

REPORT NUMBER: NCAP-MGA-2011-013

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

**FORD MOTOR COMPANY
2011 Ford Fiesta S 4-Dr Sedan
NHTSA No.: MB0214**

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



Test Date: August 18, 2010

Final Report Date: October 1, 2010

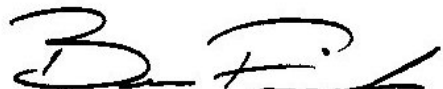
FINAL REPORT

**U.S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Office of Crashworthiness Standards
1200 New Jersey Ave, SE
Mail Code: NVS 111, Room W43-410
Washington, DC 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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Approval Date: October 1, 2010

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

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16. Abstract A 56.3 km/h NCAP Frontal Impact Test was conducted on the 2011 Ford Fiesta S 4-Dr Sedan in accordance with the specifications of the Office of Crashworthiness Standards Frontal NCAP Laboratory Test Procedure for the generation of consumer information on vehicle frontal crash protection. 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 18, 2010. 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 post-test maximum crush was 612 mm located at the vehicle's centerline. The test vehicle's performance was as follows: <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th rowspan="2">Units</th> <th colspan="2">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>148</td> <td>291</td> </tr> <tr> <td>Maximum Chest Compression</td> <td>mm</td> <td>63</td> <td>52</td> <td>21</td> <td>11</td> </tr> <tr> <td>Nij</td> <td>N/A</td> <td>1</td> <td>1</td> <td>0.25</td> <td>0.52</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>4170</td> <td>2620</td> <td>1096</td> <td>692</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>4000</td> <td>2520</td> <td>198</td> <td>525</td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>10008</td> <td>6805</td> <td>1847</td> <td>2419</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>10008</td> <td>6805</td> <td>1552</td> <td>1815</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	148	291	Maximum Chest Compression	mm	63	52	21	11	Nij	N/A	1	1	0.25	0.52	Neck Tension	N	4170	2620	1096	692	Neck Compression	N	4000	2520	198	525	Left Femur Force	N	10008	6805	1847	2419	Right Femur Force	N	10008	6805	1552	1815
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SECTION 1

PURPOSE AND SUMMARY OF TEST

PURPOSE

This 56.3 km/h frontal barrier impact test is part of the Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under contract number DTNH22-06-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 Standard's NCAP Frontal Laboratory Test Procedure dated January 2010.

SUMMARY

A load cell barrier was impacted by a 2011 Ford Fiesta S 4-Dr Sedan at a velocity of 56.5 kph. The test was performed at MGA Research Corporation on August 18, 2010. Receiving photographs of the vehicle can be found in Appendix A (see test notes).

Two 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 on the driver's lap and shoulder belts and the passenger's lap belt 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 verification 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 612 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 headrest. The driver's knees contacted the knee bag. The passenger's head and chest contacted the airbag. The passenger's head also contacted the headrest. The passenger's knees contacted the glove box.

The occupant data is summarized below:

ATD position	HIC ₁₅	T ¹	T ²	Chest Disp. (mm)	Nij	Neck Tension (N)	Neck Comp. (N)	Left Femur (N)	Right Femur (N)
Driver (50 th)	148	84.4	99.4	21	0.25	1096	198	1847	1552
Passenger (5 th)	291	67.9	82.9	11	0.52	692	525	2419	1815

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

TEST NOTES

There was no valid data collected for:
Right Rear Seat Crossmember X
Top of Engine X after 35 msec.

Test photos are incomplete due to computer malfunction.

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: 2011 Ford Fiesta S 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0214
 Test Date: 8/18/2010

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	MB0214	Anti-Lock Brakes	Yes
Model Year	2011	All Wheel Drive	No
Make	Ford	Power Steering	Yes
Model	Fiesta	Driver Front Airbag	Yes
Body Style	Sedan	Driver Curtain Airbag	Yes
VIN	3FADP4AJ8BM111431	Driver Head/Torso Airbag	No
Body Color	Blue Flame Metallic	Driver Torso Airbag	No
Delivery Date	7/29/2010	Driver Torso/Pelvis Airbag	Yes
Odometer (mi)	209	Driver Pelvis Airbag	No
Odometer (km)	336	Driver Knee Airbag	Yes
Dealer	Boucher Fleet Group	Pass. Front Airbag	Yes
Transmission	Automatic	Pass. Curtain Airbag	Yes
Final Drive	Front	Pass. Head/Torso Airbag	No
Type/No. Cylinders	4	Pass. Torso Airbag	No
Engine Displacement (L)	1.6	Pass. Torso/Pelvis Airbag	Yes
Engine Placement	Lateral	Pass. Pelvis Airbag	No
Roof Rack	No	Pass. Knee Airbag	No
Sunroof/T-Top	No	Pretensioners	Yes
Tinted Glass	No	Load Limiters	Yes
Traction Control	Yes	Automatic Door Locks	Yes
Power Brakes	Yes	Bucket Seats	Yes
Front Disc	Yes	Tilt Steering	Yes
Rear Disc	No	Other	
Does owner's manual provide instructions to turn off automatic door locks?	Yes		

DATA FROM CERTIFICATION LABEL

Manufactured By	Ford Motor Company	GVWR (kg)	1642
Date of Manufacture	06/10	GAWR Front (kg)	839
		GAWR Rear (kg)	816

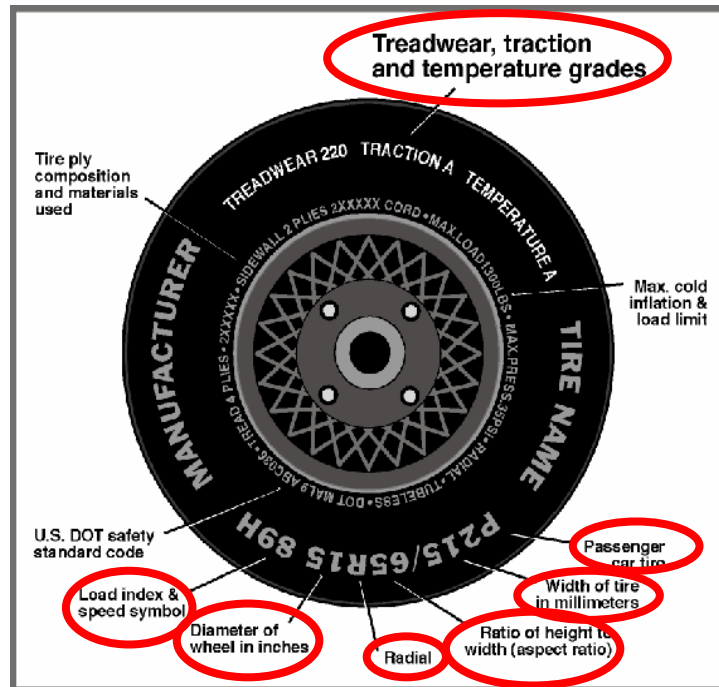
VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench		
Designated Seating Capacity (DSC)	2	3		5
Capacity Weight (VCW) (kg)				375
Cargo Weight (RCLW) (kg)				35

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

Test Vehicle: 2011 Ford Fiesta S 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0214
 Test Date: 8/18/2010



Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	220	220
Recommended Tire Size	P185/60R15	P185/60R15
Tire Size on Vehicle	P185/60R15	P185/60R15
Tire Manufacturer	Kumho	Kumho
Tire Model	SOLUS KH25	SOLUS KH25
Treadwear	480	480
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	1	1
Tire Plies Body	4	4
Load Index & Speed Symbol	84H	84H
Tire Material	Rubber	Rubber
DOT Safety Code Right	DOT C0R9 YPL8	DOT C0R9 YPL8
DOT Safety Code Left	DOT C0R9 YPL8	DOT C0R9 YPL8

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

Test Vehicle: 2011 Ford Fiesta S 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0214
 Test Date: 8/18/2010

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	355.6	254.0		388.7	307.5	
Right	kg	346.6	233.6		376.0	286.3	
Ratio	%	59.0	41.0		56.3	43.7	
Totals	kg	702.2	487.6	1189.8	764.7	593.8	1358.5

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1189.8
Weight of 1 P572E ATD & 1 P572O ATD	kg	140.6
Rated Cargo/Luggage Weight (RCLW)	kg	35
Calculated Target Vehicle Target Weight (TVTW)	kg	1365.4

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	635	652	654	646	1023
As Tested	mm	629	636	618	629	1091
Post Test	mm	618	619	627	620	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2497
Total Vehicle Length at Left Side	mm	4290
Total Vehicle Length at Centerline	mm	4419
Total Vehicle Length at Right Side	mm	4290
Weight of Ballast in Cargo Area	kg	11.3
Weight of Vehicle Components Removed	kg	20.4
Amount of Stoddard Solvent in Fuel Tank	L	43.5

List of components removed to meet test weight: Spare tire, jack & tools, trunk carpet, hub caps.

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

Test Vehicle: 2011 Ford Fiesta S 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0214
 Test Date: 8/18/2010

TARGET VEHICLE STRUCTURAL MEASUREMENT

	Elements	Pre-Test (mm)
1	Total Length	4419
2	Total Width	1683
3	Bumper Top Height	525
4	Bumper Bottom Height	411
5	Longitudinal Member Top Height	532
6	Distance between Longitudinal Members	909
7	Longitudinal Member Width	150
8	Engine Top Height	796
9	Engine Bottom Height	191
10	Engine and Gearbox Width	834
11	Front Bumper-Engine Distance	397
12	Front Shock Absorber Fixing Height	830
13	Bonnet Leading Edge Height	751
14	Front Shock Absorber Fixing Width	1105
15	Front Bumper – Front Axle Distance	843
16	Front Axle – A-Pillar Distance	386
17	A-Pillar – B-Pillar Distance	1096
18	B-Pillar – Rear Axle Distance	1008
19	B-Pillar – C-Pillar Distance	167
20	Roof Sill Bottom Height	1319
21	Roof Sill Top Height	1430
22	Floor Sill bottom Height	230
23	Floor Sill Top Height	355

DATA SHEET NO. 2

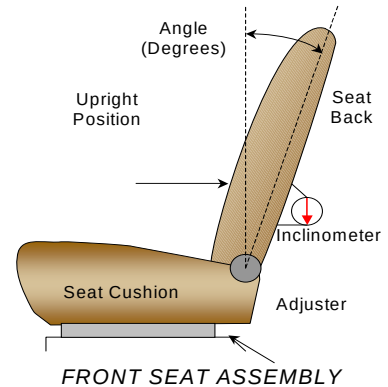
SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

Test Vehicle: 2011 Ford Fiesta S 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0214
 Test Date: 8/18/2010

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 Seating & Positioning Procedures" in the NCAP Test Procedure dated January 2010.



SEAT BACK ANGLE	Degrees
Driver Seat Back Angle	12.6° on headrest bezel
Passenger Seat Back Angle	10.3° on headrest bezel

SEAT FORE/AFT POSITIONS

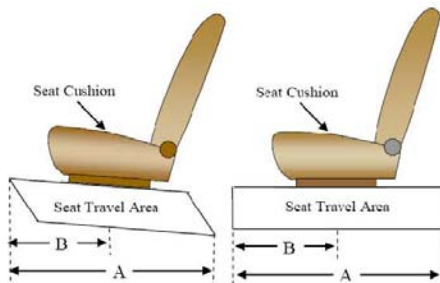
The driver and passenger seat fore/aft positions are adjusted following Appendix F, "Driver & Passenger Seating & Positioning Procedures" in the NCAP Test Procedure dated January 2010.

SEAT FORE/AFT POSITIONS	Total Fore/Aft Travel	Placed in Position #
Driver Seat	25 detents	10 th detent (forward-most as 0)
Passenger Seat	25 detents	0 detent (forward-most as 0)

SEAT BELT UPPER ANCHORAGES

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

SEAT BELT UPPER ANCHORAGES	Total # of Positions	Placed in Position #
Driver Seat	4	0 (uppermost as 0)
Passenger Seat	4	0 (uppermost as 0)



DATA SHEET NO. 2 (CONTINUED)

SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

Test Vehicle: 2011 Ford Fiesta S 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

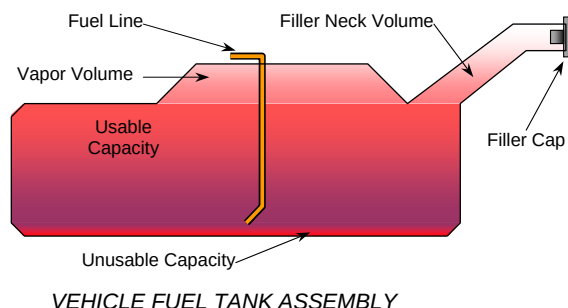
NHTSA No.: MB0214
 Test Date: 8/18/2010

FUEL TANK CAPACITY DATA

	Liters
Usable Capacity of "Standard Tank"	47.0
Usable Capacity of "Optional" Tank	
92-94% of Usable Capacity	43.2 to 44.2
Actual Amount of Solvent used	43.5
1/3 of Usable Capacity	15.7

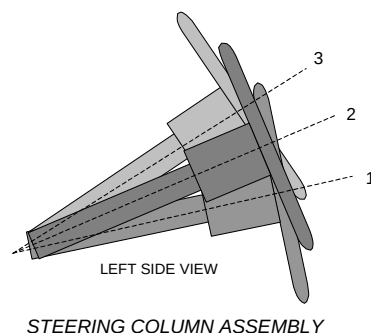
Describe the fuel pump type, its behavior, and the location of the fuel filler pipe.

The vehicle is equipped with an electric fuel pump. Fuel pump will operate when keyed on, pumps run a 2 second cycle to prime system, and otherwise doesn't run until engine is cranked. The fuel filler pipe is located on the left side.



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.



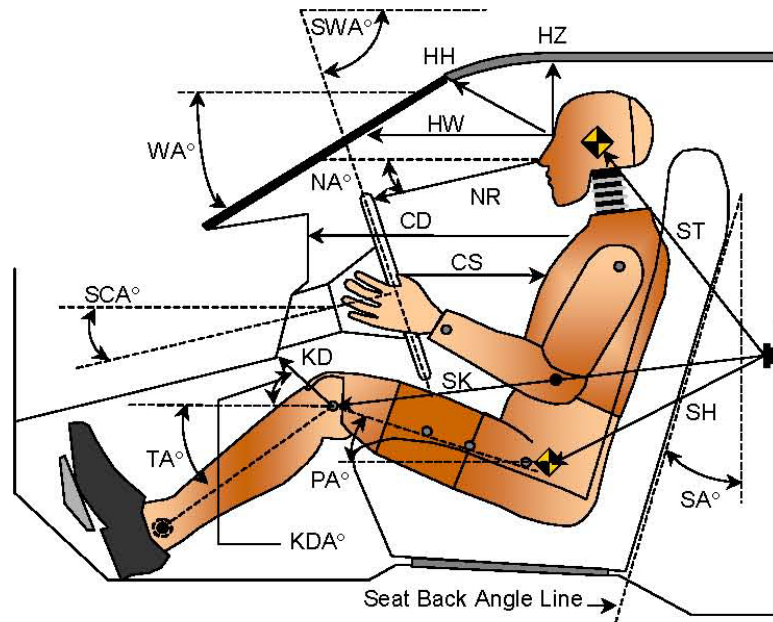
STEERING COLUMN POSITION

	Degrees	Fore/Aft Position (mm)
Lowermost – Position 1	69.0	235
Geometric Center – Position 2	66.8	215
Uppermost – Position 3	64.6	195
Telescoping Steering Wheel Travel		40
Test Position	66.8	215

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2011 Ford Fiesta S 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0214
 Test Date: 8/18/2010

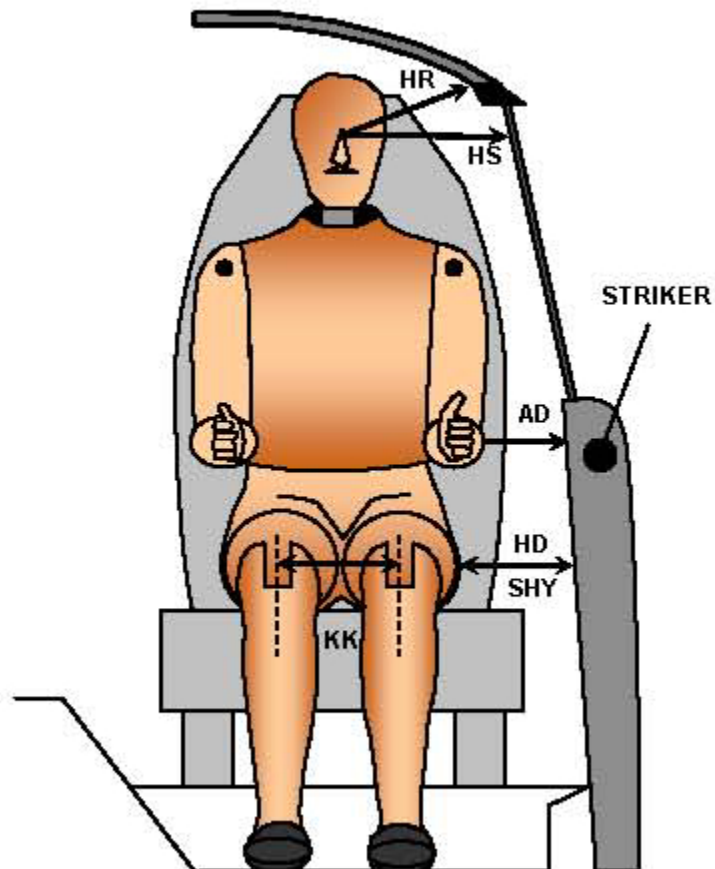


Code	Measurement Description	Driver S/N 351		Passenger S/N 138	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA	Windshield Angle		22.8		
SWA	Steering Wheel Angle		66.8		
SCA	Steering Column Angle		23.2		
SA	Seat Back Angle (headrest bezel)		12.6		10.3
HZ	Head to Roof (Z)	180	90	224	90
HH	Head to Header	326	27.8	272	46.7
HW	Head to Windshield	707	0	696	0
NR	Nose to Rim	357	6.8		
CD	Chest to Dash	516		398	
CS	Chest to Steering Hub	290	4.3		
RA	Rim to Abdomen	168	0		
KDL	Left Knee to Dash	166	39.3	78	48.6
KDR	Right Knee to Dash	154	32.0	95	40.1
PA	Pelvic Angle		24.4		21.9
TA	Tibia Angle		41.1		44.2
SK	Striker to Knee	528	91.7	685	93.9
ST	Striker to Head	496	4.6	470	32.4
SH	Striker to H-Point	212	128.6	360	116.2

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2011 Ford Fiesta S 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0214
 Test Date: 8/18/2010

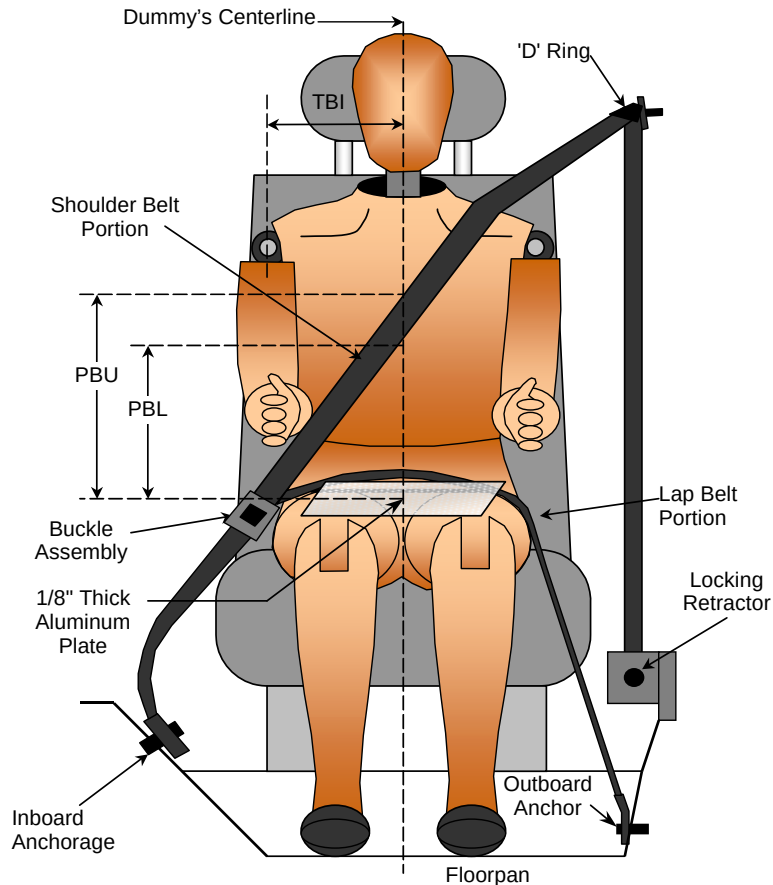


Code	Measurement Description	Driver S/N 351	Passenger S/N 138
		Length (mm)	
AD	Arm to Door	120	90
HD	H-Point to Door	147	174
HR	Head to Side Header	200	251
HS	Head to Side Window	308	350
KK	Knee to Knee	338	218
SHY	Striker to H-Point (Y Direction)	285	298
AA	Ankle to Ankle	320	158

DATA SHEET NO. 5 **SEAT BELT POSITIONING DATA**

Test Vehicle: 2011 Ford Fiesta S 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0214
 Test Date: 8/18/2010



FRONT VIEW OF DUMMY

SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU - Top surface of reference to belt upper edge	mm	370	330
PBL - To surface of reference to belt lower edge	mm	290	230

BELT LENGTH DATA

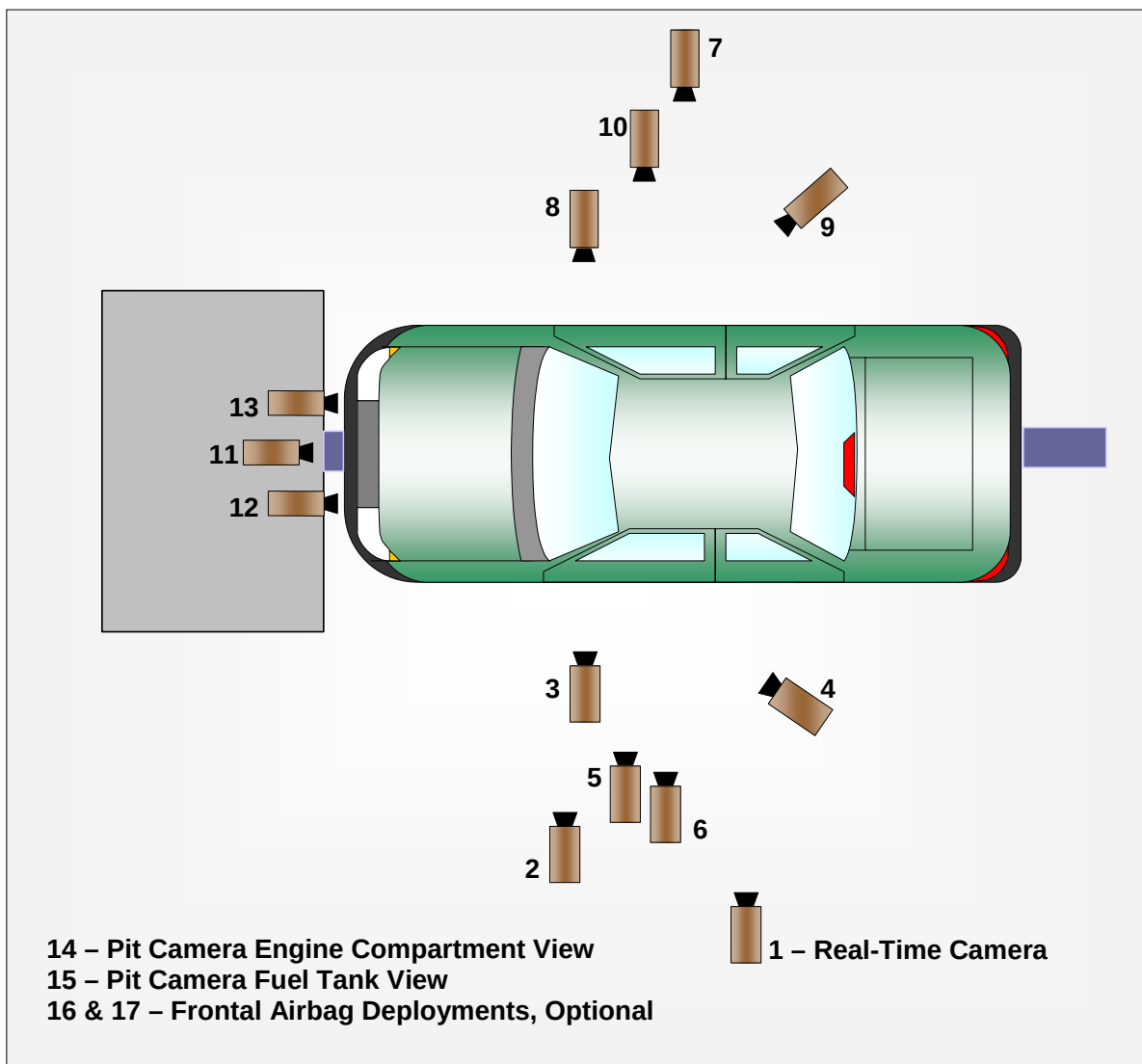
Measurement Description	Units	Driver	Passenger
Shoulder Belt Length as measured on ATD	mm	805	920
Lap Belt Length as measured on ATD	mm	780	920
Remainder of belt of reel	mm	1295	1210
Total Belt Length for Continuous Webbing Systems	mm	2880	3050

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

Test Vehicle: 2011 Ford Fiesta S 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0214
Test Date: 8/18/2010

CAMERA POSITIONS FOR FRONTAL IMPACTS



DATA SHEET NO. 6 (CONTINUED)

CAMERA LOCATIONS AND DATA

Test Vehicle: 2011 Ford Fiesta S 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0214
 Test Date: 8/18/2010

CAMERA LOCATIONS

No.	Camera View	Coordinates (mm)			Lens (mm)	Speed (fps)
		X*	Y*	Z*		
1	Real-Time Left Side View					30
2	Left Front Half	1020	-5030	-1090	24	1000
3	Driver Close-Up	1490	-6280	-1480	35	1000
4	Driver Angle	5390	-4890	-1830	50	1000
5	Steering Column Top	530	-5080	-1250	25	1000
6	Steering Column Bottom	500	-5060	-860	25	1000
7	Right Overall	2490	7110	-1120	20	1000
8	Passenger Close-Up	1470	6160	-1510	35	1000
9	Passenger Angle	5430	4790	-1810	50	1000
10	Right Front Half	1060	5010	-1070	24	1000
11	Windshield	-260	0	-2860	24	1000
12	Top Driver	-30	-360	-2270	16	1000
13	Top Passenger	-30	360	-2270	16	1000
14	Pit Front	1310	0	3150	24	1000
15	Pit Rear	2350	0	3150	24	1000
16	Onboard Driver Side (optional)					
17	Onboard Passenger Side (optional)					
18	Real-Time Pan View					30

***COORDINATES:**

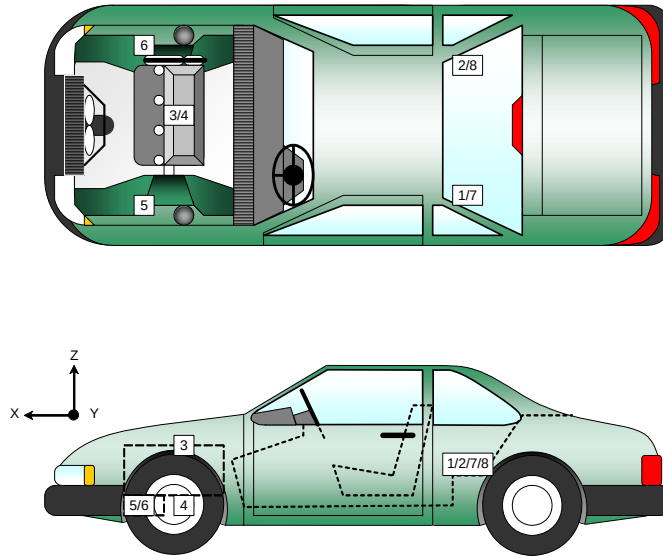
- +X = forward of impact plane
- +Y = right of monorail centerline
- +Z = below ground level

Cameras 16 & 17 were not used for this test.

DATA SHEET NO. 7
VEHICLE ACCELEROMETER DATA

Test Vehicle: 2011 Ford Fiesta S 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0214
 Test Date: 8/18/2010



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear X-Member X	1799	-320	-223
2	Right Rear X-Member X	1799	330	-223
3	Engine Top X	2802	0	-794
4	Engine Bottom X	3675	0	-249
5	Left Brake Caliper X	3608	-678	-245
6	Right Brake Caliper X	3608	678	-245
7	Left Rear X-Member Z	1799	-320	-223
8	Right Rear X-Member Z	1799	330	-223

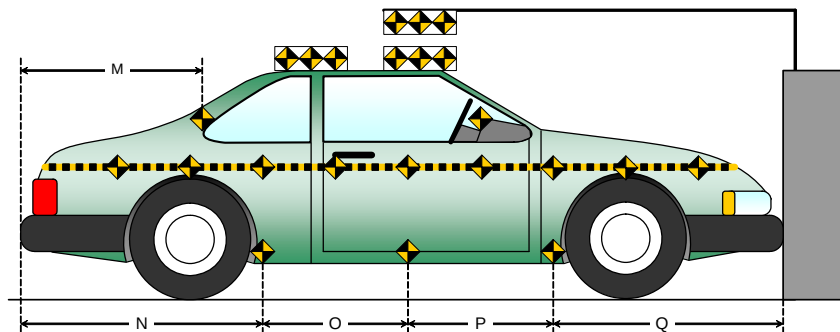
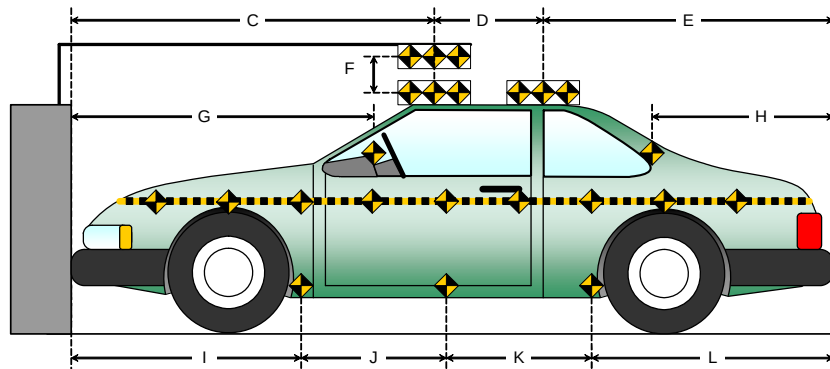
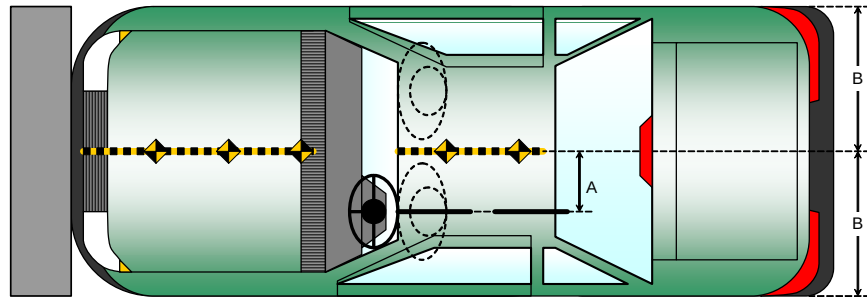
Reference Points: X - Rear Surface of Vehicle (+ forward)
 Y - Vehicle Centerline (+ to right)
 Z - Ground Plane (+ down)

DATA SHEET NO. 8
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2011 Ford Fiesta S 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0214
 Test Date: 8/18/2010

Item	Value (mm)
A	340
B	842
C	2220
D	720
E	1479
F	130
G	
H	785
I	1239
J	855
K	855
L	1470
M	785
N	1470
O	855
P	855
Q	1239



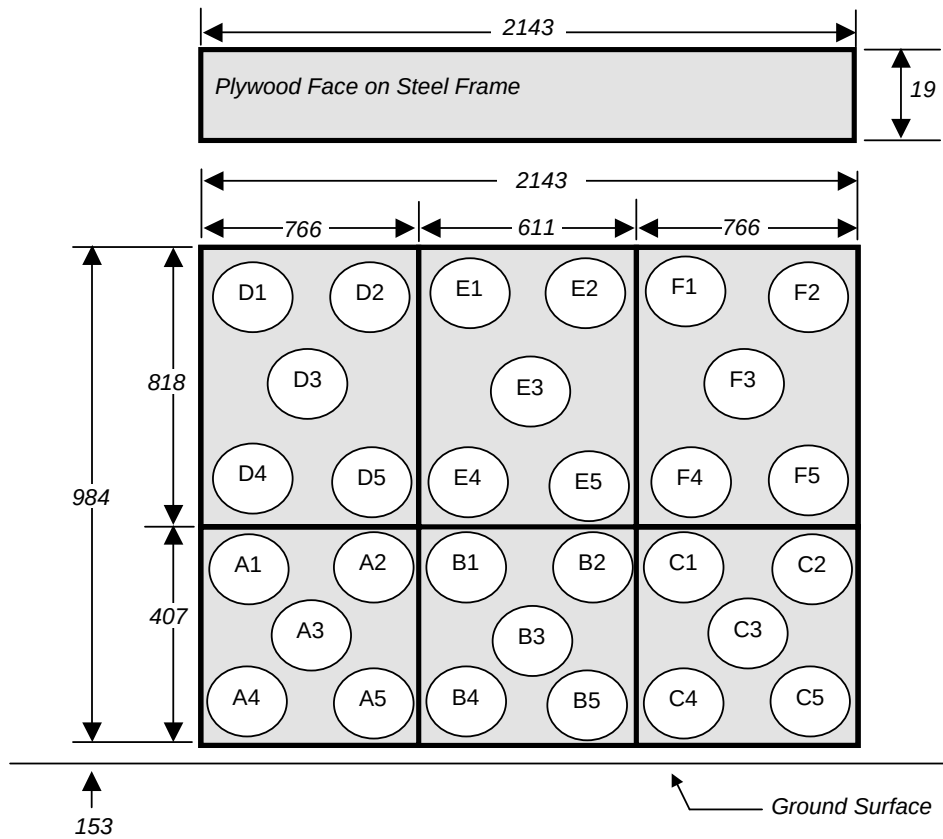
DATA SHEET NO. 9

LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle: 2011 Ford Fiesta S 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0214
 Test Date: 8/18/2010

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 SUMMARY OF RESULTS

Test Vehicle: 2011 Ford Fiesta S 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0214
Test Date: 8/18/2010

INSTRUMENTATION

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

CAMERA COVERAGE

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

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

Test Vehicle: 2011 Ford Fiesta S 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0214
 Test Date: 8/18/2010

TEST DUMMY INFORMATION AND CONTACT

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	Airbag	Airbag
Left Knee Contact	Knee Bag	Glovebox
Right Knee Contact	Knee Bag	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	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	1209
Center	mm	1188
Right Side	mm	1182
Average	mm	1193

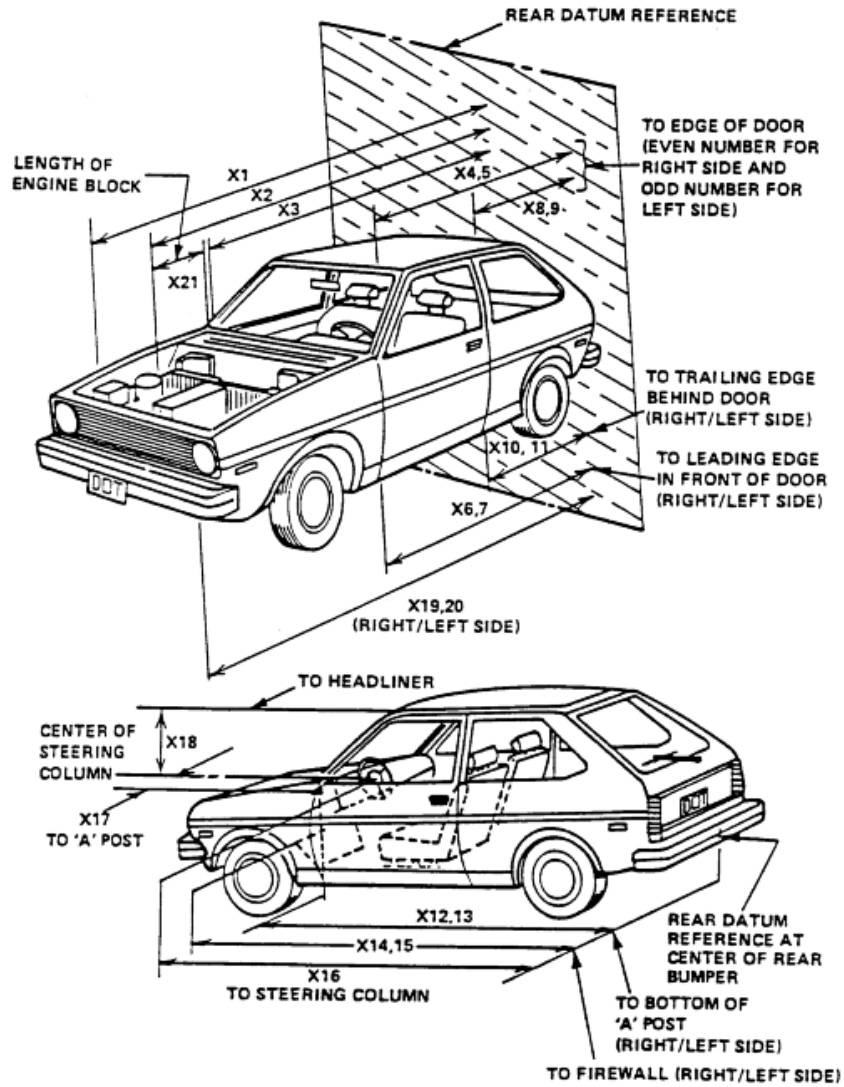
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

DATA SHEET NO. 12 **VEHICLE PROFILE MEASUREMENTS**

Test Vehicle: 2011 Ford Fiesta S 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0214
 Test Date: 8/18/2010



DATA SHEET NO. 12 (CONTINUED)
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2011 Ford Fiesta S 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0214
 Test Date: 8/18/2010

RSOV (Rear Surface of Vehicle)

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	mm	4419	3807	612
2	RSOV to Front of Engine	mm	3955	3644	311
3	RSOV to Firewall	mm	3470	3442	28
4	RSOV to Upper Leading Edge of Right Door	mm	3086	3080	6
5	RSOV to Upper Leading Edge of Left Door	mm	3081	3078	3
6	RSOV to Lower Leading Edge of Right Door	mm	3062	3050	12
7	RSOV to Lower Leading Edge of Left Door	mm	3064	3056	8
8	RSOV to Upper Trailing Edge of Right Door	mm	2019	2000	19
9	RSOV to Upper Trailing Edge of Left Door	mm	2021	2018	3
10	RSOV to Lower Trailing Edge of Right Door	mm	2031	2018	13
11	RSOV to Lower Trailing Edge of Left Door	mm	2035	2026	9
12	RSOV to Bottom of "A" Post of Right Side	mm	3063	3048	15
13	RSOV to Bottom of "A" Post of Left Side	mm	3061	3053	8
14	RSOV to Firewall, Right Side	mm	3484	3394	90
15	RSOV to Firewall, Left Side	mm	3486	3439	47
16	RSOV to Steering Column	mm	2600	2582	18
17	Center of Steering Column to "A" Post	mm	355	343	12
18	Center of Steering Column to Headliner	mm	404	400	4
19	RSOV to Right Side of Front Bumper	mm	4290	3720	570
20	RSOV to Left Side of Front Bumper	mm	4290	3740	550
21	Length of Engine Block	mm	489	470	19
RD	RSOV to Right Side of Dash Panel	mm	2799	2799	0
CD	RSOV to Center of Dash Panel	mm	2841	2841	0
LD	RSOV to Left Side of Dash Panel	mm	2801	2800	1

DATA SHEET NO. 13
ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2011 Ford Fiesta S 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

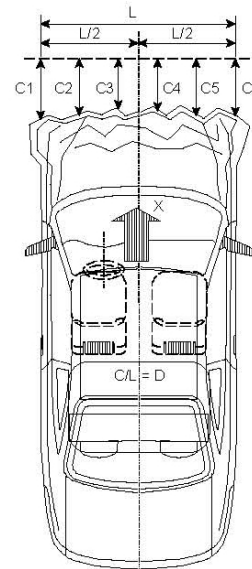
NHTSA No.: MB0214
 Test Date: 8/18/2010

VEHICLE INFORMATION

VIN: 3FADP4AJ8BM111431 Wheelbase (mm): 2497
 Vehicle Size Category: Sedan Test Weight (kg): 1358.5

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): 56.5
 Velocity Change (km/h): 60.6
 Time of Separation (msec): 93.2



CRUSH PROFILE

Collision Deformation Classification: Frontal
 Midpoint of Damage: Centerline
 Damage Region Length (mm): 950
 Impact Mode: Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	4290	3740	550
C2	Crush zone 2 at left side	mm	4341	3757	584
C3	Crush zone 3 at left side	mm	4362	3761	601
C4	Crush zone 4 at right side	mm	4362	3756	606
C5	Crush zone 5 at right side	mm	4341	3749	592
C6	Crush zone 6 at right side	mm	4290	3720	570
L	C1 TO C6	mm	950	972	-22

DATA SHEET NO. 14
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2011 Ford Fiesta S 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

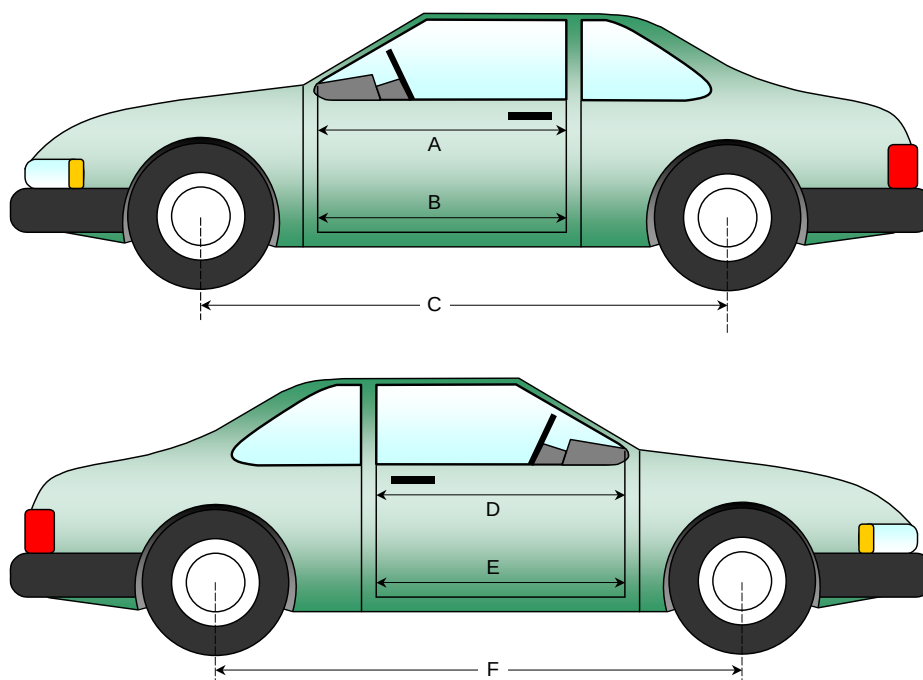
NHTSA No.: MB0214
 Test Date: 8/18/2010

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	869	869	0
B	Left Side Lower	mm	871	871	0
D	Right Side Upper	mm	869	869	0
E	Right Side Lower	mm	871	871	0

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2497	2432	65
F	Right Side Wheelbase	mm	2497	2427	70



DATA SHEET NO. 14 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

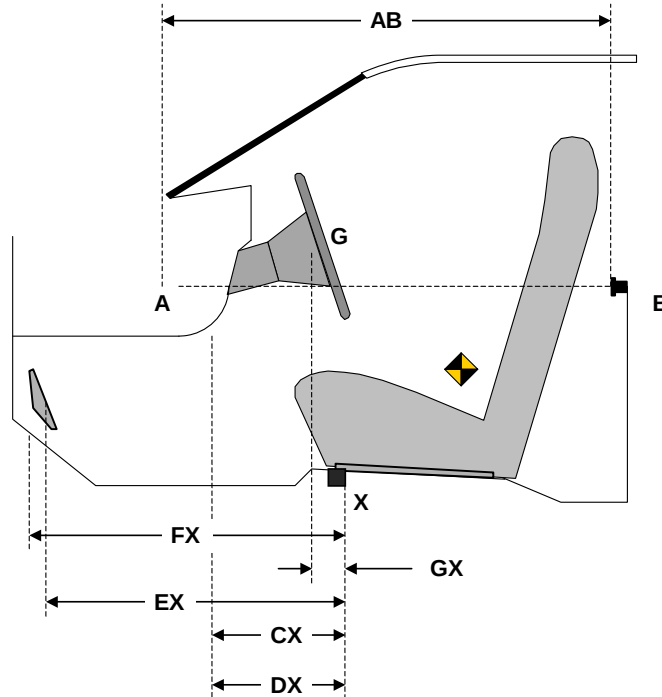
Test Vehicle: 2011 Ford Fiesta S 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0214
 Test Date: 8/18/2010

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside window jam)	mm	830	830	0
CX	Left Knee Bolster to X	mm	229	231	-2
DX	Right Knee Bolster to X	mm	210	220	-10
EX	Brake Pedal to X	mm	515	481	34
FX	Foot Rest to X	mm	549	536	13
GX	Center of Steering Column Wheel Hub to X	mm	36	76	-40

X = Front of Seat Track (stationary)

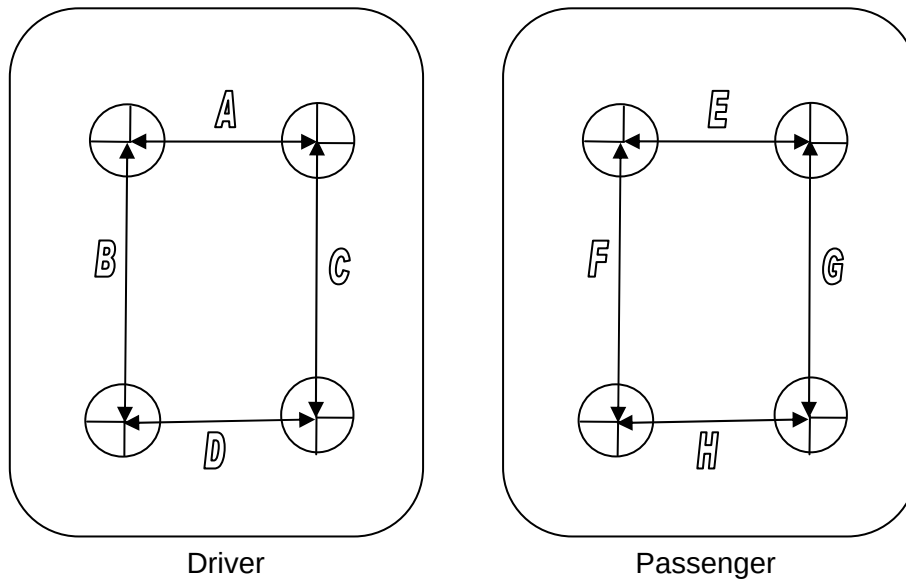


DRIVER COMPARTMENT

DATA SHEET NO. 14 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2011 Ford Fiesta S 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0214
 Test Date: 8/18/2010



TOP VIEW THROUGH FLOOR PAN

UNDERBODY FLOORBOARD DEFORMATION

Measurement	Units	Pre-Test	Post-Test	Difference
A	mm	223	221	2
B	mm	223	221	2
C	mm	223	221	2
D	mm	223	221	2
E	mm	223	220	3
F	mm	223	221	2
G	mm	223	221	2
H	mm	223	221	2

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

Test Vehicle: 2011 Ford Fiesta S 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0214
 Test Date: 8/18/2010

Windshield Mounting Details:

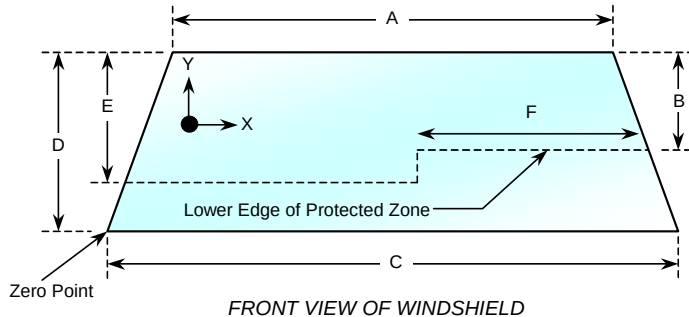
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

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	2114	2114	100
Right Side	2114	2114	100
Total	4228	4228	100



Item	Units	Value
A	mm	1130
B	mm	570
C	mm	1334
D	mm	882
E	mm	592
F	mm	541

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, 219 (PARTIAL), AND 301 DATA

Test Vehicle:	<u>2011 Ford Fiesta S 4-Dr Sedan</u>	NHTSA No.:	<u>MB0214</u>
Test Program:	<u>NCAP Frontal Barrier Impact Test</u>	Test Date:	<u>8/18/2010</u>

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Test Time:	<u>10:56 am</u>	Temperature:	<u>21° C</u>
------------	-----------------	--------------	--------------

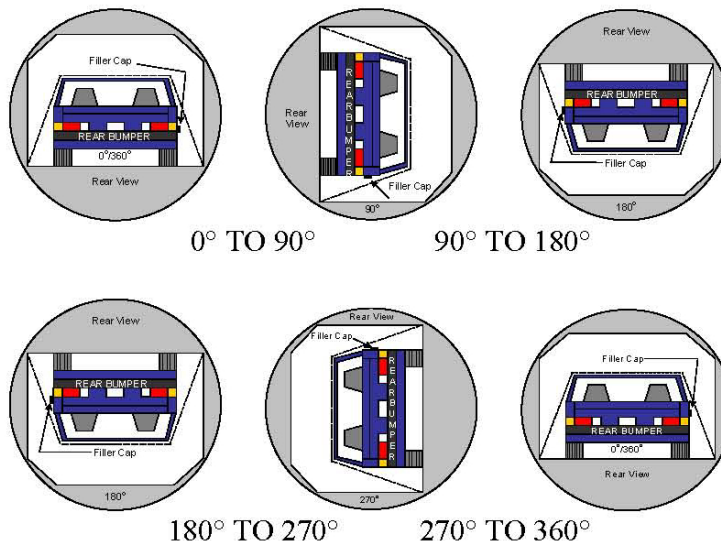
- | | |
|---|--------------|
| A. From impact until vehicle motion ceases:
(Maximum Allowable = 1 ounce) | <u>0</u> oz. |
| B. For the 5 minute period after motion ceases:
(Maximum allowable = 5 ounces) | <u>None</u> |
| C. For the following 25 minutes:
(Maximum allowable = 1 oz./minute) | <u>None</u>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

DATA SHEET NO. 16
FMVSS 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2011 Ford Fiesta S 4-Dr Sedan
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MB0214
 Test Date: 8/18/2010

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°	113	300	413
90° to 180°	113	300	413
180° to 270°	104	300	404
270° to 360°	112	300	412

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

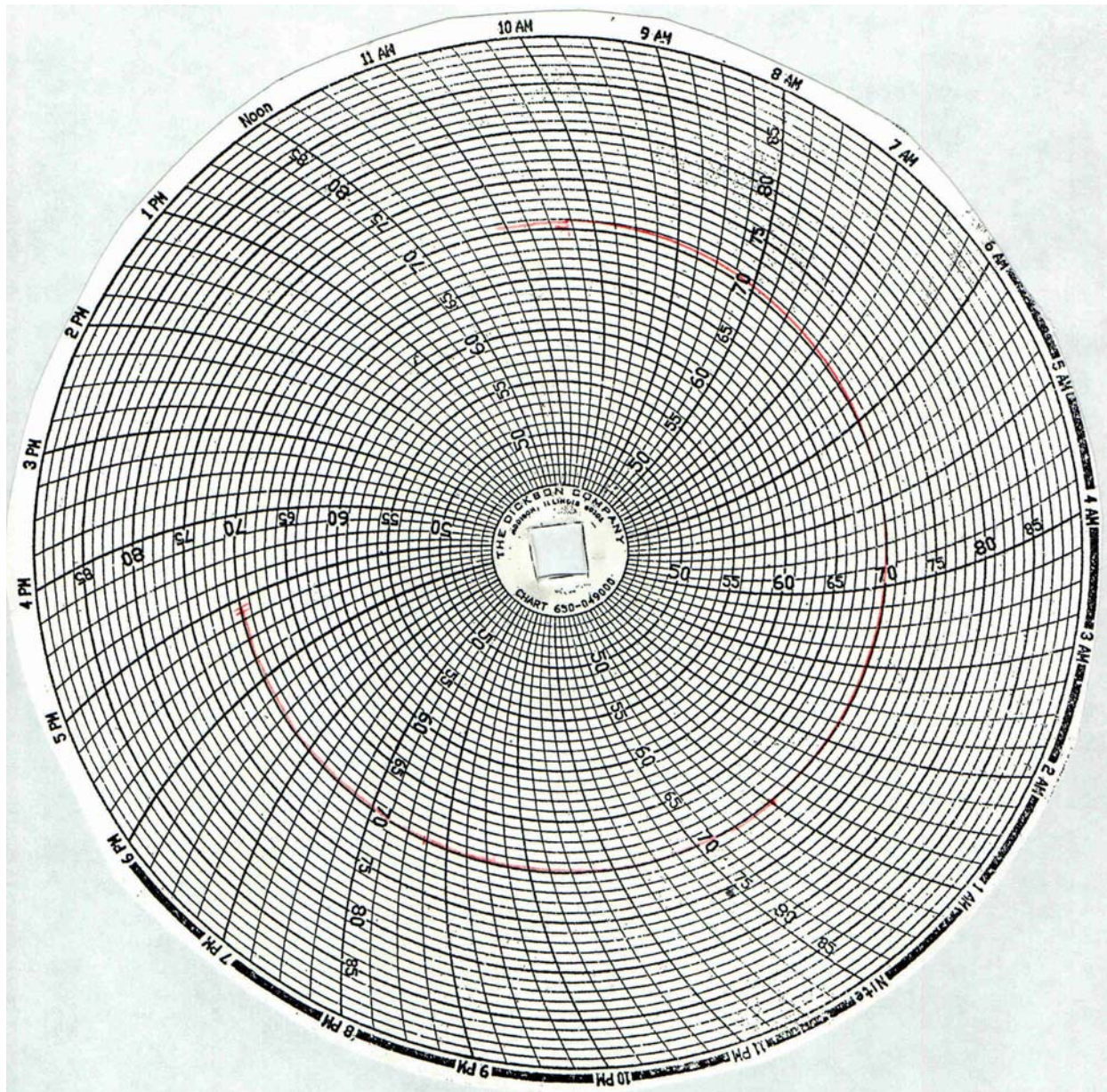
ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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

DATA SHEET NO. 17
DUMMY/VEHICLE TEMPERATURE STABILIZATION DATA

Test Vehicle: 2011 Ford Fiesta S 4-Dr Sedan
Test Program: NCAP Frontal Barrier Impact Test

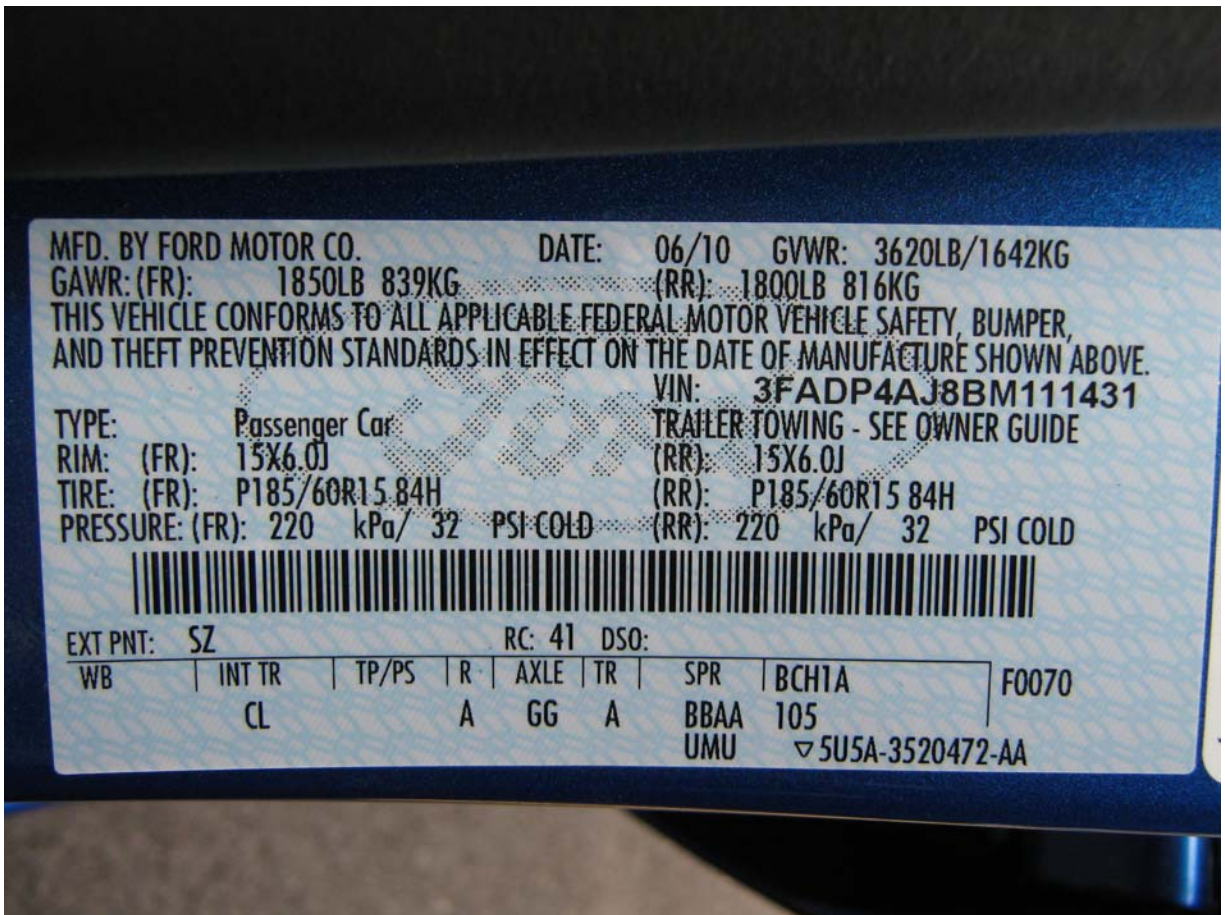
NHTSA No.: MB0214
Test Date: 8/18/2010



APPENDIX A
PHOTOGRAPHS

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Photo No. 4.	Left Rear Three-Quarter View, As Received	A-2
Photo No. 5.	Vehicle Impact	A-3
Photo No. 6.	Monroney Label	A-4



Manufacturer's Label



Tire Placard



Right Front Three-Quarter View, As Received



Left Rear Three-Quarter View, As Received



Vehicle Impact

2011 4-DOOR SEDAN S
9-PASSENGER
1.8L ITC DURATECH DOHC I4
POWER SHIFT 6 SPD AUTO TRAN

VEHICLE DESCRIPTION

FIESTA

EXTERIOR
BLUE FLAME METALLIC
INTERIOR
CHARCOAL BLACK W/LT STONE C

BM 111431

www.fordvehicles.com

STANDARD EQUIPMENT INCLUDED AT NO EXTRA CHARGE

- EXTERIOR
 - 15" STEEL WHEEL W/ COVER
 - EASYFUEL CAPLESS FILLER
 - INTEGRATED SPOTTER MIRRORS
 - POWER MIRRORS
 - QUAD BEAM HALOGEN HEADLAMP
 - REAR WINDOW DEFROSTER
 - VARIABLE INTERVAL WIPERS
- INTERIOR
 - 60/40 SPLIT FOLD REAR SEAT
 - AM/FM STEREO
 - AUXILIARY AUDIO INPUT JACK
 - AIR CONDITIONING
 - CENVER DOOR LOCKS
 - 4-SPK PREMIUM SOUND
 - CLOTH BUCKET FRONT SEATS
 - FLOOR MATS - 1ST ROW
 - DUAL SUNVISORS
 - POWER LOCKS
- FUNCTIONAL
 - ADVANCETRAC W/ESC
 - FRONT DISC REAR DRUM BRAKES (ABS)
 - POWER STEERING W/EPAS
 - TILT/TELESCOPE WHEEL
 - SAFETY/SECURITY
 - DRIVER/PASSENGER AIR BAGS
 - DRIVE KNEE AIRBAG
 - SIDE AIR BAGS/CURTAINS
 - CHILD SAFETY REAR DR LOCKS
 - SECURITY ANTI-THEFT ENGINE IMMOBILIZER
 - TIRE PRESSURE MONITOR SYS
 - WARRANTY
 - 3YR/36,000 BUMPER / BUMPER
 - 5YR/60,000 POWERTRAIN
 - 5YR/60,000 ROADSIDE ASSIST

EPA Fuel Economy Estimates

CITY MPG

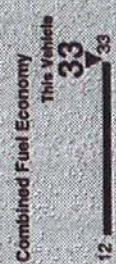
29

Expected range for most drivers 24 to 34 MPG

HIGHWAY MPG

38

Expected range for most drivers 31 to 45 MPG



All Subcompact



See the FREE Fuel Economy Guide at dealers or www.fueleconomy.gov

SOLD TO 41E 585 Gordie Boucher of West Bend, I 3021 West Washington Avenue West Bend WI 53095	ONE RJ73	DEALER NO. 41E 585	METHOD OF TRANSP. RAIL	ITEM #: 41-V015 OJT 2
SHIP TO IF OTHER THAN SOLD TO	TWO	3FADPAAJ8BM111431		
SHIP THROUGH	FINAL ASSEMBLY POINT CUAUTITLAN	AF081 N RA 2X 125 000072 06 08 10	This label is affixed pursuant to the Federal Automobile Information Disclosure Act. Dealer, Location, and Title Fees, State and Local Taxes are not included. Dealer reserves the right to substitute an equivalent model without notice.	

EXTENDED WARRANTY

Ford Extended Service Plan is the only service contract backed by Ford and licensed at all Ford and Lincoln Mercury Dealers. Ask your dealer for prices and additional details or see our website at www.ford-esp.com

PRICE INFORMATION

STANDARD VEHICLE PRICE \$13,320.00

INCLUDED ON THIS VEHICLE
RAPID SPEC 100A

OPTIONAL EQUIPMENT

- POWER SHIFT 6 SPD AUTO TRANS 1,070.00
- FRONT LICENSE PLATE BRACKET NO CHARGE
- ENGINE BLOCK HEATER 25.00
- 50 STATE EMISSIONS NO CHARGE
- CONVENIENCE PACKAGE 495.00
- AUTO LOCKING DOORS
- SINGLE CD W/MP3 W/SPEAKERS 95.00
- REMOTE KEYLESS ENTRY W/DCK RE 1,685.00
- KEYLESS ENTRY KEYPAD
- TOTAL OPTIONS

TOTAL VEHICLE & OPTIONS 15,005.00

DESTINATION & DELIVERY 675.00

This vehicle qualifies for auto insurance discounts, call 1-866-367-3131 or visit www.fordautoinsurance.com for Ford Motor Company Insurance Services availability in your state.

TOTAL MSRP \$15,680.00

GOVERNMENT SAFETY RATINGS

Frontal Crash Driver Not Rated
Passenger Not Rated
Star ratings based on the risk of injury in a frontal impact. Frontal ratings should ONLY be compared to other vehicles of similar size and weight.

Side Crash Front seat Not Rated
Rear seat Not Rated
Star ratings based on the risk of injury in a side impact.

Rollover Not Rated
Star ratings 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 call 1-888-327-4236

APPENDIX B
DUMMY RESPONSE DATA

TABLE OF DATA PLOTS

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Figure No. 35. Passenger Left Femur Force vs. Time	B-12
Figure No. 36. Passenger Right Femur Force vs. Time	B-12

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 – not installed

Driver Lap Belt Force

Driver Left Upper Tibia Moment X

Driver Left Upper Tibia Moment Y

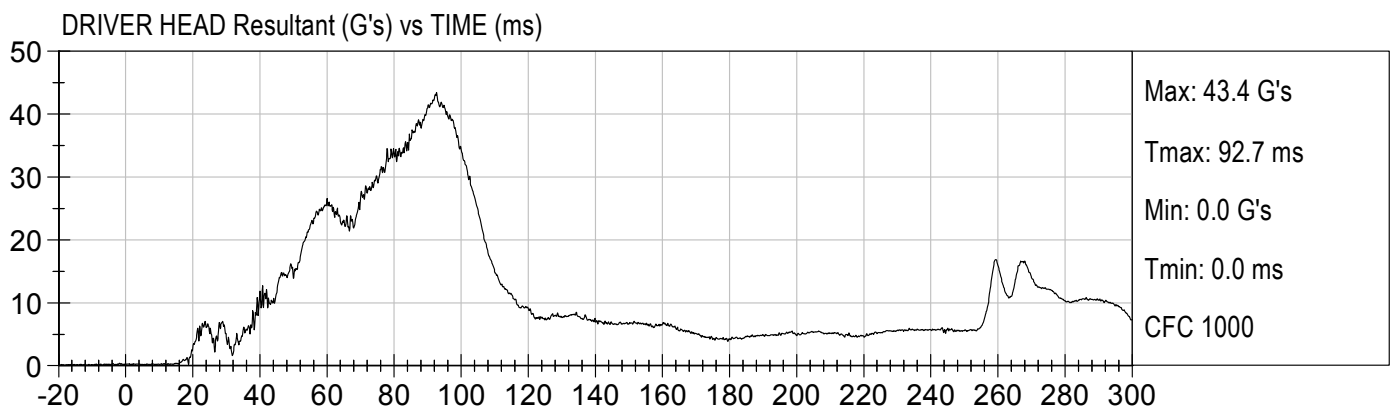
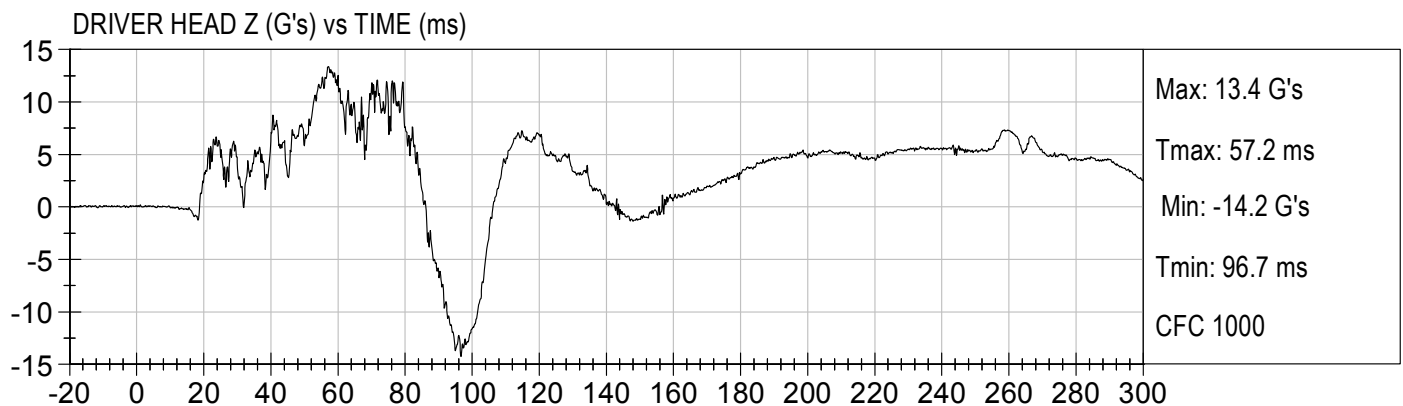
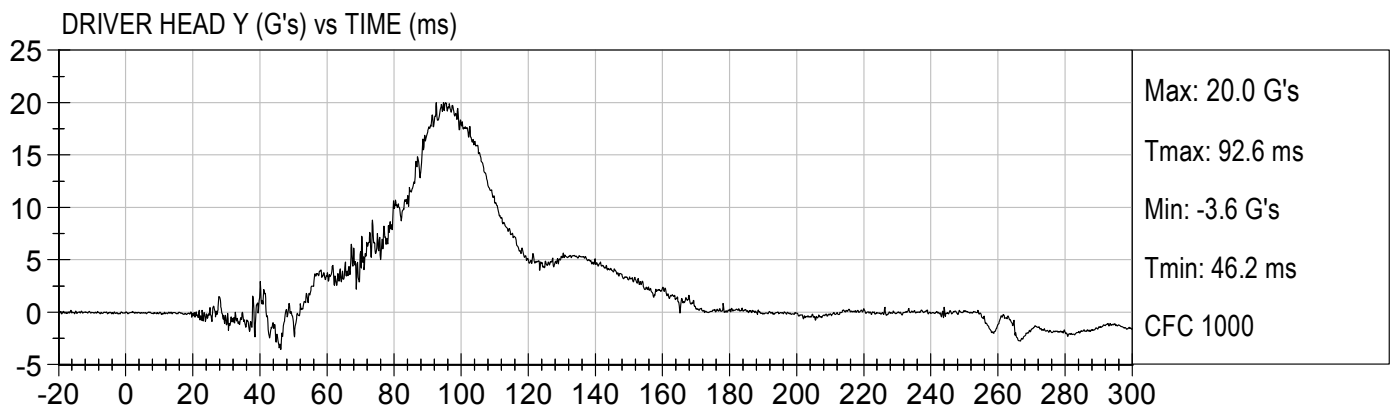
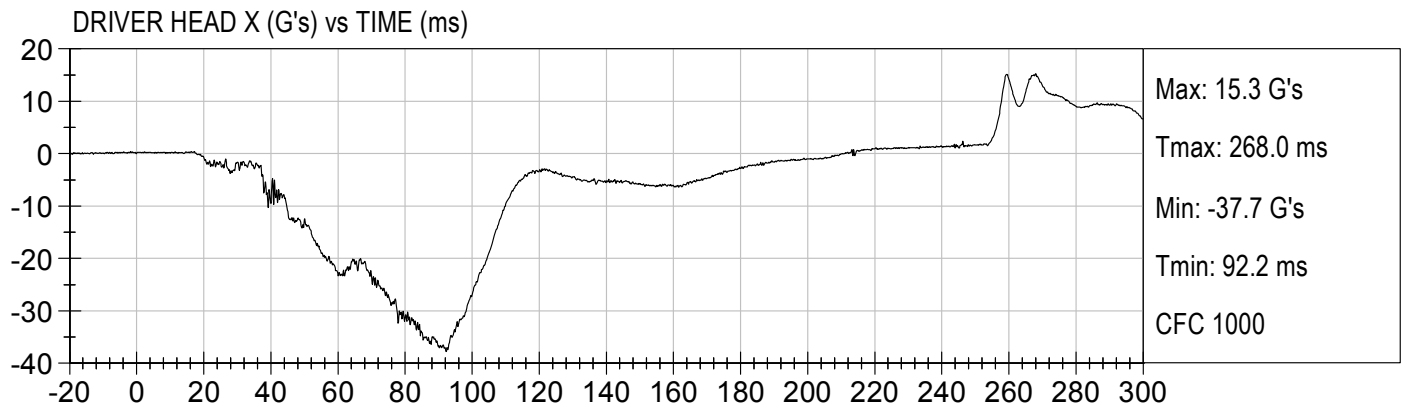
Driver Left Upper Tibia Force Z

Driver Left Lower Tibia Moment X

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
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 Lap Belt Force
Passenger Shoulder Belt Force – not installed
Passenger Left Upper Tibia Moment X
Passenger Left Upper Tibia Moment Y
Passenger Left Upper Tibia Force Z
Passenger Left Lower Tibia Moment X

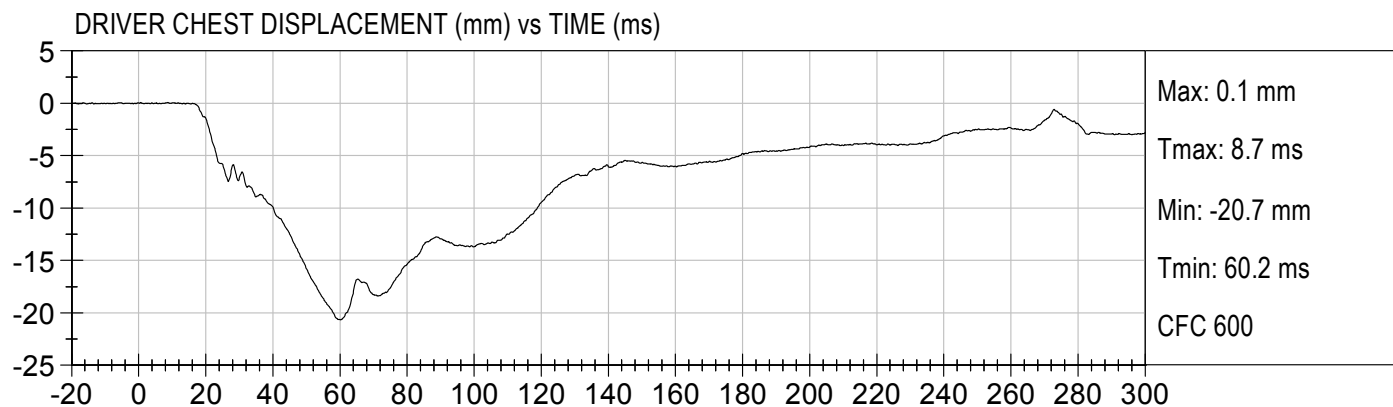
Passenger Left Lower Tibia Moment Y
Passenger Left Lower Tibia Force Z
Passenger Right Upper Tibia Moment X
Passenger Right Upper Tibia Moment Y
Passenger Right Upper Tibia Force Z
Passenger Right Lower Tibia Moment X
Passenger Right Lower Tibia Moment Y
Passenger Right Lower Tibia Force Z
Passenger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

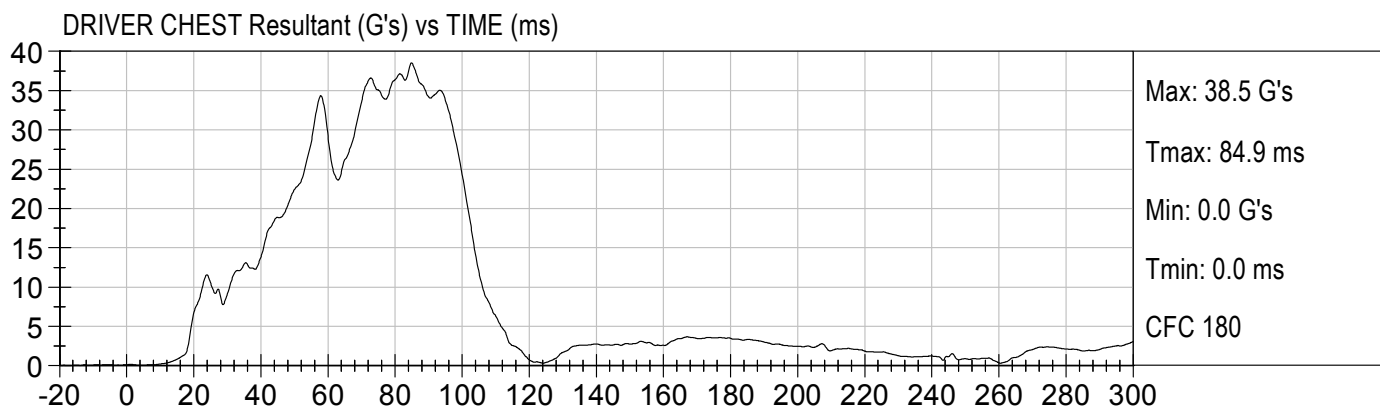
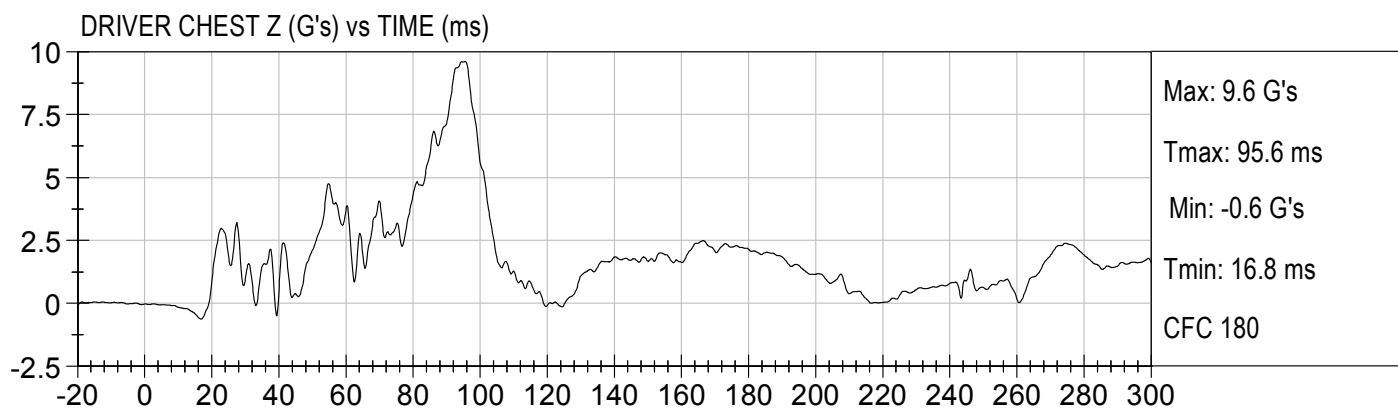
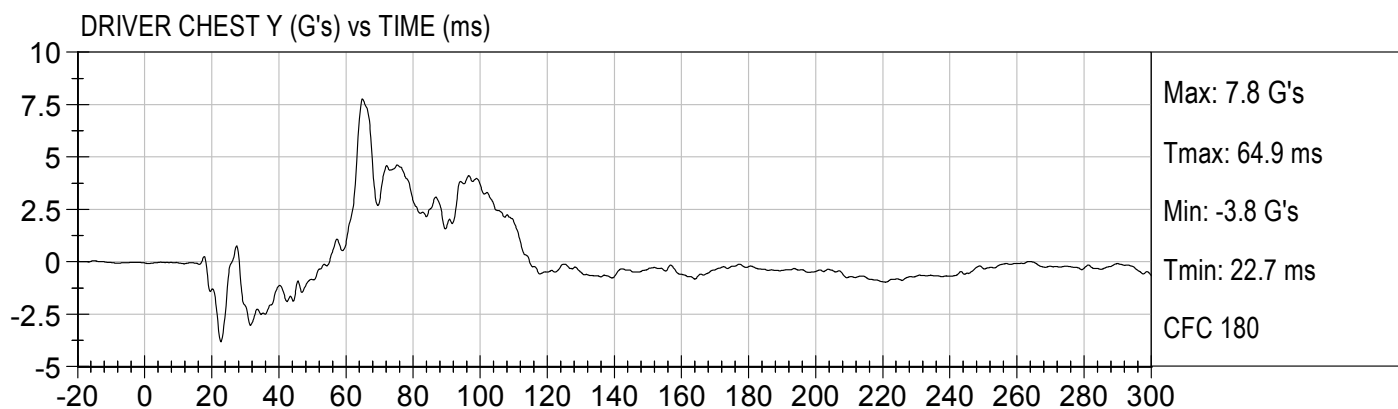
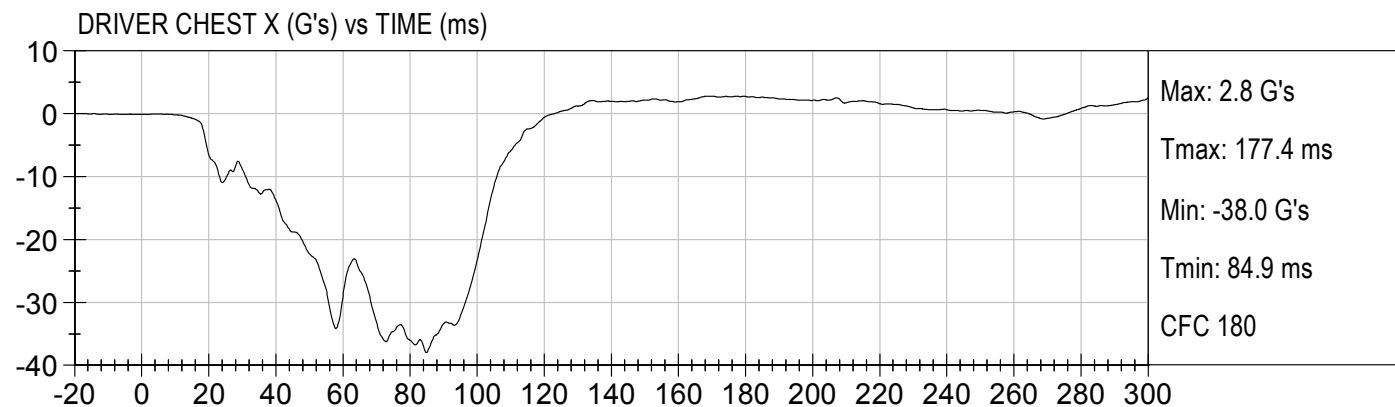


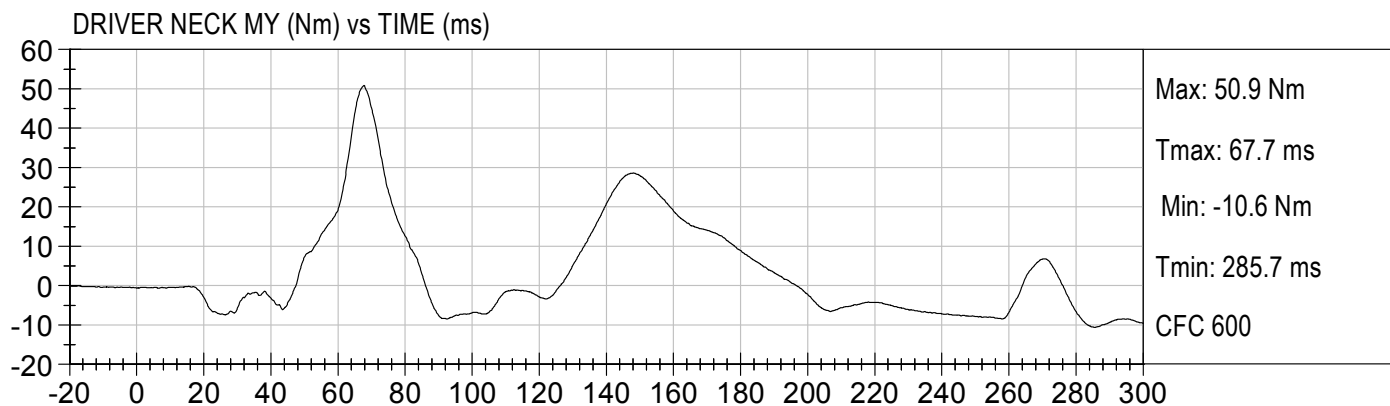
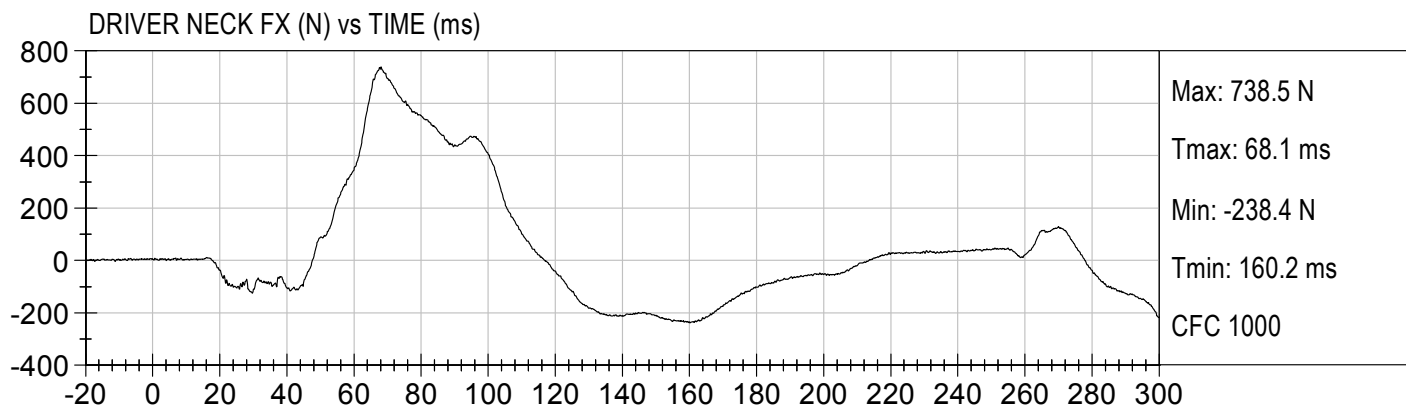


NCAP 35mph Frontal
2011 Ford Fiesta - MB0214

Test Date: 08/18/2010
Speed: 35.1 mph (56.5 km/h)

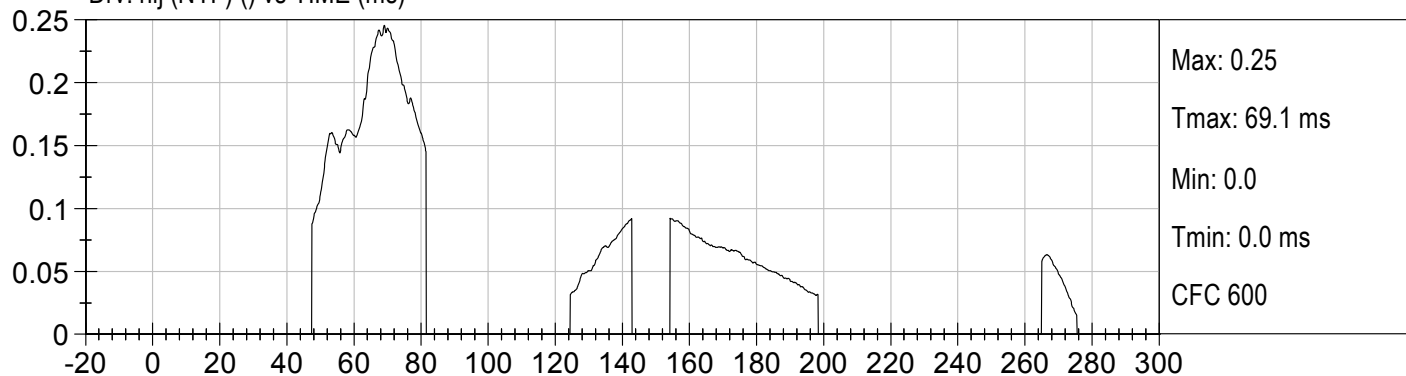




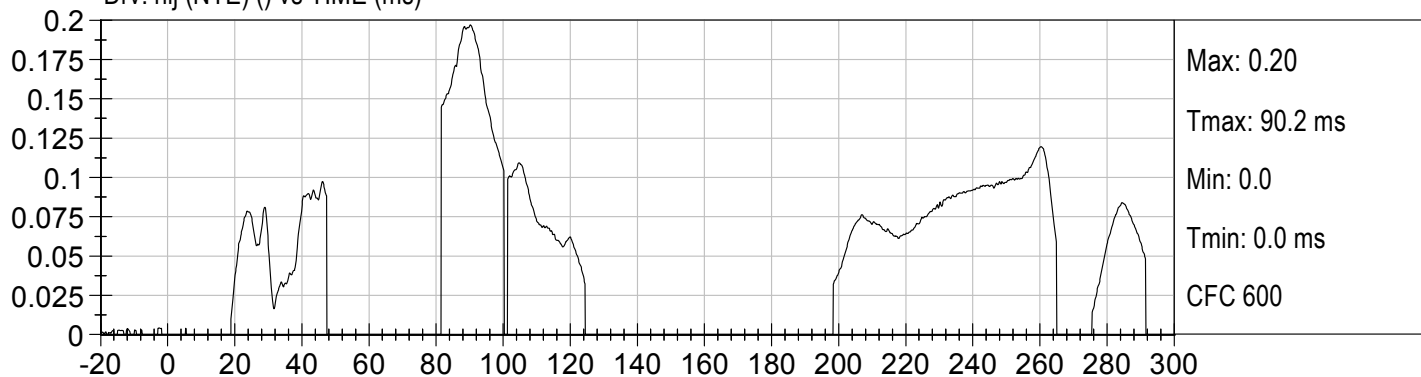




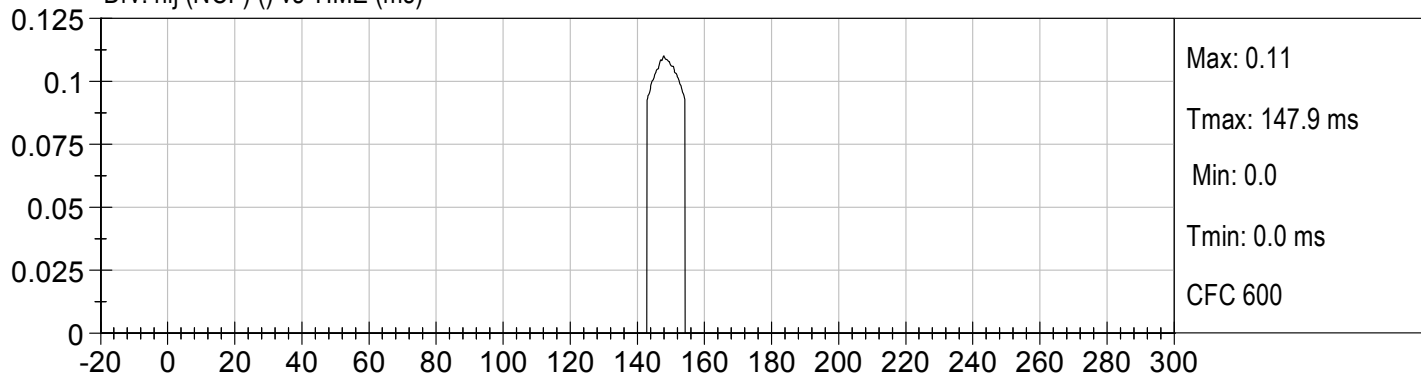
Drv. nij (NTF) () vs TIME (ms)



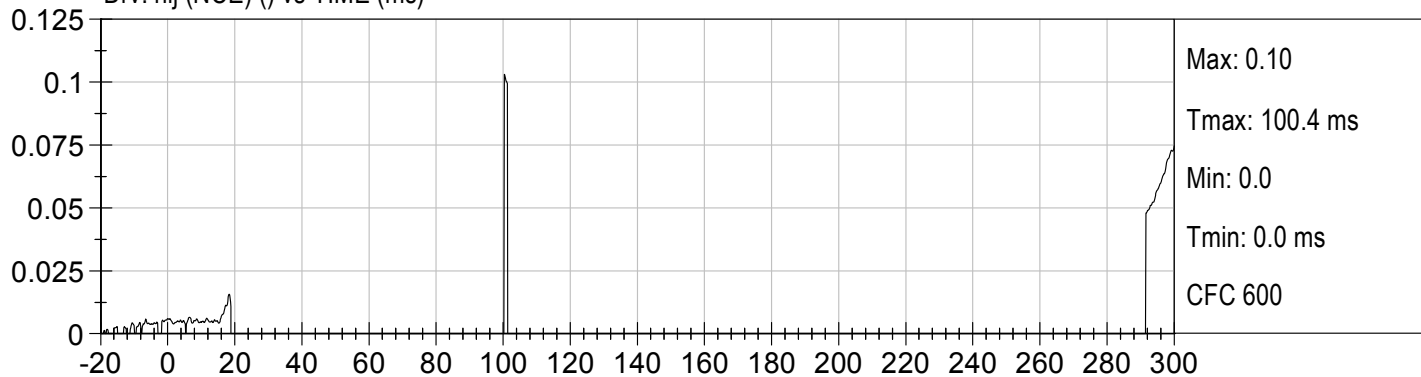
Drv. nij (NTE) () vs TIME (ms)

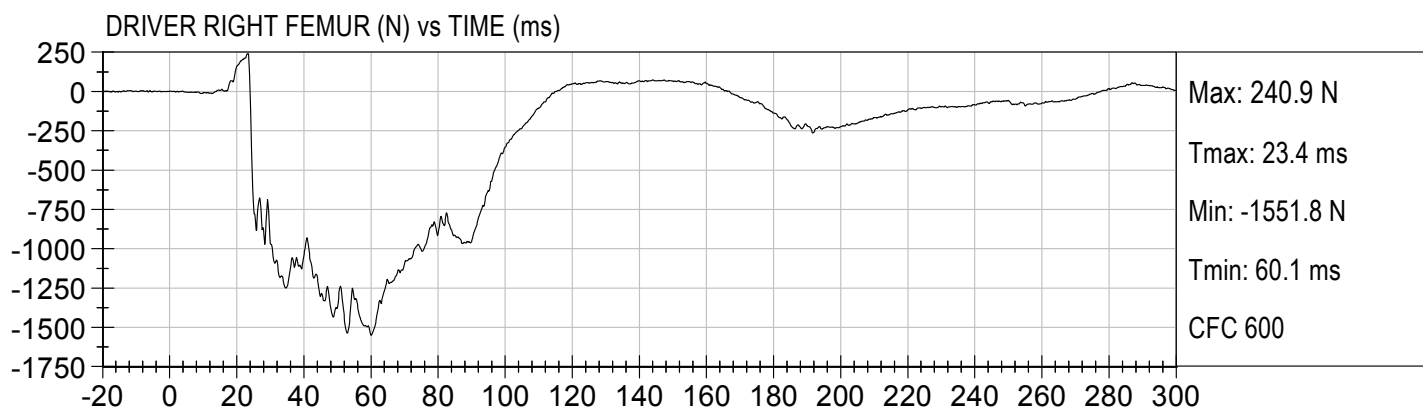
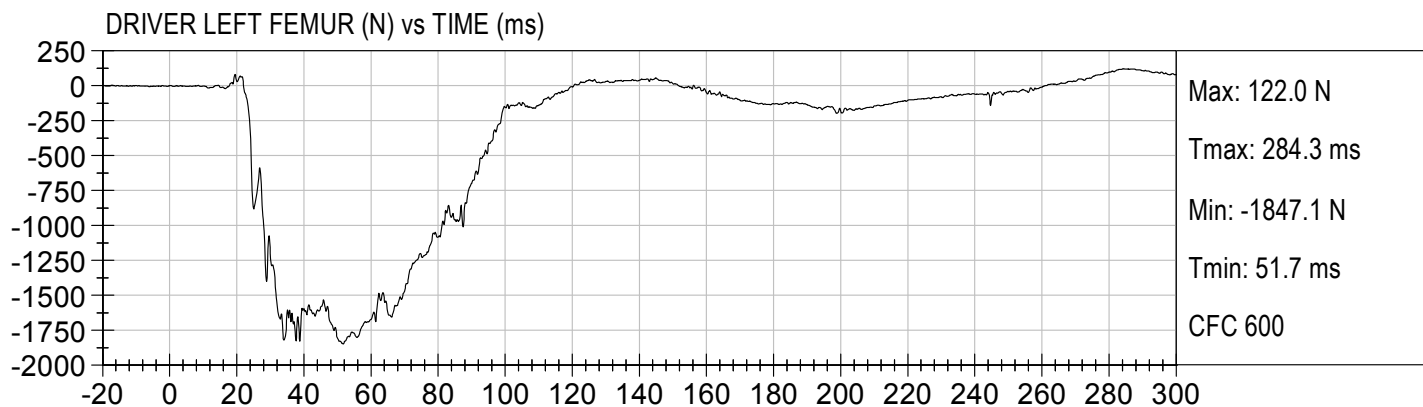


Drv. nij (NCF) () vs TIME (ms)



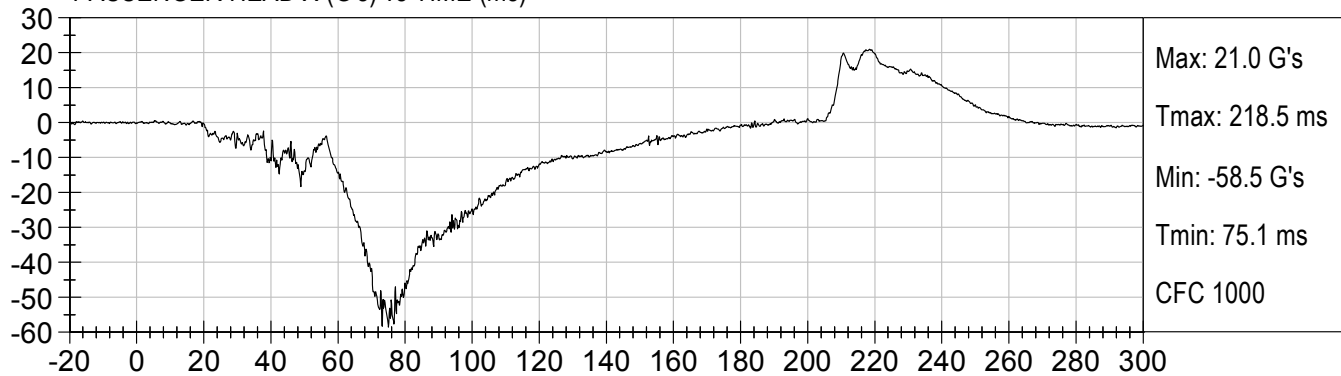
Drv. nij (NCE) () vs TIME (ms)



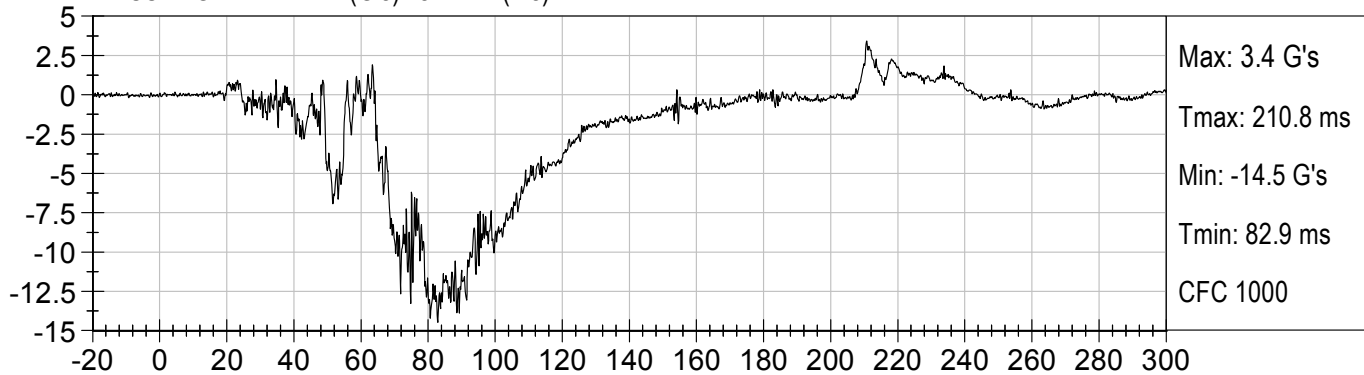




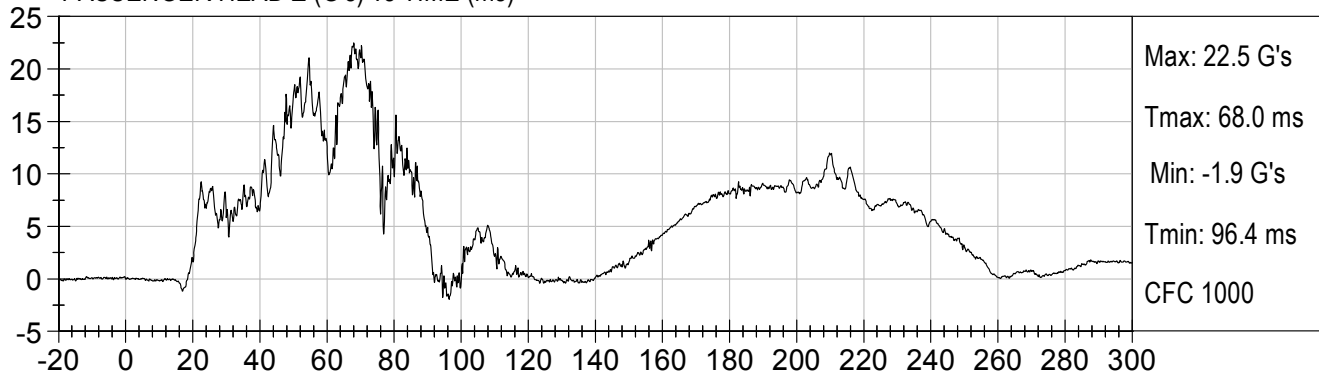
PASSENGER HEAD X (G's) vs TIME (ms)



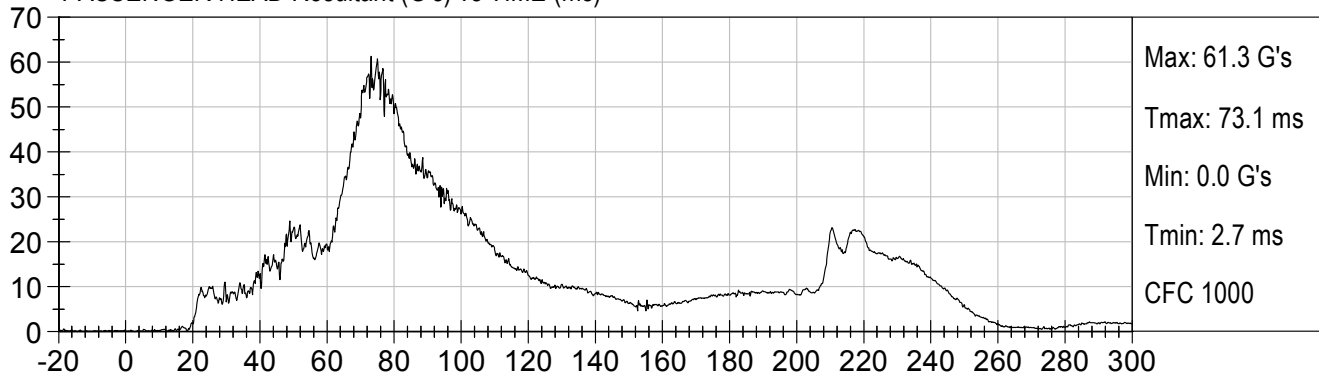
PASSENGER HEAD Y (G's) vs TIME (ms)

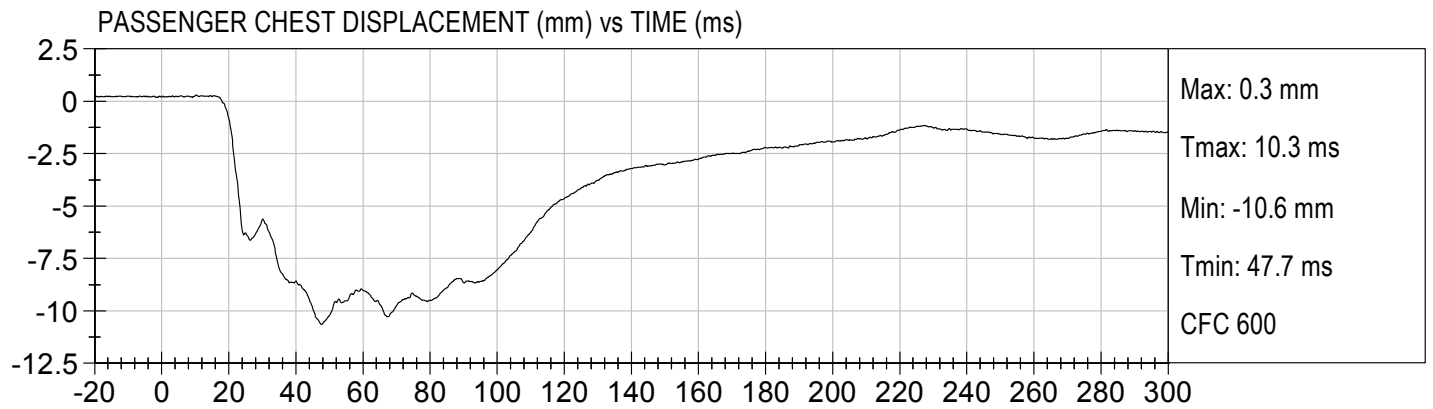


PASSENGER HEAD Z (G's) vs TIME (ms)



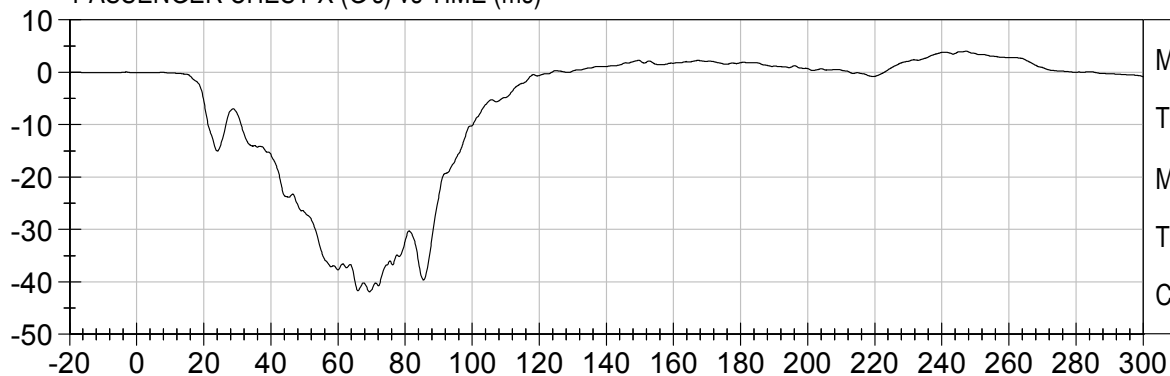
PASSENGER HEAD Resultant (G's) vs TIME (ms)





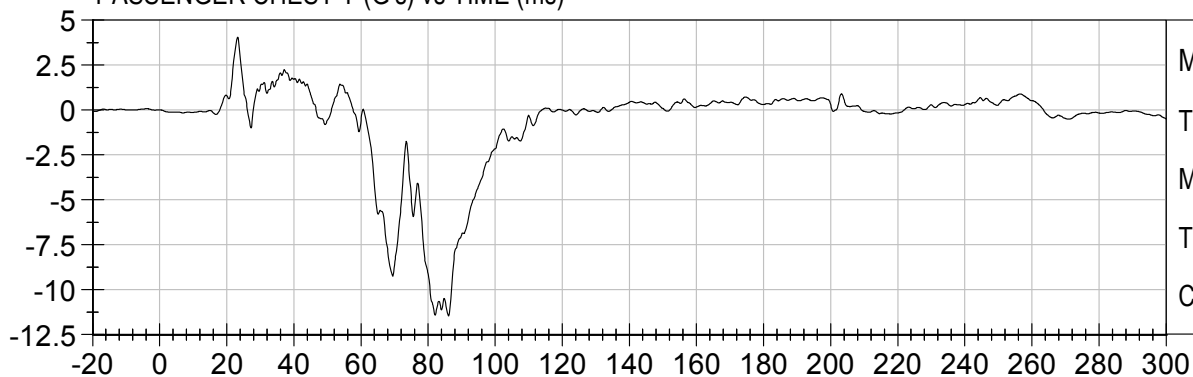


PASSENGER CHEST X (G's) vs TIME (ms)



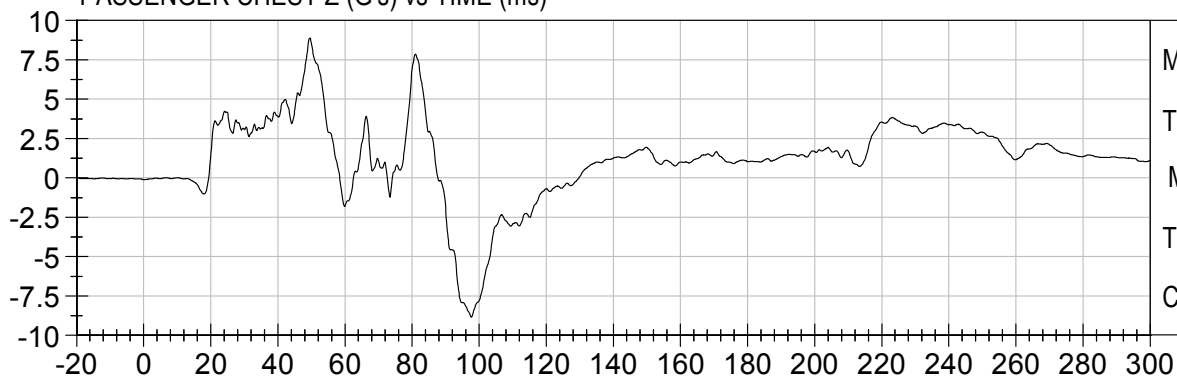
Max: 4.0 G's
Tmax: 247.2 ms
Min: -41.9 G's
Tmin: 69.4 ms
CFC 180

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



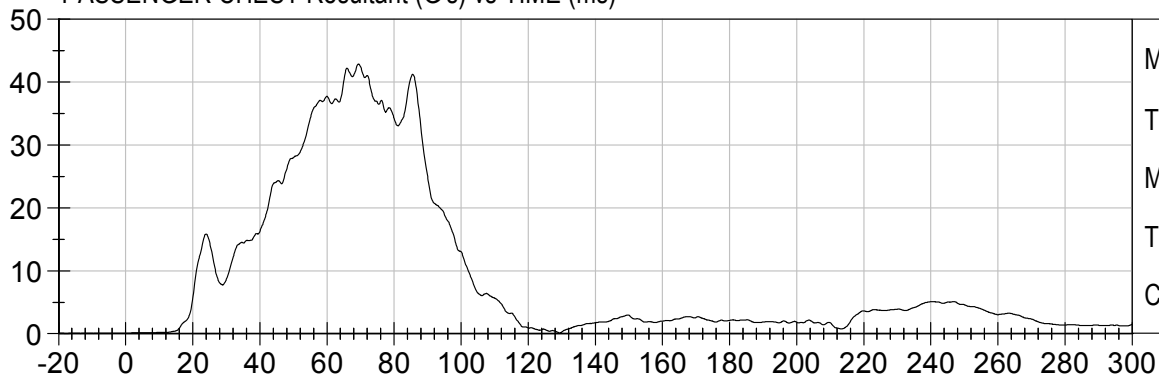
Max: 4.0 G's
Tmax: 23.3 ms
Min: -11.5 G's
Tmin: 86.1 ms
CFC 180

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



Max: 8.9 G's
Tmax: 49.5 ms
Min: -8.8 G's
Tmin: 97.7 ms
CFC 180

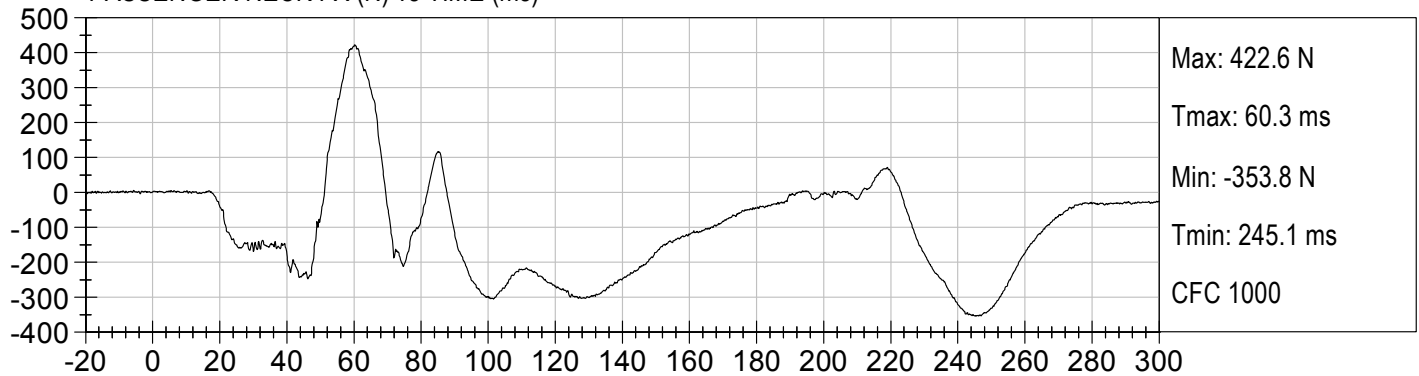
PASSENGER CHEST Resultant (G's) vs TIME (ms)



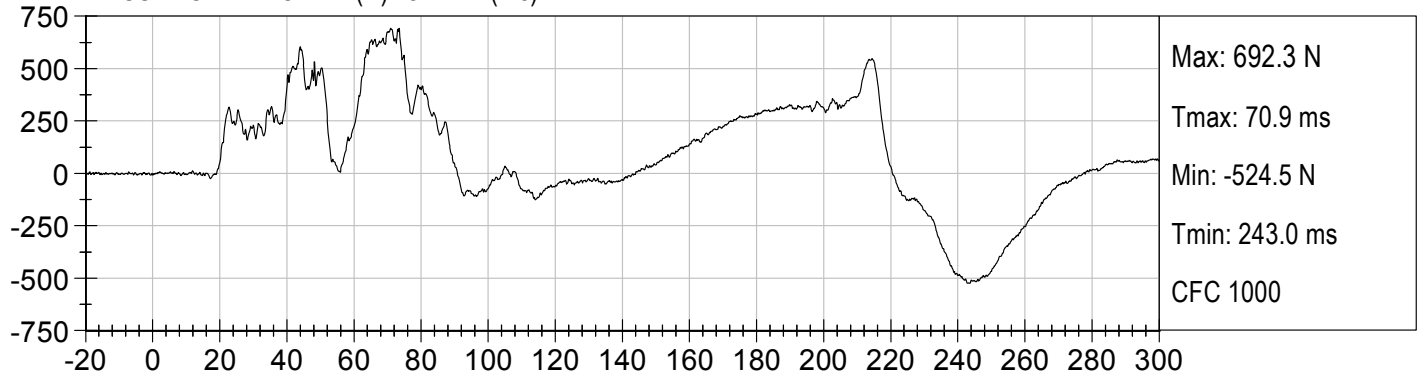
Max: 42.9 G's
Tmax: 69.4 ms
Min: 0.0 G's
Tmin: 0.0 ms
CFC 180



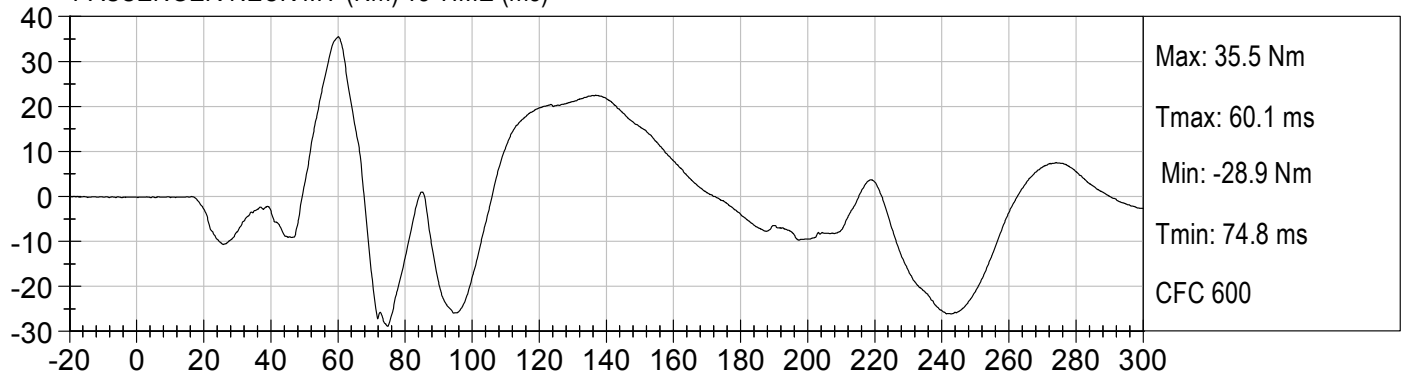
PASSENGER NECK FX (N) vs TIME (ms)



PASSENGER NECK FZ (N) vs TIME (ms)

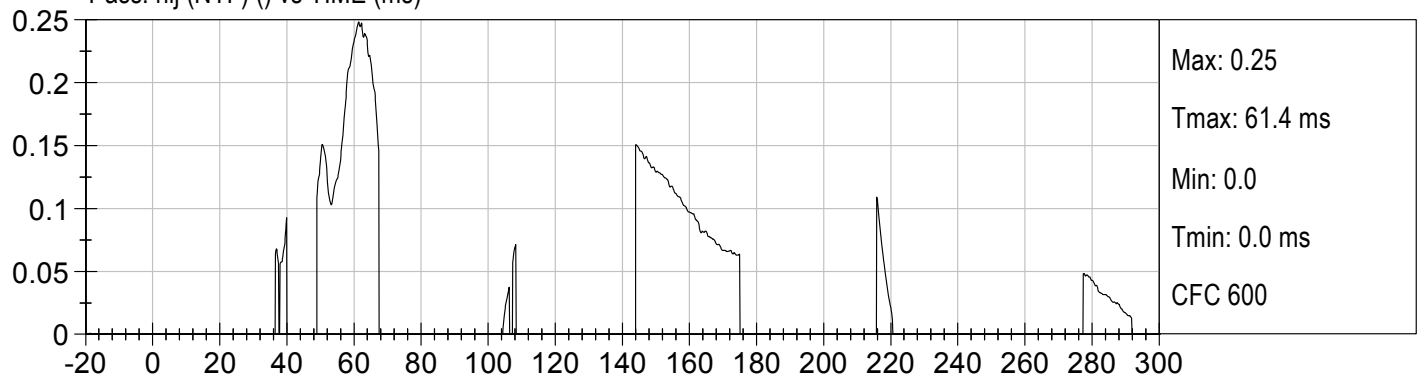


PASSENGER NECK MY (Nm) vs TIME (ms)

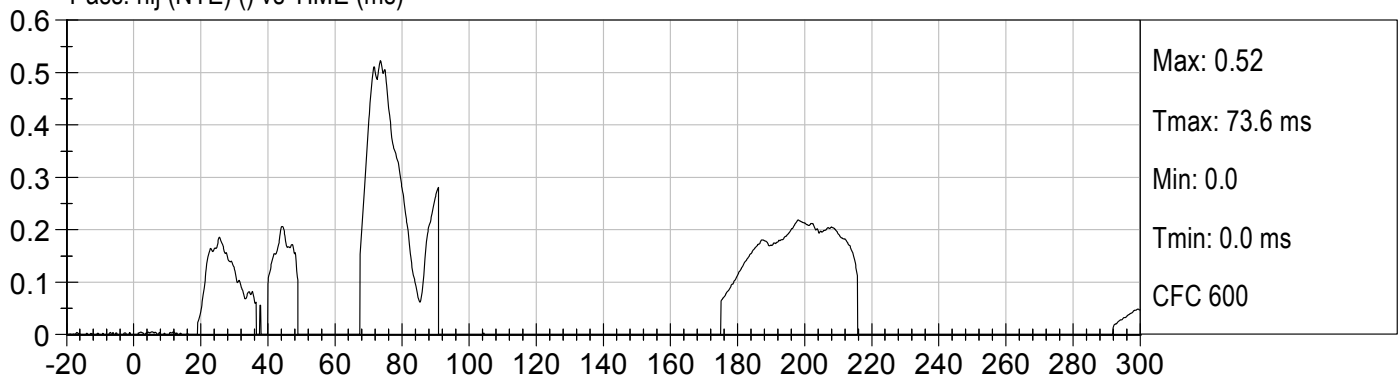




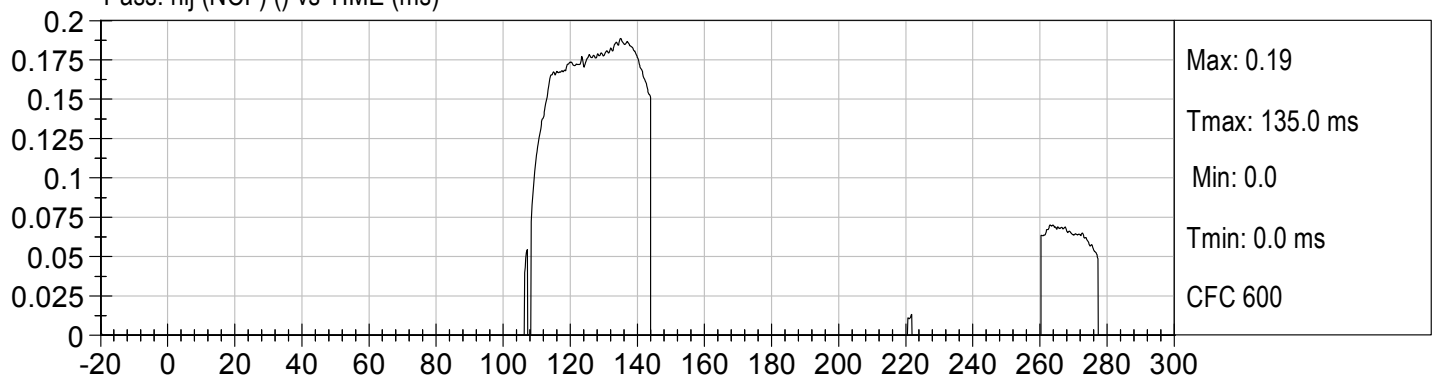
Pass. nij (NTF) () vs TIME (ms)



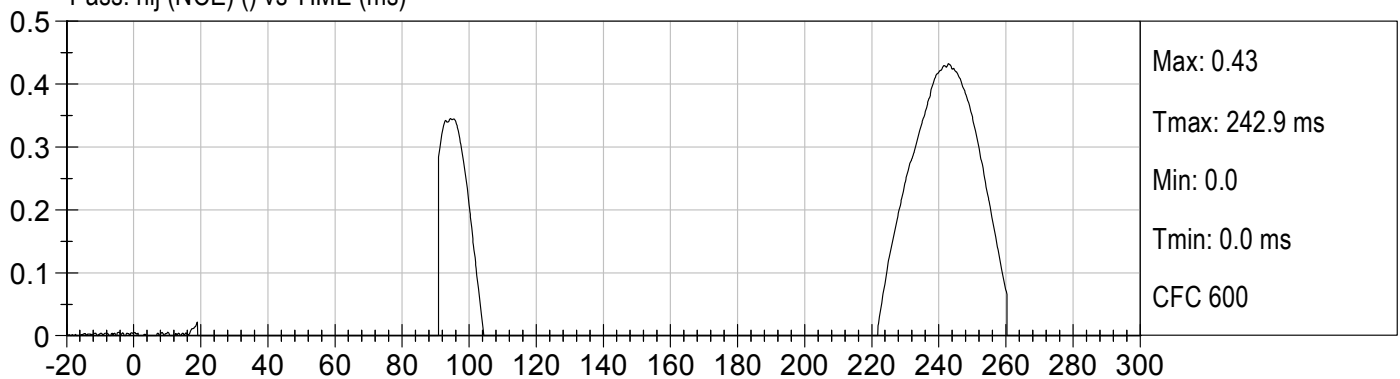
Pass. nij (NTE) () vs TIME (ms)

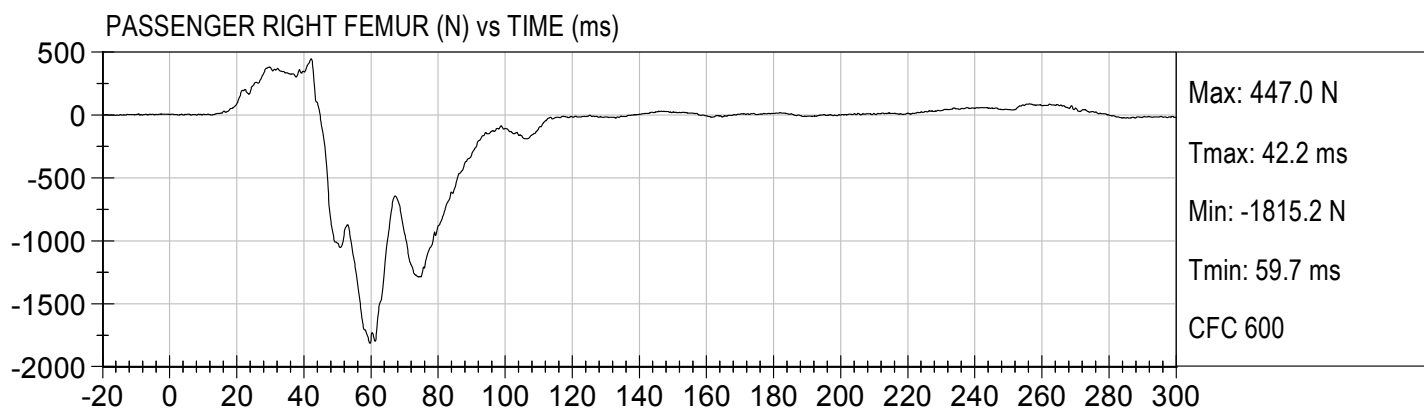
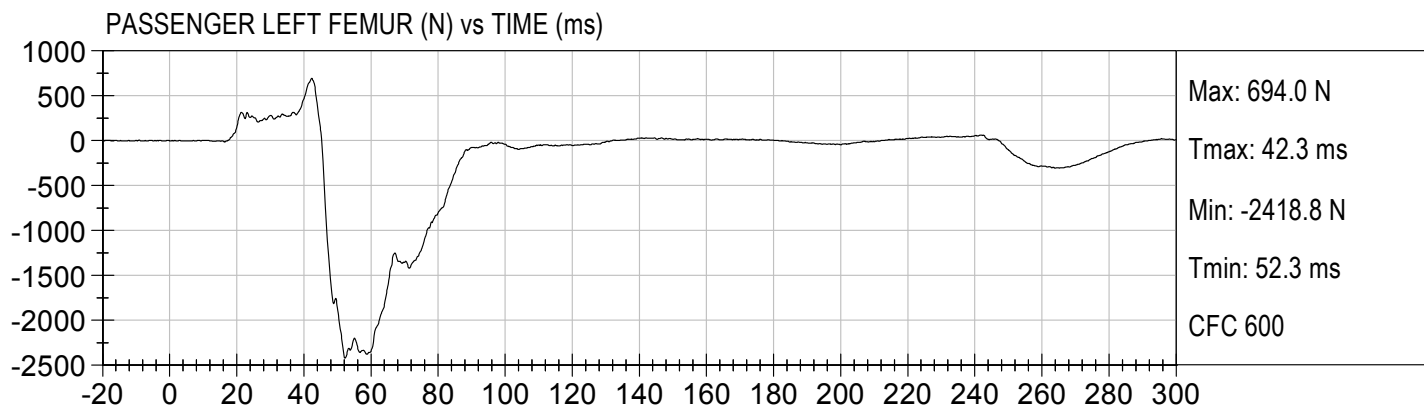


Pass. nij (NCF) () vs TIME (ms)



Pass. nij (NCE) () vs TIME (ms)





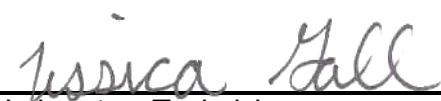
APPENDIX C
DUMMY CALIBRATION DATA

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

ATD Serial No: 351

Test ID: D102591

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	50	Pass
Peak Resultant Acceleration	G's	225 - 275	271	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	3.5	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

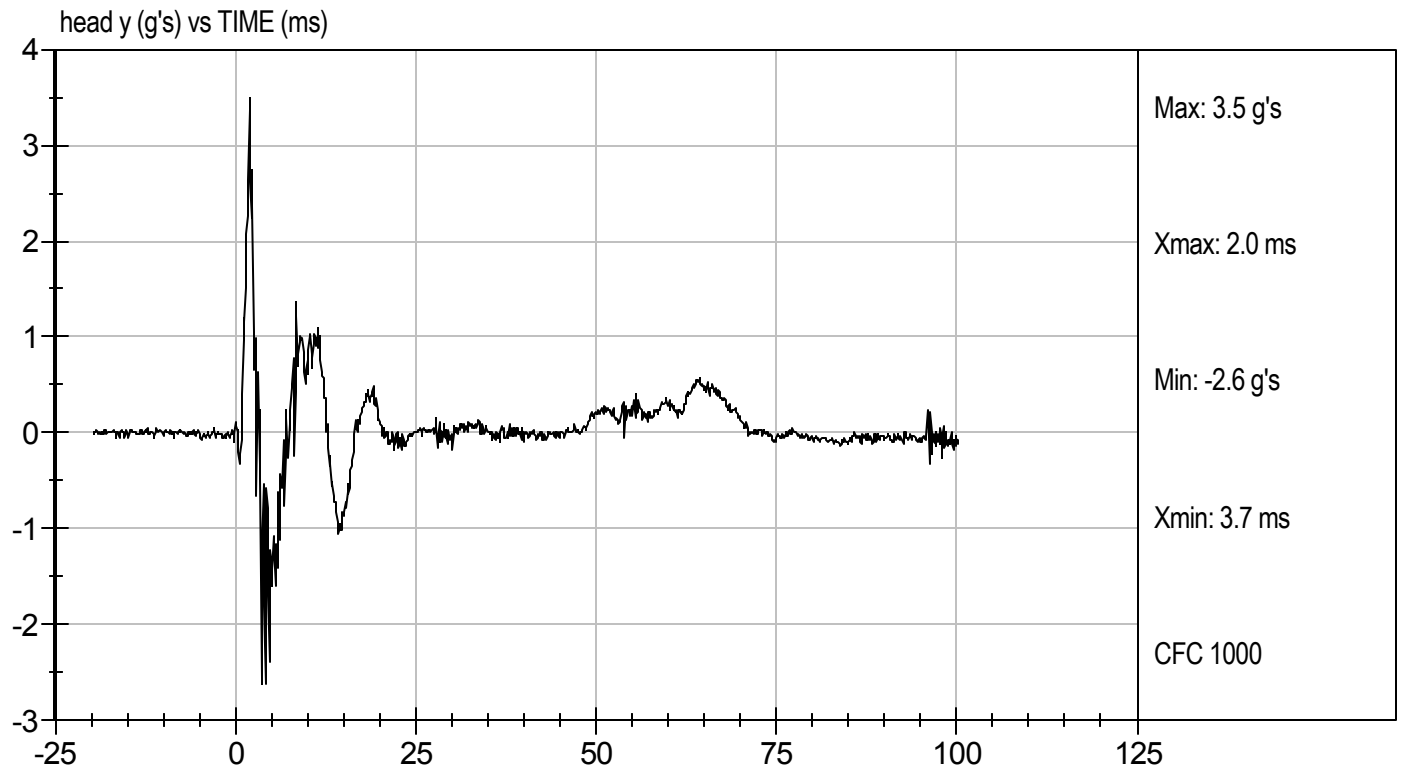
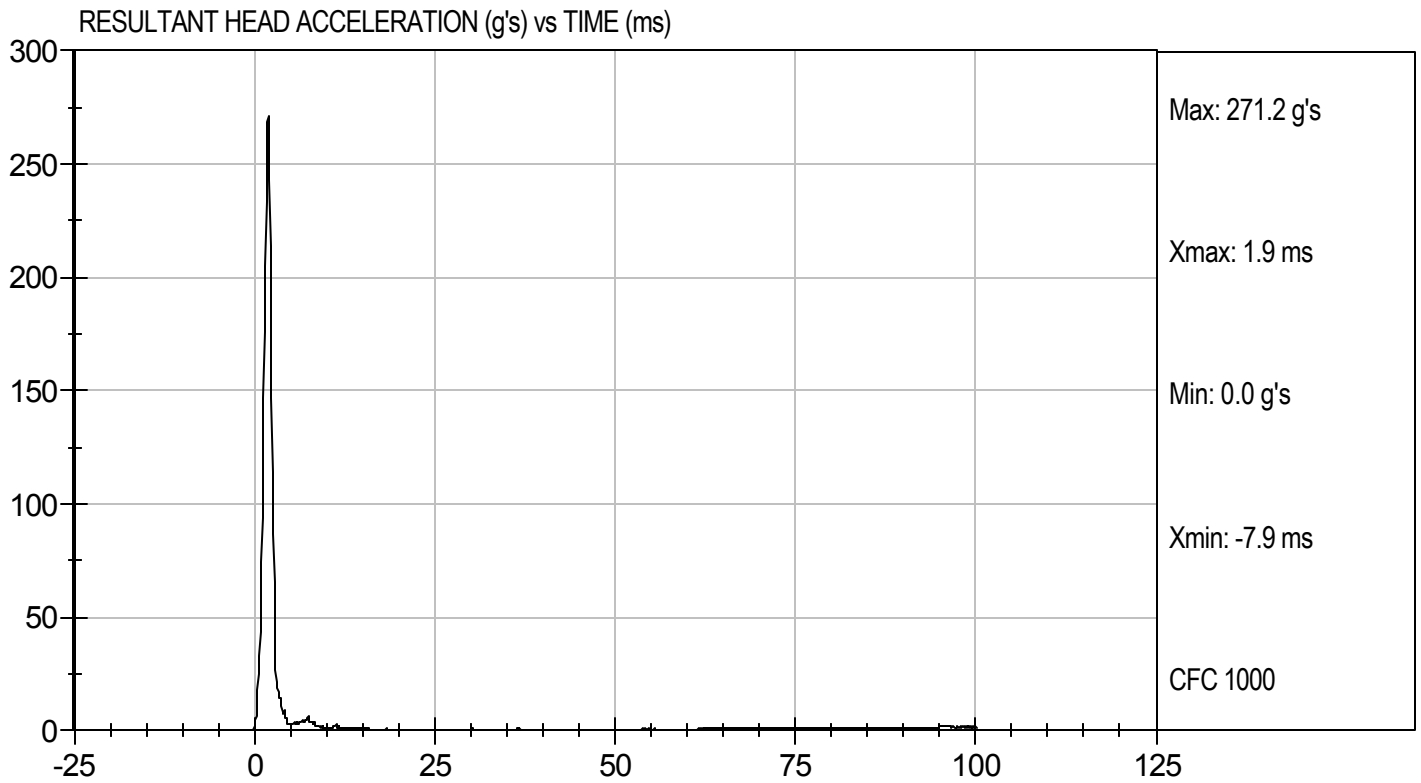
8/13/10
Test Date


Approved By



Test Desc: Head Drop
Component ID: D102591

Test Date: 8/13/10
Velocity: 0 ft/s, 0.00 m/s



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

ATD Serial No: 351

Test I.D: D102592

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.9	Pass
Laboratory Relative Humidity		%	10 to 70	50	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.04	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	24.83	Pass
	20 ms	G's	17.60 to 22.60	19.25	Pass
	30 ms	G's	12.50 to 18.50	14.10	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	14.04	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	36.5	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	71.9	Pass
	Time	ms	57.0 to 64.0	57.8	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	113.2	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	94.8	Pass
	Time	ms	47.0 to 58.0	49.6	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	101.2	Pass
Overall Test Results					Pass


 Laboratory Technician

8/16/10
 Test Date

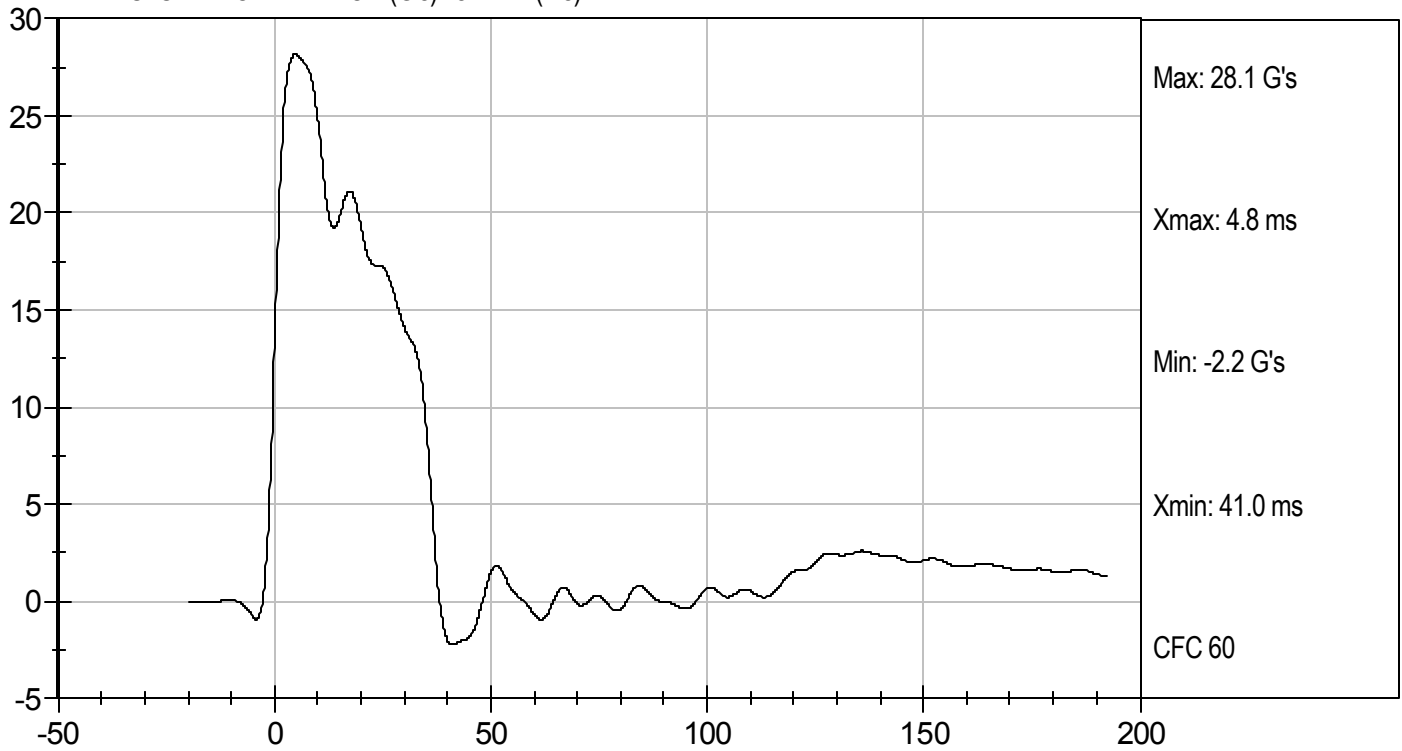

 Approved By



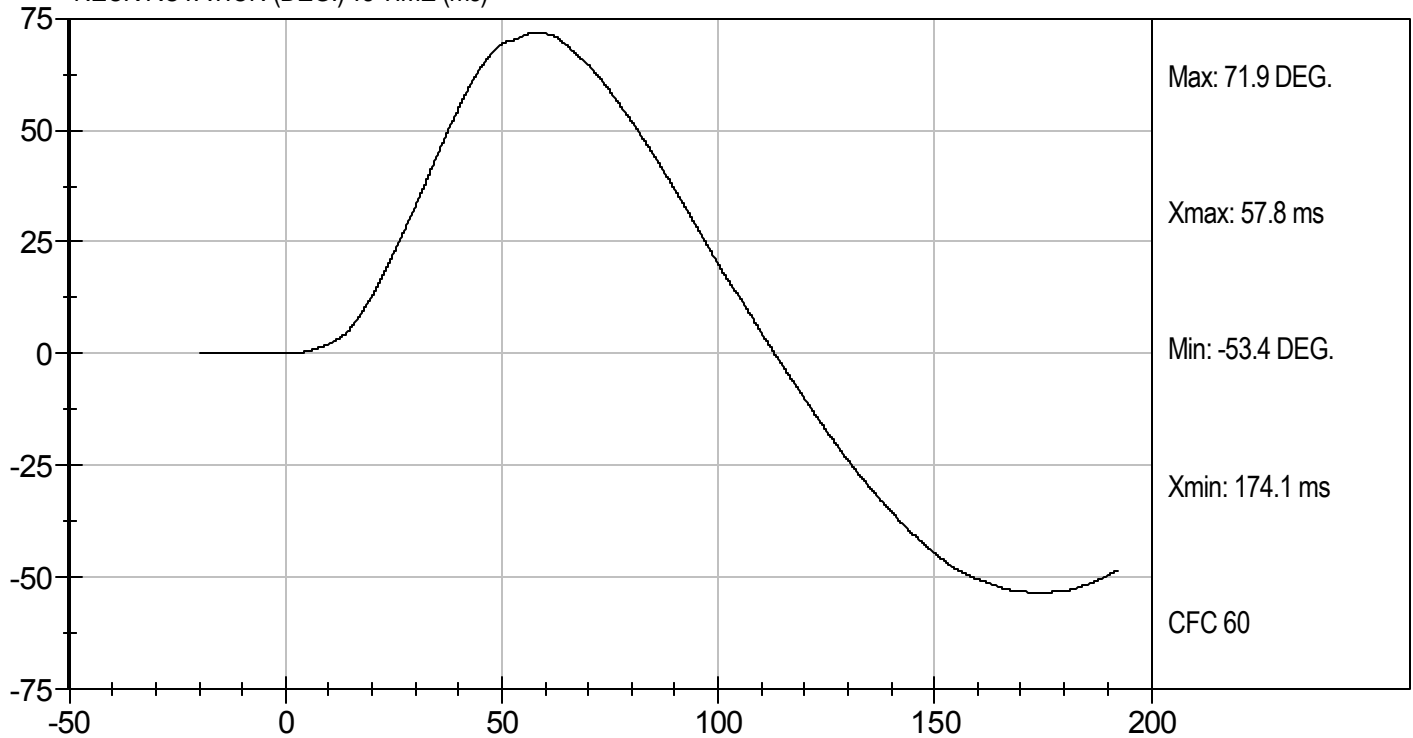
Test Desc: Neck Flexion
Component ID: D102592

Test Date: 8/16/10
Velocity: 23.1 ft/s, 7.04 m/s

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



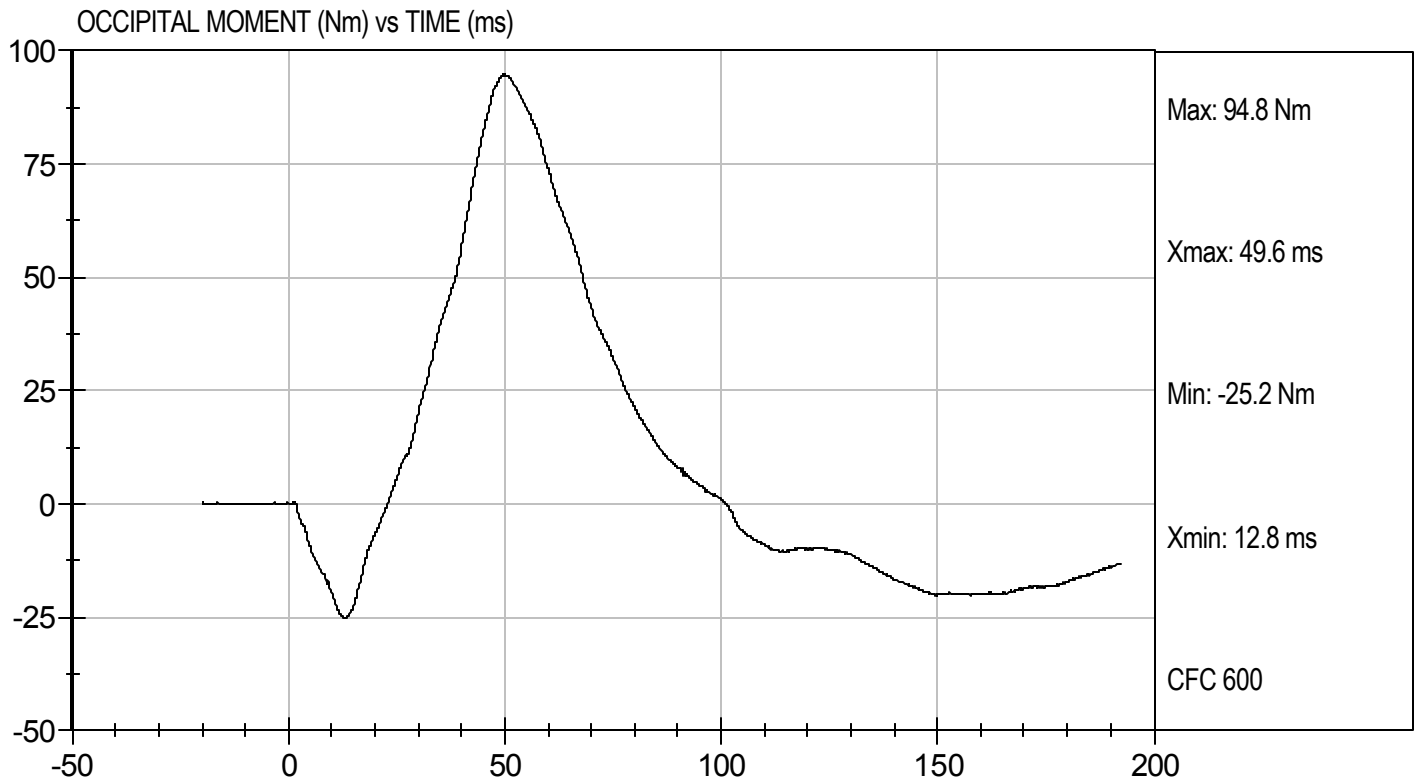
NECK ROTATION (DEG.) vs TIME (ms)





Test Desc: Neck Flexion
Component ID: D102592

Test Date: 8/16/10
Velocity: 23.1 ft/s, 7.04 m/s

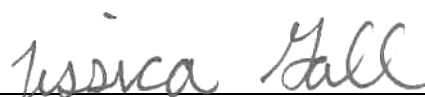


MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351

Test I.D: D102593

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.9	Pass
Laboratory Relative Humidity		%	10 to 70	50	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.04	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	17.71	Pass
	20 ms	G's	14.00 to 19.00	15.46	Pass
	30 ms	G's	11.00 to 16.00	12.58	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	13.13	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	39.3	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	93.5	Pass
	Time	ms	72.0 to 82.0	76.6	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	154.0	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-61.9	Pass
	Time	ms	65.0 to 79.0	70.4	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	141.8	Pass
Overall Test Results					Pass


 Laboratory Technician

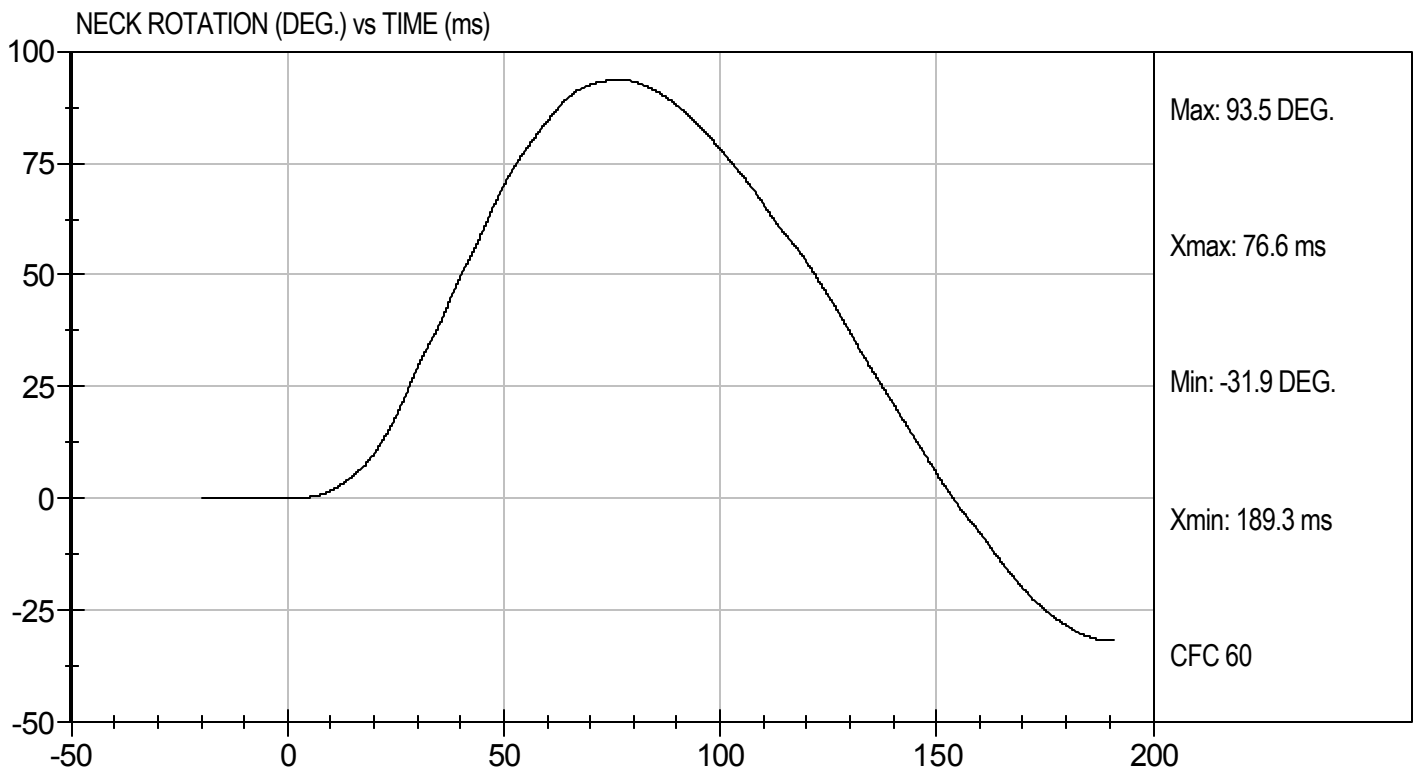
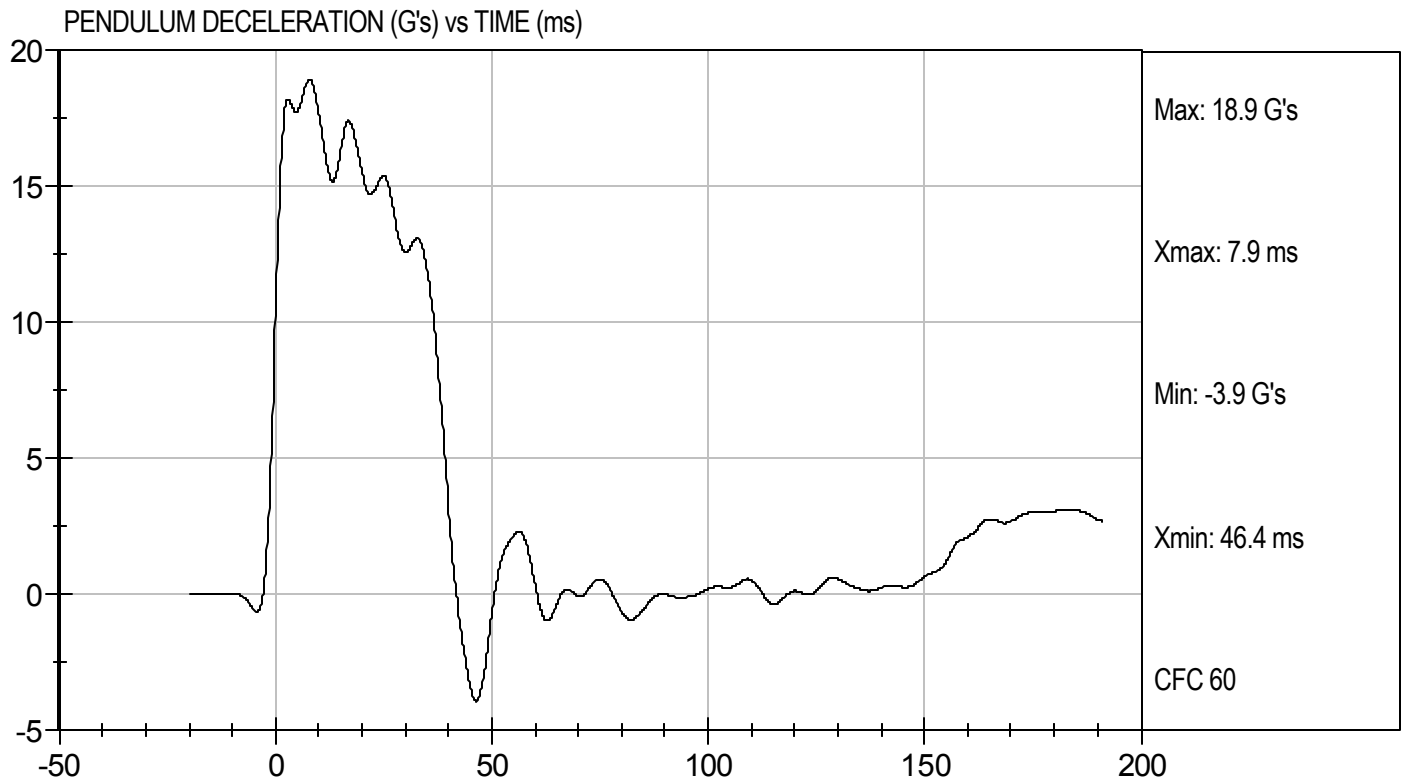
8/16/10
 Test Date


 Approved By



Test Desc: Neck Extension
Component ID: D102593

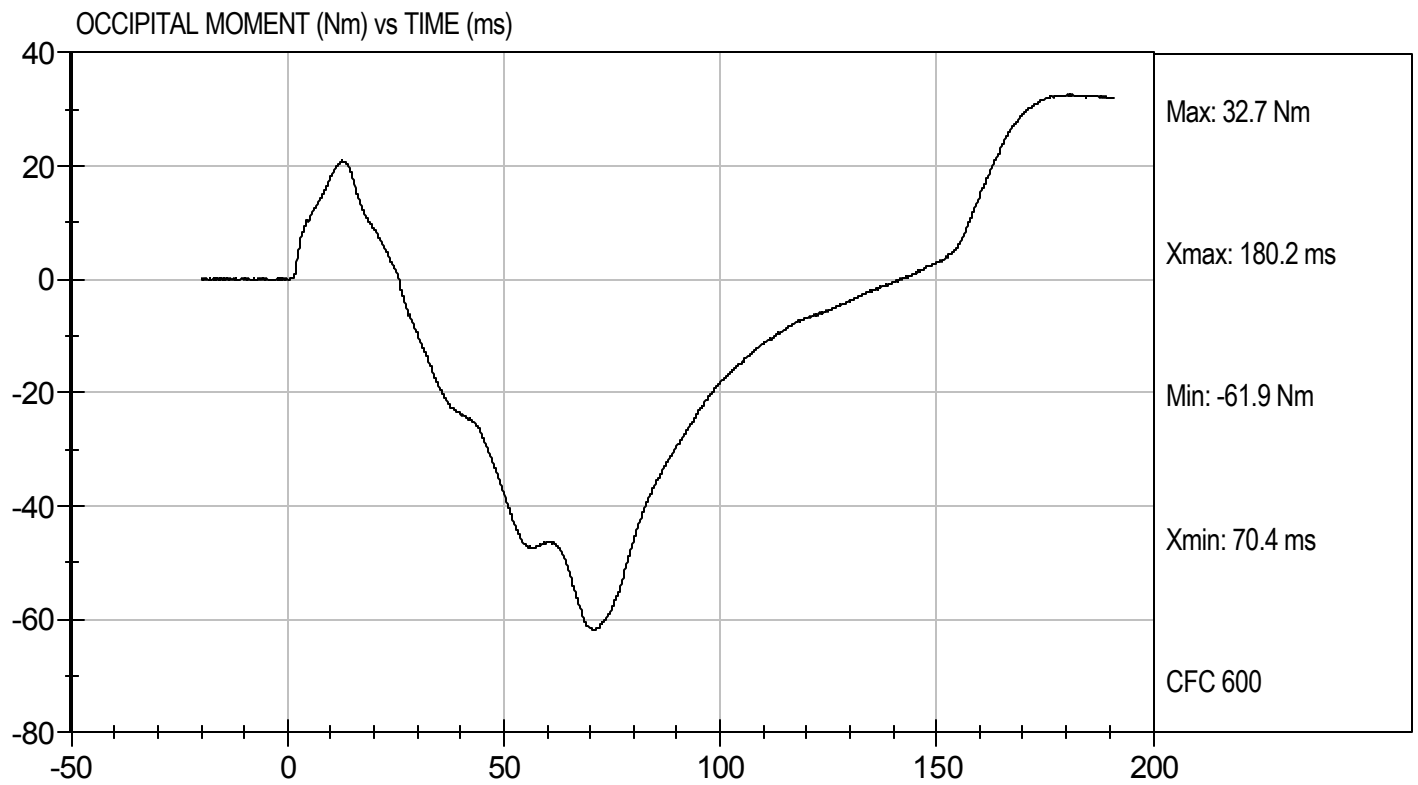
Test Date: 8/16/10
Velocity: 19.8 ft/s, 6.04 m/s





Test Desc: Neck Extension
Component ID: D102593

Test Date: 8/16/10
Velocity: 19.8 ft/s, 6.04 m/s



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351

Test I.D: D102594

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	50	Pass
Probe Velocity	m/s	6.58 to 6.82	6.60	Pass
Peak Probe Force	N	5159 to 5893	5,321	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.44	Pass
Internal Hysteresis	%	69 to 85	71	Pass
			Overall Test Results	Pass


Laboratory Technician

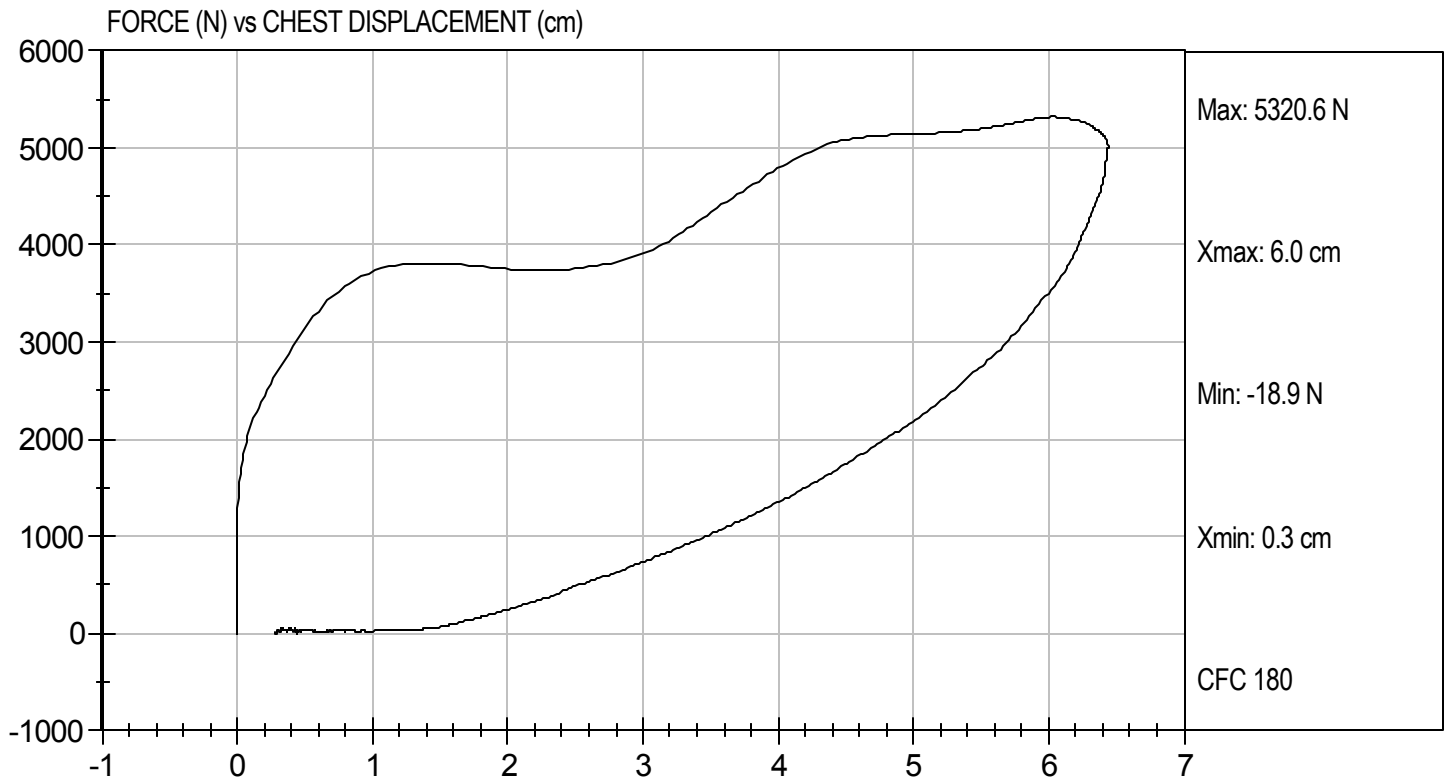
8/13/10
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D102594

Test Date: 8/13/10
Velocity: 21.65 ft/s, 6.60 m/s



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

ATD Serial No: 351

Test I.D: D102595

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	46	Pass
Probe Velocity	m/s	2.07 to 2.13	2.10	Pass
Peak Probe Force	Newtons	4715 to 5782	5,441	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

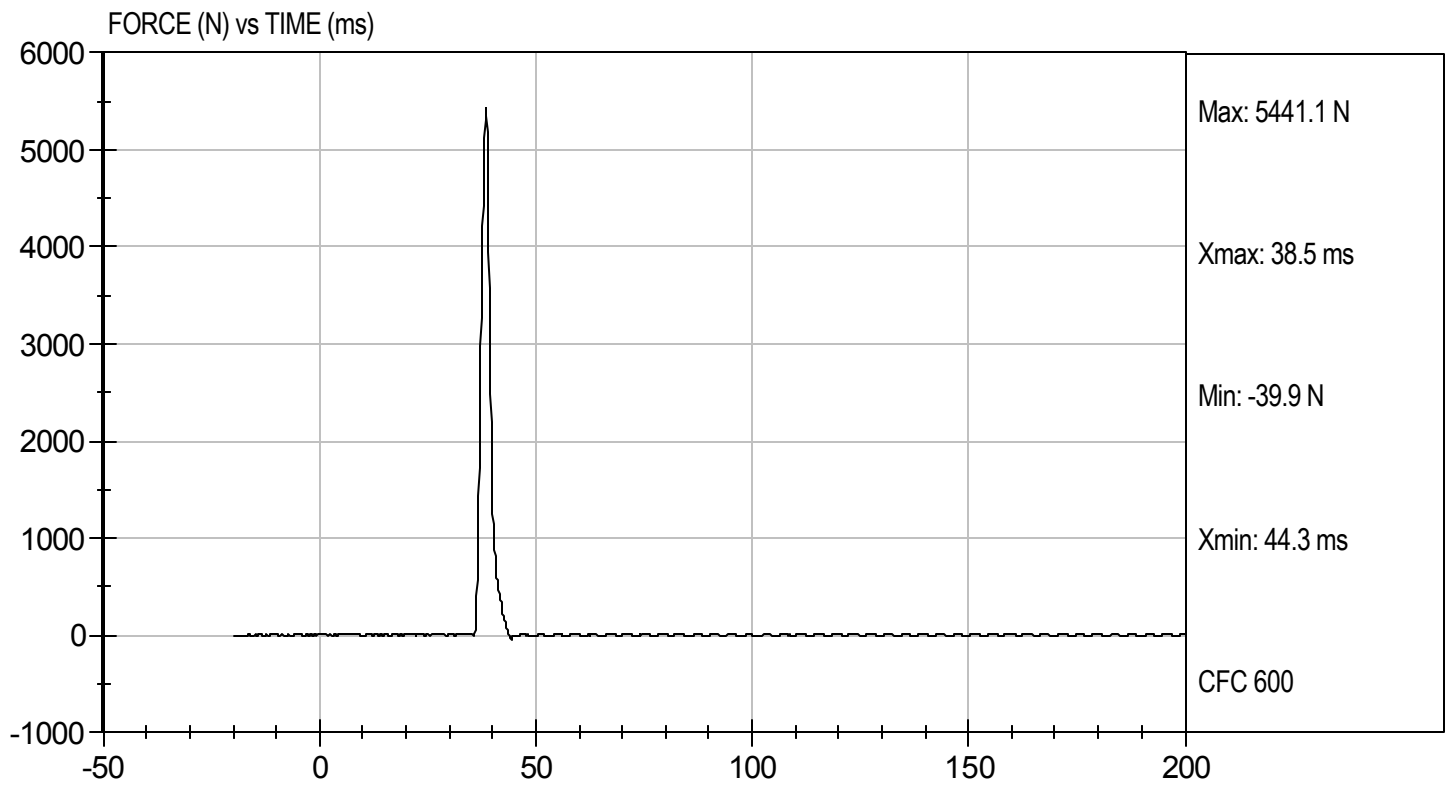
8/16/10
Test Date

David Winkelbauer
Approved By



Test Desc: Right Knee
Component ID: D102595

Test Date: 8/16/10
Velocity: 6.88 ft/s, 2.10 m/s

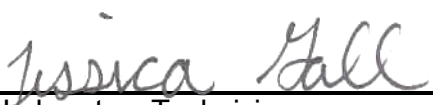


MGA RESEARCH CORPORATION
LEFT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351

Test I.D: D102596

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	46	Pass
Probe Velocity	m/s	2.07 to 2.13	2.11	Pass
Peak Probe Force	Newtons	4715 to 5782	5,666	Pass
Overall Test Results				Pass



Laboratory Technician

8/16/10
Test Date

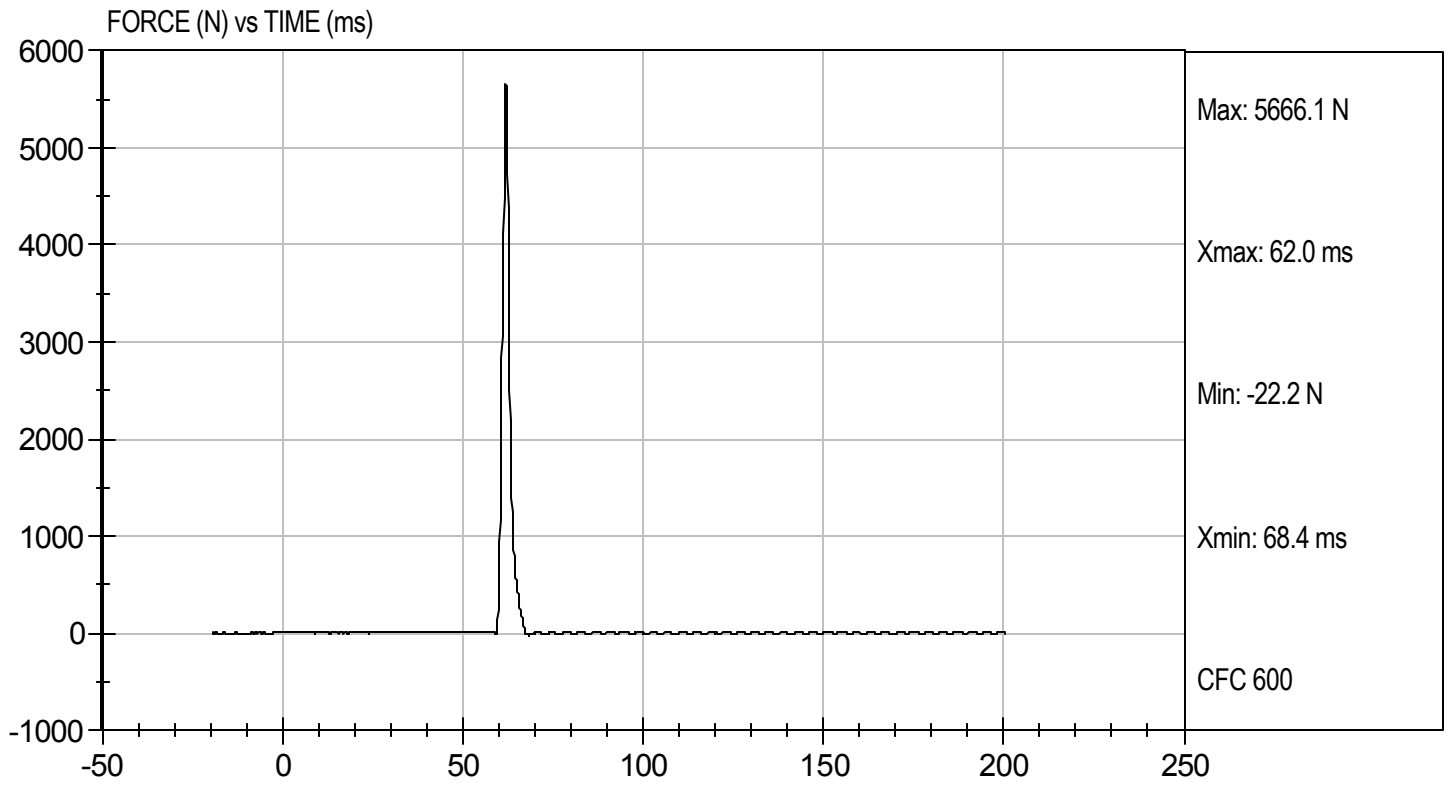


Approved By



Test Desc: Left Knee
Component ID: D102596

Test Date: 8/16/10
Velocity: 6.91 ft/s, 2.11 m/s



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

ATD Serial No: 351

Test I.D: D102590

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	47	47	Pass
Rotation Rate	deg/s	5 -10	8	8	Pass
30 Degrees	Nm	94.9 Nm Max	58.6	54.5	Pass
150 ft-lbf / 203.4 Nm	Deg	40- 50 Degree Max Rotation	45	46	Pass
Overall Test Results					Pass


Laboratory Technician

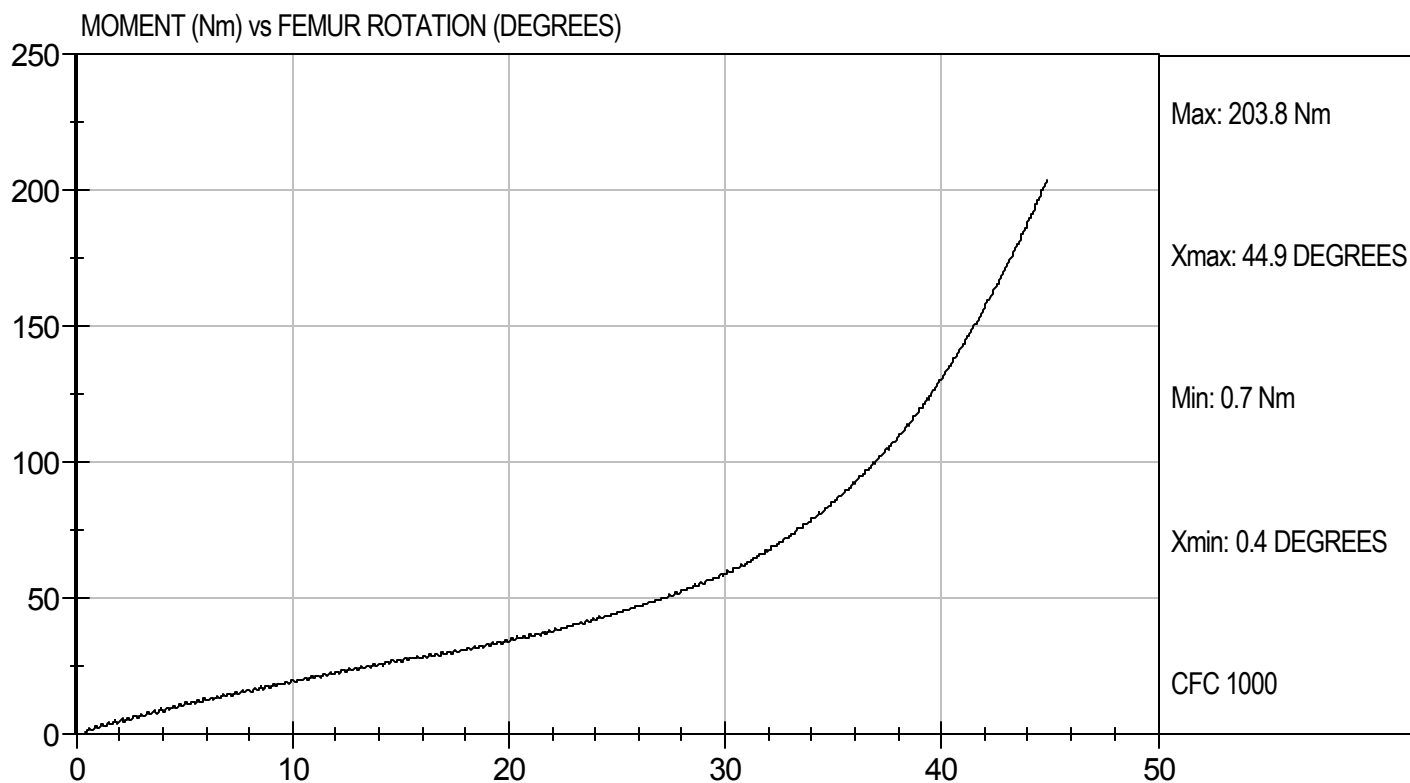
8/16/10
Test Date


Approved By



Test Desc: Hip Femur Flexion
Component ID: D102599

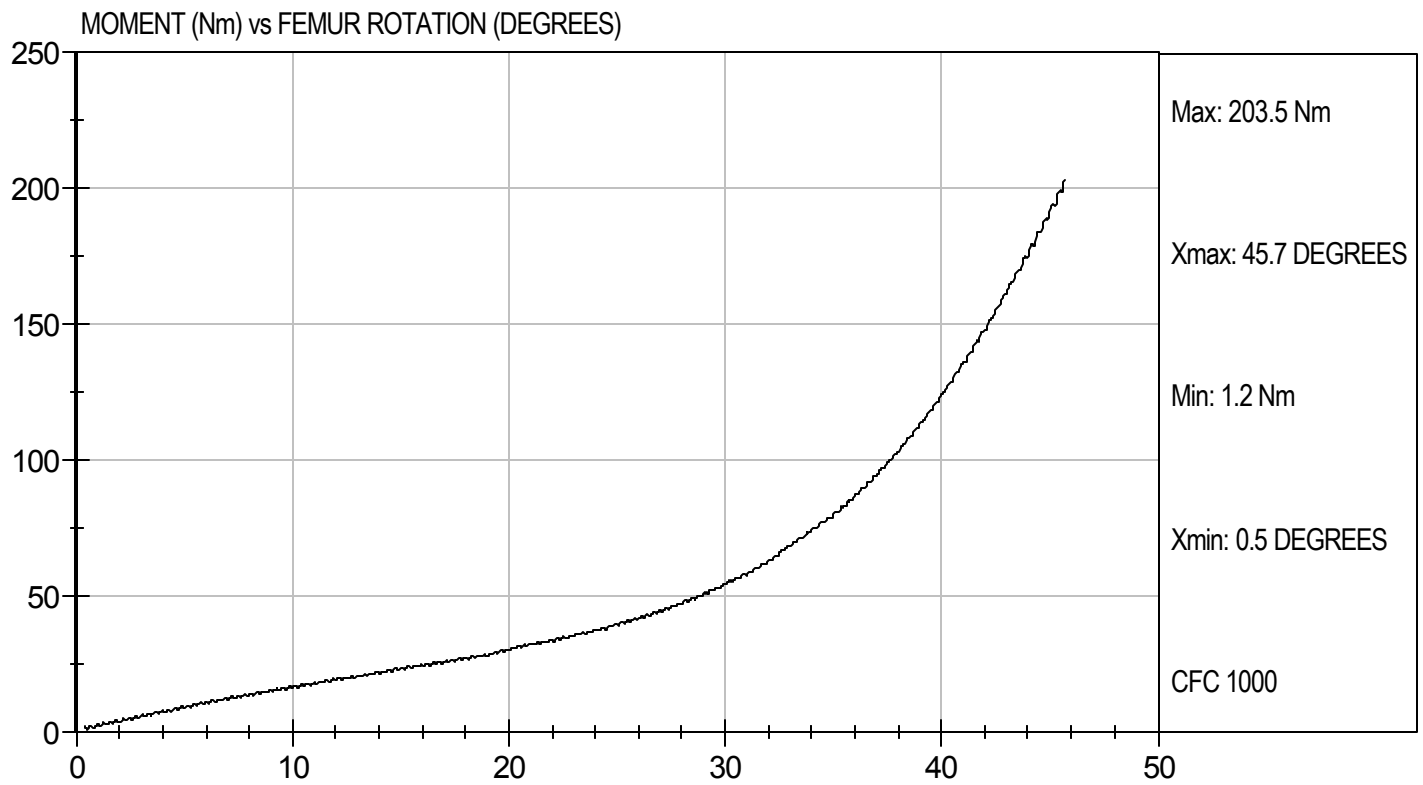
Test Date: 8/16/10
Velocity: 0 ft/s, 0.00 m/s





Test Desc: Hip Femur Flexion
Component ID: D102590

Test Date: 8/16/10
Velocity: 0 ft/s, 0.00 m/s



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

ATD Serial No: 351

Test ID: D102661

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	22.0	Pass
Laboratory Relative Humidity	%	10 to 70	52	Pass
Peak Resultant Acceleration	G's	225 - 275	268	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	4.5	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

8/19/10
Test Date

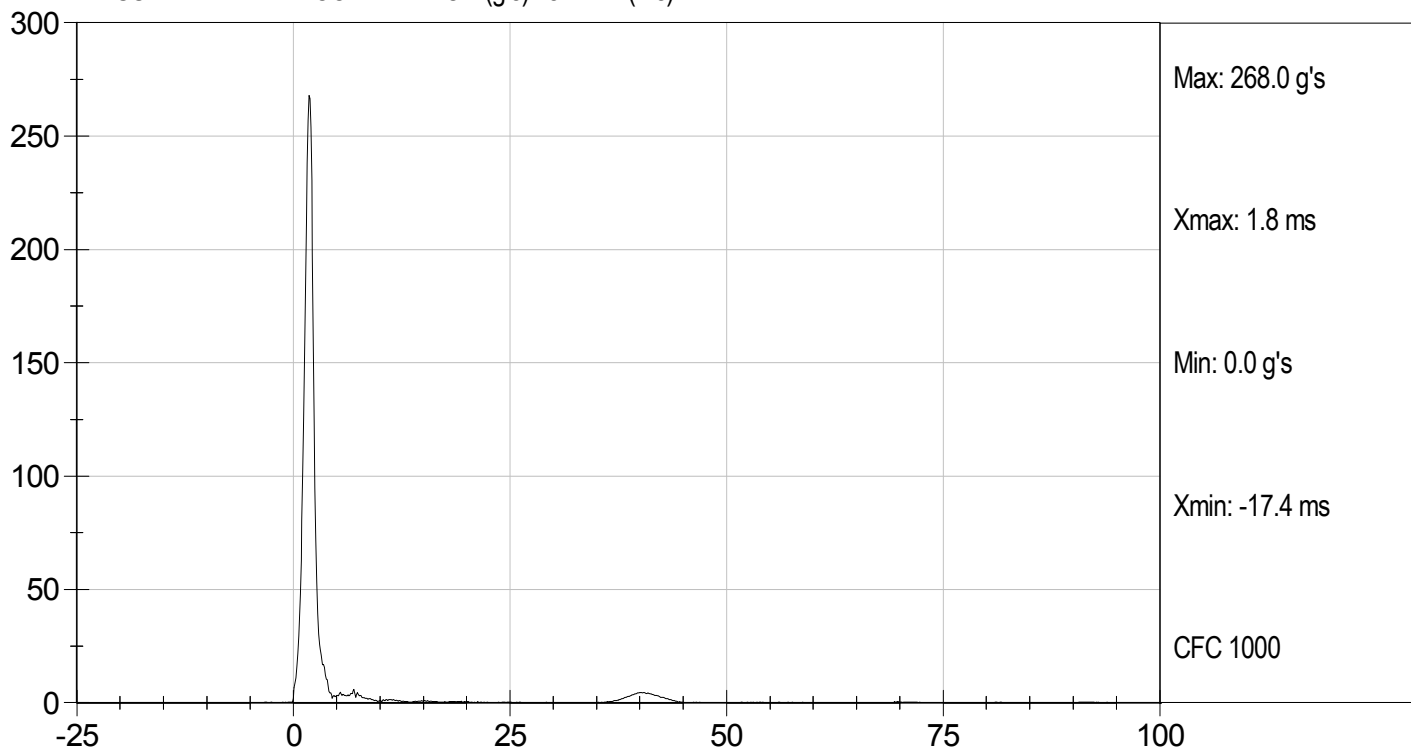

Approved By



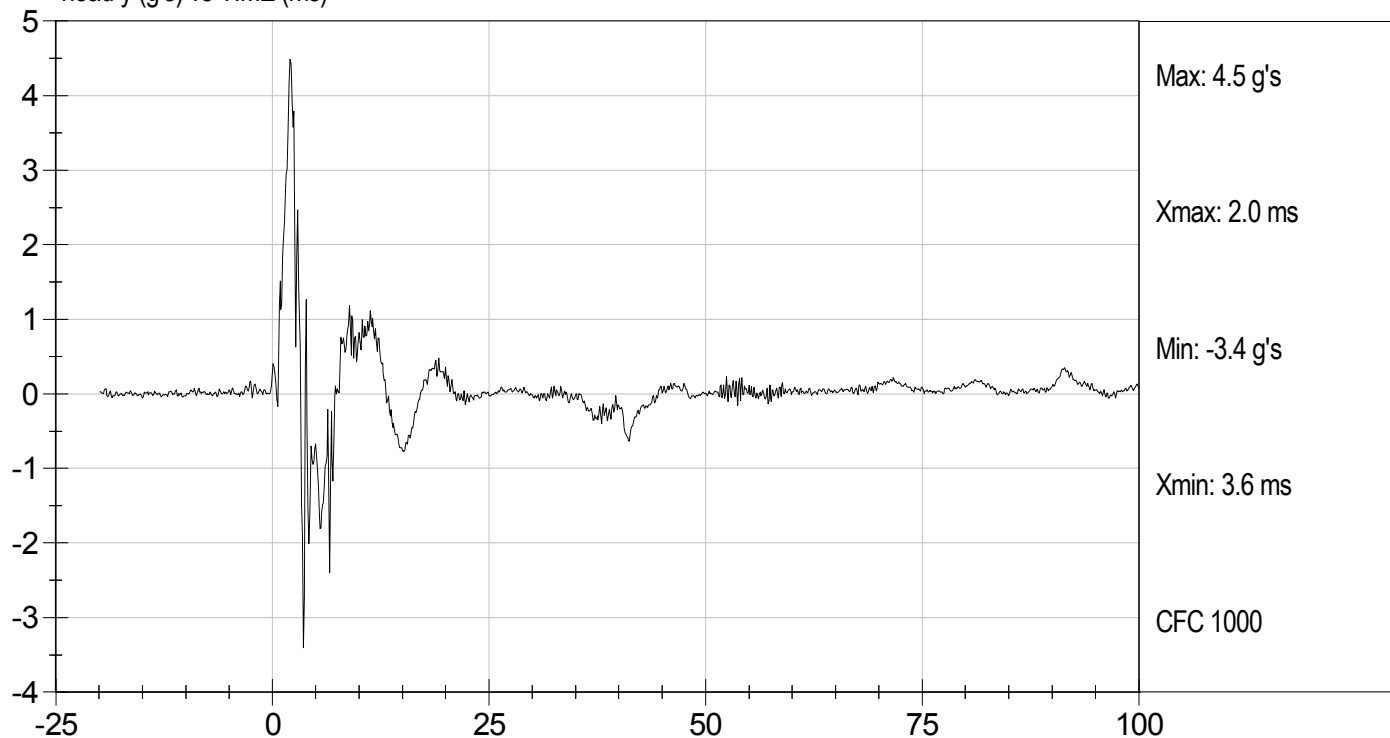
Test Desc: Head Drop
Component ID: D102661

Test Date: 8/19/10
Velocity: 0 ft/s, 0.00 m/s

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



head y (g's) vs TIME (ms)



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

ATD Serial No: 351

Test I.D: D102662

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	22.0	Pass
Laboratory Relative Humidity		%	10 to 70	51	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	22.87	Pass
	20 ms	G's	17.60 to 22.60	19.14	Pass
	30 ms	G's	12.50 to 18.50	15.25	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	15.22	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	35.9	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	66.8	Pass
	Time	ms	57.0 to 64.0	57.3	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	113.9	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	94.4	Pass
	Time	ms	47.0 to 58.0	48.6	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	99.3	Pass
Overall Test Results					Pass


 Laboratory Technician

8/19/10
 Test Date

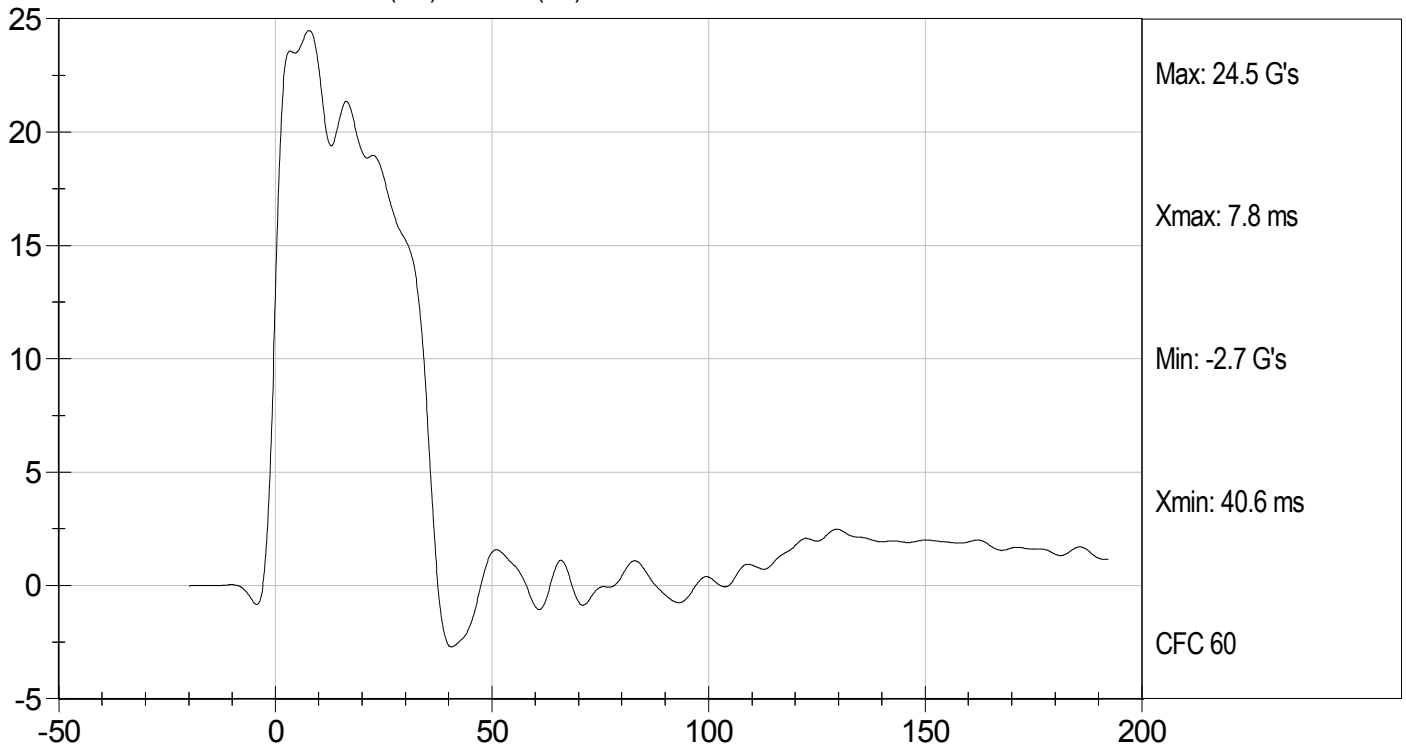

 Approved By



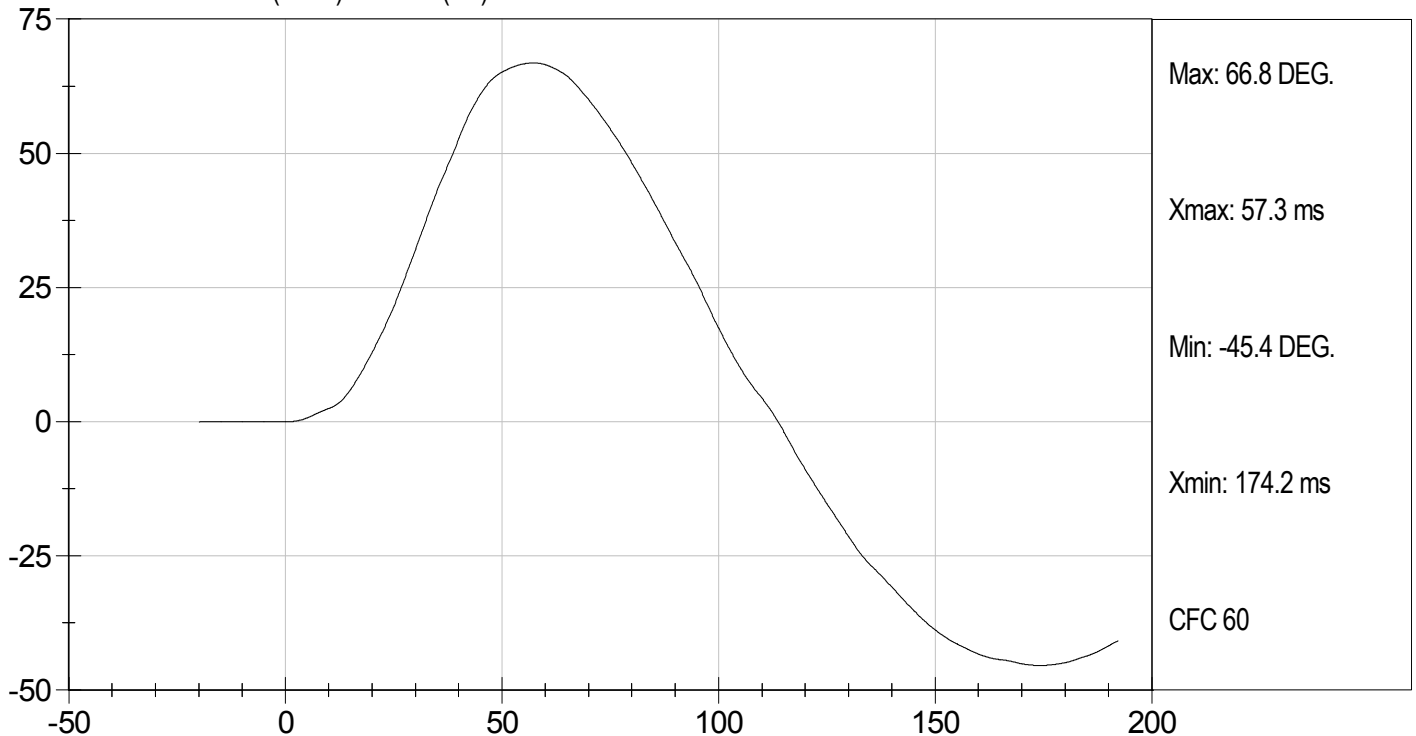
Test Desc: Neck Flexion
Component ID: D102662

Test Date: 8/19/10
Velocity: 23.15 ft/s, 7.06 m/s

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



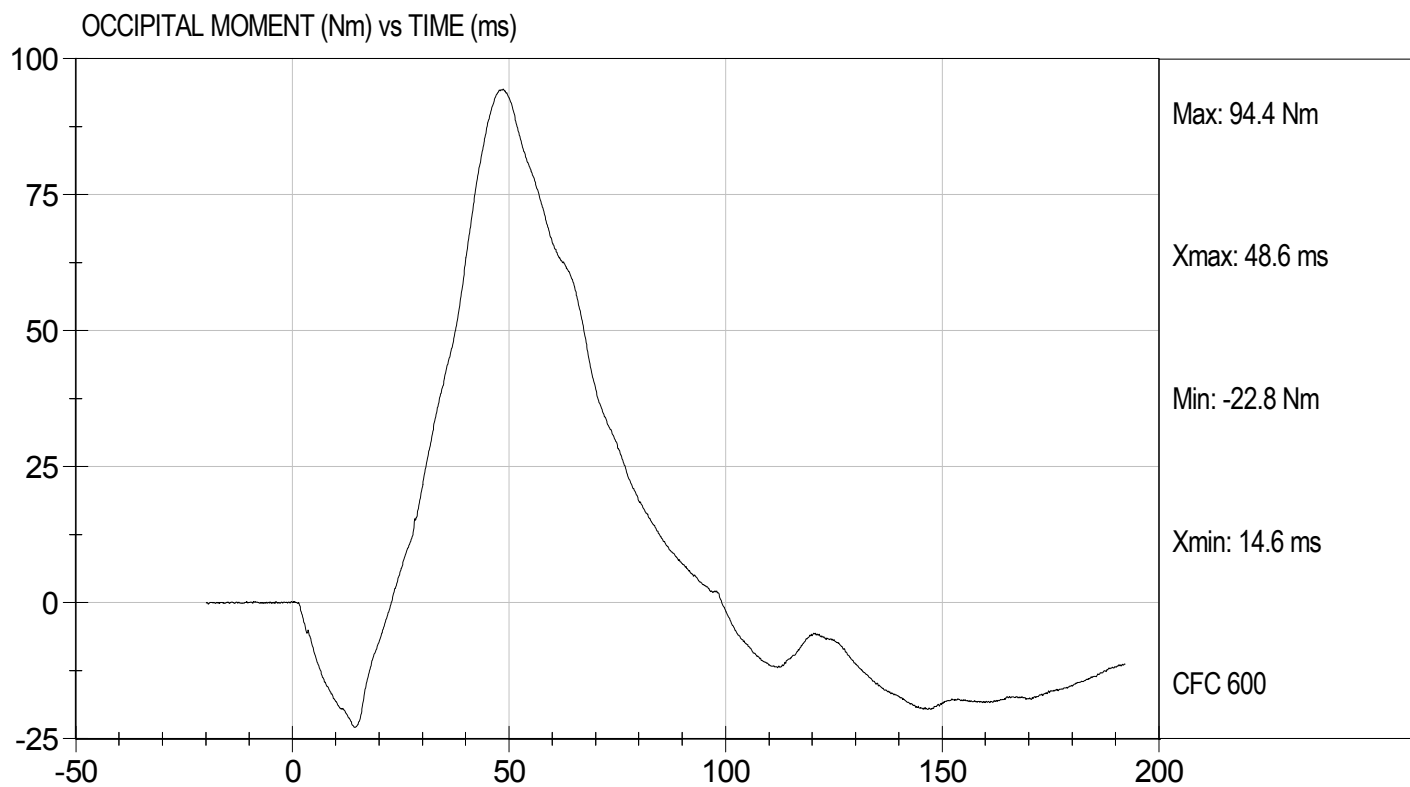
NECK ROTATION (DEG.) vs TIME (ms)





Test Desc: Neck Flexion
Component ID: D102662

Test Date: 8/19/10
Velocity: 23.15 ft/s, 7.06 m/s



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

ATD Serial No: 351

Test I.D: D102663

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	22.0	Pass
Laboratory Relative Humidity		%	10 to 70	51	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.12	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	17.95	Pass
	20 ms	G's	14.00 to 19.00	18.41	Pass
	30 ms	G's	11.00 to 16.00	13.48	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	14.13	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	38.3	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	92.1	Pass
	Time	ms	72.0 to 82.0	73.4	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	153.8	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-59.8	Pass
	Time	ms	65.0 to 79.0	69.2	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	141.5	Pass
Overall Test Results					Pass


 Laboratory Technician

8/19/10
 Test Date

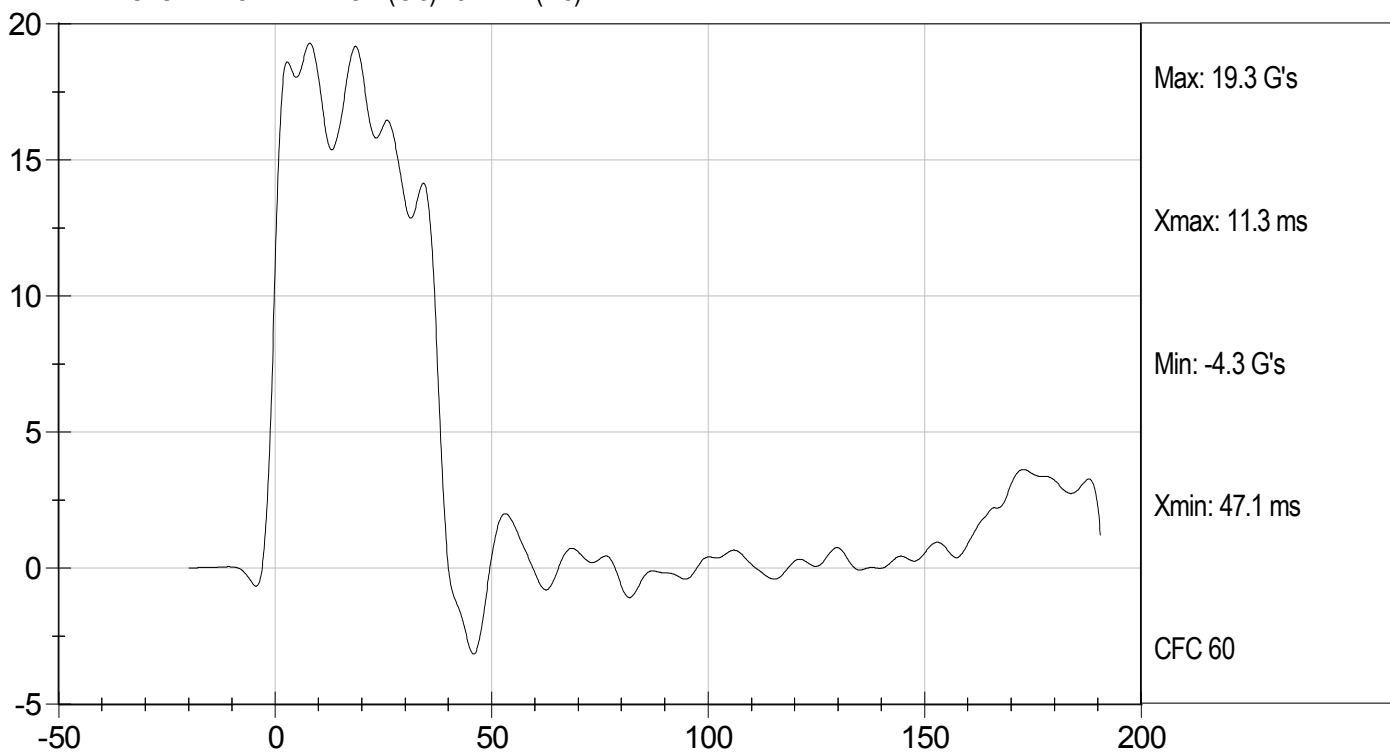

 Approved By



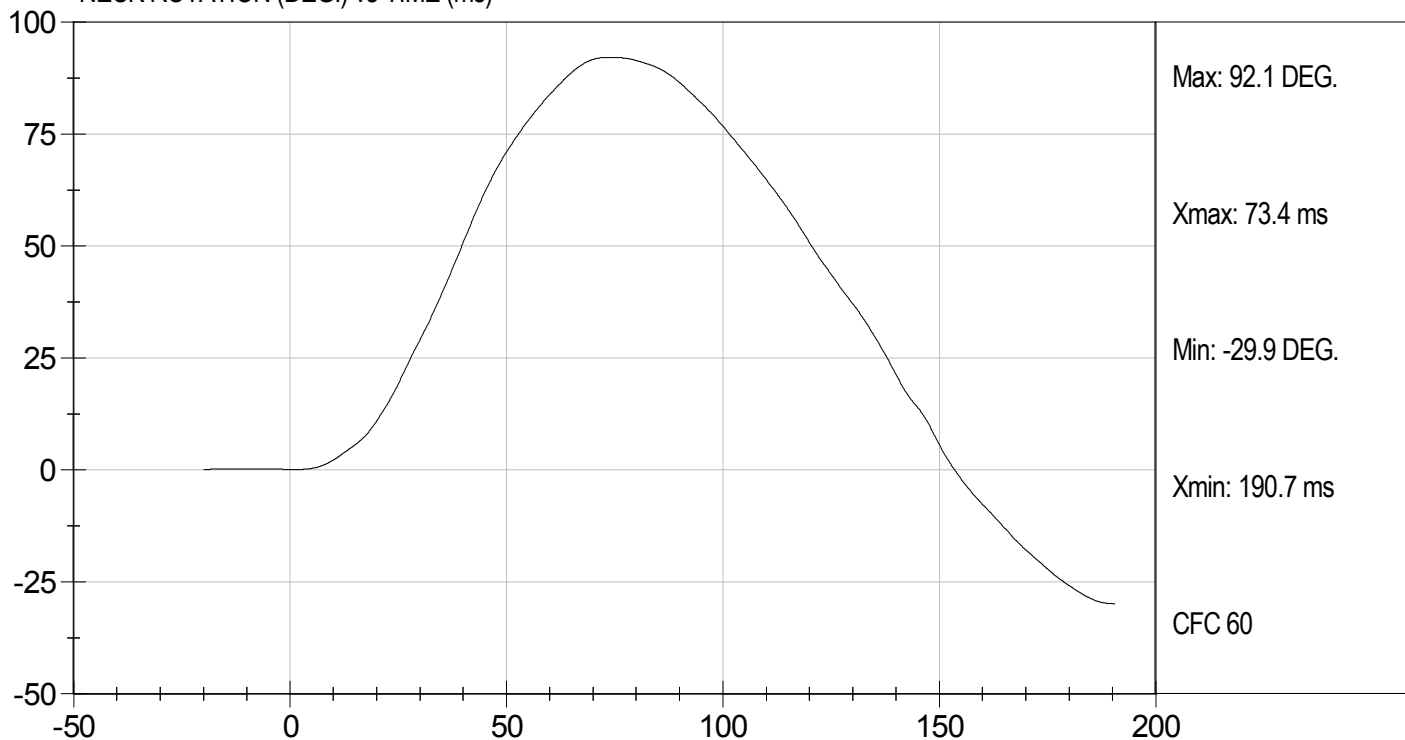
Test Desc: Neck Extension
Component ID: D102663

Test Date: 8/19/10
Velocity: 20.08 ft/s, 6.12 m/s

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



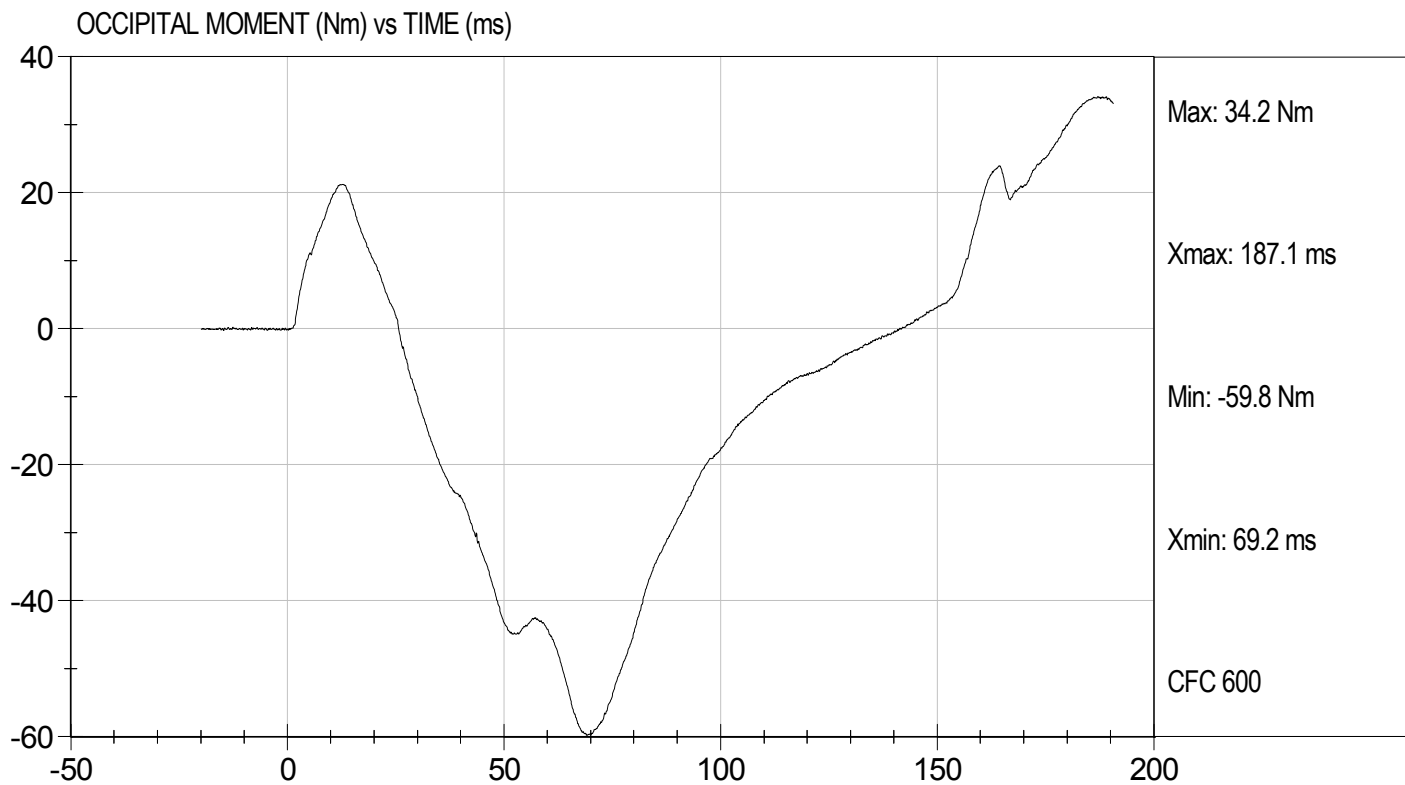
NECK ROTATION (DEG.) vs TIME (ms)





Test Desc: Neck Extension
Component ID: D102663

Test Date: 8/19/10
Velocity: 20.08 ft/s, 6.12 m/s



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351

Test I.D: D102664

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	53	Pass
Probe Velocity	m/s	6.58 to 6.82	6.68	Pass
Peak Probe Force	N	5159 to 5893	5,428	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.57	Pass
Internal Hysteresis	%	69 to 85	70	Pass
Overall Test Results				Pass


Laboratory Technician

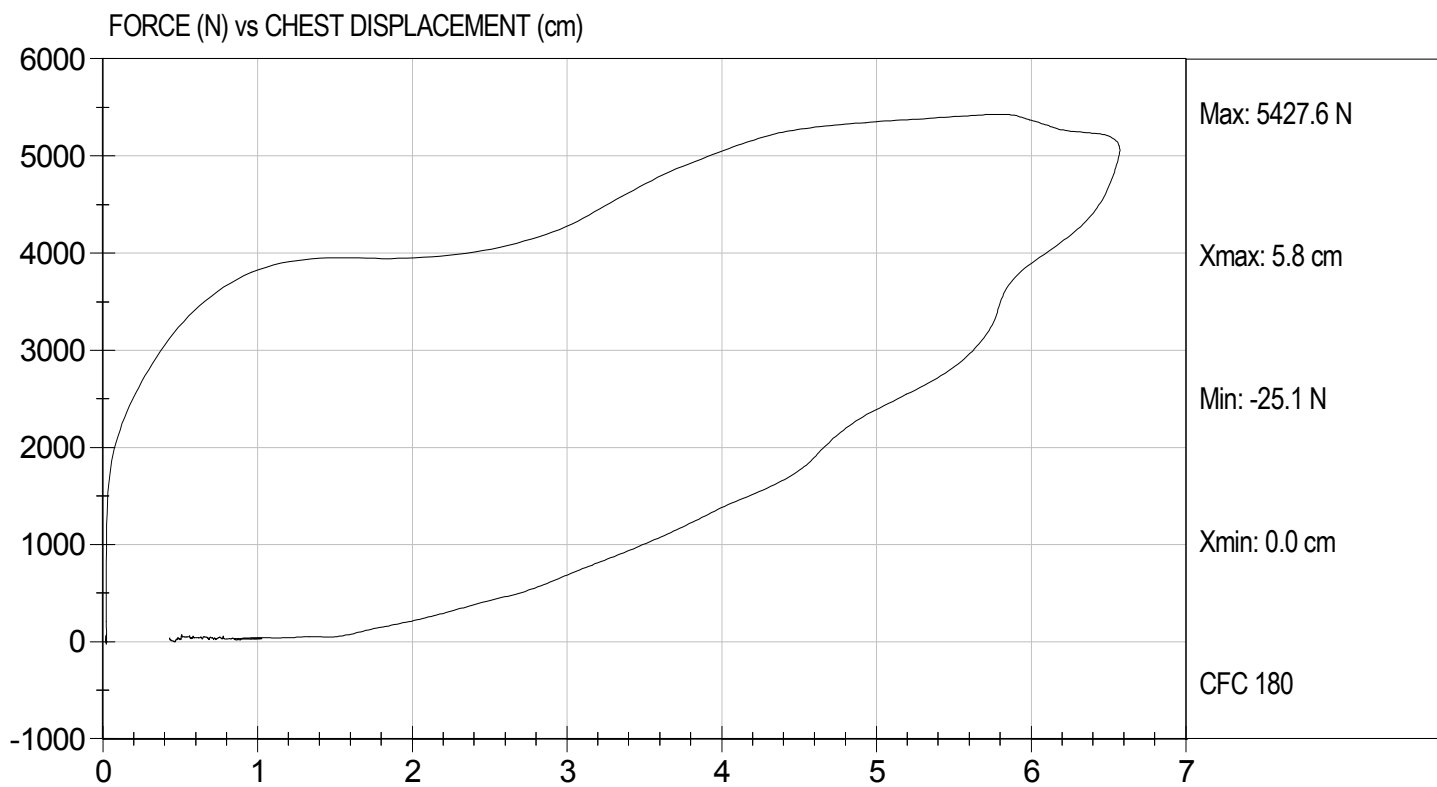
8/19/10
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D102664

Test Date: 8/19/10
Velocity: 21.9 ft/s, 6.68 m/s



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

ATD Serial No: 351

Test I.D: D102665

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	22.0	Pass
Laboratory Relative Humidity	%	10 to 70	51	Pass
Probe Velocity	m/s	2.07 to 2.13	2.10	Pass
Peak Probe Force	Newtons	4715 to 5782	5,492	Pass
			Overall Test Results	Pass

Jessica Hall
Laboratory Technician

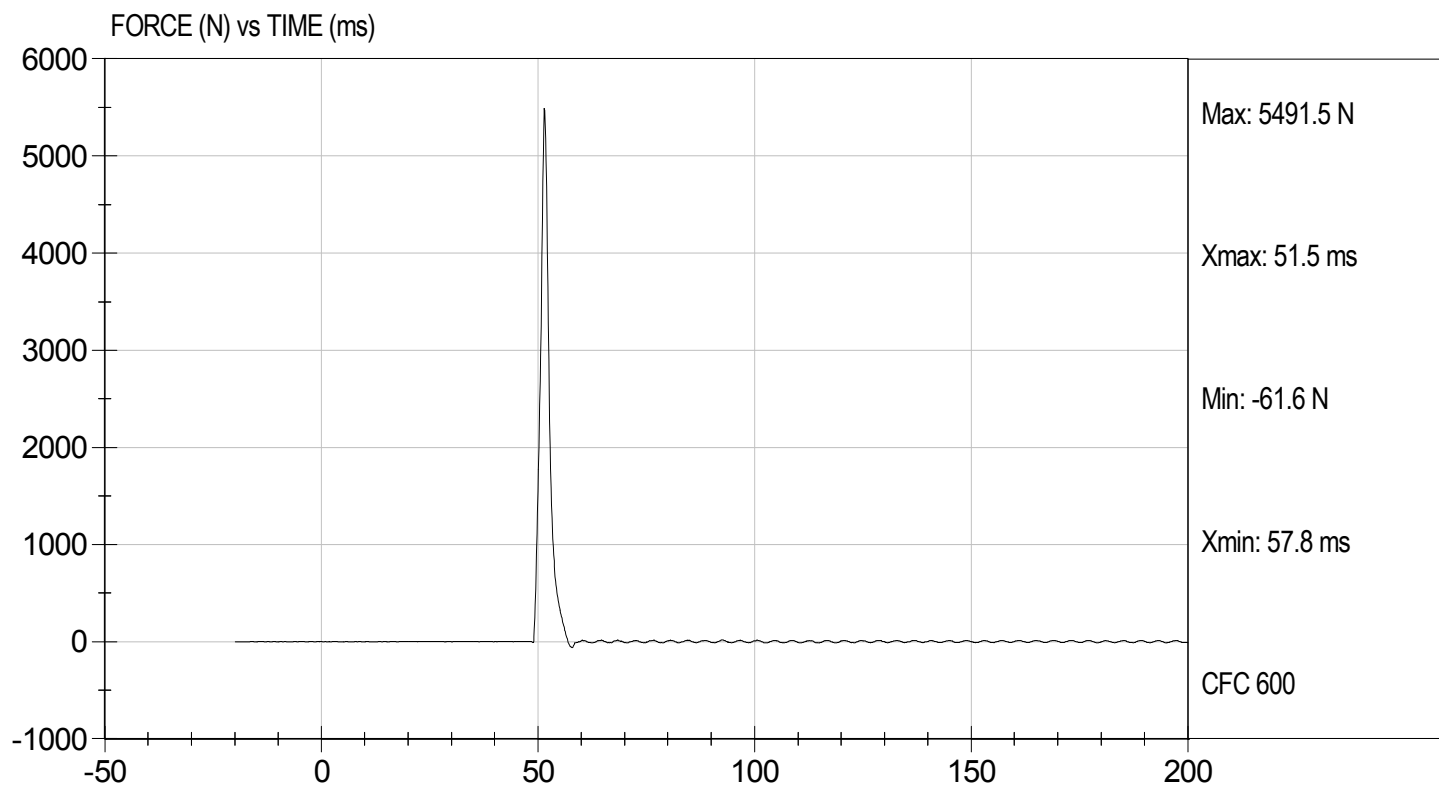
8/16/10
Test Date

David Winkelbauer
Approved By



Test Desc: Right Knee
Component ID: D102665

Test Date: 8/16/10
Velocity: 6.9 ft/s, 2.10 m/s

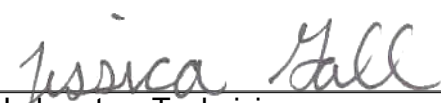


MGA RESEARCH CORPORATION
LEFT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351

Test I.D: D102666

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	22.0	Pass
Laboratory Relative Humidity	%	10 to 70	51	Pass
Probe Velocity	m/s	2.07 to 2.13	2.07	Pass
Peak Probe Force	Newtons	4715 to 5782	5,464	Pass
Overall Test Results				Pass



Laboratory Technician

8/19/10

Test Date

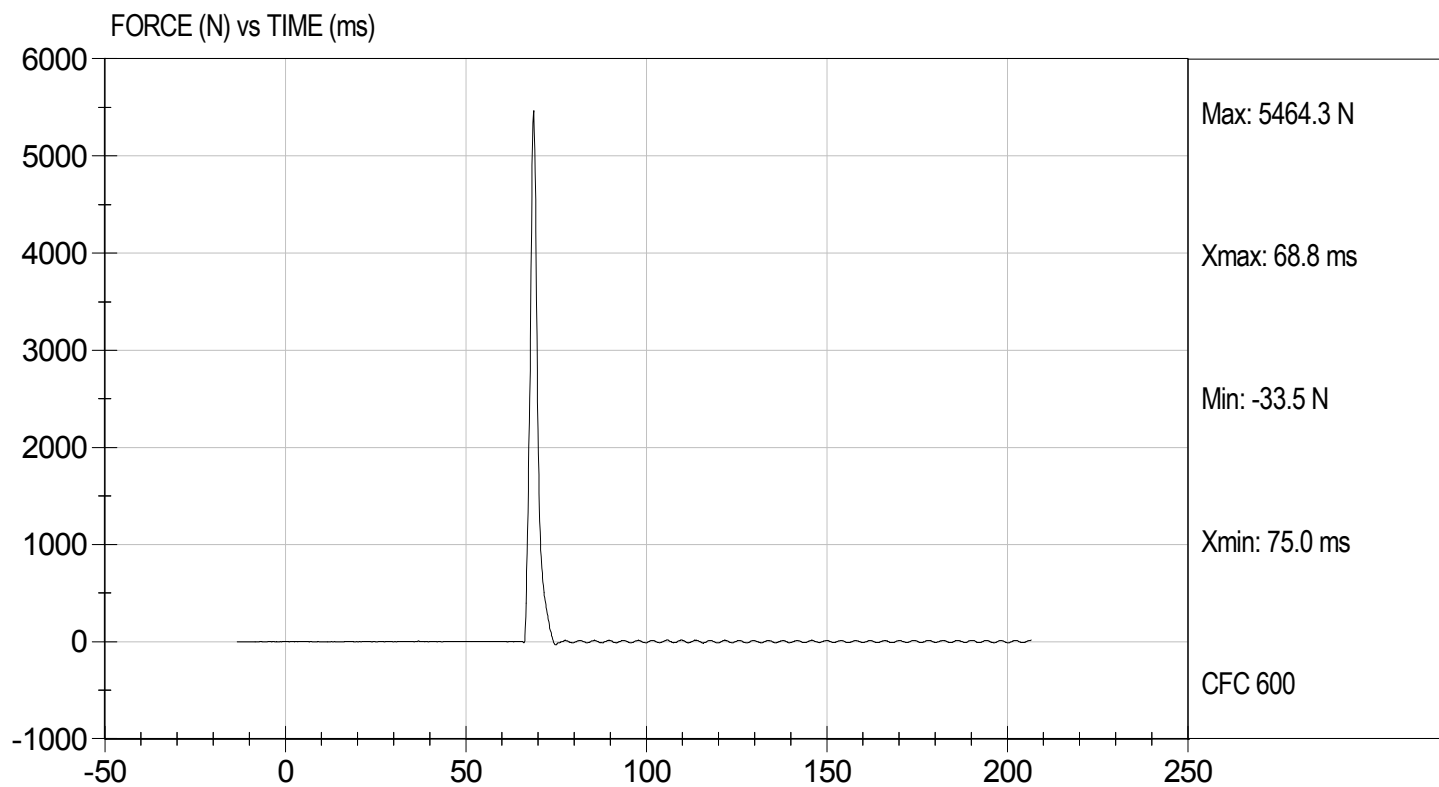


Approved By



Test Desc: Left Knee
Component ID: D102666

Test Date: 8/19/10
Velocity: 6.8 ft/s, 2.07 m/s



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

ATD Serial No: 351

Test I.D: D102660

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	22.0	22.0	Pass
Laboratory Relative Humidity	%	10 to 70	52	52	Pass
Rotation Rate	deg/s	5 -10	8	8	Pass
30 Degrees	Nm	94.9 Nm Max	62.4	57.5	Pass
150 ft-lbf / 203.4 Nm	Deg	40- 50 Degree Max Rotation	45	46	Pass
Overall Test Results					Pass

Jessica Hall
Laboratory Technician

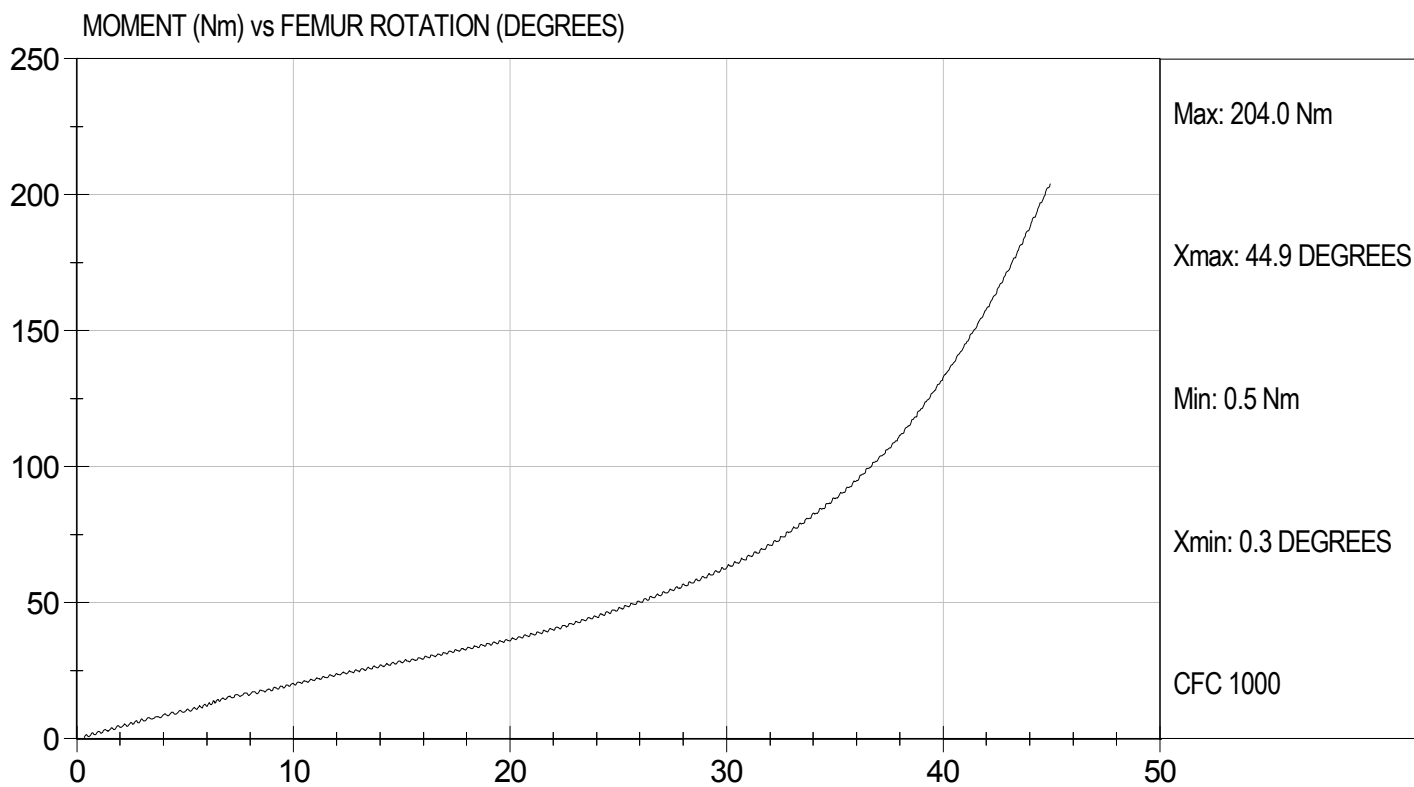
8/19/10
Test Date

David Winkelbauer
Approved By



Test Desc: Hip Femur Flexion
Component ID: D102669

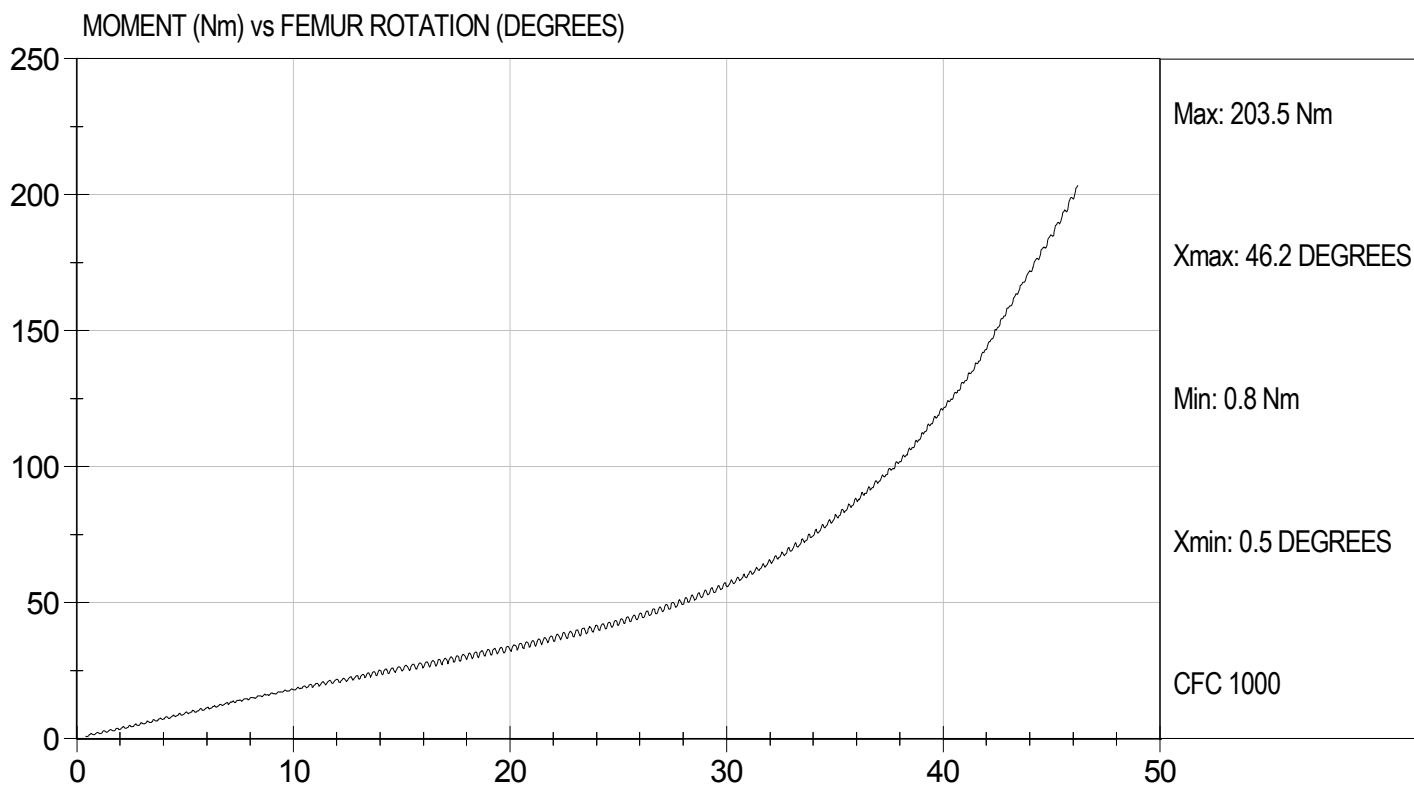
Test Date: 8/19/10
Velocity: 0 ft/s, 0.00 m/s





Test Desc: Hip Femur Flexion
Component ID: D102660

Test Date: 8/19/10
Velocity: 0 ft/s, 0.00 m/s



MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test ID: D102601

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	50	Pass
Peak Resultant Acceleration	G's	250 to 300	261	Pass
Peak Lateral Acceleration	G's	+/- 15	-1.7	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

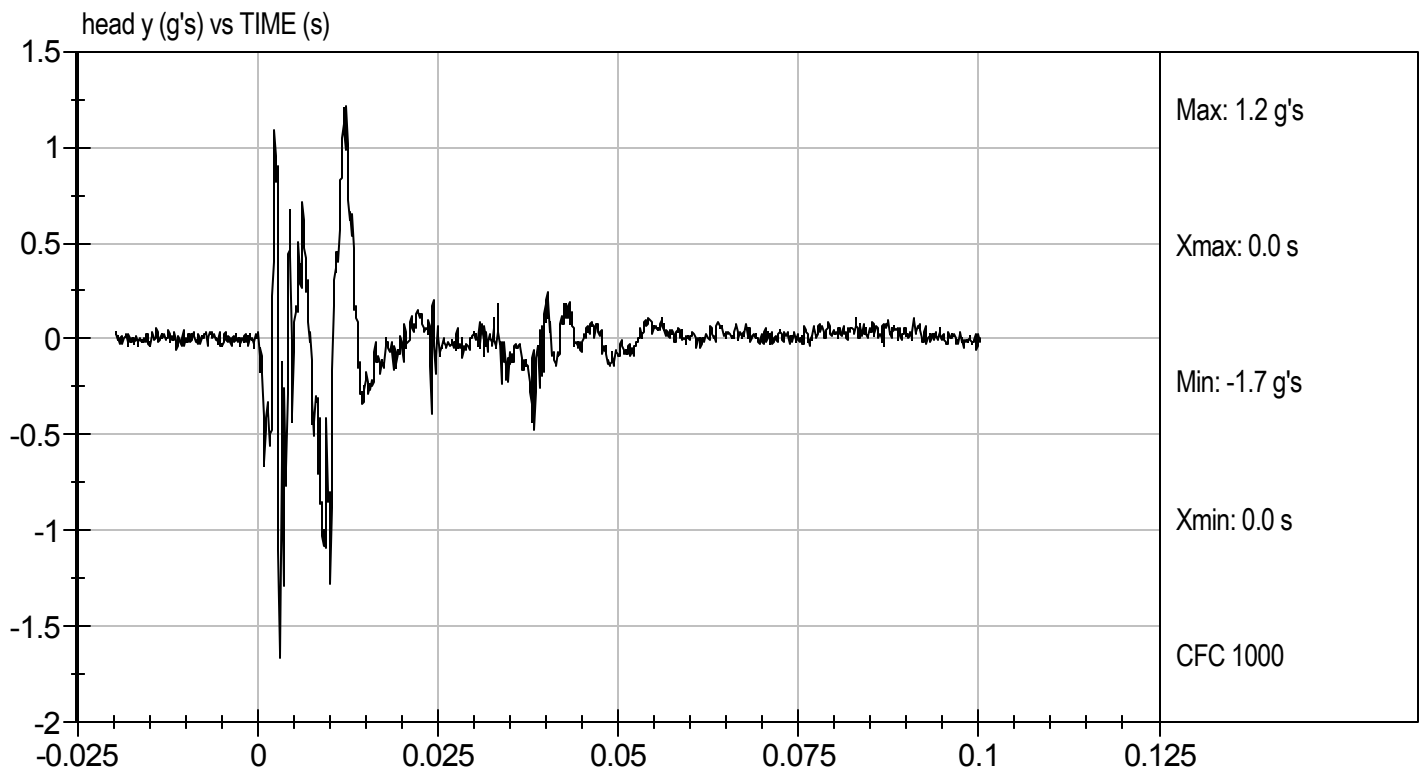
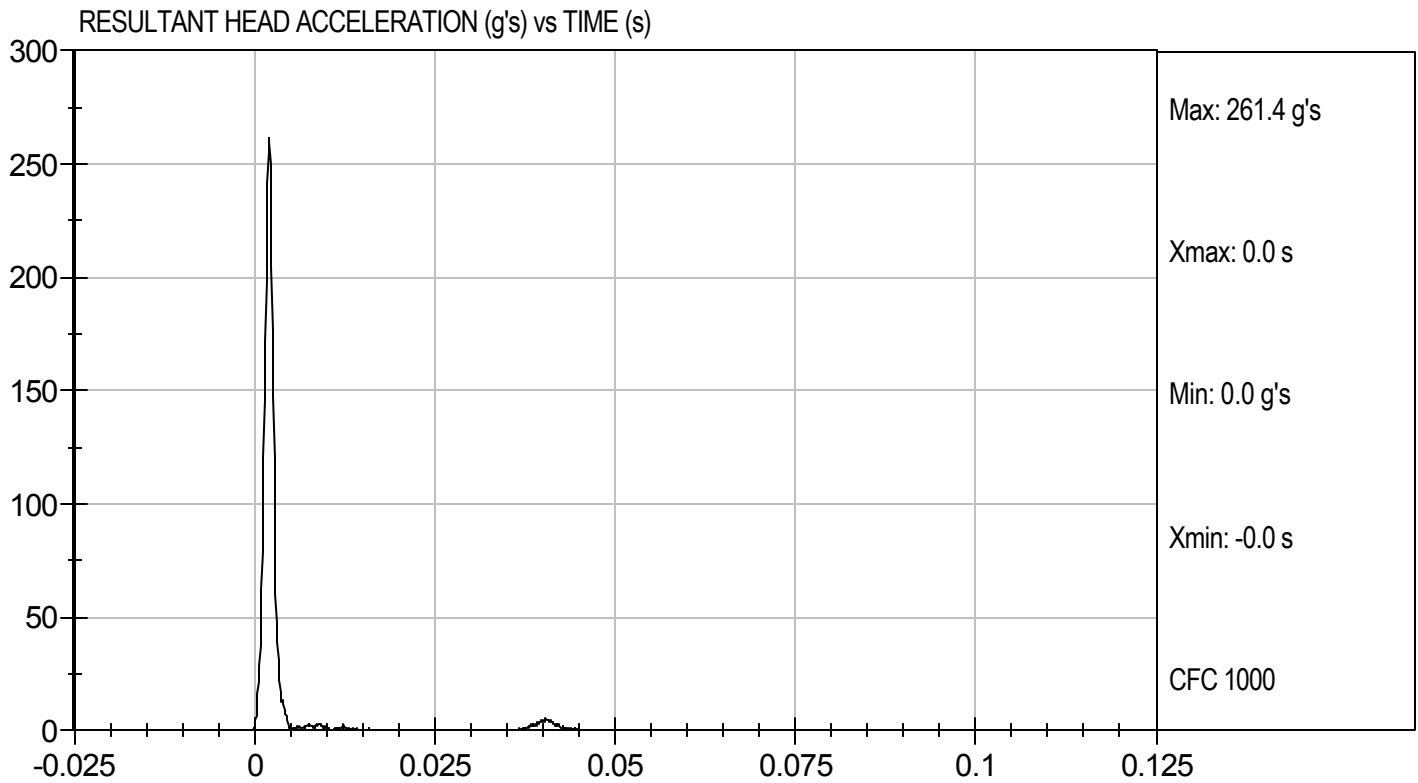
8/13/10
Test Date


Approved By



Test Desc: Head Drop
Component ID: D102601

Test Date: 8/13/10
Velocity: 0 ft/s, 0 m/s



MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D: D102602

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity		%	10 to 70	52	Pass
Pendulum Speed		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	m/s	2.1 to 2.5	2.3	Pass
	20 ms	m/s	4.0 to 5.0	4.7	Pass
	30 ms	m/s	5.8 to 7.0	6.5	Pass
D Plane Rotation	Max	deg	77 to 91	79	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	69 to 83	72	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	82	Pass
Overall Results				Pass	

Jessica Hall
Laboratory Technician

8/13/10
Test Date

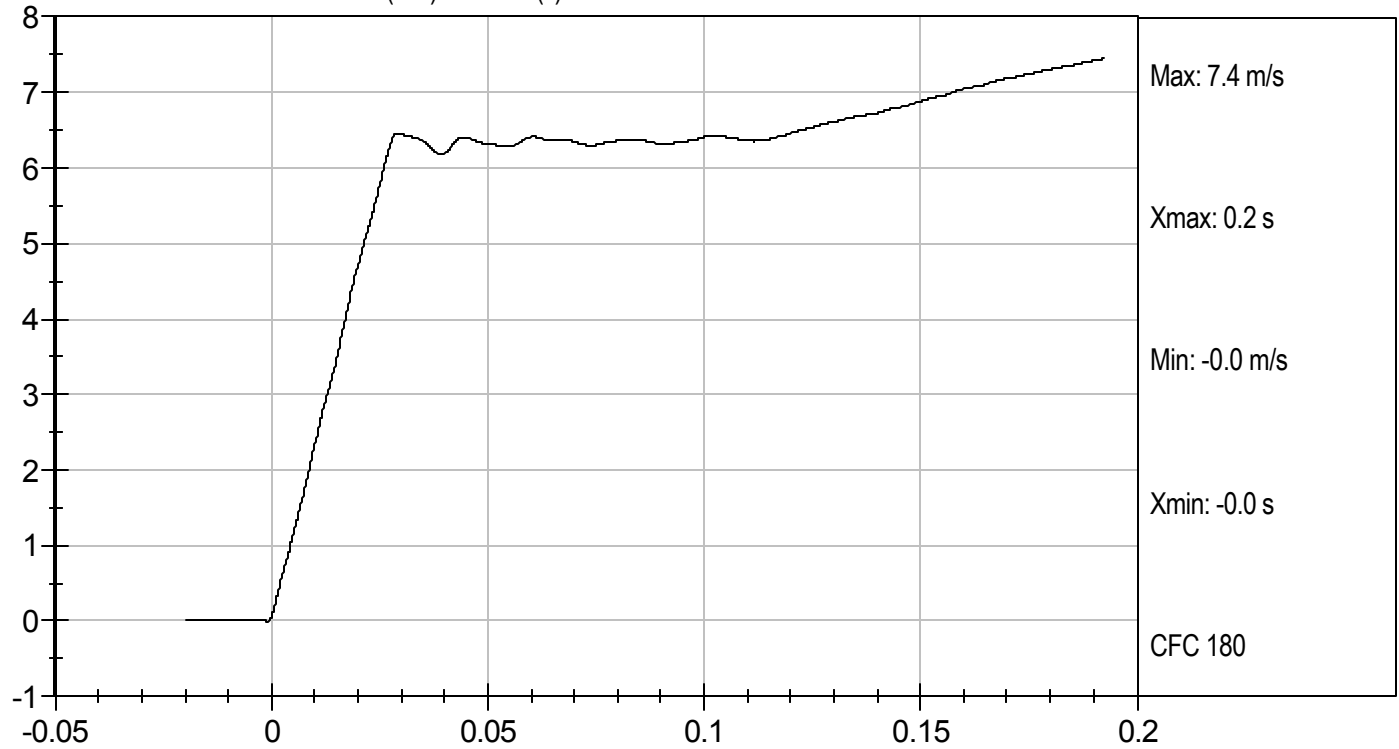
David Winkelbauer
Approved By



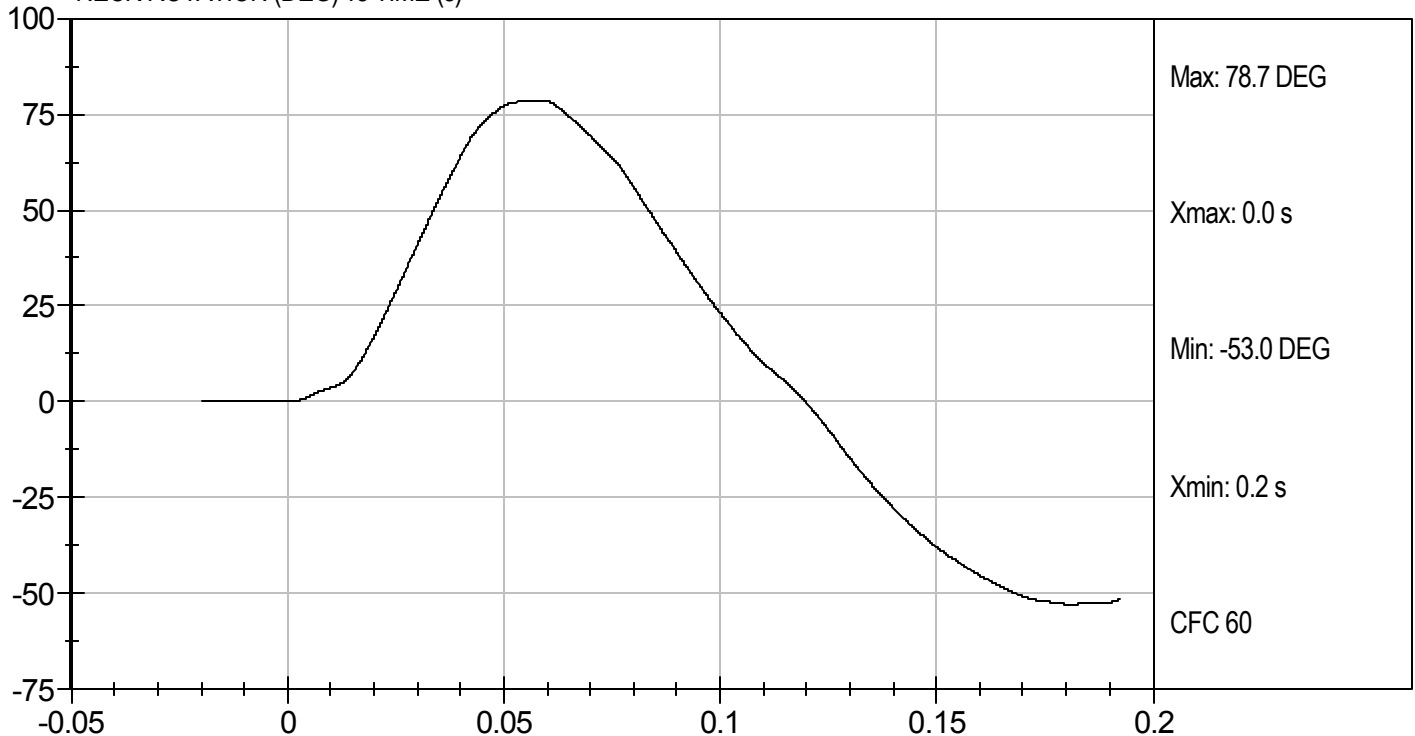
Test Desc: Neck Flexion
Component ID: D102602

Test Date: 8/13/10
Velocity: 23.15 ft/s, 7.06 m/s

PENDULUM DECELERATION (m/s) vs TIME (s)



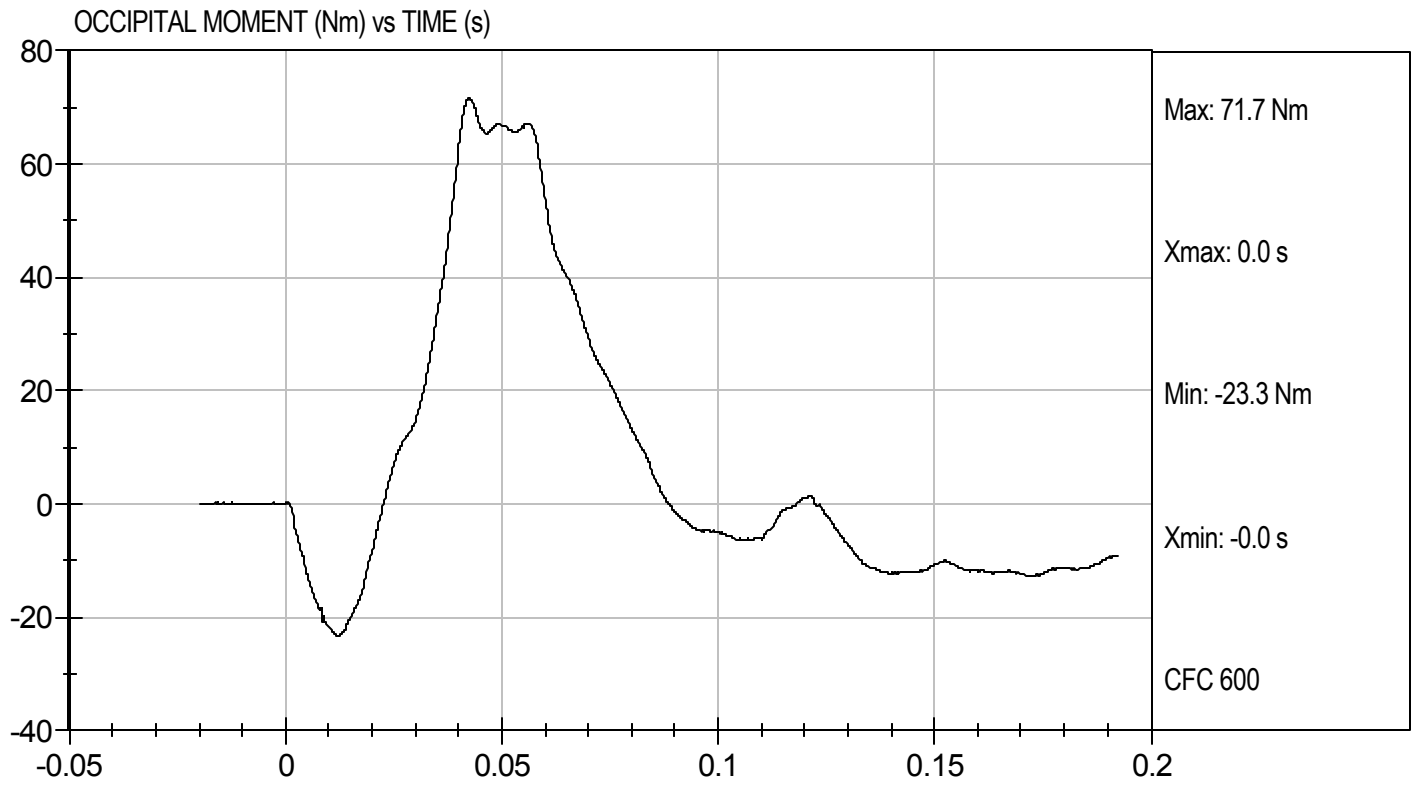
NECK ROTATION (DEG) vs TIME (s)





Test Desc: Neck Flexion
Component ID: D102602

Test Date: 8/13/10
Velocity: 23.15 ft/s, 7.06 m/s



MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D: D102603

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity		%	10 to 70	52	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.12	Pass
Pendulum Deceleration	10 ms	m/s	1.5 to 1.9	1.9	Pass
	20 ms	m/s	3.1 to 3.9	3.7	Pass
	30 ms	m/s	4.6 to 5.6	5.4	Pass
D Plane Rotation	Max	deg	99 to 114	102	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	-65 to -53	-54	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	101	Pass
Overall Results					Pass

Jessica Hall
Laboratory Technician

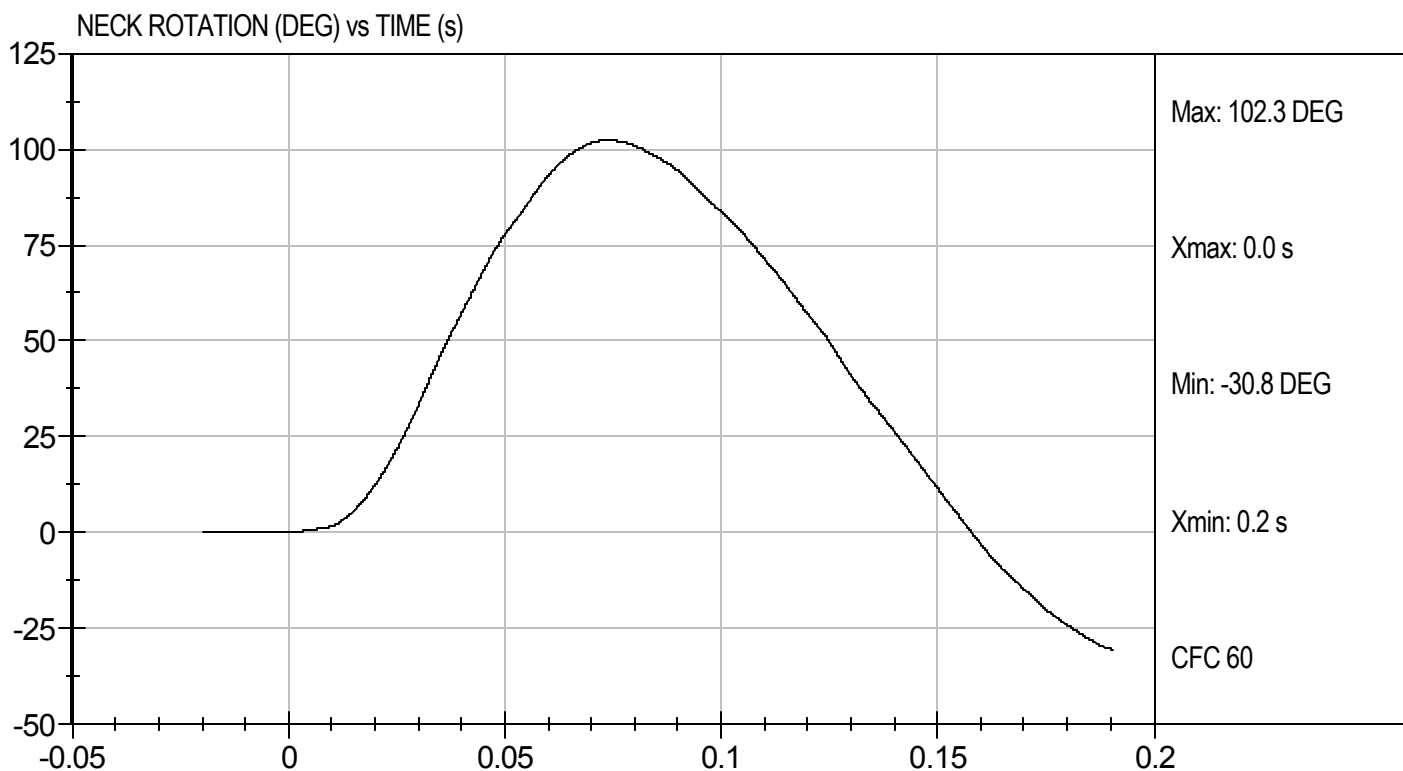
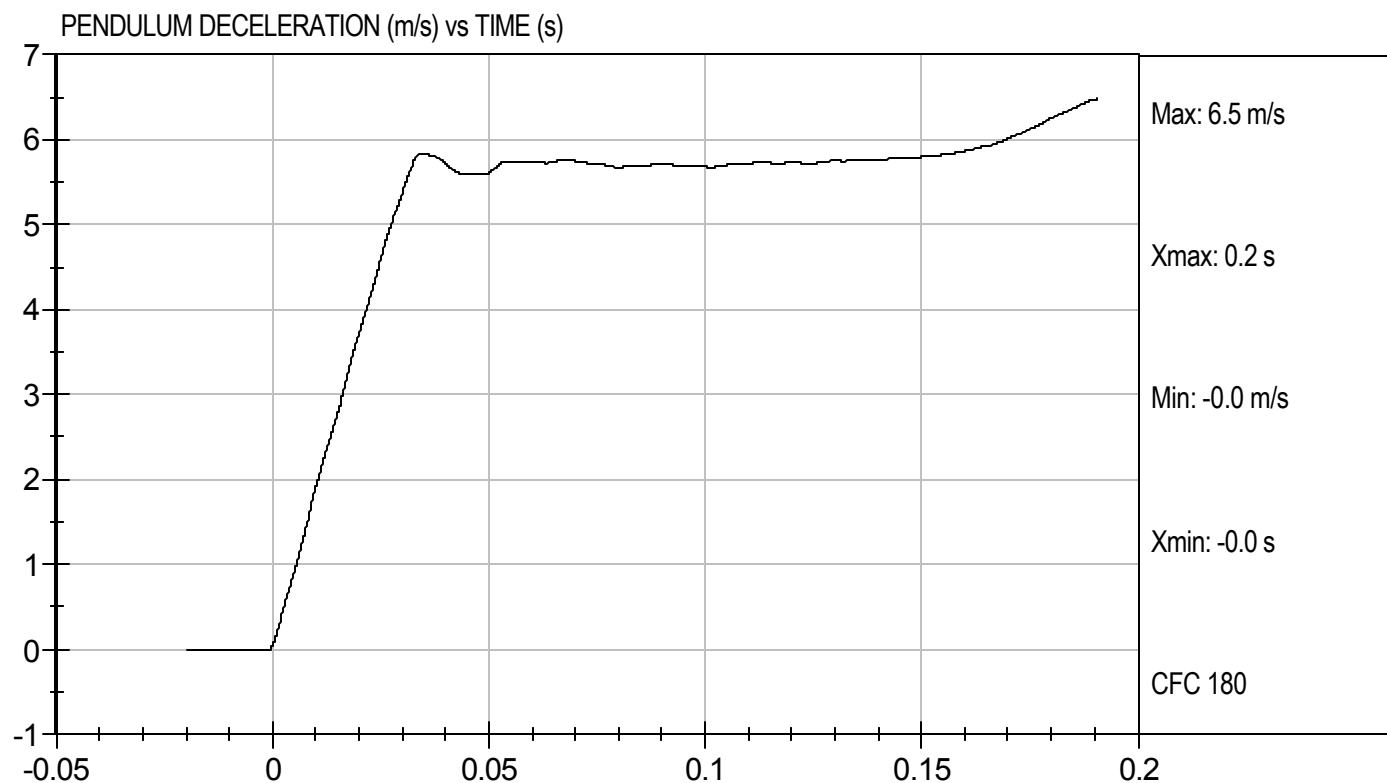
8/13/10
Test Date

David Winkelbauer
Approved By



Test Desc: Neck Extension
Component ID: D102603

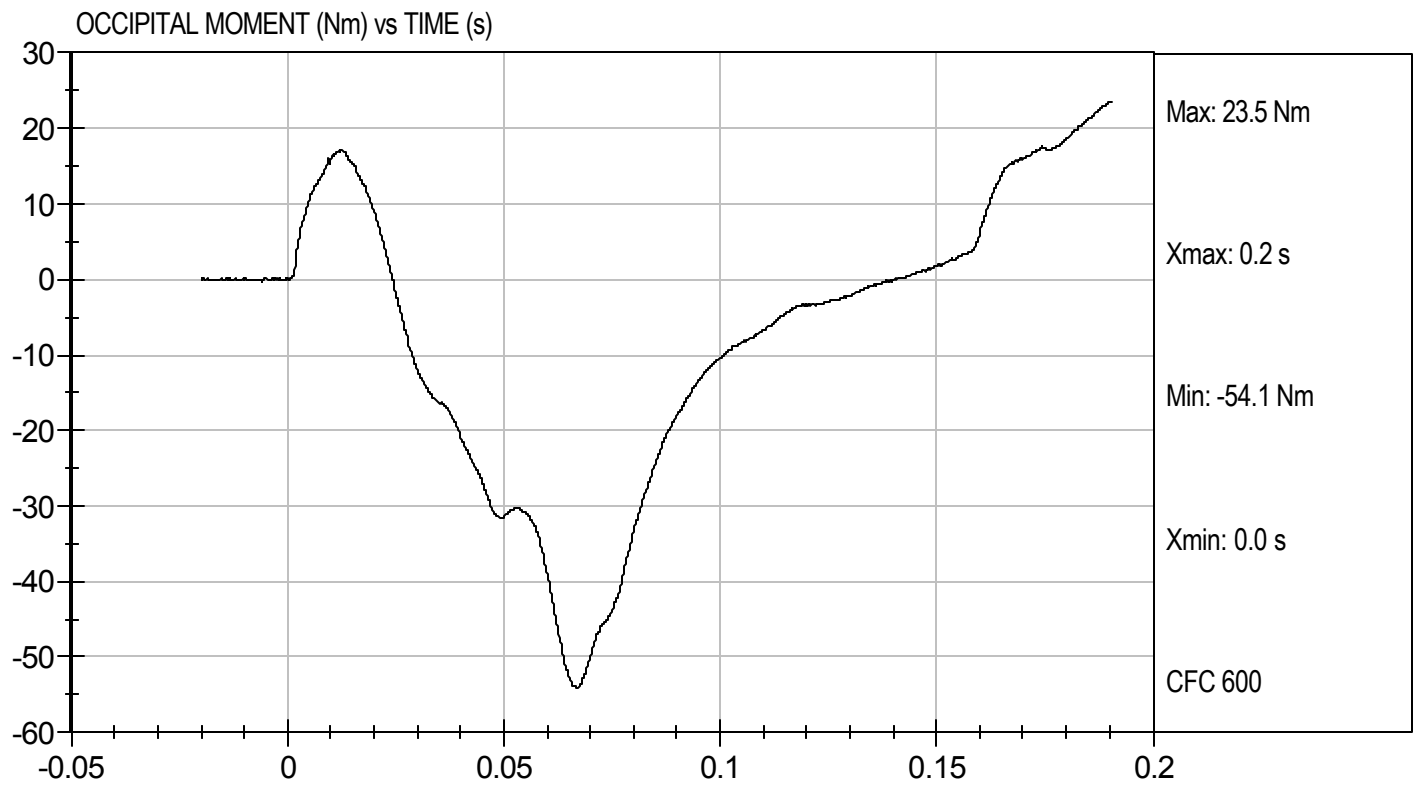
Test Date: 8/13/10
Velocity: 20.08 ft/s, 6.12 m/s





Test Desc: Neck Extension
Component ID: D102603

Test Date: 8/13/10
Velocity: 20.08 ft/s, 6.12 m/s



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D: D102604

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.2	Pass
Relative Humidity	%	10 to 70	46	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	kN	3.9 to 4.4	4.2	Pass
Internal Hysteresis	%	69 to 85	71	Pass
Peak Force 18 mm - 50 mm	N	<= 4,600 N	4254	Pass
			Overall Test Results	Pass

Jessica Hall
Laboratory Technician

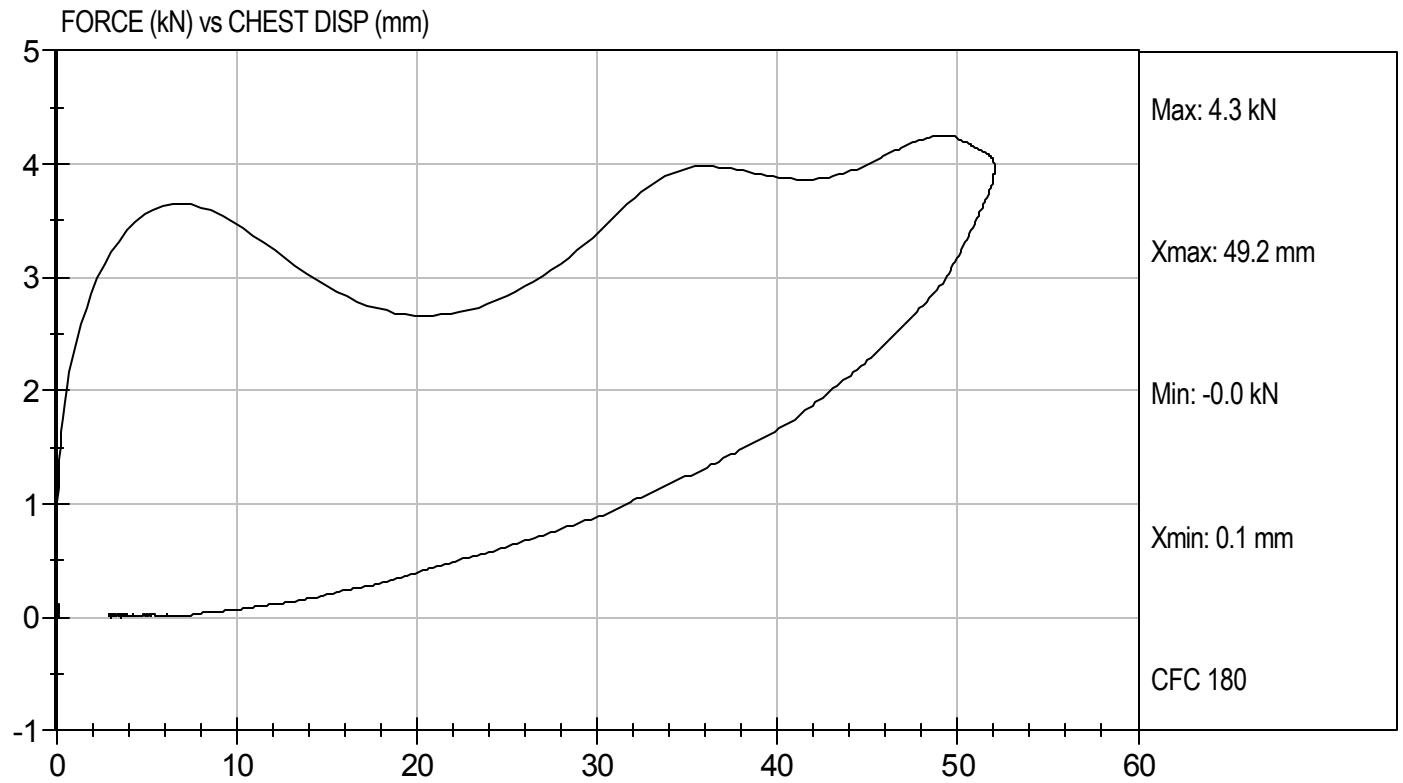
8/16/10
Test Date

David Winkelbauer
Approved By



Test Desc: Thorax Impact
Component ID: D102604

Test Date: 8/16/10
Velocity: 22.22 ft/s, 6.77 m/s



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

ATD Serial No: 138

Test I.D: D102605

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	52	Pass
Probe Speed	m/s	2.07 to 2.13	2.10	Pass
Maximum Force	kN	3.45 to 4.06	3.65	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

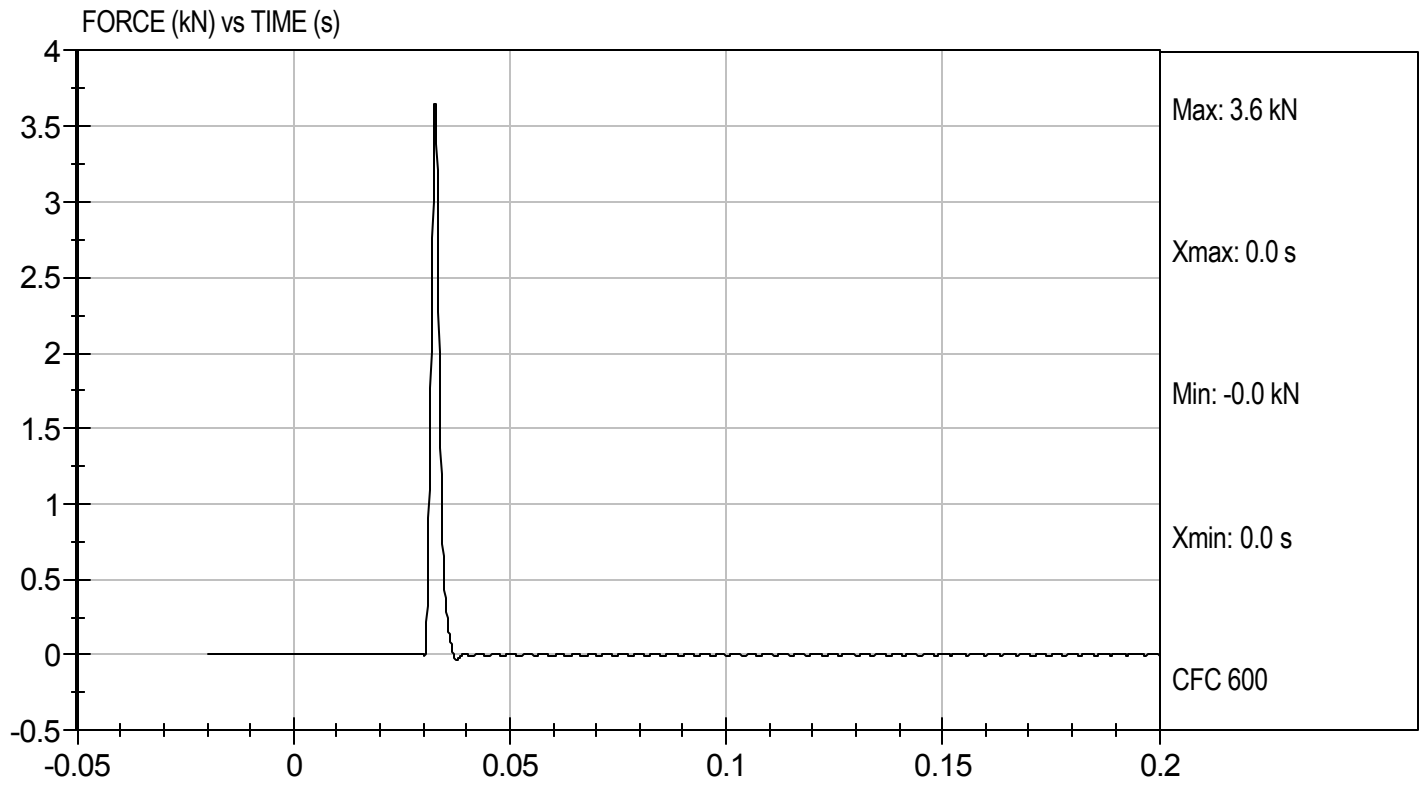
8/13/10
Test Date

David Winkelbauer
Approved By



Test Desc: Right Knee
Component ID: D102605

Test Date: 8/13/10
Velocity: 6.88 ft/s, 2.10 m/s



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D: D102606

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	52	Pass
Probe Speed	m/s	2.07 to 2.13	2.09	Pass
Maximum Force	kN	3.45 to 4.06	3.75	Pass
Overall Test Results				Pass

Jessica Gall
Laboratory Technician

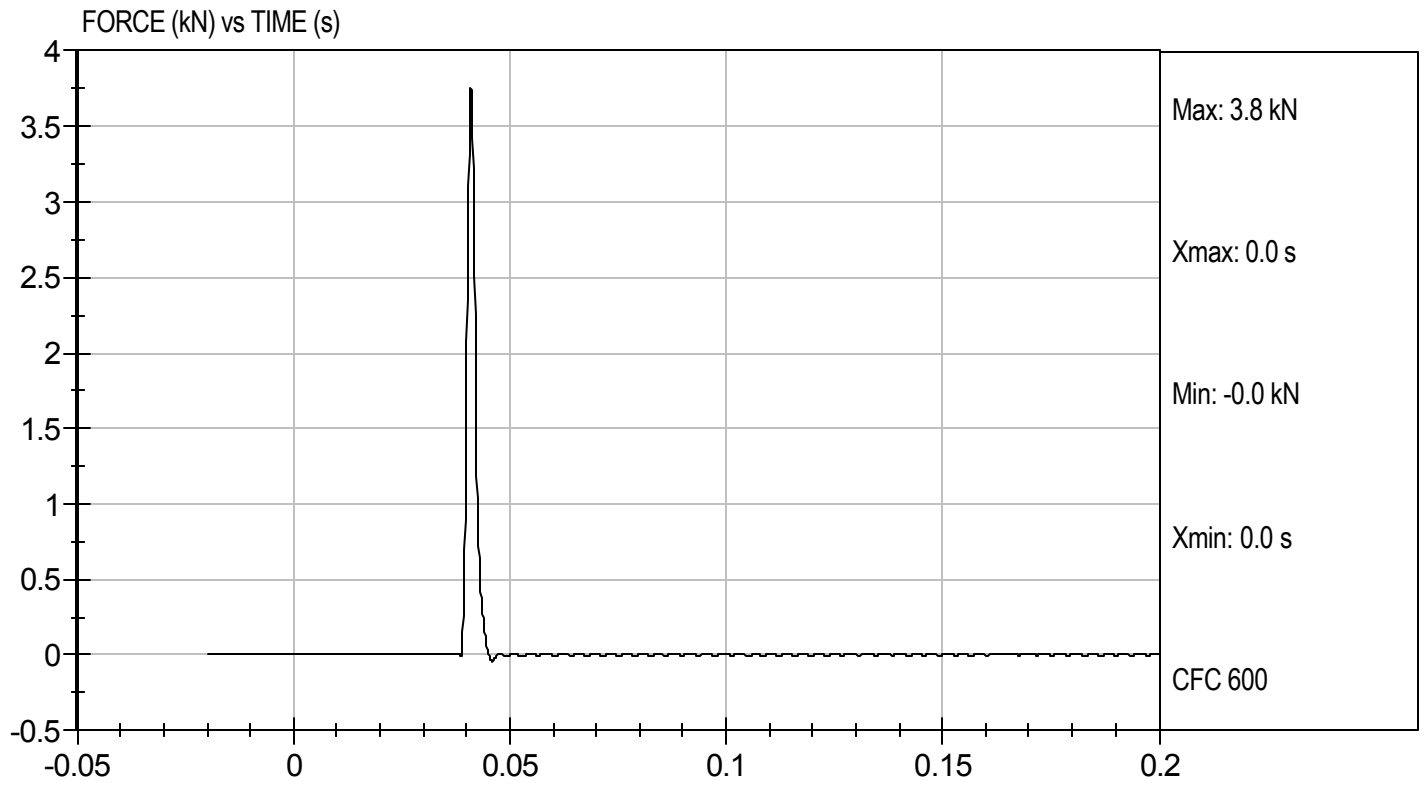
8/13/10
Test Date

David Winkelbauer
Approved By



Test Desc: Left Knee
Component ID: D102606

Test Date: 8/13/10
Velocity: 6.85 ft/s, 2.09 m/s

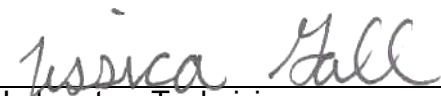


MGA RESEARCH CORPORATION
TORSO FLEXION TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D: d102607

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	47	Pass
Initial Angle	deg	0 to 20	19	Pass
Return Angle	deg	+/- 8	4	Pass
Force at 45 deg	N	320 to 390	360	Pass
Upper Torso Deflection Rate	Deg/sec	0.5 to 1.5	1.0	Pass
Overall Result				Pass


Laboratory Technician

8/16/10
Test Date

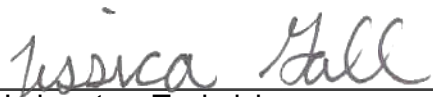

Approved By

MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test ID: D102651

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	56	Pass
Peak Resultant Acceleration	G's	250 to 300	283	Pass
Peak Lateral Acceleration	G's	+/- 15	7.1	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

8/18/10
Test Date

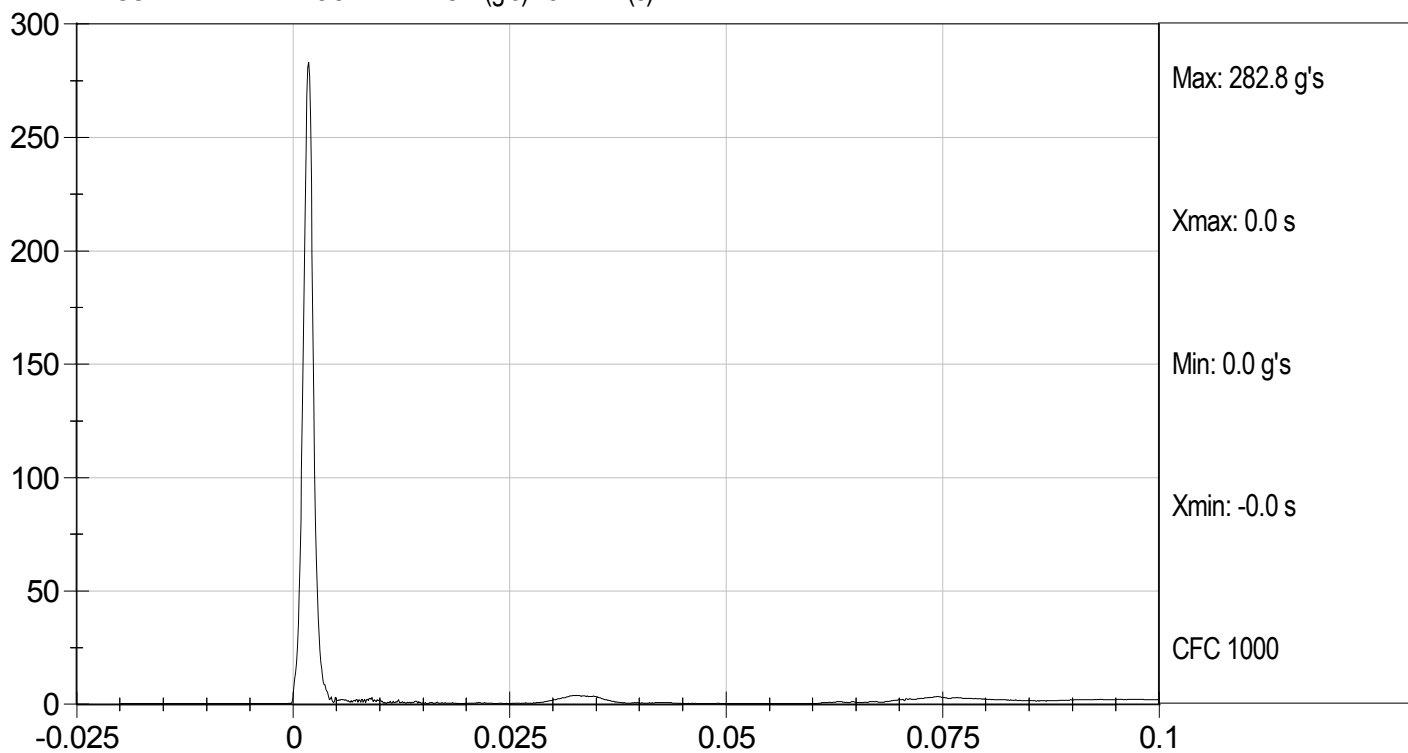

Approved By



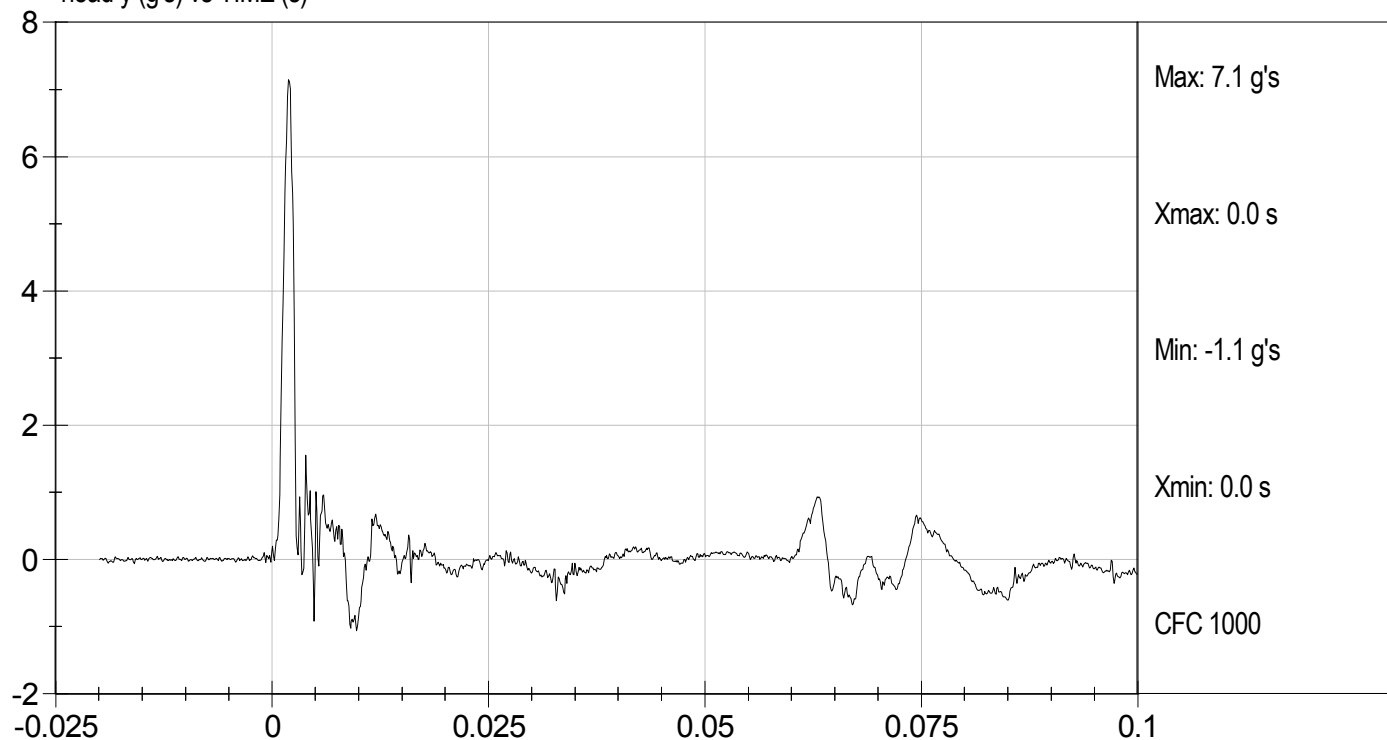
Test Desc: Head Drop
Component ID: D102651

Test Date: 8/18/10
Velocity: 0 ft/s, 0 m/s

RESULTANT HEAD ACCELERATION (g's) vs TIME (s)



head y (g's) vs TIME (s)

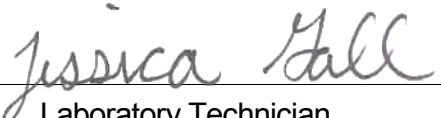


MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D: D102652

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity		%	10 to 70	52	Pass
Pendulum Speed		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	m/s	2.1 to 2.5	2.4	Pass
	20 ms	m/s	4.0 to 5.0	4.6	Pass
	30 ms	m/s	5.8 to 7.0	6.6	Pass
D Plane Rotation	Max	deg	77 to 91	79	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	69 to 83	75	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	83	Pass
Overall Results					Pass


Laboratory Technician

8/19/10
Test Date

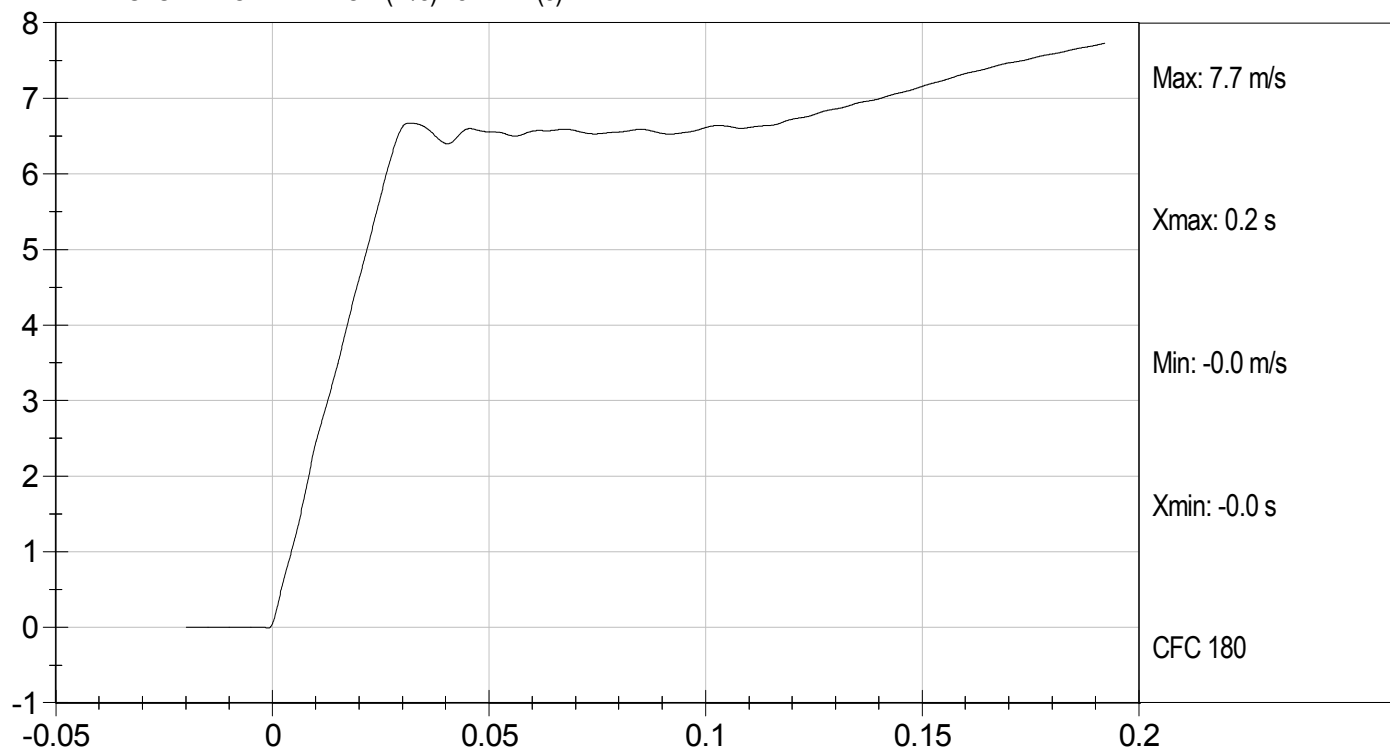

Approved By



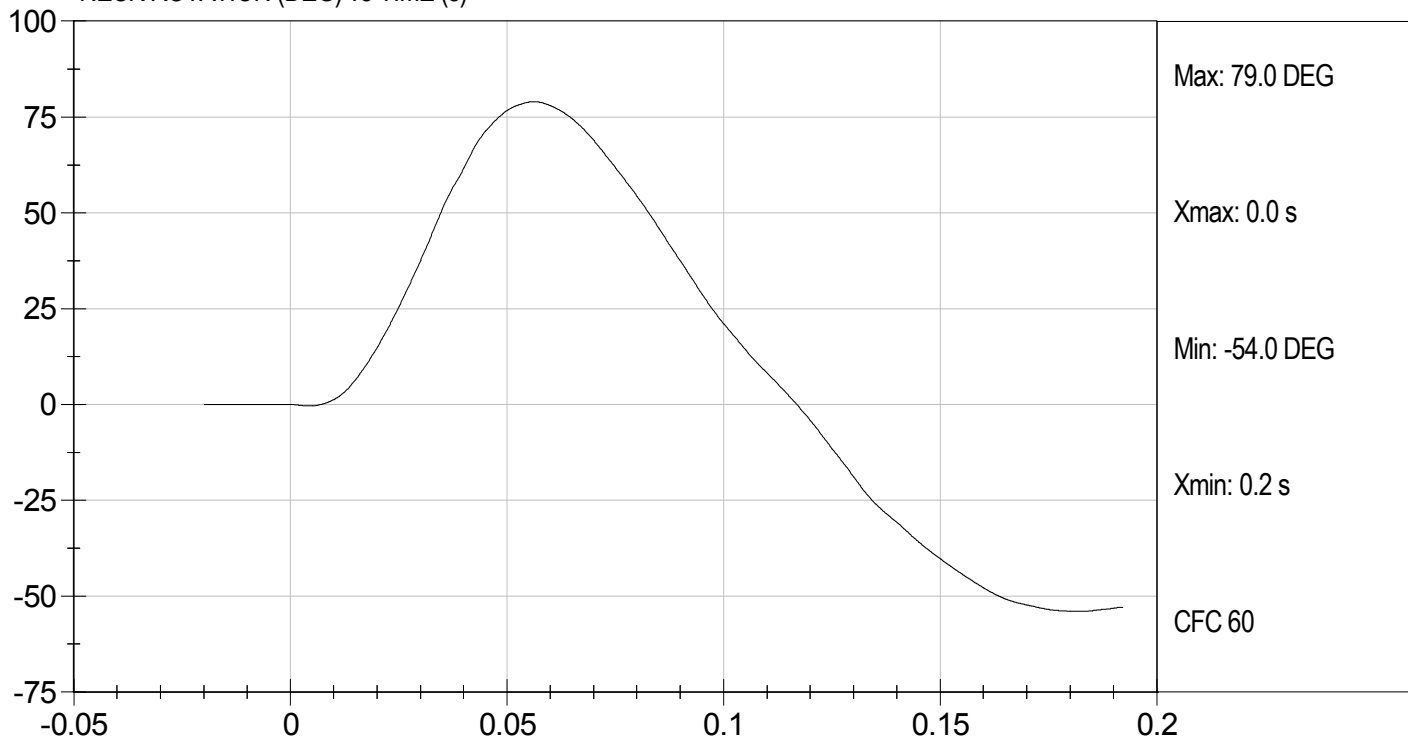
Test Desc: Neck Flexion
Component ID: D102652

Test Date: 8/19/10
Velocity: 23.15 ft/s, 7.06 m/s

PENDULUM DECELERATION (m/s) vs TIME (s)



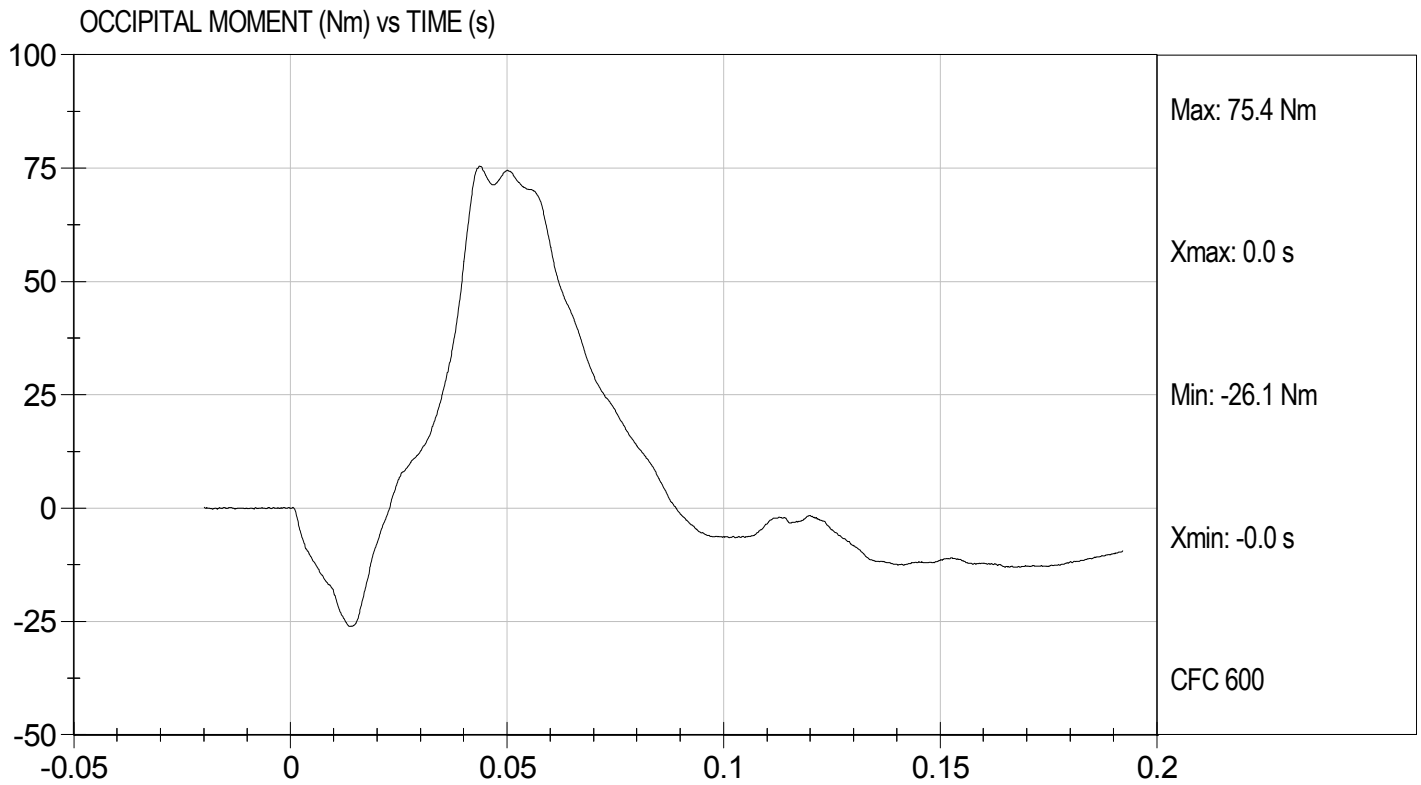
NECK ROTATION (DEG) vs TIME (s)





Test Desc: Neck Flexion
Component ID: D102652

Test Date: 8/19/10
Velocity: 23.15 ft/s, 7.06 m/s



MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D: D102653

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity		%	10 to 70	52	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.16	Pass
Pendulum Deceleration	10 ms	m/s	1.5 to 1.9	1.9	Pass
	20 ms	m/s	3.1 to 3.9	3.7	Pass
	30 ms	m/s	4.6 to 5.6	5.3	Pass
D Plane Rotation	Max	deg	99 to 114	102	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	-65 to -53	-55	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	100	Pass
Overall Results					Pass


Laboratory Technician

8/19/10
Test Date

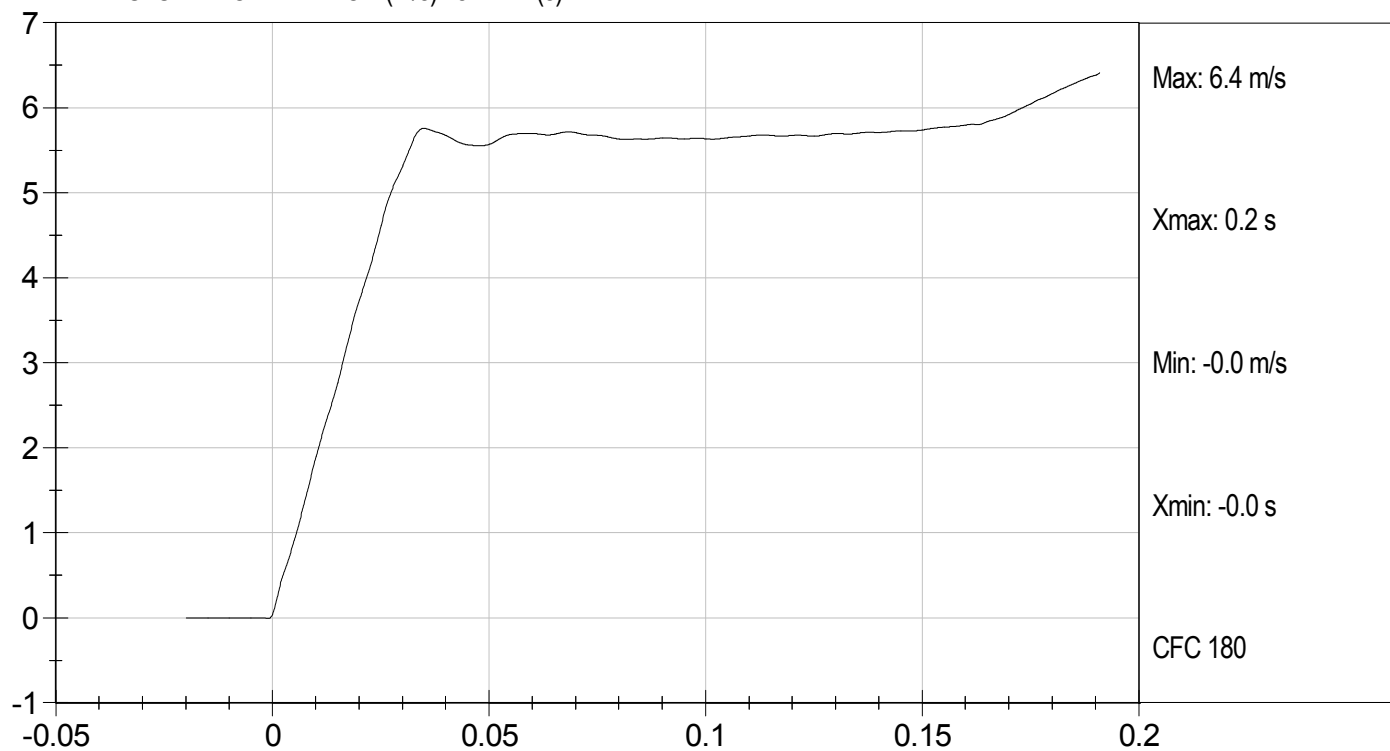

Approved By



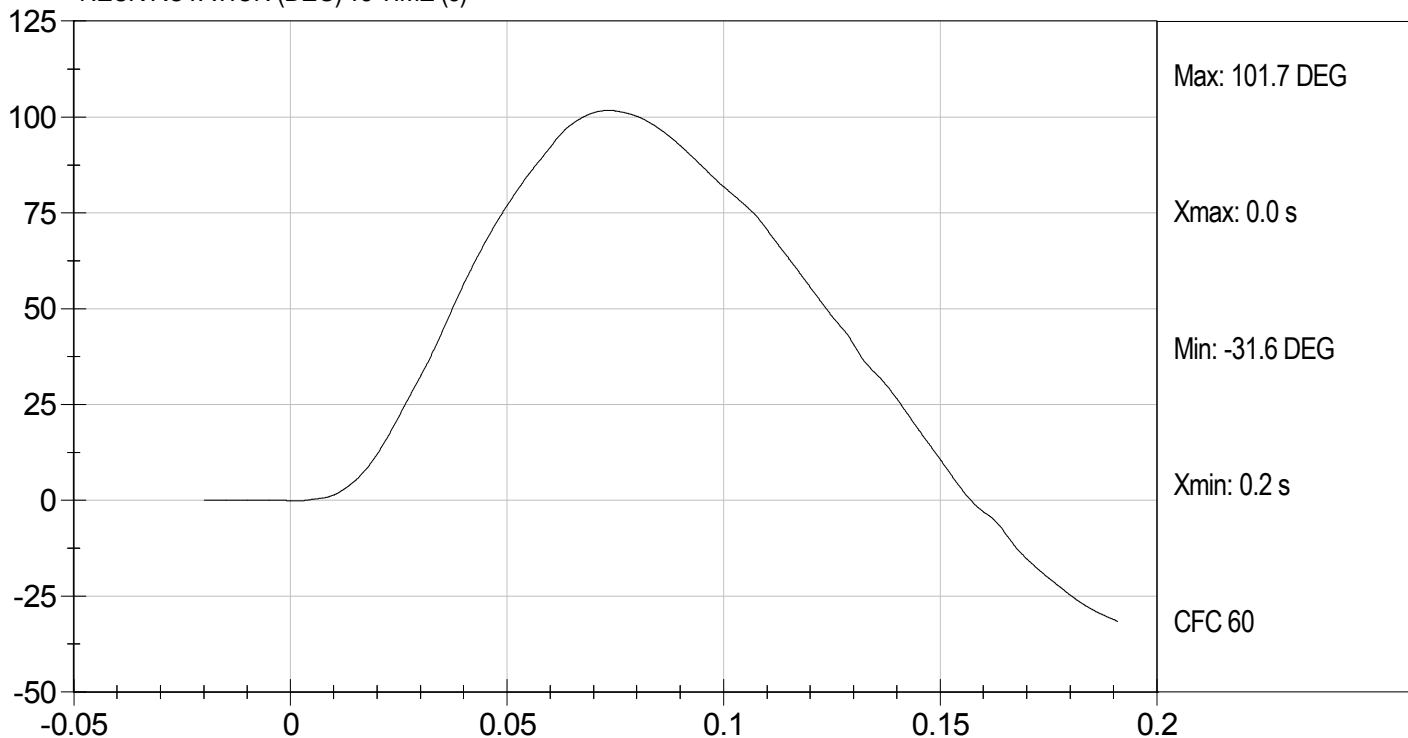
Test Desc: Neck Extension
Component ID: D102653

Test Date: 8/19/10
Velocity: 20.20 ft/s, 6.16 m/s

PENDULUM DECELERATION (m/s) vs TIME (s)



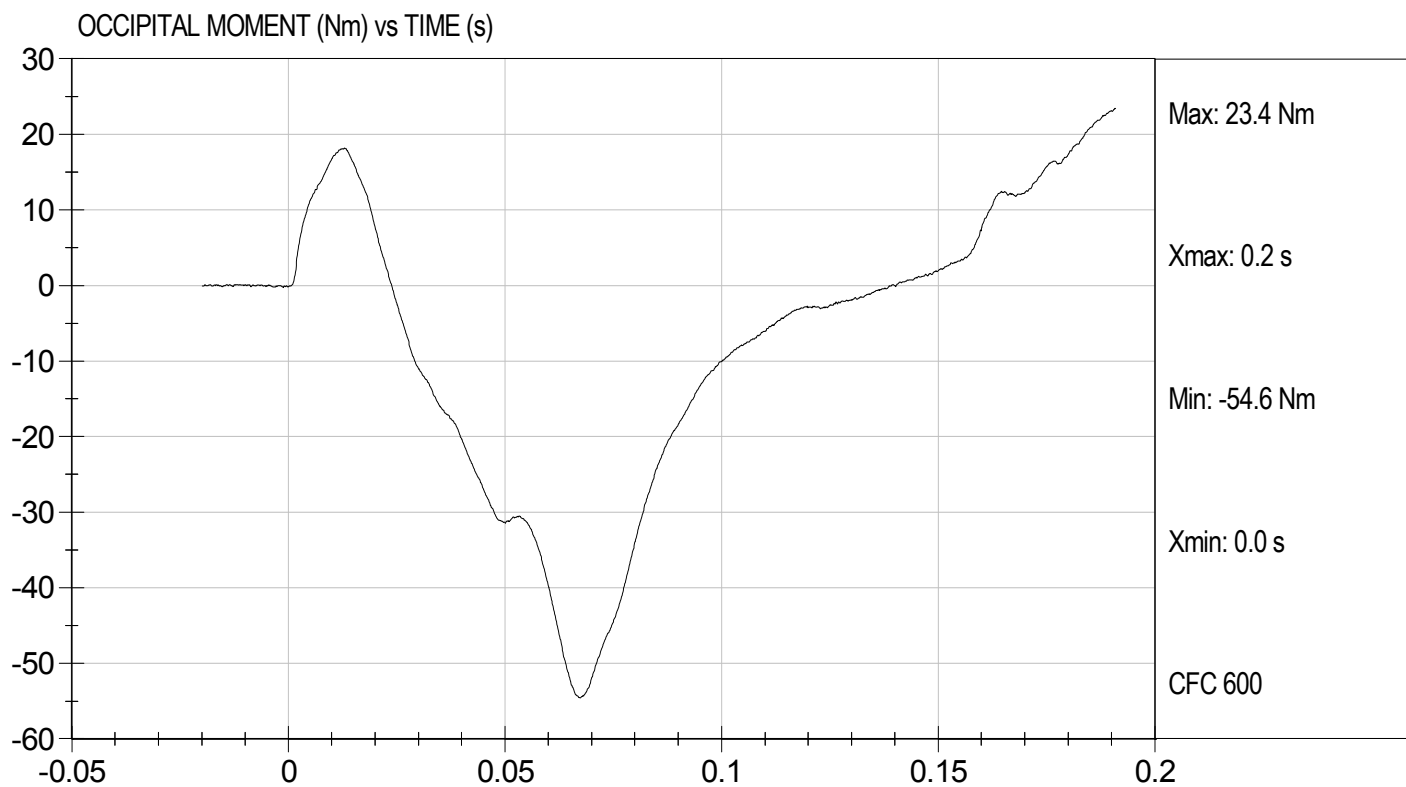
NECK ROTATION (DEG) vs TIME (s)





Test Desc: Neck Extension
Component ID: D102653

Test Date: 8/19/10
Velocity: 20.20 ft/s, 6.16 m/s



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 5TH PERCENTILE

ATD Serial No: 138

Test I.D: D102654

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.4	Pass
Relative Humidity	%	10 to 70	53	Pass
Probe Speed	m/s	6.59 to 6.83	6.77	Pass
Peak Deflection	mm	50 to 58	54	Pass
Peak Resistive Force w/in Deflection Corridor	kN	3.9 to 4.4	4.17	Pass
Internal Hysteresis	%	69 to 85	70	Pass
Peak Force 18 mm - 50 mm	N	<= 4,600 N	4156	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

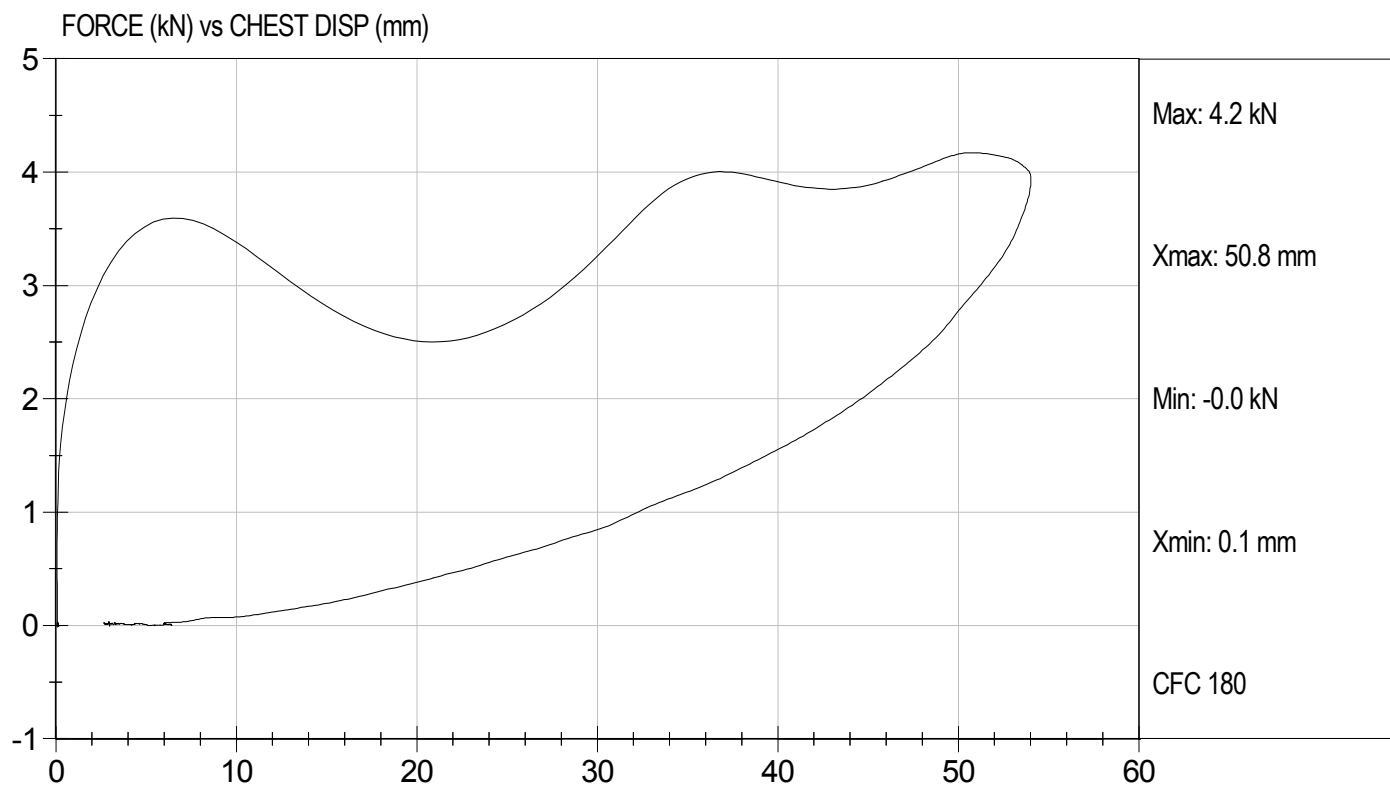
8/19/10
Test Date

David Winkelbauer
Approved By



Test Desc: Thorax Impact
Component ID: D102654

Test Date: 8/19/10
Velocity: 22.2 ft/s, 6.77 m/s



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

ATD Serial No: 138

Test I.D: D102655

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	22.0	Pass
Laboratory Relative Humidity	%	10 to 70	51	Pass
Probe Speed	m/s	2.07 to 2.13	2.13	Pass
Maximum Force	kN	3.45 to 4.06	3.81	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

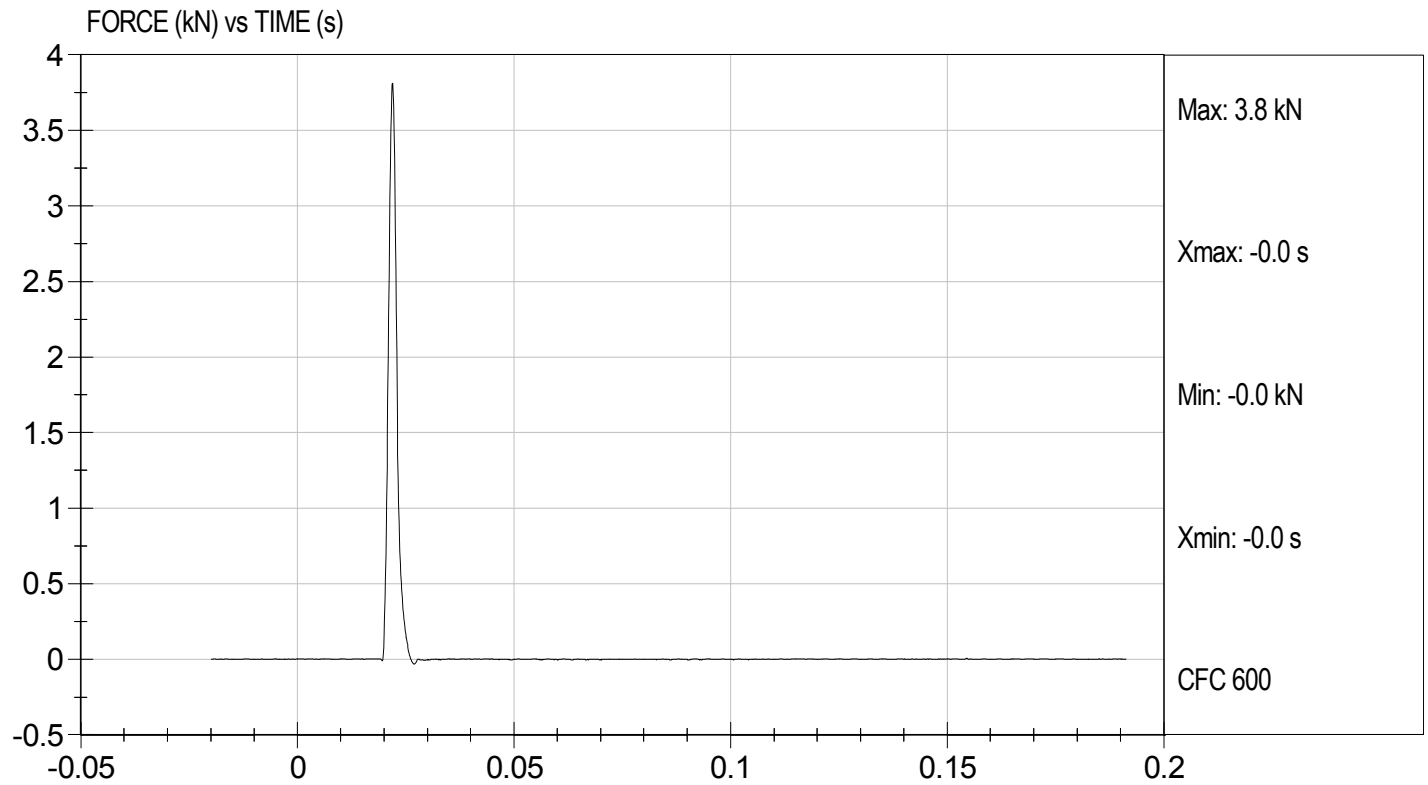
8/19/10
Test Date

David Winkelbauer
Approved By



Test Desc: Left Knee
Component ID: D102655

Test Date: 8/19/10
Velocity: 7.0 ft/s, 2.13 m/s



MGA RESEARCH CORPORATION

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

ATD Serial No: 138

Test I.D: D102656

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	22.0	Pass
Laboratory Relative Humidity	%	10 to 70	51	Pass
Probe Speed	m/s	2.07 to 2.13	2.10	Pass
Maximum Force	kN	3.45 to 4.06	3.59	Pass
Overall Test Results				Pass

Jessica Gall
Laboratory Technician

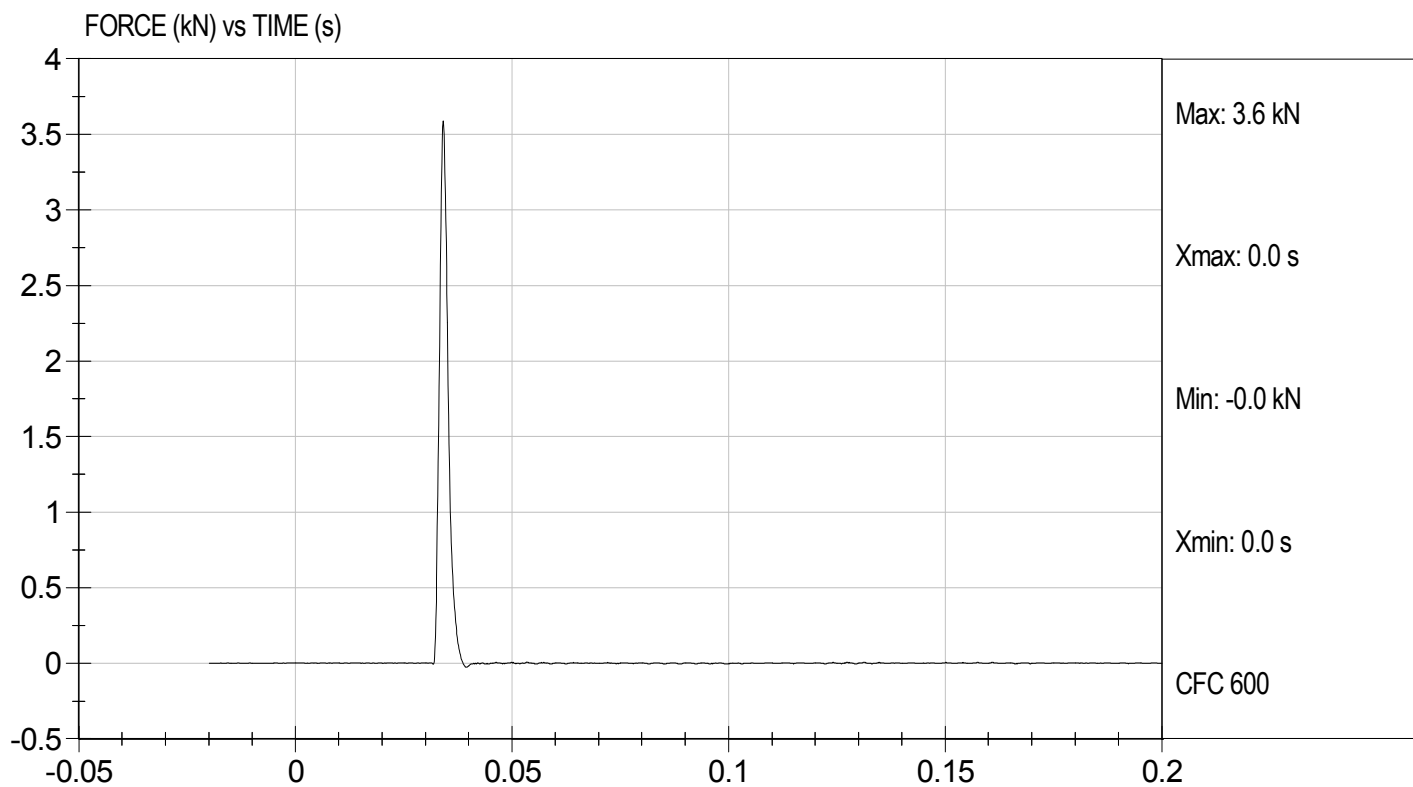
8/19/10
Test Date

David Winkelbauer
Approved By



Test Desc: Left Knee
Component ID: D102656

Test Date: 8/19/10
Velocity: 6.9 ft/s, 2.10 m/s



MGA RESEARCH CORPORATION
TORSO FLEXION TEST
HYBRID III 5TH PERCENTILE

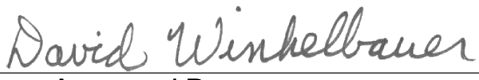
ATD Serial No: 138

Test I.D: D102657

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	53	Pass
Initial Angle	deg	0 to 20	18	Pass
Return Angle	deg	+/- 8	5	Pass
Force at 45 deg	N	320 to 390	345	Pass
Upper Torso Deflection Rate	Deg/sec	0.5 to 1.5	1.0	Pass
Overall Result			Pass	


Laboratory Technician

8/19/10
Test Date


Approved By