REPORT NUMBER: NCAP-MGA-2015-023

NEW CAR ASSESSMENT PROGRAM (NCAP)
Frontal Barrier Impact Test

FORD MOTOR COMPANY
2015 Ford Transit 150 LR Wagon XLT
NHTSA No.: M20150203

MGA RESEARCH CORPORATION
5000 Warren Road
Burlington, WI 53105

Test Date: October 27, 2014

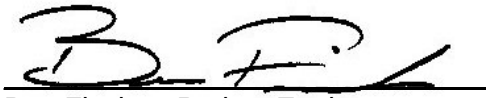
Final Report Date: December 11, 2014

FINAL REPORT

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

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

Prepared by: 
Donna Janovicz, Project Manager

Approved by: 
Ben Fischer, Project Engineer

Approval Date: December 11, 2014

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

Technical Report Documentation Page

1. Report No. NCAP-MGA-2015-023	*2. Government Accession No.*	*3. Recipient's Catalog No.*
4. Title and Subtitle Final Report of New Car Assessment Program Frontal Impact Testing of a 2015 Ford Transit 150 LR Wagon XLT, NHTSA No.: M20150203		*5. Report Date* December 11, 2014 *6. Performing Organization Code* MGA
7. Author(s) Donna Janovicz, Project Manager Ben Fischer, Project Engineer		*8. Performing Organization Report No.* NCAP-MGA-2015-023
9. Performing Organization Name and Address MGA Research Corporation 5000 Warren Road Burlington, WI 53105		*10. Work Unit No.* *11. Contract or Grant No.* DTNH22-12-D-00258
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards (NVS-111) 1200 New Jersey Ave, SE, Room W43-410 Washington, D.C. 20590		*13. Type of Report and Period Covered* Final Test Report October 27, 2014 to December 11, 2014 *14. Sponsoring Agency Code* NVS-111
15. Supplementary Notes		

16. Abstract

A 56.3 km/h NCAP Frontal Impact Test was conducted on a 2015 Ford Transit 150 LR Wagon XLT in accordance with the specifications of the Office of Crashworthiness Standards Frontal NCAP Laboratory Test Procedure. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), and 301 performance. The test was conducted at MGA Research Corporation in Burlington, Wisconsin, on October 27, 2014.

The impact velocity of the vehicle was 56.6 km/h and the ambient temperature at the barrier face at the time of impact was 21.0°C. The target vehicle post-test maximum crush was 432 located to the left of the vehicle's centerline. The test vehicle's performance was as follows:

Measurement Description	Units	Driver ATD		Passenger ATD	
		Threshold	Result	Threshold	Result
Head Injury Criteria (HIC_{15})	N/A	700	176	700	514
Maximum Chest	mm	63	30	52	17
Nij	N/A	1	0.43	1	0.46
Neck Tension	N	4170	1901	2620	1367
Neck Compression	N	4000	82	2520	533
Left Femur Force	N	10008	1857	6805	1542
Right Femur Force	N	10008	1009	6805	1136

17. Key Words 35 mph Frontal Barrier Impact Test New Car Assessment Program (NCAP)		*18. Distribution Statement* Copies of this report are available from: National Highway Traffic Safety Administration Technical Information Services Division, NPO-411 1200 New Jersey Ave, SE Washington, DC 20590 Email: tis@nhtsa.dot.gov FAX: 202-493-2833	
19. Security Classification of Report Unclassified	*20. Security Classification of Page* Unclassified	*21. No. of Pages* 168	22. Price

TABLE OF CONTENTS

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

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

Appendix		
A	Photographs	A
B	Dummy Response Data Traces	B
C	Dummy Calibration and Performance Verification Data	C

SECTION 1
PURPOSE AND SUMMARY OF TEST

PURPOSE

This 56.3 km/h frontal barrier impact test is part of the Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under contract number DTNH22-12-D-00258. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for consumer information purposes.

The 56.3 km/h frontal barrier impact was conducted in accordance with the Office of Crashworthiness Standards Frontal NCAP Laboratory Test Procedure.

SUMMARY

A load cell barrier consisting of 176 load cells was impacted by a 2015 Ford Transit 150 LR Wagon XLT at a velocity of 56.6 km/h. The test was performed at MGA Research Corporation on October 27, 2014. Pre-test and post-test photographs of the vehicle and dummies can be found in Appendix A.

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

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

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

The driver (position 1) ATD (Serial No. 351) and the right-front passenger (position 2) ATD (Serial No. 138) were calibrated previous to this test. Certification details, along with instrumentation calibration data, are found in Appendix C of this report.

The 628 channels of data were recorded on a data acquisition system. Appendix B contains the dummy response data traces.

There was 100 percent windshield retention and no intrusion into the protected zone of the windshield during the event. There was no Stoddard Solvent leakage after the event or during any phase of the static rollover.

The maximum static crush of the vehicle was 432 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 glovebox.

The occupant data is summarized below:

ATD position	HIC_{15}	Nij	Neck Tension (N)	Neck Comp. (N)	3ms Chest Clip (Gs)	Chest Disp. (mm)	Left Femur (N)	Right Femur (N)
Driver (50^{th})	176	0.43	1901	82	49	30	1857	1009
Passenger (5^{th})	514	0.46	1367	533	43	17	1542	1136

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

TEST NOTES

Barrier C-02 FX has no valid data.
Barrier C-02 MY has no valid data.
Barrier K-16 MY has no valid data.

SECTION 2
OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2015 Ford Transit 150 LR Wagon XLT NHTSA No.: M20150203
Test Program: NCAP Frontal Barrier Impact Test Test Date: 10/27/2014

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20150203	Traction Control System (TCS)	Yes
Model Year	2015	Power Steering	Yes
Make	Ford	Power Window Auto-Reverse	Yes
Model	Transit	Driver Frontal Airbag	Yes
Body Style	MPV	Driver Curtain Airbag	Yes
VIN	1FMZK1YG3FKA06635	Driver Head/Torso Airbag	No
Body Color	Ingot Silver Metallic	Driver Torso Airbag	No
Odometer (km/mi)	134 / 83	Driver Torso/Pelvis Airbag	Yes
Engine Displacement (L)	3.5	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	6	Front Pass. Head/Torso Airbag	No
Overdrive	Yes	Front Pass. Torso Airbag	No
Final Drive	RWD	Front Pass. Torso/Pelvis Airbag	Yes
Roof Rack	No	Front Pass. Pelvis Airbag	No
Sunroof/T-Top	No	Front Pass. Knee Airbag	No
Running Boards	No	Driver Pretensioner	Yes
Tilt Steering Wheel	Yes	Driver Load Limiter	Yes
Power Seats	No	Front Pass. Pretensioner	Yes
Anti-Lock Brakes (ABS)	Yes	Front Pass. Load Limiter	Yes
Automatic Door Locks (ADLs)	Yes	Other	N/A

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

DATA FROM CERTIFICATION LABEL

Manufactured By	Ford Motor Company
Date of Manufacture	07/14

GVWR (kg)	3878
GAWR Front (kg)	1873
GAWR Rear (kg)	2300

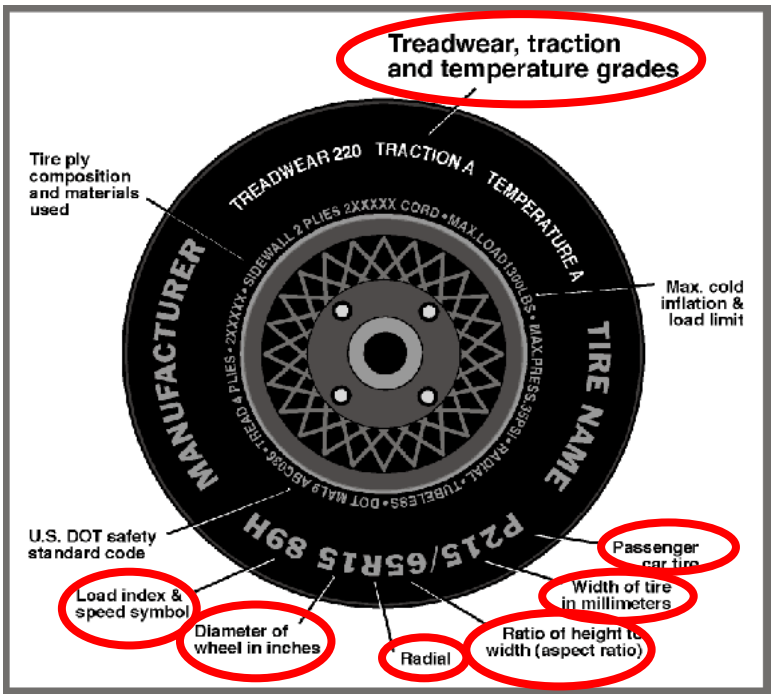
VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench	Bench	
Designated Seating Capacity (DSC)	2	3	3	8
Capacity Weight (VCW) (kg)				1253
Cargo Weight (RCLW) (kg)				709

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

Test Vehicle: 2015 Ford Transit 150 LR Wagon XLT
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: M20150203
Test Date: 10/27/2014

VEHICLE TIRE INFORMATION



Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	620	620
Cold Pressure (kPa)	340	490
Recommended Tire Size	235/65R16	235/65R16
Tire Size on Vehicle	235/65R16	235/65R16
Tire Manufacturer	Continental	Continental
Tire Model	Vanco Four Season	Vanco Four Season
Treadwear		
Traction		
Temperature Grade		
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Polyester, 2 Steel, 2 Polyamide	2 Polyester, 2 Steel, 2 Polyamide
Load Index/Speed Symbol	121/119R	121/119R
Tire Material	Rubber	Rubber
DOT Safety Code Left	65BO HN6C 1714	65BO HN6C 1714
DOT Safety Code Right	65BO HN6C 1714	65BO HN6C 1714

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

Test Vehicle: 2015 Ford Transit 150 LR Wagon XLT NHTSA No.: M20150203
Test Program: NCAP Frontal Barrier Impact Test Test Date: 10/27/2014

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	683.5	602.0		736.0	693.5	
Right	kg	696.0	576.0		731.0	667.0	
Ratio	%	53.9	46.1		51.9	48.1	
Totals	kg	1379.5	1178.0	2557.5	1467.0	1360.5	2827.5

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	2557.5
Weight of 1 P572E ATD & 1 P572O ATD	kg	140.6
Rated Cargo/Luggage Weight (RCLW)	kg	136
Calculated Test Vehicle Target Weight (TVTW)	kg	2834.1

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	784	782	815	818	1520
As Tested	mm	775	777	798	800	1588
Post Test	mm	779	793	829	810	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	3300
Total Vehicle Length at Left Side	mm	5493
Total Vehicle Length at Centerline	mm	5582
Total Vehicle Length at Right Side	mm	5493
Weight of Ballast in Cargo Area	kg	65.8
Weight of Vehicle Components Removed	kg	21.3
Amount of Stoddard Solvent in Fuel Tank	L	91.6

List of components removed to meet test weight: None

List of components removed for instrumentation, data box, and equipment installation:
Cargo carpet, jack, right taillight, rear sill trim plastic.

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

Test Vehicle: 2015 Ford Transit 150 LR Wagon XLT NHTSA No.: M20150203
Test Program: NCAP Frontal Barrier Impact Test Test Date: 10/27/2014

TARGET VEHICLE STRUCTURAL MEASUREMENT

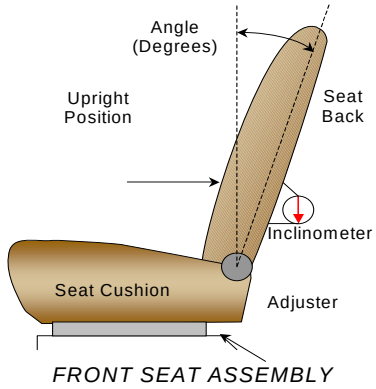
	Elements	Pre-Test (mm)
1	Total Length	5582
2	Total Width	2018
3	Bumper Top Height	645
4	Bumper Bottom Height	502
5	Longitudinal Member Top Height	650
6	Distance between Longitudinal Members	1216
7	Longitudinal Member Width	105
8	Engine Top Height	1056
9	Engine Bottom Height	368
10	Engine and Gearbox Width	455
11	Front Bumper-Engine Distance	397
12	Front Shock Absorber Fixing Height	
13	Bonnet Leading Edge Height	1099
14	Front Shock Absorber Fixing Width	
15	Front Bumper – Front Axle Distance	1560
16	Front Axle – A-Pillar Distance	538
17	A-Pillar – B-Pillar Distance	775
18	B-Pillar – Rear Axle Distance	1982
19	B-Pillar – C-Pillar Distance	1491
20	Roof Sill Bottom Height	1940
21	Roof Sill Top Height	2025
22	Floor Sill Bottom Height	285
23	Floor Sill Top Height	390

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

Test Vehicle: 2015 Ford Transit 150 LR Wagon XLT
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: M20150203
Test Date: 10/27/2014

NOMINAL DESIGN RIDING POSITION

The driver seat back is positioned as close as possible to the manufacturer's design angle. For the passenger seat back, seat back is adjusted following Appendix F, "Driver & Passenger Dummy Seating & Positioning Procedures" in the NCAP Test Procedure dated August 2013.



	Degrees
Driver Seat Back Angle	2.8° on headrest post
Passenger Seat Back Angle	3.8° on headrest post

SEAT FORE/AFT POSITIONS

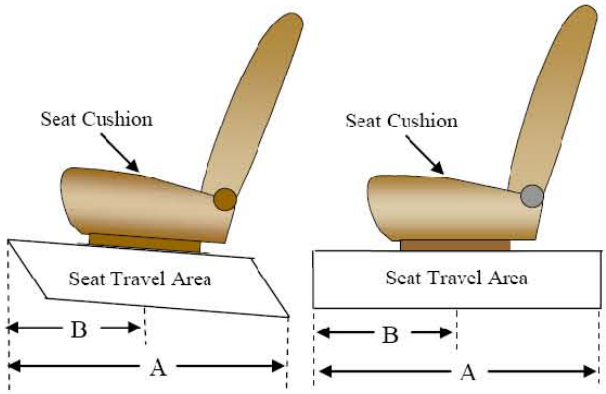
The driver and passenger seat fore/aft positions are adjusted following Appendix F, "Driver & Passenger Dummy Seating & Positioning Procedures" in the NCAP Test Procedure dated August 2013.

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	249 mm / 37 detents	125 mm / 18th detent (foremost as 0)
Passenger Seat	249 mm / 37 detents	0 mm / 0th detent (foremost as 0)

SEAT BELT UPPER ANCHORAGES

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

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



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

Test Vehicle: 2015 Ford Transit 150 LR Wagon XLT NHTSA No.: M20150203
Test Program: NCAP Frontal Barrier Impact Test Test Date: 10/27/2014

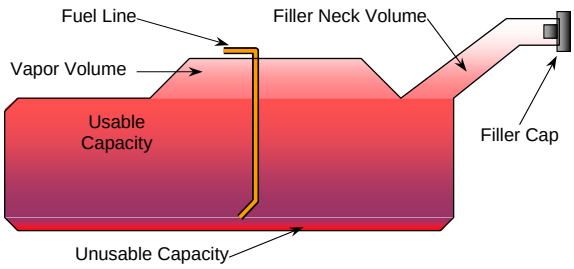
FUEL TANK CAPACITY DATA

	Liters
Usable Capacity of "Standard Tank"	96.5
Usable Capacity of "Optional Tank"	
92-94% of Usable Capacity	88.8 to 90.7
Actual Amount of Solvent used	91.6
1/3 of Usable Capacity	32.2

FUEL PUMP

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

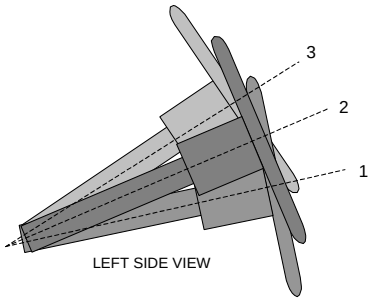
The vehicle is equipped with an electric fuel pump. The electric fuel pump operates for 2 seconds to pressurize the fuel system following actuation of the ignition. If no attempt has been made to start the engine within 2 seconds following ignition actuation the fuel pump will shut off. The fuel pump operates continuously while the engine is running. If the engine stalls the fuel pump is deactivated. Also, fuel pump shut-off is provided via the RC, designed to stop fuel flow to the engine if the vehicle sustains an impact above a certain magnitude. 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.



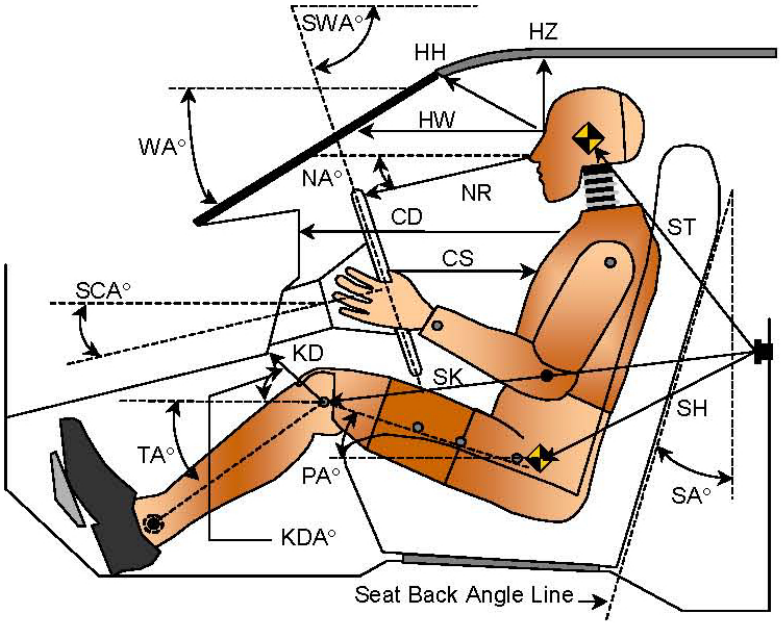
STEERING COLUMN ASSEMBLY

STEERING COLUMN POSITION

	Degrees	Fore/Aft Position (mm)
Lowermost Position 1	58.8	232
Geometric Center Position 2	56.6	207
Uppermost Position 3	54.4	182
Telescoping Steering Wheel Travel		50
Test Position	56.6	207

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2015 Ford Transit 150 LR Wagon XLT
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: M20150203
Test Date: 10/27/2014

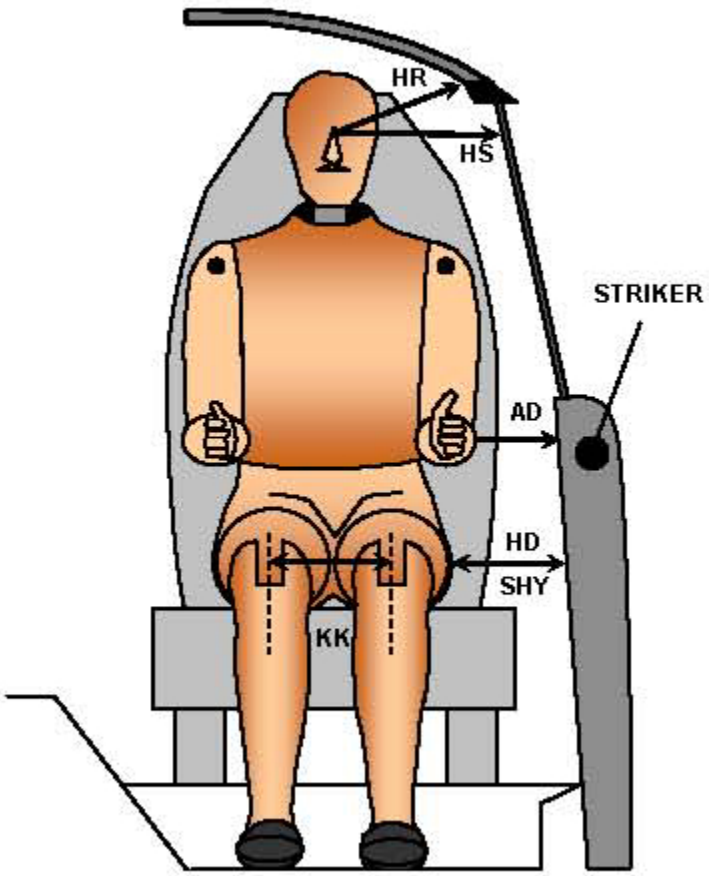


LEFT SIDE VIEW

Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		33.2		
SWA°	Steering Wheel Angle		56.6		
SCA°	Steering Column Angle		33.4		
SA°	Seat Back Angle (on headrest post)		2.8		3.8
HZ	Head to Roof (Z)	248	90.0	306	90.0
HH	Head to Header	408	24.5	393	38.0
HW	Head to Windshield	671	0.0	709	0.0
NR	Nose to Rim	481	17.4		
CD	Chest to Dash	614		439	
CS	Chest to Steering Hub	373	14.1		
RA	Rim to Abdomen	213	0.0		
KDL	Left Knee to Dash	160	24.4	74	15.4
KDR	Right Knee to Dash	146	26.2	61	16.2
PA°	Pelvic Angle		24.1		20.4
TA°	Tibia Angle		66.9		74.4
SK	Striker to Knee	605	79.1	656	80.6
ST	Striker to Head	692	10.4	636	17.4
SH	Striker to H-Point	203	81.0	313	79.2

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2015 Ford Transit 150 LR Wagon XLT
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: M20150203
Test Date: 10/27/2014

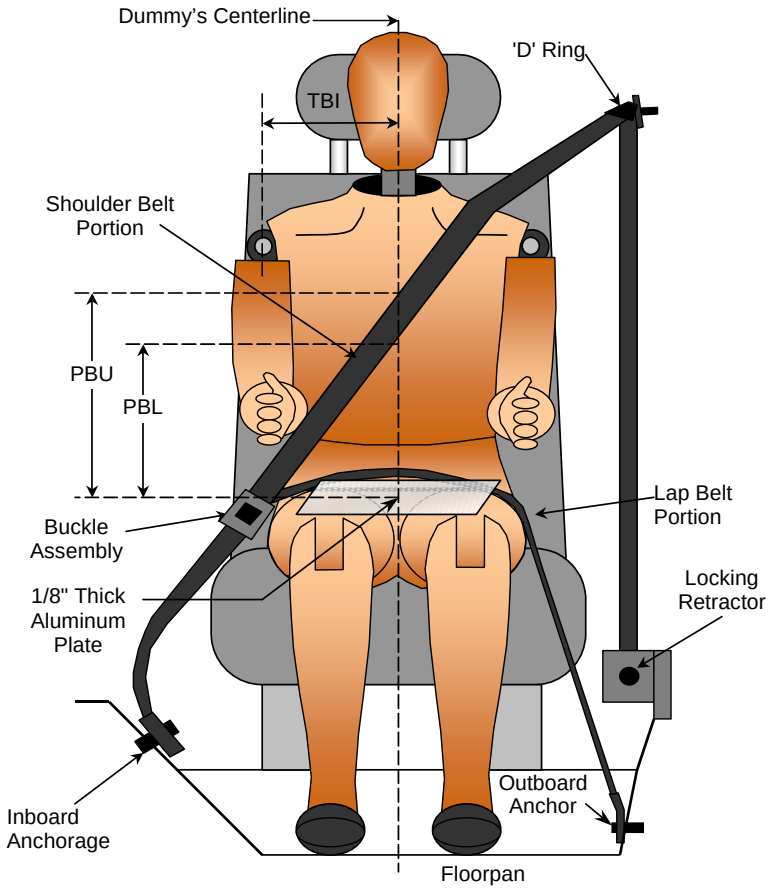


FRONT VIEW OF DUMMY

Code	Measurement Description	Driver	Passenger
		Length (mm)	
AD	Arm to Door	177	115
HD	H-Point to Door	150	199
HR	Head to Side Header	322	381
HS	Head to Side Window	433	461
KK	Knee to Knee	322	228
SHY	Striker to H-Point (Y Direction)	307	340
AA	Ankle to Ankle	301	173

DATA SHEET NO. 5
SEAT BELT POSITIONING DATA

Test Vehicle: 2015 Ford Transit 150 LR Wagon XLT
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: M20150203
Test Date: 10/27/2014



FRONT VIEW OF DUMMY

SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU - Top surface of reference to belt upper edge	mm	340	290
PBL - Top surface of reference to belt lower edge	mm	270	210

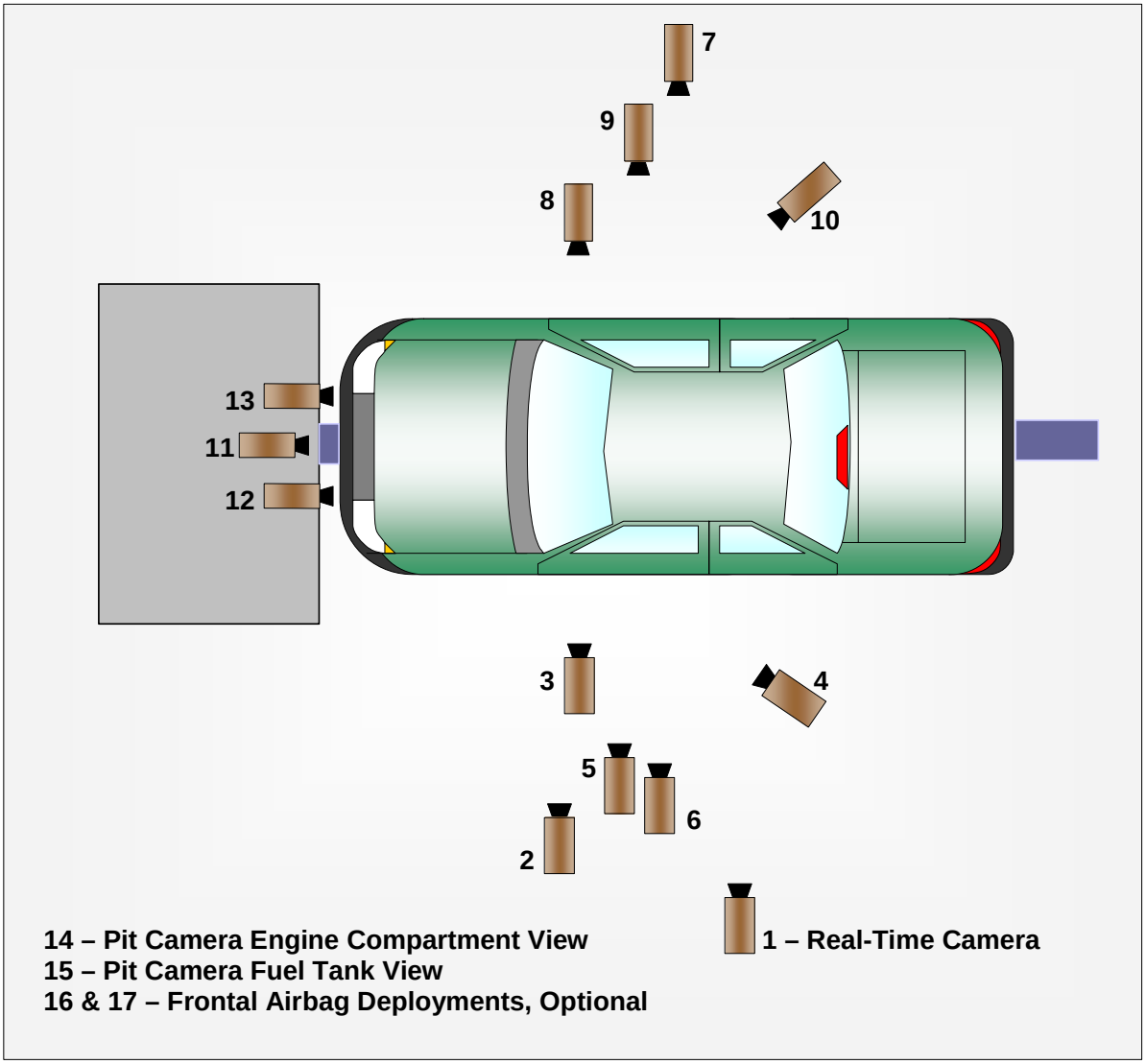
BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Shoulder Belt Length as measured on ATD	mm	985	1020
Lap Belt Length as measured on ATD	mm	710	650
Remainder of belt on reel	mm	1655	1680
Total Belt Length for Continuous Webbing Systems	mm	3350	3350

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

Test Vehicle:	2015 Ford Transit 150 LR Wagon XLT	NHTSA No.:	M20150203
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	10/27/2014

CAMERA POSITIONS FOR FRONTAL IMPACTS



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

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

Test Vehicle: 2015 Ford Transit 150 LR Wagon XLT NHTSA No.: M20150203
Test Program: NCAP Frontal Barrier Impact Test Test Date: 10/27/2014

CAMERA LOCATIONS

No.	Camera View	Coordinates (mm)			Lens (mm)	Speed (fps)
		X*	Y*	Z*		
1	Real-Time Left Overall					30
2	Driver Close-Up	1130	-6980	-1920	35	1000
3	Left Front Half	1370	-5750	-1310	24	1000
4	Left Angle	5620	-5150	-1960	50	1000
5	Steering Column - Top					
6	Steering Column - Bottom					
7	Right Overall	2770	6180	-1330	16	1000
8	Passenger Close-Up	1030	6940	-1900	35	1000
9	Right Front Half	1370	5930	-1350	24	1000
10	Right Angle	5600	4990	-1960	50	1000
11	Windshield	-260	0	-2810	20	1000
12	Driver Windshield	-20	-450	-2030	8.5	1000
13	Passenger Windshield	-20	450	-2030	8.5	1000
14	Pit Front	930	0	3150	24	1000
15	Pit Rear	3100	0	3150	24	1000
16	Onboard Driver Side				12	1000
17	Onboard Passenger Side				12	1000
18	Real-Time Pan View					30

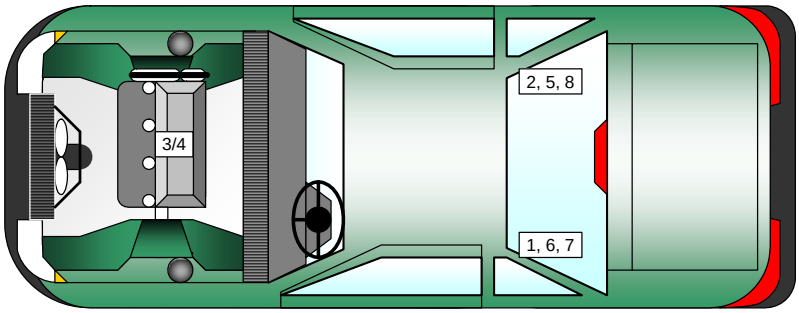
*COORDINATES:

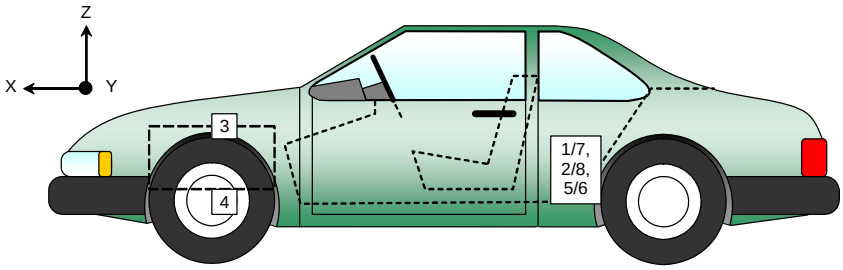
+X = forward of impact plane
+Y = right of monorail centerline
+Z = below ground level

Cameras 5 & 6 were not used for this test.

DATA SHEET NO. 7
VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2015 Ford Transit 150 LR Wagon XLT
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: M20150203
Test Date: 10/27/2014





VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear Crossmember Accelerometer – X Direction	2390	-820	-652
2	Right Rear Crossmember Accelerometer – X Direction	2480	650	-652
3	Engine Top X	4713	10	-1056
4	Engine Bottom X	4807	0	-368
5	Left Rear Crossmember Accelerometer – Z Direction	2390	-820	-652
6	Right Rear Crossmember Accelerometer – Z Direction	2480	650	-652
7	Left Rear Crossmember Accelerometer Redundant – X Direction	2390	-820	-652
8	Right Rear Crossmember Accelerometer Redundant – X Direction	2480	650	-652

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

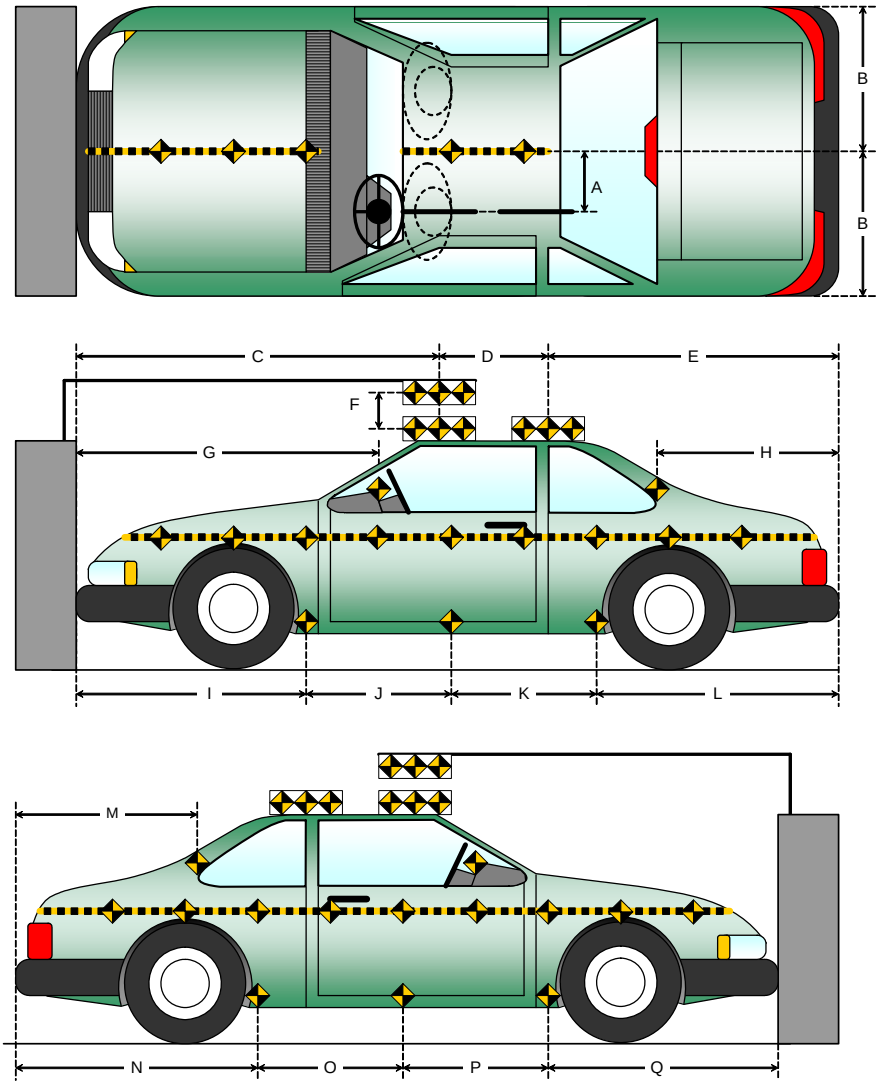
DATA SHEET NO. 8

PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2015 Ford Transit 150 LR Wagon XLT
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20150203
Test Date: 10/27/2014

Item	Value (mm)
A	445
B	1009
C	1960
D	609
E	3013
F	210
G	
H	1754
I	1560
J	1115
K	1115
L	1792
M	1754
N	1792
O	1115
P	1115
Q	1560



DATA SHEET NO. 9
LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle: 2015 Ford Transit 150 LR Wagon XLT NHTSA No.: M20150203
Test Program: NCAP Frontal Barrier Impact Test Test Date: 10/27/2014

Advanced Research Load Cell Barrier

Photo for Reference Only

Centerline

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

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

DATA SHEET NO. 10
TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle: 2015 Ford Transit 150 LR Wagon XLT NHTSA No.: M20150203
Test Program: NCAP Frontal Barrier Impact Test Test Date: 10/27/2014

INSTRUMENTATION

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

CAMERA COVERAGE

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

DATA SHEET NO. 11
POST-TEST OBSERVATIONS

Test Vehicle: 2015 Ford Transit 150 LR Wagon XLT
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: M20150203
Test Date: 10/27/2014

TEST DUMMY INFORMATION AND CONTACT LOCATIONS

Description	Driver	Passenger
Dummy Type / Serial No.	HIII 50% / 351	HIII 5% / 138
Head Contact	Airbag, Headrest	Airbag, Headrest
Upper Torso Contact	Airbag	Airbag
Lower Torso Contact	None	None
Left Knee Contact	Knee Bolster	Glovebox
Right Knee Contact	Knee Bolster	Glovebox

DOOR OPENING AND SEAT TRACK INFORMATION

Description	Driver	Passenger
Locked/Unlocked Doors	Doors were 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
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

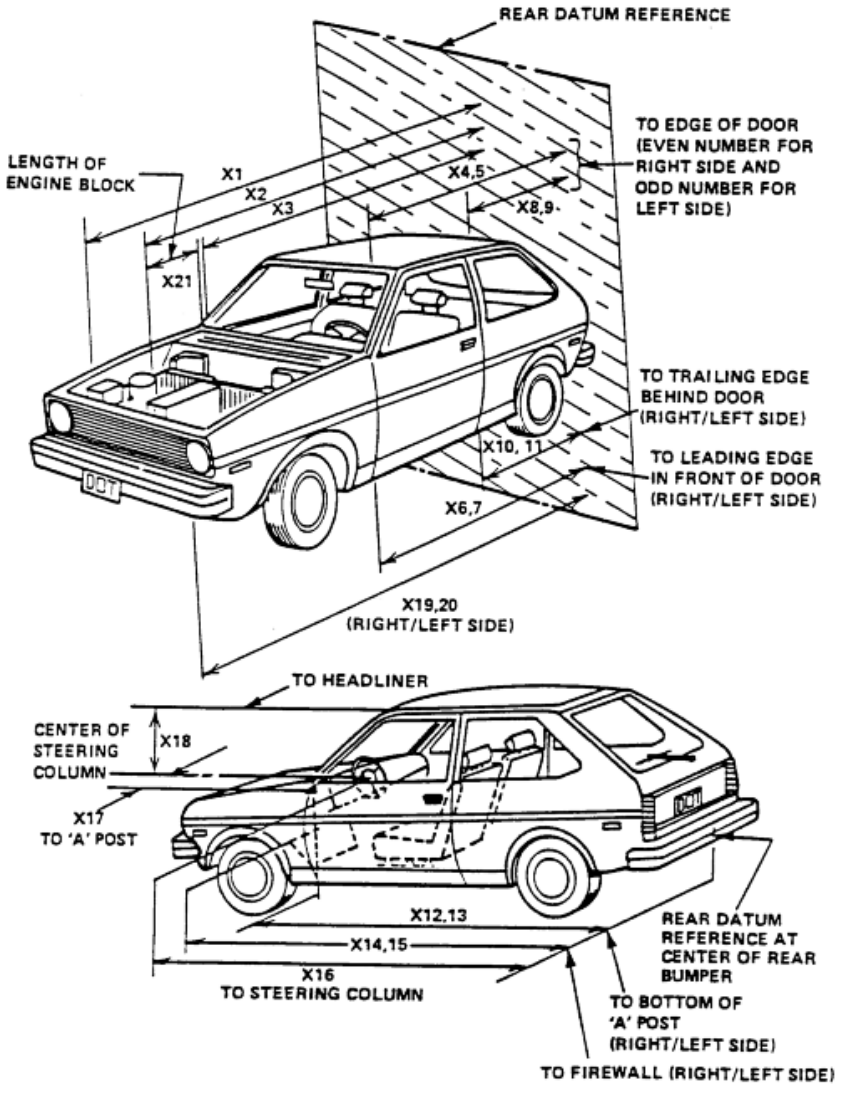
Measured Parameter	Units	Value
Left Side	mm	2335
Center	mm	2380
Right Side	mm	2400
Average	mm	2372

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Driver (Occupant 1)		Passenger (Occupant 2)	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	Yes	Yes	Yes
Curtain Side Airbag	Yes	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	

DATA SHEET NO. 12
VEHICLE PROFILE MEASUREMENTS

Test Vehicle:	2015 Ford Transit 150 LR Wagon XLT	NHTSA No.:	M20150203
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	10/27/2014



DATA SHEET NO. 12 (CONTINUED)
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2015 Ford Transit 150 LR Wagon XLT NHTSA No.: M20150203
Test Program: NCAP Frontal Barrier Impact Test Test Date: 10/27/2014

RSOV (Rear Surface of Vehicle)

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	mm	5582	5246	336
2	RSOV to Front of Engine	mm	5174	5069	105
3	RSOV to Firewall	mm	4669	4629	40
4	RSOV to Upper Leading Edge of Right Door	mm	5543	4454	-4
5	RSOV to Upper Leading Edge of Left Door	mm	5543	4460	-10
6	RSOV to Lower Leading Edge of Right Door	mm	4134	4139	-5
7	RSOV to Lower Leading Edge of Left Door	mm	4134	4132	2
8	RSOV to Upper Trailing Edge of Right Door	mm	3292	3289	3
9	RSOV to Upper Trailing Edge of Left Door	mm	3292	3292	0
10	RSOV to Lower Trailing Edge of Right Door	mm	3266	3279	-13
11	RSOV to Lower Trailing Edge of Left Door	mm	3414	3414	0
12	RSOV to Bottom of “A” Post of Right Side	mm	4447	4440	7
13	RSOV to Bottom of “A” Post of Left Side	mm	4447	4439	8
14	RSOV to Firewall, Right Side	mm	4650	4638	12
15	RSOV to Firewall, Left Side	mm	4650	4645	5
16	RSOV to Steering Column	mm	3989	4090	-101
17	Center of Steering Column to “A” Post	mm	502	502	0
18	Center of Steering Column to Headliner	mm	517	504	13
19	RSOV to Right Side of Front Bumper	mm	5493	5114	379
20	RSOV to Left Side of Front Bumper	mm	5493	5181	312
21	Length of Engine Block	mm	560	560	0
RD	RSOV to Right Side of Dash Panel	mm	4205	4205	0
CD	RSOV to Center of Dash Panel	mm	4245	4245	0
LD	RSOV to Left Side of Dash Panel	mm	4180	4197	-17

DATA SHEET NO. 13
ACCIDENT INVESTIGATION DIVISION DATA

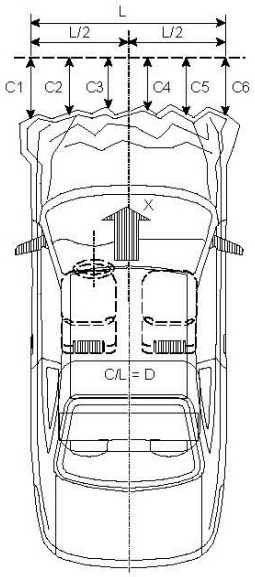
Test Vehicle: 2015 Ford Transit 150 LR Wagon XLT NHTSA No.: M20150203
Test Program: NCAP Frontal Barrier Impact Test Test Date: 10/27/2014

VEHICLE INFORMATION

VIN: 1FMZK1YG3FKA06635 Wheelbase (mm): 3300
Vehicle Size Category: MPV Test Weight (kg): 2827.5

ACCELEROMETER DATA

Accelerometer Locations: As per measurements on Page 15
Cal. Procedure/Interval: MGA procedure / 6 month
Integration Algorithm: Trapezoidal
Linearity: > 99%
Impact Velocity (km/h): 56.6
Velocity Change (km/h): 60.4
Time of Separation (msec): 116.3



CRUSH PROFILE

Collision Deformation Classification: Frontal
Midpoint of Damage: Centerline
Damage Region Length (mm): 1368
Impact Mode: Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	5493	5181	312
C2	Crush zone 2 at left side	mm	5562	5131	431
C3	Crush zone 3 at left side	mm	5574	5142	432
C4	Crush zone 4 at right side	mm	5574	5149	425
C5	Crush zone 5 at right side	mm	5562	5145	417
C6	Crush zone 6 at right side	mm	5493	5114	379
L	C1 TO C6	mm	1368	1322	46

DATA SHEET NO. 14
VEHICLE INTRUSION MEASUREMENTS

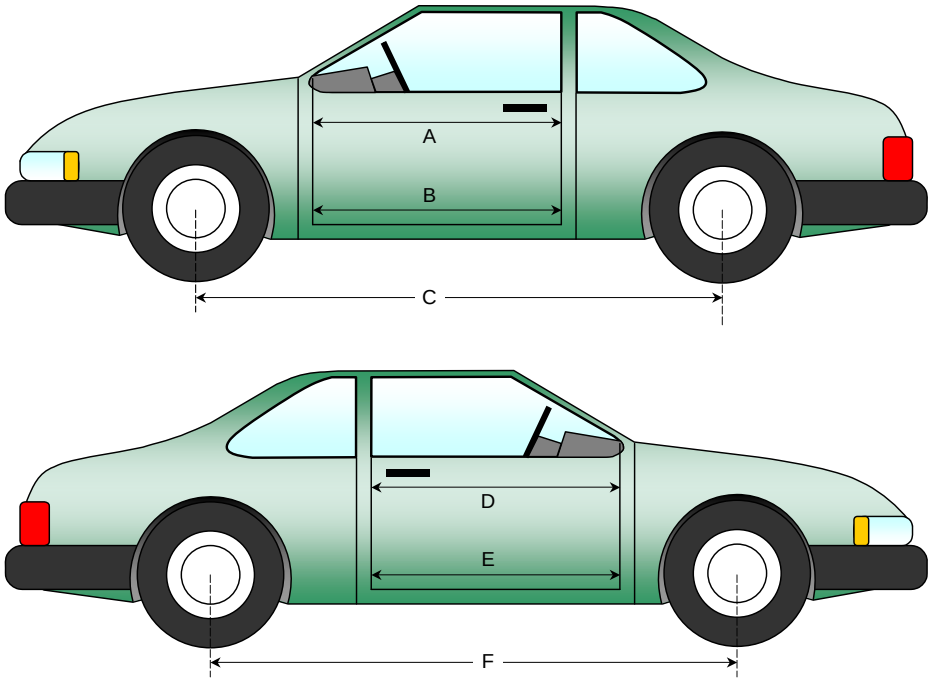
Test Vehicle: 2015 Ford Transit 150 LR Wagon XLT
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: M20150203
Test Date: 10/27/2014

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	1038	1038	0
B	Left Side Lower	mm	653	652	1
D	Right Side Upper	mm	1038	1038	0
E	Right Side Lower	mm	653	653	0

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	3300	3291	9
F	Right Side Wheelbase	mm	3300	3299	1



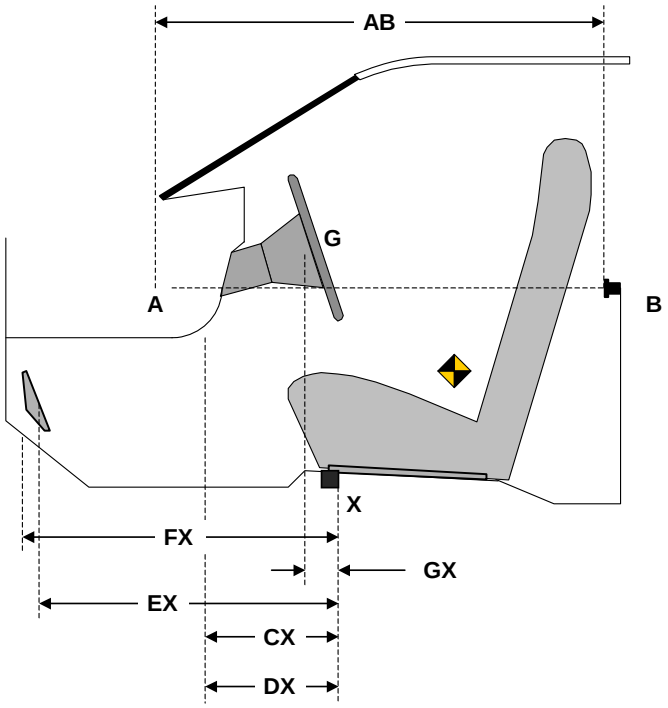
DATA SHEET NO. 14 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2015 Ford Transit 150 LR Wagon XLT
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: M20150203
Test Date: 10/27/2014

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	895	895	0
CX	Left Knee Bolster to X	mm	351	364	-13
DX	Right Knee Bolster to X	mm	332	342	-10
EX	Brake Pedal to X	mm	545	545	0
FX	Foot Rest to X	mm	528	526	2
GX	Center of Steering Column Wheel Hub to X	mm	175	261	-86

X = Front of Seat Track (stationary)



DRIVER COMPARTMENT

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

Test Vehicle: 2015 Ford Transit 150 LR Wagon XLT
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: M20150203
Test Date: 10/27/2014

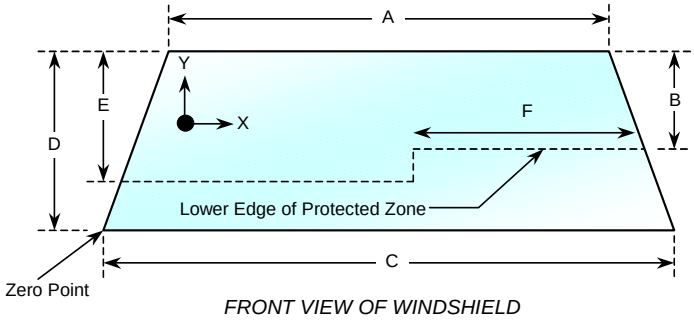
Windshield Mounting Details:
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

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

Temperature of windshield molding during test: 21.0° C.

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% of Retention
Left Side	2582	2582	100
Right Side	2582	2582	100
Total	5164	5164	100



FRONT VIEW OF WINDSHIELD

Item	Units	Value
A	mm	1630
B	mm	580
C	mm	1494
D	mm	1020
E	mm	650
F	mm	614

AREA OF PROTECTED ZONE FAILURES - NONE

A. Provide coordinates of the area that the protected zone was penetrated more than 0.25 inches by a vehicle component other than one that is normally in contact with the windshield. **None**

X	Y

B. Provide coordinates of the area beneath the protected zone that the inner surface of the windshield was penetrated by a vehicle component. **None**

X	Y

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

Test Vehicle: 2015 Ford Transit 150 LR Wagon XLT NHTSA No.: M20150203
Test Program: NCAP Frontal Barrier Impact Test Test Date: 10/27/2014

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

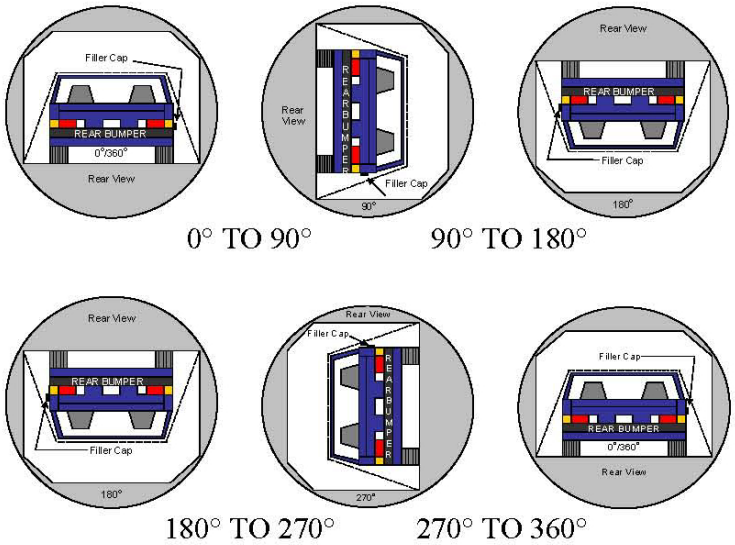
Temperature at Time of Impact: 21.0°C Test Time: 11:59 a.m.

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

DATA SHEET NO. 16
FMVSS 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2015 Ford Transit 150 LR Wagon XLT
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: M20150203
Test Date: 10/27/2014

1. The specified fixture rollover rate for each 90° of rotation is 60 to 180 seconds.
2. The position hold time at each position is 300 seconds (minimum).
3. Details of Stoddard Solvent spillage: **None**



SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	170	300	470
90° to 180°	137	300	437
180° to 270°	146	300	446
270° to 360°	169	300	469

FMVSS 301 SPILLAGE TABLE (units in ounces)

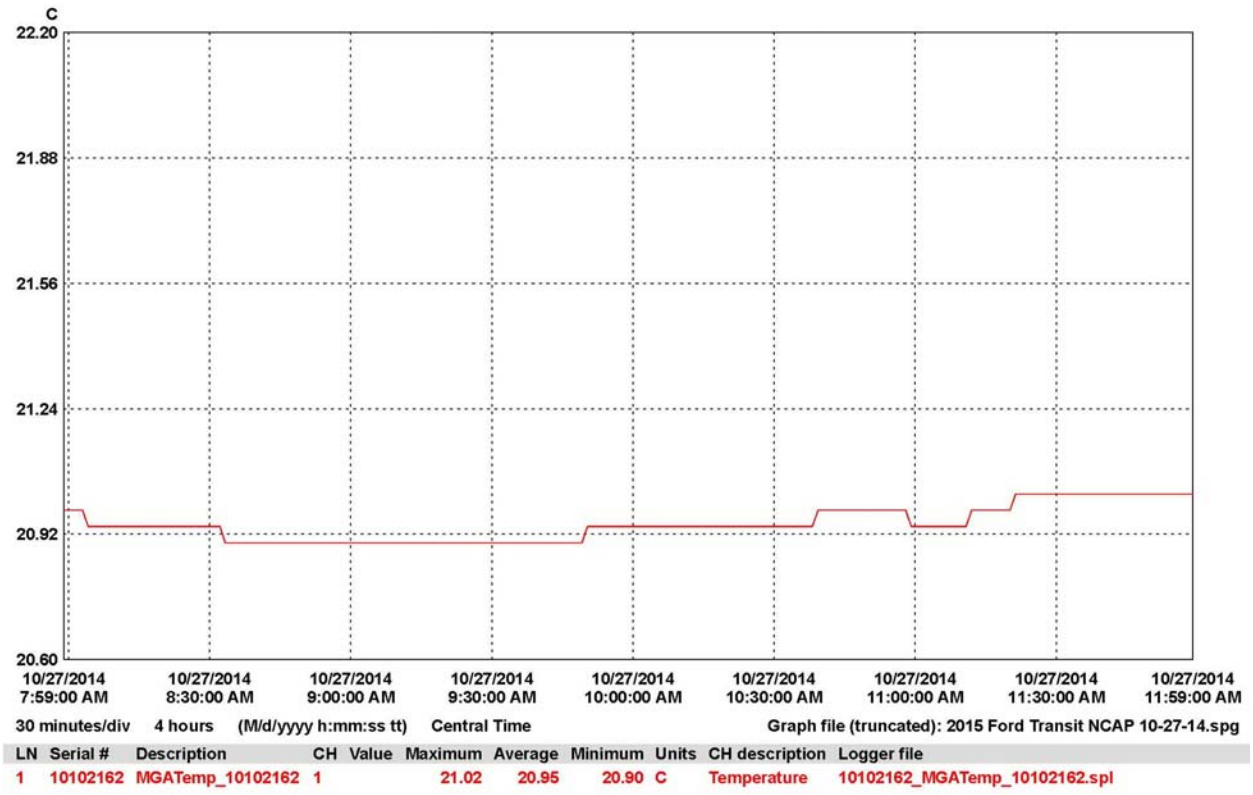
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eight Minute
0° to 90°	0	0	0	0
90° to 180°	0	0	0	0
180° to 270°	0	0	0	0
270° to 360°	0	0	0	0

SOLVENT SPILLAGE LOCATION TABLE

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

DATA SHEET NO. 17
DUMMY/VEHICLE TEMPERATURE STABILIZATION DATA

Test Vehicle: 2015 Ford Transit 150 LR Wagon XLT NHTSA No.: M20150203
Test Program: NCAP Frontal Barrier Impact Test Test Date: 10/27/2014



LN	Serial #	Description	CH	Value	Maximum	Average	Minimum	Units	CH description	Logger file
1	10102162	MGATemp_10102162	1		21.02	20.95	20.90	C	Temperature	10102162_MGATemp_10102162.spl

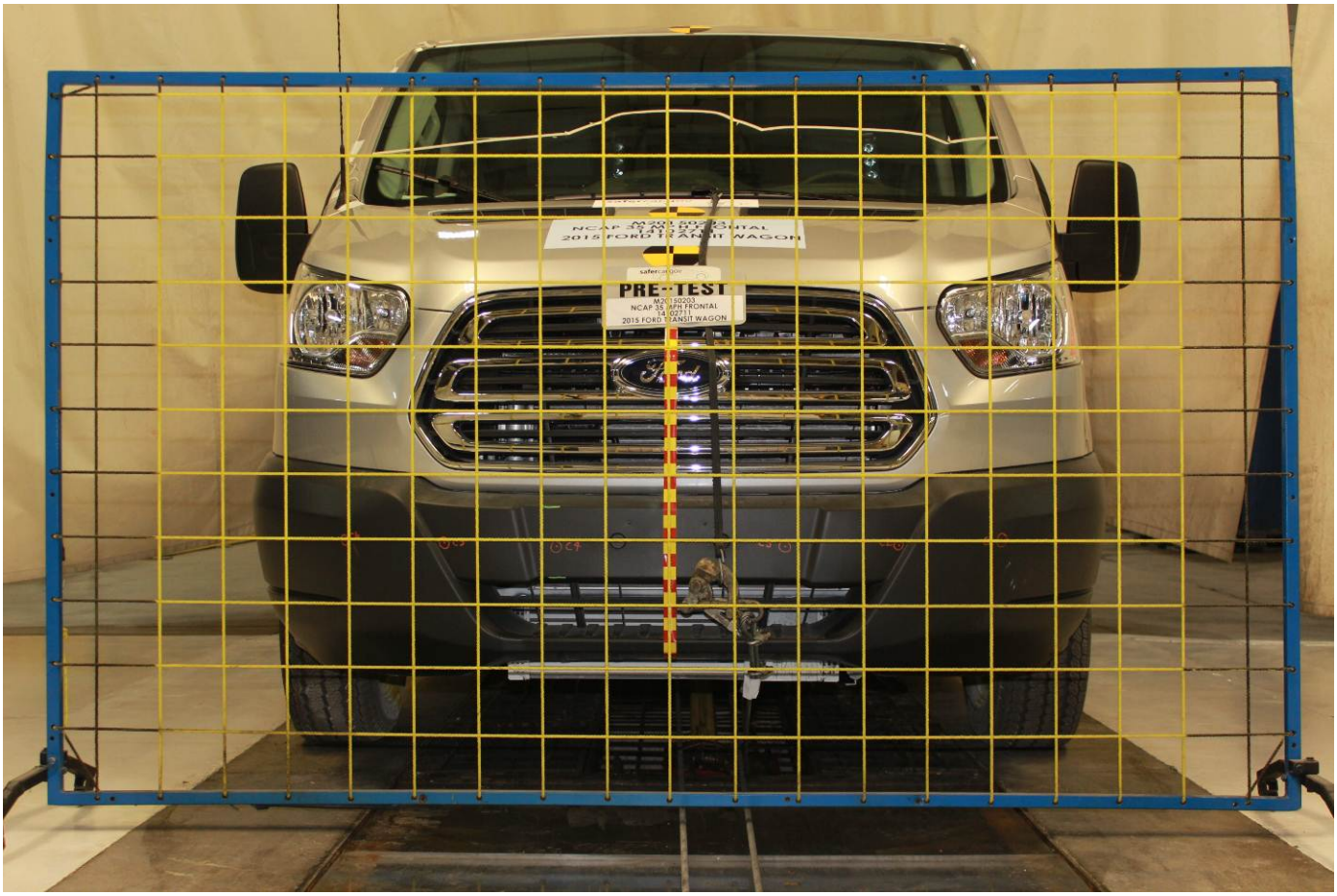
APPENDIX A
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

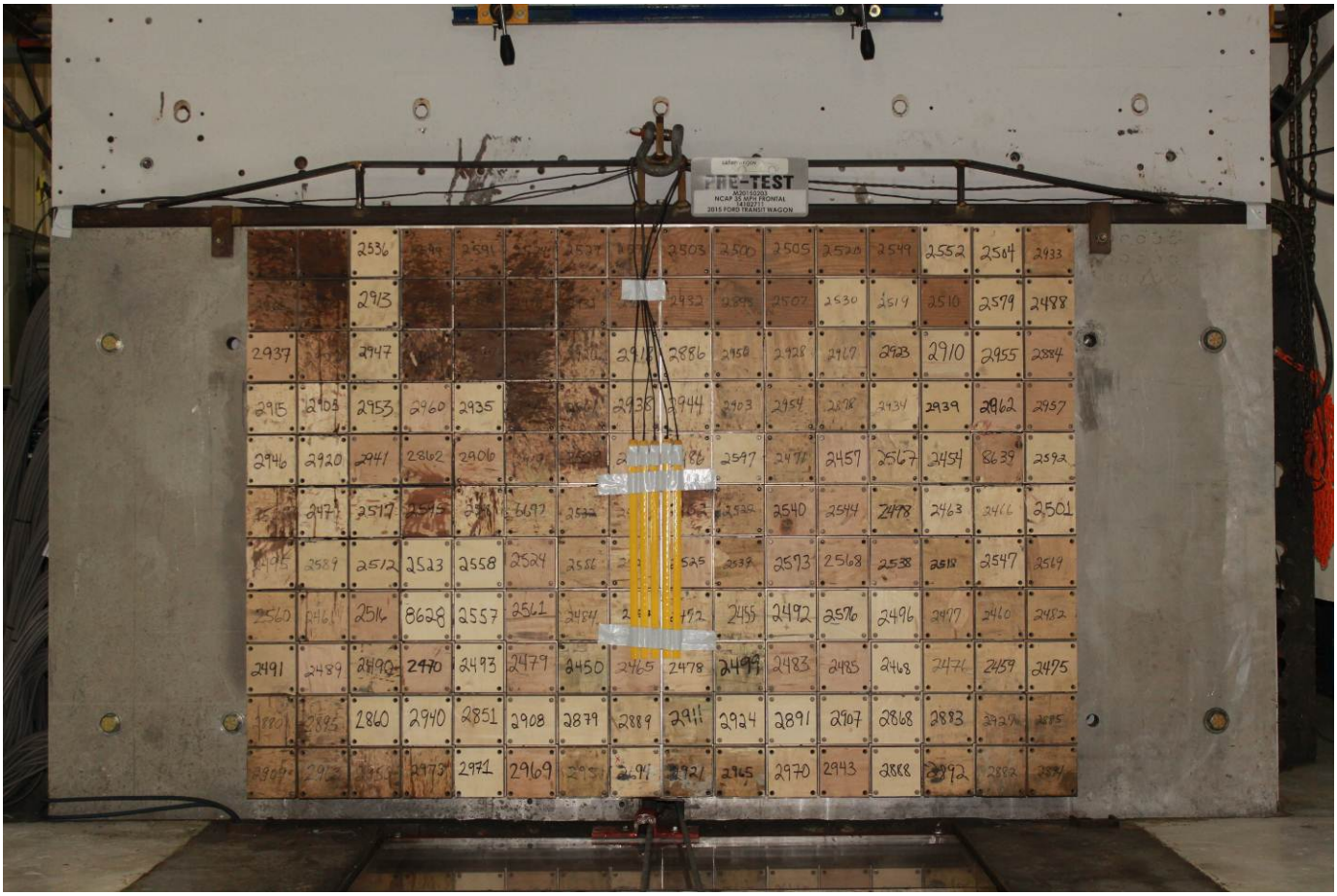
		Page No.
Photo No. 1.	Load Cell Location	A-1
Photo No. 2.	Load Cell Wall	A-1
Photo No. 3.	Manufacturer's Label	A-2
Photo No. 4.	Tire Placard	A-2
Photo No. 5.	2015 Ford Transit Frontal As Delivered	A-3
Photo No. 6.	Left Rear 3-4 View, As Received	A-3
Photo No. 7.	Pre-Test Front View of Test Vehicle	A-4
Photo No. 8.	Post-Test Front View of Test Vehicle	A-4
Photo No. 9.	Pre-Test Left View of Test Vehicle	A-5
Photo No. 10.	Post-Test Left View of Test Vehicle	A-5
Photo No. 11.	Pre-Test Right View of Test Vehicle	A-6
Photo No. 12.	Post-Test Right View of Test Vehicle	A-6
Photo No. 13.	Pre-Test Right Front 3-4 View	A-7
Photo No. 14.	Post-Test Right Front 3-4 View	A-7
Photo No. 15.	Pre-Test Left Rear 3-4 View	A-8
Photo No. 16.	Post-Test Left Rear 3-4 View	A-8
Photo No. 17.	Pre-Test Windshield View	A-9
Photo No. 18.	Post-Test Windshield View	A-9
Photo No. 19.	Pre-Test Engine Compartment View	A-10
Photo No. 20.	Post-Test Engine Compartment View	A-10
Photo No. 21.	Pre-Test Fuel Filler Cap View	A-11
Photo No. 22.	Post-Test Fuel Filler Cap View	A-11
Photo No. 23.	Pre-Test Front Underbody View	A-12
Photo No. 24.	Post-Test Front Underbody View	A-12
Photo No. 25.	Pre-Test Mid Front Underbody View	A-13
Photo No. 26.	Post-Test Mid Front Underbody View	A-13
Photo No. 27.	Pre-Test Mid Rear Underbody View	A-14
Photo No. 28.	Post-Test Mid Rear Underbody View	A-14
Photo No. 29.	Pre-Test Rear Underbody View	A-15
Photo No. 30.	Post-Test Rear Underbody View	A-15

		Page No.
Photo No. 31.	Pre-Test Dummy Cable Routing	A-16
Photo No. 32.	Post-Test Dummy Cable Routing	A-16
Photo No. 33.	Pre-Test Driver Dummy Front View	A-17
Photo No. 34.	Post-Test Driver Dummy Front View	A-17
Photo No. 35.	Pre-Test Driver Dummy Window View	A-18
Photo No. 36.	Post-Test Driver Dummy Window View	A-18
Photo No. 37.	Pre-Test Driver Dummy and Vehicle Interior (Door Open)	A-19
Photo No. 38.	Post-Test Driver Dummy and Vehicle Interior (Door Open)	A-19
Photo No. 39.	Pre-Test Driver's Seat Fore-Aft Markings	A-20
Photo No. 40.	Post-Test Driver's Seat Fore-Aft Markings	A-20
Photo No. 41.	Pre-Test View of Belt Anchorage for Driver Dummy	A-21
Photo No. 42.	Post-Test View of Belt Anchorage for Driver Dummy	A-21
Photo No. 43.	Pre-Test Driver Dummy Feet	A-22
Photo No. 44.	Post-Test Driver Dummy Feet	A-22
Photo No. 45.	Pre-Test Driver's Side Knee Bolster (without dummy)	A-23
Photo No. 46.	Post-Test Driver's Side Knee Bolster (without dummy)	A-23
Photo No. 47.	Pre-Test Driver's Side Floorpan	A-24
Photo No. 48.	Post-Test Driver's Side Floorpan	A-24
Photo No. 49.	Post-Test Driver Dummy Face	A-25
Photo No. 50.	Post-Test Driver Dummy Contact with Airbag	A-25
Photo No. 51.	Post-Test Driver Dummy Contact with Headrest	A-26
Photo No. 52.	Post-Test Driver Dummy Contact with Knee Bolster	A-26
Photo No. 53.	Pre-Test View of the Steering Wheel	A-27
Photo No. 54.	Post-Test View of the Steering Wheel	A-27
Photo No. 55.	Pre-Test Passenger Dummy Front View	A-28
Photo No. 56.	Post-Test Passenger Dummy Front View	A-28
Photo No. 57.	Pre-Test Passenger Dummy Window View	A-29
Photo No. 58.	Post-Test Passenger Dummy Window View	A-29
Photo No. 59.	Pre-Test Passenger Dummy and Vehicle Interior (Door Open)	A-30
Photo No. 60.	Post-Test Passenger Dummy and Vehicle Interior (Door Open)	A-30

		Page No.
Photo No. 61.	Pre-Test Passenger's Seat Fore-Aft Markings	A-31
Photo No. 62.	Post-Test Passenger's Seat Fore-Aft Markings	A-31
Photo No. 63.	Pre-Test View of Belt Anchorage for Passenger Dummy	A-32
Photo No. 64.	Post-Test View of Belt Anchorage for Passenger Dummy	A-32
Photo No. 65.	Pre-Test Passenger Dummy Feet	A-33
Photo No. 66.	Post-Test Passenger Dummy Feet	A-33
Photo No. 67.	Pre-Test Passenger's Side Knee Bolster (without dummy)	A-34
Photo No. 68.	Post-Test Passenger's Side Knee Bolster (without dummy)	A-34
Photo No. 69.	Pre-Test Passenger's Side Floorpan	A-35
Photo No. 70.	Post-Test Passenger's Side Floorpan	A-35
Photo No. 71.	Post-Test Passenger Dummy Face	A-36
Photo No. 72.	Post-Test Passenger Dummy Contact with Airbag	A-36
Photo No. 73.	Post-Test Passenger Dummy Contact with Headrest	A-37
Photo No. 74.	Post-Test Passenger Dummy Contact with Glovebox	A-37
Photo No. 75.	Ballast Installed in Vehicle	A-38
Photo No. 76.	Post-Test Stoddard Solvent Spillage Location View	A-38
Photo No. 77.	Post-Test Speed Trap Read-Out	A-39
Photo No. 78.	Vehicle at 0 Degree on Static Rollover Device	A-39
Photo No. 79.	Vehicle at 90 Degrees on Static Rollover Device	A-40
Photo No. 80.	Vehicle at 180 Degrees on Static Rollover Device	A-40
Photo No. 81.	Vehicle at 270 Degrees on Static Rollover Device	A-41
Photo No. 82.	Vehicle at 360 Degrees on Static Rollover Device	A-41
Photo No. 83.	2015 Ford Transit Frontal Impact Event	A-42
Photo No. 84.	Monroney Label Photograph	A-42



Load Cell Location



Load Cell Wall

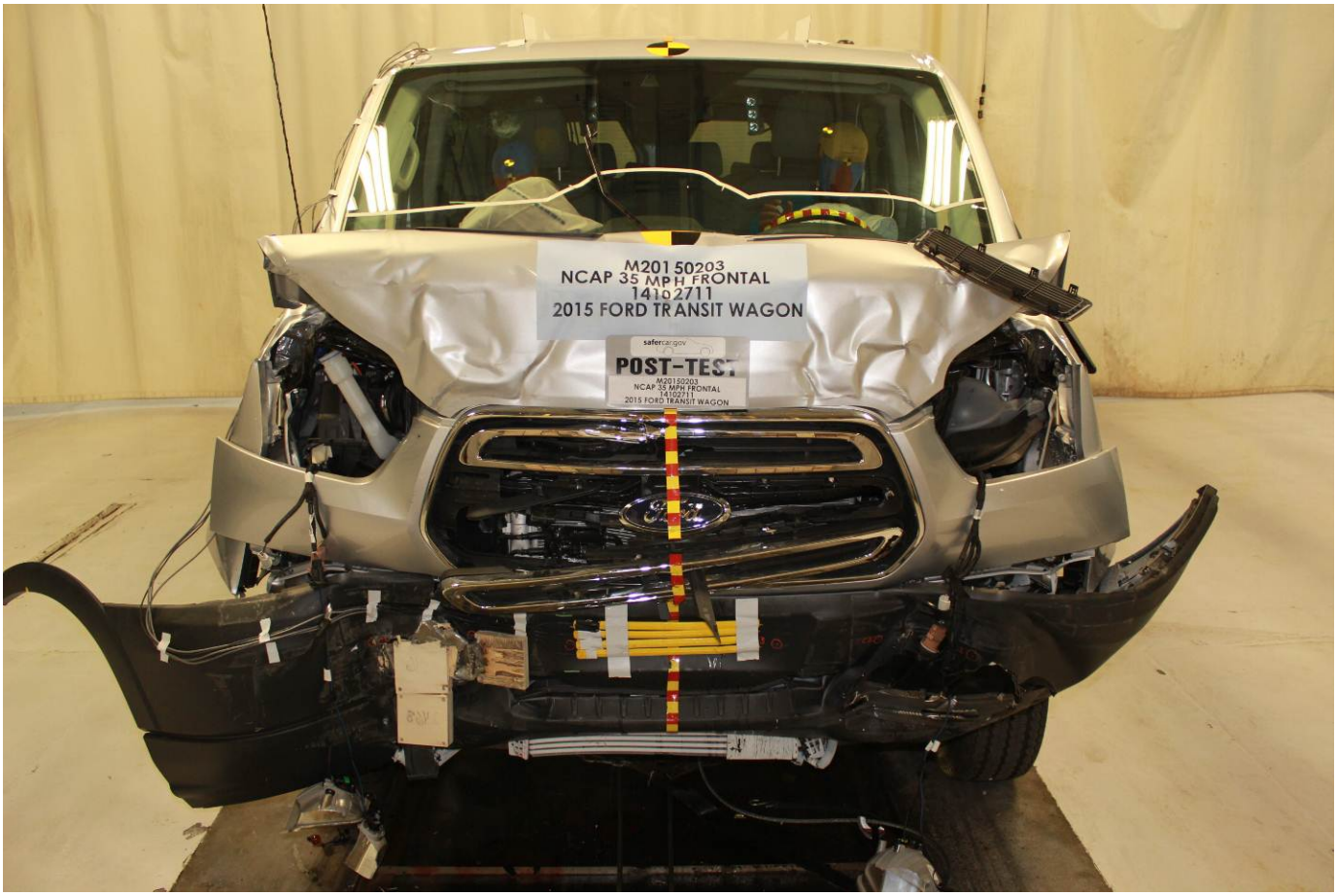
Manufacturer's Label

Tire Placard

2015 Ford Transit Frontal As Delivered

Left Rear 3-4 View, As Received

Pre-Test Front View of Test Vehicle



Post-Test Front View of Test Vehicle

Pre-Test Left View of Test Vehicle

Post-Test Left View of Test Vehicle

Pre-Test Right View of Test Vehicle

Post-Test Right View of Test Vehicle

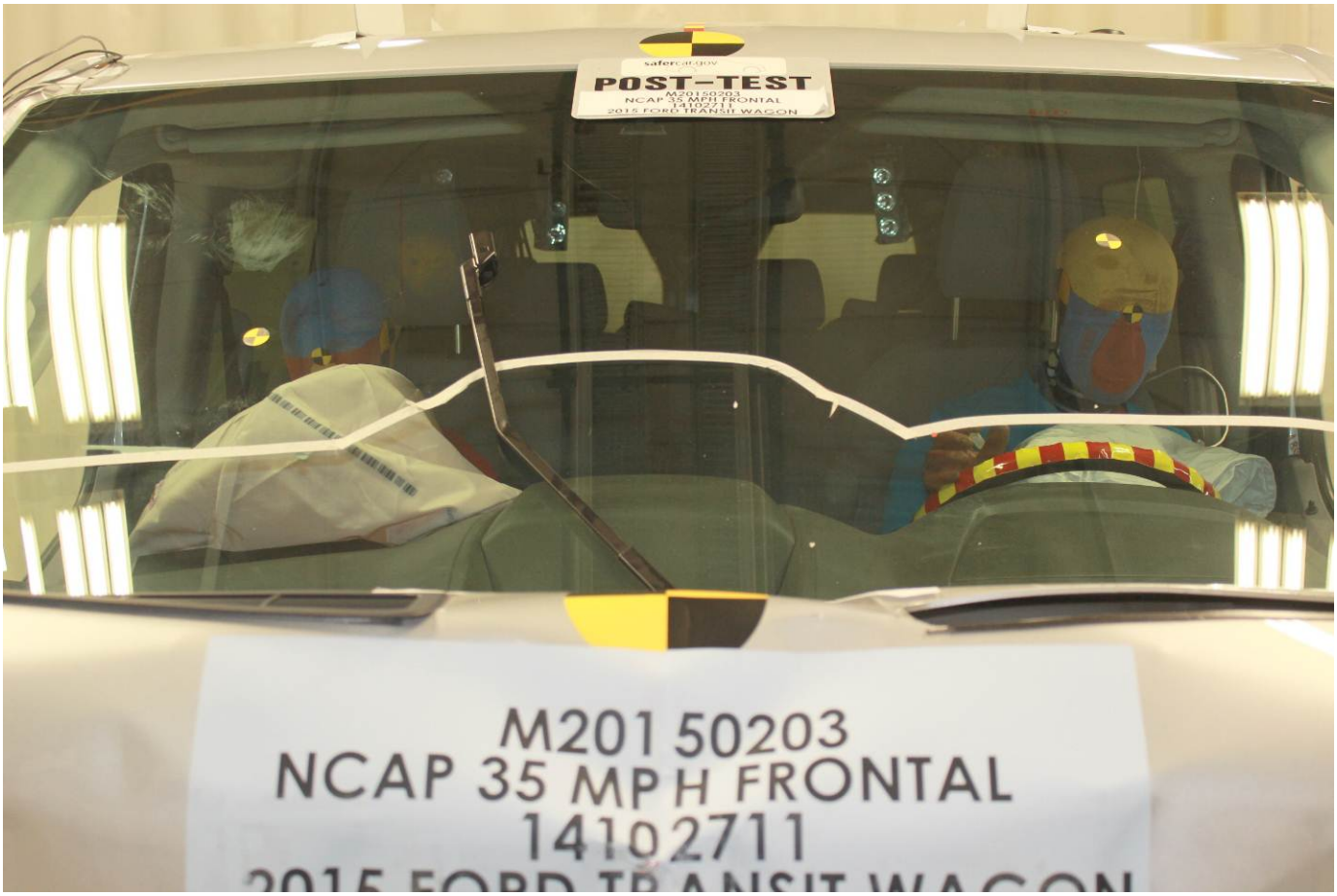
Pre-Test Right Front 3-4 View

Post-Test Right Front 3-4 View

Pre-Test Left Rear 3-4 View

Post-Test Left Rear 3-4 View

Pre-Test Windshield View



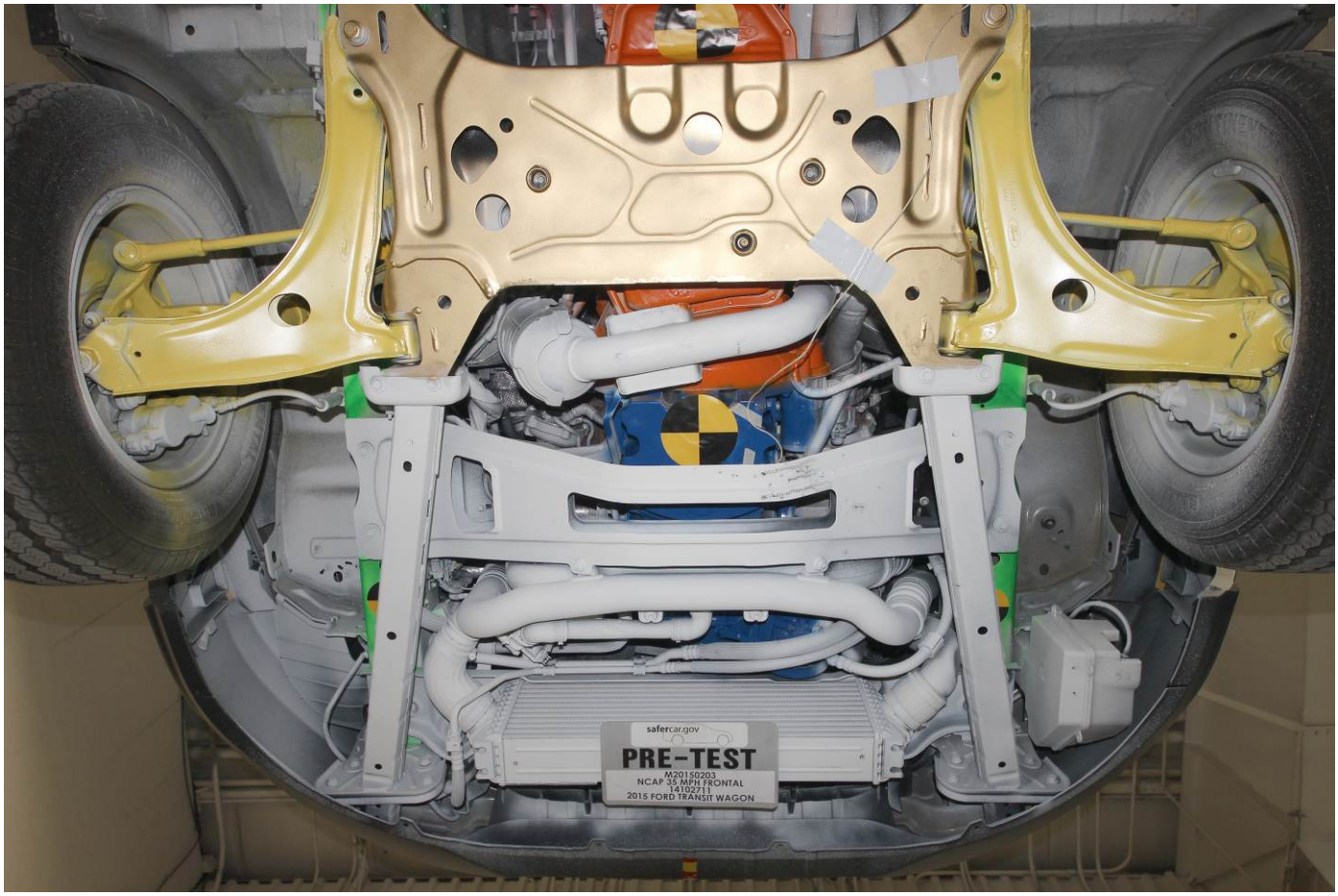
Post-Test Windshield View

Pre-Test Engine Compartment View

Post-Test Engine Compartment View

Pre-Test Fuel Filler Cap View

Post-Test Fuel Filler Cap View

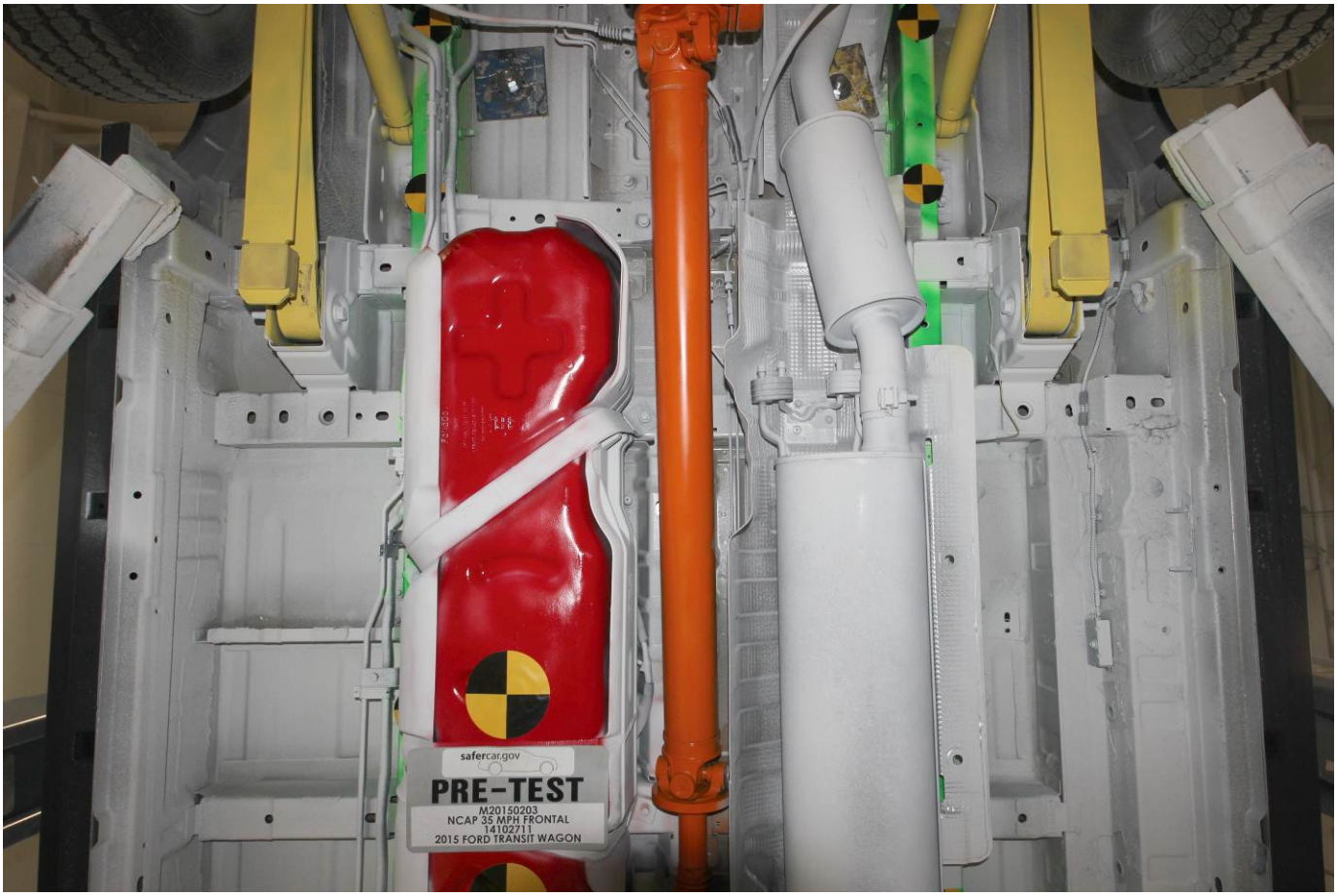


Pre-Test Front Underbody View

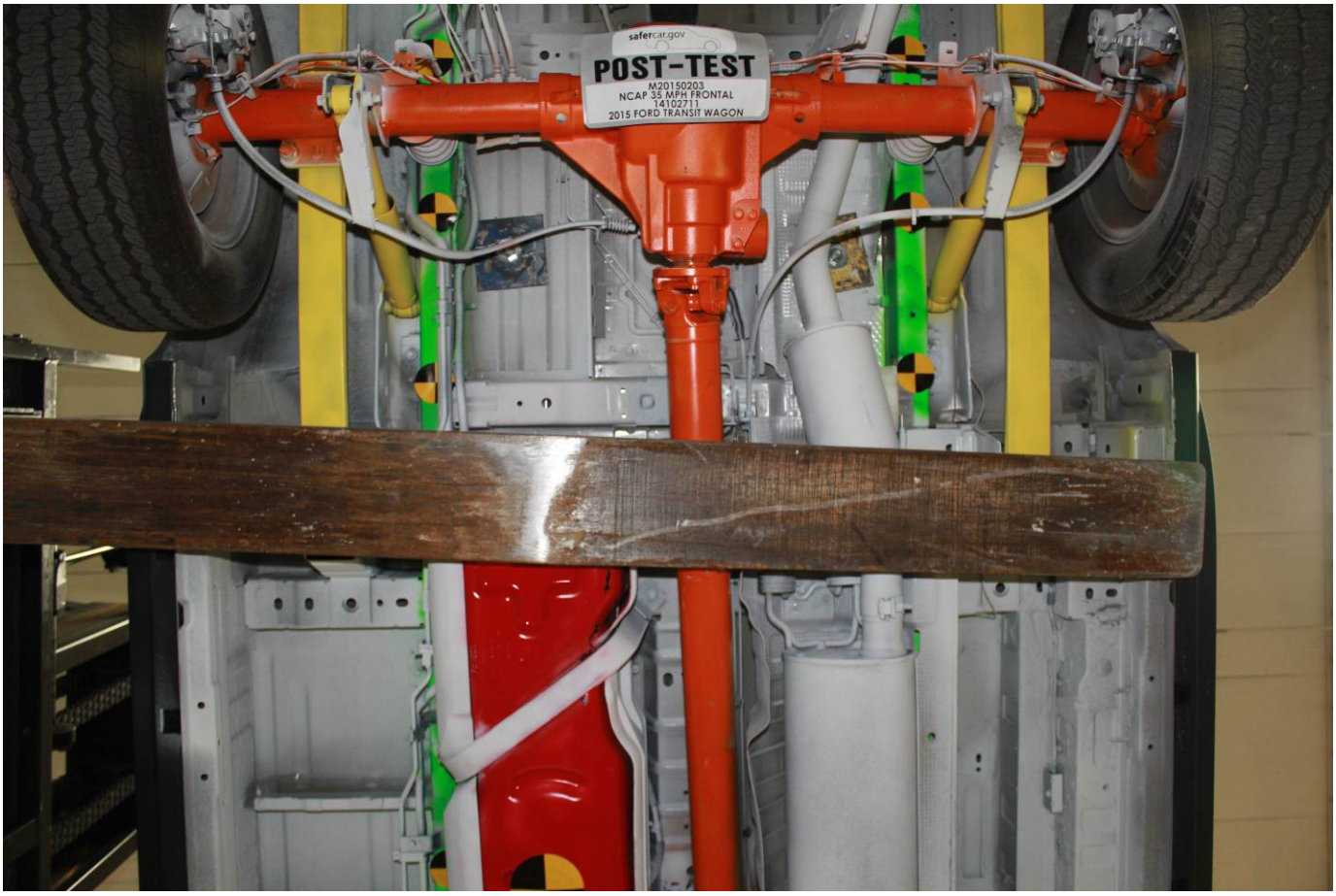
Post-Test Front Underbody View

Pre-Test Mid Front Underbody View

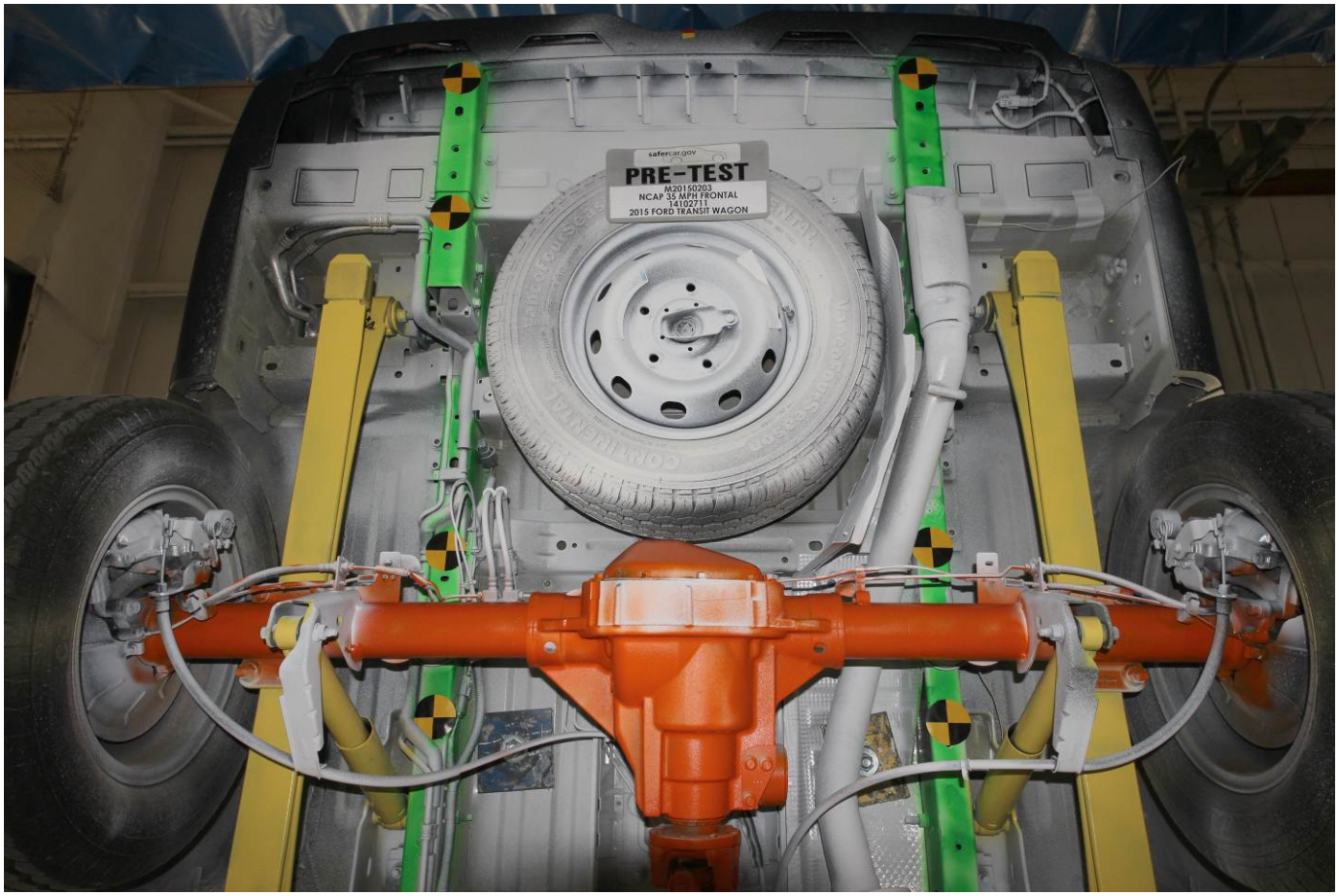
Post-Test Mid Front Underbody View



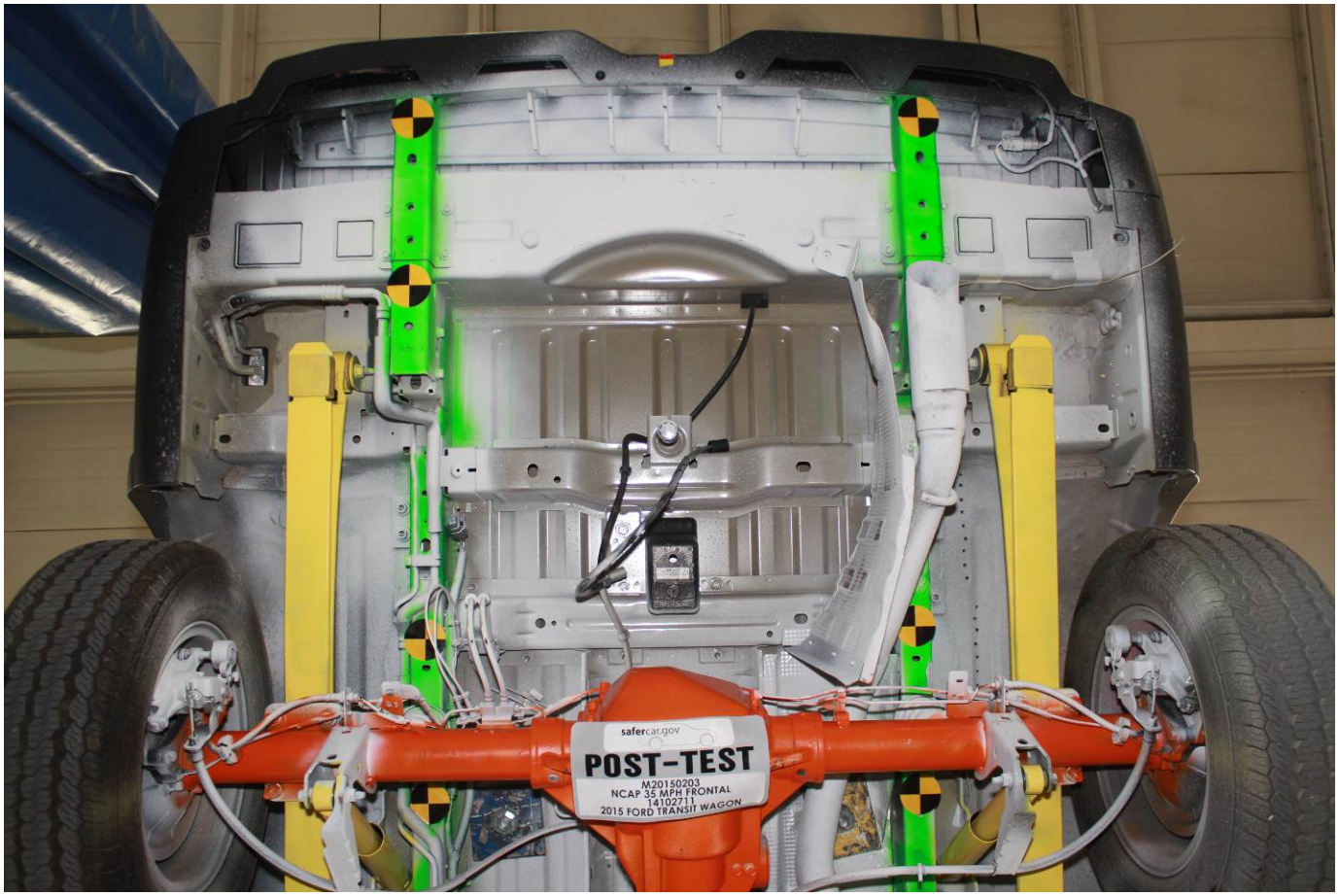
Pre-Test Mid Rear Underbody View



Post-Test Mid Rear Underbody View



Pre-Test Rear Underbody View



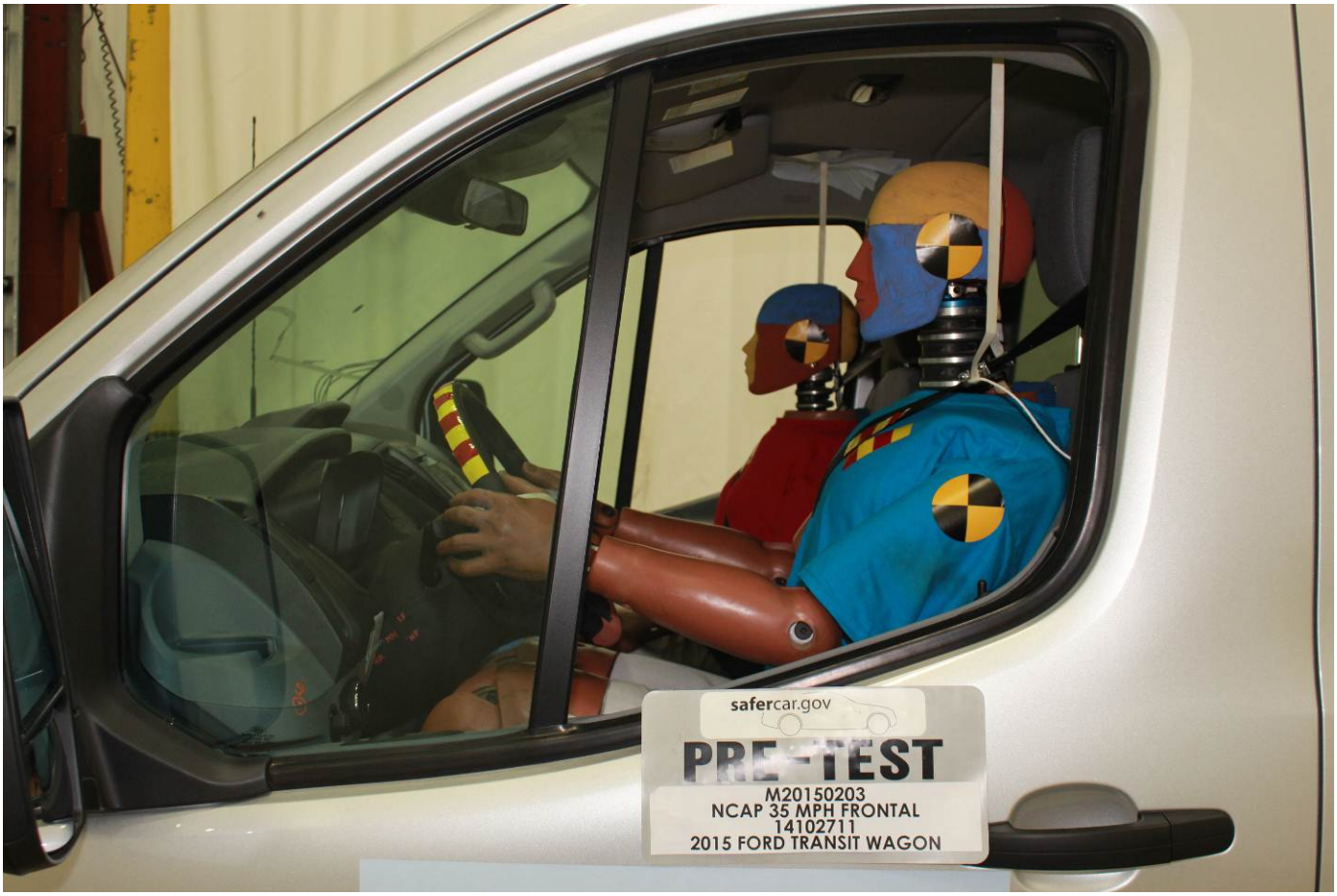
Post-Test Rear Underbody View

Pre-Test Dummy Cable Routing

Post-Test Dummy Cable Routing

Pre-Test Driver Dummy Front View

Post-Test Driver Dummy Front View



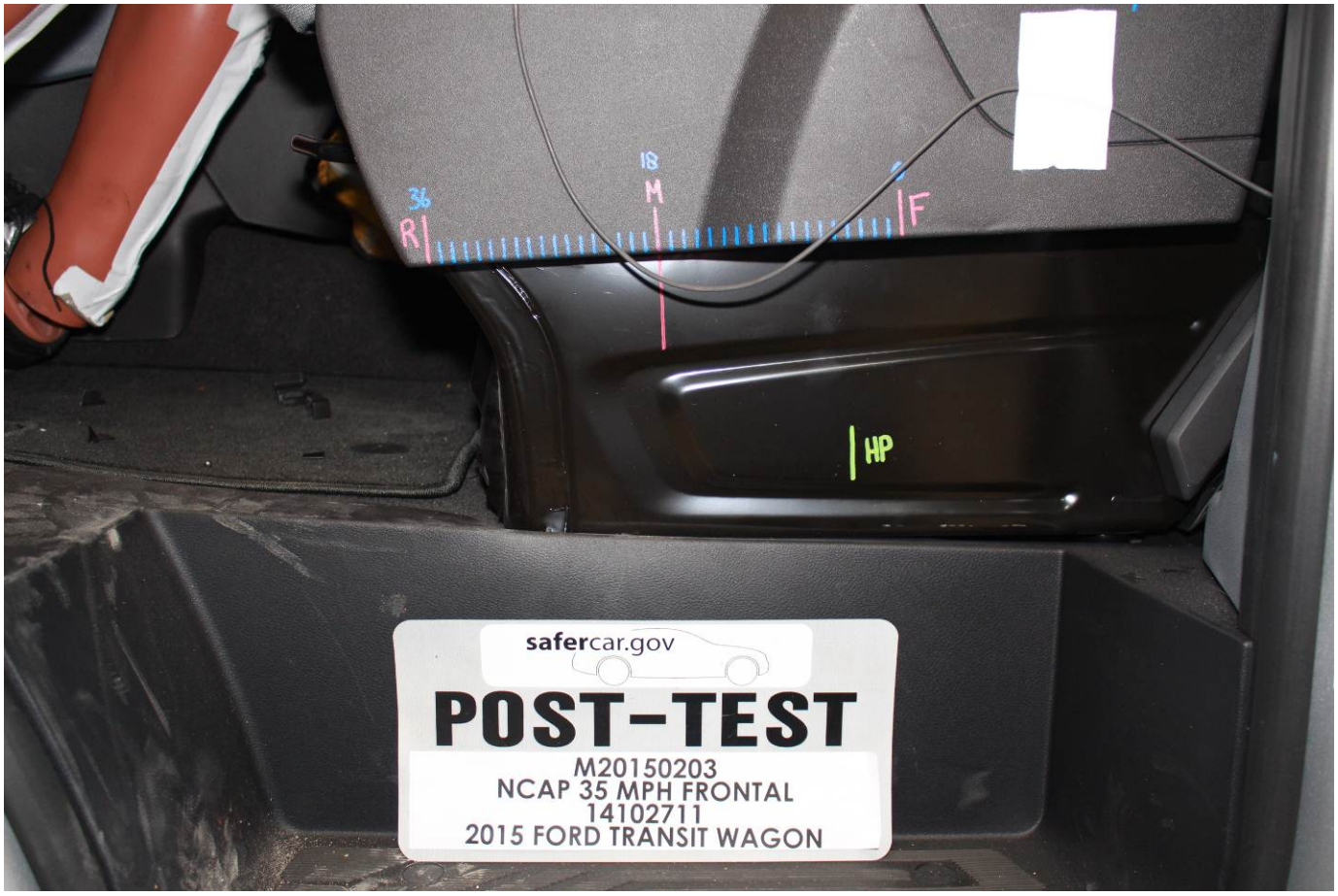
Pre-Test Driver Dummy Window View

Post-Test Driver Dummy Window View

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

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

Pre-Test Driver's Seat Fore-Aft Markings



Post-Test Driver's Seat Fore-Aft Markings

Pre-Test View of Belt Anchorage for Driver Dummy

Post-Test View of Belt Anchorage for Driver Dummy

Pre-Test Driver Dummy Feet

Post-Test Driver Dummy Feet

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

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

Pre-Test Driver's Side Floorpan

Post-Test Driver's Side Floorpan

Post-Test Driver Dummy Face

Post-Test Driver Dummy Contact with Airbag

Post-Test Driver Dummy Contact with Headrest

Post-Test Driver Dummy Contact with Knee Bolster

Pre-Test View of the Steering Wheel

Post-Test View of the Steering Wheel

Pre-Test Passenger Dummy Front View

Post-Test Passenger Dummy Front View

Pre-Test Passenger Dummy Window View

Post-Test Passenger Dummy Window View

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

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

Pre-Test Passenger's Seat Fore-Aft Markings

Post-Test Passenger's Seat Fore-Aft Markings

Pre-Test View of Belt Anchorage for Passenger Dummy

Post-Test View of Belt Anchorage for Passenger Dummy

Pre-Test Passenger Dummy Feet

Post-Test Passenger Dummy Feet

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

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

Pre-Test Passenger's Side Floorpan

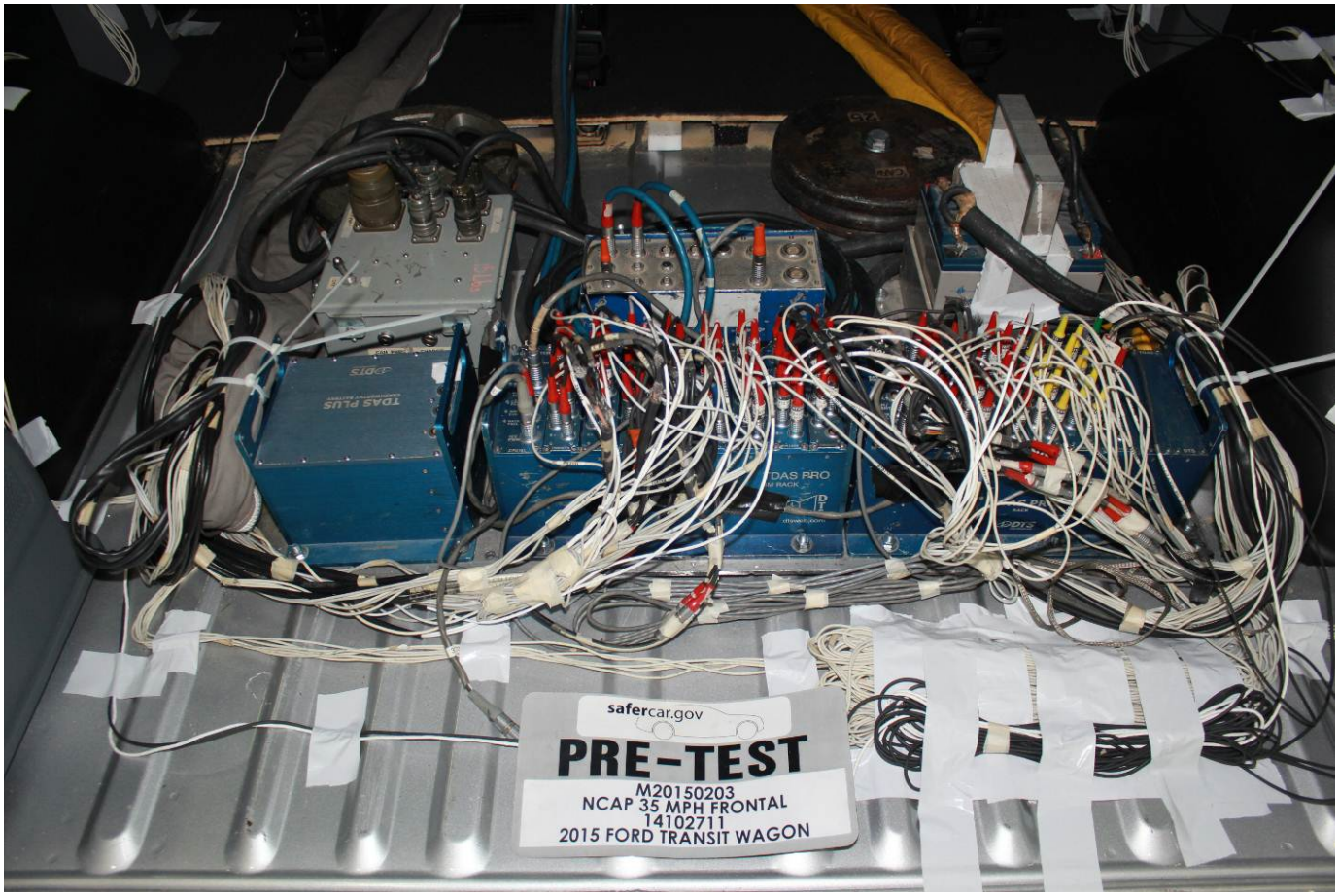
Post-Test Passenger's Side Floorpan

Post-Test Passenger Dummy Face

Post-Test Passenger Dummy Contact with Airbag

Post-Test Passenger Dummy Contact with Headrest

Post-Test Passenger Dummy Contact with Glovebox



Ballast Installed in Vehicle

PHOTOGRAPH NOT APPLICABLE

Post-Test Stoddard Solvent Spillage Location View

Post-Test Speed Trap Read-Out

Vehicle at 0 Degree on Static Rollover Device

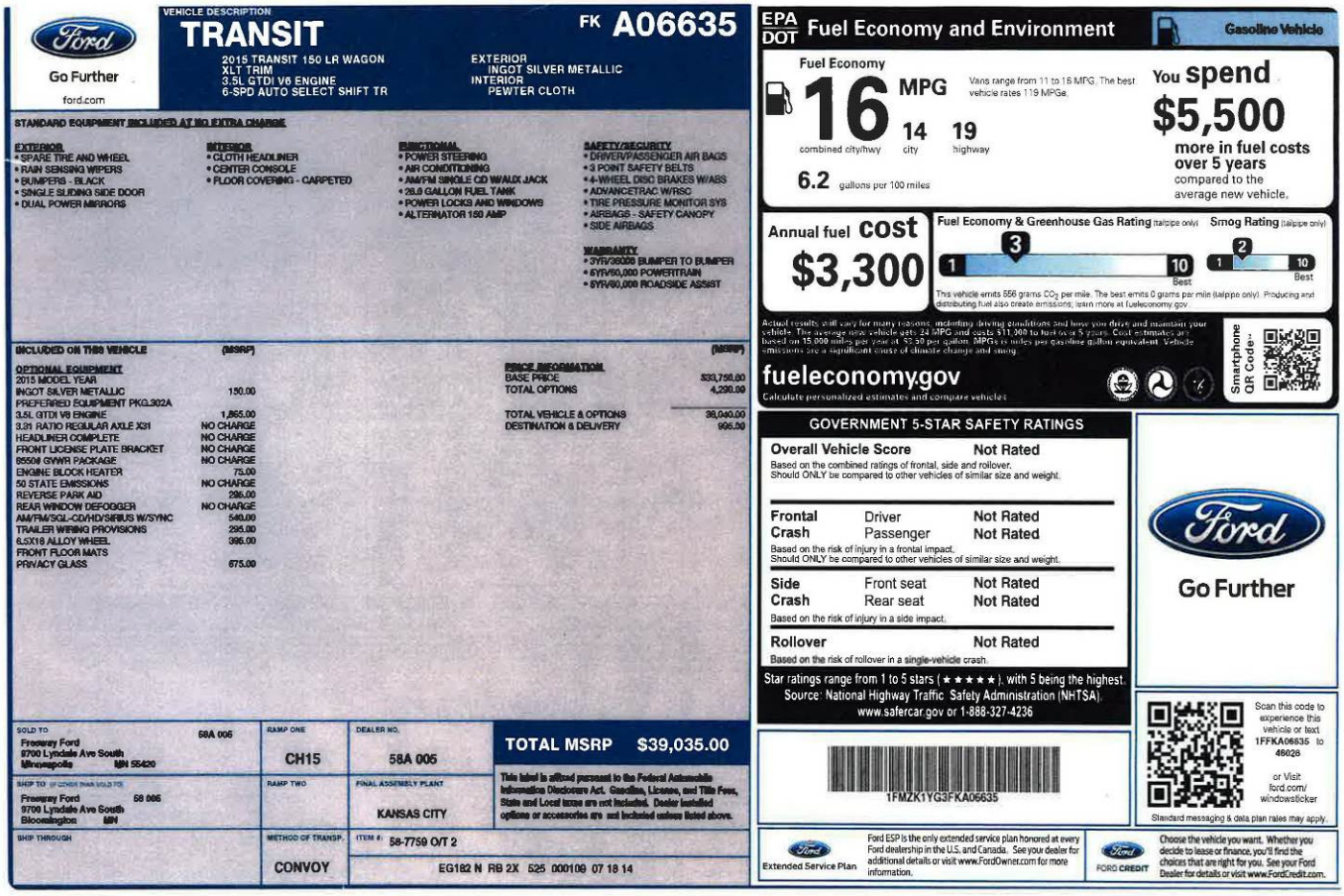
Vehicle at 90 Degrees on Static Rollover Device

Vehicle at 180 Degrees on Static Rollover Device

Vehicle at 270 Degrees on Static Rollover Device

Vehicle at 360 Degrees on Static Rollover Device

2015 Ford Transit Frontal Impact Event



VEHICLE DESCRIPTION
TRANSIT
2015 TRANSIT 150 LR WAGON
XLT TRIM
3.5L GTDI V6 ENGINE
6-SPD AUTO SELECT SHIFT TR

FK A06635

EXTERIOR
INGOT SILVER METALLIC
INTERIOR
PEWTER CLOTH

Ford
Go Further
ford.com

STANDARD EQUIPMENT INCLUDED AT NO EXTRA CHARGE

EXTERIOR
• SPARE TIRE AND WHEEL
• RAIN SENSING WIPERS
• BUMPERS - BLACK
• SINGLE SLIDING SIDE DOOR
• DUAL POWER MIRRORS

INTERIOR
• CLOTH HEADLINER
• CENTER CONSOLE
• FLOOR COVERING - CARPETED

MECHANICAL
• POWER STEERING
• AIR CONDITIONING
• AM/FM SINGLE CD W/AUX JACK
• 26.0 GALLON FUEL TANK
• POWER LOCKS AND WINDOWS
• ALTERNATOR 150 AMP

SAFETY/SECURITY
• DRIVER/PASSENGER AIR BAGS
• 3 POINT SAFETY BELTS
• 4-WHEEL DISC BRAKES W/ABS
• ADVANCETRAC W/RSC
• TIRE PRESSURE MONITOR SYS
• AIRBAGS - SAFETY CANOPY
• SIDE AIRBAGS

WARRANTY
• 3YR/36000 BUMPER TO BUMPER
• 5YR/60,000 POWERTRAIN
• 5YR/60,000 ROADSIDE ASSIST

INCLUDED ON THIS VEHICLE	(MSRP)
OPTIONAL EQUIPMENT	
2015 MODEL YEAR	
INGOT SILVER METALLIC	150.00
PREFERRED EQUIPMENT PKG.302A	
3.5L GTDI V6 ENGINE	1,865.00
3.31 RATIO REGULAR AXLE X31	NO CHARGE
HEADLINER COMPLETE	NO CHARGE
FRONT LICENSE PLATE BRACKET	NO CHARGE
650W GVWR PACKAGE	NO CHARGE
ENGINE BLOCK HEATER	75.00
50 STATE EMISSIONS	NO CHARGE
REVERSE PARK AID	295.00
REAR WINDOW DEFOGGER	NO CHARGE
AM/FM/SCL-CD/HD/SIRIUS W/SYNC	540.00
TRAILER WIRING PROVISIONS	295.00
6.5X16 ALLOY WHEEL	395.00
FRONT FLOOR MATS	
PRIVACY GLASS	675.00

PRICE INFORMATION	(MSRP)
BASE PRICE	$33,750.00
TOTAL OPTIONS	4,290.00
TOTAL VEHICLE & OPTIONS	38,040.00
DESTINATION & DELIVERY	995.00

SOLD TO 58A 005
Freeway Ford
5700 Lyndale Ave South
Minneapolis MN 55420

RAMP ONE CH15

DEALER NO. 58A 005

TOTAL MSRP $39,035.00

This label is affixed pursuant to the Federal Automobile Information Disclosure Act. Gasoline, License, and Title Fees, State and Local taxes are not included. Dealer installed options or accessories are not included unless listed above.

SHIP TO (IF OTHER THAN SOLD TO) 58 005
Freeway Ford
9700 Lyndale Ave South
Bloomington MN

RAMP TWO

FINAL ASSEMBLY PLANT KANSAS CITY

SHIP THROUGH

METHOD OF TRANSP. CONVOY

ITEM #: 58-7759 O/T 2

EG182 N RB 2X 525 000109 07 18 14

EPA DOT Fuel Economy and Environment

Gasoline Vehicle

Fuel Economy
16 MPG
combined city/hwy
14 city
19 highway
6.2 gallons per 100 miles

Vans range from 11 to 16 MPG. The best vehicle rates 119 MPGe.

You spend $5,500 more in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost $3,300

Fuel Economy & Greenhouse Gas Rating (tailpipe only) 3 (1 to 10, Best)

Smog Rating (tailpipe only) 2 (1 to 10, Best)

This vehicle emits 856 grams CO_2 per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also create emissions; learn more at fueleconomy.gov

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 24 MPG and costs $11,300 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at $2.50 per gallon. MPGe is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

fueleconomy.gov
Calculate personalized estimates and compare vehicles

Smartphone QR Code

GOVERNMENT 5-STAR SAFETY RATINGS

Overall Vehicle Score: Not Rated
Based on the combined ratings of frontal, side and rollover. Should ONLY be compared to other vehicles of similar size and weight.

Frontal Crash — Driver: Not Rated; Passenger: Not Rated
Based on the risk of injury in a frontal impact. Should ONLY be compared to other vehicles of similar size and weight.

Side Crash — Front seat: Not Rated; Rear seat: Not Rated
Based on the risk of injury in a side impact.

Rollover: Not Rated
Based on the risk of rollover in a single-vehicle crash.

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

Ford
Go Further

1FMZK1YG3FKA06635

Scan this code to experience this vehicle or text 1FFKA06635 to 46026

or Visit ford.com/windowsticker

Standard messaging & data plan rates may apply.

Ford Extended Service Plan

Ford ESP is the only extended service plan honored at every Ford dealership in the U.S. and Canada. See your dealer for additional details or visit www.FordOwner.com for more information.

Ford Credit

Choose the vehicle you want. Whether you decide to lease or finance, you'll find the choices that are right for you. See your Ford Dealer for details or visit www.FordCredit.com.

Monroney Label Photograph

APPENDIX B
DUMMY RESPONSE DATA TRACES

TABLE OF DATA PLOTS

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

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

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

Driver Head X Redundant

Driver Head Y Redundant

Driver Head Z Redundant

Driver Upper Neck Force Y

Driver Upper Neck Moment X

Driver Upper Neck Moment Z

Driver Chest X Redundant

Driver Chest Y Redundant

Driver Chest Z Redundant

Driver Pelvis X

Driver Pelvis Y

Driver Pelvis Z

Driver Left Femur Redundant

Driver Right Femur Redundant

Driver Left Upper Tibia Moment X

Driver Left Upper Tibia Moment Y

Driver Left Upper Tibia Force Z

Driver Left Lower Tibia Moment X

Driver Left Lower Tibia Moment Y

Driver Left Lower Tibia Force Z

Driver Right Upper Tibia Moment X

Driver Right Upper Tibia Moment Y

Driver Right Upper Tibia Force Z

Driver Right Lower Tibia Moment X

Driver Right Lower Tibia Moment Y

Driver Right Lower Tibia Force Z

Driver Left Foot Fore Z

Driver Left Foot Aft X

Driver Left Foot Aft Z

Driver Right Foot Fore Z

Driver Right Foot Aft X

Driver Right Foot Aft Z

Driver Lap Belt Force

Driver Shoulder Belt Force

Passenger Head X Redundant

Passenger Head Y Redundant

Passenger Head Z Redundant

Passenger Upper Neck Force Y

Passenger Upper Neck Moment X

Passenger Upper Neck Moment Z

Passenger Chest X Redundant

Passenger Chest Y Redundant

Passenger Chest Z Redundant

Passenger Pelvis X

Passenger Pelvis Y

Passenger Pelvis Z

Passenger Left Femur Redundant

Passenger Right Femur Redundant

Passenger Left Upper Tibia Moment X

Passenger Left Upper Tibia Moment Y

Passenger Left Upper Tibia Force Z

Passenger Left Lower Tibia Moment X

Passenger Left Lower Tibia Moment Y

Passenger Left Lower Tibia Force Z

Passenger Right Upper Tibia Moment X

Passenger Right Upper Tibia Moment Y

Passenger Right Upper Tibia Force Z

Passenger Right Lower Tibia Moment X

Passenger Right Lower Tibia Moment Y

Passenger Right Lower Tibia Force Z

Passenger Left Foot Fore Z

Passenger Left Foot Aft X

Passenger Left Foot Aft Z

Passenger Right Foot Fore Z

Passenger Right Foot Aft X

Passenger Right Foot Aft Z

Passenger Lap Belt Force

Passenger Shoulder Belt Force

Left Rear Seat Crossmember X

Right Rear Seat Crossmember X

Vehicle Engine Top X

Vehicle Engine Bottom X

Left Rear Seat Crossmember Z

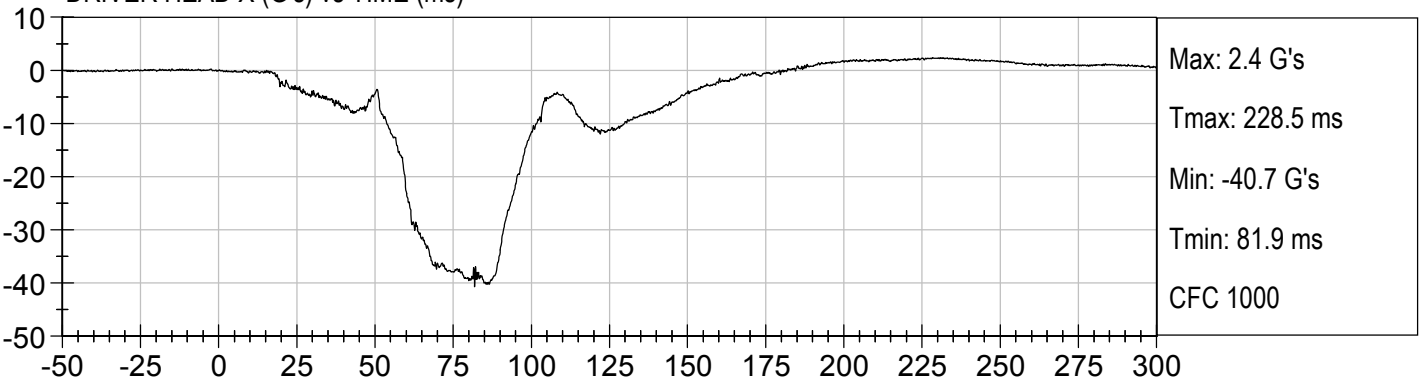
Right Rear Seat Crossmember Z

Left Rear Seat Crossmember Xr

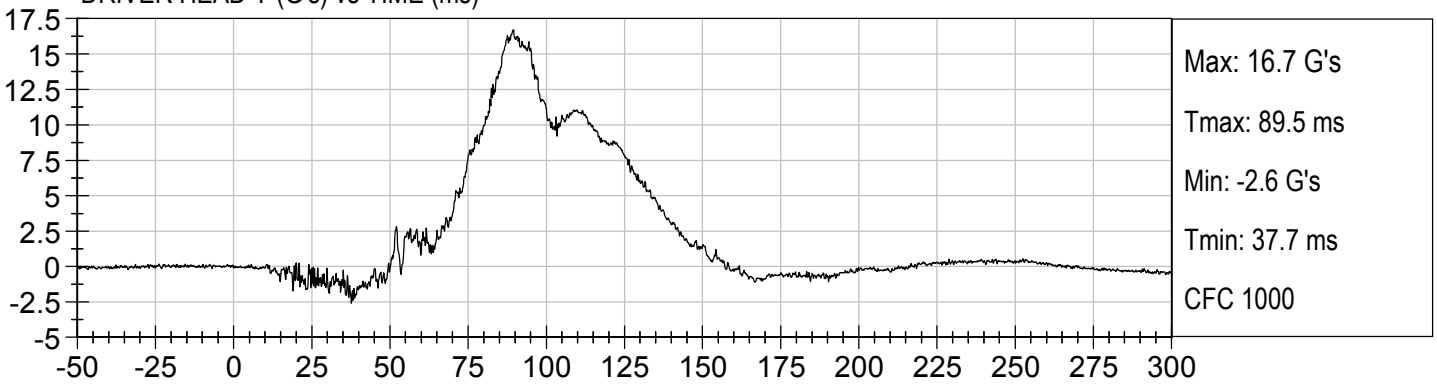
Right Rear Seat Crossmember Xr

Advanced Research Load Cell Barrier – 528 channels

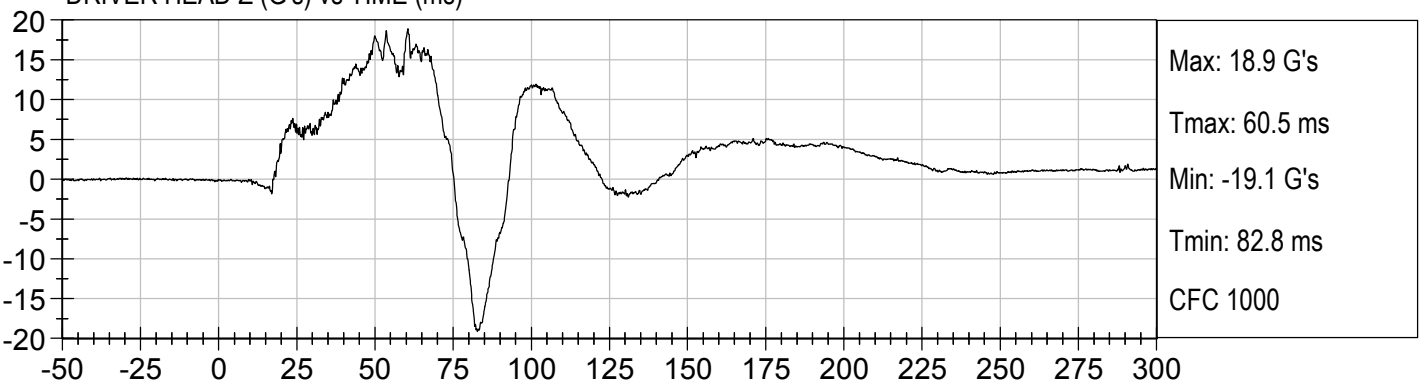
DRIVER HEAD X (G's) vs TIME (ms)



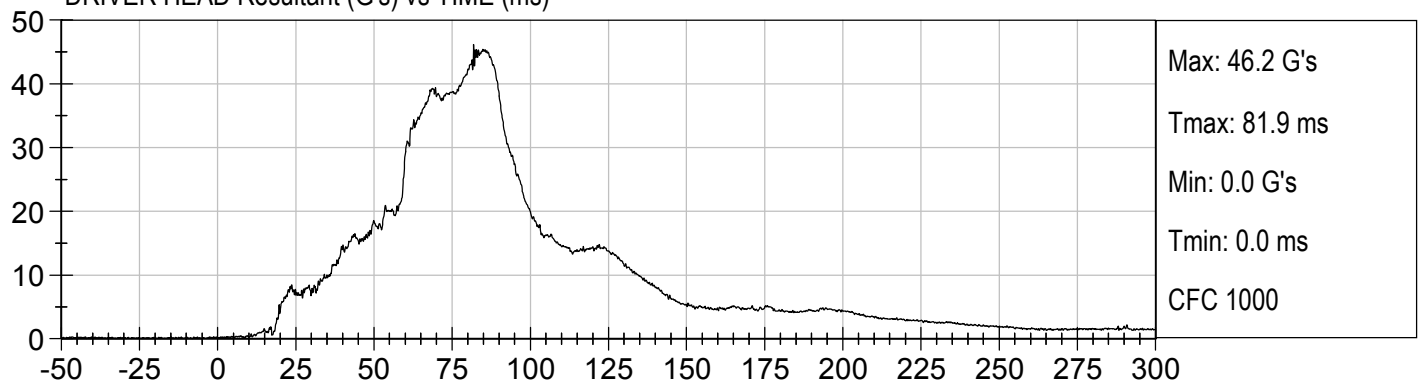
DRIVER HEAD Y (G's) vs TIME (ms)



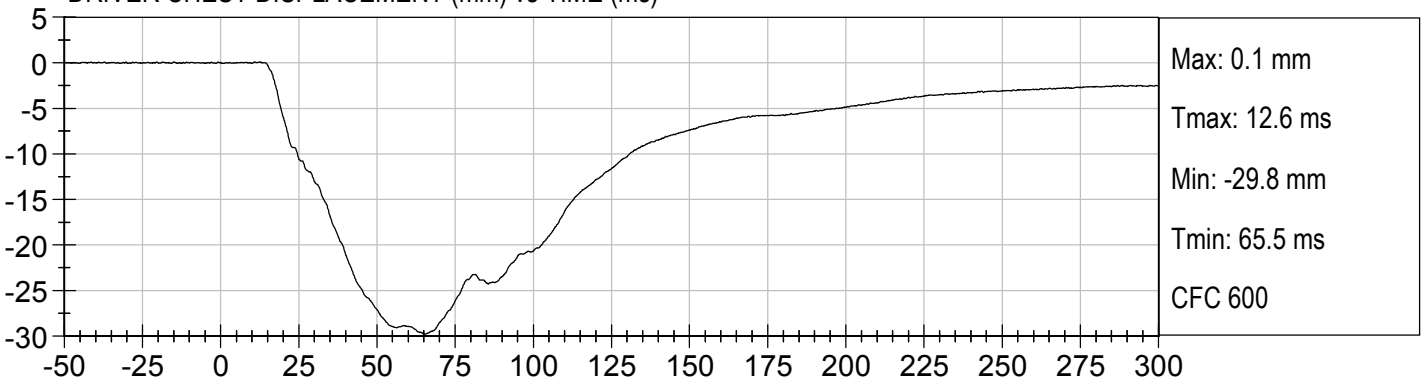
DRIVER HEAD Z (G's) vs TIME (ms)

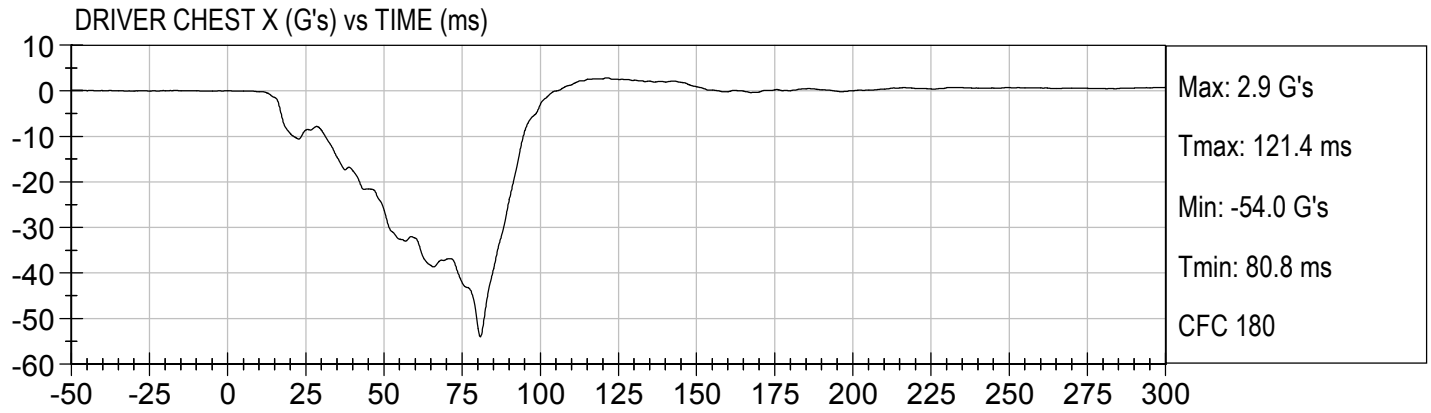


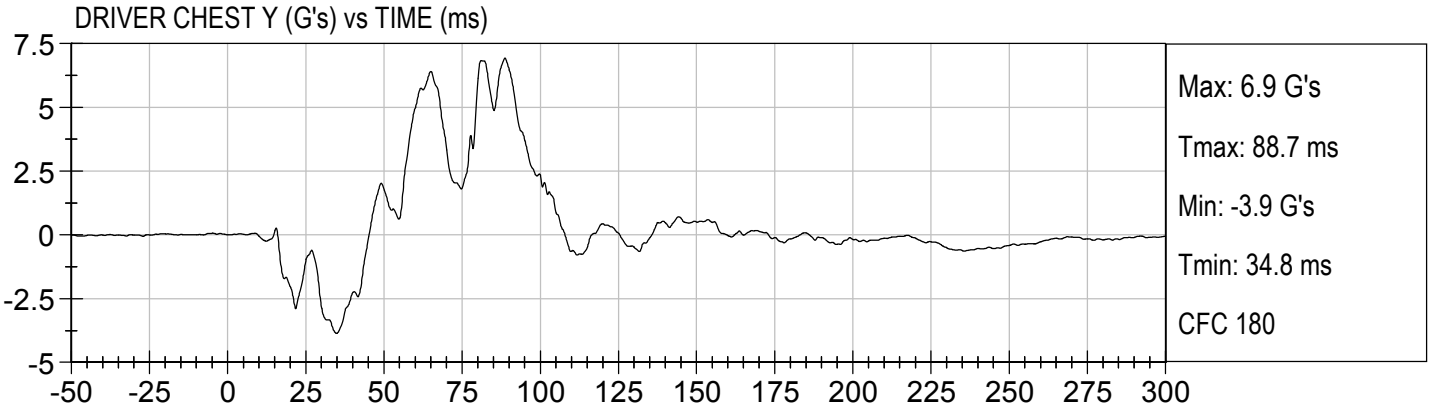
DRIVER HEAD Resultant (G's) vs TIME (ms)

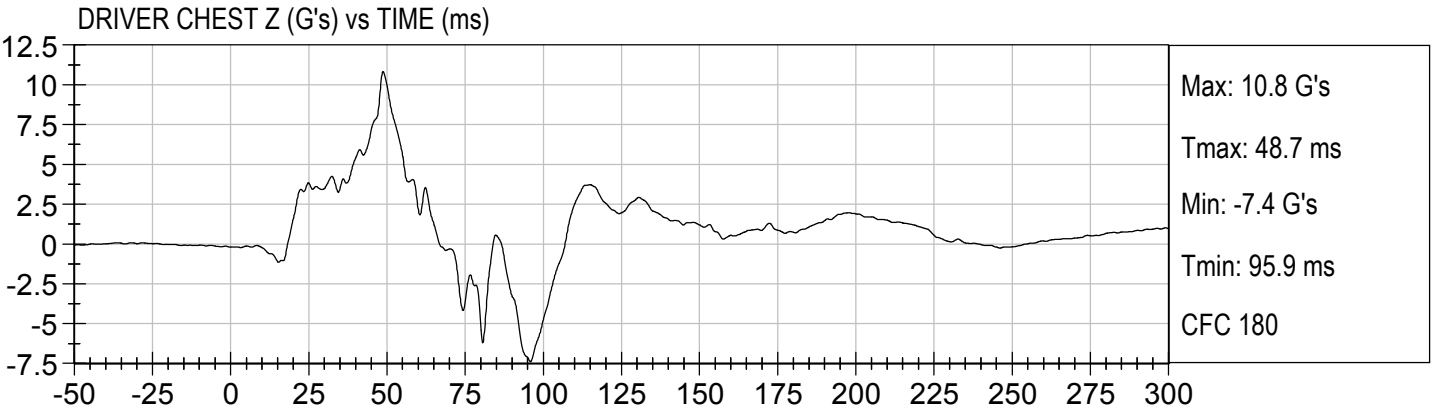


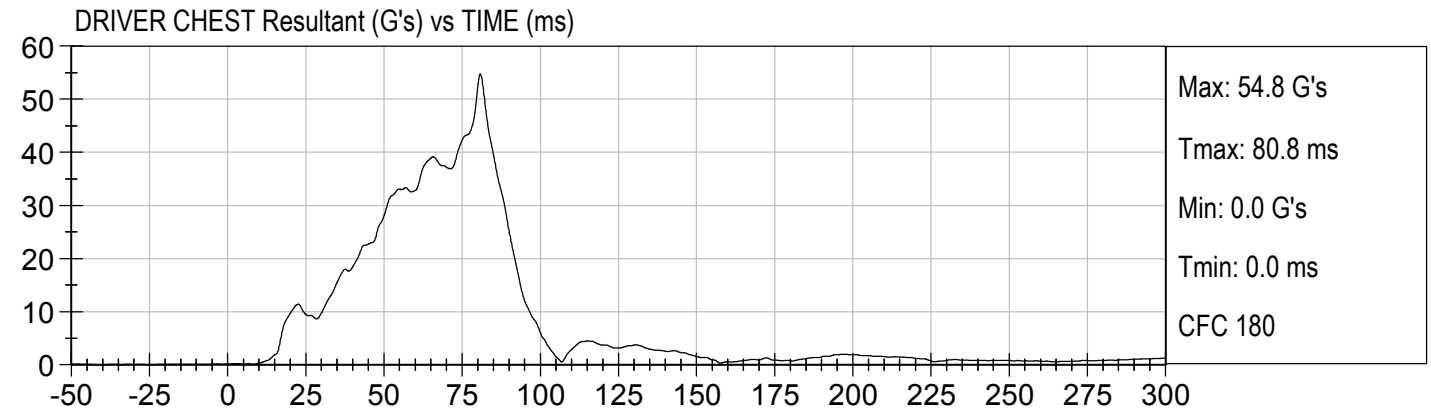
DRIVER CHEST DISPLACEMENT (mm) vs TIME (ms)



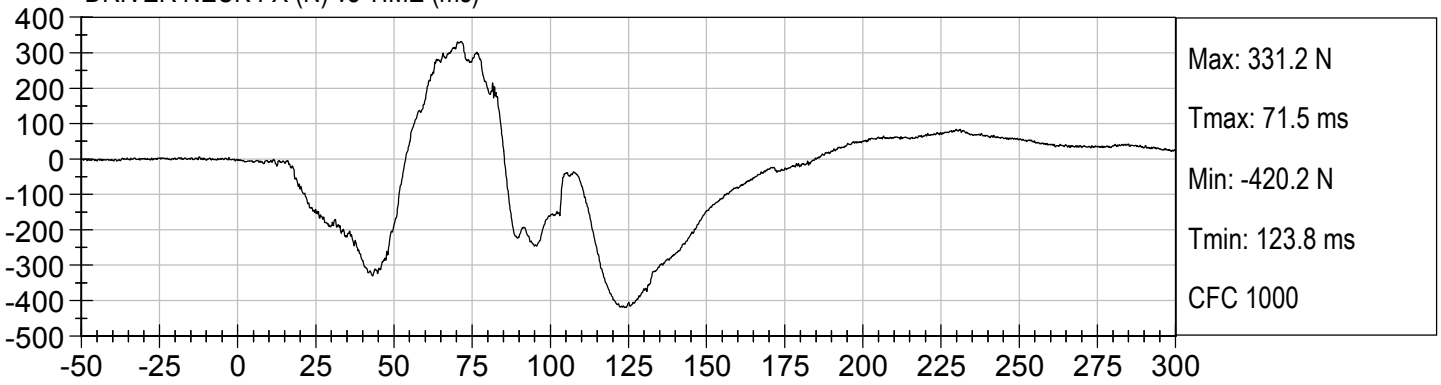

DRIVER CHEST X (G's) vs TIME (ms)
10
0
-10
-20
-30
-40
-50
-60
-50 -25 0 25 50 75 100 125 150 175 200 225 250 275 300
Max: 2.9 G's
Tmax: 121.4 ms
Min: -54.0 G's
Tmin: 80.8 ms
CFC 180


DRIVER CHEST Y (G's) vs TIME (ms)
7.5
5
2.5
0
-2.5
-5
-50 -25 0 25 50 75 100 125 150 175 200 225 250 275 300
Max: 6.9 G's
Tmax: 88.7 ms
Min: -3.9 G's
Tmin: 34.8 ms
CFC 180


DRIVER CHEST Z (G's) vs TIME (ms)
12.5
10
7.5
5
2.5
0
-2.5
-5
-7.5
-50 -25 0 25 50 75 100 125 150 175 200 225 250 275 300
Max: 10.8 G's
Tmax: 48.7 ms
Min: -7.4 G's
Tmin: 95.9 ms
CFC 180

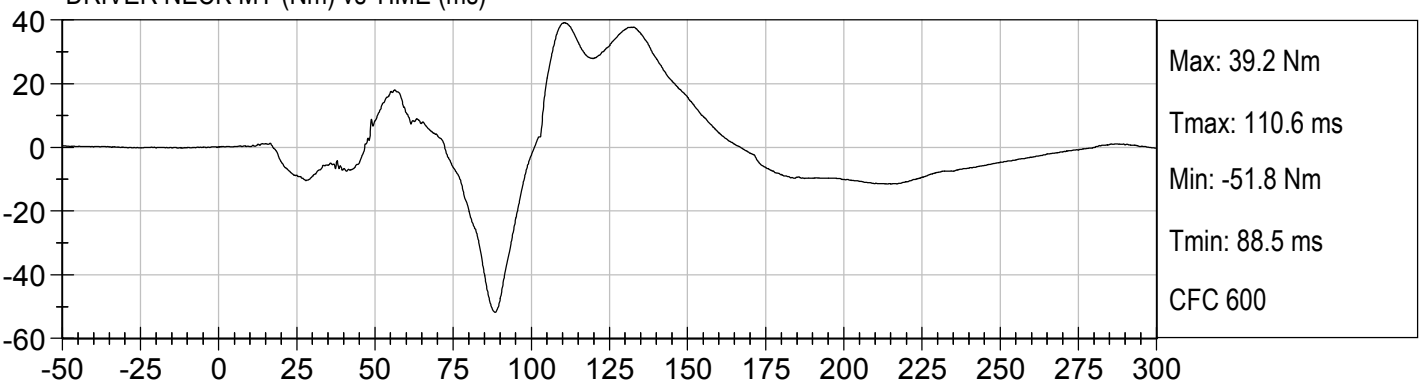

DRIVER CHEST Resultant (G's) vs TIME (ms)
60
50
40
30
20
10
0
-50 -25 0 25 50 75 100 125 150 175 200 225 250 275 300
Max: 54.8 G's
Tmax: 80.8 ms
Min: 0.0 G's
Tmin: 0.0 ms
CFC 180

DRIVER NECK FX (N) vs TIME (ms)

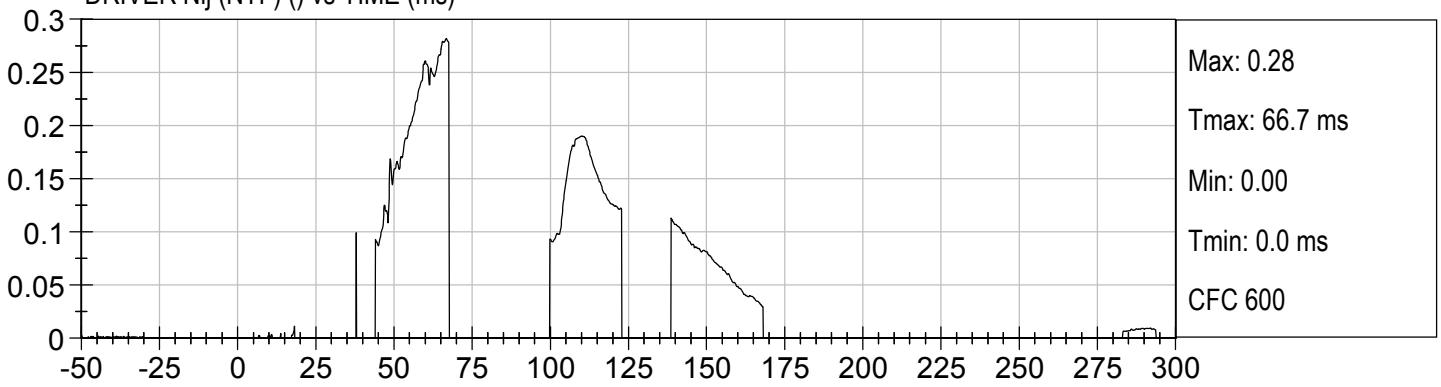


DRIVER NECK FZ (N) vs TIME (ms)

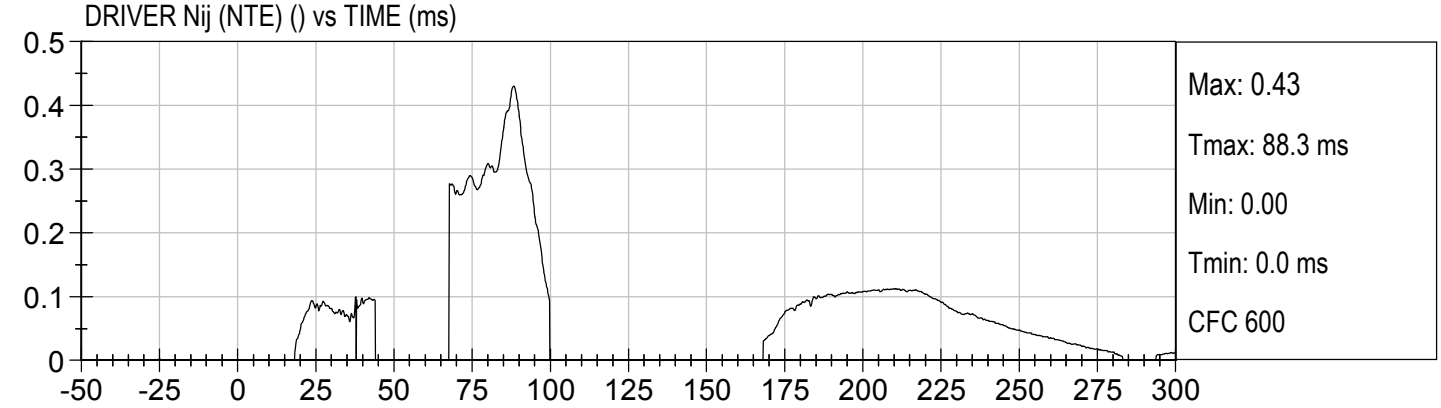
DRIVER NECK MY (Nm) vs TIME (ms)



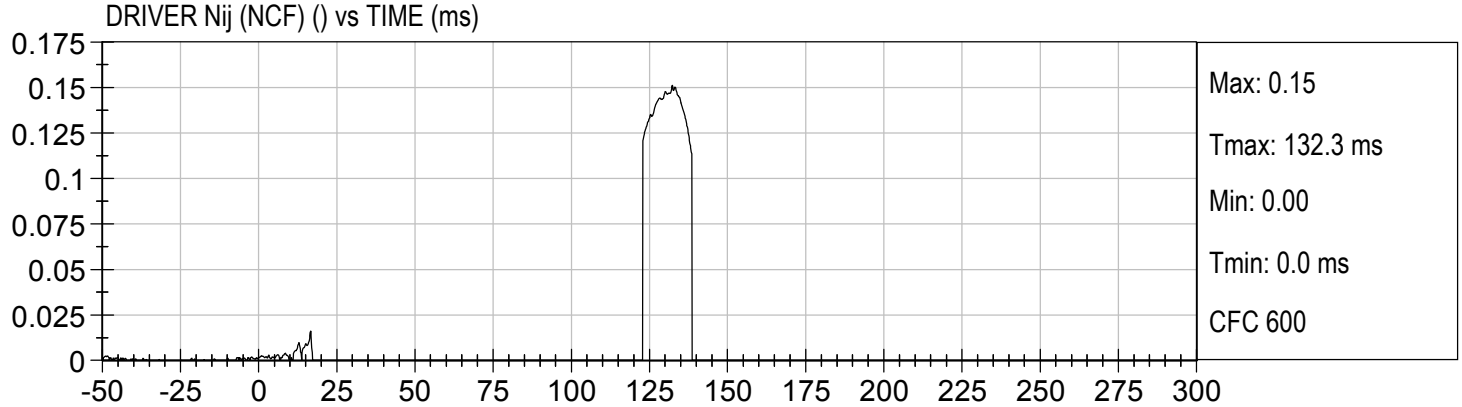
DRIVER Nij (NTF) () vs TIME (ms)



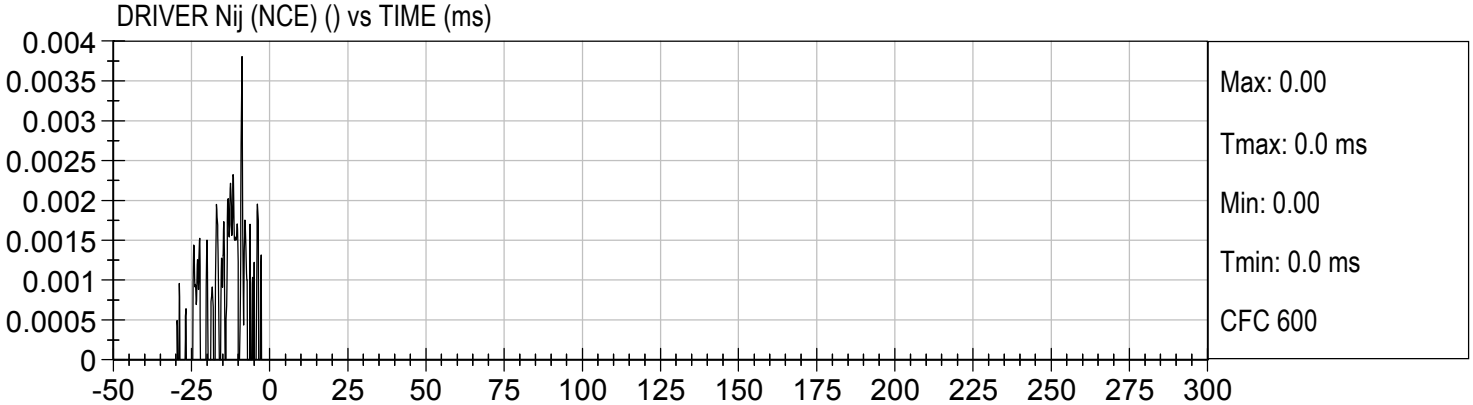
DRIVER Nij (NTE) () vs TIME (ms)



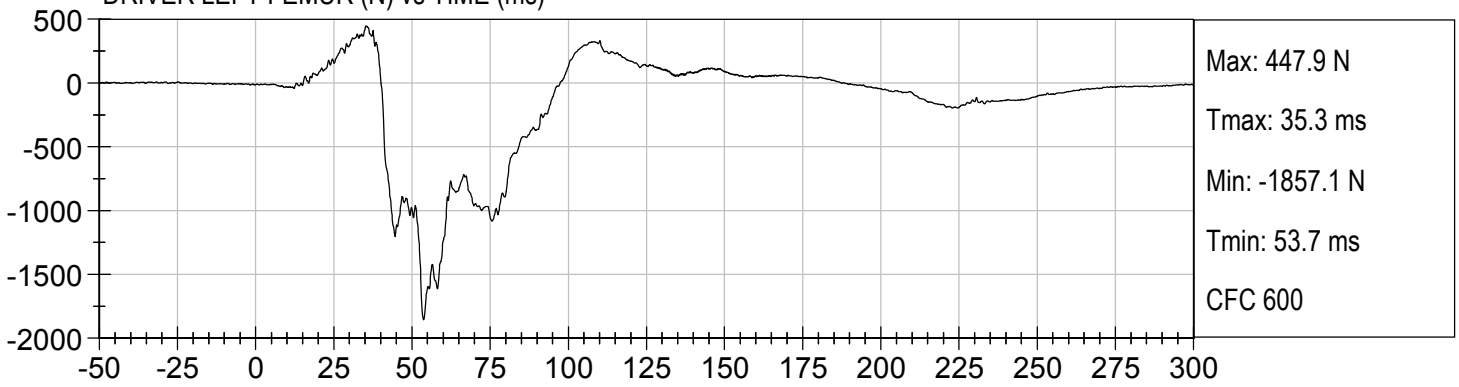
DRIVER Nij (NCF) () vs TIME (ms)



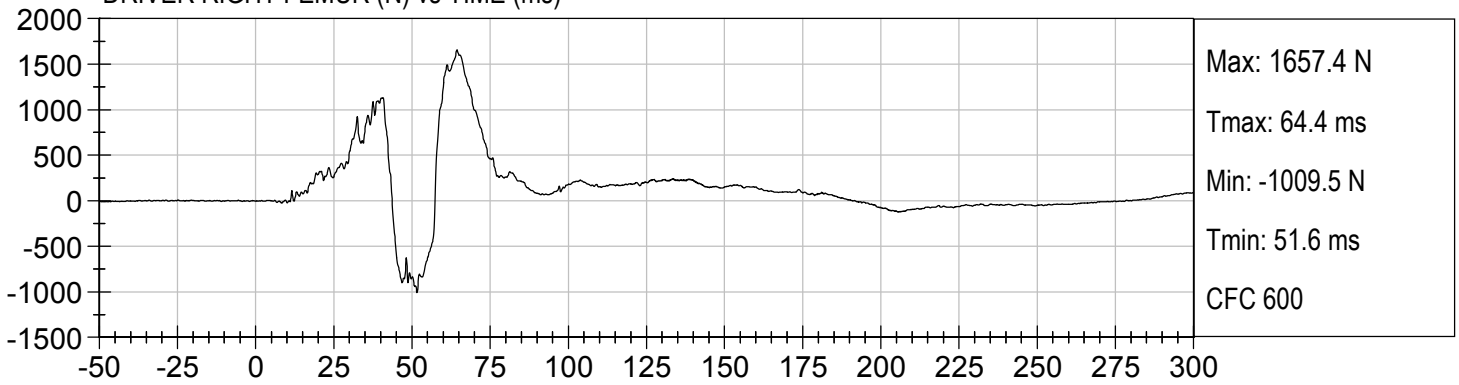
DRIVER Nij (NCE) () vs TIME (ms)



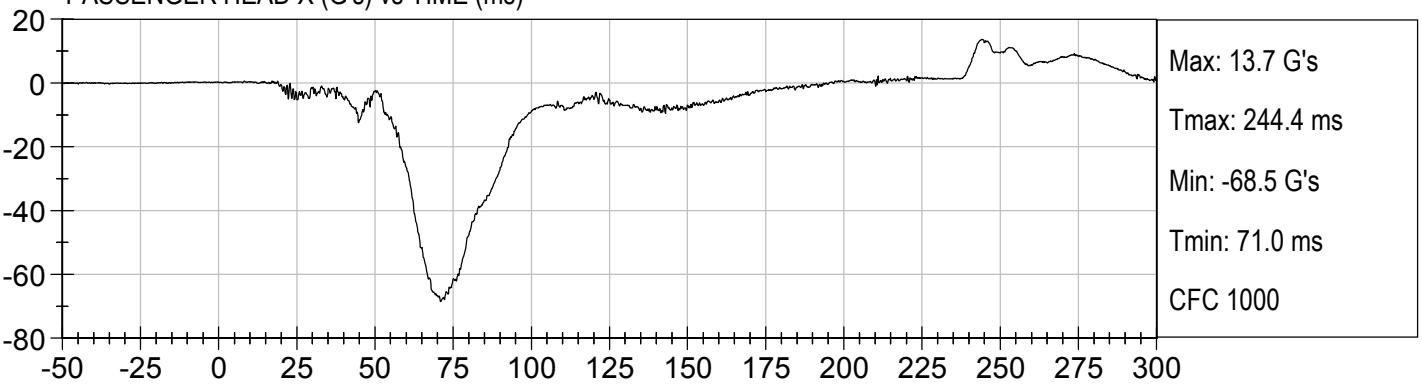
DRIVER LEFT FEMUR (N) vs TIME (ms)



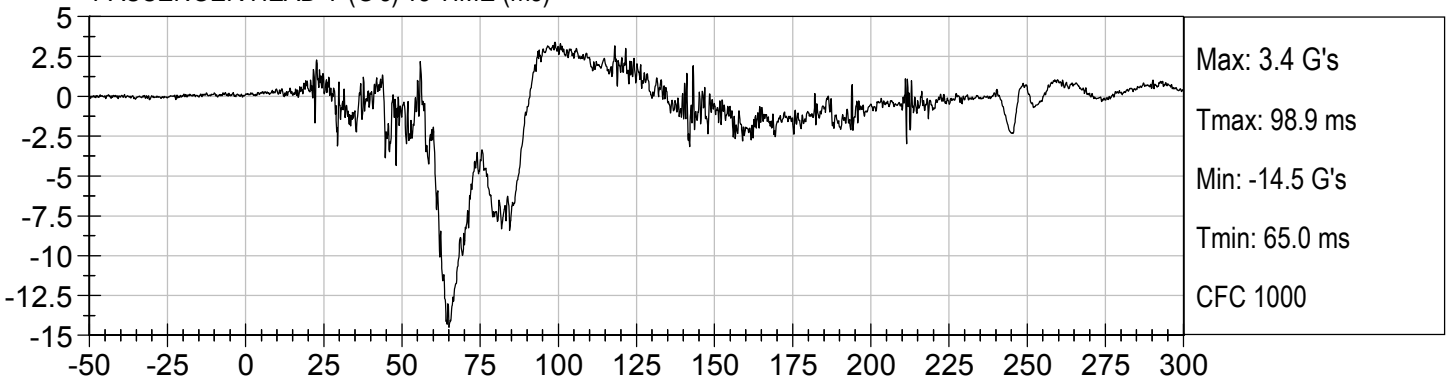
DRIVER RIGHT FEMUR (N) vs TIME (ms)



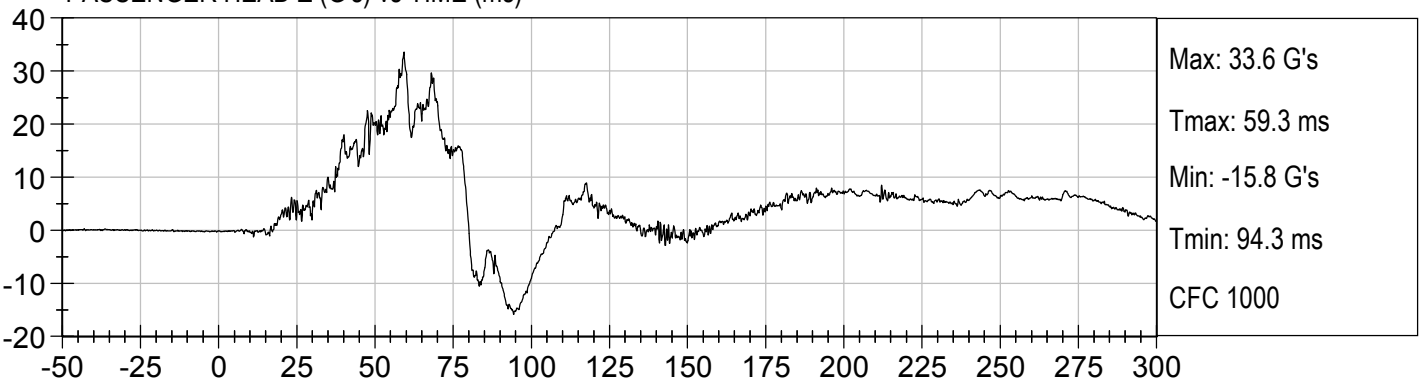
PASSENGER HEAD X (G's) vs TIME (ms)



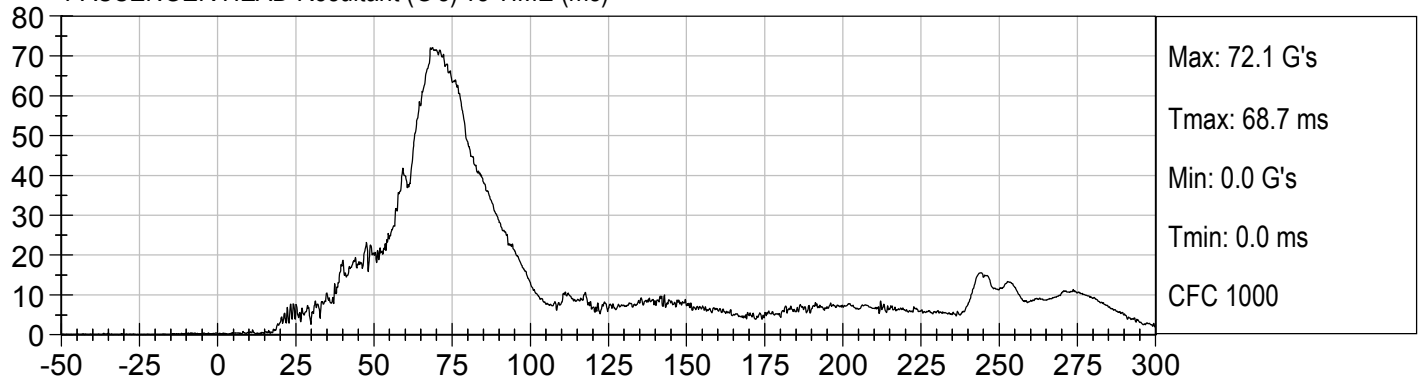
PASSENGER HEAD Y (G's) vs TIME (ms)



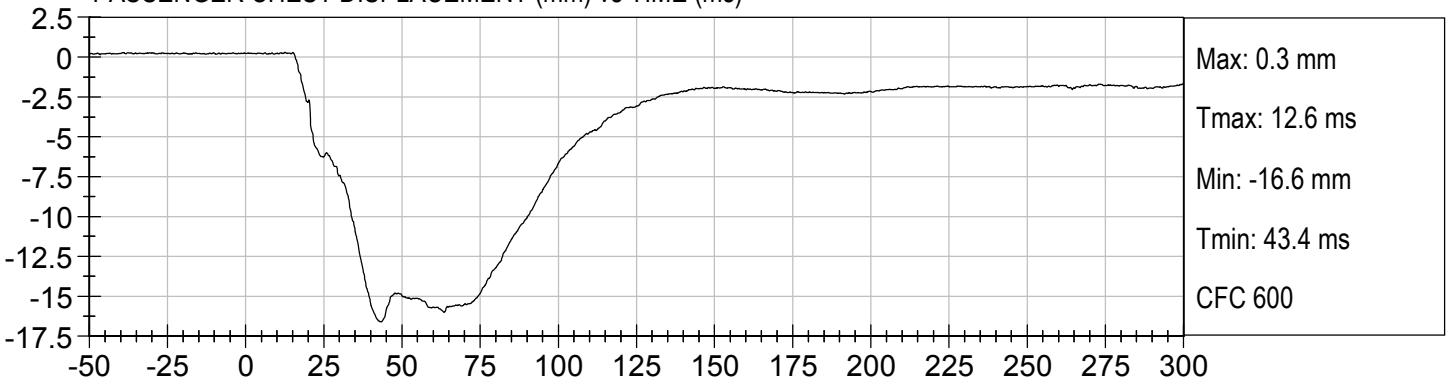
PASSENGER HEAD Z (G's) vs TIME (ms)



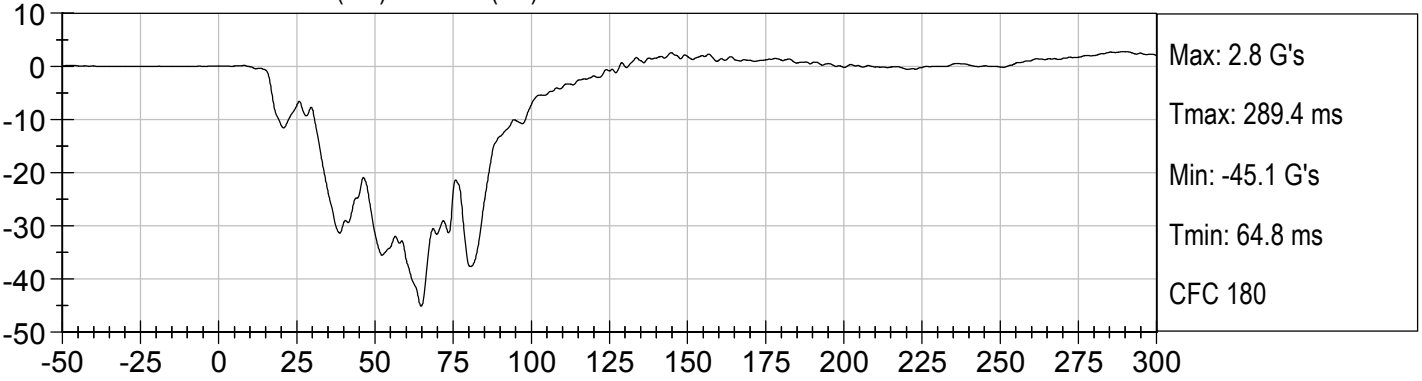
PASSENGER HEAD Resultant (G's) vs TIME (ms)



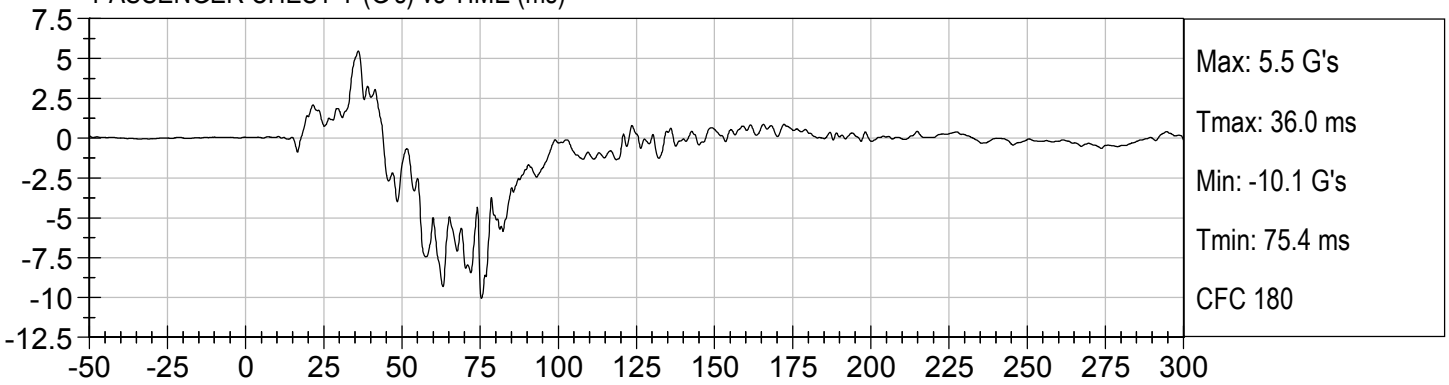
PASSENGER CHEST DISPLACEMENT (mm) vs TIME (ms)



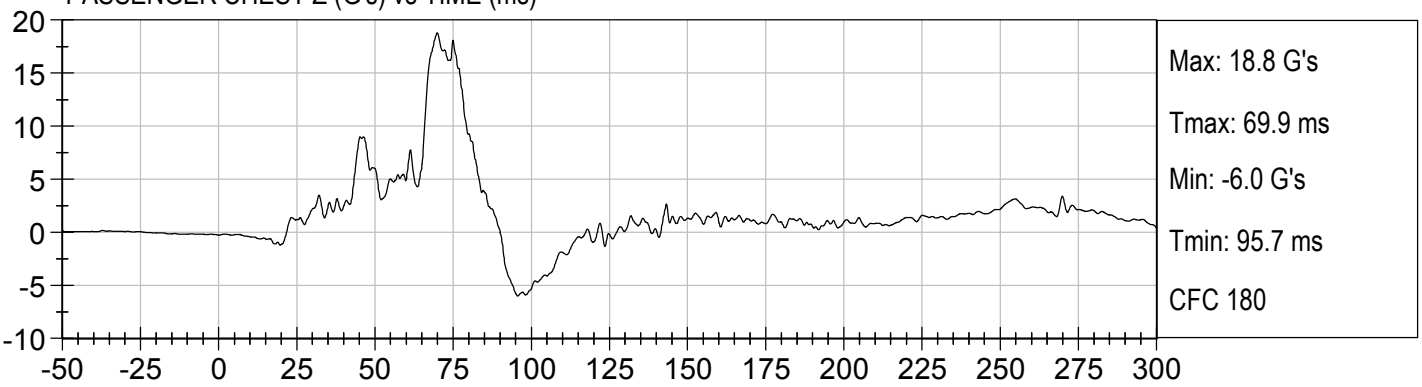
PASSENGER CHEST X (G's) vs TIME (ms)



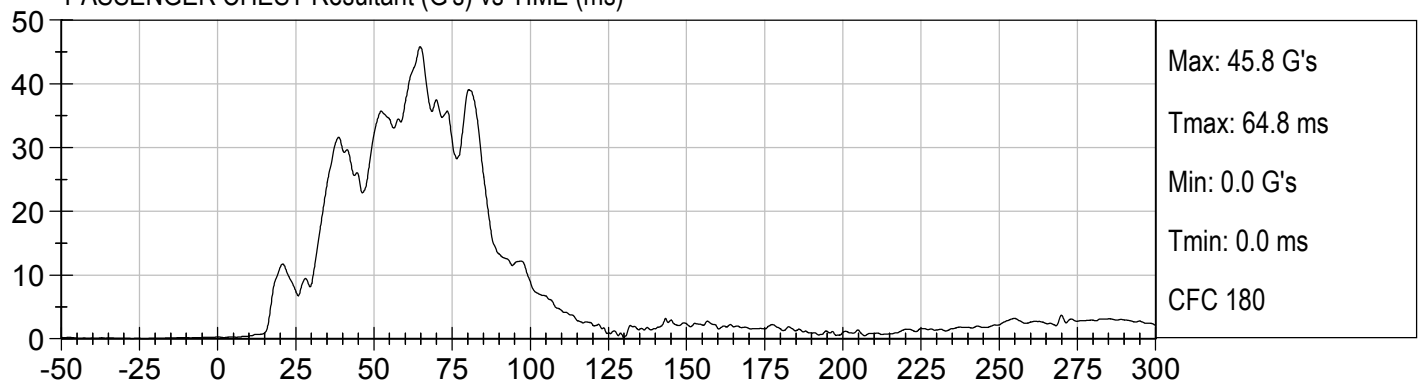
PASSENGER CHEST Y (G's) vs TIME (ms)



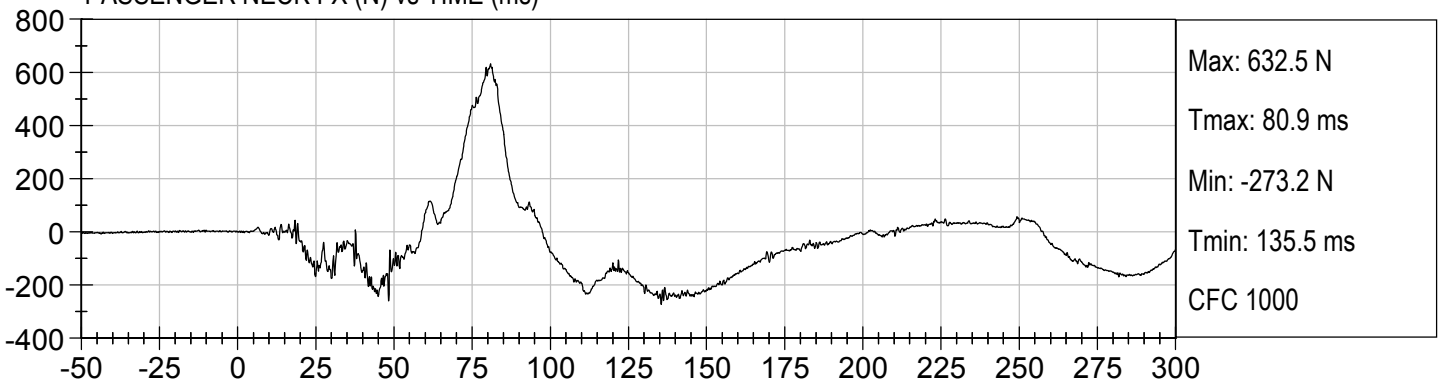
PASSENGER CHEST Z (G's) vs TIME (ms)



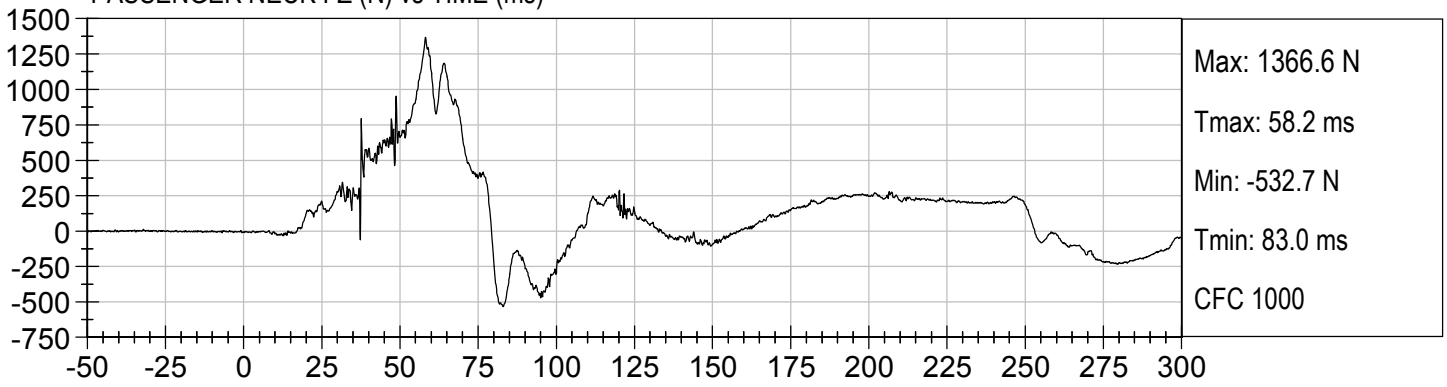
PASSENGER CHEST Resultant (G's) vs TIME (ms)



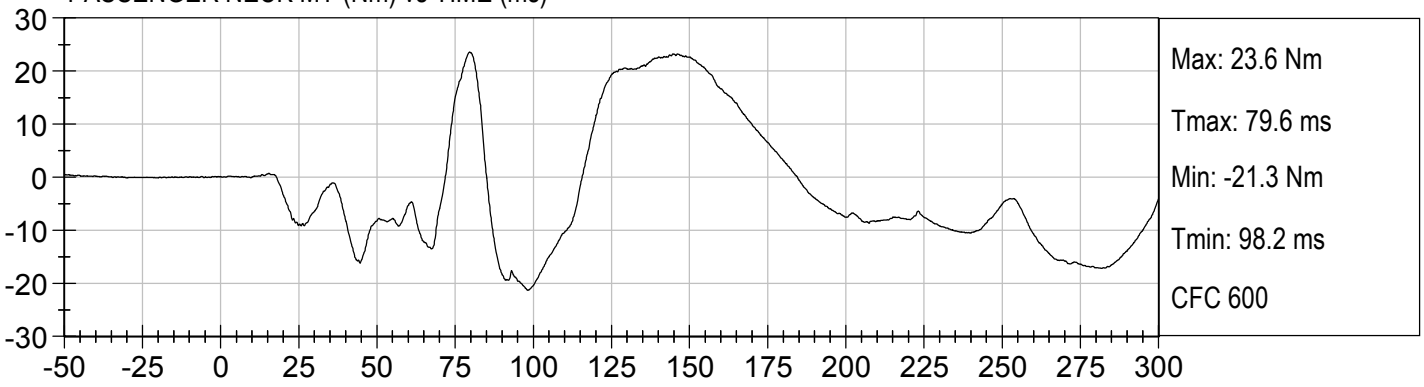
PASSENGER NECK FX (N) vs TIME (ms)

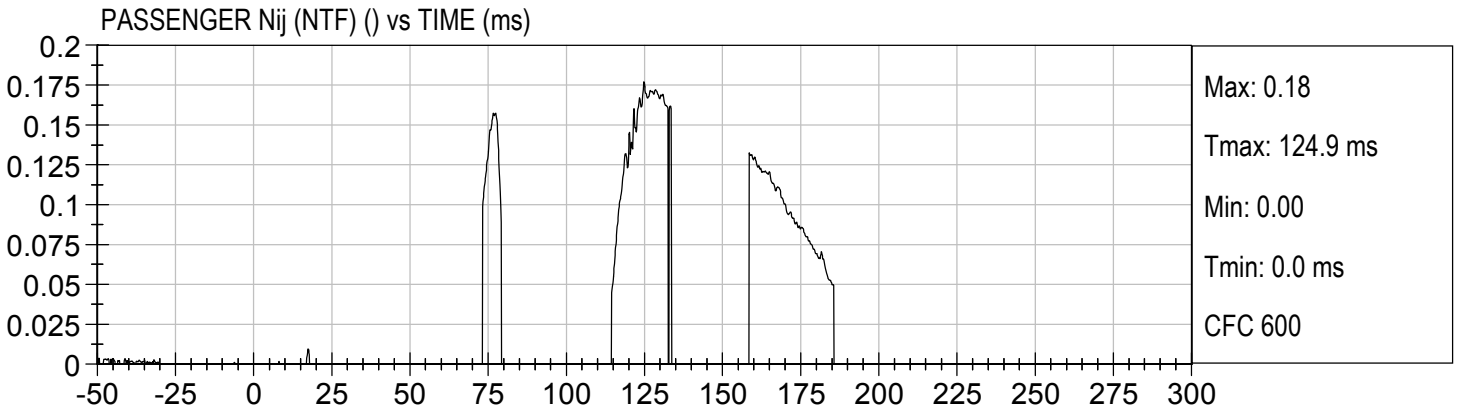


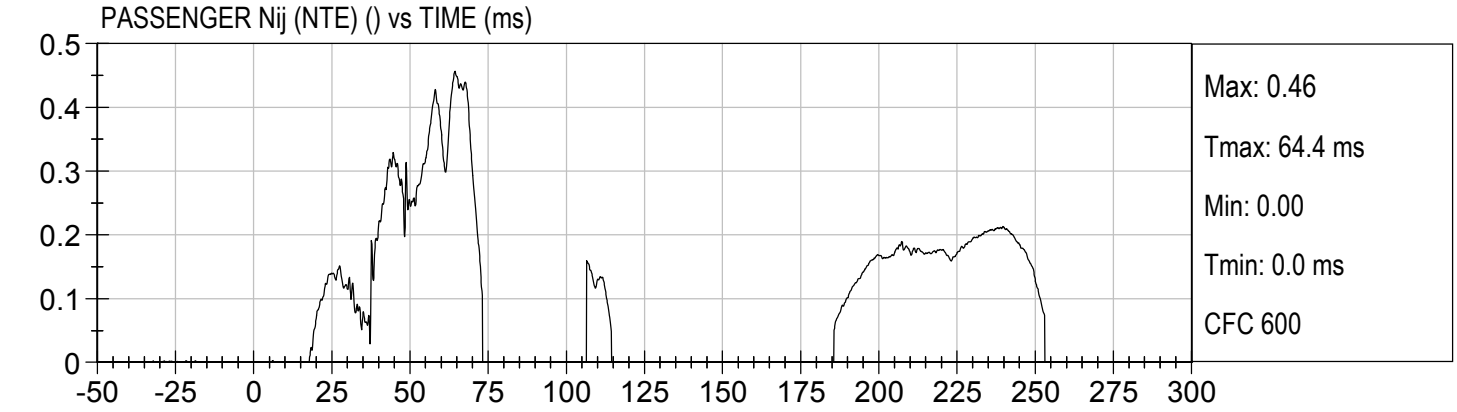
PASSENGER NECK FZ (N) vs TIME (ms)

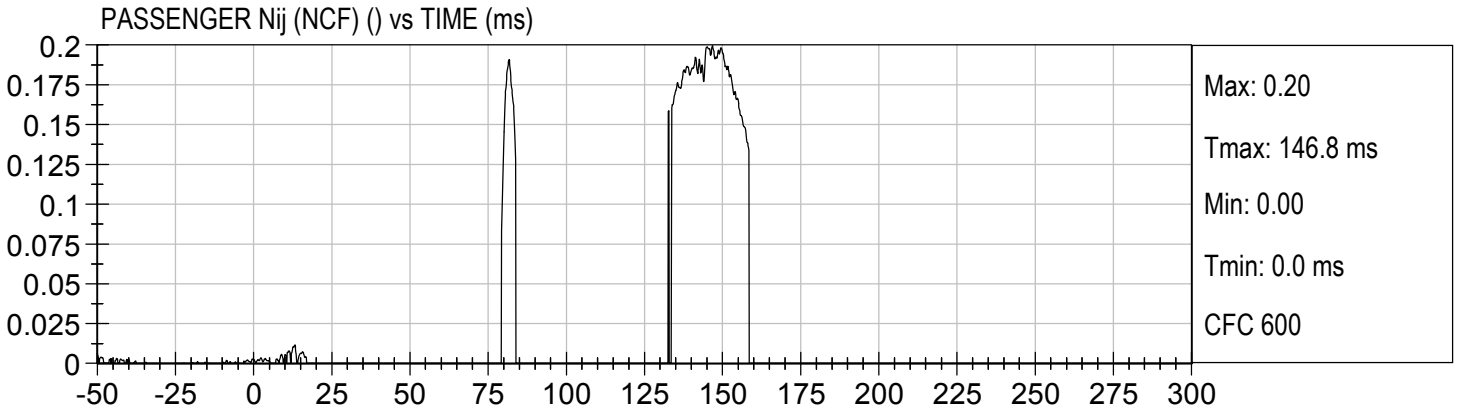


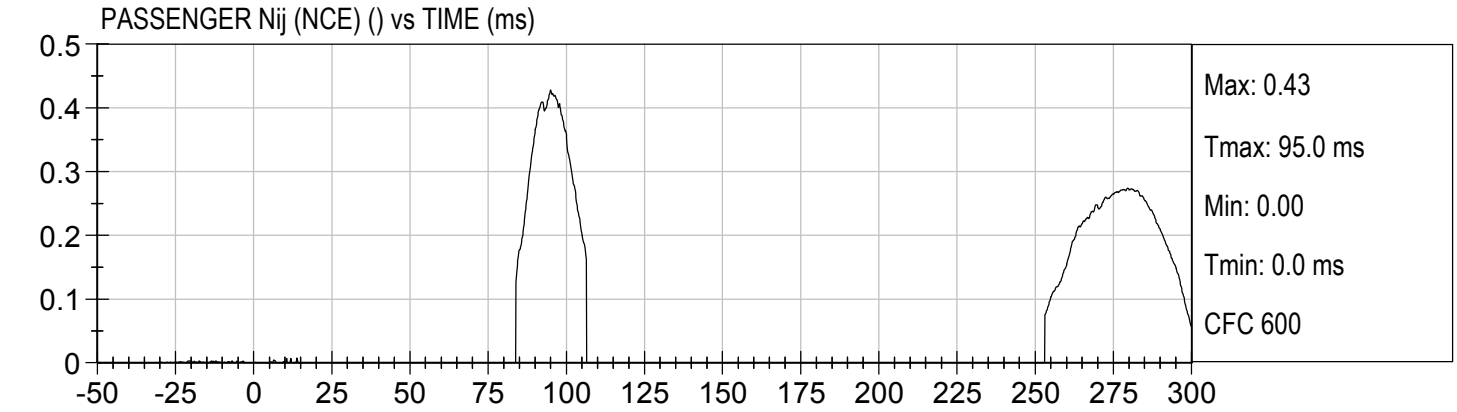
PASSENGER NECK MY (Nm) vs TIME (ms)



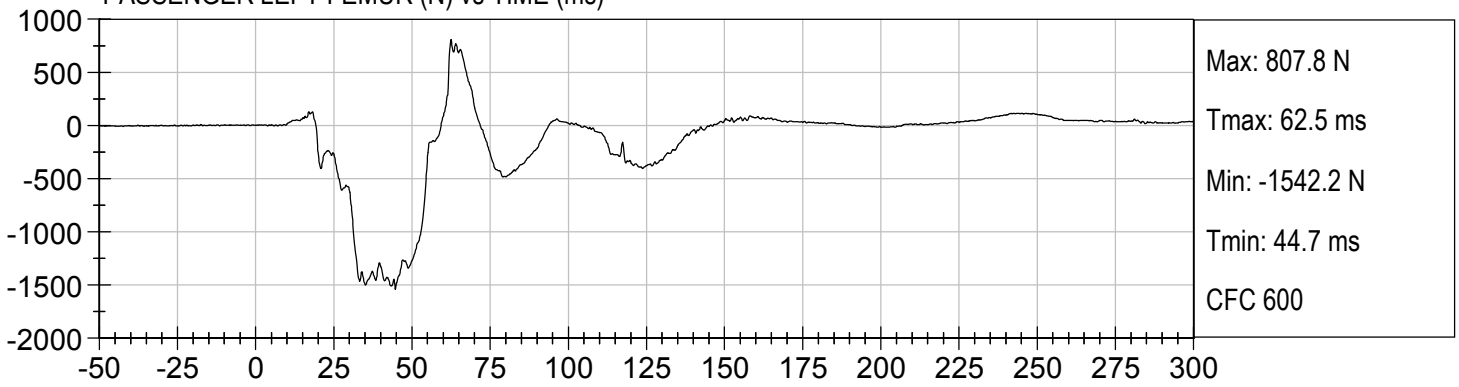

PASSENGER Nij (NTF) () vs TIME (ms)
0.2
0.175
0.15
0.125
0.1
0.075
0.05
0.025
0
-50 -25 0 25 50 75 100 125 150 175 200 225 250 275 300
Max: 0.18
Tmax: 124.9 ms
Min: 0.00
Tmin: 0.0 ms
CFC 600


PASSENGER Nij (NTE) () vs TIME (ms)
0.5
0.4
0.3
0.2
0.1
0
-50 -25 0 25 50 75 100 125 150 175 200 225 250 275 300
Max: 0.46
Tmax: 64.4 ms
Min: 0.00
Tmin: 0.0 ms
CFC 600

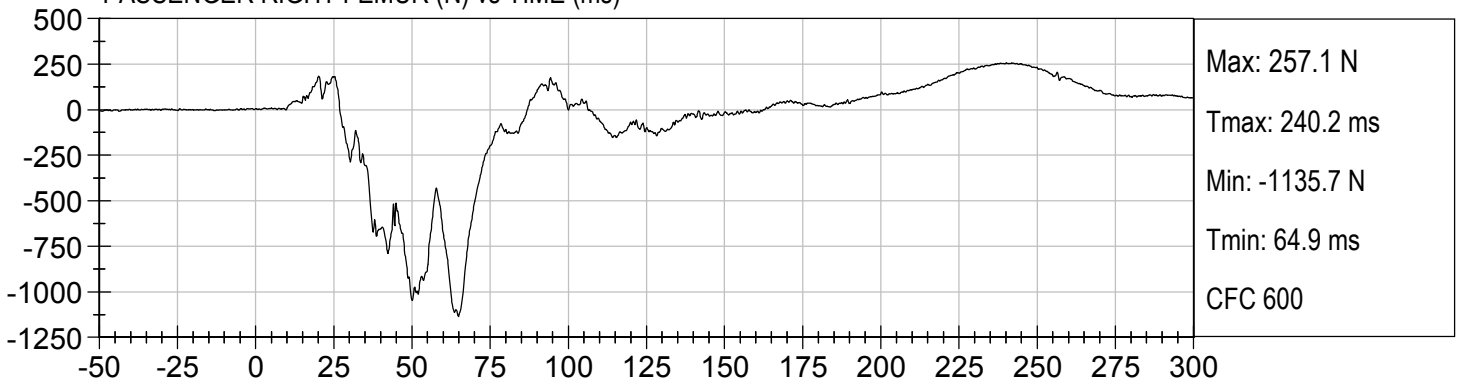

PASSENGER Nij (NCF) () vs TIME (ms)
0.2
0.175
0.15
0.125
0.1
0.075
0.05
0.025
0
-50 -25 0 25 50 75 100 125 150 175 200 225 250 275 300
Max: 0.20
Tmax: 146.8 ms
Min: 0.00
Tmin: 0.0 ms
CFC 600


PASSENGER Nij (NCE) () vs TIME (ms)
0.5
0.4
0.3
0.2
0.1
0
-50 -25 0 25 50 75 100 125 150 175 200 225 250 275 300
Max: 0.43
Tmax: 95.0 ms
Min: 0.00
Tmin: 0.0 ms
CFC 600

PASSENGER LEFT FEMUR (N) vs TIME (ms)



PASSENGER RIGHT FEMUR (N) vs TIME (ms)



APPENDIX C
DUMMY CALIBRATION AND PERFORMANCE VERIFICATION DATA

Hybrid III, 50th External Measurements
SN: 351

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

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

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

MGA RESEARCH CORPORATION

HEAD DROP TEST

HYBRID III 50TH PERCENTILE MALE

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

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	47	Pass
Peak Resultant Acceleration	G's	225 to 275	271	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-7.6	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
		Overall Test Results		Pass

David Schoedel
Laboratory Technician

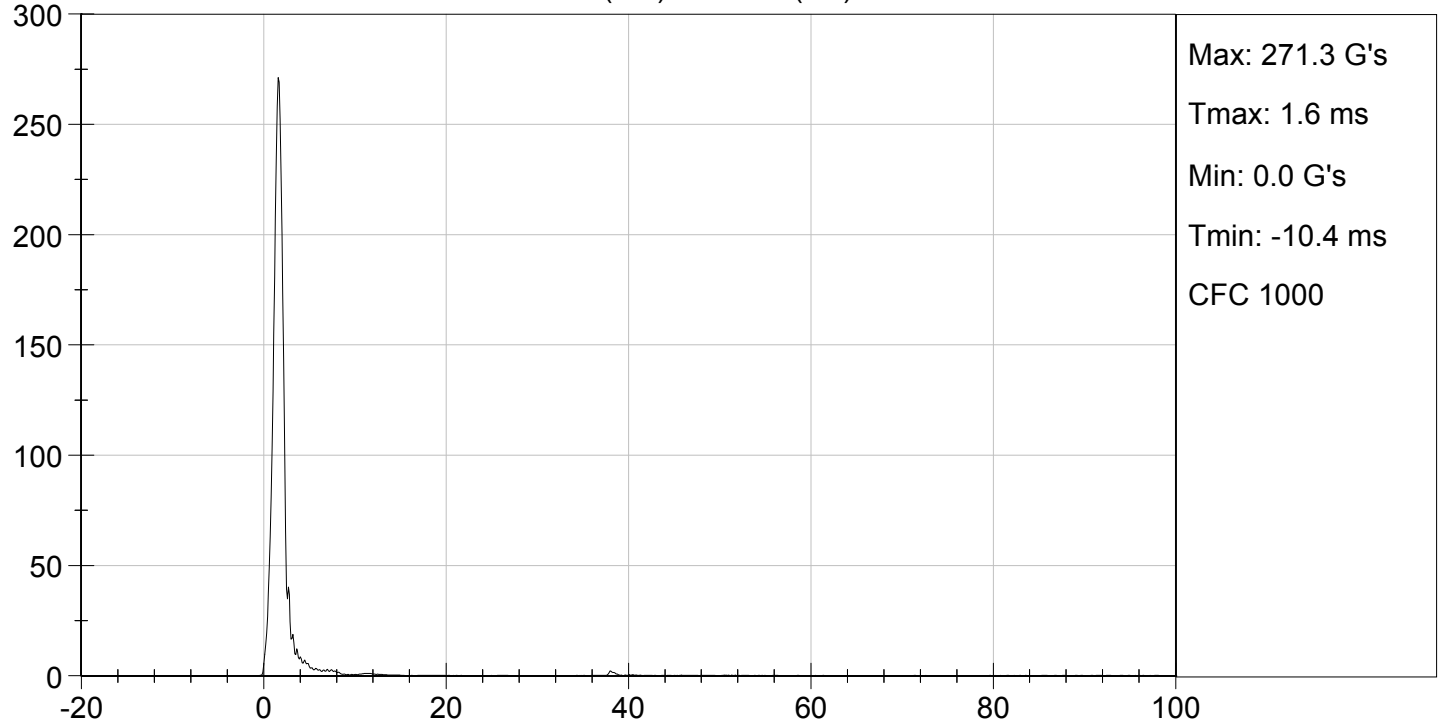
10/15/2014
Test Date

Jessica Gall
Approved By

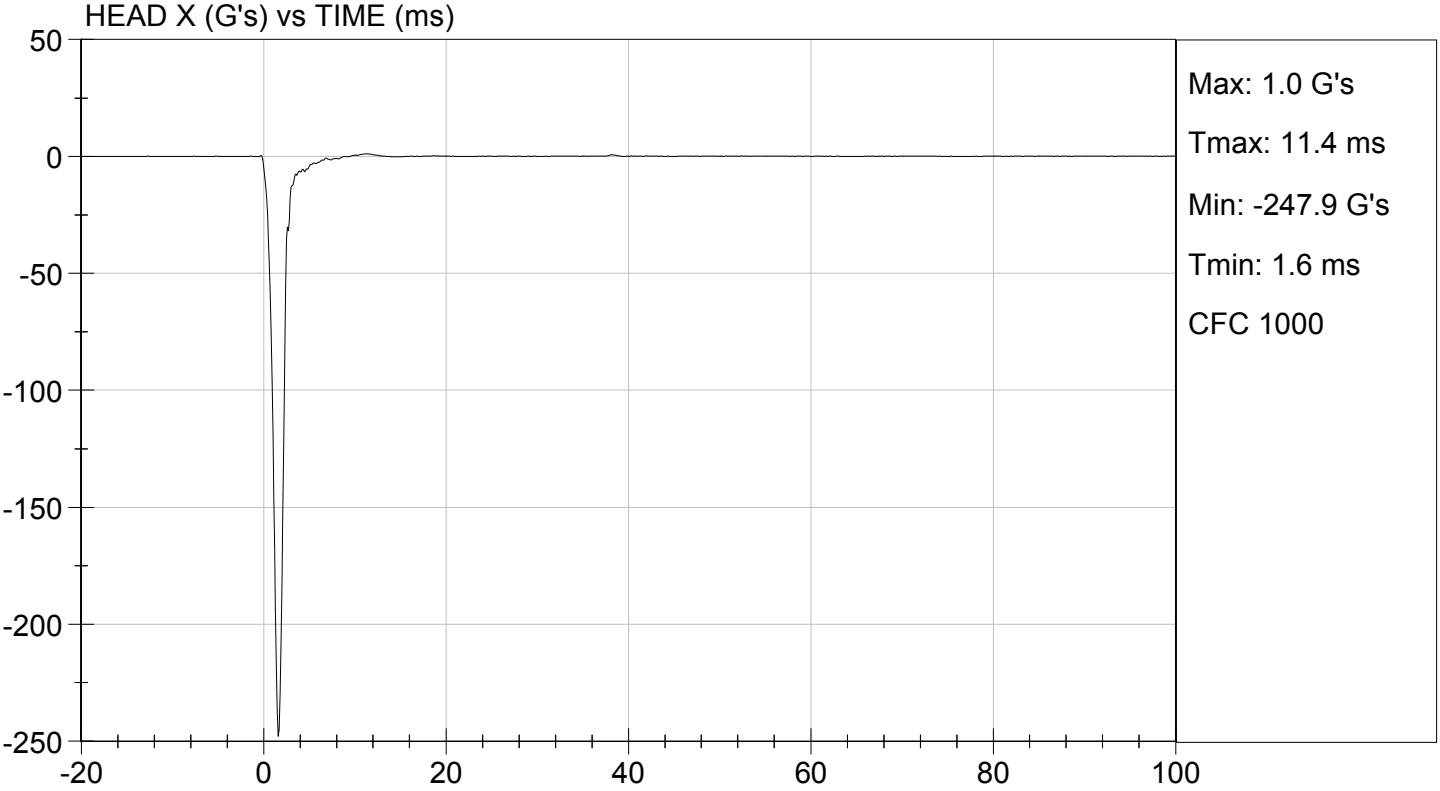
TEST DESC: HEAD DROP

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

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



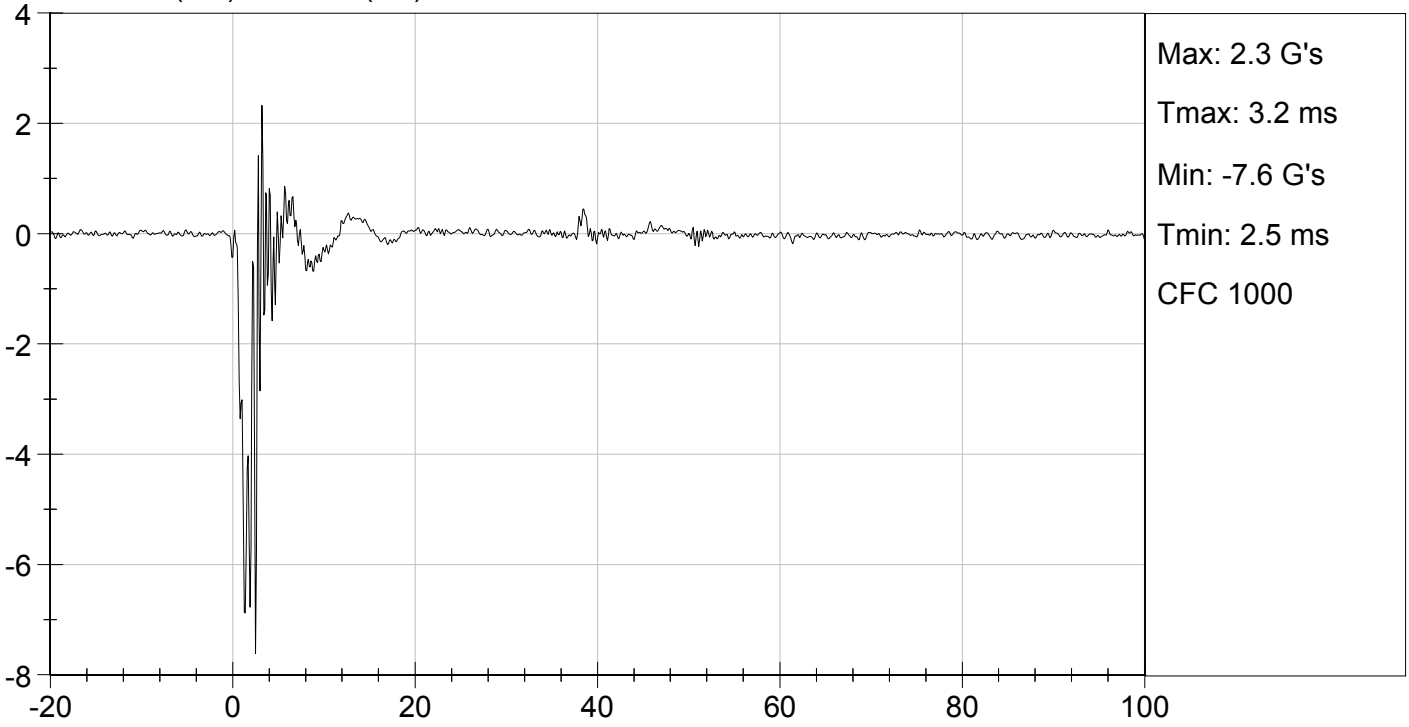
HEAD X (G's) vs TIME (ms)



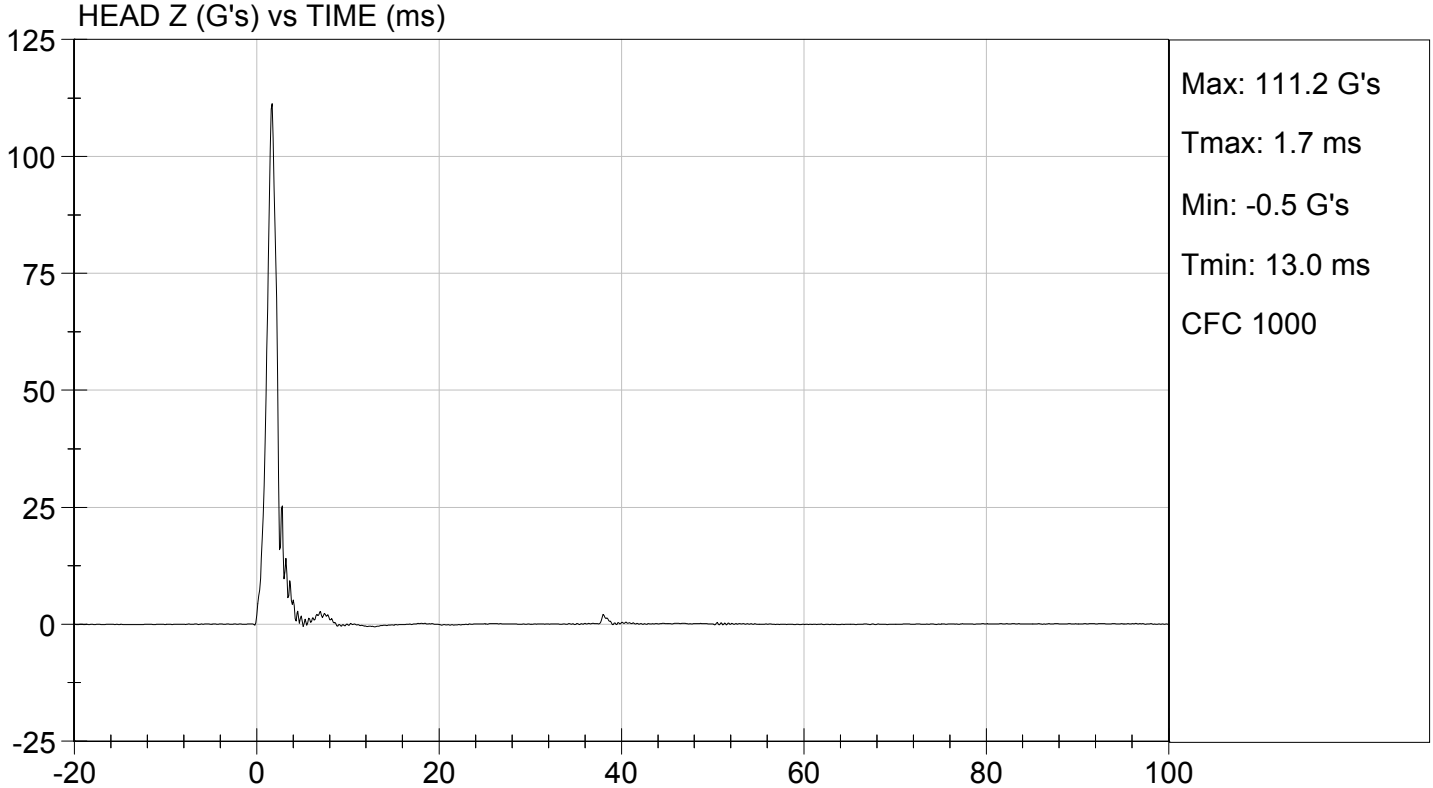
TEST DESC: HEAD DROP

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

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



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



MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 50TH PERCENTILE MALE

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

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.9	Pass
Laboratory Relative Humidity		%	10 to 70	45	Pass
Pendulum Velocity		m/s	6.89 to 7.13	6.96	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	23.06	Pass
	20 ms	G's	17.60 to 22.60	17.64	Pass
	30 ms	G's	12.50 to 18.50	13.40	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	13.4	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	41.4	Pass
Maximum "D" Plane Rotation	Maximum	Deg	64.0 to 78.0	68.6	Pass
	Time	ms	57.0 to 64.0	57.1	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	115.6	Pass
Moment About Occipital Condyle	Maximum	Nm	88.1 to 108.5	91.2	Pass
	Time	ms	47.0 to 58.0	54.7	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	100.7	Pass
			Overall Test Results		Pass

David Schoedel
Laboratory Technician

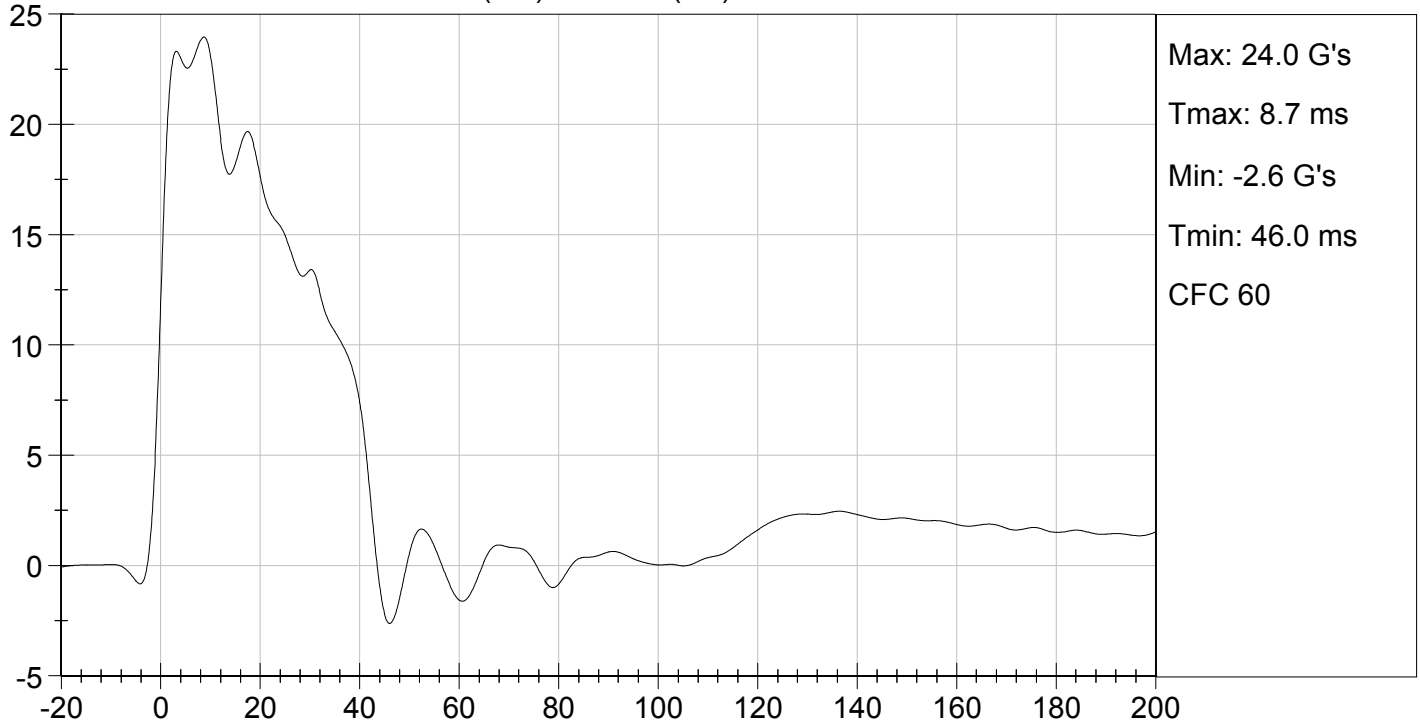
10/15/2014
Test Date

Jessica Hall
Approved By

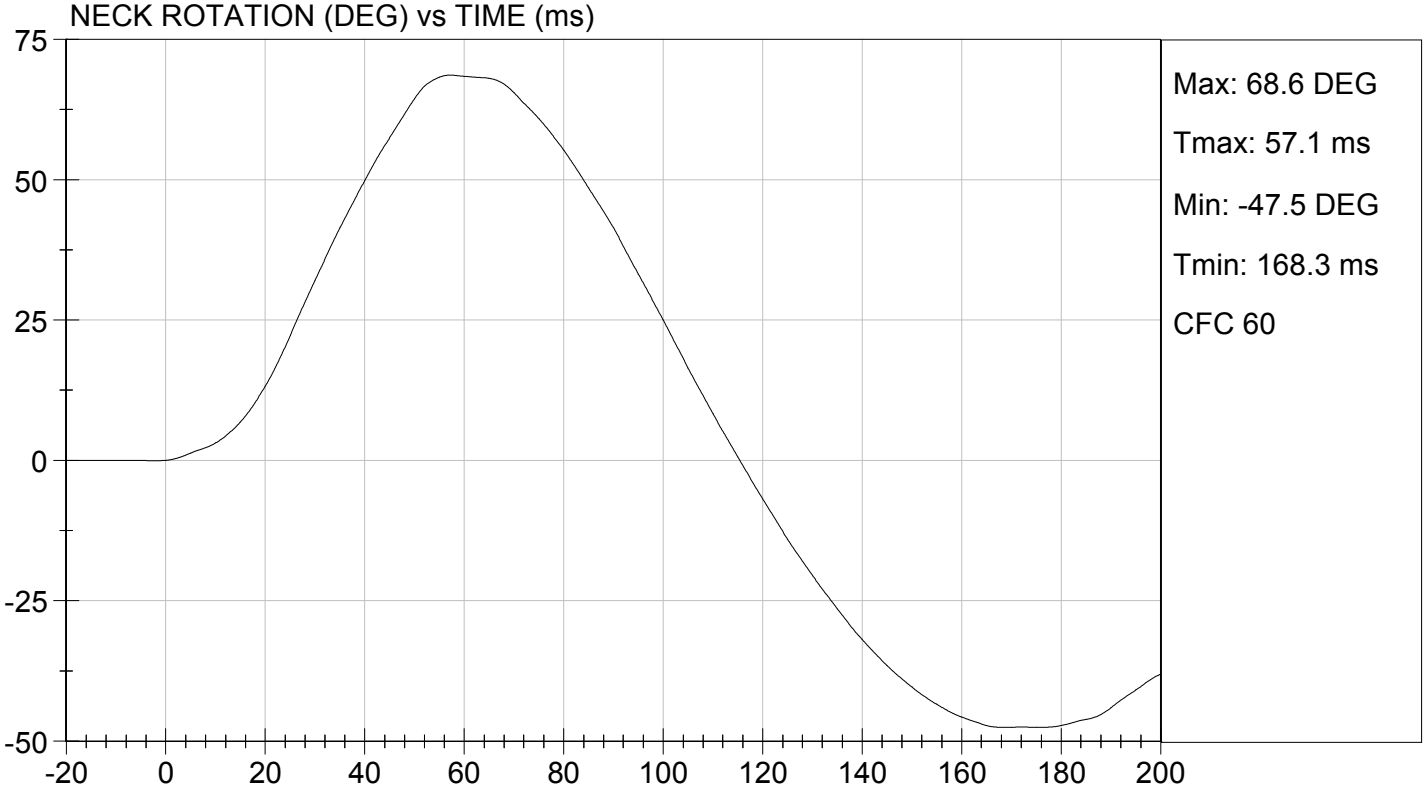
TEST DESC: NECK FLEXION
VELOCITY: 22.83 ft/s, 6.96 m/s

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

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



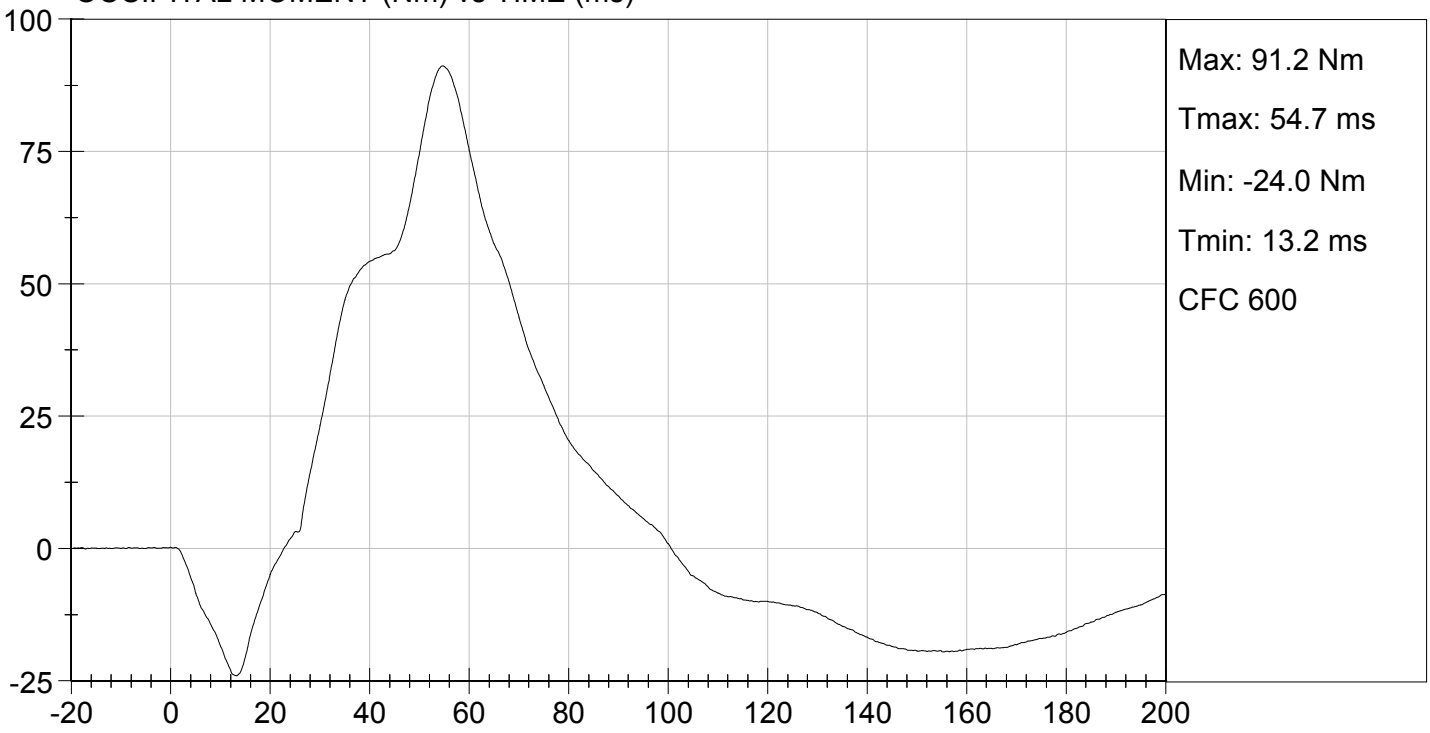
NECK ROTATION (DEG) vs TIME (ms)



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

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

OCCIPITAL MOMENT (Nm) vs TIME (ms)



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 50TH PERCENTILE MALE

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

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.9	Pass
Laboratory Relative Humidity		%	10 to 70	45	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.05	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	18.37	Pass
	20 ms	G's	14.00 to 19.00	14.70	Pass
	30 ms	G's	11.00 to 16.00	13.71	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	13.7	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	42.3	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	95.3	Pass
	Time	ms	72.0 to 82.0	78.0	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	156.9	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-56.5	Pass
	Time	ms	65.0 to 79.0	72.5	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	144.8	Pass
			Overall Test Results		Pass

David Schoedel
Laboratory Technician

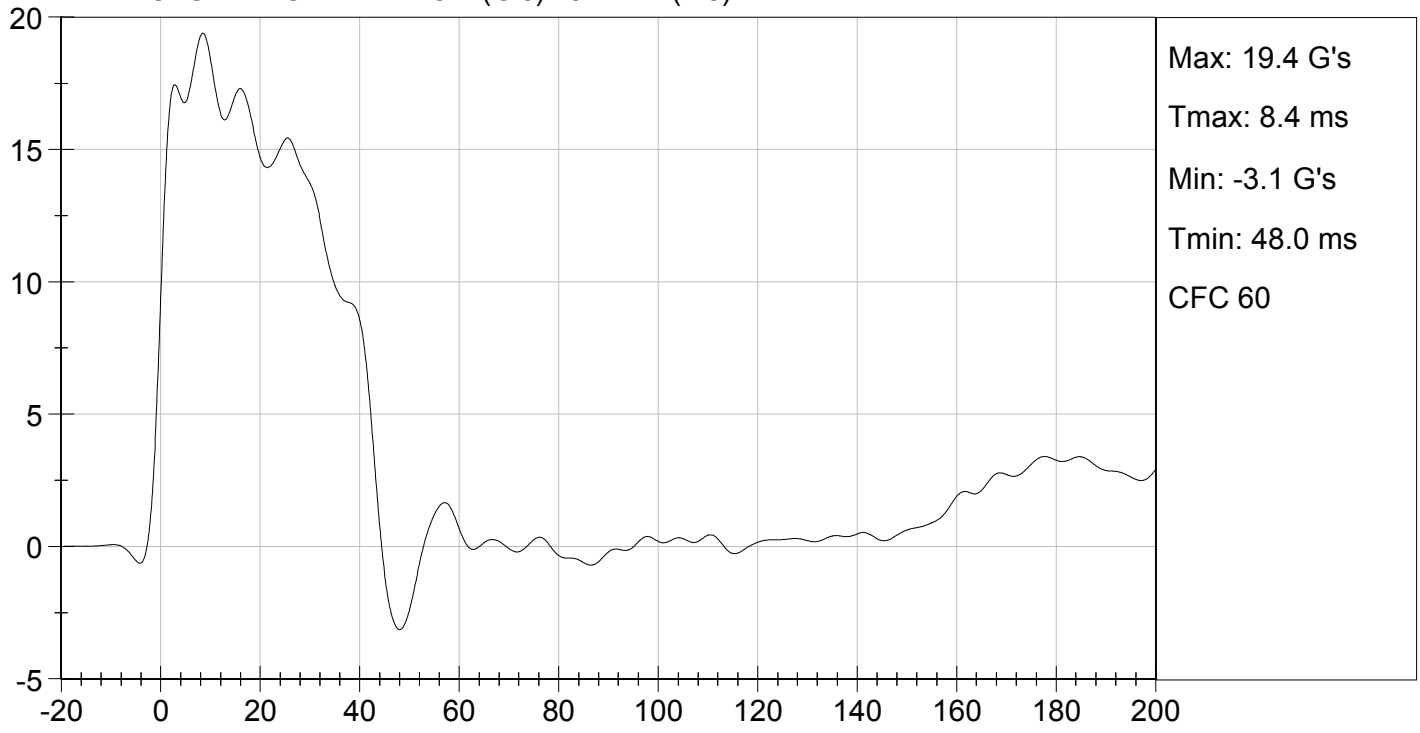
10/15/2014
Test Date

Jessica Gall
Approved By

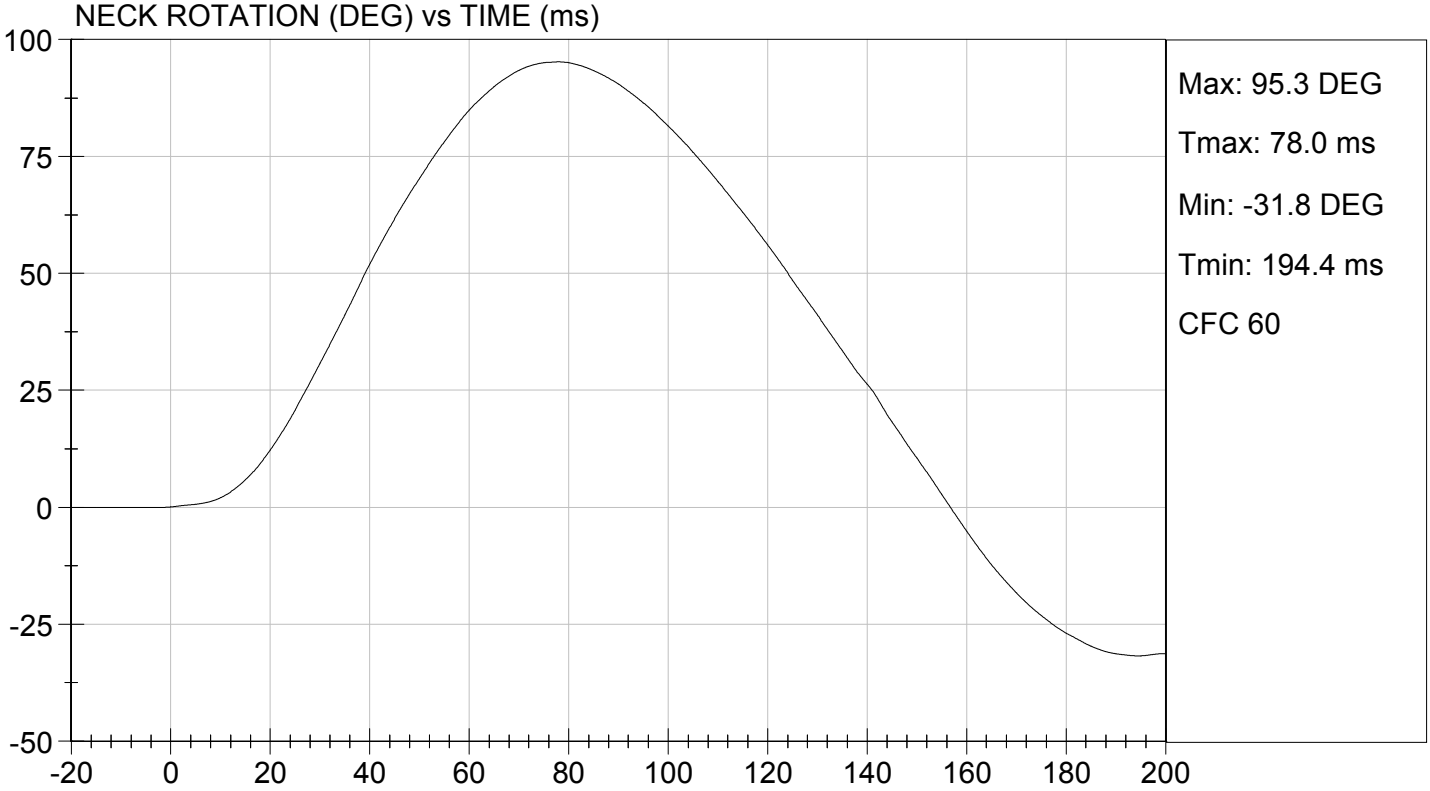
TEST DESC: NECK EXTENSION
VELOCITY: 19.84 ft/s, 6.05 m/s

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

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

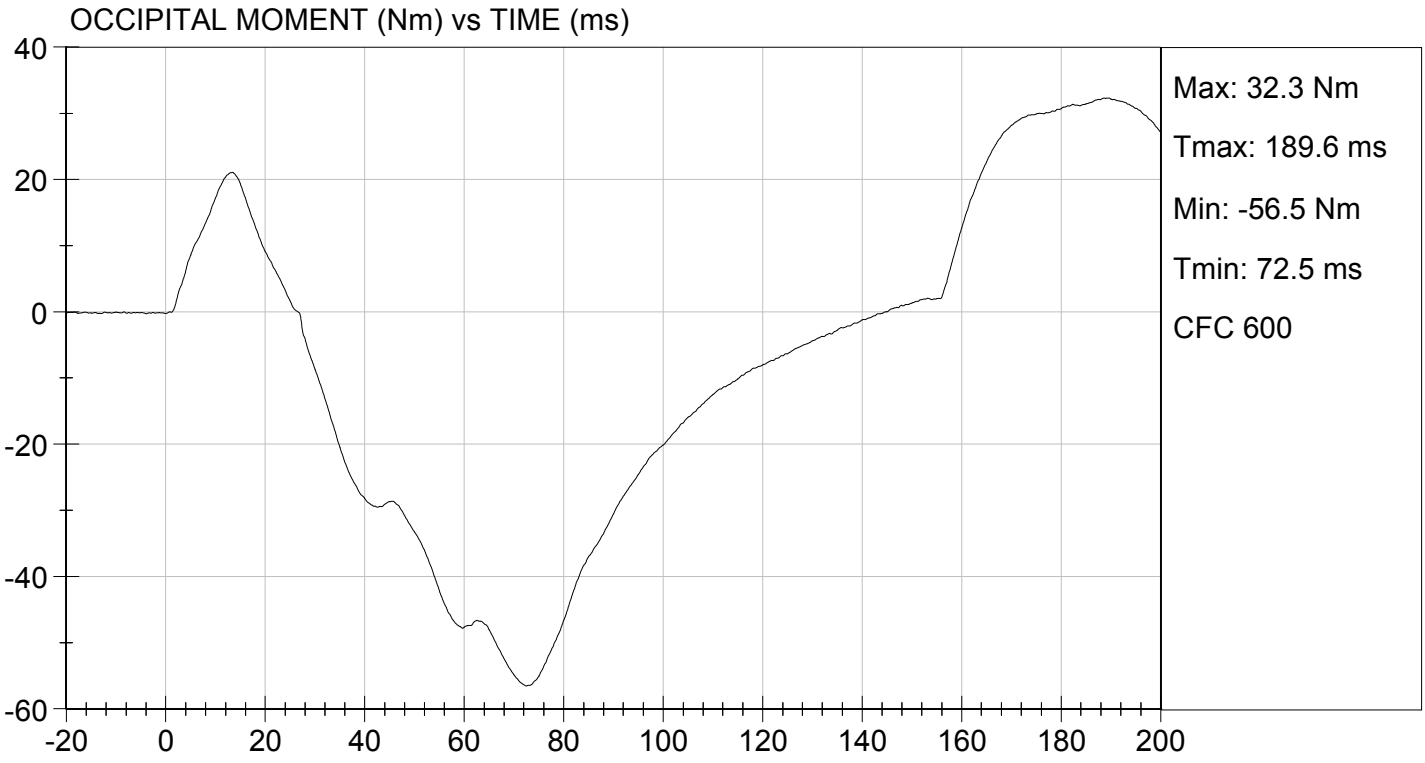


NECK ROTATION (DEG) vs TIME (ms)



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

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



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 50TH PERCENTILE MALE

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

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

Maxime Chamberland
Laboratory Technician

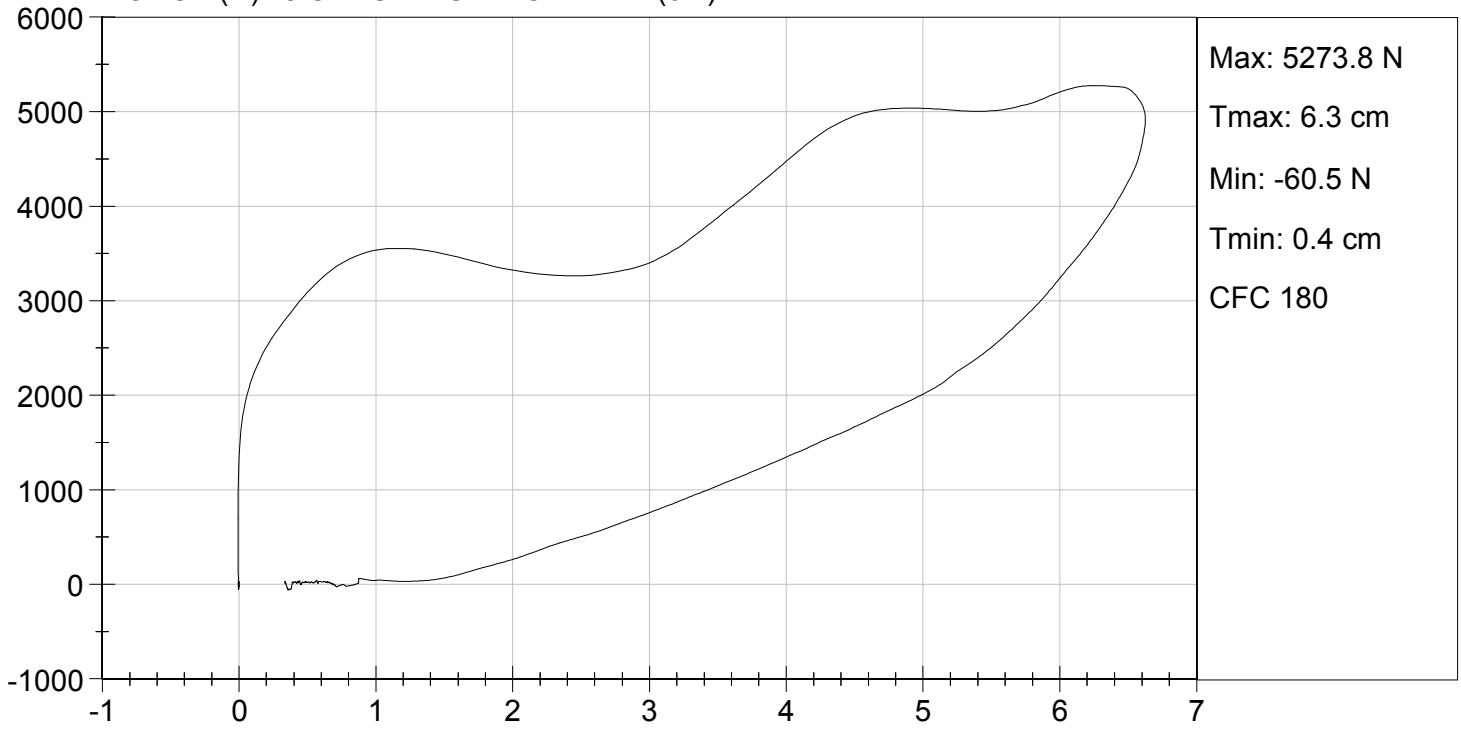
10/16/2014
Test Date

Jessica Hall
Approved By

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

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

FORCE (N) vs CHEST DISPLACEMENT (cm)



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

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

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	45	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	N	4715 to 5782	5,186	Pass
		Overall Test Results		Pass

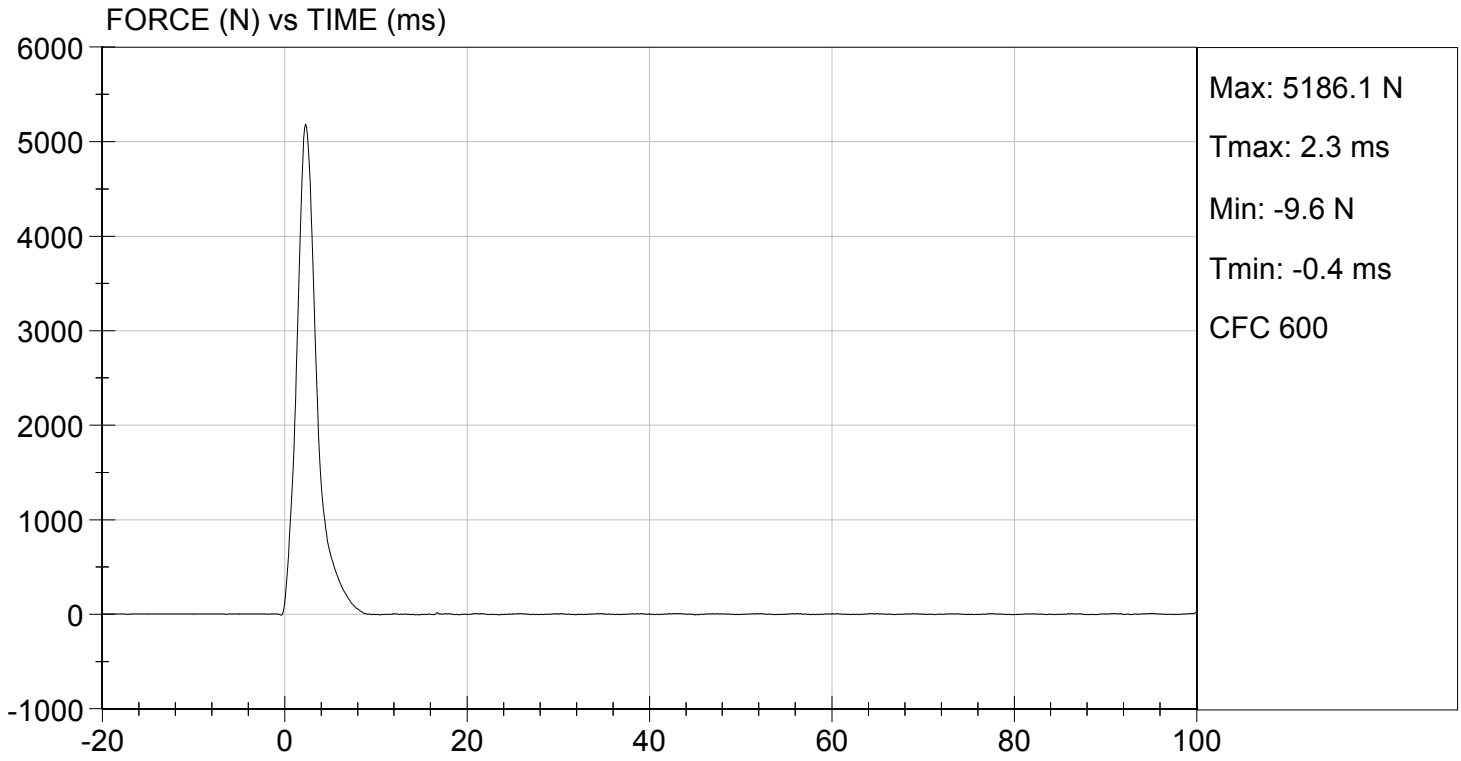
David Schoedel
Laboratory Technician

10/15/2014
Test Date

Jessica Hall
Approved By

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

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



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

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

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	45	Pass
Probe Velocity	m/s	2.07 to 2.13	2.13	Pass
Peak Probe Force	N	4715 to 5782	5,354	Pass
		Overall Test Results		Pass

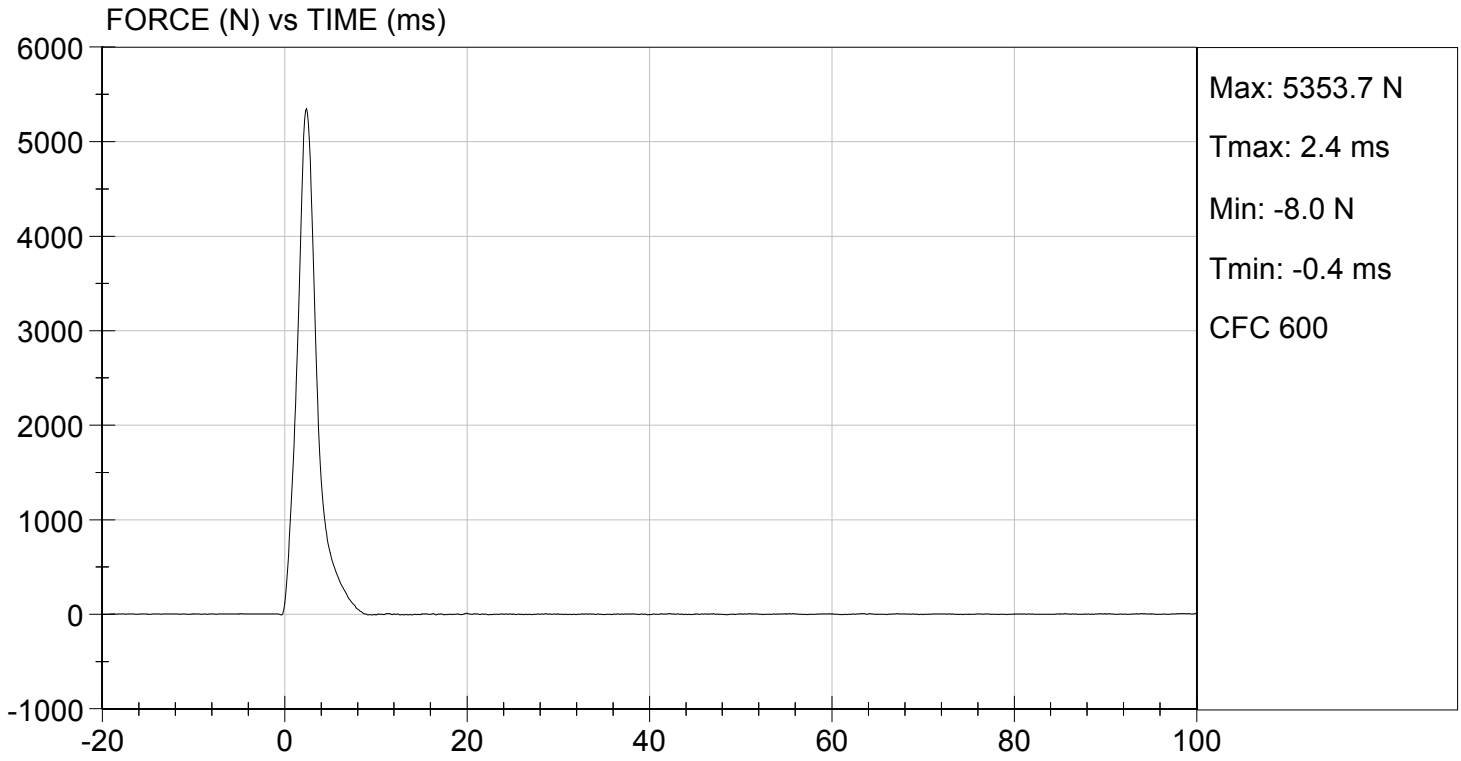
David Schoedel
Laboratory Technician

10/15/2014
Test Date

Jessica Hall
Approved By

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

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



MGA RESEARCH CORPORATION

HIP-FEMUR FLEXION TEST

HYBRID III 50TH PERCENTILE MALE

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

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

Jack Coleman
Laboratory Technician

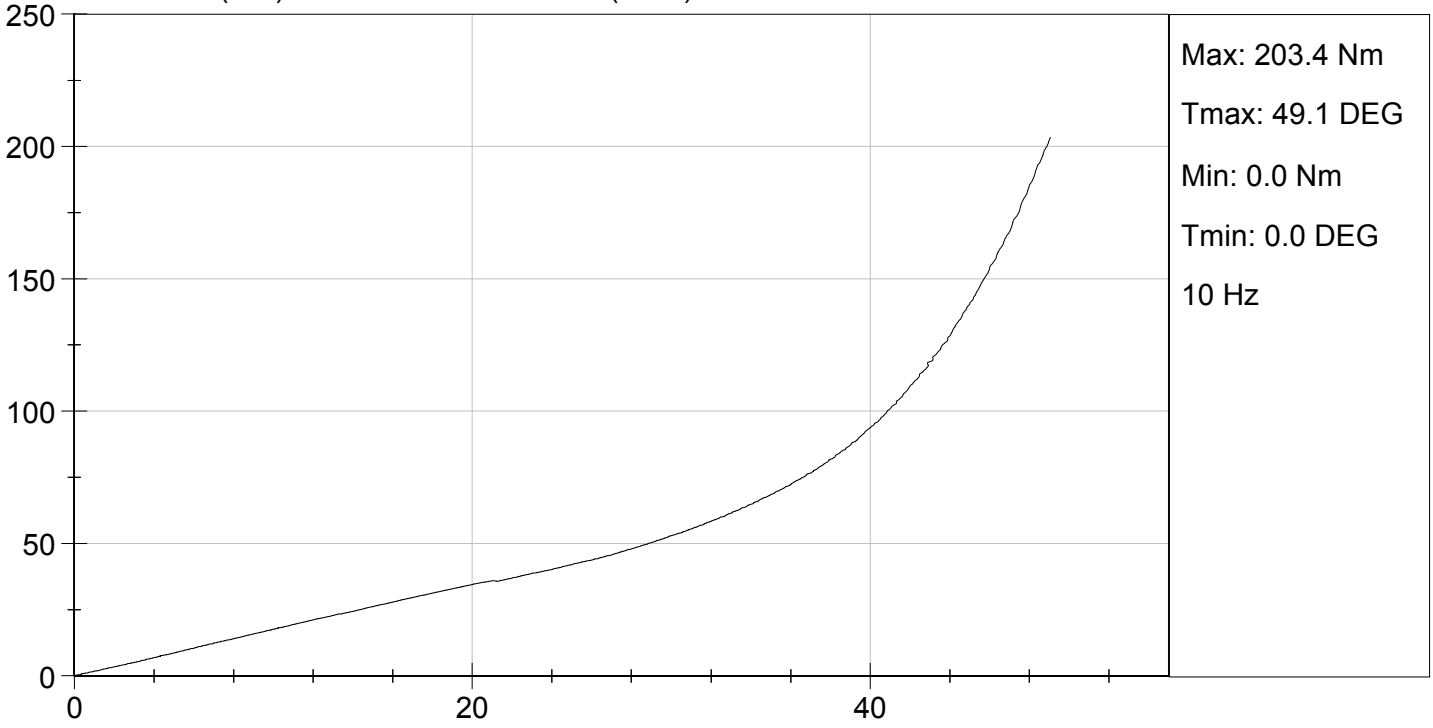
10/15/2014
Test Date

Jessica Hall
Approved By

TEST DESC: RIGHT HIP FEMUR FLEXION

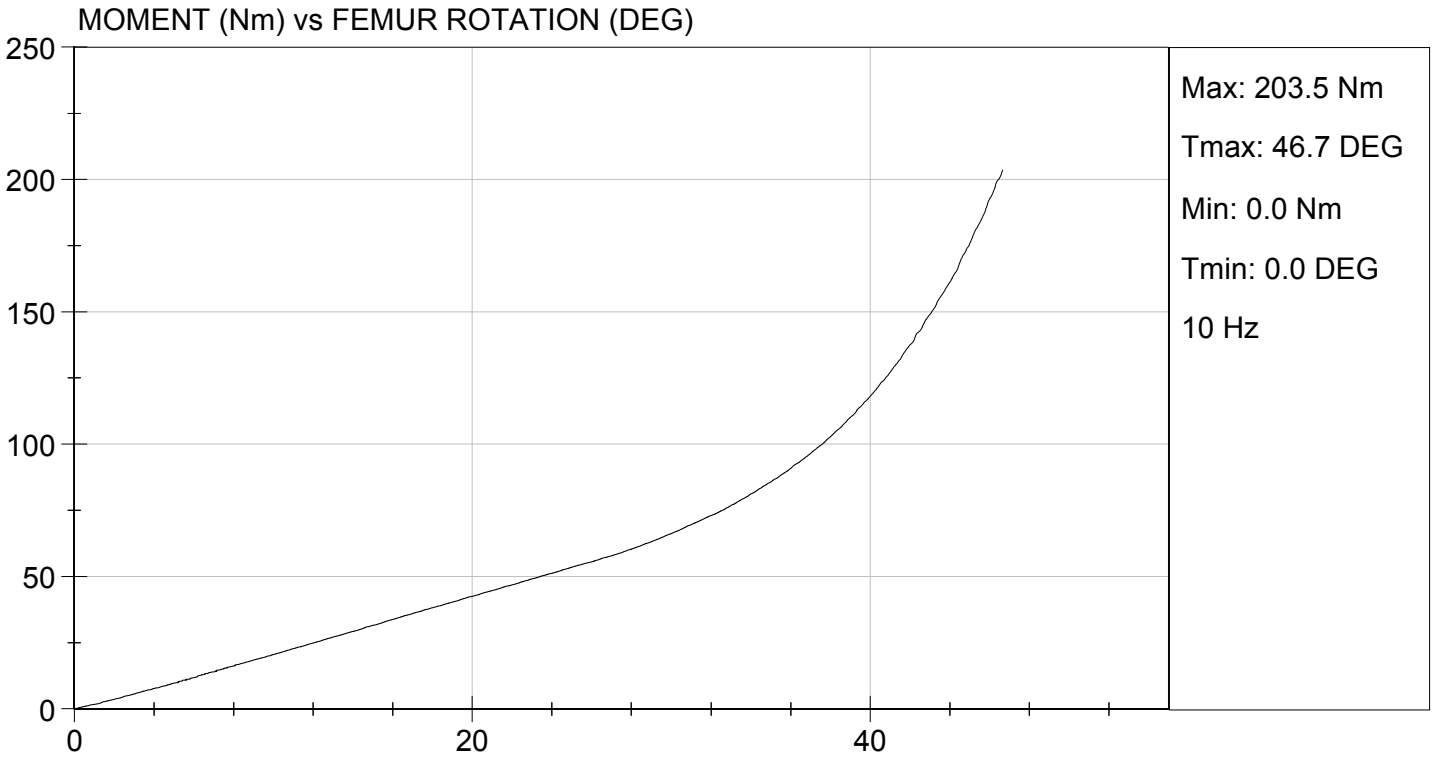
TEST DATE: 10/15/2014
TEST #: D143639

MOMENT (Nm) vs FEMUR ROTATION (DEG)



TEST DESC: LEFT HIP FEMUR FLEXION

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



MGA RESEARCH CORPORATION

HEAD DROP TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test ID:** D143761

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	44	Pass
Peak Resultant Acceleration	G's	225 to 275	255	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	9.5	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
		Overall Test Results		Pass

David Schoedel
Laboratory Technician

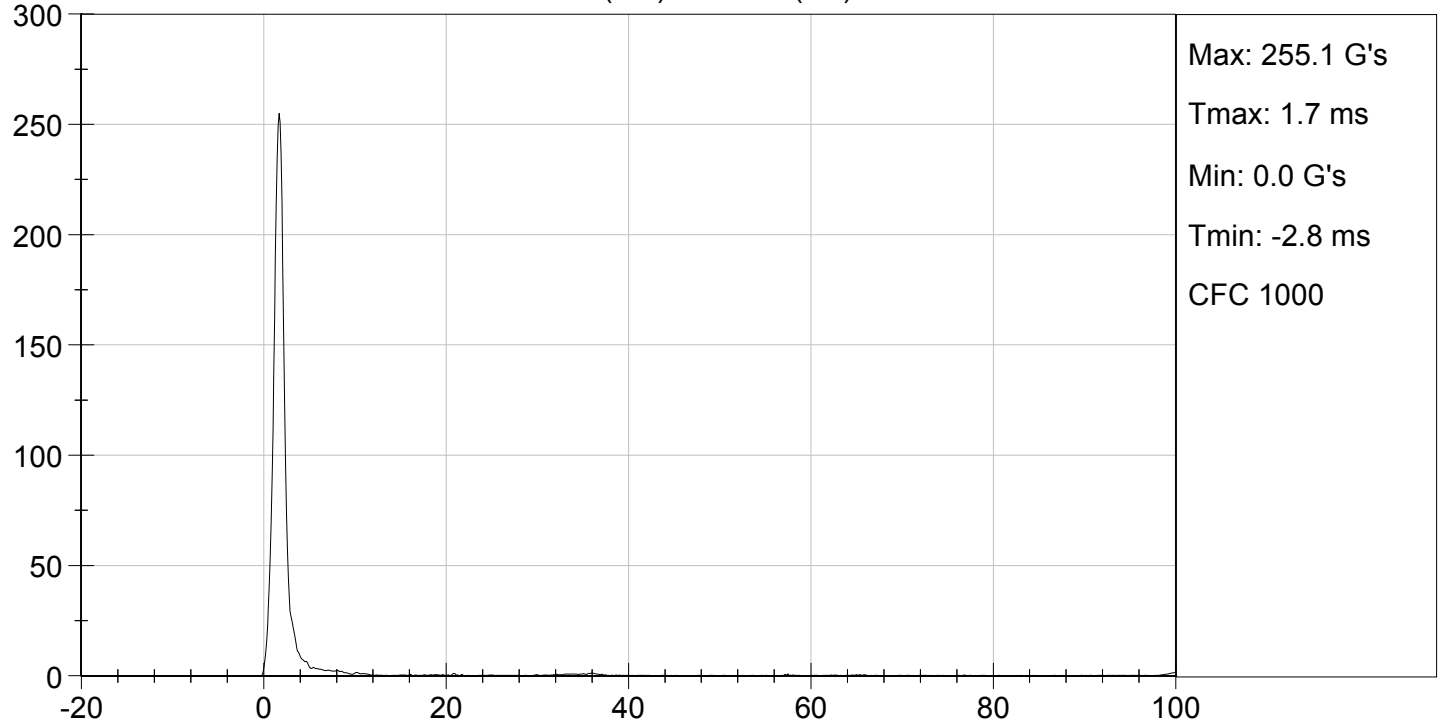
10/28/2014
Test Date

Jessica Hall
Approved By

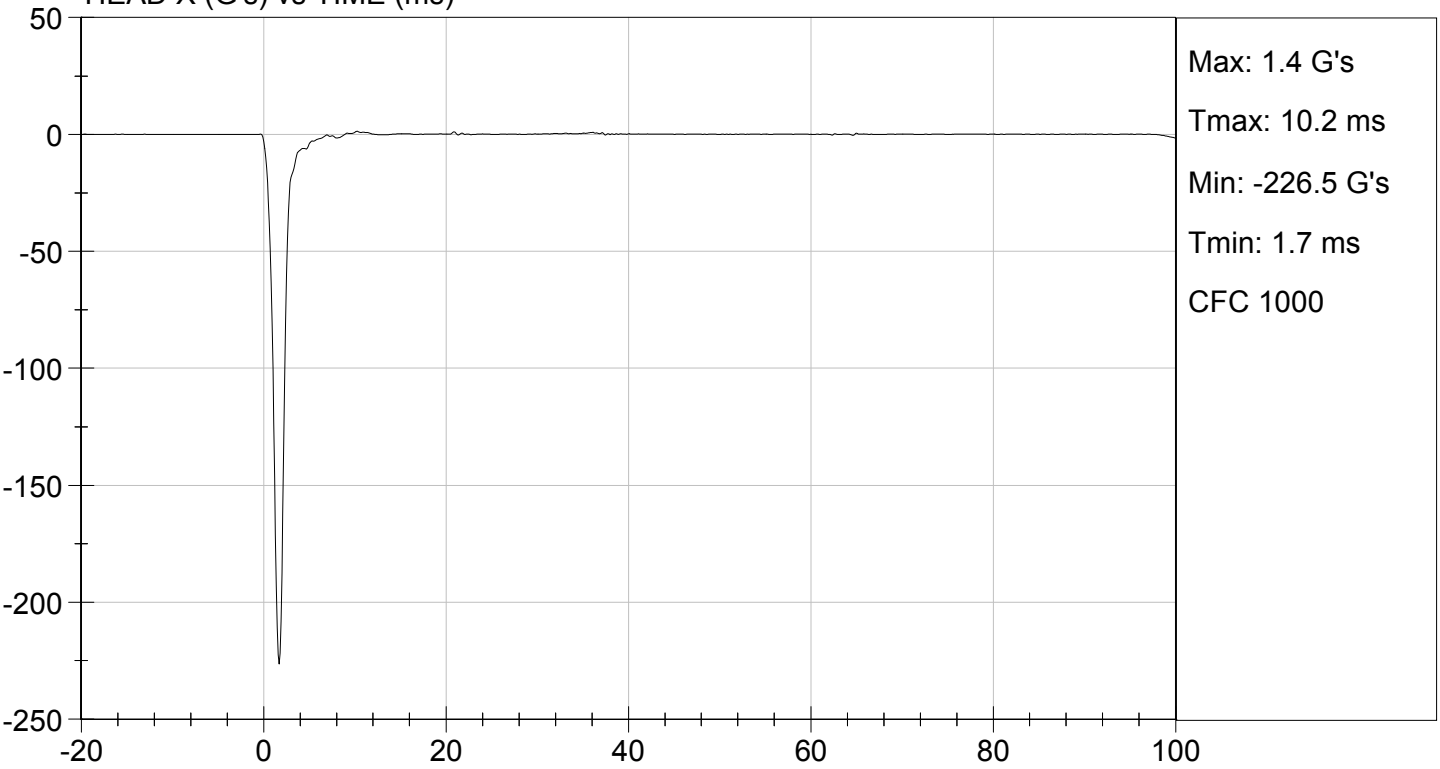
TEST DESC: HEAD DROP

TEST DATE: 10/28/2014
TEST #: D143761

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

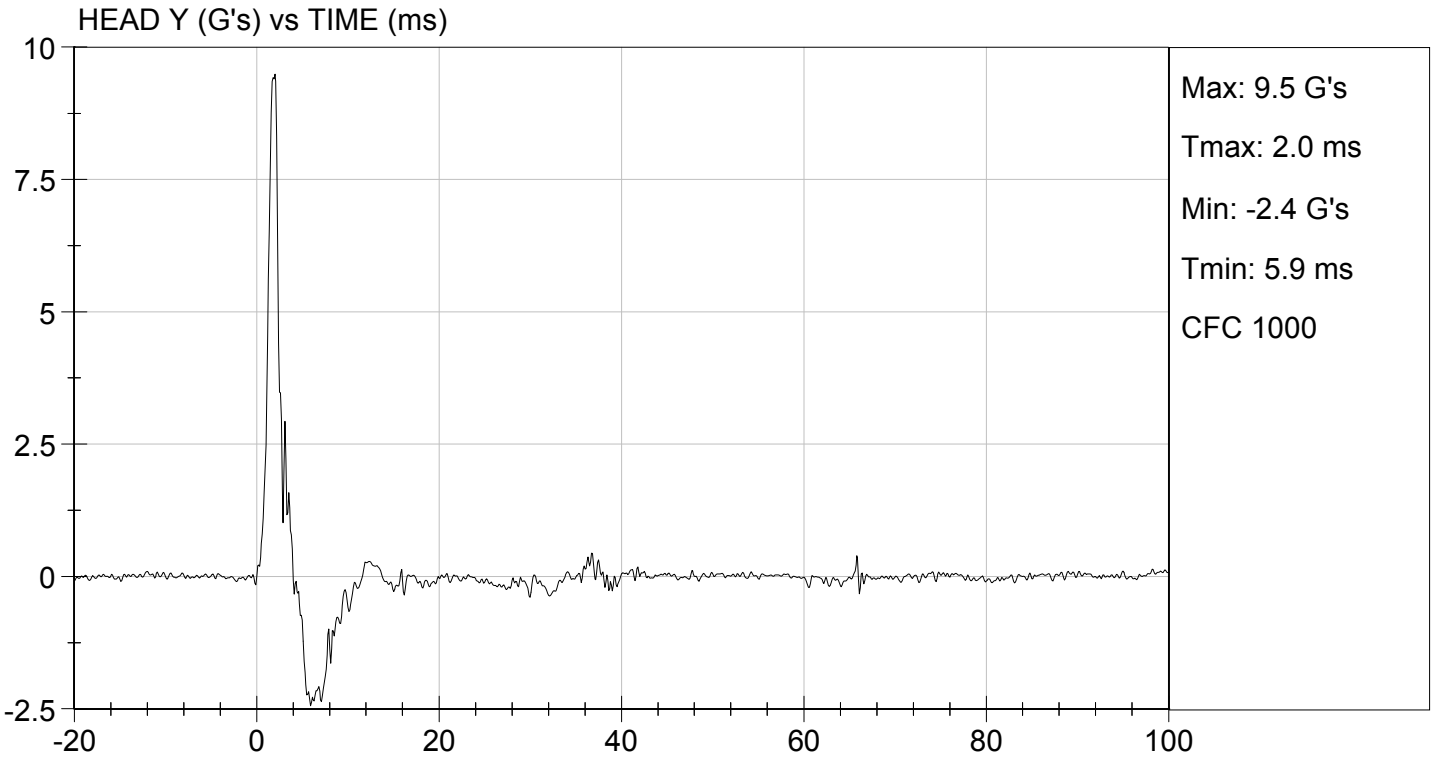


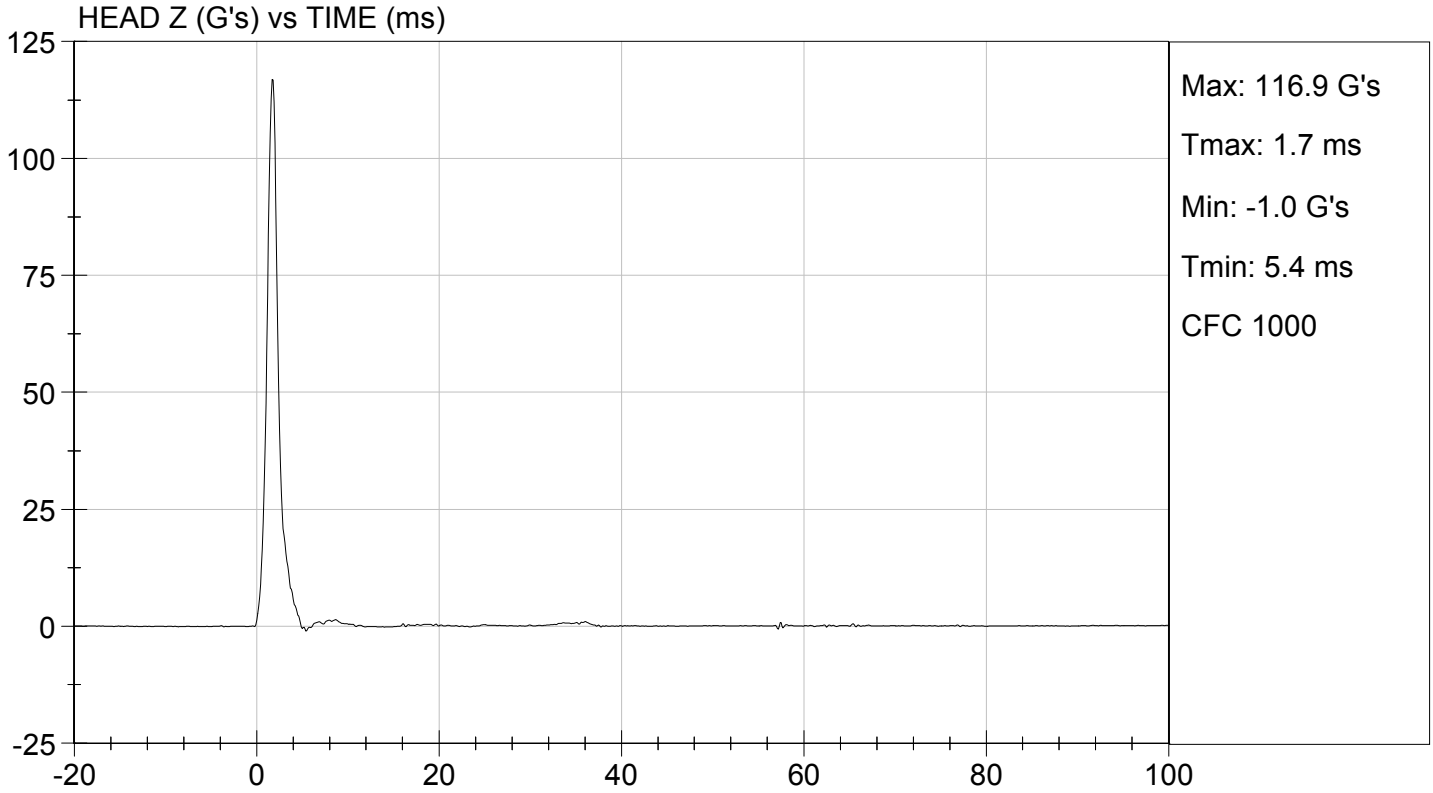
HEAD X (G's) vs TIME (ms)



TEST DESC: HEAD DROP

TEST DATE: 10/28/2014
TEST #: D143761





MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D143762

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.5	Pass
Laboratory Relative Humidity		%	10 to 70	44	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	24.31	Pass
	20 ms	G's	17.60 to 22.60	19.38	Pass
	30 ms	G's	12.50 to 18.50	14.11	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	14.0	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	34.2	Pass
Maximum "D" Plane Rotation	Maximum	Deg	64.0 to 78.0	64.3	Pass
	Time	ms	57.0 to 64.0	57.4	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	114.1	Pass
Moment About Occipital Condyle	Maximum	Nm	88.1 to 108.5	92.5	Pass
	Time	ms	47.0 to 58.0	48.2	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	100.6	Pass
			Overall Test Results		Pass

David Schoedel
Laboratory Technician

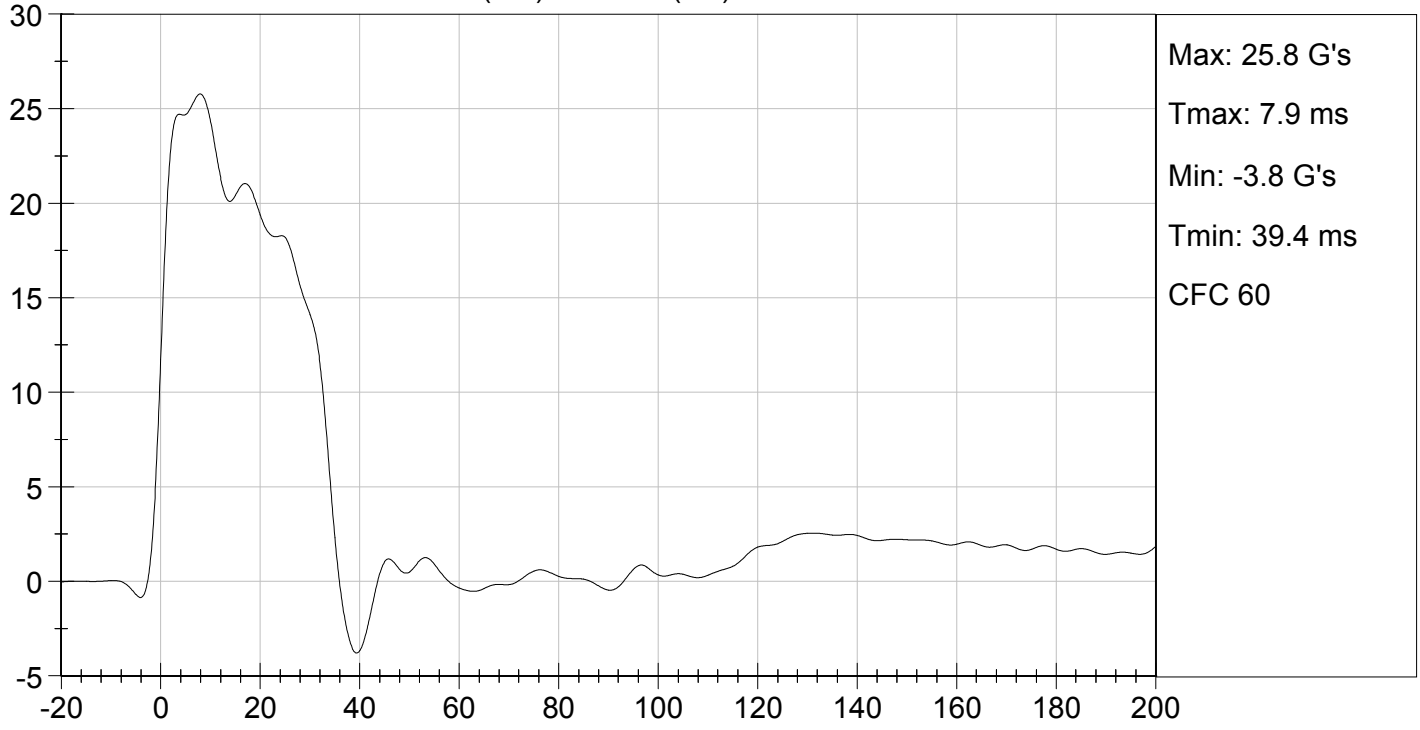
10/28/2014
Test Date

Jessica Hall
Approved By

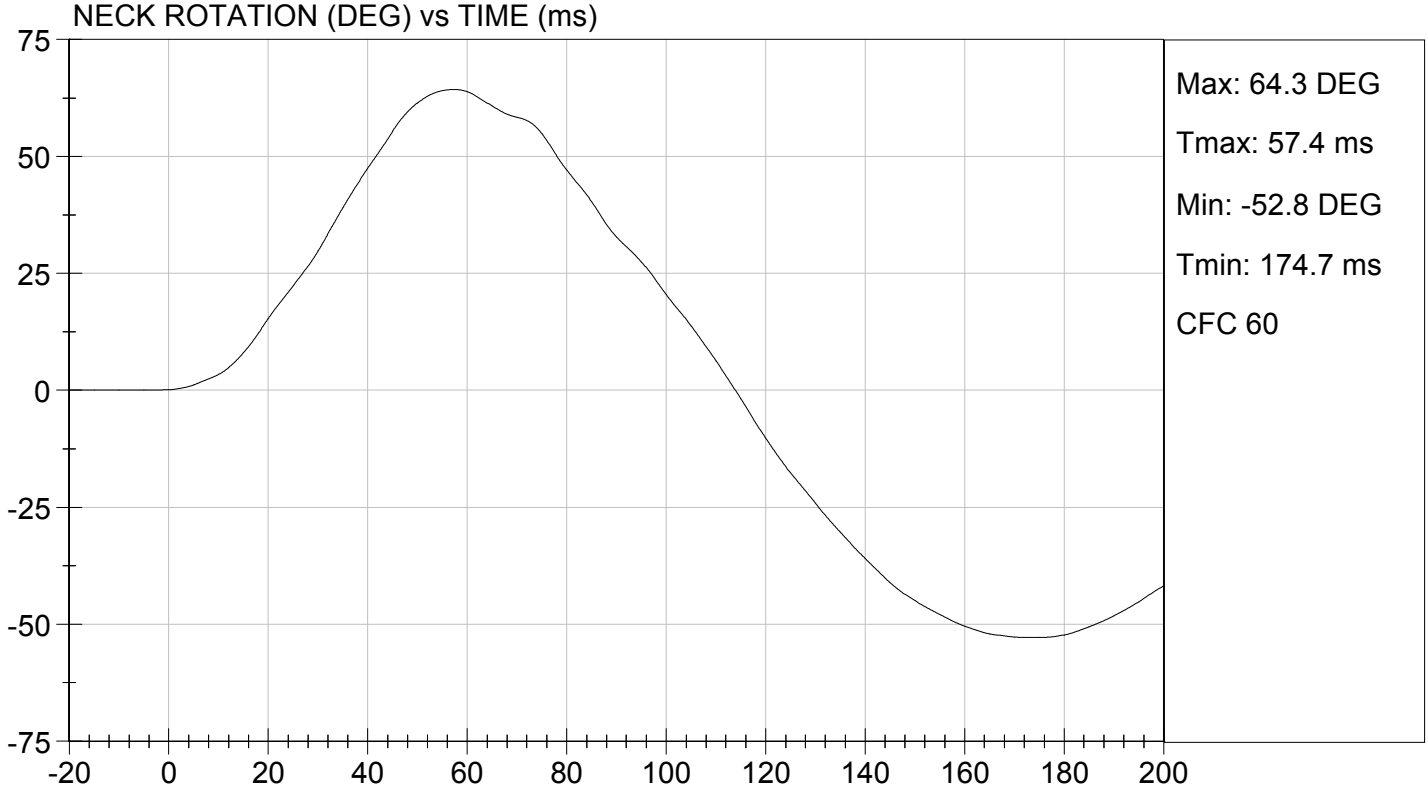
TEST DESC: NECK FLEXION
VELOCITY: 23.15 ft/s, 7.06 m/s

TEST DATE: 10/28/2014
TEST #: D143762

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

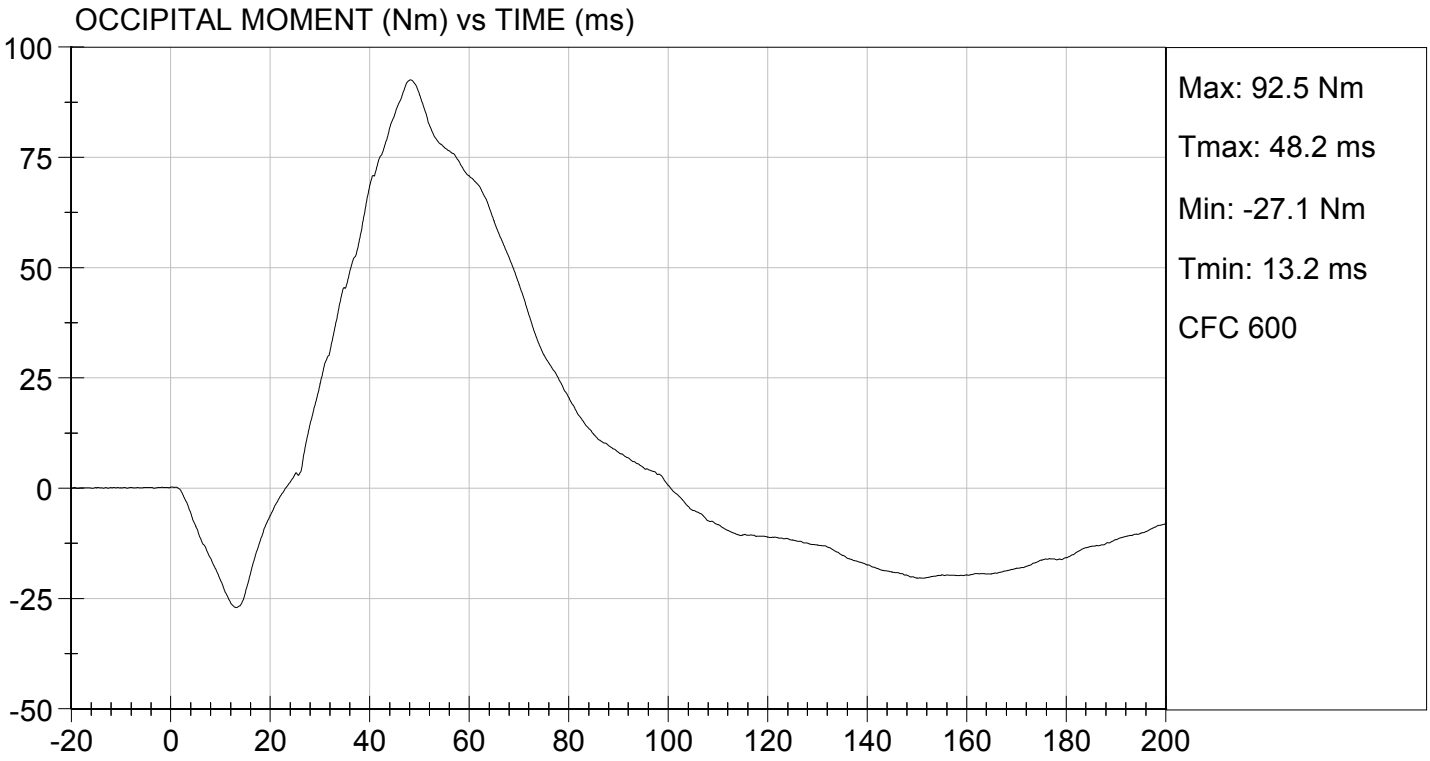


NECK ROTATION (DEG) vs TIME (ms)



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

TEST DATE: 10/28/2014
TEST #: D143762



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D143763

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.5	Pass
Laboratory Relative Humidity		%	10 to 70	44	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.12	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	19.04	Pass
	20 ms	G's	14.00 to 19.00	16.34	Pass
	30 ms	G's	11.00 to 16.00	11.47	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	11.4	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	39.7	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	92.8	Pass
	Time	ms	72.0 to 82.0	75.3	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	153.1	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-60.4	Pass
	Time	ms	65.0 to 79.0	70.1	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	140.6	Pass
			Overall Test Results		Pass

David Schoedel
Laboratory Technician

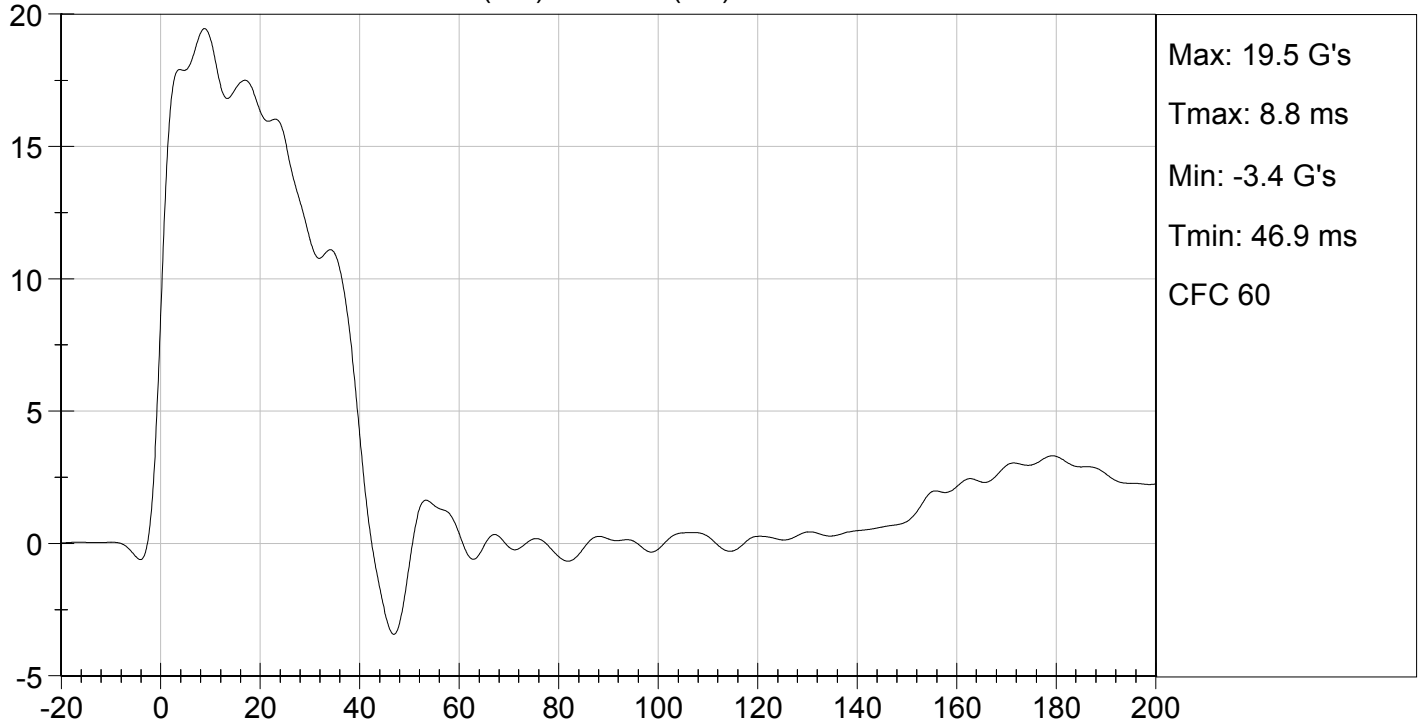
10/28/2014
Test Date

Jessica Gall
Approved By

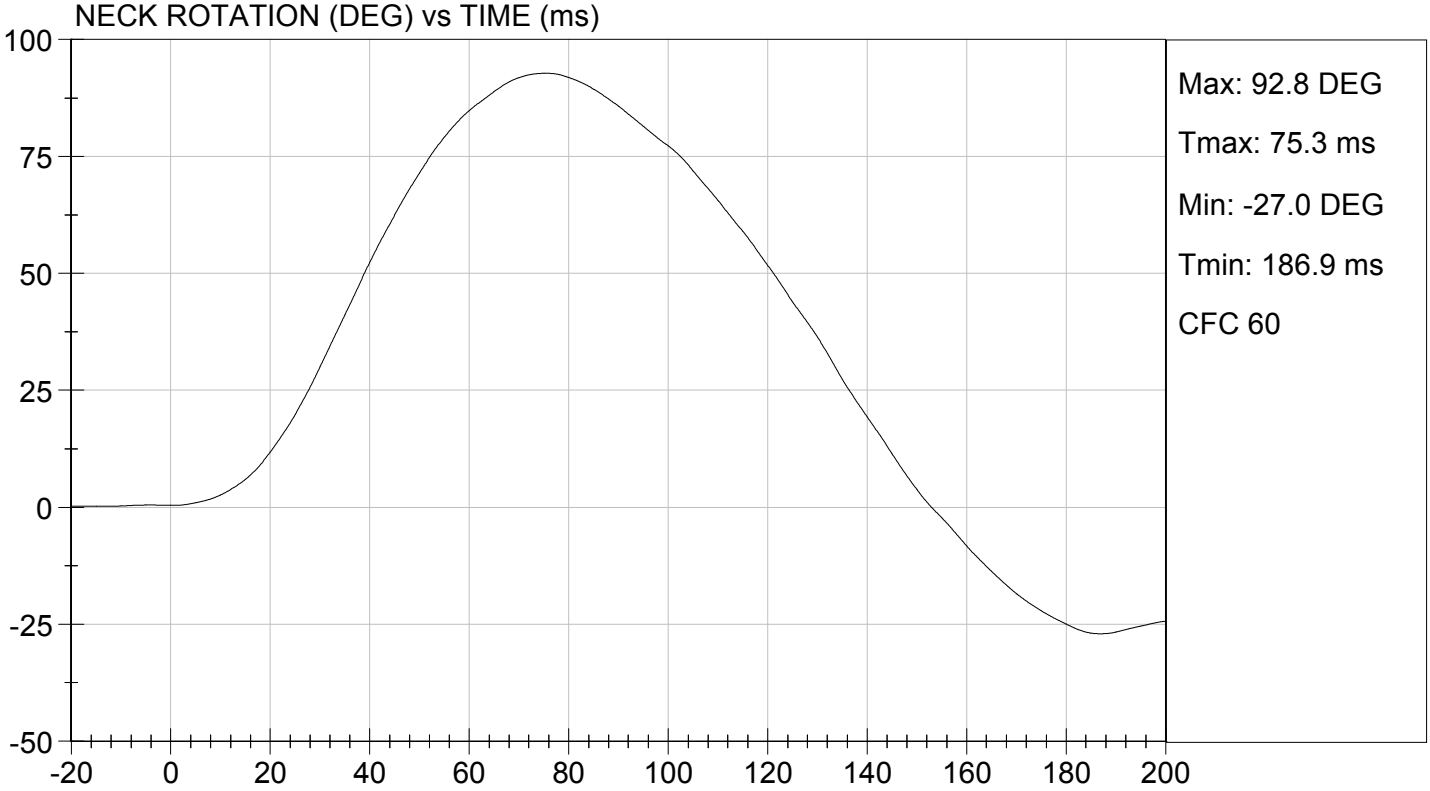
TEST DESC: NECK EXTENSION
VELOCITY: 20.08 ft/s, 6.12 m/s

TEST DATE: 10/28/2014
TEST #: D143763

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

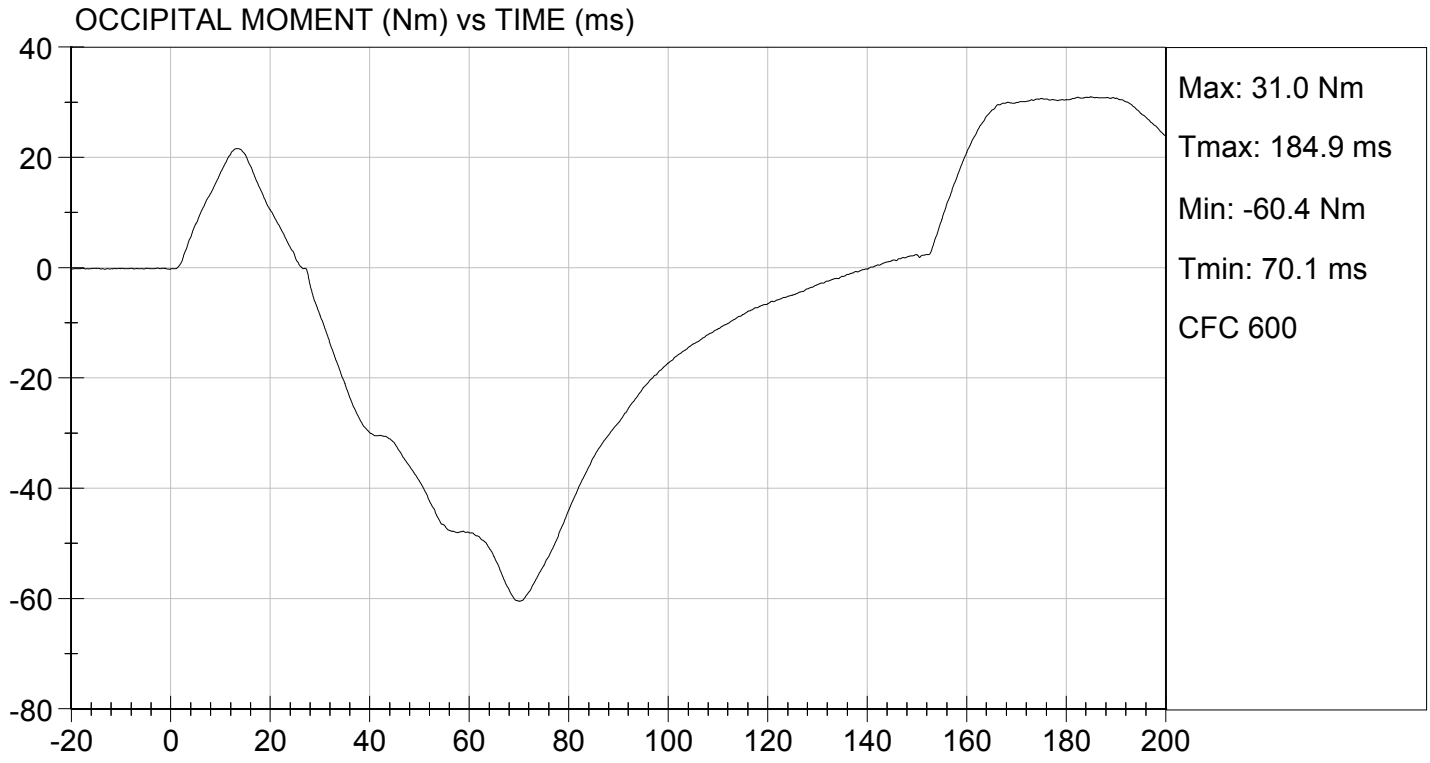


NECK ROTATION (DEG) vs TIME (ms)



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

TEST DATE: 10/28/2014
TEST #: D143763



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D143764

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	41	Pass
Probe Velocity	m/s	6.58 to 6.82	6.77	Pass
Peak Probe Force	N	5159 to 5893	5,277	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.54	Pass
Internal Hysteresis	%	69 to 85	70	Pass
		Overall Test Results		Pass

David Schoedel
Laboratory Technician

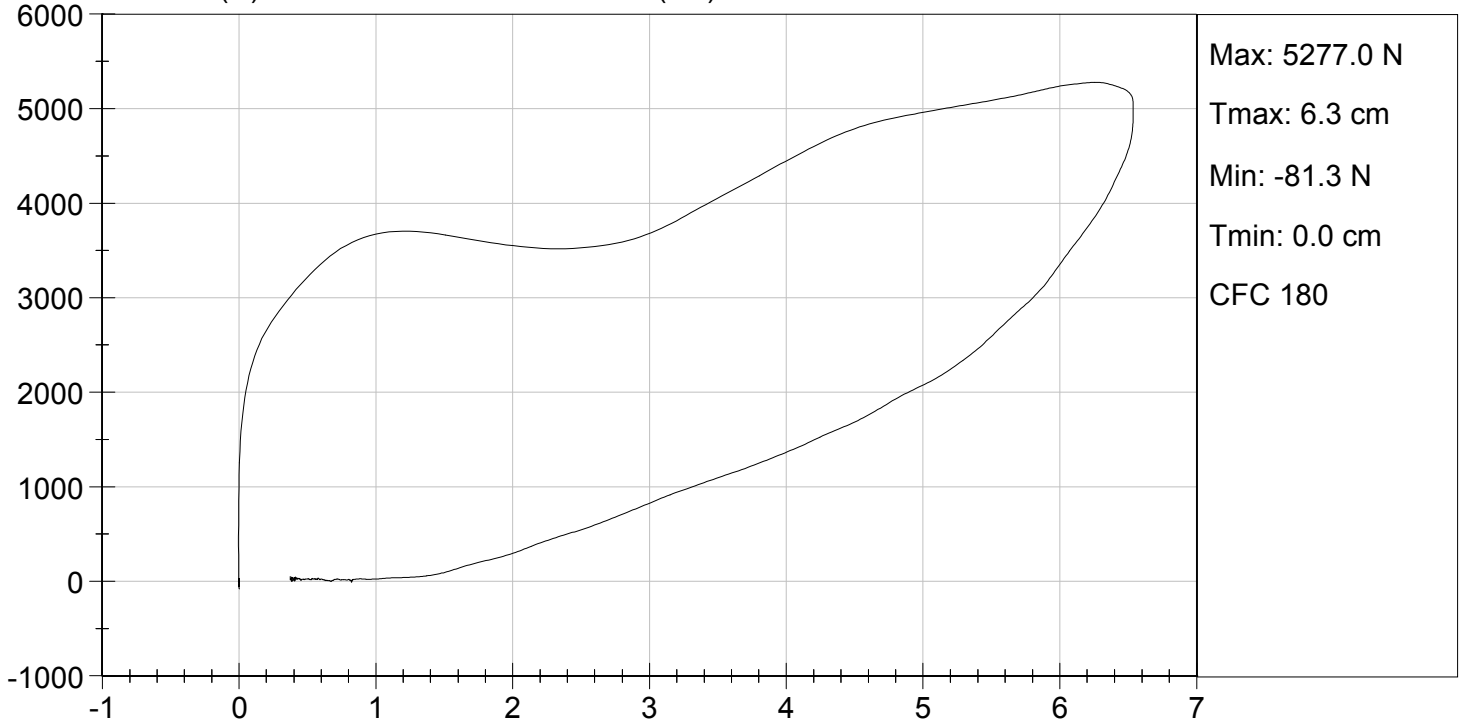
10/28/2014
Test Date

Jessica Hall
Approved By

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

TEST DATE: 10/28/2014
TEST #: D143764

FORCE (N) vs CHEST DISPLACEMENT (cm)



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D143765

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	48	Pass
Probe Velocity	m/s	2.07 to 2.13	2.09	Pass
Peak Probe Force	N	4715 to 5782	5,613	Pass
		Overall Test Results		Pass

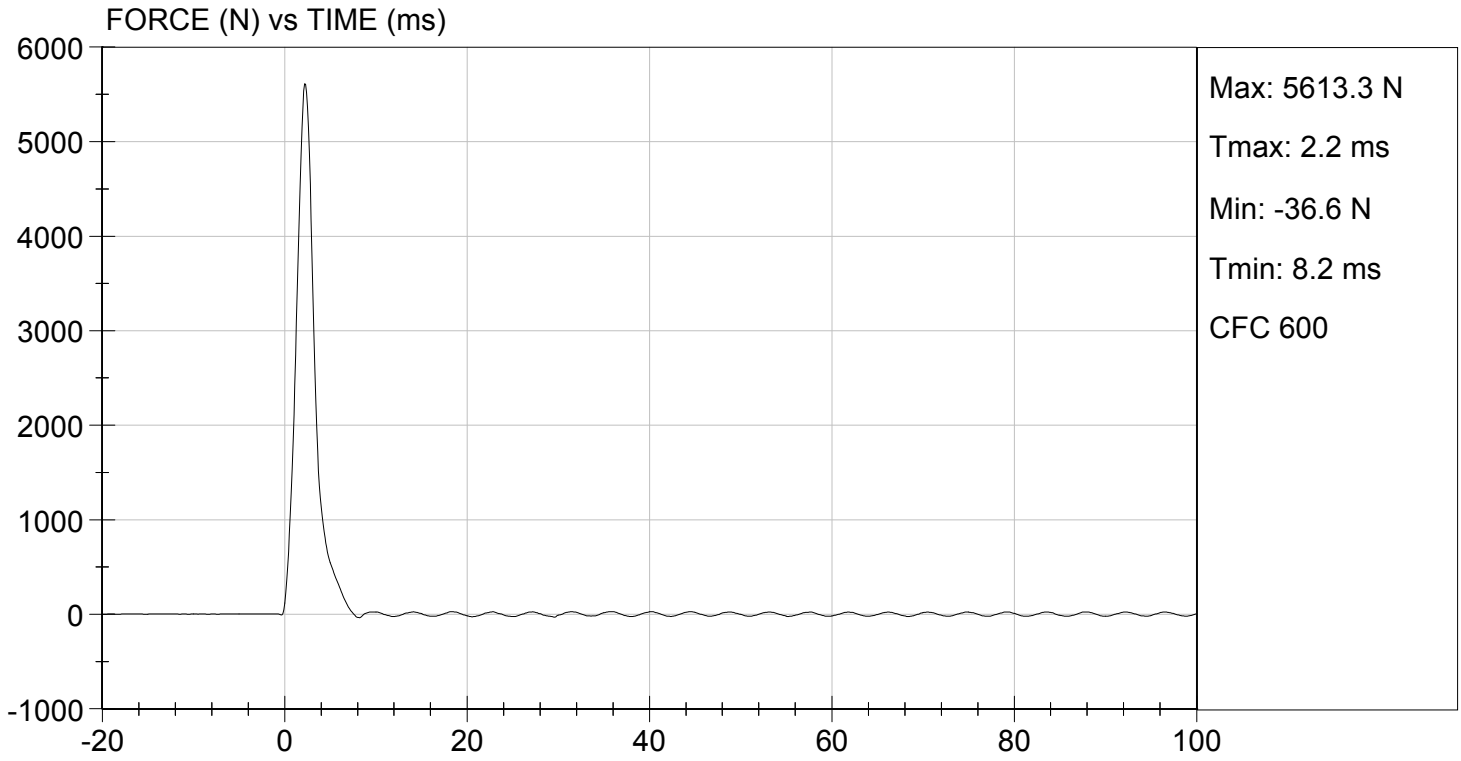
Maxime Chamberland
Laboratory Technician

10/27/2014
Test Date

Jessica Gall
Approved By

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

TEST DATE: 10/27/2014
TEST #: D143765



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D143766

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	48	Pass
Probe Velocity	m/s	2.07 to 2.13	2.09	Pass
Peak Probe Force	N	4715 to 5782	4,875	Pass
		Overall Test Results		Pass

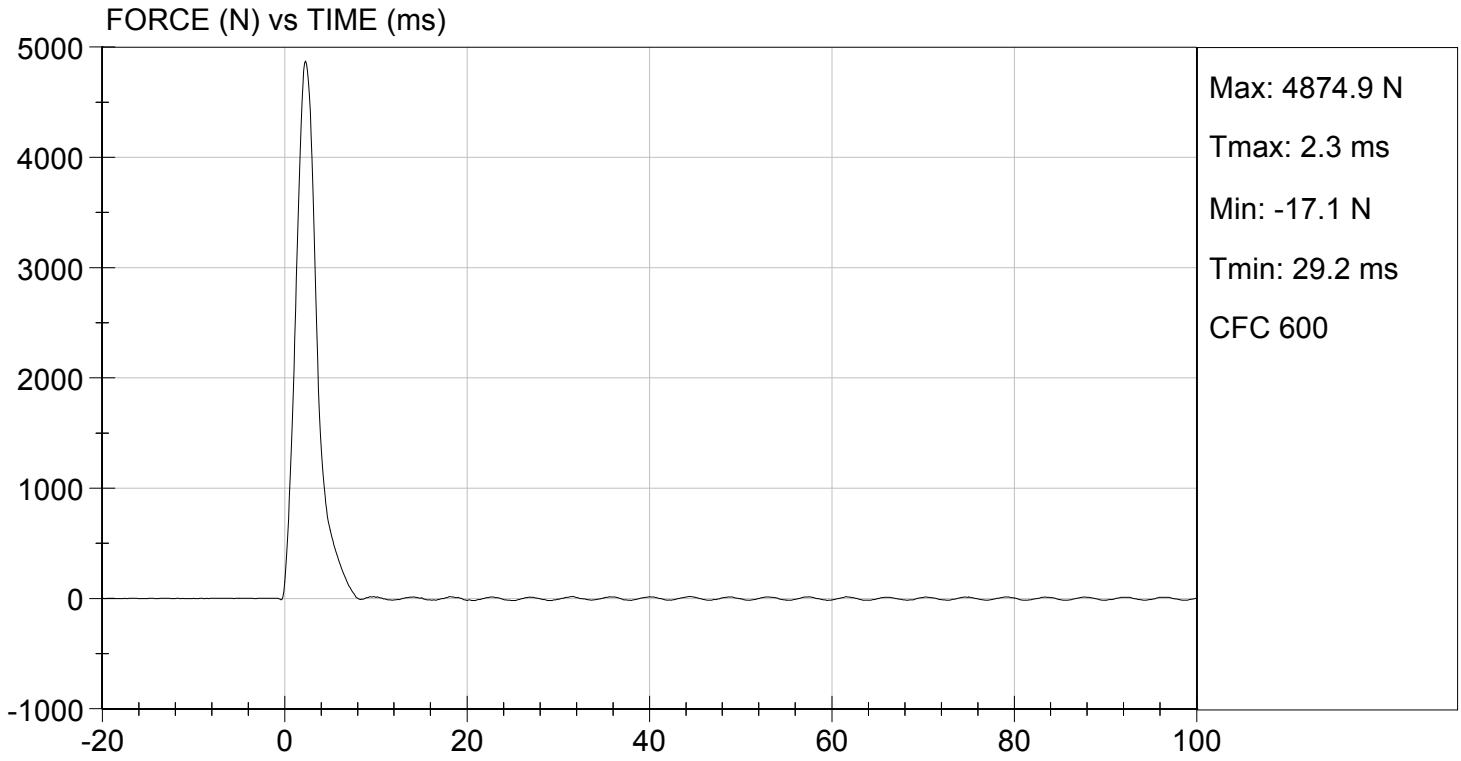
Maxime Chamberland
Laboratory Technician

10/27/2014
Test Date

Jessica Hall
Approved By

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

TEST DATE: 10/27/2014
TEST #: D143766



MGA RESEARCH CORPORATION

HIP-FEMUR FLEXION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351 **Test I.D:** D143760

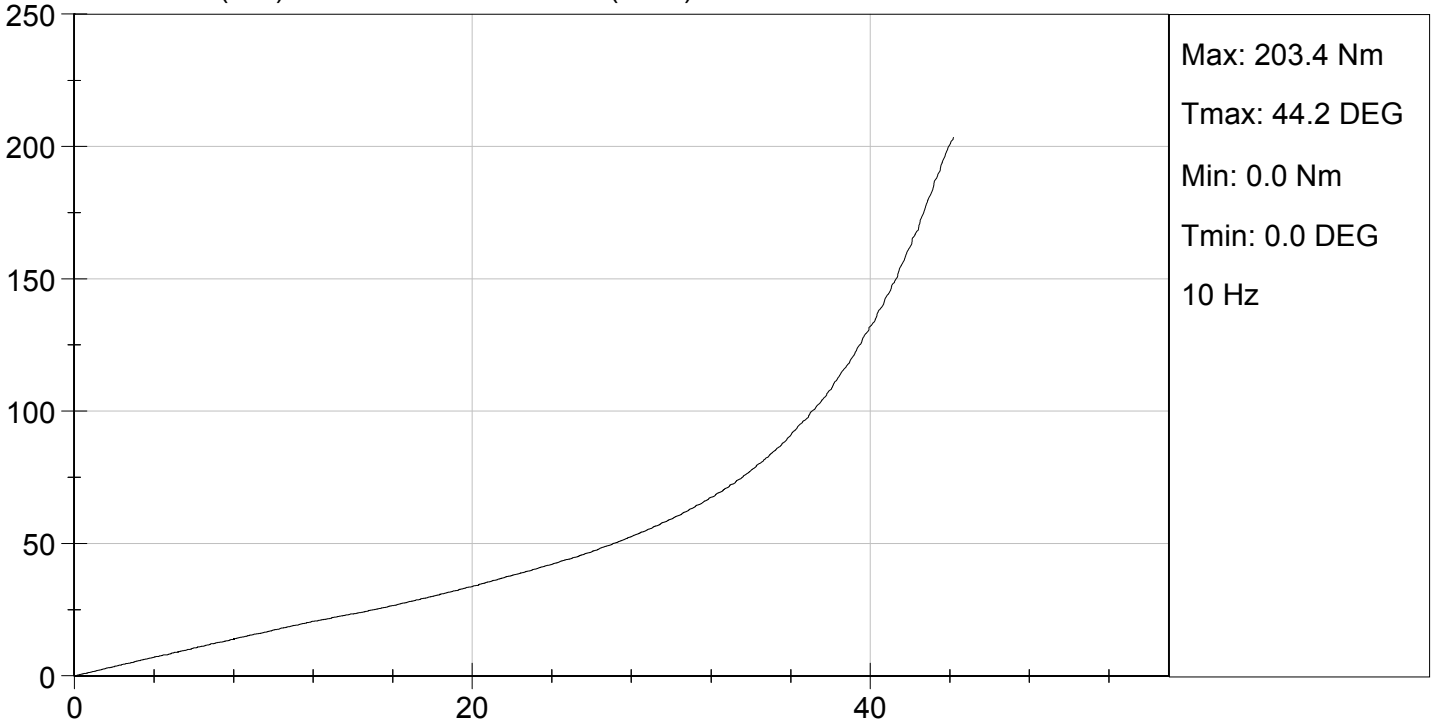
Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	20.9	20.9	Pass
Laboratory Relative Humidity	%	10 to 70	49	49	Pass
Rotation Rate	deg/s	5.0 to 10.0	6.1	6.3	Pass
30 Degrees	Nm	94.9 Nm Max	59.3	67.1	Pass
150 ft-lbf / 203.4 Nm	Deg	40.0 to 50.0 Degree Max Rotation	44.2	46.6	Pass
		Overall Test Results			Pass

David Schoedel
Laboratory Technician

10/28/2014
Test Date

Jessica Hall
Approved By

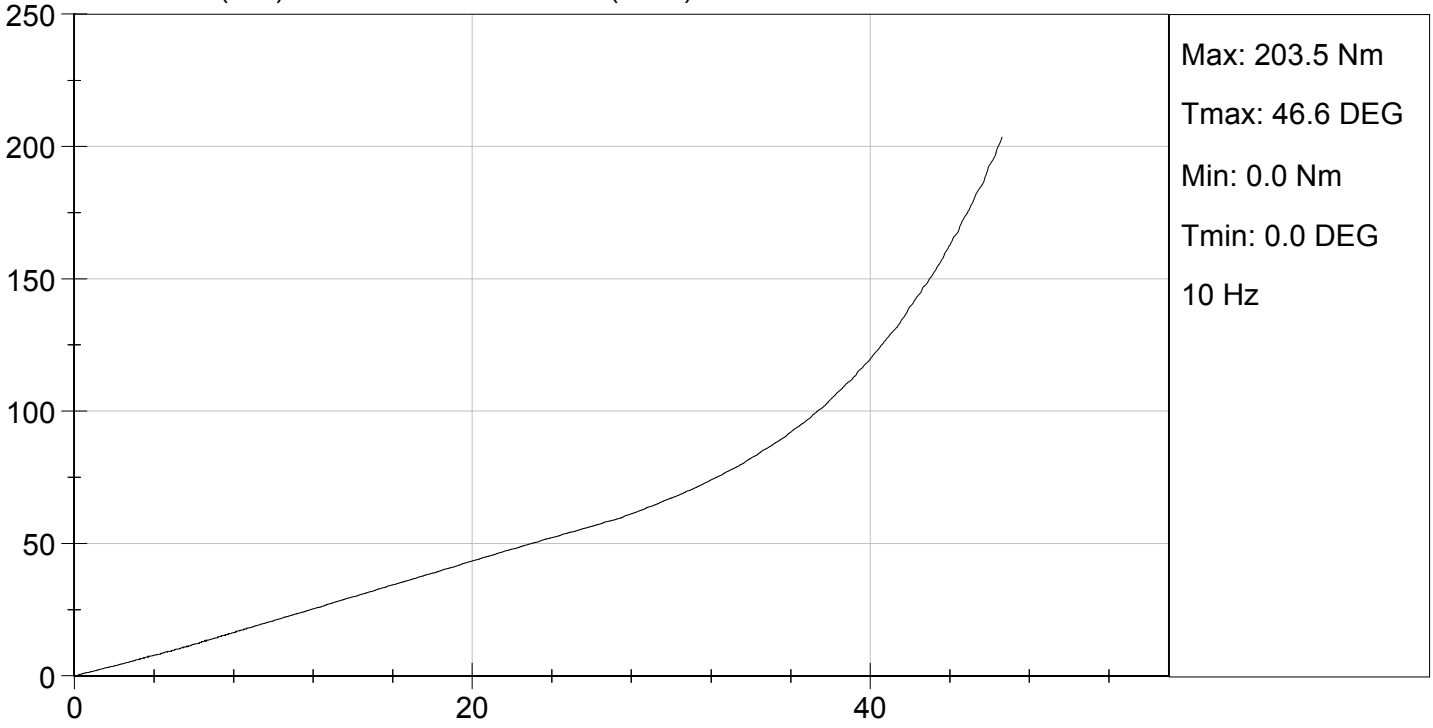
MOMENT (Nm) vs FEMUR ROTATION (DEG)



TEST DESC: LEFT HIP FEMUR FLEXION

TEST DATE: 10/28/2014
TEST #: D143760

MOMENT (Nm) vs FEMUR ROTATION (DEG)



Hybrid III, 5th External Measurements
SN: 138

HYBRID III, PART 572, SUBPART O EXTERNAL DIMENSIONS				
DIMENSION	DESCRIPTION	DETAILS	ASSEMBLY DIMENSION (mm)	ACTUAL MEASUREMENT
A	TOTAL SITTING HEIGHT	Seat surface to highest point on top of the head.	774.7-800.1	785.1
B	SHOULDER PIVOT HEIGHT	Centerline of shoulder pivot bolt to the seat surface.	431.8-457.2	456.8
C	H-POINT HEIGHT	Reference	81.3-86.3	84.0
D	H-POINT LOCATION FROM BACKLINE	Reference	144.8-149.8	146.2
E	SHOULDER PIVOT FROM BACKLINE	Center of the shoulder clevis to the rear vertical surface of the fixture.	68.6-83.8	78.0
F	THIGH CLEARANCE	Measured at the highest point on the upper femur segment.	119.4-134.6	127.5
G	BACK OF ELBOW TO WRIST PIVOT	back of the elbow flesh to the wrist pivot in line with the elbow and wrist pivots	243.9-259.1	249.6
H	HEAD BACK TO BACKLINE	Back of Skull cap skin to seat rear vertical surface (Reference)	43.2-48.2	45.0
I	SHOULDER TO- ELBOW LENGTH	Measure from the highest point on top of the shoulder clevis to the lowest part of the flesh on the elbow in line with the elbow pivot bolt.	276.8-297.2	280.2
J	ELBOW REST HEIGHT	Measure from the flesh below the elbow pivot bolt to the seat surface.	182.8-203.2	201.9
K	BUTTOCK TO KNEE LENGTH	The forward most part of the knee flesh to the rear vertical surface of the fixture.	520.7-546.1	526.7
L	POPLITEAL HEIGHT	Seat surface to the plane of the horizontal plane of the bottom of the feet.	355.6-376.0	362.3
M	KNEE PIVOT HEIGHT	Centerline of knee pivot bolt to the horizontal plane of the bottom of the feet.	393.7-419.1	398.0

N	BUTTOCK POPLITEAL LENGTH	The rearmost surface of the lower leg to the same point on the rear surface of the buttocks used for dim. “K”.	414-439.4	430.5
HYBRID III, SUBPART O EXTERNAL DIMENSIONS, continued				
DIMENSION	DESCRIPTION	DETAILS	ASSEMBLY DIMENSION (mm)	ACTUAL MEASUREMENT
O	CHEST DEPTH WITHOUT JACKET	Measured 304.8 ± 5.1 mm above seat surface	175.3-190.5	184.6
P	FOOT LENGTH	Tip of toe to rear of heal	218.5-233.7	221.0
Q	STANDING HEIGHT	(THEORETICAL)	1501.1	N/A
R	BUTTOCK TO KNEE PIVOT LENGTH	The rear surface of the buttocks to the knee pivot bolt	457.2-482.6	472.6
S	HEAD BREADTH	The widest part of the head	137.1-147.3	141.9
T	HEAD DEPTH	Back of the head to the forehead	177.8-188.0	184.2
U	HIP BREADTH	The widest part of the hip	299.7-314.9	307.4
V	SHOULDER BREADTH	Outside edges of right and left shoulder clevises	350.5-365.7	360.5
W	FOOT BREADTH	The widest part of the foot	78.8-94.0	85.0
X	HEAD CIRCUMFERENCE	Measured at the point as in dim. “T”	528.3-548.7	546.2
Y	CHEST CIRCUMFERENCE (WITH CHEST JACKET)	Measured 345.4 ± 12.7 mm above seat surface	850.9-881.3	875.1
Z	WAIST CIRCUMFERENCE	Measured 165.1 ± 5.1 mm above seat surface	759.5-789.9	785.4
AA	REFERENCE LOCATION FOR MEASUREMENT OF CHEST CIRCUMFERENCE	Reference	332.7-358.1	345.4
BB	REFERENCE LOCATION FOR MEASUREMENT OF WAIST CIRCUMFERENCE	Reference	160.1-170.2	165.1

MGA RESEARCH CORPORATION

HEAD DROP TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 138 **Test ID:** D143131

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	57	Pass
Peak Resultant Acceleration	G's	250 to 300	268	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-10.9	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
		Overall Test Results		Pass

David Schoedel
Laboratory Technician

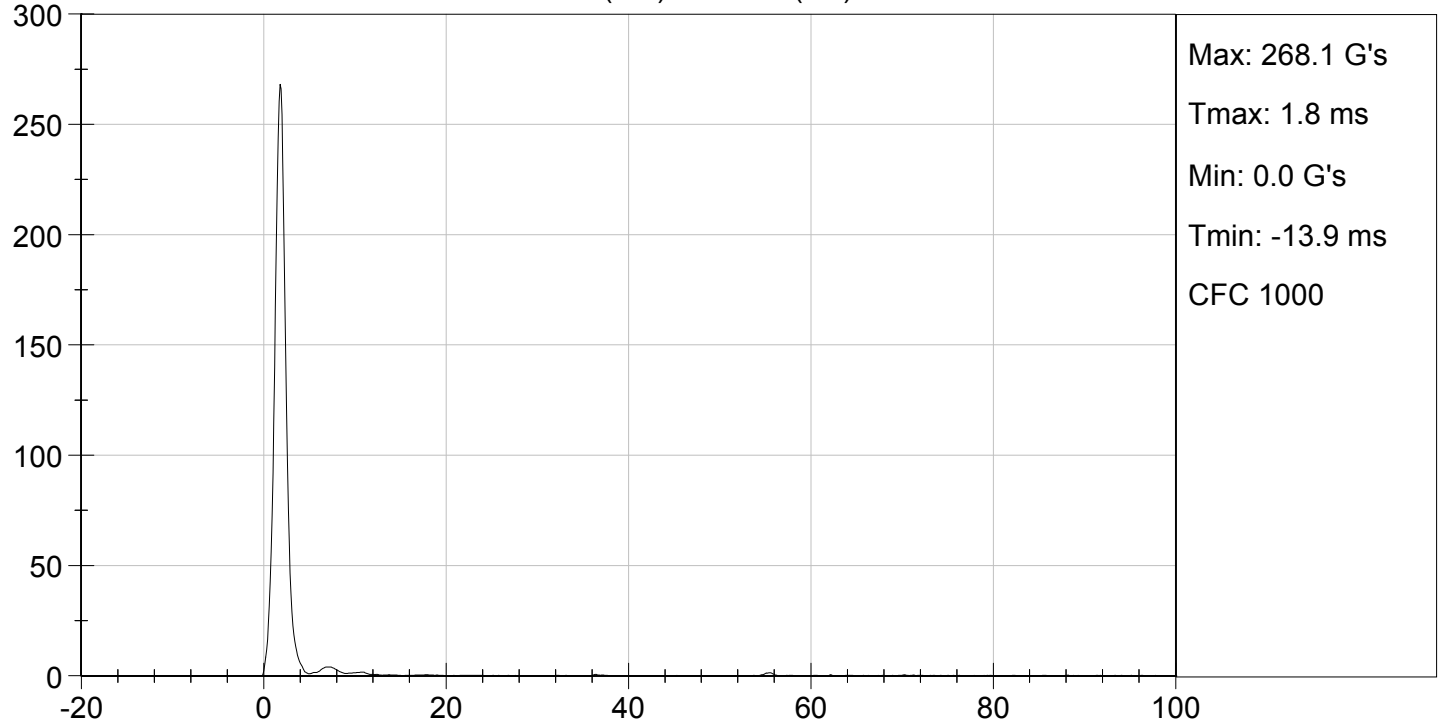
09/10/2014
Test Date

Jessica Gall
Approved By

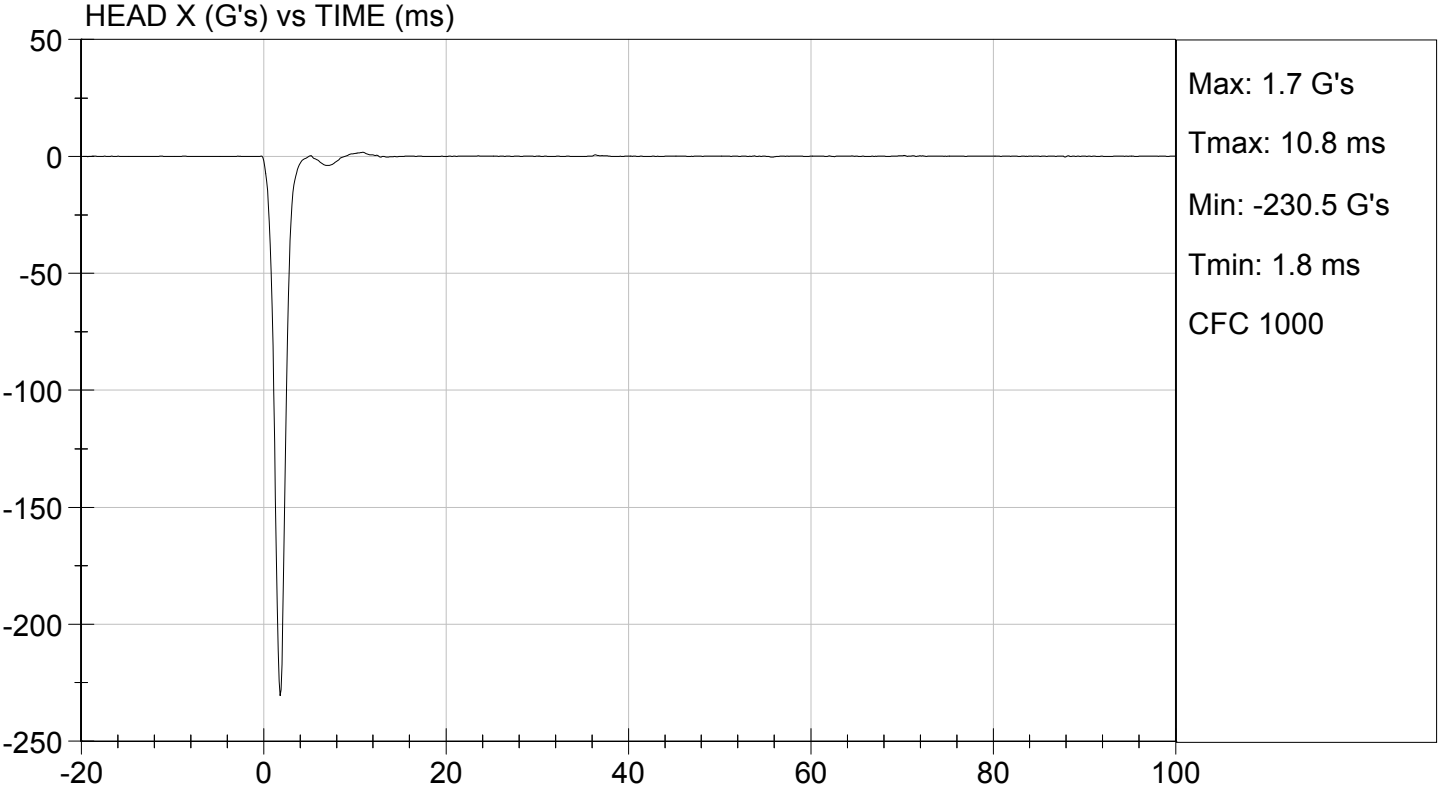
TEST DESC: HEAD DROP

TEST DATE: 09/10/2014
TEST #: D143131

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



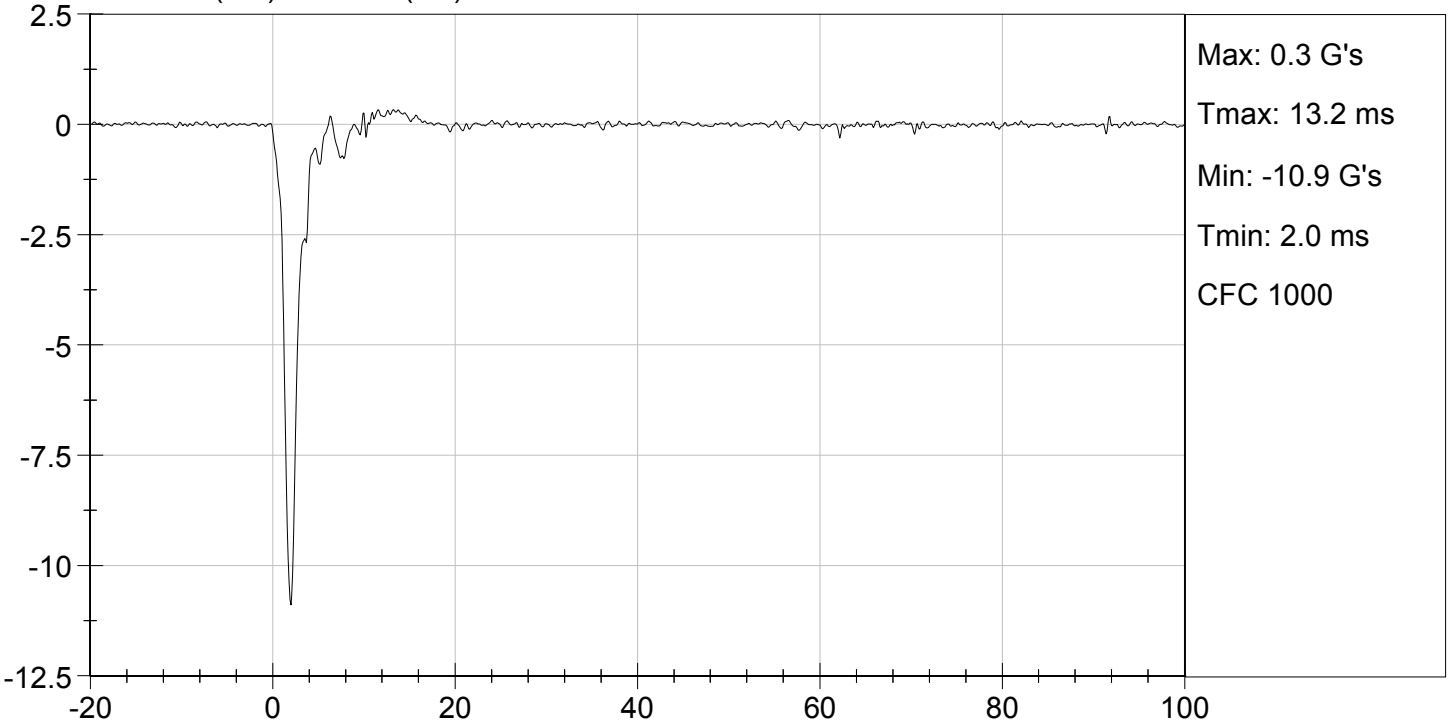
HEAD X (G's) vs TIME (ms)



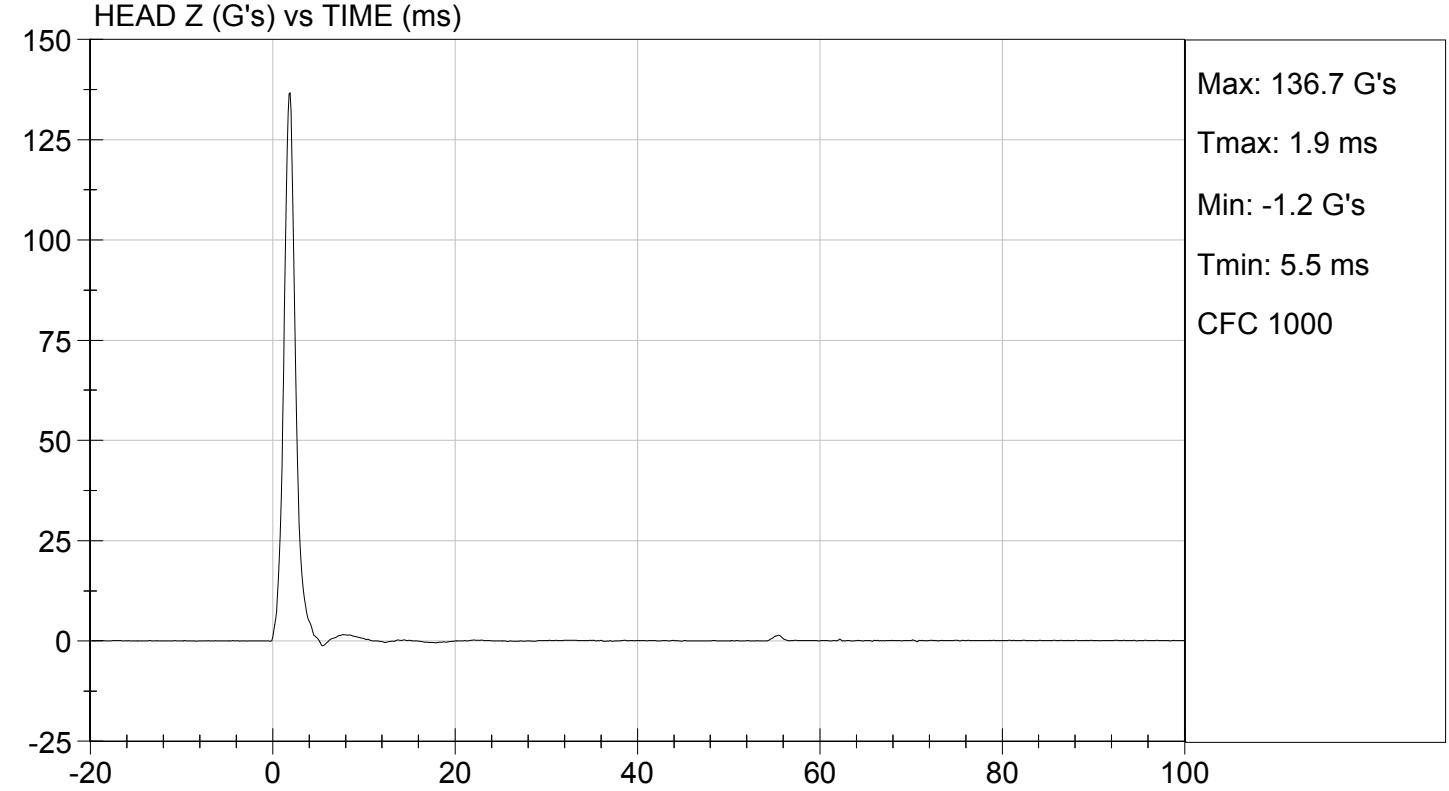
TEST DESC: HEAD DROP

TEST DATE: 09/10/2014
TEST #: D143131

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: 138 **Test I.D:** D143132

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	54	Pass
Pendulum Speed		m/s	6.89 to 7.13	7.13	Pass
Pendulum Velocity	10 ms	m/s	2.1 to 2.5	2.5	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	73	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	85	Pass
			Overall Results		Pass

David Schoedel
Laboratory Technician

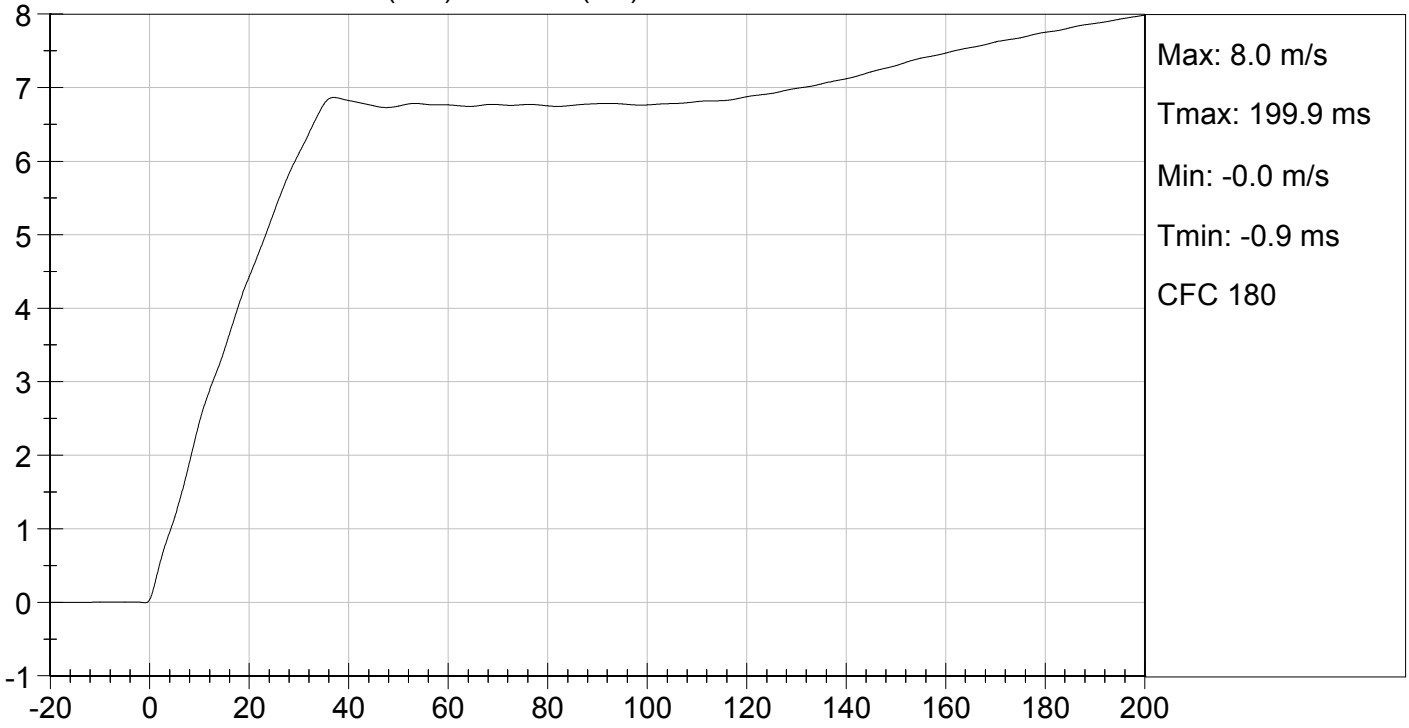
09/10/2014
Test Date

Jessica Hall
Approved By

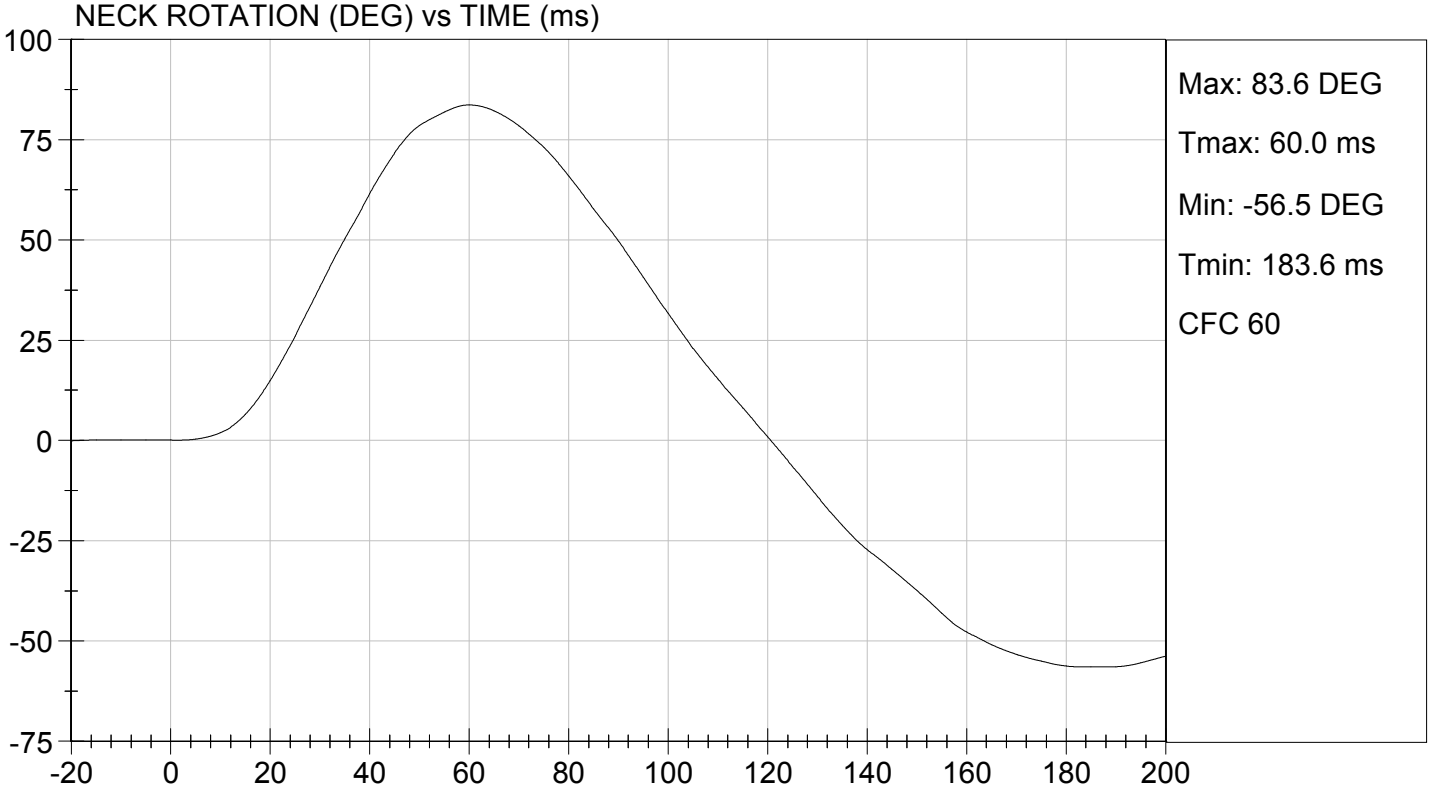
TEST DESC: NECK FLEXION
VELOCITY: 23.40 ft/s, 7.13 m/s

TEST DATE: 09/10/2014
TEST #: D143132

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



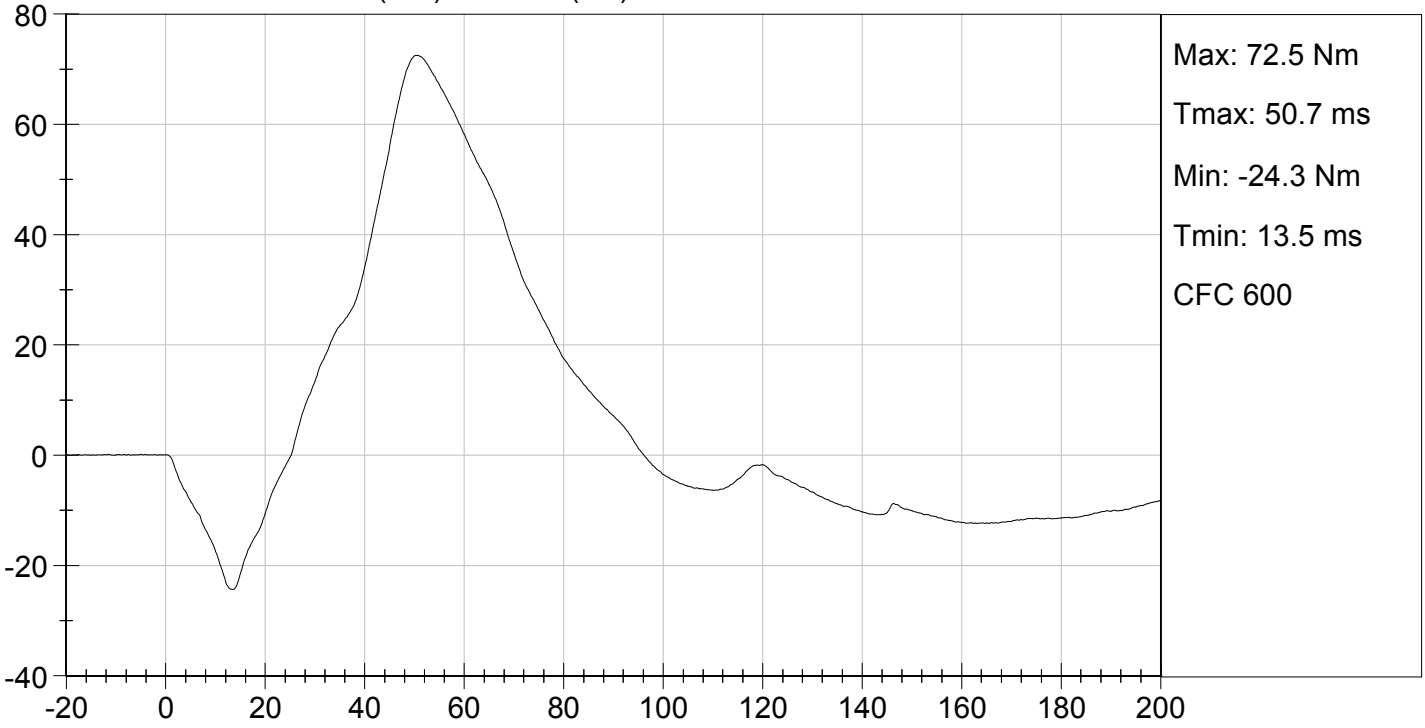
NECK ROTATION (DEG) vs TIME (ms)



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

TEST DATE: 09/10/2014
TEST #: D143132

OCCIPITAL MOMENT (Nm) vs TIME (ms)



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 138 **Test I.D:** D143133

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	54	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.19	Pass
Pendulum Velocity	10 ms	m/s	1.5 to 1.9	1.8	Pass
	20 ms	m/s	3.1 to 3.9	3.8	Pass
	30 ms	m/s	4.6 to 5.6	5.3	Pass
D Plane Rotation	Max	deg	99 to 114	107	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	-65 to -53	-54	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	96	Pass
			Overall Results		Pass

David Schoedel
Laboratory Technician

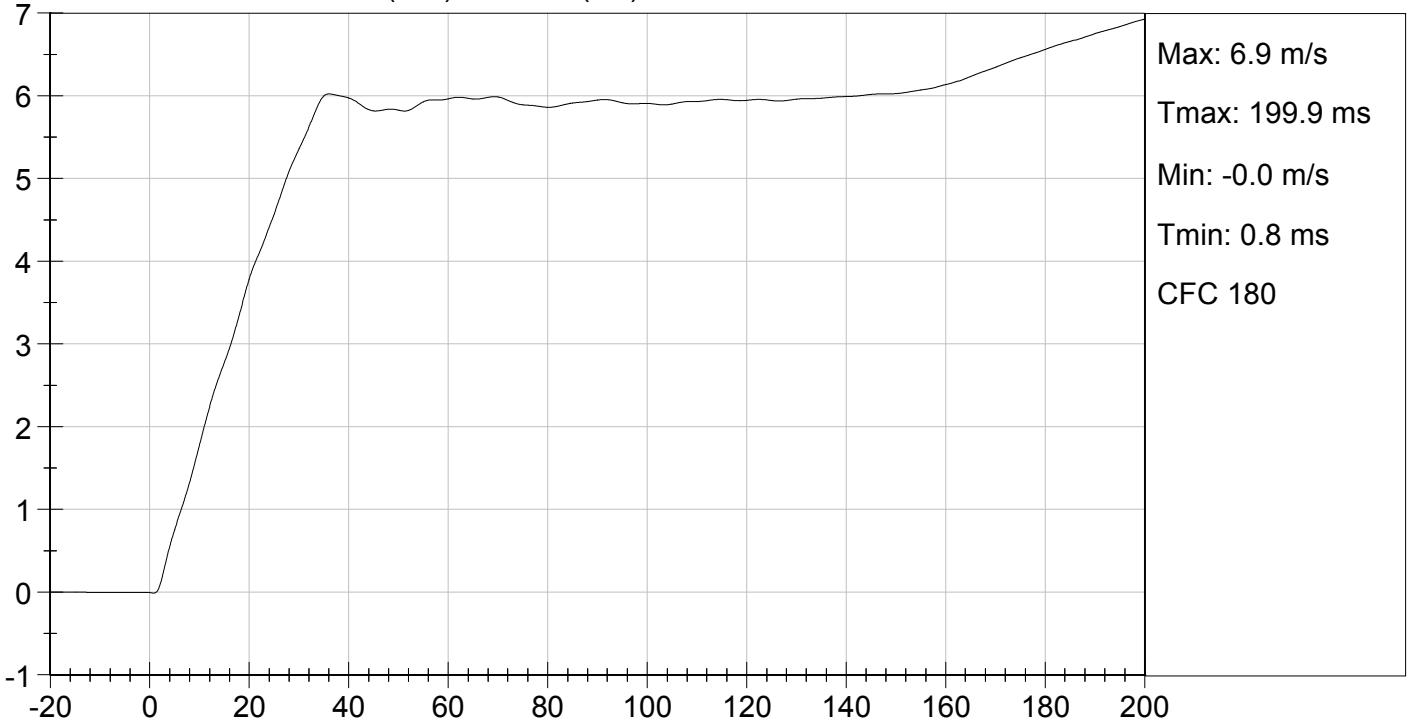
09/10/2014
Test Date

Jessica Hall
Approved By

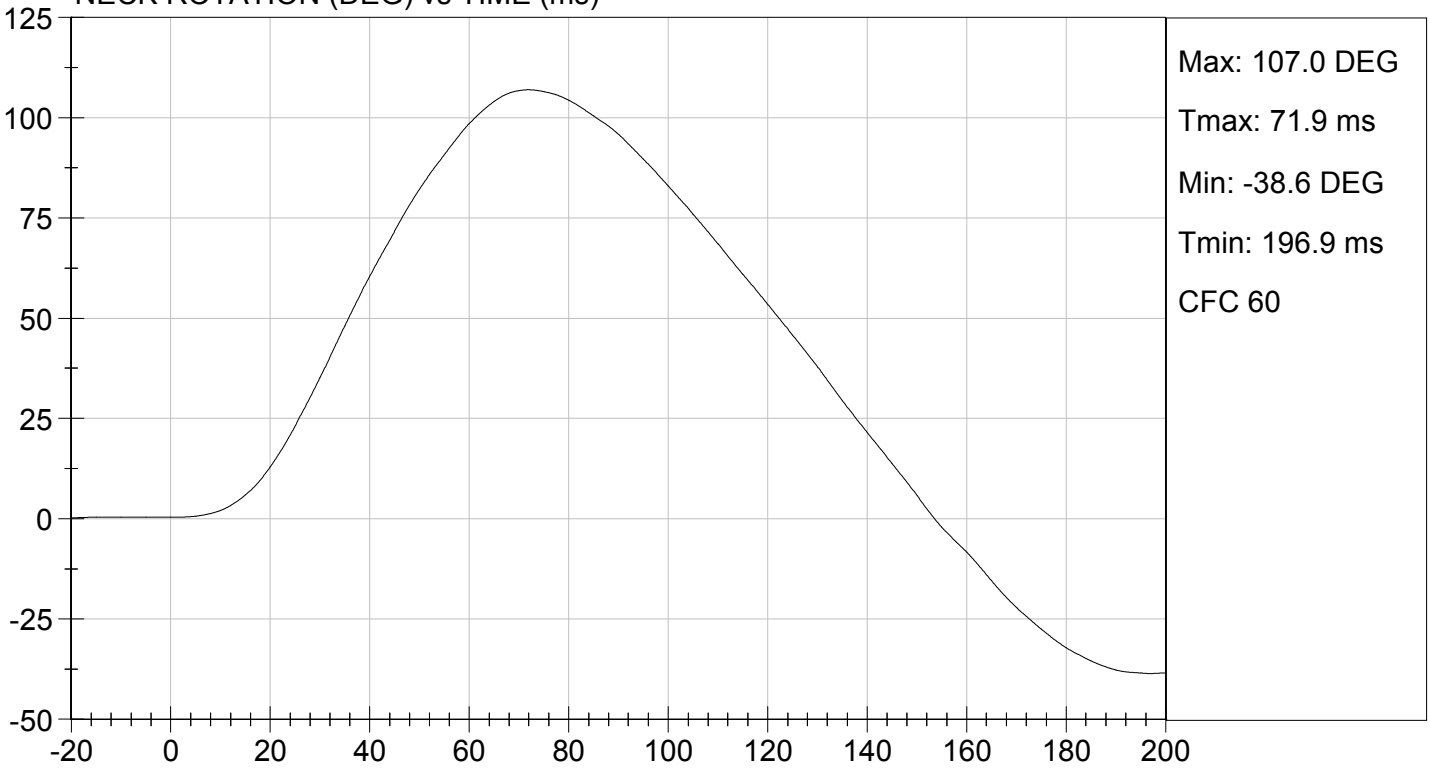
TEST DESC: NECK EXTENSION
VELOCITY: 20.30 ft/s, 6.19 m/s

TEST DATE: 09/10/2014
TEST #: D143133

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

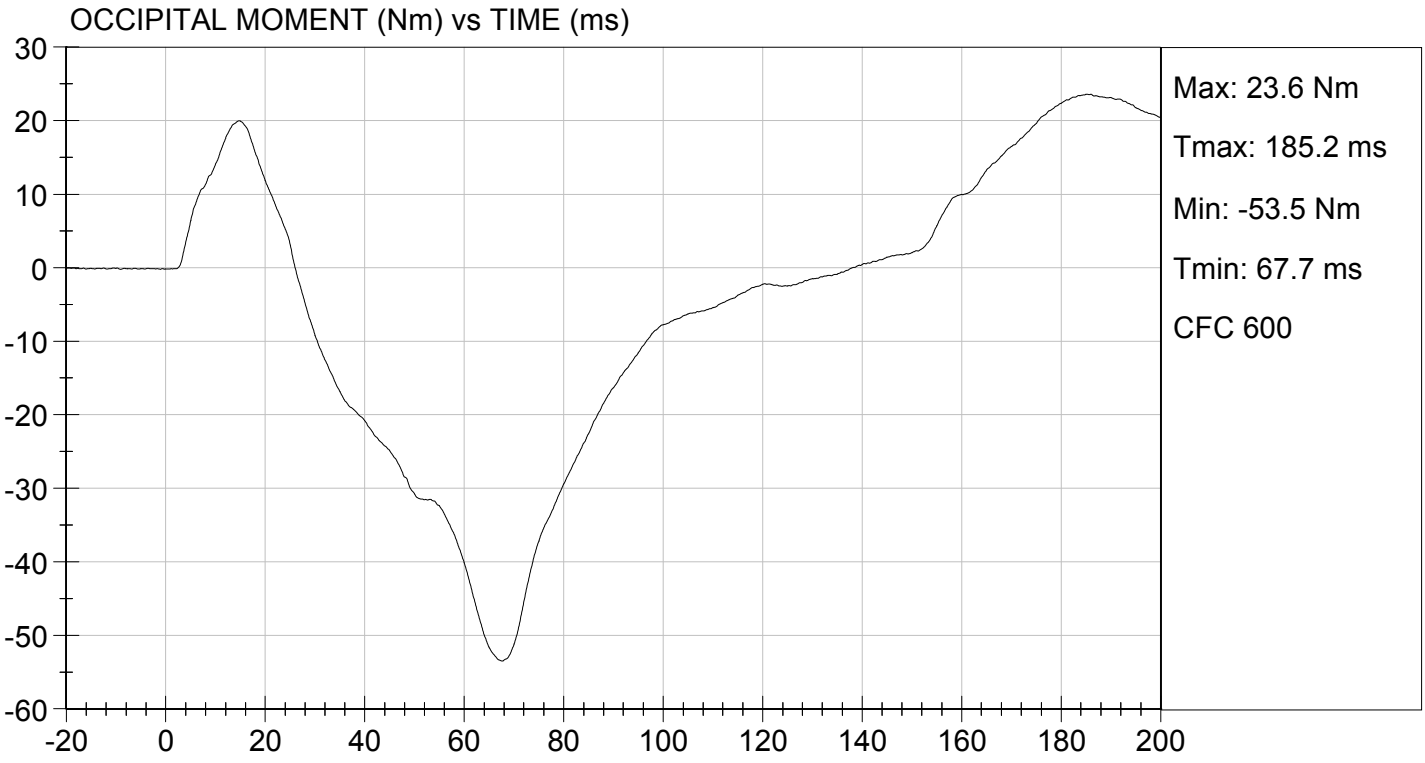


NECK ROTATION (DEG) vs TIME (ms)



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

TEST DATE: 09/10/2014
TEST #: D143133



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 5TH PERCENTILE

ATD Serial No: 138 **Test I.D:** D143134

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.4	Pass
Relative Humidity	%	10 to 70	54	Pass
Probe Speed	m/s	6.59 to 6.83	6.77	Pass
Peak Deflection	mm	50 to 58	52	Pass
Peak Resistive Force w/in Deflection Corridor	N	3900 to 4400	4190	Pass
Internal Hysteresis	%	69 to 85	73	Pass
Peak Force 18 mm - 50 mm	N	<= 4600	4214	Pass
		Overall Test Results		Pass

David Schoedel
Laboratory Technician

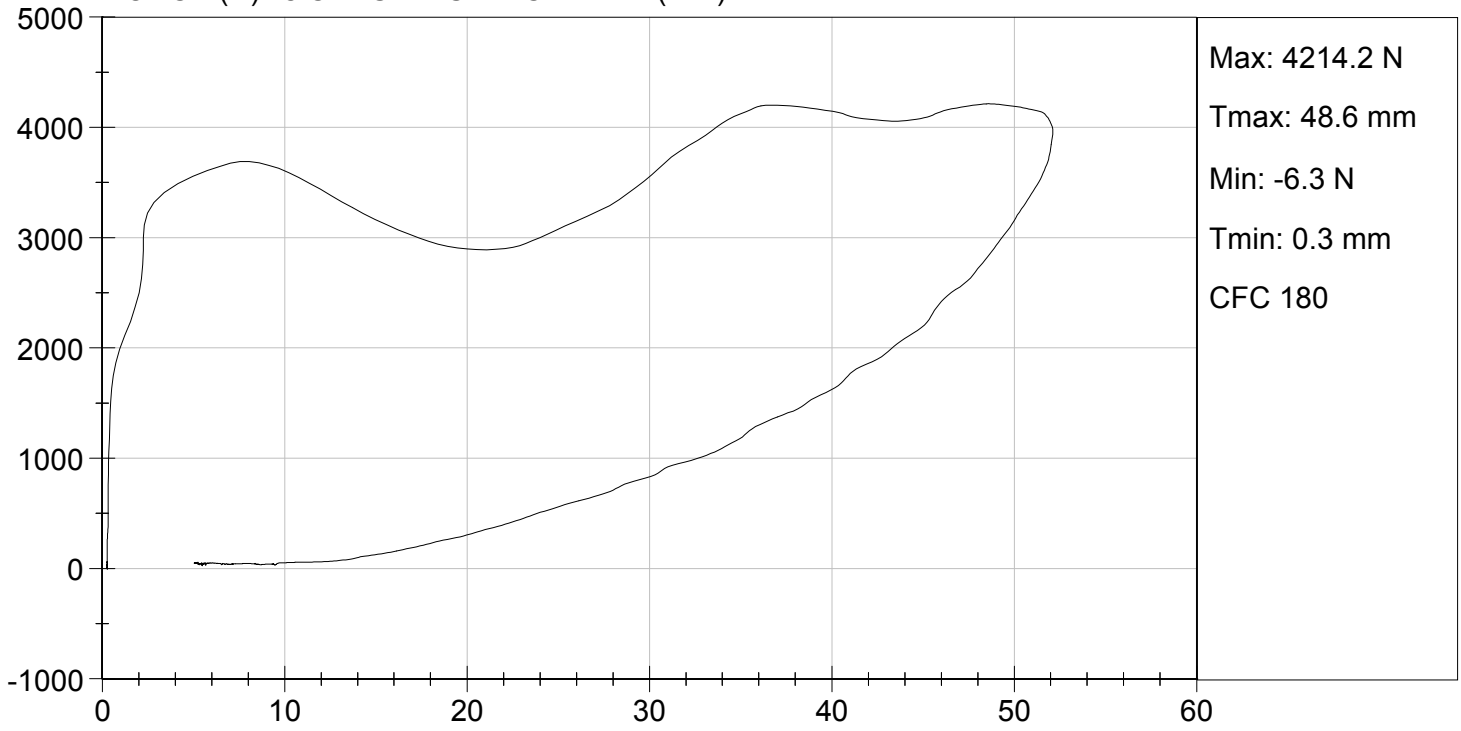
09/10/2014
Test Date

Jessica Gall
Approved By

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

TEST DATE: 09/10/2014
TEST #: D143134

FORCE (N) vs CHEST DISPLACEMENT (mm)



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 138 **Test I.D:** D143135

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	52	Pass
Probe Speed	m/s	2.07 to 2.13	2.13	Pass
Maximum Force	N	3450 to 4060	3766	Pass
		Overall Test Results		Pass

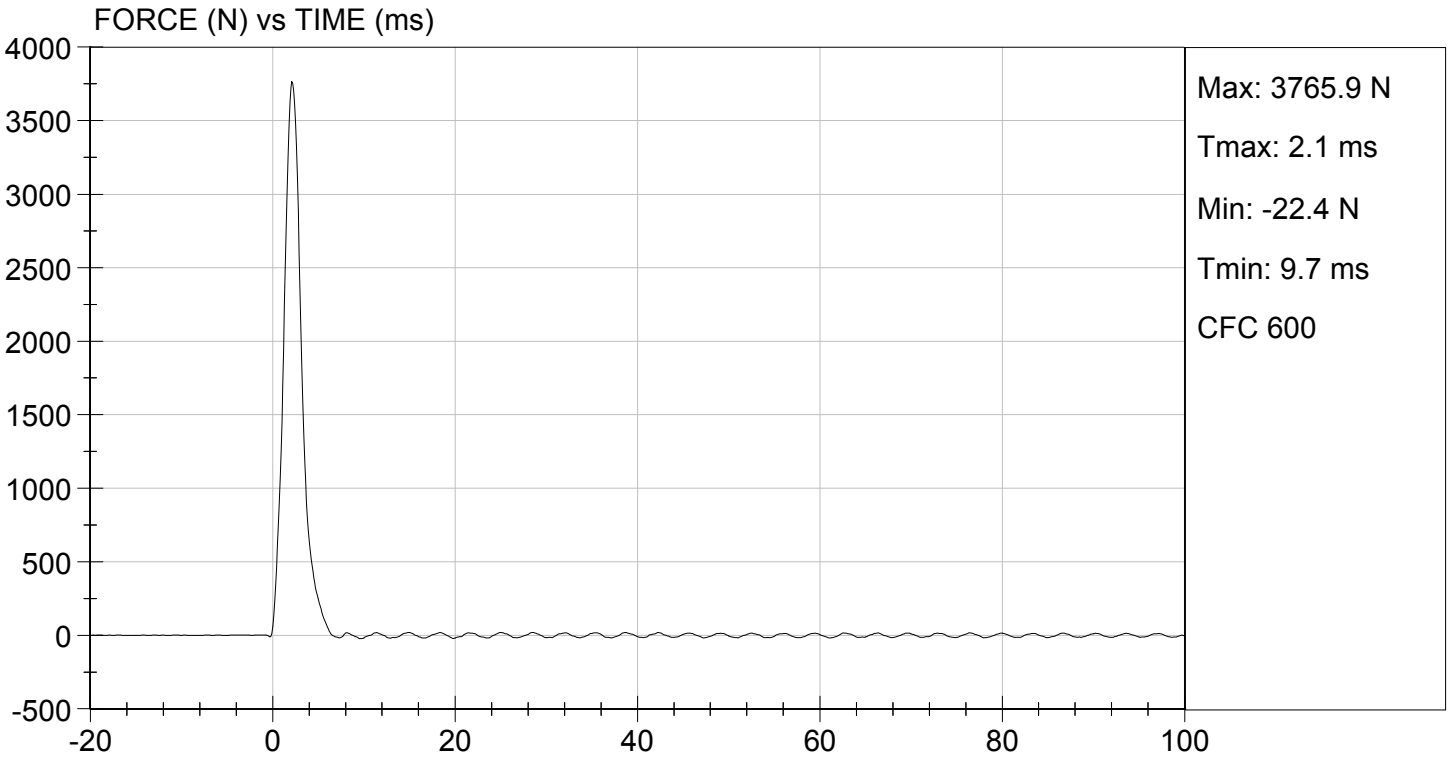
David Schoedel
Laboratory Technician

09/10/2014
Test Date

Jessica Gall
Approved By

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

TEST DATE: 09/10/2014
TEST #: D143135



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 138 **Test I.D:** D143136

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	52	Pass
Probe Speed	m/s	2.07 to 2.13	2.13	Pass
Maximum Force	N	3450 to 4060	3541	Pass
		Overall Test Results		Pass

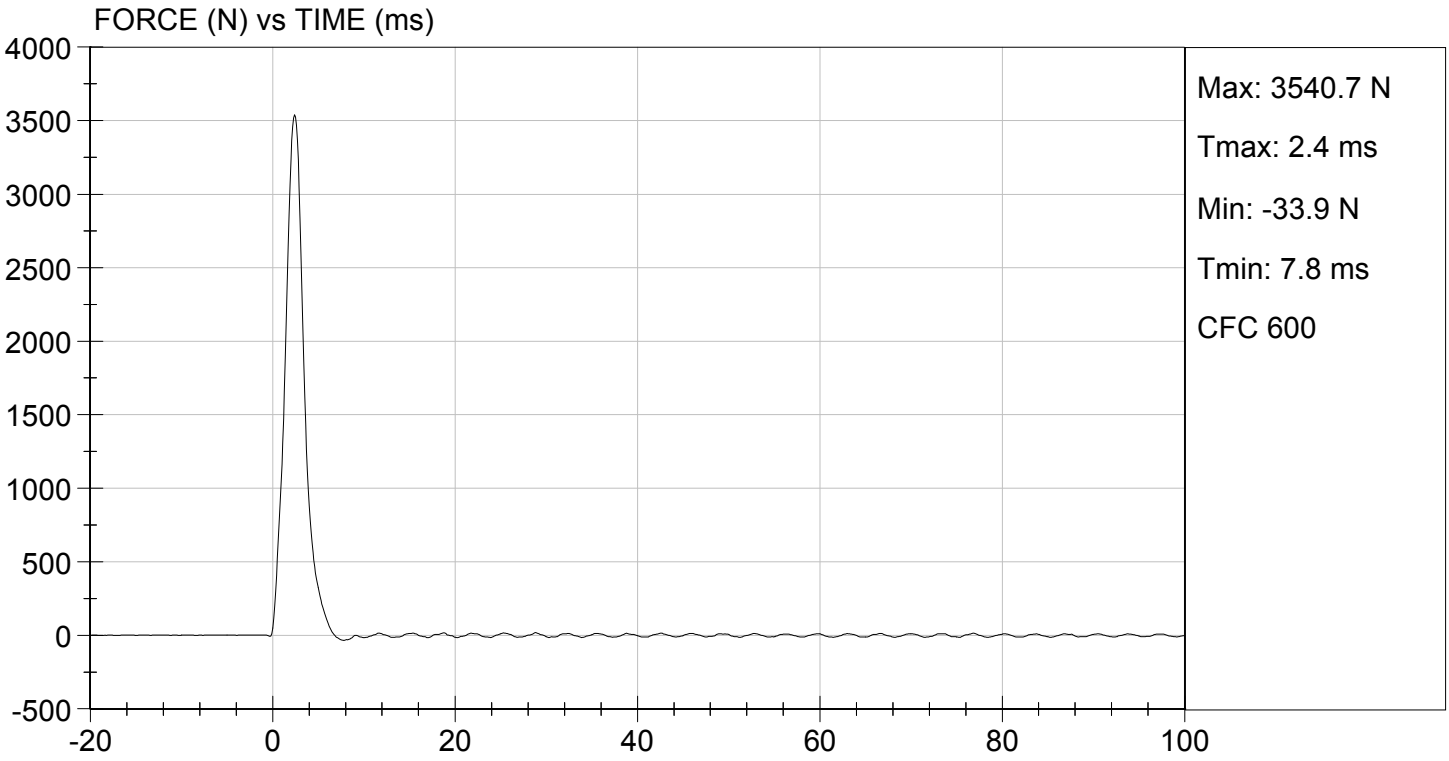
David Schoedel
Laboratory Technician

09/10/2014
Test Date

Jessica Hall
Approved By

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

TEST DATE: 09/10/2014
TEST #: D143136



MGA RESEARCH CORPORATION

TORSO FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 138 **Test I.D:** D143137

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	52	Pass
Initial Angle	deg	0 to 20	20	Pass
Return Angle	deg	+/- 8	3	Pass
Force at 45 deg	N	320 to 390	378	Pass
Upper Torso Deflection Rate	deg/s	0.5 to 1.5	0.9	Pass
		Overall Result		Pass

David Schoedel
Laboratory Technician

09/10/2014
Test Date

Jessica Hall
Approved By

MGA RESEARCH CORPORATION

HEAD DROP TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 138 **Test ID:** D143771

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	38	Pass
Peak Resultant Acceleration	G's	250 to 300	253	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-14.4	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
		Overall Test Results		Pass

Maxime Chamberland
Laboratory Technician

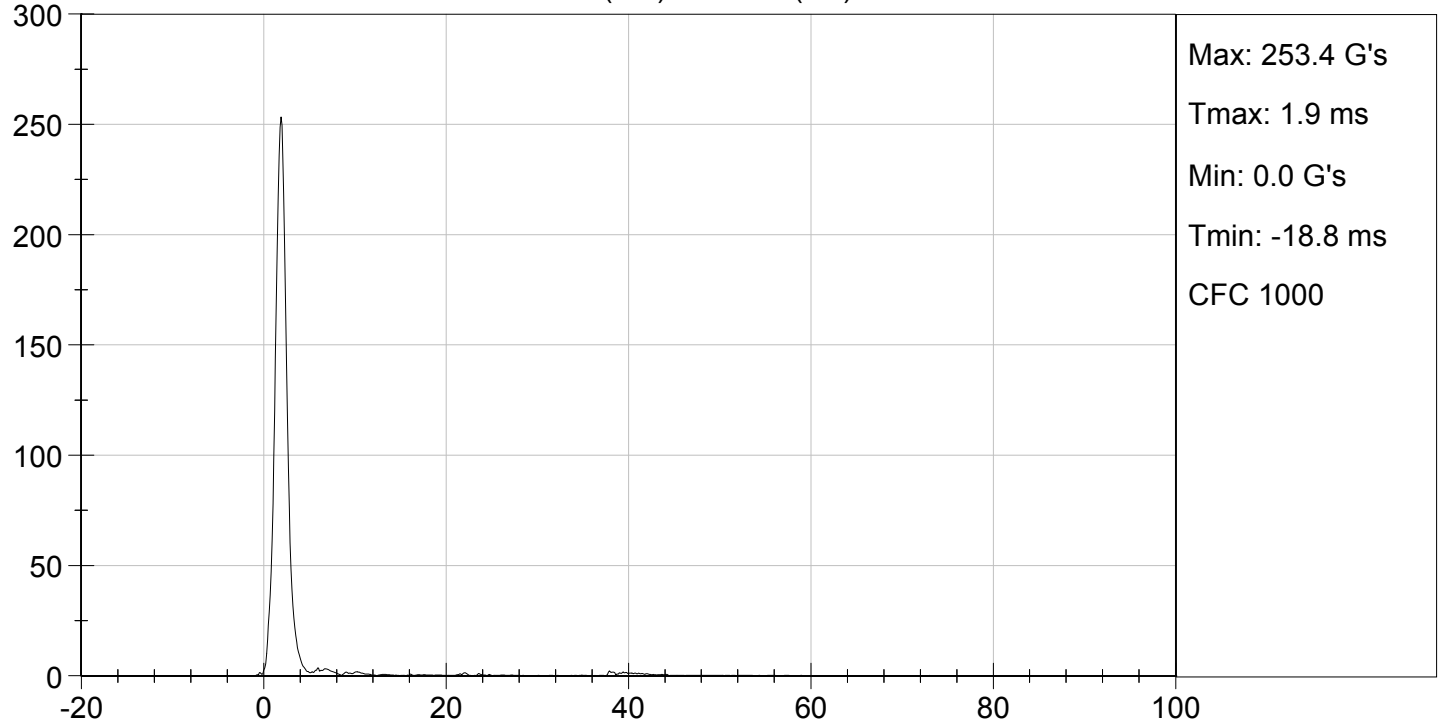
10/28/2014
Test Date

Jessica Gall
Approved By

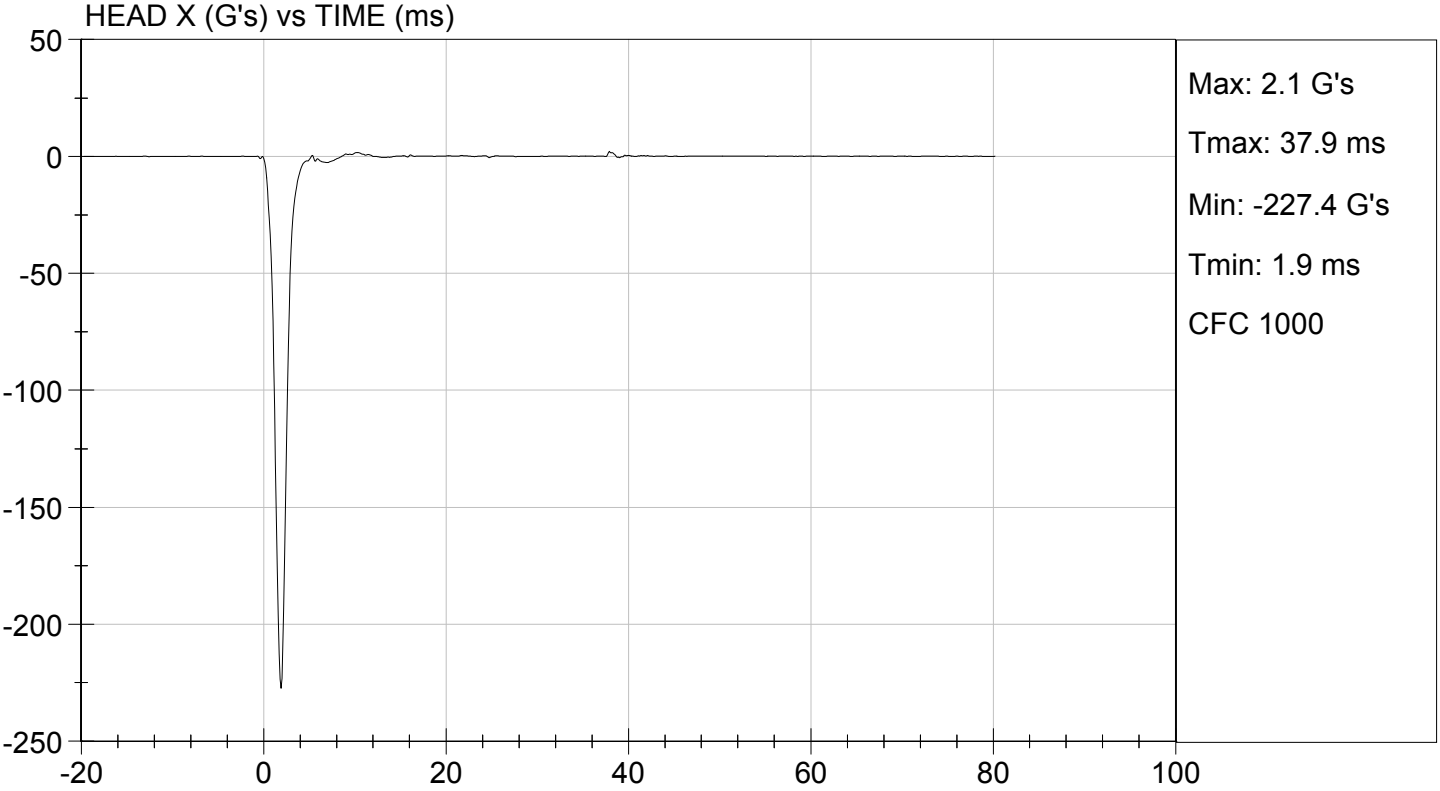
TEST DESC: HEAD DROP

TEST DATE: 10/28/2014
TEST #: D143771

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

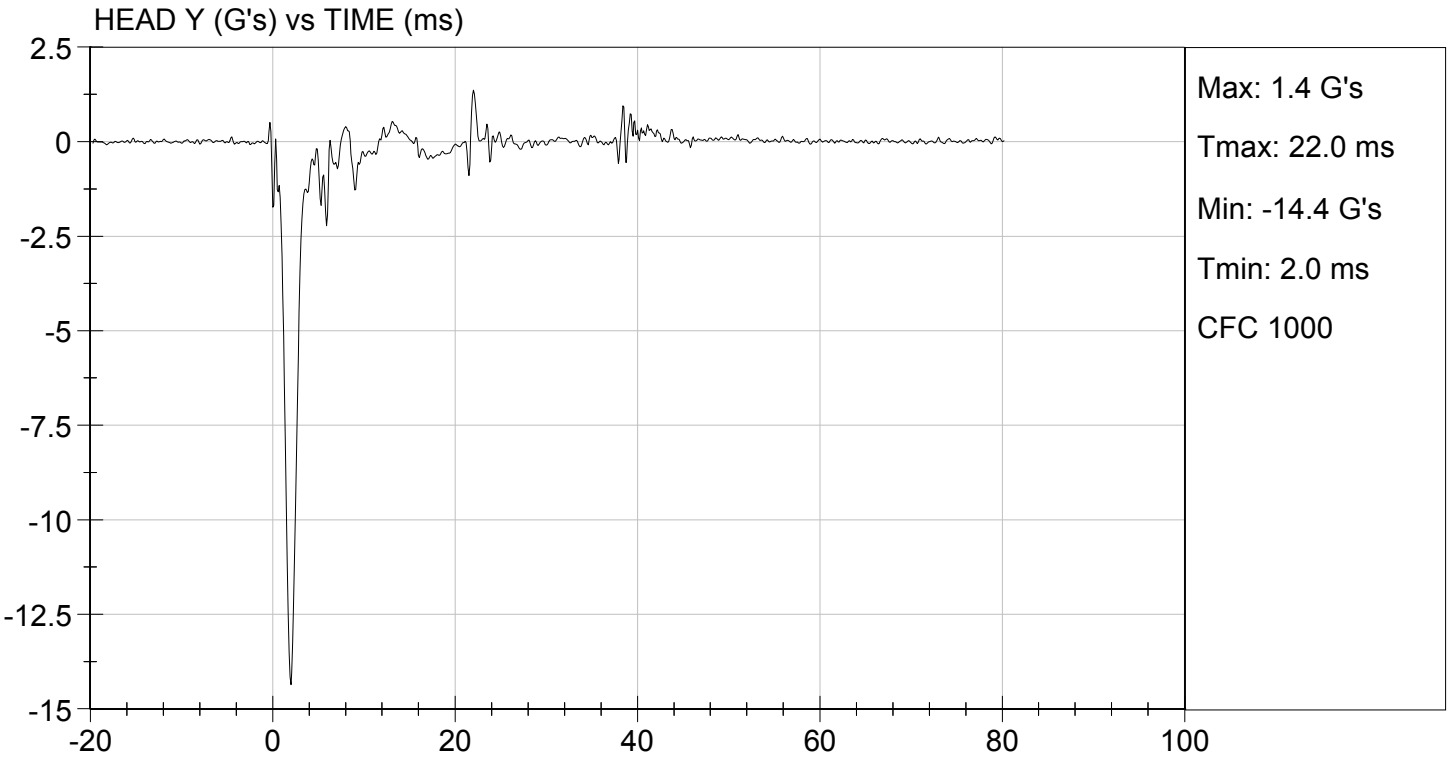


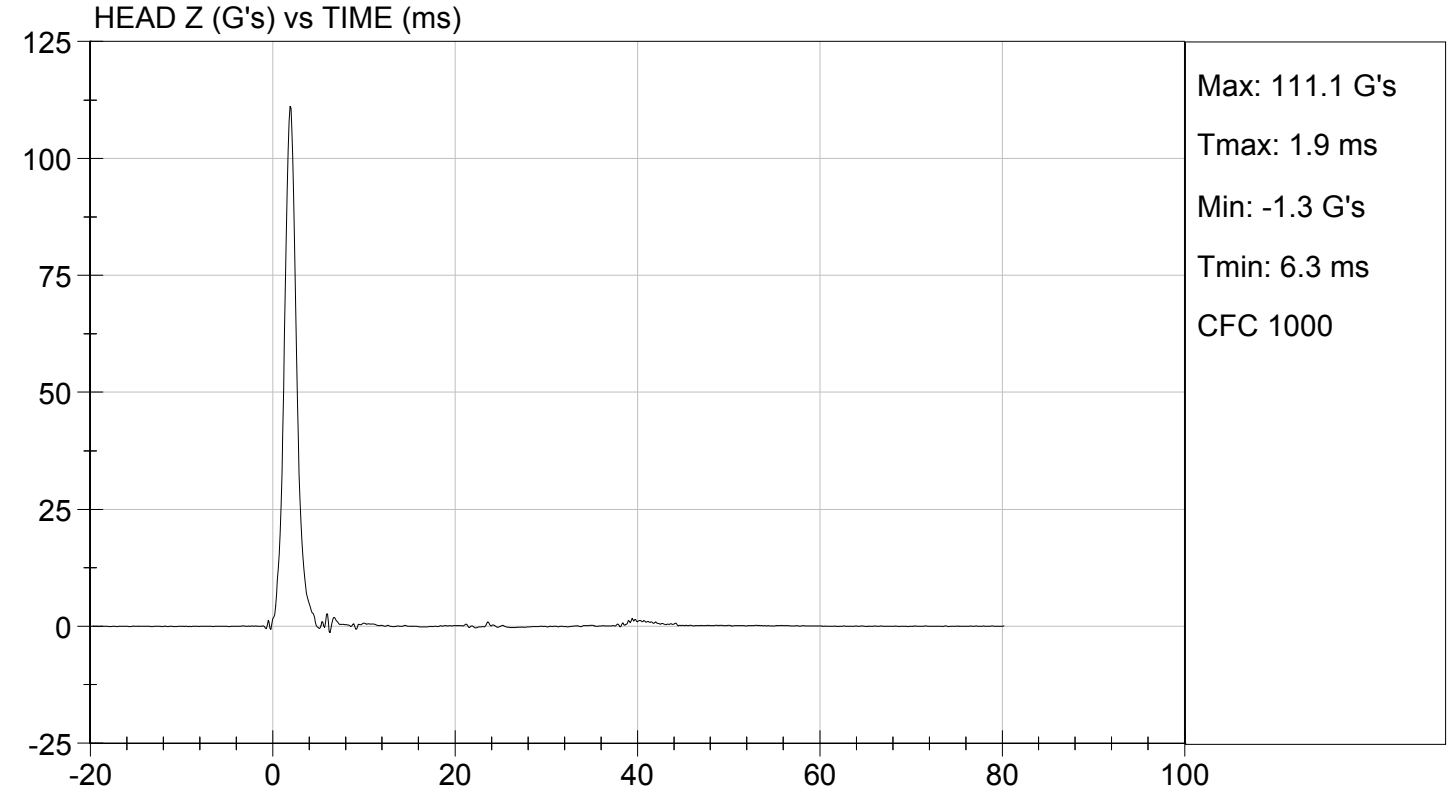
HEAD X (G's) vs TIME (ms)



TEST DESC: HEAD DROP

TEST DATE: 10/28/2014
TEST #: D143771





MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 138 **Test I.D:** D143772

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.5	Pass
Laboratory Relative Humidity		%	10 to 70	44	Pass
Pendulum Speed		m/s	6.89 to 7.13	7.13	Pass
Pendulum Velocity	10 ms	m/s	2.1 to 2.5	2.3	Pass
	20 ms	m/s	4.0 to 5.0	4.2	Pass
	30 ms	m/s	5.8 to 7.0	5.9	Pass
D Plane Rotation	Max	deg	77 to 91	79	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	69 to 83	74	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	87	Pass
			Overall Results		Pass

David Schoedel
Laboratory Technician

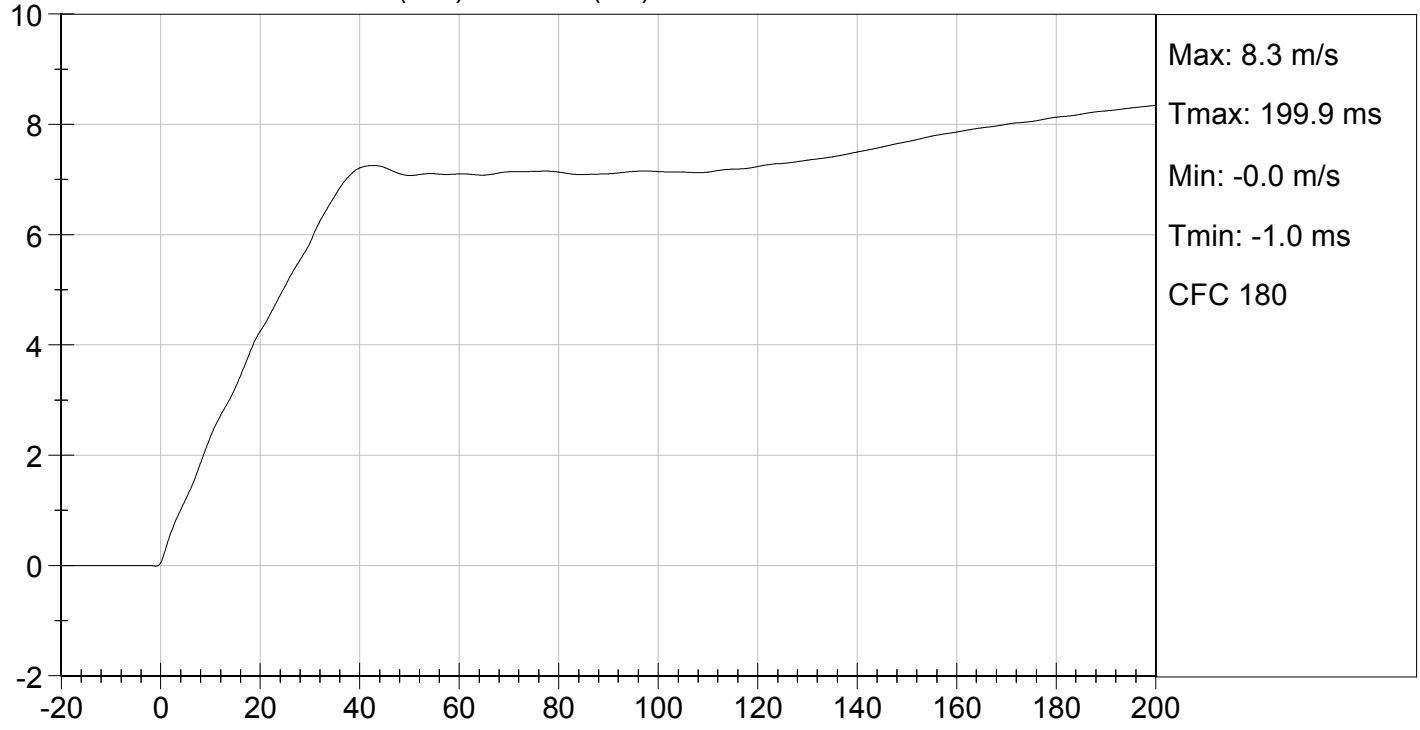
10/28/2014
Test Date

Jessica Hall
Approved By

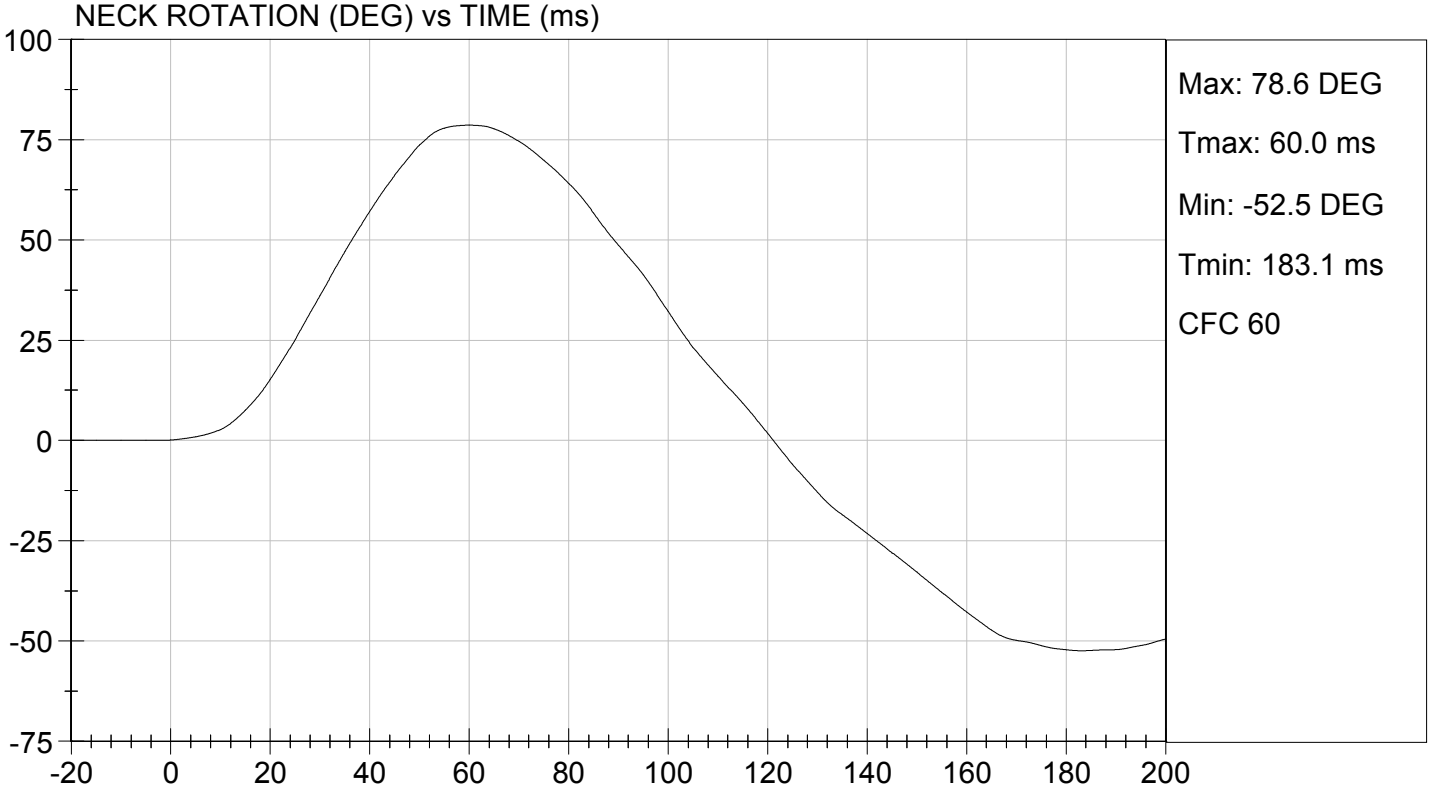
TEST DESC: NECK FLEXION
VELOCITY: 23.40 ft/s, 7.13 m/s

TEST DATE: 10/28/2014
TEST #: D143772

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

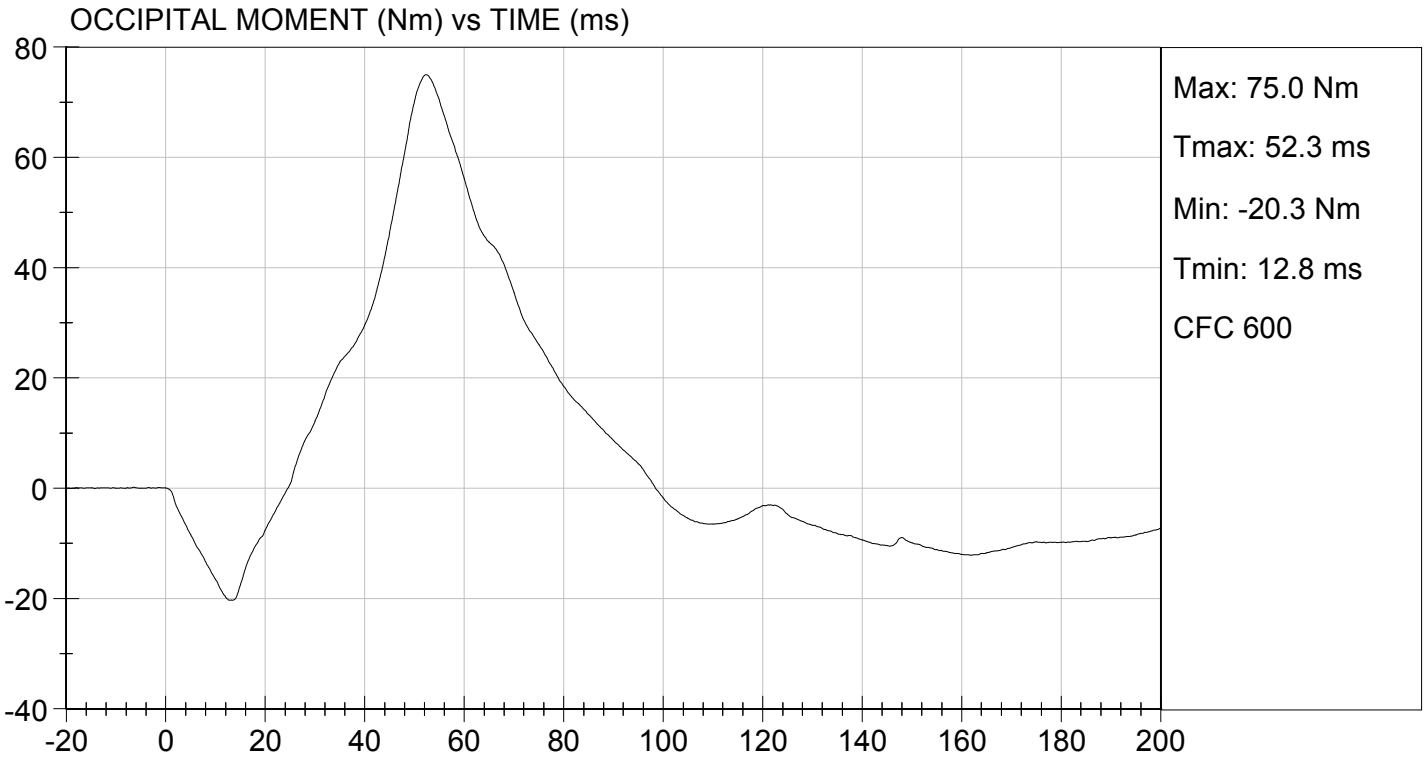


NECK ROTATION (DEG) vs TIME (ms)



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

TEST DATE: 10/28/2014
TEST #: D143772



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 138 **Test I.D:** D143773

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.5	Pass
Laboratory Relative Humidity		%	10 to 70	44	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.19	Pass
Pendulum Velocity	10 ms	m/s	1.5 to 1.9	1.6	Pass
	20 ms	m/s	3.1 to 3.9	3.4	Pass
	30 ms	m/s	4.6 to 5.6	5.1	Pass
D Plane Rotation	Max	deg	99 to 114	110	Pass
Occipital Condyle Moment within Rotation Corridor		Nm	-65 to -53	-56	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	103	Pass
			Overall Results		Pass

David Schoedel
Laboratory Technician

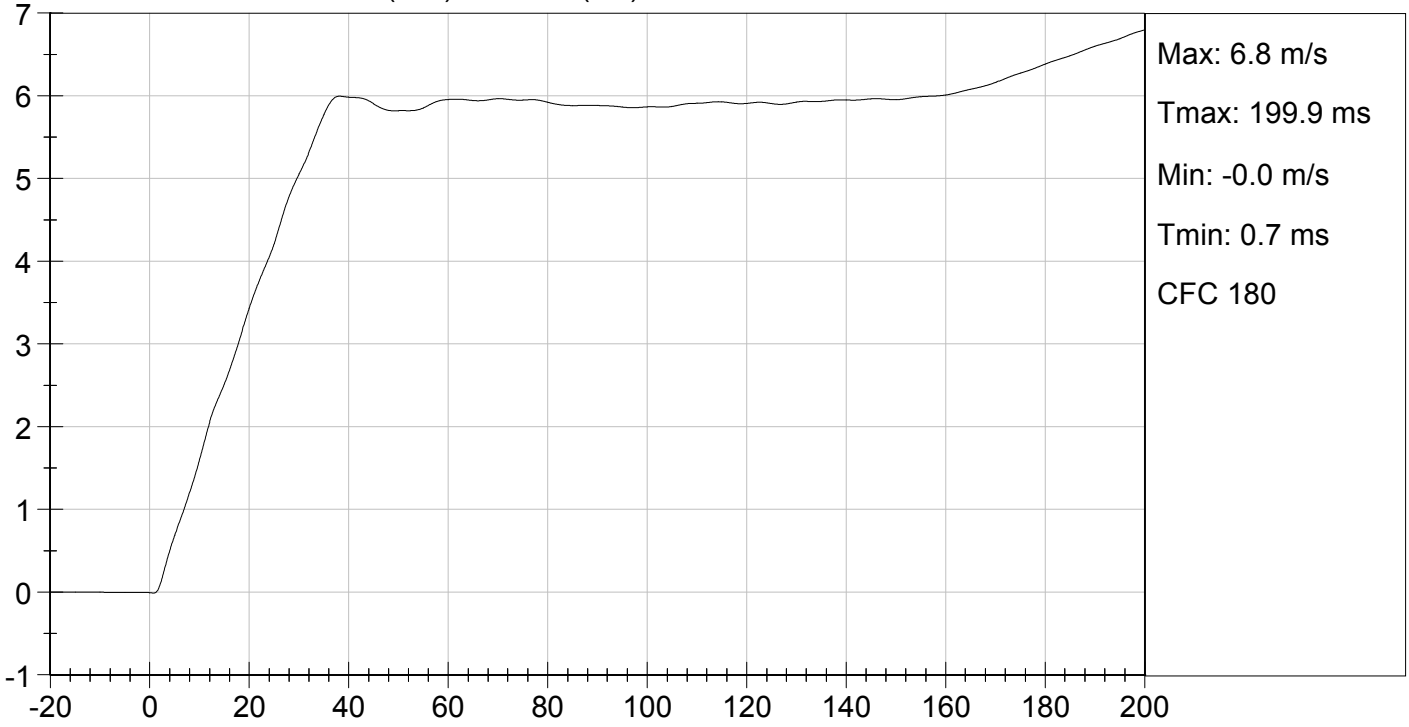
10/28/2014
Test Date

Jessica Hall
Approved By

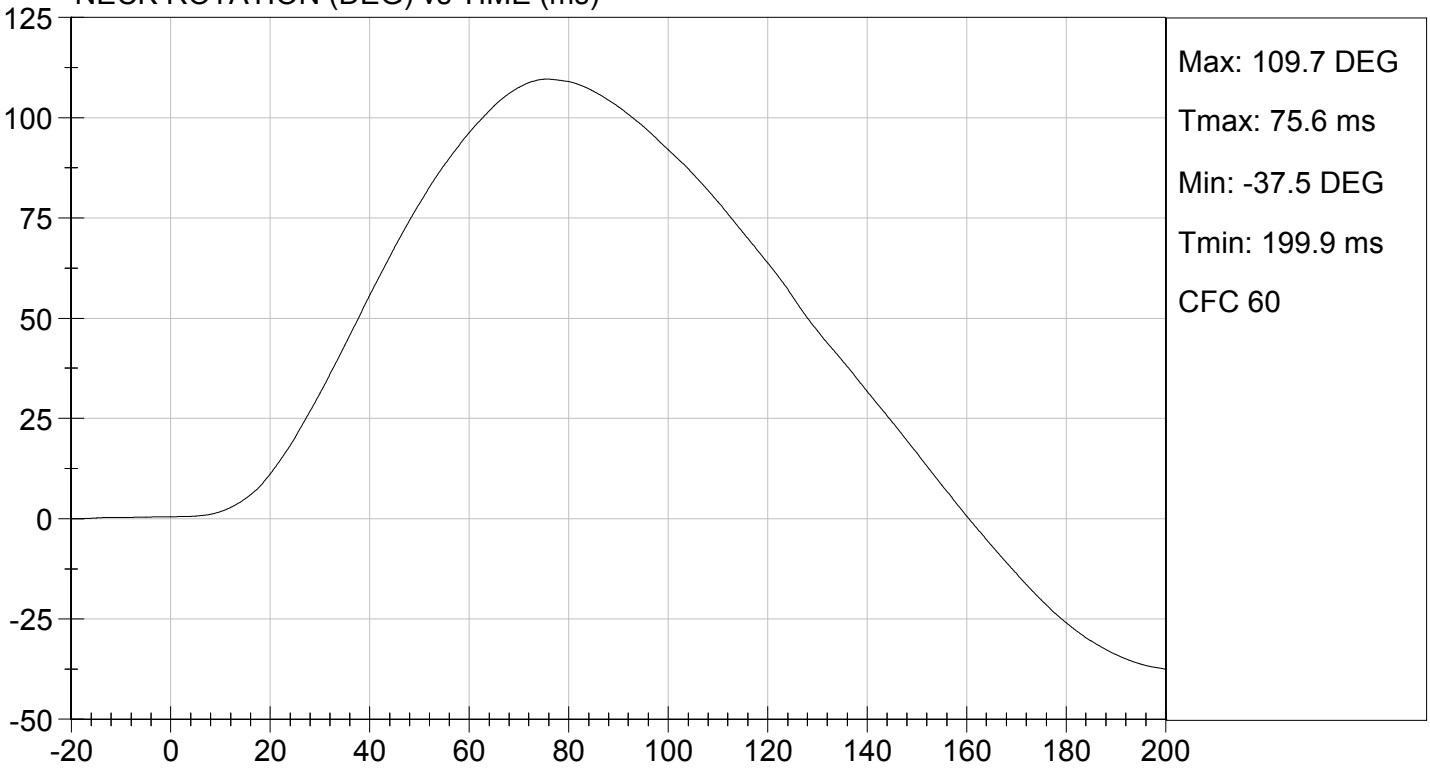
TEST DESC: NECK EXTENSION
VELOCITY: 20.30 ft/s, 6.19 m/s

TEST DATE: 10/28/2014
TEST #: D143773

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

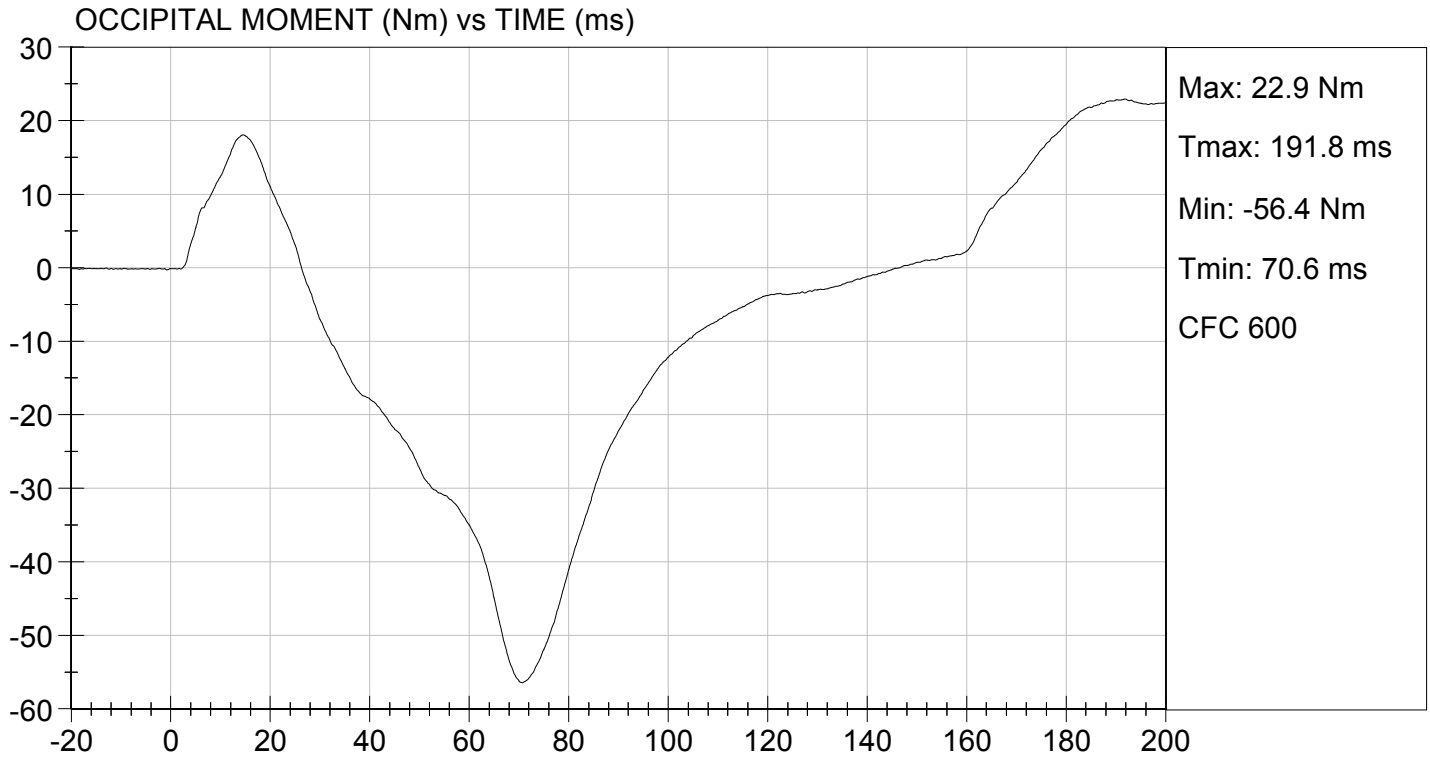


NECK ROTATION (DEG) vs TIME (ms)



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

TEST DATE: 10/28/2014
TEST #: D143773



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 5TH PERCENTILE

ATD Serial No: 138 **Test I.D:** D143774

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.0	Pass
Relative Humidity	%	10 to 70	35	Pass
Probe Speed	m/s	6.59 to 6.83	6.77	Pass
Peak Deflection	mm	50 to 58	52	Pass
Peak Resistive Force w/in Deflection Corridor	N	3900 to 4400	4064	Pass
Internal Hysteresis	%	69 to 85	73	Pass
Peak Force 18 mm - 50 mm	N	<= 4600	4175	Pass
		Overall Test Results		Pass

Jack Coleman
Laboratory Technician

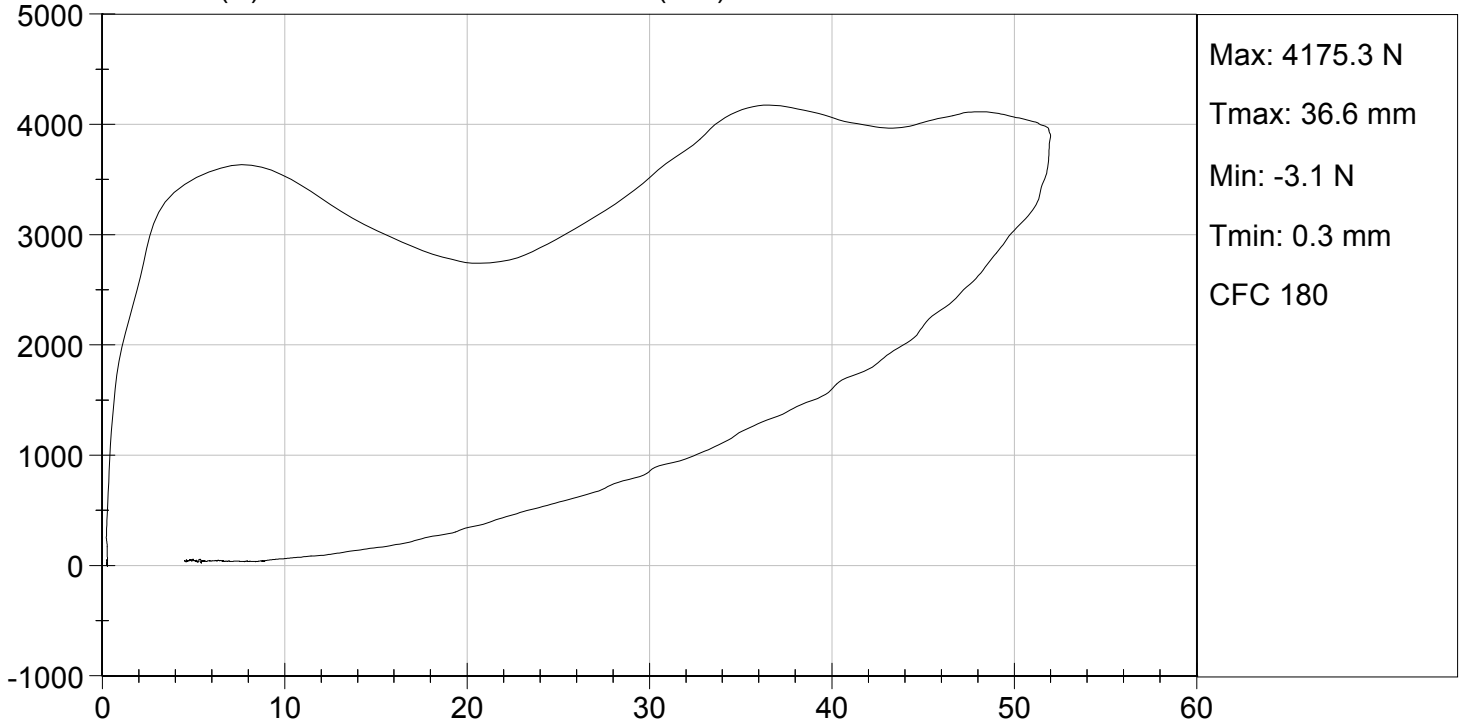
10/28/2014
Test Date

Jessica Hall
Approved By

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

TEST DATE: 10/28/2014
TEST #: D143774

FORCE (N) vs CHEST DISPLACEMENT (mm)



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 138 **Test I.D:** D143775

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	44	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	N	3450 to 4060	3518	Pass
		Overall Test Results		Pass

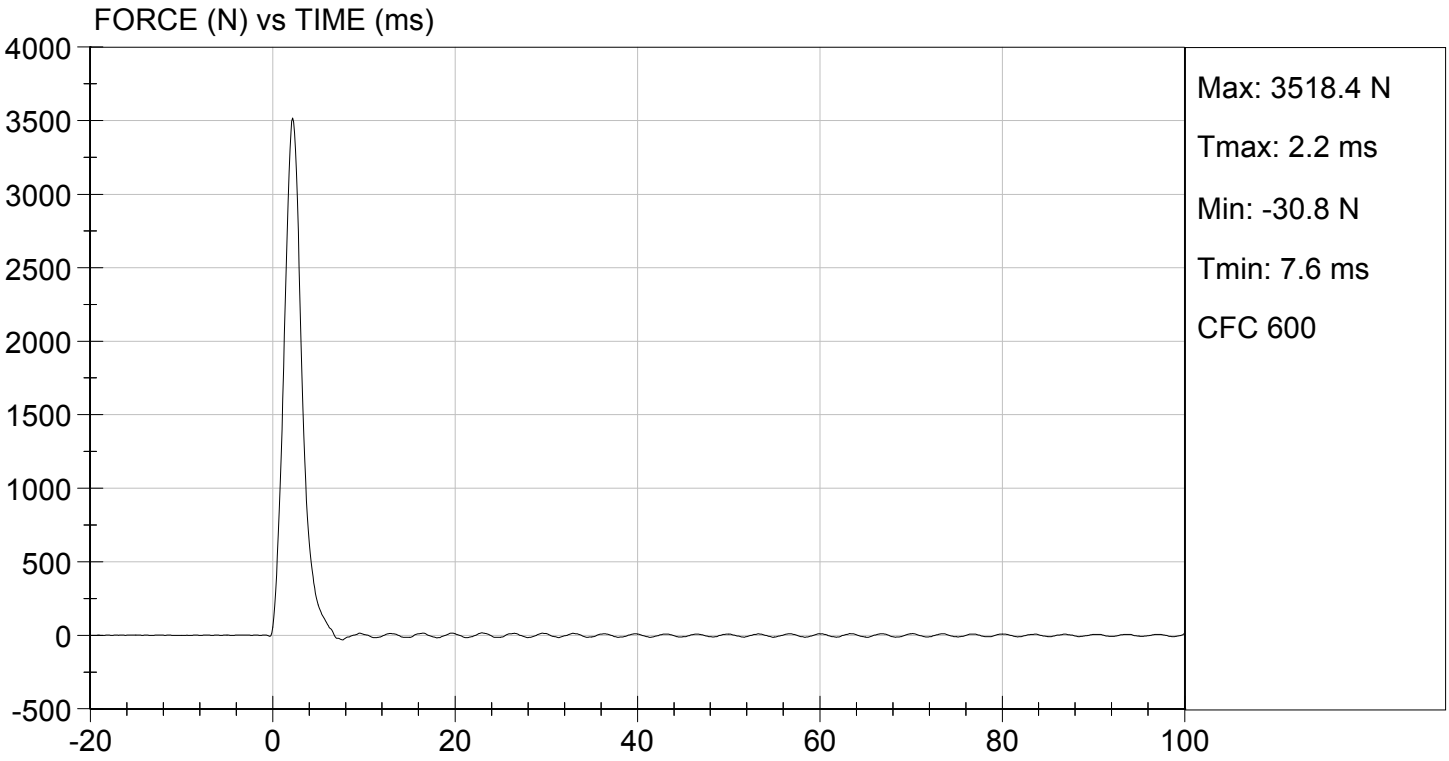
Jack Coleman
Laboratory Technician

10/28/2014
Test Date

Jessica Hall
Approved By

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

TEST DATE: 10/28/2014
TEST #: D143775



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 138 **Test I.D:** D143776

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	44	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	N	3450 to 4060	3503	Pass
		Overall Test Results		Pass

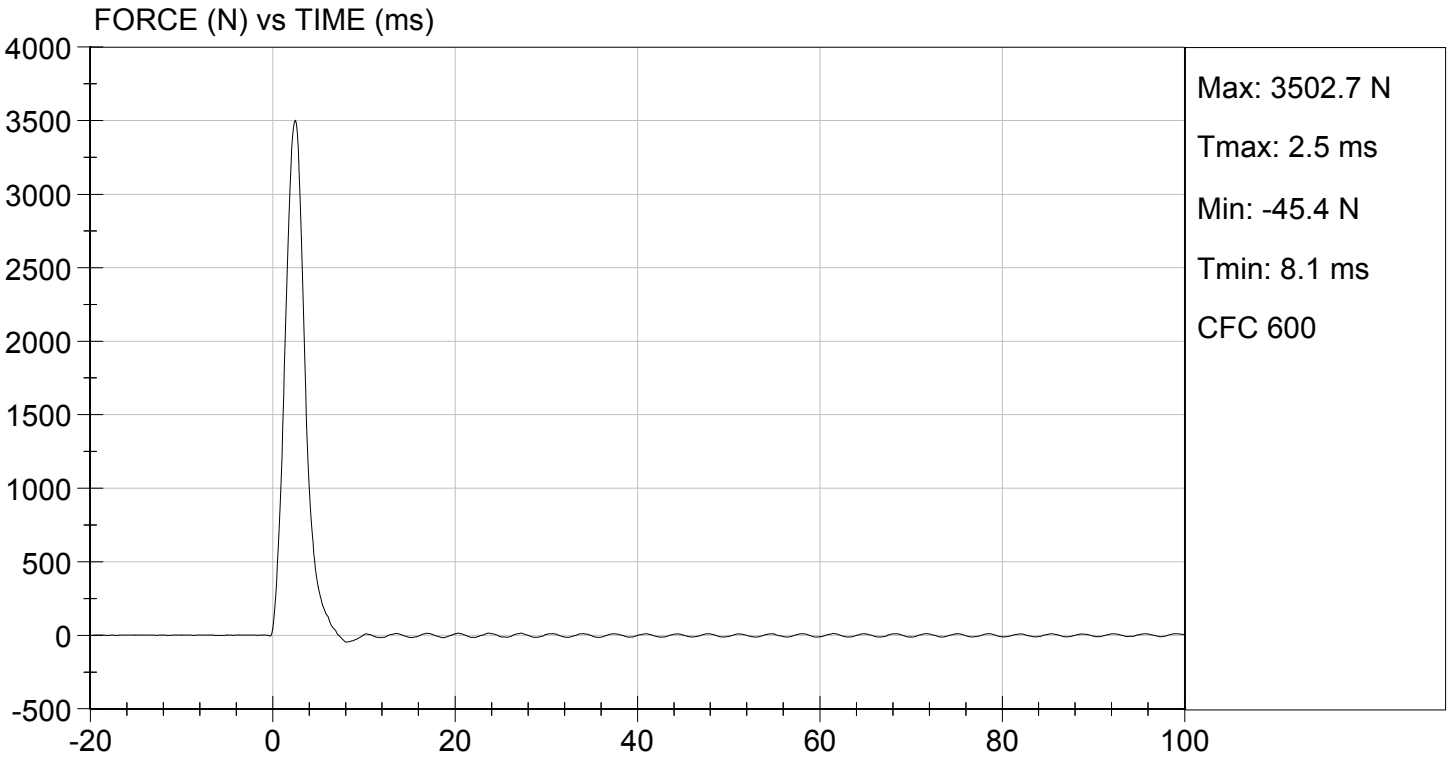
Jack Coleman
Laboratory Technician

10/28/2014
Test Date

Jessica Hall
Approved By

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

TEST DATE: 10/28/2014
TEST #: D143776



MGA RESEARCH CORPORATION

TORSO FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 138 **Test I.D:** D143777

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	39	Pass
Initial Angle	deg	0 to 20	20	Pass
Return Angle	deg	+/- 8	4	Pass
Force at 45 deg	N	320 to 390	389	Pass
Upper Torso Deflection Rate	deg/s	0.5 to 1.5	0.8	Pass
		Overall Result		Pass

Jack Coleman
Laboratory Technician

10/28/2014
Test Date

Jessica Gall
Approved By