

REPORT NUMBER: NCAP-MGA-2010-002

**VALIDATION
FRONTAL BARRIER IMPACT TEST**

**HYUNDAI MOTOR COMPANY
2010 HYUNDAI GENESIS 2-DR COUPE
NHTSA NUMBER: MA0500**

**PREPARED BY:
MGA RESEARCH CORPORATION
5000 WARREN ROAD
BURLINGTON, WI 53105**



Test Date: August 14, 2009

Final Report Date: October 23, 2009

FINAL REPORT

**PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF CRASHWORTHINESS STANDARDS
MAIL CODE: NVS-111
1200 NEW JERSEY AVENUE, SE, ROOM W43-410
WASHINGTON, D.C. 20590**

This final test report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, in response to Contract Number DTNH22-06-D-00028.

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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-2010-002	2. Government Accession No.	3. Recipient's Catalog No.																																																			
4. Title and Subtitle Final Report of Validation Testing of a 2010 Hyundai Genesis 2-Dr Coupe NHTSA No.: MA0500		5. Report Date October 23, 2009																																																			
		6. Performing Organization Code MGA																																																			
7. Author(s) Donna Janovicz, Project Manager Joe Fleck, Project Engineer		8. Performing Organization Report No. NCAP-MGA-2010-002																																																			
9. Performing Organization Name and Address MGA Research Corporation 5000 Warren Road Burlington, WI 53105		10. Work Unit No.																																																			
		11. Contract or Grant No. DTNH22-06-D-00028																																																			
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards 1200 New Jersey Ave, SE, Room W43-410 Washington, D.C. 20590		13. Type of Report and Period Covered Final Test Report 8/14/2009 to 10/23/2009																																																			
		14. Sponsoring Agency Code NVS-111																																																			
15. Supplementary Notes Validation Testing																																																					
16. Abstract A 56.3 km/h NCAP Frontal Validation Test was conducted on a 2010 Hyundai Genesis 2-Dr Coupe in accordance with the specifications of the Office of Crashworthiness Standards Frontal NCAP Laboratory Test Procedure. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and foot well intrusion performance. The test was conducted at MGA Research Corporation in Burlington, Wisconsin, on August 14, 2009. The impact velocity was 56.5 km/h and the ambient temperature at the barrier face at the time of impact was 21°C. The target vehicle's maximum post test static crush is 477 mm located at the vehicle's centerline. The occupant injury criteria summary was as follows: <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th rowspan="2">Units</th> <th colspan="2">Threshold</th> <th rowspan="2">Driver ATD</th> <th rowspan="2">Passenger ATD</th> </tr> <tr> <th>50th</th> <th>5th</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₁₅)</td> <td>N/A</td> <td>700</td> <td>700</td> <td>226</td> <td>393</td> </tr> <tr> <td>Maximum Chest Compression</td> <td>mm</td> <td>63</td> <td>52</td> <td>28</td> <td>18</td> </tr> <tr> <td>Nij</td> <td>N/A</td> <td>1</td> <td>1</td> <td>0.3</td> <td>0.9</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>4170</td> <td>2620</td> <td>1796</td> <td>1545</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>4000</td> <td>2520</td> <td>292</td> <td>216</td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>10008</td> <td>6805</td> <td>1150</td> <td>1613</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>10008</td> <td>6805</td> <td>1532</td> <td>303</td> </tr> </tbody> </table>				Measurement Description	Units	Threshold		Driver ATD	Passenger ATD	50 th	5 th	Head Injury Criteria (HIC ₁₅)	N/A	700	700	226	393	Maximum Chest Compression	mm	63	52	28	18	Nij	N/A	1	1	0.3	0.9	Neck Tension	N	4170	2620	1796	1545	Neck Compression	N	4000	2520	292	216	Left Femur Force	N	10008	6805	1150	1613	Right Femur Force	N	10008	6805	1532	303
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19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 126	22. Price																																																		

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SECTION 1

PURPOSE AND SUMMARY OF TEST

PURPOSE

This 56.3 km/h frontal barrier impact test is part of the NCAP Frontal Validation Test Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under contract number DTNH22-06-D-00028. 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 was impacted by a 2010 Hyundai Genesis 2-Dr Coupe at a velocity of 56.5 kph. The test was performed at MGA Research Corporation on August 14, 2009. Pre-and post-test photographs of the vehicle and dummies can be found in Appendix A.

One real-time camera 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 on the driver and passenger's lap and shoulder belts to measure dummy torso and pelvic section loading. The driver (position 1) ATD (Serial No. 1045) and the right-front passenger (position 2) ATD (Serial No. 634) were calibrated previous to this test. Certification details, along with instrumentation calibration data, are found in Appendix C of this report.

The 102 channels of data were recorded on an on-board data acquisition system. Appendix B contains the dummy head, chest displacement, neck, and femur 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 477 mm and both the driver and passenger side doors remained closed during the impact event and were operable after the impact.

The driver's head and chest contacted the airbag. The driver's head also contacted the headrest and headliner. The driver's left knee contacted the steering column. The passenger's head and chest contacted the airbag. The passenger's head also contacted the headrest. The passenger's knees had no contact.

The occupant data is summarized below:

ATD position	HIC ₁₅	T ¹	T ²	Chest Disp. (mm)	Nij	Neck Tension (N)	Neck Comp. (N)	Left Femur (N)	Right Femur (N)
Driver (50 th)	226	58.6	73.6	28	0.3	1796	292	1150	1532
Passenger (5 th)	393	58.2	73.2	18	0.9	1545	216	1613	303

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

TEST NOTES

There was no valid data collected for:
Passenger Chest Y after 100 msec.

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

SECTION 2
OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2010 Hyundai Genesis 2-Dr Coupe
 Test Program: Frontal Validation Testing

NHTSA No.: MA0500
 Test Date: 8/14/2009

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	MA0500	Anti-Lock Brakes	Yes
Model Year	2010	All Wheel Drive	No
Make	Hyundai	Power Steering	Yes
Model	Genesis	Driver Front Airbag	Yes
Body Style	Coupe	Driver Side Airbag	Yes
VIN	KMHHT6KD7AU011063	Driver Head Airbag	No
Body Color	Bathurst Black	Driver Curtain Airbag	Yes
Delivery Date	7/14/2009	Driver Knee Airbag	No
Odometer (km/mi)	31 / 19	Pass. Front Airbag	Yes
Dealer	Northtown Hyundai	Pass. Side Airbag	Yes
Transmission	Automatic	Pass. Head Airbag	No
Final Drive	Rear	Pass. Curtain Airbag	Yes
Type/No. Cyl	4	Pass. Knee Airbag	No
Engine Displacement (L)	2.0	Pretensioners	Yes
Engine Placement	Longitudinal	Load Limiters	Yes
Roof Rack	No	Air Conditioning	Yes
Sunroof/T-Top	No	AM/FM CD	Yes
Tinted Glass	No	Tilt Steering	Yes
Traction Control	Yes	Automatic Door Locks	Yes
Power Brakes	Yes	Power Windows	Yes
Front Disc	Yes	Power Seats	No
Rear Disc	Yes		
Does owner's manual provide instructions to turn off automatic door locks?	No		

DATA FROM MANUFACTURER'S CERTIFICATION LABEL

Manufactured By	Hyundai Motor Company	GVWR (kg)	1930
Date of Manufacture	APR/17/09	GAWR Front (kg)	1000
		GAWR Rear (kg)	1050

VEHICLE SEATING AND WEIGHT CAPACITY

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bucket		
Designated Seating Capacity (DSC)	2	2		4
Capacity Wt. (VCW) (kg)				322
Cargo Wt. (RCLW) (kg)				50

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

Test Vehicle: 2010 Hyundai Genesis 2-Dr Coupe
 Test Program: Frontal Validation Testing

NHTSA No.: MA0500
 Test Date: 8/14/2009

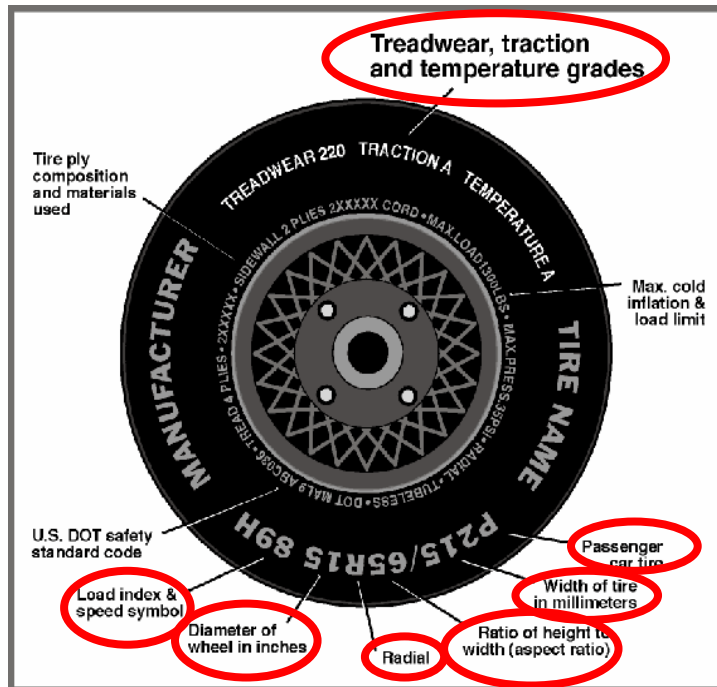
VEHICLE SEAT TYPE

Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						w/ Lever	w/ Knob
Front Seat	X					X	
Rear or Second	X				X		
Third Row Seat							

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

Test Vehicle: 2010 Hyundai Genesis 2-Dr Coupe
 Test Program: Frontal Validation Testing

NHTSA No.: MA0500
 Test Date: 8/14/2009



Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	240	240
Recommended Tire Size	225/45R18	245/45R18
Tire Size on Vehicle	225/45R18	245/45R18
Tire Manufacturer	Bridgestone	Bridgestone
Tire Model	Potenza	Potenza
Treadwear	260	260
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	3 Polyester	3 Polyester
Tire Plies Body	2 Polyester + 2 Steel + 1 Nylon	2 Polyester + 2 Steel + 1
Load Index & Speed Symbol	91V	96V
Tire Material	Rubber	Rubber
DOT Safety Code Right	DFA 0209 DOT EJJ7	DFA 5108 DOT EJ1K
DOT Safety Code Left	DFA 0209 DOT EJJ7	DFA 5108 DOT EJ1K

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

Test Vehicle: 2010 Hyundai Genesis 2-Dr Coupe
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NHTSA No.: MA0500
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TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	425.0	344.3		463.1	444.5	
Right	kg	417.8	343.8		407.8	398.3	
Ratio	%	55.1	44.9		50.8	49.2	
Totals	kg	842.8	688.1	1530.9	870.9	842.8	1713.7

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1530.9
Weight of 1 P572E ATD & 1 P572O ATD	kg	140.6
Rated Cargo/Luggage Weight (RCLW)	kg	50
Calculated Vehicle Target Weight (TVTW)	kg	1721.5

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	690	693	725	723	1268
As Tested	mm	689	690	705	708	1387
Post Test	mm	715	690	684	732	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2820
Total Vehicle Length at Left Side	mm	3465
Total Vehicle Length at Centerline	mm	4574
Total Vehicle Length at Right Side	mm	3465
Weight of Ballast	kg	22.7
Weight of Vehicle Components Removed	kg	24.5
Amount of Stoddard Solvent in Fuel Tank	L	59.8

Vehicle components removed to meet Test Weight: Right rear tail light, trunk carpet, spare tire, jack, trunk foam.

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

Test Vehicle: 2010 Hyundai Genesis 2-Dr Coupe
 Test Program: Frontal Validation Testing

NHTSA No.: MA0500
 Test Date: 8/14/2009

TARGET VEHICLE STRUCTURAL MEASUREMENT

	Elements	Pre-Test (mm)
1	Total Length	4574
2	Total Width	1832
3	Bumper Top Height	515
4	Bumper Bottom Height	368
5	Longitudinal Member Top Height	468
6	Distance between Longitudinal Members	927
7	Longitudinal Member Width	66
8	Engine Top Height	831
9	Engine Bottom Height	148
10	Engine and Gearbox Width	673
11	Front Bumper-Engine Distance	514
12	Front Shock Absorber Fixing Height	864
13	Bonnet Leading Edge Height	657
14	Front Shock Absorber Fixing Width	1208
15	Front Bumper – Front Axle Distance	829
16	Front Axle – A-Pillar Distance	626
17	A-Pillar – B-Pillar Distance	1370
18	B-Pillar – Rear Axle Distance	795
19	B-Pillar – C-Pillar Distance	609
20	Roof Sill Bottom Height	1263
21	Roof Sill Top Height	1363
22	Floor Sill bottom Height	182
23	Floor Sill Top Height	333

DATA SHEET NO. 2

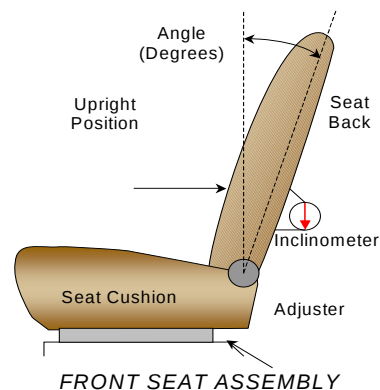
SEAT ADJUSTMENT, SEAT BELTS, FUEL SYSTEMS, AND STEERING WHEEL DATA

Test Vehicle: 2010 Hyundai Genesis 2-Dr Coupe
 Test Program: Frontal Validation Testing

NHTSA No.: MA0500
 Test Date: 8/14/2009

NOMINAL DESIGN RIDING POSITION

The driver seat back is positioned as close as possible to the manufacturer's designated angle. For the passenger seat, seat was adjusted until the dummy's transverse instrumentation platform is level to within ± 0.5 degrees.



SEAT BACK ANGLES

	Degrees
Driver Seat Back Angle	14.6° on headrest post
Passenger Seat Back Angle	6.4° on headrest post

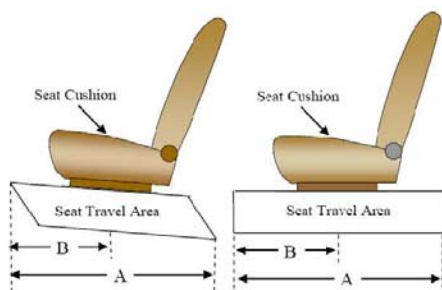
SEAT FORE/AFT POSITIONS

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	22 detents	10 th detent (forward-most as 0)
Passenger Seat	22 detents	0 detent (Full Forward)

SEAT BELT UPPER ANCHORAGES

	Total # of Positions	Placed in Position #
Driver Seat	Fixed	
Passenger Seat	Fixed	

Describe method: Both seat belt upper anchorages were non-adjustable.



DATA SHEET NO. 2 (CONTINUED)

SEAT ADJUSTMENT, SEAT BELTS, FUEL SYSTEMS, AND STEERING WHEEL DATA

Test Vehicle: 2010 Hyundai Genesis 2-Dr Coupe
 Test Program: Frontal Validation Testing

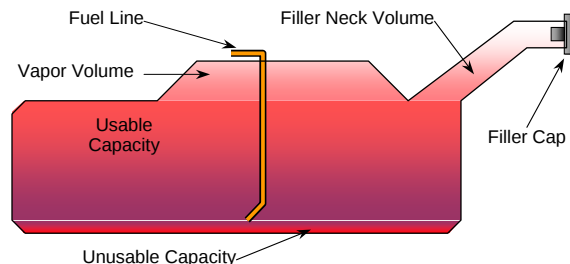
NHTSA No.: MA0500
 Test Date: 8/14/2009

FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	64.3
Usable Capacity of "Optional" Tank	
92-94% of Usable Capacity	59.2 to 60.4
Actual Amount of Solvent used	59.8
1/3 of Usable Capacity	21.4

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

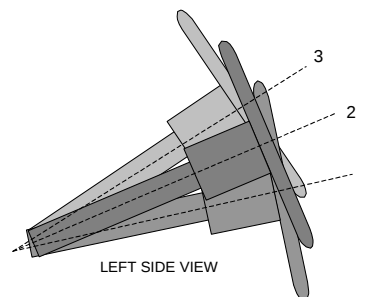
The vehicle is equipped with an electric fuel pump. Fuel pump will operate when engine system is normally operating. The fuel filler pipe is located on the left side.



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

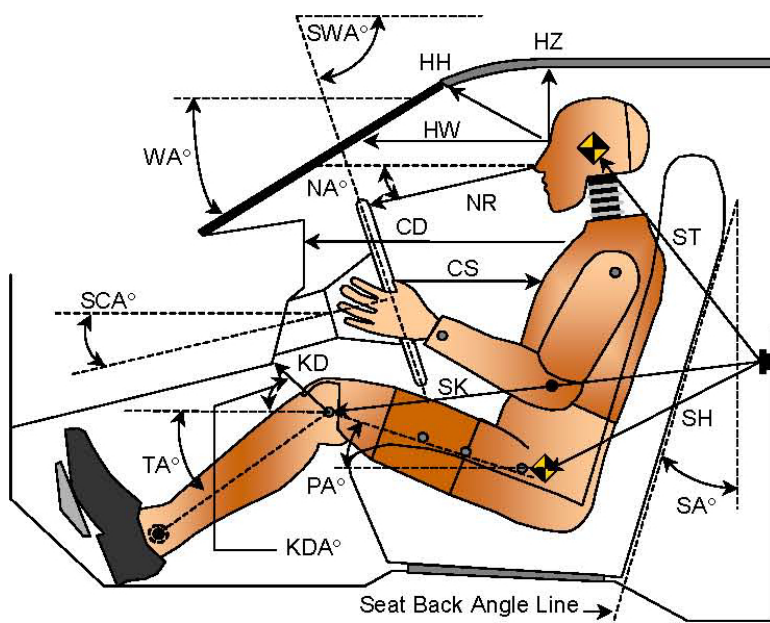
	Degrees	Fore/Aft Position (mm)
Lowermost - Position 1	67.3	
Geometric Center – Position 2	69.4	
Uppermost – Position 3	71.5	
Telescoping Steering Wheel Travel		
Test Position	69.4	

DATA SHEET NO. 3

DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2010 Hyundai Genesis 2-Dr Coupe
 Test Program: Frontal Validation Testing

NHTSA No.: MA0500
 Test Date: 8/14/2009

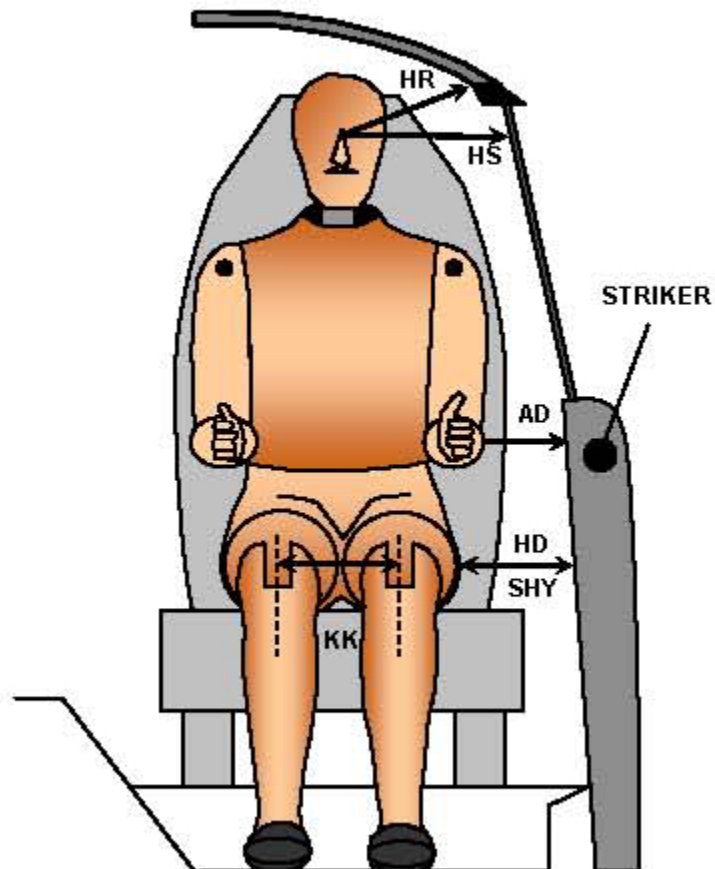


Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA	Windshield Angle		27.0		
SWA	Steering Wheel Angle		69.4		
SCA	Steering Column Angle		20.6		
SA	Seat Back Angle (headrest post)		14.6		6.4
HZ	Head to Roof (Z)	185	90	212	90
HH	Head to Header	359	20.7	292	40.4
HW	Head to Windshield	648	0	652	0
NR	Nose to Rim	403	9.6		
CD	Chest to Dash	532		465	
CS	Chest to Steering Hub	314	0.4		
RA	Rim to Abdomen	212	0		
KDL	Left Knee to Dash	260	17.2	155	24.6
KDR	Right Knee to Dash	227	16.7	186	19.5
PA	Pelvic Angle		22.3		19.4
TA	Tibia Angle		32.8		38.9
SK	Striker to Knee	891	102.8	995	102.7
ST	Striker to Head	495	43.0	556	61.5
SH	Striker to H-Point	569	121.6	691	116.1

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2010 Hyundai Genesis 2-Dr Coupe
 Test Program: Frontal Validation Testing

NHTSA No.: MA0500
 Test Date: 8/14/2009



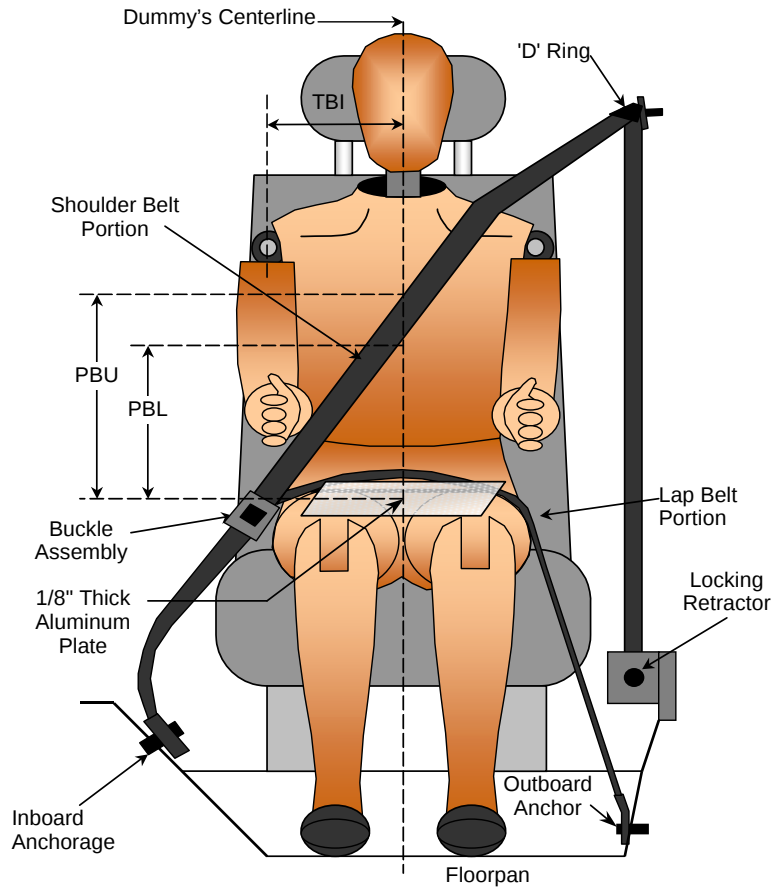
Code	Measurement Description	Driver	Passenger
AD	Arm to Door	140	195
HD	H-Point to Door	154	198
HR	Head to Side Header	234	269
HS	Head to Side Window	350	377
KK	Knee to Knee	335	207
SHY	Striker to H-Point (Y Direction)	290	295
AA	Ankle to Ankle	325	195

DATA SHEET NO. 5

SEAT BELT POSITIONING DATA

Test Vehicle: 2010 Hyundai Genesis 2-Dr Coupe
 Test Program: Frontal Validation Testing

NHTSA No.: MA0500
 Test Date: 8/14/2009



SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU - Top surface of reference to belt upper edge	mm	330	280
PBL - To surface of reference to belt lower edge	mm	250	200

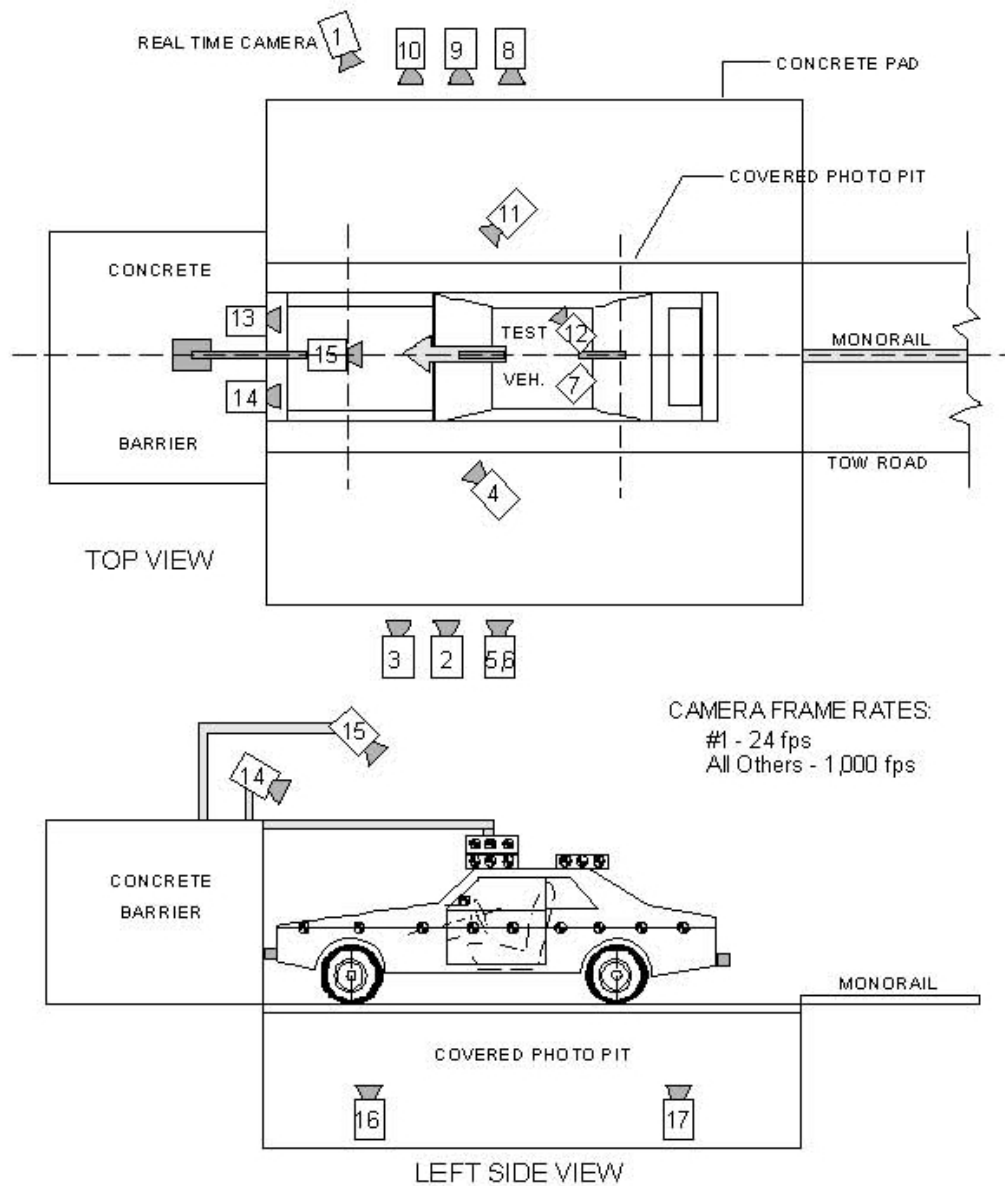
BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Shoulder Belt Length as measured on ATD	mm	1075	1080
Lap Belt Length as measured on ATD	mm	810	900
Reminder of belt of reel	mm	1600	1505
Total Belt Length for Continuous Webbing Systems	mm	3485	3485

DATA SHEET NO. 6
CAMERA LOCATIONS AND DATA

Test Vehicle: 2010 Hyundai Genesis 2-Dr Coupe
Test Program: Frontal Validation Testing

NHTSA No.: MA0500
Test Date: 8/14/2009



DATA SHEET NO. 6 (CONTINUED)

CAMERA LOCATIONS AND DATA

Test Vehicle: 2010 Hyundai Genesis 2-Dr Coupe

NHTSA No.: MA0500

Test Program: Frontal Validation Testing

Test Date: 8/14/2009

No.	Camera View	Location (mm) *			Angle (deg)	Lens (mm)	Speed (fps)
		X	Y	Z			
1	Real-Time Camera					13	24
2	Overall Left Side	1080	-5290	-1050	6.3	24	1000
3	Left Side A-Pillar	1490	-6380	-1460	2.5	35	1000
4	Left Side B-Pillar	5170	-5120	-1820	5.1	50	1000
5	Steering Column, Upper	845	-5650	-1320	5.3	25	1000
6	Steering Column, Lower	830	-5570	-850	5.7	25	1000
7	On-Board Driver's Seat Belt						
8	Overall Right Side	2050	6690	-1210	3.3	20	1000
9	Right Side A-Pillar	1470	6340	-1370	3.1	35	1000
10	Passenger IP View	1090	5270	-1040	5.5	24	1000
11	Right Side B-Pillar	5150	5100	-1830	5.2	50	1000
12	On-Board Pass. Seat Belt						
13	Overhead Passenger View	-110	420	-2180	46.3	24	1000
14	Overhead Driver View	-135	-470	-2180	47.2	24	1000
15	Overhead Windshield View	-285	0	-2860	47.3	12.5	1000
16	Pit View of Engine Compartment	1250	0	3150	89.3	24	1000
17	Pit View of Fuel Tank	3020	0	3150	89.6	24	1000

***COORDINATES:**

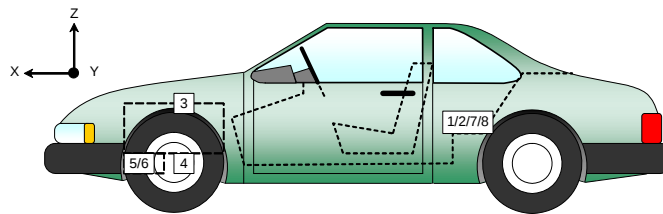
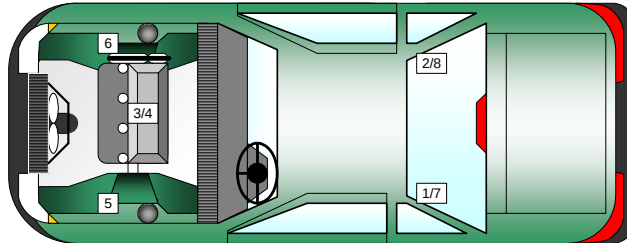
- +X = forward of impact plane
- +Y = right of monorail centerline
- +Z = below ground level

Cameras 7 & 12 were not used for this test.

DATA SHEET NO. 7
VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2010 Hyundai Genesis 2-Dr Coupe
 Test Program: Frontal Validation Testing

NHTSA No.: MA0500
 Test Date: 8/14/2009



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear X-Member X	1802	-378	-404
2	Right Rear X-Member X	1802	378	-404
3	Engine Top X	4016	0	-835
4	Engine Bottom X	3901	0	-144
5	Left Brake Caliper X	3621	-702	-226
6	Right Brake Caliper X	3621	702	-226
7	Left Rear X-Member Z	1802	-378	-404
8	Right Rear X-Member Z	1802	378	-404

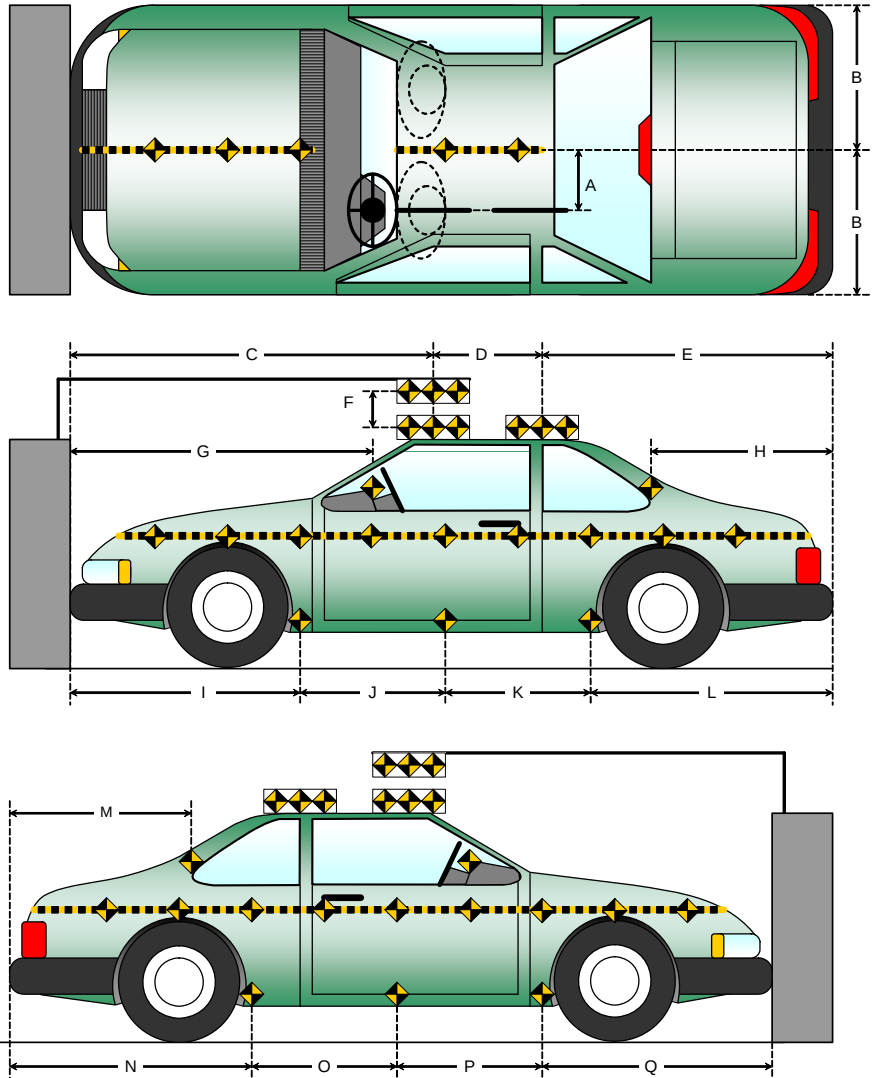
Reference Points: X - Rear Surface of Vehicle (+ forward)
 Y - Vehicle Centerline (+ to right)
 Z - Ground Plane (+ down)

DATA SHEET NO. 8
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2010 Hyundai Genesis 2-Dr Coupe
 Test Program: Frontal Validation Testing

NHTSA No.: MA0500
 Test Date: 8/14/2009

Item	Value (mm)
A	380
B	915
C	2422
D	610
E	1542
F	127
G	
H	1080
I	1271
J	1010
K	923
L	1370
M	1076
N	1359
O	1026
P	921
Q	1268



DATA SHEET NO. 9

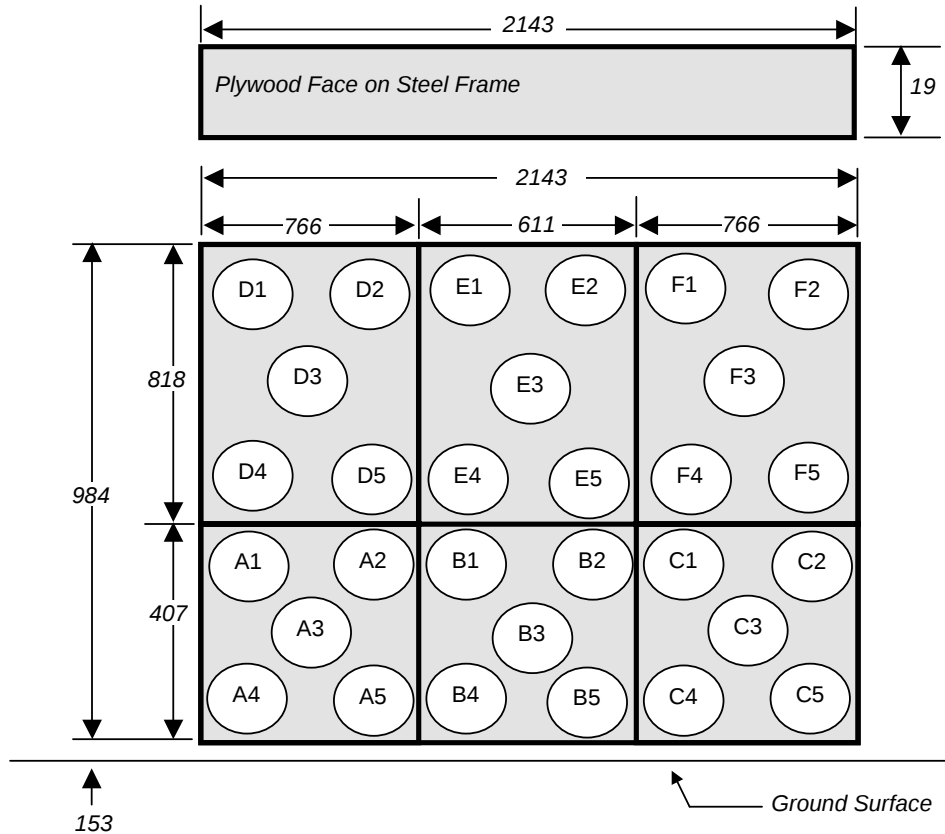
LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle: 2010 Hyundai Genesis 2-Dr Coupe
 Test Program: Frontal Validation Testing

NHTSA No.: MA0500
 Test Date: 8/14/2009

30 Load Cell Rigid Barrier

Load Cell Locations on Fixed Barrier



Group 4 D1-D5	Group 5 E1-E5	Group 6 F1-F5
Group 1 A1-A5	Group 2 B1-B5	Group 3 C1-C5

6 Groups of 5 Load Cells Each

DATA SHEET NO. 10

TEST VEHICLE CAMERA AND INSTRUMENTATION SUMMARY

Test Vehicle: 2010 Hyundai Genesis 2-Dr Coupe

NHTSA No.: MA0500

Test Program: Frontal Validation Testing

Test Date: 8/14/2009

INSTRUMENTATION

Driver Dummy Channels	44
Passenger Dummy Channels	44
Vehicle Structure Accelerometers	8
Barrier Channels	6
Total	102

CAMERA COVERAGE

High-Speed Vehicle Onboard	0
High-Speed Offboard	14
Real-Time Panning	1
Total	15

DATA SHEET NO. 11

POST-TEST OBSERVATIONS

Test Vehicle: 2010 Hyundai Genesis 2-Dr Coupe
 Test Program: Frontal Validation Testing

NHTSA No.: MA0500
 Test Date: 8/14/2009

TEST DUMMY INFORMATION AND CONTACT

Description	Driver	Passenger
Dummy Type / Serial No.	HIII 50% / 1045	HIII 5% / 634
Head Contact	Airbag, Headrest, Headliner	Airbag, Headrest
Upper Torso Contact	Airbag	Airbag
Lower Torso Contact	None	None
Left Knee Contact	Steering Column	None
Right Knee Contact	None	None

POST TEST DOOR OPENING AND SEAT TRACK INFORMATION

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

POST TEST STRUCTURAL OBSERVATIONS

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

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	865
Center	mm	895
Right Side	mm	790
Average	mm	850

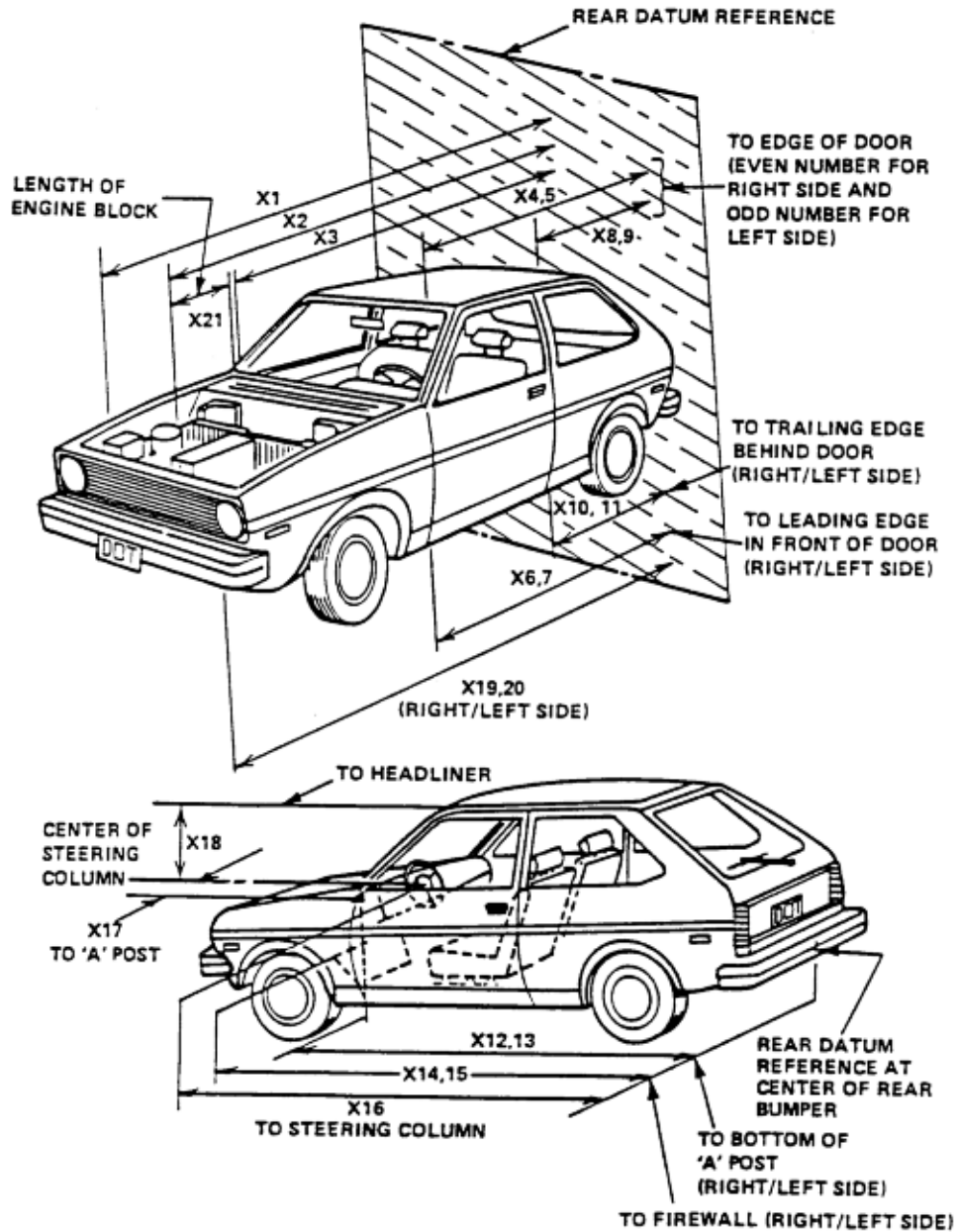
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Driver		Passenger	
	Installed	Deployed	Installed	Deployed
Frontal Airbag	Yes	Yes	Yes	Yes
Knee Bag	No		No	
Side Torso Airbag	Yes	No	Yes	No
Combination Head/Torso Airbag	No		No	
Side Head Curtain/Tube Airbag	Yes	No	Yes	No
Seat Belt Pretensioner	Yes	No	Yes	No
Seat Belt Load Limiter	Yes	Yes	Yes	Yes

DATA SHEET NO. 12 VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2010 Hyundai Genesis 2-Dr Coupe
 Test Program: Frontal Validation Testing

NHTSA No.: MA0500
 Test Date: 8/14/2009



DATA SHEET NO. 12 (CONTINUED)
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2010 Hyundai Genesis 2-Dr Coupe
 Test Program: Frontal Validation Testing

NHTSA No.: MA0500
 Test Date: 8/14/2009

RSOV (Rear Surface of Vehicle)

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	mm	4574	4097	477
2	RSOV to Front of Engine	mm	4064	3878	186
3	RSOV to Firewall	mm	3455	3380	75
4	RSOV to Upper Leading Edge of Right Door	mm	3061	3061	0
5	RSOV to Upper Leading Edge of Left Door	mm	3059	3065	-6
6	RSOV to Lower Leading Edge of Right Door	mm	3034	3029	5
7	RSOV to Lower Leading Edge of Left Door	mm	3048	3039	9
8	RSOV to Upper Trailing Edge of Right Door	mm	1792	1790	2
9	RSOV to Upper Trailing Edge of Left Door	mm	1787	1785	2
10	RSOV to Lower Trailing Edge of Right Door	mm	1813	1810	3
11	RSOV to Lower Trailing Edge of Left Door	mm	1817	1812	5
12	RSOV to Bottom of "A" Post of Right Side	mm	3042	3038	4
13	RSOV to Bottom of "A" Post of Left Side	mm	3064	3054	10
14	RSOV to Firewall, Right Side	mm	3310	3290	20
15	RSOV to Firewall, Left Side	mm	3361	3323	38
16	RSOV to Steering Column	mm	2565	2610	-45
17	Center of Steering Column to "A" Post	mm	390	366	24
18	Center of Steering Column to Headliner	mm	404	392	12
19	RSOV to Right Side of Front Bumper	mm	4431	4068	363
20	RSOV to Left Side of Front Bumper	mm	4431	4060	371
21	Length of Engine Block	mm	479	479	0
RD	RSOV to Right Side of Dash Panel	mm	2850	2829	21
CD	RSOV to Center of Dash Panel	mm	2777	2772	5
LD	RSOV to Left Side of Dash Panel	mm	2796	2805	-9

DATA SHEET NO. 13
ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2010 Hyundai Genesis 2-Dr Coupe
 Test Program: Frontal Validation Testing

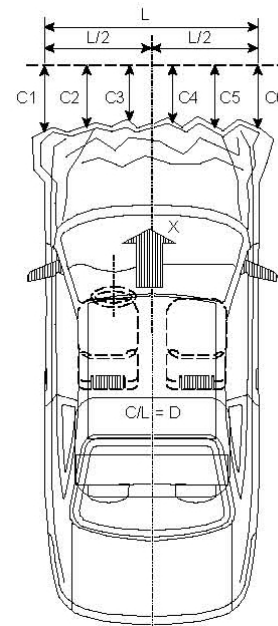
NHTSA No.: MA0500
 Test Date: 8/14/2009

VEHICLE INFORMATION

VIN: KMHHT6KD7AU011063 Wheelbase (mm): 2820
 Vehicle Size Category: Coupe Test Weight (kg): 1713.7

ACCELEROMETER DATA

Accelerometer Locations: As per measurements on Page 16
 Cal. Procedure/Interval: MGA procedure / 6 month
 Integration Algorithm: Trapezoidal Linearity: > 99%
 Impact Velocity (km/h): 56.5
 Velocity Change (km/h): 61.7
 Time of Separation (msec): 97.6



CRUSH PROFILE

Collision Deformation Classification: Frontal
 Midpoint of Damage: Centerline
 Damage Region Length (mm): 1375
 Impact Mode: Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	4431	4060	371
C2	Crush zone 2 at left side	mm	4518	4073	445
C3	Crush zone 3 at left side	mm	4568	4102	466
C4	Crush zone 4 at right side	mm	4568	4095	473
C5	Crush zone 5 at right side	mm	4518	4065	453
C6	Crush zone 6 at right side	mm	4431	4068	363
L	C1 TO C6	mm	1375	1350	25

DATA SHEET NO. 14
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2010 Hyundai Genesis 2-Dr Coupe
 Test Program: Frontal Validation Testing

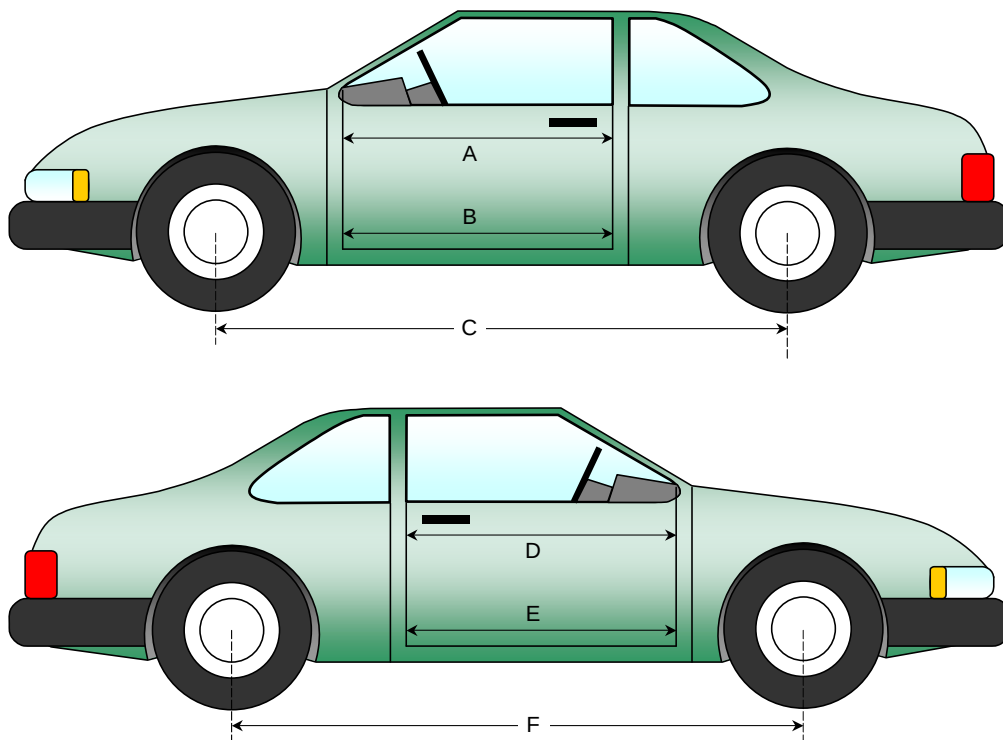
NHTSA No.: MA0500
 Test Date: 8/14/2009

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	1289	1287	2
B	Left Side Lower	mm	1120	1120	0
D	Right Side Upper	mm	1288	1286	2
E	Right Side Lower	mm	1124	1123	1

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2820	2784	36
F	Right Side Wheelbase	mm	2820	2786	34



DATA SHEET NO. 14 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

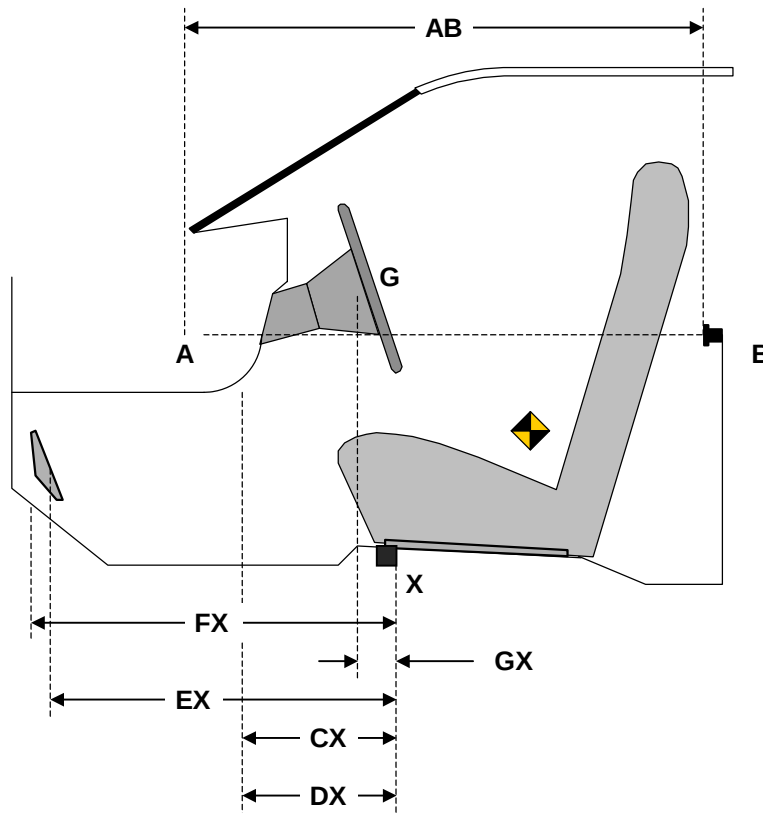
Test Vehicle: 2010 Hyundai Genesis 2-Dr Coupe
 Test Program: Frontal Validation Testing

NHTSA No.: MA0500
 Test Date: 8/14/2009

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside window jam)	mm	1033	1031	2
CX	Left Knee Bolster to X	mm	336	337	-1
DX	Right Knee Bolster to X	mm	328	330	-2
EX	Brake Pedal to X	mm	576	490	86
FX	Foot Rest to X	mm	601	600	1
GX	Center of Steering Column Wheel Hub to X	mm	42	90	-48

X = Front of Seat Track (stationary)



DRIVER COMPARTMENT

DATA SHEET NO. 15

SUMMARY OF FMVSS 212 AND FMVSS 219 (PARTIAL) DATA

Test Vehicle: 2010 Hyundai Genesis 2-Dr Coupe
 Test Program: Frontal Validation Testing

NHTSA No.: MA0500
 Test Date: 8/14/2009

Windshield Mounting Details:

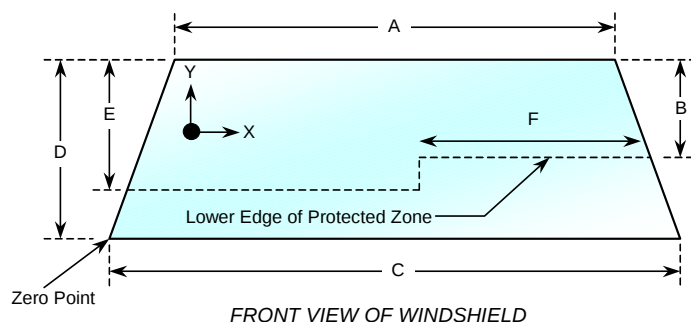
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

The standard requires that the post-test retention measurement be a minimum of 75 percent of the pretest 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°C

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% of Retention
Left Side	2138	2138	100
Right Side	2138	2138	100
Total	4276	4276	100



Item	Units	Value
A	mm	1226
B	mm	494
C	mm	1548
D	mm	751
E	mm	476
F	mm	519

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. 16

FMVSS 301 FUEL SYSTEM INTEGRITY POST-IMPACT DATA

Test Vehicle: 2010 Hyundai Genesis 2-Dr Coupe

NHTSA No.: MA0500

Test Program: Frontal Validation Testing

Test Date: 8/14/2009

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

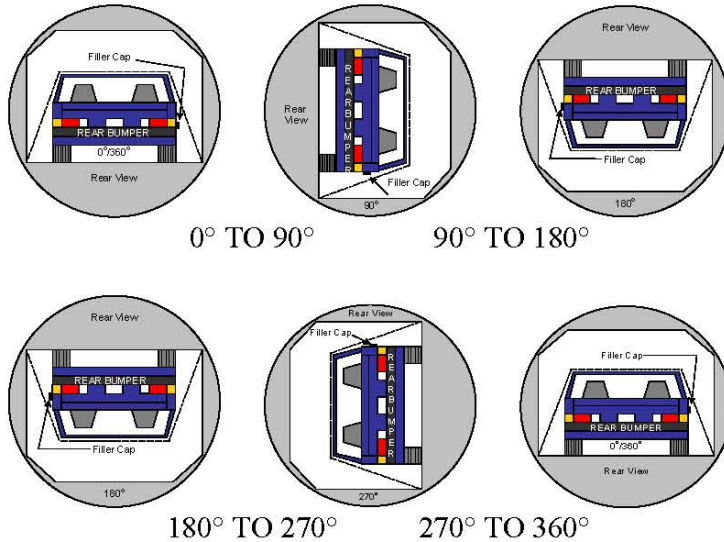
Test Time: 9:43 am Temperature: 21° C

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

DATA SHEET NO. 17
FMVSS 301 STATIC ROLLOVER DATA

Test Vehicle: 2010 Hyundai Genesis 2-Dr Coupe
 Test Program: Frontal Validation Testing

NHTSA No.: MA0500
 Test Date: 8/14/2009



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°	114	300	414
90° to 180°	108	300	408
180° to 270°	106	300	406
270° to 360°	118	300	418

FMVSS 301 ROLLOVER 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

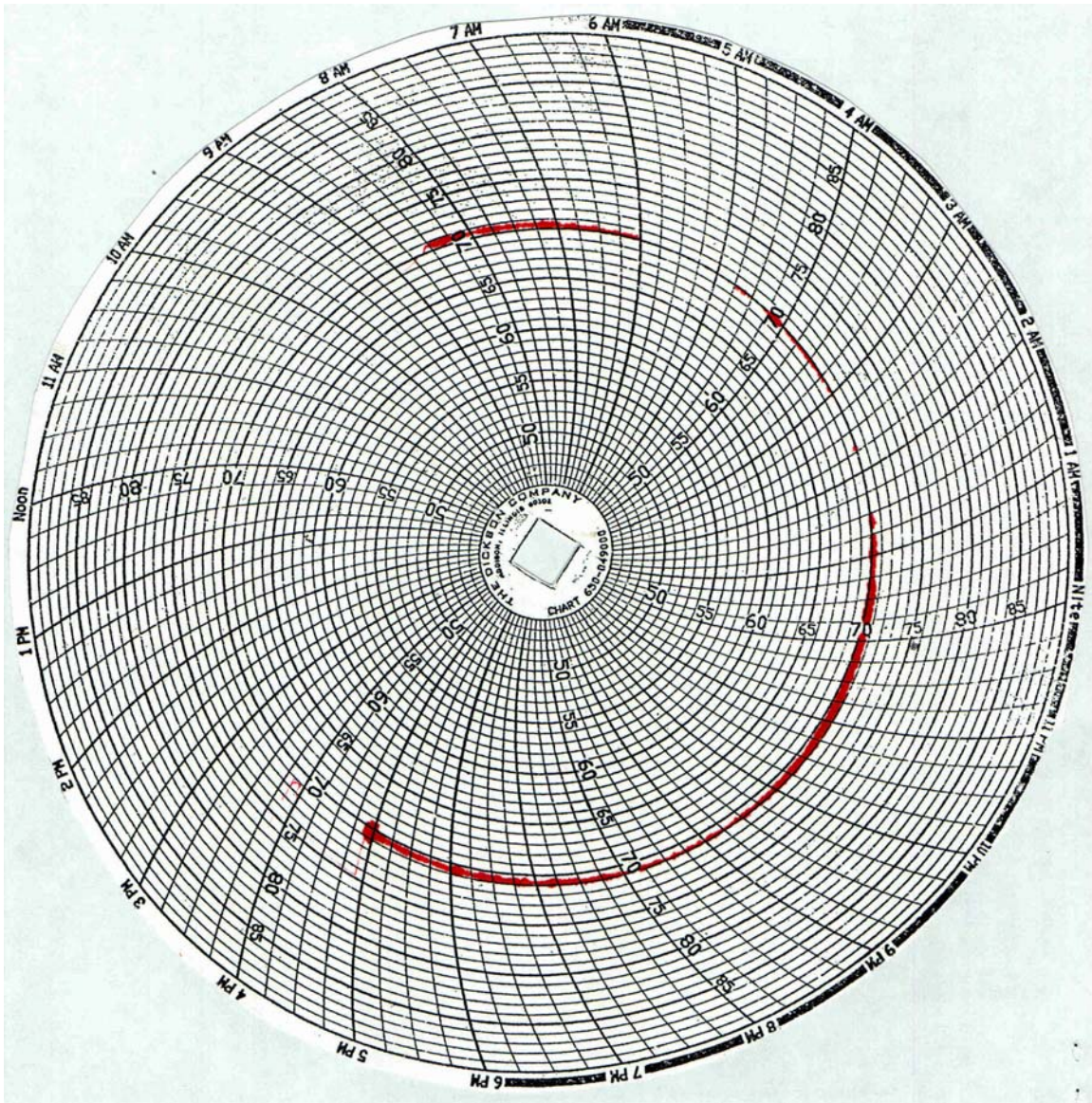
ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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

DATA SHEET NO. 18
DUMMY/VEHICLE TEMPERATURE STABILIZATION DATA

Test Vehicle: 2010 Hyundai Genesis 2-Dr Coupe
Test Program: Frontal Validation Testing

NHTSA No.: MA0500
Test Date: 8/14/2009



APPENDIX A
PHOTOGRAPHS

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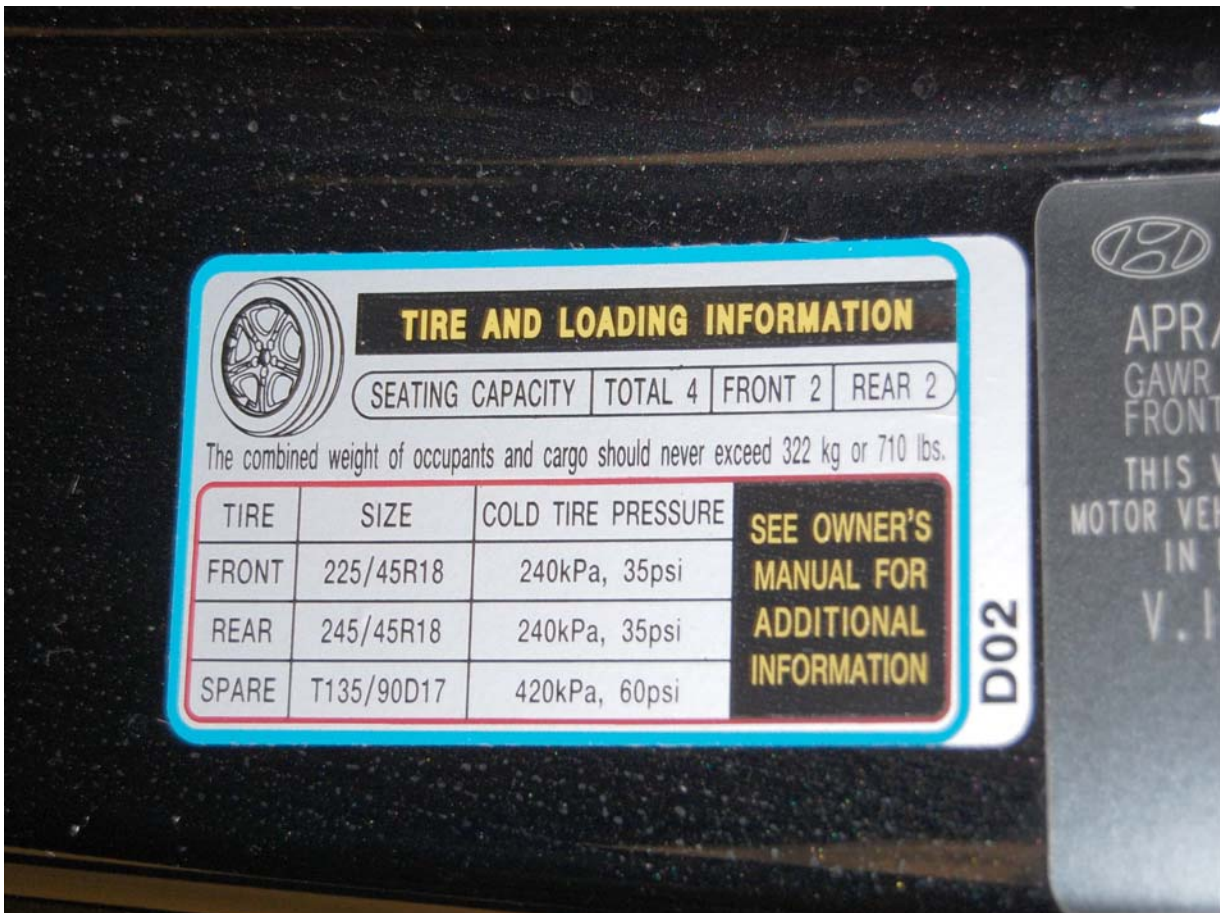
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Load Cell Location



Manufacturer's Label



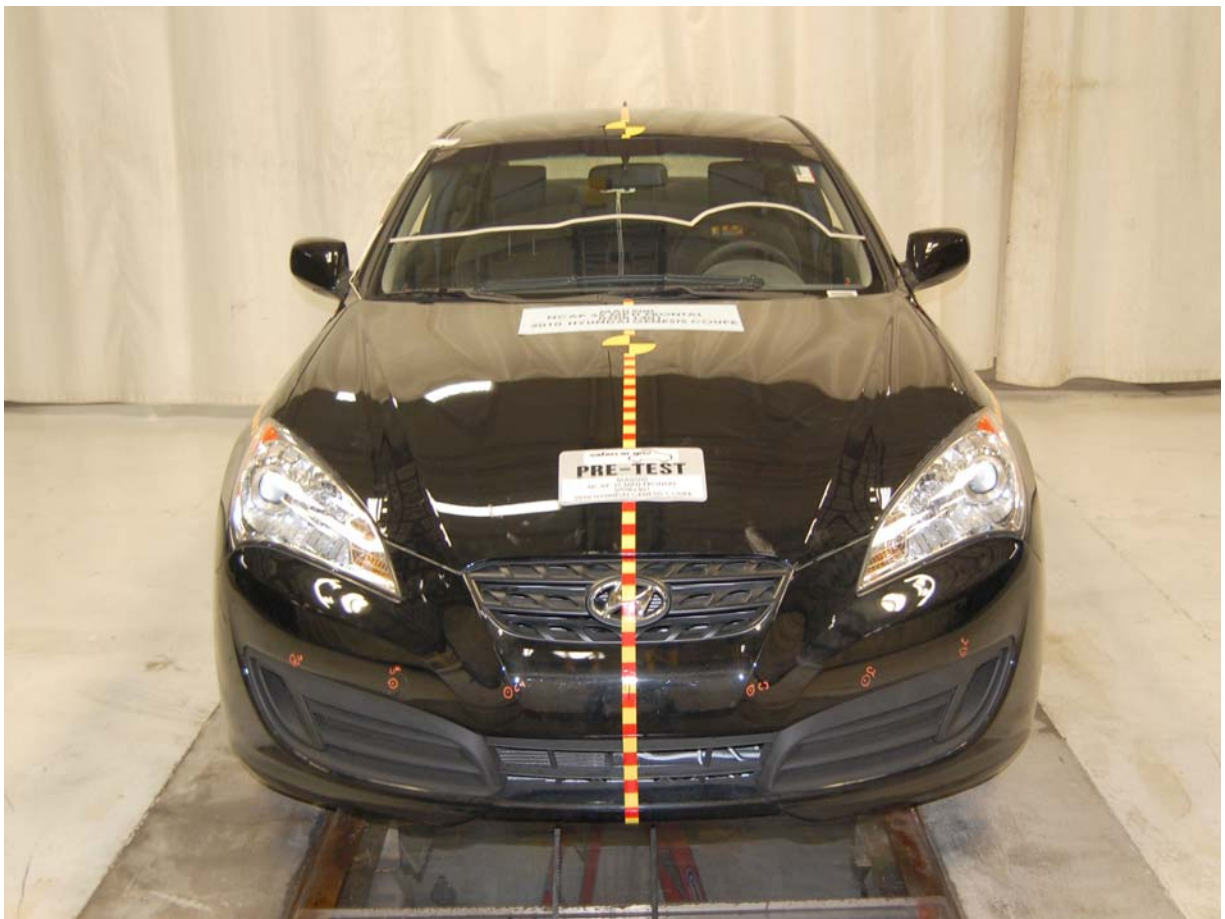
Tire Placard



Right Front Three-Quarter View, As Received



Left Rear Three-Quarter View, As Received



Pre-Test Front View



Post-Test Front View



Pre-Test Left Side View (with vehicle at barrier)



Post-Test Left Side View



Pre-Test Right Side View (with vehicle at barrier)



Post-Test Right Side View



Pre-Test Right Front $\frac{3}{4}$ View



Post-Test Right Front $\frac{3}{4}$ View



Pre-Test Left Rear $\frac{3}{4}$ View (with vehicle at barrier)



Post-Test Left Rear $\frac{3}{4}$ View



Pre-Test Windshield View

No Photograph Available

Post-Test Windshield View



Pre-Test Engine Compartment View



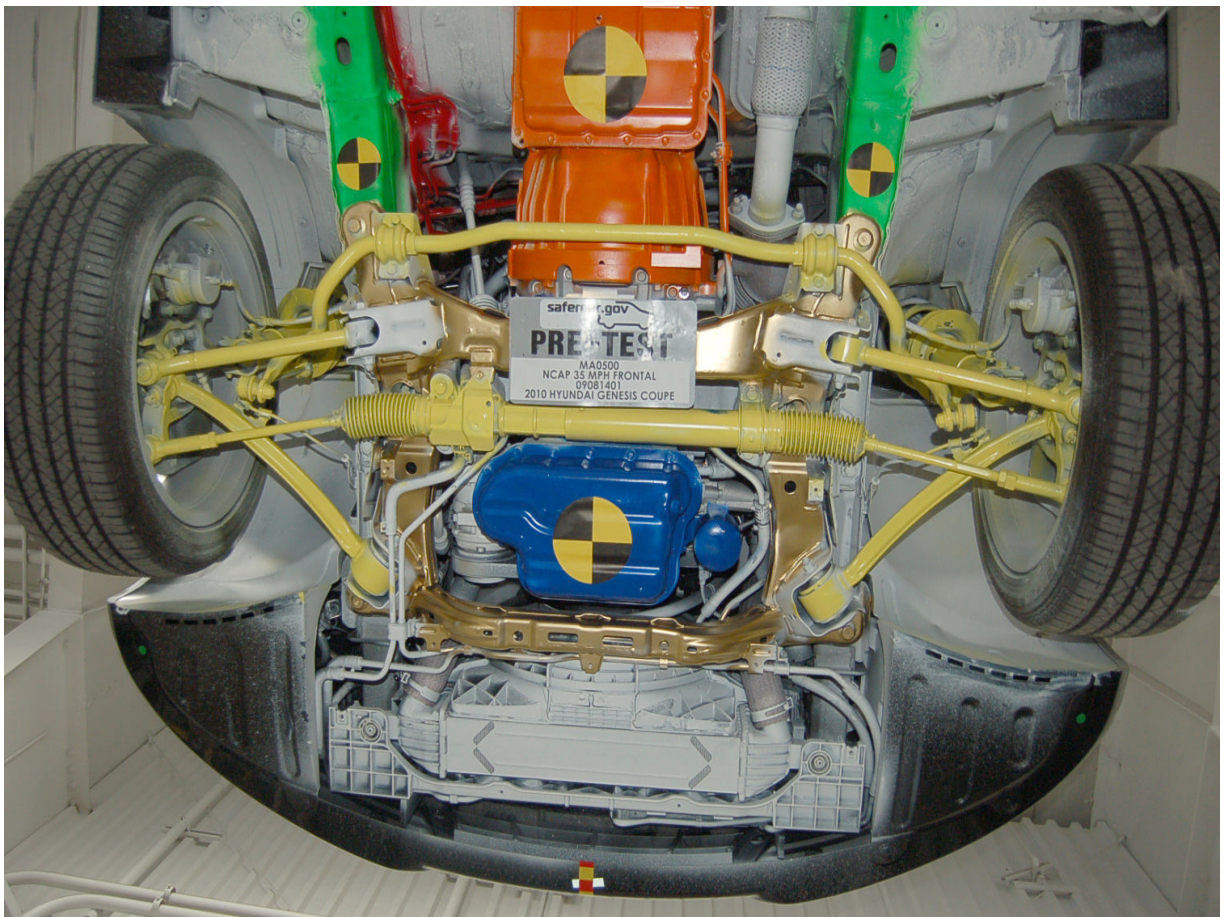
Post-Test Engine Compartment View



Pre-Test Fuel Cap View



Post-Test Fuel Cap View



Pre-Test Front Underbody View



Post-Test Front Underbody View



Pre-Test Mid Front Underbody View



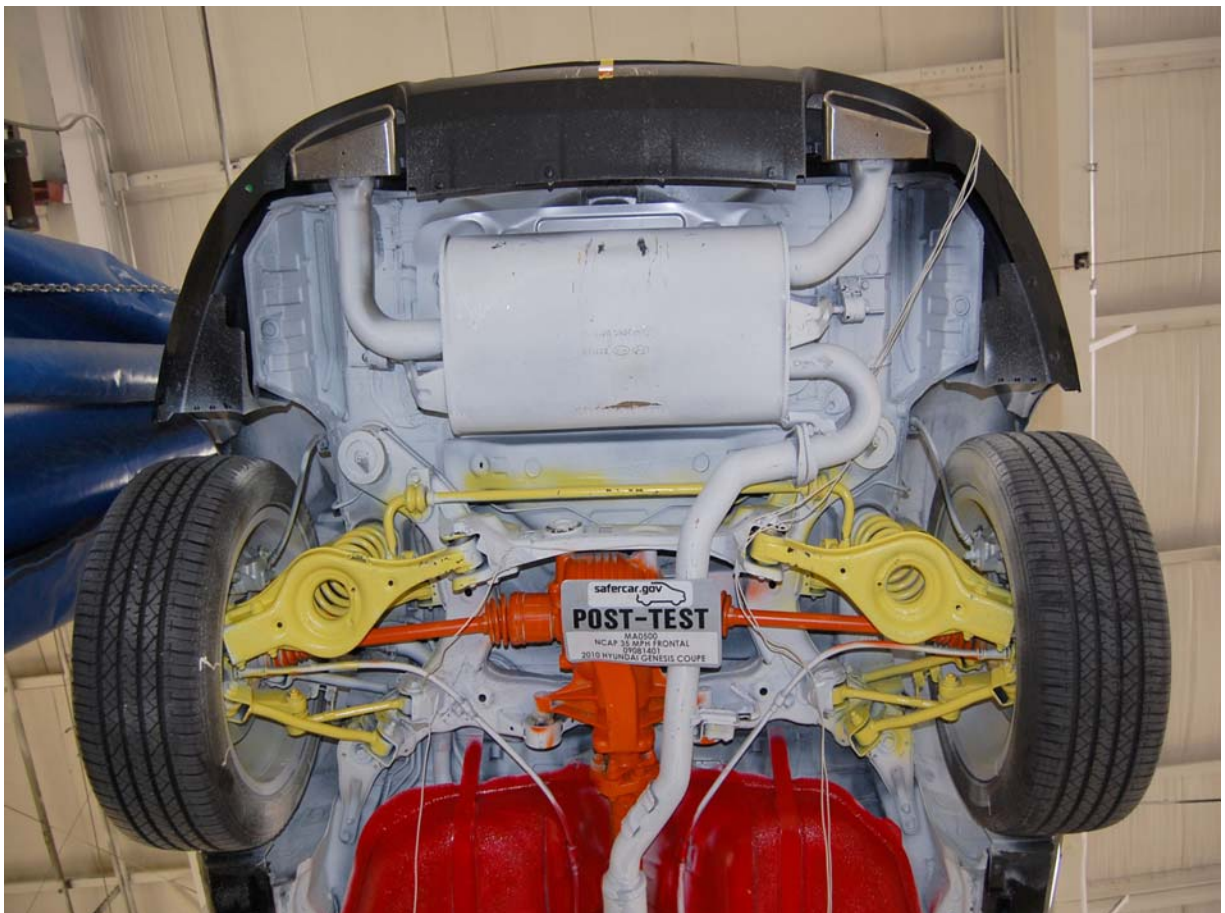
Pre-Test Mid Rear Underbody View



Post-Test Mid 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 Driver Dummy Feet



Post-Test Driver Dummy Feet



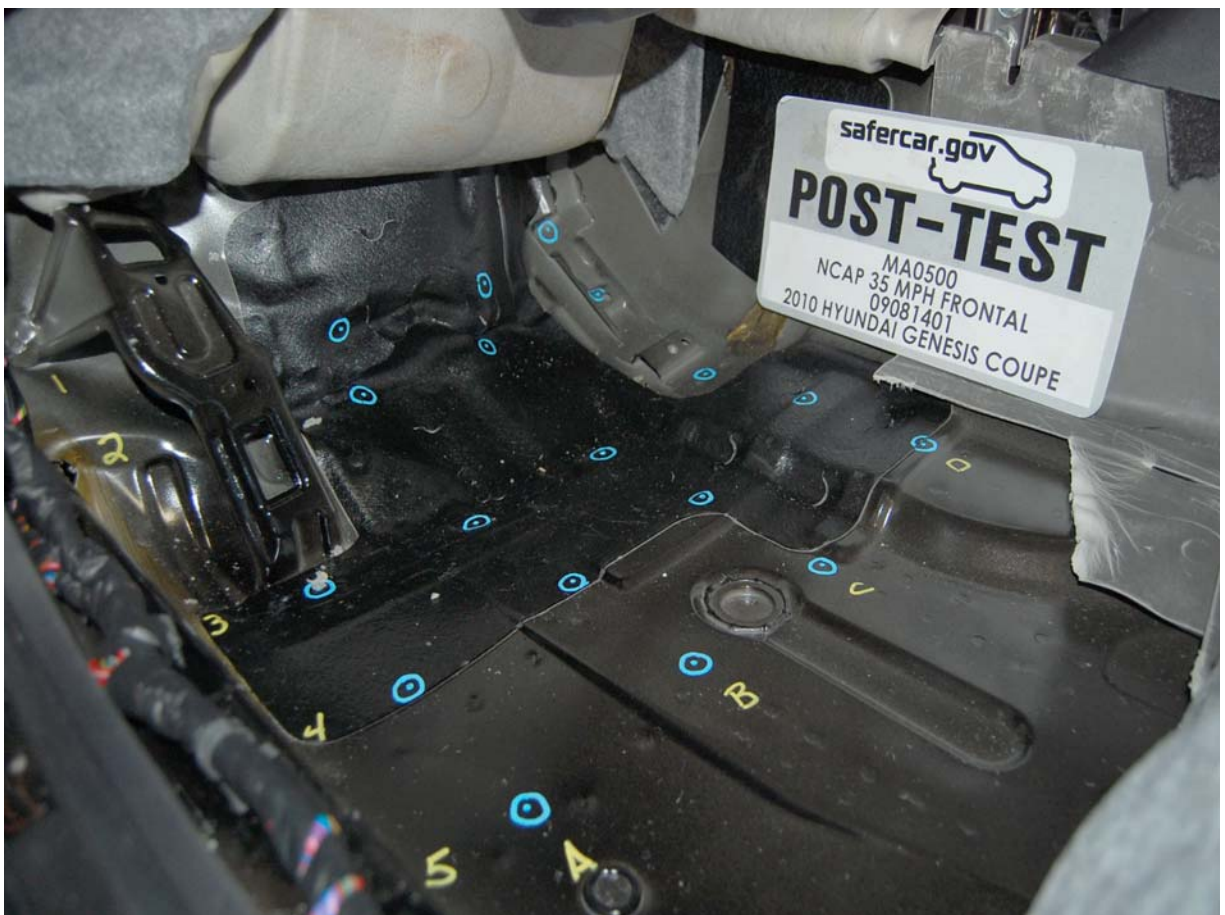
Pre-Test Driver's Side Knee Bolster



Post-Test Driver's Side Knee Bolster



Pre-Test Driver's Side Floorpan



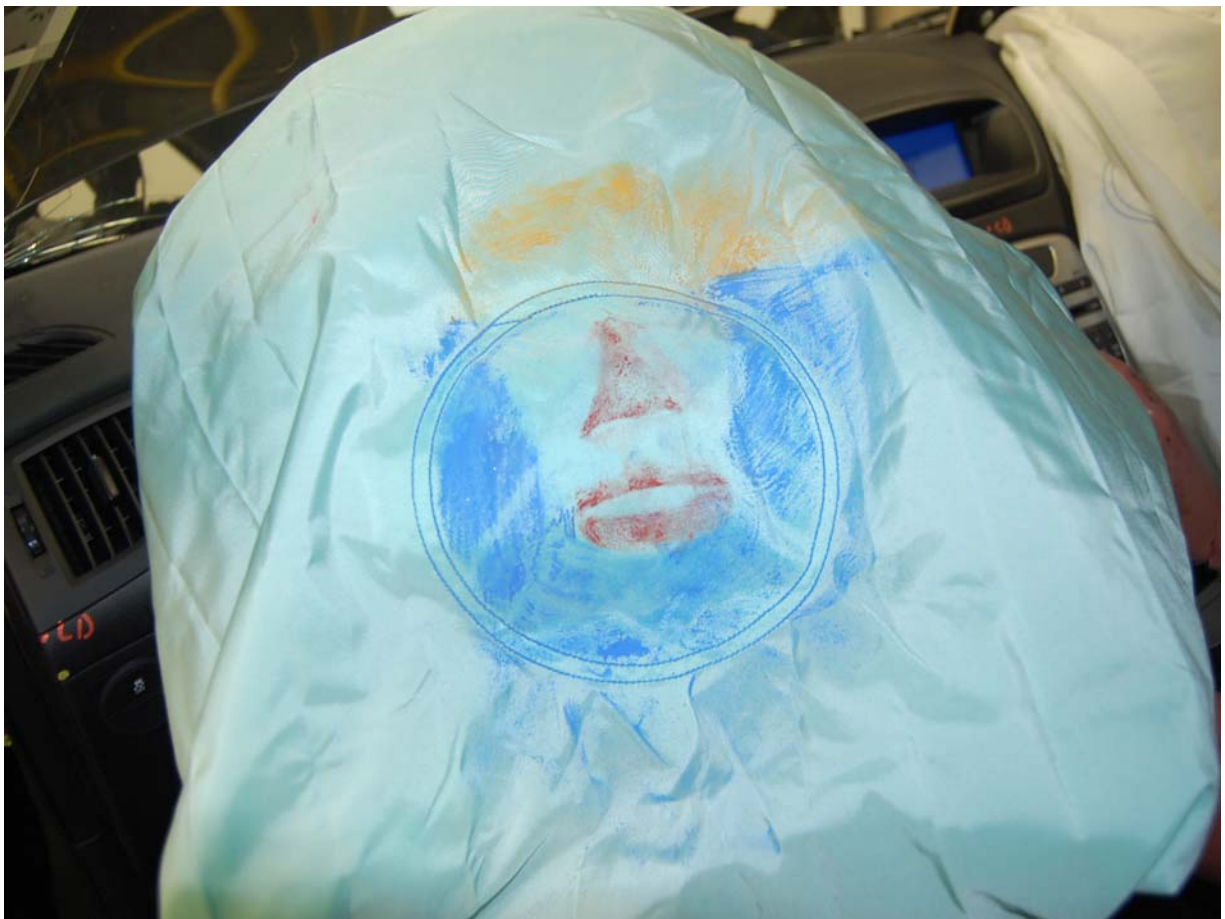
Post-Test Driver's Side Floorpan



Post-Test Driver Dummy Head Contact



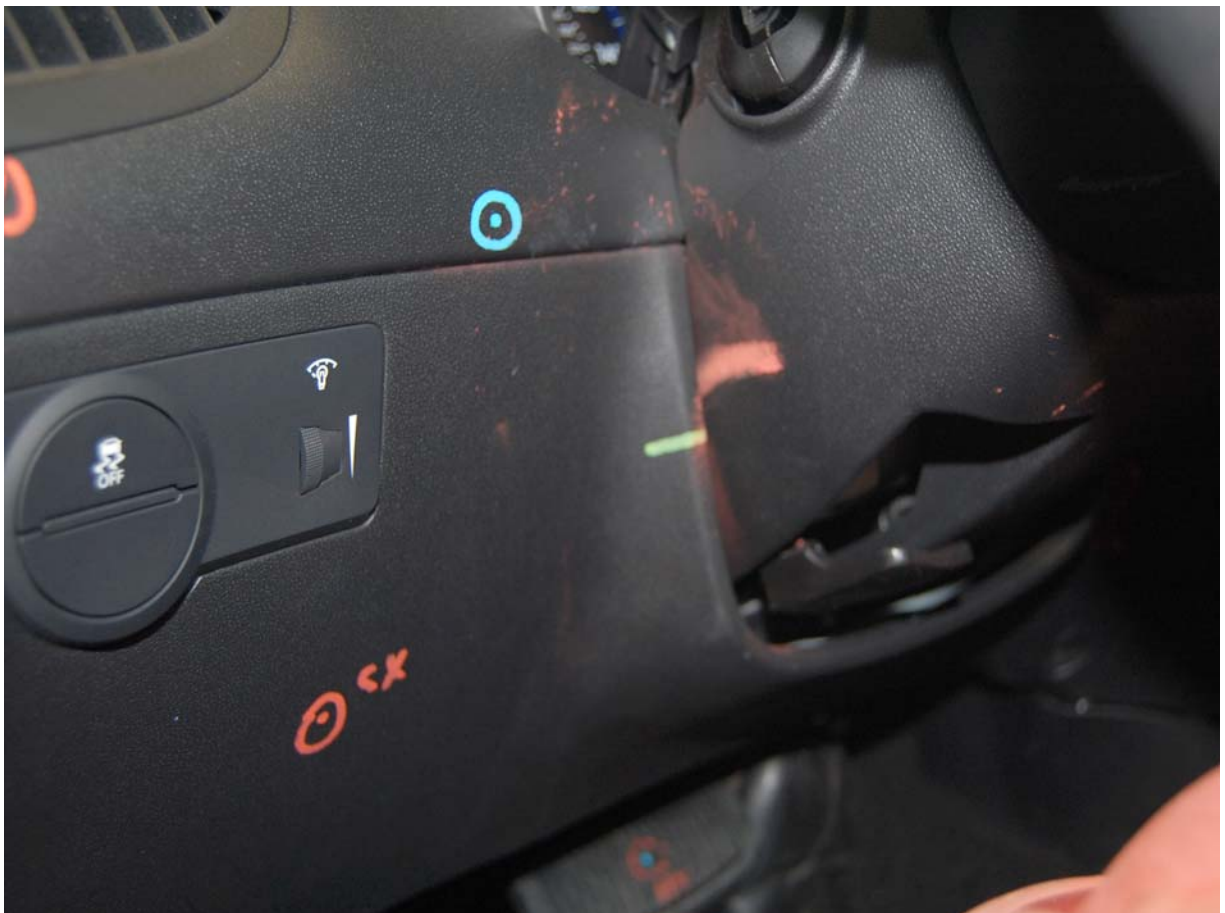
Post-Test Driver Dummy Knee Contact (steering column)



Post-Test Driver Dummy Airbag Contact



Pre-Test View of Steering Column Shear Capsule



Post-Test View of Steering Column Shear Capsule



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 Passenger Dummy Feet



Post-Test Passenger Dummy Feet



Pre-Test Passenger's Side Knee Bolster



Post-Test Passenger's Side Knee Bolster



Pre-Test Passenger's Side Floorpan



Post-Test Passenger's Side Floorpan



Post-Test Passenger Dummy Head Contact



Post-Test Passenger Dummy Knee Contact (no contact)



Post-Test Passenger Dummy Airbag Contact



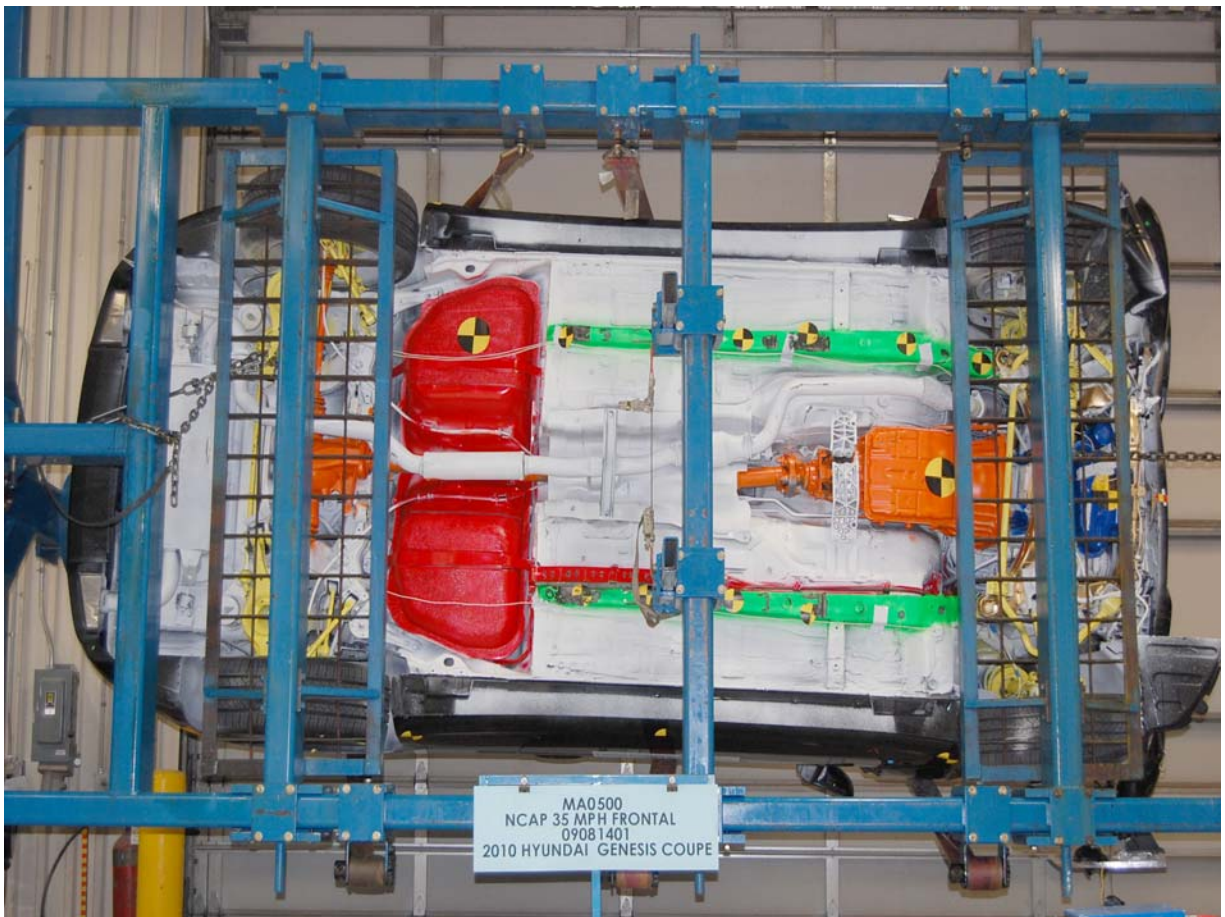
Ballast Installed in Vehicle



Post-Test Speed Trap Read-Out



Vehicle at 0 Degrees 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



Vehicle Impact

APPENDIX B
DUMMY RESPONSE DATA TRACES

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The following 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 Shoulder Belt Force

Driver Lap Belt Force

Driver Left Upper Tibia Moment X

Driver Left Upper Tibia Moment Y

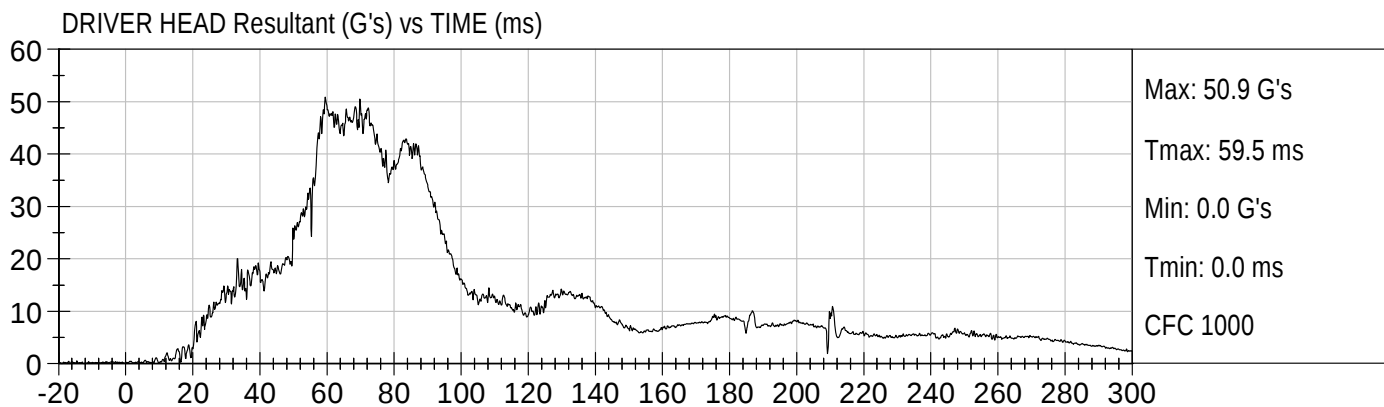
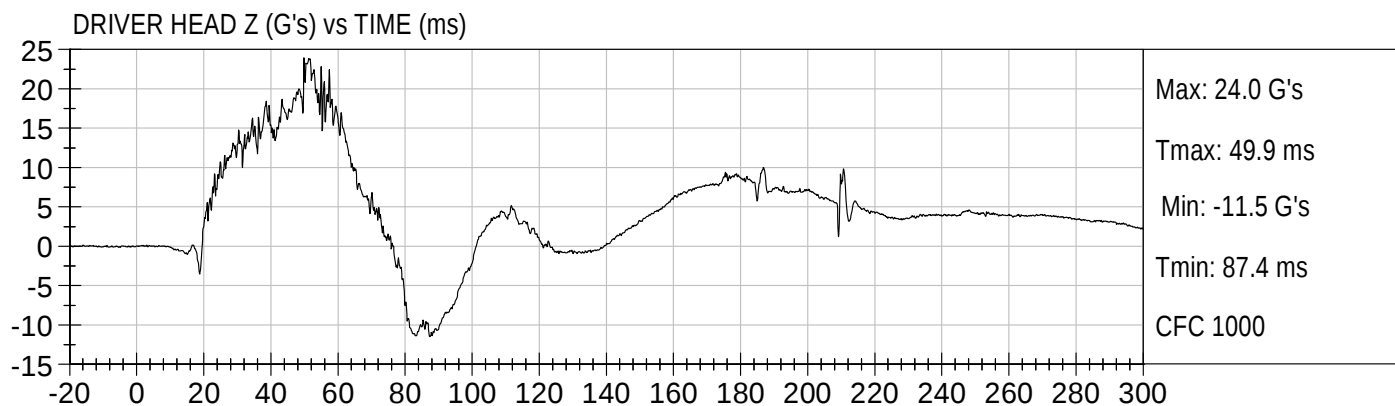
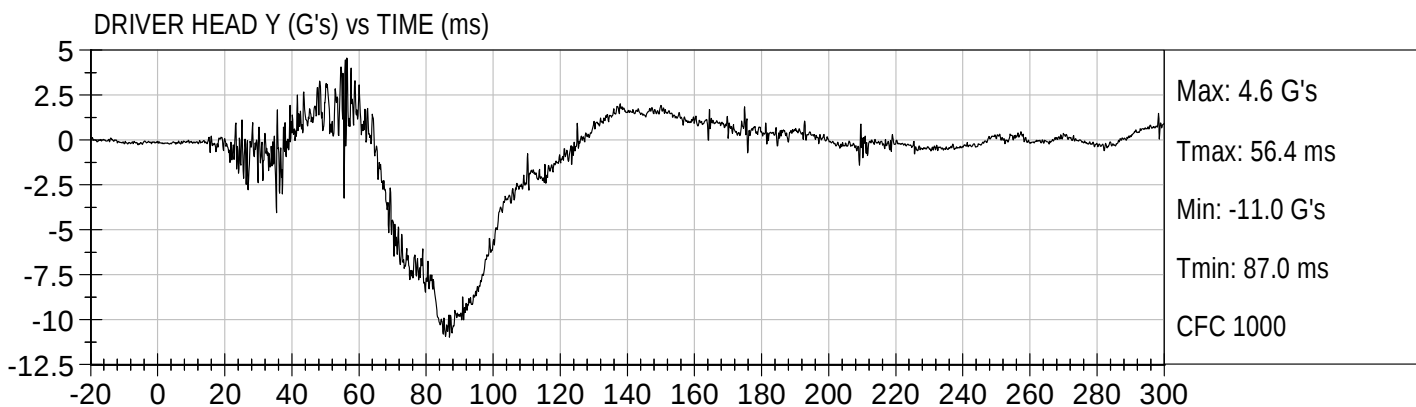
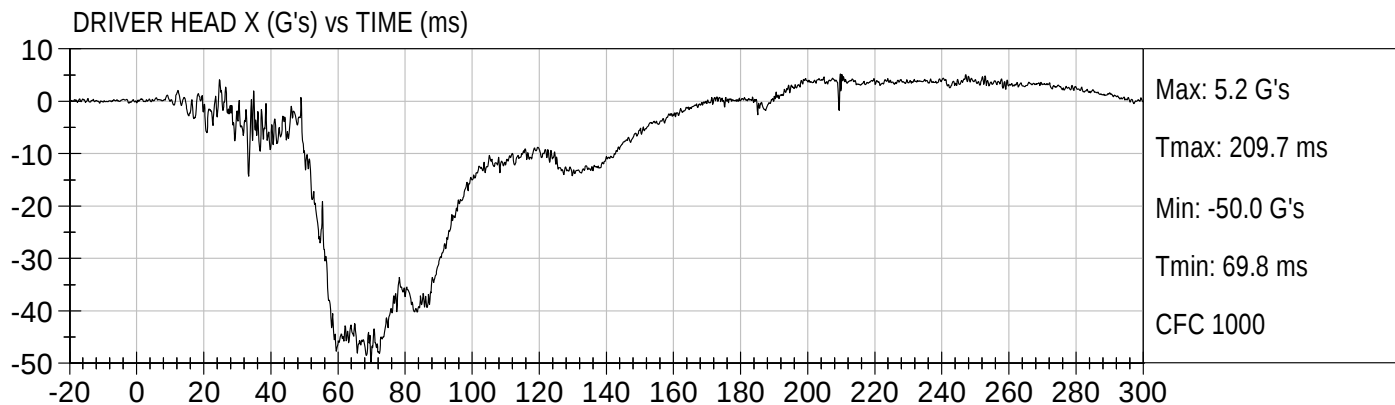
Driver Left Upper Tibia Force Z

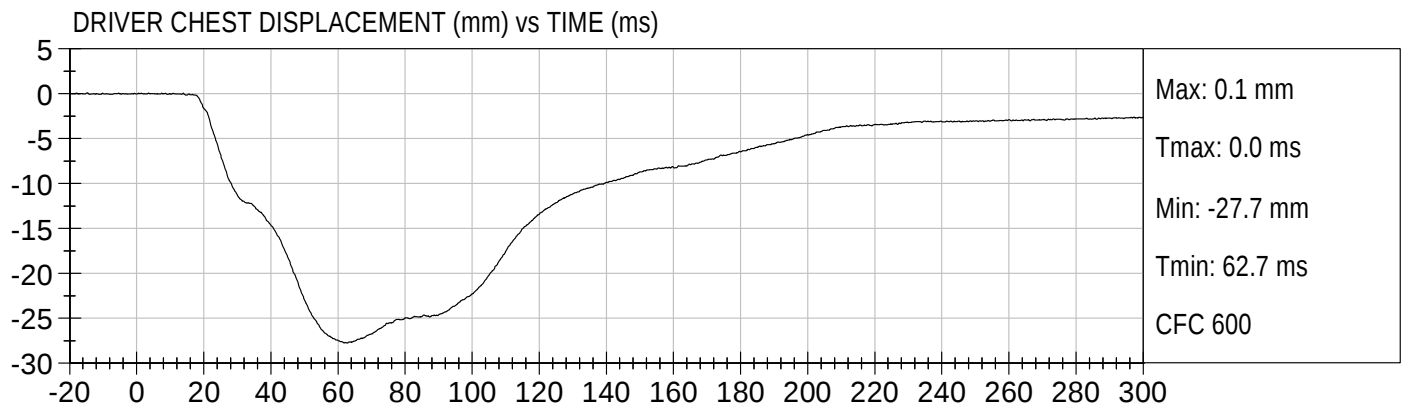
Driver Left Lower Tibia Moment X

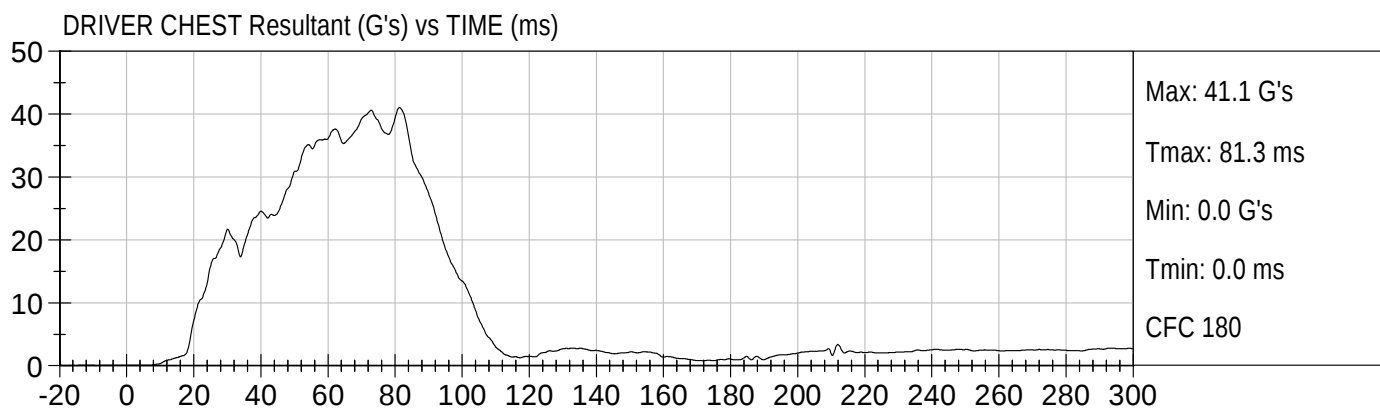
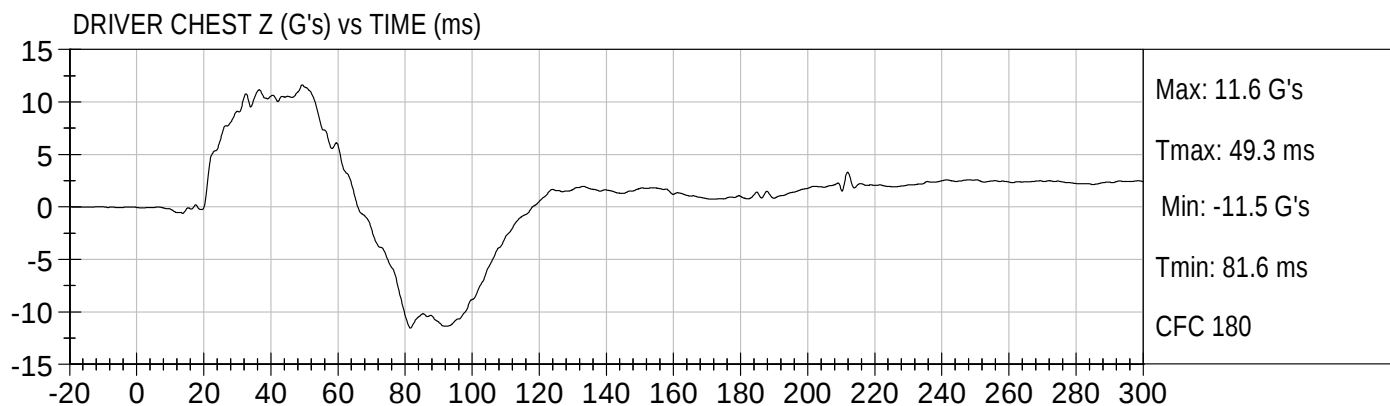
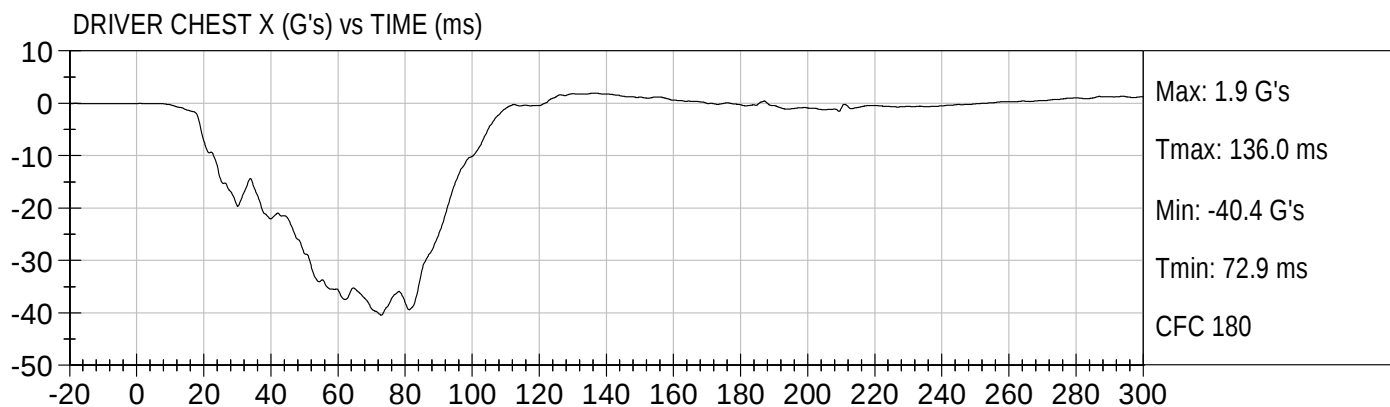
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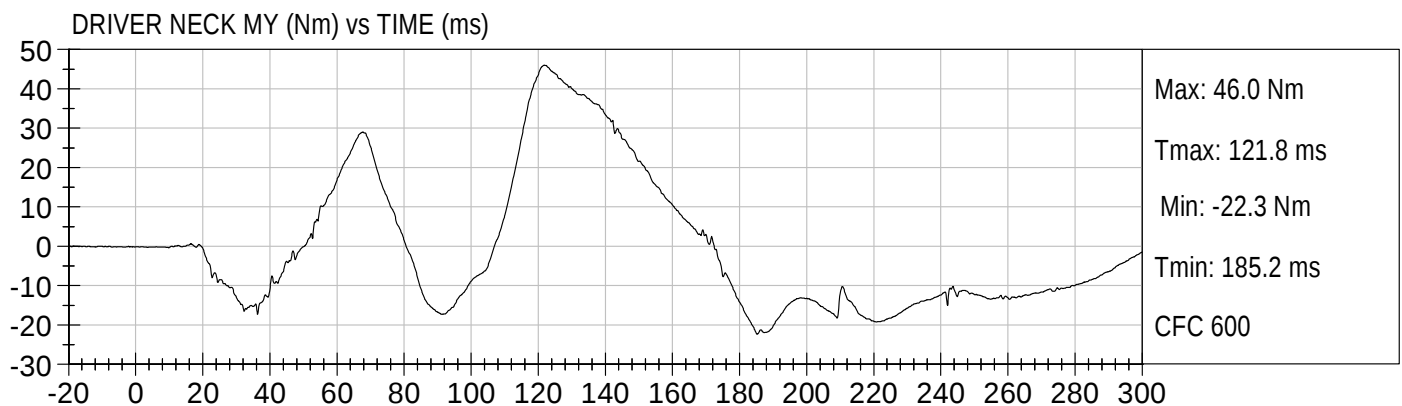
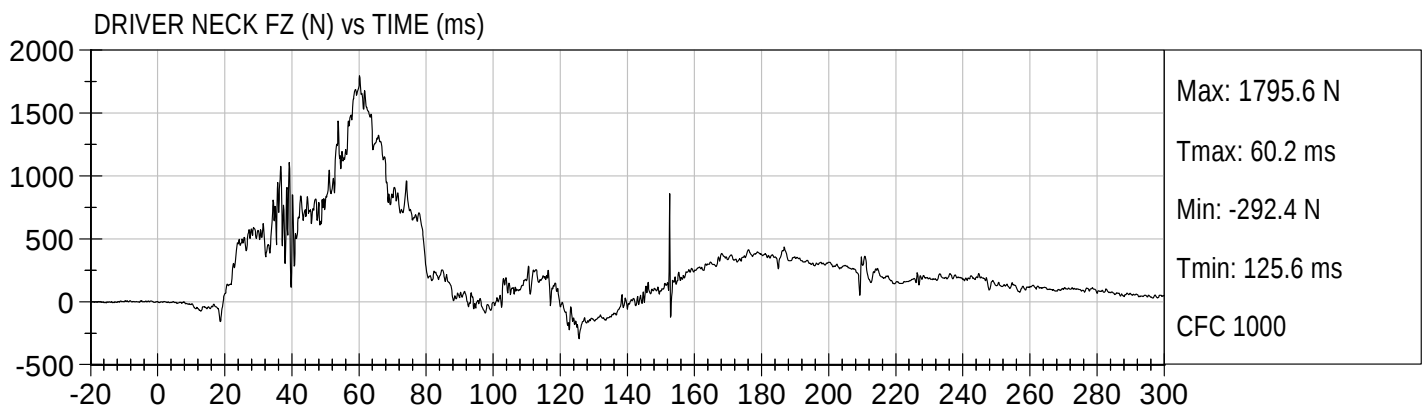
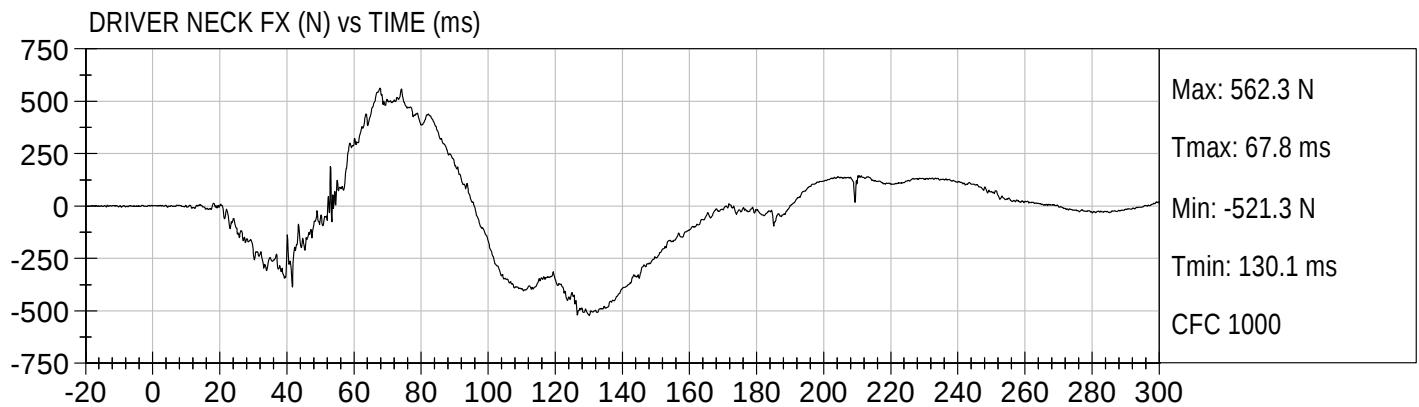
Driver Left Lower Tibia Force Z
Driver Right Upper Tibia Moment X
Driver Right Upper Tibia Moment Y
Driver Right Upper Tibia Force Z
Driver Right Lower Tibia Moment X
Driver Right Lower Tibia Moment Y
Driver Right Lower Tibia Force Z
Driver Left Foot Fore Z
Driver Left Foot Aft X
Driver Left Foot Aft Z
Driver Right Foot Fore Z
Driver Right Foot Aft X
Driver Right Foot Aft Z
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 Shoulder Belt Force
Passenger Lap Belt Force
Passenger Left Upper Tibia Moment X
Passenger Left Upper Tibia Moment Y
Passenger Left Upper Tibia Force Z
Passenger Left Lower Tibia Moment X

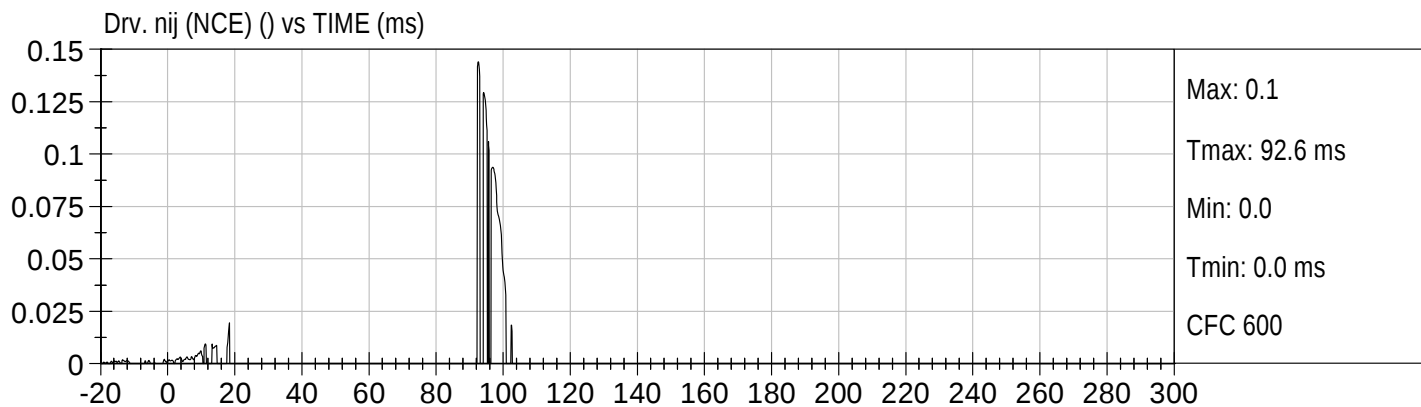
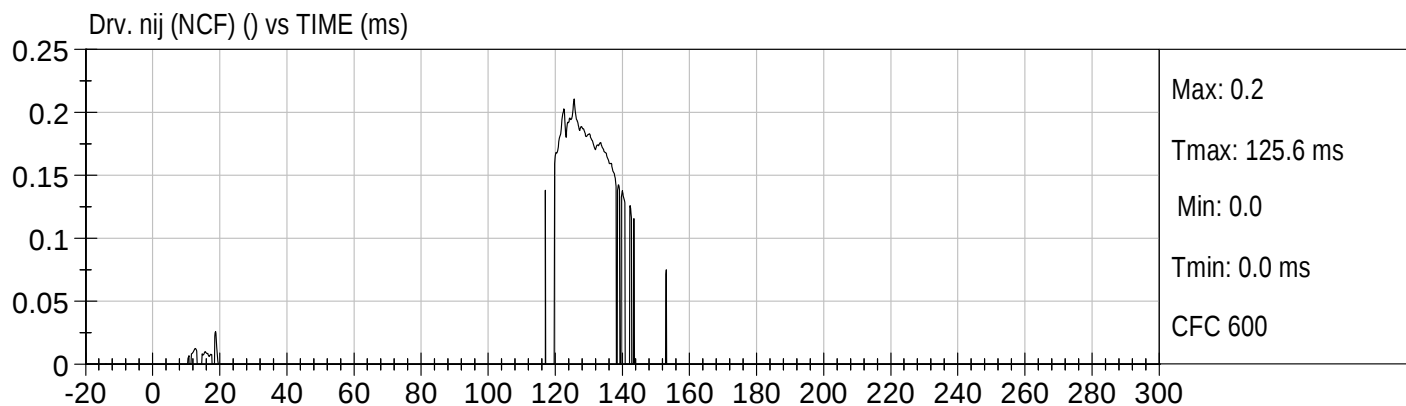
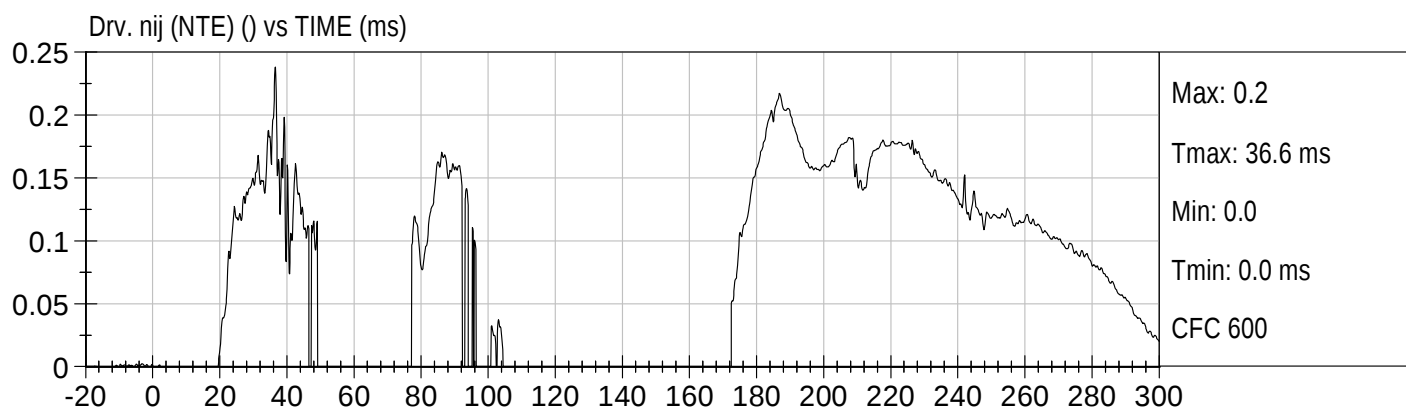
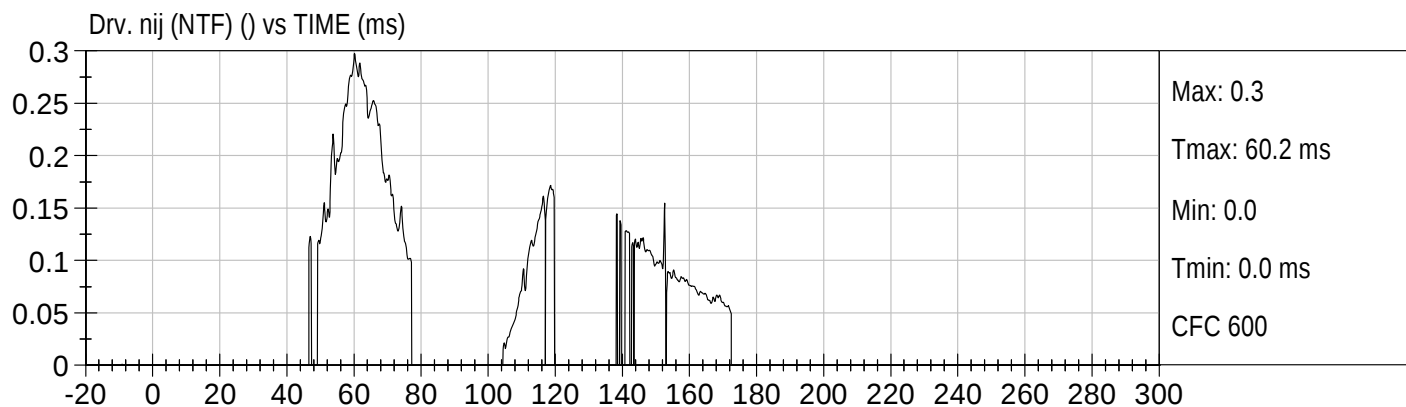
Passenger Left Lower Tibia Moment Y
Passenger Left Lower Tibia Force Z
Passenger Right Upper Tibia Moment X
Passenger Right Upper Tibia Moment Y
Passenger Right Upper Tibia Force Z
Passenger Right Lower Tibia Moment X
Passenger Right Lower Tibia Moment Y
Passenger Right Lower Tibia Force Z
Passenger 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
Left Rear Seat Crossmember X
Right Rear Seat Crossmember X
Vehicle Engine Top X
Vehicle Engine Bottom X
Vehicle Left Brake Caliper X
Vehicle Right Brake Caliper X
Left Rear Seat Crossmember Z
Right Rear Seat Crossmember Z
Barrier Force – Upper Left
Barrier Force – Upper Center
Barrier Force – Upper Right
Barrier Force – Lower Left
Barrier Force – Lower Center
Barrier Force – Lower Right

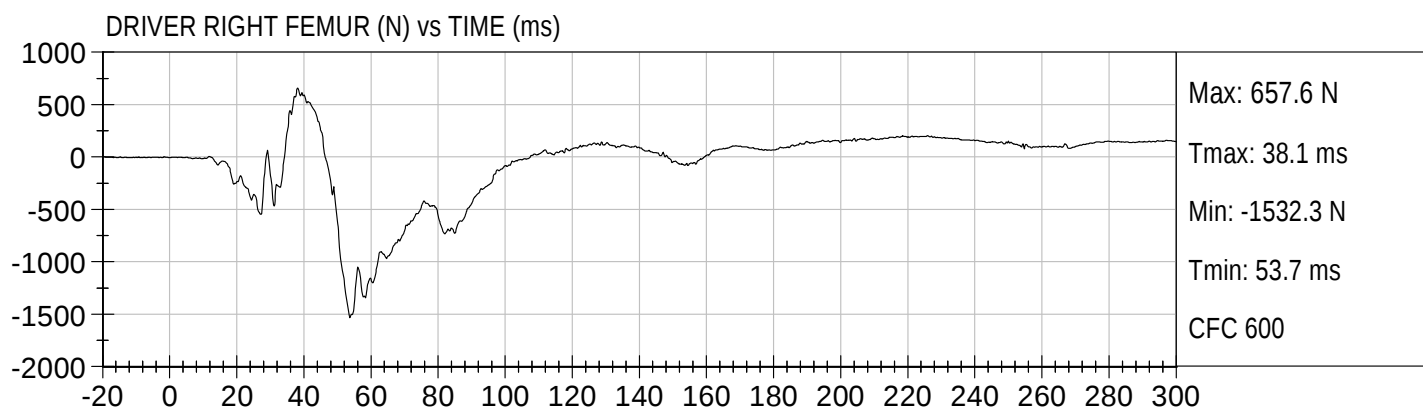
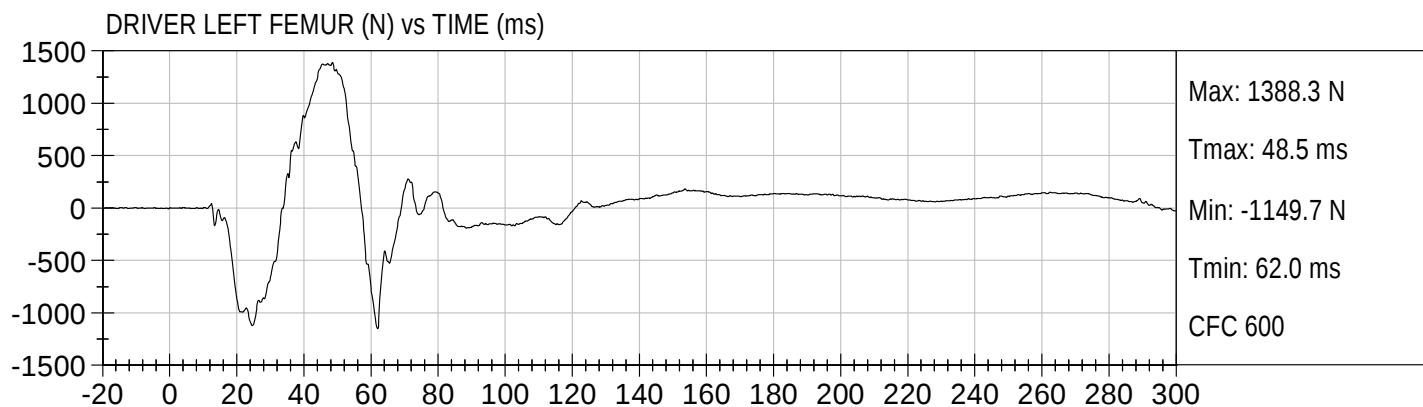






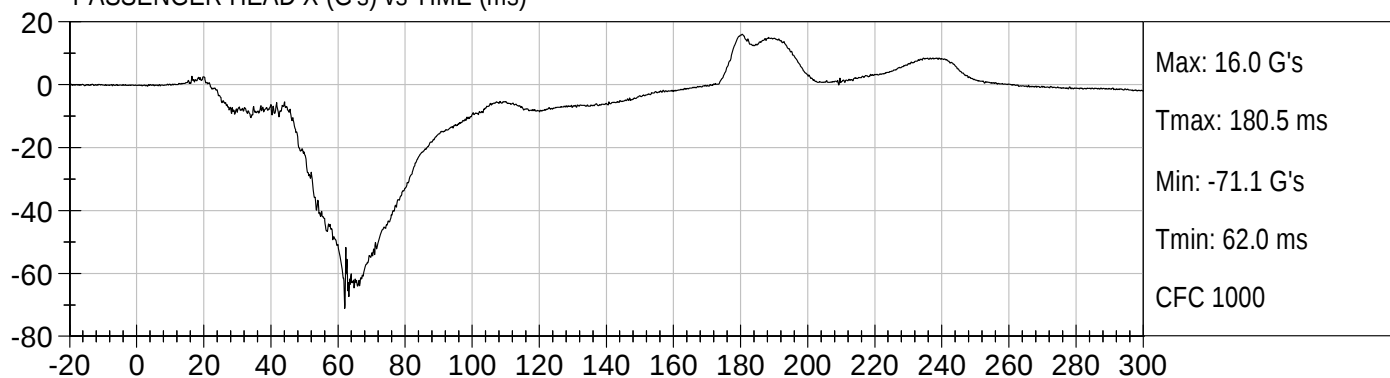




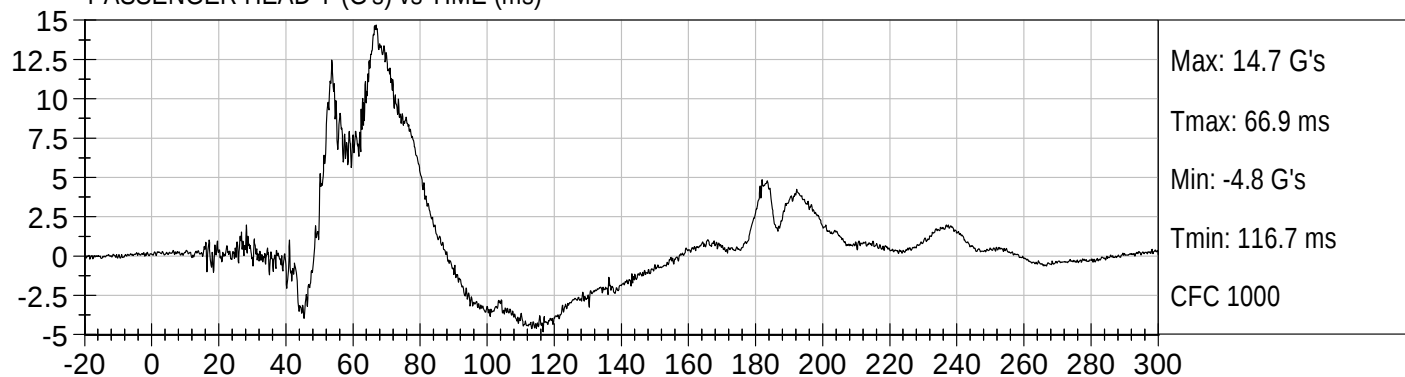




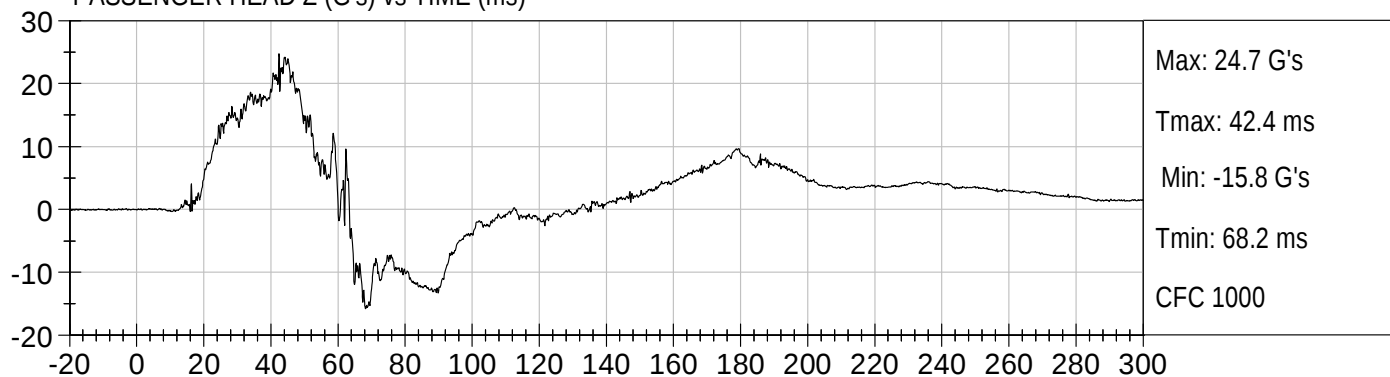
PASSENGER HEAD X (G's) vs TIME (ms)



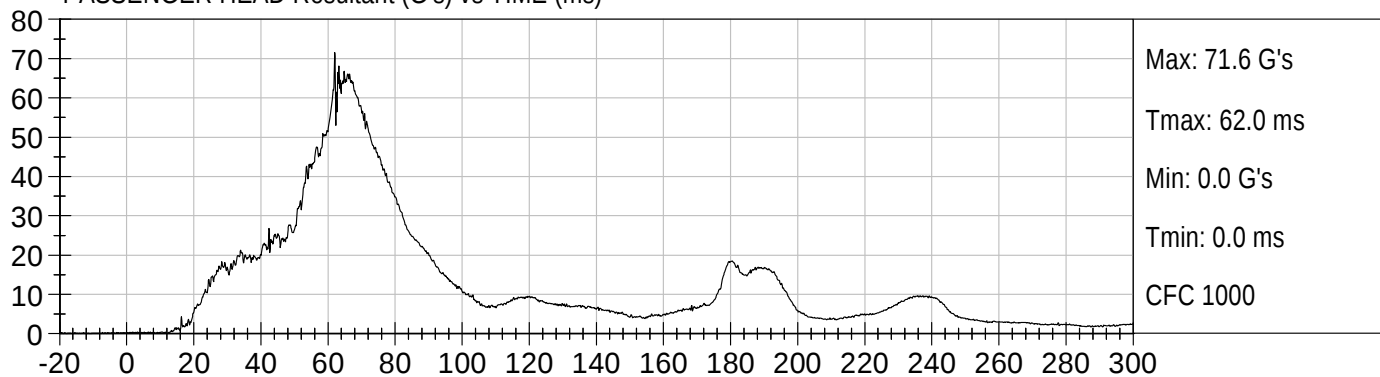
PASSENGER HEAD Y (G's) vs TIME (ms)

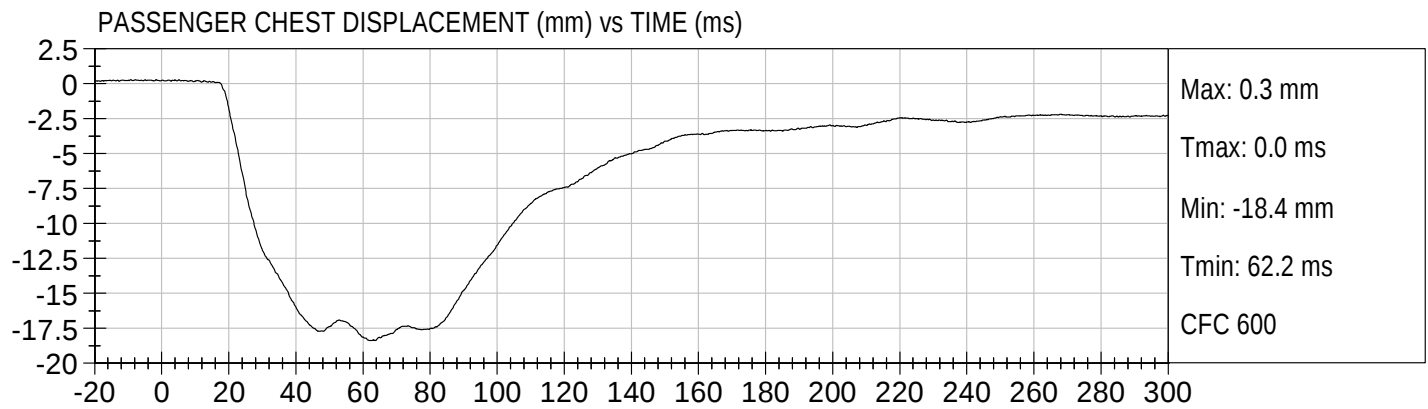


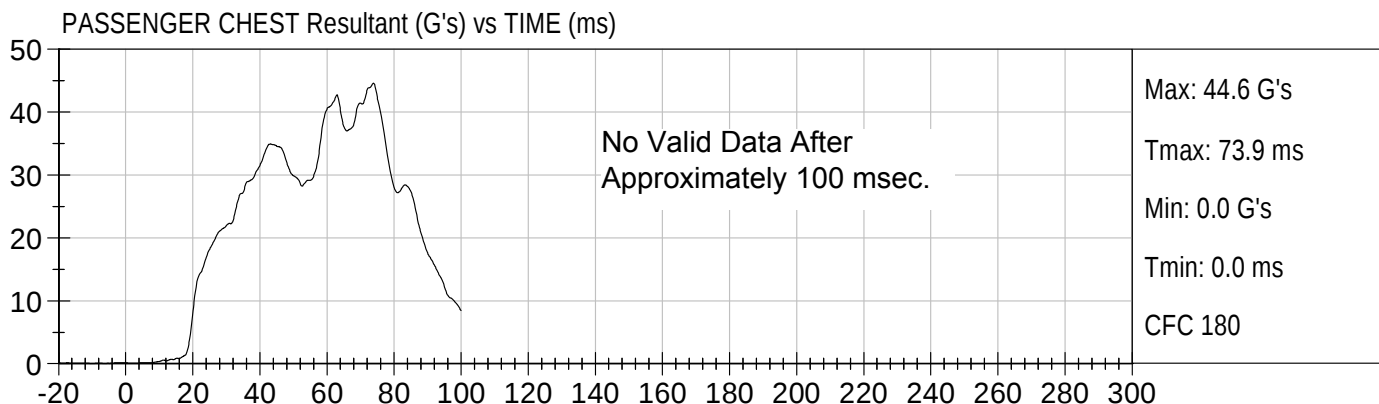
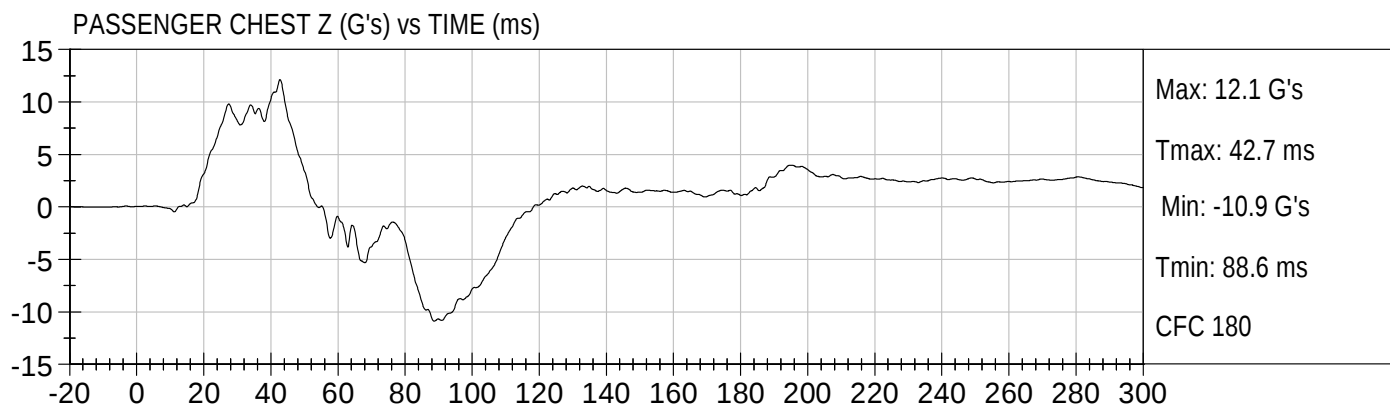
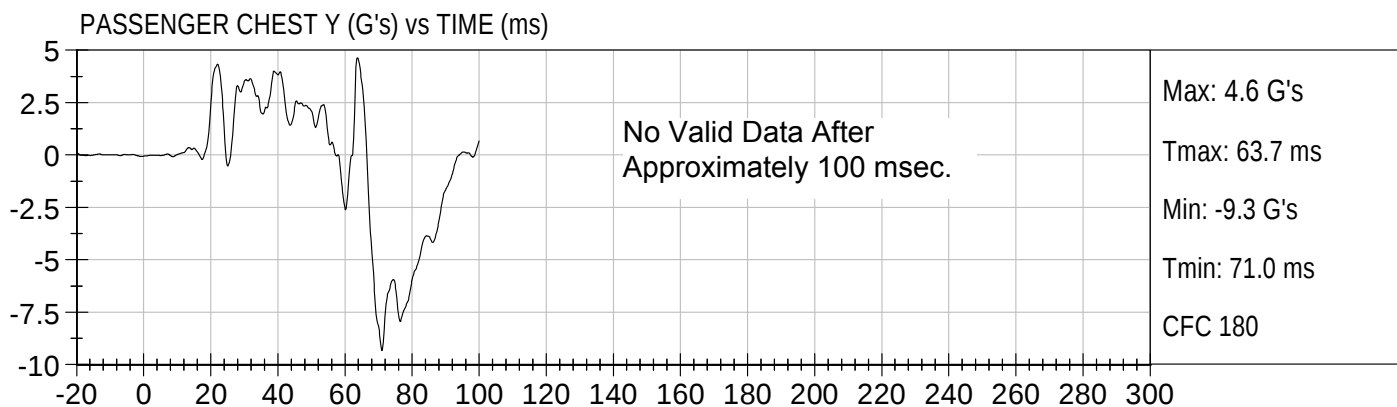
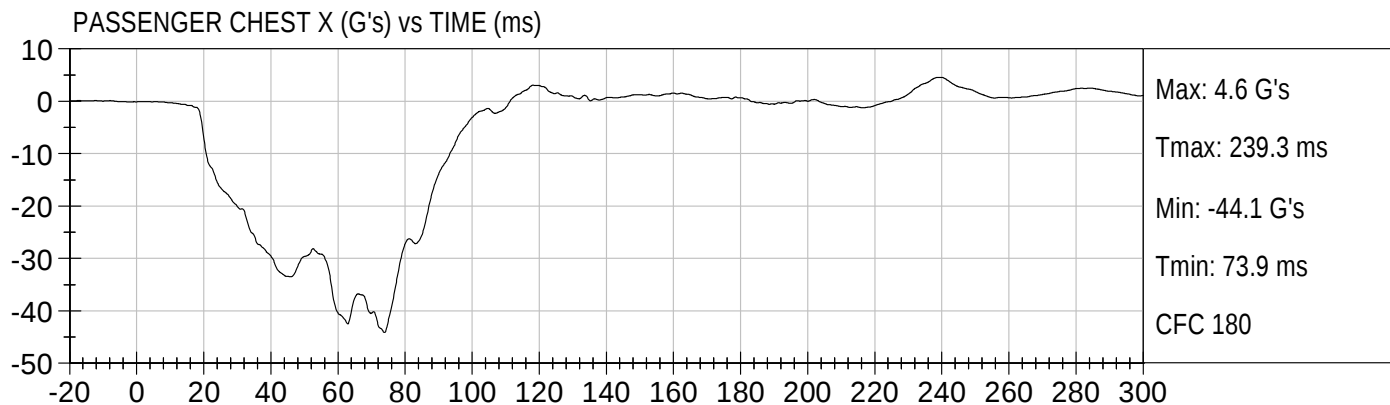
PASSENGER HEAD Z (G's) vs TIME (ms)

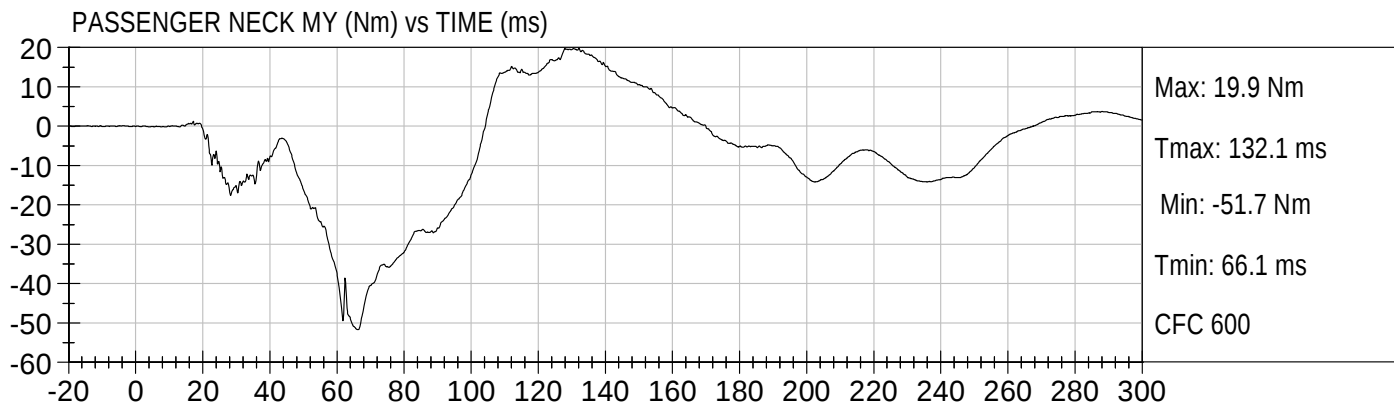
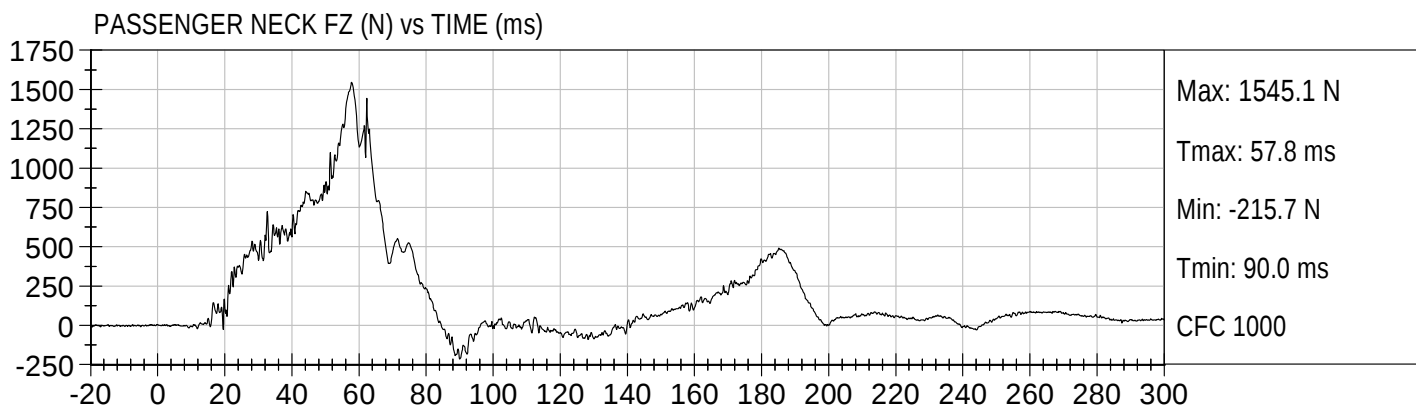
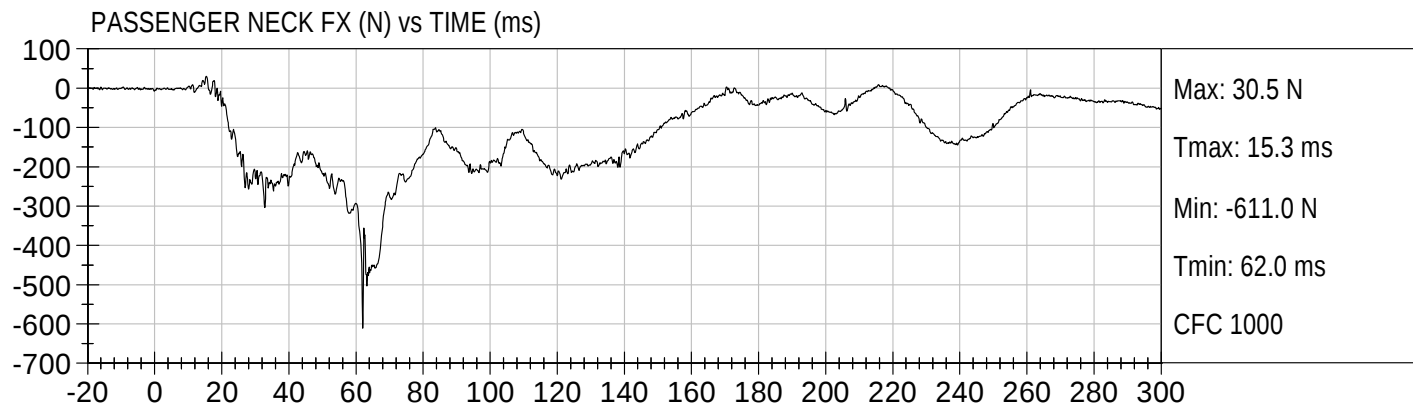


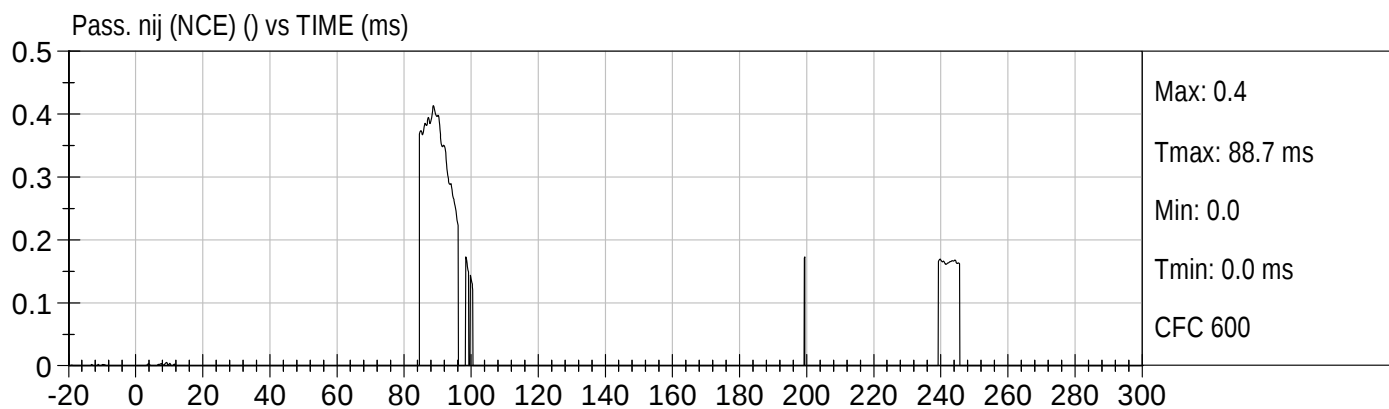
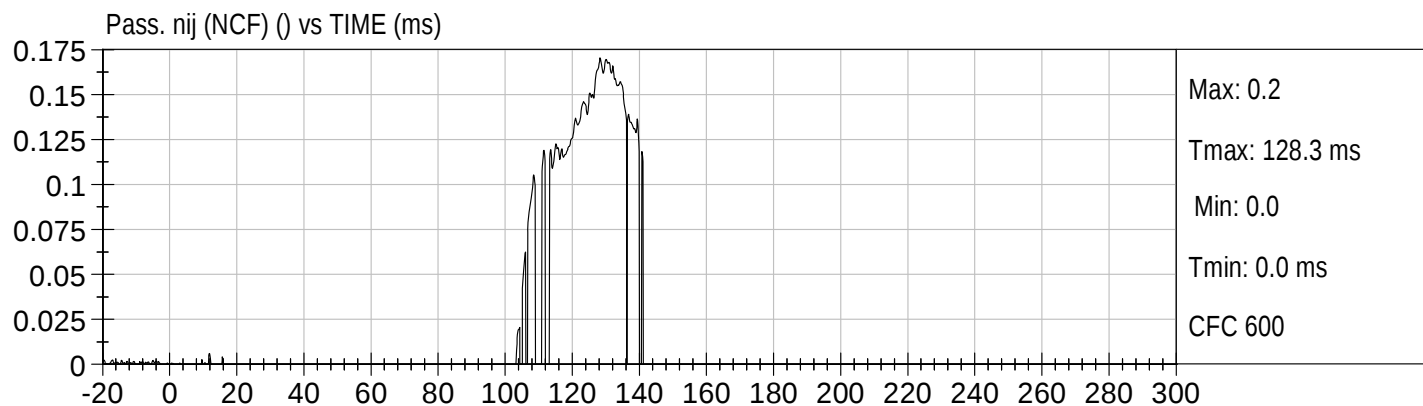
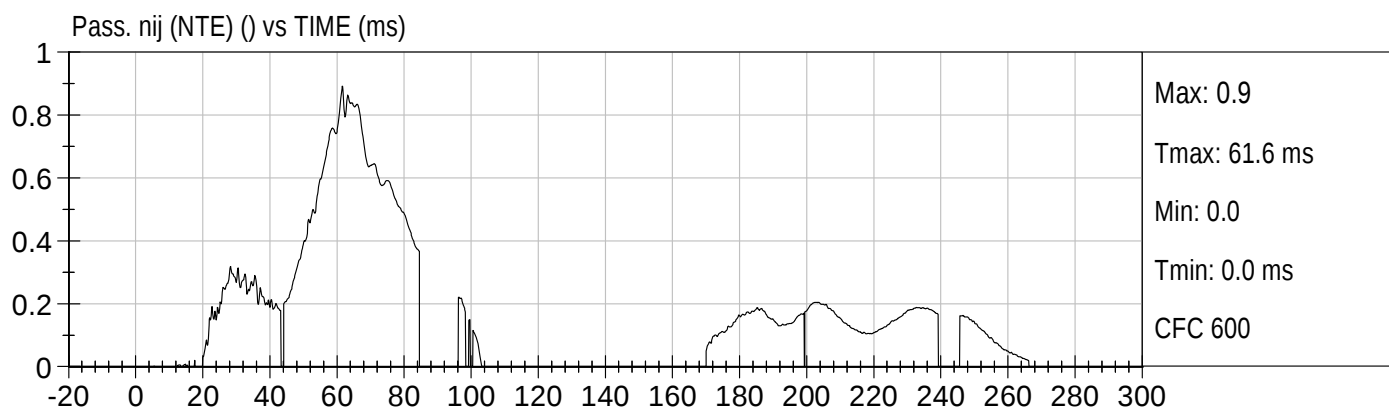
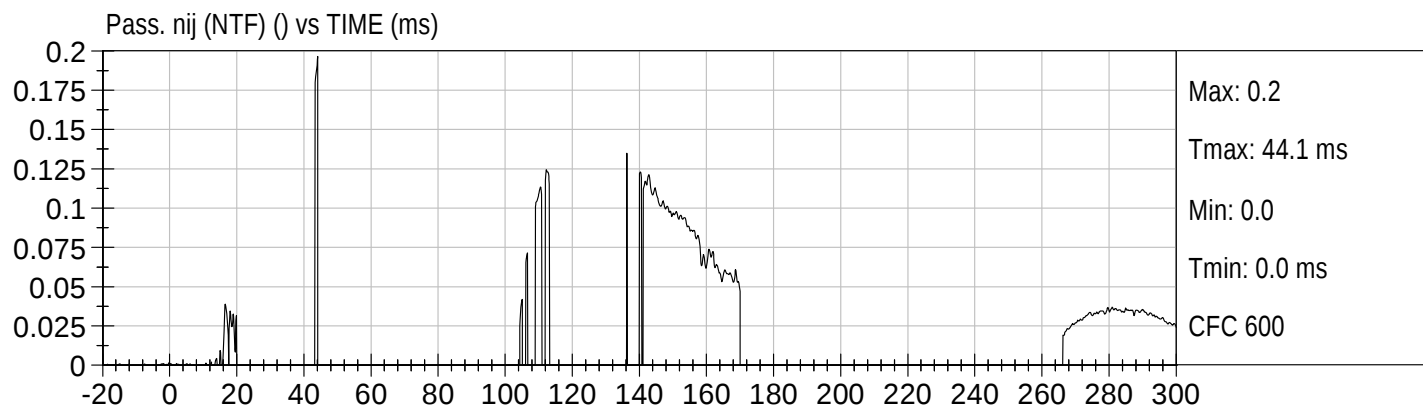
PASSENGER HEAD Resultant (G's) vs TIME (ms)

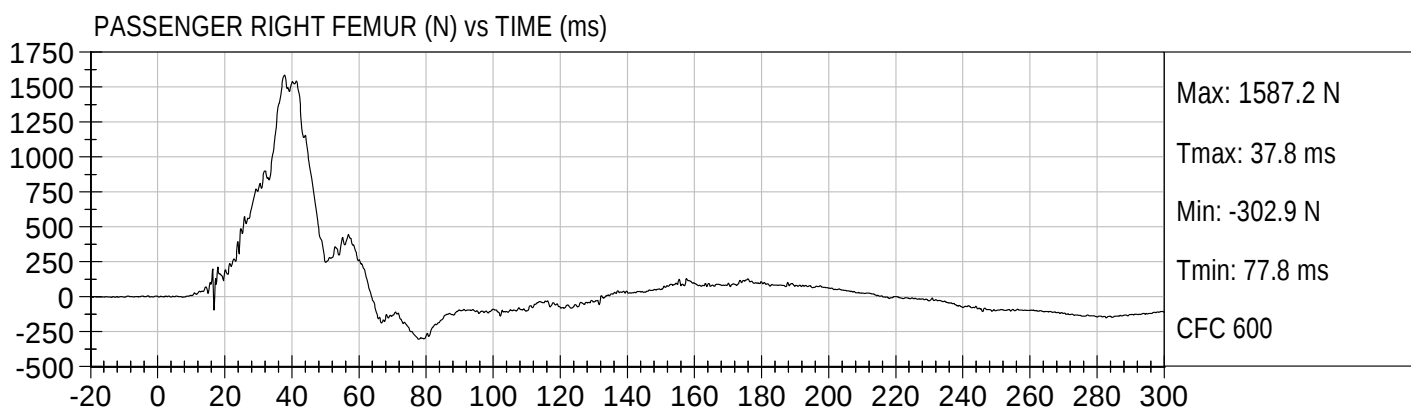
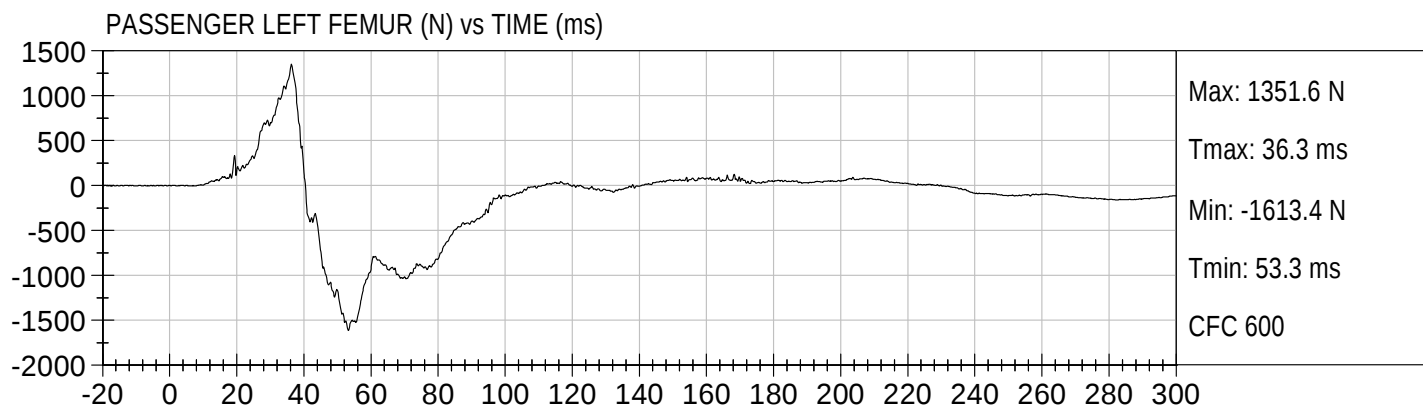












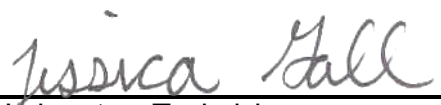
APPENDIX C
DUMMY CALIBRATION DATA

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

ATD Serial No: 1045

Test ID: D091241

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	41	Pass
Peak Resultant Acceleration	G's	225 - 275	262	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	6.4	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

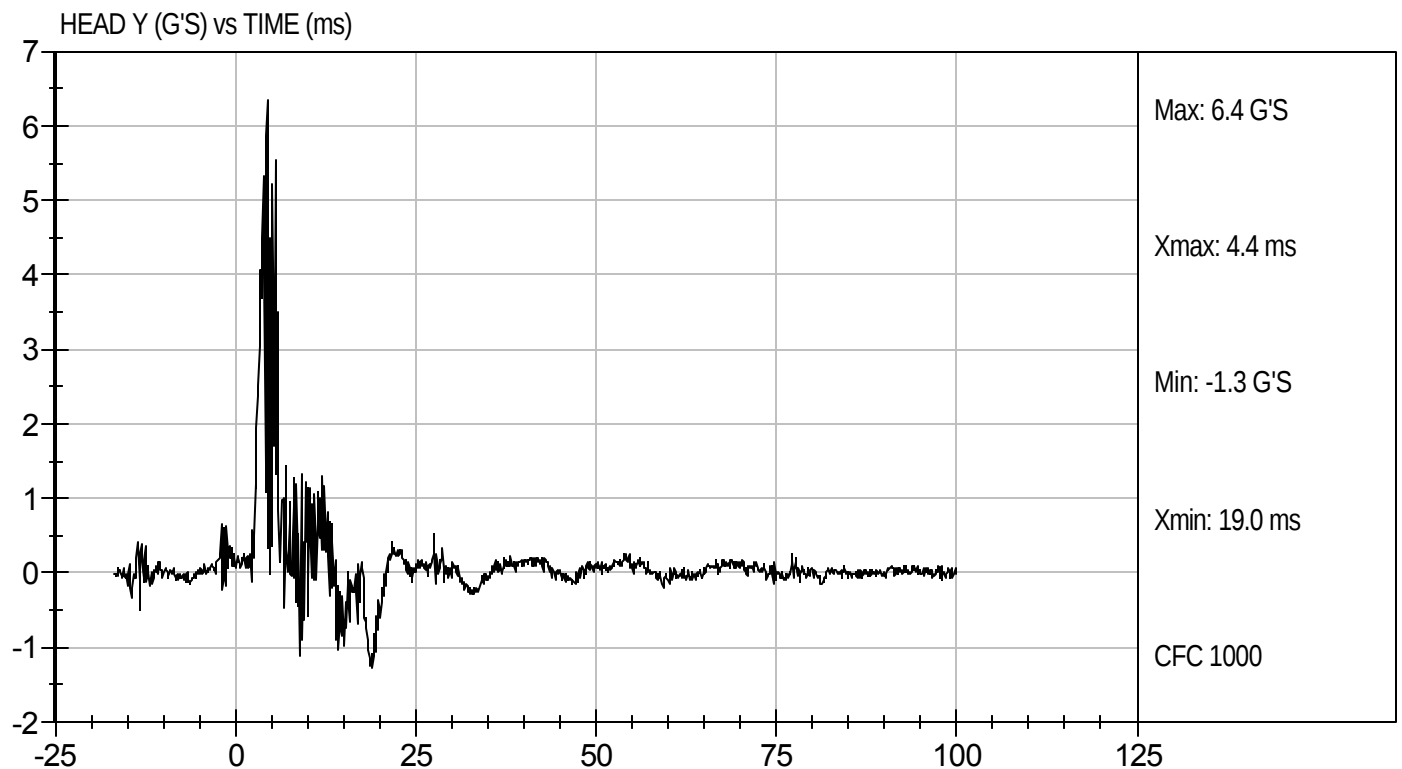
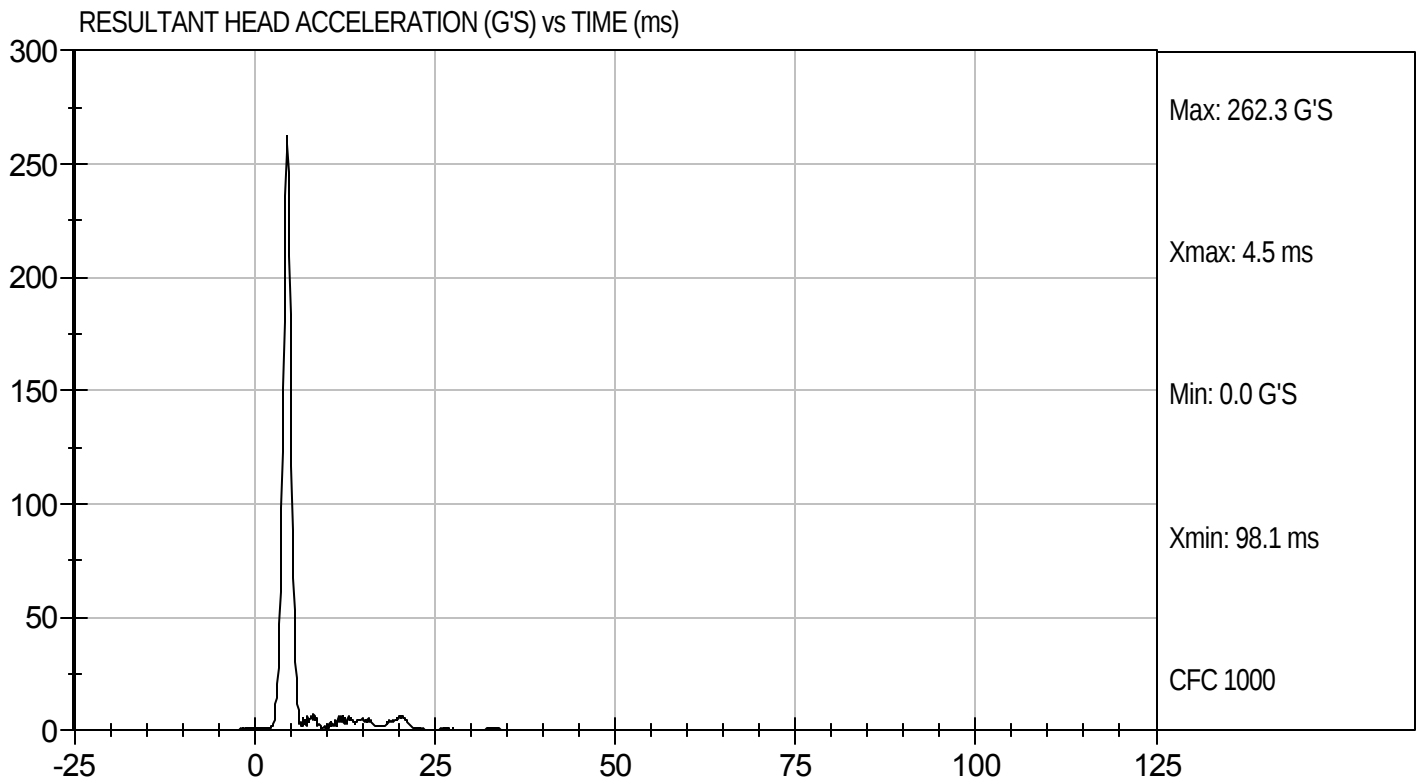
5/21/09
Test Date


Approved By



Test Desc: Head Drop
Component ID: D091241

Test Date: 5/21/09
Velocity: 0 ft/s, 0.00 m/s

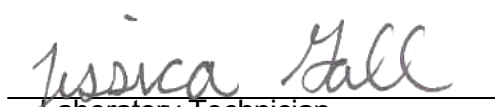


MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 1045

Test I.D: D091242

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity		%	10 to 70	41	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 msec	G's	22.50 to 27.50	22.79	Pass
	20 msec	G's	17.60 to 22.60	20.41	Pass
	30 msec	G's	12.50 to 18.50	13.98	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 29.0	13.92	Pass
Deceleration Decay Time to Cross 5 G's		msec	34.0 to 42.0	41.7	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	64.8	Pass
	Time	msec	57.0 to 64.0	57.3	Pass
"D" Plane Rotation Decay Time To Zero Crossing		msec	113.0 to 128.0	114.6	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	94.7	Pass
	Time	msec	47.0 to 58.0	52.4	Pass
Positive Moment Decay Time To Zero Crossing		msec	97.0 to 107.0	98.8	Pass
Overall Test Results					Pass


 Laboratory Technician

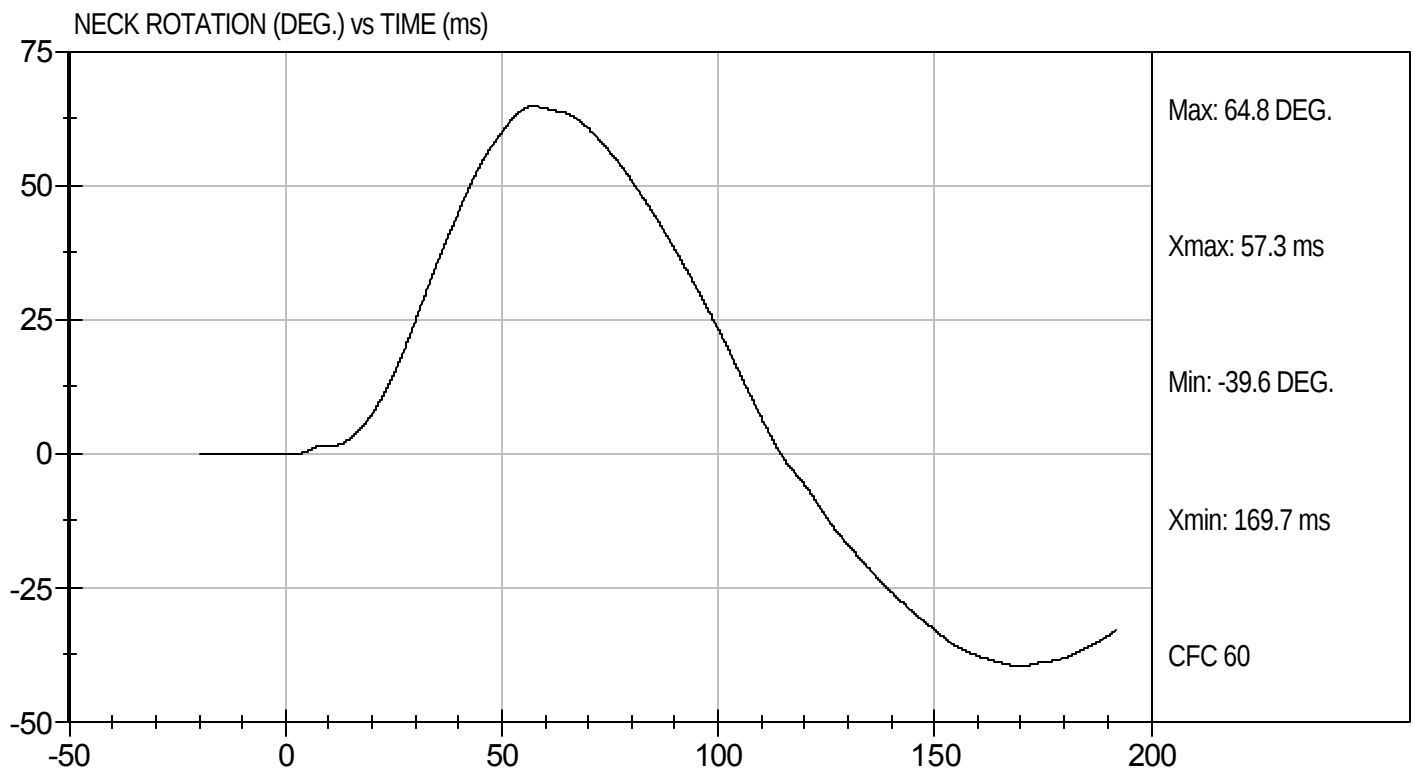
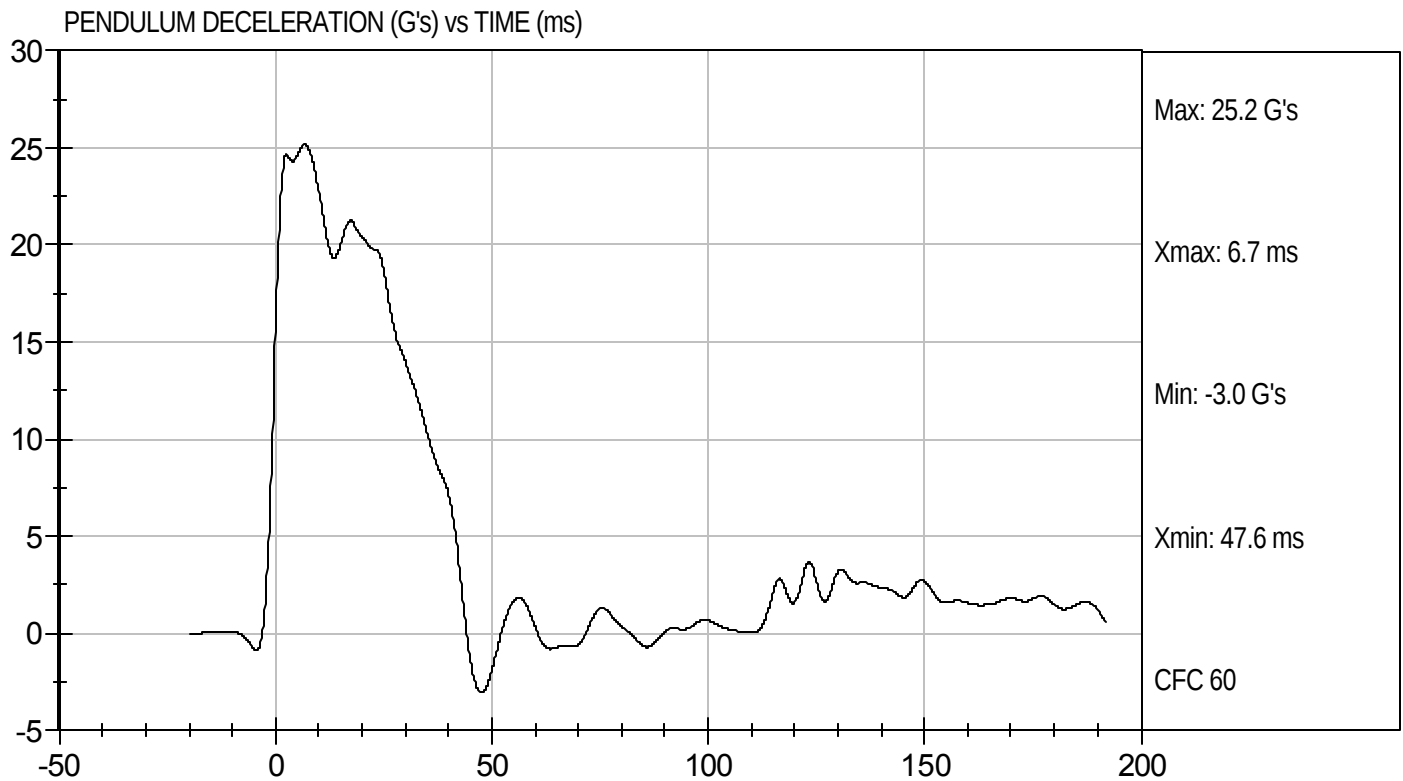
5/21/09
 Test Date


 Approved By



Test Desc: Neck Flexion
Component ID: D091242

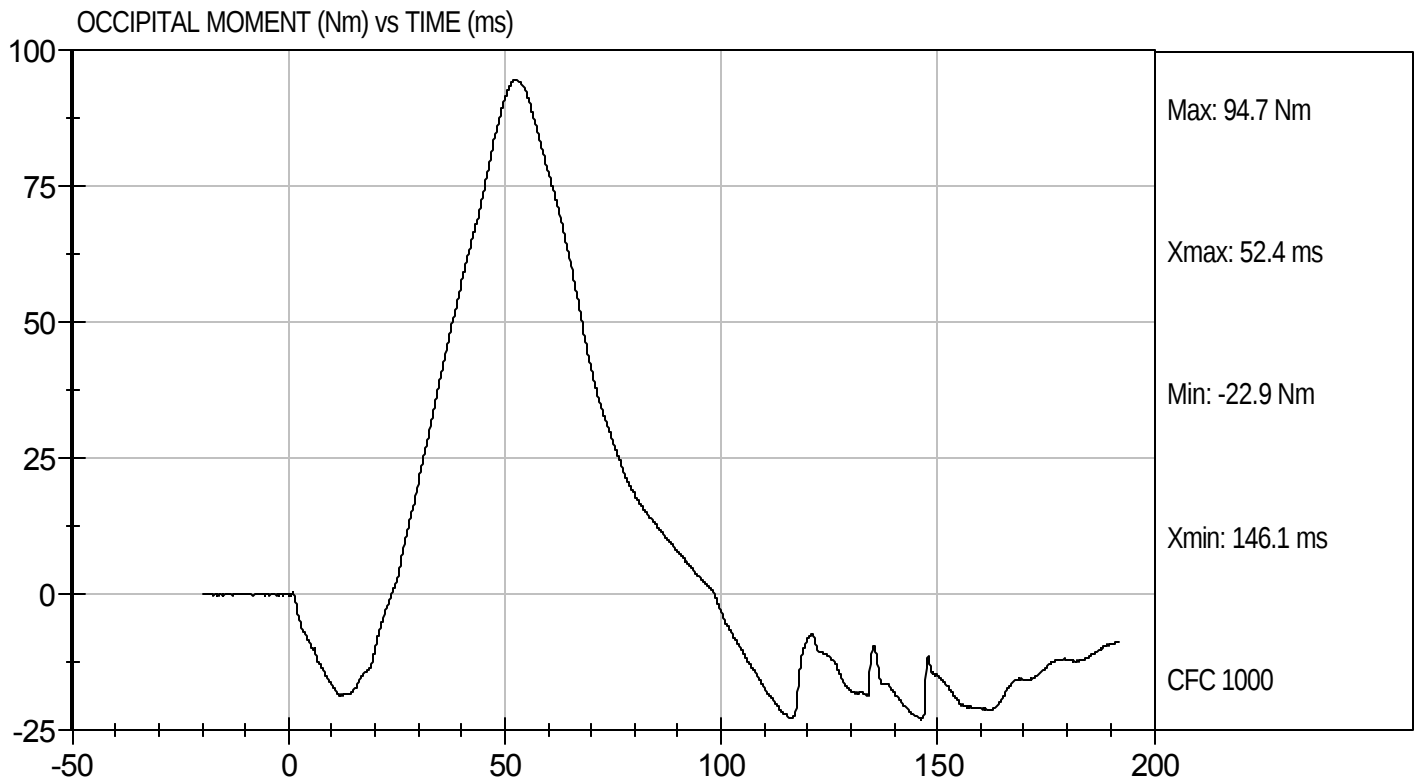
Test Date: 5/21/09
Velocity: 23.15 ft/s, 7.06 m/s





Test Desc: Neck Flexion
Component ID: D091242

Test Date: 5/21/09
Velocity: 23.15 ft/s, 7.06 m/s



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

ATD Serial No: 1045

Test I.D: D091243

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity		%	10 to 70	41	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.16	Pass
Pendulum Deceleration	10 msec	G's	17.20 to 21.20	19.34	Pass
	20 msec	G's	14.00 to 19.00	16.62	Pass
	30 msec	G's	11.00 to 16.00	12.58	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 22.0	12.56	Pass
Deceleration Decay Time to Cross 5 G's		msec	38.0 to 46.0	38.7	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	87.5	Pass
	Time	msec	72.0 to 82.0	73.4	Pass
"D" Plane Rotation Decay Time To Zero Crossing		msec	147.0 to 174.0	147.5	Pass
Moment About Occipital Condyle	Maximum	N m	-52.9 to -79.9	-58.4	Pass
	Time	msec	65.0 to 79.0	70.1	Pass
Negative Moment Decay Time To Zero Crossing		msec	120.0 to 148.0	134.7	Pass
Overall Test Results					Pass

Jessica Hall
Laboratory Technician

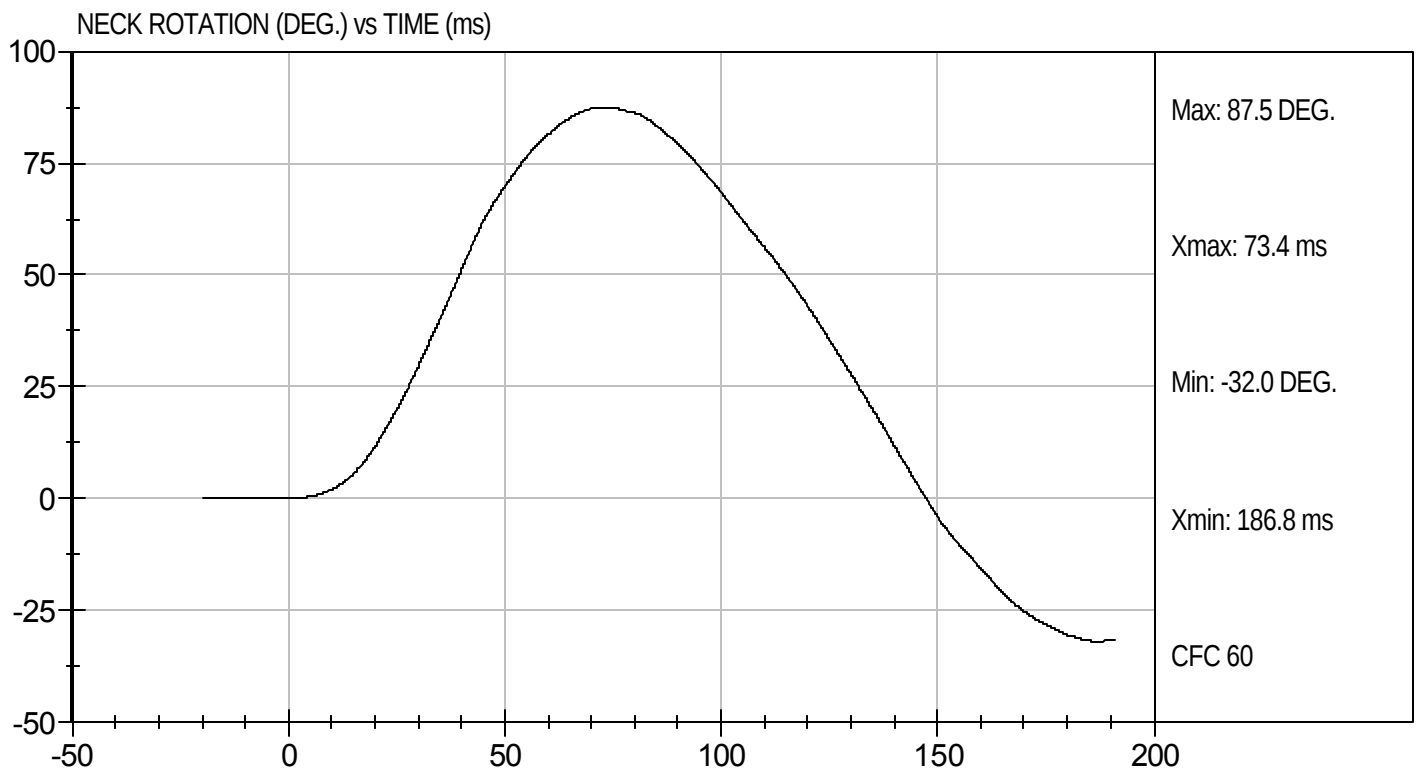
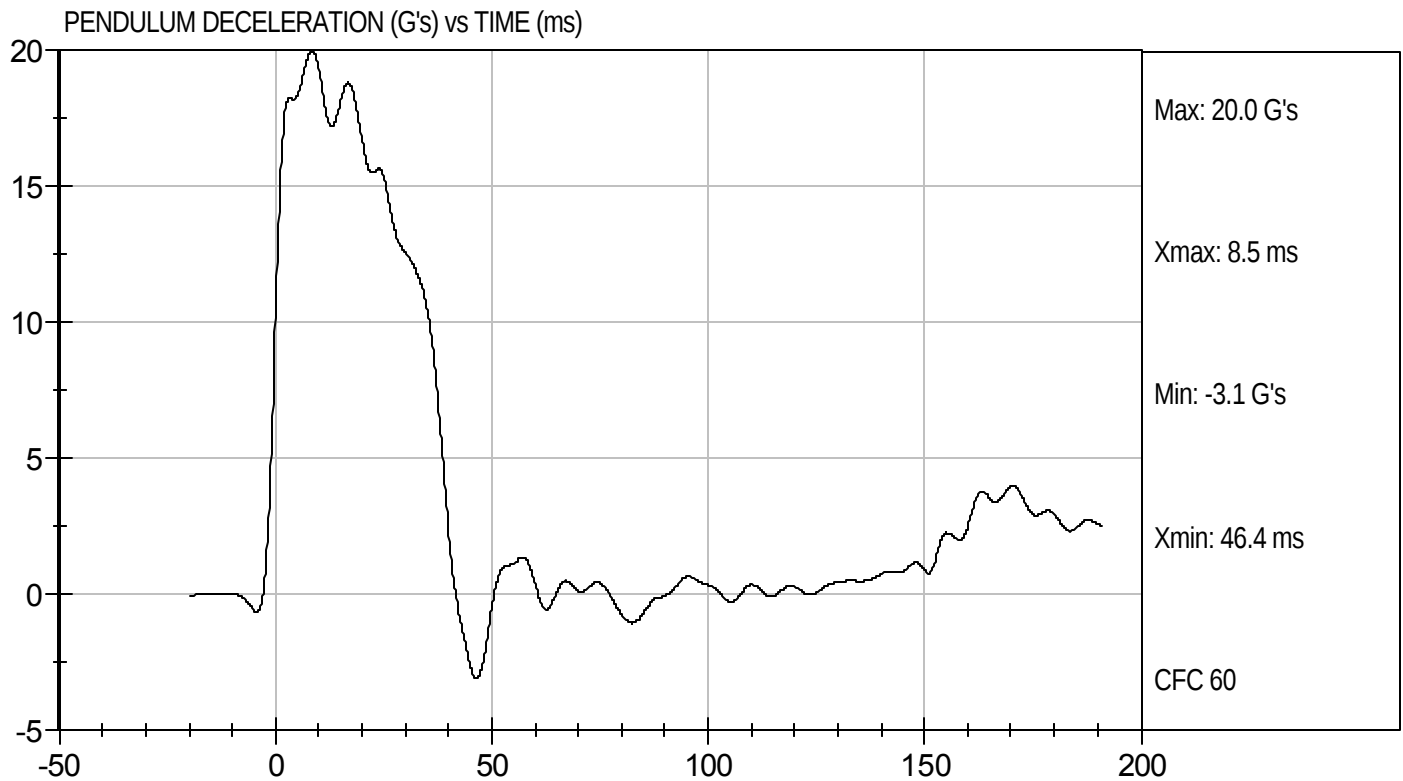
5/21/09
Test Date

David Winkelbauer
Approved By



Test Desc: Neck Extension
Component ID: D091243

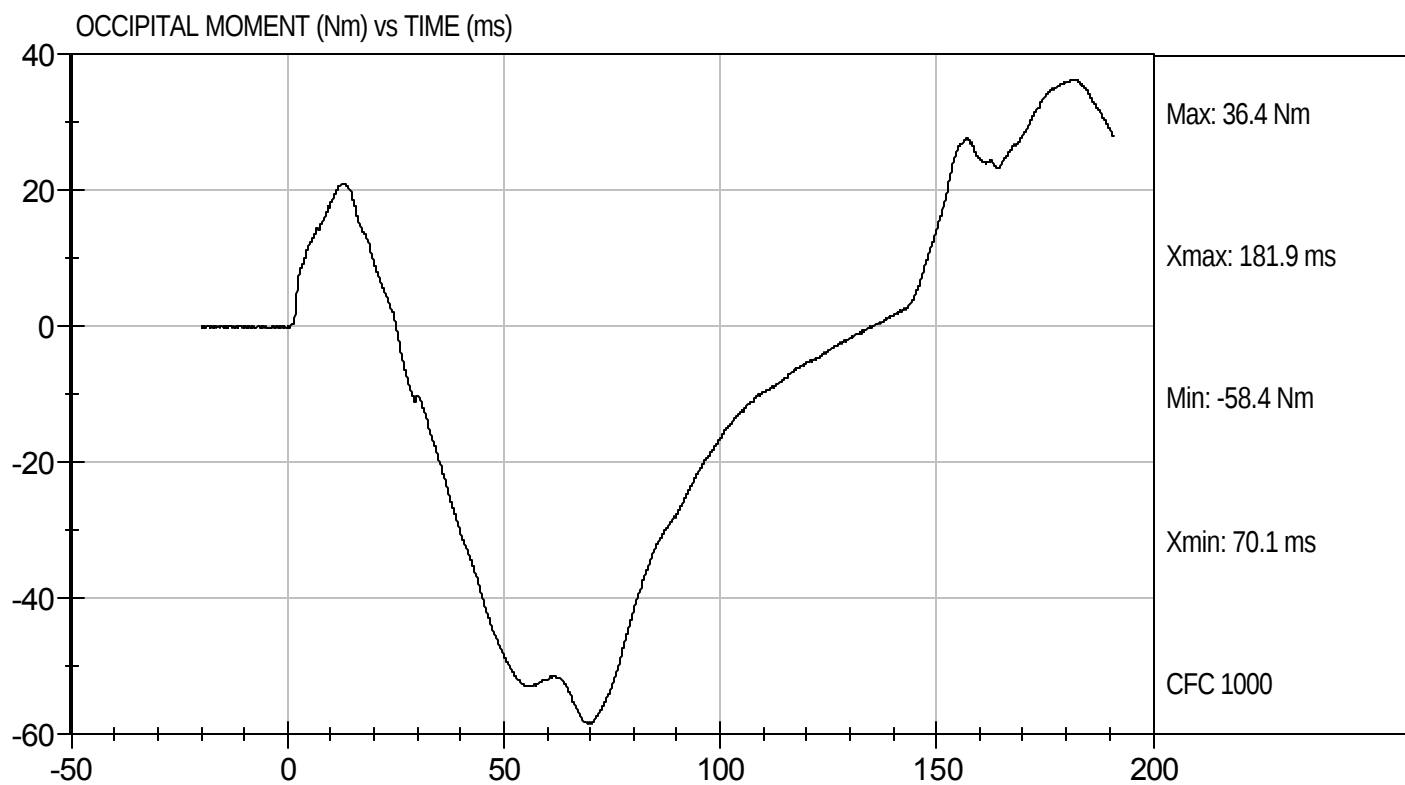
Test Date: 5/21/09
Velocity: 20.20 ft/s, 6.16 m/s





Test Desc: Neck Extension
Component ID: D091243

Test Date: 5/21/09
Velocity: 20.20 ft/s, 6.16 m/s

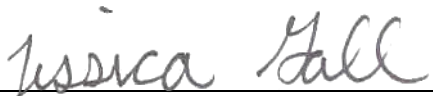


MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 1045

Test I.D: D091244

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	39	Pass
Probe Velocity	m/s	6.58 to 6.82	6.68	Pass
Peak Probe Force	N	5159 to 5893	5,452	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.43	Pass
Internal Hysteresis	%	69 to 85	71	Pass
Overall Test Results			Pass	


Laboratory Technician

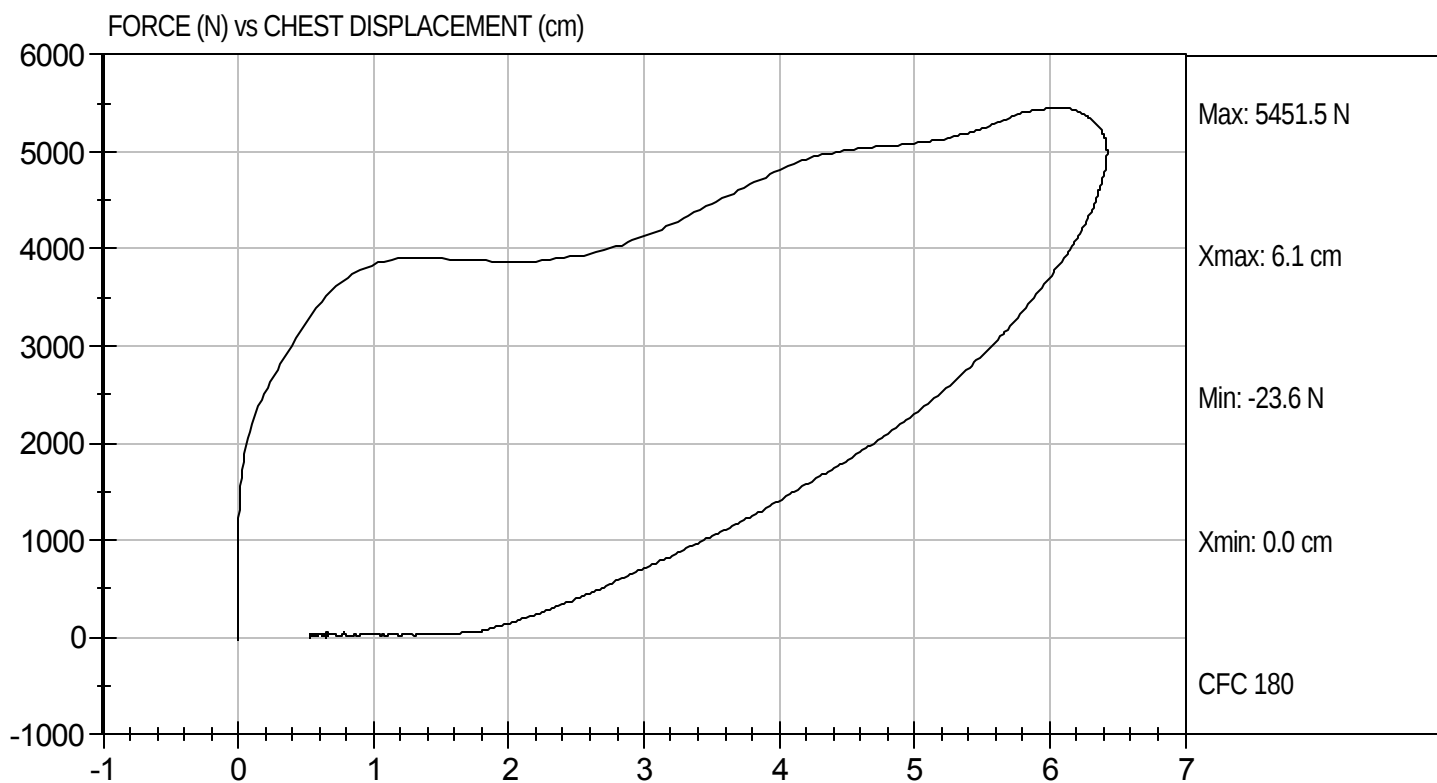
5/21/09
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D091244

Test Date: 5/21/09
Velocity: 21.93 ft/s, 6.68 m/s

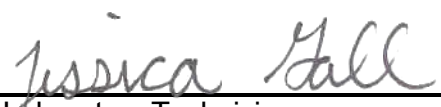


MGA RESEARCH CORPORATION
RIGHT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 1045

Test I.D: D091245

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	41	Pass
Probe Velocity	m/sec	2.07 to 2.13	2.08	Pass
Peak Probe Force	Newtons	4715 to 5782	5,056	Pass
Overall Test Results				Pass


Laboratory Technician

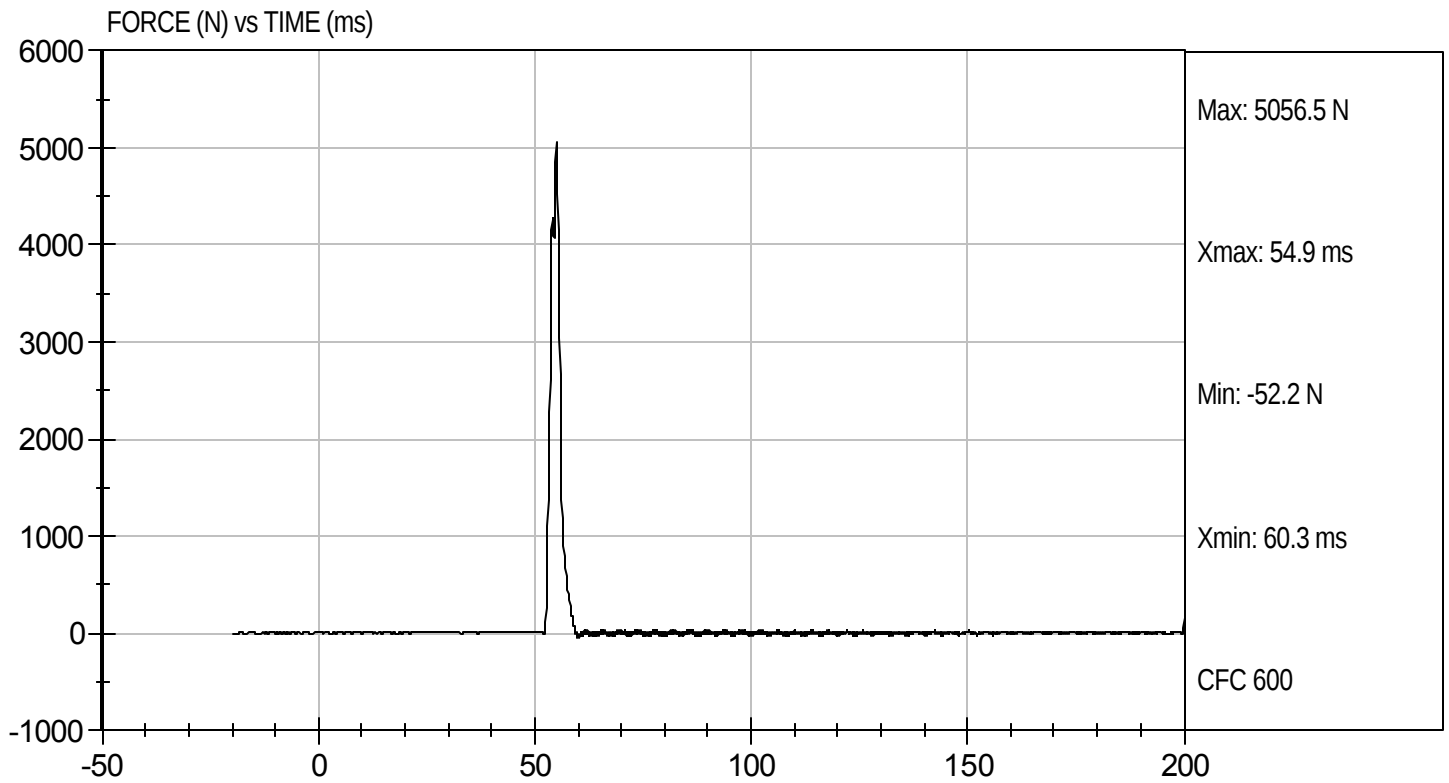
5/21/09
Test Date


Approved By



Test Desc: Right Knee
Component ID: D091245

Test Date: 5/21/09
Velocity: 6.81 ft/s, 2.08 m/s



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

ATD Serial No: 1045

Test I.D: D091246

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	41	Pass
Probe Velocity	m/sec	2.07 to 2.13	2.08	Pass
Peak Probe Force	Newtons	4715 to 5782	5,471	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

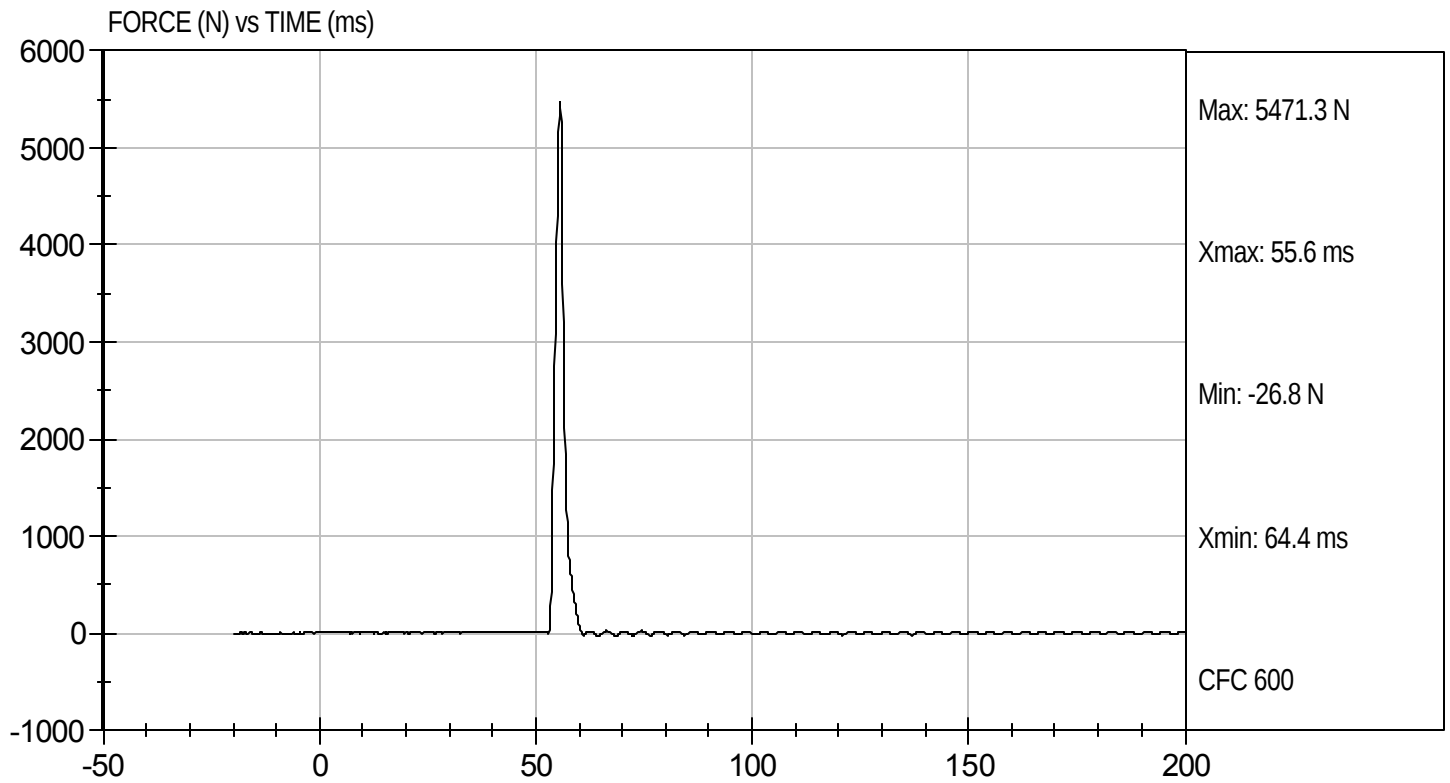
5/21/09
Test Date

David Winkelbauer
Approved By



Test Desc: Left Knee
Component ID: D091246

Test Date: 5/21/09
Velocity: 6.81 ft/s, 2.08 m/s



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

ATD Serial No: 1045

Test I.D: D091240

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.3	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	42	42	Pass
Rotation Rate	deg/sec	5 -10	8	8	Pass
30 Degrees	Nm	94.9 Nm Max	65.7	58.9	Pass
150 ft-lbf / 203.4 Nm	Deg	40- 50 Degree Max Rotation	41	41	Pass
Overall Test Results					Pass

Jessica Hall
Laboratory Technician

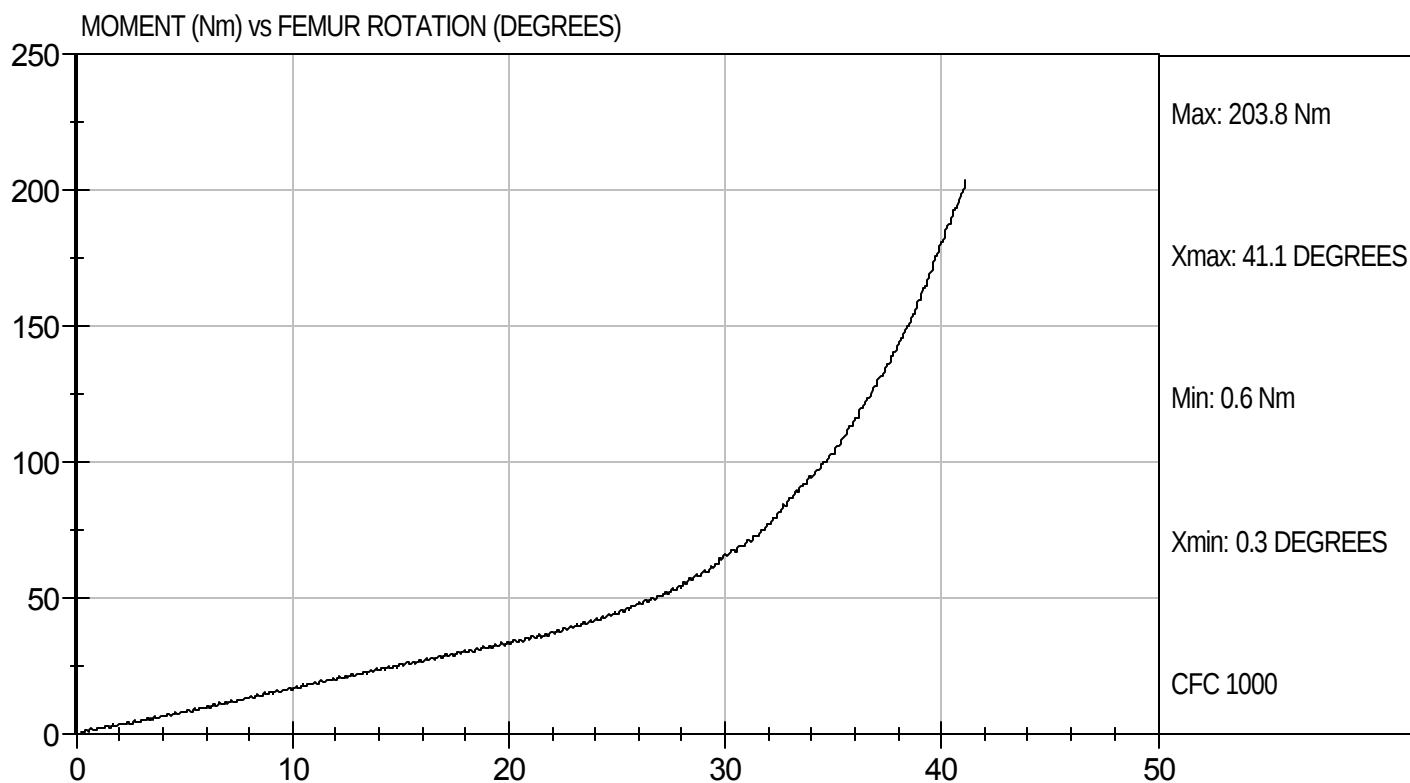
5/21/09
Test Date

David Winkelbauer
Approved By



Test Desc: Hip Femur Flexion
Component ID: D091249

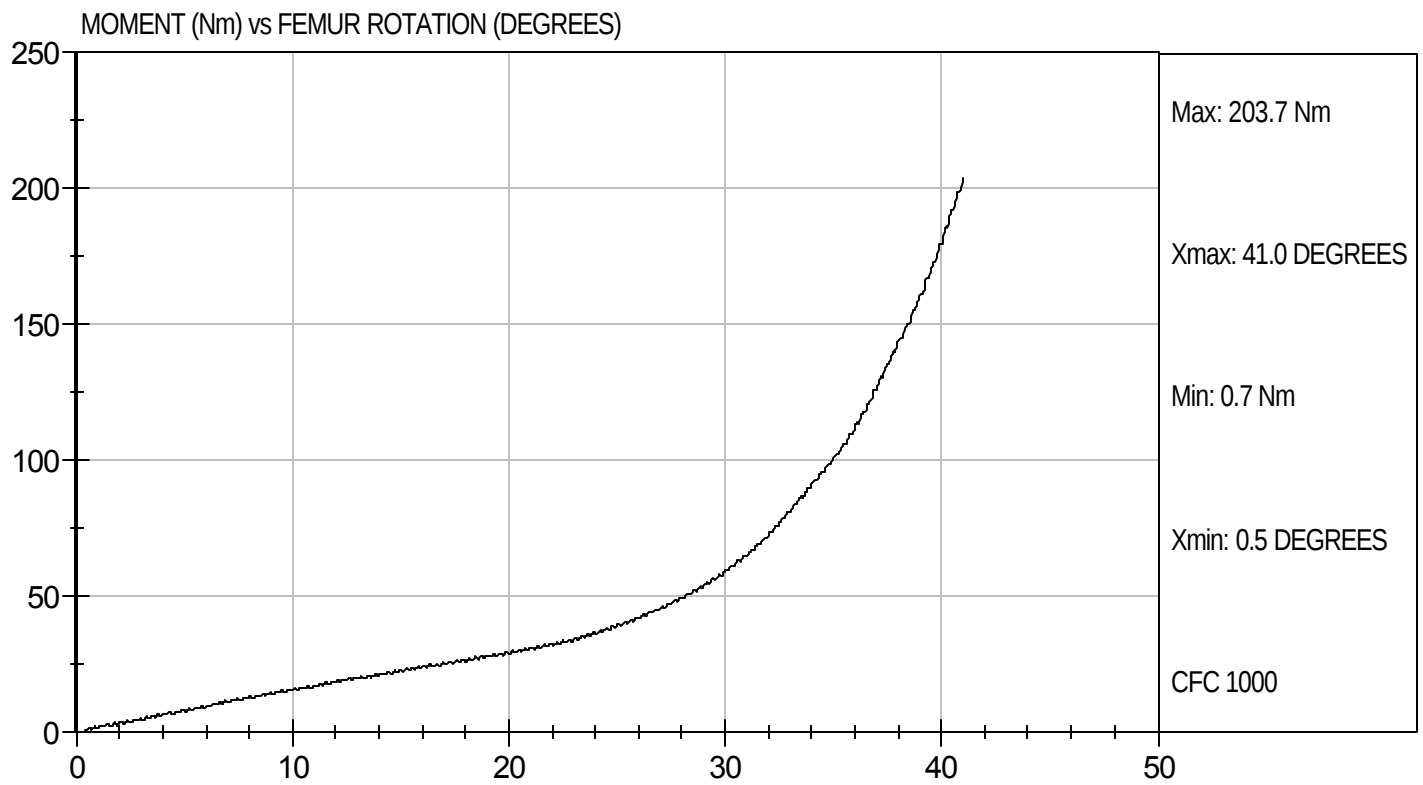
Test Date: 5/21/09
Velocity: 0 ft/s, 0.00 m/s





Test Desc: Hip Femur Flexion
Component ID: D091240

Test Date: 5/21/09
Velocity: 0 ft/s, 0.00 m/s



MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test ID: D091231

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	41	Pass
Peak Resultant Acceleration	G's	250 to 300	266	Pass
Peak Lateral Acceleration	G's	+/- 15	11.8	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

5/21/09
Test Date

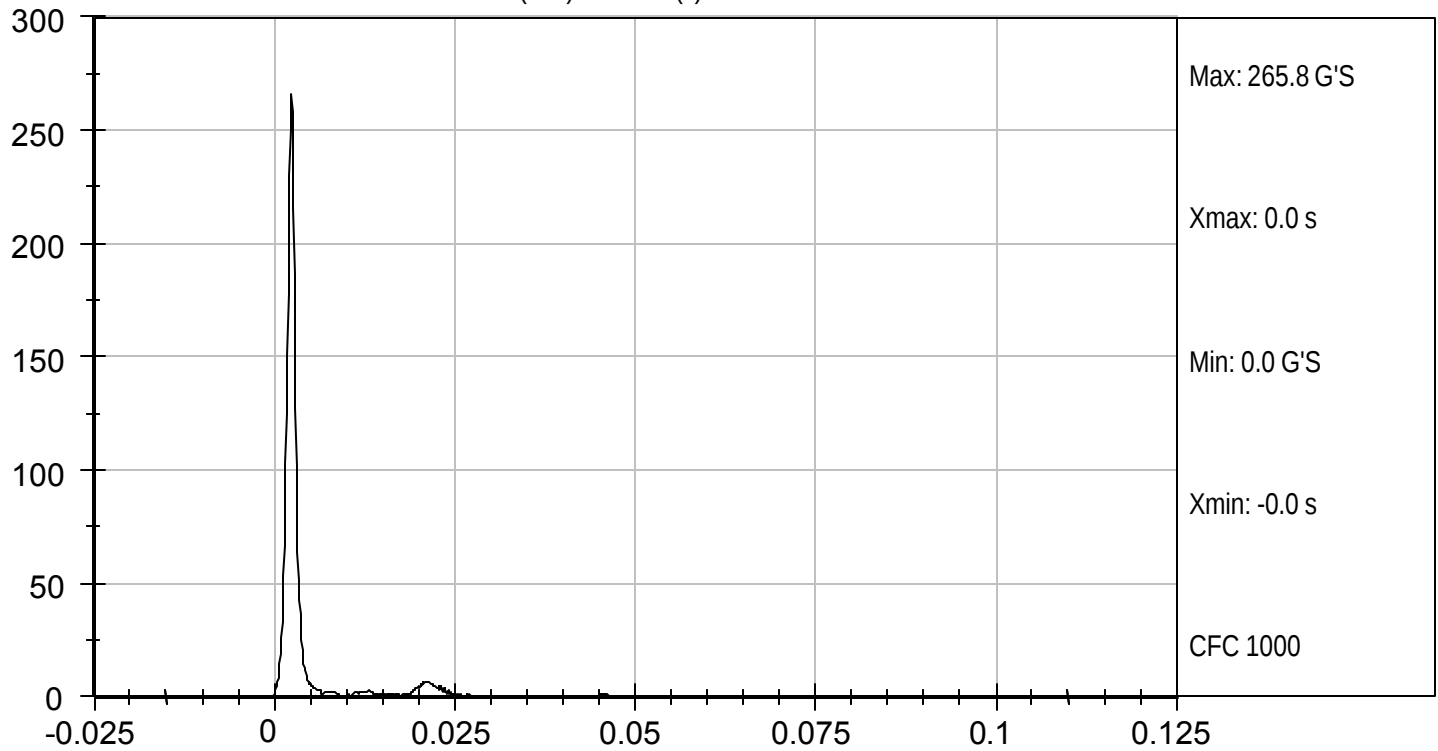

Approved By



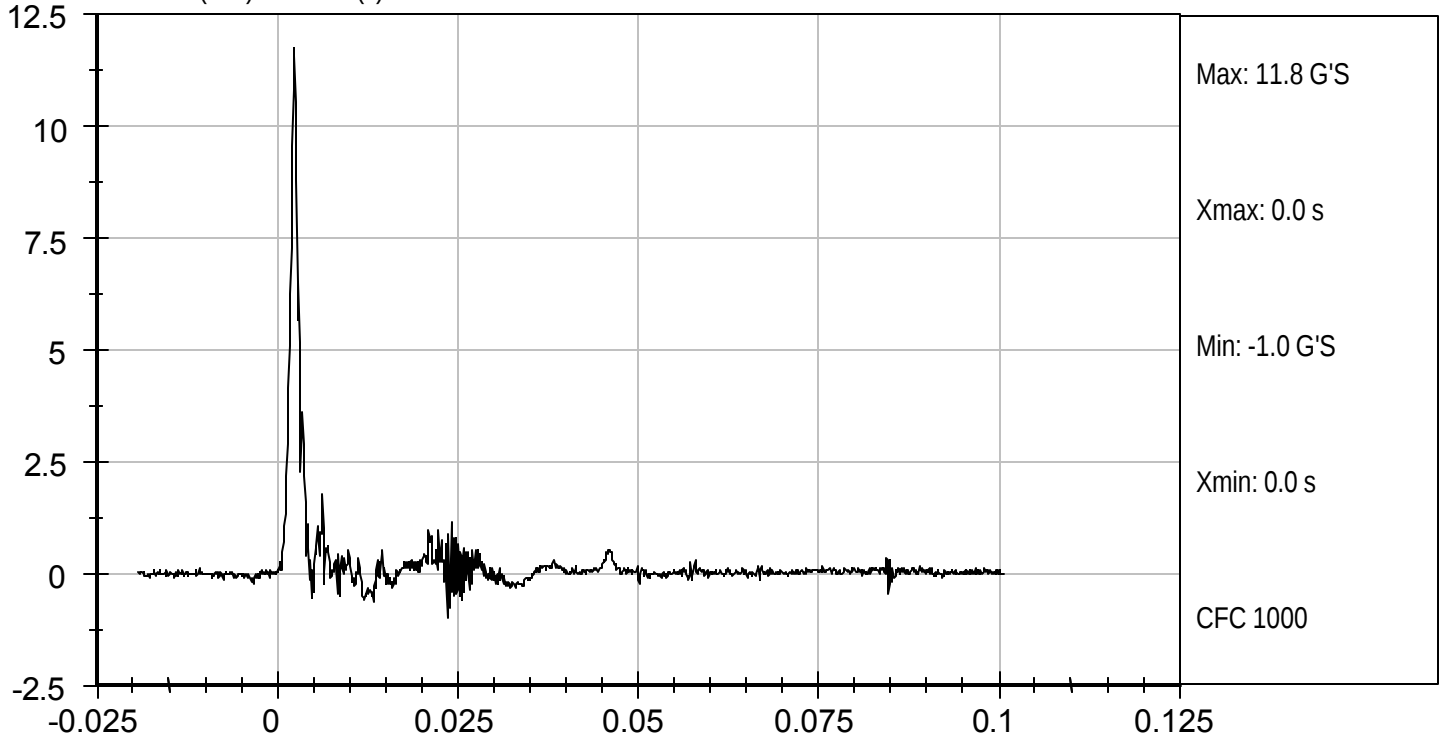
Test Desc: Head Drop
Component ID: D091231

Test Date: 5/21/09
Velocity: 0 ft/s, 0 m/s

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



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

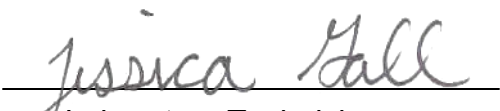


MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test I.D: D091232

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity		%	10 to 70	41	Pass
Pendulum Speed		m/sec	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 msec	m/sec	2.1 to 2.5	2.4	Pass
	20 msec	m/sec	4.0 to 5.0	4.4	Pass
	30 msec	m/sec	5.8 to 7.0	6.1	Pass
D Plane Rotation	Max	deg	77 to 91	77	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	69 to 83	72	Pass
Positive Moment Time Curve Decay to 10 Nm		msec	80 to 100	86	Pass
Overall Results				Pass	


Laboratory Technician

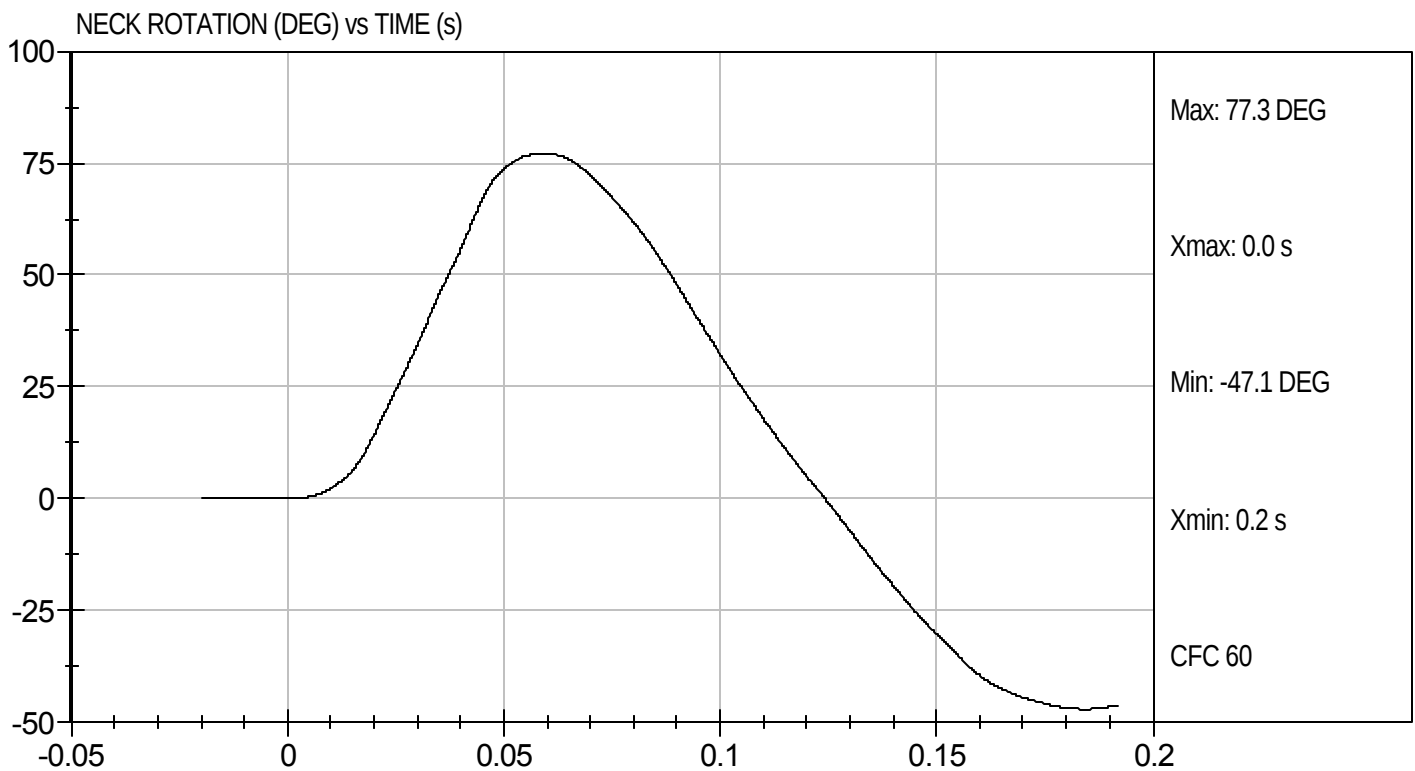
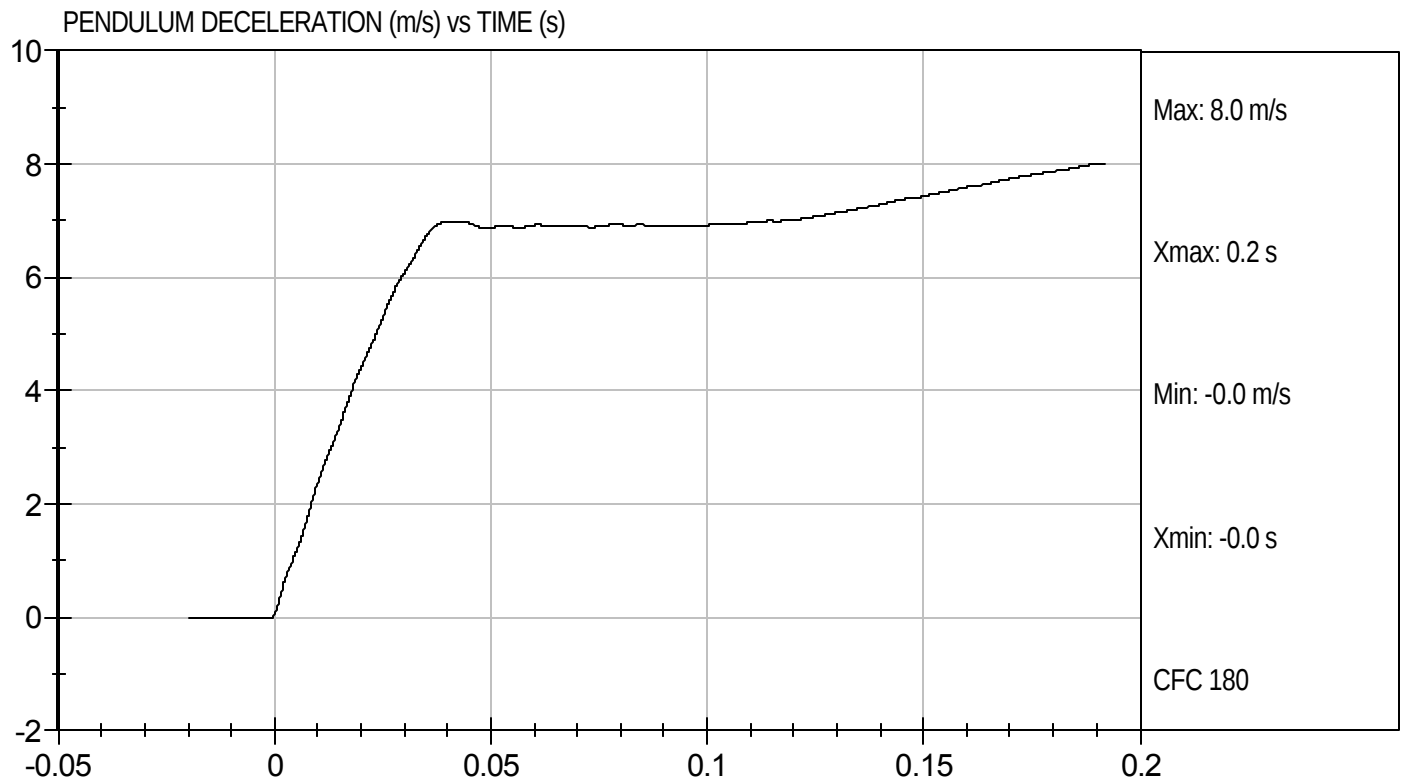
5/21/09
Test Date


Approved By



Test Desc: Neck Flexion
Component ID: D091232

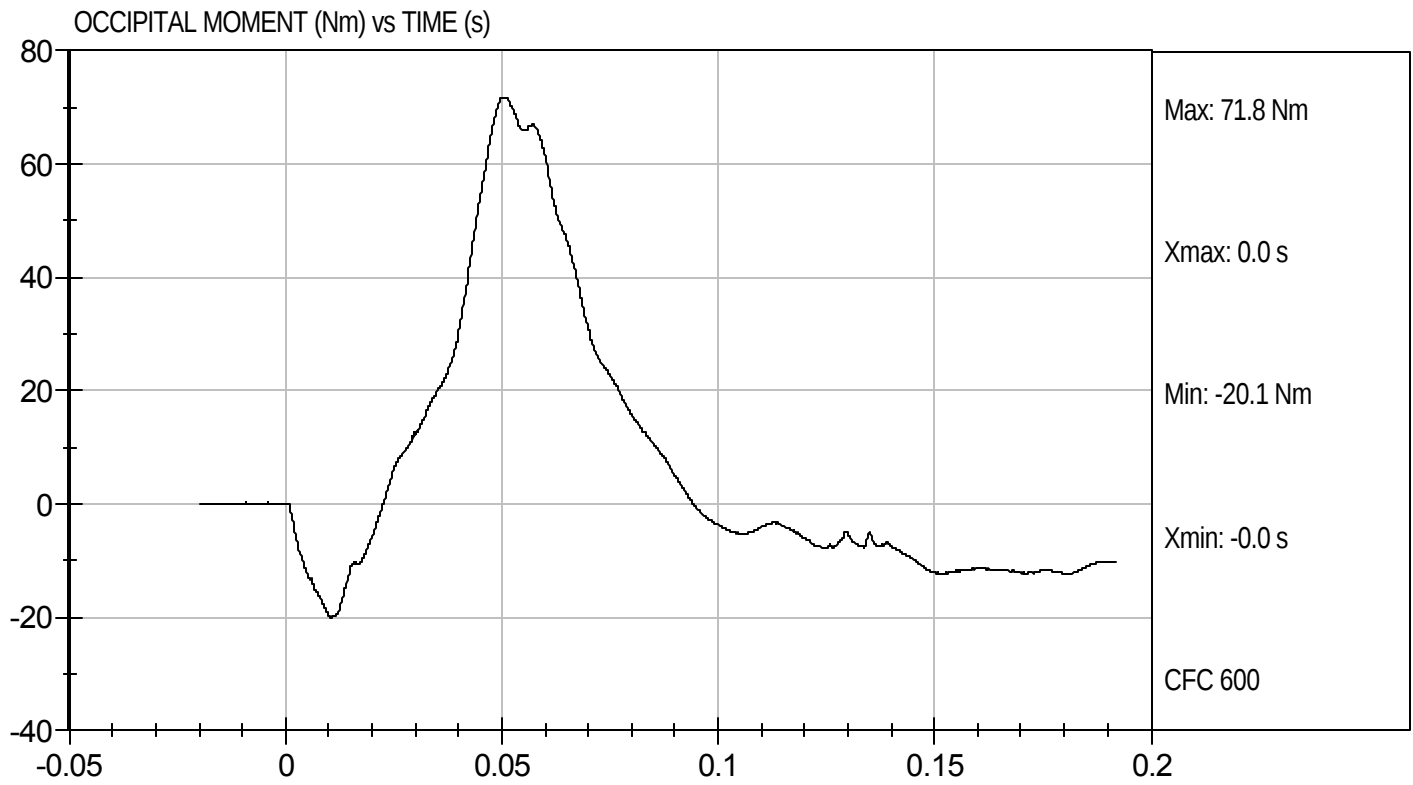
Test Date: 5/21/09
Velocity: 23.15 ft/s, 7.06 m/s





Test Desc: Neck Flexion
Component ID: D091232

Test Date: 5/21/09
Velocity: 23.15 ft/s, 7.06 m/s



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634Test I.D: D091233

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity		%	10 to 70	41	Pass
Pendulum Speed		m/sec	5.95 to 6.19	6.16	Pass
Pendulum Deceleration	10 msec	m/sec	1.5 to 1.9	1.9	Pass
	20 msec	m/sec	3.1 to 3.9	3.6	Pass
	30 msec	m/sec	4.6 to 5.6	5.3	Pass
D Plane Rotation	Max	deg	99 to 114	99	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	-65 to -53	-57	Pass
Negative Moment Time Curve Decay to -10 Nm		msec	94 to 114	95	Pass
Overall Results					Pass

Jessica Hall
Laboratory Technician

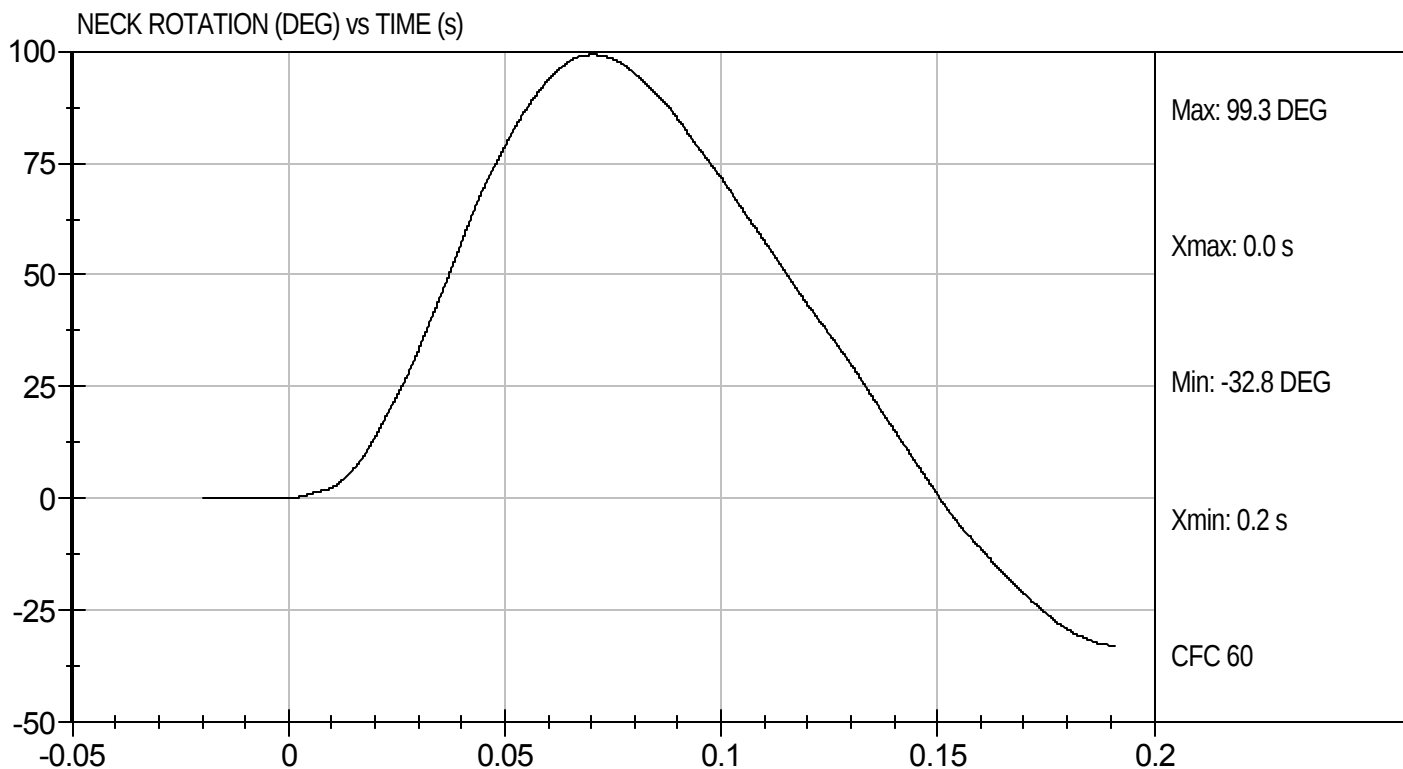
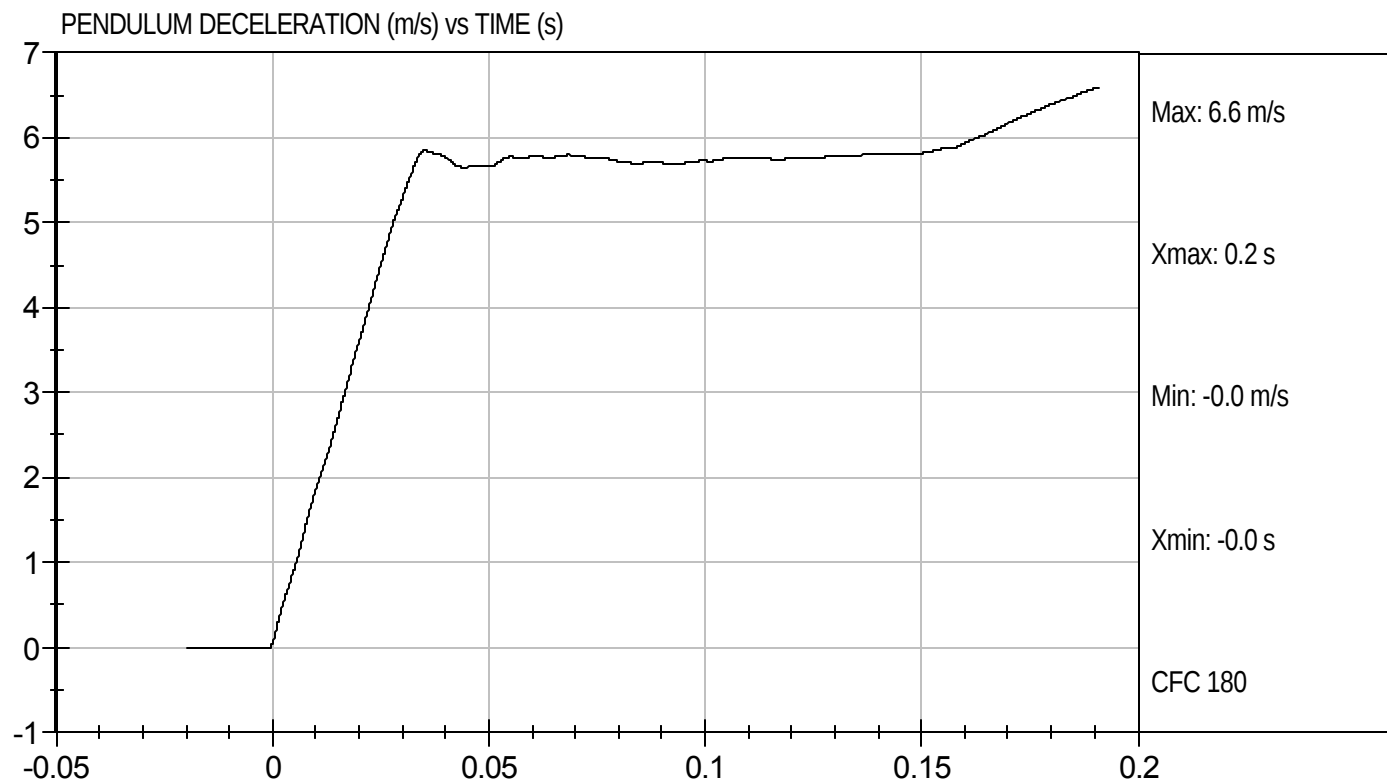
5/21/09
Test Date

David Winkelbauer
Approved By



Test Desc: Neck Extension
Component ID: D091233

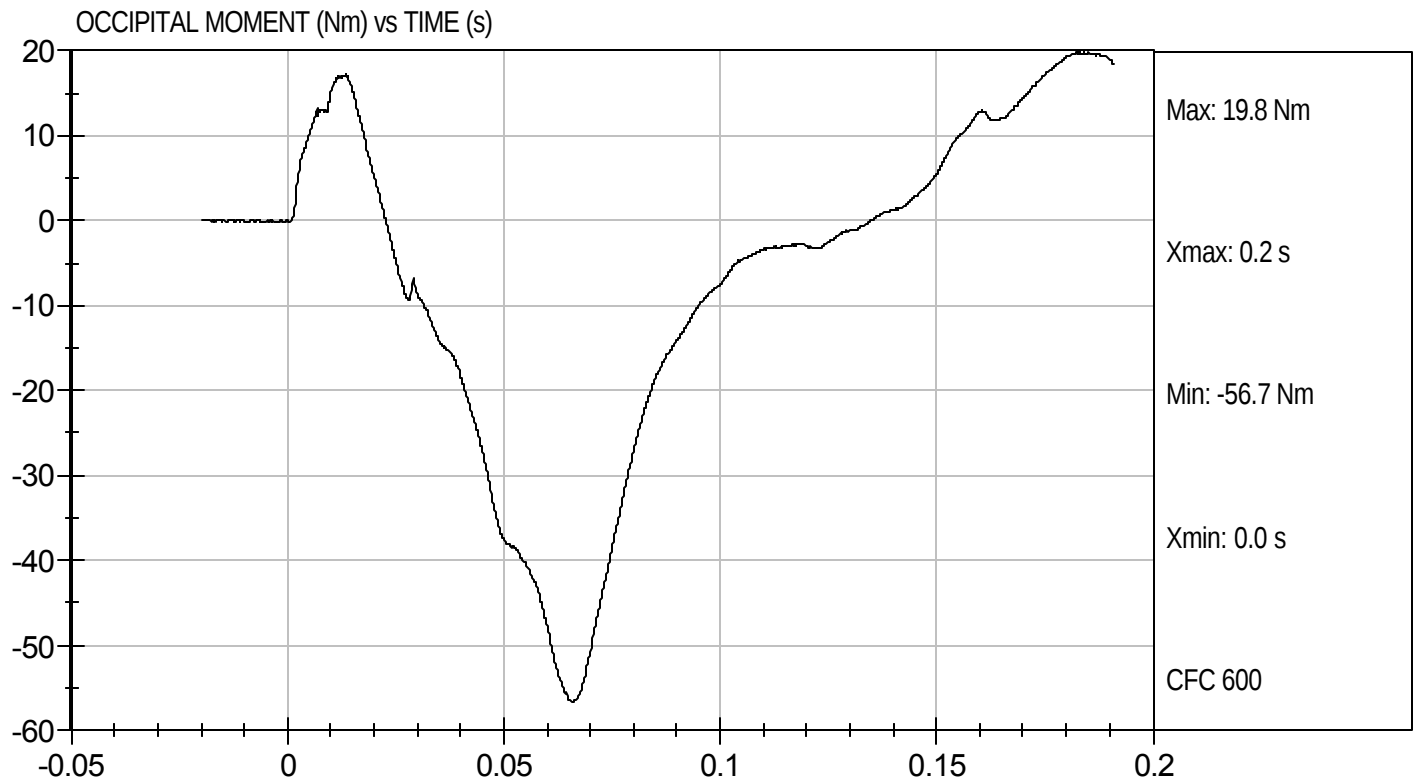
Test Date: 5/21/09
Velocity: 20.20 ft/s, 6.16 m/s





Test Desc: Neck Extension
Component ID: D091233

Test Date: 5/21/09
Velocity: 20.20 ft/s, 6.16 m/s

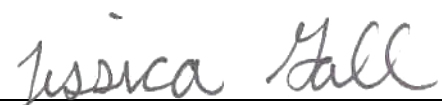


MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test I.D: D091234

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.9	Pass
Relative Humidity	%	10 to 70	39	Pass
Probe Speed	m/s	6.59 to 6.83	6.68	Pass
Peak Deflection	mm	50 to 58	54	Pass
Peak Resistive Force w/in Deflection Corridor	kN	3.9 to 4.4	4.2	Pass
Internal Hysteresis	%	69 to 85	70	Pass
Peak Force 18 mm - 50 mm	N	<= 4,600 N	4135	Pass
Overall Test Results			Pass	


Laboratory Technician

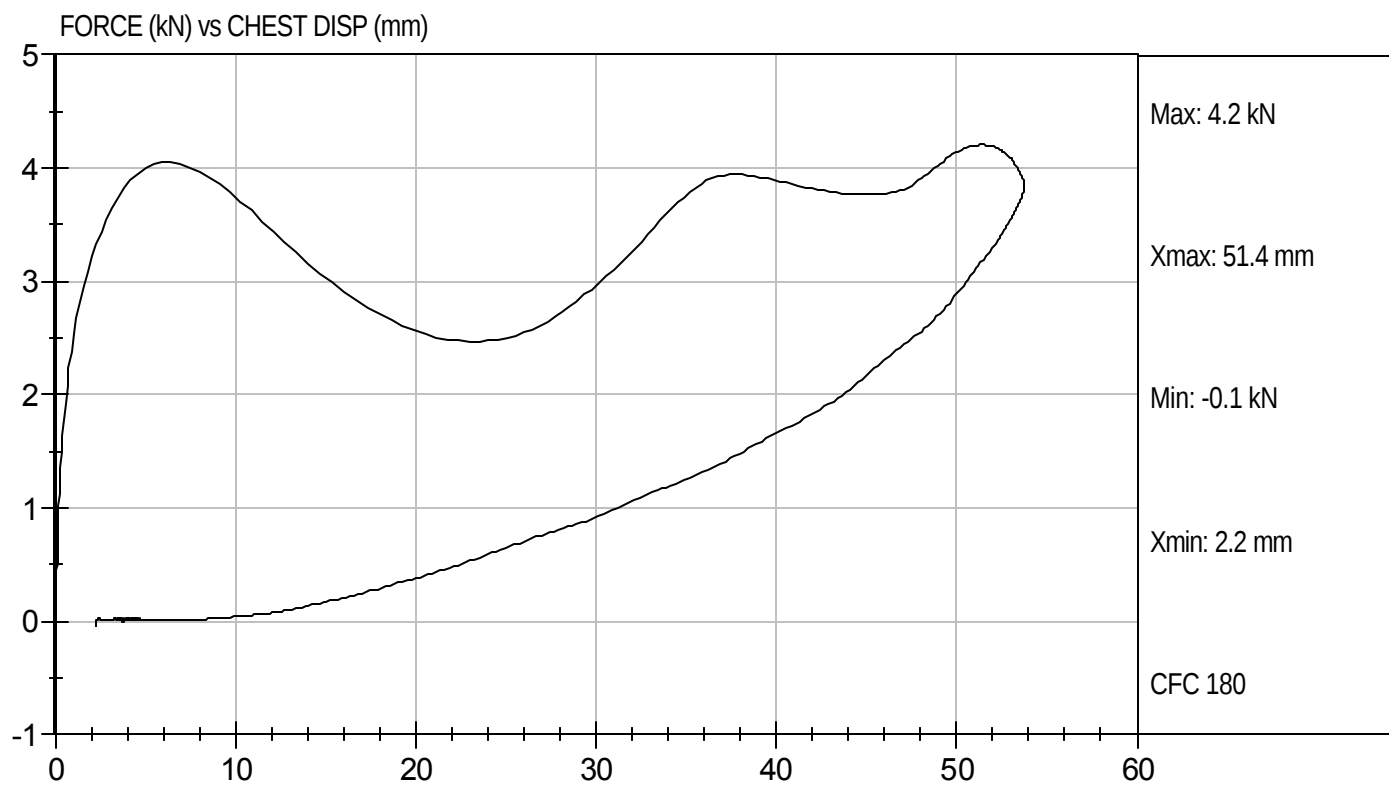
5/21/09
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D091234

Test Date: 5/21/09
Velocity: 21.93 ft/s, 6.68 m/s



MGA RESEARCH CORPORATION
RIGHT KNEE IMPACT TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test I.D: D091235

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	40	Pass
Probe Speed	m/sec	2.07 to 2.13	2.12	Pass
Maximum Force	kN	3.45 to 4.06	3.93	Pass
Overall Test Results				Pass



Laboratory Technician

5/21/08
Test Date

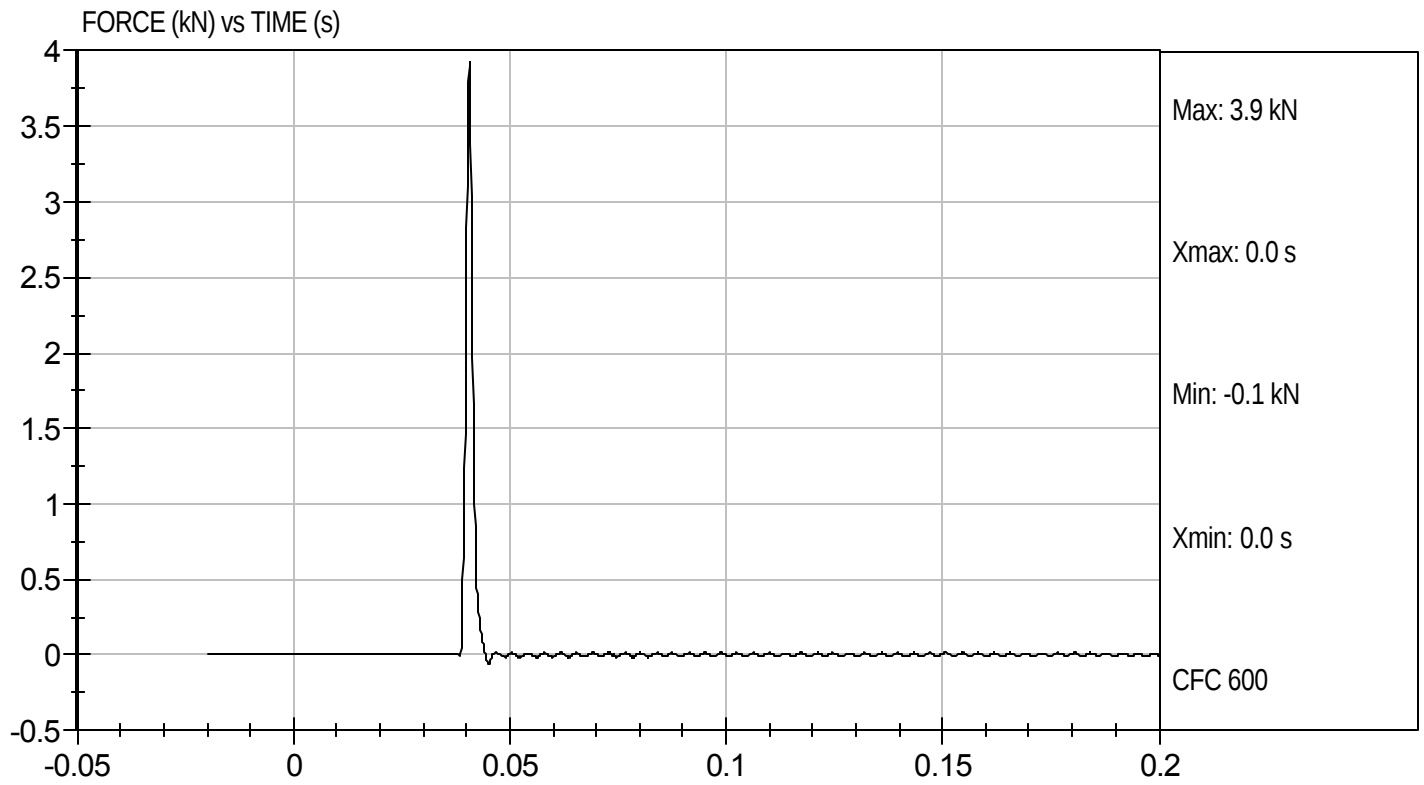


Approved By



Test Desc: Right Knee
Component ID: D091235

Test Date: 5/21/08
Velocity: 6.97 ft/s, 2.12 m/s



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test I.D: D091236

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	40	Pass
Probe Speed	m/sec	2.07 to 2.13	2.12	Pass
Maximum Force	kN	3.45 to 4.06	3.68	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

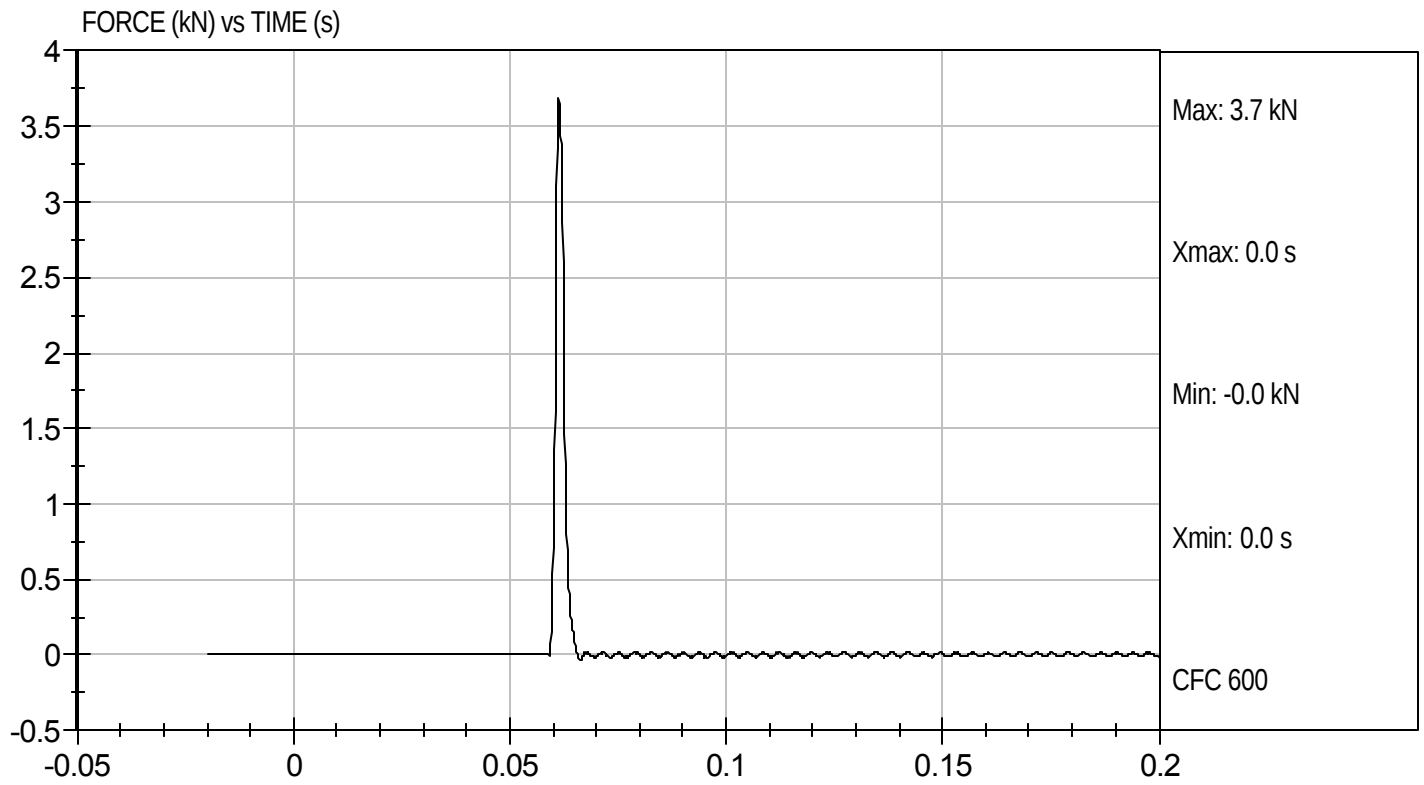
5/21/09
Test Date

David Winkelbauer
Approved By



Test Desc: Left Knee
Component ID: D091236

Test Date: 5/21/09
Velocity: 6.97 ft/s, 2.12 m/s

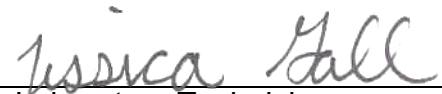


MGA RESEARCH CORPORATION
TORSO FLEXION TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 634

Test I.D: D091237

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	40	Pass
Initial Angle	deg	0 to 20	16	Pass
Return Angle	deg	+/- 8	3	Pass
Force at 45 deg	N	320 to 390	361	Pass
Upper Torso Deflection Rate	Deg/sec	0.5 to 1.5	1.0	Pass
Overall Result			Pass	


Laboratory Technician

5/21/09
Test Date


Approved By