REPORT NUMBER: NCAP-MGA-2013-030

NEW CAR ASSESSMENT PROGRAM (NCAP)
Frontal Barrier Impact Test

CHRYSLER GROUP LLC
2013 Dodge Challenger SXT 2-Dr Coupe
NHTSA No.: MD0300

MGA RESEARCH CORPORATION
5000 Warren Road
Burlington, WI 53105

Test Date: November 8, 2012

Final Report Date: December 19, 2012

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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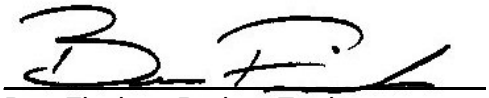
Prepared by: 
Donna Janovicz, Project Manager

Approved by: 
Ben Fischer, Project Engineer

Approval Date: December 19, 2012

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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16. Abstract

A 56.3 km/h NCAP Frontal Impact Test was conducted on a 2013 Dodge Challenger SXT 2-Dr Coupe in accordance with the specifications of the Office of Crashworthiness Standards Frontal NCAP Laboratory Test Procedure. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and foot well intrusion performance. The test was conducted at MGA Research Corporation in Burlington, Wisconsin, on November 8, 2012.

The impact velocity was 56.4 km/h and the ambient temperature at the barrier face at the time of impact was 20.8°C. The target vehicle post-test maximum crush was 740 mm located at the vehicle's centerline. The test vehicle's performance was as follows:

Measurement Description	Units	Threshold		Driver ATD	Passenger ATD
		50th	5th		
Head Injury Criteria (HIC_{15})	N/A	700	700	157	200
Maximum Chest Compression	mm	63	52	20	9
Nij	N/A	1	1	0.28	0.40
Neck Tension	N	4170	2620	1111	718
Neck Compression	N	4000	2520	46	115
Left Femur Force	N	10008	6805	1927	231
Right Femur Force	N	10008	6805	2968	673

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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 flat rigid barrier was impacted by a 2013 Dodge Challenger SXT 2-Dr Coupe at a velocity of 56.4 km/h. The test was performed at MGA Research Corporation on November 8, 2012. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

Two (2) real-time cameras and fourteen (14) high-speed cameras were used to document the frontal barrier impact event. Camera locations and other pertinent camera information can be found in this report.

One Part 572E 50th percentile male anthropomorphic test device (ATD), was placed in the driver seating position and one Part 572O 5th percentile female test device (ATD) was placed in the right-front passenger seating position according to dummy placement instructions specified in the Frontal NCAP Laboratory Test Procedure.

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

The driver (position 1) ATD (Serial No. 036) 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 112 channels of data were recorded on an on-board data acquisition system. Appendix B contains the vehicle and 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 740 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. 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 glove box.

The occupant data is summarized below:

ATD position	HIC_{15}	Nij	Neck Tension (N)	Neck Comp. (N)	3ms Chest Clip (Gs)	Chest Disp. (mm)	Left Femur (N)	Right Femur (N)
Driver (50^{th})	157	0.28	1111	46	38	20	1927	2968
Passenger (5^{th})	200	0.40	718	115	45	9	231	673

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

TEST NOTES

Top of Engine X has no valid data after 40ms.
Bottom of Engine X has no valid data after 59ms.

SECTION 2
OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2013 Dodge Challenger SXT 2-Dr Coupe
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MD0300
Test Date: 11/08/2012

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	MD0300	Traction Control System (TCS)	Yes
Model Year	2013	Power Steering	Yes
Make	Dodge	Power Window Auto-Reverse	No
Model	Challenger	Driver Frontal Airbag	Yes
Body Style	Coupe	Driver Curtain Airbag	Yes
VIN	2C3CDYAG9DH536253	Driver Head/Torso Airbag	No
Body Color	Redline Pearl	Driver Torso Airbag	No
Odometer (km/mi)	113 / 70	Driver Torso/Pelvis Airbag	Yes
Engine Displacement (L)	3.6	Driver Pelvis Airbag	No
Type/No. Cylinders	6	Driver Knee Airbag	No
Engine Placement	Longitudinal	Front Pass. Frontal Airbag	Yes
Transmission Type	Automatic	Front Pass. Curtain Airbag	Yes
Transmission Speeds	5	Front Pass. Head/Torso Airbag	No
Overdrive	Yes	Front Pass. Torso Airbag	No
Final Drive	Rear Wheel Drive	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	Driver Only	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?	Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	CHRYSLER GROUP LLC
Date of Manufacture	SEP 12

GVWR (kg)	2246
GAWR Front (kg)	1275
GAWR Rear (kg)	1275

VEHICLE SEATING AND WEIGHT CAPACITY DATA

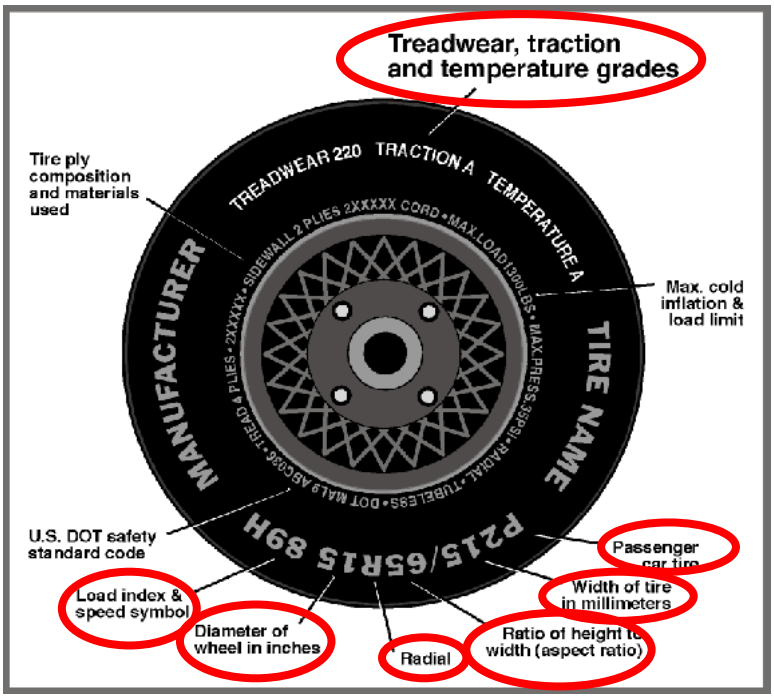
Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench		
Designated Seating Capacity (DSC)	2	3		5
Capacity Weight (VCW) (kg)				392
Cargo Weight (RCLW) (kg)				52

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

Test Vehicle: 2013 Dodge Challenger SXT 2-Dr Coupe
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MD0300
Test Date: 11/08/2012

VEHICLE TIRE INFORMATION



Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	220	220
Recommended Tire Size	P235/55R18	P235/55R18
Tire Size on Vehicle	P235/55R18	P235/55R18
Tire Manufacturer	Michelin	Michelin
Tire Model	Pilot HX MXM4	Pilot HX MXM4
Treadwear	300	300
Traction	A	A
Temperature Grade	A	A
Tire Plies Sidewall	2	2
Tire Plies Body	5	5
Load Index/Speed Symbol	99V	99V
Tire Material	Rubber	Rubber
DOT Safety Code Left	B93J PN2X	B93J PN2X
DOT Safety Code Right	B93J PN2X	B93J PN2X

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

Test Vehicle: 2013 Dodge Challenger SXT 2-Dr Coupe NHTSA No.: MD0300
Test Program: NCAP Frontal Barrier Impact Test Test Date: 11/08/2012

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	455.9	417.3		492.2	492.6	
Right	kg	465.4	422.3		478.1	484.9	
Ratio	%	52.3	47.7		49.8	50.2	
Totals	kg	921.3	839.6	1760.9	970.3	977.5	1947.8

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1760.9
Weight of 1 P572E ATD & 1 P572O ATD	kg	140.6
Rated Cargo/Luggage Weight (RCLW)	kg	52
Calculated Vehicle Target Weight (TVTW)	kg	1953.5

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	764	763	781	784	1409
As Tested	mm	758	758	764	761	1483
Post Test	mm	1008	970	757	763	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2955
Total Vehicle Length at Left Side	mm	4857
Total Vehicle Length at Centerline	mm	5024
Total Vehicle Length at Right Side	mm	4857
Weight of Ballast in Cargo Area	kg	42.6
Weight of Vehicle Components Removed	kg	30.4
Amount of Stoddard Solvent in Fuel Tank	L	67.2

List of components removed to meet test weight: Right taillight, jack and tools, spare tire, trunk lining, engine splash shields, rear floor mats, and trunk floor.

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

Test Vehicle: 2013 Dodge Challenger SXT 2-Dr Coupe NHTSA No.: MD0300
Test Program: NCAP Frontal Barrier Impact Test Test Date: 11/08/2012

TARGET VEHICLE STRUCTURAL MEASUREMENT

	Elements	Pre-Test (mm)
1	Total Length	5024
2	Total Width	1918
3	Bumper Top Height	510
4	Bumper Bottom Height	400
5	Longitudinal Member Top Height	510
6	Distance between Longitudinal Members	790
7	Longitudinal Member Width	62
8	Engine Top Height	942
9	Engine Bottom Height	178
10	Engine and Gearbox Width	1091
11	Front Bumper-Engine Distance	300
12	Front Shock Absorber Fixing Height	820
13	Bonnet Leading Edge Height	877
14	Front Shock Absorber Fixing Width	988
15	Front Bumper – Front Axle Distance	952
16	Front Axle – A-Pillar Distance	752
17	A-Pillar – B-Pillar Distance	1275
18	B-Pillar – Rear Axle Distance	938
19	B-Pillar – C-Pillar Distance	462
20	Roof Sill Bottom Height	1288
21	Roof Sill Top Height	1420
22	Floor Sill Bottom Height	167
23	Floor Sill Top Height	388

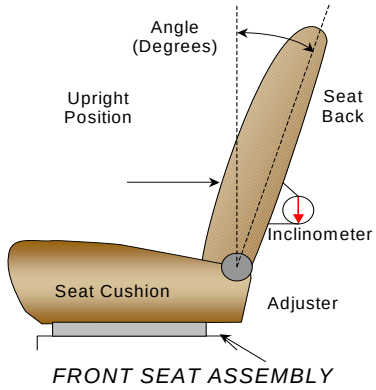
DATA SHEET NO. 2
SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

Test Vehicle: 2013 Dodge Challenger SXT 2-Dr Coupe
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MD0300
Test Date: 11/08/2012

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 September 2012.



FRONT SEAT ASSEMBLY

	Degrees
Driver Seat Back Angle	15.4° on headrest post
Passenger Seat Back Angle	16.6° on headrest post

SEAT FORE/AFT POSITIONS

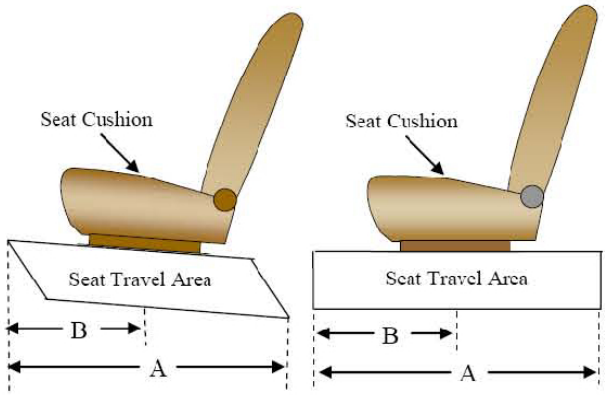
The driver and passenger seat fore/aft positions are adjusted following Appendix F, "Driver & Passenger Dummy Seating & Positioning Procedures" in the NCAP Test Procedure dated September 2012.

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	333 mm	167 mm (foremost as 0)
Passenger Seat	220 mm, 22 Detents (1st as 0)	0 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	Fixed	Fixed
Passenger Seat	Fixed	Fixed



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

Test Vehicle: 2013 Dodge Challenger SXT 2-Dr Coupe
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MD0300
Test Date: 11/08/2012

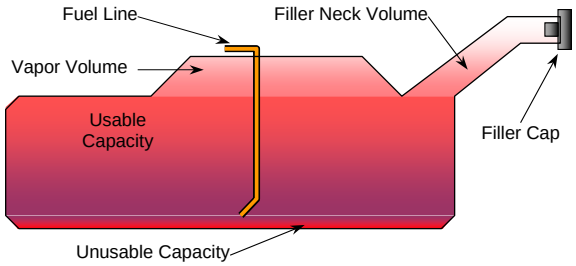
FUEL TANK CAPACITY DATA

	Liters
Usable Capacity of "Standard Tank"	72.3
Usable Capacity of "Optional Tank"	
92-94% of Usable Capacity	66.5 to 68.0
Actual Amount of Solvent used	67.2
1/3 of Usable Capacity	24.1

FUEL PUMP

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

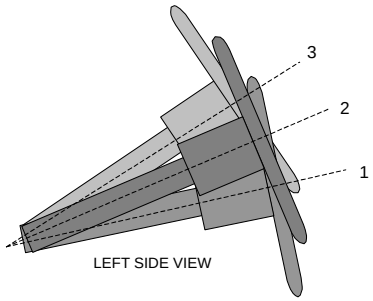
The vehicle is equipped with an electric fuel pump. The fuel pump starts pumping fuel when the key is in "ON" position. The fuel pipe is on the left side.



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

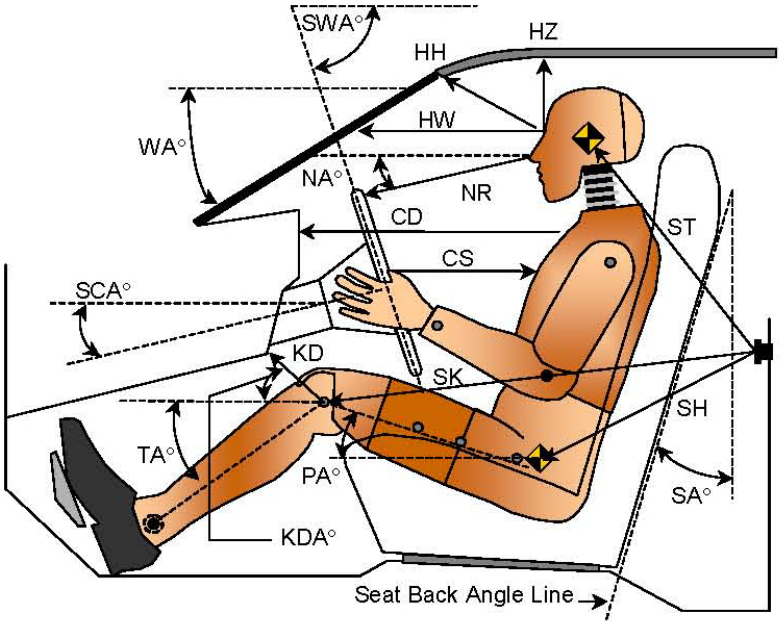
STEERING COLUMN POSITION

	Degrees	Fore/Aft Position (mm)
Lowermost Position 1	70.0	210
Geometric Center Position 2	67.5	180
Uppermost Position 3	65.0	150
Telescoping Steering Wheel Travel		60
Test Position	67.5	180

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2013 Dodge Challenger SXT 2-Dr Coupe
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MD0300
Test Date: 11/08/2012



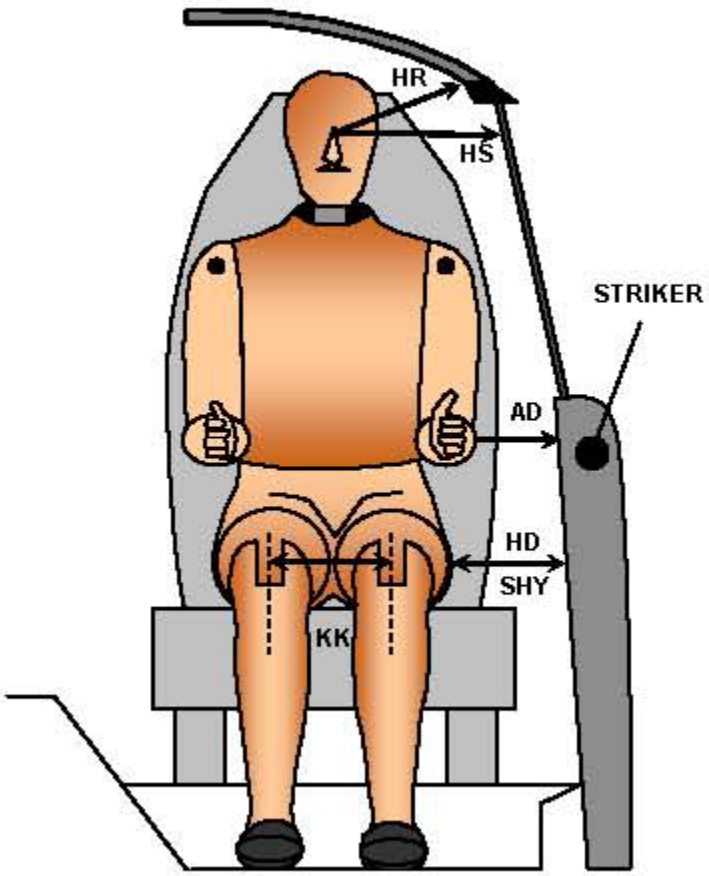
LEFT SIDE VIEW

Code	Measurement Description	Driver S/N 036		Passenger S/N 634	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		26.5		
SWA°	Steering Wheel Angle		67.5		
SCA°	Steering Column Angle		22.5		
SA°	Seat Back Angle (on headrest post)		15.4		16.6
HZ	Head to Roof (Z)	223	90	236	90
HH	Head to Header	414	17.6	351	38.2
HW	Head to Windshield	729	0	763	0
NR	Nose to Rim	394	8.8		
CD	Chest to Dash	542		386	
CS	Chest to Steering Hub	294	1.9		
RA	Rim to Abdomen	194	0		
KDL	Left Knee to Dash	180	30.4	126	36.0
KDR	Right Knee to Dash	173	32.6	123	31.4
PA°	Pelvic Angle		23.8		21.8
TA°	Tibia Angle		41.5		48.3
SK	Striker to Knee	846	93.0	950	92.6
ST	Striker to Head	616	34.5	643	50.2
SH	Striker to H-Point	478	109.9	649	104.4

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2013 Dodge Challenger SXT 2-Dr Coupe
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MD0300
Test Date: 11/08/2012



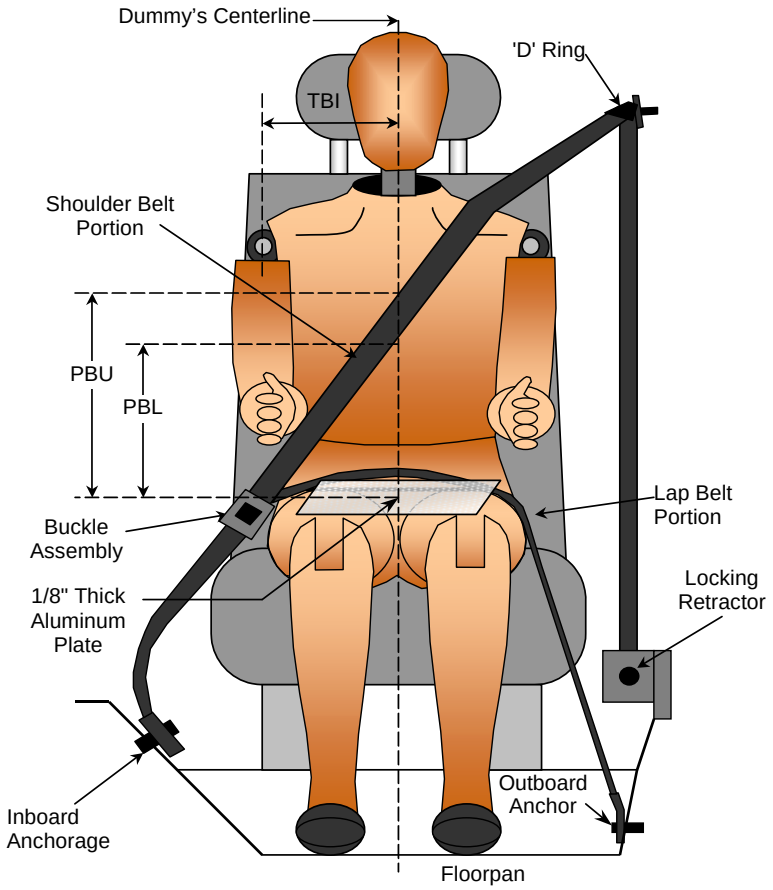
FRONT VIEW OF DUMMY

Code	Measurement Description	Driver S/N 036	Passenger S/N 634
		Length (mm)	
AD	Arm to Door	150	103
HD	H-Point to Door	158	186
HR	Head to Side Header	244	282
HS	Head to Side Window	361	390
KK	Knee to Knee	335	227
SHY	Striker to H-Point (Y Direction)	325	330
AA	Ankle to Ankle	350	167

DATA SHEET NO. 5
SEAT BELT POSITIONING DATA

Test Vehicle: 2013 Dodge Challenger SXT 2-Dr Coupe
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MD0300
Test Date: 11/08/2012



FRONT VIEW OF DUMMY

SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU - Top surface of reference to belt upper edge	mm	390	370
PBL - Top surface of reference to belt lower edge	mm	320	295

BELT LENGTH DATA

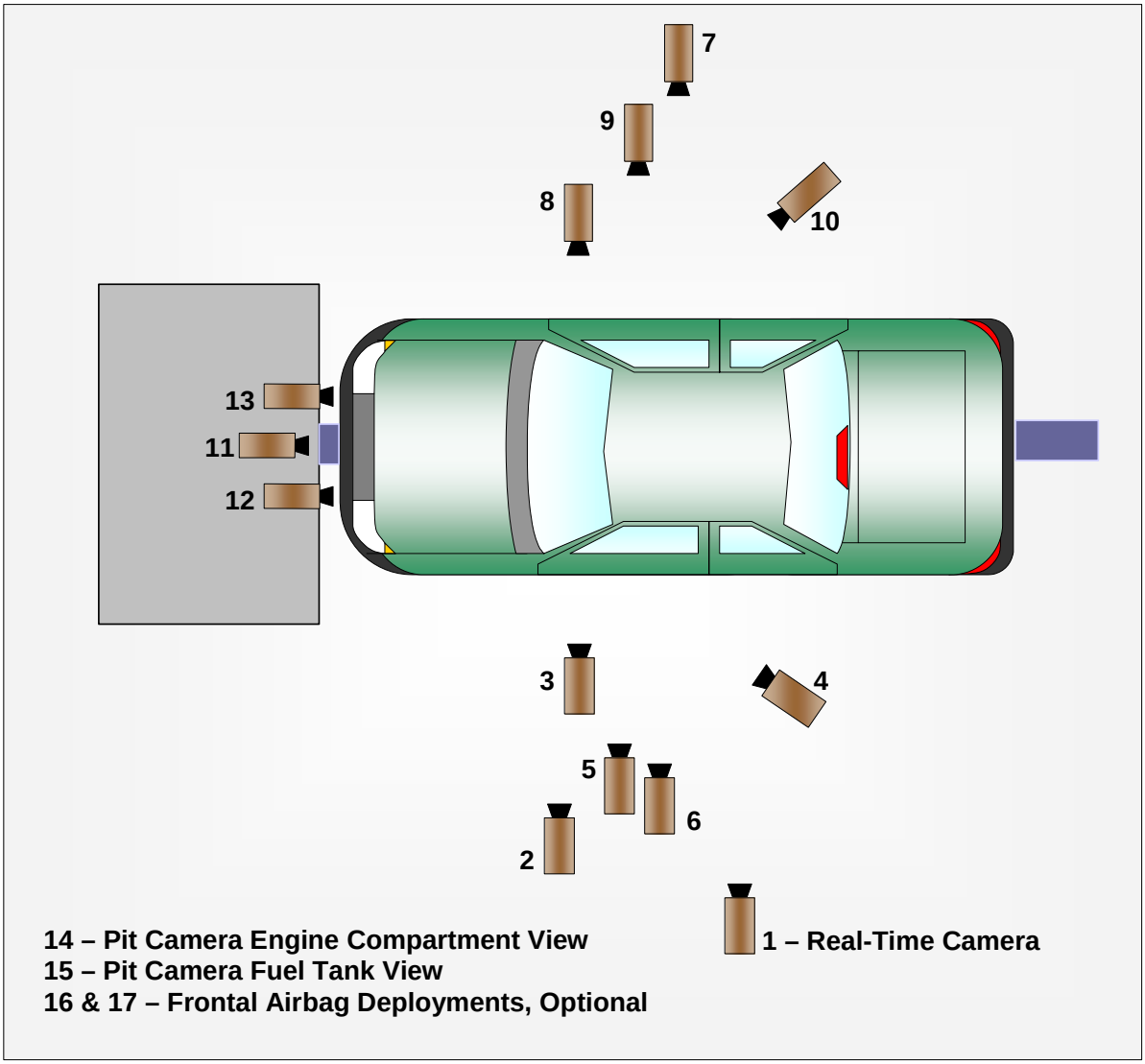
Measurement Description	Units	Driver	Passenger
Shoulder Belt Length as measured on ATD	mm	1010	
Lap Belt Length as measured on ATD	mm	780	
Remainder of belt on reel	mm	1310	
Total Belt Length for Continuous Webbing Systems	mm	3100	3100

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

Test Vehicle: 2013 Dodge Challenger SXT 2-Dr Coupe
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MD0300
Test Date: 11/08/2012

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: 2013 Dodge Challenger SXT 2-Dr Coupe
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MD0300
Test Date: 11/08/2012

CAMERA LOCATIONS

No.	Camera View	Coordinates (mm)			Lens (mm)	Speed (fps)
		X*	Y*	Z*		
1	Real-Time Left Overall					30
2	Driver Close-Up	1840	-6880	-1850	35	1000
3	Left Front Half	1440	-5400	-1260	24	1000
4	Left Angle	5650	-5100	-2030	50	1000
5	Steering Column - Top	570	-5000	-1260	24	1000
6	Steering Column - Bottom	550	-4970	-860	24	1000
7	Right Overall	2330	6980	-1370	20	1000
8	Passenger Close-Up	1830	7030	-1890	35	1000
9	Right Front Half	1430	5610	-1330	24	1000
10	Right Angle	5750	4710	-2030	50	1000
11	Windshield	-60	0	-2810	20	1000
12	Driver Windshield	-220	-450	-2030	8.5	1000
13	Passenger Windshield	-220	450	-2740	8.5	1000
14	Pit Front	1270	0	3150	24	1000
15	Pit Rear	3180	0	3150	24	1000
16	Onboard Driver Side (optional)					
17	Onboard Passenger Side (optional)					
18	Real-Time Pan View					30

*COORDINATES:

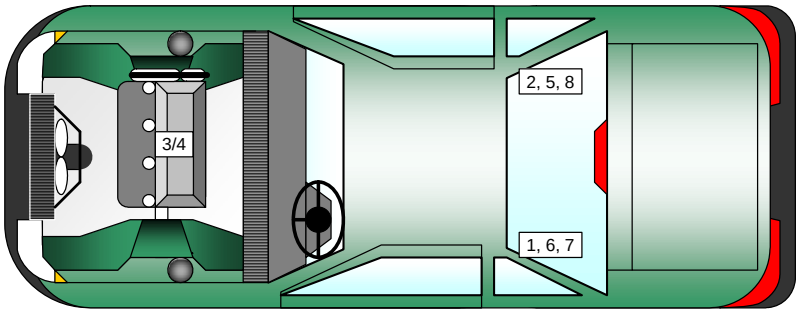
+X = forward of impact plane
+Y = right of monorail centerline
+Z = below ground level

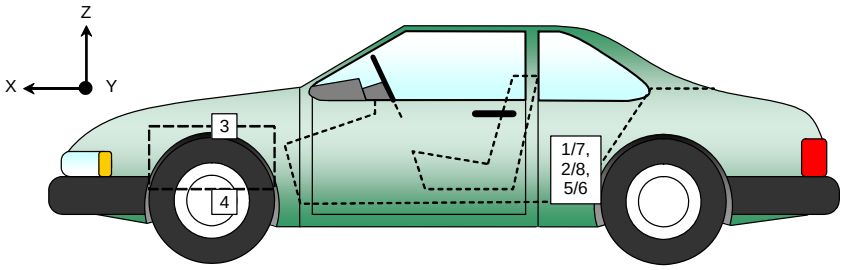
Cameras 16 & 17 were not used for this test.

DATA SHEET NO. 7
VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2013 Dodge Challenger SXT 2-Dr Coupe
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MD0300
Test Date: 11/08/2012





VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear Accelerometer – X Direction	2058	-276	-218
2	Right Rear Accelerometer – X Direction	2070	238	-198
3	Engine Top X	3994	-20	-943
4	Engine Bottom X	4257	58	-188
5	Left Rear Accelerometer – Z Direction	2058	-276	-218
6	Right Rear Accelerometer – Z Direction	2070	238	-198
7	Left Rear Accelerometer Redundant – X Direction	2058	-276	-218
8	Right Rear Accelerometer Redundant – X Direction	2070	238	-198

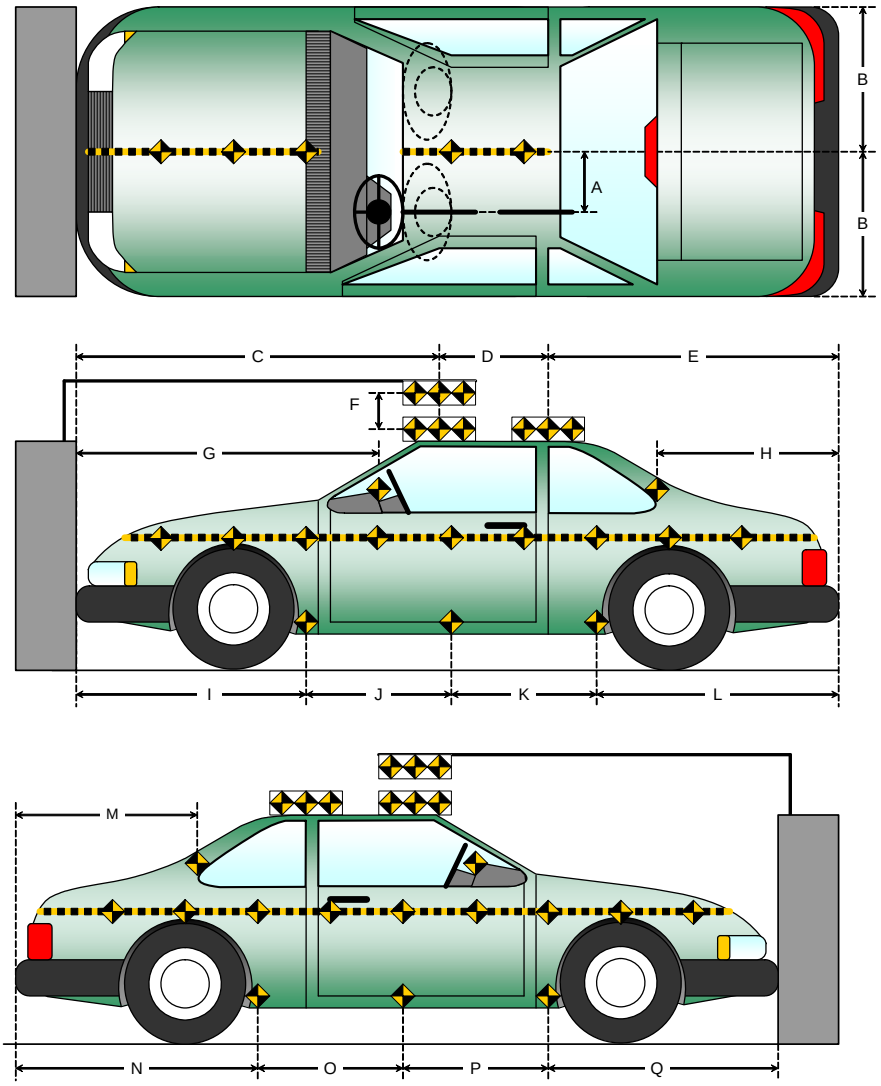
Reference Points: X - Rear Surface of Vehicle (+ forward)
Y - Vehicle Centerline (+ to right)
Z - Ground Plane (+ down)

DATA SHEET NO. 8
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2013 Dodge Challenger SXT 2-Dr Coupe
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MD0300
Test Date: 11/08/2012

Item	Value (mm)
A	320
B	959
C	2518
D	670
E	1836
F	152
G	
H	1326
I	1460
J	998
K	998
L	1568
M	1326
N	1568
O	998
P	998
Q	1460



DATA SHEET NO. 9
LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle: 2013 Dodge Challenger SXT 2-Dr Coupe
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MD0300
Test Date: 11/08/2012

Advanced Research Load Cell Barrier

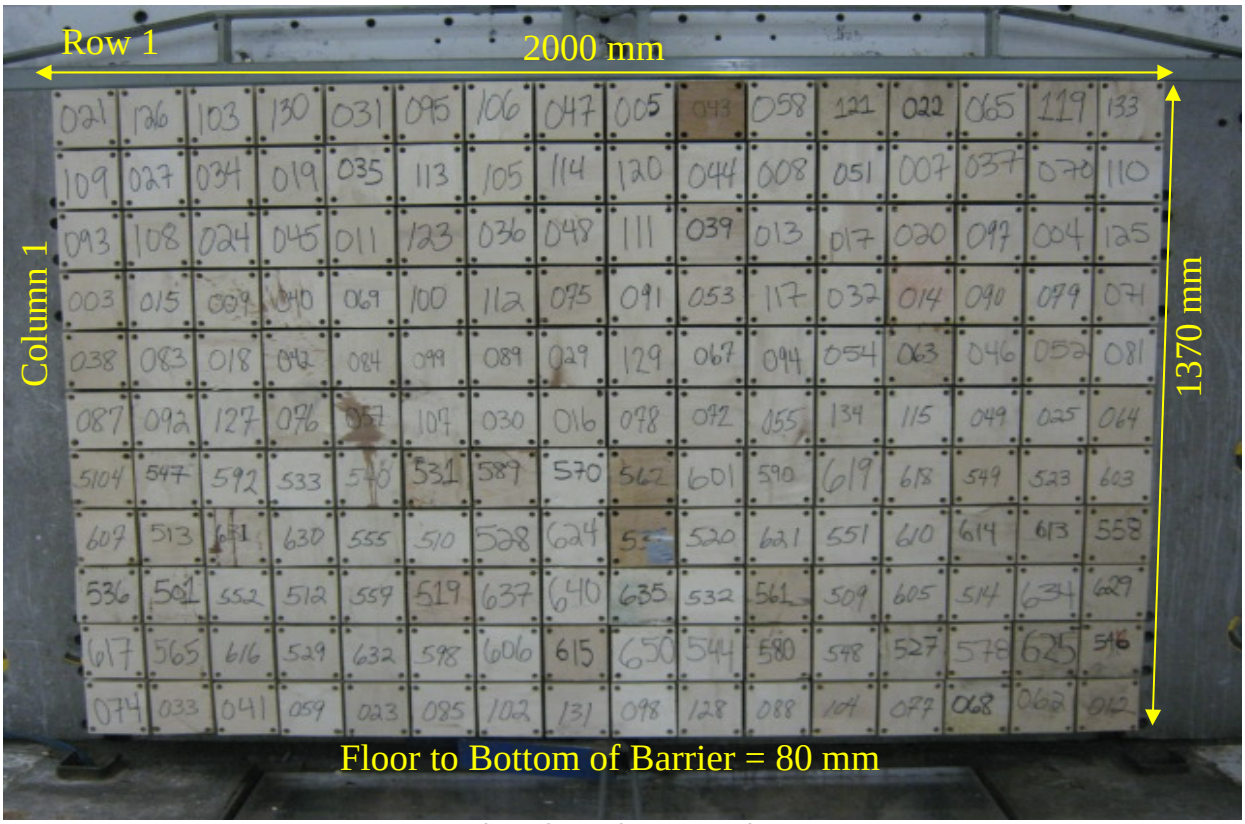


Photo for Reference Only

Centerline

1-1	1-2	1-3	1-4	1-5	1-6	1-7	1-8	1-9	1-10	1-11	1-12	1-13	1-14	1-15	1-16
2-1	2-2	2-3	2-4	2-5	2-6	2-7	2-8	2-9	2-10	2-11	2-12	2-13	2-14	2-15	2-16
3-1	3-2	3-3	3-4	3-5	3-6	3-7	3-8	3-9	3-10	3-11	3-12	3-13	3-14	3-15	3-16
4-1	4-2	4-3	4-4	4-5	4-6	4-7	4-8	4-9	4-10	4-11	4-12	4-13	4-14	4-15	4-16
5-1	5-2	5-3	5-4	5-5	5-6	5-7	5-8	5-9	5-10	5-11	5-12	5-13	5-14	5-15	5-16
6-1	6-2	6-3	6-4	6-5	6-6	6-7	6-8	6-9	6-10	6-11	6-12	6-13	6-14	6-15	6-16
7-1	7-2	7-3	7-4	7-5	7-6	7-7	7-8	7-9	7-10	7-11	7-12	7-13	7-14	7-15	7-16
8-1	8-2	8-3	8-4	8-5	8-6	8-7	8-8	8-9	8-10	8-11	8-12	8-13	8-14	8-15	8-16
9-1	9-2	9-3	9-4	9-5	9-6	9-7	9-8	9-9	9-10	9-11	9-12	9-13	9-14	9-15	9-16
10-1	10-2	10-3	10-4	10-5	10-6	10-7	10-8	10-9	10-10	10-11	10-12	10-13	10-14	10-15	10-16
11-1	11-2	11-3	11-4	11-5	11-6	11-7	11-8	11-9	11-10	11-11	11-12	11-13	11-14	11-15	11-16

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: 2013 Dodge Challenger SXT 2-Dr Coupe NHTSA No.: MD0300
Test Program: NCAP Frontal Barrier Impact Test Test Date: 11/08/2012

INSTRUMENTATION

Driver Dummy Data Channels	52
Passenger Dummy Data Channels	52
Vehicle Structure Accelerometers	8
Barrier Channels	0
Total	112

CAMERA COVERAGE

High-Speed Vehicle Onboard	0
High-Speed Offboard	14
Real-Time	2
Total	16

DATA SHEET NO. 11
POST-TEST OBSERVATIONS

Test Vehicle: 2013 Dodge Challenger SXT 2-Dr Coupe
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: MD0300
Test Date: 11/08/2012

TEST DUMMY INFORMATION AND CONTACT LOCATIONS

Description	Driver	Passenger
Dummy Type / Serial No.	HIII 50% / 036	HIII 5% / 634
Head Contact	Airbag, Headrest	Airbag, Headrest
Upper Torso Contact	Airbag	Airbag
Lower Torso Contact	None	None
Left Knee Contact	Knee Bolster	Glove Box
Right Knee Contact	Knee Bolster	Glove Box

DOOR OPENING AND SEAT TRACK INFORMATION

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

POST TEST STRUCTURAL OBSERVATIONS

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

VEHICLE REBOUND FROM BARRIER

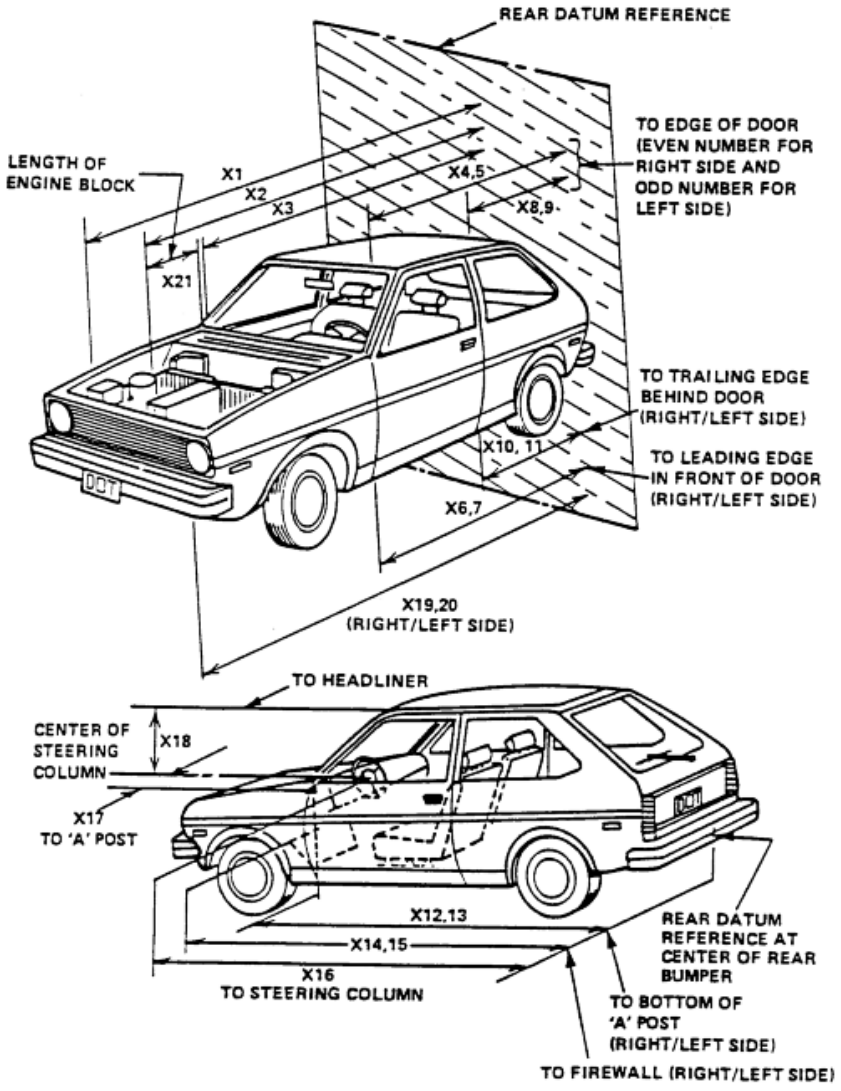
Measured Parameter	Units	Value
Left Side	mm	910
Center	mm	920
Right Side	mm	915
Average	mm	915

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Left Front (Driver) P1		Right Front (Passenger) P2	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	Yes	Yes	Yes
Curtain Side Airbag	Yes	No	Yes	No
Torso/Pelvis Side Airbag	Yes	No	Yes	No
Knee Airbag	No		No	
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load Limiter	Yes		Yes	
Other	No		No	

DATA SHEET NO. 12
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2013 Dodge Challenger SXT 2-Dr Coupe NHTSA No.: MD0300
Test Program: NCAP Frontal Barrier Impact Test Test Date: 11/08/2012



DATA SHEET NO. 12 (CONTINUED)
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2013 Dodge Challenger SXT 2-Dr Coupe NHTSA No.: MD0300
Test Program: NCAP Frontal Barrier Impact Test Test Date: 11/08/2012

RSOV (Rear Surface of Vehicle)

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	mm	5024	4284	740
2	RSOV to Front of Engine	mm	4379	4206	173
3	RSOV to Firewall	mm	3854	3736	118
4	RSOV to Upper Leading Edge of Right Door	mm	3226	3234	-8
5	RSOV to Upper Leading Edge of Left Door	mm	3226	3221	5
6	RSOV to Lower Leading Edge of Right Door	mm	3314	3304	10
7	RSOV to Lower Leading Edge of Left Door	mm	3310	3302	8
8	RSOV to Upper Trailing Edge of Right Door	mm	1975	1988	-13
9	RSOV to Upper Trailing Edge of Left Door	mm	1975	1980	-5
10	RSOV to Lower Trailing Edge of Right Door	mm	2049	2041	8
11	RSOV to Lower Trailing Edge of Left Door	mm	2049	2039	10
12	RSOV to Bottom of “A” Post of Right Side	mm	3320	3325	-5
13	RSOV to Bottom of “A” Post of Left Side	mm	3320	3320	0
14	RSOV to Firewall, Right Side	mm	3880	3792	88
15	RSOV to Firewall, Left Side	mm	3887	3821	66
16	RSOV to Steering Column	mm	2782	2862	-80
17	Center of Steering Column to “A” Post	mm	406	404	2
18	Center of Steering Column to Headliner	mm	405	423	-18
19	RSOV to Right Side of Front Bumper	mm	4857	4284	573
20	RSOV to Left Side of Front Bumper	mm	4857	4284	573
21	Length of Engine Block	mm	488	488	0
RD	RSOV to Right Side of Dash Panel	mm	2999	3019	-20
CD	RSOV to Center of Dash Panel	mm	3055	3058	-3
LD	RSOV to Left Side of Dash Panel	mm	2998	3006	-8

DATA SHEET NO. 13
ACCIDENT INVESTIGATION DIVISION DATA

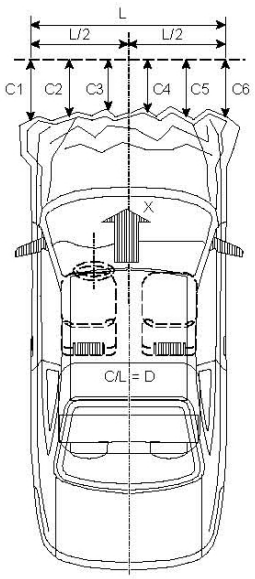
Test Vehicle: 2013 Dodge Challenger SXT 2-Dr Coupe NHTSA No.: MD0300
Test Program: NCAP Frontal Barrier Impact Test Test Date: 11/08/2012

VEHICLE INFORMATION

VIN: 2C3CDYAG9DH536253 Wheelbase (mm): 2955
Vehicle Size Category: Passenger Test Weight (kg): 1947.8

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): 56.4
Velocity Change (km/h): 66.0
Time of Separation (msec): 134.2



CRUSH PROFILE

Collision Deformation Classification: Frontal
Midpoint of Damage: Centerline
Damage Region Length (mm): 1432
Impact Mode: Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	4857	4284	573
C2	Crush zone 2 at left side	mm	4903	4296	607
C3	Crush zone 3 at left side	mm	4937	4295	642
C4	Crush zone 4 at right side	mm	4937	4298	639
C5	Crush zone 5 at right side	mm	4903	4292	611
C6	Crush zone 6 at right side	mm	4857	4284	573
L	C1 TO C6	mm	1432	1434	-2

DATA SHEET NO. 14
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2013 Dodge Challenger SXT 2-Dr Coupe
Test Program: NCAP Frontal Barrier Impact Test

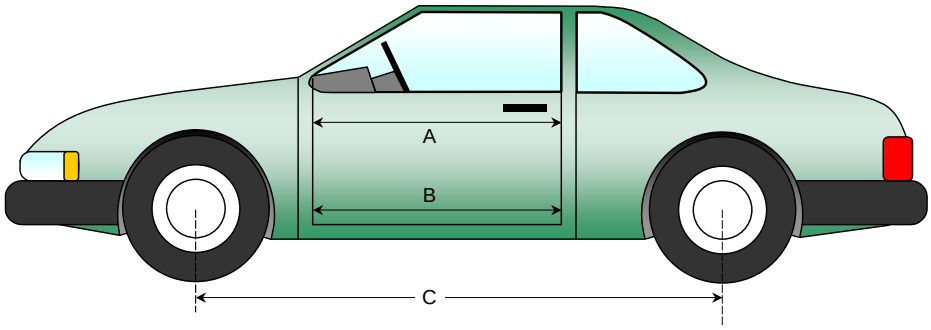
NHTSA No.: MD0300
Test Date: 11/08/2012

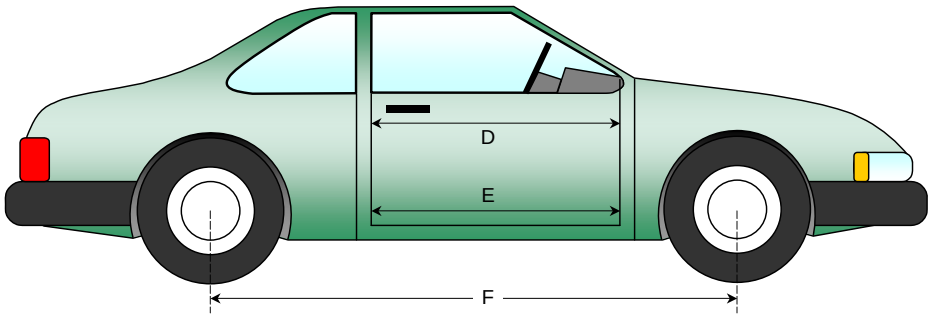
DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	1261	1260	1
B	Left Side Lower	mm	1254	1256	-2
D	Right Side Upper	mm	1261	1255	6
E	Right Side Lower	mm	1254	1252	2

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2955	2800	155
F	Right Side Wheelbase	mm	2955	2806	149





DATA SHEET NO. 14 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

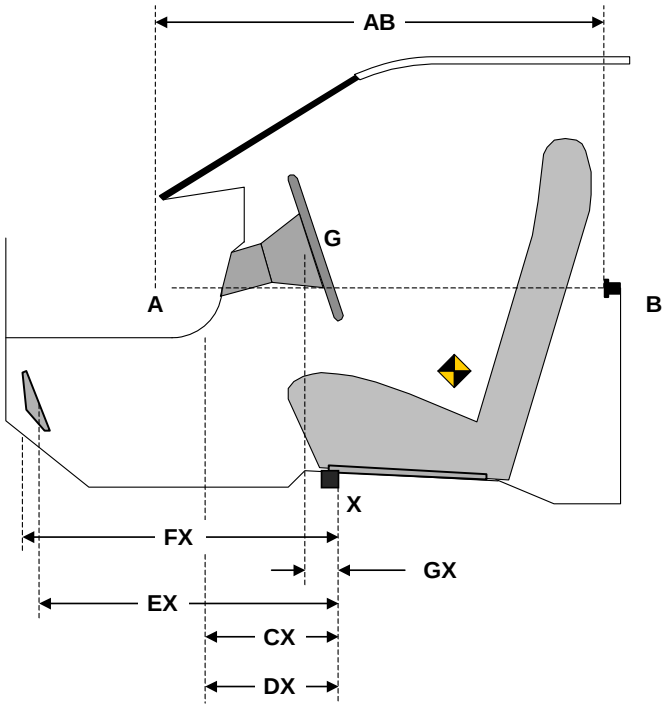
Test Vehicle: 2013 Dodge Challenger SXT 2-Dr Coupe
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MD0300
Test Date: 11/08/2012

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	1102	1102	0
CX	Left Knee Bolster to X	mm	263	279	-16
DX	Right Knee Bolster to X	mm	253	265	-12
EX	Brake Pedal to X	mm	604	528	76
FX	Foot Rest to X	mm	616	606	10
GX	Center of Steering Column Wheel Hub to X	mm	59	157	-98

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: 2013 Dodge Challenger SXT 2-Dr Coupe NHTSA No.: MD0300
Test Program: NCAP Frontal Barrier Impact Test Test Date: 11/08/2012

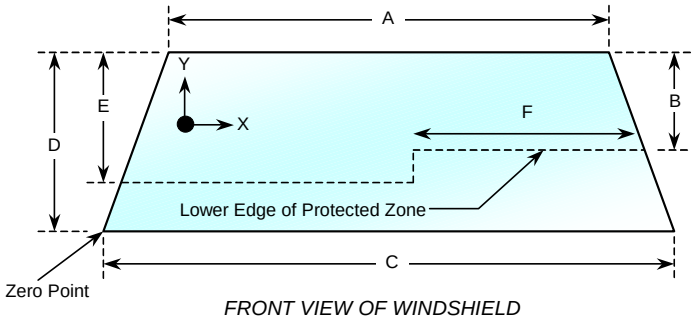
Windshield Mounting Details:
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

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: 20.8°C

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% of Retention
Left Side	2201	2201	100
Right Side	2201	2201	100
Total	4402	4402	100



FRONT VIEW OF WINDSHIELD

Item	Units	Value
A	mm	1268
B	mm	312
C	mm	1874
D	mm	630
E	mm	395
F	mm	633

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: 2013 Dodge Challenger SXT 2-Dr Coupe NHTSA No.: MD0300
Test Program: NCAP Frontal Barrier Impact Test Test Date: 11/08/2012

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 20.8°C Test Time: 10:05 a.m.

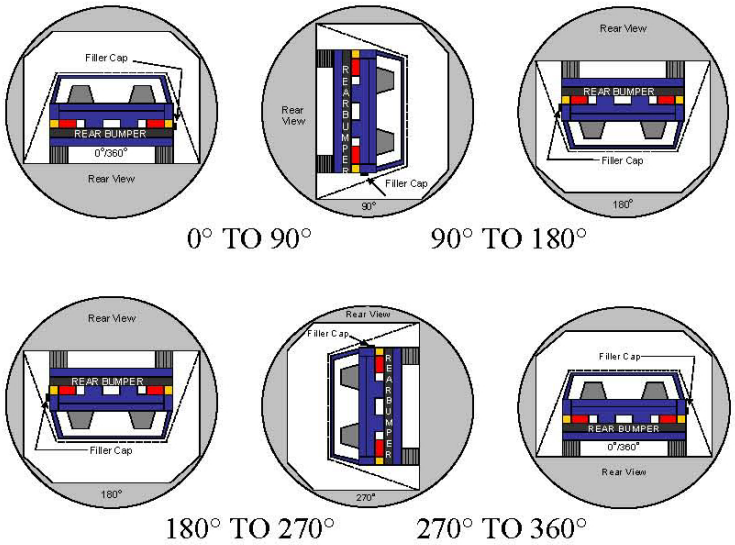
A. From impact until vehicle motion ceases: 0 oz.
(Maximum allowable = 1 oz.)
B. For the 5 minute period after motion ceases: 0 oz.
(Maximum allowable = 5 oz.)
C. For the following 25 minutes: 0 oz.
(Maximum allowable = 1 oz./minute)
D. Spillage: None

DATA SHEET NO. 16
FMVSS 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2013 Dodge Challenger SXT 2-Dr Coupe
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MD0300
Test Date: 11/08/2012

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

FMVSS 301 SPILLAGE TABLE (units in ounces)

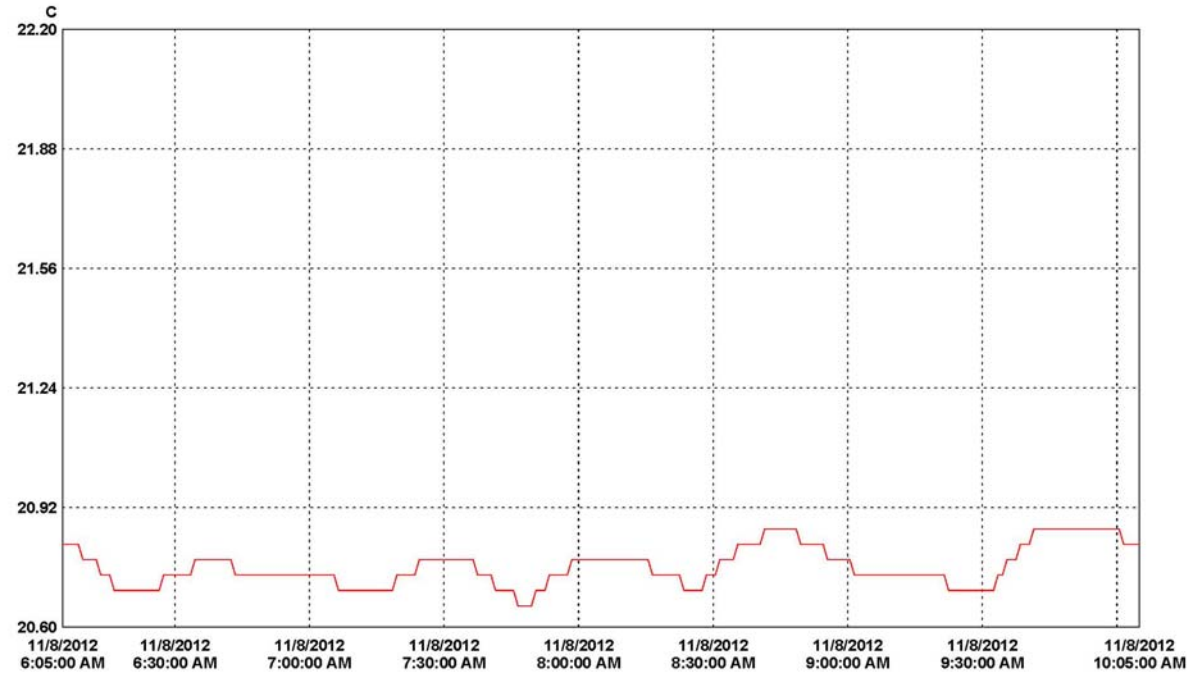
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eight Minute
0° to 90°	0	0	0	0
90° to 180°	0	0	0	0
180° to 270°	0	0	0	0
270° to 360°	0	0	0	0

SOLVENT SPILLAGE LOCATION TABLE

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

DATA SHEET NO. 17
DUMMY/VEHICLE TEMPERATURE STABILIZATION DATA

Test Vehicle: 2013 Dodge Challenger SXT 2-Dr Coupe NHTSA No.: MD0300
Test Program: NCAP Frontal Barrier Impact Test Test Date: 11/08/2012



30 minutes/div 4 hours (M/d/yyyy h:mm:ss tt) Central Time Graph file (truncated): DODGE CHALLENGER 11-8-12.spg

LN	Serial #	Description	CH	Value	Maximum	Average	Minimum	Units	CH description	Logger file
1	10102056	Crash Prep 1	1		20.86	20.76	20.66	C	Temperature	10102056_Crash_Prep_1.spl

LN	Logger file	ID #	Security	Created by	Creation time
1	C:\Program Files (x86)\Veriteq Instruments\vLog 4.4\2013 NCAP\10102056_Crash_Prep_1.spl				

LN	Serial #	Last calibrated by	Last calibration	Next calibration
1	10102056			

Report ID Number: 151661904 Page 1 of 1

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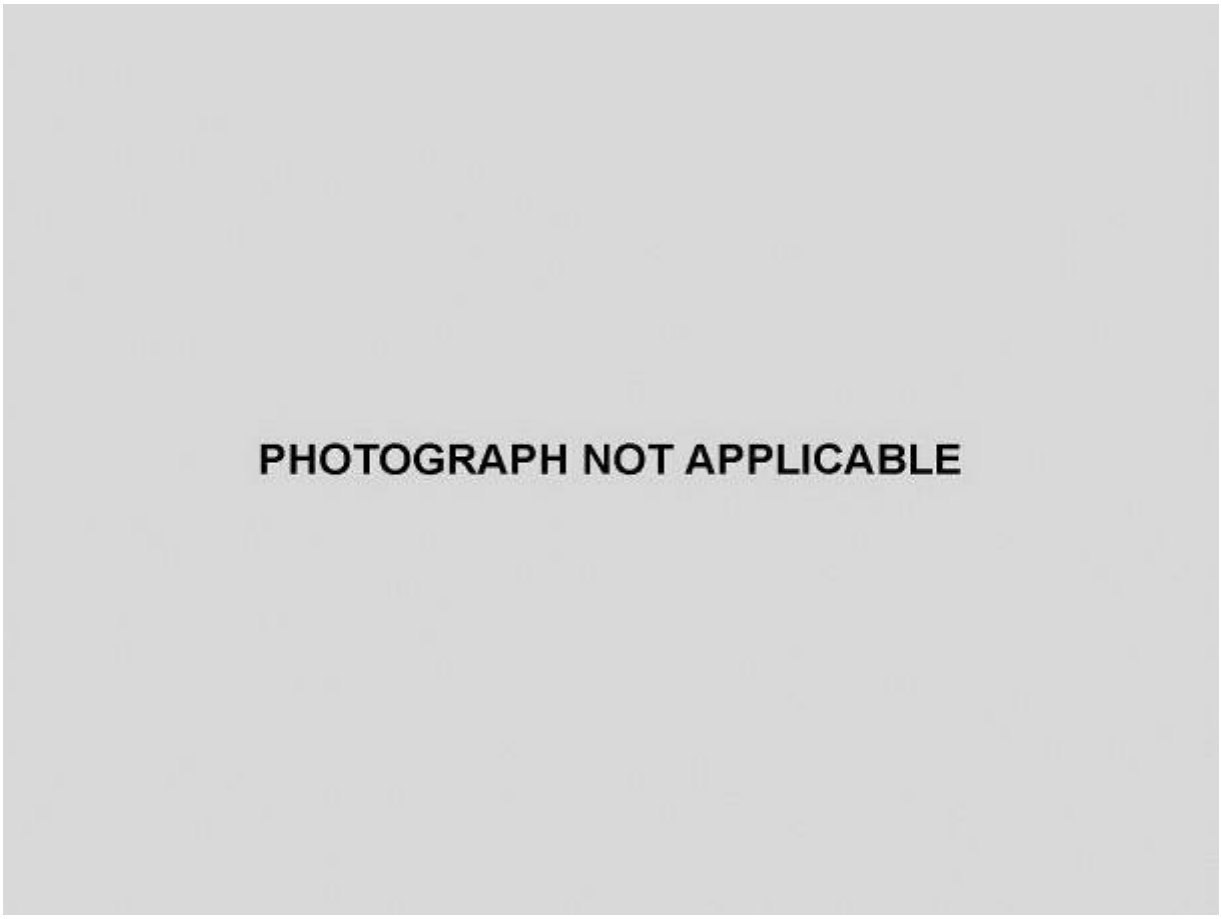

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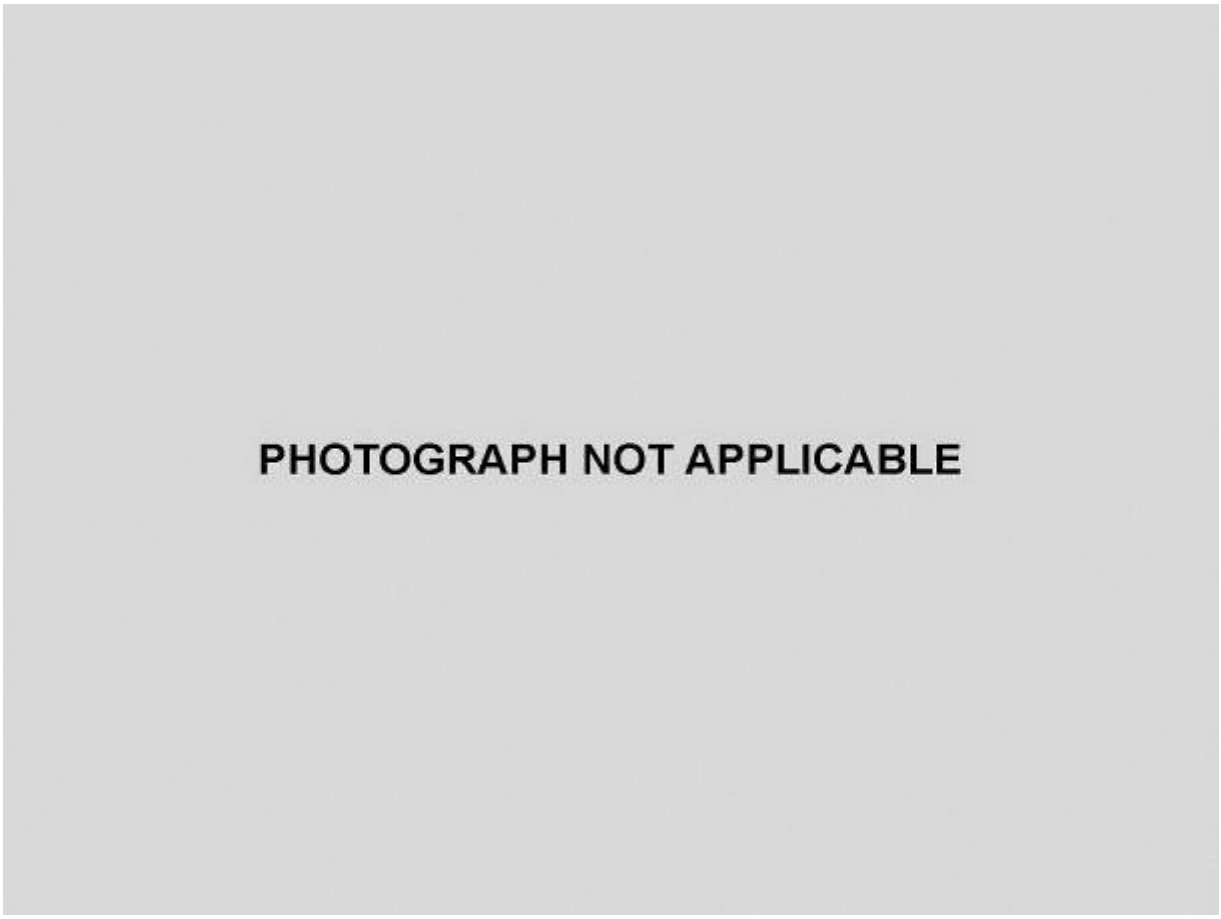


Load Cell Wall

Manufacturer's Label

Tire Placard

2013 Dodge Challenger SXT 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

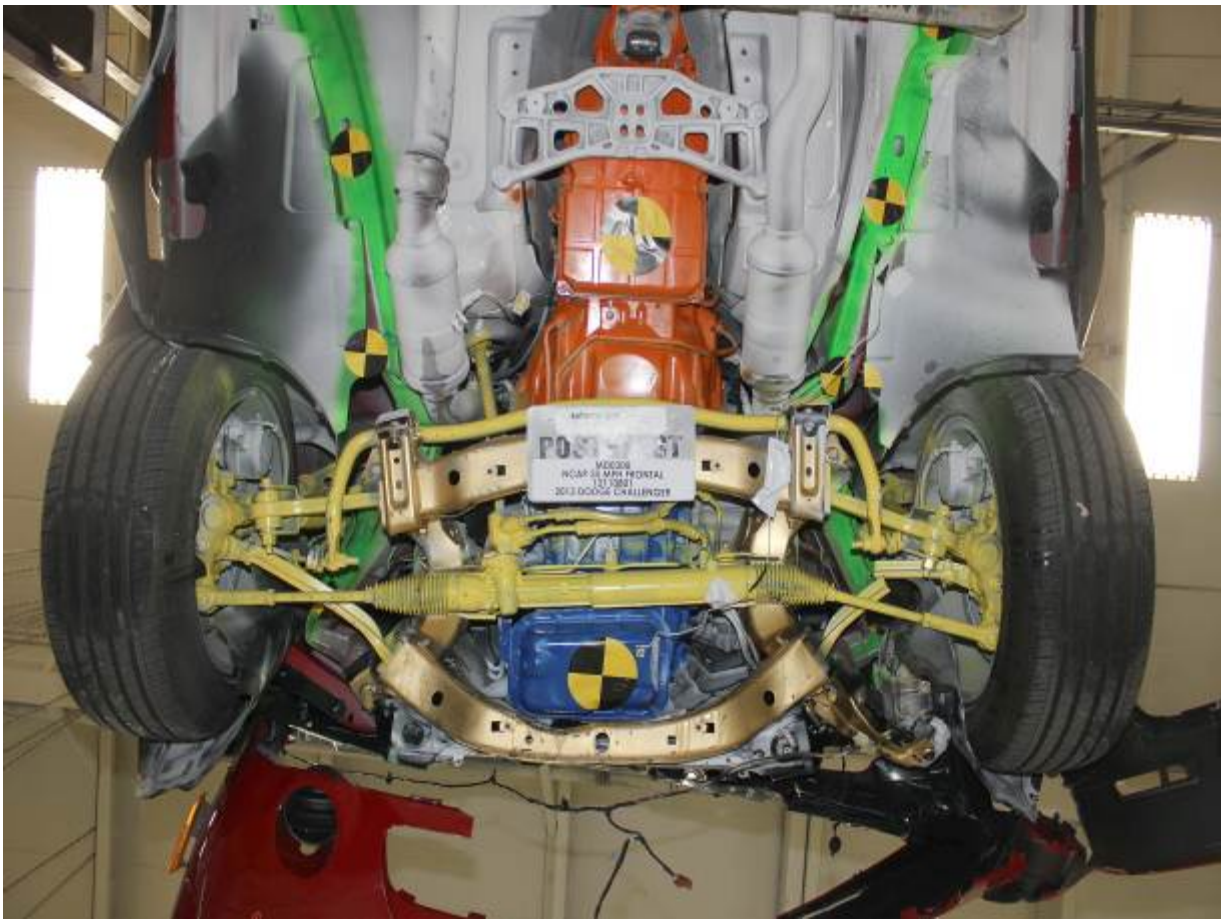
Pre-Test Engine Compartment View

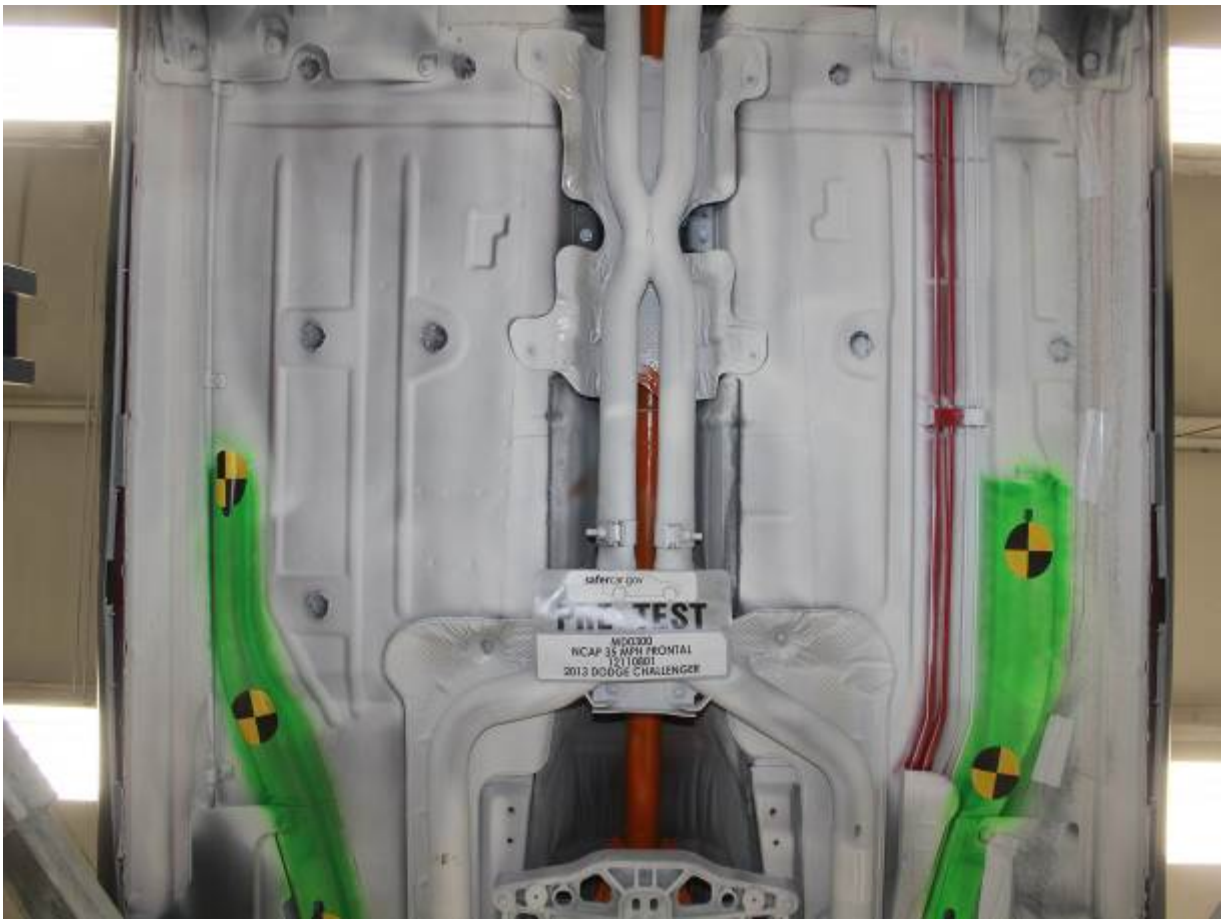
Post-Test Engine Compartment View

Pre-Test Fuel Filler Cap View

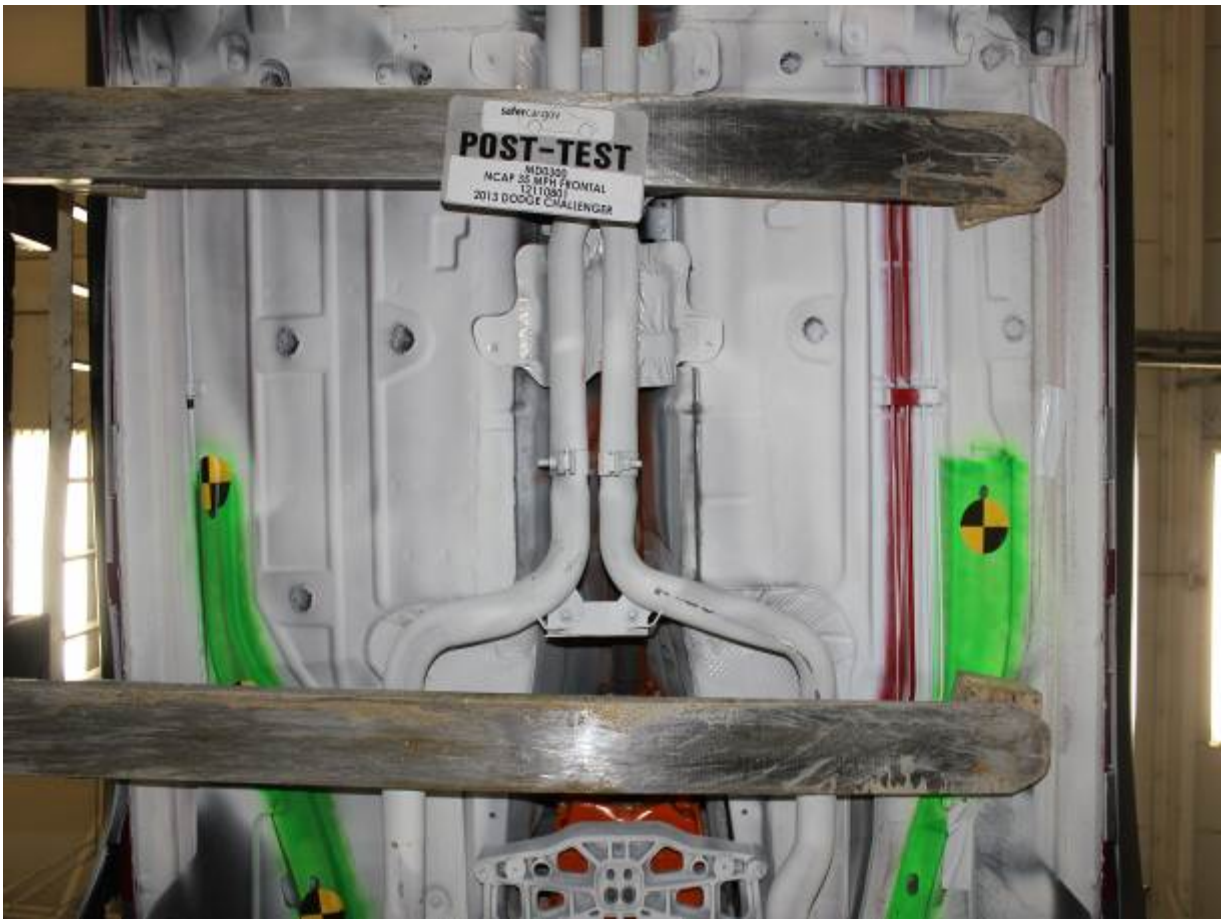
Post-Test Fuel Filler Cap View

Pre-Test Front Underbody View

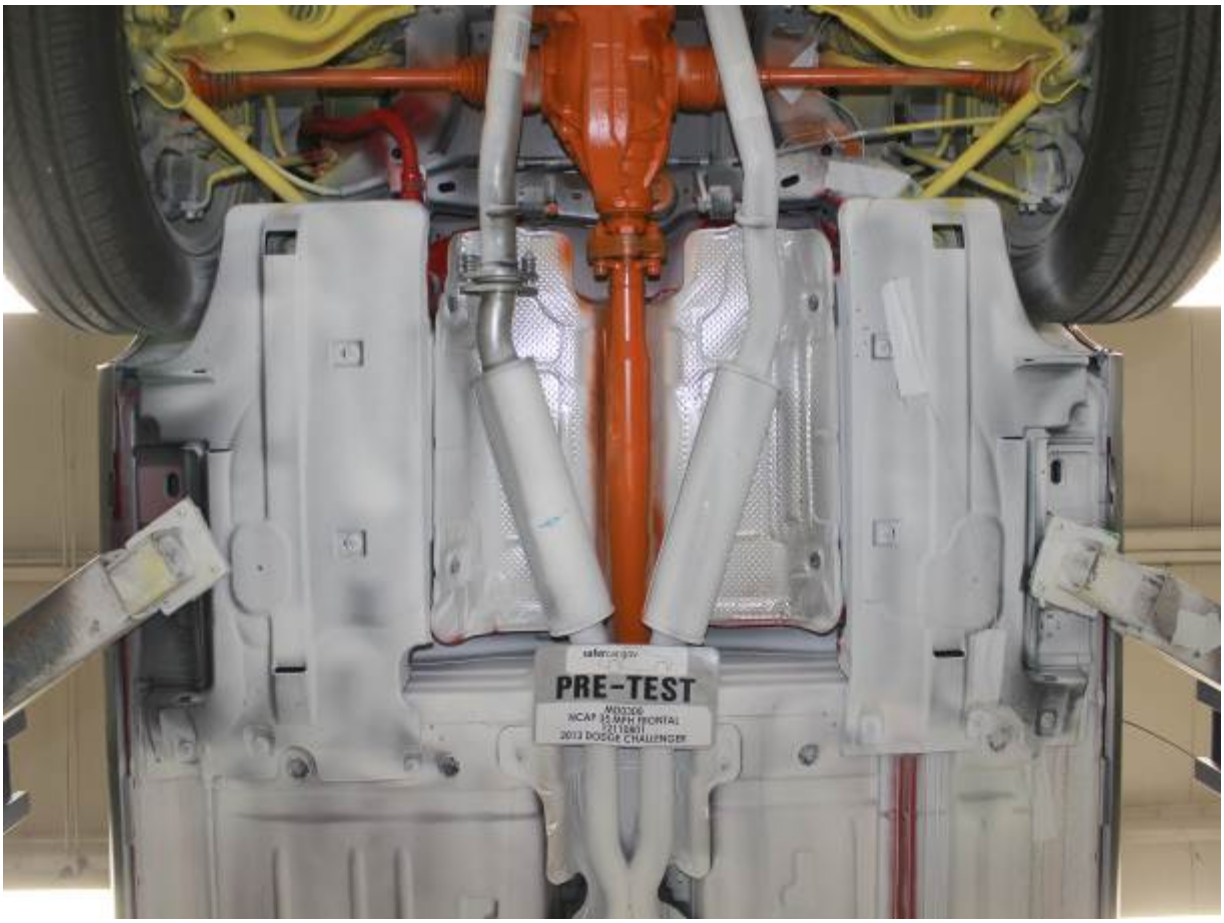

Post-Test Front Underbody View



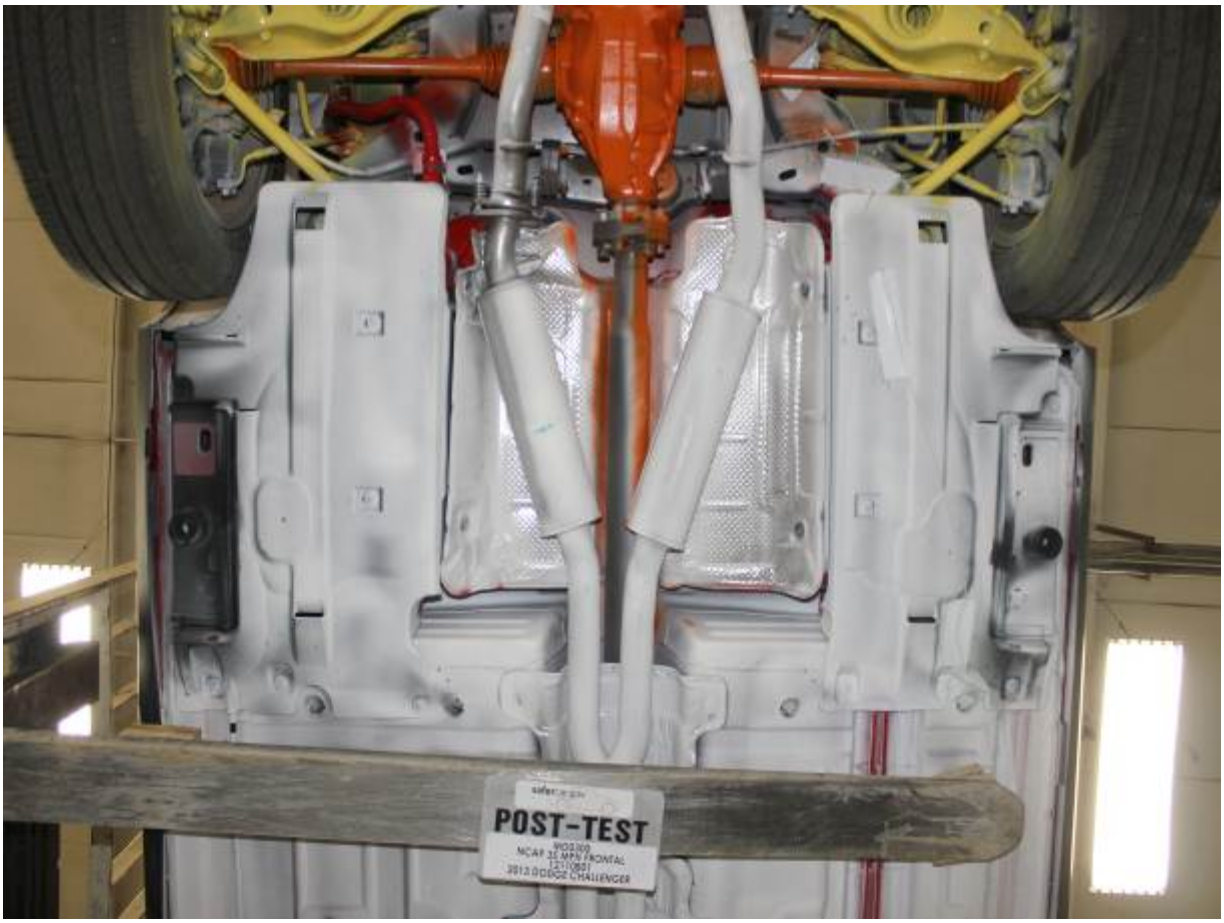
Pre-Test Mid Front Underbody View



Post-Test Mid Front Underbody View

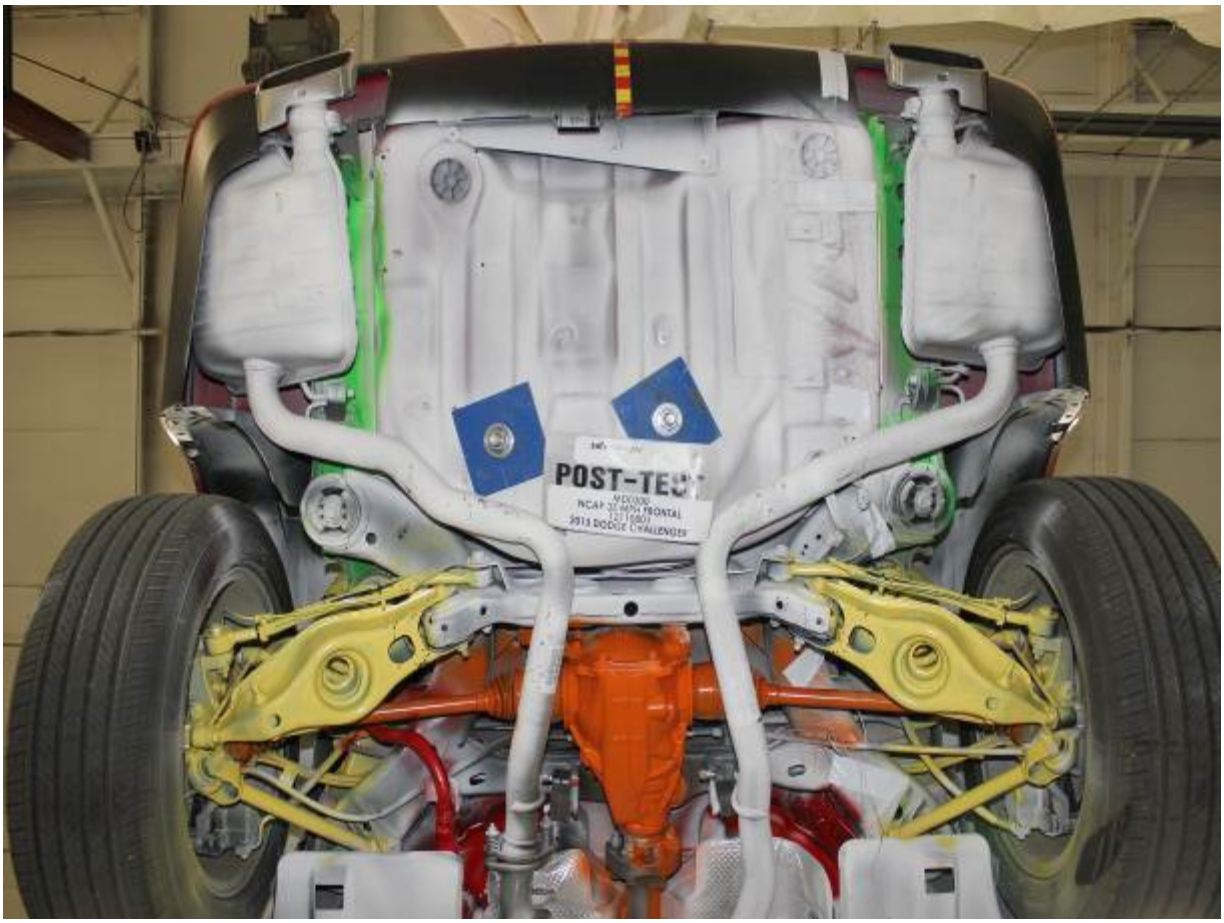


Pre-Test Mid Rear Underbody View



Post-Test Mid Rear Underbody View

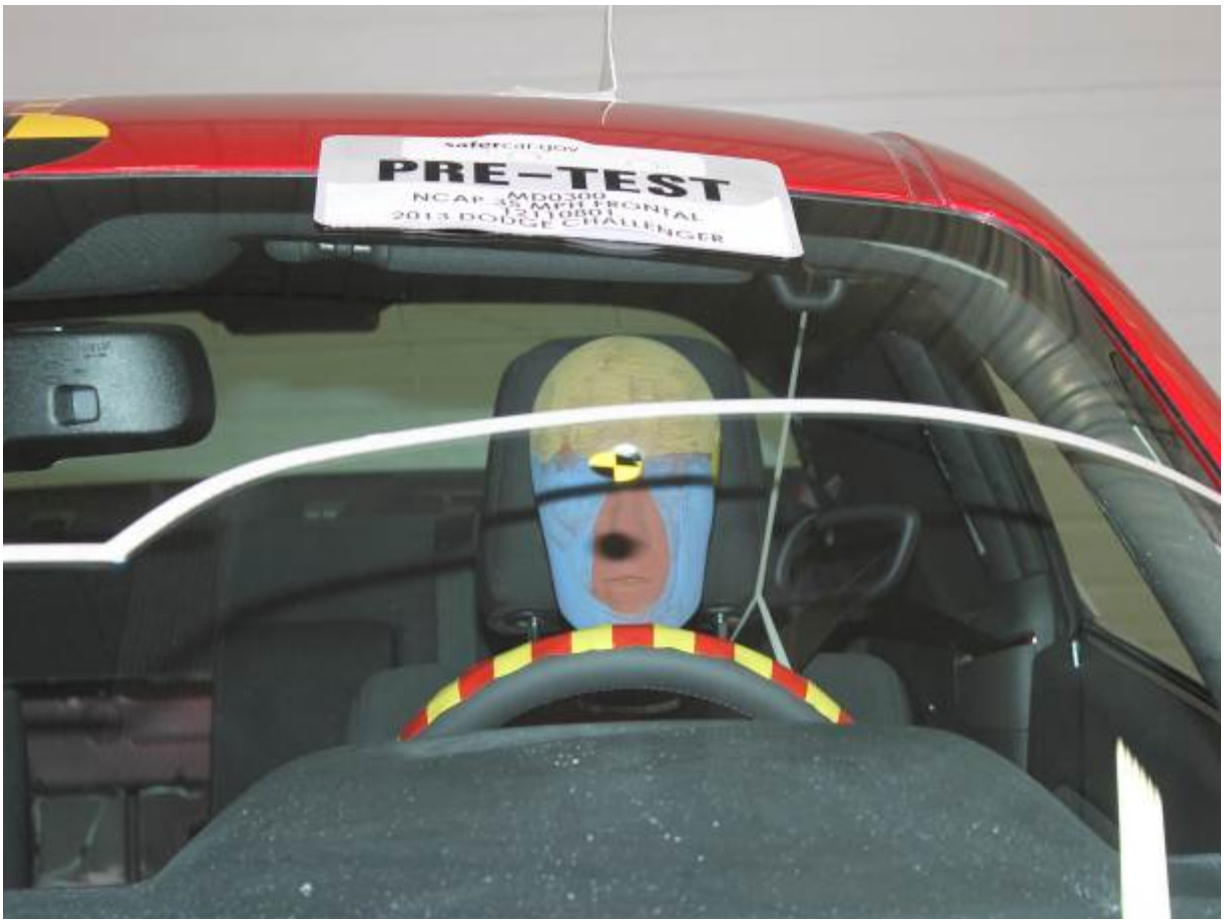
Pre-Test Rear Underbody View



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

Pre-Test View of Belt Anchorage for Driver Dummy

Post-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

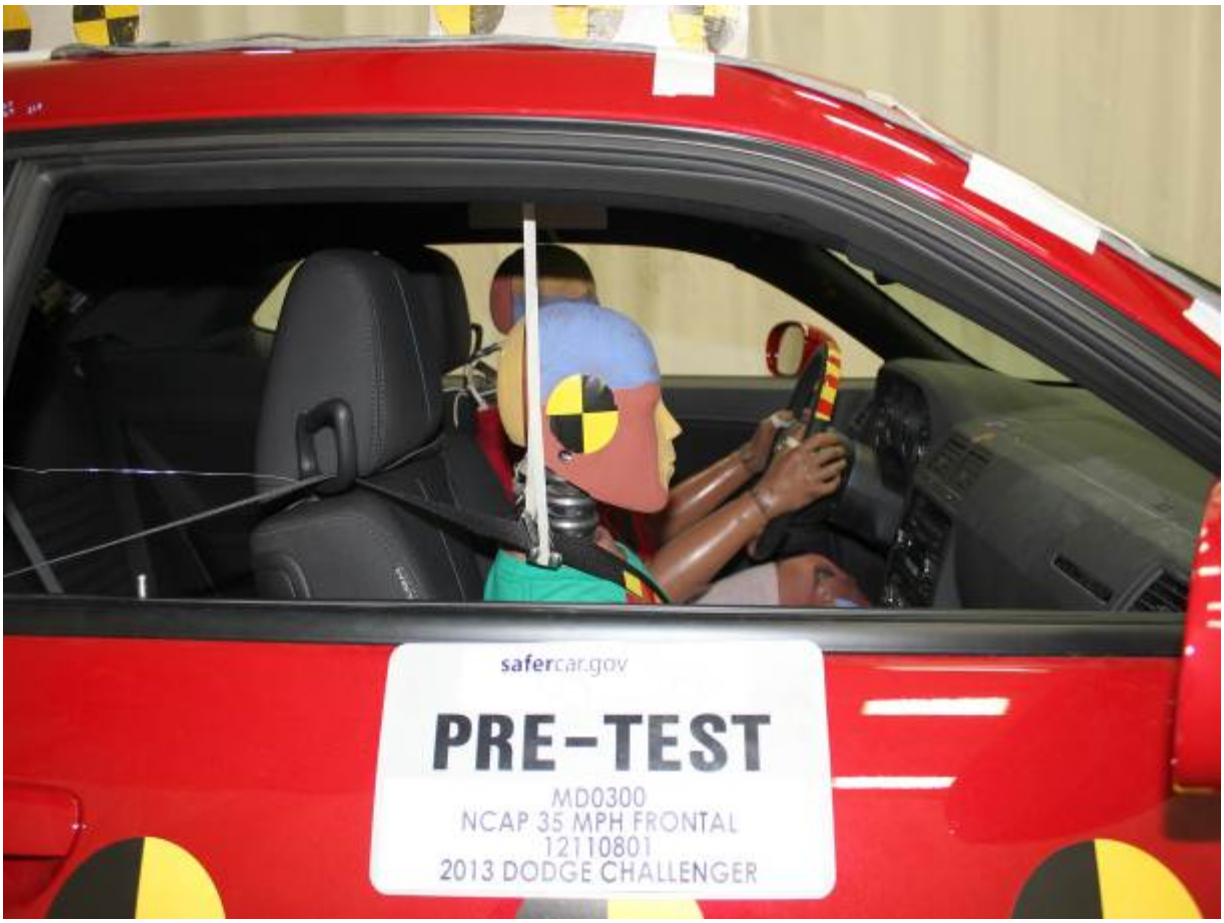
Post-Test Driver Dummy Contact with Knee Bolster

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

Pre-Test View of Belt Anchorage for Passenger Dummy

Post-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 Contact with Airbag

Post-Test Passenger Dummy Contact with Headrest

Post-Test Passenger Dummy Contact with Glove Box

Ballast Installed in Vehicle

PHOTOGRAPH NOT APPLICABLE

Post-Test Stoddard Solvent Spillage Location View

Post-Test Speed Trap Read-Out

Vehicle at 0° on Static Rollover Device

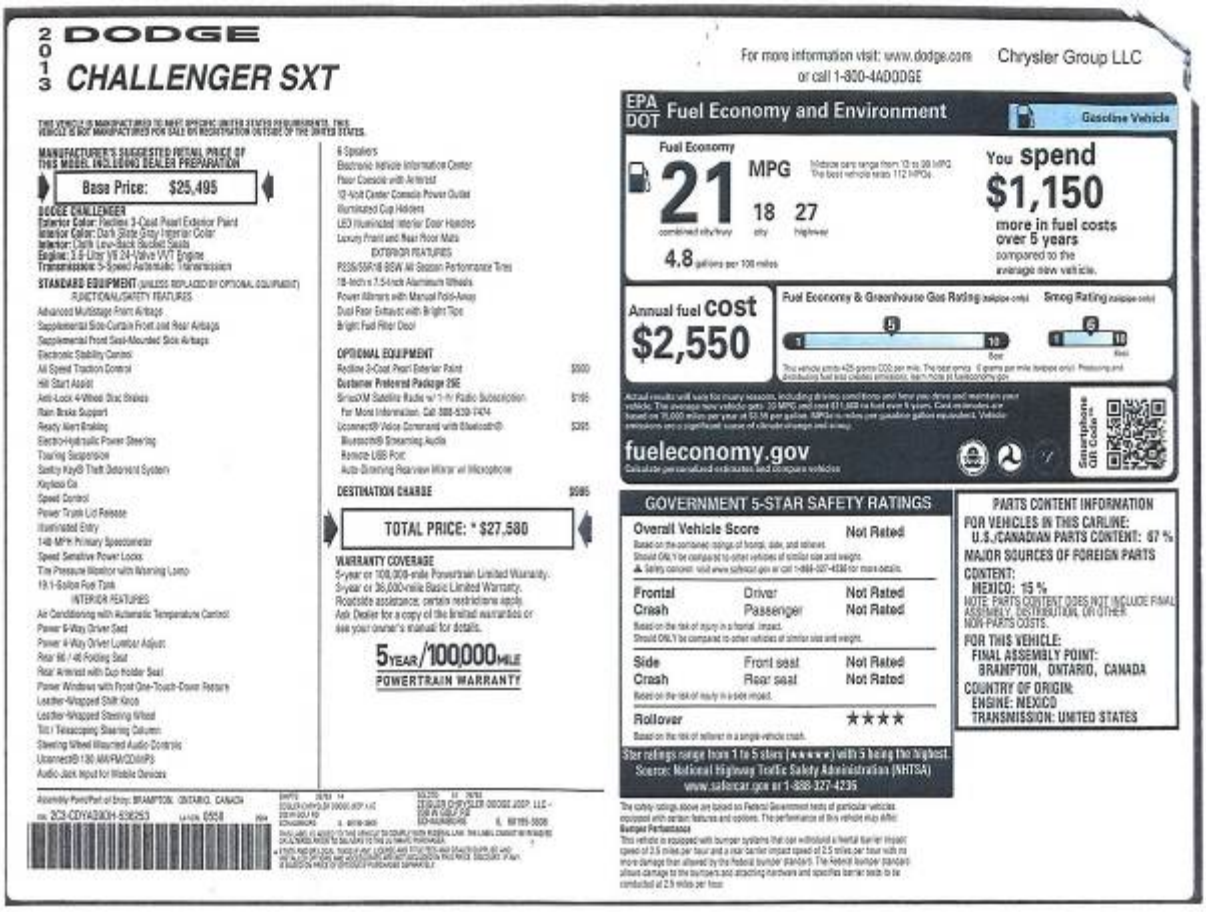
Vehicle at 90° on Static Rollover Device

Vehicle at 180° on Static Rollover Device

Vehicle at 270° on Static Rollover Device

Vehicle at 360° on Static Rollover Device


2013 Dodge Challenger SXT Frontal Impact Event



2013 DODGE CHALLENGER SXT

THIS VEHICLE IS MANUFACTURED TO MEET SPECIFIC UNITED STATES REQUIREMENTS. THIS VEHICLE IS NOT MANUFACTURED FOR SALE OR REGISTRATION OUTSIDE OF THE UNITED STATES.

MANUFACTURER'S SUGGESTED RETAIL PRICE OF THIS MODEL INCLUDING DEALER PREPARATION

Base Price: $25,495

DODGE CHALLENGER
Exterior Color: Redline 3-Coat Pearl Exterior Paint
Interior Color: Dark Slate Gray Interior Color
Interior: Cloth Low-Back Bucket Seats
Engine: 3.6 Liter V6 24-Valve VVT Engine
Transmission: 5-Speed Automatic Transmission

STANDARD EQUIPMENT (UNLESS REPLACED BY OPTIONAL EQUIPMENT)

FUNCTIONAL/SAFETY FEATURES
Advanced Multistage Front Airbags
Supplemental Side-Curtain Front and Rear Airbags
Supplemental Front Seat-Mounted Side Airbags
Electronic Stability Control
All Speed Traction Control
Hill Start Assist
Anti-Lock 4-Wheel Disc Brakes
Rain Brake Support
Ready Alert Braking
Electro-Hydraulic Power Steering
Touring Suspension
Sentry Key® Theft Deterrent System
Keyless Go
Speed Control
Power Trunk Lid Release
Illuminated Entry
148 MPH Primary Speedometer
Speed Sensitive Power Locks
Tire Pressure Monitor with Warning Lamp
19.1-Gallon Fuel Tank

INTERIOR FEATURES
Air Conditioning with Automatic Temperature Control
Power 6-Way Driver Seat
Power 4-Way Driver Lumbar Adjust
Rear 60 / 40 Folding Seat
Rear Armrest with Cup Holder Seat
Power Windows with Front One-Touch Down Feature
Leather-Wrapped Shift Knob
Leather-Wrapped Steering Wheel
Tilt / Telescoping Steering Column
Steering Wheel Mounted Audio Controls
Uconnect® 130 AM/FM/CD/MP3
Audio Jack Input for Mobile Devices
6 Speakers
Electronic Vehicle Information Center
Floor Console with Armrest
12-Volt Center Console Power Outlet
Illuminated Cup Holders
LED Illuminated Interior Door Handles
Luxury Front and Rear Floor Mats

EXTERIOR FEATURES
P235/55R18 86W All Season Performance Tires
18-Inch x 7.5-Inch Aluminum Wheels
Power Mirrors with Manual Fold-Away
Dual Rear Exhaust with Bright Tips
Bright Fuel Filler Door

OPTIONAL EQUIPMENT
Redline 3-Coat Pearl Exterior Paint $900
Customer Preferred Package 29E $195
SiriusXM Satellite Radio w/ 1-Yr Radio Subscription $195
For More Information, Call 888-539-7474
Uconnect® Voice Command with Bluetooth® $395
Bluetooth® Streaming Audio
Remote USB Port
Auto-Dimming Rearview Mirror w/ Microphone

DESTINATION CHARGE $995

TOTAL PRICE: * $27,580

WARRANTY COVERAGE
5-year or 100,000-mile Powertrain Limited Warranty.
3-year or 36,000-mile Basic Limited Warranty.
Roadside assistance; certain restrictions apply.
Ask Dealer for a copy of the limited warranties or see your owner's manual for details.

5 YEAR/100000 MILE POWERTRAIN WARRANTY

Assembly Point/Port of Entry: BRAMPTON, ONTARIO, CANADA

For more information visit: www.dodge.com or call 1-800-4ADODGE

Chrysler Group LLC

EPA DOT Fuel Economy and Environment

Gasoline Vehicle

Fuel Economy
21 MPG
18 city 27 highway
4.8 gallons per 100 miles

You spend $1,150 more in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost $2,550

Fuel Economy & Greenhouse Gas Rating (1=Worst, 10=Best) 5

Smog Rating (1=Worst, 10=Best) 6

fueleconomy.gov
Calculate personalized estimates and compare vehicles

Smartphone QR Code

GOVERNMENT 5-STAR SAFETY RATINGS

Overall Vehicle Score		Not Rated
Frontal Crash	Driver	Not Rated
	Passenger	Not Rated
Side Crash	Front seat	Not Rated
	Rear seat	Not Rated
Rollover		★★★★

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

PARTS CONTENT INFORMATION
FOR VEHICLES IN THIS CARLINE:
U.S./CANADIAN PARTS CONTENT: 67 %
MAJOR SOURCES OF FOREIGN PARTS CONTENT:
MEXICO: 15 %
NOTE: PARTS CONTENT DOES NOT INCLUDE FINAL ASSEMBLY, DISTRIBUTION, OR OTHER NON-PARTS COSTS.
FOR THIS VEHICLE:
FINAL ASSEMBLY POINT:
BRAMPTON, ONTARIO, CANADA
COUNTRY OF ORIGIN:
ENGINE: MEXICO
TRANSMISSION: UNITED STATES

Monroney Label

APPENDIX B
DUMMY RESPONSE DATA TRACES

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

Driver Head CG X Redundant

Driver Head CG Y Redundant

Driver Head CG Z Redundant

Driver 9 Axis Head X Arm Y

Driver 9 Axis Head X Arm Z

Driver 9 Axis Head Y Arm X

Driver 9 Axis Head Y Arm Z

Driver 9 Axis Head Z Arm X

Driver 9 Axis Head Z Arm Y

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 CG X Redundant

Passenger Head CG Y Redundant

Passenger Head CG Z Redundant

Passenger 9 Axis Head X Arm Y

Passenger 9 Axis Head X Arm Z

Passenger 9 Axis Head Y Arm X

Passenger 9 Axis Head Y Arm Z

Passenger 9 Axis Head Z Arm X

Passenger 9 Axis Head Z Arm Y

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

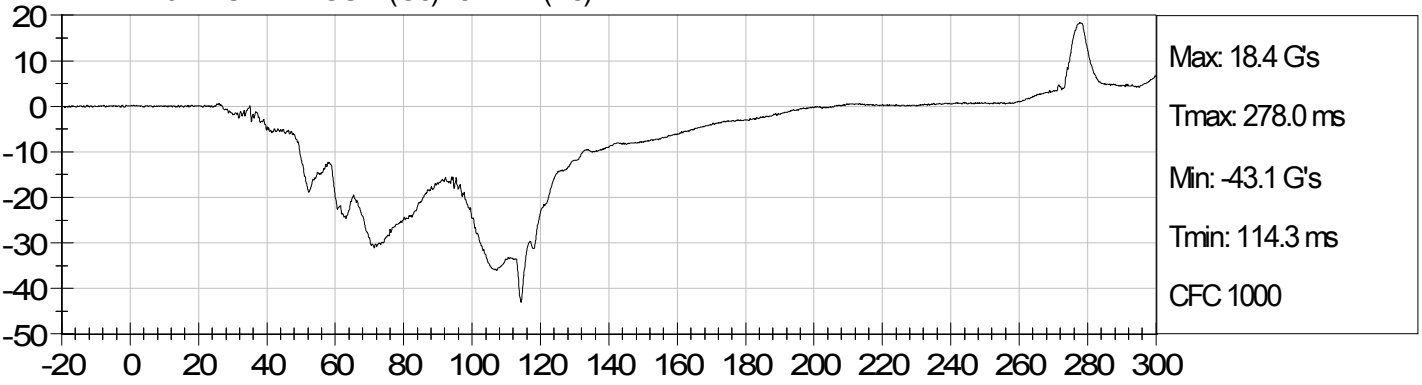
Right Rear Seat Crossmember Z

Left Rear Seat Crossmember Xr

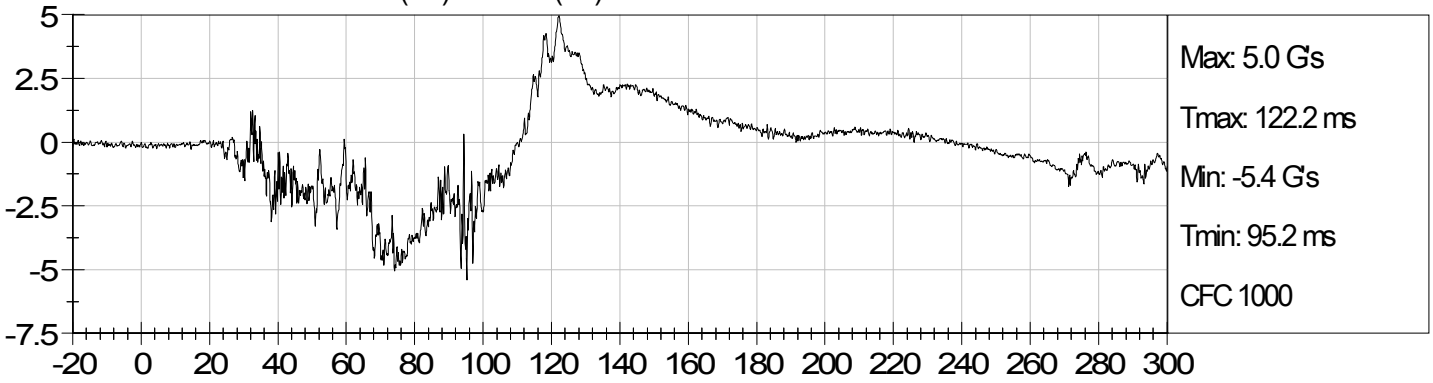
Right Rear Seat Crossmember Xr

Advanced Research Load Cell Barrier – 128 channels

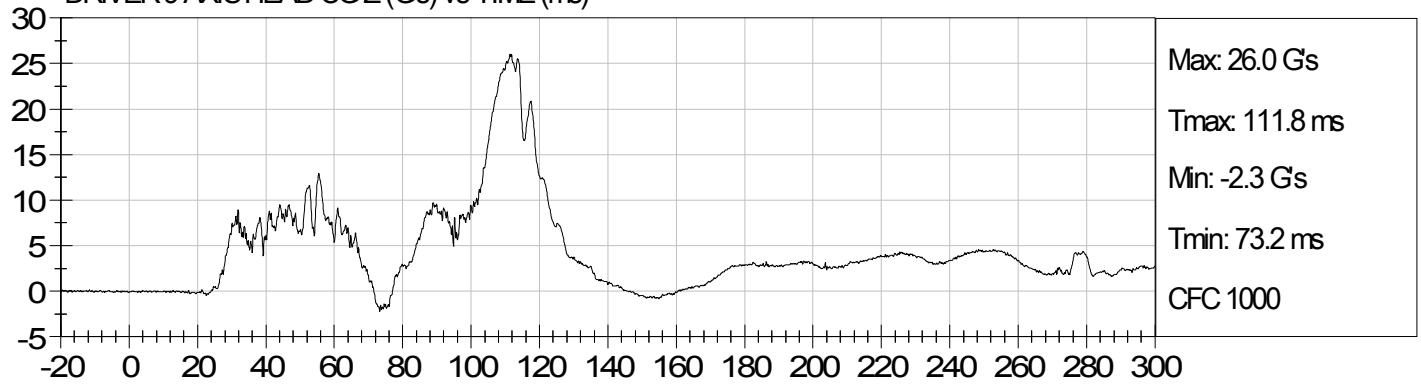
DRIVER 9 AXIS HEAD CG X (G's) vs TIME (ms)



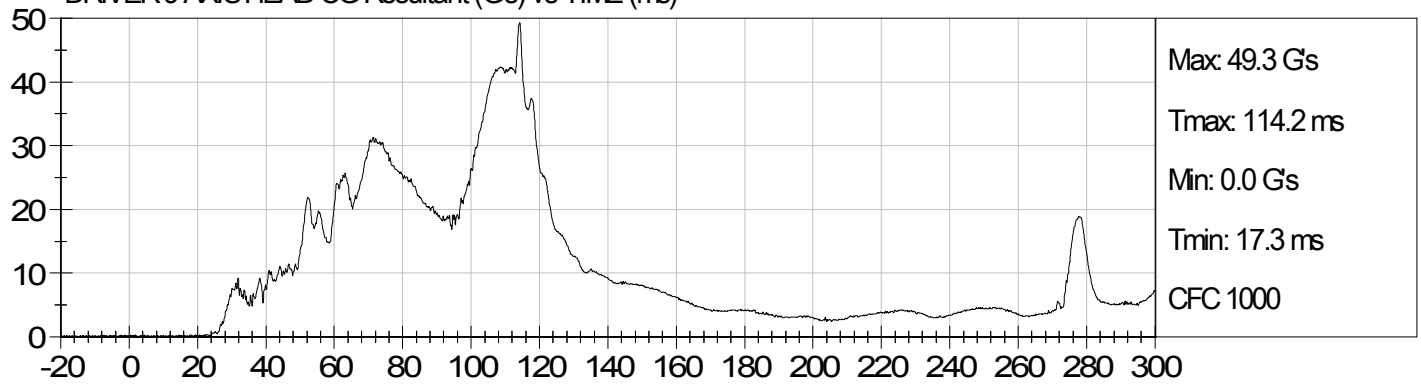
DRIVER 9 AXIS HEAD CG Y (G's) vs TIME (ms)

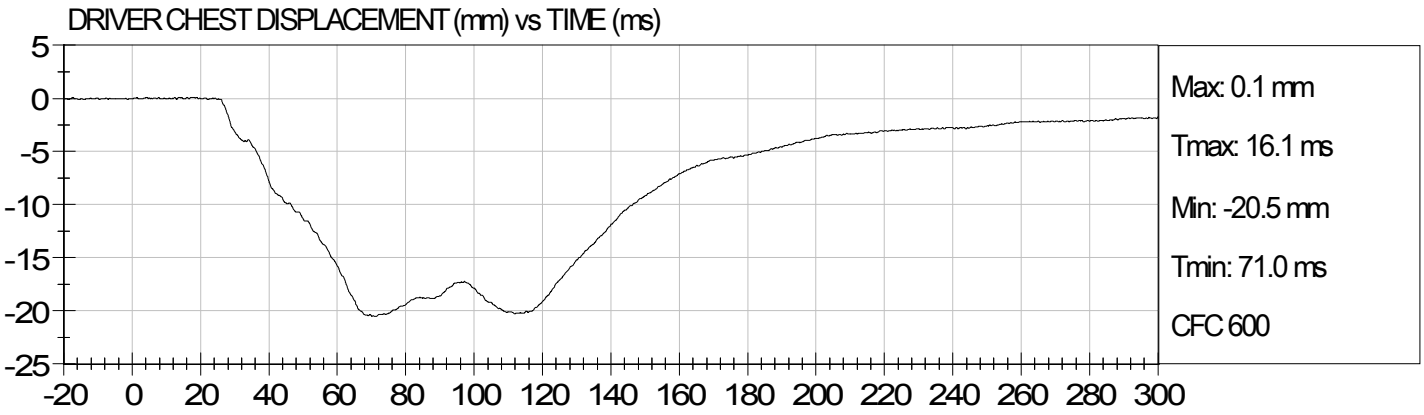


DRIVER 9 AXIS HEAD CG Z (G's) vs TIME (ms)

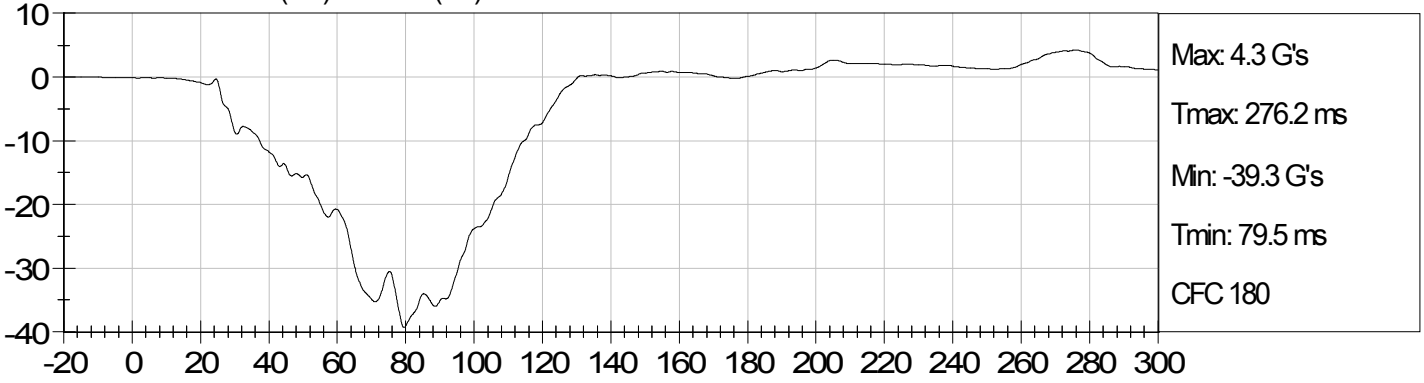


DRIVER 9 AXIS HEAD CG Resultant (G's) vs TIME (ms)

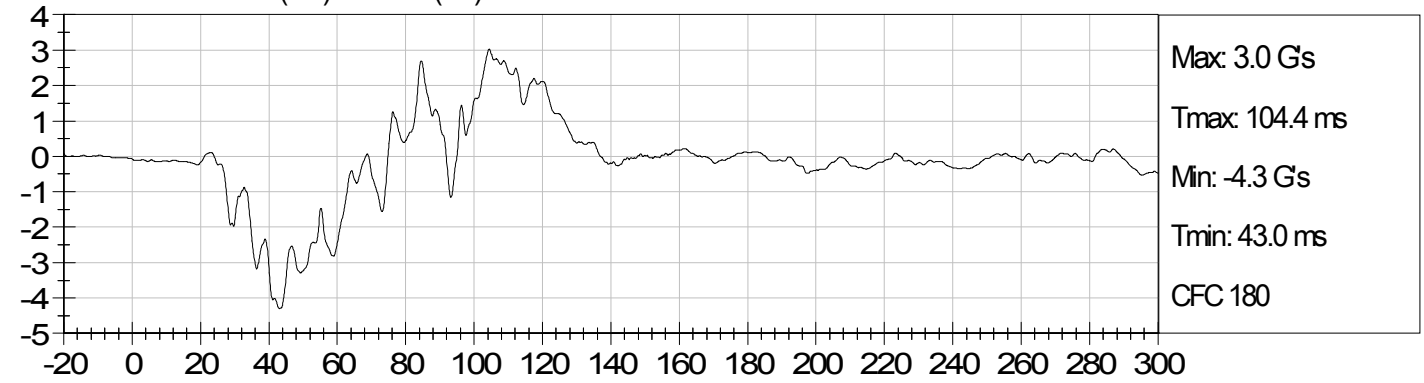



DRIVER CHEST DISPLACEMENT (mm) vs TIME (ms)
5
0
-5
-10
-15
-20
-25
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.1 mm
Tmax: 16.1 ms
Min: -20.5 mm
Tmin: 71.0 ms
CFC 600

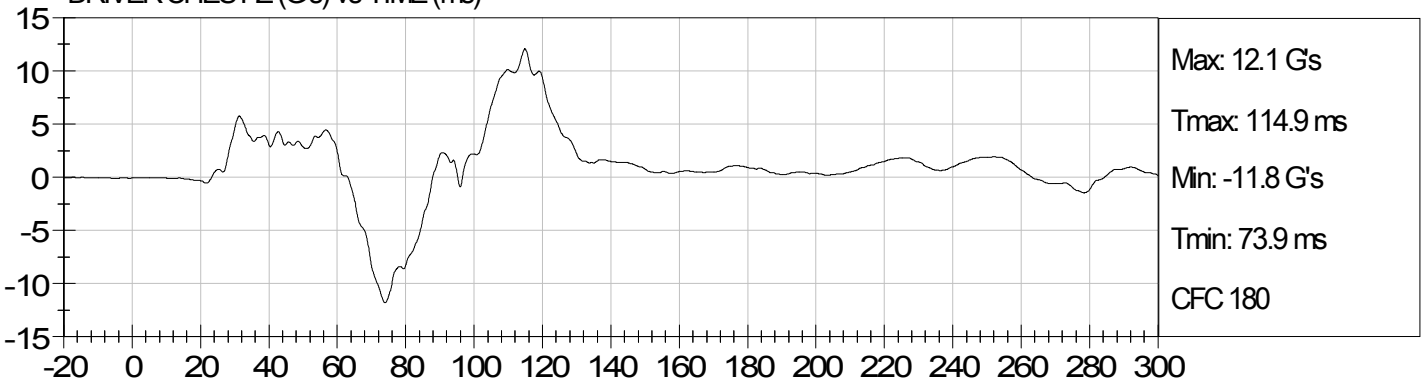
DRIVER CHEST X (G's) vs TIME (ms)



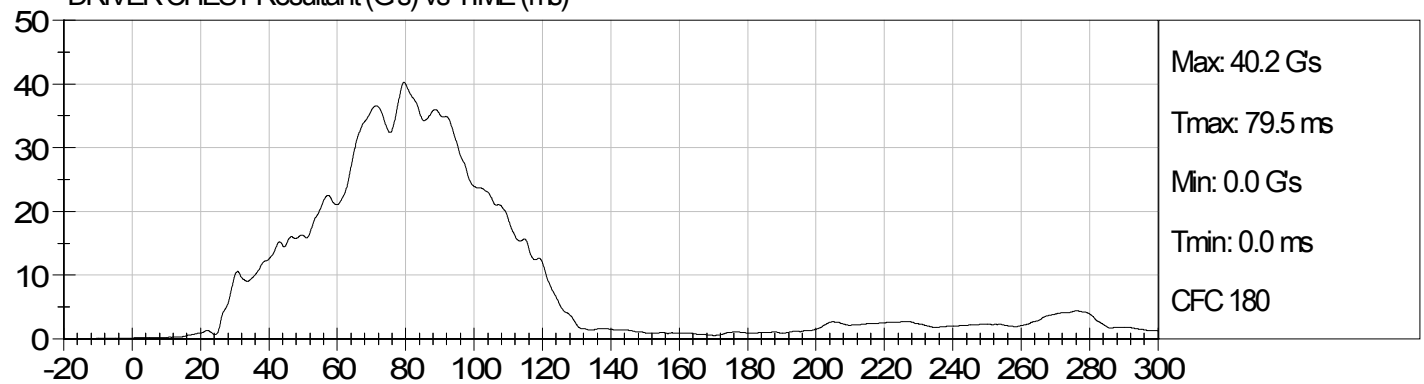
DRIVER CHEST Y (G's) vs TIME (ms)



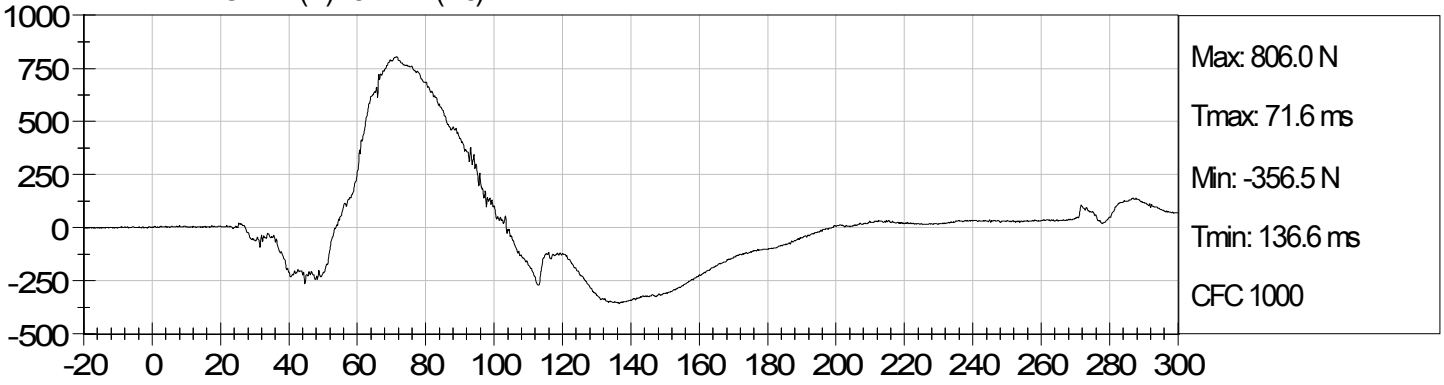
DRIVER CHEST Z (G's) vs TIME (ms)



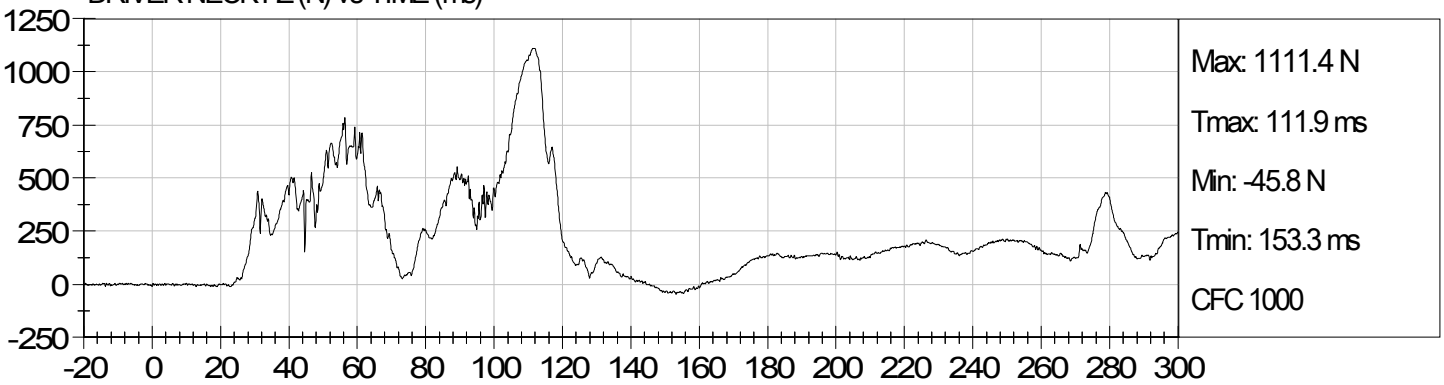
DRIVER CHEST Resultant (G's) vs TIME (ms)



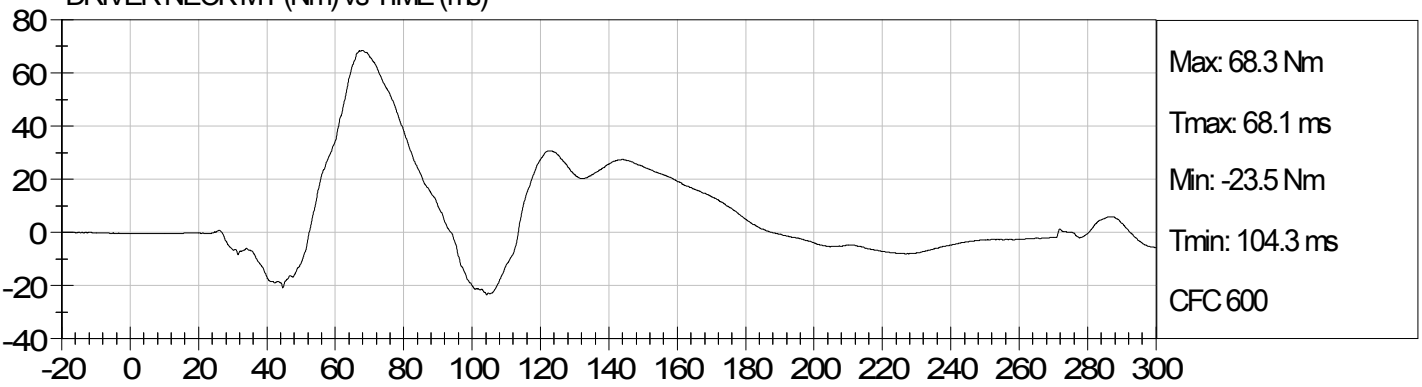
DRIVER NECK FX (N) vs TIME (ms)

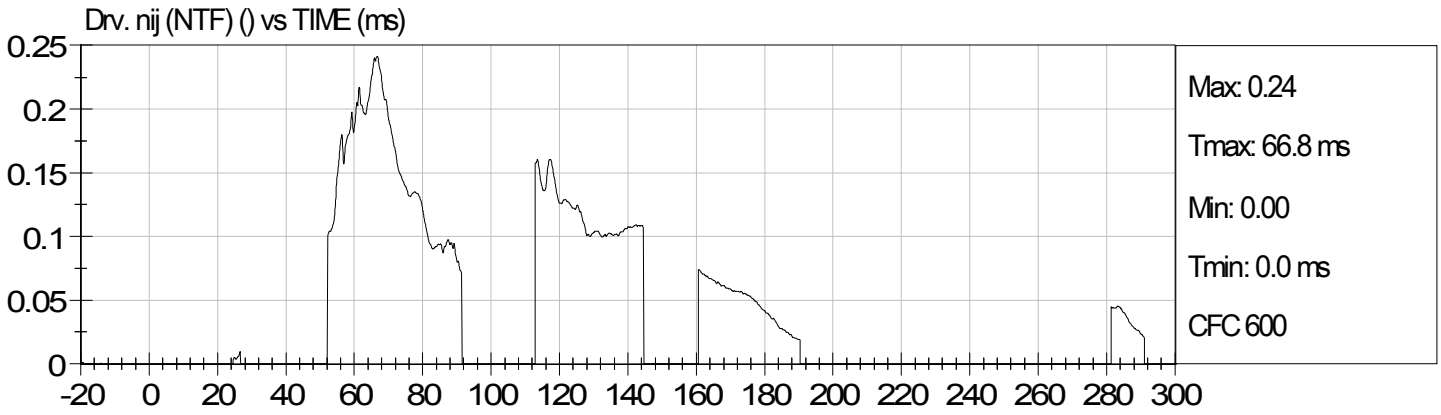


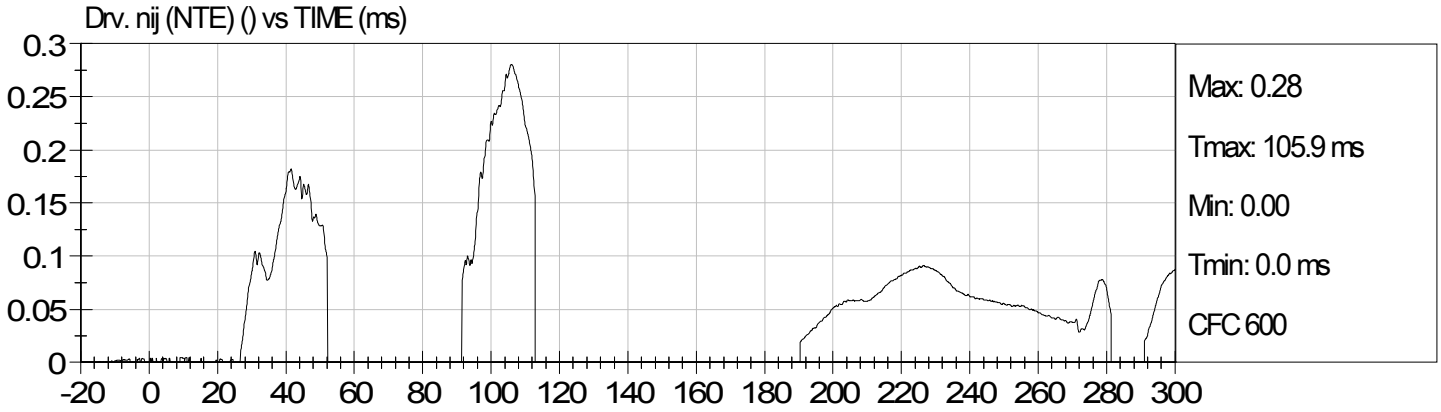
DRIVER NECK FZ (N) vs TIME (ms)

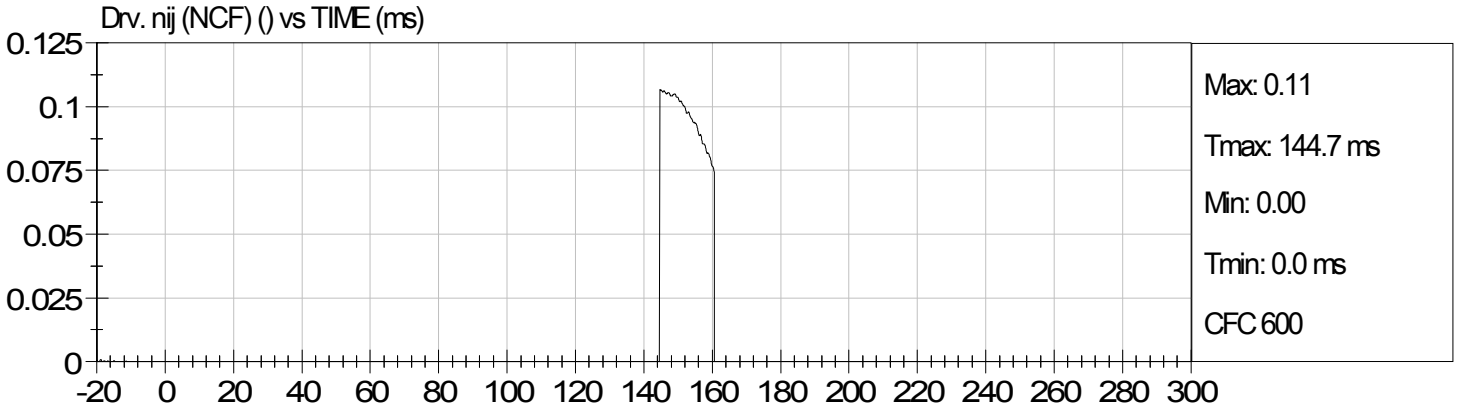


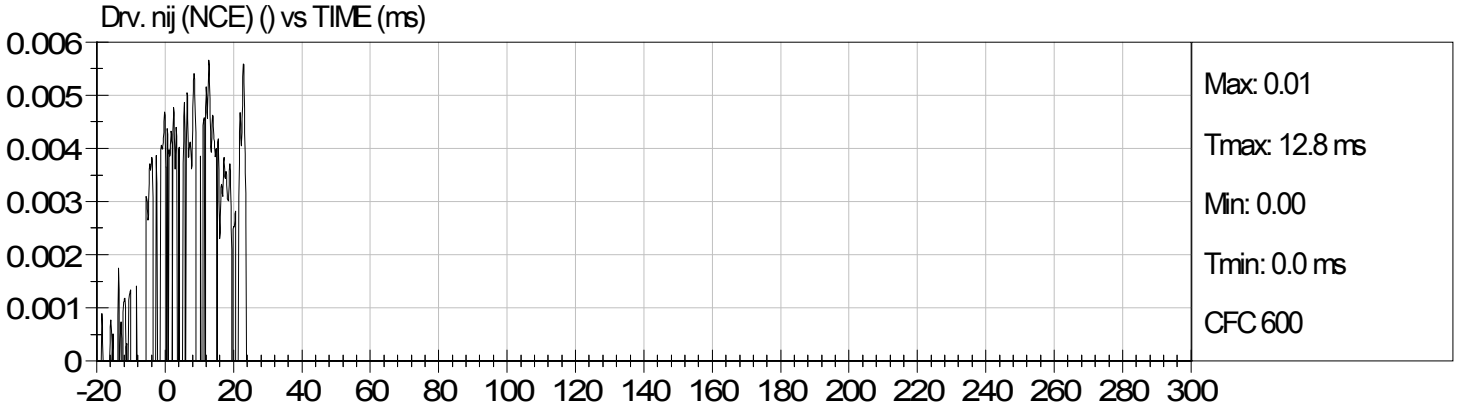
DRIVER NECK MY (Nm) vs TIME (ms)

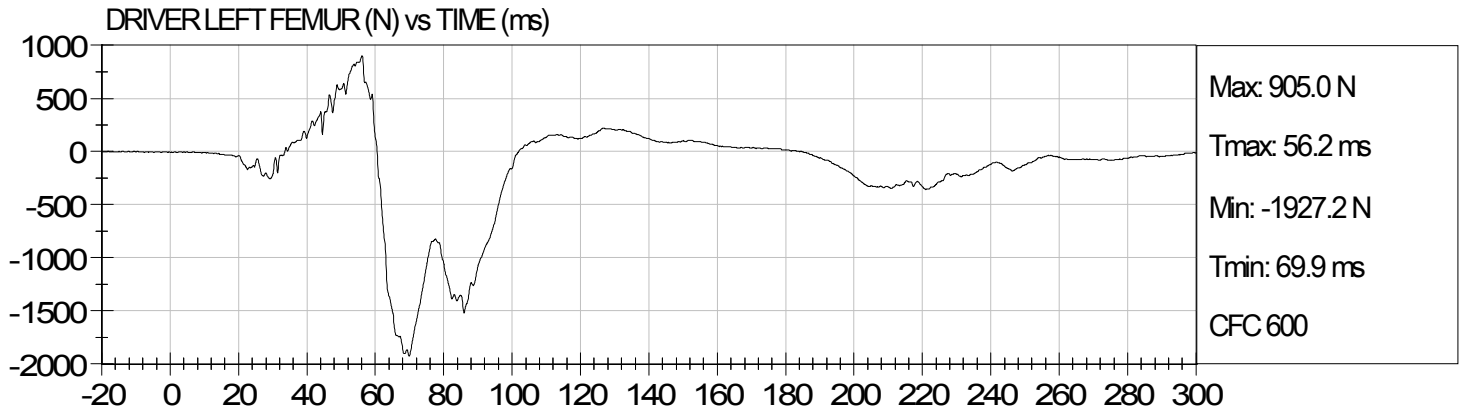


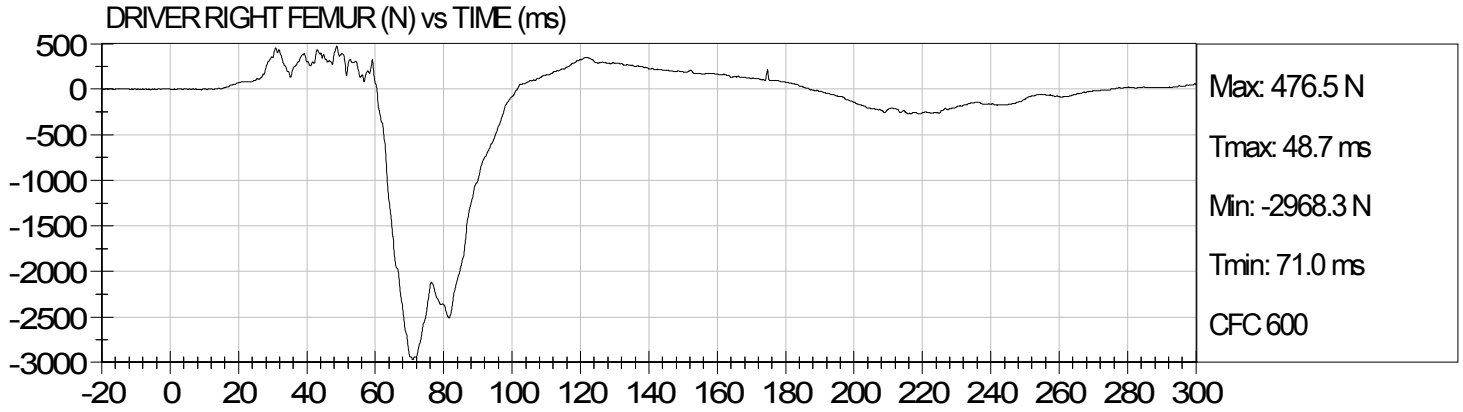

Drv. nij (NTF) () vs TIME (ms)
0.25
0.2
0.15
0.1
0.05
0
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.24
Tmax: 66.8 ms
Min: 0.00
Tmin: 0.0 ms
CFC 600


Drv. nij (NTE) () vs TIME (ms)
0.3
0.25
0.2
0.15
0.1
0.05
0
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.28
Tmax: 105.9 ms
Min: 0.00
Tmin: 0.0 ms
CFC 600

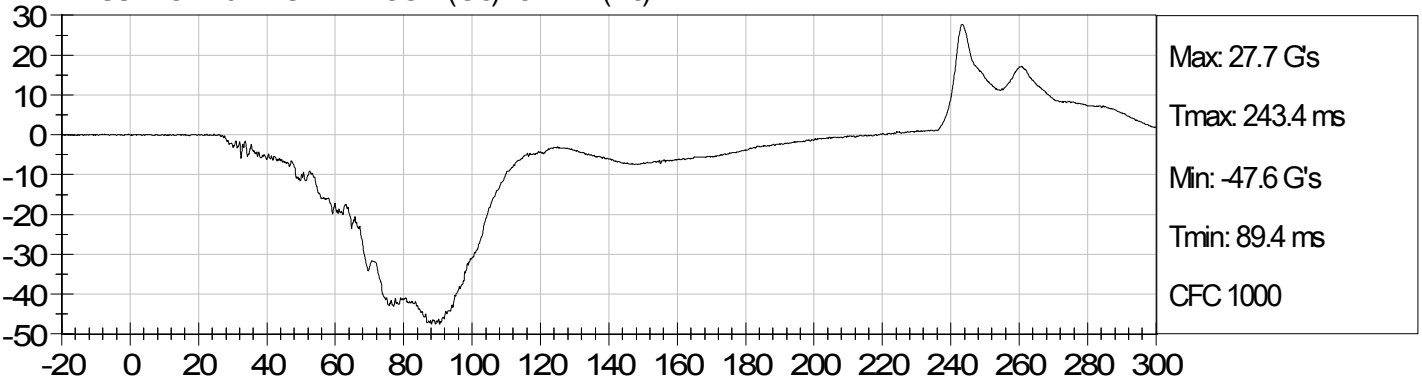

Drv. nij (NCF) () vs TIME (ms)
0.125
0.1
0.075
0.05
0.025
0
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.11
Tmax: 144.7 ms
Min: 0.00
Tmin: 0.0 ms
CFC 600


Drv. nij (NCE) () vs TIME (ms)
0.006
0.005
0.004
0.003
0.002
0.001
0
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.01
Tmax: 12.8 ms
Min: 0.00
Tmin: 0.0 ms
CFC 600

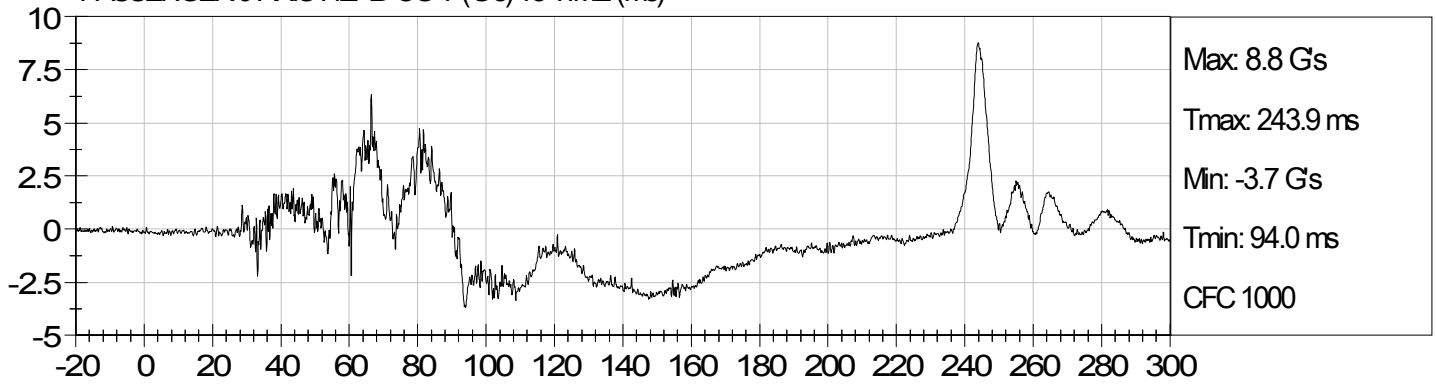

DRIVER LEFT FEMUR (N) vs TIME (ms)
1000
500
0
-500
-1000
-1500
-2000
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 905.0 N
Tmax: 56.2 ms
Min: -1927.2 N
Tmin: 69.9 ms
CFC 600


DRIVER RIGHT FEMUR (N) vs TIME (ms)
500
0
-500
-1000
-1500
-2000
-2500
-3000
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 476.5 N
Tmax: 48.7 ms
Min: -2968.3 N
Tmin: 71.0 ms
CFC 600

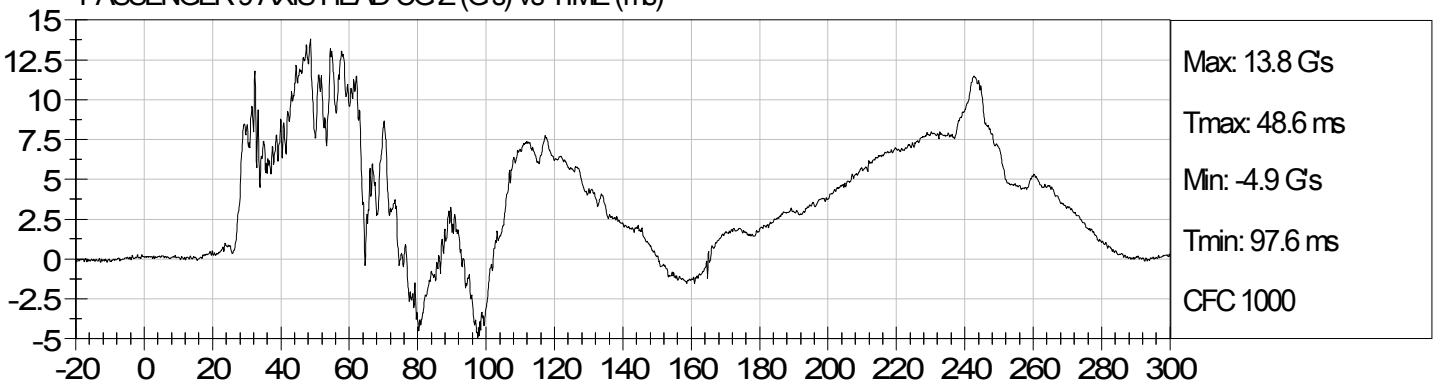
PASSENGER 9 AXIS HEAD CG X (G's) vs TIME (ms)



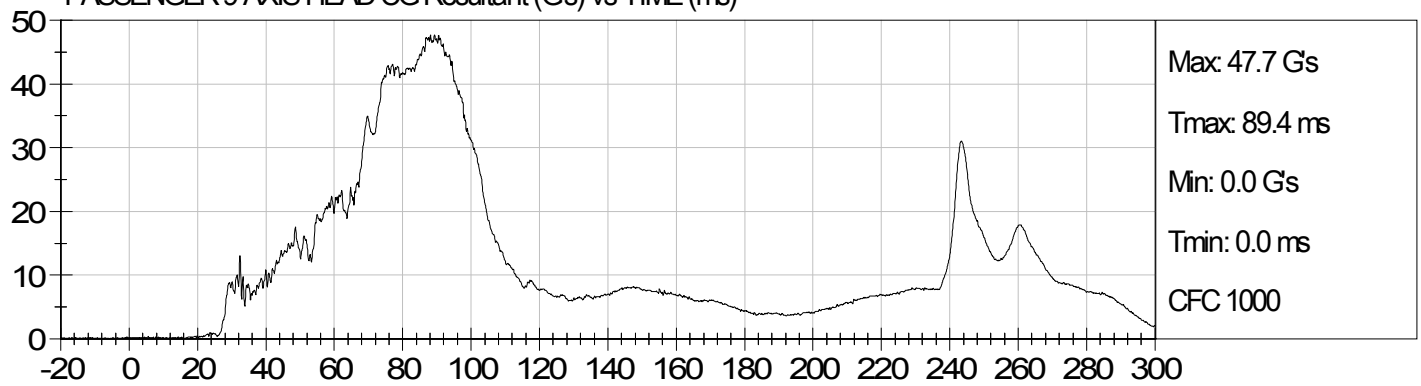
PASSENGER 9 AXIS HEAD CG Y (G's) vs TIME (ms)

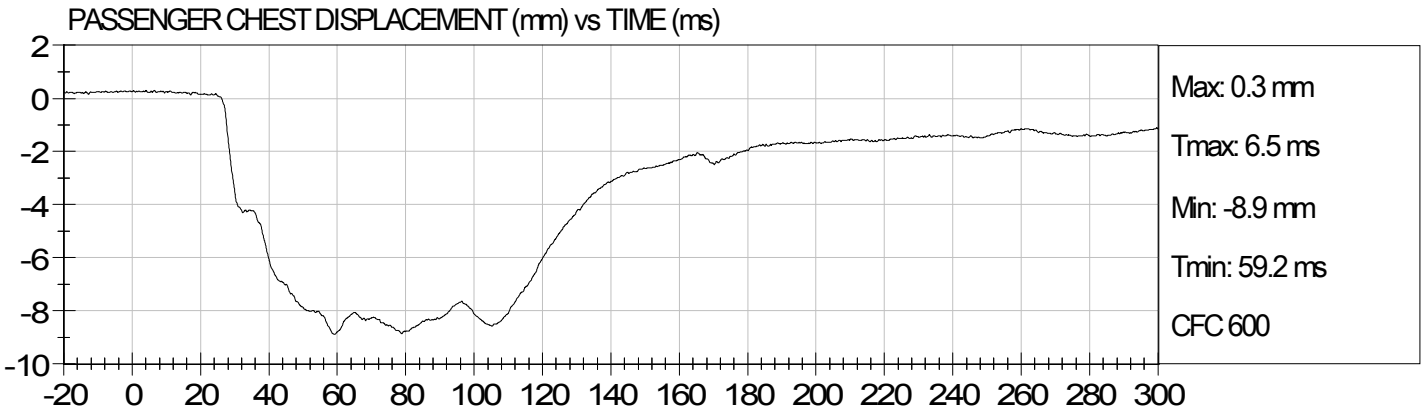


PASSENGER 9 AXIS HEAD CG Z (G's) vs TIME (ms)

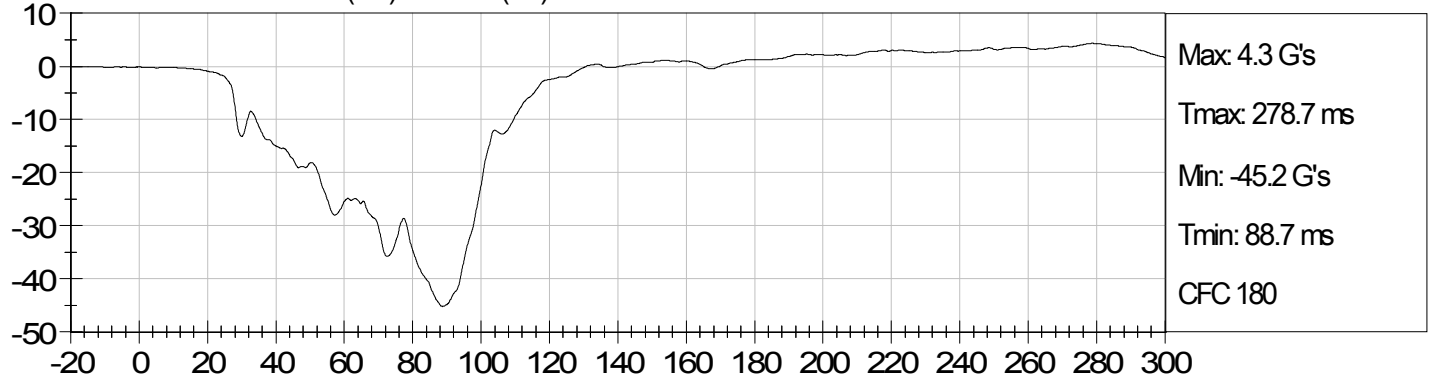


PASSENGER 9 AXIS HEAD CG Resultant (G's) vs TIME (ms)

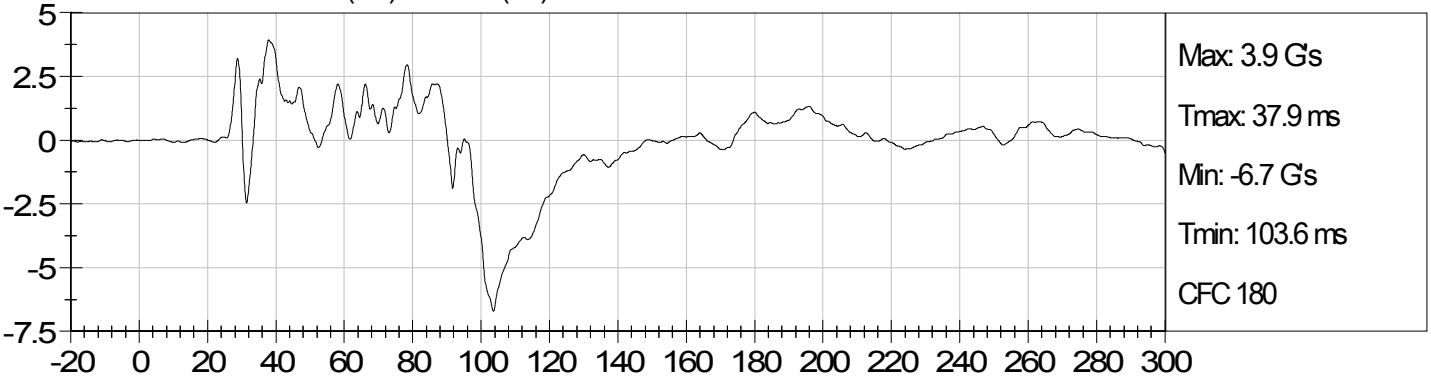



PASSENGER CHEST DISPLACEMENT (mm) vs TIME (ms)
2
0
-2
-4
-6
-8
-10
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.3 mm
Tmax: 6.5 ms
Min: -8.9 mm
Tmin: 59.2 ms
CFC 600

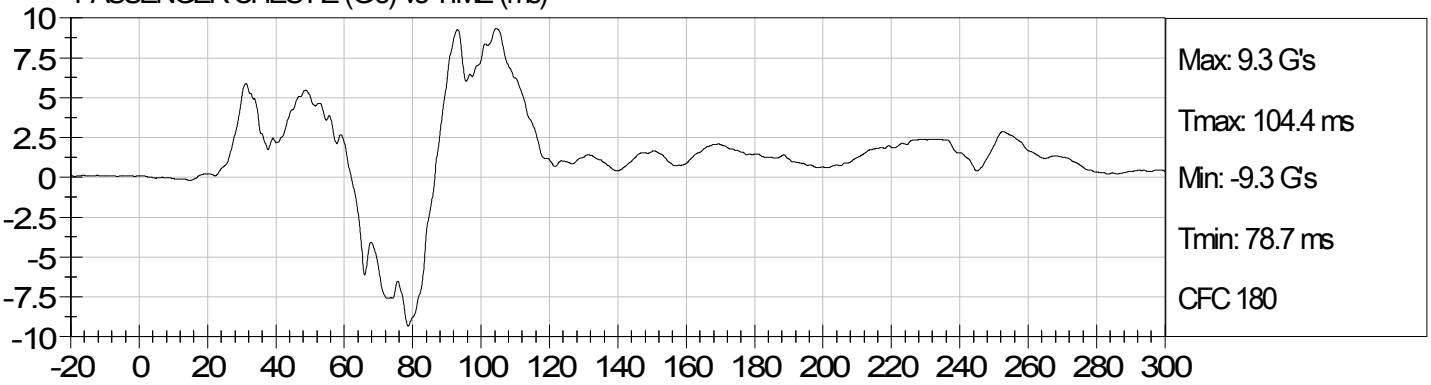
PASSENGER CHEST X (G's) vs TIME (ms)



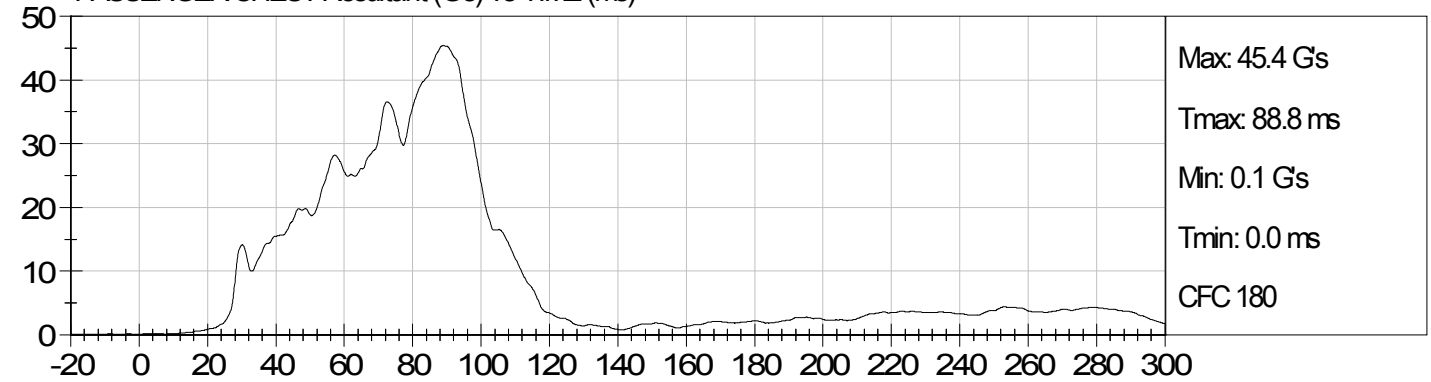
PASSENGER CHEST Y (G's) vs TIME (ms)



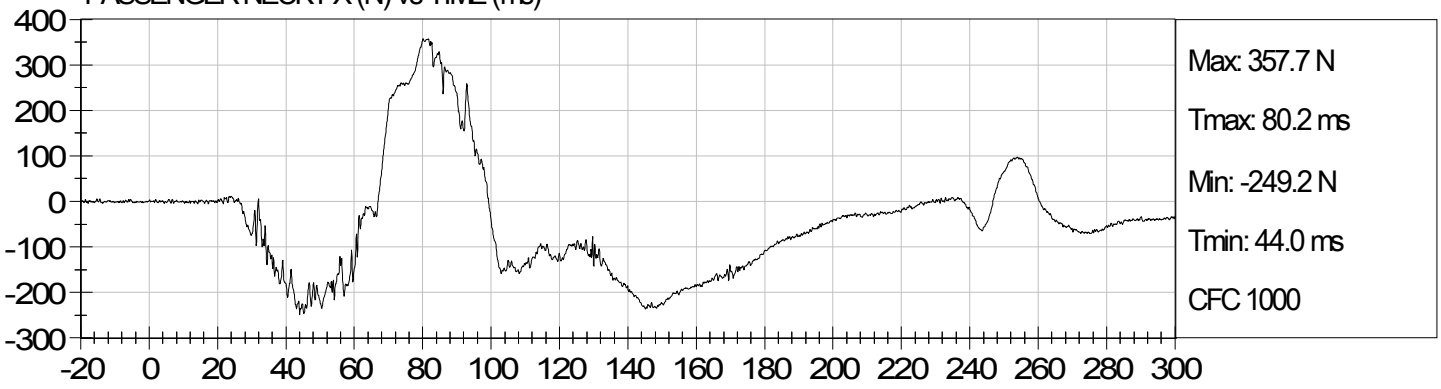
PASSENGER CHEST Z (G's) vs TIME (ms)



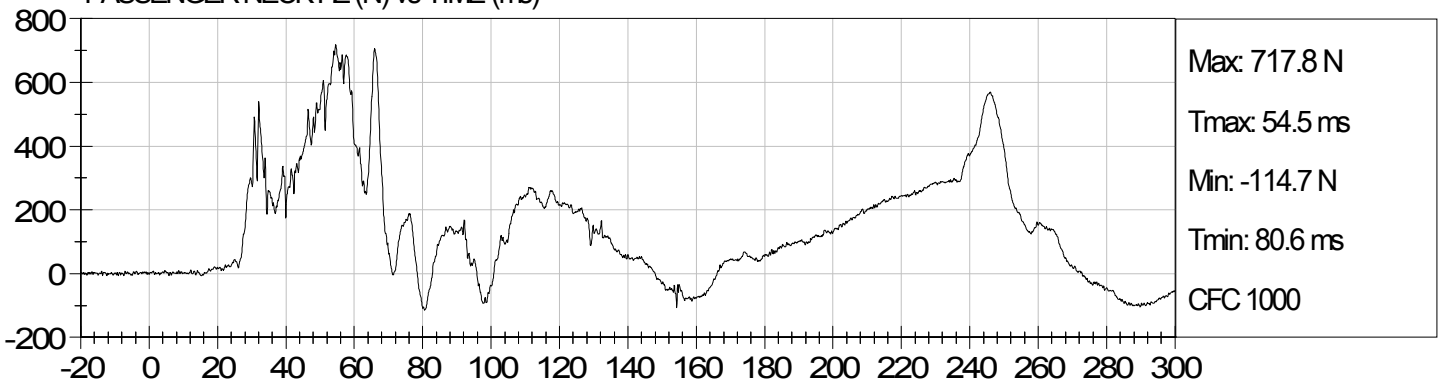
PASSENGER CHEST Resultant (G's) vs TIME (ms)



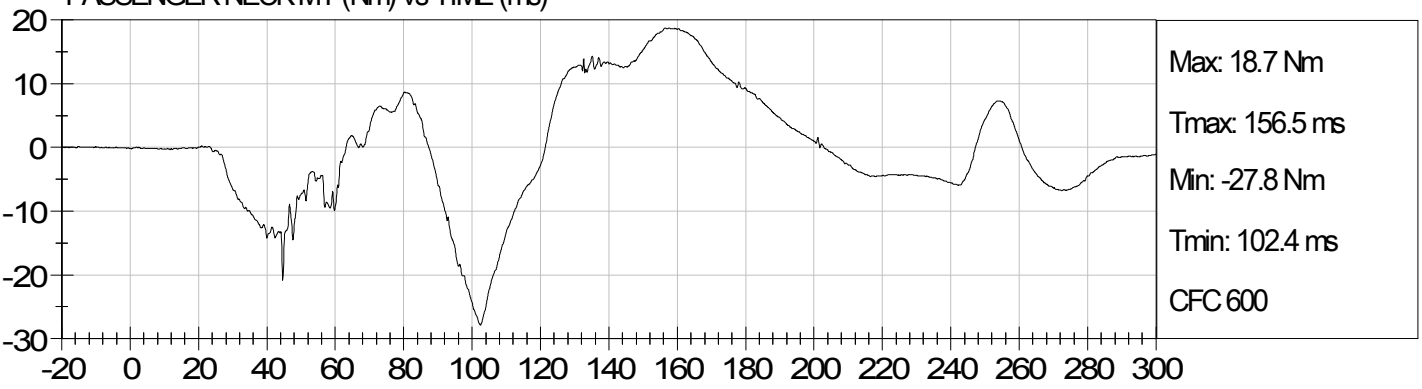
PASSENGER NECK FX (N) vs TIME (ms)

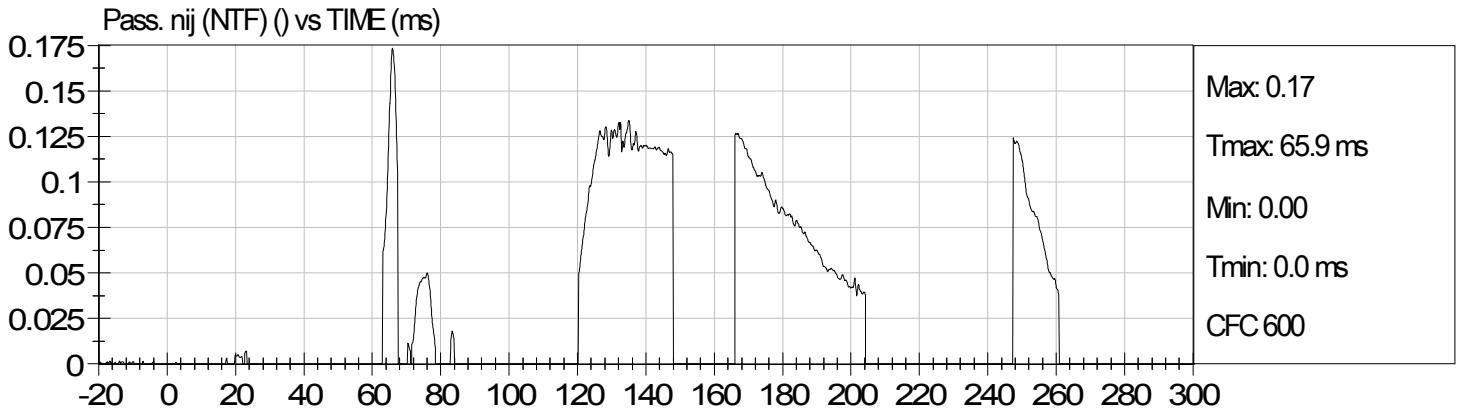


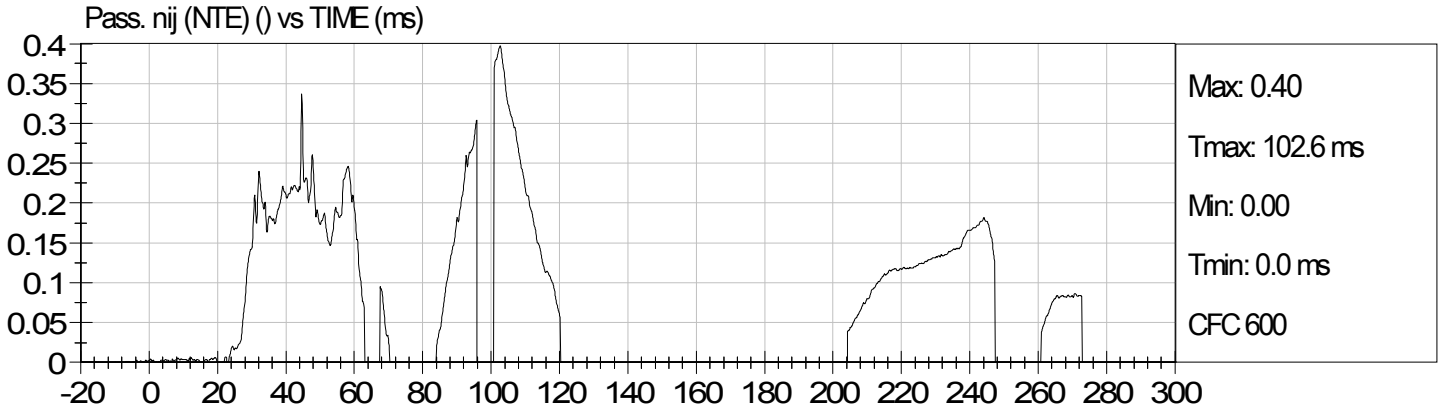
PASSENGER NECK FZ (N) vs TIME (ms)

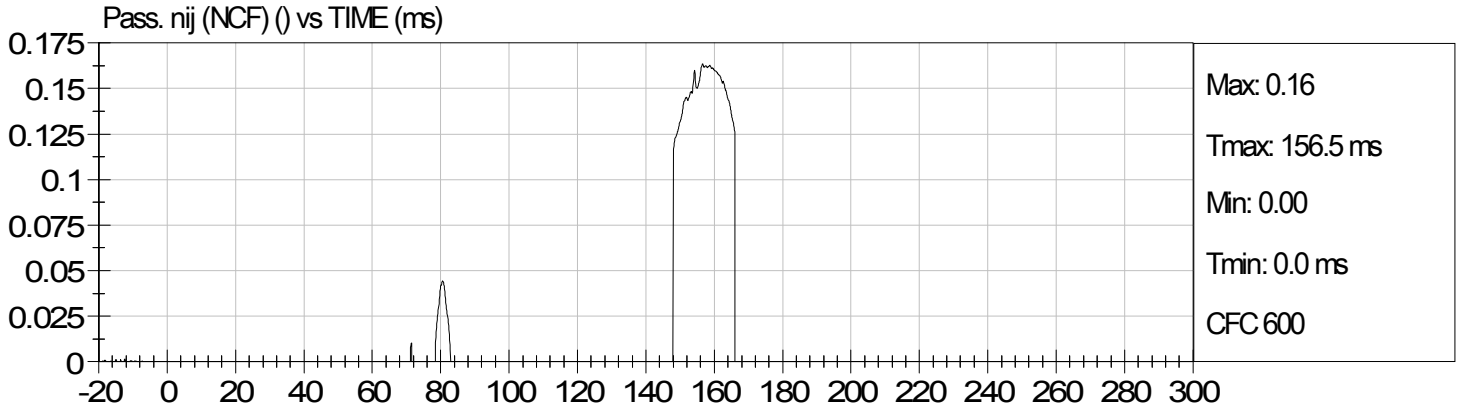


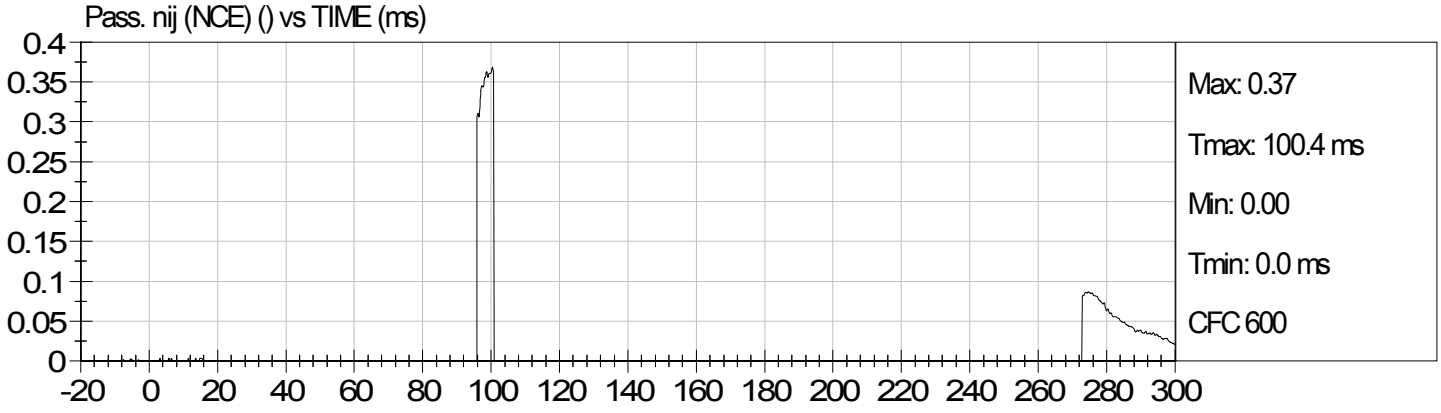
PASSENGER NECK MY (Nm) vs TIME (ms)



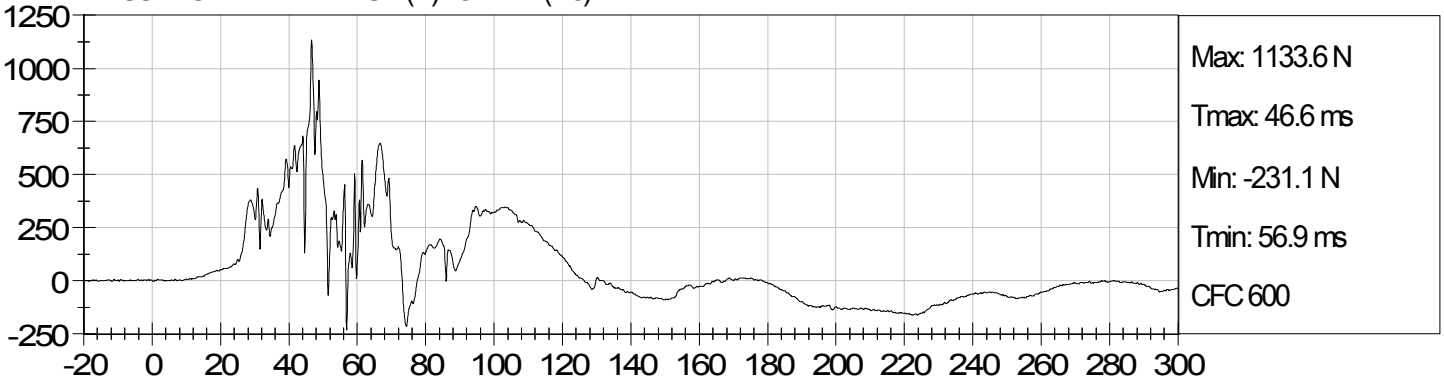

Pass. nij (NTF) () vs TIME (ms)
0.175
0.15
0.125
0.1
0.075
0.05
0.025
0
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.17
Tmax: 65.9 ms
Min: 0.00
Tmin: 0.0 ms
CFC 600


Pass. nij (NTE) () vs TIME (ms)
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.40
Tmax: 102.6 ms
Min: 0.00
Tmin: 0.0 ms
CFC 600

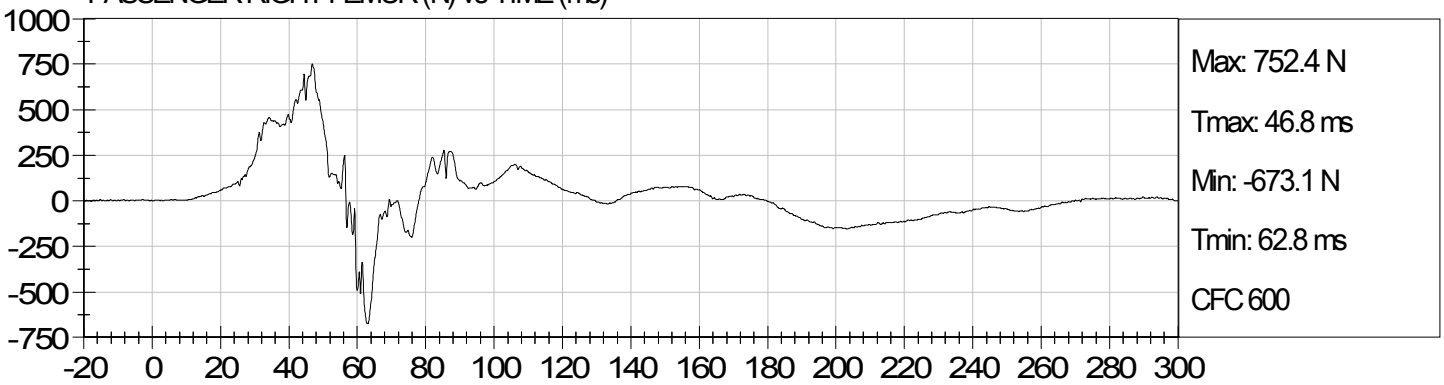

Pass. nij (NCF) () vs TIME (ms)
0.175
0.15
0.125
0.1
0.075
0.05
0.025
0
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.16
Tmax: 156.5 ms
Min: 0.00
Tmin: 0.0 ms
CFC 600


Pass. nij (NCE) () vs TIME (ms)
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.37
Tmax: 100.4 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: 036

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	34.7
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	5.4
E	SHOULDER PIVOT FROM BACKLINE	Center of the shoulder clevis to the rear vertical surface of the fixture.	3.3-3.7	3.6
F	THIGH CLEARANCE	Measured at the highest point on the upper femur segment.	5.5-6.1	5.8
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	11.5
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	13.0
J	ELBOW REST HEIGHT	Measure from the flesh below the elbow pivot bolt to the seat surface.	7.5-8.3	7.9
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	17.3
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	17.9

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	8.8
P	FOOT LENGTH	Tip of toe to rear of heel	9.9-10.5	10.0
V	SHOULDER BREADTH	Outside edges of right and left shoulder clevises	16.3-17.2	16.4
W	FOOT BREADTH	The widest part of the foot	3.6-4.2	4.1
Y	CHEST CIRCUMFERENCE (WITH CHEST JACKET)	Measured 16.9-17.1 in. above seat surface	38.2-39.4	38.4
Z	WAIST CIRCUMFERENCE	Measured 8.9-9.1 in. above seat surface	32.9-34.1	34.0
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: 036 **Test ID:** D124211

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Peak Resultant Acceleration	G's	225 to 275	245	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	3.8	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
		Overall Test Results		Pass

Jessica Hall
Laboratory Technician

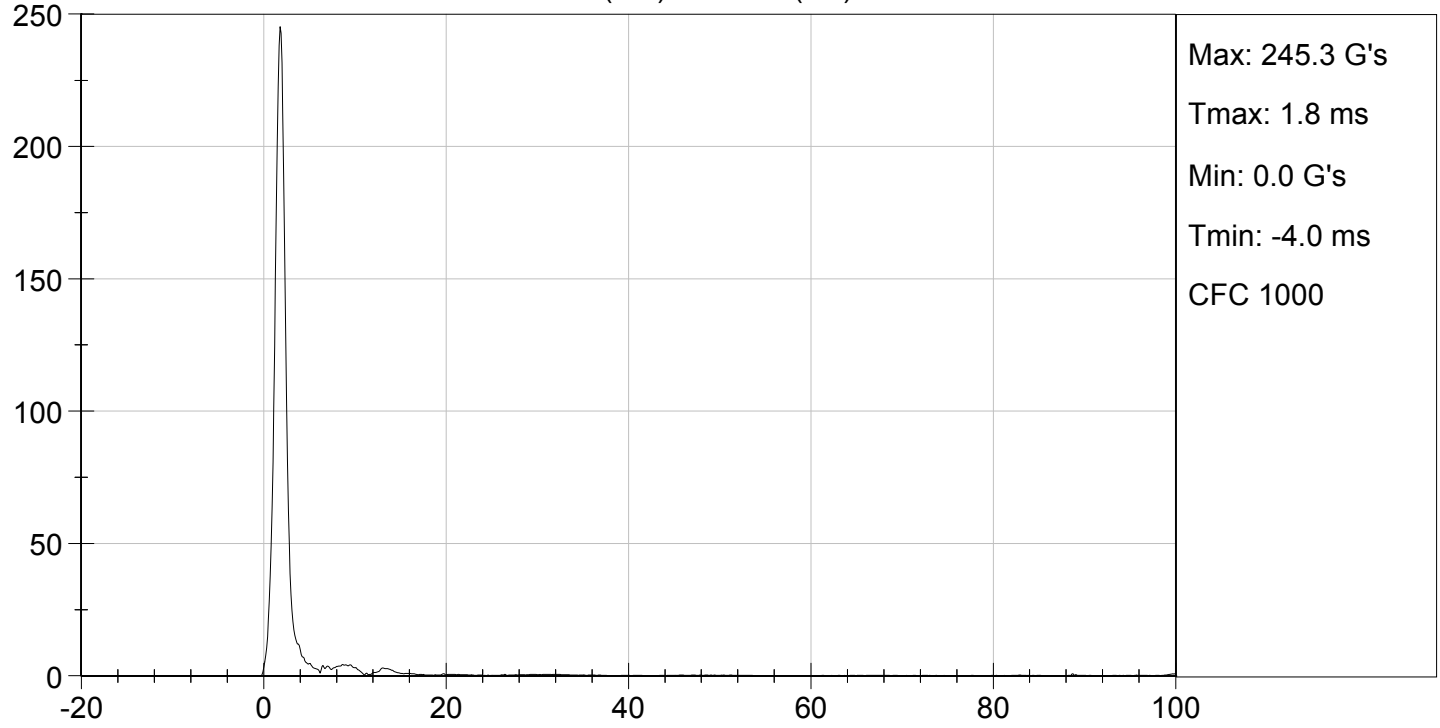
11/05/2012
Test Date

David Winkelbauer
Approved By

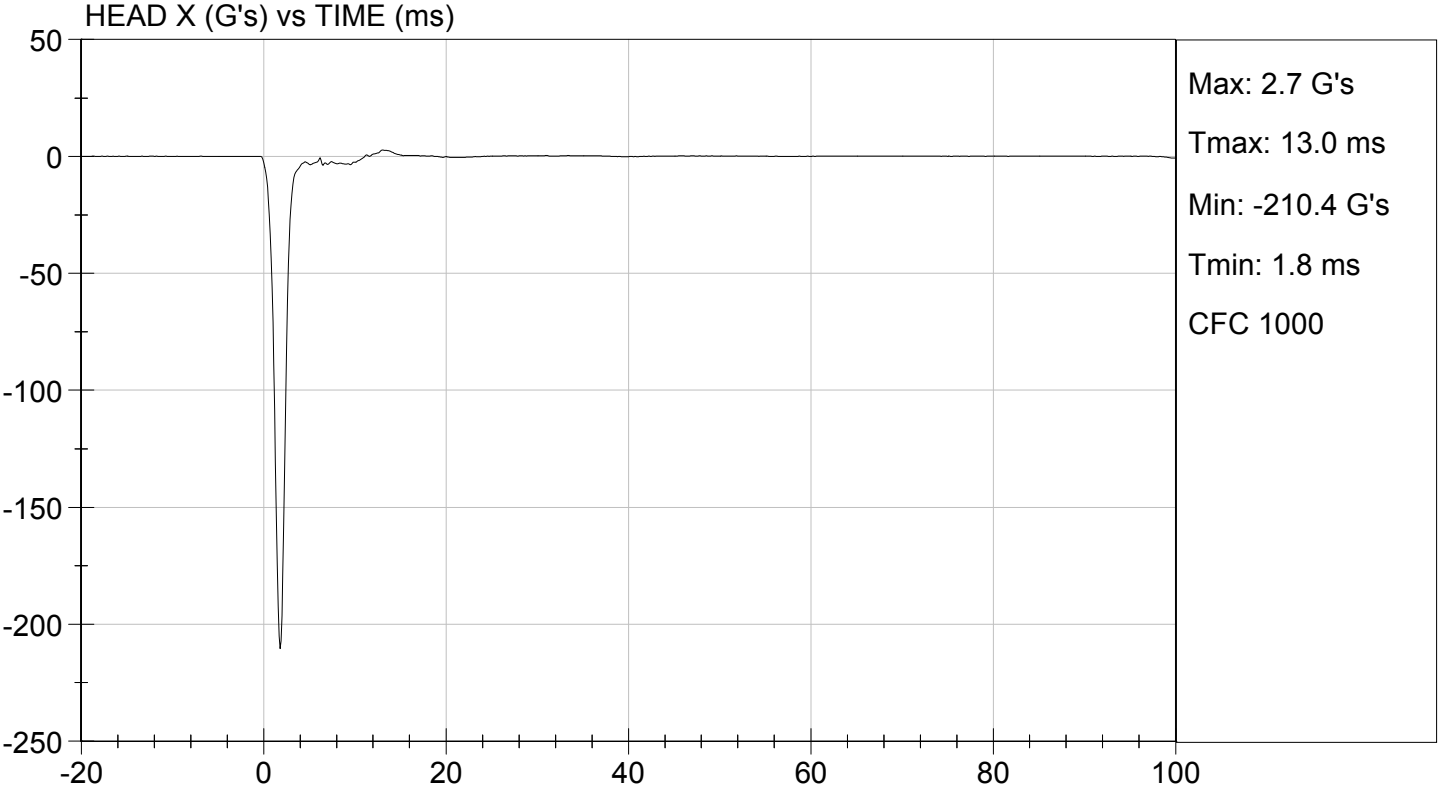
TEST DESC: HEAD DROP

TEST DATE: 11/05/2012
TEST #: D124211

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



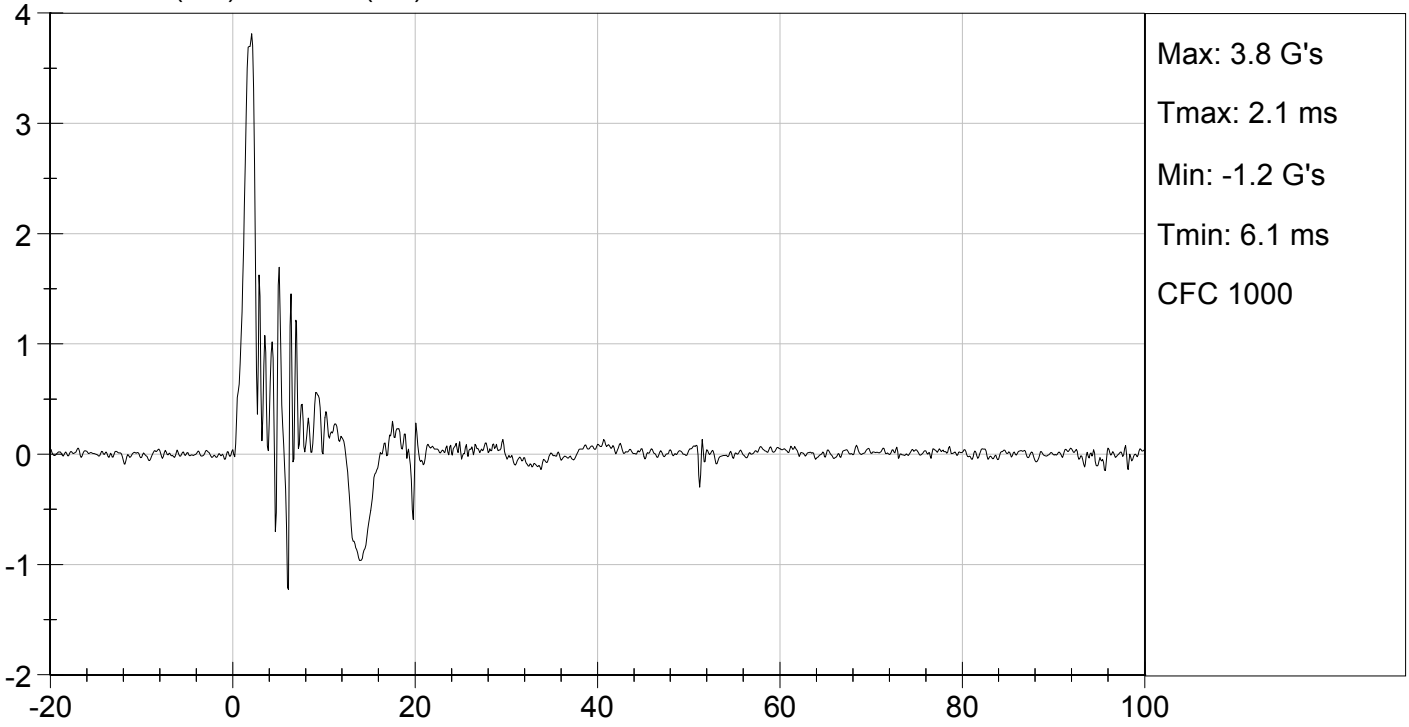
HEAD X (G's) vs TIME (ms)



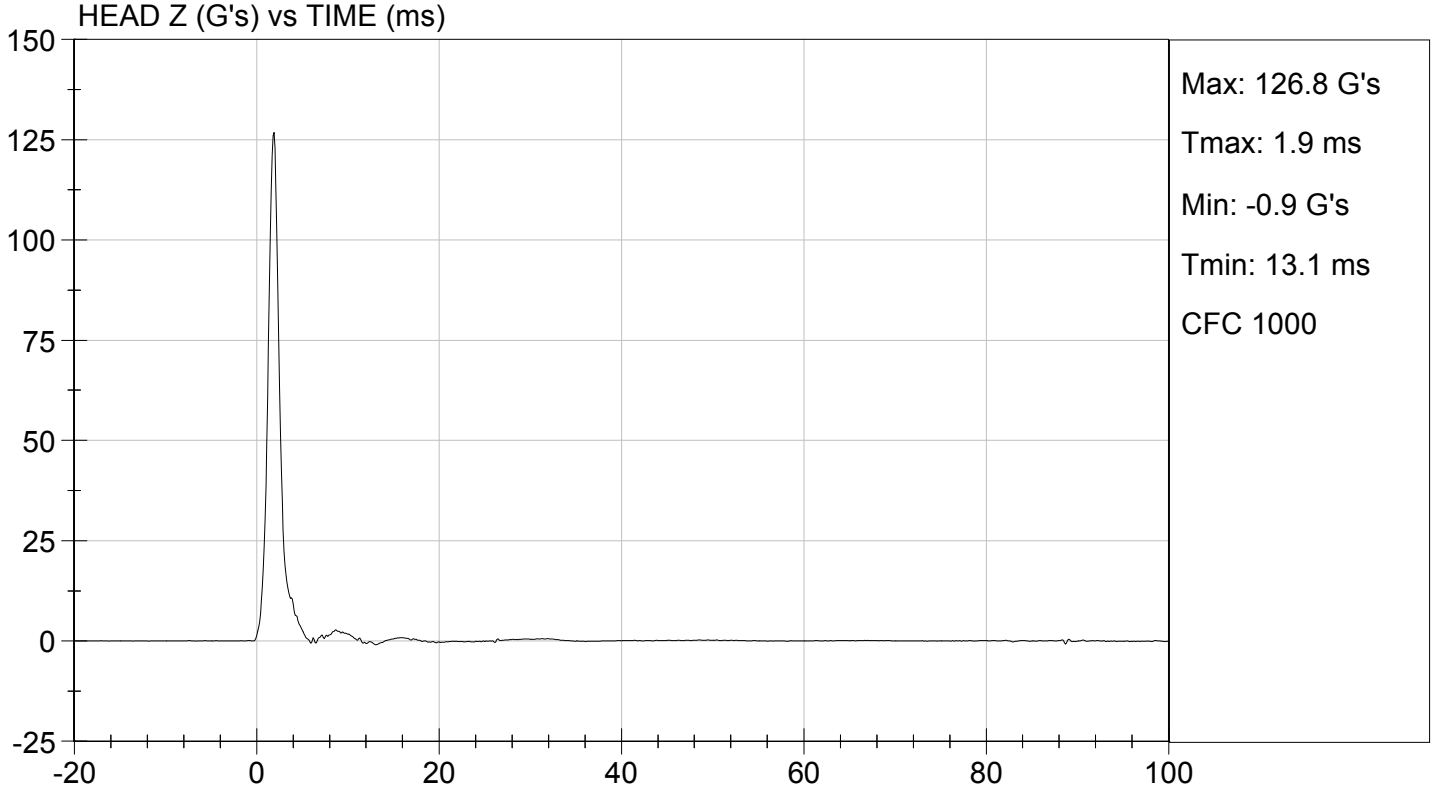
TEST DESC: HEAD DROP

TEST DATE: 11/05/2012
TEST #: D124211

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: 036 **Test I.D:** D124212

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	20.9	Pass
Laboratory Relative Humidity		%	10 to 70	27	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	23.39	Pass
	20 ms	G's	17.60 to 22.60	17.82	Pass
	30 ms	G's	12.50 to 18.50	14.4	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	14.3	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	36.0	Pass
Maximum "D" Plane Rotation	Maximum	Deg	64.0 to 78.0	66.7	Pass
	Time	ms	57.0 to 64.0	60.2	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	120.3	Pass
Moment About Occipital Condyle	Maximum	Nm	88.1 to 108.5	88.7	Pass
	Time	ms	47.0 to 58.0	49.6	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	100.9	Pass
			Overall Test Results		Pass

Jessica Hall
Laboratory Technician

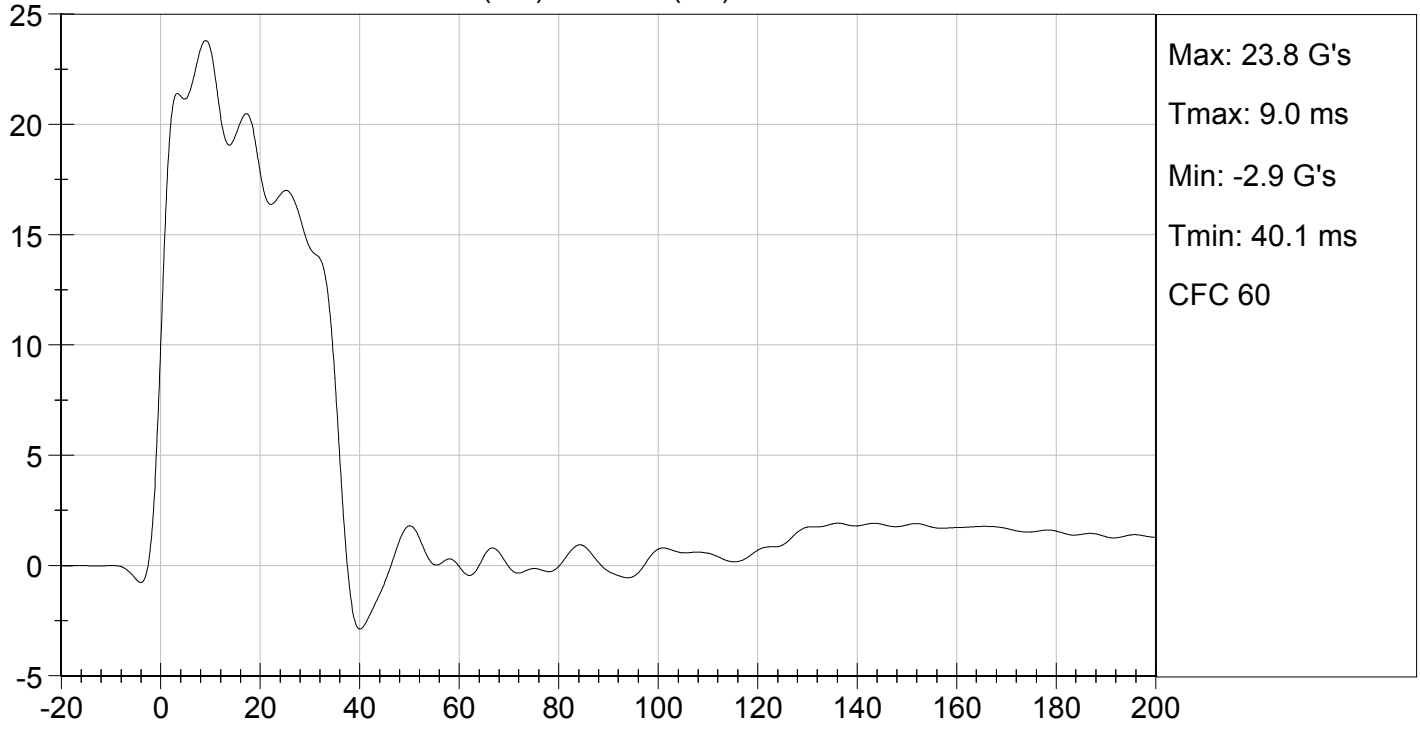
11/05/2012
Test Date

David Winkelbauer
Approved By

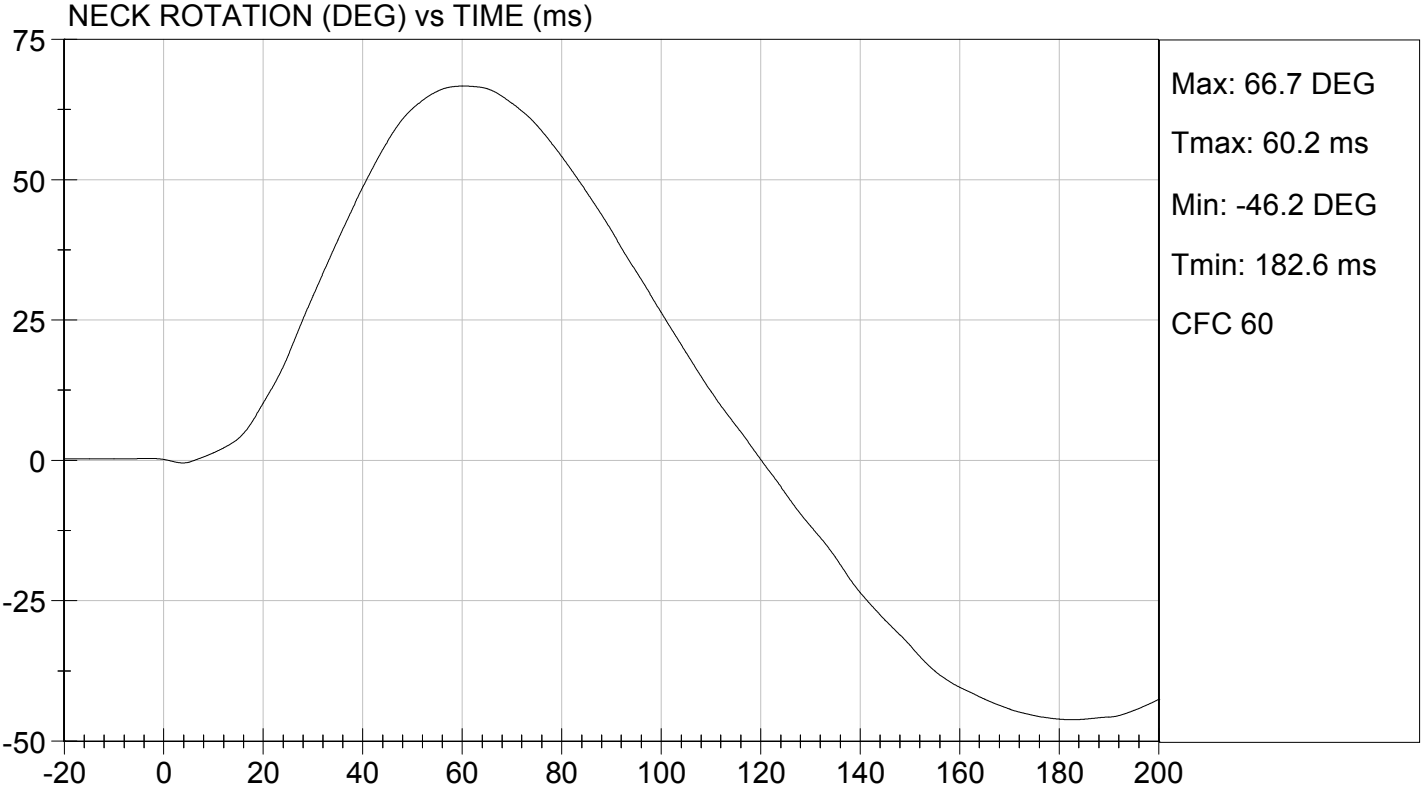
TEST DESC: NECK FLEXION
VELOCITY: 23.15 ft/s, 7.06 m/s

TEST DATE: 11/05/2012
TEST #: D124212

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



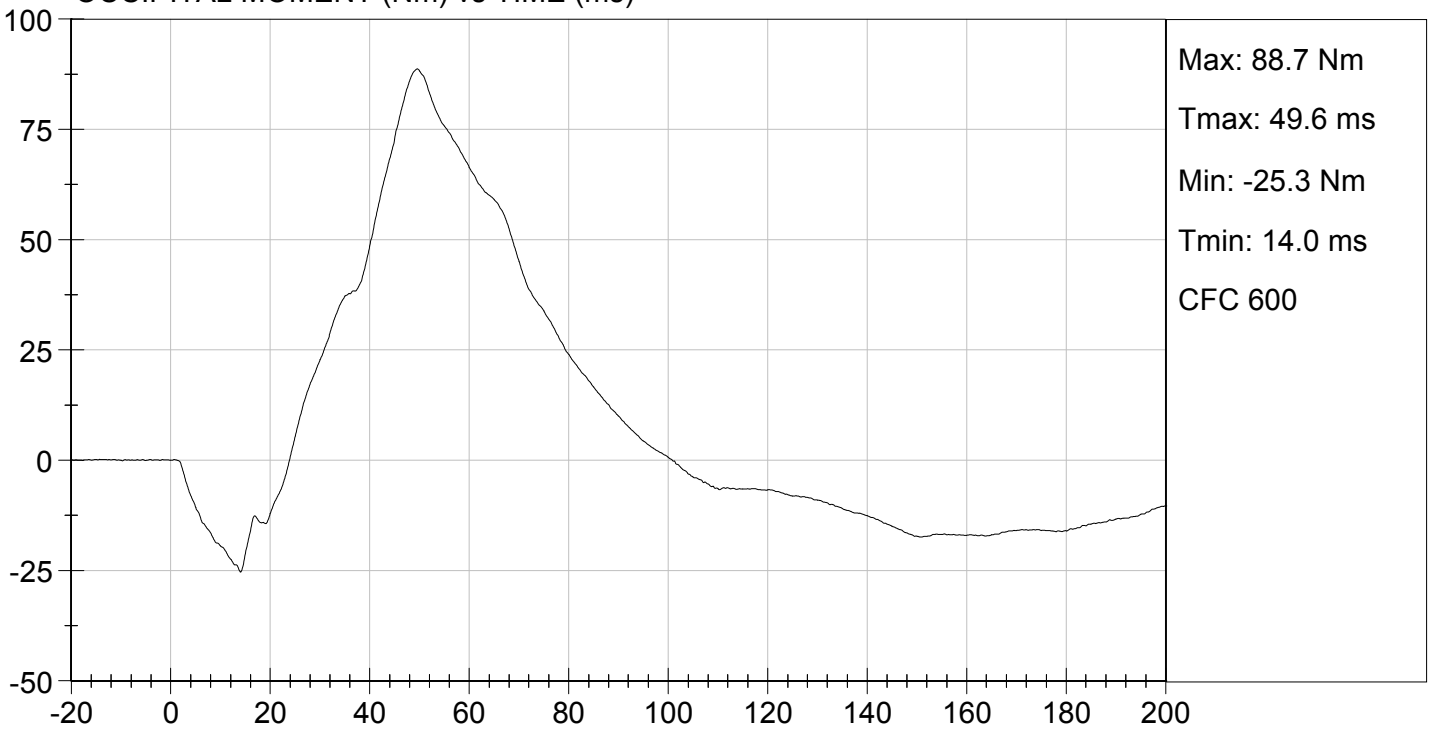
NECK ROTATION (DEG) vs TIME (ms)



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

TEST DATE: 11/05/2012
TEST #: D124212

OCCIPITAL MOMENT (Nm) vs TIME (ms)



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036 **Test I.D:** D124213

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	20.9	Pass
Laboratory Relative Humidity		%	10 to 70	27	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.05	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	20.10	Pass
	20 ms	G's	14.00 to 19.00	17.03	Pass
	30 ms	G's	11.00 to 16.00	14.04	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	14.0	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	38.2	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	97.1	Pass
	Time	ms	72.0 to 82.0	78.3	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	163.3	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-62.0	Pass
	Time	ms	65.0 to 79.0	70.7	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	146.3	Pass
			Overall Test Results		Pass

Jessica Hall
Laboratory Technician

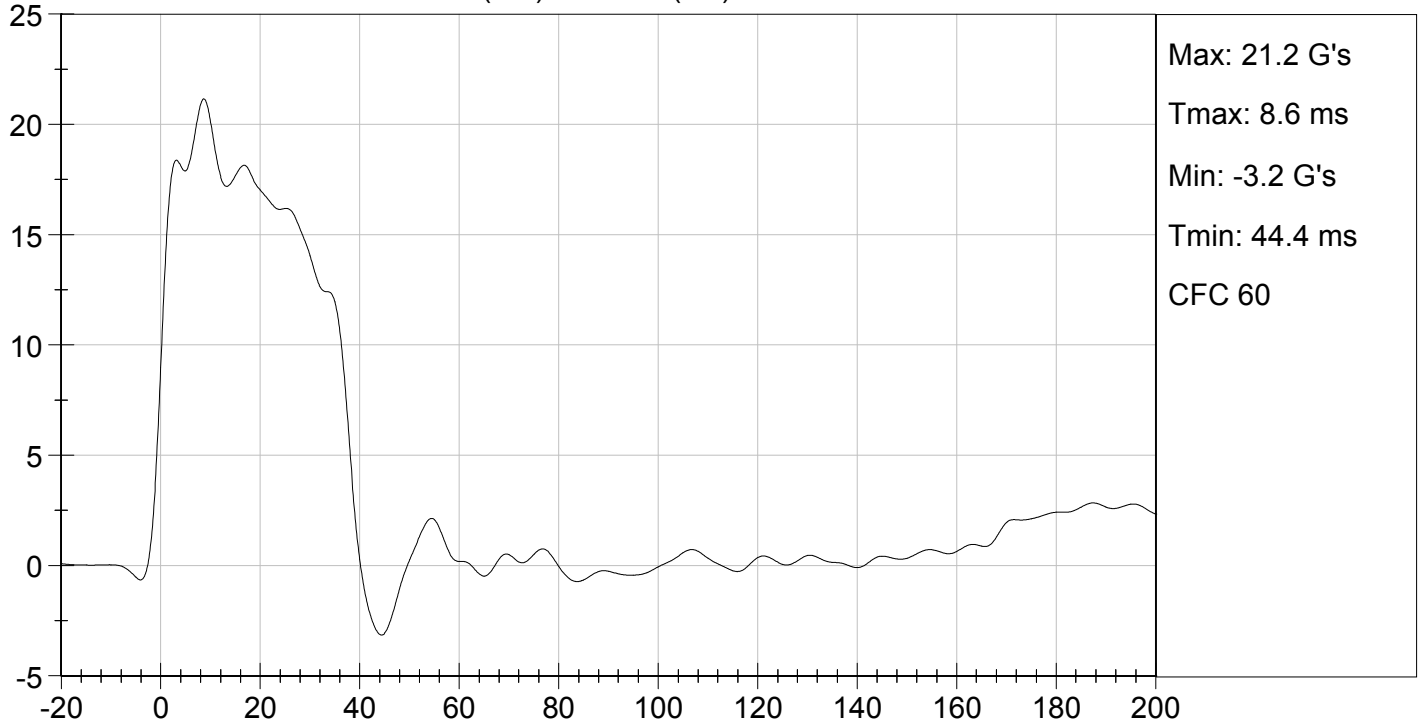
11/05/2012
Test Date

David Winkelbauer
Approved By

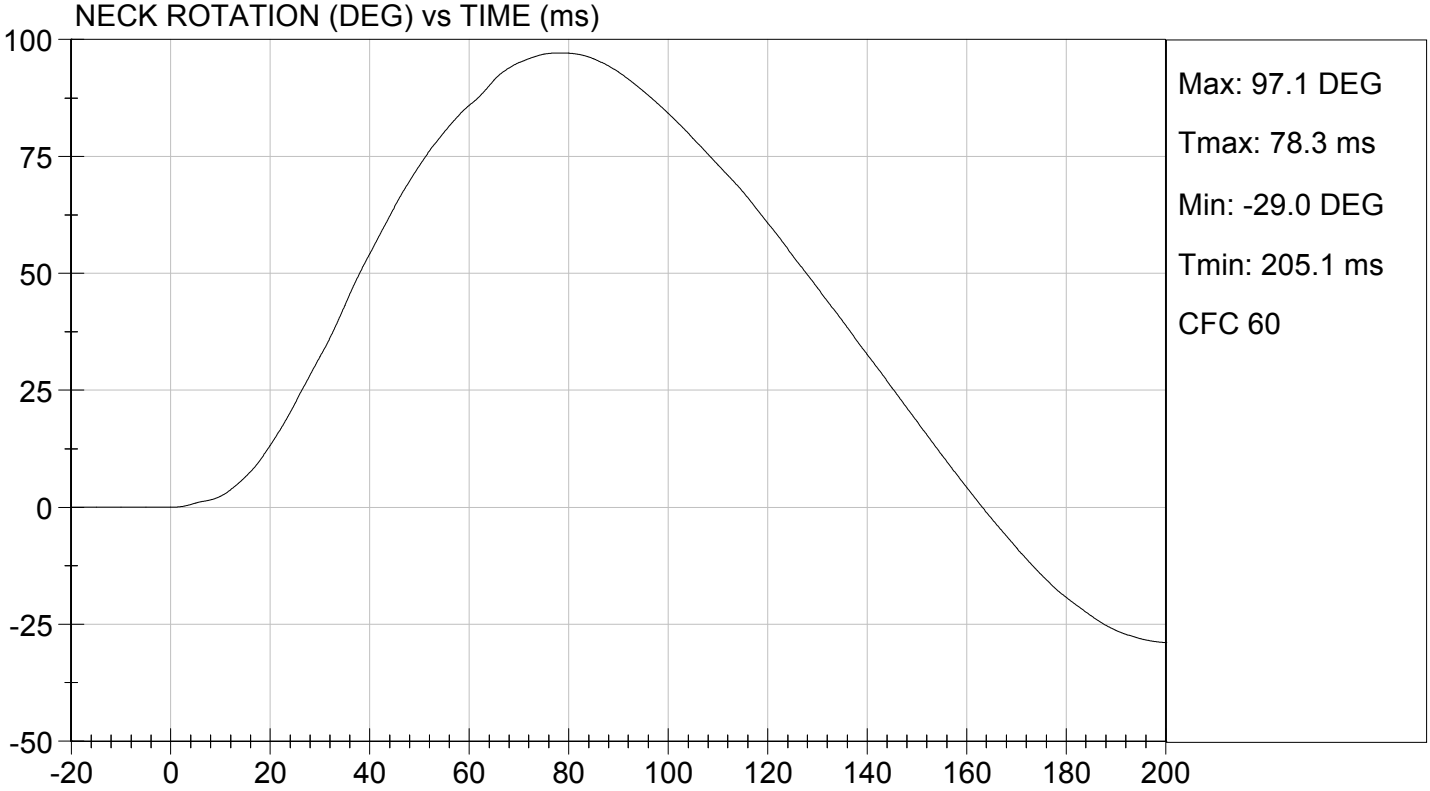
TEST DESC: NECK EXTENSION
VELOCITY: 19.84 ft/s, 6.05 m/s

TEST DATE: 11/05/2012
TEST #: D124213

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

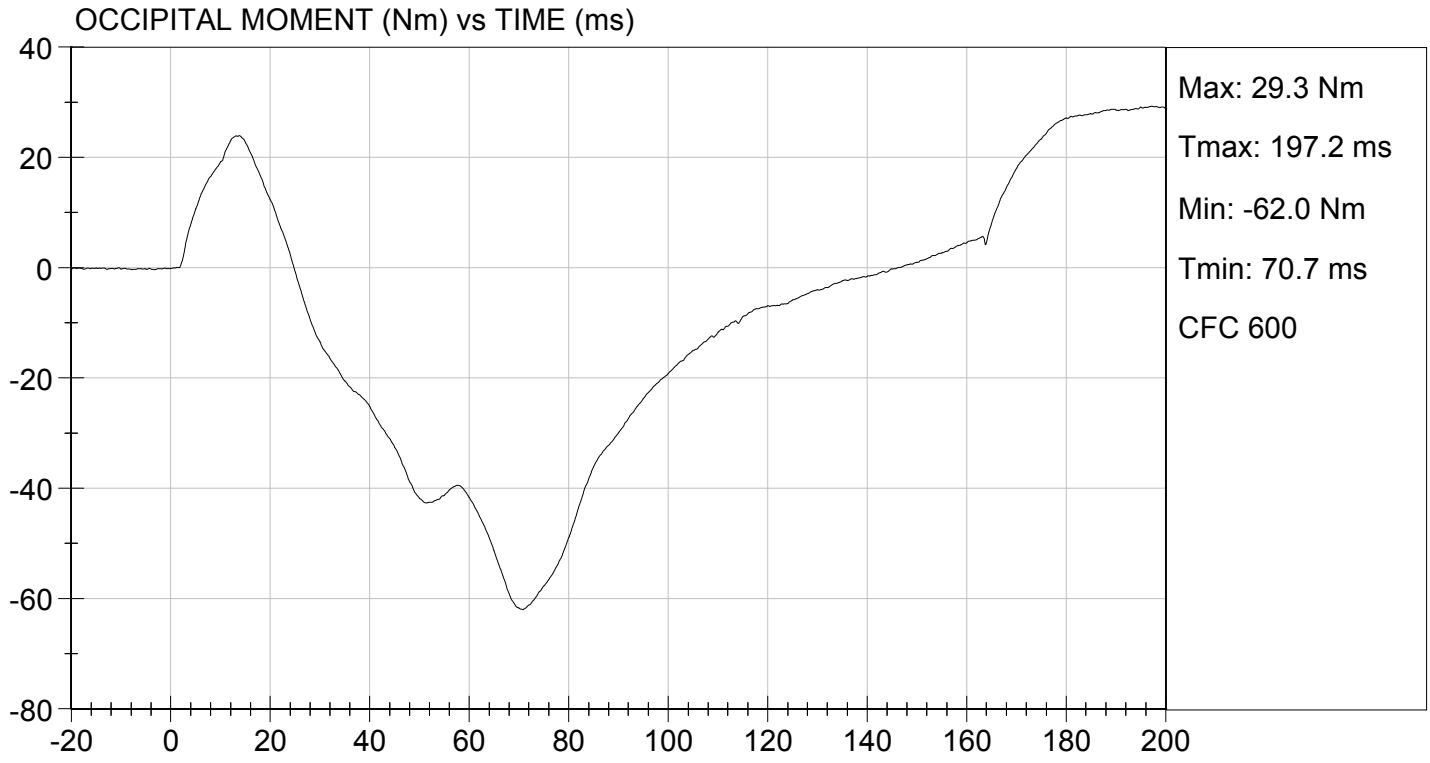


NECK ROTATION (DEG) vs TIME (ms)



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

TEST DATE: 11/05/2012
TEST #: D124213



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036 **Test I.D:** D124214

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Probe Velocity	m/s	6.58 to 6.82	6.77	Pass
Peak Probe Force	N	5159 to 5893	5,560	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.64	Pass
Internal Hysteresis	%	69 to 85	71	Pass
		Overall Test Results		Pass

Jessica Hall
Laboratory Technician

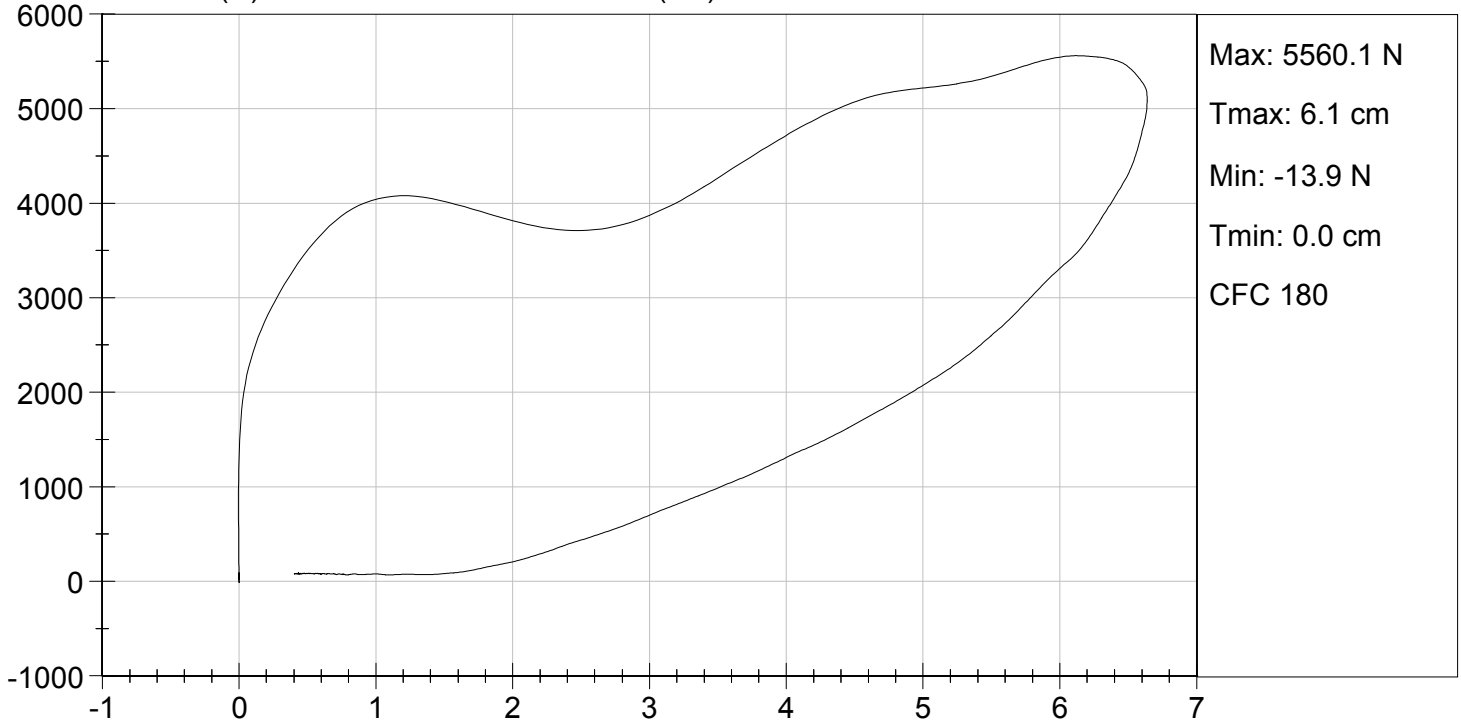
11/06/2012
Test Date

David Winkelbauer
Approved By

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

TEST DATE: 11/06/2012
TEST #: D124214

FORCE (N) vs CHEST DISPLACEMENT (cm)



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036 **Test I.D:** D124215

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	26	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	N	4715 to 5782	5,079	Pass
		Overall Test Results		Pass

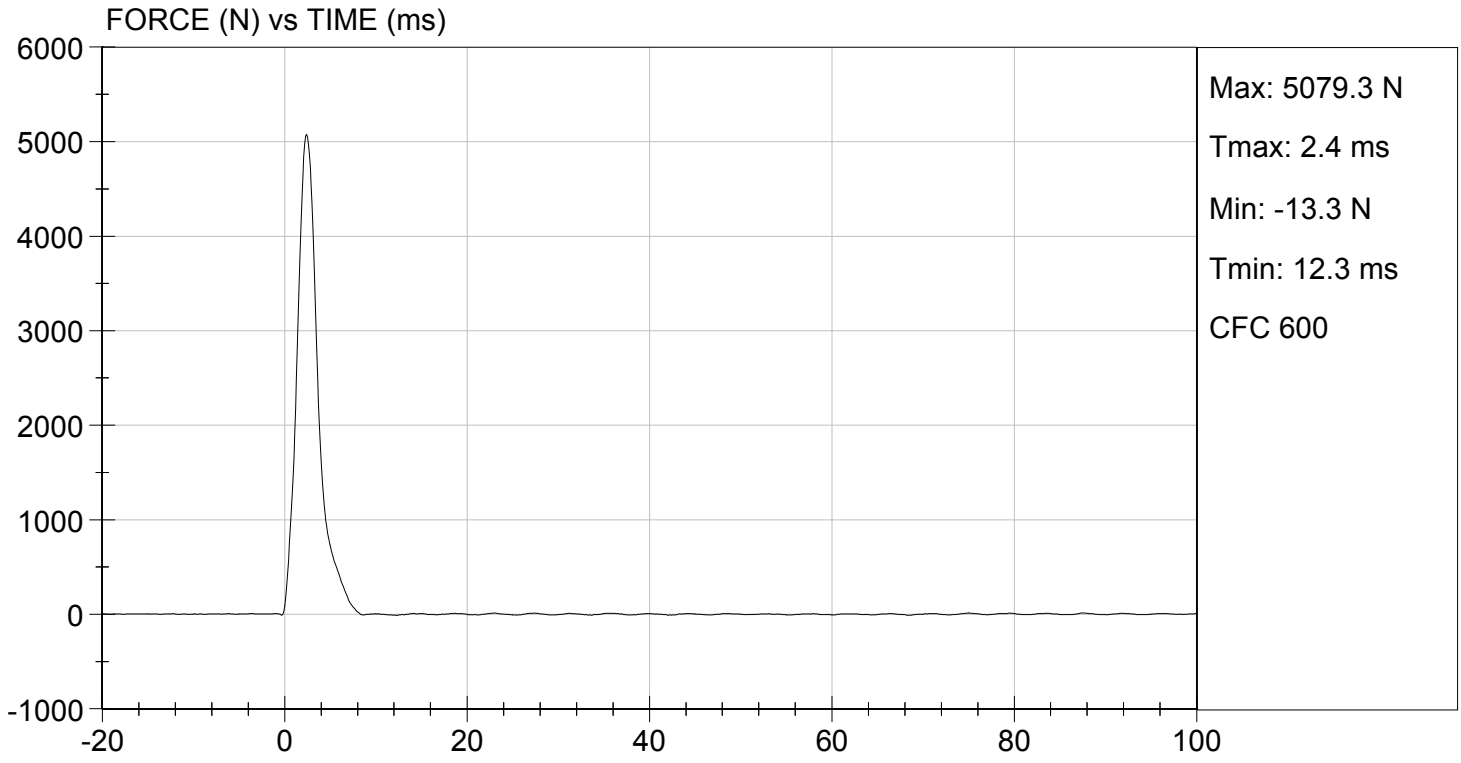
Jessica Hall
Laboratory Technician

11/06/2012
Test Date

David Winkelbauer
Approved By

TEST DESC: RIGHT KNEE
VELOCITY: 6.94 ft/s, 2.12 m/s

TEST DATE: 11/06/2012
TEST #: D124215



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036 **Test I.D:** D124216

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	26	Pass
Probe Velocity	m/s	2.07 to 2.13	2.09	Pass
Peak Probe Force	N	4715 to 5782	5,253	Pass
		Overall Test Results		Pass

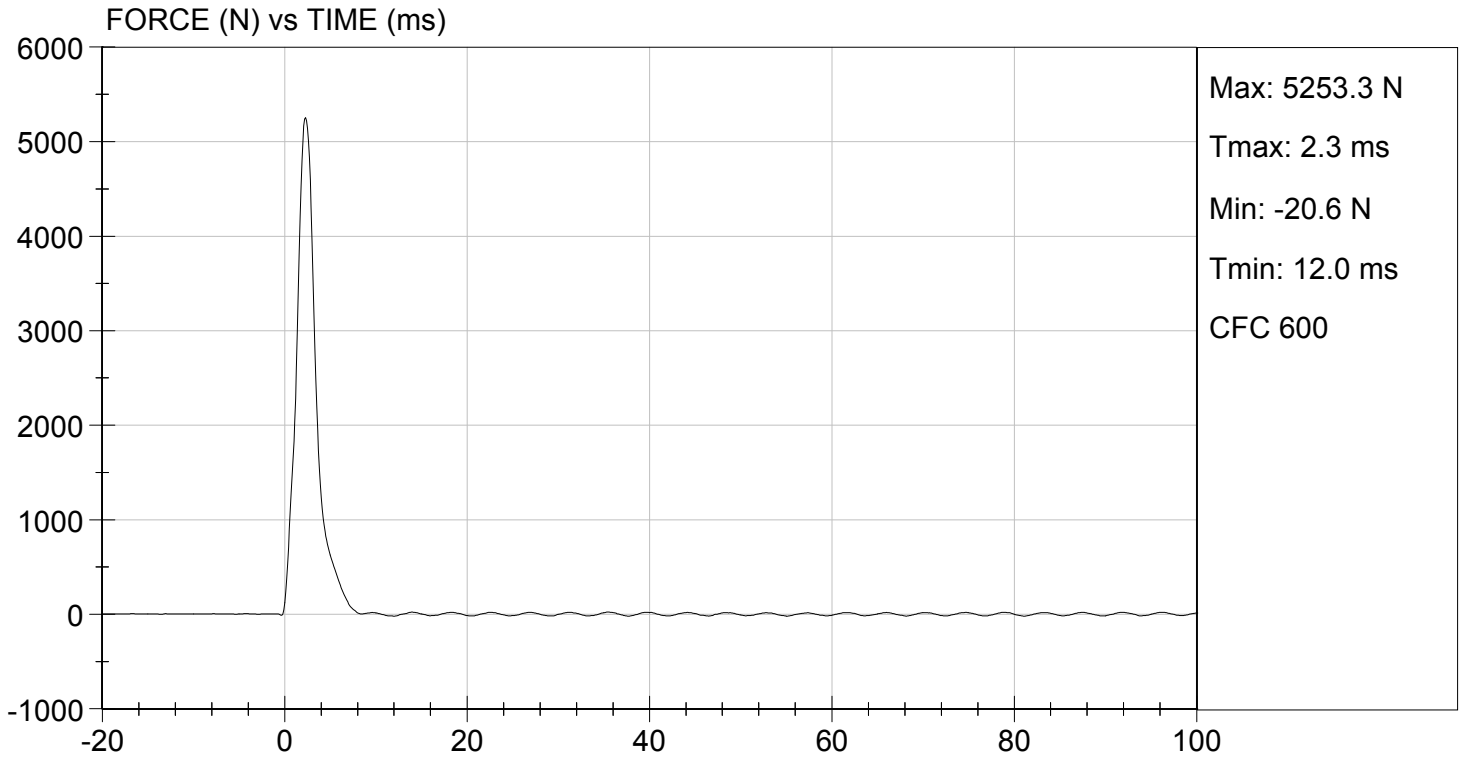
Jessica Hall
Laboratory Technician

11/06/2012
Test Date

David Winkelbauer
Approved By

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

TEST DATE: 11/06/2012
TEST #: D124216



MGA RESEARCH CORPORATION

HIP-FEMUR FLEXION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036 **Test I.D:** D124210

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.0	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	27	27	Pass
Rotation Rate	deg/s	5.0 to 10.0	6.2	6.3	Pass
30 Degrees	Nm	94.9 Nm Max	90.4	75.1	Pass
150 ft-lbf / 203.4 Nm	Deg	40.0 to 50.0 Degree Max Rotation	44.3	45.6	Pass
		Overall Test Results			Pass

Jessica Gall
Laboratory Technician

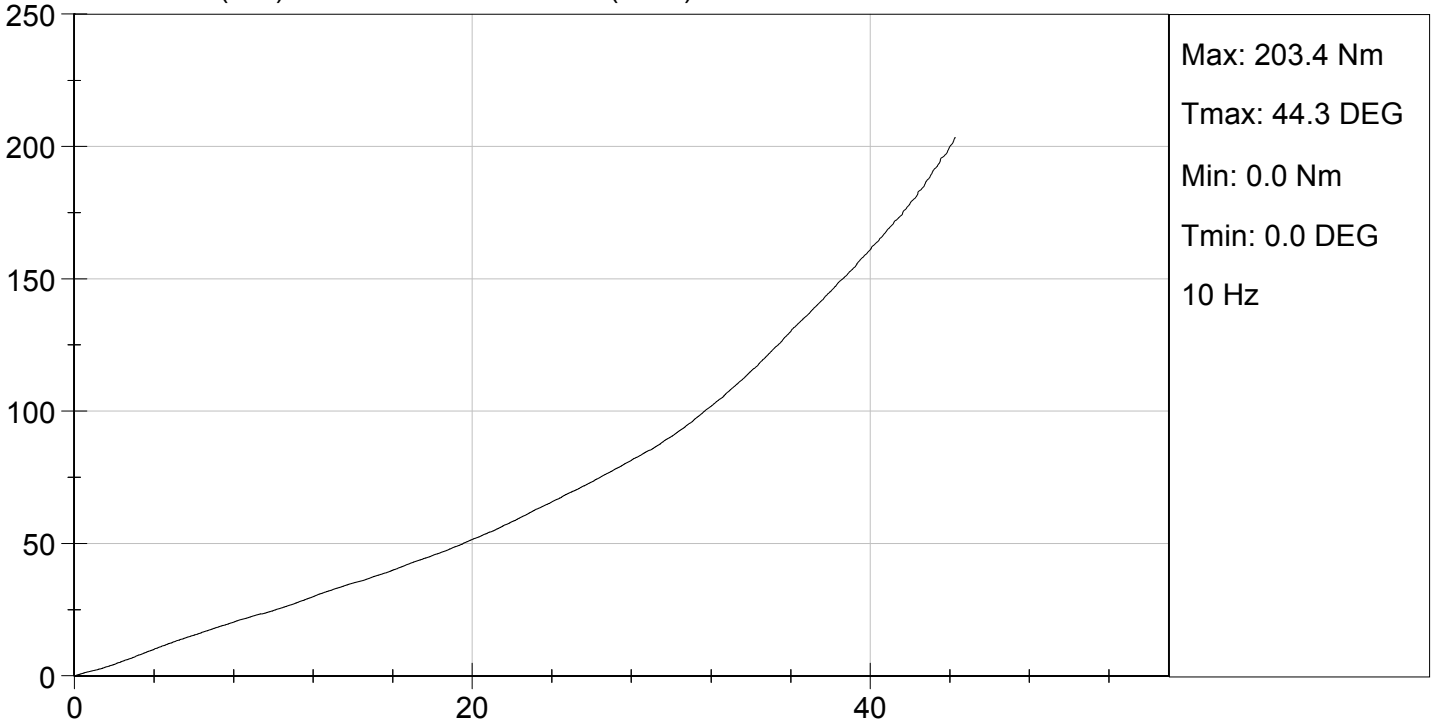
11/05/2012
Test Date

David Winkelbauer
Approved By

TEST DESC: RIGHT HIP FEMUR FLEXION

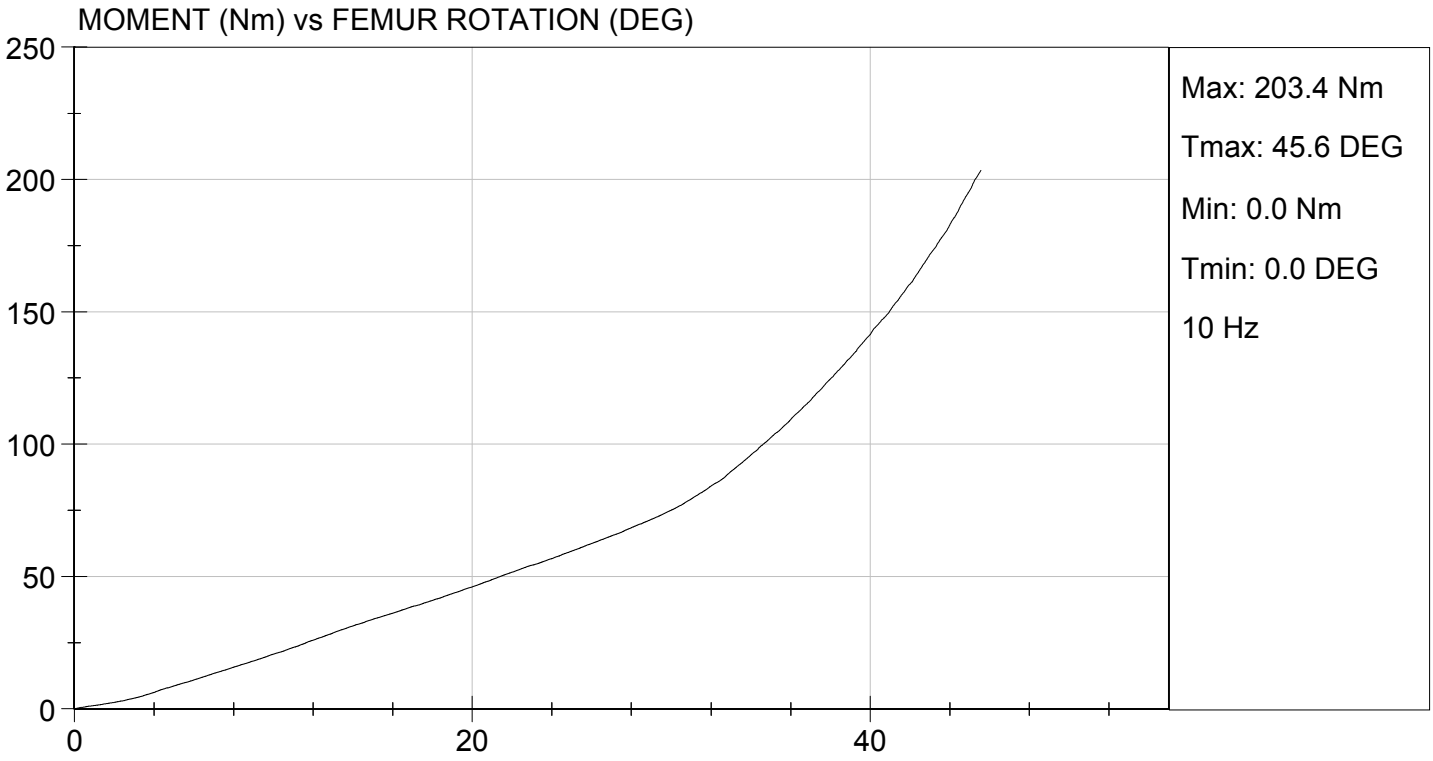
TEST DATE: 11/05/2012
TEST #: D124219

MOMENT (Nm) vs FEMUR ROTATION (DEG)



TEST DESC: LEFT HIP FEMUR FLEXION

TEST DATE: 11/05/2012
TEST #: D124210



MGA RESEARCH CORPORATION

HEAD DROP TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036 **Test ID:** D124271

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Peak Resultant Acceleration	G's	225 to 275	257	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-3.1	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
		Overall Test Results		Pass

Jessica Hall
Laboratory Technician

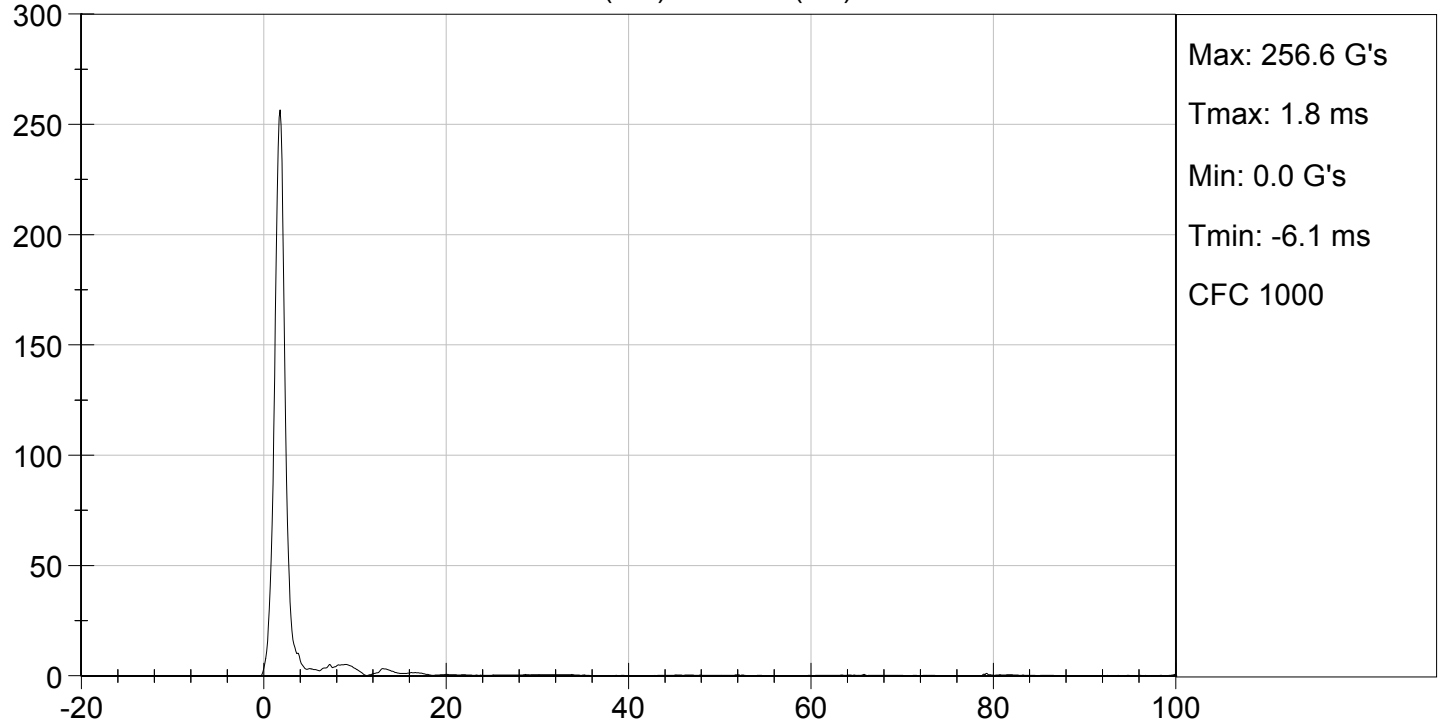
11/08/2012
Test Date

David Winkelbauer
Approved By

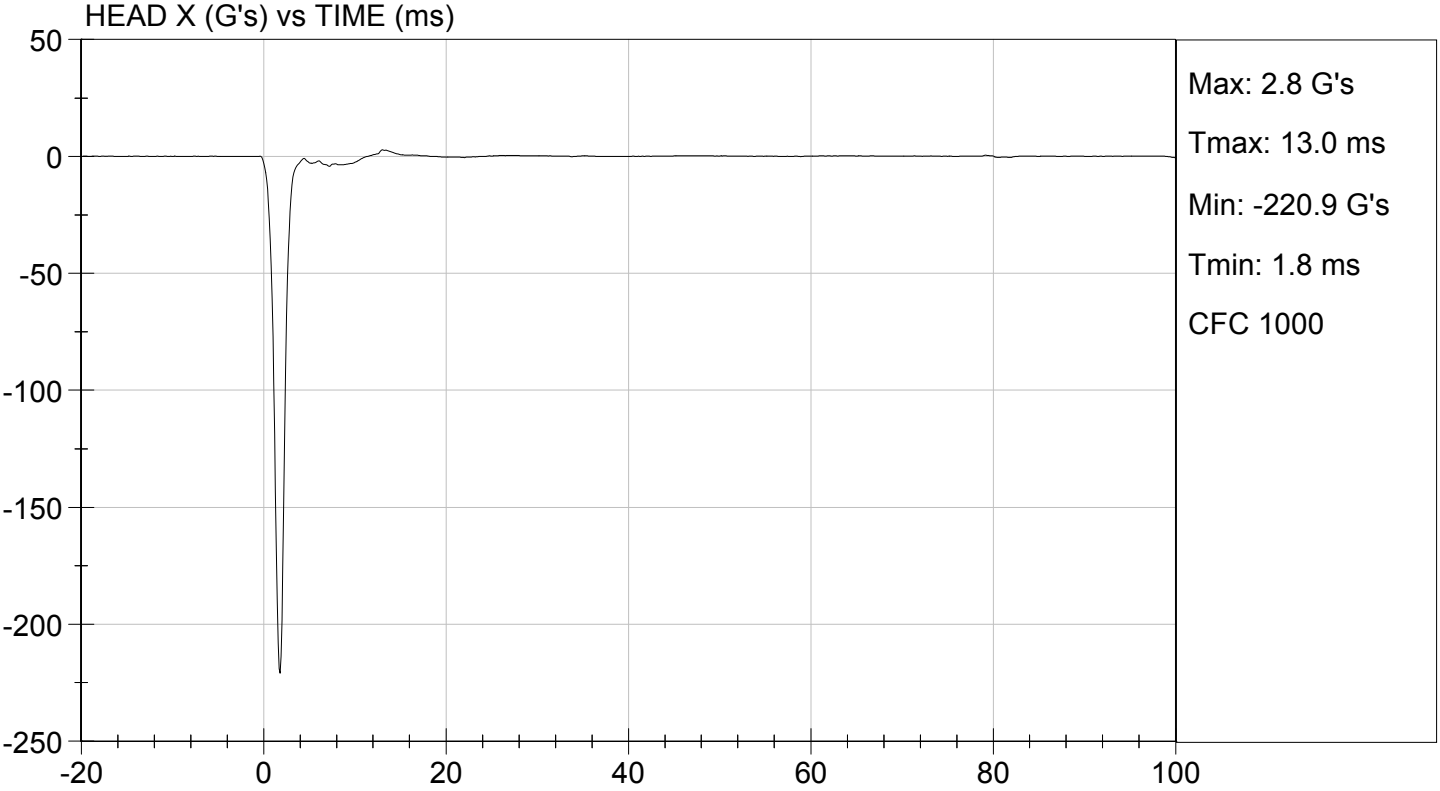
TEST DESC: HEAD DROP

TEST DATE: 11/08/2012
TEST #: D124271

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

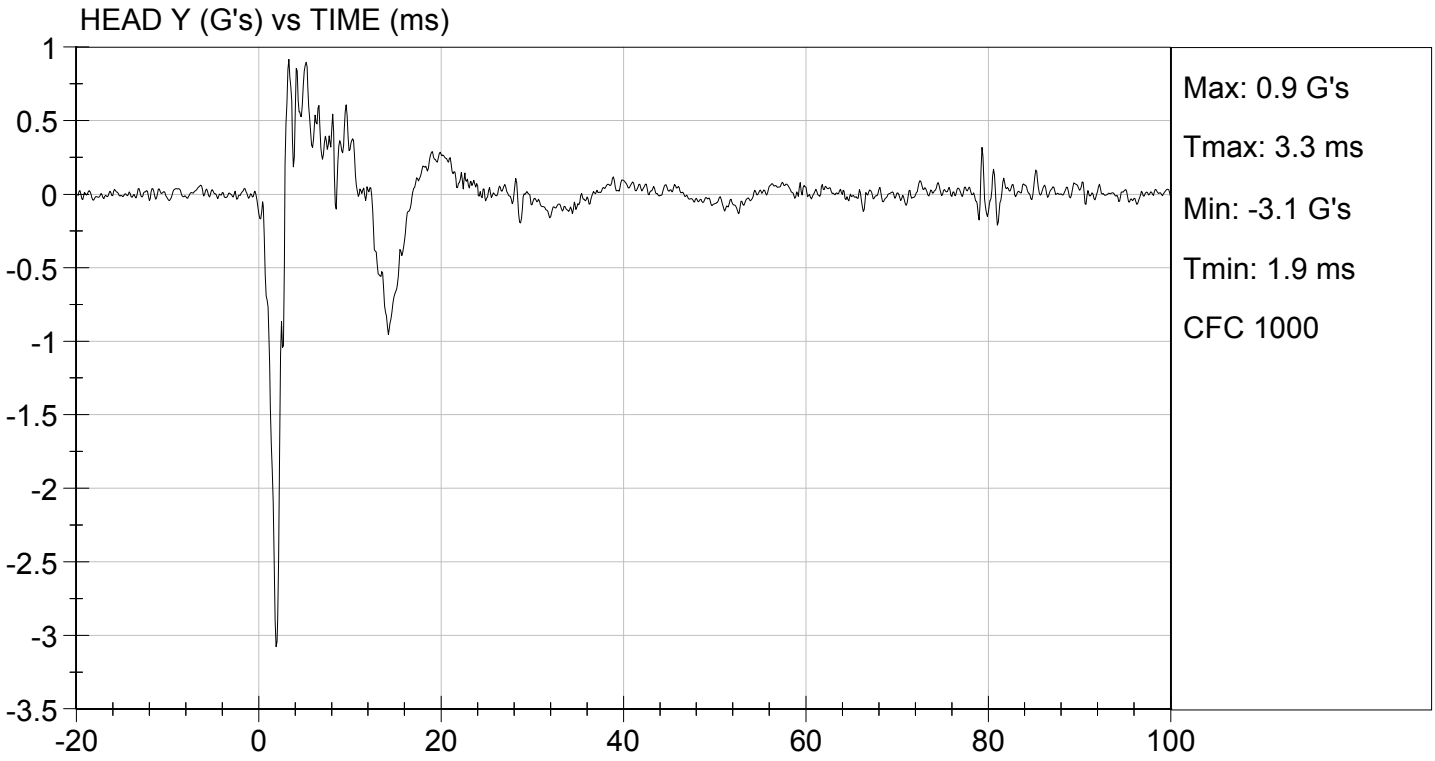


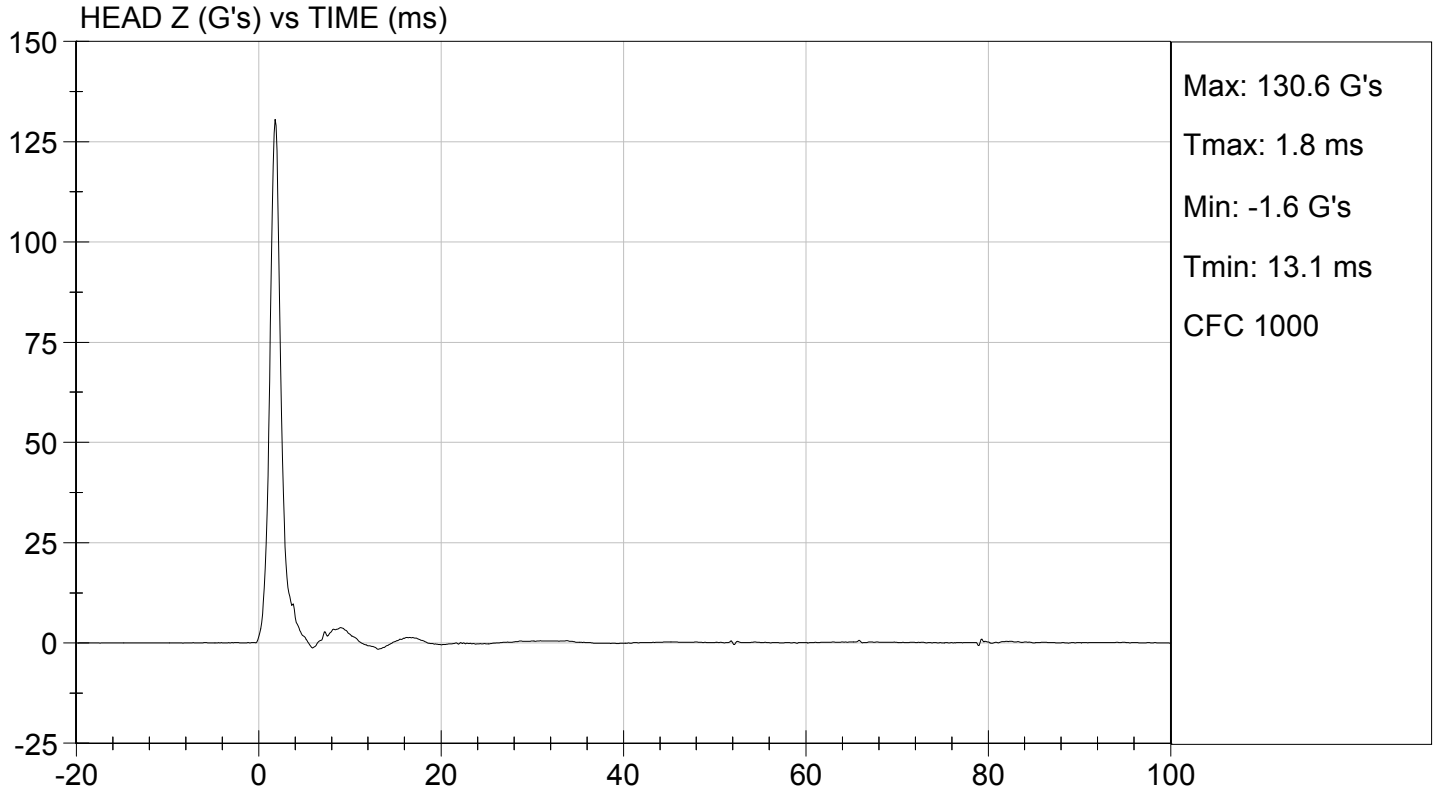
HEAD X (G's) vs TIME (ms)



TEST DESC: HEAD DROP

TEST DATE: 11/08/2012
TEST #: D124271





MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036 **Test I.D:** D124272

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	30	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	23.47	Pass
	20 ms	G's	17.60 to 22.60	18.42	Pass
	30 ms	G's	12.50 to 18.50	13.0	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	12.9	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	36.9	Pass
Maximum "D" Plane Rotation	Maximum	Deg	64.0 to 78.0	69.4	Pass
	Time	ms	57.0 to 64.0	58.1	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	119.5	Pass
Moment About Occipital Condyle	Maximum	Nm	88.1 to 108.5	92.9	Pass
	Time	ms	47.0 to 58.0	50.6	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	98.4	Pass
			Overall Test Results		Pass

Jessica Hall
Laboratory Technician

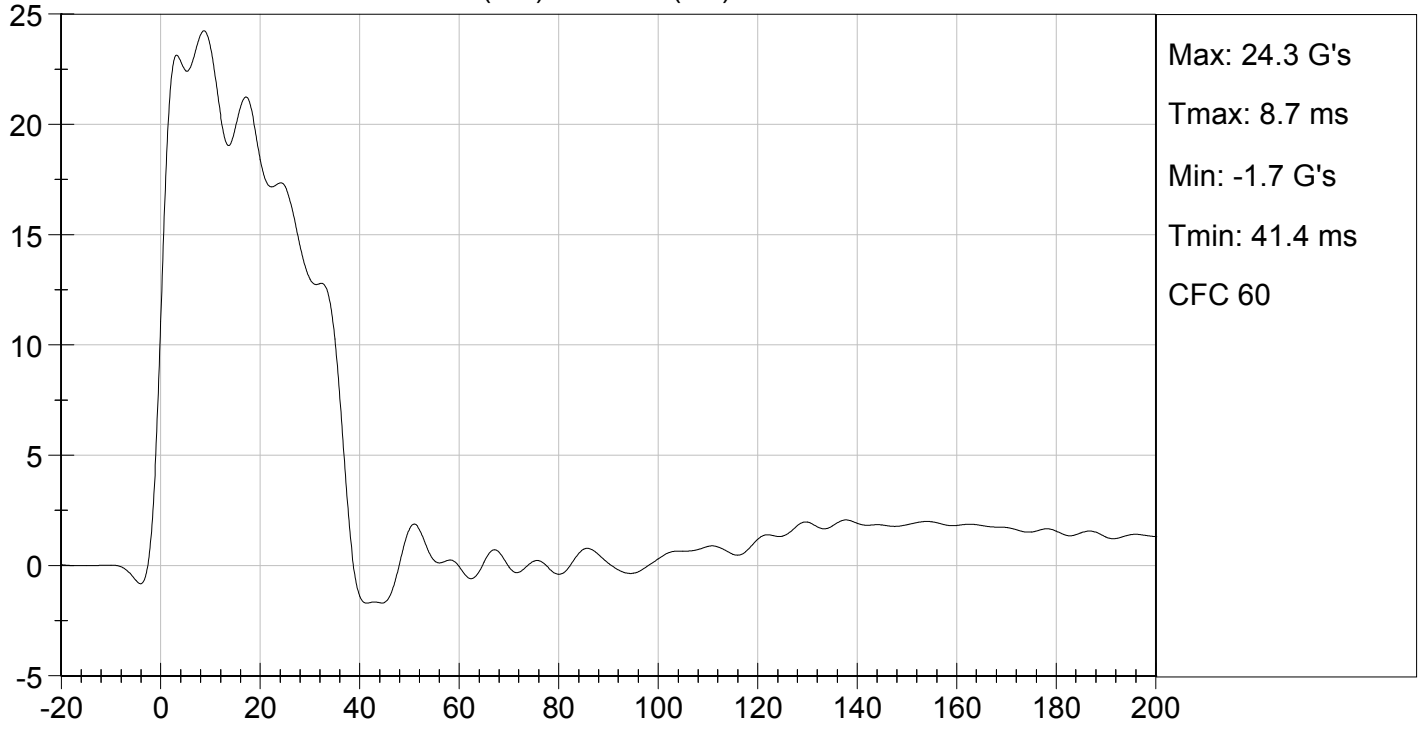
11/08/2012
Test Date

David Winkelbauer
Approved By

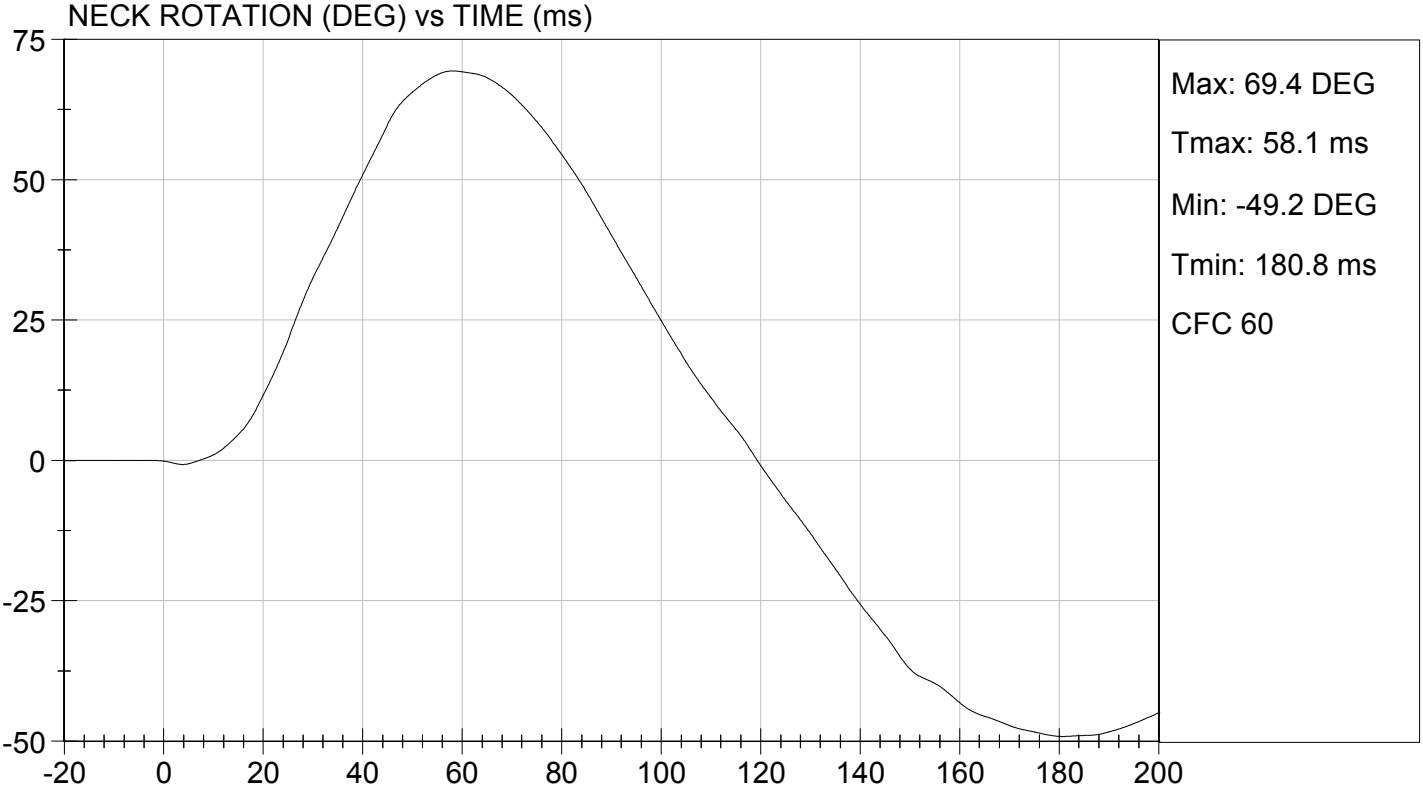
TEST DESC: NECK FLEXION
VELOCITY: 23.15 ft/s, 7.06 m/s

TEST DATE: 11/08/2012
TEST #: D124272

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

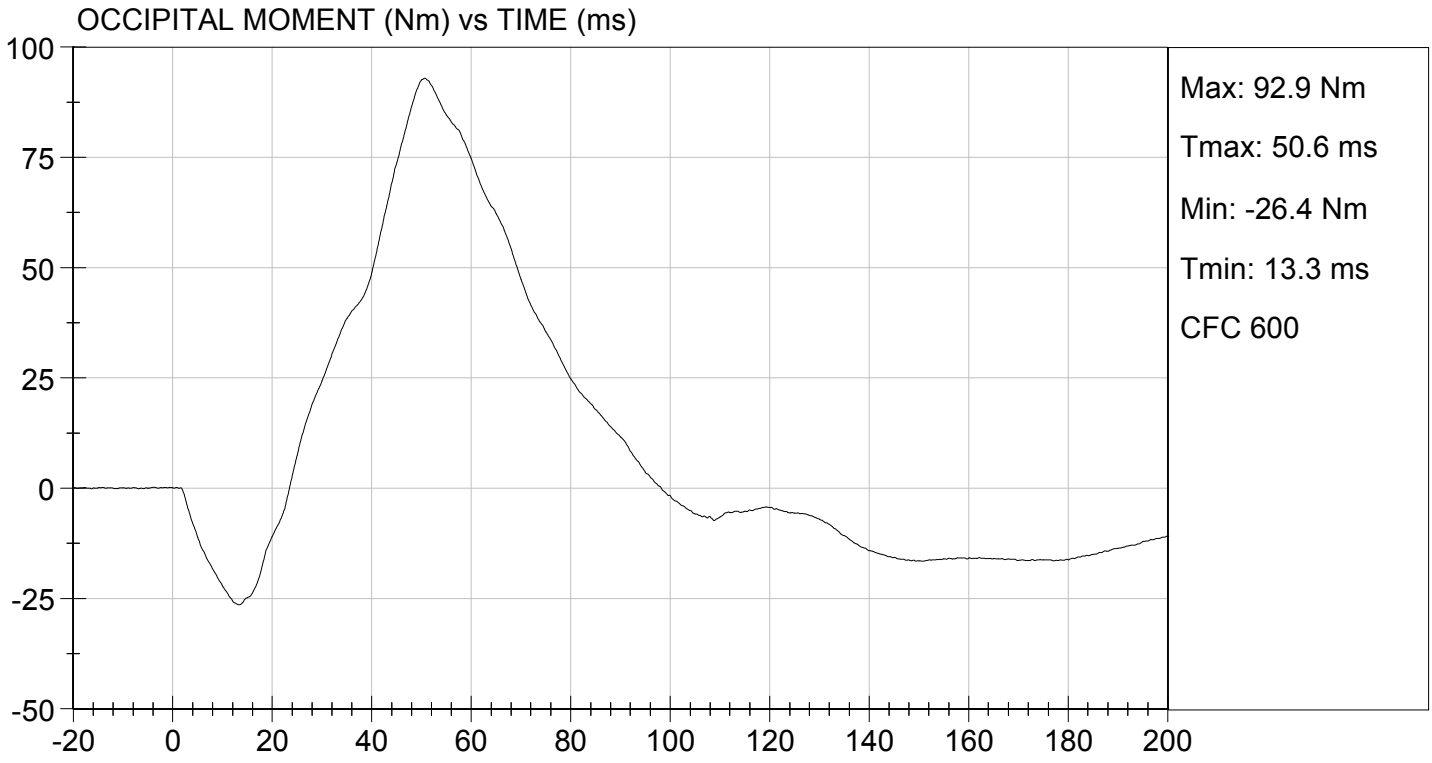


NECK ROTATION (DEG) vs TIME (ms)



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

TEST DATE: 11/08/2012
TEST #: D124272



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036 **Test I.D:** D124273

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	30	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.05	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	20.04	Pass
	20 ms	G's	14.00 to 19.00	16.59	Pass
	30 ms	G's	11.00 to 16.00	13.29	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	13.2	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	38.5	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	99.4	Pass
	Time	ms	72.0 to 82.0	77.6	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	160.2	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-67.9	Pass
	Time	ms	65.0 to 79.0	69.6	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	144.8	Pass
			Overall Test Results		Pass

Jessica Hall
Laboratory Technician

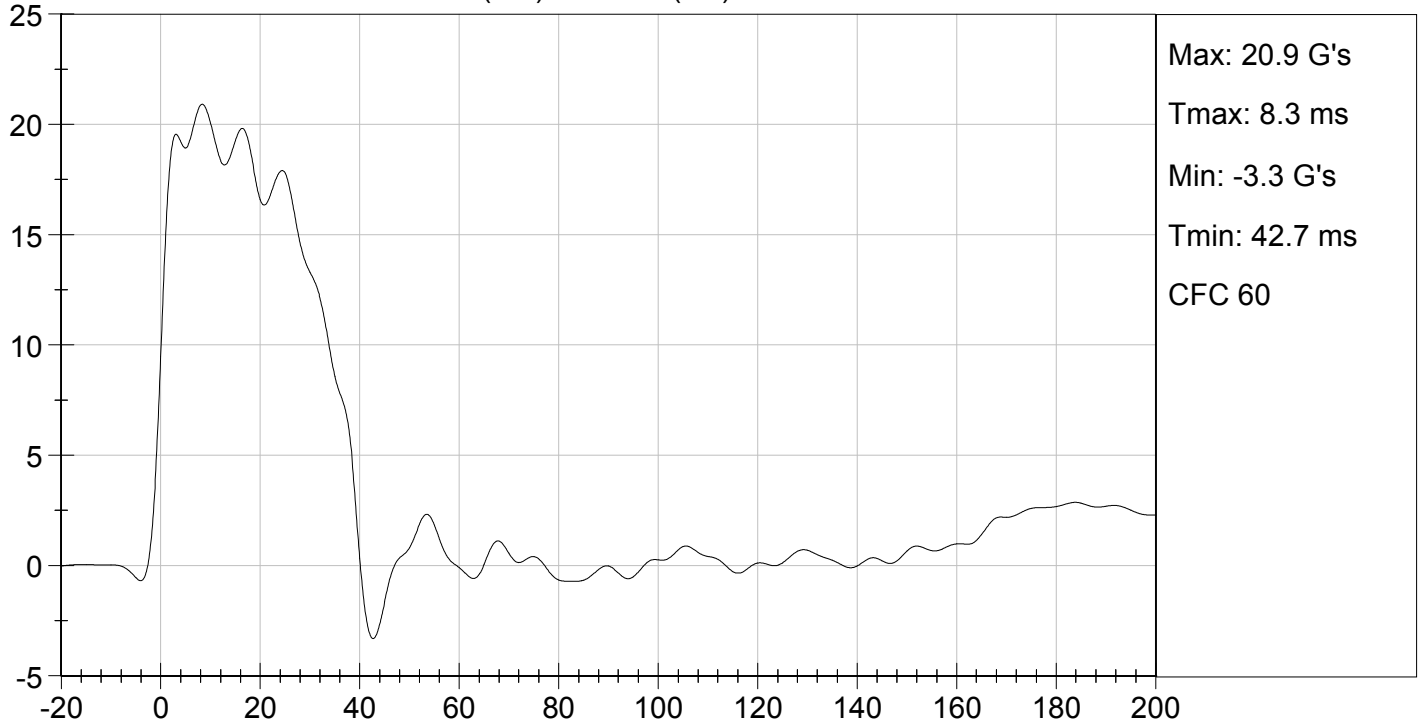
11/08/2012
Test Date

David Winkelbauer
Approved By

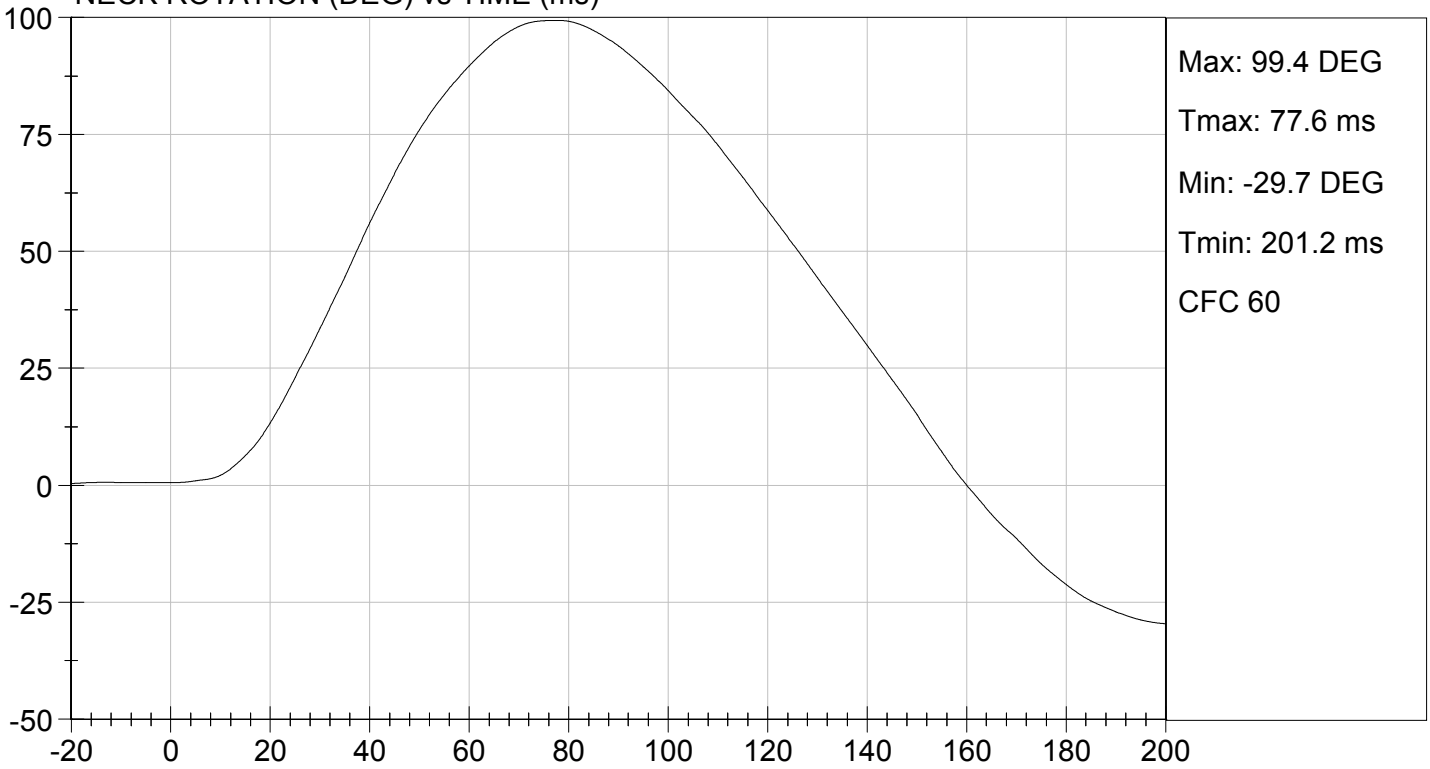
TEST DESC: NECK EXTENSION
VELOCITY: 19.84 ft/s, 6.05 m/s

TEST DATE: 11/08/2012
TEST #: D124273

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

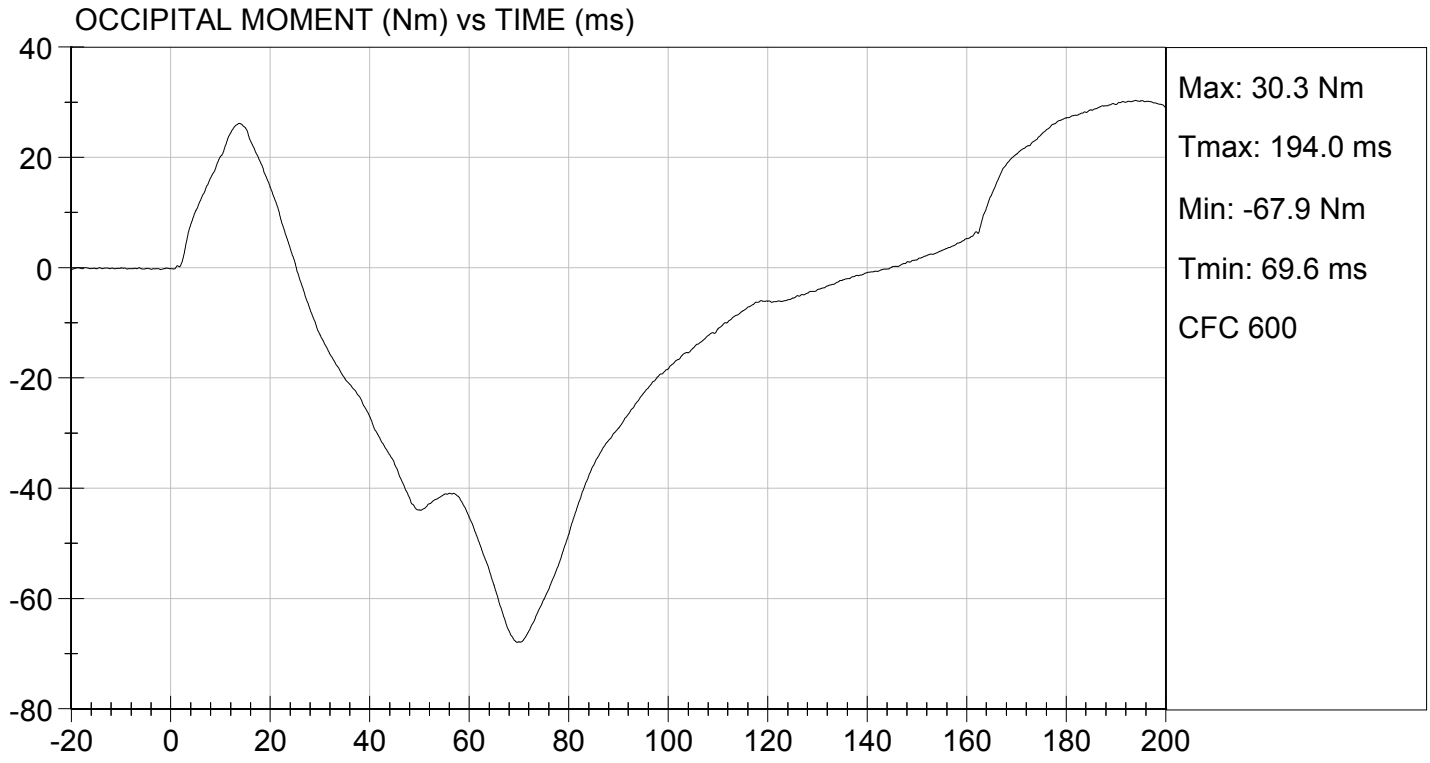


NECK ROTATION (DEG) vs TIME (ms)



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

TEST DATE: 11/08/2012
TEST #: D124273



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036 **Test I.D:** D124274

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	31	Pass
Probe Velocity	m/s	6.58 to 6.82	6.68	Pass
Peak Probe Force	N	5159 to 5893	5,341	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.92	Pass
Internal Hysteresis	%	69 to 85	71	Pass
		Overall Test Results		Pass

Jessica Hall
Laboratory Technician

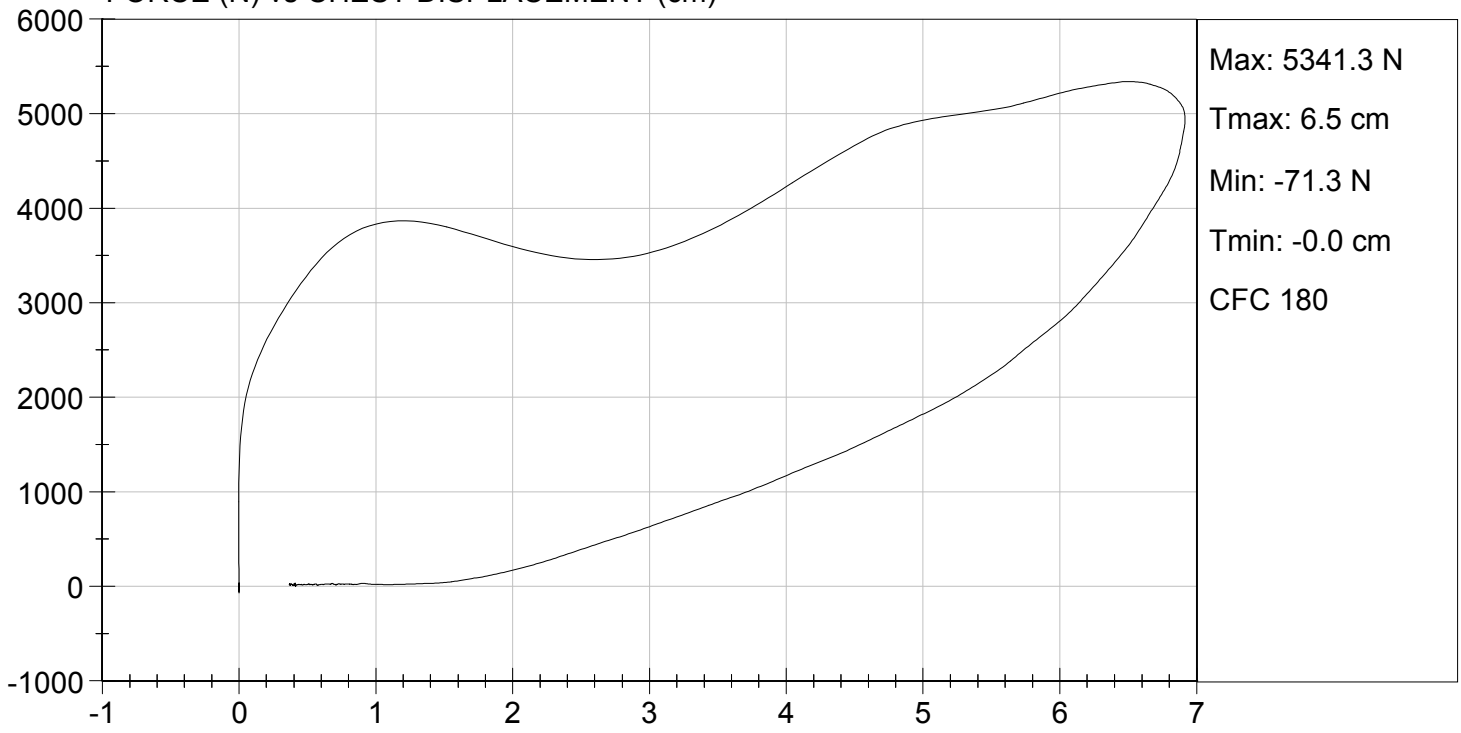
11/08/2012
Test Date

David Winkelbauer
Approved By

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

TEST DATE: 11/08/2012
TEST #: D124274

FORCE (N) vs CHEST DISPLACEMENT (cm)



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036 **Test I.D:** D124275

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	N	4715 to 5782	4,791	Pass
		Overall Test Results		Pass

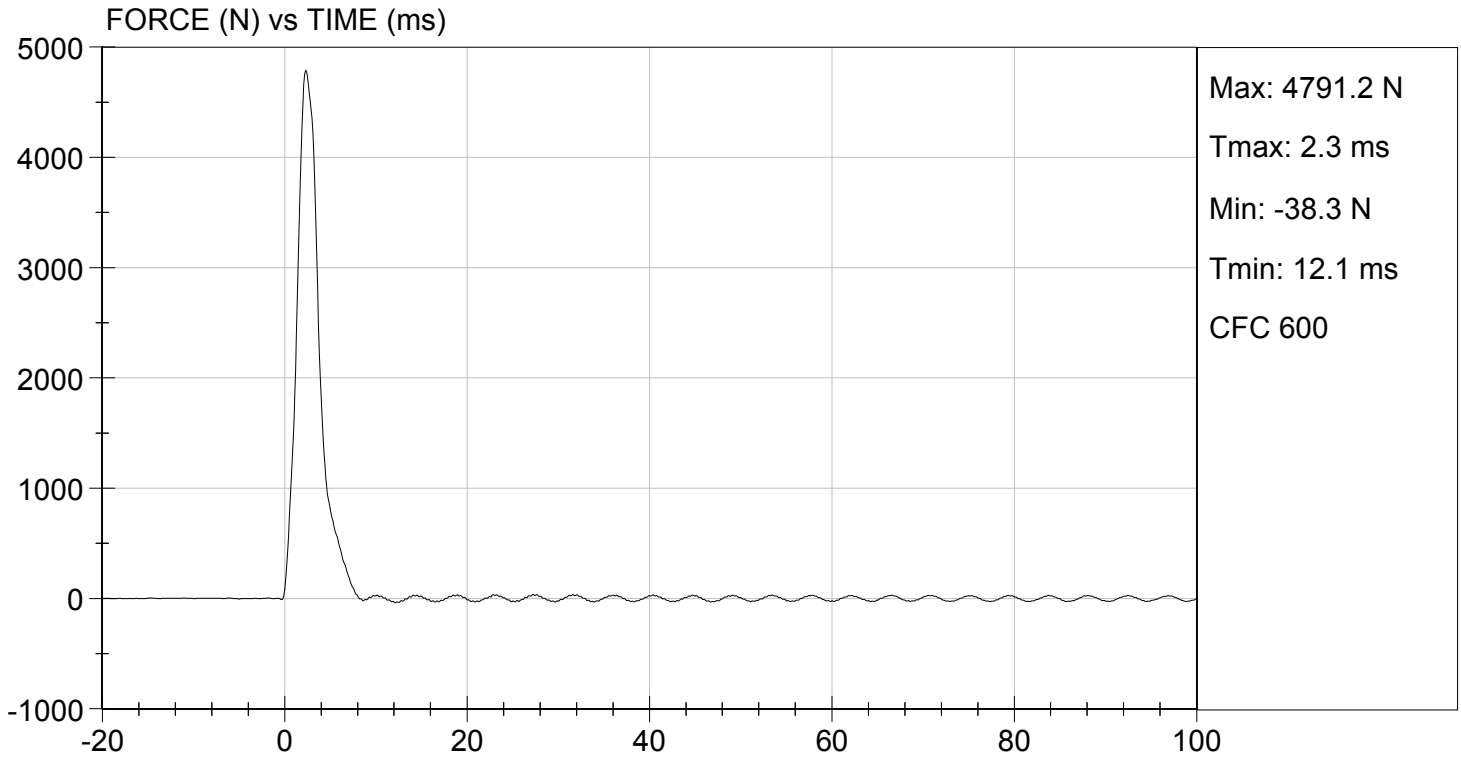
Jessica Gall
Laboratory Technician

11/08/2012
Test Date

David Winkelbauer
Approved By

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

TEST DATE: 11/08/2012
TEST #: D124275



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036 **Test I.D:** D124276

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	N	4715 to 5782	5,310	Pass
		Overall Test Results		Pass

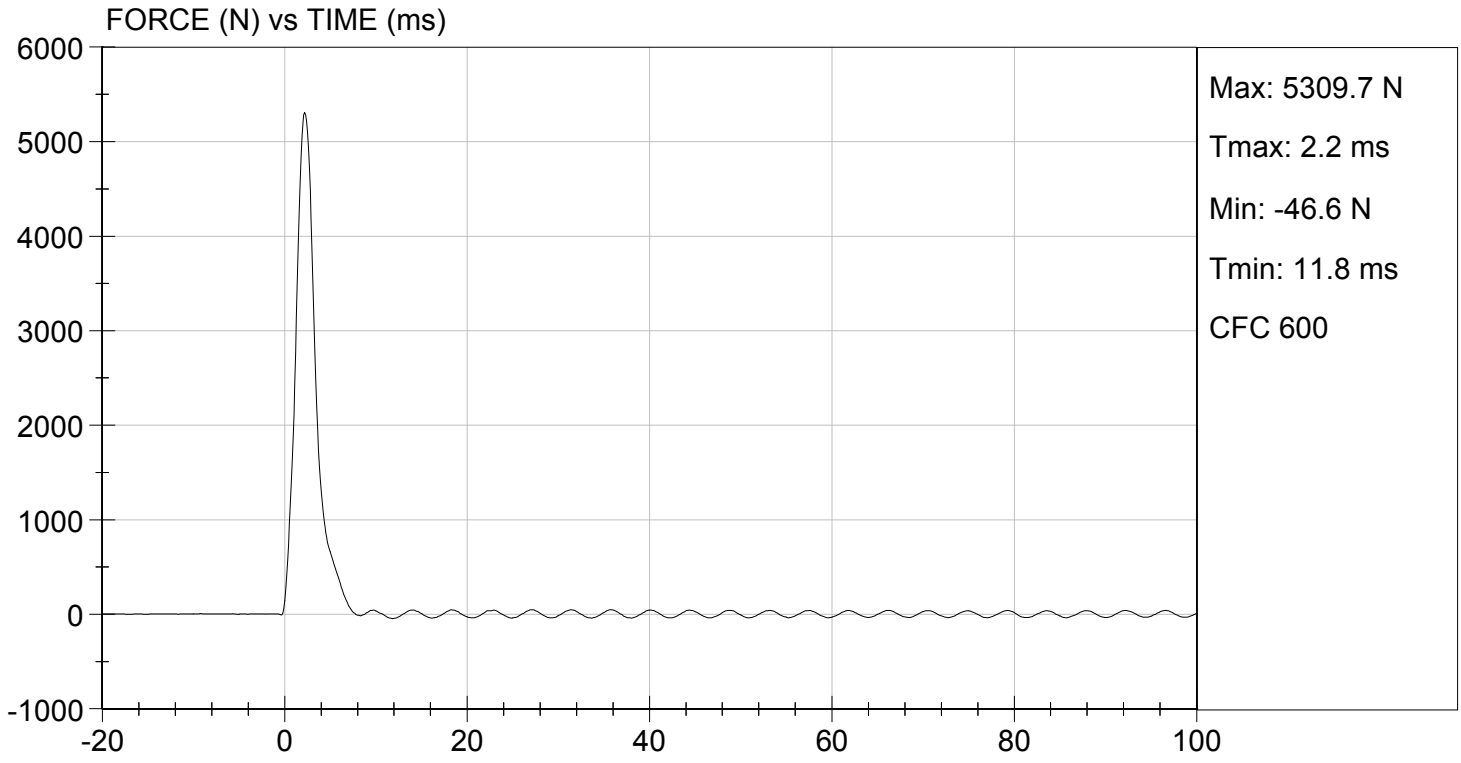
Jessica Gall
Laboratory Technician

11/08/2012
Test Date

David Winkelbauer
Approved By

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

TEST DATE: 11/08/2012
TEST #: D124276



MGA RESEARCH CORPORATION

HIP-FEMUR FLEXION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 036 **Test I.D:** D124270

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	32	32	Pass
Rotation Rate	deg/s	5.0 to 10.0	6.2	6.3	Pass
30 Degrees	Nm	94.9 Nm Max	84.4	74.5	Pass
150 ft-lbf / 203.4 Nm	Deg	40.0 to 50.0 Degree Max Rotation	44.6	45.8	Pass
		Overall Test Results			Pass

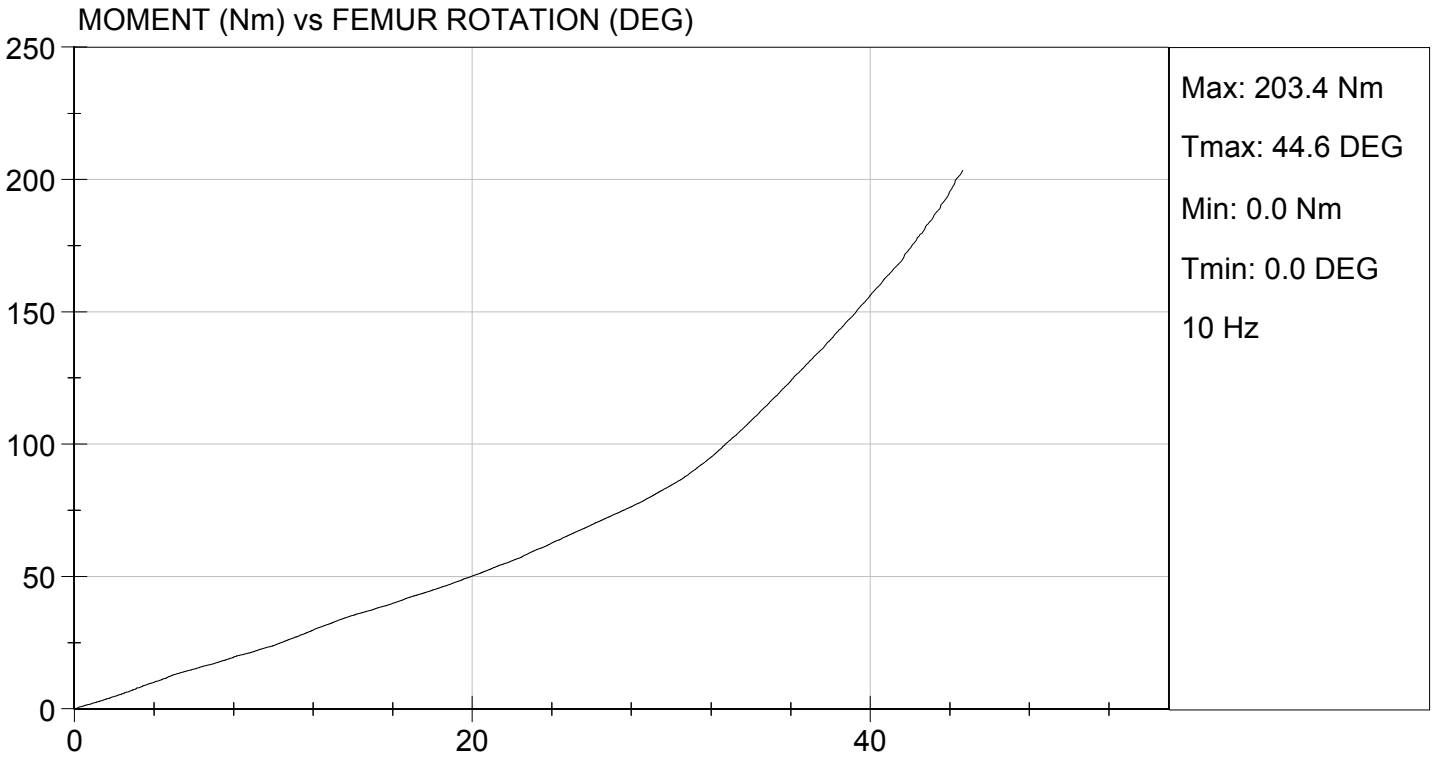
Jessica Hall
Laboratory Technician

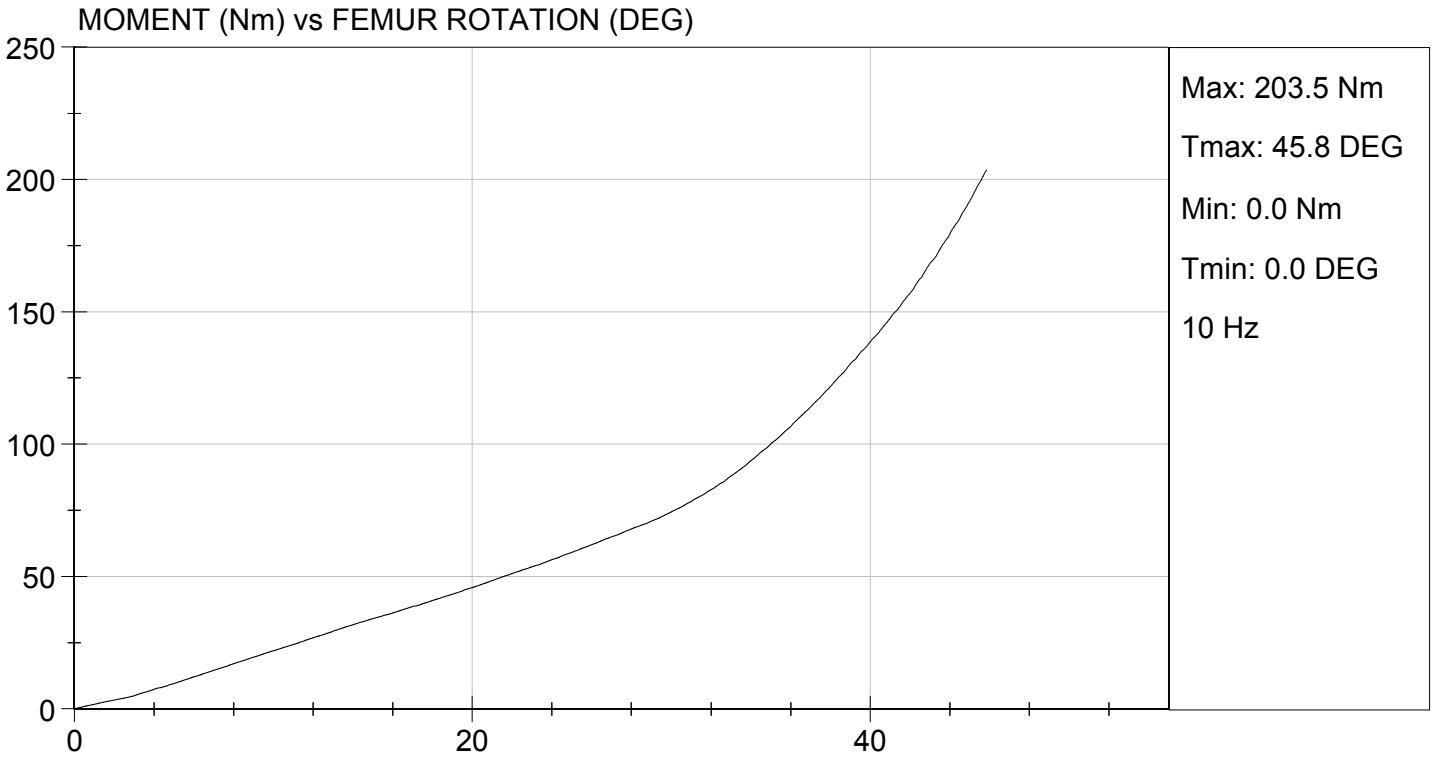
11/08/2012
Test Date

David Winkelbauer
Approved By

TEST DESC: RIGHT HIP FEMUR FLEXION

TEST DATE: 11/08/2012
TEST #: D124279




MOMENT (Nm) vs FEMUR ROTATION (DEG)
250
200
150
100
50
0
0
20
40
Max: 203.5 Nm
Tmax: 45.8 DEG
Min: 0.0 Nm
Tmin: 0.0 DEG
10 Hz

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
eP	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:** D124221

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Peak Resultant Acceleration	G's	250 to 300	258	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	10.0	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
		Overall Test Results		Pass

Jessica Hall
Laboratory Technician

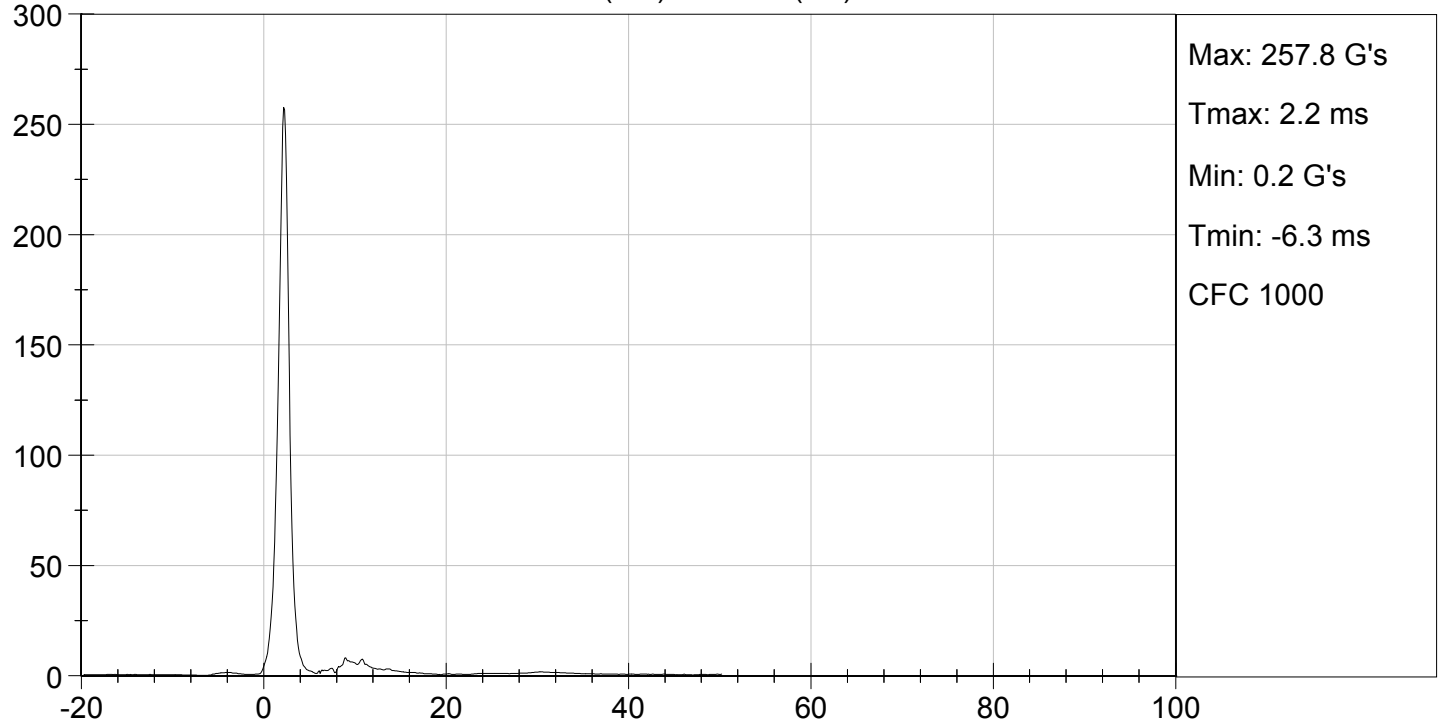
11/06/2012
Test Date

David Winkelbauer
Approved By

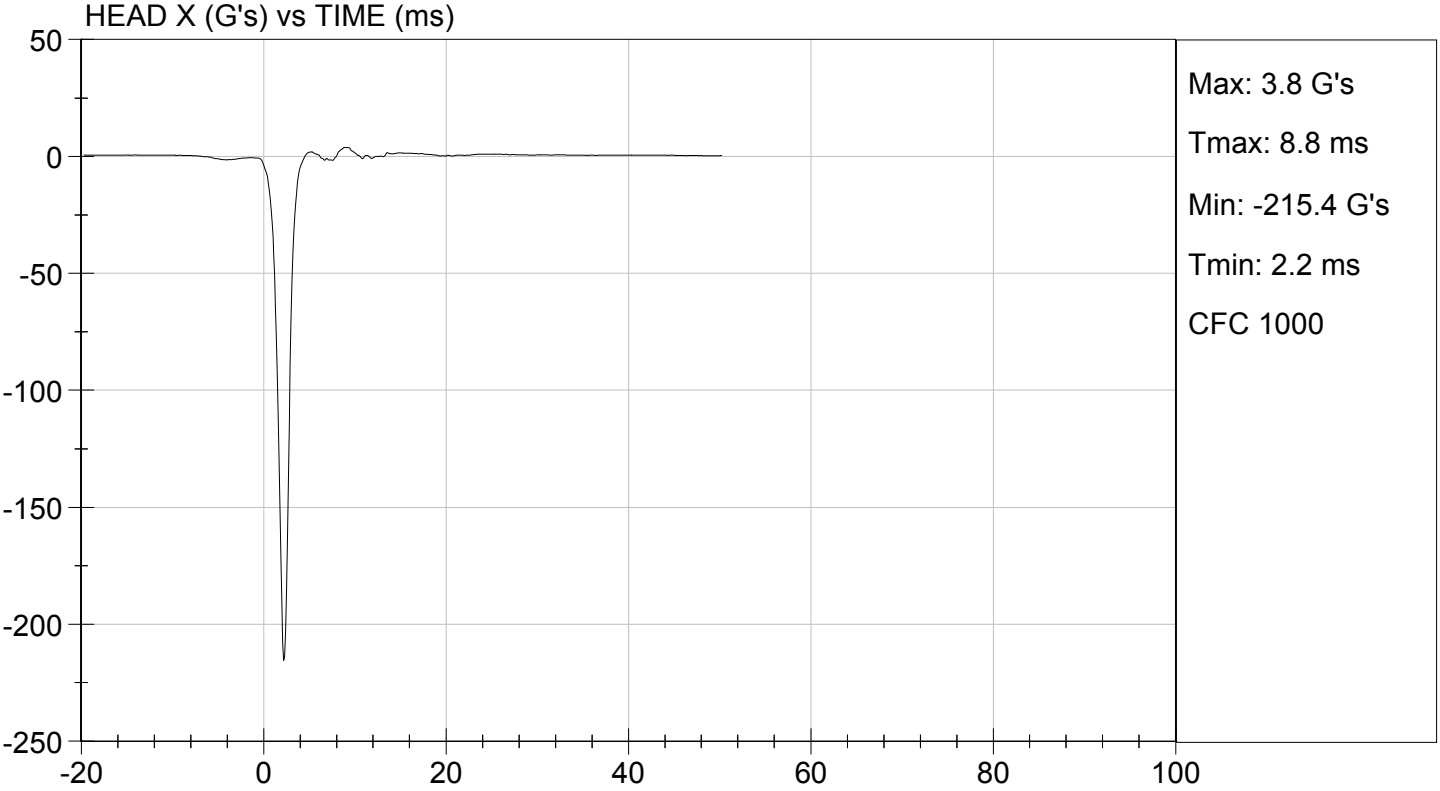
TEST DESC: HEAD DROP

TEST DATE: 11/06/2012
TEST #: D124221

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



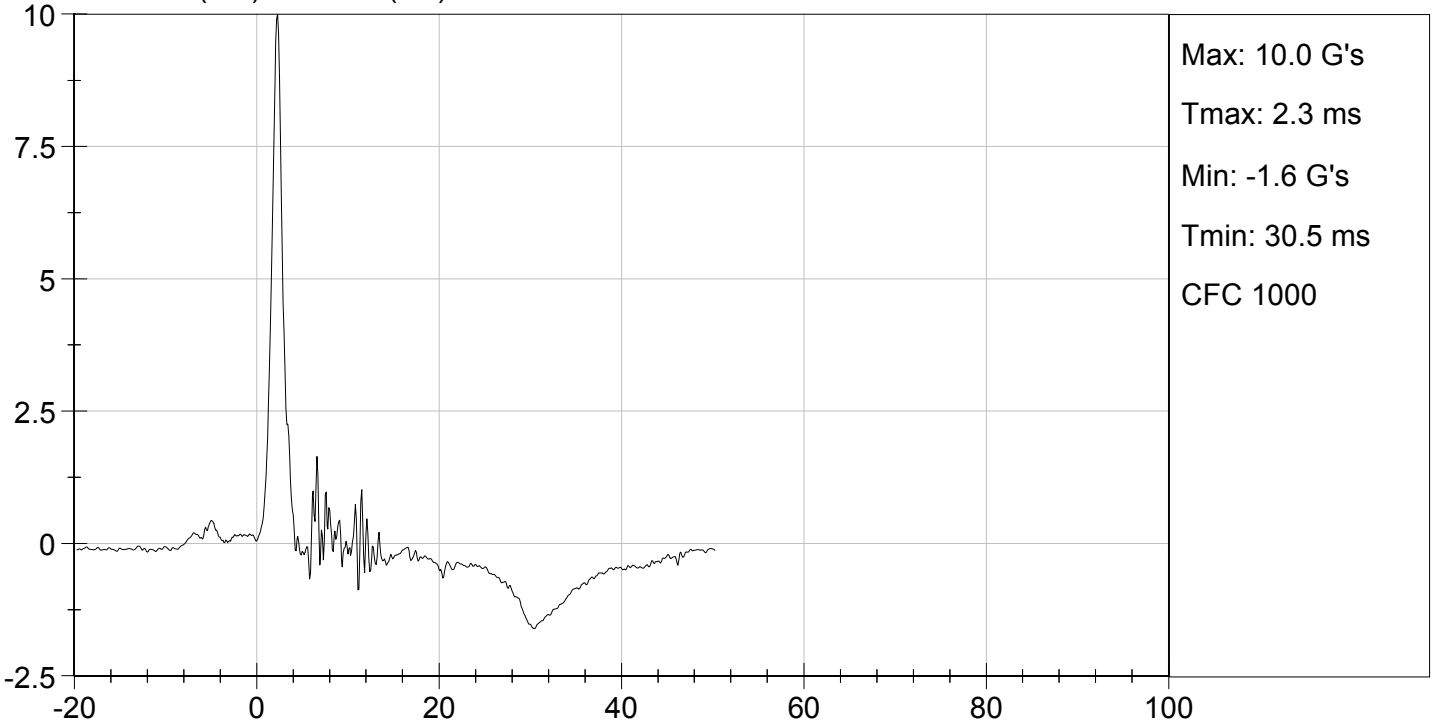
HEAD X (G's) vs TIME (ms)



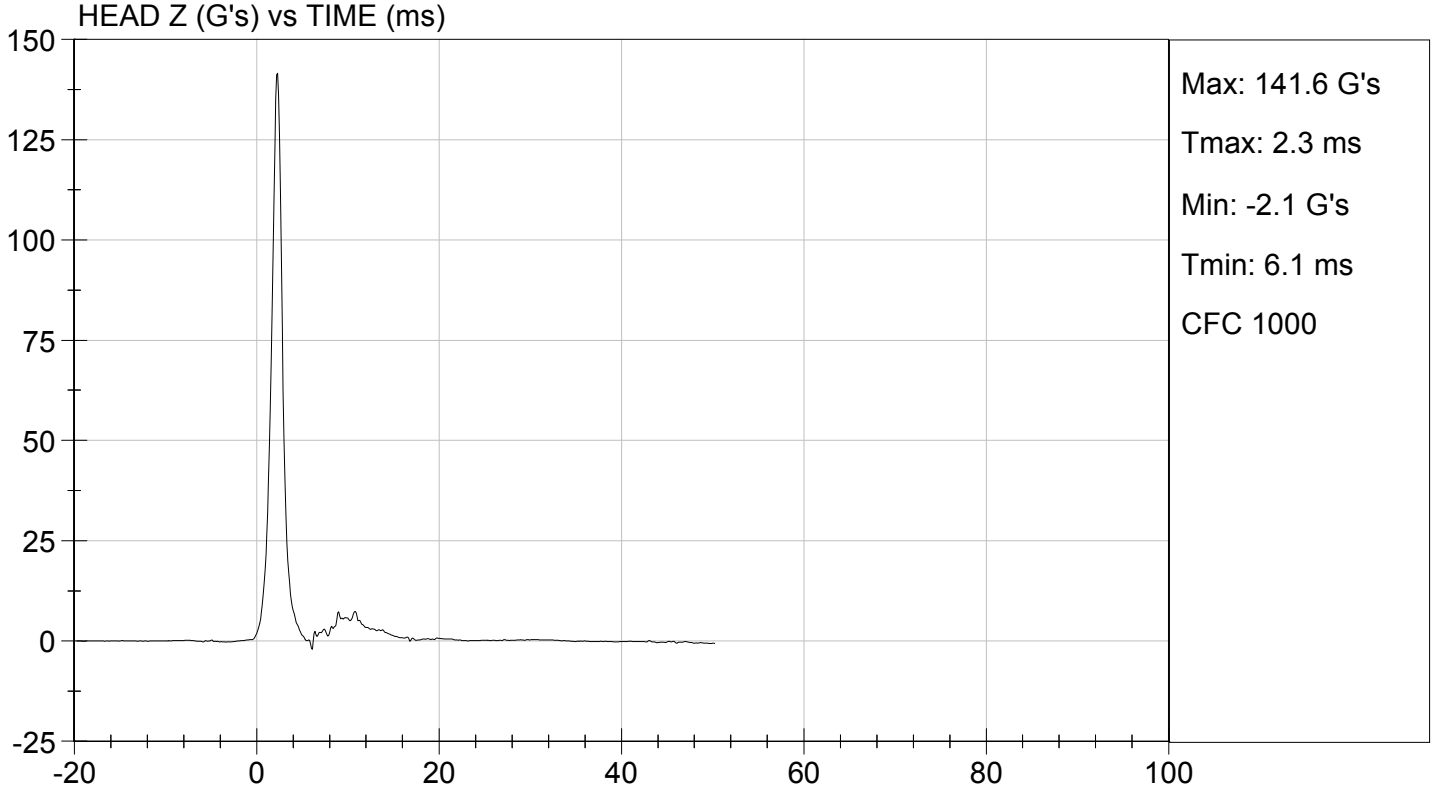
TEST DESC: HEAD DROP

TEST DATE: 11/06/2012
TEST #: D124221

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:** D124222

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.0	Pass
Laboratory Relative Humidity		%	10 to 70	27	Pass
Pendulum Speed		m/s	6.89 to 7.13	7.06	Pass
Pendulum Velocity	10 ms	m/s	2.1 to 2.5	2.5	Pass
	20 ms	m/s	4.0 to 5.0	4.6	Pass
	30 ms	m/s	5.8 to 7.0	6.4	Pass
D Plane Rotation	Max	deg	77 to 91	83	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	69 to 83	69.4	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	87	Pass
			Overall Results		Pass

Jessica Hall
Laboratory Technician

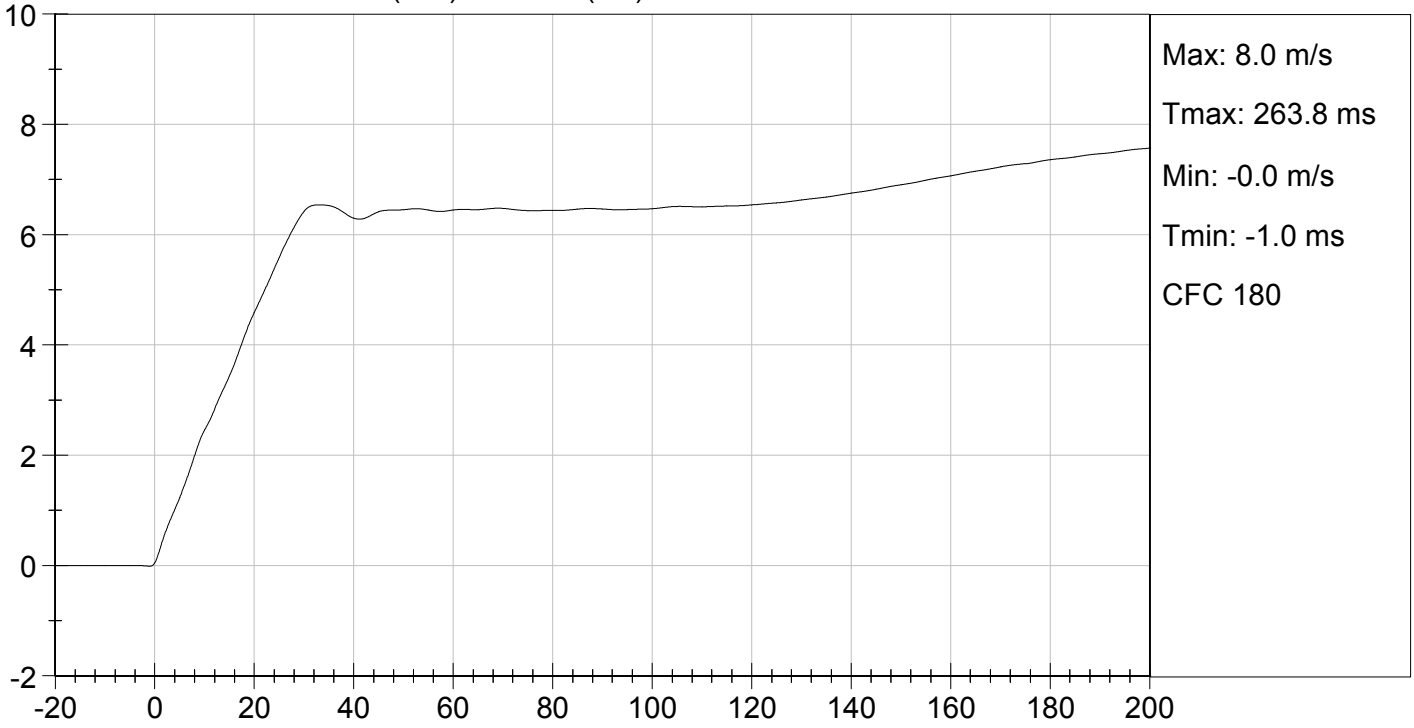
11/05/2012
Test Date

David Winkelbauer
Approved By

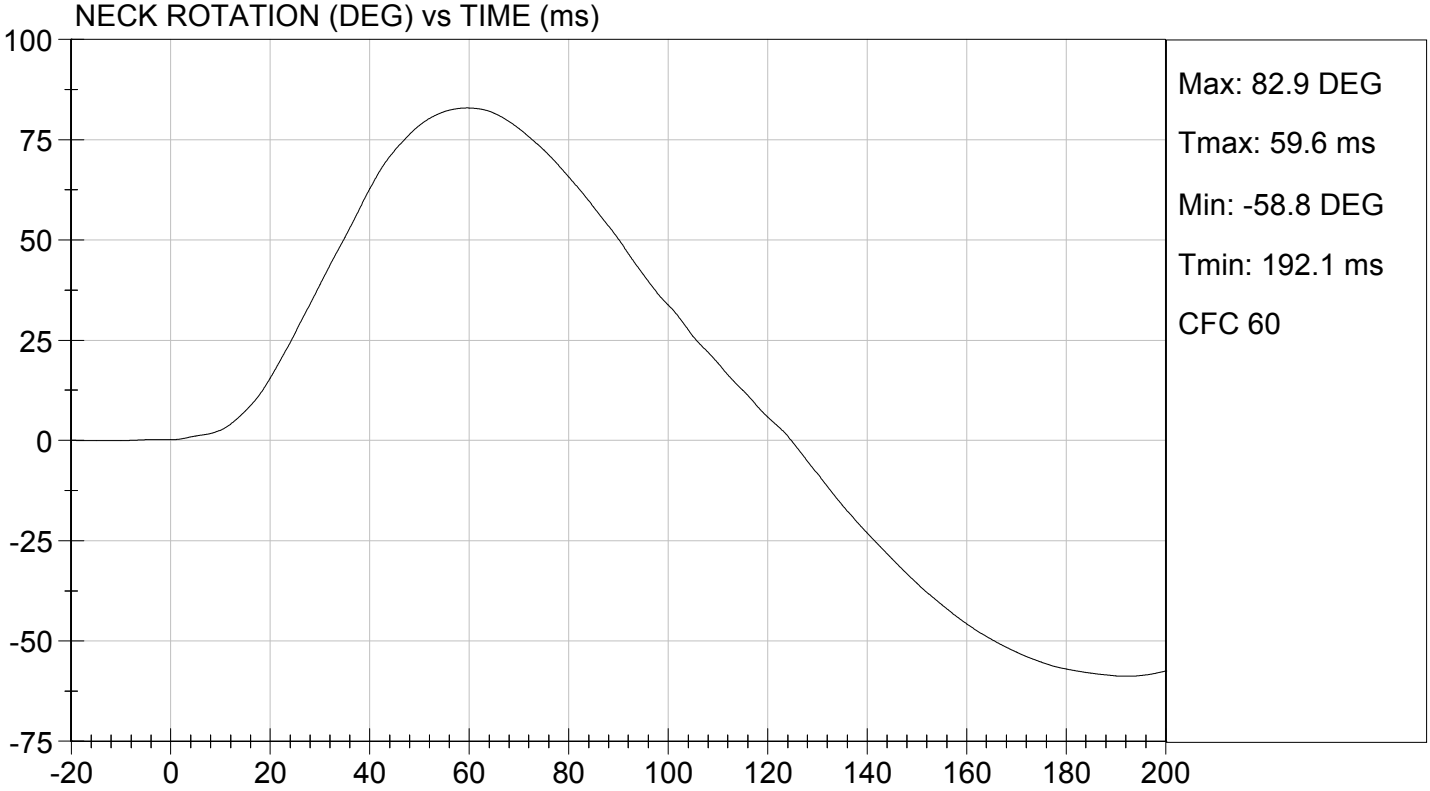
TEST DESC: NECK FLEXION
VELOCITY: 23.15 ft/s, 7.06 m/s

TEST DATE: 11/05/2012
TEST #: D124222

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



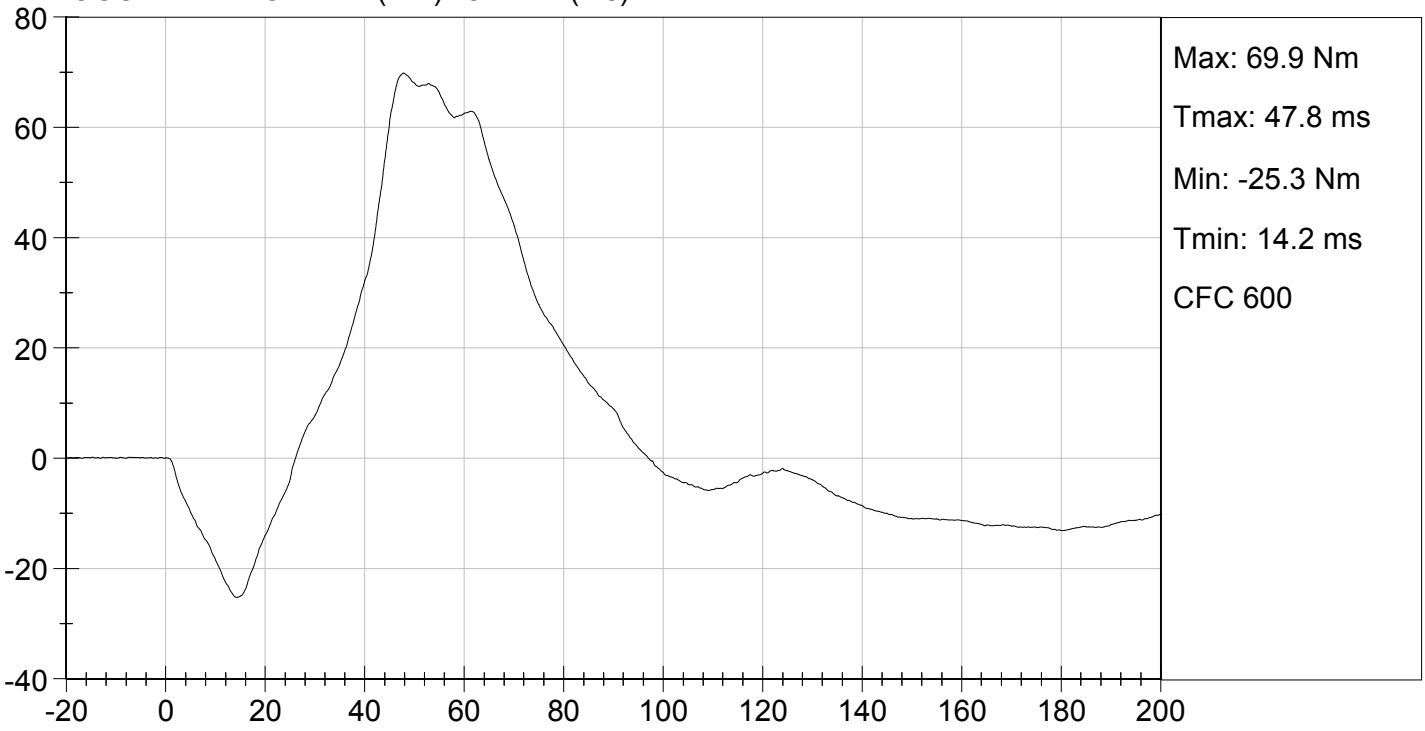
NECK ROTATION (DEG) vs TIME (ms)



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

TEST DATE: 11/05/2012
TEST #: D124222

OCCIPITAL MOMENT (Nm) vs TIME (ms)



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D124223

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.0	Pass
Laboratory Relative Humidity		%	10 to 70	27	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.05	Pass
Pendulum Velocity	10 ms	m/s	1.5 to 1.9	1.8	Pass
	20 ms	m/s	3.1 to 3.9	3.6	Pass
	30 ms	m/s	4.6 to 5.6	5.1	Pass
D Plane Rotation	Max	deg	99 to 114	102	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	-65 to -53	-57.0	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	98	Pass
			Overall Results		Pass

Jessica Hall
Laboratory Technician

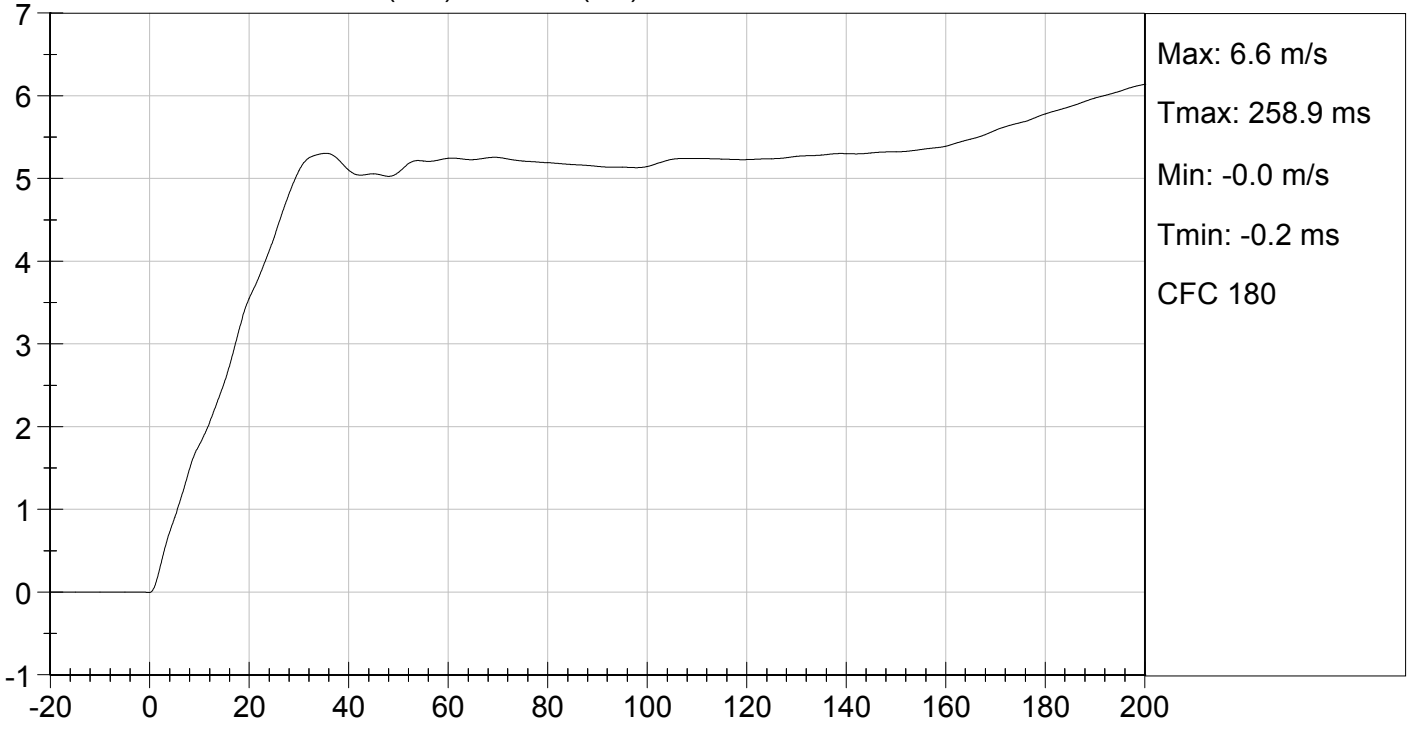
11/05/2012
Test Date

David Winkelbauer
Approved By

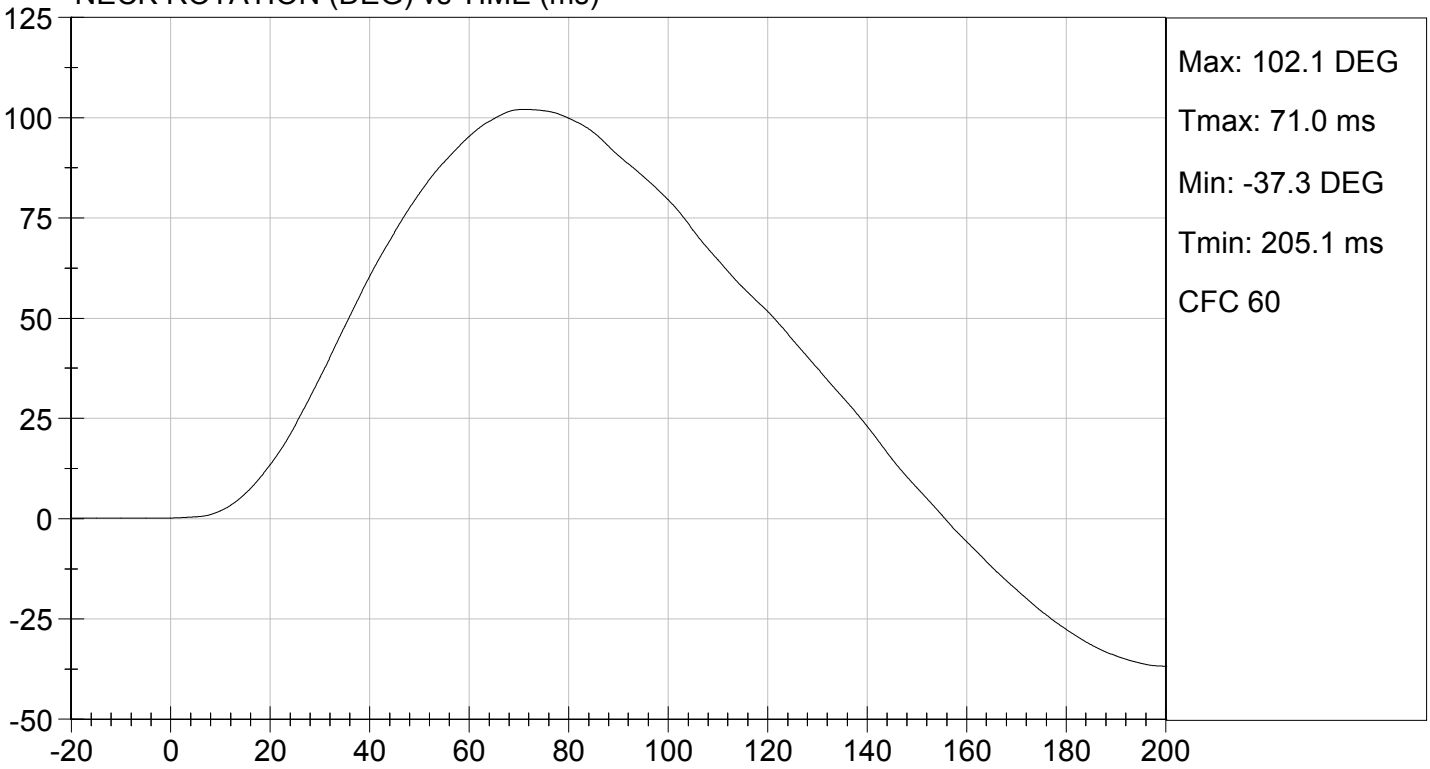
TEST DESC: NECK EXTENSION
VELOCITY: 19.84 ft/s, 6.05 m/s

TEST DATE: 11/05/2012
TEST #: D124223

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

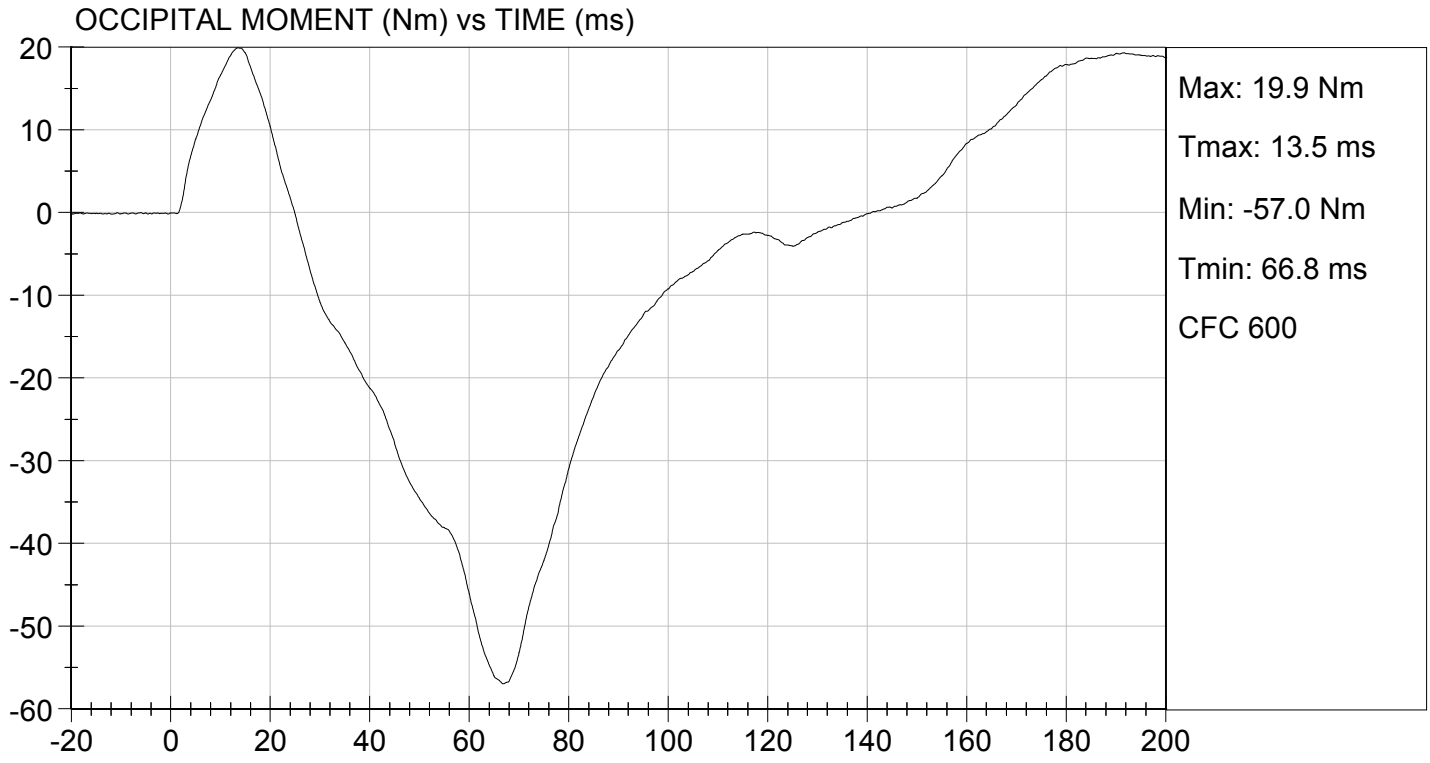


NECK ROTATION (DEG) vs TIME (ms)



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

TEST DATE: 11/05/2012
TEST #: D124223



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D124224

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.0	Pass
Relative Humidity	%	10 to 70	27	Pass
Probe Speed	m/s	6.59 to 6.83	6.77	Pass
Peak Deflection	mm	50 to 58	53	Pass
Peak Resistive Force w/in Deflection Corridor	N	3900 to 4400	4220	Pass
Internal Hysteresis	%	69 to 85	71	Pass
Peak Force 18 mm - 50 mm	N	<= 4600	4153	Pass
		Overall Test Results		Pass

Jessica Hall
Laboratory Technician

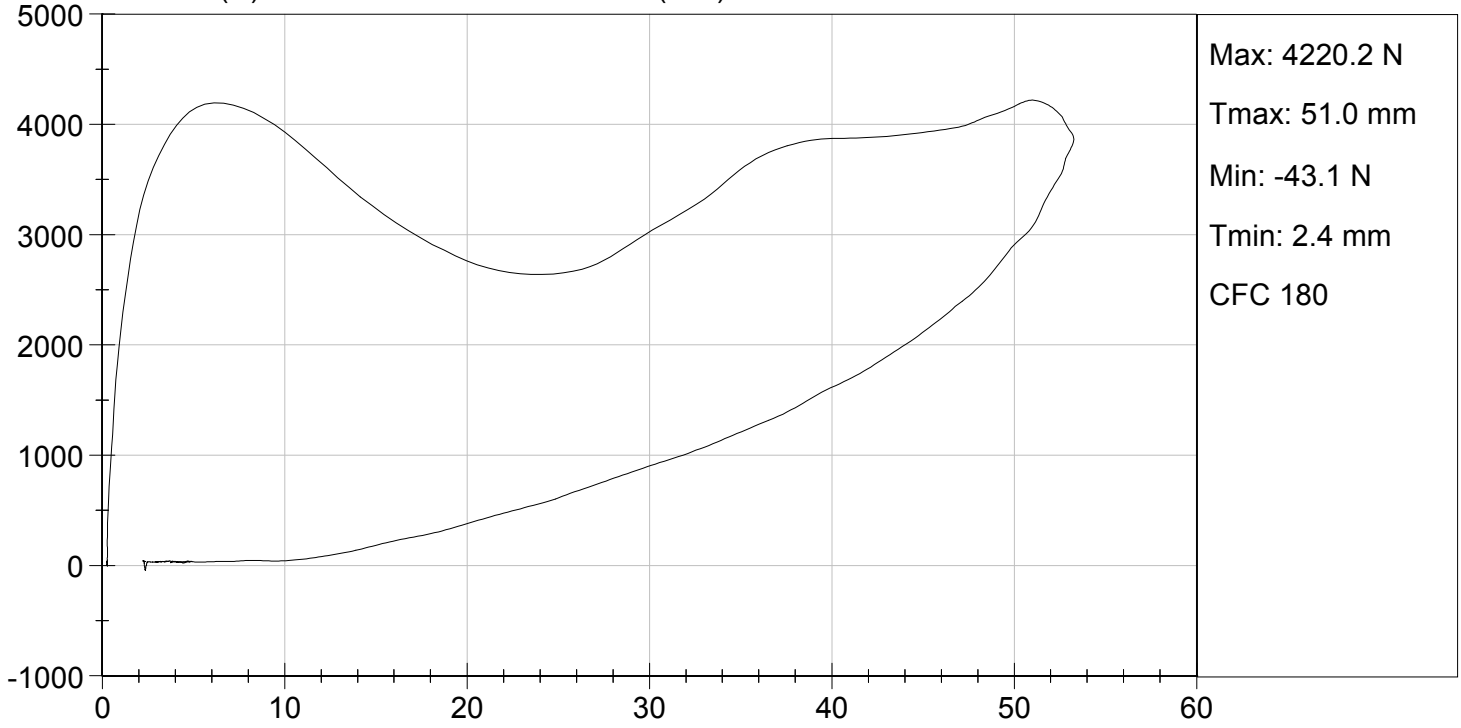
11/06/2012
Test Date

David Winkelbauer
Approved By

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

TEST DATE: 11/06/2012
TEST #: D124224

FORCE (N) vs CHEST DISPLACEMENT (mm)



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D124225

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	26	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	N	3450 to 4060	3807	Pass
		Overall Test Results		Pass

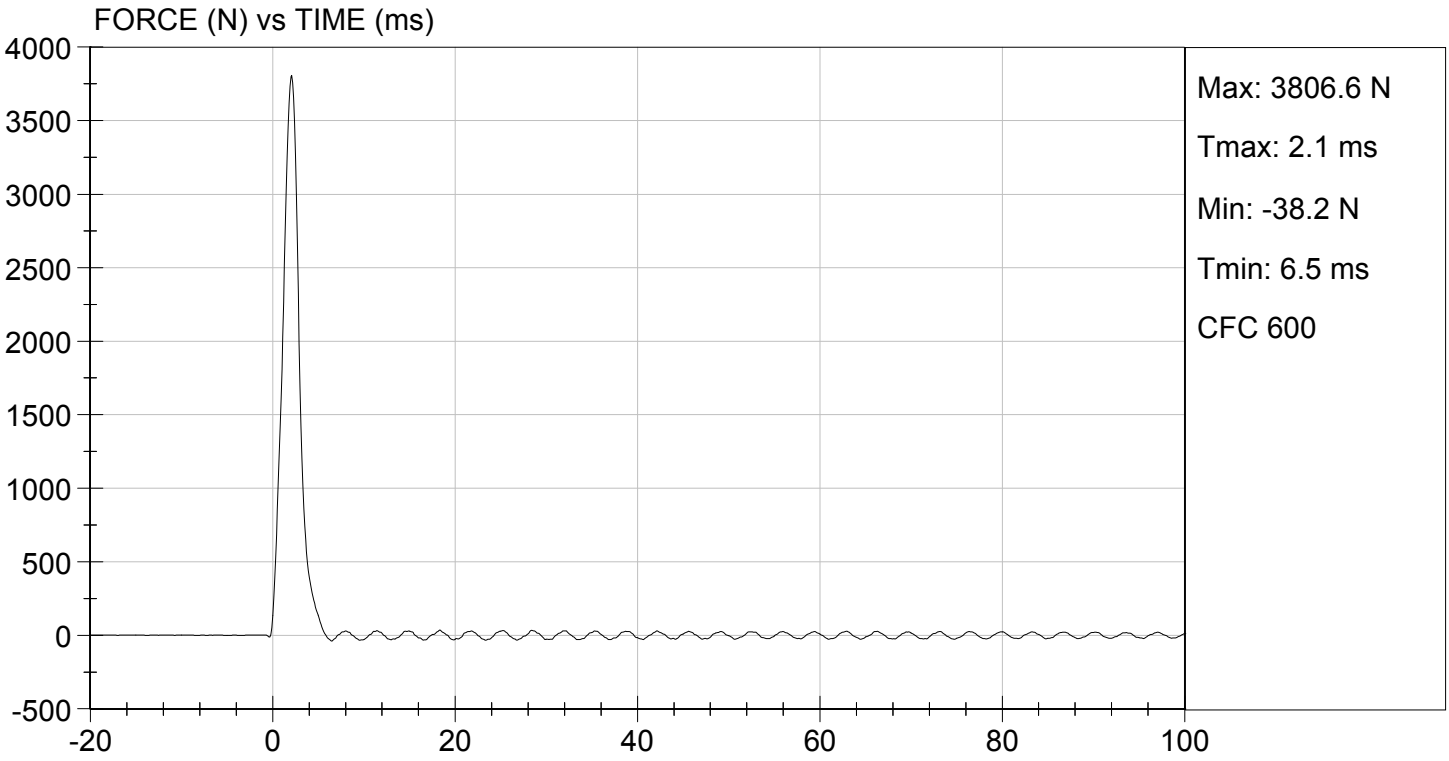
Jessica Hall
Laboratory Technician

11/06/2012
Test Date

David Winkelbauer
Approved By

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

TEST DATE: 11/06/2012
TEST #: D124225



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D124226

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	26	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	N	3450 to 4060	3974	Pass
		Overall Test Results		Pass

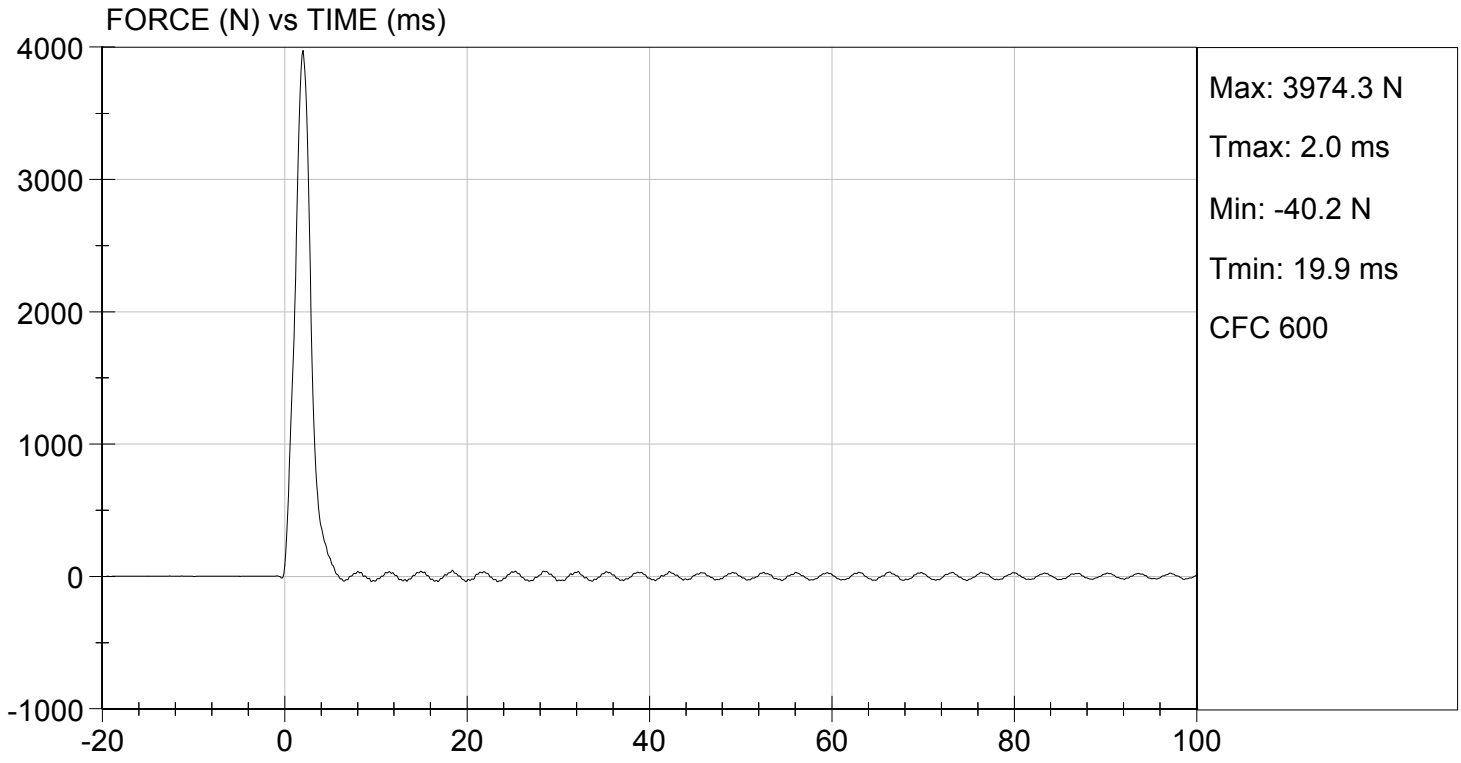
Jessica Hall
Laboratory Technician

11/06/2012
Test Date

David Winkelbauer
Approved By

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

TEST DATE: 11/06/2012
TEST #: D124226



MGA RESEARCH CORPORATION

TORSO FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D124227

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Initial Angle	deg	0 to 20	16	Pass
Return Angle	deg	+/- 8	5	Pass
Force at 45 deg	N	320 to 390	360	Pass
Upper Torso Deflection Rate	deg/s	0.5 to 1.5	0.9	Pass
		Overall Result		Pass

Jessica Hall
Laboratory Technician

11/05/2012
Test Date

David Winkelbauer
Approved By

MGA RESEARCH CORPORATION

HEAD DROP TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test ID:** D124281

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Peak Resultant Acceleration	G's	250 to 300	256	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-2.0	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
		Overall Test Results		Pass

Jessica Hall
Laboratory Technician

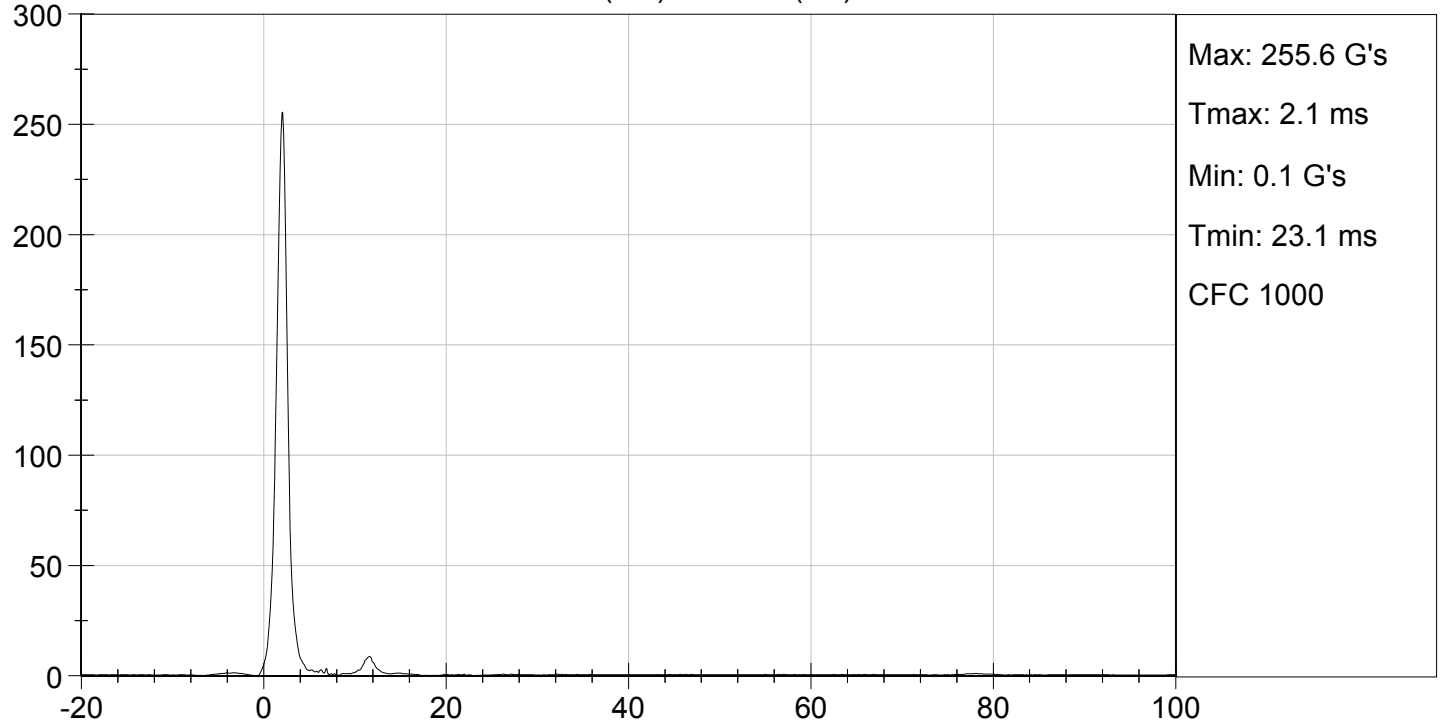
11/08/2012
Test Date

David Winkelbauer
Approved By

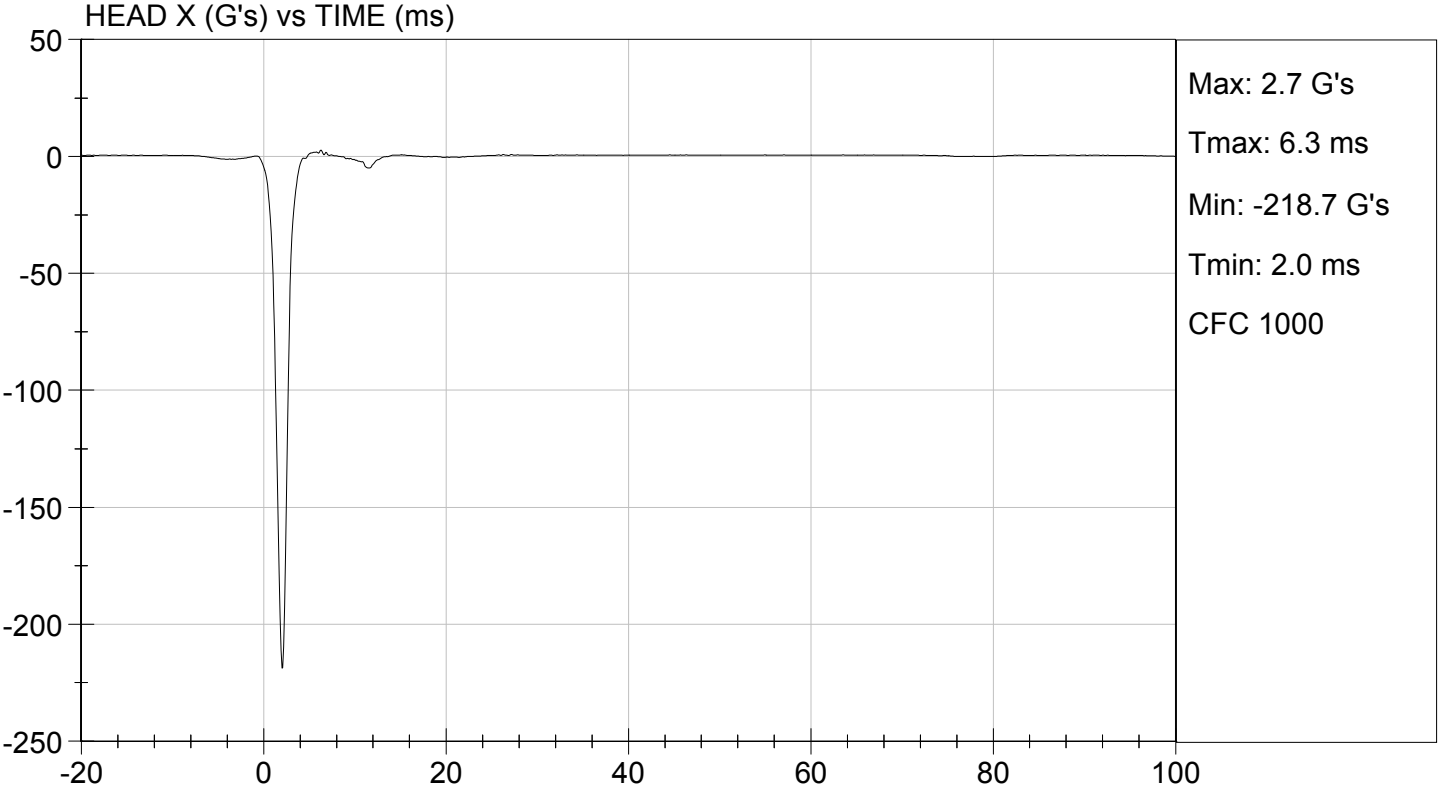
TEST DESC: HEAD DROP

TEST DATE: 11/08/2012
TEST #: D124281

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

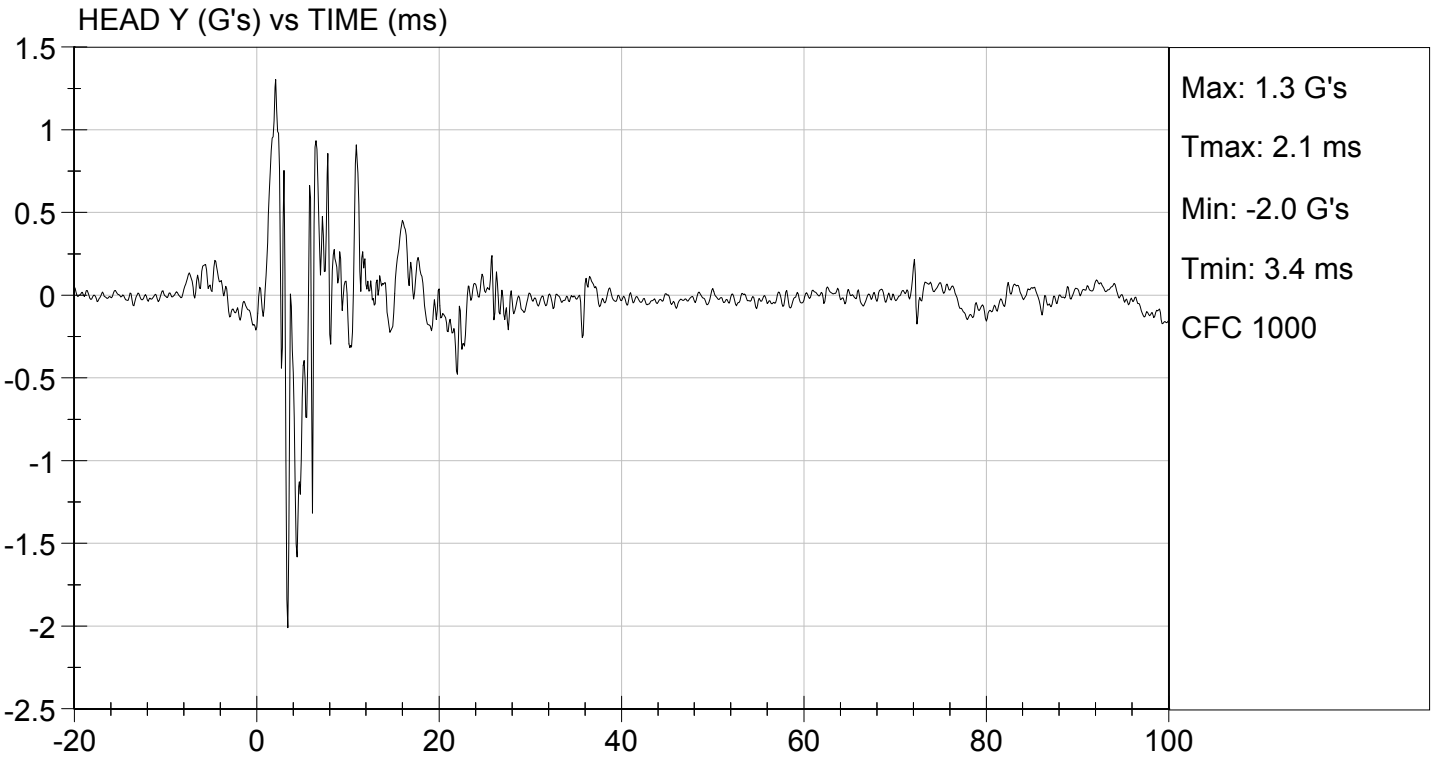


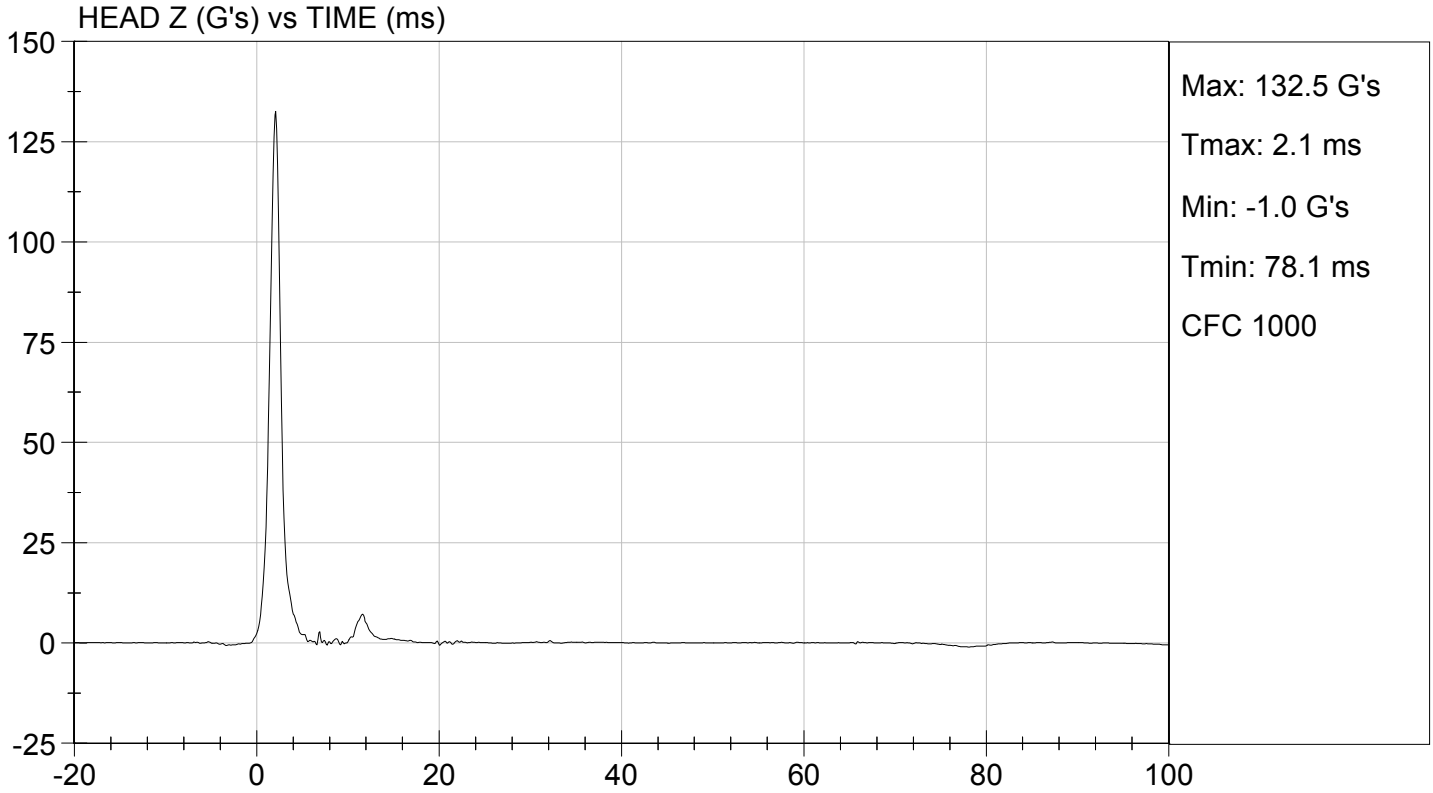
HEAD X (G's) vs TIME (ms)



TEST DESC: HEAD DROP

TEST DATE: 11/08/2012
TEST #: D124281





MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D124282

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	30	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	4.4	Pass
	30 ms	m/s	5.8 to 7.0	6.1	Pass
D Plane Rotation	Max	deg	77 to 91	84	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	69 to 83	71.9	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	86	Pass
			Overall Results		Pass

Jessica Gall
Laboratory Technician

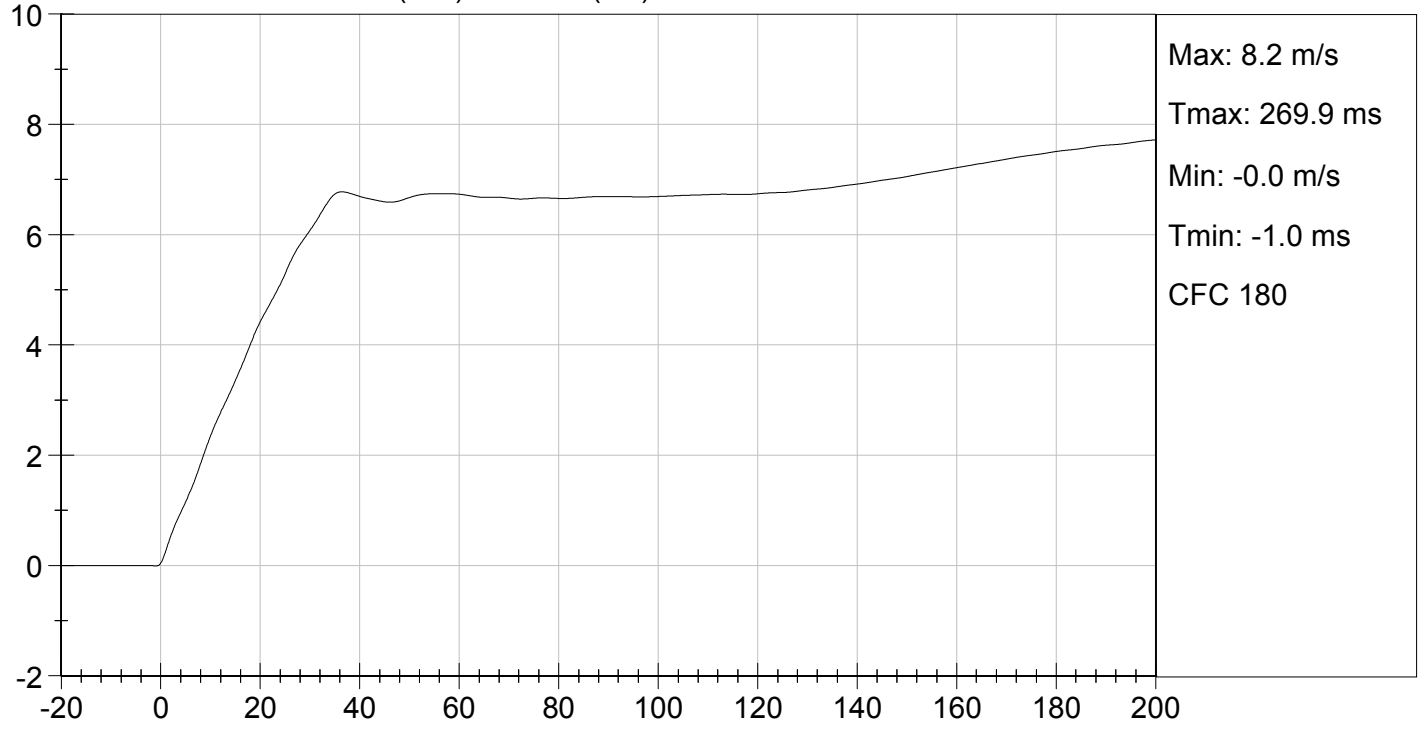
11/08/2012
Test Date

David Winkelbauer
Approved By

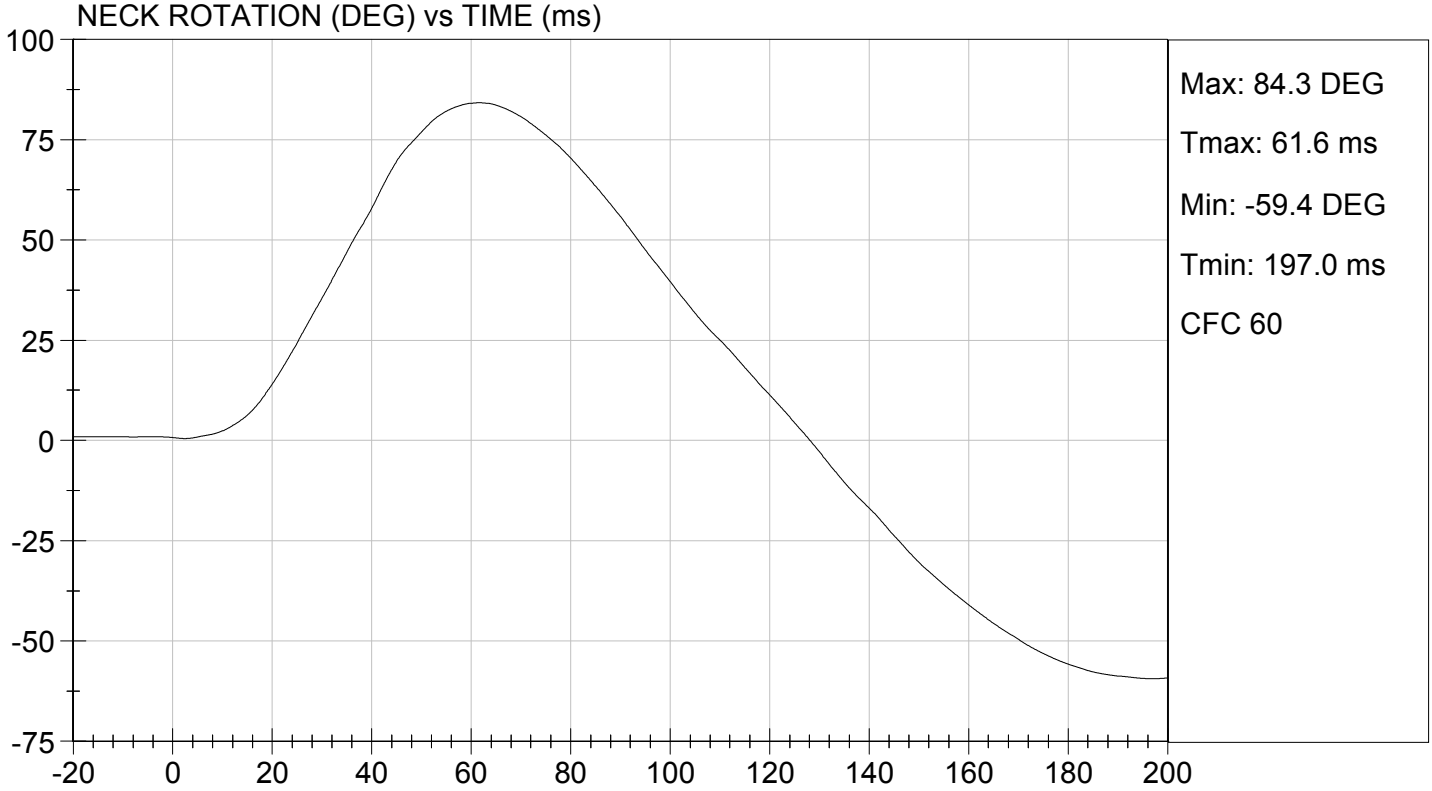
TEST DESC: NECK FLEXION
VELOCITY: 23.15 ft/s, 7.06 m/s

TEST DATE: 11/08/2012
TEST #: D124282

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

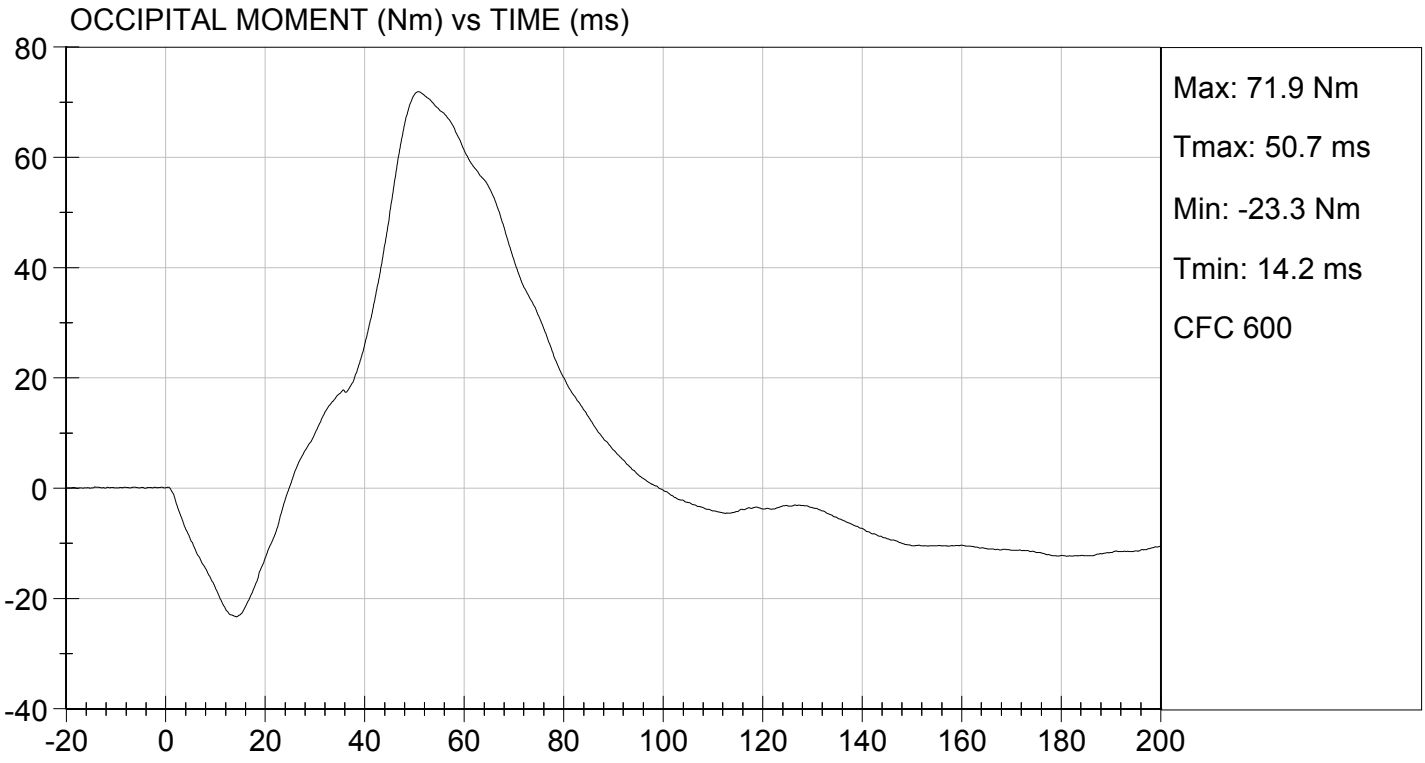


NECK ROTATION (DEG) vs TIME (ms)



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

TEST DATE: 11/08/2012
TEST #: D124282



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D124283

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	30	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.13	Pass
Pendulum Velocity	10 ms	m/s	1.5 to 1.9	1.8	Pass
	20 ms	m/s	3.1 to 3.9	3.7	Pass
	30 ms	m/s	4.6 to 5.6	5.4	Pass
D Plane Rotation	Max	deg	99 to 114	106	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	-65 to -53	-60.4	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	94	Pass
			Overall Results		Pass

Jessica Hall
Laboratory Technician

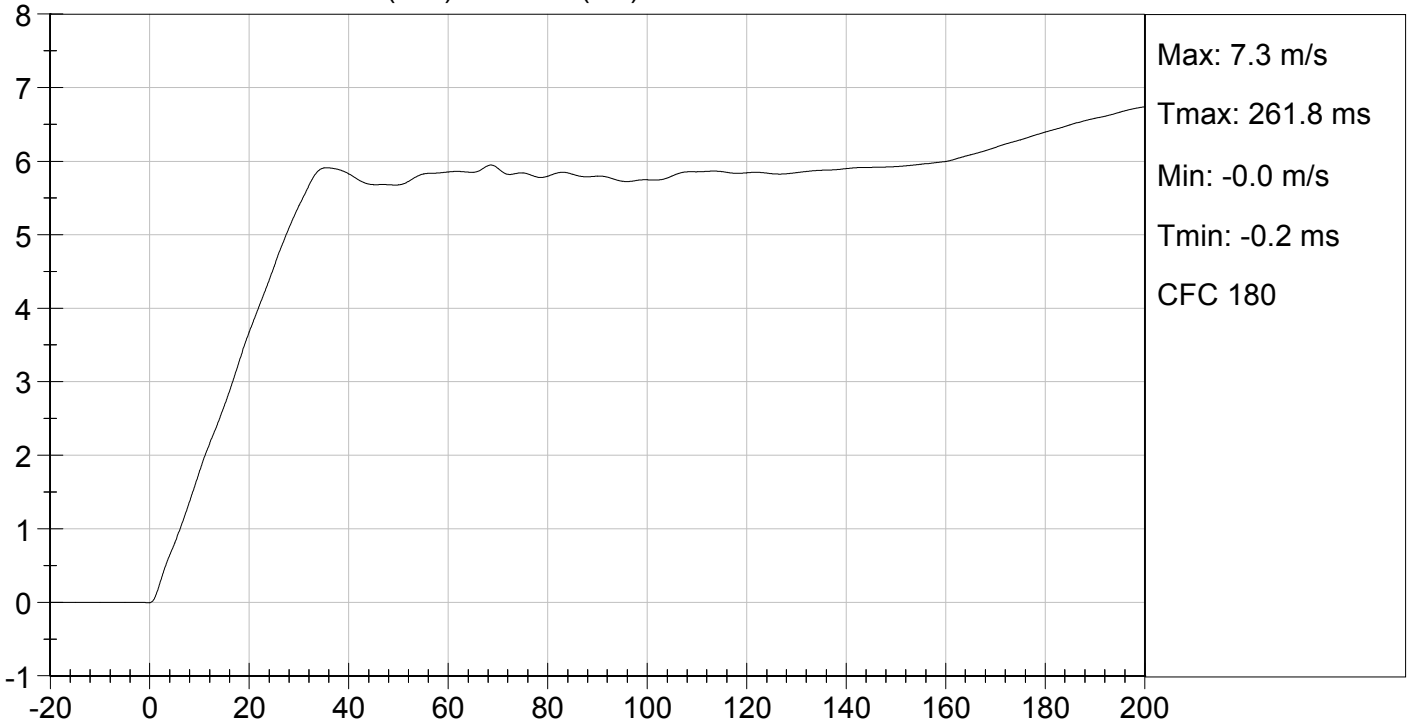
11/08/2012
Test Date

David Winkelbauer
Approved By

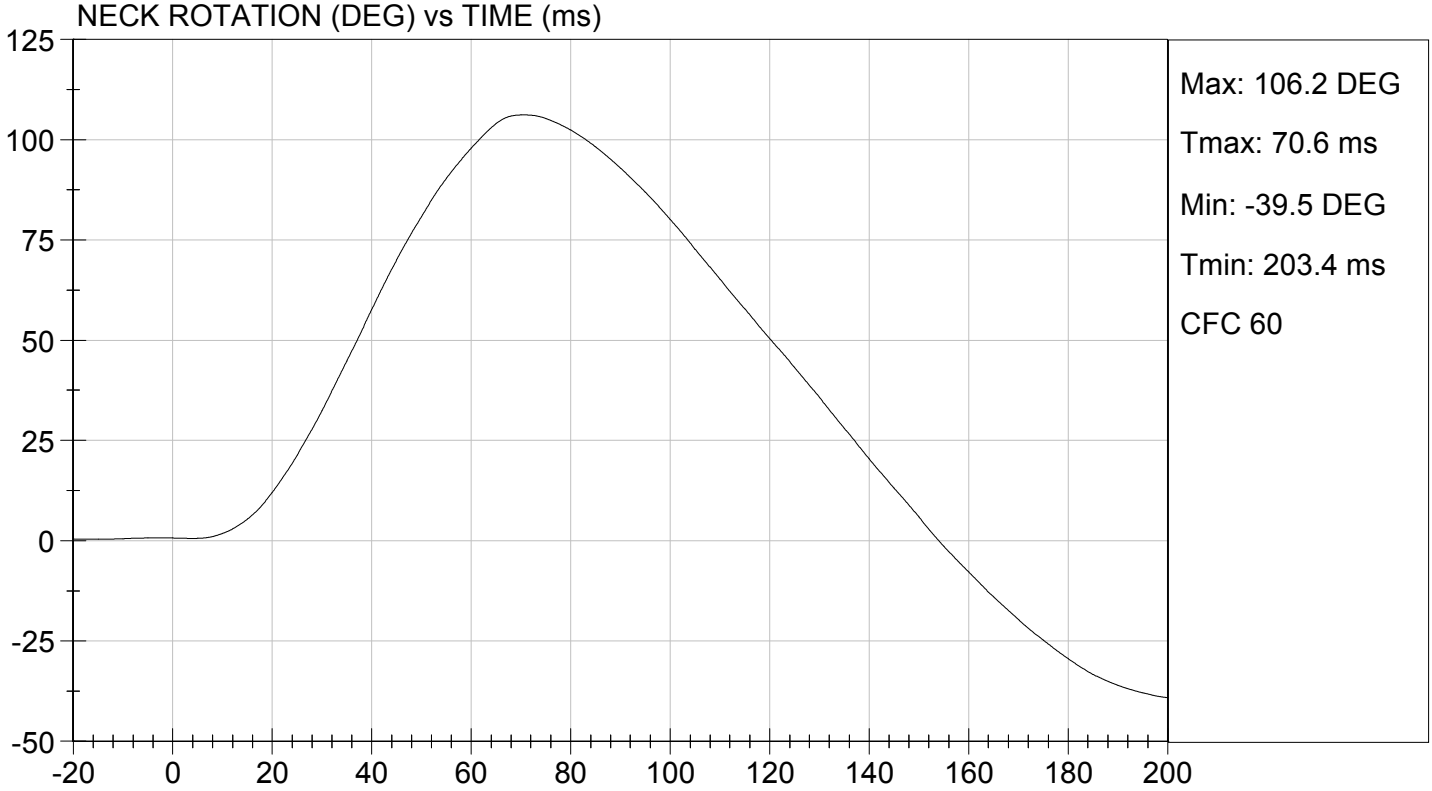
TEST DESC: NECK EXTENSION
VELOCITY: 20.10 ft/s, 6.13 m/s

TEST DATE: 11/08/2012
TEST #: D124283

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

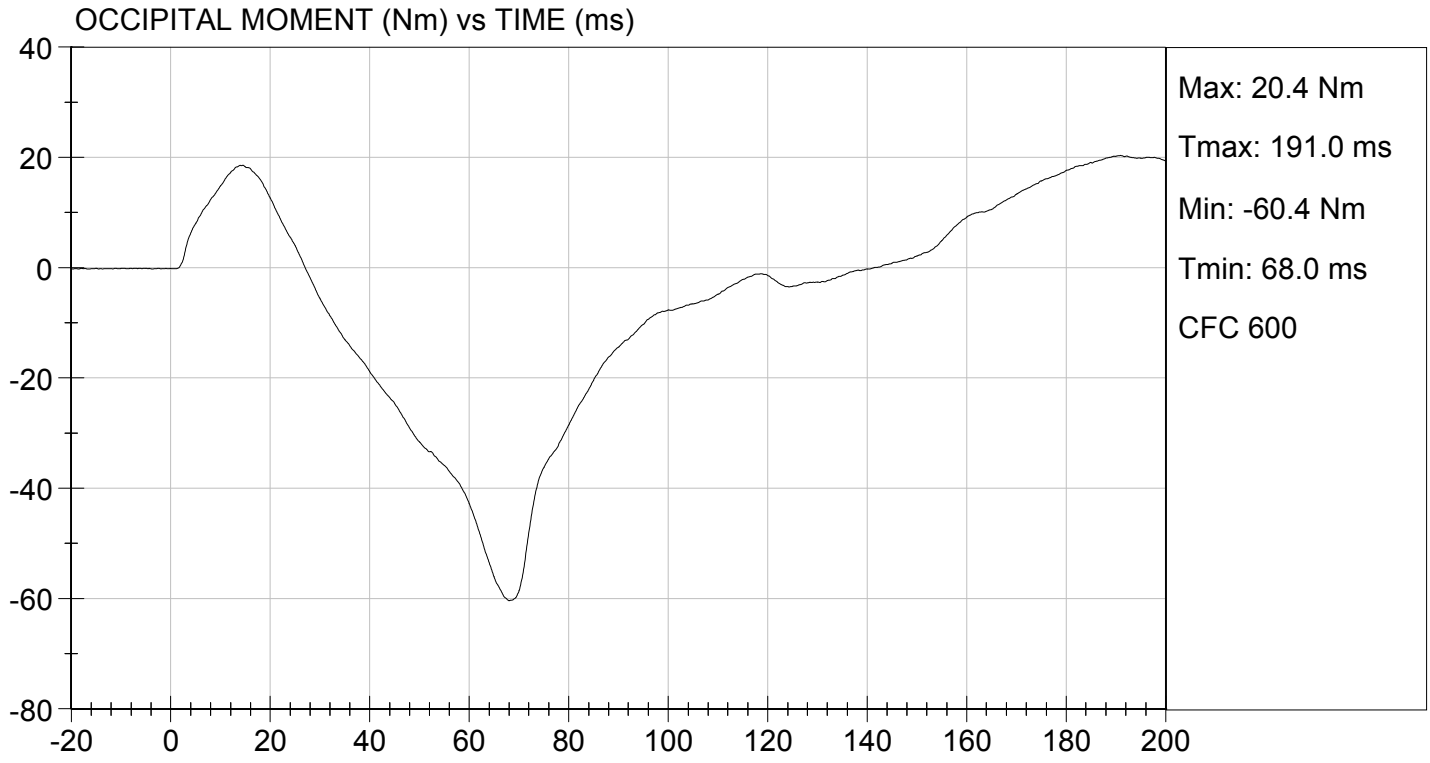


NECK ROTATION (DEG) vs TIME (ms)



TEST DESC: NECK EXTENSION
VELOCITY: 20.10 ft/s, 6.13 m/s

TEST DATE: 11/08/2012
TEST #: D124283



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D124284

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.6	Pass
Relative Humidity	%	10 to 70	31	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	4074	Pass
Internal Hysteresis	%	69 to 85	73	Pass
Peak Force 18 mm - 50 mm	N	<= 4600	4169	Pass
		Overall Test Results		Pass

Jessica Gall
Laboratory Technician

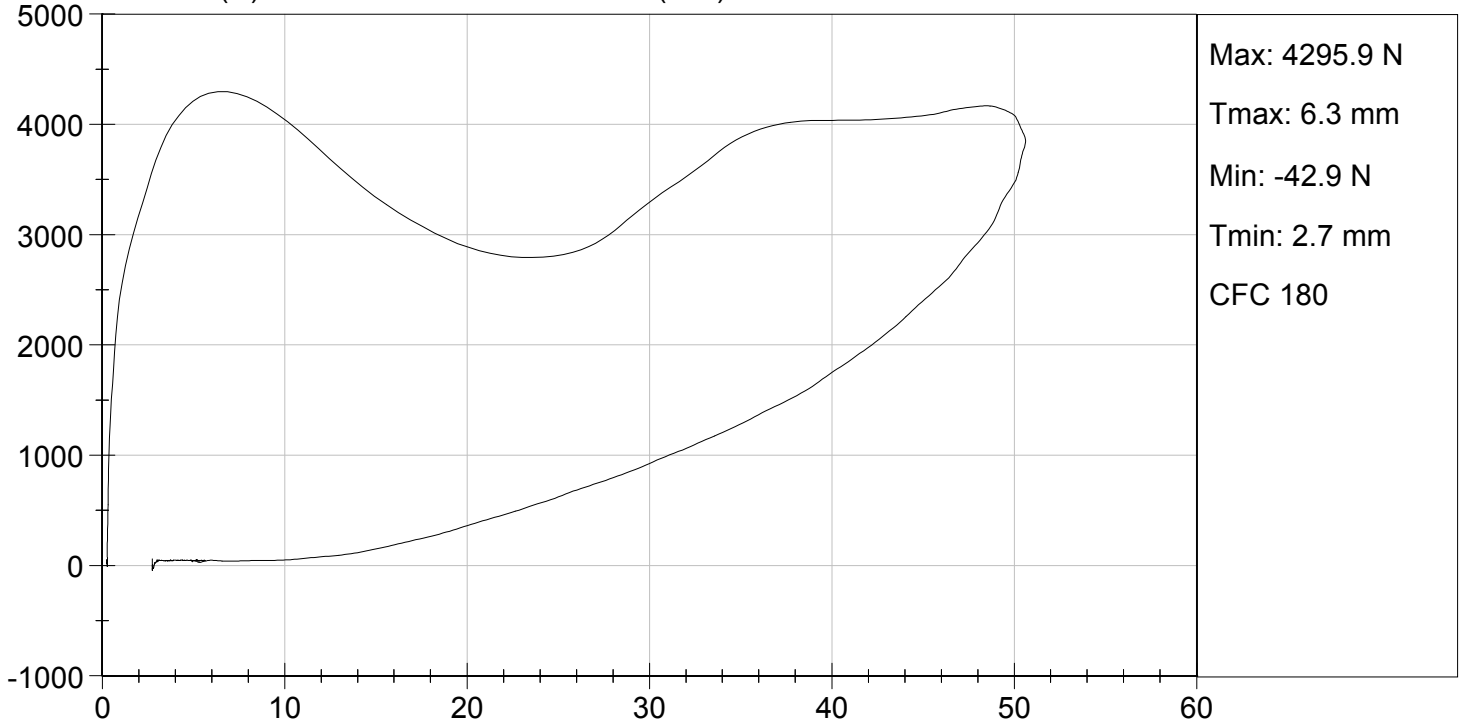
11/08/2012
Test Date

David Winkelbauer
Approved By

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

TEST DATE: 11/08/2012
TEST #: D124284

FORCE (N) vs CHEST DISPLACEMENT (mm)



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D124285

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	N	3450 to 4060	3734	Pass
		Overall Test Results		Pass

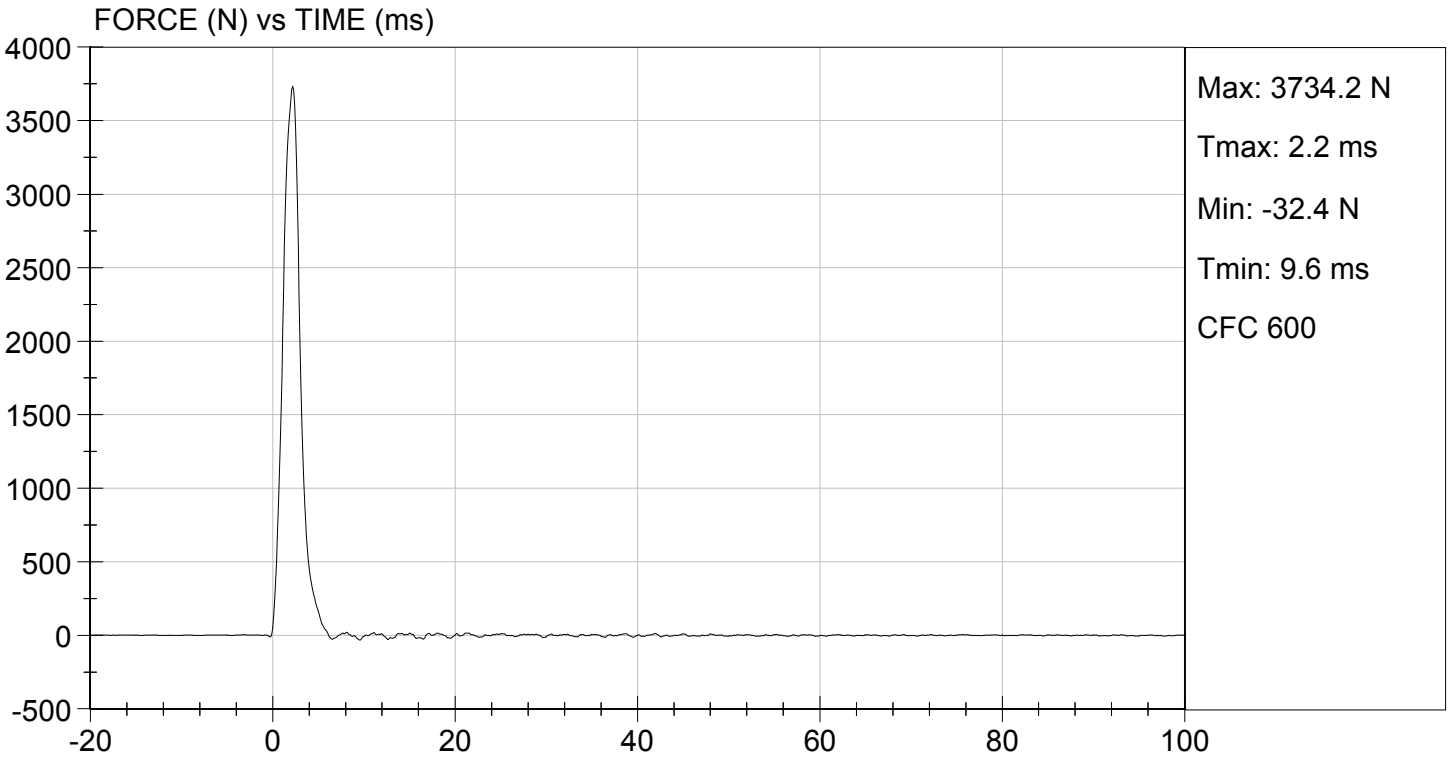
Jessica Gall
Laboratory Technician

11/08/2012
Test Date

David Winkelbauer
Approved By

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

TEST DATE: 11/08/2012
TEST #: D124285



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D124286

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	N	3450 to 4060	3881	Pass
		Overall Test Results		Pass

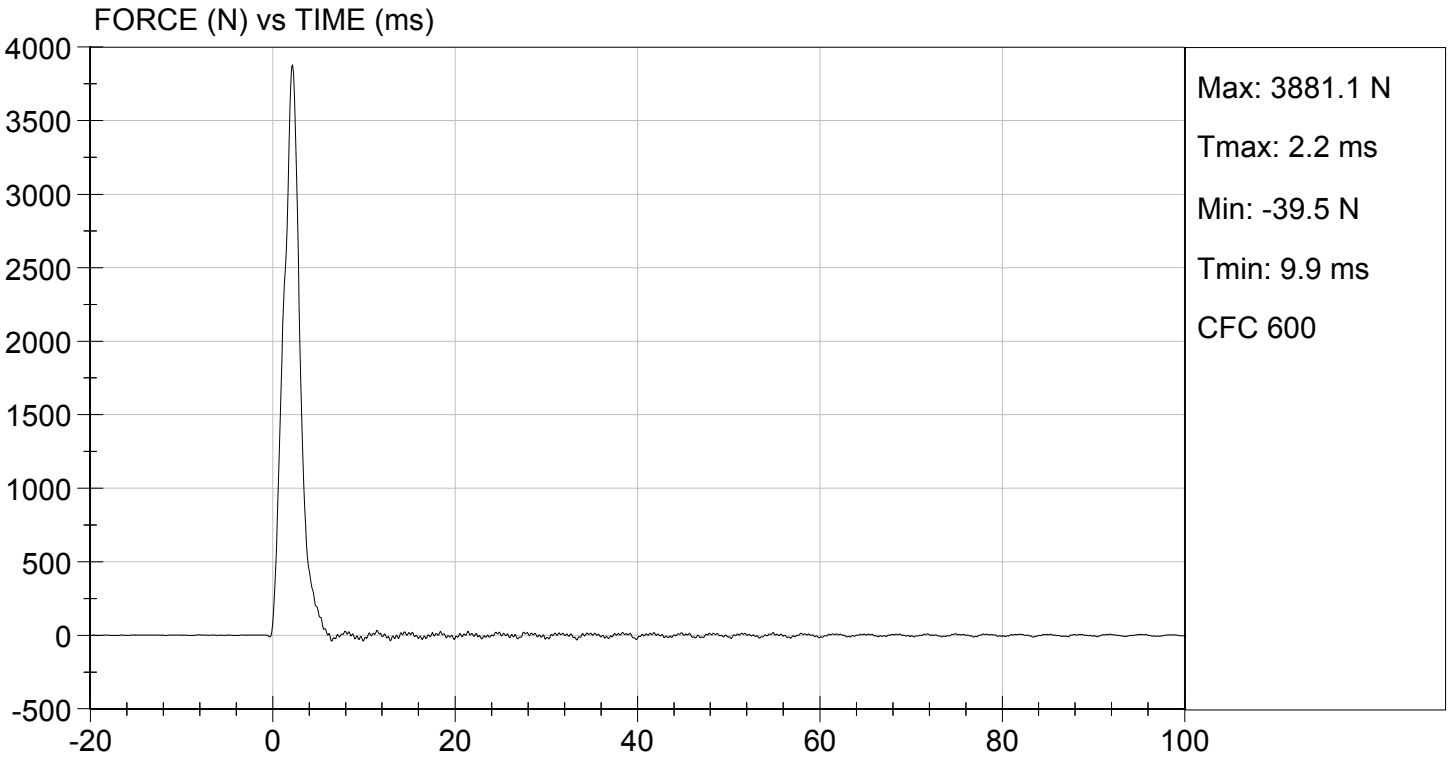
Jessica Gall
Laboratory Technician

11/08/2012
Test Date

David Winkelbauer
Approved By

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

TEST DATE: 11/08/2012
TEST #: D124286



MGA RESEARCH CORPORATION

TORSO FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634 **Test I.D:** D124287

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
Initial Angle	deg	0 to 20	17	Pass
Return Angle	deg	+/- 8	4	Pass
Force at 45 deg	N	320 to 390	357	Pass
Upper Torso Deflection Rate	deg/s	0.5 to 1.5	1.0	Pass
		Overall Result		Pass

Jessica Hall
Laboratory Technician

11/08/2012
Test Date

David Winkelbauer
Approved By