

REPORT NUMBER: NCAP-MGA-20-011

**NEW CAR ASSESSMENT PROGRAM (NCAP)
Frontal Barrier Impact Test**

**HYUNDAI MOTOR COMPANY
2020 Hyundai Accent SE 4-Door Sedan
NHTSA No.: M20204200**

**MGA RESEARCH CORPORATION
5000 Warren Road
Burlington, WI 53105**



Test Date: January 6, 2020

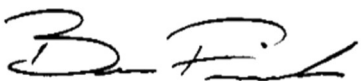
Final Report Date: March 23, 2020

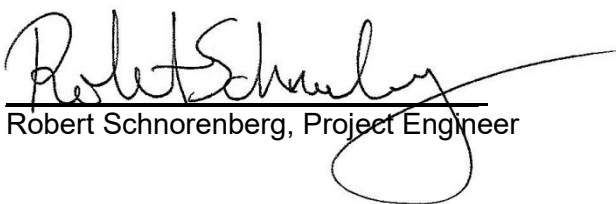
FINAL REPORT

**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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Approval Date: March 23, 2020

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

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16. Abstract A 56.3 km/h NCAP Frontal Rigid Barrier Impact Test was conducted on a 2020 Hyundai Accent SE 4-Door Sedan in accordance with the specifications of the Office of Crashworthiness Standards Laboratory Procedure for NCAP Full Frontal Rigid Barrier Impact Testing. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), and 301 performance. The test was conducted at MGA Research Corporation in Burlington, Wisconsin on January 6, 2020. The impact velocity of the vehicle was 56.21 km/h and the ambient temperature at the barrier face at the time of impact was 21.4°C. The target vehicle post-test maximum crush was 540 mm located at the vehicle centerline. The test vehicle's performance was as follows: <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <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 (HIC₁₅)</td> <td></td> <td>700</td> <td>290</td> <td>700</td> <td>340</td> </tr> <tr> <td>Maximum Chest Compression</td> <td>mm</td> <td>63</td> <td>23</td> <td>52</td> <td>10</td> </tr> <tr> <td>Nij</td> <td></td> <td>1</td> <td>0.26</td> <td>1</td> <td>0.56</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>4170</td> <td>1114</td> <td>2620</td> <td>882</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>4000</td> <td>176</td> <td>2520</td> <td>415</td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>10008</td> <td>267</td> <td>6805</td> <td>146</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>10008</td> <td>285</td> <td>6805</td> <td>140</td> </tr> </tbody> </table>						Measurement Description	Units	Driver ATD		Passenger ATD		Threshold	Result	Threshold	Result	Head Injury Criteria (HIC ₁₅)		700	290	700	340	Maximum Chest Compression	mm	63	23	52	10	Nij		1	0.26	1	0.56	Neck Tension	N	4170	1114	2620	882	Neck Compression	N	4000	176	2520	415	Left Femur Force	N	10008	267	6805	146	Right Femur Force	N	10008	285	6805	140
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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 693JJ919D000006. 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 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 2020 Hyundai Accent SE 4-Door Sedan at a velocity of 56.21 km/h. The test was performed at MGA Research Corporation on January 6, 2020. Pre-test and post-test photographs of the vehicle and dummies can be found in Appendix A.

Two (2) 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 this report.

One Part 572E 50th percentile male anthropomorphic test device (ATD), was placed in the driver seating position and one Part 572O 5th percentile female test device (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 transducers, right/left femur load cells, and lower leg instrumentation. Seat belt load cells were installed on the driver's and passenger's lap and shoulder belts to measure dummy torso and pelvic section loading.

The driver (position 1) ATD (Serial No. 351) and the right-front passenger (position 2) ATD (Serial No. DH1659) were qualified previous to this test. Certification details, along with instrumentation calibration data, are found in Appendix C of this report.

The 634 channels of data were recorded on a 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 vehicle was 540 mm located at the vehicle centerline and 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's head contacted the airbag. The driver's head also contacted the headrest. The driver's right knee contacted the steering column shroud. The passenger's visible contact points were as follows: The passenger's head contacted the airbag. The passenger's head also contacted the headrest. The passenger's knees contacted the glove box.

The occupant data is summarized below:

ATD position	HIC ₁₅	Nij	Neck Tension (N)	Neck Comp. (N)	3ms Chest Clip (g)	Chest Disp. (mm)	Left Femur (N)	Right Femur (N)
Driver (50 th)	290	0.26	1114	176	46	23	267	285
Passenger (5 th)	340	0.56	882	415	45	10	146	140

The test data can be found on the NHTSA website at www.nhtsa.gov

TEST NOTES

Driver Shoulder and Lap Belt load cells were not installed.
 Passenger Shoulder and Lap Belt load cells were not installed.
 Driver Right Ankle X recorded no valid data after 110 ms.
 Passenger Chest Xr recorded no valid data after 100 ms.
 Passenger Chest Yr recorded no valid data after 75 ms.
 Passenger Chest Zr recorded no valid data after 86 ms.
 Passenger Right Femur Redundant recorded no valid data after 95 ms.
 Passenger Left Femur Redundant recorded no valid data after 85 ms.
 Top of Engine X recorded no valid data after 31 ms.
 Barrier C-01 Fx recorded no valid data.
 Barrier C-02 Fx, My, Mz recorded no valid data.
 Barrier K-03 Fx recorded questionable data.
 Barrier K-15 My recorded no valid data.

MGA does not endorse or certify products. The manufacturer's name appears solely for identification purposes.

SECTION 2
OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2020 Hyundai Accent SE 4-Door Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20204200
 Test Date: 1/6/2020

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20204200	Traction Control System (TCS)	Yes
Model Year	2020	Power Steering	Yes
Make	Hyundai	Power Window Auto-Reverse	No
Model	Accent SE	Driver Frontal Airbag	Yes
Body Style	4-Door Sedan	Driver Curtain Airbag	Yes
VIN	3KPC24A67LE094049	Driver Head/Torso Airbag	No
Body Color	Urban Gray	Driver Torso Airbag	No
Odometer (km/mi)	21 km / 13 mi	Driver Torso/Pelvis Airbag	Yes
Engine Displacement (L)	1.6 L	Driver Pelvis Airbag	No
Type/No. Cylinders	Inline 4	Driver Knee Airbag	No
Engine Placement	Lateral	Front Pass. Frontal Airbag	Yes
Transmission Type	Manual	Front Pass. Curtain Airbag	Yes
Transmission Speeds	6	Front Pass. Head/Torso Airbag	No
Overdrive	Yes	Front Pass. Torso Airbag	No
Final Drive	FWD	Front Pass. Torso/Pelvis Airbag	Yes
Roof Rack	No	Front Pass. Pelvis Airbag	No
Sunroof/T-Top	No	Front Pass. Knee Airbag	No
Running Boards	No	Driver Pretensioner	Yes
Tilt Steering Wheel	Yes	Driver Load Limiter	Yes
Power Seats	No	Front Pass. Pretensioner	Yes
Anti-Lock Brakes (ABS)	Yes	Front Pass. Load Limiter	Yes
Automatic Door Locks (ADLs)	Yes	Other	N/A

Does owner's manual provide instructions to turn off automatic door locks?	No
--	----

DATA FROM CERTIFICATION LABEL

Manufactured By	HYUNDAI MOTOR COMPANY	GVWR (kg)	3439
Date of Manufacture	07/19	GAWR Front (kg)	1940
		GAWR Rear (kg)	1852

VEHICLE SEATING AND WEIGHT CAPACITY DATA

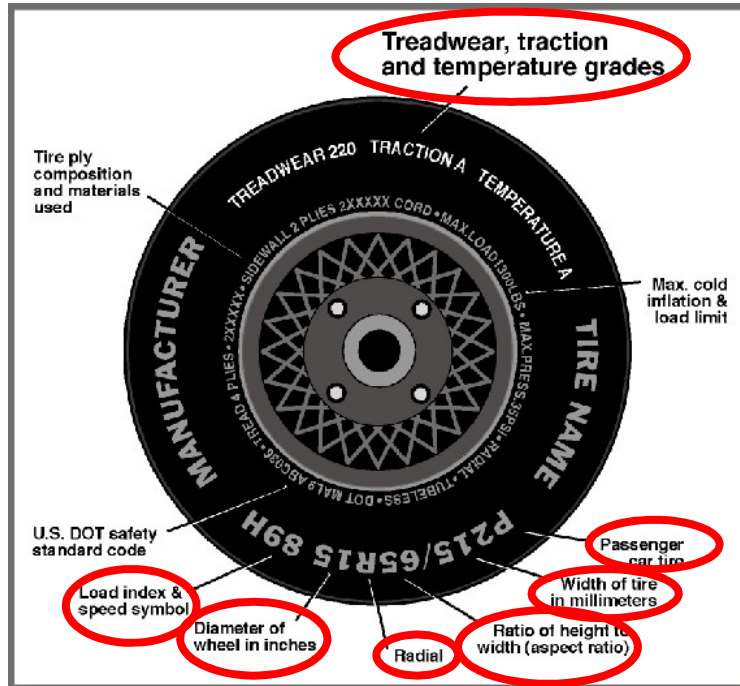
Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Contoured		
Designated Seating Capacity (DSC)	2	3		5
Capacity Weight (VCW) (kg)				385
Cargo Weight (RCLW) (kg)				45

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

Test Vehicle: 2020 Hyundai Accent SE 4-Door Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20204200
 Test Date: 1/6/2020

VEHICLE TIRE INFORMATION



Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	230	230
Recommended Tire Size	185/65R15	185/65R15
Tire Size on Vehicle	185/65R15	185/65R15
Tire Manufacturer	Continental	Continental
Tire Model	ProContact	ProContact
Treadwear	500	500
Traction	A	A
Temperature Grade	A	A
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	1 Polyester, 2 Steel, 1 Polyamide	1 Polyester, 2 Steel, 1 Polyamide
Load Index/Speed Symbol	88H	88H
Tire Material	Rubber	Rubber
DOT Safety Code Left	P519 WCET 2519	P519 WCET 2519
DOT Safety Code Right	P519 WCET 2519	P519 WCET 2519

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

Test Vehicle: 2020 Hyundai Accent SE 4-Door Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20204200
 Test Date: 1/6/2020

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	345.5	235.0		381.5	292.5	
Right	kg	351.5	220.5		379.0	280.0	
Ratio	%	60.5%	39.5%		57.1%	42.9%	
Totals	kg	697.0	455.5	1152.5	760.5	572.5	1333.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1152.5
Weight of 1 P572E ATD & 1 P572O ATD	kg	141
Rated Cargo/Luggage Weight (RCLW)	kg	45
Calculated Test Vehicle Target Weight (TVTW)	kg	1338.5

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	657	662	665	662	1021
As Tested	mm	647	652	625	632	1110
Post Test	mm	662	680	624	624	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2584
Total Vehicle Length at Left Side	mm	4285
Total Vehicle Length at Centerline	mm	4386
Total Vehicle Length at Right Side	mm	4285
Weight of Ballast in Cargo Area	kg	0
Weight of Vehicle Components Removed	kg	24
Amount of Stoddard Solvent in Fuel Tank	L	41.6

List of components removed to meet test weight: LR tail light, LR / RR headrest.

List of components removed for instrumentation, data box, and equipment installation: Cargo area cover / carpet / trim, jack and tools, RR tail light, underbody plastic.

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

Test Vehicle: 2020 Hyundai Accent SE 4-Door Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20204200
 Test Date: 1/6/2020

TARGET VEHICLE STRUCTURAL MEASUREMENT

	Elements	Pre-Test (mm)
1	Total Length	4386
2	Total Width	1702
3	Bumper Top Height	518
4	Bumper Bottom Height	413
5	Longitudinal Member Top Height	519
6	Distance between Longitudinal Members	904
7	Longitudinal Member Width	61
8	Engine Top Height	824
9	Engine Bottom Height	205
10	Engine and Gearbox Width	822
11	Front Bumper-Engine Distance	477
12	Front Shock Absorber Fixing Height	835
13	Bonnet Leading Edge Height	769
14	Front Shock Absorber Fixing Width	1180
15	Front Bumper – Front Axle Distance	823
16	Front Axle – A-Pillar Distance	406
17	A-Pillar – B-Pillar Distance	1141
18	B-Pillar – Rear Axle Distance	1034
19	B-Pillar – C-Pillar Distance	623
20	Roof Sill Bottom Height	1300
21	Roof Sill Top Height	1398
22	Floor Sill Bottom Height	177
23	Floor Sill Top Height	350

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

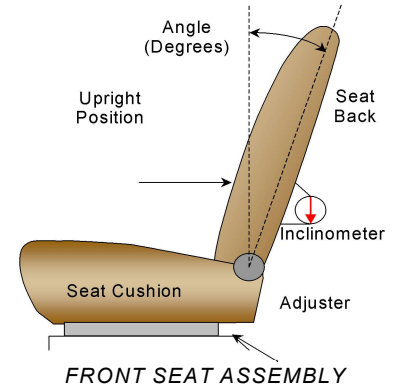
Test Vehicle: 2020 Hyundai Accent SE 4-Door Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20204200
 Test Date: 1/6/2020

NOMINAL DESIGN RIDING POSITION

The driver seat back is positioned as close as possible to the manufacturer's design angle. For the passenger seat back, seat back is adjusted following Appendix F, "Driver & Passenger Dummy Seating & Positioning Procedures" in the NCAP Test Procedure dated May 2018.

	Degrees
Driver Seat Back Angle	0.1° on outboard headrest post
Passenger Seat Back Angle	0.5° on outboard headrest post



SEAT FORE/AFT POSITIONS

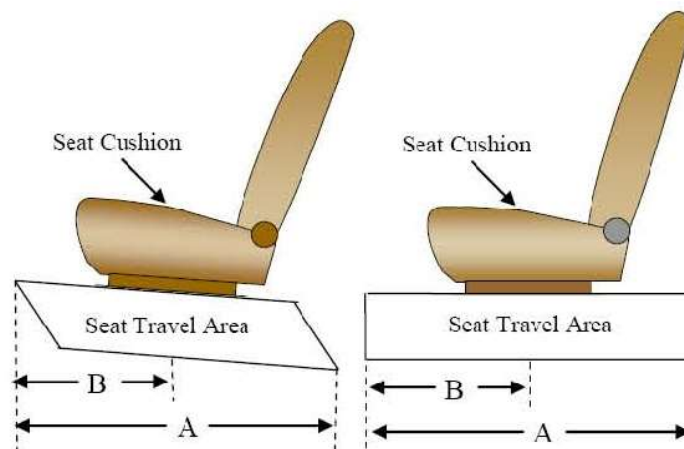
The driver and passenger seat fore/aft positions are adjusted following Appendix F, "Driver & Passenger Dummy Seating & Positioning Procedures" in the NCAP Test Procedure dated May 2018.

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	298 mm / 38 detents (1 st as 1)	149 mm / 14 th detent (1 st as 0)
Passenger Seat	240 mm / 38 detents (1 st as 1)	0 mm / 0 th detent (1 st as 0)

SEAT BELT UPPER ANCHORAGES

The seat belt upper anchorages are set following the manufacturer's specified position as listed in Form 1.

	Total # of Positions	Placed in Position #
Driver Seat	3 (1 st as 1)	0 (1 st as 0)
Passenger Seat	3 (1 st as 1)	0 (1 st as 0)



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

Test Vehicle: 2020 Hyundai Accent SE 4-Door Sedan
 Test Program: NCAP Frontal Barrier Impact Test

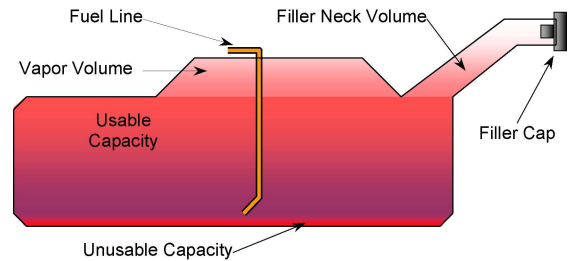
NHTSA No.: M20204200
 Test Date: 1/6/2020

FUEL TANK CAPACITY DATA

	Liters
Usable Capacity of "Standard Tank"	45.0
Usable Capacity of "Optional Tank"	
92-94% of Usable Capacity	41.4 to 42.3
Actual Amount of Solvent used	41.6
1/3 of Usable Capacity	15.0

FUEL PUMP

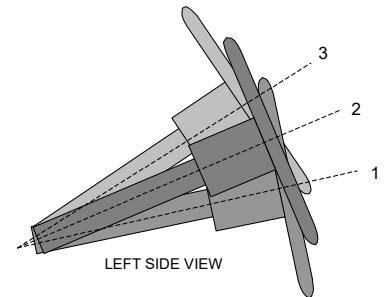
The vehicle is equipped with an electronic fuel pump. The fuel pump will run when the engine is running. The pump will also briefly run when the ignition key is turned to the "on" position. The filler neck is located on the driver's side.



VEHICLE FUEL TANK ASSEMBLY

STEERING COLUMN ADJUSTMENT

Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when moved through its full range of motion. An aluminum plate is placed across the rim of the steering wheel, an inclinometer is placed on the plate and the angle is measured.



STEERING COLUMN ASSEMBLY

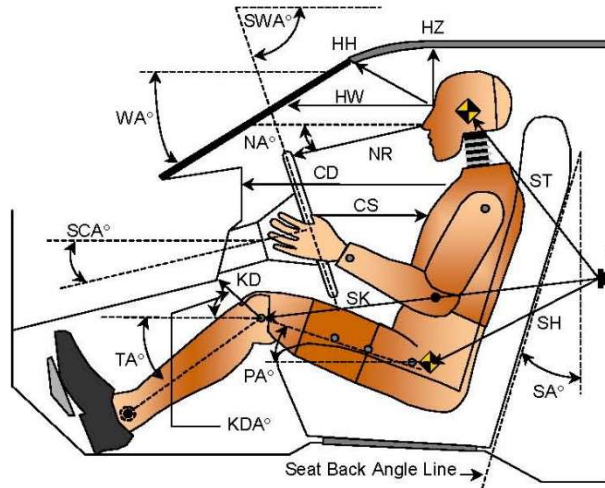
STEERING COLUMN POSITION

	Degrees	Fore/Aft Position (mm)
Lowermost Position 1	69.0	
Geometric Center Position 2	66.5	
Uppermost Position 3	63.9	
Telescoping Steering Wheel Travel		
Test Position	66.5	

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2020 Hyundai Accent SE 4-Door Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20204200
 Test Date: 1/6/2020



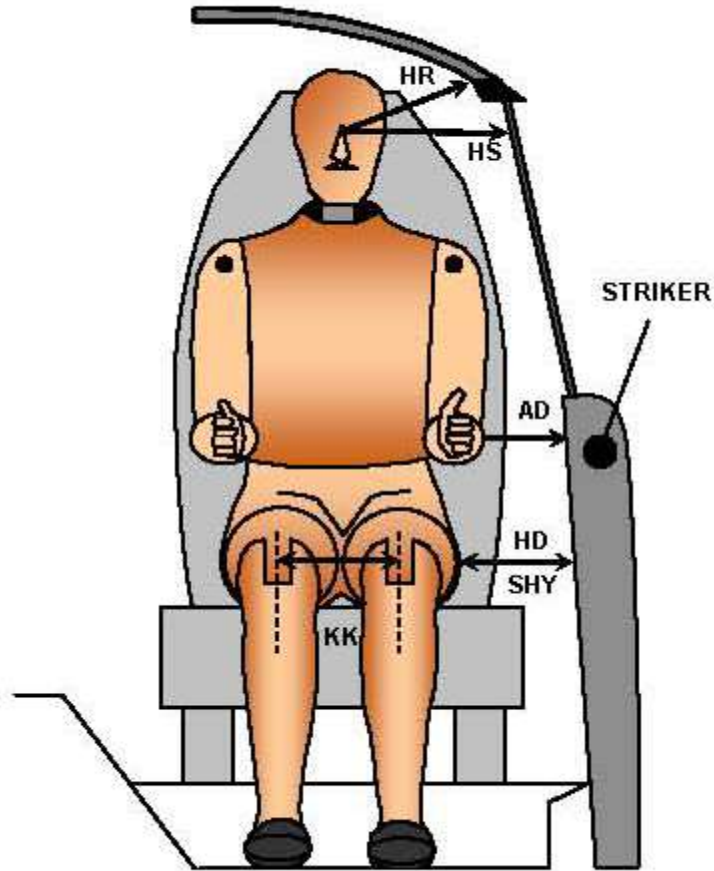
LEFT SIDE VIEW

Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		20.8		
SWA°	Steering Wheel Angle		66.5		
SCA°	Steering Column Angle		23.5		
SA°	Seat Back Angle		0.1		0.5
HZ	Head to Roof (Z)	188	90	230	90
HH	Head to Header	346	28.9	340	38.1
HW	Head to Windshield	661	0	704	0
NR	Nose to Rim	365	6.7		
CD	Chest to Dash	515		430	
CS	Chest to Steering Hub	302	3.1		
RA	Rim to Abdomen	191	0		
KDL	Left Knee to Dash	204	26.8	135	23.2
KDR	Right Knee to Dash	154	30.0	145	24.5
PA°	Pelvic Angle		24.0		20.5
TA°	Tibia Angle		42.8		44.7
SK	Striker to Knee	573	98.9	647	100.3
ST	Striker to Head	420	14.7	386	22.4
SH	Striker to H-Point	317	144.2	390	122.4

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2020 Hyundai Accent SE 4-Door Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20204200
 Test Date: 1/6/2020



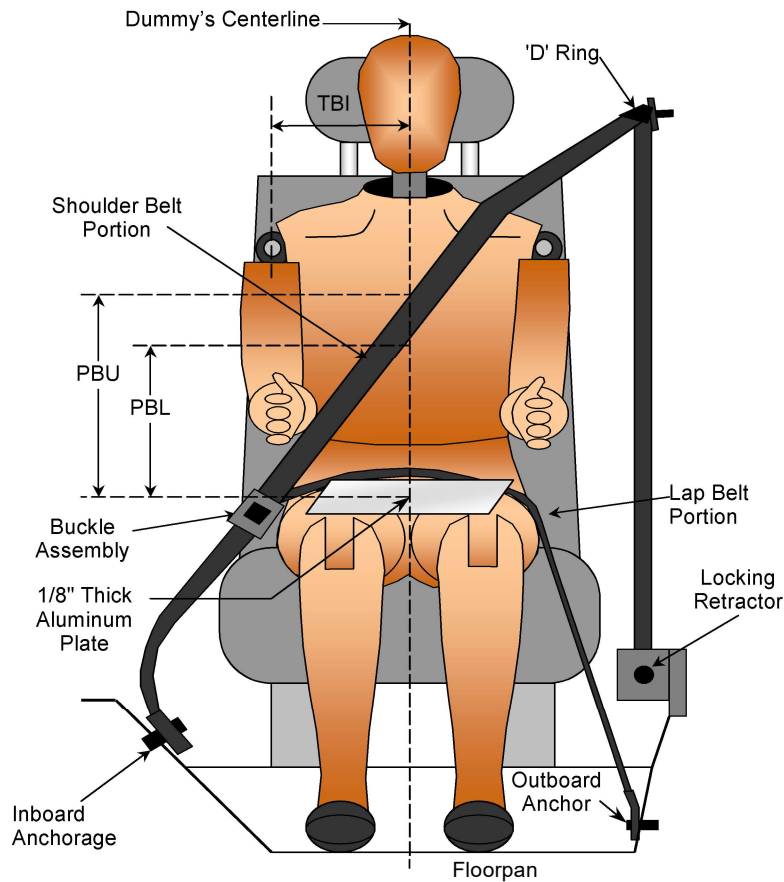
FRONT VIEW OF DUMMY

Code	Measurement Description	Driver	Passenger
		Length (mm)	
AD	Arm to Door	45	85
HD	H-Point to Door	145	168
HR	Head to Side Header	214	260
HS	Head to Side Window	351	355
KK	Knee to Knee	354	230
SHY	Striker to H-Point (Y Direction)	287	293
AA	Ankle to Ankle	350	178

DATA SHEET NO. 5 SEAT BELT POSITIONING DATA

Test Vehicle: 2020 Hyundai Accent SE 4-Door Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20204200
Test Date: 1/6/2020



FRONT VIEW OF DUMMY

SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU - Top surface of reference to belt upper edge	mm	365	345
PBL - Top surface of reference to belt lower edge	mm	305	260

BELT LENGTH DATA

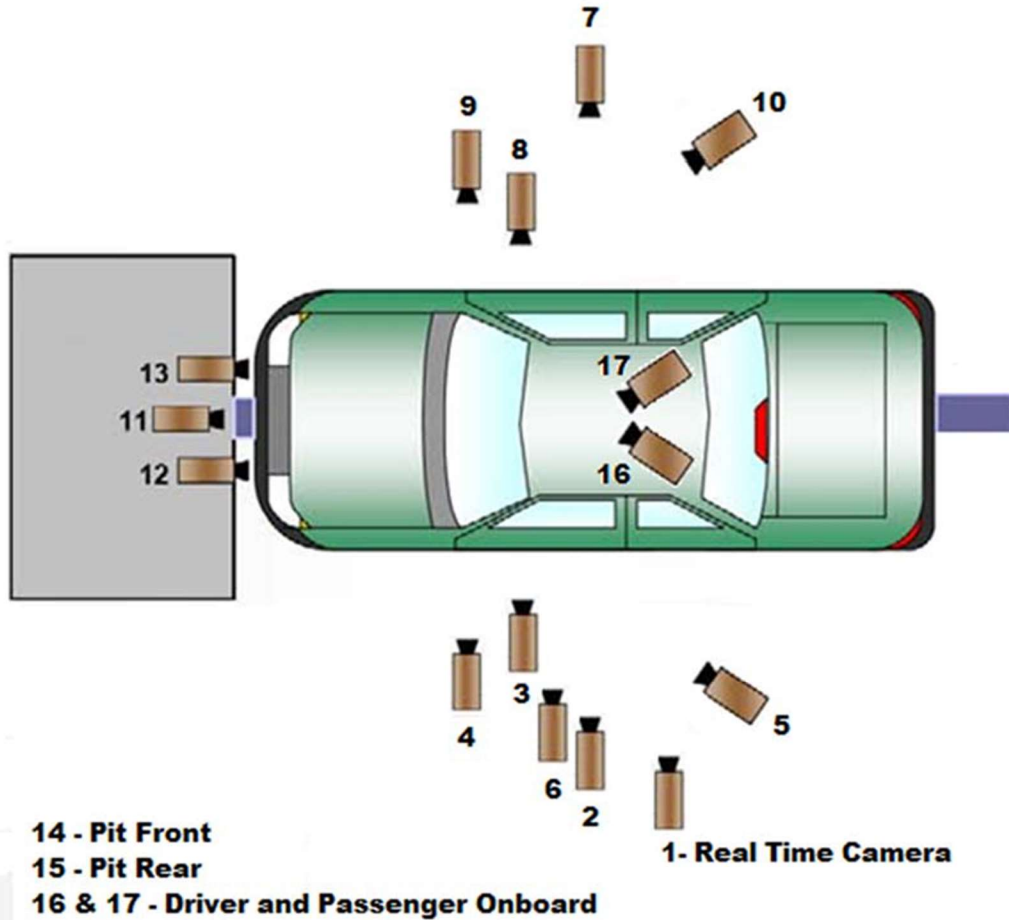
Measurement Description	Units	Driver	Passenger
Shoulder Belt Length as measured on ATD	mm	890	930
Lap Belt Length as measured on ATD	mm	610	680
Remainder of belt on reel	mm	900	790
Total Belt Length for Continuous Webbing Systems	mm	3000	3000

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

Test Vehicle: 2020 Hyundai Accent SE 4-Door Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20204200
Test Date: 1/6/2020

CAMERA POSITIONS FOR FRONTAL IMPACTS



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

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

Test Vehicle: 2020 Hyundai Accent SE 4-Door Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20204200
 Test Date: 1/6/2020

CAMERA LOCATIONS

No.	Camera View	Coordinates* (mm)			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Overall					30
2	Left Overall	-2030	-5480	-1380	12	1000
3	Driver Close-Up	-1300	-7120	-1880	50	1000
4	Left Front Half	-1360	-5540	-1310	24	1000
5	Left Angle	-7480	-6070	-2070	75	1000
6	Steering Column	-850	-7640	-1270	50	1000
7	Right Overall	-1779	-5810	-1311	12	1000
8	Passenger Close-Up	-1310	-6650	-1950	50	1000
9	Right Front Half	-1094	-5270	-1300	24	1000
10	Right Angle	-7390	-5040	-2030	75	1000
11	Windshield	80	0	-2310	11	1000
12	Driver Windshield	150	-370	-2230	25	1000
13	Passenger Windshield	150	-370	-2230	25	1000
14	Pit Front	-680	0	3340	24	1000
15	Pit Rear	-2870	0	3340	24	1000
16	Driver Onboard				12	1000
17	Passenger Onboard				12	1000
18	Real-Time Pan View					30

*COORDINATES:

+X = forward of impact plane

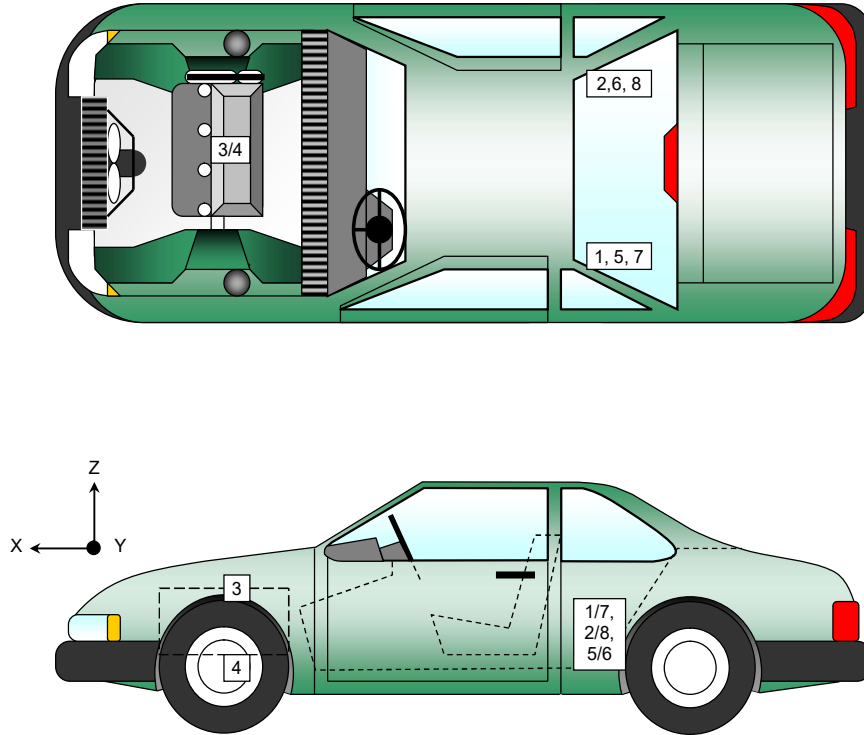
+Y = right of monorail centerline

+Z = below ground level

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

Test Vehicle: 2020 Hyundai Accent SE 4-Door Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20204200
 Test Date: 1/6/2020



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear Crossmember Accelerometer – X Direction	1759	-341	-205
2	Right Rear Crossmember Accelerometer – X Direction	1759	335	-211
3	Engine Top X	3667	-15	-824
4	Engine Bottom X	3689	104	-205
5	Left Rear Crossmember Accelerometer – Z Direction	1759	-341	-205
6	Right Rear Crossmember Accelerometer – Z Direction	1759	335	-211
7	Left Rear Crossmember Accelerometer Redundant – X Direction	1759	-303	-208
8	Right Rear Crossmember Accelerometer Redundant – X Direction	1759	303	-210

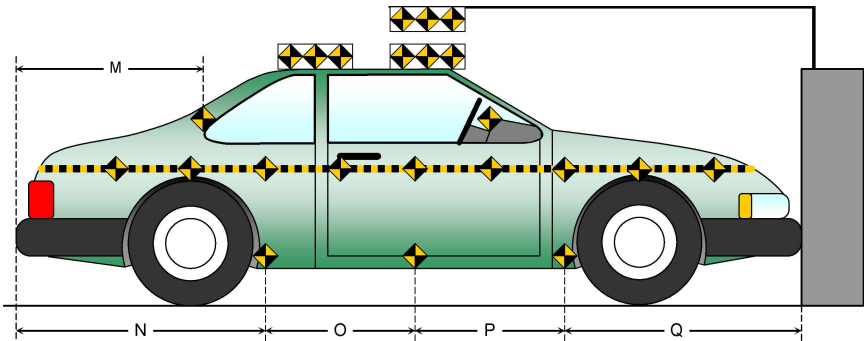
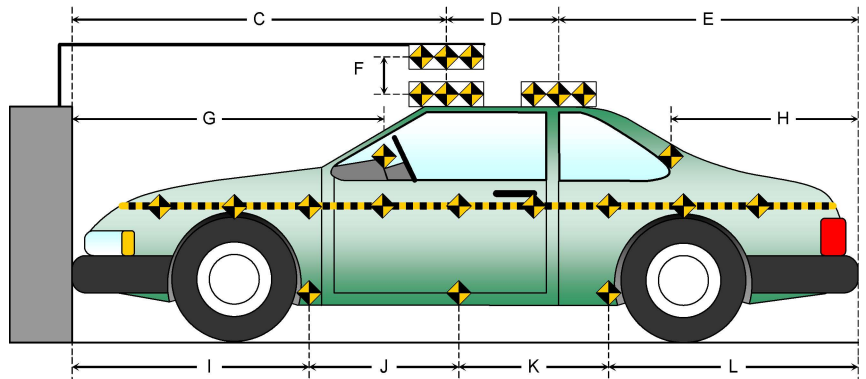
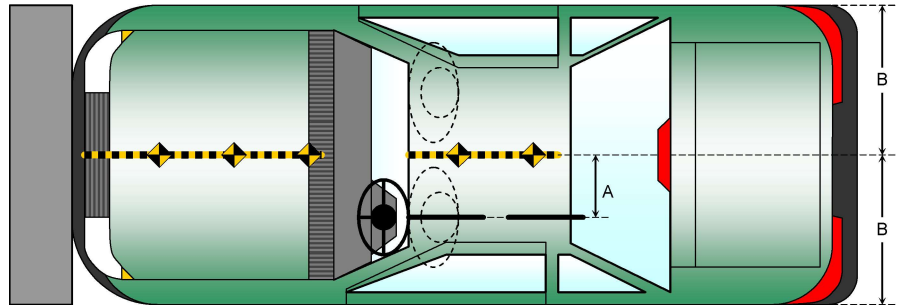
Reference Points: X - Rear Surface of Vehicle (+ forward)
 Y - Vehicle Centerline (+ to right)
 Z - Ground Plane (+ down)

DATA SHEET NO. 8
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2020 Hyundai Accent SE 4-Door Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20204200
 Test Date: 1/6/2020

Item	Value (mm)
A	340
B	851
C	2150
D	610
E	1626
F	260
G	
H	1245
I	1232
J	886
K	886
L	1382
M	1245
N	1382
O	886
P	886
Q	1232



DATA SHEET NO. 9
LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle: 2020 Hyundai Accent SE 4-Door Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20204200
Test Date: 1/6/2020

ADVANCED RESEARCH LOAD CELL BARRIER

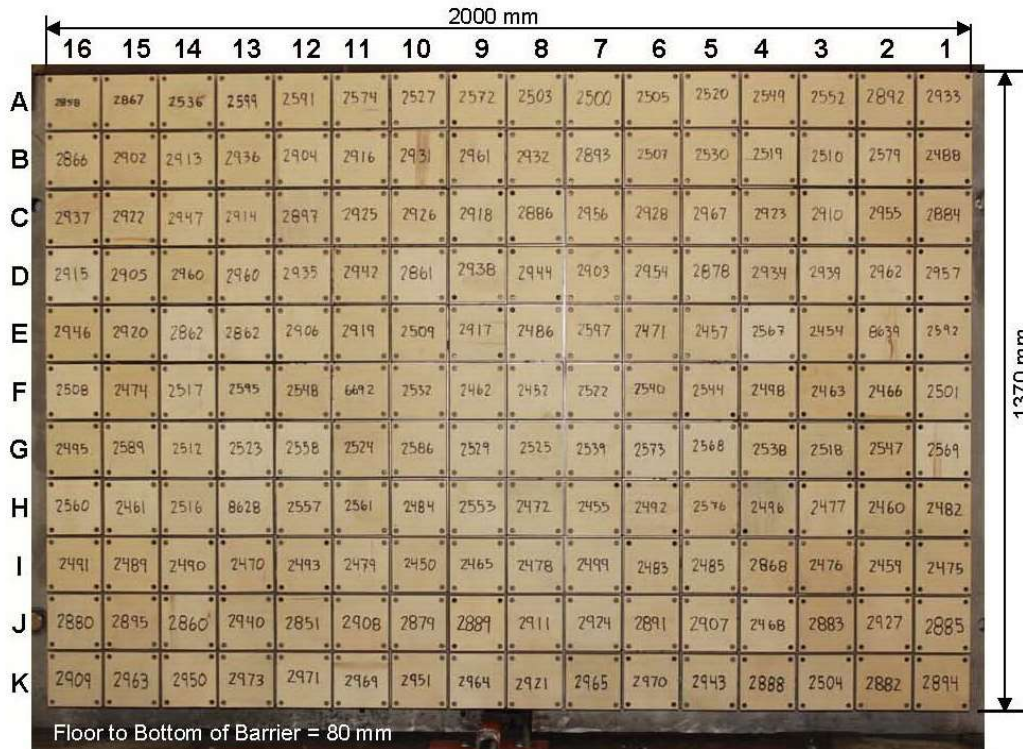


Photo for Reference Only

Centerline

A-16	A-15	A-14	A-13	A-12	A-11	A-10	A-09	A-08	A-07	A-06	A-05	A-04	A-03	A-02	A-01
B-16	B-15	B-14	B-13	B-12	B-11	B-10	B-09	B-08	B-07	B-06	B-05	B-04	B-03	B-02	B-01
C-16	C-15	C-14	C-13	C-12	C-11	C-10	C-09	C-08	C-07	C-06	C-05	C-04	C-03	C-02	C-01
D-16	D-15	D-14	D-13	D-12	D-11	D-10	D-09	D-08	D-07	D-06	D-05	D-04	D-03	D-02	D-01
E-16	E-15	E-14	E-13	E-12	E-11	E-10	E-09	E-08	E-07	E-06	E-05	E-04	E-03	E-02	E-01
F-16	F-15	F-14	F-13	F-12	F-11	F-10	F-09	F-08	F-07	F-06	F-05	F-04	F-03	F-02	F-01
G-16	G-15	G-14	G-13	G-12	G-11	G-10	G-09	G-08	G-07	G-06	G-05	G-04	G-03	G-02	G-01
H-16	H-15	H-14	H-13	H-12	H-11	H-10	H-09	H-08	H-07	H-06	H-05	H-04	H-03	H-02	H-01
I-16	I-15	I-14	I-13	I-12	I-11	I-10	I-09	I-08	I-07	I-06	I-05	I-04	I-03	I-02	I-01
J-16	J-15	J-14	J-13	J-12	J-11	J-10	J-09	J-08	J-07	J-06	J-05	J-04	J-03	J-02	J-01
K-16	K-15	K-14	K-13	K-12	K-11	K-10	K-09	K-08	K-07	K-06	K-05	K-04	K-03	K-02	K-01

Load Cells are 121 mm x 121 mm with a 7 mm gap in between each load cell.

DATA SHEET NO. 10
TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle: 2020 Hyundai Accent SE 4-Door Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20204200
Test Date: 1/6/2020

INSTRUMENTATION

Instrumentation	Number of Channels Collected
Driver Dummy Data Channels	49
Passenger Dummy Data Channels	49
Vehicle Structure Accelerometers	8
Barrier Channels	528
Total	634

CAMERA COVERAGE

Type of Camera	Number Used in this Test
High-Speed Vehicle Onboard	2
High-Speed Offboard	14
Real-Time	2
Total	18

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

Test Vehicle: 2020 Hyundai Accent SE 4-Door Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20204200
Test Date: 1/6/2020

TEST DUMMY INFORMATION AND CONTACT LOCATIONS

Description	Driver	Passenger
Dummy Type / Serial No.	HIIL 50% / 351	HIIL 5% / DH1659
Head Contact	Frontal Airbag, Headrest	Frontal Airbag, Headrest
Upper Torso Contact	None	None
Lower Torso Contact	None	None
Left Knee Contact	None	Glove Box
Right Knee Contact	Steering Column Shroud	Glove Box

DOOR OPENING, TRUNK OPENING, AND SEAT TRACK INFORMATION

Description	Driver	Passenger
Locked/Unlocked Doors	Doors were locked	Doors were locked
Front Door Opening	Remained closed and unlocked; opened without tools	Remained closed and unlocked; opened without tools
Rear Door Opening	Remained closed and unlocked; opened without tools	Remained closed and unlocked; opened without tools
Trunk/Hatch/Tailgate Opening	Remained closed; opened without tools	
Seat Track Shift (mm)	0	0
Seat Back Movement	None	None

OTHER VEHICLE POST-TEST OBSERVATIONS

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

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	1510
Center	mm	1535
Right Side	mm	1545
Average	mm	1530

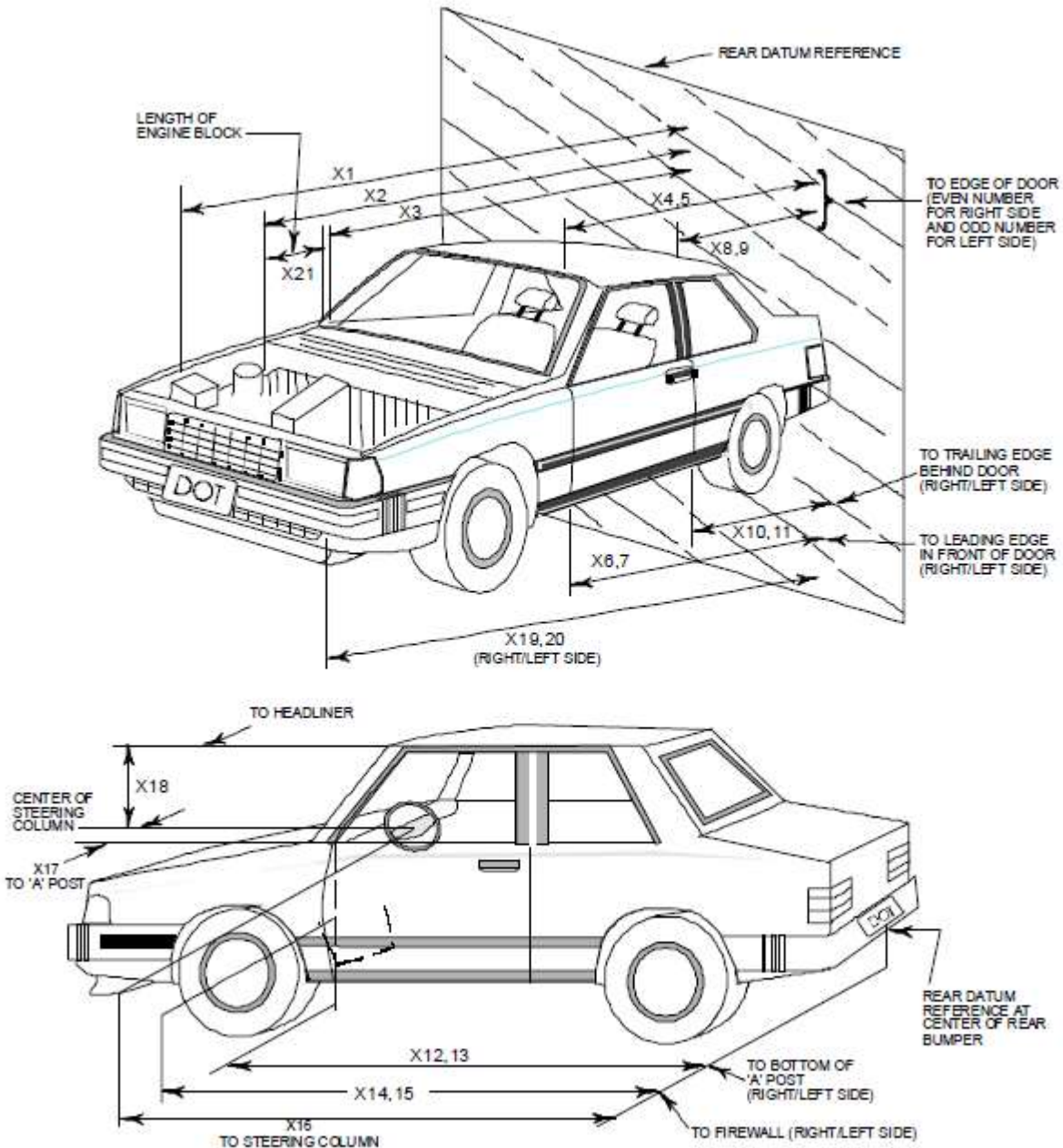
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Driver		Passenger	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	Yes	Yes	Yes
Curtain Side Airbag	Yes	No	Yes	No
Torso/Pelvis Side Airbag	Yes	No	Yes	No
Knee Airbag	No		No	
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load Limiter	Yes		Yes	
Other				

DATA SHEET NO. 12 VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2020 Hyundai Accent SE 4-Door Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20204200
Test Date: 1/6/2020



DATA SHEET NO. 12 (CONTINUED)
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2020 Hyundai Accent SE 4-Door Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20204200
Test Date: 1/6/2020

No.	Measurement Description	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	4386	3846	540
2	RSOV to Front of Engine	3789	3563	226
3	RSOV to Firewall	3500	3448	52
4	RSOV to Upper Leading Edge of Right Door	3048	3057	-9
5	RSOV to Upper Leading Edge of Left Door	3049	3052	-3
6	RSOV to Lower Leading Edge of Right Door	3021	3020	1
7	RSOV to Lower Leading Edge of Left Door	3021	3016	5
8	RSOV to Upper Trailing Edge of Right Door	1965	1964	1
9	RSOV to Upper Trailing Edge of Left Door	1964	1960	4
10	RSOV to Lower Trailing Edge of Right Door	1973	1969	4
11	RSOV to Lower Trailing Edge of Left Door	1971	1966	5
12	RSOV to Bottom of "A" Post of Right Side	3026	3033	-7
13	RSOV to Bottom of "A" Post of Left Side	3034	3035	-1
14	RSOV to Firewall, Right Side	3316	3312	4
15	RSOV to Firewall, Left Side	3316	3309	7
16	RSOV to Steering Column	2579	2593	-14
17	Center of Steering Column to "A" Post	362	383	-21
18	Center of Steering Column to Headliner	401	451	-50
19	RSOV to Right Side of Front Bumper	4285	3803	482
20	RSOV to Left Side of Front Bumper	4285	3804	481
21	Length of Engine Block	459	459	0
RD	RSOV to Right Side of Dash Panel	2875	2880	-5
CD	RSOV to Center of Dash Panel	2825	2813	12
LD	RSOV to Left Side of Dash Panel	2885	2857	28

All Dimensions in mm

DATA SHEET NO. 13
ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2020 Hyundai Accent SE 4-Door Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20204200
Test Date: 1/6/2020

VEHICLE INFORMATION

VIN: 3KPC24A67LE094049
Vehicle Size Category: Passenger Car

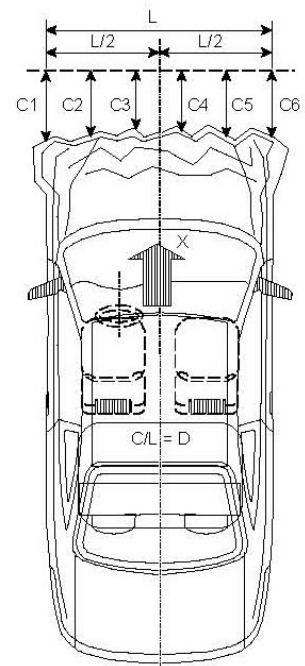
Wheelbase (mm): 2584
Test Weight (kg): 1333.0

ACCELEROMETER DATA

Accelerometer Locations: As per Data Sheet No. 7
Cal. Procedure/Interval: MGA Procedure / 6 month
Integration Algorithm: Trapezoidal
Linearity: > 99%
Impact Velocity (km/h): 56.21
Velocity Change (km/h): 63.6
Time of Separation (msec): 106

CRUSH PROFILE

Collision Deformation Classification: 12FDEW2
Midpoint of Damage: Centerline
Damage Region Length (mm): 1128
Impact Mode: Frontal



No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	4285	3804	481
C2	Crush zone 2 at left side	mm	4331	3809	522
C3	Crush zone 3 at left side	mm	4345	3810	535
C4	Crush zone 4 at right side	mm	4345	3814	531
C5	Crush zone 5 at right side	mm	4331	3812	519
C6	Crush zone 6 at right side	mm	4285	3803	482
L	C1 TO C6	mm	1128	1107	21

DATA SHEET NO. 14
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2020 Hyundai Accent SE 4-Door Sedan
Test Program: NCAP Frontal Barrier Impact Test

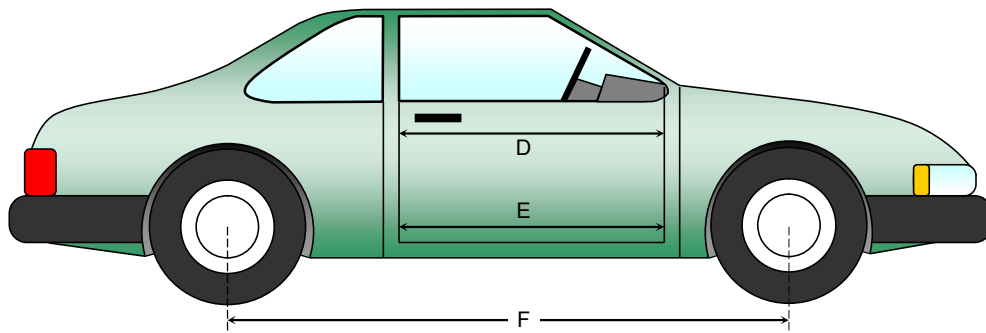
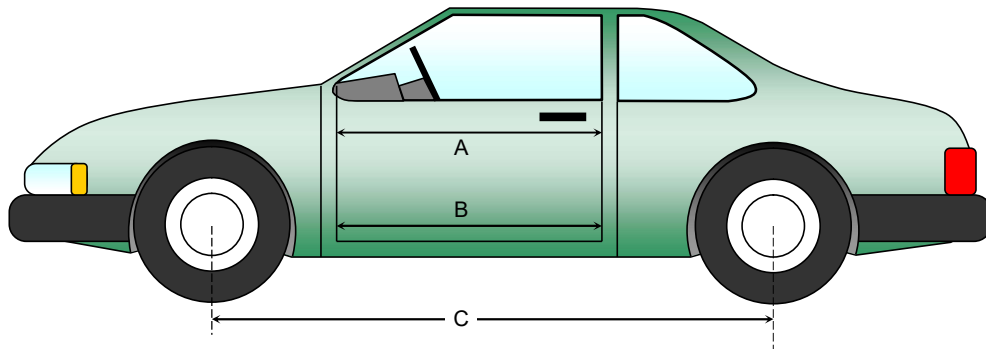
NHTSA No.: M20204200
Test Date: 1/6/2020

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	1000	1000	0
B	Left Side Lower	mm	944	944	0
D	Right Side Upper	mm	1000	1000	0
E	Right Side Lower	mm	943	943	0

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2584	2570	14
F	Right Side Wheelbase	mm	2584	2547	37



DATA SHEET NO. 14 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

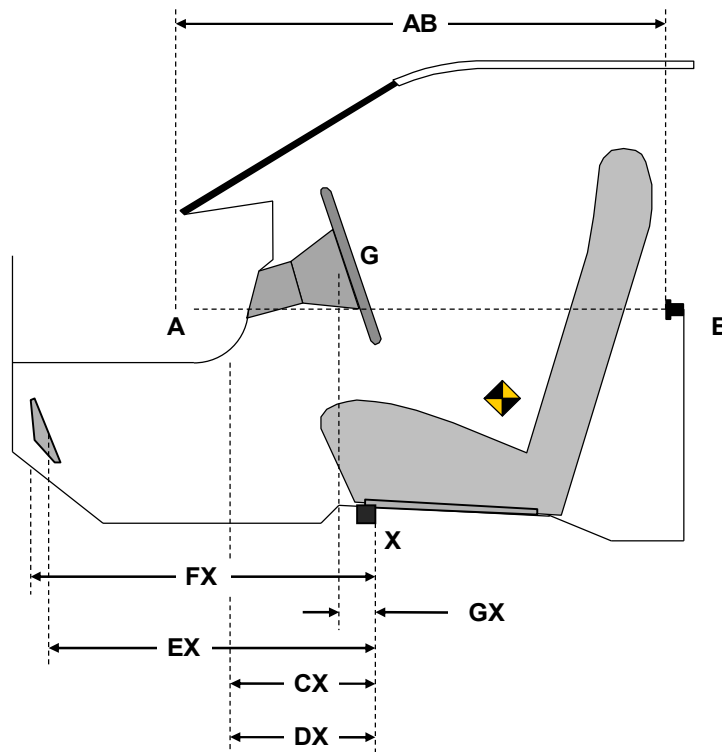
Test Vehicle: 2020 Hyundai Accent SE 4-Door Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20204200
 Test Date: 1/6/2020

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	817	817	0
CX	Left Knee Bolster to X	mm	321	327	-6
DX	Right Knee Bolster to X	mm	309	310	-1
EX	Brake Pedal to X	mm	569	523	46
FX	Foot Rest to X	mm	577	565	12
GX	Center of Steering Column Wheel Hub to X	mm	84	133	-49

X = Front of Seat Track (stationary)



DRIVER COMPARTMENT

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

Test Vehicle: 2020 Hyundai Accent SE 4-Door Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20204200
 Test Date: 1/6/2020

WINDSHIELD MOUNTING DETAILS

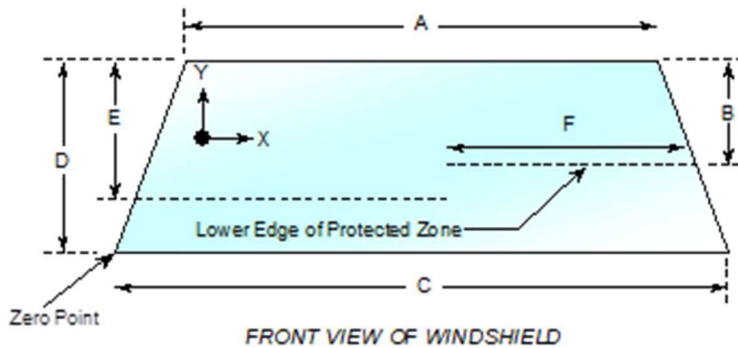
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

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

Temperature of windshield molding during test: 21.4°C.

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% of Retention
Left Side	2099	2099	100
Right Side	2099	2099	100
Total	4198	4198	100



Item	Units	Value
A	mm	1132
B	mm	516
C	mm	1418
D	mm	824
E	mm	498
F	mm	454

AREA 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. **None**

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. **None**

X	Y

DATA SHEET NO. 16
FMVSS 301 BARRIER IMPACT AND STATIC ROLLOVER

Test Vehicle: 2020 Hyundai Accent SE 4-Door Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20204200
 Test Date: 1/6/2020

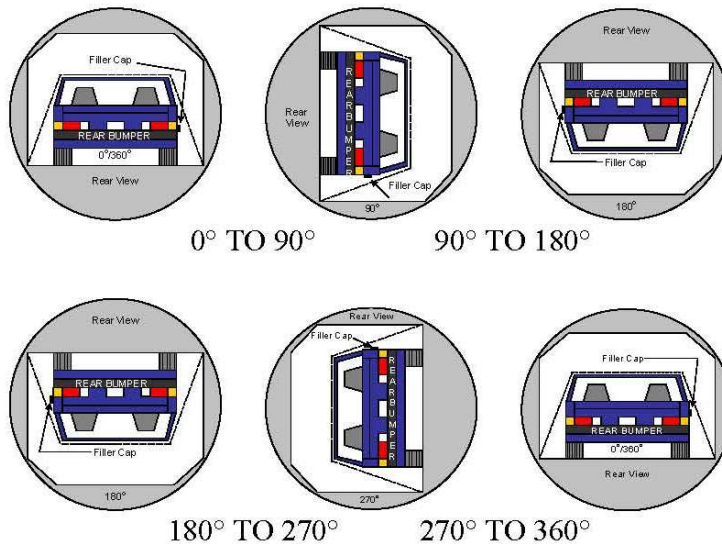
FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 21.4°C

Test Time: 10:37 a.m.

- A. From impact until vehicle motion ceases: (Maximum Allowable = 1 ounce) 0.0 oz.
 B. For the 5 minute period after motion ceases: (Maximum Allowable = 5 ounces) 0.0 oz.
 C. For the following 25 minutes: (Maximum Allowable = 1 ounce / minute) None
 D. Spillage Details: None

FMVSS 301 STATIC ROLLOVER RESULTS



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: **None**

SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	112	300	412
90° to 180°	111	300	411
180° to 270°	108	300	408
270° to 360°	112	300	412

DATA SHEET NO. 16 (CONTINUED)
FMVSS 301 BARRIER IMPACT AND STATIC ROLLOVER

Test Vehicle: 2020 Hyundai Accent SE 4-Door Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20204200
 Test Date: 1/6/2020

FMVSS 301 SPILLAGE TABLE (UNITS IN OUNCES)

Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eight 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	

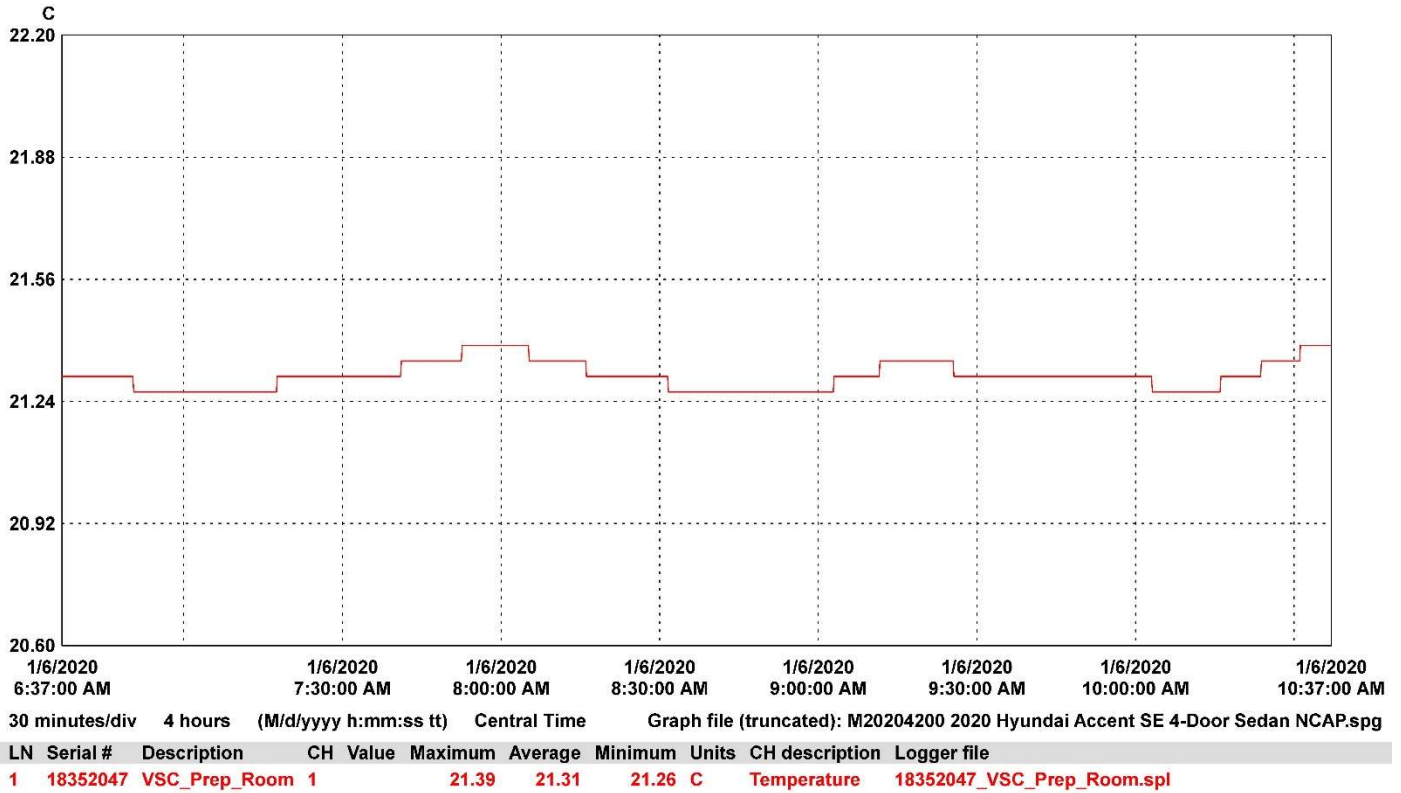
SOLVENT SPILLAGE LOCATION TABLE

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

DATA SHEET NO. 17
DUMMY/VEHICLE TEMPERATURE STABILIZATION DATA

Test Vehicle: 2020 Hyundai Accent SE 4-Door Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20204200
 Test Date: 1/6/2020



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Photo No. 082	2020 Hyundai Accent SE 4-Door Sedan Frontal Impact Event	A-42
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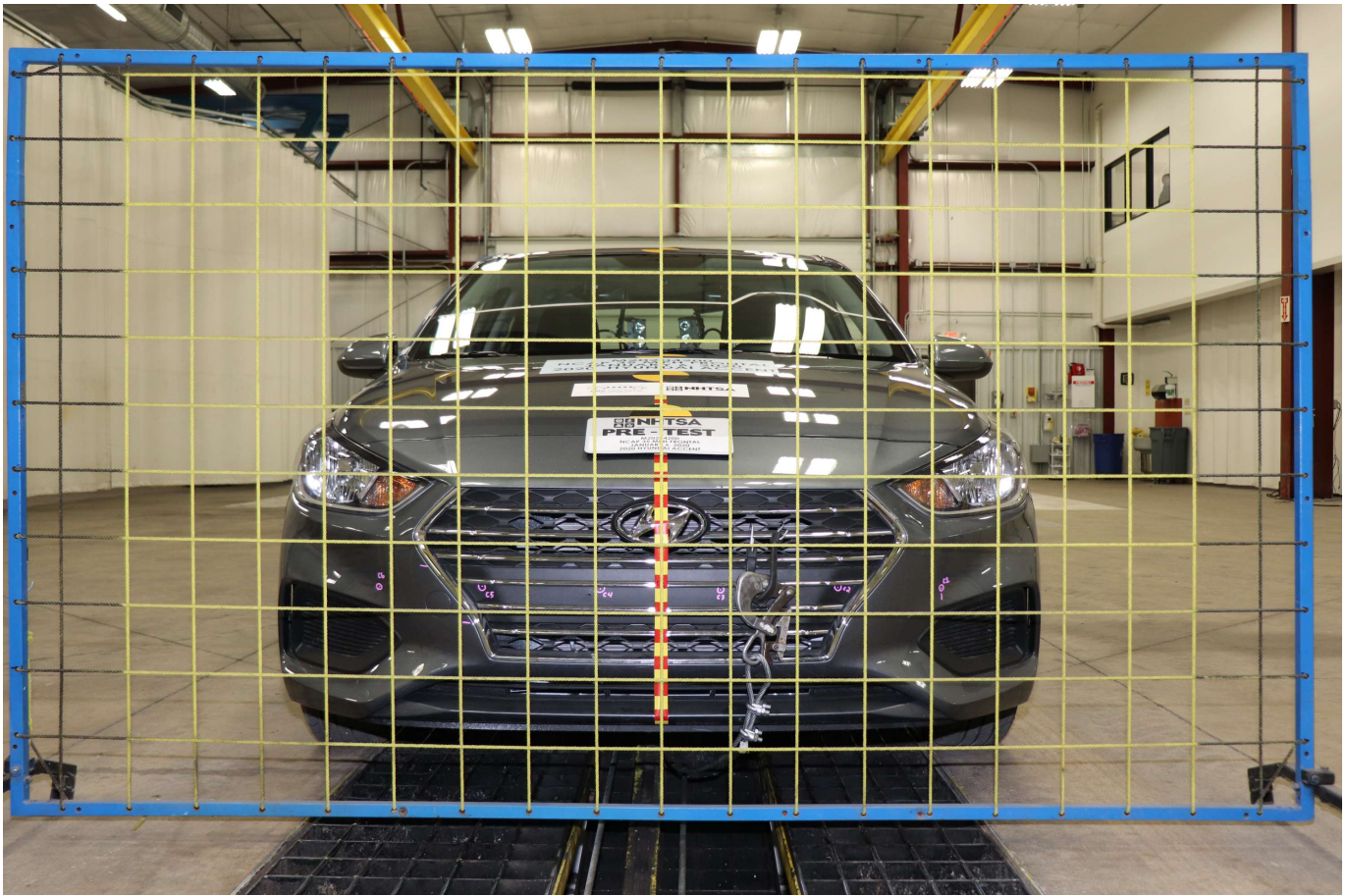


Photo No. 001 - Load Cell Location



Photo No. 002 - Pre-Test Load Cell Wall



Photo No. 003 - Post-Test Load Cell Wall



Photo No. 004 - Manufacturer Label



Photo No. 005 - Tire Placard



Photo No. 005a - Vehicle Load Carrying Capacity Reduction Label



Photo No. 006 - 2020 Hyundai Accent SE 4-Door Sedan Frontal As Delivered



Photo No. 007 - Left Rear 3-4 View, As Received



Photo No. 008 - Pre-Test Front View of Test Vehicle

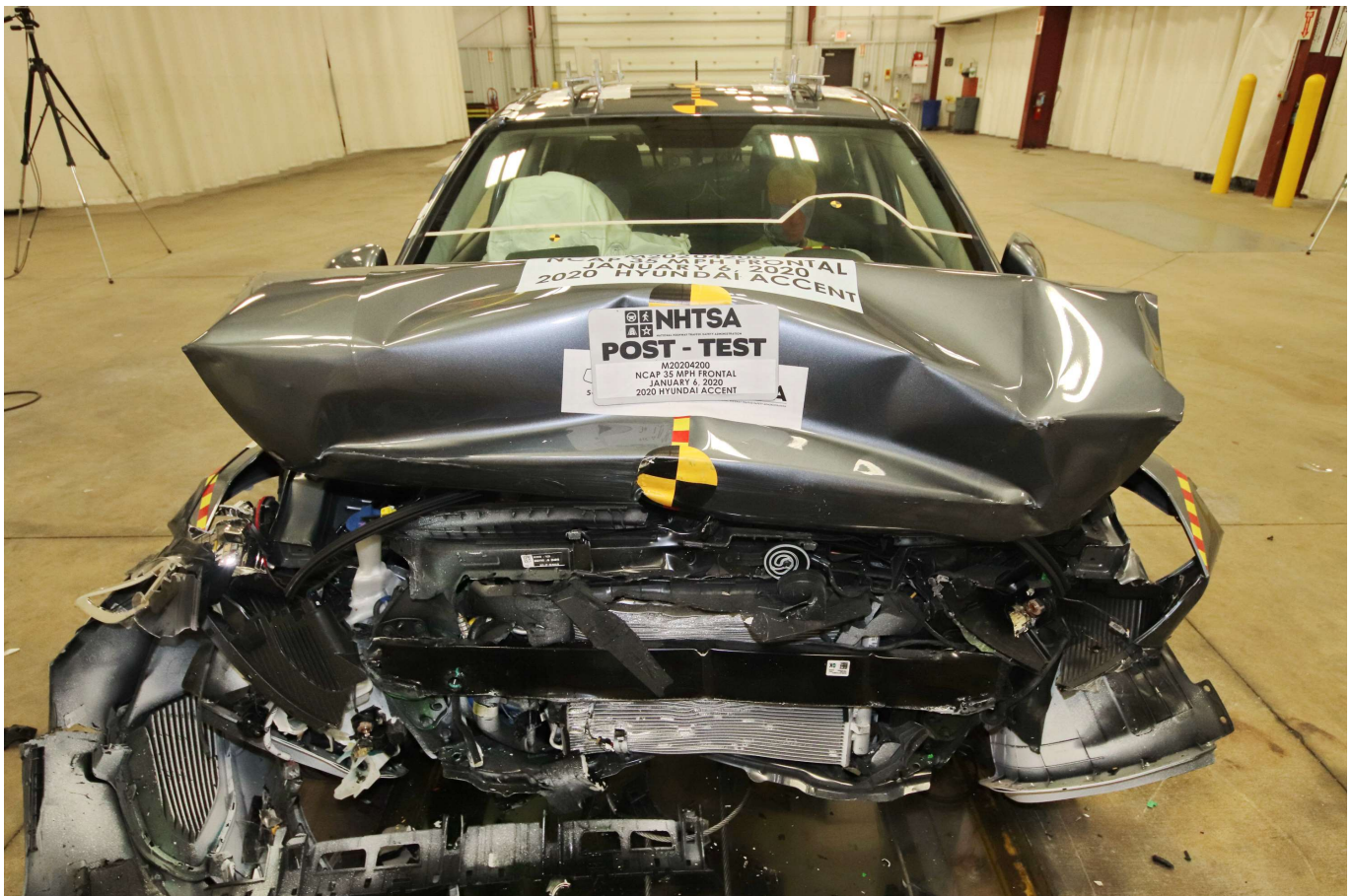


Photo No. 009 - Post-Test Front View of Test Vehicle



Photo No. 010 - Pre-Test Left View of Test Vehicle



Photo No. 011 - Post-Test Left View of Test Vehicle



Photo No. 012 - Pre-Test Right View of Test Vehicle

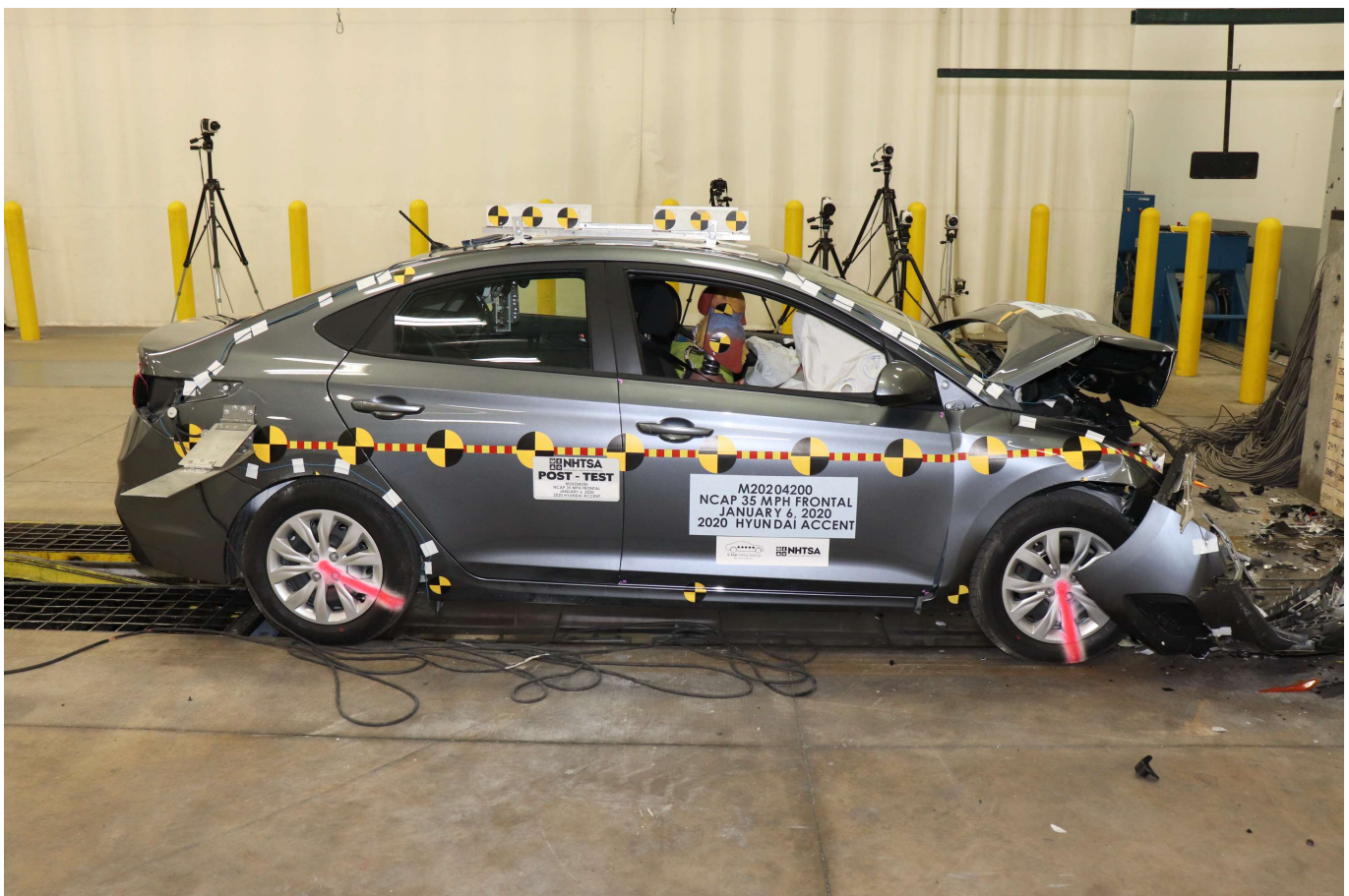


Photo No. 013 - Post-Test Right View of Test Vehicle



Photo No. 014 - Pre-Test Right Front 3-4 View

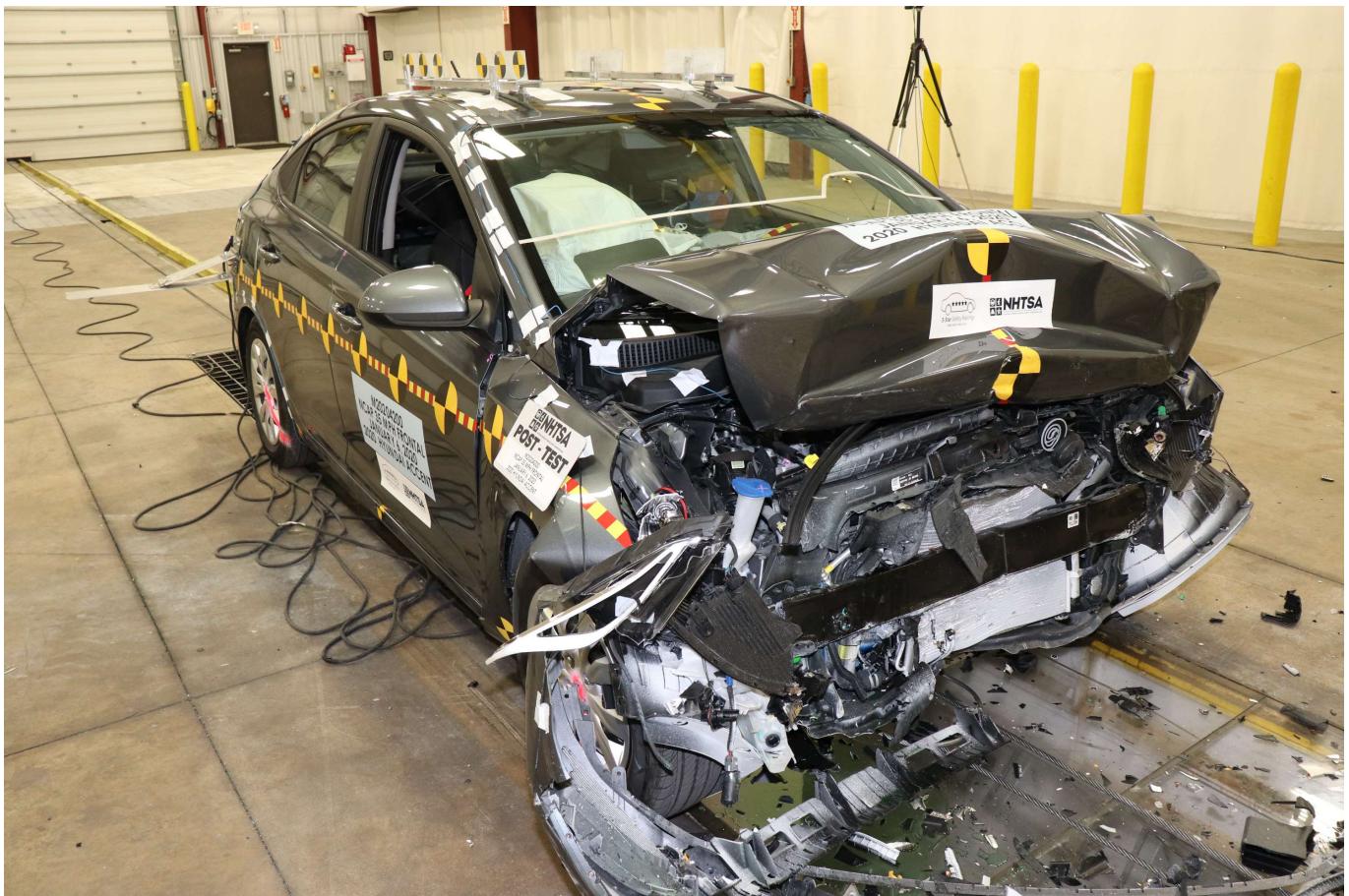


Photo No. 015 - Post-Test Right Front 3-4 View



Photo No. 016 - Pre-Test Left Rear 3-4 View



Photo No. 017 - Post-Test Left Rear 3-4 View



Photo No. 018 - Pre-Test Windshield View

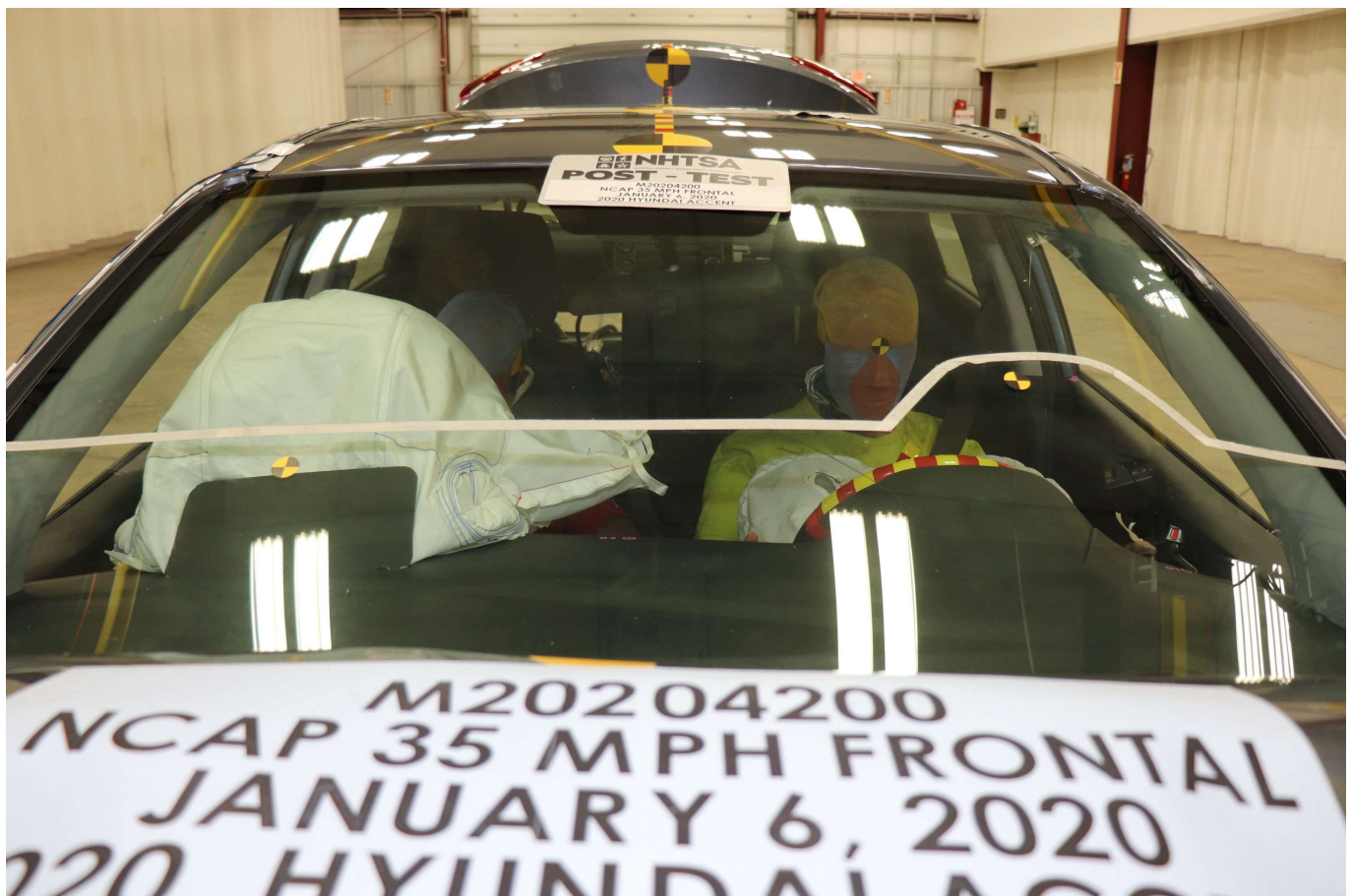


Photo No. 019 - Post-Test Windshield View



Photo No. 020 - Pre-Test Engine Compartment View

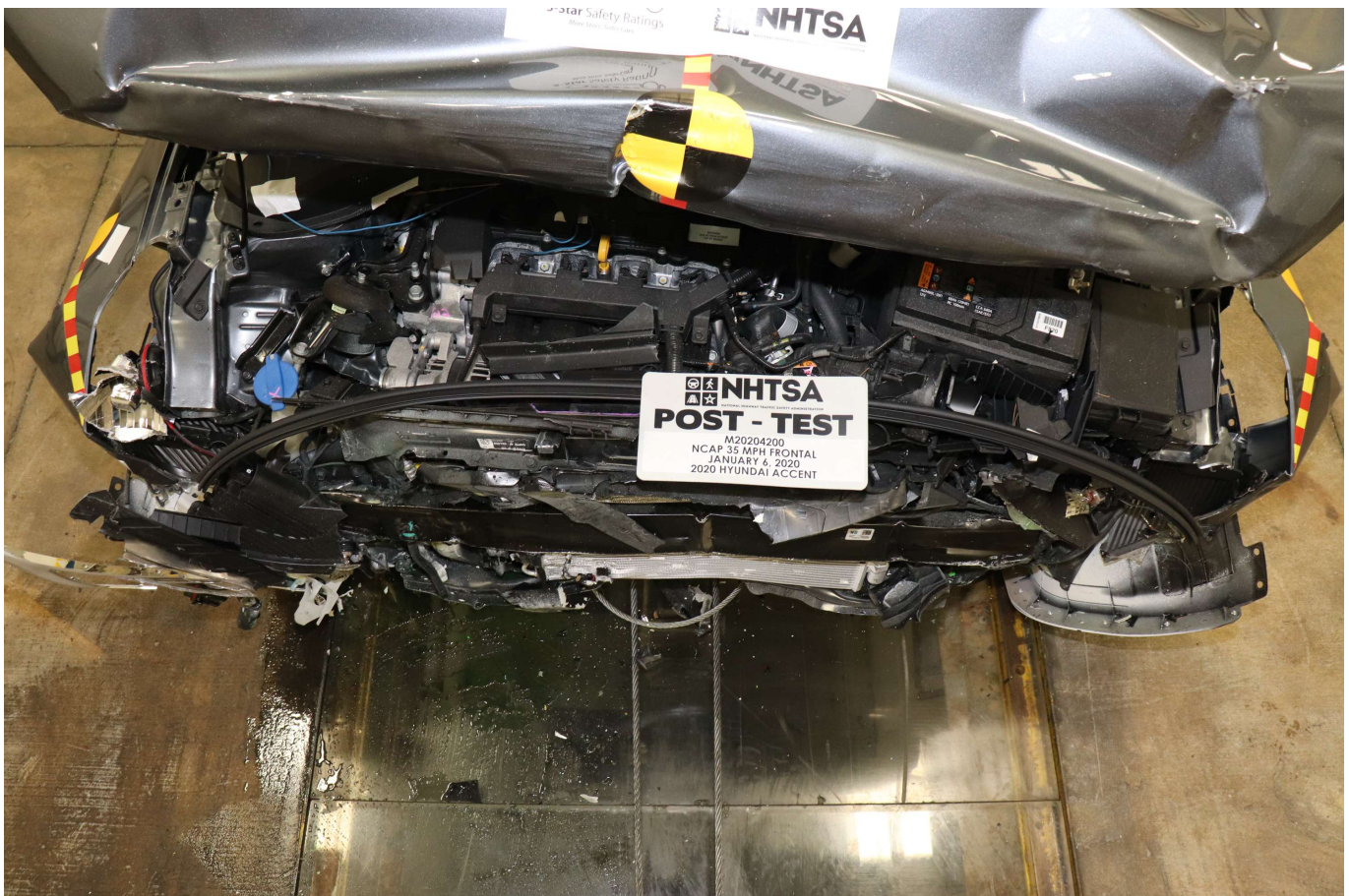


Photo No. 021 - Post-Test Engine Compartment View



Photo No. 022 - Pre-Test Fuel Filler Cap View



Photo No. 023 - Post-Test Fuel Filler Cap View

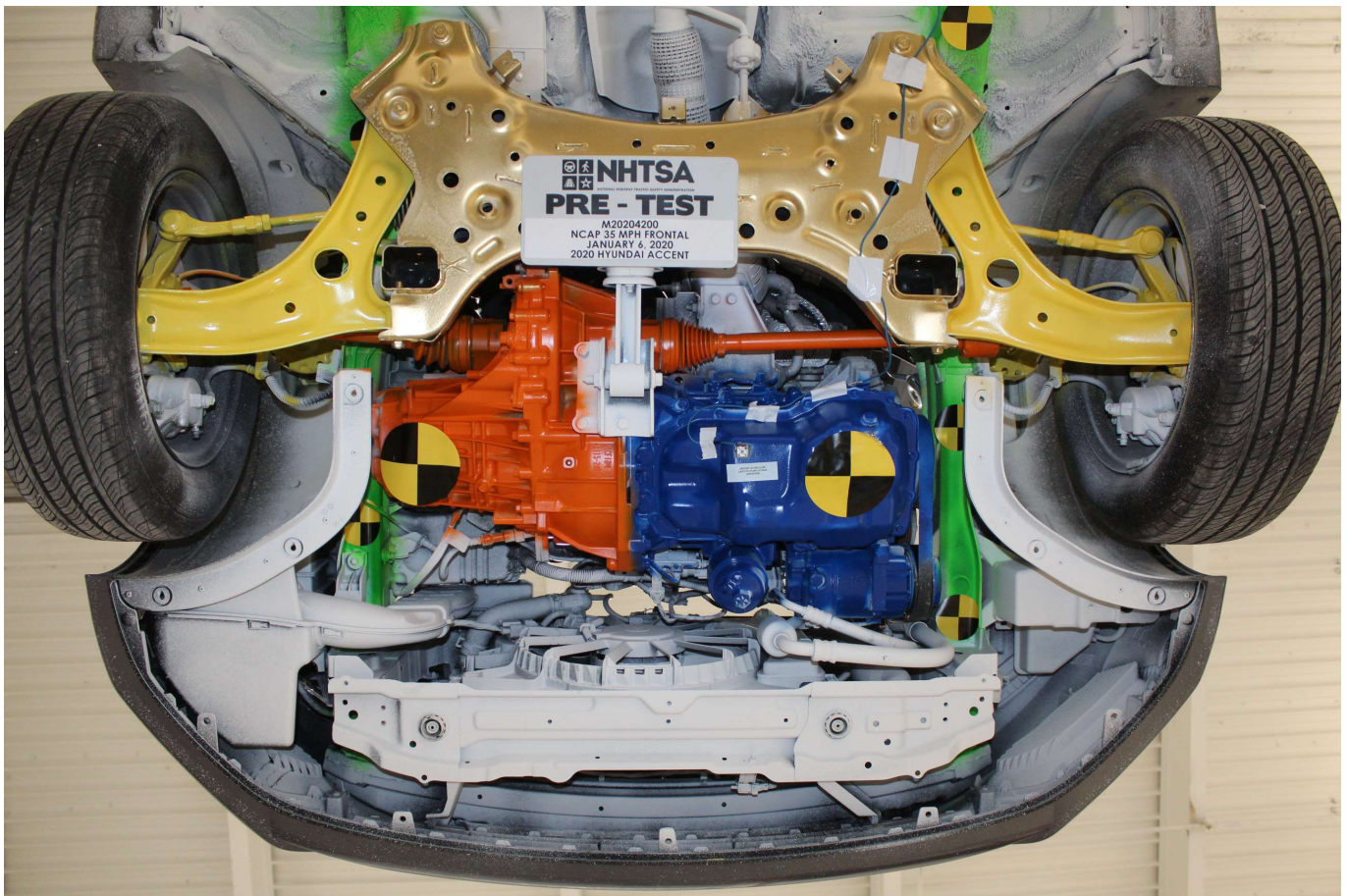


Photo No. 024 - Pre-Test Front Underbody View

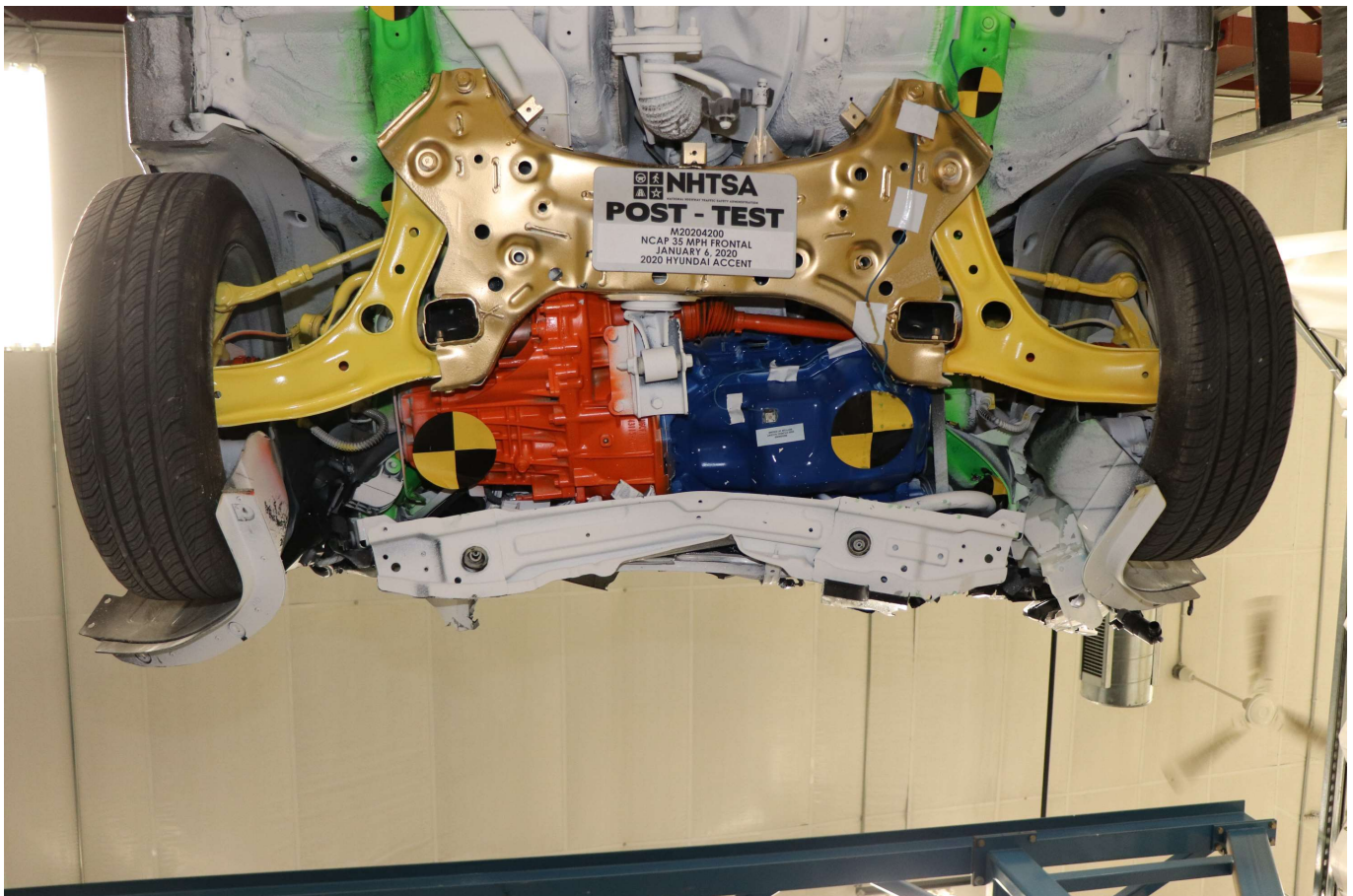


Photo No. 025 - Post-Test Front Underbody View

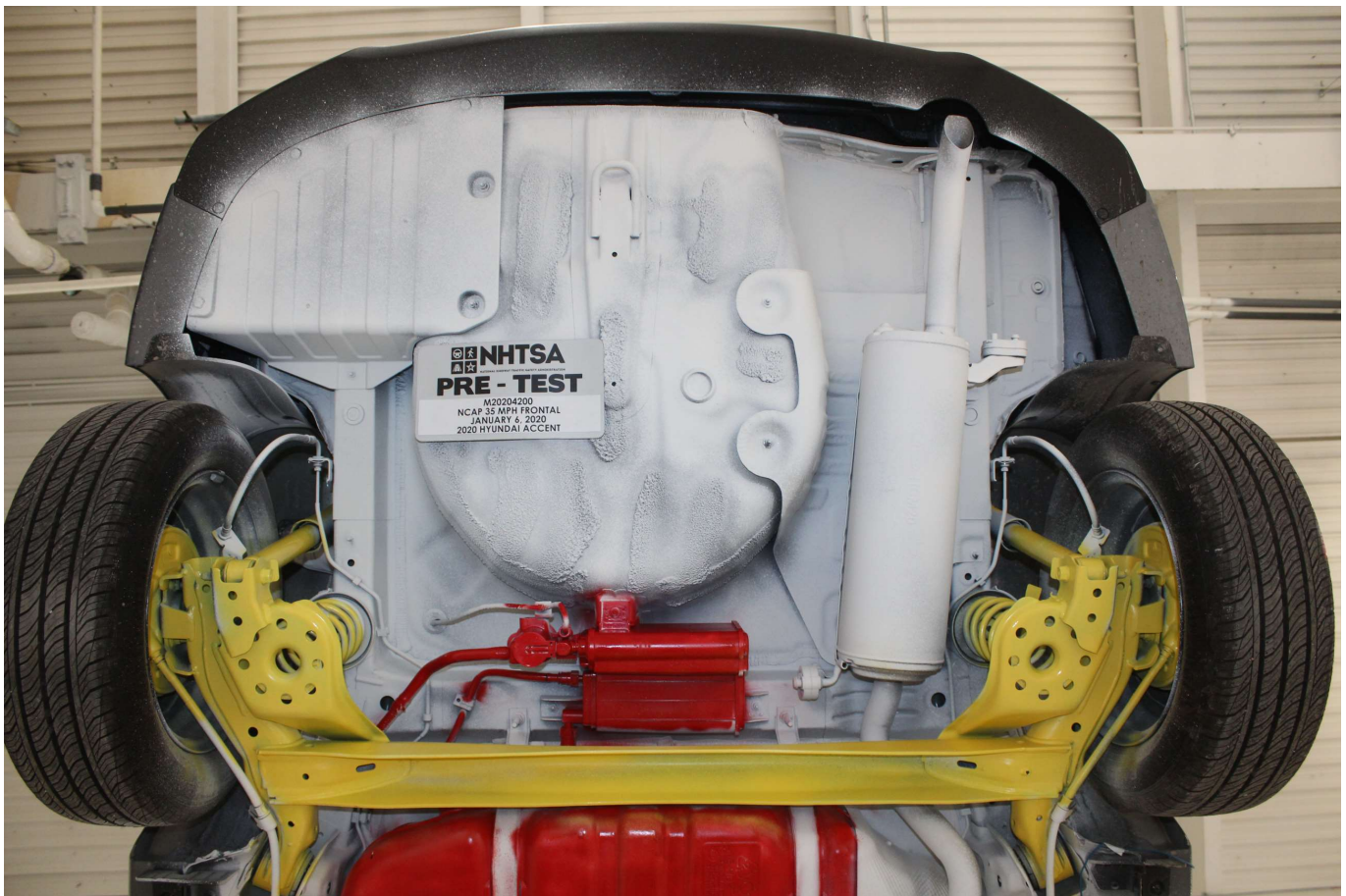


Photo No. 026 - Pre-Test Rear Underbody View

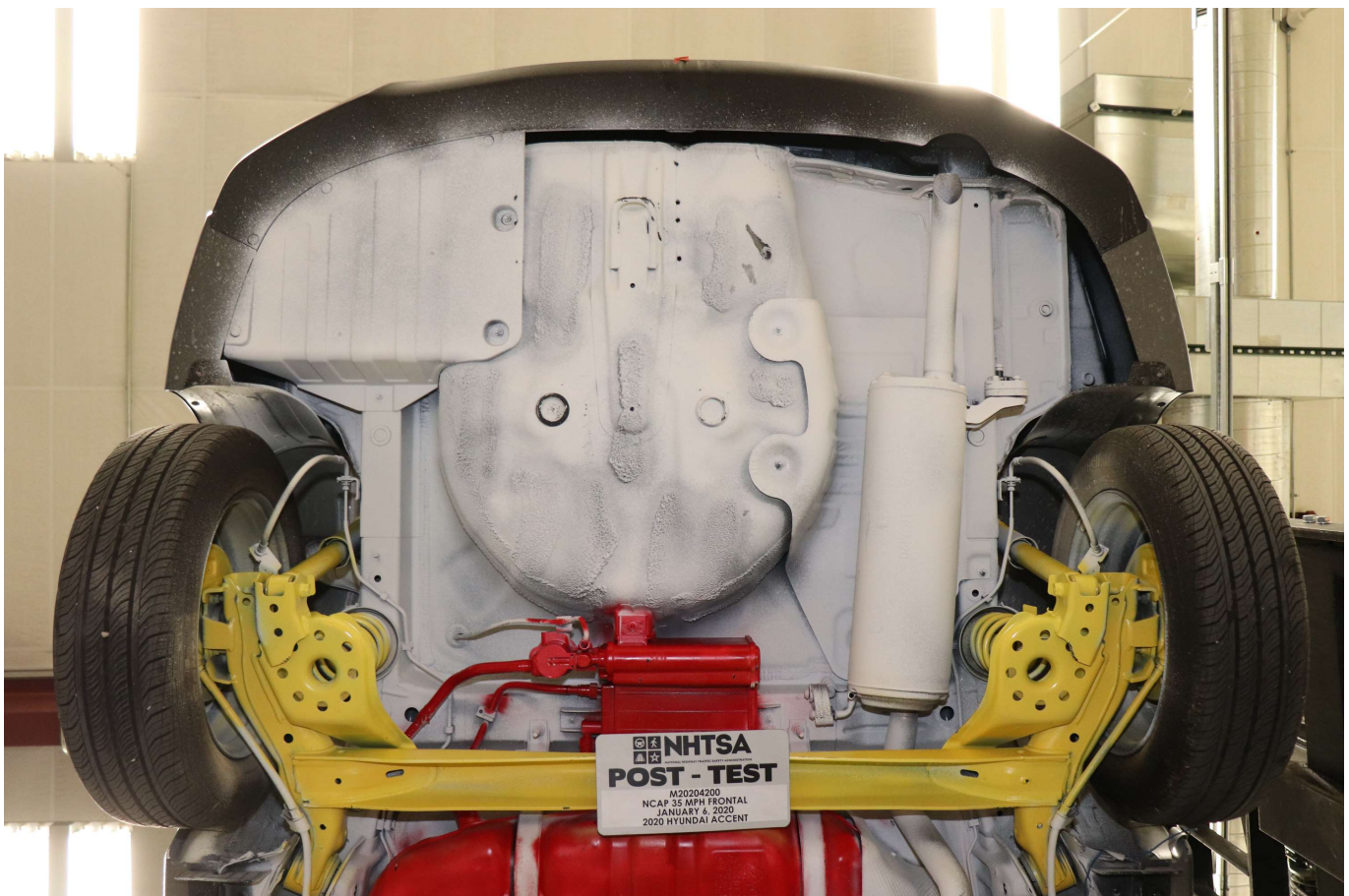


Photo No. 027 - Post-Test Rear Underbody View



Photo No. 028 - Pre-Test Dummy Cable Routing



Photo No. 029 - Post-Test Dummy Cable Routing



Photo No. 030 - Pre-Test Driver Dummy Front View



Photo No. 031 - Post-Test Driver Dummy Front View



Photo No. 032 - Pre-Test Driver Dummy Window View



Photo No. 033 - Post-Test Driver Dummy Window View



Photo No. 034 - Pre-Test Driver Dummy and Vehicle Interior



Photo No. 035 - Post-Test Driver Dummy and Vehicle Interior



Photo No. 036 - Pre-Test Driver Seat Fore-Aft Markings



Photo No. 037 - Post-Test Driver Seat Fore-Aft Markings



Photo No. 038 - Pre-Test View of Belt Anchorage for Driver Dummy



Photo No. 039 - Post-Test View of Belt Anchorage for Driver Dummy



Photo No. 040 - Pre-Test View of Belt Buckle and Latch Plate for Driver Dummy



Photo No. 041 - Post-Test View of Belt Buckle and Latch Plate for Driver Dummy



Photo No. 042 - Pre-Test Driver Dummy Feet



Photo No. 043 - Post-Test Driver Dummy Feet



Photo No. 044 - Pre-Test Driver Side Knee Bolster



Photo No. 045 - Post-Test Driver Side Knee Bolster



Photo No. 046 - Pre-Test Driver Side Floorpan



Photo No. 047 - Post-Test Driver Side Floorpan



Photo No. 048 - Post-Test Driver Dummy Face

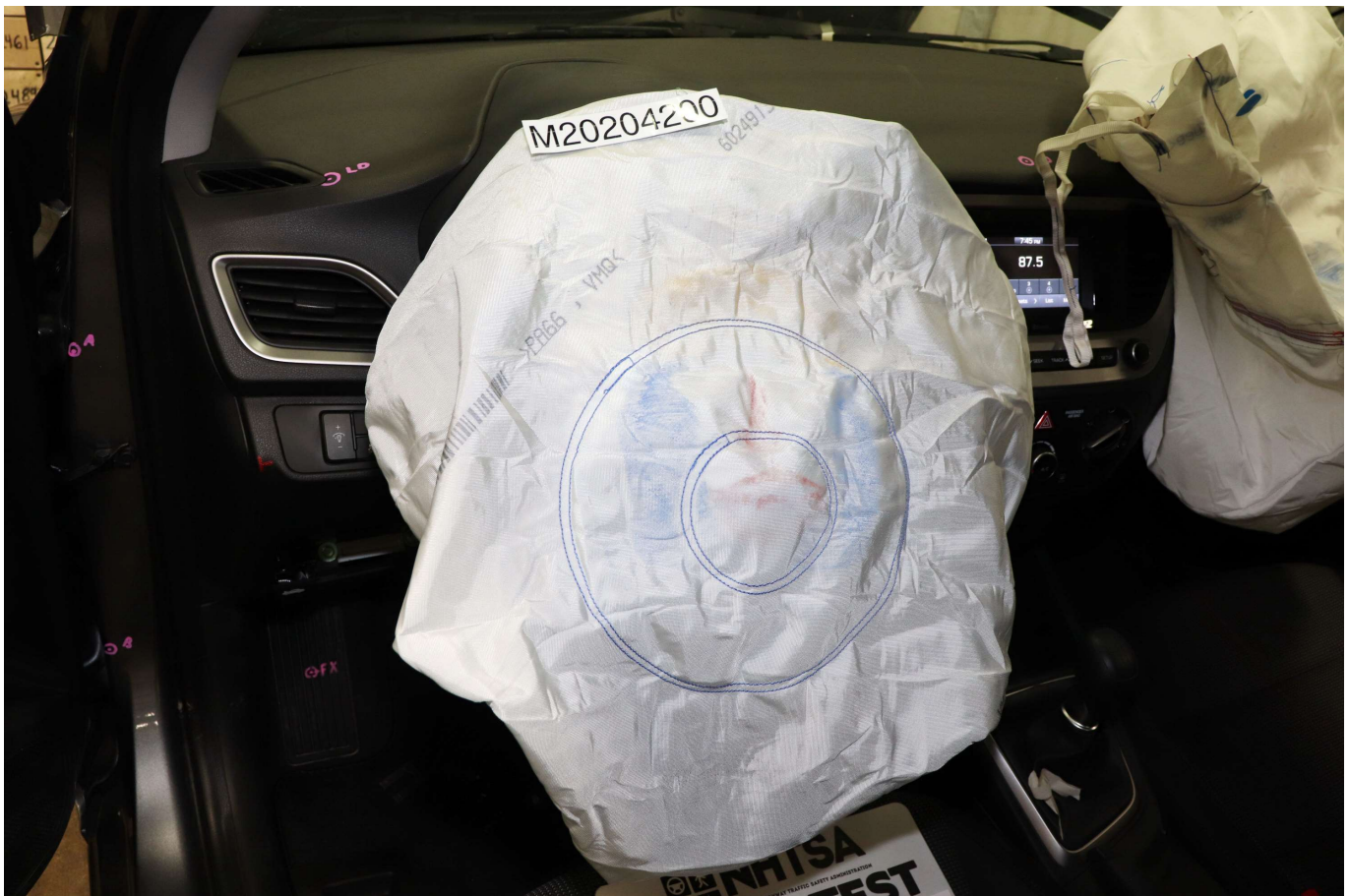


Photo No. 049 - Post-Test Driver Dummy Contact with Airbag



Photo No. 050 - Post-Test Driver Dummy Contact with Headrest



Photo No. 051 - Pre-Test View of the Steering Wheel



Photo No. 052 - Post-Test View of the Steering Wheel



Photo No. 053 - Pre-Test Passenger Dummy Front View



Photo No. 054 - Post-Test Passenger Dummy Front View



Photo No. 055 - Pre-Test Passenger Dummy Window View



Photo No. 056 - Post-Test Passenger Dummy Window View



Photo No. 057 - Pre-Test Passenger Dummy and Vehicle Interior



Photo No. 058 - Post-Test Passenger Dummy and Vehicle Interior



Photo No. 059 - Pre-Test Passenger Seat Fore-Aft Markings



Photo No. 060 - Post-Test Passenger Seat Fore-Aft Markings



Photo No. 061 - Pre-Test View of Belt Anchorage for Passenger Dummy



Photo No. 062 - Post-Test View of Belt Anchorage for Passenger Dummy



Photo No. 063 - Pre-Test View of Belt Buckle and Latch Plate for Passenger Dummy



Photo No. 064 - Post-Test View of Belt Buckle and Latch Plate for Passenger Dummy



Photo No. 065 - Pre-Test Passenger Dummy Feet



Photo No. 066 - Post-Test Passenger Dummy Feet



Photo No. 067 - Pre-Test Passenger Side Knee Bolster



Photo No. 068 - Post-Test Passenger Side Knee Bolster



Photo No. 069 - Pre-Test Passenger Side Floorpan



Photo No. 070 - Post-Test Passenger Side Floorpan



Photo No. 071 - Post-Test Passenger Dummy Face



Photo No. 072 - Post-Test Passenger Dummy Contact with Airbag



Photo No. 073 - Post-Test Passenger Dummy Contact with Headrest

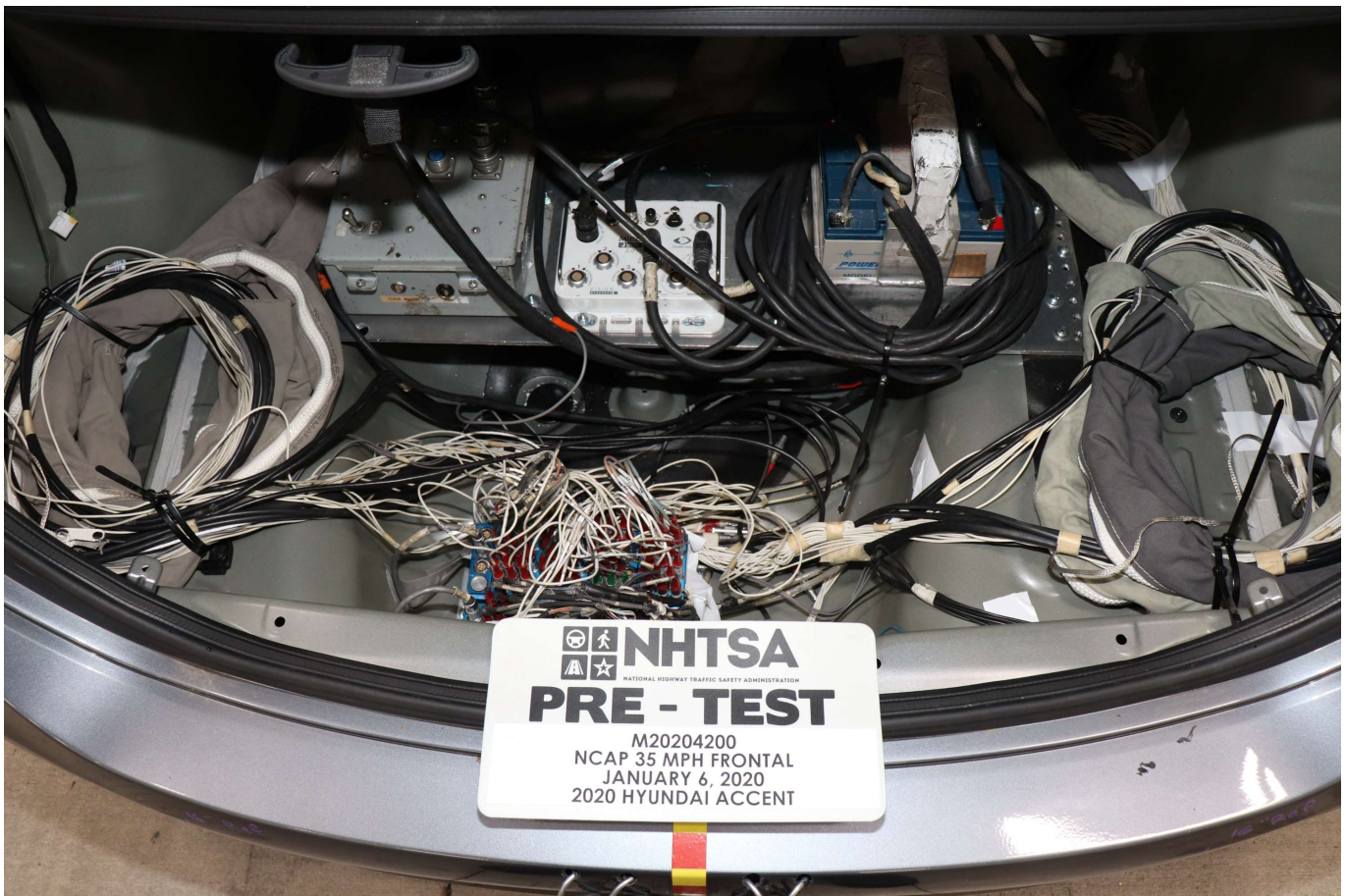


Photo No. 074 - Ballast Installed in Vehicle

PHOTOGRAPH NOT APPLICABLE

Photo No. 075 - Post-Test Stoddard Solvent Spillage Location View



Photo No. 076 - Post-Test Speed Trap Read-Out



Photo No. 077 - Vehicle at 0 Degrees on Static Rollover Device

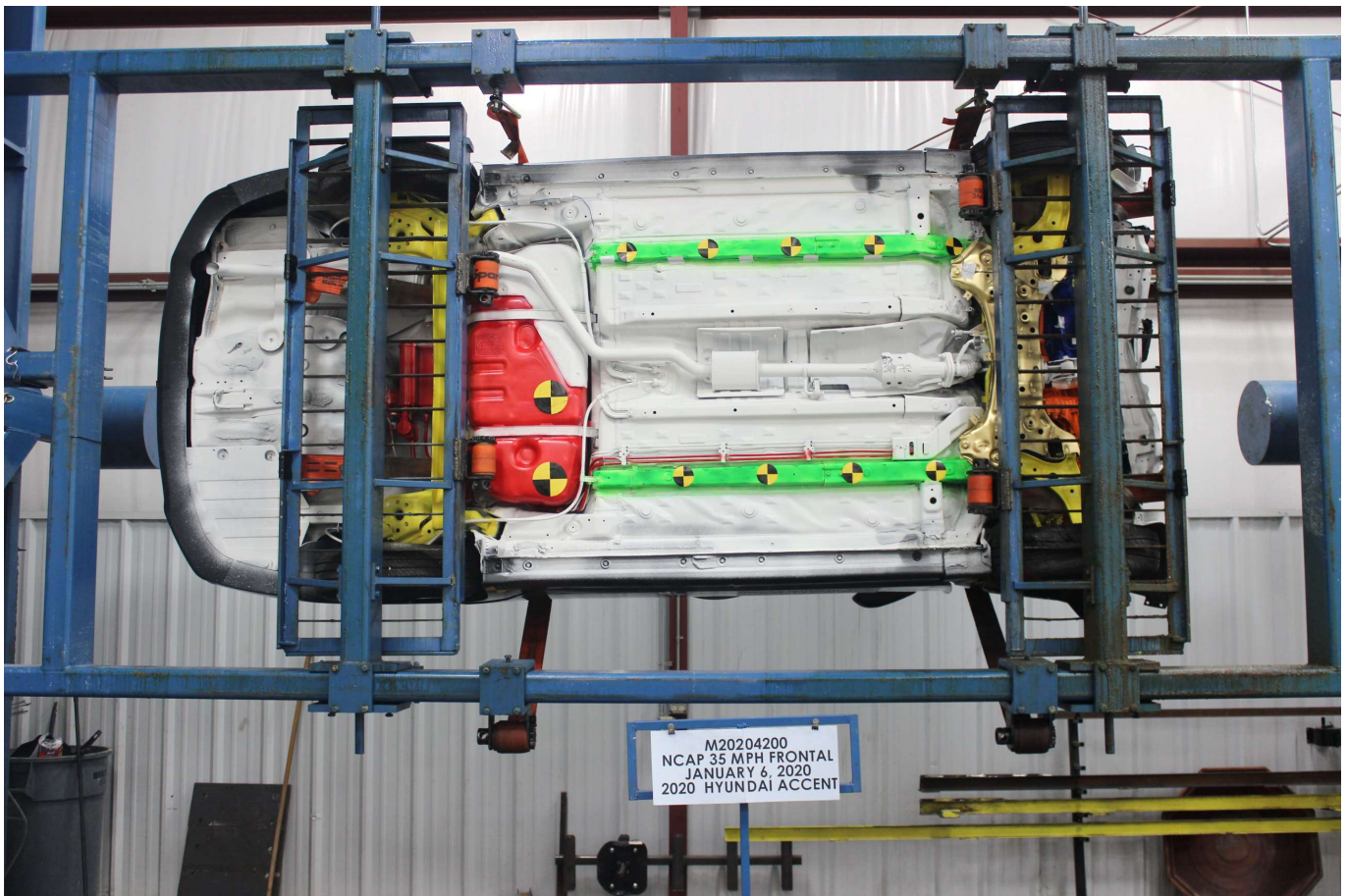


Photo No. 078 - Vehicle at 90 Degrees on Static Rollover Device



Photo No. 079 - Vehicle at 180 Degrees on Static Rollover Device



Photo No. 080 - Vehicle at 270 Degrees on Static Rollover Device



Photo No. 081 - Vehicle at 360 Degrees on Static Rollover Device



Photo No. 082 - 2020 Hyundai Accent SE 4-Door Sedan Frontal Impact Event



2020 ACCENT SE M/T

SOLD TO: NY108
GLICK HYUNDAI
48 BRIDGEVILLE RD
MONTICELLO NY 12701

SHIPPED TO: NY108

VIN: 3KPC24A67LE094049
MODEL: 17413F45
ENGINE: G4FMKE302649
PORT OF ENTRY: PH
EXTERIOR COLOR: URBAN GRAY
INTERIOR/SEAT COLOR: BLACK/BLACK
TRANSPORT: TRUCK
ACCESSORY WEIGHT: 16 lbs./ 7 kgs.
EMISSIONS: This vehicle is certified to meet emission requirements in all 50 states

GOVERNMENT 5-STAR SAFETY RATINGS

This vehicle has not been rated by the government for overall vehicle score, frontal crash, side crash or rollover risk.

Source: National Highway Traffic Safety Administration (NHTSA).
www.safercar.gov or 1-888-327-4236

STANDARD FEATURES:

AMERICA'S BEST WARRANTY

5-year/60,000-mile New Vehicle Warranty*
10-year/100,000-mile Powertrain Warranty*
7-year/Unlimited-mile Anti-perforation Warranty*
5-year/Unlimited-mile Roadside Assistance

*Limited warranties, see dealer for details

ADVANCED SAFETY TECHNOLOGY

Electronic Stability Control (ESC) w/ Traction Control
ABS w/ Electronic Brake Force Distribution & Brake Assist
Front, Front Side Impact & Side Curtain Airbags
Rearview Camera w/ Dynamic Guidelines
Tire Pressure Monitoring System

POWERTRAIN TECHNOLOGY

1.6L DPL 120 HP, 113 lbs-ft Torque, DOHC 4-Cylinder
Continuously Variable Valve Timing
6-Speed Manual Transmission

EXTERIOR

15-inch Wheels w/ Full Covers and 185/65R15 Tires
Body Color Outside Mirrors & Door Handles
One Touch Triple Turn Signal
Hood Insulator

COMFORT & CONVENIENCE

AM/FM Audio System w/ 4 Speakers
5-inch color touchscreen
Smartphone/USB & Auxiliary Input Jacks
Cruise Control
Air Conditioning
Bluetooth® Hands Free Phone System
Dual Vanity Mirrors with Sliding Survisors
Steering Wheel Mounted Audio & Cruise Controls
Tilt Steering Wheel
6-way Adjustable Driver Seat Including Height Adjustment
60/40 Split-Folding Rear Seat
Map, Dome & Cargo Lights
Remote Keyless Entry w/ Panic Alert
Compact Temporary Spare Tire
*Full Tank of Gas

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Manufacturer's Suggested Retail Price:

\$15,195.00

ADDED FEATURES:

*Carpeted Floor Mats \$135.00
*Cargo Net \$50.00
*Cargo Tray \$115.00
*First Aid Kit \$30.00
*Cargo Trunk Hook \$30.00

Inland Freight & Handling:

\$930.00

Total Price:

\$16,485.00

Smarts, Style & Safety Accent Has It All



EPA DOT Fuel Economy and Environment

Gasoline Vehicle

Fuel Economy

33 MPG
combined city/hwy

29 city
39 highway

3.0 gallons per 100 miles

Compact Cars range from 14 to 119 MPG. The best vehicle rates 136 MPG.

You save \$1,250
in fuel costs
over 5 years
compared to the
average new vehicle.

Annual fuel cost
\$1,250

Fuel Economy & Greenhouse Gas Rating (tailpipe only)

1 **7** **10**
Best

This vehicle emits 273 grams CO₂ per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also create emissions; learn more at fuelconomy.gov.

Smog Rating (tailpipe only)

1 **3** **10**
Best

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 27 MPG and costs \$7,500 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at \$2.70 per gallon. MPGe is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

fuelconomy.gov

Calculate personalized estimates and compare vehicles



Manufacturer's suggested retail price includes manufacturer's recommended pre-delivery service, state and local taxes and dealer installed options and accessories are not included in the manufacture. This label has been affixed to this vehicle by Hyundai Motor America, pursuant to the requirements which prohibits its removal or alteration prior to delivery to the ultimate purchaser.

and title fees
retail price,
et seq.

PARTS CONTENT INFORMATION

FOR VEHICLE IN THIS CARLINE:

U.S./CANADIAN PARTS CONTENT: 3 %

MAJOR SOURCES OF FOREIGN PARTS CONTENT: MEXICO: 53 %

KOREA: 44 %

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

FOR THIS VEHICLE:

FINAL ASSEMBLY POINT: NUEVO LEON, MEXICO

COUNTRY OF ORIGIN:

ENGINE: MEXICO

TRANSMISSION: KOREA/MEXICO



Photo No. 083 - Monroney Label Photograph

APPENDIX B
DUMMY RESPONSE DATA TRACES

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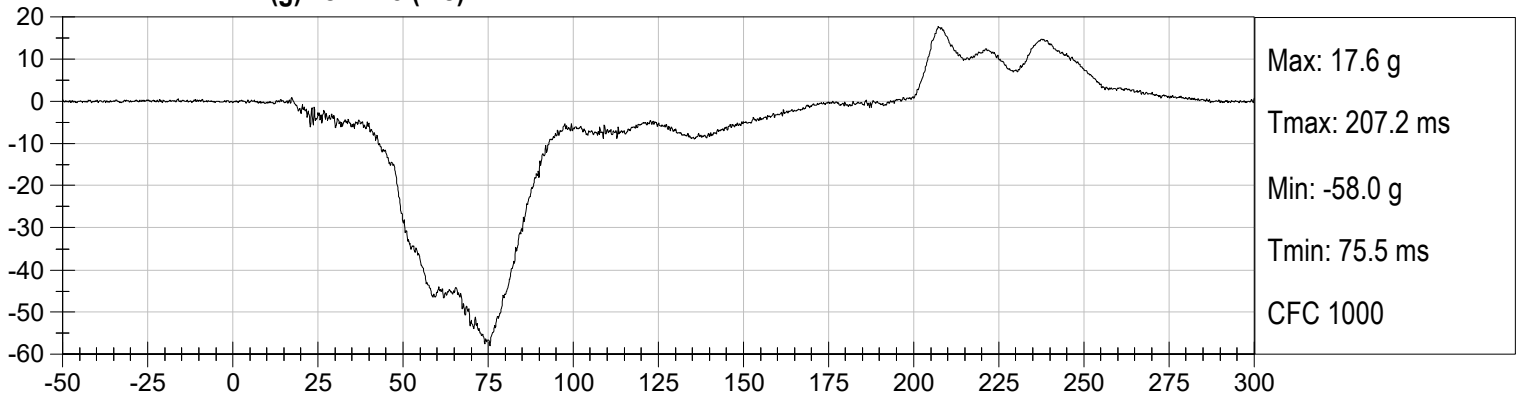
The following additional dummy and vehicle response data can be found in the R&D section of the NHTSA website at www.nhtsa.gov

Driver Head X Redundant
 Driver Head Y Redundant
 Driver Head Z Redundant
 Driver Head Angular Velocity X
 Driver Head Angular Velocity Y
 Driver Head Angular Velocity Z
 Driver Upper Neck Force Y
 Driver Upper Neck Moment X
 Driver Upper Neck Moment Z
 Driver Chest X Redundant
 Driver Chest Y Redundant
 Driver Chest Z Redundant
 Driver Pelvis X
 Driver Pelvis Y
 Driver Pelvis Z
 Driver Left Femur Redundant
 Driver Right Femur Redundant
 Driver Left Upper Tibia Moment X
 Driver Left Upper Tibia Moment Y

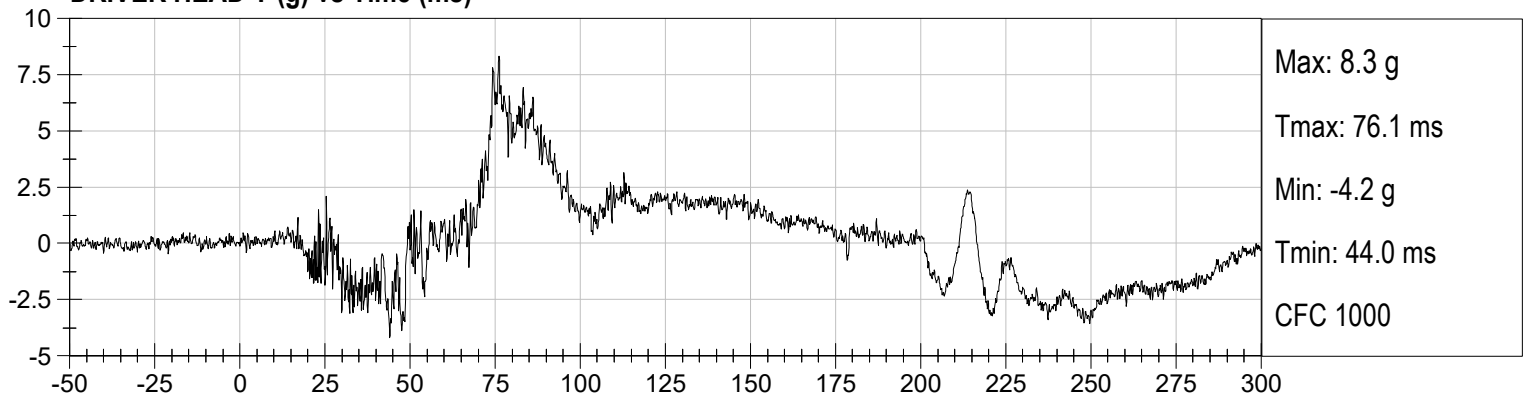
Driver Left Upper Tibia Force Z
Driver Left Lower Tibia Moment X
Driver Left Lower Tibia Moment Y
Driver Left Lower Tibia Force Z
Driver Right Upper Tibia Moment X
Driver Right Upper Tibia Moment Y
Driver Right Upper Tibia Force Z
Driver Right Lower Tibia Moment X
Driver Right Lower Tibia Moment Y
Driver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

Passenger Pelvis Z
Passenger Left Femur Redundant
Passenger Right Femur Redundant
Passenger Left Upper Tibia Moment X
Passenger Left Upper Tibia Moment Y
Passenger Left Upper Tibia Force Z
Passenger Left Lower Tibia Moment X
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 Lap Belt Force
Passenger Shoulder Belt Force
Left Rear Seat Crossmember X
Right Rear Seat Crossmember X
Vehicle Engine Top X
Vehicle Engine Bottom X
Left Rear Seat Crossmember Z
Right Rear Seat Crossmember Z
Left Rear Seat Crossmember Xr
Right Rear Seat Crossmember Xr
Advanced Research Load Cell Barrier – 528 channels

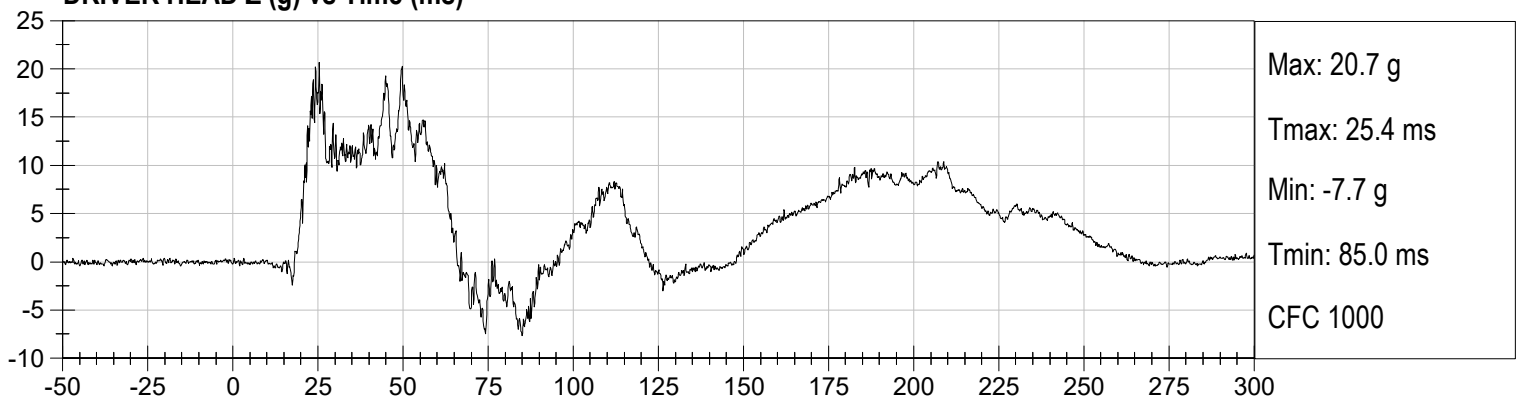
DRIVER HEAD X (g) vs Time (ms)



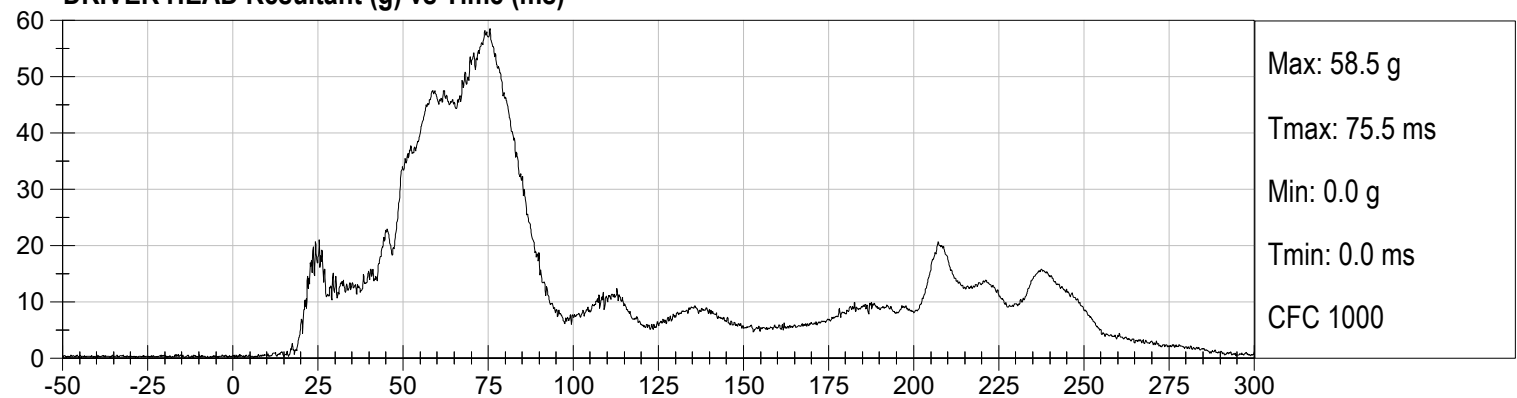
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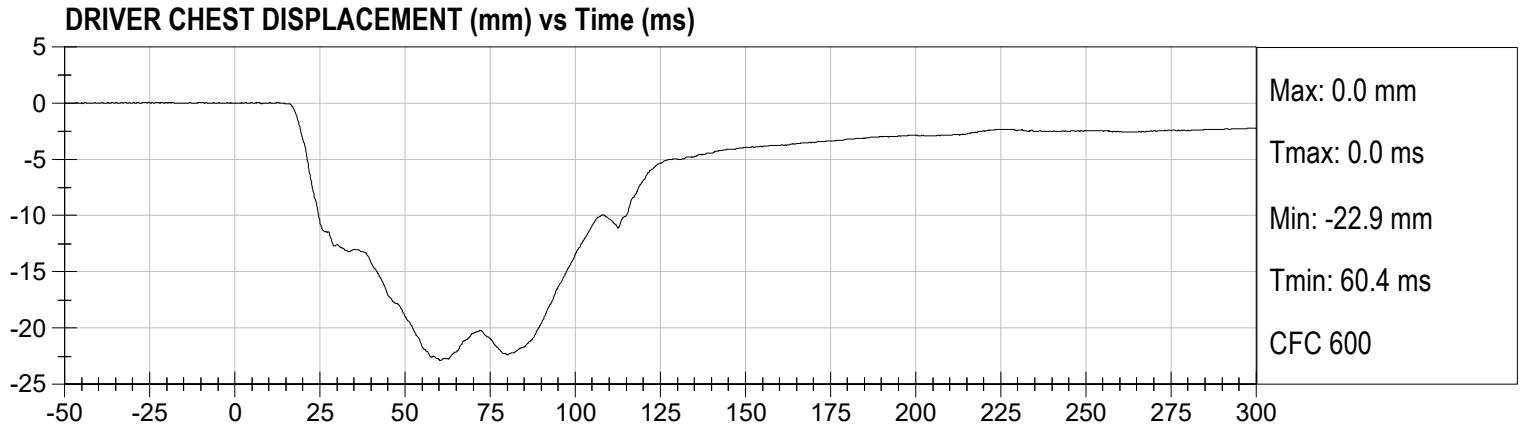


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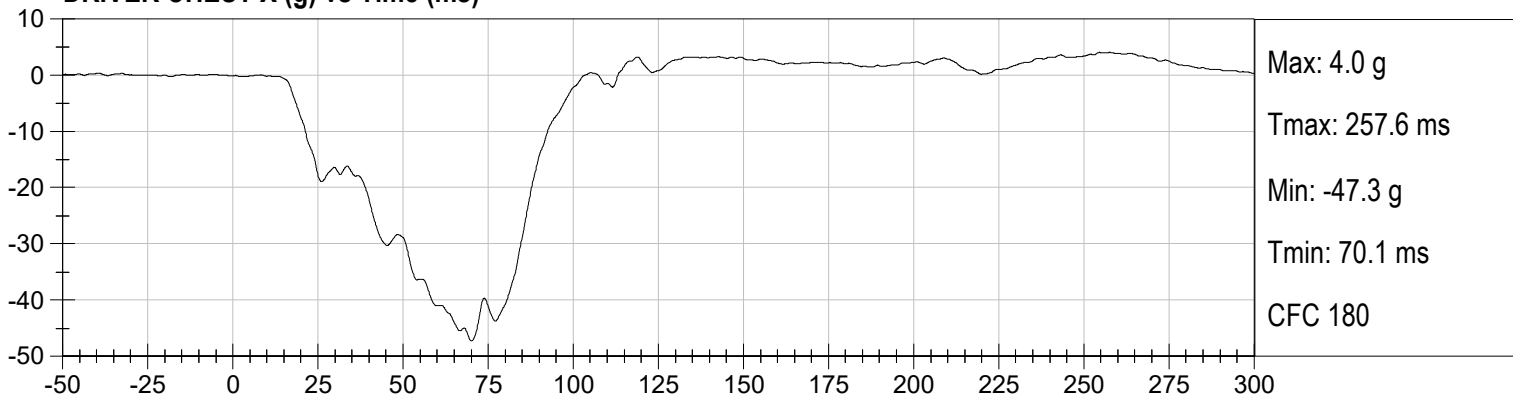


DRIVER HEAD Resultant (g) vs Time (ms)

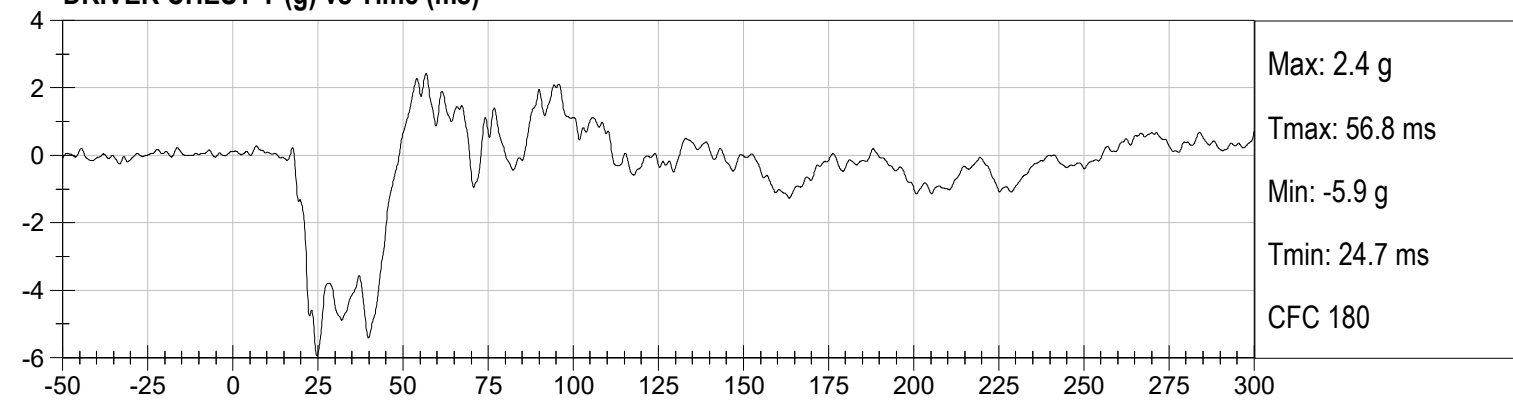




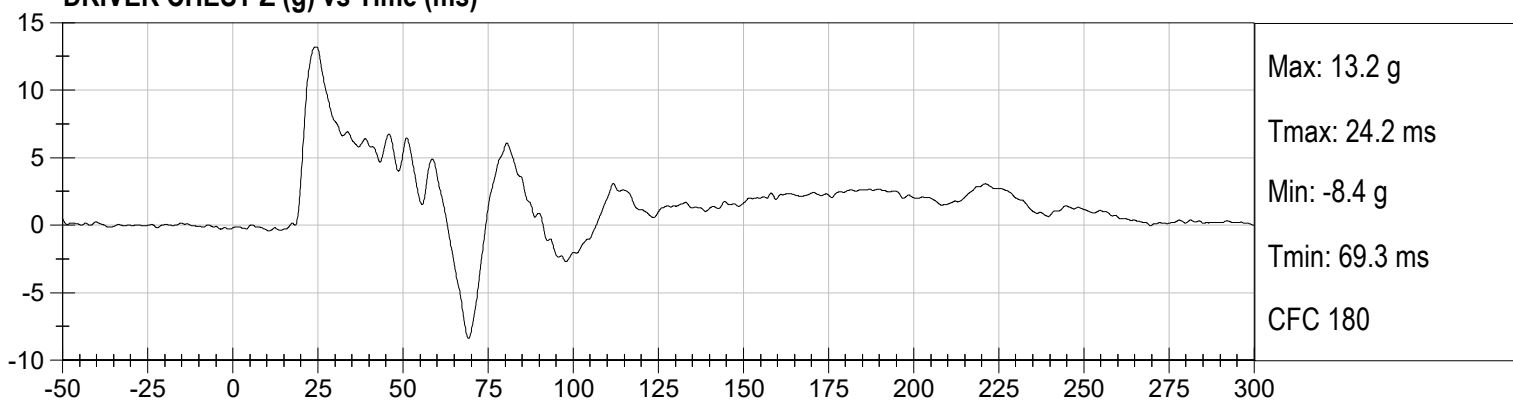
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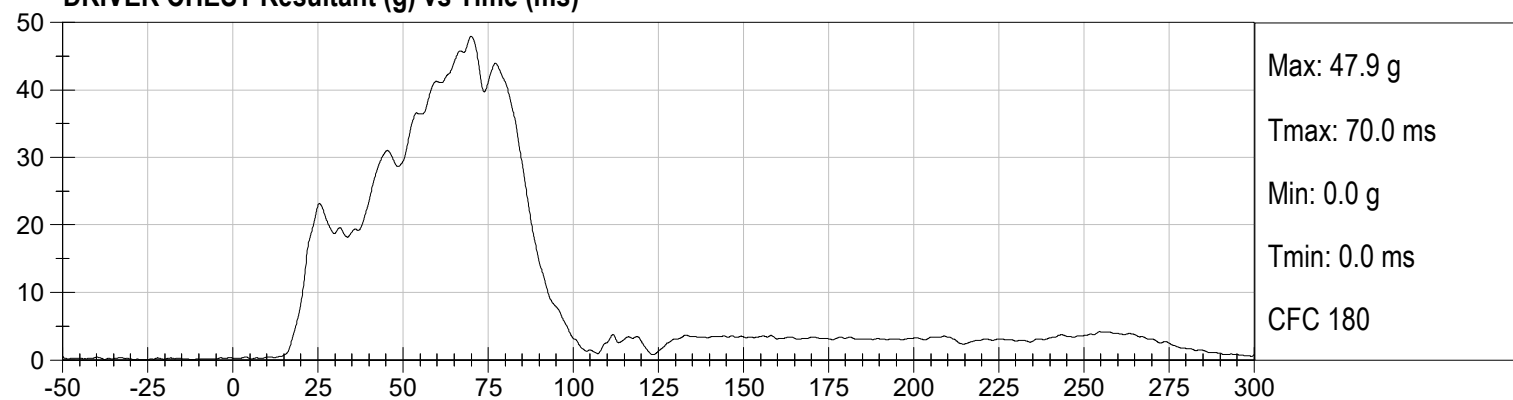
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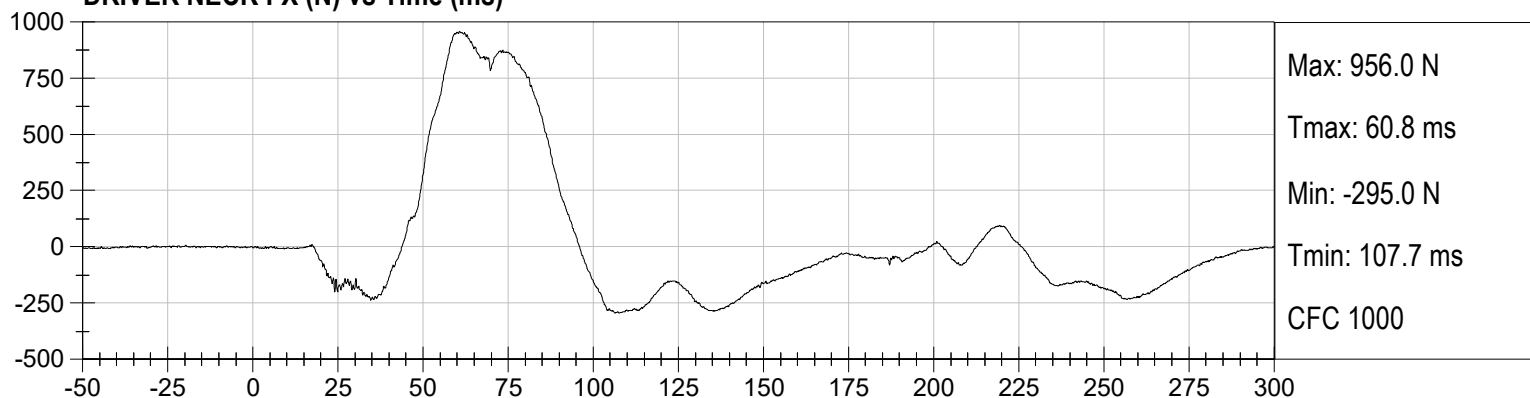
DRIVER CHEST Z (g) vs Time (ms)



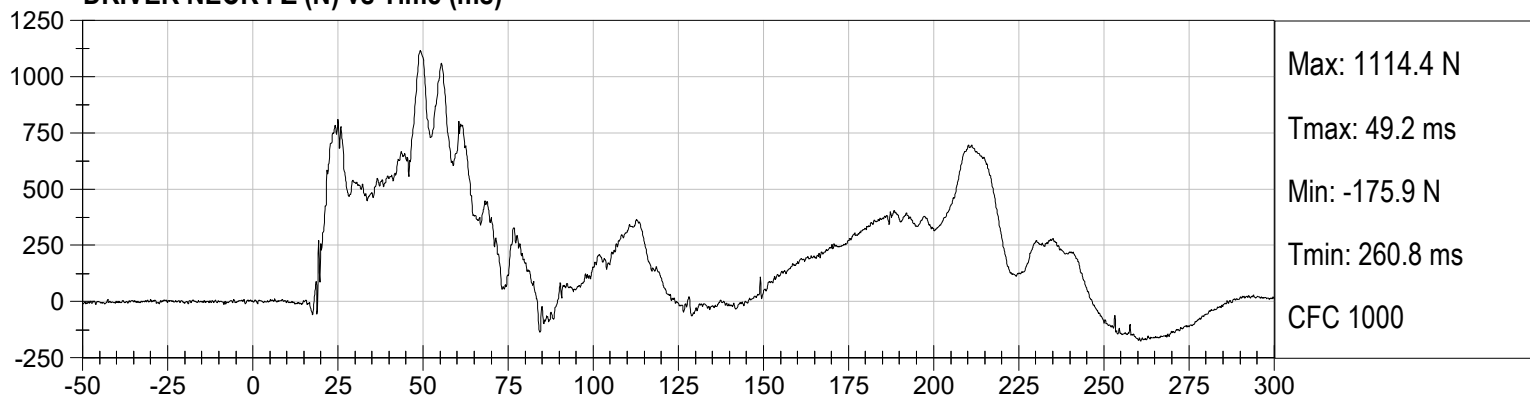
DRIVER CHEST Resultant (g) vs Time (ms)



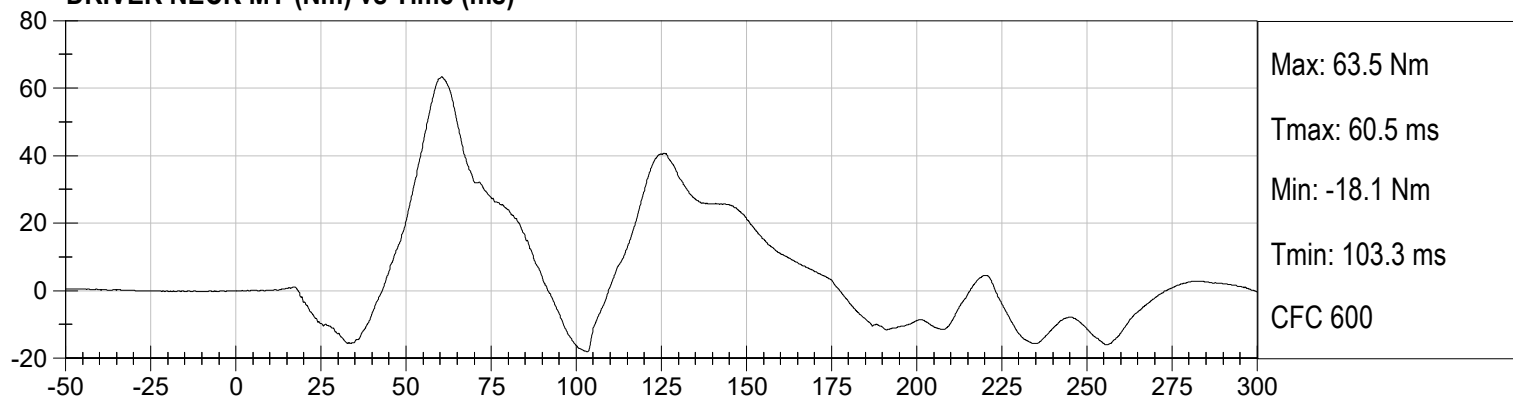
DRIVER NECK FX (N) vs Time (ms)



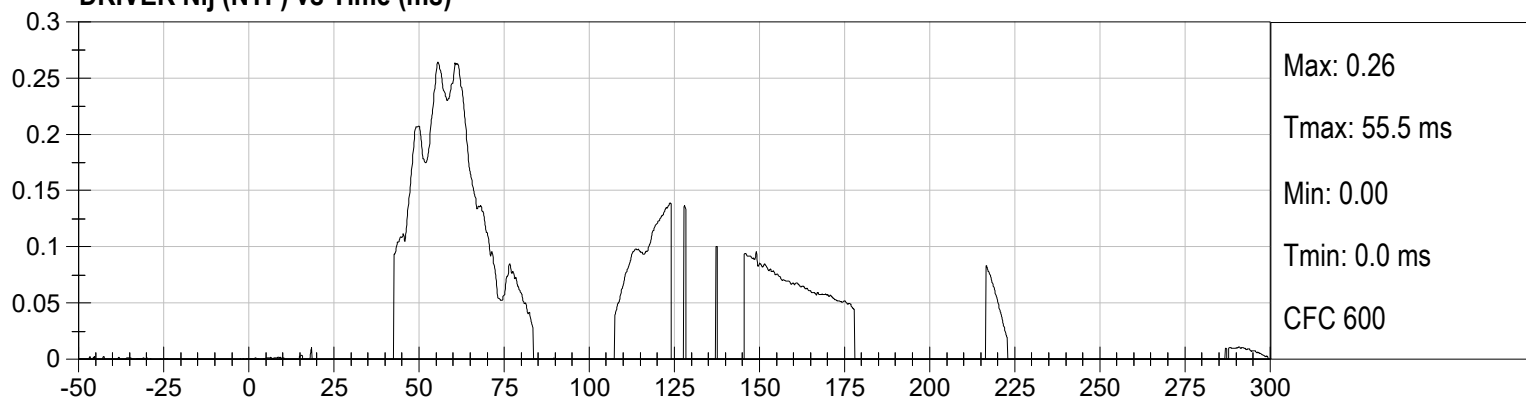
DRIVER NECK FZ (N) vs Time (ms)



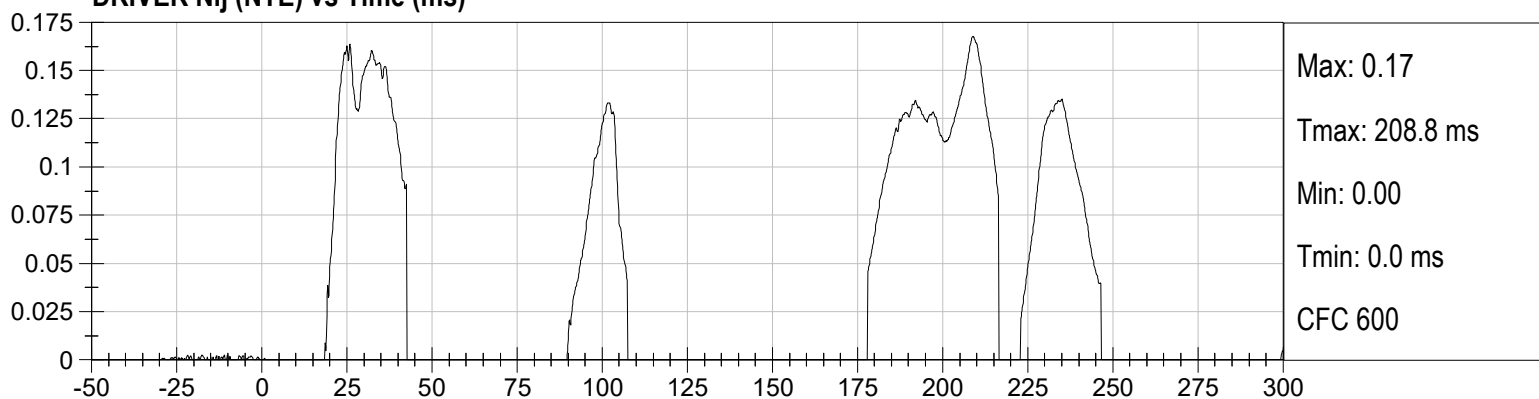
DRIVER NECK MY (Nm) vs Time (ms)



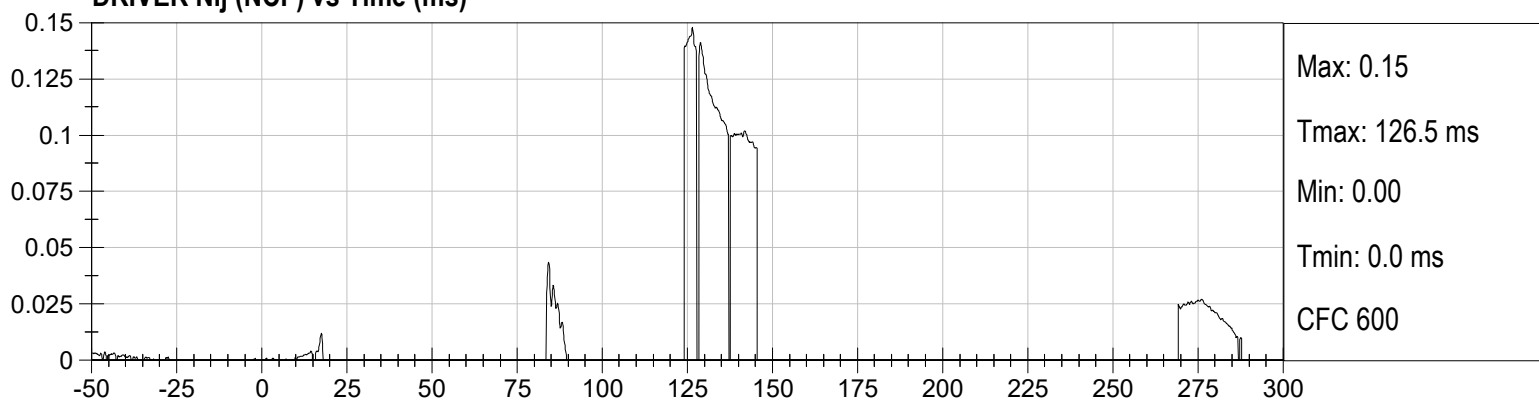
DRIVER Nij (NTF) vs Time (ms)



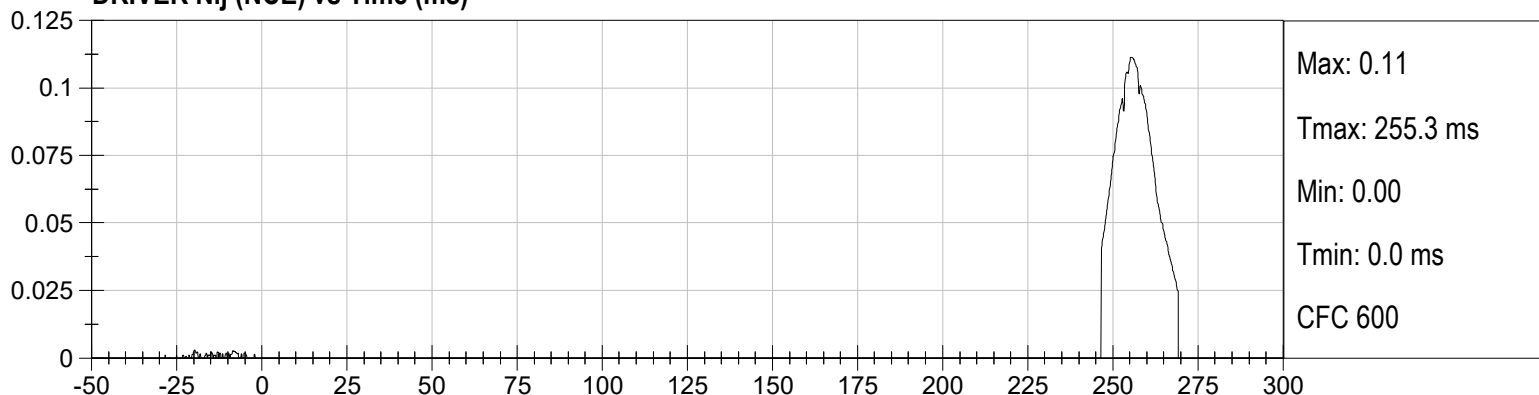
DRIVER Nij (NTE) vs Time (ms)



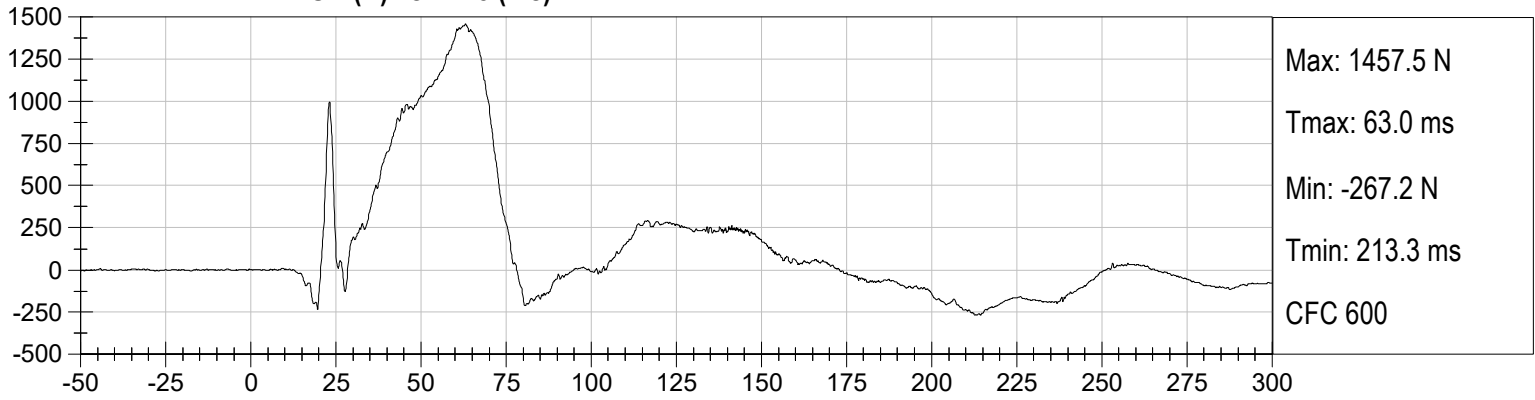
DRIVER Nij (NCF) vs Time (ms)



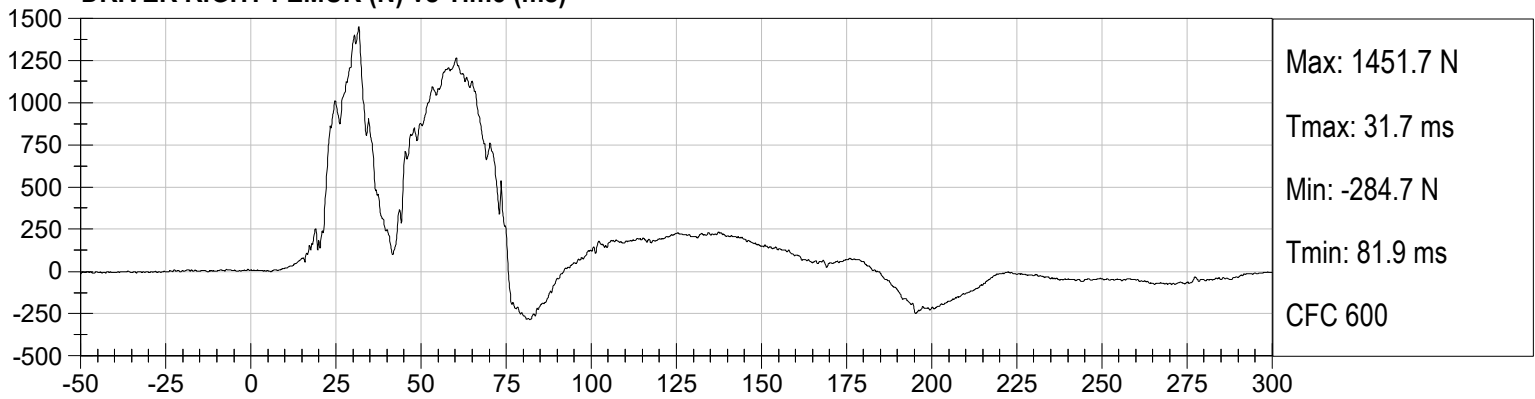
DRIVER Nij (NCE) vs Time (ms)



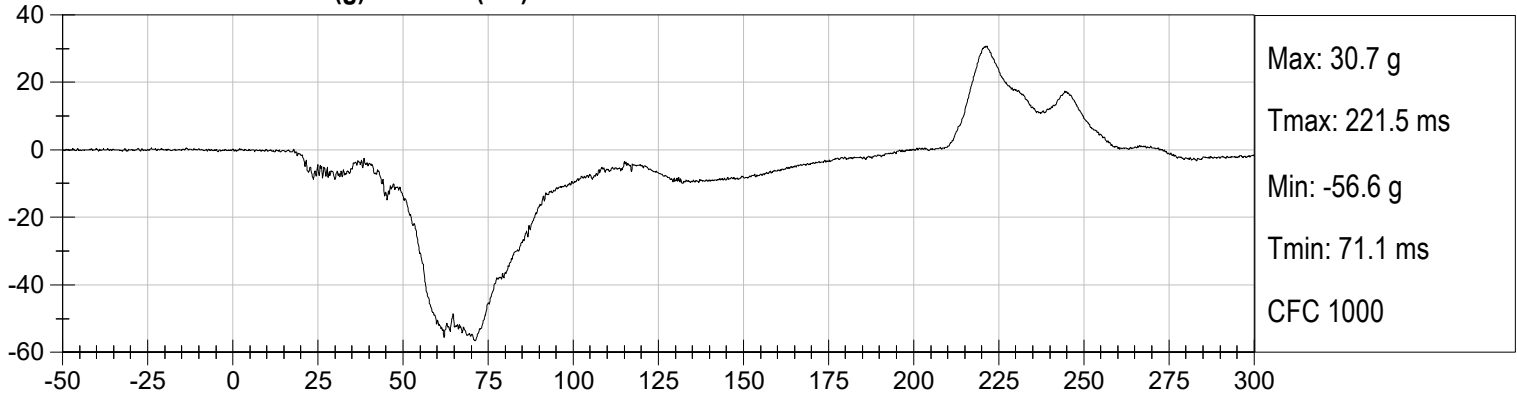
DRIVER LEFT FEMUR (N) vs Time (ms)



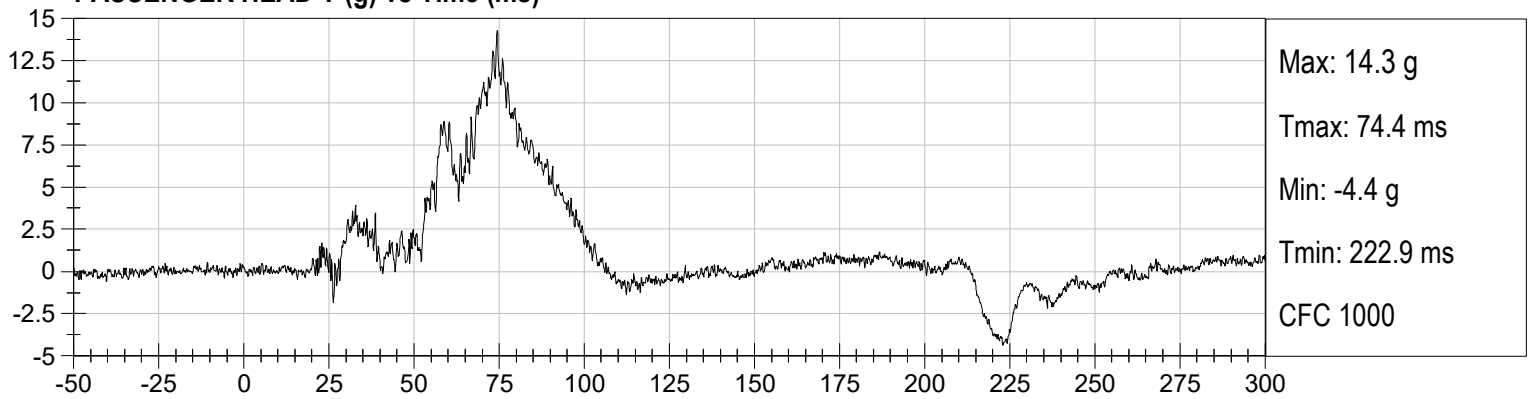
DRIVER RIGHT FEMUR (N) vs Time (ms)



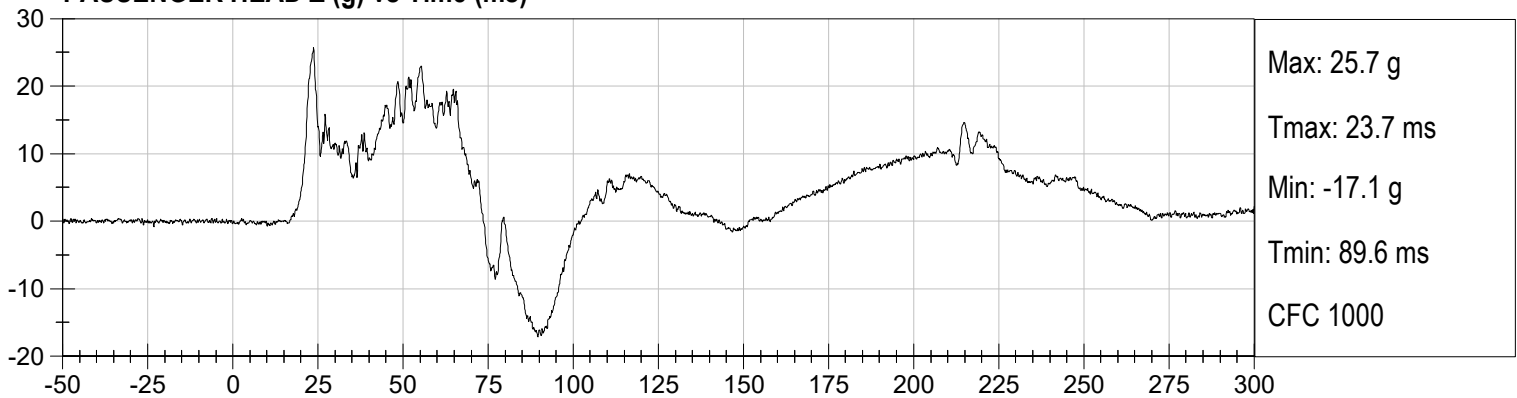
PASSENGER HEAD X (g) vs Time (ms)



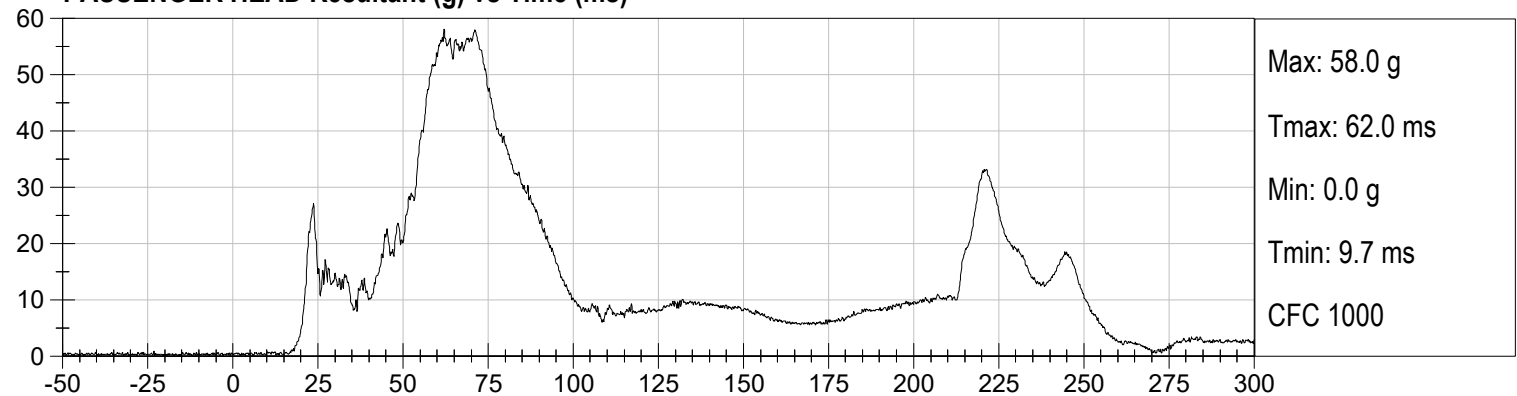
PASSENGER HEAD Y (g) vs Time (ms)

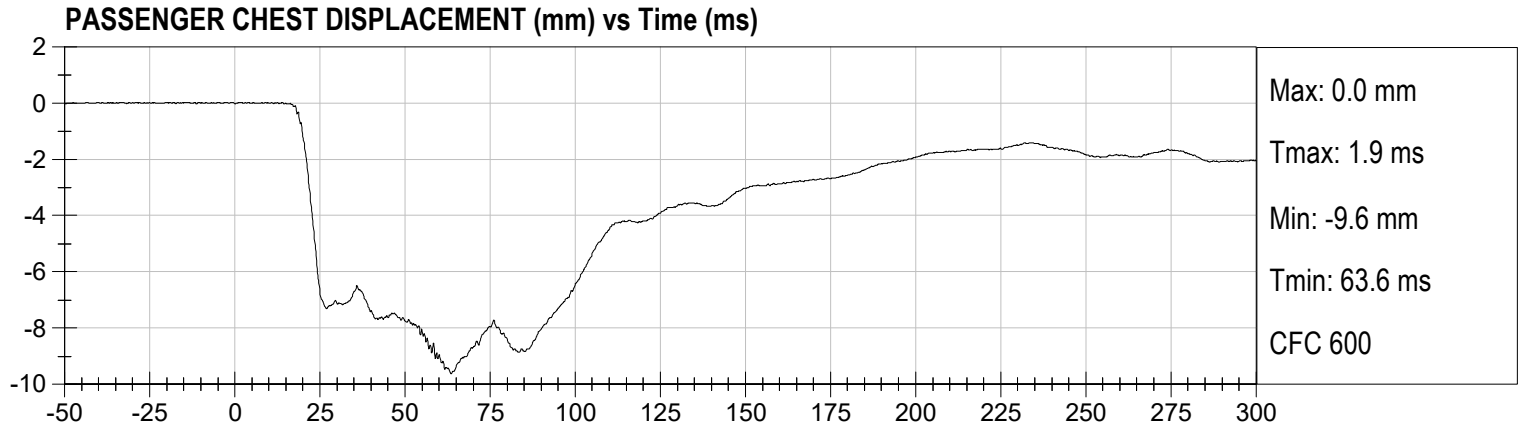


PASSENGER HEAD Z (g) vs Time (ms)

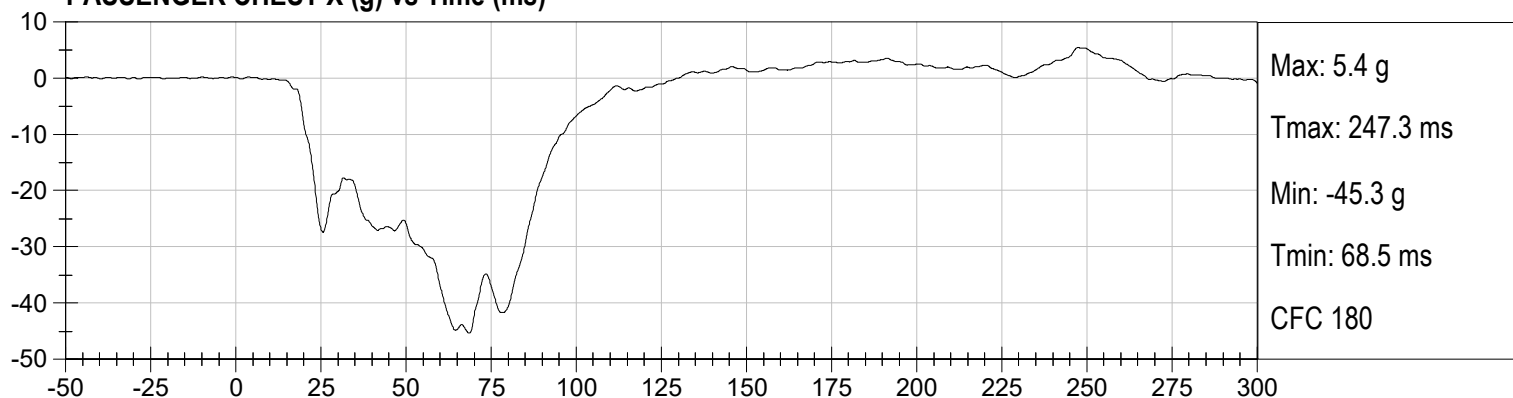


PASSENGER HEAD Resultant (g) vs Time (ms)

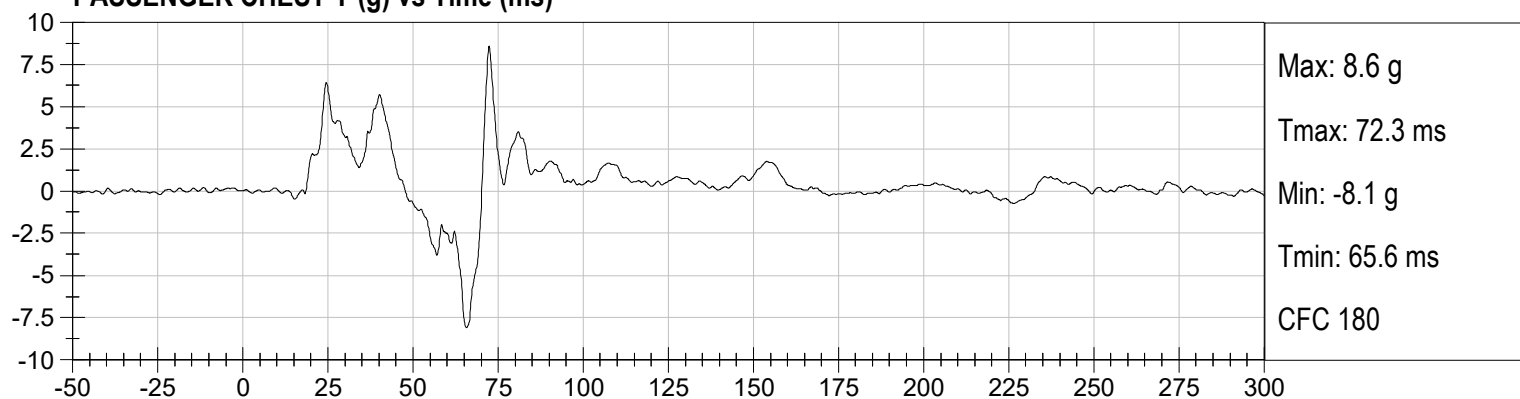




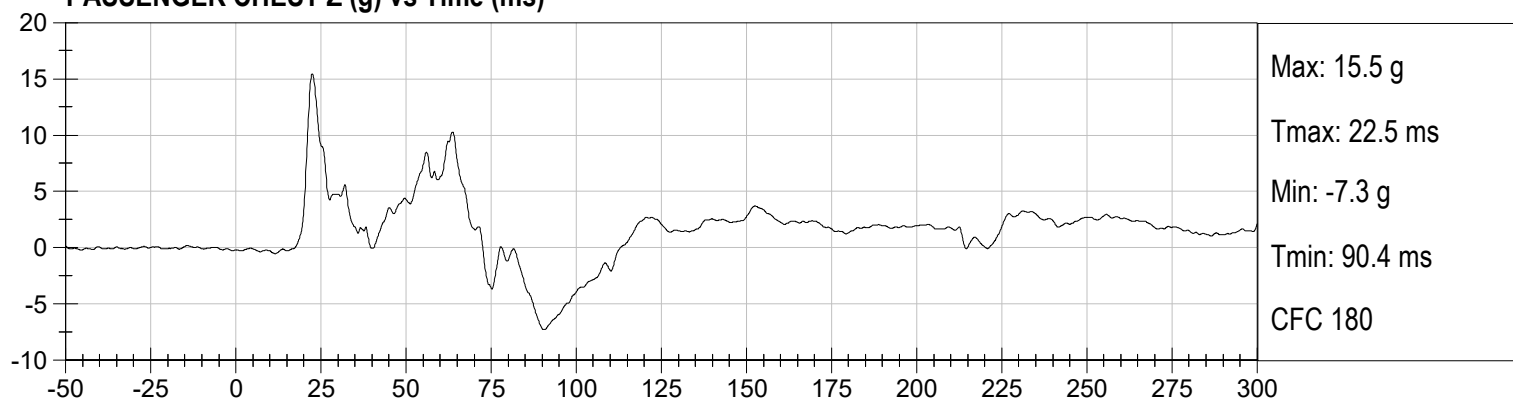
PASSENGER CHEST X (g) vs Time (ms)



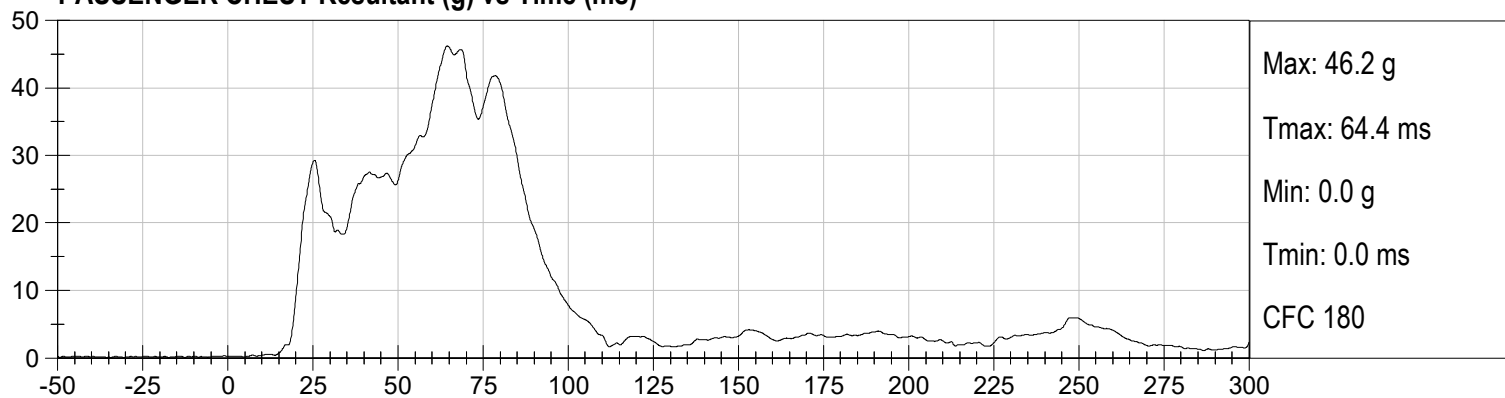
PASSENGER CHEST Y (g) vs Time (ms)



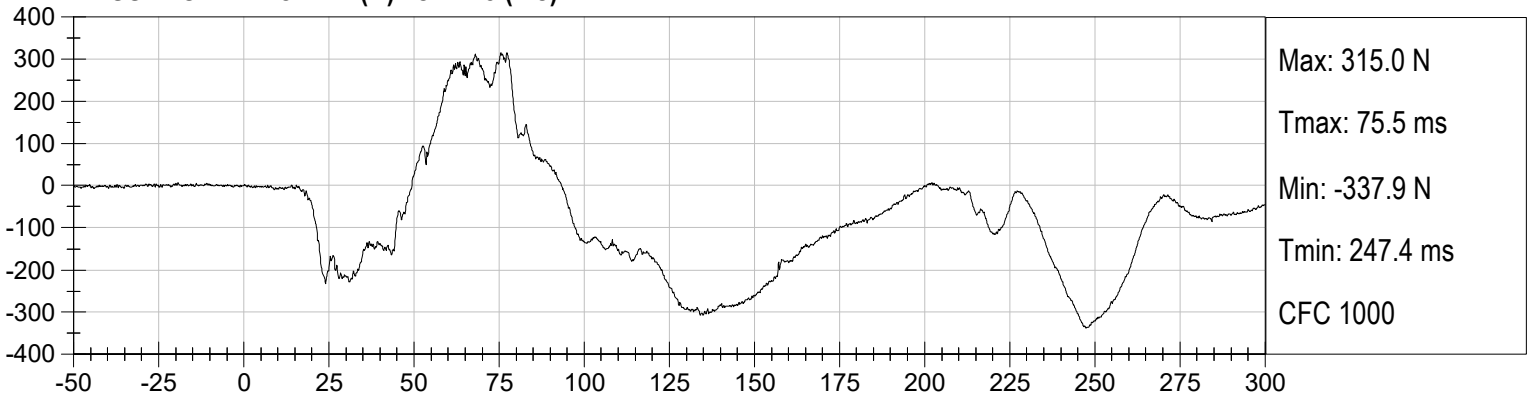
PASSENGER CHEST Z (g) vs Time (ms)



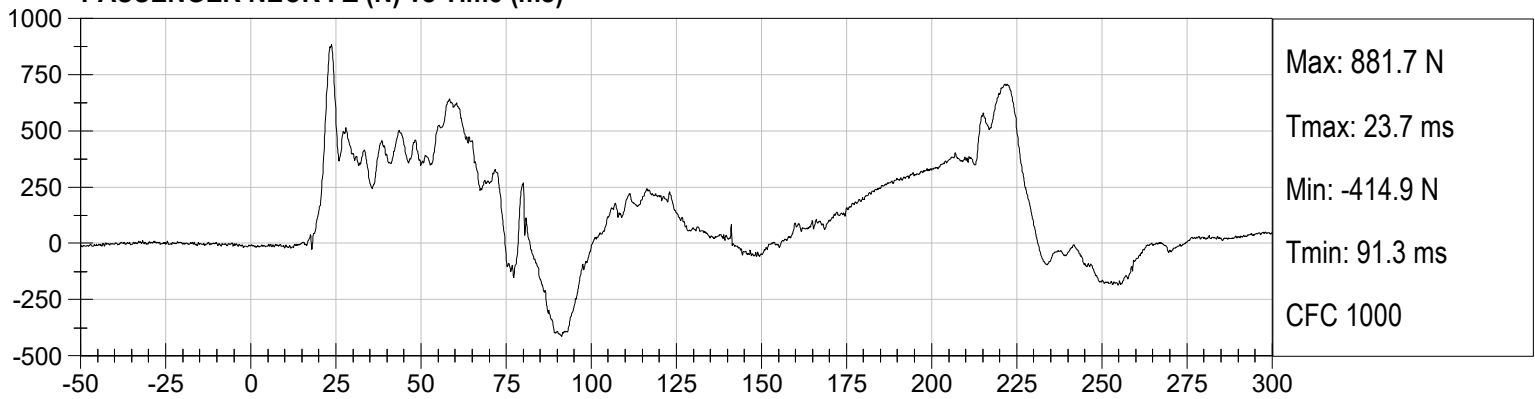
PASSENGER CHEST Resultant (g) vs Time (ms)



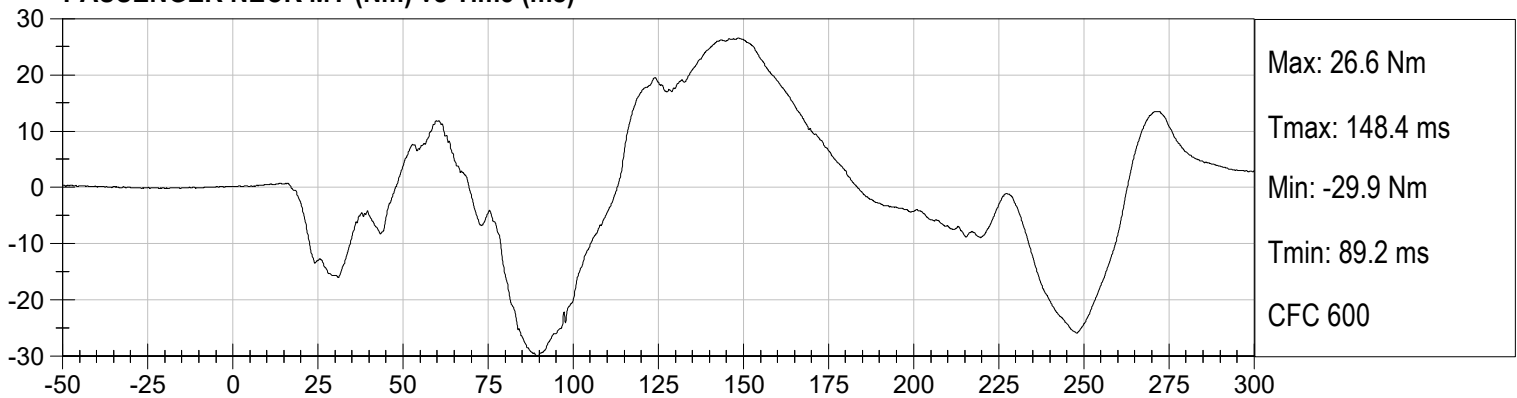
PASSENGER NECK FX (N) vs Time (ms)



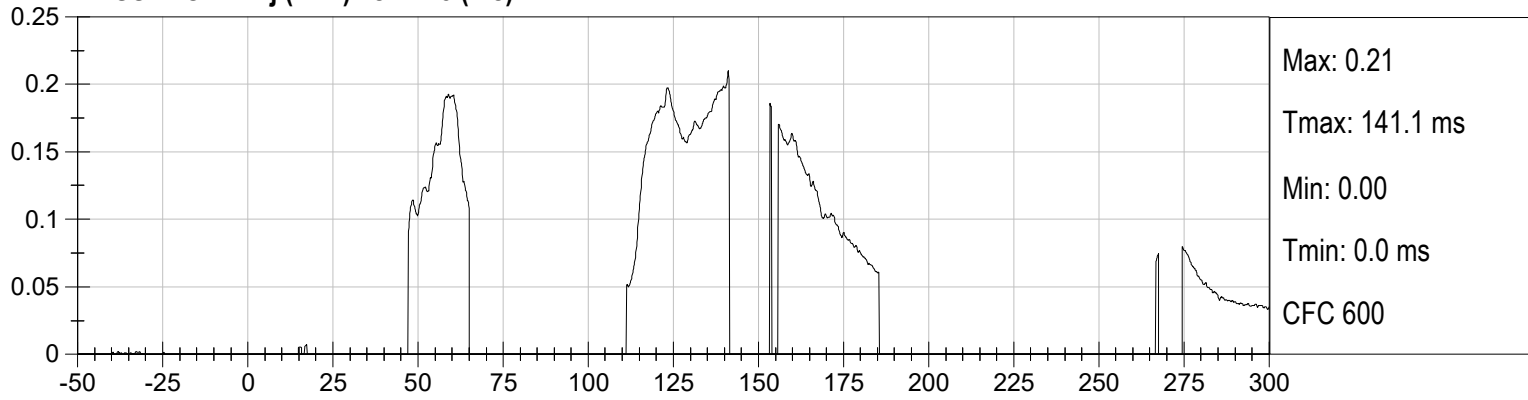
PASSENGER NECK FZ (N) vs Time (ms)



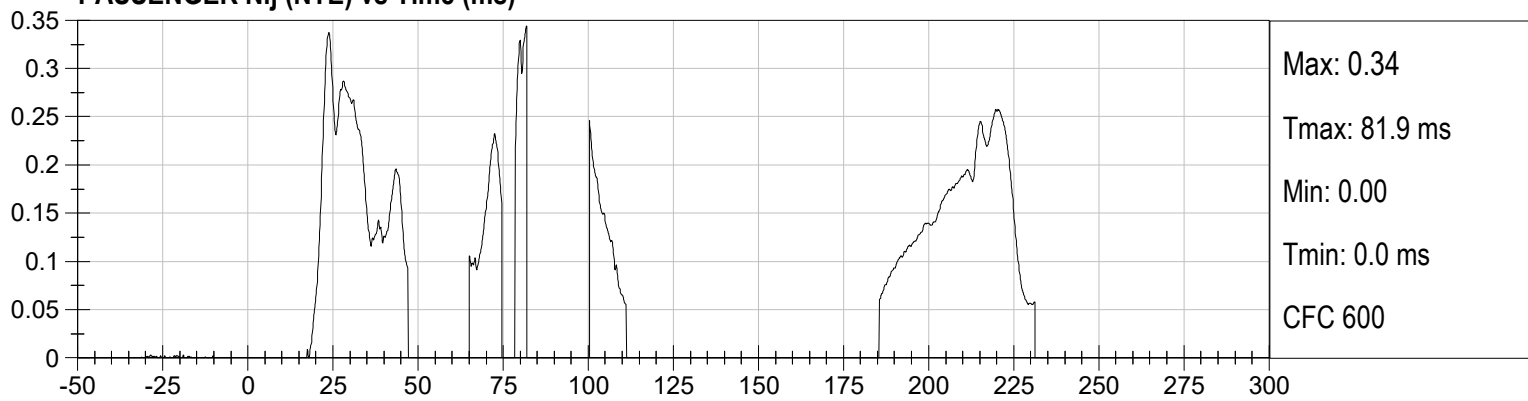
PASSENGER NECK MY (Nm) vs Time (ms)



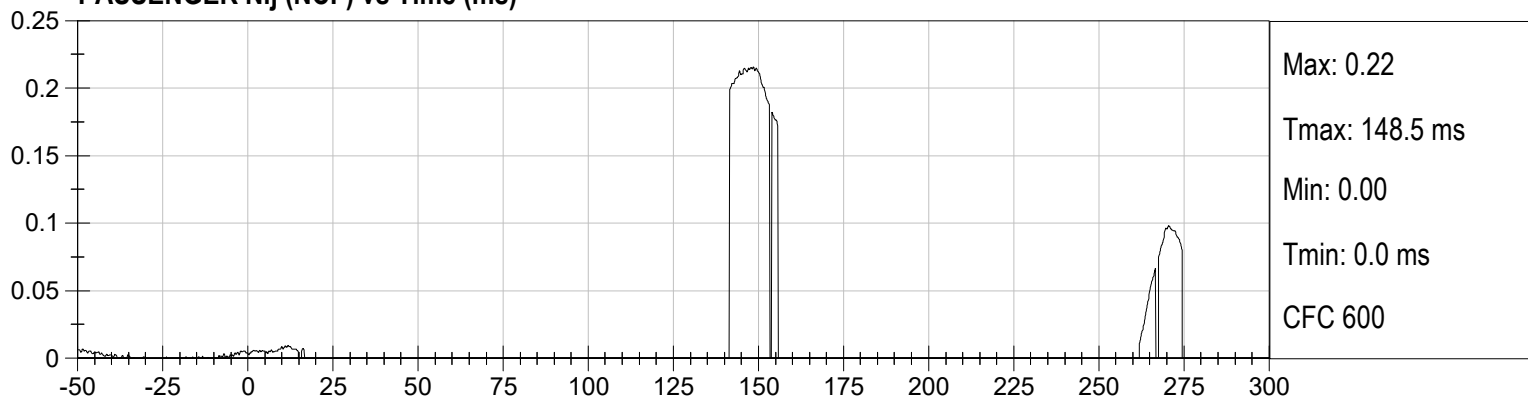
PASSENGER Nij (NTF) vs Time (ms)



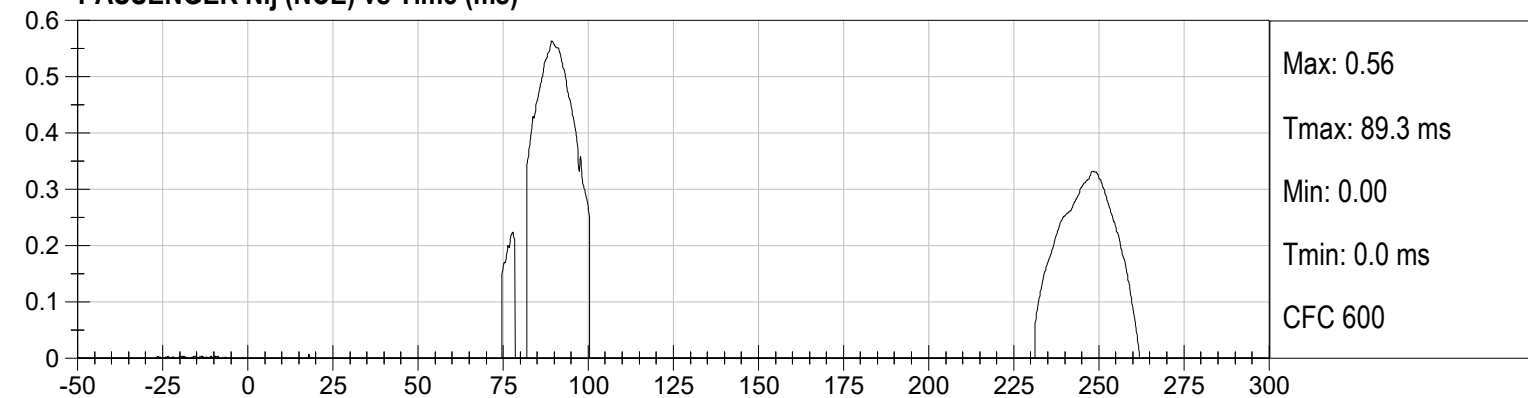
PASSENGER Nij (NTE) vs Time (ms)



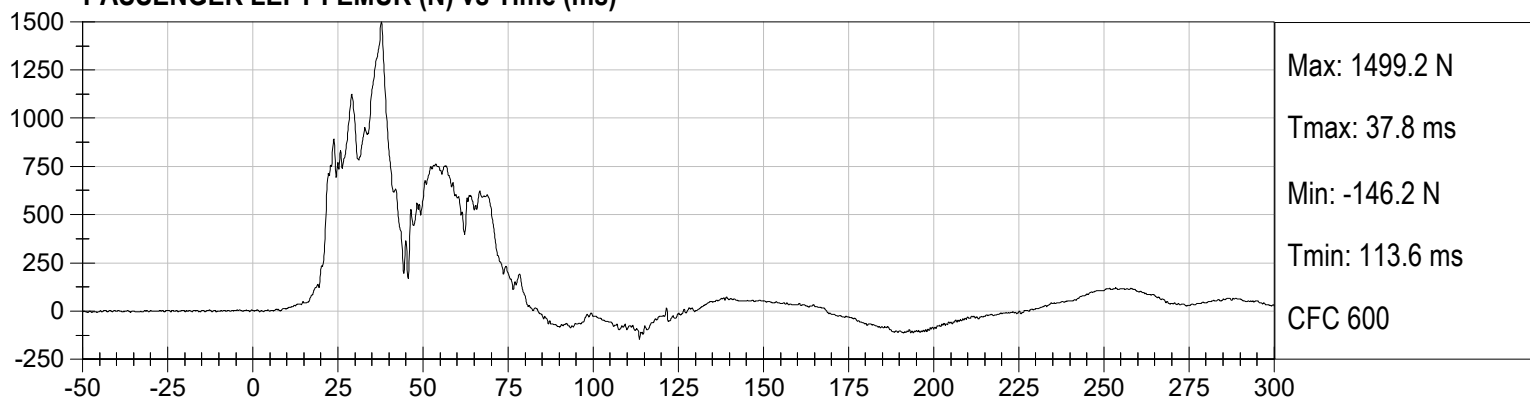
PASSENGER Nij (NCF) vs Time (ms)



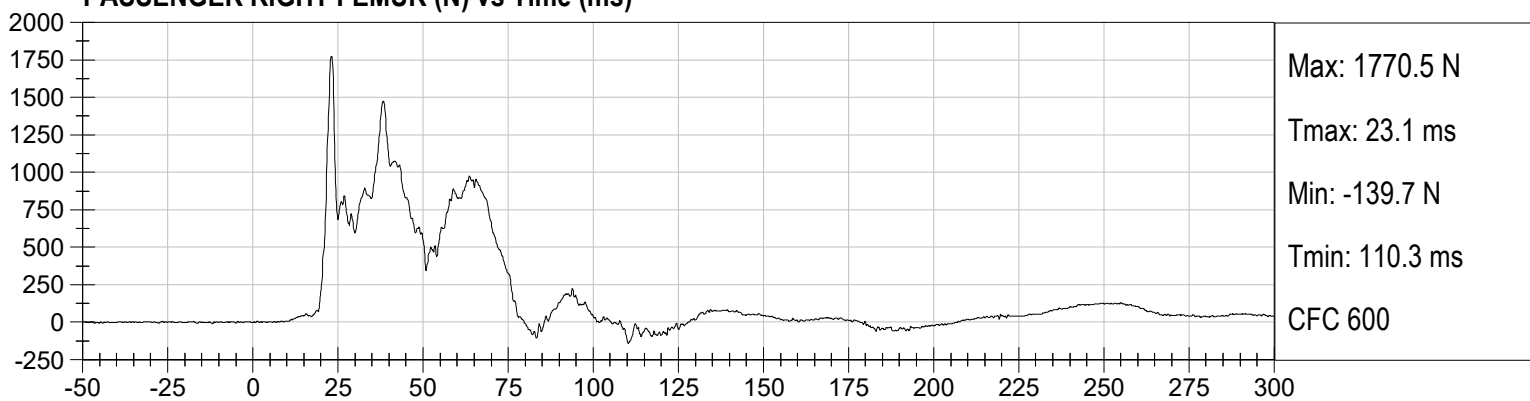
PASSENGER Nij (NCE) vs Time (ms)



PASSENGER LEFT FEMUR (N) vs Time (ms)



PASSENGER RIGHT FEMUR (N) vs Time (ms)



APPENDIX C
DUMMY CALIBRATION AND PERFORMANCE VERIFICATION DATA

CALIBRATION TEST RESULTS

PRE-TEST

HYBRID III 50TH PERCENTILE MALE - DRIVER ATD

Hybrid III, 50th External Measurements
SN: 351

HYBRID III, PART 572, SUBPART E EXTERNAL DIMENSIONS				
DIMENSION	DESCRIPTION	DETAILS	ASSEMBLY DIMENSION (inches)	ACTUAL MEASUREMENT
A	TOTAL SITTING HEIGHT	Seat surface to highest point on top of the head.	34.6–35.0	34.8
B	SHOULDER PIVOT HEIGHT	Centerline of shoulder pivot bolt to the seat surface.	19.9-20.5	20.0
C	H-POINT HEIGHT	Reference	3.3-3.5	3.4
D	H-POINT LOCATION FROM BACKLINE	Reference	5.3-5.5	5.5
E	SHOULDER PIVOT FROM BACKLINE	Center of the shoulder clevis to the rear vertical surface of the fixture.	3.3-3.7	3.5
F	THIGH CLEARANCE	Measured at the highest point on the upper femur segment.	5.5-6.1	6.0
G	BACK OF ELBOW TO WRIST PIVOT	back of the elbow flesh to the wrist pivot in line with the elbow and wrist pivots	11.4-12.0	11.8
H	HEAD BACK TO BACKLINE	Back of Skull cap skin to seat rear vertical surface (Reference)	1.6-1.8	1.7
I	SHOULDER TO- ELBOW LENGTH	Measure from the highest point on top of the shoulder clevis to the lowest part of the flesh on the elbow in line with the elbow pivot bolt.	13.0-13.6	13.3
J	ELBOW REST HEIGHT	Measure from the flesh below the elbow pivot bolt to the seat surface.	7.5-8.3	7.8
K	BUTTOCK TO KNEE LENGTH	The forward most part of the knee flesh to the rear vertical surface of the fixture.	22.8-23.8	23.8
L	POPLITEAL HEIGHT	Seat surface to the plane of the horizontal plane of the bottom of the feet.	16.9-17.9	17.0
M	KNEE PIVOT HEIGHT	Centerline of knee pivot bolt to the horizontal plane of the bottom of the feet.	19.1-19.7	19.5
N	BUTTOCK POPLITEAL LENGTH	The rearmost surface of the lower leg to the same point on the rear surface of the buttocks used for dim. "K".	17.8-18.8	18.8

HYBRID III, SUBPART E EXTERIOR DIMENSIONS, continued				
DIMENSION	DESCRIPTION	DETAILS		ACTUAL MEASUREMENT
O	CHEST DEPTH WITHOUT JACKET	Measured 16.9-17.1 in. above seat surface	8.4-9.0	8.5
P	FOOT LENGTH	Tip of toe to rear of heel	9.9-10.5	10.3
V	SHOULDER BREADTH	Outside edges of right and left shoulder clevises	16.3-17.2	16.5
W	FOOT BREADTH	The widest part of the foot	3.6-4.2	4.0
Y	CHEST CIRCUMFERENCE (WITH CHEST JACKET)	Measured 16.9-17.1 in. above seat surface	38.2-39.4	39.2
Z	WAIST CIRCUMFERENCE	Measured 8.9-9.1 in. above seat surface	32.9-34.1	33.7
AA	REFERENCE LOCATION FOR MEASUREMENT OF CHEST CIRCUMFERENCE	Reference	16.9-17.1	17.0
BB	REFERENCE LOCATION FOR MEASUREMENT OF WAIST CIRCUMFERENCE	Reference	8.9-9.1	9.0

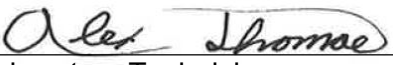
NOTE: THE H-POINT IS LOCATED 1.83 INCHES FORWARD AND 2.57 INCHES DOWN FROM THE CENTER OF THE PELVIS ANGLE REFERENCE HOLE.

MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351

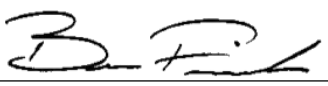
Test ID: D193881

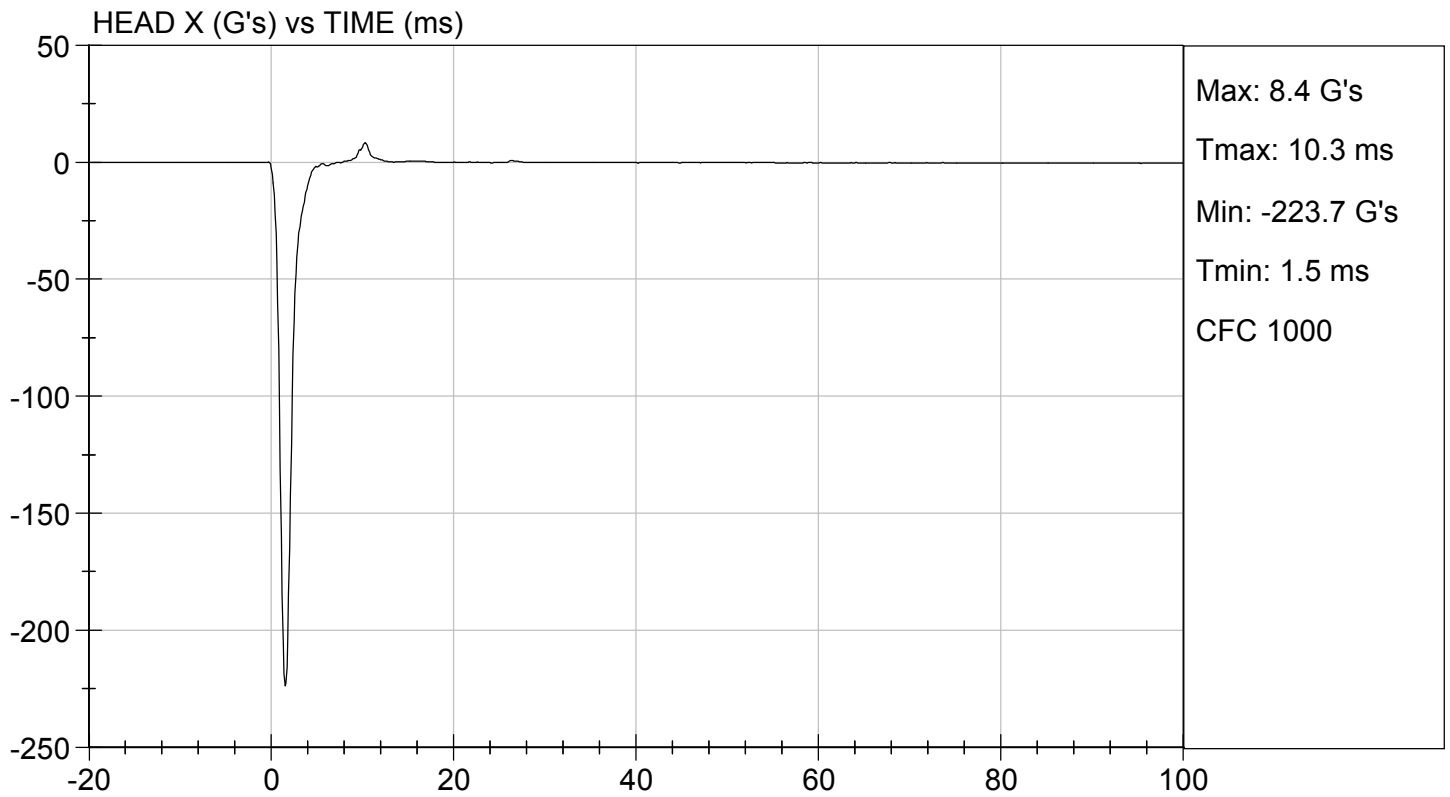
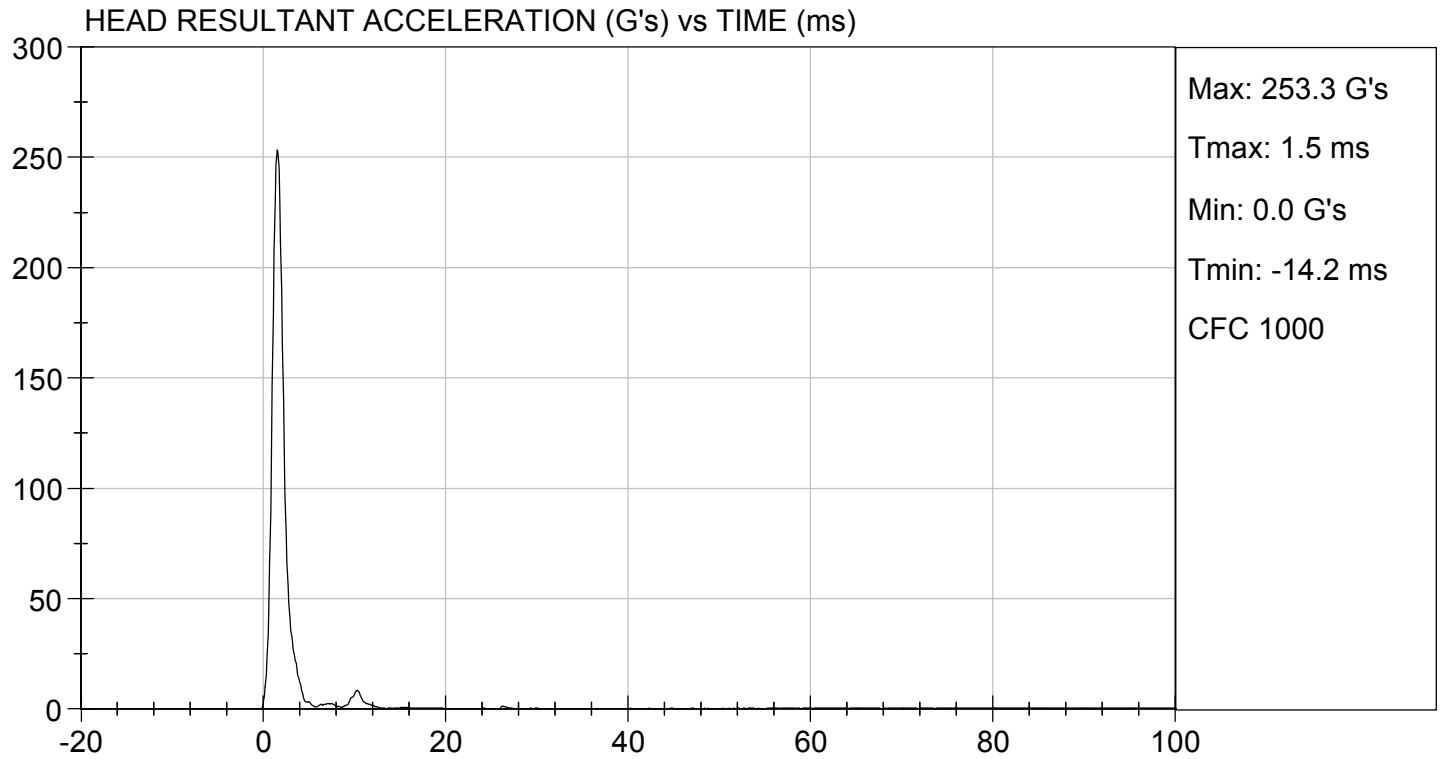
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Peak Resultant Acceleration	G's	225 to 275	253	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	6.6	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass

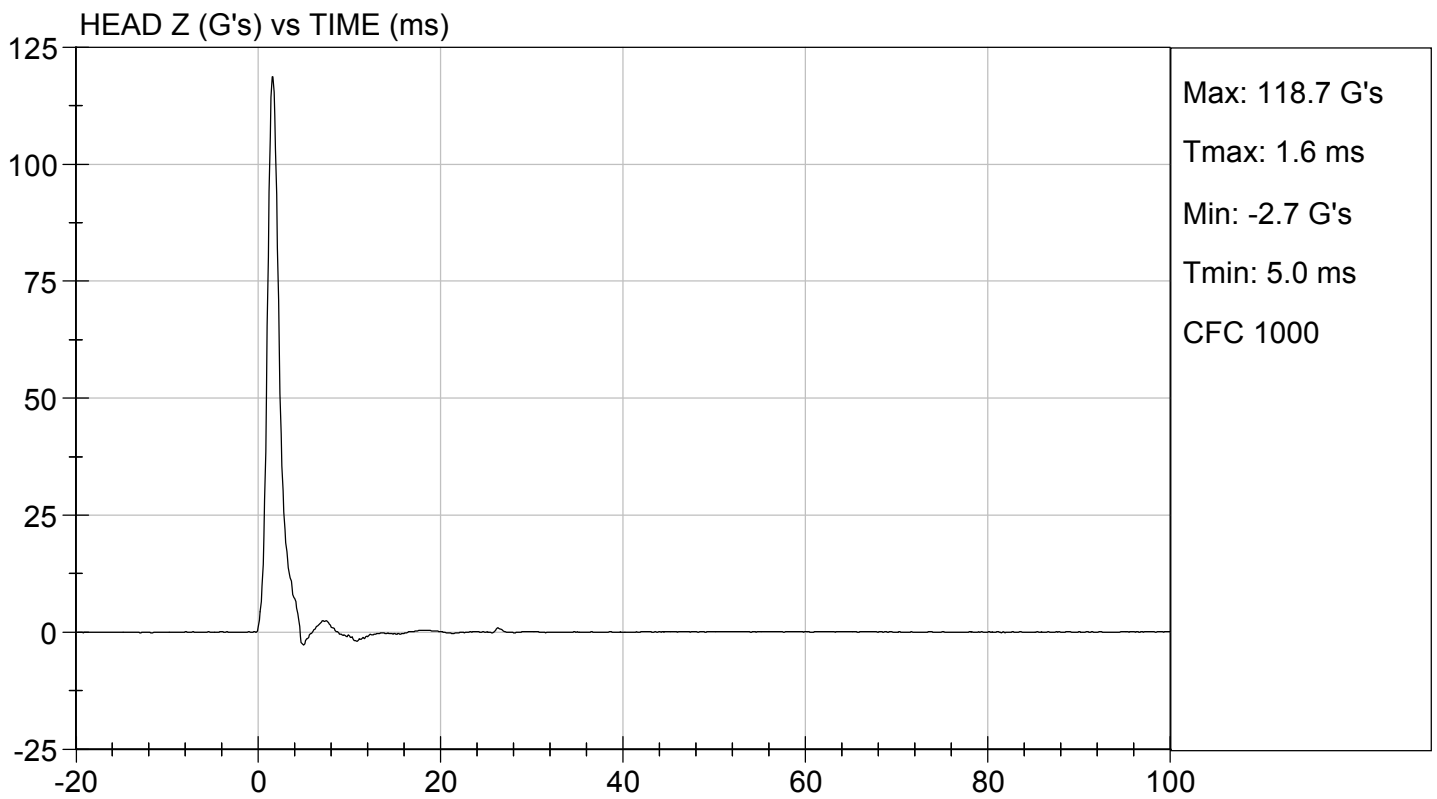
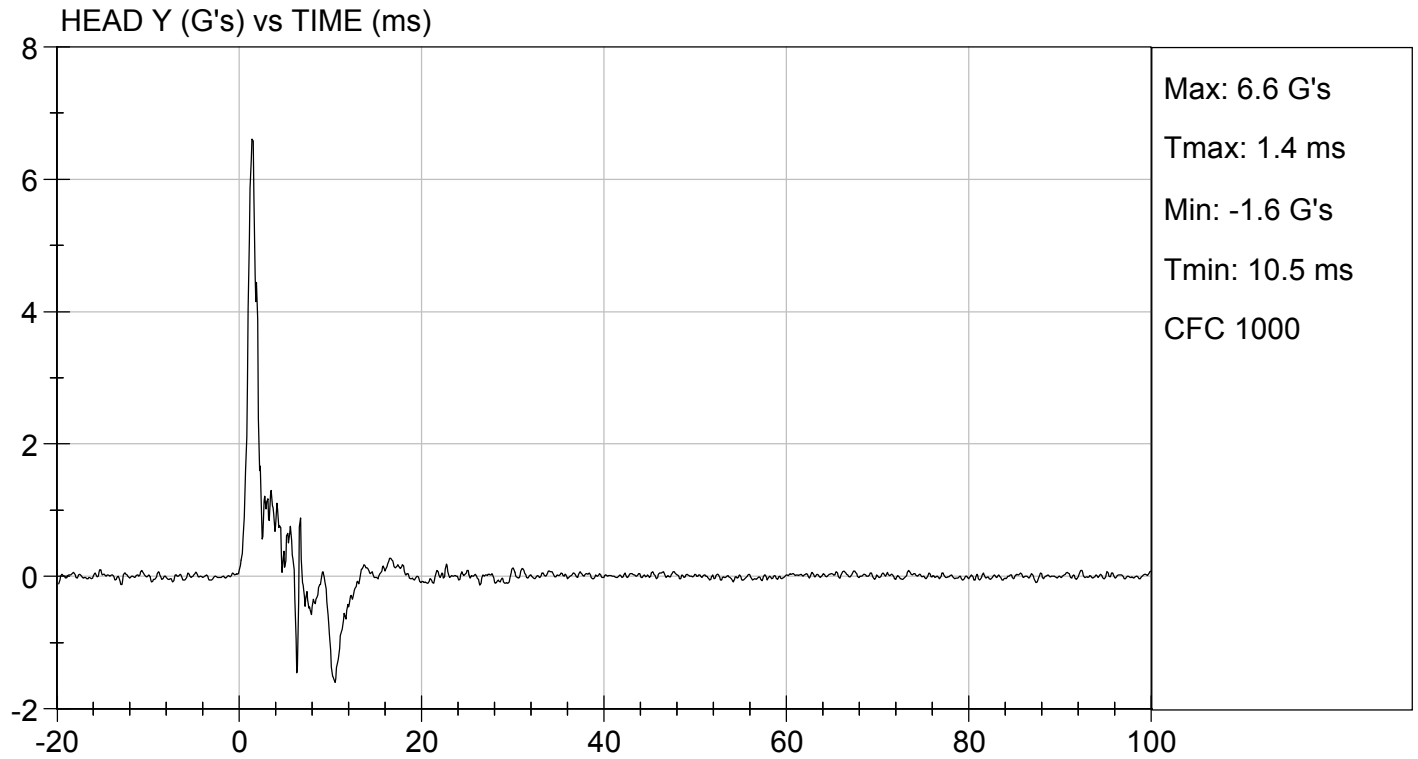

Laboratory Technician

12/13/2019

Test Date


Approved By





MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 50TH PERCENTILE MALE

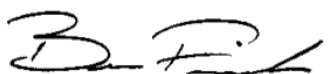
ATD Serial No: 351

Test I.D: D193882

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	20.7	Pass
Laboratory Relative Humidity		%	10 to 70	28	Pass
Pendulum Velocity		m/s	6.89 to 7.13	6.96	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	25.38	Pass
	20 ms	G's	17.60 to 22.60	19.52	Pass
	30 ms	G's	12.50 to 18.50	14.44	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	14.4	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	35.5	Pass
Maximum "D" Plane Rotation	Maximum	Deg	64.0 to 78.0	69.4	Pass
	Time	ms	57.0 to 64.0	57.5	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	114.3	Pass
Moment About Occipital Condyle	Maximum	Nm	88.1 to 108.5	88.6	Pass
	Time	ms	47.0 to 58.0	47.3	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	98.4	Pass
Overall Test Results					Pass


 Laboratory Technician

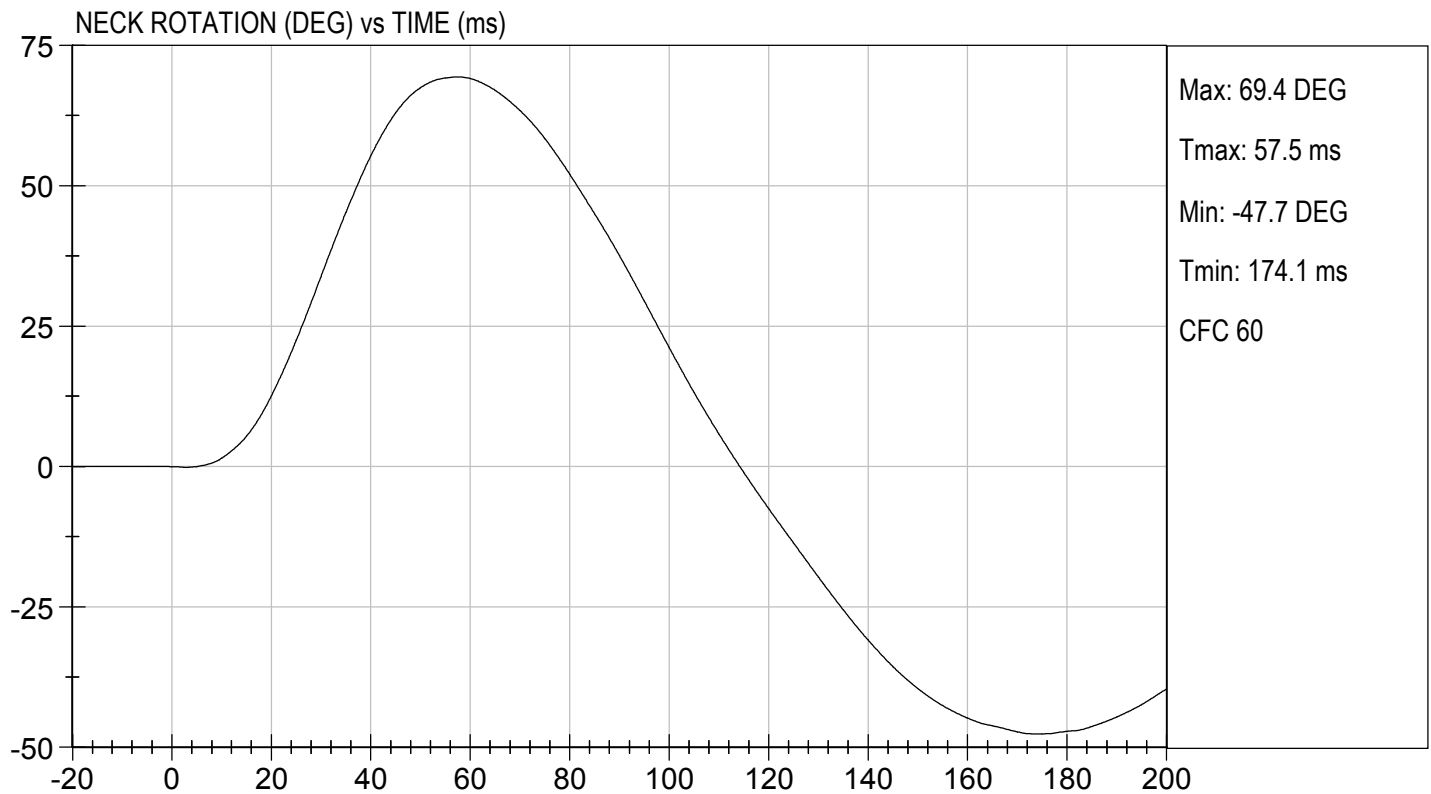
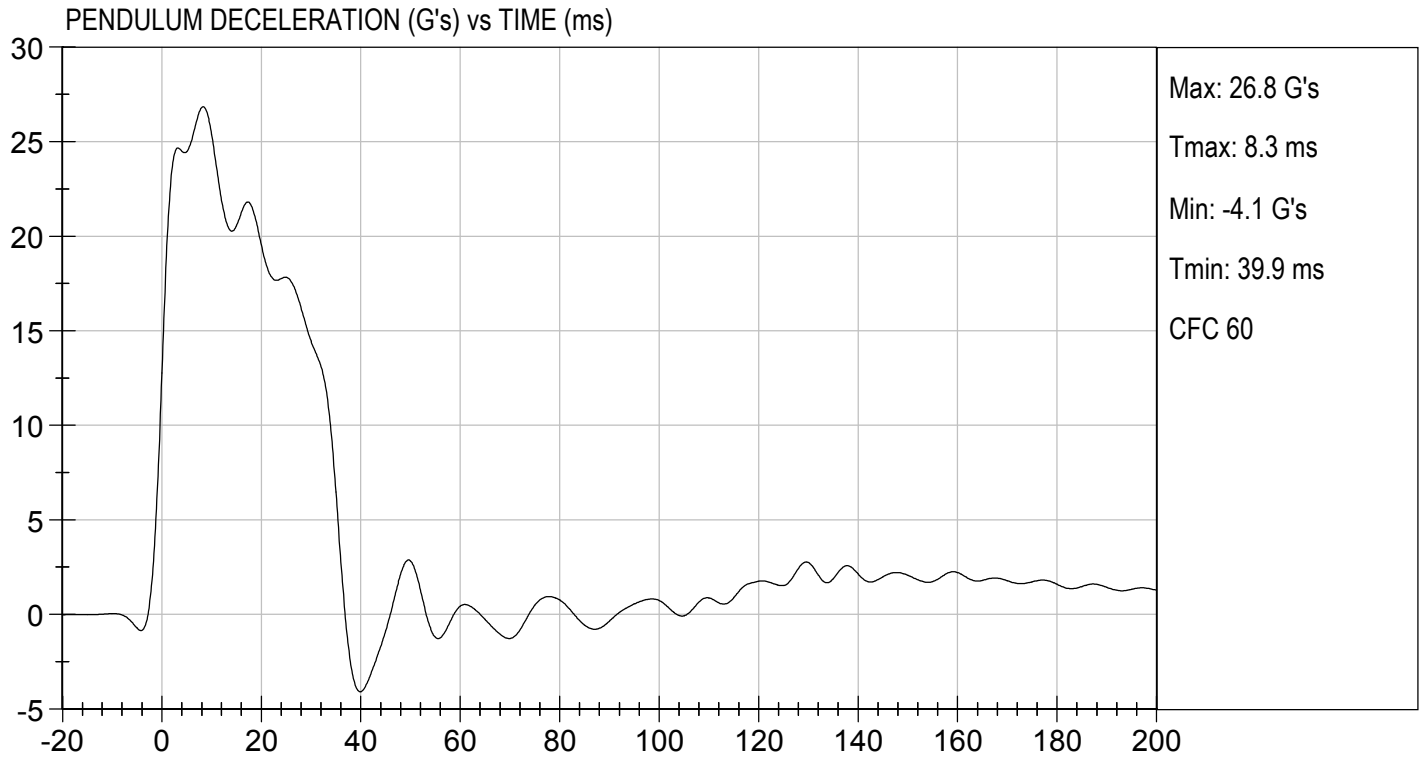
12/13/2019
 Test Date


 Approved By



TEST DESC: NECK FLEXION
VELOCITY: 22.83 ft/s, 6.96 m/s

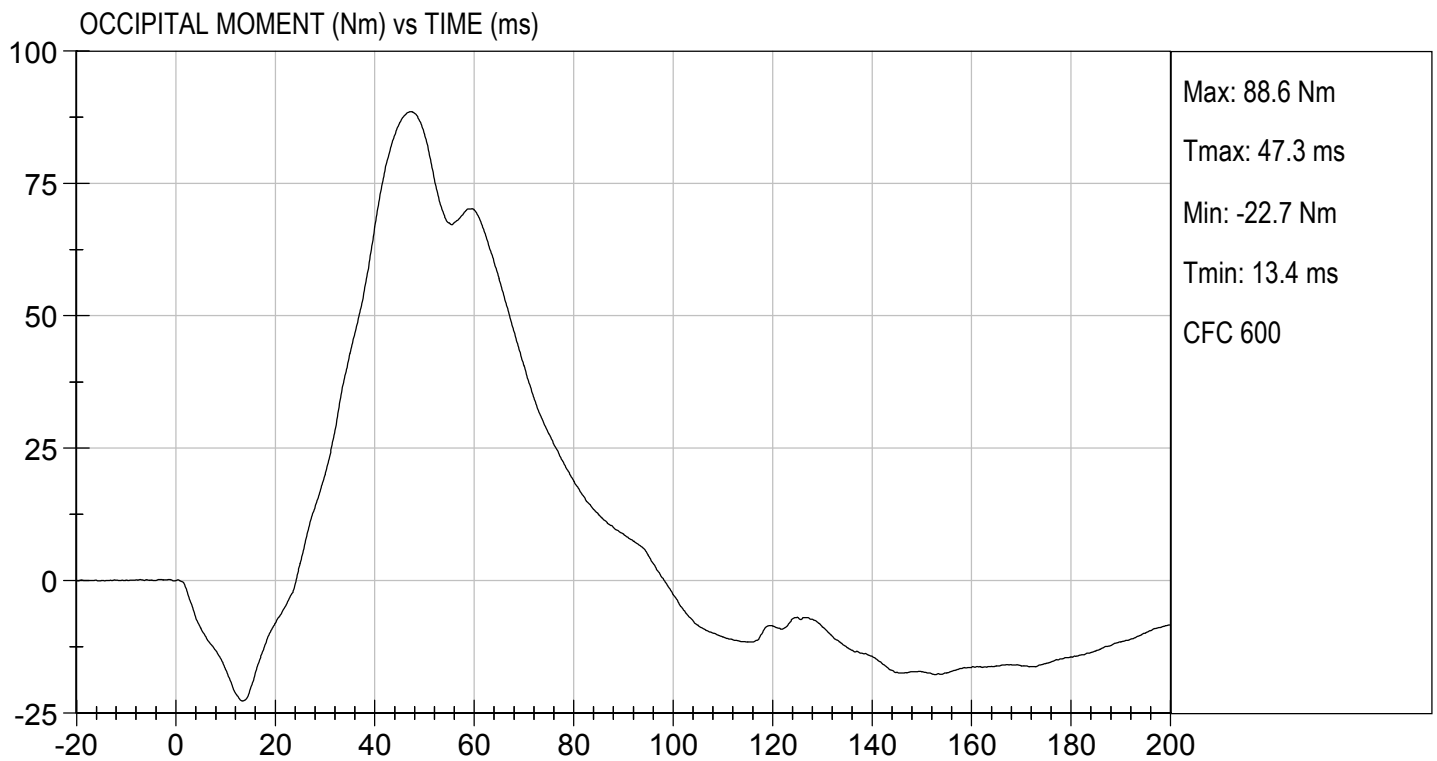
TEST DATE: 12/13/2019
TEST #: D193882





TEST DESC: NECK FLEXION
VELOCITY: 22.83 ft/s, 6.96 m/s

TEST DATE: 12/13/2019
TEST #: D193882



MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 50TH PERCENTILE MALE

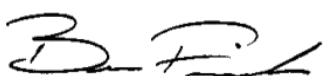
ATD Serial No: 351

Test I.D: D193883

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	20.7	Pass
Laboratory Relative Humidity		%	10 to 70	28	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.19	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	17.73	Pass
	20 ms	G's	14.00 to 19.00	16.82	Pass
	30 ms	G's	11.00 to 16.00	13.41	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	14.1	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	40.8	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	97.1	Pass
	Time	ms	72.0 to 82.0	78.8	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	161.6	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-57.1	Pass
	Time	ms	65.0 to 79.0	71.6	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	141.9	Pass
Overall Test Results					Pass


 Laboratory Technician

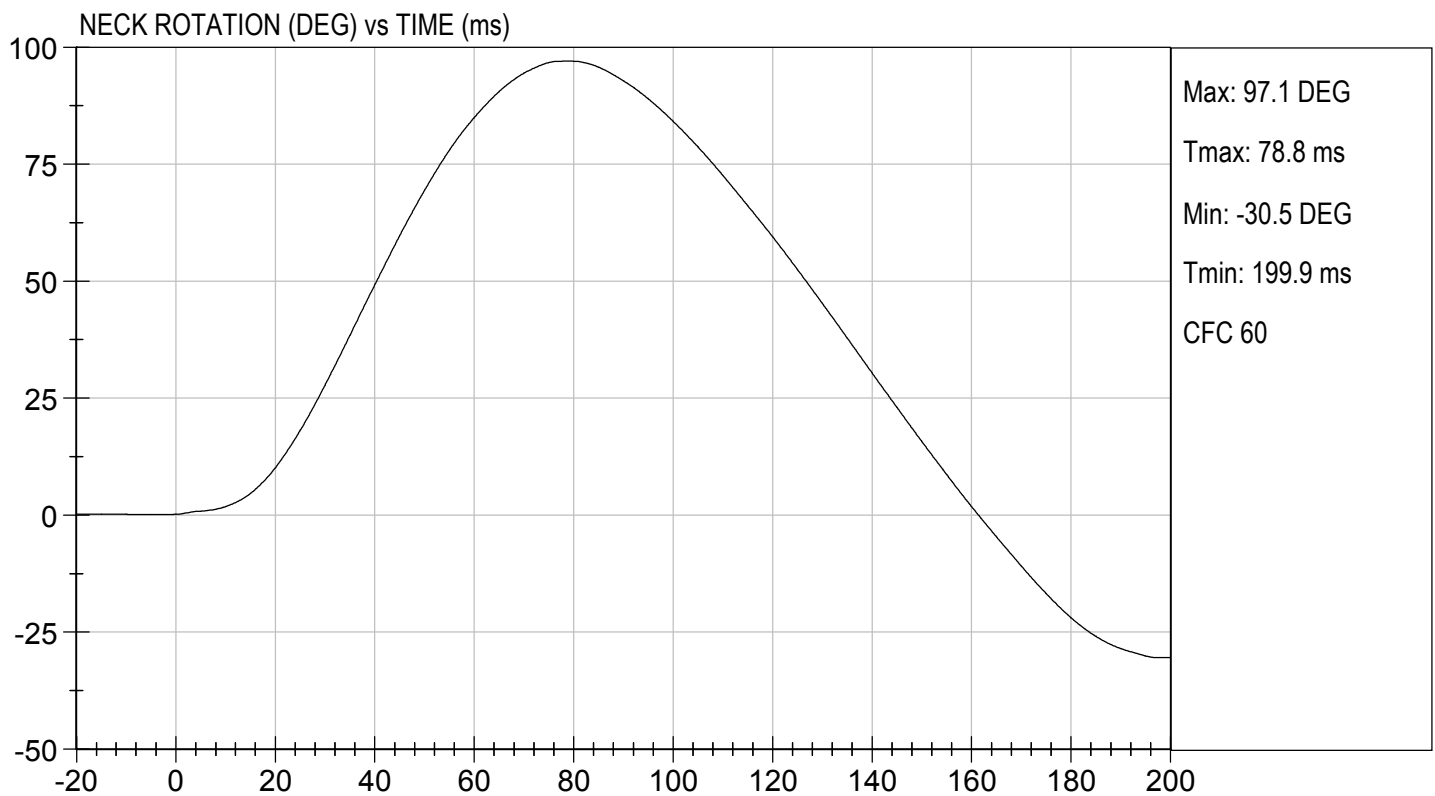
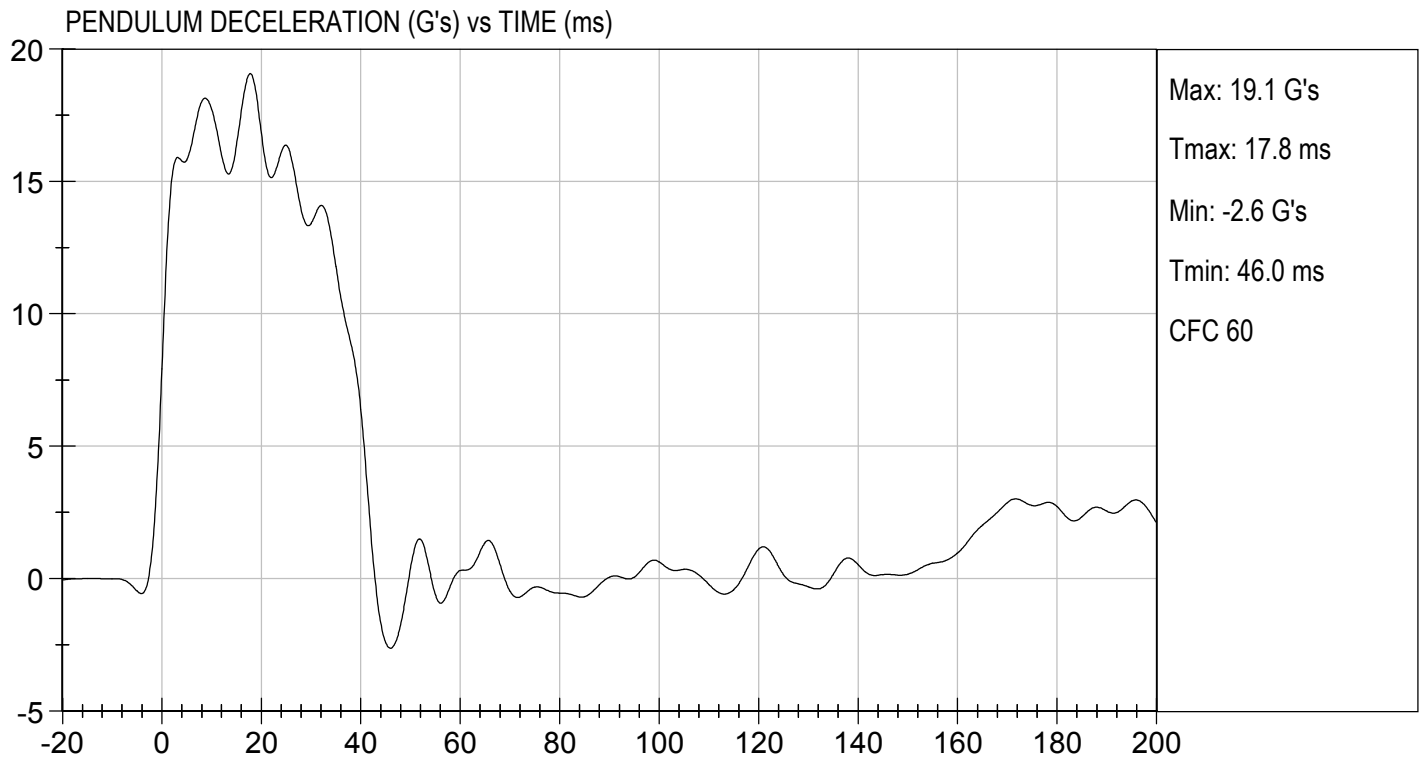
12/13/2019
 Test Date


 Approved By



TEST DESC: NECK EXTENSION
VELOCITY: 20.30 ft/s, 6.19 m/s

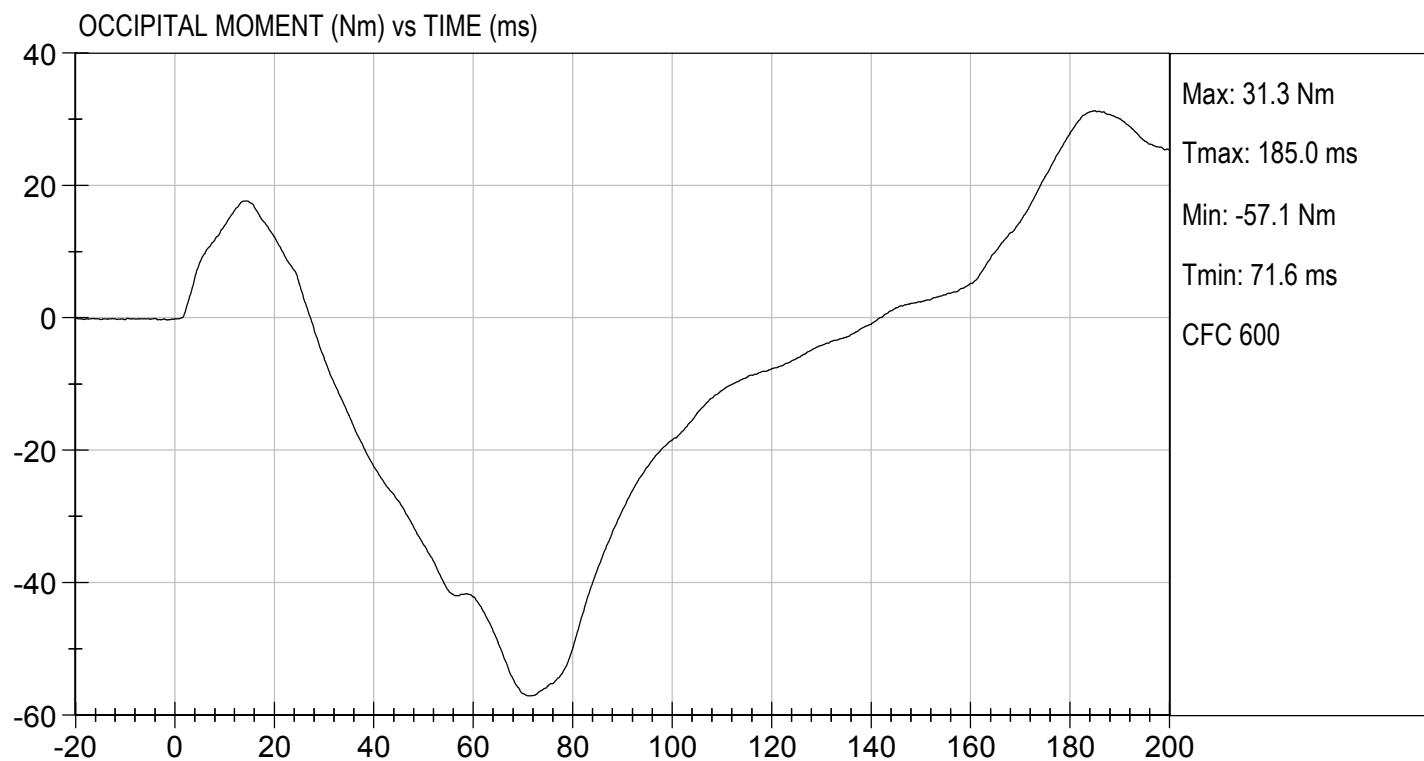
TEST DATE: 12/13/2019
TEST #: D193883





TEST DESC: NECK EXTENSION
VELOCITY: 20.30 ft/s, 6.19 m/s

TEST DATE: 12/13/2019
TEST #: D193883



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE

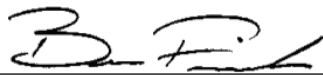
ATD Serial No: 351

Test I.D: D193884

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Probe Velocity	m/s	6.58 to 6.82	6.68	Pass
Peak Probe Force	N	5159 to 5893	5,460	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.84	Pass
Internal Hysteresis	%	69 to 85	72	Pass
			Overall Test Results	Pass


Laboratory Technician

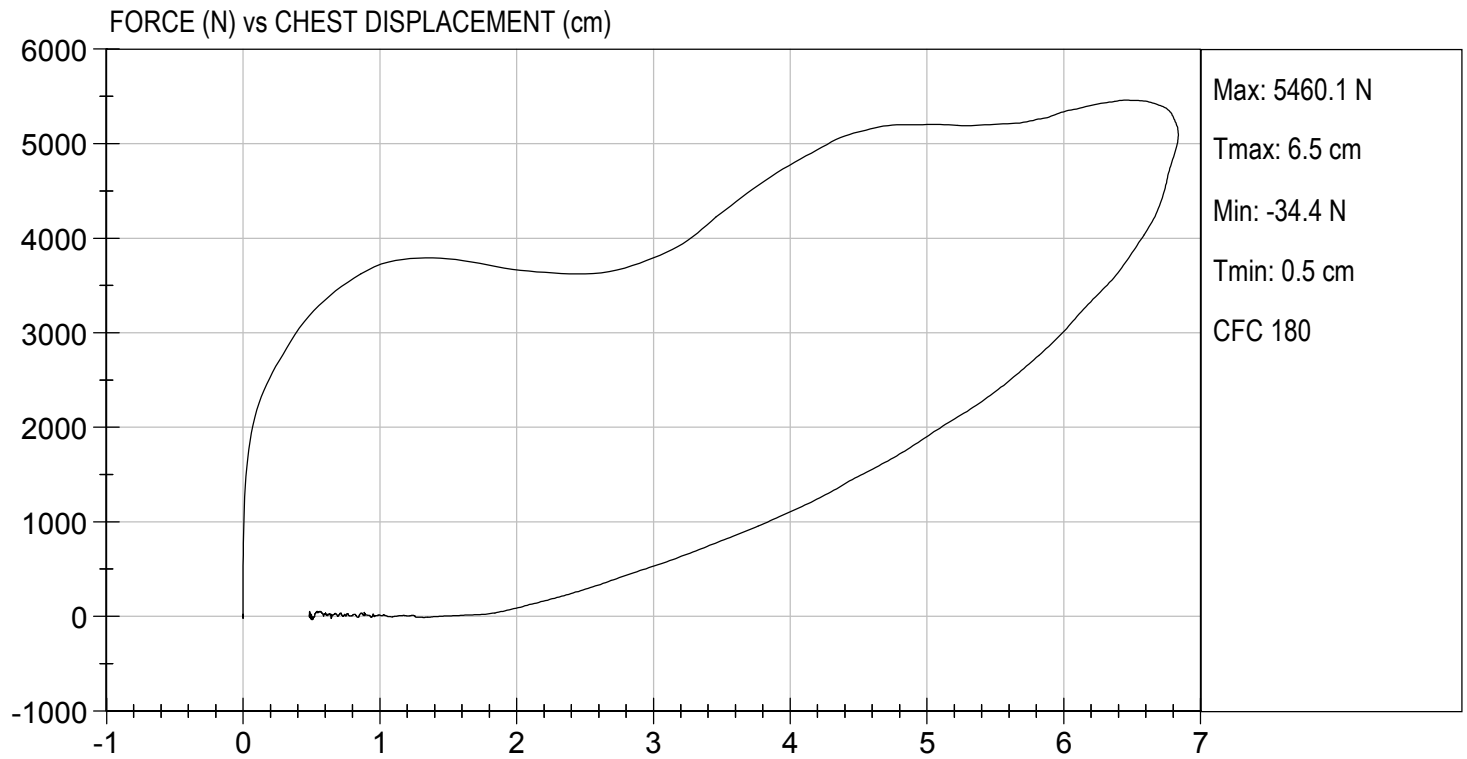
12/12/2019
Test Date


Approved By



TEST DESC: THORAX IMPACT
VELOCITY: 21.93 ft/s, 6.68 m/s

TEST DATE: 12/12/2019
TEST #: D193884

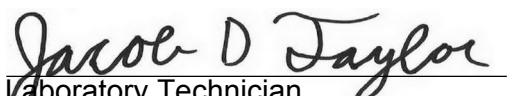


MGA RESEARCH CORPORATION
RIGHT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351

Test I.D: D193885

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	28	Pass
Probe Velocity	m/s	2.07 to 2.13	2.09	Pass
Peak Probe Force	N	4715 to 5782	5,589	Pass
Overall Test Results				Pass


Laboratory Technician

12/13/2019

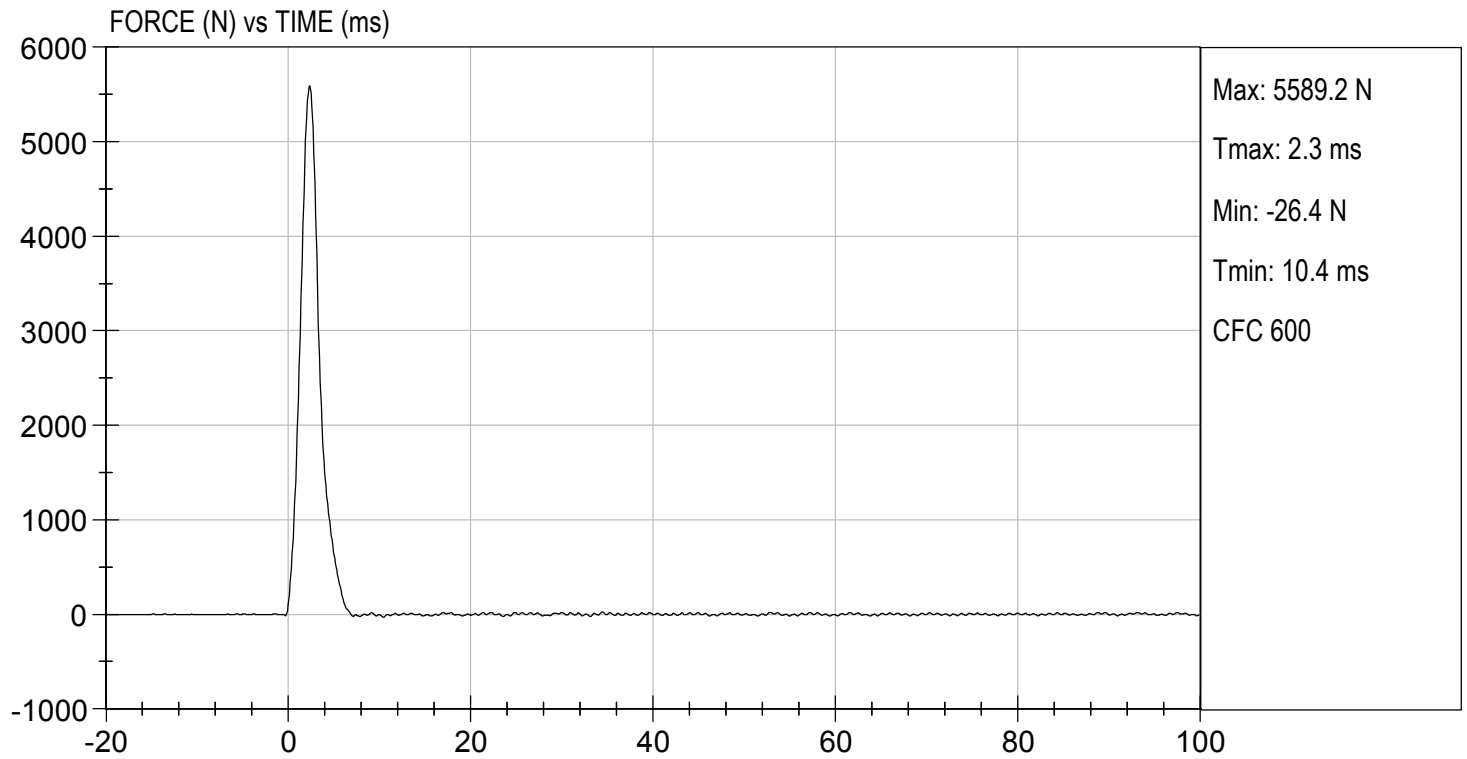
Test Date


Approved By



TEST DESC: RIGHT KNEE
VELOCITY: 6.86 ft/s, 2.09 m/s

TEST DATE: 12/13/2019
TEST #: D193885

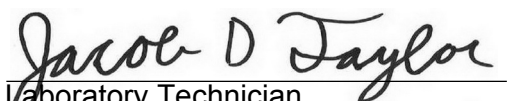


MGA RESEARCH CORPORATION
LEFT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351

Test I.D: D193886

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	28	Pass
Probe Velocity	m/s	2.07 to 2.13	2.11	Pass
Peak Probe Force	N	4715 to 5782	4,916	Pass
Overall Test Results				Pass


Laboratory Technician

12/13/2019

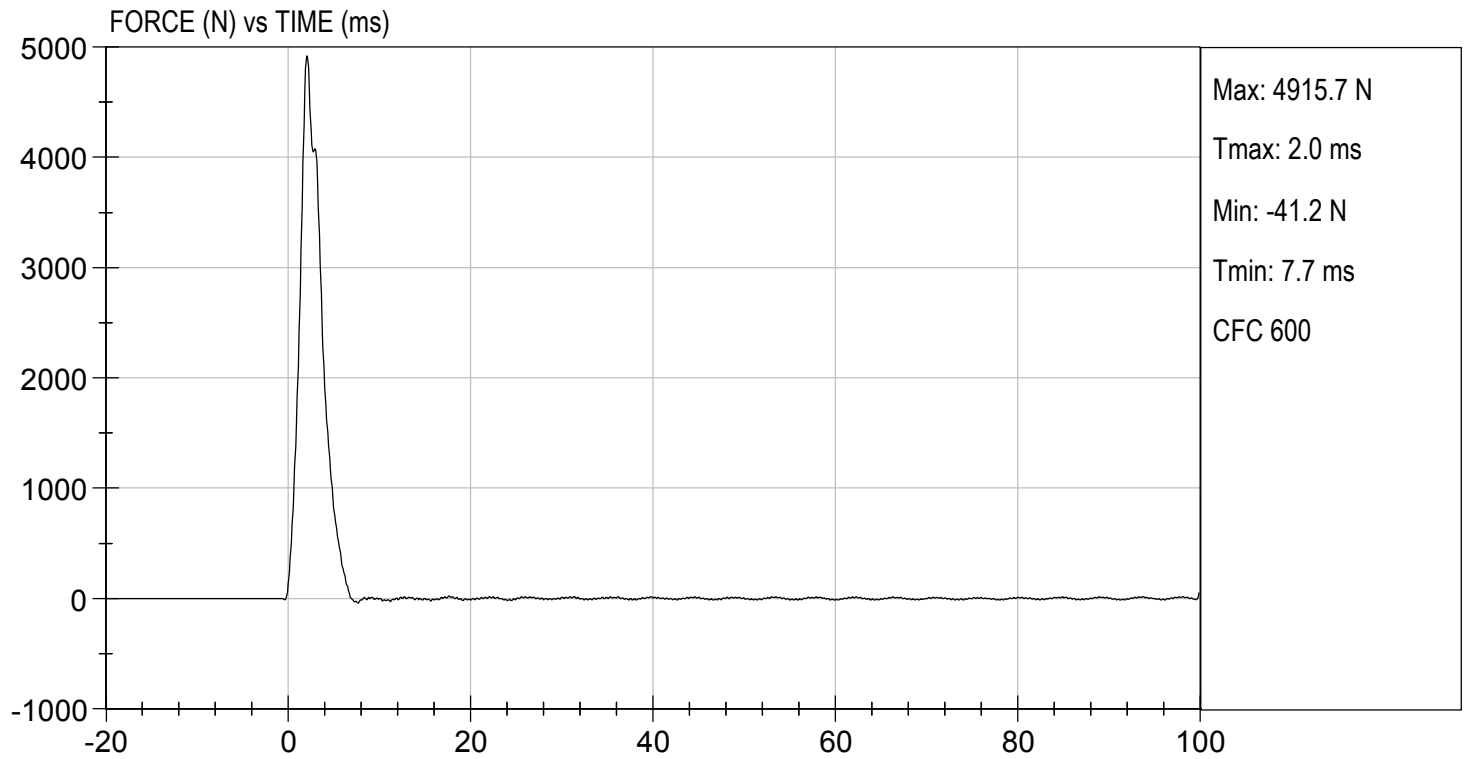
Test Date


Approved By



TEST DESC: LEFT KNEE
VELOCITY: 6.92 ft/s, 2.11 m/s

TEST DATE: 12/13/2019
TEST #: D193886



MGA RESEARCH CORPORATION
HIP-FEMUR FLEXION TEST
HYBRID III 50TH PERCENTILE MALE

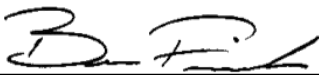
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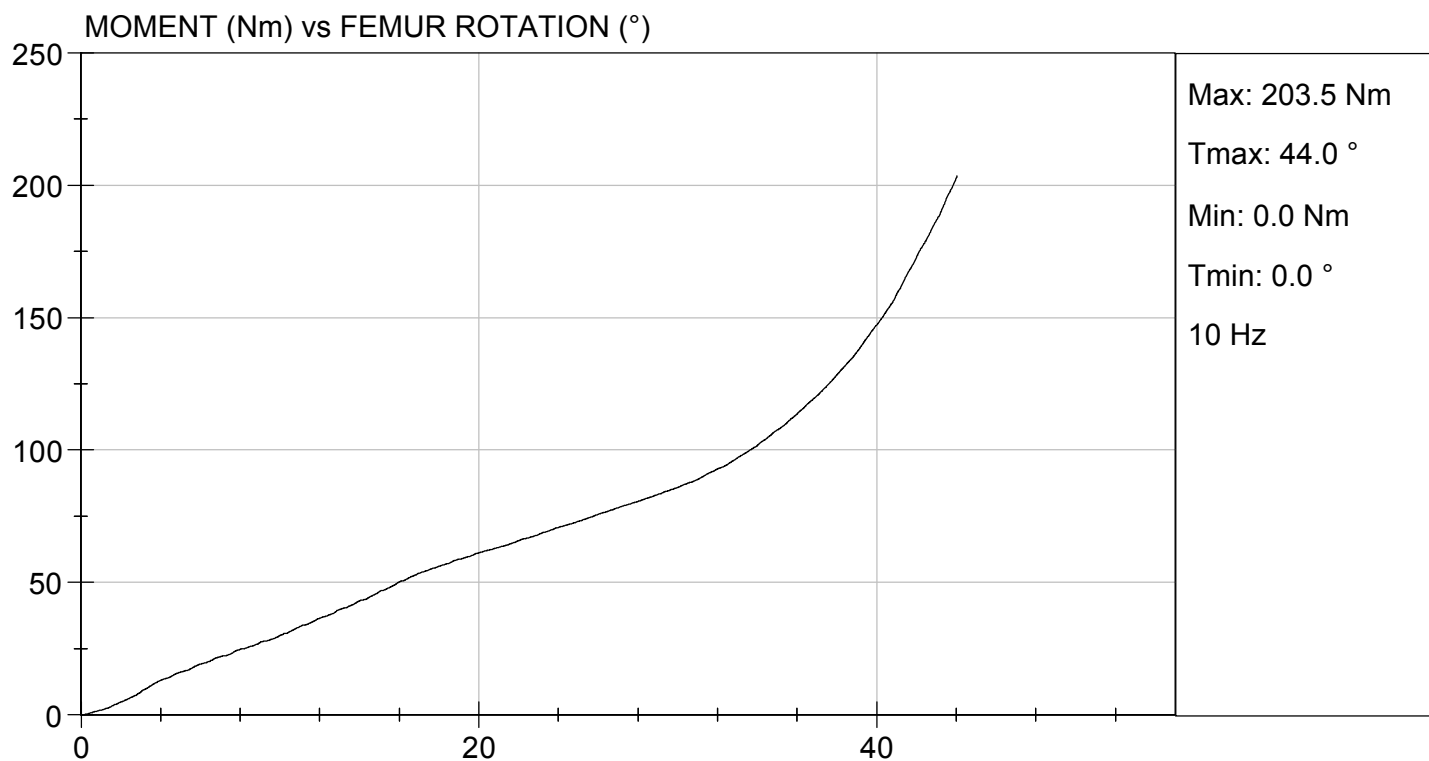
Test I.D: D193880

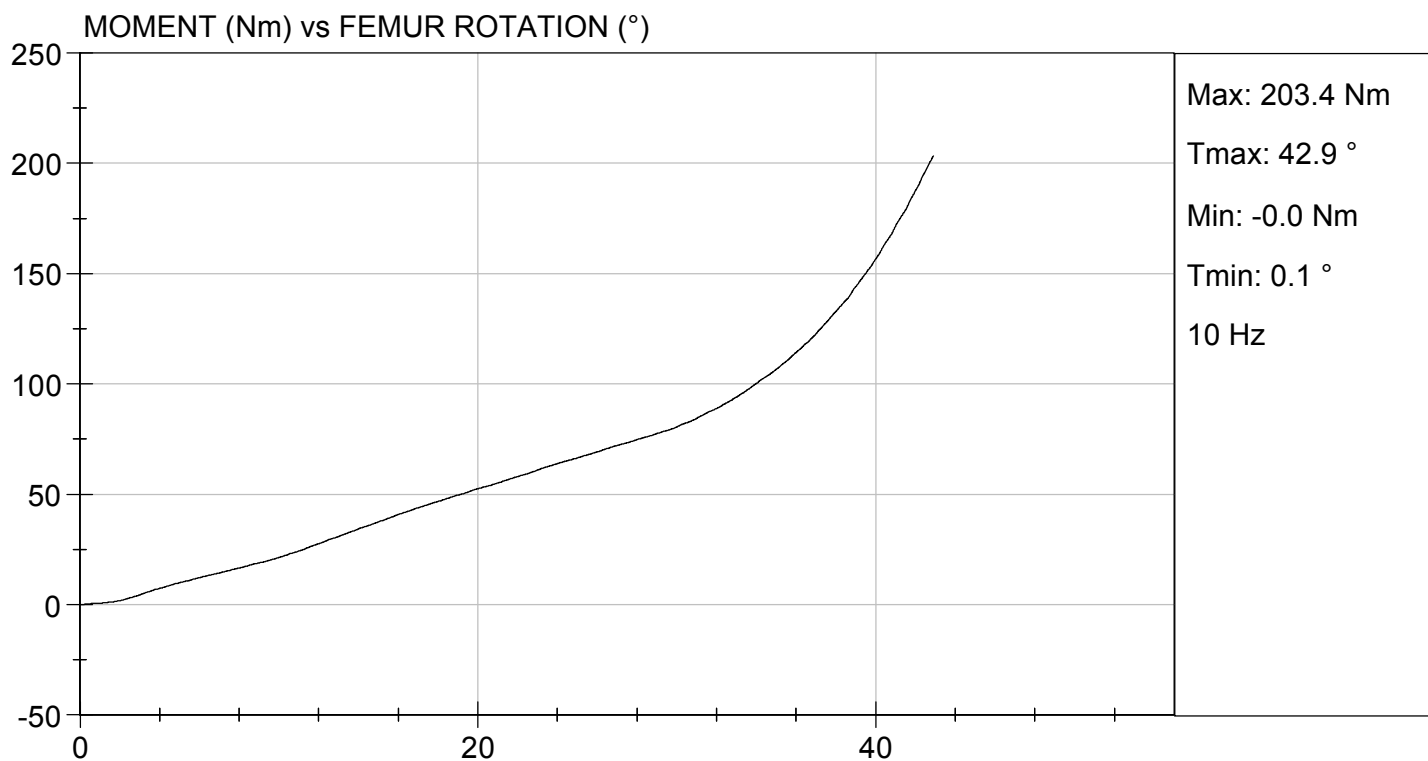
Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	20.8	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	27	27	Pass
Rotation Rate	deg/s	5.0 to 10.0	6.3	6.4	Pass
30 Degrees	Nm	94.9 Nm Max	85.9	80.5	Pass
150 ft-lbf / 203.4 Nm	Deg	40.0 to 50.0 Degree Max Rotation	44.0	42.9	Pass
Overall Test Results					Pass


 Laboratory Technician

12/13/2019
 Test Date


 Approved By





CALIBRATION TEST RESULTS

POST-TEST

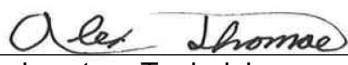
HYBRID III 50TH PERCENTILE MALE - DRIVER ATD

MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 50TH PERCENTILE MALE

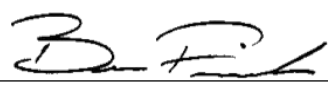
ATD Serial No: 351

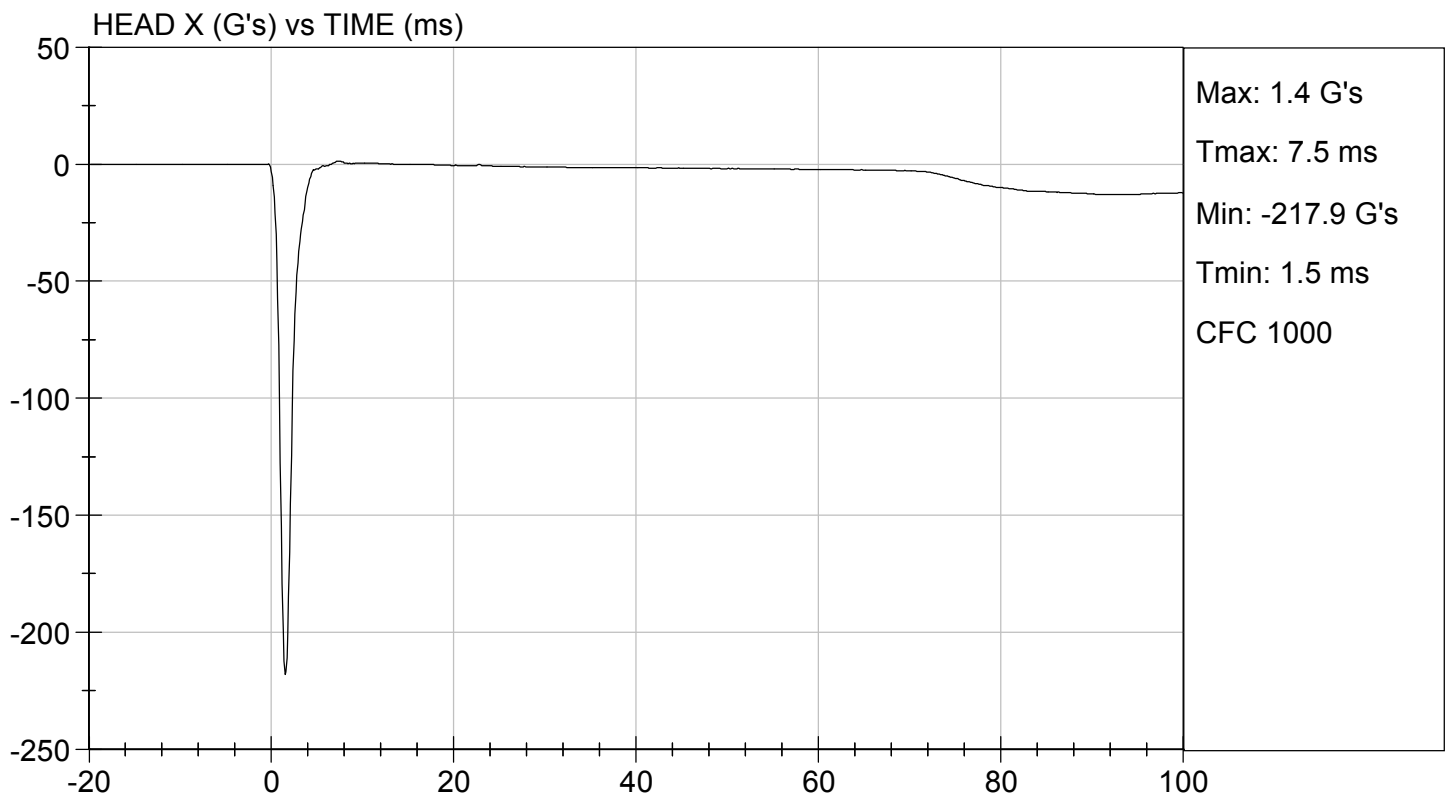
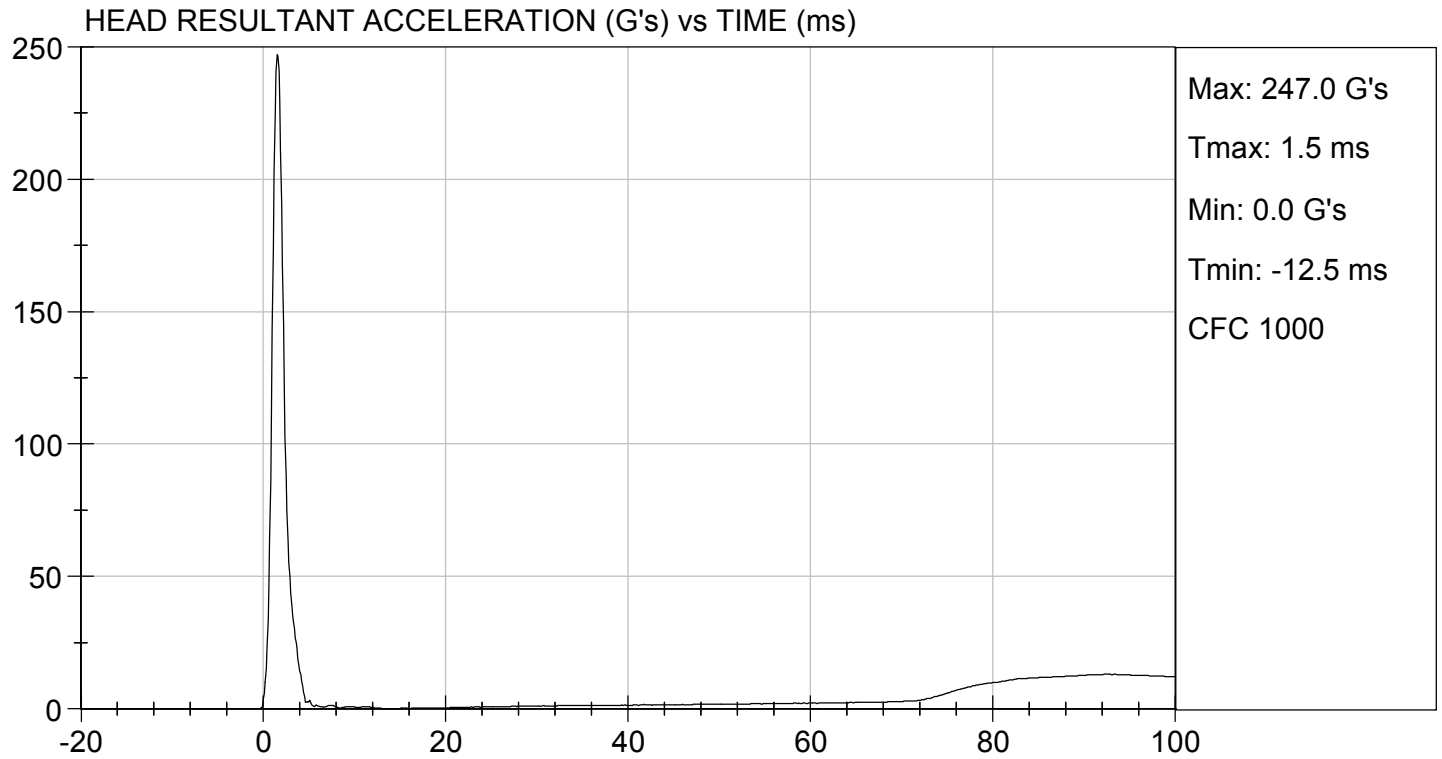
Test ID: D200081

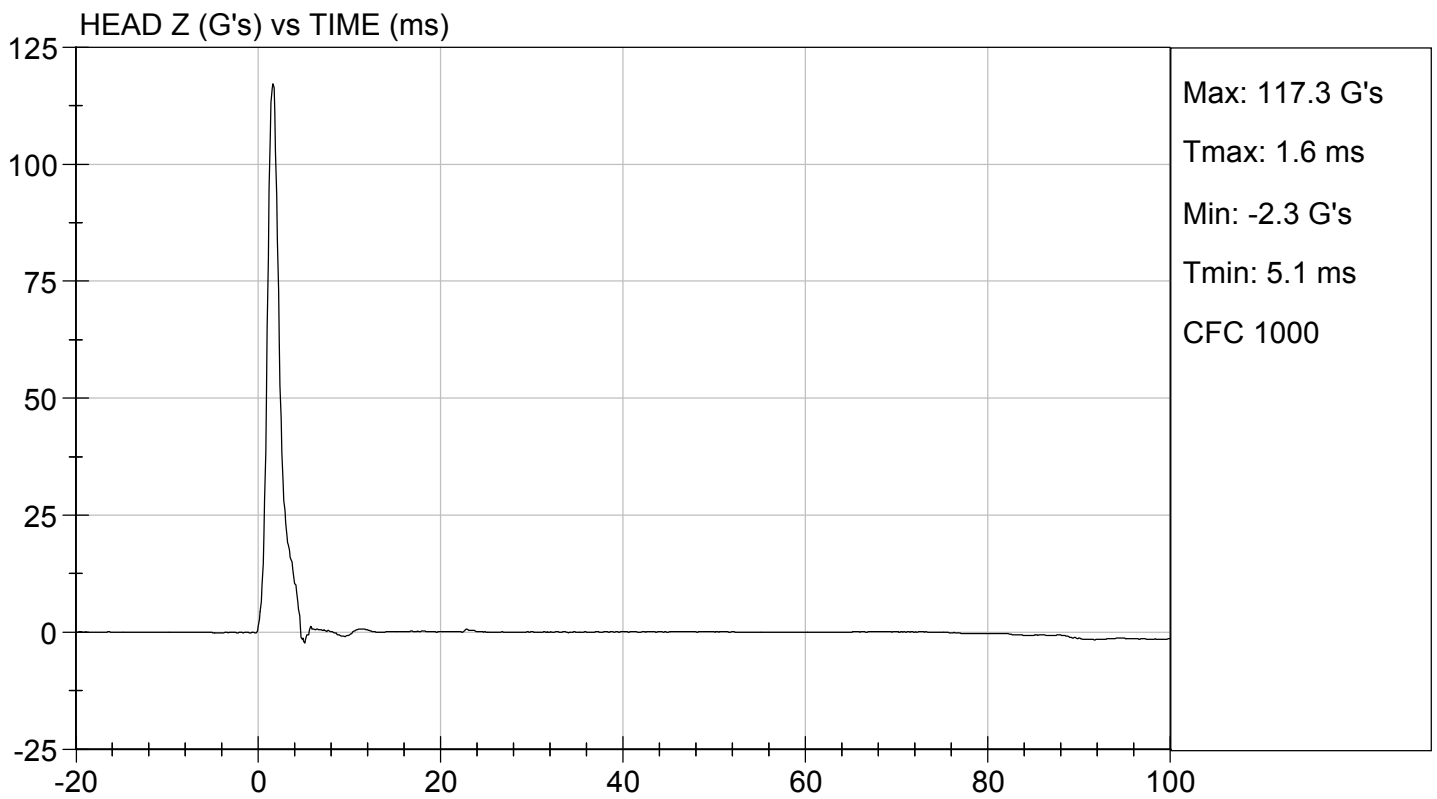
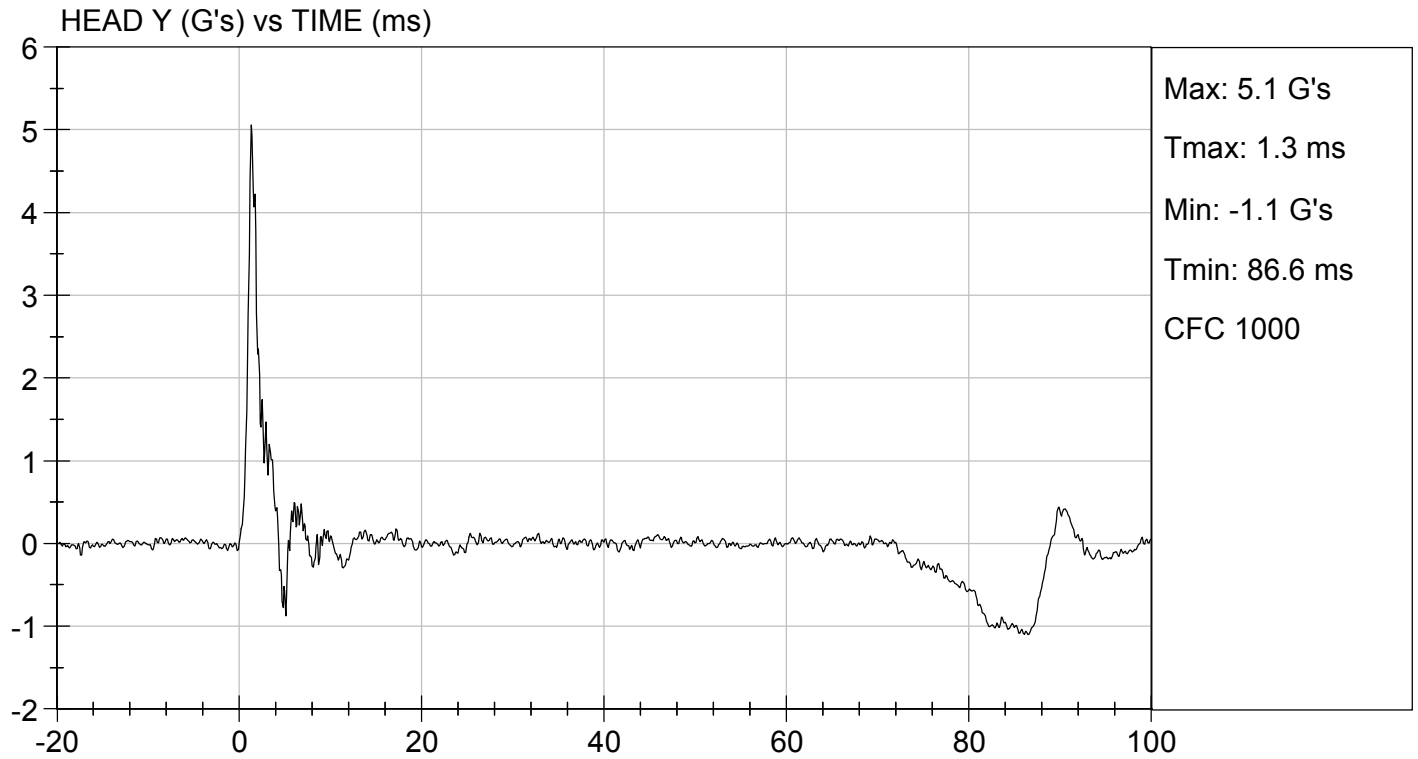
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Peak Resultant Acceleration	G's	225 to 275	247	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	5.1	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

01/07/2020
Test Date


Approved By





MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 50TH PERCENTILE MALE

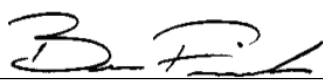
ATD Serial No: 351

Test I.D: D200082

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	20.9	Pass
Laboratory Relative Humidity		%	10 to 70	14	Pass
Pendulum Velocity		m/s	6.89 to 7.13	6.92	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	22.75	Pass
	20 ms	G's	17.60 to 22.60	20.29	Pass
	30 ms	G's	12.50 to 18.50	17.45	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	17.4	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	36.4	Pass
Maximum "D" Plane Rotation	Maximum	Deg	64.0 to 78.0	65.7	Pass
	Time	ms	57.0 to 64.0	61.6	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	121.6	Pass
Moment About Occipital Condyle	Maximum	Nm	88.1 to 108.5	91.3	Pass
	Time	ms	47.0 to 58.0	48.6	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	102.6	Pass
Overall Test Results					Pass


 Laboratory Technician

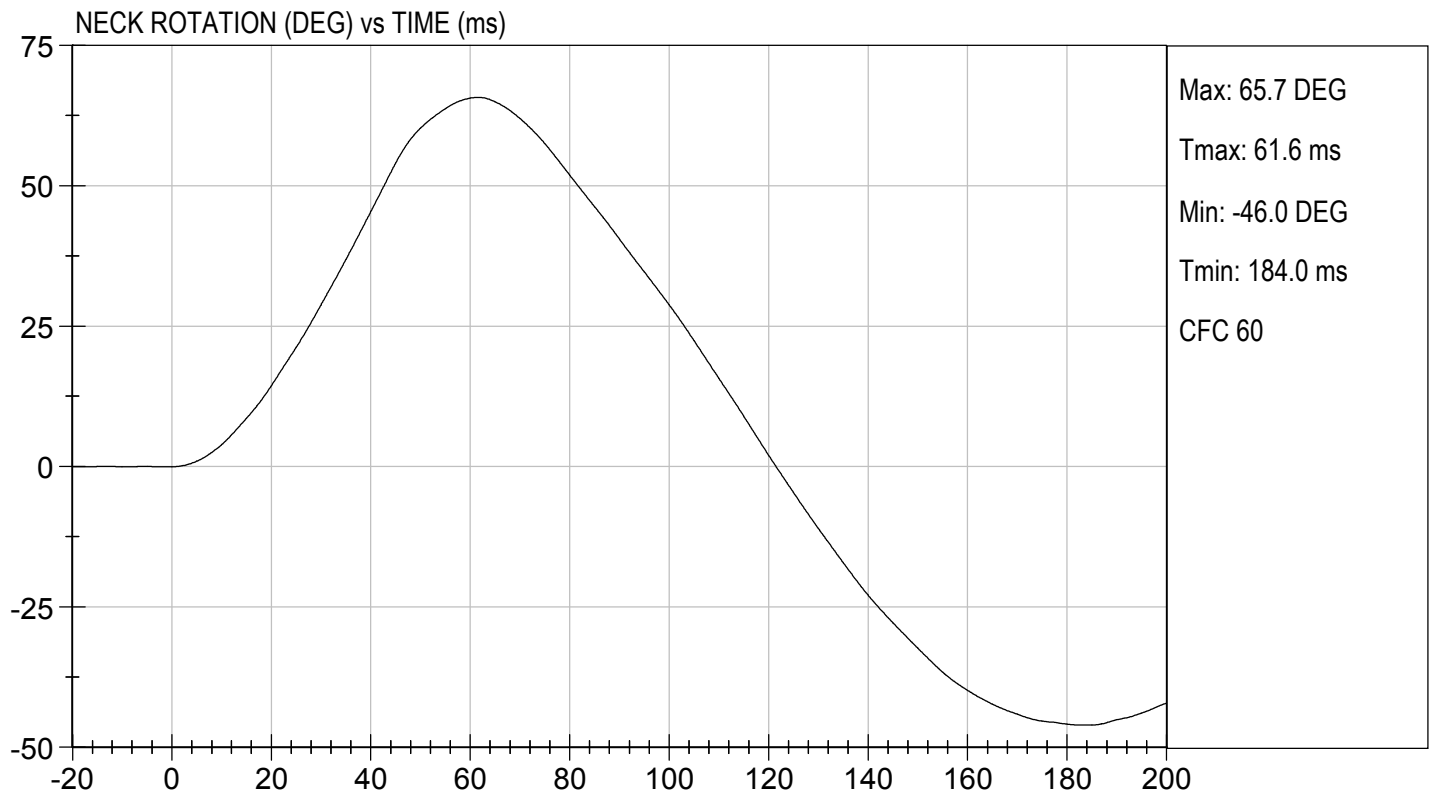
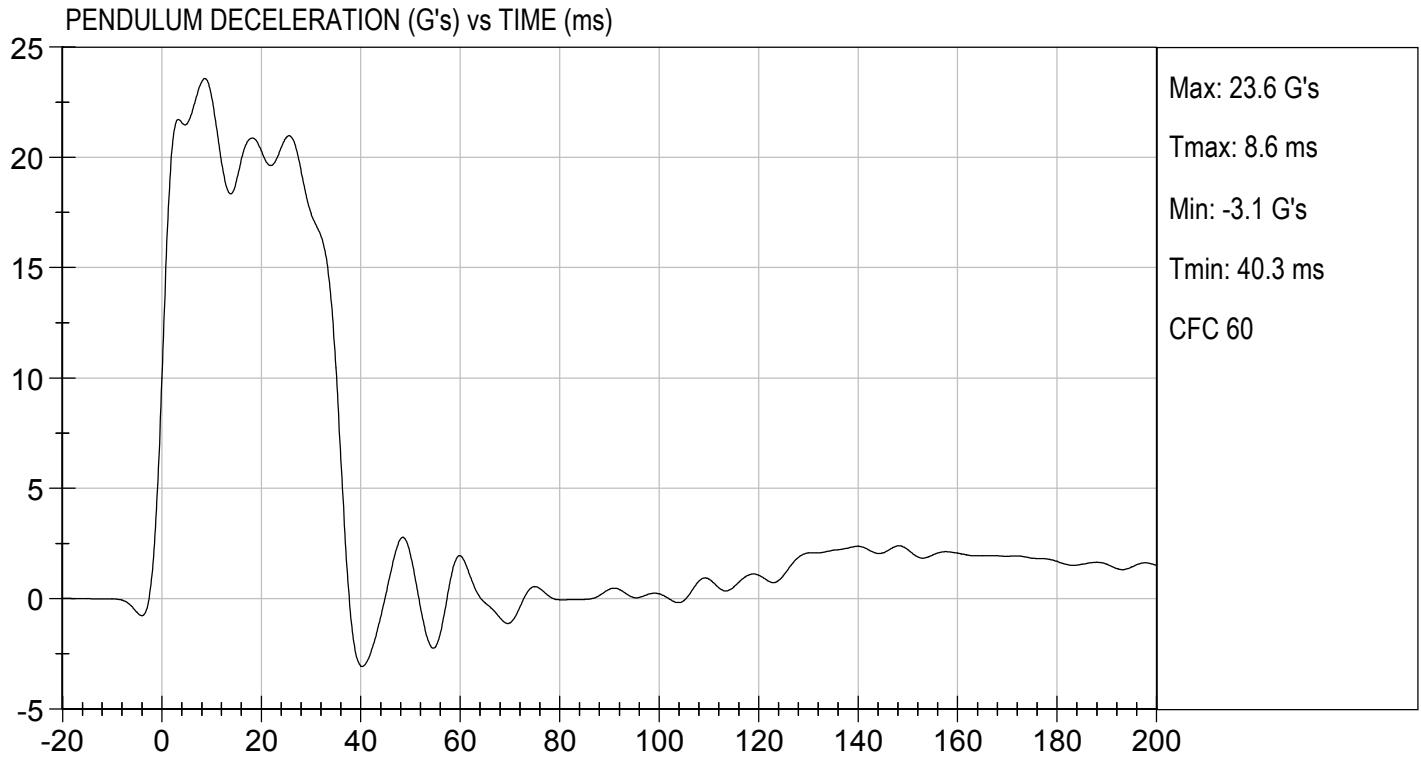
01/08/2020
 Test Date


 Approved By



TEST DESC: NECK FLEXION
VELOCITY: 22.70 ft/s, 6.92 m/s

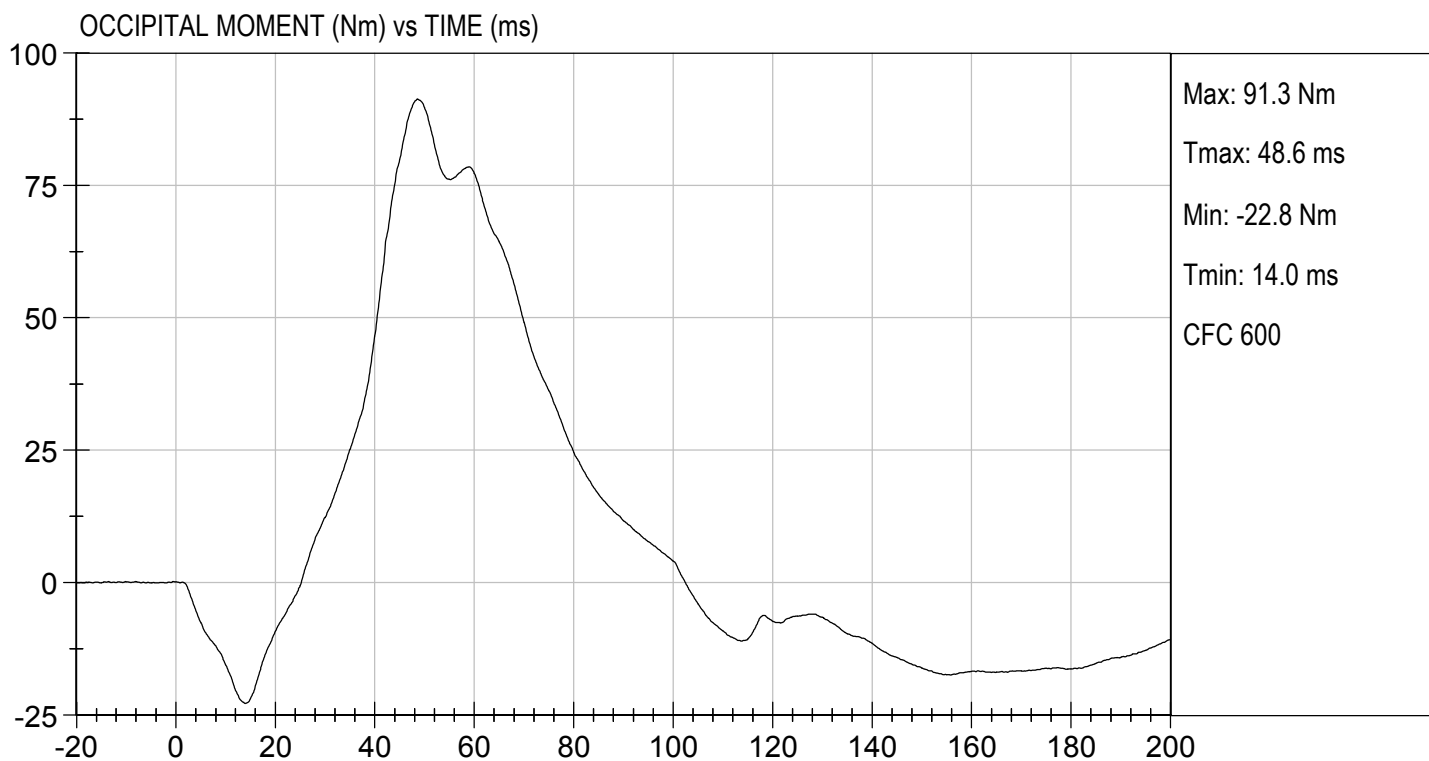
TEST DATE: 01/08/2020
TEST #: D200082





TEST DESC: NECK FLEXION
VELOCITY: 22.70 ft/s, 6.92 m/s

TEST DATE: 01/08/2020
TEST #: D200082



MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 50TH PERCENTILE MALE

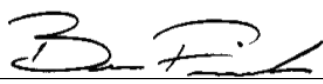
ATD Serial No: 351

Test I.D: D200083

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	20.9	Pass
Laboratory Relative Humidity		%	10 to 70	14	Pass
Pendulum Velocity		m/s	5.95 to 6.19	5.98	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	18.79	Pass
	20 ms	G's	14.00 to 19.00	17.14	Pass
	30 ms	G's	11.00 to 16.00	12.94	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	14.4	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	39.5	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	92.3	Pass
	Time	ms	72.0 to 82.0	76.8	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	162.8	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-63.4	Pass
	Time	ms	65.0 to 79.0	72.3	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	143.4	Pass
Overall Test Results					Pass


 Laboratory Technician

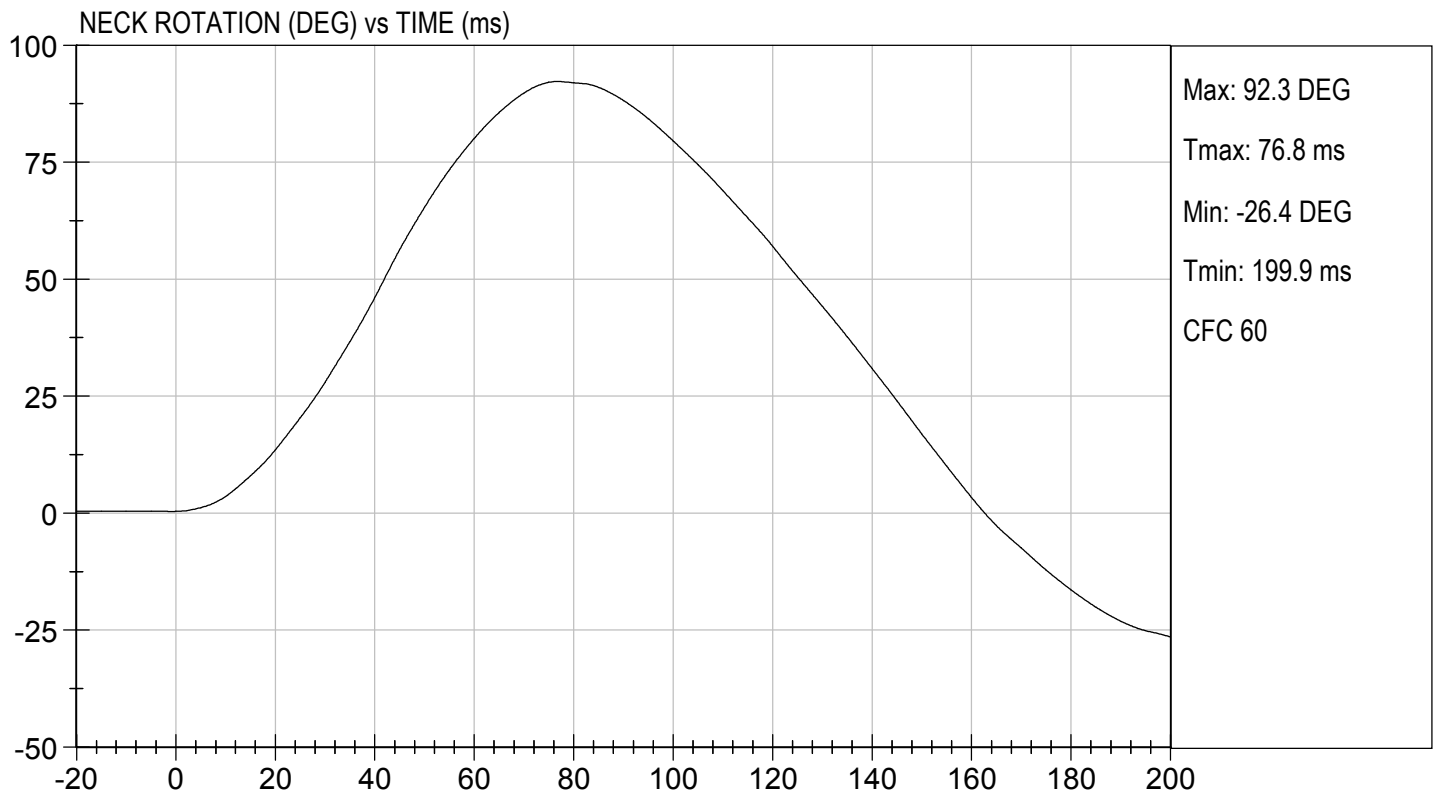
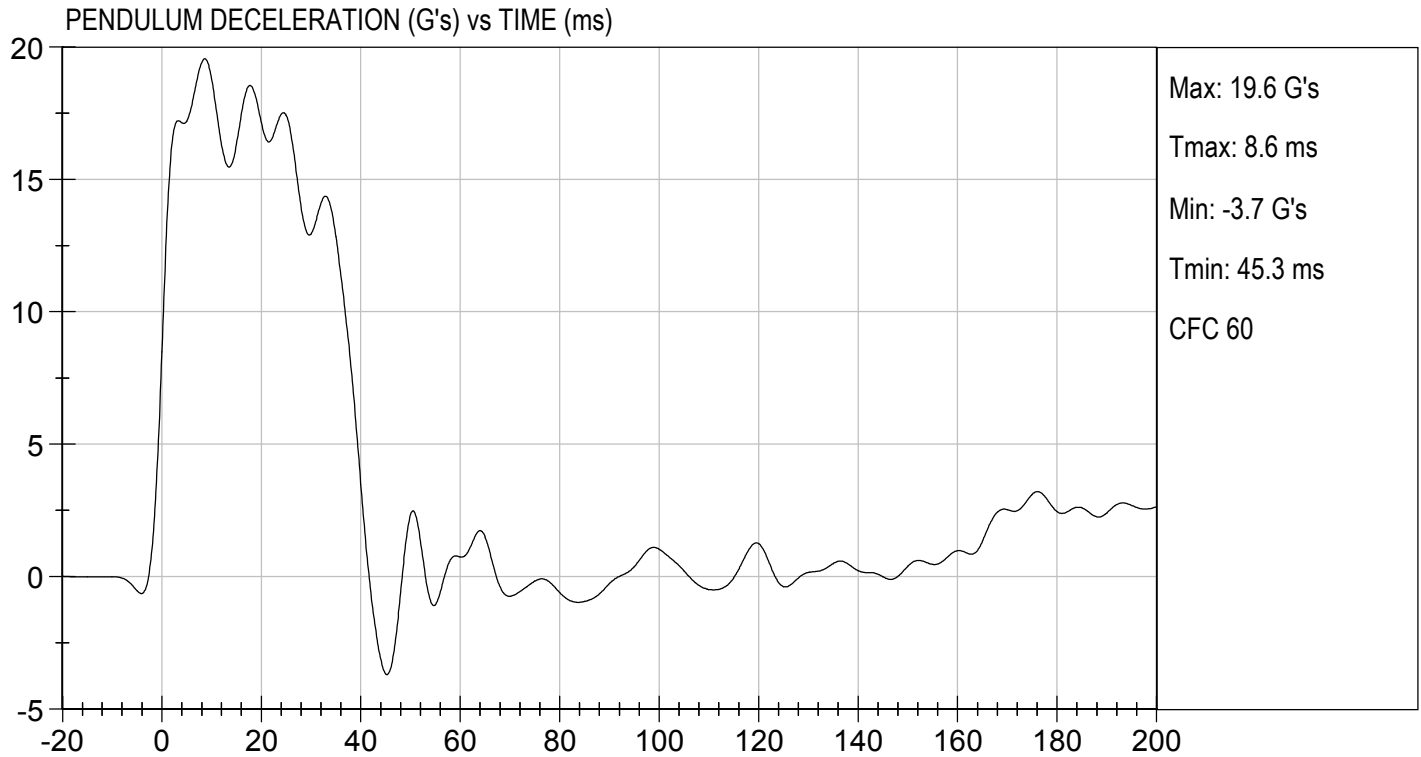
01/08/2020
 Test Date


 Approved By



TEST DESC: NECK EXTENSION
VELOCITY: 19.61 ft/s, 5.98 m/s

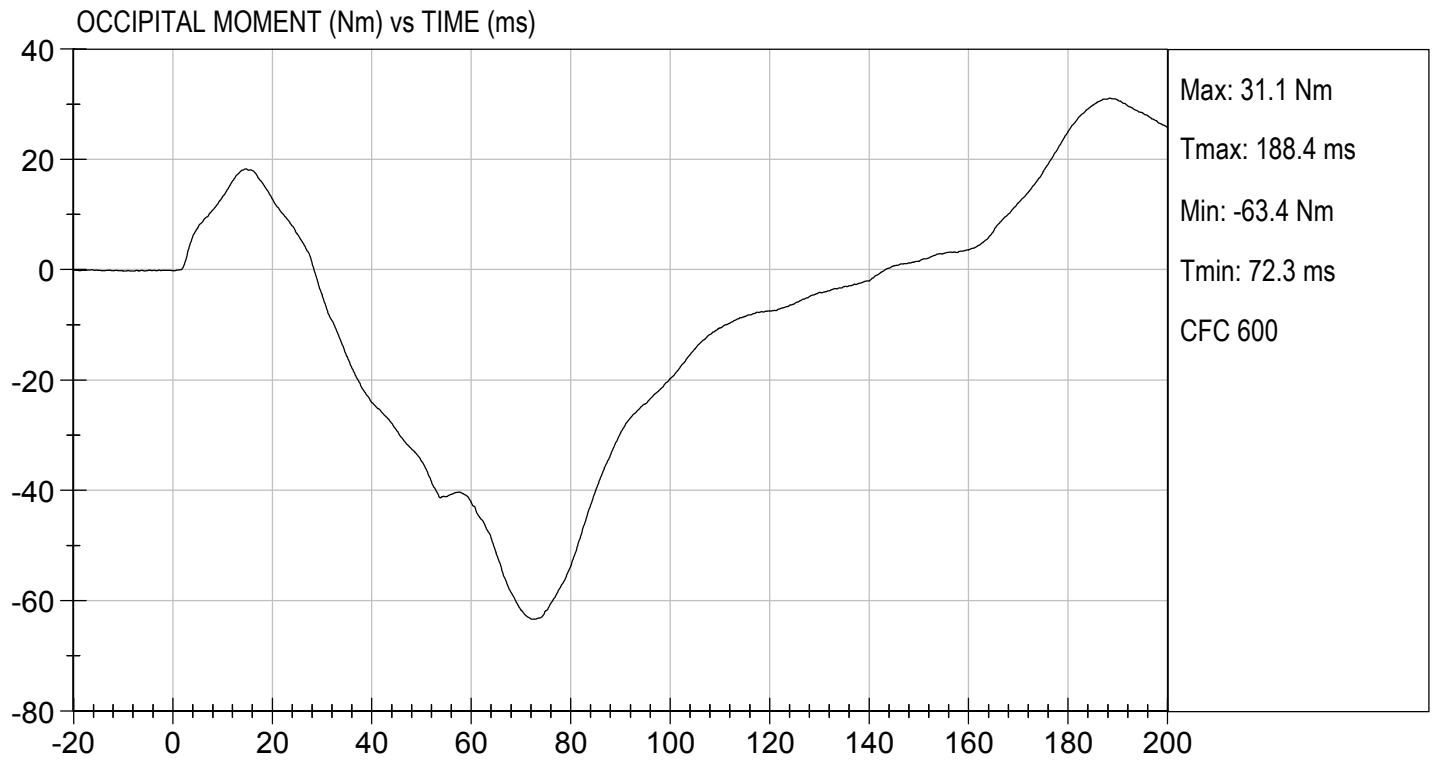
TEST DATE: 01/08/2020
TEST #: D200083





TEST DESC: NECK EXTENSION
VELOCITY: 19.61 ft/s, 5.98 m/s

TEST DATE: 01/08/2020
TEST #: D200083

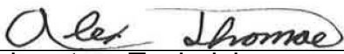


MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE

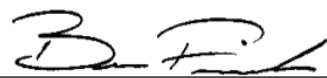
ATD Serial No: 351

Test I.D: D200084

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Probe Velocity	m/s	6.58 to 6.82	6.77	Pass
Peak Probe Force	N	5159 to 5893	5,500	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.85	Pass
Internal Hysteresis	%	69 to 85	72	Pass
			Overall Test Results	Pass


Laboratory Technician

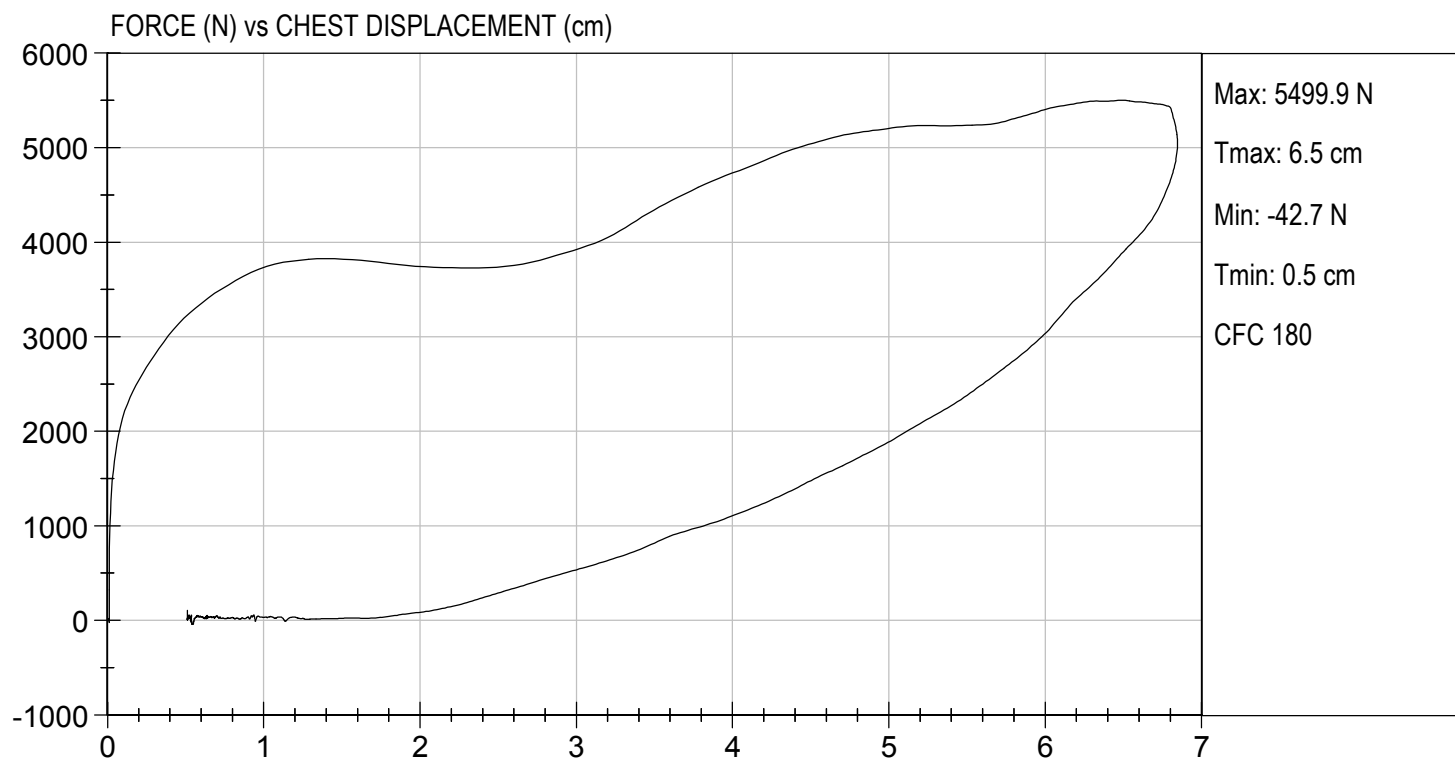
01/07/2020
Test Date


Approved By



TEST DESC: THORAX IMPACT
VELOCITY: 22.22 ft/s, 6.77 m/s

TEST DATE: 01/07/2020
TEST #: D200084



MGA RESEARCH CORPORATION
RIGHT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

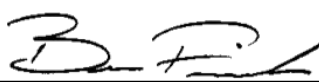
ATD Serial No: 351

Test I.D: D200085

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	15	Pass
Probe Velocity	m/s	2.07 to 2.13	2.09	Pass
Peak Probe Force	N	4715 to 5782	5,008	Pass
Overall Test Results				Pass


Laboratory Technician

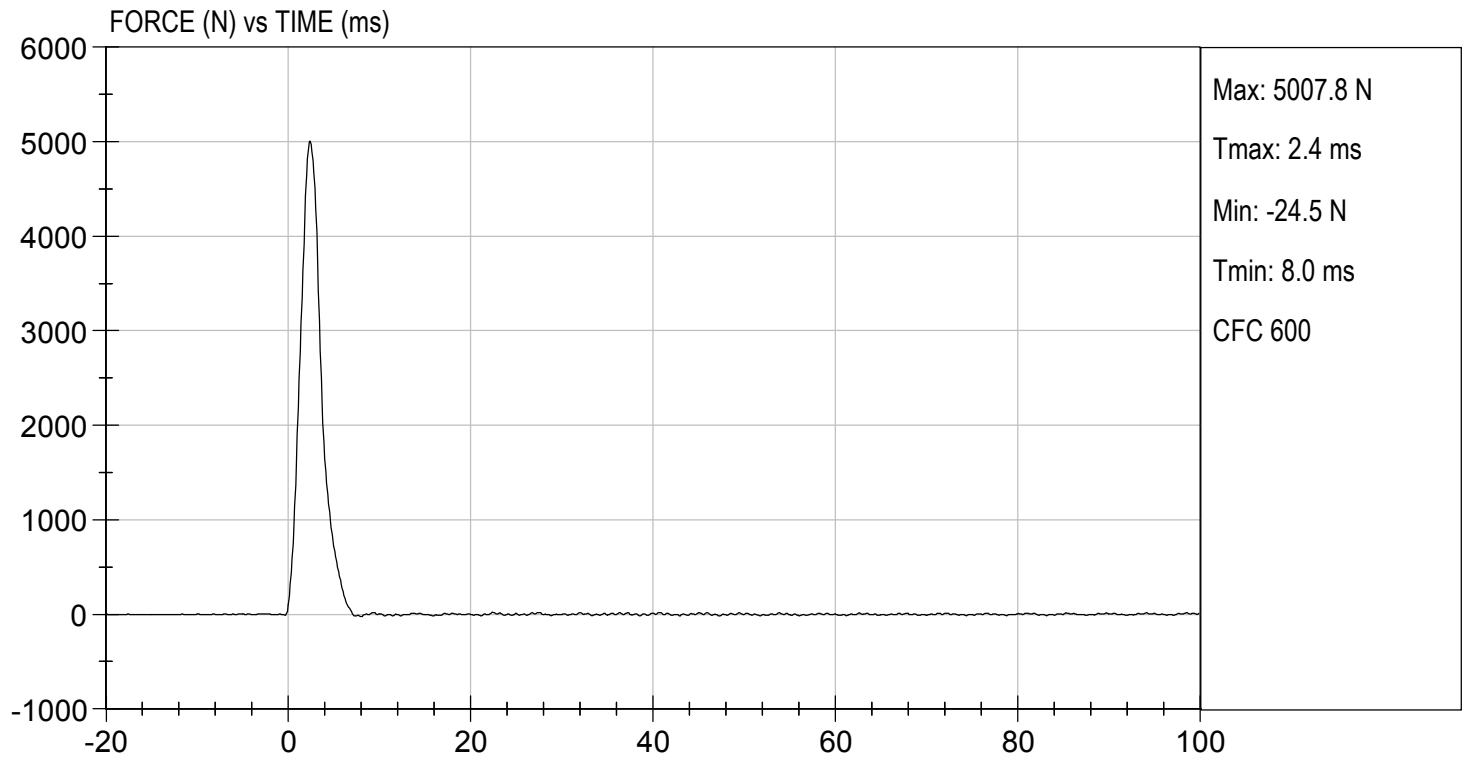
01/08/2020
Test Date


Approved By



TEST DESC: RIGHT KNEE
VELOCITY: 6.86 ft/s, 2.09 m/s

TEST DATE: 01/08/2020
TEST #: D200085



MGA RESEARCH CORPORATION
LEFT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

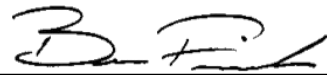
ATD Serial No: 351

Test I.D: D200086

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	15	Pass
Probe Velocity	m/s	2.07 to 2.13	2.08	Pass
Peak Probe Force	N	4715 to 5782	5,441	Pass
Overall Test Results				Pass


Laboratory Technician

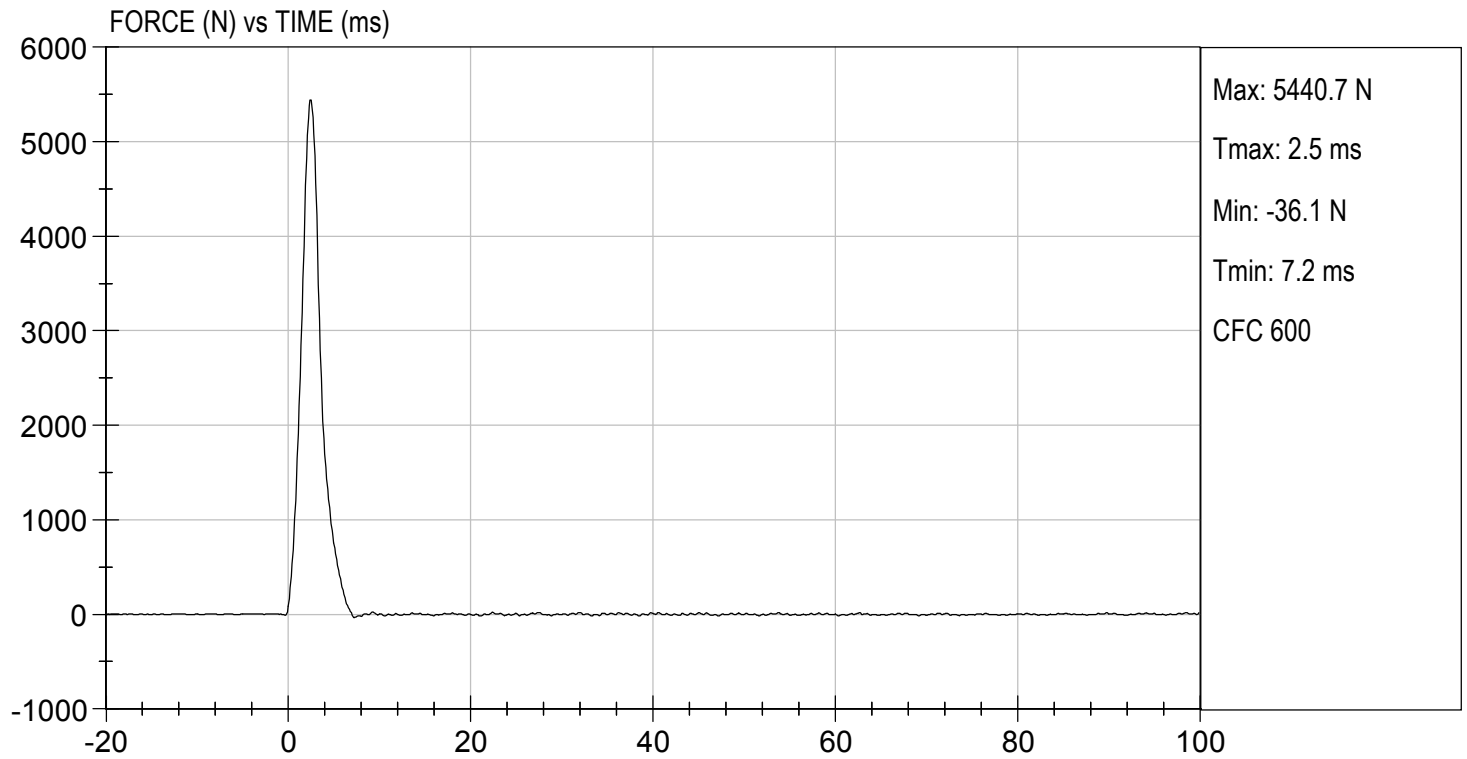
01/08/2020
Test Date


Approved By



TEST DESC: LEFT KNEE
VELOCITY: 6.83 ft/s, 2.08 m/s

TEST DATE: 01/08/2020
TEST #: D200086

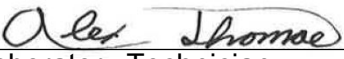


MGA RESEARCH CORPORATION
HIP-FEMUR FLEXION TEST
HYBRID III 50TH PERCENTILE MALE

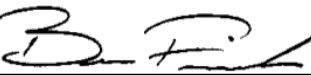
ATD Serial No: 351

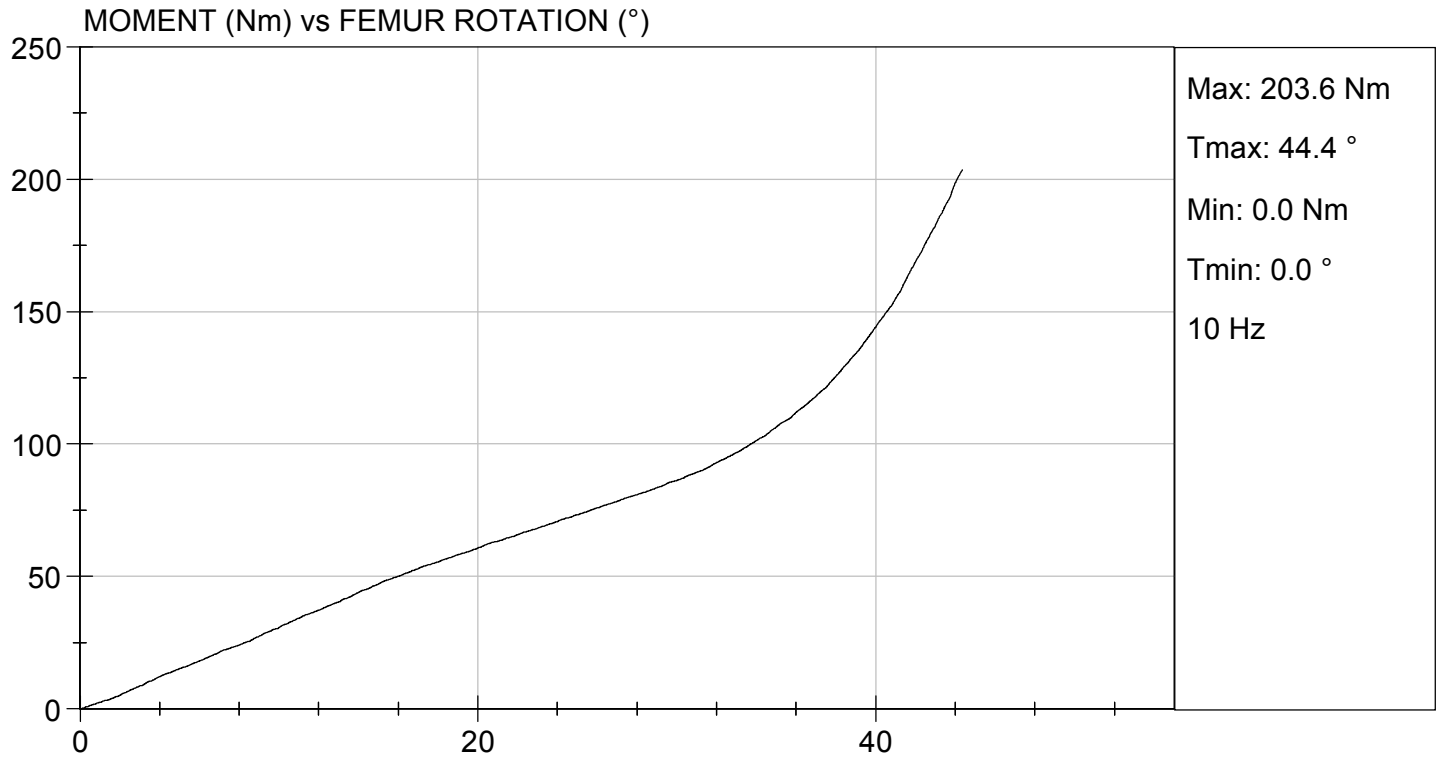
Test I.D: D200080

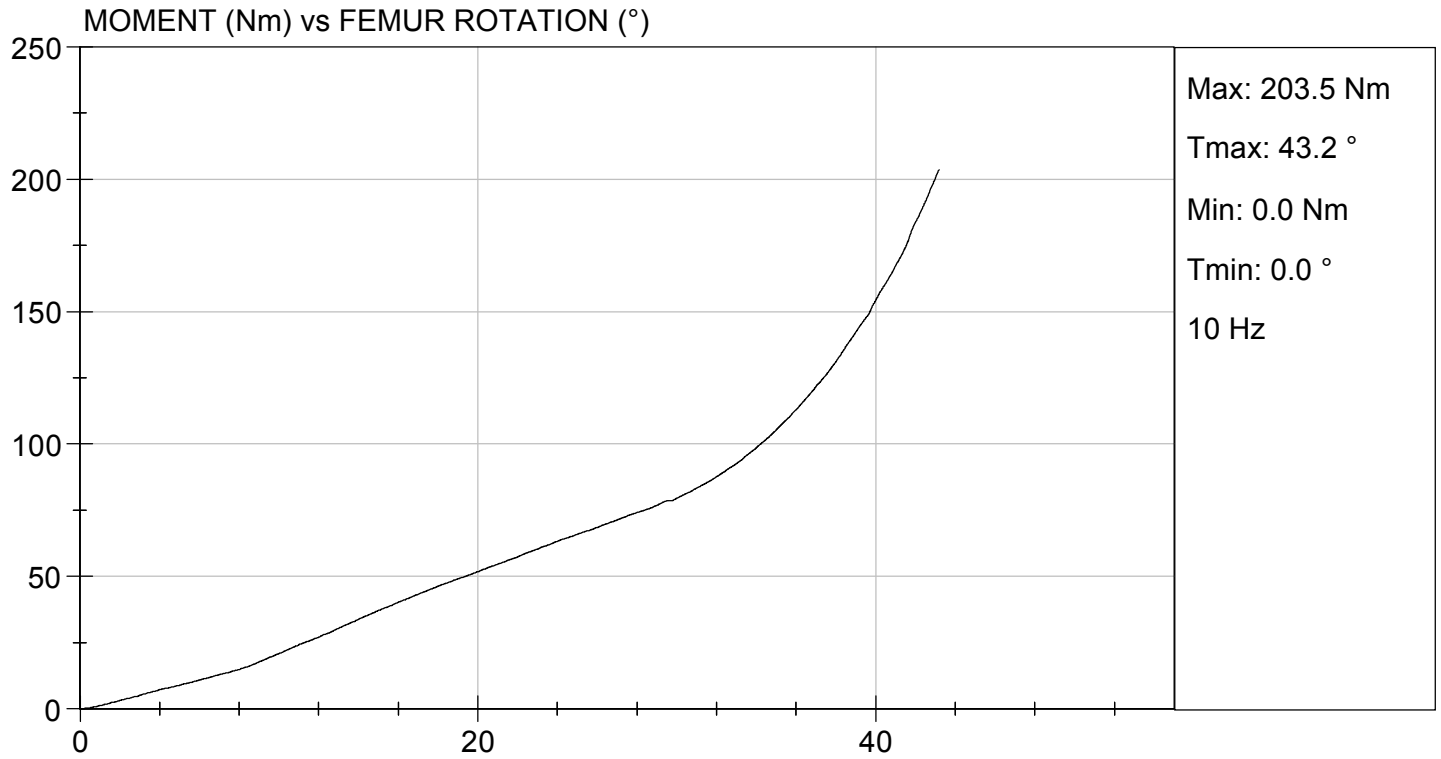
Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.8	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	27	27	Pass
Rotation Rate	deg/s	5.0 to 10.0	6.3	6.4	Pass
30 Degrees	Nm	94.9 Nm Max	86.3	79.6	Pass
150 ft-lbf / 203.4 Nm	Deg	40.0 to 50.0 Degree Max Rotation	44.4	43.2	Pass
Overall Test Results					Pass


 Laboratory Technician

01/08/2020
 Test Date


 Approved By





CALIBRATION TEST RESULTS

PRE-TEST

HYBRID III 5TH PERCENTILE FEMALE - PASSENGER ATD

Hybrid III, 5th External Measurements
SN: DH1659

HYBRID III, PART 572, SUBPART O EXTERNAL DIMENSIONS				
DIMENSION	DESCRIPTION	DETAILS	ASSEMBLY DIMENSION (mm)	ACTUAL MEASUREMENT
A	TOTAL SITTING HEIGHT	Seat surface to highest point on top of the head.	774.7-800.1	778
B	SHOULDER PIVOT HEIGHT	Centerline of shoulder pivot bolt to the seat surface.	431.8-457.2	440
C	H-POINT HEIGHT	Reference	81.3-86.3	85
D	H-POINT LOCATION FROM BACKLINE	Reference	144.8-149.8	147
E	SHOULDER PIVOT FROM BACKLINE	Center of the shoulder clevis to the rear vertical surface of the fixture.	68.6-83.8	82
F	THIGH CLEARANCE	Measured at the highest point on the upper femur segment.	119.4-134.6	130
G	BACK OF ELBOW TO WRIST PIVOT	back of the elbow flesh to the wrist pivot in line with the elbow and wrist pivots	243.9-259.1	251
H	HEAD BACK TO BACKLINE	Back of Skull cap skin to seat rear vertical surface (Reference)	43.2-48.2	45
I	SHOULDER TO- ELBOW LENGTH	Measure from the highest point on top of the shoulder clevis to the lowest part of the flesh on the elbow in line with the elbow pivot bolt.	276.8-297.2	285
J	ELBOW REST HEIGHT	Measure from the flesh below the elbow pivot bolt to the seat surface.	182.8-203.2	189
K	BUTTOCK TO KNEE LENGTH	The forward most part of the knee flesh to the rear vertical surface of the fixture.	520.7-546.1	543
L	POPLITEAL HEIGHT	Seat surface to the plane of the horizontal plane of the bottom of the feet.	355.6-376	357
M	KNEE PIVOT HEIGHT	Centerline of knee pivot bolt to the horizontal plane of the bottom of the feet.	393.7-419.1	398

N	BUTTOCK POPLITEAL LENGTH	The rearmost surface of the lower leg to the same point on the rear surface of the buttocks used for dim. "K".	414-439.4	435
HYBRID III, SUBPART O EXTERNAL DIMENSIONS, continued				
DIMENSION	DESCRIPTION	DETAILS	ASSEMBLY DIMENSION (mm)	ACTUAL MEASUREMENT
O	CHEST DEPTH WITHOUT JACKET	Measured 304.8 ± 5.1 mm above seat surface	175.3-190.5	182
P	FOOT LENGTH	Tip of toe to rear of heal	218.5-233.7	221
Q	STANDING HEIGHT	(THEORETICAL)	1501.1	N/A
R	BUTTOCK TO KNEE PIVOT LENGTH	The rear surface of the buttocks to the knee pivot bolt	457.2-482.6	469
S	HEAD BREADTH	The widest part of the head	137.1-147.3	141
T	HEAD DEPTH	Back of the head to the forehead	177.8-188	182
U	HIP BREADTH	The widest part of the hip	299.7-314.9	306
V	SHOULDER BREADTH	Outside edges of right and left shoulder clevises	350.5-365.7	357
W	FOOT BREADTH	The widest part of the foot	78.8-94	83
X	HEAD CIRCUMFERENCE	Measured at the point as in dim. "T"	528.3-548.7	542
Y	CHEST CIRCUMFERENCE (WITH CHEST JACKET)	Measured 345.4 ± 12.7 mm above seat surface	850.9-881.3	865
Z	WAIST CIRCUMFERENCE	Measured 165.1 ± 5.1 mm above seat surface	759.5-789.9	785
AA	REFERENCE LOCATION FOR MEASUREMENT OF CHEST CIRCUMFERENCE	Reference	332.7-358.1	345
BB	REFERENCE LOCATION FOR MEASUREMENT OF WAIST CIRCUMFERENCE	Reference	160.1-170.2	165

MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: DH1659

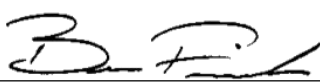
Test ID: D193821

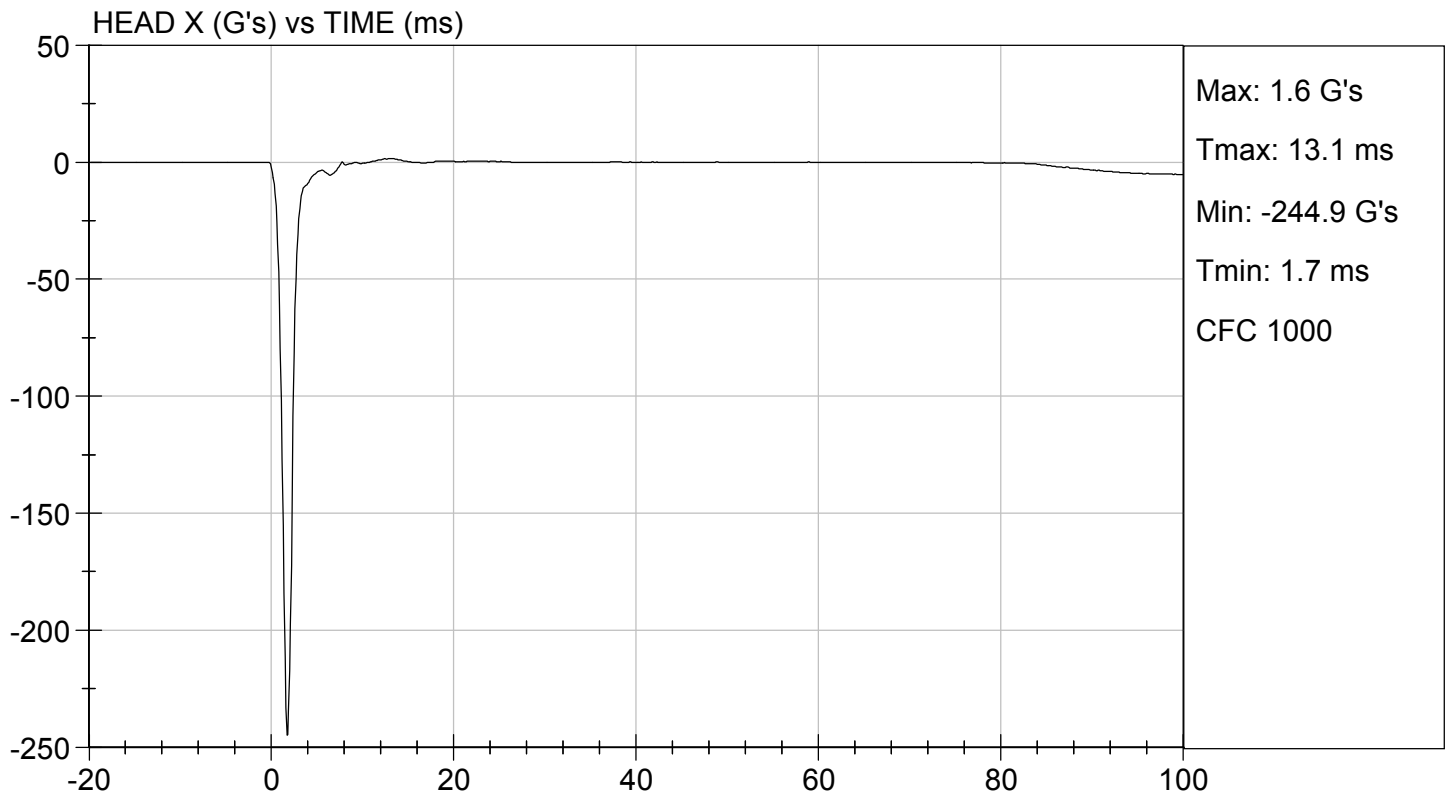
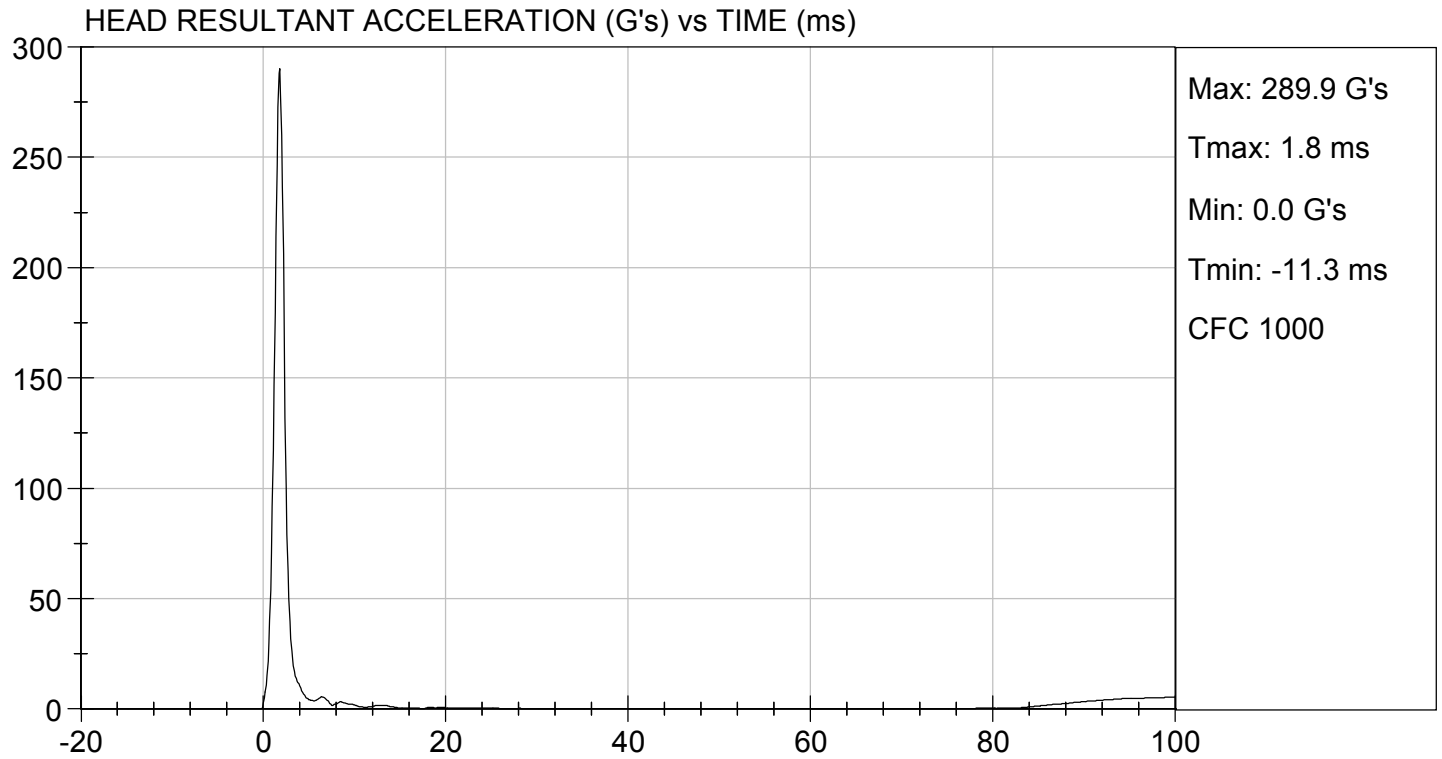
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21	Pass
Laboratory Relative Humidity	%	10 to 70	29	Pass
Peak Resultant Acceleration	G's	250 to 300	290	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	3.3	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
			Overall Test Results	Pass

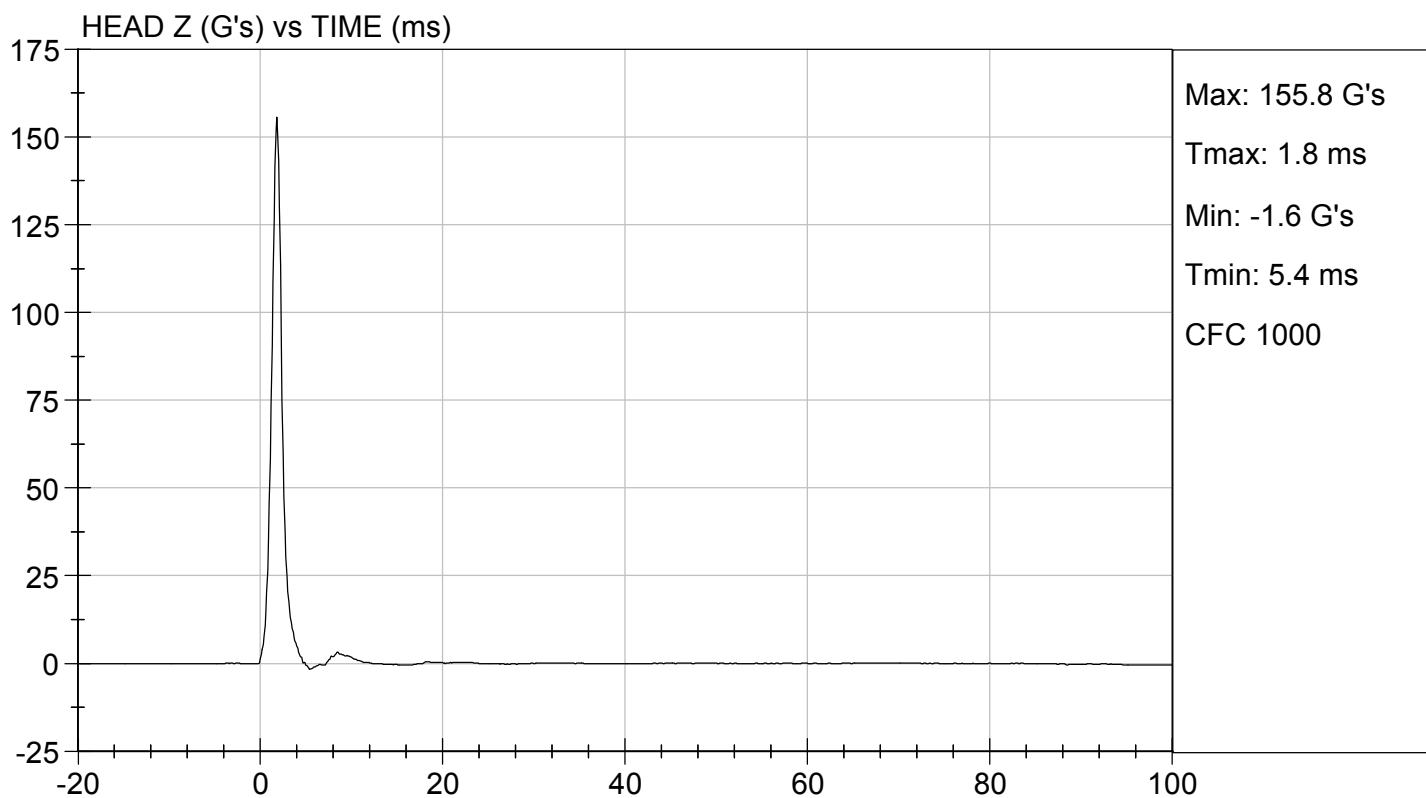
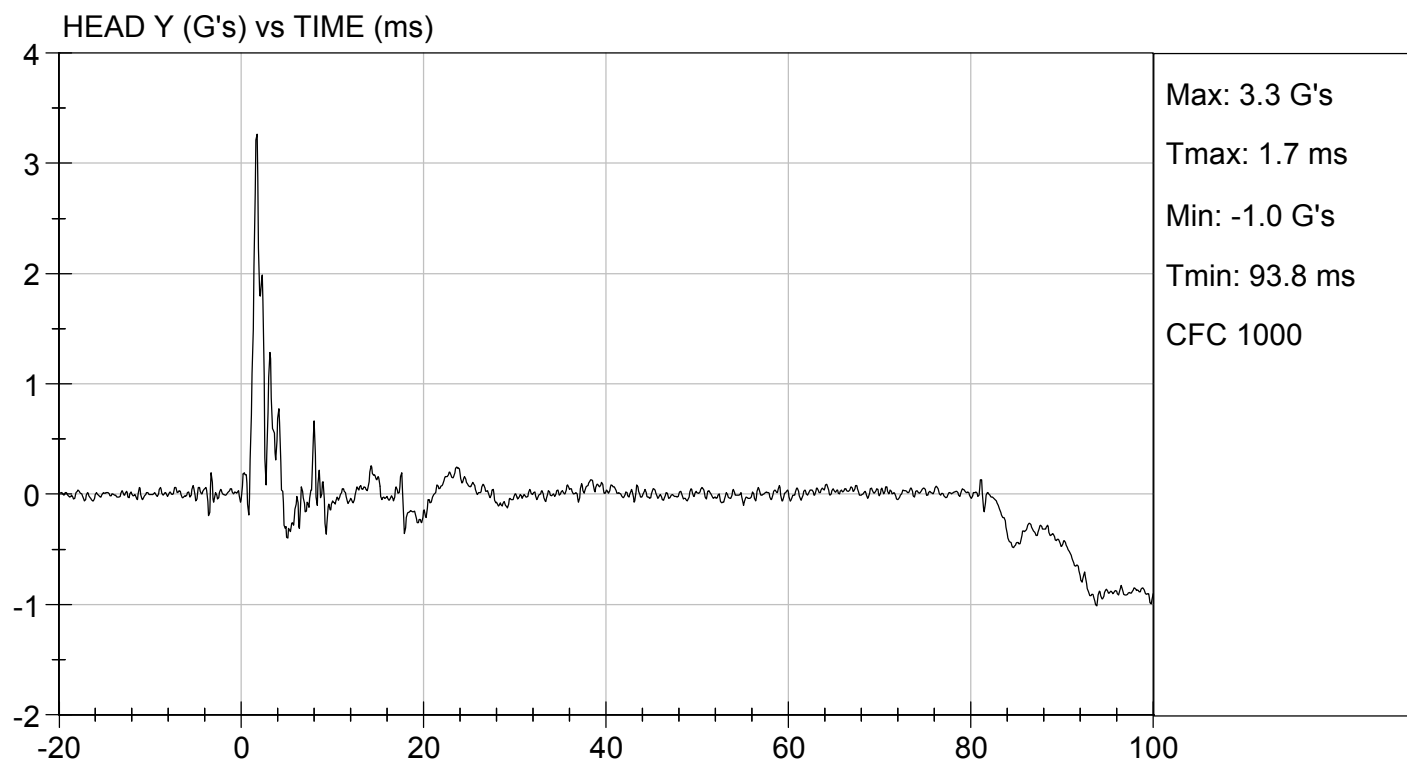

Laboratory Technician

12/06/2019

Test Date


Approved By





MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: DH1659Test I.D.: D193822

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity		%	10 to 70	32	Pass
Pendulum Speed		m/s	6.89 to 7.13	7.06	Pass
Pendulum Velocity	10 ms	m/s	2.1 to 2.5	2.4	Pass
	20 ms	m/s	4.0 to 5.0	4.8	Pass
	30 ms	m/s	5.8 to 7.0	6.9	Pass
D Plane Rotation	Max	deg	77 to 91	81	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	69 to 83	71	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	82	Pass
Overall Results					Pass

Jacob D Taylor
Laboratory Technician

12/09/2019

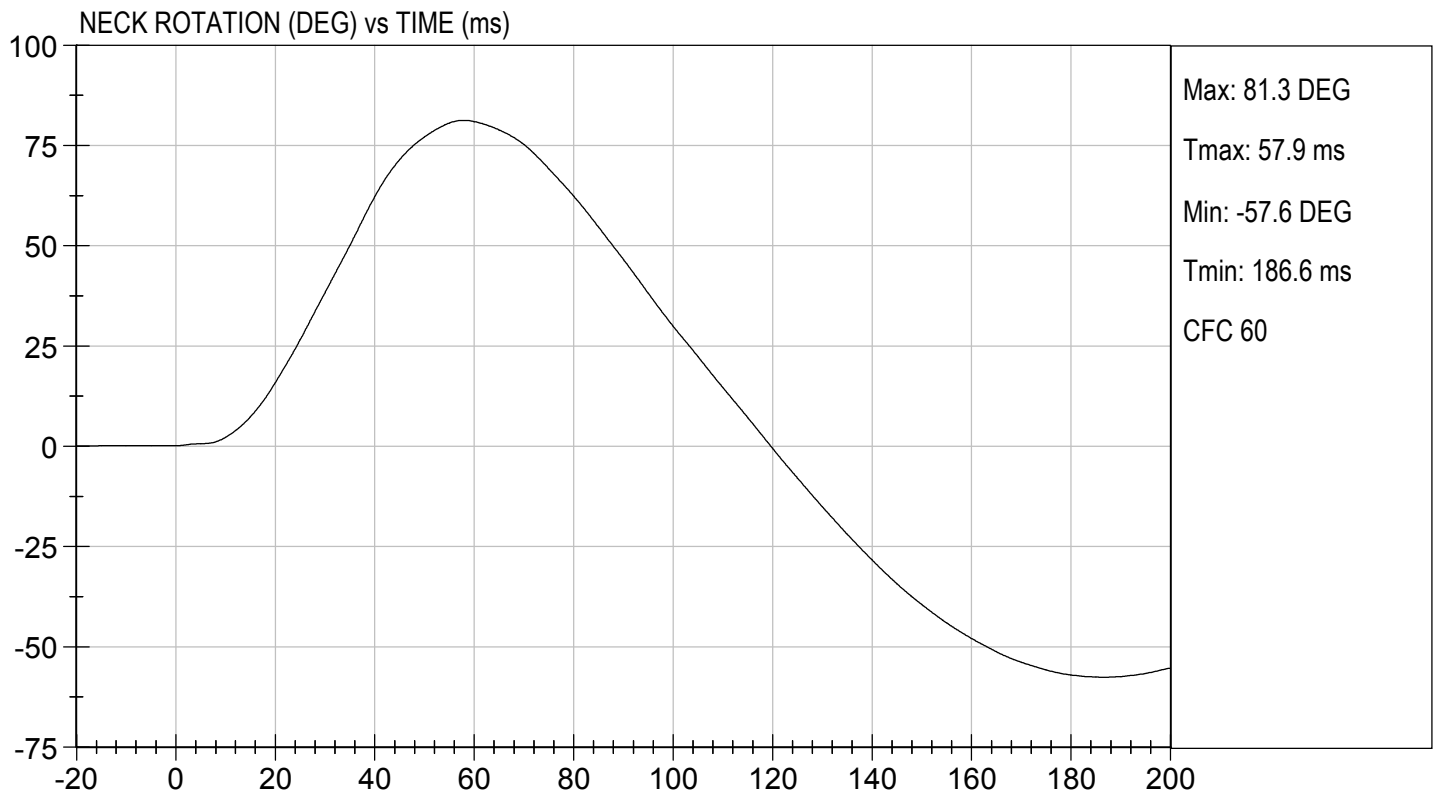
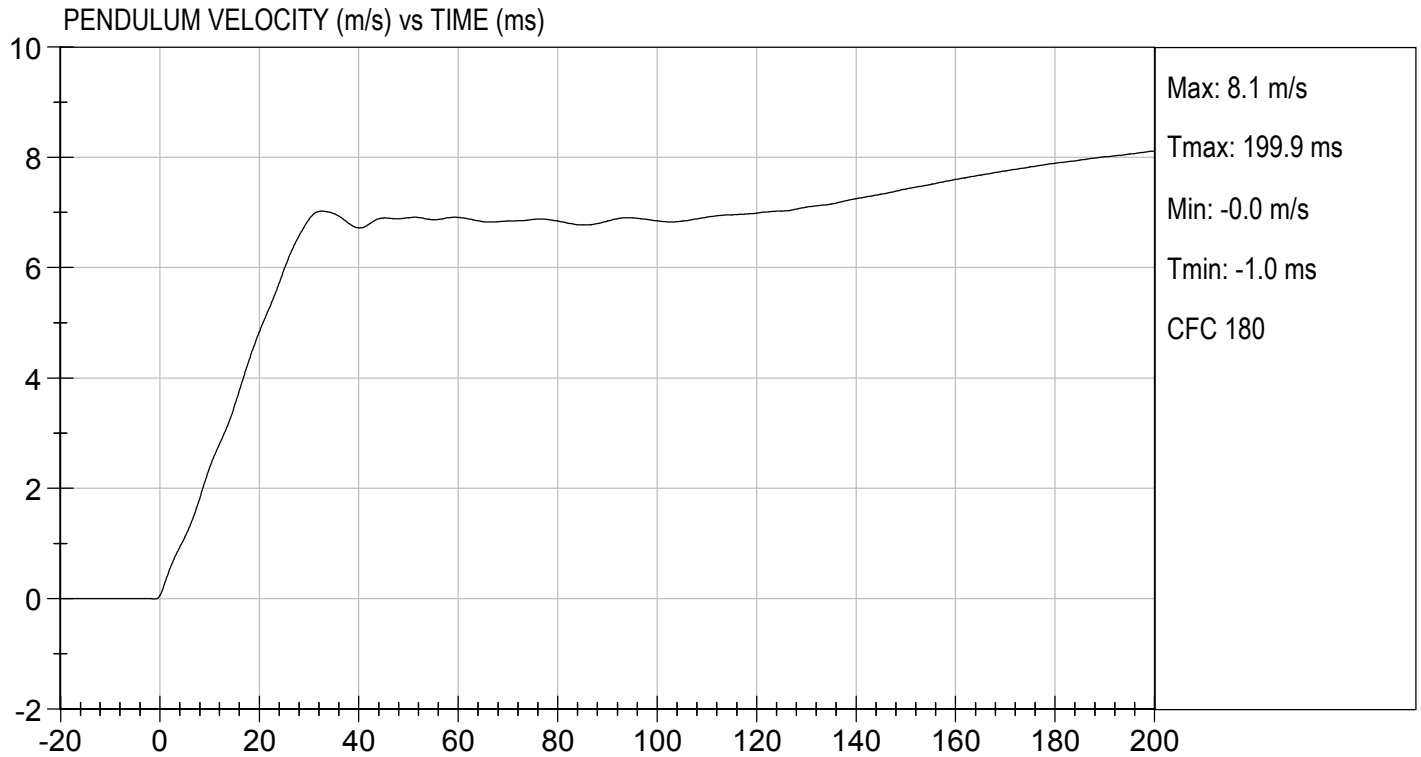
Test Date

B. F. H.
Approved By



TEST DESC: NECK FLEXION
VELOCITY: 23.15 ft/s, 7.06 m/s

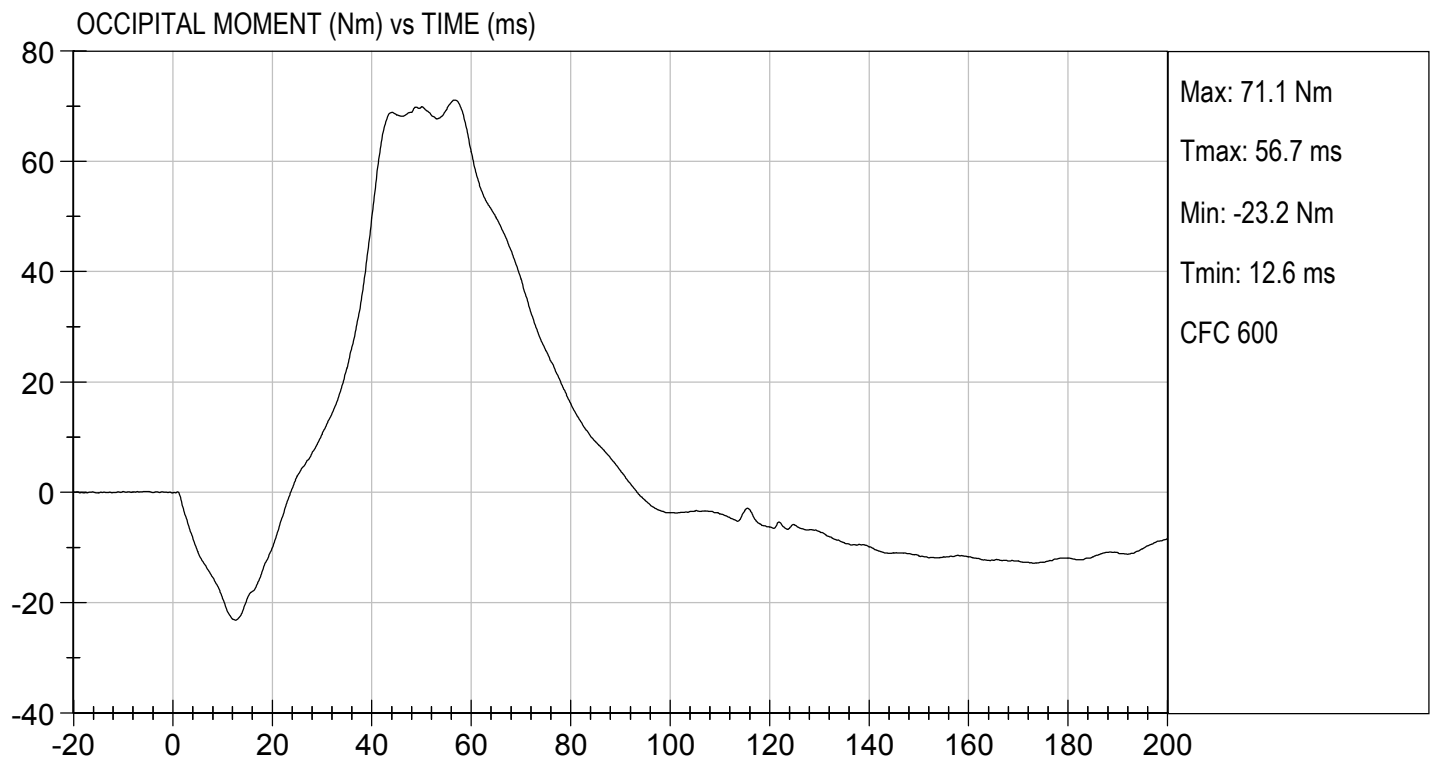
TEST DATE: 12/09/2019
TEST #: D193822





TEST DESC: NECK FLEXION
VELOCITY: 23.15 ft/s, 7.06 m/s

TEST DATE: 12/09/2019
TEST #: D193822



MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 5TH PERCENTILE

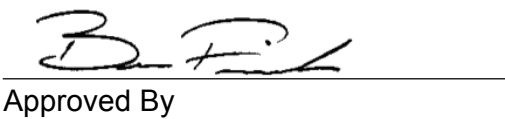
ATD Serial No: DH1659

Test I.D: D193823

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity		%	10 to 70	32	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.19	Pass
Pendulum Velocity	10 ms	m/s	1.5 to 1.9	1.7	Pass
	20 ms	m/s	3.1 to 3.9	3.4	Pass
	30 ms	m/s	4.6 to 5.6	5	Pass
D Plane Rotation	Max	deg	99 to 114	108	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	-65 to -53	-54	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	105	Pass
Overall Results					Pass


Laboratory Technician

12/09/2019
Test Date

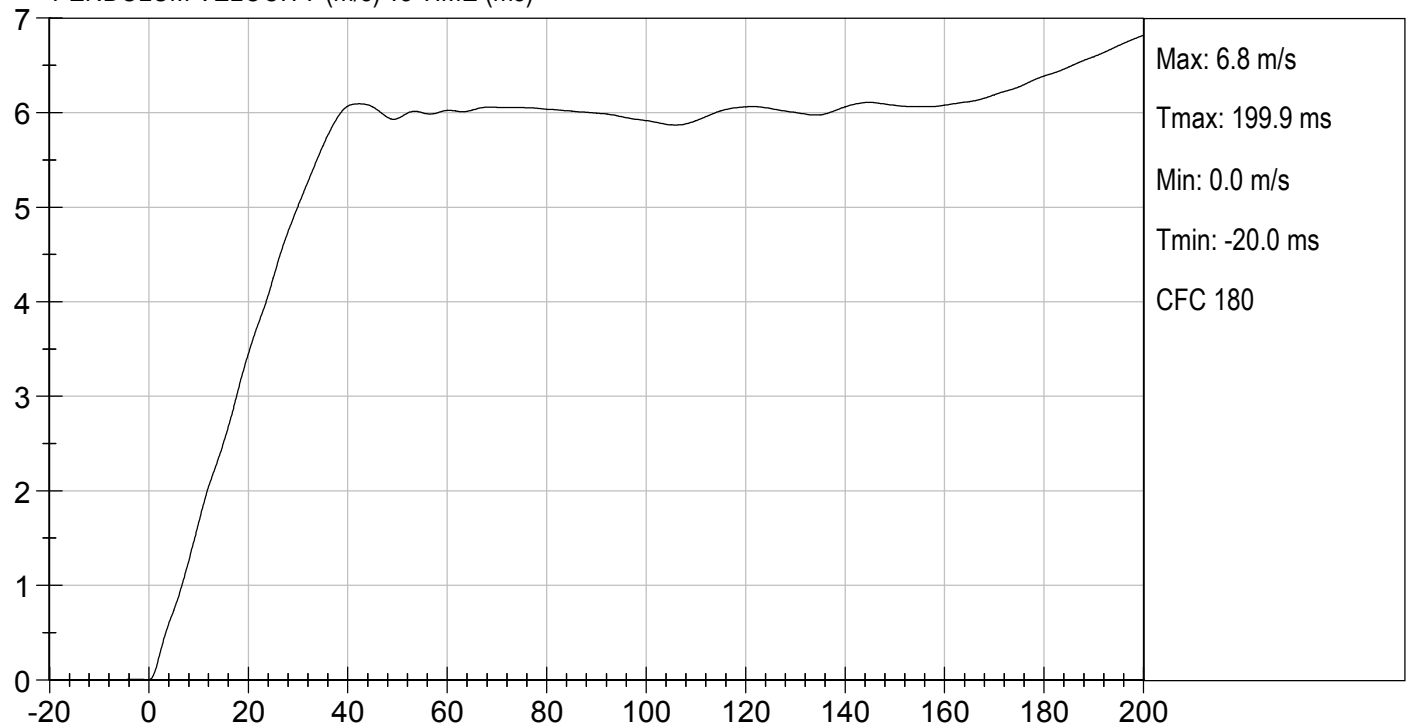

Approved By



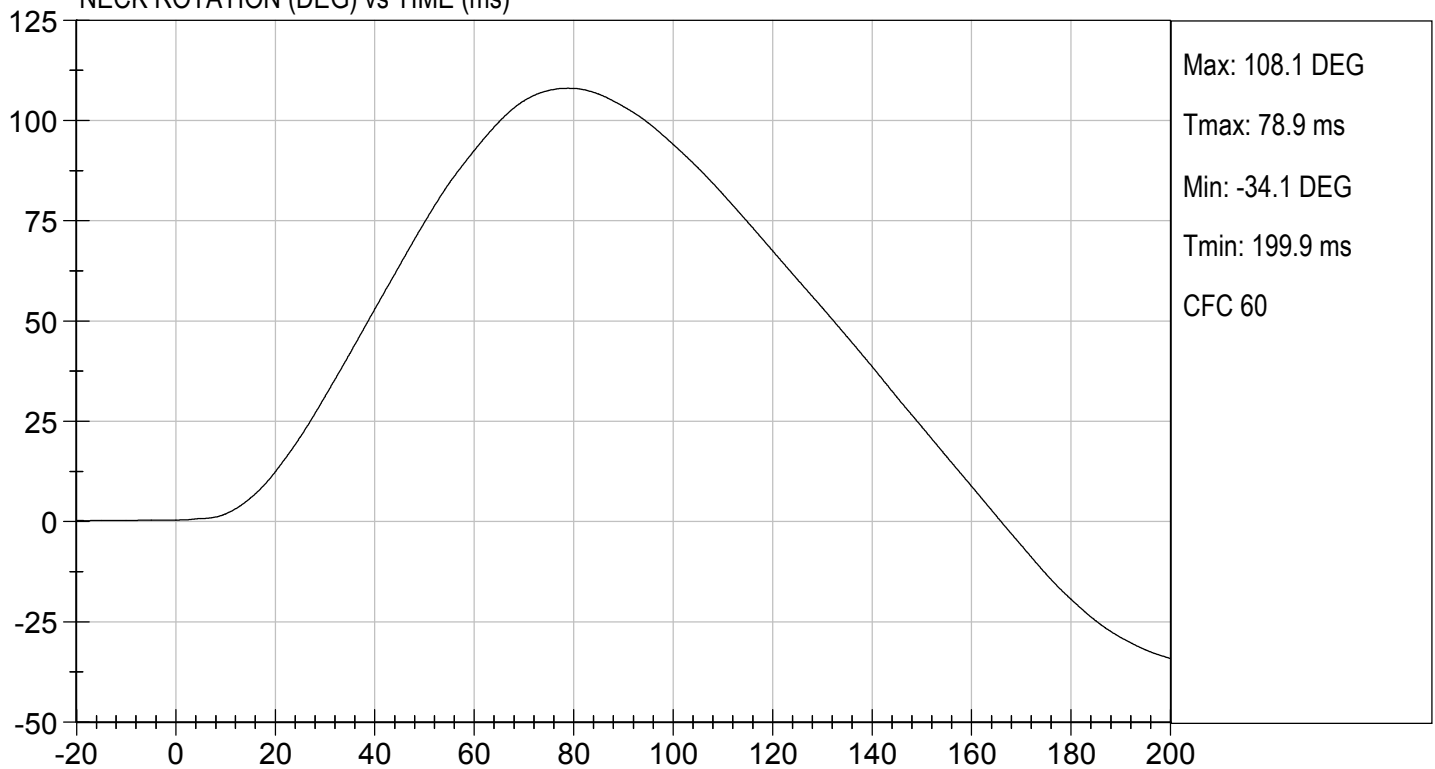
TEST DESC: NECK EXTENSION
VELOCITY: 20.30 ft/s, 6.19 m/s

TEST DATE: 12/09/2019
TEST #: D193823

PENDULUM VELOCITY (m/s) vs TIME (ms)



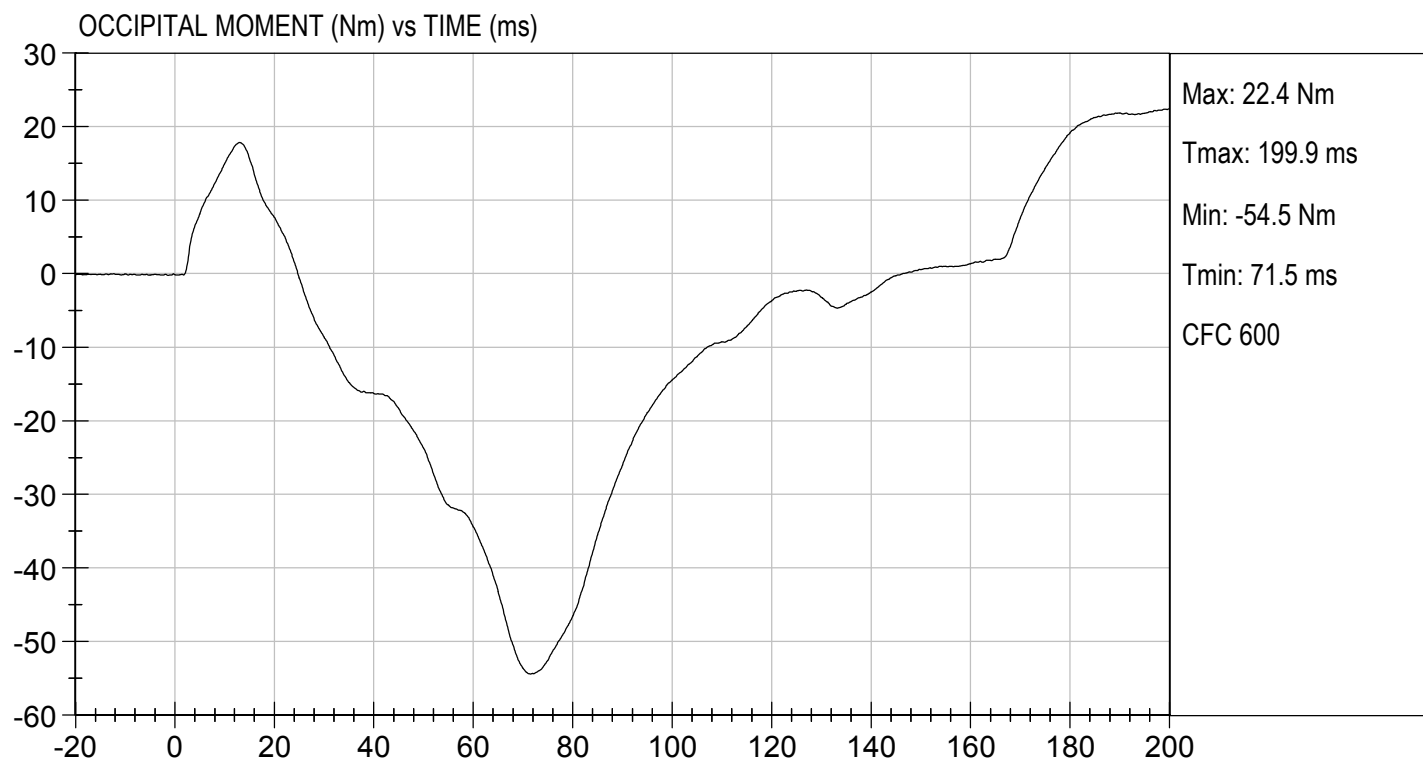
NECK ROTATION (DEG) vs TIME (ms)





TEST DESC: NECK EXTENSION
VELOCITY: 20.30 ft/s, 6.19 m/s

TEST DATE: 12/09/2019
TEST #: D193823



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 5TH PERCENTILE

ATD Serial No: DH1659

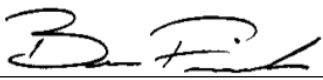
Test I.D: D193824

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.6	Pass
Relative Humidity	%	10 to 70	32	Pass
Probe Speed	m/s	6.59 to 6.83	6.77	Pass
Peak Deflection	mm	50 to 58	52	Pass
Peak Resistive Force w/in Deflection Corridor	N	3900 to 4400	4376	Pass
Internal Hysteresis	%	69 to 85	74	Pass
Peak Force 18 mm - 50 mm	N	<= 4600	4391	Pass
Overall Test Results				Pass


Laboratory Technician

12/09/2019

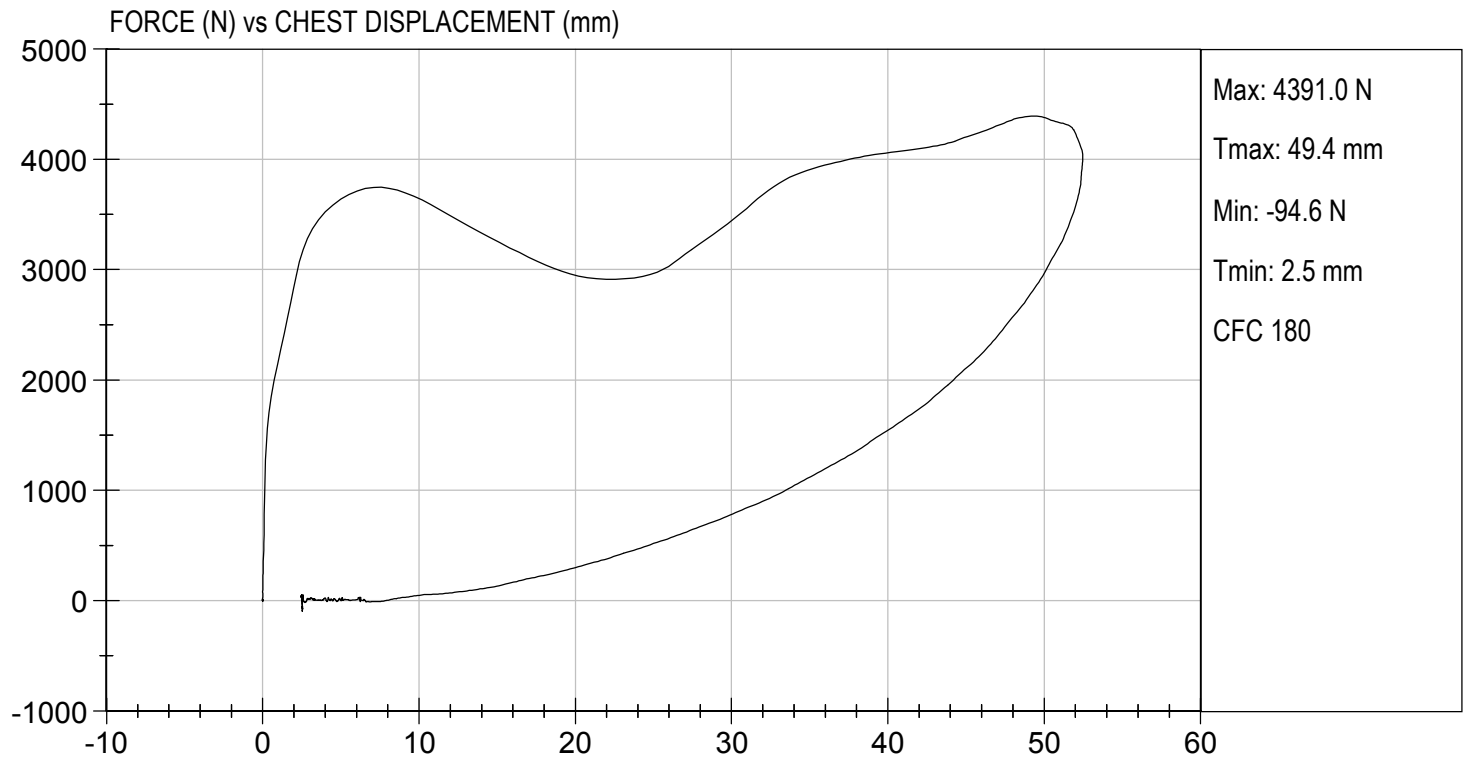
Test Date


Approved By



TEST DESC: THORAX IMPACT
VELOCITY: 22.22 ft/s, 6.77 m/s

TEST DATE: 12/09/2019
TEST #: D193824



MGA RESEARCH CORPORATION

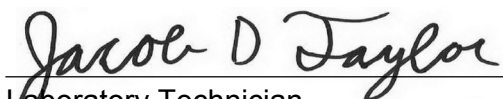
RIGHT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: DH1659

Test I.D: D193825

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	23	Pass
Probe Speed	m/s	2.07 to 2.13	2.10	Pass
Maximum Force	N	3450 to 4060	3689	Pass
Overall Test Results				Pass


Laboratory Technician

12/06/2019

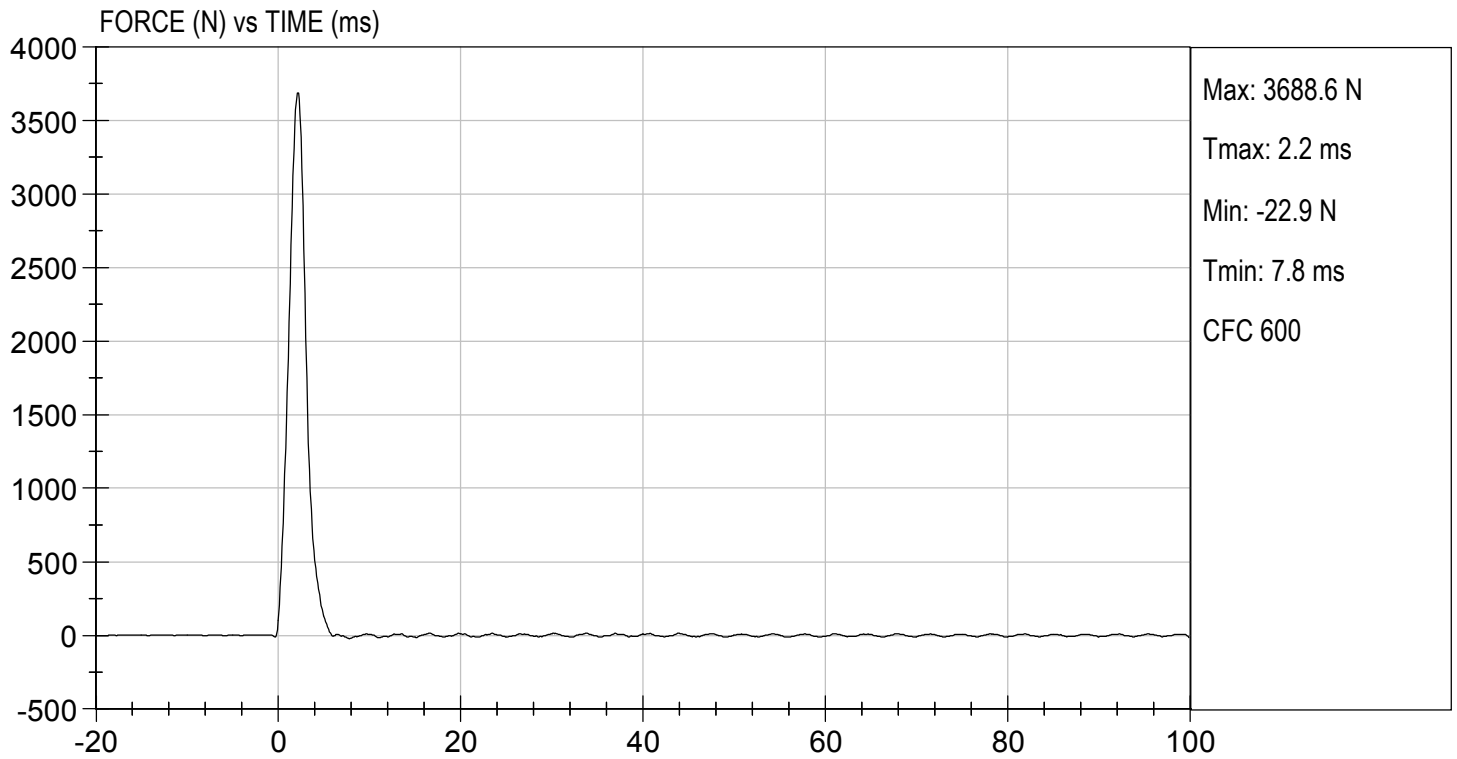
Test Date


Approved By



TEST DESC: RIGHT KNEE
VELOCITY: 6.89 ft/s, 2.10 m/s

TEST DATE: 12/06/2019
TEST #: D193825



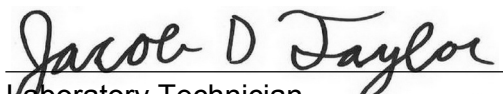
MGA RESEARCH CORPORATION

**LEFT KNEE IMPACT TEST
HYBRID III 5TH PERCENTILE**

ATD Serial No: DH1659

Test I.D: D193826

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	23	Pass
Probe Speed	m/s	2.07 to 2.13	2.10	Pass
Maximum Force	N	3450 to 4060	3694	Pass
Overall Test Results				Pass


Laboratory Technician

12/06/2019

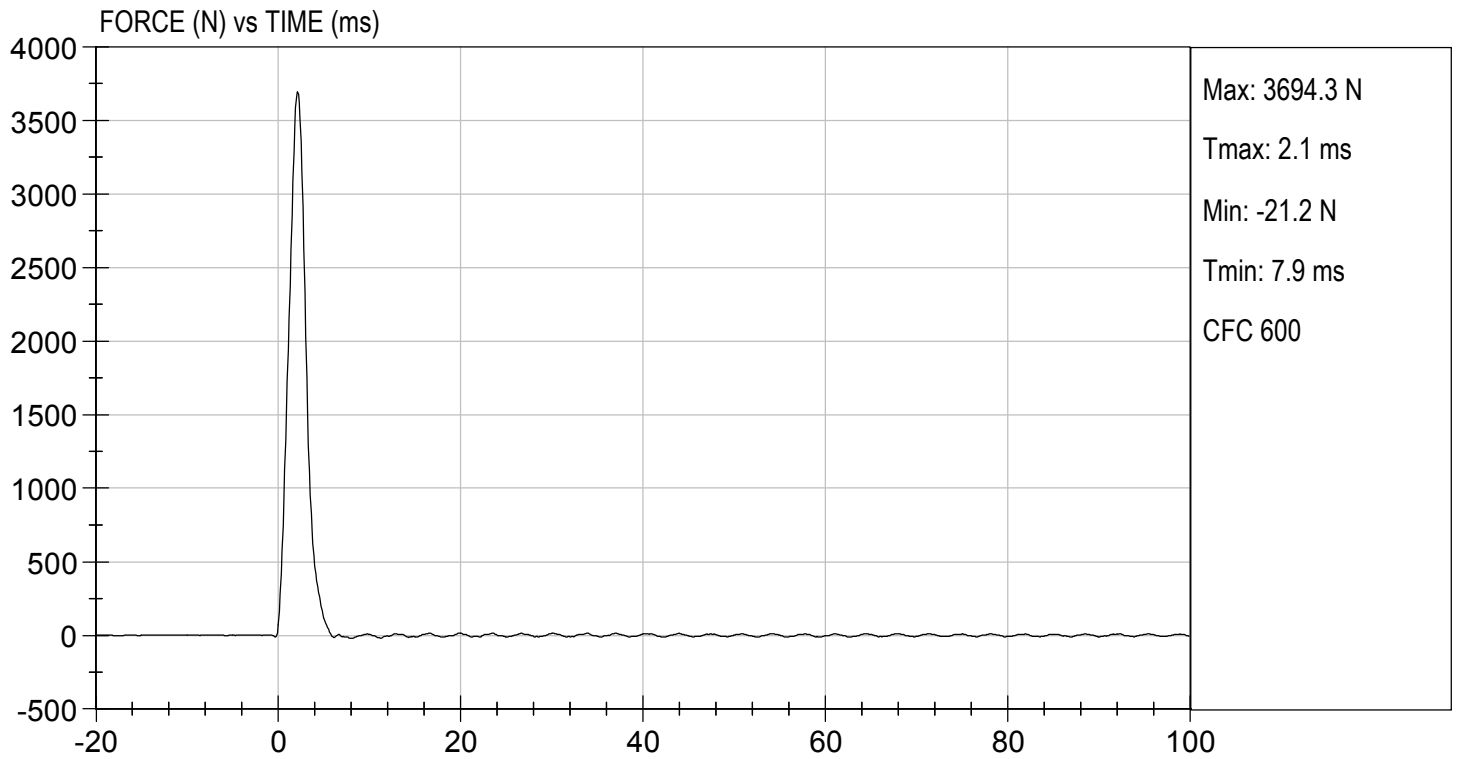
Test Date


Approved By



TEST DESC: LEFT KNEE
VELOCITY: 6.89 ft/s, 2.10 m/s

TEST DATE: 12/06/2019
TEST #: D193826



MGA RESEARCH CORPORATION

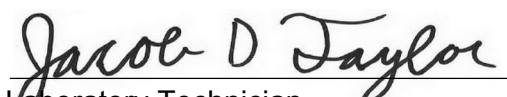
TORSO FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: DH1659

Test I.D: D193827

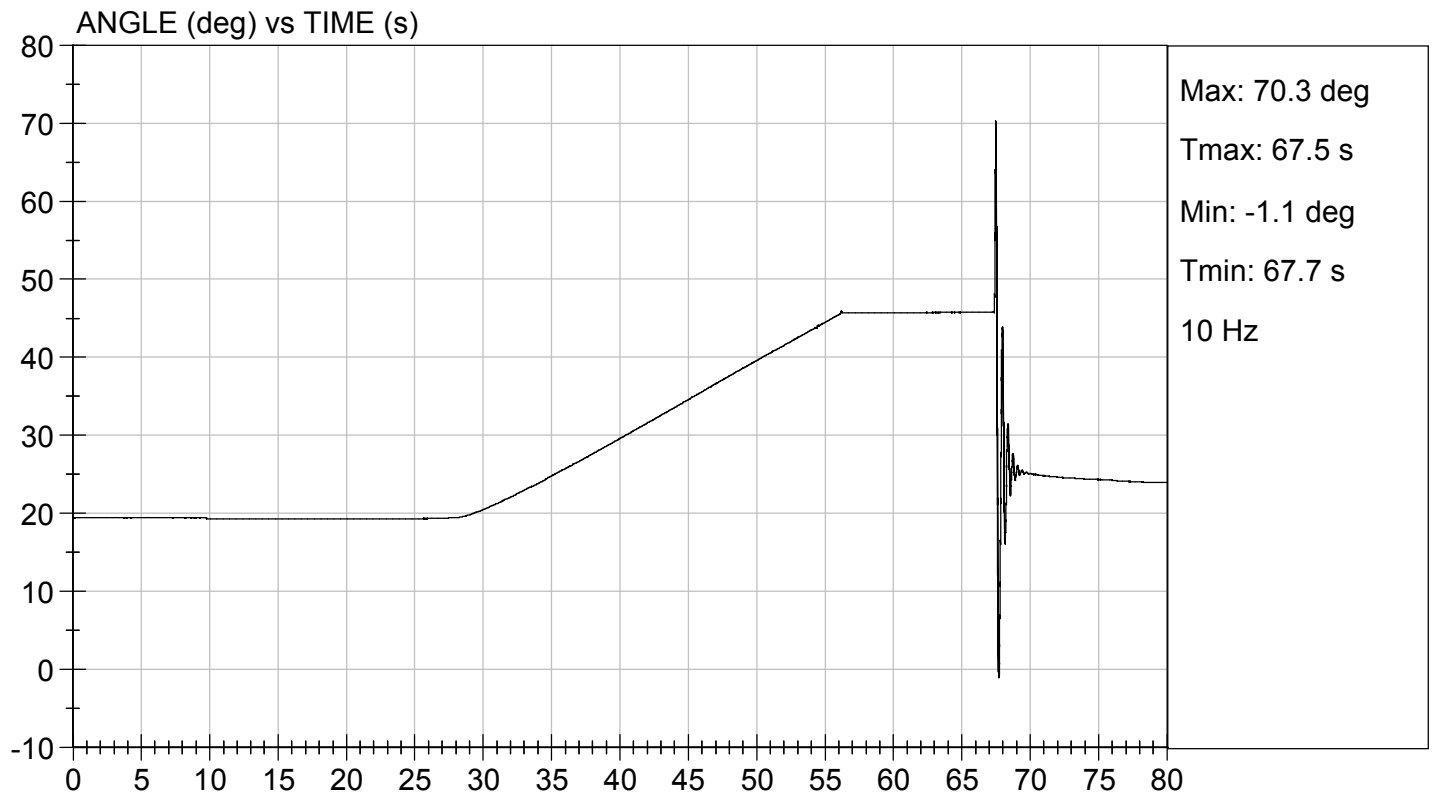
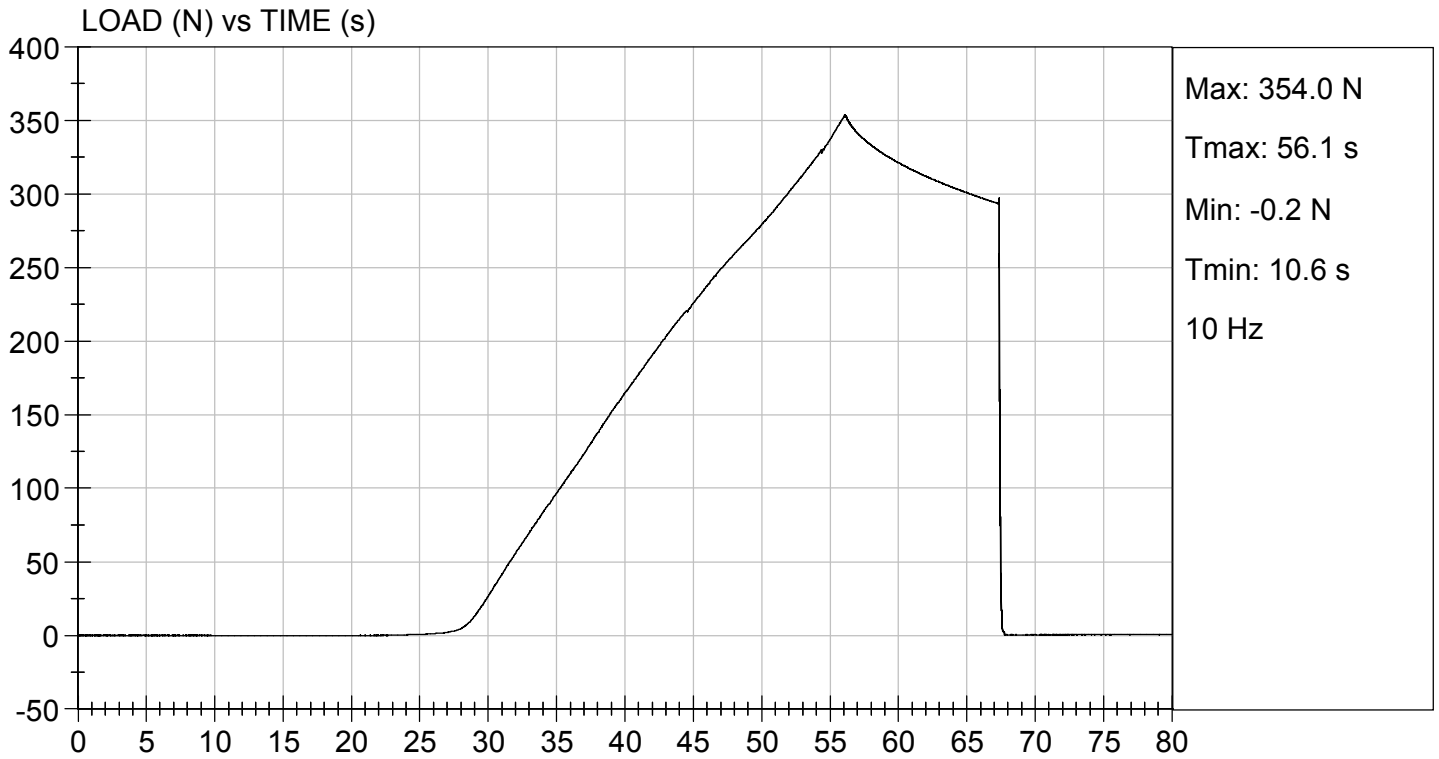
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21	Pass
Laboratory Relative Humidity	%	10 to 70	29	Pass
Initial Angle	deg	0 to 20	19	Pass
Return Angle	deg	+/- 8	4	Pass
Force at 45 deg	N	320 to 390	354	Pass
Upper Torso Deflection Rate	deg/s	0.5 to 1.5	1.0	Pass
Overall Result				Pass


Laboratory Technician

12/06/2019

Test Date


Approved By



CALIBRATION TEST RESULTS

POST-TEST

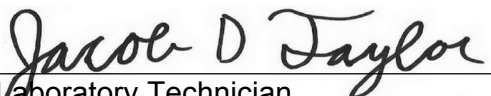
HYBRID III 5TH PERCENTILE FEMALE - PASSENGER ATD

MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: DH1659

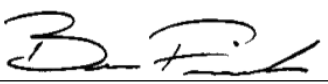
Test ID: D200071

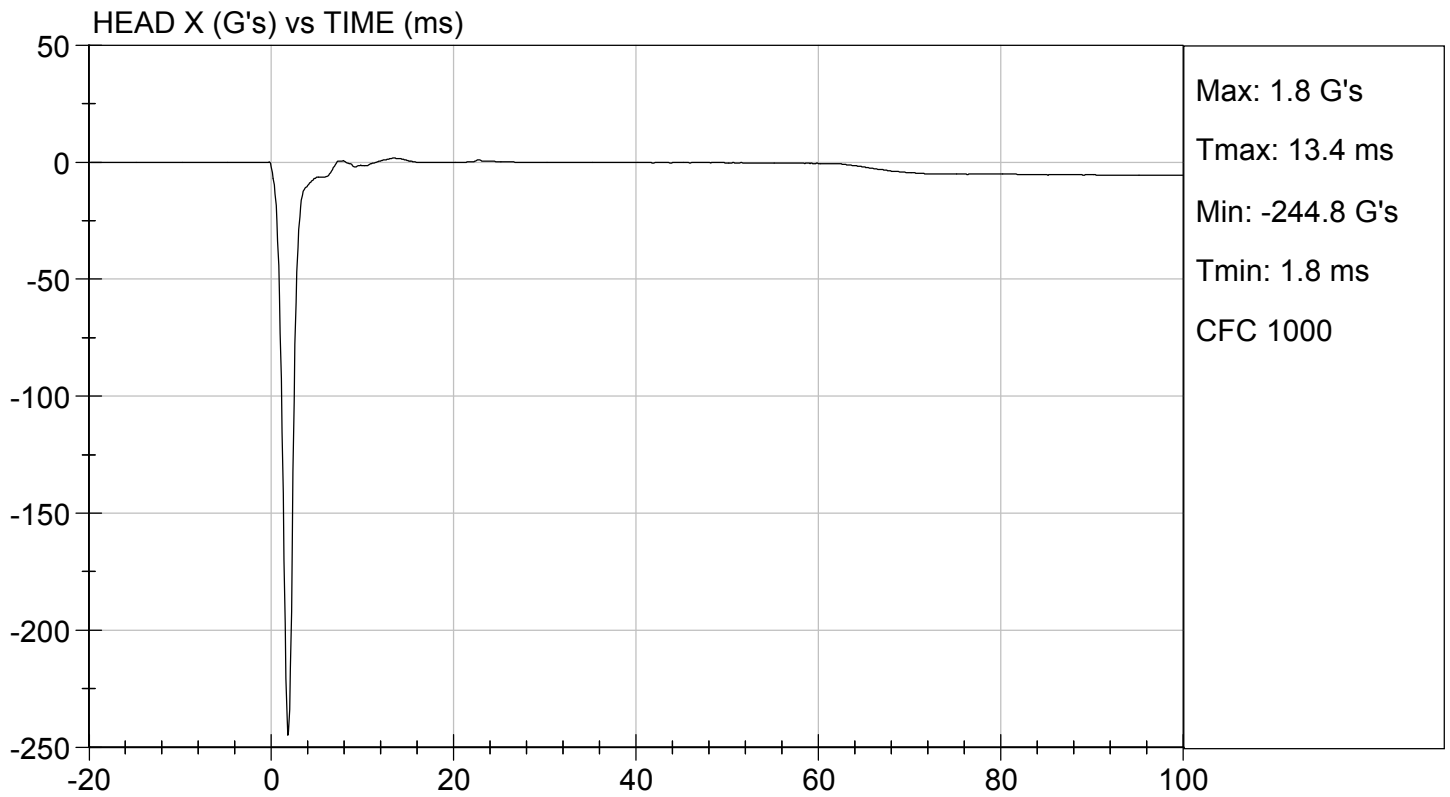
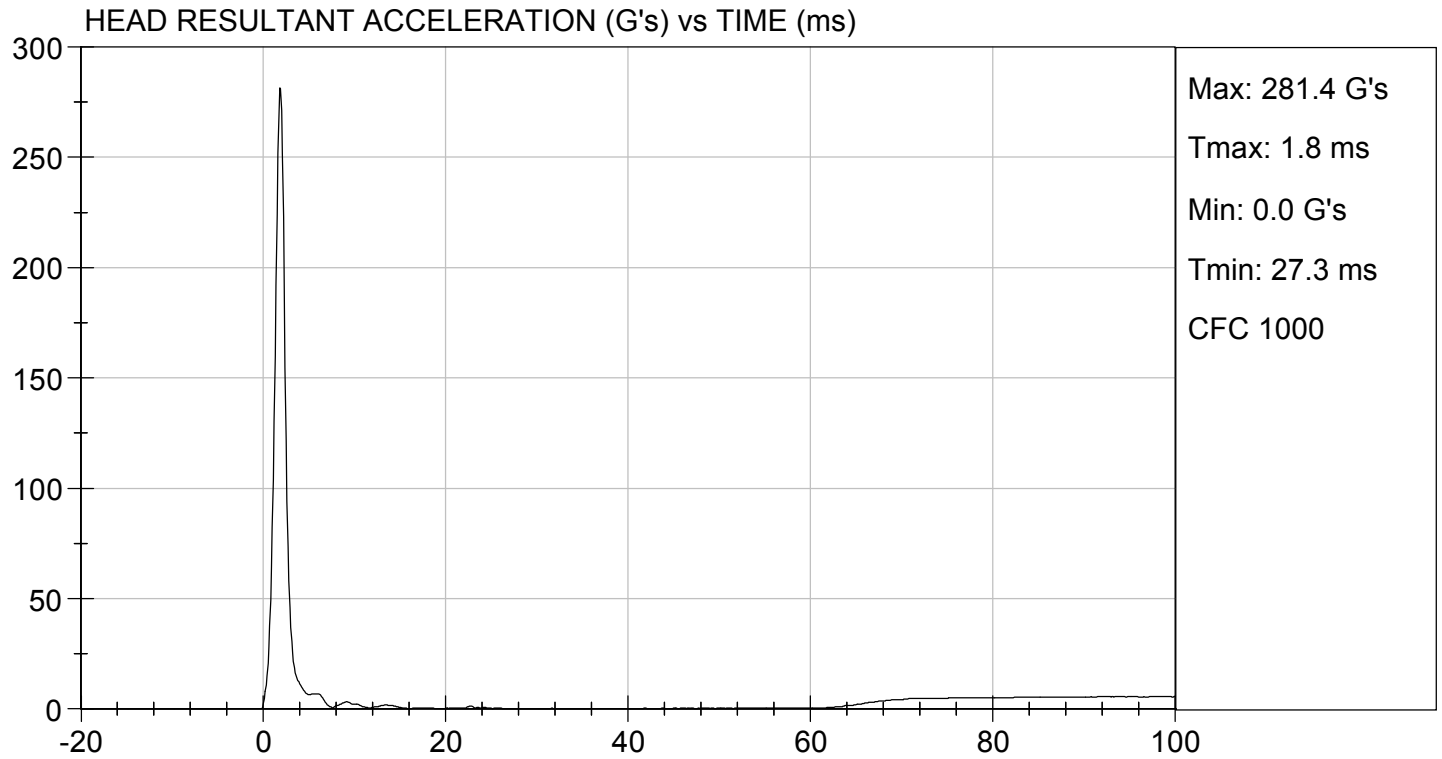
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Peak Resultant Acceleration	G's	250 to 300	281	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-7.9	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass

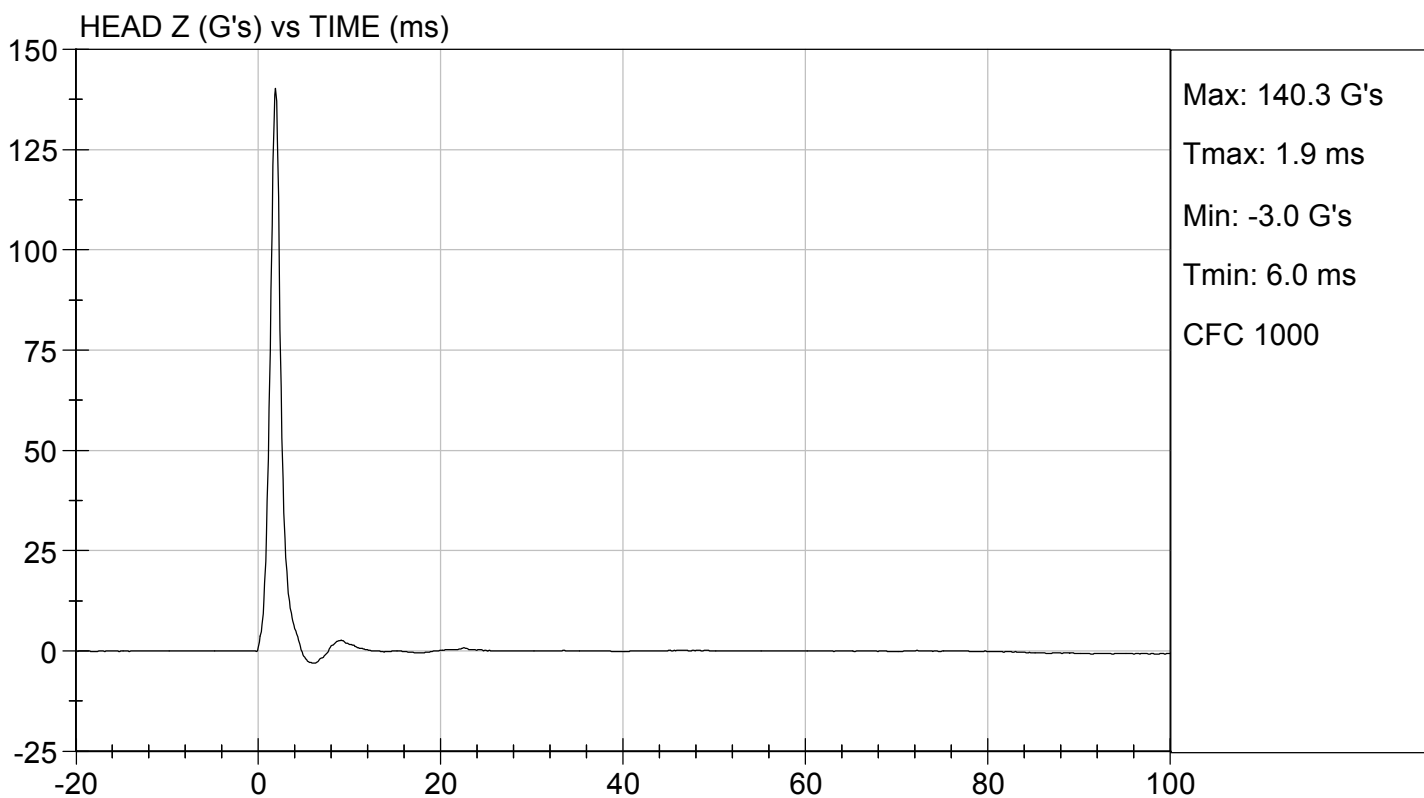
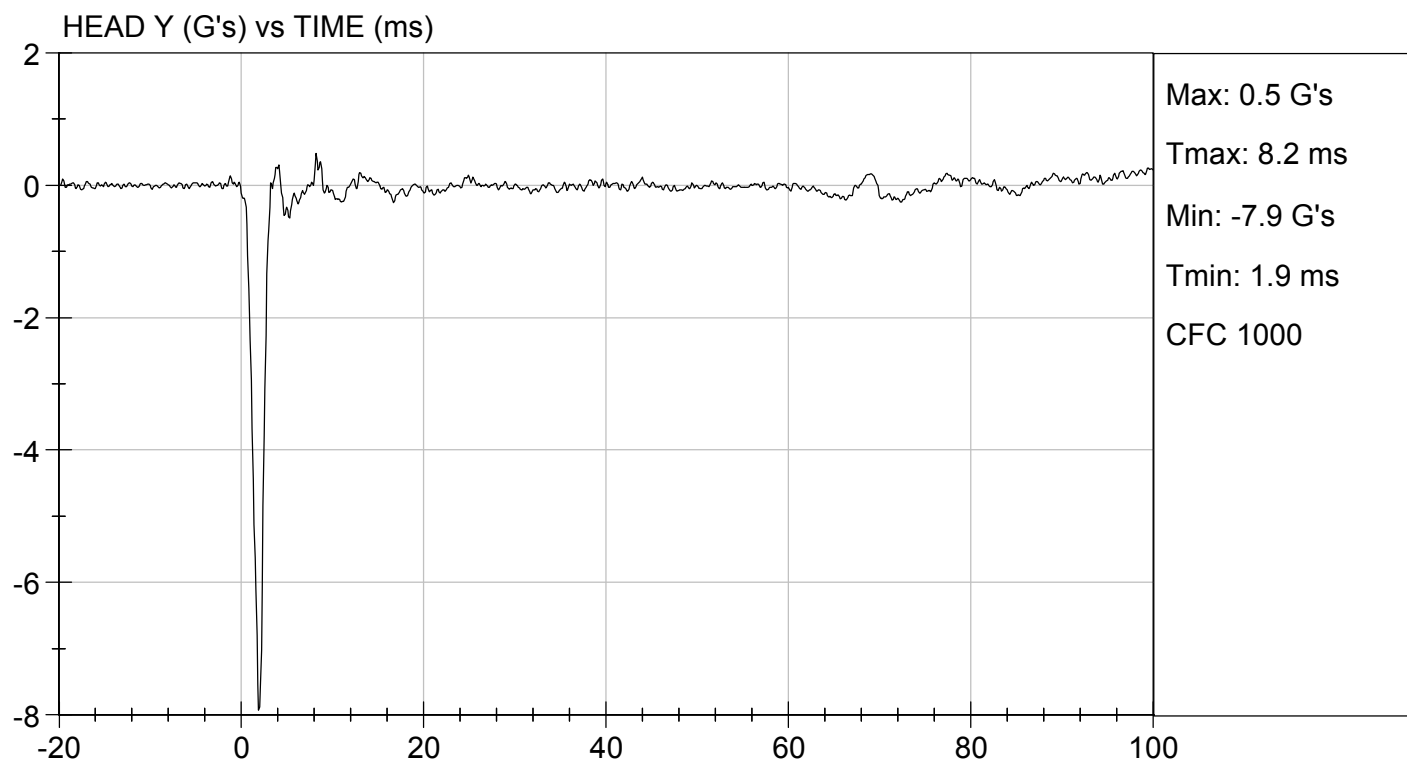

Laboratory Technician

01/07/2020

Test Date


Approved By





MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: DH1659Test I.D.: D200072

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	20.8	Pass
Laboratory Relative Humidity		%	10 to 70	26	Pass
Pendulum Speed		m/s	6.89 to 7.13	7.06	Pass
Pendulum Velocity	10 ms	m/s	2.1 to 2.5	2.5	Pass
	20 ms	m/s	4.0 to 5.0	4.9	Pass
	30 ms	m/s	5.8 to 7.0	6.8	Pass
D Plane Rotation	Max	deg	77 to 91	80	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	69 to 83	73	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	84	Pass
Overall Results					Pass

Jacob D Taylor
Laboratory Technician

01/07/2020

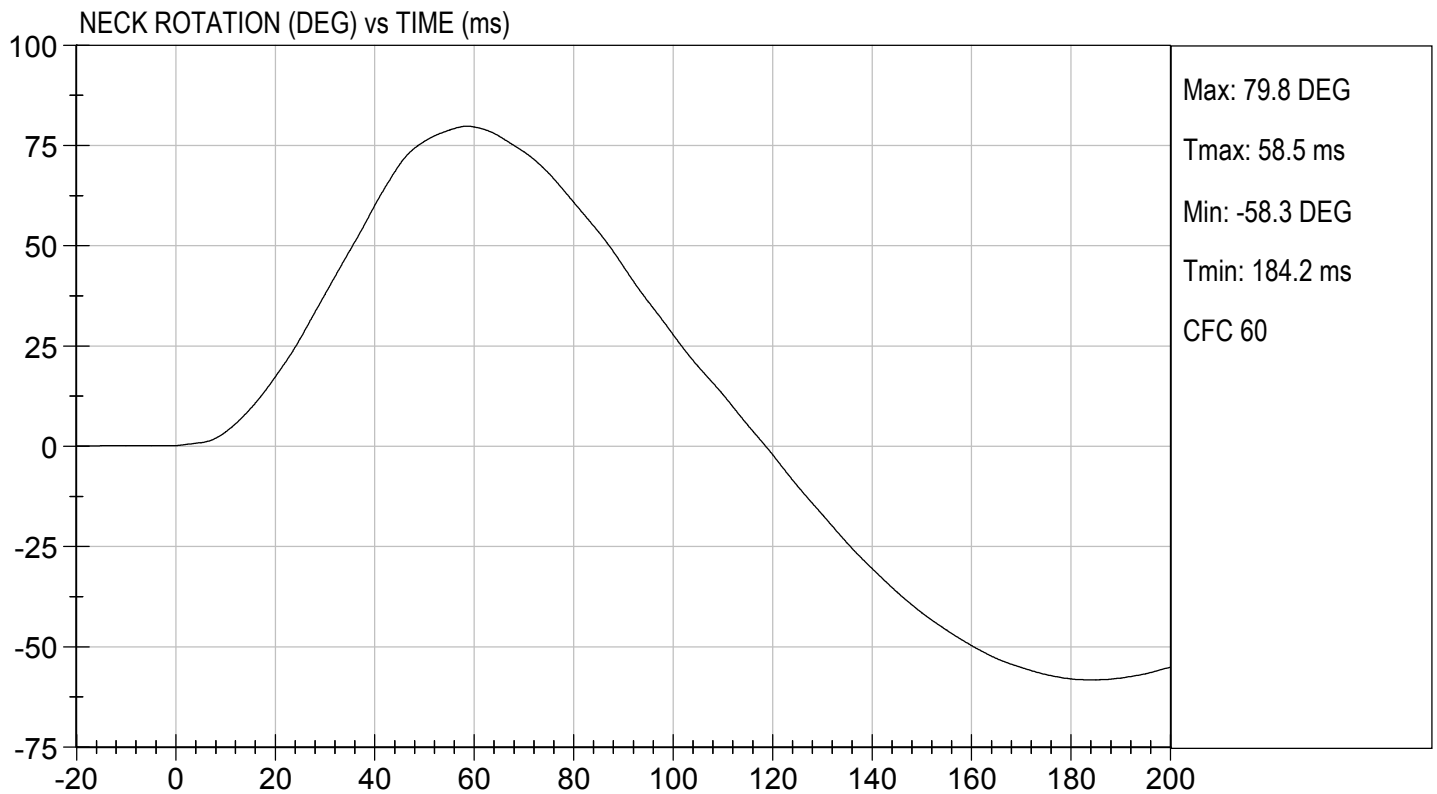
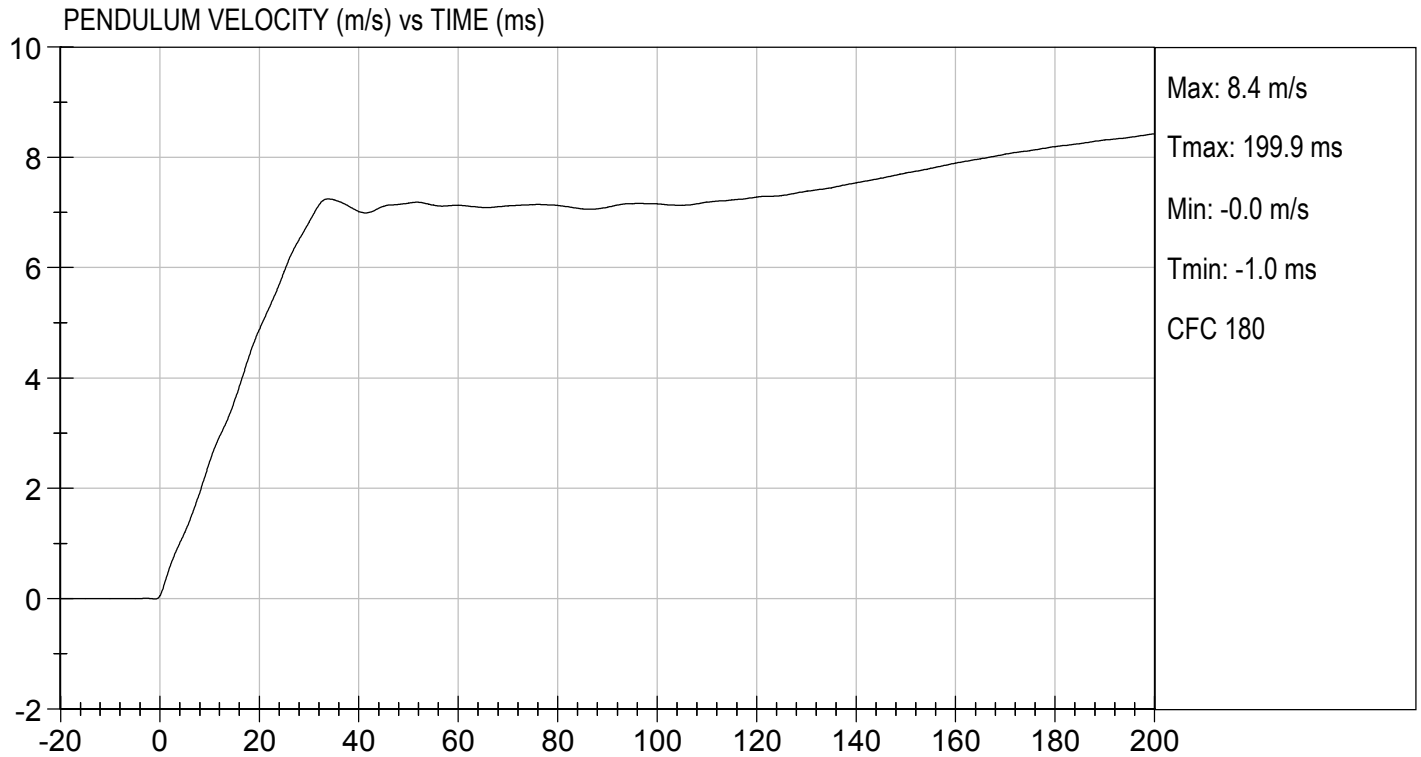
Test Date

B. F. L.
Approved By



TEST DESC: NECK FLEXION
VELOCITY: 23.15 ft/s, 7.06 m/s

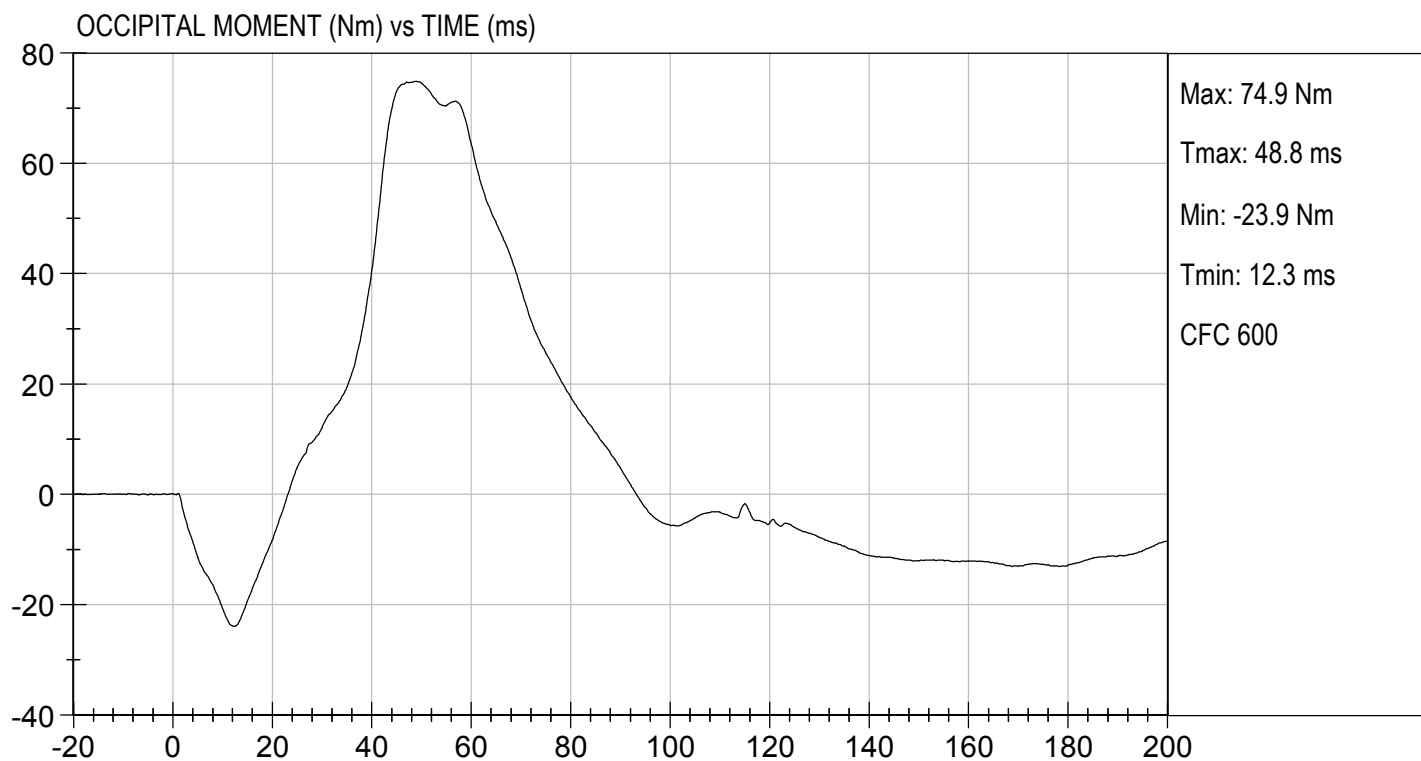
TEST DATE: 01/07/2020
TEST #: D200072





TEST DESC: NECK FLEXION
VELOCITY: 23.15 ft/s, 7.06 m/s

TEST DATE: 01/07/2020
TEST #: D200072

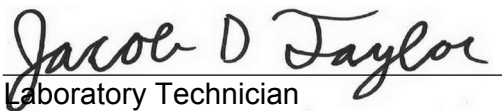


MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 5TH PERCENTILE

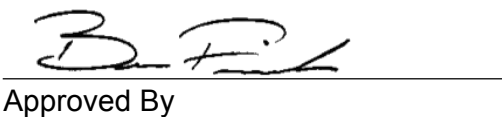
ATD Serial No: DH1659

Test I.D: D200073

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	20.8	Pass
Laboratory Relative Humidity		%	10 to 70	26	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.19	Pass
Pendulum Velocity	10 ms	m/s	1.5 to 1.9	1.6	Pass
	20 ms	m/s	3.1 to 3.9	3.3	Pass
	30 ms	m/s	4.6 to 5.6	4.9	Pass
D Plane Rotation	Max	deg	99 to 114	108	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	-65 to -53	-55	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	106	Pass
Overall Results					Pass


Laboratory Technician

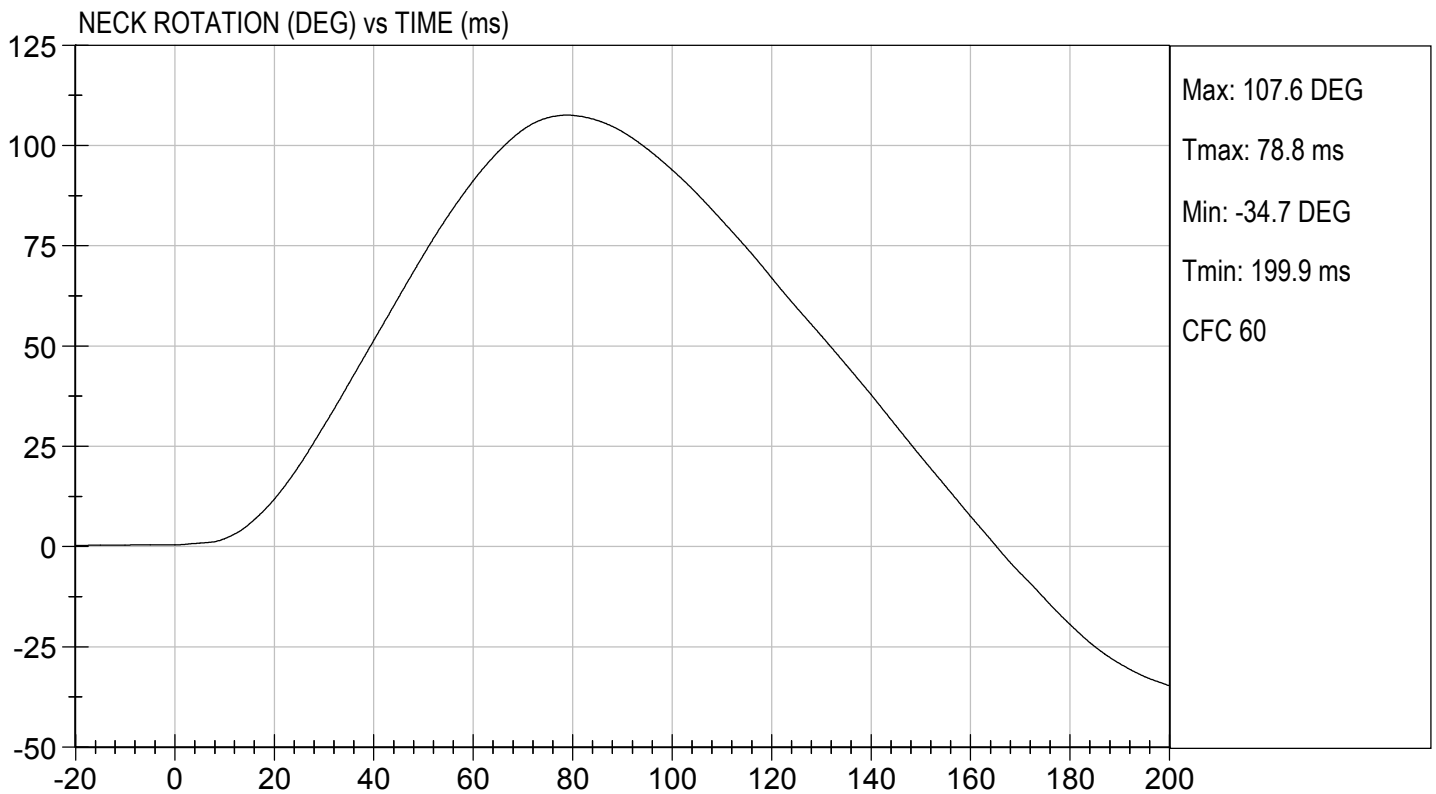
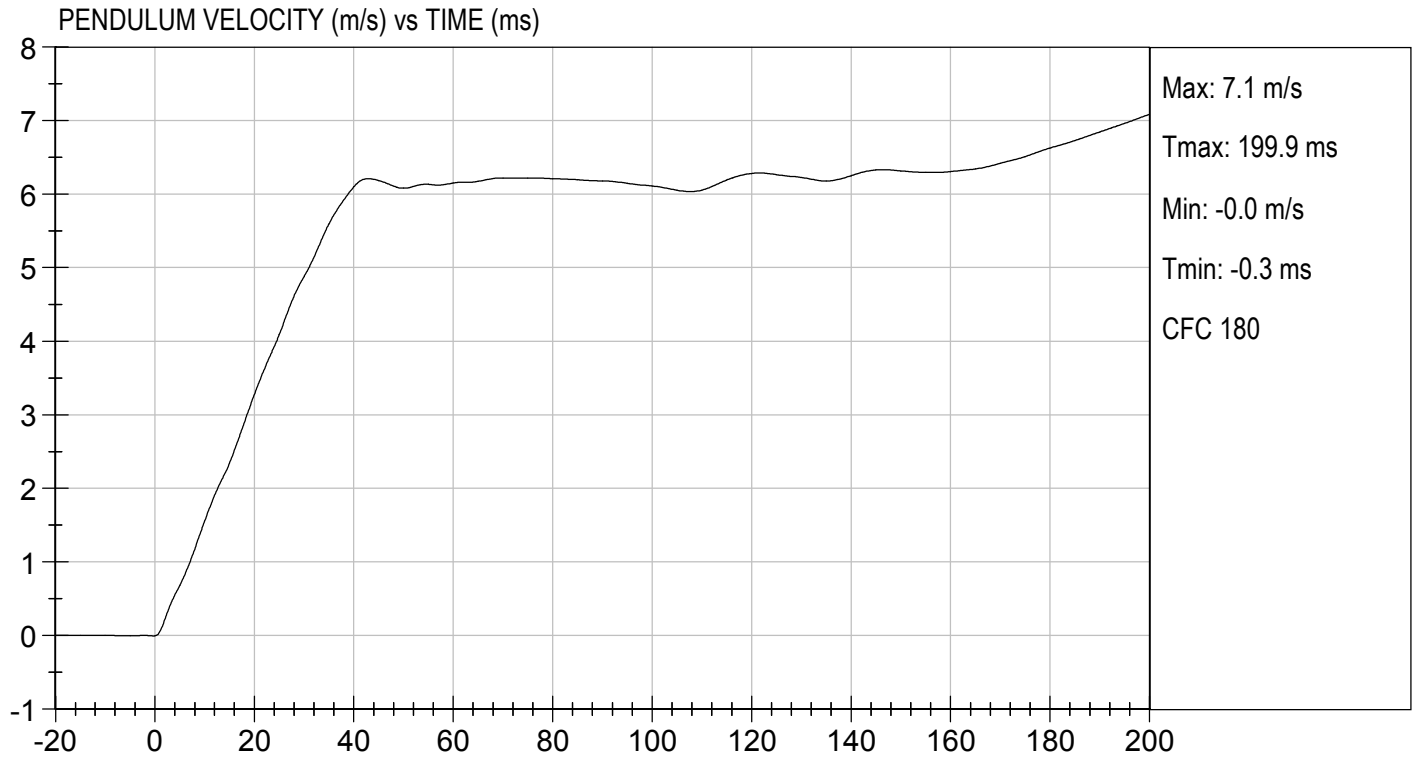
01/07/2020
Test Date


Approved By



TEST DESC: NECK EXTENSION
VELOCITY: 20.30 ft/s, 6.19 m/s

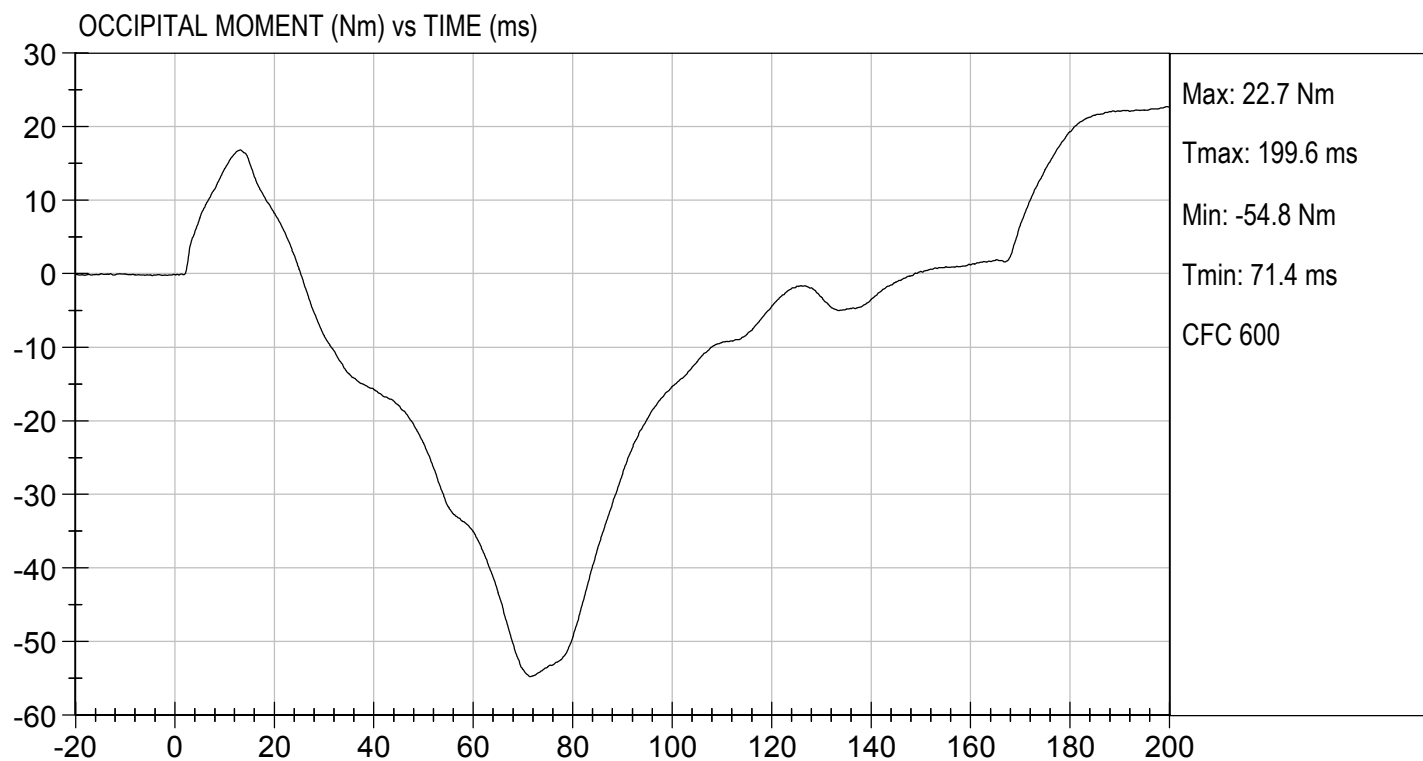
TEST DATE: 01/07/2020
TEST #: D200073





TEST DESC: NECK EXTENSION
VELOCITY: 20.30 ft/s, 6.19 m/s

TEST DATE: 01/07/2020
TEST #: D200073

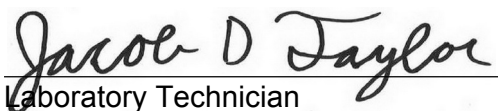


MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 5TH PERCENTILE

ATD Serial No: DH1659

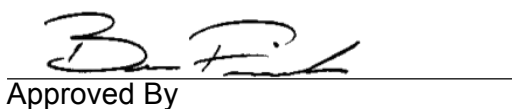
Test I.D: D200074

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.2	Pass
Relative Humidity	%	10 to 70	27	Pass
Probe Speed	m/s	6.59 to 6.83	6.83	Pass
Peak Deflection	mm	50 to 58	50	Pass
Peak Resistive Force w/in Deflection Corridor	N	3900 to 4400	4309	Pass
Internal Hysteresis	%	69 to 85	75	Pass
Peak Force 18 mm - 50 mm	N	<= 4600	4478	Pass
			Overall Test Results	Pass


Laboratory Technician

01/07/2020

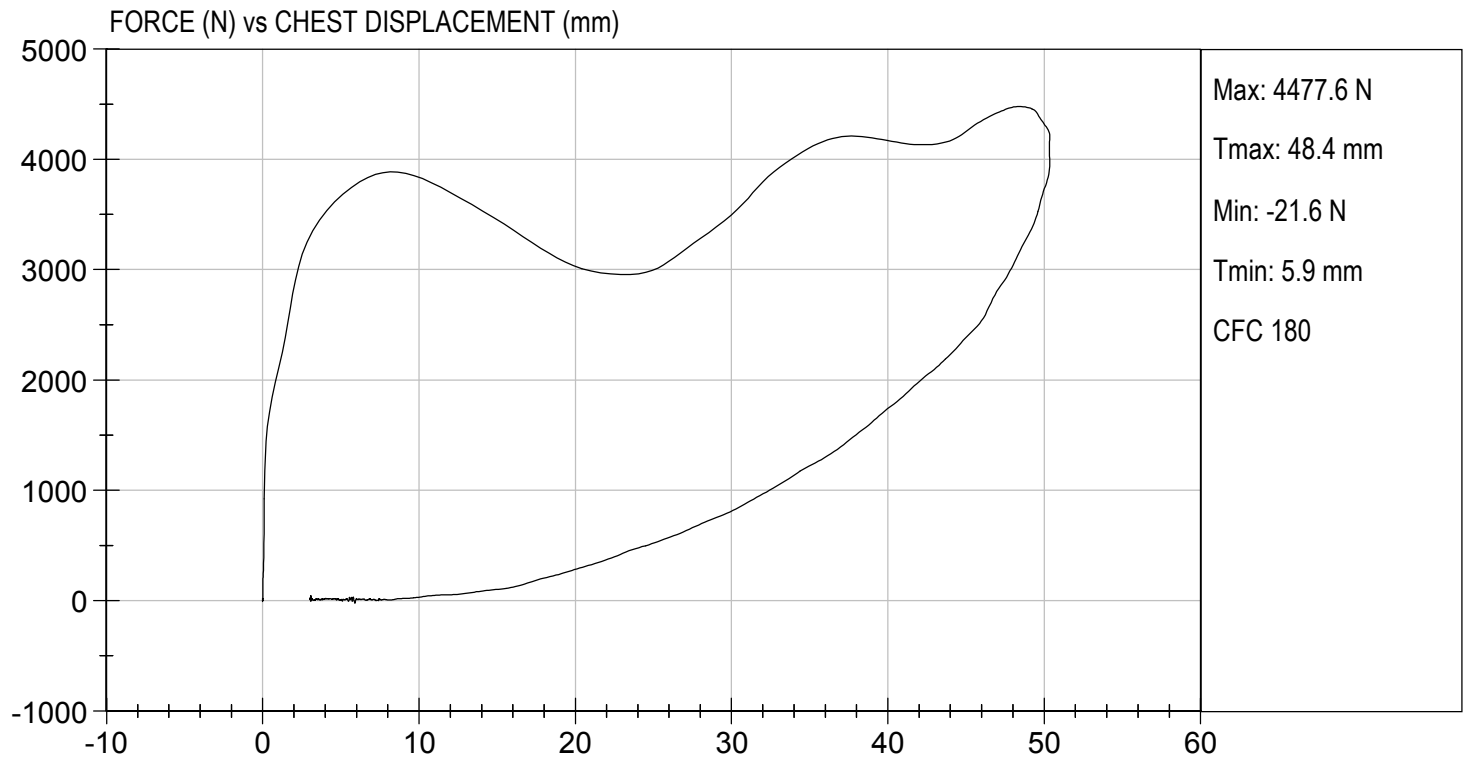
Test Date


Approved By



TEST DESC: THORAX IMPACT
VELOCITY: 22.40 ft/s, 6.83 m/s

TEST DATE: 01/07/2020
TEST #: D200074



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

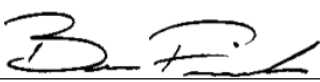
ATD Serial No: DH1659

Test I.D: D200075

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	28	Pass
Probe Speed	m/s	2.07 to 2.13	2.09	Pass
Maximum Force	N	3450 to 4060	3730	Pass
Overall Test Results				Pass


Laboratory Technician

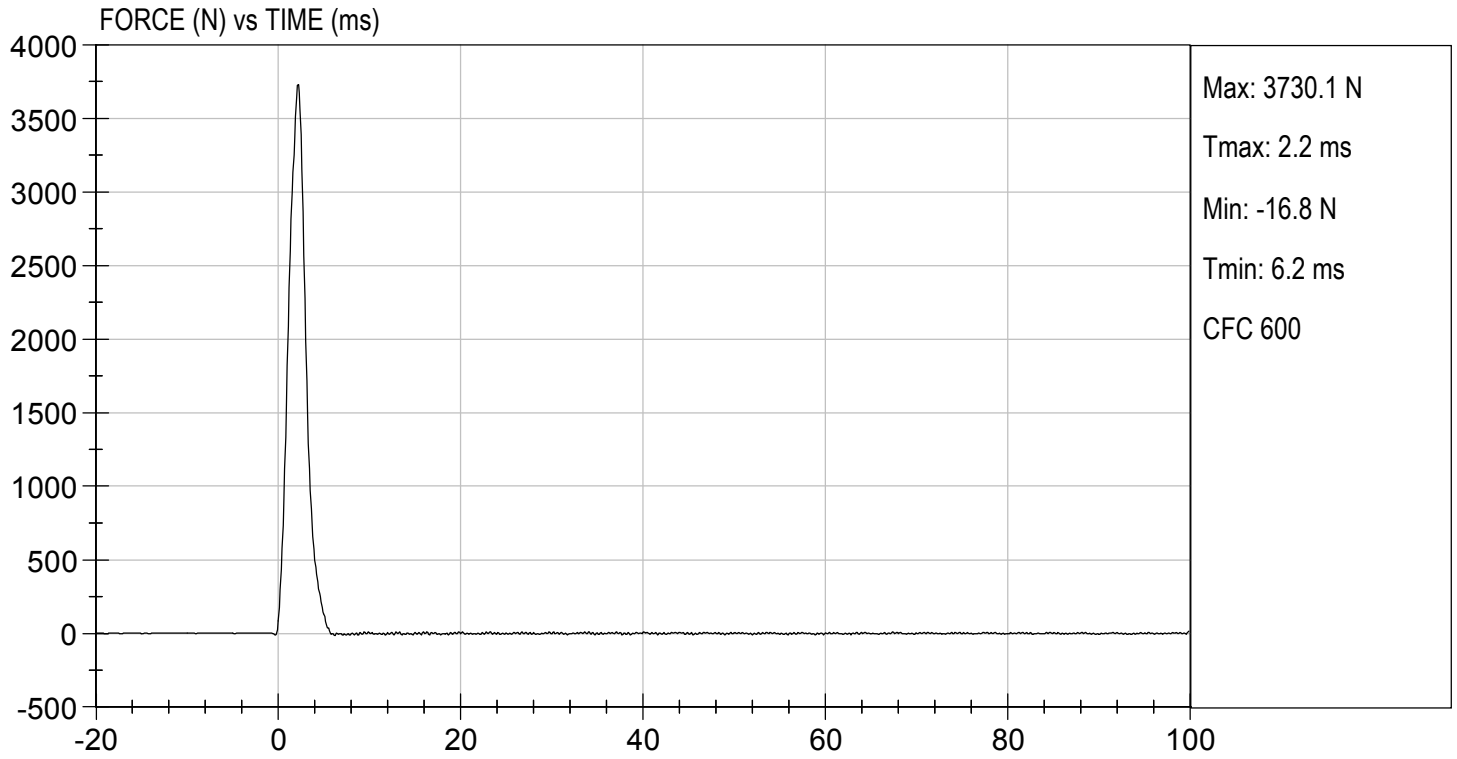
01/07/2020
Test Date


Approved By



TEST DESC: RIGHT KNEE
VELOCITY: 6.86 ft/s, 2.09 m/s

TEST DATE: 01/07/2020
TEST #: D200075



MGA RESEARCH CORPORATION

**LEFT KNEE IMPACT TEST
HYBRID III 5TH PERCENTILE**

ATD Serial No: DH1659

Test I.D: D200076

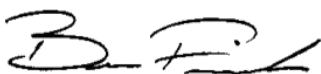
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	28	Pass
Probe Speed	m/s	2.07 to 2.13	2.10	Pass
Maximum Force	N	3450 to 4060	3735	Pass
Overall Test Results				Pass



Laboratory Technician

01/07/2020

Test Date

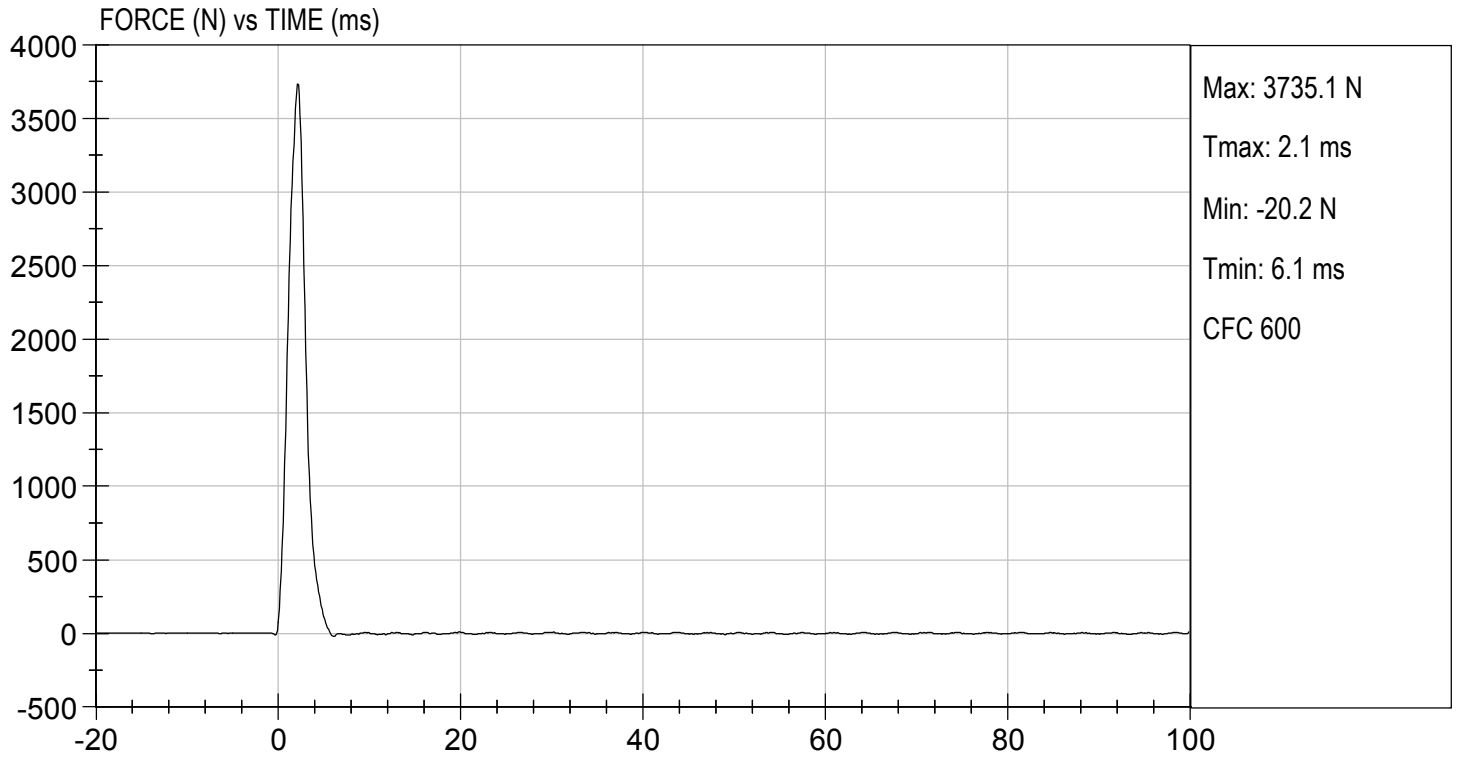


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TEST DESC: LEFT KNEE
VELOCITY: 6.89 ft/s, 2.10 m/s

TEST DATE: 01/07/2020
TEST #: D200076



MGA RESEARCH CORPORATION

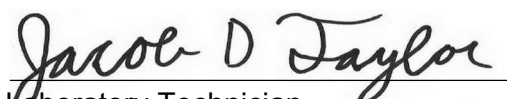
TORSO FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: DH1659

Test I.D: D200077

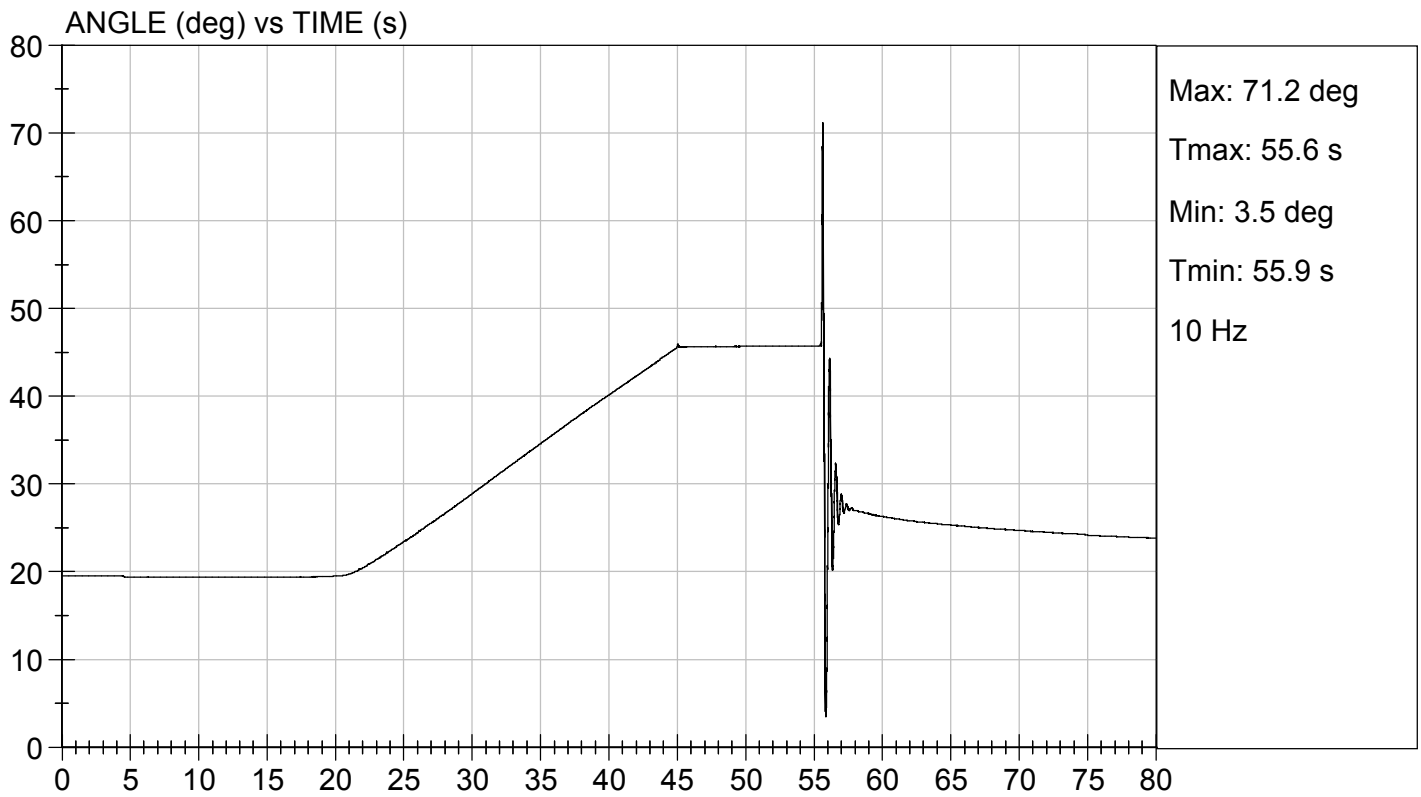
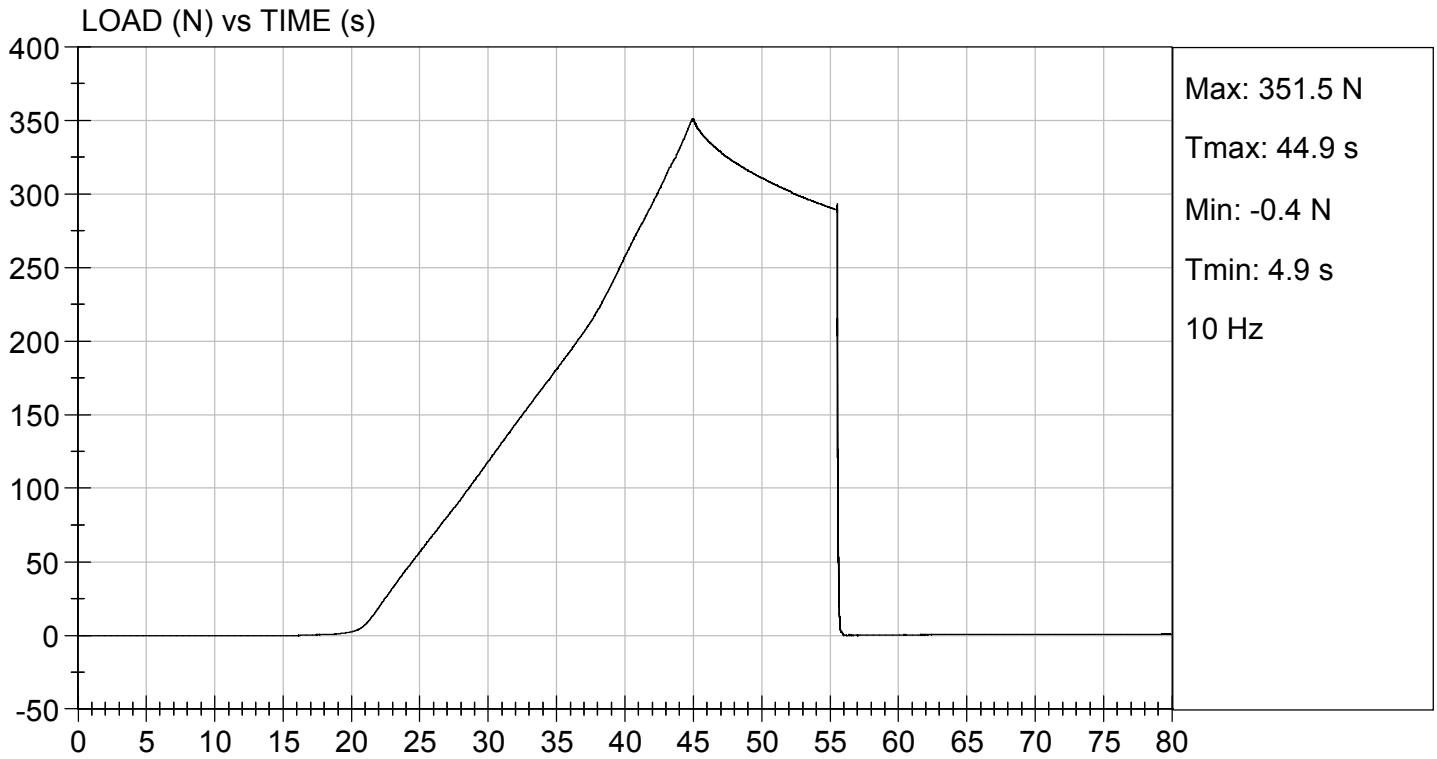
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Initial Angle	deg	0 to 20	20	Pass
Return Angle	deg	+/- 8	4	Pass
Force at 45 deg	N	320 to 390	352	Pass
Upper Torso Deflection Rate	deg/s	0.5 to 1.5	1.1	Pass
Overall Result				Pass


Laboratory Technician

01/07/2020

Test Date


Approved By



APPENDIX D
TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

TABLE 1 – DRIVER DUMMY INSTRUMENTATION

Instrument Location			Axis	Hybrid III 50 th S/N 351		
				Serial Number	Manufacturer	Calibration Date
Head Accelerometers	Primary		X	P79741	Endevco	9/12/2019
			Y	P79743	Endevco	9/12/2019
			Z	P79744	Endevco	9/12/2019
	Redundant		X	P94834	Endevco	9/12/2019
			Y	P94856	Endevco	9/12/2019
			Z	P97412	Endevco	9/12/2019
Head Angular Rate Sensors			X	ARS7325	DTS	7/8/2019
			Y	ARS7371	DTS	7/8/2019
			Z	ARS7391	DTS	7/8/2019
Upper Neck Load Cell		Fx, Fy, Fz Mx, My, Mz	NG174	FTSS	3/18/2019	
Chest Accelerometers	Primary		X	P86792	Endevco	9/13/2019
			Y	P86793	Endevco	9/13/2019
			Z	P88348	Endevco	9/13/2019
	Redundant		X	P88666	Endevco	9/13/2019
			Y	P88667	Endevco	9/13/2019
			Z	P94109	Endevco	9/13/2019
Chest Potentiometer		X	351	Servo	9/13/2019	
Pelvis Accelerometers			X	P95526	Endevco	9/12/2019
			Y	P96038	Endevco	9/12/2019
			Z	P97742	Endevco	9/12/2019
Femur Load Cells	Right	Primary	Z	FG121P	Denton	9/13/2019
		Redundant	Z	FG121R	Denton	9/13/2019
	Left	Primary	Z	FG122P	Denton	9/13/2019
		Redundant	Z	FG122R	Denton	9/13/2019
Tibia Load Cells	Right	Upper	Mx, My, Fz	TG405	Denton	3/18/2019
		Lower	Mx, My, Fz	AG368	Denton	3/18/2019
	Left	Upper	Mx, My, Fz	TG475	Denton	3/18/2019
		Lower	Mx, My, Fz	AG504	Denton	3/18/2019
Foot Accelerometers	Right	Rear	X	P94812	Endevco	9/12/2019
			Z	T16447	Endevco	9/12/2019
		Front	Z	P82120	Endevco	9/12/2019
	Left	Rear	X	T16468	Endevco	9/12/2019
			Z	T16496	Endevco	9/12/2019
		Front	Z	T16501	Endevco	9/12/2019
Seat Belt Load Cells		Lap				
		Shoulder				

TABLE 2 – FRONT PASSENGER DUMMY INSTRUMENTATION

Instrument Location			Axis	Hybrid III 5 th S/N DH1659		
				Serial Number	Manufacturer	Calibration Date
Head Accelerometers	Primary		X	P82304	Endevco	8/21/2019
			Y	P88172	Endevco	8/21/2019
			Z	T16400	Endevco	8/21/2019
	Redundant		X	T16403	Endevco	8/21/2019
			Y	T16406	Endevco	8/21/2019
			Z	T16413	Endevco	8/21/2019
Head Angular Rate Sensors			X	ARS7340	DTS	7/8/2019
			Y	ARS7354	DTS	7/8/2019
			Z	ARS7357	DTS	7/8/2019
Upper Neck Load Cell		Fx, Fy, Fz Mx, My, Mz	NG2256	Denton	4/19/2019	
Chest Accelerometers	Primary		X	T16415	Endevco	8/21/2019
			Y	T16416	Endevco	8/21/2019
			Z	T16420	Endevco	8/21/2019
	Redundant		X	T16423	Endevco	8/21/2019
			Y	T16426	Endevco	8/21/2019
			Z	T16433	Endevco	8/21/2019
Chest Potentiometer			X	DH1659	Servo	8/21/2019
Pelvis Accelerometers			X	T16434	Endevco	8/21/2019
			Y	T16435	Endevco	8/21/2019
			Z	T16436	Endevco	8/21/2019
Femur Load Cells	Right	Primary	Z	FG126P	Denton	8/21/2019
		Redundant	Z	FG126R	Denton	8/21/2019
	Left	Primary	Z	FG127P	Denton	8/21/2019
		Redundant	Z	FG127R	Denton	8/21/2019
Tibia Load Cells	Right	Upper	Mx, My, Fz	TG467	Denton	5/9/2019
		Lower	Mx, My, Fz	AG491	Denton	5/9/2019
	Left	Upper	Mx, My, Fz	TG478	Denton	5/9/2019
		Lower	Mx, My, Fz	AG500	Denton	5/9/2019
Foot Accelerometers	Right	Rear	X	T16437	Endevco	8/20/2019
			Z	T16438	Endevco	8/20/2019
		Front	Z	T16439	Endevco	8/20/2019
	Left	Rear	X	T16441	Endevco	8/20/2019
			Z	T16444	Endevco	8/20/2019
		Front	Z	T16445	Endevco	8/20/2019
Seat Belt Load Cells		Lap				
		Shoulder				

TABLE 3 – VEHICLE INSTRUMENTATION

Instrument Location			Axis	Serial Number	Manufacturer	Calibration Date
Crossmember / Rear Seat Accelerometers	Left	Primary	X	T21457	Endevco	7/26/2019
			Z	T20368	Endevco	9/26/2019
		Redundant	X	T20401	Endevco	9/26/2019
	Right	Primary	X	T21391	Endevco	7/29/2019
			Z	T20029	Endevco	11/13/2019
		Redundant	X	T19379	Endevco	12/17/2019
Engine Accelerometers		Top	X	PCB1247	Endevco	7/24/2019
		Bottom	X	PCB1294	PCB	7/24/2019