REPORT NUMBER: NCAP-MGA-2015-022

NEW CAR ASSESSMENT PROGRAM (NCAP)
Frontal Barrier Impact Test

NISSAN MOTOR CO., LTD.
2015 Nissan Rogue S AWD SUV
NHTSA No.: O20155200

MGA RESEARCH CORPORATION
5000 Warren Road
Burlington, WI 53105

Test Date: October 15, 2014

Final Report Date: December 22, 2014

FINAL REPORT

U.S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Office of Crashworthiness Standards
Mail Code: NVS-111
1200 New Jersey Ave, SE
Room W43-410
Washington, DC 20590

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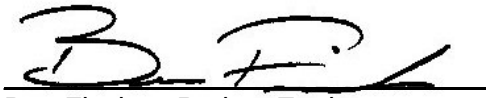
Approved by: 
Ben Fischer, Project Engineer

Approval Date: December 22, 2014

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

Technical Report Documentation Page

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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
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15. Supplementary Notes		

16. Abstract

A 56.3 km/h NCAP Frontal Impact Test was conducted on a 2015 Nissan Rogue S AWD 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 October 15, 2014.

The impact velocity of the vehicle was 56.2 km/h and the ambient temperature at the barrier face at the time of impact was 21.6°C. The target vehicle post-test maximum crush was 454 located at the vehicle's centerline. The test vehicle's performance was as follows:

Measurement Description	Units	Driver ATD		Passenger ATD	
		Threshold	Result	Threshold	Result
Head Injury Criteria (HIC_{15})	N/A	700	294	700	298
Maximum Chest	mm	63	18	52	17
Nij	N/A	1	0.31	1	0.63
Neck Tension	N	4170	1264	2620	1044
Neck Compression	N	4000	197	2520	484
Left Femur Force	N	10008	3806	6805	1746
Right Femur Force	N	10008	1764	6805	1786

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	
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SECTION 1
PURPOSE AND SUMMARY OF TEST

PURPOSE

This 56.3 km/h frontal barrier impact test is part of the Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under contract number 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 2015 Nissan Rogue S AWD SUV at a velocity of 56.2 km/h. The test was performed at MGA Research Corporation on October 15, 2014. 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 not installed on the driver's or right-front passenger's lap or shoulder belts.

The driver (position 1) ATD (Serial No. 351) and the right-front passenger (position 2) ATD (Serial No. 634) were calibrated previous to this test. Certification details, along with instrumentation calibration data, are found in Appendix C of this report.

The 628 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 454 mm 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 and chest contacted the airbag. The driver's head also contacted the headrest and curtain airbag. The driver's knees contacted the knee bolster. The passenger's visible contact points were as follows: The passenger's head and chest contacted the airbag. The passenger's head also contacted the headrest. The passenger's knees contacted the glovebox.

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})	294	0.31	1264	197	40	18	3806	1764
Passenger (5^{th})	298	0.63	1044	484	48	17	1746	1786

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

TEST NOTES

Barrier C-02 FX has questionable data.
Barrier C-02 MY has questionable data.
Barrier K-16 MY has no valid data after 10 ms.

SECTION 2
OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2015 Nissan Rogue S AWD SUV NHTSA No.: O20155200
Test Program: NCAP Frontal Barrier Impact Test Test Date: 10/15/2014

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	O20155200	Traction Control System (TCS)	Yes
Model Year	2015	Power Steering	Yes
Make	Nissan	Power Window Auto-Reverse	Yes
Model	Rogue	Driver Frontal Airbag	Yes
Body Style	MPV	Driver Curtain Airbag	Yes
VIN	5N1AT2MV8FC751525	Driver Head/Torso Airbag	No
Body Color	Cayenne Red	Driver Torso Airbag	No
Odometer (km/mi)	92 / 57	Driver Torso/Pelvis Airbag	Yes
Engine Displacement (L)	2.5	Driver Pelvis Airbag	No
Type/No. Cylinders	4	Driver Knee Airbag	No
Engine Placement	Lateral	Front Pass. Frontal Airbag	Yes
Transmission Type	Automatic	Front Pass. Curtain Airbag	Yes
Transmission Speeds	CVT	Front Pass. Head/Torso Airbag	No
Overdrive	Yes	Front Pass. Torso Airbag	No
Final Drive	AWD	Front Pass. Torso/Pelvis Airbag	Yes
Roof Rack	No	Front Pass. Pelvis Airbag	No
Sunroof/T-Top	No	Front Pass. Knee Airbag	No
Running Boards	No	Driver Pretensioner	Yes
Tilt Steering Wheel	Yes	Driver Load Limiter	Yes
Power Seats	No	Front Pass. Pretensioner	Yes
Anti-Lock Brakes (ABS)	Yes	Front Pass. Load Limiter	Yes
Automatic Door Locks (ADLs)	Yes	Other	N/A

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

DATA FROM CERTIFICATION LABEL

Manufactured By	Nissan Motor Co., Ltd.
Date of Manufacture	08/14

GVWR (kg)	2122
GAWR Front (kg)	1072
GAWR Rear (kg)	1089

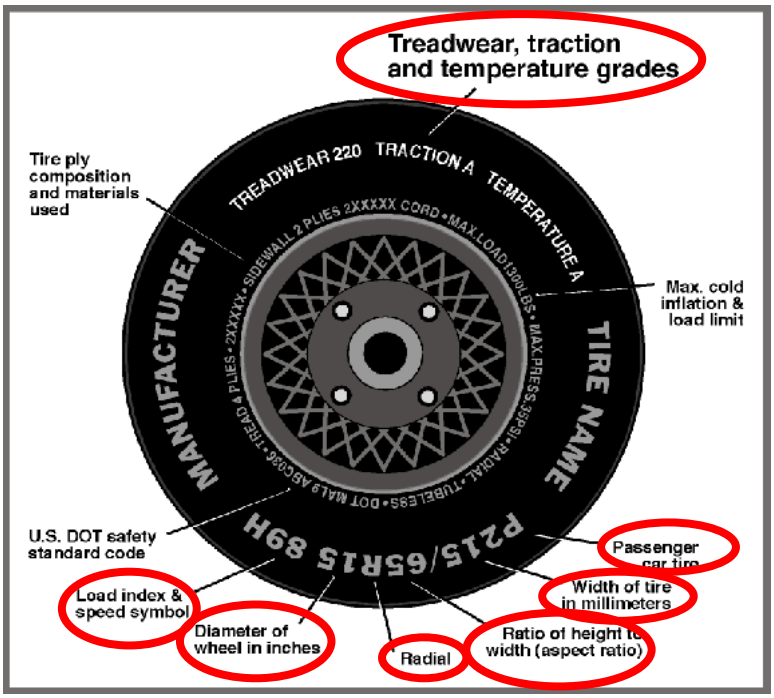
VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Split Bench		
Designated Seating Capacity (DSC)	2	3		5
Capacity Weight (VCW) (kg)				408
Cargo Weight (RCLW) (kg)				68

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

Test Vehicle: 2015 Nissan Rogue S AWD SUV NHTSA No.: O20155200
Test Program: NCAP Frontal Barrier Impact Test Test Date: 10/15/2014

VEHICLE TIRE INFORMATION



Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	230	230
Recommended Tire Size	225/65R17	225/65R17
Tire Size on Vehicle	225/65R17	225/65R17
Tire Manufacturer	Hankook	Hankook
Tire Model	Dynapro HT	Dynapro HT
Treadwear	380	380
Traction	A	A
Temperature Grade	A	A
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Steel, 2 Polyester, 1 Nylon	2 Steel, 2 Polyester, 1 Nylon
Load Index/Speed Symbol	102H	102H
Tire Material	Rubber	Rubber
DOT Safety Code Left	T7H1 HUH 1714	T7H1 HUH 1714
DOT Safety Code Right	T7H1 HUH 1714	T7H1 HUH 1714

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

Test Vehicle: 2015 Nissan Rogue S AWD SUV NHTSA No.: O20155200
Test Program: NCAP Frontal Barrier Impact Test Test Date: 10/15/2014

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	455.5	359.5		495.5	442.0	
Right	kg	475.0	319.5		490.0	384.0	
Ratio	%	57.8	42.2		54.4	45.6	
Totals	kg	930.5	679.0	1609.5	985.5	826.0	1811.5

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1609.5
Weight of 1 P572E ATD & 1 P572O ATD	kg	140.6
Rated Cargo/Luggage Weight (RCLW)	kg	68
Calculated Test Vehicle Target Weight (TVTW)	kg	1818.1

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	783	792	805	793	1142
As Tested	mm	779	785	772	776	1235
Post Test	mm	820	780	808	746	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2708
Total Vehicle Length at Left Side	mm	4502
Total Vehicle Length at Centerline	mm	4643
Total Vehicle Length at Right Side	mm	4502
Weight of Ballast in Cargo Area	kg	11.3
Weight of Vehicle Components Removed	kg	37.2
Amount of Stoddard Solvent in Fuel Tank	L	51.0

List of components removed to meet test weight: None

List of components removed for instrumentation, data box, and equipment installation:
Jack & tools, spare tire & cover, right taillight, front underbody plastic, all wheel covers.

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

Test Vehicle: 2015 Nissan Rogue S AWD SUV NHTSA No.: O20155200
Test Program: NCAP Frontal Barrier Impact Test Test Date: 10/15/2014

TARGET VEHICLE STRUCTURAL MEASUREMENT

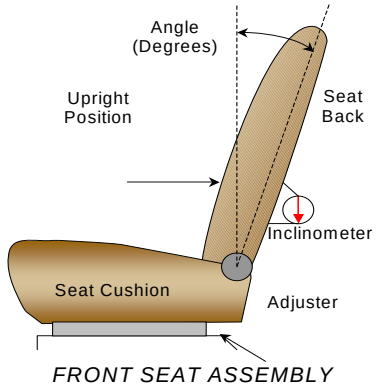
	Elements	Pre-Test (mm)
1	Total Length	4643
2	Total Width	1819
3	Bumper Top Height	640
4	Bumper Bottom Height	540
5	Longitudinal Member Top Height	630
6	Distance between Longitudinal Members	920
7	Longitudinal Member Width	60
8	Engine Top Height	880
9	Engine Bottom Height	240
10	Engine and Gearbox Width	900
11	Front Bumper-Engine Distance	460
12	Front Shock Absorber Fixing Height	960
13	Bonnet Leading Edge Height	896
14	Front Shock Absorber Fixing Width	1195
15	Front Bumper – Front Axle Distance	929
16	Front Axle – A-Pillar Distance	527
17	A-Pillar – B-Pillar Distance	1096
18	B-Pillar – Rear Axle Distance	1086
19	B-Pillar – C-Pillar Distance	850
20	Roof Sill Bottom Height	1442
21	Roof Sill Top Height	1637
22	Floor Sill Bottom Height	220
23	Floor Sill Top Height	420

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

Test Vehicle: 2015 Nissan Rogue S AWD SUV NHTSA No.: O20155200
Test Program: NCAP Frontal Barrier Impact Test Test Date: 10/15/2014

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 August 2013.



	Degrees
Driver Seat Back Angle	5.9° on headrest post
Passenger Seat Back Angle	6.9° on headrest post

SEAT FORE/AFT POSITIONS

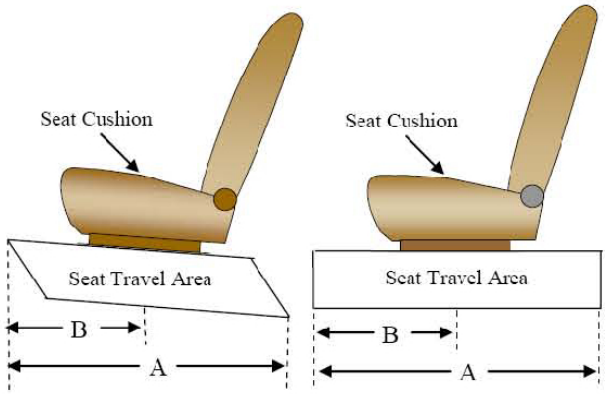
The driver and passenger seat fore/aft positions are adjusted following Appendix F, "Driver & Passenger Dummy Seating & Positioning Procedures" in the NCAP Test Procedure dated August 2013.

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	289 mm / 25 detents	149 mm / 10th detent (foremost as 0)
Passenger Seat	240 mm / 25 detents	0 mm / 0th detent (foremost as 0)

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 (1st as 1)	0 (1st as 0)
Passenger Seat	4 (1st as 1)	0 (1st as 0)



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

Test Vehicle: 2015 Nissan Rogue S AWD SUV NHTSA No.: O20155200
Test Program: NCAP Frontal Barrier Impact Test Test Date: 10/15/2014

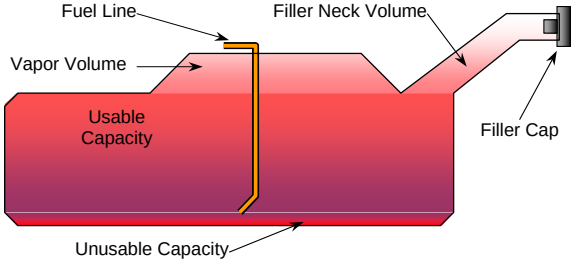
FUEL TANK CAPACITY DATA

	Liters
Usable Capacity of "Standard Tank"	54.9
Usable Capacity of "Optional Tank"	
92-94% of Usable Capacity	50.5 to 51.6
Actual Amount of Solvent used	51.0
1/3 of Usable Capacity	18.3

FUEL PUMP

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

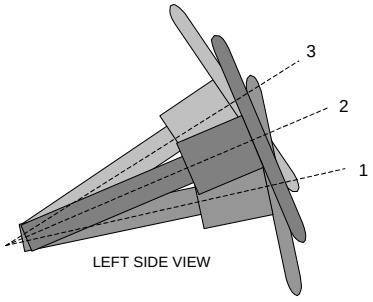
The vehicle is equipped with an electric fuel pump. The fuel pump will pump fuel when the engine is running. The fuel pipe is on the right side.



VEHICLE FUEL TANK ASSEMBLY

STEERING COLUMN ADJUSTMENT

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



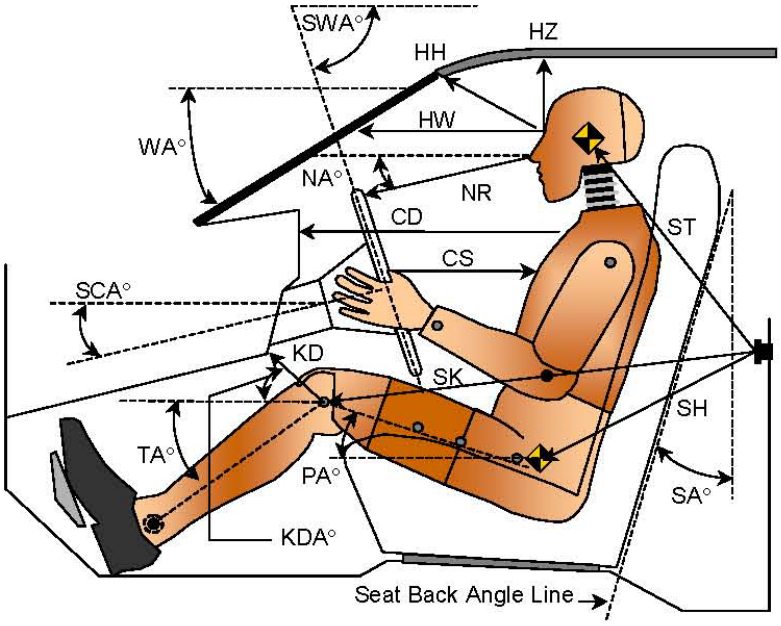
STEERING COLUMN ASSEMBLY

STEERING COLUMN POSITION

	Degrees	Fore/Aft Position (mm)
Lowermost Position 1	63.2	211
Geometric Center Position 2	61.0	187
Uppermost Position 3	58.8	163
Telescoping Steering Wheel Travel		48
Test Position	61.0	187

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2015 Nissan Rogue S AWD SUV
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: O20155200
Test Date: 10/15/2014



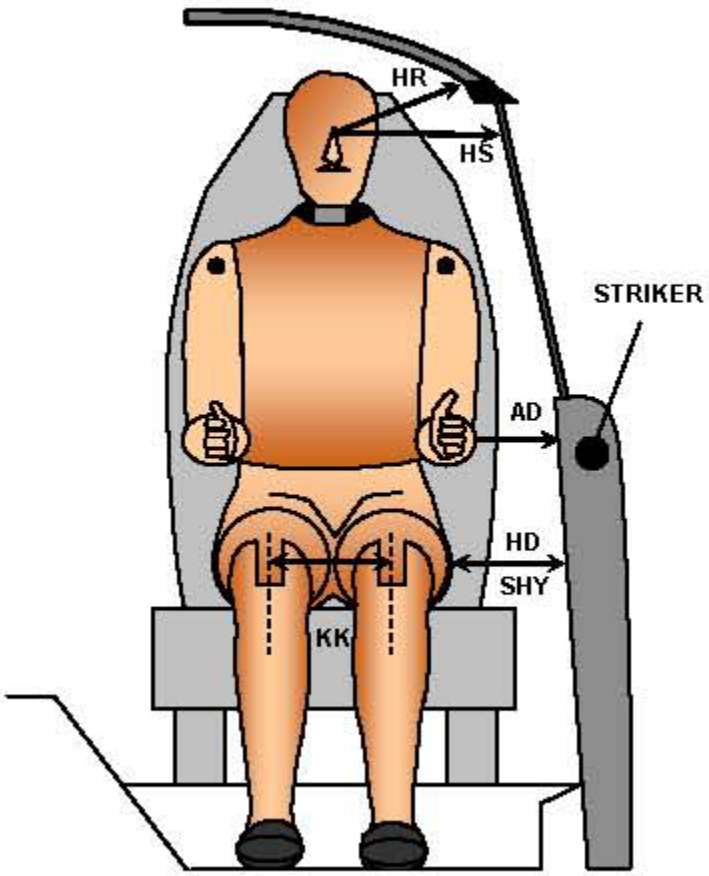
LEFT SIDE VIEW

Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		25.3		
SWA°	Steering Wheel Angle		61.0		
SCA°	Steering Column Angle		29.0		
SA°	Seat Back Angle (on headrest post)		5.9		6.9
HZ	Head to Roof (Z)	235	90.0	246	90.0
HH	Head to Header	350	25.7	310	45.3
HW	Head to Windshield	664	0.0	677	0.0
NR	Nose to Rim	411	15.5		
CD	Chest to Dash	540		402	
CS	Chest to Steering Hub	307	3.8		
RA	Rim to Abdomen	176	0.0		
KDL	Left Knee to Dash	142	25.6	74	31.4
KDR	Right Knee to Dash	101	29.1	87	32.0
PA°	Pelvic Angle		24.7		20.5
TA°	Tibia Angle		54.5		57.6
SK	Striker to Knee	652	90.2	751	97.6
ST	Striker to Head	526	19.8	541	28.8
SH	Striker to H-Point	308	112.1	405	105.4

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2015 Nissan Rogue S AWD SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20155200
Test Date: 10/15/2014

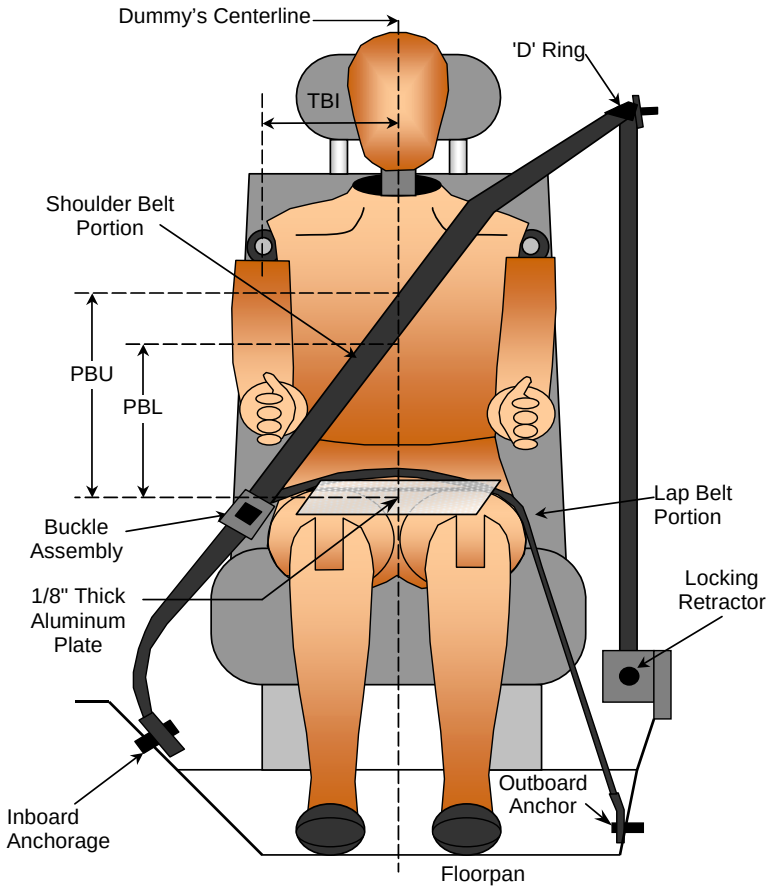


FRONT VIEW OF DUMMY

Code	Measurement Description	Driver	Passenger
		Length (mm)	
AD	Arm to Door	118	74
HD	H-Point to Door	155	175
HR	Head to Side Header	244	270
HS	Head to Side Window	335	354
KK	Knee to Knee	364	228
SHY	Striker to H-Point (Y Direction)	298	319
AA	Ankle to Ankle	373	176

DATA SHEET NO. 5
SEAT BELT POSITIONING DATA

Test Vehicle: 2015 Nissan Rogue S AWD SUV
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: O20155200
Test Date: 10/15/2014



FRONT VIEW OF DUMMY

SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU - Top surface of reference to belt upper edge	mm	365	325
PBL - Top surface of reference to belt lower edge	mm	290	230

BELT LENGTH DATA

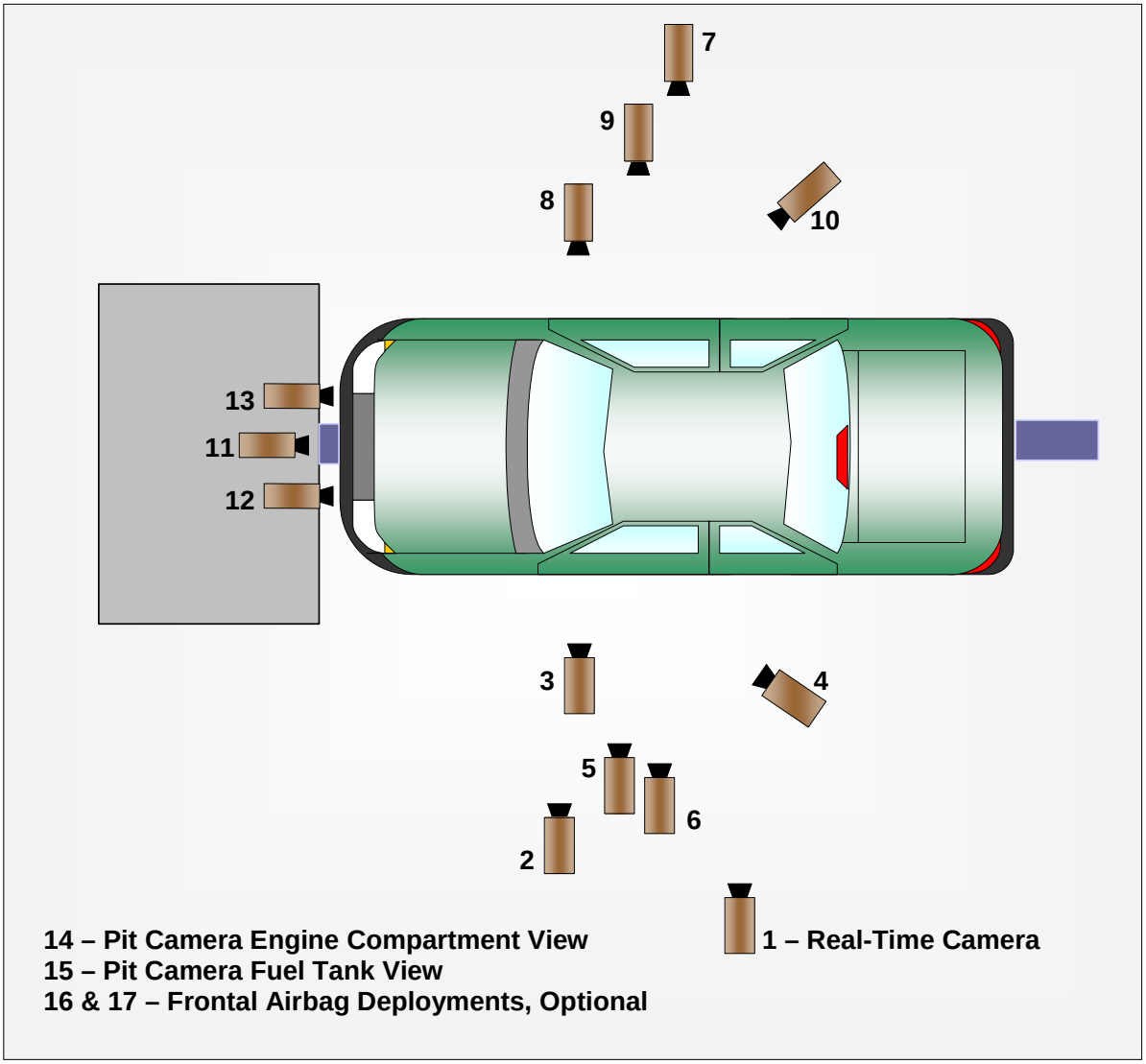
Measurement Description	Units	Driver	Passenger
Shoulder Belt Length as measured on ATD	mm	900	950
Lap Belt Length as measured on ATD	mm	720	800
Remainder of belt on reel	mm	1460	1330
Total Belt Length for Continuous Webbing Systems	mm	3080	3080

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

Test Vehicle: 2015 Nissan Rogue S AWD SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20155200
Test Date: 10/15/2014

CAMERA POSITIONS FOR FRONTAL IMPACTS



14 – Pit Camera Engine Compartment View
15 – Pit Camera Fuel Tank View
16 & 17 – Frontal Airbag Deployments, Optional

1 – Real-Time Camera

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

Test Vehicle: 2015 Nissan Rogue S AWD SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20155200
Test Date: 10/15/2014

CAMERA LOCATIONS

No.	Camera View	Coordinates (mm)			Lens (mm)	Speed (fps)
		X*	Y*	Z*		
1	Real-Time Left Overall					30
2	Driver Close-Up	1380	-6030	-1890	35	1000
3	Left Front Half	1160	-5200	-1310	24	1000
4	Left Angle	6080	-5000	-1960	50	1000
5	Steering Column - Top					
6	Steering Column - Bottom					
7	Right Overall	2210	6480	-1310	20	1000
8	Passenger Close-Up	1600	6460	-1870	35	1000
9	Right Front Half	1220	5130	-1320	24	1000
10	Right Angle	6090	4920	-1910	50	1000
11	Windshield	-210	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	1120	0	3150	24	1000
15	Pit Rear	2960	0	3150	24	1000
16	Onboard Driver Side				12	1000
17	Onboard Passenger Side				12	1000
18	Real-Time Pan View					30

*COORDINATES:

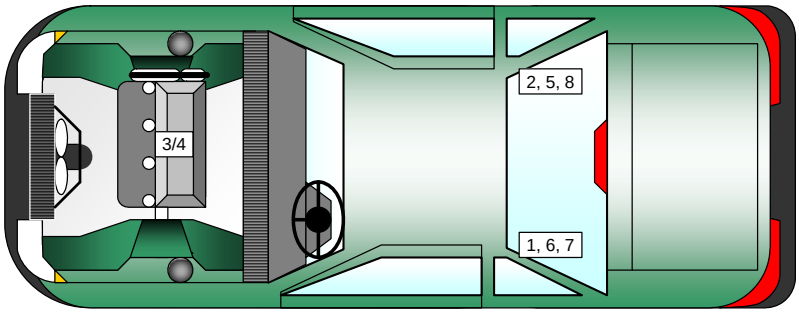
+X = forward of impact plane
+Y = right of monorail centerline
+Z = below ground level

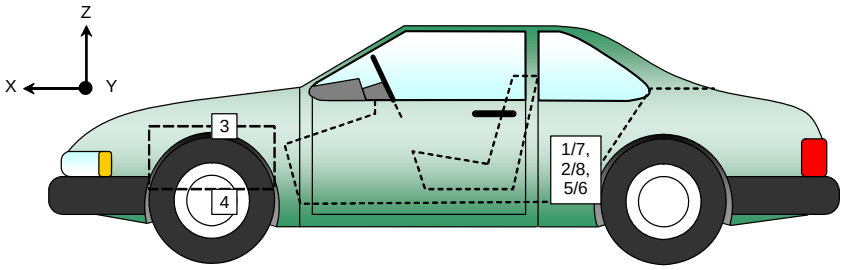
Cameras 5 & 6 were not used for this test.

DATA SHEET NO. 7
VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2015 Nissan Rogue S AWD SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20155200
Test Date: 10/15/2014





VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear Crossmember Accelerometer – X Direction	1915	-412	-304
2	Right Rear Crossmember Accelerometer – X Direction	1915	408	-304
3	Engine Top X	3863	22	-867
4	Engine Bottom X	3890	205	-230
5	Left Rear Crossmember Accelerometer – Z Direction	1915	-412	-304
6	Right Rear Crossmember Accelerometer – Z Direction	1915	408	-304
7	Left Rear Crossmember Accelerometer Redundant – X Direction	1915	-412	-304
8	Right Rear Crossmember Accelerometer Redundant – X Direction	1915	408	-304

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

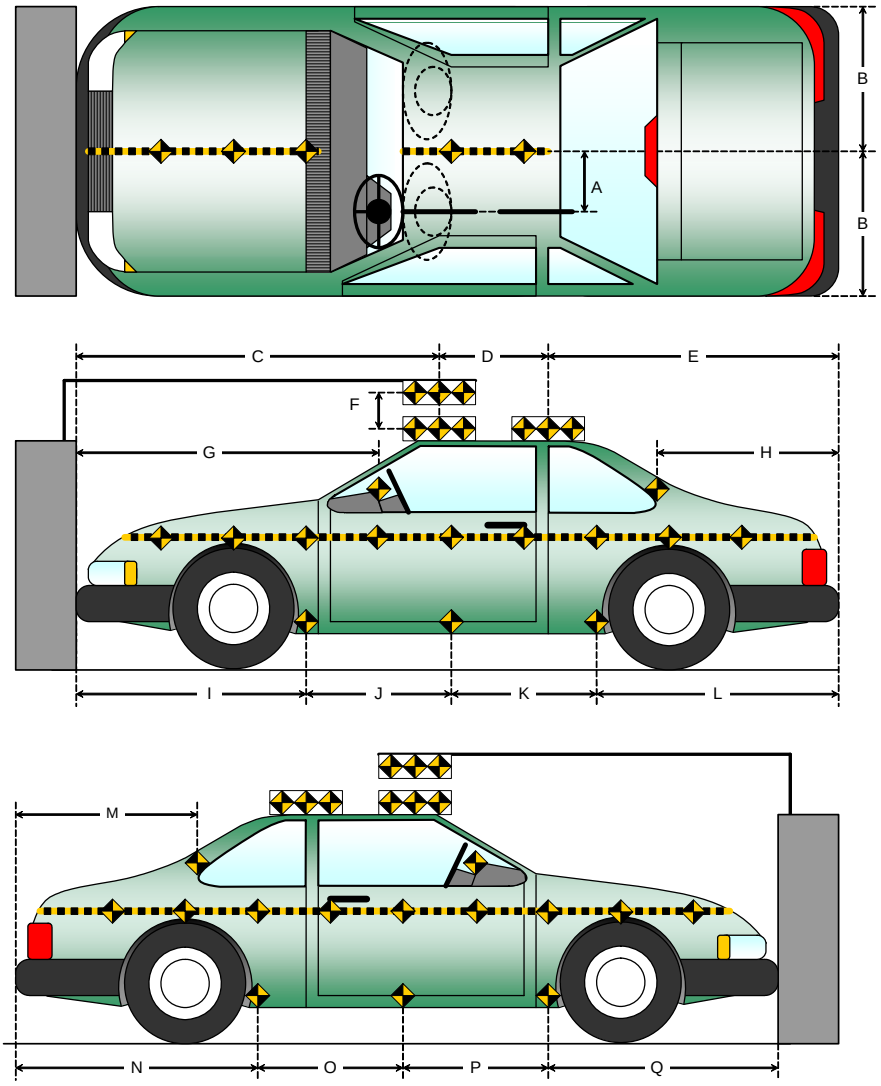
DATA SHEET NO. 8

PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2015 Nissan Rogue S AWD SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: O20155200
Test Date: 10/15/2014

Item	Value (mm)
A	357
B	910
C	2282
D	611
E	1750
F	24
G	
H	1210
I	1454
J	863
K	863
L	1463
M	1210
N	1463
O	863
P	863
Q	1454



DATA SHEET NO. 9
LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle: 2015 Nissan Rogue S AWD SUV NHTSA No.: O20155200
Test Program: NCAP Frontal Barrier Impact Test Test Date: 10/15/2014

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: 2015 Nissan Rogue S AWD SUV NHTSA No.: O20155200
Test Program: NCAP Frontal Barrier Impact Test Test Date: 10/15/2014

INSTRUMENTATION

Driver Dummy Data Channels	46
Passenger Dummy Data Channels	46
Vehicle Structure Accelerometers	8
Barrier Channels	528
Total	628

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: 2015 Nissan Rogue S AWD SUV
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: O20155200
Test Date: 10/15/2014

TEST DUMMY INFORMATION AND CONTACT LOCATIONS

Description	Driver	Passenger
Dummy Type / Serial No.	HIII 50% / 351	HIII 5% / 634
Head Contact	Airbag, Headrest, Curtain Airbag	Airbag, Headrest
Upper Torso Contact	Airbag	Airbag
Lower Torso Contact	None	None
Left Knee Contact	Knee Bolster	Glovebox
Right Knee Contact	Knee Bolster	Glovebox

DOOR OPENING AND SEAT TRACK INFORMATION

Description	Driver	Passenger
Locked/Unlocked Doors	Doors were locked	Doors were locked
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	Hood Unlatched

VEHICLE REBOUND FROM BARRIER

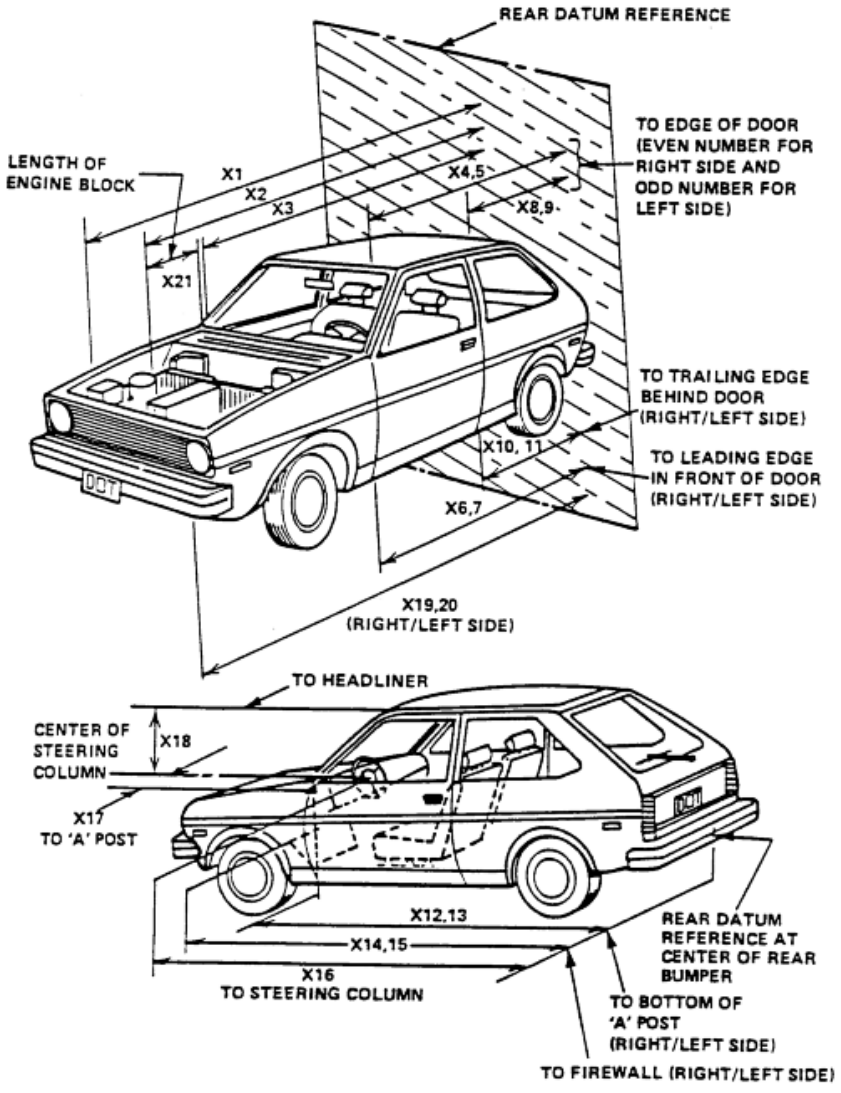
Measured Parameter	Units	Value
Left Side	mm	1575
Center	mm	1330
Right Side	mm	1560
Average	mm	1488

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	No		No	
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load Limiter	Yes		Yes	

DATA SHEET NO. 12
VEHICLE PROFILE MEASUREMENTS

Test Vehicle:	2015 Nissan Rogue S AWD SUV	NHTSA No.:	O20155200
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	10/15/2014



DATA SHEET NO. 12 (CONTINUED)
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2015 Nissan Rogue S AWD SUV NHTSA No.: O20155200
Test Program: NCAP Frontal Barrier Impact Test Test Date: 10/15/2014

RSOV (Rear Surface of Vehicle)

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	mm	4643	4189	454
2	RSOV to Front of Engine	mm	3982	3788	194
3	RSOV to Firewall	mm	3520	3473	47
4	RSOV to Upper Leading Edge of Right Door	mm	3190	3186	4
5	RSOV to Upper Leading Edge of Left Door	mm	3190	3190	0
6	RSOV to Lower Leading Edge of Right Door	mm	3160	3157	3
7	RSOV to Lower Leading Edge of Left Door	mm	3160	3160	0
8	RSOV to Upper Trailing Edge of Right Door	mm	2070	2069	1
9	RSOV to Upper Trailing Edge of Left Door	mm	2070	2070	0
10	RSOV to Lower Trailing Edge of Right Door	mm	2080	2076	4
11	RSOV to Lower Trailing Edge of Left Door	mm	2080	2079	1
12	RSOV to Bottom of “A” Post of Right Side	mm	3210	3206	4
13	RSOV to Bottom of “A” Post of Left Side	mm	3210	3208	2
14	RSOV to Firewall, Right Side	mm	3475	3404	71
15	RSOV to Firewall, Left Side	mm	3475	3450	25
16	RSOV to Steering Column	mm	2745	2776	-31
17	Center of Steering Column to “A” Post	mm	420	395	25
18	Center of Steering Column to Headliner	mm	450	439	11
19	RSOV to Right Side of Front Bumper	mm	4502	4208	294
20	RSOV to Left Side of Front Bumper	mm	4502	4142	360
21	Length of Engine Block	mm	170	170	0
RD	RSOV to Right Side of Dash Panel	mm	2942	2936	6
CD	RSOV to Center of Dash Panel	mm	2975	2956	19
LD	RSOV to Left Side of Dash Panel	mm	2955	2943	12

DATA SHEET NO. 13
ACCIDENT INVESTIGATION DIVISION DATA

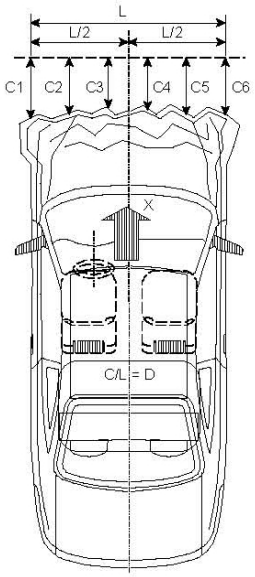
Test Vehicle: 2015 Nissan Rogue S AWD SUV NHTSA No.: O20155200
Test Program: NCAP Frontal Barrier Impact Test Test Date: 10/15/2014

VEHICLE INFORMATION

VIN: 5N1AT2MV8FC751525 Wheelbase (mm): 2708
Vehicle Size Category: MPV Test Weight (kg): 1811.5

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): 56.2
Velocity Change (km/h): 62.3
Time of Separation (msec): 103.1



CRUSH PROFILE

Collision Deformation Classification: Frontal
Midpoint of Damage: Centerline
Damage Region Length (mm): 1184
Impact Mode: Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	4502	4142	360
C2	Crush zone 2 at left side	mm	4588	4150	438
C3	Crush zone 3 at left side	mm	4605	4158	447
C4	Crush zone 4 at right side	mm	4605	4163	442
C5	Crush zone 5 at right side	mm	4588	4164	424
C6	Crush zone 6 at right side	mm	4502	4208	294
L	C1 TO C6	mm	1184	1172	12

DATA SHEET NO. 14
VEHICLE INTRUSION MEASUREMENTS

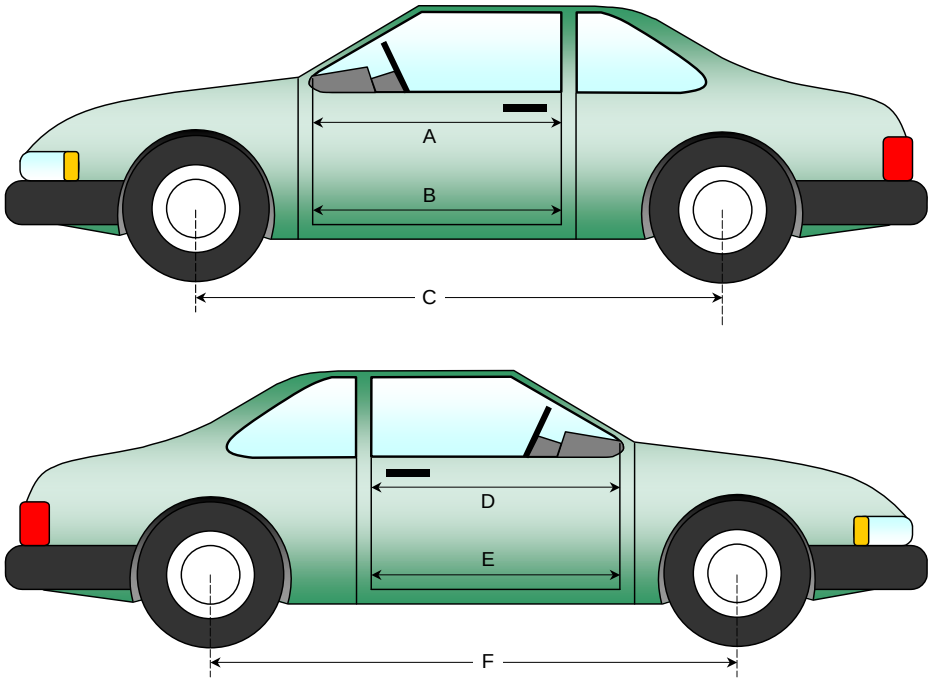
Test Vehicle: 2015 Nissan Rogue S AWD SUV
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: O20155200
Test Date: 10/15/2014

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	1018	1015	3
B	Left Side Lower	mm	936	934	2
D	Right Side Upper	mm	1018	1008	10
E	Right Side Lower	mm	936	932	4

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2708	2662	46
F	Right Side Wheelbase	mm	2708	2681	27



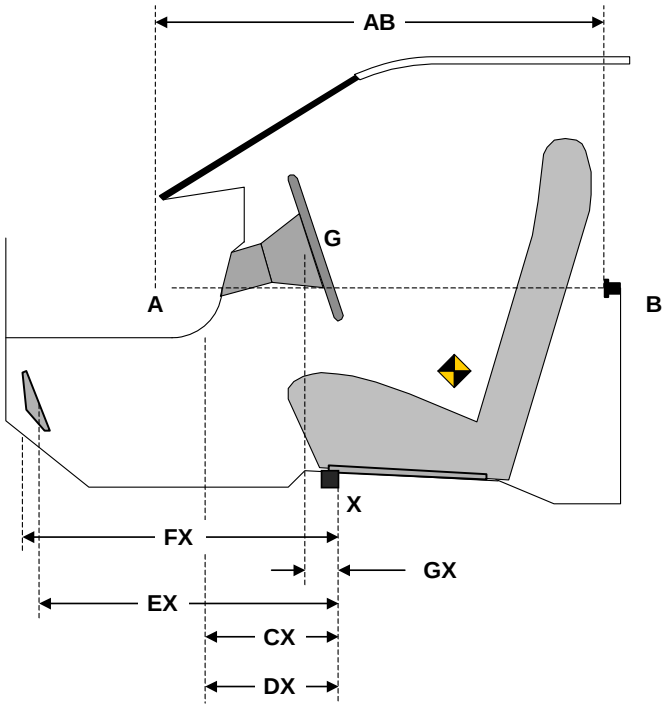
DATA SHEET NO. 14 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2015 Nissan Rogue S AWD SUV
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: O20155200
Test Date: 10/15/2014

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	812	812	0
CX	Left Knee Bolster to X	mm	296	290	6
DX	Right Knee Bolster to X	mm	305	302	3
EX	Brake Pedal to X	mm	588	572	16
FX	Foot Rest to X	mm	614	611	3
GX	Center of Steering Column Wheel Hub to X	mm	108	142	-34

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: 2015 Nissan Rogue S AWD SUV NHTSA No.: O20155200
Test Program: NCAP Frontal Barrier Impact Test Test Date: 10/15/2014

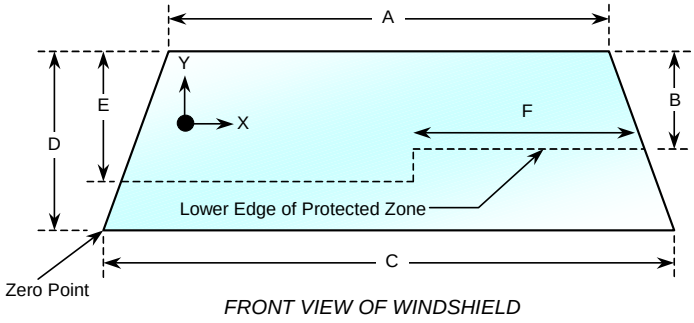
Windshield Mounting Details:
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

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: 21.6° C.

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% of Retention
Left Side	2225	2225	100
Right Side	2225	2225	100
Total	4450	4450	100



FRONT VIEW OF WINDSHIELD

Item	Units	Value
A	mm	1220
B	mm	556
C	mm	1422
D	mm	904
E	mm	570
F	mm	488

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: 2015 Nissan Rogue S AWD SUV NHTSA No.: O20155200
Test Program: NCAP Frontal Barrier Impact Test Test Date: 10/15/2014

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

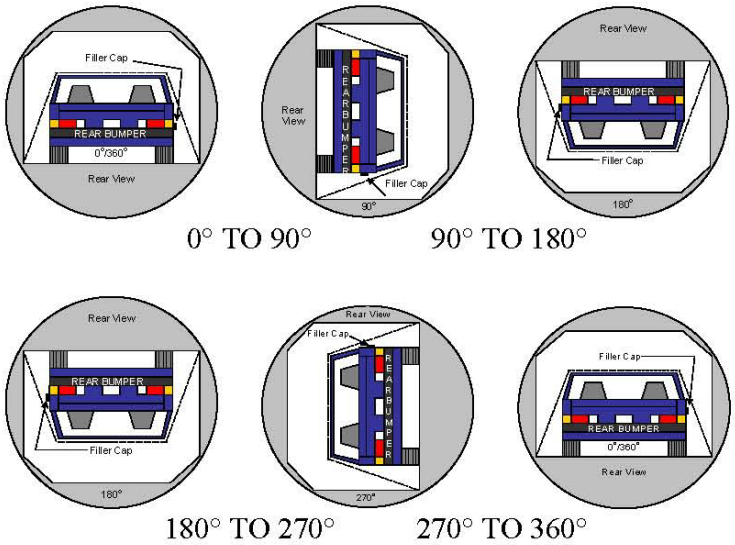
Temperature at Time of Impact: 21.6°C Test Time: 10:52 a.m.

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: 2015 Nissan Rogue S AWD SUV
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: O20155200
Test Date: 10/15/2014

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°	109	300	409
90° to 180°	111	300	411
180° to 270°	106	300	406
270° to 360°	113	300	413

FMVSS 301 SPILLAGE TABLE (units in ounces)

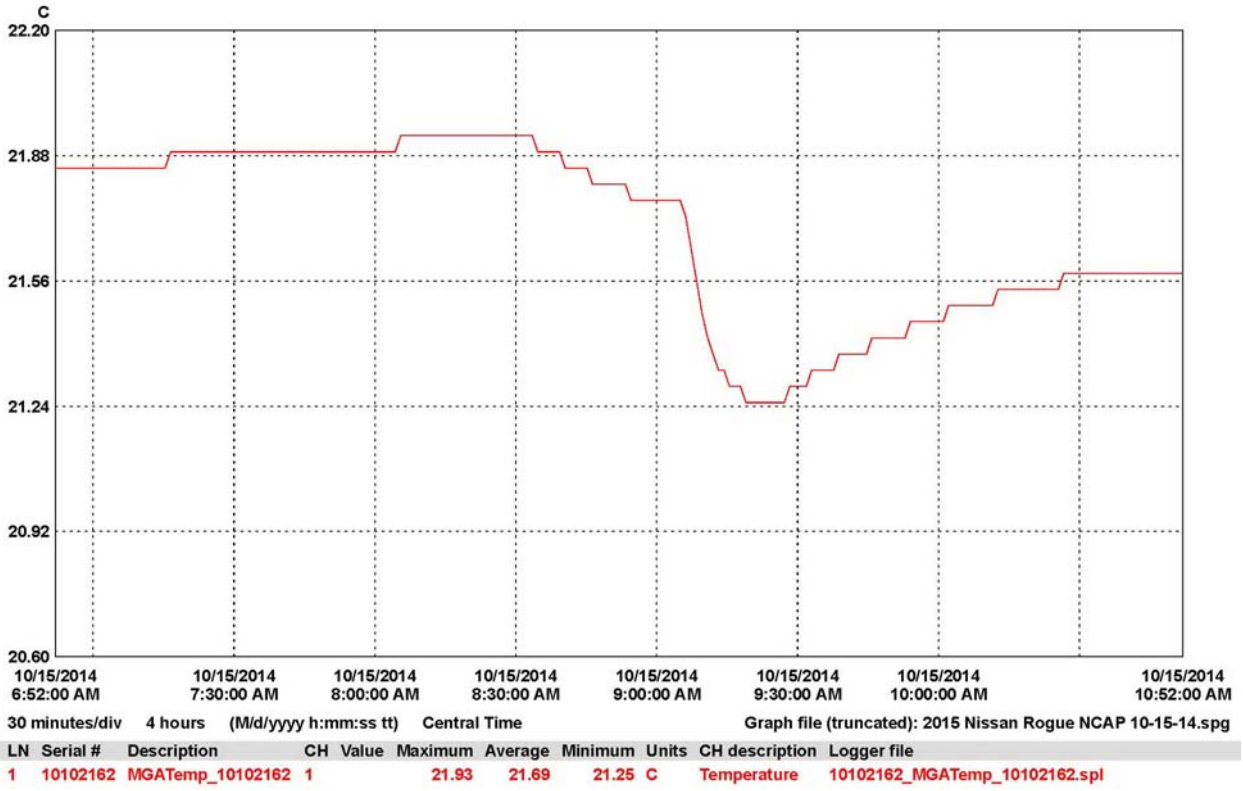
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eight Minute
0° to 90°	0	0	0	0
90° to 180°	0	0	0	0
180° to 270°	0	0	0	0
270° to 360°	0	0	0	0

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

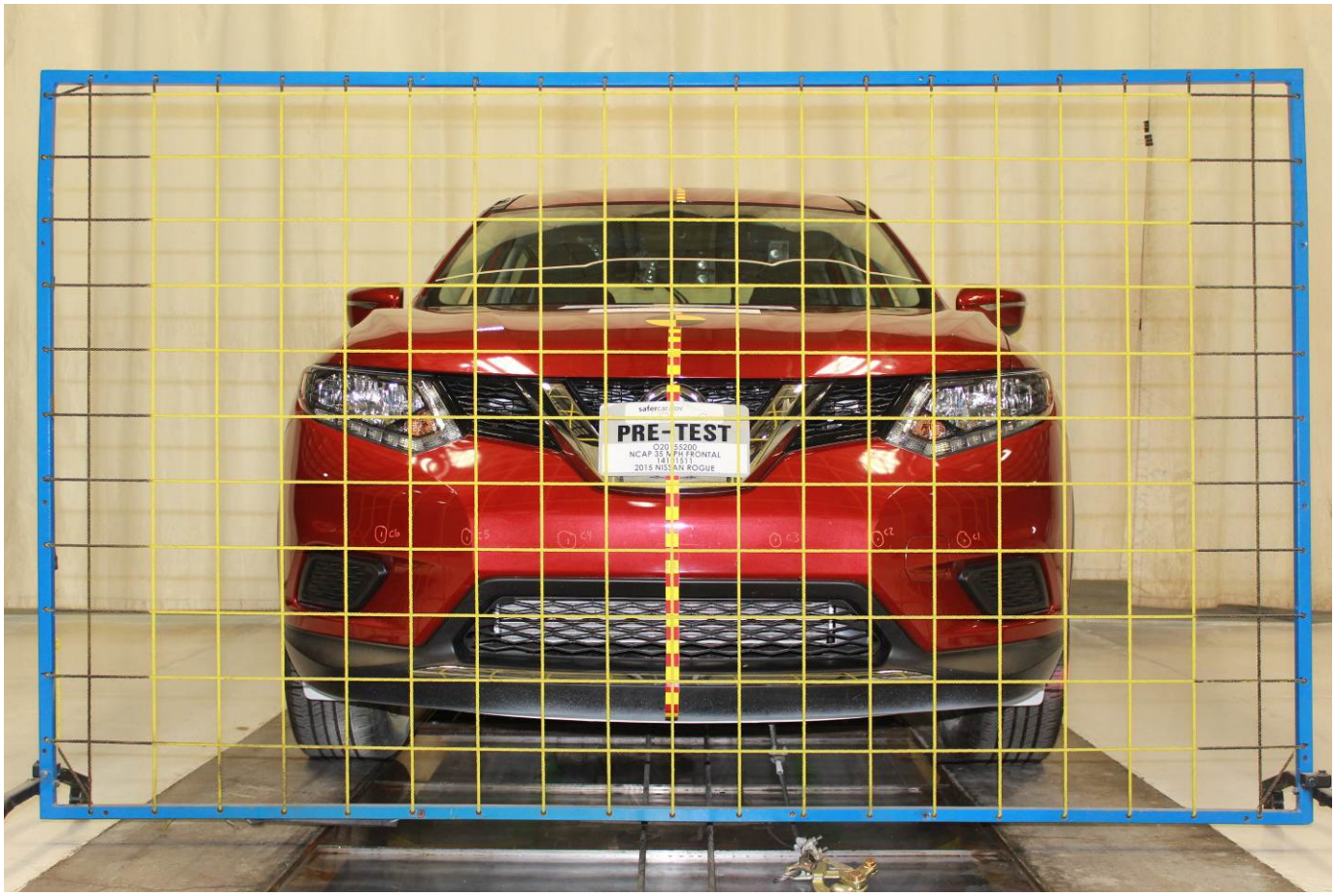
Test Vehicle: 2015 Nissan Rogue S AWD SUV NHTSA No.: O20155200
Test Program: NCAP Frontal Barrier Impact Test Test Date: 10/15/2014



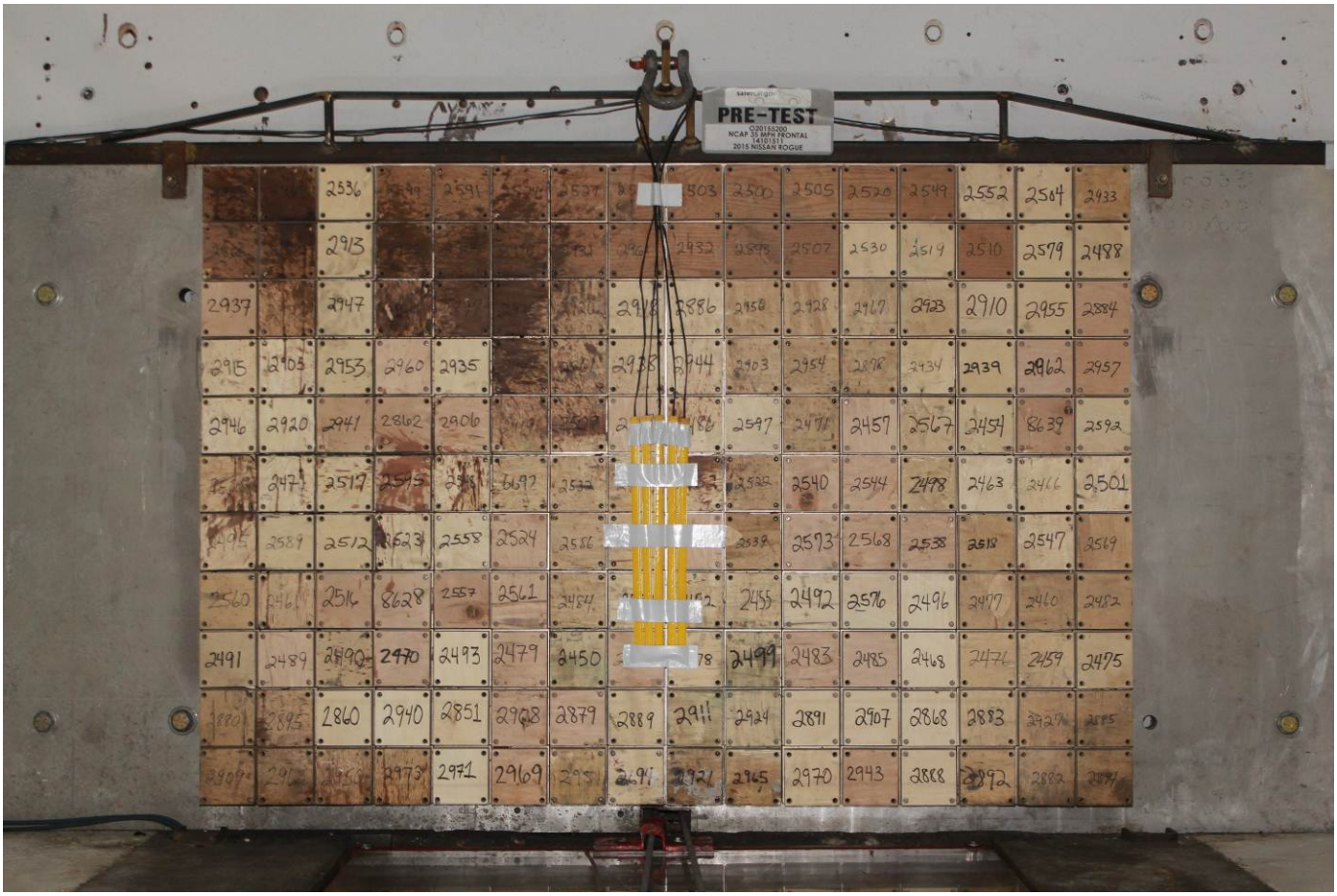
LN	Serial #	Description	CH	Value	Maximum	Average	Minimum	Units	CH description	Logger file
1	10102162	MGATemp_10102162	1		21.93	21.69	21.25	C	Temperature	10102162_MGATemp_10102162.spl

APPENDIX A
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS



Load Cell Location



Load Cell Wall

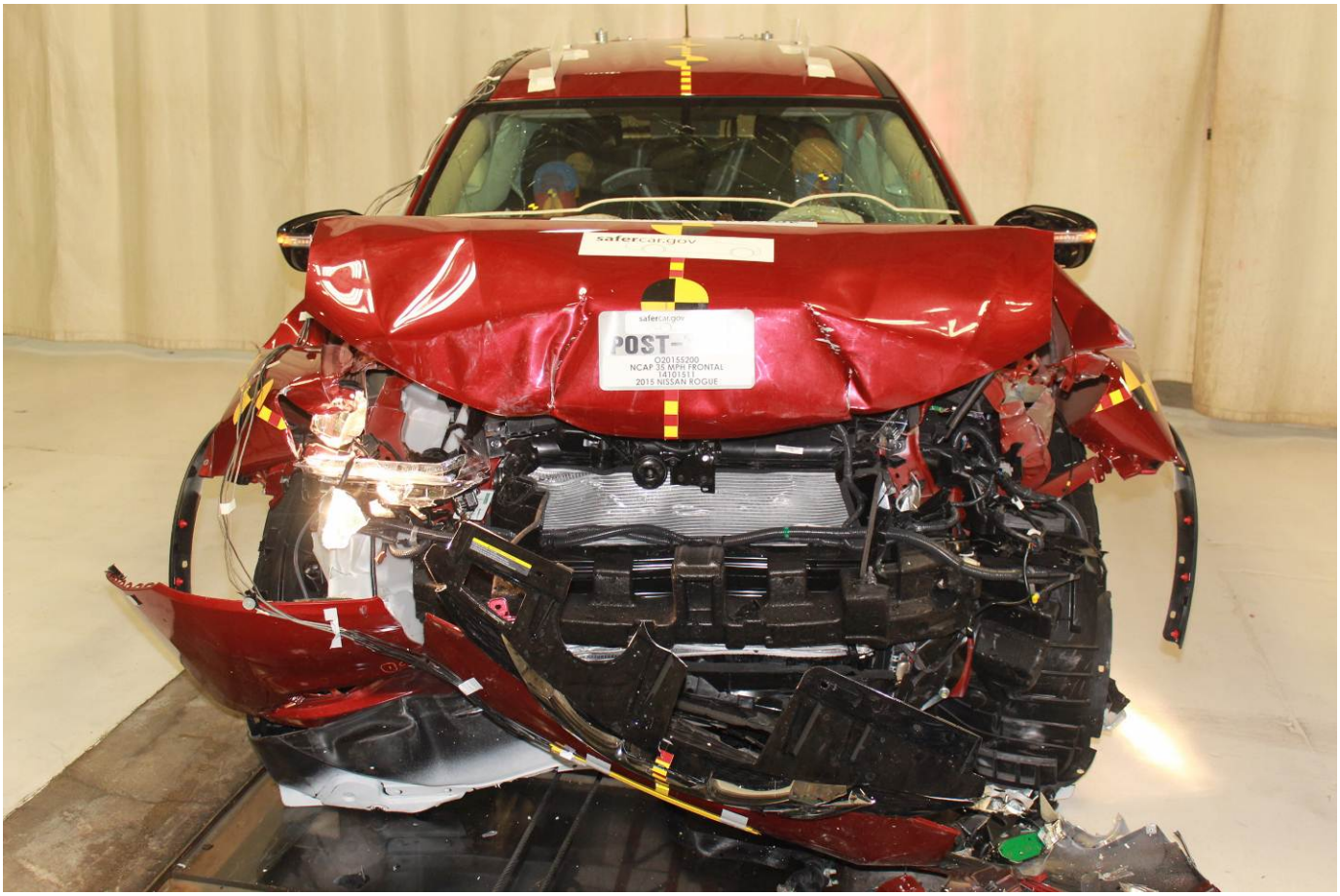
Manufacturer's Label

Tire Placard

2015 Nissan Rogue Frontal As Delivered

Left Rear 3-4 View, As Received

Pre-Test Front View of Test Vehicle



Post-Test Front View of Test Vehicle

Pre-Test Left View of Test Vehicle

Post-Test Left View of Test Vehicle

Pre-Test Right View of Test Vehicle

Post-Test Right View of Test Vehicle

Pre-Test Right Front 3-4 View

Post-Test Right Front 3-4 View

Pre-Test Left Rear 3-4 View

Post-Test Left Rear 3-4 View

Pre-Test Windshield View

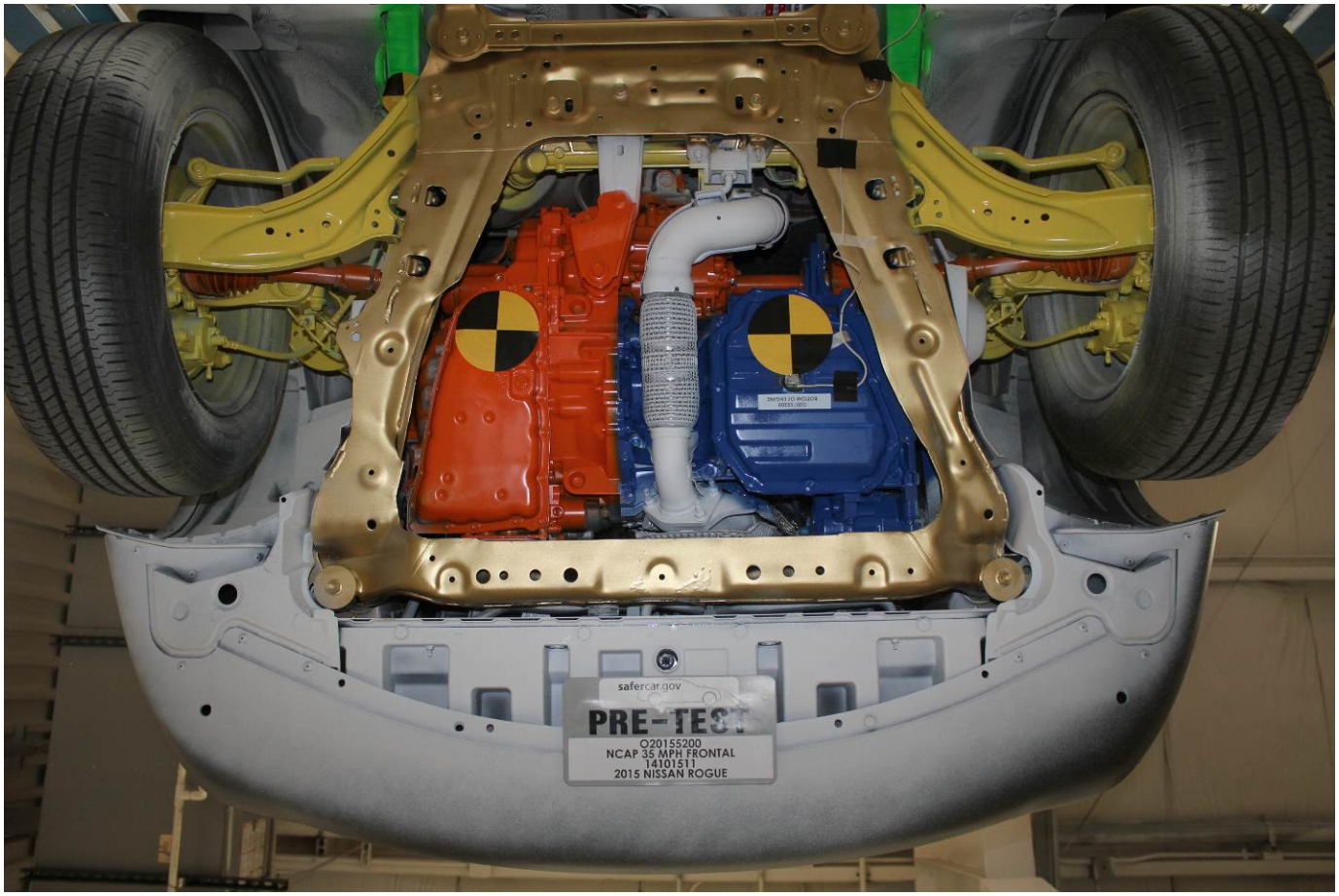
Post-Test Windshield View

Pre-Test Engine Compartment View

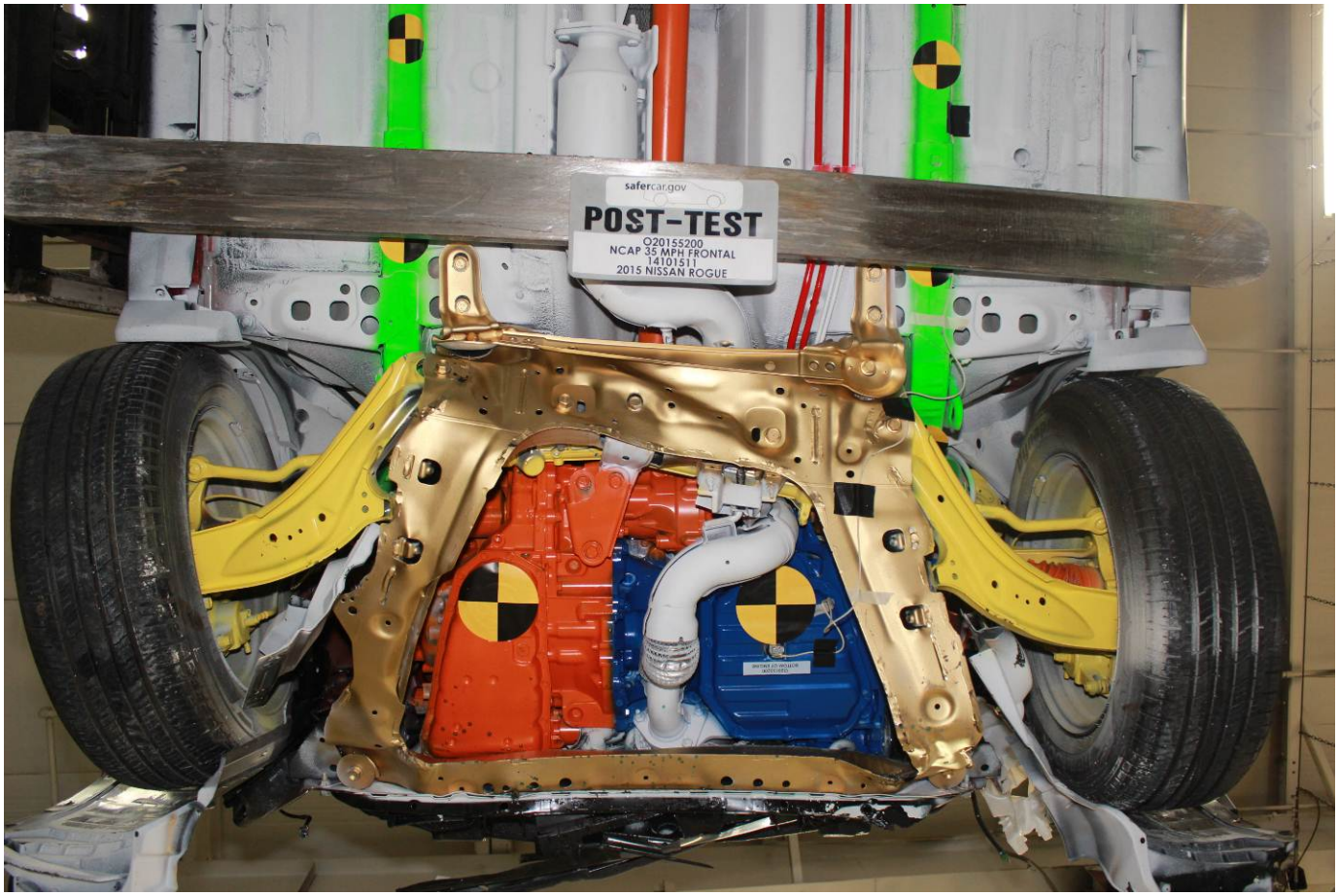
Post-Test Engine Compartment View

Pre-Test Fuel Filler Cap View

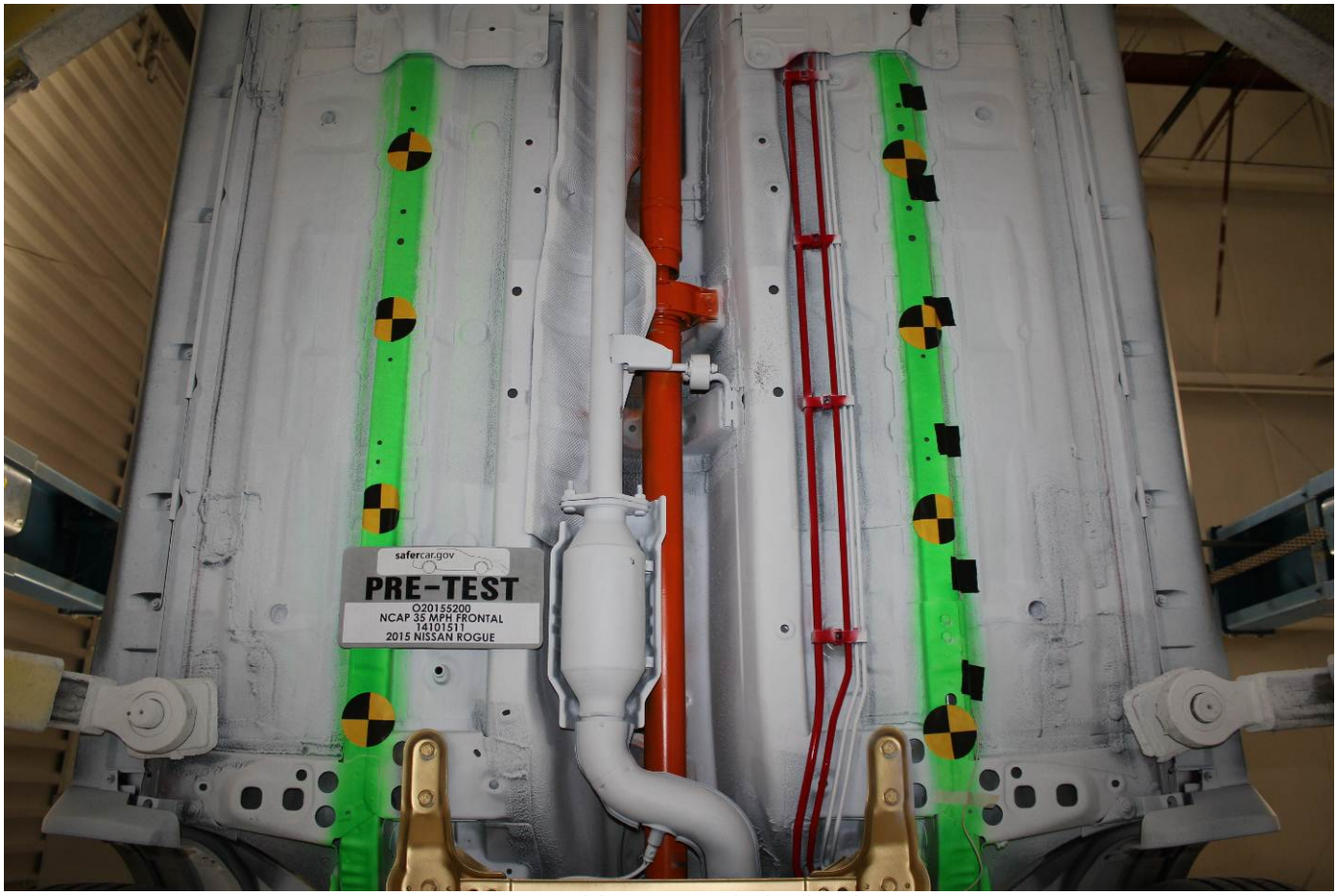
Post-Test Fuel Filler Cap View



Pre-Test Front Underbody View

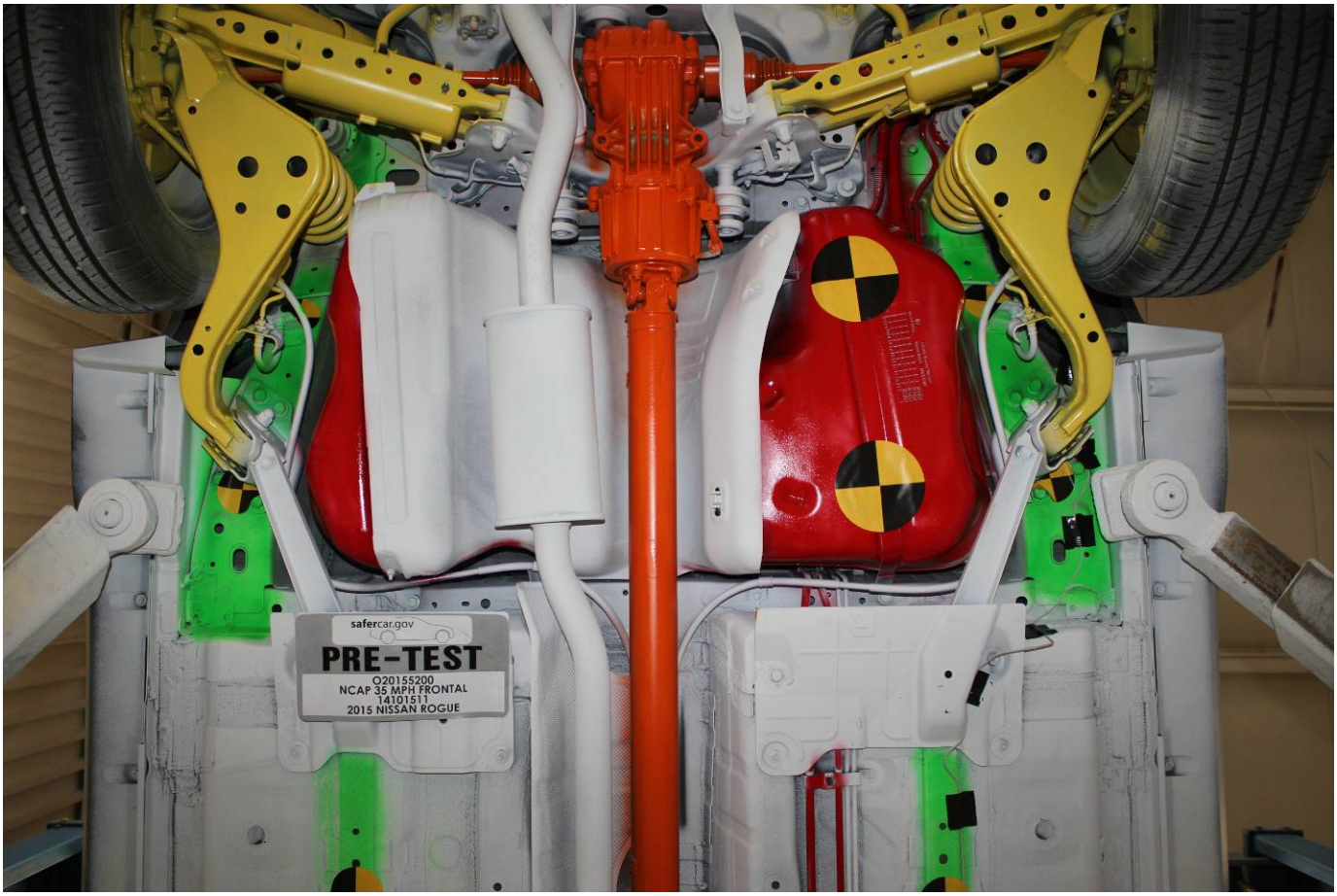


Post-Test Front Underbody View



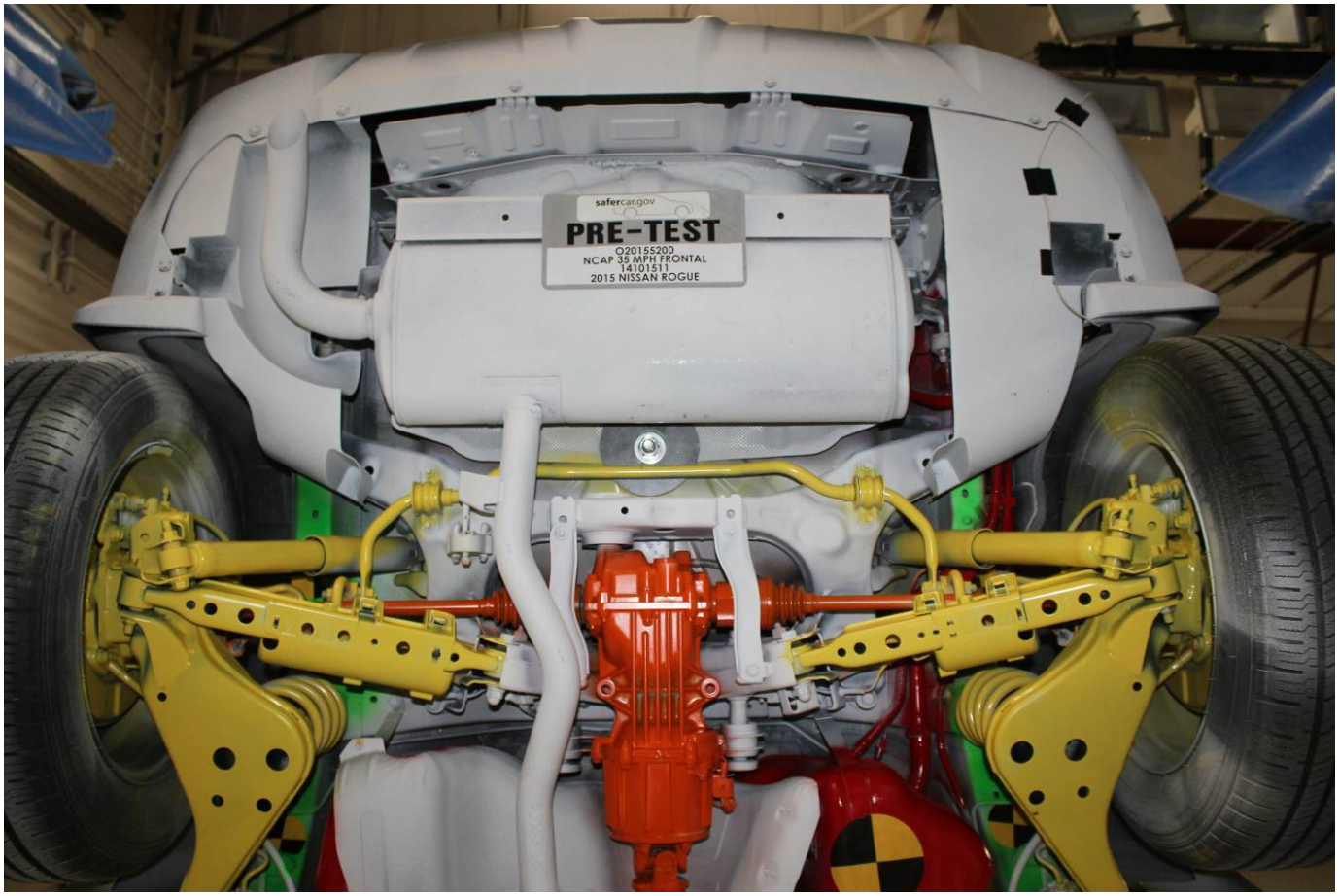
Pre-Test Mid Front Underbody View

Post-Test Mid Front Underbody View

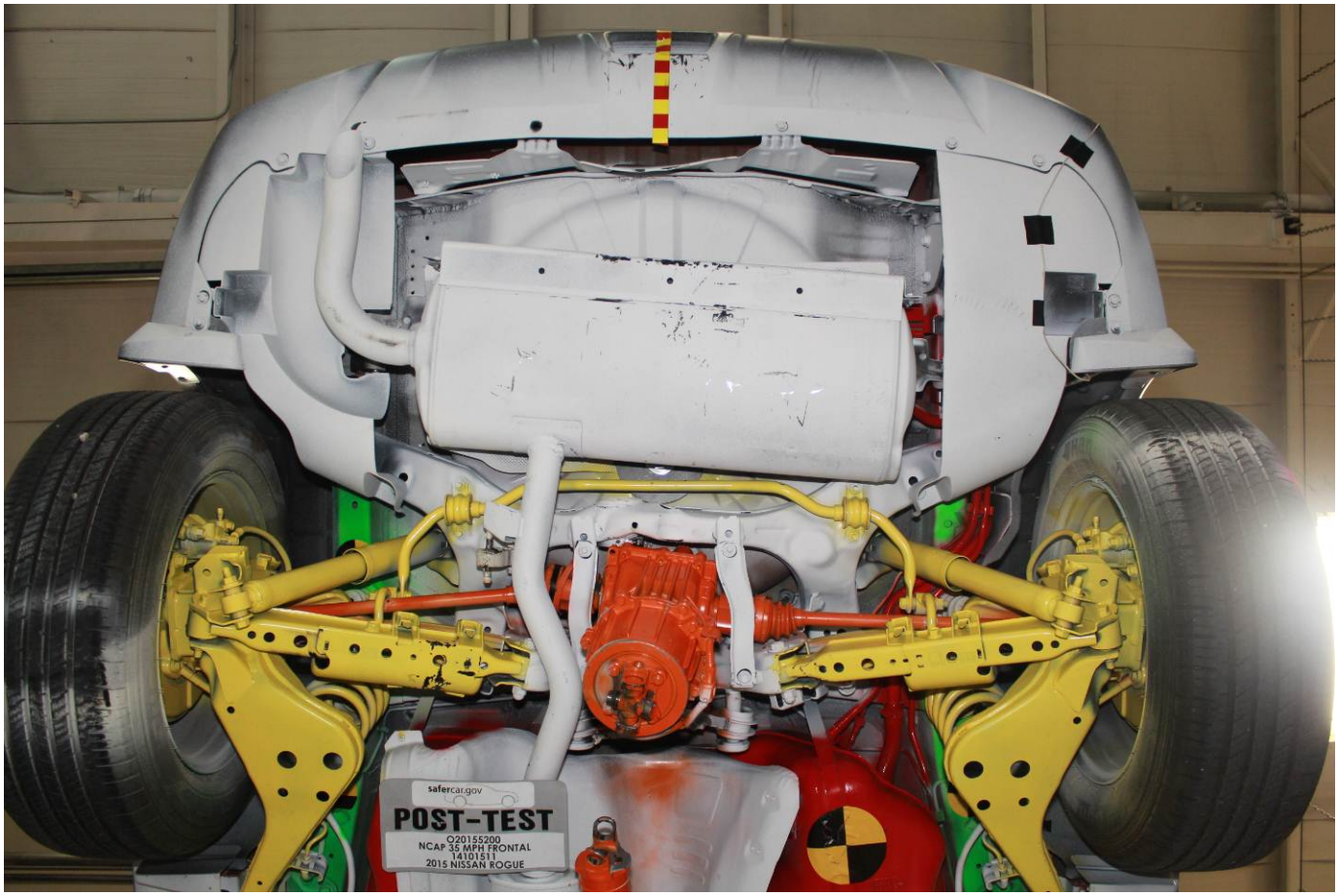


Pre-Test Mid Rear Underbody View

Post-Test Mid Rear Underbody View



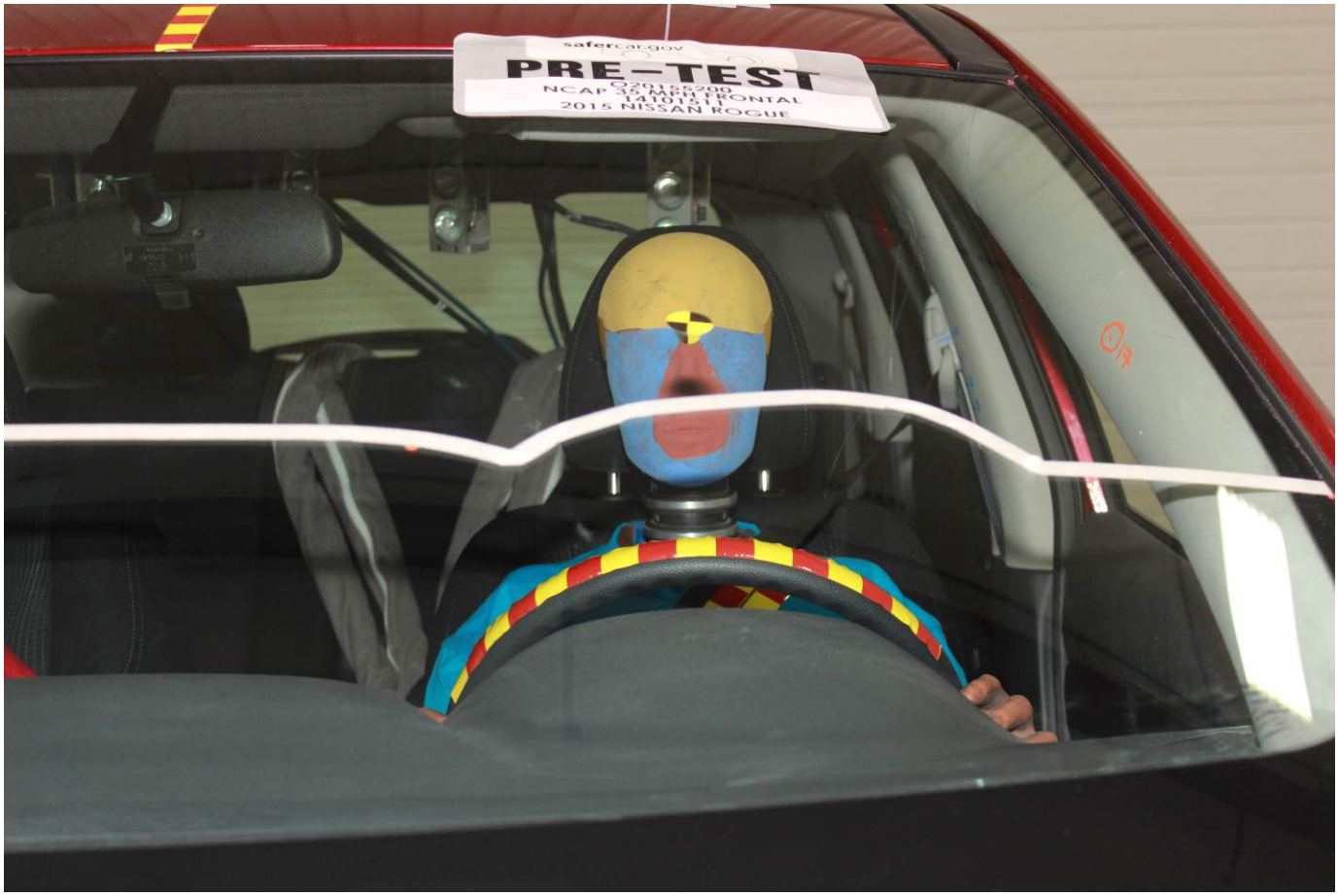
Pre-Test Rear Underbody View



Post-Test Rear Underbody View

Pre-Test Dummy Cable Routing

Post-Test Dummy Cable Routing



Pre-Test Driver Dummy Front View

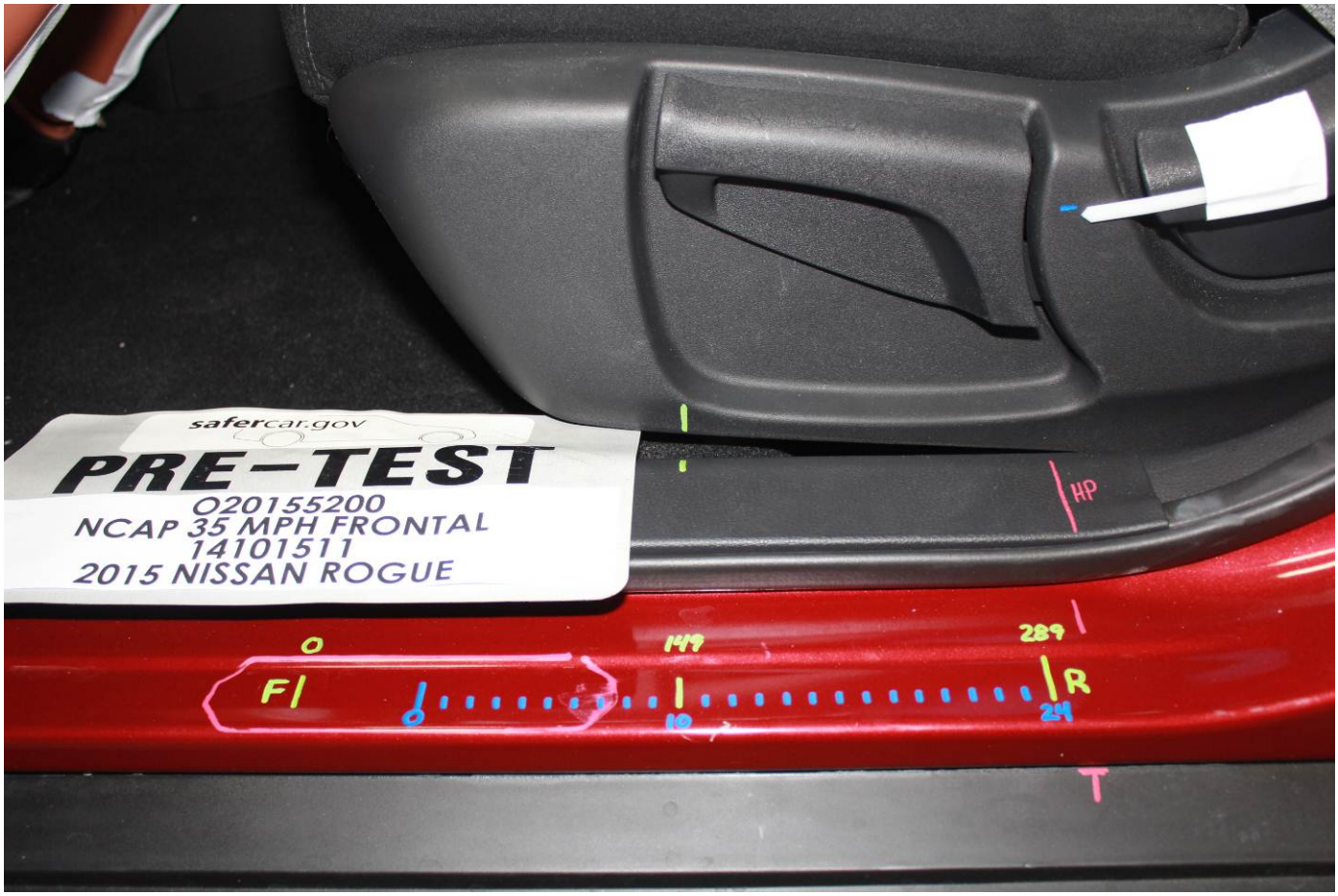
Post-Test Driver Dummy Front View

Pre-Test Driver Dummy Window View

Post-Test Driver Dummy Window View

Pre-Test Driver Dummy and Vehicle Interior (Door Open)

Post-Test Driver Dummy and Vehicle Interior (Door Open)



Pre-Test Driver's Seat Fore-Aft Markings

Post-Test Driver's Seat Fore-Aft Markings

Pre-Test View of Belt Anchorage for Driver Dummy

Post-Test View of Belt Anchorage for Driver Dummy

Pre-Test Driver Dummy Feet

Post-Test Driver Dummy Feet

Pre-Test Driver's Side Knee Bolster (without dummy)

Post-Test Driver's Side Knee Bolster (without dummy)

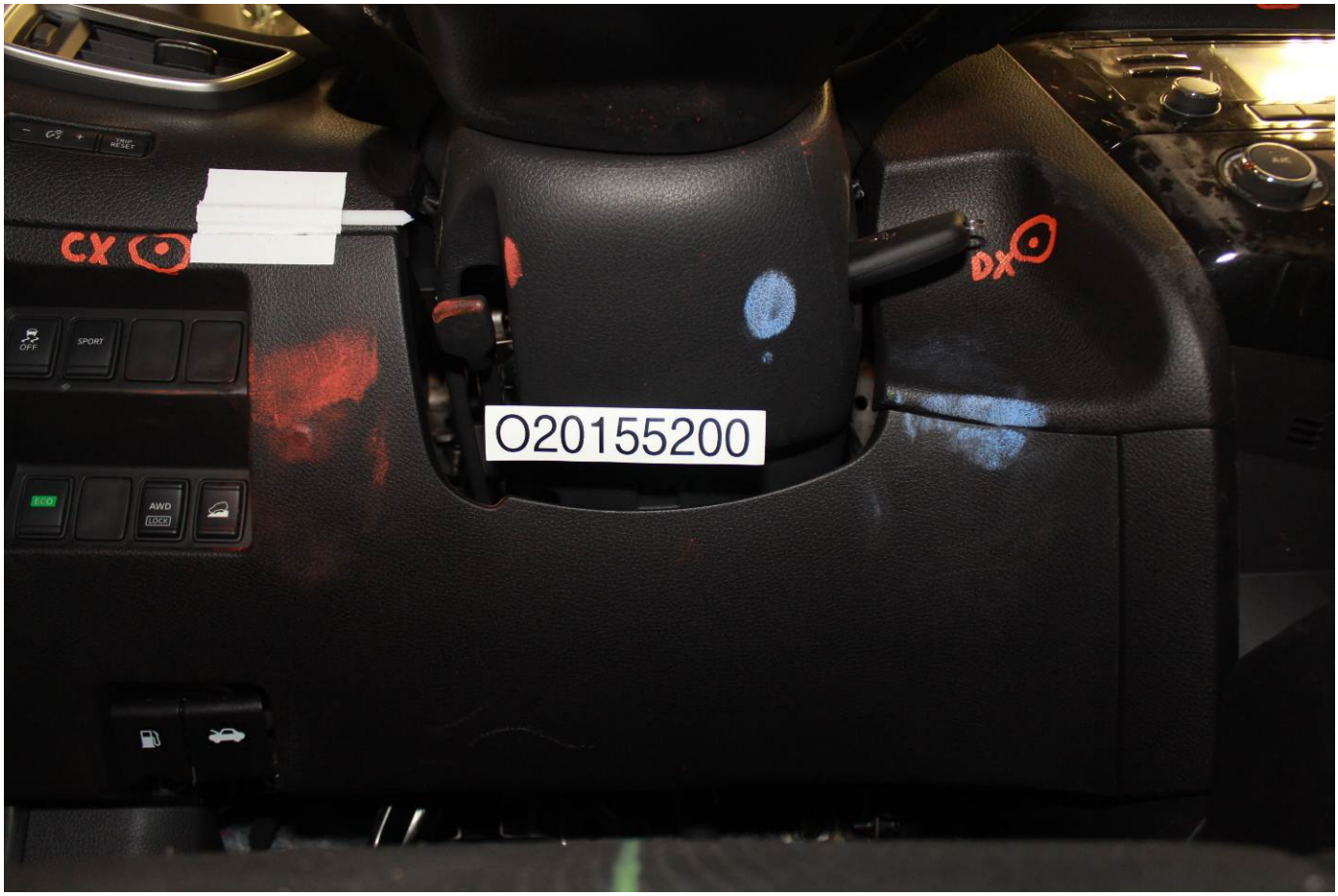
Pre-Test Driver's Side Floorpan

Post-Test Driver's Side Floorpan

Post-Test Driver Dummy Face

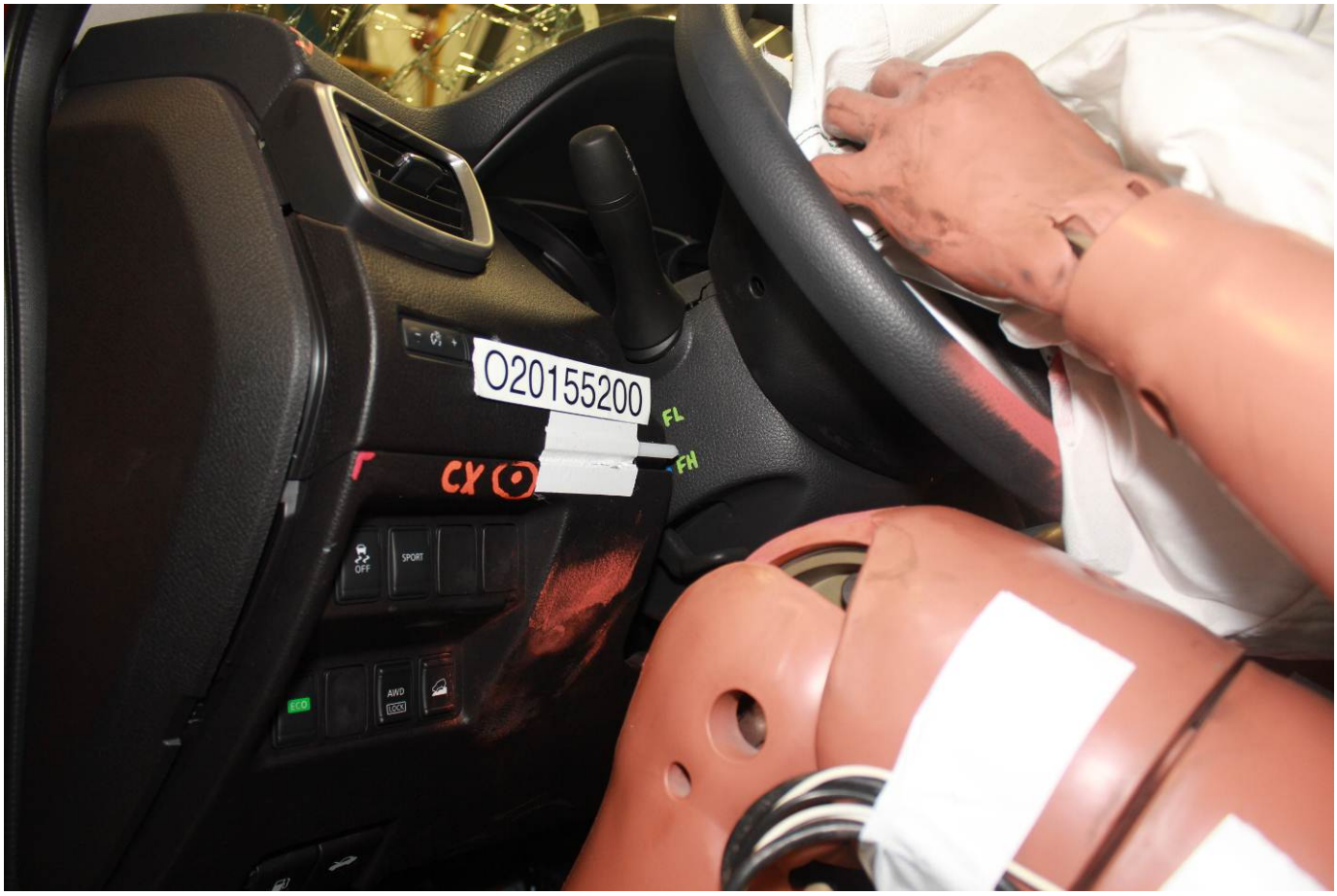
Post-Test Driver Dummy Contact with Airbag

Post-Test Driver Dummy Contact with Headrest and CAB



Post-Test Driver Dummy Contact with Knee Bolster

Pre-Test View of the Steering Wheel



Post-Test View of the Steering Wheel

Pre-Test Passenger Dummy Front View

Post-Test Passenger Dummy Front View

Pre-Test Passenger Dummy Window View

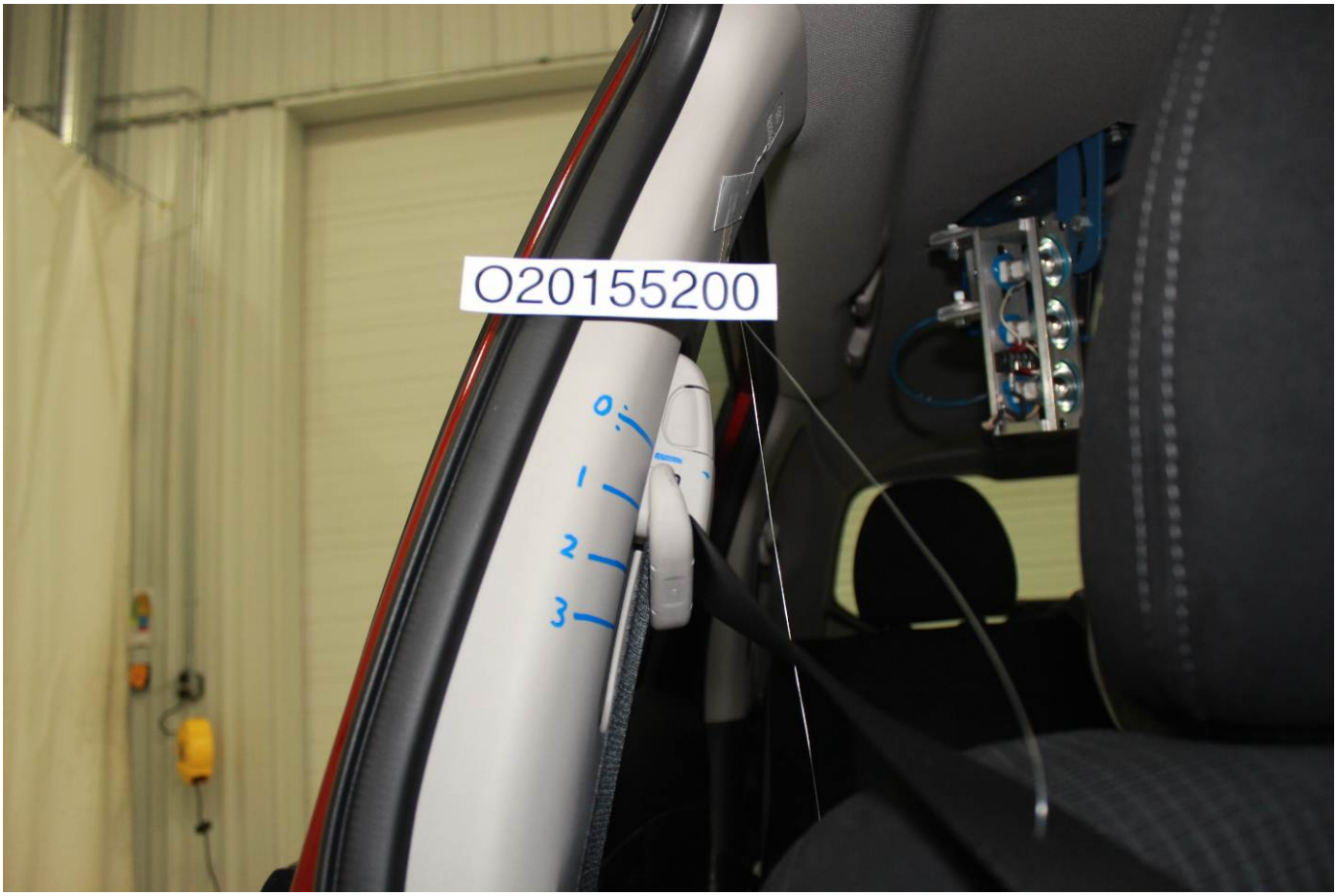
Post-Test Passenger Dummy Window View

Pre-Test Passenger Dummy and Vehicle Interior (Door Open)

Post-Test Passenger Dummy and Vehicle Interior (Door Open)

Pre-Test Passenger's Seat Fore-Aft Markings

Post-Test Passenger's Seat Fore-Aft Markings



Pre-Test View of Belt Anchorage for Passenger Dummy

Post-Test View of Belt Anchorage for Passenger Dummy

Pre-Test Passenger Dummy Feet

Post-Test Passenger Dummy Feet

Pre-Test Passenger's Side Knee Bolster (without dummy)

Post-Test Passenger's Side Knee Bolster (without dummy)

Pre-Test Passenger's Side Floorpan

Post-Test Passenger's Side Floorpan

Post-Test Passenger Dummy Face

Post-Test Passenger Dummy Contact with Airbag

Post-Test Passenger Dummy Contact with Headrest

Post-Test Passenger Dummy Contact with Glovebox

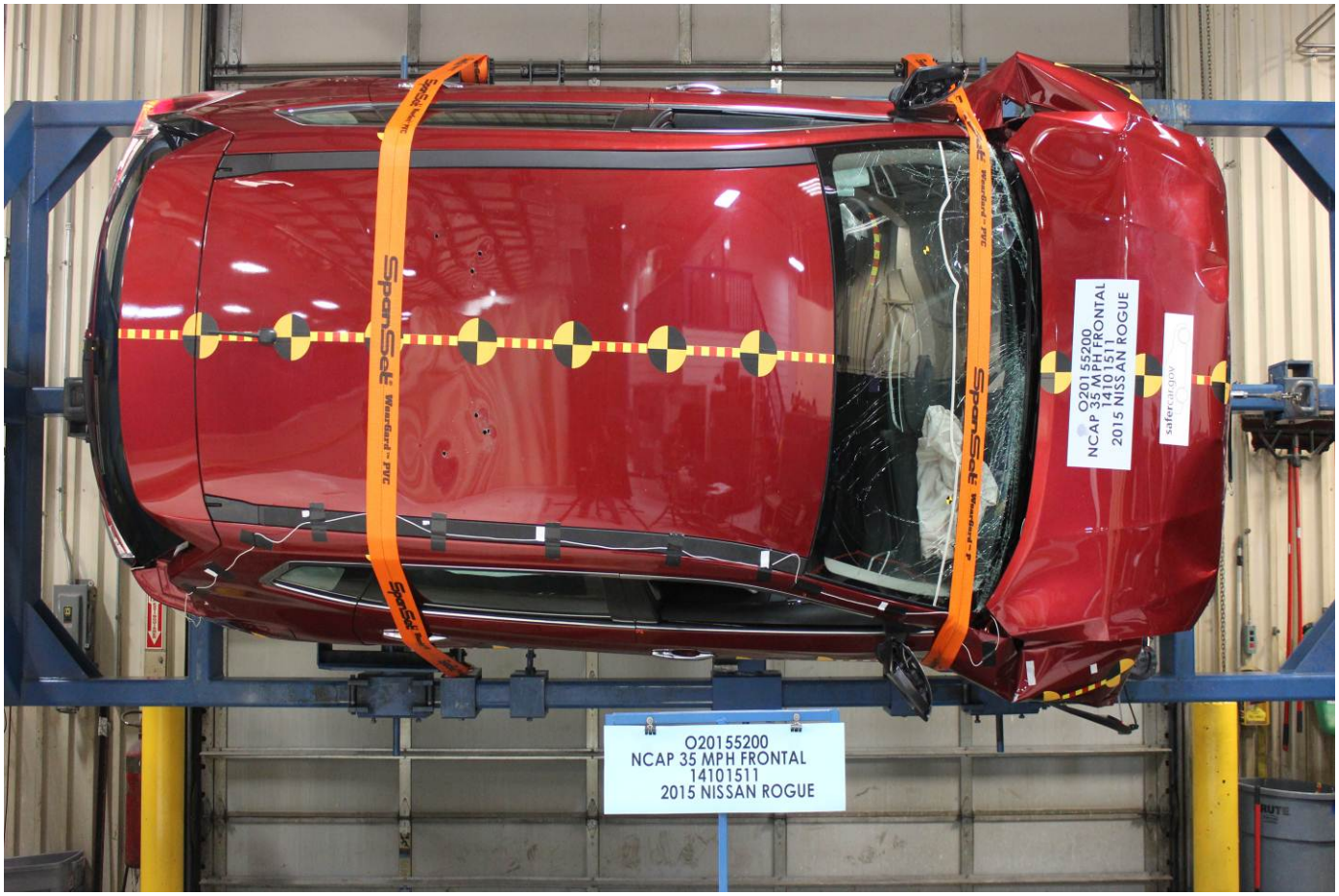
Ballast Installed in Vehicle

PHOTOGRAPH NOT APPLICABLE

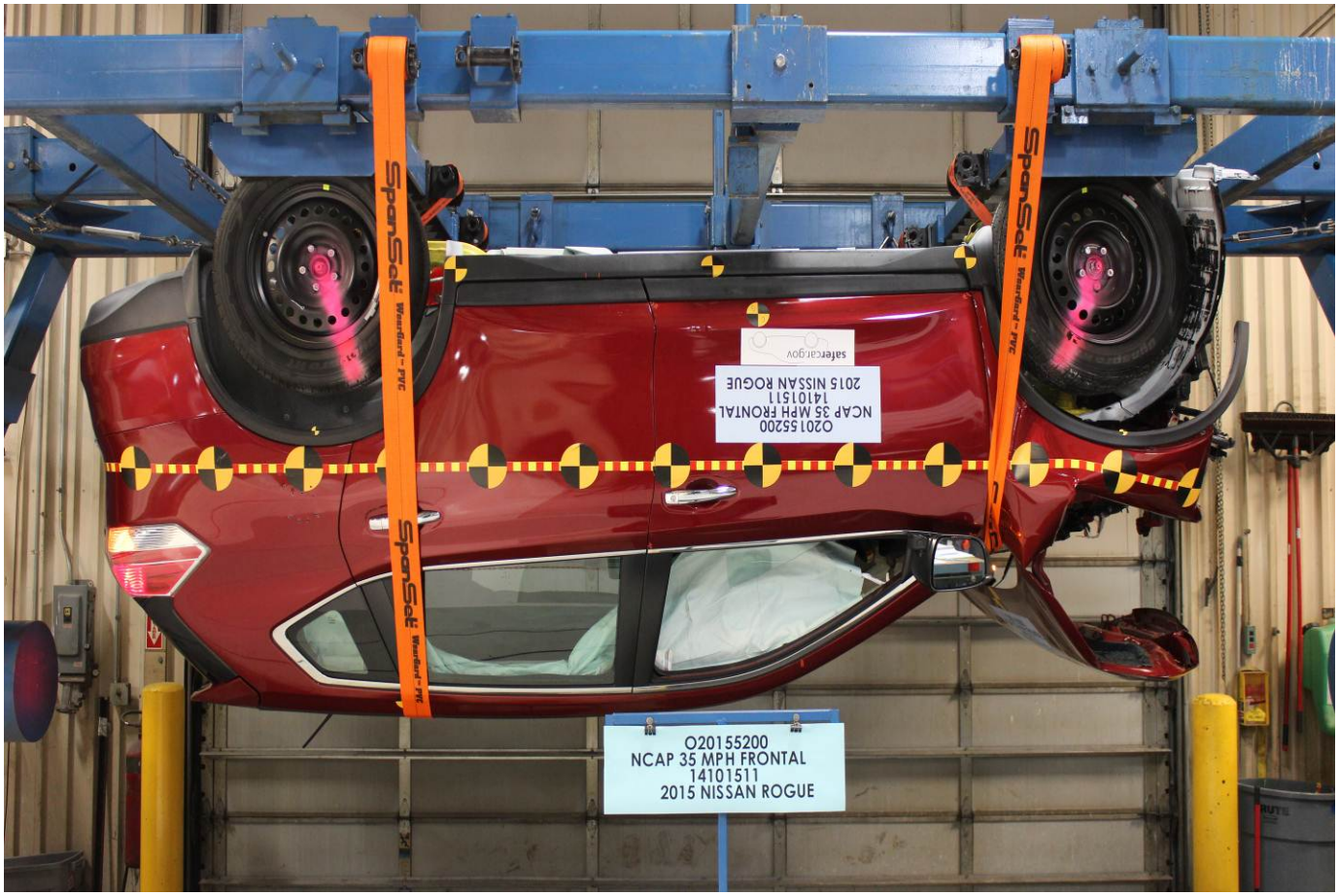
Post-Test Stoddard Solvent Spillage Location View

Post-Test Speed Trap Read-Out

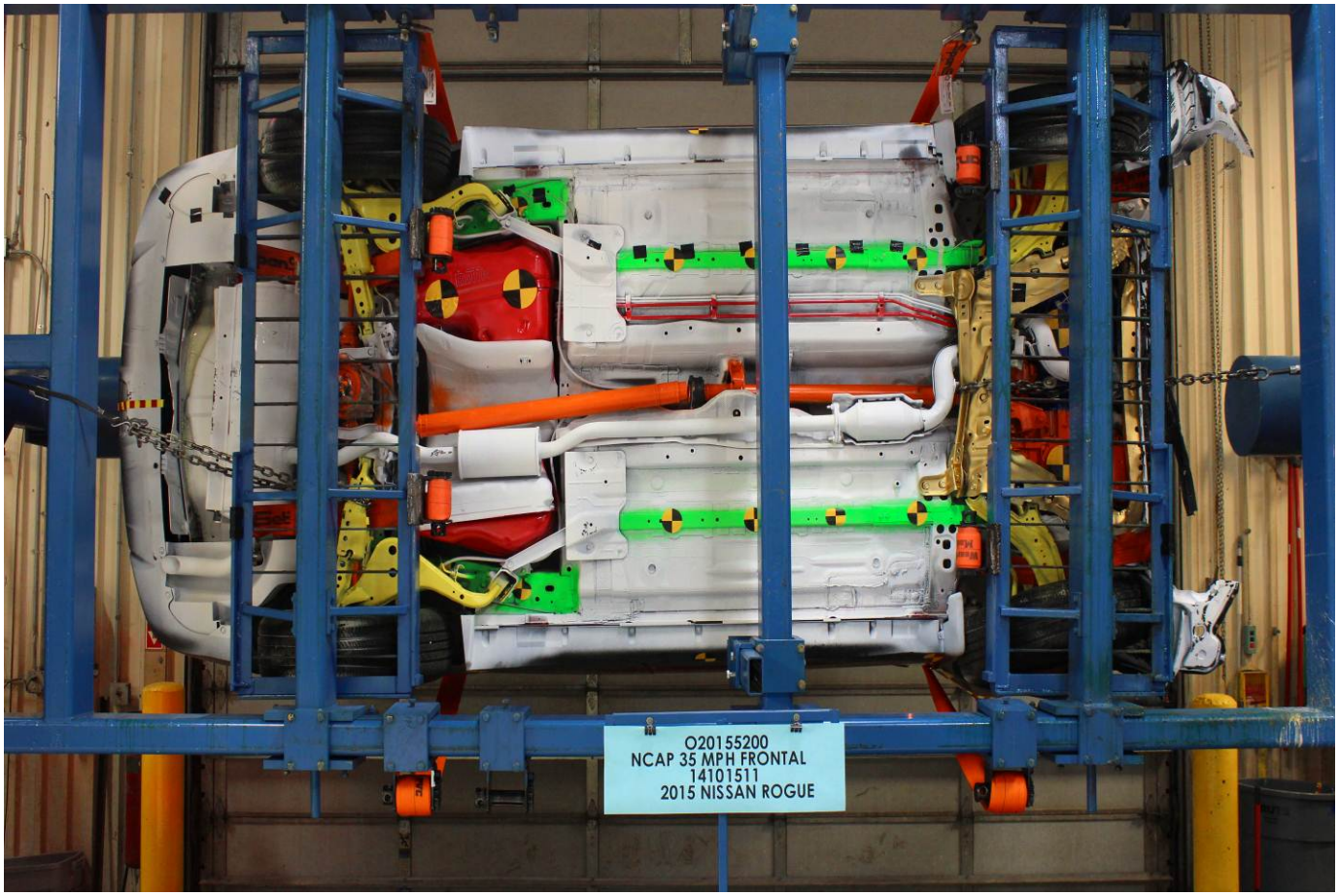
Vehicle at 0 Degree on Static Rollover Device



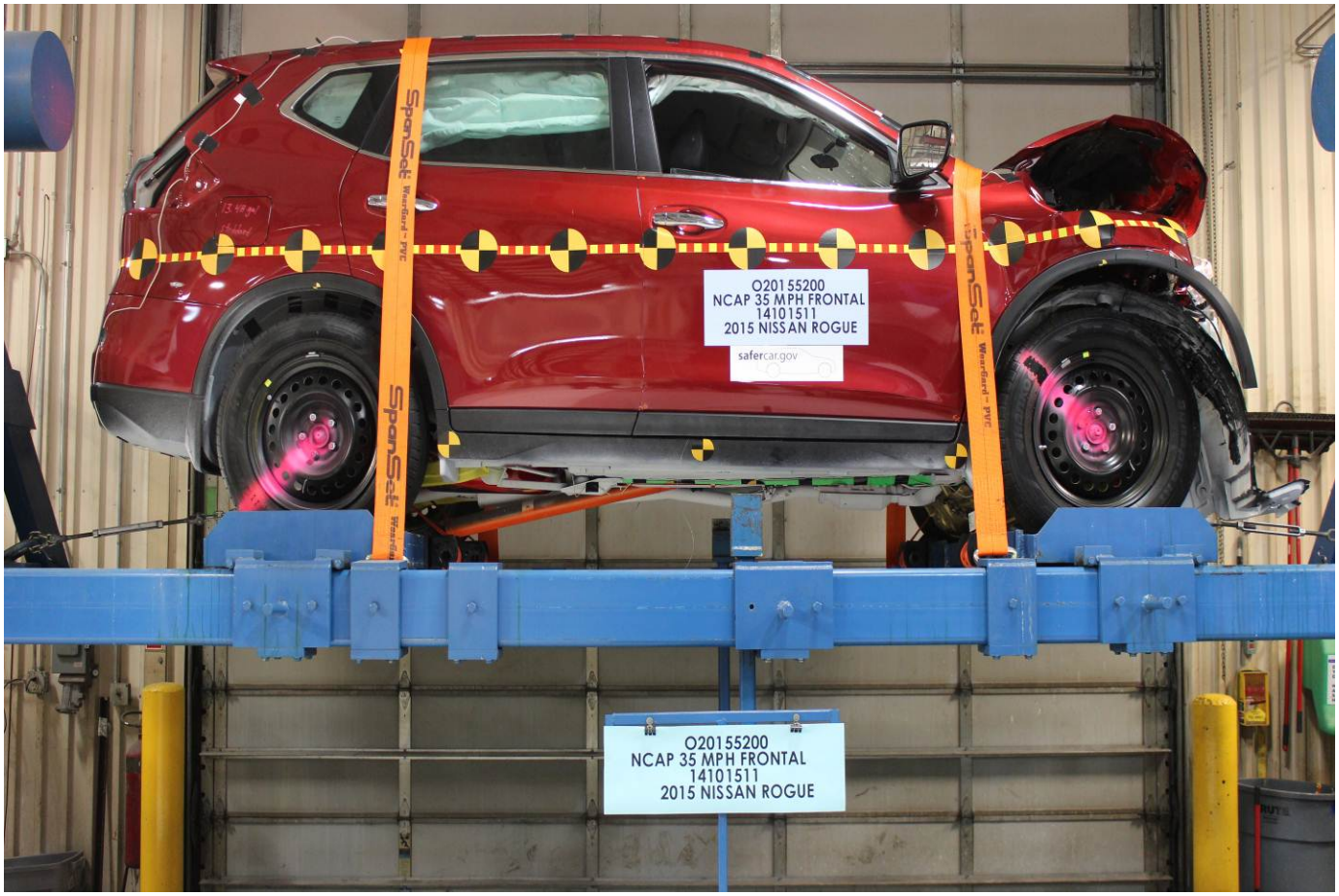
Vehicle at 90 Degrees on Static Rollover Device



Vehicle at 180 Degrees on Static Rollover Device



Vehicle at 270 Degrees on Static Rollover Device



Vehicle at 360 Degrees on Static Rollover Device

2015 Nissan Rogue Frontal Impact Event

NISSAN

2015 ROGUE S AWD

Scan QR code for general model information & options

Standard Equipment Included at No Extra Charge

MECHANICAL & PERFORMANCE
2.5-liter DOHC I-4 Engine
170 Horsepower and 175 lb-ft of Torque
Xtronic CVT® (Continuously Variable Transmission) with Sport & Eco Mode Switch
All-Wheel Drive
4-Wheel Front and Rear Disc Brakes
17" Steel Wheels with Full Wheel Covers
All Season Tires/Temporary Spare Tire
Hill Start Assist & Hill Descent Control
Active Trace Control
Active Engine Braking
Active Ride Control

SAFETY & SECURITY
Driver & Front Passenger, Side-Impact, Curtain Air Bags
Lower Anchors and Tethers for CHildren (LATCH)
4-Wheel Anti-Lock Braking System
Vehicle Dynamic Control (VDC) with Traction Control System (TCS)
Electronic Brake Force Distribution (EBD) and Brake Assist (BA)
Nissan Vehicle Immobilizer System
Vehicle Security System
Tire Pressure Monitoring System (TPMS) with Easy Fill Tire Alert

COMFORT & CONVENIENCE
EZ Flex® Seating System
40/20/40 Folding and Reclining 60/40 Sliding 2nd Row
4-Speaker AM/FM/CD Audio System
Auxiliary Audio Input Jack
NissanConnect™ ****
5" Color Audio Display
USB connection port for iPod® interface and other compatible devices
Bluetooth® Hands-free Phone System
Streaming Audio via Bluetooth®
Hands-free text messaging assistant*****
Advanced Drive-Assist® Display
3 12-volt power points
RearView Monitor

COMFORT & CONVENIENCE CONT.
2nd row seat A/C vents
Illuminated & Adjustable Visor Vanity Mirrors
Divide-N-Hide® Cargo System
Power Door Locks w/ Auto Locking Feature
Power Windows w/ DR Auto Up/Down

EXTERIOR
LED Daytime Running Lights
Halogen Headlights w/ Auto Off Function
Outside Mirrors w/ LED Turn Signals

***Optional Equipment Replaces Standard Where Applicable

****NissanConnect™
Certain remote functions require compatible phone, not included with vehicle. Cellular network and vehicle services provided by independent companies not within Nissan's control. Cellular network not available in all areas. Certain connected vehicle services, including but not limited to Points of Interest and Send-to-Car, may require subscription and owner consent to activate. Should service provider terminate/restrict service, service may be suspended or terminated without notice or liability to Nissan and/or its agents. Nissan not responsible for any equipment replacement or upgrades, or associated costs, that may be required for continued operation due to service changes. Standard text rates, voice minutes, roaming charges and/or data usage may apply.

*****Compatible smartphone required. Standard text rates and/or data usage may apply.

Manufacturer's Suggested Retail Base Price:	$24,140.00
Options Included by Manufacturer	
Splash Guards	160.00
Rear Bumper Protector	85.00
DESTINATION CHARGES	860.00
Total*	$25,245.00

Miles 8/14

*Does not include dealer installed options and accessories, local taxes or license fees. This label has been applied pursuant to federal law. Do not remove prior to delivery to the ultimate purchaser.

EPA DOT Fuel Economy and Environment — Gasoline Vehicle

Fuel Economy: **28 MPG** combined city/hwy (25 city, 32 highway)
SMALL SPORT UTILITY range from 16 to 31 MPG. The best vehicle rates 119 MPGe
3.6 gallons per 100 miles

You save **$1,500** in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost **$1,900**

Fuel Economy & Greenhouse Gas Rating (tailpipe only) 7 (1–10) Smog Rating (tailpipe only) 5 (1–10 Best)
This vehicle emits 378 grams CO2 per mile. The best emits 0 grams/mile (tailpipe only). Producing and distributing fuel also create emissions; learn more at fueleconomy.gov

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 24 MPG and costs $11,000 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at $3.40 per gallon. MPGe is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

fueleconomy.gov
Calculate personalized estimates and compare vehicles

Smartphone QR Code*

GOVERNMENT 5-STAR SAFETY RATINGS

Overall Vehicle Score ★★★★
Based on the combined ratings of frontal, side and rollover. Should ONLY be compared to other vehicles of similar size and weight.

Frontal Crash — Driver ★★★ / Passenger ★★
Based on the risk of injury in a frontal impact. Should ONLY be compared to other vehicles of similar size and weight.

Side Crash — Front seat ★★★★★ / Rear seat ★★★★★
Based on the risk of injury in a side impact.

Rollover ★★★★
Based on the risk of rollover in a single-vehicle crash.

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

This Vehicle qualifies for Nissan's
Security+Plus Vehicle Protection Plan
The only service agreement backed by Nissan!
Ask your dealer for details, or call 1-800-NISSAN-1 for more information

DELIVERY

VEHICLE COLORS:
EXT: CAYENNE RED
INT: CHARCOAL

FINAL ASSEMBLY POINT:
SMYRNA

TRANSPORT METHOD:
TRUCK

DEALER:
GORDIE BOUCHER NISSAN
4141 S. 108TH STREET
GREENFIELD WI
53228

VIN: 5N1AT2MV8FC751525
EMS: 50 STATE EMISSIONS
MDL: 22215-751525 NAH-G
OPT: B-B92B93C03

20140827013602AS3070

Monroney Label Photograph

APPENDIX B
DUMMY RESPONSE DATA TRACES

TABLE OF DATA PLOTS

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 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 Upper Neck Force Y

Passenger Upper Neck Moment X

Passenger Upper Neck Moment Z

Passenger Chest X Redundant

Passenger Chest Y Redundant

Passenger Chest Z Redundant

Passenger Pelvis X

Passenger Pelvis Y

Passenger Pelvis Z

Passenger Left Femur Redundant

Passenger Right Femur Redundant

Passenger Left Upper Tibia Moment X

Passenger Left Upper Tibia Moment Y

Passenger Left Upper Tibia Force Z

Passenger Left Lower Tibia Moment X

Passenger Left Lower Tibia Moment Y

Passenger Left Lower Tibia Force Z

Passenger Right Upper Tibia Moment X

Passenger Right Upper Tibia Moment Y

Passenger Right Upper Tibia Force Z

Passenger Right Lower Tibia Moment X

Passenger Right Lower Tibia Moment Y

Passenger Right Lower Tibia Force Z

Passenger Left Foot Fore Z

Passenger Left Foot Aft X

Passenger Left Foot Aft Z

Passenger Right Foot Fore Z

Passenger Right Foot Aft X

Passenger Right Foot Aft Z

Passenger Lap Belt Force

Passenger Shoulder Belt Force

Left Rear Seat Crossmember X

Right Rear Seat Crossmember X

Vehicle Engine Top X

Vehicle Engine Bottom X

Left Rear Seat Crossmember Z

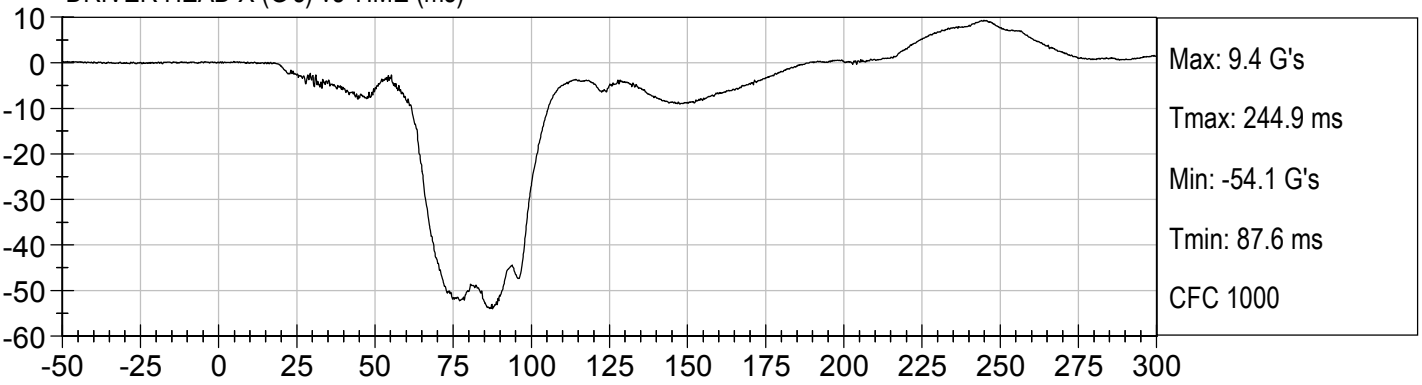
Right Rear Seat Crossmember Z

Left Rear Seat Crossmember Xr

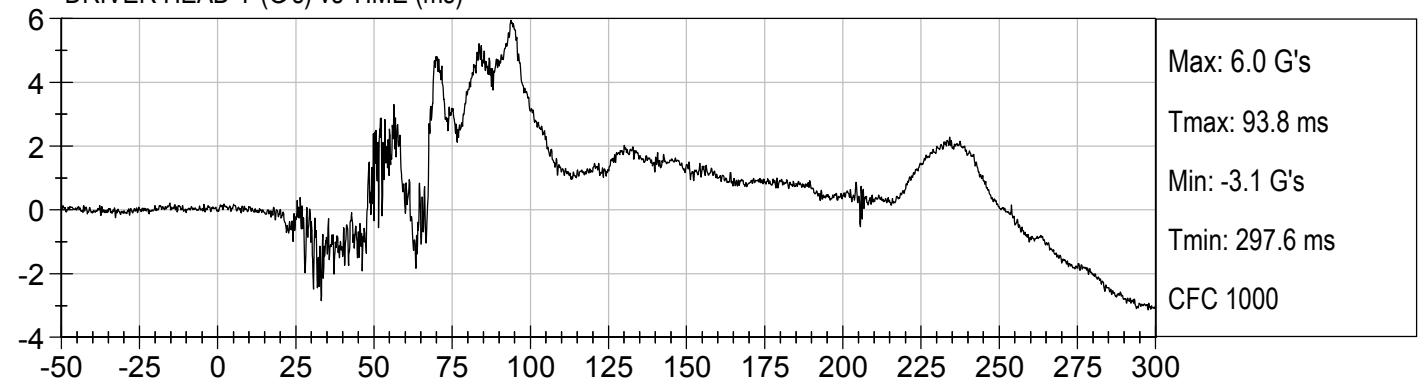
Right Rear Seat Crossmember Xr

Advanced Research Load Cell Barrier – 528 channels

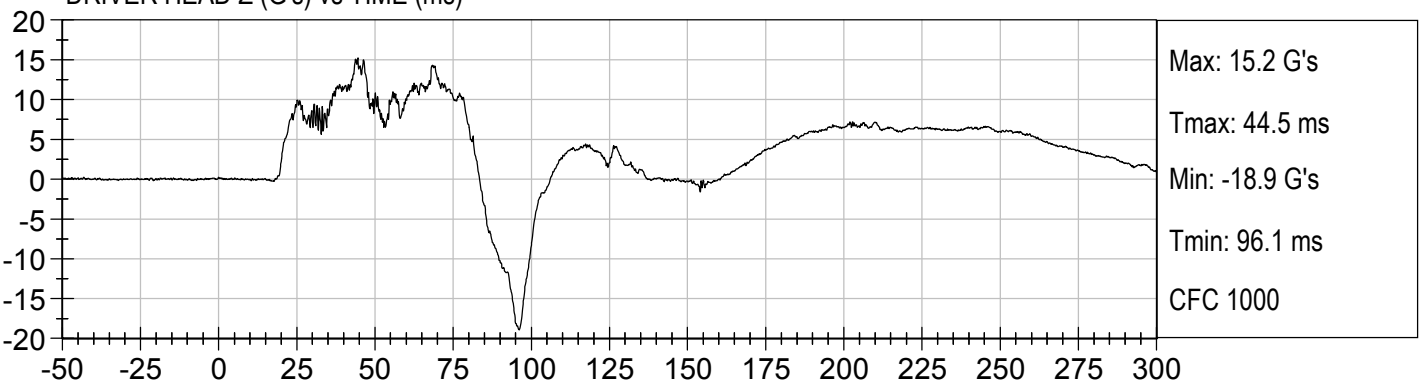
DRIVER HEAD X (G's) vs TIME (ms)



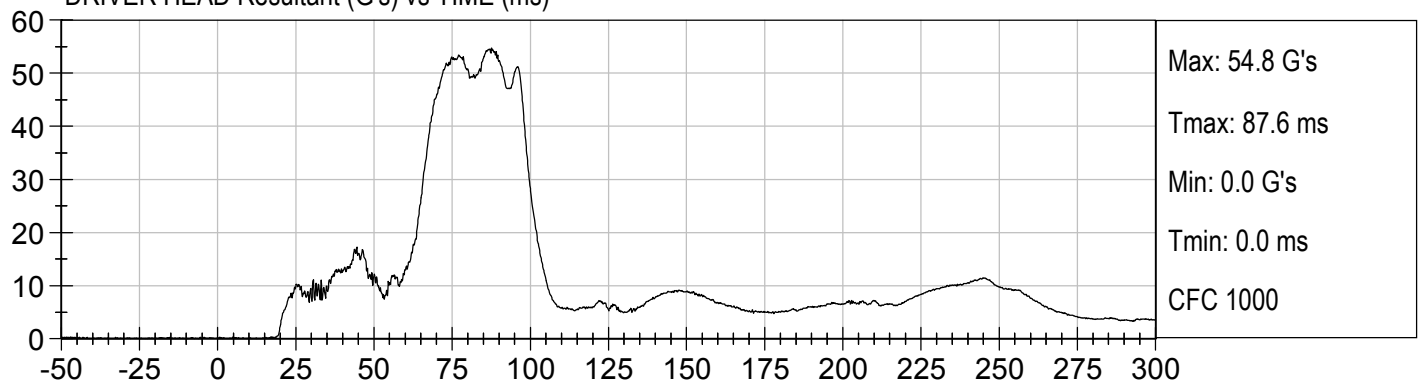
DRIVER HEAD Y (G's) vs TIME (ms)



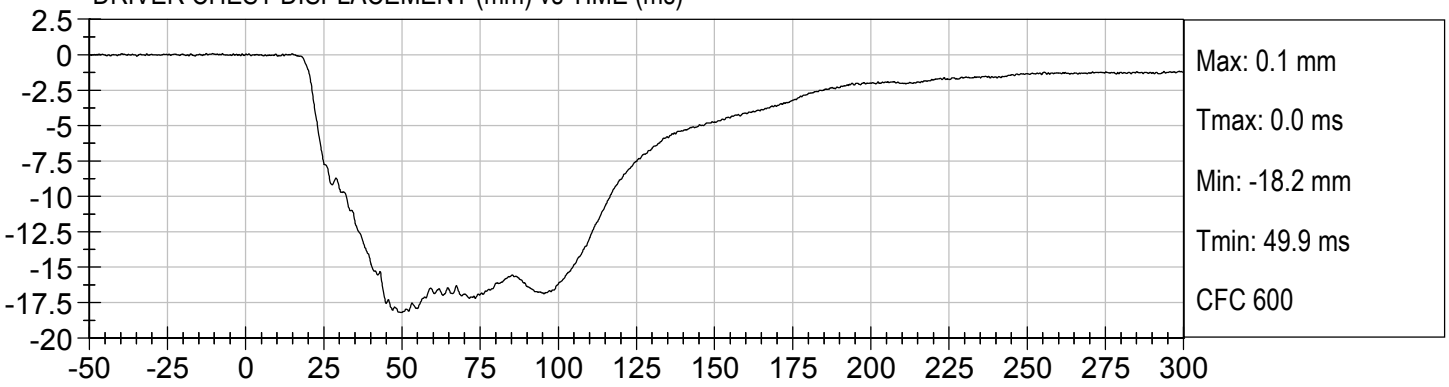
DRIVER HEAD Z (G's) vs TIME (ms)



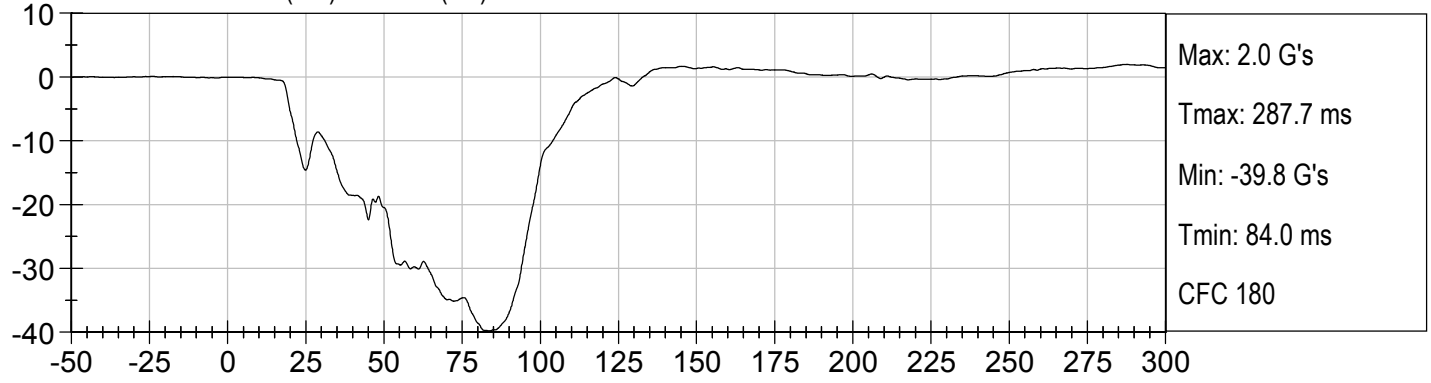
DRIVER HEAD Resultant (G's) vs TIME (ms)



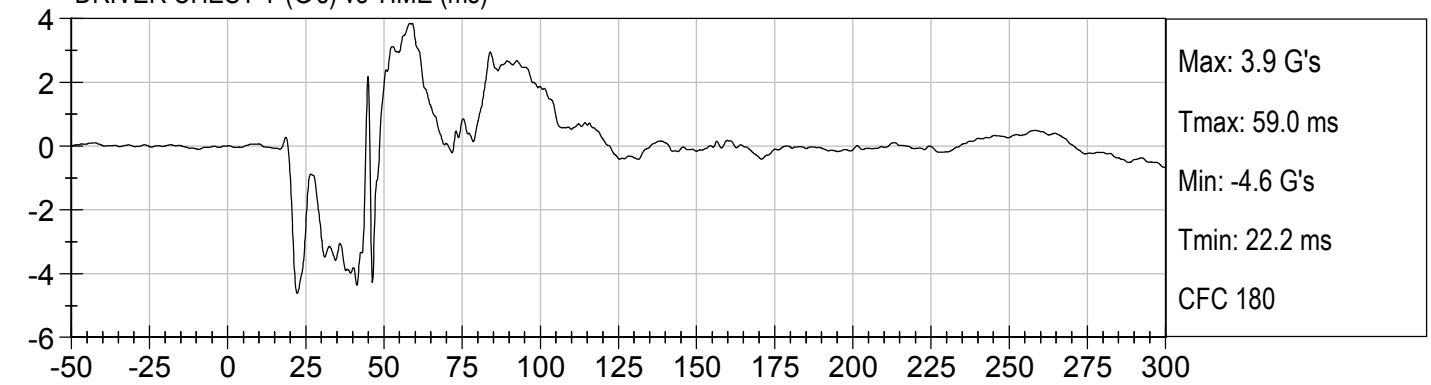
DRIVER CHEST DISPLACEMENT (mm) vs TIME (ms)



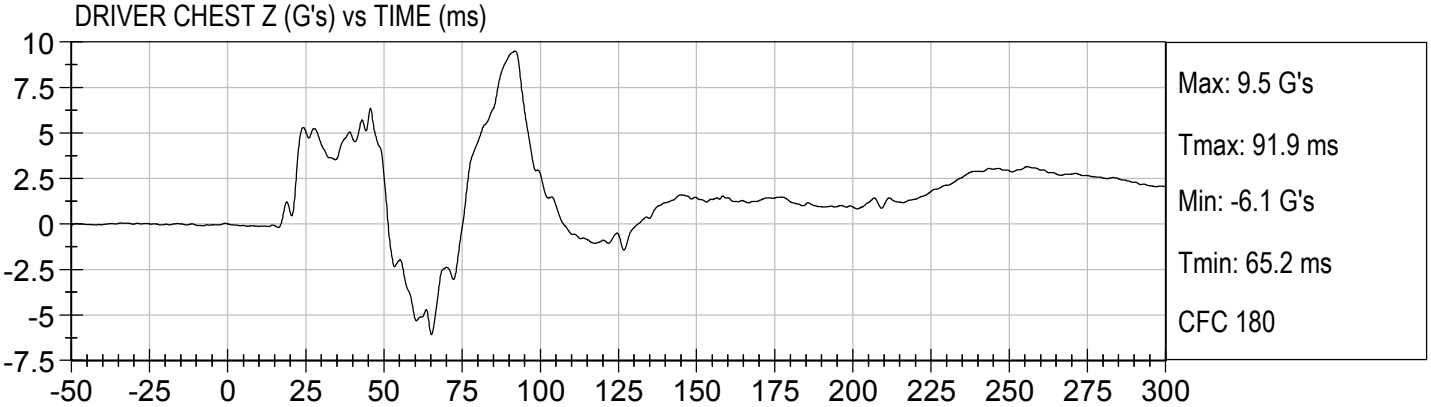
DRIVER CHEST X (G's) vs TIME (ms)



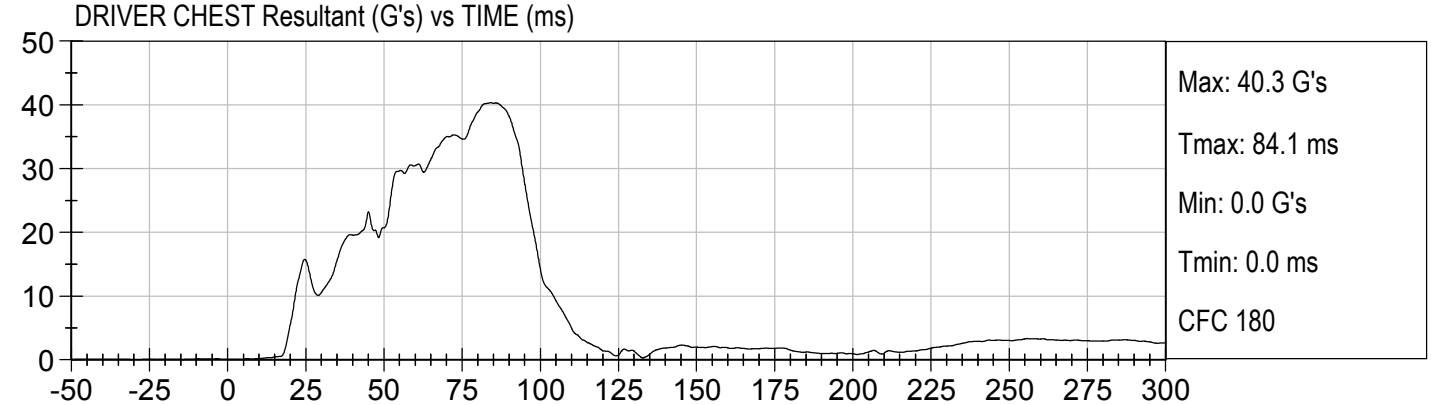
DRIVER CHEST Y (G's) vs TIME (ms)



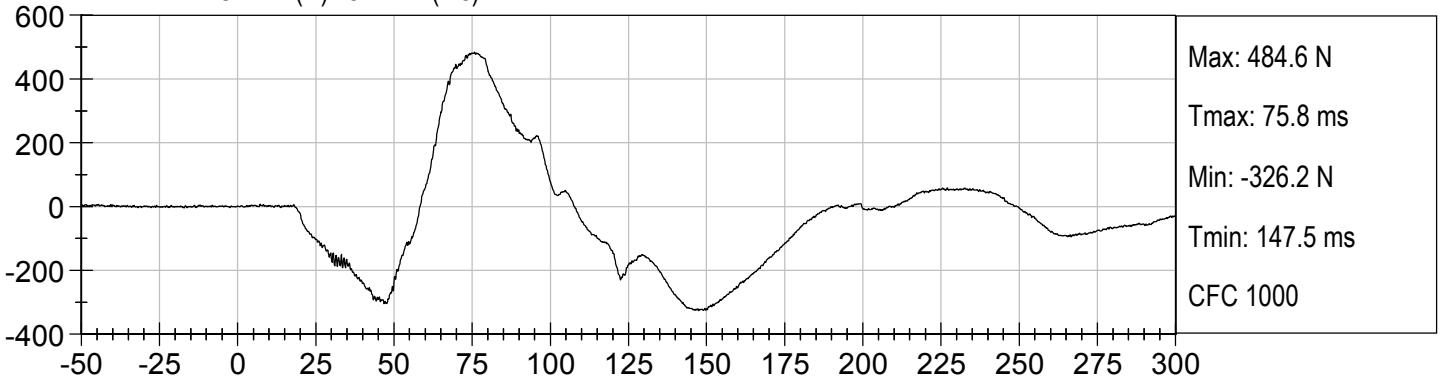
DRIVER CHEST Z (G's) vs TIME (ms)



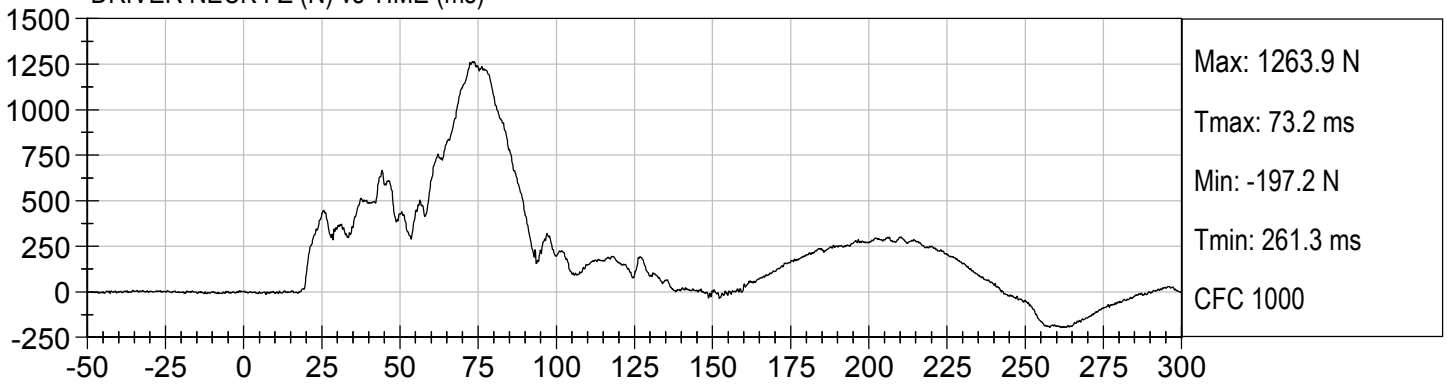
DRIVER CHEST Resultant (G's) vs TIME (ms)



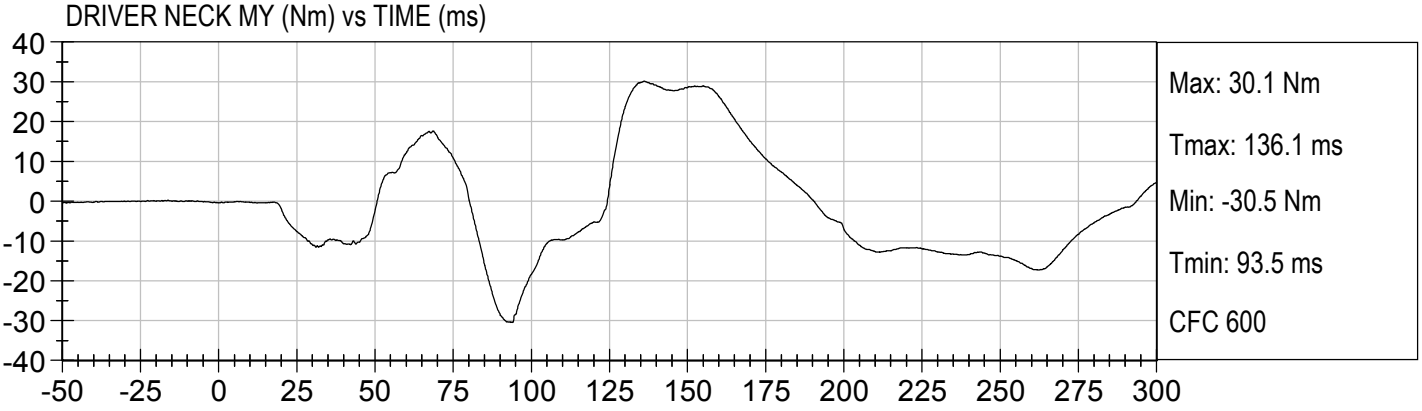
DRIVER NECK FX (N) vs TIME (ms)



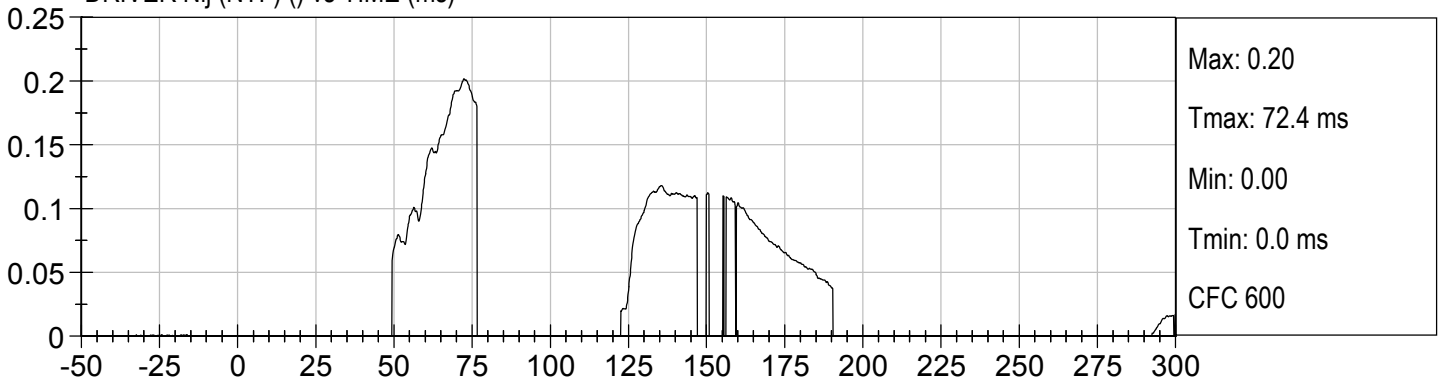
DRIVER NECK FZ (N) vs TIME (ms)



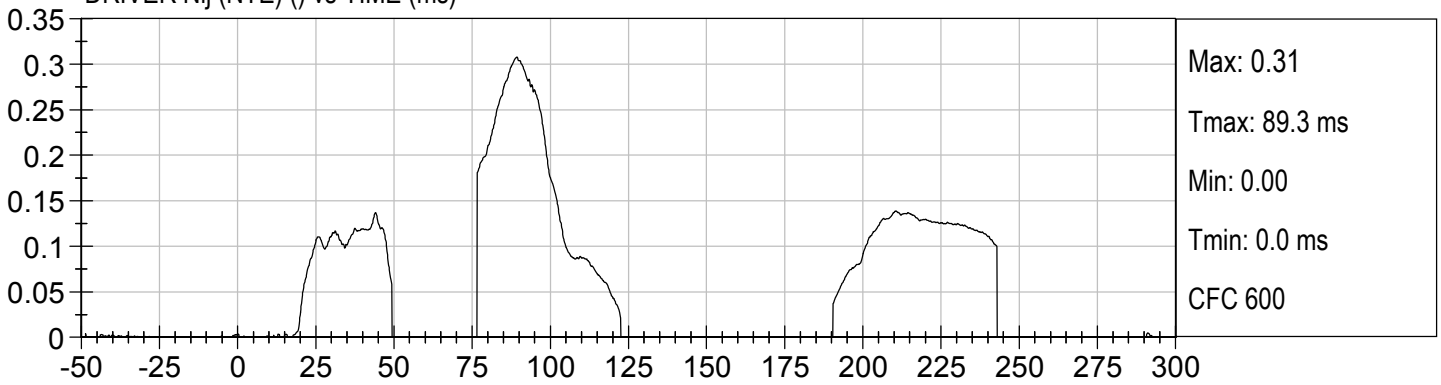
DRIVER NECK MY (Nm) vs TIME (ms)



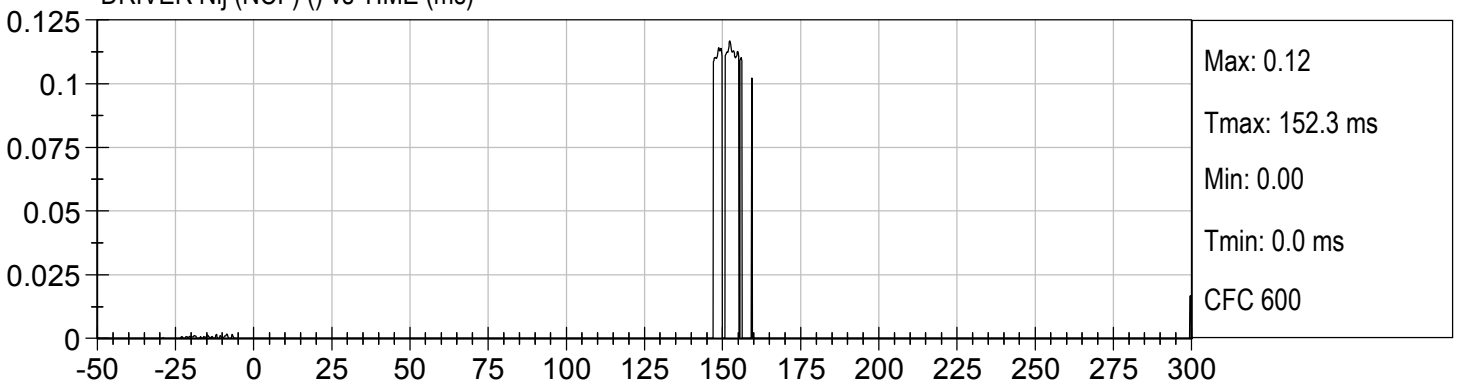
DRIVER Nij (NTF) () vs TIME (ms)



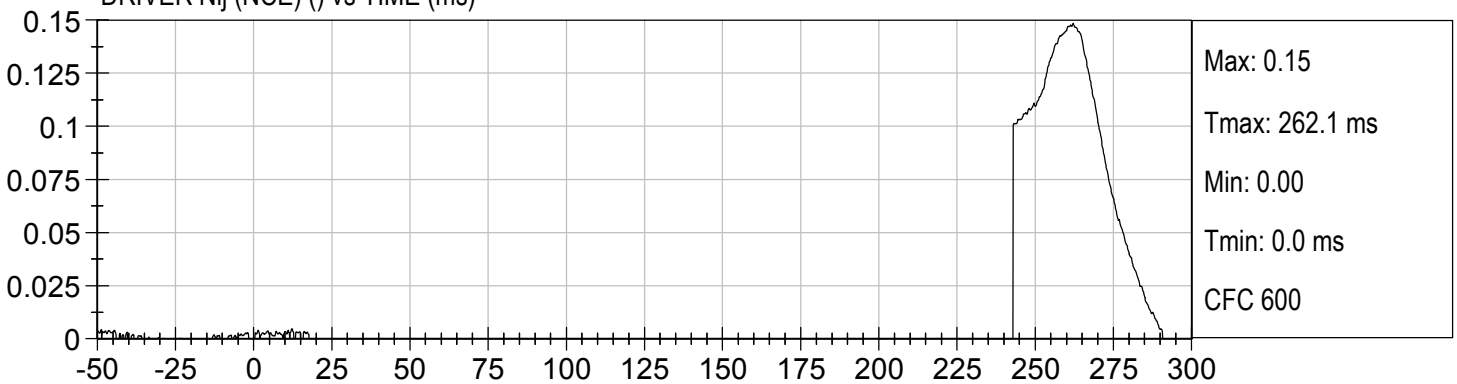
DRIVER Nij (NTE) () vs TIME (ms)

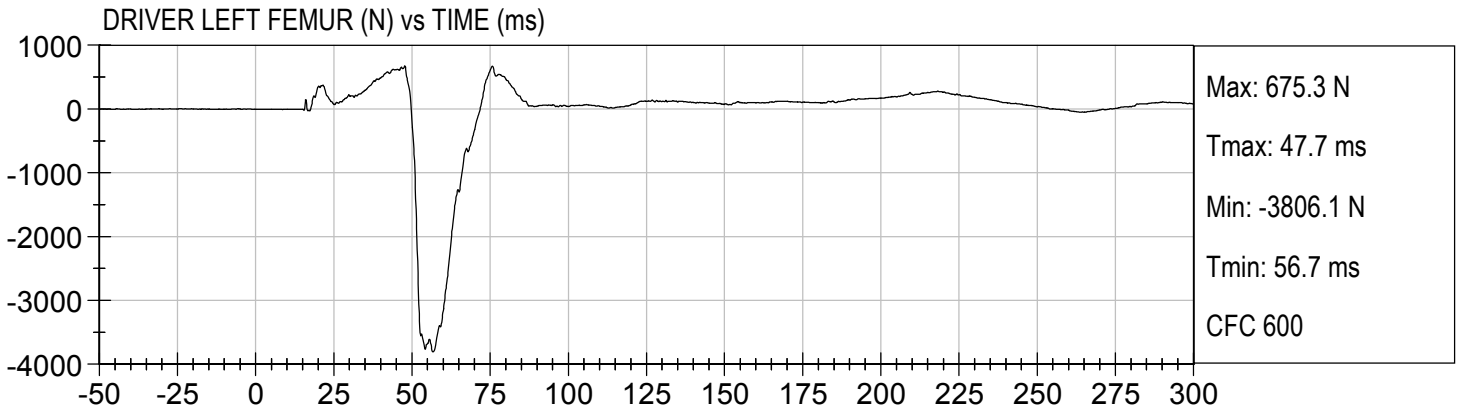


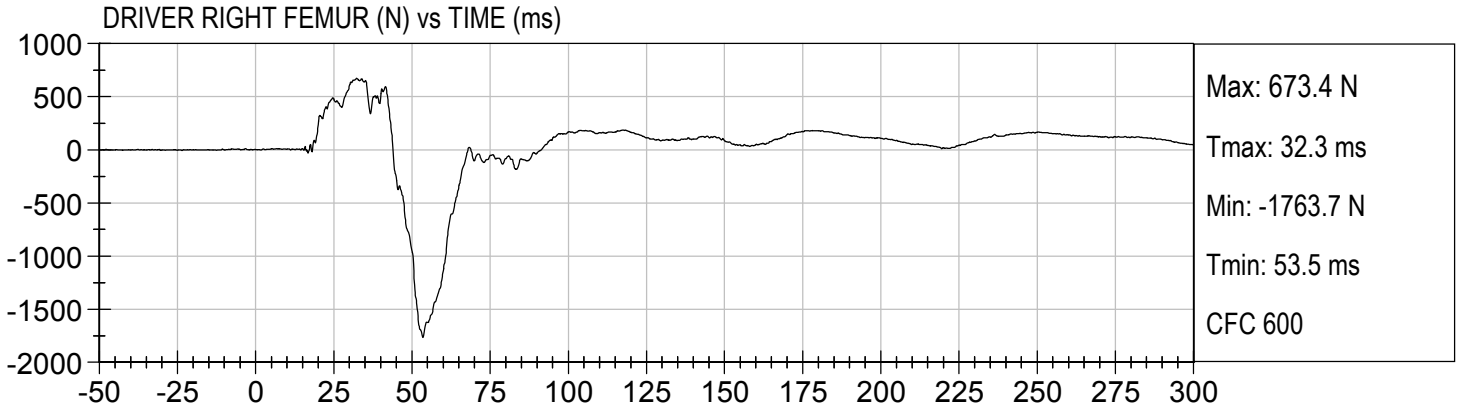
DRIVER Nij (NCF) () vs TIME (ms)



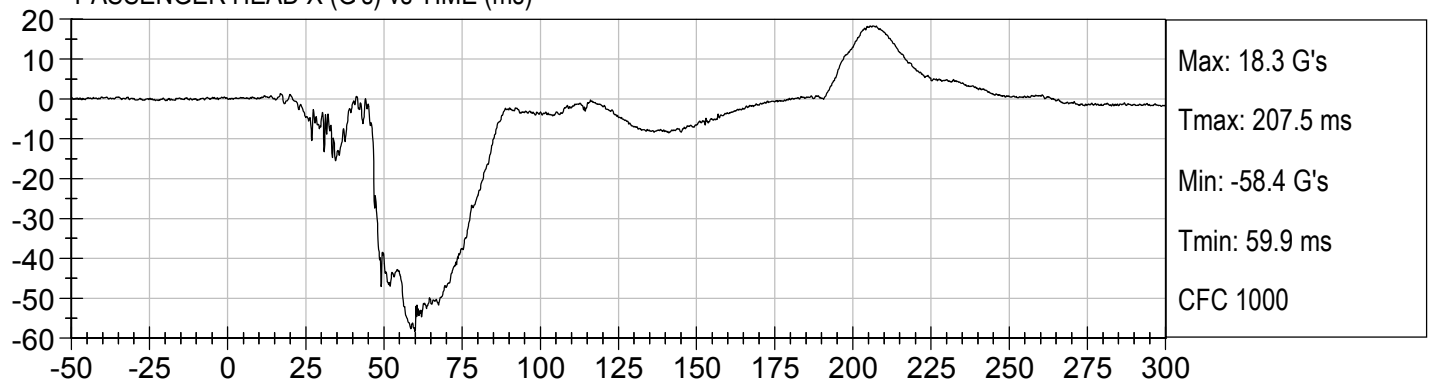
DRIVER Nij (NCE) () vs TIME (ms)



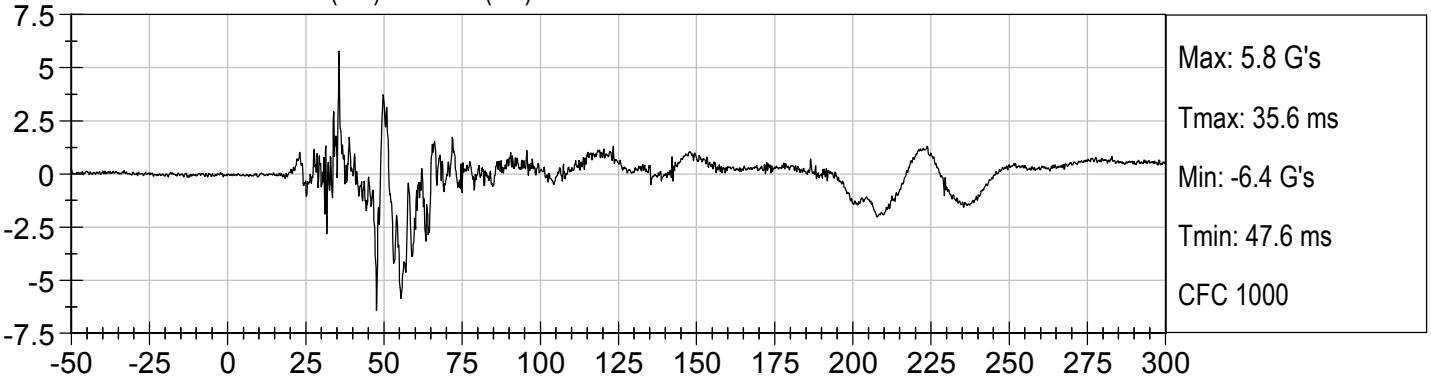

DRIVER LEFT FEMUR (N) vs TIME (ms)
1000
0
-1000
-2000
-3000
-4000
-50
-25
0
25
50
75
100
125
150
175
200
225
250
275
300
Max: 675.3 N
Tmax: 47.7 ms
Min: -3806.1 N
Tmin: 56.7 ms
CFC 600


DRIVER RIGHT FEMUR (N) vs TIME (ms)
1000
500
0
-500
-1000
-1500
-2000
-50
-25
0
25
50
75
100
125
150
175
200
225
250
275
300
Max: 673.4 N
Tmax: 32.3 ms
Min: -1763.7 N
Tmin: 53.5 ms
CFC 600

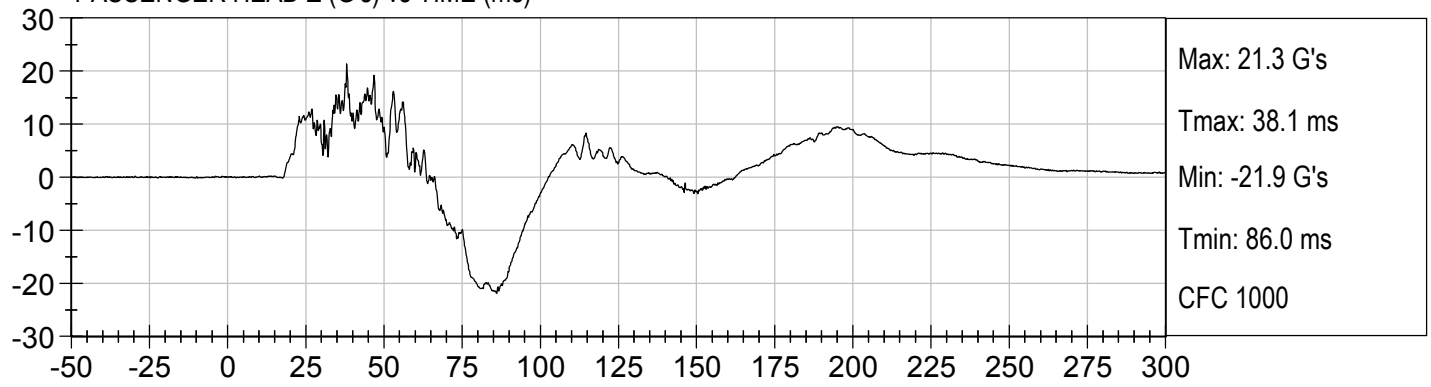
PASSENGER HEAD X (G's) vs TIME (ms)



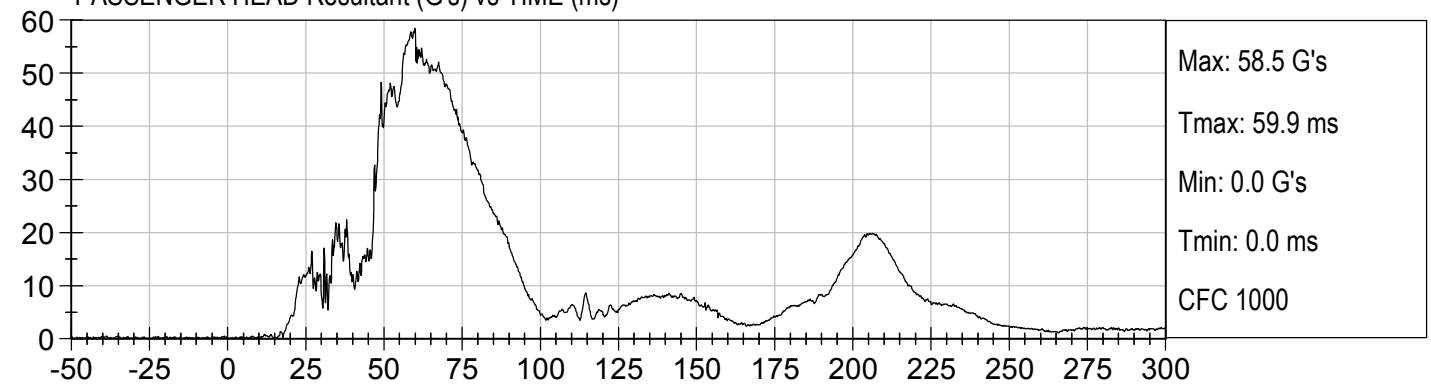
PASSENGER HEAD Y (G's) vs TIME (ms)



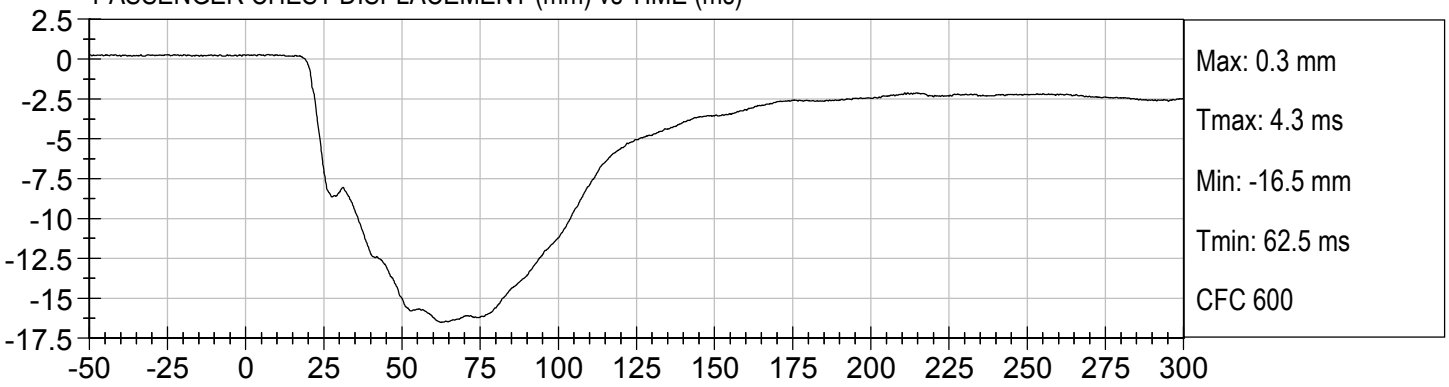
PASSENGER HEAD Z (G's) vs TIME (ms)

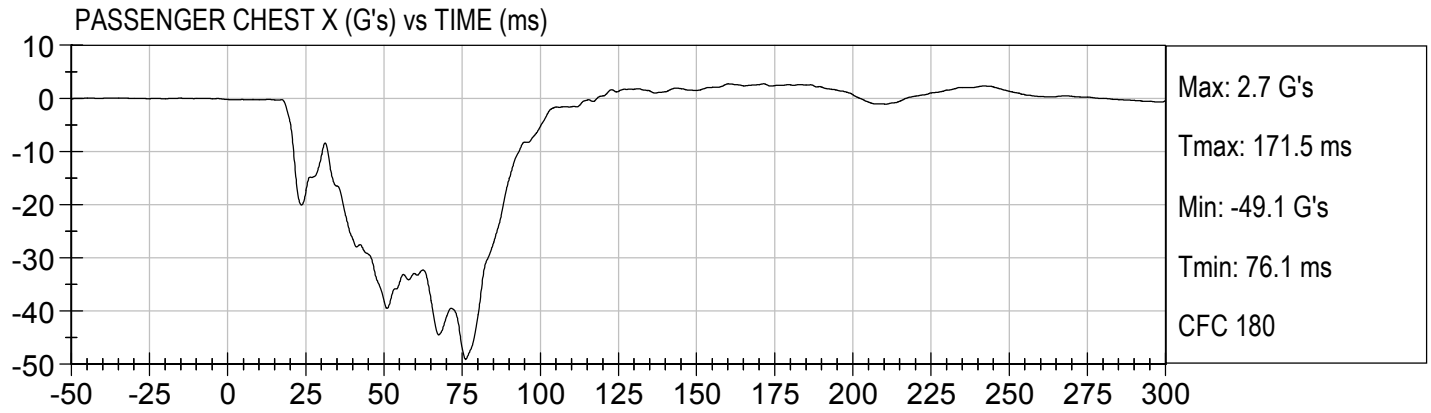


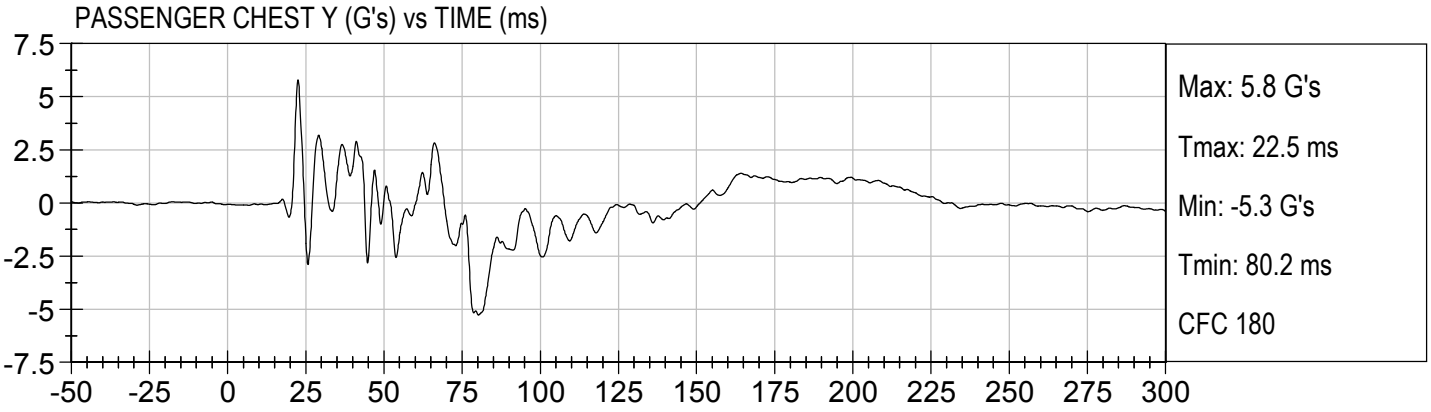
PASSENGER HEAD Resultant (G's) vs TIME (ms)

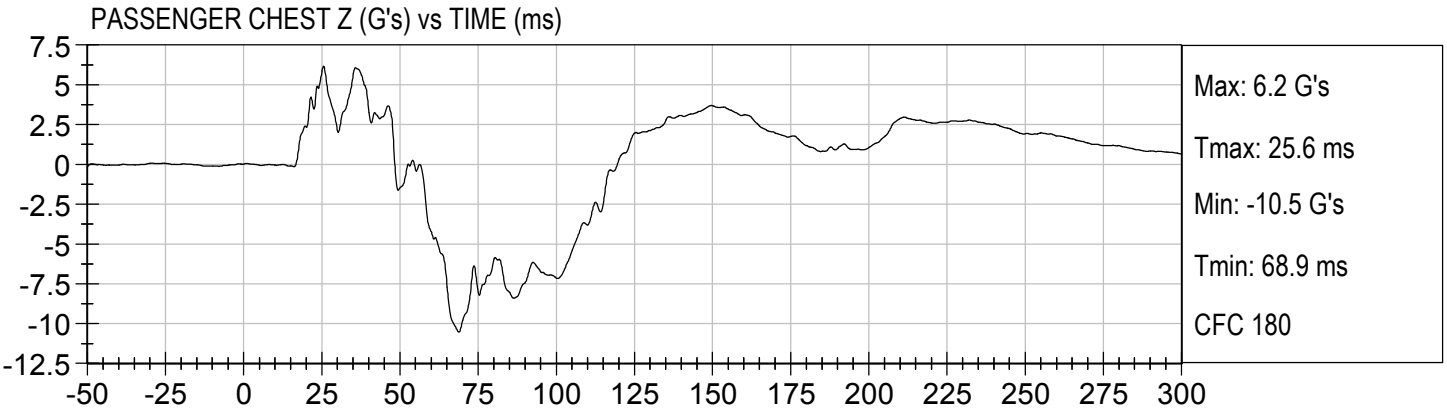


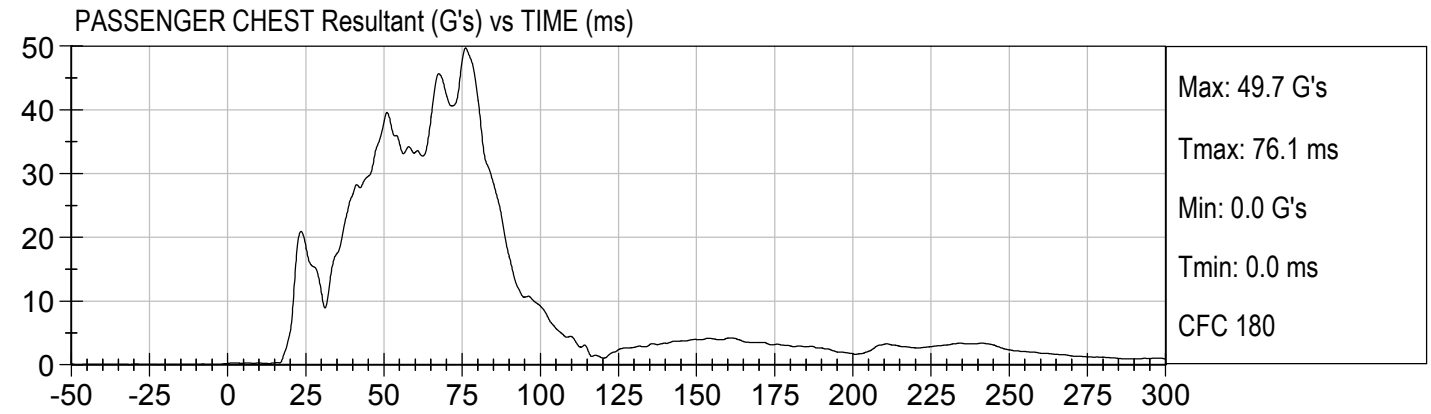
PASSENGER CHEST DISPLACEMENT (mm) vs TIME (ms)



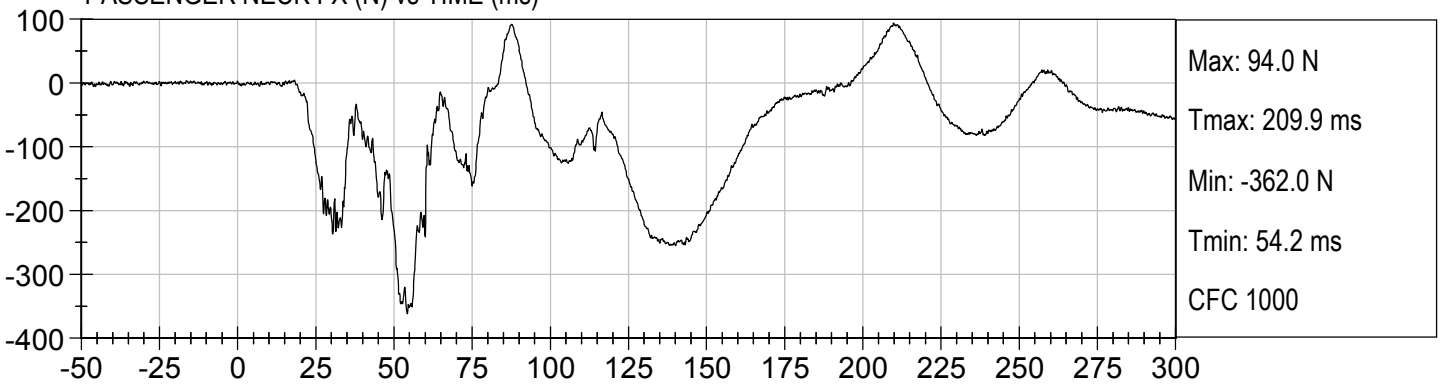

PASSENGER CHEST X (G's) vs TIME (ms)
10
0
-10
-20
-30
-40
-50
-50 -25 0 25 50 75 100 125 150 175 200 225 250 275 300
Max: 2.7 G's
Tmax: 171.5 ms
Min: -49.1 G's
Tmin: 76.1 ms
CFC 180


PASSENGER CHEST Y (G's) vs TIME (ms)
7.5
5
2.5
0
-2.5
-5
-7.5
-50 -25 0 25 50 75 100 125 150 175 200 225 250 275 300
Max: 5.8 G's
Tmax: 22.5 ms
Min: -5.3 G's
Tmin: 80.2 ms
CFC 180

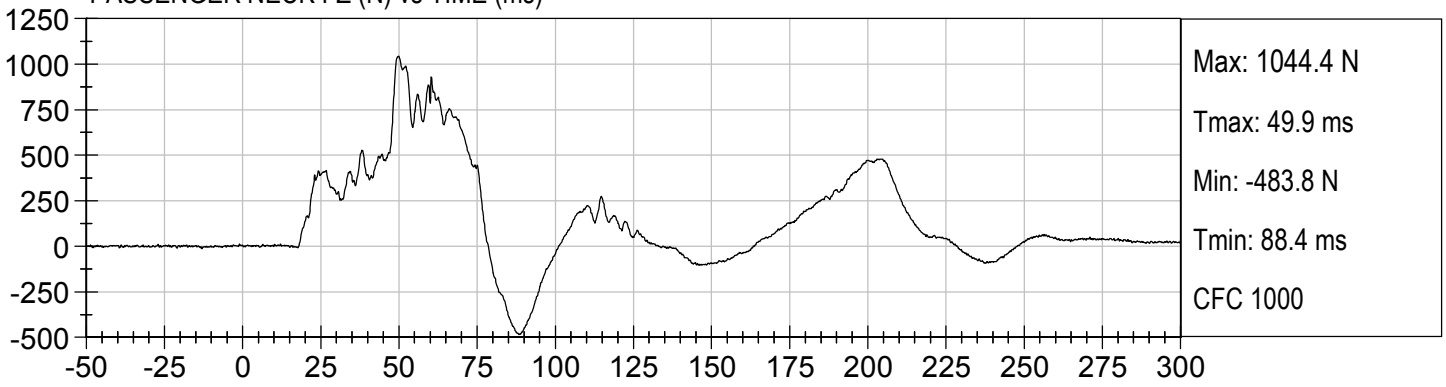

PASSENGER CHEST Z (G's) vs TIME (ms)
7.5
5
2.5
0
-2.5
-5
-7.5
-10
-12.5
-50 -25 0 25 50 75 100 125 150 175 200 225 250 275 300
Max: 6.2 G's
Tmax: 25.6 ms
Min: -10.5 G's
Tmin: 68.9 ms
CFC 180


PASSENGER CHEST Resultant (G's) vs TIME (ms)
50
40
30
20
10
0
-50 -25 0 25 50 75 100 125 150 175 200 225 250 275 300
Max: 49.7 G's
Tmax: 76.1 ms
Min: 0.0 G's
Tmin: 0.0 ms
CFC 180

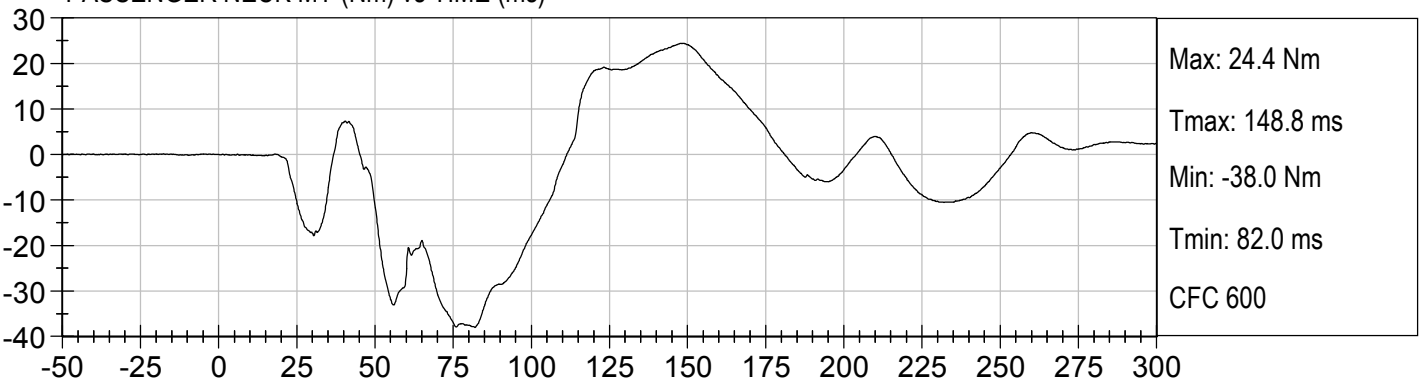
PASSENGER NECK FX (N) vs TIME (ms)

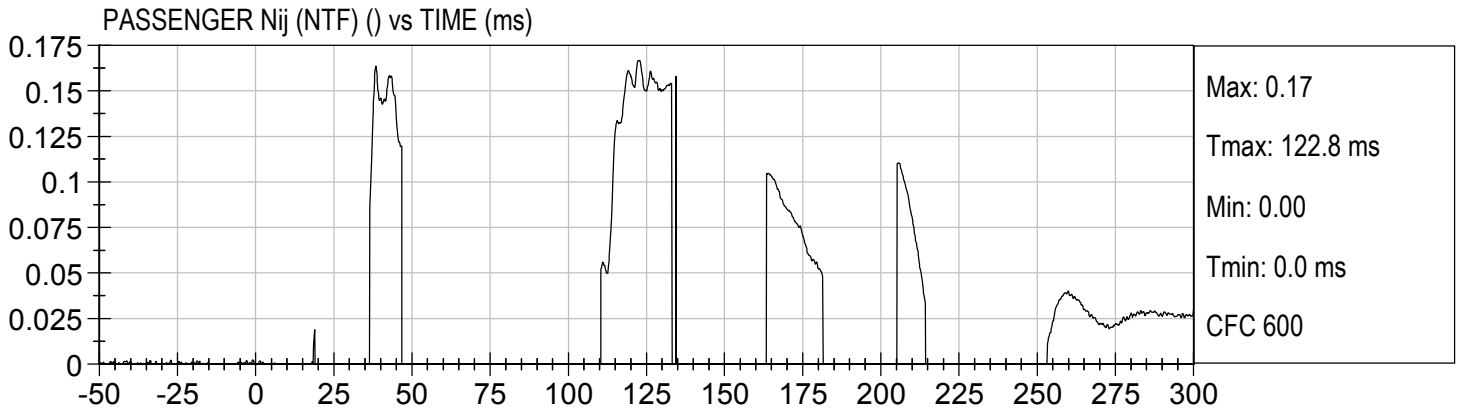


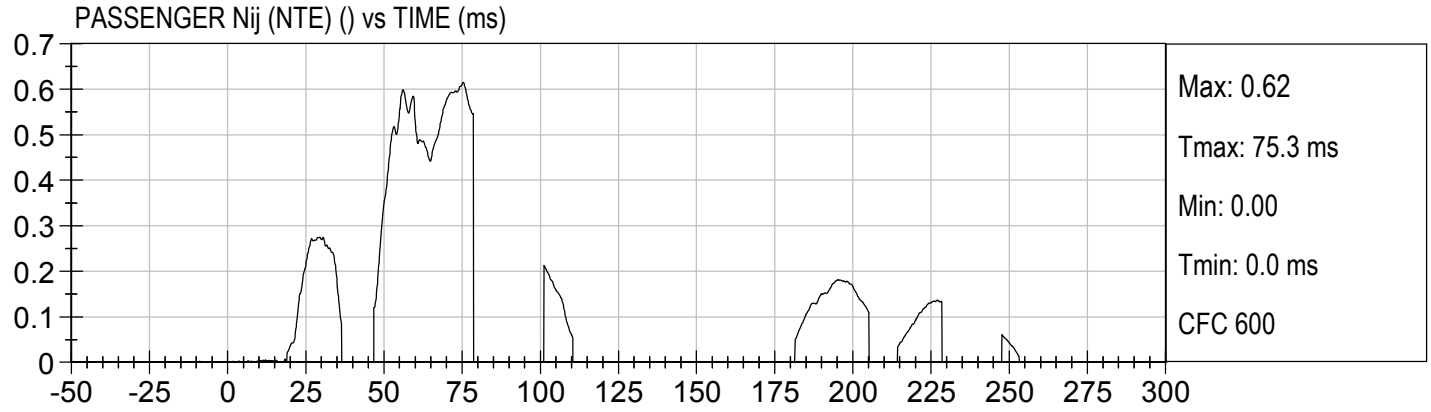
PASSENGER NECK FZ (N) vs TIME (ms)

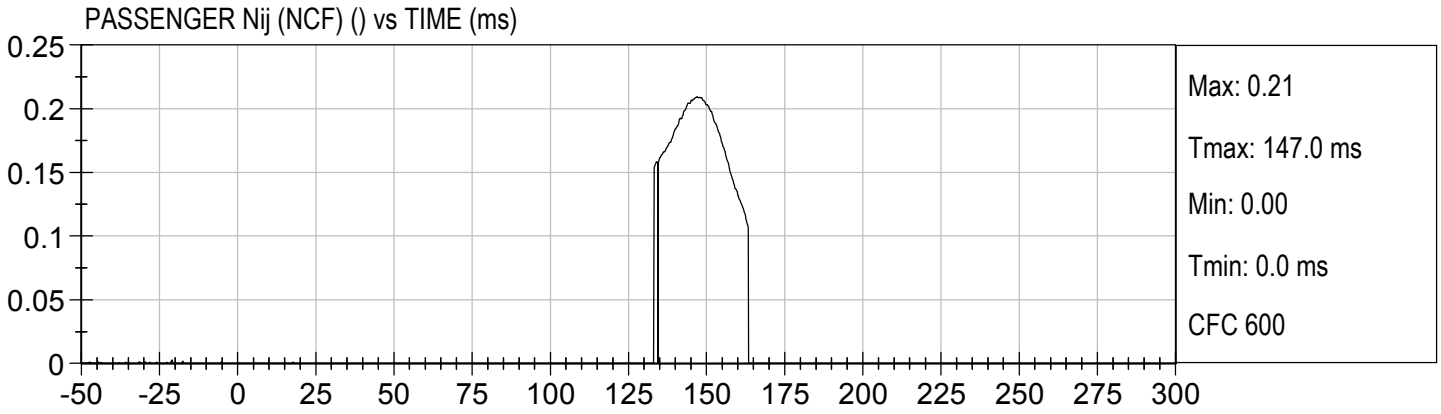


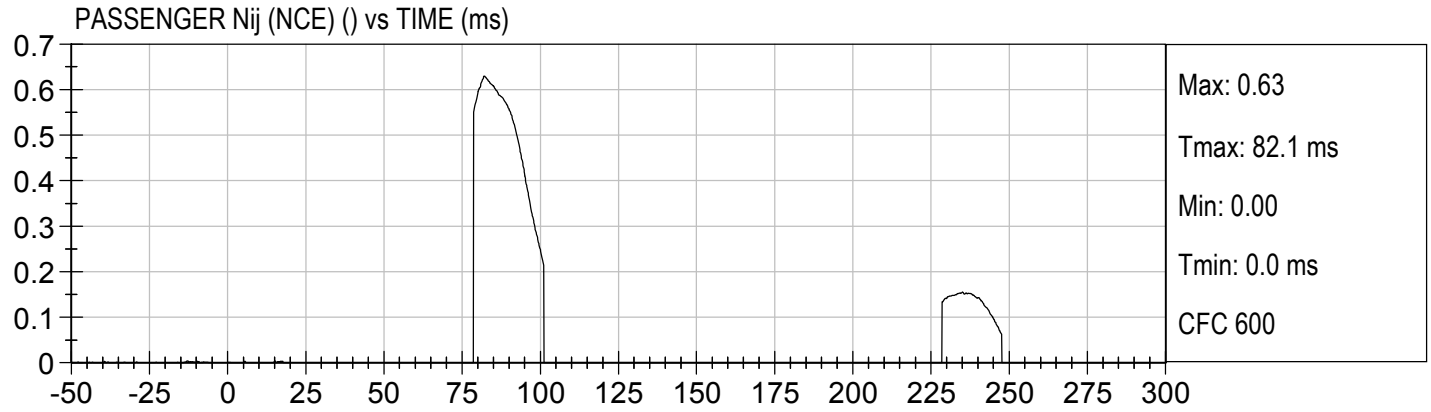
PASSENGER NECK MY (Nm) vs TIME (ms)



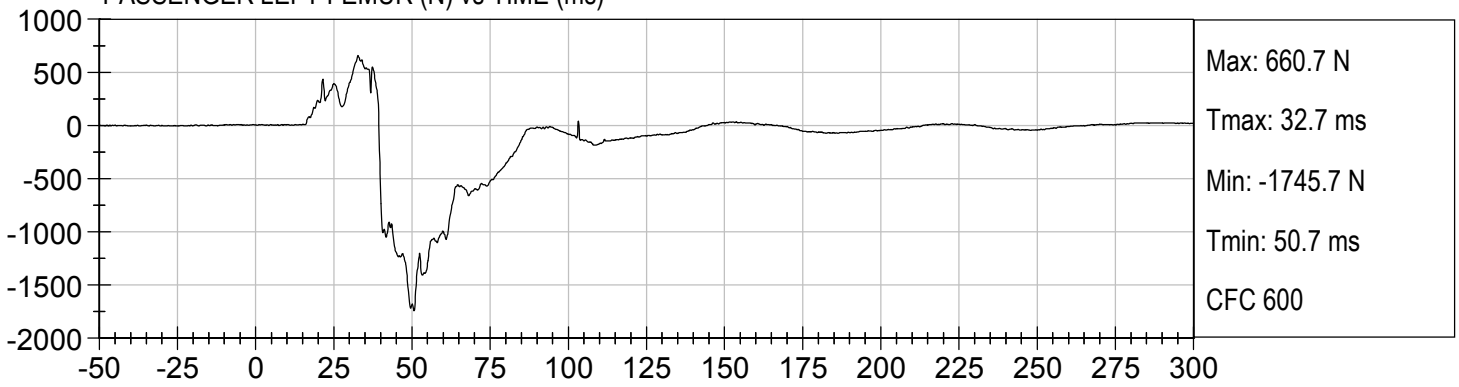

PASSENGER Nij (NTF) () vs TIME (ms)
0.175
0.15
0.125
0.1
0.075
0.05
0.025
0
-50 -25 0 25 50 75 100 125 150 175 200 225 250 275 300
Max: 0.17
Tmax: 122.8 ms
Min: 0.00
Tmin: 0.0 ms
CFC 600


PASSENGER Nij (NTE) () vs TIME (ms)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-50 -25 0 25 50 75 100 125 150 175 200 225 250 275 300
Max: 0.62
Tmax: 75.3 ms
Min: 0.00
Tmin: 0.0 ms
CFC 600

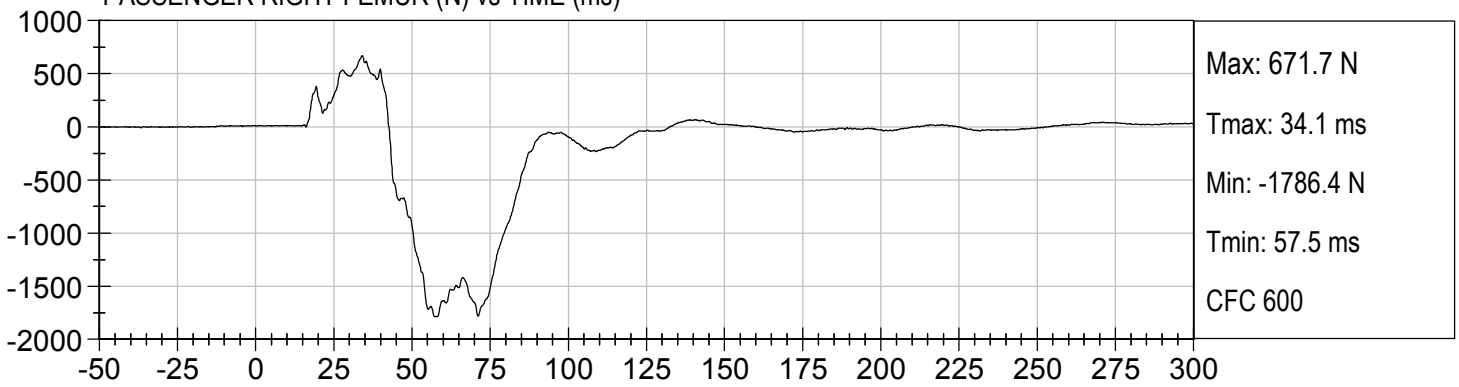

PASSENGER Nij (NCF) () vs TIME (ms)
0.25
0.2
0.15
0.1
0.05
0
-50 -25 0 25 50 75 100 125 150 175 200 225 250 275 300
Max: 0.21
Tmax: 147.0 ms
Min: 0.00
Tmin: 0.0 ms
CFC 600


PASSENGER Nij (NCE) () vs TIME (ms)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-50 -25 0 25 50 75 100 125 150 175 200 225 250 275 300
Max: 0.63
Tmax: 82.1 ms
Min: 0.00
Tmin: 0.0 ms
CFC 600

PASSENGER LEFT FEMUR (N) vs TIME (ms)



PASSENGER RIGHT FEMUR (N) vs TIME (ms)



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:** D143441

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	22.1	Pass
Laboratory Relative Humidity	%	10 to 70	44	Pass
Peak Resultant Acceleration	G's	225 to 275	264	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-10.6	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
		Overall Test Results		Pass

David Schoedel
Laboratory Technician

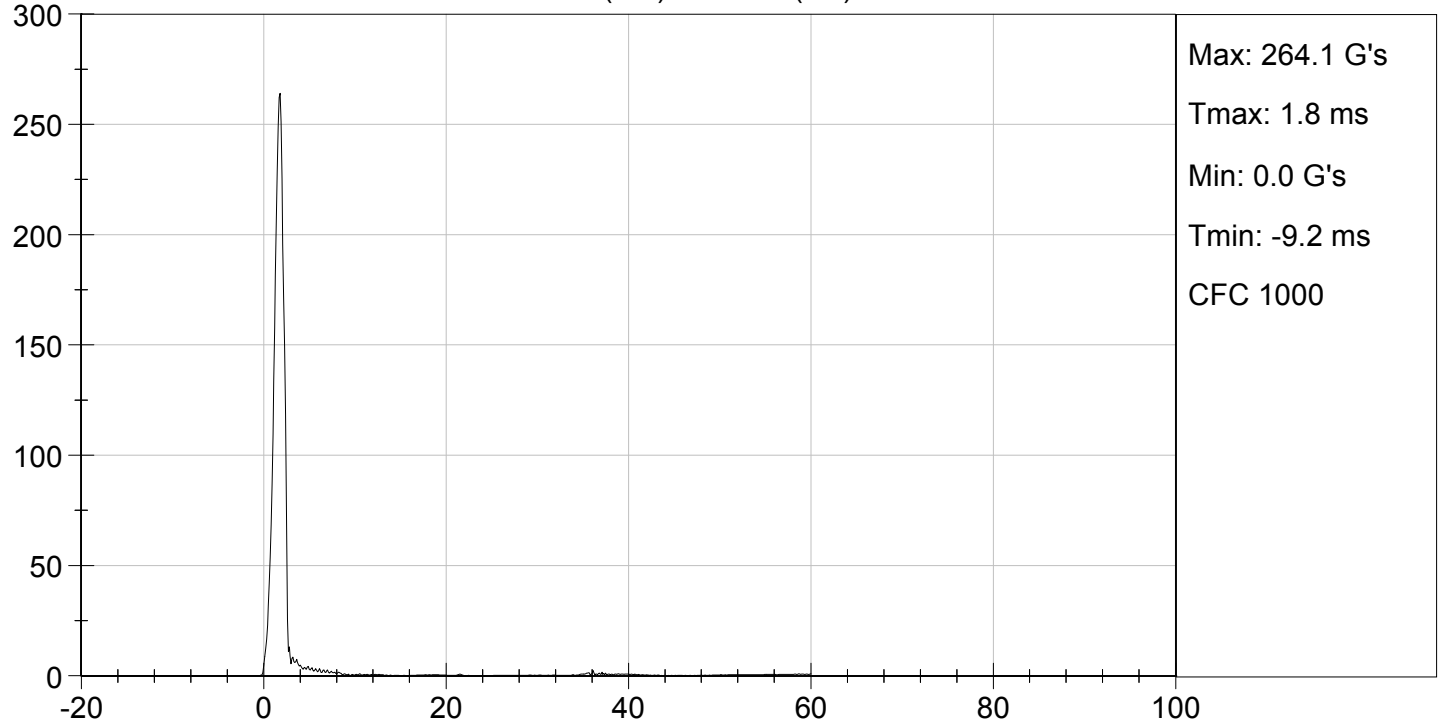
10/01/2014
Test Date

Jessica Hall
Approved By

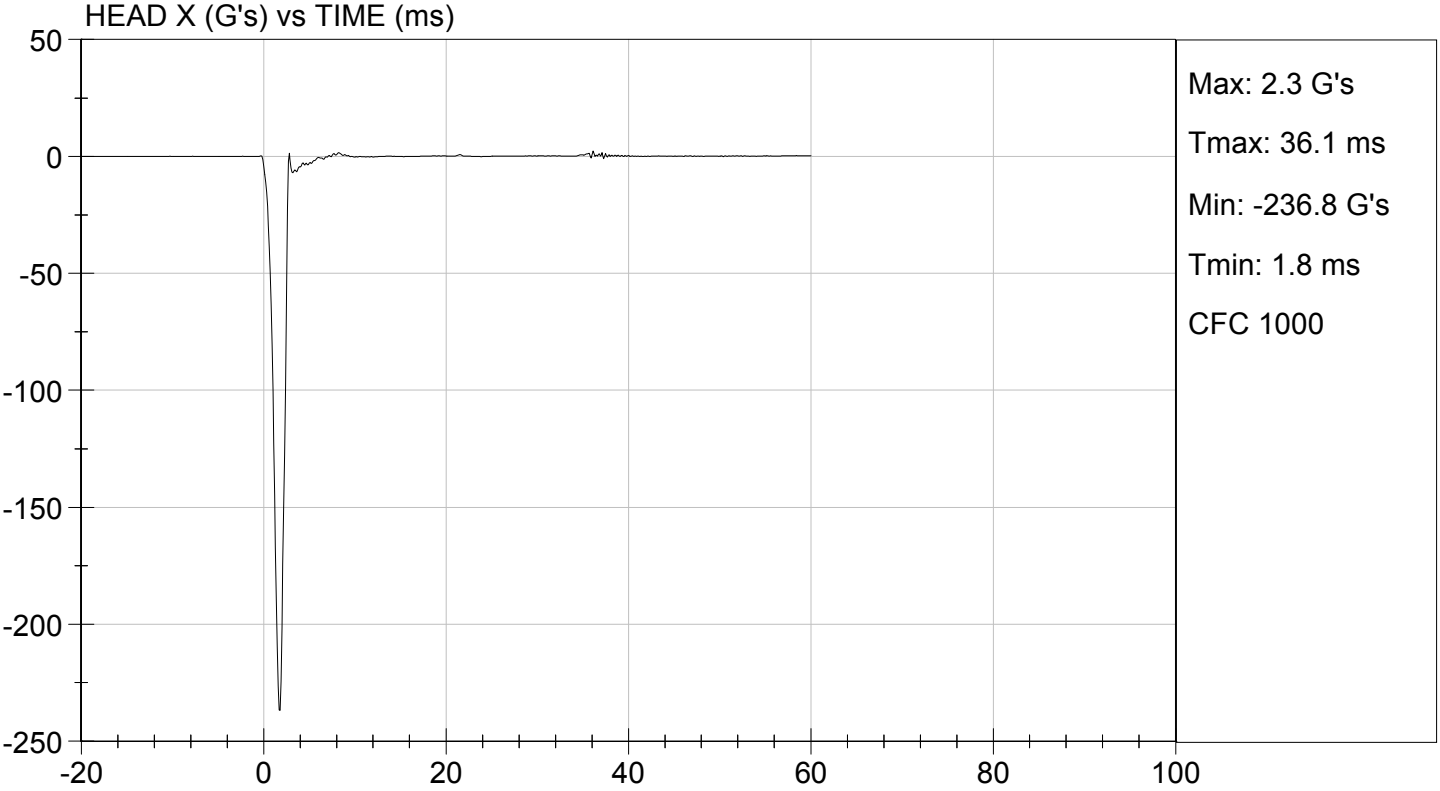
TEST DESC: HEAD DROP

TEST DATE: 10/01/2014
TEST #: D143441

HEAD RESULTANT ACCELERATION (G's) vs TIME (ms)



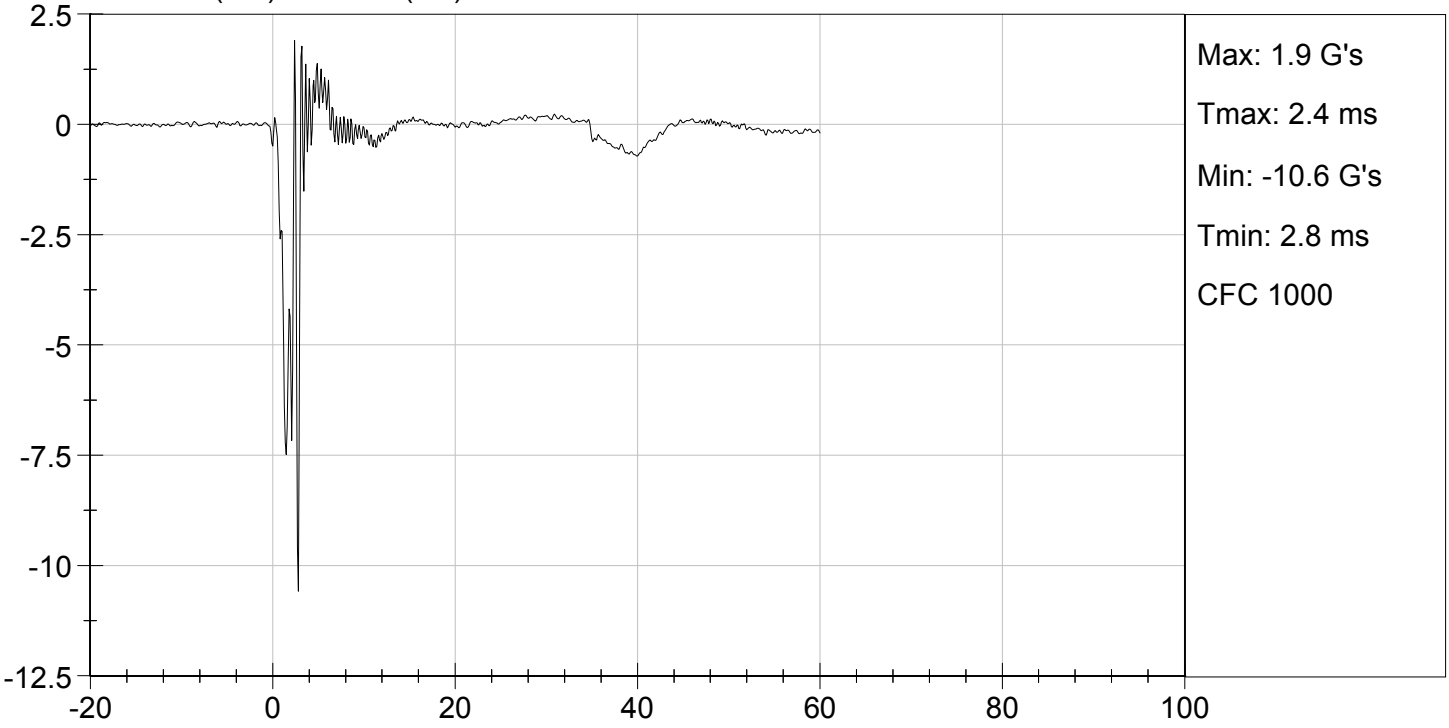
HEAD X (G's) vs TIME (ms)



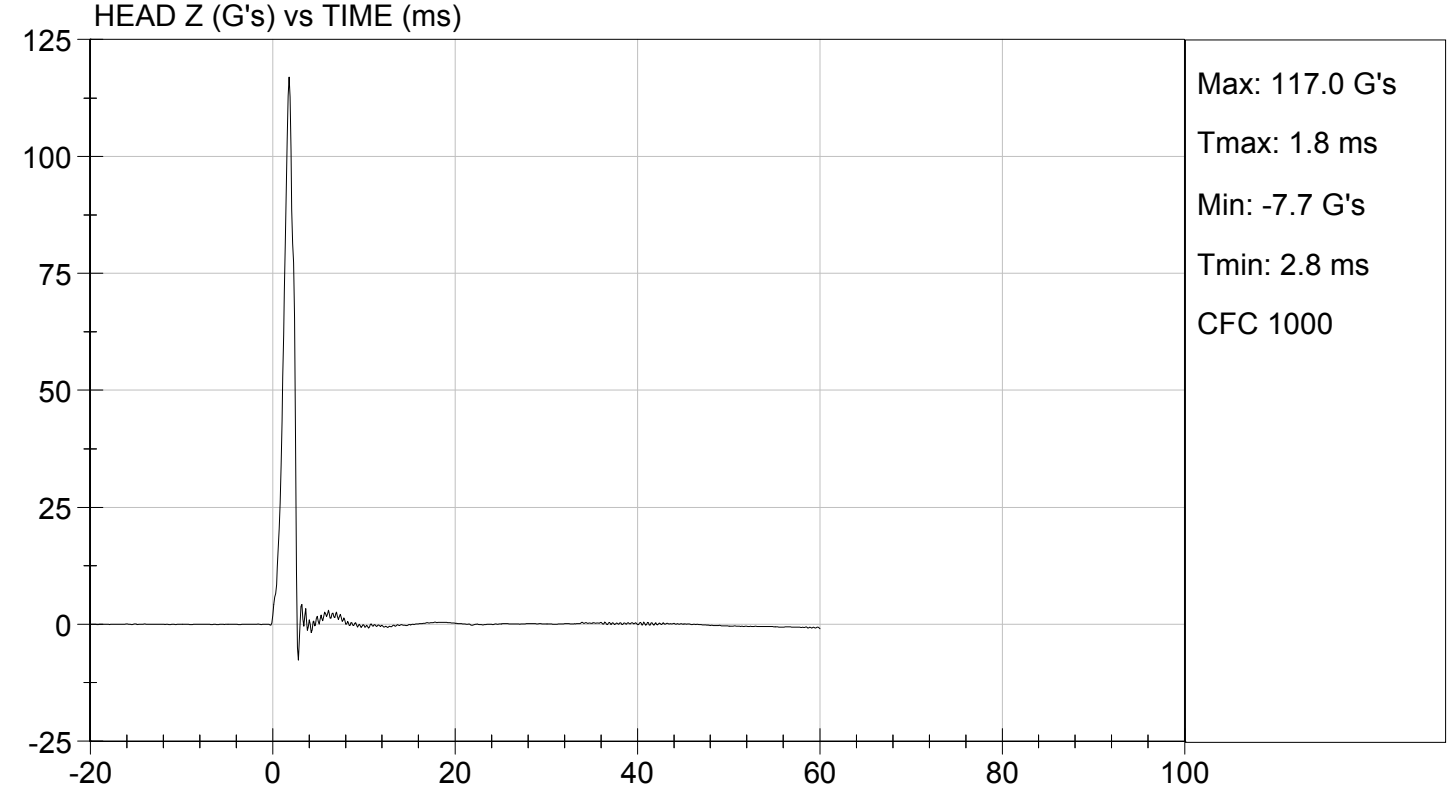
TEST DESC: HEAD DROP

TEST DATE: 10/01/2014
TEST #: D143441

HEAD Y (G's) vs TIME (ms)



HEAD Z (G's) vs TIME (ms)



MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D143442

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	47	Pass
Pendulum Velocity		m/s	6.89 to 7.13	6.96	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	23.23	Pass
	20 ms	G's	17.60 to 22.60	19.45	Pass
	30 ms	G's	12.50 to 18.50	14.76	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	14.8	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	38.8	Pass
Maximum "D" Plane Rotation	Maximum	Deg	64.0 to 78.0	65.7	Pass
	Time	ms	57.0 to 64.0	57.3	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	113.3	Pass
Moment About Occipital Condyle	Maximum	Nm	88.1 to 108.5	88.4	Pass
	Time	ms	47.0 to 58.0	52.0	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	99.2	Pass
			Overall Test Results		Pass

David Schoedel
Laboratory Technician

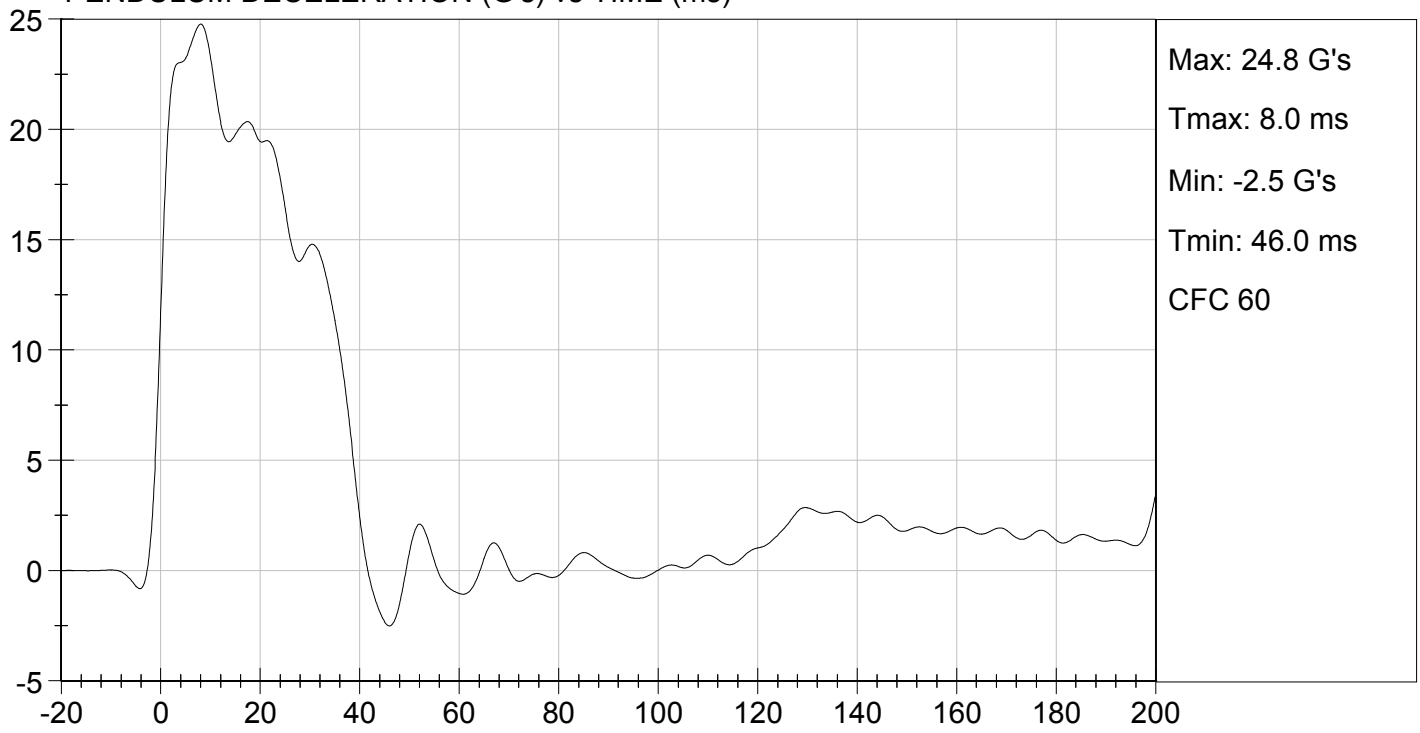
10/01/2014
Test Date

Jessica Gall
Approved By

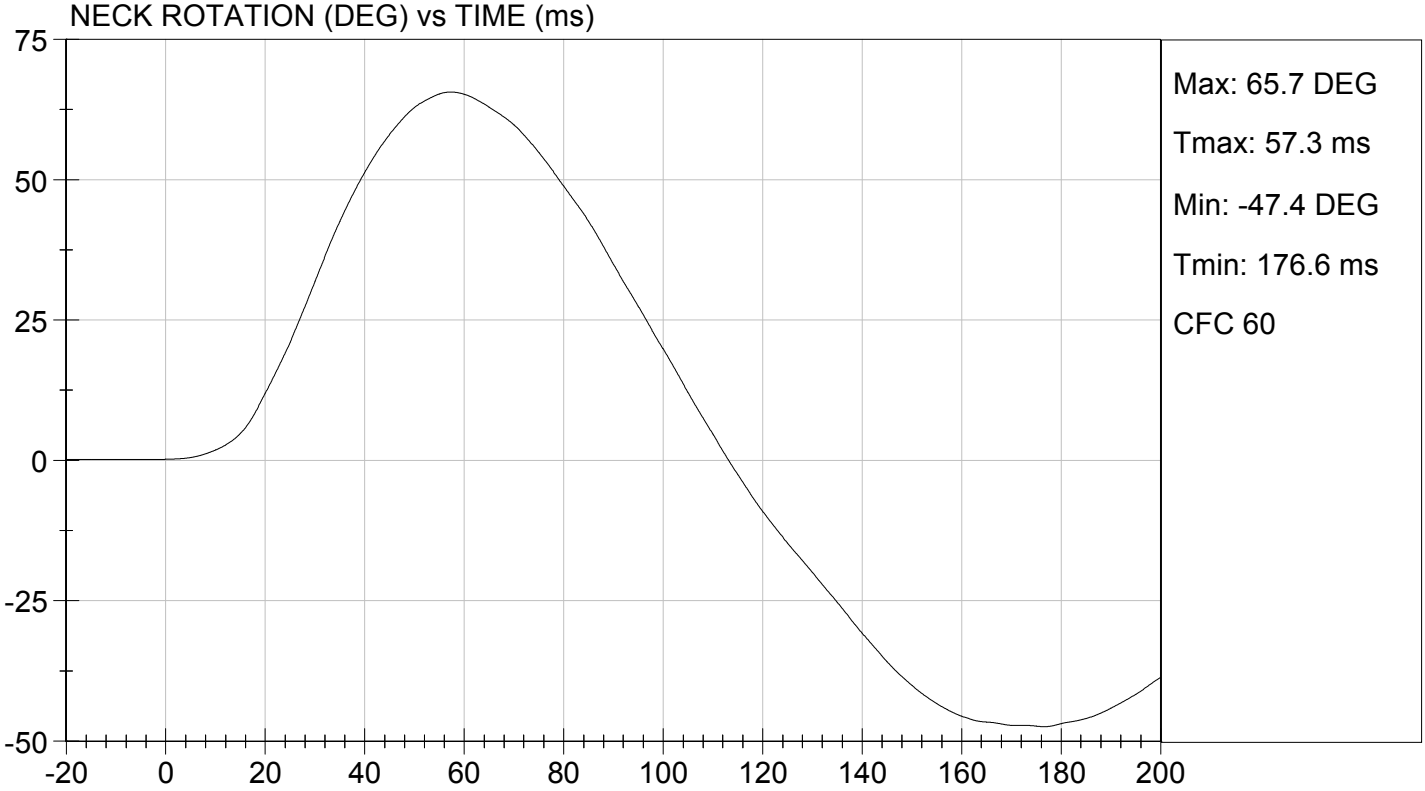
TEST DESC: NECK FLEXION
VELOCITY: 22.83 ft/s, 6.96 m/s

TEST DATE: 10/01/2014
TEST #: D143442

PENDULUM DECELERATION (G's) vs TIME (ms)



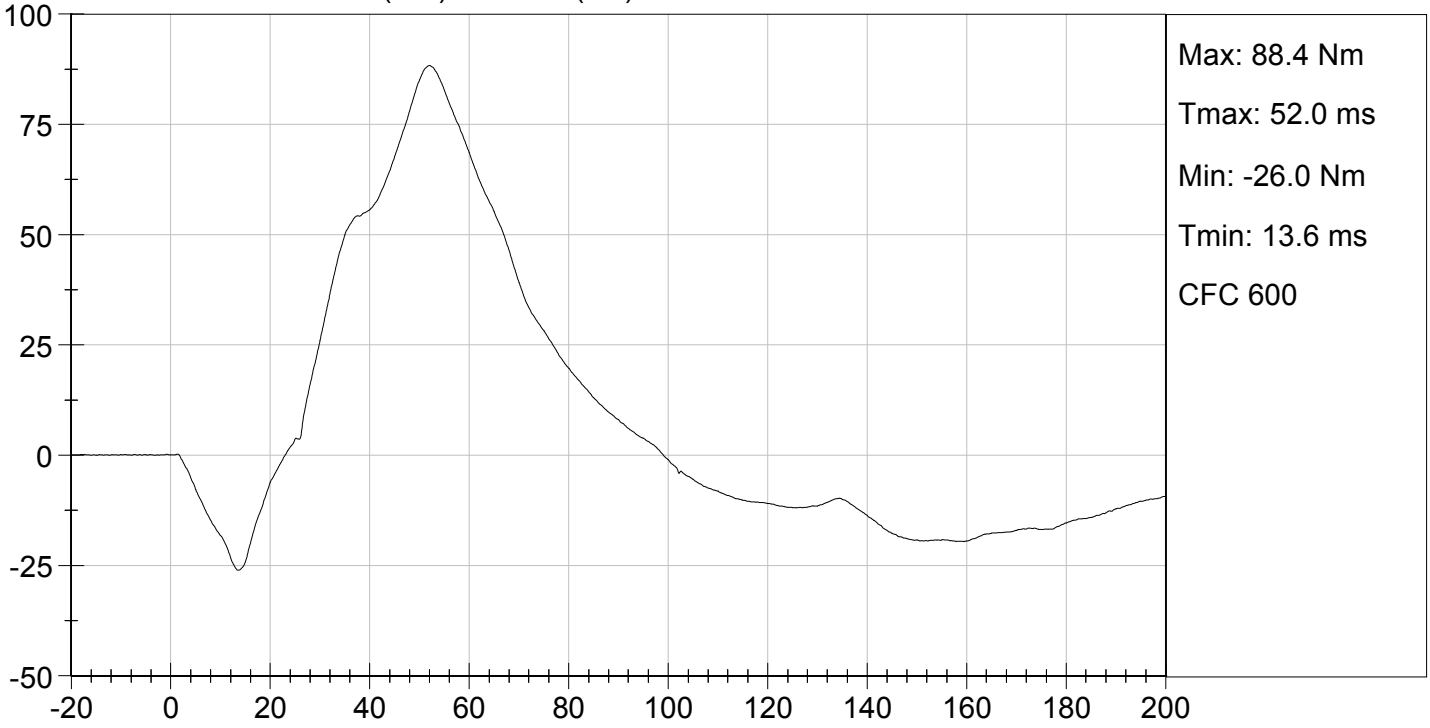
NECK ROTATION (DEG) vs TIME (ms)



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

TEST DATE: 10/01/2014
TEST #: D143442

OCCIPITAL MOMENT (Nm) vs TIME (ms)



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D143443

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	47	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.12	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	17.38	Pass
	20 ms	G's	14.00 to 19.00	15.24	Pass
	30 ms	G's	11.00 to 16.00	12.78	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	12.8	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	41.3	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	94.1	Pass
	Time	ms	72.0 to 82.0	77.4	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	156.6	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-55.3	Pass
	Time	ms	65.0 to 79.0	71.6	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	145.3	Pass
			Overall Test Results		Pass

David Schoedel
Laboratory Technician

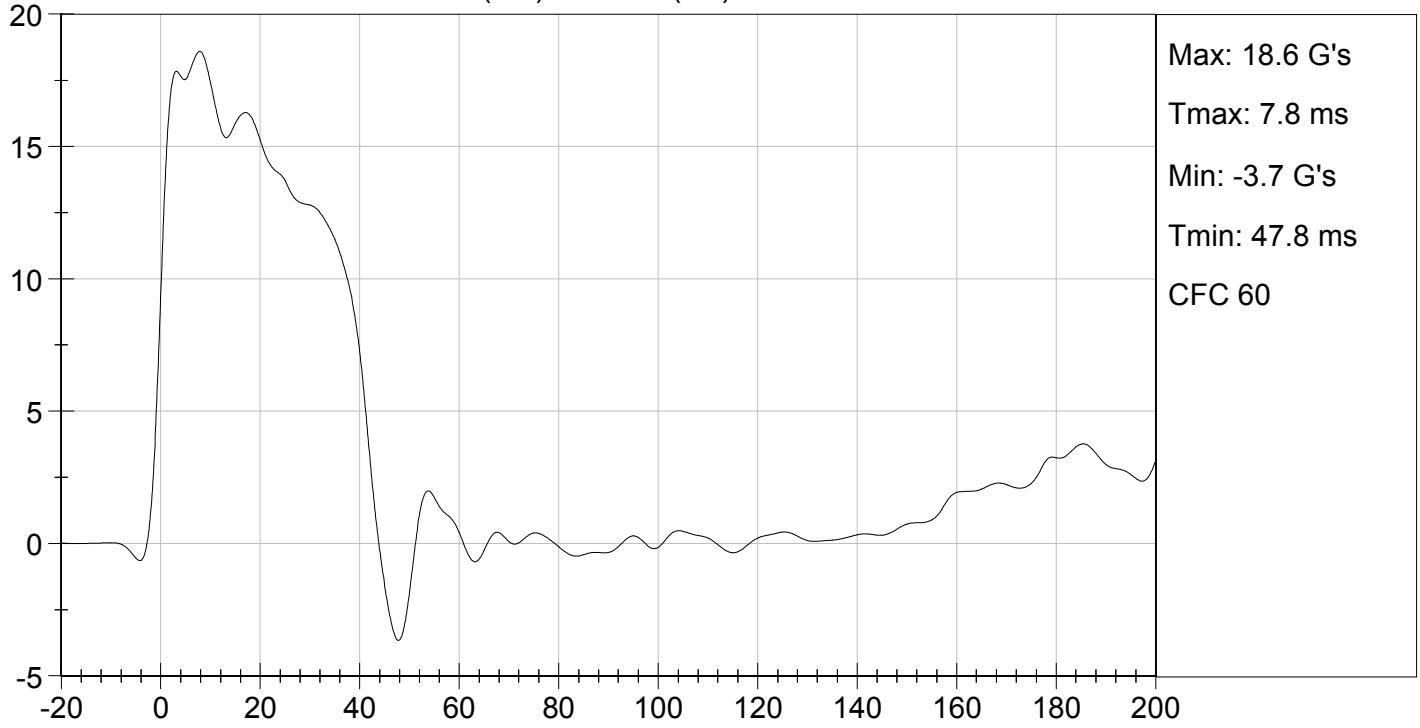
10/01/2014
Test Date

Jessica Gall
Approved By

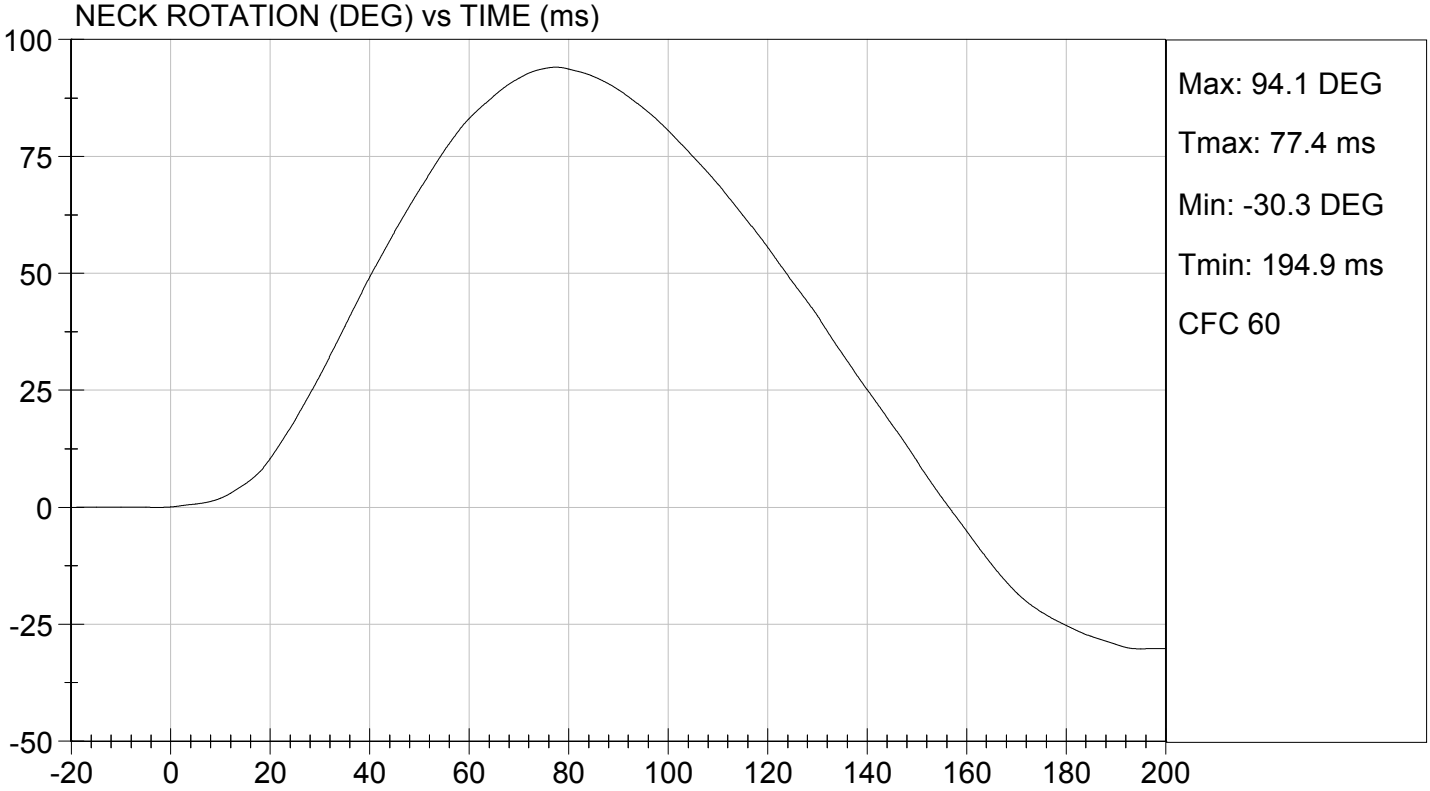
TEST DESC: NECK EXTENSION
VELOCITY: 20.08 ft/s, 6.12 m/s

TEST DATE: 10/01/2014
TEST #: D143443

PENDULUM DECELERATION (G's) vs TIME (ms)

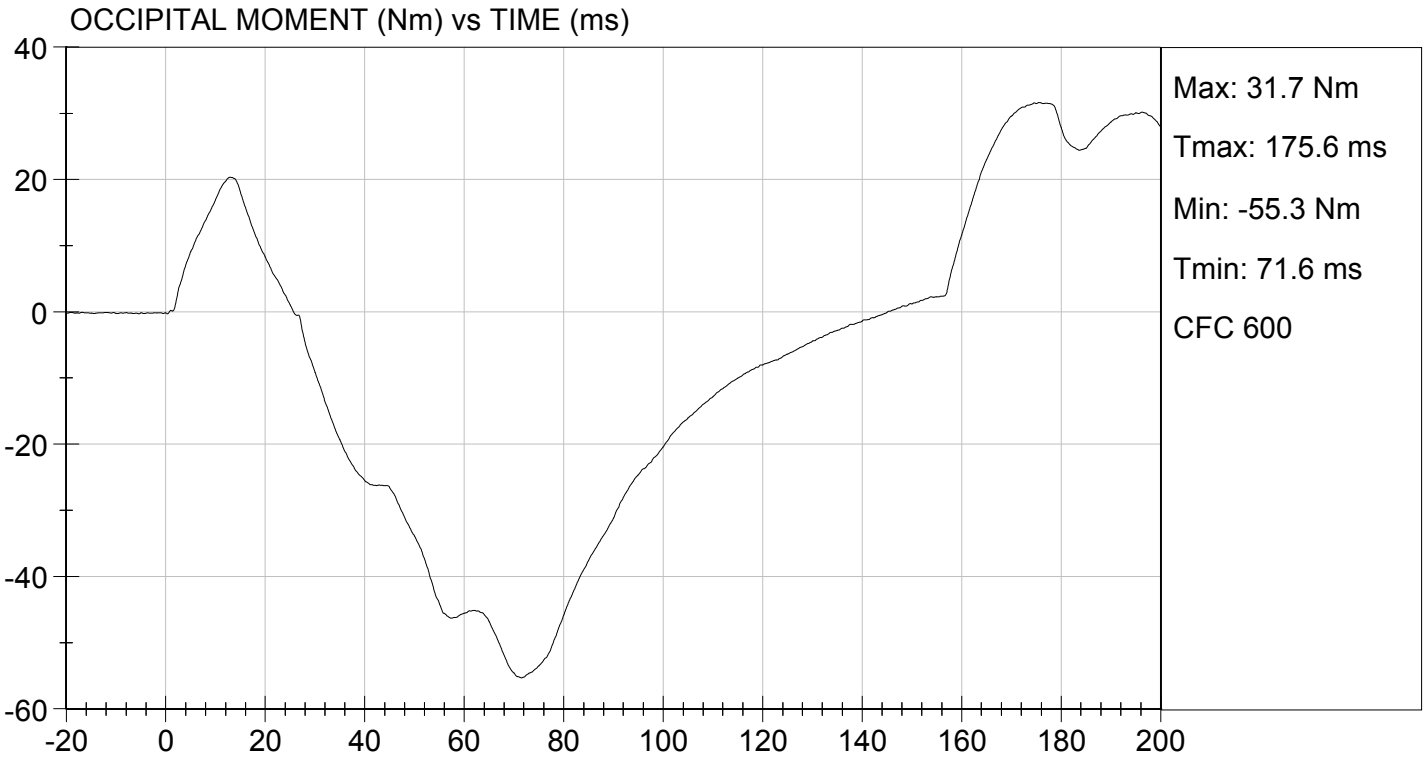


NECK ROTATION (DEG) vs TIME (ms)



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

TEST DATE: 10/01/2014
TEST #: D143443



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D143444

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	48	Pass
Probe Velocity	m/s	6.58 to 6.82	6.77	Pass
Peak Probe Force	N	5159 to 5893	5,213	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.68	Pass
Internal Hysteresis	%	69 to 85	69	Pass
		Overall Test Results		Pass

Jack Coleman
Laboratory Technician

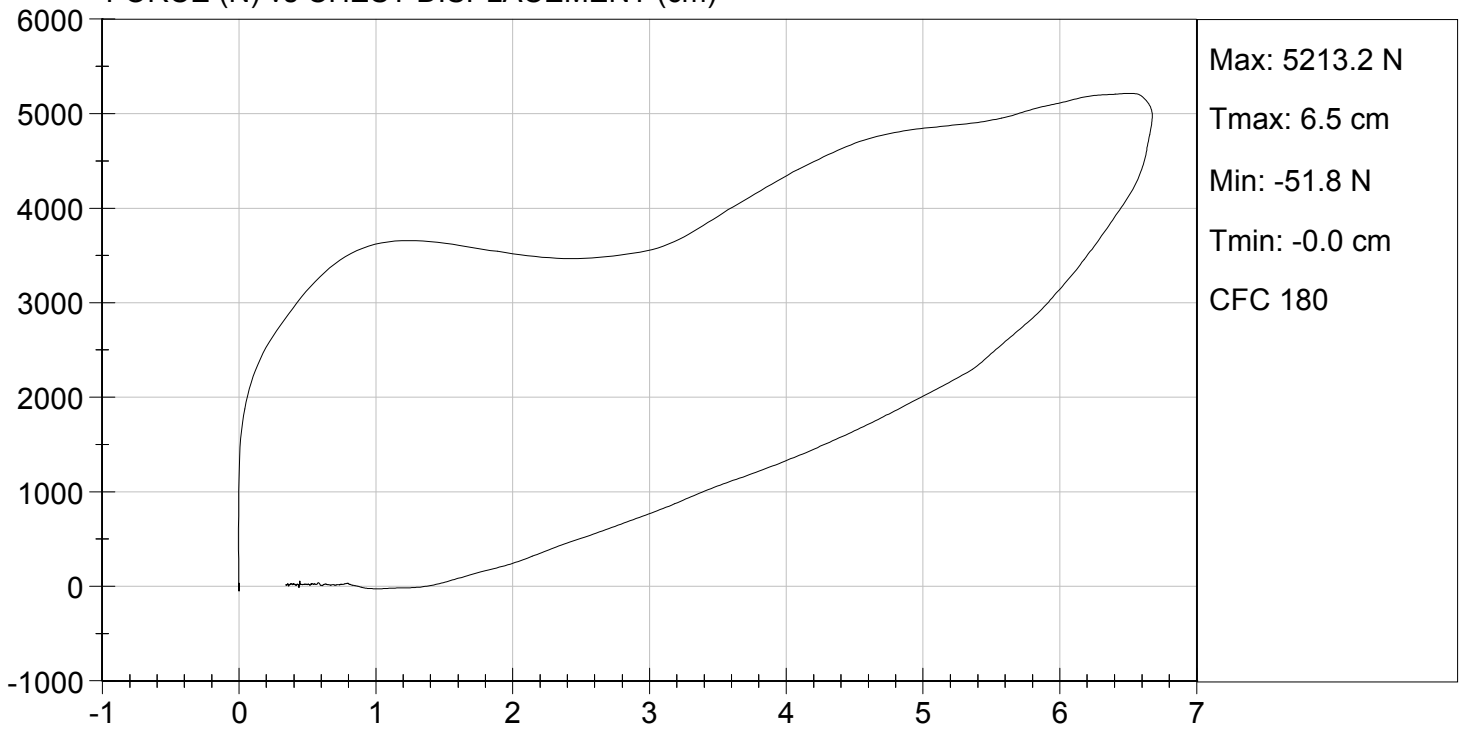
10/02/2014
Test Date

Jessica Hall
Approved By

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

TEST DATE: 10/02/2014
TEST #: D143444

FORCE (N) vs CHEST DISPLACEMENT (cm)



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D143445

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	20.9	Pass
Laboratory Relative Humidity	%	10 to 70	49	Pass
Probe Velocity	m/s	2.07 to 2.13	2.11	Pass
Peak Probe Force	N	4715 to 5782	5,430	Pass
		Overall Test Results		Pass

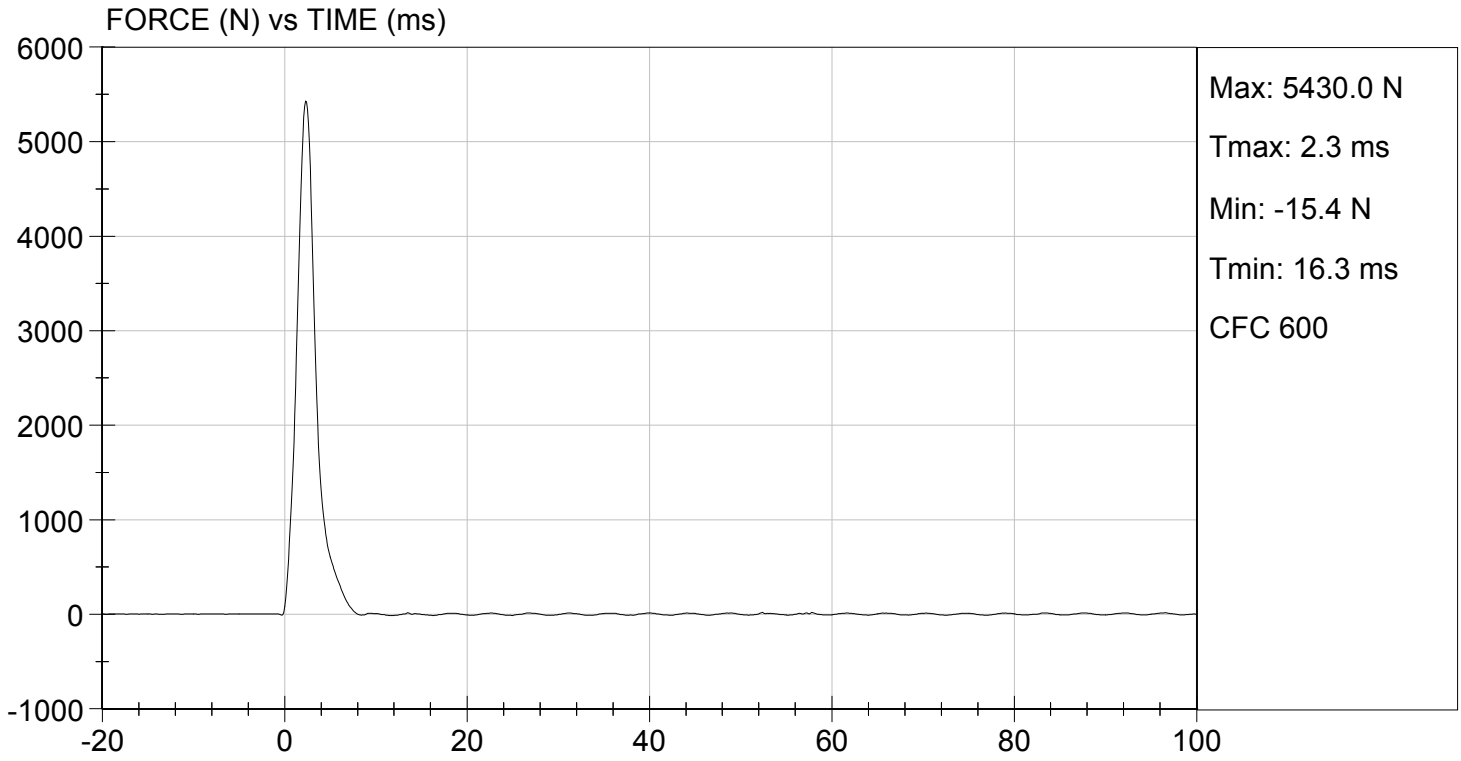
Maxime Chamberland
Laboratory Technician

10/01/2014
Test Date

Jessica Hall
Approved By

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

TEST DATE: 10/01/2014
TEST #: D143445



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D143446

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	20.4	Pass
Laboratory Relative Humidity	%	10 to 70	48	Pass
Probe Velocity	m/s	2.07 to 2.13	2.11	Pass
Peak Probe Force	N	4715 to 5782	4,967	Pass
		Overall Test Results		Pass

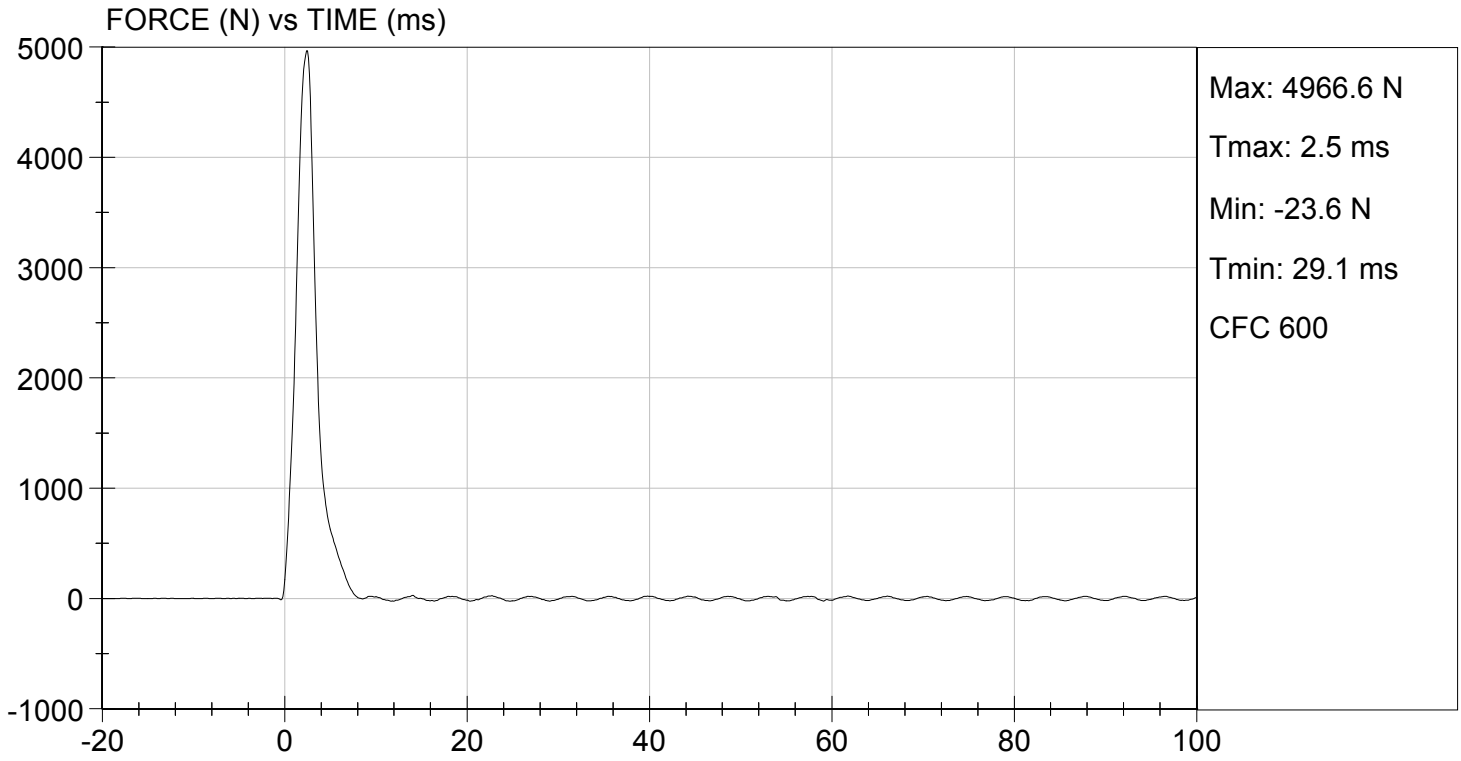
Maxime Chamberland
Laboratory Technician

10/01/2014
Test Date

Jessica Gall
Approved By

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

TEST DATE: 10/01/2014
TEST #: D143446



MGA RESEARCH CORPORATION

HIP-FEMUR FLEXION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D143440

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.7	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	47	47	Pass
Rotation Rate	deg/s	5.0 to 10.0	6.3	6.3	Pass
30 Degrees	Nm	94.9 Nm Max	51.4	65.5	Pass
150 ft-lbf / 203.4 Nm	Deg	40.0 to 50.0 Degree Max Rotation	49.2	46.8	Pass
		Overall Test Results			Pass

Jack Coleman
Laboratory Technician

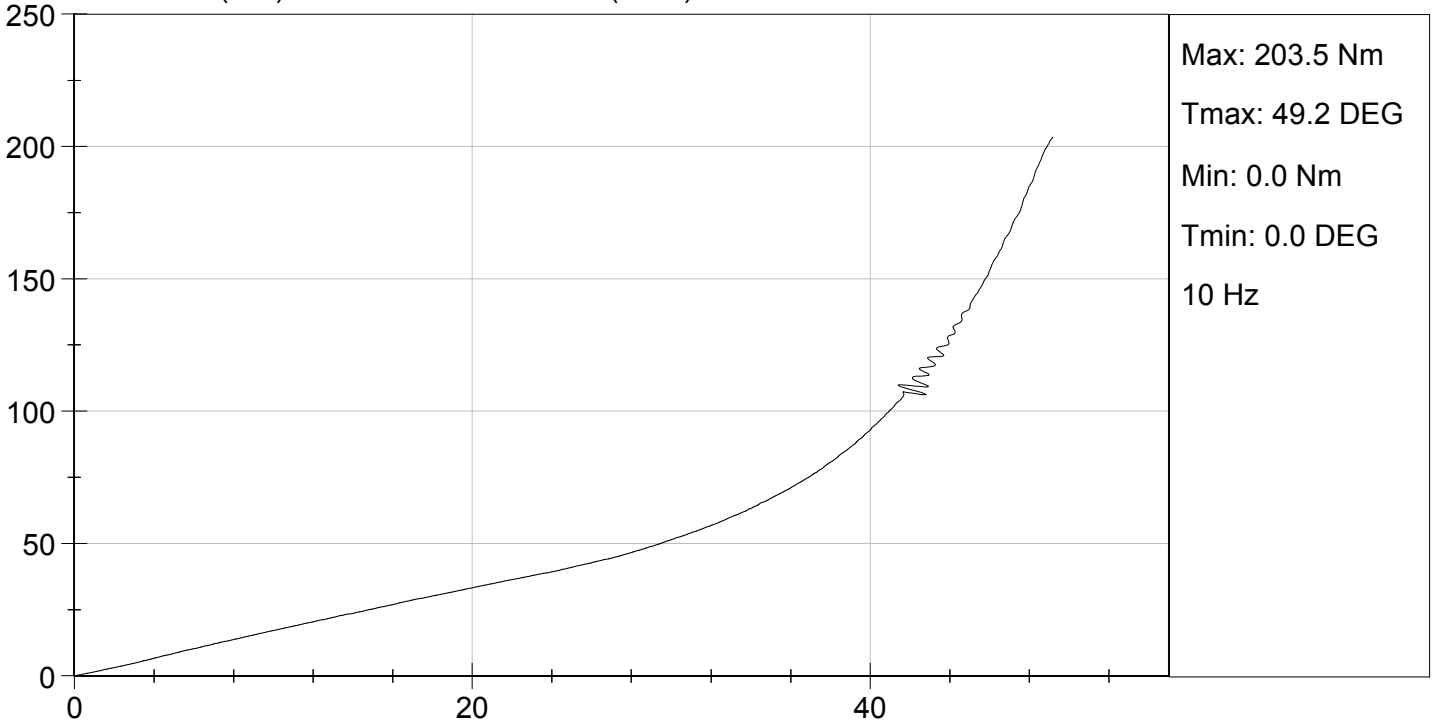
10/01/2014
Test Date

Jessica Hall
Approved By

TEST DESC: RIGHT HIP FEMUR FLEXION

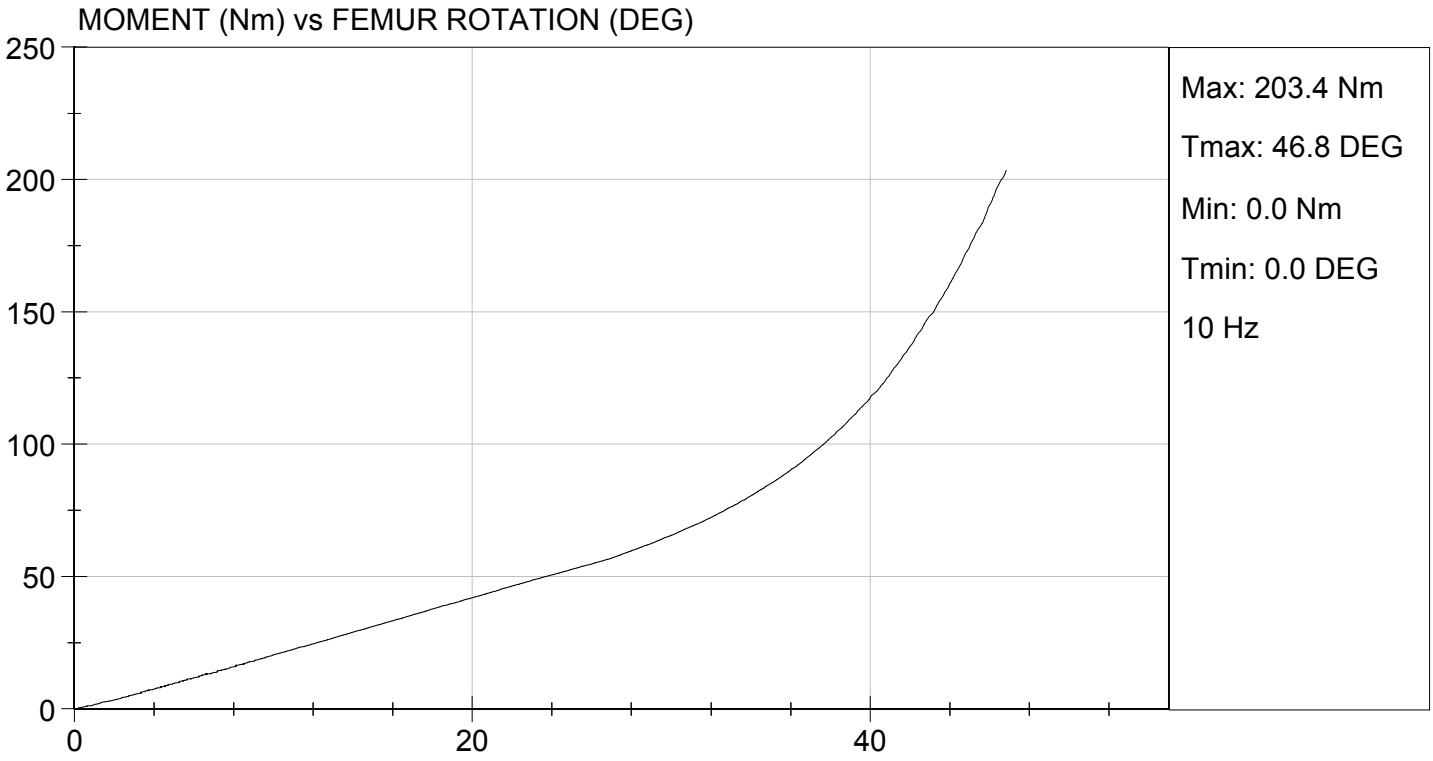
TEST DATE: 10/01/2014
TEST #: D143449

MOMENT (Nm) vs FEMUR ROTATION (DEG)



TEST DESC: LEFT HIP FEMUR FLEXION

TEST DATE: 10/01/2014
TEST #: D143440



MGA RESEARCH CORPORATION

HEAD DROP TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test ID:** D143631

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	47	Pass
Peak Resultant Acceleration	G's	225 to 275	271	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-7.6	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
		Overall Test Results		Pass

David Schoedel
Laboratory Technician

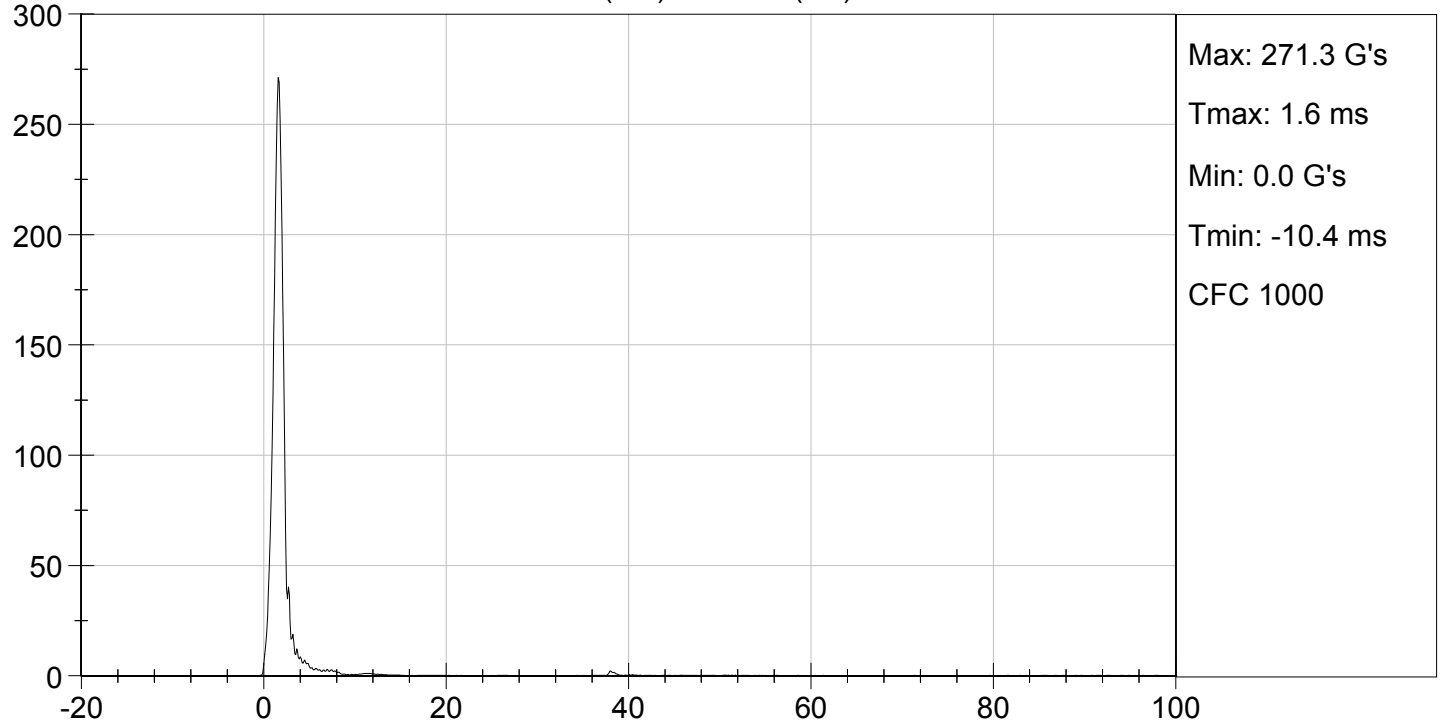
10/15/2014
Test Date

Jessica Gall
Approved By

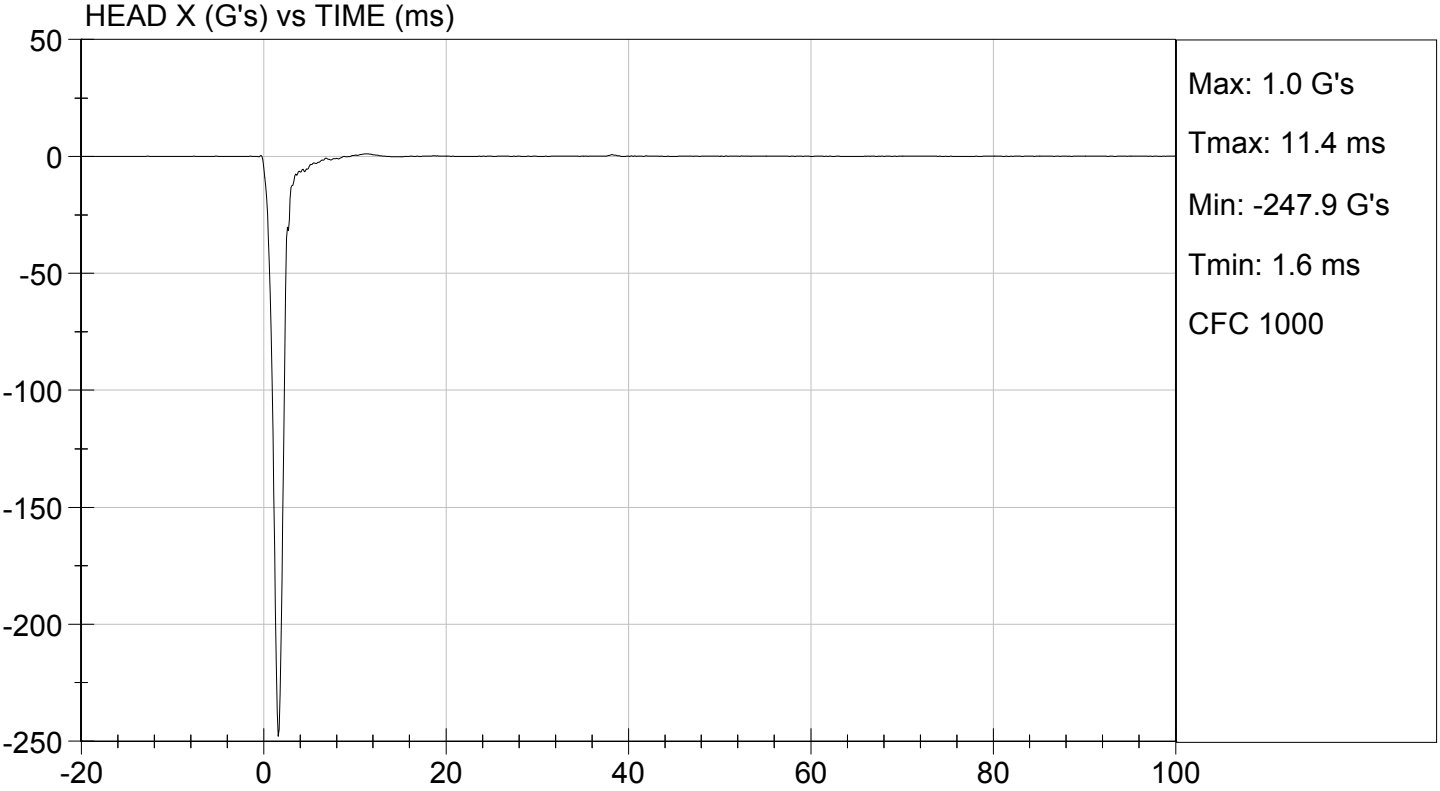
TEST DESC: HEAD DROP

TEST DATE: 10/15/2014
TEST #: D143631

HEAD RESULTANT ACCELERATION (G's) vs TIME (ms)



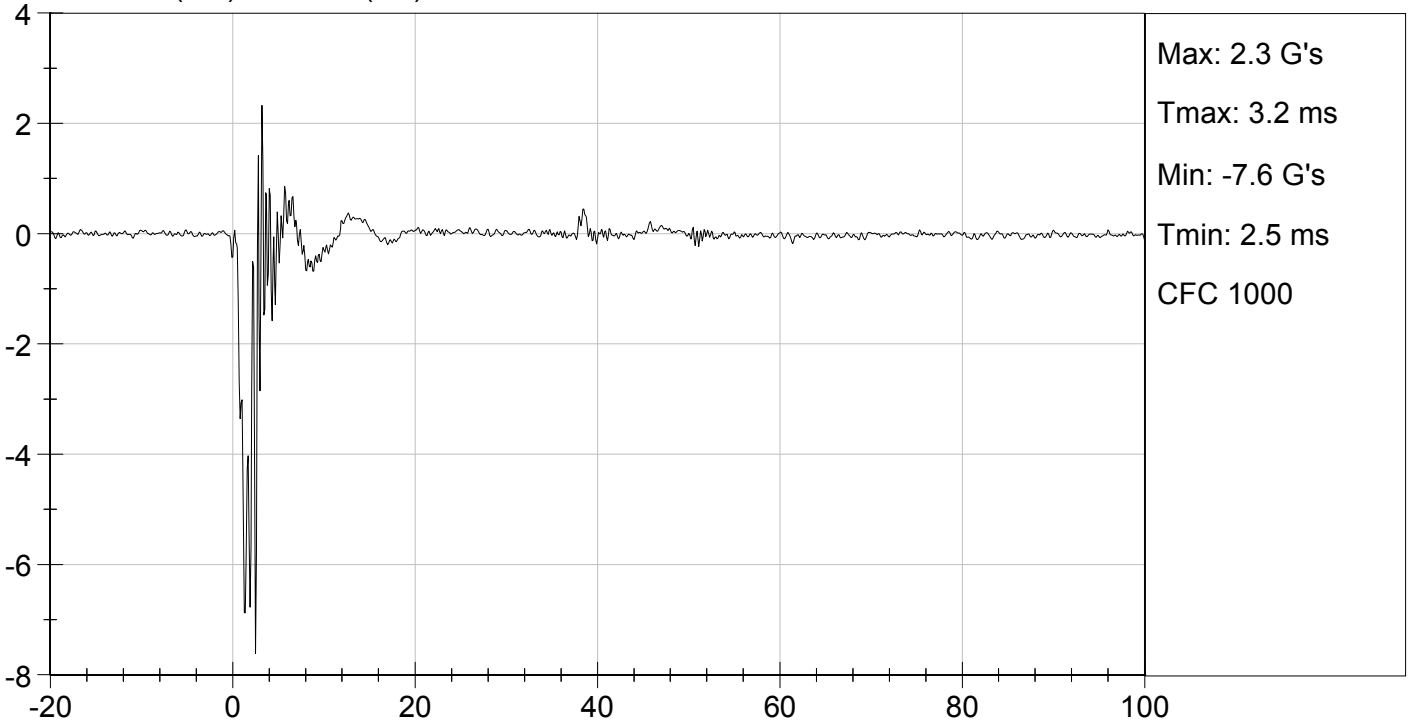
HEAD X (G's) vs TIME (ms)



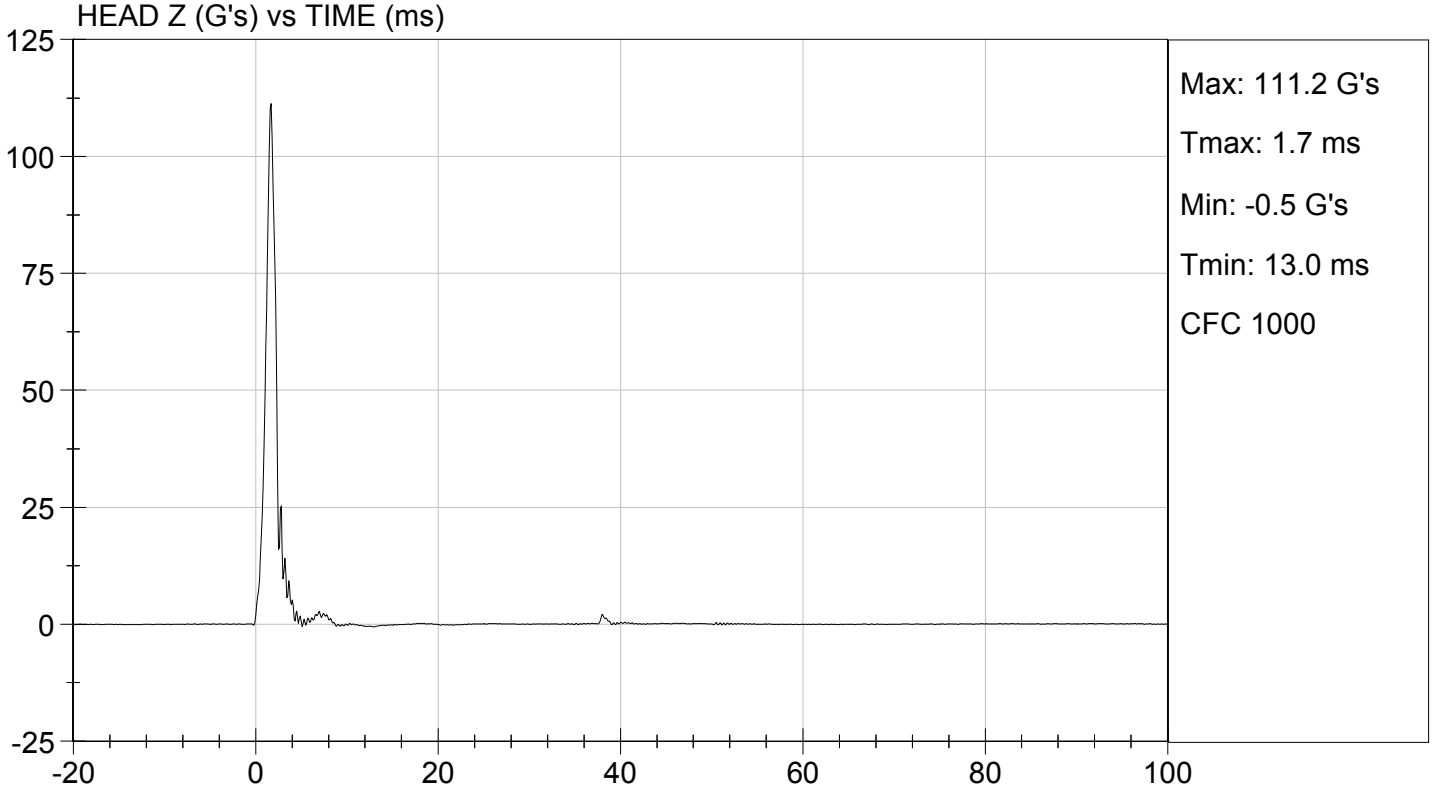
TEST DESC: HEAD DROP

TEST DATE: 10/15/2014
TEST #: D143631

HEAD Y (G's) vs TIME (ms)



HEAD Z (G's) vs TIME (ms)



MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D143632

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	45	Pass
Pendulum Velocity		m/s	6.89 to 7.13	6.96	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	23.06	Pass
	20 ms	G's	17.60 to 22.60	17.64	Pass
	30 ms	G's	12.50 to 18.50	13.40	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	13.4	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	41.4	Pass
Maximum "D" Plane Rotation	Maximum	Deg	64.0 to 78.0	68.6	Pass
	Time	ms	57.0 to 64.0	57.1	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	115.6	Pass
Moment About Occipital Condyle	Maximum	Nm	88.1 to 108.5	91.2	Pass
	Time	ms	47.0 to 58.0	54.7	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	100.7	Pass
			Overall Test Results		Pass

David Schoedel
Laboratory Technician

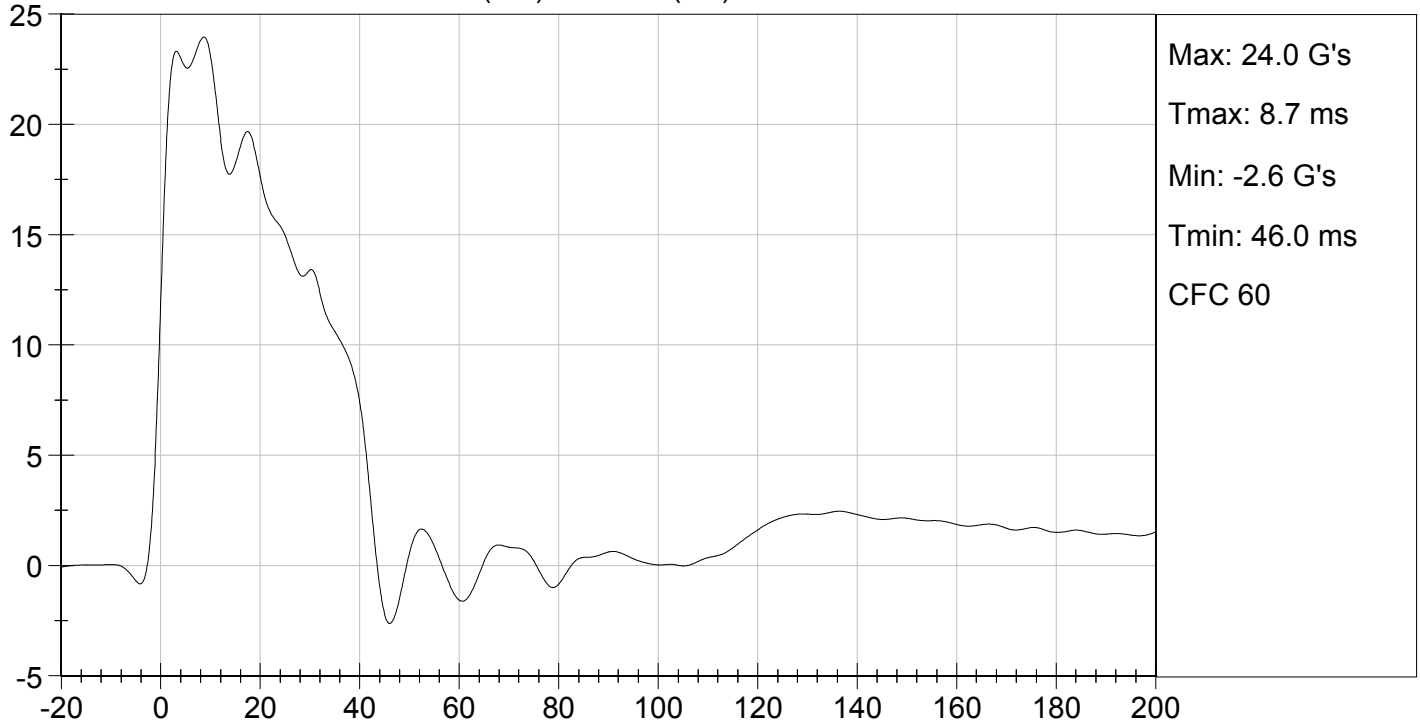
10/15/2014
Test Date

Jessica Hall
Approved By

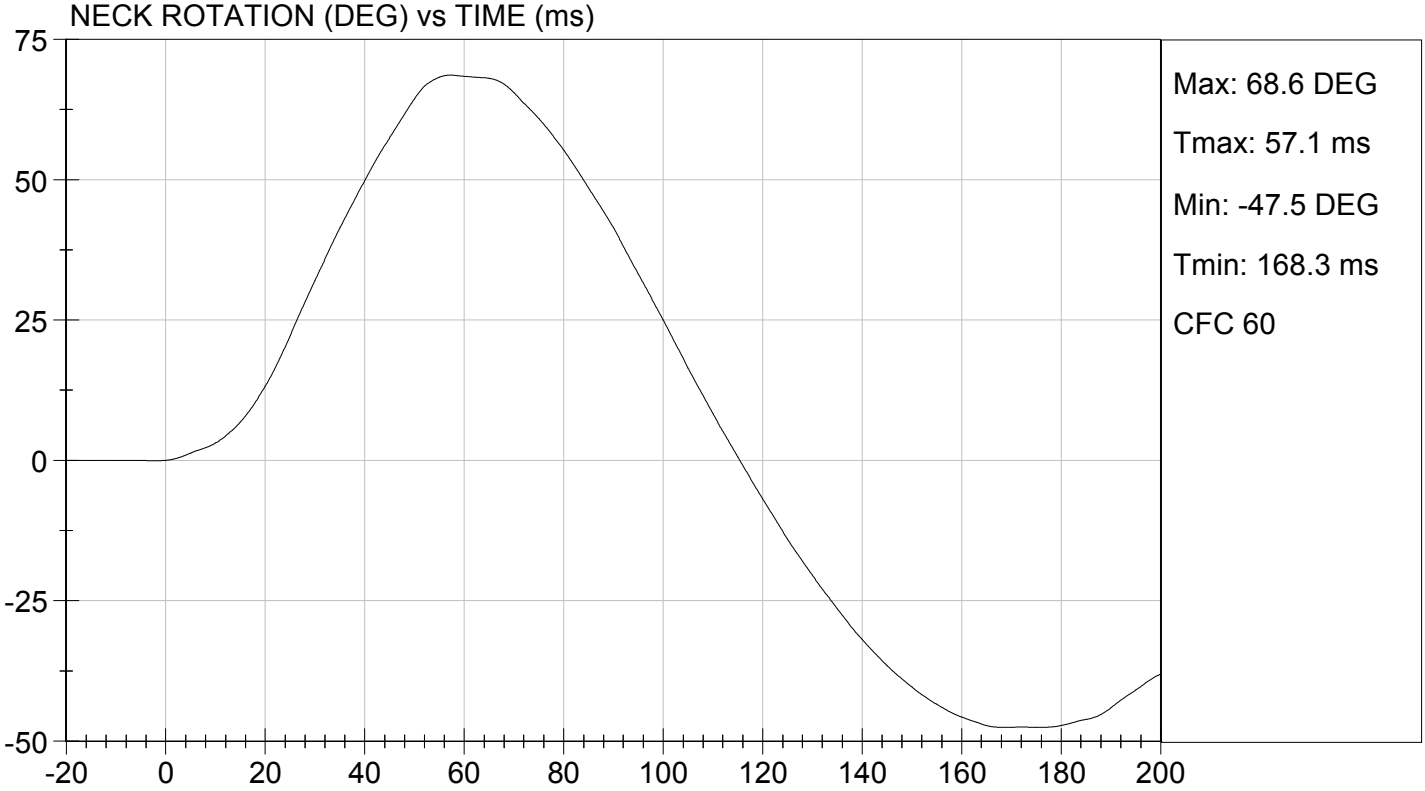
TEST DESC: NECK FLEXION
VELOCITY: 22.83 ft/s, 6.96 m/s

TEST DATE: 10/15/2014
TEST #: D143632

PENDULUM DECELERATION (G's) vs TIME (ms)



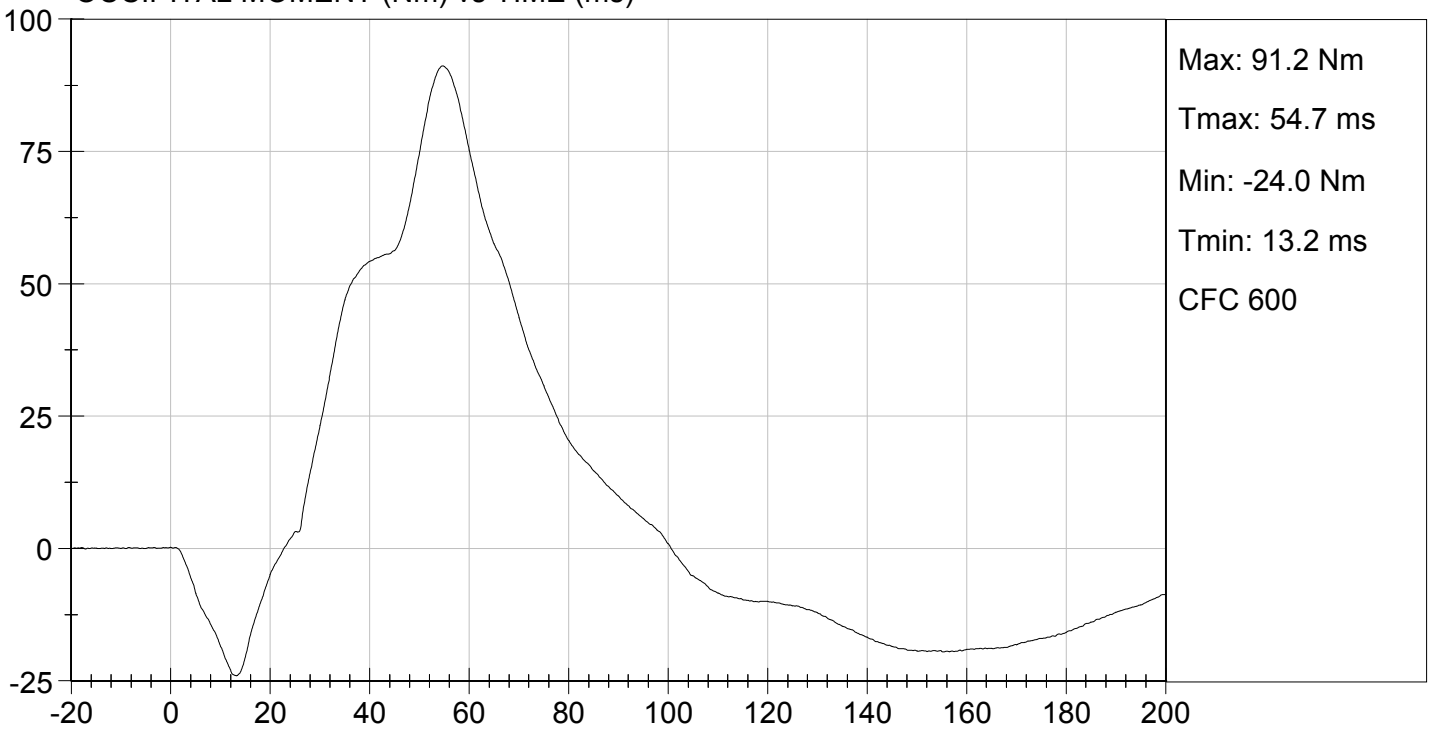
NECK ROTATION (DEG) vs TIME (ms)



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

TEST DATE: 10/15/2014
TEST #: D143632

OCCIPITAL MOMENT (Nm) vs TIME (ms)



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D143633

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	45	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.05	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	18.37	Pass
	20 ms	G's	14.00 to 19.00	14.70	Pass
	30 ms	G's	11.00 to 16.00	13.71	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	13.7	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	42.3	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	95.3	Pass
	Time	ms	72.0 to 82.0	78.0	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	156.9	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-56.5	Pass
	Time	ms	65.0 to 79.0	72.5	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	144.8	Pass
			Overall Test Results		Pass

David Schoedel
Laboratory Technician

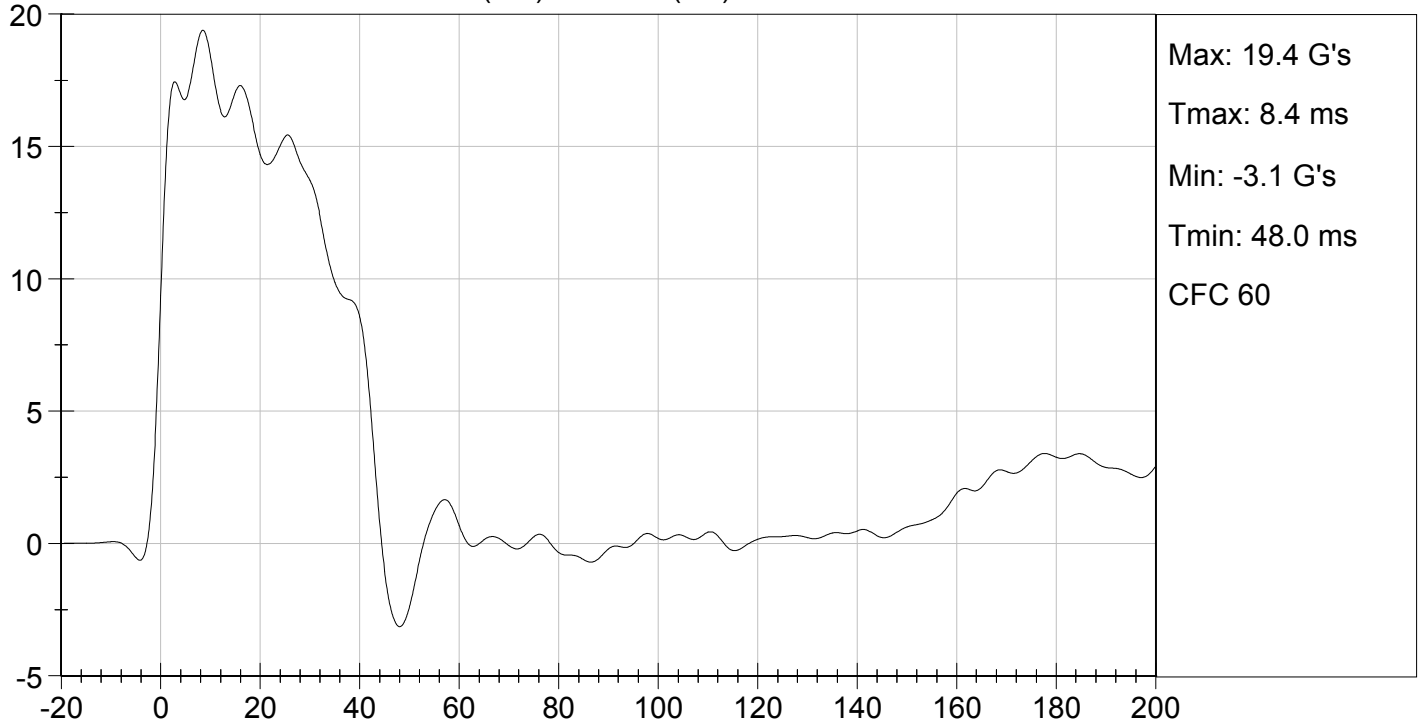
10/15/2014
Test Date

Jessica Gall
Approved By

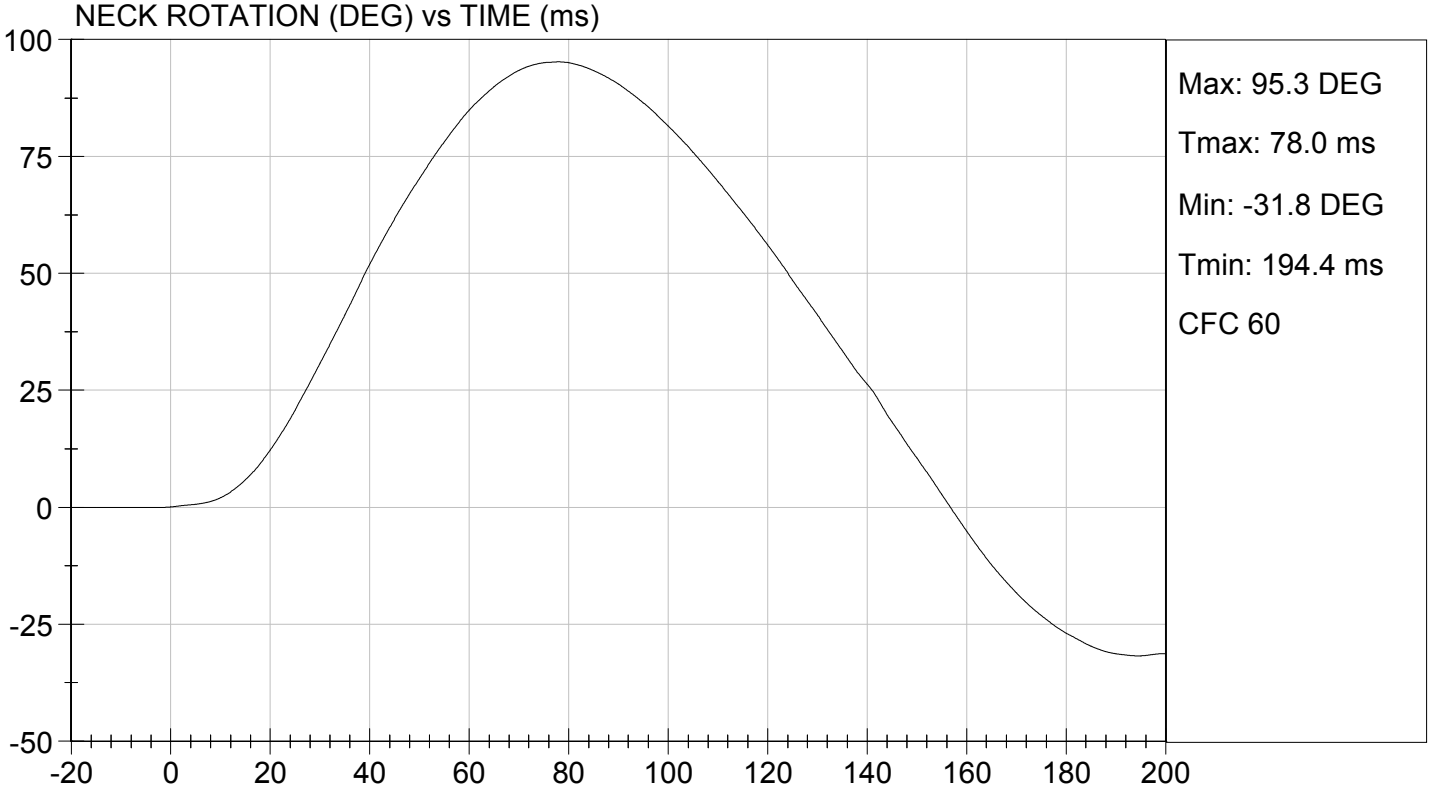
TEST DESC: NECK EXTENSION
VELOCITY: 19.84 ft/s, 6.05 m/s

TEST DATE: 10/15/2014
TEST #: D143633

PENDULUM DECELERATION (G's) vs TIME (ms)

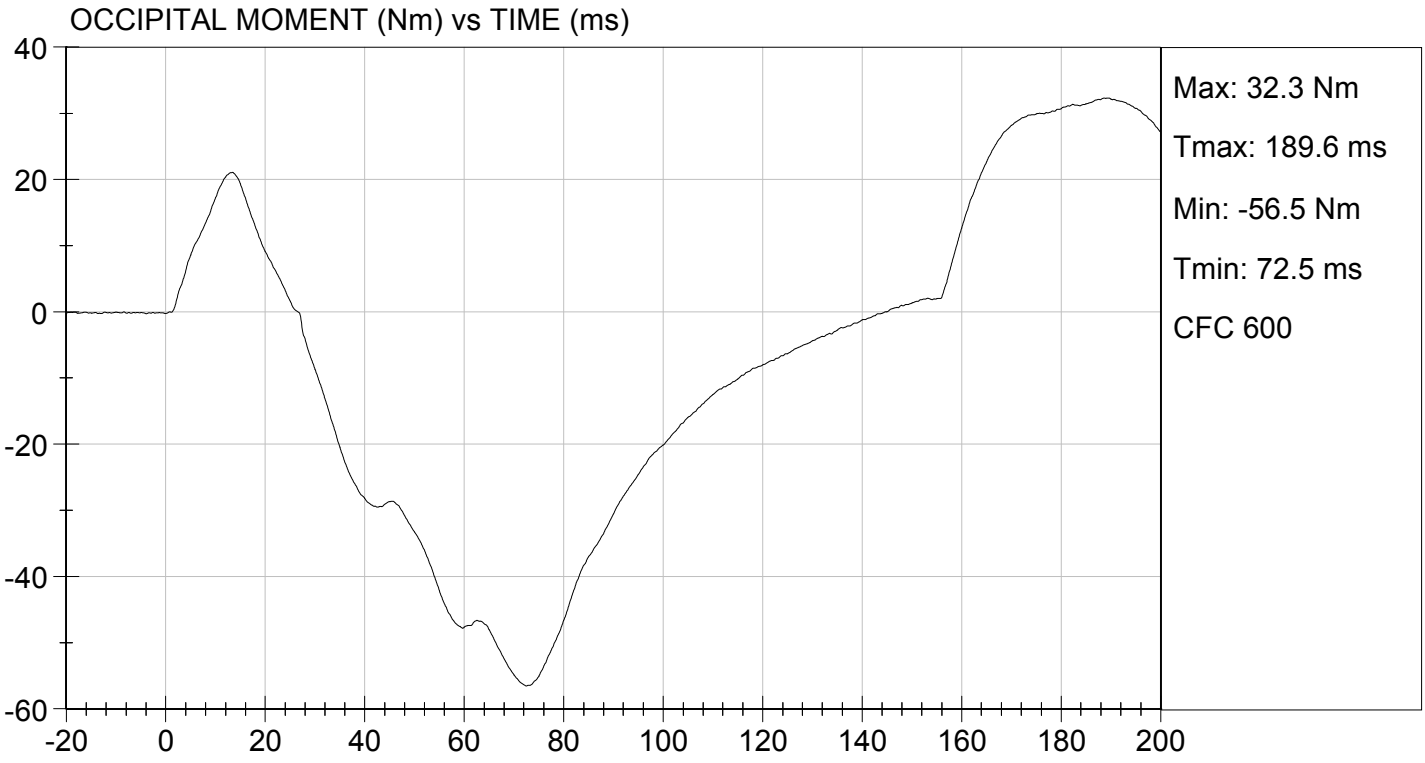


NECK ROTATION (DEG) vs TIME (ms)



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

TEST DATE: 10/15/2014
TEST #: D143633



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D143634

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	22.1	Pass
Laboratory Relative Humidity	%	10 to 70	50	Pass
Probe Velocity	m/s	6.58 to 6.82	6.77	Pass
Peak Probe Force	N	5159 to 5893	5,274	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.62	Pass
Internal Hysteresis	%	69 to 85	69	Pass
		Overall Test Results		Pass

Maxime Chamberland
Laboratory Technician

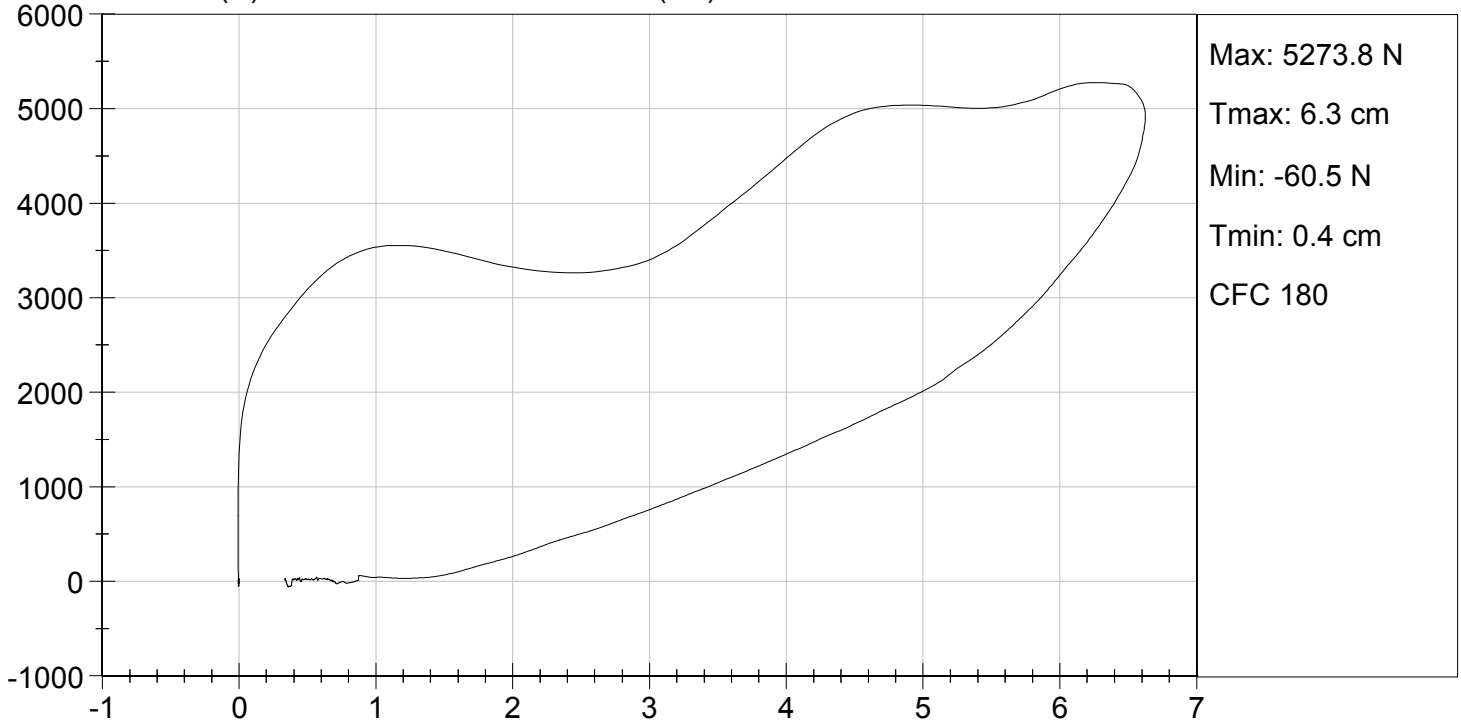
10/16/2014
Test Date

Jessica Hall
Approved By

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

TEST DATE: 10/16/2014
TEST #: D143634

FORCE (N) vs CHEST DISPLACEMENT (cm)



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D143635

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 Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	N	4715 to 5782	5,186	Pass
		Overall Test Results		Pass

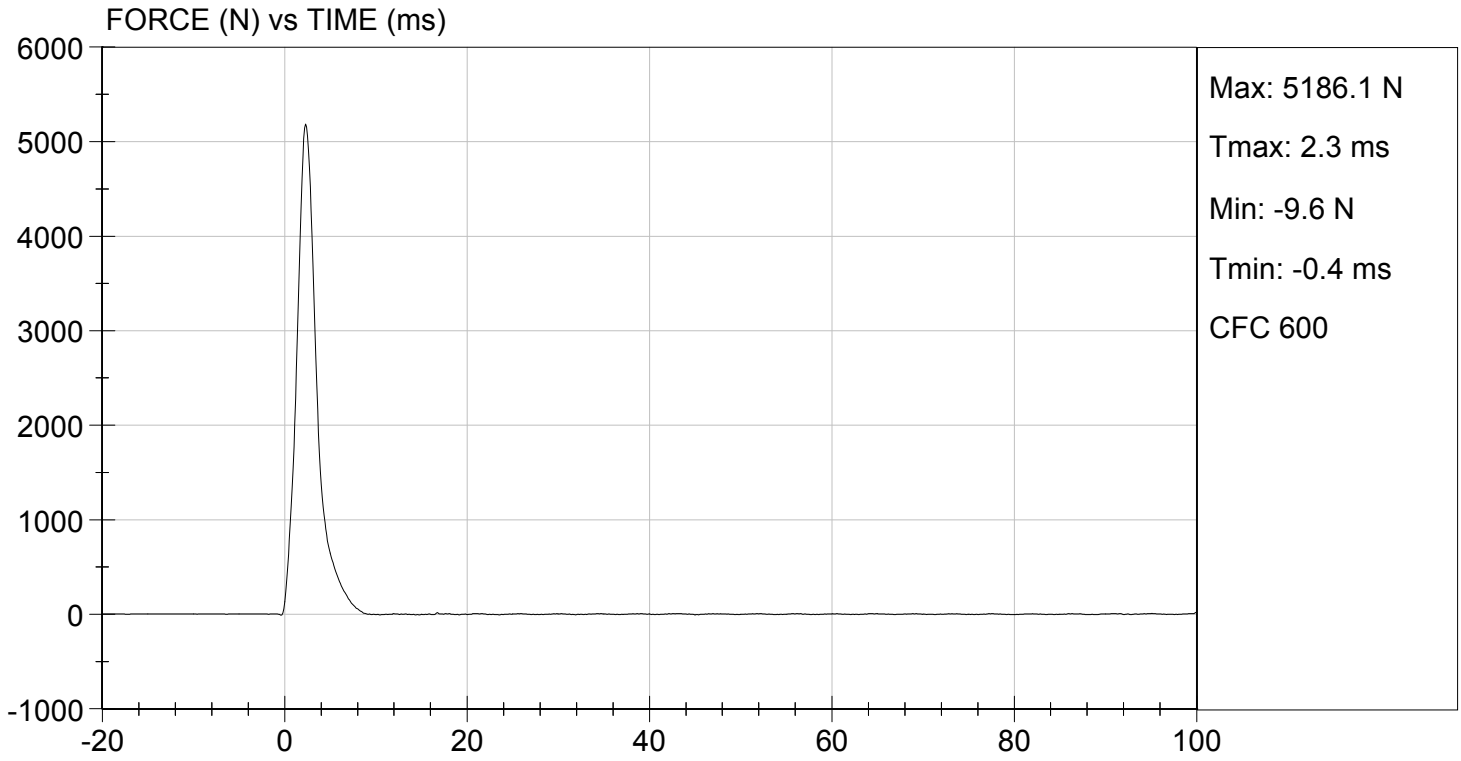
David Schoedel
Laboratory Technician

10/15/2014
Test Date

Jessica Hall
Approved By

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

TEST DATE: 10/15/2014
TEST #: D143635



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D143636

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 Velocity	m/s	2.07 to 2.13	2.13	Pass
Peak Probe Force	N	4715 to 5782	5,354	Pass
		Overall Test Results		Pass

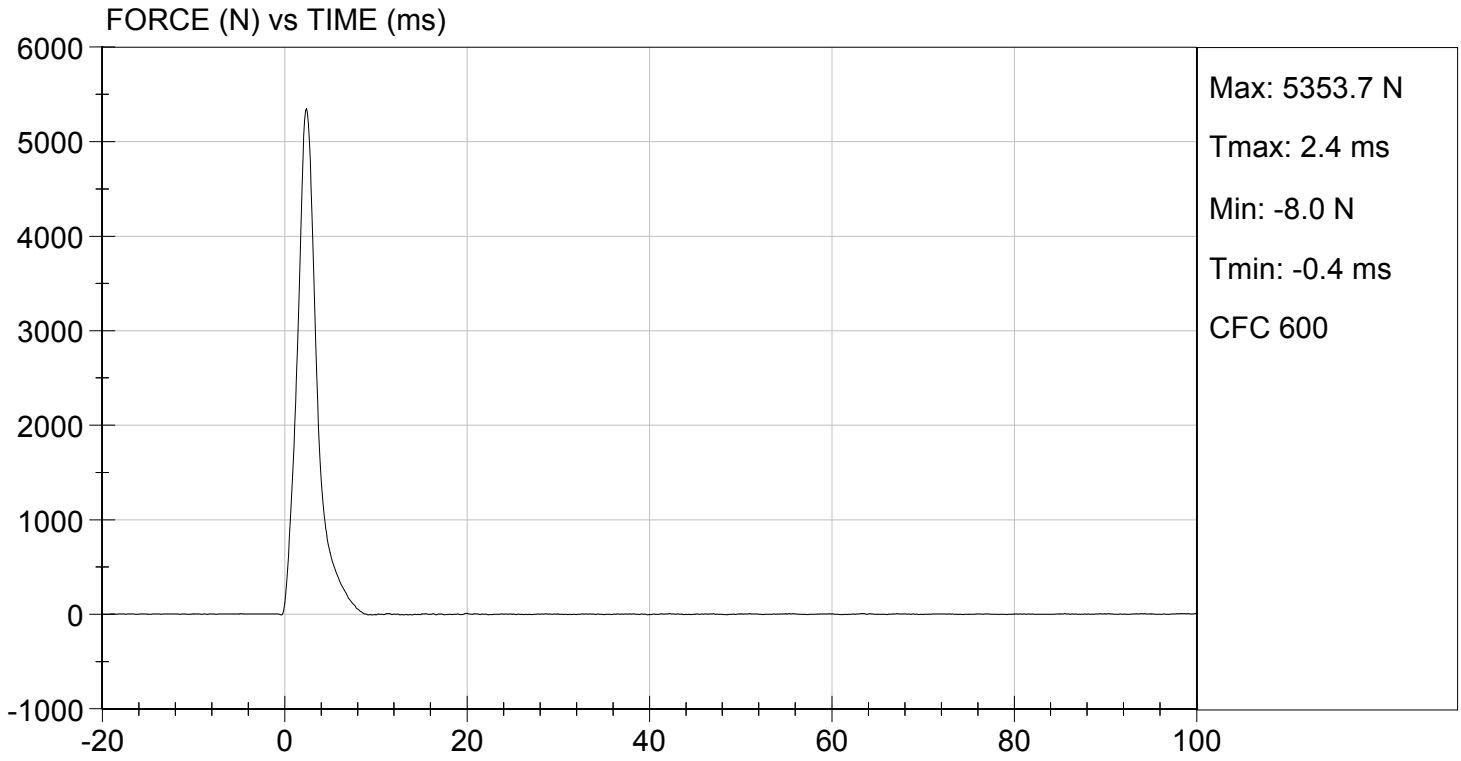
David Schoedel
Laboratory Technician

10/15/2014
Test Date

Jessica Hall
Approved By

TEST DESC: LEFT KNEE
VELOCITY: 6.98 ft/s, 2.13 m/s

TEST DATE: 10/15/2014
TEST #: D143636



MGA RESEARCH CORPORATION

HIP-FEMUR FLEXION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D143630

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.4	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	47	47	Pass
Rotation Rate	deg/s	5.0 to 10.0	6.3	6.3	Pass
30 Degrees	Nm	94.9 Nm Max	52.9	66.2	Pass
150 ft-lbf / 203.4 Nm	Deg	40.0 to 50.0 Degree Max Rotation	49.1	46.7	Pass
		Overall Test Results			Pass

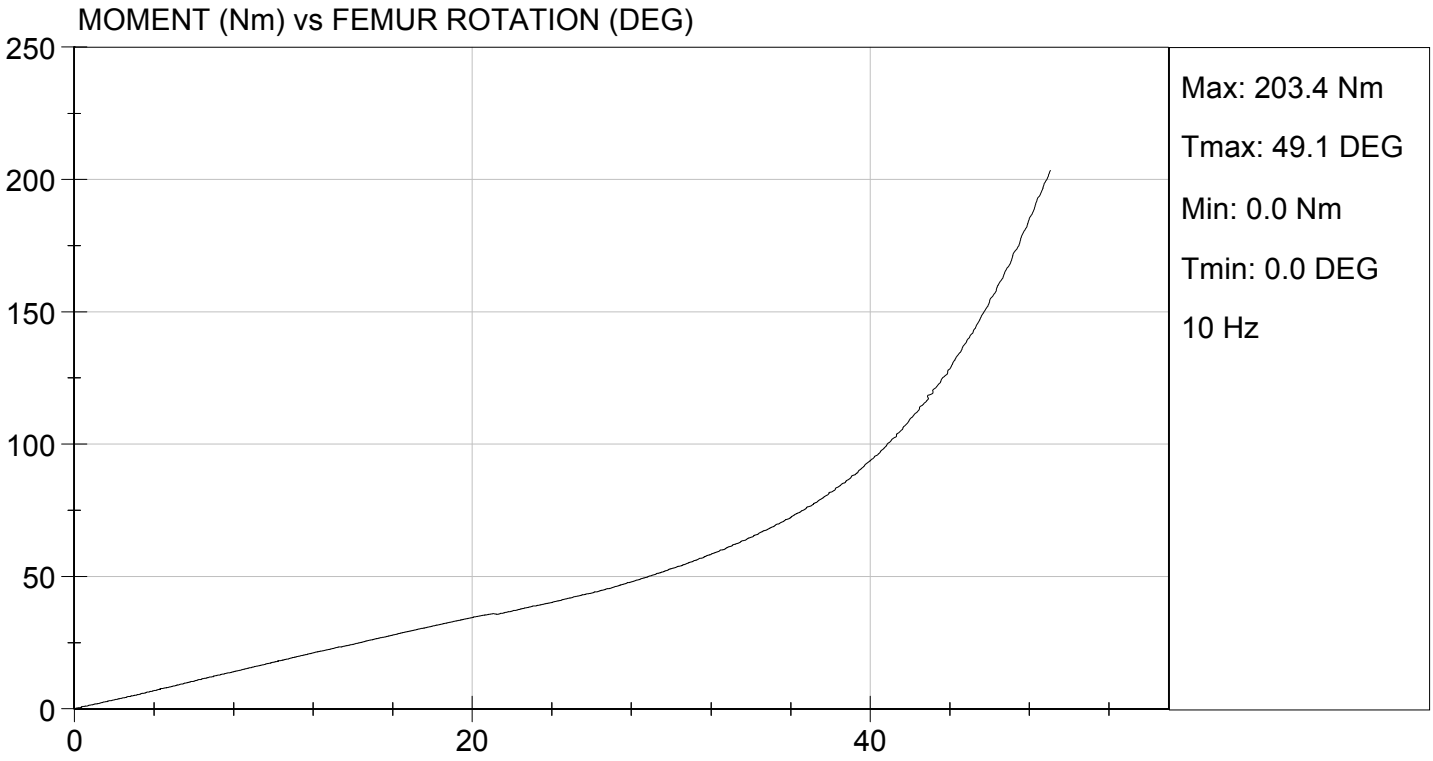
Jack Coleman
Laboratory Technician

10/15/2014
Test Date

Jessica Hall
Approved By

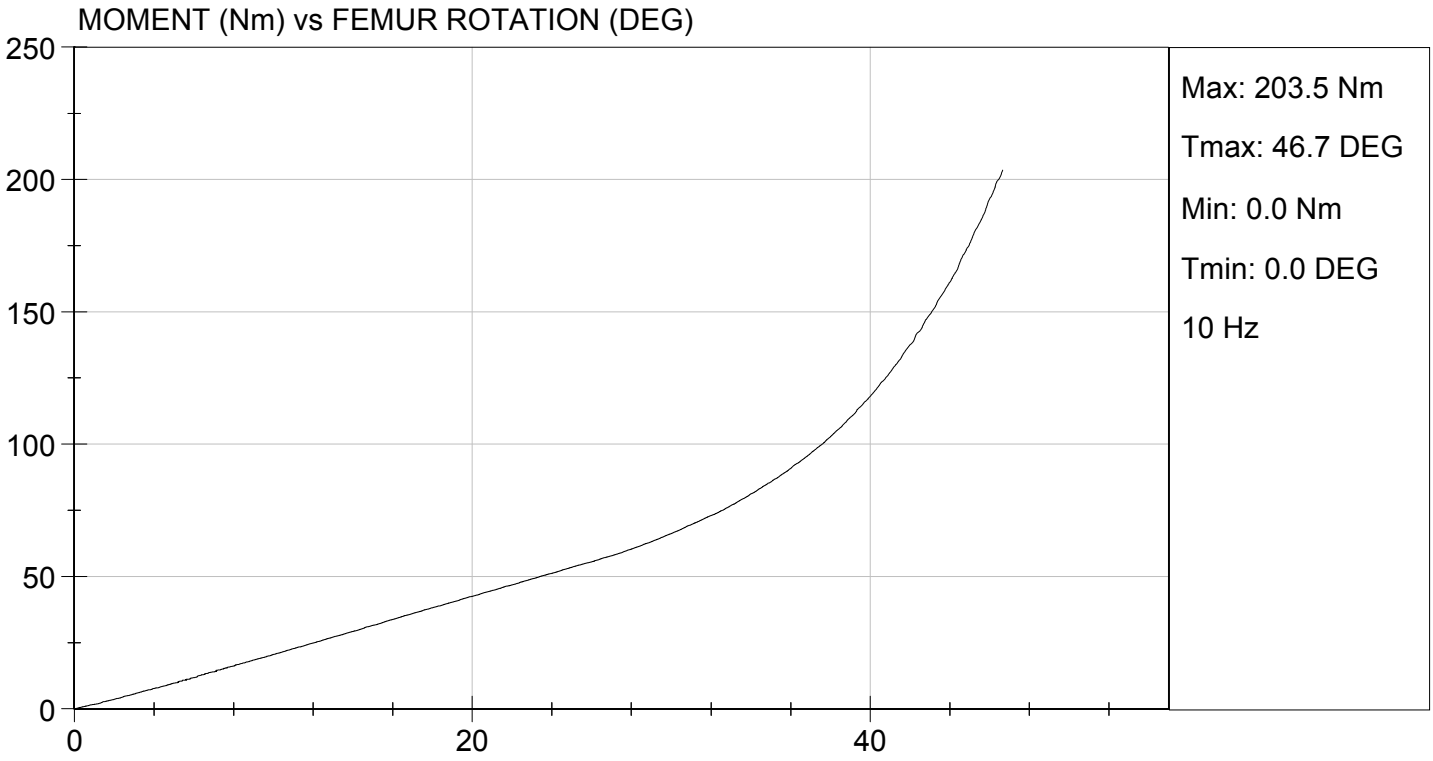
TEST DESC: RIGHT HIP FEMUR FLEXION

TEST DATE: 10/15/2014
TEST #: D143639



TEST DESC: LEFT HIP FEMUR FLEXION

TEST DATE: 10/15/2014
TEST #: D143630



Hybrid III, 5th External Measurements
SN: 634

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	784.6
B	SHOULDER PIVOT HEIGHT	Centerline of shoulder pivot bolt to the seat surface.	431.8-457.2	449.0
C	H-POINT HEIGHT	Reference	81.3-86.3	85.0
D	H-POINT LOCATION FROM BACKLINE	Reference	144.8-149.8	145.0
E	SHOULDER PIVOT FROM BACKLINE	Center of the shoulder clevis to the rear vertical surface of the fixture.	68.6-83.8	79.2
F	THIGH CLEARANCE	Measured at the highest point on the upper femur segment.	119.4-134.6	125.6
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	253.4
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	277.8
J	ELBOW REST HEIGHT	Measure from the flesh below the elbow pivot bolt to the seat surface.	182.8-203.2	197.5
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	541.4
L	POPLITEAL HEIGHT	Seat surface to the plane of the horizontal plane of the bottom of the feet.	355.6-376.0	362.1
M	KNEE PIVOT HEIGHT	Centerline of knee pivot bolt to the horizontal plane of the bottom of the feet.	393.7-419.1	400.4
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	428.6

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	181.6
P	FOOT LENGTH	Tip of toe to rear of heel	218.5-233.7	224.7
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	482.0
S	HEAD BREADTH	The widest part of the head	137.1-147.3	139.6
T	HEAD DEPTH	Back of the head to the forehead	177.8-188.0	179.2
U	HIP BREADTH	The widest part of the hip	299.7-314.9	306.1
V	SHOULDER BREADTH	Outside edges of right and left shoulder clevises	350.5-365.7	355.5
W	FOOT BREADTH	The widest part of the foot	78.8-94.0	90.0
X	HEAD CIRCUMFERENCE	Measured at the point as in dim. “T”	528.3-548.7	540.6
Y	CHEST CIRCUMFERENCE (WITH CHEST JACKET)	Measured 345.4 ± 12.7 mm above seat surface	850.9-881.3	868.7
Z	WAIST CIRCUMFERENCE	Measured 165.1 ± 5.1 mm above seat surface	759.5-789.9	786.8
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: 634 **Test ID:** D143451

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	22.1	Pass
Laboratory Relative Humidity	%	10 to 70	44	Pass
Peak Resultant Acceleration	G's	250 to 300	299	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-7.7	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
		Overall Test Results		Pass

David Schoedel
Laboratory Technician

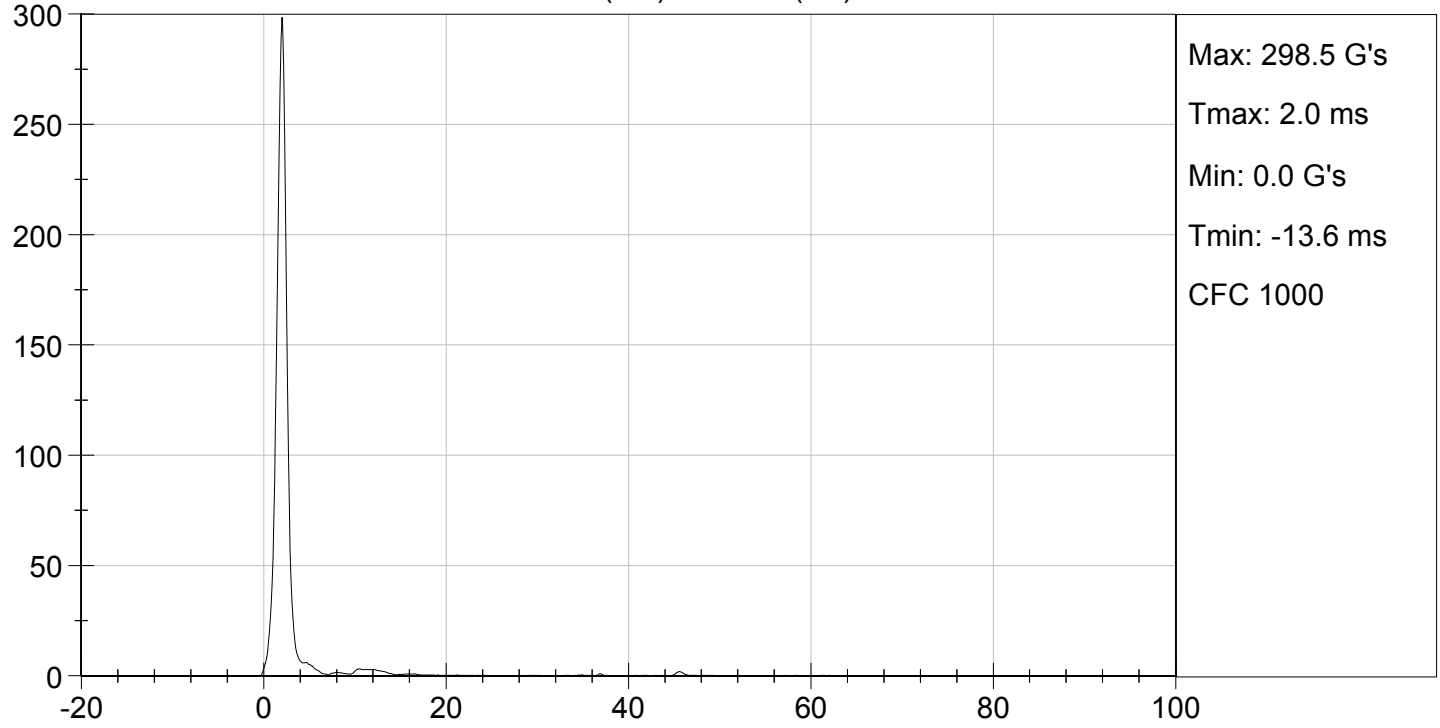
10/01/2014
Test Date

Jessica Hall
Approved By

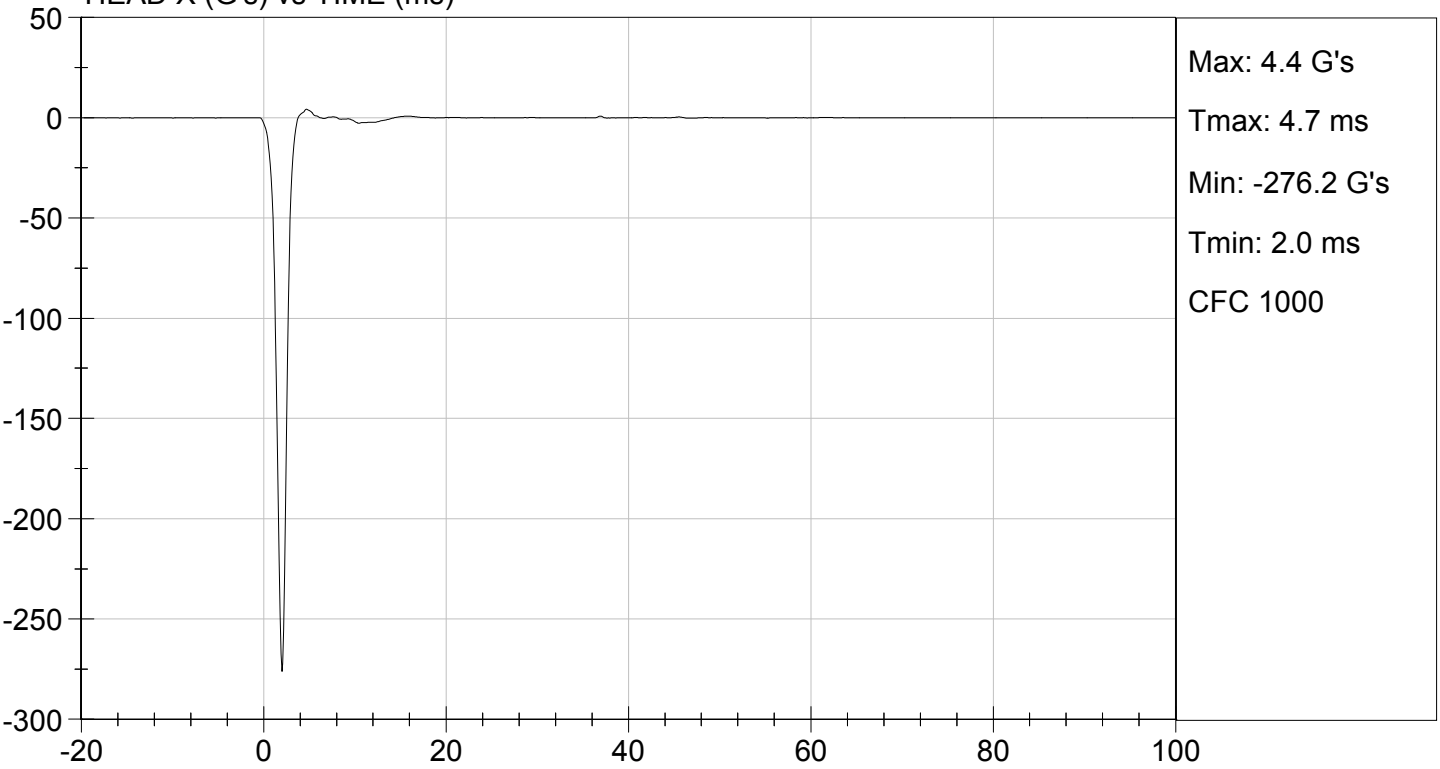
TEST DESC: HEAD DROP

TEST DATE: 10/01/2014
TEST #: D143451

HEAD RESULTANT ACCELERATION (G's) vs TIME (ms)



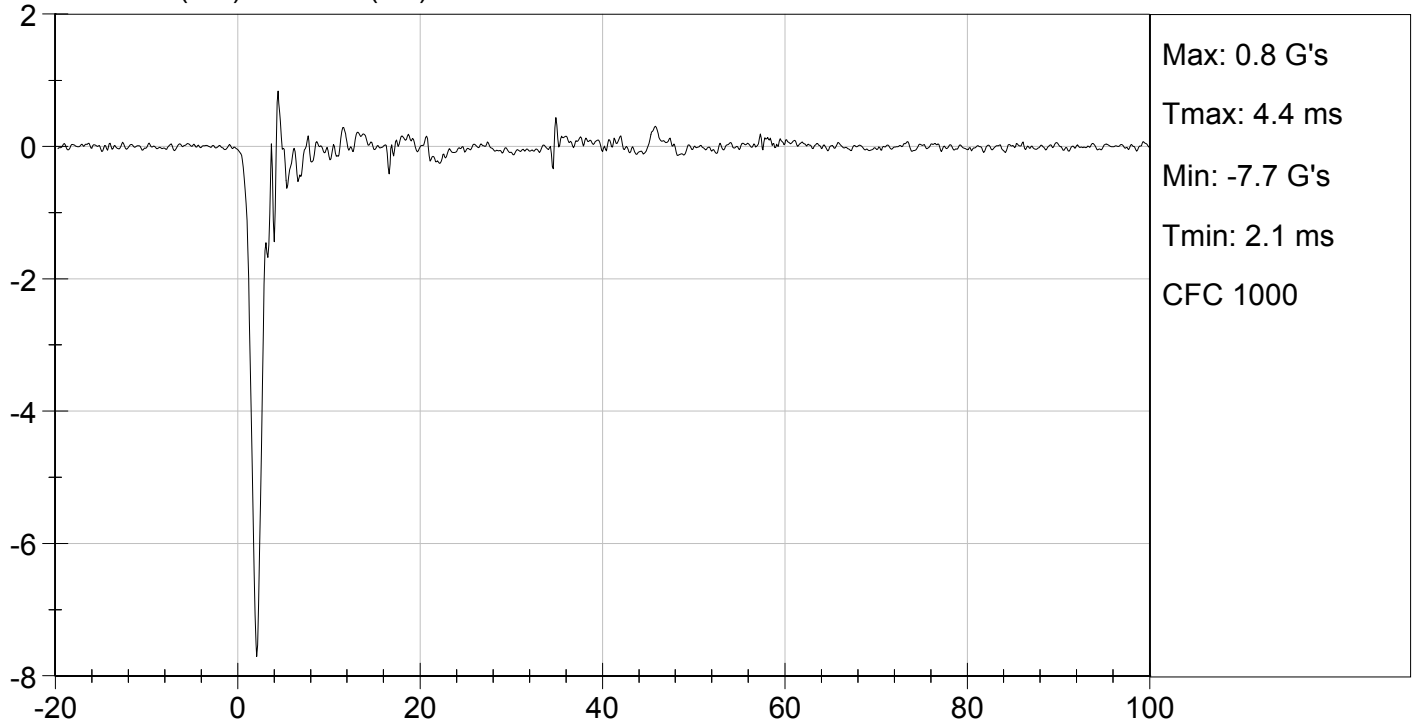
HEAD X (G's) vs TIME (ms)



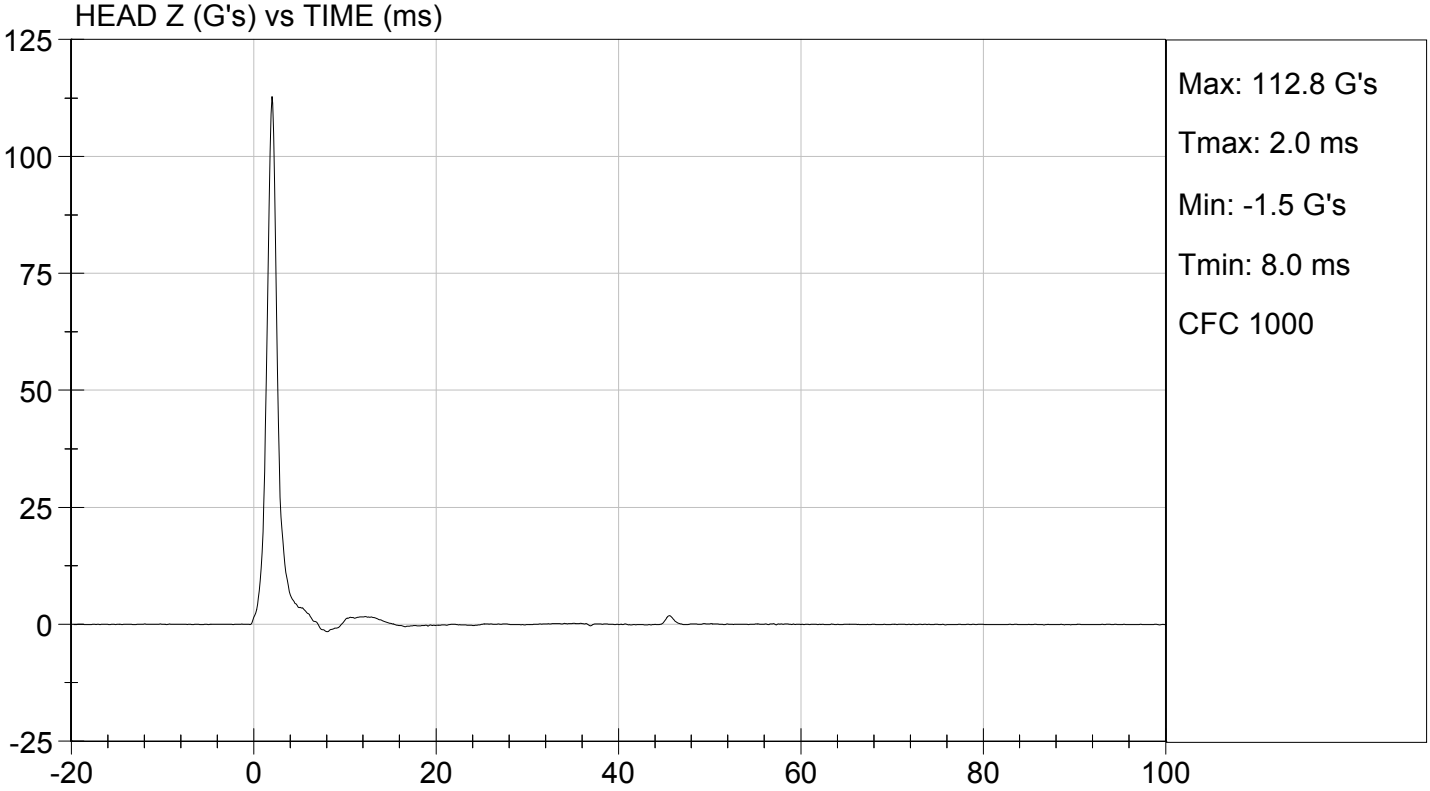
TEST DESC: HEAD DROP

TEST DATE: 10/01/2014
TEST #: D143451

HEAD Y (G's) vs TIME (ms)



HEAD Z (G's) vs TIME (ms)



MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D143452

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	22.1	Pass
Laboratory Relative Humidity		%	10 to 70	44	Pass
Pendulum Speed		m/s	6.89 to 7.13	7.13	Pass
Pendulum Velocity	10 ms	m/s	2.1 to 2.5	2.4	Pass
	20 ms	m/s	4.0 to 5.0	4.4	Pass
	30 ms	m/s	5.8 to 7.0	6.0	Pass
D Plane Rotation	Max	deg	77 to 91	84	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	69 to 83	70	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	85	Pass
			Overall Results		Pass

David Schoedel
Laboratory Technician

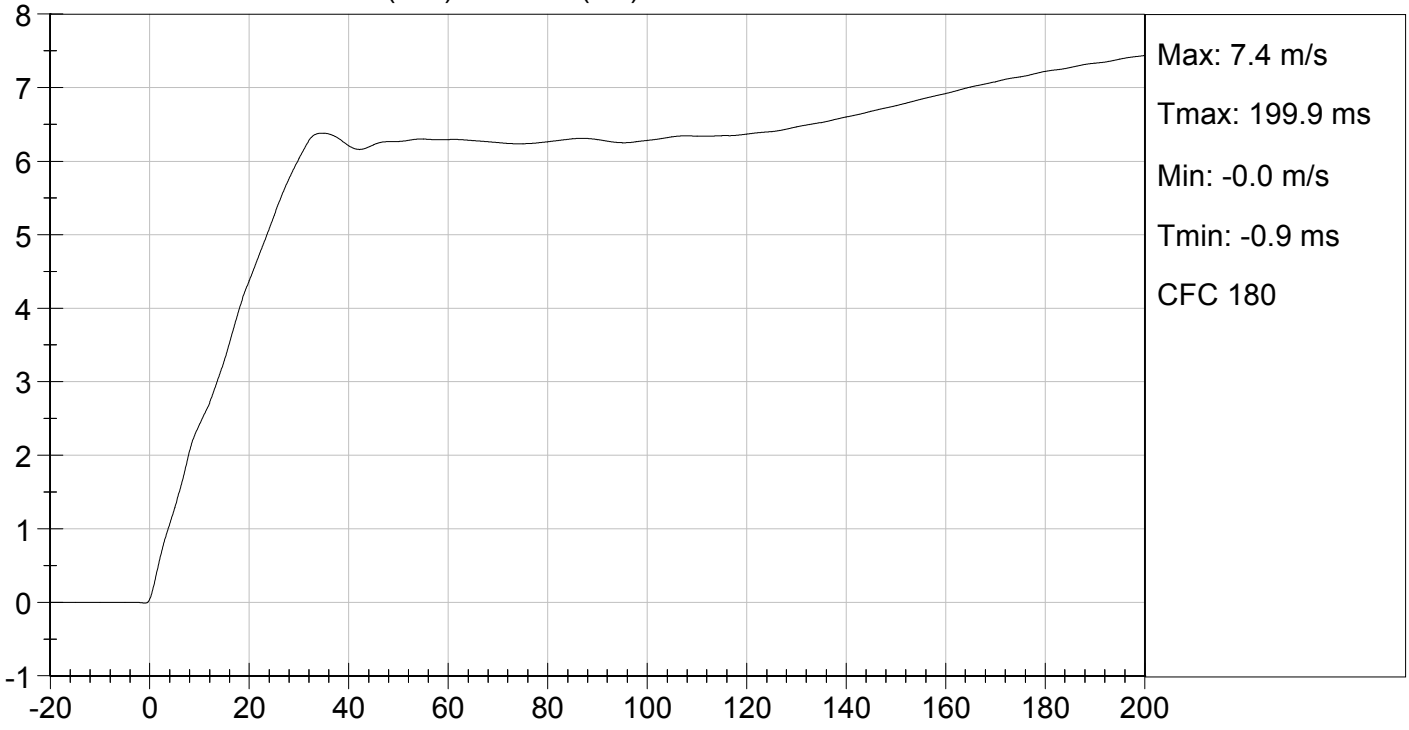
10/01/2014
Test Date

Jessica Hall
Approved By

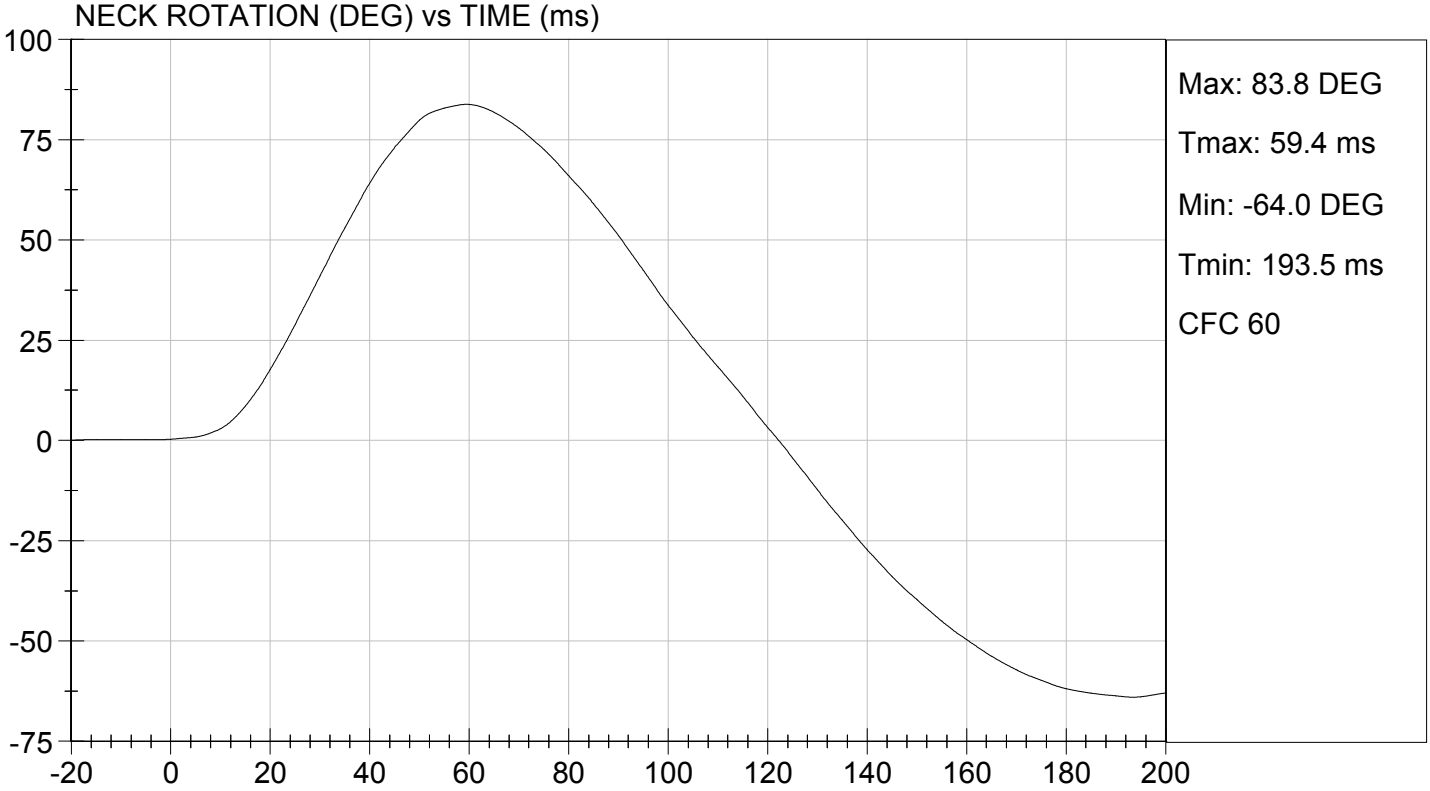
TEST DESC: NECK FLEXION
VELOCITY: 23.40 ft/s, 7.13 m/s

TEST DATE: 10/01/2014
TEST #: D143452

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



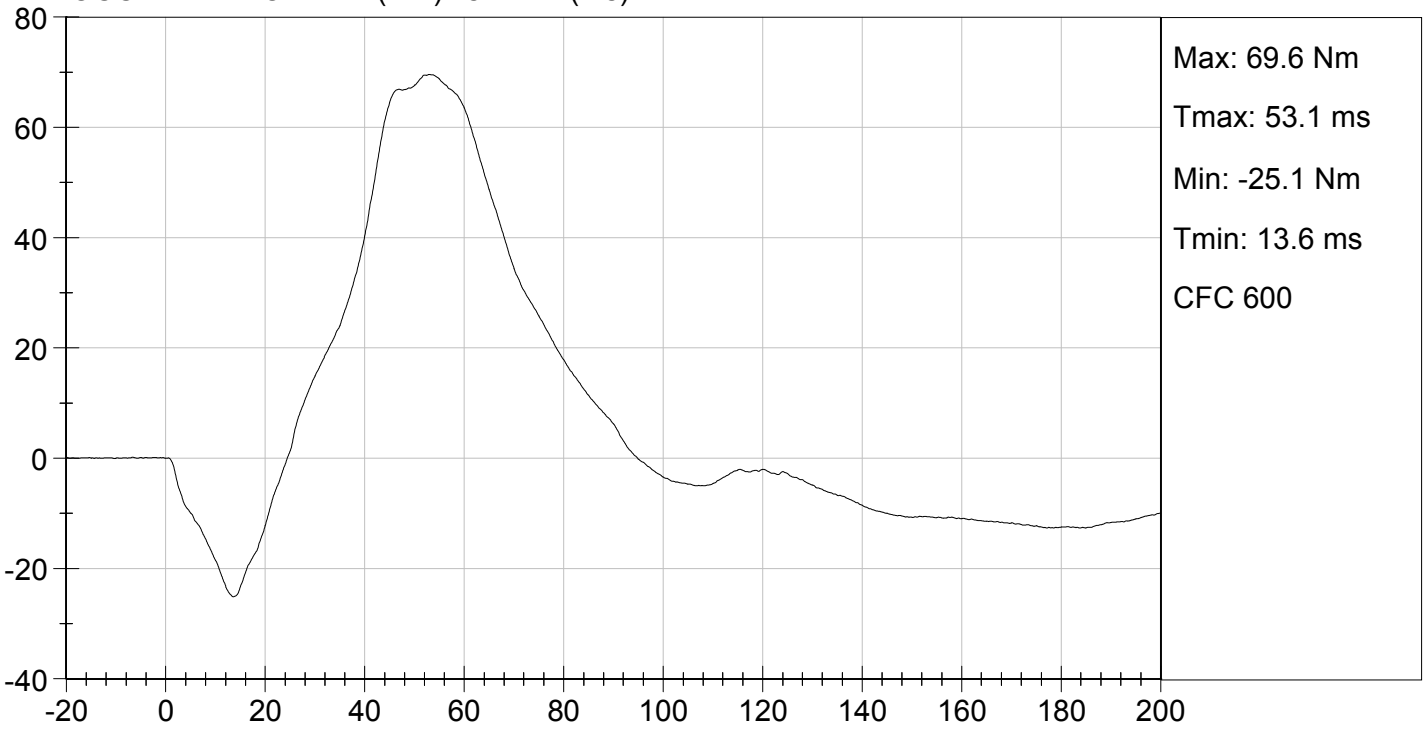
NECK ROTATION (DEG) vs TIME (ms)



TEST DESC: NECK FLEXION
VELOCITY: 23.40 ft/s, 7.13 m/s

TEST DATE: 10/01/2014
TEST #: D143452

OCCIPITAL MOMENT (Nm) vs TIME (ms)



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D143453

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	22.1	Pass
Laboratory Relative Humidity		%	10 to 70	44	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.12	Pass
Pendulum Velocity	10 ms	m/s	1.5 to 1.9	1.7	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	106	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	-65 to -53	-54	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	97	Pass
			Overall Results		Pass

David Schoedel
Laboratory Technician

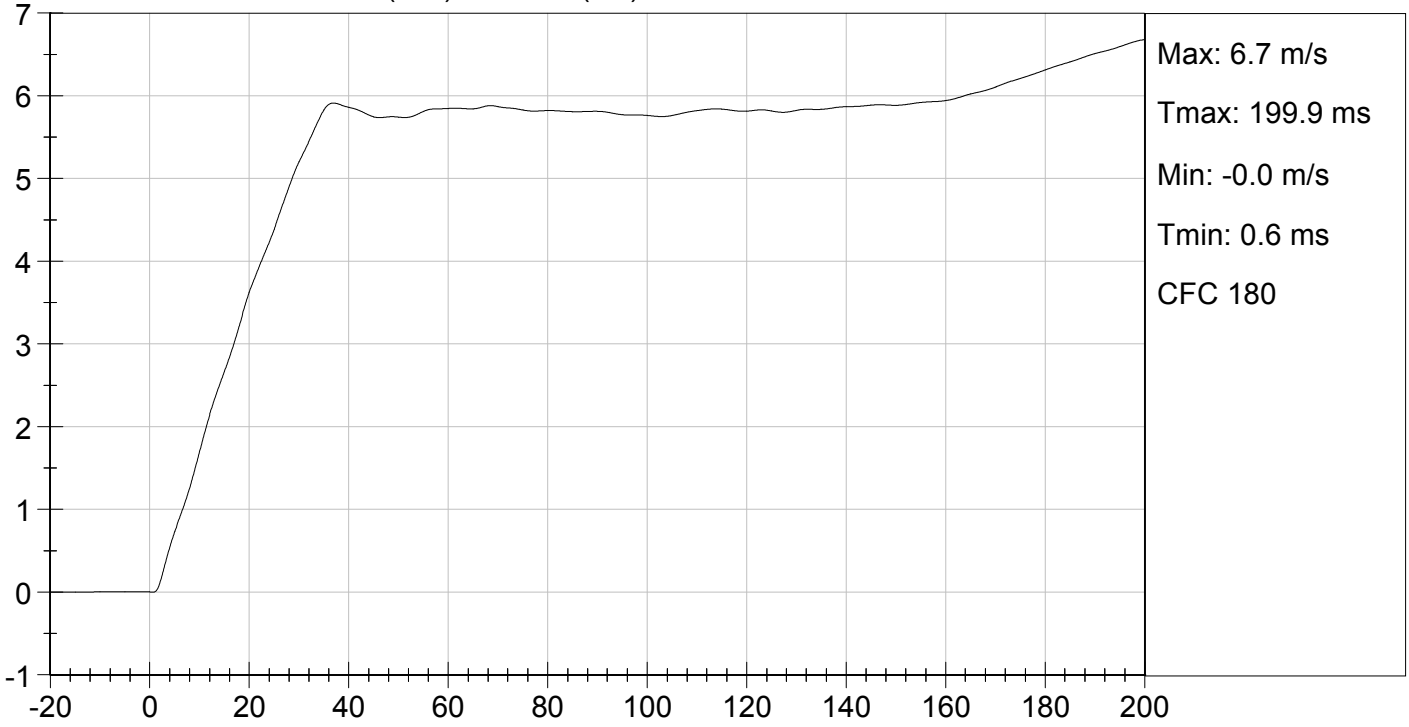
10/01/2014
Test Date

Jessica Hall
Approved By

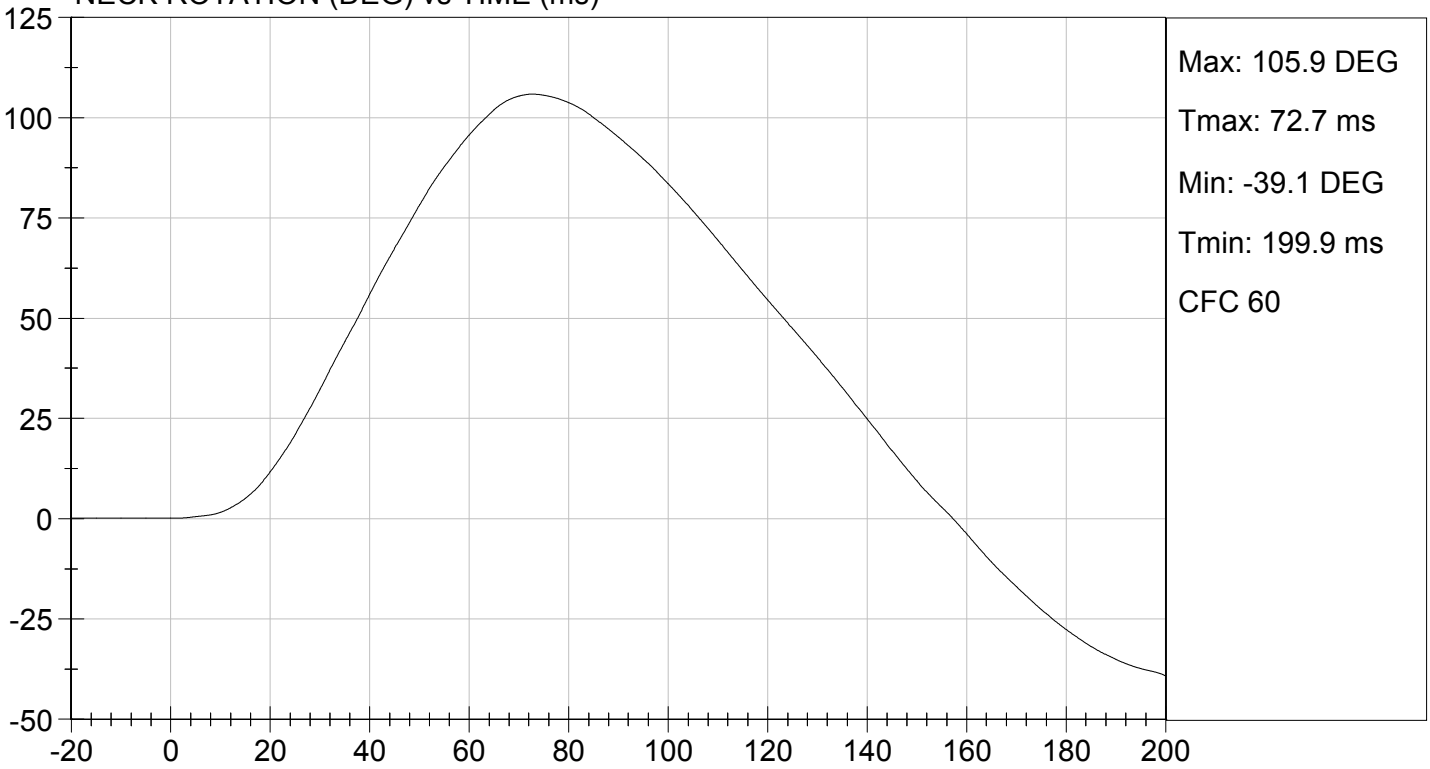
TEST DESC: NECK EXTENSION
VELOCITY: 20.08 ft/s, 6.12 m/s

TEST DATE: 10/01/2014
TEST #: D143453

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

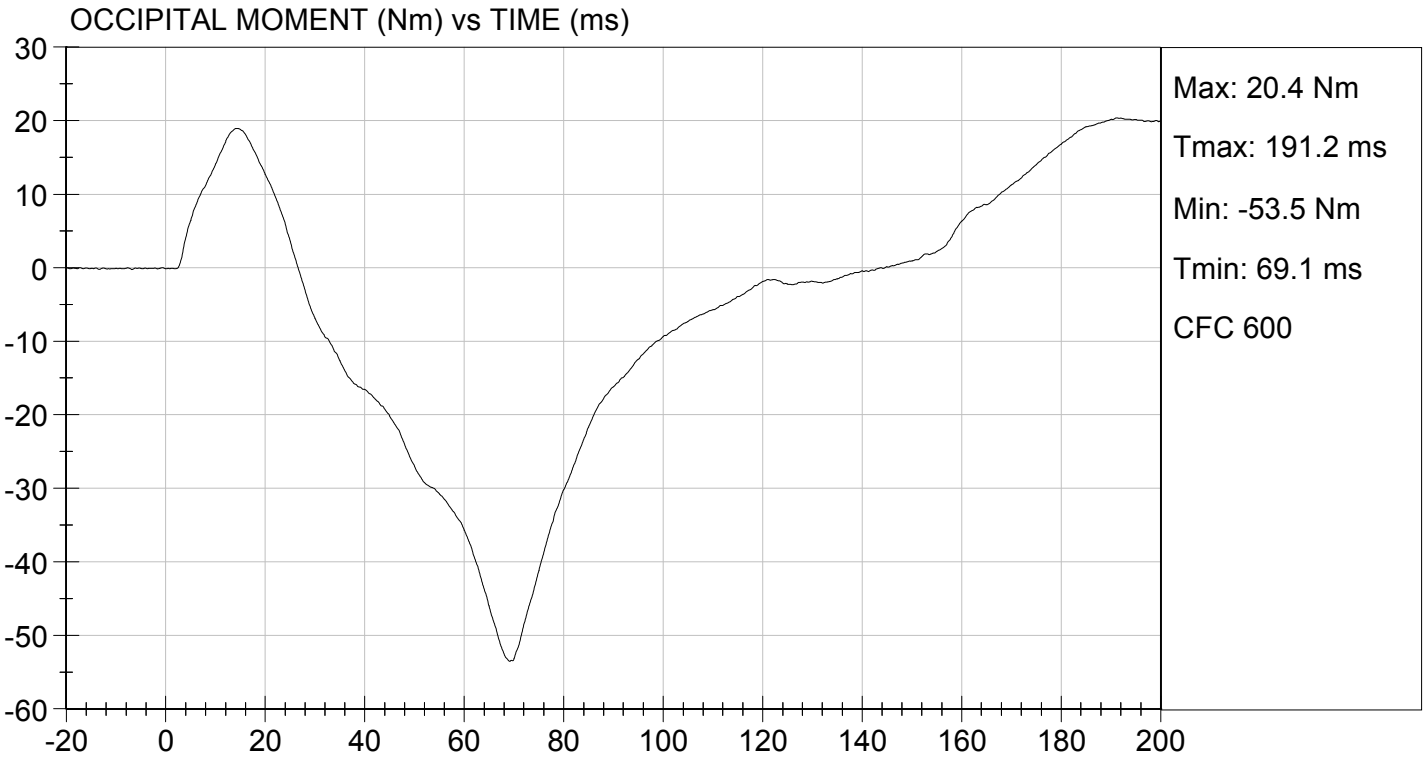


NECK ROTATION (DEG) vs TIME (ms)



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

TEST DATE: 10/01/2014
TEST #: D143453



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D143454

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.7	Pass
Relative Humidity	%	10 to 70	47	Pass
Probe Speed	m/s	6.59 to 6.83	6.77	Pass
Peak Deflection	mm	50 to 58	51	Pass
Peak Resistive Force w/in Deflection Corridor	N	3900 to 4400	4299	Pass
Internal Hysteresis	%	69 to 85	73	Pass
Peak Force 18 mm - 50 mm	N	<= 4600	4304	Pass
		Overall Test Results		Pass

David Schoedel
Laboratory Technician

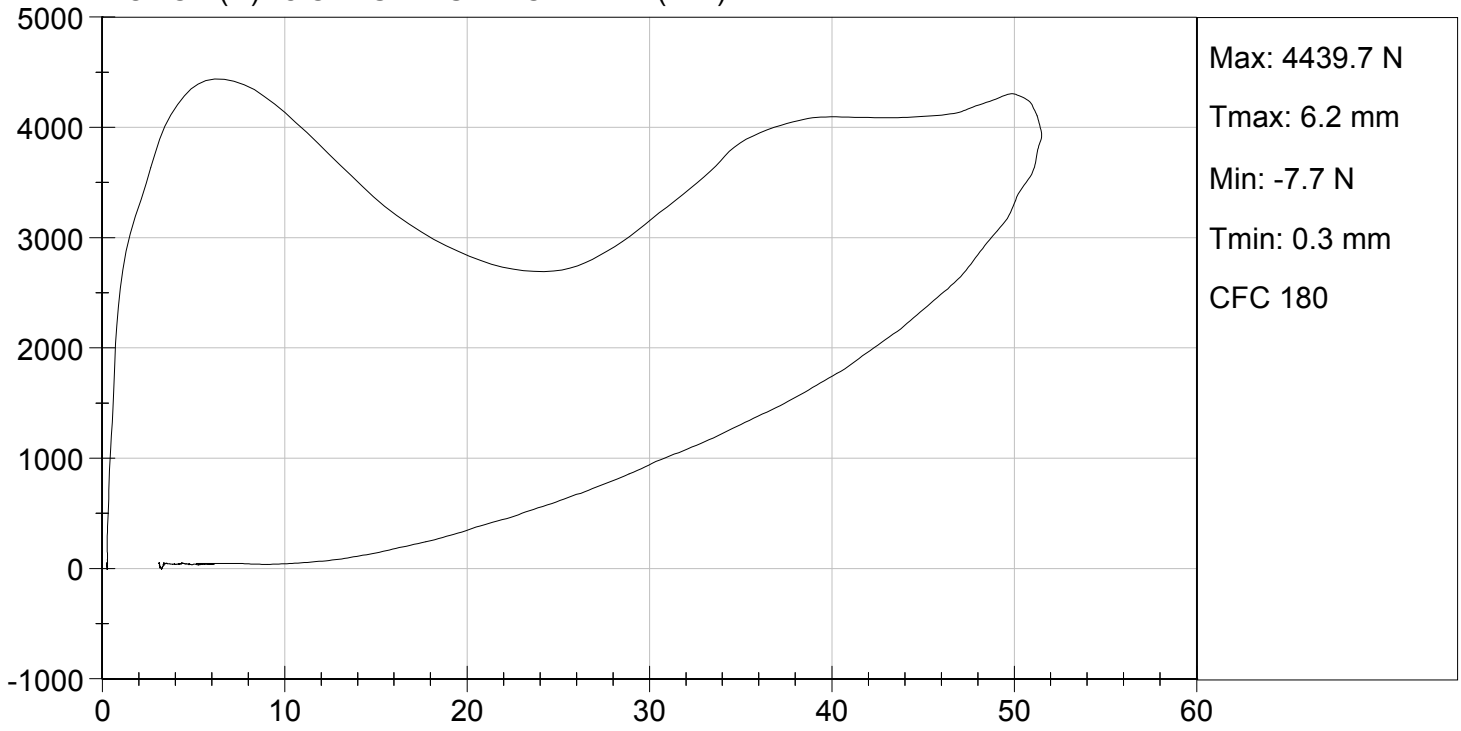
10/01/2014
Test Date

Jessica Hall
Approved By

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

TEST DATE: 10/01/2014
TEST #: D143454

FORCE (N) vs CHEST DISPLACEMENT (mm)



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D143455

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	22.1	Pass
Laboratory Relative Humidity	%	10 to 70	44	Pass
Probe Speed	m/s	2.07 to 2.13	2.13	Pass
Maximum Force	N	3450 to 4060	3942	Pass
		Overall Test Results		Pass

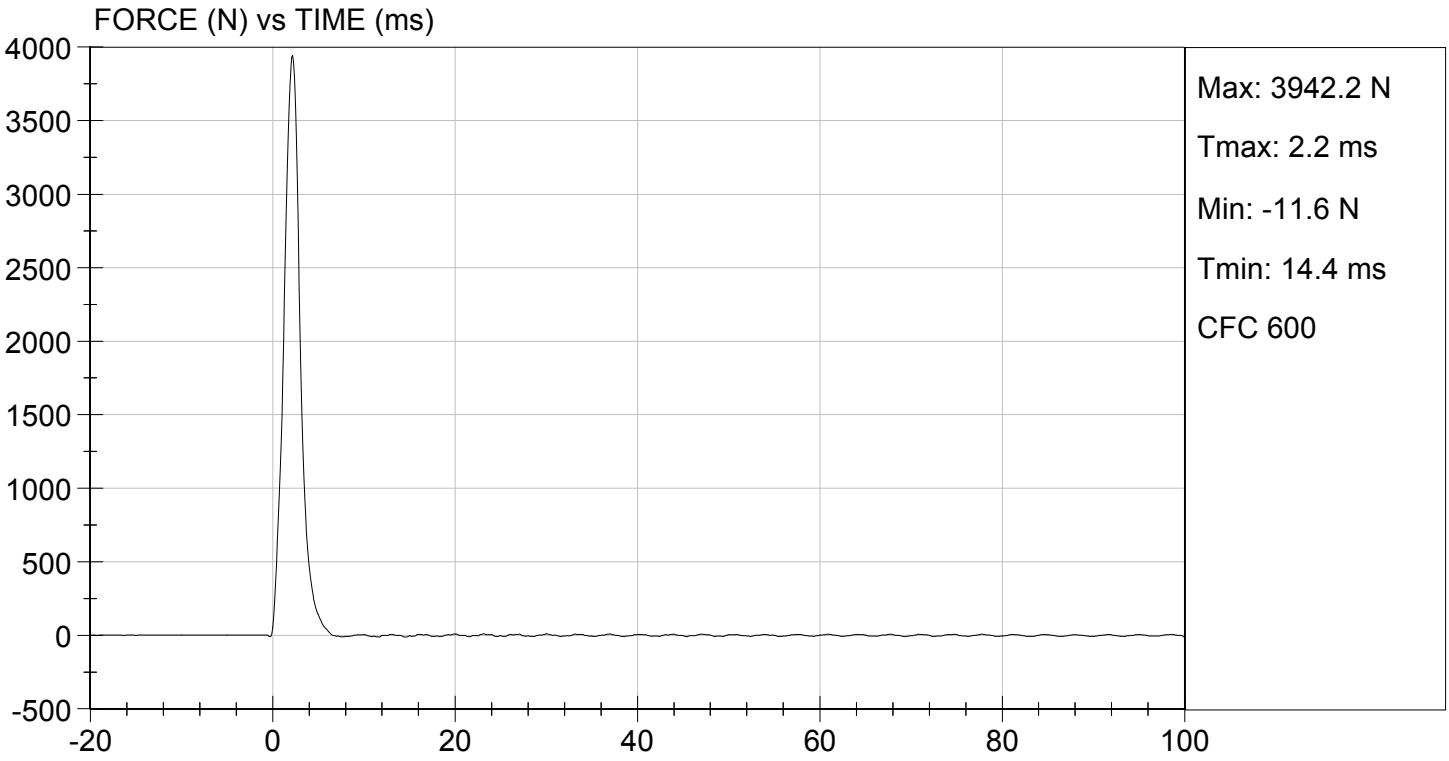
David Schoedel
Laboratory Technician

10/01/2014
Test Date

Jessica Hall
Approved By

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

TEST DATE: 10/01/2014
TEST #: D143455



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D143456

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	22.1	Pass
Laboratory Relative Humidity	%	10 to 70	44	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	N	3450 to 4060	4042	Pass
		Overall Test Results		Pass

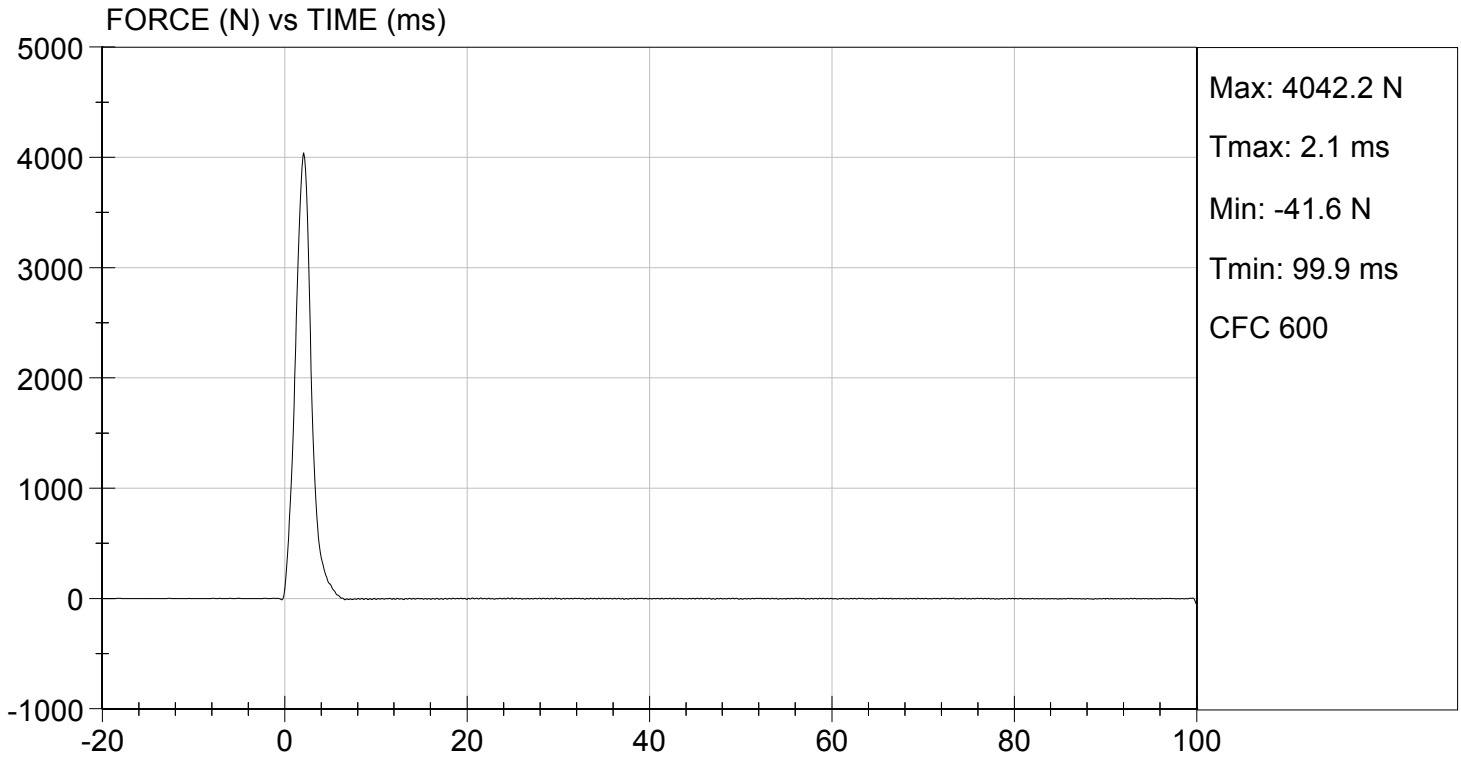
David Schoedel
Laboratory Technician

10/01/2014
Test Date

Jessica Gall
Approved By

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

TEST DATE: 10/01/2014
TEST #: D143456



MGA RESEARCH CORPORATION

TORSO FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D143457

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	48	Pass
Initial Angle	deg	0 to 20	18	Pass
Return Angle	deg	+/- 8	4	Pass
Force at 45 deg	N	320 to 390	372	Pass
Upper Torso Deflection Rate	deg/s	0.5 to 1.5	0.9	Pass
		Overall Result		Pass

David Schoedel
Laboratory Technician

10/01/2014
Test Date

Jessica Hall
Approved By

MGA RESEARCH CORPORATION

HEAD DROP TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test ID:** D143621

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	50	Pass
Peak Resultant Acceleration	G's	250 to 300	294	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	1.4	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
		Overall Test Results		Pass

David Schoedel
Laboratory Technician

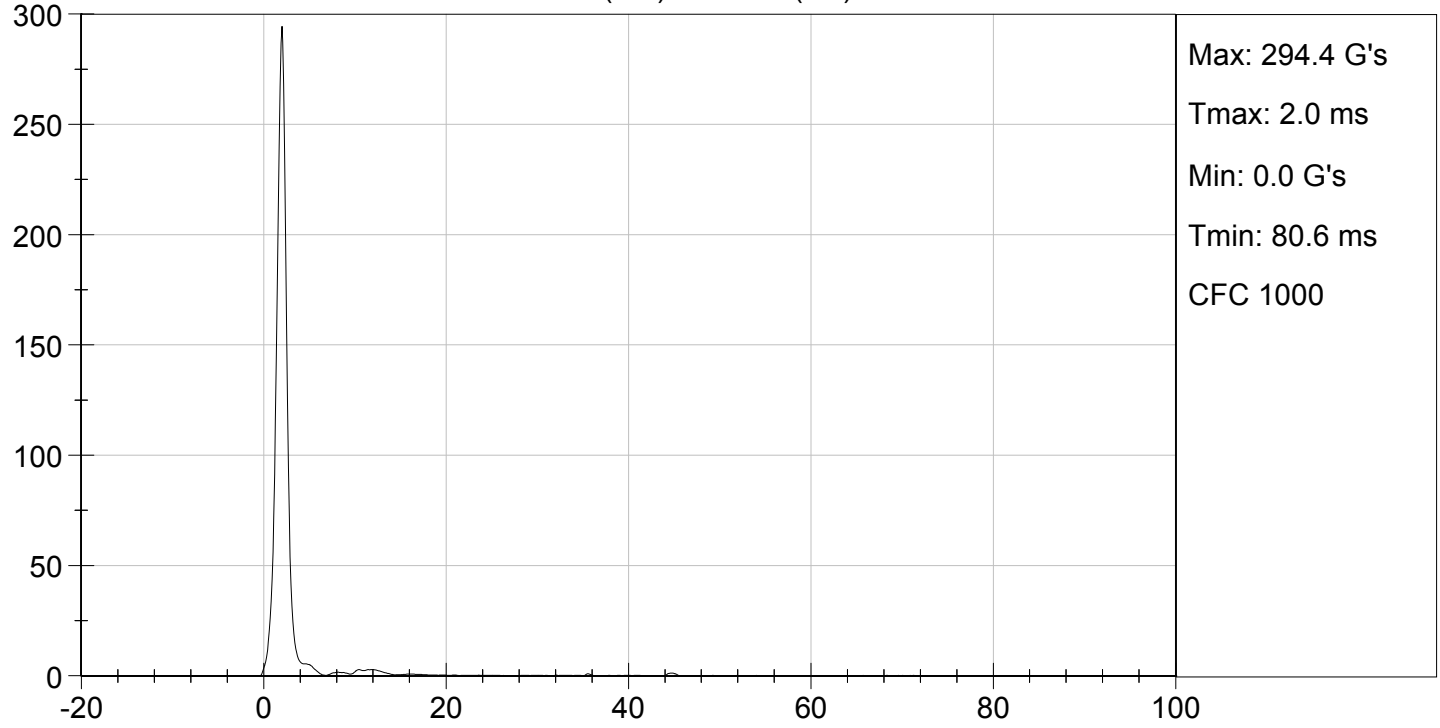
10/15/2014
Test Date

Jessica Gall
Approved By

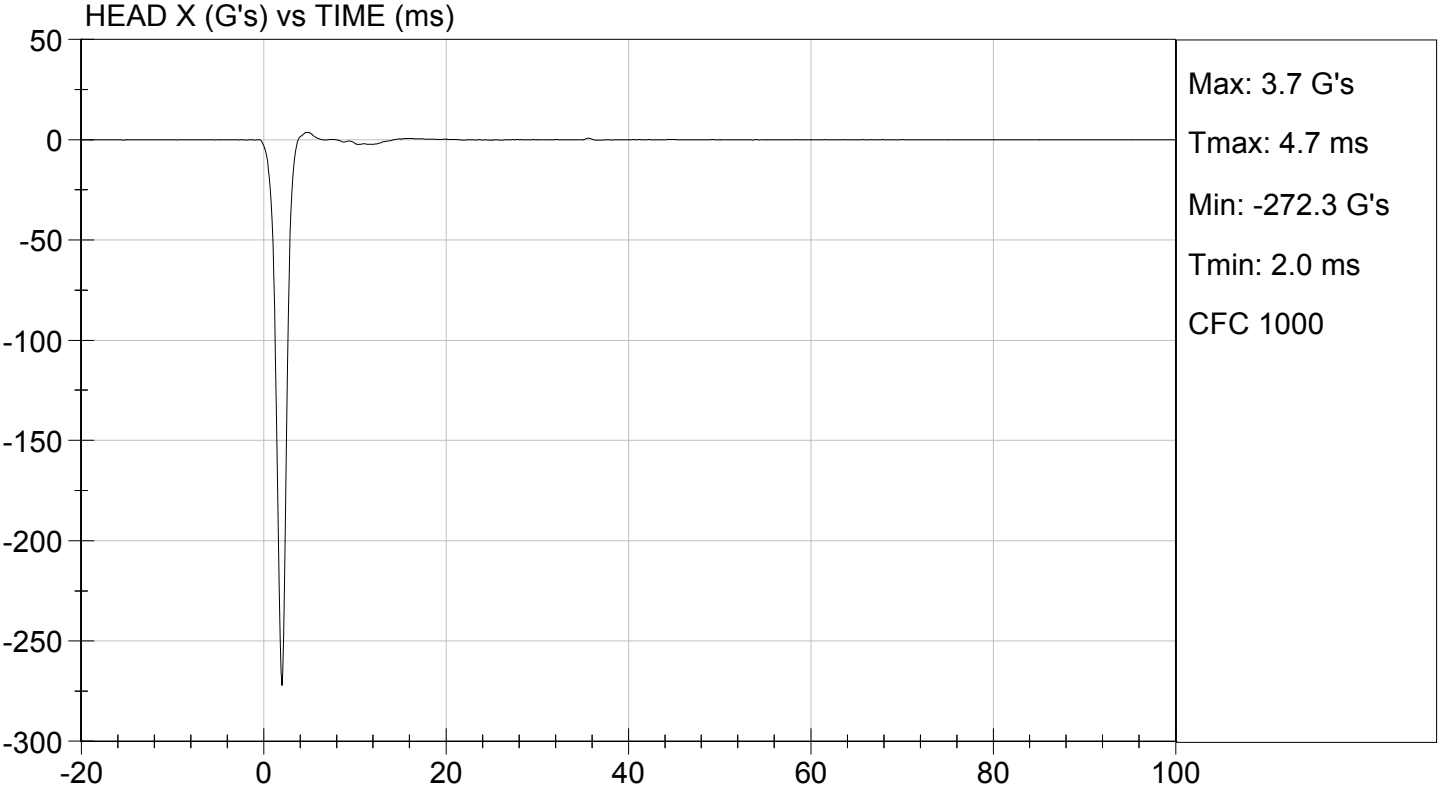
TEST DESC: HEAD DROP

TEST DATE: 10/15/2014
TEST #: D143621

HEAD RESULTANT ACCELERATION (G's) vs TIME (ms)



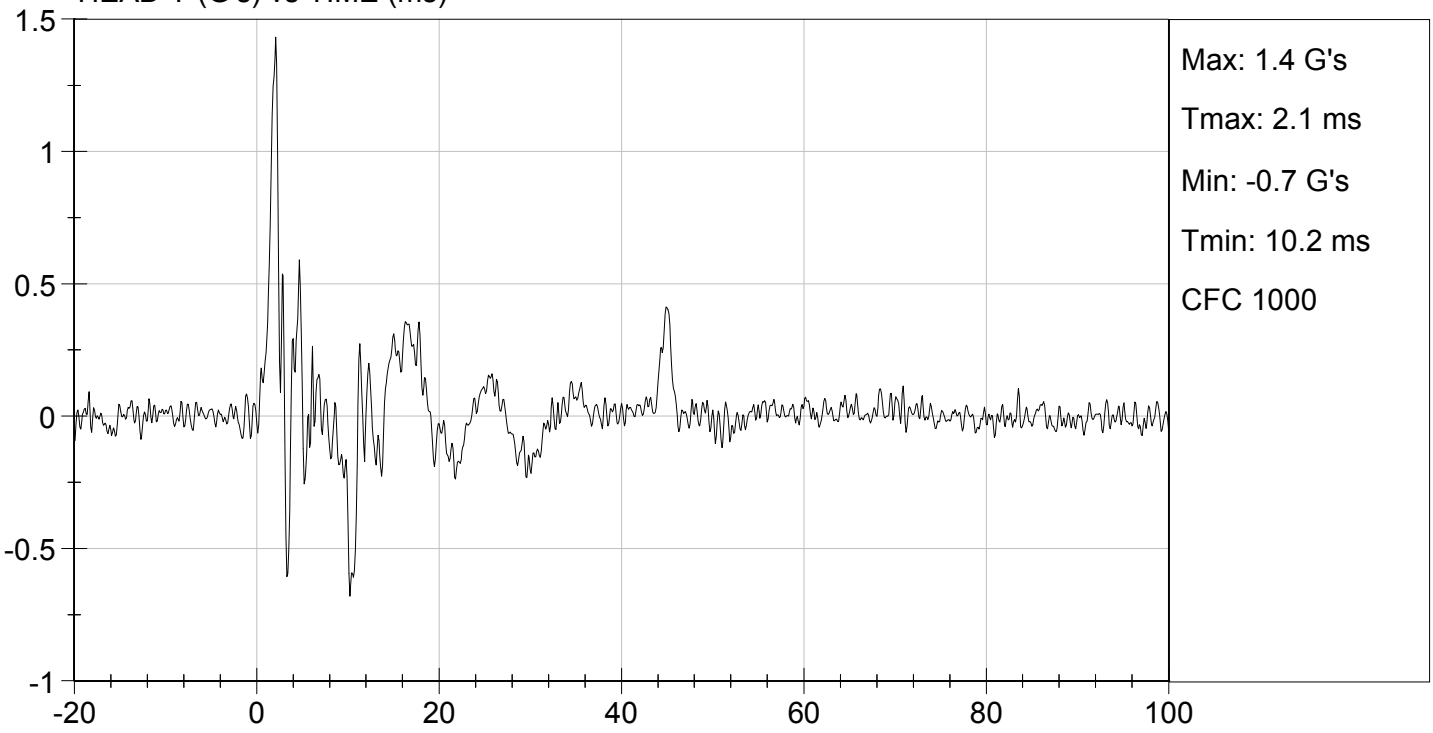
HEAD X (G's) vs TIME (ms)



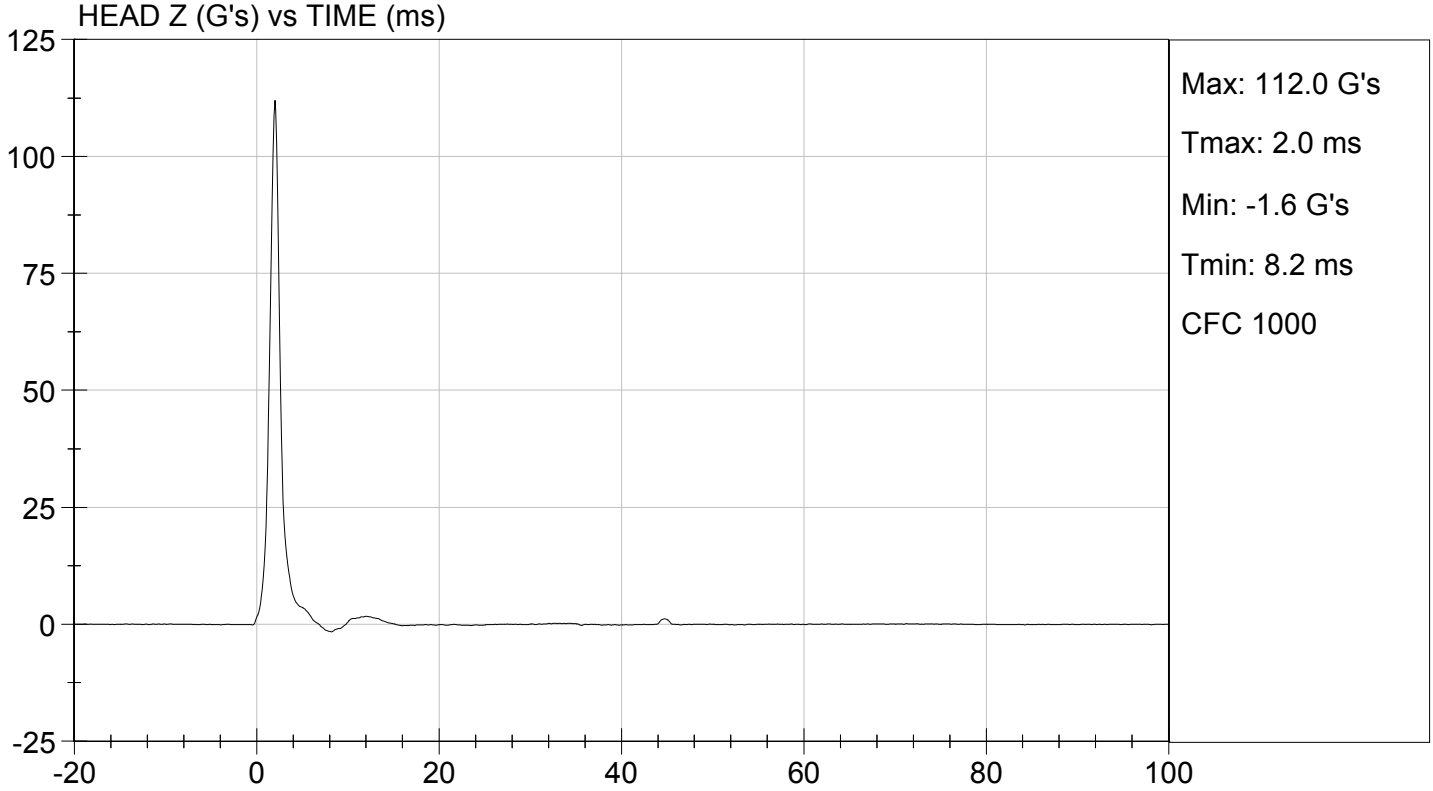
TEST DESC: HEAD DROP

TEST DATE: 10/15/2014
TEST #: D143621

HEAD Y (G's) vs TIME (ms)



HEAD Z (G's) vs TIME (ms)



MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D143622

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	45	Pass
Pendulum Speed		m/s	6.89 to 7.13	7.06	Pass
Pendulum Velocity	10 ms	m/s	2.1 to 2.5	2.4	Pass
	20 ms	m/s	4.0 to 5.0	4.5	Pass
	30 ms	m/s	5.8 to 7.0	6.2	Pass
D Plane Rotation	Max	deg	77 to 91	86	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	85	Pass
			Overall Results		Pass

David Schoedel
Laboratory Technician

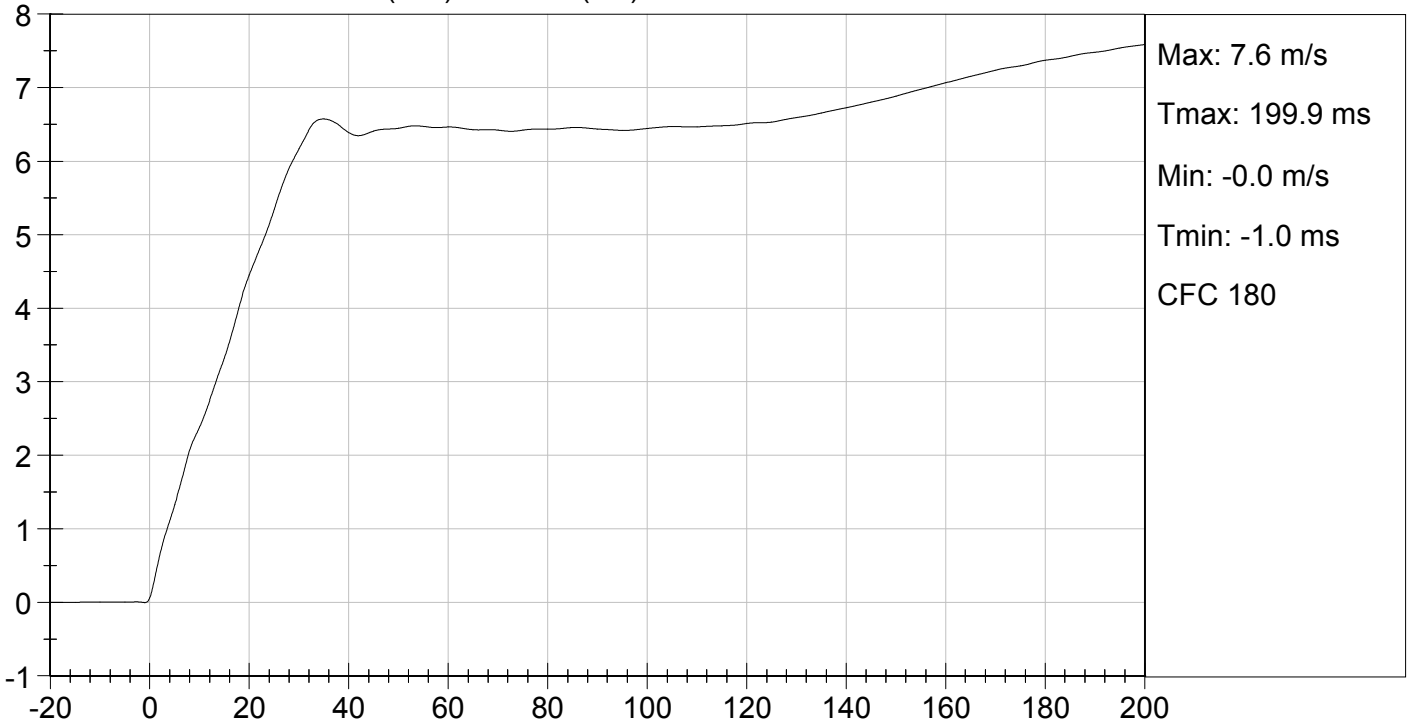
10/15/2014
Test Date

Jessica Gall
Approved By

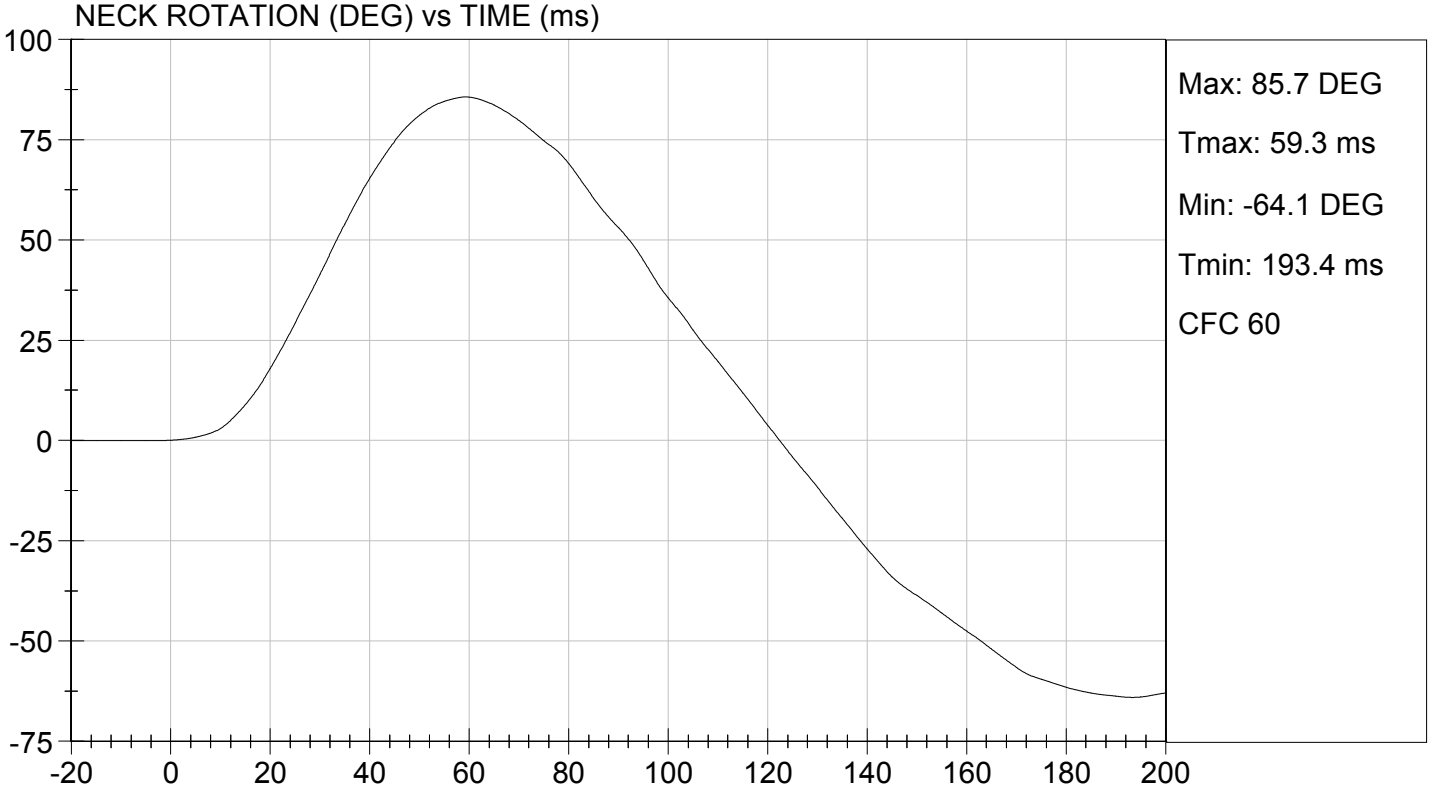
TEST DESC: NECK FLEXION
VELOCITY: 23.15 ft/s, 7.06 m/s

TEST DATE: 10/15/2014
TEST #: D143622

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

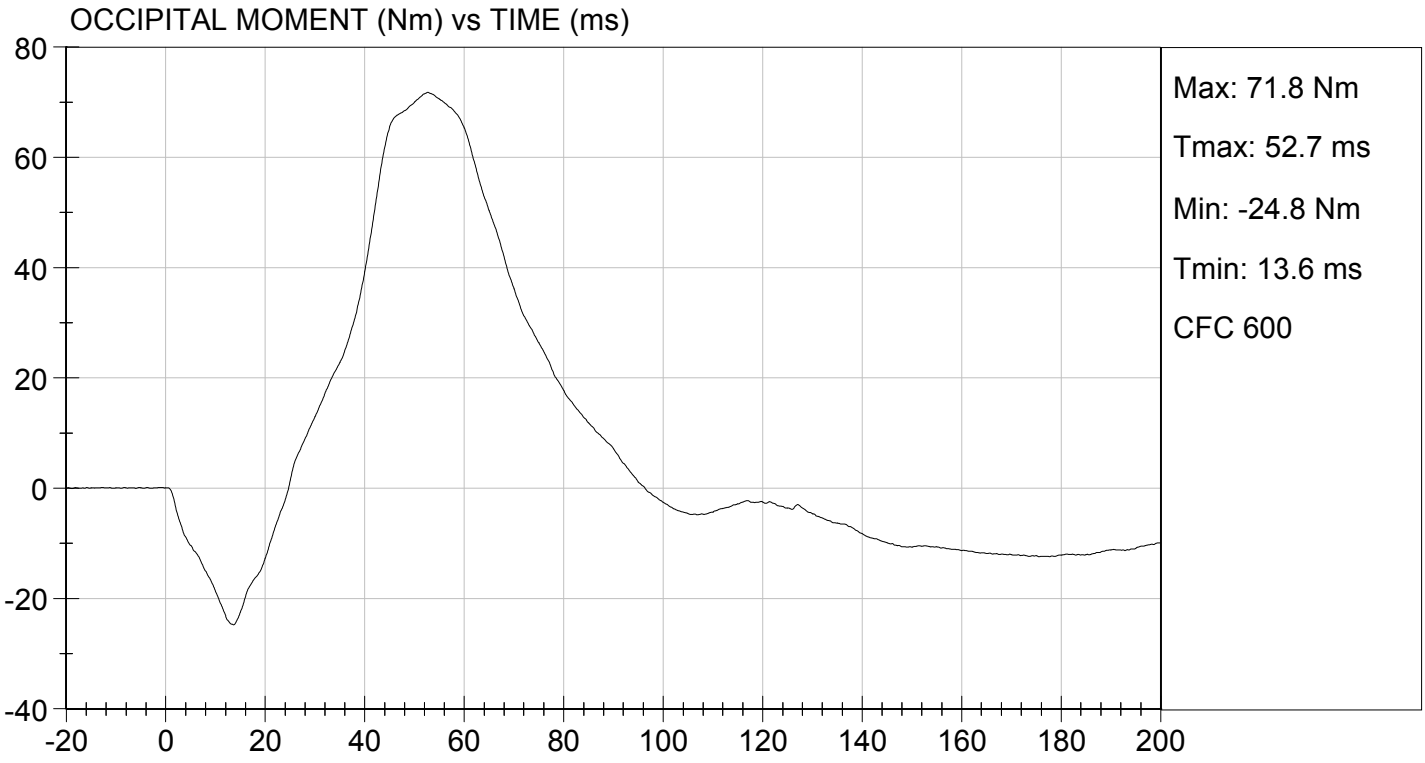


NECK ROTATION (DEG) vs TIME (ms)



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

TEST DATE: 10/15/2014
TEST #: D143622



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D143623

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	45	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.12	Pass
Pendulum Velocity	10 ms	m/s	1.5 to 1.9	1.7	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	-59	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	97	Pass
			Overall Results		Pass

David Schoedel
Laboratory Technician

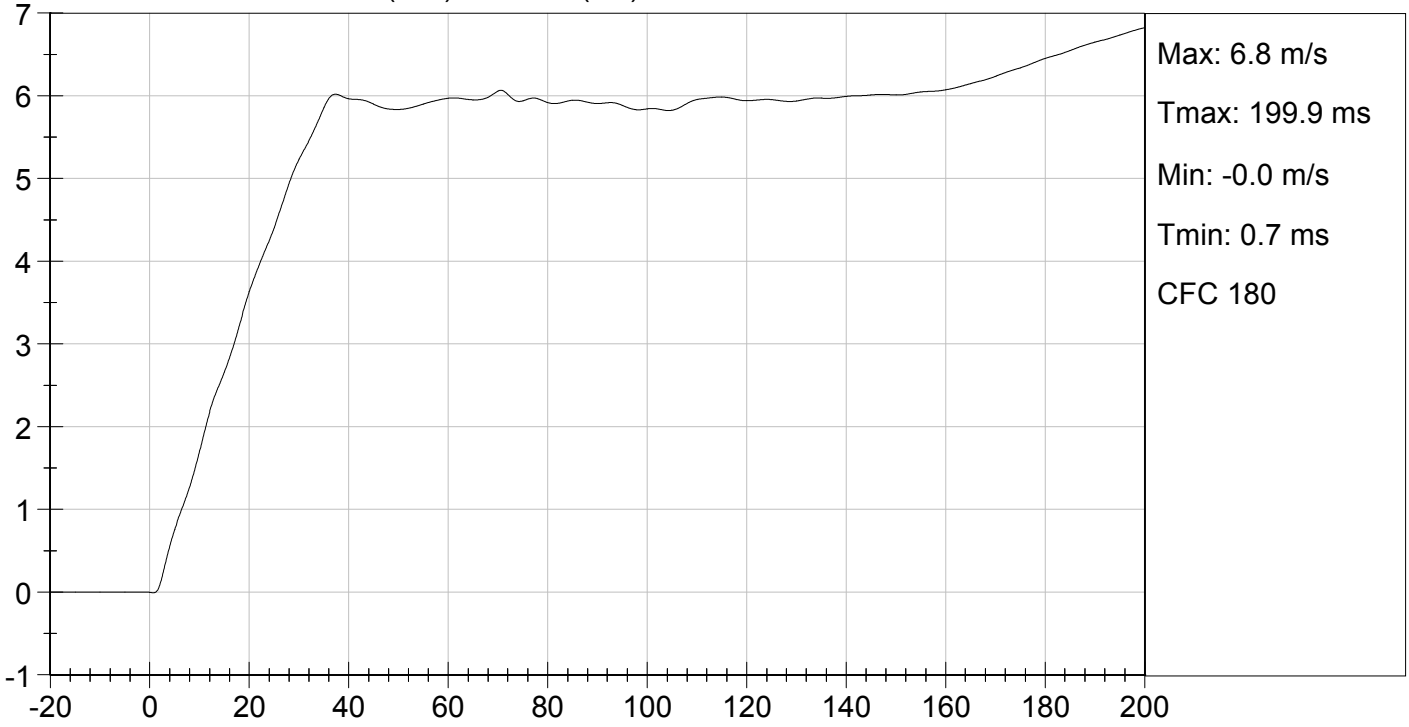
10/15/2014
Test Date

Jessica Hall
Approved By

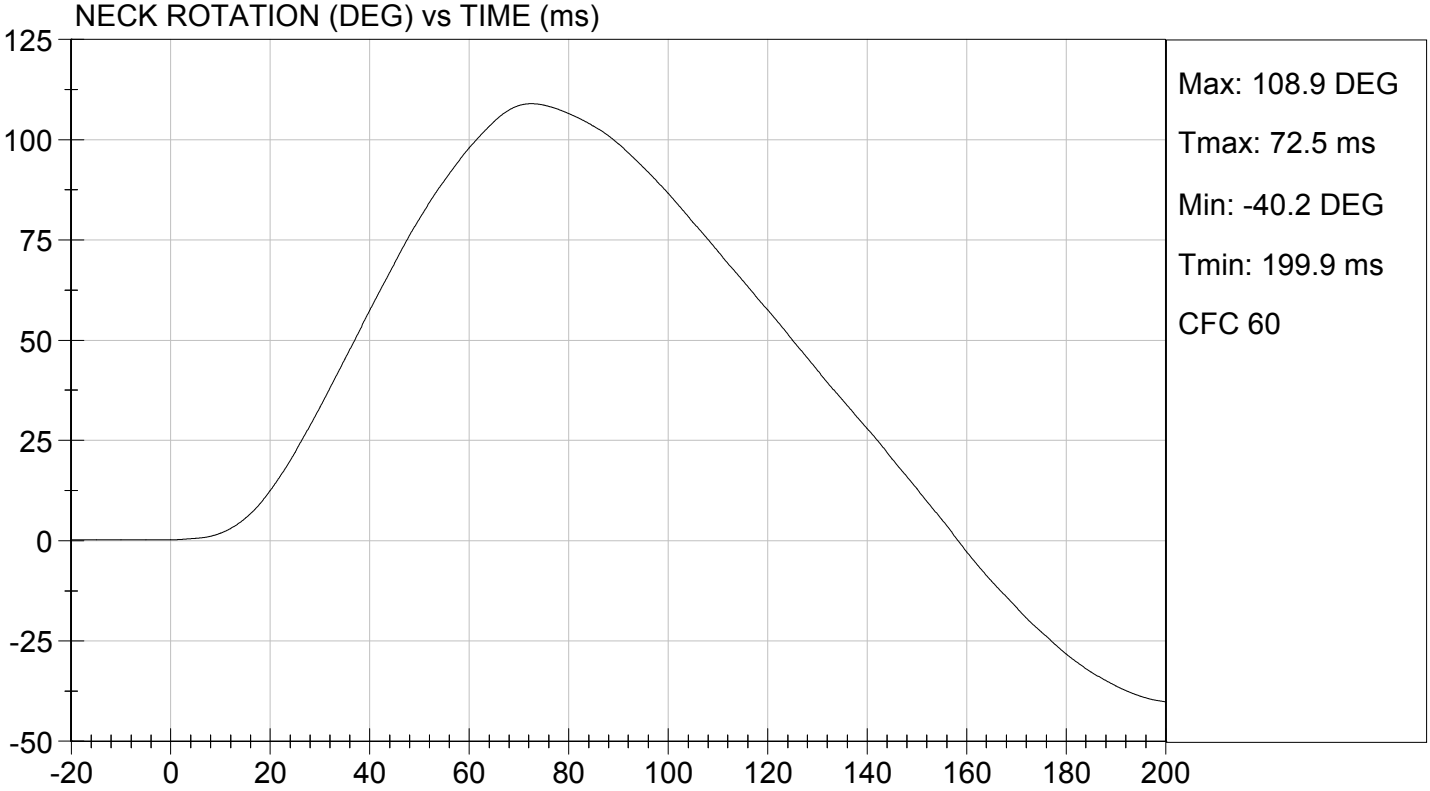
TEST DESC: NECK EXTENSION
VELOCITY: 20.08 ft/s, 6.12 m/s

TEST DATE: 10/15/2014
TEST #: D143623

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

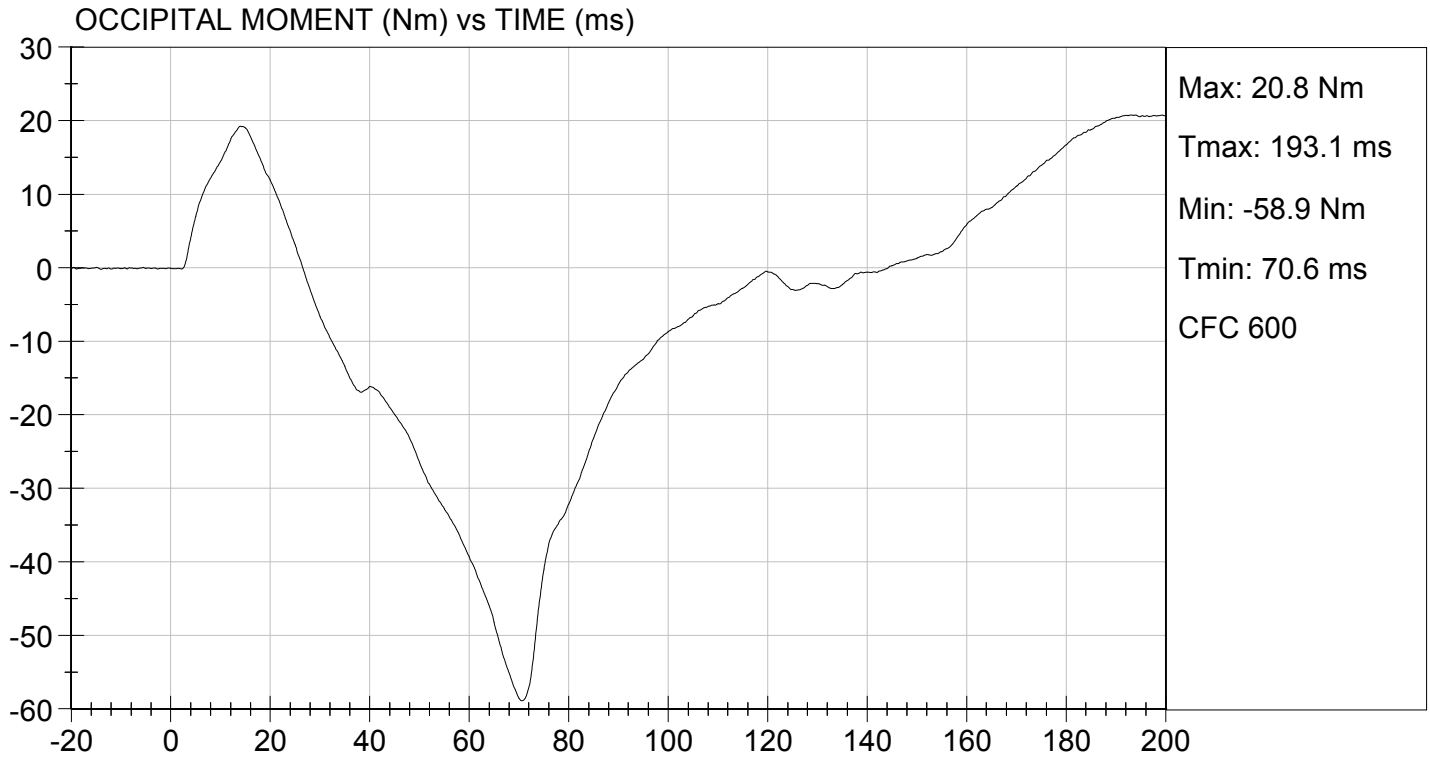


NECK ROTATION (DEG) vs TIME (ms)



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

TEST DATE: 10/15/2014
TEST #: D143623



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D143624

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.6	Pass
Relative Humidity	%	10 to 70	48	Pass
Probe Speed	m/s	6.59 to 6.83	6.68	Pass
Peak Deflection	mm	50 to 58	51	Pass
Peak Resistive Force w/in Deflection Corridor	N	3900 to 4400	4265	Pass
Internal Hysteresis	%	69 to 85	72	Pass
Peak Force 18 mm - 50 mm	N	<= 4600	4275	Pass
		Overall Test Results		Pass

Jack Coleman
Laboratory Technician

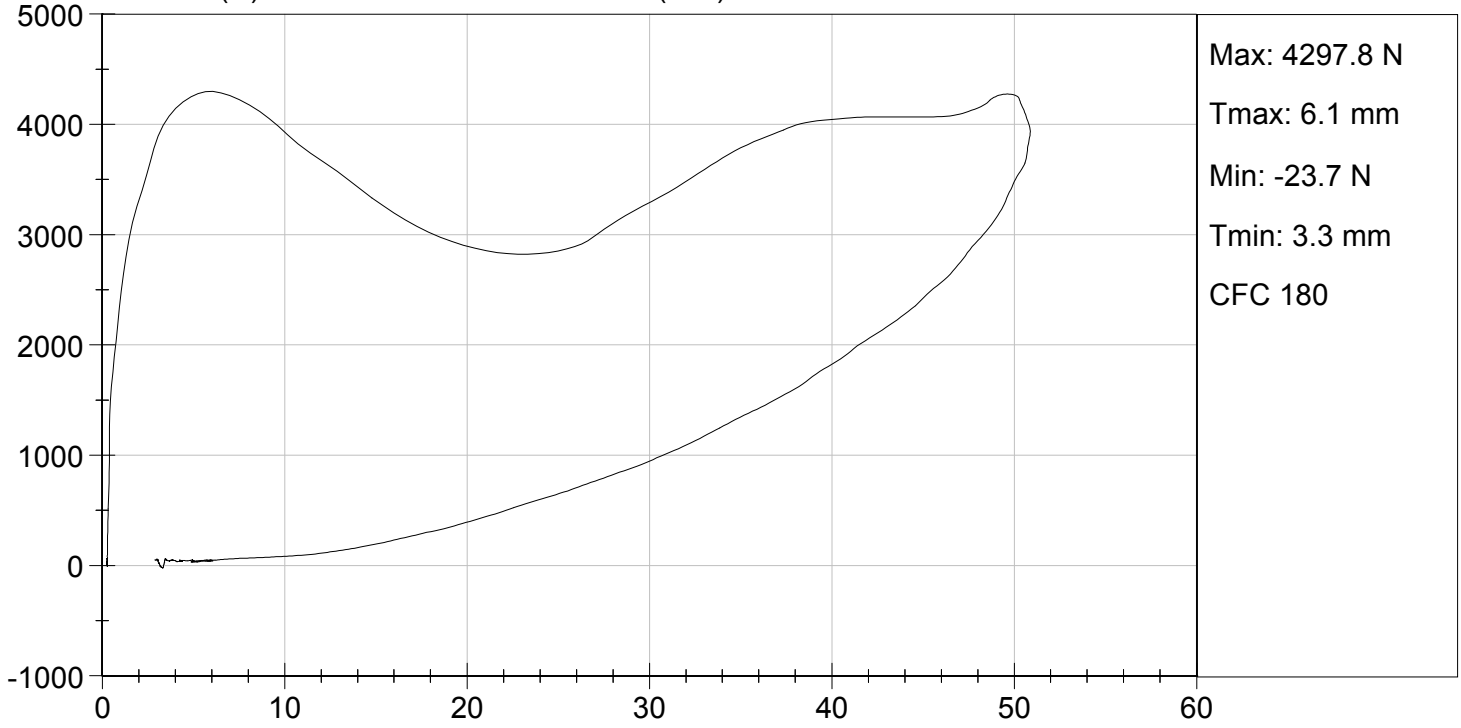
10/16/2014
Test Date

Jessica Hall
Approved By

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

TEST DATE: 10/16/2014
TEST #: D143624

FORCE (N) vs CHEST DISPLACEMENT (mm)



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D143625

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	3536	Pass
		Overall Test Results		Pass

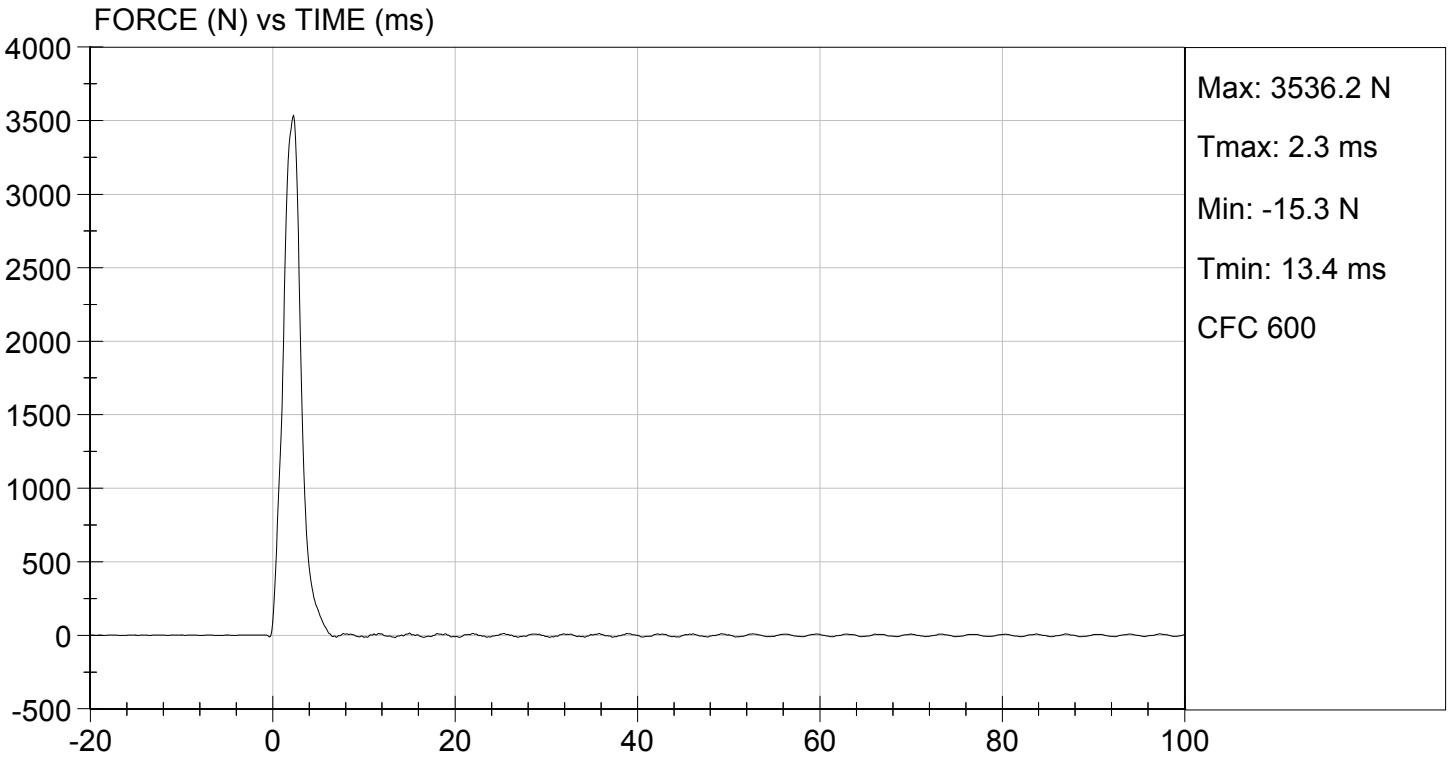
David Schoedel
Laboratory Technician

10/15/2014
Test Date

Jessica Gall
Approved By

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

TEST DATE: 10/15/2014
TEST #: D143625



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D143626

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	3642	Pass
		Overall Test Results		Pass

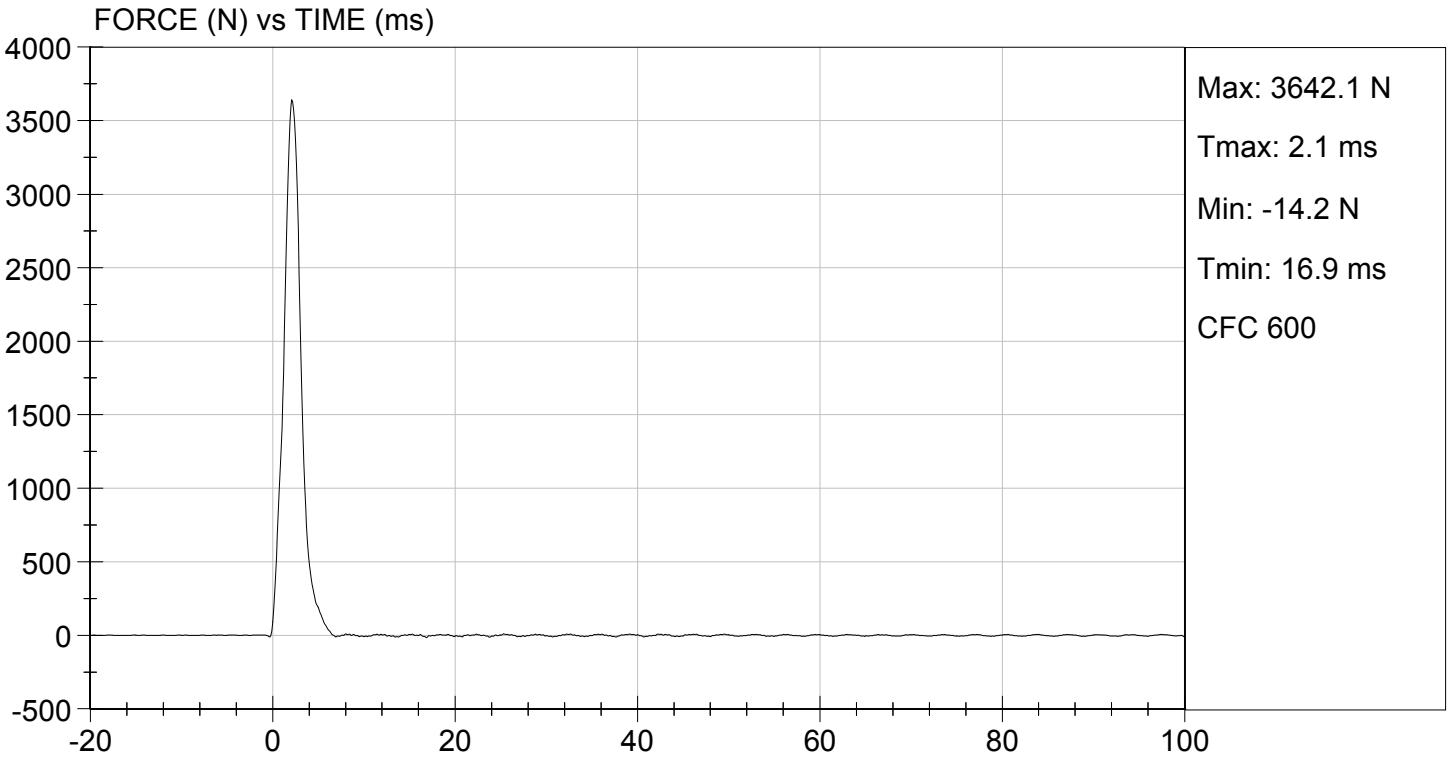
David Schoedel
Laboratory Technician

10/15/2014
Test Date

Jessica Hall
Approved By

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

TEST DATE: 10/15/2014
TEST #: D143626



MGA RESEARCH CORPORATION

TORSO FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D143627

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	44	Pass
Initial Angle	deg	0 to 20	19	Pass
Return Angle	deg	+/- 8	4	Pass
Force at 45 deg	N	320 to 390	364	Pass
Upper Torso Deflection Rate	deg/s	0.5 to 1.5	0.7	Pass
		Overall Result		Pass

David Schoedel
Laboratory Technician

10/15/2014
Test Date

Jessica Hall
Approved By