

**REPORT NUMBER: NCAP-KAR-20-031**

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

**SUBARU CORPORATION  
2021 SUBARU OUTBACK 5-DOOR MPV**

**NHTSA NUMBER: O20215500**

**PREPARED BY:  
APPLUS+ IDIADA KARCO ENGINEERING, LLC.  
9270 HOLLY ROAD  
ADELANTO, CA 92301**



**DECEMBER 8, 2020**

**FINAL REPORT**

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

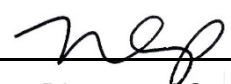
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FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: \_\_\_\_\_

\_\_\_\_\_  
COTR, New Car Assessment Program  
NHTSA, Office of Crashworthiness Standards

Date: \_\_\_\_\_

## TECHNICAL REPORT DOCUMENTATION PAGE

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<b>4. Title and Subtitle</b> Final Report of New Car Assessment Program Testing of a 2021 Subaru Outback 5-Door MPV NHTSA No. O20215500		<b>5. Report Date</b> December 8, 2020																																																					
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		<b>14. Sponsoring Agency Code</b> NRM-110																																																					
<b>15. Supplementary Notes</b>																																																							
<b>16. Abstract</b>  A 56.3 km/h NCAP Frontal Impact Test was conducted on a 2021 Subaru Outback 5-door MPV in accordance with the specifications of the Office of Crashworthiness Standards Frontal NCAP Laboratory Test Procedure. The test was conducted at the Applus+ IDIADA KARCO Engineering, LLC. facility in Adelanto, California on November 24, 2020.  The impact velocity of the vehicle was 56.79 km/h and the ambient temperature at the barrier face at the time of impact was 15.6°C. The target vehicle's post-test maximum crush was 380 mm at the vehicle's centerline. The test vehicle's performance is as follows:																																																							
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th rowspan="2">Units</th> <th colspan="2">Driver ATD</th> <th colspan="2">Passenger ATD</th> </tr> <tr> <th>Threshold</th> <th>Result</th> <th>Threshold</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC<sub>15</sub>)</td> <td>N/A</td> <td>700</td> <td>157.8</td> <td>700</td> <td>241.4</td> </tr> <tr> <td>Maximum Chest Compression</td> <td>mm</td> <td>63</td> <td>-19</td> <td>52</td> <td>-14</td> </tr> <tr> <td>Nij</td> <td>N/A</td> <td>1</td> <td>0.26</td> <td>1</td> <td>0.43</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>4170</td> <td>1250.3</td> <td>2620</td> <td>653.5</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>4000</td> <td>-254.8</td> <td>2520</td> <td>-227.2</td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>10000</td> <td>-1022.5</td> <td>6805</td> <td>-717.8</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>10000</td> <td>-1109.2</td> <td>6805</td> <td>-609.3</td> </tr> </tbody> </table>				Measurement Description	Units	Driver ATD		Passenger ATD		Threshold	Result	Threshold	Result	Head Injury Criteria (HIC <sub>15</sub> )	N/A	700	157.8	700	241.4	Maximum Chest Compression	mm	63	-19	52	-14	Nij	N/A	1	0.26	1	0.43	Neck Tension	N	4170	1250.3	2620	653.5	Neck Compression	N	4000	-254.8	2520	-227.2	Left Femur Force	N	10000	-1022.5	6805	-717.8	Right Femur Force	N	10000	-1109.2	6805	-609.3
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<b>17. Key Words</b> 56.3 km/h (35 mph) Full Frontal Rigid Barrier Impact Test New Car Assessment Program (NCAP)		<b>18. Distribution Statement</b> Copies of this report are available from: National Highway Traffic Safety Administration Technical Information Services Division 1200 New Jersey Ave., SE Washington, DC 20590																																																					
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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 number 693JJ919D000004. 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 Laboratory Procedure for NCAP Full Frontal Rigid Barrier Impact Testing.

#### **SUMMARY**

A load cell barrier consisting of 176 load cells was impacted by a 2021 Subaru Outback 5-Door MPV at a velocity of 56.79 km/h. The test was performed at Applus+ IDIADA KARCO Engineering, LLC. on November 24, 2020. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A of this report.

One (1) real-time cameras and sixteen (16) 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 VIII 50<sup>th</sup> percentile male anthropomorphic test device (ATD) was placed in the left-front driver seating position and one Part VIII 5<sup>th</sup> percentile female ATD was placed in the right-front passenger seating position according to dummy placement instructions specified in the Laboratory Procedure for NCAP Full Frontal Rigid Barrier Impact Testing.

Both ATDs were fully instrumented with head, chest and pelvis tri-axial accelerometers, chest displacement potentiometers, upper neck force transducers, right / left femur load cells, and lower leg instrumentation.

The driver (position 1) ATD (Serial No. 360) and the right-front passenger (position 2) ATD (Serial No. 141) were qualified prior to this test. Certification details, along with instrumentation calibration data, are found in Appendix C of this report.

The 106 channels of dummy and vehicle response data were recorded on an on-board data acquisition system. Appendix B contains 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 no Stoddard solvent leakage after the event or during any phase of the static rollover.

The maximum static crush of the test vehicle was 380 mm at the vehicle's centerline. Both the driver and passenger side doors remained closed during the impact event and were operable after the impact.

The driver's visible contact points were as follows: the driver ATD's head contacted the frontal airbag and headrest. The upper torso contacted the frontal airbag. The lower torso contacted the frontal airbag. Both the left and right knees contacted the knee airbag.

The passenger's visible contact points were as follows: the passenger ATD's head contacted the frontal airbag and headrest. The upper torso contacted the frontal airbag. The lower torso contacted the frontal airbag. Both the left and right knees contacted the knee bolster.

The occupant data is summarized below:

ATD Position	HIC <sub>15</sub>	Nij	Neck Tension (N)	Neck Comp. (N)	3ms Chest Clip (g)	Chest Disp. (mm)	Left Femur (N)	Right Femur (N)
Driver (50th Male)	157.8	0.26	1250.3	-254.8	43	-19	-1022.5	-1109.2
Passenger (5th Female)	241.4	0.43	653.5	-227.2	46	-14	-717.8	-609.3

## SECTION 2

### OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

Test Vehicle: 2021 Subaru Outback 5-Door MPV NHTSA No.: O20215500

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/24/20

### CONVERSION FACTORS

Quantity	Typical Application	Std Units	Metric Unit	Multiply By
Mass	Vehicle Weight	lb	kg	0.4536
Linear Velocity	Impact Velocity	miles/hr	km/hr	1.609344
Length or Distance	Measurements	in	mm	25.4
Volume	Fuel Systems	gal	liter	3.785
Volume	Small Fluids	oz	mL	29.574
Pressure	Tire Pressures	lbf/in <sup>2</sup>	kPa	6.895
Temperature	General Use	°F	°C	$=(T_f - 32)/1.8$
Force	Dynamic Forces	lbf	N	4.448
Moment	Torque	lbf-ft	N•m	1.355

## DATA SHEET NO. 1

### GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2021 Subaru Outback 5-Door MPV NHTSA No.: O20215500  
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/24/20

### TEST VEHICLE INFORMATION AND OPTIONS

NHTSA Number	O20215500
Model Year	2021
Make	Subaru
Model	Outback
Body Style	5-Door MPV
VIN	4S4BTACC1M3102371
Body Color	Magnetic Gray Metallic
Odometer Reading (km / mi)	153/95
Engine Displacement (L)	2.5
Type / No. of Cylinders	4 Boxer
Engine Placement	Longitudinal
Transmission Type	Automatic
Transmission Speeds	8
Overdrive	Yes
Final Drive	AWD
Roof Rack	Yes
Sunroof / T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	Driver
Anti-Lock Brakes (ABS)	Yes
Automatic Door Locks (ADLs)	Yes

Traction Control System	Yes
Power Steering	Yes
Power Window Auto-Reverse	Yes
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 Seat Belt Pretensioner	Yes
Driver Load Limiter	Yes
Front Pass. Seat Belt Pretensioner	Yes
Front Pass. Load Limiter	Yes
Other Safety Restraint	Seat Pan Airbag

Does Owner's Manual provide instructions to turn off automatic door locks? Yes

### DATA FROM CERTIFICATION LABEL

Manufactured By	Subaru Corporation
Date of Manufacture	Sep-20

GVWR (kg)	2200
GAWR Front (kg)	1250
GAWR Rear (kg)	1220

### VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench		
Designated Seating Capacity	2	3		5
Capacity Weight (VCW) (kg)				408.0
DSC x 68.04 (kg)				340.2
Cargo Weight (RCLW) (kg)				67.8

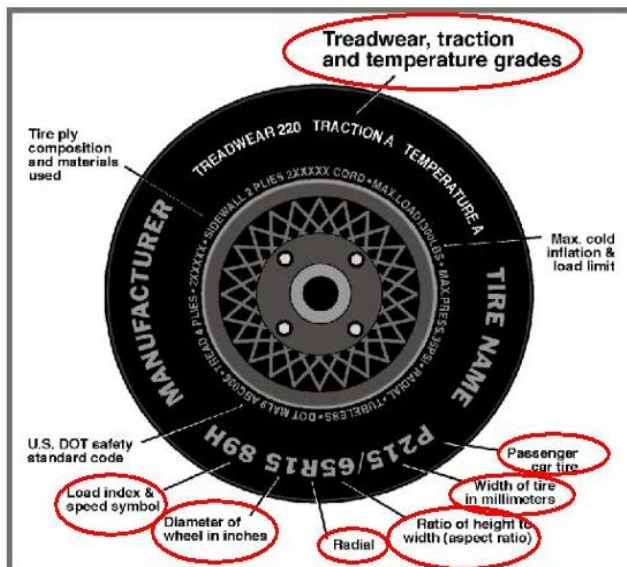
A  
B  
A-B



## DATA SHEET NO. 1 ... (CONTINUED)

### GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2021 Subaru Outback 5-Door MPV NHTSA No.: O20215500  
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/24/20



### VEHICLE TIRE INFORMATION

Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	240	230
Recommended Tire Size	P225/65 R17	P225/65 R17
Tire Size on Vehicle	P225/65 R17	P225/65 R17
Tire Manufacturer	Yokohama	Yokohama
Tire Model	Avid GT	Avid GT
Treadwear	400	400
Traction	B	B
Temperature Grades	A	A
Tire Plies Sidewall	All Polyester	All Polyester
Tire Plies Body	1 Polyester, 2 Steel, 1 Nylon	1 Polyester, 2 Steel, 1 Nylon
Load Index / Speed Symbol	102 H	102 H
Tire Material	Polyester, Steel, Nylon	Polyester, Steel, Nylon
DOT Safety Code Left	DOT YVFS	DOT YVFS
DOT Safety Code Right	DOT YVFS	DOT YVFS

**DATA SHEET NO. 1 ... (CONTINUED)**

**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2021 Subaru Outback 5-Door MPV NHTSA No.: O20215500  
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/24/20

**TEST VEHICLE WEIGHTS**

	Units	As Delivered Weights (UWV)			As Tested Weights (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	462.5	375.0		498.0	470.0	
Right	kg	468.0	343.5		465.5	418.0	
Ratio	%	56.4%	43.6%	100.0%	52.0%	48.0%	100.0%
Total	kg	930.5	718.5	1649.0	963.5	888.0	1851.5

**TARGET TEST WEIGHT CALCULATION**

Measured Parameter	Units	Value	
Total Delivered Weight (UWV)	kg	1649.0	A
Weight of 1 HIII ATD & 1 HIII ATD	kg	141.0	B
Rated Cargo/Luggage Weight (RCLW)	kg	67.8	C
Calculated Vehicle Target Weight (TVTW)	kg	1857.8	A+B+C

**TEST VEHICLE ATTITUDES**

Condition	Units	LF	RF	LR	RR	CG Aft of Front Axle
As Delivered	mm	815	820	812	816	1190
As Tested	mm	793	800	795	805	1309
Post-Test	mm	855	850	791	785	

**GENERAL TEST VEHICLE DATA**

Measurement Description	Units	Value
Total Vehicle Wheelbase	mm	2730
Total Vehicle Length at Left Side	mm	4130
Total Vehicle Length at Centerline	mm	4790
Total Vehicle Length at Right Side	mm	4132
Weight of Ballast in Cargo Area	kg	59.2
Weight of Vehicle Components Removed	kg	25.5
Amount of Stoddard Solvent in Fuel Tank	L	70.00

**VEHICLE COMPONENTS REMOVED TO MEET TEST WEIGHT:**

Trunk trim (11.5 kg), spare tire (14.0 kg)  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**DATA SHEET NO. 1 ... (CONTINUED)**

**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2021 Subaru Outback 5-Door MPV NHTSA No.: O20215500  
Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/24/20

**TARGET VEHICLE STRUCTURAL MEASUREMENTS**

No.	Description	Pre-Test
1	Total Length	4790
2	Total Width	1855
3	Bumper Top Height	557
4	Bumper Bottom Height	300
5	Longitudinal Member Top Height	620
6	Distance Between Longitudinal Members	820
7	Longitudinal Member Width	50
8	Engine Top Height	915
9	Engine Bottom Height	320
10	Engine and Gearbox Width	725
11	Front Bumper to Engine Distance	500
12	Front Shock Absorber Fixing Height	990
13	Bonnet Leading Edge Height	915
14	Front Shock Absorber Fixing Width	1195
15	Front Bumper to Front Axle Distance	995
16	Front Axle to A-Pillar Distance	1510
17	A-Pillar to B-Pillar Distance	1050
18	B-Pillar to Rear Axle Distance	1143
19	B-Pillar to C-Pillar Distance	932
20	Roof Sill Bottom Height	1465
21	Roof Sill Top Height	1570
22	Floor Sill Bottom Height	308
23	Floor Sill Top Height	423

All measurements in millimeters.

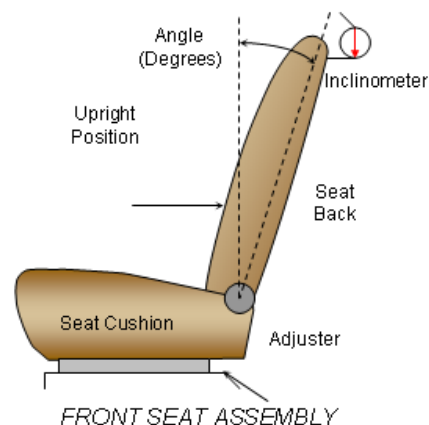
## DATA SHEET NO. 2

### SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

Test Vehicle: 2021 Subaru Outback 5-Door MPV NHTSA No.: O20215500  
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/24/20

#### NOMINAL DESIGN RIDING POSITION

The procedure for the driver is as follows: the seat back is set to the manufacturer's designated angle. The procedure for the passenger is as follows: the seat back is set to position the transverse instrumentation platform of the dummy's head at  $0^\circ \pm 0.5^\circ$ . Seat back angle is measured at the headrest post.

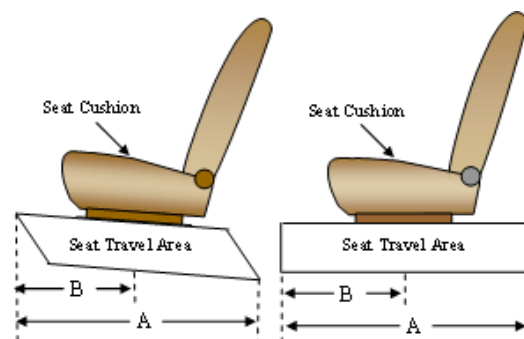


#### SEAT BACK ANGLE

Seating Position	Degrees
Driver Seat Back Angle	8.7
Passenger Seat Back Angle	7.9

#### SEAT FORE / AFT POSITIONING

The total seat travel is measured from the forward most possible position to the rear most possible position. The driver's seat is set to the middle of the fore-aft travel. The passenger's seat is set to the forward most position where the ATD will not contact any interior panels.



#### SEAT FORE/AFT POSITIONS

Seating Position	Total Fore-Aft Travel	Placed in Position
Driver Seat	304 mm	152 mm
Passenger Seat	250 mm (26 detents)	125 mm (9th detent)

#### SEAT BELT UPPER ANCHORAGE

The seat belt upper anchorage is positioned to the manufacturer's design position for a 50<sup>th</sup> percentile adult male ATD for the driver, and a 5<sup>th</sup> percentile adult female ATD for the passenger. Position "L" is the lowermost position, followed by position "M1". Position "H" is the uppermost position.

#### SEAT BELT UPPER ANCHORAGES

Seating Position	Total No. of Positions	Placed in Position
Driver Seat	4	H
Passenger Seat	4	H

**DATA SHEET NO. 2 ... (CONTINUED)**

**SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA**

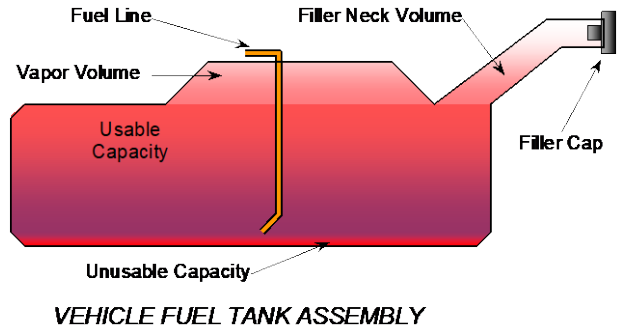
Test Vehicle: 2021 Subaru Outback 5-Door MPV NHTSA No.: O20215500  
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/24/20

**FUEL TANK CAPACITY**

Description	Liters
Usable Capacity of "Standard Tank"	70.00
Usable Capacity of "Optional Tank"	
92 - 94% of Usable Capacity	64.4 to 65.8
Actual Amount of Stoddard Solvent Used	65.15
1/3 of Usable Capacity	23.33

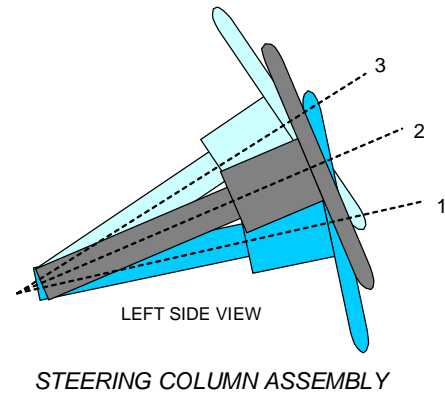
**FUEL PUMP**

The vehicle is equipped with an electronic fuel pump. The fuel pump normally operates when the vehicle's electrical system is activated. The fuel pump operates for 1.0 second after the ignition is switched to "ON", while the engine is running, and for 1.5 seconds after the engine stops.



**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. A digital inclinometer is used to measure a plate which is placed across the rim of the steering wheel for angular measurements.



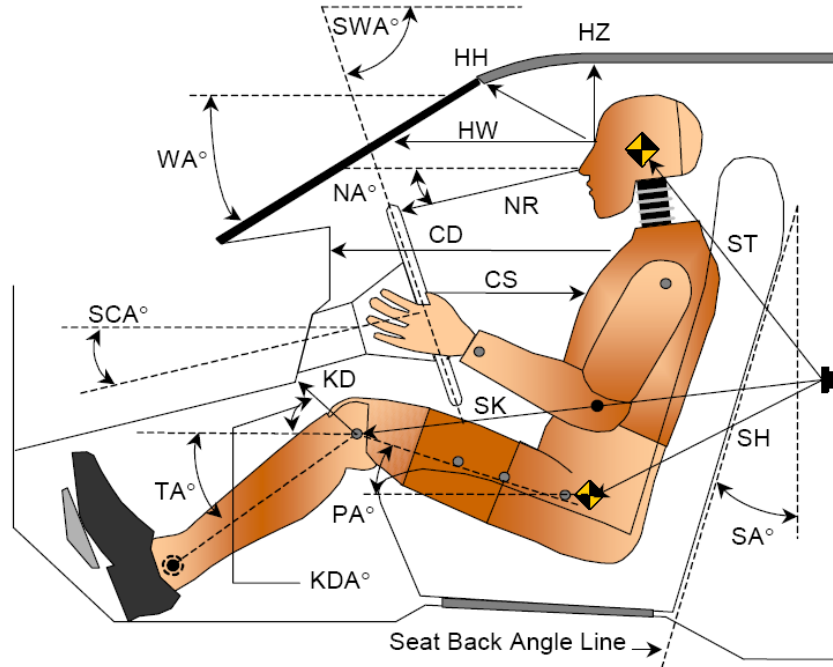
**STEERING COLUMN POSITIONING**

	Degrees	Fore-Aft Position (mm)
Lowermost Position, No. 1	20.3	115
Geometric Center Position, No. 2	22.3	143
Uppermost Position, No. 3	24.3	170
Telescoping Steering Wheel Travel		55
Test Position	22.3	143

### DATA SHEET NO. 3

### DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2021 Subaru Outback 5-Door MPV      NHTSA No.: O20215500  
 Test Program: 56.3 km/h Frontal Impact NCAP Test      Test Date: 11/24/20



**LEFT SIDE VIEW**

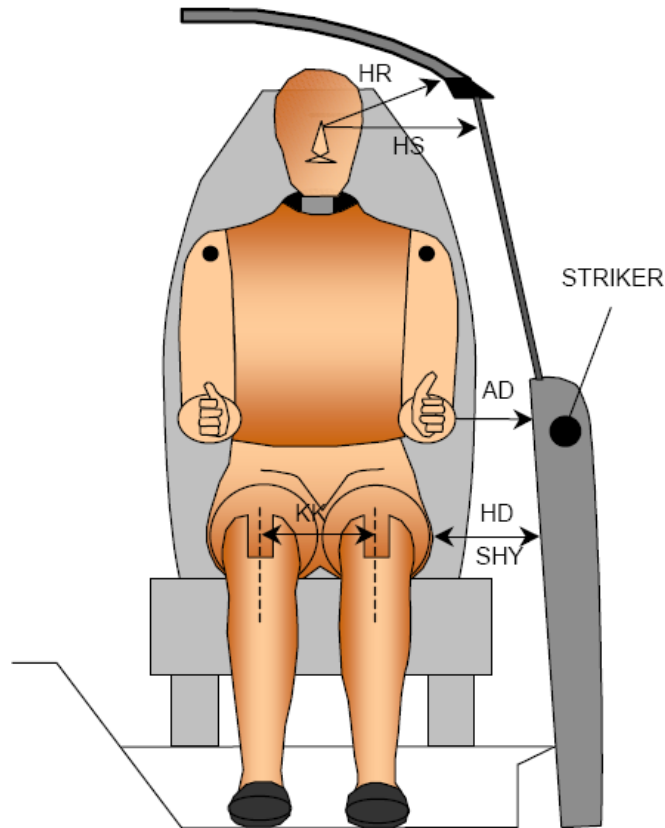
Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		28.1		
SWA°	Steering Wheel Angle		22.3		
SCA°	Steering Column Angle		67.7		
SA°	Seat Back Angle (On Headrest Post)		8.7		7.9
HZ	Head to Roof	184	0.0	731	90.0
HH	Head to Header	278	35.2	328	53.2
HW	Head to Windshield	621	0.0	687	0.0
NR	Nose to Rim	351	14.1	494	27.0
CD	Chest to Dash	493	12.3	445	1.6
CS	Chest to Steering Hub	259	0.0		
RA	Rim to Abdomen	180	0.0		
KDL	Left Knee to Dash	148	19.1	101	36.2
KDR	Right Knee to Dash	112	43.6	109	38.8
PA°	Pelvic Angle		21.8		21.0
TA°	Tibia Angle		46.9		48.0
SK	Striker to Knee	629	11.0	708	11.5
ST	Striker to Head	443	68.7	422	60.6
SH	Striker to H-Point	332	46.1	412	29.3

## DATA SHEET NO. 4

### DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2021 Subaru Outback 5-Door MPV NHTSA No.: O20215500

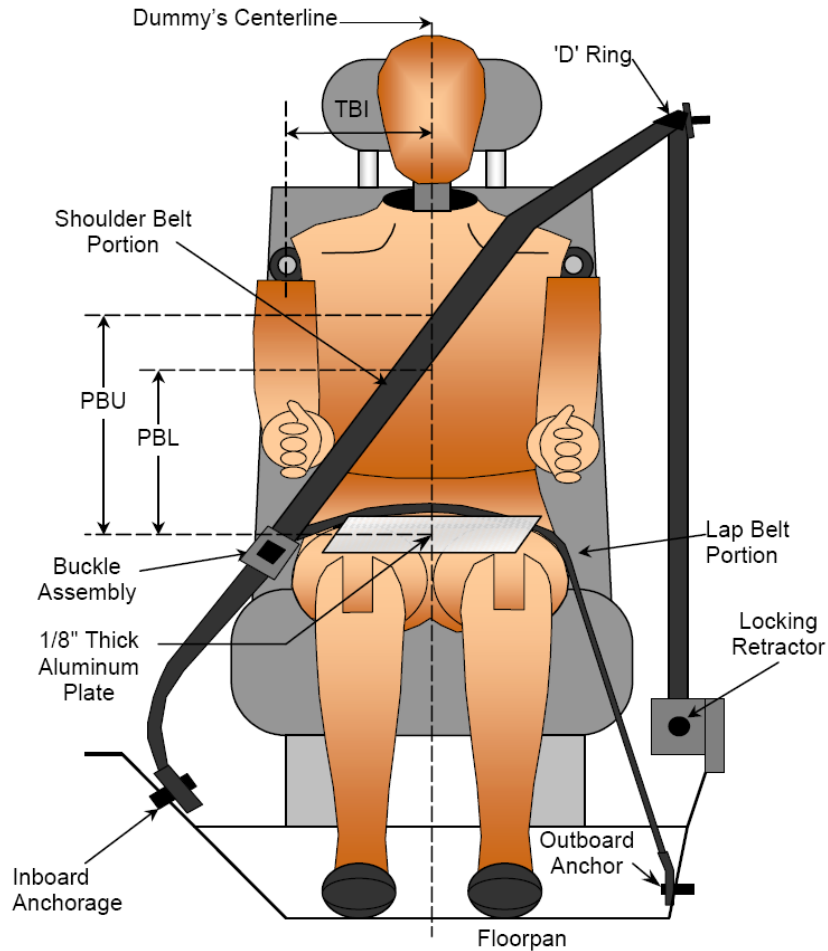
Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/24/20



Code	Description	Driver (mm)	Passenger (mm)
AD	Arm to Door	131	98
HD	H-Point to Door	178	190
HR	Head to Side Header	224	271
HS	Head to Side Window	331	395
KK	Knee to Knee	865	110
SHY	Striker to H-Point (Y-Direction)	258	286
AA	Ankle to Ankle	335	180

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

Test Vehicle: 2021 Subaru Outback 5-Door MPV NHTSA No.: O20215500  
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/24/20



**FRONT VIEW OF DUMMY**

**SEAT BELT POSITIONING MEASUREMENTS**

Code	Measurement Description	Units	Driver	Passenger
PBU	Top Surface of Aluminum Plate to Belt Upper Edge	mm	325	295
PBL	Top Surface of Aluminum Plate to Belt Lower Edge	mm	250	205

**BELT LENGTH DATA**

Measurement Description	Units	Driver	Passenger
Shoulder Belt Length as Measured on ATD	mm	842	915
Lap Belt Length as Measured on ATD	mm	722	850
Remainder of Belt on Reel	mm	970	840
Total Belt Length for Continuous Webbing Systems	mm	2534	2605



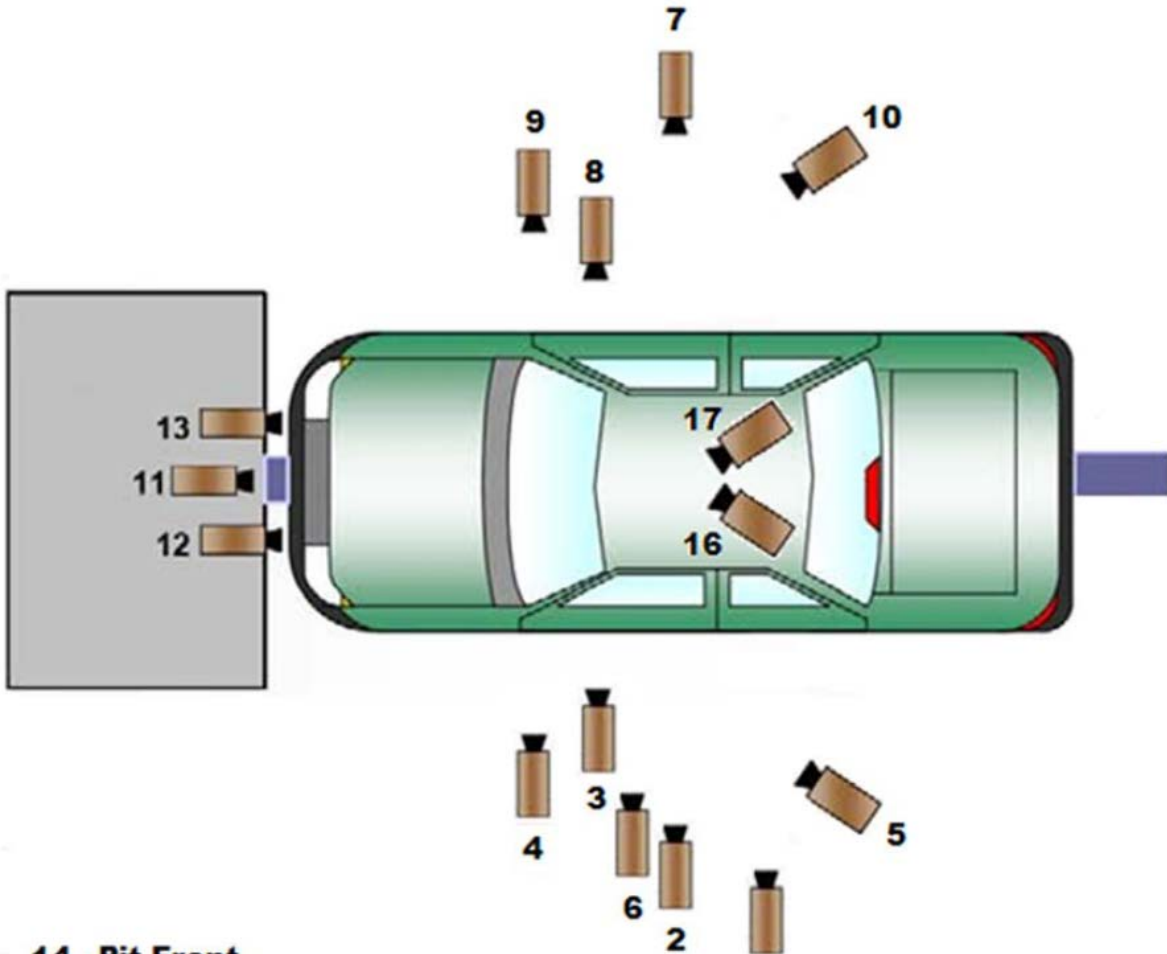
DATA SHEET NO. 6

HIGH-SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2021 Subaru Outback 5-Door MPV NHTSA No.: O20215500

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/24/20

CAMERA POSITIONS FOR FRONTAL IMPACTS



14 - Pit Front

15 - Pit Rear

16 & 17 - Driver and Passenger Onboard

1- Real Time Camera

*\*\*Camera locations are approximate and not to scale*

**DATA SHEET NO. 6 ... (CONTINUED)**

**HIGH-SPEED CAMERA LOCATIONS AND DATA**

Test Vehicle: 2021 Subaru Outback 5-Door MPV NHTSA No.: O20215500  
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/24/20

**CAMERA LOCATIONS**

No.	Description	Location (mm)			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Overall	-11412	-8150	-1484		30
2	Left Overall	-2456	-7975	-1025	20	1000
3	Driver Close-Up	-2590	-7950	-1371	50	1000
4	Left Front Half	-1701	-6197	-1701	35	1000
5	Left Angle	-6696	-10308	-3211	105	1000
6	Steering Column	-1966	-10412	-3688	35	1000
7	Right Overall	-2336	7569	-1012	20	1000
8	Passenger Close-Up	-1733	7581	-1408	50	1000
9	Right Front Half	-1600	8214	-1811	35	1000
10	Right Angle	-6217	9516	-4830	85	1000
11	Windshield	-354	0	-5749	28	1000
12	Driver Windshield	297	-366	-2460	24	1000
13	Passenger Windshield	297	366	-2460	24	1000
14	Pit Front	-756	0	1495	20	1000
15	Pit Rear	-3398	0	1495	20	1000
16	Driver Onboard	-1500	-300	-1530	6	1000
17	Passenger Onboard	-1500	300	-1530	6	1000

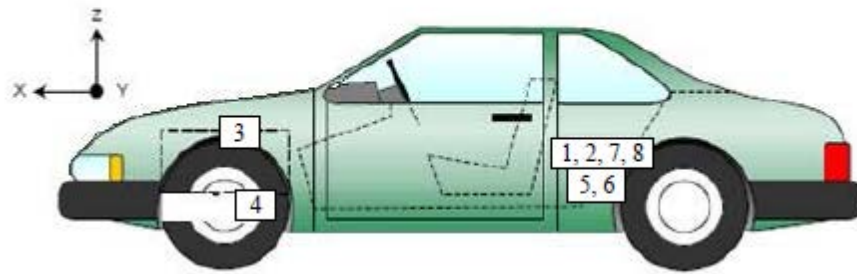
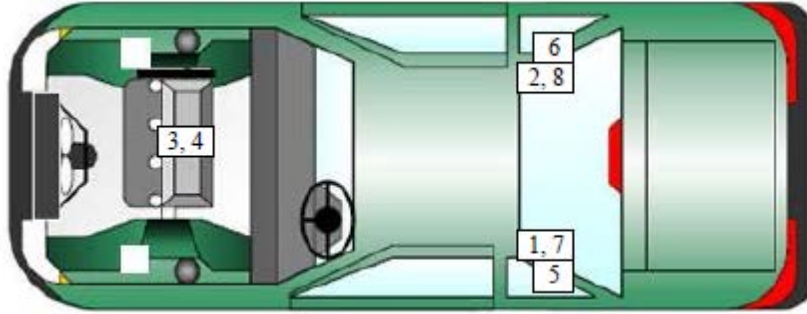
Coordinates:     +X = forward impact plane  
                       +Y = right of monorail center  
                       +Z = into ground

## DATA SHEET NO. 7

### VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2021 Subaru Outback 5-Door MPV NHTSA No.: O20215500

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/24/20



### VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Description	Location		
		X	Y	Z
1	Left Rear Accelerometer X-Direction	2040	765	410
2	Right Rear Accelerometer X-Direction	2040	765	410
3	Engine Top X	4035	55	850
4	Engine Bottom X	4230	260	370
5	Left Rear Accelerometer Z-Direction	2040	765	410
6	Right Rear Accelerometer Z-Direction	2040	765	410
7	Left Rear Accelerometer X-Direction Redundant	2040	765	410
8	Right Rear Accelerometer X-Direction Redundant	2040	765	410

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

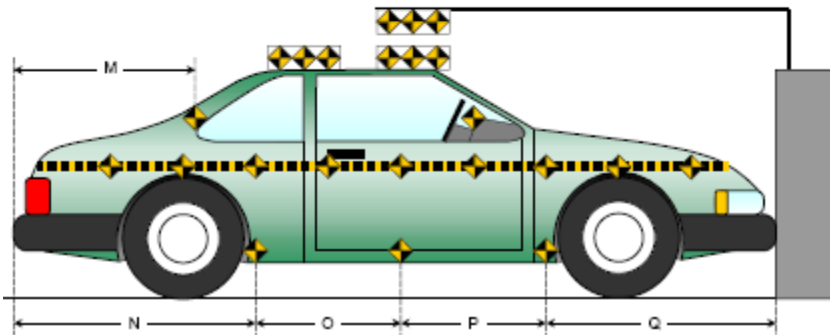
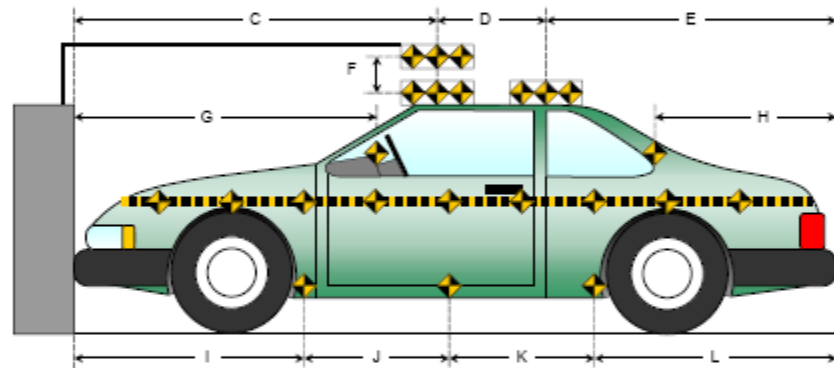
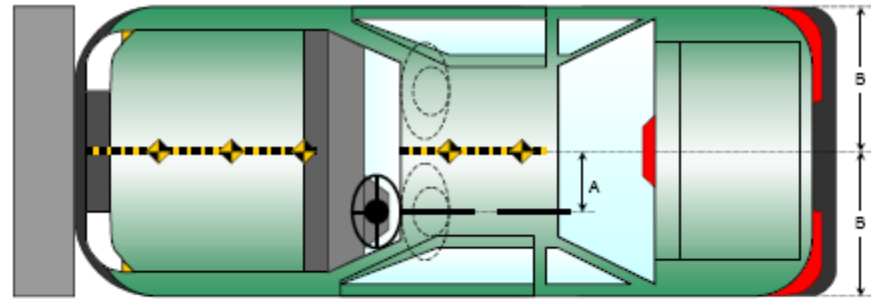
**DATA SHEET NO. 8**

**PHOTOGRAPHIC REFERENCE TARGET LOCATIONS**

Test Vehicle: 2021 Subaru Outback 5-Door MPV NHTSA No.: O20215500

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/24/20

Item	Value
A	380
B	928
C	2275
D	610
E	1905
F	305
G	1820
H	550
I	1477
J	910
K	910
L	1493
M	555
N	1493
O	910
P	910
Q	1479



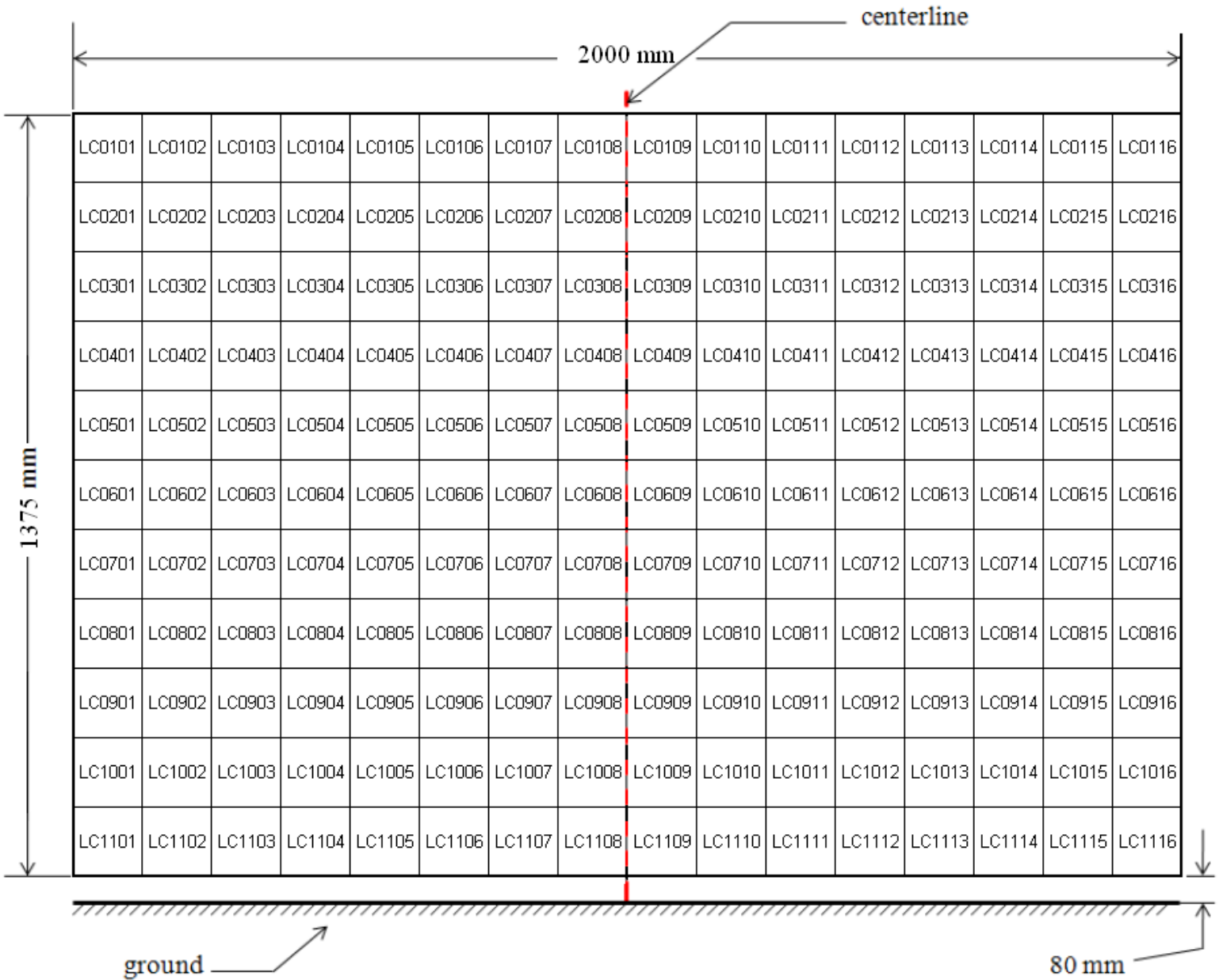
All measurements in millimeters.

**DATA SHEET NO. 9**

**LOAD CELL LOCATIONS ON FIXED BARRIER**

Test Vehicle: 2021 Subaru Outback 5-Door MPV NHTSA No.: O20215500

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/24/20



**DATA SHEET NO. 10**

**TEST VEHICLE SUMMARY OF RESULTS**

Test Vehicle: 2021 Subaru Outback 5-Door MPV NHTSA No.: O20215500  
Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/24/20

**INSTRUMENTATION**

Driver Dummy Accelerometers	49
Passenger Dummy Accelerometers	49
Vehicle Structure Accelerometers	8
Load Cell Barrier	528
Total	634

**CAMERA COVERAGE**

High-Speed Vehicle On Board	2
High-Speed Off Board	14
Real Time	1
Total	17

**DATA SHEET NO. 11**  
**POST-TEST OBSERVATIONS**

Test Vehicle: 2021 Subaru Outback 5-Door MPV NHTSA No.: O20215500  
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/24/20

**TEST DUMMY INFORMATION AND CONTACT LOCATIONS**

Description	Driver	Passenger
Dummy Type/Serial No.	HIII 50th Percentile Male ATD / 360	HIII 5th Percentile Female ATD / 141
Head Contact	Frontal Airbag, Headrest	Frontal Airbag, Headrest
Upper Torso Contact	Frontal Airbag	Frontal Airbag
Lower Torso Contact	Frontal Airbag	Frontal Airbag
Left Knee Contact	Knee Airbag	Knee Bolster
Right Knee Contact	Knee Airbag	Knee Bolster

**DOOR OPENING, TRUNK OPENING, AND SEAT TRACK INFORMATION**

Description	Driver	Passenger
Locked / Unlocked Doors	Unlocked	Unlocked
Front Door Opening	Remained closed and latched, operational	Remained closed and latched, operational
Rear Door Opening	Remained closed and latched, operational	Remained closed and latched, operational
Trunk/Hatch/Tailgate Opening	None	
Seat Track Shift (mm)	0	0
Seat Back Movement from Initial Position	None	None

**OTHER VEHICLE POST-TEST OBSERVATIONS**

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

**VEHICLE REBOUND FROM BARRIER**

Measured Parameter	Units	Value
Left Side	mm	3117
Center	mm	3039
Right Side	mm	3168
Average	mm	3108

**SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION**

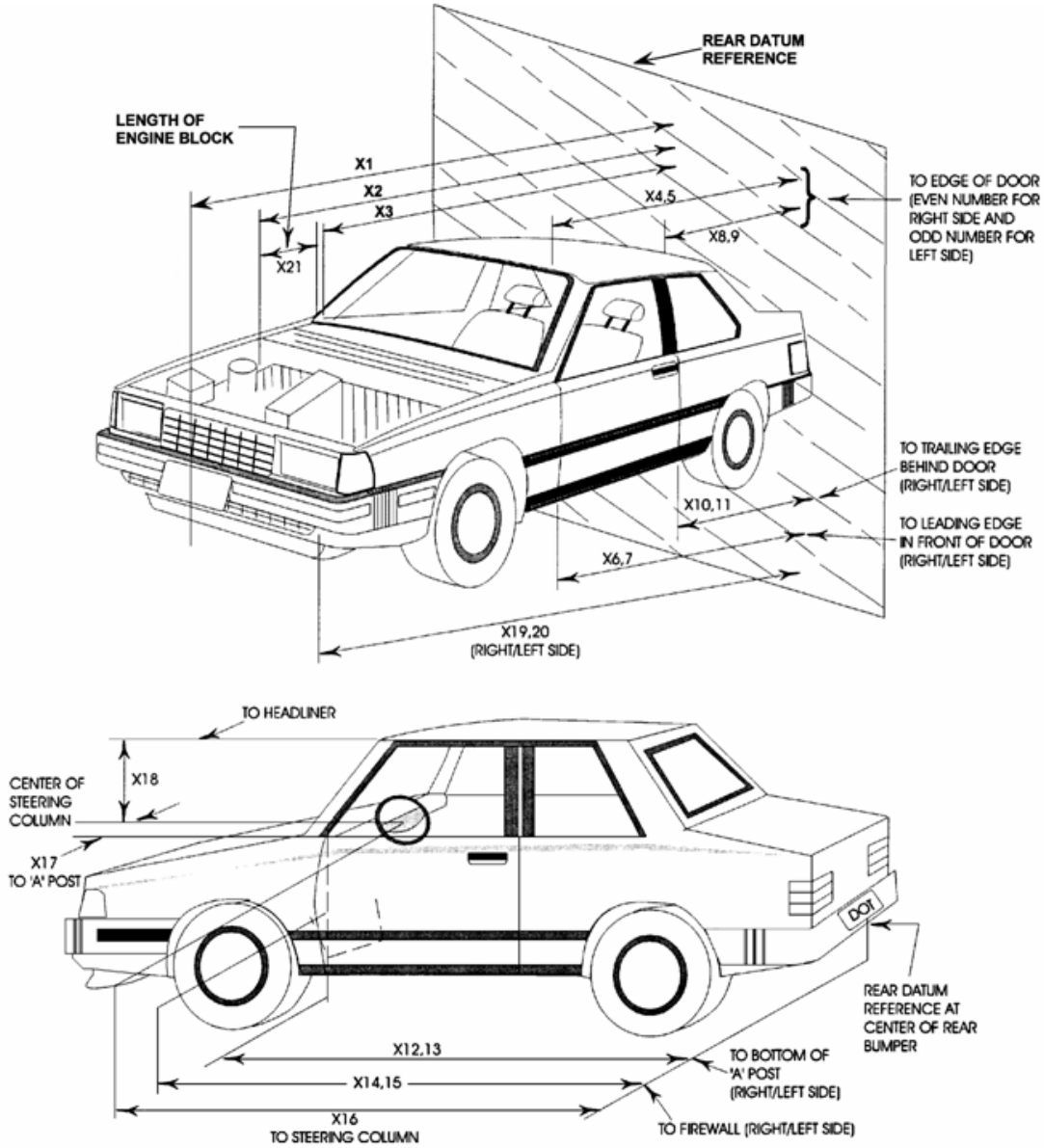
Restraint Type	Driver		Passenger	
	Installed	Operated	Installed	Operated
Front Airbag	Yes	Yes	Yes	Yes
Side Airbag 1 (Curtain)	Yes	No	Yes	No
Side Airbag 2 (Torso/Pelvis)	Yes	No	Yes	No
Knee Airbag	Yes	Yes	No	No
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load Limiter	Yes	Yes	Yes	Yes
Other (Seat Pan)	No	No	Yes	Yes

**DATA SHEET NO. 12**

**VEHICLE PROFILE MEASUREMENTS**

Test Vehicle: 2021 Subaru Outback 5-Door MPV NHTSA No.: O20215500

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/24/20





**DATA SHEET NO. 12 ... (CONTINUED)**

**VEHICLE PROFILE MEASUREMENTS**

Test Vehicle: 2021 Subaru Outback 5-Door MPV NHTSA No.: O20215500

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/24/20

No.	Description	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	4790	4410	-380
2	Rear Surface of Vehicle to Front of Engine	4330	4320	-10
3	RSOV to Firewall	3655	3647	-8
4	RSOV to Upper Leading Edge of Right Door	3292	3288	-4
5	RSOV to Upper Leading Edge of Left Door	3290	3286	-4
6	RSOV to Lower Leading Edge of Right Door	3261	3260	-1
7	RSOV to Lower Leading Edge of Left Door	3260	3562	302
8	RSOV to Upper Trailing Edge of Right Door	2174	2172	-2
9	RSOV to Upper Trailing Edge of Left Door	2175	2170	-5
10	RSOV to Lower Trailing Edge of Right Door	2188	2187	-1
11	RSOV to Lower Trailing Edge of Left Door	2187	2186	-1
12	RSOV to Bottom of A-Pillar, Right Side	3322	3320	-2
13	RSOV to Bottom of A-Pillar, Left Side	3320	3318	-2
14	RSOV to Firewall, Right Side	3600	3596	-4
15	RSOV to Firewall, Left Side	3600	3593	-7
16	RSOV to Steering Column	2765	2820	55
17	Center of Steering Column to A-Pillar	430	430	0
18	Center of Steering Column to Headliner	460	475	15
19	RSOV to Right Side of Front Bumper	4132	4050	-82
20	RSOV to Left Side of Front Bumper	4130	3900	-230
21	Length of Engine Block	615	615	0
RD	RSOV to Right Side of Dash Panel	3037	3039	2
CD	RSOV to Center of Dash Panel	3170	3172	2
LD	RSOV to Left Side of Dash Panel	3040	3044	4

All measurements in millimeters.

**DATA SHEET NO. 13**

**ACCIDENT INVESTIGATION DIVISION DATA**

Test Vehicle: 2021 Subaru Outback 5-Door MPV NHTSA No.: O20215500  
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/24/20

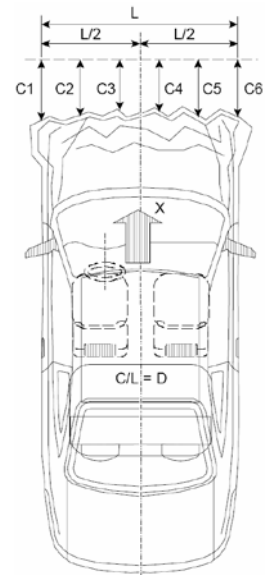
**VEHICLE INFORMATION**

VIN: 4S4BTACC1M3102371 Wheelbase (mm): 2730  
 Vehicle Size Category: MPV Test Weight (kg): 1851.5

**ACCELEROMETER DATA**

Accelerometer Locations: Left Rear Crossmember  
 Cal. Procedure/Interval: Vibration Test / 6 months  
 Integration Algorithm: NHTSA Standard  
 Impact Velocity (km/h): 56.79  
 Velocity Change (km/h): 70.1  
 Time of Separation (msec): 65.1

Linearity: Good



**CRUSH PROFILE**

Collision Deformation Classification: 12FDEW1  
 Midpoint of Damage: Vehicle Centerline  
 Damage Region Length (mm): 1387  
 Impact Mode: Full Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush Zone 1 at Left Side	mm	150	405	255
C2	Crush Zone 2 at Left Side	mm	5	350	345
C3	Crush Zone 3 at Left Side	mm	0	355	355
C4	Crush Zone 4 at Right Side	mm	0	358	358
C5	Crush Zone 5 at Right Side	mm	5	340	335
C6	Crush Zone 6 at Right Side	mm	150	345	195
L	C1 to C6	mm	1387		

**DATA SHEET NO. 14**

**VEHICLE INTRUSION MEASUREMENTS**

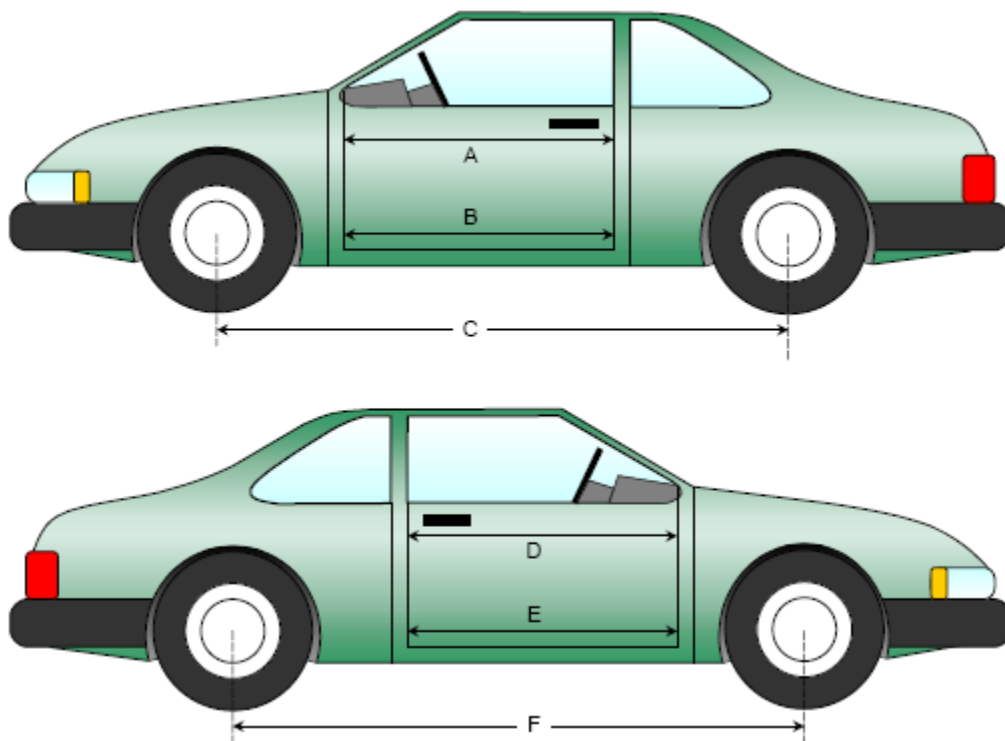
Test Vehicle: 2021 Subaru Outback 5-Door MPV NHTSA No.: O20215500  
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/24/20

**DOOR OPENING WIDTH**

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	1050	1048	2
B	Left Side Lower	mm	953	956	-3
D	Right Side Upper	mm	1050	1046	4
E	Right Side Lower	mm	923	919	4

**WHEELBASE MEASUREMENTS**

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2730	2695	35
F	Right Side Wheelbase	mm	2730	2700	30



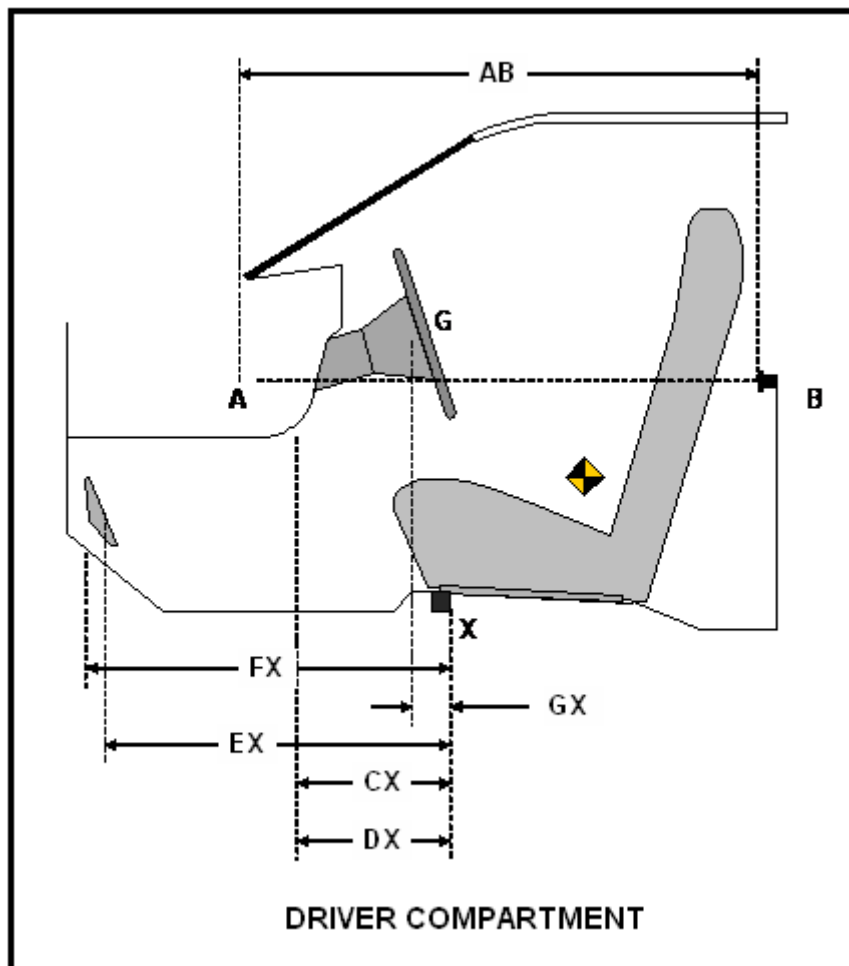
**DATA SHEET NO. 14 ... (CONTINUED)**  
**VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2021 Subaru Outback 5-Door MPV NHTSA No.: O20215500  
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/24/20

**DRIVER COMPARTMENT INTRUSION**

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	965	973	-8
CX	Left Knee Bolster to X	mm	225	215	10
DX	Right Knee Bolster to X	mm	225	210	15
EX	Brake Pedal to X	mm	545	530	15
FX	Foot Rest to X	mm	535	530	5
GX	Center of Steering Wheel Hub to X	mm	-25	40	-65

X = Front of Seat Track (Stationary)



**DATA SHEET NO. 15**

**SUMMARY OF INDICANT FMVSS 212 AND 219 (PARTIAL) DATA**

Test Vehicle: 2021 Subaru Outback 5-Door MPV NHTSA No.: O20215500  
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/24/20

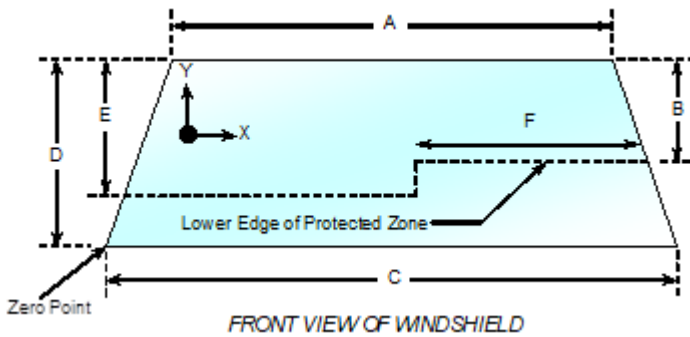
Windshield Mounting Details: Windshield glass is secured to the vehicle frame with rubber molding and rubber cement.

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: 21.8° C

**WINDSHIELD PERIPHERY MEASUREMENTS**

Measurement	Pre-Test (mm)	Post-Test (mm)	% Retention
Left Side	2268	2268	100.0%
Right Side	2268	2268	100.0%
Total	4536	4536	100.0%



Item	Units	Value
A	mm	1215
B	mm	417
C	mm	1450
D	mm	935
E	mm	563
F	mm	587

**AREAS OF PROTECTED ZONE FAILURES**

A. Provide Coordinates of the area that the protected zone was penetrated more than 0.25 inches by a vehicle component other than one that is normally in contact with the windshield.

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.

X	Y

**DATA SHEET NO. 16**

**FMVSS 301 BARRIER IMPACT AND STATIC ROLLOVER RESULTS**

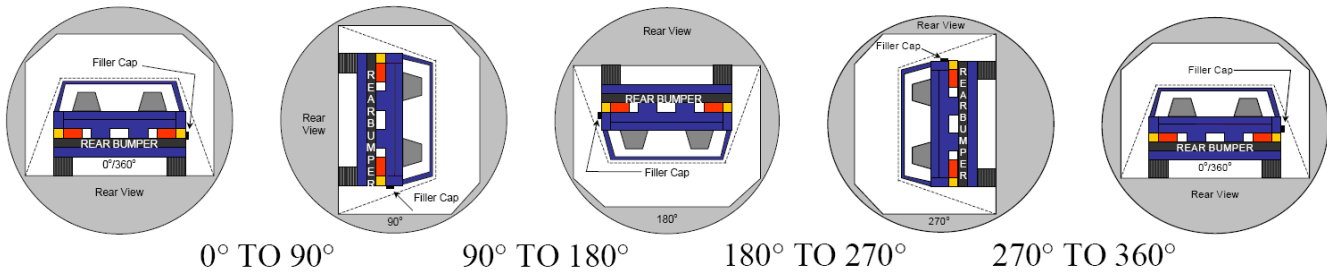
Test Vehicle: 2021 Subaru Outback 5-Door MPV NHTSA No.: O20215500  
 Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/24/20

**FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA**

Temperature at Time of Impact: 15.6° C Test Time: 1:12 PM

**Stoddard Solvent Spillage Measurements**

- A. From impact until vehicle motion ceases: 0 oz.  
(Maximum allowable = 1 oz.)
- B. For the 5 minute period after motion ceases: 0 oz.  
(Maximum allowable = 5 oz.)
- C. For the following 25 minutes: 0 oz.  
(Maximum allowable = 1 oz./minute)
- D. Spillage: There was no Stoddard solvent spillage.  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



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: There was no Stoddard solvent spillage.

**SOLVENT COLLECTION TIME TABLE IN SECONDS**

Test Phase	Rotation Time	Hold Time	Total Time
0° To 90°	78	300	378
90° To 180°	82	300	382
180° To 270°	81	300	381
270° To 360°	79	300	379

**DATA SHEET NO. 16 ... (CONTINUED)**

**FMVSS 301 BARRIER IMPACT AND STATIC ROLLOVER RESULTS**

Test Vehicle: 2021 Subaru Outback 5-Door MPV NHTSA No.: O20215500  
Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/24/20

**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**

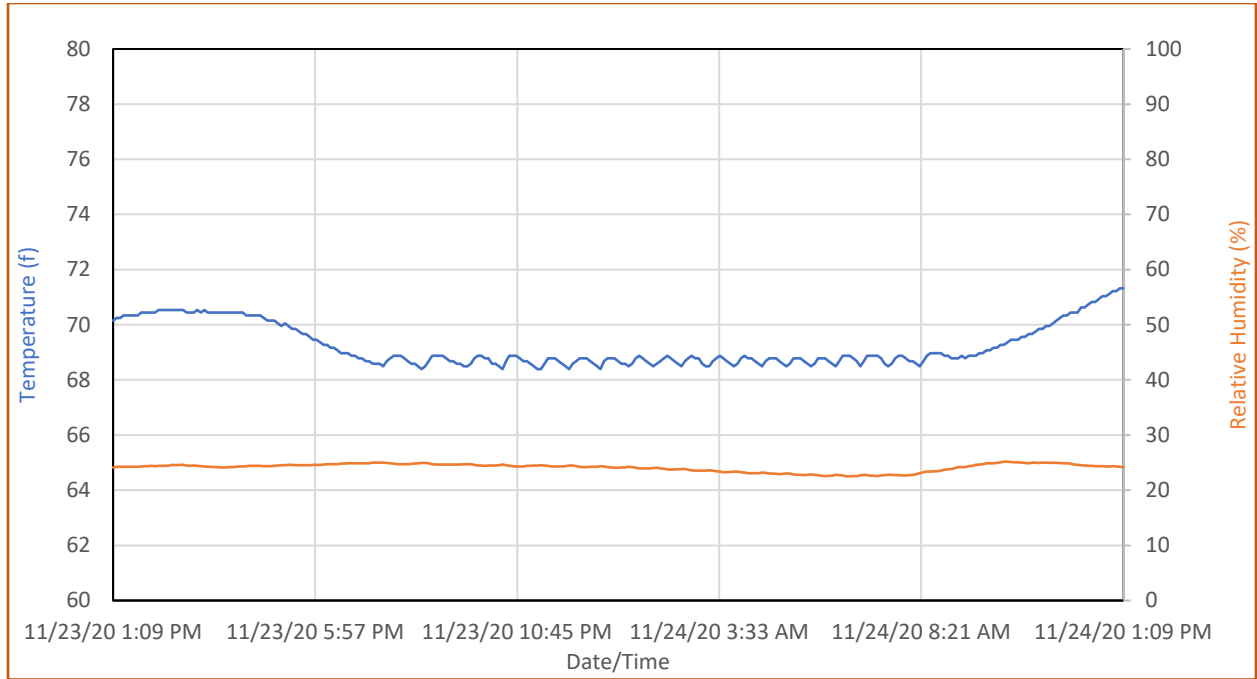
Test Phase	Spillage Location
0° To 90°	
90° To 180°	
180° To 270°	
270° To 360°	

**DATA SHEET NO. 17**

**DUMMY / VEHICLE TEMPERATURE STABILIZATION CHART**

Test Vehicle: 2021 Subaru Outback 5-Door MPV NHTSA No.: O20215500

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 11/24/20





**APPENDIX A**  
**PHOTOGRAPHIC DOCUMENTATION**

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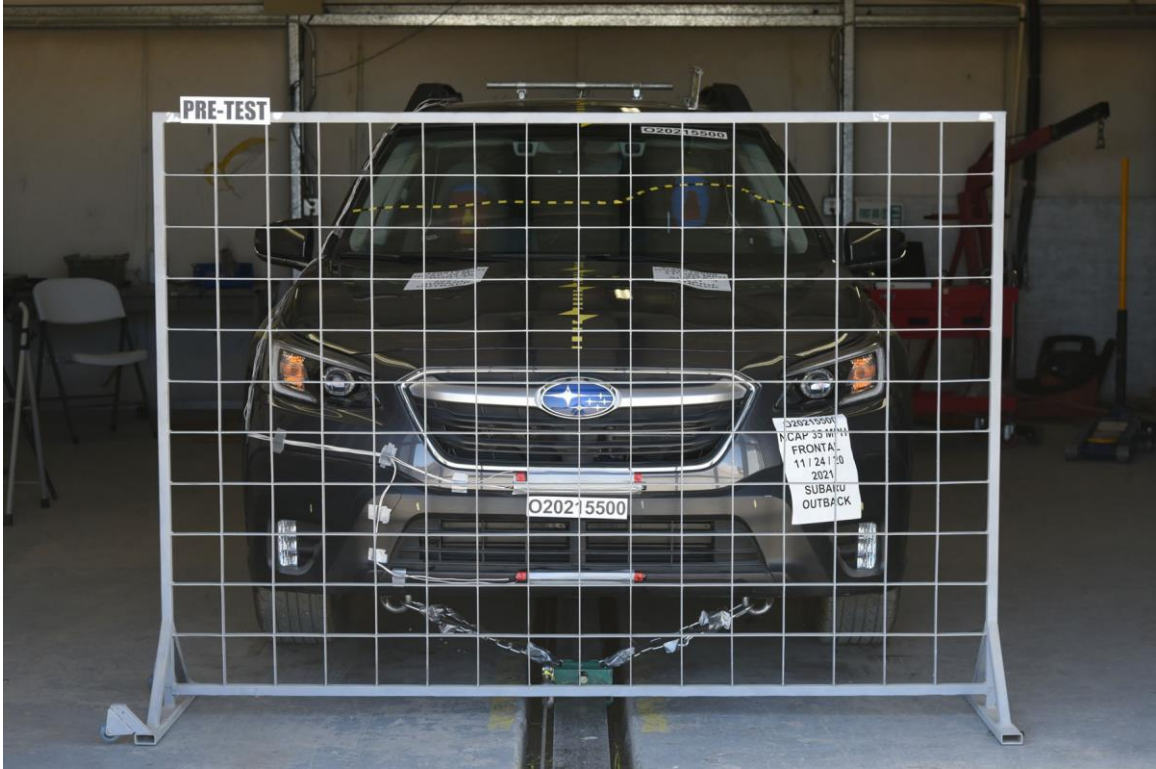


FIGURE 1. Load Cell Location

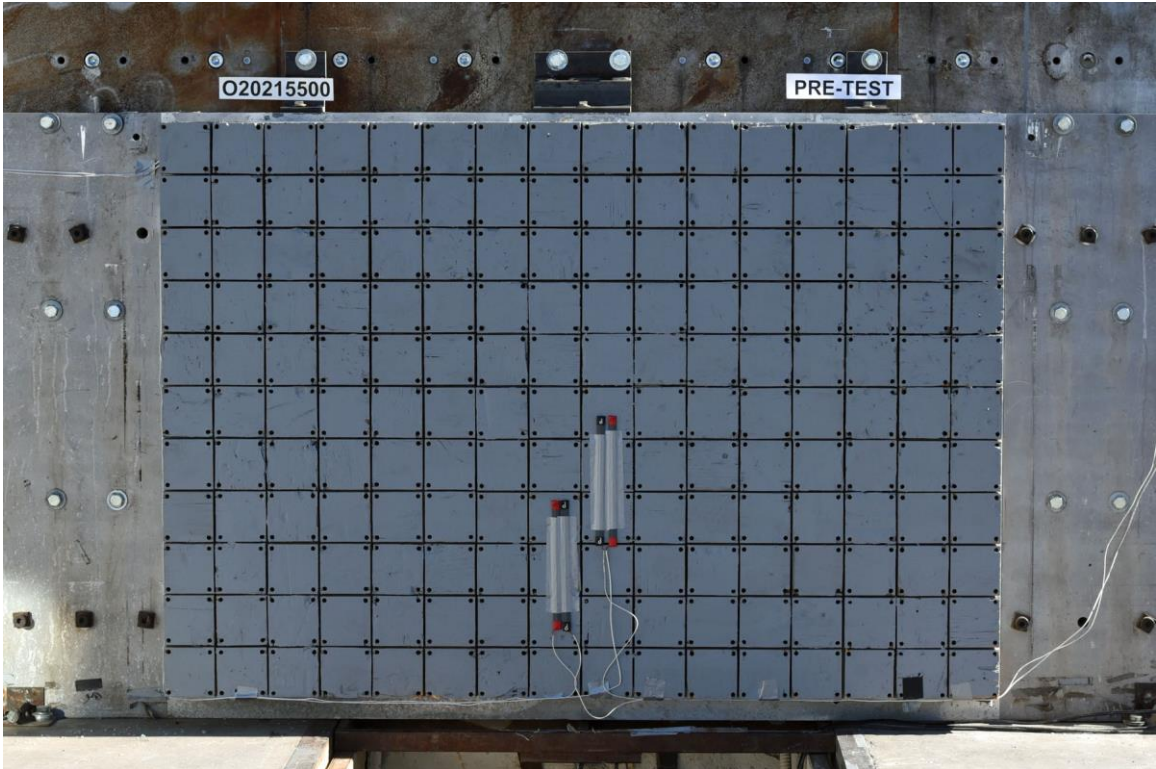


FIGURE 2. Pre-Test Load Cell Wall

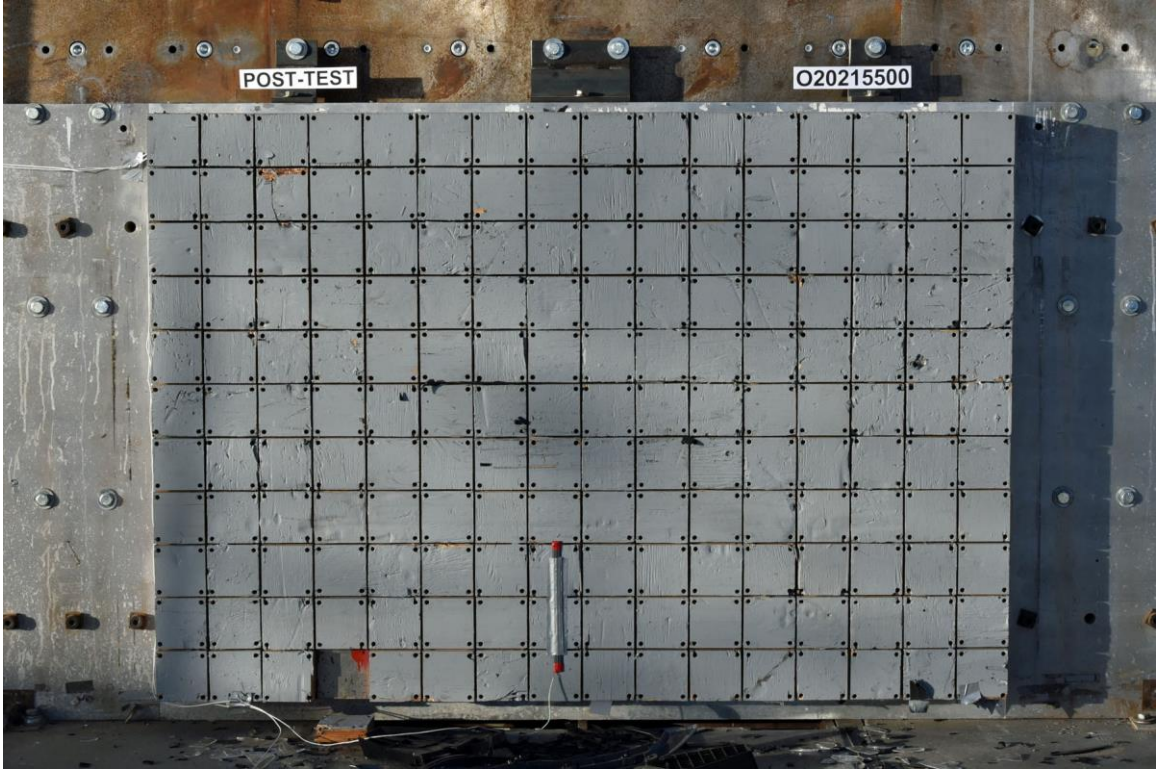


FIGURE 3. Post-Test Load Cell Wall



FIGURE 4. Manufacturer's Label



FIGURE 5. Tire Placard



FIGURE 6. 2021 Subaru Outback Frontal as Delivered



FIGURE 7. Left Rear  $\frac{3}{4}$  View, as Received



FIGURE 8. Pre-Test Front View of Test Vehicle





FIGURE 9. Post-Test Front View of Test Vehicle



FIGURE 10. Pre-Test Left View of Test Vehicle



FIGURE 11. Post-Test Left View of Test Vehicle



FIGURE 12. Pre-Test Right View of Test Vehicle



FIGURE 13. Post-Test Right View of Test Vehicle



FIGURE 14. Pre-Test Right Front 3/4 View



FIGURE 15. Post-Test Right Front  $\frac{3}{4}$  View



FIGURE 16. Pre-Test Left Rear  $\frac{3}{4}$  View



FIGURE 17. Post-Test Left Rear  $\frac{3}{4}$  View



FIGURE 18. Pre-Test Windshield View



FIGURE 19. Post-Test Windshield View



FIGURE 20. Pre-Test Engine Compartment View



FIGURE 21. Post-Test Engine Compartment View



FIGURE 22. Pre-Test Fuel Filler Cap View



FIGURE 23. Post-Test Fuel Filler Cap View



FIGURE 24. Pre-Test Front Underbody View



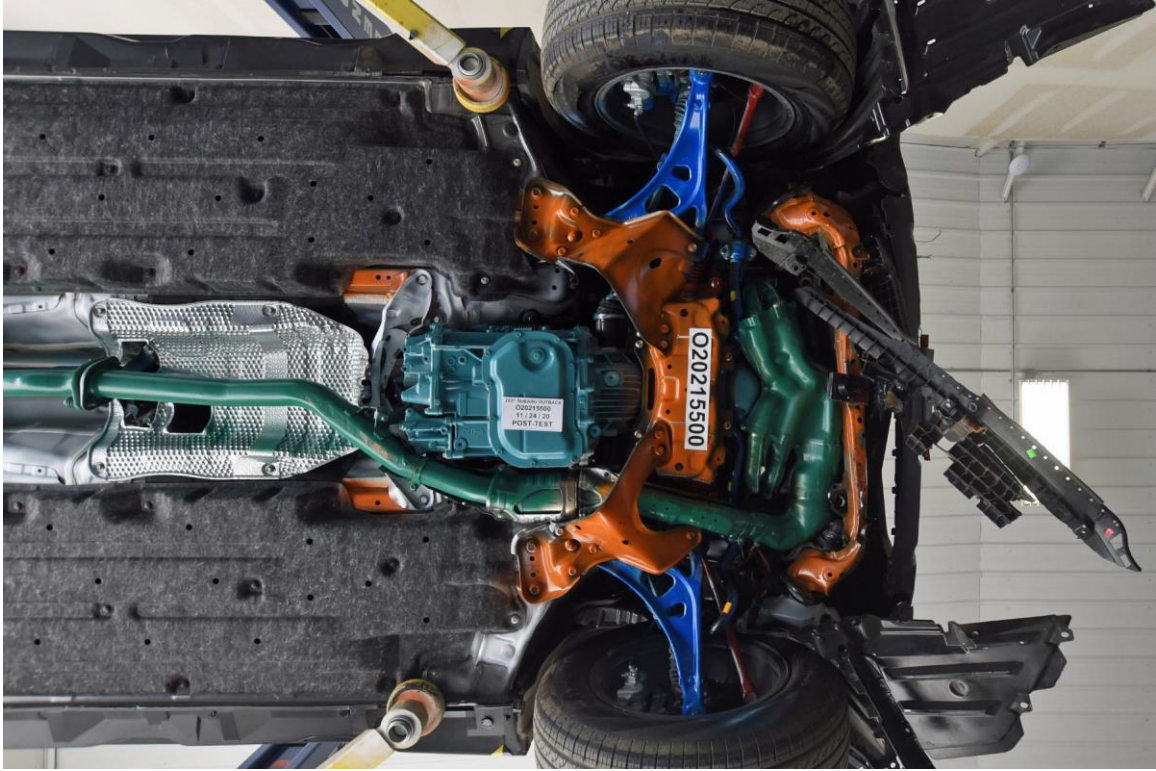


FIGURE 25. Post-Test Front Underbody View

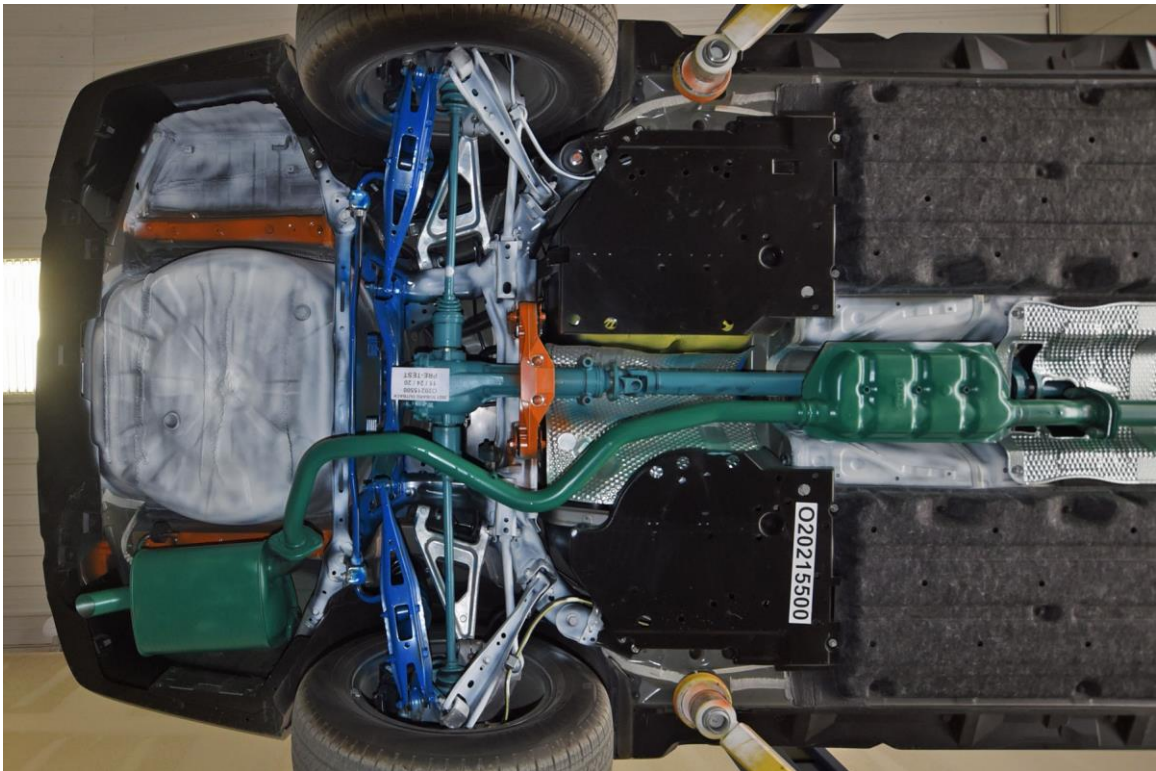


FIGURE 26. Pre-Test Rear Underbody View



FIGURE 27. Post-Test Rear Underbody View



FIGURE 28. Pre-Test Dummy Cable Routing



FIGURE 29. Post-Test Dummy Cable Routing

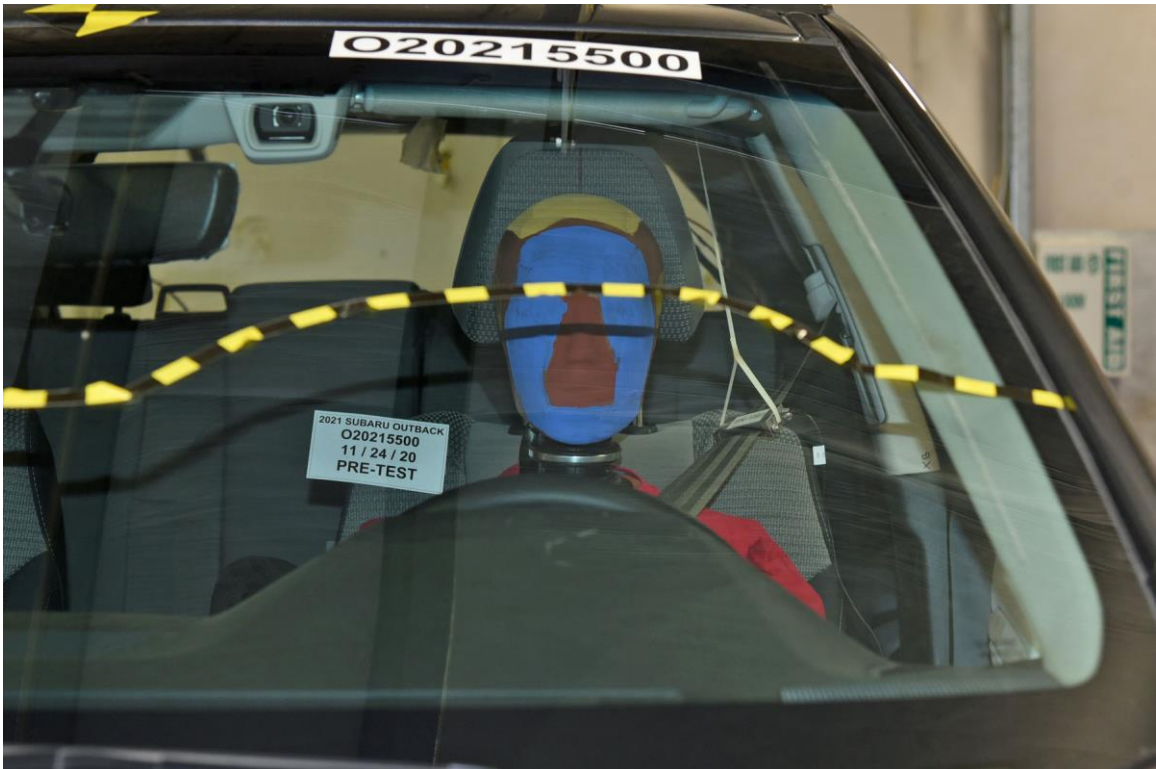


FIGURE 30. Pre-Test Driver Dummy Front View



FIGURE 31. Post-Test Driver Dummy Front View



FIGURE 32. Pre-Test Driver Dummy Window View



FIGURE 33. Post-Test Driver Dummy Window View



FIGURE 34. Pre-Test Driver Dummy and Vehicle Interior View



FIGURE 35. Post-Test Driver Dummy and Vehicle Interior View



FIGURE 36. Pre-Test Driver's Seat Fore-Aft Markings

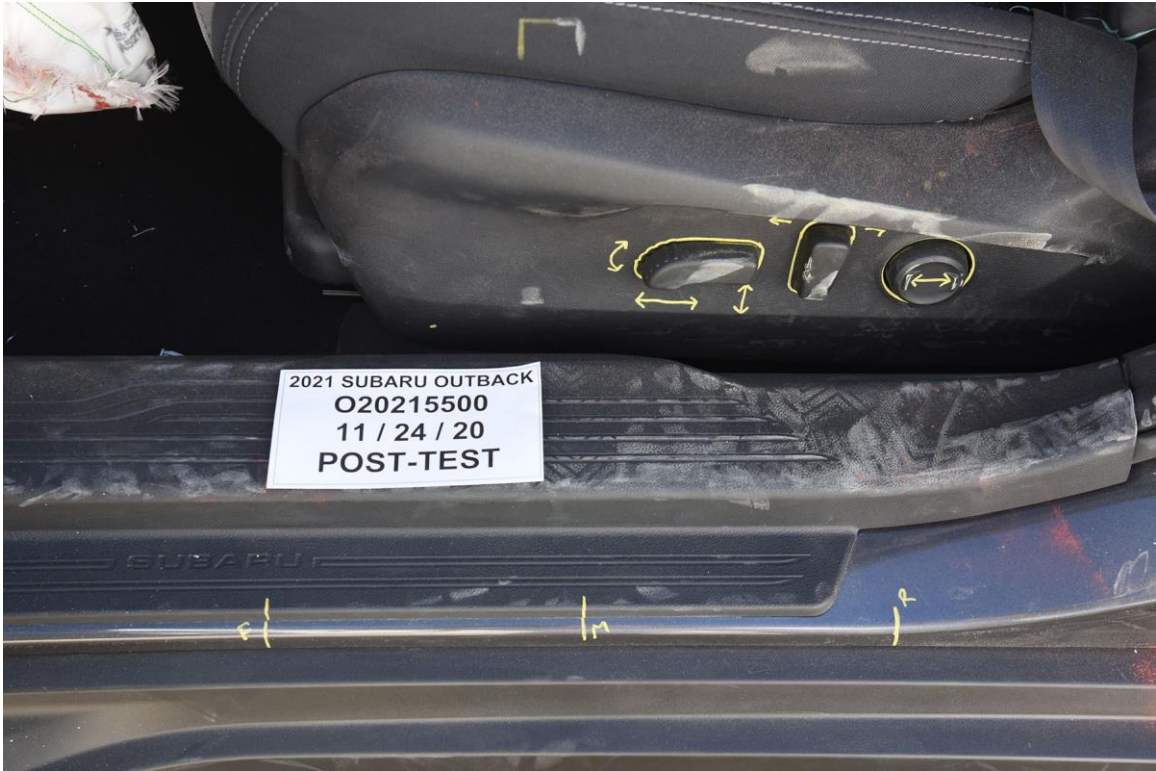


FIGURE 37. Post-Test Driver's Seat Fore-Aft Markings



FIGURE 38. Pre-Test View of Belt Anchorage for Driver Dummy



FIGURE 39. Post-Test View of Belt Anchorage for Driver Dummy

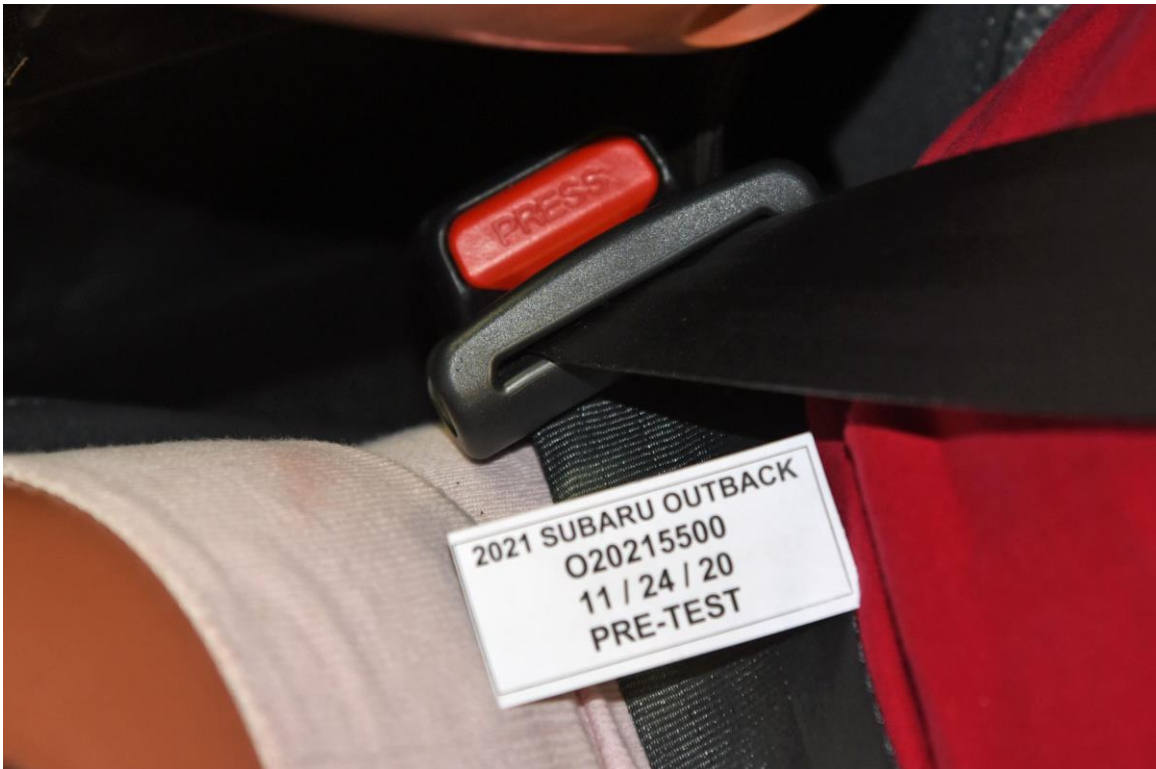


FIGURE 40. Pre-Test View of Belt Buckle and Latch Plate for Driver Dummy





FIGURE 41. Post-Test View of Belt Buckle and Latch Plate for Driver Dummy



FIGURE 42. Pre-Test Driver Dummy Feet



FIGURE 43. Post-Test Driver Dummy Feet



FIGURE 44. Pre-Test Driver's Side Knee Bolster



FIGURE 45. Post-Test Driver's Side Knee Bolster



FIGURE 46. Pre-Test Driver's Side Floorpan



FIGURE 47. Post-Test Driver's Side Floorpan



FIGURE 48. Post-Test Driver Dummy Face



FIGURE 49. Post-Test Driver Dummy Contact with Airbag



FIGURE 50. Post-Test Driver Dummy Contact with Headrest



FIGURE 50a. Post-Test Driver Dummy Contact with Knee Airbag

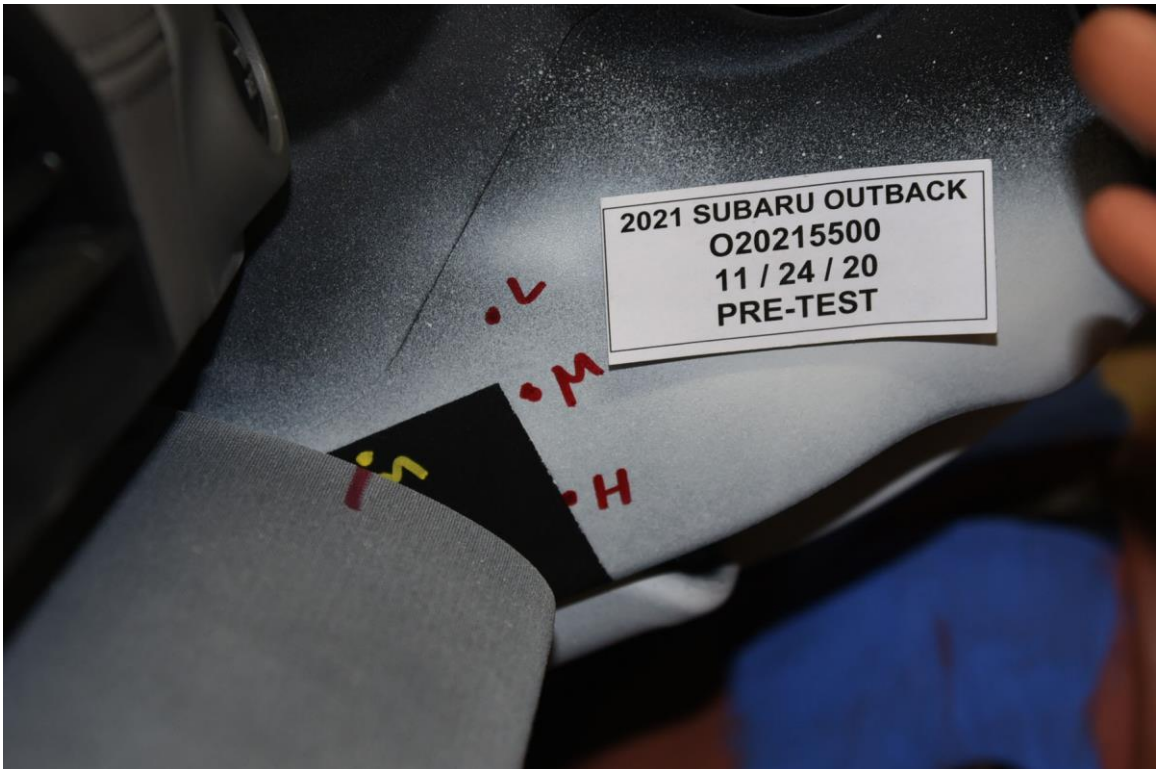


FIGURE 51. Pre-Test View of the Steering Wheel



FIGURE 52. Post-Test View of the Steering Wheel

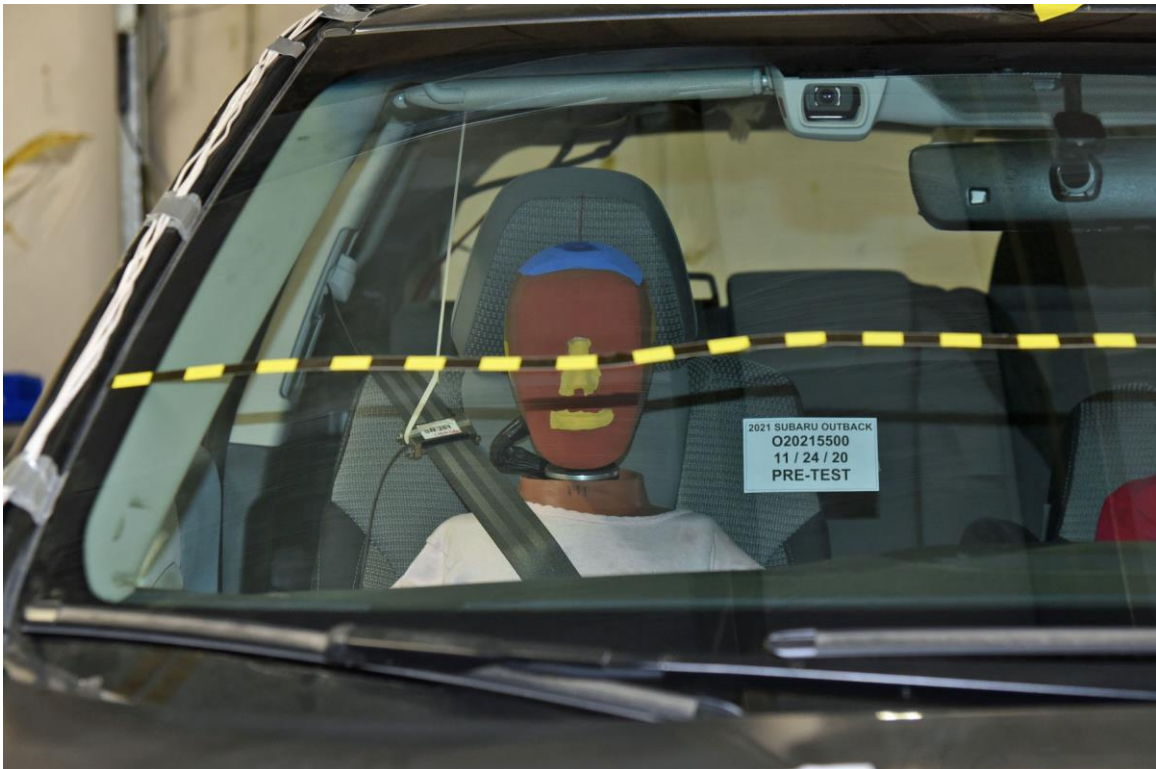


FIGURE 53. Pre-Test Passenger Dummy Front View

# Photograph Not Available

FIGURE 54. Post-Test Passenger Dummy Front View



FIGURE 55. Pre-Test Passenger Dummy Window View





FIGURE 56. Post-Test Passenger Dummy Window View



FIGURE 57. Pre-Test Passenger Dummy and Vehicle Interior View



FIGURE 58. Post-Test Passenger Dummy and Vehicle Interior View

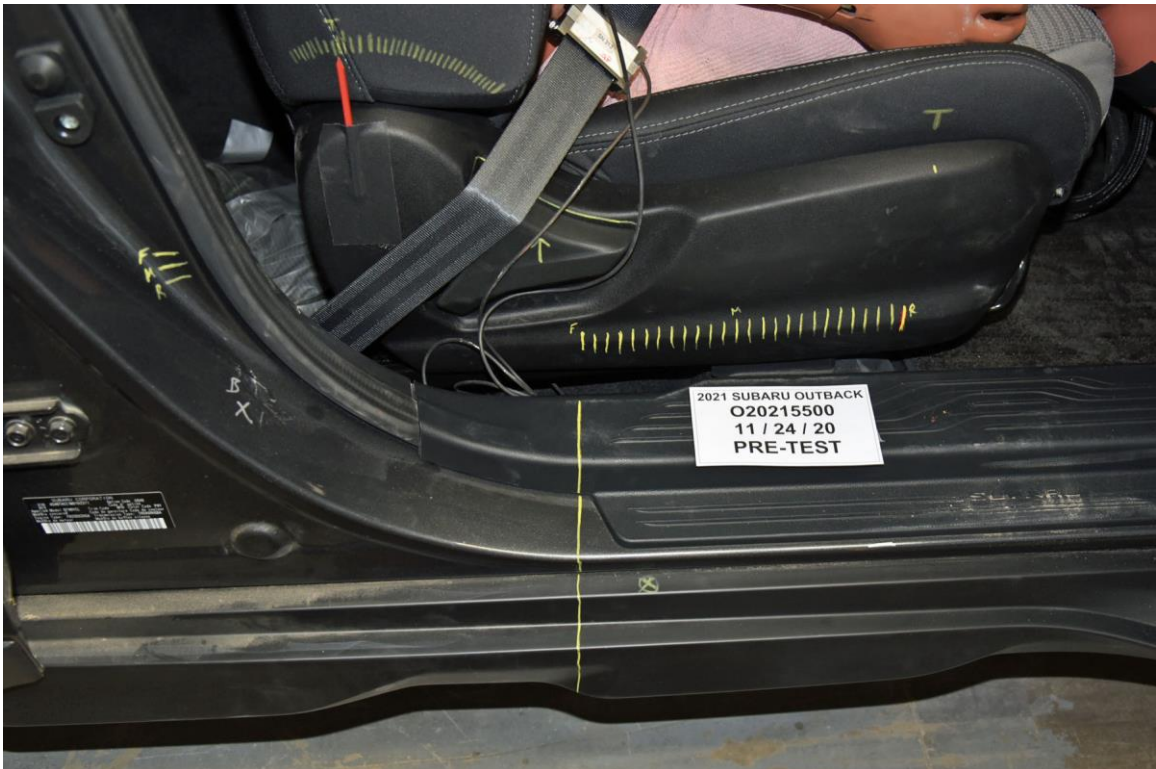


FIGURE 59. Pre-Test Passenger's Seat Fore-Aft Markings



FIGURE 60. Post-Test Passenger's Seat Fore-Aft Markings



FIGURE 61. Pre-Test View of Belt Anchorage for Passenger Dummy



FIGURE 62. Post-Test View of Belt Anchorage for Passenger Dummy



FIGURE 63. Pre-Test View of Belt Buckle and Latch Plate for Passenger Dummy



FIGURE 64. Post-Test View of Belt Buckle and Latch Plate for Passenger Dummy



FIGURE 65. Pre-Test Passenger Dummy Feet



FIGURE 66. Post-Test Passenger Dummy Feet



FIGURE 67. Pre-Test Passenger's Side Knee Bolster



FIGURE 68. Post-Test Passenger's Side Knee Bolster



FIGURE 69. Pre-Test Passenger's Side Floorpan



FIGURE 70. Post-Test Passenger's Side Floorpan



FIGURE 71. Post-Test Passenger Dummy Face

”





FIGURE 72. Post-Test Passenger Dummy Contact with Airbag

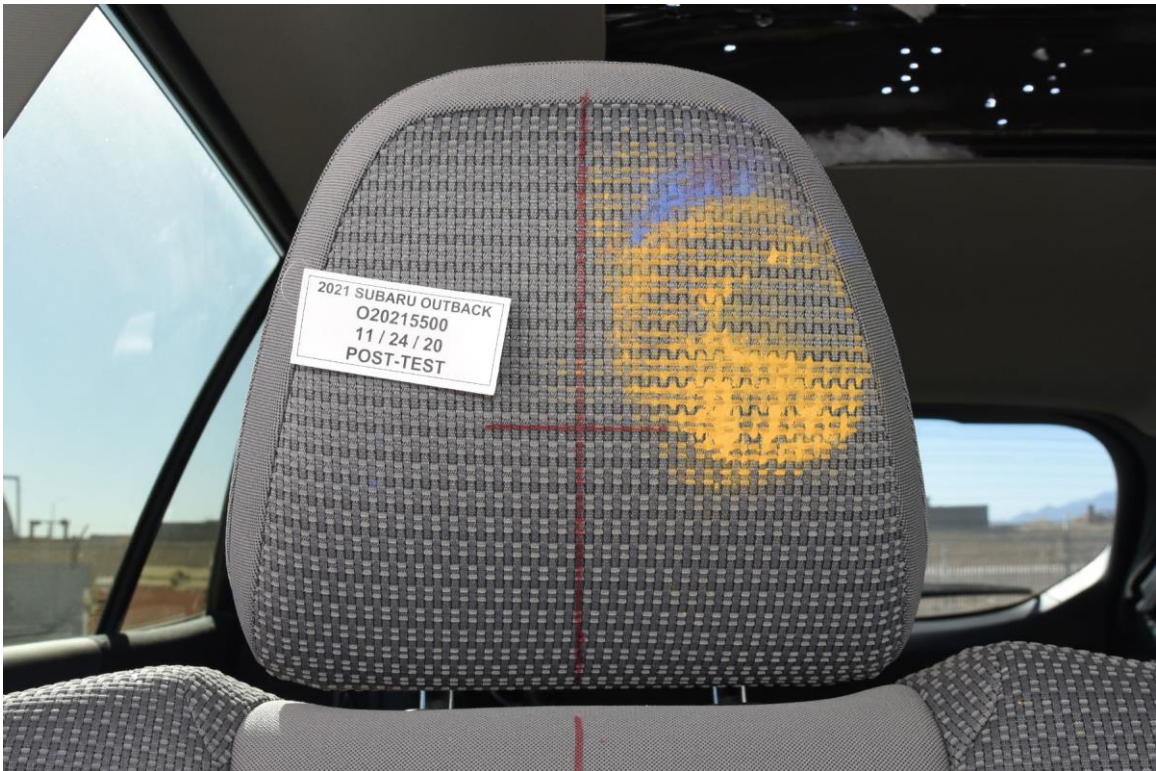


FIGURE 73. Post-Test Passenger Dummy Contact with Headrest

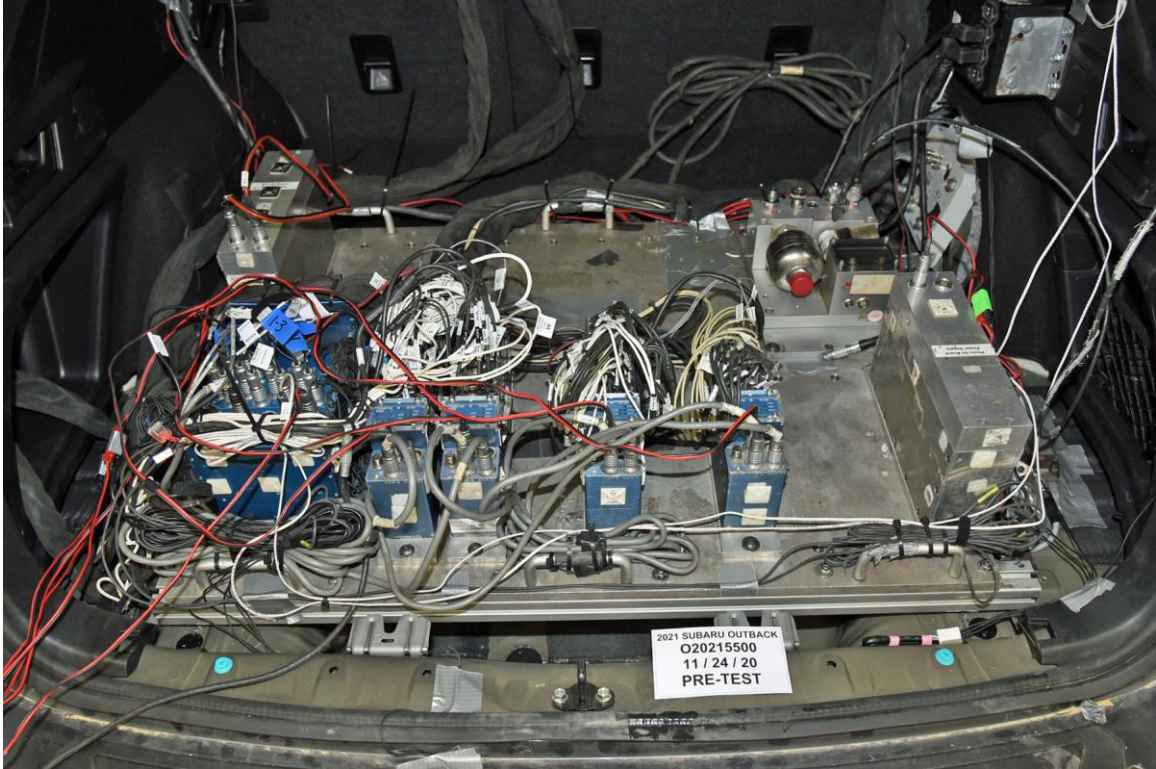


FIGURE 74. Photograph of Ballast Installed in Vehicle

**Photograph Not Applicable**

**No Stoddard  
Solvent Spillage**

FIGURE 75. Post-Test Stoddard Solvent Spillage Location View

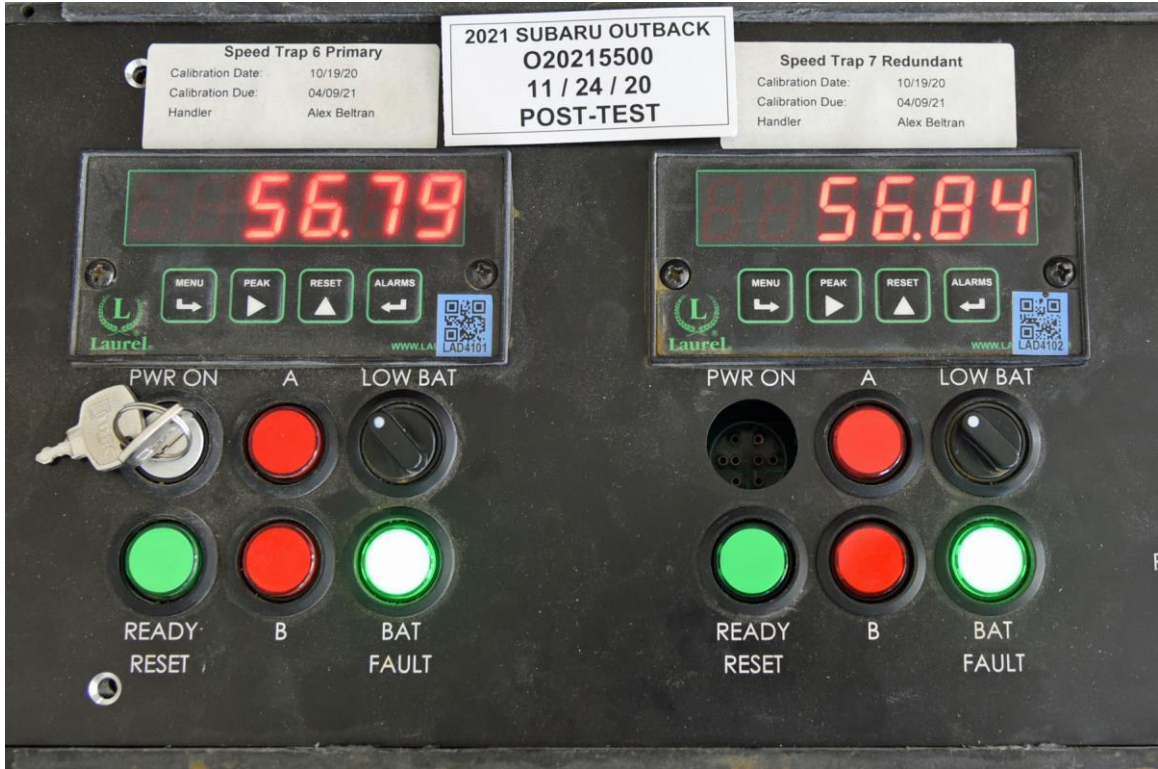


FIGURE 76. Post-Test Speed Trap Read-Out

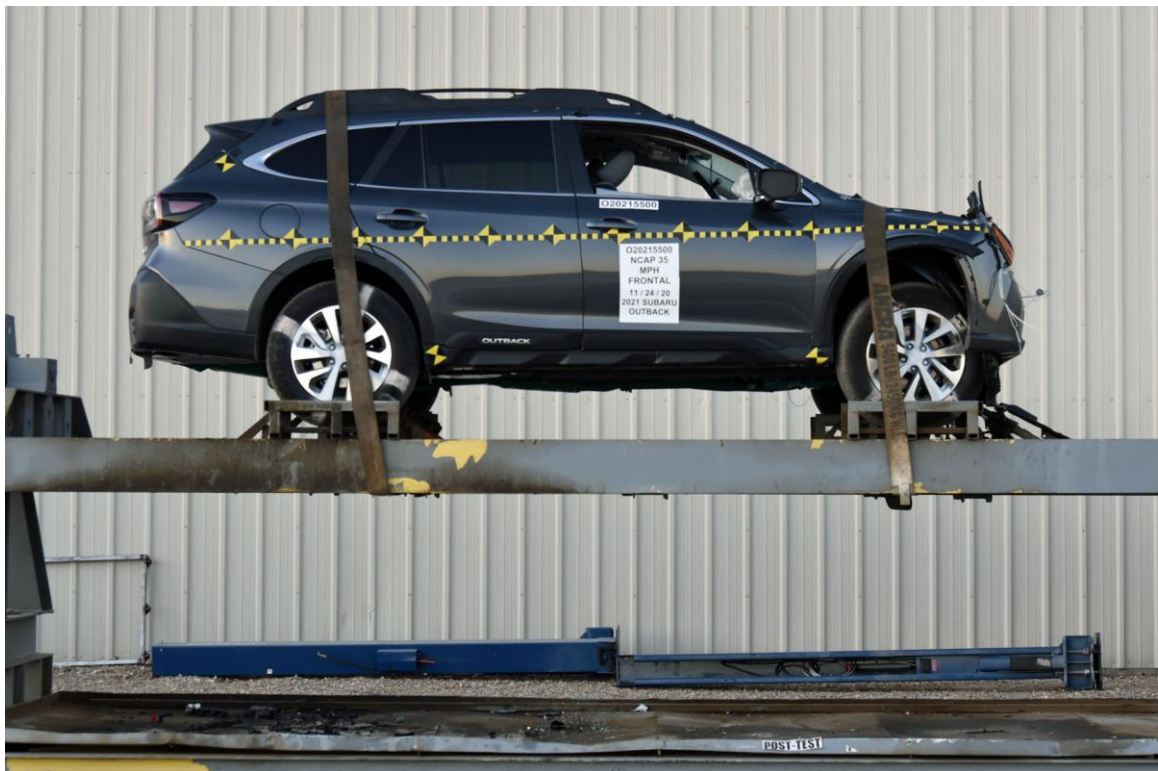


FIGURE 77. Vehicle at 0° on Static Rollover Device



FIGURE 78. Vehicle at 90° on Static Rollover Device



FIGURE 79. Vehicle at 180° on Static Rollover Device



FIGURE 80. Vehicle at 270° on Static Rollover Device



FIGURE 81. Vehicle at 360° on Static Rollover Device



FIGURE 82. 2021 Subaru Outback Frontal Impact Event

**OUTBACK** VIN: 4S4BTACC1M3102371 2021 SUBARU OUTBACK PREMIUM MDD  
 Model/Code: LAFAYETTE, IN  
 Port/Assembly: TRUCK, 401-631236

SHIP TO: 090796 SUBARU OF GLENDALE 1300 S BRAND BLVD GLENDALE, CA 91204  
 SOLD TO: 090796 SUBARU OF GLENDALE 1300 S BRAND BLVD GLENDALE, CA 91204

**GOVERNMENT 5-STAR SAFETY RATINGS**

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

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

**Fuel Economy and Environment**

**29** MPG combined city/hwy  
 26 city  
 33 highway  
 3.4 gallons per 100 miles

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

**Annual fuel Cost \$1,400**

**Gasoline Vehicle**

**Annual Fuel Economy & Greenhouse Gas Rating (tailpipe only)**

Smog Rating (tailpipe only)

**SAFETY**

- Symmetrical All-Wheel Drive w/ Vehicle Dynamics Control
- EyeSight Driver-Assist System w/ Automatic Emergency Braking
- Advanced Adaptive Cruise Control w/ Lane Centering
- Lane Departure and Sway Warning
- Rear Vision Camera w/ Adaptive Guidelines
- Anti-Lock Brakes (ABS)
- 4-Wheel Disc Brakes with Brake Assist
- Subaru Advanced Frontal Airbag System
- Driver Knee Airbag, Passenger Seat Cushion Airbags
- Side Curtain Airbags with Roll-over Sensor and Seat Side Airbags
- Front and Rear Passenger Seatbelt Warning Light & Chime
- LATCH System for Child Safety Seats, Rear Seat Reminder
- Anti-Theft Alarm & Immobilizer System
- Brake Override System

**PERFORMANCE AND EXTERIOR**

- 2.5L Direct Injection 4-Cylinder DOHC 16-Valve Boxer Engine
- Lineartronic CVT with 8-Speed Manual Mode
- Auto Start - Stop
- X-Mode, Traction Management System
- Active Torque Vectoring with Quick Ratio Steering
- Four-Wheel Independent Suspension
- 8.7" Ground Clearance
- 17" Aluminum Alloy Wheels: Black w/ Machine Finish
- LED Headlights w/ High Beam Assist, LED Fog Lights
- Integrated Roof Rack System with Swing in Place Crossbars

**COMFORT, CONVENIENCE & INTERIOR**

- STARLINK 11.6" Multimedia Infotainment System
- Bluetooth Hands-Free Phone Connectivity
- STARLINK Smartphone Connectivity/Apps
- SUBARU STARLINK Safety Plus - 3 Years Free
- Apple CarPlay and Android Auto, SiriusXM Radio w/ 4 Months Free
- Dual Front & Rear USB Ports, iPod / iPhone Connectivity
- 10-Way Adjustable Power Driver's Seat w/ Lumbar Support
- Heated Front Seats, Heated Mirrors, Wiper De-Icer
- Dual Zone Automatic Climate Control w/ Air Filtration System
- Auto-Up/Down Front Power Windows & Power Side Mirrors
- Remote Keyless Entry (2 Fobs)
- 60/40 Split Fold-Down Rear Seatback
- Tilt/Telescopic Leather Steering Wheel with Cruise Control
- Carpeted Floor Mats & Cargo Area Mat

**LIMITED WARRANTY/ROADSIDE ASSISTANCE**

- 3 Years / 36,000 Miles Basic
- 5 Years / 60,000 Miles Powertrain
- 5 Yrs/Unlimited Mileage Rust Perforation
- 3 Yrs / 36,000 24/7 Roadside Assistance
- See Owner into K&N Warranty For Details

**OPTIONAL EQUIPMENT AND OTHER ITEMS**

Manufacturer's Suggested Retail Price	\$29,045.00
Full Tank of Gas	INCLD
Standard Option: 11	
Mirror Compass w/ homelink	\$365.00
Rear Bumper Cover	\$159.00
All-Weather Floor Liners	\$132.00
Sunshade	\$76.00

**PARTS CONTENT INFORMATION**

FOR VEHICLES IN THIS CARLINE: U.S./CANADIAN PARTS CONTENT: 50% MAJOR SOURCES OF FOREIGN PARTS CONTENT: JAPAN: 35%

FOR THIS VEHICLE: FINAL ASSEMBLY POINT: Lafayette, IN COUNTRY OF ORIGIN: JAPAN ENGINE: JAPAN TRANSMISSION: JAPAN

Note: Parts content does not include final assembly, distribution, or other non-parts costs.

**Destination and Delivery \$1,050.00**  
**Total Suggested Retail Price \$30,827.00**

FIGURE 83. Monroney Label Photograph

**APPENDIX B**  
**DUMMY RESPONSE DATA TRACES**

## TABLE OF DATA PLOTS

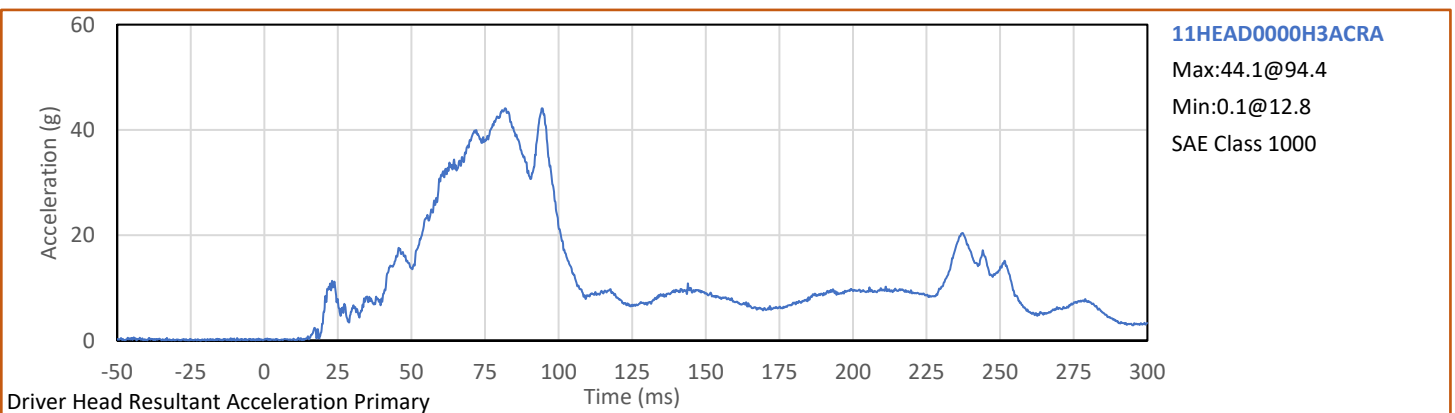
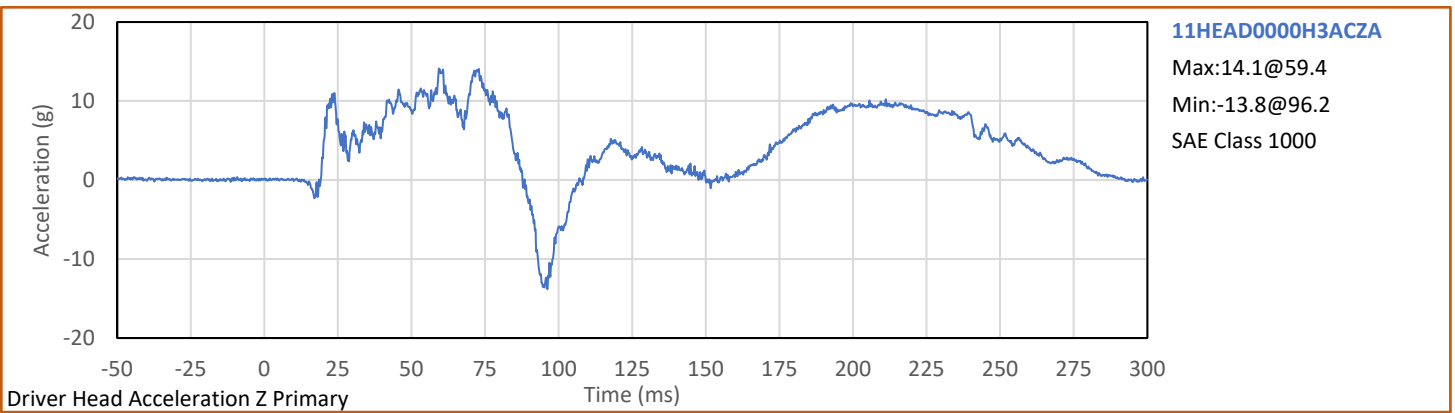
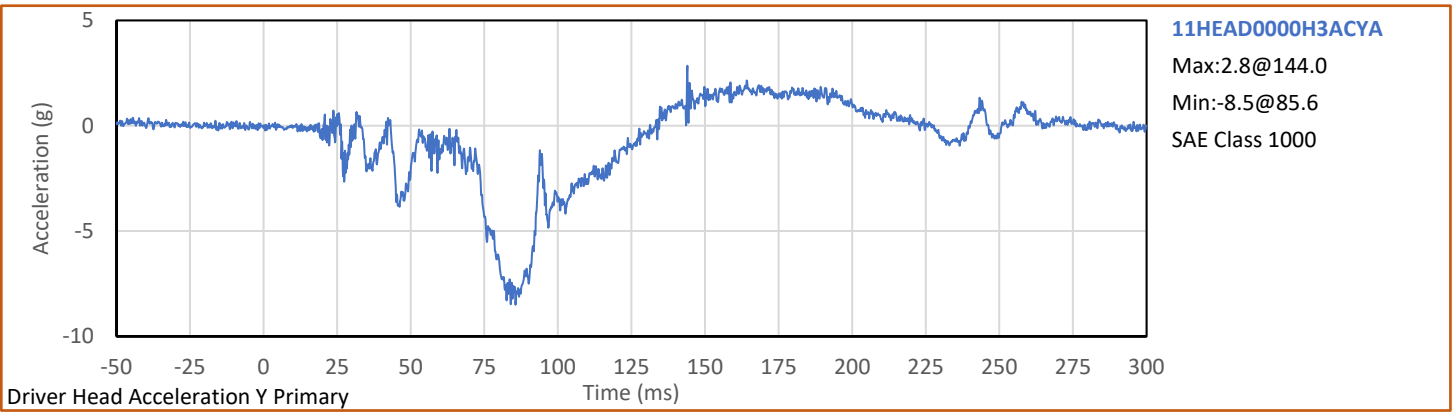
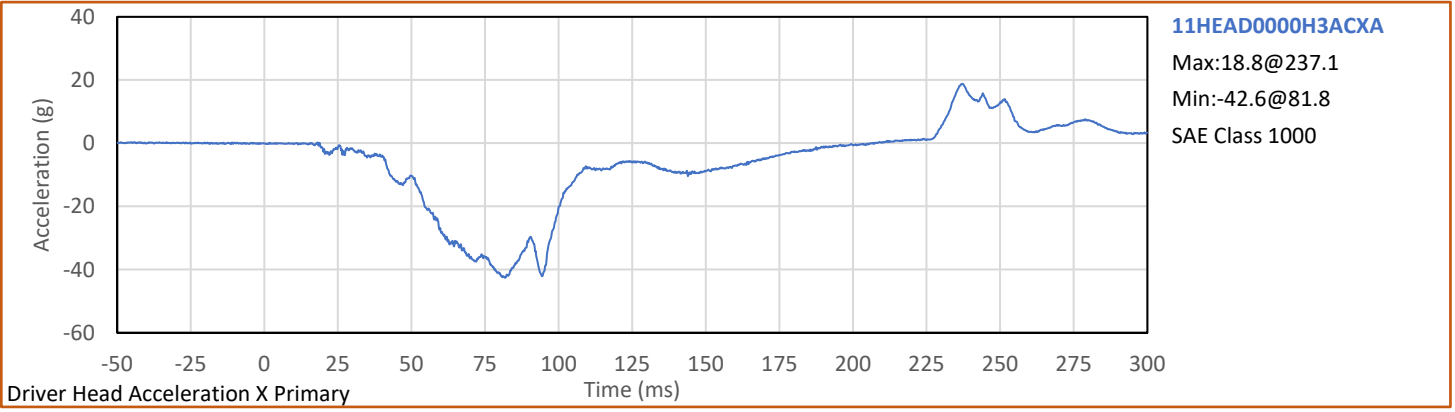
Plot		Page
1	Driver Head Acceleration X Primary	B-1
2	Driver Head Acceleration Y Primary	B-1
3	Driver Head Acceleration Z Primary	B-1
4	Driver Head Resultant Acceleration Primary	B-1
5	Driver Chest X Deflection	B-2
6	Driver Upper Neck Force X	B-3
7	Driver Upper Neck Force Z	B-3
8	Driver Upper Neck Moment Y	B-3
9	Driver Nij	B-3
10	Driver Chest Acceleration X Primary	B-4
11	Driver Chest Acceleration Y Primary	B-4
12	Driver Chest Acceleration Z Primary	B-4
13	Driver Chest Resultant Acceleration Primary	B-4
14	Driver Left Femur Force Z	B-5
15	Driver Right Femur Force Z	B-5
16	Passenger Head Acceleration X Primary	B-6
17	Passenger Head Acceleration Y Primary	B-6
18	Passenger Head Acceleration Z Primary	B-6
19	Passenger Head Resultant Acceleration Primary	B-6
20	Passenger Chest X Deflection	B-7
21	Passenger Upper Neck Force X	B-8
22	Passenger Upper Neck Force Z	B-8
23	Passenger Upper Neck Moment Y	B-8
24	Passenger Nij	B-8
25	Passenger Chest Acceleration X Primary	B-9
26	Passenger Chest Acceleration Y Primary	B-9
27	Passenger Chest Acceleration Z Primary	B-9
28	Passenger Chest Resultant Acceleration Primary	B-9
29	Passenger Left Femur Force Z	B-10
30	Passenger Right Femur Force Z	B-10



The following additional dummy and vehicle response data can be found in the R&D section of the NHTSA website at [www.nhtsa.gov](http://www.nhtsa.gov)

Driver Head X Acceleration Redundant  
Driver Head Y Acceleration Redundant  
Driver Head Z Acceleration Redundant  
Driver Upper Neck Force Y  
Driver Upper Neck Moment X  
Driver Upper Neck Moment Z  
Driver Chest X Acceleration Redundant  
Driver Chest Y Acceleration Redundant  
Driver Chest Z Acceleration Redundant  
Driver Pelvis X  
Driver Pelvis Y  
Driver Pelvis Z  
Driver Left Femur Force Z Redundant  
Driver Right Femur Force Z Redundant  
Driver Left Upper Tibia Moment X  
Driver Left Upper Tibia Moment Y  
Driver Left Upper Tibia Force Z  
Driver Left Lower Tibia Moment X  
Driver Left Lower Tibia Moment Y  
Driver Left Lower Tibia Force Z  
Driver Right Upper Tibia Moment X  
Driver Right Upper Tibia Moment Y  
Driver Right Upper Tibia Force Z  
Driver Right Lower Tibia Moment X  
Driver Right Lower Tibia Moment Y  
Driver Right Lower Tibia Force Z  
Driver Left Foot Fore Z  
Driver Left Foot Aft X  
Driver Left Foot Aft Z  
Driver Right Foot Fore Z  
Driver Right Foot Aft X  
Driver Right Foot Aft Z  
Driver Shoulder Belt Force  
Driver Lap Belt Force  
Driver Head Angular Velocity X  
Driver Head Angular Velocity Y  
Driver Head Angular Velocity Z  
Passenger Head X Acceleration Redundant  
Passenger Head Y Acceleration Redundant  
Passenger Head Z Acceleration Redundant  
Passenger Upper Neck Force X  
Passenger Upper Neck Force Z  
Passenger Upper Neck Moment Y

Passenger Chest X Acceleration Redundant  
Passenger Chest Y Acceleration Redundant  
Passenger Chest Z Acceleration Redundant  
Passenger Pelvis X  
Passenger Pelvis Y  
Passenger Pelvis Z  
Passenger Left Femur Force Redundant  
Passenger Right Femur Force Redundant  
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Passenger Left Lower Tibia Moment Y  
Passenger Left Lower Tibia Force Z  
Passenger Right Upper Tibia Moment X  
Passenger Right Upper Tibia Moment Y  
Passenger Right Upper Tibia Force Z  
Passenger Right Lower Tibia Moment X  
Passenger Right Lower Tibia Moment Y  
Passenger Right Lower Tibia Force Z  
Passenger Left Foot Fore Z  
Passenger Left Foot Aft X  
Passenger Left Foot Aft Z  
Passenger Right Foot Fore Z  
Passenger Right Foot Aft X  
Passenger Right Foot Aft Z  
Passenger Shoulder Belt Force  
Passenger Lap Belt Force  
Passenger Head Angular Velocity X  
Passenger Head Angular Velocity Y  
Passenger Head Angular Velocity Z  
Left Rear Seat Crossmember X  
Left Rear Seat Crossmember Z  
Right Rear Seat Crossmember X  
Right Rear Seat Crossmember Z  
Left Rear Seat Crossmember X Redundant  
Right Rear Seat Crossmember X Redundant  
Vehicle Engine Top X  
Vehicle Engine Bottom X  
Load Cell Barrier Forces and Moments



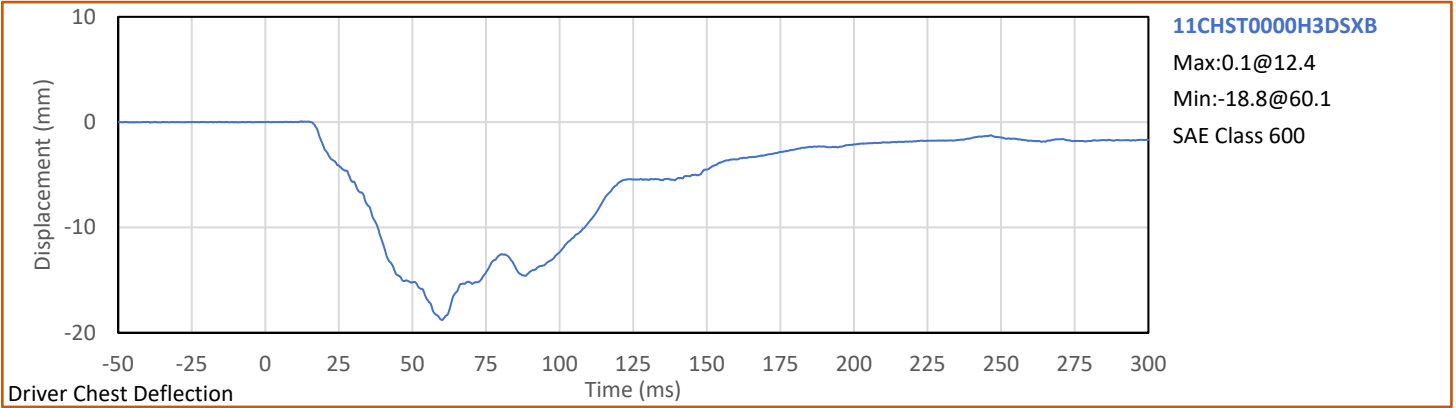
Test Vehicle: 2021 Subaru Outback 5-Door MPV

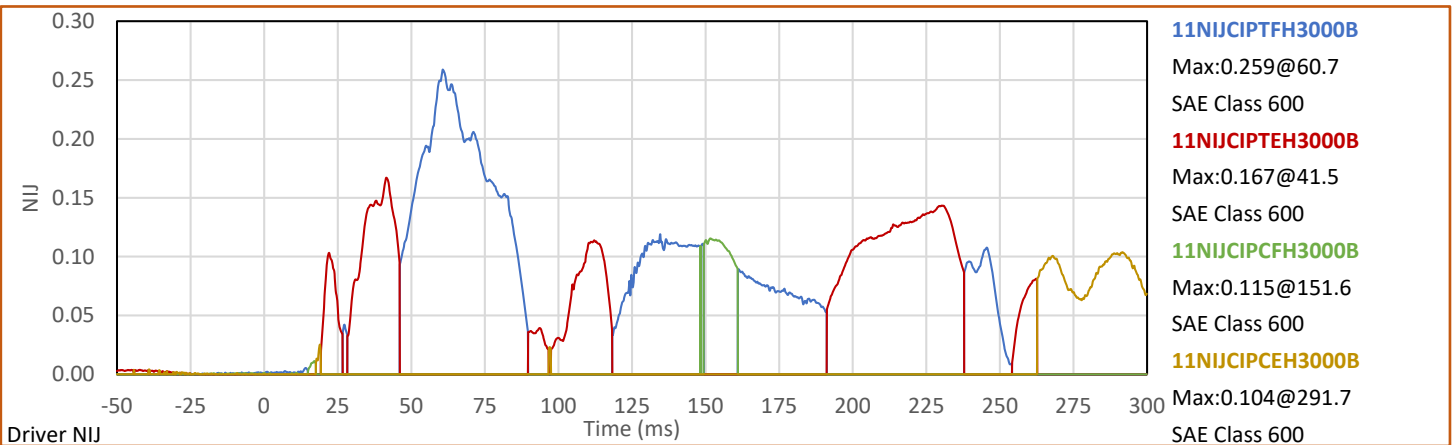
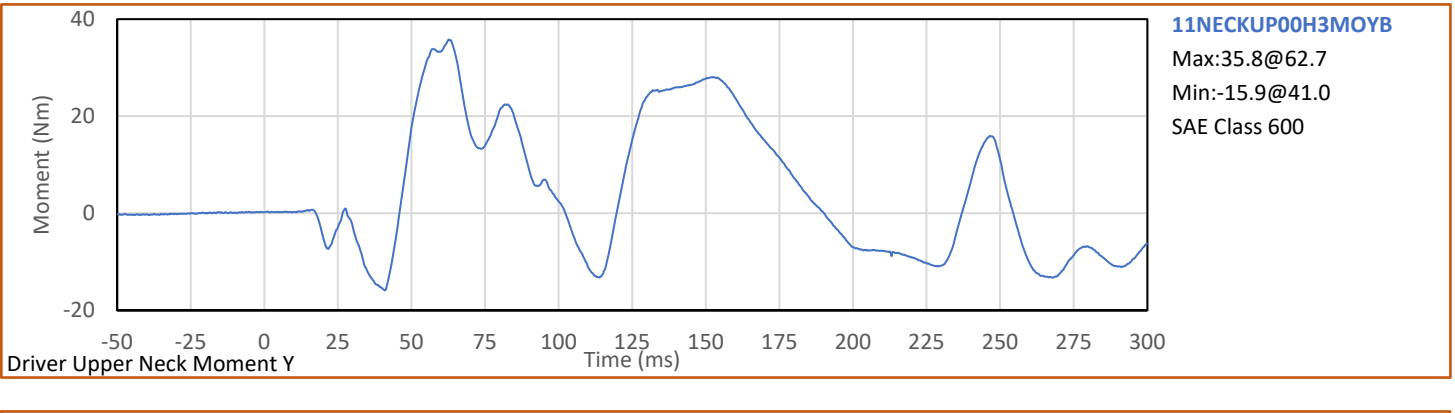
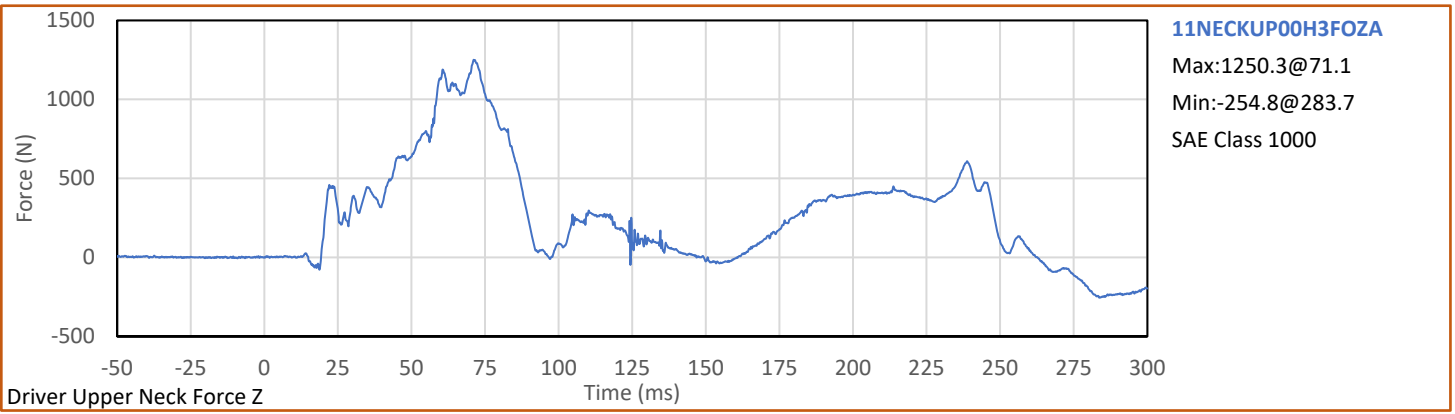
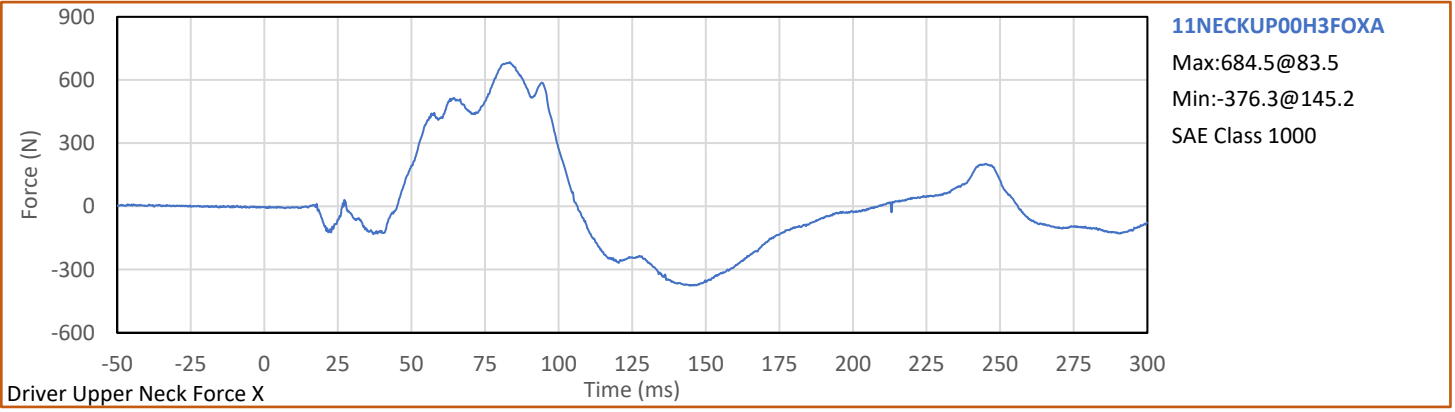
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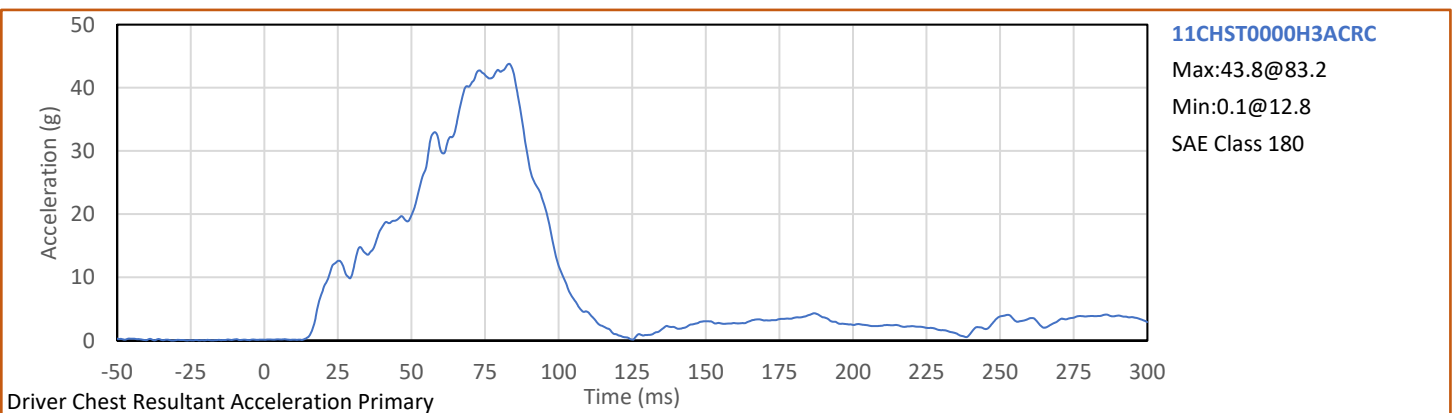
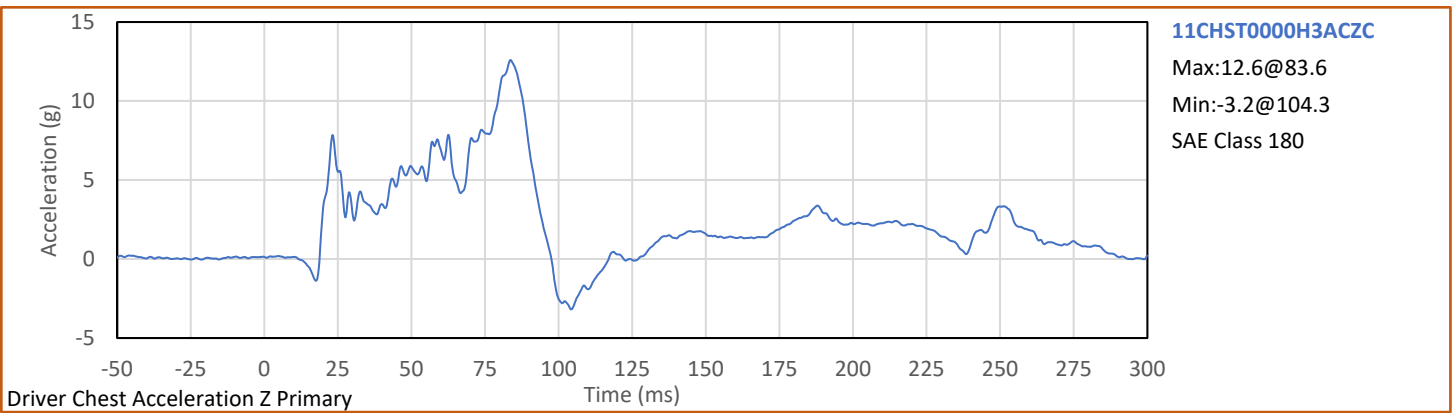
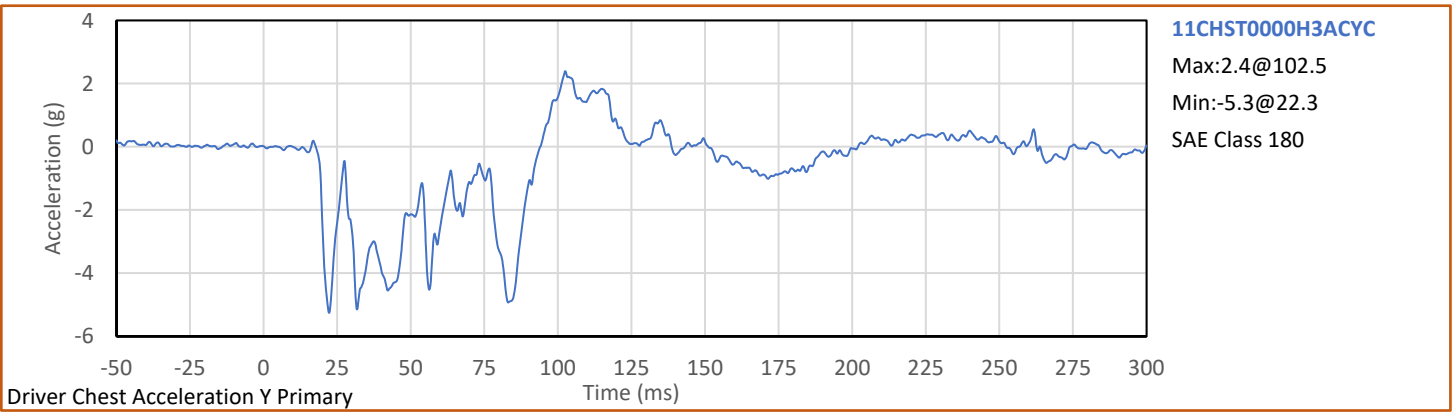
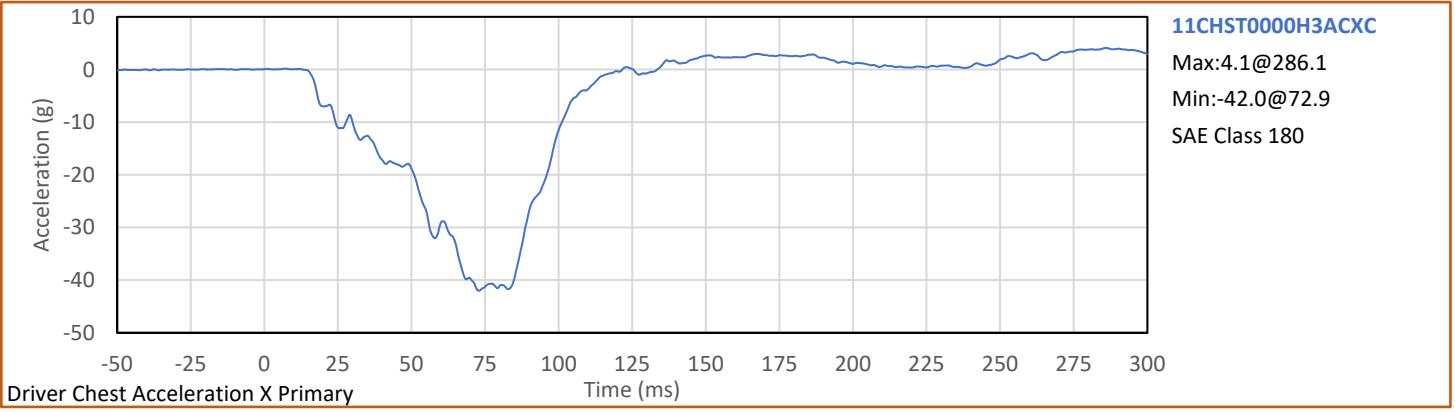


Test Program: 56.3 km/h Frontal Impact NCAP Test

Test Date: 11/24/2020

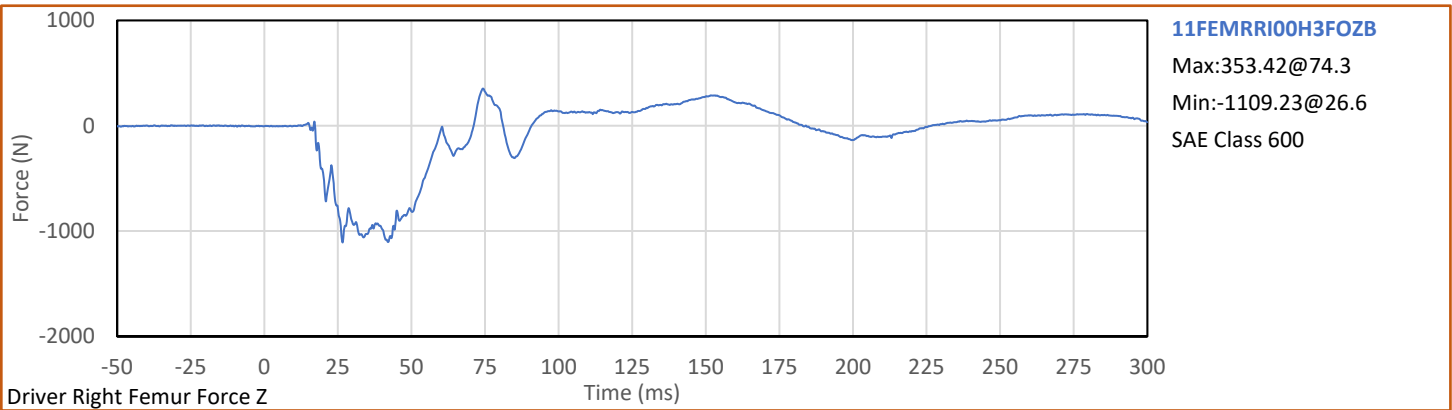
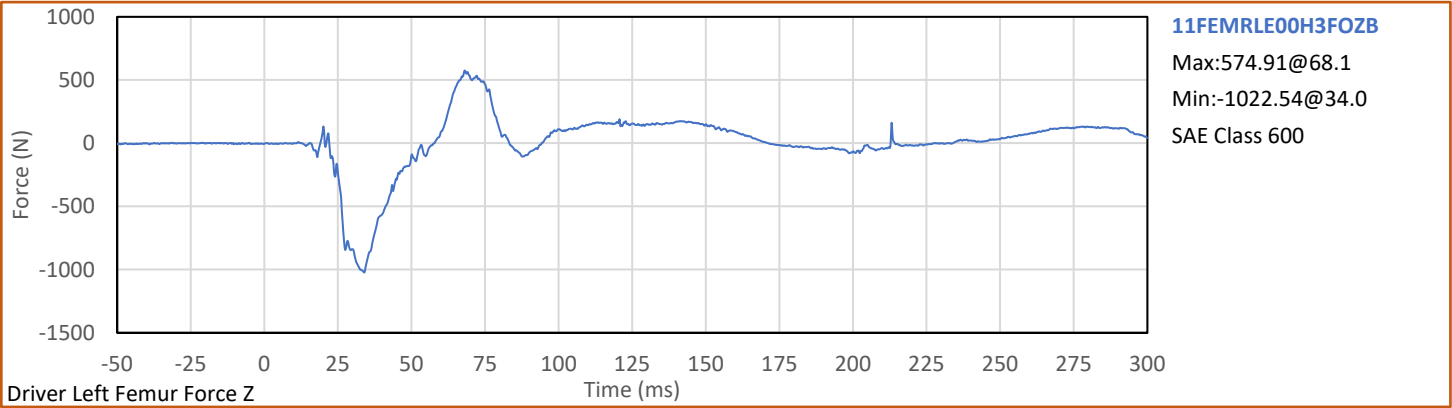


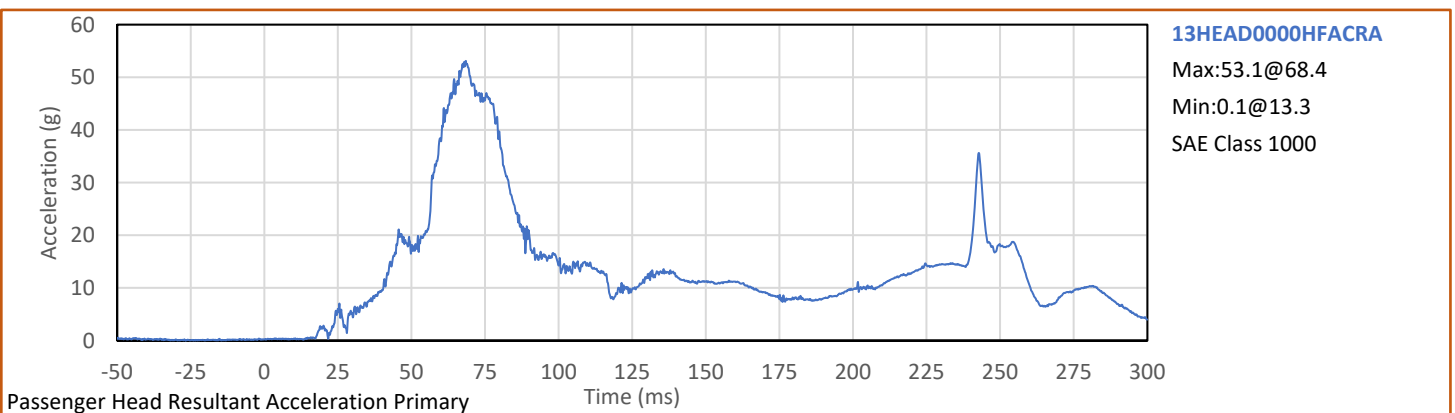
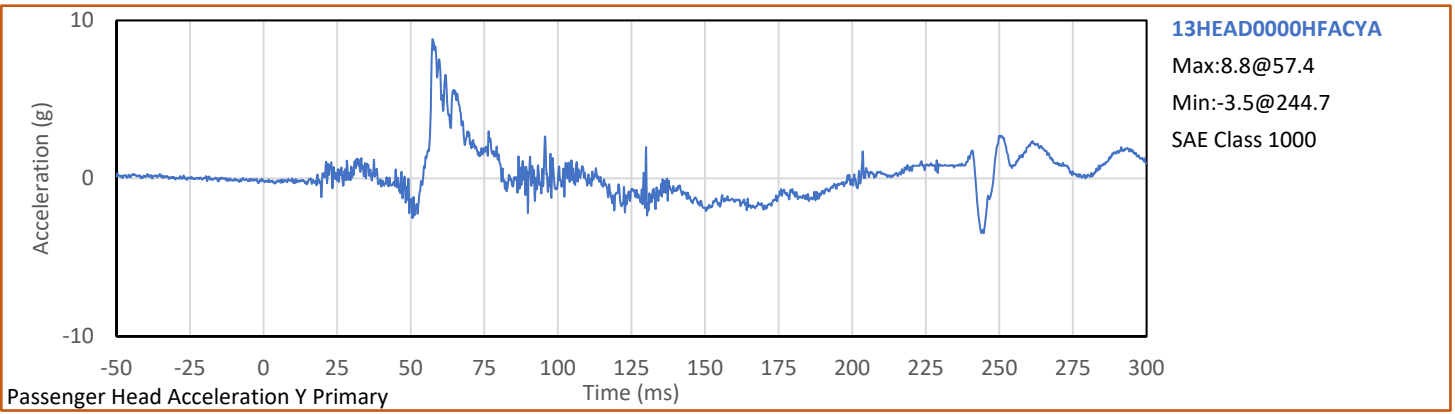
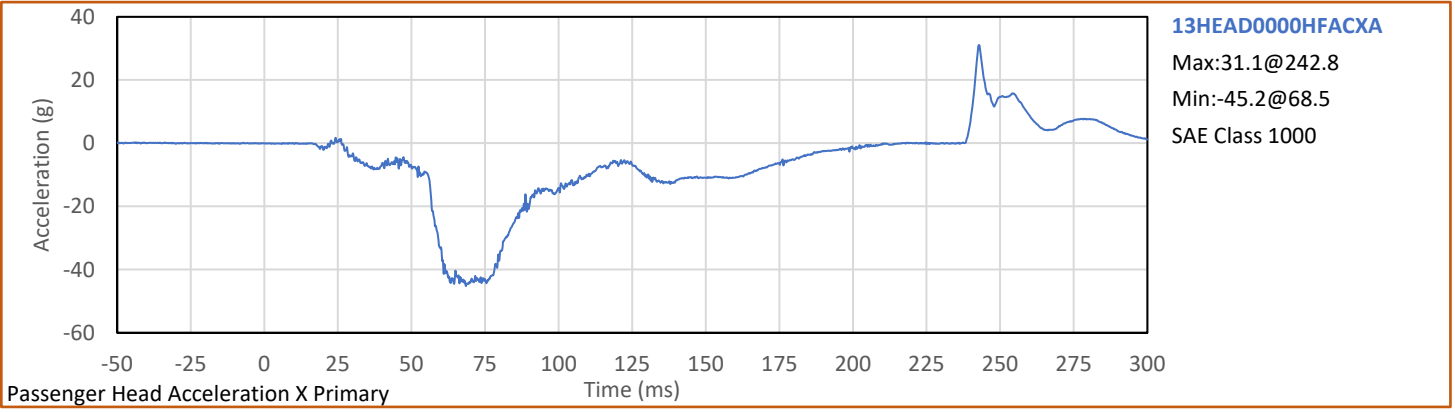




Test Vehicle: 2021 Subaru Outback 5-Door MPV  
Test Program: 56.3 km/h Frontal Impact NCAP Test

NHTSA No.: O20215500  
Test Date: 11/24/2020







Test Vehicle: 2021 Subaru Outback 5-Door MPV

NHTSA No.: O20215500

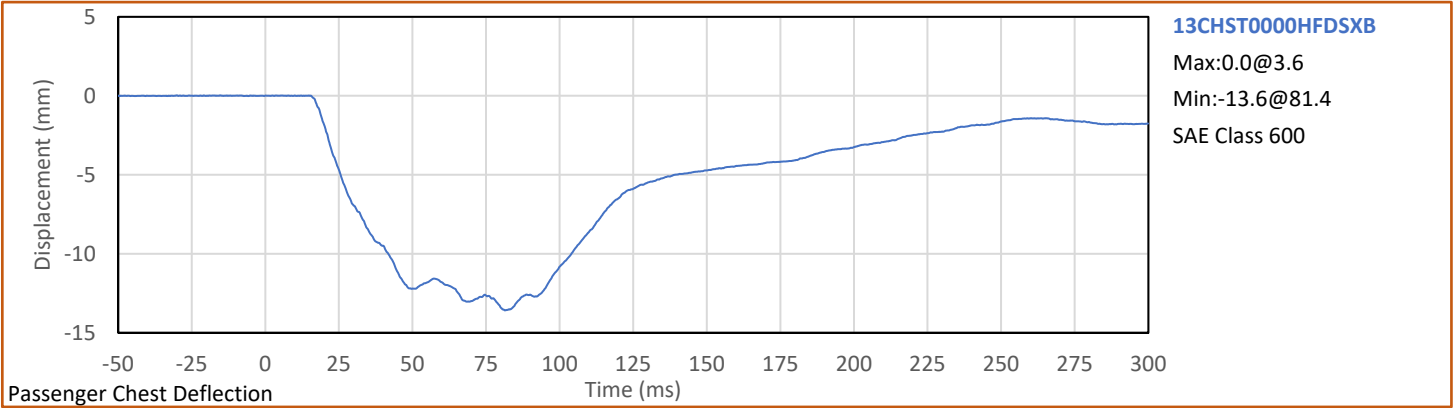
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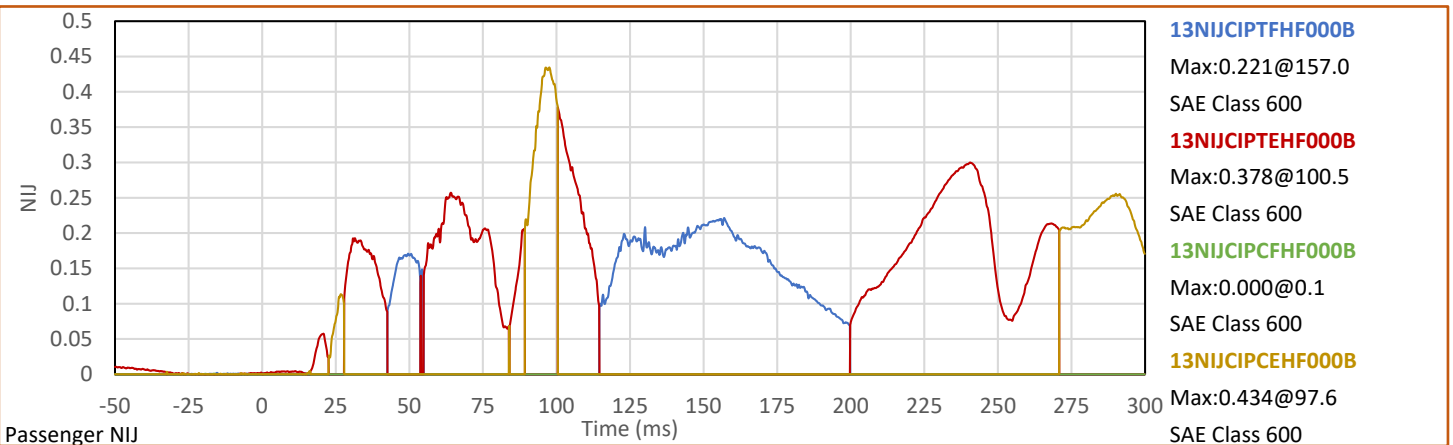
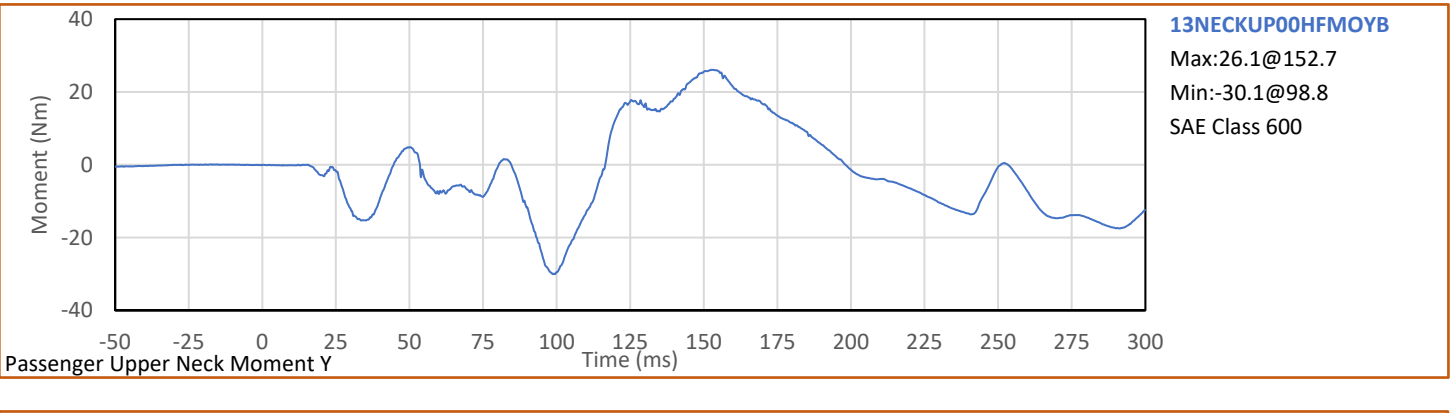
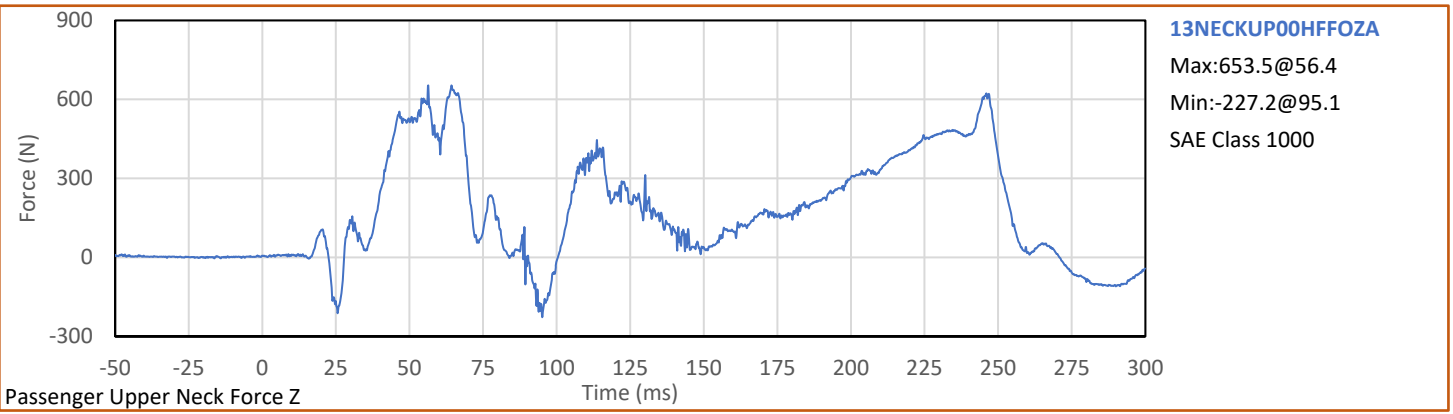
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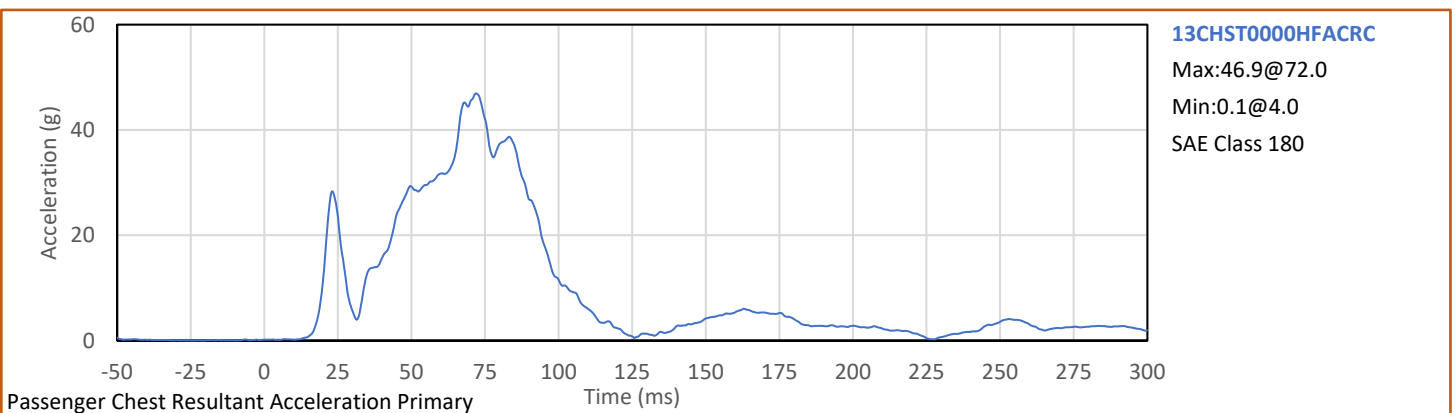
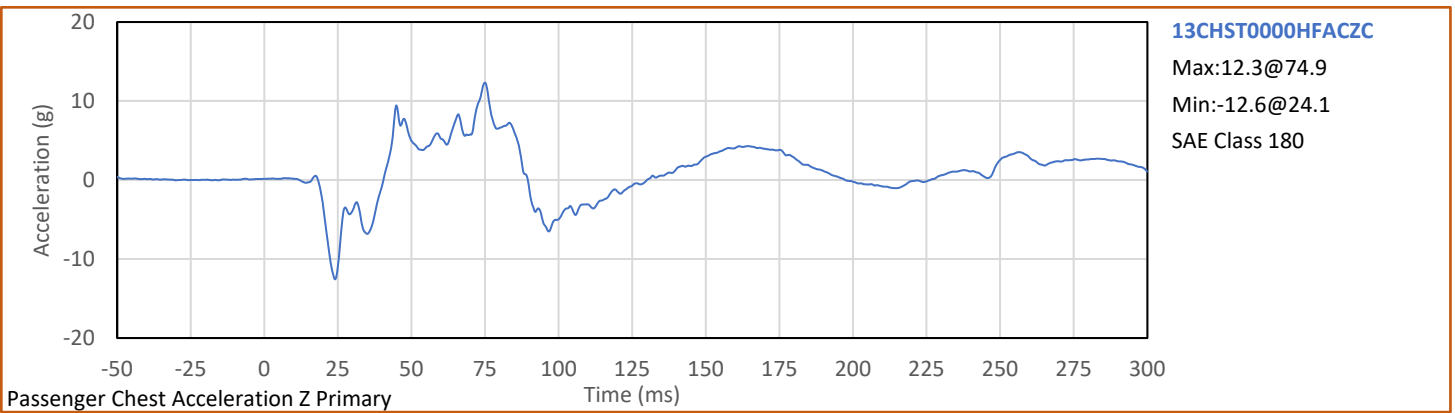
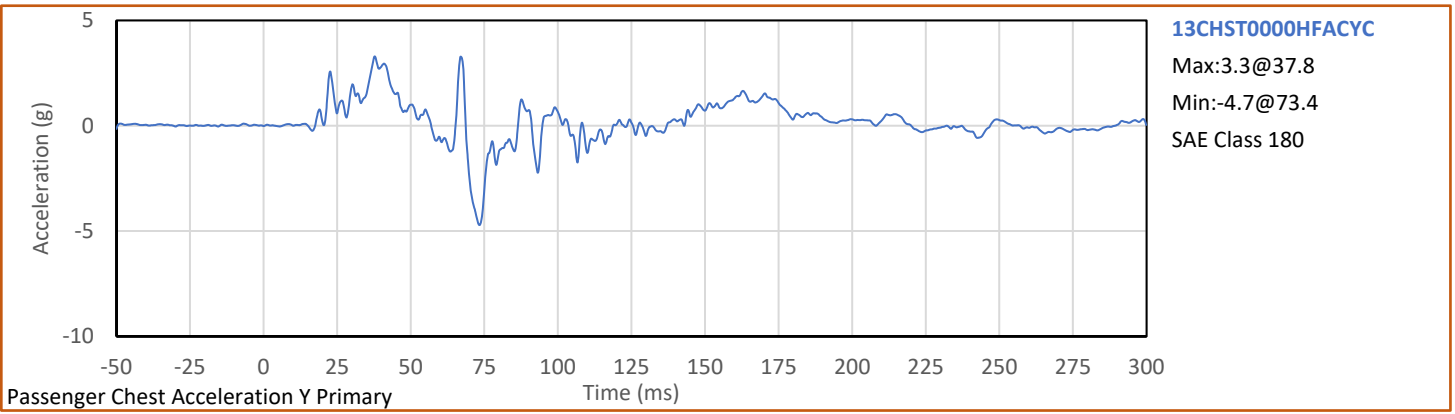
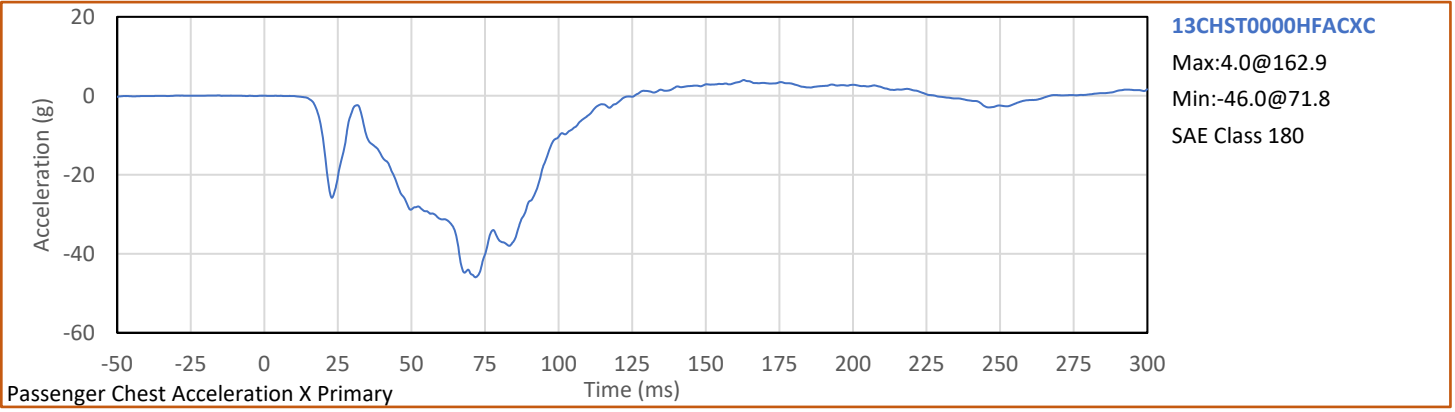
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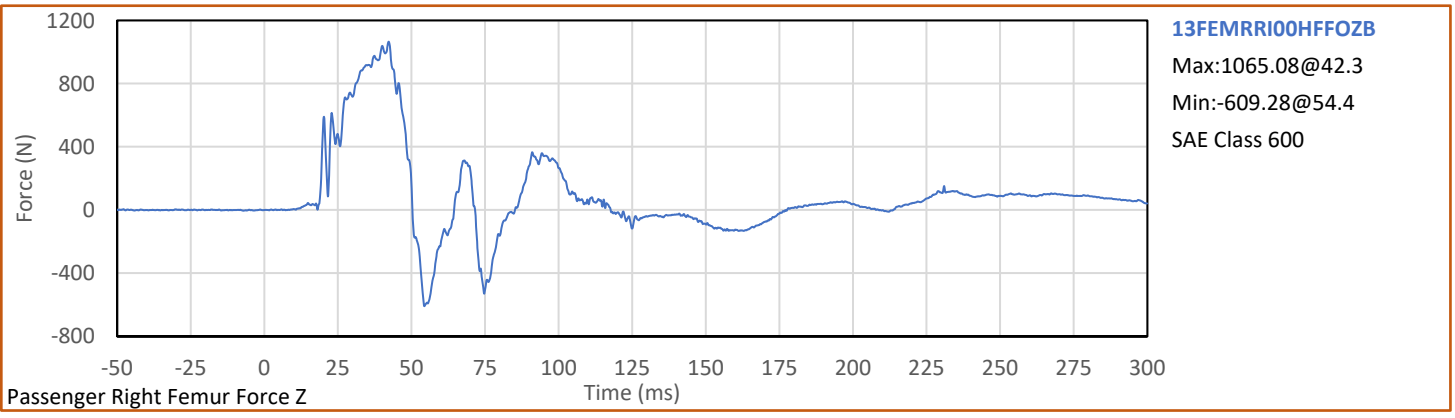
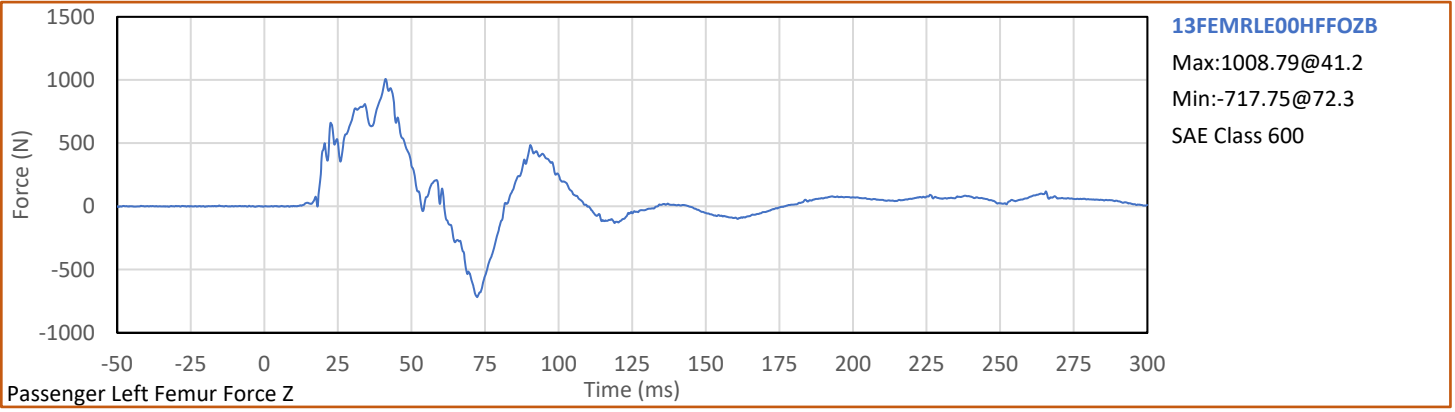






Test Vehicle: 2021 Subaru Outback 5-Door MPV  
Test Program: 56.3 km/h Frontal Impact NCAP Test

NHTSA No.: O20215500  
Test Date: 11/24/2020



**APPENDIX C**  
**DUMMY QUALIFICATION AND PERFORMANCE VERIFICATION**

**APPENDIX C**  
**Pre-Test ATD Qualification and Performance Verification**  
**Hybrid III 50th Percentile Male ATD**  
**S/N: 360**

ATD Serial No.: 360


Test Date: 2020-11-20

Dummy Item	Inspect for	Comments	Damage	OK
Entire ATD	Perform general cleaning			✓
Outer Skin	Gashes, rips, cracks			✓
Head	Ballast secure			✓
	General appearance			✓
Neck bracket	Upper neck firmly attached to lower bracket			✓
Neck	Broken or cracked rubber			✓
	Looseness at the condyle joint			✓
Nodding block	Cracked or out of position			✓
Lumbar Spine	Broken or cracked rubber			✓
Ribs	Broken or bent ribs			✓
	Broken or bent rib supports			✓
	Damping material separated or cracked			✓
	Rubber bumpers in place			✓
Chest Displ. Assembly	Bent shaft			✓
	Slider arm riding in track			✓
Sensors	Check cables for cuts, tears			✓
	Check for damaged insulation			✓
Accelerometer Mounting	Head mounting secure			✓
	Chest mounting secure			✓
Knees	Skin condition			✓
	Insert (do not remove)			✓
	Casting			✓
Limbs	Normal movement and adjustment			✓
Knee Sliders	Wires intact			✓
	Rubber returned to "resting" position			✓
Pelvis	Broken			✓
Other	Describe below as needed			✓

Describe any repairs or replacement of parts or other findings:

No Problems Found

Technician:   
J. Hernandez

Approved By:   
P. Puzzuto

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Relative Humidity	%	10	70	25	Pass
A - Total sitting height	mm	879	889	887	Pass
B - Shoulder pivot height	mm	505	521	513	Pass
C - 'H' point height	mm	84	89	87	Pass
D - 'H' point location from backline	mm	135	140	140	Pass
E - Shoulder pivot from backline	mm	84	94	90	Pass
F - Thigh clearance	mm	140	155	150	Pass
G - Back of elbow to wrist pivot	mm	290	305	294	Pass
H - Head back to backline	mm	41	46	46	Pass
I - Shoulder to elbow length	mm	330	345	341	Pass
J - Elbow rest height	mm	190	211	204	Pass
K - Buttock to knee length	mm	579	604	594	Pass
L - Popliteal length	mm	429	455	435	Pass
M - Knee pivot height	mm	485	500	491	Pass
N - Buttock popliteal length	mm	452	477	463	Pass
O - Chest depth without jacket	mm	213	229	221	Pass
P - Foot length	mm	251	267	258	Pass
V - Shoulder breadth	mm	422	437	428	Pass
W - Foot breadth	mm	91	107	102	Pass
Y - Chest circum. (w/chest jacket)	mm	970	1001	984	Pass
Z - Waist circum.	mm	836	866	845	Pass
AA - Location for chest circum.	mm	429	434	433	Pass
BB - Location for waist circum.	mm	226	231	229	Pass
Overall Test Results					Pass

Technician: \_\_\_\_\_



J. Hernandez

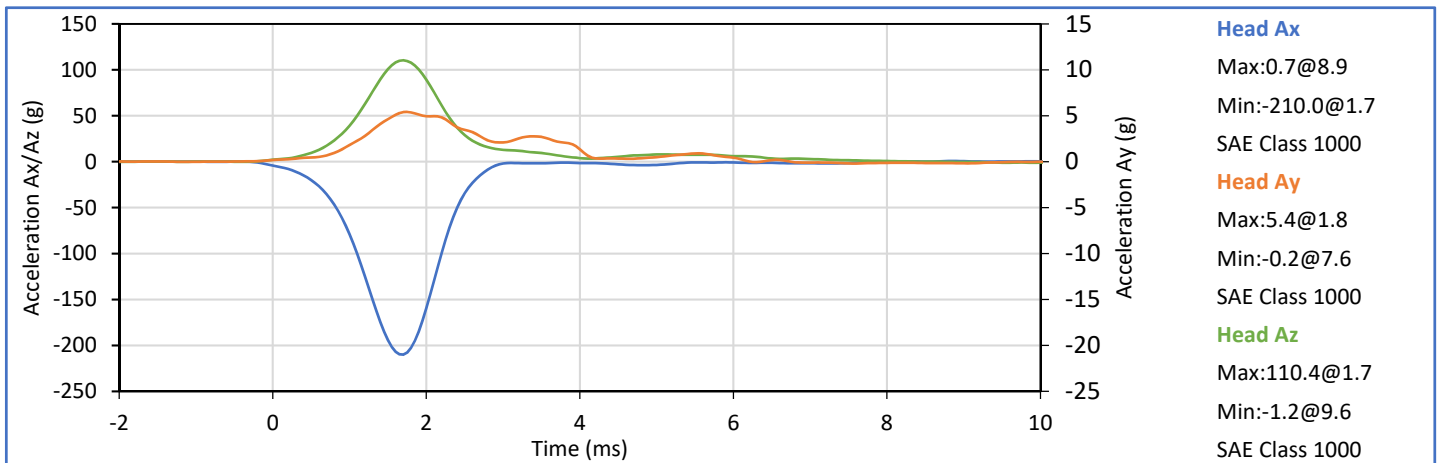
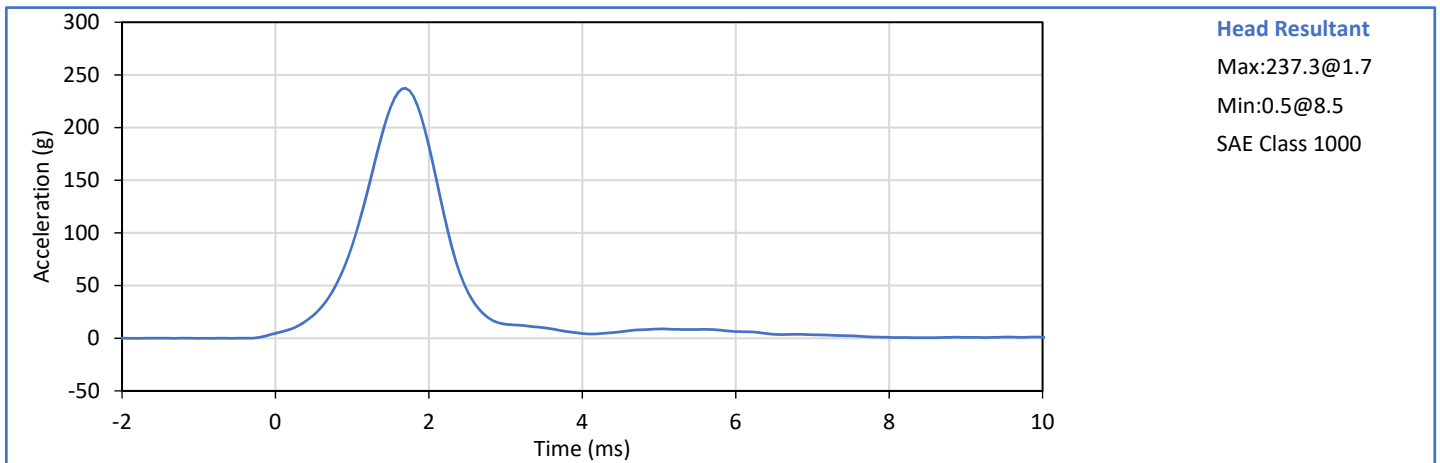
Approved By: \_\_\_\_\_




P. Puzzuto



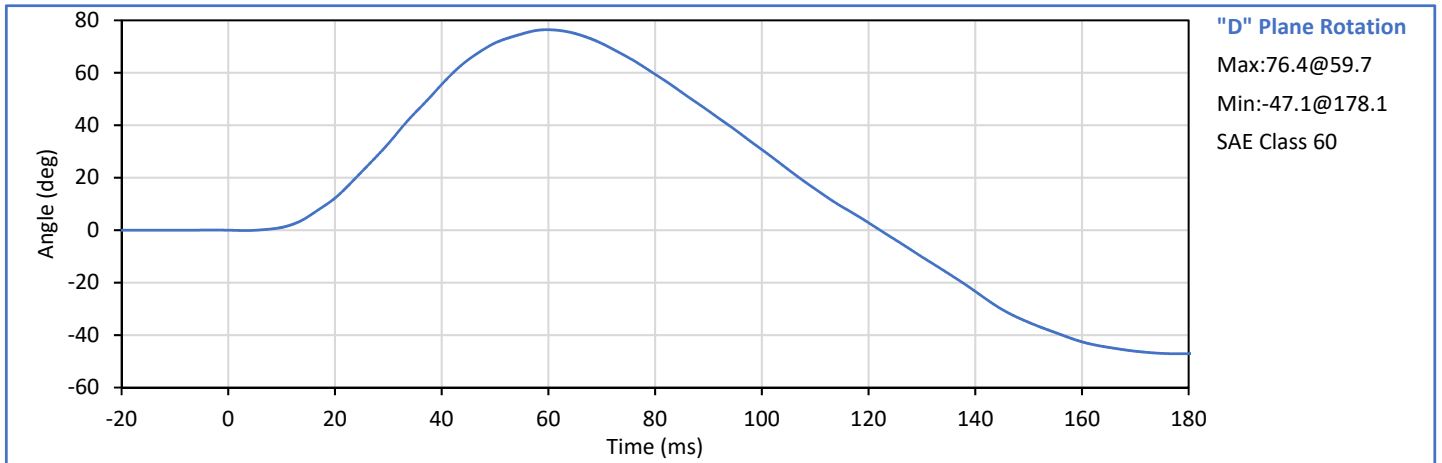
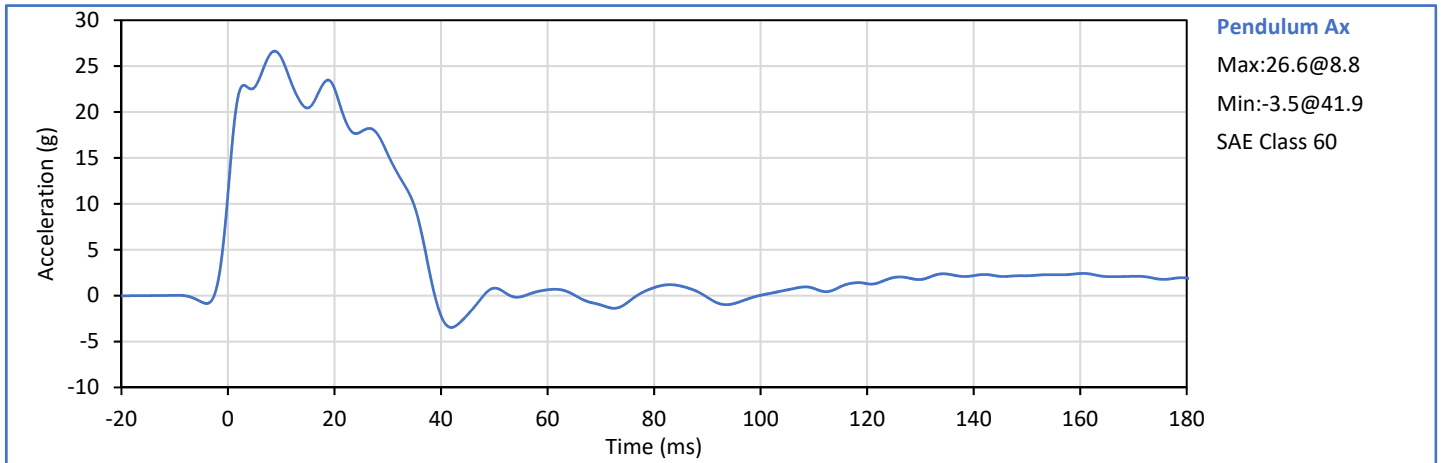
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Laboratory Temperature	°C	18.9	25.6	21.4	Pass
Laboratory Relative Humidity	%	10	70	33	Pass
Peak Resultant Acceleration	g	225.0	275.0	237.3	Pass
Peak Lateral Acceleration	g	-15.0	15.0	5.4	Pass
Oscillations After Main Pulse	%	0.0	10.0	3.5	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
<b>Overall Test Results</b>					<b>Pass</b>




Technician:   
J. Hernandez

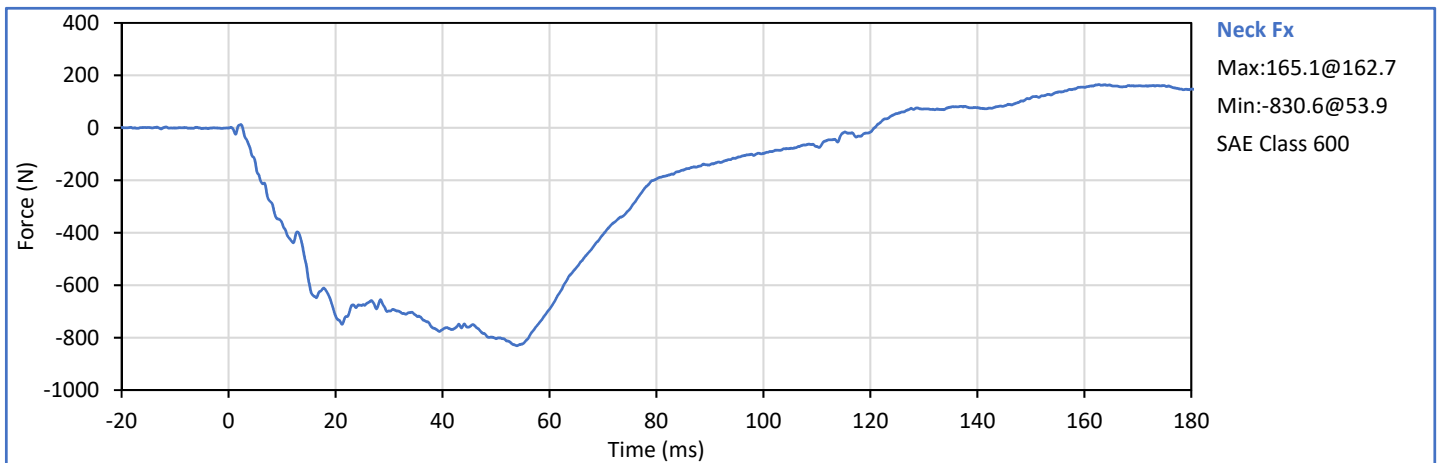
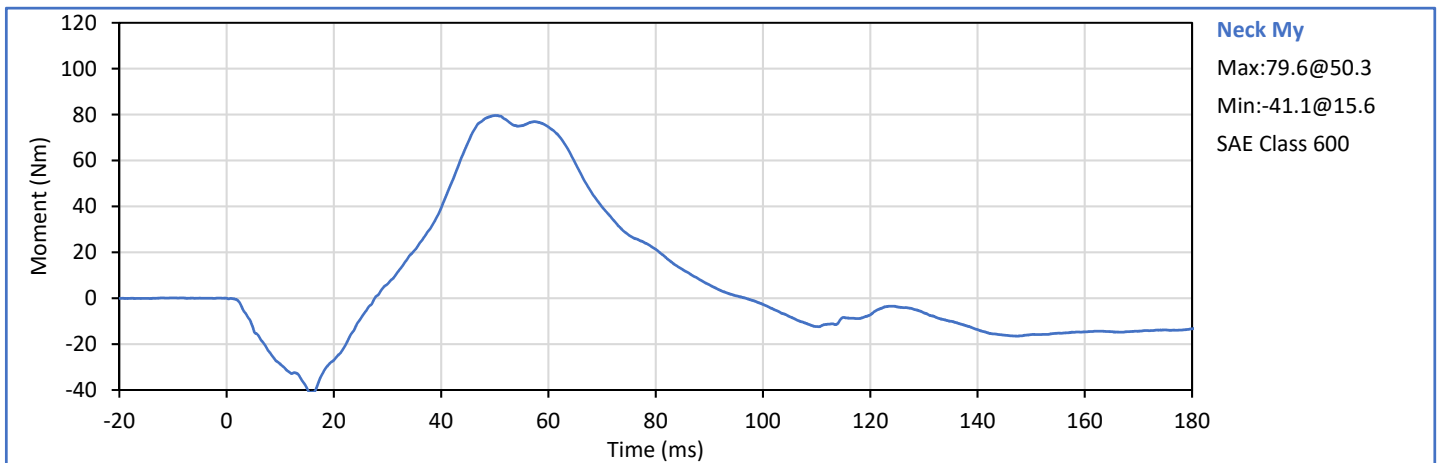
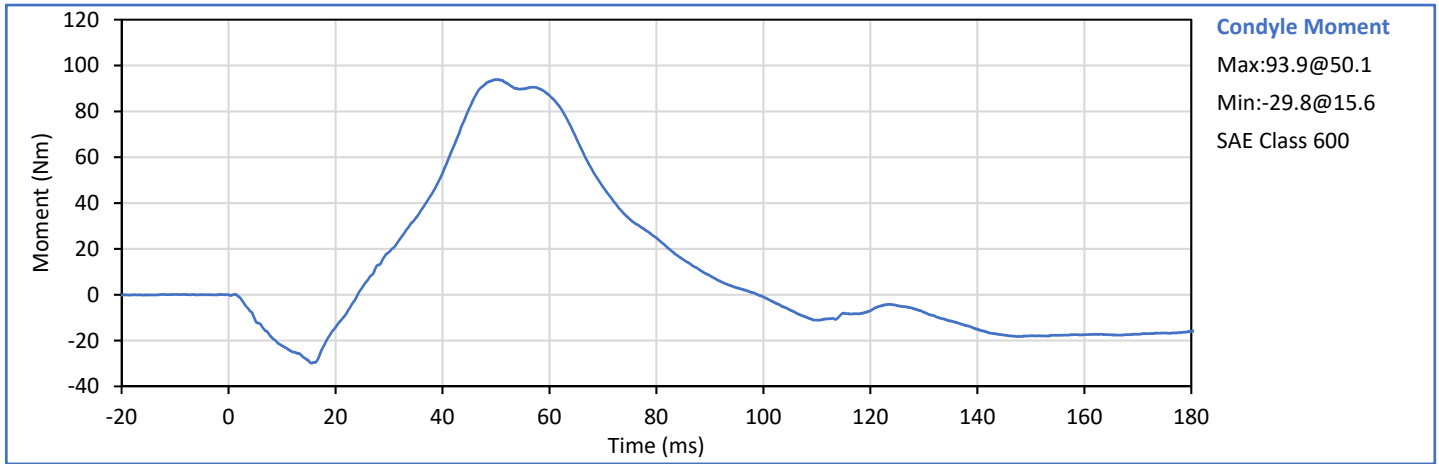
Approved By:   
P. Puzzuto

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.9	Pass
Laboratory Relative Humidity	%	10	70	20	Pass
Pendulum Velocity	m/s	6.89	7.13	7.02	Pass
Pendulum Deceleration at 10 ms	g	22.5	27.5	25.9	Pass
Pendulum Deceleration at 20 ms	g	17.6	22.6	22.5	Pass
Pendulum Deceleration at 30 ms	g	12.5	18.5	15.4	Pass
Peak Pendulum Decel. after 30 ms	g	0.0	29.0	15.4	Pass
Deceleration Decay to Cross 5 g	ms	34.0	42.0	37.0	Pass
"D" Plane Rotation peak	deg	64.0	78.0	76.4	Pass
	ms	57.0	64.0	59.7	Pass
"D" Plane Rotation Decay To Zero	ms	113.0	128.0	122.2	Pass
Moment About Occipital Condyle	Nm	88.1	108.5	93.9	Pass
	ms	47.0	58.0	50.1	Pass
Moment Decay, Peak to Zero	ms	97.0	107.0	99.0	Pass
<b>Overall Test Results</b>					<b>Pass</b>

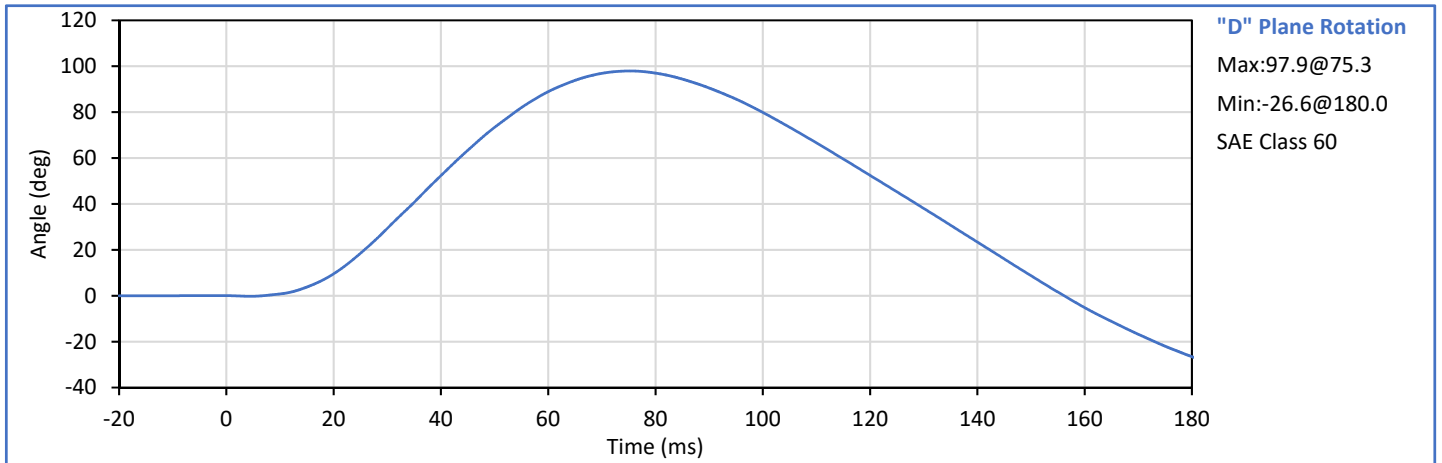
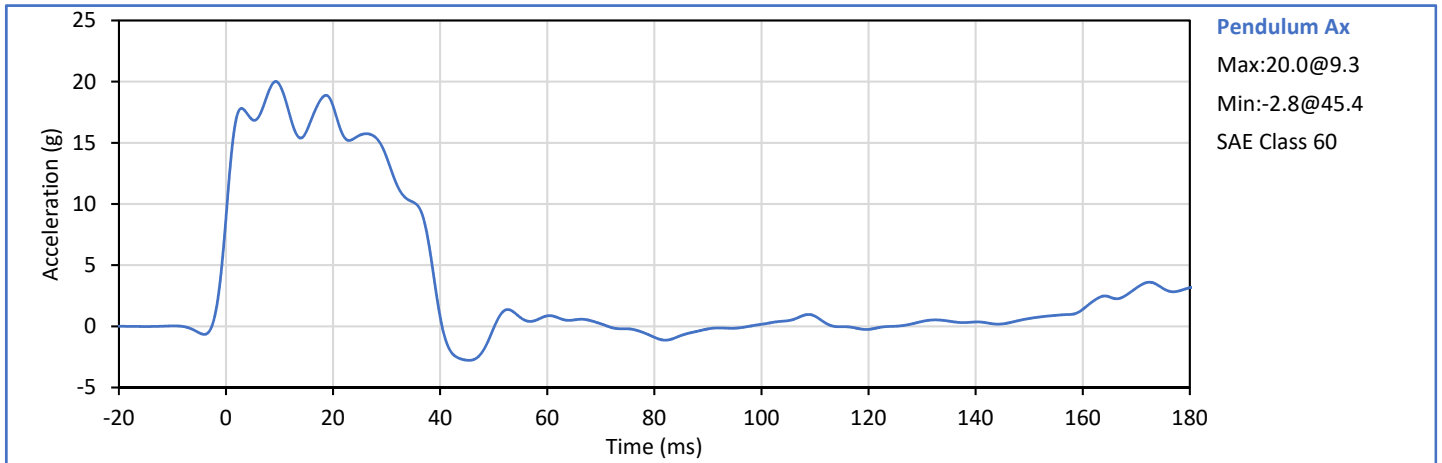


Technician:   
J. Hernandez


Approved By:   
P. Puzzuto

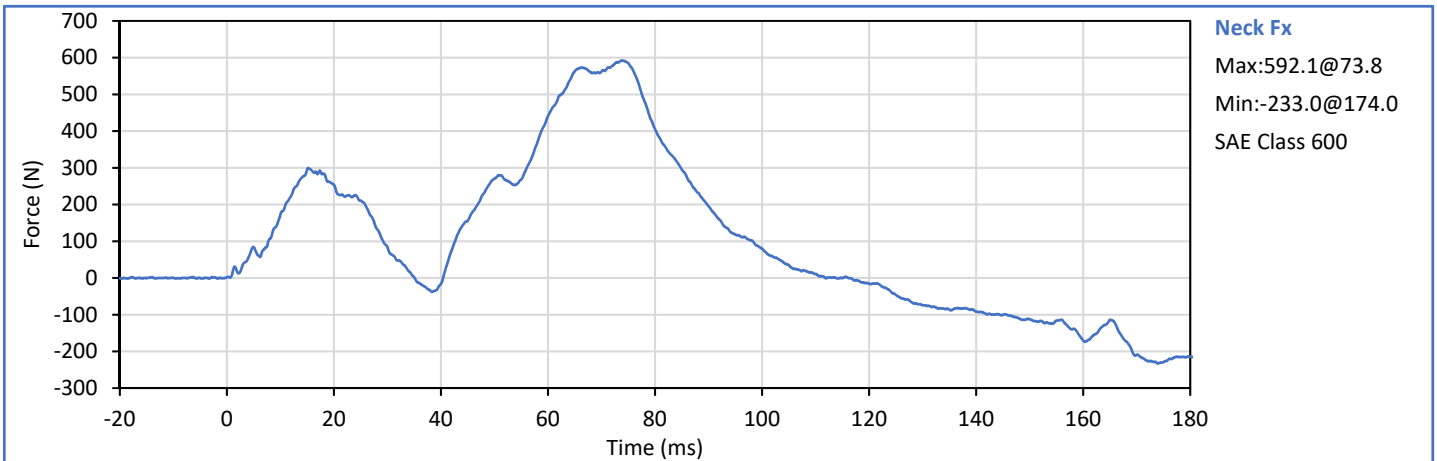
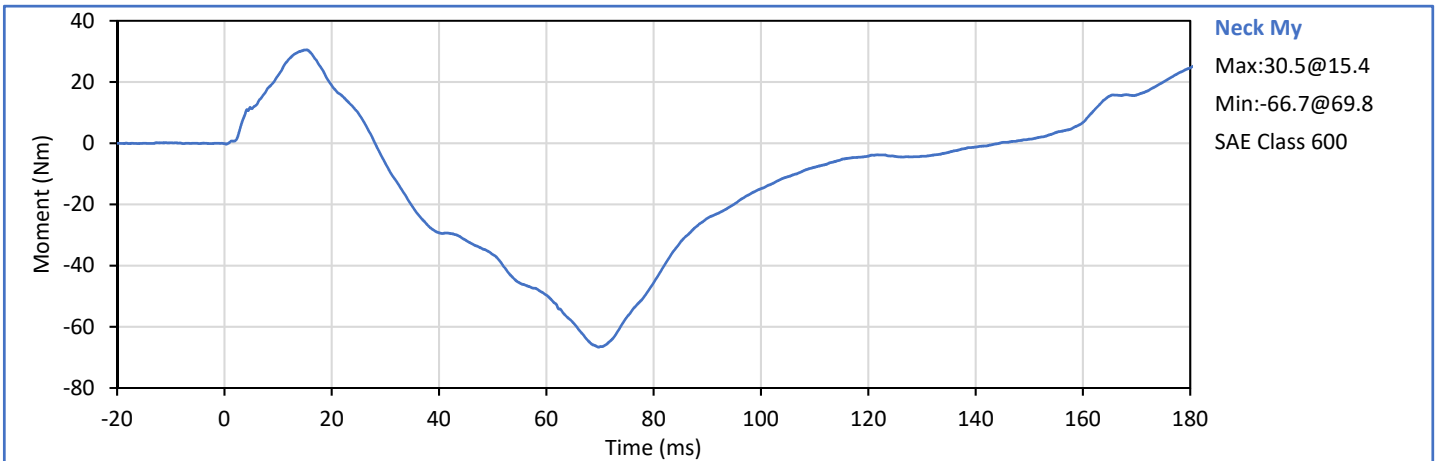
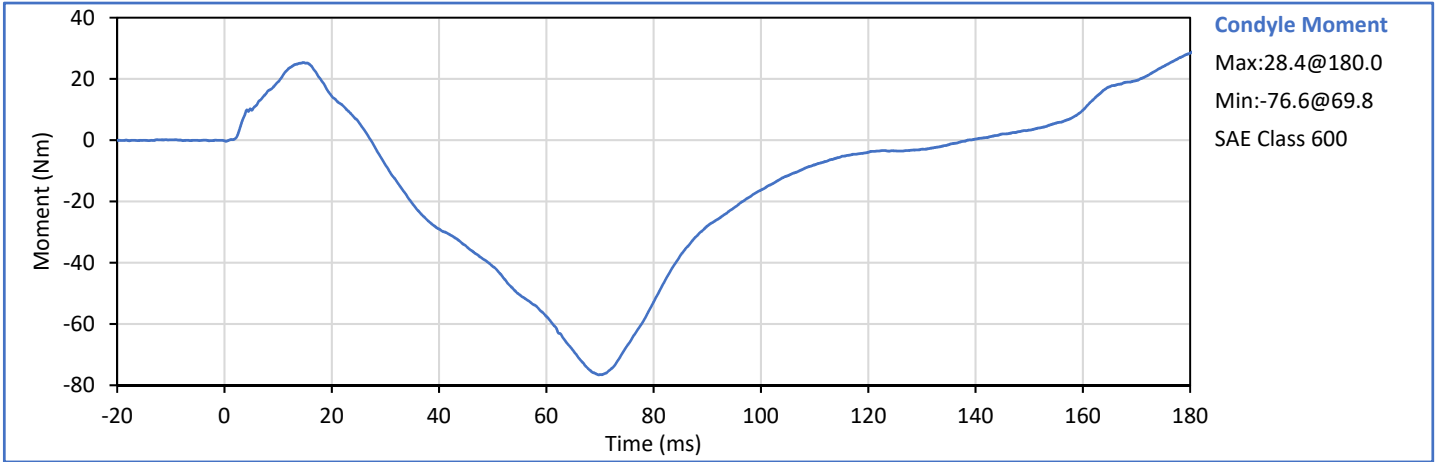


Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Relative Humidity	%	10	70	20	Pass
Pendulum Velocity	m/s	5.94	6.19	6.09	Pass
Pendulum Deceleration at 10 ms	g	17.2	21.2	19.8	Pass
Pendulum Deceleration at 20 ms	g	14.0	19.0	18.0	Pass
Pendulum Deceleration at 30 ms	g	11.0	16.0	13.8	Pass
Peak Pendulum Decel. after 30 ms	g	0.0	22.0	13.8	Pass
Deceleration Decay to Cross 5 g	ms	38.0	46.0	38.5	Pass
"D" Plane Rotation peak	deg	81.0	106.0	97.9	Pass
	ms	72.0	82.0	75.3	Pass
"D" Plane Rotation Decay To Zero	ms	147.0	174.0	156.2	Pass
Moment About Occipital Condyle	Nm	-79.9	-52.9	-76.6	Pass
	ms	65.0	79.0	69.8	Pass
Moment Decay, Peak to Zero	ms	120.0	148.0	138.5	Pass
<b>Overall Test Results</b>					<b>Pass</b>

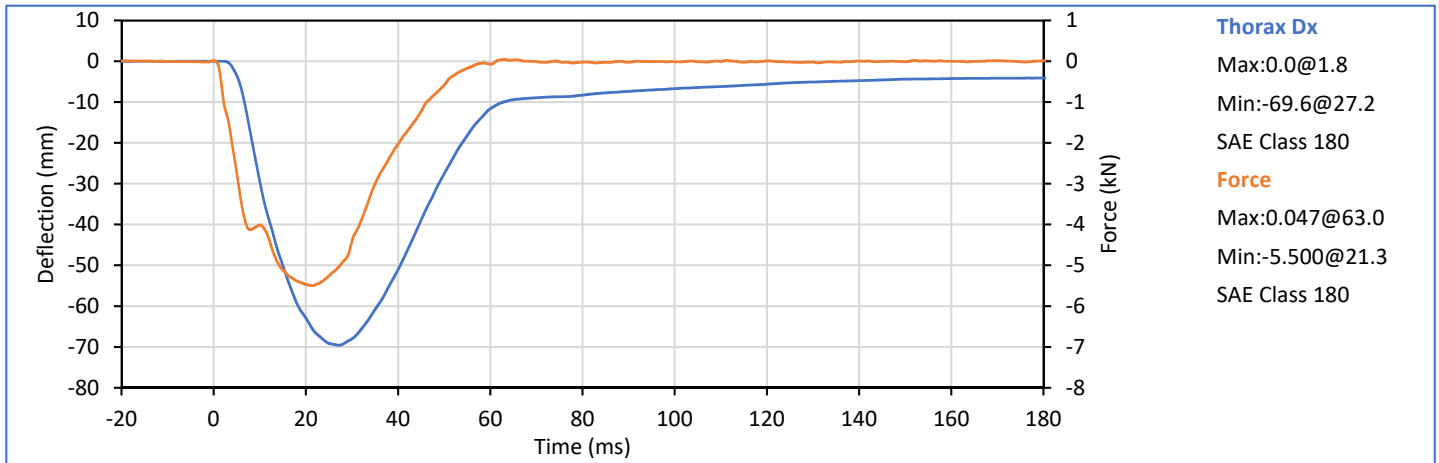
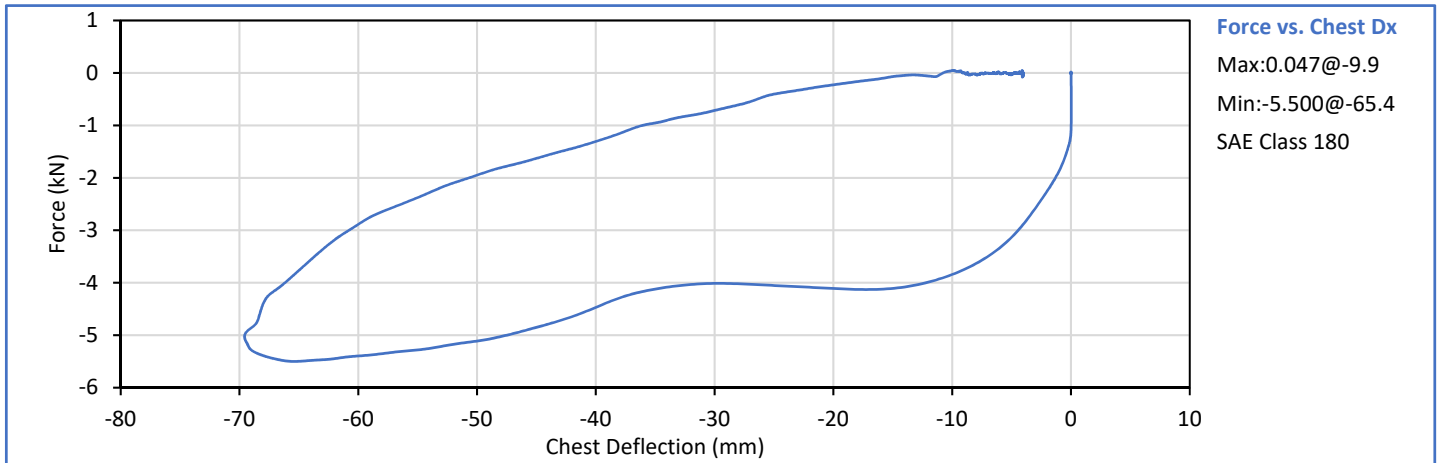


Technician:   
J. Hernandez


Approved By:   
P. Puzzuto



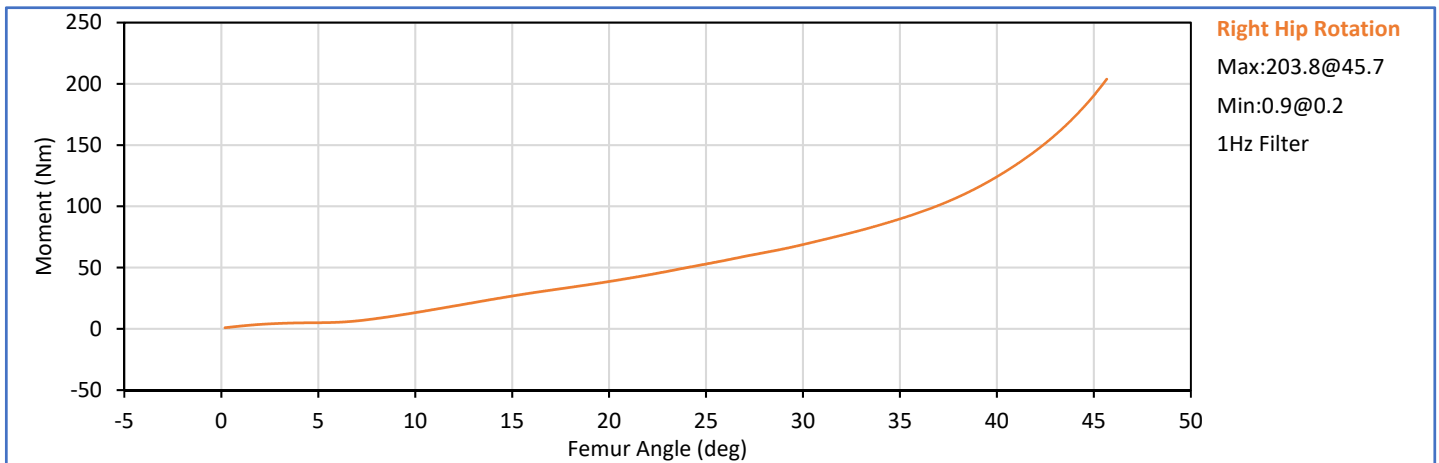
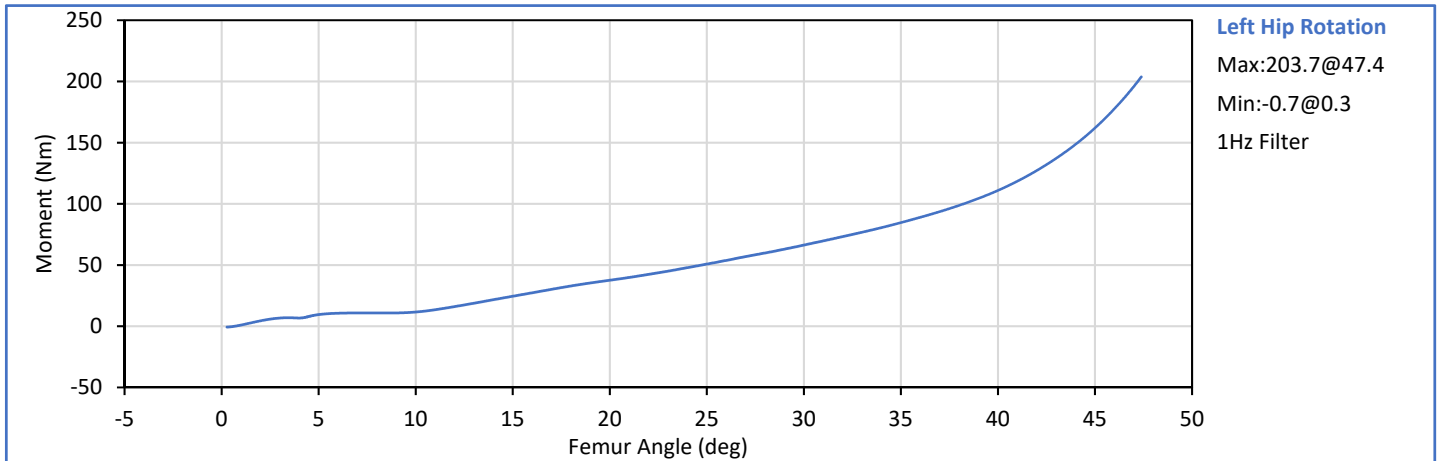
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Relative Humidity	%	10	70	30	Pass
Probe Velocity	m/s	6.58	6.82	6.73	Pass
Peak Chest Deflection	mm	-72.6	-63.5	-69.6	Pass
Peak Probe Force	kN	-5.893	-5.159	-5.500	Pass
Internal Hysteresis	%	69.0	85.0	70.1	Pass
<b>Overall Test Results</b>					<b>Pass</b>




Technician:   
 J. Hernandez

Approved By:   
 P. Puzzuto

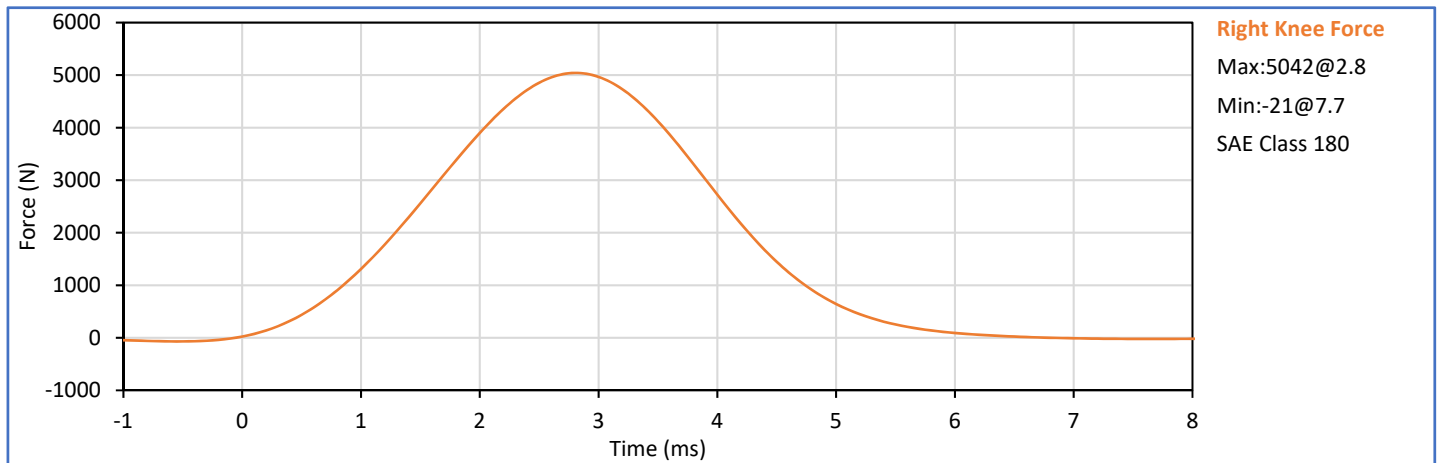
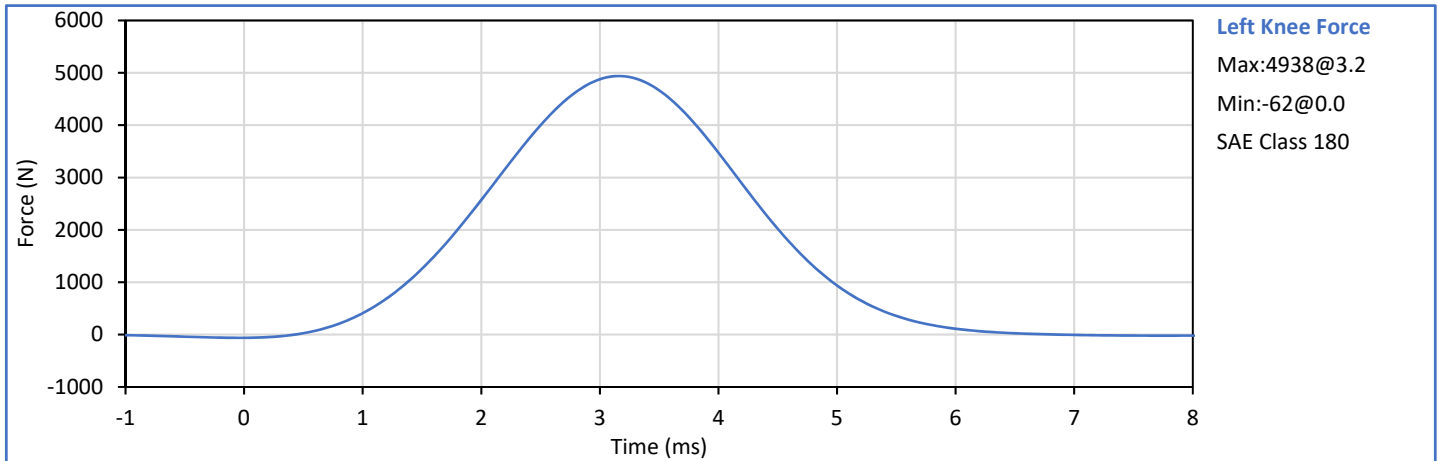
	Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
	Laboratory Temperature	°C	18.9	25.6	21.2	Pass
	Laboratory Relative Humidity	%	10	70	21	Pass
Left Hip	Left Hip Rotation Rate	deg/s	5.0	10.0	5.7	Pass
	Left Femur Torque at 30°	Nm	0.0	95.0	66.4	Pass
	Left Hip Rotation at 203 Nm	deg	40.0	50.0	47.3	Pass
Right Hip	Right Hip Rotation Rate	deg/s	5.0	10.0	5.7	Pass
	Right Femur Torque at 30°	Nm	0.0	95.0	68.8	Pass
	Right Hip Rotation at 203 Nm	deg	40.0	50.0	45.6	Pass
Overall Test Results						Pass




Technician:   
J. Hernandez

Approved By:   
P. Puzzuto

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.1	Pass
Laboratory Relative Humidity	%	10	70	32	Pass
Left Knee Probe Velocity	m/s	2.070	2.130	2.102	Pass
Left Knee Peak Resistive Force	N	4715	5782	4938	Pass
Right Knee Probe Velocity	m/s	2.070	2.130	2.122	Pass
Right Knee Peak Resistive Force	N	4715	5782	5042	Pass
Overall Test Results					Pass



Technician:   
J. Hernandez

Approved By:   
P. Puzzuto



**APPENDIX C**  
**Pre-Test ATD Qualification and Performance Verification**  
**Hybrid III 5th Percentile Female ATD**  
**S/N: 141**

Dummy Item	Inspect for	Comments	Damage	Okay
Entire ATD	Perform general cleaning			✓
Outer Skin	Gashes, rips, cracks			✓
Head	Ballast secure			✓
	General appearance			✓
Neck bracket	Upper neck firmly attached to lower bracket			✓
Neck	Broken or cracked rubber			✓
	Looseness at the condyle joint			✓
Nodding block	Cracked or out of position			✓
Lumbar Spine	Broken or cracked rubber			✓
Ribs	Broken or bent ribs			✓
	Broken or bent rib supports			✓
	Damping material separated or cracked			✓
	Rubber bumpers in place			✓
Chest Displ. Assembly	Bent shaft			✓
	Slider arm riding in track			✓
Sensors	Check cables for cuts, tears			✓
	Check for damaged insulation			✓
Accelerometer	Head mounting secure			✓
Mounting	Chest mounting secure			✓
Knees	Skin condition			✓
	Insert (do not remove)			✓
	Casting			✓
Limbs	Normal movement and adjustment			✓
Knee Sliders	Wires intact			✓
	Rubber returned to "resting" position			✓
Pelvis	Broken			✓
Other	Describe below as needed			✓

Describe any repairs or replacement of parts or other findings:

No Problems Found

Technician: \_\_\_\_\_

J. Hernandez

Approved By: \_\_\_\_\_

P. Puzzuto

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Relative Humidity	%	10	70	22	Pass
A - Total sitting height	mm	775	800	788	Pass
B - Shoulder pivot height	mm	432	457	453	Pass
C - 'H' point height	mm	81	86	86	Pass
D - 'H' point location from backline	mm	145	150	148	Pass
E - Shoulder pivot from backline	mm	69	84	78	Pass
F - Thigh clearance	mm	119	135	128	Pass
G - Back of elbow to wrist pivot	mm	244	259	254	Pass
H - Head back to backline	mm	41	46	43	Pass
I - Shoulder to elbow length	mm	277	297	287	Pass
J - Elbow rest height	mm	183	203	197	Pass
K - Buttock to knee length	mm	521	546	531	Pass
L - Popliteal length	mm	356	376	367	Pass
M - Knee pivot height	mm	394	419	407	Pass
N - Buttock popliteal length	mm	414	439	428	Pass
O - Chest depth without jacket	mm	175	191	183	Pass
P - Foot length	mm	219	234	231	Pass
R - Buttock to Knee Pivot Length	mm	457	483	473	Pass
S - Head Breadth	mm	137	147	144	Pass
T - Head Depth	mm	178	188	184	Pass
U - Hip Breadth	mm	300	315	308	Pass
V - Shoulder breadth	mm	351	366	360	Pass
W - Foot breadth	mm	79	94	88	Pass
X - Head circum.	mm	528	549	535	Pass
Y - Chest circum. (w/chest jacket)	mm	851	881	868	Pass
Z - Waist circum.	mm	760	790	776	Pass
AA - Location for chest circum.	mm	333	358	339	Pass
BB - Location for waist circum.	mm	160	170	168	Pass
Overall Test Results					Pass

Technician: \_\_\_\_\_



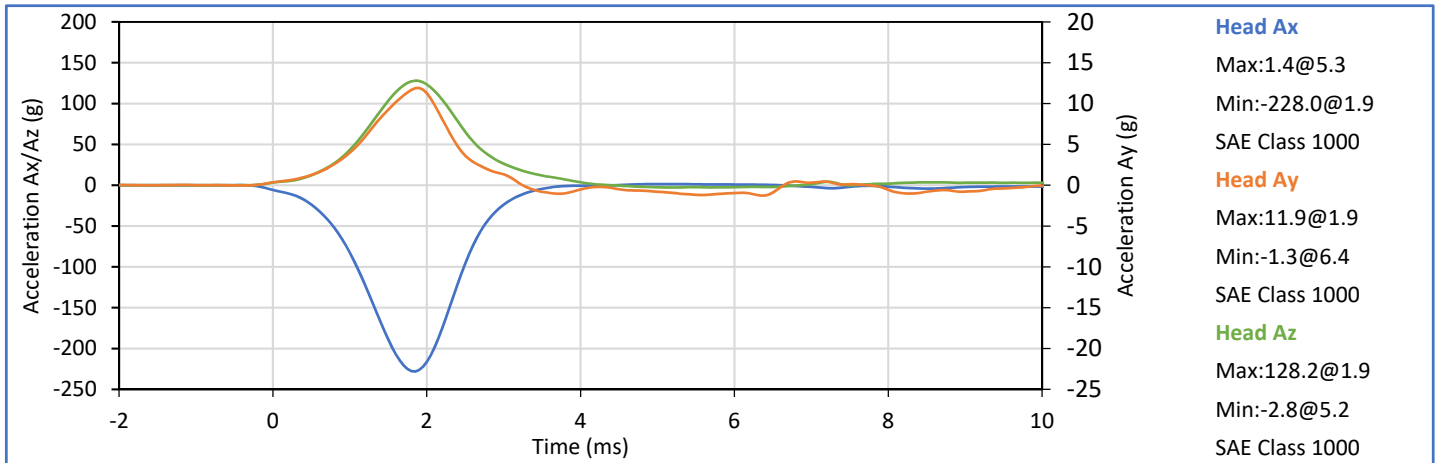
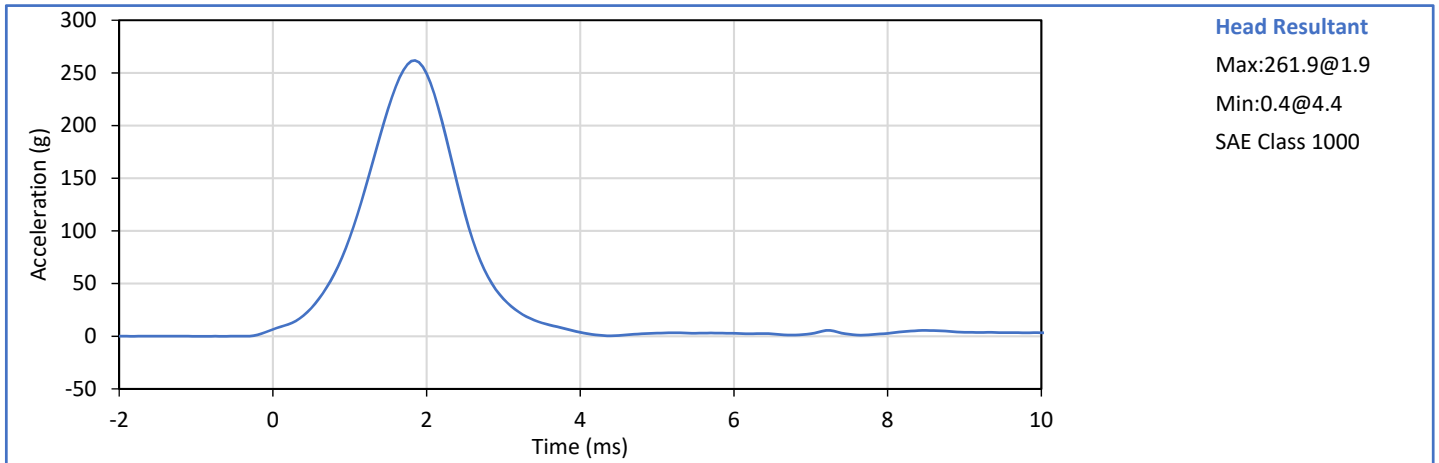
J. Hernandez


Approved By: \_\_\_\_\_




P. Puzzuto

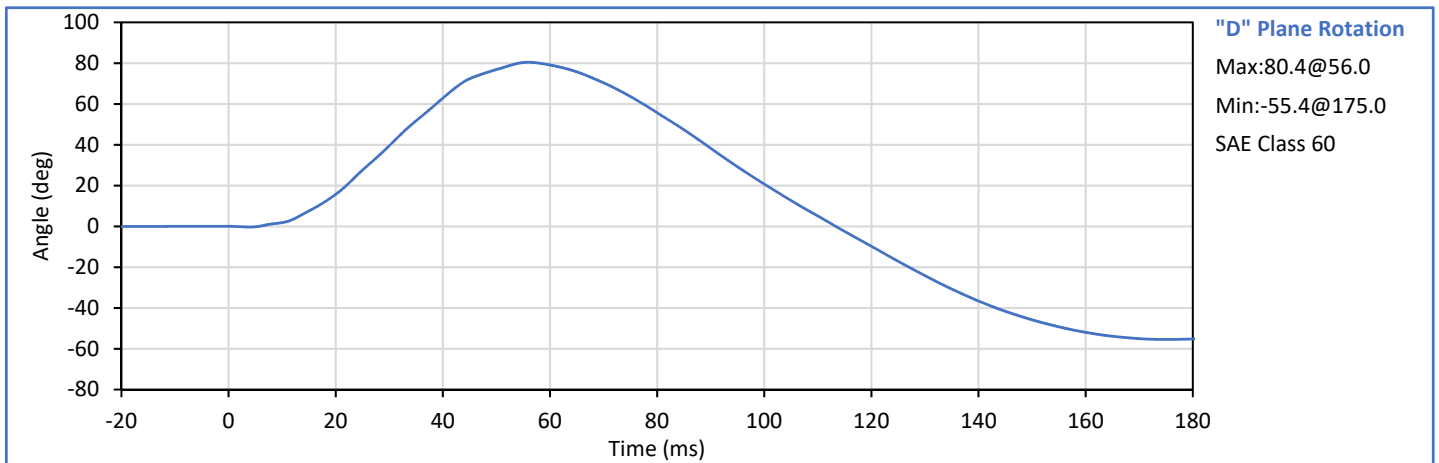
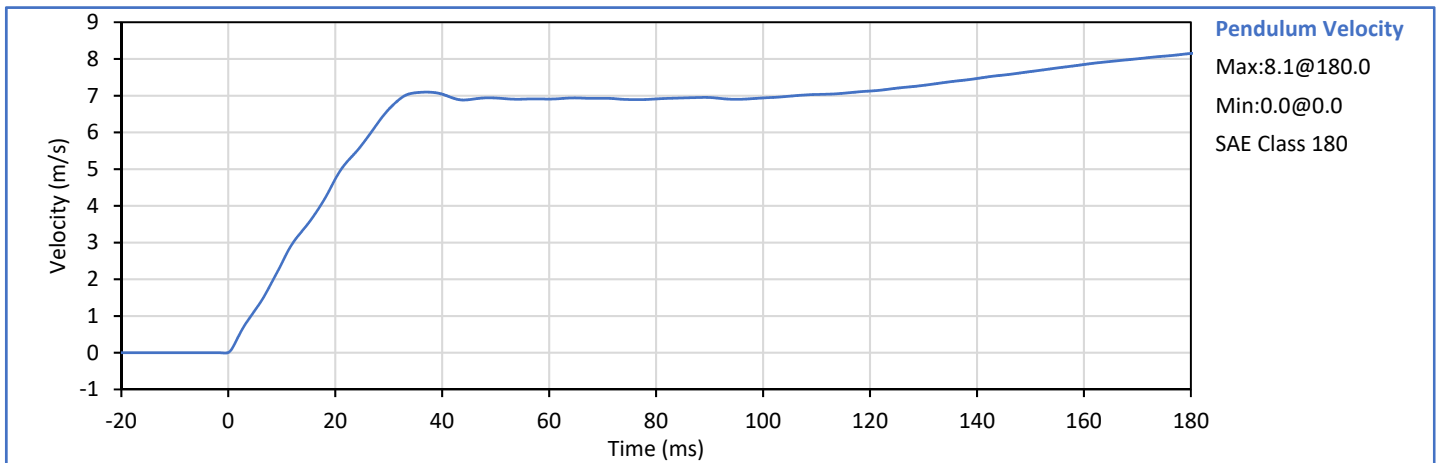
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.1	Pass
Laboratory Humidity	%	10	70	32	Pass
Peak Resultant Acceleration	g	250.0	300.0	261.9	Pass
Peak Lateral Acceleration	g	-15.0	15.0	11.9	Pass
Oscillations After Main Pulse	%	0.0	10.0	2.1	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
<b>Overall Test Results</b>					<b>Pass</b>




Technician:   
J. Hernandez

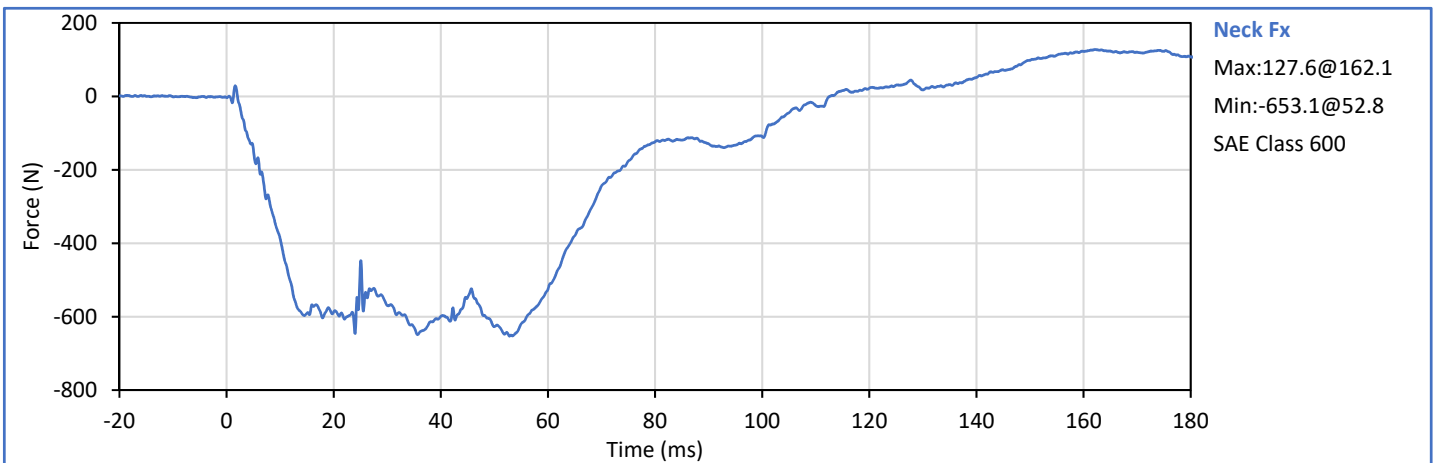
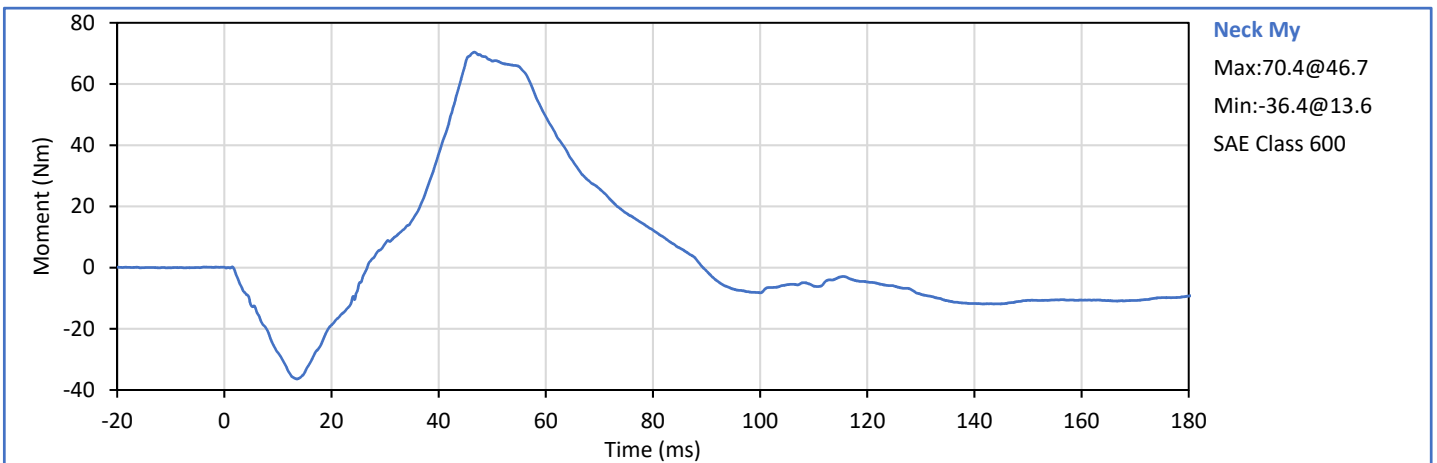
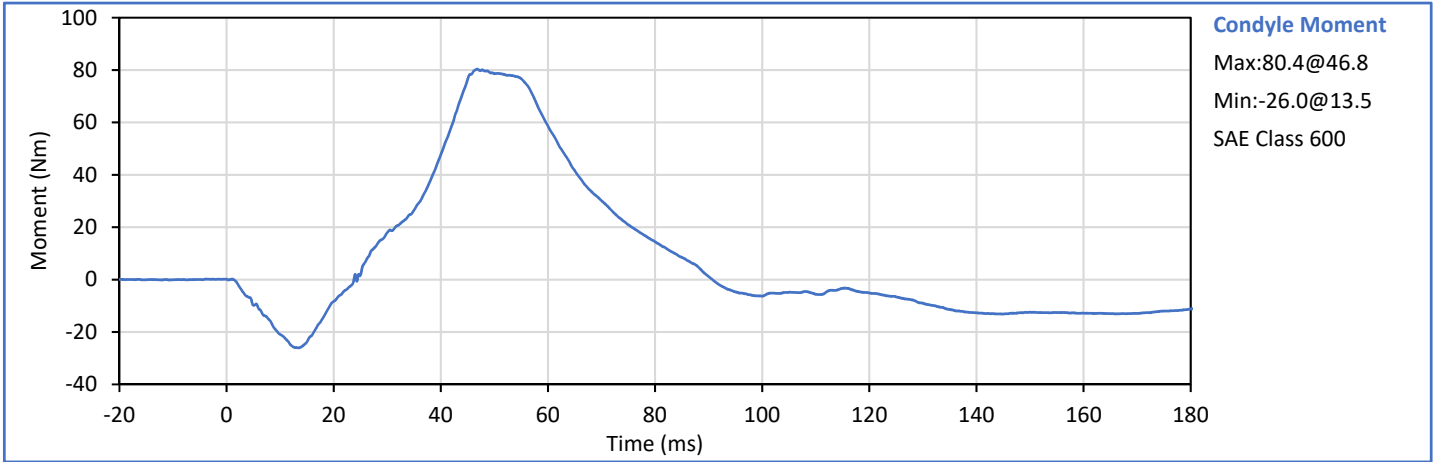
Approved By:   
P. Puzzuto

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Humidity	%	10	70	20	Pass
Pendulum Velocity	m/s	6.89	7.13	7.00	Pass
Pendulum Velocity at 10 ms	m/s	2.10	2.50	2.43	Pass
Pendulum Velocity at 20 ms	m/s	4.00	5.00	4.73	Pass
Pendulum Velocity at 30 ms	m/s	5.80	7.00	6.63	Pass
Peak "D" Plane Rotation	deg	77.0	91.0	80.4	Pass
Peak Moment in Rotation	Nm	69.0	83.0	80.4	Pass
Positive Moment Decay to 10 Nm	ms	80.0	100.0	83.8	Pass
<b>Overall Test Results</b>					<b>Pass</b>

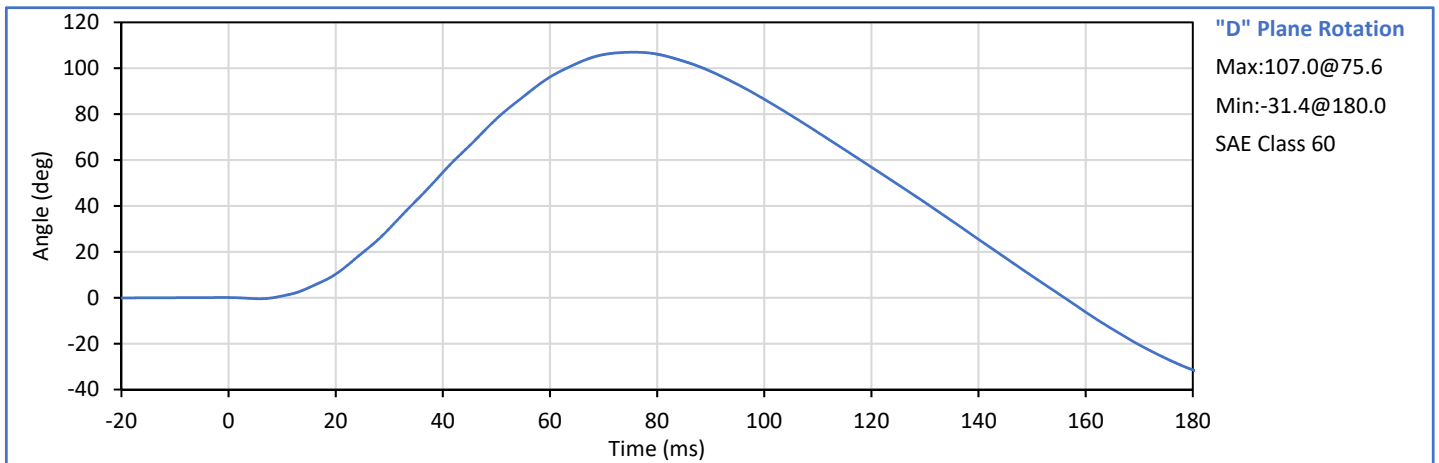
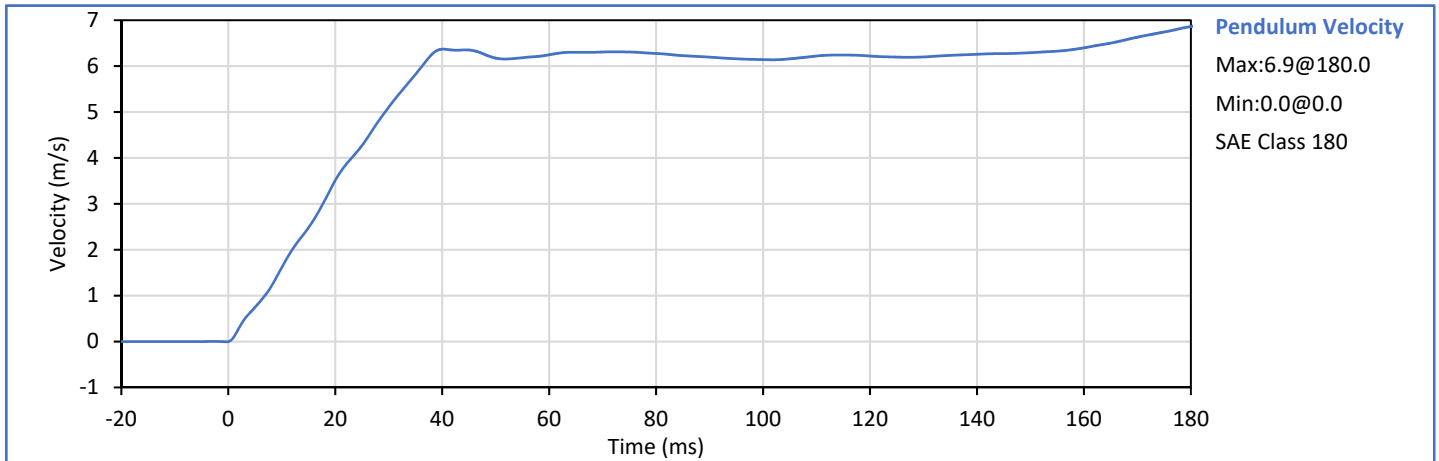



Technician:   
J. Hernandez


Approved By:   
P. Puzzuto

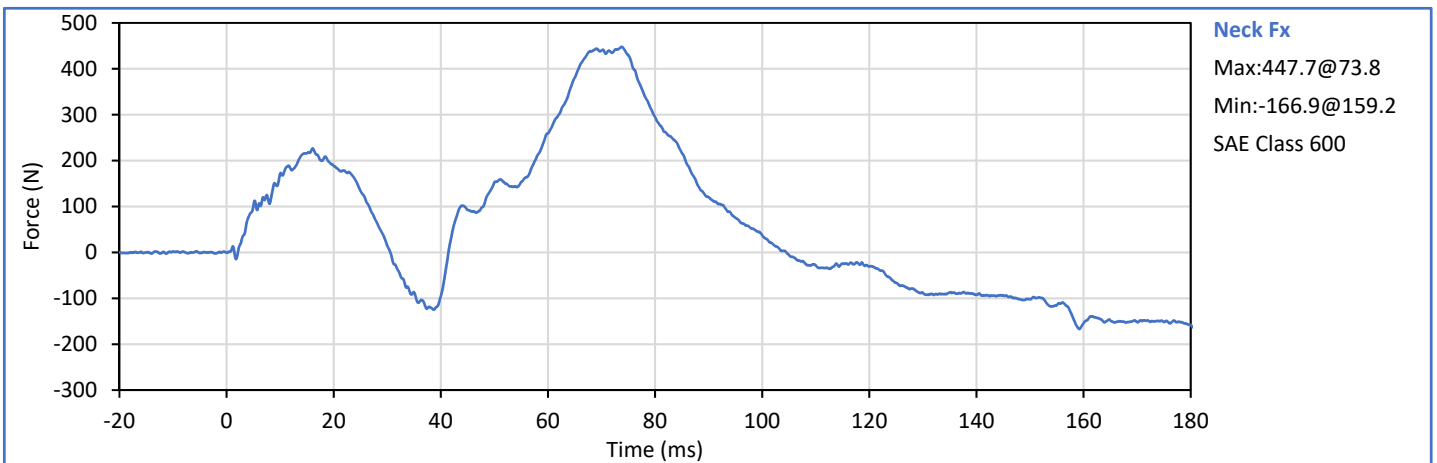
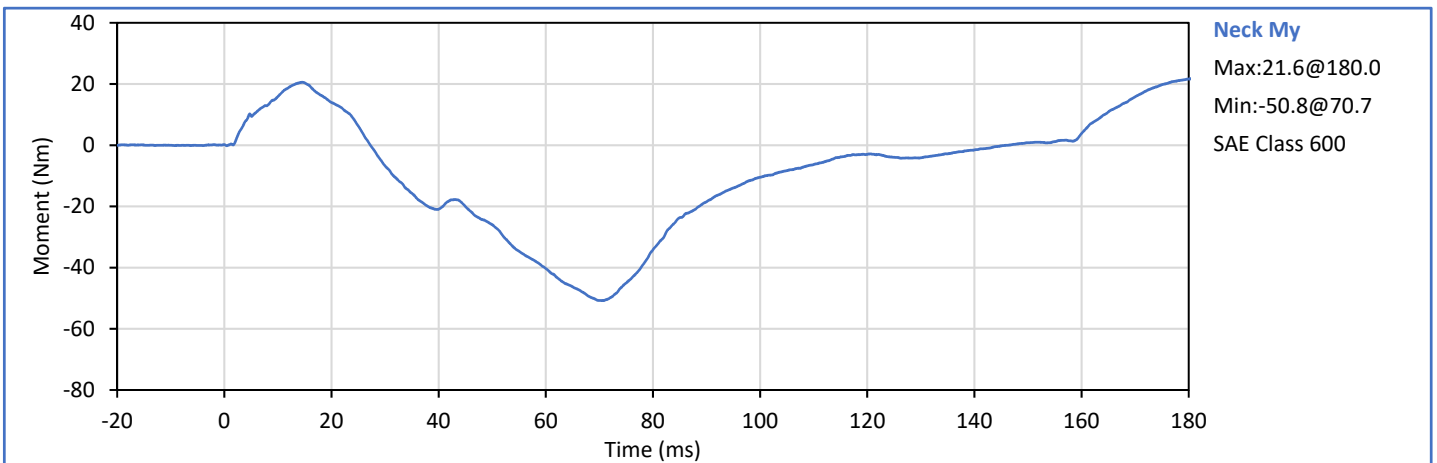
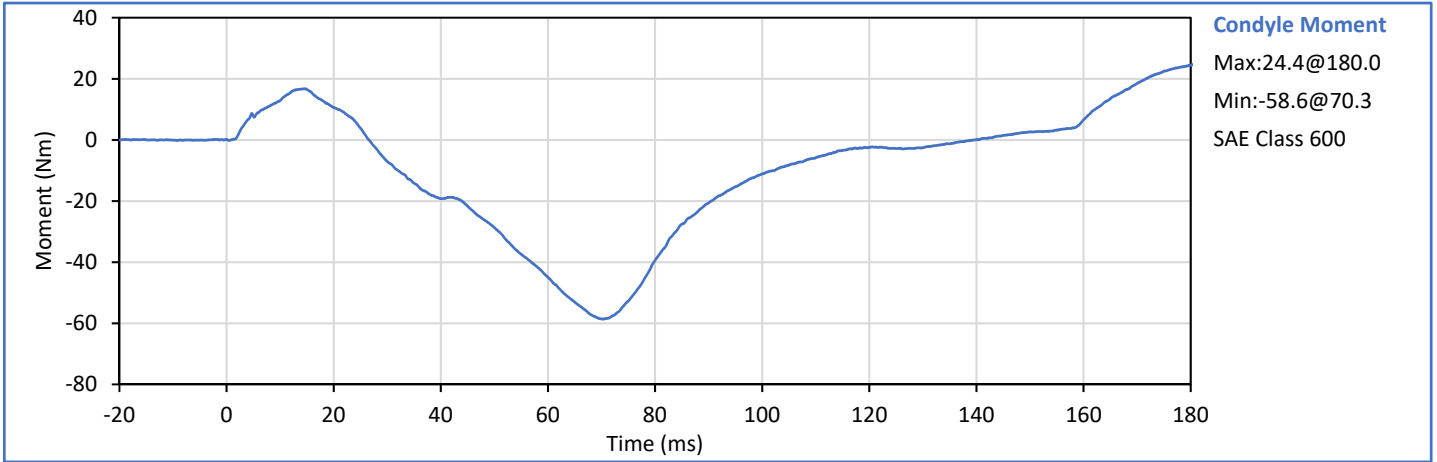


Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Humidity	%	10	70	20	Pass
Pendulum Velocity	m/s	5.95	6.19	6.18	Pass
Pendulum Velocity at 10 ms	m/s	1.50	1.90	1.61	Pass
Pendulum Velocity at 20 ms	m/s	3.10	3.90	3.51	Pass
Pendulum Velocity at 30 ms	m/s	4.60	5.60	5.11	Pass
Peak "D" Plane Rotation	deg	99.0	114.0	107.0	Pass
Peak Moment in Rotation	Nm	-65.0	-53.0	-58.6	Pass
Negative Moment Decay to -10 Nm	ms	94.0	114.0	102.4	Pass
<b>Overall Test Results</b>					<b>Pass</b>



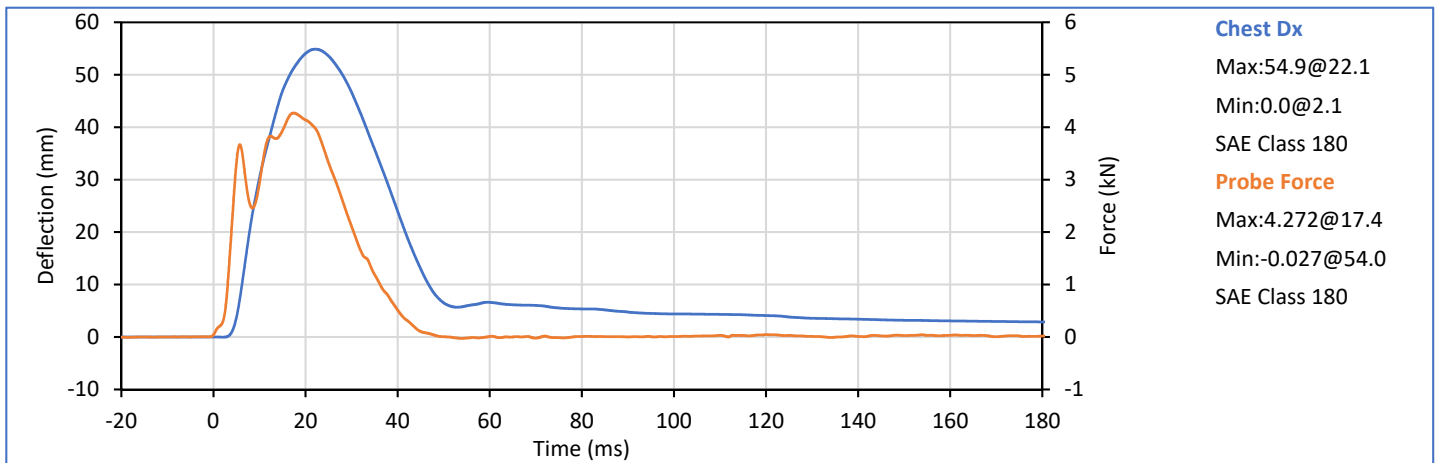
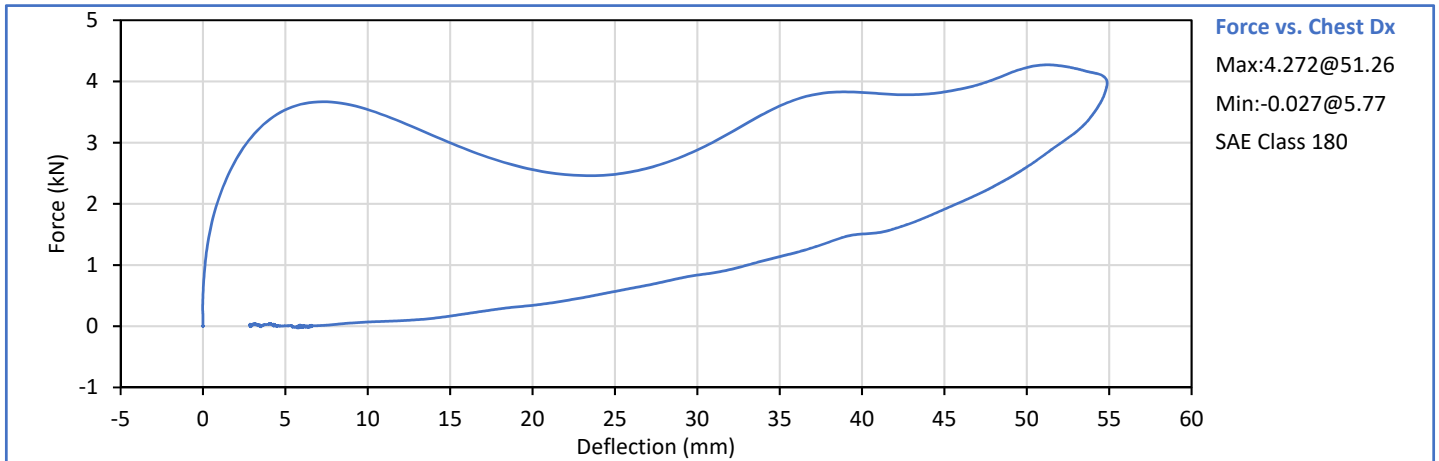
Technician:   
J. Hernandez

Approved By:   
P. Puzzuto






Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.9	Pass
Laboratory Humidity	%	10	70	30	Pass
Probe Velocity	m/s	6.59	6.83	6.72	Pass
Peak Chest Deflection	mm	50.0	58.0	54.9	Pass
Peak Probe Force, 50 and 58 mm	kN	3.900	4.400	4.272	Pass
Peak Probe Force, 18 and 50 mm	kN	0.000	4.600	4.225	Pass
Internal Hysterisis	%	69.0	85.0	70.4	Pass
Overall Test Results					Pass



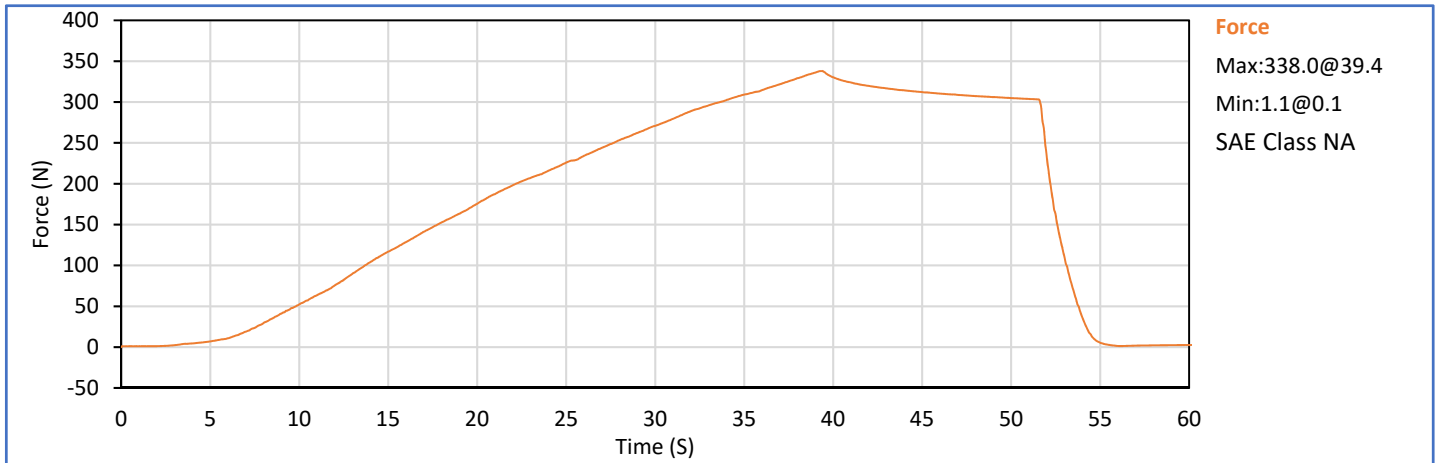
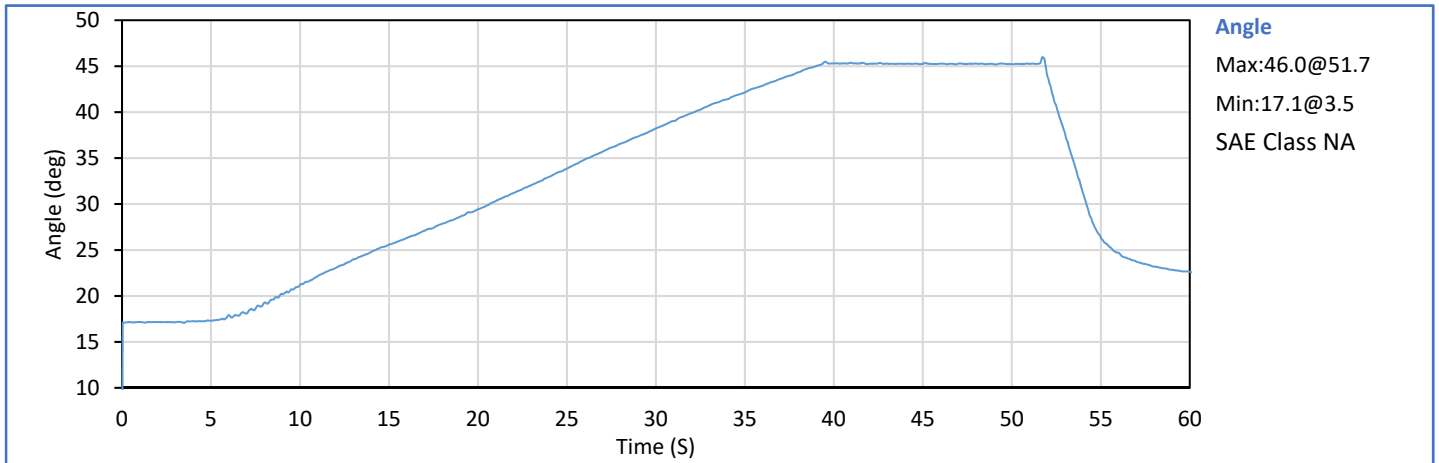
Technician:   
 J. Hernandez

Approved By:   
 P. Puzzuto


ATD Serial No.: 141

Test Date: 2020-11-20

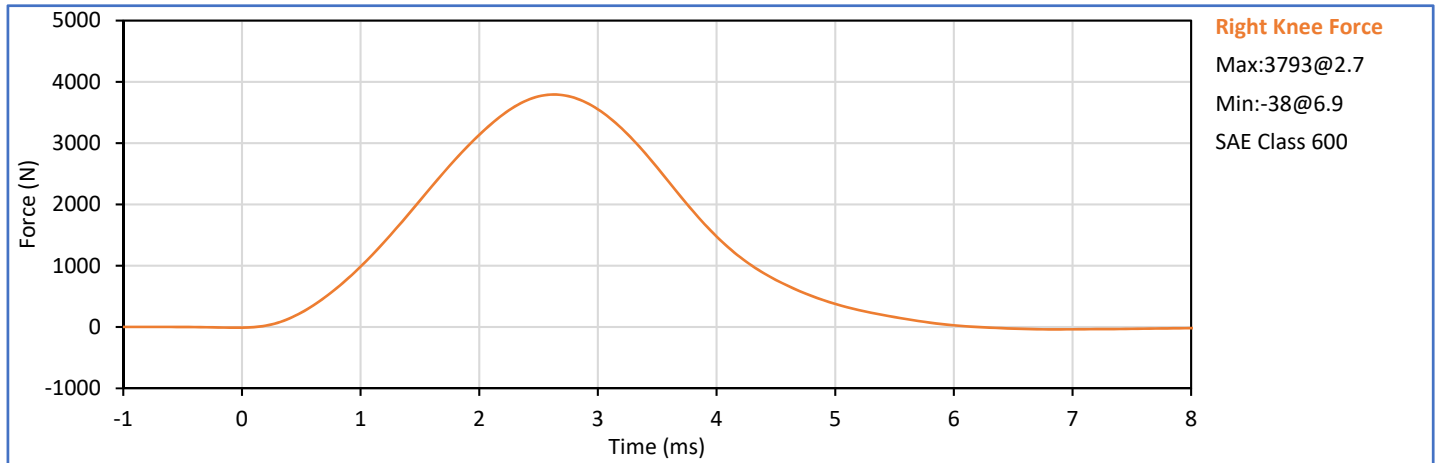
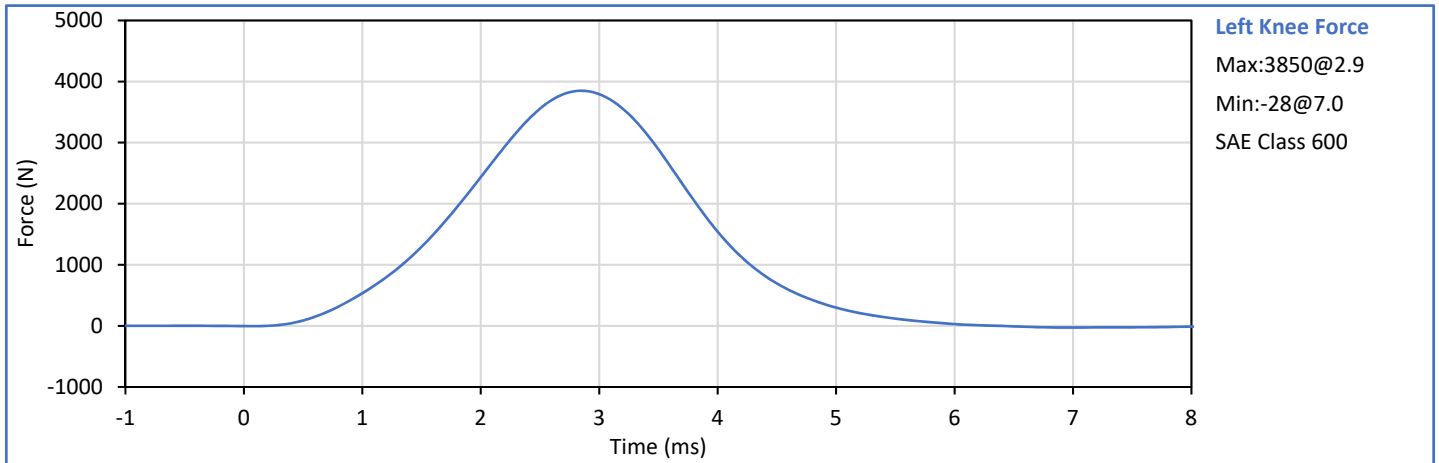
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.6	Pass
Laboratory Humidity	%	10	70	34	Pass
Orientation Angle	deg	0.0	20.0	15.1	Pass
Test Initial Angle	deg	11.0	19.0	17.1	Pass
Peak Force at 45° (+/-0.5°)	N	320.0	390.0	337.1	Pass
Torso Flexion Rate	deg/s	0.50	1.50	0.83	Pass
Final Reference Plane Angle	deg	-8.0	8.0	4.2	Pass
Overall Test Results					Pass




Technician:   
J. Hernandez

Approved By:   
P. Puzzuto

	Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
	Laboratory Temperature	°C	18.9	25.6	21.1	Pass
	Laboratory Humidity	%	10	70	33	Pass
Left	Probe Velocity	m/s	2.070	2.130	2.110	Pass
Knee	Peak Resistive Force	N	3450	4060	3850	Pass
Right	Probe Velocity	m/s	2.070	2.130	2.101	Pass
Knee	Peak Resistive Force	N	3450	4060	3793	Pass
Overall Test Results						Pass



Technician:   
J. Hernandez

Approved By:   
P. Puzzuto

**APPENDIX C**  
**Post-Test ATD Qualification and Performance Verification**  
**Hybrid III 50th Percentile Male ATD**  
**S/N: 360**

ATD Serial No.: 360


Test Date: 2020-11-30

Dummy Item	Inspect for	Comments	Damage	OK
Entire ATD	Perform general cleaning			✓
Outer Skin	Gashes, rips, cracks			✓
Head	Ballast secure			✓
	General appearance			✓
Neck bracket	Upper neck firmly attached to lower bracket			✓
Neck	Broken or cracked rubber			✓
	Looseness at the condyle joint			✓
Nodding block	Cracked or out of position			✓
Lumbar Spine	Broken or cracked rubber			✓
Ribs	Broken or bent ribs			✓
	Broken or bent rib supports			✓
	Damping material separated or cracked			✓
	Rubber bumpers in place			✓
Chest Displ. Assembly	Bent shaft			✓
	Slider arm riding in track			✓
Sensors	Check cables for cuts, tears			✓
	Check for damaged insulation			✓
Accelerometer Mounting	Head mounting secure			✓
	Chest mounting secure			✓
Knees	Skin condition			✓
	Insert (do not remove)			✓
	Casting			✓
Limbs	Normal movement and adjustment			✓
Knee Sliders	Wires intact			✓
	Rubber returned to "resting" position			✓
Pelvis	Broken			✓
Other	Describe below as needed			✓

Describe any repairs or replacement of parts or other findings:

No Problems Found

Technician:   
J. Hernandez

Approved By:   
P. Puzzuto

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Relative Humidity	%	10	70	26	Pass
A - Total sitting height	mm	879	889	884	Pass
B - Shoulder pivot height	mm	505	521	512	Pass
C - 'H' point height	mm	84	89	87	Pass
D - 'H' point location from backline	mm	135	140	139	Pass
E - Shoulder pivot from backline	mm	84	94	90	Pass
F - Thigh clearance	mm	140	155	152	Pass
G - Back of elbow to wrist pivot	mm	290	305	295	Pass
H - Head back to backline	mm	41	46	45	Pass
I - Shoulder to elbow length	mm	330	345	340	Pass
J - Elbow rest height	mm	190	211	204	Pass
K - Buttock to knee length	mm	579	604	588	Pass
L - Popliteal length	mm	429	455	439	Pass
M - Knee pivot height	mm	485	500	497	Pass
N - Buttock popliteal length	mm	452	477	470	Pass
O - Chest depth without jacket	mm	213	229	224	Pass
P - Foot length	mm	251	267	262	Pass
V - Shoulder breadth	mm	422	437	428	Pass
W - Foot breadth	mm	91	107	105	Pass
Y - Chest circum. (w/chest jacket)	mm	970	1001	990	Pass
Z - Waist circum.	mm	836	866	852	Pass
AA - Location for chest circum.	mm	429	434	433	Pass
BB - Location for waist circum.	mm	226	231	229	Pass
Overall Test Results					Pass

Technician: \_\_\_\_\_



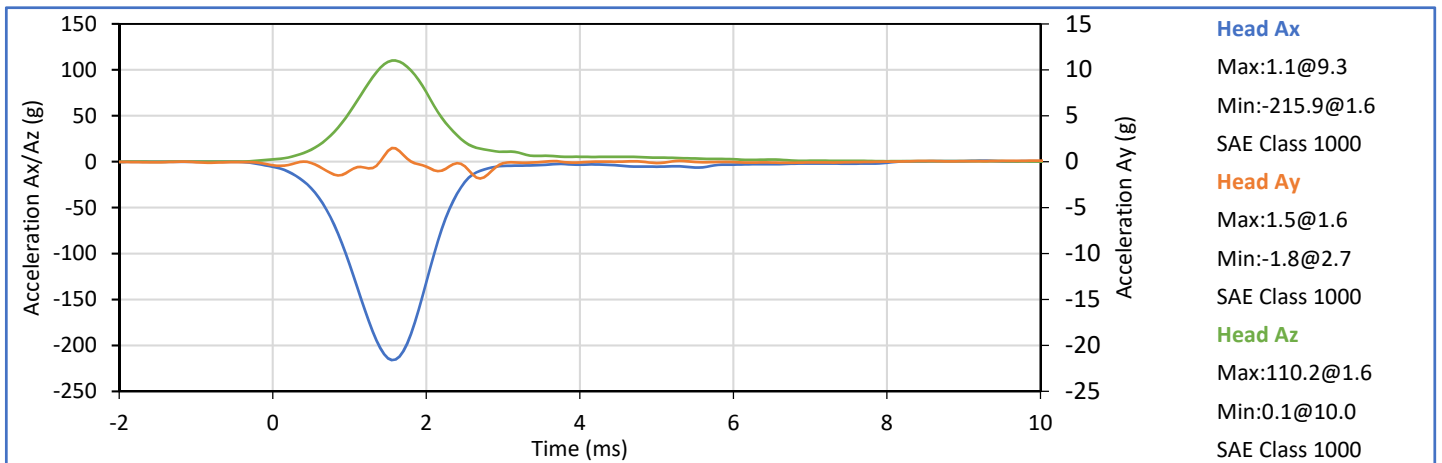
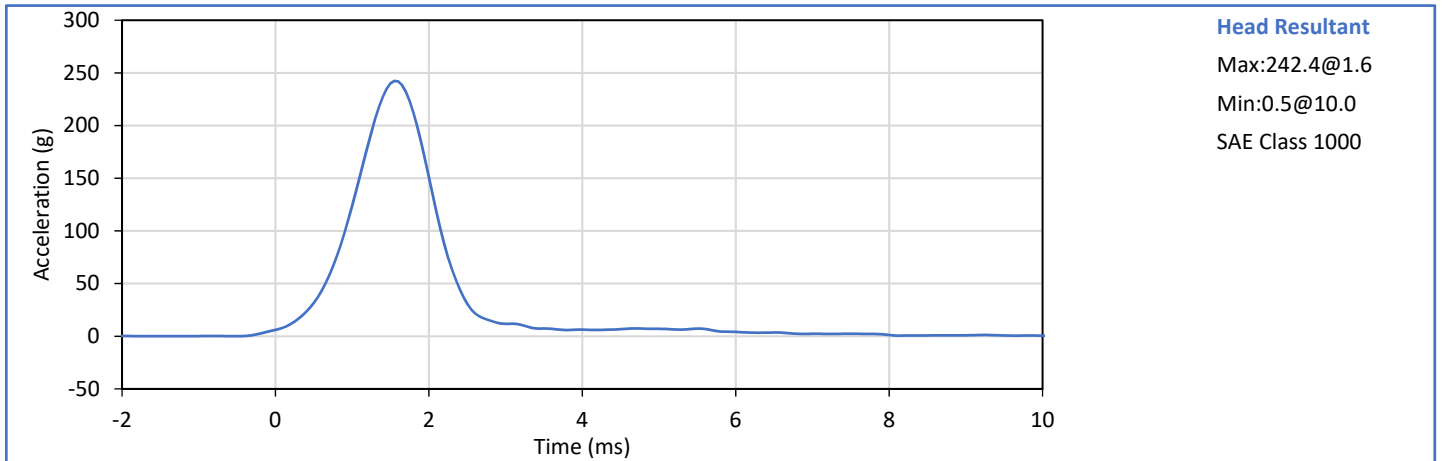
J. Hernandez

Approved By: \_\_\_\_\_




P. Puzzuto

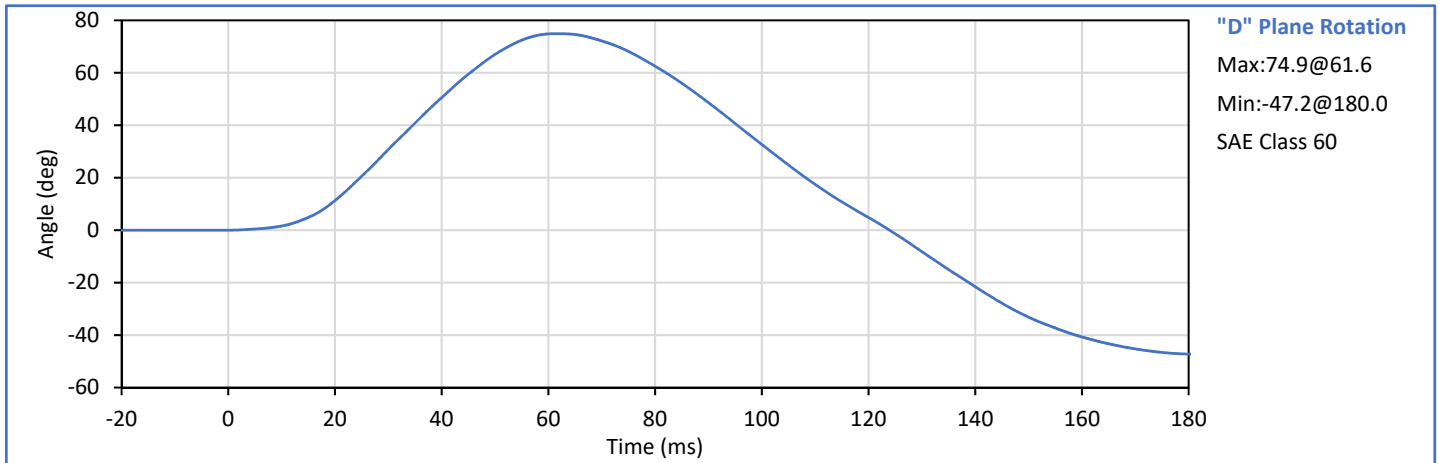
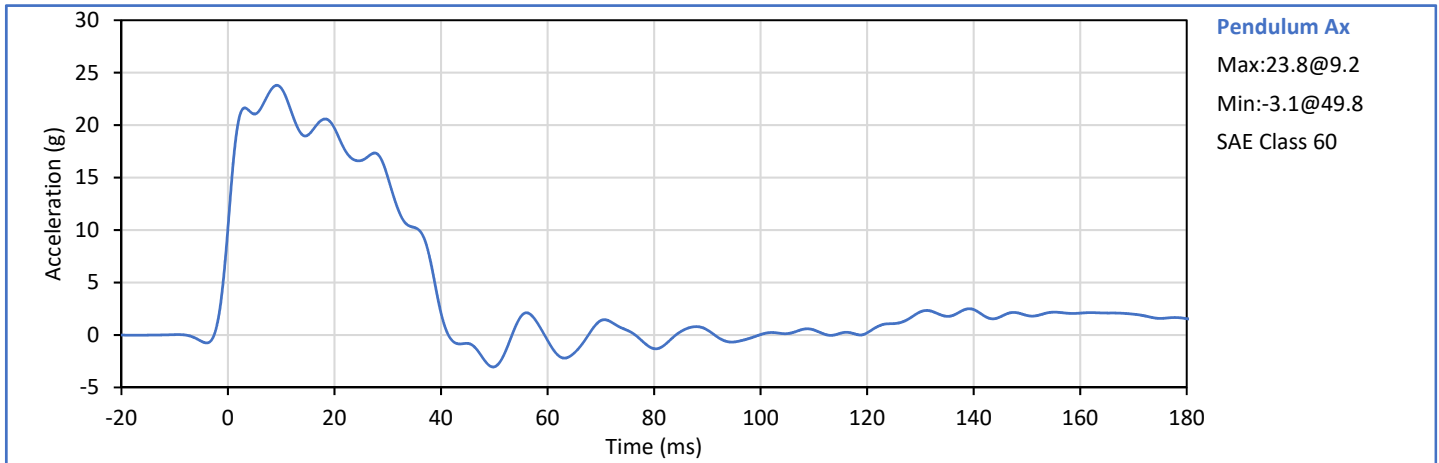
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	22.0	Pass
Laboratory Relative Humidity	%	10	70	19	Pass
Peak Resultant Acceleration	g	225.0	275.0	242.4	Pass
Peak Lateral Acceleration	g	-15.0	15.0	-1.8	Pass
Oscillations After Main Pulse	%	0.0	10.0	3.0	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
<b>Overall Test Results</b>					<b>Pass</b>




Technician:   
J. Hernandez

Approved By:   
P. Puzzuto

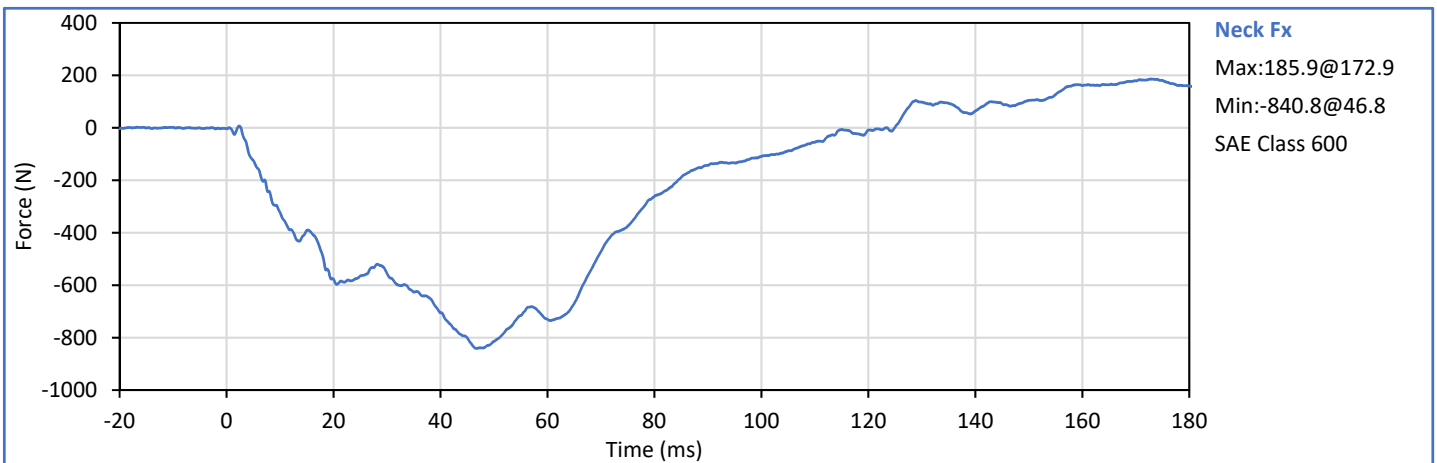
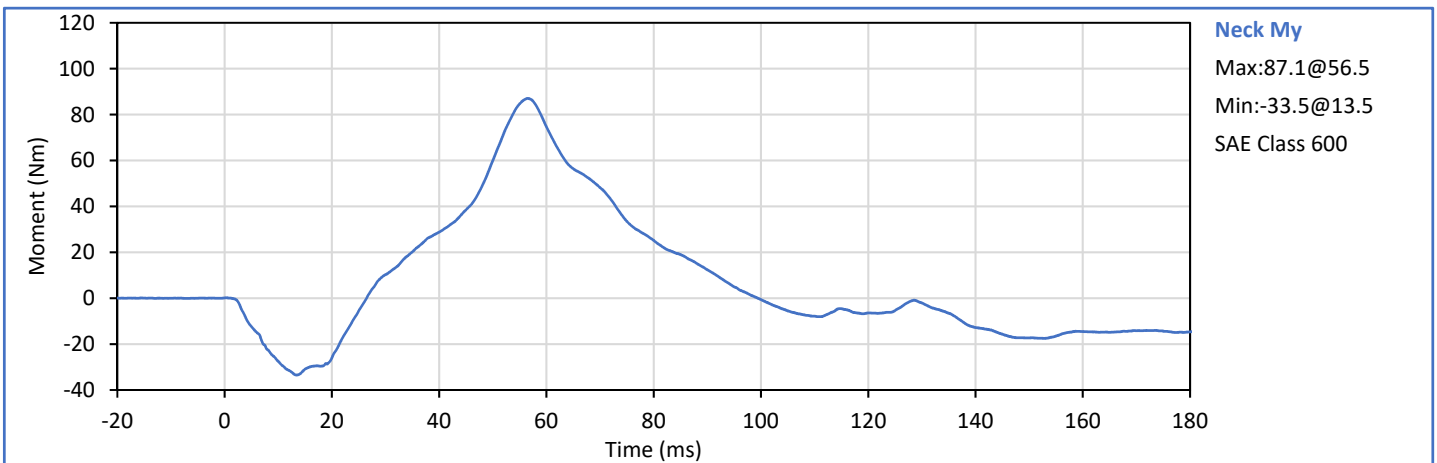
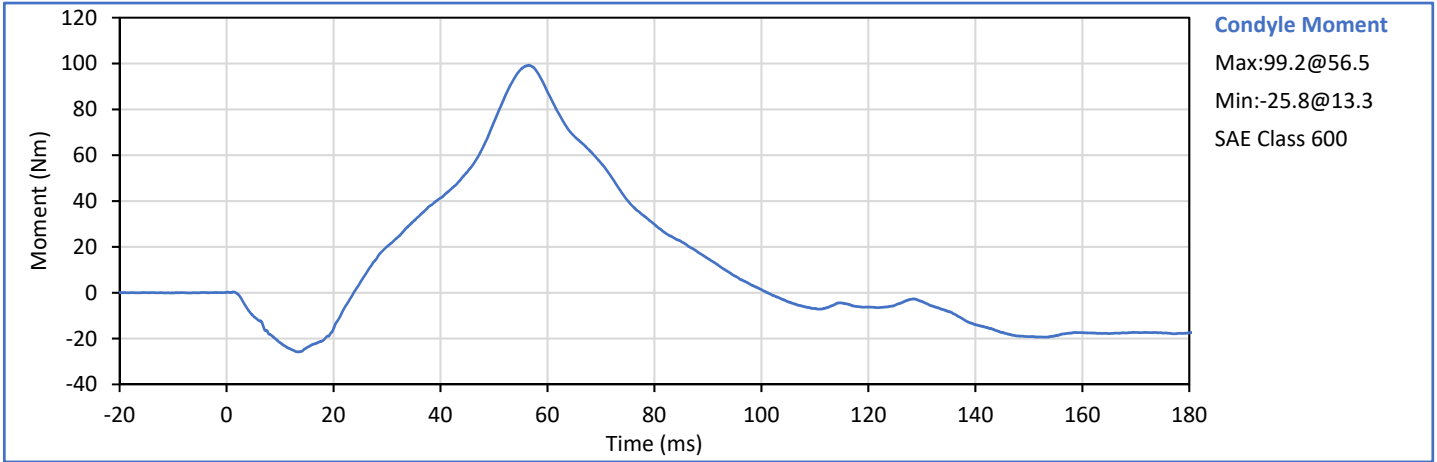
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	22.0	Pass
Laboratory Relative Humidity	%	10	70	19	Pass
Pendulum Velocity	m/s	6.89	7.13	6.92	Pass
Pendulum Deceleration at 10 ms	g	22.5	27.5	23.5	Pass
Pendulum Deceleration at 20 ms	g	17.6	22.6	19.7	Pass
Pendulum Deceleration at 30 ms	g	12.5	18.5	15.0	Pass
Peak Pendulum Decel. after 30 ms	g	0.0	29.0	15.0	Pass
Deceleration Decay to Cross 5 g	ms	34.0	42.0	38.8	Pass
"D" Plane Rotation peak	deg	64.0	78.0	74.9	Pass
	ms	57.0	64.0	61.6	Pass
"D" Plane Rotation Decay To Zero	ms	113.0	128.0	124.0	Pass
Moment About Occipital Condyle	Nm	88.1	108.5	99.2	Pass
	ms	47.0	58.0	56.5	Pass
Moment Decay, Peak to Zero	ms	97.0	107.0	101.1	Pass
<b>Overall Test Results</b>					<b>Pass</b>



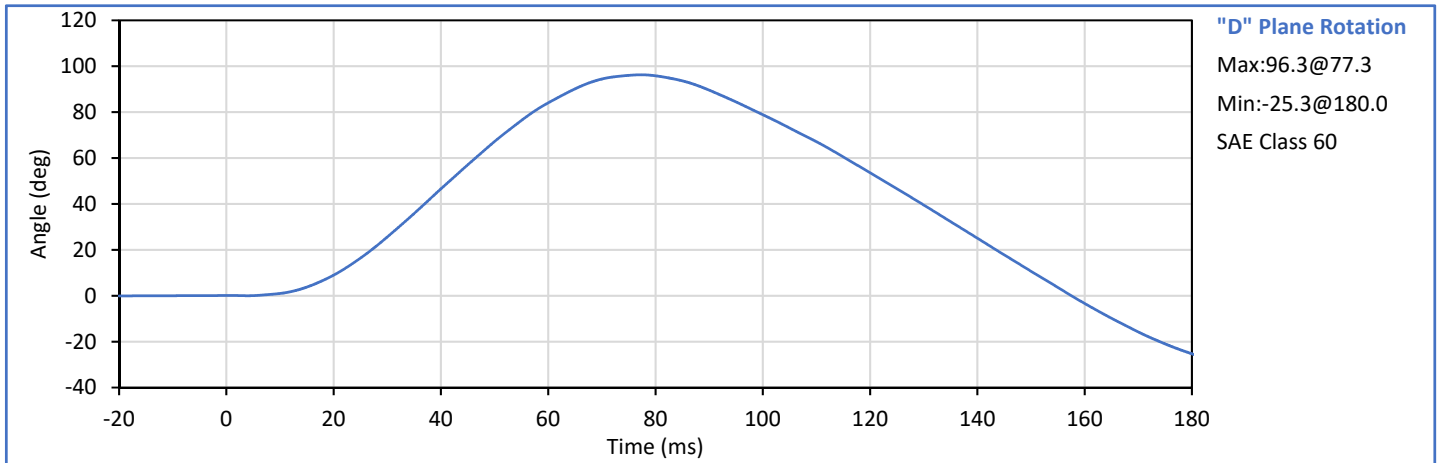
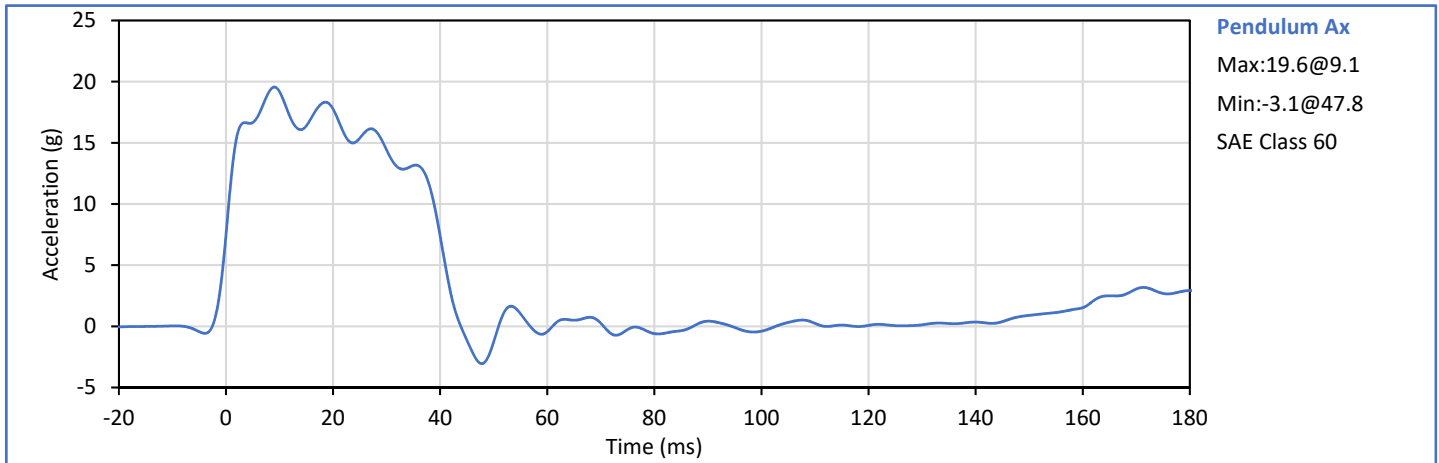
Technician:   
J. Hernandez


Approved By:   
P. Puzzuto




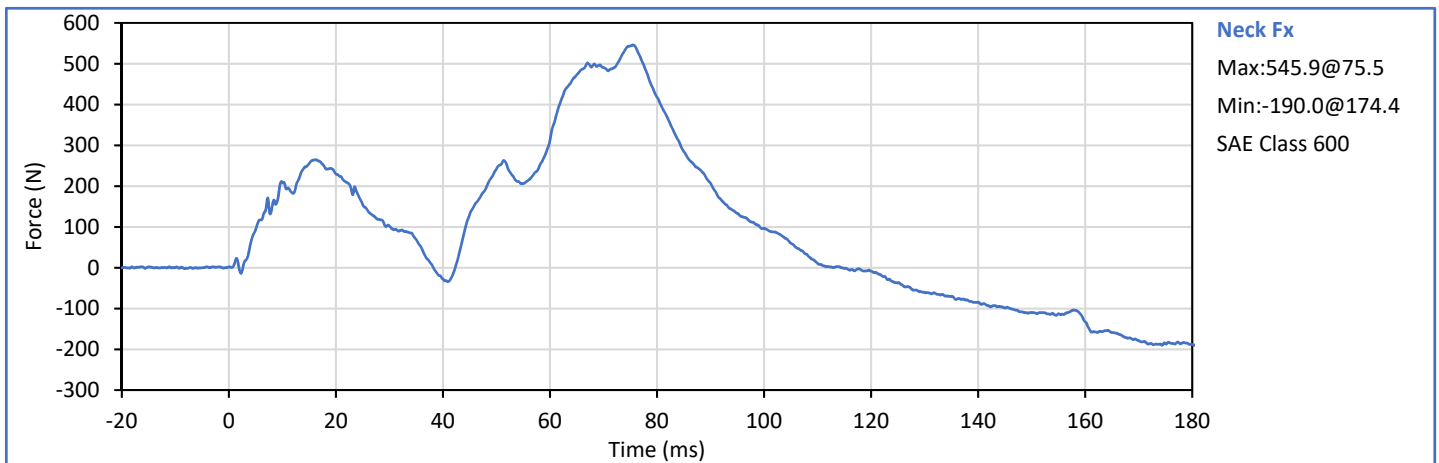
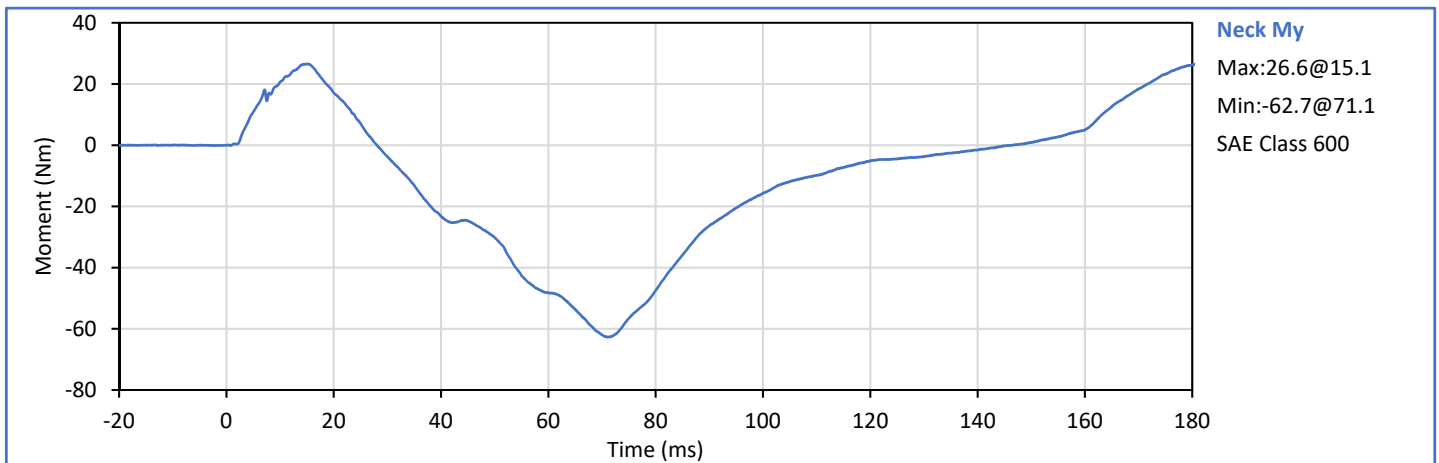
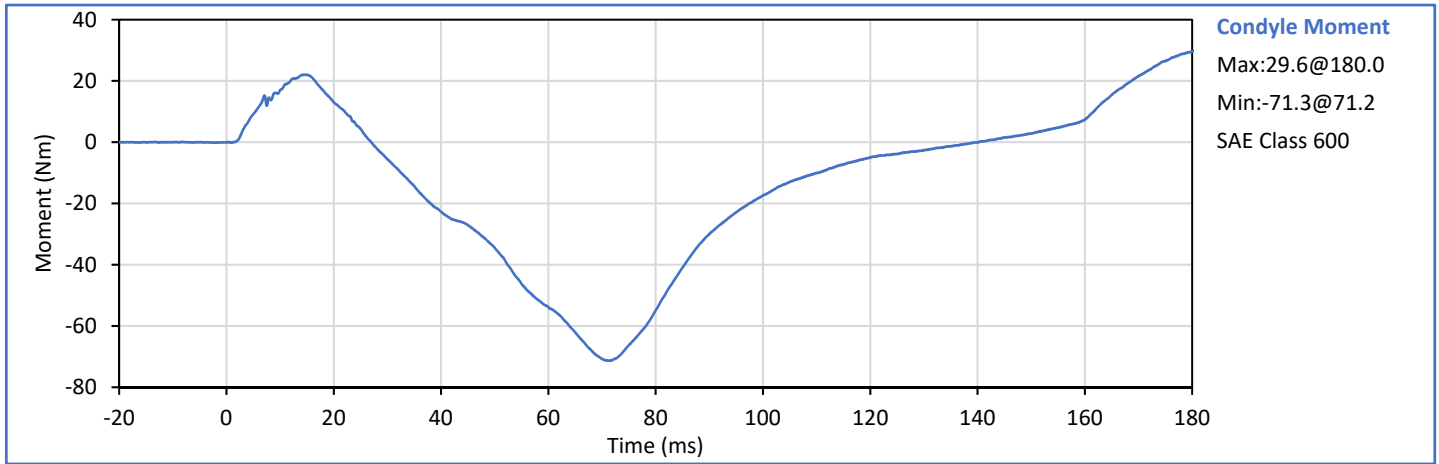


Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	22.0	Pass
Laboratory Relative Humidity	%	10	70	19	Pass
Pendulum Velocity	m/s	5.94	6.19	6.10	Pass
Pendulum Deceleration at 10 ms	g	17.2	21.2	19.2	Pass
Pendulum Deceleration at 20 ms	g	14.0	19.0	17.8	Pass
Pendulum Deceleration at 30 ms	g	11.0	16.0	14.4	Pass
Peak Pendulum Decel. after 30 ms	g	0.0	22.0	14.4	Pass
Deceleration Decay to Cross 5 g	ms	38.0	46.0	41.0	Pass
"D" Plane Rotation peak	deg	81.0	106.0	96.3	Pass
	ms	72.0	82.0	77.3	Pass
"D" Plane Rotation Decay To Zero	ms	147.0	174.0	157.6	Pass
Moment About Occipital Condyle	Nm	-79.9	-52.9	-71.3	Pass
	ms	65.0	79.0	71.2	Pass
Moment Decay, Peak to Zero	ms	120.0	148.0	140.2	Pass
<b>Overall Test Results</b>					<b>Pass</b>

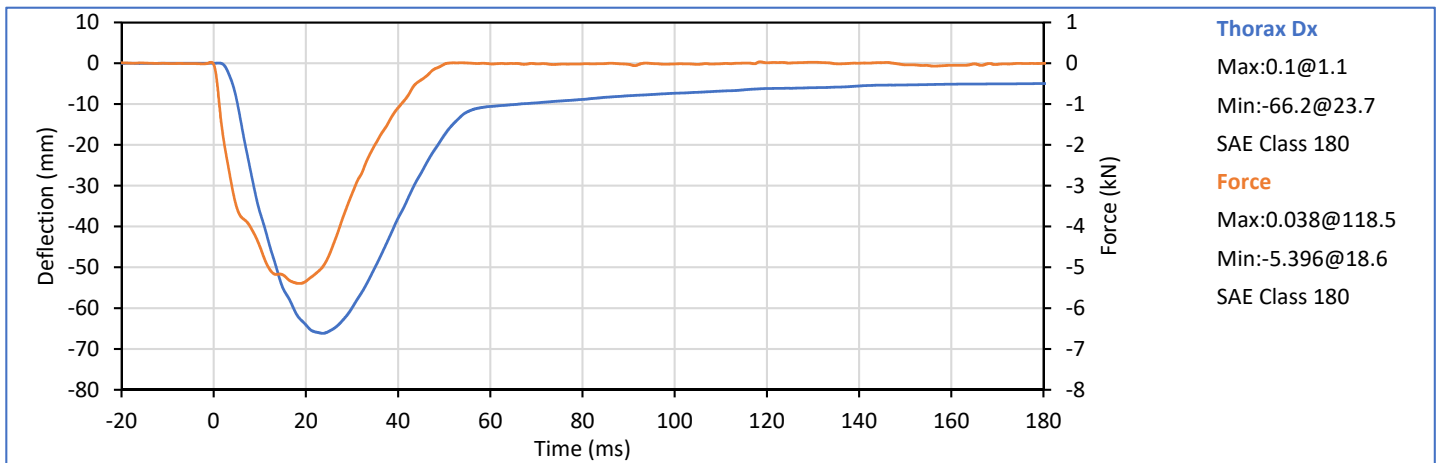
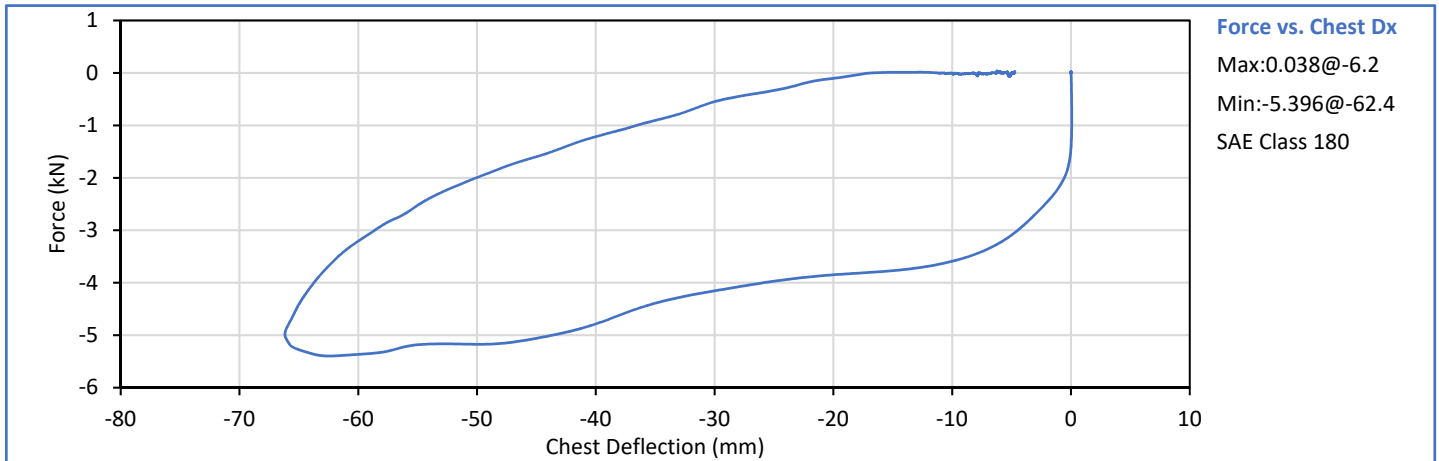



Technician:   
J. Hernandez


Approved By:   
P. Puzzuto



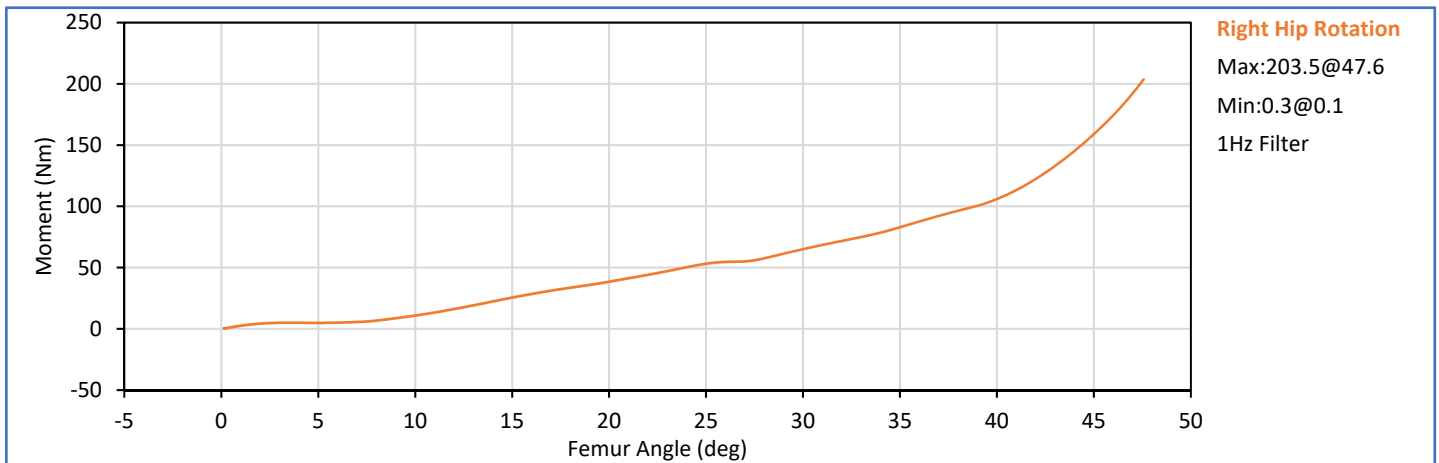
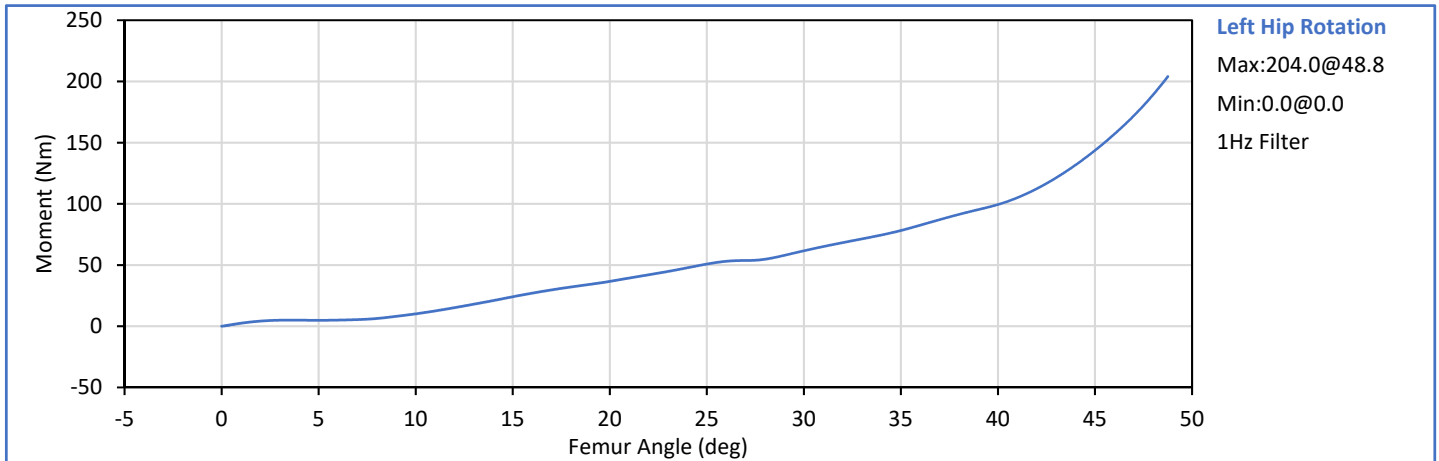
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Relative Humidity	%	10	70	15	Pass
Probe Velocity	m/s	6.58	6.82	6.67	Pass
Peak Chest Deflection	mm	-72.6	-63.5	-66.2	Pass
Peak Probe Force	kN	-5.893	-5.159	-5.396	Pass
Internal Hysteresis	%	69.0	85.0	72.8	Pass
<b>Overall Test Results</b>					<b>Pass</b>




Technician:   
 J. Hernandez

Approved By:   
 P. Puzzuto

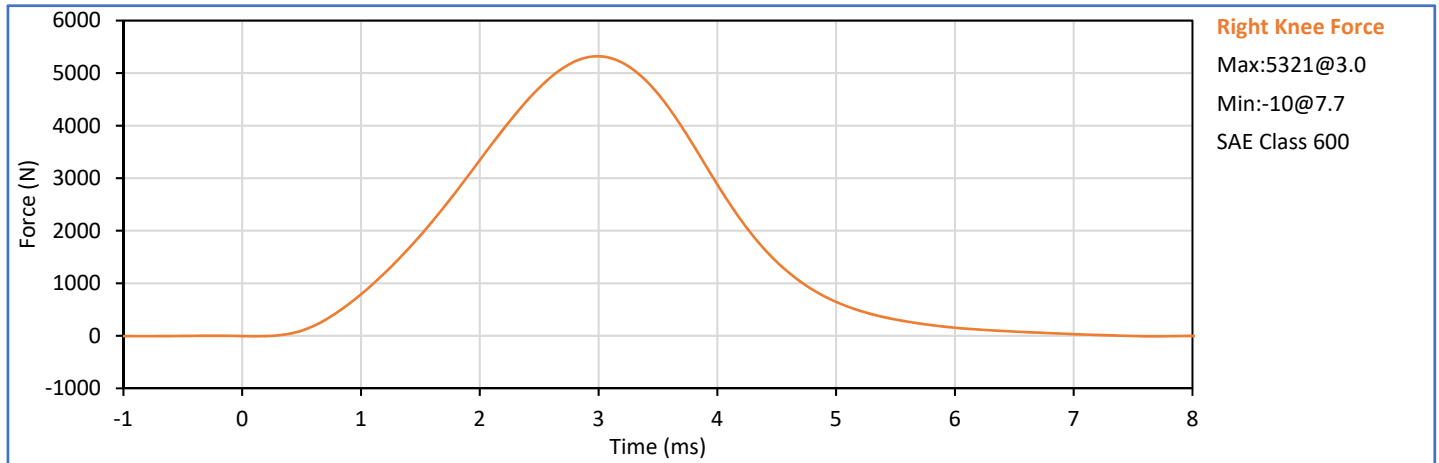
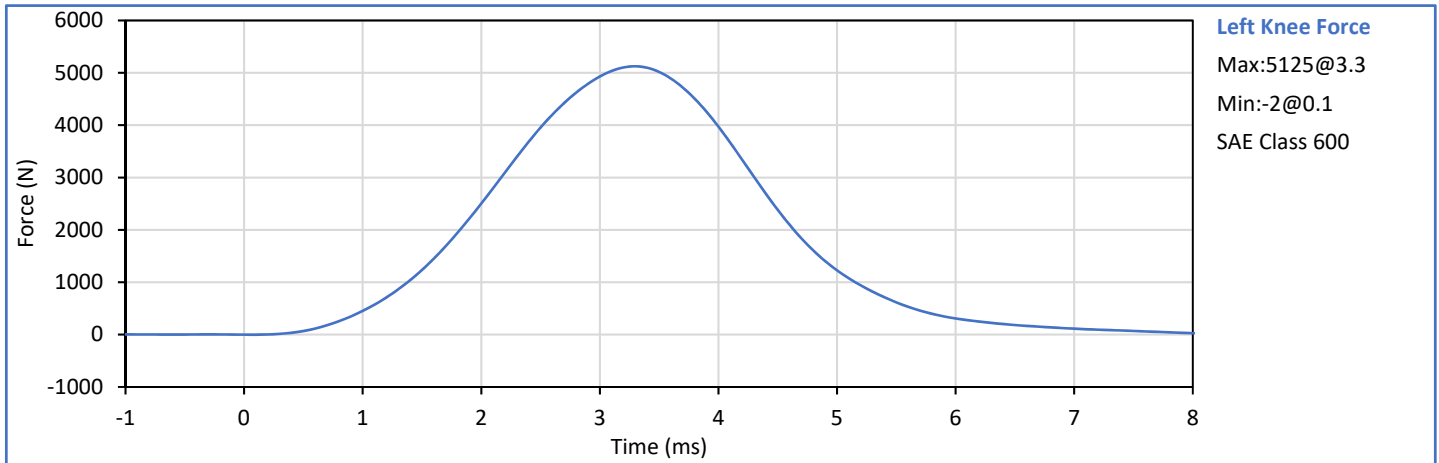
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail	
Laboratory Temperature	°C	18.9	25.6	22.0	Pass	
Laboratory Relative Humidity	%	10	70	19	Pass	
Left Hip	Left Hip Rotation Rate	deg/s	5.0	10.0	5.8	Pass
	Left Femur Torque at 30°	Nm	0.0	95.0	61.7	Pass
	Left Hip Rotation at 203 Nm	deg	40.0	50.0	48.7	Pass
Right Hip	Right Hip Rotation Rate	deg/s	5.0	10.0	5.8	Pass
	Right Femur Torque at 30°	Nm	0.0	95.0	65.1	Pass
	Right Hip Rotation at 203 Nm	deg	40.0	50.0	47.5	Pass
Overall Test Results					Pass	




Technician:   
J. Hernandez

Approved By:   
P. Puzzuto

	Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
	Laboratory Temperature	°C	18.9	25.6	20.6	Pass
	Laboratory Relative Humidity	%	10	70	11	Pass
Left	Probe Velocity	m/s	2.070	2.130	2.120	Pass
Knee	Peak Resistive Force	N	4715	5782	5125	Pass
Right	Probe Velocity	m/s	2.070	2.130	2.122	Pass
Knee	Peak Resistive Force	N	4715	5782	5321	Pass
					Overall Test Results	Pass



Technician:   
J. Hernandez

Approved By:   
P. Puzzuto

**APPENDIX C**  
**Post-Test ATD Qualification and Performance Verification**  
**Hybrid III 5th Percentile Female ATD**  
**S/N: 141**

Dummy Item	Inspect for	Comments	Damage	Okay
Entire ATD	Perform general cleaning			✓
Outer Skin	Gashes, rips, cracks			✓
Head	Ballast secure			✓
	General appearance			✓
Neck bracket	Upper neck firmly attached to lower bracket			✓
Neck	Broken or cracked rubber			✓
	Looseness at the condyle joint			✓
Nodding block	Cracked or out of position			✓
Lumbar Spine	Broken or cracked rubber			✓
Ribs	Broken or bent ribs			✓
	Broken or bent rib supports			✓
	Damping material separated or cracked			✓
	Rubber bumpers in place			✓
Chest Displ. Assembly	Bent shaft			✓
	Slider arm riding in track			✓
Sensors	Check cables for cuts, tears			✓
	Check for damaged insulation			✓
Accelerometer	Head mounting secure			✓
Mounting	Chest mounting secure			✓
Knees	Skin condition			✓
	Insert (do not remove)			✓
	Casting			✓
Limbs	Normal movement and adjustment			✓
Knee Sliders	Wires intact			✓
	Rubber returned to "resting" position			✓
Pelvis	Broken			✓
Other	Describe below as needed			✓

Describe any repairs or replacement of parts or other findings:

No Problems Found

Technician: \_\_\_\_\_

J. Hernandez

Approved By: \_\_\_\_\_

P. Puzzuto



Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Relative Humidity	%	10	70	22	Pass
A - Total sitting height	mm	775	800	791	Pass
B - Shoulder pivot height	mm	432	457	452	Pass
C - 'H' point height	mm	81	86	86	Pass
D - 'H' point location from backline	mm	145	150	148	Pass
E - Shoulder pivot from backline	mm	69	84	81	Pass
F - Thigh clearance	mm	119	135	125	Pass
G - Back of elbow to wrist pivot	mm	244	259	254	Pass
H - Head back to backline	mm	41	46	43	Pass
I - Shoulder to elbow length	mm	277	297	288	Pass
J - Elbow rest height	mm	183	203	199	Pass
K - Buttock to knee length	mm	521	546	528	Pass
L - Popliteal length	mm	356	376	370	Pass
M - Knee pivot height	mm	394	419	413	Pass
N - Buttock popliteal length	mm	414	439	424	Pass
O - Chest depth without jacket	mm	175	191	183	Pass
P - Foot length	mm	219	234	225	Pass
R - Buttock to Knee Pivot Length	mm	457	483	471	Pass
S - Head Breadth	mm	137	147	146	Pass
T - Head Depth	mm	178	188	181	Pass
U - Hip Breadth	mm	300	315	309	Pass
V - Shoulder breadth	mm	351	366	362	Pass
W - Foot breadth	mm	79	94	86	Pass
X - Head circum.	mm	528	549	538	Pass
Y - Chest circum. (w/chest jacket)	mm	851	881	873	Pass
Z - Waist circum.	mm	760	790	777	Pass
AA - Location for chest circum.	mm	333	358	342	Pass
BB - Location for waist circum.	mm	160	170	167	Pass
Overall Test Results					Pass

Technician:



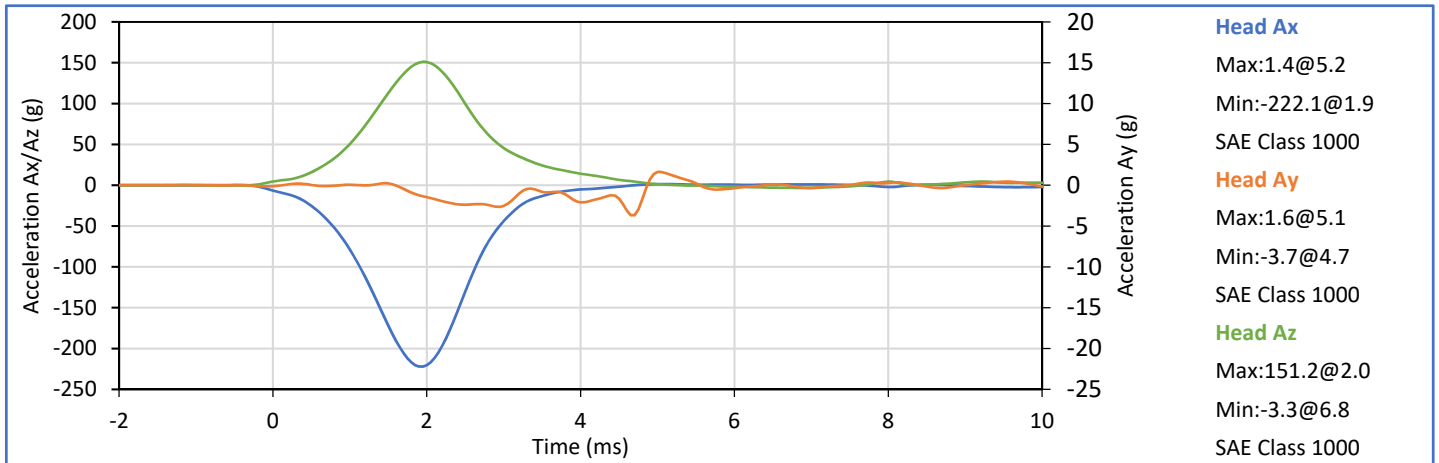
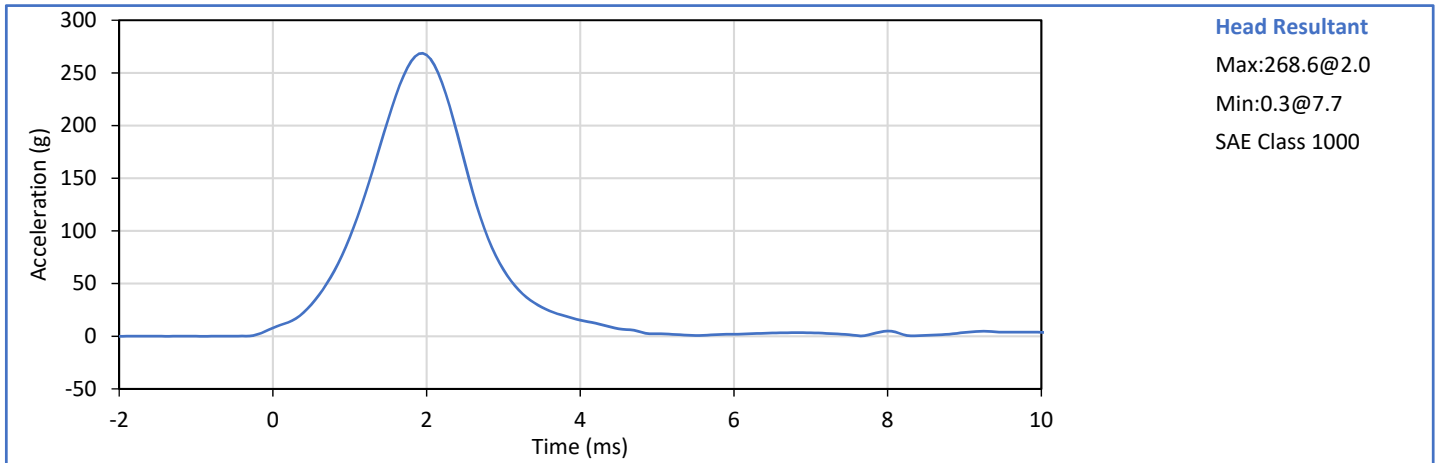
J. Hernandez

Approved By:




P. Puzzuto

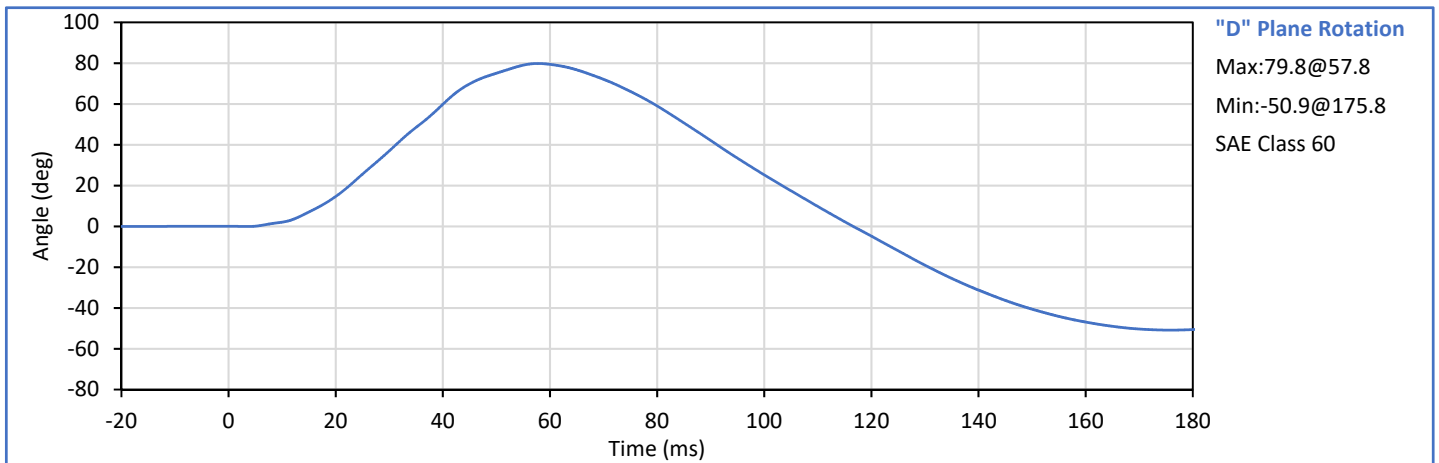
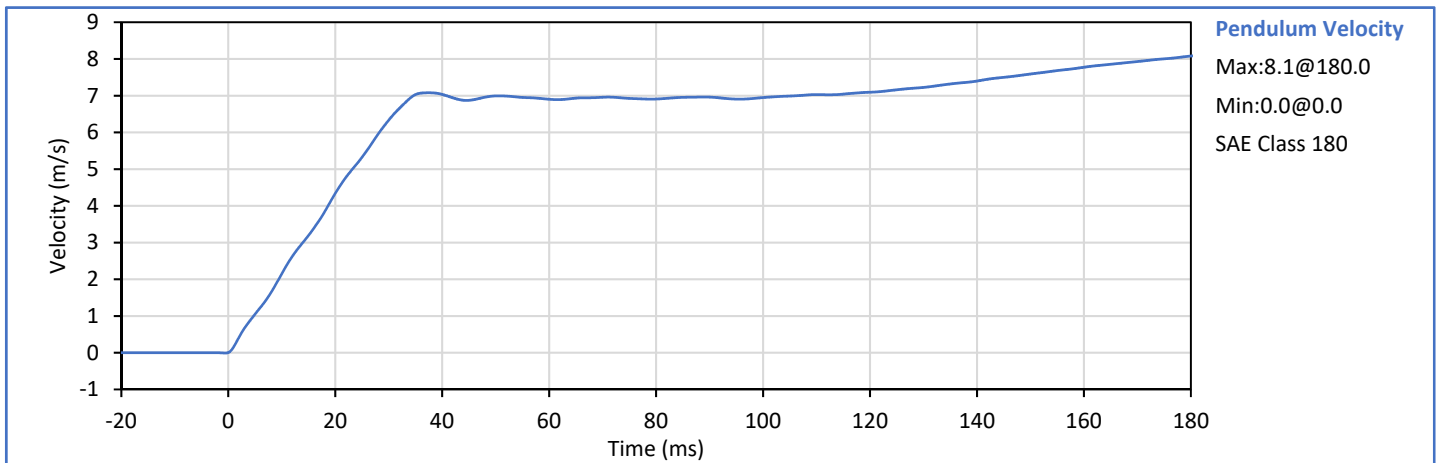
Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.1	Pass
Laboratory Humidity	%	10	70	22	Pass
Peak Resultant Acceleration	g	250.0	300.0	268.6	Pass
Peak Lateral Acceleration	g	-15.0	15.0	-3.7	Pass
Oscillations After Main Pulse	%	0.0	10.0	1.8	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
<b>Overall Test Results</b>					<b>Pass</b>




Technician:   
J. Hernandez

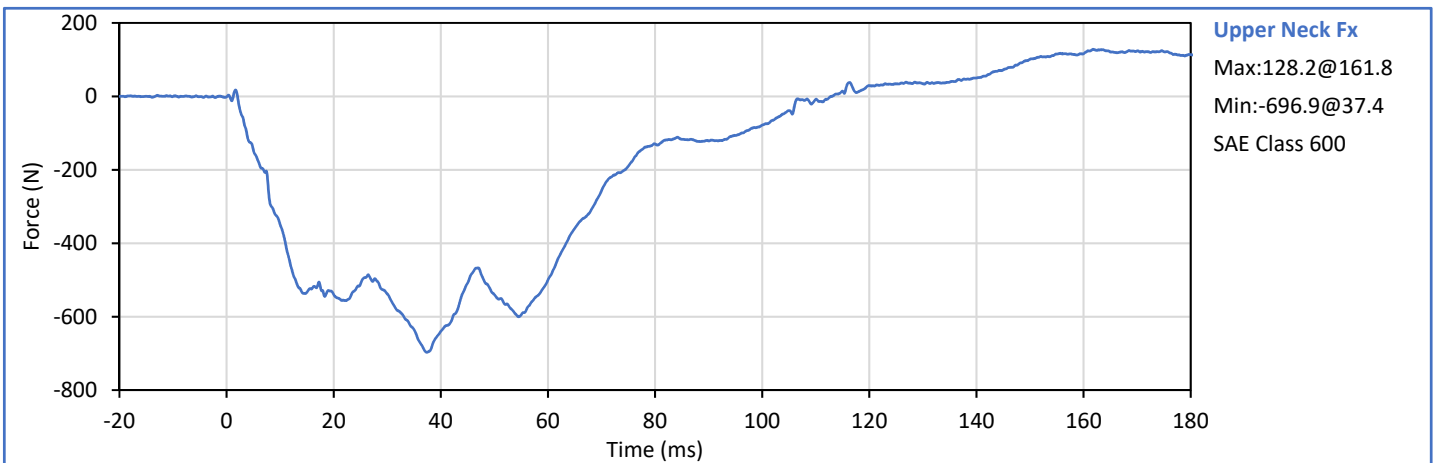
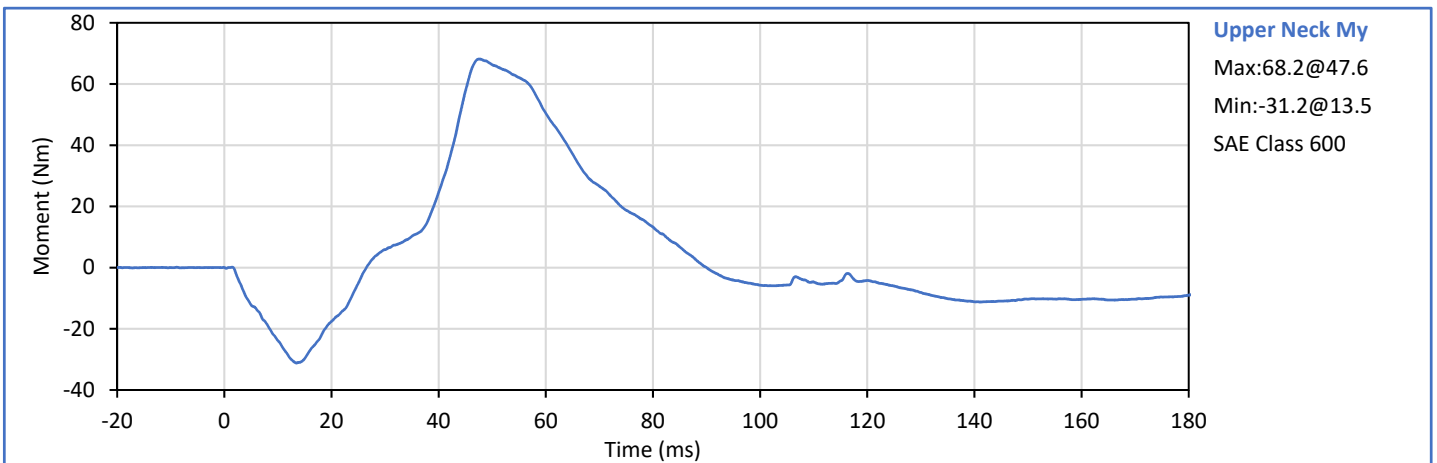
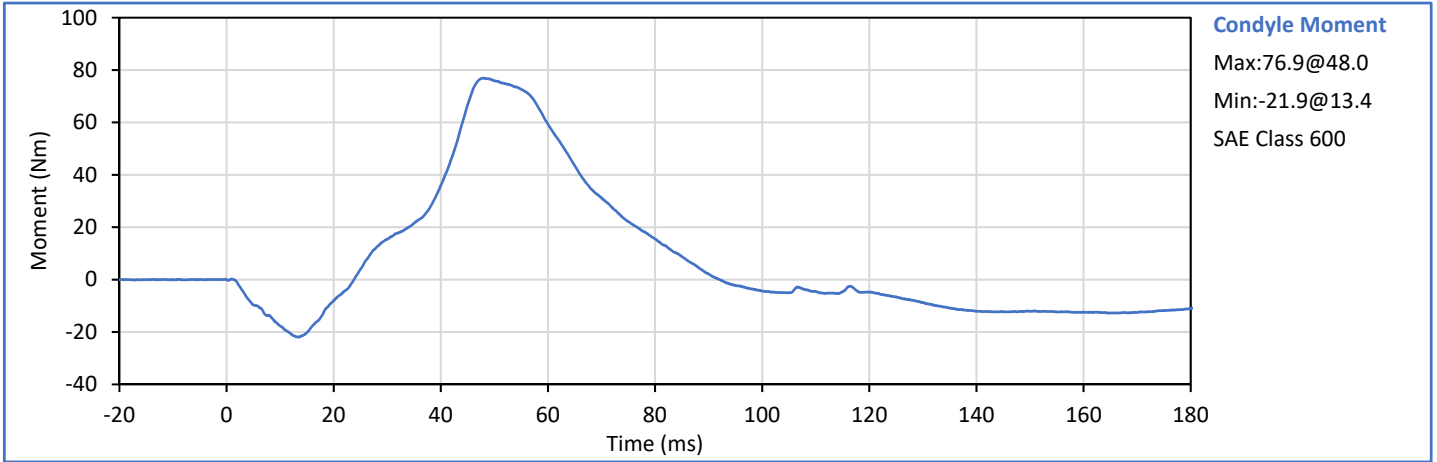
Approved By:   
P. Puzzuto

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	22	Pass
Pendulum Velocity	m/s	6.89	7.13	7.02	Pass
Pendulum Velocity at 10 ms	m/s	2.10	2.50	2.15	Pass
Pendulum Velocity at 20 ms	m/s	4.00	5.00	4.34	Pass
Pendulum Velocity at 30 ms	m/s	5.80	7.00	6.33	Pass
Peak "D" Plane Rotation	deg	77.0	91.0	79.8	Pass
Peak Moment in Rotation	Nm	69.0	83.0	76.9	Pass
Positive Moment Decay to 10 Nm	ms	80.0	100.0	84.2	Pass
<b>Overall Test Results</b>					<b>Pass</b>

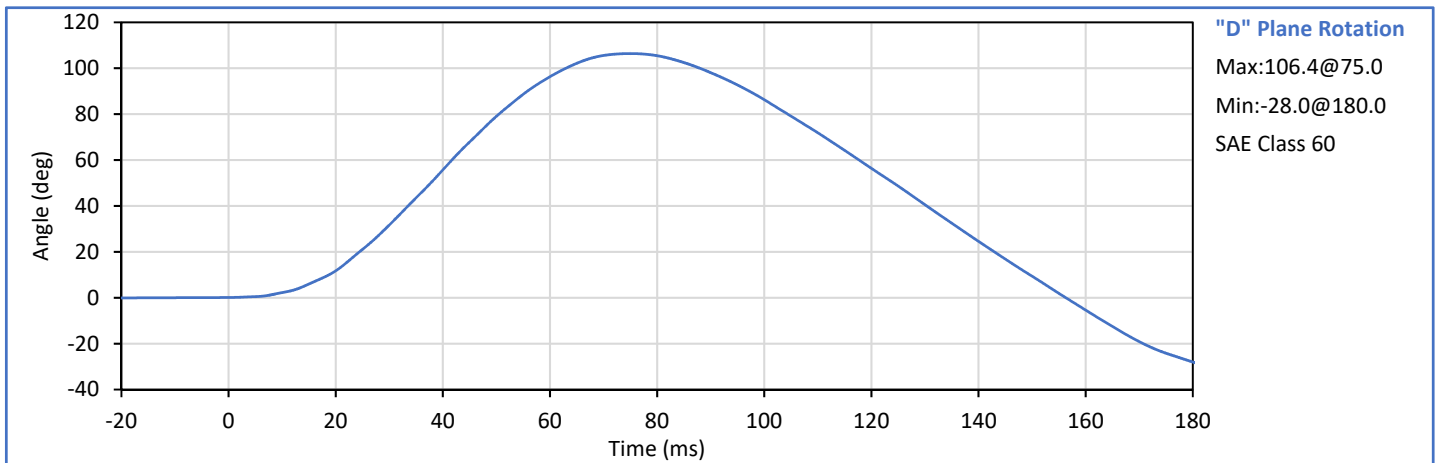
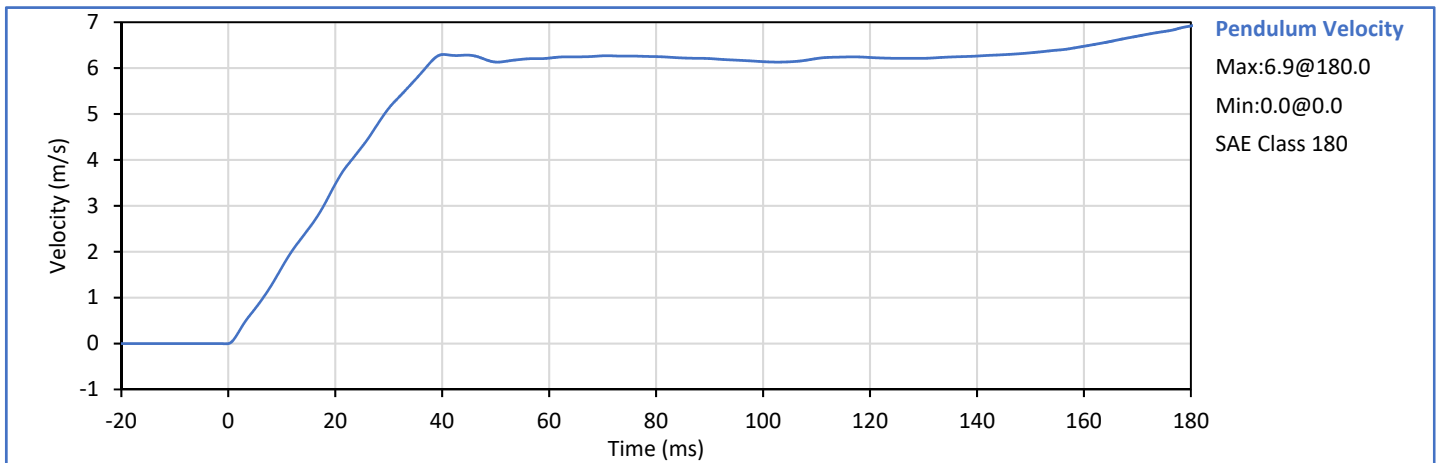


Technician:   
J. Hernandez


Approved By:   
P. Puzzuto

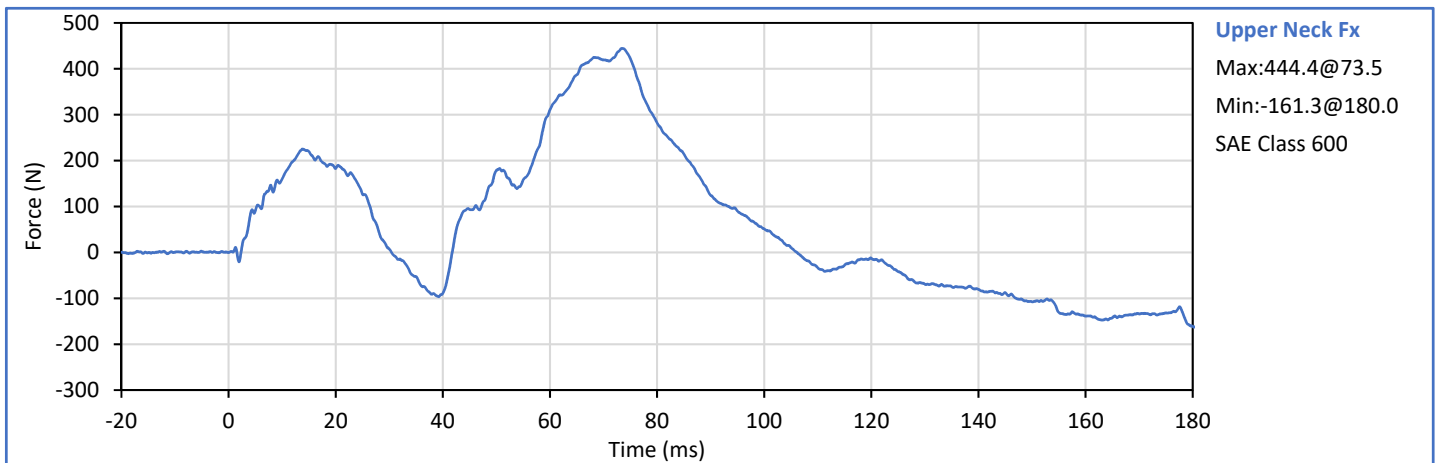
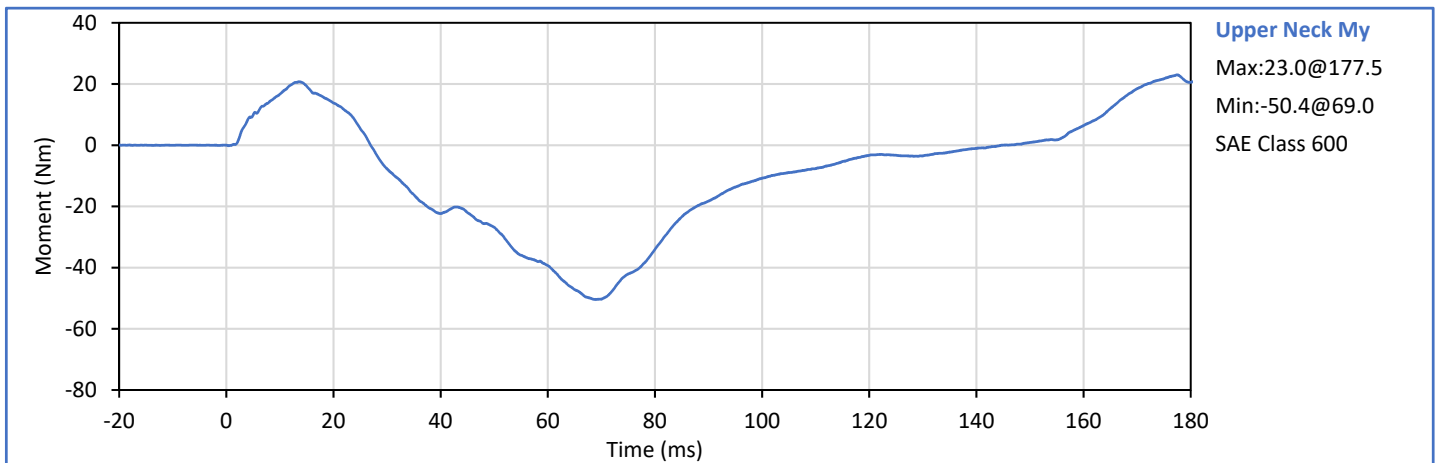
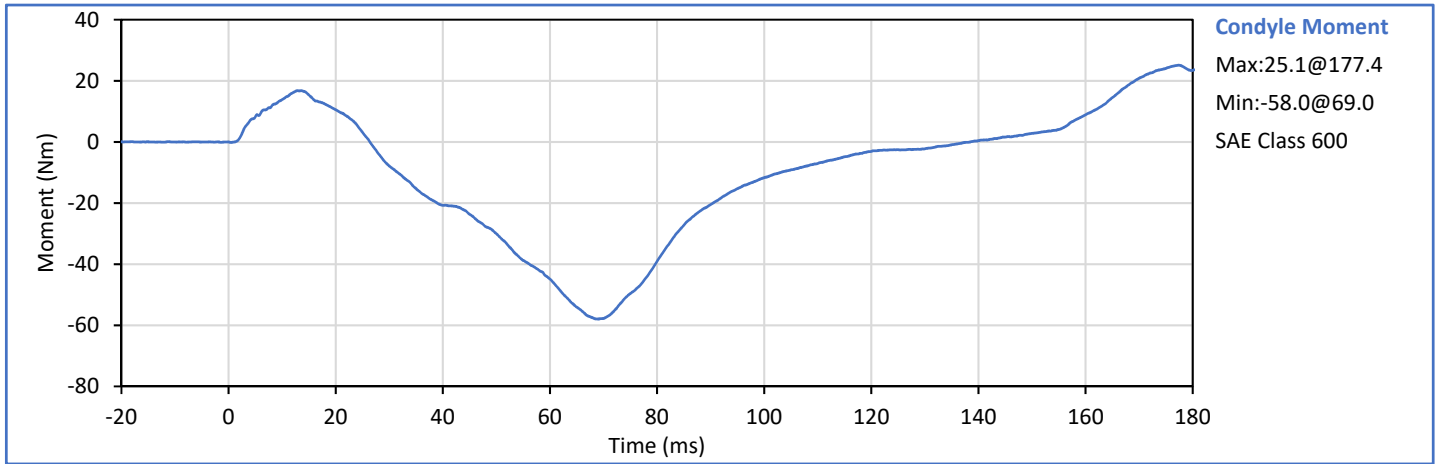


Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.1	Pass
Laboratory Humidity	%	10	70	22	Pass
Pendulum Velocity	m/s	5.95	6.19	6.02	Pass
Pendulum Velocity at 10 ms	m/s	1.50	1.90	1.66	Pass
Pendulum Velocity at 20 ms	m/s	3.10	3.90	3.47	Pass
Pendulum Velocity at 30 ms	m/s	4.60	5.60	5.12	Pass
Peak "D" Plane Rotation	deg	99.0	114.0	106.4	Pass
Peak Moment in Rotation	Nm	-65.0	-53.0	-58.0	Pass
Negative Moment Decay to -10 Nm	ms	94.0	114.0	103.2	Pass
<b>Overall Test Results</b>					<b>Pass</b>

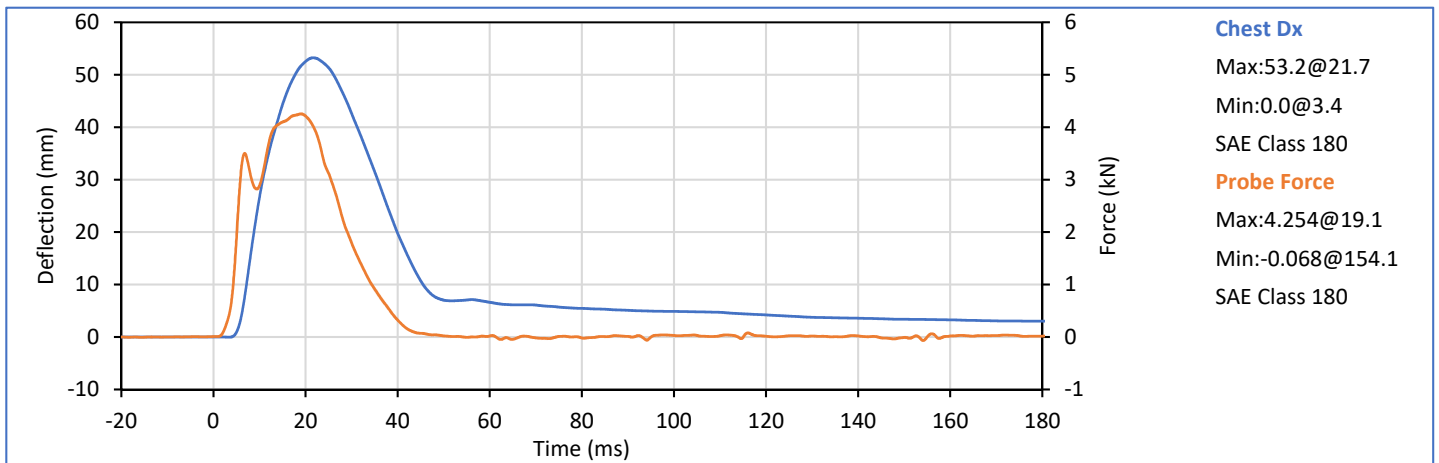
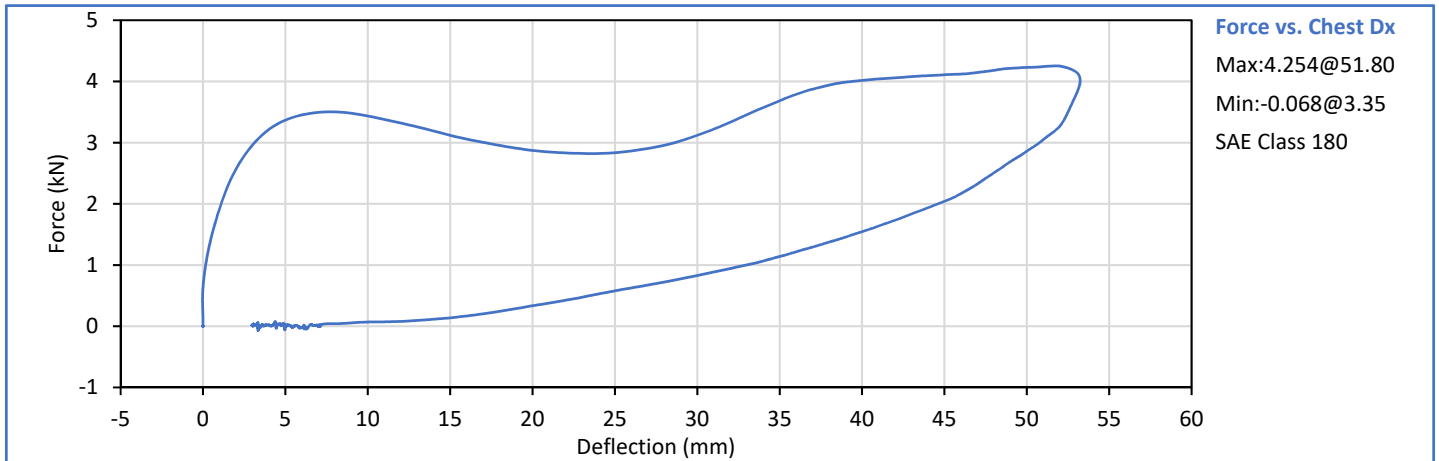


Technician:   
J. Hernandez


Approved By:   
P. Puzzuto



Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.7	Pass
Laboratory Humidity	%	10	70	15	Pass
Probe Velocity	m/s	6.59	6.83	6.67	Pass
Peak Chest Deflection	mm	50.0	58.0	53.2	Pass
Peak Probe Force, 50 and 58 mm	kN	3.900	4.400	4.254	Pass
Peak Probe Force, 18 and 50 mm	kN	0.000	4.600	4.229	Pass
Internal Hysterisis	%	69.0	85.0	72.1	Pass
<b>Overall Test Results</b>					<b>Pass</b>



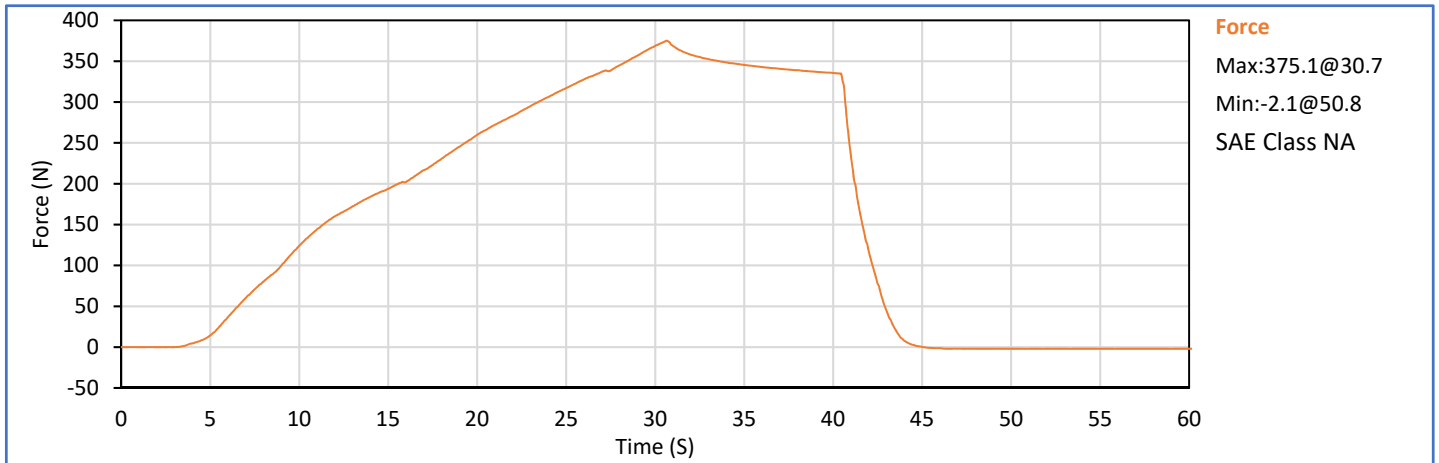
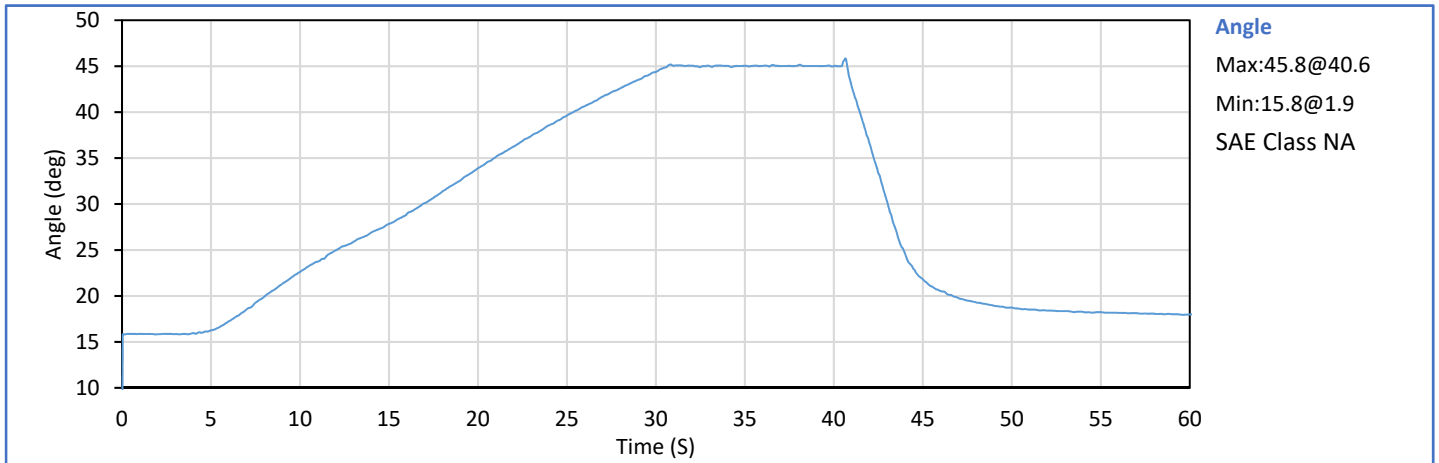
Technician:   
 J. Hernandez


Approved By:   
 P. Puzzuto


ATD Serial No.: 141

Test Date: 2020-11-30

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.6	Pass
Laboratory Humidity	%	10	70	34	Pass
Orientation Angle	deg	0.0	20.0	15.6	Pass
Test Initial Angle	deg	11.0	19.0	15.8	Pass
Peak Force at 45° (+/-0.5°)	N	320.0	390.0	339.0	Pass
Torso Flexion Rate	deg/s	0.50	1.50	1.13	Pass
Final Reference Plane Angle	deg	-8.0	8.0	4.1	Pass
<b>Overall Test Results</b>					<b>Pass</b>

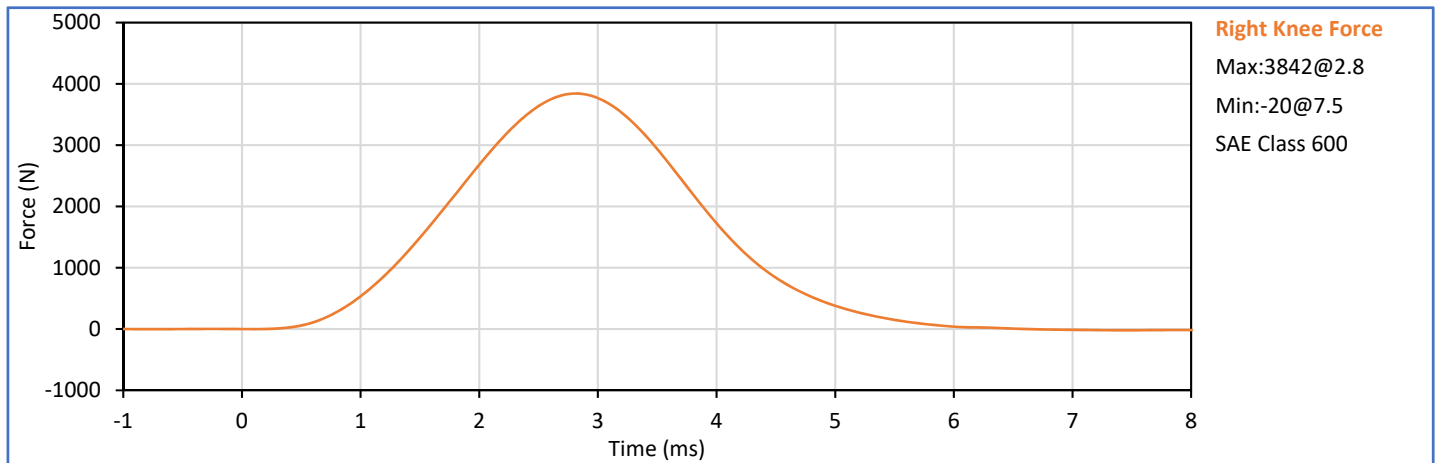
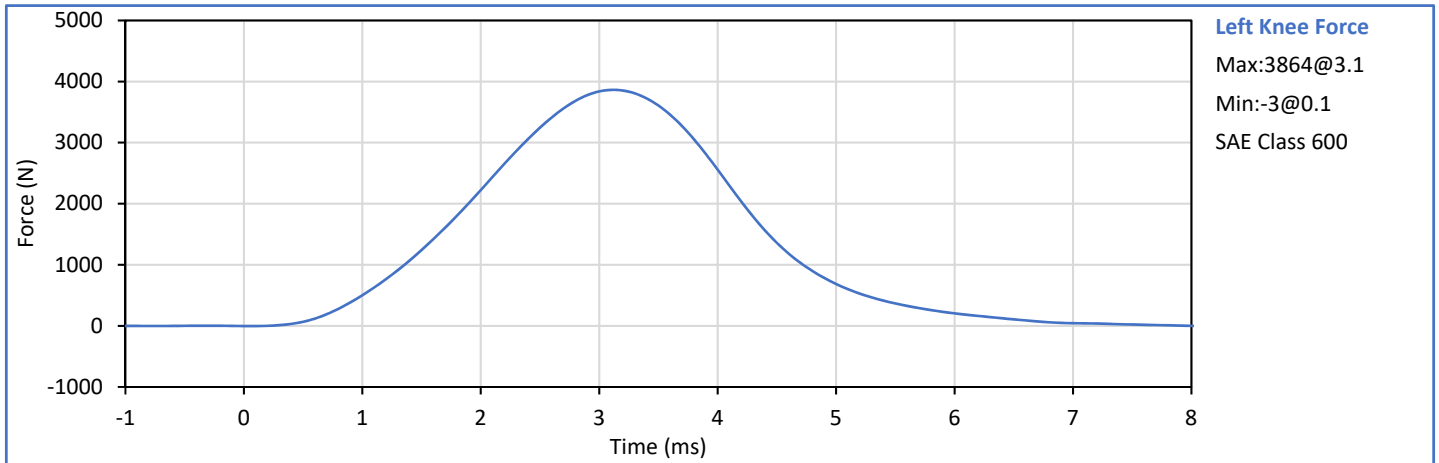


Technician:   
J. Hernandez


Approved By:   
P. Puzzuto



	Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
	Laboratory Temperature	°C	18.9	25.6	21.0	Pass
	Laboratory Humidity	%	10	70	20	Pass
Left	Probe Velocity	m/s	2.070	2.130	2.096	Pass
Knee	Peak Resistive Force	N	3450	4060	3864	Pass
Right	Probe Velocity	m/s	2.070	2.130	2.101	Pass
Knee	Peak Resistive Force	N	3450	4060	3842	Pass
Overall Test Results						Pass



Technician:   
J. Hernandez

Approved By:   
P. Puzzuto

**APPENDIX D**  
**TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION**

**Table 1 - Driver ATD Instrumentation**

Sensor Location	Sensor S\N	Mfr	Model	Cal Date
Head Acceleration X Primary	P49209	Endevco	7264C-2k	2020-08-20
Head Acceleration Y Primary	P49228	Endevco	7264C-2k	2020-08-20
Head Acceleration Z Primary	P50101	Endevco	7264C-2k	2020-08-20
Head Acceleration X Redundant	P50103	Endevco	7264C-2k	2020-08-20
Head Acceleration Y Redundant	P49210	Endevco	7264C-2k	2020-08-20
Head Acceleration Z Redundant	P58713	Endevco	7264C-2k	2020-08-20
Head Rotation Rate X	ARS15066	DTS	ARS PRO-8k (2000Hz)	2020-06-08
Head Rotation Rate Y	ARS15067	DTS	ARS PRO-8k (2000Hz)	2020-06-08
Head Rotation Rate Z	ARS15068	DTS	ARS PRO-8k (2000Hz)	2020-06-08
Upper Neck Force X	1633 Fx	R.A. Denton	1716A	2020-07-20
Upper Neck Force Y	1633 Fy	R.A. Denton	1716A	2020-07-20
Upper Neck Force Z	1633 Fz	R.A. Denton	1716A	2020-07-20
Upper Neck Moment X	1633 Mx	R.A. Denton	1716A	2020-07-20
Upper Neck Moment Y	1633 My	R.A. Denton	1716A	2020-07-20
Upper Neck Moment Z	1633 Mz	R.A. Denton	1716A	2020-07-20
Chest Acceleration X Primary	P52112	Endevco	7264C-2k	2020-08-20
Chest Acceleration Y Primary	P49208	Endevco	7264C-2k	2020-08-20
Chest Acceleration Z Primary	P51264	Endevco	7264C-2k	2020-08-20
Chest Acceleration X Redundant	P49461	Endevco	7264C-2k	2020-08-20
Chest Acceleration Y Redundant	P58774	Endevco	7264C-2k	2020-08-20
Chest Acceleration Z Redundant	P49168	Endevco	7264C-2k	2020-08-20
Chest Deflection	0606 (H3)	Servo	14CBI-3615	2020-08-27
Pelvis Acceleration X	P49238	Endevco	7264C-2k	2020-08-20
Pelvis Acceleration Y	P58877	Endevco	7264C-2k	2020-08-20
Pelvis Acceleration Z	P50087	Endevco	7264C-2k	2020-08-20
Left Femur Force Z	120 (pri)	R.A. Denton	3821JTF	2020-01-06
Right Femur Force Z	130 (pri)	R.A. Denton	3821JTF	2020-01-06
Left Femur Force Z Redundant	120 (red)	R.A. Denton	3821JTF	2020-01-06
Right Femur Force Z Redundant	130 (red)	R.A. Denton	3821JTF	2020-01-06
Left Upper Tibia Moment X	DH3054 Mx	R.A. Denton	IF-857	2020-02-18
Left Upper Tibia Moment Y	DH3054 My	R.A. Denton	IF-857	2020-02-18
Left Upper Tibia Force Z	DH3054 Fz	R.A. Denton	IF-857	2020-02-18
Left Lower Tibia Moment X	494 Mx	R.A. Denton	3644	2020-02-18
Left Lower Tibia Moment Y	494 My	R.A. Denton	3644	2020-02-18
Left Lower Tibia Force Z	494 Fz	R.A. Denton	3644	2020-02-18
Right Upper Tibia Moment X	482 Mx	R.A. Denton	3643	2020-02-18
Right Upper Tibia Moment Y	482 My	R.A. Denton	3643	2020-02-18
Right Upper Tibia Force Z	482 Fz	R.A. Denton	3643	2020-02-18
Right Lower Tibia Moment X	499 Mx	R.A. Denton	3644	2020-02-18
Right Lower Tibia Moment Y	499 My	R.A. Denton	3644	2020-02-18
Right Lower Tibia Force Z	499 Fz	R.A. Denton	3644	2020-02-18
Left Ankle Acceleration X	03E20-N09	Entran	EGEB6Q-2k	2020-08-24
Left Ankle Acceleration Z	03D30-N13	Entran	EGEB6Q-2k	2020-08-24
Left Toe Acceleration Z	03H07-Z10	Entran	EGEB6Q-2k	2020-08-24
Right Ankle Acceleration X	03E29-N20	Entran	EGEB6Q-2k	2020-08-24
Right Ankle Acceleration Z	03E18-F02	Entran	EGEB6Q-2k	2020-08-24
Right Toe Acceleration Z	05H31-Z04	Entran	EGEB6Q-2k	2020-08-24
Seat Belt Outside Lap Force	263	FTSS	IF-964	2020-10-02
Seat Belt Upper Diagonal Force	315	FTSS	IF-964	2020-10-02

**Table 2 - Right Front Passenger ATD Instrumentation**

Sensor Location	Sensor S\N	Mfr	Model	Cal Date
Head Acceleration X Primary	P58902	Endevco	7264C-2k	2020-08-25
Head Acceleration Y Primary	P58900	Endevco	7264C-2k	2020-08-25
Head Acceleration Z Primary	P58989	Endevco	7264C-2k	2020-08-25
Head Acceleration X Redundant	P58906	Endevco	7264C-2k	2020-08-25
Head Acceleration Y Redundant	P58983	Endevco	7264C-2k	2020-08-25
Head Acceleration Z Redundant	P58901	Endevco	7264C-2k	2020-08-25
Head Rotation Rate X	ARS15060	DTS	ARS PRO-8k (2000Hz)	2020-06-08
Head Rotation Rate Y	ARS15061	DTS	ARS PRO-8k (2000Hz)	2020-06-08
Head Rotation Rate Z	ARS15062	DTS	ARS PRO-8k (2000Hz)	2020-06-08
Upper Neck Force X	284 Fx	FTSS	IF-205	2020-01-07
Upper Neck Force Y	284 Fy	FTSS	IF-205	2020-01-07
Upper Neck Force Z	284 Fz	FTSS	IF-205	2020-01-07
Upper Neck Moment X	284 Mx	FTSS	IF-205	2020-01-07
Upper Neck Moment Y	284 My	FTSS	IF-205	2020-01-07
Upper Neck Moment Z	284 Mz	FTSS	IF-205	2020-01-07
Chest Acceleration X Primary	P58742	Endevco	7264C-2k	2020-08-26
Chest Acceleration Y Primary	P51640	Endevco	7264C-2k	2020-08-26
Chest Acceleration Z Primary	P58988	Endevco	7264C-2k	2020-08-26
Chest Acceleration X Redundant	P51632	Endevco	7264C-2k	2020-08-26
Chest Acceleration Y Redundant	P58793	Endevco	7264C-2k	2020-08-26
Chest Acceleration Z Redundant	P58790	Endevco	7264C-2k	2020-08-26
Chest Deflection	2527 (HF)	Servo	14CBI-3615	2020-08-27
Pelvis Acceleration X	P50076	Endevco	7264C-2k	2020-08-25
Pelvis Acceleration Y	P58897	Endevco	7264C-2k	2020-08-25
Pelvis Acceleration Z	P51724	Endevco	7264C-2k	2020-08-25
Left Femur Force Z	114 (pri)	R.A. Denton	3821JTF	2020-01-06
Right Femur Force Z	125 (pri)	R.A. Denton	3821JTF	2020-01-06
Left Femur Force Z Redundant	114 (red)	R.A. Denton	3821JTF	2020-01-06
Right Femur Force Z Redundant	125 (red)	R.A. Denton	3821JTF	2020-01-06
Left Upper Tibia Moment X	468 Mx	R.A. Denton	3643	2020-02-18
Left Upper Tibia Moment Y	468 My	R.A. Denton	3643	2020-02-18
Left Upper Tibia Force Z	468 Fz	R.A. Denton	3643	2020-02-18
Left Lower Tibia Moment X	91 Mx	R.A. Denton	3644	2020-02-18
Left Lower Tibia Moment Y	91 My	R.A. Denton	3644	2020-02-18
Left Lower Tibia Force Z	91 Fz	R.A. Denton	3644	2020-02-18
Right Upper Tibia Moment X	477 Mx	R.A. Denton	3643	2020-02-18
Right Upper Tibia Moment Y	477 My	R.A. Denton	3643	2020-02-18
Right Upper Tibia Force Z	477 Fz	R.A. Denton	3643	2020-02-18
Right Lower Tibia Moment X	399 Mx	R.A. Denton	3644	2020-02-11
Right Lower Tibia Moment Y	399 My	R.A. Denton	3644	2020-02-11
Right Lower Tibia Force Z	399 Fz	R.A. Denton	3644	2020-02-11
Left Ankle Acceleration X	A199899	MSI	64C-2k	2020-07-20
Left Ankle Acceleration Z	A199908	MSI	64C-2k	2020-07-20
Left Toe Acceleration Z	A199930	MSI	64C-2k	2020-07-20
Right Ankle Acceleration X	A202287	MSI	64C-2k	2020-07-20
Right Ankle Acceleration Z	A201195	MSI	64C-2k	2020-07-20
Right Toe Acceleration Z	A201202	MSI	64C-2k	2020-07-20
Seat Belt Outside Lap Force	313	FTSS	IF-964	2020-10-02
Seat Belt Upper Diagonal Force	251	FTSS	IF-964	2020-10-02

**Table 3 - Vehicle Instrumentation**

Sensor Location	Sensor S\N	Mfr	Model	Cal Date
Left Rear Primary Ax	A356313	MSI	52F-2k	2020-09-15
Right Rear Primary Ax	A356329	MSI	52F-2k	2020-09-15
Engine Top Ax	A354816	MSI	52F-2k	2020-09-11
Engine Bottom Ax	A356509	MSI	52F-2k	2020-09-16
Left Rear Az	A354813	MSI	52F-2k	2020-09-11
Right Rear Az	A354846	MSI	52F-2k	2020-09-08
Left Rear Redundant Ax	A356488	MSI	52F-2k	2020-09-16
Right Rear Redundant Ax	A354884	MSI	52F-2k	2020-09-08