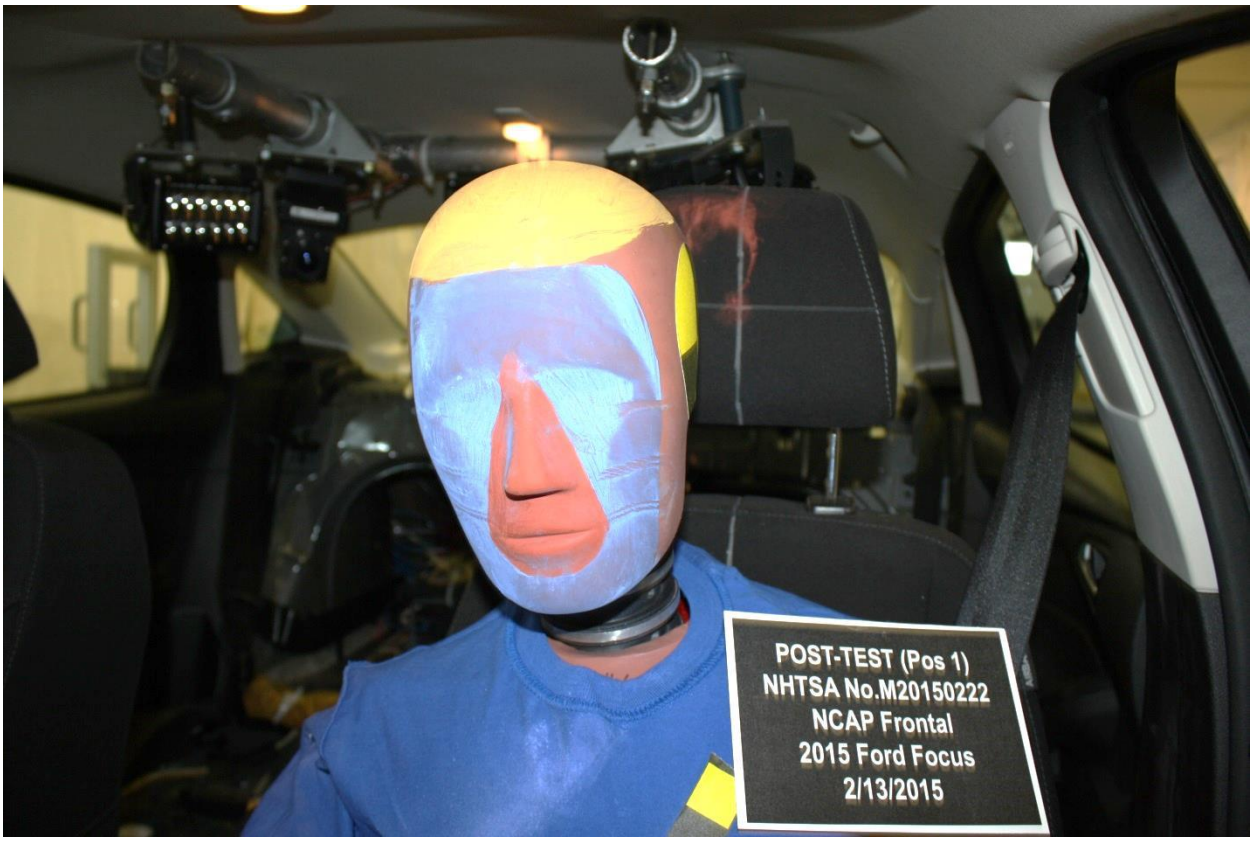


Figure A-45: Post-Test Driver Dummy Face

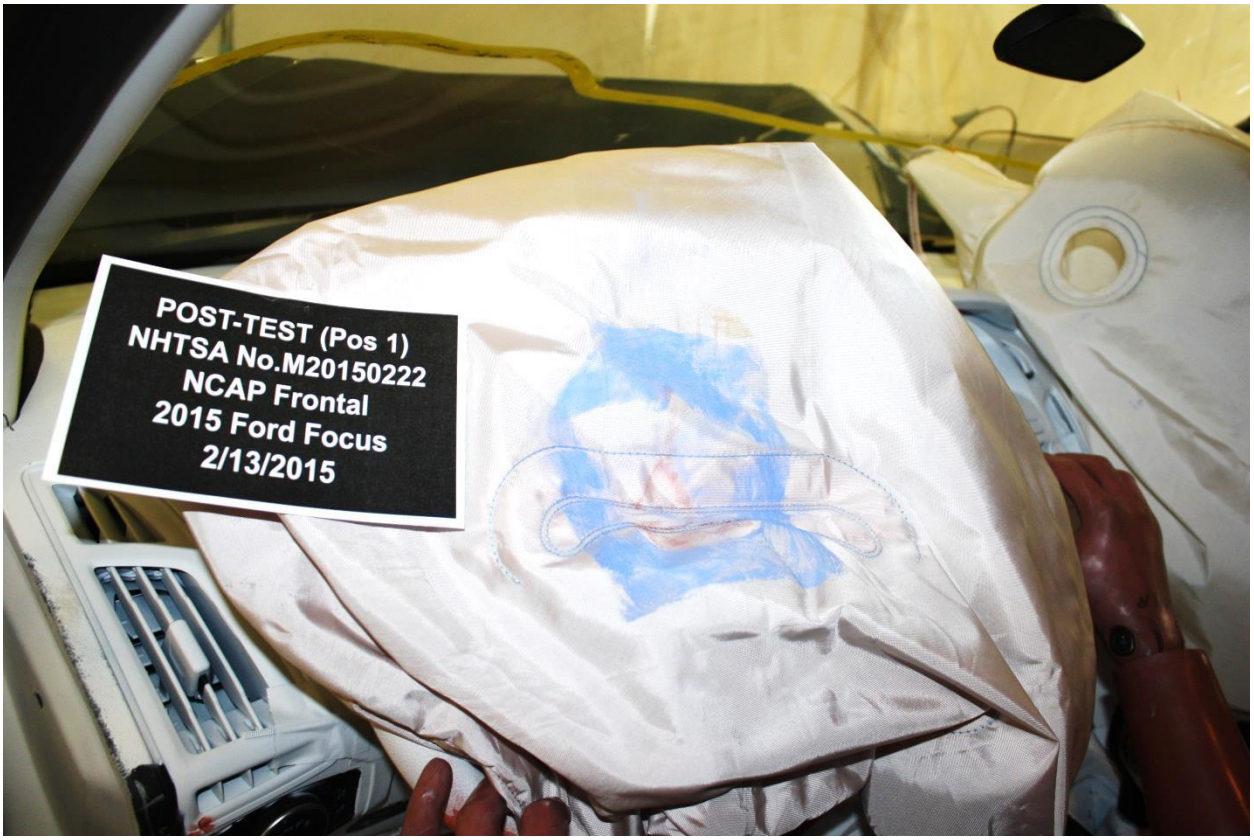


Figure A-46: Post-Test Driver Dummy Contact With Airbag

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

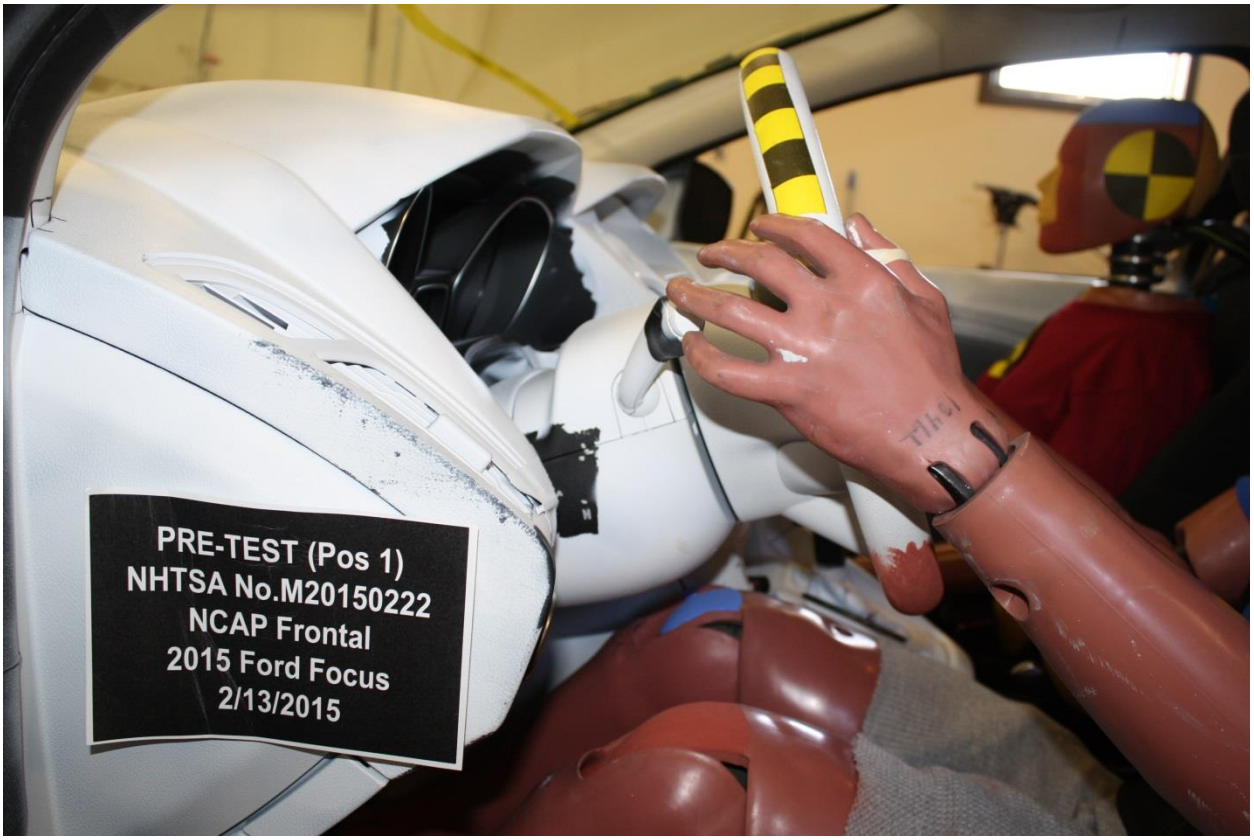


Figure A-48: Pre-Test View of the Steering Wheel

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

Figure A-50: Pre-Test Passenger Dummy Front View

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

Figure A-52: Pre-Test Passenger Dummy Window View

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

Figure A-54: Pre-Test Passenger Dummy and Vehicle Interior View

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

Figure A-56: Pre-Test Passenger's Seat Fore-Aft Markings

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

Figure A-58: Pre-Test View of Belt Anchorage for Passenger Dummy

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

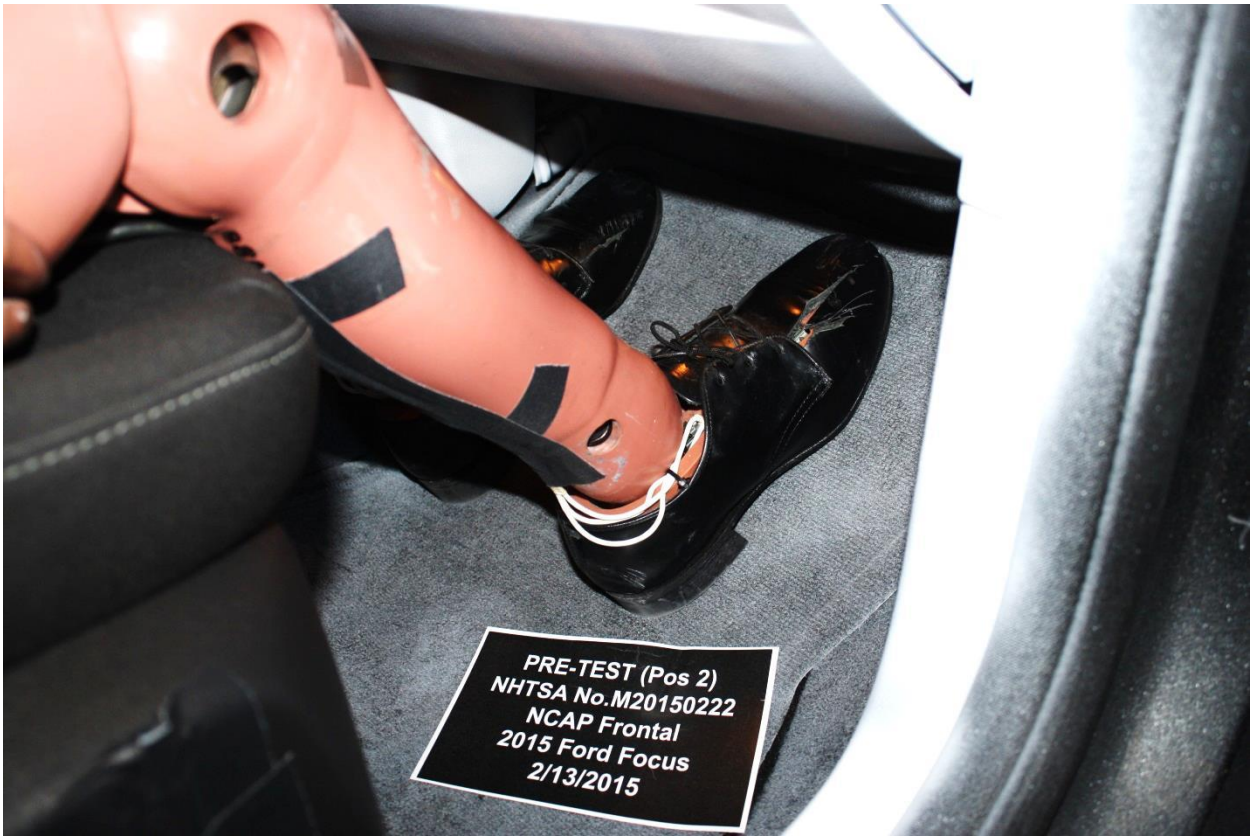


Figure A-60: Pre-Test Passenger Dummy Feet

Figure A-61: Post-Test Passenger Dummy Feet

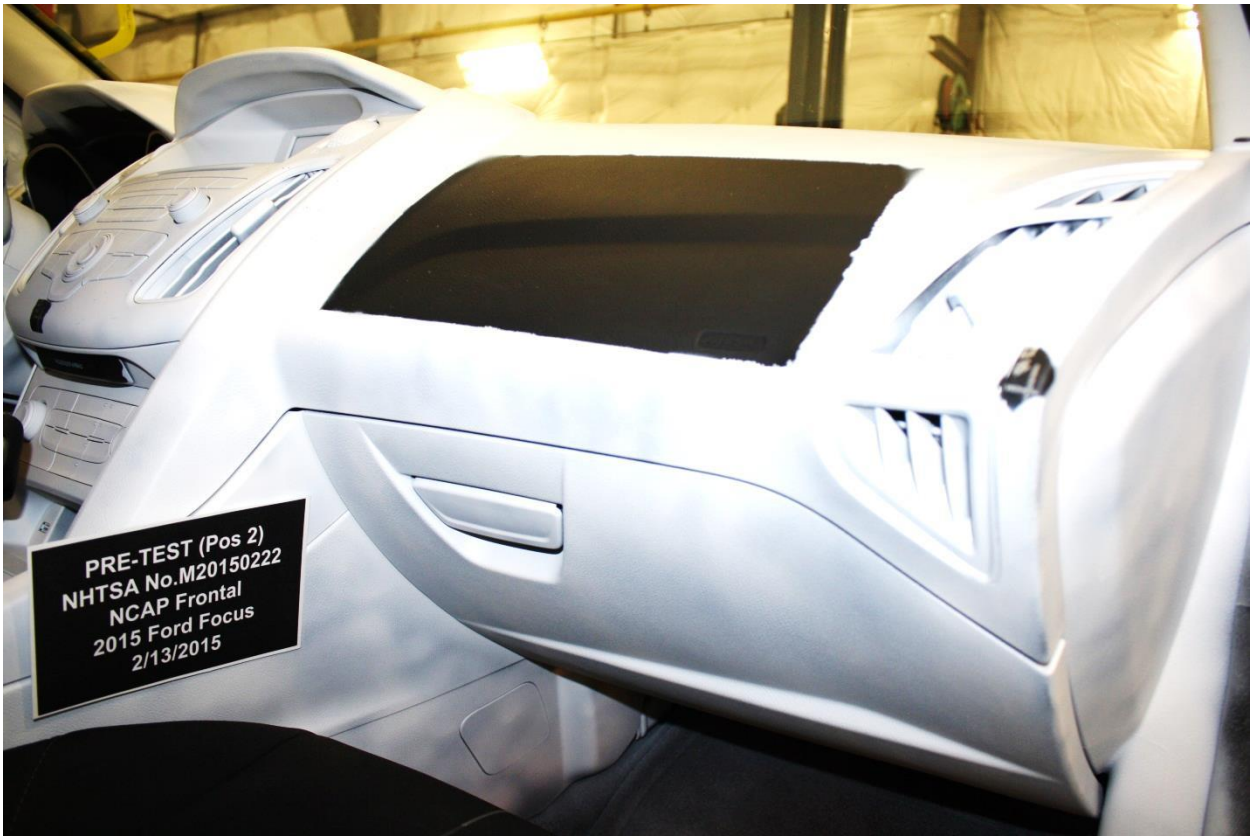


Figure A-62: Pre-Test Passenger's Side Knee Bolster

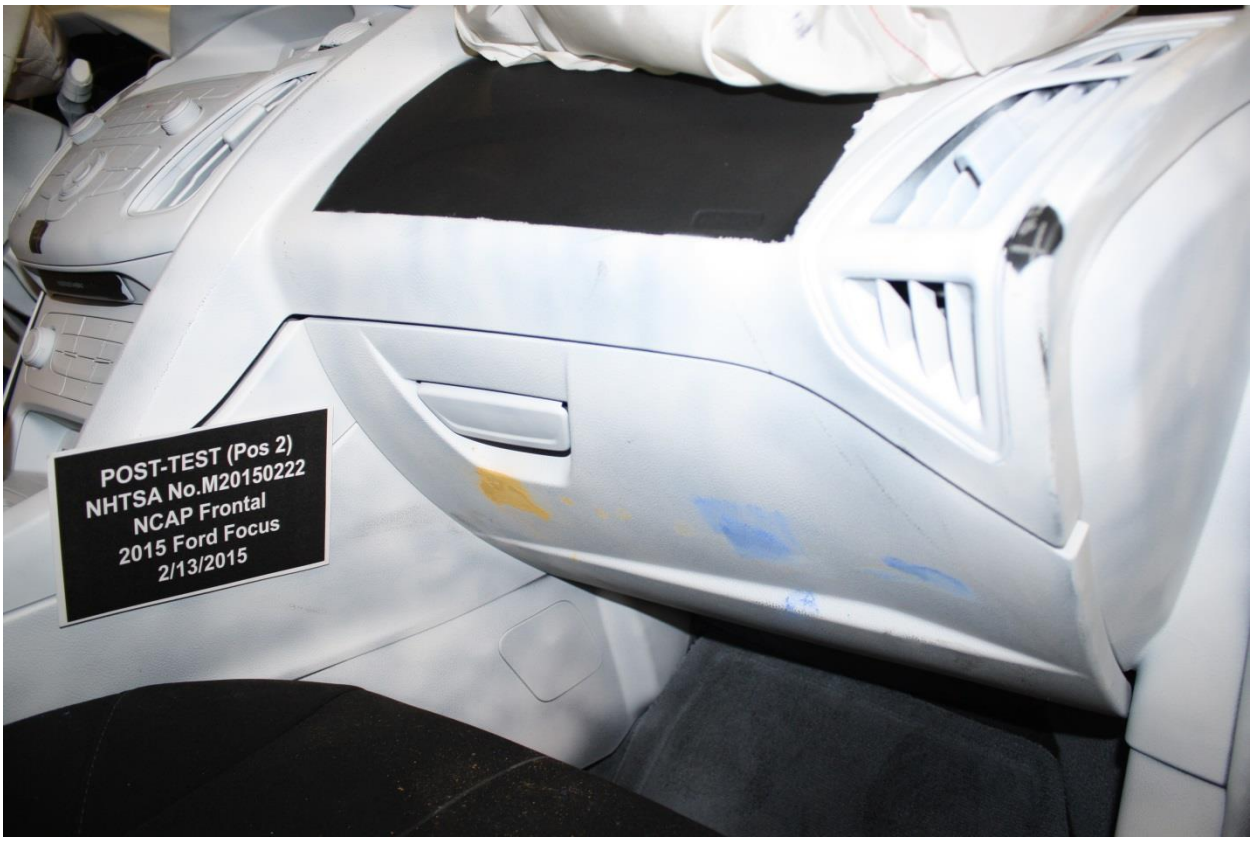


Figure A-63: Post-Test Passenger's Side Knee Bolster

Figure A-64: Pre-Test Passenger's Side Floorpan

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

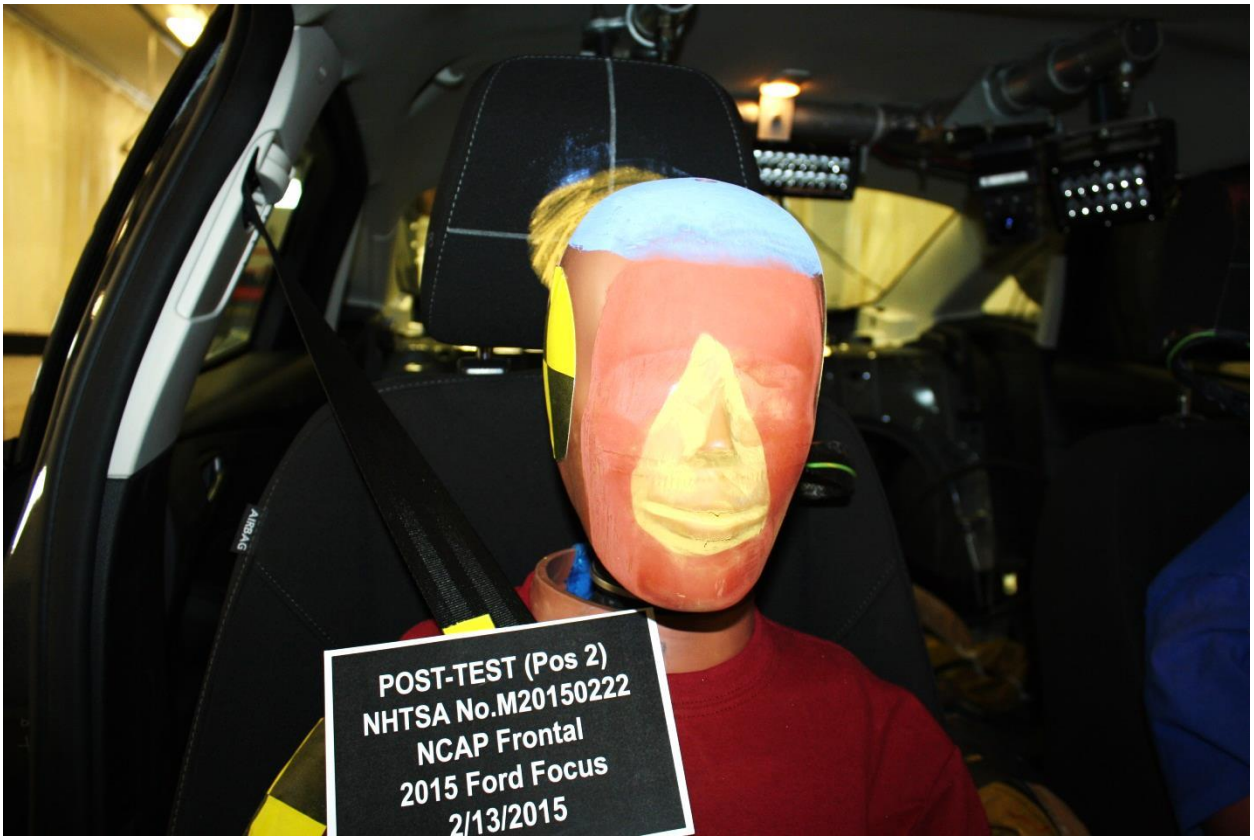


Figure A-66: Post-Test Passenger Dummy Face

Figure A-67: Post-Test Passenger Dummy Contact With Airbag

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

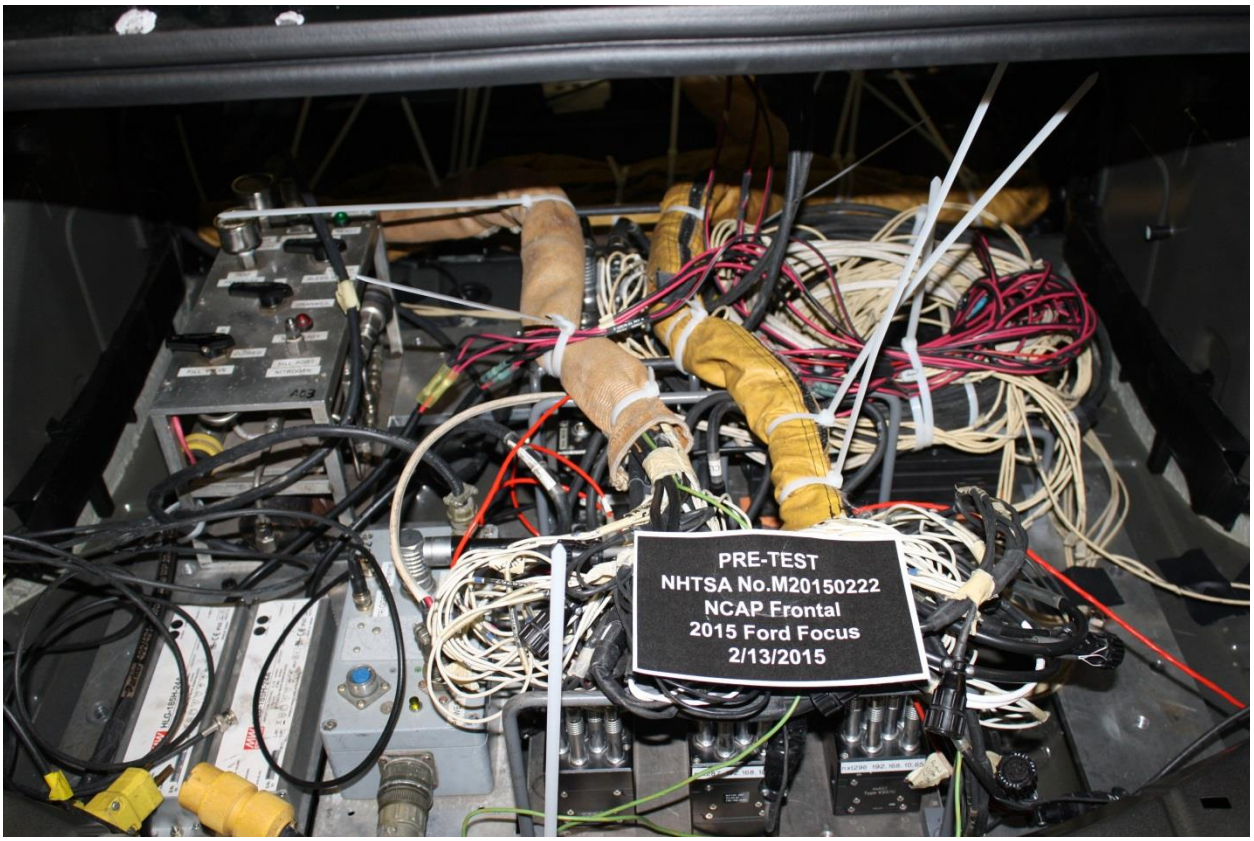


Figure A-69: Photograph of Ballast Installed in Vehicle

Photo Not Applicable

Figure A-70: Post-Test Stoddard Solvent Spillage Location View, If Required

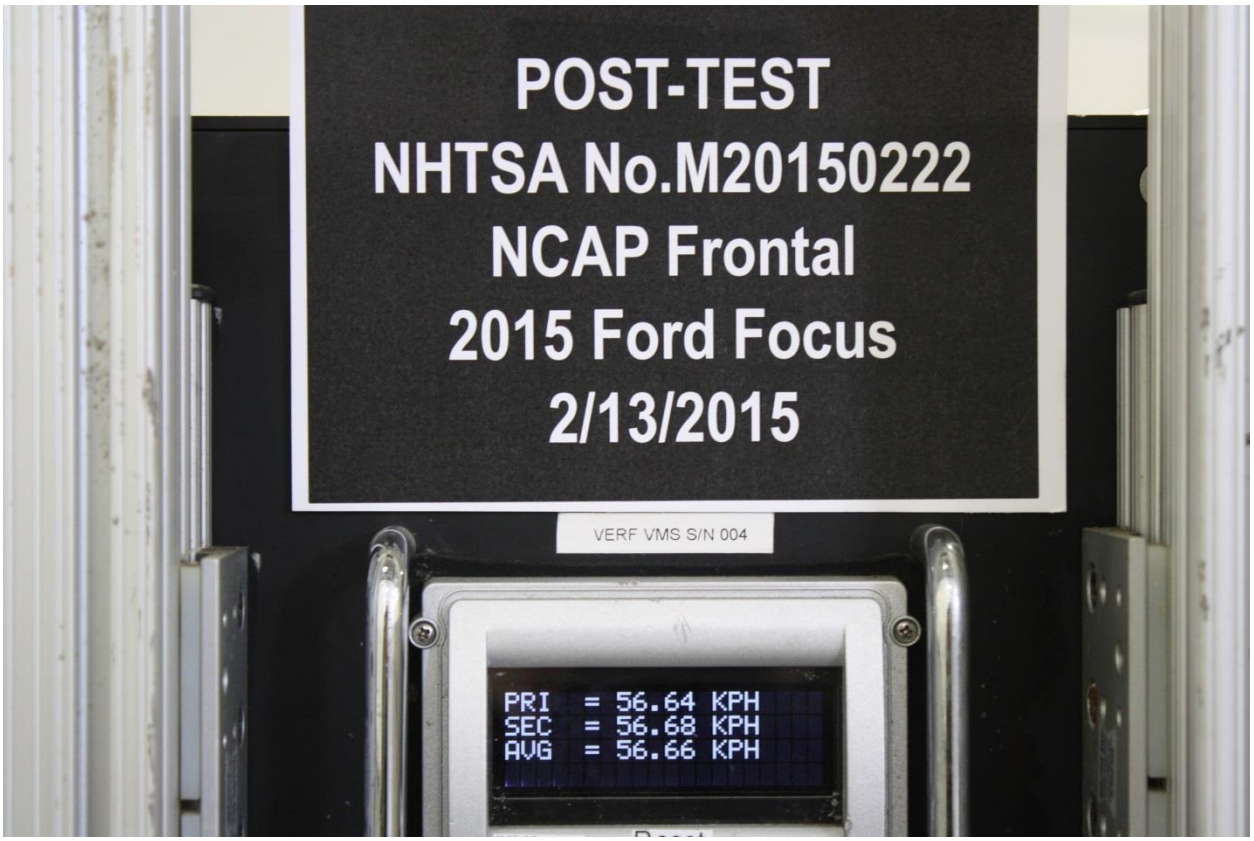


Figure A-71: Post-Test Speed Trap Read-Out

Figure A-72: Vehicle at 0º on Static Rollover Device

Figure A-73: Vehicle at 90º on Static Rollover Device

Figure A-74: Vehicle at 180º on Static Rollover Device

Figure A-75: Vehicle at 270º on Static Rollover Device

Figure A-76: Vehicle at 360º on Static Rollover Device

Figure A-77: 2015 Ford Focus Frontal Impact Event

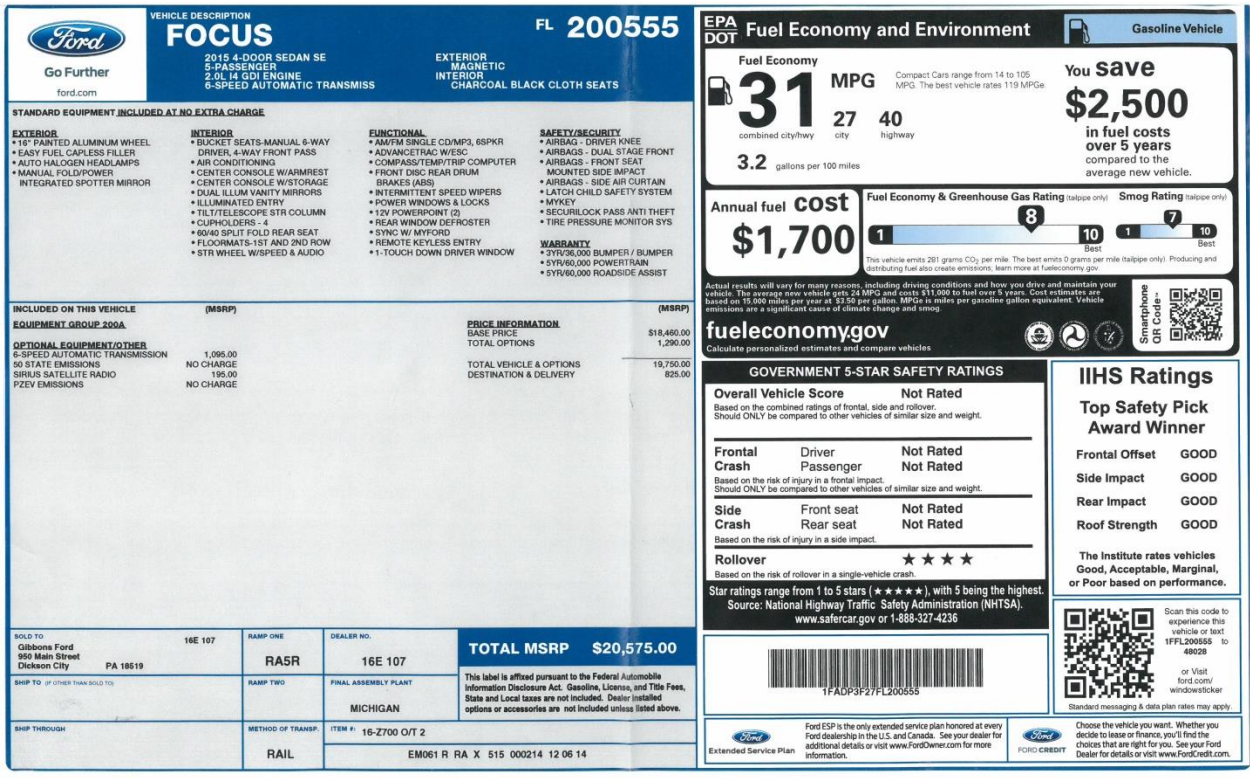
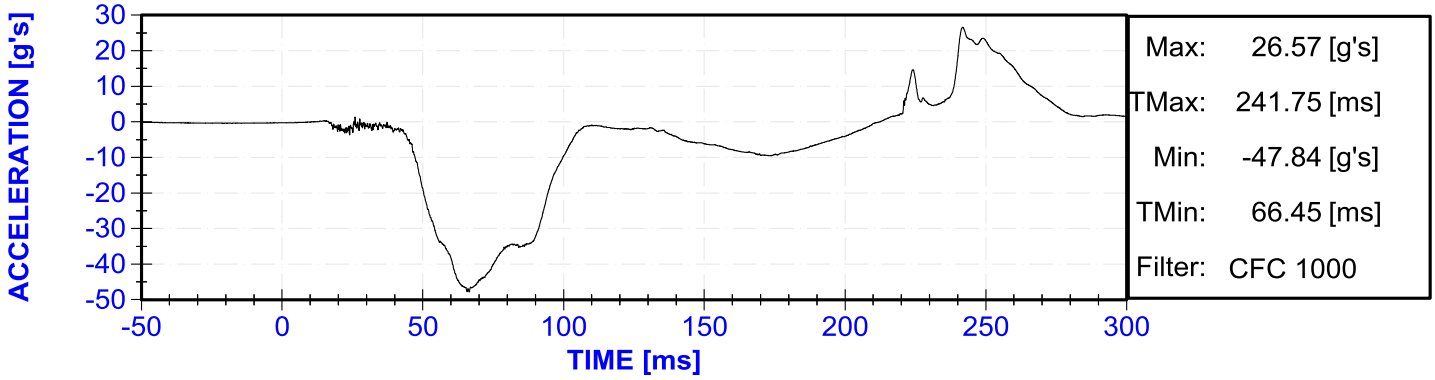


Figure A-78: Monroney Label Photograph

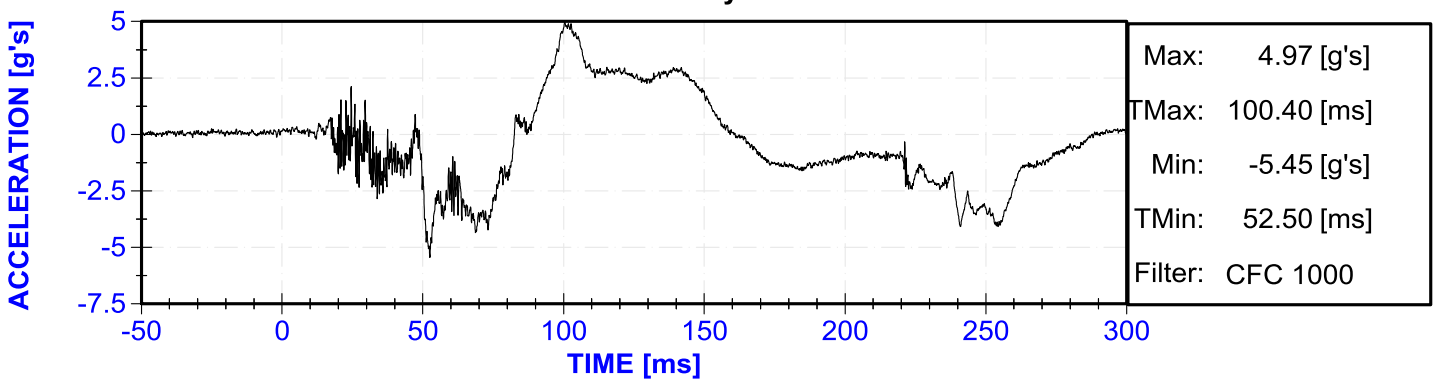
APPENDIX B
VEHICLE & DUMMY RESPONSE DATA TRACES

Table of Data Plots

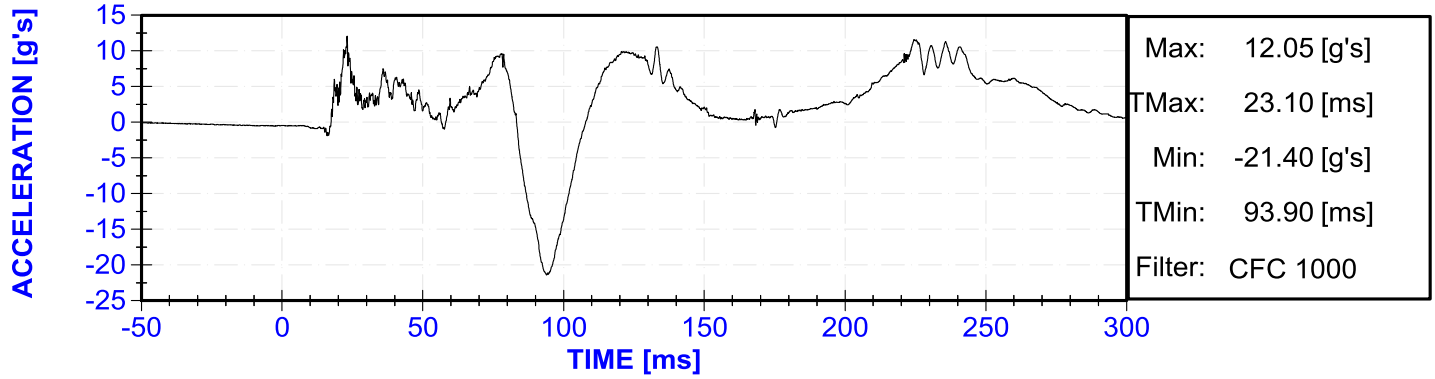
Driver Head X Acceleration vs. Time Primary



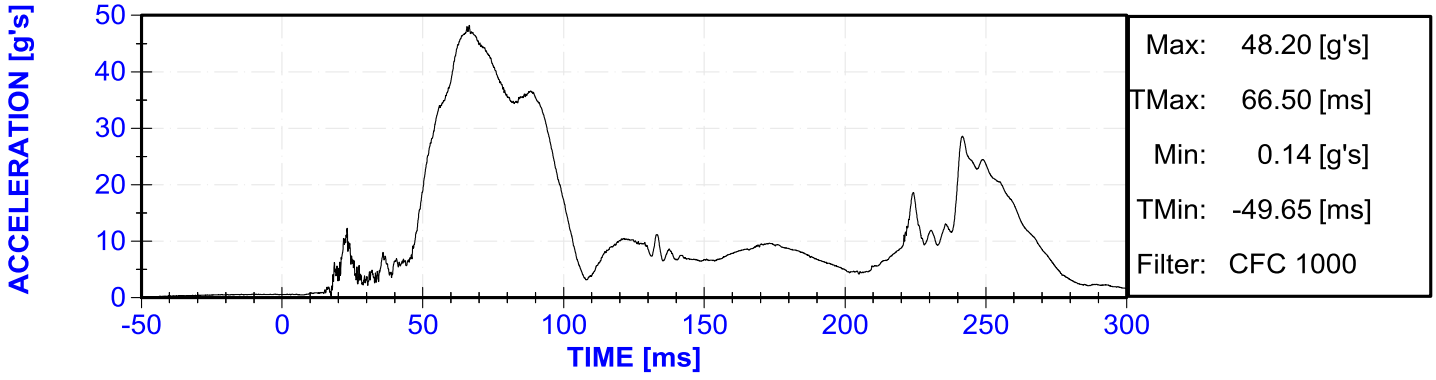
Driver Head Y Acceleration vs. Time Primary



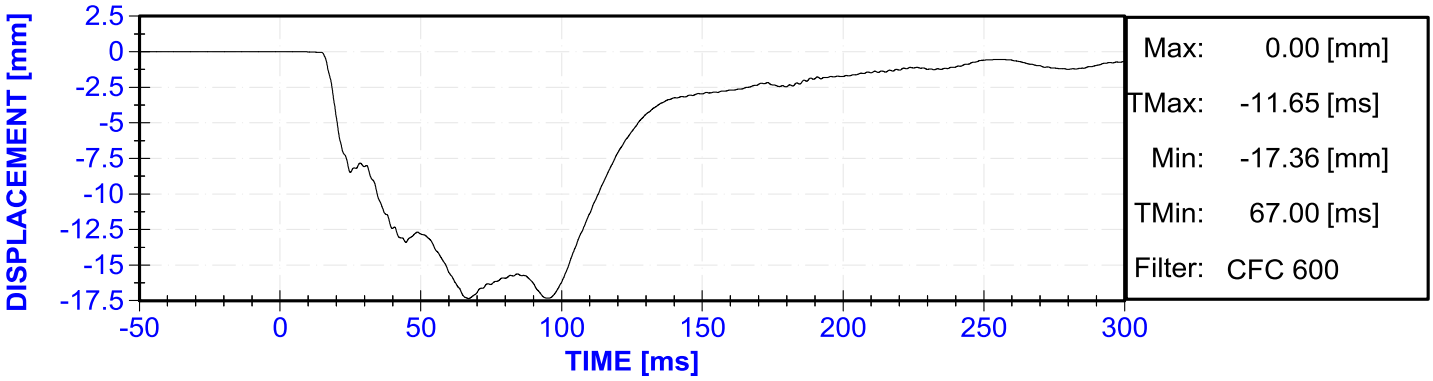
Driver Head Z Acceleration vs. Time Primary



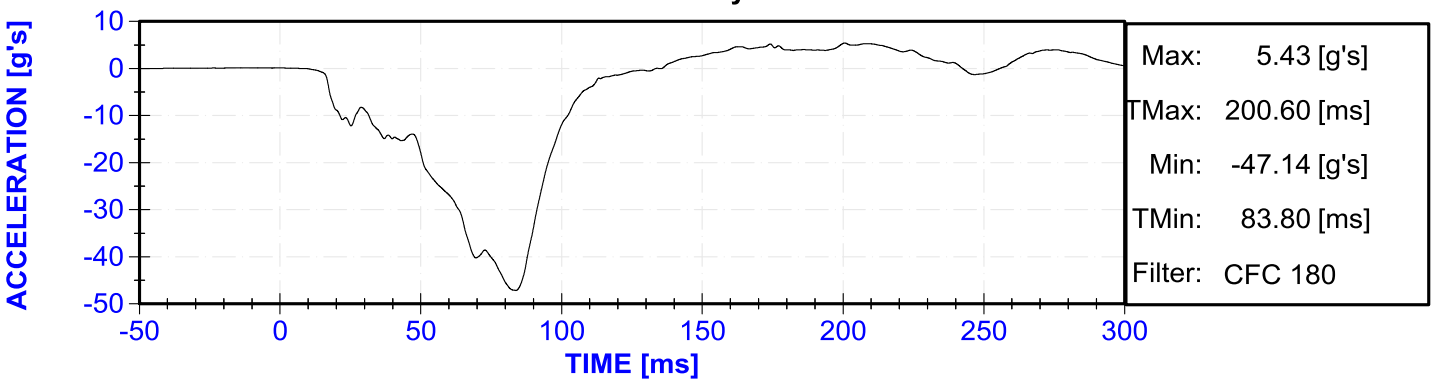
Driver Head Resultant Acceleration vs. Time Primary



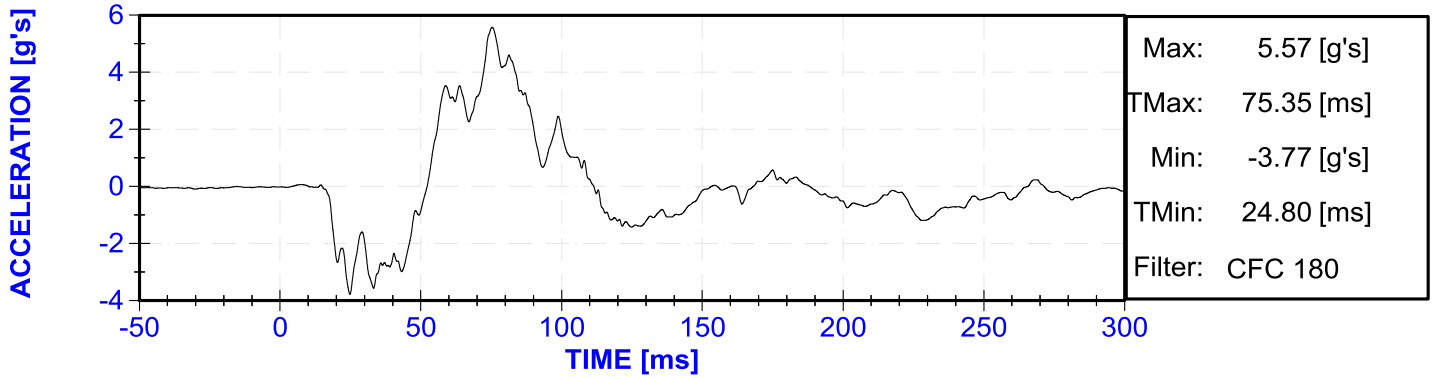
Driver Chest X Deflection vs. Time



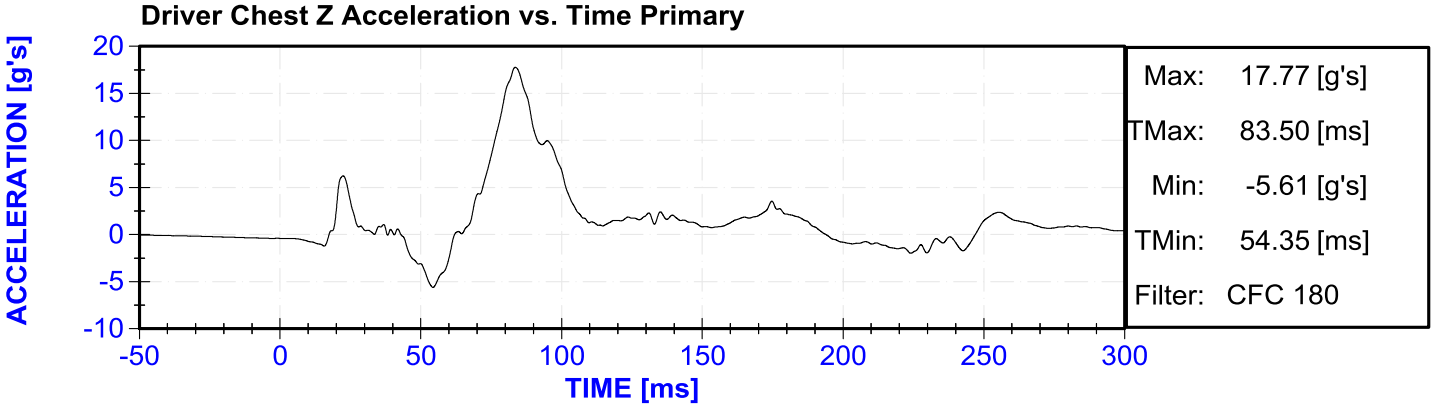
Driver Chest X Acceleration vs. Time Primary



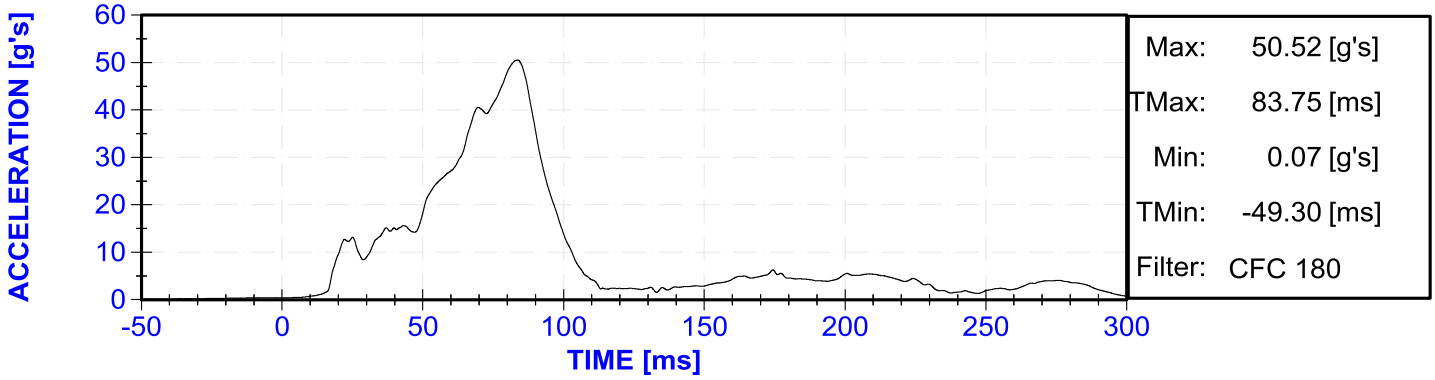
Driver Chest Y Acceleration vs. Time Primary



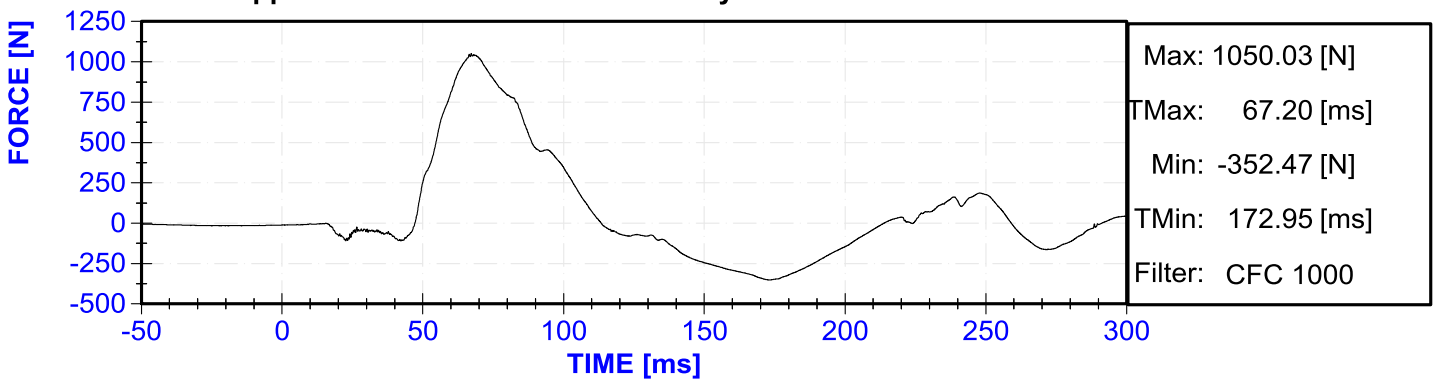
Driver Chest Z Acceleration vs. Time Primary



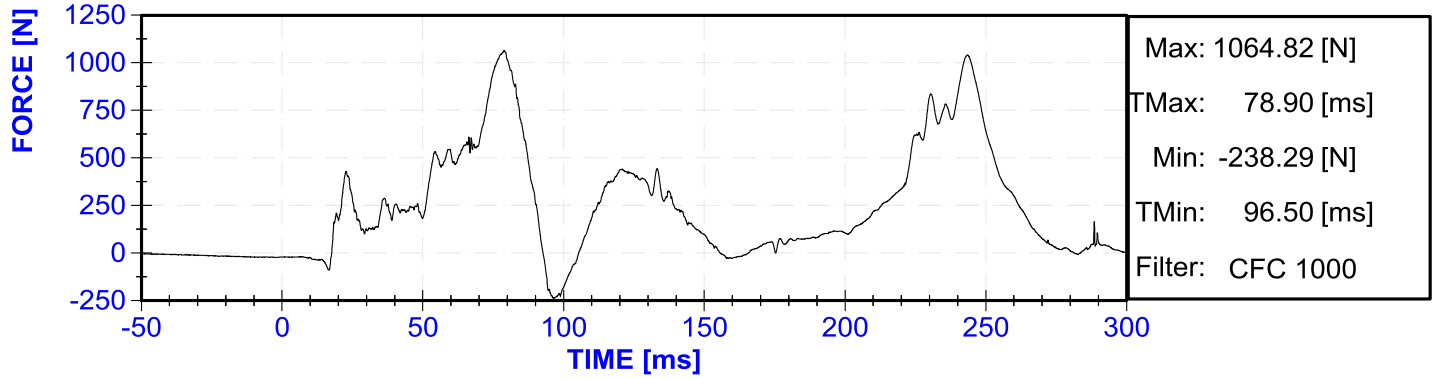
Driver Chest Resultant Acceleration vs. Time Primary



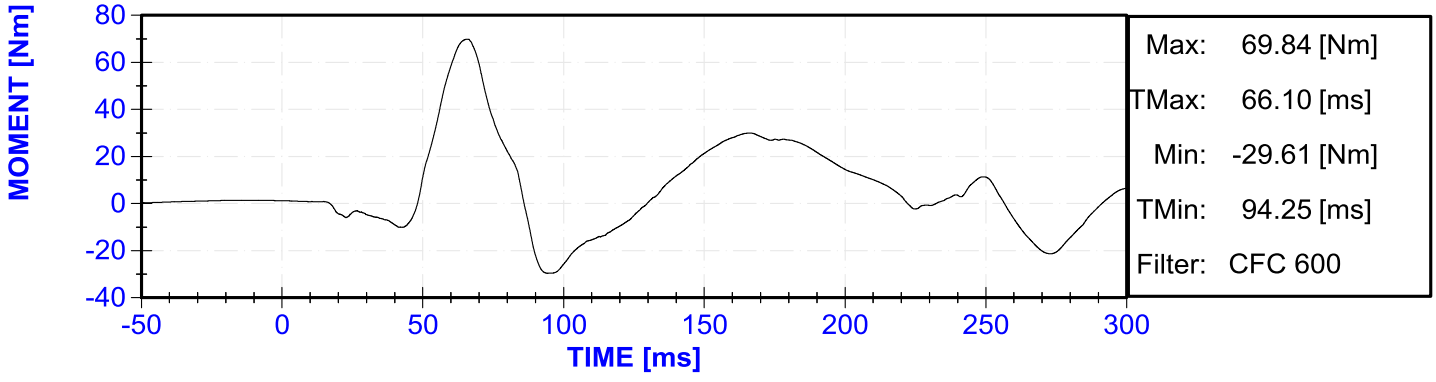
Driver Upper Neck Force X vs. Time Primary



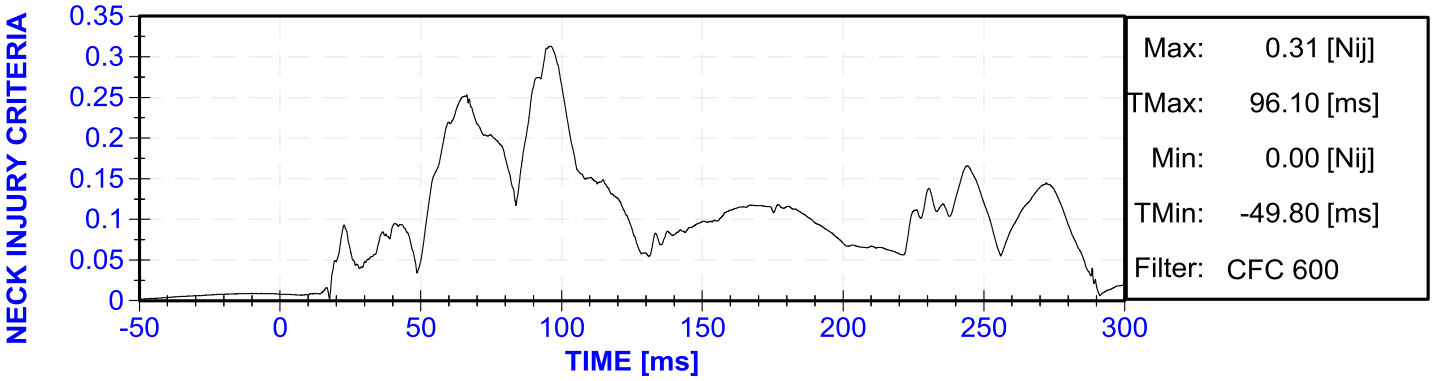
Driver Upper Neck Force Z vs. Time Primary



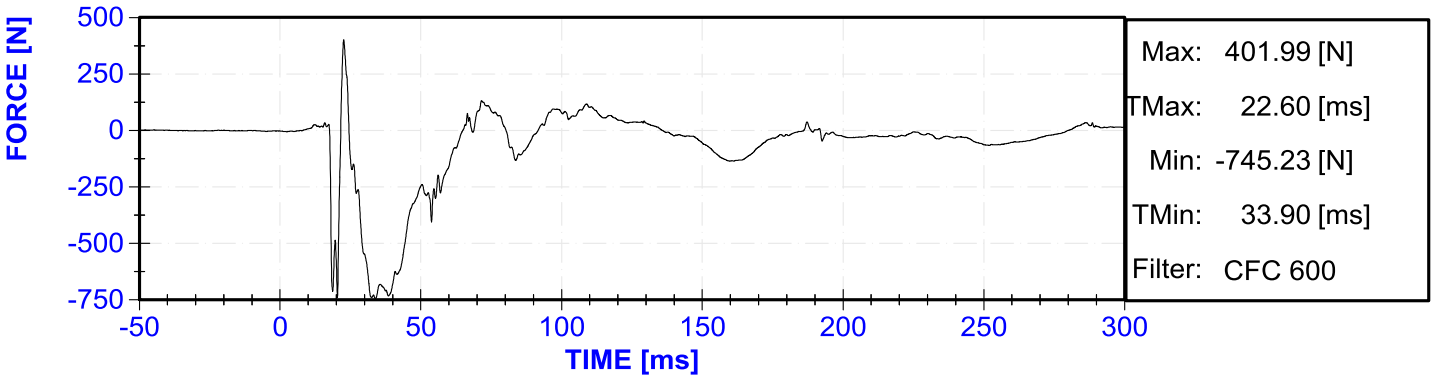
Driver Upper Neck Moment Y vs. Time Primary



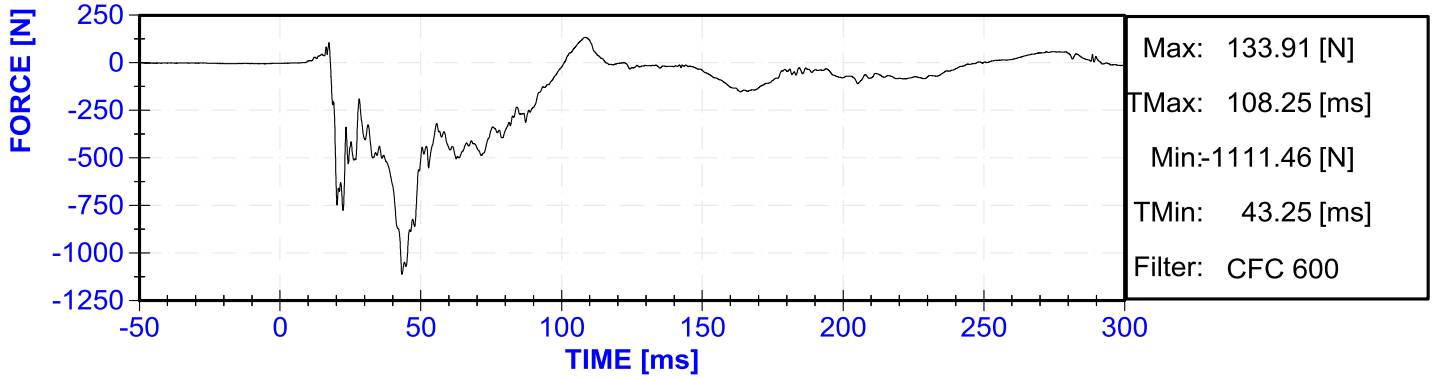
Driver Nij vs. Time Primary



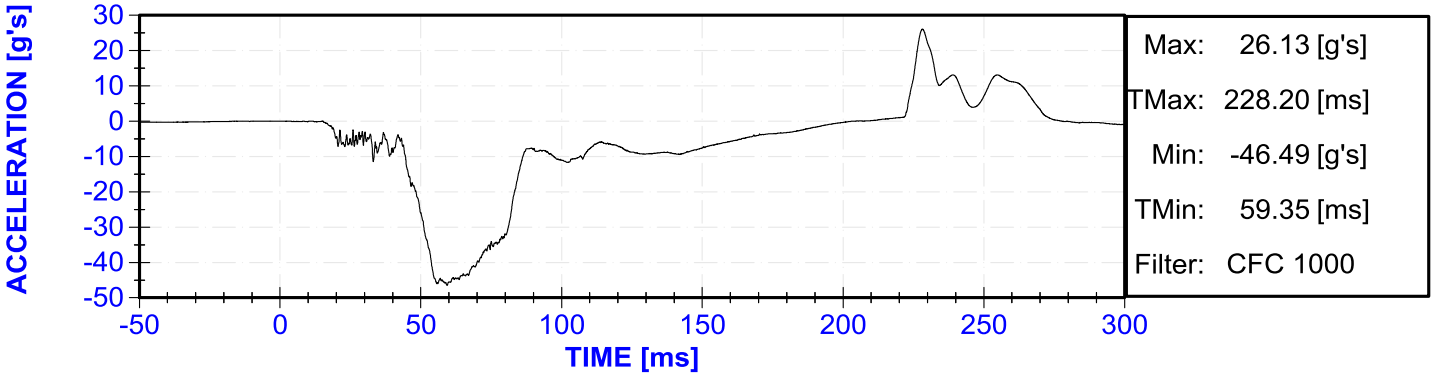
Driver Left Femur Force vs. Time



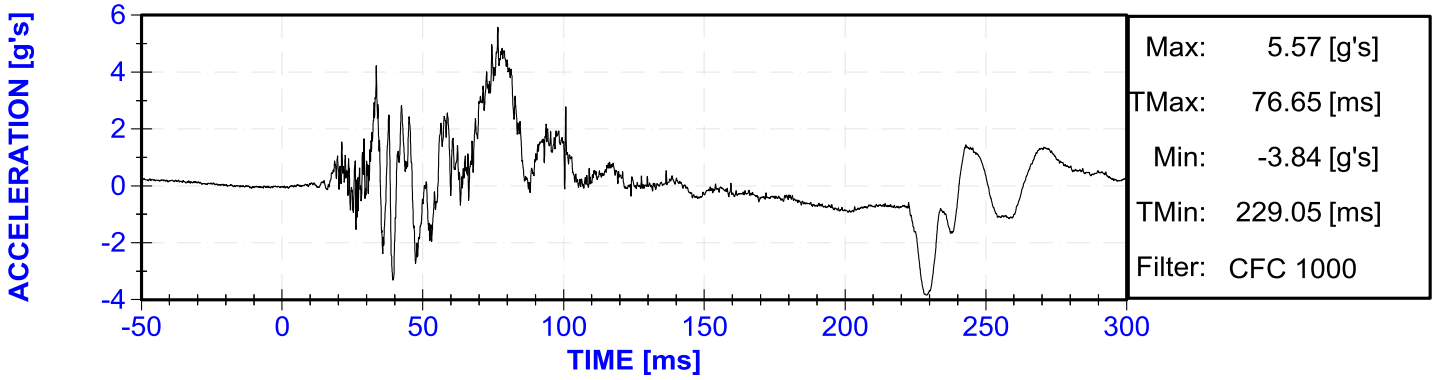
Driver Right Femur Force vs. Time



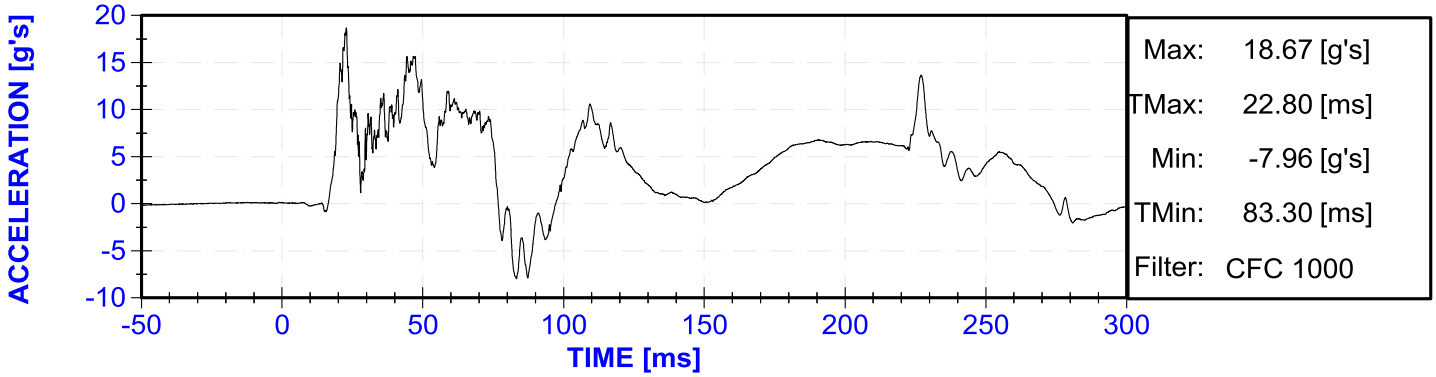
Passenger Head X Acceleration vs. Time Primary



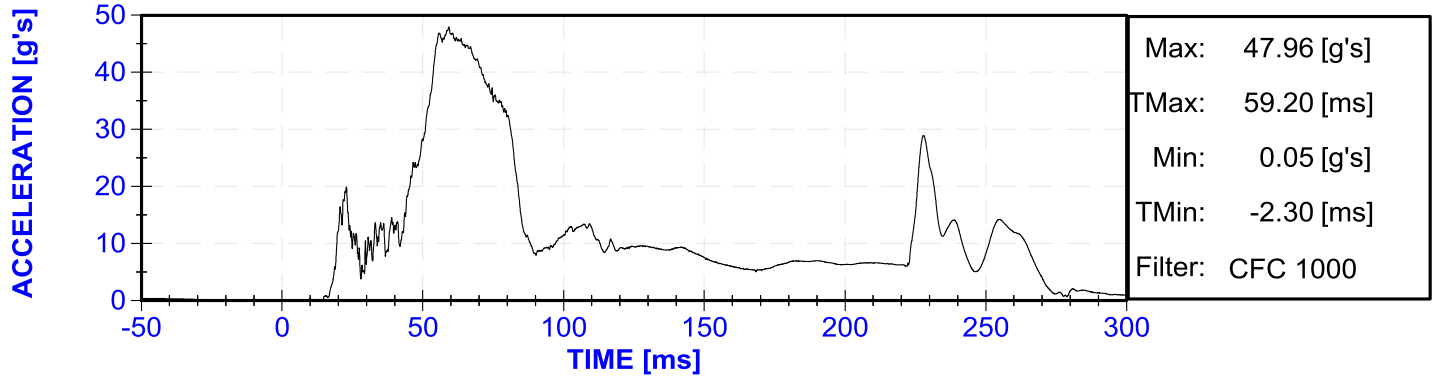
Passenger Head Y Acceleration vs. Time Primary



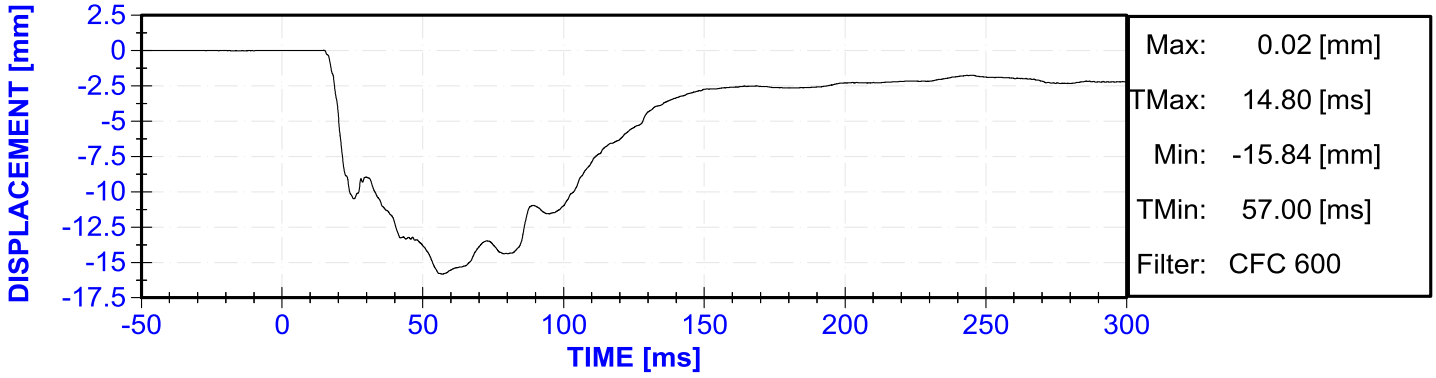
Passenger Head Z Acceleration vs. Time Primary



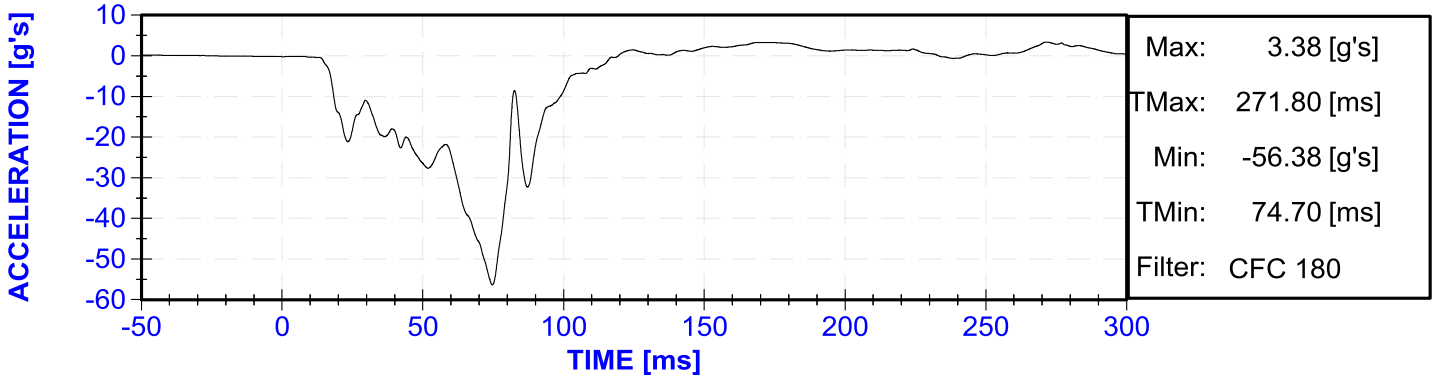
Passenger Head Resultant Acceleration vs. Time Primary



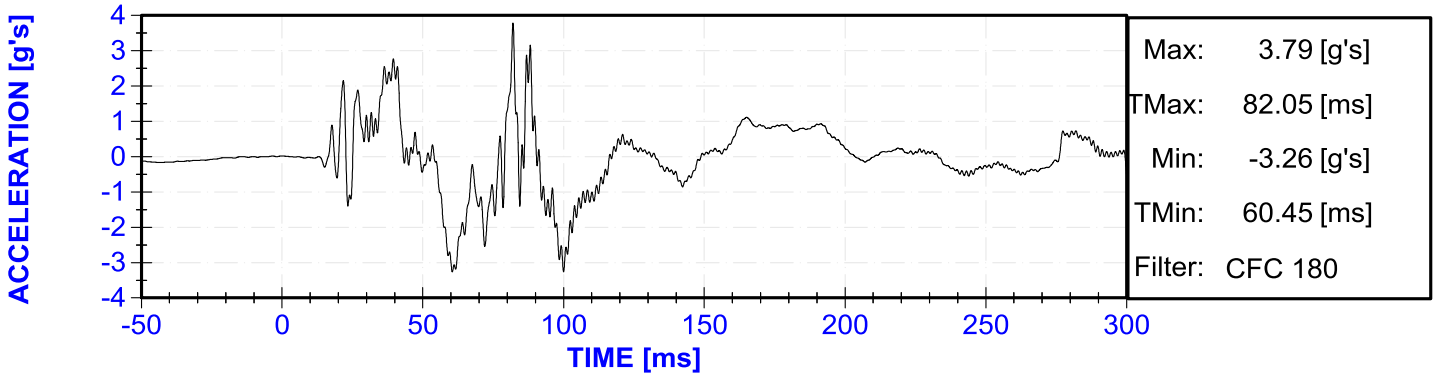
Passenger Chest X Deflection vs. Time



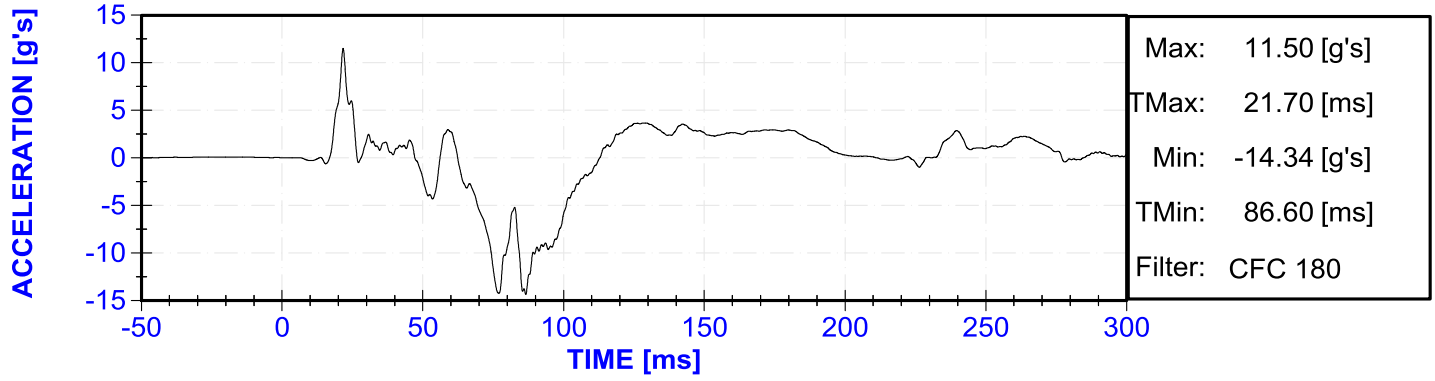
Passenger Chest X Acceleration vs. Time Primary



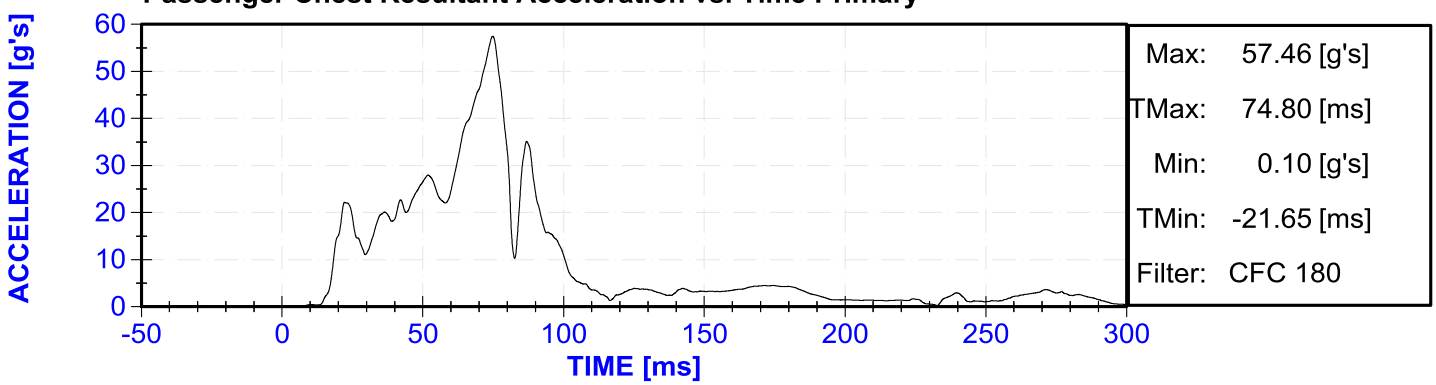
Passenger Chest Y Acceleration vs. Time Primary



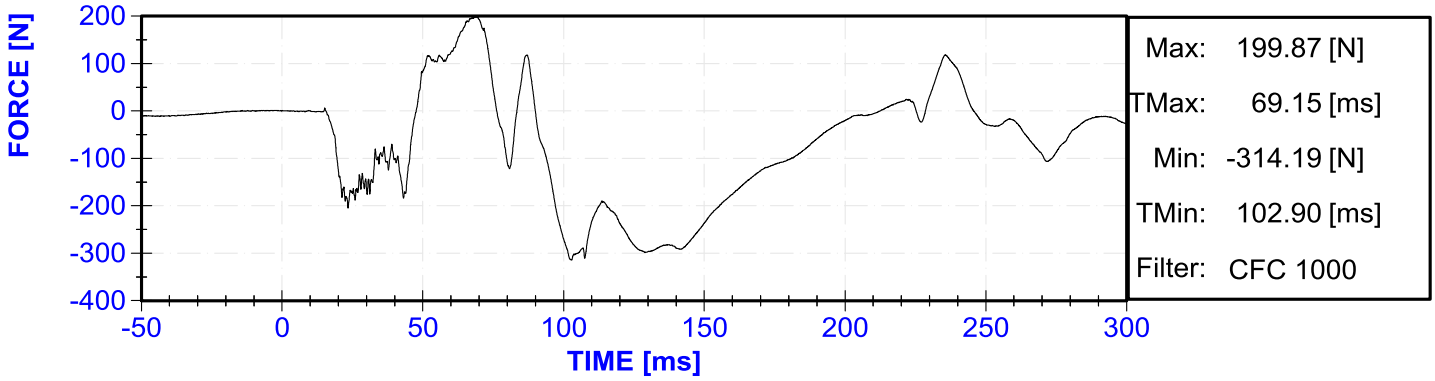
Passenger Chest Z Acceleration vs. Time Primary



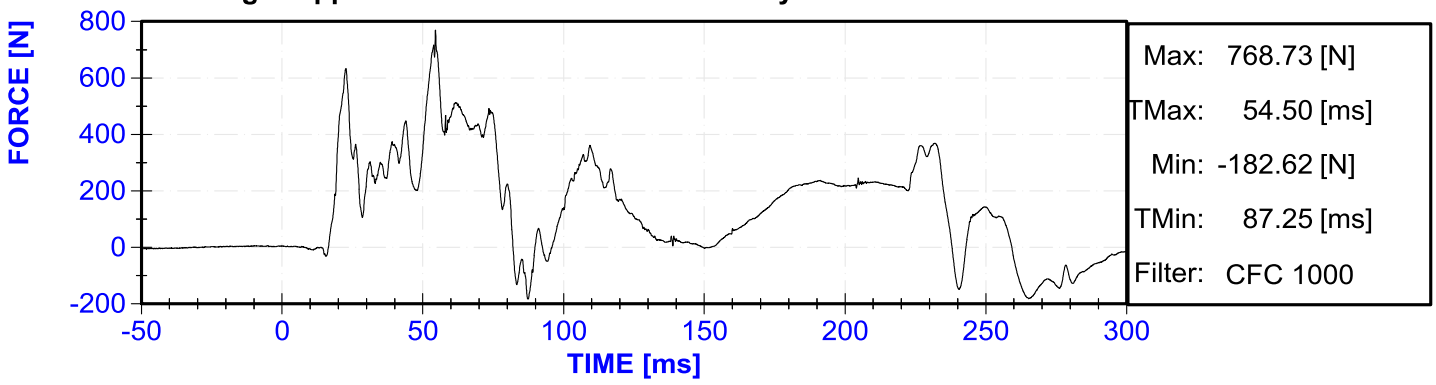
Passenger Chest Resultant Acceleration vs. Time Primary



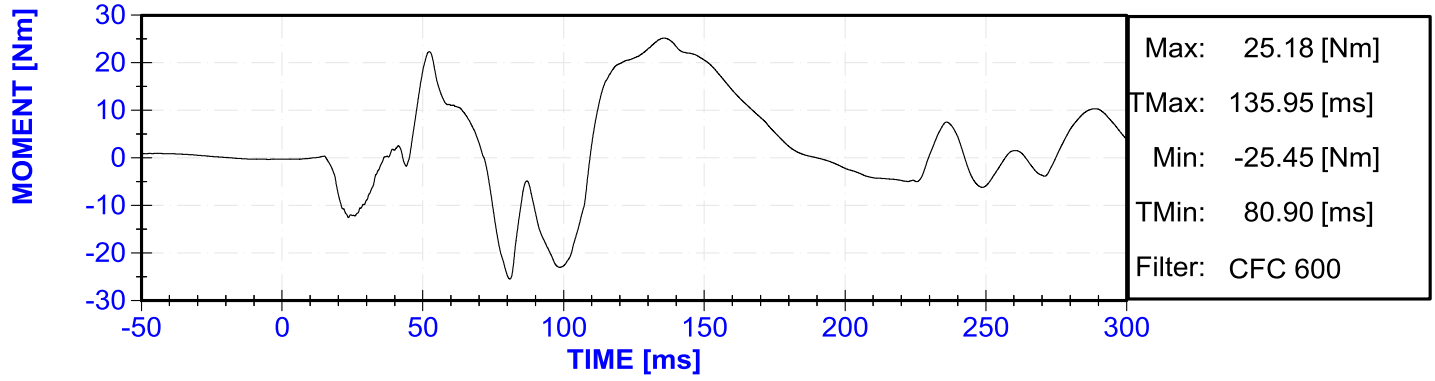
Passenger Upper Neck Force X vs. Time Primary



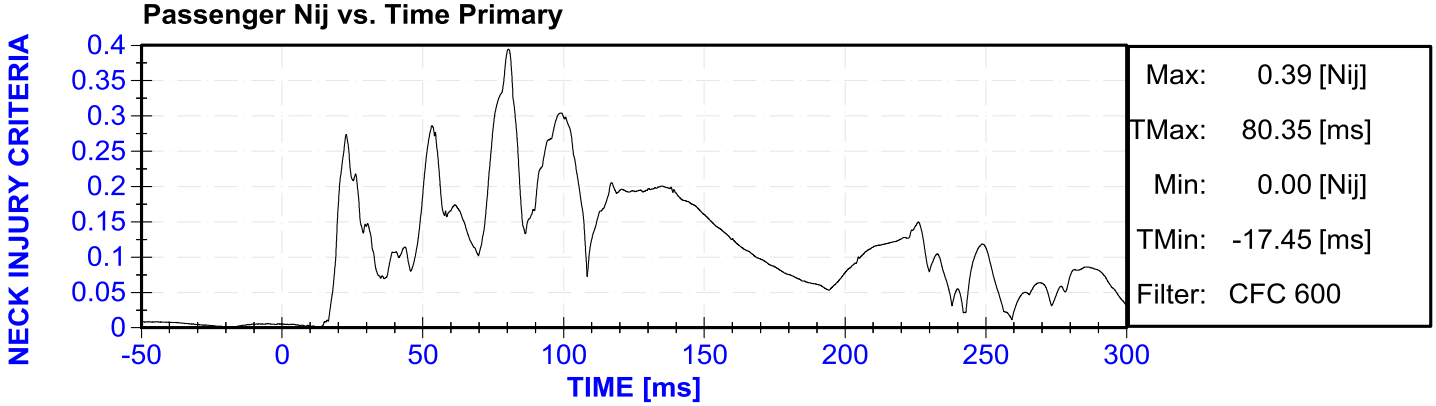
Passenger Upper Neck Force Z vs. Time Primary



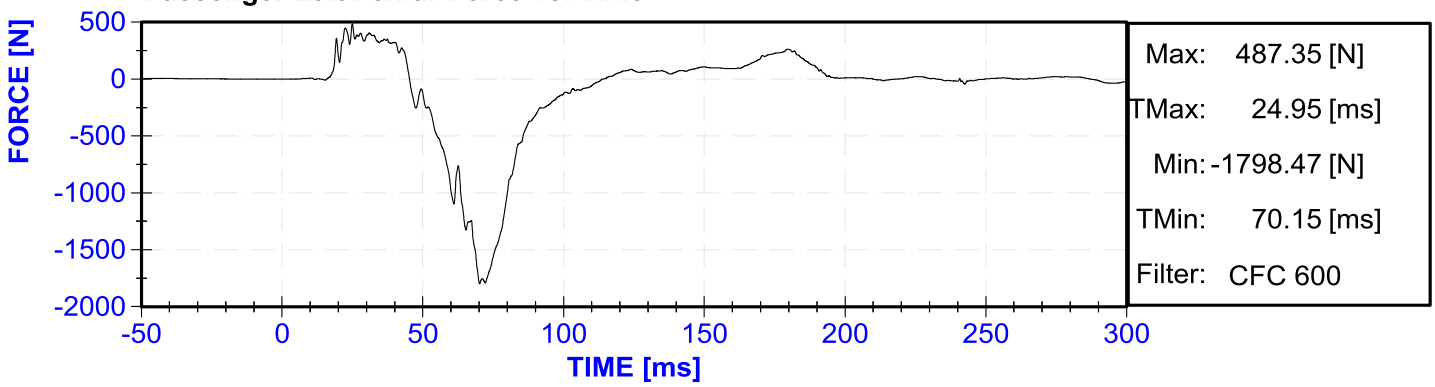
Passenger Upper Neck Moment Y vs. Time Primary



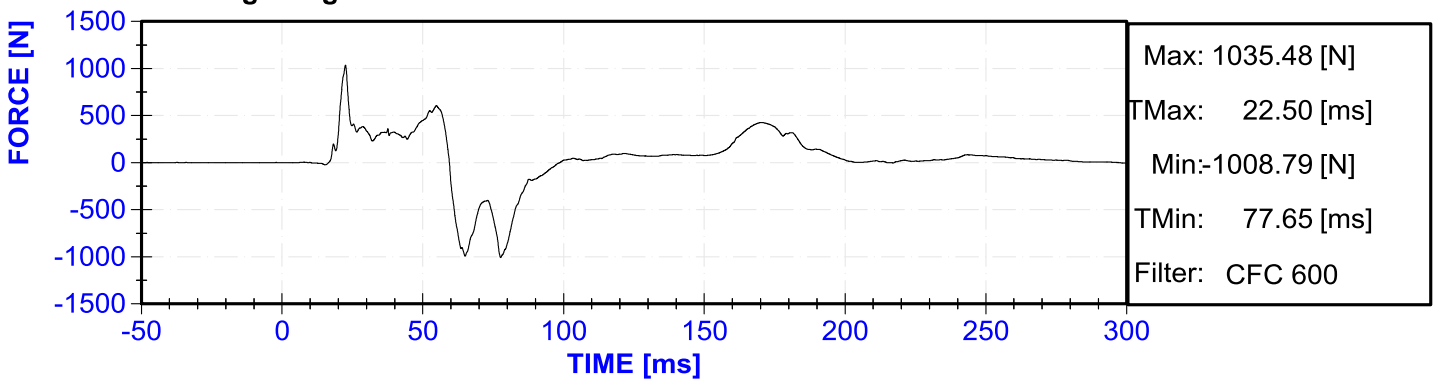
Passenger Nij vs. Time Primary



Passenger Left Femur Force vs. Time



Passenger Right Femur Force vs. Time



APPENDIX C

DUMMY CALIBRATION AND PERFORMANCE VERIFICATION DATA

CALIBRATION TEST RESULTS

PRE-TEST

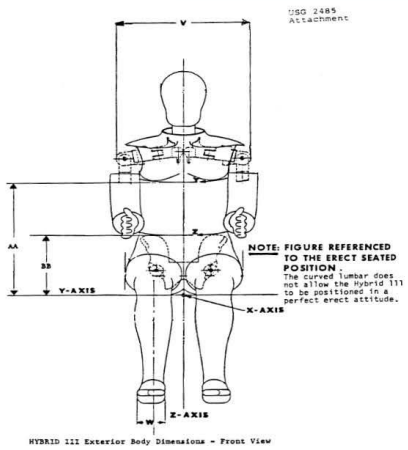
HYBRID III 50TH PERCENTILE MALE - DRIVER ATD

SERIAL NO: 1046

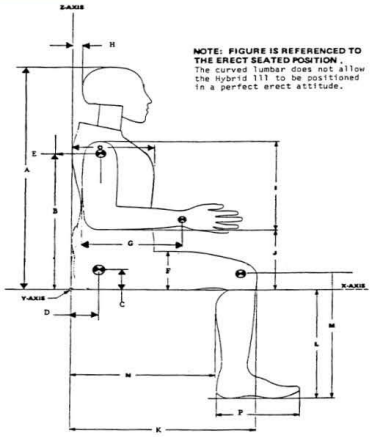
External Measurements - Hybrid 3 - 50th Male

Technician: M.Hartung Date: 2/5/2015

Dummy Serial Number: 1046



HYBRID III Exterior Body Dimensions - Front View



HYBRID III Exterior Body Dimensions - Side View

Symbol	Description	Specification (in)		Result (in)	Pass/Fail
A	Sitting Height	34.6	35.0	34.9	Pass
B	Shoulder Pivot Height	19.9	20.5	20.1	Pass
C	H-Point Height	3.3	3.5	3.4	Pass
D	H-Point from Backline	5.3	5.5	5.4	Pass
E	Shoulder Pivot from Backline	3.3	3.7	3.6	Pass
F	Thigh Clearance	5.5	6.1	5.8	Pass
G	Back of Elbow to Wrist Pivot	11.4	12.0	11.8	Pass
H	Head Back to Backline	1.6	1.8	1.7	Pass
I	Shoulder to Elbow Length	13.0	13.6	13.4	Pass
J	Elbow Rest Height	7.5	8.3	7.9	Pass
K	Buttock to Knee Length	22.8	23.8	23.3	Pass
L	Popliteal Height	16.9	17.9	17.6	Pass
M	Knee Pivot Height	19.1	19.7	19.4	Pass
N	Buttock Popliteal Length	17.8	18.8	18.1	Pass
O	Chest Depth without Jacket	8.4	9.0	8.6	Pass
P	Foot Length (right)	9.9	10.5	10.1	Pass
V	Shoulder Breadth	16.3	17.2	16.8	Pass
W	Foot Breadth	3.6	4.2	3.7	Pass
Y	Chest Circumference with Jacket	38.2	39.4	38.8	Pass
Z	Waist Circumference	32.9	34.1	33.8	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

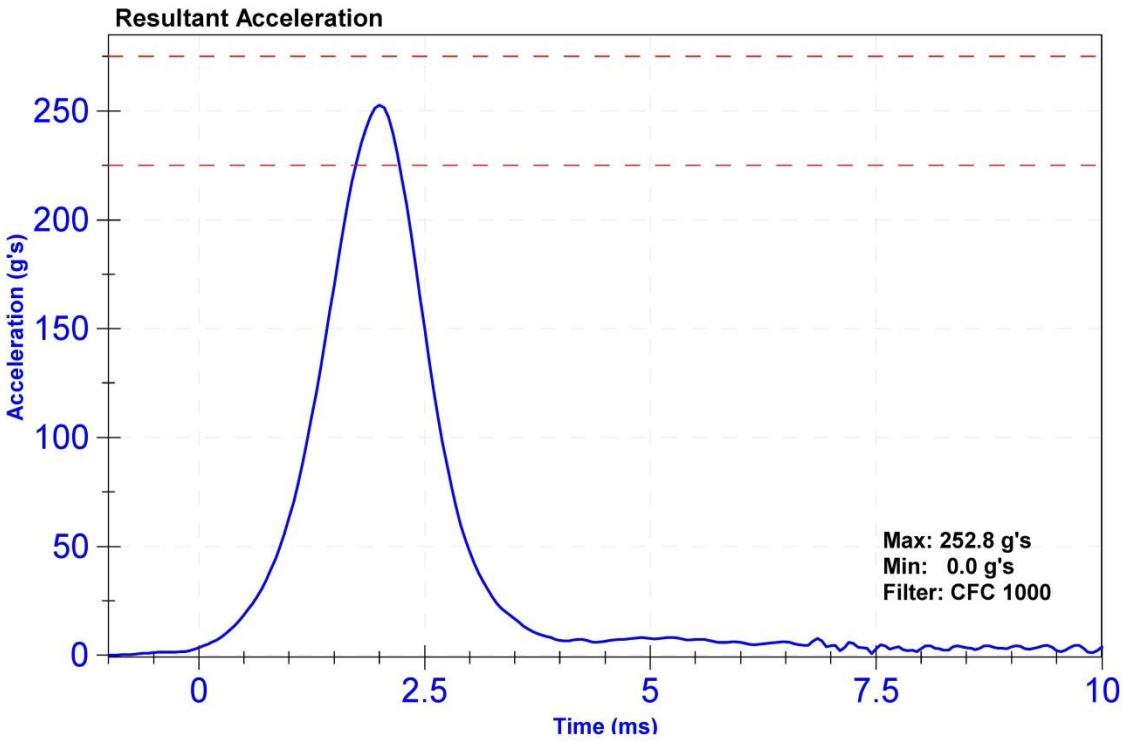
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	1046	Laboratory Supervisor	M.Goehle

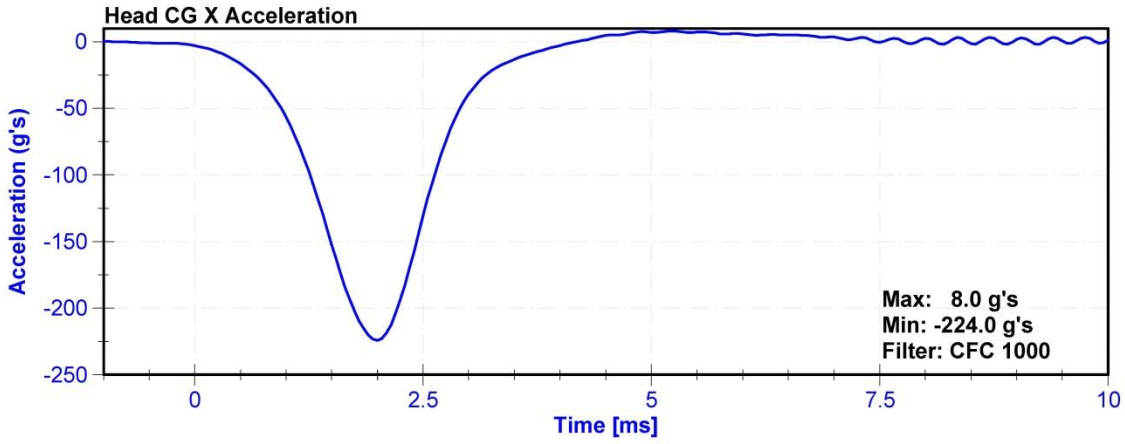
Results

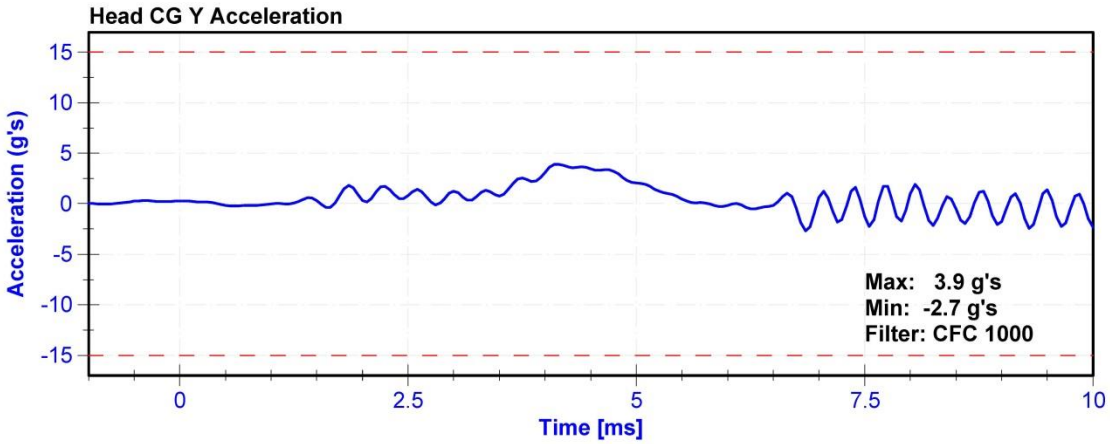
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	C	21.4	Pass
Humidity	10	70	%	13.3	Pass
Resultant Acceleration	225	275	g's	252.8	Pass
Oscillation	0	10	%	3.2	Pass
Lateral Acceleration	-15	15	g's	3.9	Pass

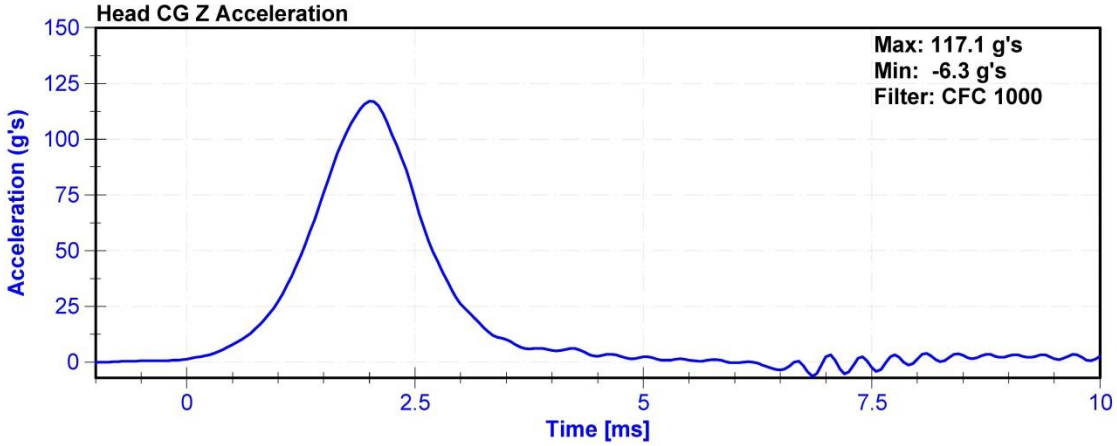
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264CT	AC-P58871	12/19/2014	6/19/2015
Y Accelerometer	ENDEVCO 7264	AC-P12359	12/19/2014	6/19/2015
Z Accelerometer	ENDEVCO 7264CT	AC-P52133	12/19/2014	6/19/2015




Head CG X Acceleration
Acceleration (g's)
0
-50
-100
-150
-200
-250
0
2.5
5
7.5
10
Time [ms]
Max: 8.0 g's
Min: -224.0 g's
Filter: CFC 1000


Head CG Y Acceleration
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
5
7.5
10
Time [ms]
Max: 3.9 g's
Min: -2.7 g's
Filter: CFC 1000


Head CG Z Acceleration
Acceleration (g's)
150
125
100
75
50
25
0
0
2.5
5
7.5
10
Time [ms]
Max: 117.1 g's
Min: -6.3 g's
Filter: CFC 1000

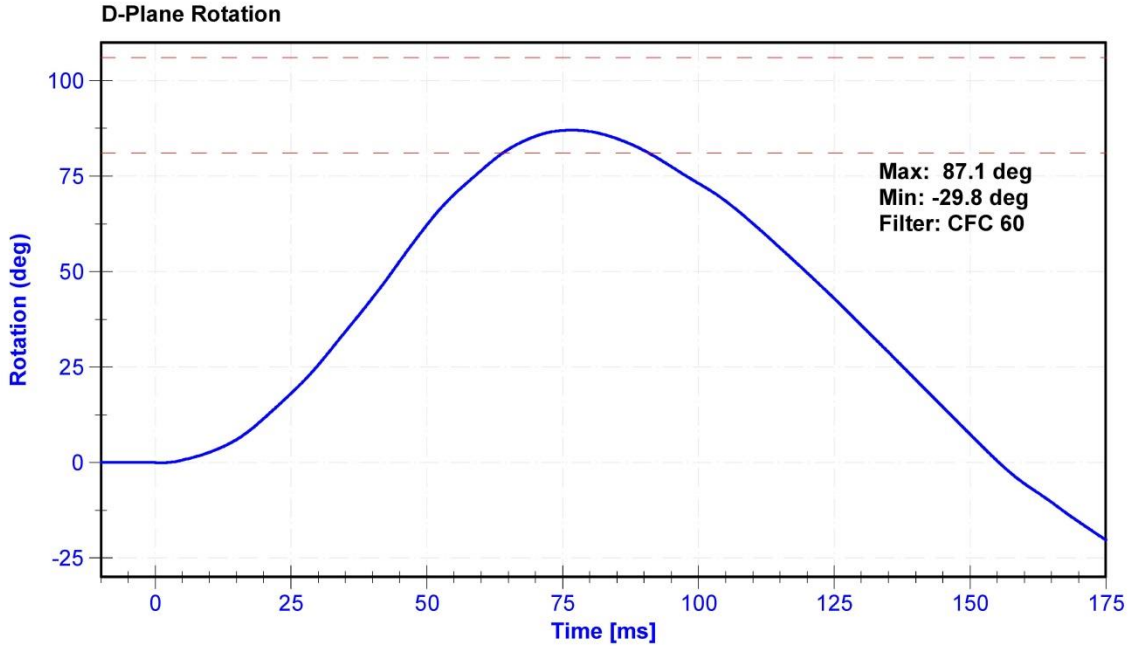
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	1046	Laboratory Supervisor	M.Goehle

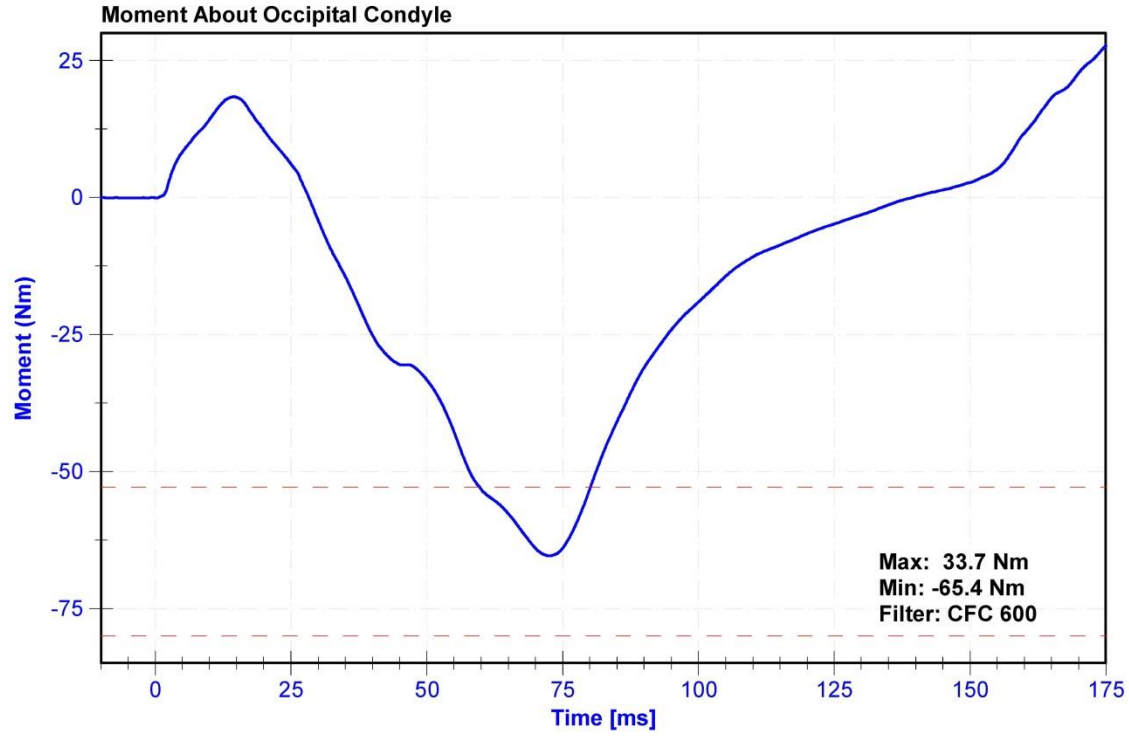
Results

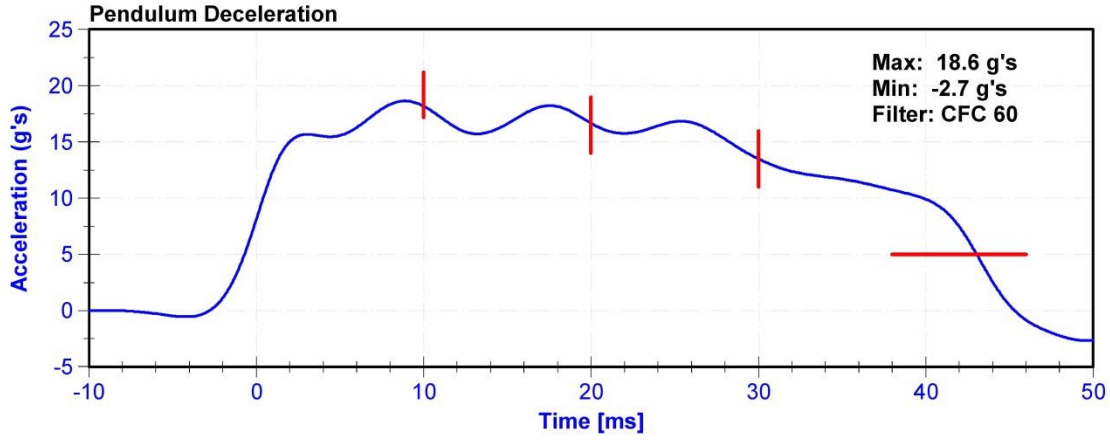
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.5	Pass
Humidity	10	70	%	13.5	Pass
Velocity	5.94	6.19	m/s	6.025	Pass
Pendulum Deceleration at 10ms	17.2	21.2	g's	18.18	Pass
Pendulum Deceleration at 20ms	14	19	g's	16.7	Pass
Pendulum Deceleration at 30ms	11	16	g's	13.5	Pass
Max. Pendulum Deceleration After 30ms	0	22	g's	18.6	Pass
Pendulum Deceleration Time to 5 g's	38	46	ms	43.1	Pass
D Plane Rotation	81	106	deg	87.1	Pass
Time at Maximum Rotation	72	82	ms	76.7	Pass
Rotation Decay to Zero	147	174	ms	155.4	Pass
Moment About Occipital Condyle	-80	-52.9	Nm	-65.38	Pass
Time at Minimum Moment	65	79	ms	72.3	Pass
Moment Decay to Zero	120	148	ms	139.3	Pass

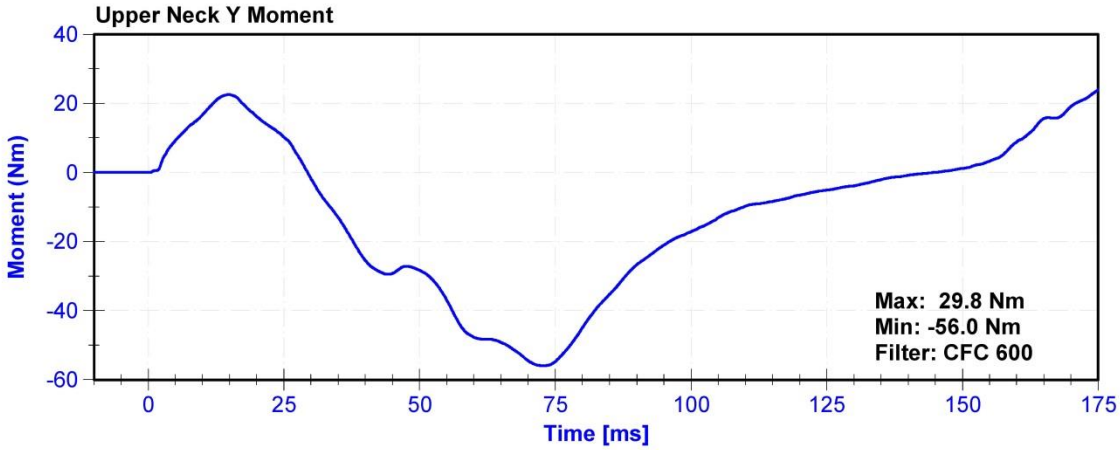
Transducer Calibrations

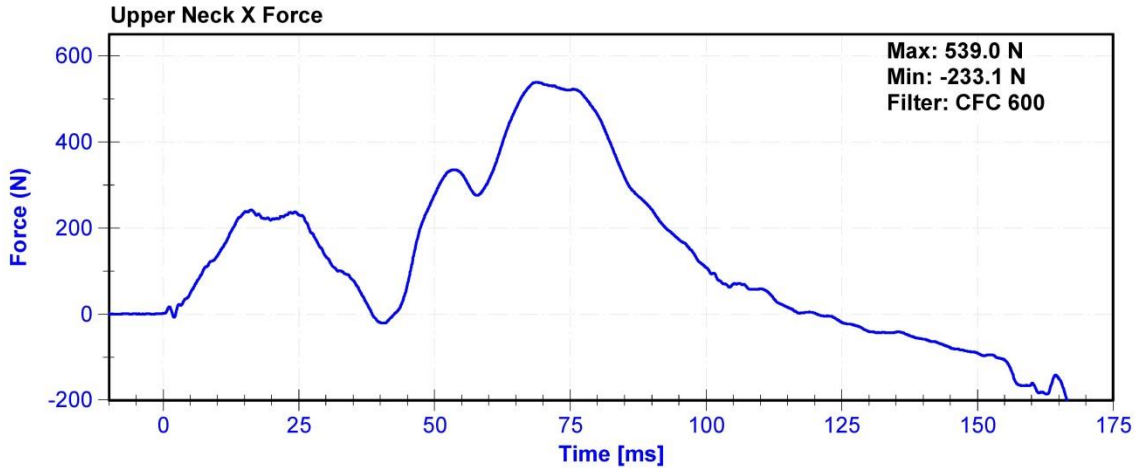
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	11/6/2014	11/6/2015
Pendulum Potentiometer	SP22G	DS-PendPot	9/16/2014	9/16/2015
Condyle Potentiometer	SP22G	DS-CondPot	2/21/2014	2/21/2015
Upper Neck Load Cell	DENTON 1716A	LC-2186Fx	8/7/2014	8/7/2015


D-Plane Rotation
Rotation (deg)
100
75
50
25
0
-25
0
25
50
75
100
125
150
175
Time [ms]
Max: 87.1 deg
Min: -29.8 deg
Filter: CFC 60


Moment About Occipital Condyle
Moment (Nm)
25
0
-25
-50
-75
0
25
50
75
100
125
150
175
Time [ms]
Max: 33.7 Nm
Min: -65.4 Nm
Filter: CFC 600


Pendulum Deceleration
Max: 18.6 g's
Min: -2.7 g's
Filter: CFC 60
Acceleration (g's)
Time [ms]


Upper Neck Y Moment
Max: 29.8 Nm
Min: -56.0 Nm
Filter: CFC 600
Moment (Nm)
Time [ms]


Upper Neck X Force
Max: 539.0 N
Min: -233.1 N
Filter: CFC 600
Force (N)
Time [ms]

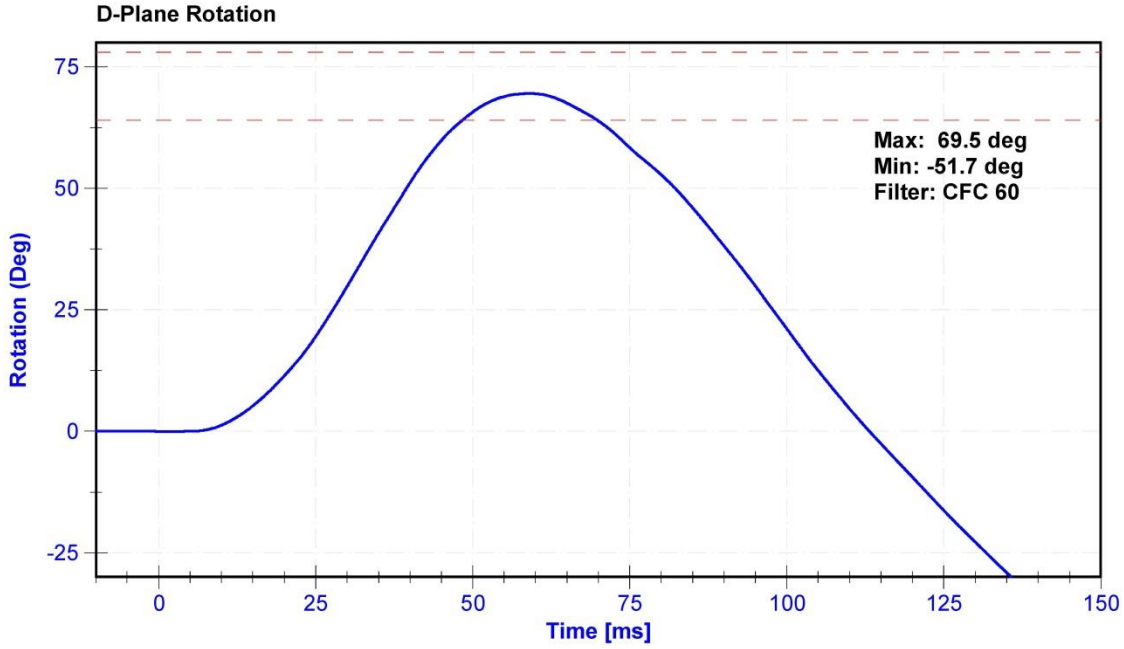
ATD Manufacturer	FTSS	Test Technician	M. Hartung
ATD Serial Number	1046	Laboratory Supervisor	M. Goehle

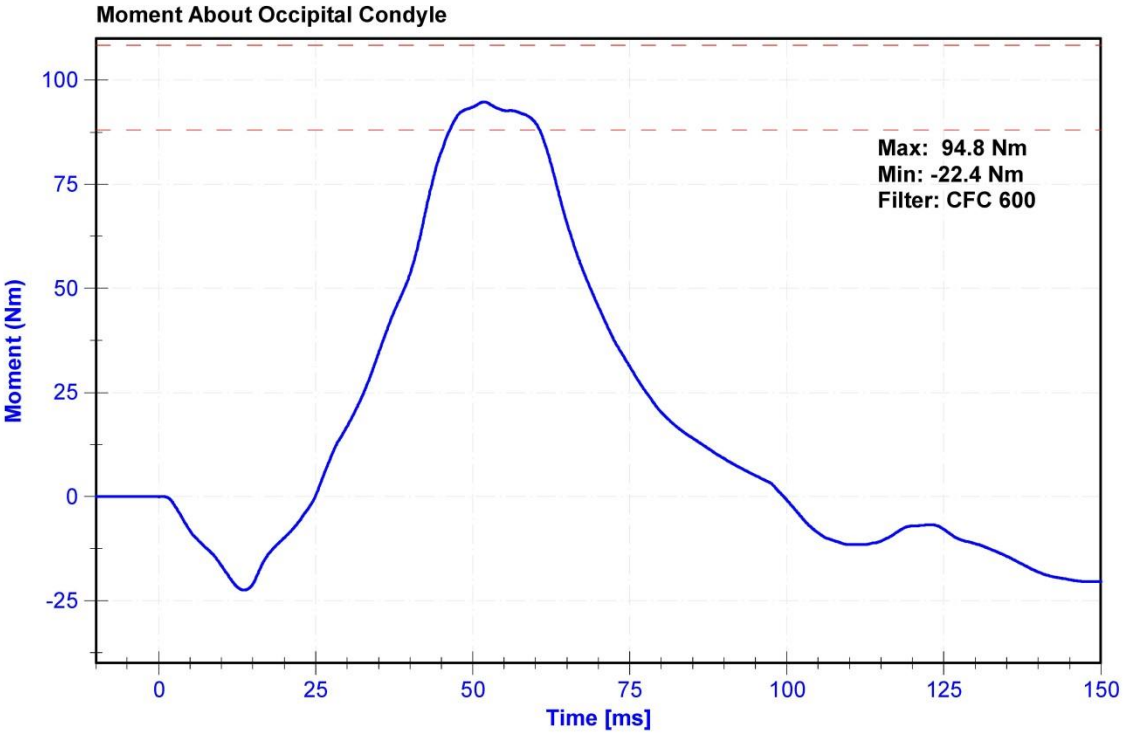
Results

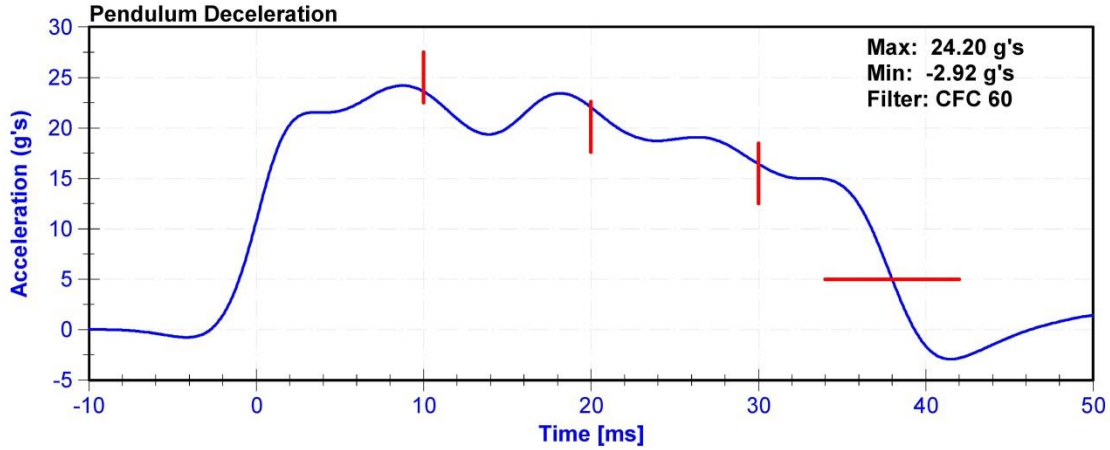
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.5	Pass
Humidity	10	70	%	14.1	Pass
Velocity	6.89	7.13	m/s	6.979	Pass
Pendulum Deceleration at 10ms	22.5	27.5	g's	23.61	Pass
Pendulum Deceleration at 20ms	17.6	22.6	g's	22.05	Pass
Pendulum Deceleration at 30ms	12.5	18.5	g's	16.43	Pass
Max. Pendulum Deceleration After 30ms	0	29	g's	24.2	Pass
Pendulum Deceleration Time to 5 g's	34	42	ms	38.0	Pass
D Plane Rotation	64	78	deg	69.5	Pass
Time at Maximum Rotation	57	64	ms	59.0	Pass
Rotation Decay to Zero	113	127	ms	113.2	Pass
Moment About Occipital Condyle	88.1	108.4	Nm	94.78	Pass
Time at Maximum Moment	47	58	ms	51.8	Pass
Moment Decay to Zero	97	107	ms	99.5	Pass

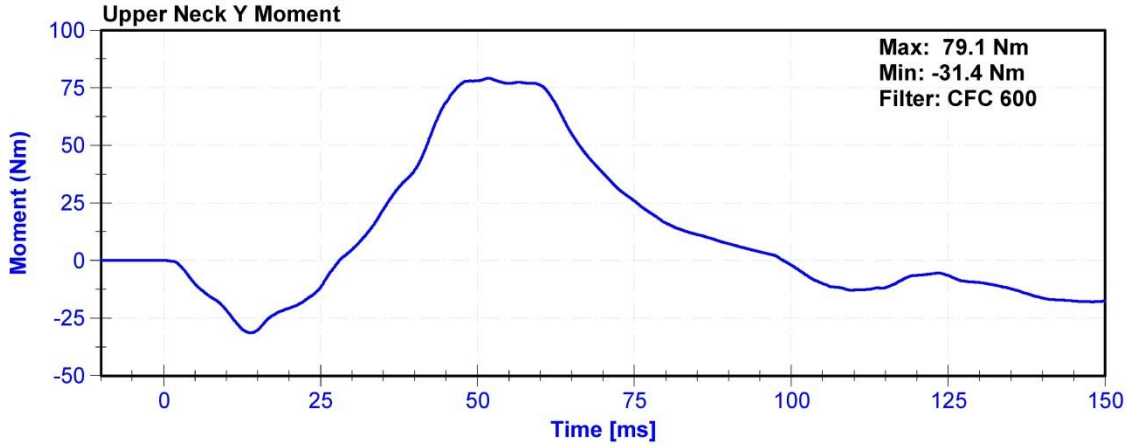
Transducer Calibrations

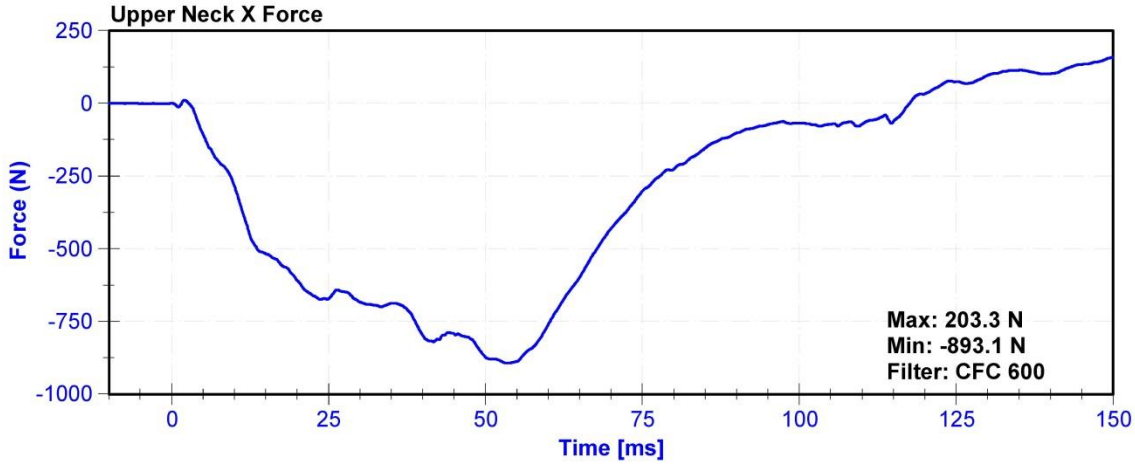
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	11/6/2014	11/6/2015
Pendulum Potentiometer	SP22G	DS-PendPot	9/16/2014	9/16/2015
Condyle Potentiometer	SP22G	DS-CondPot	2/21/2014	2/21/2015
Upper Neck Load Cell	DENTON 1716A	LC-2186Fx	8/7/2014	8/7/2015


D-Plane Rotation
Max: 69.5 deg
Min: -51.7 deg
Filter: CFC 60
Rotation (Deg)
75
50
25
0
-25
0
25
50
75
100
125
150
Time [ms]


Moment About Occipital Condyle
Max: 94.8 Nm
Min: -22.4 Nm
Filter: CFC 600
Moment (Nm)
100
75
50
25
0
-25
0
25
50
75
100
125
150
Time [ms]


Pendulum Deceleration
Max: 24.20 g's
Min: -2.92 g's
Filter: CFC 60
Acceleration (g's)
Time [ms]


Upper Neck Y Moment
Max: 79.1 Nm
Min: -31.4 Nm
Filter: CFC 600
Moment (Nm)
Time [ms]


Upper Neck X Force
Max: 203.3 N
Min: -893.1 N
Filter: CFC 600
Force (N)
Time [ms]

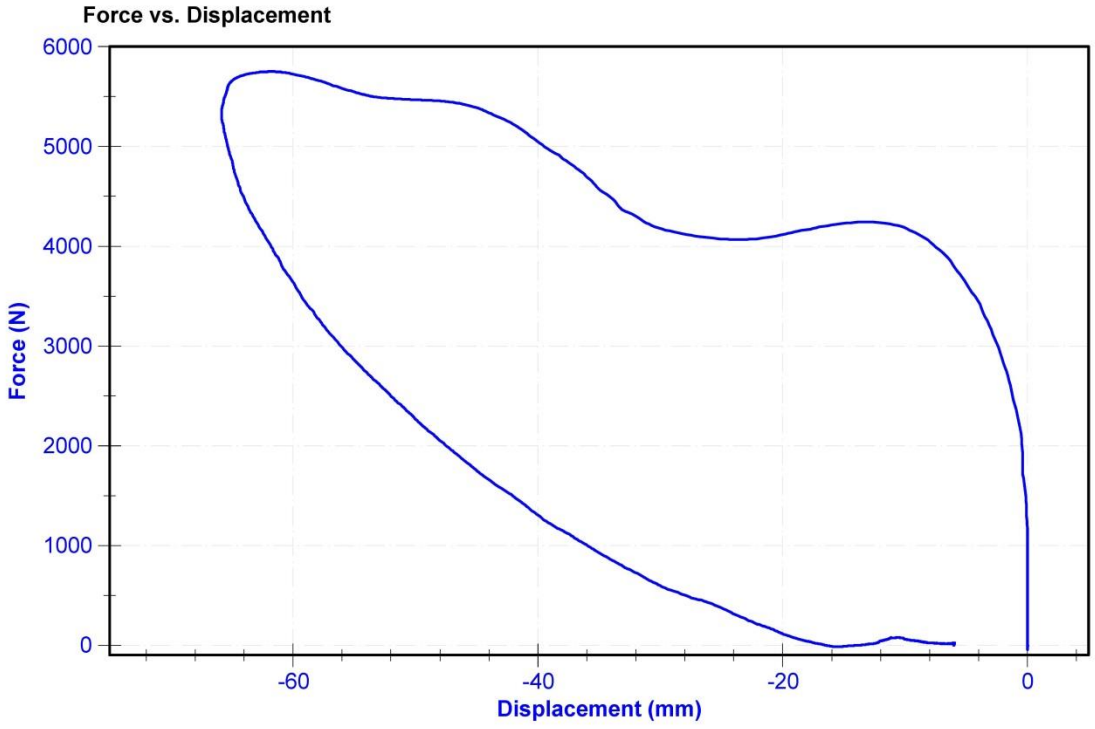
ATD Manufacturer	FTSS	Test Technician	M. Goehle
ATD Serial Number	1046	Laboratory Supervisor	M. Goehle

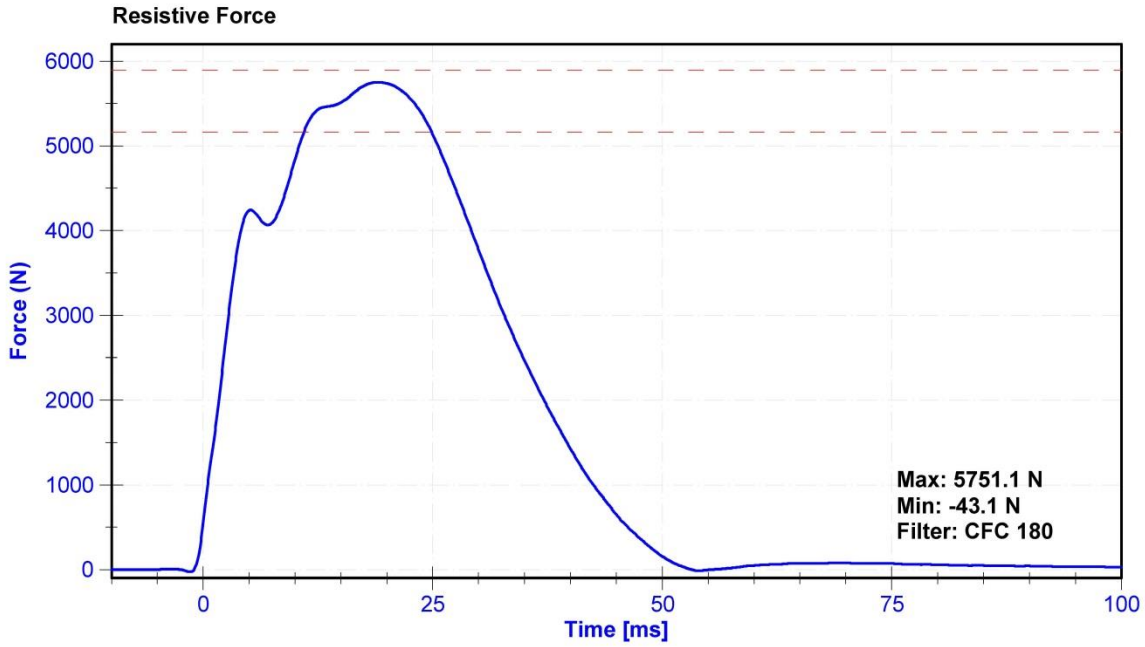
Results

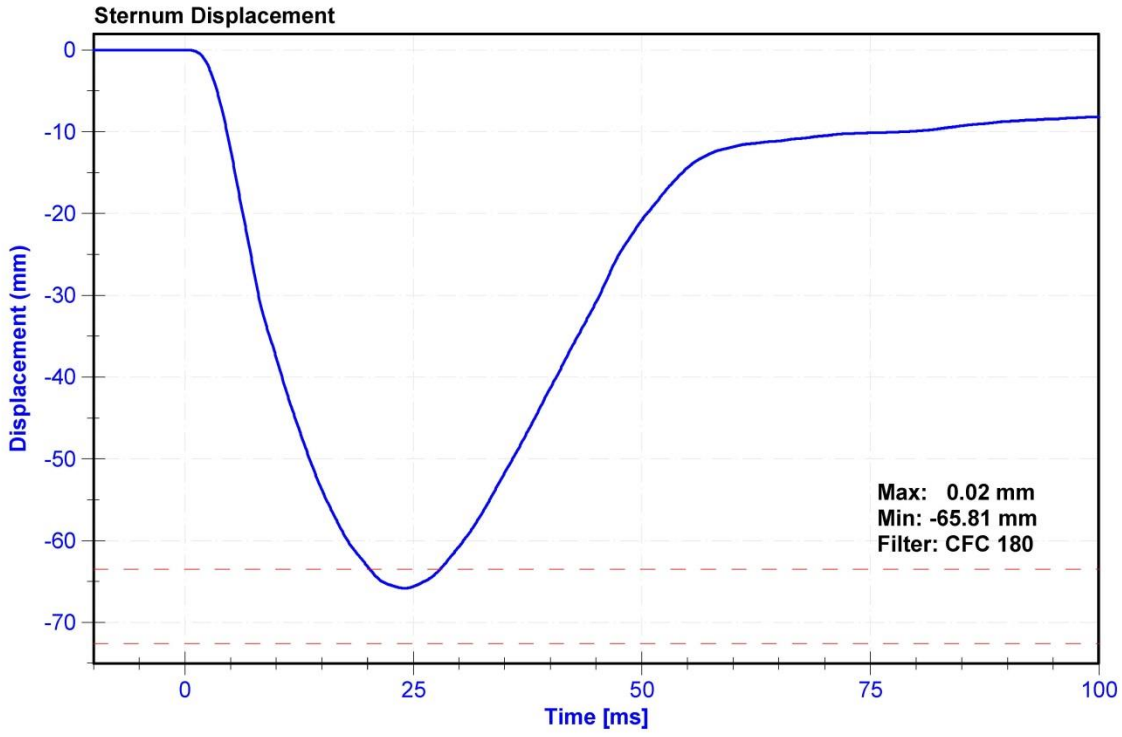
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	˚C	21.0	Pass
Humidity	10	70	%	15.1	Pass
Velocity	6.59	6.83	m/s	6.82	Pass
Chest Displacement	-72.6	-63.5	mm	-65.81	Pass
Resistive Force	5,160	5,894	N	5751.1	Pass
Hysteresis	69	85	%	72.1	Pass

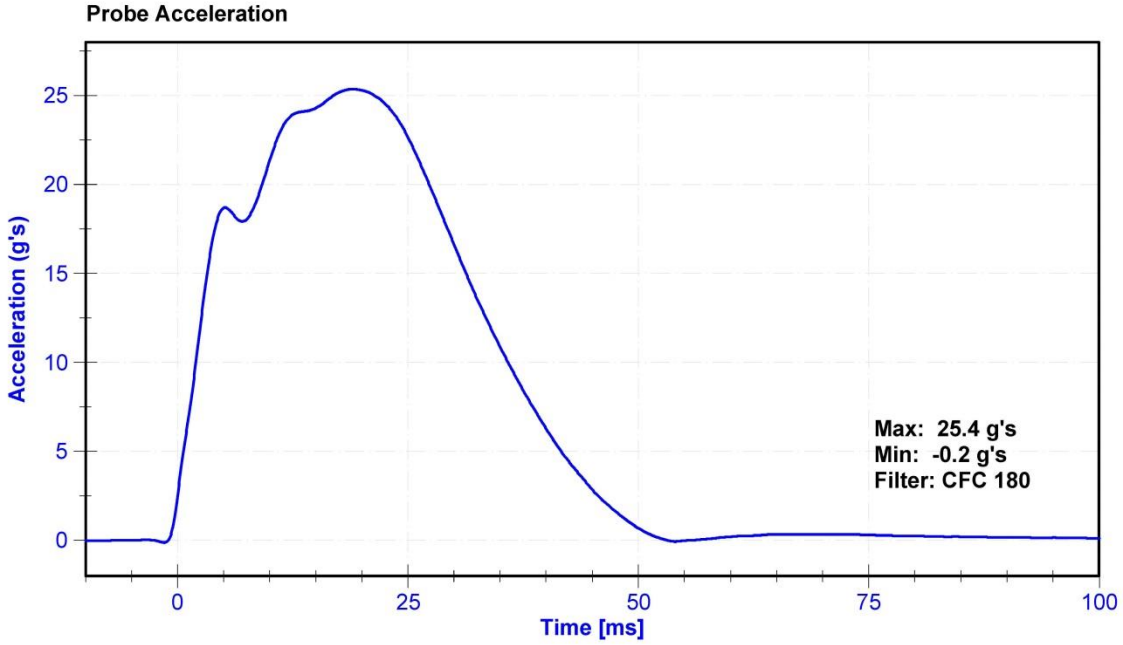
Transducer Calibrations

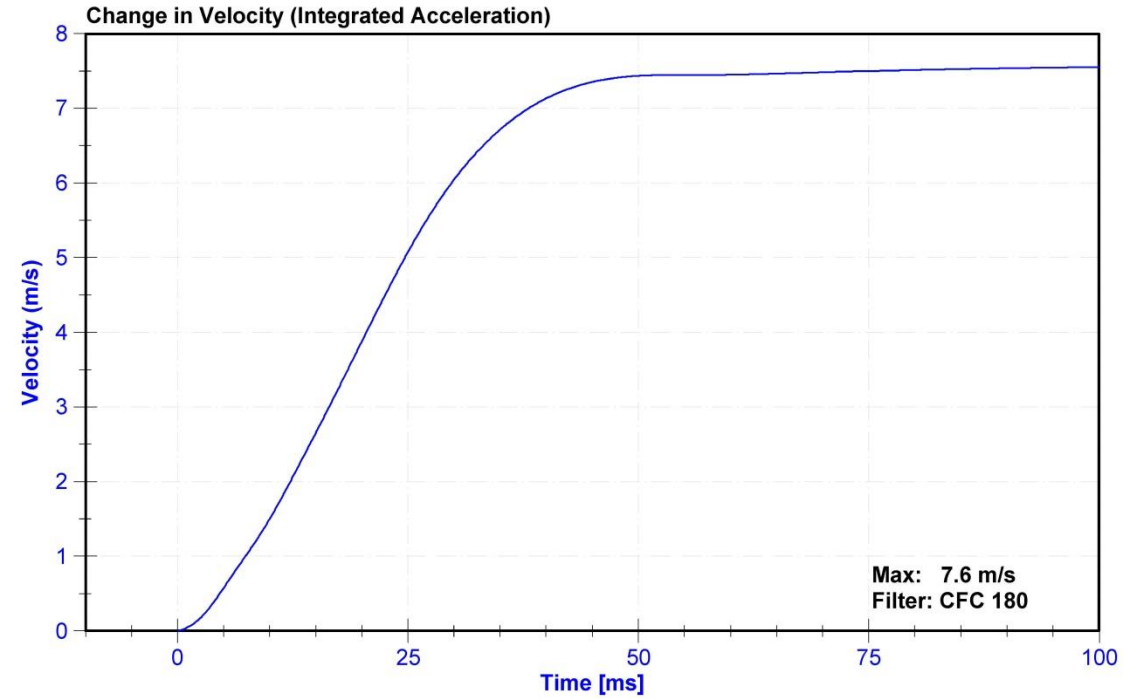
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C14972	2/6/2015	8/7/2015
Chest Potentiometer	Servo 14CB1-2897	DS-1046	7/31/2014	7/31/2015




Resistive Force
Force (N)
6000
5000
4000
3000
2000
1000
0
0
25
50
75
100
Time [ms]
Max: 5751.1 N
Min: -43.1 N
Filter: CFC 180


Sternum Displacement
Displacement (mm)
0
-10
-20
-30
-40
-50
-60
-70
0
25
50
75
100
Time [ms]
Max: 0.02 mm
Min: -65.81 mm
Filter: CFC 180


Probe Acceleration
Acceleration (g's)
25
20
15
10
5
0
0
25
50
75
100
Time [ms]
Max: 25.4 g's
Min: -0.2 g's
Filter: CFC 180


Change in Velocity (Integrated Acceleration)
Velocity (m/s)
8
7
6
5
4
3
2
1
0
0
25
50
75
100
Time [ms]
Max: 7.6 m/s
Filter: CFC 180

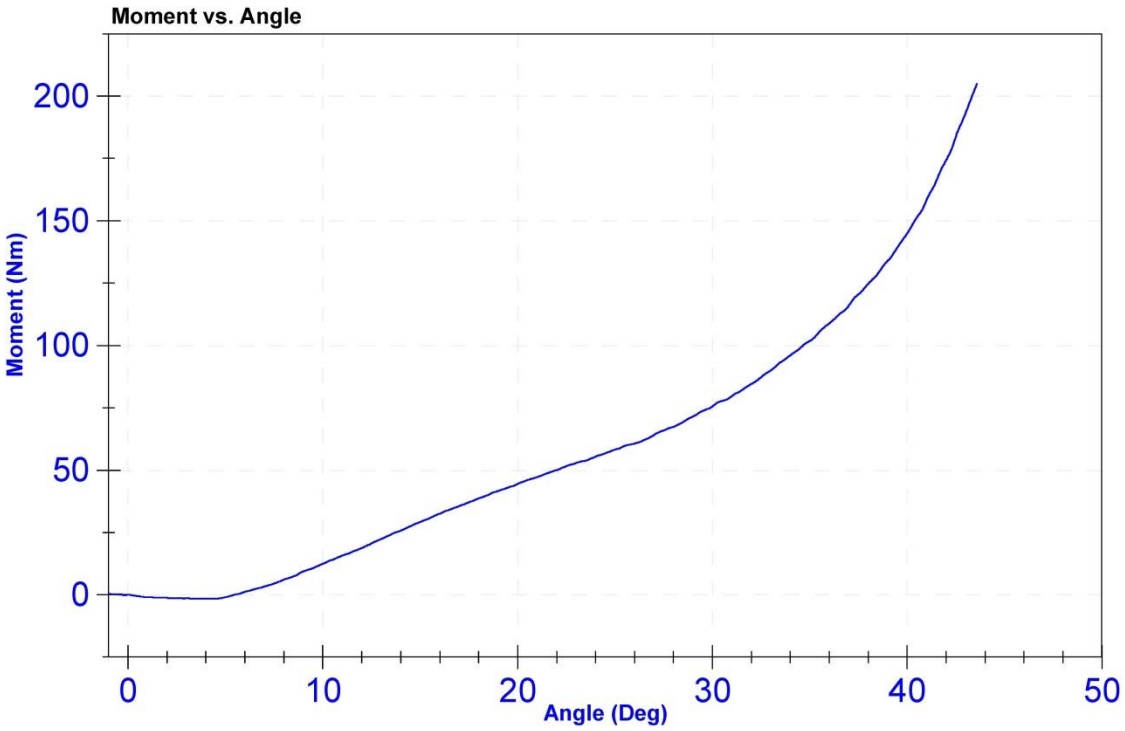
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	1046	Laboratory Supervisor	M.Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	23.4	Pass
Humidity	10	70	%	14.6	Pass
Average Velocity	5	10	deg/s	5.9	Pass
Angle at 203Nm	40	50	deg	43.5	Pass
Moment at 30 degrees	0	94.9	Nm	75.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	Servo 14CB1-3615	DS-0008	2/20/2014	2/20/2015
Load Cell	Key Trans 2301-02	LC-115 My	3/25/2014	3/25/2015



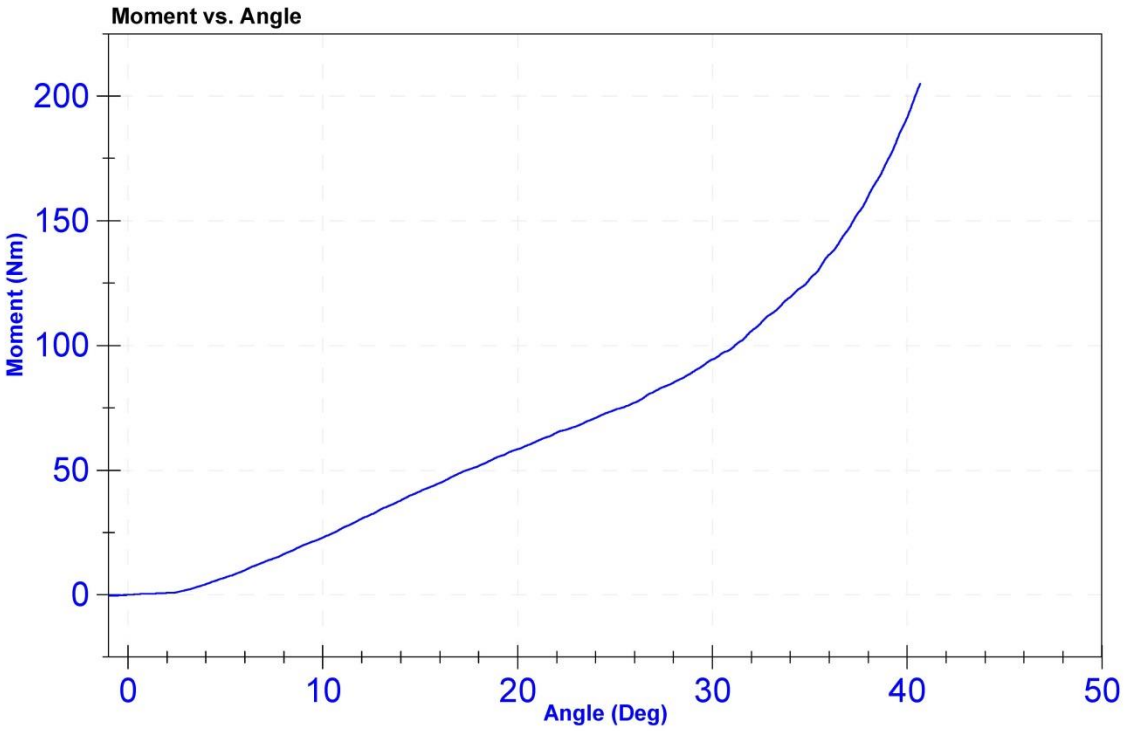
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	1046	Laboratory Supervisor	M.Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.2	Pass
Humidity	10	70	%	14.4	Pass
Average Velocity	5	10	deg/s	5.8	Pass
Angle at 203Nm	40	50	deg	40.6	Pass
Moment at 30 degrees	0	94.9	Nm	94.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	Servo 14CB1-3615	DS-0008	2/20/2014	2/20/2015
Load Cell	Key Trans 2301-02	LC-115 My	3/25/2014	3/25/2015



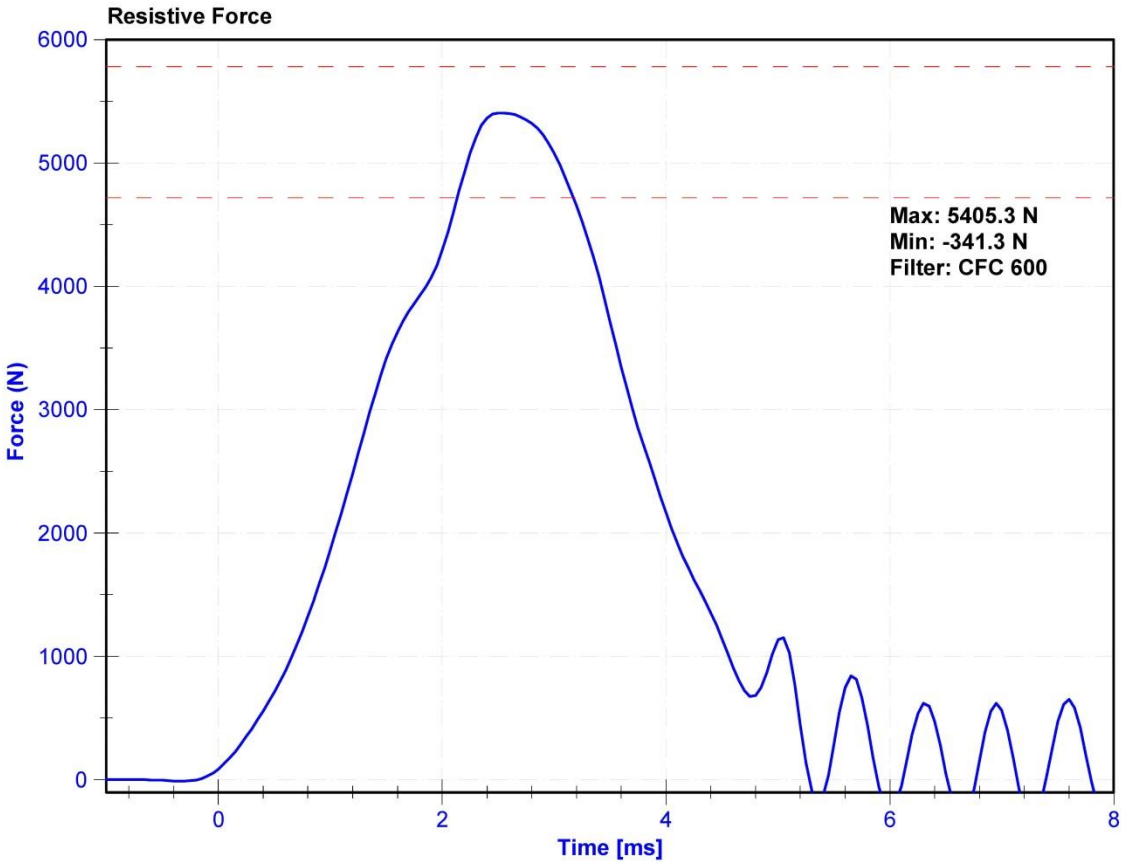
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	1046	Laboratory Supervisor	M. Goehle

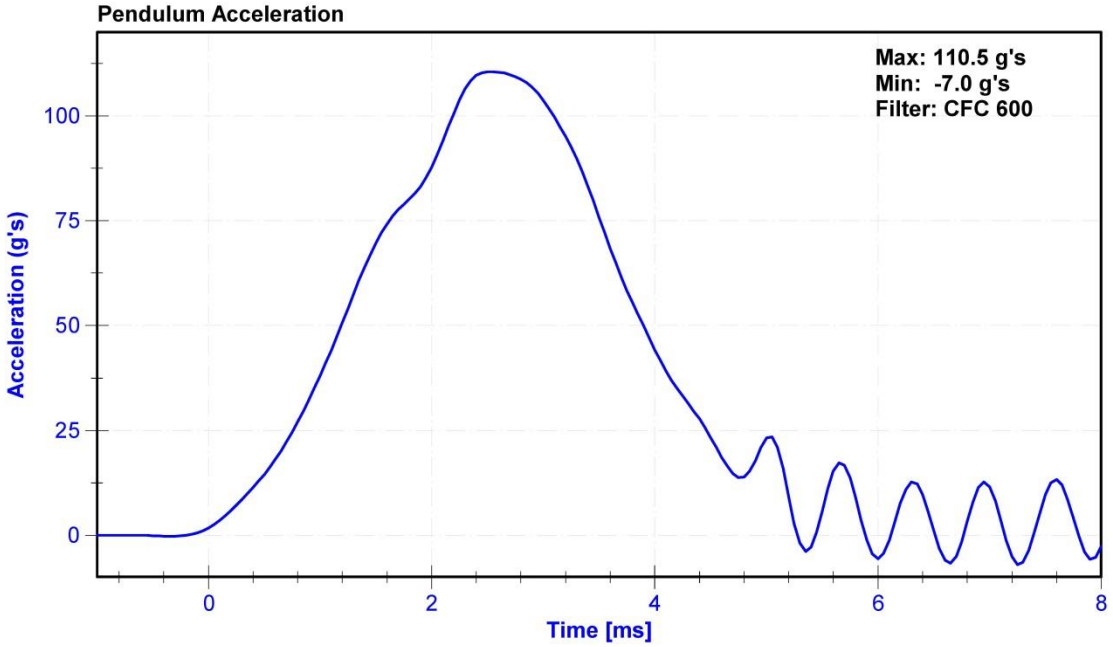
Results

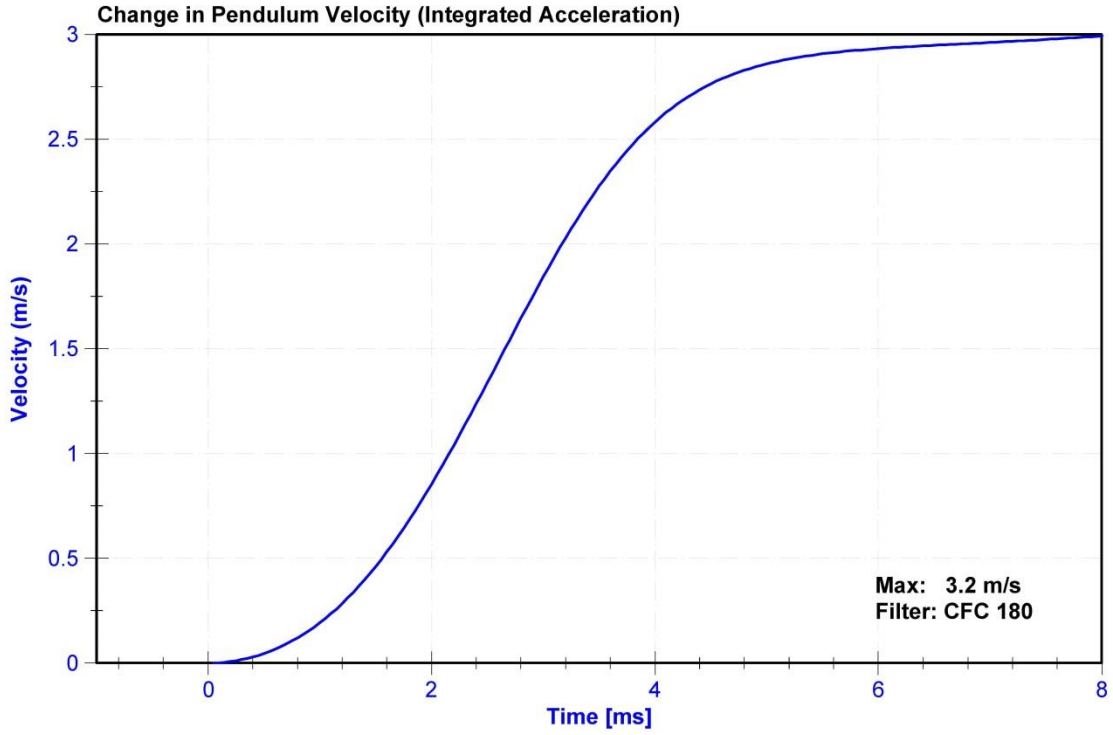
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.5	Pass
Humidity	10	70	%	15.2	Pass
Velocity	2.07	2.13	m/s	2.085	Pass
Resistive Force	4,720	5,780	N	5405.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C14953	1/29/2015	7/30/2015




Pendulum Acceleration
Max: 110.5 g's
Min: -7.0 g's
Filter: CFC 600
Acceleration (g's)
100
75
50
25
0
0
2
4
6
8
Time [ms]


Change in Pendulum Velocity (Integrated Acceleration)
Velocity (m/s)
3
2.5
2
1.5
1
0.5
0
Max: 3.2 m/s
Filter: CFC 180
0
2
4
6
8
Time [ms]

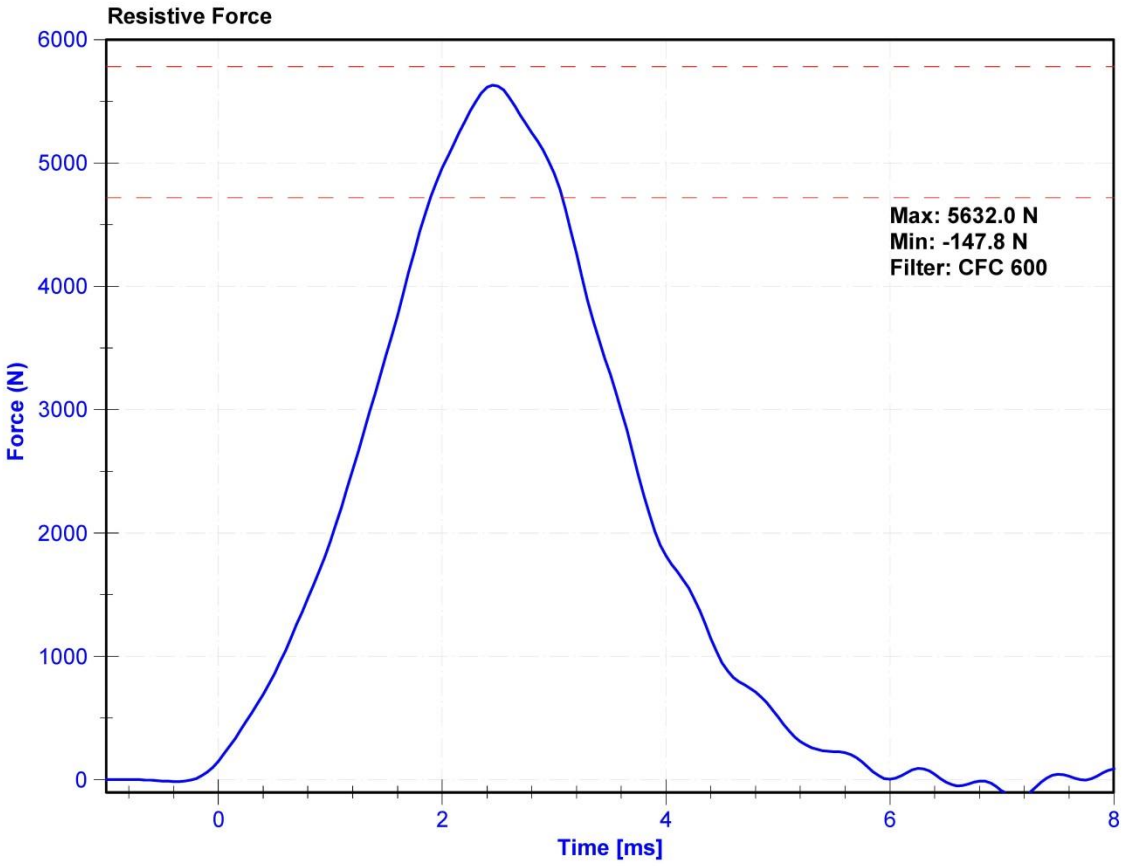
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	1046	Laboratory Supervisor	M. Goehle

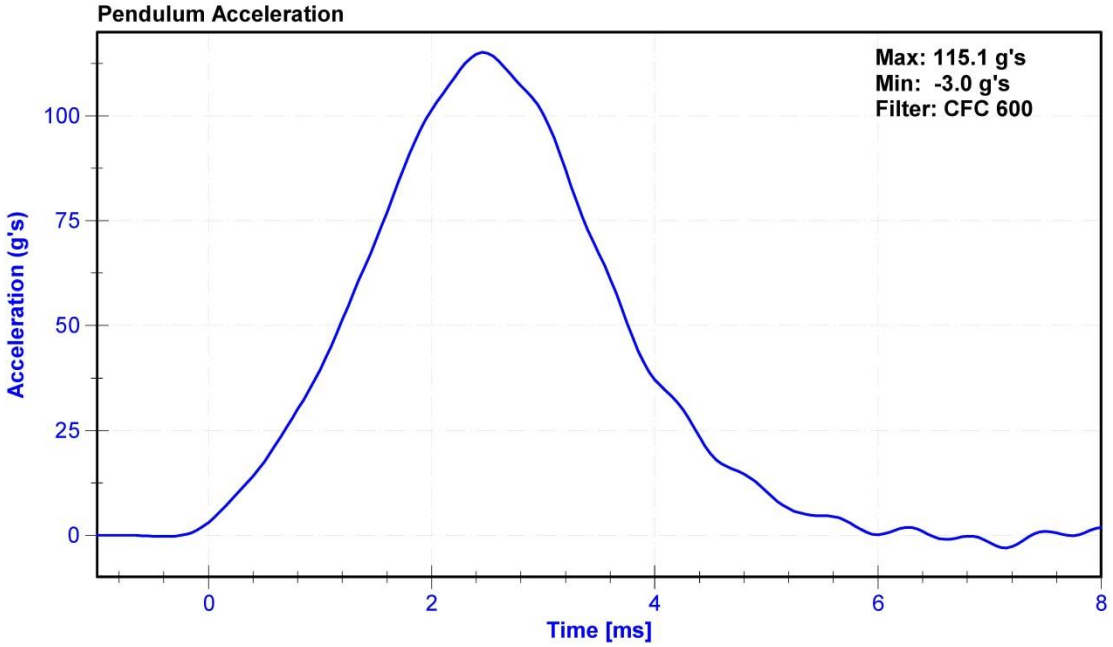
Results

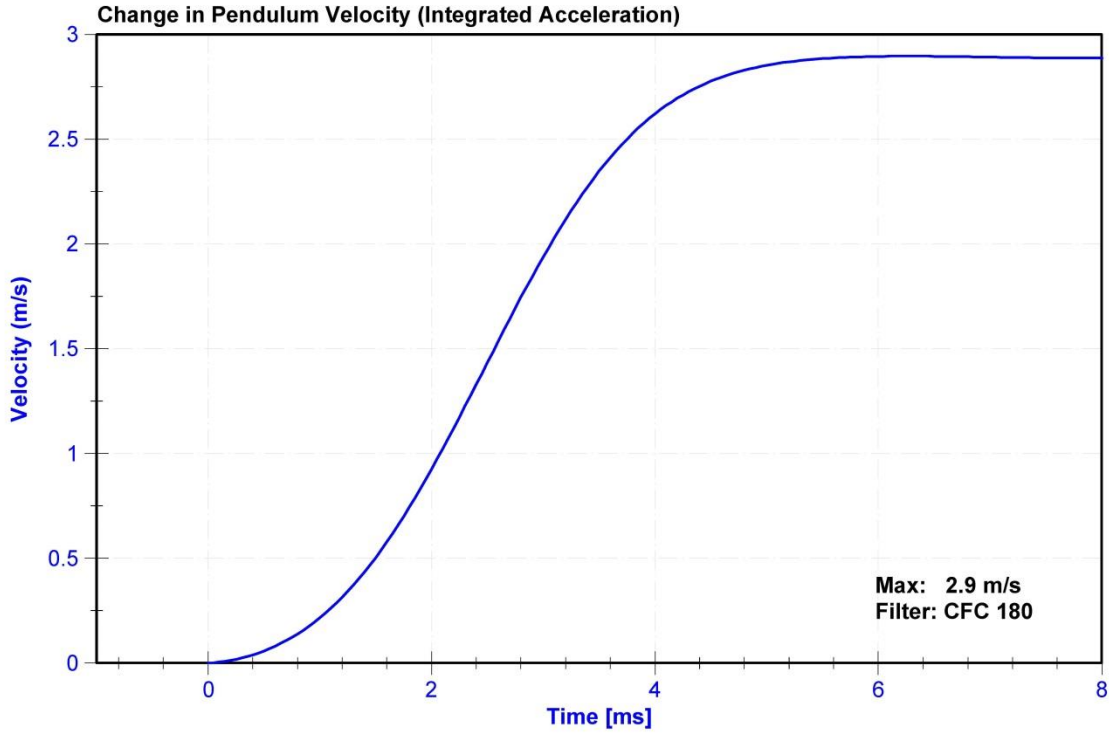
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21	Pass
Humidity	10	70	%	16.8	Pass
Velocity	2.07	2.13	m/s	2.076	Pass
Resistive Force	4,720	5,780	N	5632.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C14953	1/29/2015	7/30/2015




Pendulum Acceleration
Max: 115.1 g's
Min: -3.0 g's
Filter: CFC 600
Acceleration (g's)
100
75
50
25
0
0
2
4
6
8
Time [ms]


Change in Pendulum Velocity (Integrated Acceleration)
Velocity (m/s)
3
2.5
2
1.5
1
0.5
0
Max: 2.9 m/s
Filter: CFC 180
0
2
4
6
8
Time [ms]

CALIBRATION TEST RESULTS

PRE-TEST

HYBRID III 5TH PERCENTILE FEMALE - PASSENGER ATD

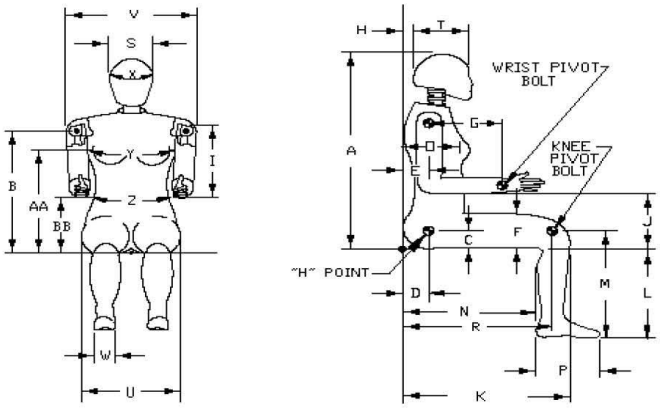
SERIAL NO: 139

Calspan

External Measurements - Hybrid 3 - 5th Female

Technician: M. Geesey Date: 2/5/2015

Dummy Serial Number: 139



Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	775	800	788	Pass
B	Shoulder Pivot Height	432	457	445	Pass
C	H-Point Height	81	86	85	Pass
D	H-Point from Backline	145	150	147	Pass
E	Shoulder Pivot from Backline	69	84	75	Pass
F	Thigh Clearance	119	135	123	Pass
G	Back of Elbow to Wrist Pivot	244	259	249	Pass
H	Head Back to Backline	43	48	46	Pass
I	Shoulder to Elbow Length	277	297	290	Pass
J	Elbow Rest Height	183	203	188	Pass
K	Buttock to Knee Length	521	546	541	Pass
L	Popliteal Height	356	376	362	Pass
M	Knee Pivot Height	394	419	399	Pass
N	Buttock Popliteal Length	414	439	424	Pass
O	Chest Depth without Jacket	175	191	185	Pass
P	Foot Length (right)	219	234	220	Pass
R	Buttock To Knee Pivot Length	457	483	470	Pass
S	Head Breadth	137	437	143	Pass
T	Head Depth	178	188	182	Pass
U	Hip Breadth	300	315	302	Pass
V	Shoulder Breadth	351	366	360	Pass
W	Foot Breadth	79	94	84	Pass
X	Head Circumference	528	549	535	Pass
Y	Chest Circumference with Jacket	851	881	854	Pass
Z	Waist Circumference	460	790	773	Pass
AA	Reference Location (Chest Circumference)	333	358	356	Pass
BB	Reference Location (Waist Circumference)	160	170	170	Pass

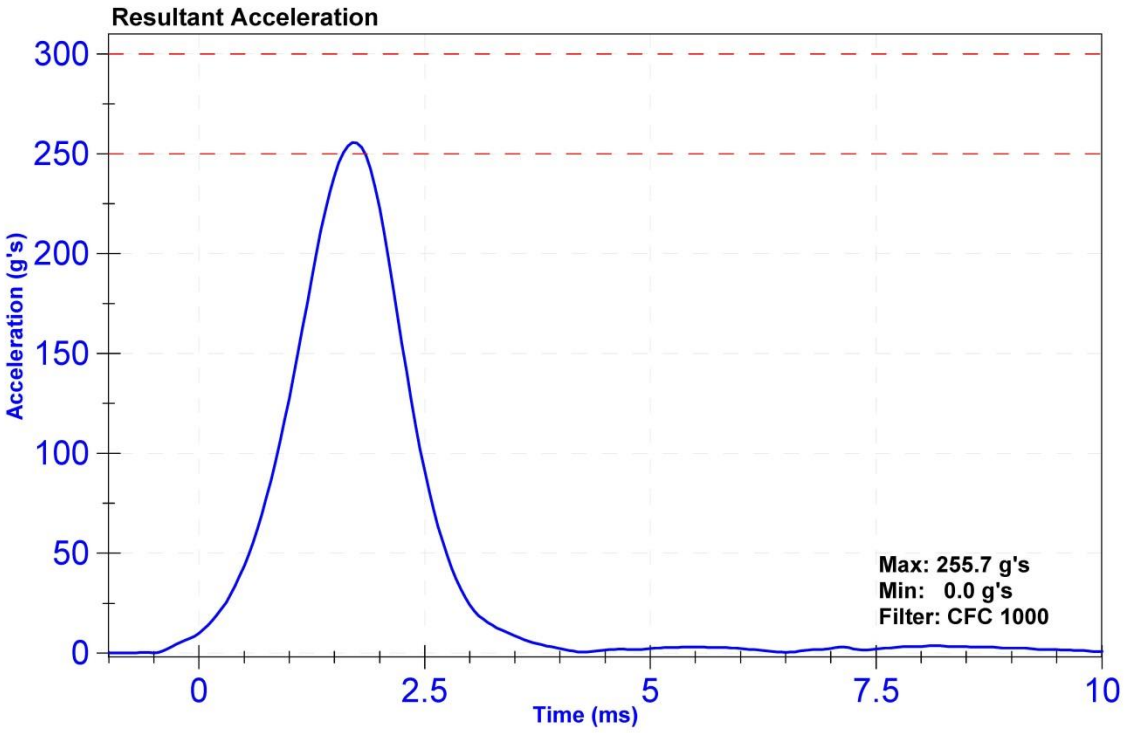
ATD Manufacturer	Denton	Test Technician	M. Geesey
ATD Serial Number	139	Laboratory Supervisor	M. Goehle

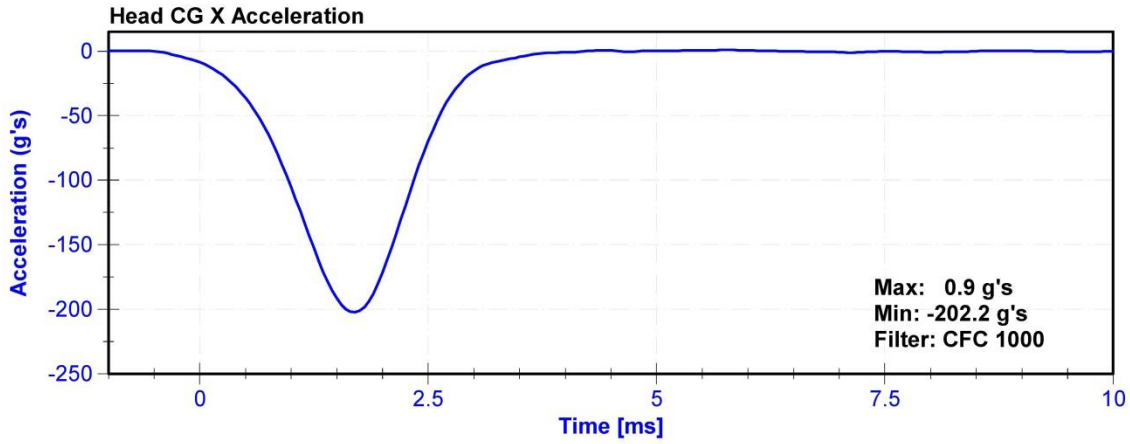
Results

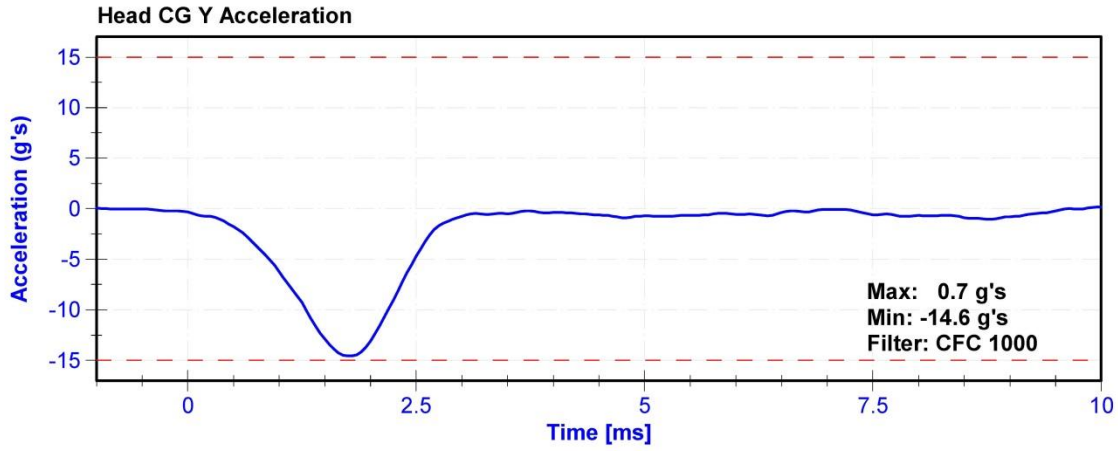
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.5	Pass
Humidity	10	70	%	14.0	Pass
Resultant Acceleration	250	300	g's	255.7	Pass
Oscillation	0	10	%	1.5	Pass
Lateral Acceleration	-15	15	g's	-14.6	Pass

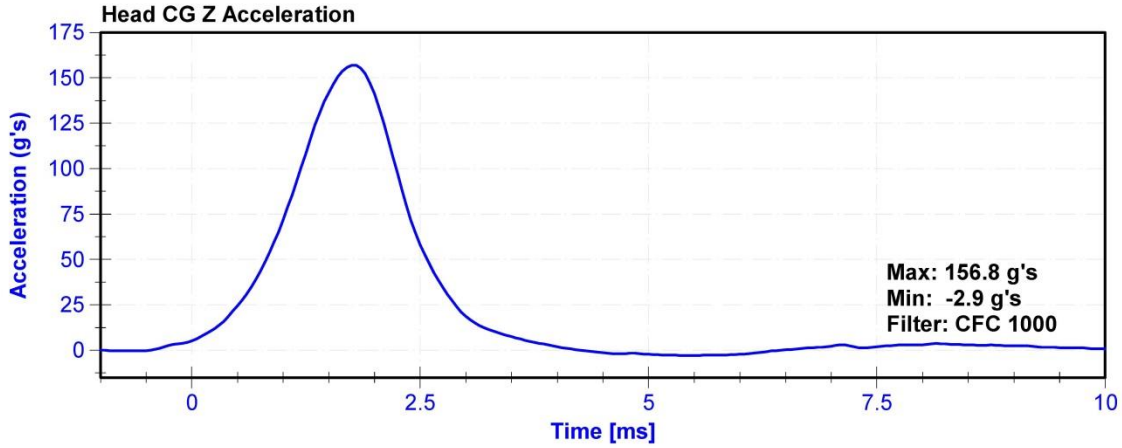
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264	AC-P52054	8/26/2014	2/24/2015
Y Accelerometer	ENDEVCO 7264	AC-P52007	8/26/2014	2/24/2015
Z Accelerometer	ENDEVCO 7264	AC-P51298	8/26/2014	2/24/2015




Head CG X Acceleration
Acceleration (g's)
0
-50
-100
-150
-200
-250
0
2.5
5
7.5
10
Time [ms]
Max: 0.9 g's
Min: -202.2 g's
Filter: CFC 1000


Head CG Y Acceleration
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
5
7.5
10
Time [ms]
Max: 0.7 g's
Min: -14.6 g's
Filter: CFC 1000


Head CG Z Acceleration
Acceleration (g's)
175
150
125
100
75
50
25
0
0
2.5
5
7.5
10
Time [ms]
Max: 156.8 g's
Min: -2.9 g's
Filter: CFC 1000

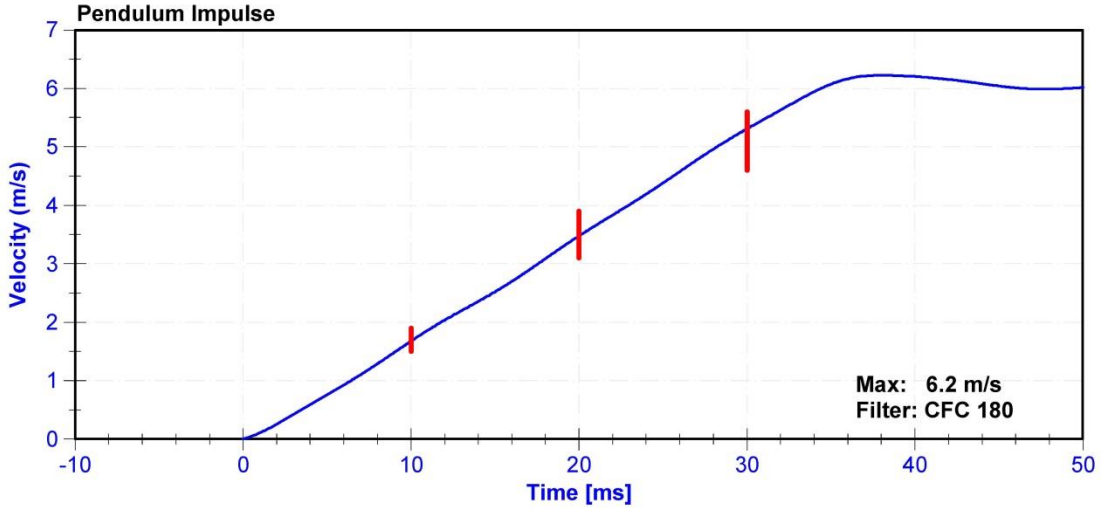
ATD Manufacturer	Denton	Test Technician	M. Geesey
ATD Serial Number	139	Laboratory Supervisor	M. Goehle

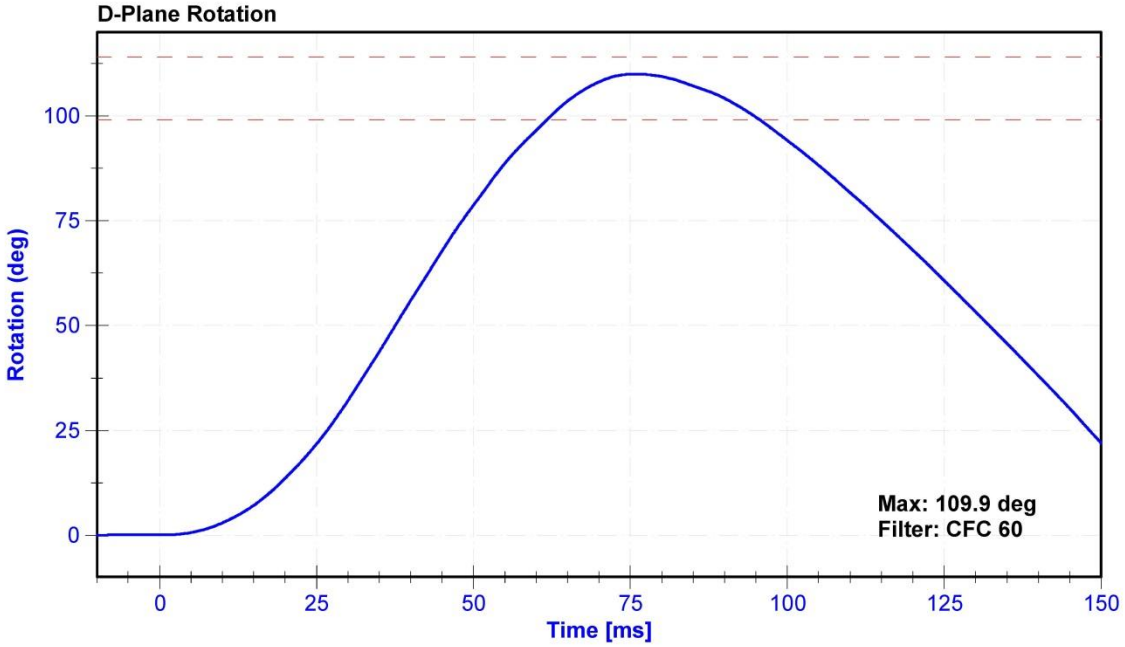
Results

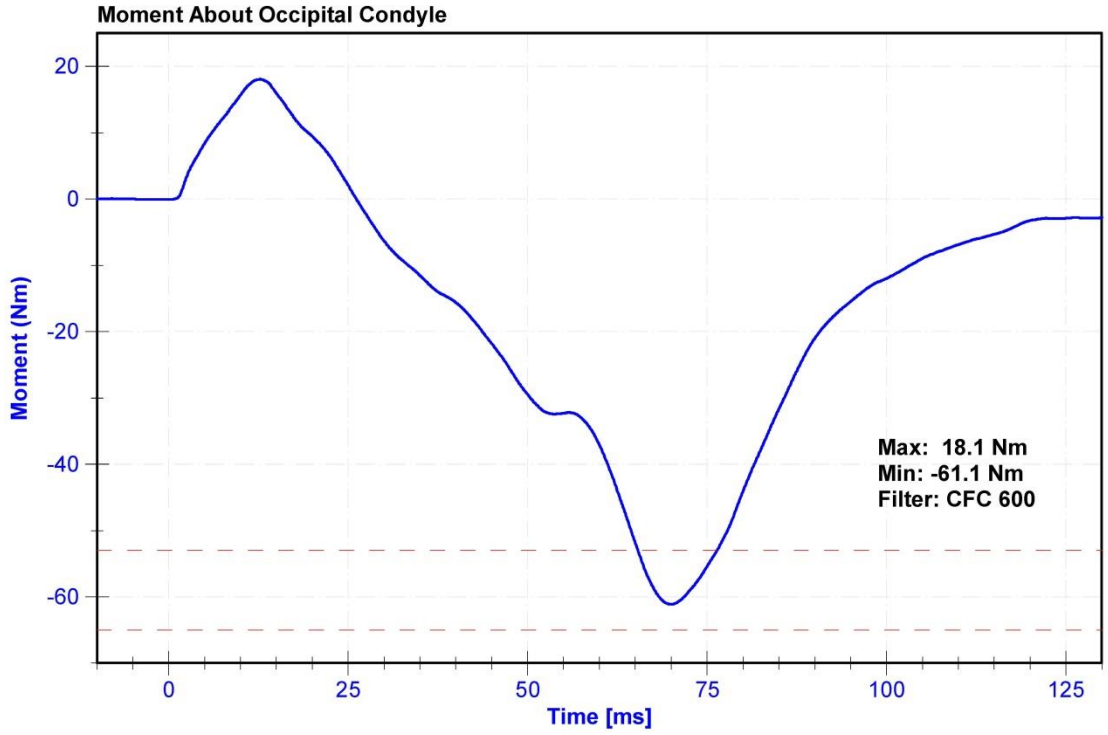
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.6	Pass
Humidity	10	70	%	14.8	Pass
Velocity	5.96	6.19	m/s	5.98	Pass
Pendulum Impulse at 10ms	1.5	1.9	G's	1.68	Pass
Pendulum Impulse at 20ms	3.1	3.9	G's	3.47	Pass
Pendulum Impulse at 30ms	4.6	5.6	G's	5.31	Pass
D Plane Rotation	99	114	deg	109.9	Pass
Moment During Rotation Interval	-65	-53	Nm	-61.1	Pass
Moment Decay to -10Nm	94	114	ms	103.3	Pass

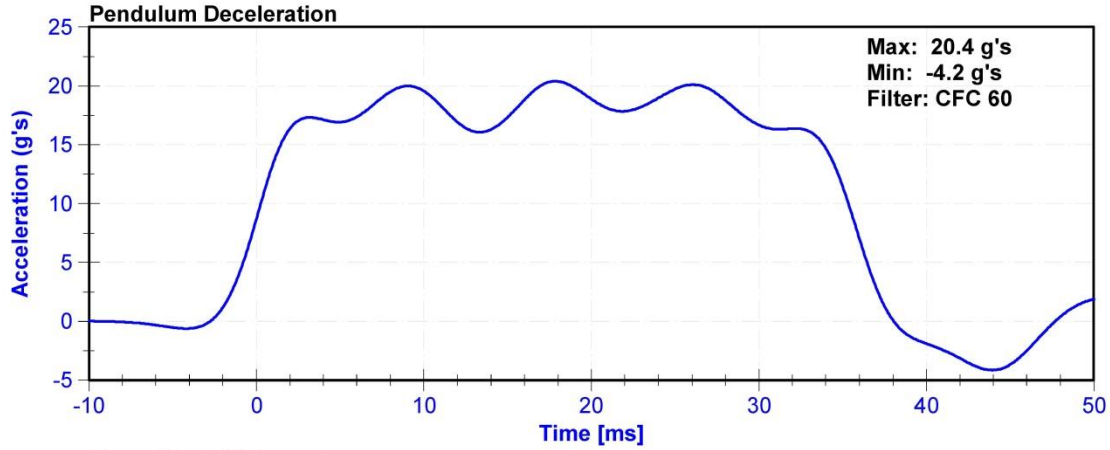
Transducer Calibrations

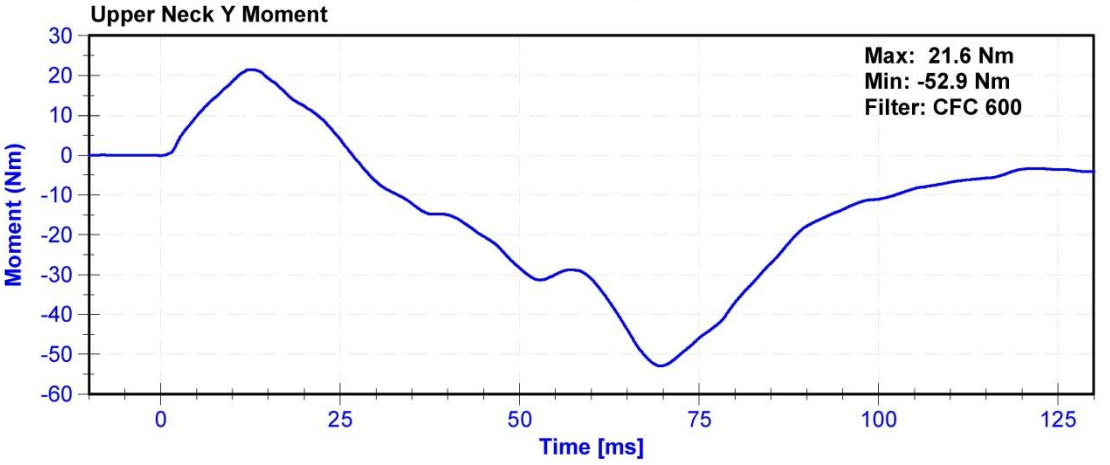
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	11/6/2014	11/6/2015
Pendulum Potentiometer	SP22G	DS-PendPot	9/16/2014	9/16/2015
Condyle Potentiometer	SP22G	DS-CondPot	2/21/2014	2/21/2015
Upper Neck Load Cell	Denton 1716A	LC-2018Fx	5/1/2014	5/1/2015

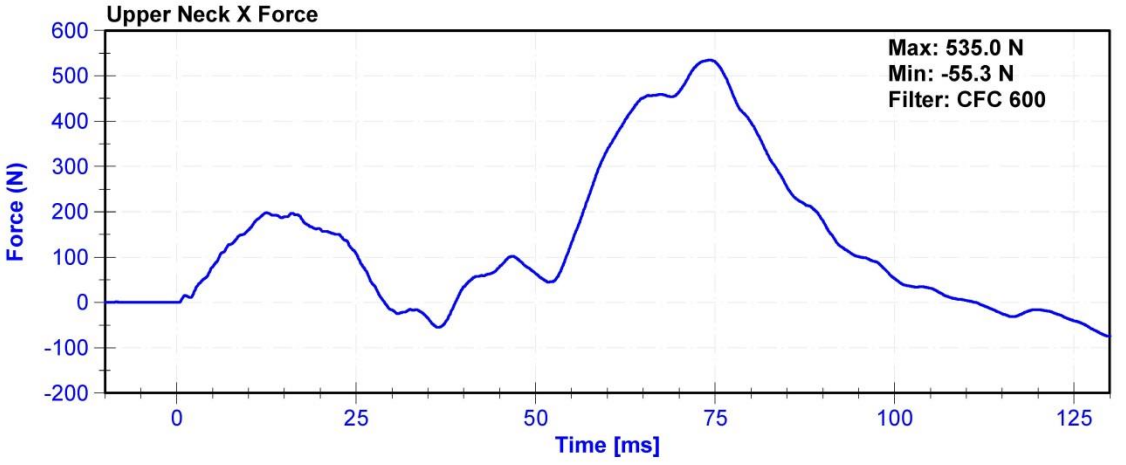



D-Plane Rotation
Rotation (deg)
100
75
50
25
0
0
25
50
75
100
125
150
Time [ms]
Max: 109.9 deg
Filter: CFC 60


Moment About Occipital Condyle
Moment (Nm)
20
0
-20
-40
-60
0
25
50
75
100
125
Time [ms]
Max: 18.1 Nm
Min: -61.1 Nm
Filter: CFC 600


Pendulum Deceleration
Max: 20.4 g's
Min: -4.2 g's
Filter: CFC 60
Acceleration (g's)
25
20
15
10
5
0
-5
-10
0
10
20
30
40
50
Time [ms]


Upper Neck Y Moment
Max: 21.6 Nm
Min: -52.9 Nm
Filter: CFC 600
Moment (Nm)
30
20
10
0
-10
-20
-30
-40
-50
-60
0
25
50
75
100
125
Time [ms]


Upper Neck X Force
Max: 535.0 N
Min: -55.3 N
Filter: CFC 600
Force (N)
600
500
400
300
200
100
0
-100
-200
0
25
50
75
100
125
Time [ms]

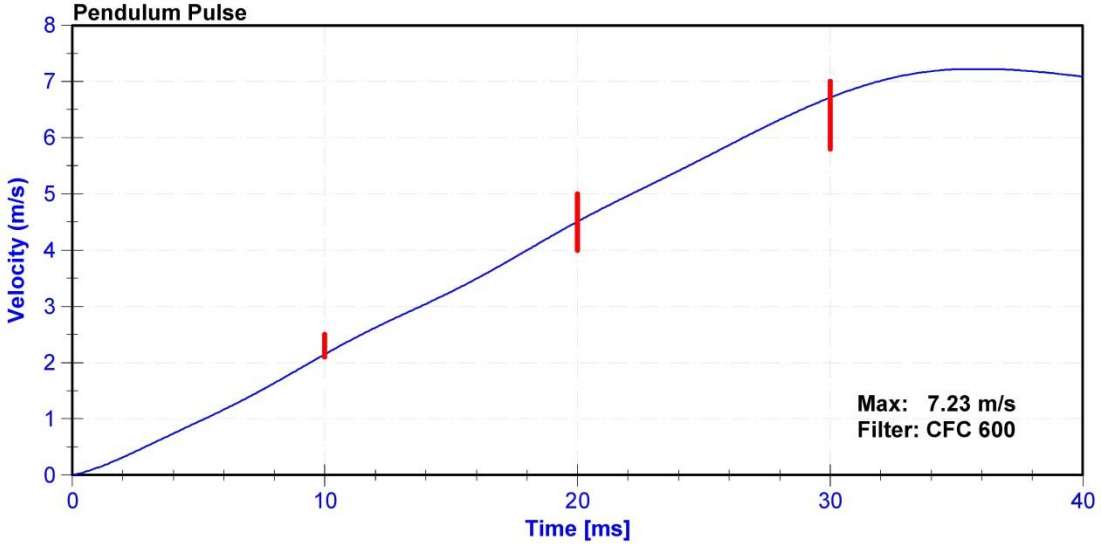
ATD Manufacturer	Denton	Test Technician	M. Geesey
ATD Serial Number	139	Laboratory Supervisor	M. Goehle

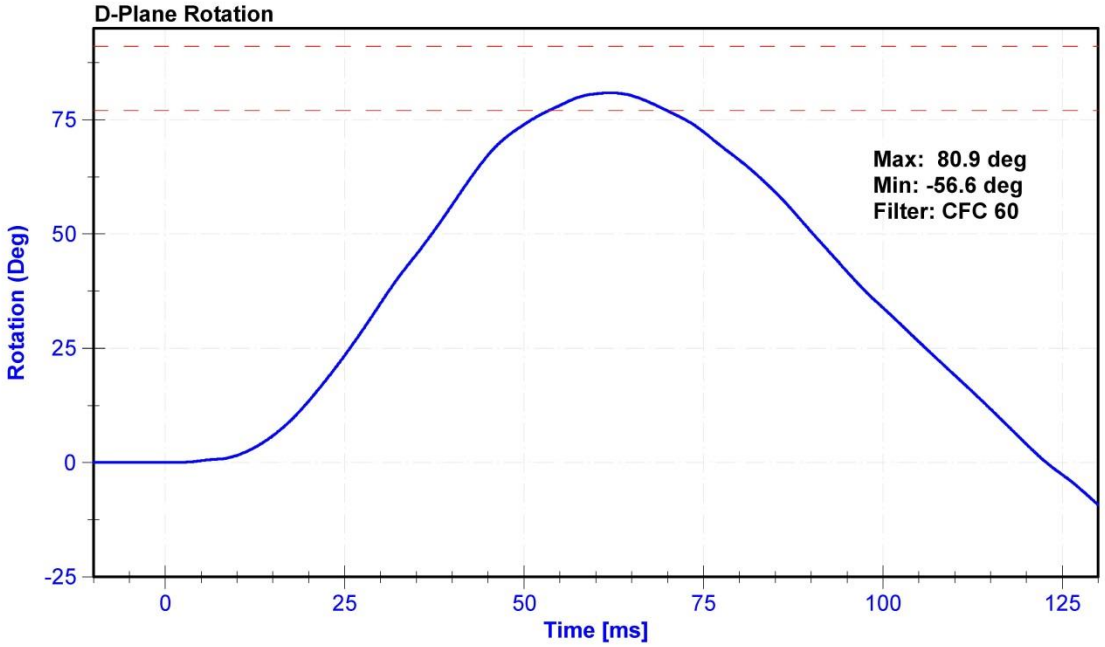
Results

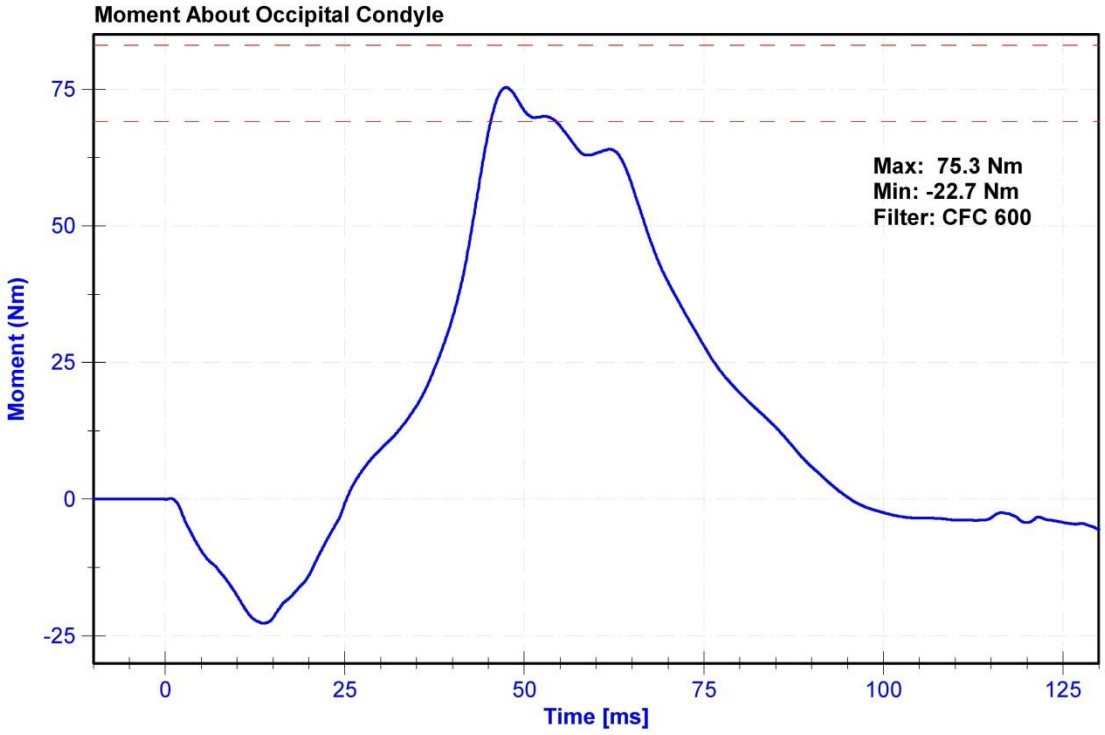
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.5	Pass
Humidity	10	70	%	14.9	Pass
Velocity	6.89	7.13	m/s	6.979	Pass
Pendulum Impulse at 10ms	2.1	2.5	m/s	2.15	Pass
Pendulum Impulse at 20ms	4	5	m/s	4.51	Pass
Pendulum Impulse at 30ms	5.8	7.0	m/s	6.71	Pass
D Plane Rotation	77	91	deg	80.9	Pass
Moment During Rotation Interval	69	83	Nm	75.3	Pass
Moment Decay to 10.0 Nm	80	100	ms	87.2	Pass

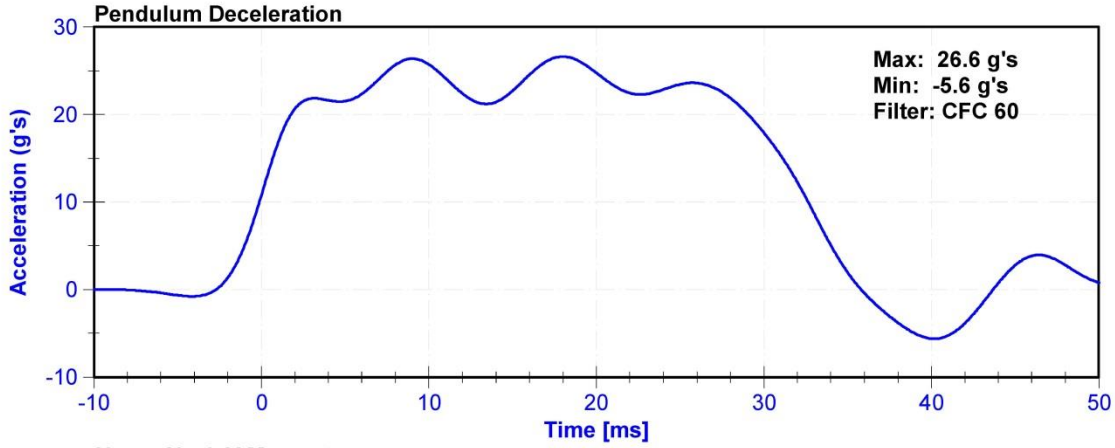
Transducer Calibrations

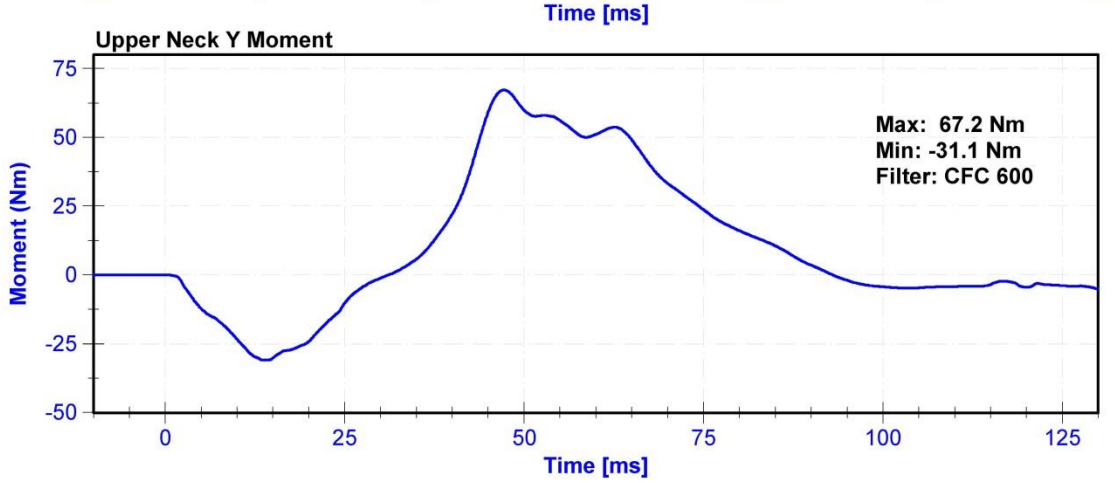
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	11/6/2014	11/6/2015
Pendulum Potentiometer	SP22G	DS-PendPot	9/16/2014	9/16/2015
Condyle Potentiometer	SP22G	DS-CondPot	2/21/2014	2/21/2015
Upper Neck Load Cell	Denton 1716A	LC-2018Fx	5/1/2014	5/1/2015

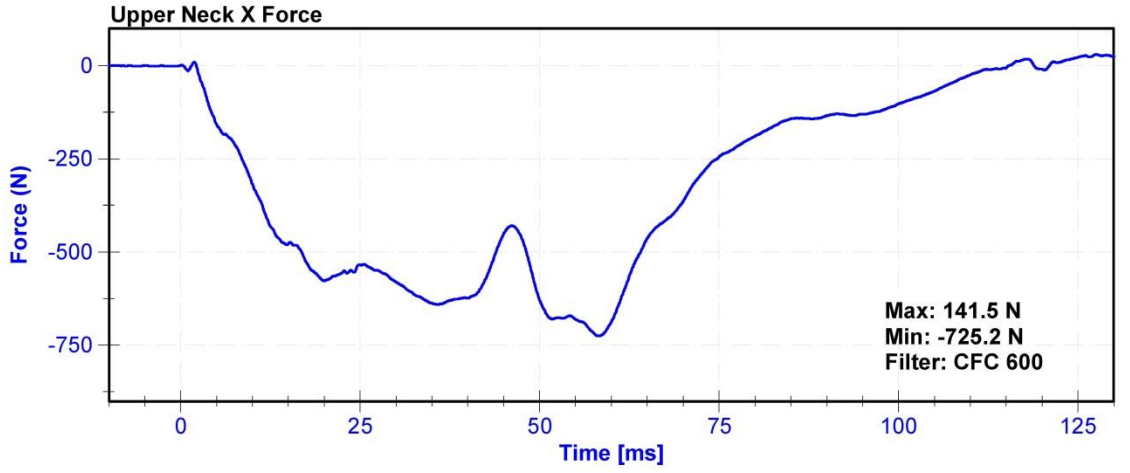



D-Plane Rotation
Max: 80.9 deg
Min: -56.6 deg
Filter: CFC 60
Rotation (Deg)
75
50
25
0
-25
0
25
50
75
100
125
Time [ms]


Moment About Occipital Condyle
Max: 75.3 Nm
Min: -22.7 Nm
Filter: CFC 600
Moment (Nm)
75
50
25
0
-25
0
25
50
75
100
125
Time [ms]


Pendulum Deceleration
Max: 26.6 g's
Min: -5.6 g's
Filter: CFC 60
Acceleration (g's)
30
20
10
0
-10
-10
0
10
20
30
40
50
Time [ms]


Upper Neck Y Moment
Max: 67.2 Nm
Min: -31.1 Nm
Filter: CFC 600
Moment (Nm)
75
50
25
0
-25
-50
0
25
50
75
100
125
Time [ms]


Upper Neck X Force
Max: 141.5 N
Min: -725.2 N
Filter: CFC 600
Force (N)
0
-250
-500
-750
0
25
50
75
100
125
Time [ms]

ATD Manufacturer	Denton	Test Technician	M. Geesey
ATD Serial Number	139	Laboratory Supervisor	M. Goehle

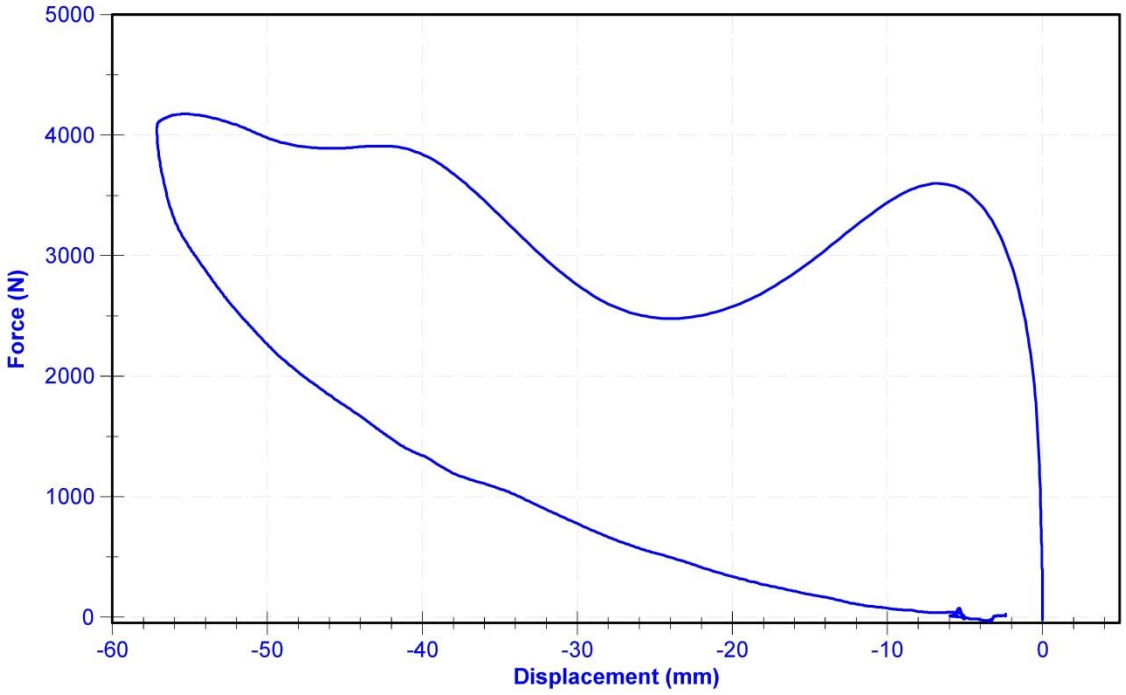
Results

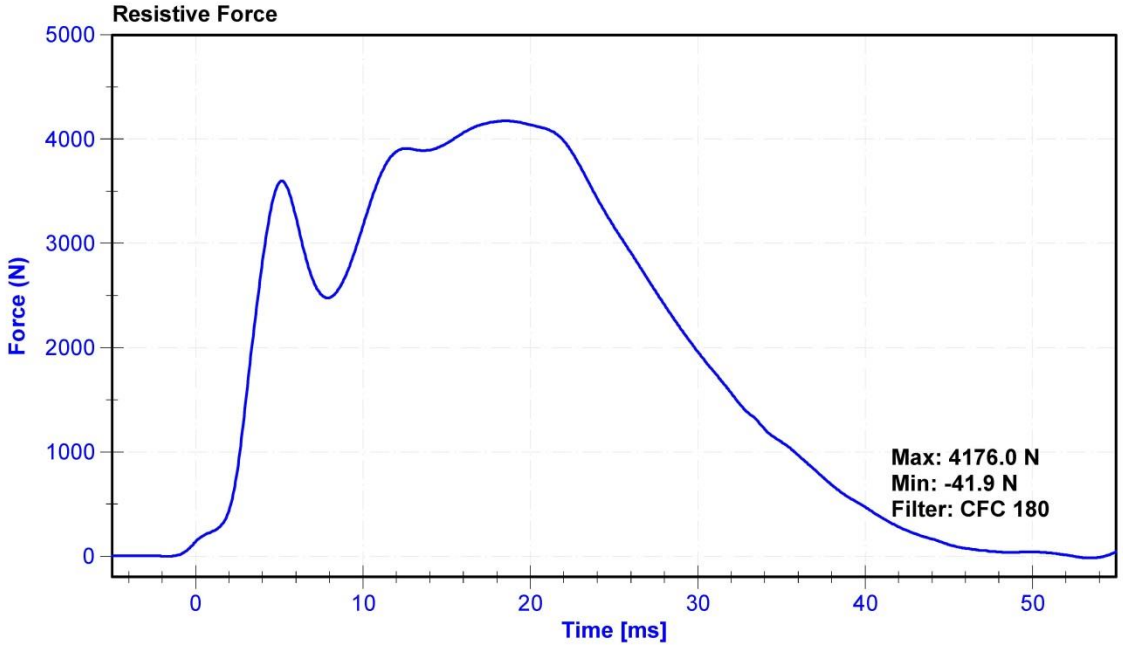
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	13.3	Pass
Velocity	6.59	6.83	m/s	6.76	Pass
Chest Displacement	-58	-50	mm	-57.1	Pass
Force During Displacement Interval	3,900	4,400	N	4176.0	Pass
Force During -18 to 50mm Displacement	0	4,600	N	3974.0	Pass
Hysteresis	69	85	%	70.3	Pass

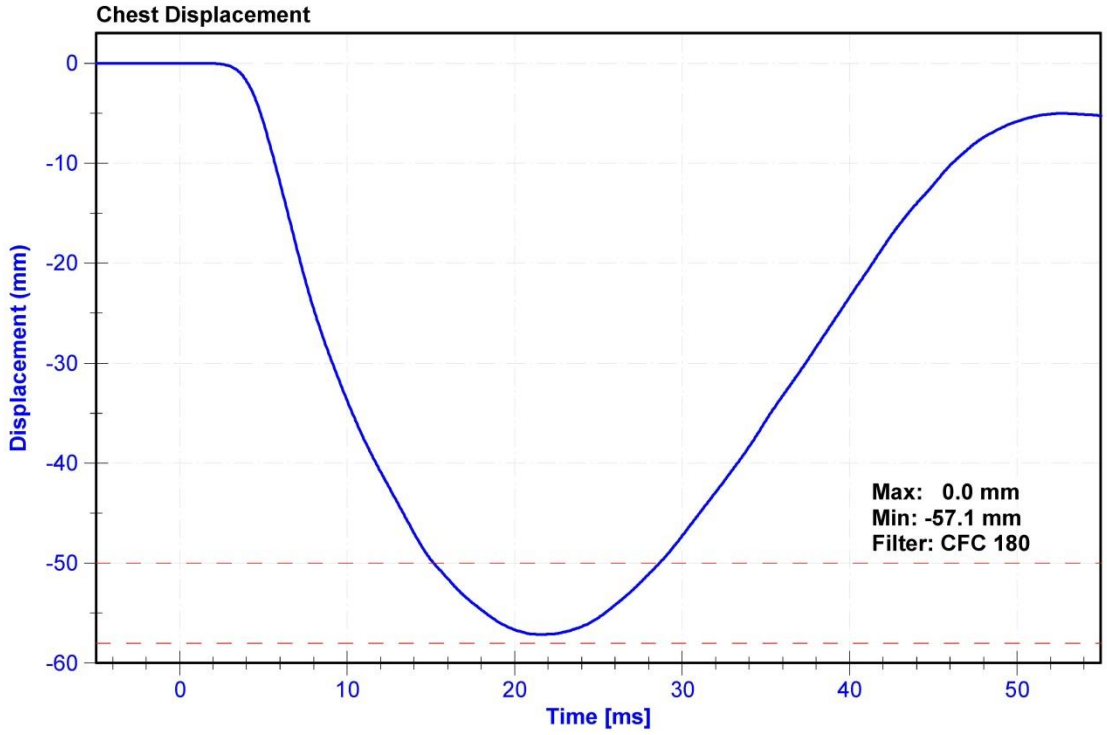
Transducer Calibrations

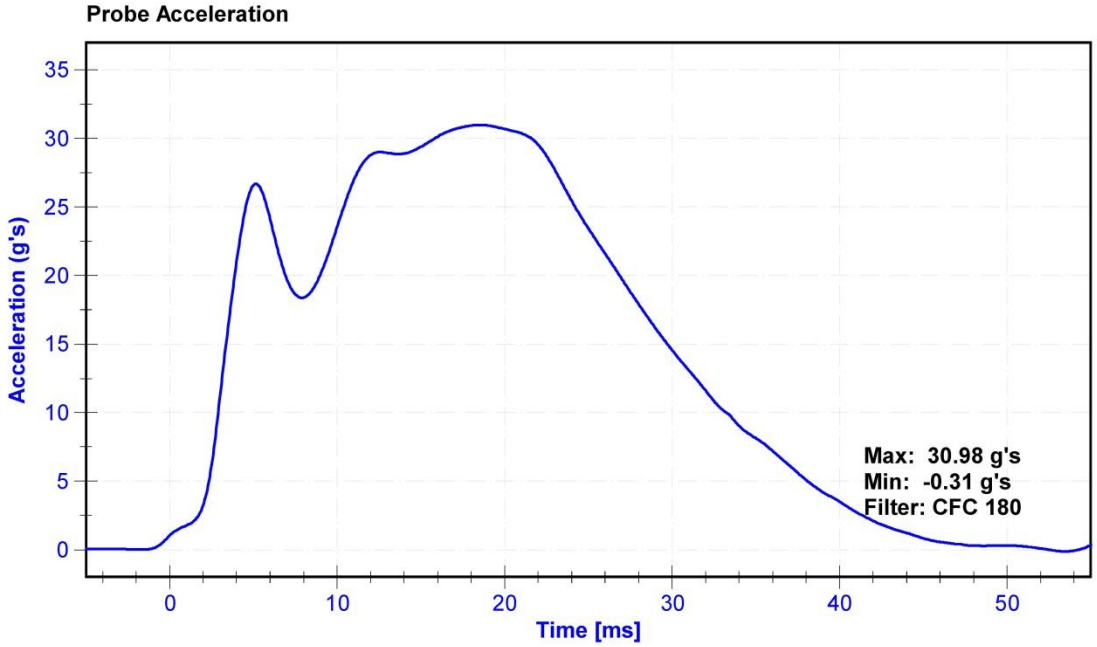
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C14953	1/29/2015	7/30/2015
Chest Potentiometer	Servo 14CBI-3615	DS-139	7/31/2014	7/31/2015

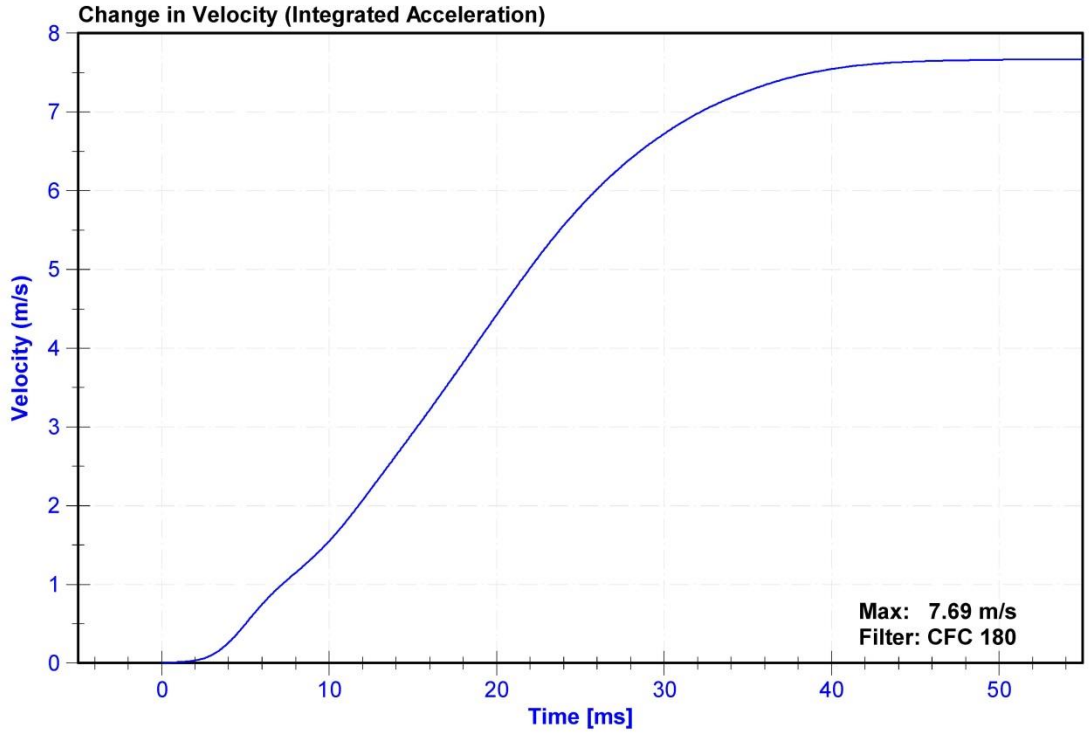
Force vs. Displacement




Resistive Force
Force (N)
5000
4000
3000
2000
1000
0
0
10
20
30
40
50
Time [ms]
Max: 4176.0 N
Min: -41.9 N
Filter: CFC 180


Chest Displacement
Displacement (mm)
0
-10
-20
-30
-40
-50
-60
0
10
20
30
40
50
Time [ms]
Max: 0.0 mm
Min: -57.1 mm
Filter: CFC 180


Probe Acceleration
Acceleration (g's)
35
30
25
20
15
10
5
0
0
10
20
30
40
50
Time [ms]
Max: 30.98 g's
Min: -0.31 g's
Filter: CFC 180


Change in Velocity (Integrated Acceleration)
Velocity (m/s)
8
7
6
5
4
3
2
1
0
0
10
20
30
40
50
Time [ms]
Max: 7.69 m/s
Filter: CFC 180

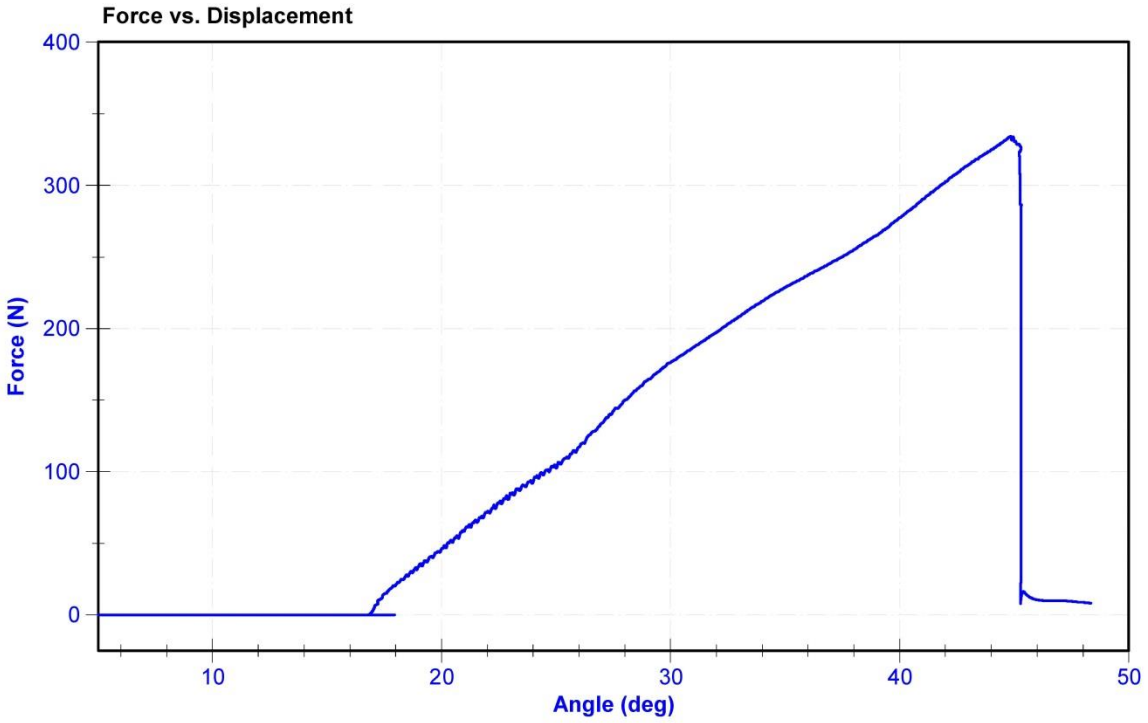
ATD Manufacturer	Denton	Test Technician	M.Hartung
ATD Serial Number	139	Laboratory Supervisor	M.Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.6	25.6	°C	21.9	Pass
Humidity	10	70	%	14.8	Pass
Initial Angle	0	20	deg	16.6	Pass
Force at 45 Degrees	320	390	N	331.8	Pass
Return Angle	0	8	deg	6.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	Rieker N4C-1	DS-13051548	8/1/2014	8/1/2015
Load Cell	Interface SML-200	LC-493319	8/13/2014	8/13/2015



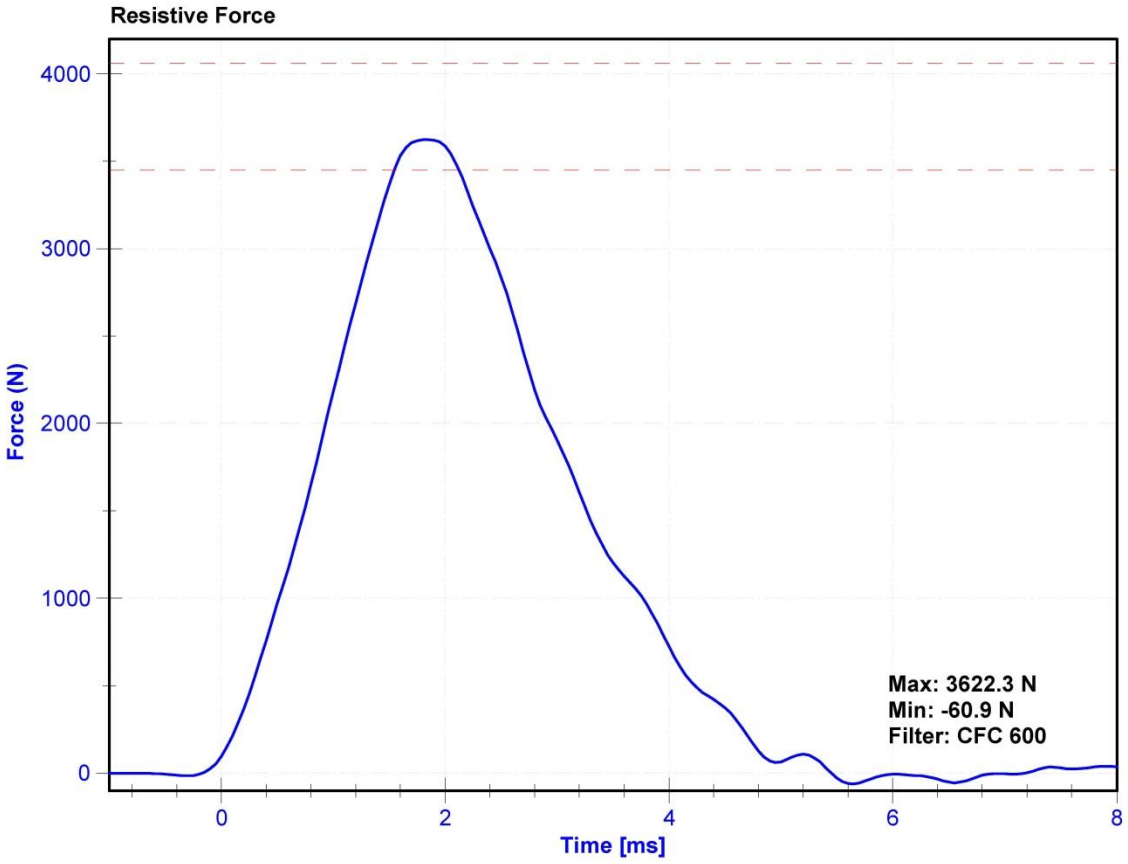
ATD Manufacturer	Left	Test Technician	M.Hartung
ATD Serial Number	139	Laboratory Supervisor	M.Goehle

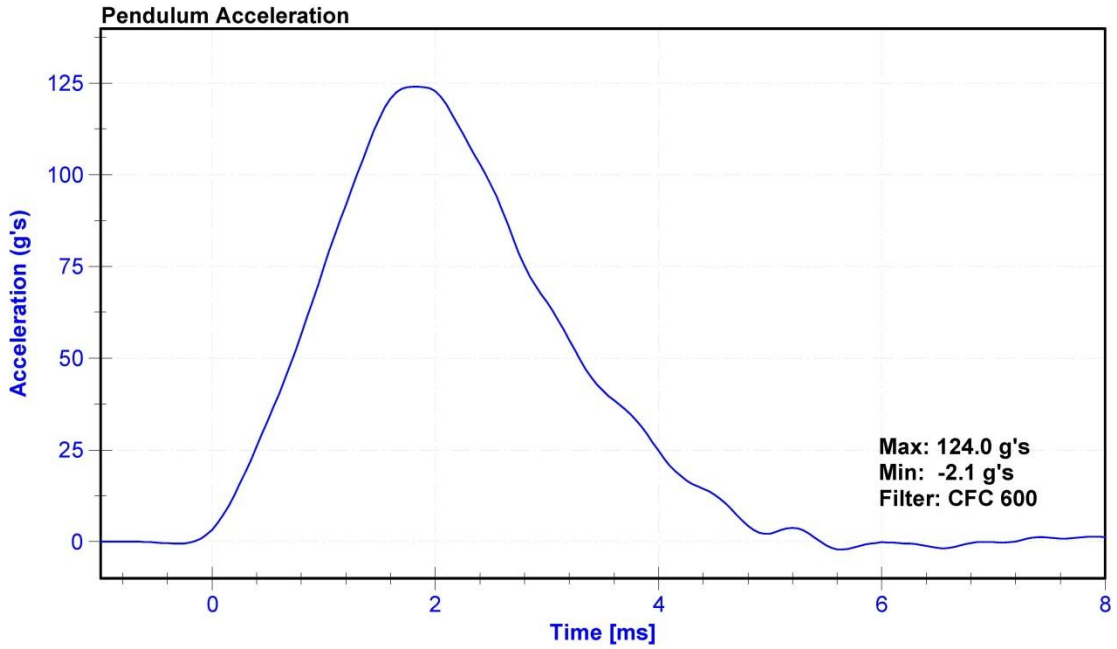
Results

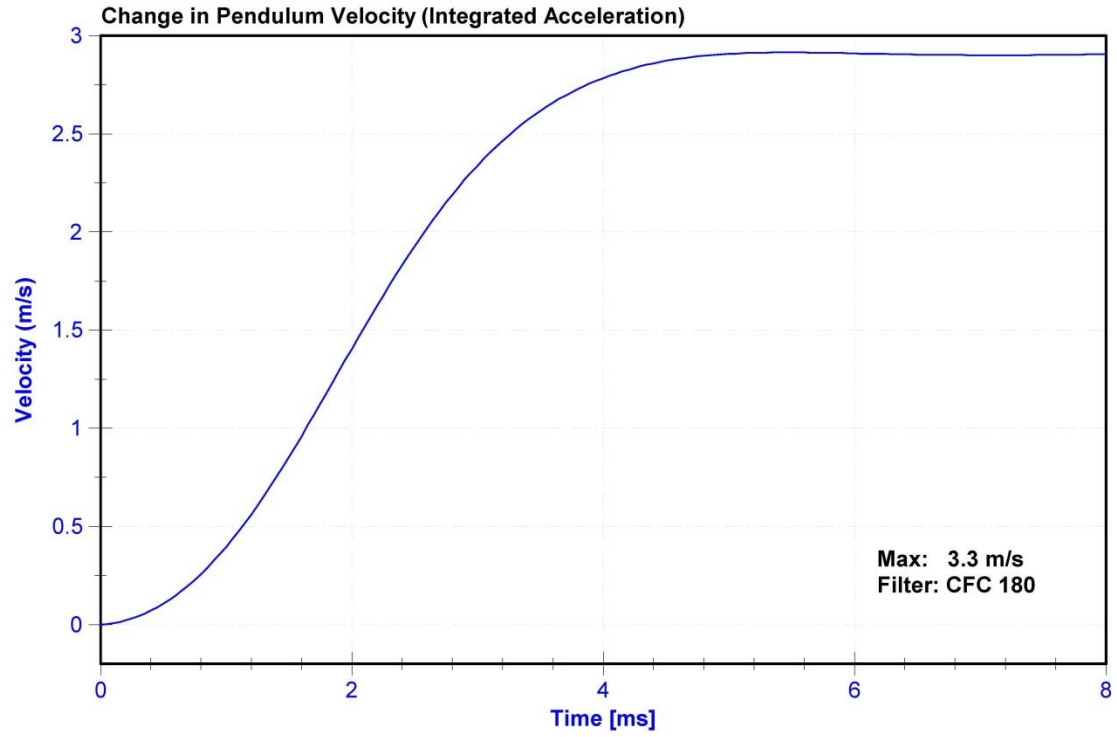
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	20.3	Pass
Humidity	10	70	%	14.3	Pass
Velocity	2.07	2.13	m/s	2.099	Pass
Resistive Force	3,450	4,060	N	3622.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C14972	2/6/2015	8/7/2015




Pendulum Acceleration
Acceleration (g's)
125
100
75
50
25
0
0
2
4
6
8
Time [ms]
Max: 124.0 g's
Min: -2.1 g's
Filter: CFC 600


Change in Pendulum Velocity (Integrated Acceleration)
Velocity (m/s)
3
2.5
2
1.5
1
0.5
0
0
2
4
6
8
Time [ms]
Max: 3.3 m/s
Filter: CFC 180

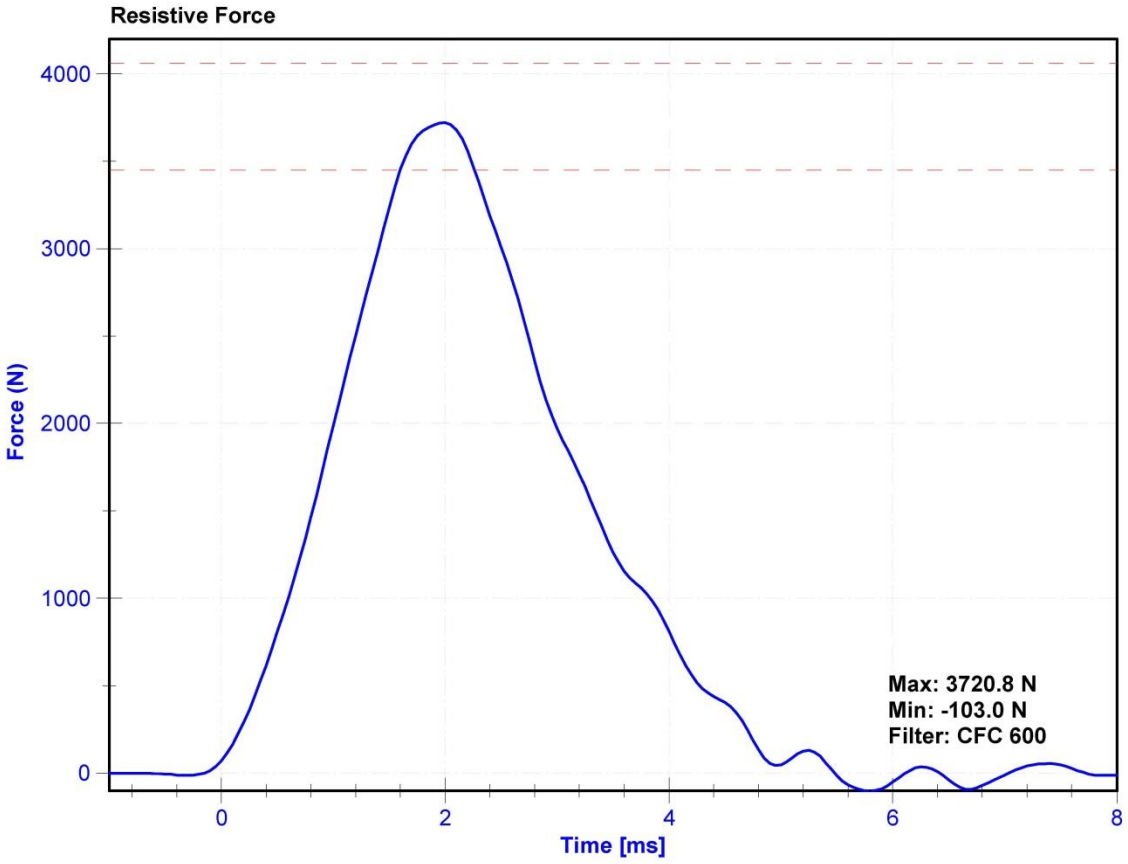
ATD Manufacturer	Denton	Test Technician	M.Hartung
ATD Serial Number	139	Laboratory Supervisor	M.Goehle

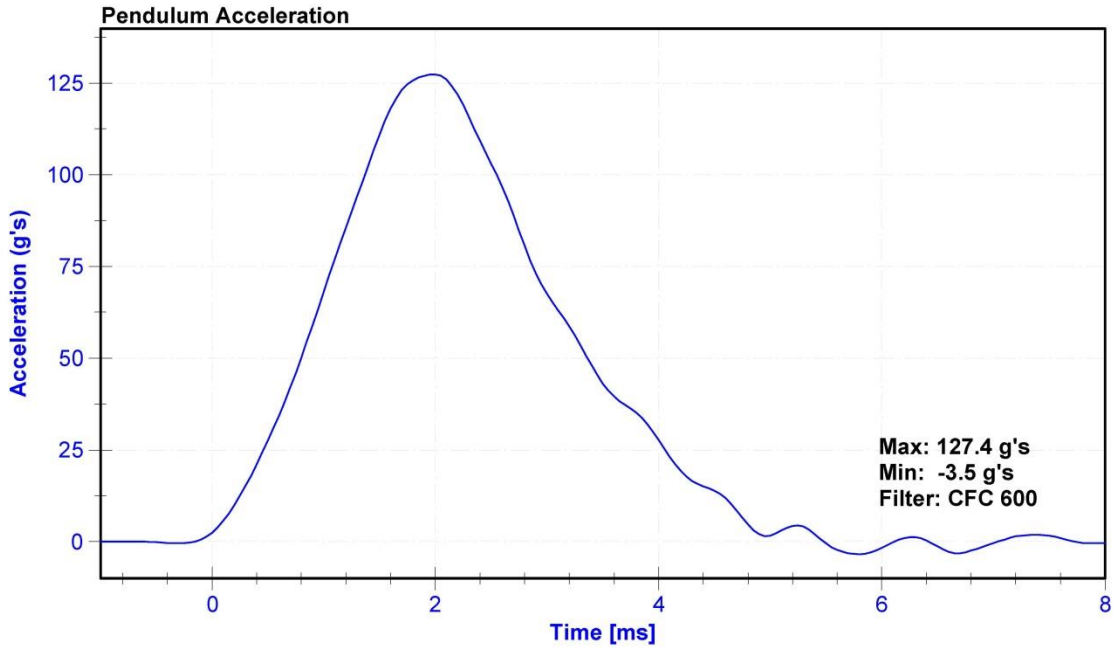
Results

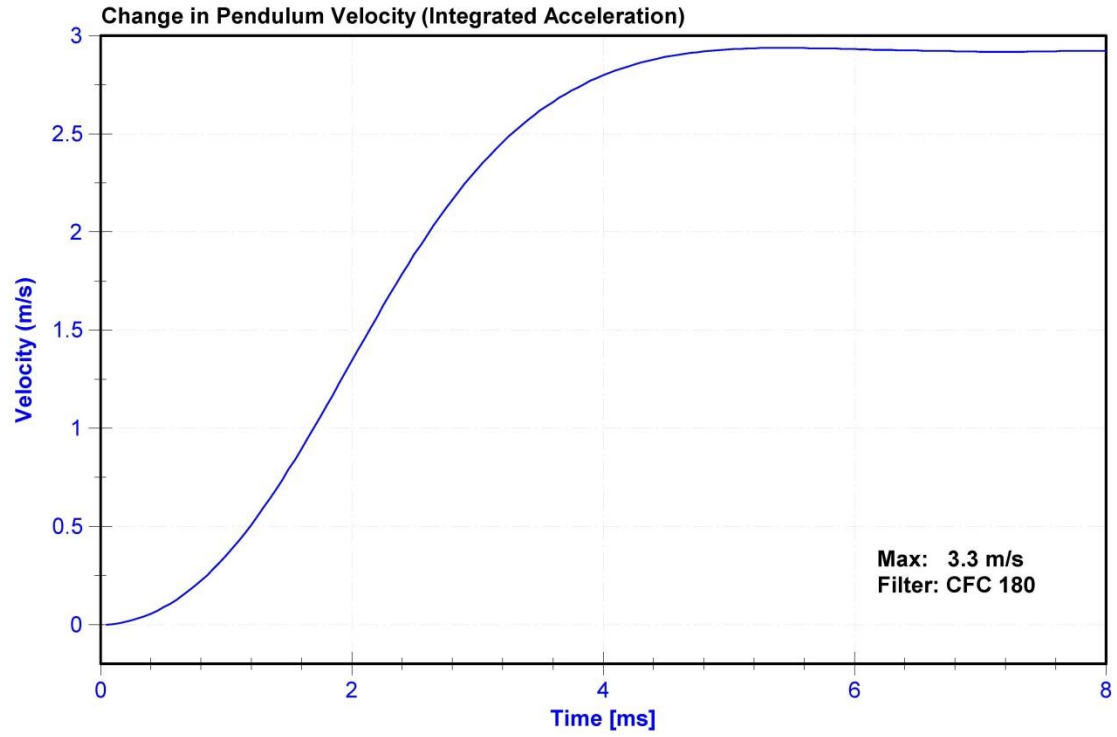
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	20.3	Pass
Humidity	10	70	%	14.3	Pass
Velocity	2.07	2.13	m/s	2.099	Pass
Resistive Force	3,450	4,060	N	3720.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C14972	2/6/2015	8/7/2015




Pendulum Acceleration
Acceleration (g's)
125
100
75
50
25
0
0
2
4
6
8
Time [ms]
Max: 127.4 g's
Min: -3.5 g's
Filter: CFC 600


Change in Pendulum Velocity (Integrated Acceleration)
Velocity (m/s)
3
2.5
2
1.5
1
0.5
0
0
2
4
6
8
Time [ms]
Max: 3.3 m/s
Filter: CFC 180

CALIBRATION TEST RESULTS

POST-TEST

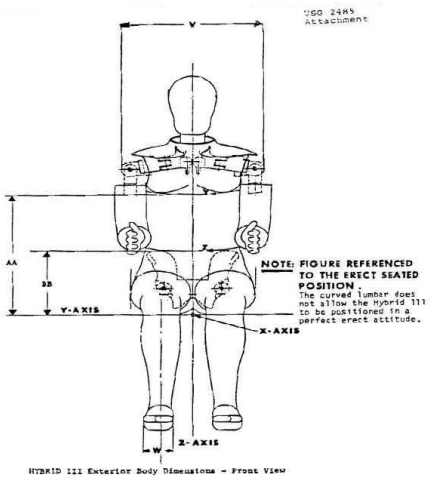
HYBRID III 50TH PERCENTILE MALE - DRIVER ATD

SERIAL NO: 1046

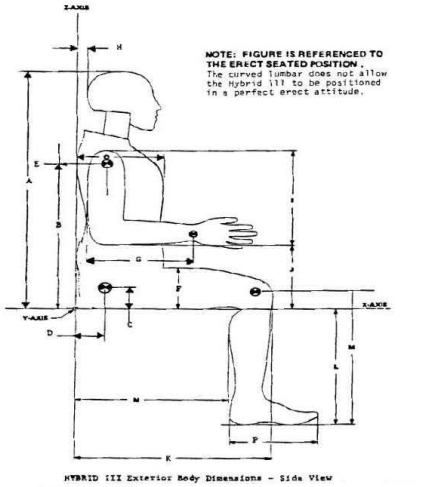
External Measurements - Hybrid 3 - 50th Male

Technician: M.Hartung Date: 2/13/2015

Dummy Serial Number: 1046



HYBRID III Exterior Body Dimensions - Front View



HYBRID III Exterior Body Dimensions - Side View

Symbol	Description	Specification (in)		Result (in)	Pass/Fail
A	Sitting Height	34.6	35.0	34.9	Pass
B	Shoulder Pivot Height	19.9	20.5	20.1	Pass
C	H-Point Height	3.3	3.5	3.4	Pass
D	H-Point from Backline	5.3	5.5	5.3	Pass
E	Shoulder Pivot from Backline	3.3	3.7	3.6	Pass
F	Thigh Clearance	5.5	6.1	5.7	Pass
G	Back of Elbow to Wrist Pivot	11.4	12.0	11.8	Pass
H	Head Back to Backline	1.6	1.8	1.6	Pass
I	Shoulder to Elbow Length	13.0	13.6	13.4	Pass
J	Elbow Rest Height	7.5	8.3	7.9	Pass
K	Buttock to Knee Length	22.8	23.8	23.1	Pass
L	Popliteal Height	16.9	17.9	17.5	Pass
M	Knee Pivot Height	19.1	19.7	19.3	Pass
N	Buttock Popliteal Length	17.8	18.8	18.0	Pass
O	Chest Depth without Jacket	8.4	9.0	8.6	Pass
P	Foot Length (right)	9.9	10.5	10.2	Pass
V	Shoulder Breadth	16.3	17.2	16.8	Pass
W	Foot Breadth	3.6	4.2	3.7	Pass
Y	Chest Circumference with Jacket	38.2	39.4	38.7	Pass
Z	Waist Circumference	32.9	34.1	33.8	Pass
AA	Reference Location (Chest Circumference)	16.9	17.1	17.0	Pass
BB	Reference Location (Waist Circumference)	8.9	9.1	9.1	Pass

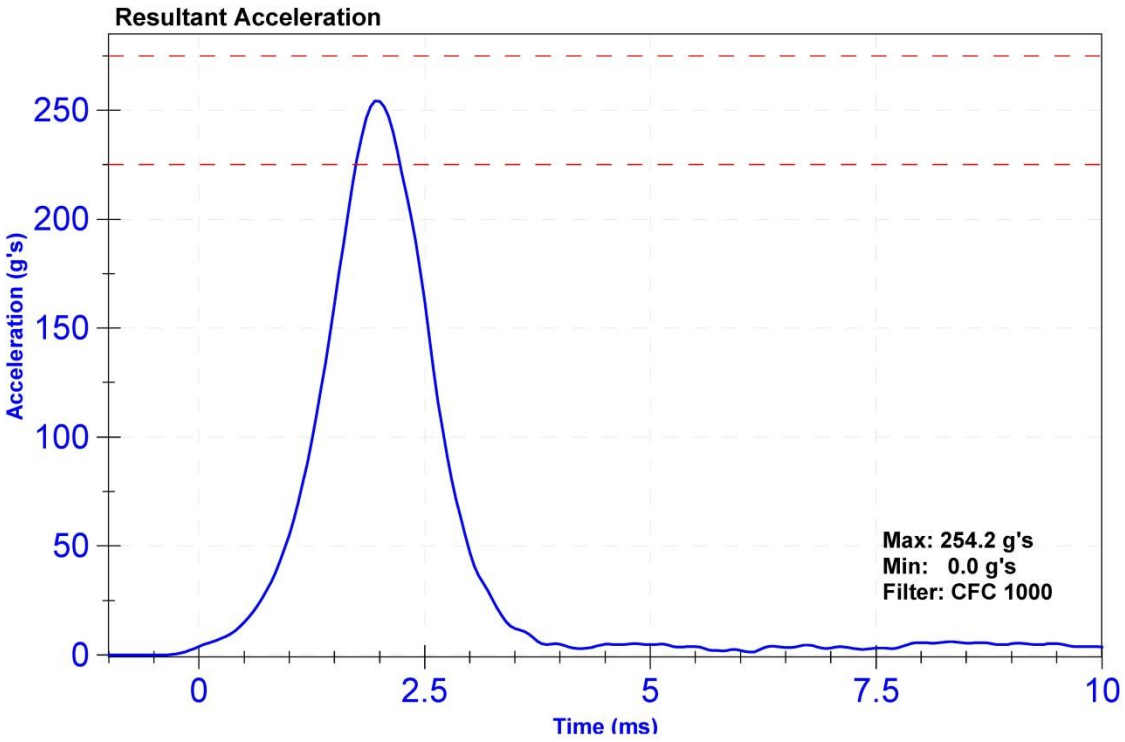
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	1046	Laboratory Supervisor	M.Goehle

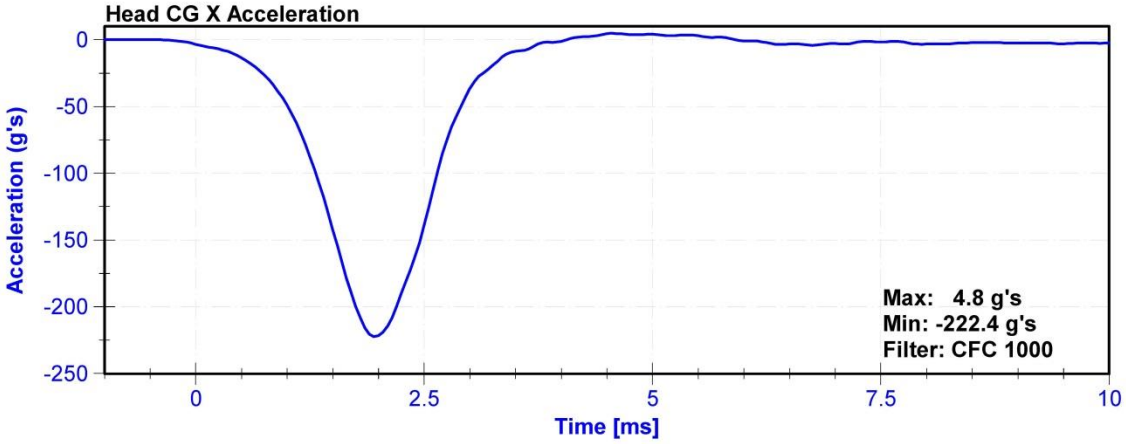
Results

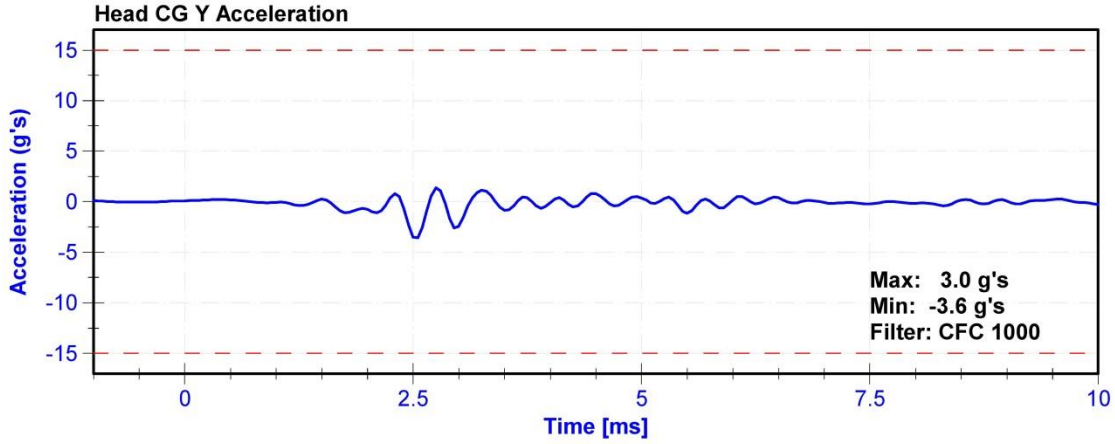
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.5	Pass
Humidity	10	70	%	12.4	Pass
Resultant Acceleration	225	275	g's	254.2	Pass
Oscillation	0	10	%	2.4	Pass
Lateral Acceleration	-15	15	g's	-3.6	Pass

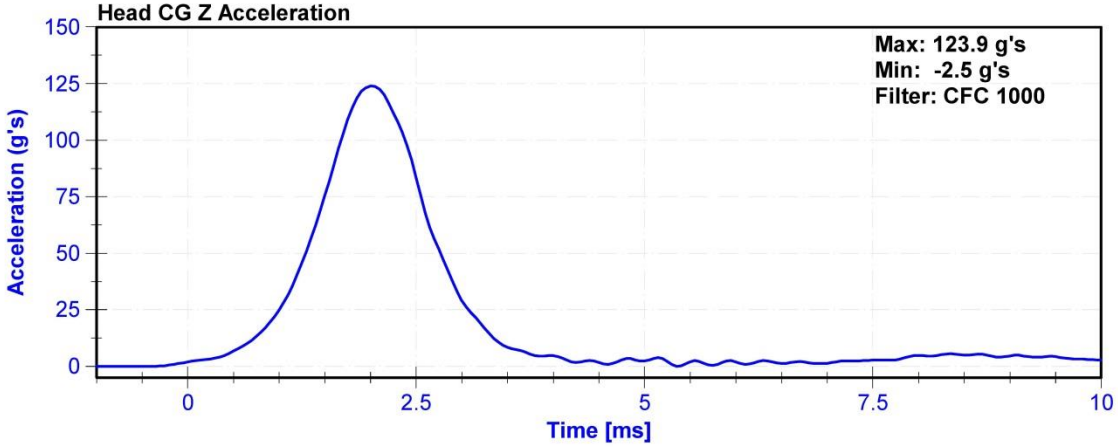
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264CT	AC-P58871	12/19/2014	6/19/2015
Y Accelerometer	ENDEVCO 7264	AC-P12359	12/19/2014	6/19/2015
Z Accelerometer	ENDEVCO 7264CT	AC-P52133	12/19/2014	6/19/2015




Head CG X Acceleration
Acceleration (g's)
0
-50
-100
-150
-200
-250
0
2.5
5
7.5
10
Time [ms]
Max: 4.8 g's
Min: -222.4 g's
Filter: CFC 1000


Head CG Y Acceleration
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
5
7.5
10
Time [ms]
Max: 3.0 g's
Min: -3.6 g's
Filter: CFC 1000


Head CG Z Acceleration
Acceleration (g's)
150
125
100
75
50
25
0
0
2.5
5
7.5
10
Time [ms]
Max: 123.9 g's
Min: -2.5 g's
Filter: CFC 1000

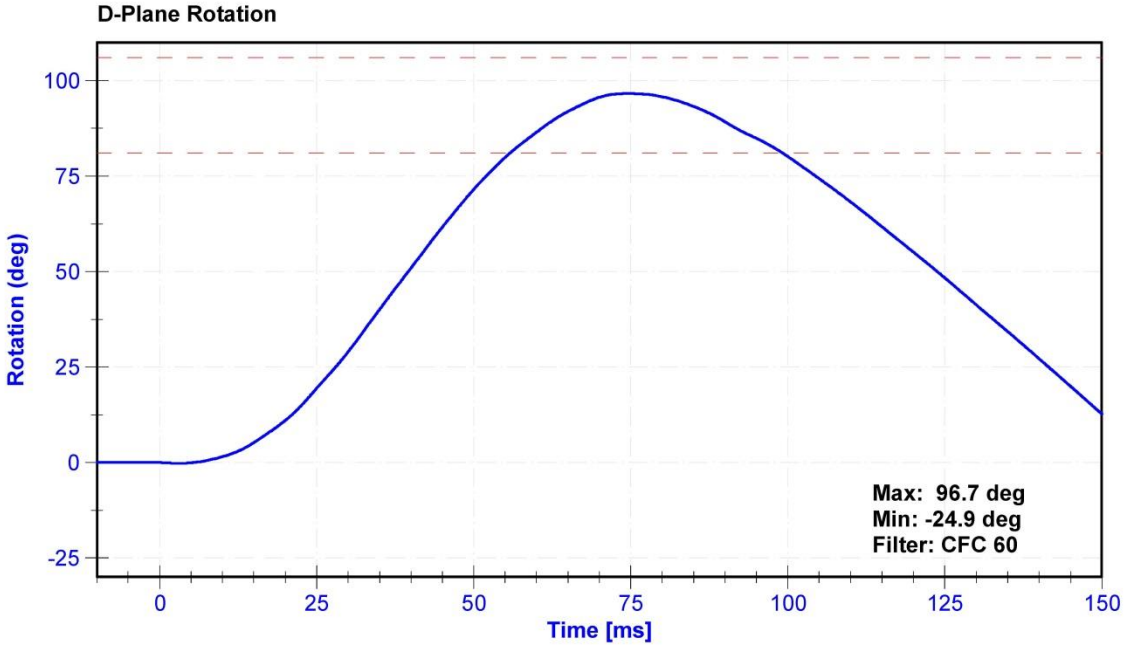
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	1046	Laboratory Supervisor	M.Goehle

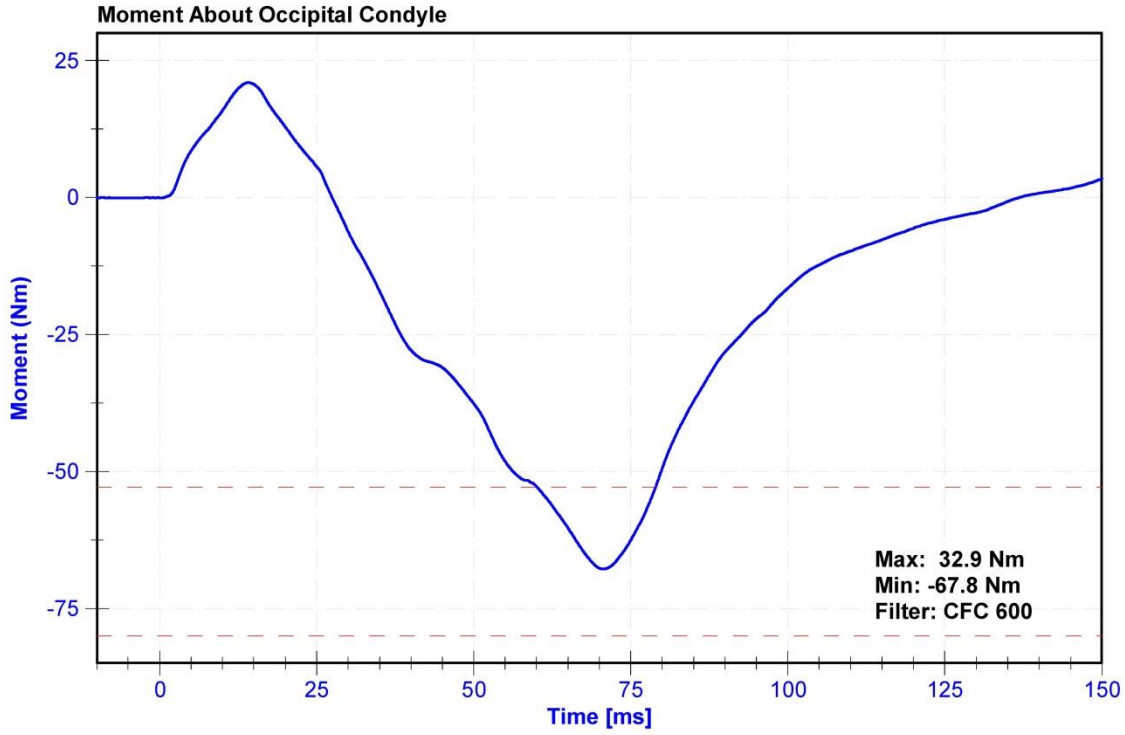
Results

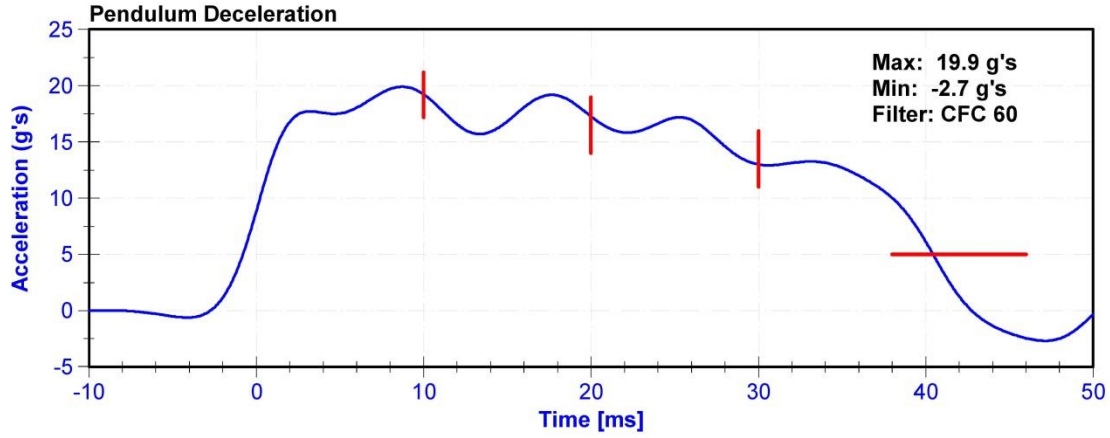
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.7	Pass
Humidity	10	70	%	12.7	Pass
Velocity	5.94	6.19	m/s	6.025	Pass
Pendulum Deceleration at 10ms	17.2	21.2	g's	19.23	Pass
Pendulum Deceleration at 20ms	14	19	g's	17.3	Pass
Pendulum Deceleration at 30ms	11	16	g's	13.0	Pass
Max. Pendulum Deceleration After 30ms	0	22	g's	19.9	Pass
Pendulum Deceleration Time to 5 g's	38	46	ms	40.5	Pass
D Plane Rotation	81	106	deg	96.7	Pass
Time at Maximum Rotation	72	82	ms	74.6	Pass
Rotation Decay to Zero	147	174	ms	159.5	Pass
Moment About Occipital Condyle	-80	-52.9	Nm	-67.82	Pass
Time at Minimum Moment	65	79	ms	70.7	Pass
Moment Decay to Zero	120	148	ms	136.9	Pass

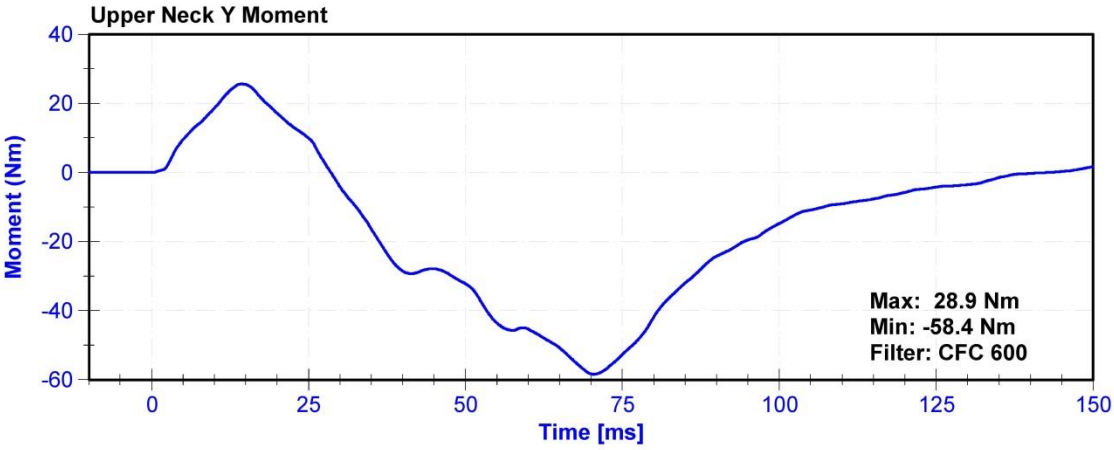
Transducer Calibrations

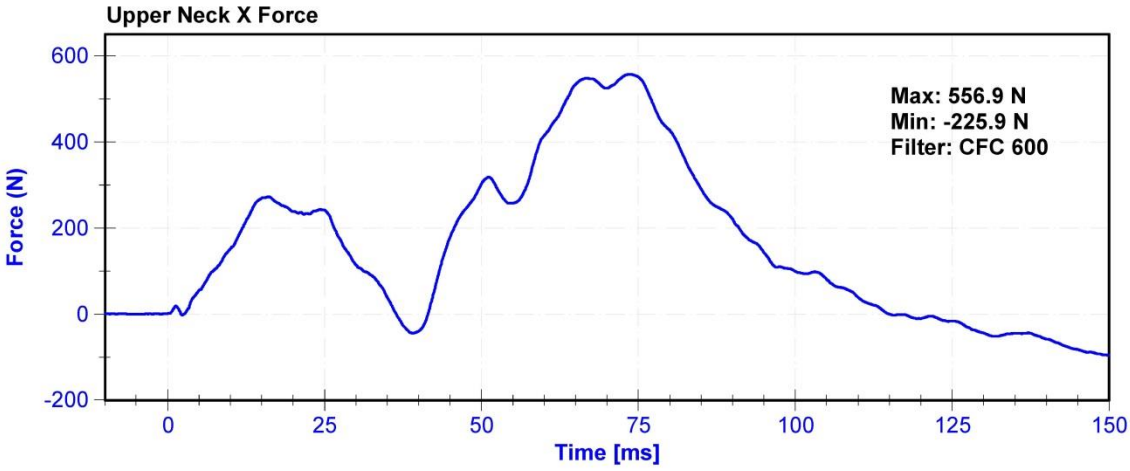
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	11/6/2014	11/6/2015
Pendulum Potentiometer	SP22G	DS-PendPot	9/16/2014	9/16/2015
Condyle Potentiometer	SP22G	DS-CondPot	2/21/2014	2/21/2015
Upper Neck Load Cell	DENTON 1716A	LC-2186Fx	8/7/2014	8/7/2015


D-Plane Rotation
Rotation (deg)
100
75
50
25
0
-25
0
25
50
75
100
125
150
Time [ms]
Max: 96.7 deg
Min: -24.9 deg
Filter: CFC 60


Moment About Occipital Condyle
Moment (Nm)
25
0
-25
-50
-75
0
25
50
75
100
125
150
Time [ms]
Max: 32.9 Nm
Min: -67.8 Nm
Filter: CFC 600


Pendulum Deceleration
Max: 19.9 g's
Min: -2.7 g's
Filter: CFC 60
Acceleration (g's)
Time [ms]


Upper Neck Y Moment
Max: 28.9 Nm
Min: -58.4 Nm
Filter: CFC 600
Moment (Nm)
Time [ms]


Upper Neck X Force
Max: 556.9 N
Min: -225.9 N
Filter: CFC 600
Force (N)
Time [ms]

ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	1046	Laboratory Supervisor	M.Goehle

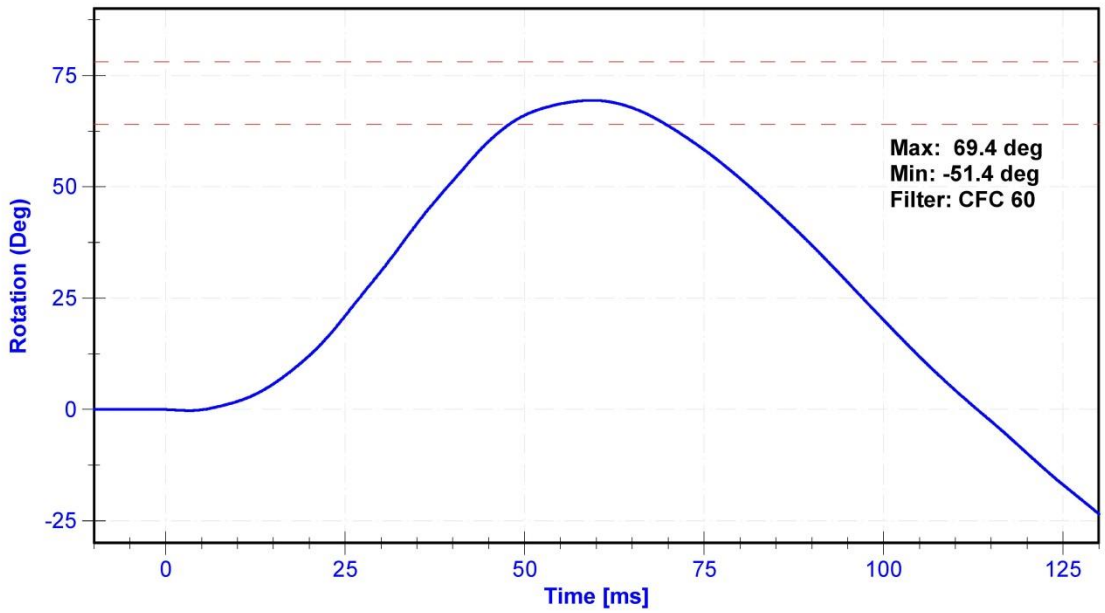
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.6	Pass
Humidity	10	70	%	12.7	Pass
Velocity	6.89	7.13	m/s	7.037	Pass
Pendulum Deceleration at 10ms	22.5	27.5	g's	23.01	Pass
Pendulum Deceleration at 20ms	17.6	22.6	g's	21.41	Pass
Pendulum Deceleration at 30ms	12.5	18.5	g's	16.51	Pass
Max. Pendulum Deceleration After 30ms	0	29	g's	23.8	Pass
Pendulum Deceleration Time to 5 g's	34	42	ms	39.2	Pass
D Plane Rotation	64	78	deg	69.4	Pass
Time at 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	96.95	Pass
Time at Maximum Moment	47	58	ms	51.8	Pass
Moment Decay to Zero	97	107	ms	97.7	Pass

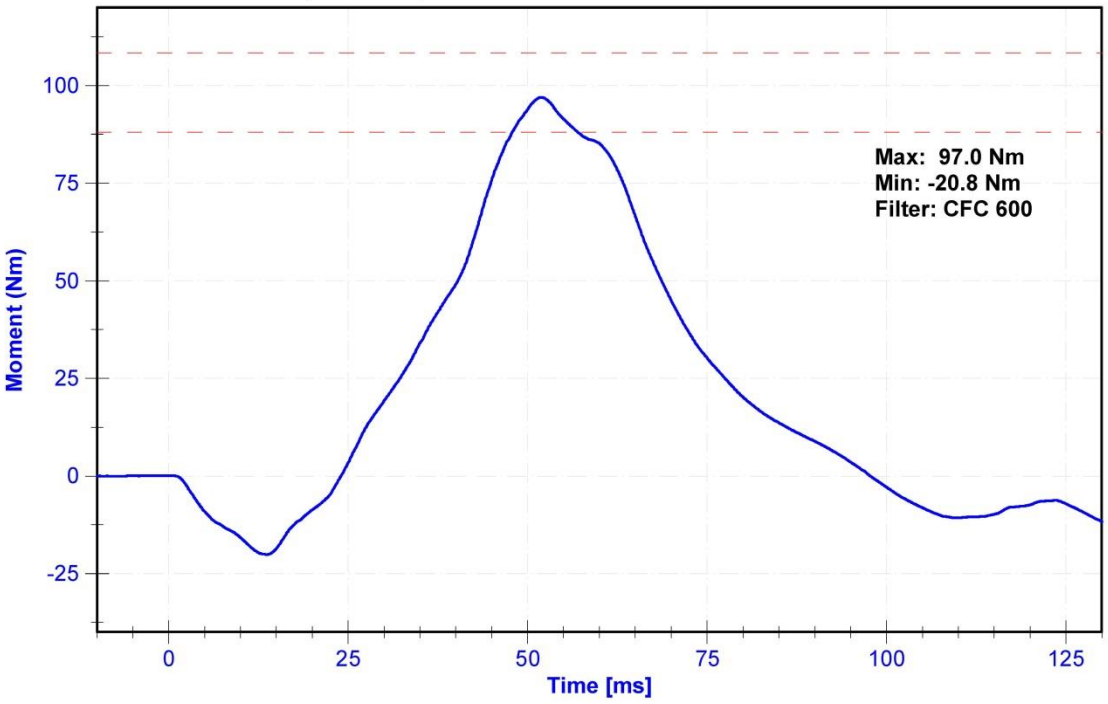
Transducer Calibrations

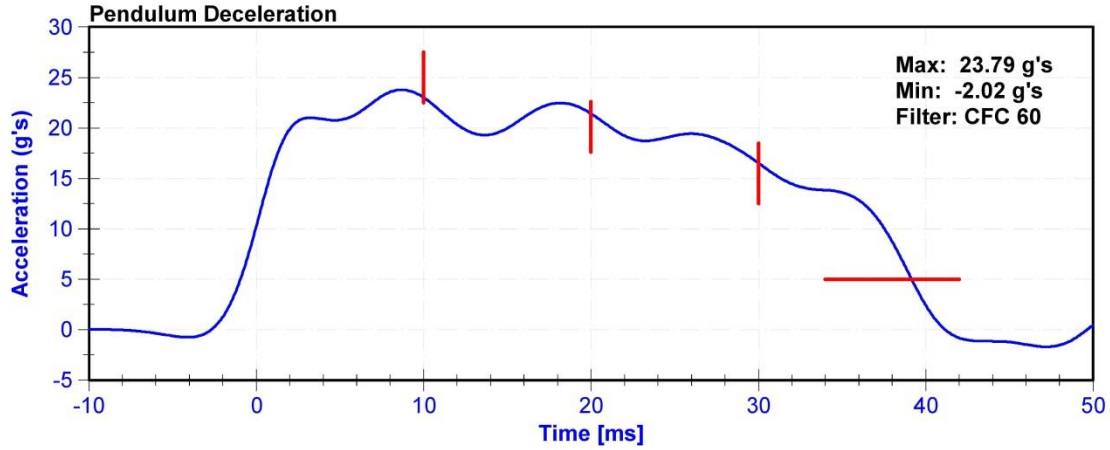
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	11/6/2014	11/6/2015
Pendulum Potentiometer	SP22G	DS-PendPot	9/16/2014	9/16/2015
Condyle Potentiometer	SP22G	DS-CondPot	2/21/2014	2/21/2015
Upper Neck Load Cell	DENTON 1716A	LC-2186Fx	8/7/2014	8/7/2015

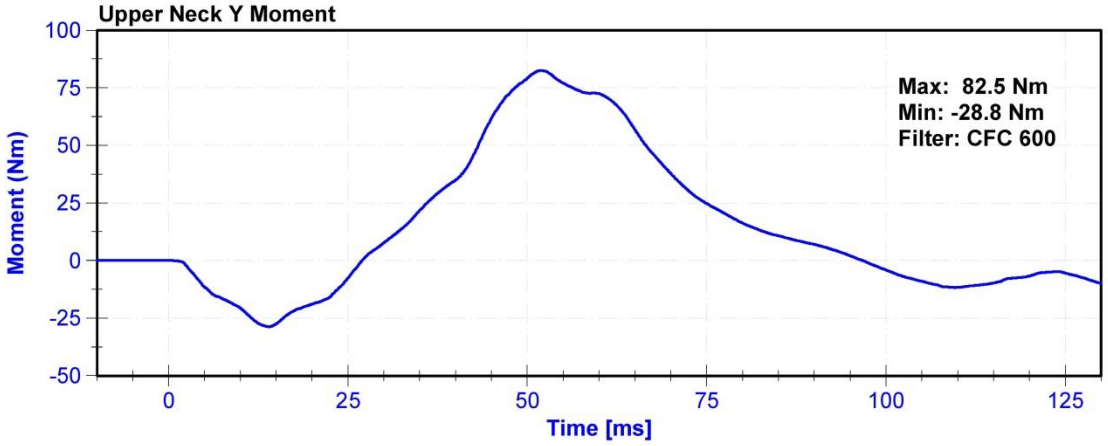
D-Plane Rotation

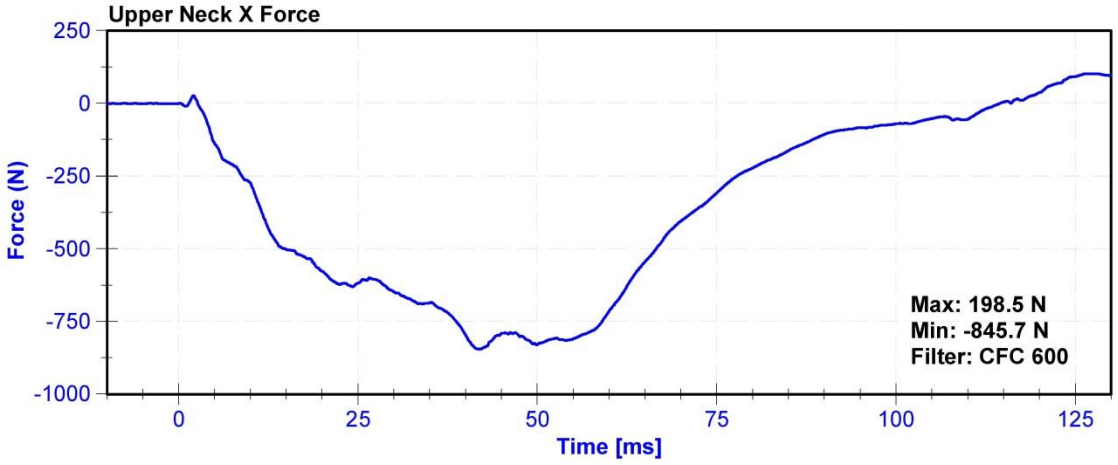


Moment About Occipital Condyle




Pendulum Deceleration
Max: 23.79 g's
Min: -2.02 g's
Filter: CFC 60
Acceleration (g's)
Time [ms]


Upper Neck Y Moment
Max: 82.5 Nm
Min: -28.8 Nm
Filter: CFC 600
Moment (Nm)
Time [ms]


Upper Neck X Force
Max: 198.5 N
Min: -845.7 N
Filter: CFC 600
Force (N)
Time [ms]

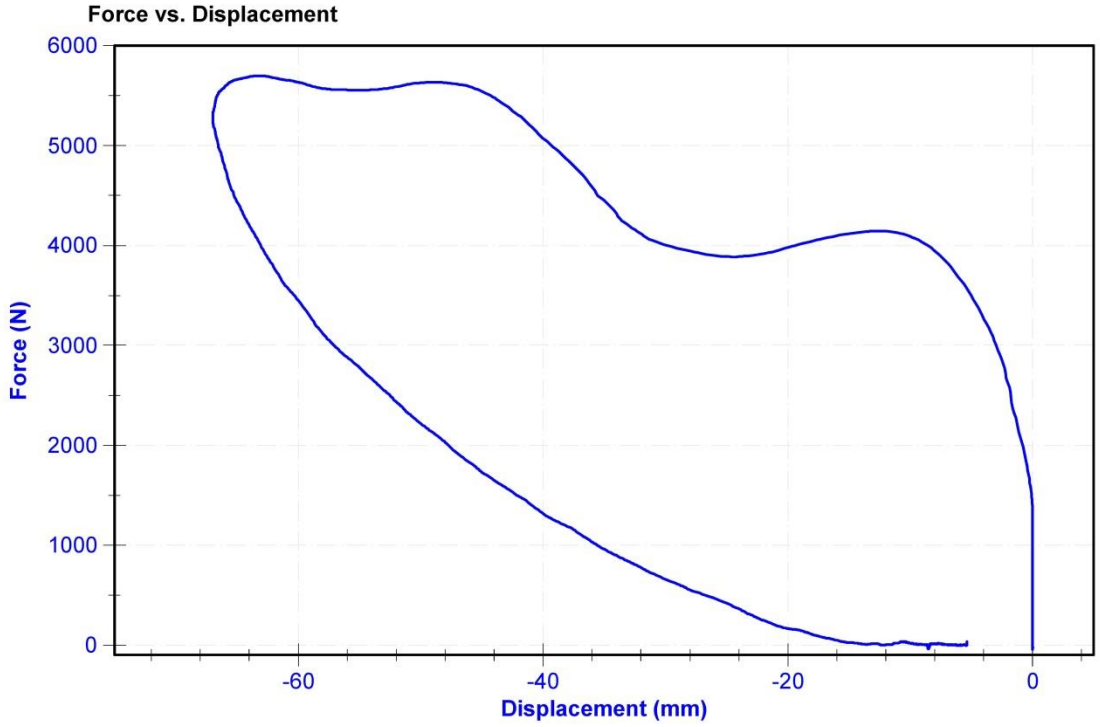
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	1046	Laboratory Supervisor	M.Goehle

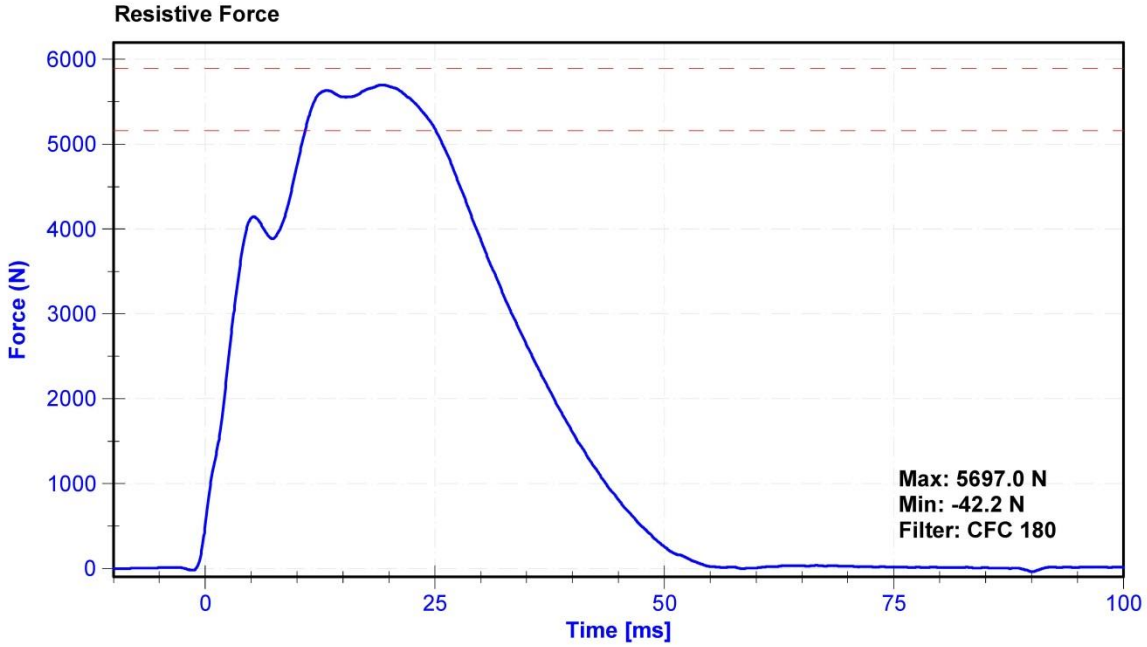
Results

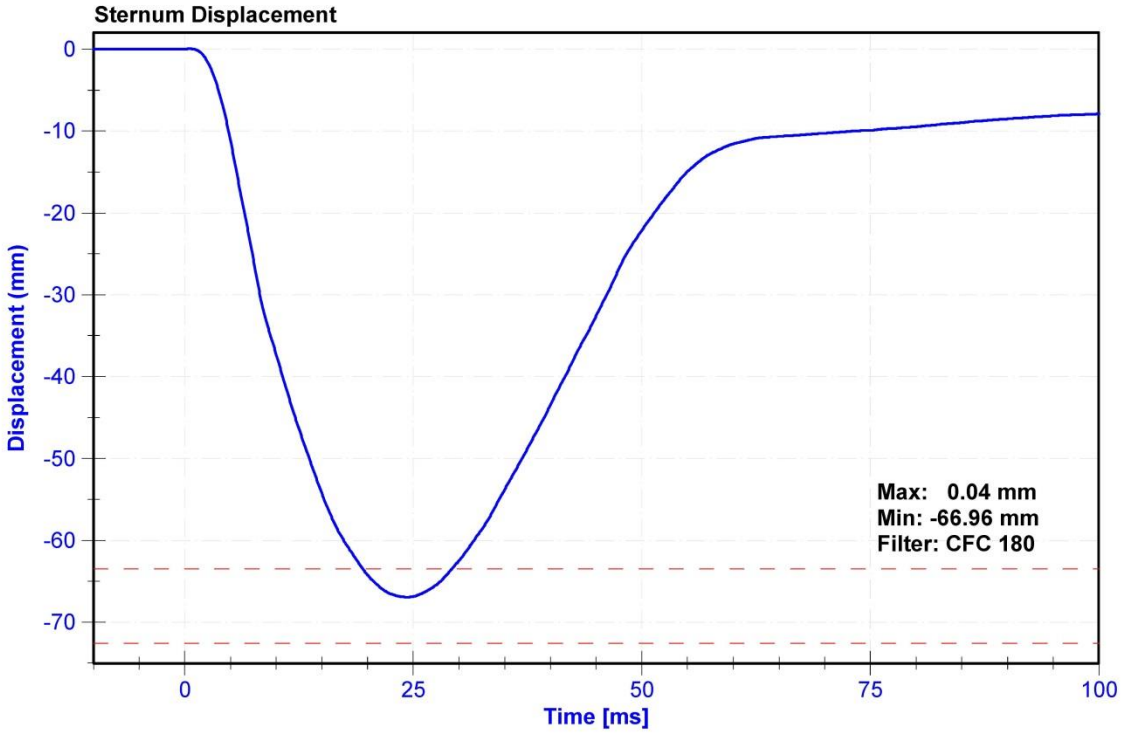
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.7	Pass
Humidity	10	70	%	10.2	Pass
Velocity	6.59	6.83	m/s	6.79	Pass
Chest Displacement	-72.6	-63.5	mm	-66.96	Pass
Resistive Force	5,160	5,894	N	5697.0	Pass
Hysteresis	69	85	%	71.2	Pass

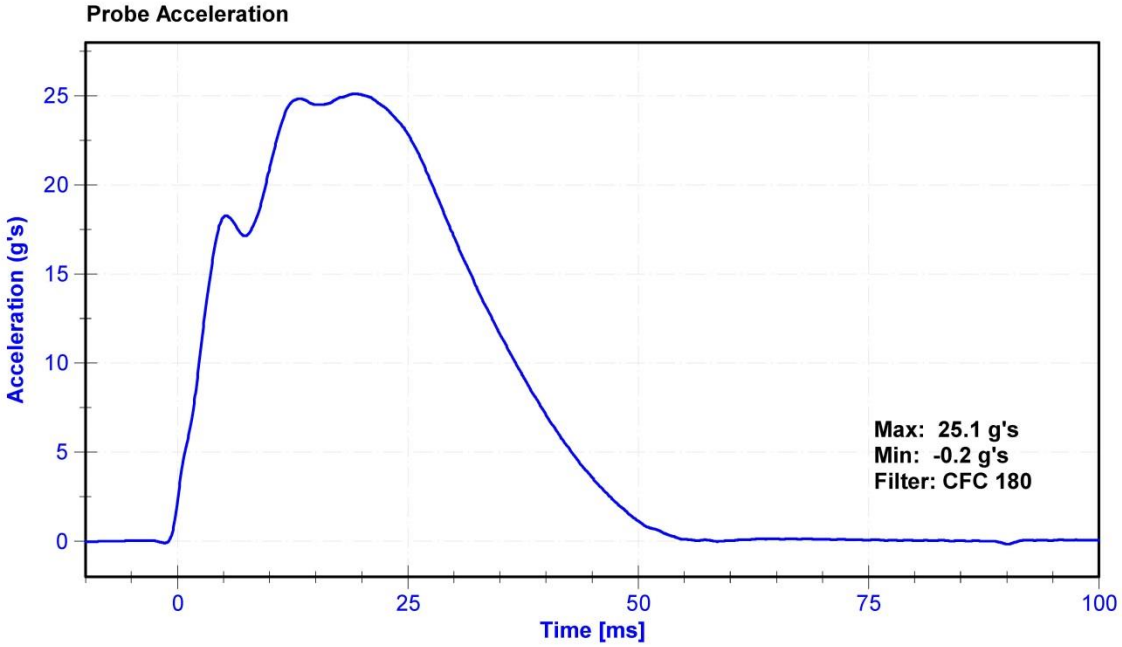
Transducer Calibrations

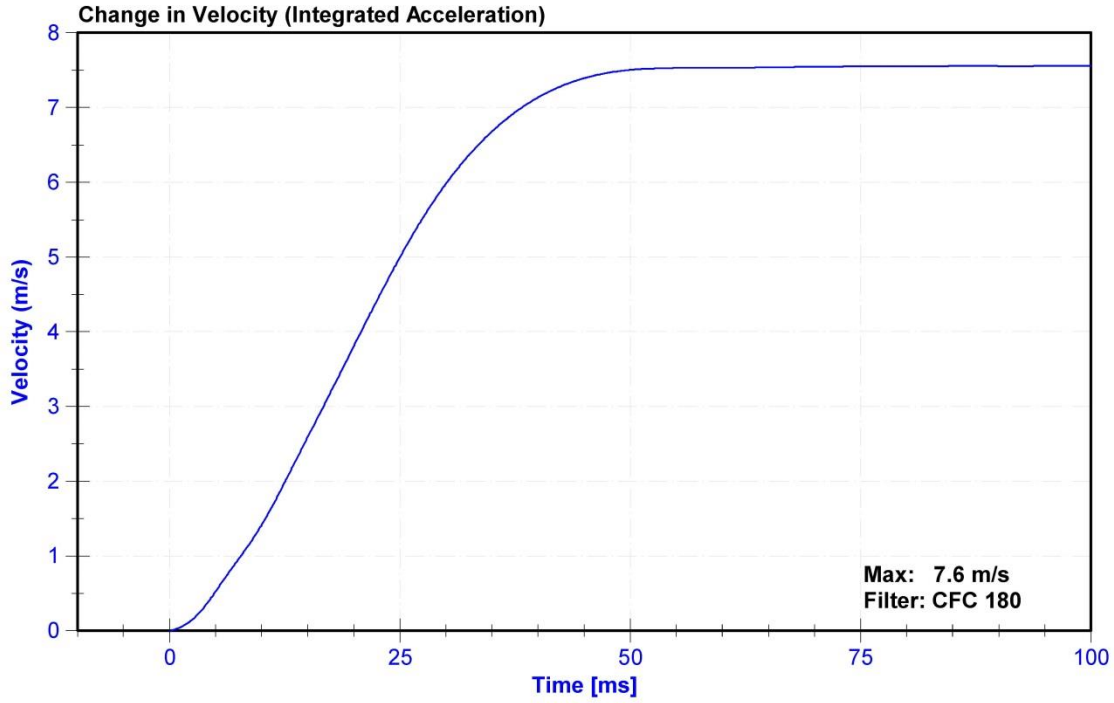
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C14972	2/6/2015	8/7/2015
Chest Potentiometer	Servo 14CB1-2897	DS-1046	7/31/2014	7/31/2015




Resistive Force
Force (N)
6000
5000
4000
3000
2000
1000
0
0
25
50
75
100
Time [ms]
Max: 5697.0 N
Min: -42.2 N
Filter: CFC 180


Sternum Displacement
Displacement (mm)
0
-10
-20
-30
-40
-50
-60
-70
0
25
50
75
100
Time [ms]
Max: 0.04 mm
Min: -66.96 mm
Filter: CFC 180


Probe Acceleration
Acceleration (g's)
25
20
15
10
5
0
0
25
50
75
100
Time [ms]
Max: 25.1 g's
Min: -0.2 g's
Filter: CFC 180


Change in Velocity (Integrated Acceleration)
Velocity (m/s)
8
7
6
5
4
3
2
1
0
0
25
50
75
100
Time [ms]
Max: 7.6 m/s
Filter: CFC 180

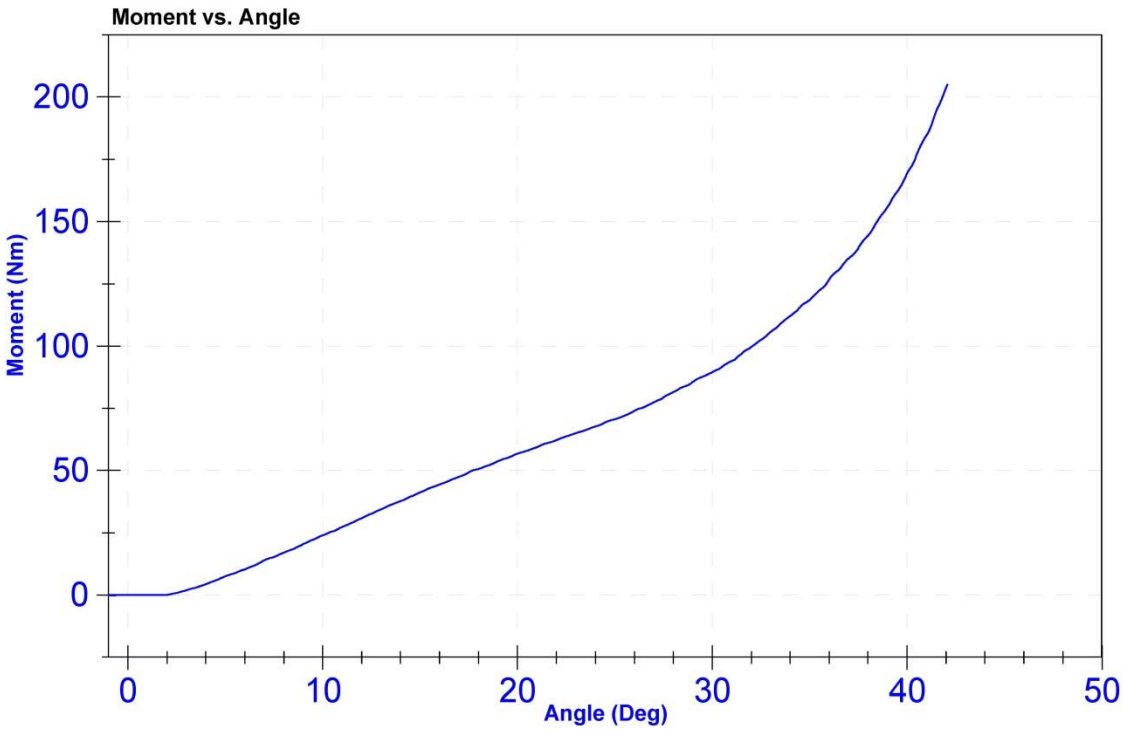
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	1046	Laboratory Supervisor	M.Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	C	21.4	Pass
Humidity	10	70	%	11.9	Pass
Average Velocity	5	10	deg/s	5.7	Pass
Angle at 203Nm	40	50	deg	42.0	Pass
Moment at 30 degrees	0	94.9	Nm	89.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	Servo 14CB1-3615	DS-0008	2/20/2014	2/20/2015
Load Cell	Key Trans 2301-02	LC-115 My	3/25/2014	3/25/2015



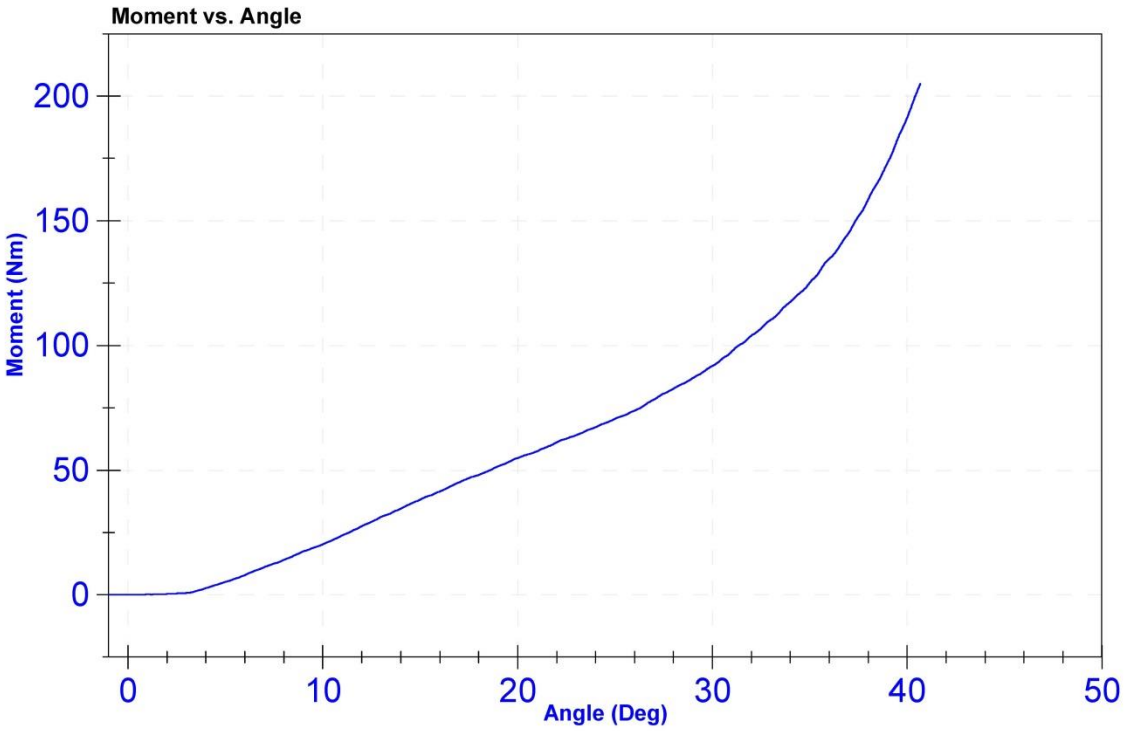
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	1046	Laboratory Supervisor	M.Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.4	Pass
Humidity	10	70	%	11.9	Pass
Average Velocity	5	10	deg/s	5.9	Pass
Angle at 203Nm	40	50	deg	40.6	Pass
Moment at 30 degrees	0	94.9	Nm	91.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	Servo 14CB1-3615	DS-0008	2/20/2014	2/20/2015
Load Cell	Key Trans 2301-02	LC-115 My	3/25/2014	3/25/2015



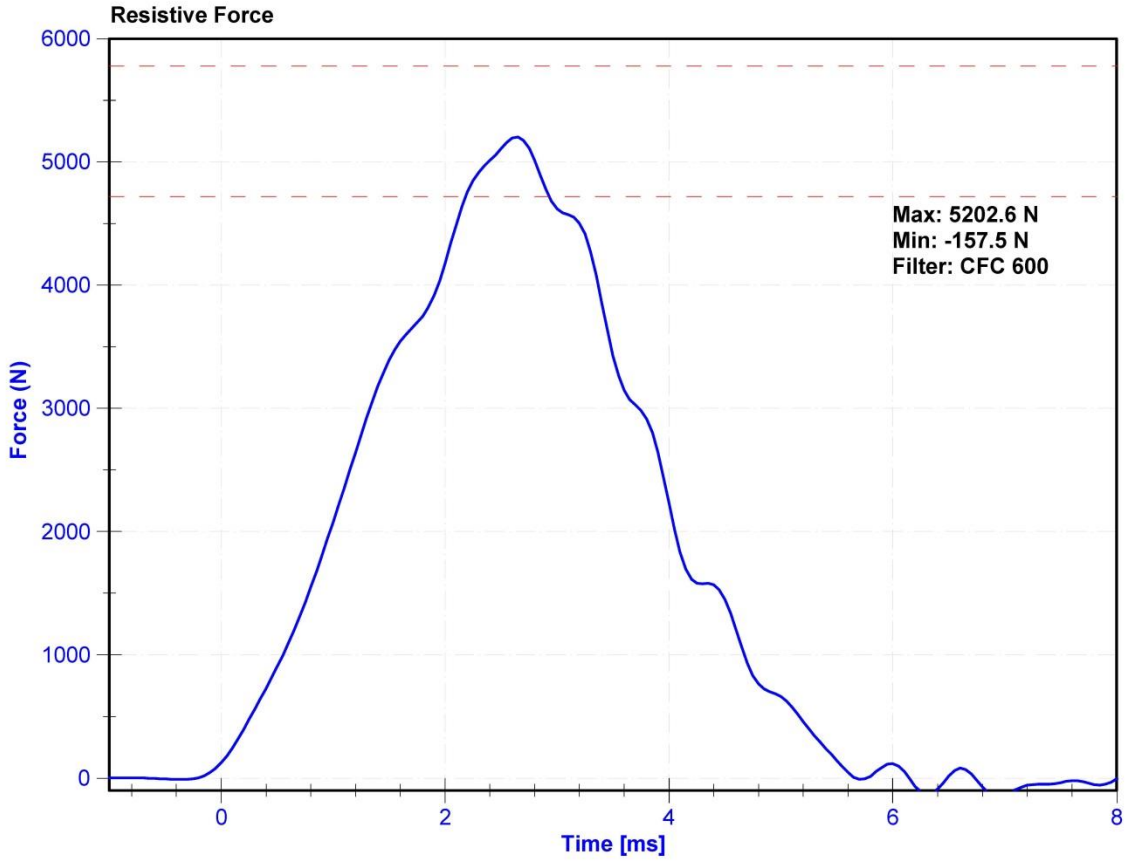
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	1046	Laboratory Supervisor	M. Goehle

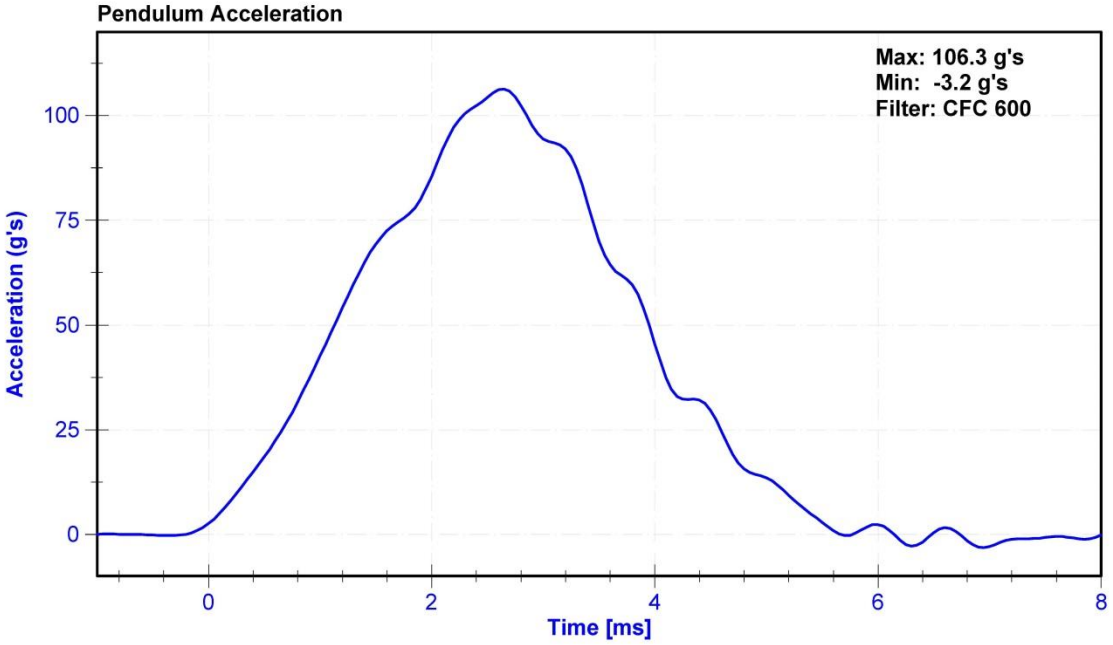
Results

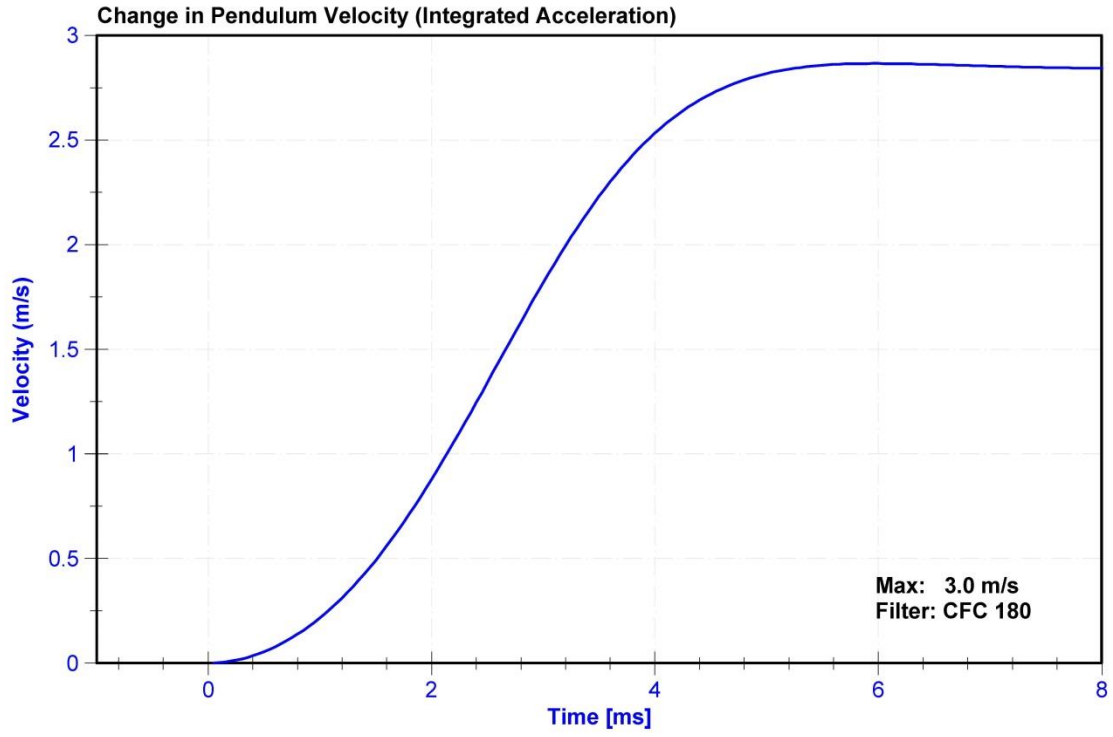
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	C	21.5	Pass
Humidity	10	70	%	10.6	Pass
Velocity	2.07	2.13	m/s	2.124	Pass
Resistive Force	4,720	5,780	N	5202.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C14972	2/6/2015	8/7/2015




Pendulum Acceleration
Max: 106.3 g's
Min: -3.2 g's
Filter: CFC 600
Acceleration (g's)
100
75
50
25
0
0
2
4
6
8
Time [ms]


Change in Pendulum Velocity (Integrated Acceleration)
Velocity (m/s)
3
2.5
2
1.5
1
0.5
0
Max: 3.0 m/s
Filter: CFC 180
0
2
4
6
8
Time [ms]

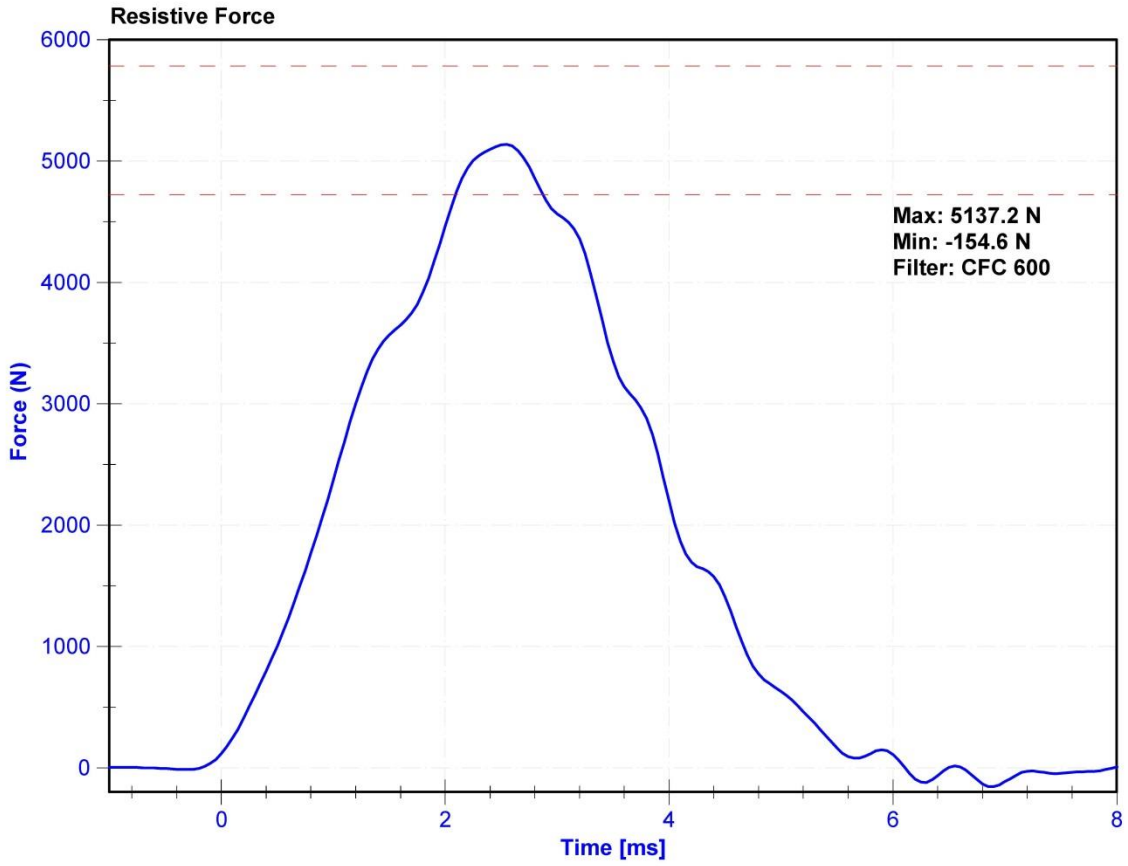
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	1046	Laboratory Supervisor	M. Goehle

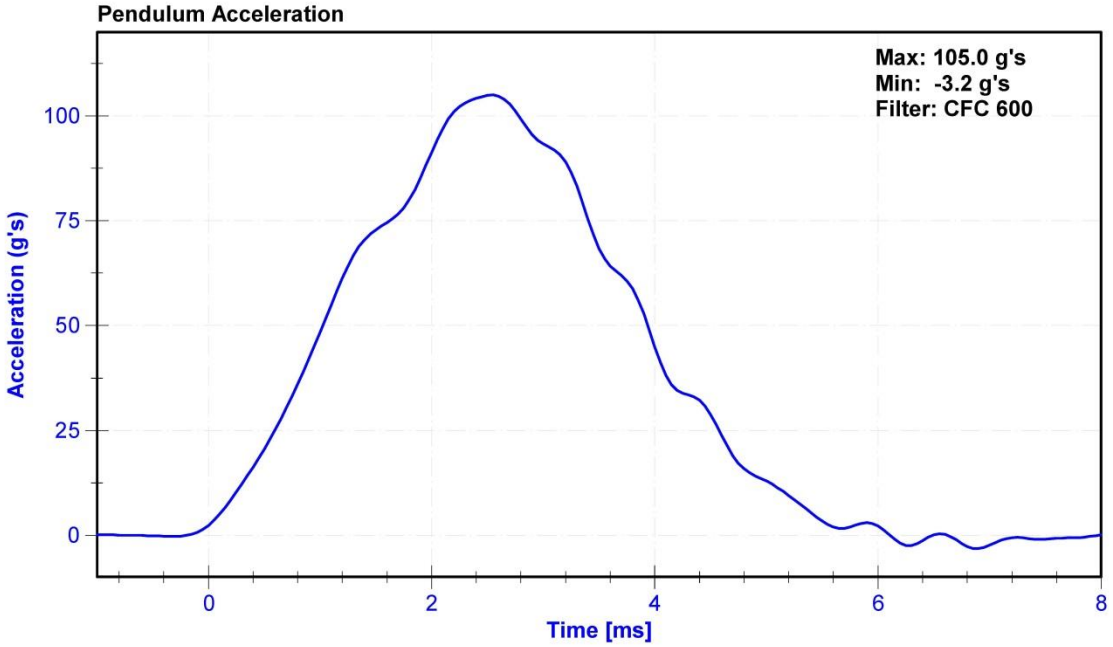
Results

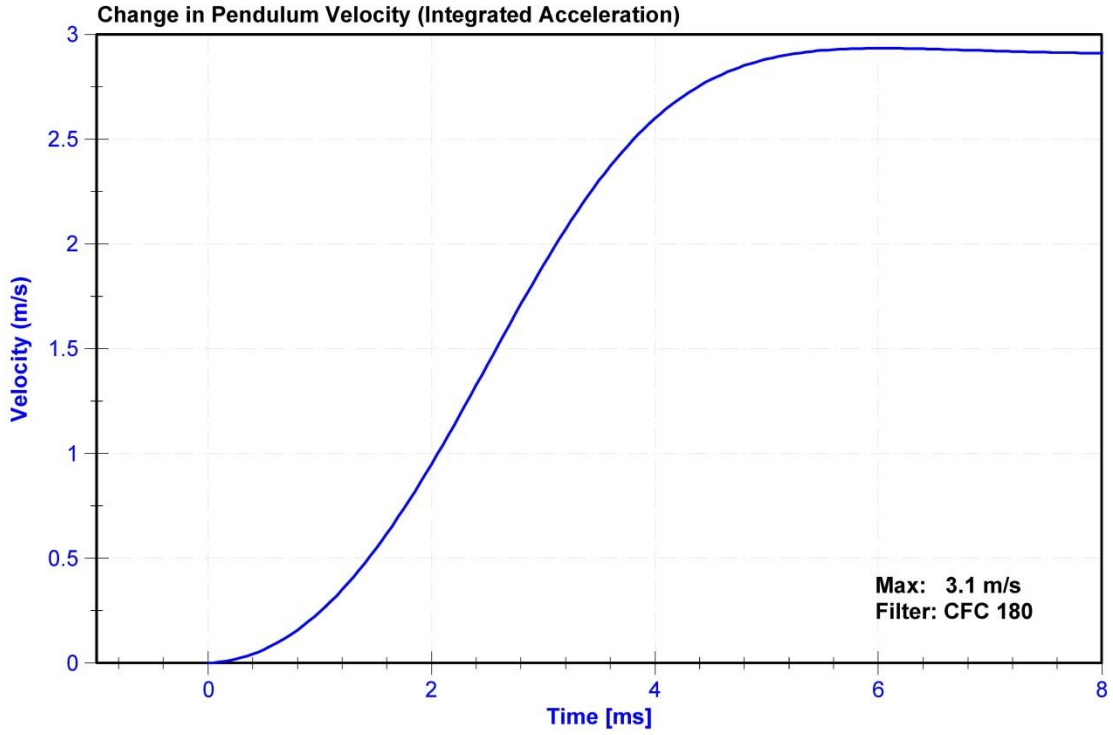
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	21.5	Pass
Humidity	10	70	%	10.6	Pass
Velocity	2.07	2.13	m/s	2.126	Pass
Resistive Force	4,720	5,780	N	5137.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C14972	2/6/2015	8/7/2015




Pendulum Acceleration
Max: 105.0 g's
Min: -3.2 g's
Filter: CFC 600
Acceleration (g's)
100
75
50
25
0
0
2
4
6
8
Time [ms]


Change in Pendulum Velocity (Integrated Acceleration)
Velocity (m/s)
3
2.5
2
1.5
1
0.5
0
Max: 3.1 m/s
Filter: CFC 180
0
2
4
6
8
Time [ms]

CALIBRATION TEST RESULTS

POST-TEST

HYBRID III 5TH PERCENTILE FEMALE - PASSENGER ATD

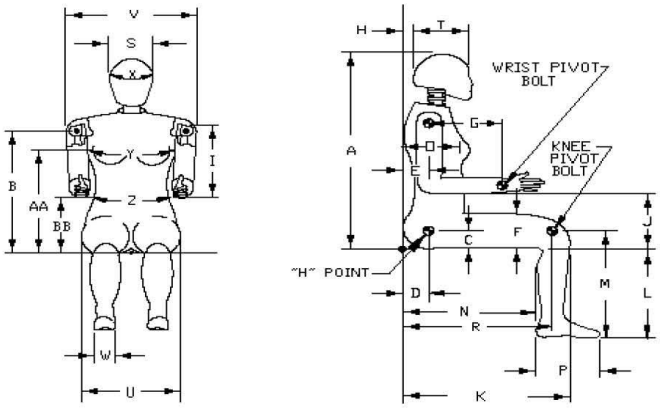
SERIAL NO: 139

Calspan

External Measurements - Hybrid 3 - 5th Female

Technician: M. Geesey Date: 2/16/2015

Dummy Serial Number: 139



Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	775	800	788	Pass
B	Shoulder Pivot Height	432	457	445	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	76	Pass
F	Thigh Clearance	119	135	123	Pass
G	Back of Elbow to Wrist Pivot	244	259	249	Pass
H	Head Back to Backline	43	48	46	Pass
I	Shoulder to Elbow Length	277	297	290	Pass
J	Elbow Rest Height	183	203	188	Pass
K	Buttock to Knee Length	521	546	541	Pass
L	Popliteal Height	356	376	363	Pass
M	Knee Pivot Height	394	419	398	Pass
N	Buttock Popliteal Length	414	439	424	Pass
O	Chest Depth without Jacket	175	191	186	Pass
P	Foot Length (right)	219	234	220	Pass
R	Buttock To Knee Pivot Length	457	483	472	Pass
S	Head Breadth	137	437	141	Pass
T	Head Depth	178	188	180	Pass
U	Hip Breadth	300	315	302	Pass
V	Shoulder Breadth	351	366	360	Pass
W	Foot Breadth	79	94	83	Pass
X	Head Circumference	528	549	534	Pass
Y	Chest Circumference with Jacket	851	881	854	Pass
Z	Waist Circumference	460	790	773	Pass
AA	Reference Location (Chest Circumference)	333	358	356	Pass
BB	Reference Location (Waist Circumference)	160	170	170	Pass

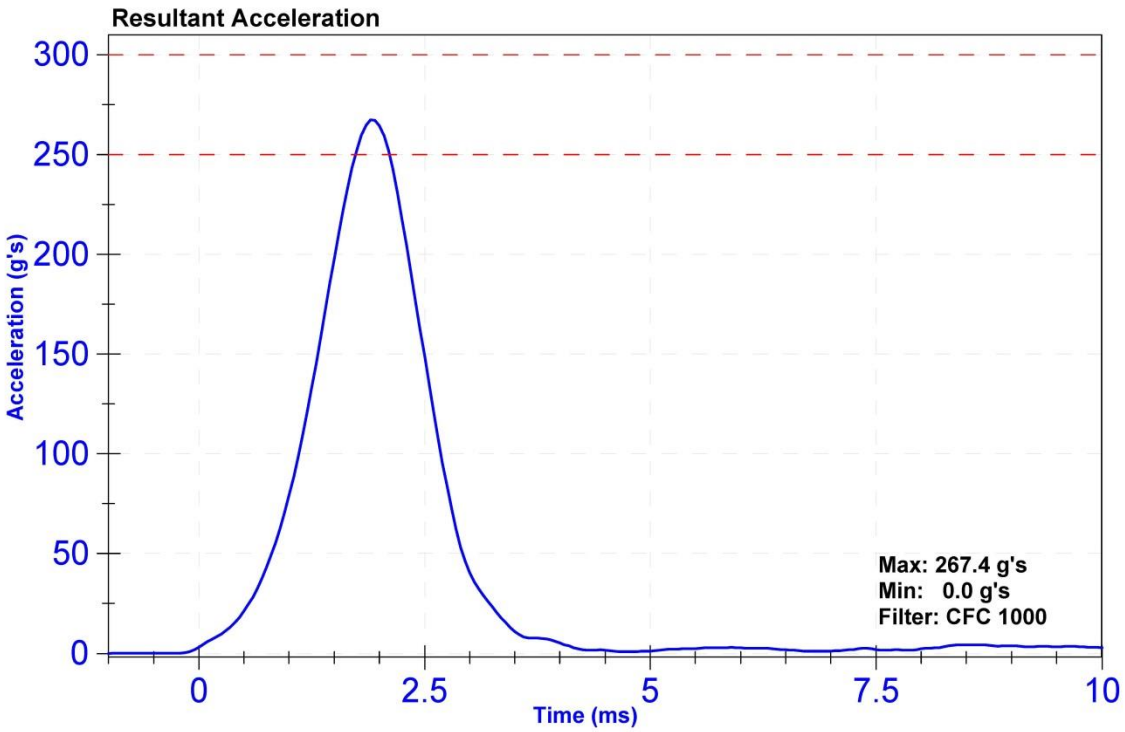
ATD Manufacturer	Denton	Test Technician	M. Geesey
ATD Serial Number	139	Laboratory Supervisor	M. Goehle

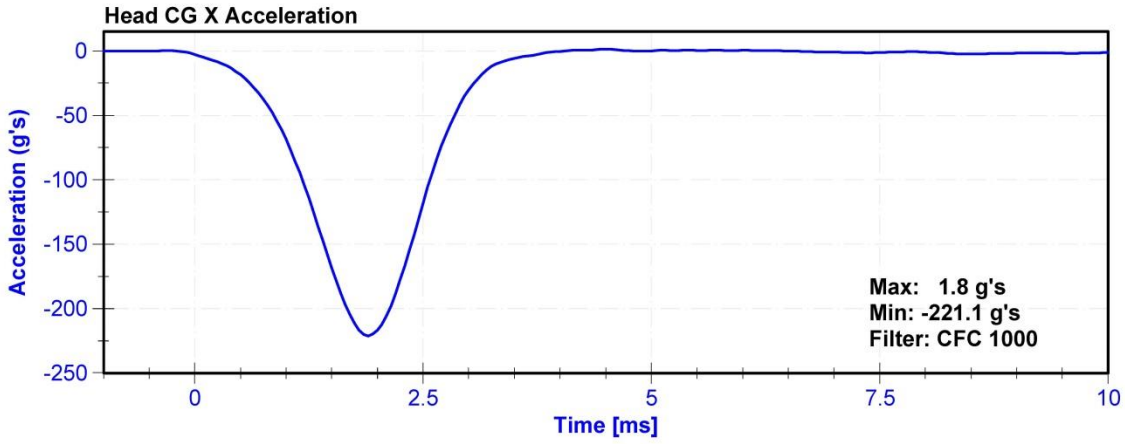
Results

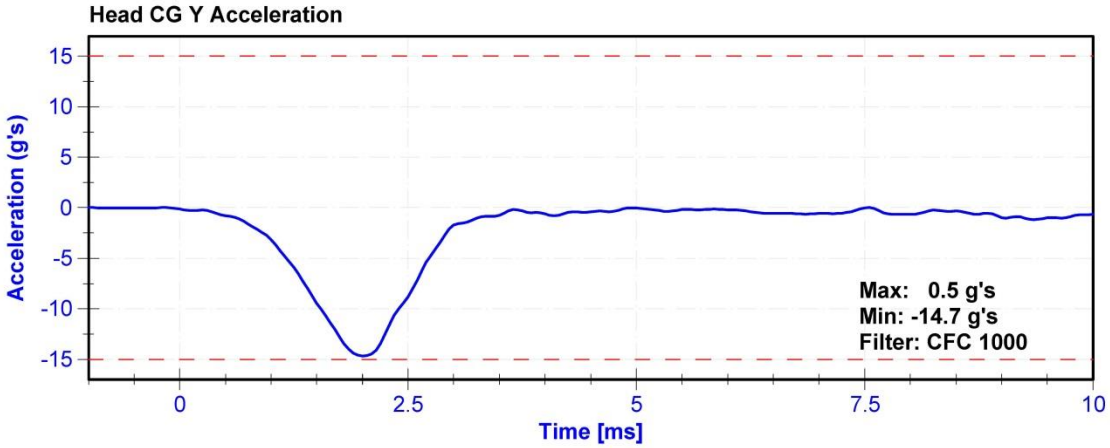
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	C	21	Pass
Humidity	10	70	%	12.2	Pass
Resultant Acceleration	250	300	g's	267.4	Pass
Oscillation	0	10	%	2.8	Pass
Lateral Acceleration	-15	15	g's	-14.7	Pass

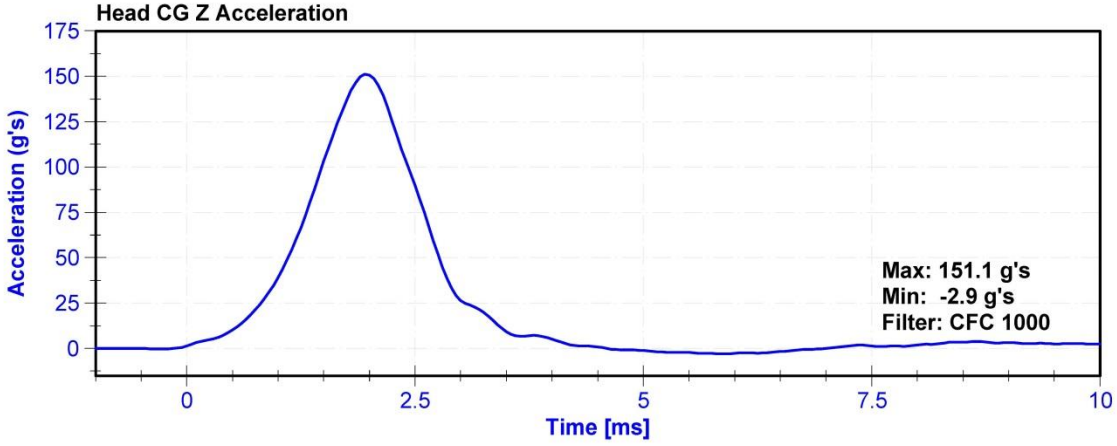
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264	AC-P52054	8/26/2014	2/24/2015
Y Accelerometer	ENDEVCO 7264	AC-P52007	8/26/2014	2/24/2015
Z Accelerometer	ENDEVCO 7264	AC-P51298	8/26/2014	2/24/2015




Head CG X Acceleration
Acceleration (g's)
0
-50
-100
-150
-200
-250
0
2.5
5
7.5
10
Time [ms]
Max: 1.8 g's
Min: -221.1 g's
Filter: CFC 1000


Head CG Y Acceleration
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
5
7.5
10
Time [ms]
Max: 0.5 g's
Min: -14.7 g's
Filter: CFC 1000


Head CG Z Acceleration
Acceleration (g's)
175
150
125
100
75
50
25
0
0
2.5
5
7.5
10
Time [ms]
Max: 151.1 g's
Min: -2.9 g's
Filter: CFC 1000

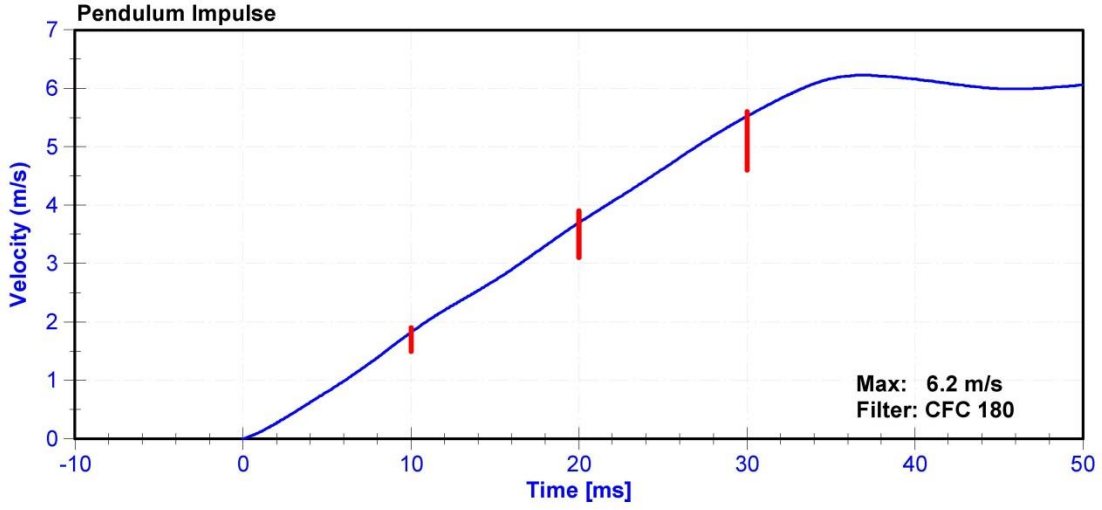
ATD Manufacturer	Denton	Test Technician	M. Geesey
ATD Serial Number	139	Laboratory Supervisor	M. Goehle

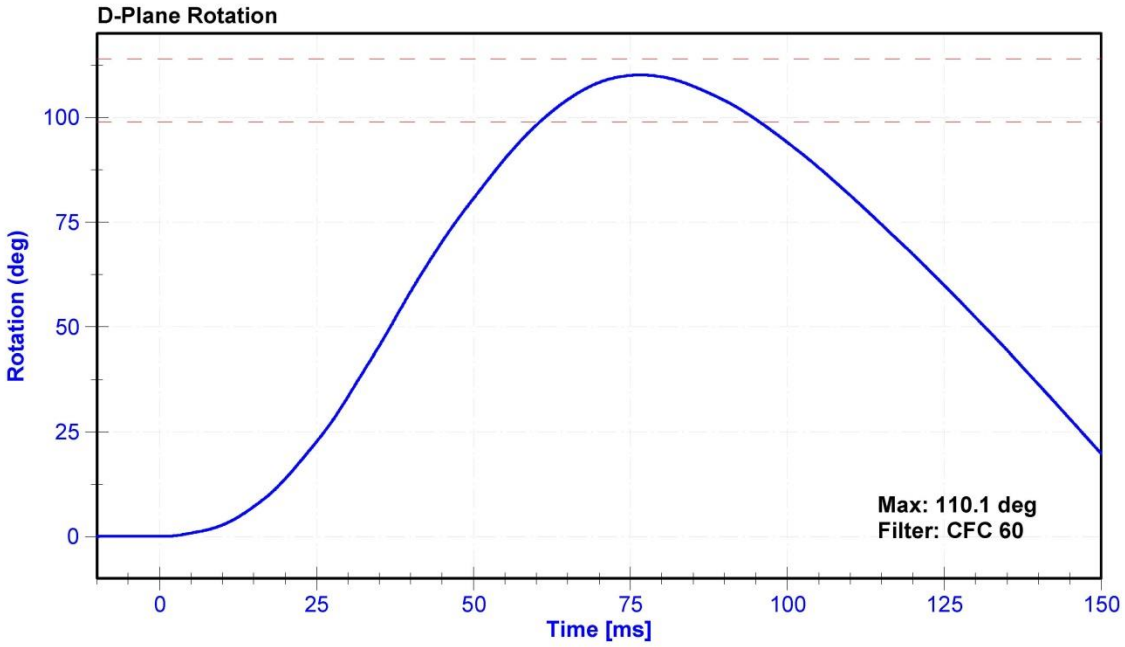
Results

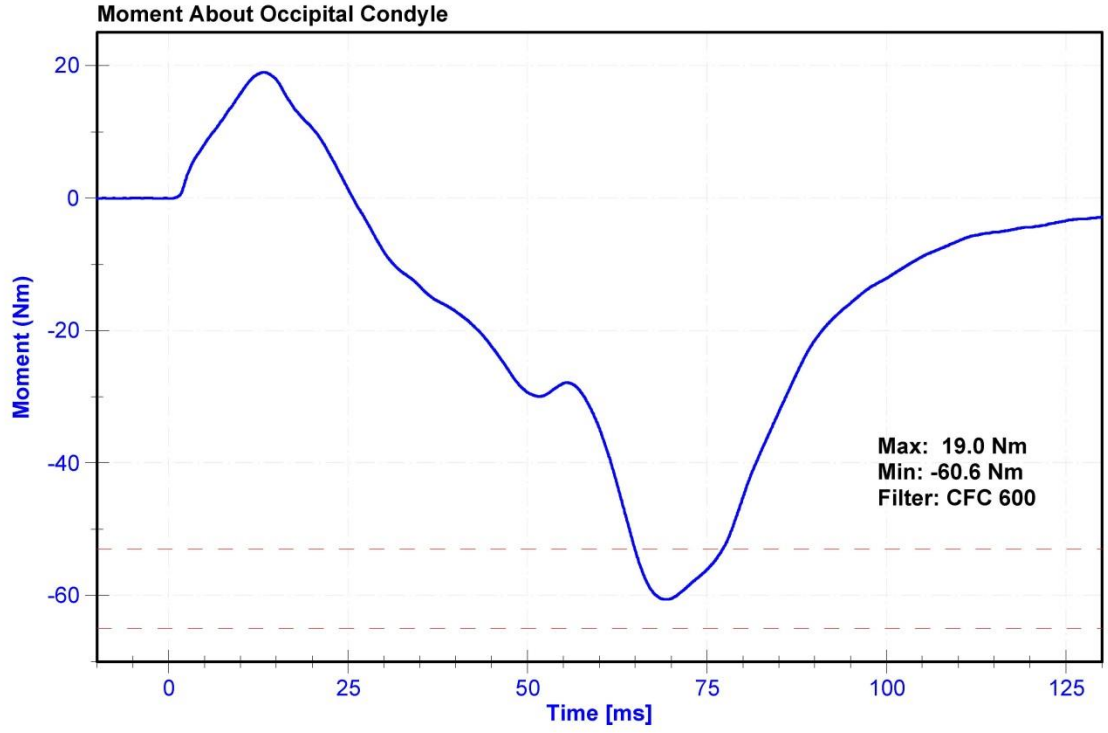
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.8	Pass
Humidity	10	70	%	12.3	Pass
Velocity	5.96	6.19	m/s	6.02	Pass
Pendulum Impulse at 10ms	1.5	1.9	G's	1.82	Pass
Pendulum Impulse at 20ms	3.1	3.9	G's	3.70	Pass
Pendulum Impulse at 30ms	4.6	5.6	G's	5.52	Pass
D Plane Rotation	99	114	deg	110.1	Pass
Moment During Rotation Interval	-65	-53	Nm	-60.6	Pass
Moment Decay to -10Nm	94	114	ms	103.2	Pass

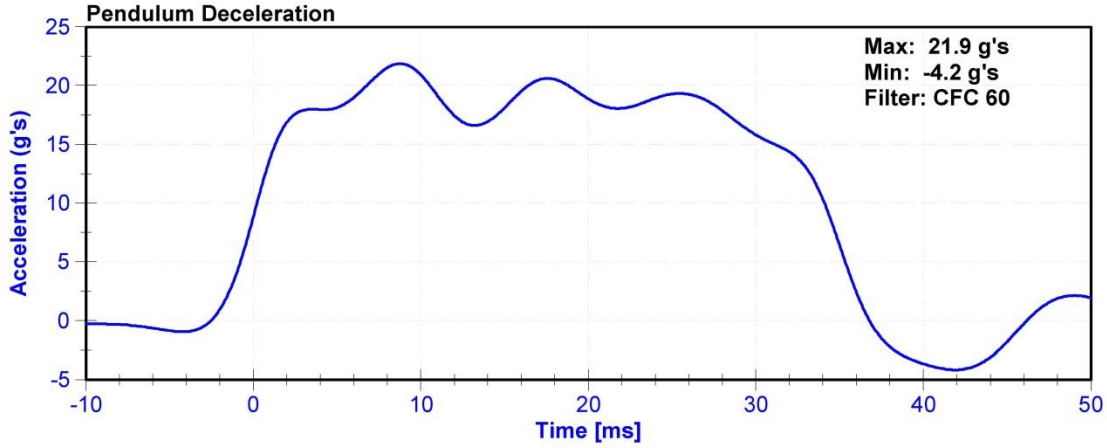
Transducer Calibrations

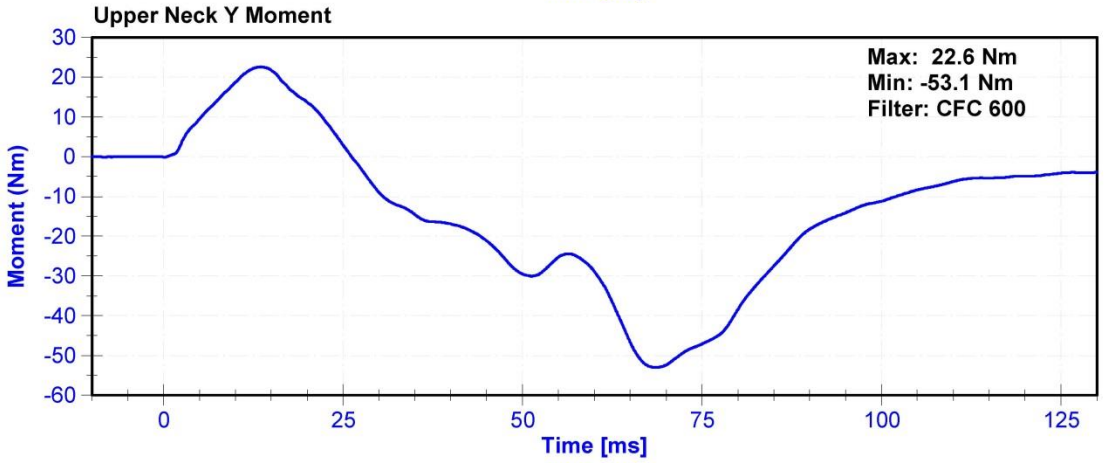
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	11/6/2014	11/6/2015
Pendulum Potentiometer	SP22G	DS-PendPot	9/16/2014	9/16/2015
Condyle Potentiometer	SP22G	DS-CondPot	2/21/2014	2/21/2015
Upper Neck Load Cell	Denton 1716A	LC-2018Fx	5/1/2014	5/1/2015

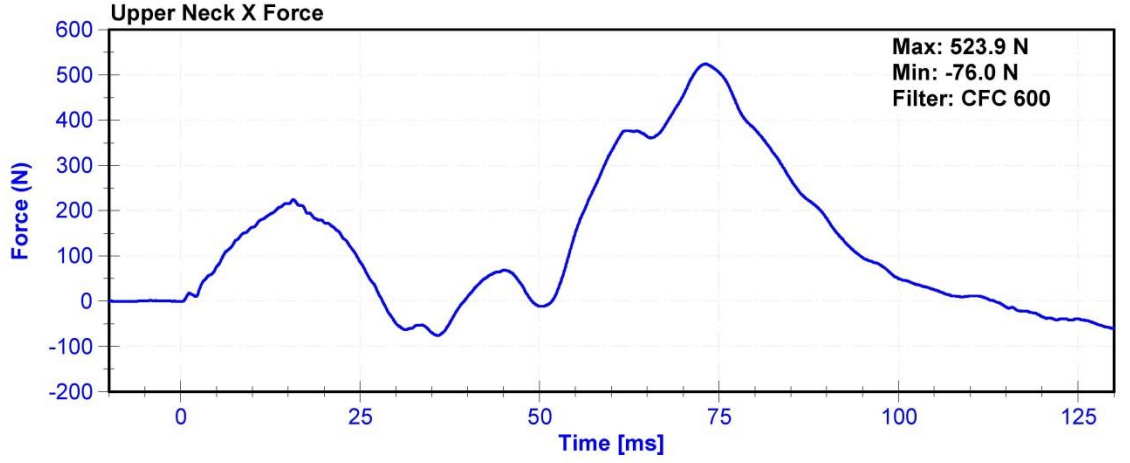



D-Plane Rotation
Rotation (deg)
100
75
50
25
0
0
25
50
75
100
125
150
Time [ms]
Max: 110.1 deg
Filter: CFC 60


Moment About Occipital Condyle
Moment (Nm)
20
0
-20
-40
-60
0
25
50
75
100
125
Time [ms]
Max: 19.0 Nm
Min: -60.6 Nm
Filter: CFC 600


Pendulum Deceleration
Max: 21.9 g's
Min: -4.2 g's
Filter: CFC 60
Acceleration (g's)
25
20
15
10
5
0
-5
-10
0
10
20
30
40
50
Time [ms]


Upper Neck Y Moment
Max: 22.6 Nm
Min: -53.1 Nm
Filter: CFC 600
Moment (Nm)
30
20
10
0
-10
-20
-30
-40
-50
-60
0
25
50
75
100
125
Time [ms]


Upper Neck X Force
Max: 523.9 N
Min: -76.0 N
Filter: CFC 600
Force (N)
600
500
400
300
200
100
0
-100
-200
0
25
50
75
100
125
Time [ms]

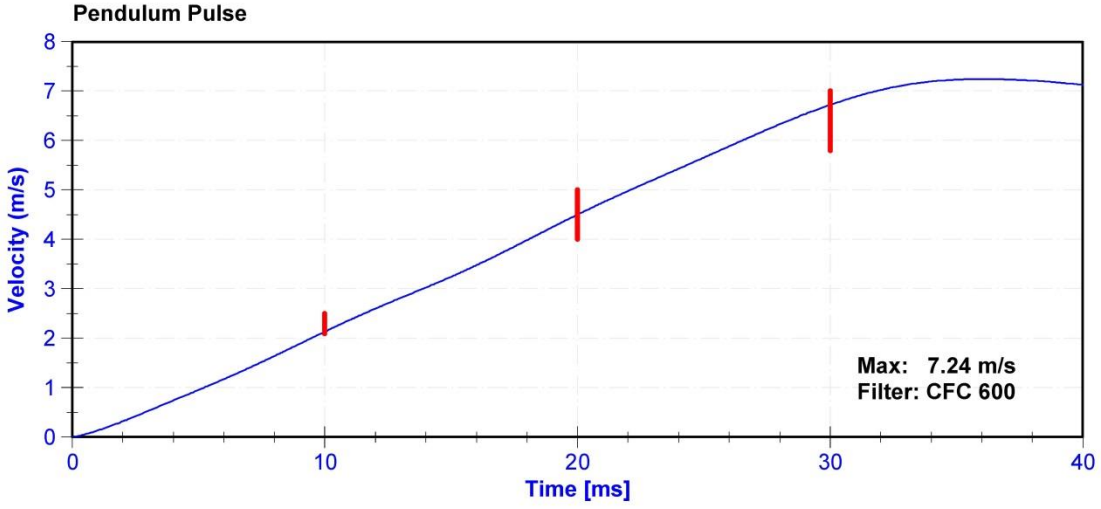
ATD Manufacturer	Denton	Test Technician	M. Geesey
ATD Serial Number	139	Laboratory Supervisor	M. Goehle

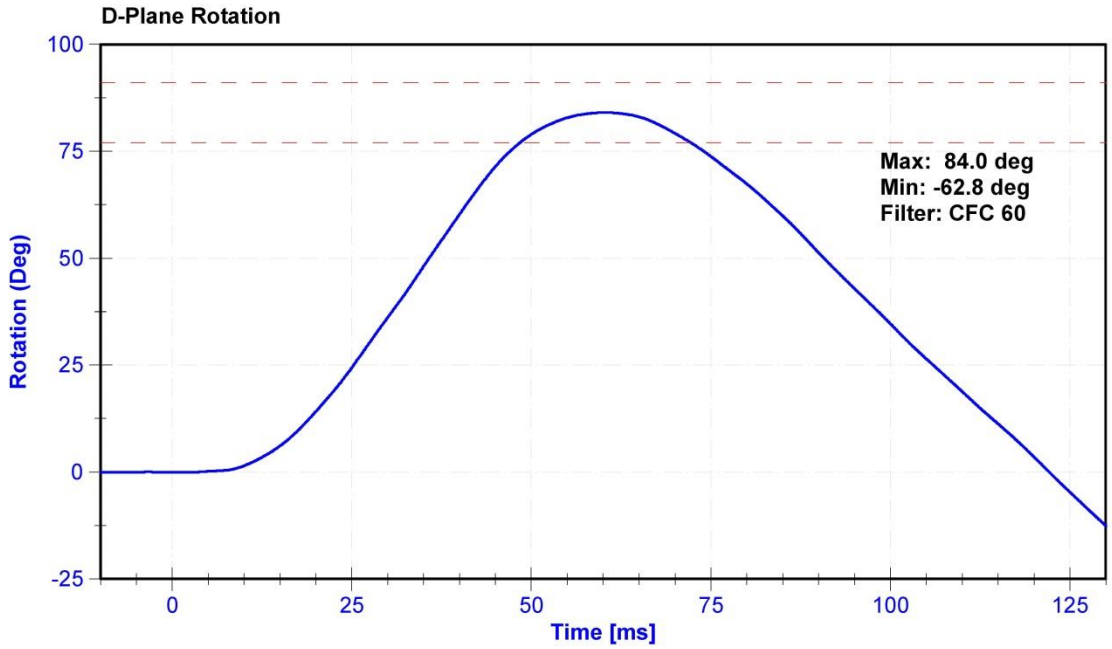
Results

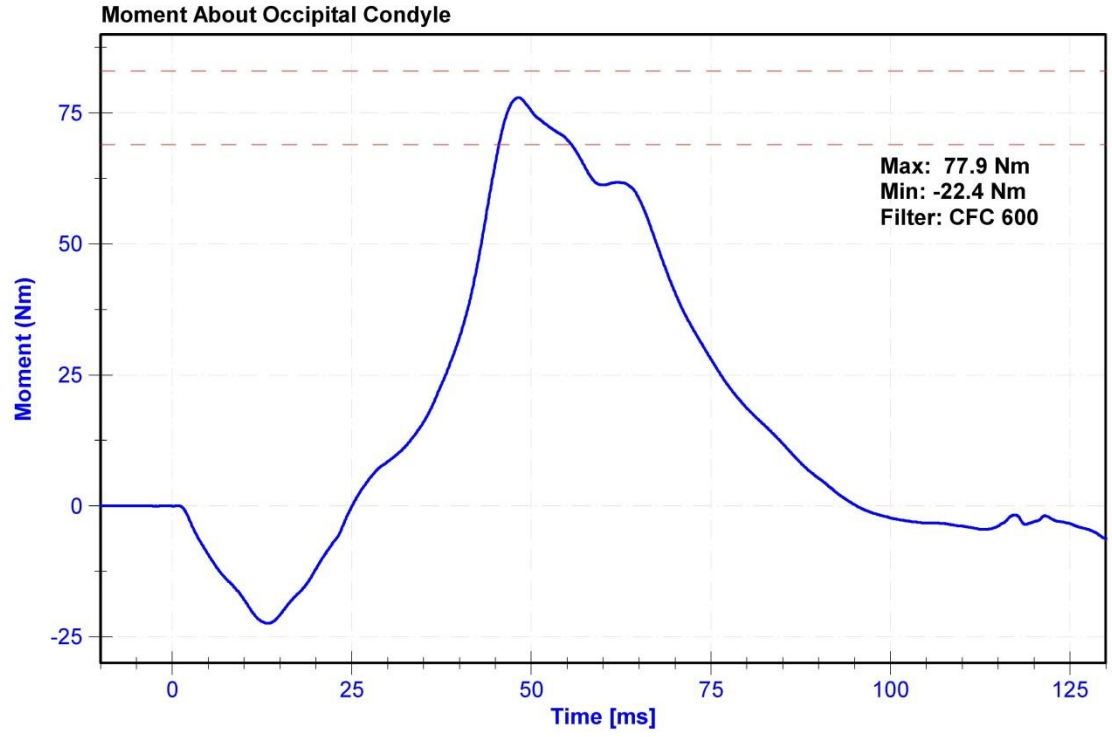
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	12.3	Pass
Velocity	6.89	7.13	m/s	6.979	Pass
Pendulum Impulse at 10ms	2.1	2.5	m/s	2.13	Pass
Pendulum Impulse at 20ms	4	5	m/s	4.50	Pass
Pendulum Impulse at 30ms	5.8	7.0	m/s	6.72	Pass
D Plane Rotation	77	91	deg	84.0	Pass
Moment During Rotation Interval	69	83	Nm	77.9	Pass
Moment Decay to 10.0 Nm	80	100	ms	86.3	Pass

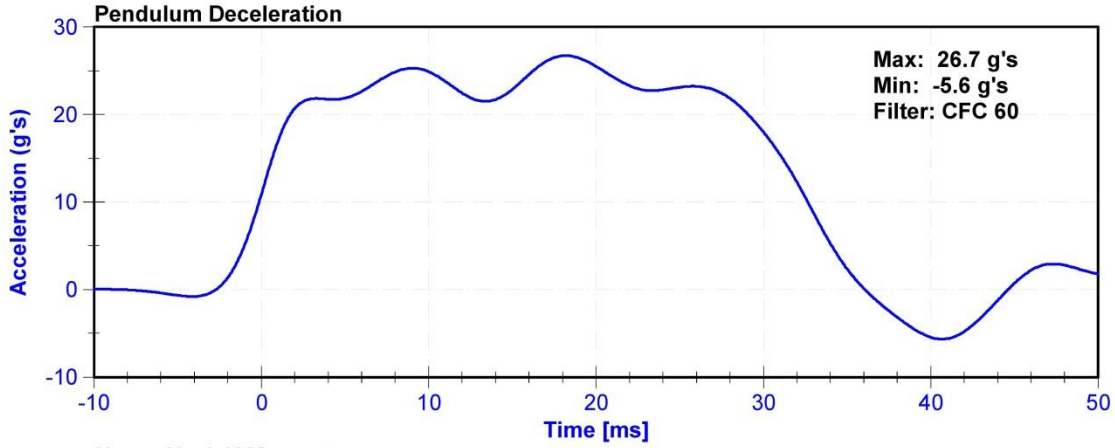
Transducer Calibrations

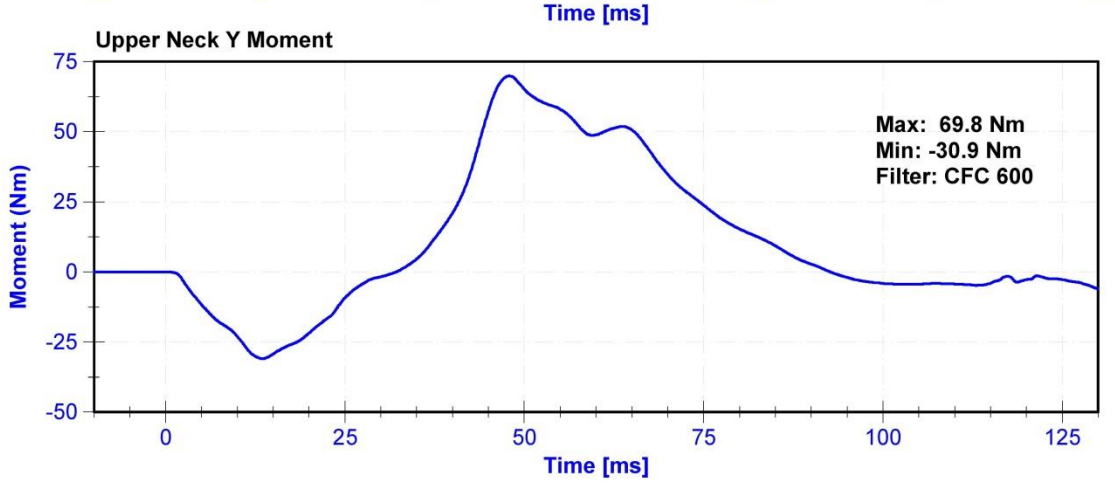
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	11/6/2014	11/6/2015
Pendulum Potentiometer	SP22G	DS-PendPot	9/16/2014	9/16/2015
Condyle Potentiometer	SP22G	DS-CondPot	2/21/2014	2/21/2015
Upper Neck Load Cell	Denton 1716A	LC-2018Fx	5/1/2014	5/1/2015

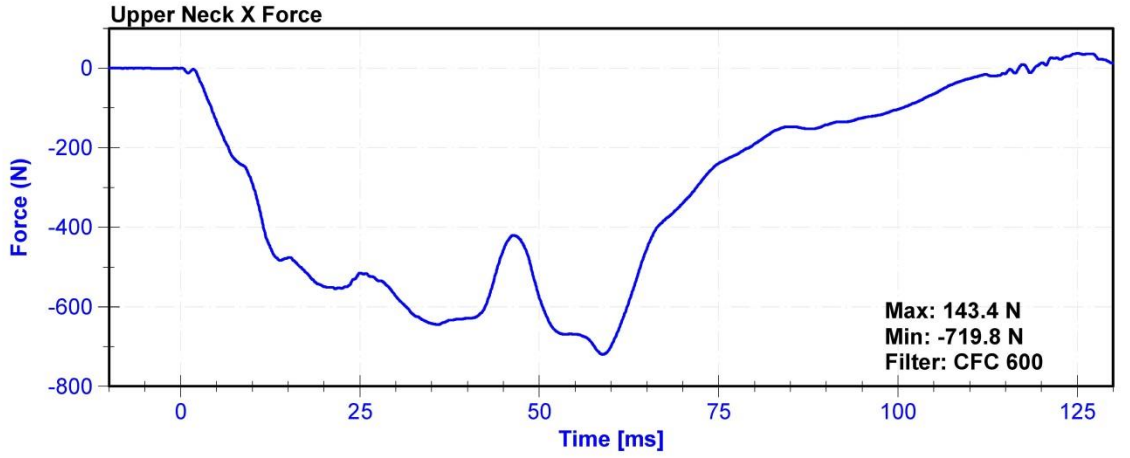



D-Plane Rotation
Rotation (Deg)
100
75
50
25
0
-25
0
25
50
75
100
125
Time [ms]
Max: 84.0 deg
Min: -62.8 deg
Filter: CFC 60


Moment About Occipital Condyle
Moment (Nm)
75
50
25
0
-25
0
25
50
75
100
125
Time [ms]
Max: 77.9 Nm
Min: -22.4 Nm
Filter: CFC 600


Pendulum Deceleration
Max: 26.7 g's
Min: -5.6 g's
Filter: CFC 60
Acceleration (g's)
30
20
10
0
-10
-10
0
10
20
30
40
50
Time [ms]


Upper Neck Y Moment
Max: 69.8 Nm
Min: -30.9 Nm
Filter: CFC 600
Moment (Nm)
75
50
25
0
-25
-50
0
25
50
75
100
125
Time [ms]


Upper Neck X Force
Max: 143.4 N
Min: -719.8 N
Filter: CFC 600
Force (N)
0
-200
-400
-600
-800
0
25
50
75
100
125
Time [ms]

ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	139	Laboratory Supervisor	M.Goehle

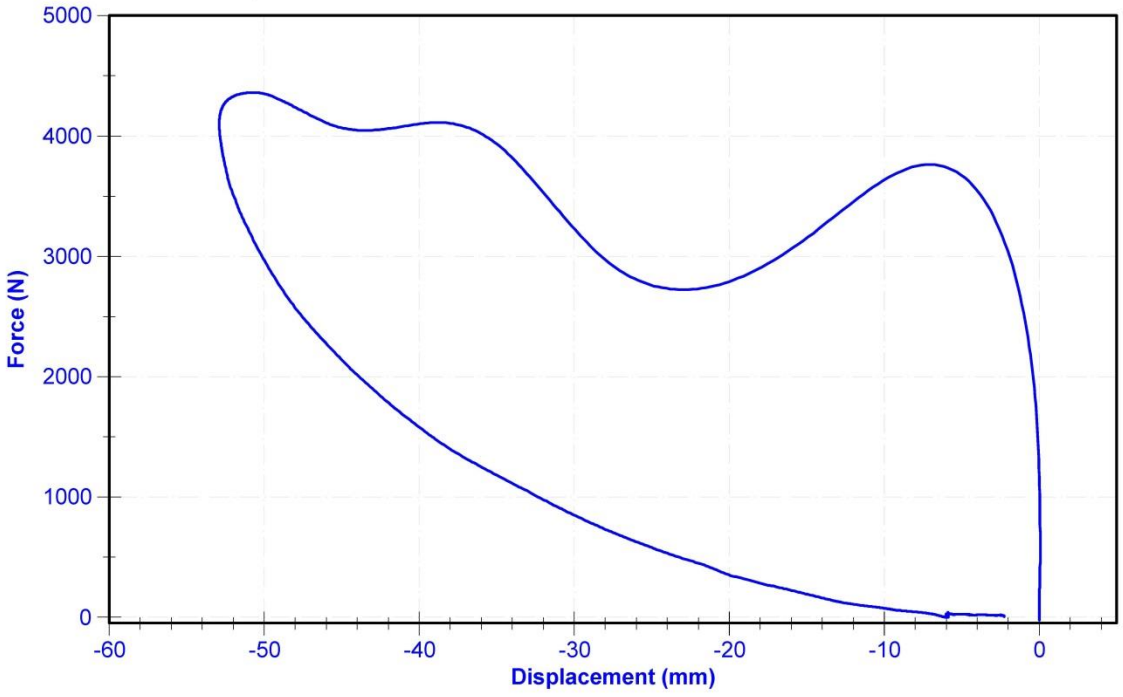
Results

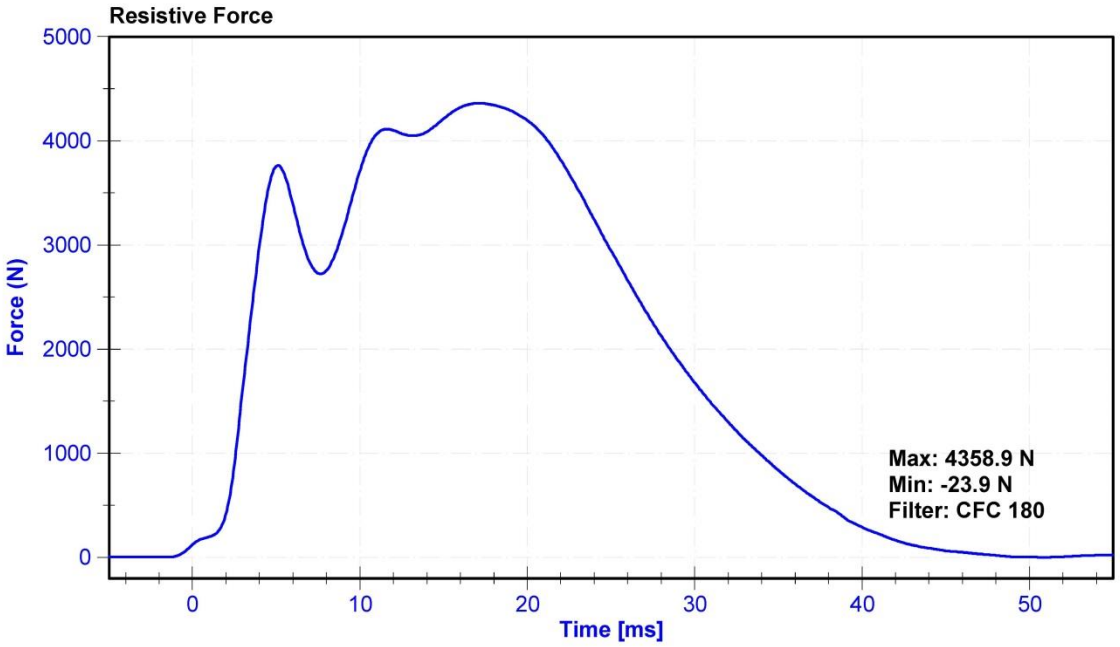
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	C	21.2	Pass
Humidity	10	70	%	10.7	Pass
Velocity	6.59	6.83	m/s	6.79	Pass
Chest Displacement	-58	-50	mm	-52.9	Pass
Force During Displacement Interval	3,900	4,400	N	4358.9	Pass
Force During -18 to 50mm Displacement	0	4,600	N	4347.7	Pass
Hysteresis	69	85	%	72.3	Pass

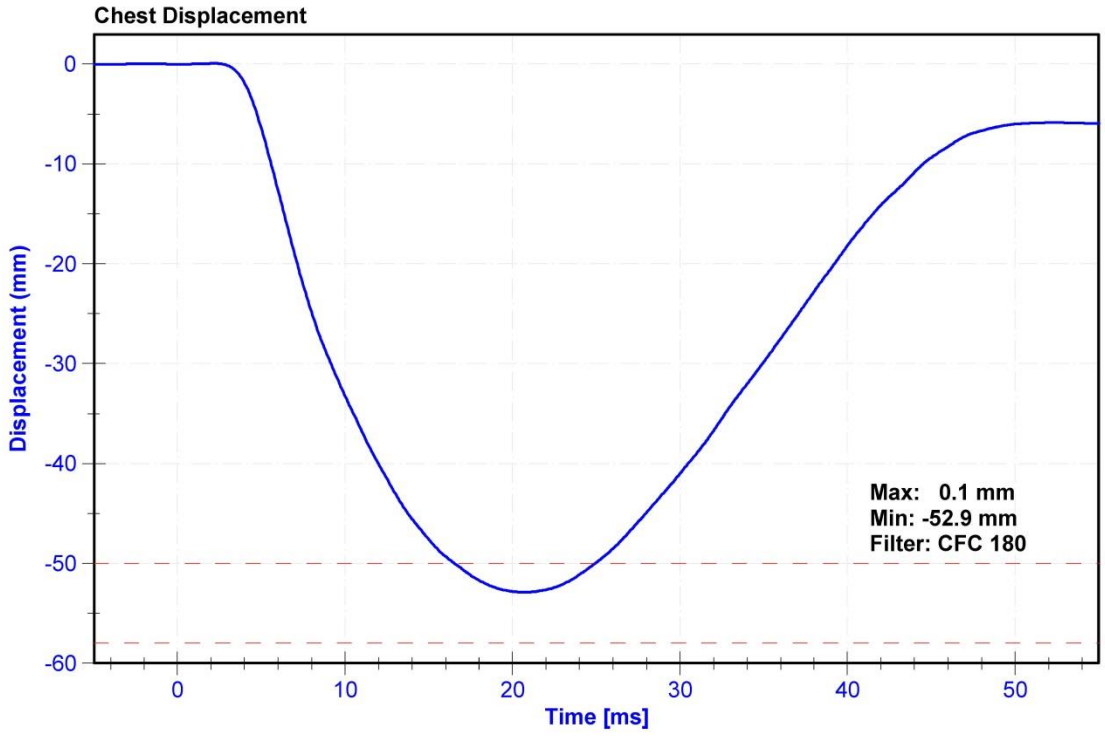
Transducer Calibrations

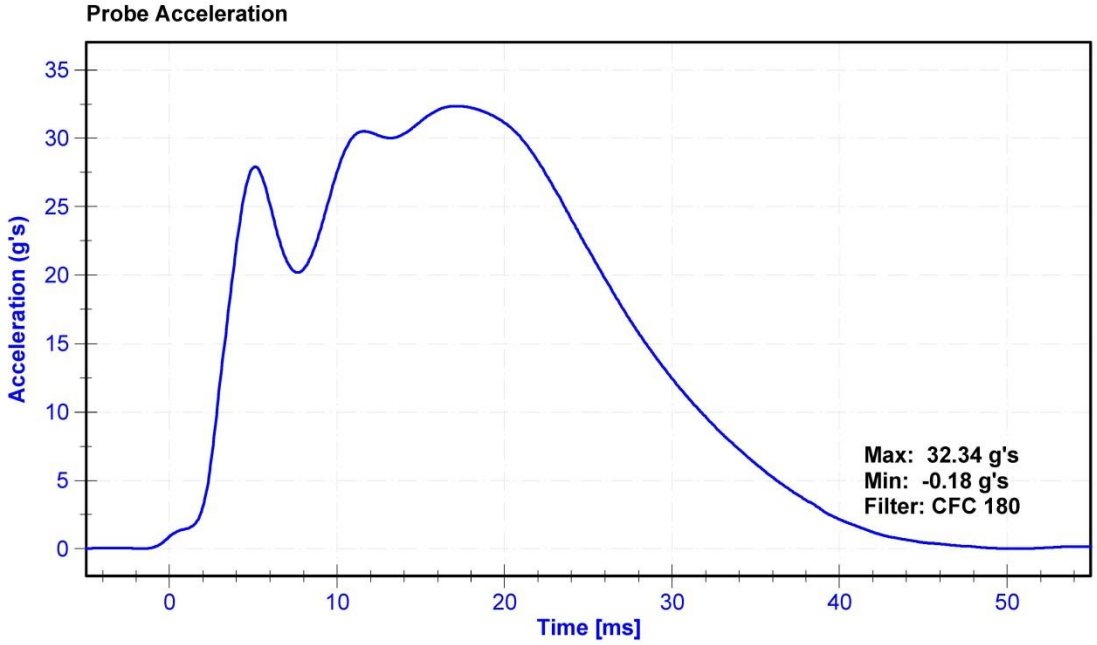
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C14972	2/6/2015	8/7/2015
Chest Potentiometer	Servo 14CBI-3615	DS-139	7/31/2014	7/31/2015

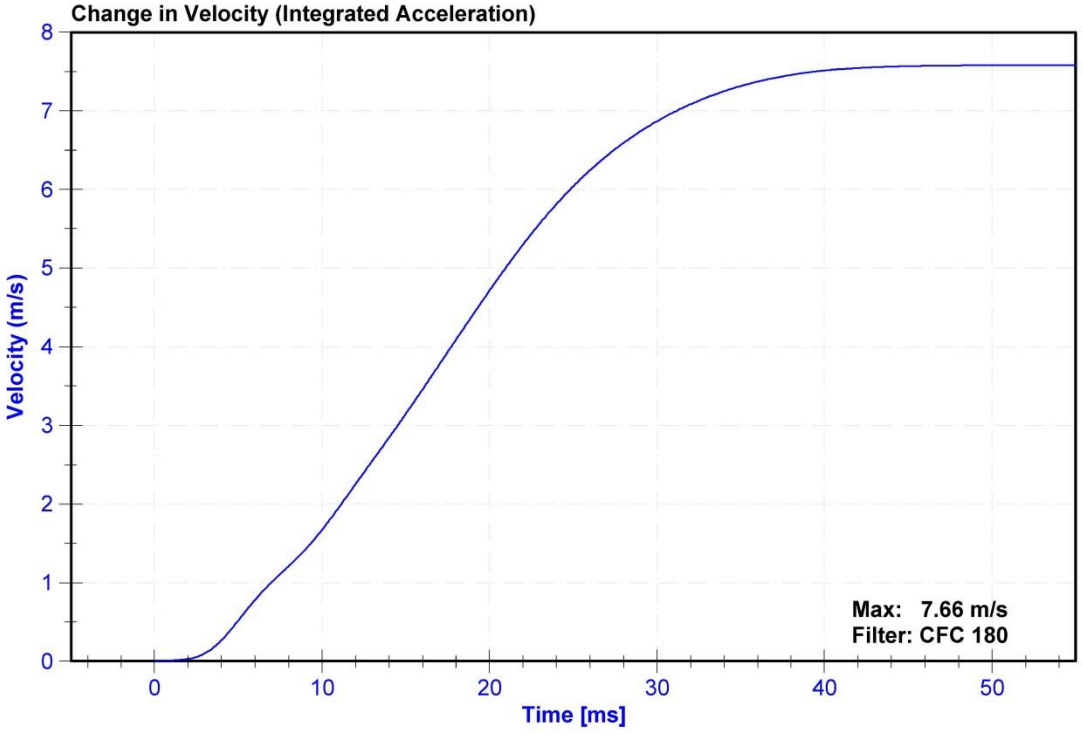
Force vs. Displacement




Resistive Force
Force (N)
5000
4000
3000
2000
1000
0
0
10
20
30
40
50
Time [ms]
Max: 4358.9 N
Min: -23.9 N
Filter: CFC 180


Chest Displacement
Displacement (mm)
0
-10
-20
-30
-40
-50
-60
0
10
20
30
40
50
Time [ms]
Max: 0.1 mm
Min: -52.9 mm
Filter: CFC 180


Probe Acceleration
Acceleration (g's)
35
30
25
20
15
10
5
0
0
10
20
30
40
50
Time [ms]
Max: 32.34 g's
Min: -0.18 g's
Filter: CFC 180


Change in Velocity (Integrated Acceleration)
Velocity (m/s)
8
7
6
5
4
3
2
1
0
0
10
20
30
40
50
Time [ms]
Max: 7.66 m/s
Filter: CFC 180

ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	139	Laboratory Supervisor	M.Goehle

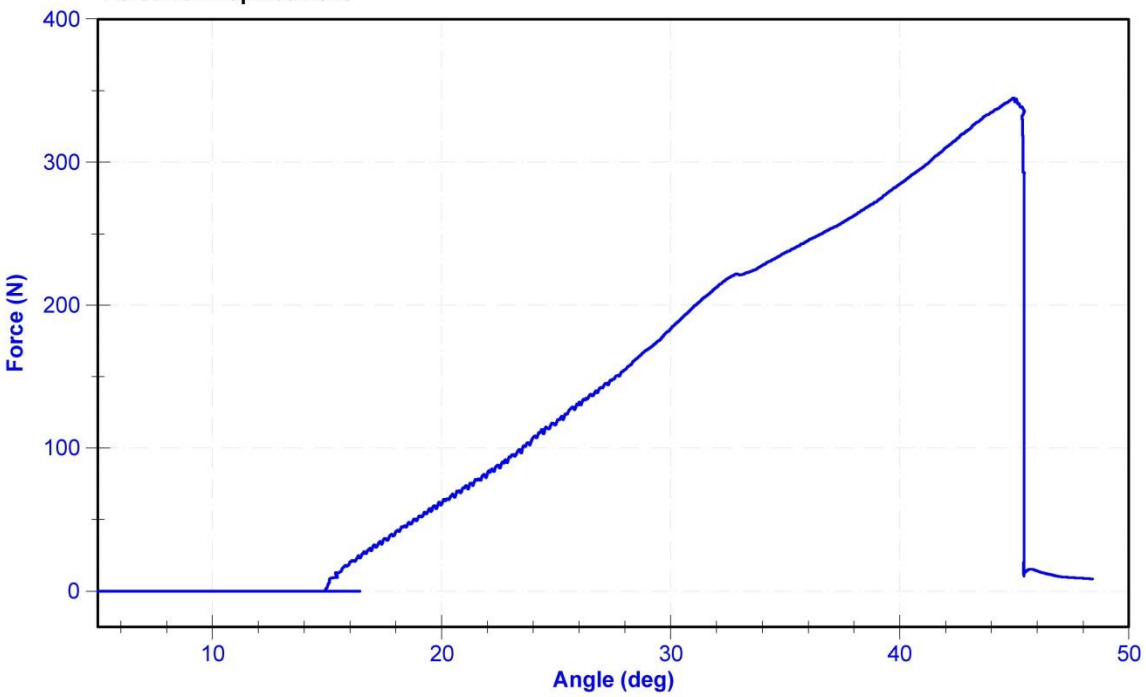
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.6	25.6	C	21.8	Pass
Humidity	10	70	%	12.6	Pass
Initial Angle	0	20	deg	14.	Pass
Force at 45 Degrees	320	390	N	344.01	Pass
Return Angle	0	8	deg	6.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	Rieker N4C-1	DS-13051548	8/1/2014	8/1/2015
Load Cell	Interface SML-200	LC-493319	8/13/2014	8/13/2015

Force vs. Displacement



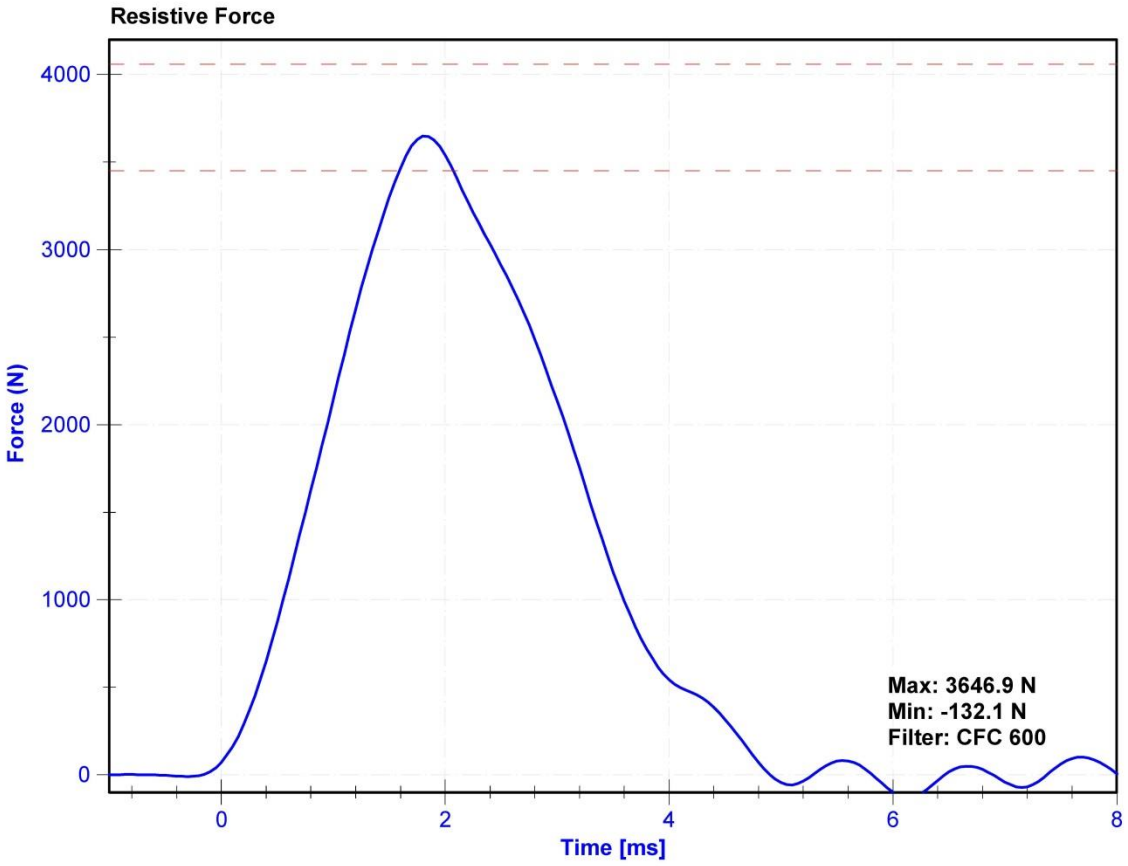
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	139	Laboratory Supervisor	M.Goehle

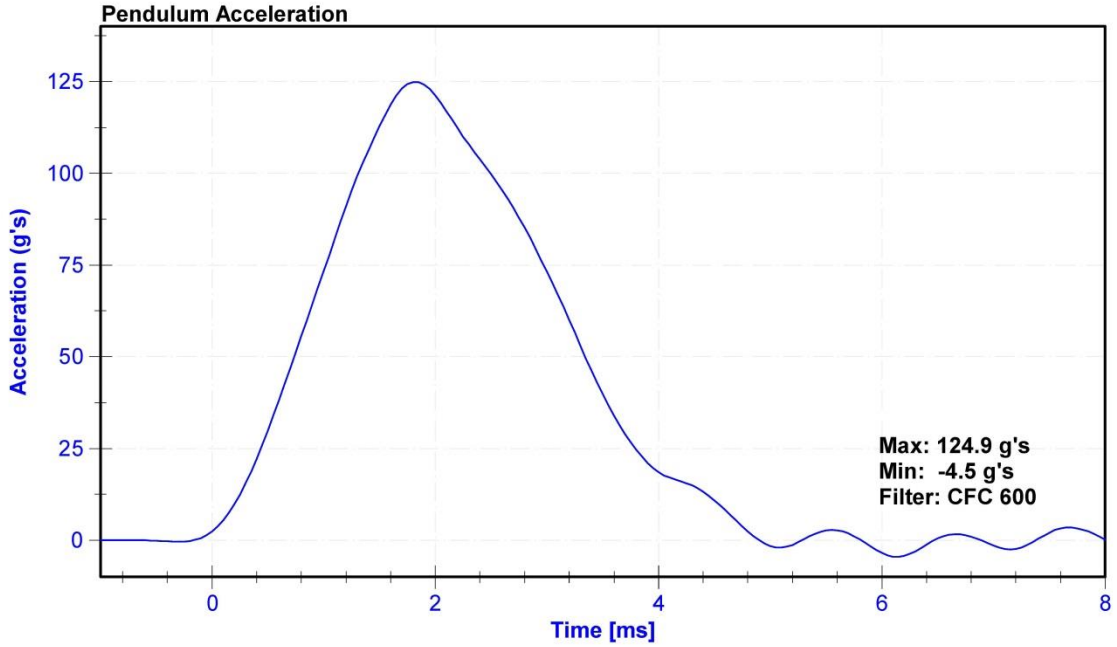
Results

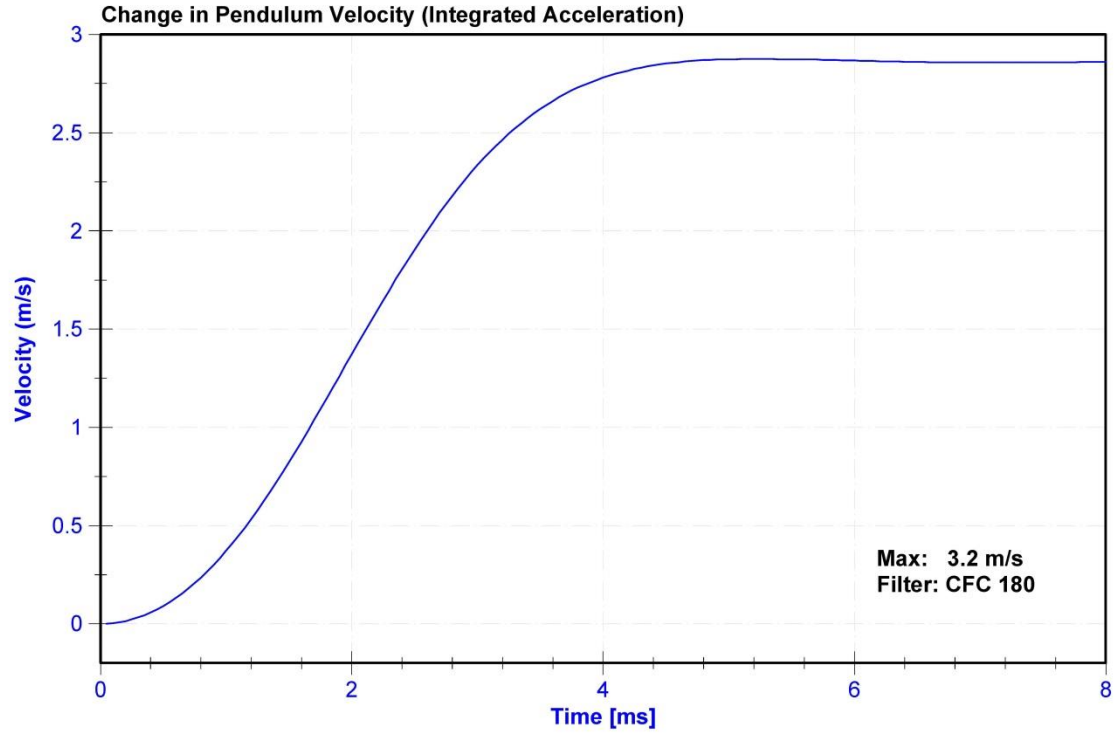
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	20.7	Pass
Humidity	10	70	%	10.8	Pass
Velocity	2.07	2.13	m/s	2.102	Pass
Resistive Force	3,450	4,060	N	3646.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C14972	2/6/2015	8/7/2015




Pendulum Acceleration
Acceleration (g's)
125
100
75
50
25
0
0
2
4
6
8
Time [ms]
Max: 124.9 g's
Min: -4.5 g's
Filter: CFC 600


Change in Pendulum Velocity (Integrated Acceleration)
Velocity (m/s)
3
2.5
2
1.5
1
0.5
0
0
2
4
6
8
Time [ms]
Max: 3.2 m/s
Filter: CFC 180

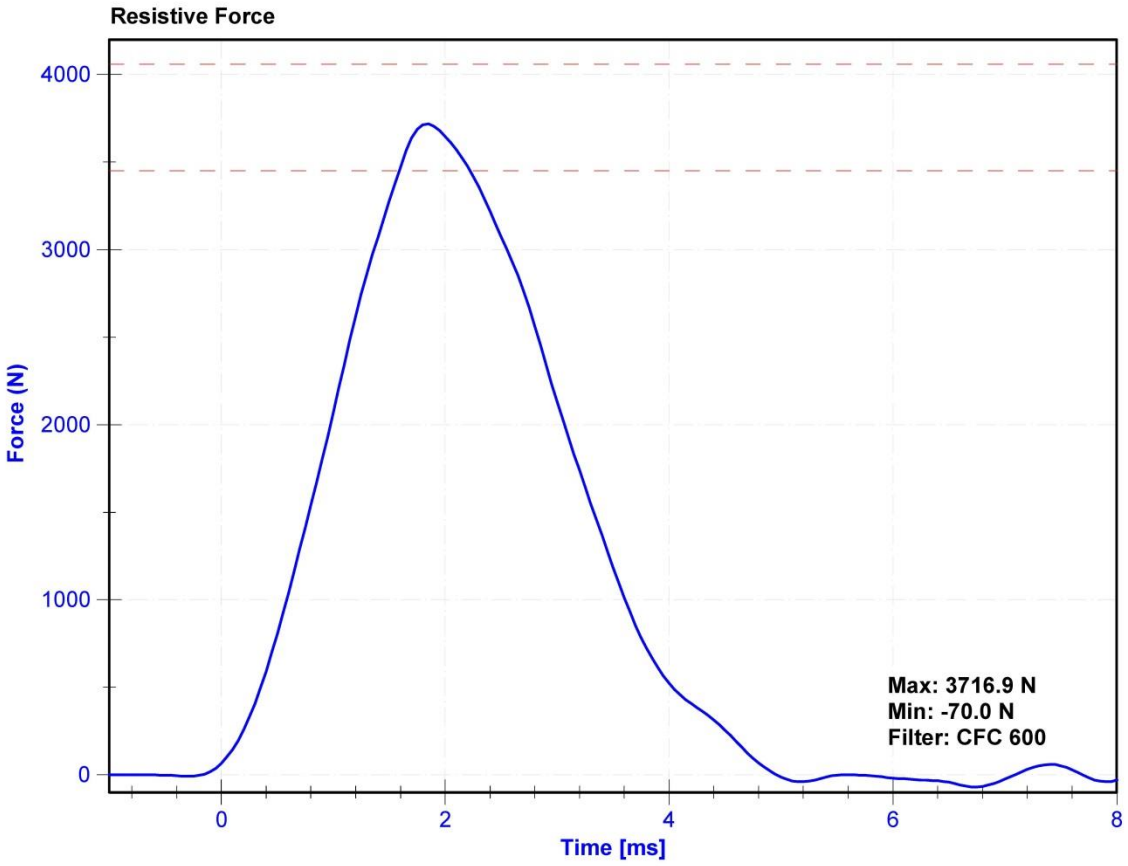
ATD Manufacturer	FTSS	Test Technician	M.Hartung
ATD Serial Number	139	Laboratory Supervisor	M.Goehle

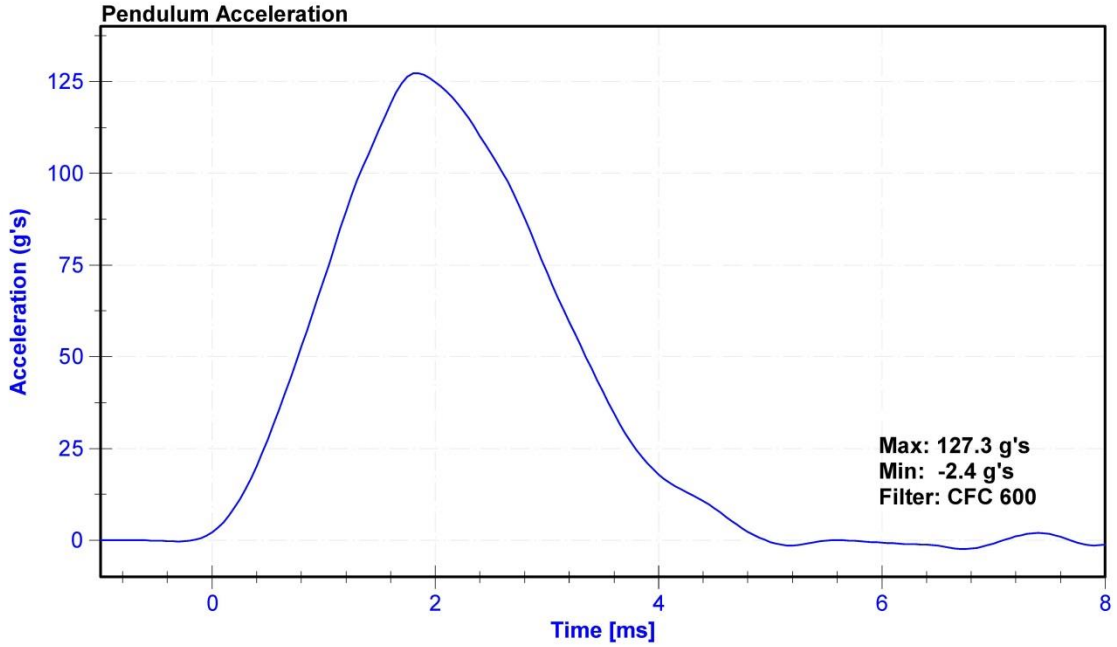
Results

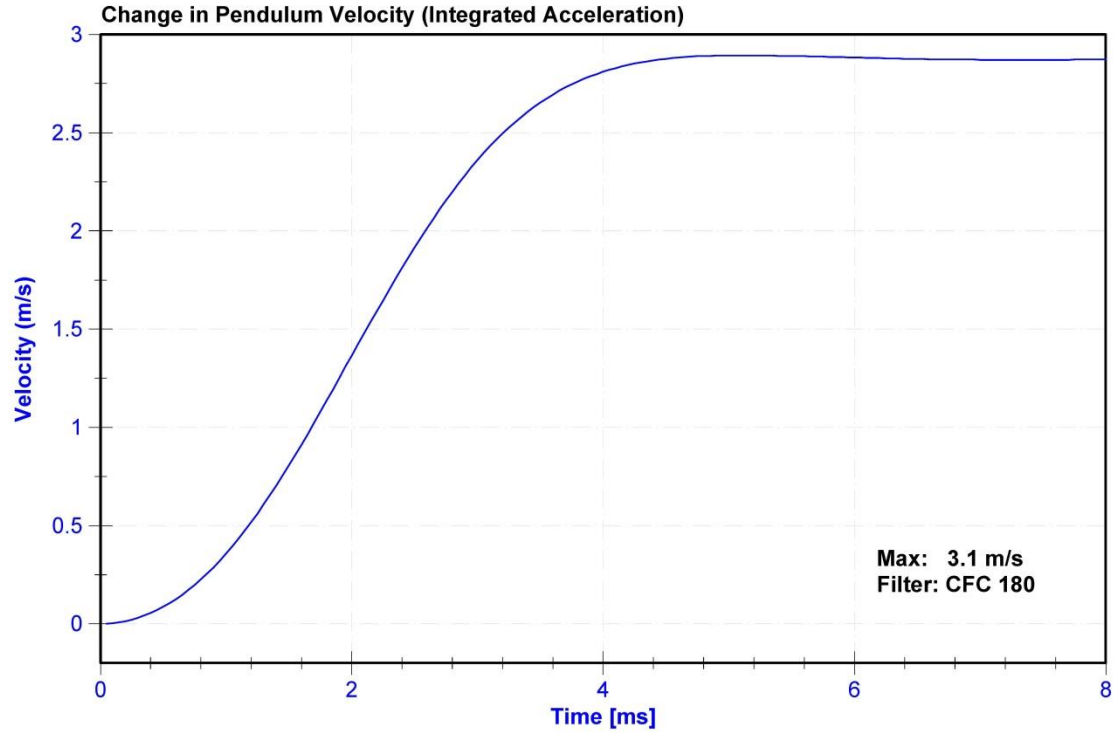
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	°C	20.7	Pass
Humidity	10	70	%	10.8	Pass
Velocity	2.07	2.13	m/s	2.101	Pass
Resistive Force	3,450	4,060	N	3716.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C14972	2/6/2015	8/7/2015




Pendulum Acceleration
Acceleration (g's)
125
100
75
50
25
0
0
2
4
6
8
Time [ms]
Max: 127.3 g's
Min: -2.4 g's
Filter: CFC 600


Change in Pendulum Velocity (Integrated Acceleration)
Velocity (m/s)
3
2.5
2
1.5
1
0.5
0
0
2
4
6
8
Time [ms]
Max: 3.1 m/s
Filter: CFC 180