

REPORT NUMBER: NCAP-MGA-2016-049

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

**TOYOTA MOTOR MANUFACTURING CANADA, INC.
2016 Lexus RX 350 AWD 5-Door SUV
NHTSA No.: O20165100**

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



Test Date: June 8, 2016

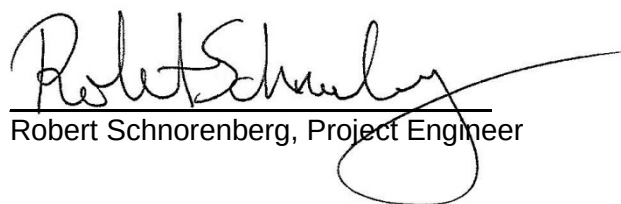
Final Report Date: July 21, 2016

FINAL REPORT

**U.S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Office of Crashworthiness Standards
Mail Code: NRM-110
1200 New Jersey Ave, SE
Room W43-410
Washington, DC 20590**

This publication is distributed by the U.S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration. The United States Government assumes no liability for its contents or use thereof. If trade or manufacturers' names or products are mentioned, it is only because they are considered essential to the object of the publication and should not be construed as an endorsement. The United States Government does not endorse products or manufacturers.

Prepared by: 
Ben Fischer, Project Engineer

Approved by: 
Robert Schnorenberg, Project Engineer

Approval Date: July 21, 2016

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

Technical Report Documentation Page

1. Report No. NCAP-MGA-2016-049	2. Government Accession No.	3. Recipient's Catalog No.																																																					
4. Title and Subtitle Final Report of New Car Assessment Program Frontal Impact Testing of a 2016 Lexus RX 350 AWD 5-Door SUV, NHTSA No.: O20165100		5. Report Date July 21, 2016																																																					
		6. Performing Organization Code MGA																																																					
7. Author(s) Ben Fischer, Project Engineer		8. Performing Organization Report No. NCAP-MGA-2016-049																																																					
9. Performing Organization Name and Address MGA Research Corporation 5000 Warren Road Burlington, WI 53105		10. Work Unit No.																																																					
		11. Contract or Grant No. DTNH22-12-D-00258																																																					
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards (NRM-110) 1200 New Jersey Ave, SE, Room W43-410 Washington, D.C. 20590		13. Type of Report and Period Covered Final Test Report June 8, 2016 to July 21, 2016																																																					
		14. Sponsoring Agency Code NRM-110																																																					
15. Supplementary Notes																																																							
16. Abstract A 56.3 km/h NCAP Frontal Impact Test was conducted on a 2016 Lexus RX 350 AWD 5-Door SUV in accordance with the specifications of the Office of Crashworthiness Standards Frontal NCAP Laboratory Test Procedure. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), and 301 performance. The test was conducted at MGA Research Corporation in Burlington, Wisconsin on June 8, 2016. The impact velocity of the vehicle was 56.09 km/h and the ambient temperature at the barrier face at the time of impact was 21.8°C. The target vehicle post-test maximum crush was 654mm located at the vehicle's centerline. The test vehicle's performance was as follows: <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <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>N/A</td> <td>700</td> <td>339</td> <td>700</td> <td>220</td> </tr> <tr> <td>Maximum Chest</td> <td>mm</td> <td>63</td> <td>28</td> <td>52</td> <td>11</td> </tr> <tr> <td>Nij</td> <td>N/A</td> <td>1</td> <td>0.44</td> <td>1</td> <td>0.47</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>4170</td> <td>2593</td> <td>2620</td> <td>1261</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>4000</td> <td>399</td> <td>2520</td> <td>346</td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>10008</td> <td>2387</td> <td>6805</td> <td>1691</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>10008</td> <td>2825</td> <td>6805</td> <td>1071</td> </tr> </tbody> </table>				Measurement Description	Units	Driver ATD		Passenger ATD		Threshold	Result	Threshold	Result	Head Injury Criteria (HIC ₁₅)	N/A	700	339	700	220	Maximum Chest	mm	63	28	52	11	Nij	N/A	1	0.44	1	0.47	Neck Tension	N	4170	2593	2620	1261	Neck Compression	N	4000	399	2520	346	Left Femur Force	N	10008	2387	6805	1691	Right Femur Force	N	10008	2825	6805	1071
Measurement Description	Units	Driver ATD				Passenger ATD																																																	
		Threshold	Result	Threshold	Result																																																		
Head Injury Criteria (HIC ₁₅)	N/A	700	339	700	220																																																		
Maximum Chest	mm	63	28	52	11																																																		
Nij	N/A	1	0.44	1	0.47																																																		
Neck Tension	N	4170	2593	2620	1261																																																		
Neck Compression	N	4000	399	2520	346																																																		
Left Femur Force	N	10008	2387	6805	1691																																																		
Right Femur Force	N	10008	2825	6805	1071																																																		
17. Key Words 35 mph Frontal Barrier Impact Test New Car Assessment Program (NCAP)		18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Administration Technical Information Services Division, NPO-411 1200 New Jersey Ave, SE Washington, DC 20590 Email: tis@nhtsa.dot.gov FAX: 202-493-2833																																																					
19. Security Classification of Report Unclassified	20. Security Classification of Page Unclassified	21. No. of Pages 168	22. Price																																																				

TABLE OF CONTENTS

<u>Section</u>		<u>Page No.</u>
1	Purpose and Summary of Test	1
2	Occupant and Vehicle Information / Data Sheets	3

<u>Data Sheet No.</u>		<u>Page No.</u>
1	General Test and Vehicle Parameter Data	4
2	Seat Adjustment, Fuel System, and Steering Wheel Data	8
3	Dummy Longitudinal Clearance Dimensions	10
4	Dummy Lateral Clearance Dimensions	11
5	Seat Belt Positioning Data	12
6	High-Speed Camera Locations and Data	13
7	Vehicle Accelerometer Locations	15
8	Photographic Reference Target Locations	16
9	Load Cell Locations on Fixed Barrier	17
10	Test Vehicle Summary of Results	18
11	Post-Test Observations	19
12	Vehicle Profile Measurements	20
13	Accident Investigation Division Data	22
14	Vehicle Intrusion Measurements	23
15	Summary of FMVSS 212, FMVSS 219 (Partial) Data, and 301 Data	25
16	FMVSS 301 Static Rollover Results	27
17	Dummy/Vehicle Temperature Stabilization Data	28

<u>Appendix</u>		
A	Photographs	A
B	Dummy Response Data Traces	B
C	Dummy Calibration and Performance Verification Data	C

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 DTNH22-12-D-00258. 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 Frontal NCAP Laboratory Test Procedure.

SUMMARY

A load cell barrier consisting of 176 load cells was impacted by a 2016 Lexus RX 350 AWD 5-Door SUV at a velocity of 56.09 km/h. The test was performed at MGA Research Corporation on June 8, 2016. Pre-test and post-test photographs of the vehicle and dummies can be found in Appendix A.

Two (2) real-time cameras and fourteen (14) 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 Frontal NCAP Laboratory Test Procedure.

Both ATDs were fully instrumented with head, chest and pelvis tri-axial accelerometers, chest displacement potentiometers, upper neck transducers, right/left femur load cells, and lower leg instrumentation. Seat belt load cells were also installed on the driver's shoulder belt, driver's lap belt, passenger's shoulder belt, and passenger's lap belt to measure dummy torso section loading.

The driver (position 1) ATD (Serial No. 351) and the right-front passenger (position 2) ATD (Serial No. 138) were calibrated 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 654mm 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, headliner, and curtain airbag. The driver's knees contacted the knee airbag. The passenger's visible contact points were as follows: The passenger's head contacted the airbag. The passenger's head also contacted the headrest and headliner. 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 (Gs)	Chest Disp. (mm)	Left Femur (N)	Right Femur (N)
Driver (50 th)	339	0.44	2593	399	50	28	2387	2825
Passenger (5 th)	220	0.47	1261	346	52	11	1691	1071

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

TEST NOTES

Barrier K-16 My recorded no valid data.
 Barrier C-04 Fx recorded no valid data.
 Barrier C-04 My recorded no valid data.
 Barrier C-04 Mz 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: 2016 Lexus RX 350 AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20165100
 Test Date: 6/8/2016

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	O20165100	Traction Control System (TCS)	Yes
Model Year	2016	Power Steering	Yes
Make	Lexus	Power Window Auto-Reverse	Yes
Model	RX 350 AWD	Driver Frontal Airbag	Yes
Body Style	5-Door SUV	Driver Curtain Airbag	Yes
VIN	2T2BZMCA5GC007578	Driver Head/Torso Airbag	No
Body Color	Silver Lining Metallic	Driver Torso Airbag	No
Odometer (km/mi)	142km / 88mi	Driver Torso/Pelvis Airbag	Yes
Engine Displacement (L)	3.5 L	Driver Pelvis Airbag	No
Type/No. Cylinders	6	Driver Knee Airbag	Yes
Engine Placement	Lateral	Front Pass. Frontal Airbag	Yes
Transmission Type	Automatic	Front Pass. Curtain Airbag	Yes
Transmission Speeds	8	Front Pass. Head/Torso Airbag	No
Overdrive	Yes	Front Pass. Torso Airbag	No
Final Drive	AWD	Front Pass. Torso/Pelvis Airbag	Yes
Roof Rack	No	Front Pass. Pelvis Airbag	No
Sunroof/T-Top	Yes	Front Pass. Knee Airbag	No
Running Boards	No	Driver Pretensioner	Yes
Tilt Steering Wheel	Yes	Driver Load Limiter	Yes
Power Seats	Yes	Front Pass. Pretensioner	Yes
Anti-Lock Brakes (ABS)	Yes	Front Pass. Load Limiter	Yes
Automatic Door Locks (ADLs)	Yes	Front Pass. Seat Pan Airbag	Yes

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

Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	TOYOTA MOTOR MANUFACTURING CANADA, INC.
Date of Manufacture	11/15

GVWR (kg)	2660
GAWR Front (kg)	1360
GAWR Rear (kg)	1460

VEHICLE SEATING AND WEIGHT CAPACITY DATA

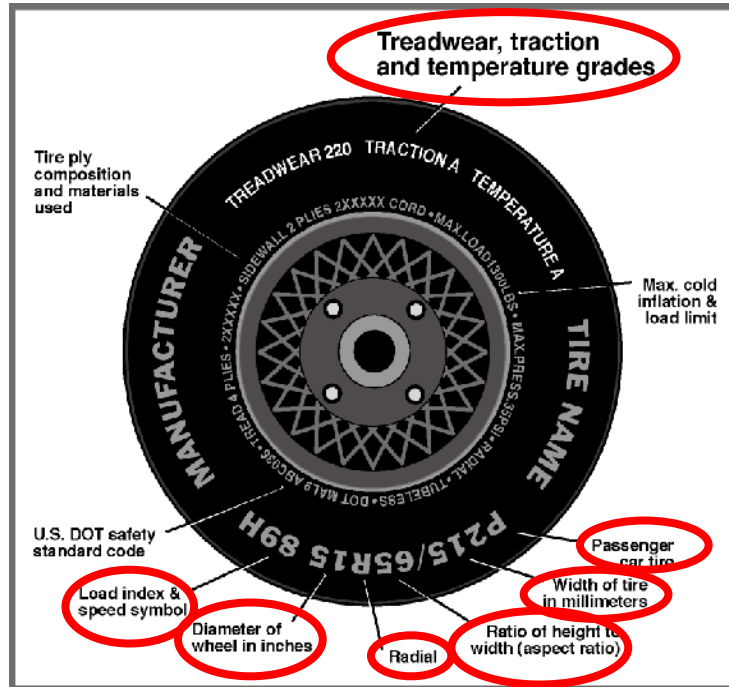
Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Split Bench		
Designated Seating Capacity (DSC)	2	3		5
Capacity Weight (VCW) (kg)				420
Cargo Weight (RCLW) (kg)				64

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

Test Vehicle: 2016 Lexus RX 350 AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20165100
 Test Date: 6/8/2016

VEHICLE TIRE INFORMATION



Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	230	230
Recommended Tire Size	235/65R18	235/65R18
Tire Size on Vehicle	235/65R18	235/65R18
Tire Manufacturer	Michelin	Michelin
Tire Model	Primier LTX	Primier LTX
Treadwear	620	620
Traction	A	A
Temperature Grade	A	A
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Polyester, 2 Steel, 1 Polyamide	2 Polyester, 2 Steel, 1 Polyamide
Load Index/Speed Symbol	106V	106V
Tire Material	Rubber	Rubber
DOT Safety Code Left	M3MB KOKX 4515	M3MB KOKX 4515
DOT Safety Code Right	M3MB KOKX 4515	M3MB KOKX 4515

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

Test Vehicle: 2016 Lexus RX 350 AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20165100
 Test Date: 6/8/2016

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	583.5	443.5		608.5	523.5	
Right	kg	573.5	424.5		602.5	487.0	
Ratio	%	57.1%	42.9%		54.5%	45.5%	
Totals	kg	1157.0	868.0	2025.0	1211.0	1010.5	2221.5

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	2025.0
Weight of 1 P572E ATD & 1 P572O ATD	kg	141
Rated Cargo/Luggage Weight (RCLW)	kg	64
Calculated Test Vehicle Target Weight (TVTW)	kg	2230.0

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	832	832	847	855	1196
As Tested	mm	819	825	825	832	1269
Post Test	mm	786	797	829	833	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2791
Total Vehicle Length at Left Side	mm	4640
Total Vehicle Length at Centerline	mm	4891
Total Vehicle Length at Right Side	mm	4640
Weight of Ballast in Cargo Area	kg	21
Weight of Vehicle Components Removed	kg	43
Amount of Stoddard Solvent in Fuel Tank	L	55.6

List of components removed to meet test weight: None.

List of components removed for instrumentation, data box, and equipment installation: Cargo area carpet and trim, LR and RR floor mat, RR tail light, spare tire and cover, jack and tool kit.

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

Test Vehicle: 2016 Lexus RX 350 AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20165100
 Test Date: 6/8/2016

TARGET VEHICLE STRUCTURAL MEASUREMENT

	Elements	Pre-Test (mm)
1	Total Length	4891
2	Total Width	1897
3	Bumper Top Height	578
4	Bumper Bottom Height	485
5	Longitudinal Member Top Height	645
6	Distance between Longitudinal Members	947
7	Longitudinal Member Width	78
8	Engine Top Height	964
9	Engine Bottom Height	223
10	Engine and Gearbox Width	910
11	Front Bumper-Engine Distance	300
12	Front Shock Absorber Fixing Height	1024
13	Bonnet Leading Edge Height	937
14	Front Shock Absorber Fixing Width	1224
15	Front Bumper – Front Axle Distance	1086
16	Front Axle – A-Pillar Distance	530
17	A-Pillar – B-Pillar Distance	1061
18	B-Pillar – Rear Axle Distance	1208
19	B-Pillar – C-Pillar Distance	674
20	Roof Sill Bottom Height	1509
21	Roof Sill Top Height	1640
22	Floor Sill Bottom Height	294
23	Floor Sill Top Height	508

DATA SHEET NO. 2

SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

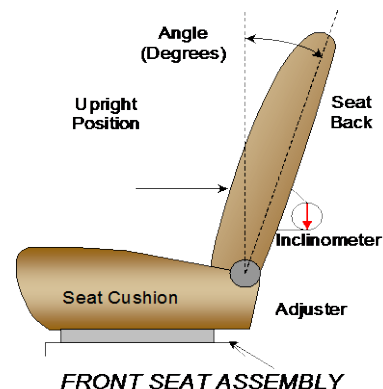
Test Vehicle: 2016 Lexus RX 350 AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20165100
 Test Date: 6/8/2016

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 October 2015.

	Degrees
Driver Seat Back Angle	3.2° on headrest post
Passenger Seat Back Angle	-1.2° on headrest post



SEAT FORE/AFT POSITIONS

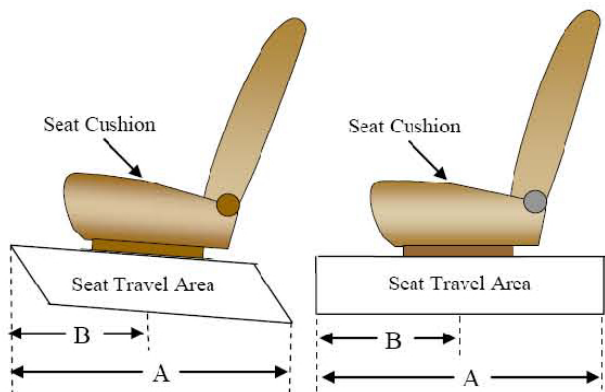
The driver and passenger seat fore/aft positions are adjusted following Appendix F, "Driver & Passenger Dummy Seating & Positioning Procedures" in the NCAP Test Procedure dated October 2015.

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	319 mm	160 mm
Passenger Seat	260 mm	0 mm

SEAT BELT UPPER ANCHORAGES

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

	Total # of Positions	Placed in Position #
Driver Seat	4 (1 st as 1)	0 (1 st as 0)
Passenger Seat	4 (1 st as 1)	0 (1 st as 0)



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

Test Vehicle: 2016 Lexus RX 350 AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20165100
 Test Date: 6/8/2016

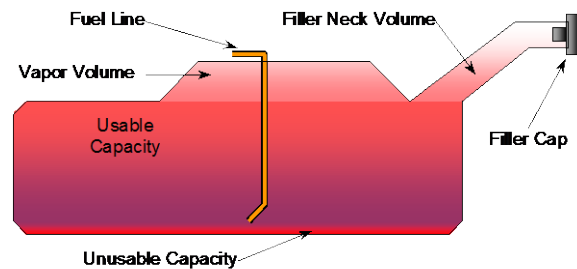
FUEL TANK CAPACITY DATA

	Liters
Usable Capacity of "Standard Tank"	60.2
Usable Capacity of "Optional Tank"	
92-94% of Usable Capacity	55.4 to 56.6
Actual Amount of Solvent used	55.6
1/3 of Usable Capacity	20.1

FUEL PUMP

Describe the fuel pump type, its behavior, and the location of the fuel filler pipe.

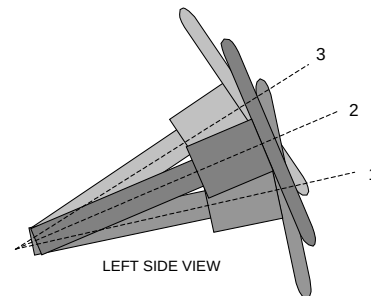
The filler neck is located on the driver's side.



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

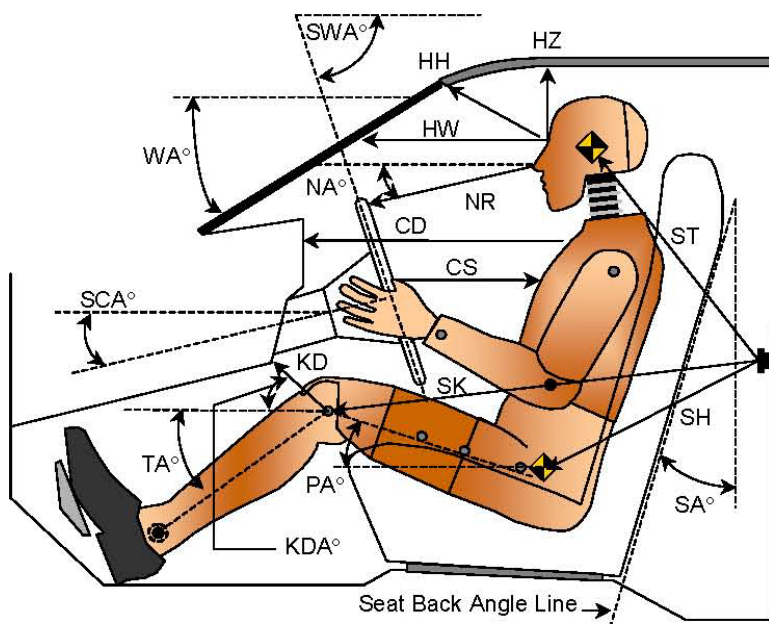
STEERING COLUMN POSITION

	Degrees	Fore/Aft
Lowermost Position 1	68.6	200
Geometric Center	66.4	221
Uppermost Position 3	64.2	242
Telescoping Steering		42
Test Position	66.4	221

DATA SHEET NO. 3 DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2016 Lexus RX 350 AWD 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20165100
Test Date: 6/8/2016



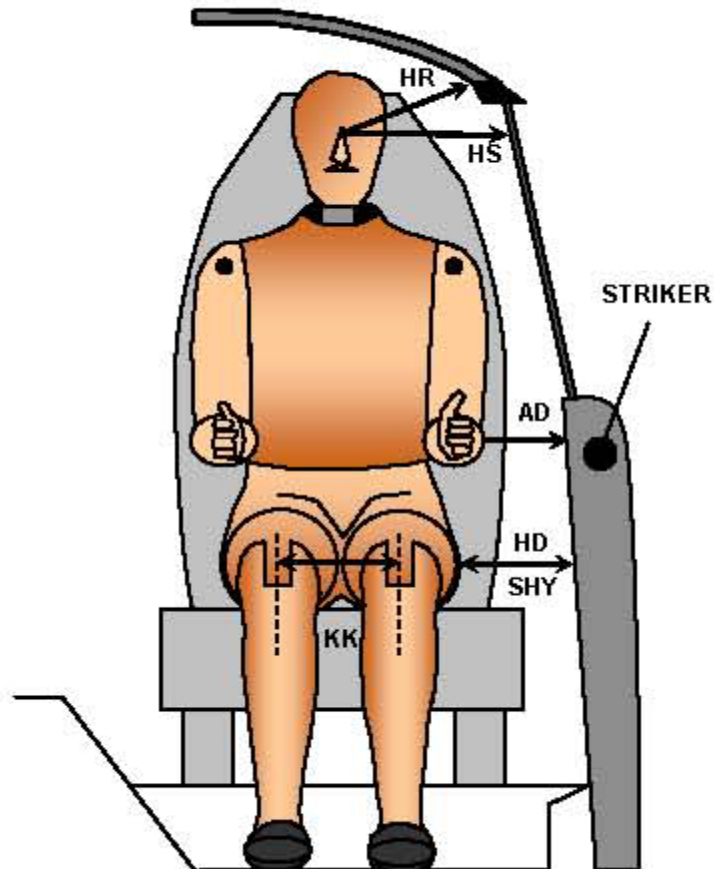
LEFT SIDE VIEW

Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		24.2		
SWA°	Steering Wheel Angle		66.4		
SCA°	Steering Column Angle		33.6		
SA°	Seat Back Angle (on headrest post)		3.2		-1.2
HZ	Head to Roof (Z)	177	90	195	90
HH	Head to Header	372	28.1	273	46.0
HW	Head to Windshield	717	0	657	0
NR	Nose to Rim	367	8.1		
CD	Chest to Dash	490		325	
CS	Chest to Steering Hub	276	2.9		
RA	Rim to Abdomen	157	0		
KDL	Left Knee to Dash	129	22.5	64	32.4
KDR	Right Knee to Dash	107	23.1	65	32.0
PA°	Pelvic Angle		24.2		20.5
TA°	Tibia Angle		53.6		49.1
SK	Striker to Knee	679	101.7	773	104.5
ST	Striker to Head	438	22.6	475	40.2
SH	Striker to H-Point	371	135.0	473	117.1

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2016 Lexus RX 350 AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20165100
 Test Date: 6/8/2016



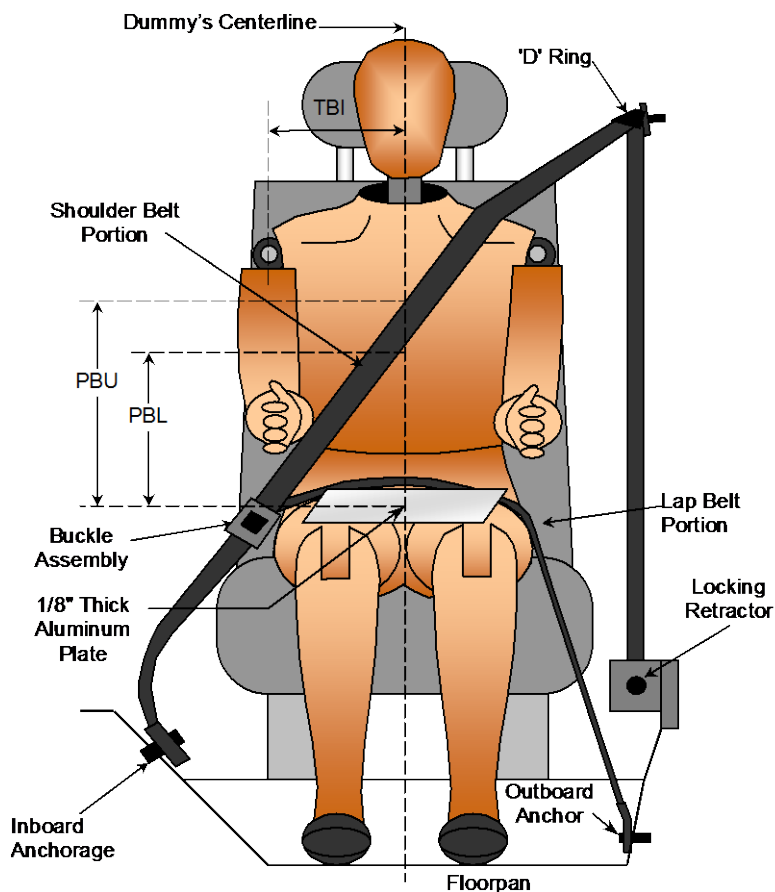
FRONT VIEW OF DUMMY

Code	Measurement Description	Driver	Passenger
		Length (mm)	
AD	Arm to Door	141	97
HD	H-Point to Door	237	264
HR	Head to Side Header	228	244
HS	Head to Side Window	335	373
KK	Knee to Knee	354	227
SHY	Striker to H-Point (Y Direction)	333	350
AA	Ankle to Ankle	337	164

DATA SHEET NO. 5 SEAT BELT POSITIONING DATA

Test Vehicle: 2016 Lexus RX 350 AWD 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20165100
Test Date: 6/8/2016



FRONT VIEW OF DUMMY

SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU - Top surface of reference to belt upper edge	mm	385	360
PBL - Top surface of reference to belt lower edge	mm	300	280

BELT LENGTH DATA

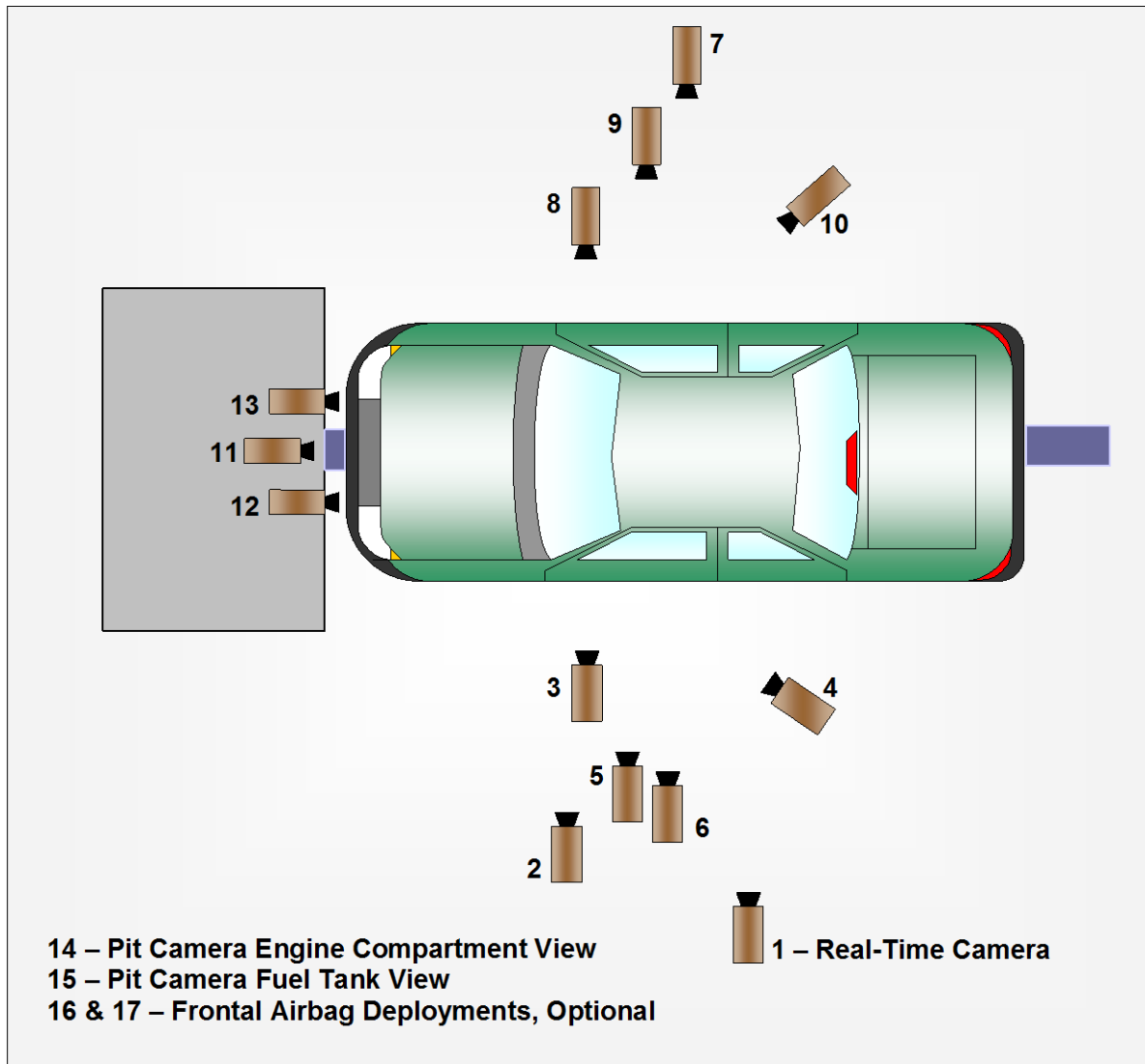
Measurement Description	Units	Driver	Passenger
Shoulder Belt Length as measured on ATD	mm	875	950
Lap Belt Length as measured on ATD	mm	850	965
Remainder of belt on reel	mm	945	755
Total Belt Length for Continuous Webbing Systems	mm	3420	3420

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

Test Vehicle: 2016 Lexus RX 350 AWD 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20165100
Test Date: 6/8/2016

CAMERA POSITIONS FOR FRONTAL IMPACTS



DATA SHEET NO. 6 (CONTINUED)
CAMERA LOCATIONS AND DATA

Test Vehicle: 2016 Lexus RX 350 AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20165100
 Test Date: 6/8/2016

CAMERA LOCATIONS

No.	Camera View	Coordinates (mm)			Lens (mm)	Speed (fps)
		X*	Y*	Z*		
1	Real-Time Left Overall					30
2	Driver Close-Up	-1870	-6960	-2050	35	1000
3	Left Front Half	-1180	-5390	-1120	24	1000
4	Left Angle	-5820	-5120	-2020	50	1000
5	Steering Column - Top					
6	Steering Column - Bottom					
7	Right Overall	-2330	6760	-1130	20	1000
8	Passenger Close-Up	-1890	6910	-2020	35	1000
9	Right Front Half	-1030	5370	-1220	24	1000
10	Right Angle	-5970	5140	-2050	50	1000
11	Windshield	440	0	-2810	20	1000
12	Driver Windshield	-30	-450	-2030	8.5	1000
13	Passenger Windshield	-30	450	-2030	8.5	1000
14	Pit Front	-890	0	3150	24	1000
15	Pit Rear	-3040	0	3150	24	1000
16	Onboard Driver Side				12	1000
17	Onboard Passenger Side				12	1000
18	Real-Time Pan View					30

***COORDINATES:**

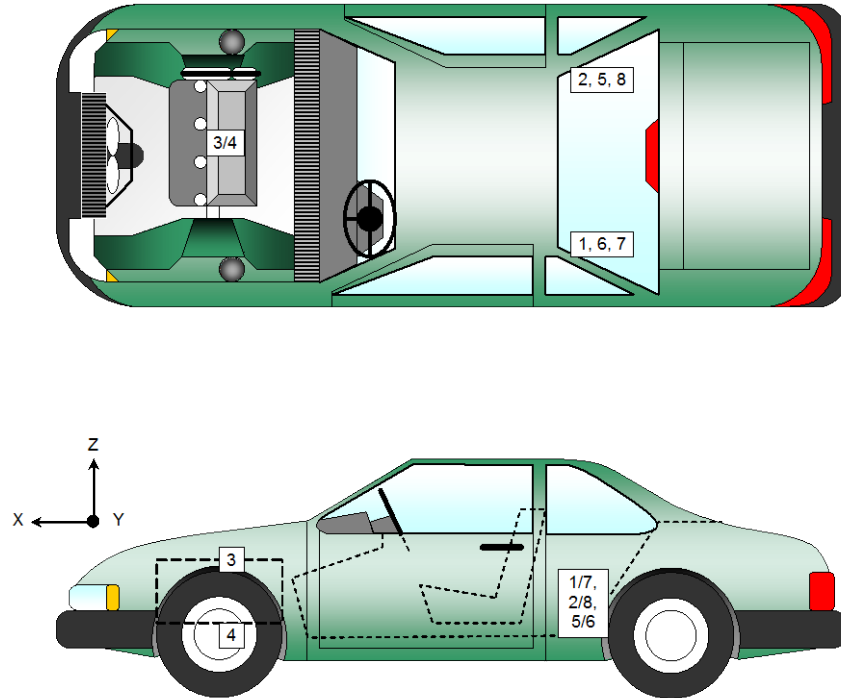
+X = forward of impact plane
 +Y = right of monorail centerline
 +Z = below ground level

Cameras 5 & 6 were not used for this test.

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

Test Vehicle: 2016 Lexus RX 350 AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20165100
 Test Date: 6/8/2016



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear Crossmember Accelerometer – X Direction	1960	-387	-437
2	Right Rear Crossmember Accelerometer – X Direction	1962	398	-437
3	Engine Top X	4095	-43	-856
4	Engine Bottom X	4095	0	-344
5	Left Rear Crossmember Accelerometer – Z Direction	1960	-387	-437
6	Right Rear Crossmember Accelerometer – Z Direction	1962	398	-437
7	Left Rear Crossmember Accelerometer Redundant – X Direction	2098	-387	-435
8	Right Rear Crossmember Accelerometer Redundant – X Direction	2100	398	-435

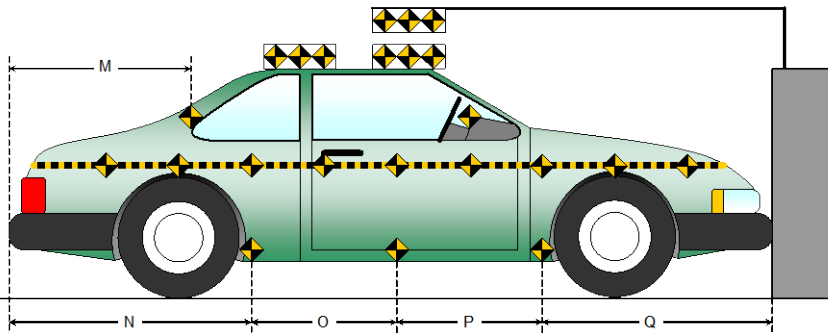
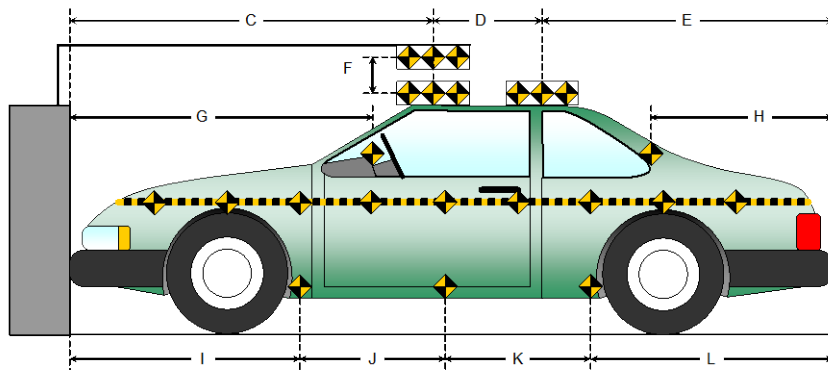
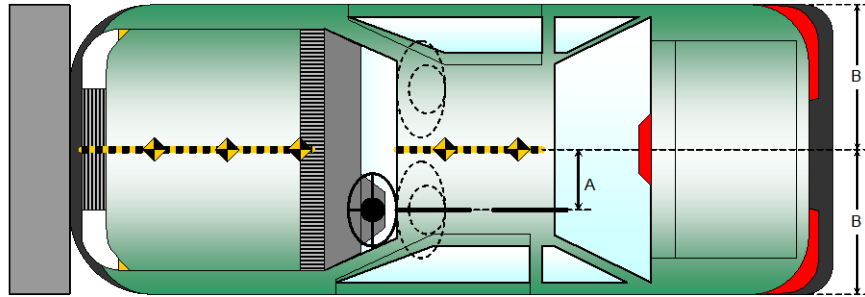
Reference Points: X - Rear Surface of Vehicle (+ forward)
 Y - Vehicle Centerline (+ to right)
 Z - Ground Plane (+ down)

DATA SHEET NO. 8
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2016 Lexus RX 350 AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20165100
 Test Date: 6/8/2016

Item	Value (mm)
A	390
B	949
C	2430
D	609
E	1852
F	110
G	
H	1502
I	1612
J	866
K	866
L	1547
M	1502
N	1547
O	866
P	866
Q	1612



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

Test Vehicle: 2016 Lexus RX 350 AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20165100
 Test Date: 6/8/2016

Advanced Research Load Cell Barrier

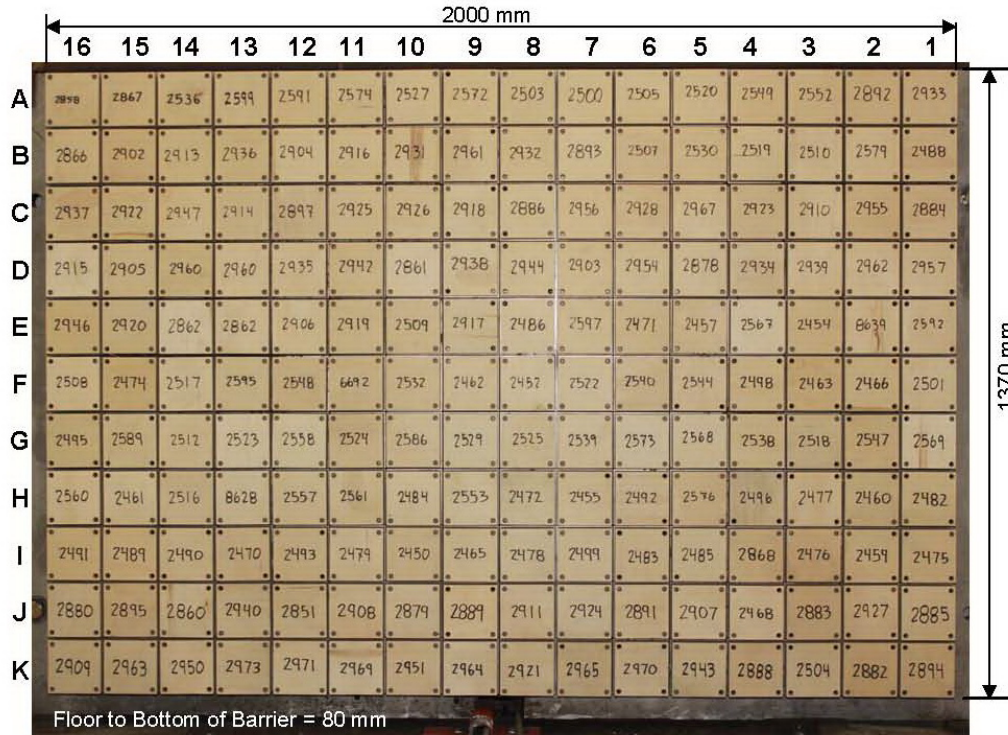


Photo for Reference Only

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: 2016 Lexus RX 350 AWD 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20165100
Test Date: 6/8/2016

INSTRUMENTATION

Driver Dummy Data Channels	49
Passenger Dummy Data Channels	49
Vehicle Structure Accelerometers	8
Barrier Channels	528
Total	634

CAMERA COVERAGE

High-Speed Vehicle Onboard	2
High-Speed Offboard	12
Real-Time	2
Total	16

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

Test Vehicle: 2016 Lexus RX 350 AWD 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20165100
Test Date: 6/8/2016

TEST DUMMY INFORMATION AND CONTACT LOCATIONS

Description	Driver	Passenger
Dummy Type / Serial No.	HIIL 50% / 351	HIIL 5% / 138
Head Contact	Airbag, Headrest, Headliner, CAB	Airbag, Headrest, Headliner
Upper Torso Contact	Airbag	Airbag
Lower Torso Contact	None	None
Left Knee Contact	Knee Airbag	Glove Box
Right Knee Contact	Knee Airbag	Glove Box

DOOR OPENING AND SEAT TRACK INFORMATION

Description	Driver	Passenger
Locked/Unlocked Doors	Doors were unlocked	Doors were unlocked
Front Door Opening	Door remained closed and latched; Door opened without tools	Door remained closed and latched; Door opened without tools
Rear Door Opening	Door remained closed and latched; Door opened without tools	Door remained closed and latched; Door opened without tools
Seat Track Shift (mm)	0	0
Seat Back Failure	None	None

POST TEST STRUCTURAL 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	990
Center	mm	965
Right Side	mm	1045
Average	mm	1000

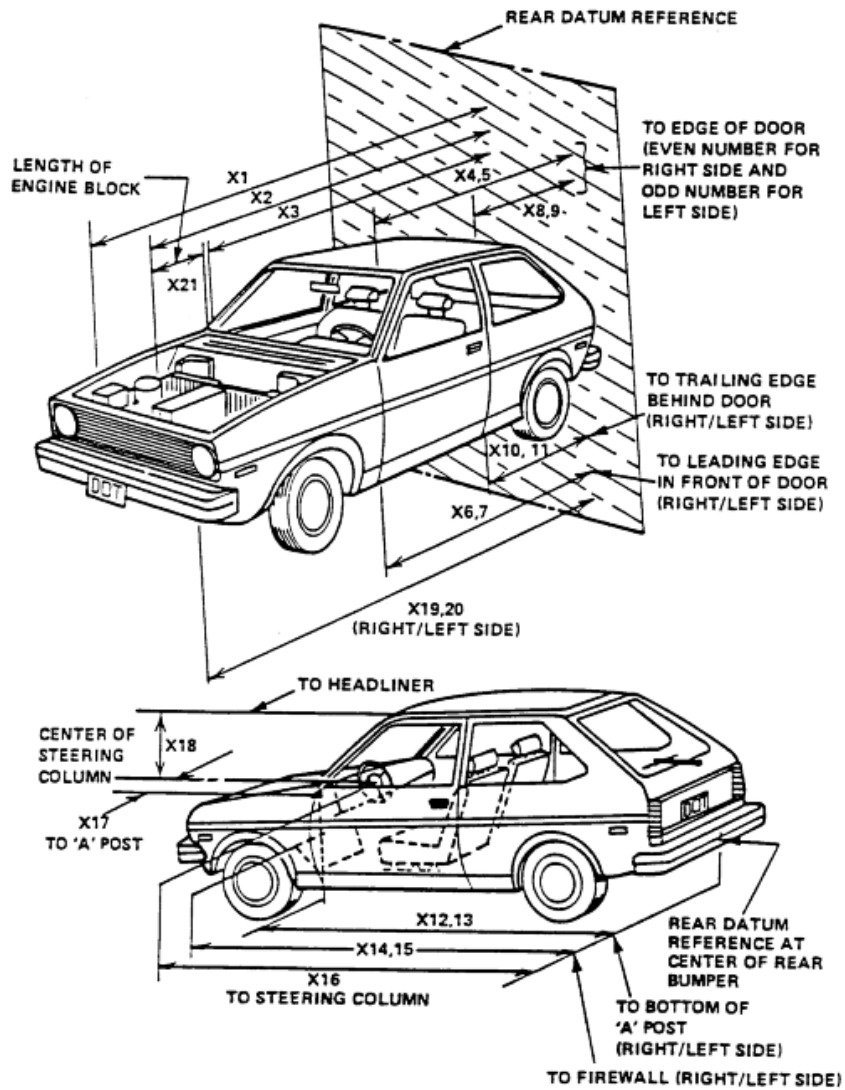
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Driver (Occupant 1)		Passenger (Occupant 2)	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	Yes	Yes	Yes
Curtain Side Airbag	Yes	Yes	Yes	Yes
Torso/Pelvis Side Airbag	Yes	Yes	Yes	Yes
Knee Airbag	Yes	Yes	No	
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load Limiter	Yes		Yes	
Seat Pan Airbag	No		Yes	Yes

DATA SHEET NO. 12 VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2016 Lexus RX 350 AWD 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20165100
Test Date: 6/8/2016



DATA SHEET NO. 12 (CONTINUED)
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2016 Lexus RX 350 AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20165100
 Test Date: 6/8/2016

RSOV (Rear Surface of Vehicle)

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	mm	4891	4237	654
2	RSOV to Front of Engine	mm	4295	4041	254
3	RSOV to Firewall	mm	3610	3634	-24
4	RSOV to Upper Leading Edge of Right Door	mm	3286	3311	-25
5	RSOV to Upper Leading Edge of Left Door	mm	3286	3312	-26
6	RSOV to Lower Leading Edge of Right Door	mm	3248	3258	-10
7	RSOV to Lower Leading Edge of Left Door	mm	3248	3260	-12
8	RSOV to Upper Trailing Edge of Right Door	mm	2191	2212	-21
9	RSOV to Upper Trailing Edge of Left Door	mm	2191	2217	-26
10	RSOV to Lower Trailing Edge of Right Door	mm	2200	2195	5
11	RSOV to Lower Trailing Edge of Left Door	mm	2200	2192	8
12	RSOV to Bottom of "A" Post of Right Side	mm	3273	3276	-3
13	RSOV to Bottom of "A" Post of Left Side	mm	3272	3285	-13
14	RSOV to Firewall, Right Side	mm	3696	3684	12
15	RSOV to Firewall, Left Side	mm	3680	3660	20
16	RSOV to Steering Column	mm	2774	2851	-77
17	Center of Steering Column to "A" Post	mm	410	384	26
18	Center of Steering Column to Headliner	mm	450	455	-5
19	RSOV to Right Side of Front Bumper	mm	4640	4254	386
20	RSOV to Left Side of Front Bumper	mm	4640	4292	348
21	Length of Engine Block	mm	505	505	0
RD	RSOV to Right Side of Dash Panel	mm	3080	3075	5
CD	RSOV to Center of Dash Panel	mm	3023	3059	-36
LD	RSOV to Left Side of Dash Panel	mm	3024	3059	-35

DATA SHEET NO. 13
ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2016 Lexus RX 350 AWD 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20165100
Test Date: 6/8/2016

VEHICLE INFORMATION

VIN: 2T2BZMCA5GC007578

Wheelbase (mm): 2791

Vehicle Size Category: MPV

Test Weight (kg): 2221.5

ACCELEROMETER DATA

Accelerometer Locations: As per measurements on Page 15

Cal. Procedure/Interval: MGA procedure / 6 month

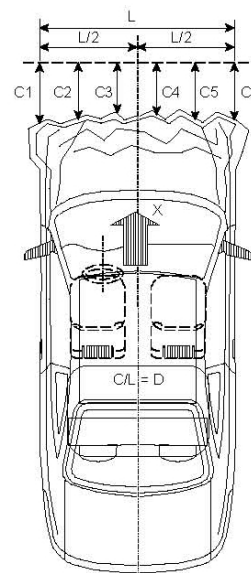
Integration Algorithm: Trapezoidal

Linearity: > 99%

Impact Velocity (km/h): 56.09

Velocity Change (km/h): 62.0

Time of Separation (msec): 96



CRUSH PROFILE

Collision Deformation Classification: Frontal

Midpoint of Damage: Centerline

Damage Region Length (mm): 1500

Impact Mode: Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	4640	4292	348
C2	Crush zone 2 at left side	mm	4753	4262	491
C3	Crush zone 3 at left side	mm	4781	4271	510
C4	Crush zone 4 at right side	mm	4781	4261	520
C5	Crush zone 5 at right side	mm	4753	4239	514
C6	Crush zone 6 at right side	mm	4640	4254	386
L	C1 TO C6	mm	1500	1466	34

**DATA SHEET NO. 14
VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2016 Lexus RX 350 AWD 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

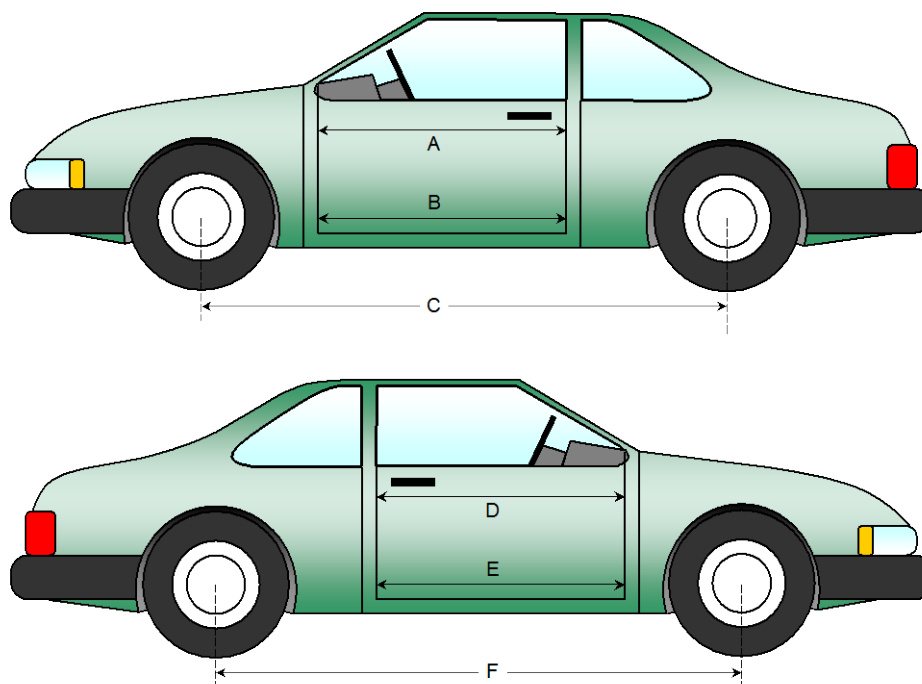
NHTSA No.: O20165100
Test Date: 6/8/2016

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	1020	1020	0
B	Left Side Lower	mm	874	874	0
D	Right Side Upper	mm	1020	1020	0
E	Right Side Lower	mm	874	874	0

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2791	2712	79
F	Right Side Wheelbase	mm	2791	2793	-2



DATA SHEET NO. 14 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

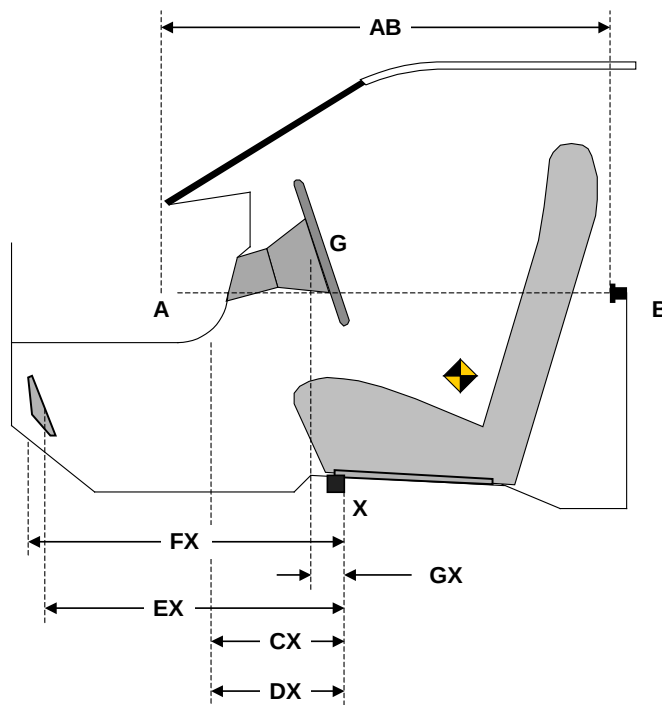
Test Vehicle: 2016 Lexus RX 350 AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20165100
 Test Date: 6/8/2016

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	970	970	0
CX	Left Knee Bolster to X	mm	222	229	-7
DX	Right Knee Bolster to X	mm	230	235	-5
EX	Brake Pedal to X	mm	578	575	3
FX	Foot Rest to X	mm	545	537	8
GX	Center of Steering Column Wheel Hub to X	mm	33	95	-62

X = Front of Seat Track (stationary)



DRIVER COMPARTMENT

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

Test Vehicle: 2016 Lexus RX 350 AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20165100
 Test Date: 6/8/2016

Windshield Mounting Details:

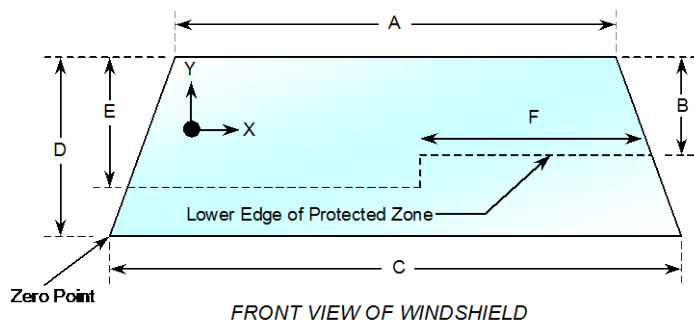
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

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: 21.8° C.

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% of Retention
Left Side	2332	2332	100.0
Right Side	2349	2349	100.0
Total	4681	4681	100.0



Item	Units	Value
A	mm	1240
B	mm	616
C	mm	1493
D	mm	974
E	mm	622
F	mm	511

AREA OF PROTECTED ZONE FAILURES - NONE

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. 15 (CONTINUED)
SUMMARY OF FMVSS 212, FMVSS 219 (PARTIAL), AND 301 DATA

Test Vehicle: 2016 Lexus RX 350 AWD 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20165100
Test Date: 6/8/2016

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 21.8°C Test Time: 10:59 a.m.

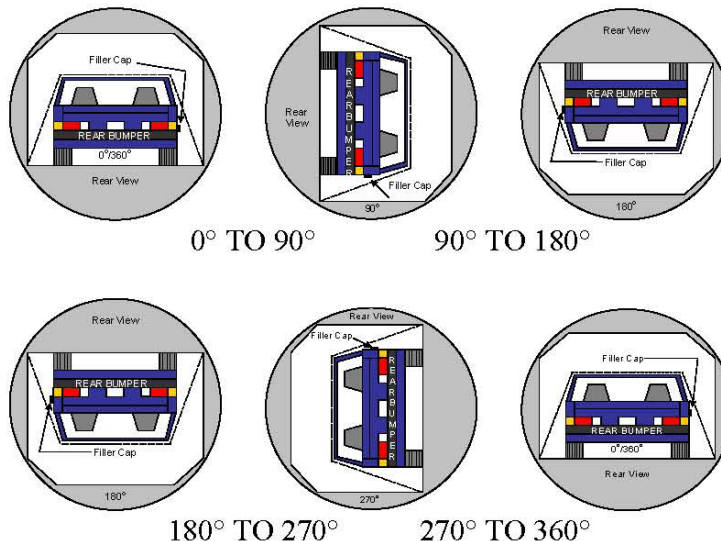
- A. From impact until vehicle motion ceases: 0 oz.
(Maximum allowable = 1 oz.)
- B. For the 5 minute period after motion ceases: 0 oz.
(Maximum allowable = 5 oz.)
- C. For the following 25 minutes: 0 oz.
(Maximum allowable = 1 oz./minute)
- D. Spillage: None

DATA SHEET NO. 16 **FMVSS 301 STATIC ROLLOVER RESULTS**

Test Vehicle: 2016 Lexus RX 350 AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20165100
 Test Date: 6/8/2016

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°	110	300	410
90° to 180°	111	300	411
180° to 270°	108	300	408
270° to 360°	112	300	412

FMVSS 301 SPILLAGE TABLE (units in ounces)

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

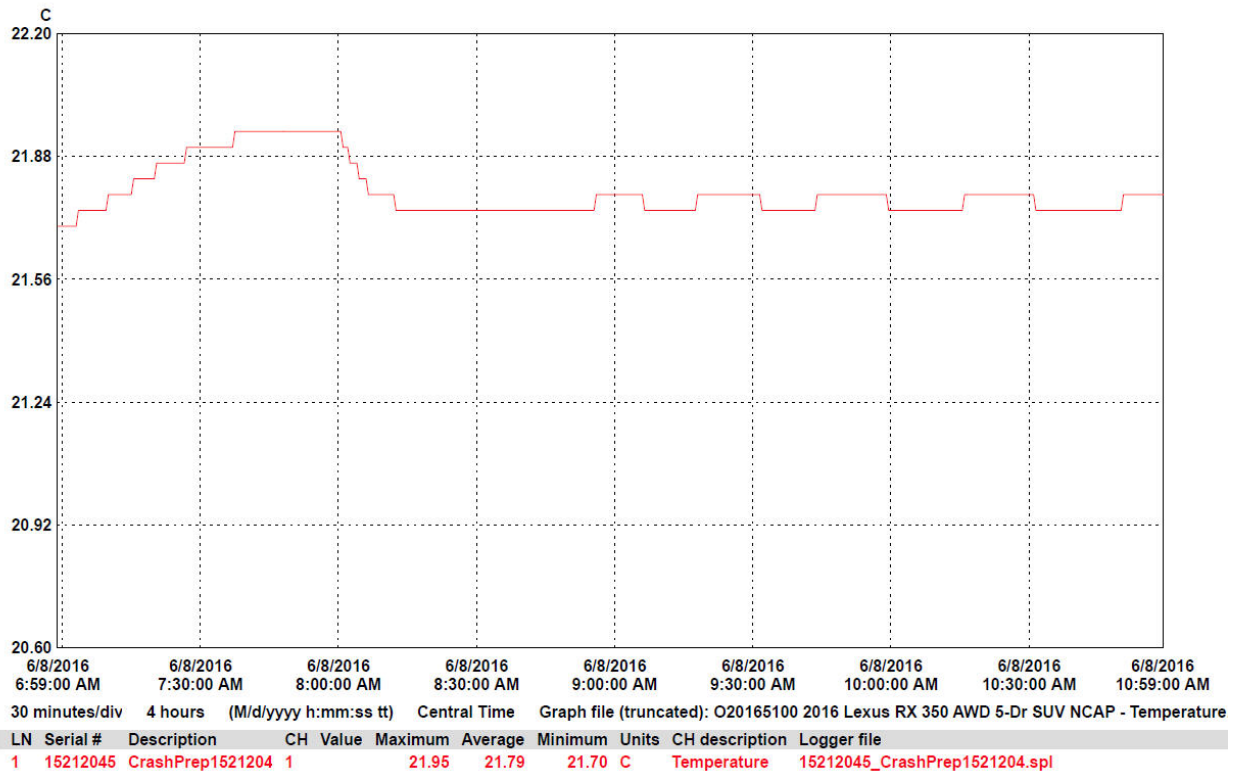
SOLVENT SPILLAGE LOCATION TABLE

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: 2016 Lexus RX 350 AWD 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20165100
 Test Date: 6/8/2016



**APPENDIX A
PHOTOGRAPHS**

TABLE OF PHOTOGRAPHS

		<u>Page No.</u>
Photo No. 001	Load Cell Location	A-1
Photo No. 002	Pre-Test Load Cell Wall	A-1
Photo No. 003	Post-Test Load Cell Wall	A-2
Photo No. 004	Manufacturer's Label	A-2
Photo No. 005	Tire Placard	A-3
Photo No. 005a	Capacity Reduction Label	A-3
Photo No. 006	2016 Lexus RX 350 AWD Frontal As Delivered	A-4
Photo No. 007	Left Rear 3-4 View, As Received	A-4
Photo No. 008	Pre-Test Front View of Test Vehicle	A-5
Photo No. 009	Post-Test Front View of Test Vehicle	A-5
Photo No. 010	Pre-Test Left View of Test Vehicle	A-6
Photo No. 011	Post-Test Left View of Test Vehicle	A-6
Photo No. 012	Pre-Test Right View of Test Vehicle	A-7
Photo No. 013	Post-Test Right View of Test Vehicle	A-7
Photo No. 014	Pre-Test Right Front 3-4 View	A-8
Photo No. 015	Post-Test Right Front 3-4 View	A-8
Photo No. 016	Pre-Test Left Rear 3-4 View	A-9
Photo No. 017	Post-Test Left Rear 3-4 View	A-9
Photo No. 018	Pre-Test Windshield View	A-10
Photo No. 019	Post-Test Windshield View	A-10
Photo No. 020	Pre-Test Engine Compartment View	A-11
Photo No. 021	Post-Test Engine Compartment View	A-11
Photo No. 022	Pre-Test Fuel Filler Cap View	A-12
Photo No. 023	Post-Test Fuel Filler Cap View	A-12
Photo No. 024	Pre-Test Front Underbody View	A-13
Photo No. 025	Post-Test Front Underbody View	A-13
Photo No. 026	Pre-Test Rear Underbody View	A-14
Photo No. 027	Post-Test Rear Underbody View	A-14
Photo No. 028	Pre-Test Dummy Cable Routing	A-15
Photo No. 029	Post-Test Dummy Cable Routing	A-15

		<u>Page No.</u>
Photo No. 030	Pre-Test Driver Dummy Front View	A-16
Photo No. 031	Post-Test Driver Dummy Front View	A-16
Photo No. 032	Pre-Test Driver Dummy Window View	A-17
Photo No. 033	Post-Test Driver Dummy Window View	A-17
Photo No. 034	Pre-Test Driver Dummy and Vehicle Interior (Door Open)	A-18
Photo No. 035	Post-Test Driver Dummy and Vehicle Interior (Door Open)	A-18
Photo No. 036	Pre-Test Driver's Seat Fore-Aft Markings	A-19
Photo No. 037	Post-Test Driver's Seat Fore-Aft Markings	A-19
Photo No. 038	Pre-Test View of Belt Anchorage for Driver Dummy	A-20
Photo No. 039	Post-Test View of Belt Anchorage for Driver Dummy	A-20
Photo No. 040	Pre-Test Driver Dummy Feet	A-21
Photo No. 041	Post-Test Driver Dummy Feet	A-21
Photo No. 042	Pre-Test Driver's Side Knee Bolster (without dummy)	A-22
Photo No. 043	Post-Test Driver's Side Knee Bolster (without dummy)	A-22
Photo No. 044	Pre-Test Driver's Side Floorpan	A-23
Photo No. 045	Post-Test Driver's Side Floorpan	A-23
Photo No. 046	Post-Test Driver Dummy Face	A-24
Photo No. 047	Post-Test Driver Dummy Contact with Airbag	A-24
Photo No. 048	Post-Test Driver Dummy Contact with Headrest	A-25
Photo No. 049	Pre-Test View of the Steering Wheel	A-25
Photo No. 050	Post-Test View of the Steering Wheel	A-26
Photo No. 051	Pre-Test Passenger Dummy Front View	A-26
Photo No. 052	Post-Test Passenger Dummy Front View	A-27
Photo No. 053	Pre-Test Passenger Dummy Window View	A-27
Photo No. 054	Post-Test Passenger Dummy Window View	A-28
Photo No. 055	Pre-Test Passenger Dummy and Vehicle Interior (Door Open)	A-28
Photo No. 056	Post-Test Passenger Dummy and Vehicle Interior (Door Open)	A-29
Photo No. 057	Pre-Test Passenger's Seat Fore-Aft Markings	A-29
Photo No. 058	Post-Test Passenger's Seat Fore-Aft Markings	A-30
Photo No. 059	Pre-Test View of Belt Anchorage for Passenger Dummy	A-30

		<u>Page No.</u>
Photo No. 060	Post-Test View of Belt Anchorage for Passenger Dummy	A-31
Photo No. 061	Pre-Test Passenger Dummy Feet	A-31
Photo No. 062	Post-Test Passenger Dummy Feet	A-32
Photo No. 063	Pre-Test Passenger's Side Knee Bolster (without dummy)	A-32
Photo No. 064	Post-Test Passenger's Side Knee Bolster (without dummy)	A-33
Photo No. 065	Pre-Test Passenger's Side Floorpan	A-33
Photo No. 066	Post-Test Passenger's Side Floorpan	A-34
Photo No. 067	Post-Test Passenger Dummy Face	A-34
Photo No. 068	Post-Test Passenger Dummy Contact with Airbag	A-35
Photo No. 069	Post-Test Passenger Dummy Contact with Headrest	A-35
Photo No. 070	Ballast Installed in Vehicle	A-36
Photo No. 071	Post-Test Stoddard Solvent Spillage Location View	A-36
Photo No. 072	Post-Test Speed Trap Read-Out	A-37
Photo No. 073	Vehicle at 0 Degree on Static Rollover Device	A-37
Photo No. 074	Vehicle at 90 Degrees on Static Rollover Device	A-38
Photo No. 075	Vehicle at 180 Degrees on Static Rollover Device	A-38
Photo No. 076	Vehicle at 270 Degrees on Static Rollover Device	A-39
Photo No. 077	Vehicle at 360 Degrees on Static Rollover Device	A-39
Photo No. 078	2016 Lexus RX 350 AWD Frontal Impact Event	A-40
Photo No. 079	Monroney Label Photograph	A-40

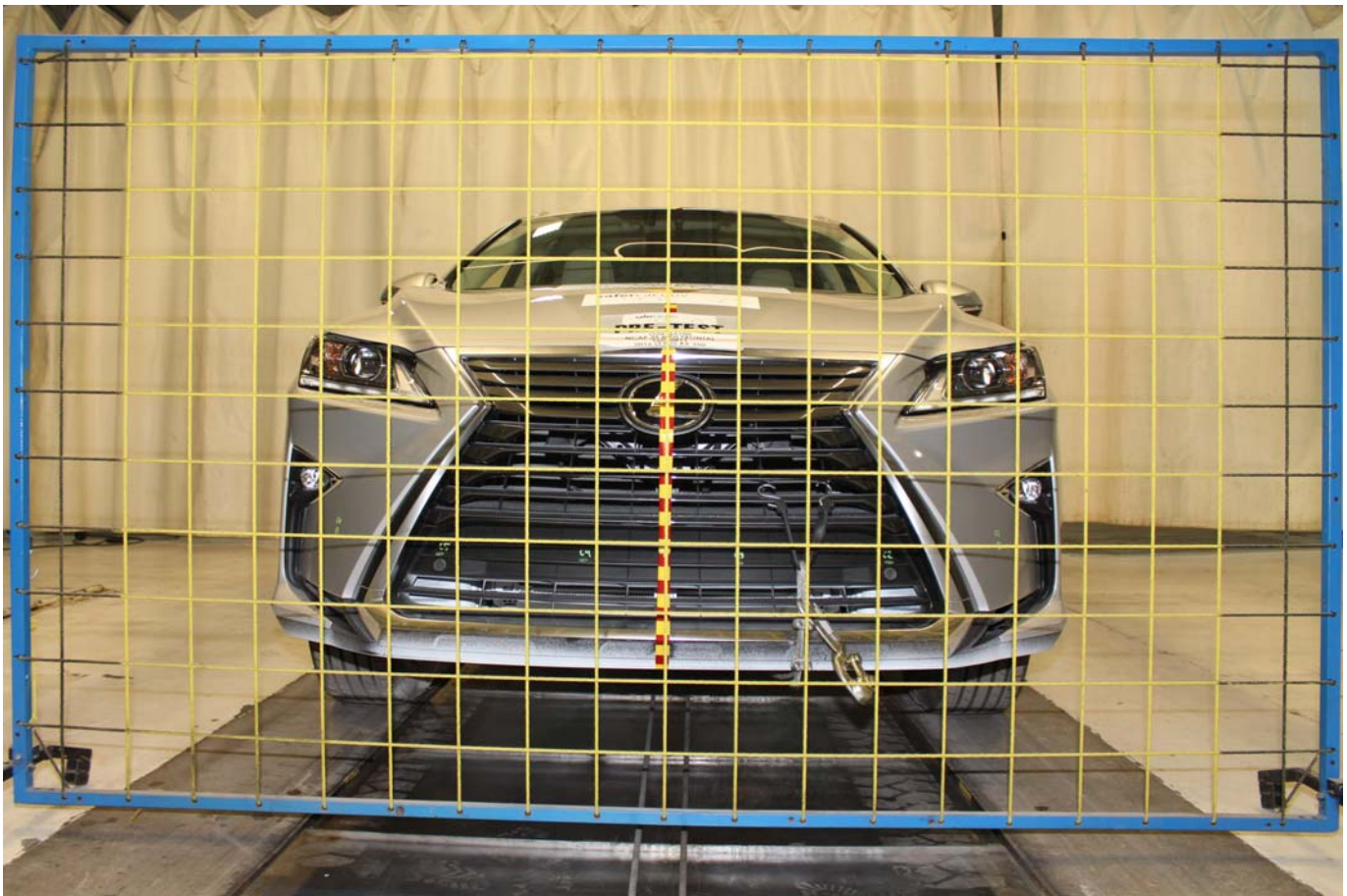


Photo No. 001 - Load Cell Location

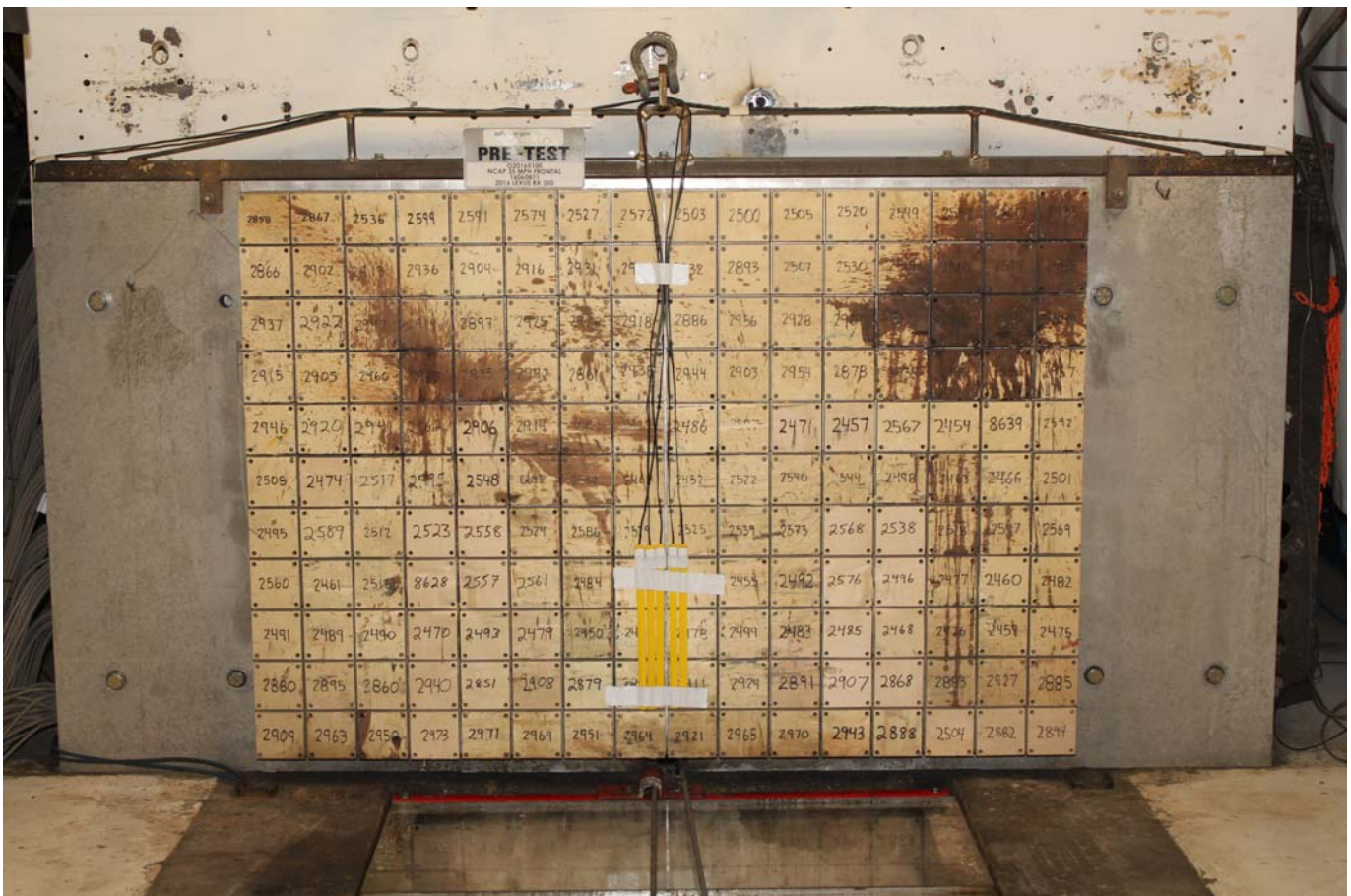


Photo No. 002 - Pre-Test Load Cell Wall

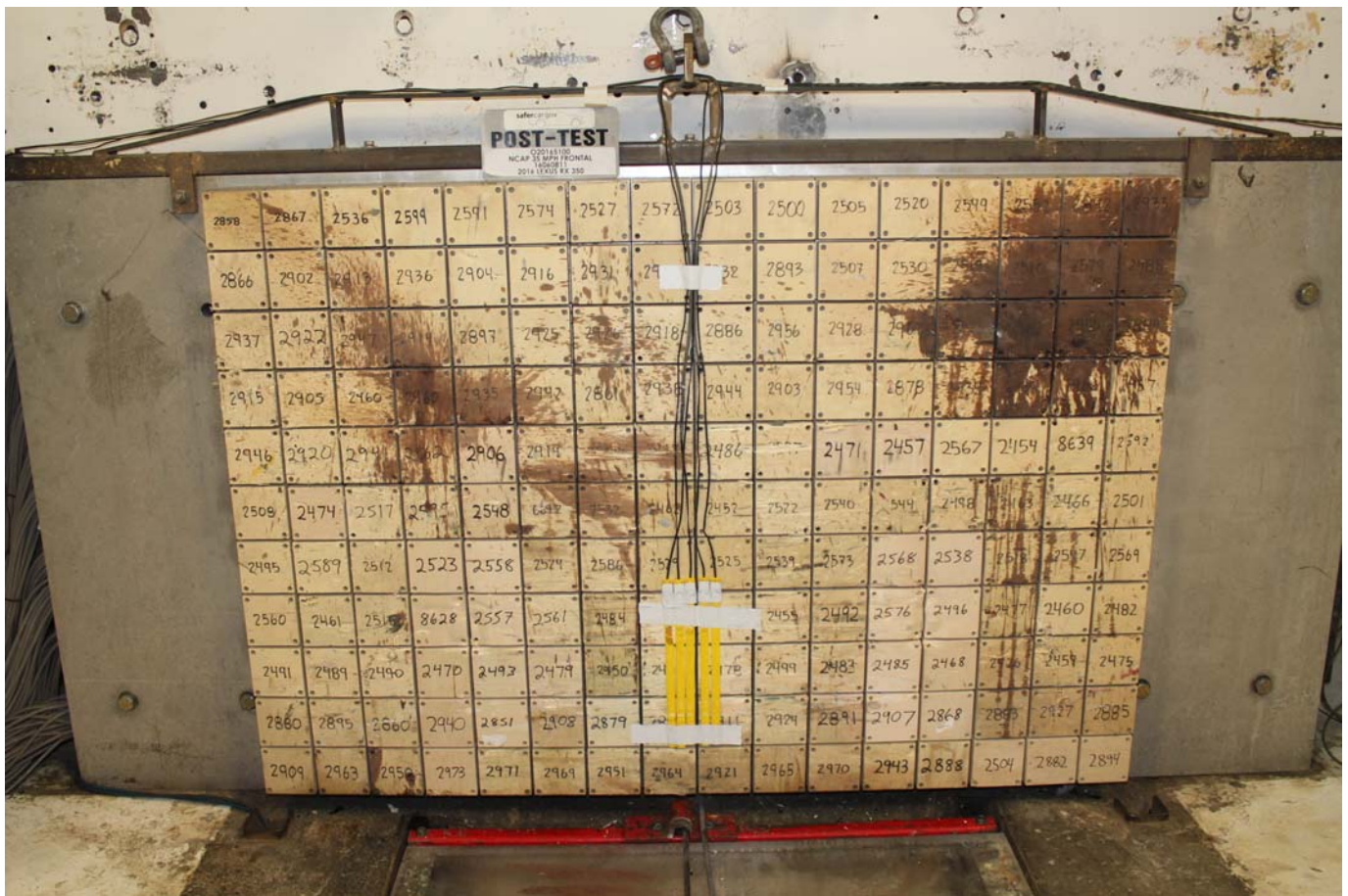


Photo No. 003 - Post-Test Load Cell Wall



Photo No. 004 - Manufacturer's Label

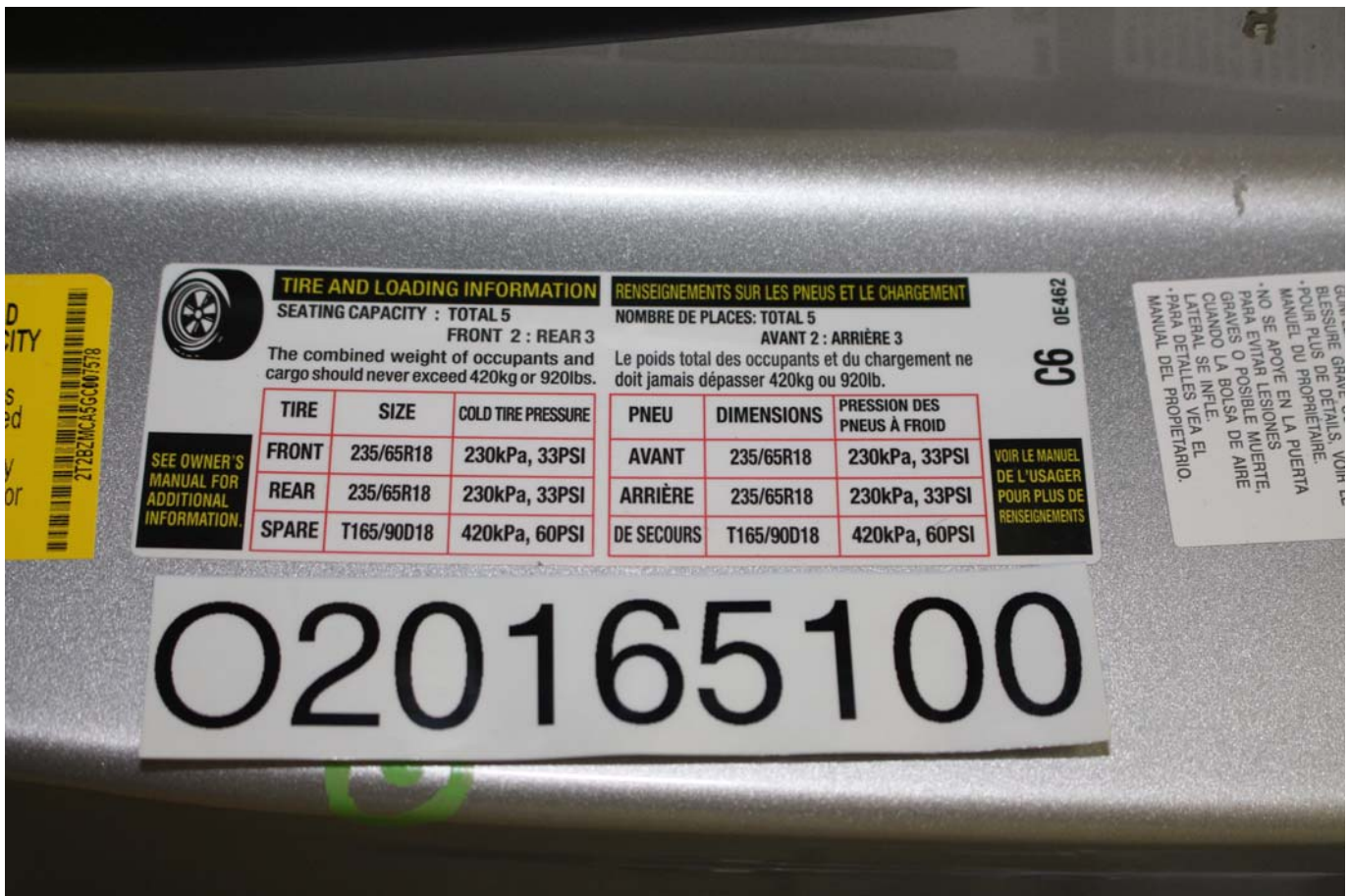


Photo No. 005 - Tire Placard



Photo No. 005a - Capacity Reduction Label



Photo No. 006 - 2016 Lexus RX 350 AWD Frontal As Delivered



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

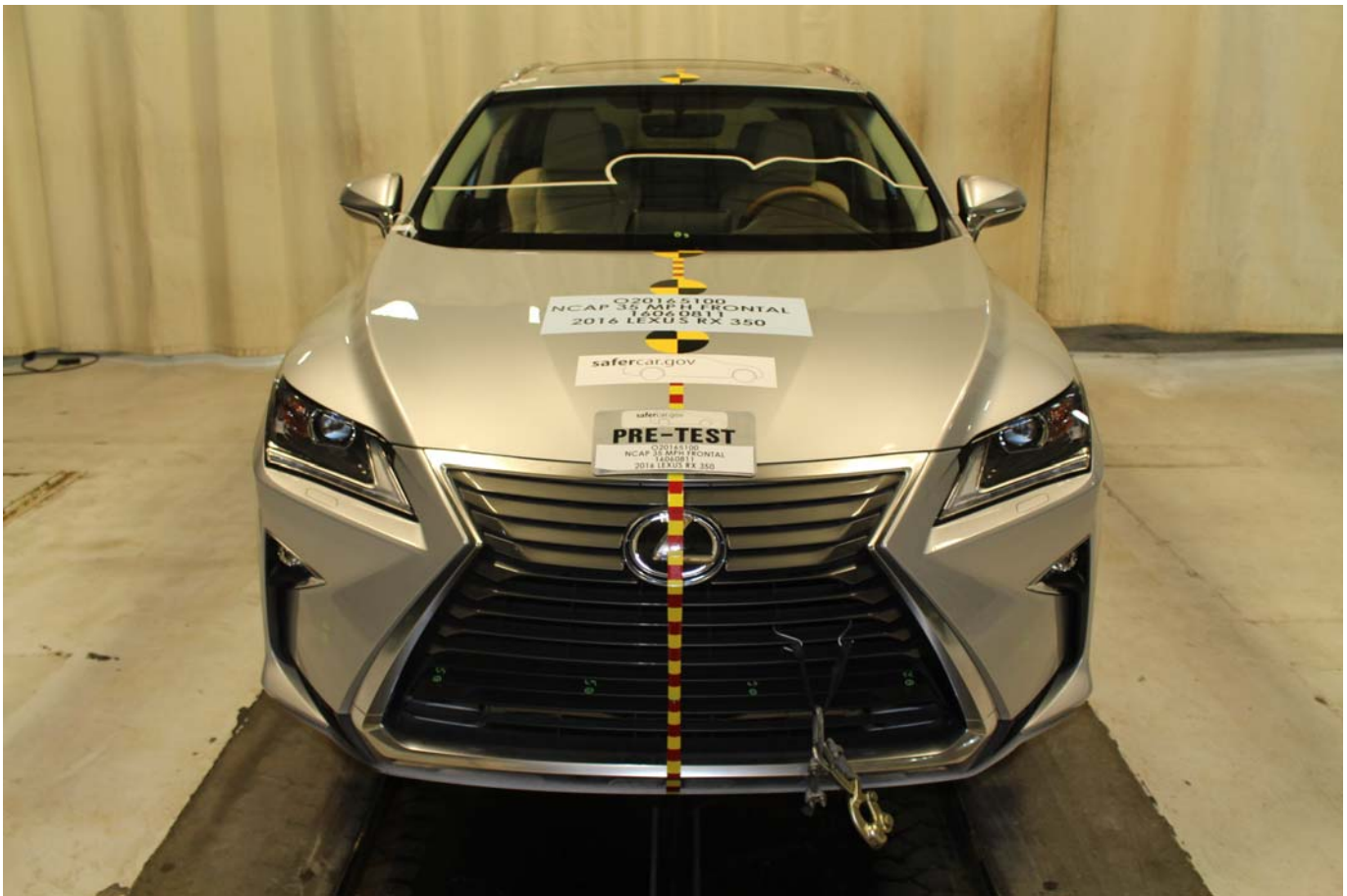


Photo No. 008 - Pre-Test Front View of Test Vehicle

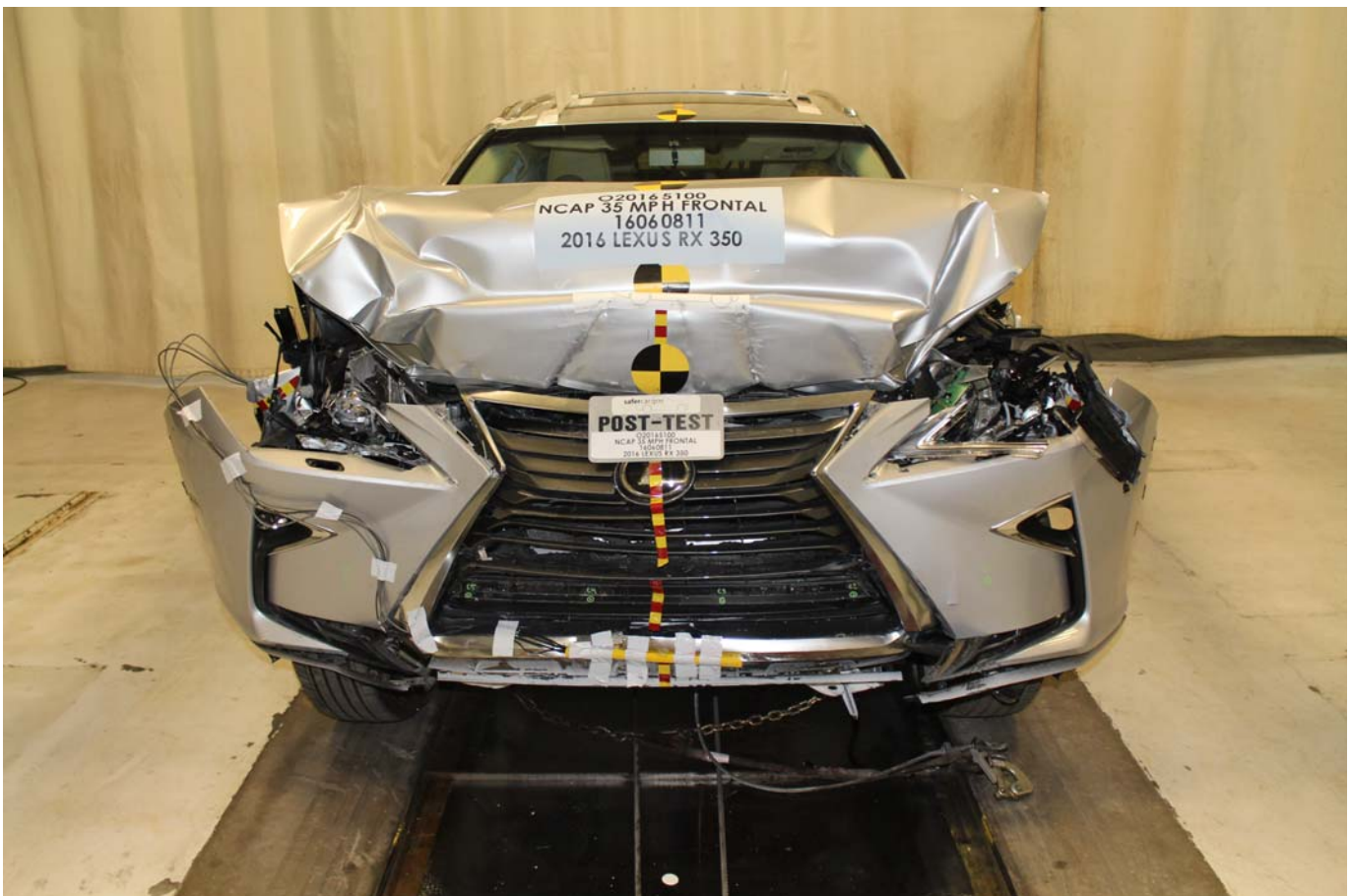


Photo No. 009 - Post-Test Front View of Test Vehicle



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

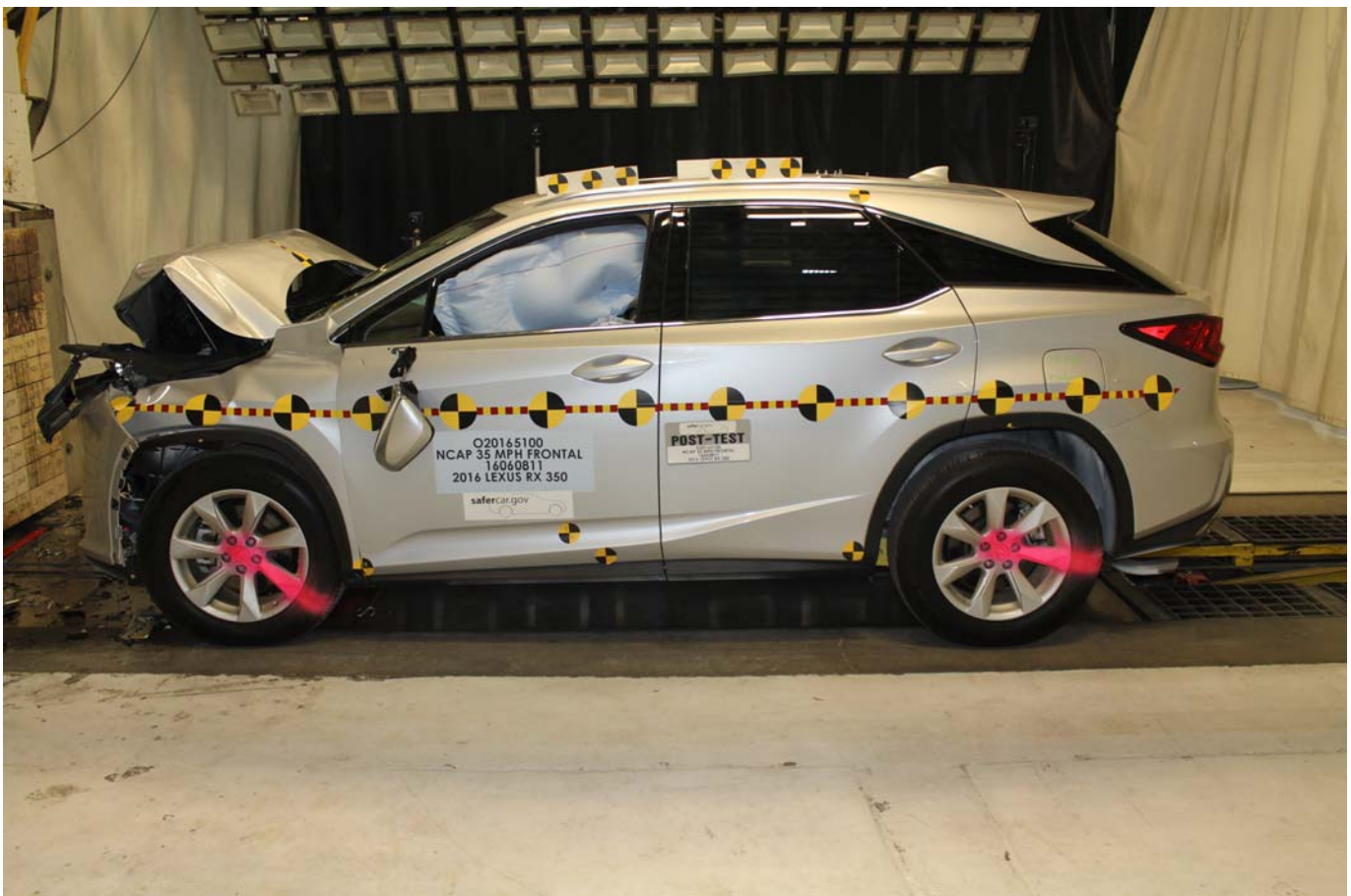


Photo No. 011 - Post-Test Left View of Test Vehicle



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



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

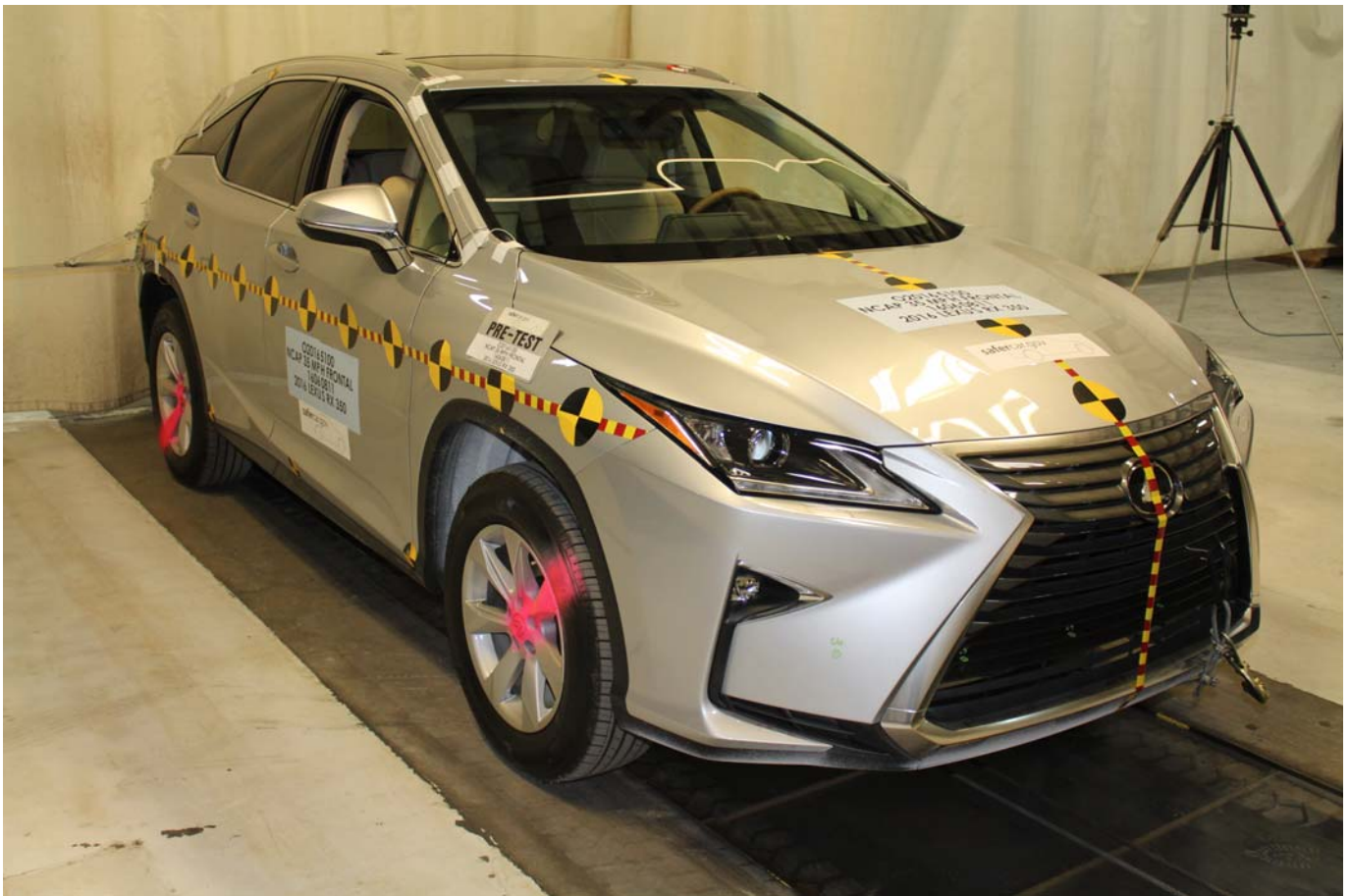


Photo No. 014 - Pre-Test Right Front 3-4 View



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

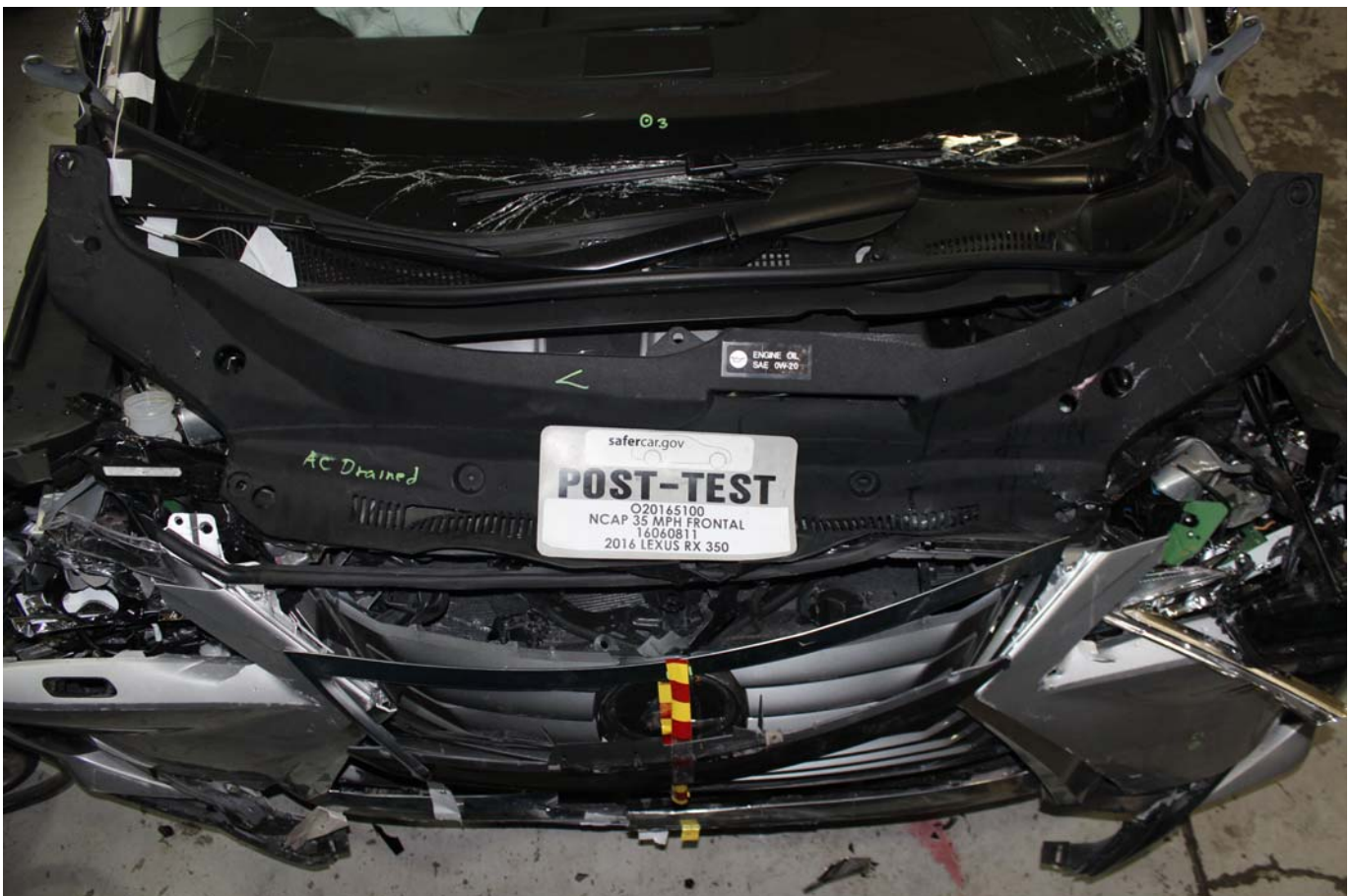


Photo No. 021 - Post-Test Engine Compartment View



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



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

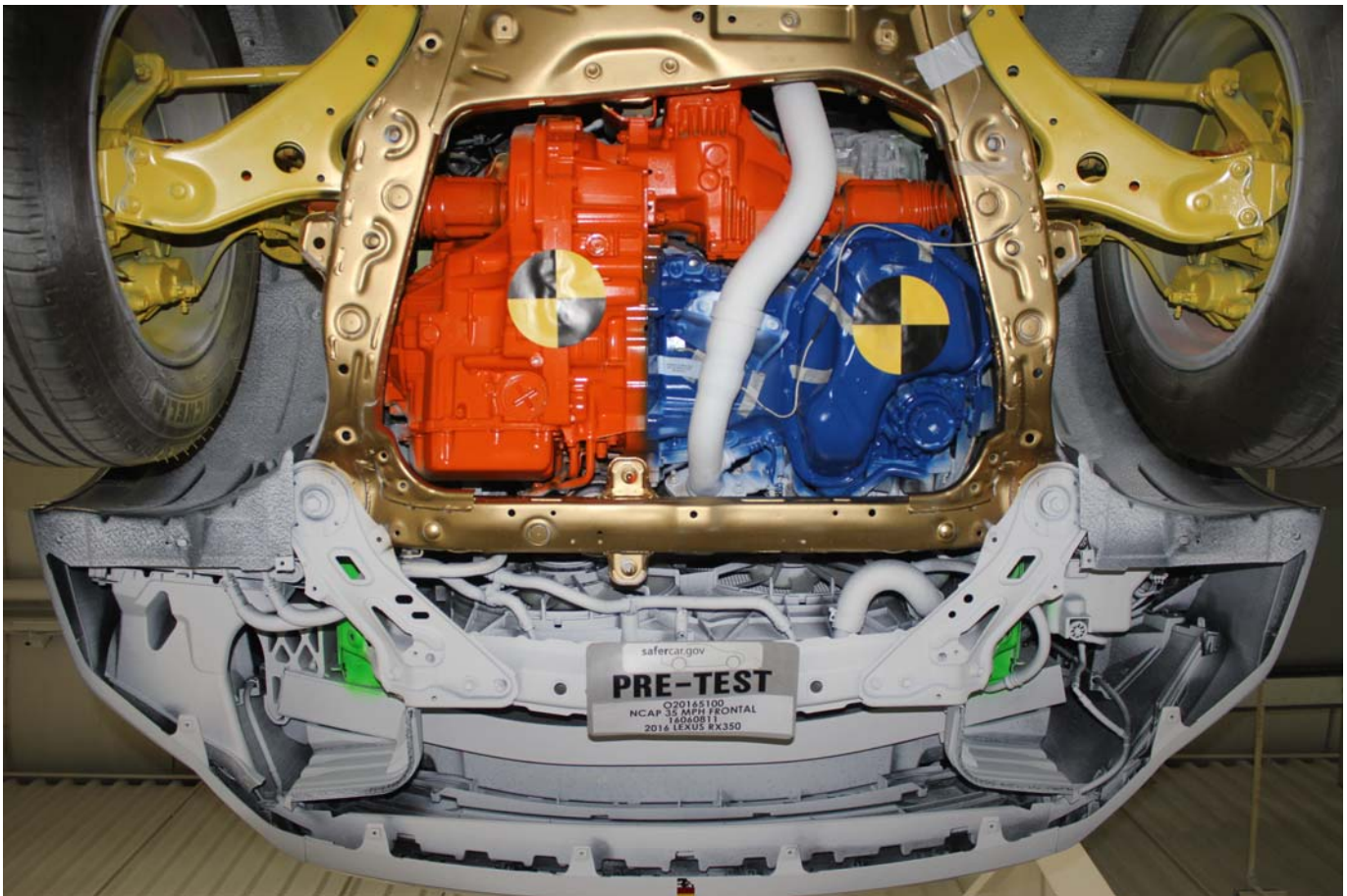


Photo No. 024 - Pre-Test Front Underbody View

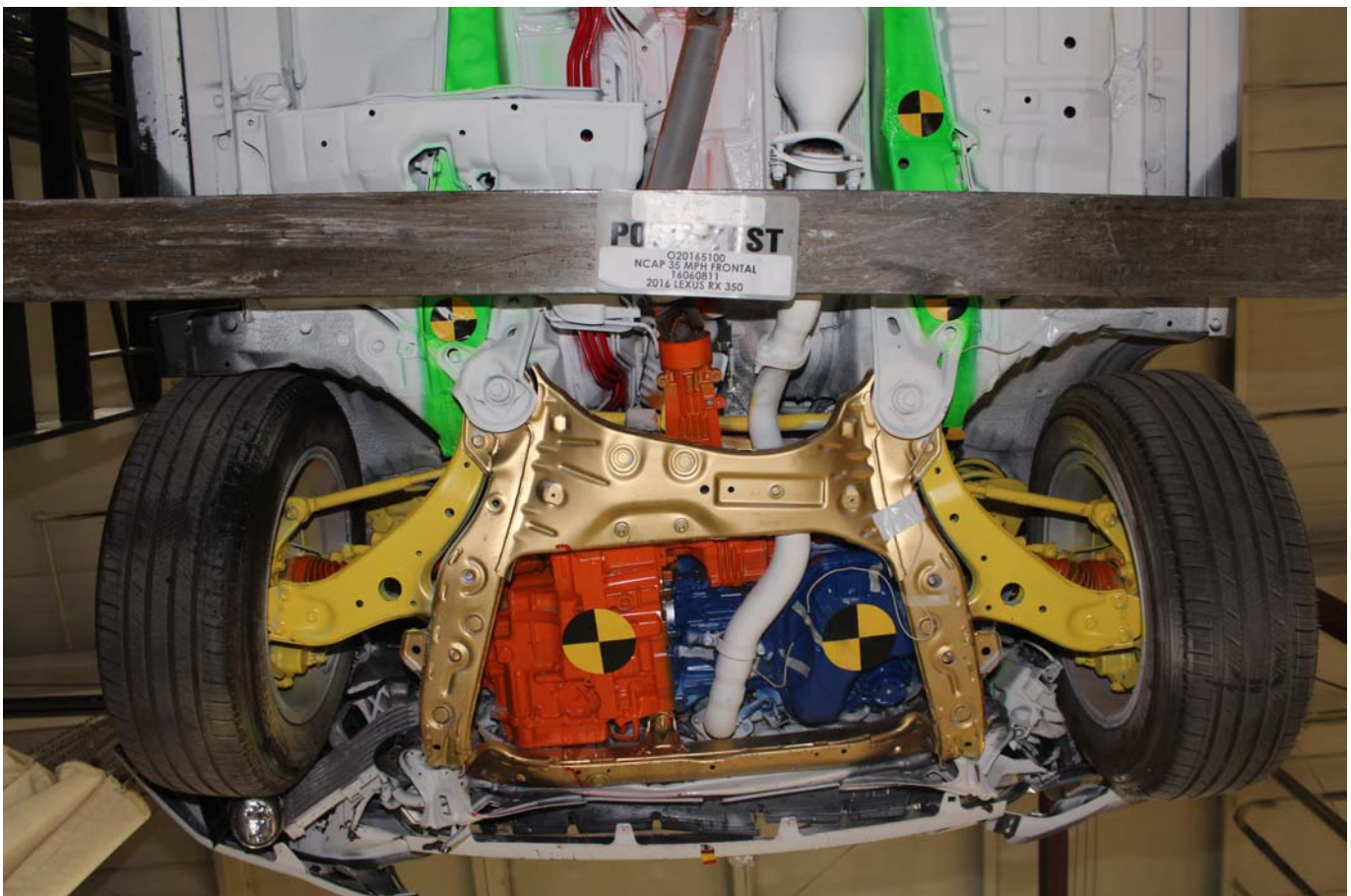


Photo No. 025 - Post-Test Front Underbody View

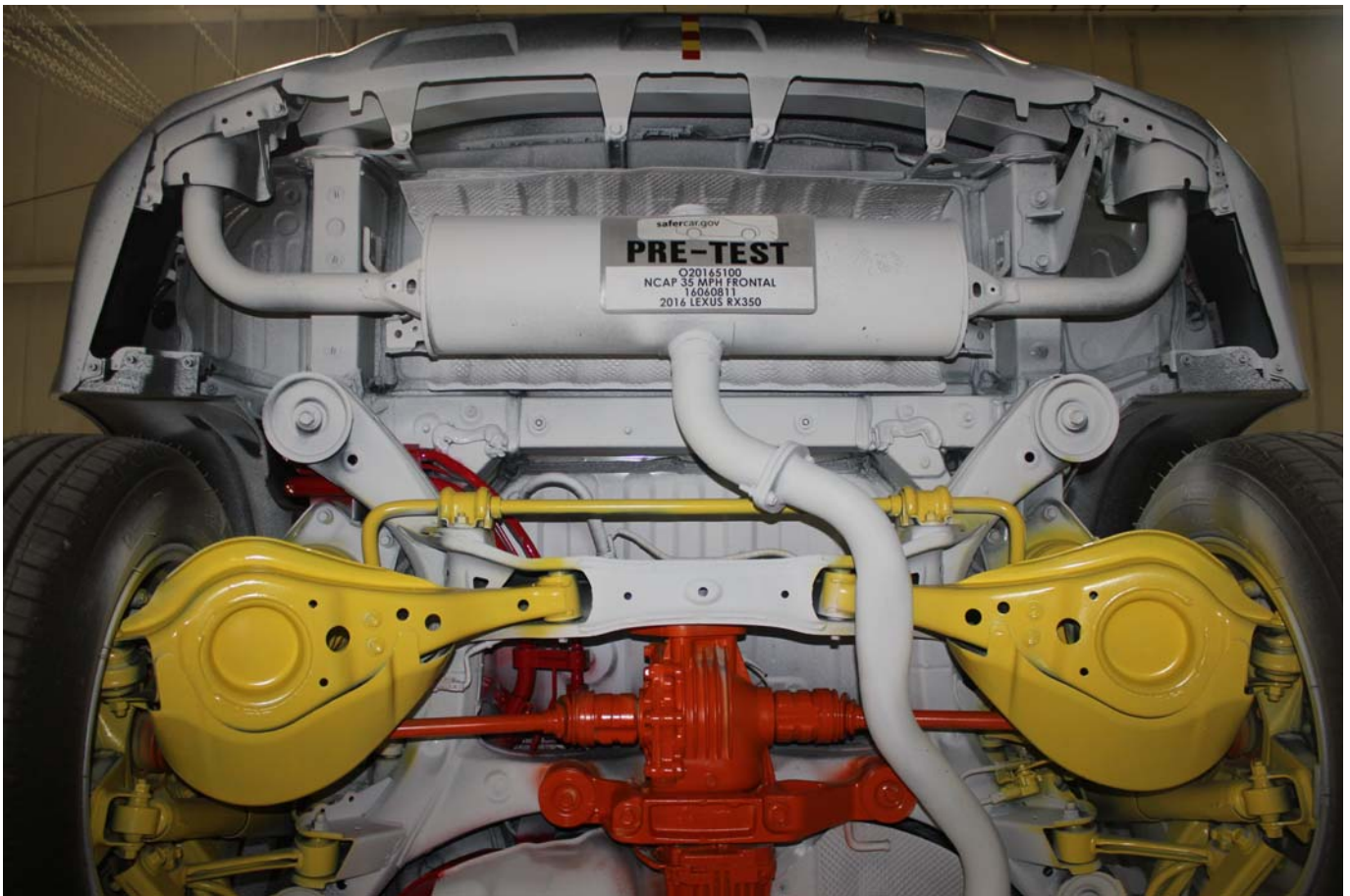


Photo No. 026 - Pre-Test Rear Underbody View



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 (Door Open)



Photo No. 035 - Post-Test Driver Dummy and Vehicle Interior (Door Open)



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



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

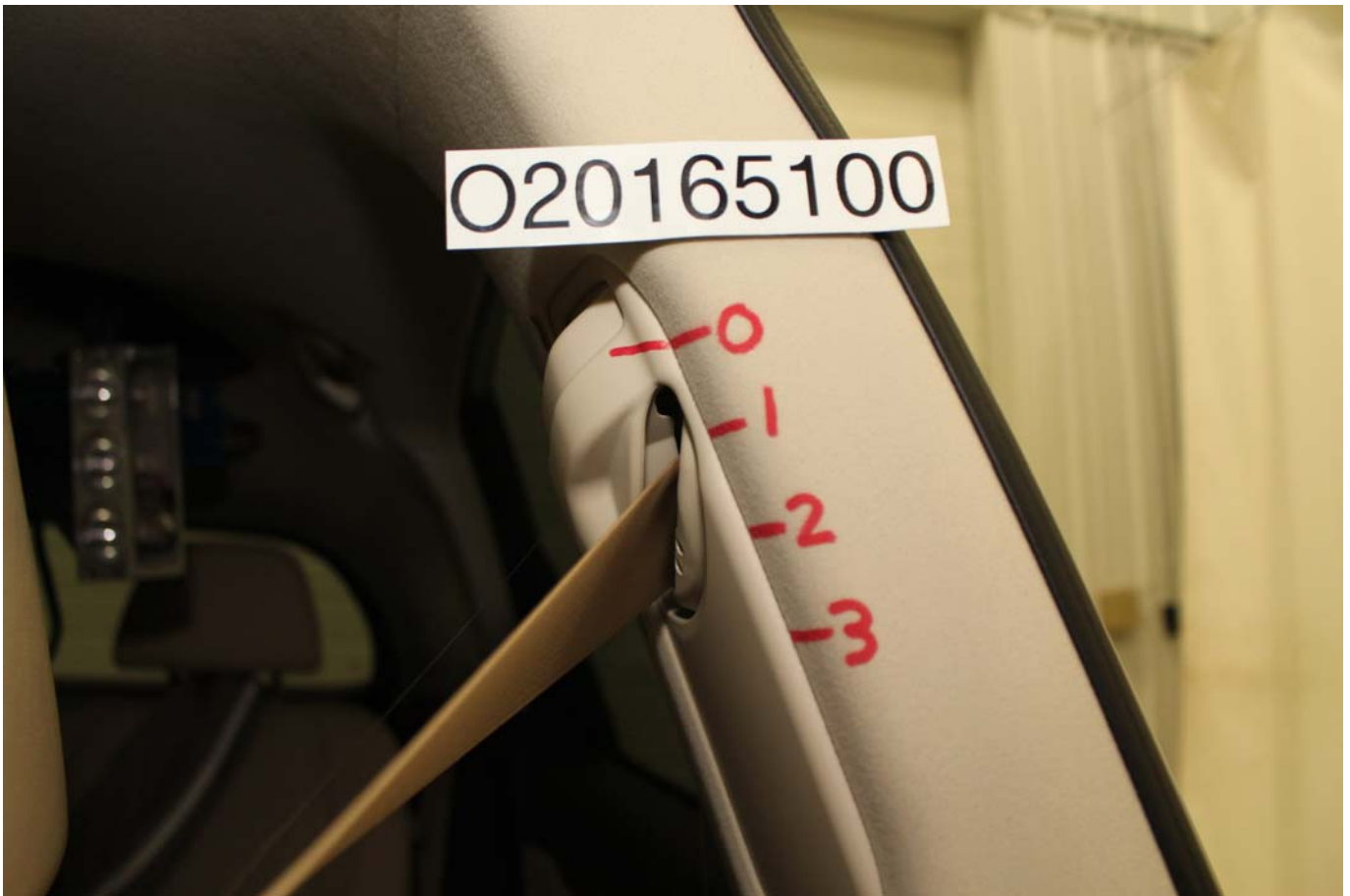


Photo No. 038 - Pre-Test View of Belt Anchorage for Driver Dummy



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



Photo No. 040 - Pre-Test Driver Dummy Feet



Photo No. 041 - Post-Test Driver Dummy Feet



Photo No. 042 - Pre-Test Driver's Side Knee Bolster (without dummy)



Photo No. 043 - Post-Test Driver's Side Knee Bolster (without dummy)



Photo No. 044 - Pre-Test Driver's Side Floorpan



Photo No. 045 - Post-Test Driver's Side Floorpan



Photo No. 046 - Post-Test Driver Dummy Face



Photo No. 047 - Post-Test Driver Dummy Contact with Airbag



Photo No. 048 - Post-Test Driver Dummy Contact with Headrest



Photo No. 049 - Pre-Test View of the Steering Wheel



Photo No. 050 - Post-Test View of the Steering Wheel



Photo No. 051 - Pre-Test Passenger Dummy Front View



Photo No. 052 - Post-Test Passenger Dummy Front View

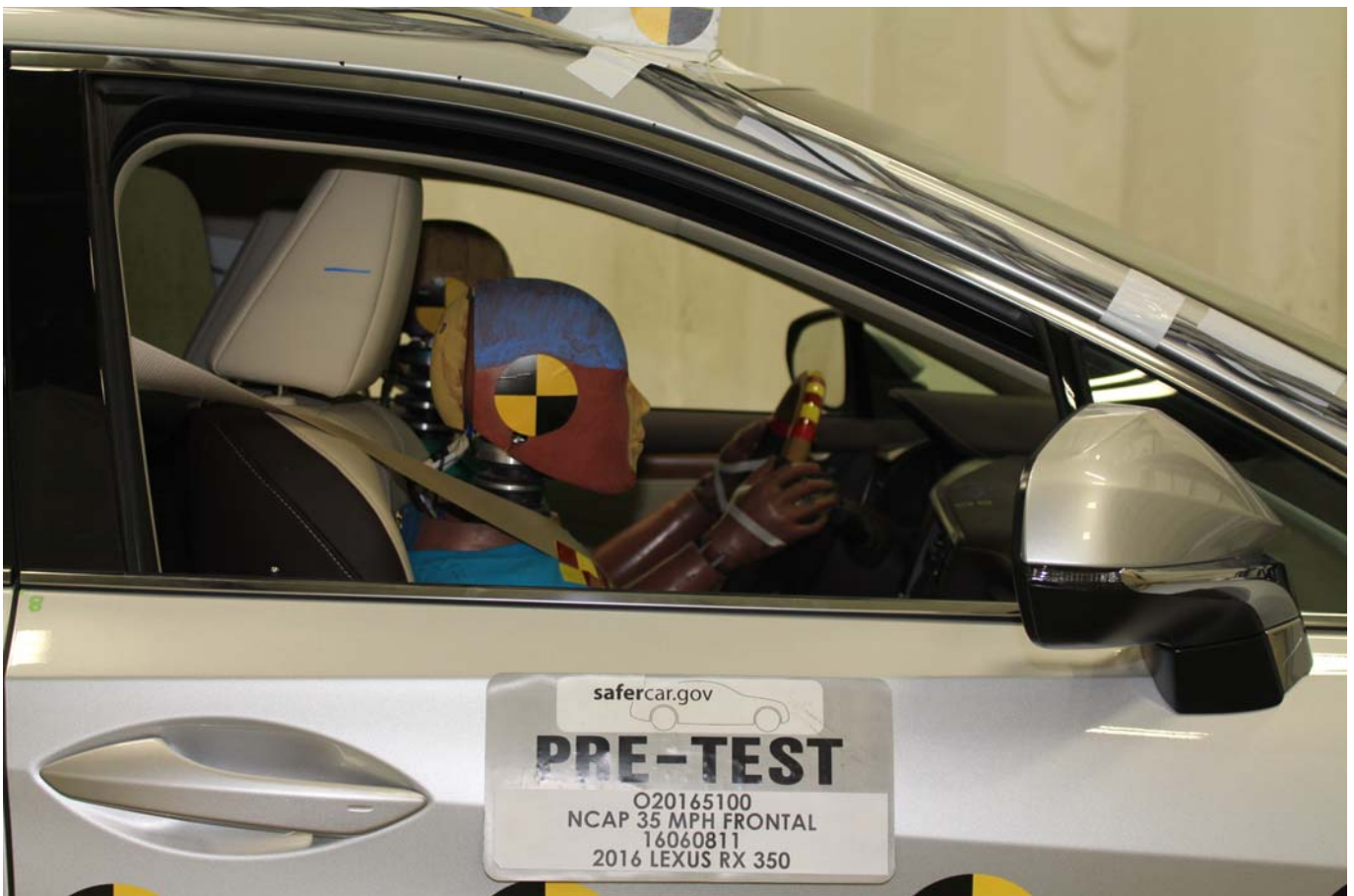


Photo No. 053 - Pre-Test Passenger Dummy Window View

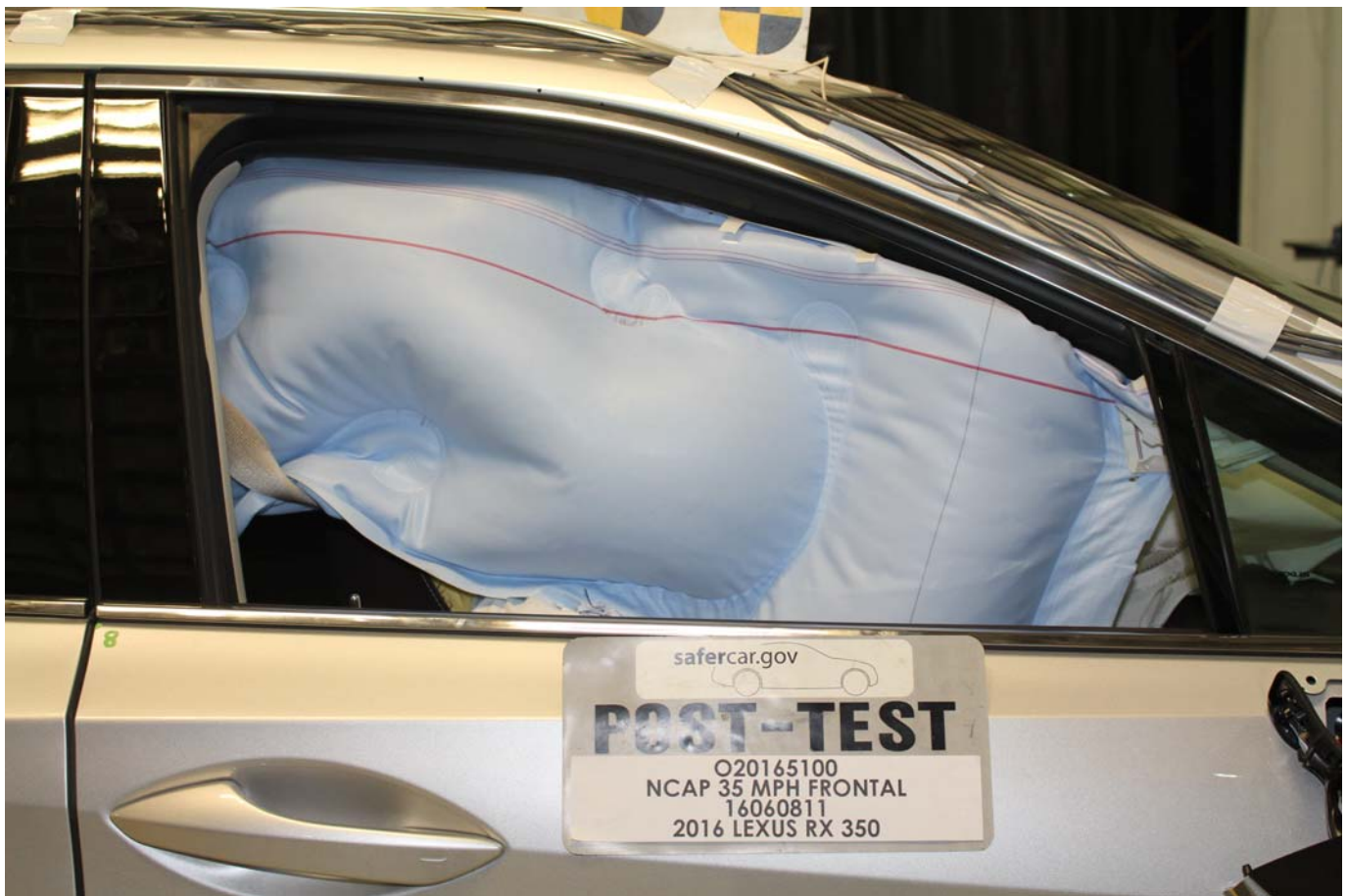


Photo No. 054 - Post-Test Passenger Dummy Window View



Photo No. 055 - Pre-Test Passenger Dummy and Vehicle Interior (Door Open)



Photo No. 056 - Post-Test Passenger Dummy and Vehicle Interior (Door Open)



Photo No. 057 - Pre-Test Passenger's Seat Fore-Aft Markings

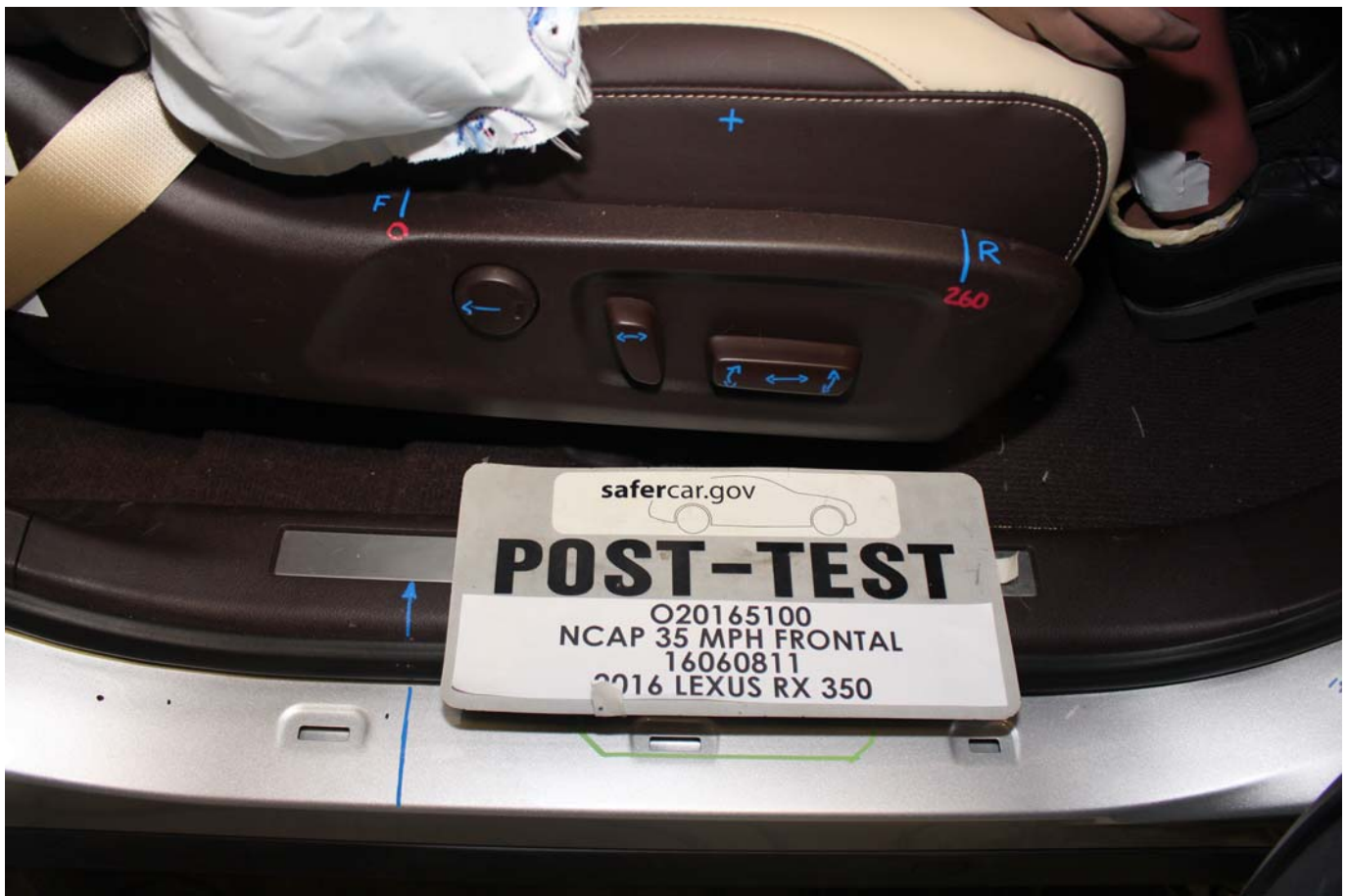


Photo No. 058 - Post-Test Passenger's Seat Fore-Aft Markings

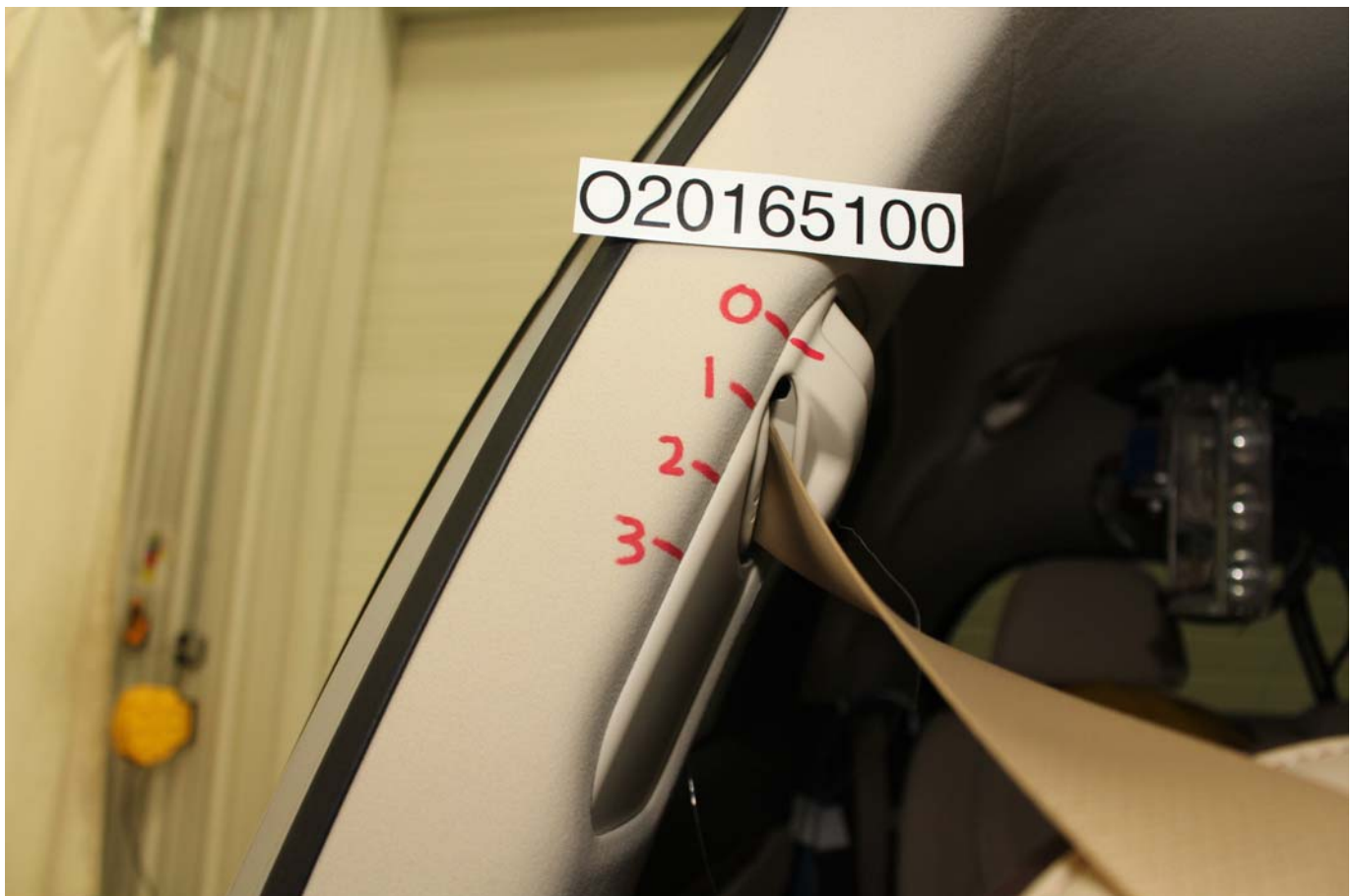


Photo No. 059 - Pre-Test View of Belt Anchorage for Passenger Dummy



Photo No. 060 - Post-Test View of Belt Anchorage for Passenger Dummy



Photo No. 061 - Pre-Test Passenger Dummy Feet



Photo No. 062 - Post-Test Passenger Dummy Feet



Photo No. 063 - Pre-Test Passenger's Side Knee Bolster (without dummy)



Photo No. 064 - Post-Test Passenger's Side Knee Bolster (without dummy)



Photo No. 065 - Pre-Test Passenger's Side Floorpan



Photo No. 066 - Post-Test Passenger's Side Floorpan



Photo No. 067 - Post-Test Passenger Dummy Face



Photo No. 068 - Post-Test Passenger Dummy Contact with Airbag



Photo No. 069 - Post-Test Passenger Dummy Contact with Headrest



Photo No. 070 - Ballast Installed in Vehicle

PHOTOGRAPH NOT APPLICABLE

Photo No. 071 - Post-Test Stoddard Solvent Spillage Location View



Photo No. 072 - Post-Test Speed Trap Read-Out



Photo No. 073 - Vehicle at 0 Degree on Static Rollover Device

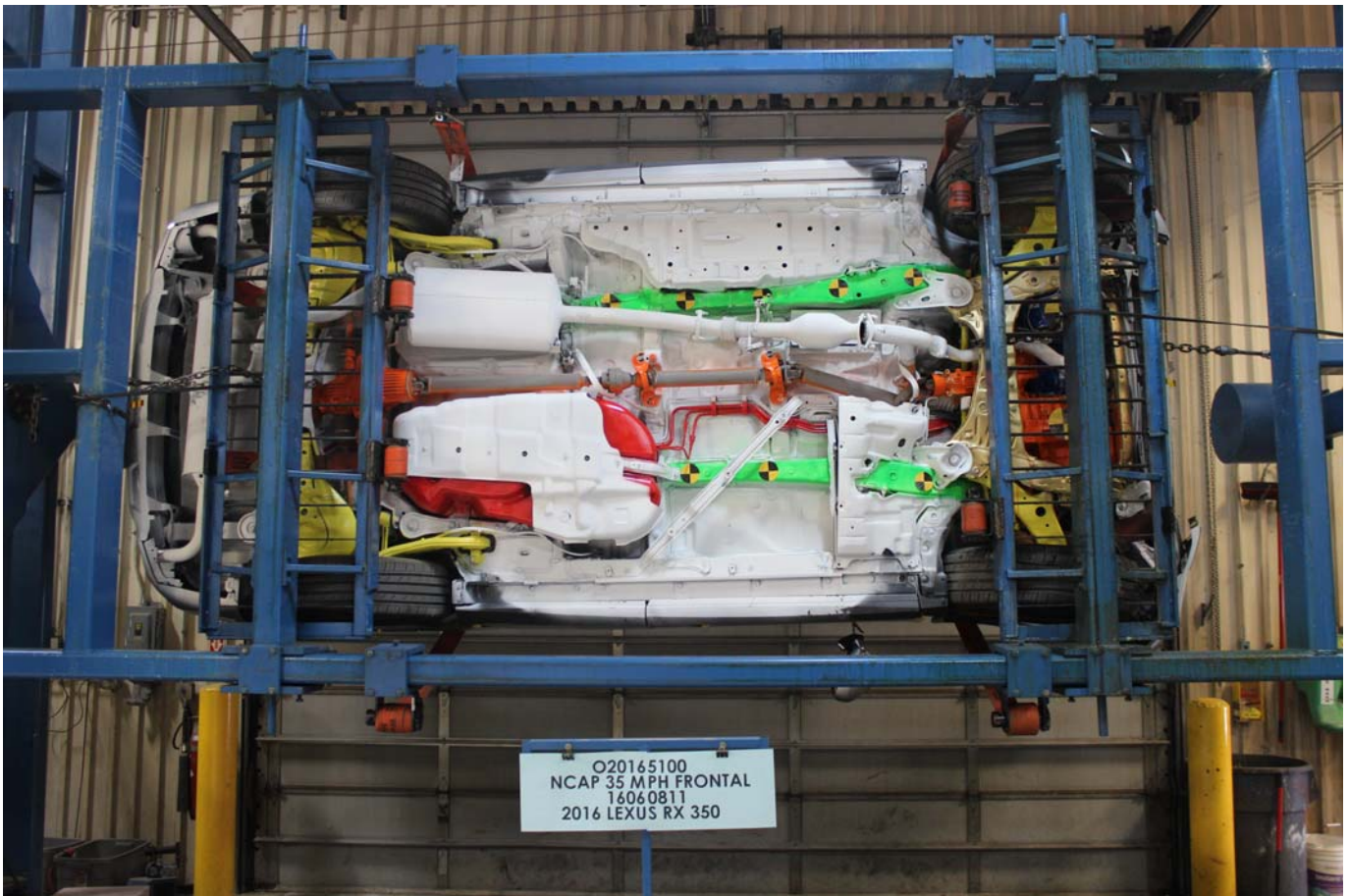


Photo No. 074 - Vehicle at 90 Degrees on Static Rollover Device



Photo No. 075 - Vehicle at 180 Degrees on Static Rollover Device



Photo No. 076 - Vehicle at 270 Degrees on Static Rollover Device



Photo No. 077 - Vehicle at 360 Degrees on Static Rollover Device

APPENDIX B
DUMMY RESPONSE DATA TRACES

TABLE OF DATA PLOTS

Page No.

List of Data Plots Provided in the Test Report

Figure No. 1.	Driver Head X Acceleration vs. Time	B-1
Figure No. 2.	Driver Head Y Acceleration vs. Time	B-1
Figure No. 3.	Driver Head Z Acceleration vs. Time	B-1
Figure No. 4.	Driver Head Resultant Acceleration vs. Time	B-1
Figure No. 5.	Driver Chest Displacement vs. Time	B-2
Figure No. 6.	Driver Chest X Acceleration vs. Time	B-3
Figure No. 7.	Driver Chest Y Acceleration vs. Time	B-3
Figure No. 8.	Driver Chest Z Acceleration vs. Time	B-3
Figure No. 9.	Driver Chest Resultant Acceleration vs. Time	B-3
Figure No. 10.	Driver Neck Force X vs. Time	B-4
Figure No. 11.	Driver Neck Force Z vs. Time	B-4
Figure No. 12.	Driver Neck Moment Y vs. Time	B-4
Figure No. 13.	Driver Nij (NTF) vs. Time	B-5
Figure No. 14.	Driver Nij (NTE) vs. Time	B-5
Figure No. 15.	Driver Nij (NCF) vs. Time	B-5
Figure No. 16.	Driver Nij (NCE) vs. Time	B-5
Figure No. 17.	Driver Left Femur Force vs. Time	B-6
Figure No. 18.	Driver Right Femur Force vs. Time	B-6
Figure No. 19.	Passenger Head X Acceleration vs. Time	B-7
Figure No. 20.	Passenger Head Y Acceleration vs. Time	B-7
Figure No. 21.	Passenger Head Z Acceleration vs. Time	B-7
Figure No. 22.	Passenger Head Resultant Acceleration vs. Time	B-7
Figure No. 23.	Passenger Chest Displacement vs. Time	B-8
Figure No. 24.	Passenger Chest X Acceleration vs. Time	B-9
Figure No. 25.	Passenger Chest Y Acceleration vs. Time	B-9
Figure No. 26.	Passenger Chest Z Acceleration vs. Time	B-9
Figure No. 27.	Passenger Chest Resultant Z Acceleration vs. Time	B-9

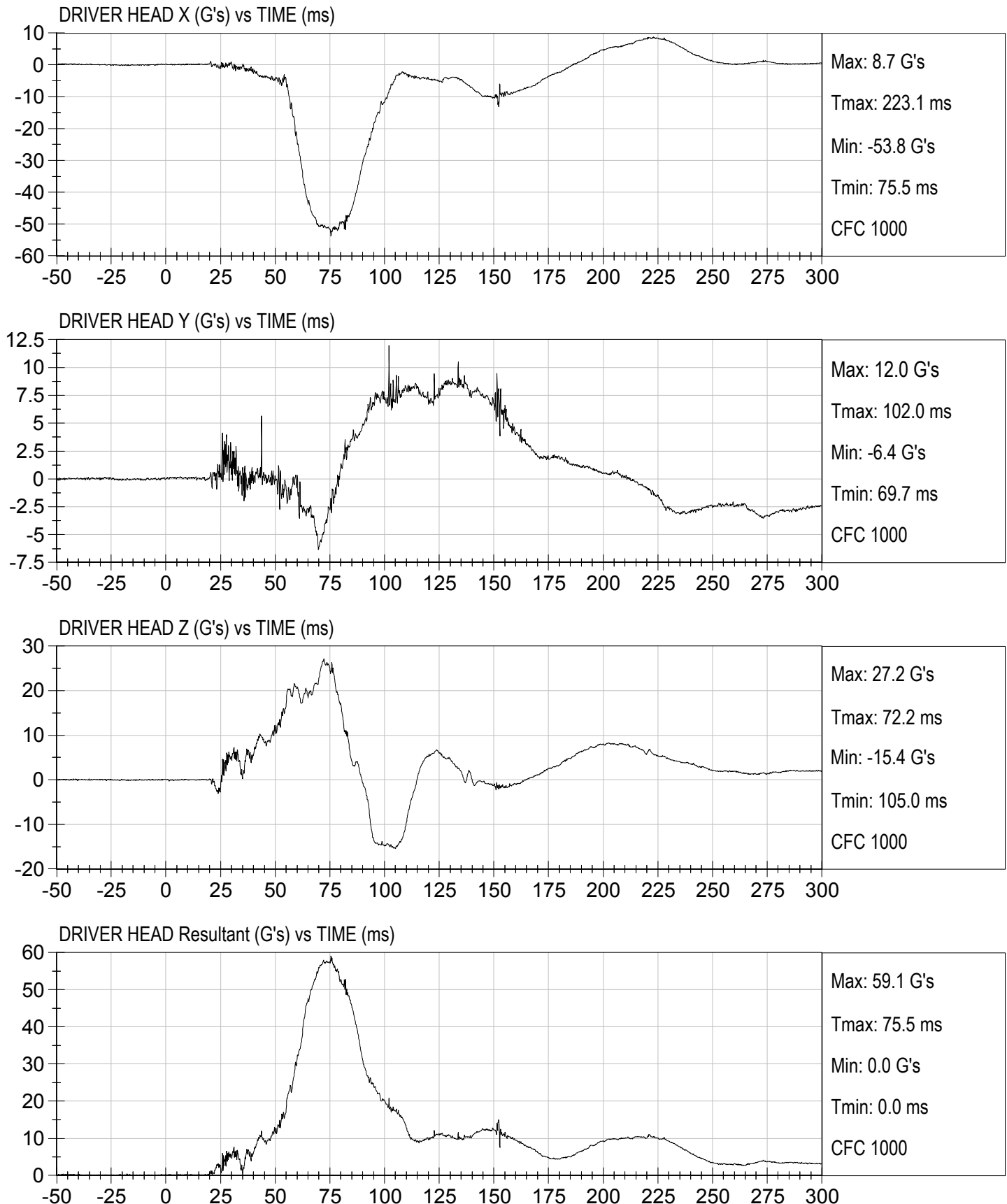
		<u>Page No.</u>
Figure No. 28.	Passenger Neck Force X vs. Time	B-10
Figure No. 29.	Passenger Neck Force Z vs. Time	B-10
Figure No. 30.	Passenger Neck Moment Y vs. Time	B-10
Figure No. 31.	Passenger Nij (NTF) vs. Time	B-11
Figure No. 32.	Passenger Nij (NTE) vs. Time	B-11
Figure No. 33.	Passenger Nij (NCF) vs. Time	B-11
Figure No. 34.	Passenger Nij (NCE) vs. Time	B-11
Figure No. 35.	Passenger Left Femur Force vs. Time	B-12
Figure No. 36.	Passenger Right Femur Force vs. Time	B-12

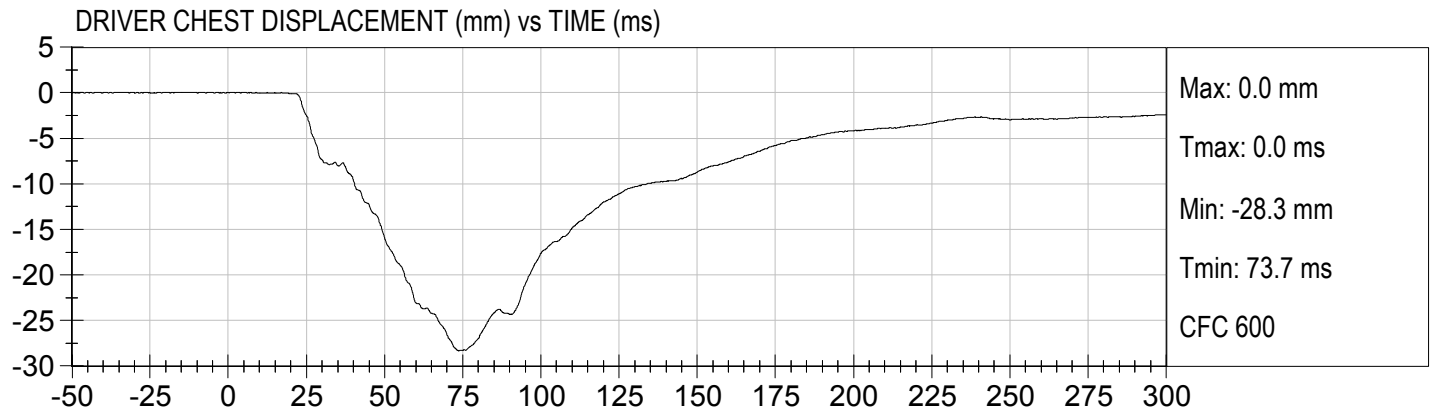
The following additional dummy and vehicle response data can be found in the R&D section of the NHTSA website at www.nhtsa.dot.gov

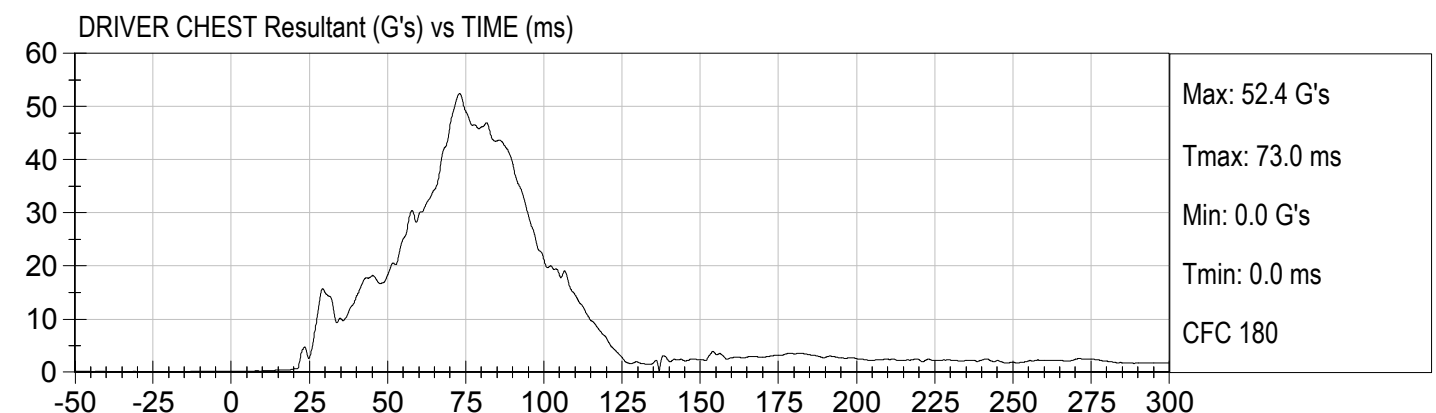
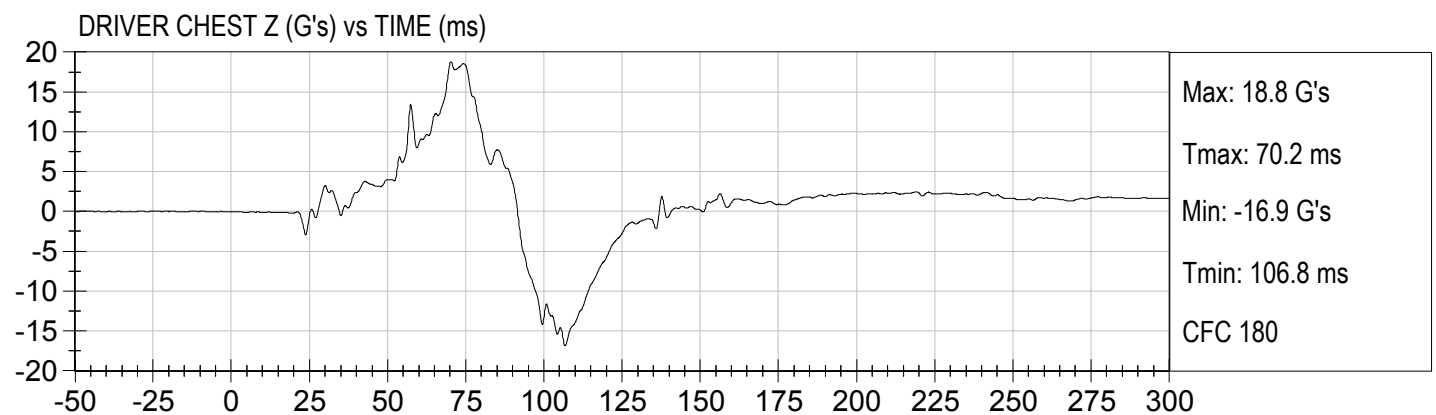
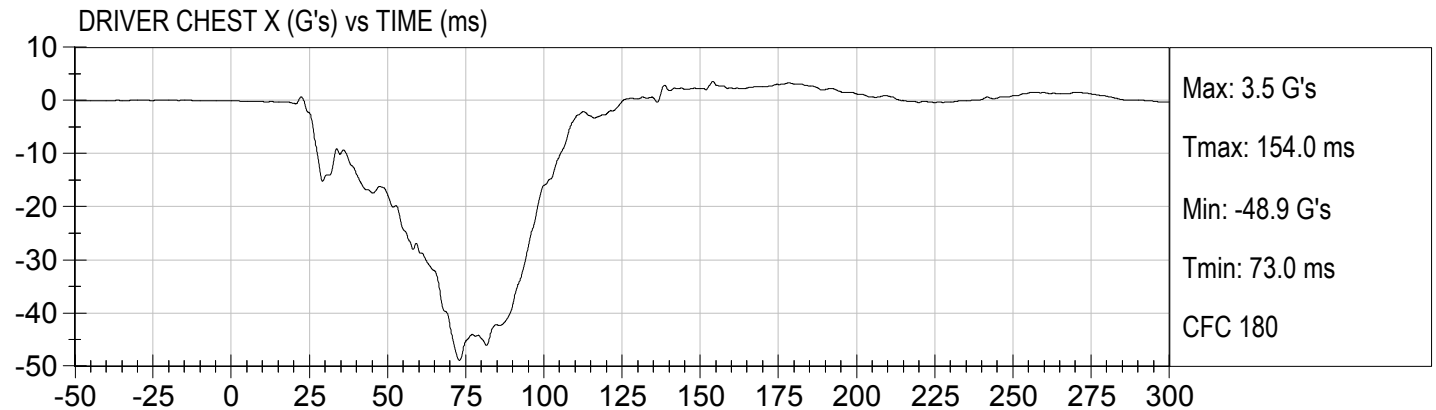
Driver Head X Redundant
 Driver Head Y Redundant
 Driver Head Z Redundant
 Driver Head Angular Velocity X
 Driver Head Angular Velocity Y
 Driver Head Angular Velocity Z
 Driver Upper Neck Force Y
 Driver Upper Neck Moment X
 Driver Upper Neck Moment Z
 Driver Chest X Redundant
 Driver Chest Y Redundant
 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

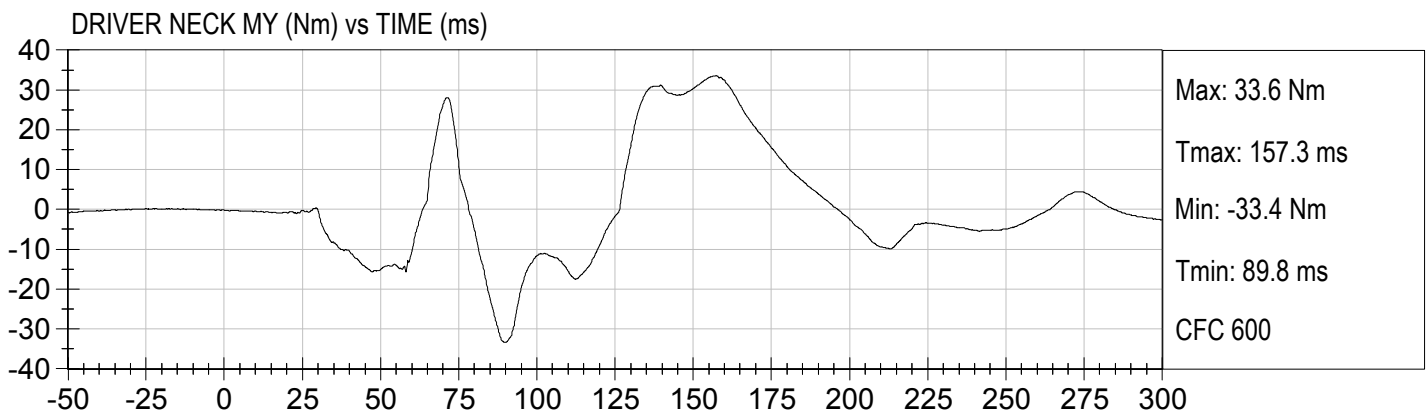
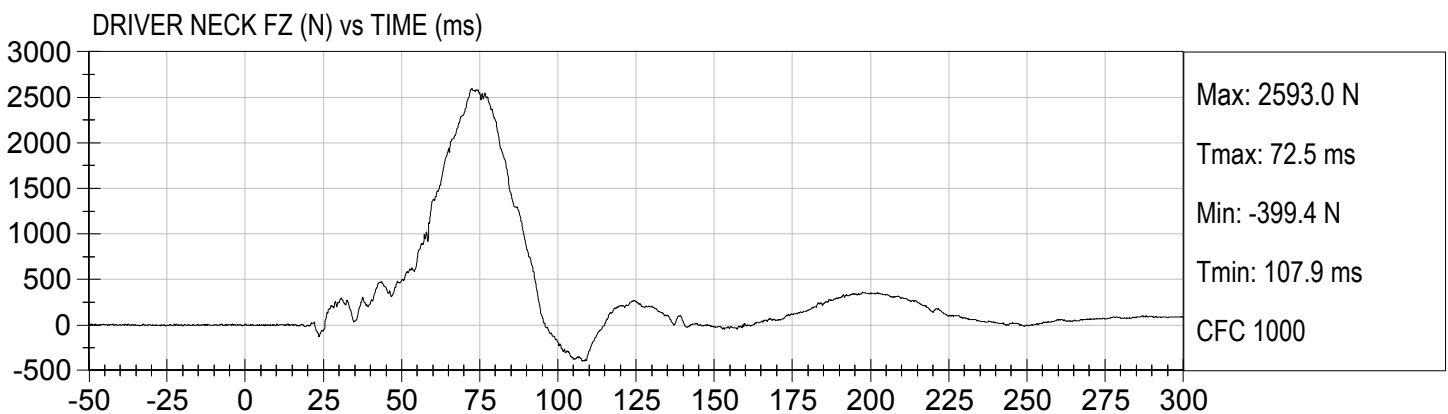
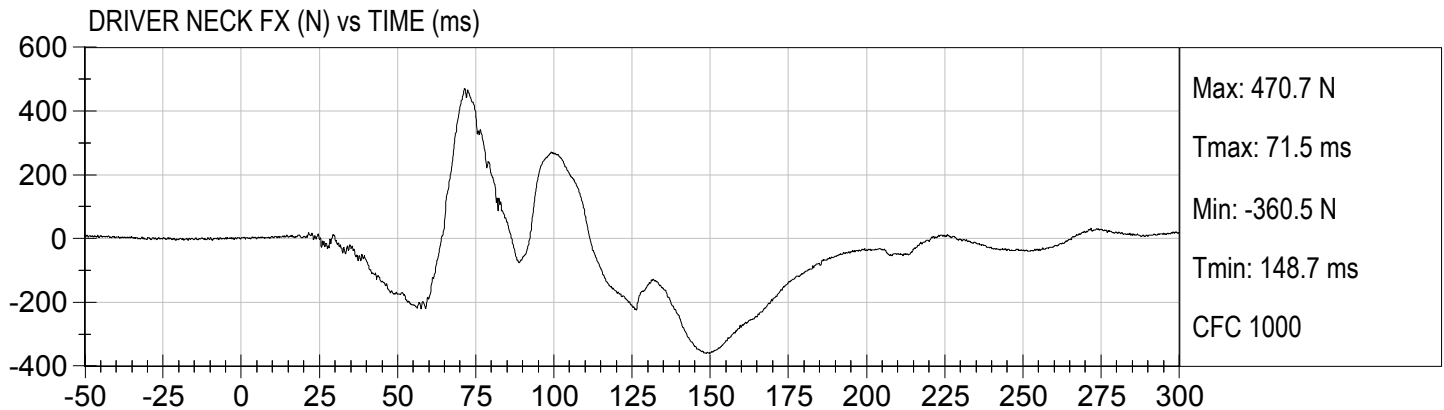
Driver Left Upper Tibia Force Z
Driver Left Lower Tibia Moment X
Driver Left Lower Tibia Moment Y
Driver Left Lower Tibia Force Z
Driver Right Upper Tibia Moment X
Driver Right Upper Tibia Moment Y
Driver Right Upper Tibia Force Z
Driver Right Lower Tibia Moment X
Driver Right Lower Tibia Moment Y
Driver 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

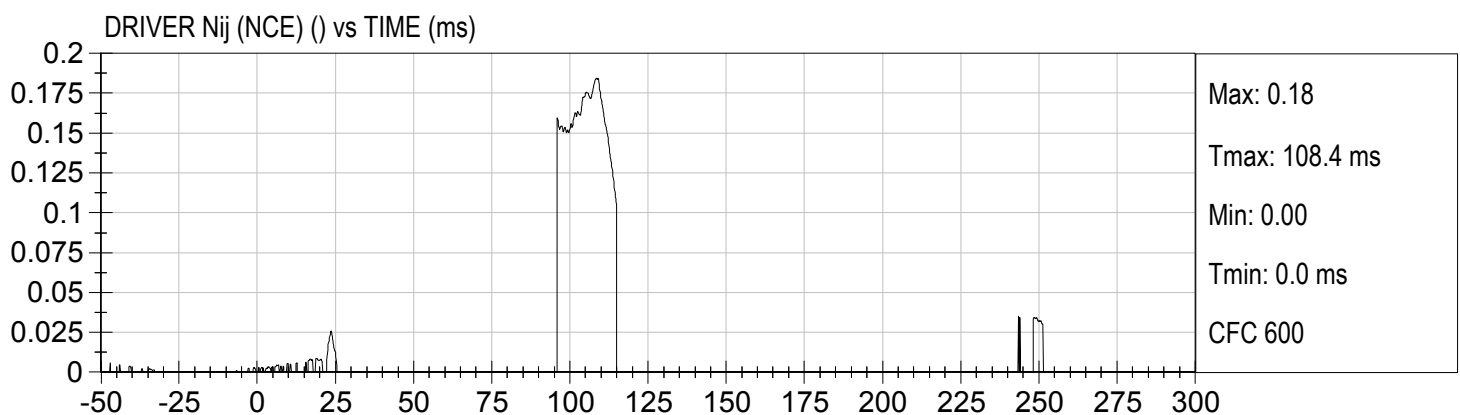
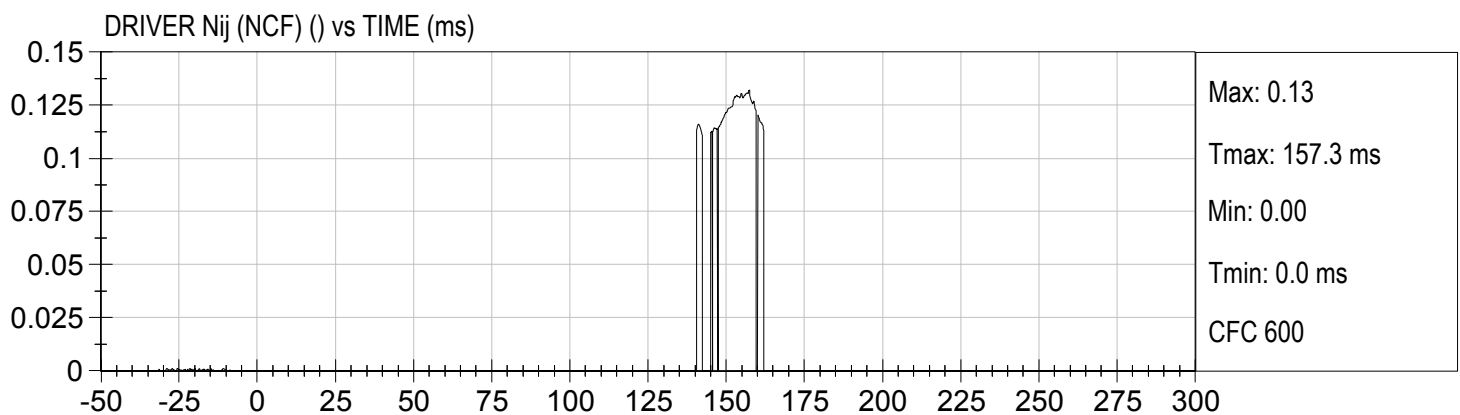
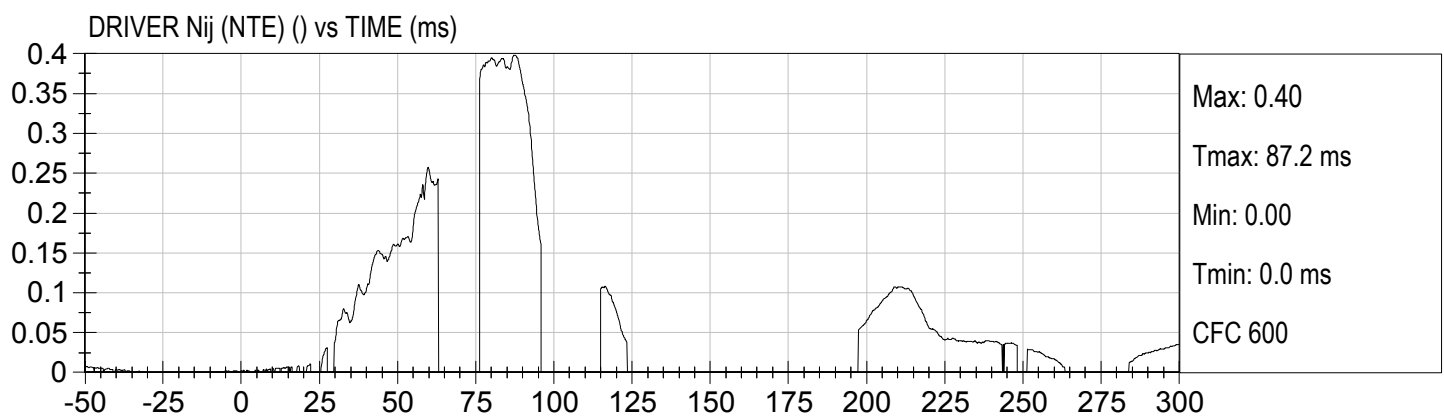
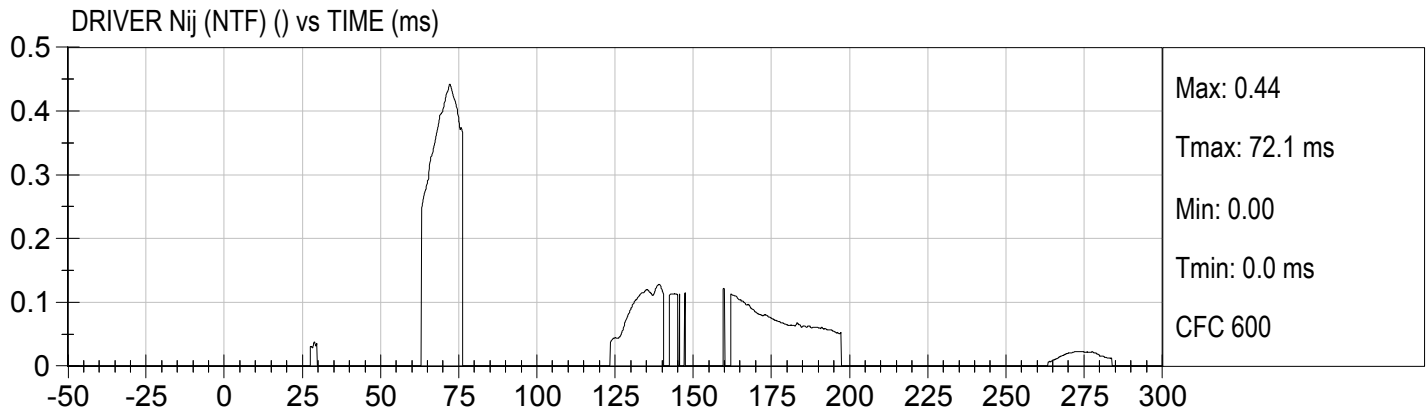
Passenger Pelvis Z
Passenger Left Femur Redundant
Passenger Right Femur Redundant
Passenger Left Upper Tibia Moment X
Passenger Left Upper Tibia Moment Y
Passenger Left Upper Tibia Force Z
Passenger Left Lower Tibia Moment X
Passenger Left Lower Tibia Moment Y
Passenger Left Lower Tibia Force Z
Passenger 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

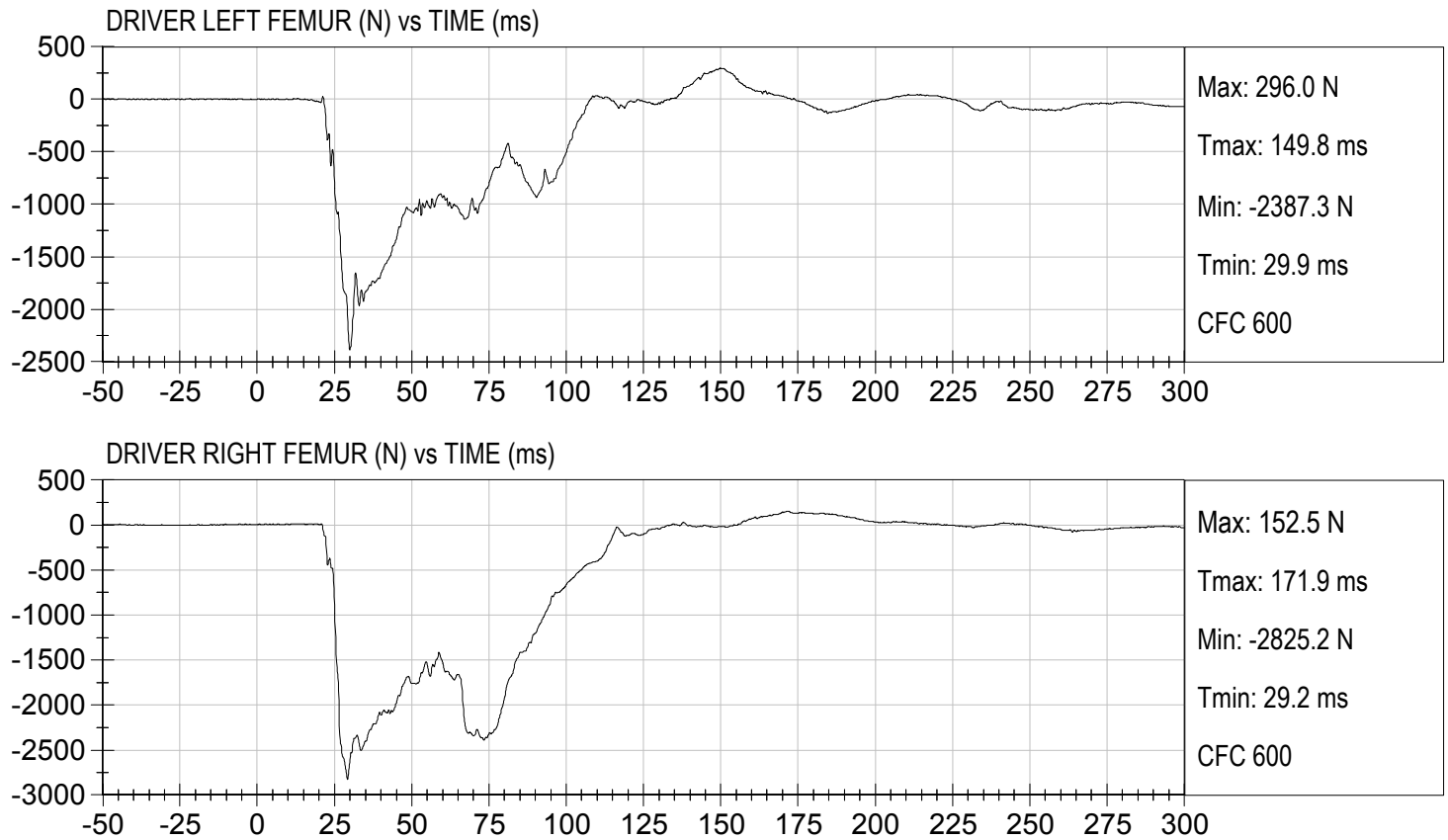


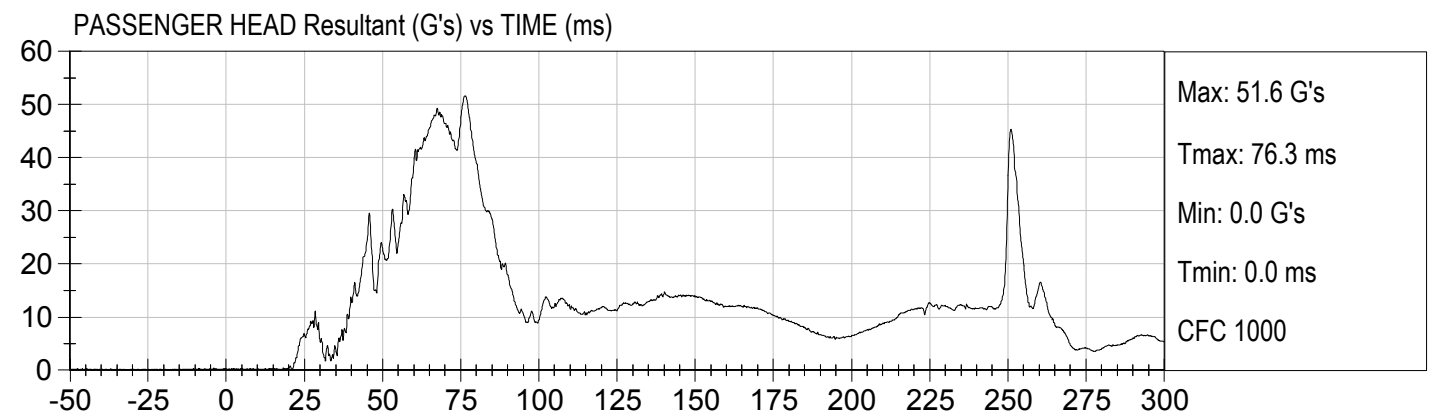
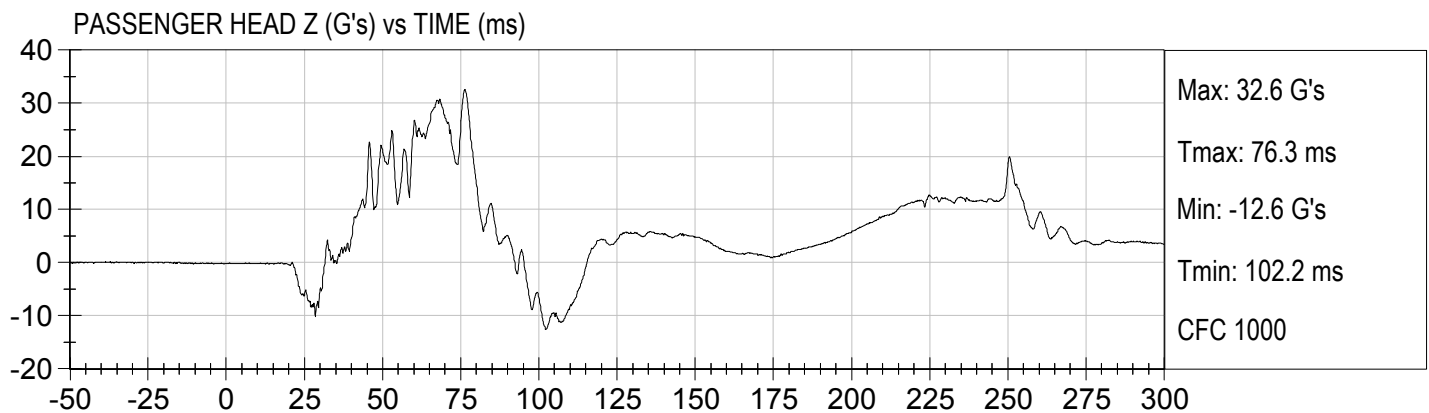
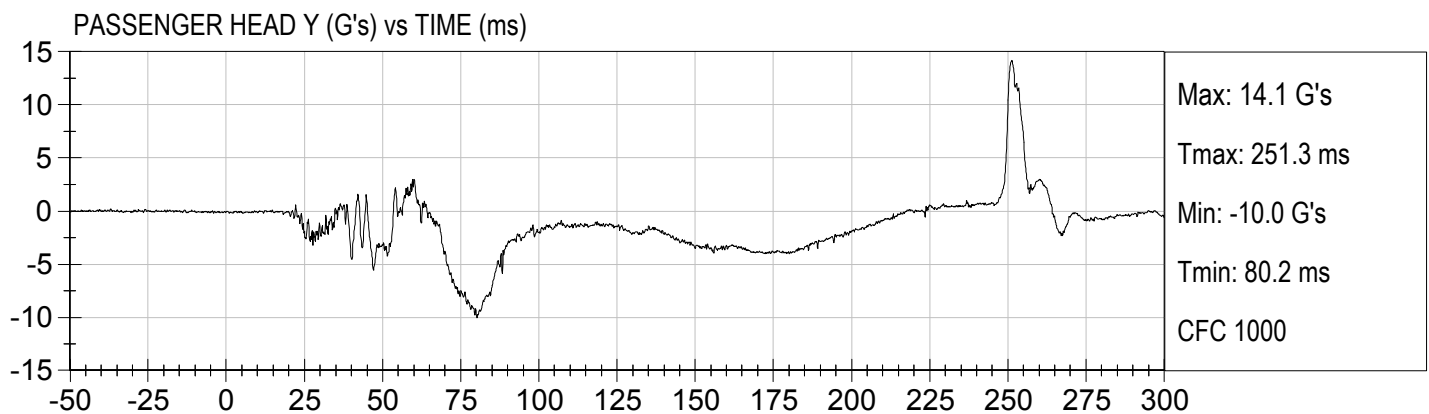
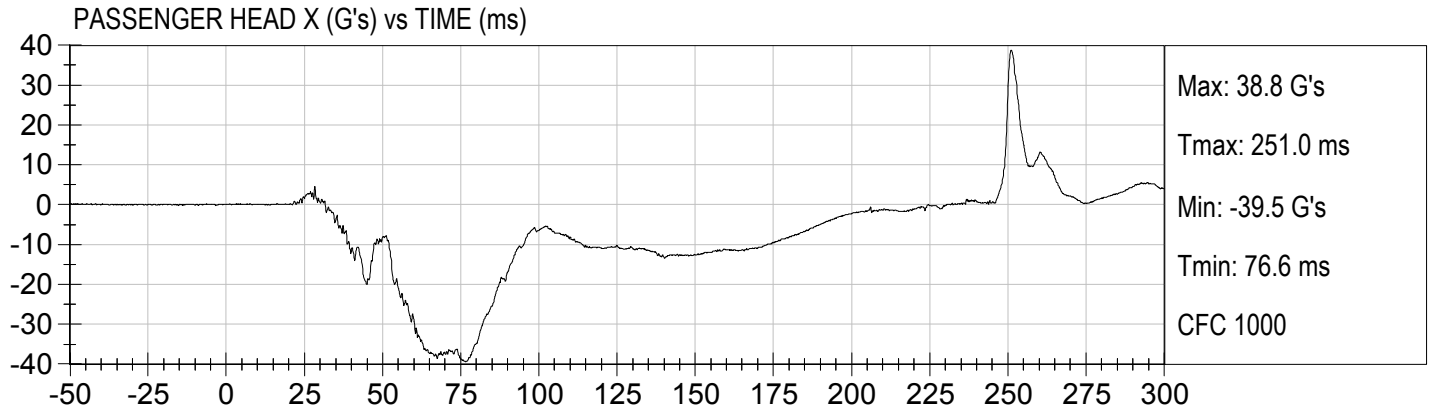


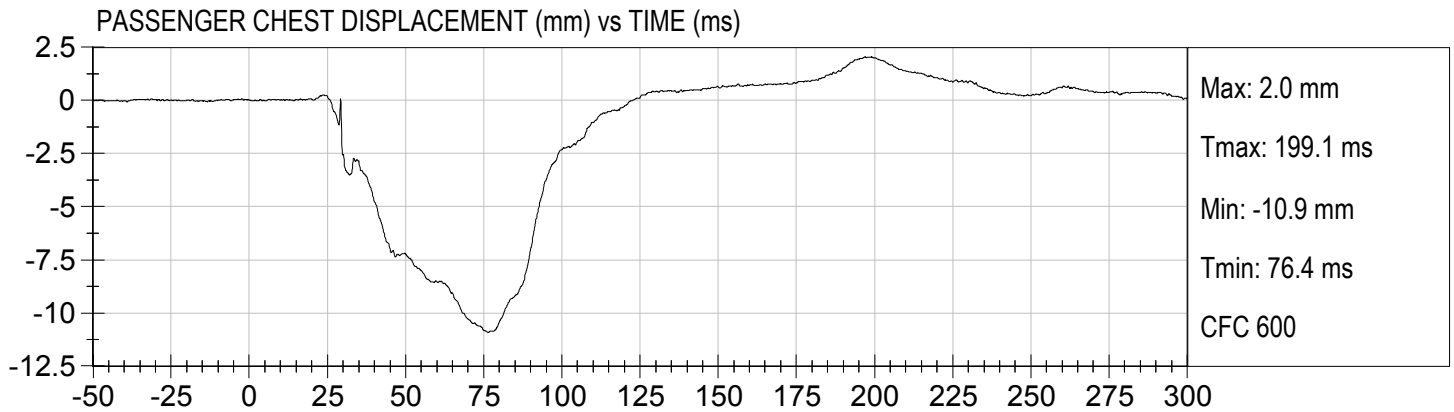


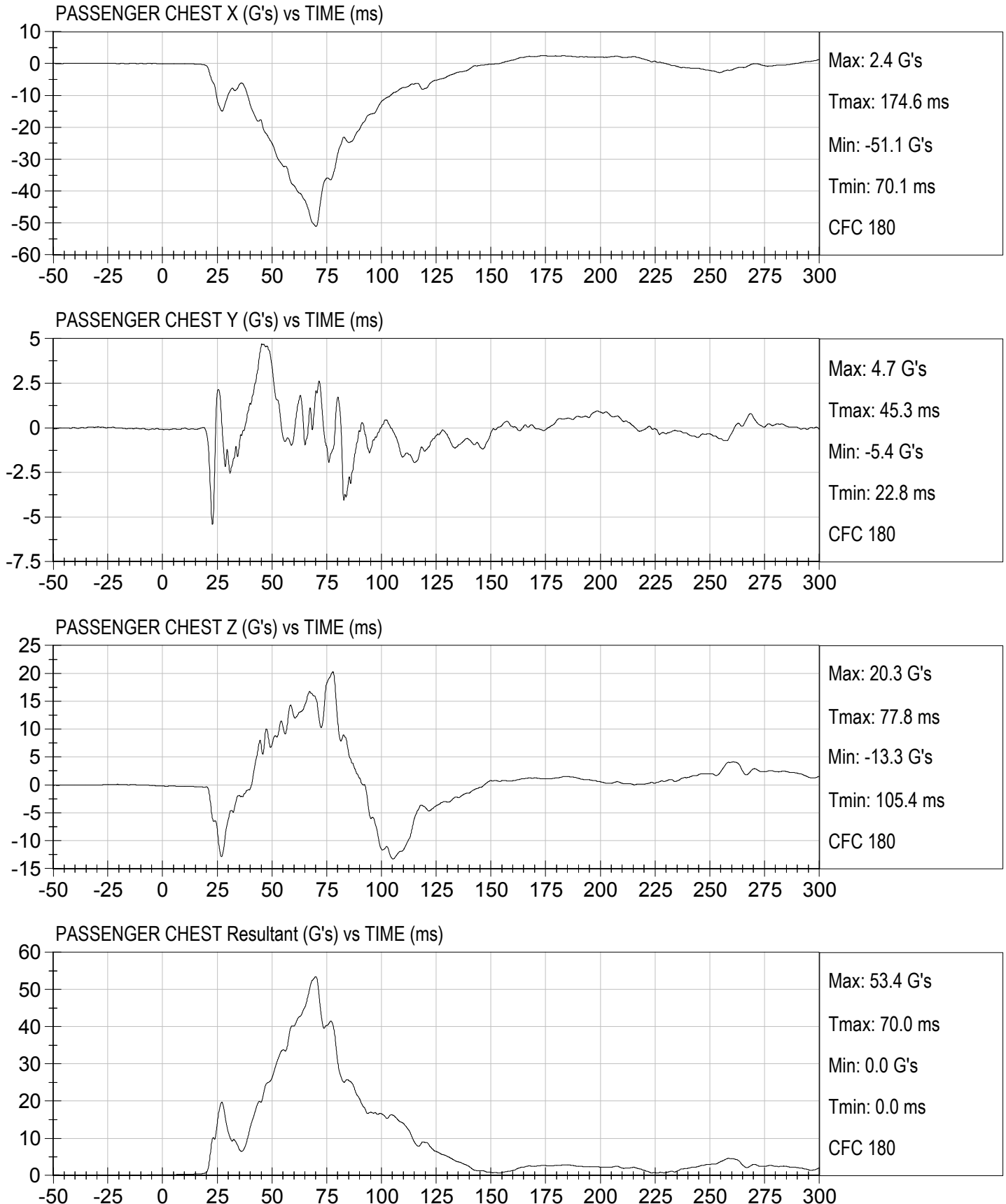


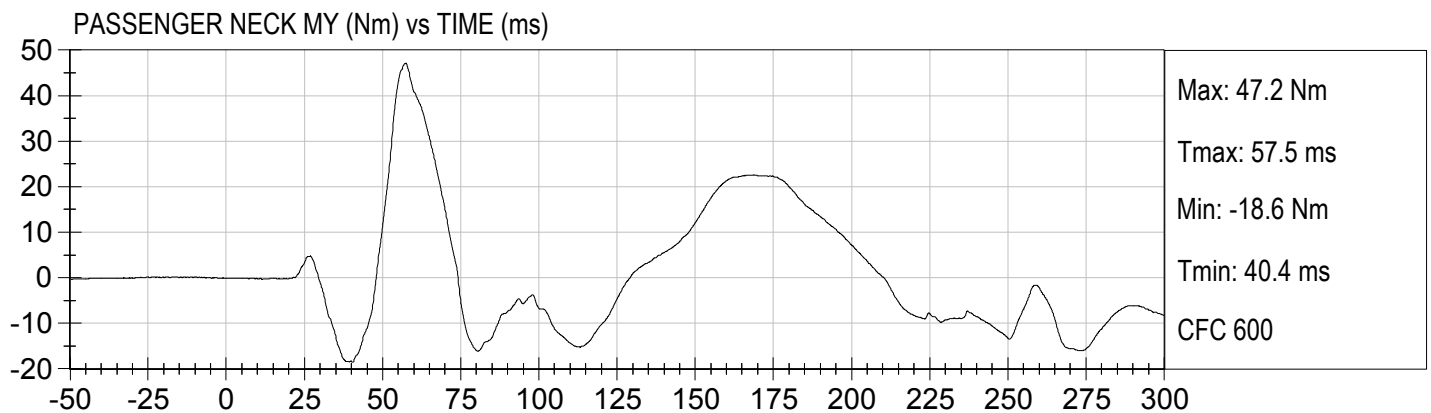
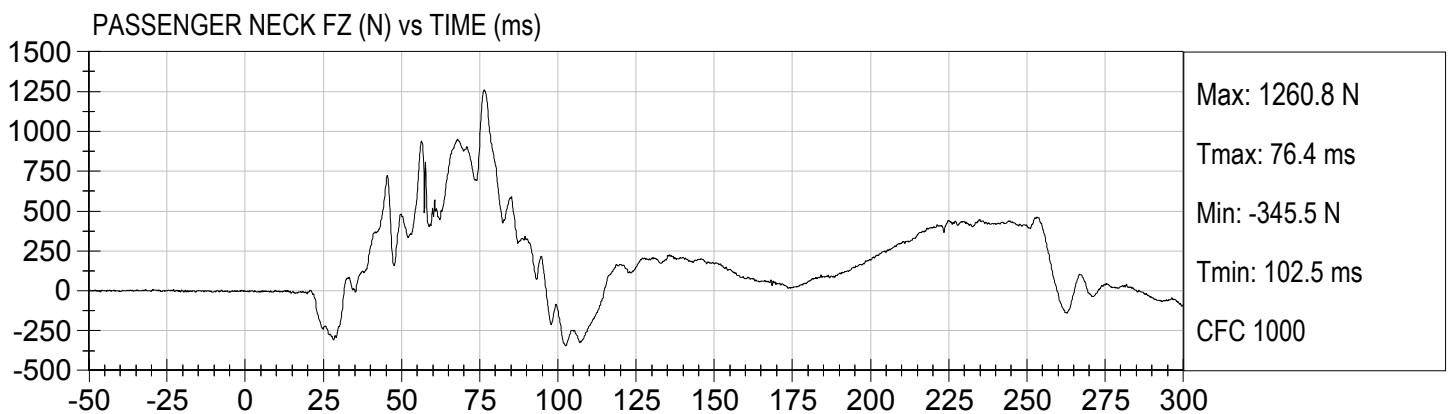
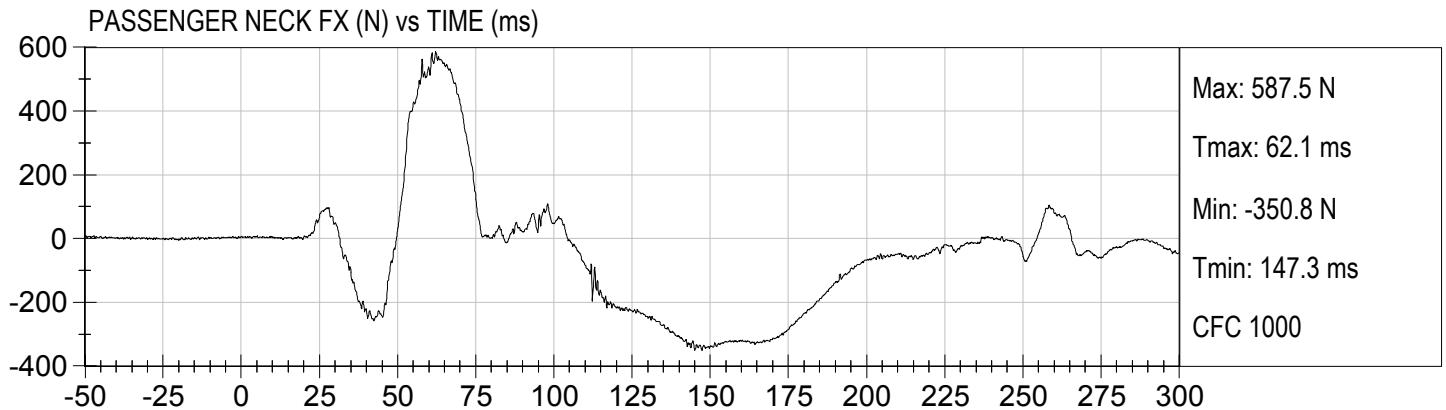


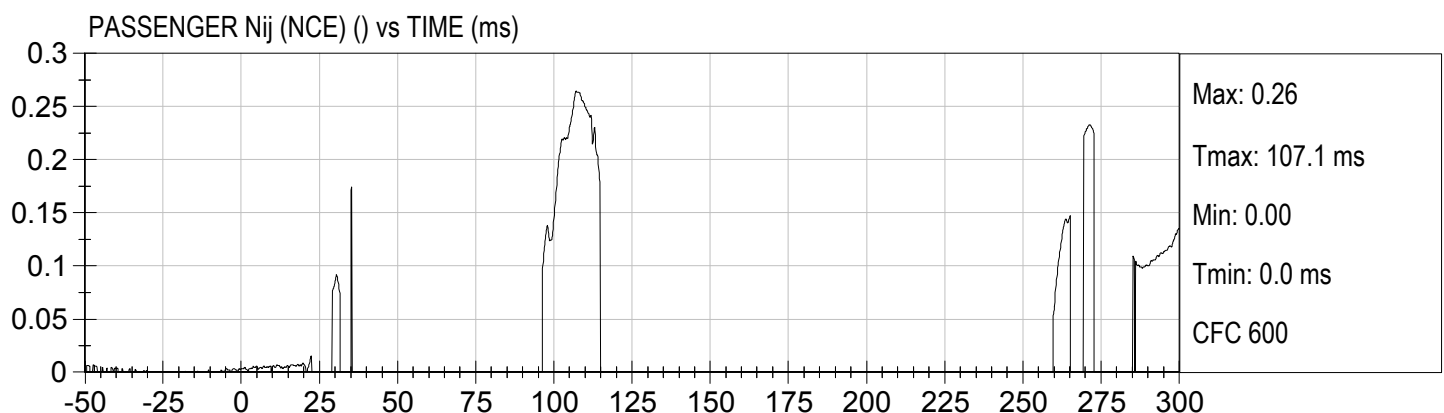
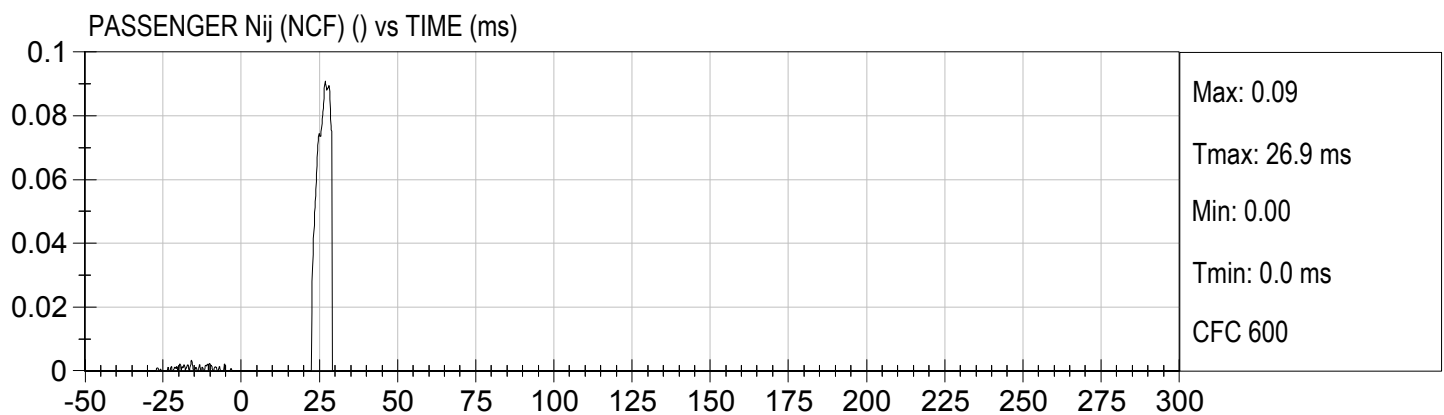
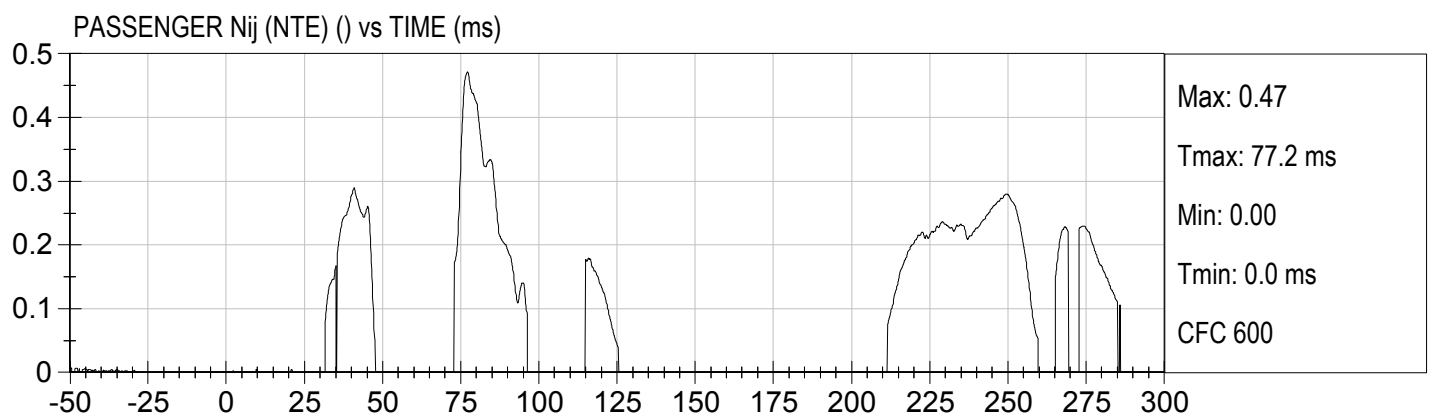
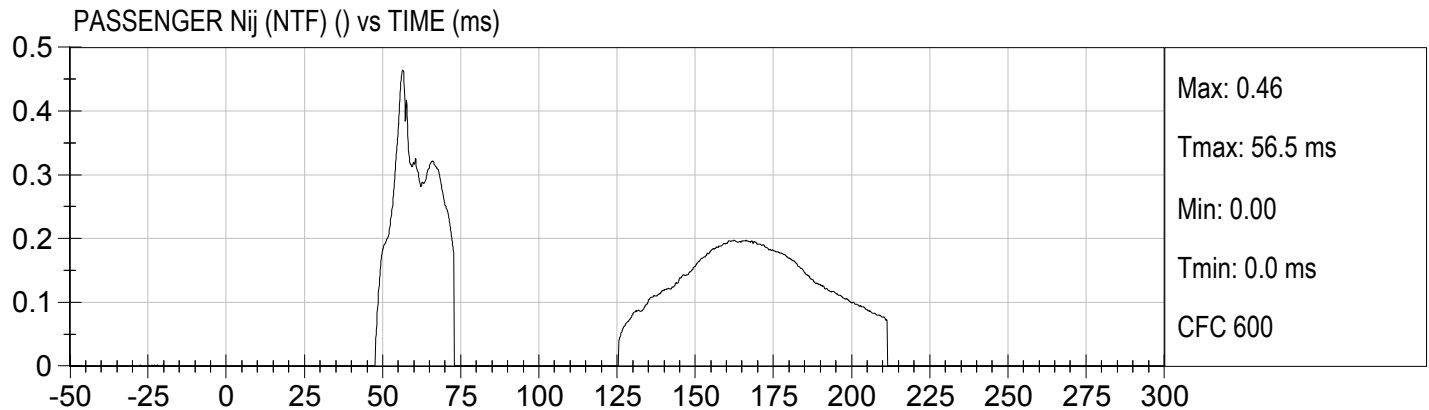


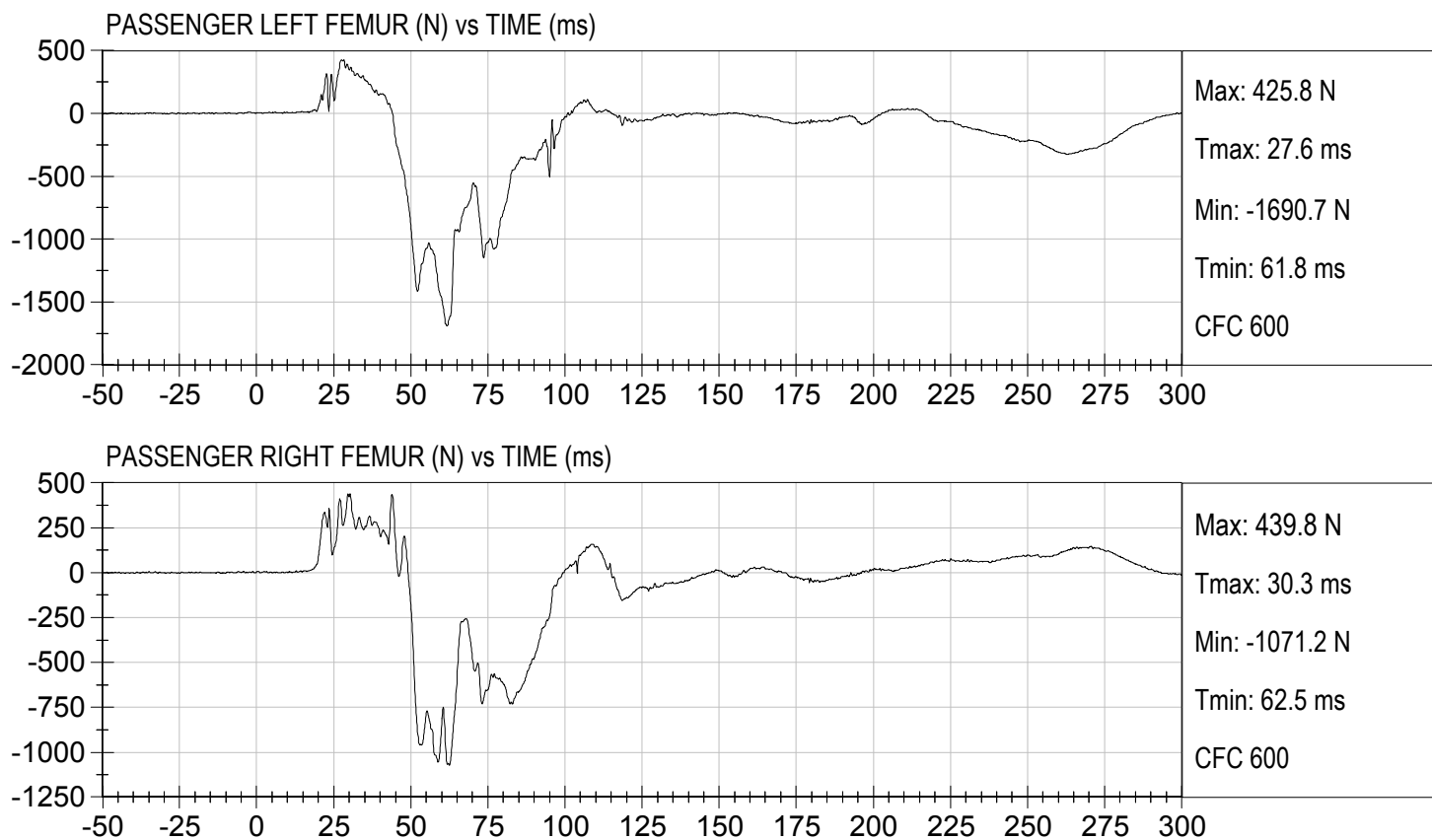












APPENDIX C
DUMMY CALIBRATION AND PERFORMANCE VERIFICATION DATA

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

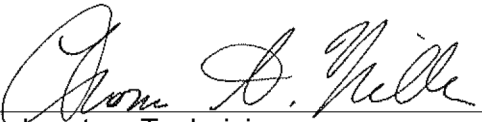
NOTE: THE H-POINT IS LOCATED 1.83 INCHES FORWARD AND 2.57 INCHES DOWN FROM THE CENTER OF THE PELVIS ANGLE REFERENCE HOLE.

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

ATD Serial No: 351

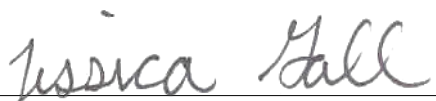
Test ID: D161821

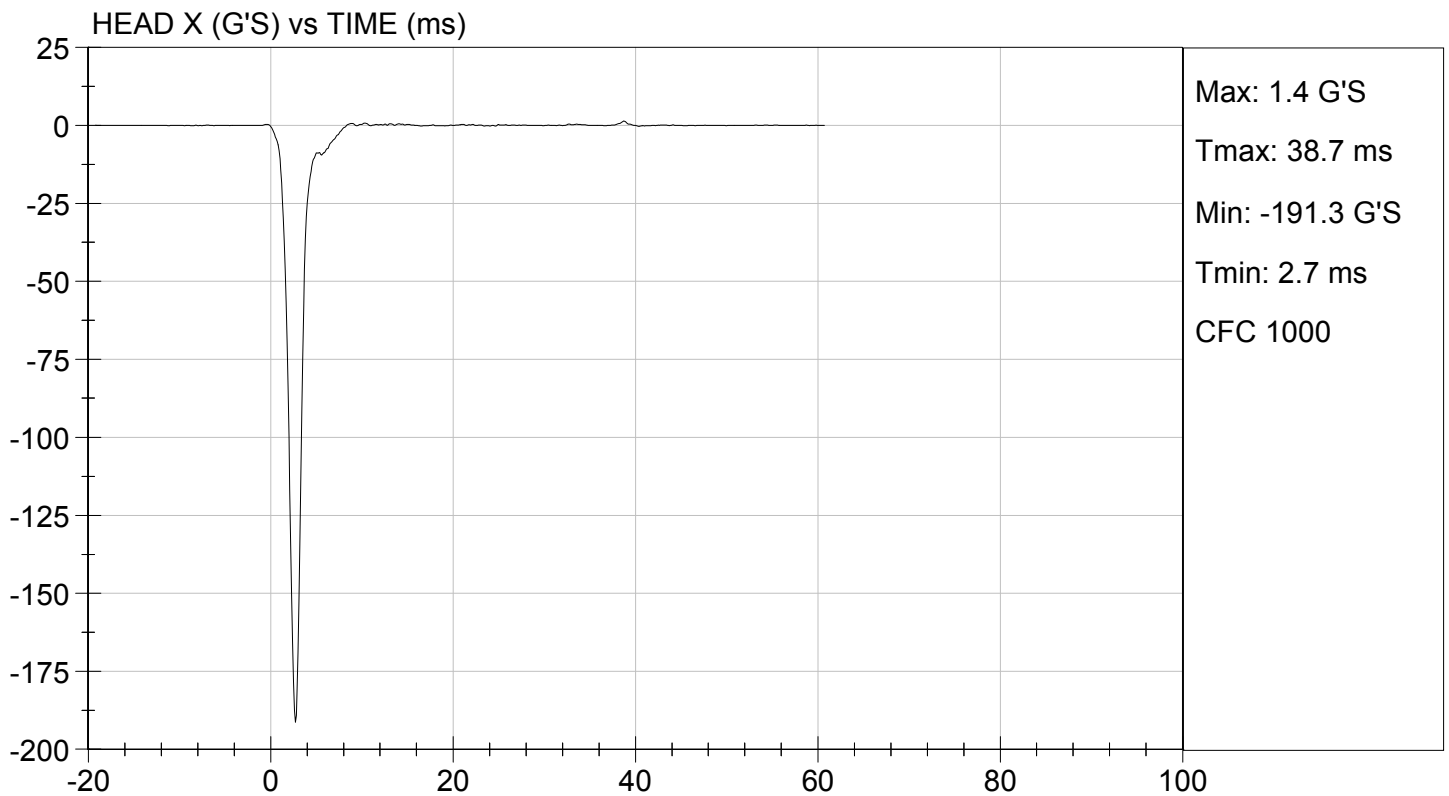
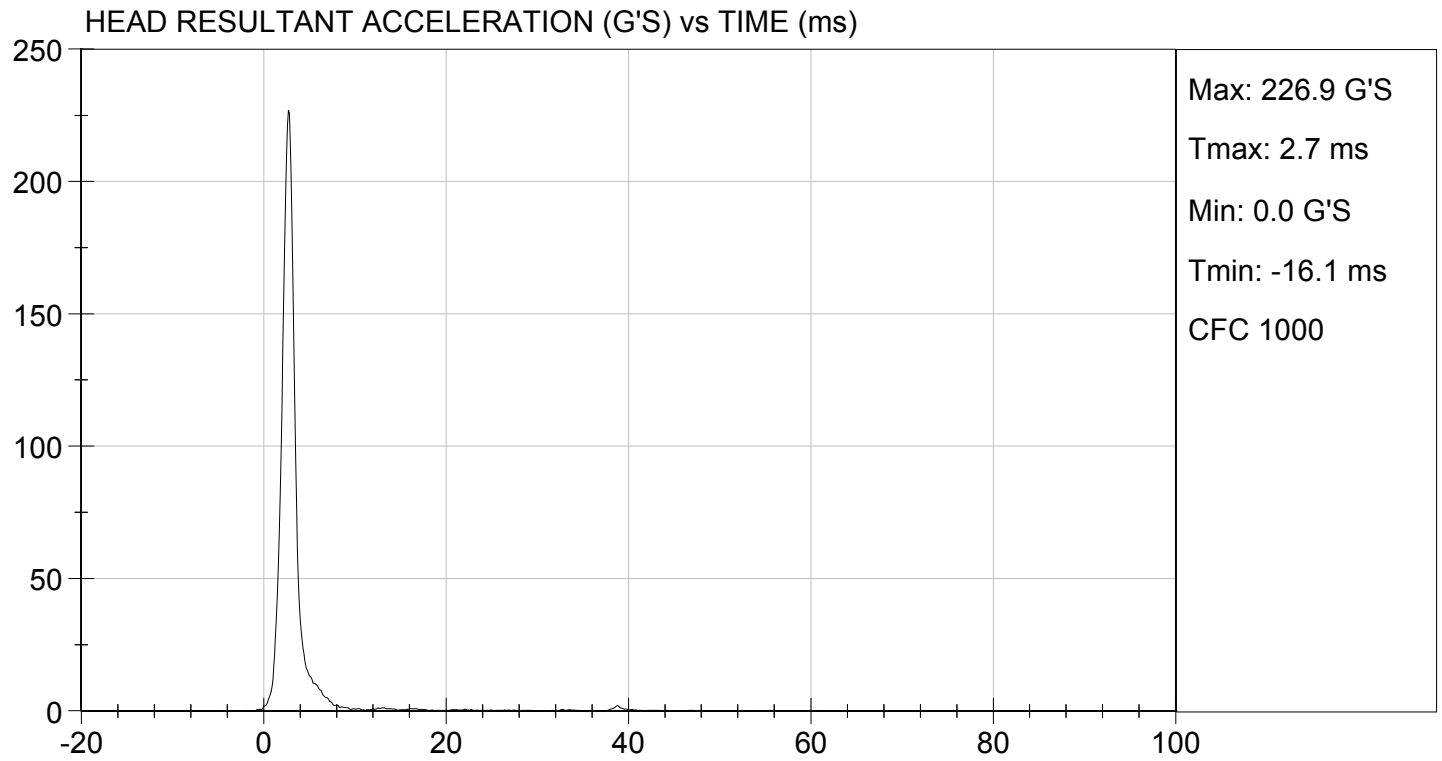
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	46	Pass
Peak Resultant Acceleration	G's	225 to 275	227	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	12.1	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass

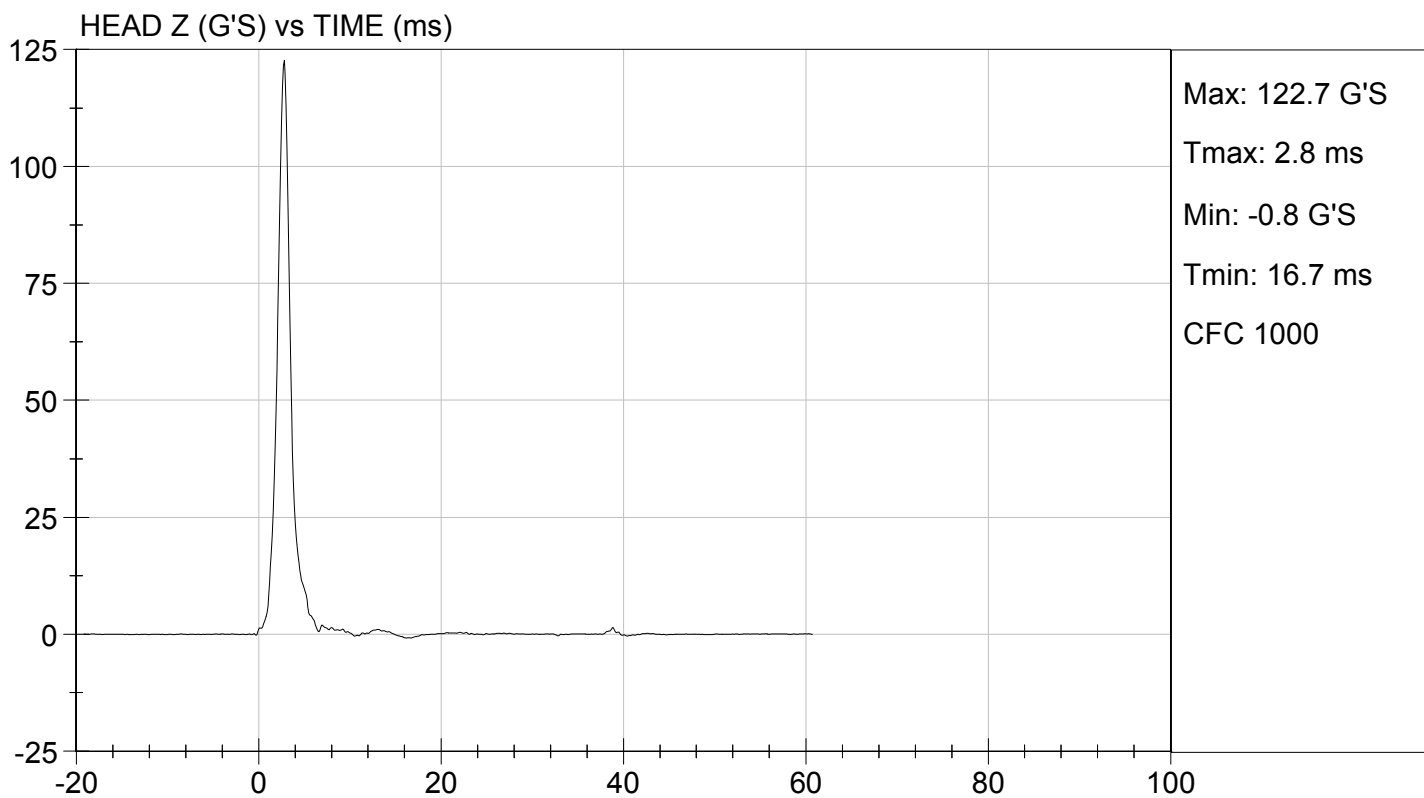
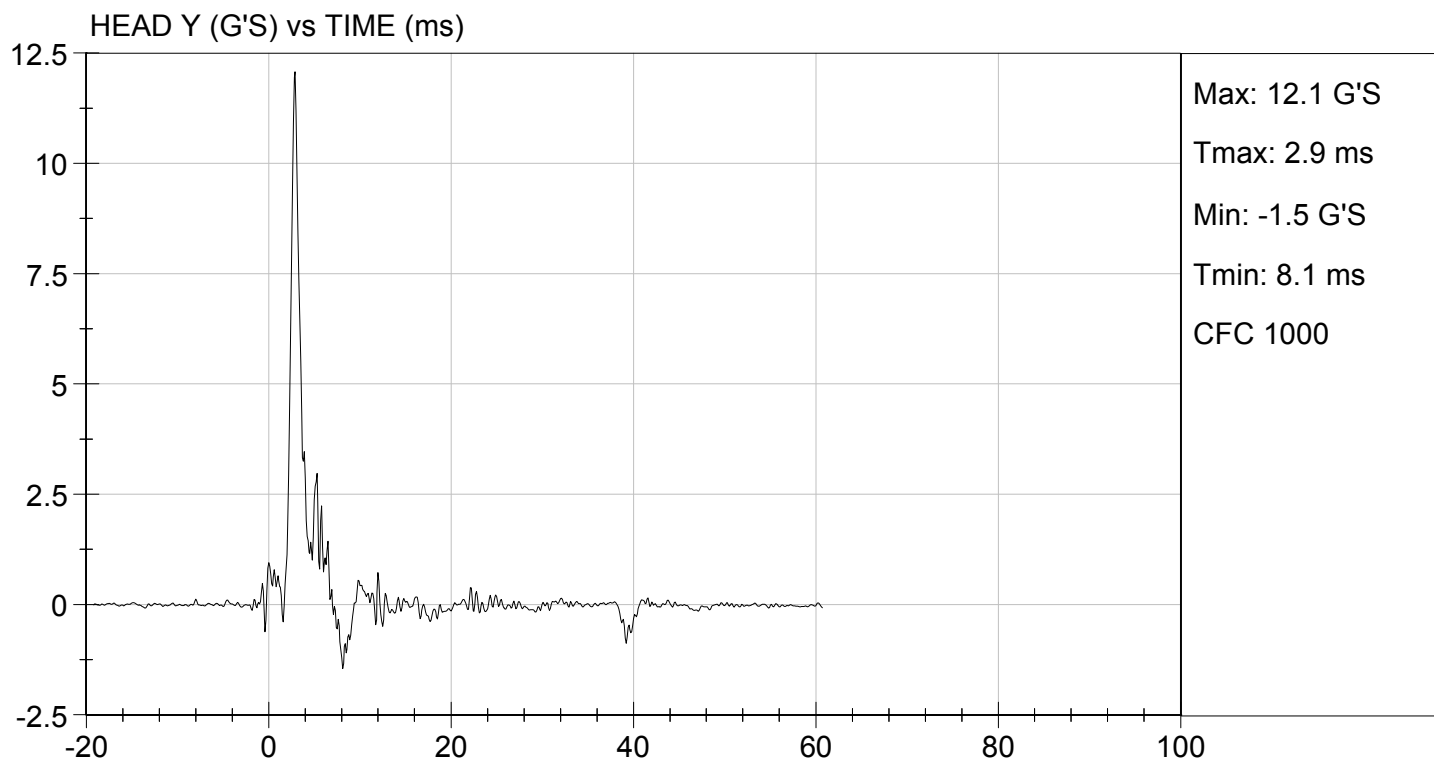

Laboratory Technician

05/26/2016

Test Date


Approved By



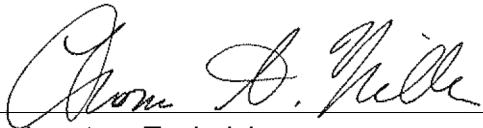


MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351

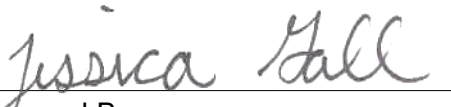
Test I.D: D161822

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	48	Pass
Pendulum Velocity		m/s	6.89 to 7.13	6.96	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	23.27	Pass
	20 ms	G's	17.60 to 22.60	20.19	Pass
	30 ms	G's	12.50 to 18.50	13.95	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	13.9	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	39.3	Pass
Maximum "D" Plane Rotation	Maximum	Deg	64.0 to 78.0	69.1	Pass
	Time	ms	57.0 to 64.0	59.8	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	118.3	Pass
Moment About Occipital Condyle	Maximum	Nm	88.1 to 108.5	89.2	Pass
	Time	ms	47.0 to 58.0	52.7	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	102.3	Pass
Overall Test Results					Pass


 Laboratory Technician

05/26/2016

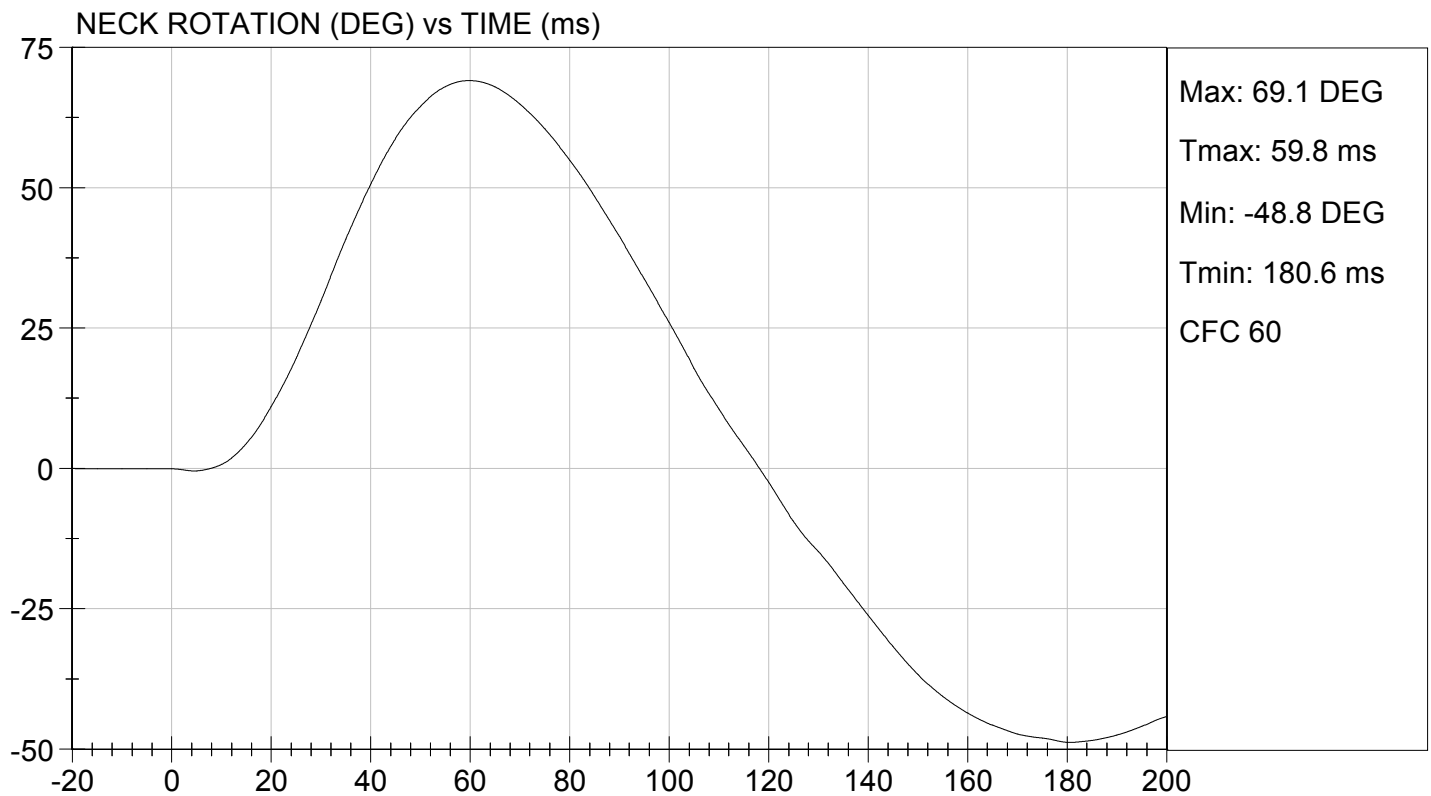
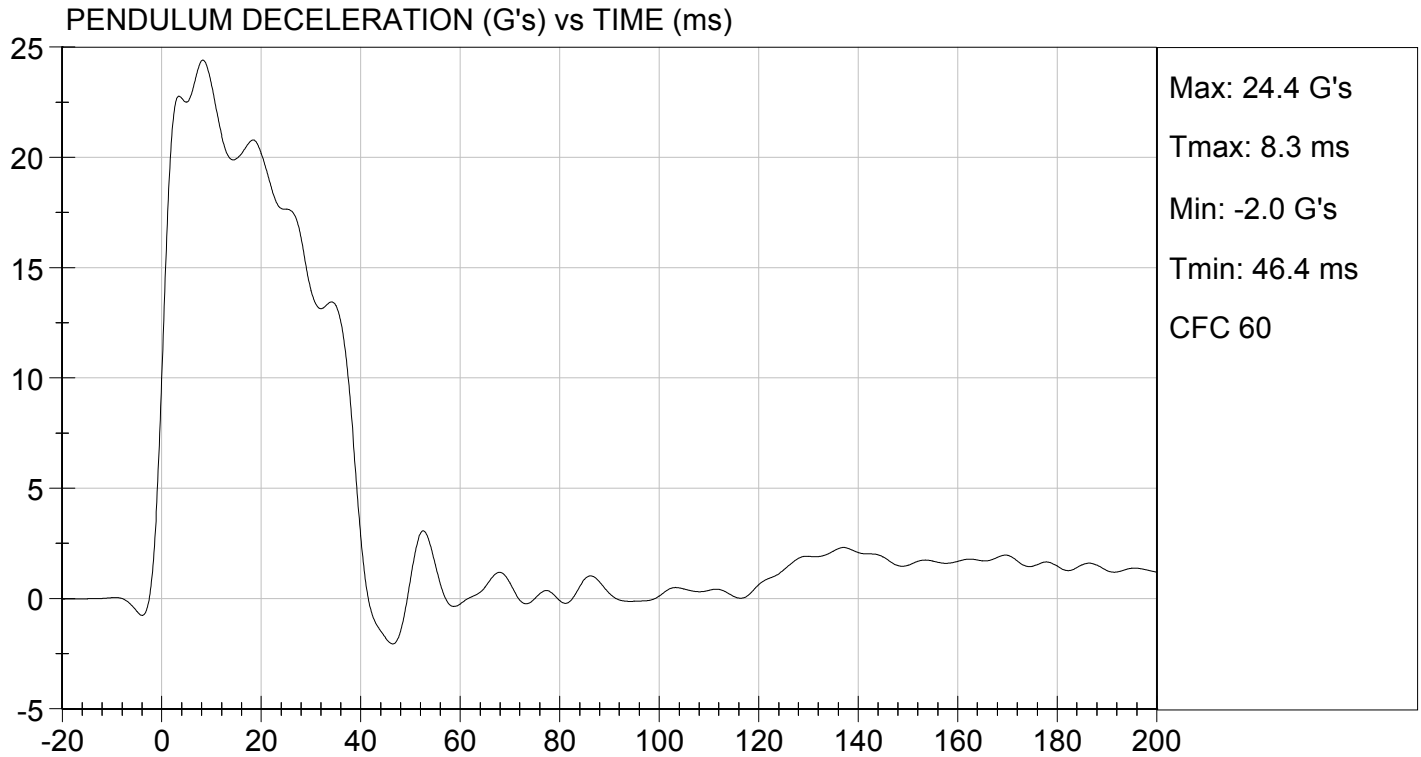
Test Date


 Approved By



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

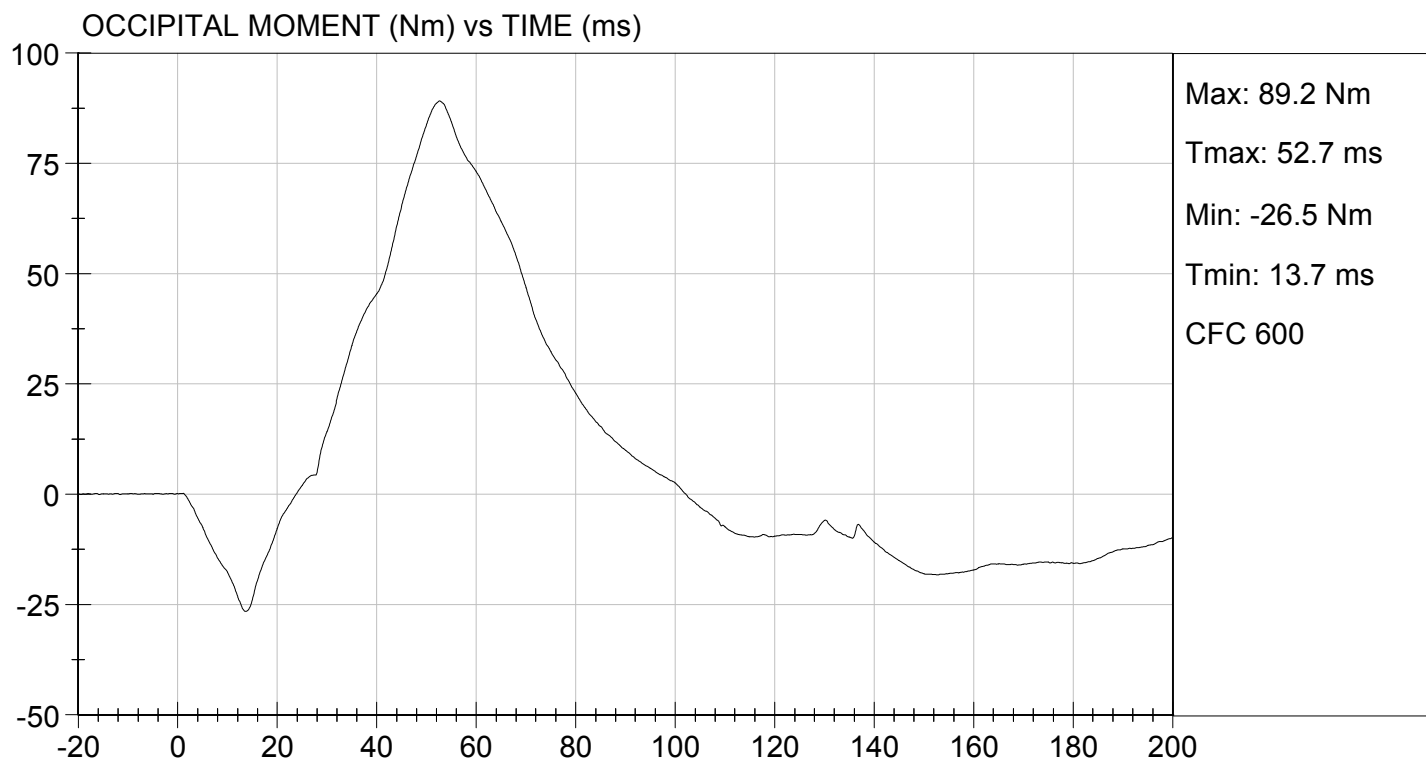
TEST DATE: 05/26/2016
TEST #: D161822





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

TEST DATE: 05/26/2016
TEST #: D161822



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

ATD Serial No: 351

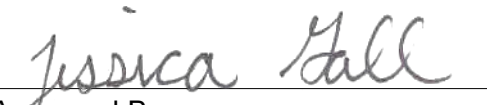
Test I.D: D161823

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	48	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.05	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	19.28	Pass
	20 ms	G's	14.00 to 19.00	17.61	Pass
	30 ms	G's	11.00 to 16.00	12.54	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	12.7	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	38.3	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	98.1	Pass
	Time	ms	72.0 to 82.0	78.1	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	164.6	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-60.0	Pass
	Time	ms	65.0 to 79.0	71.7	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	148.0	Pass
Overall Test Results					Pass


 Laboratory Technician

05/26/2016

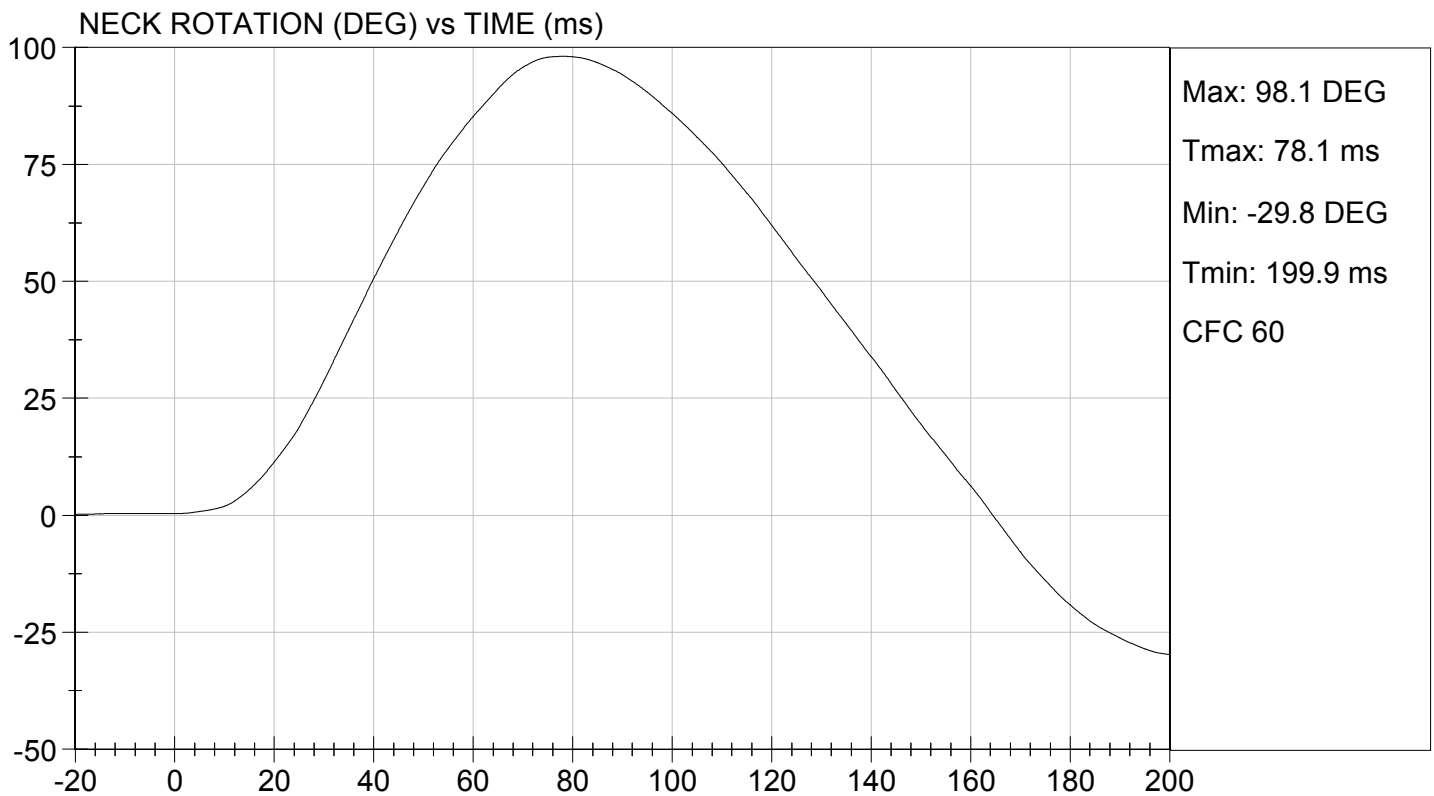
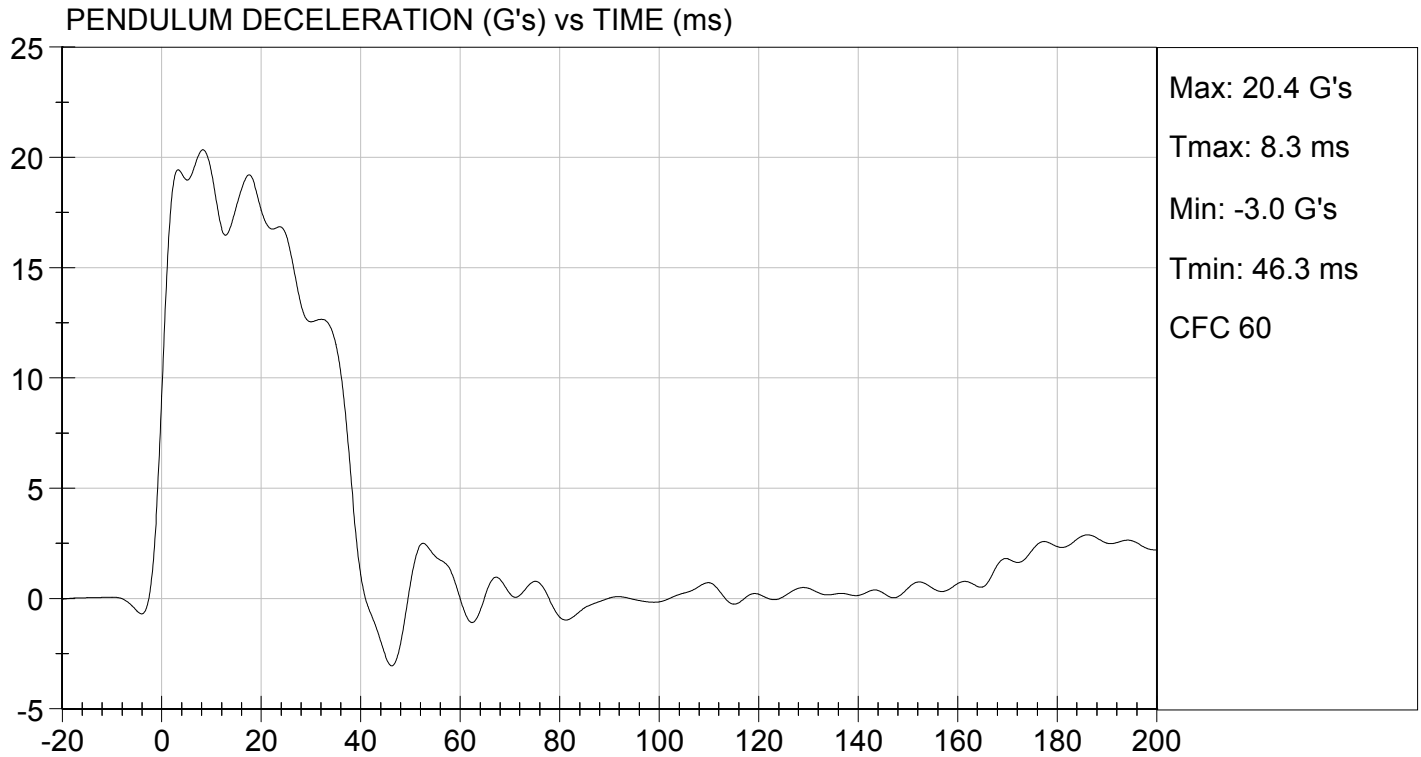
Test Date


 Approved By



TEST DESC: NECK EXTENSION
VELOCITY: 19.84 ft/s, 6.05 m/s

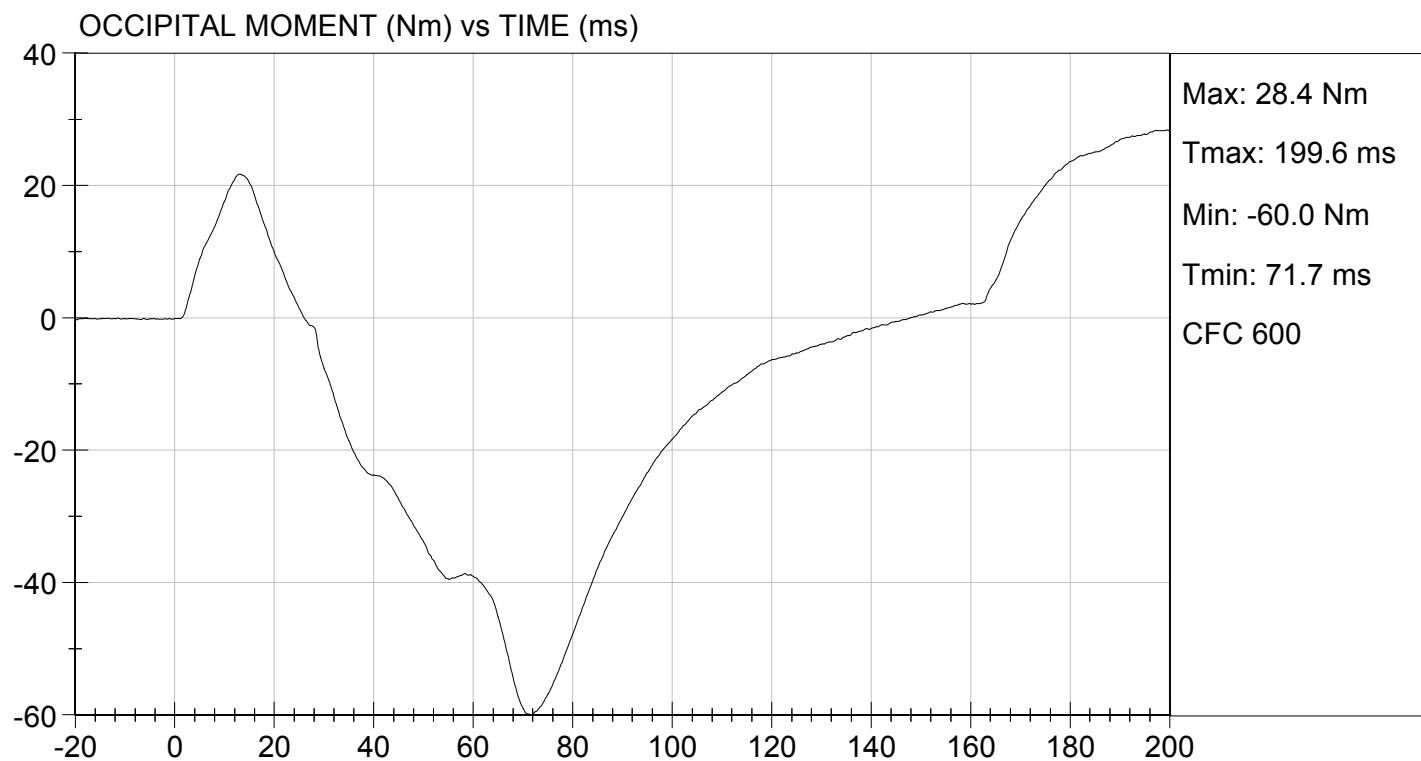
TEST DATE: 05/26/2016
TEST #: D161823





TEST DESC: NECK EXTENSION
VELOCITY: 19.84 ft/s, 6.05 m/s

TEST DATE: 05/26/2016
TEST #: D161823



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE

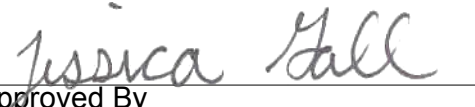
ATD Serial No: 351

Test I.D: D161824

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	56	Pass
Probe Velocity	m/s	6.58 to 6.82	6.68	Pass
Peak Probe Force	N	5159 to 5893	5,688	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.69	Pass
Internal Hysteresis	%	69 to 85	75	Pass
			Overall Test Results	Pass


Laboratory Technician

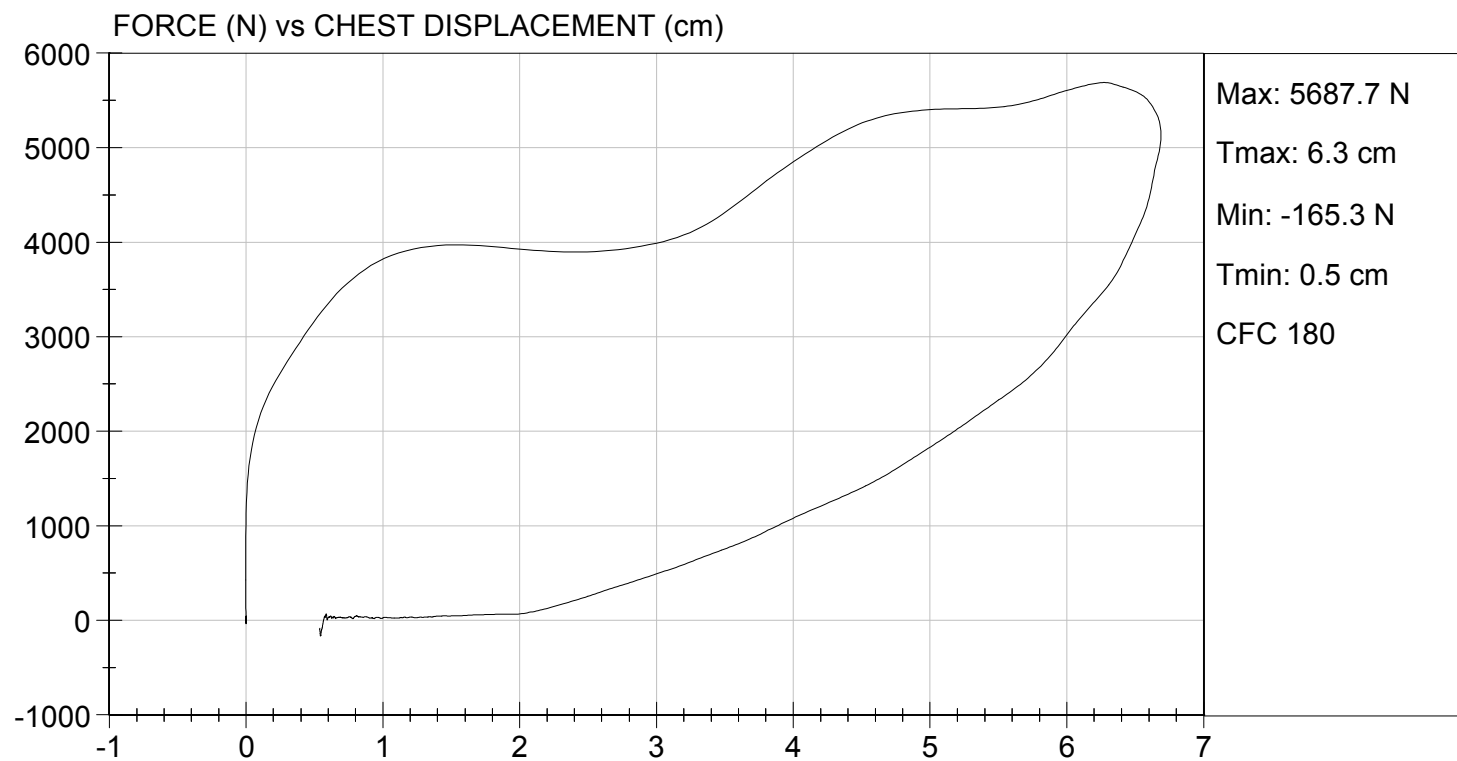
05/27/2016
Test Date


Approved By



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

TEST DATE: 05/27/2016
TEST #: D161824



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

ATD Serial No: 351

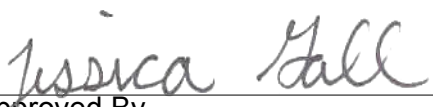
Test I.D: D161825

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	48	Pass
Probe Velocity	m/s	2.07 to 2.13	2.10	Pass
Peak Probe Force	N	4715 to 5782	5,311	Pass
Overall Test Results				Pass



Laboratory Technician

05/26/2016
Test Date

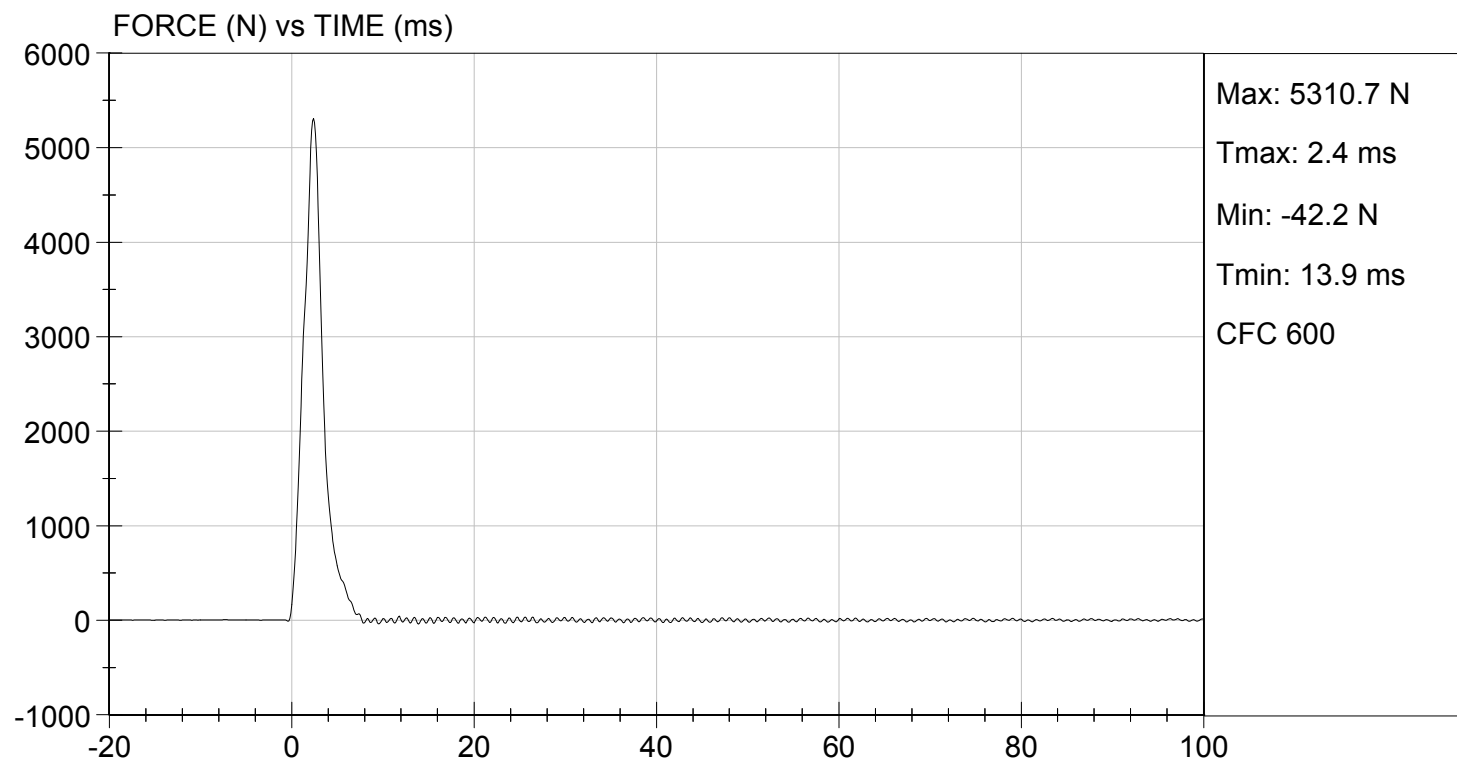


Approved By



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

TEST DATE: 05/26/2016
TEST #: D161825



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

ATD Serial No: 351

Test I.D: D161826

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	48	Pass
Probe Velocity	m/s	2.07 to 2.13	2.10	Pass
Peak Probe Force	N	4715 to 5782	5,221	Pass
Overall Test Results				Pass



Laboratory Technician

05/26/2016
Test Date

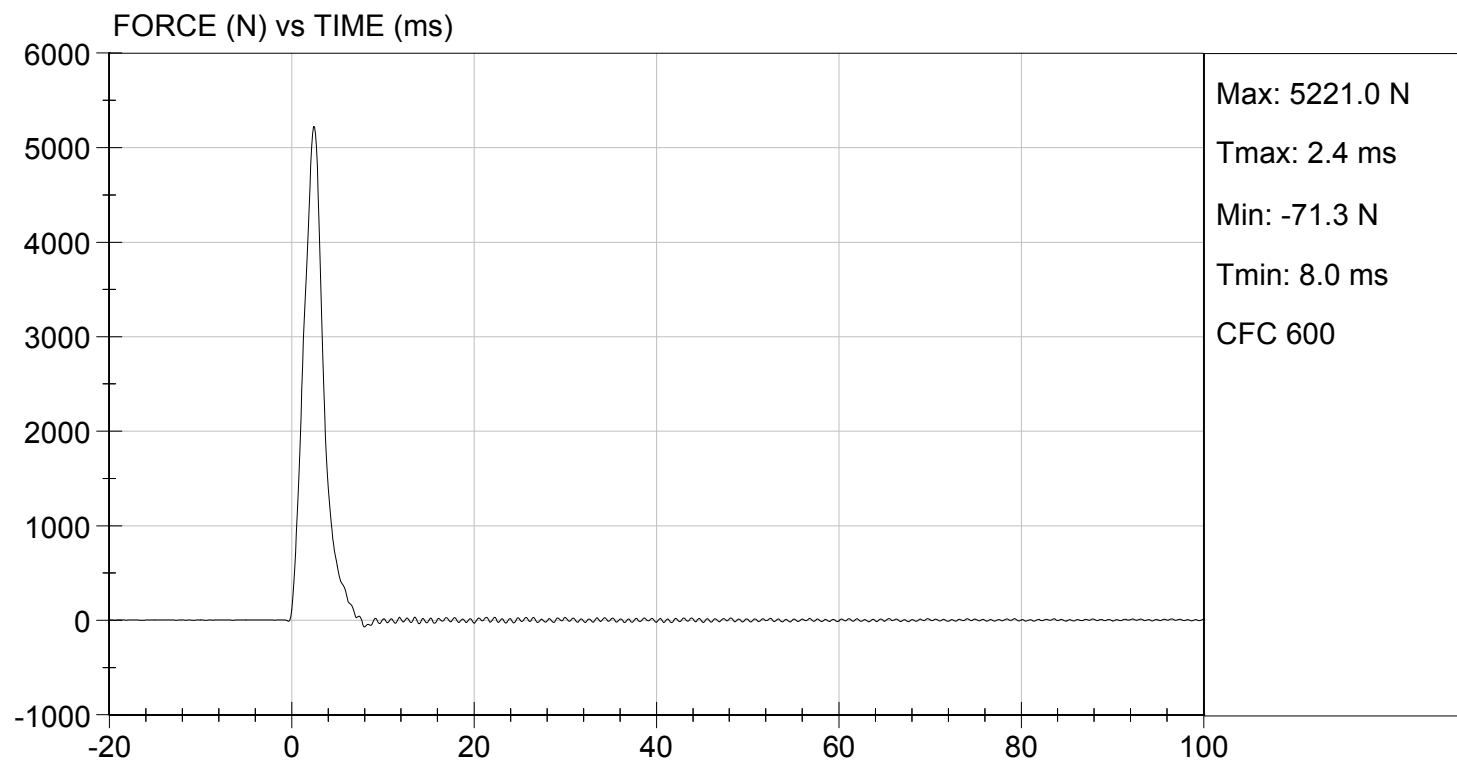


Approved By



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

TEST DATE: 05/26/2016
TEST #: D161826



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

ATD Serial No: 351

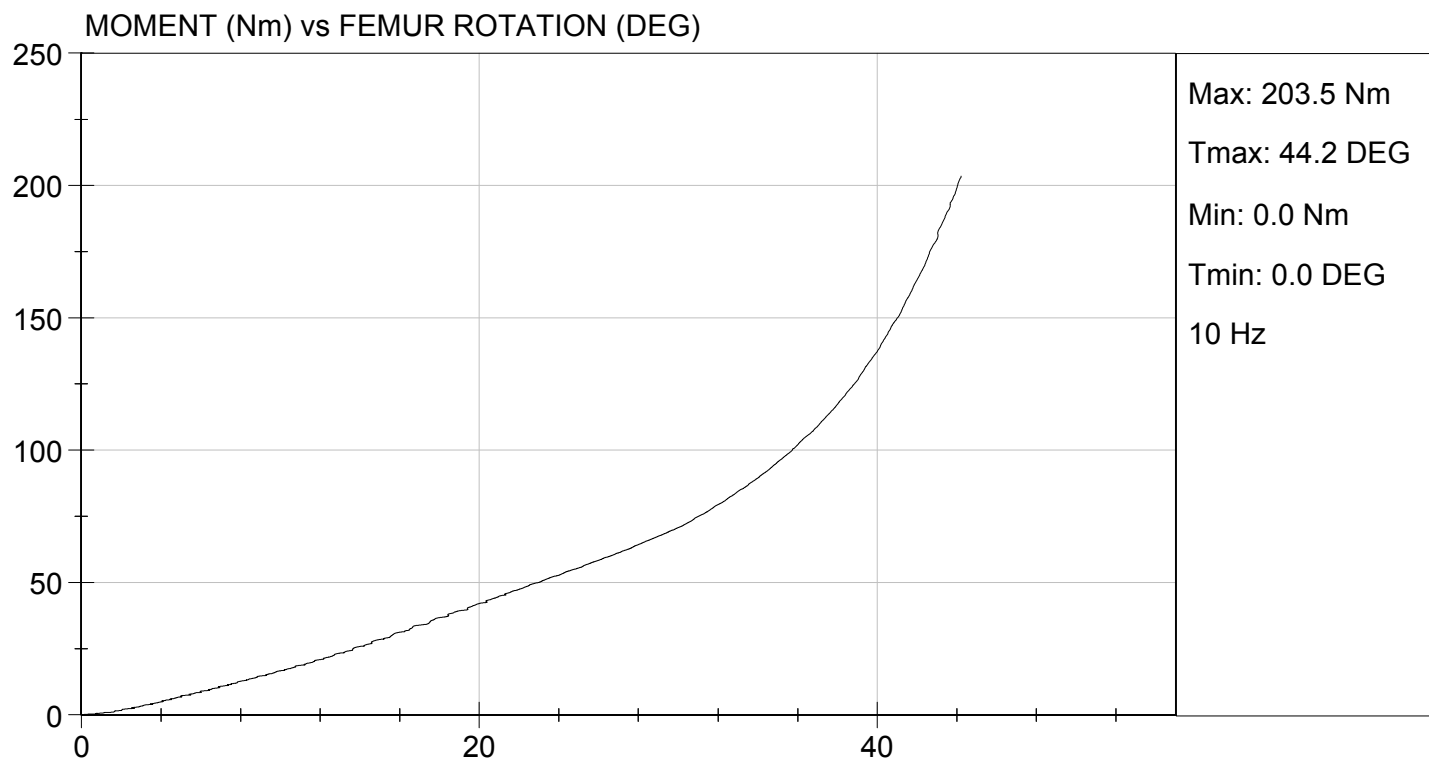
Test I.D: D161820

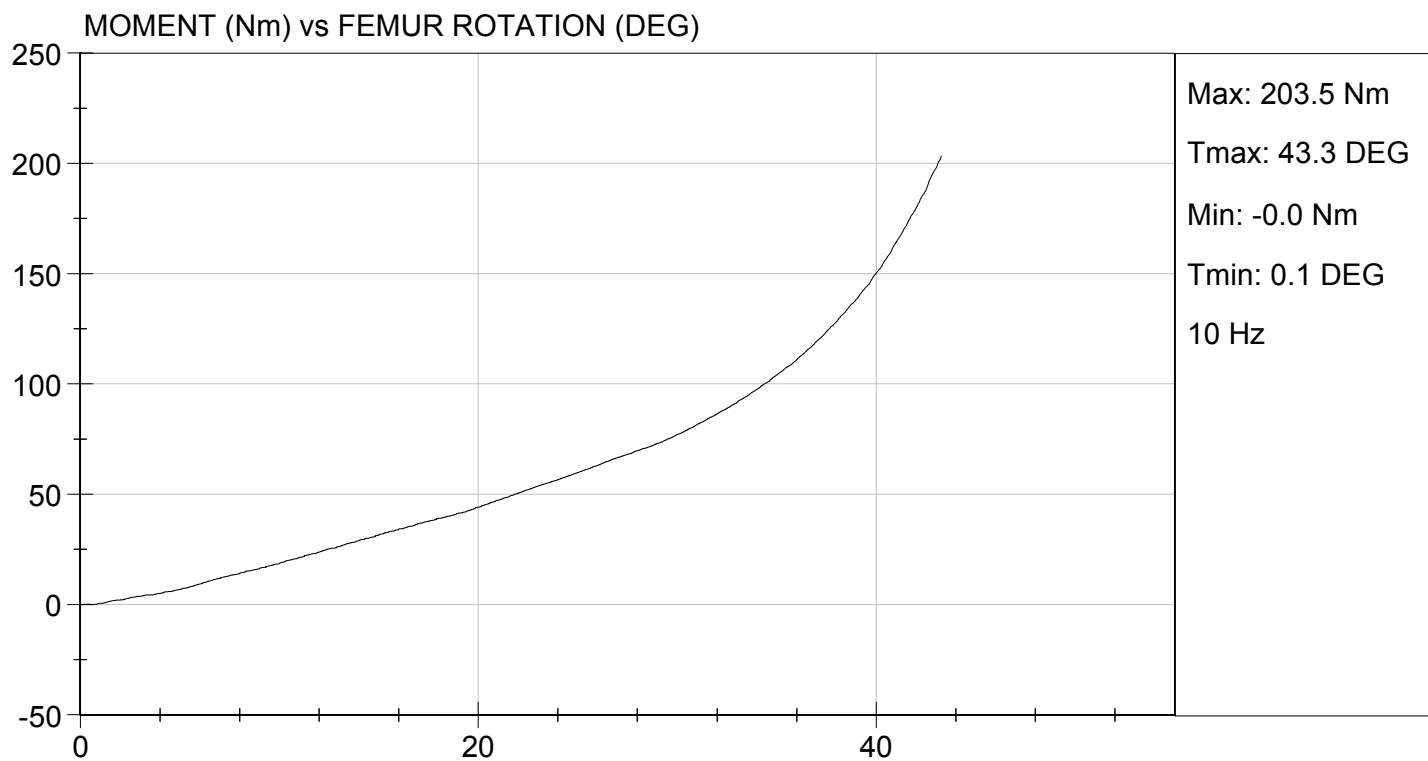
Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.9	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	50	50	Pass
Rotation Rate	deg/s	5.0 to 10.0	6.2	6.3	Pass
30 Degrees	Nm	94.9 Nm Max	70.8	77.1	Pass
150 ft-lbf / 203.4 Nm	Deg	40.0 to 50.0 Degree Max Rotation	44.2	43.3	Pass
Overall Test Results					Pass


 Laboratory Technician

05/26/2016
 Test Date


 Approved By



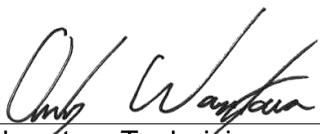


MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351

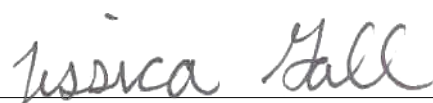
Test ID: D161991

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	47	Pass
Peak Resultant Acceleration	G's	225 to 275	257	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-3.0	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass

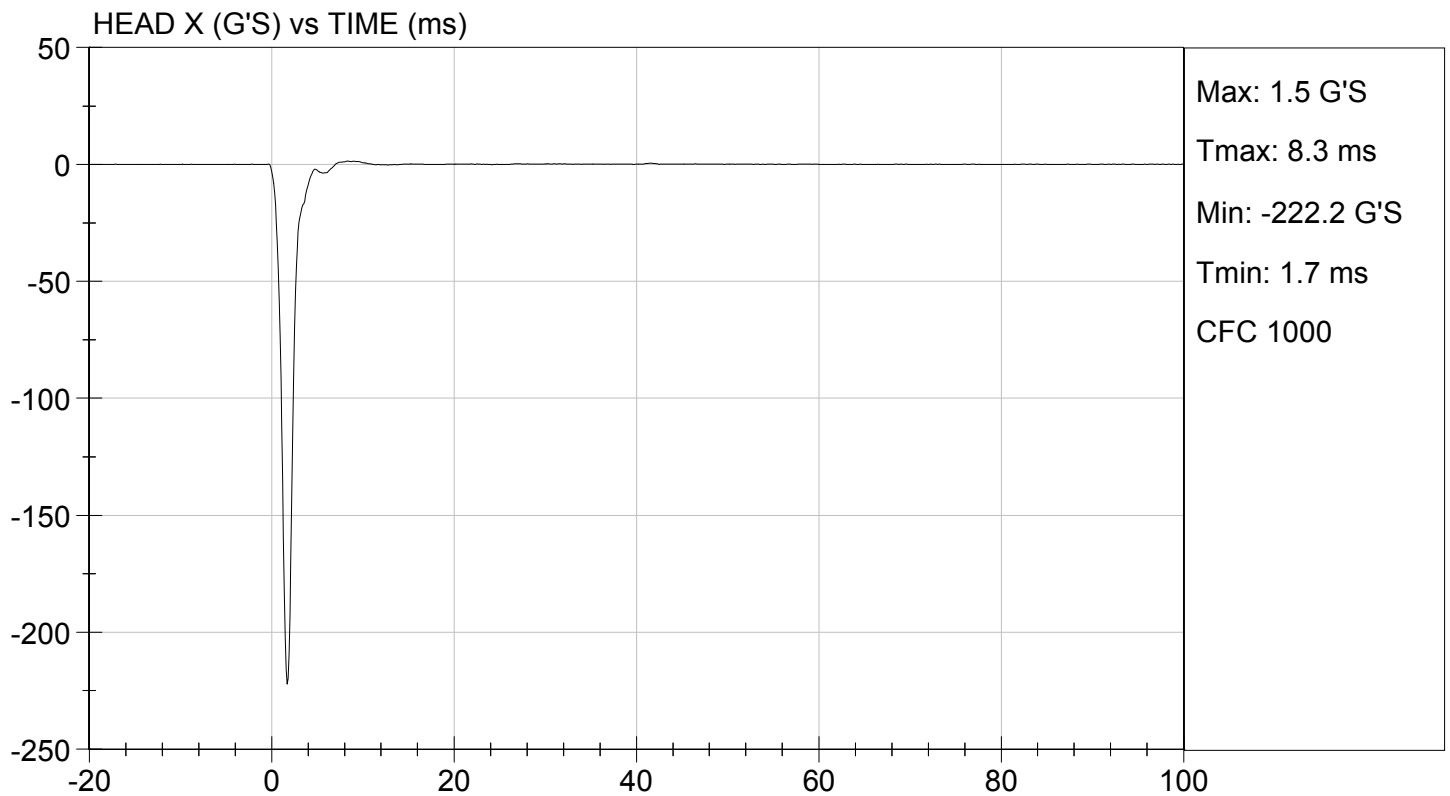
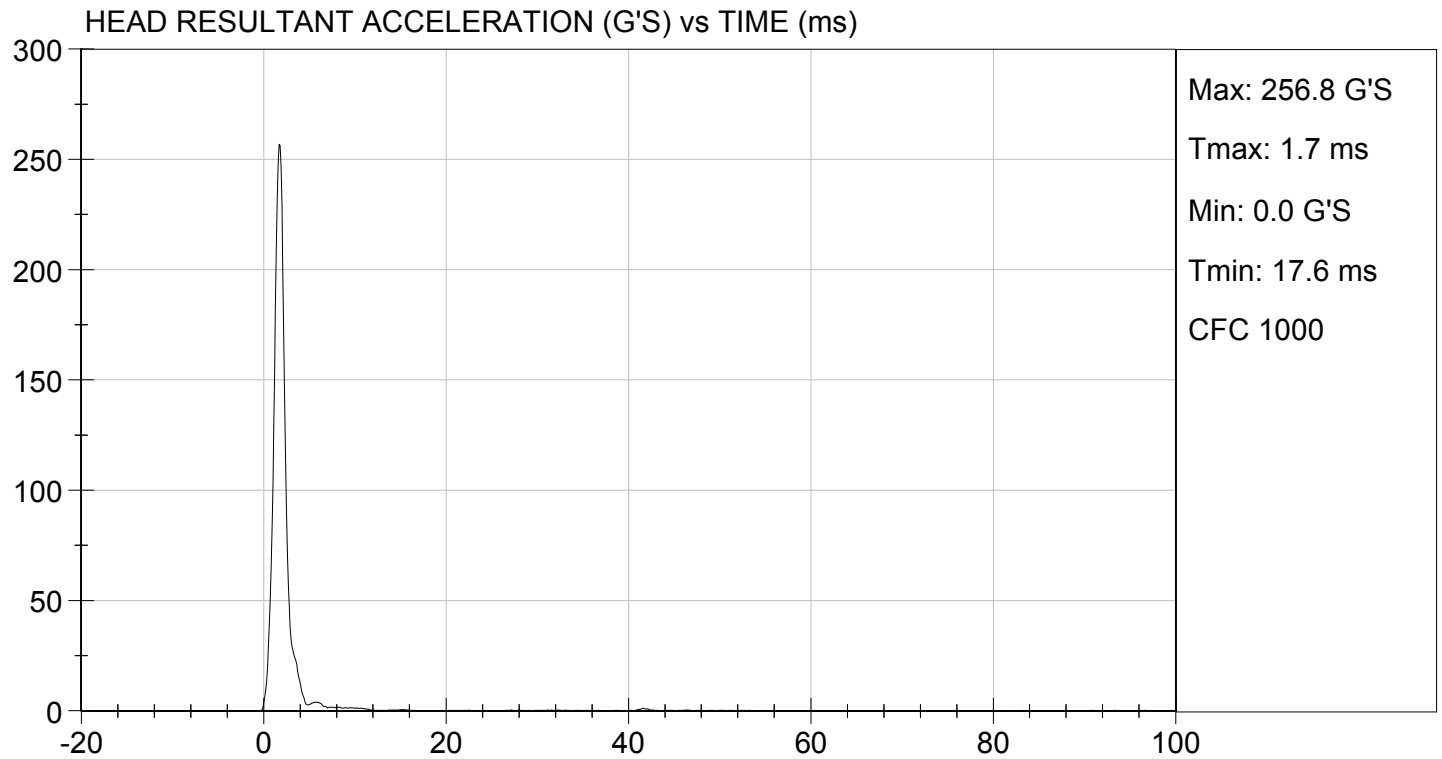


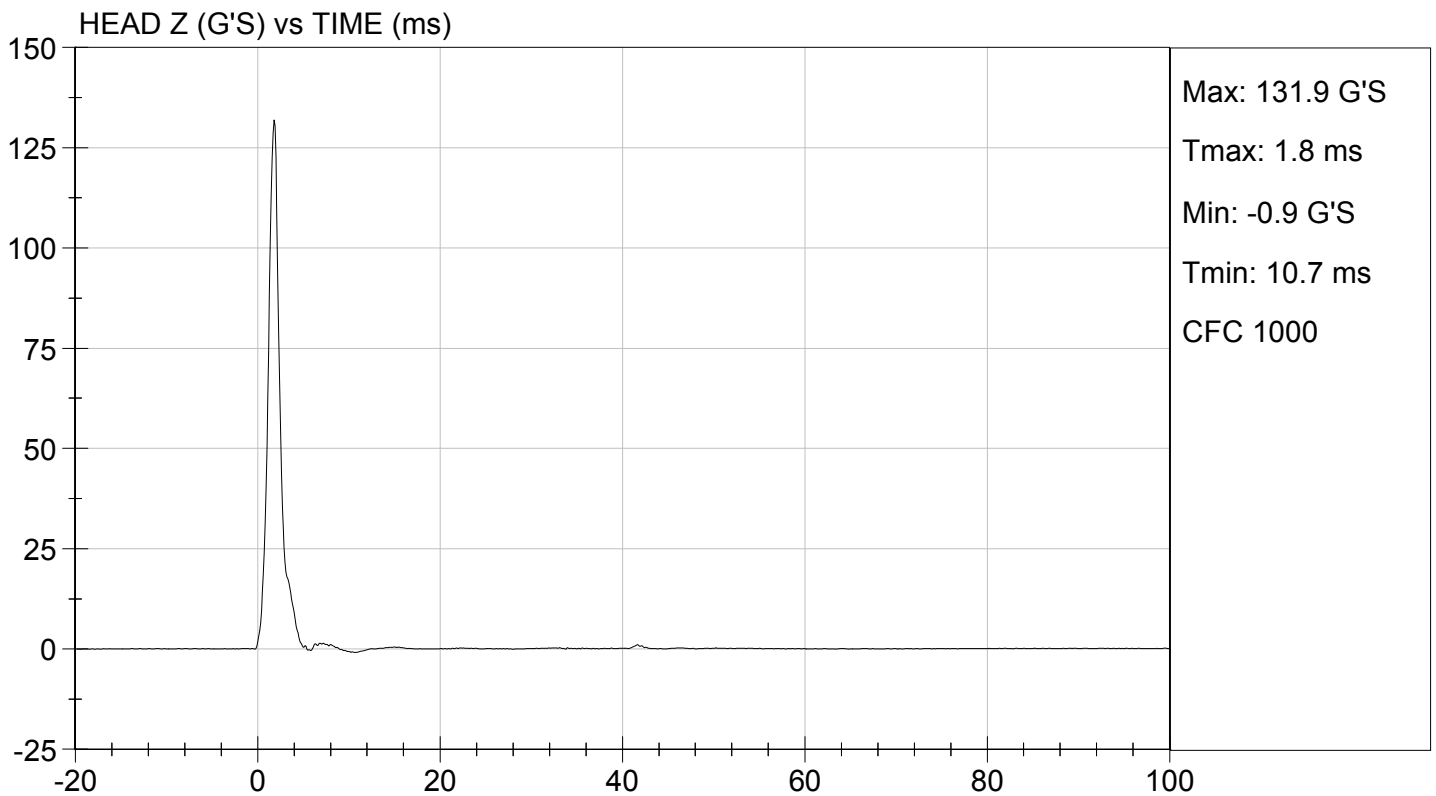
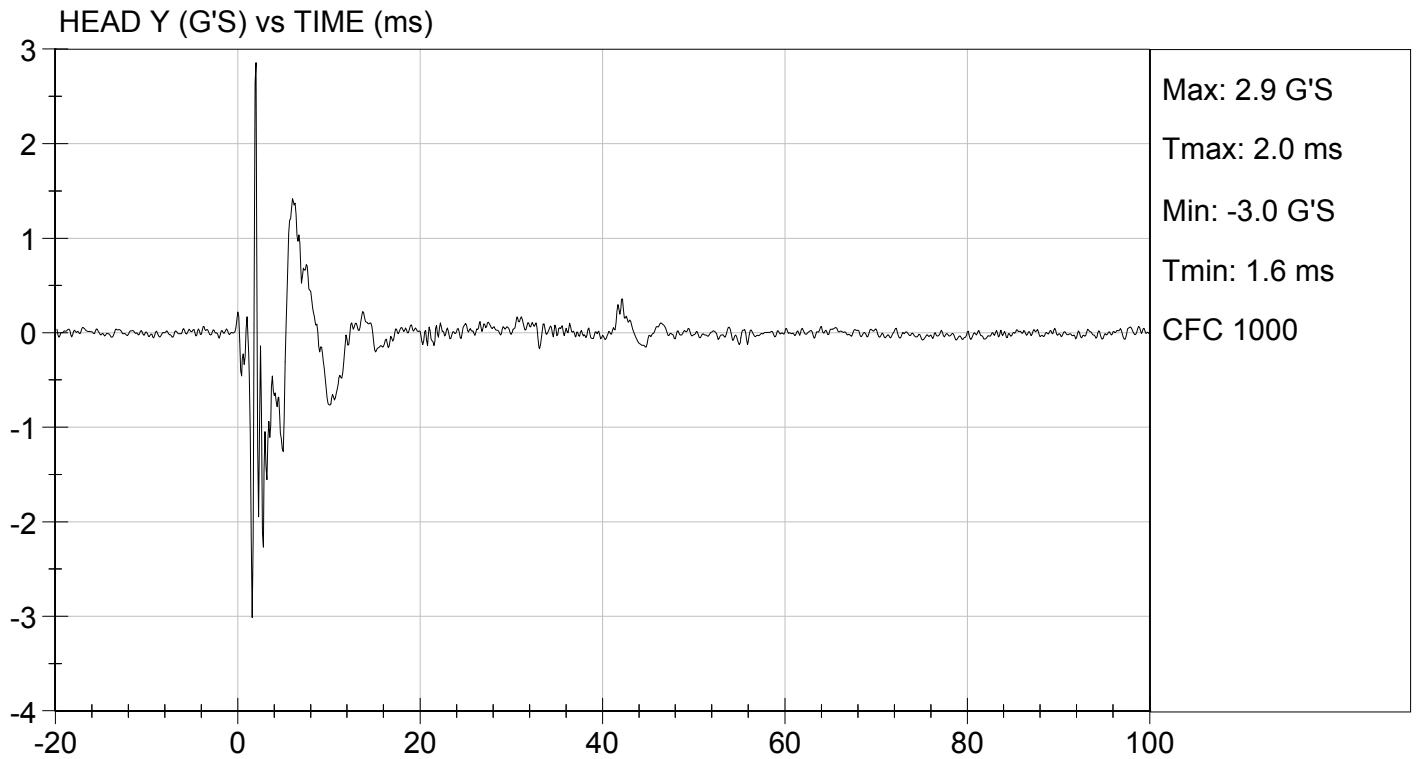
Laboratory Technician

06/09/2016
Test Date



Approved By



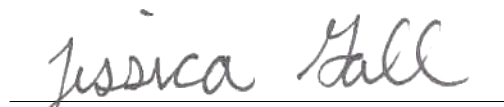


MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351

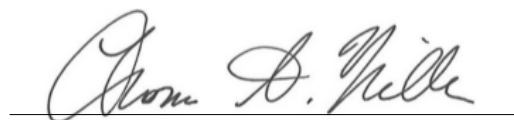
Test I.D: D161992

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.9	Pass
Laboratory Relative Humidity		%	10 to 70	50	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	24.47	Pass
	20 ms	G's	17.60 to 22.60	22.50	Pass
	30 ms	G's	12.50 to 18.50	15.74	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	15.6	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	34.6	Pass
Maximum "D" Plane Rotation	Maximum	Deg	64.0 to 78.0	70.7	Pass
	Time	ms	57.0 to 64.0	58.2	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	116.6	Pass
Moment About Occipital Condyle	Maximum	Nm	88.1 to 108.5	91.7	Pass
	Time	ms	47.0 to 58.0	47.4	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	97.7	Pass
Overall Test Results					Pass


 Laboratory Technician

06/09/2016

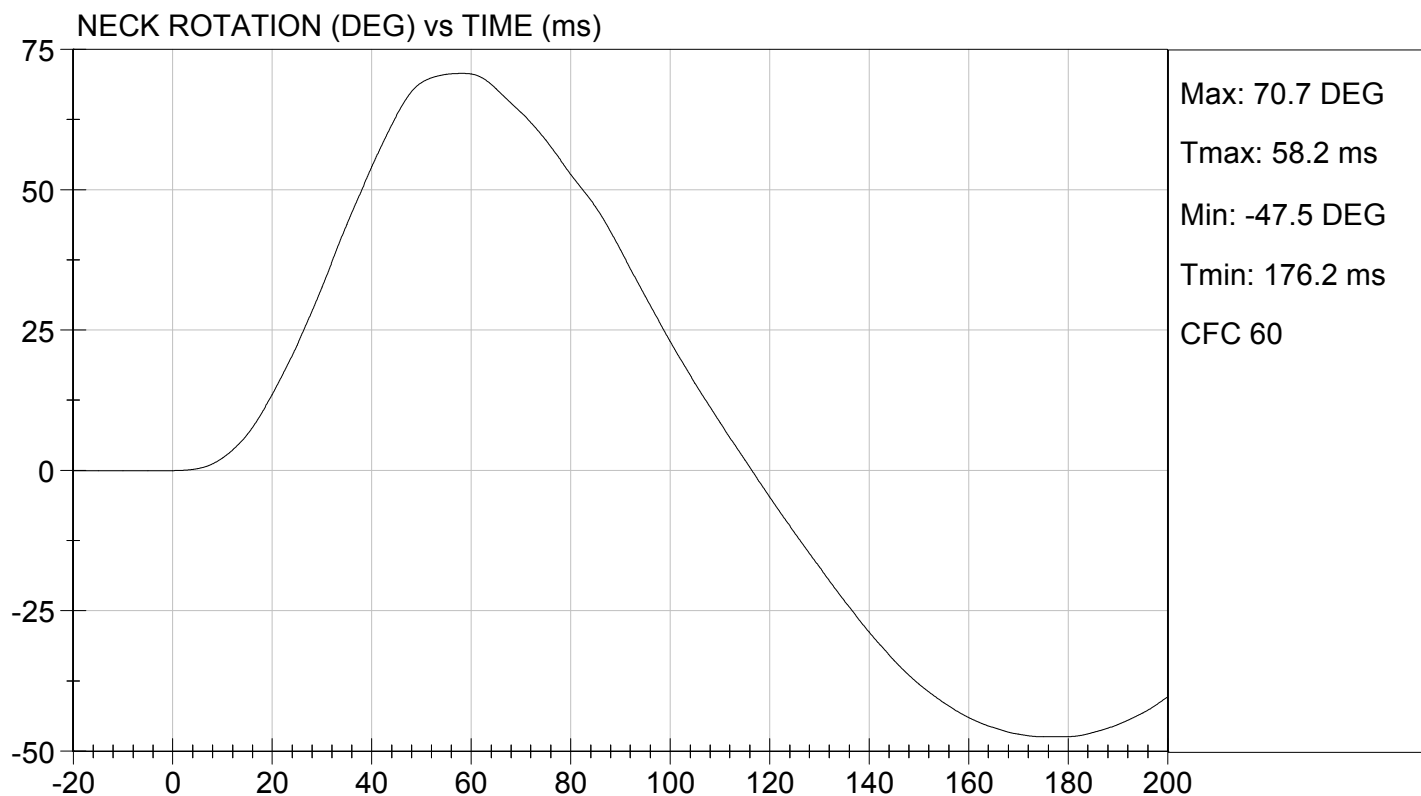
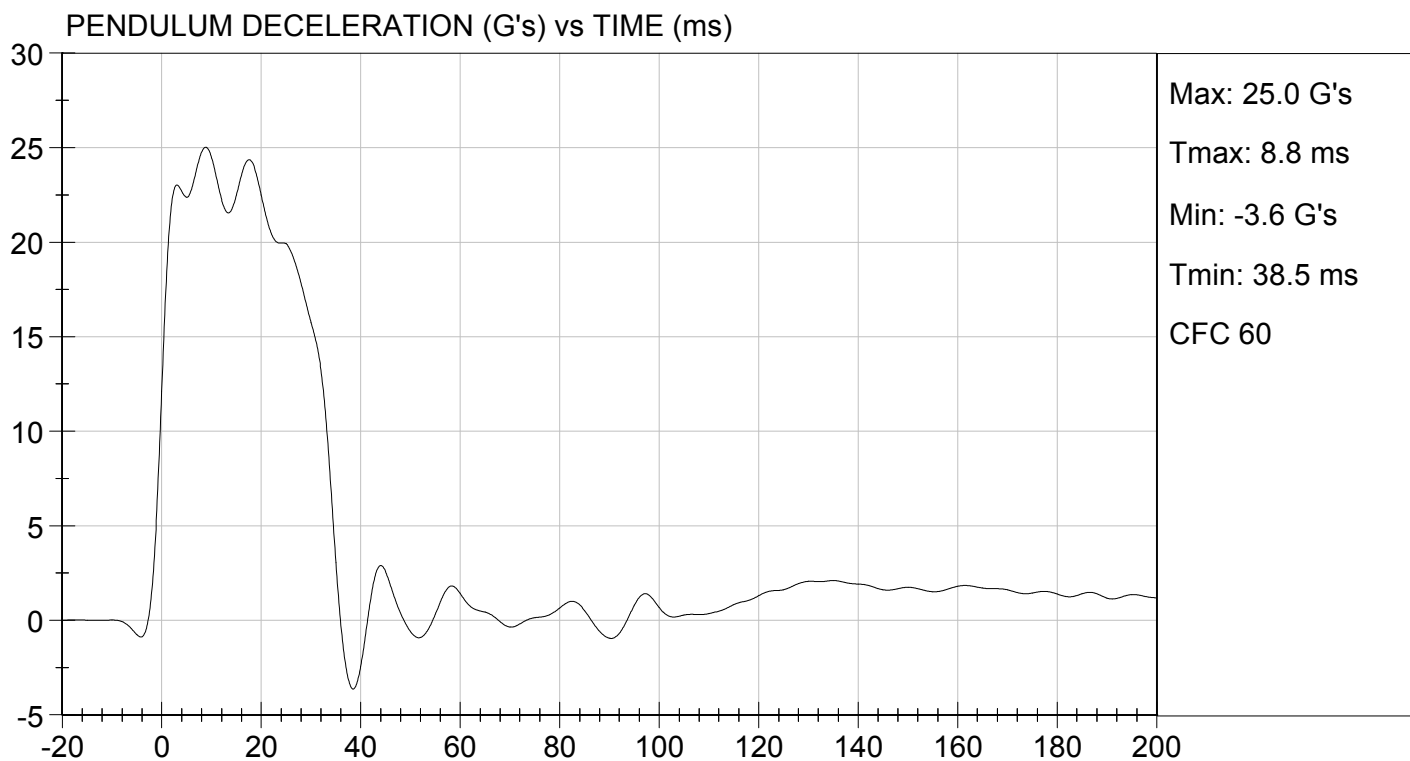
Test Date


 Approved By



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

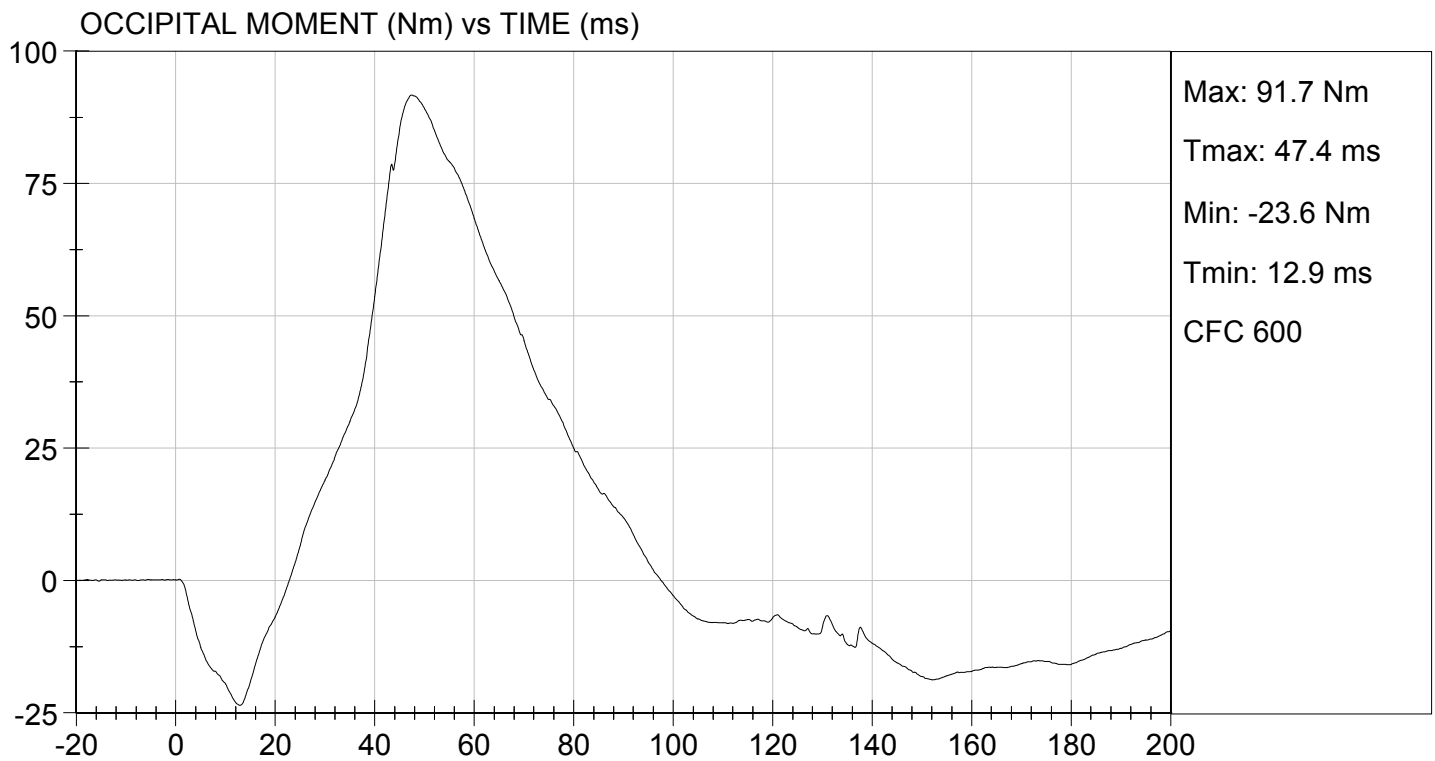
TEST DATE: 06/09/2016
TEST #: D161992





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

TEST DATE: 06/09/2016
TEST #: D161992



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

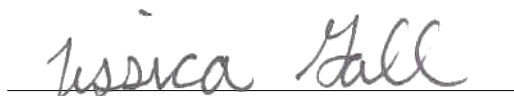
ATD Serial No: 351

Test I.D: D161993

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.9	Pass
Laboratory Relative Humidity		%	10 to 70	50	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.12	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	18.73	Pass
	20 ms	G's	14.00 to 19.00	17.76	Pass
	30 ms	G's	11.00 to 16.00	13.47	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	14.3	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	38.7	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	98.6	Pass
	Time	ms	72.0 to 82.0	77.7	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	162.7	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-60.8	Pass
	Time	ms	65.0 to 79.0	71.8	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	147.7	Pass
Overall Test Results					Pass


 Laboratory Technician

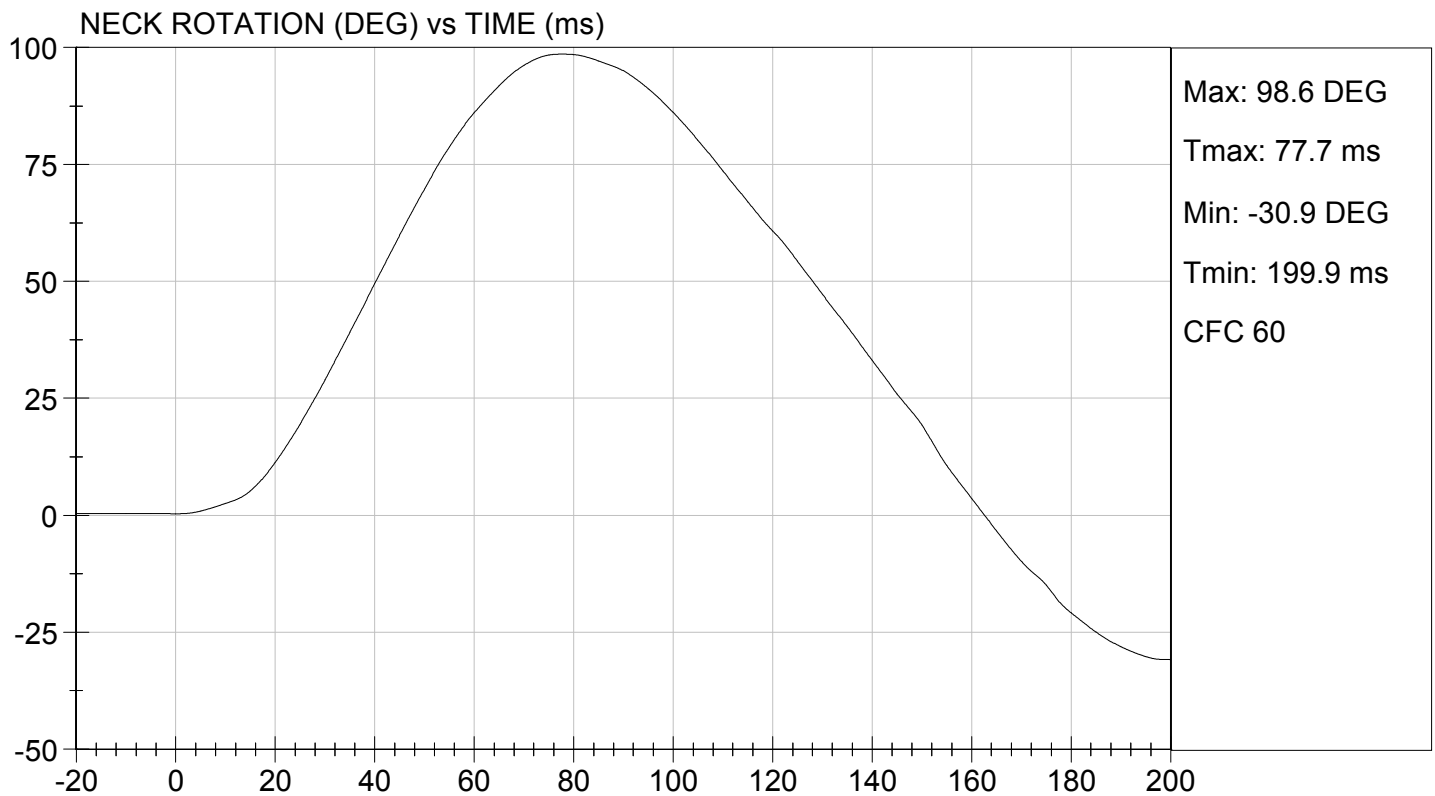
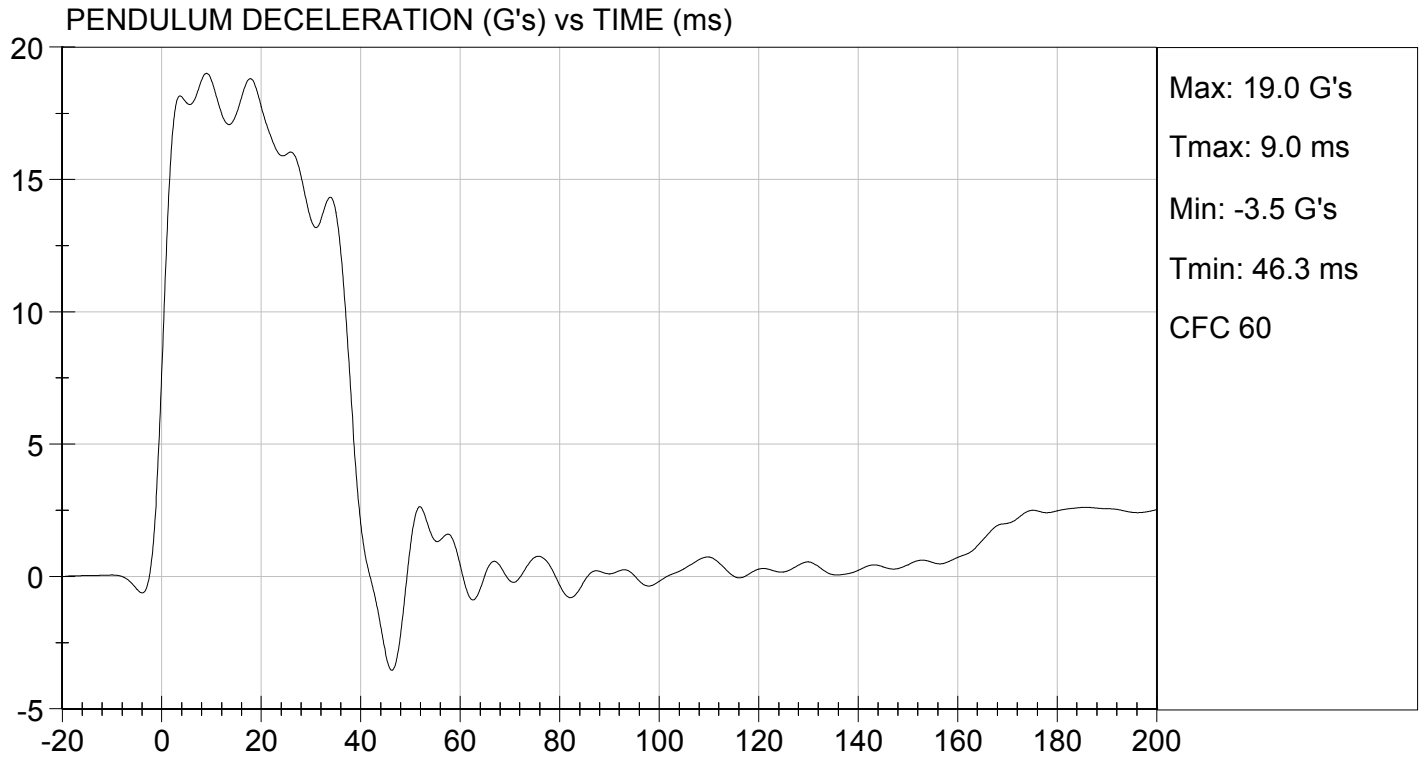
06/09/2016
 Test Date


 Approved By



TEST DESC: NECK EXTENSION
VELOCITY: 20.08 ft/s, 6.12 m/s

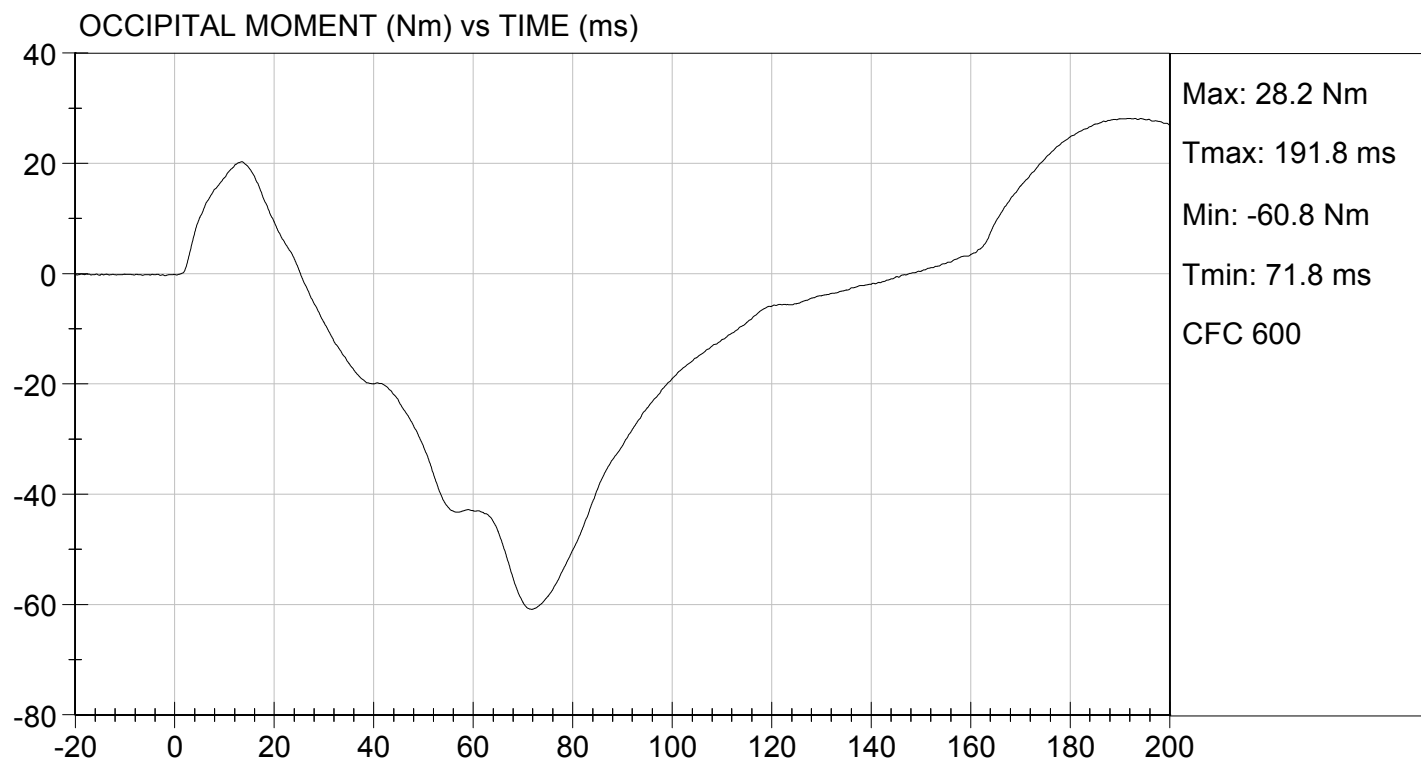
TEST DATE: 06/09/2016
TEST #: D161993





TEST DESC: NECK EXTENSION
VELOCITY: 20.08 ft/s, 6.12 m/s

TEST DATE: 06/09/2016
TEST #: D161993



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351

Test I.D: D161994

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	51	Pass
Probe Velocity	m/s	6.58 to 6.82	6.68	Pass
Peak Probe Force	N	5159 to 5893	5,597	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.75	Pass
Internal Hysteresis	%	69 to 85	74	Pass
			Overall Test Results	Pass


Laboratory Technician

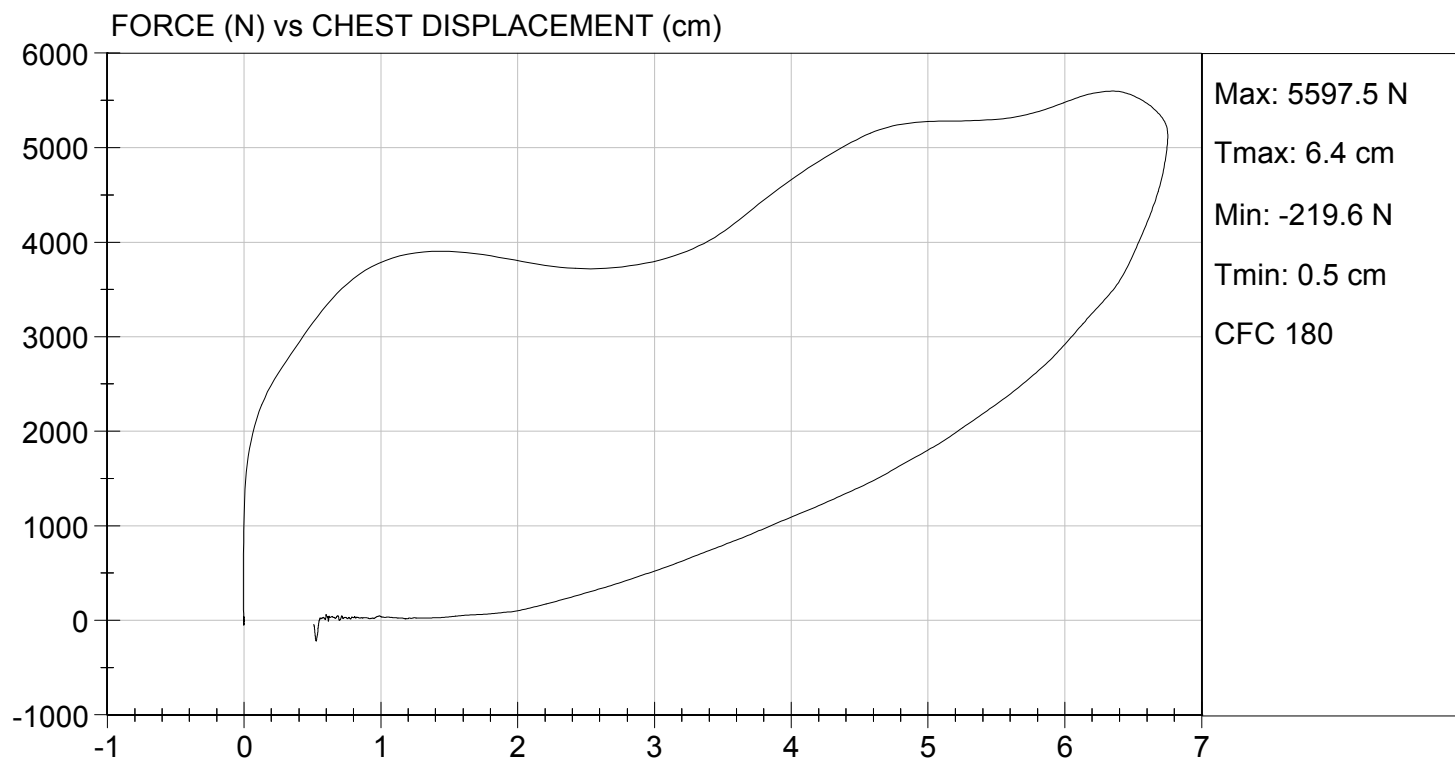
06/09/2016
Test Date


Approved By



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

TEST DATE: 06/09/2016
TEST #: D161994



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

ATD Serial No: 351

Test I.D: D161995

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	46	Pass
Probe Velocity	m/s	2.07 to 2.13	2.07	Pass
Peak Probe Force	N	4715 to 5782	5,096	Pass
Overall Test Results				Pass


Laboratory Technician

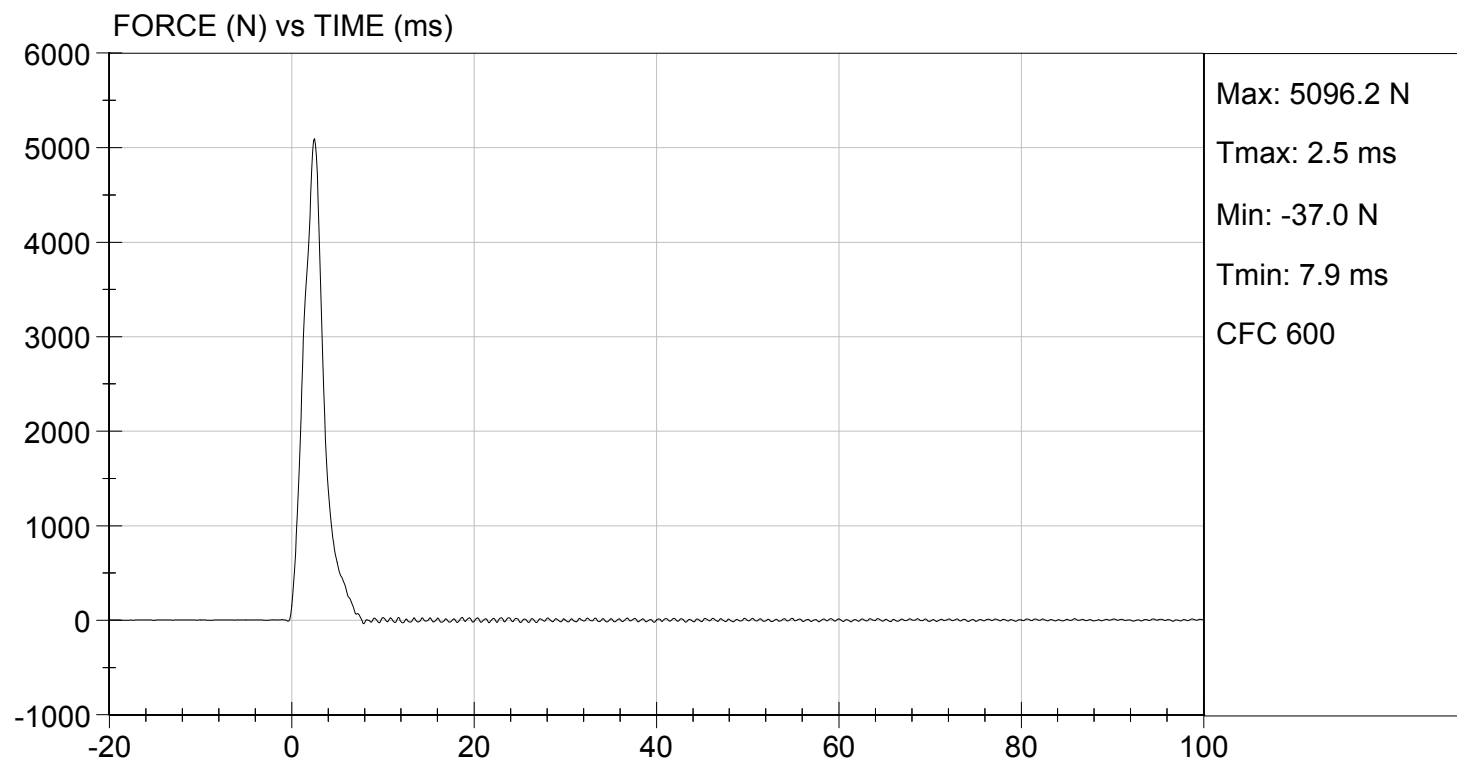
06/09/2016
Test Date


Approved By



TEST DESC: RIGHT KNEE
VELOCITY: 6.80 ft/s, 2.07 m/s

TEST DATE: 06/09/2016
TEST #: D161995



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

ATD Serial No: 351

Test I.D: D161996

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	46	Pass
Probe Velocity	m/s	2.07 to 2.13	2.10	Pass
Peak Probe Force	N	4715 to 5782	5,322	Pass
Overall Test Results				Pass


Laboratory Technician

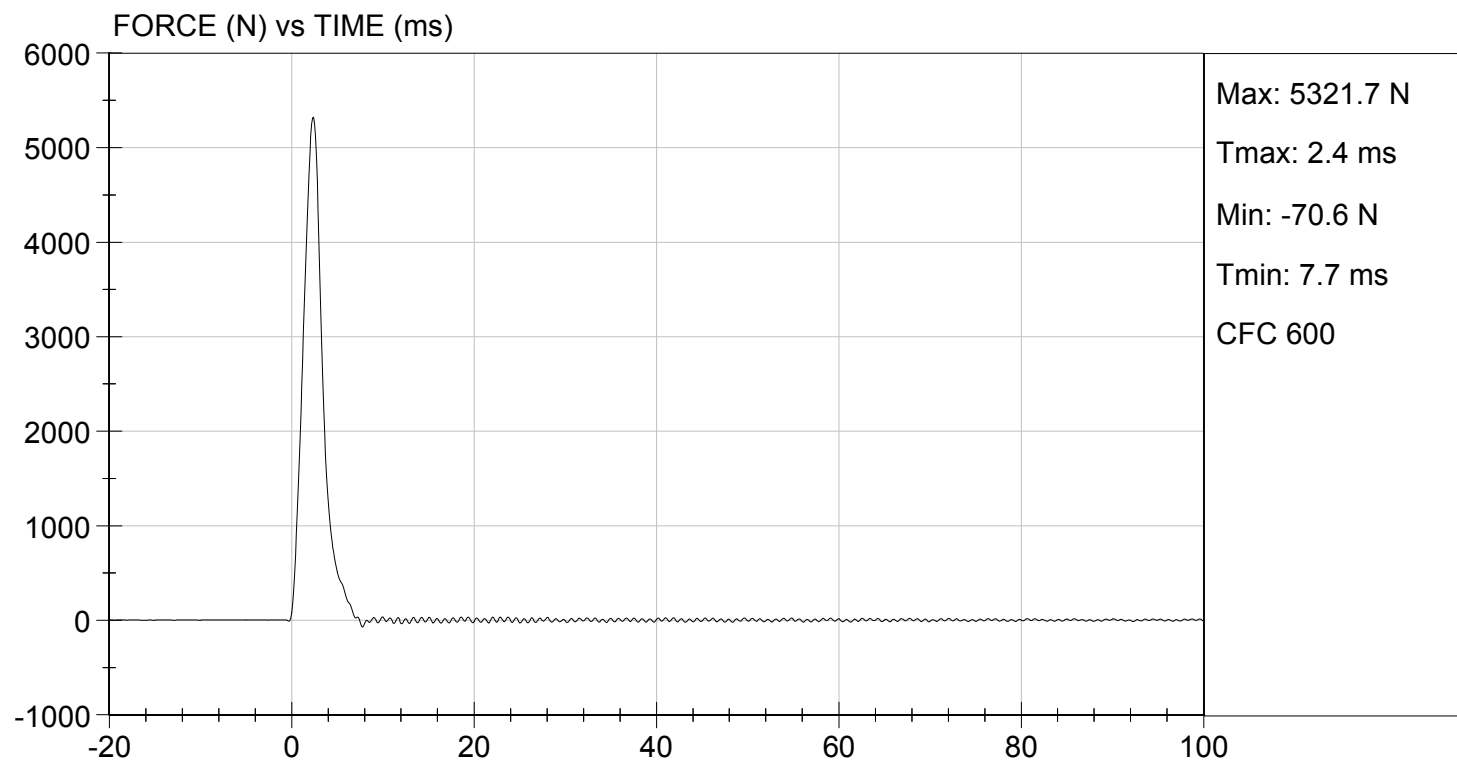
06/09/2016
Test Date


Approved By



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

TEST DATE: 06/09/2016
TEST #: D161996



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

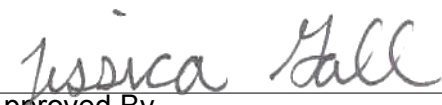
ATD Serial No: 351

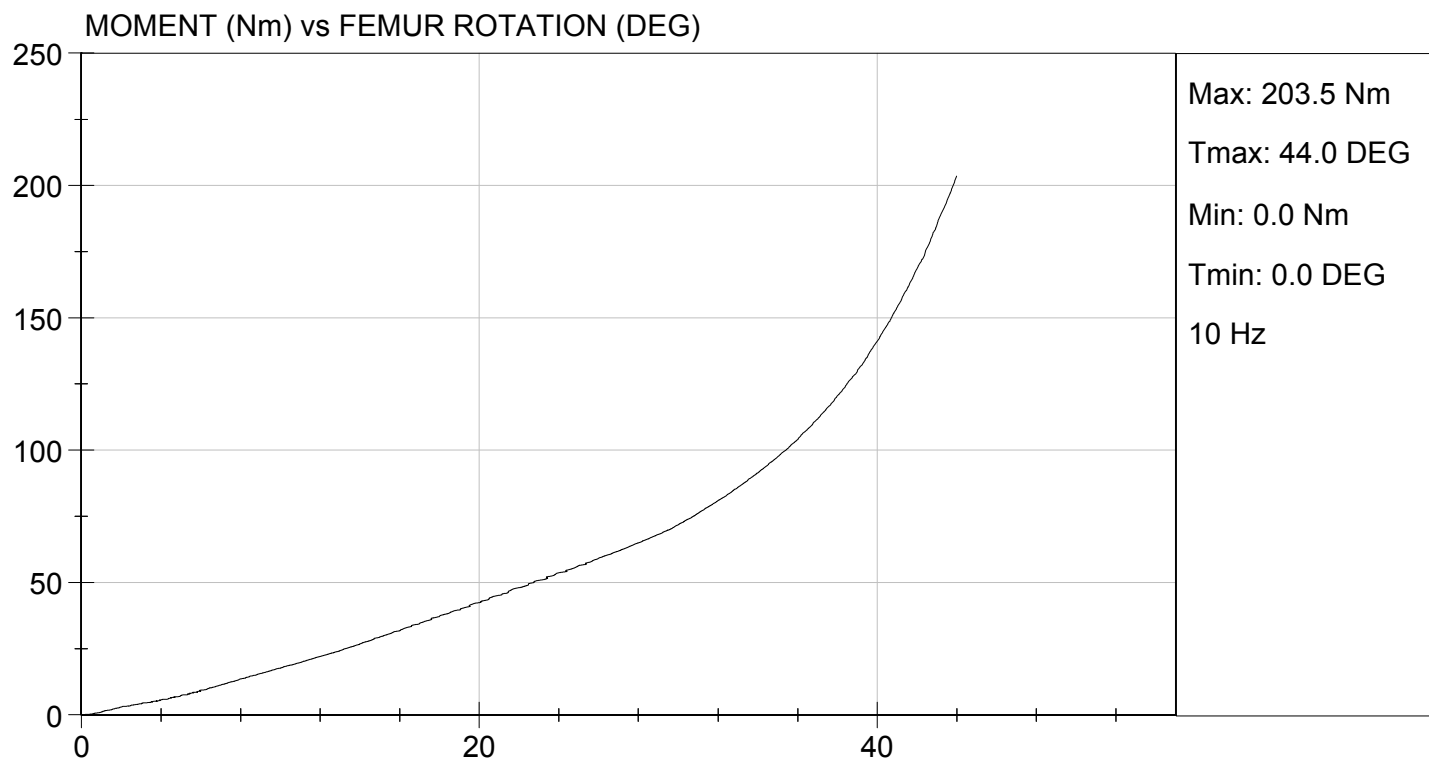
Test I.D: D161990

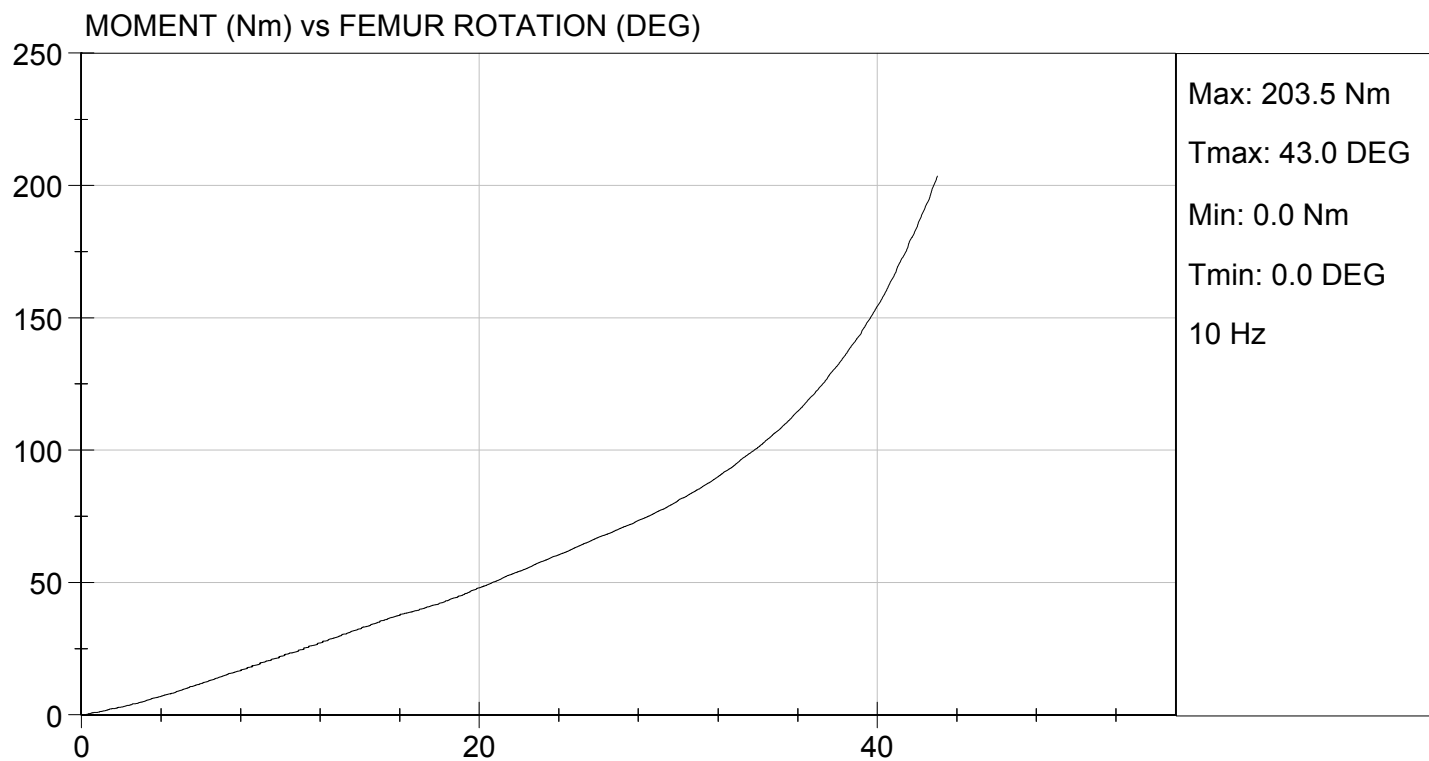
Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.8	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	47	47	Pass
Rotation Rate	deg/s	5.0 to 10.0	6.2	6.3	Pass
30 Degrees	Nm	94.9 Nm Max	71.9	81.0	Pass
150 ft-lbf / 203.4 Nm	Deg	40.0 to 50.0 Degree Max Rotation	44.0	43.0	Pass
Overall Test Results					Pass


 Laboratory Technician

06/09/2016
 Test Date


 Approved By





Hybrid III, 5th External Measurements
SN: 138

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	785.1
B	SHOULDER PIVOT HEIGHT	Centerline of shoulder pivot bolt to the seat surface.	431.8-457.2	456.8
C	H-POINT HEIGHT	Reference	81.3-86.3	84.0
D	H-POINT LOCATION FROM BACKLINE	Reference	144.8-149.8	146.2
E	SHOULDER PIVOT FROM BACKLINE	Center of the shoulder clevis to the rear vertical surface of the fixture.	68.6-83.8	78.0
F	THIGH CLEARANCE	Measured at the highest point on the upper femur segment.	119.4-134.6	127.5
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	249.6
H	HEAD BACK TO BACKLINE	Back of Skull cap skin to seat rear vertical surface (Reference)	43.2-48.2	45.0
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	280.2
J	ELBOW REST HEIGHT	Measure from the flesh below the elbow pivot bolt to the seat surface.	182.8-203.2	201.9
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	526.7
L	POPLITEAL HEIGHT	Seat surface to the plane of the horizontal plane of the bottom of the feet.	355.6-376.0	362.3
M	KNEE PIVOT HEIGHT	Centerline of knee pivot bolt to the horizontal plane of the bottom of the feet.	393.7-419.1	398.0

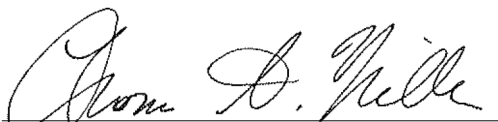
N	BUTTOCK POPLITEAL LENGTH	The rearmost surface of the lower leg to the same point on the rear surface of the buttocks used for dim. "K".	414-439.4	430.5
HYBRID III, SUBPART O EXTERNAL DIMENSIONS, continued				
DIMENSION	DESCRIPTION	DETAILS	ASSEMBLY DIMENSION (mm)	ACTUAL MEASUREMENT
O	CHEST DEPTH WITHOUT JACKET	Measured 304.8 ± 5.1 mm above seat surface	175.3-190.5	184.6
P	FOOT LENGTH	Tip of toe to rear of heel	218.5-233.7	221.0
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	472.6
S	HEAD BREADTH	The widest part of the head	137.1-147.3	141.9
T	HEAD DEPTH	Back of the head to the forehead	177.8-188.0	184.2
U	HIP BREADTH	The widest part of the hip	299.7-314.9	307.4
V	SHOULDER BREADTH	Outside edges of right and left shoulder clevises	350.5-365.7	360.5
W	FOOT BREADTH	The widest part of the foot	78.8-94.0	85.0
X	HEAD CIRCUMFERENCE	Measured at the point as in dim. "T"	528.3-548.7	546.2
Y	CHEST CIRCUMFERENCE (WITH CHEST JACKET)	Measured 345.4 ± 12.7 mm above seat surface	850.9-881.3	875.1
Z	WAIST CIRCUMFERENCE	Measured 165.1 ± 5.1 mm above seat surface	759.5-789.9	785.4
AA	REFERENCE LOCATION FOR MEASUREMENT OF CHEST CIRCUMFERENCE	Reference	332.7-358.1	345.4
BB	REFERENCE LOCATION FOR MEASUREMENT OF WAIST CIRCUMFERENCE	Reference	160.1-170.2	165.1

MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

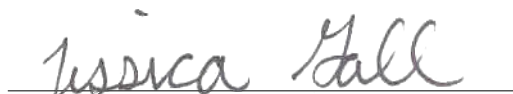
Test ID: D161831

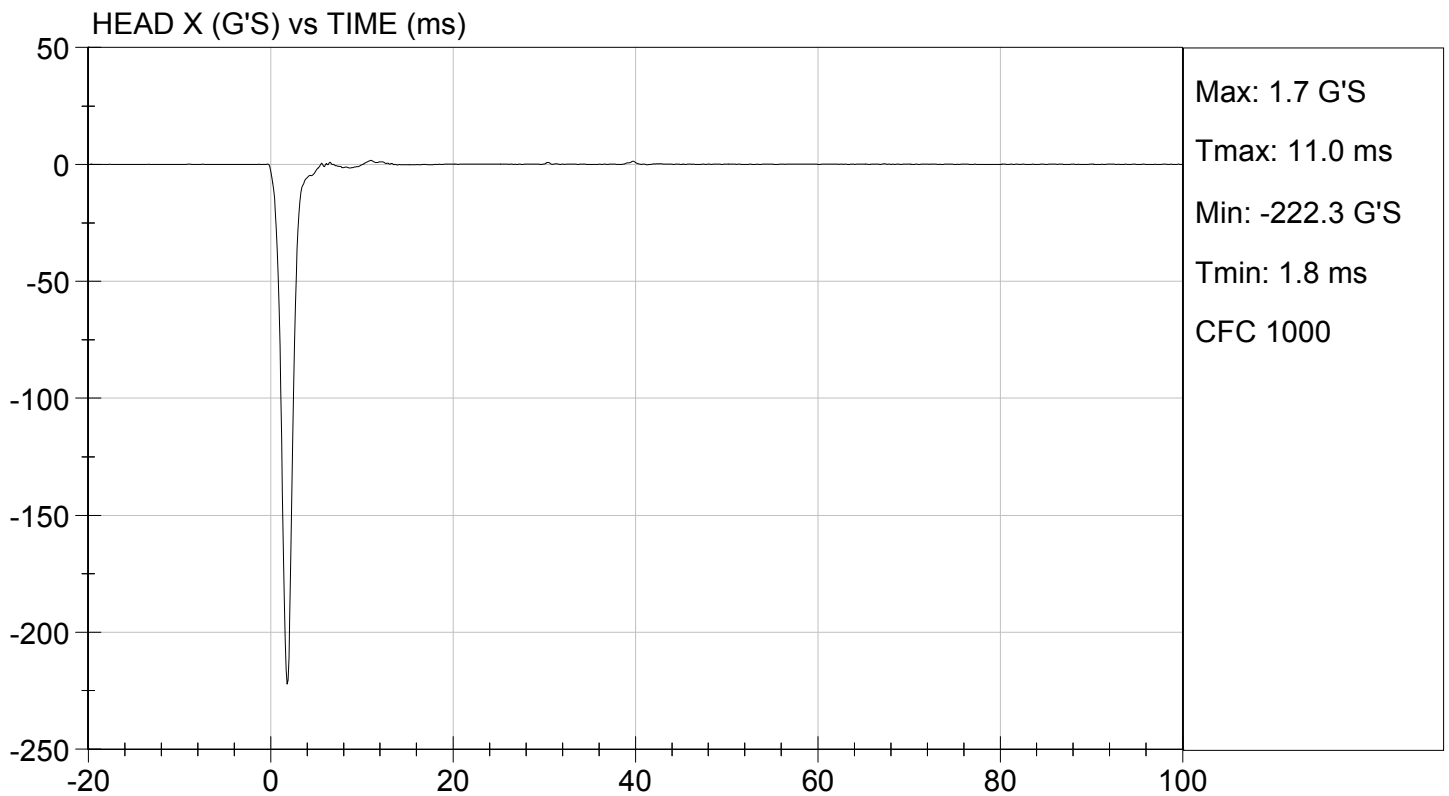
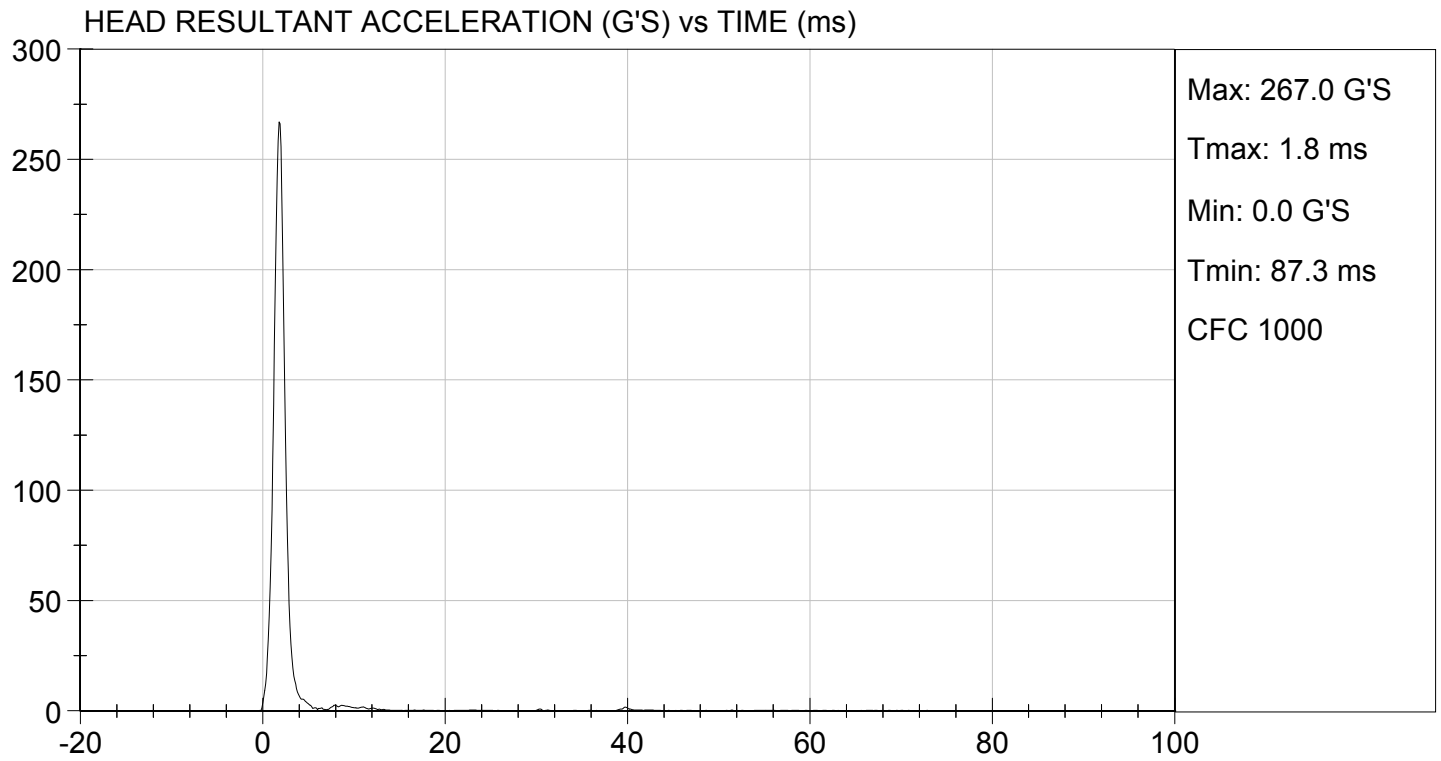
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	46	Pass
Peak Resultant Acceleration	G's	250 to 300	267	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	5.8	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
			Overall Test Results	Pass

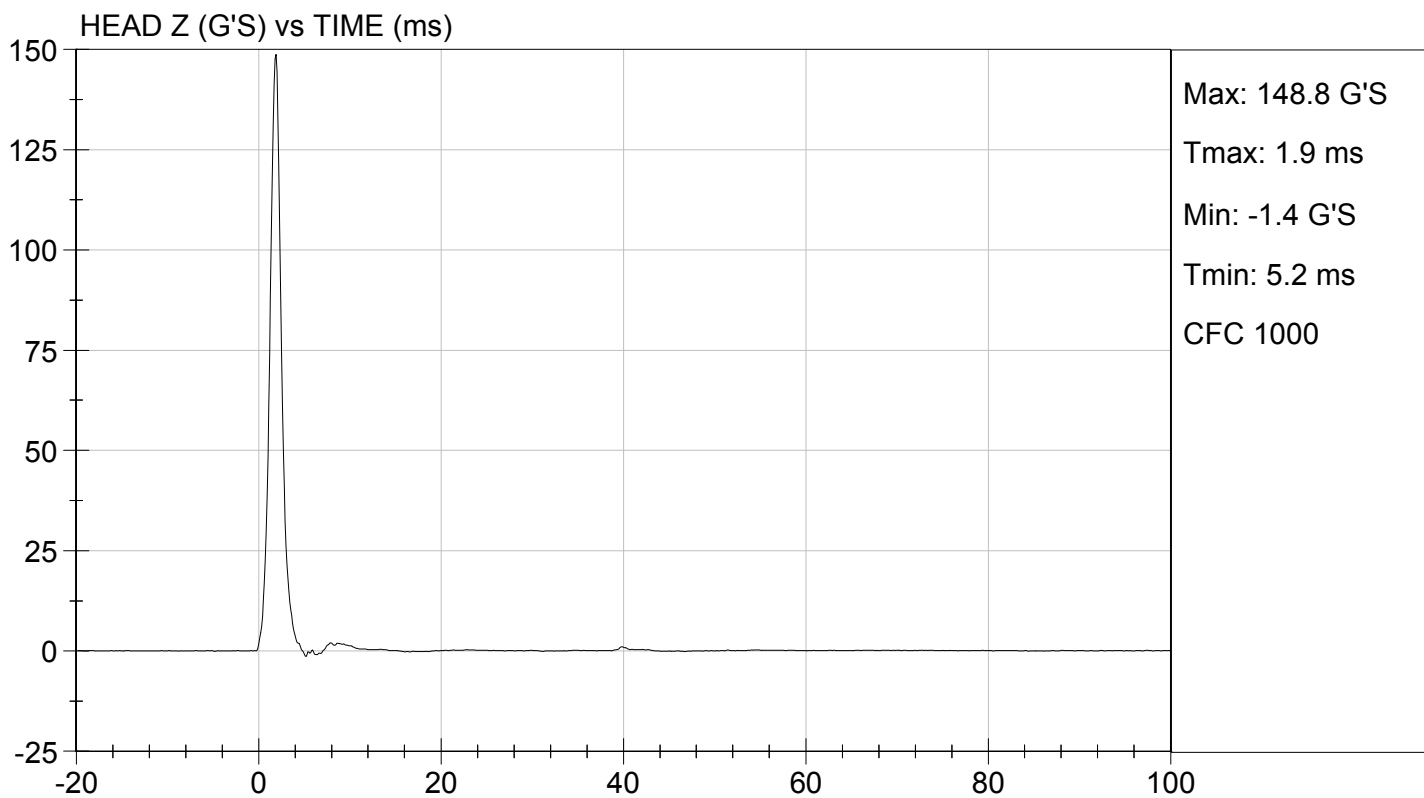
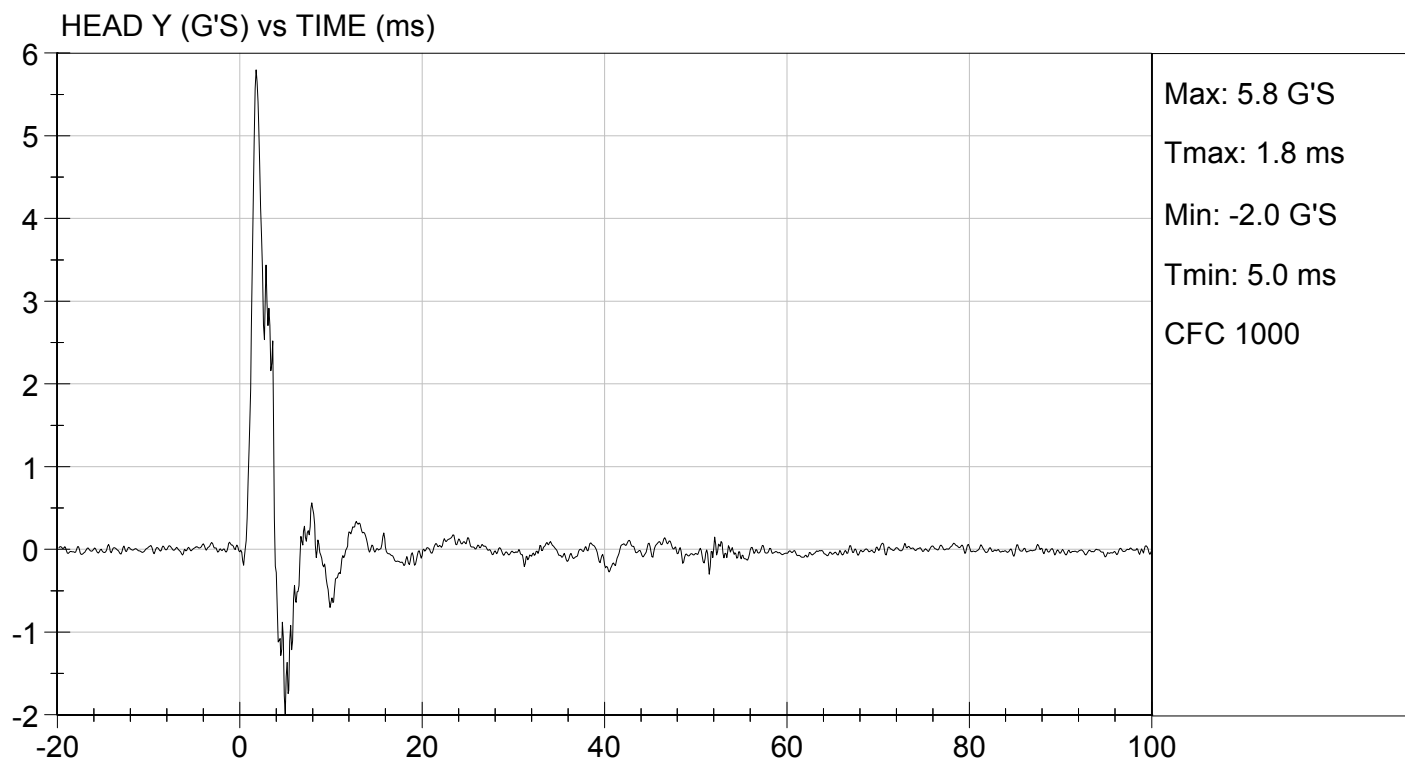

Laboratory Technician

05/26/2016

Test Date


Approved By





MGA RESEARCH CORPORATION

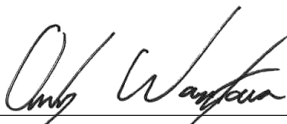
NECK FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D: D161832

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	22.0	Pass
Laboratory Relative Humidity		%	10 to 70	56	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	4.6	Pass
	30 ms	m/s	5.8 to 7.0	6.4	Pass
D Plane Rotation	Max	deg	77 to 91	82	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	69 to 83	72	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	86	Pass
Overall Results					Pass



Laboratory Technician

05/27/2016

Test Date

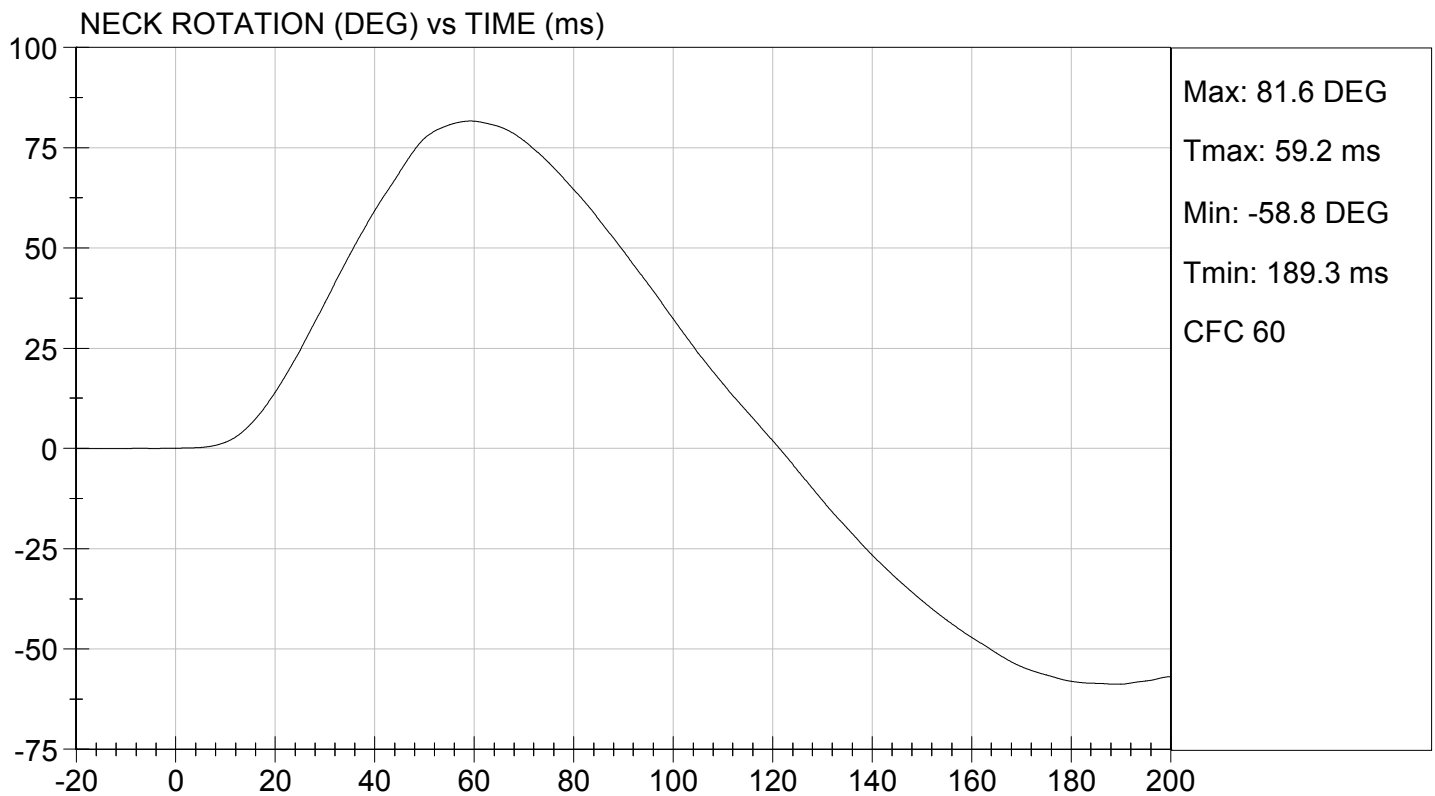
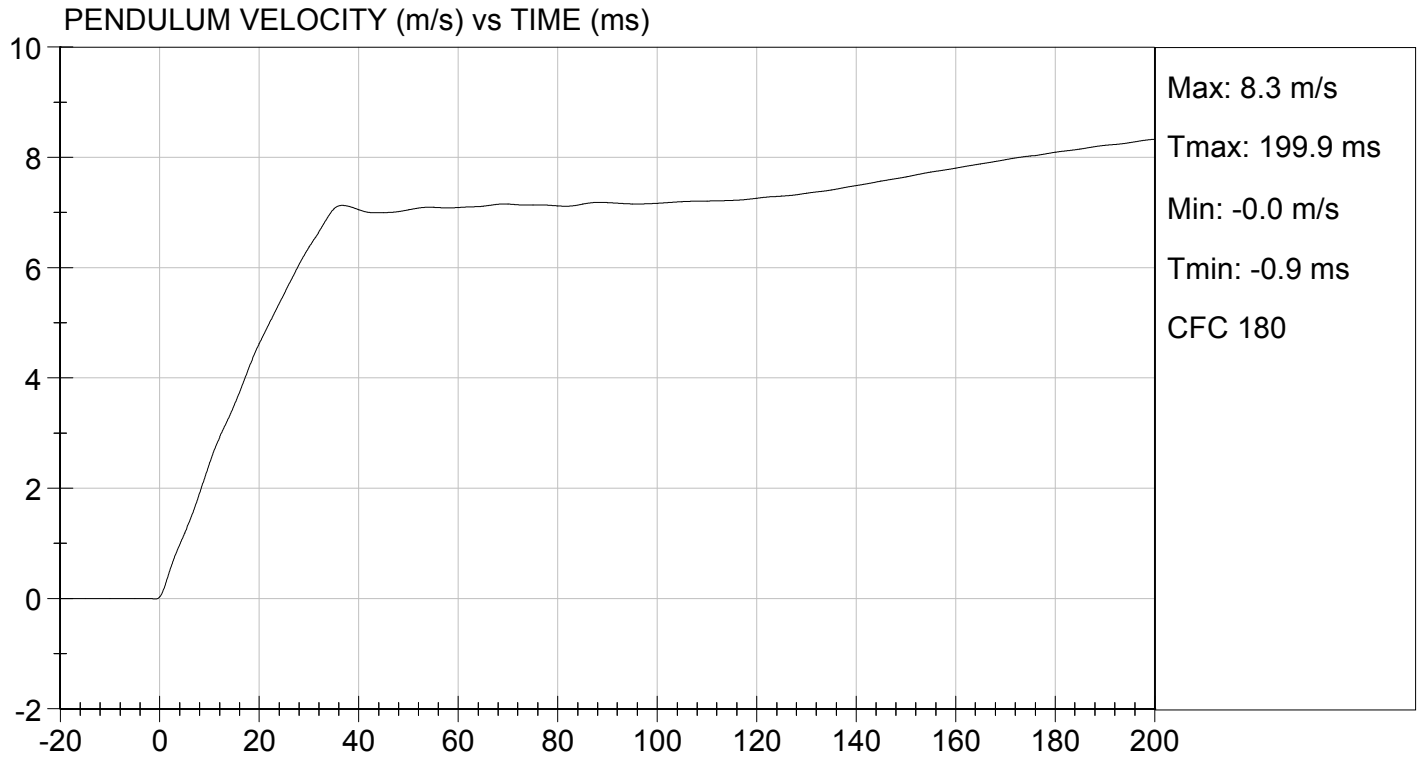


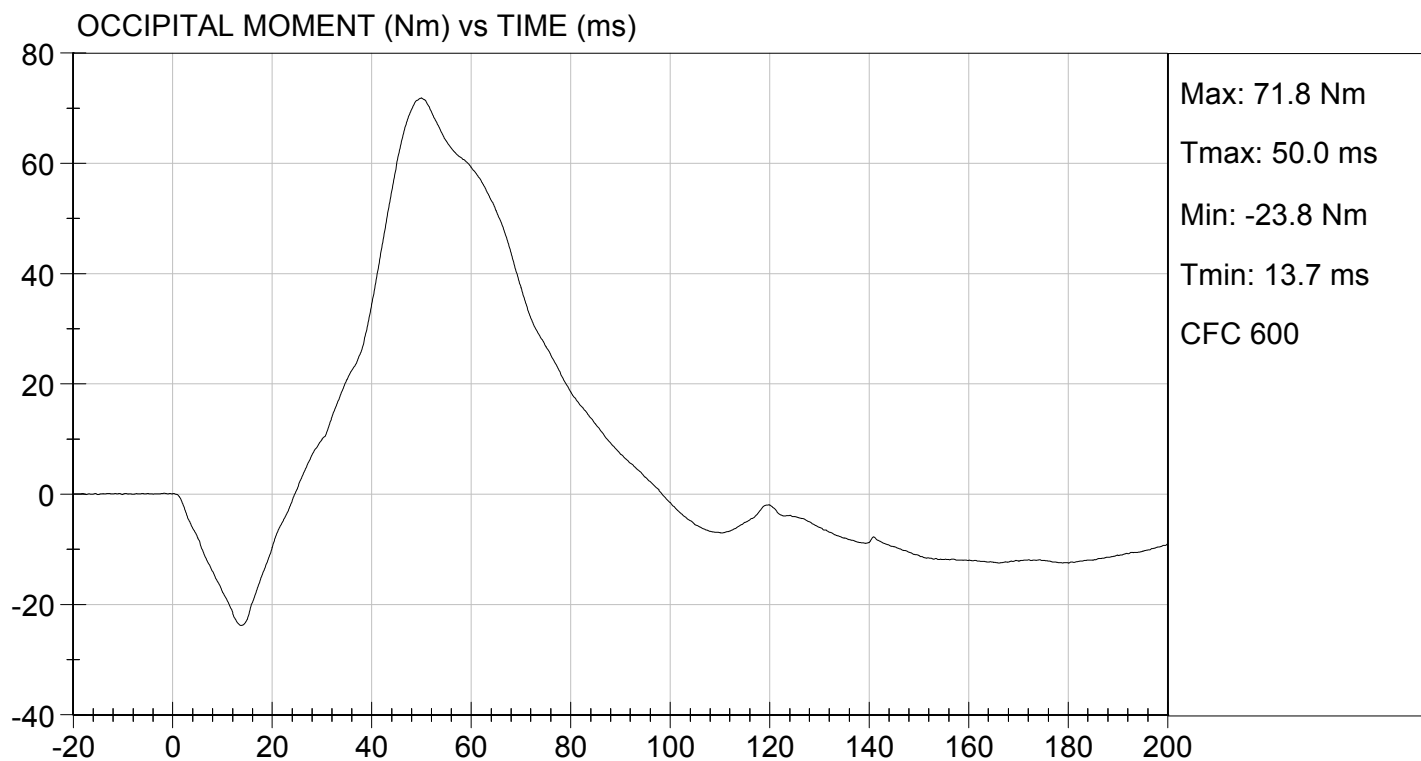
Approved By



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

TEST DATE: 05/27/2016
TEST #: D161832



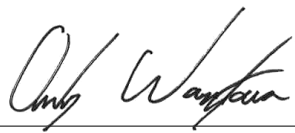


MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D: D161833

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	22.0	Pass
Laboratory Relative Humidity		%	10 to 70	56	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.12	Pass
Pendulum Velocity	10 ms	m/s	1.5 to 1.9	1.8	Pass
	20 ms	m/s	3.1 to 3.9	3.6	Pass
	30 ms	m/s	4.6 to 5.6	5.2	Pass
D Plane Rotation	Max	deg	99 to 114	109	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	103	Pass
Overall Results					Pass


 Laboratory Technician

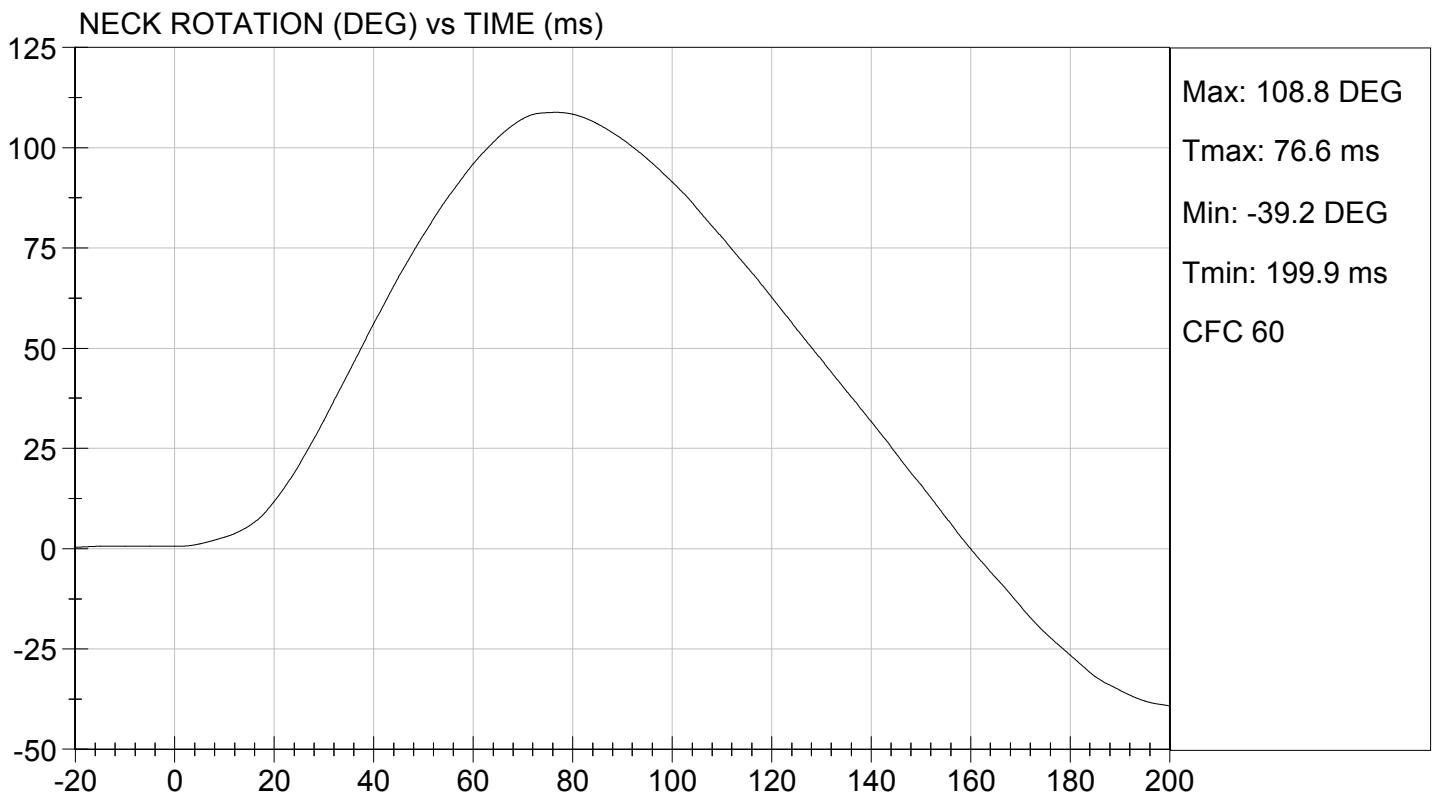
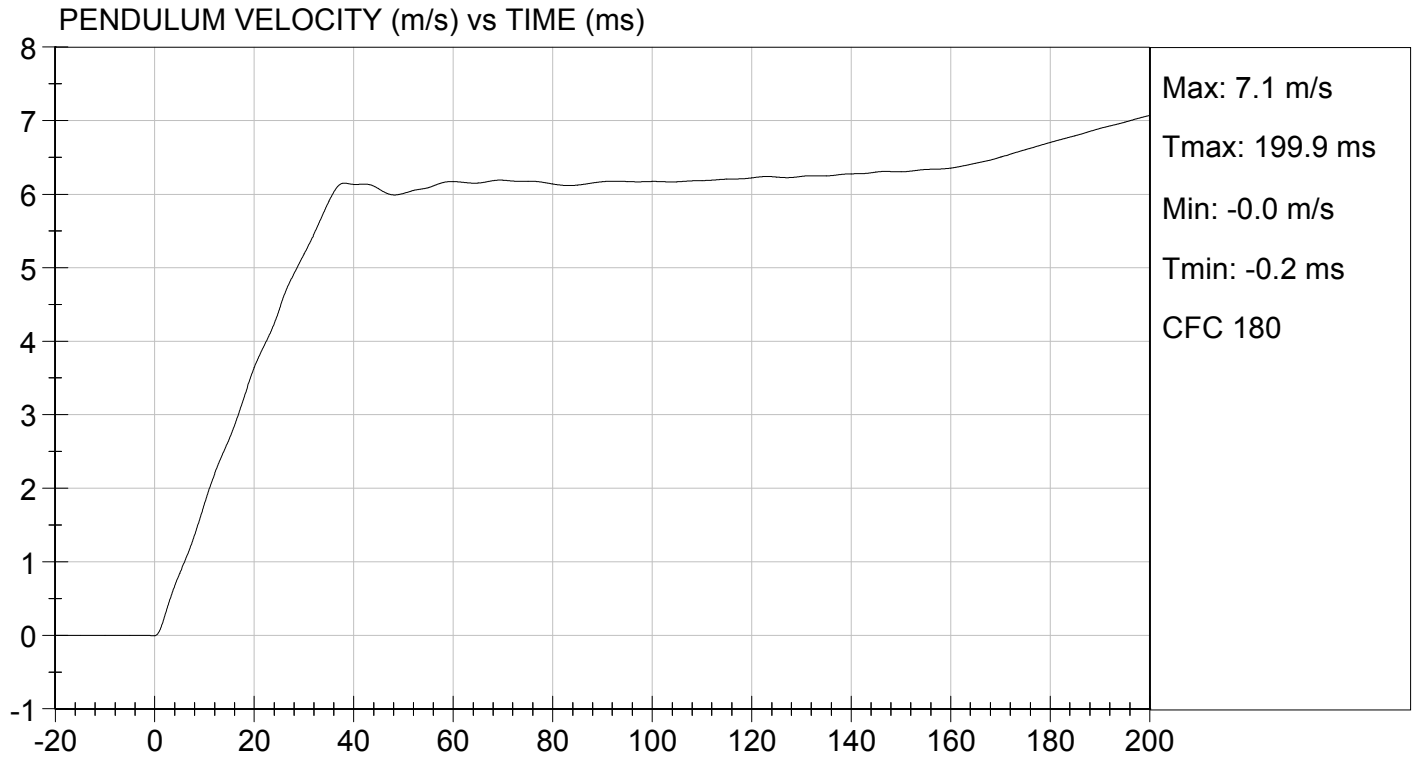
05/27/2016
 Test Date


 Approved By



TEST DESC: NECK EXTENSION
VELOCITY: 20.08 ft/s, 6.12 m/s

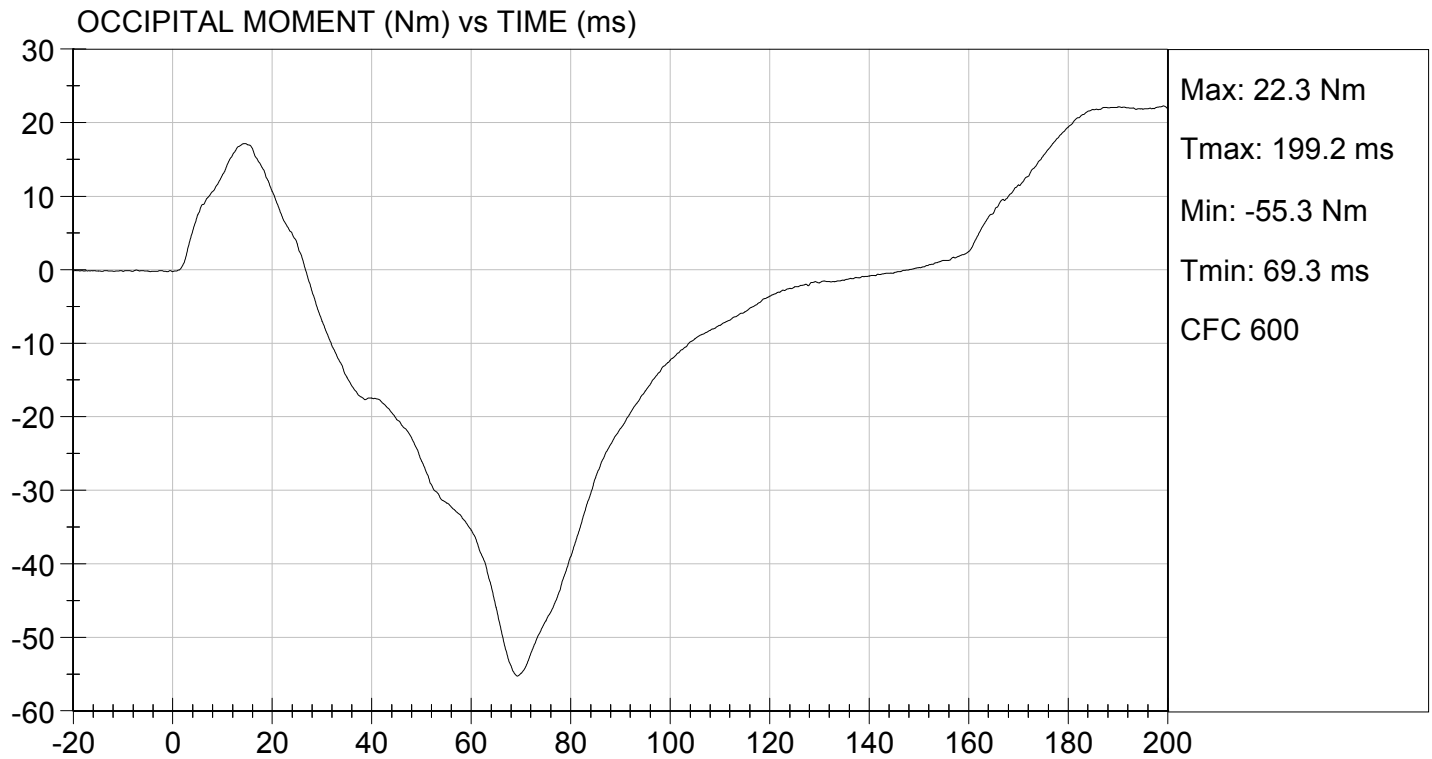
TEST DATE: 05/27/2016
TEST #: D161833





TEST DESC: NECK EXTENSION
VELOCITY: 20.08 ft/s, 6.12 m/s

TEST DATE: 05/27/2016
TEST #: D161833



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

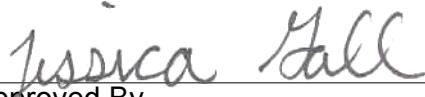
Test I.D: D161834

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.5	Pass
Relative Humidity	%	10 to 70	54	Pass
Probe Speed	m/s	6.59 to 6.83	6.77	Pass
Peak Deflection	mm	50 to 58	54	Pass
Peak Resistive Force w/in Deflection Corridor	N	3900 to 4400	4312	Pass
Internal Hysteresis	%	69 to 85	72	Pass
Peak Force 18 mm - 50 mm	N	<= 4600	4302	Pass
Overall Test Results				Pass


Laboratory Technician

05/27/2016

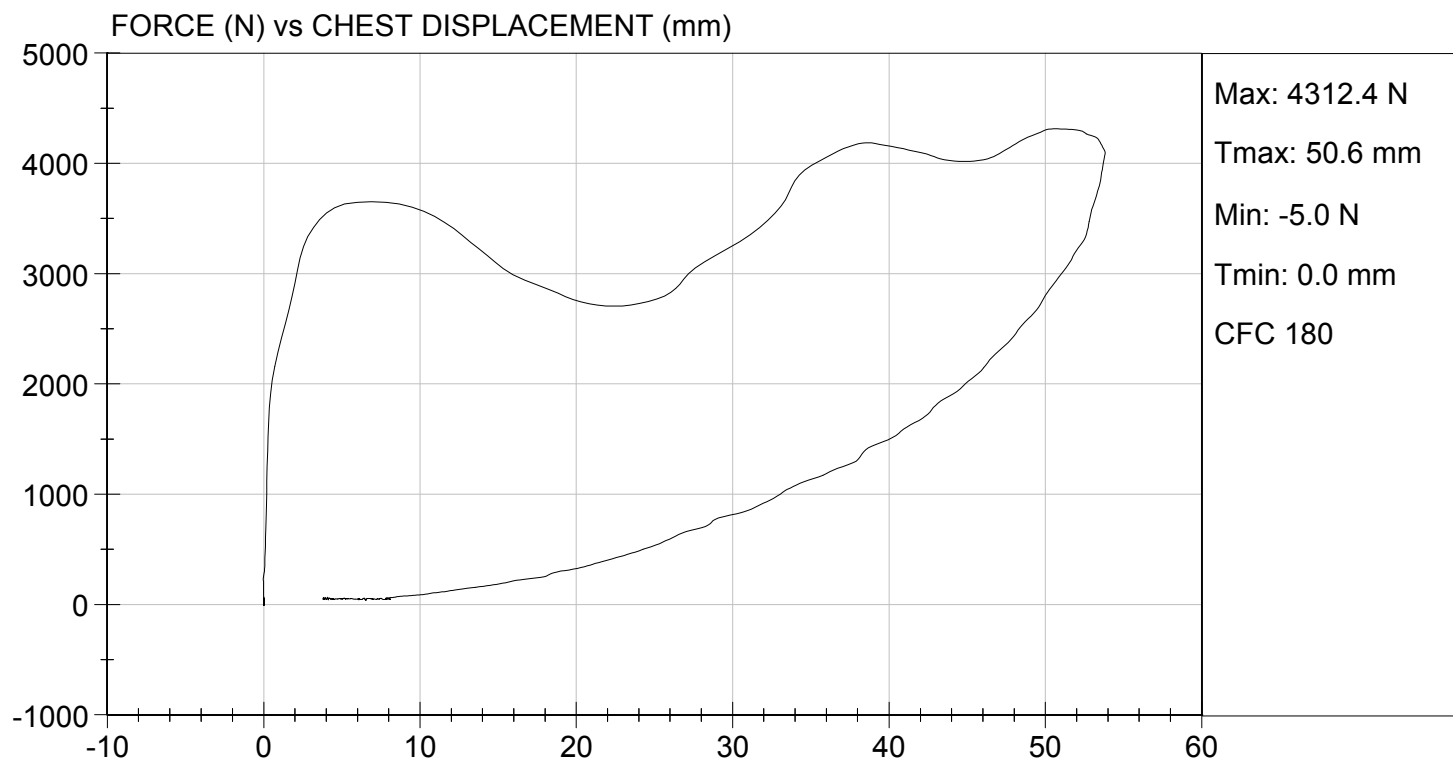
Test Date


Approved By



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

TEST DATE: 05/27/2016
TEST #: D161834



MGA RESEARCH CORPORATION

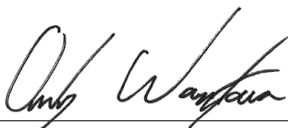
RIGHT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D: D161835

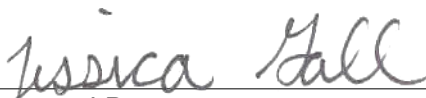
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	48	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	N	3450 to 4060	3623	Pass
Overall Test Results				Pass



Laboratory Technician

05/26/2016

Test Date

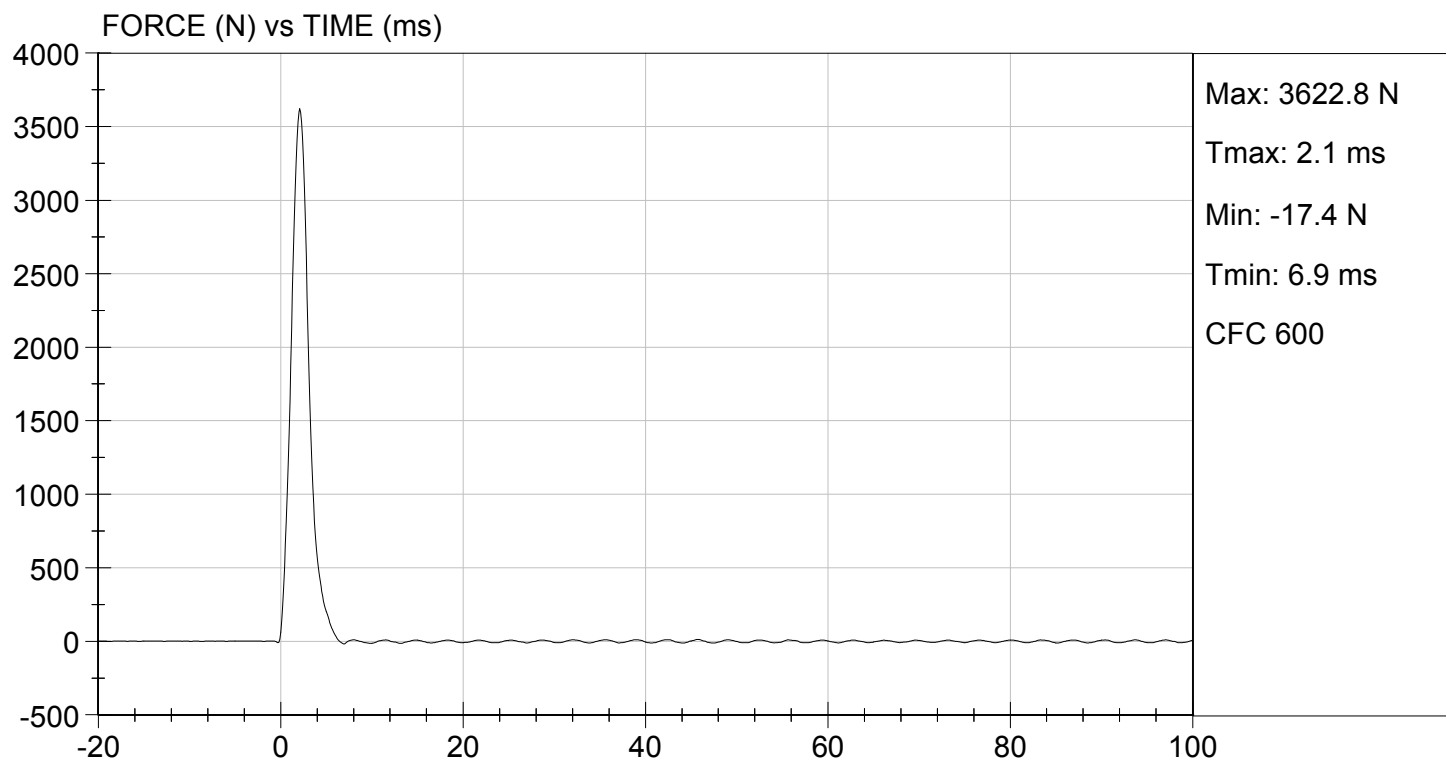


Approved By



TEST DESC: RIGHT KNEE
VELOCITY: 6.97 ft/s, 2.12 m/s

TEST DATE: 05/26/2016
TEST #: D161835



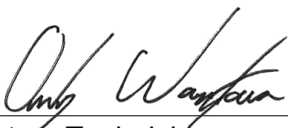
MGA RESEARCH CORPORATION

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

ATD Serial No: 138

Test I.D: D161836

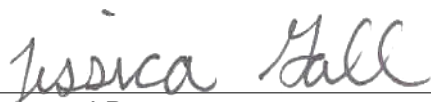
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	48	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	N	3450 to 4060	3547	Pass
Overall Test Results				Pass



Laboratory Technician

05/26/2016

Test Date

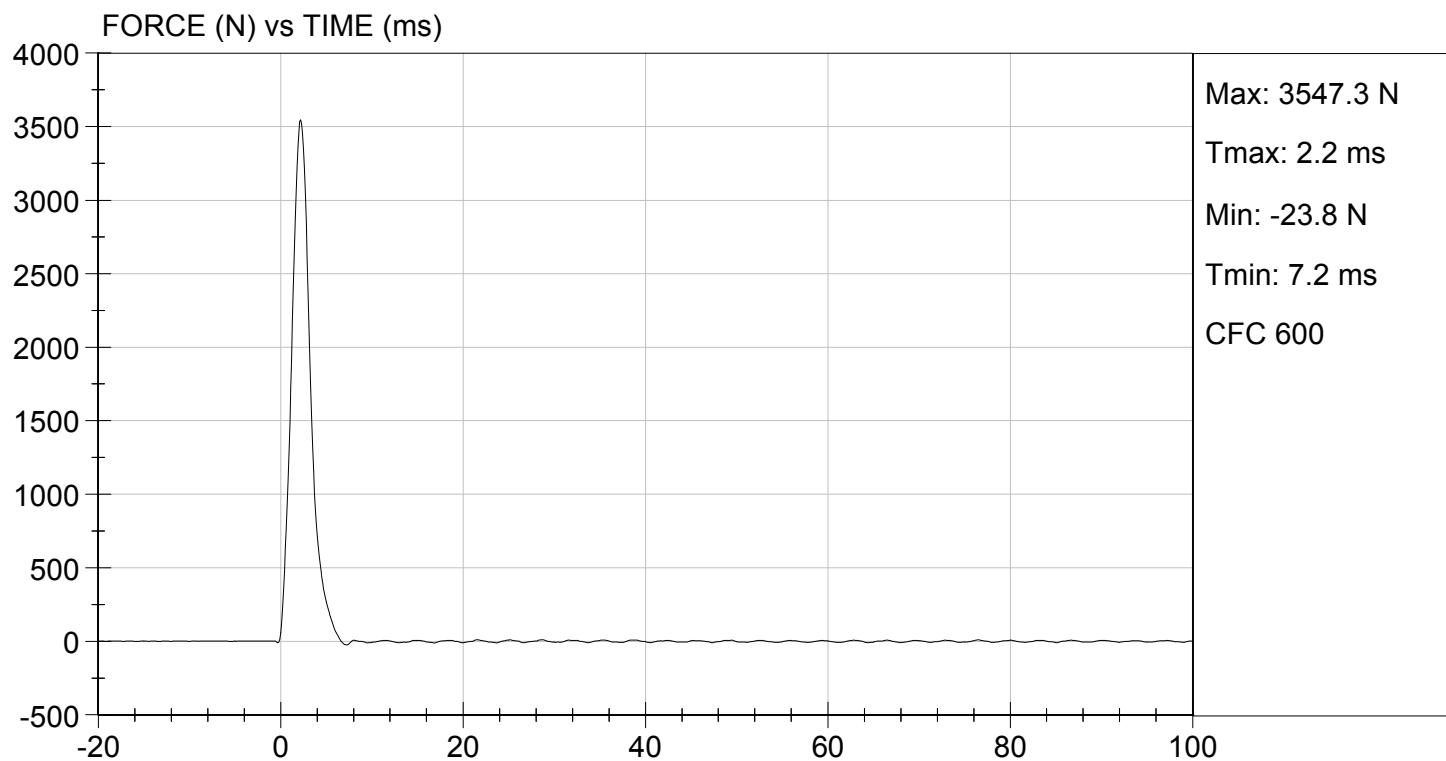


Approved By



TEST DESC: LEFT KNEE
VELOCITY: 6.97 ft/s, 2.12 m/s

TEST DATE: 05/26/2016
TEST #: D161836



MGA RESEARCH CORPORATION

**TORSO FLEXION TEST
HYBRID III 5TH PERCENTILE**

ATD Serial No: 138

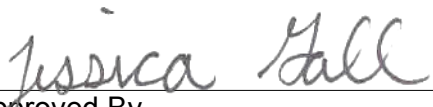
Test I.D: D161837

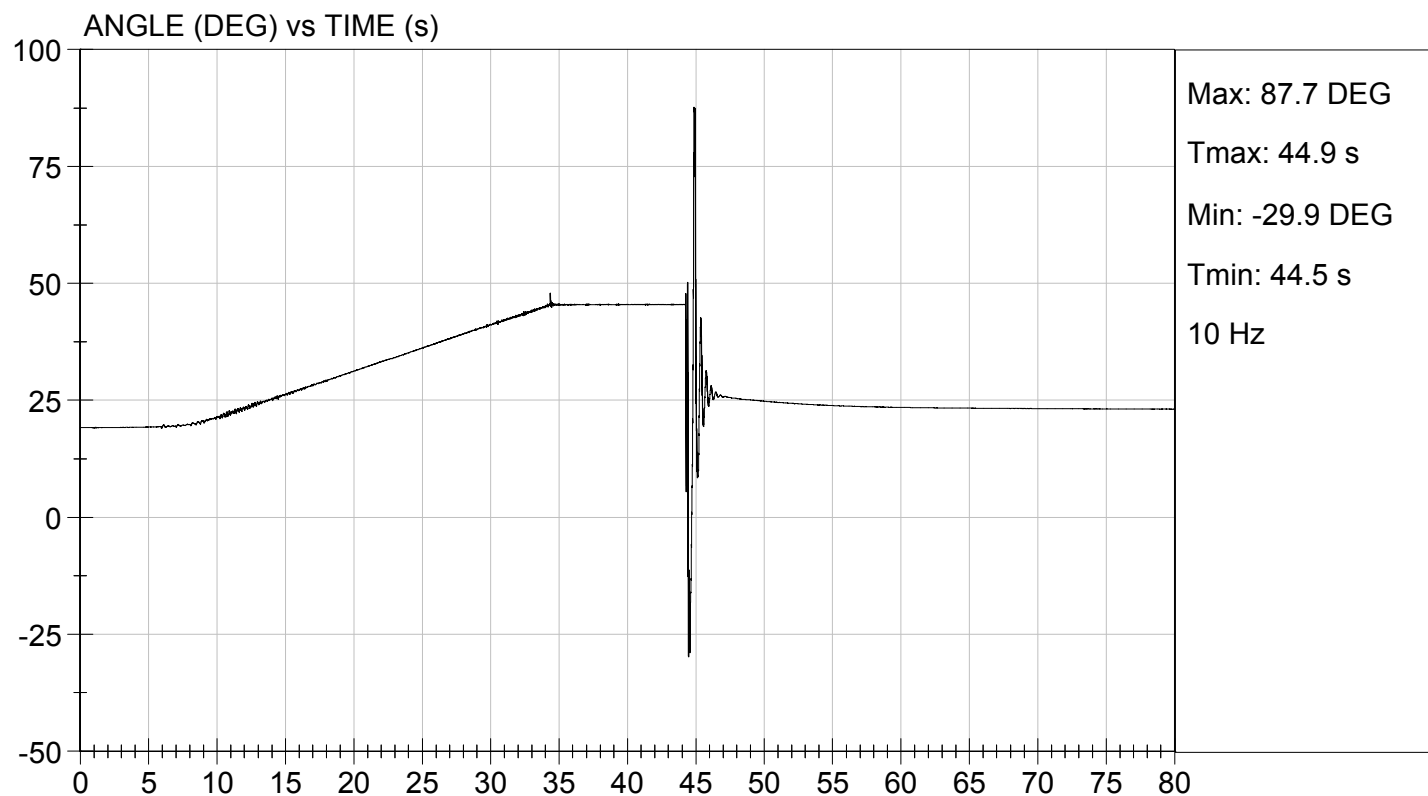
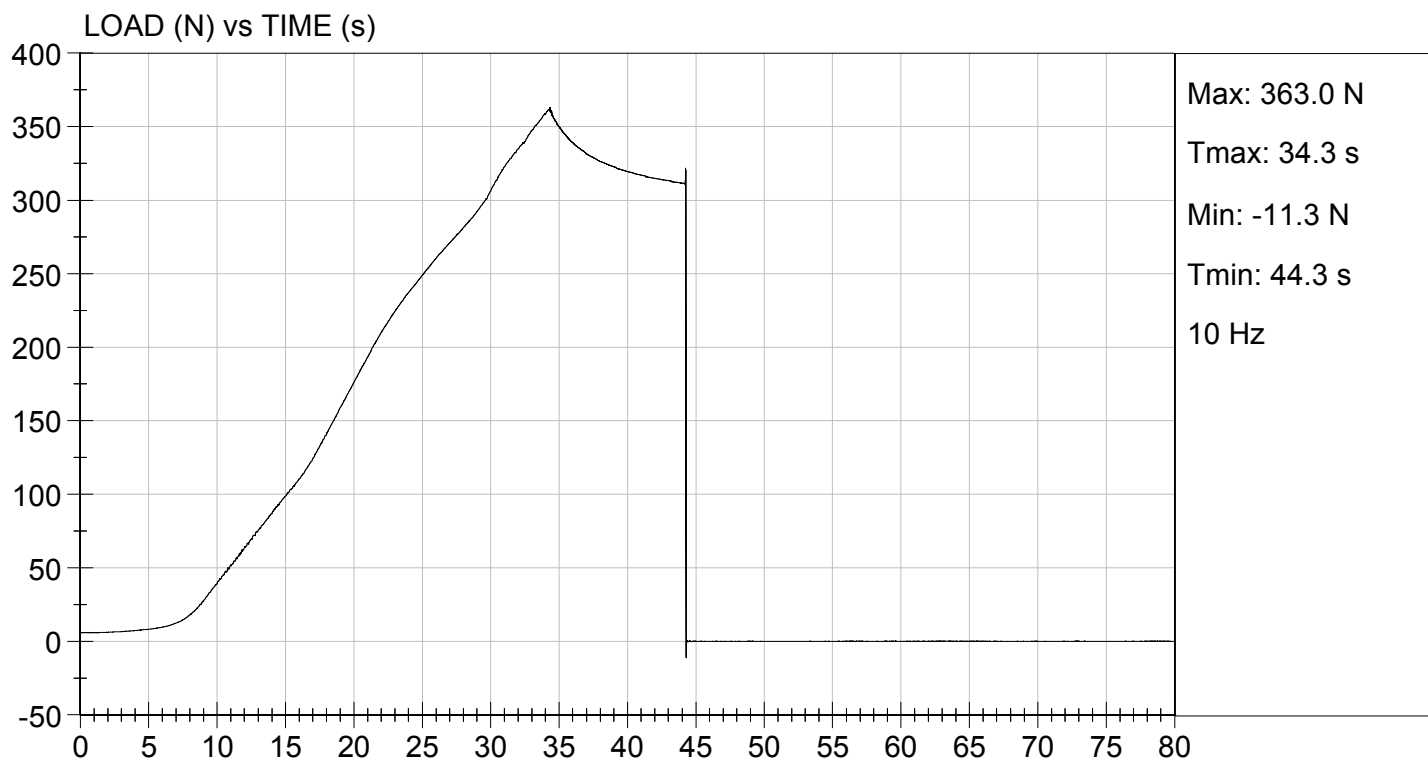
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	46	Pass
Initial Angle	deg	0 to 20	19	Pass
Return Angle	deg	+/- 8	4	Pass
Force at 45 deg	N	320 to 390	363	Pass
Upper Torso Deflection Rate	deg/s	0.5 to 1.5	0.9	Pass
Overall Result				Pass


Laboratory Technician

05/26/2016

Test Date


Approved By



MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test ID: D161981

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	41	Pass
Peak Resultant Acceleration	G's	250 to 300	266	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-12.5	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass

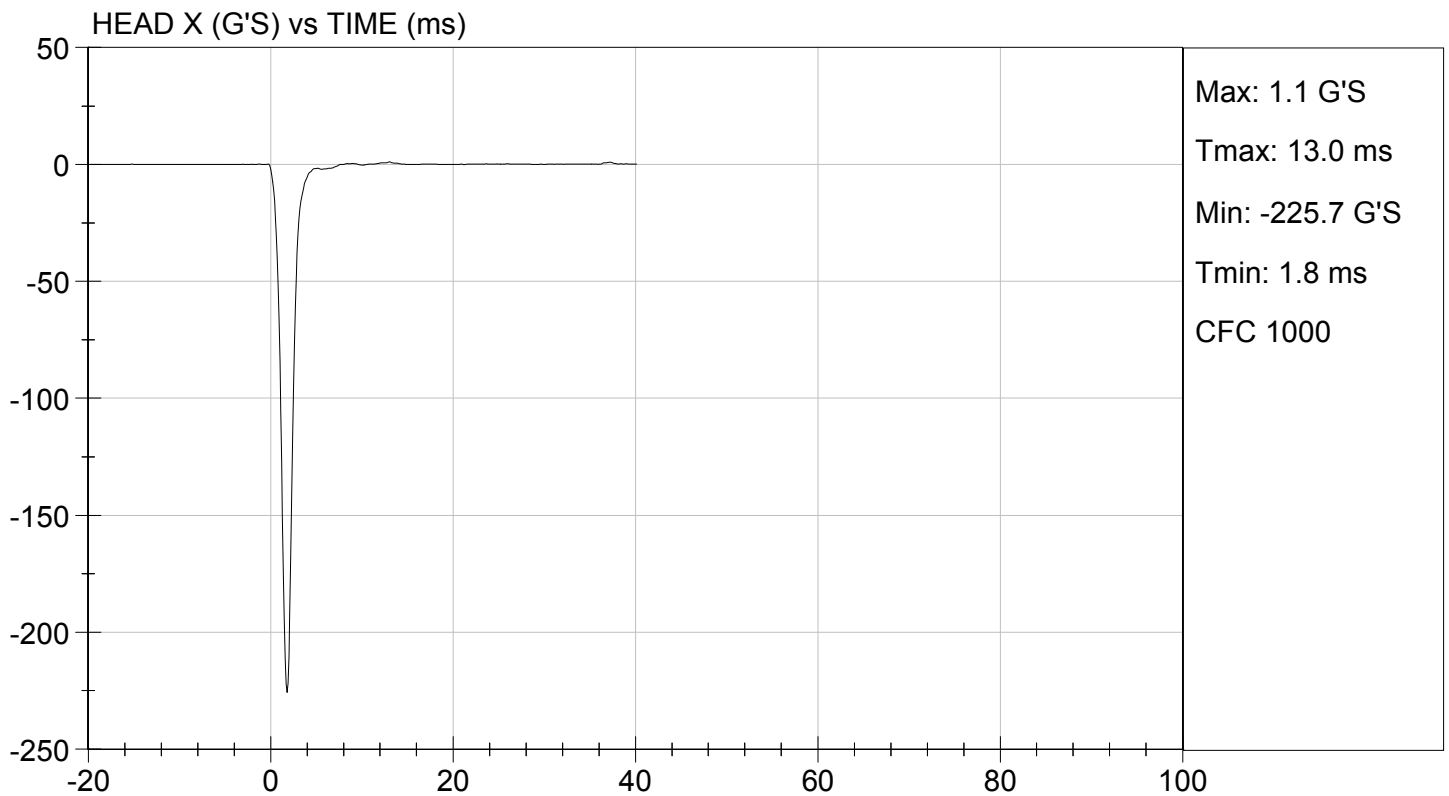
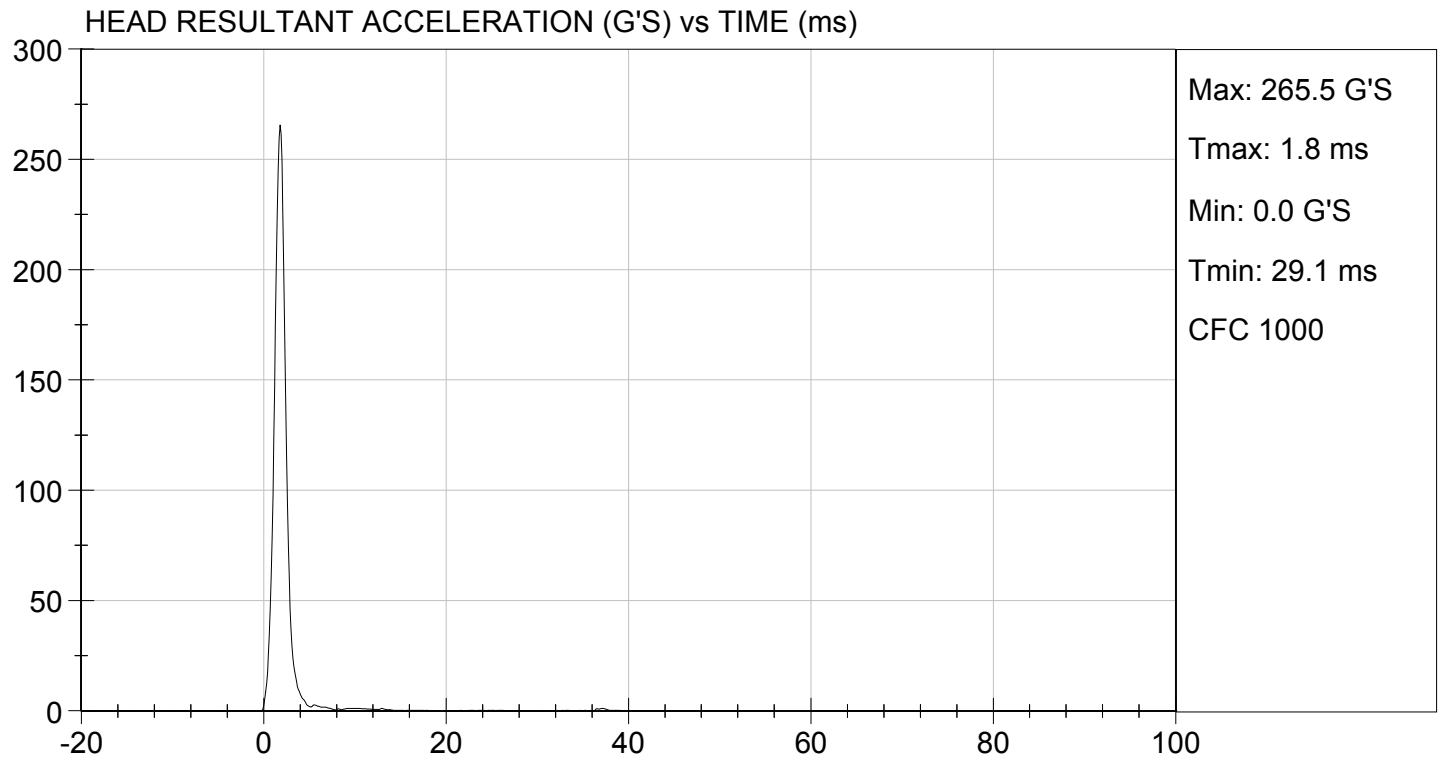


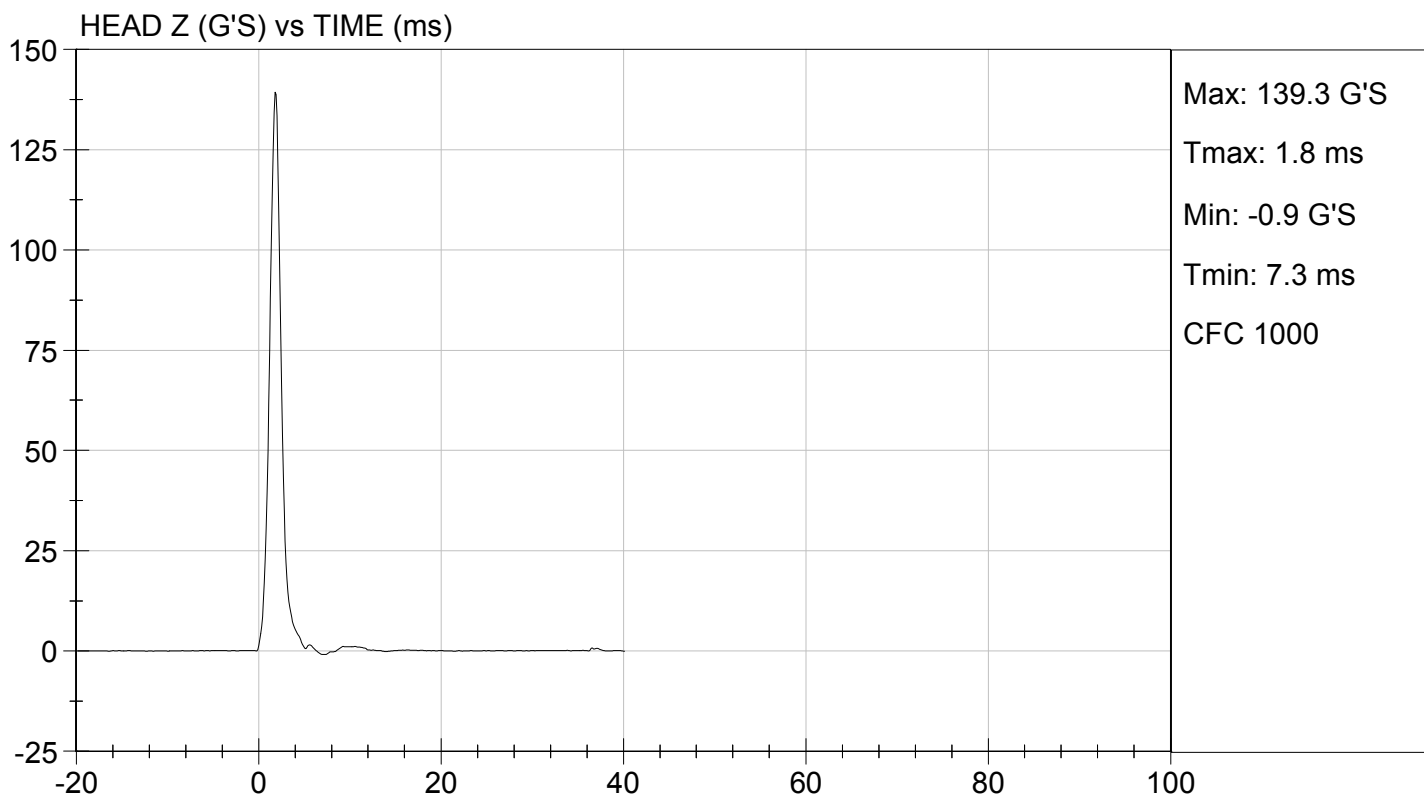
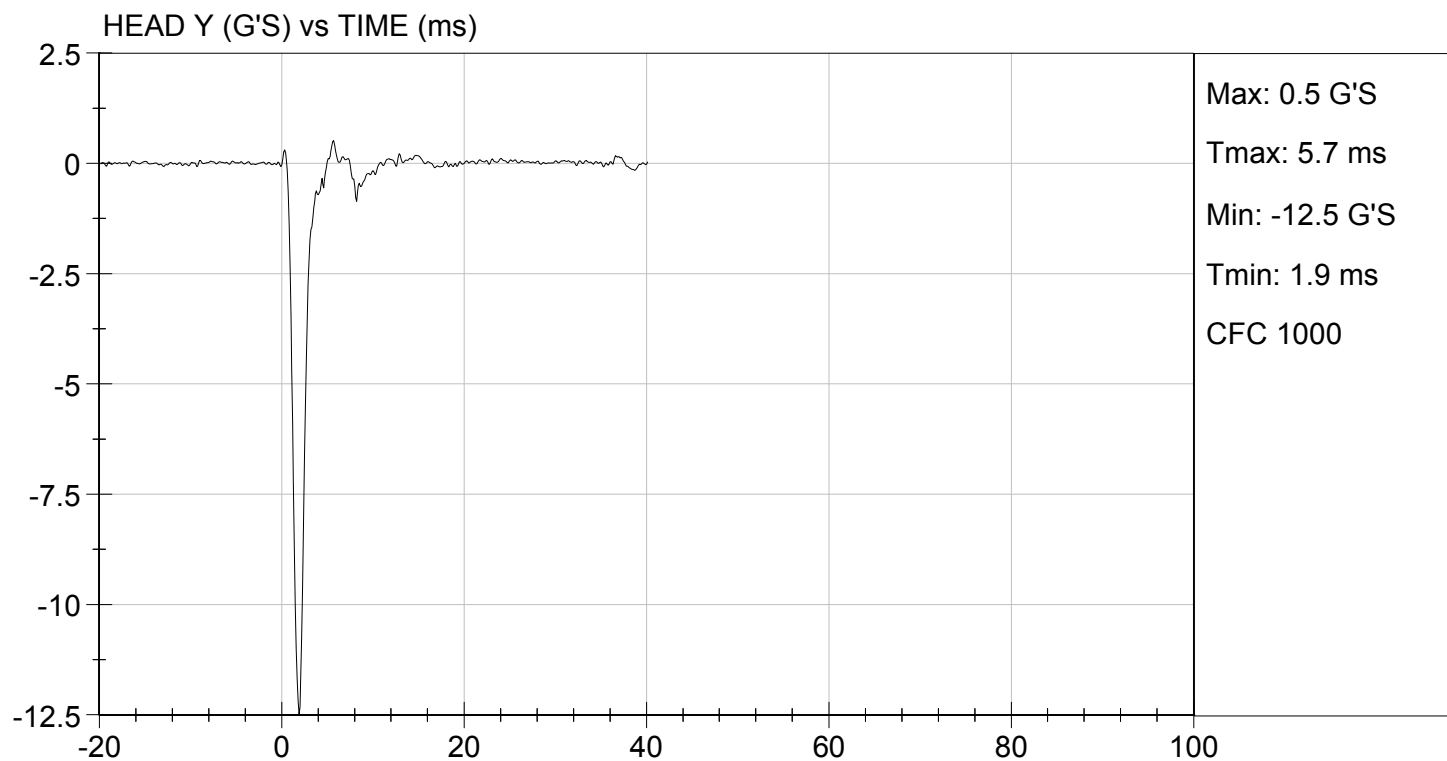
Laboratory Technician

06/08/2016
Test Date



Approved By





MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D: D161982

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.5	Pass
Laboratory Relative Humidity		%	10 to 70	40	Pass
Pendulum Speed		m/s	6.89 to 7.13	6.96	Pass
Pendulum Velocity	10 ms	m/s	2.1 to 2.5	2.3	Pass
	20 ms	m/s	4.0 to 5.0	4.4	Pass
	30 ms	m/s	5.8 to 7.0	6.2	Pass
D Plane Rotation	Max	deg	77 to 91	84	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	87	Pass
Overall Results					Pass


 Laboratory Technician

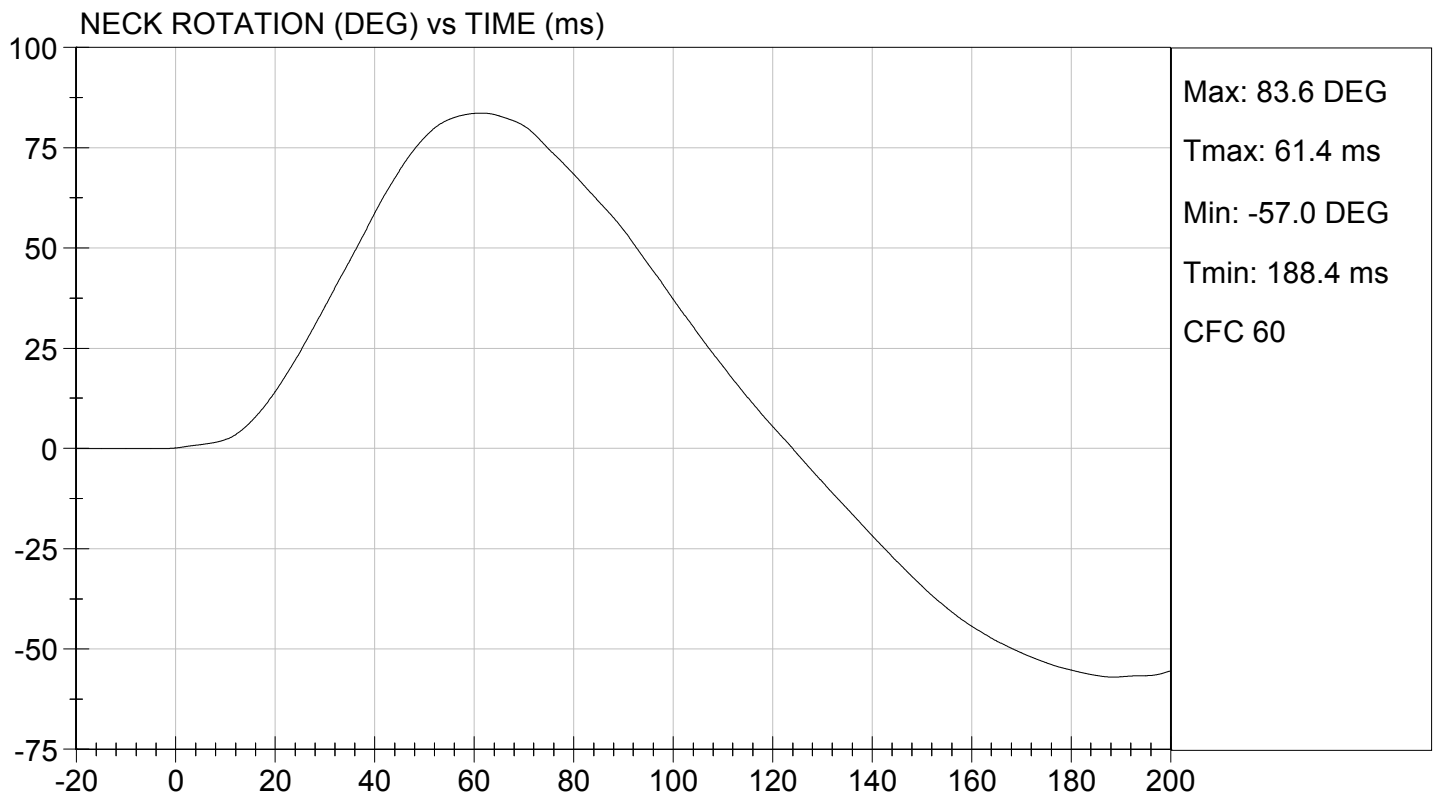
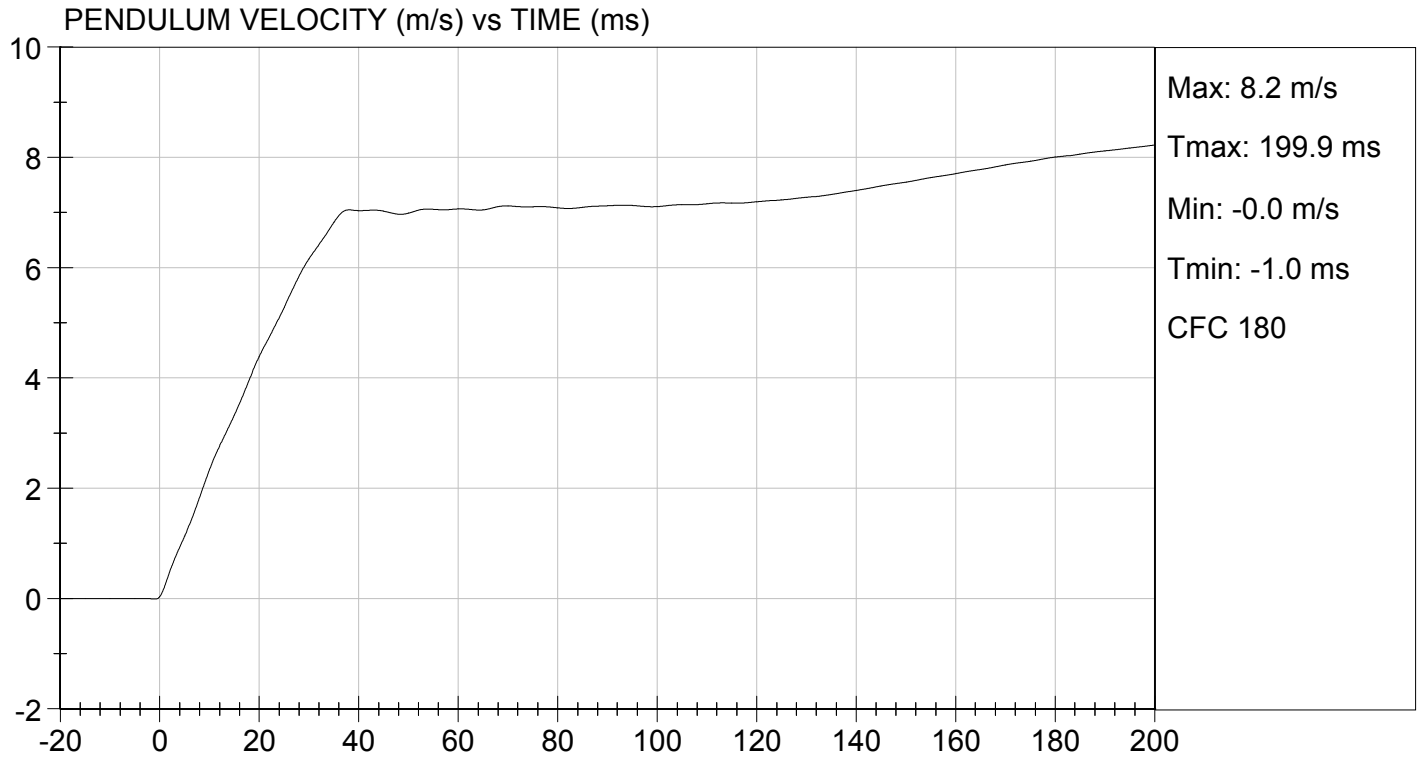
06/08/2016
 Test Date


 Approved By



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

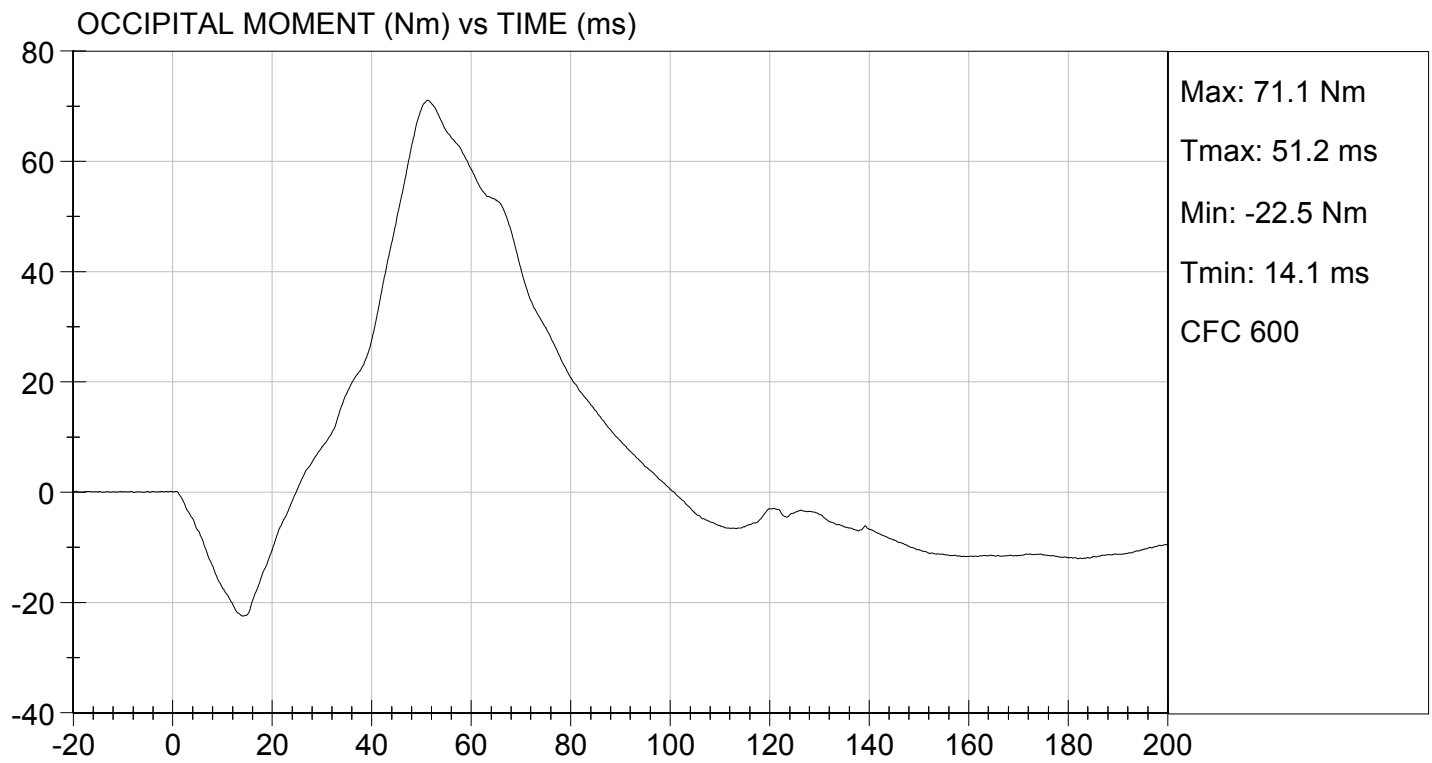
TEST DATE: 06/08/2016
TEST #: D161982





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

TEST DATE: 06/08/2016
TEST #: D161982



MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 5TH PERCENTILE

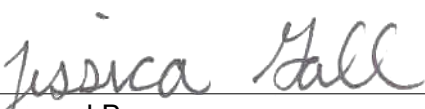
ATD Serial No: 138

Test I.D: D161983

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.5	Pass
Laboratory Relative Humidity		%	10 to 70	40	Pass
Pendulum Speed		m/s	5.95 to 6.19	5.98	Pass
Pendulum Velocity	10 ms	m/s	1.5 to 1.9	1.8	Pass
	20 ms	m/s	3.1 to 3.9	3.7	Pass
	30 ms	m/s	4.6 to 5.6	5.5	Pass
D Plane Rotation	Max	deg	99 to 114	110	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	-65 to -53	-56	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	103	Pass
Overall Results					Pass


 Laboratory Technician

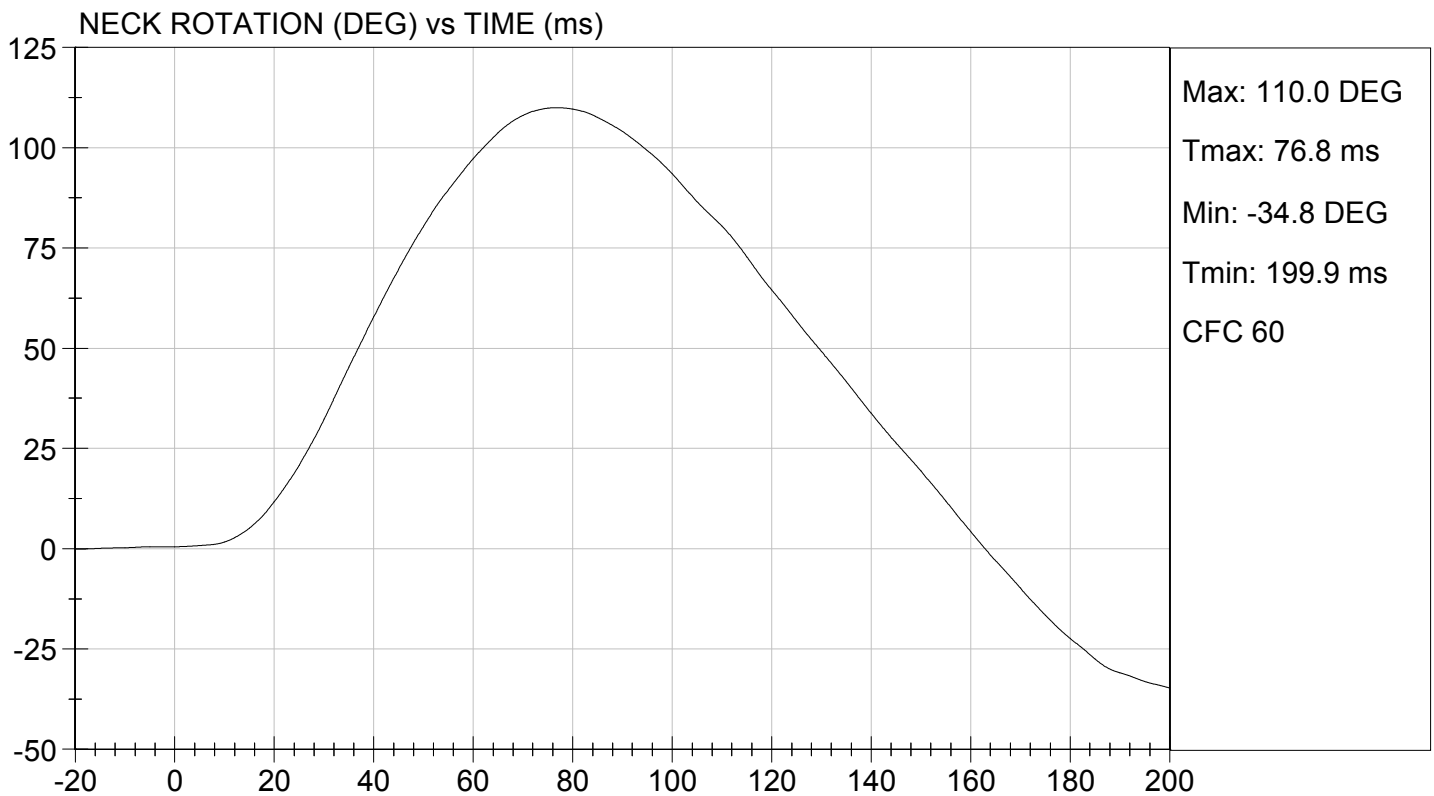
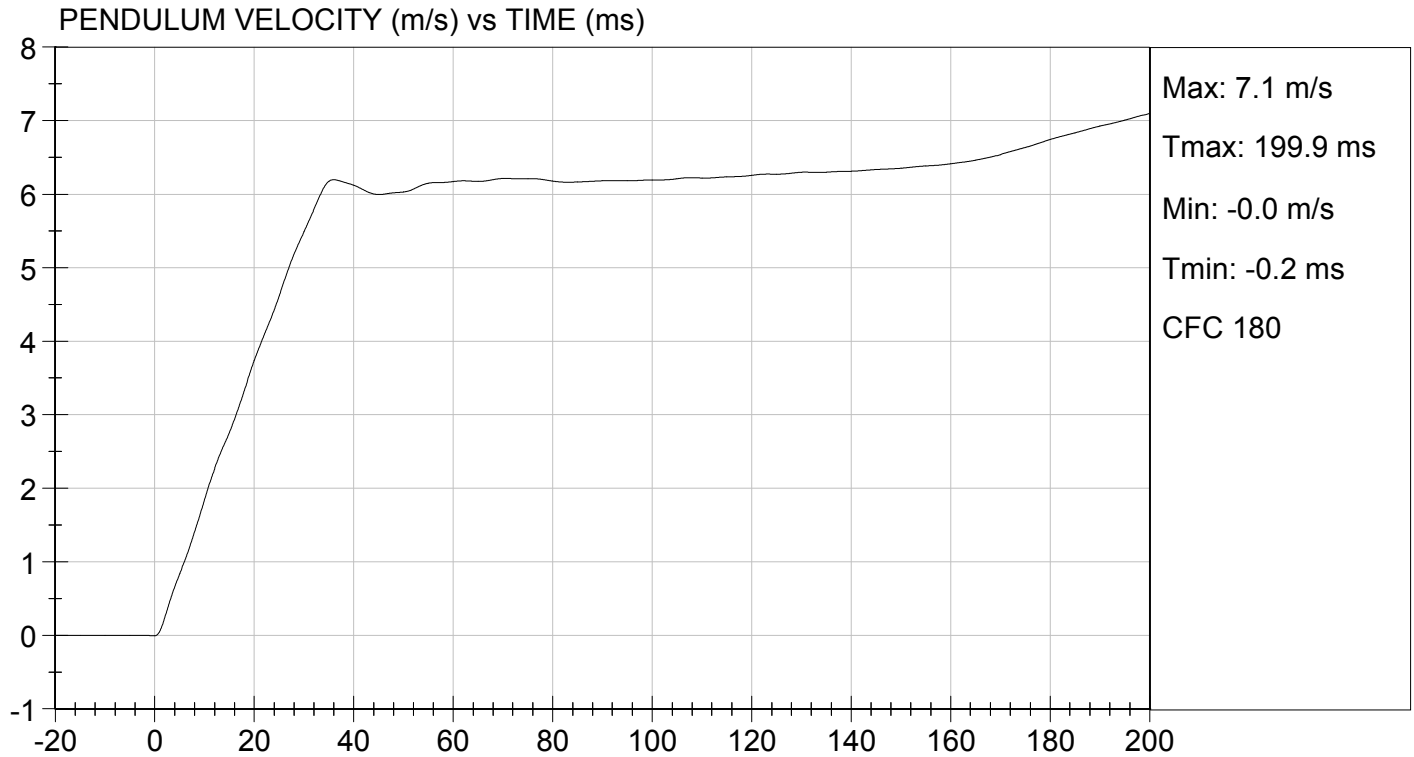
06/08/2016
 Test Date


 Approved By



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

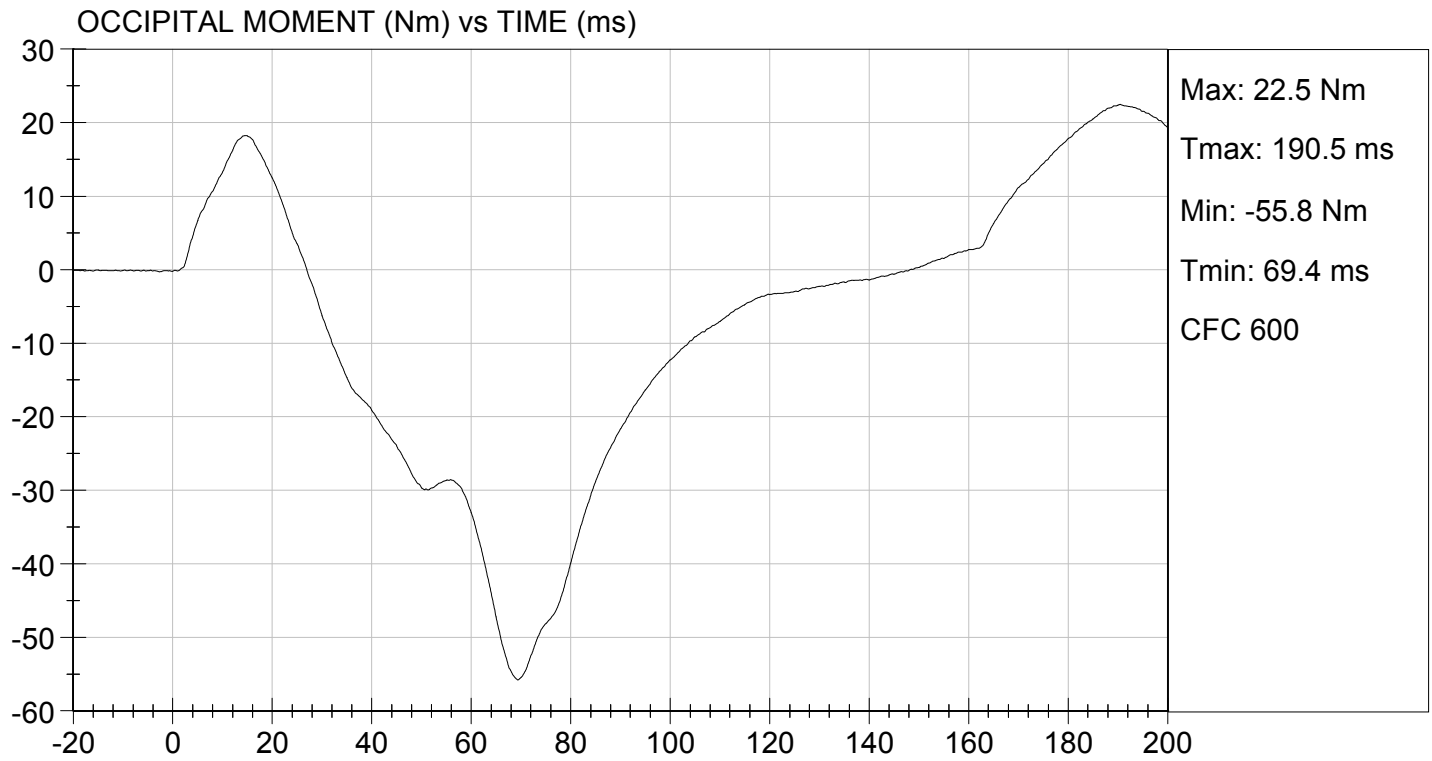
TEST DATE: 06/08/2016
TEST #: D161983





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

TEST DATE: 06/08/2016
TEST #: D161983



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D: D161984

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.9	Pass
Relative Humidity	%	10 to 70	46	Pass
Probe Speed	m/s	6.59 to 6.83	6.68	Pass
Peak Deflection	mm	50 to 58	58	Pass
Peak Resistive Force w/in Deflection Corridor	N	3900 to 4400	4373	Pass
Internal Hysteresis	%	69 to 85	69	Pass
Peak Force 18 mm - 50 mm	N	<= 4600	4065	Pass
Overall Test Results				Pass



Laboratory Technician

06/09/2016

Test Date

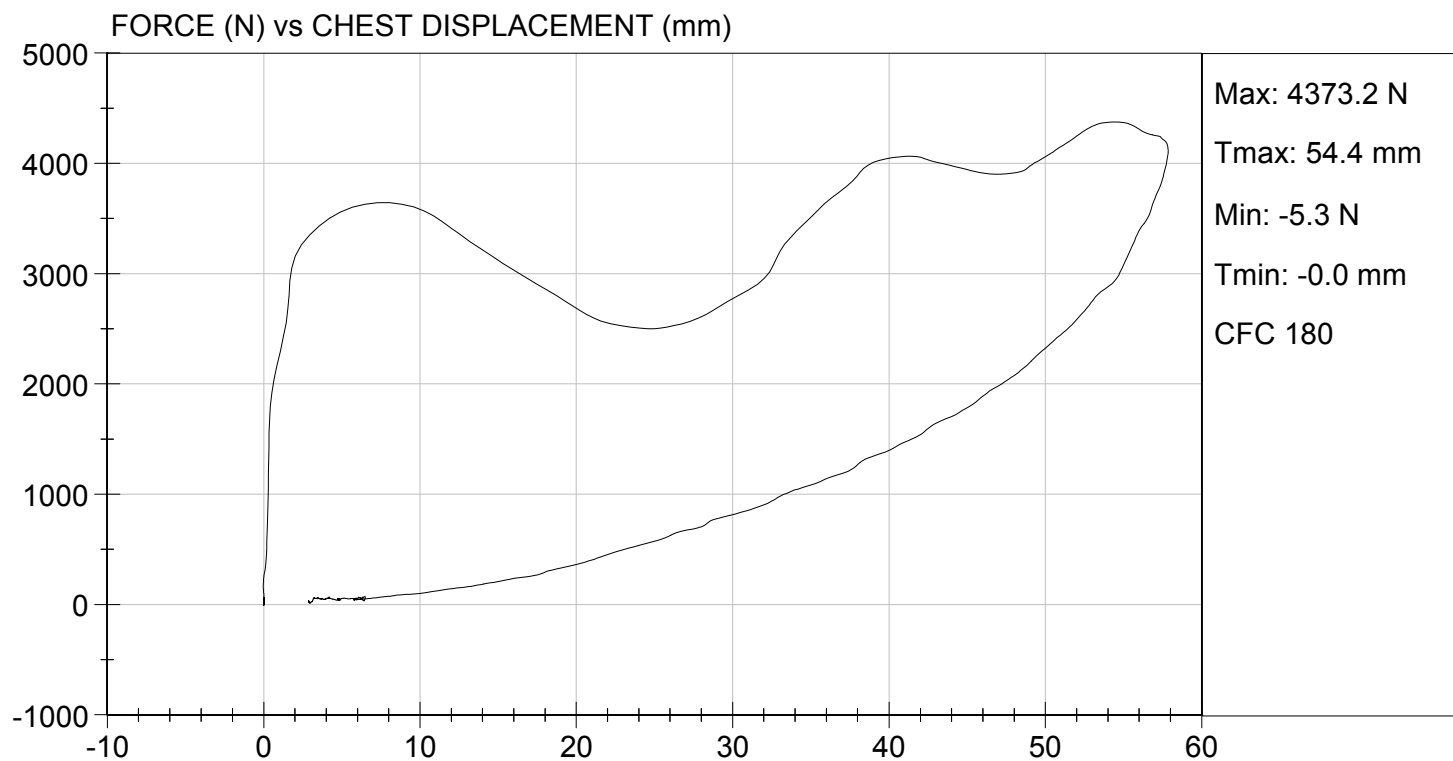


Approved By



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

TEST DATE: 06/09/2016
TEST #: D161984



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D: D161985

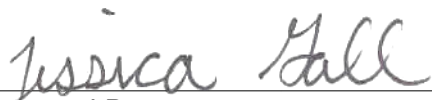
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	45	Pass
Probe Speed	m/s	2.07 to 2.13	2.11	Pass
Maximum Force	N	3450 to 4060	3657	Pass
Overall Test Results				Pass



Laboratory Technician

06/09/2016

Test Date

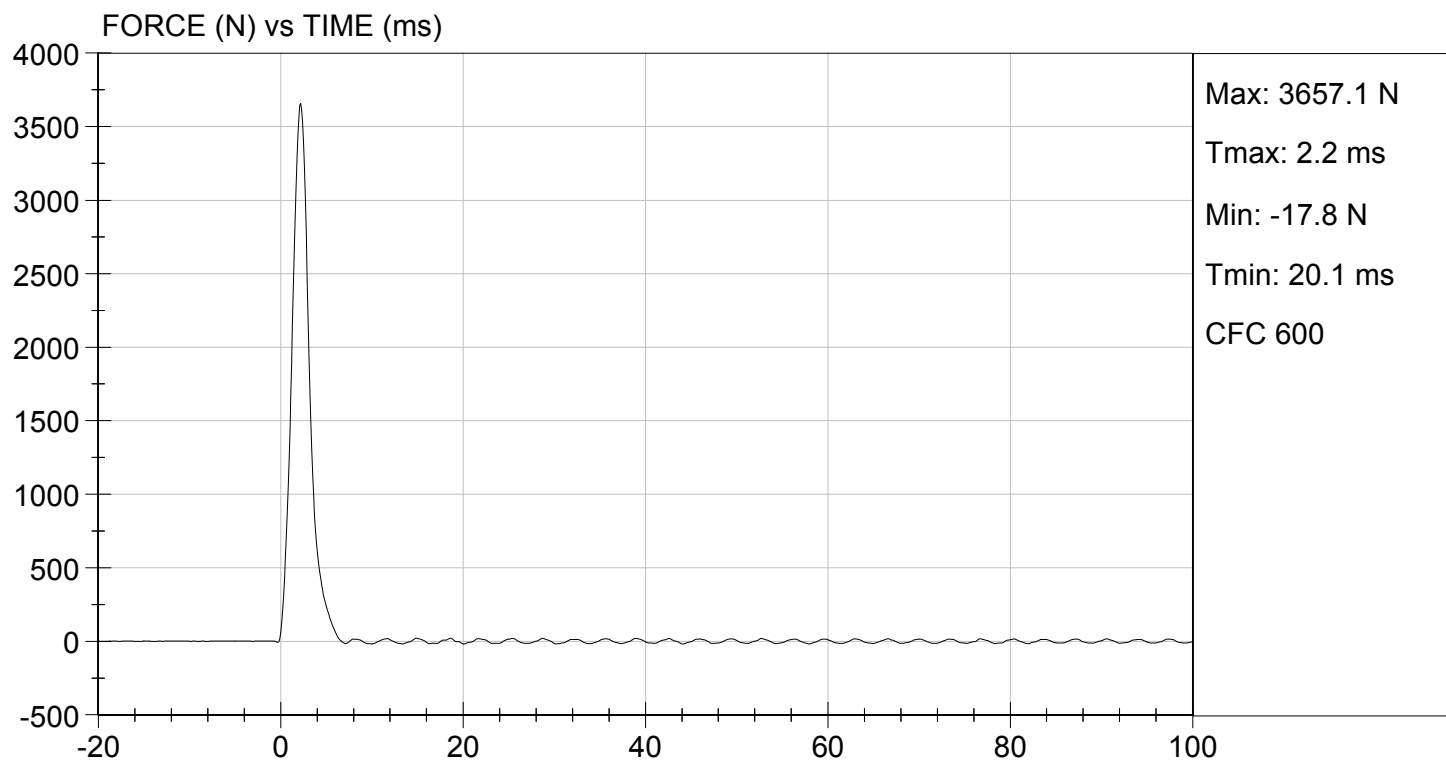


Approved By



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

TEST DATE: 06/09/2016
TEST #: D161985



MGA RESEARCH CORPORATION

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

ATD Serial No: 138

Test I.D: D161986

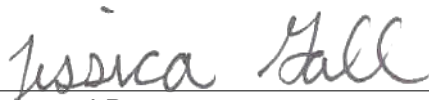
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	45	Pass
Probe Speed	m/s	2.07 to 2.13	2.13	Pass
Maximum Force	N	3450 to 4060	3550	Pass
Overall Test Results				Pass



Laboratory Technician

06/09/2016

Test Date

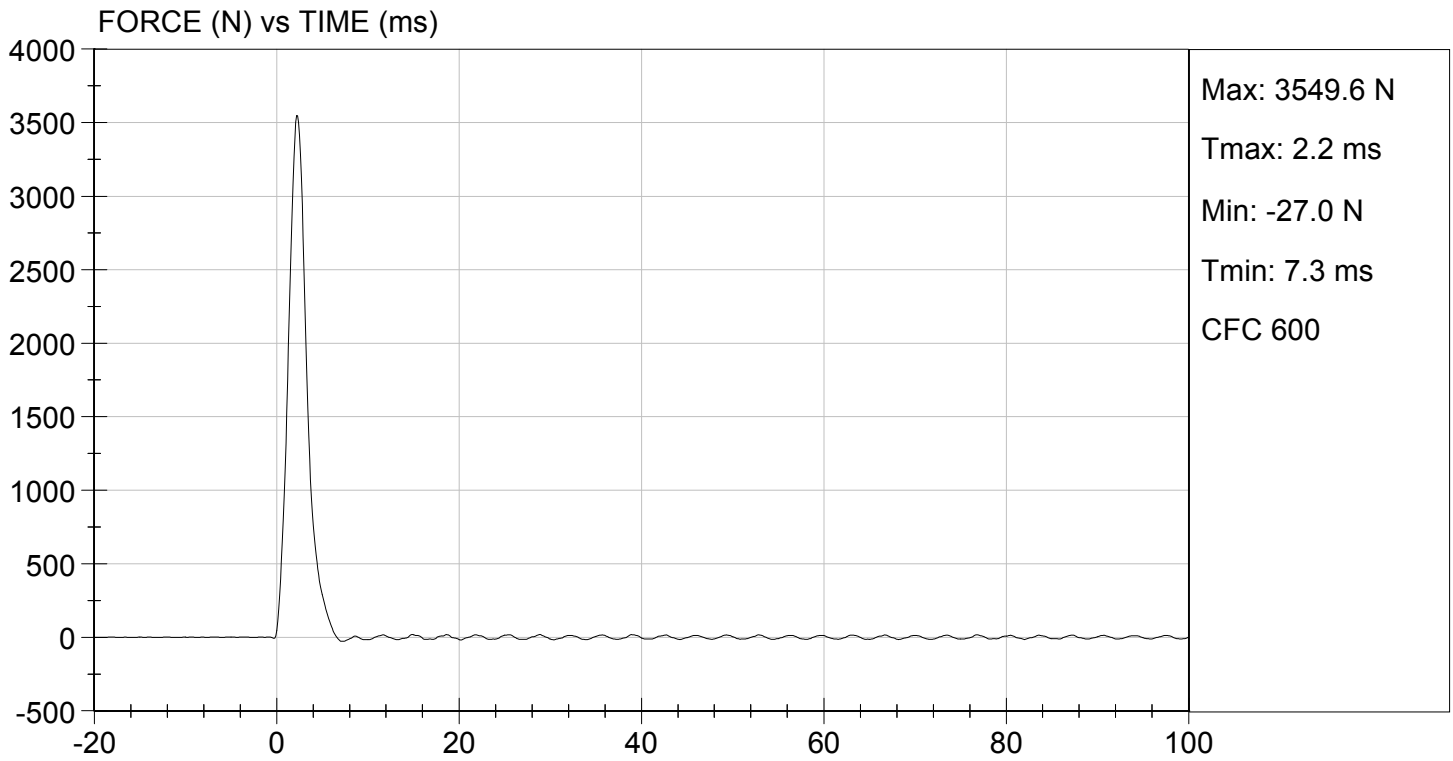


Approved By



TEST DESC: LEFT KNEE
VELOCITY: 7.00 ft/s, 2.13 m/s

TEST DATE: 06/09/2016
TEST #: D161986



MGA RESEARCH CORPORATION

**TORSO FLEXION TEST
HYBRID III 5TH PERCENTILE**

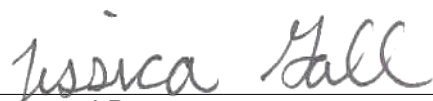
ATD Serial No: 138

Test I.D: D161987

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	45	Pass
Initial Angle	deg	0 to 20	20	Pass
Return Angle	deg	+/- 8	2	Pass
Force at 45 deg	N	320 to 390	373	Pass
Upper Torso Deflection Rate	deg/s	0.5 to 1.5	0.9	Pass
Overall Result				Pass


Laboratory Technician

06/09/2016
Test Date


Approved By

