

REPORT NUMBER: NCAP-MGA-2008-009

**NEW CAR ASSESSMENT PROGRAM
FRONTAL BARRIER IMPACT TEST**

**CHRYSLER LLC
2008 DODGE DAKOTA CREW CAB ST 4X4
NHTSA NUMBER: M80306**

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



Test Date: October 26, 2007


Final Report Date: December 12, 2007

FINAL REPORT

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

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16. Abstract A frontal barrier impact was conducted on a 2008 Dodge Dakota Crew Cab ST 4x4 at MGA Research Corporation on October 26, 2007. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and foot well intrusion performance. The impact velocity was 56.5 km/h. The ambient temperature at the barrier face at the time of impact was 21 degrees Celsius. The vehicle's maximum post test static crush is 625 mm located at the vehicle's centerline. The test vehicle is equipped with a 3-point continuous belt system and an airbag in both front outboard seating positions. With respect to FMVSS 208 "Occupant Crash Protection", the occupant injury criteria summary is as follows:																														
<table border="1"> <thead> <tr> <th><u>Measurement Description</u></th> <th><u>Units</u></th> <th><u>Threshold</u></th> <th><u>Driver ATD</u></th> <th><u>Pass. ATD</u></th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC)</td> <td>N/A</td> <td>1000</td> <td>291</td> <td>384</td> </tr> <tr> <td>Max. Thorax Accel. (3ms Clip)</td> <td>G's</td> <td>60</td> <td>33</td> <td>34</td> </tr> <tr> <td>Left Femur Force</td> <td>Newton</td> <td>10009</td> <td>-5400</td> <td>-2279</td> </tr> <tr> <td>Right Femur Force</td> <td>Newton</td> <td>10009</td> <td>-4141</td> <td>-818</td> </tr> </tbody> </table>						<u>Measurement Description</u>	<u>Units</u>	<u>Threshold</u>	<u>Driver ATD</u>	<u>Pass. ATD</u>	Head Injury Criteria (HIC)	N/A	1000	291	384	Max. Thorax Accel. (3ms Clip)	G's	60	33	34	Left Femur Force	Newton	10009	-5400	-2279	Right Femur Force	Newton	10009	-4141	-818
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SECTION 1

PURPOSE AND SUMMARY OF TEST

PURPOSE

This 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 an impact in excess of the current 48.3 kph requirements.

SUMMARY

A load cell barrier was impacted by a 2008 Dodge Dakota Crew Cab ST 4x4 at a velocity of 56.5 kph. The test was performed at MGA Research Corporation on October 26, 2007. Pre-and post-test photographs of the vehicle and dummies can be found in Appendix A.

One real-time camera and sixteen 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.

Two Part 572E, 50th percentile male anthropomorphic test devices (ATDs), were placed in the driver and right-front passenger seating positions according to dummy placement instructions specified in the Laboratory Indicant Test Procedure.

Both ATDs were fully instrumented with head, chest and pelvis tri-axial accelerometers, chest displacement potentiometer, upper neck transducers, right/left femur load cells, and lower leg instrumentation. The driver (position 1) ATD (Serial No. 065) and right-front passenger (position 2) ATD (Serial No. 066) were calibrated previous to this test. Certification details, along with instrumentation calibration data, are found in Appendix C.

The 102 channels of data were recorded on an on-board data acquisition system. Appendix B contains the dummy head, chest, 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 625 mm and both the driver and passenger side doors remained closed and latched 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. The driver's knees contacted the knee bolster. 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	T ¹	T ²	Clip (g)	T ¹	T ²	Chest Disp. (mm)	Left Femur (N)	Right Femur (N)
Driver	291	55.1	91.1	33	62.4	65.4	-32	-5400	-4141
Passenger	384	68.7	104.7	34	48.9	51.9	-30	-2279	-818

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

TEST NOTES

None

SECTION 2
OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

DATA SHEET NO. 1
CRASH TEST SUMMARY

Test Vehicle: 2008 Dodge Dakota Crew Cab ST 4x4
 Test Program: 35mph Frontal Impact

NHTSA No.: M80306
 Test Date: 10/26/2007

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
Glazing Damage	The windshield cracked.	

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	1505
Center	mm	1620
Right Side	mm	1595
Average	mm	1573

BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Shoulder belt length as measured on ATD	mm	744	733
Lap belt length as measured on ATD	mm	681	672
Remainder of belt on reel	mm	1537	1515
Total belt length for continuous webbing systems	mm	2962	2920

DATA SHEET NO. 2

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2008 Dodge Dakota Crew Cab ST 4x4
 Test Program: 35mph Frontal Impact

NHTSA No.: M80306
 Test Date: 10/26/2007

TEST VEHICLE INFORMATION

Manufacturer	Dodge
Model	Dakota
Body Style	Crew Cab ST 4x4
NHTSA No.	M80306
VIN	1D7HW28K18S508163
Color	Brilliant Black
Delivery Date	10/12/2007
Odometer Reading (mile)	159
Dealer	Boucher Fleet Group
Transmission	Automatic
Final Drive	4 Wheel
Number of Cylinders	6
Engine Displacement (L)	3.7
Engine Placement	Longitudinal
Automatic Door Lock (ADL)	No
Owners Manual Details Instructions on Disabling ADLs	N/A
Bucket Seats	Yes

TEST VEHICLE OPTIONS

Front Airbag	Yes
Driver Side Curtain Airbag	No
Driver Side Torso Airbag	No
Rear Passenger Side Curtain Airbag	No
Rear Passenger Side Torso Airbag	No
Force Limiter	Yes
Pretensioner	Yes
Power Steering	Yes
Power Door Locks	No
Tilt Wheel	No
Air Conditioning	Yes
Anti-lock Brakes	No
Traction Control	No
All Wheel Drive	Yes
Power Seats	No

DATA FROM CERTIFICATION LABEL

Manufactured By	Chrysler LLC
Date of Manufacture	8-07

GVWR (kg)	2727
GAWR Front (kg)	1633
GAWR Rear (kg)	1633

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench		
Number of Occupants	2	3		5
Capacity Wt. (VCW) (kg)				651
Cargo Wt. (RCLW) (kg)				136.1

DATA SHEET NO. 2... (CONTINUED)
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2008 Dodge Dakota Crew Cab ST 4x4 NHTSA No.: M80306
 Test Program: 35mph Frontal Impact Test Date: 10/26/2007

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	596.9	446.3		665.9	531.2	
Right	kg	582.0	427.8		623.2	516.6	
Ratio	%	57.4	42.6		55.2	44.8	
Totals	kg	1178.9	874.1	2053.0	1289.1	1047.8	2336.9

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	2053.0
Weight of 2 P572E ATDs	kg	156.0
Rated Cargo/Luggage Weight (RCLW)	kg	136.1
Calculated Vehicle Target Weight (TVTW)	kg	2345.1

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	853	867	911	923	1420
As Tested	mm	847	856	868	874	1496
Post Test	mm	803	829	880	886	

Vehicle Wheelbase (mm): 3336

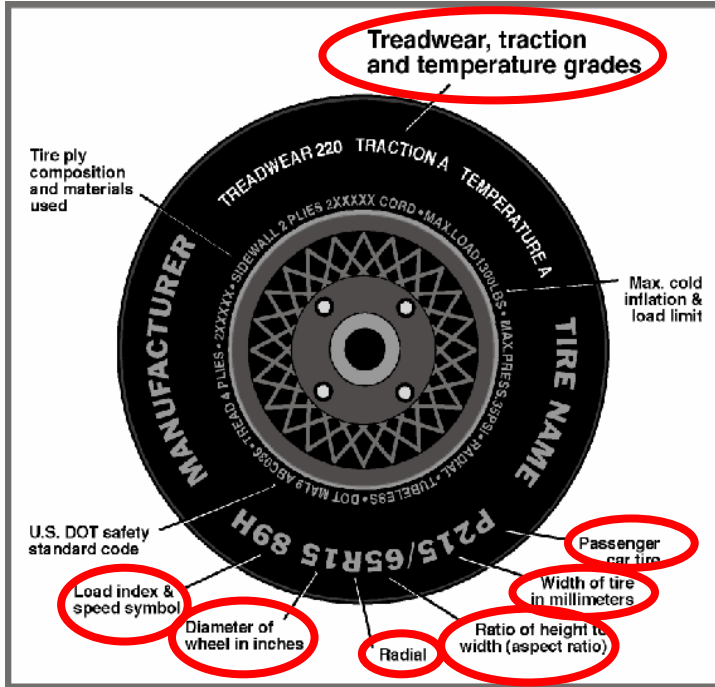
Weight of Ballast secured in truck box (kg): 20.4

Vehicle Components Removed: Jack, jack handle, and spare tire.

Ballast weight does not include instrumentation and data acquisition system.

DATA SHEET NO. 3
TEST VEHICLE TIRE INFORMATION

Test Vehicle: 2008 Dodge Dakota Crew Cab ST 4x4 NHTSA No.: M80306
 Test Program: 35mph Frontal Impact Test Date: 10/26/2007



DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	240	240
Recommended Tire Size	P245/70R16	P245/70R16
Tire Size on Vehicle	P245/70R16	P245/70R16
Tire Manufacturer	Goodyear	Goodyear
Tire Name	Wrangler	Wrangler
Tire Type	Passenger	Passenger
Tire Width (mm)	245	245
Ratio of Height to Width (aspect ratio)	70	70
Radial	R	R
Wheel Diameter	16	16
Load Index & Speed Symbol	106S	106S
Treadwear	360	360
Traction Grade	A	A
Temperature Grade	B	B

DATA SHEET NO. 4
TEST VEHICLE INFORMATION

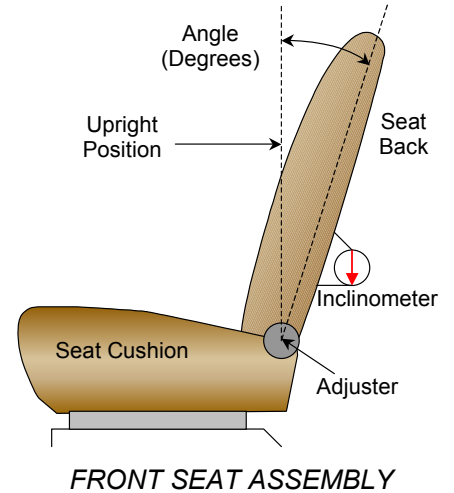
Test Vehicle: 2008 Dodge Dakota Crew Cab ST 4x4
 Test Program: 35mph Frontal Impact

NHTSA No.: M80306
 Test Date: 10/26/2007

NORMAL DESIGN RIDING POSITION

The driver and passenger seat back is positioned to the manufacturer's designated angle. The procedure is as follows: For the driver, the test position is 21.3 degrees. For the front passenger, the test position is 22 degrees. Both are from the upright position.

Driver seat back angle: 21.3 degrees
 Passenger seat back angle: 22.0 degrees

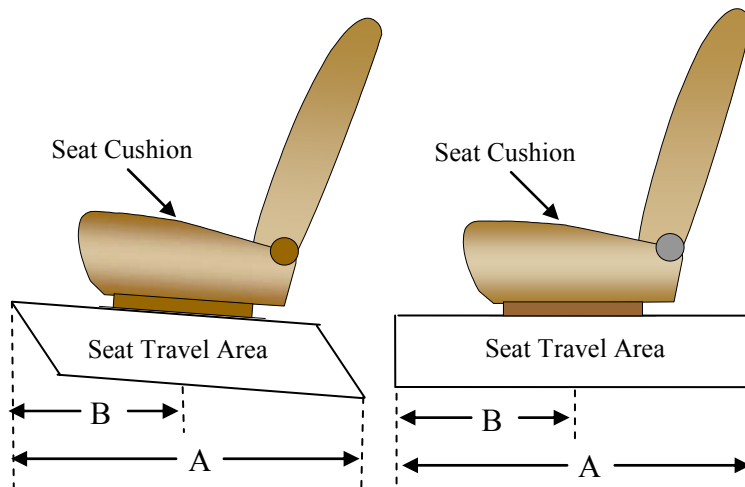


SEAT FORE/AFT POSITIONING

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	220 mm	110 mm
Passenger Seat	220 mm	110 mm

ADJUSTABLE D-RING POSITION

The driver and passenger D-rings were set in position 2 of 4 with the upper-most detent defined as 0).



DATA SHEET NO. 4...(CONTINUED)

TEST VEHICLE INFORMATION

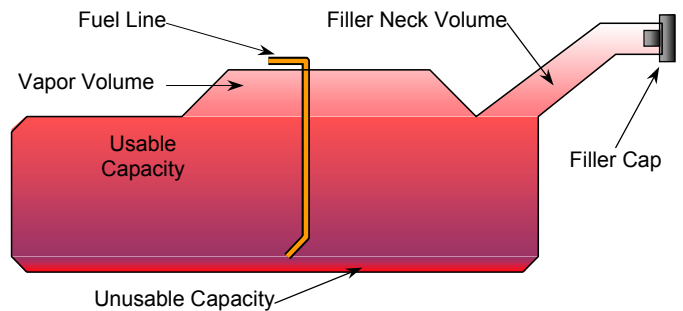
Test Vehicle: 2008 Dodge Dakota Crew Cab ST 4x4
 Test Program: 35mph Frontal Impact

NHTSA No.: M80306
 Test Date: 10/26/2007

FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	83.3
Usable Capacity of "Optional" Tank	
92-94% of Usable Capacity	76.6 – 78.3
Actual Amount of Solvent used	76.8
1/3 of Usable Capacity	27.8

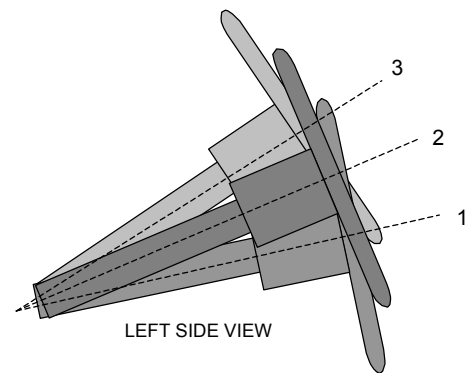
The test vehicle is equipped with an electric fuel pump. The fuel pump will pump fuel, if vehicle is powered on, and key is in the "run" position.



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 POSITIONS

The steering column is non-adjustable.

	Fore/Aft Position (mm)	Degrees
Lowermost position No. 1		
Geometric center position No. 2		
Uppermost position No. 3		

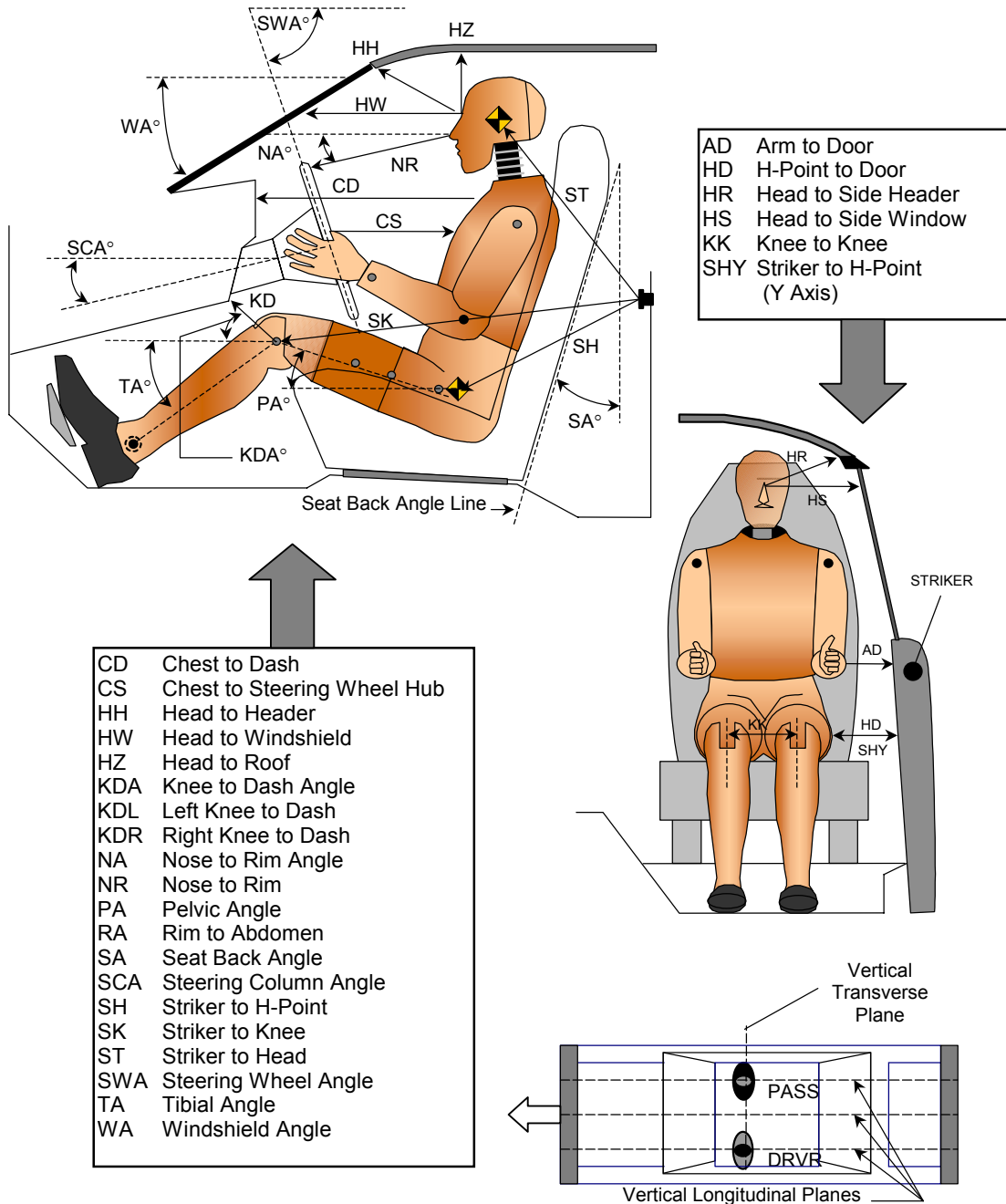
DATA SHEET NO. 5

DUMMY POSITIONING IN VEHICLE

Test Vehicle: 2008 Dodge Dakota Crew Cab ST 4x4
 Test Program: 35mph Frontal Impact

NHTSA No.: M80306
 Test Date: 10/26/2007

DUMMY MEASUREMENTS FOR FRONT SEAT OCCUPANTS



DATA SHEET NO. 5... (CONTINUED)

DUMMY POSITIONING IN VEHICLE

Test Vehicle: 2008 Dodge Dakota Crew Cab ST 4x4
 Test Program: 35mph Frontal Impact

NHTSA No.: M80306
 Test Date: 10/26/2007

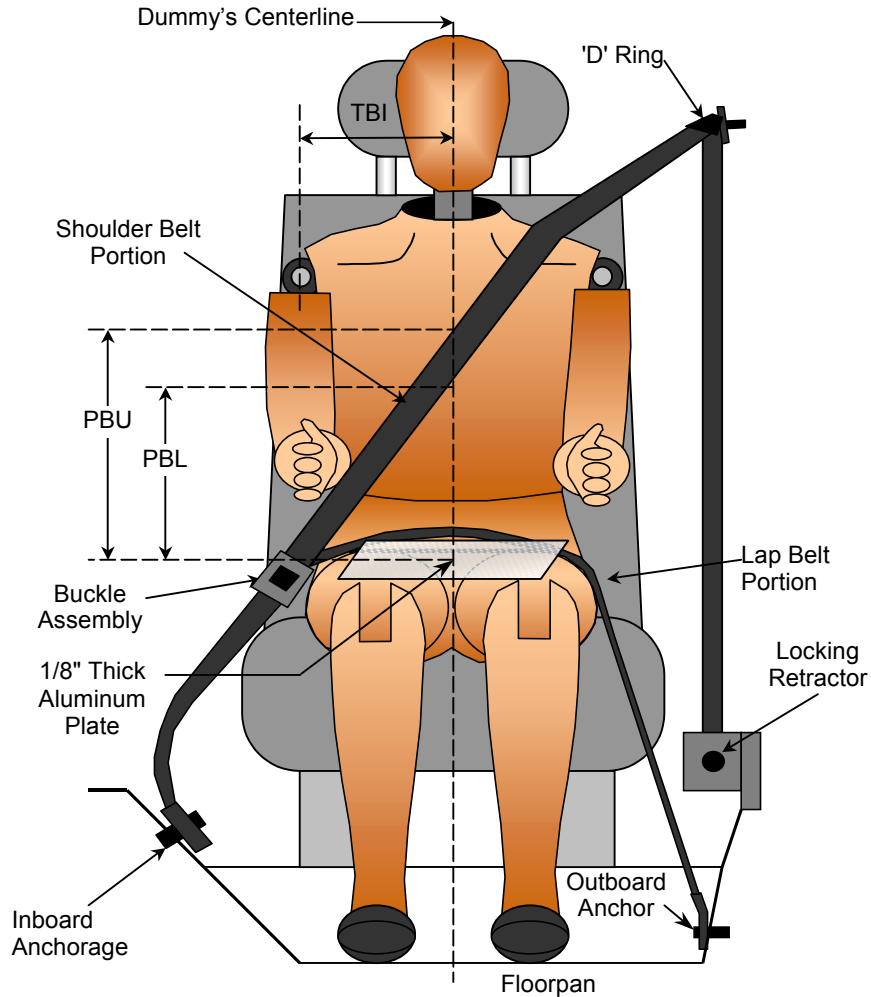
TEST DUMMY POSITION MEASUREMENTS

Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA	Windshield Angle		34.2		
SWA	Steering Wheel Angle		68.0		
SCA	Steering Column Angle		22.8		
SA	Seat Back Angle		21.3		22.0
HZ	Head to Roof (Z)	214	90	220	90
HH	Head to Header	391	12.8	403	17.6
HW	Head to Windshield	645	0	668	0
HR	Head to Side Header (Y)	201		210	
NR	Nose to Rim	387	14.1		
CD	Chest to Dash	565		560	
CS	Chest to Steering Hub	306	9.1		
RA	Rim to Abdomen	162	0		
KDL	Left Knee to Dash	156	11.0	162	
KDR	Right Knee to Dash	141		181	30.1
PA	Pelvic Angle		22.1		21.2
TA	Tibia Angle		52.6		45.7
KK	Knee to Knee (Y)	266		267	
SK	Striker to Knee	574	86.4	585	89.1
ST	Striker to Head	608	5.2	595	7.1
SH	Striker to H-Point	192	114.2	193	113.6
SHY	Striker to H-Point (Y)	264		261	
HS	Head to Side Window	331		336	
HD	H-Point to Door (Y)	184		192	
AD	Arm to Door (Y)	126		131	
AA	Ankle to Ankle	229		187	

DATA SHEET NO. 6
SEAT BELT POSITIONING DATA

Test Vehicle: 2008 Dodge Dakota Crew Cab ST 4x4
 Test Program: 35mph Frontal Impact

NHTSA No.: M80306
 Test Date: 10/26/2007



SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU - Top surface of reference to belt upper edge	mm	345	345
PBL - To surface of reference to belt lower edge	mm	265	265

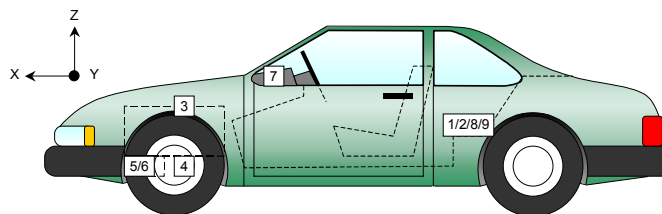
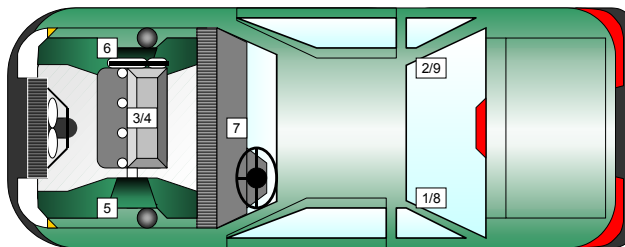
DATA SHEET NO. 7
VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2008 Dodge Dakota Crew Cab ST 4x4 NHTSA No.: M80306
 Test Program: 35mph Frontal Impact Test Date: 10/26/2007

VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear X-Member X	2687	-366	530
2	Right Rear X-Member X	2687	394	530
3	Engine Top X	4609	0	983
4	Engine Bottom X	4480	45	330
5	Left Brake Caliper X	4435	-657	325
6	Right Brake Caliper X	4435	657	320
7	Instrument Panel X			
8	Left Rear X-Member Z	2687	-366	530
9	Right Rear X-Member Z	2687	394	530

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



DATA SHEET NO. 8

SUMMARY OF FMVSS 212 AND FMVSS 219 (Partial) DATA

Test Vehicle: 2008 Dodge Dakota Crew Cab ST 4x4
 Test Program: 35mph Frontal Impact

NHTSA No.: M80306
 Test Date: 10/26/2007

Windshield Mounting Details:

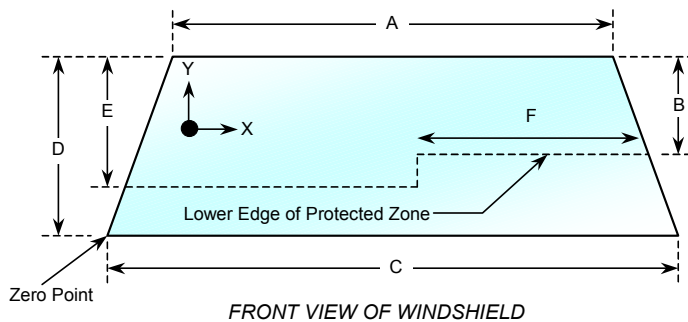
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

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	2060	2060	100
Right Side	2060	2060	100
Total	4120	4120	100



Item	Units	Value
A	mm	1237
B	mm	376
C	mm	1558
D	mm	663
E	mm	457
F	mm	704

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. 9
SUMMARY OF FMVSS 301 DATA

Test Vehicle: 2008 Dodge Dakota Crew Cab ST 4x4 NHTSA No.: M80306
 Test Program: 35mph Frontal Impact Test Date: 10/26/2007

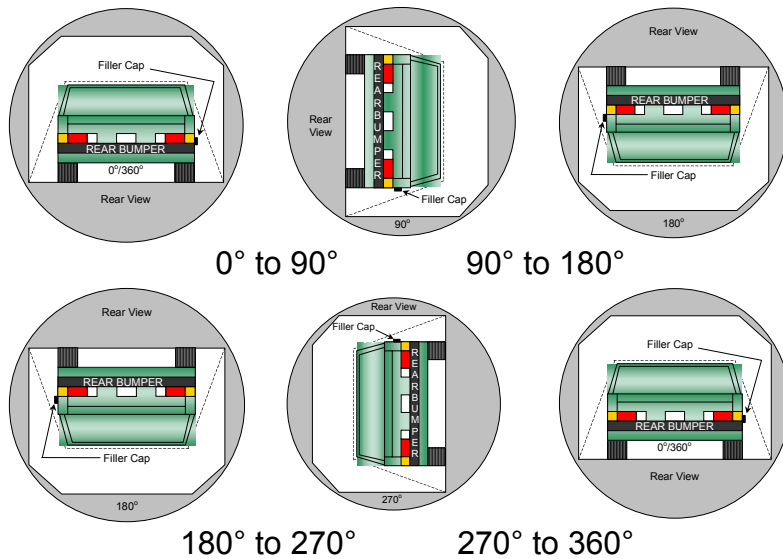
FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 21° C Test Time: 9:58 am

Stoddard Solvent Spillage Measurements

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

FMVSS 301 STATIC ROLLOVER DATA



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 locations:

None

Test Phase	Rotation Time (sec.)	Hold Time (sec.)	Spillage (oz.)
0° to 90°	116	300	0
90° to 180°	119	300	0
180° to 270°	111	300	0
270° to 360°	114	300	0

DATA SHEET NO. 10
VEHICLE MEASUREMENTS

Test Vehicle: 2008 Dodge Dakota Crew Cab ST 4x4
Test Program: 35mph Frontal Impact

NHTSA No.: M80306
Test Date: 10/26/2007

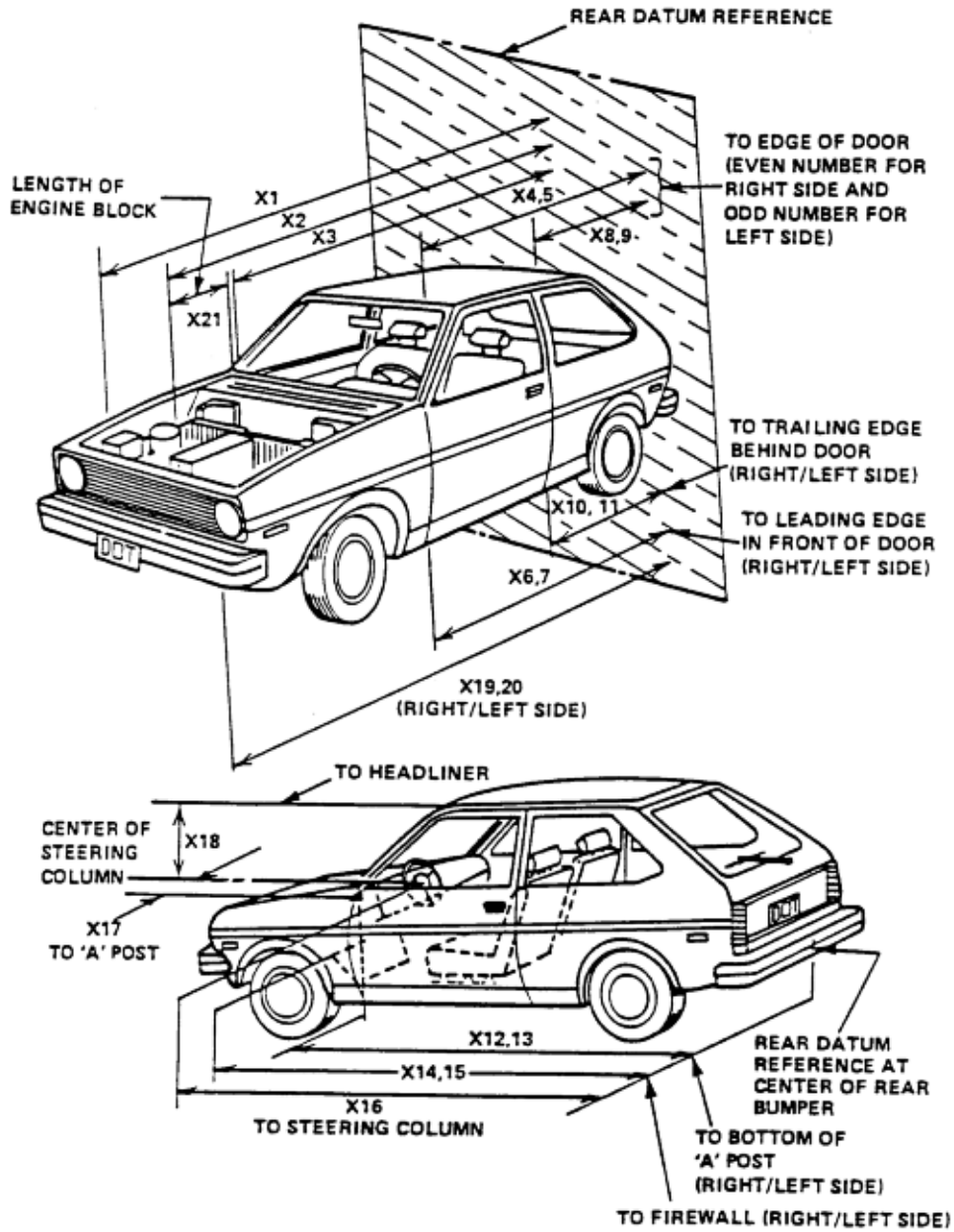
No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total length of vehicle at centerline	mm	5546	4921	625
2	RSOV to front of engine	mm	4779	4750	29
3	RSOV to firewall centerline	mm	4399	4339	60
4	RSOV to leading edge of right door	mm	4021	4068	-47
5	RSOV to leading edge of left door	mm	4022	4060	-38
6	RSOV to lower leading edge of right door	mm	4003	4014	-11
7	RSOV to lower leading edge of left door	mm	4018	4008	10
8	RSOV to upper leading edge of right door	mm	2898	2947	-49
9	RSOV to upper leading edge of left door	mm	2906	2942	-36
10	RSOV to lower trailing edge of right door	mm	2922	2932	-10
11	RSOV to lower trailing edge of left door	mm	2924	2926	-2
12	RSOV to bottom of right 'A' pillar	mm	4009	4022	-13
13	RSOV to bottom of left 'A' pillar	mm	3998	4021	-23
14	RSOV to firewall on right side	mm	4356	4349	7
15	RSOV to firewall on left side	mm	4359	4431	-72
16	RSOV to steering column	mm	3548	3518	30
17	Center of steering column to left 'A' pillar	mm	435	424	11
18	Center of steering column to headlining	mm	450	440	10
19	RSOV to right side of front bumper	mm	5415	4887	528
20	RSOV to left side of front bumper	mm	5421	4912	509
21	Length of engine block	mm	425	492	-67
RD	RSOV to right side of dash panel	mm	3812	3851	-39
CD	RSOV to center of dash panel	mm	3733	3802	-69
LD	RSOV to left side of dash panel	mm	3806	3840	-34

DATA SHEET NO. 10... (continued)

VEHICLE MEASUREMENTS

Test Vehicle: 2008 Dodge Dakota Crew Cab ST 4x4
Test Program: 35mph Frontal Impact

NHTSA No.: M80306
Test Date: 10/26/2007



DATA SHEET NO. 10... (continued)

VEHICLE MEASUREMENTS

Test Vehicle: 2008 Dodge Dakota Crew Cab ST 4x4 NHTSA No.: M80306
 Test Program: 35mph Frontal Impact Test Date: 10/26/2007

Target Vehicle Structural Measurement

	Elements	Pre-Test (mm)
1	Total Length	5546
2	Total Width	1829
3	Bumper Top Height	656
4	Bumper Bottom Height	444
5	Longitudinal Member Top Height	593
6	Distance between Longitudinal Members	864
7	Longitudinal Member Width	101
8	Engine Top Height	983
9	Engine Bottom Height	330
10	Engine and gearbox width	632
11	Front bumper-engine distance	698
12	Front shock absorber fixing height	718
13	Bonnet leading edge height	998
14	Front shock absorber fixing width	883
15	Front bumper – front axle distance	972
16	Front axle – a pillar distance	470
17	A-pillar – B-pillar distance	1192
18	B-Pillar – rear axle distance	1674
19	B-pillar – C-pillar distance	891
20	Roof sill bottom height	1639
21	Roof sill top height	1391
22	Floor sill bottom height	374
23	Floor sill top height	498

DATA SHEET NO. 11
CAMERA LOCATIONS

Test Vehicle: 2008 Dodge Dakota Crew Cab ST 4x4
Test Program: 35mph Frontal Impact

NHTSA No.: M80306
Test Date: 10/26/2007

No.	Camera View	Location (mm) *			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Side View				13	24
2	Left Front View	1280	-4690	1210	24	1000
3	Steering Column Top	1210	-5310	1250	25	1000
4	Steering Column Bottom	1210	-5300	1220	25	1000
5	Driver Close-up	1320	-5250	1310	35	1000
6	Driver Angle	6750	-5200	2280	50	1000
7	On board Driver Side				8	1000
8	On board Passenger Side				8	1000
9	Right Overall	1670	6800	1315	24	1000
10	Right Passenger Half	1270	4780	1220	24	1000
11	Right Close-up	1380	5310	1320	35	1000
12	Right Angle	6800	5310	2315	50	1000
13	Windshield	-285	0	2860	12.5	1000
14	Top Driver	-135	500	2180	24	1000
15	Top Passenger	-110	490	2180	24	1000
16	Pit Front	1210	0	-3150	24	1000
17	Pit Rear	3220	0	-3150	24	1000

*COORDINATES:

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

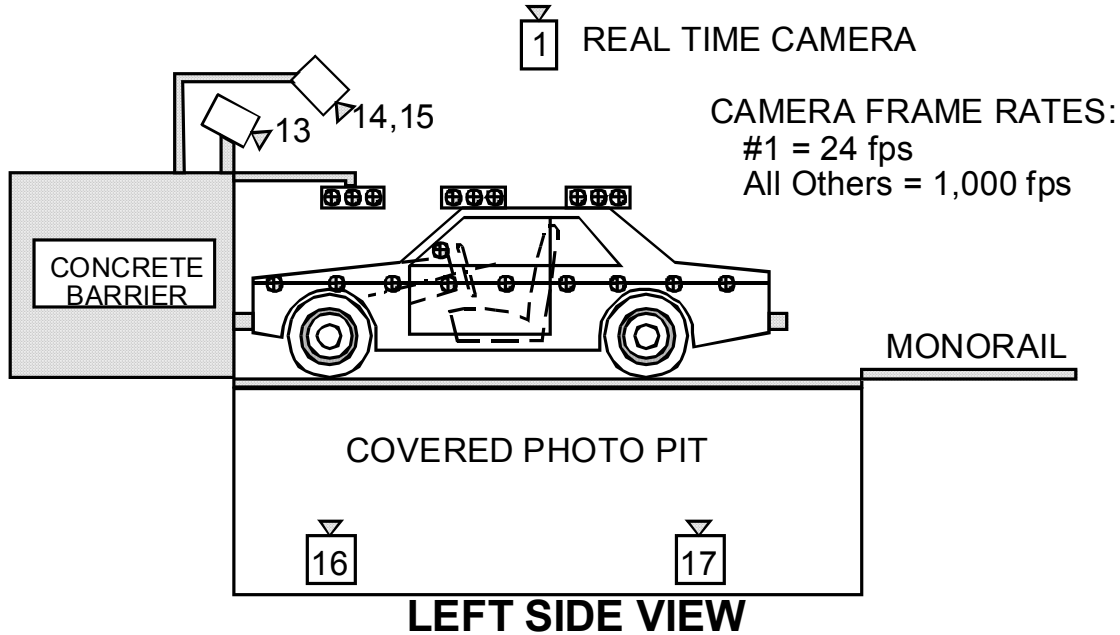
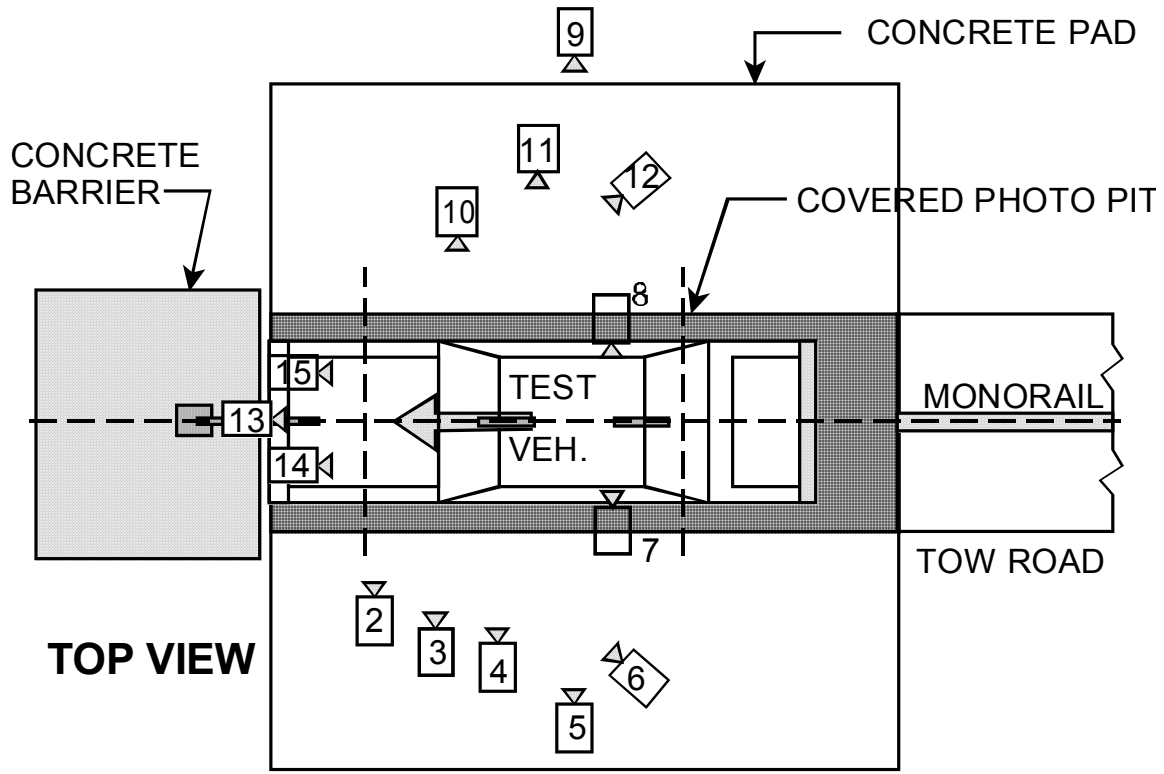
DATA SHEET NO. 11... (continued)

CAMERA LOCATIONS

Test Vehicle: 2008 Dodge Dakota Crew Cab ST 4x4
Test Program: 35mph Frontal Impact

NHTSA No.: M80306
Test Date: 10/26/2007

CAMERA POSITIONS FOR FRONTAL IMPACTS

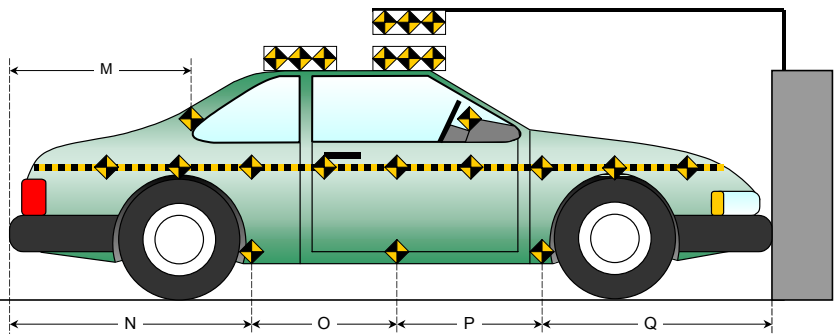
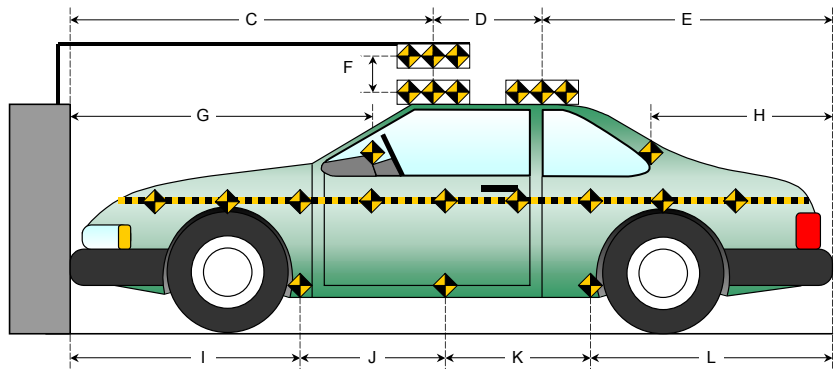
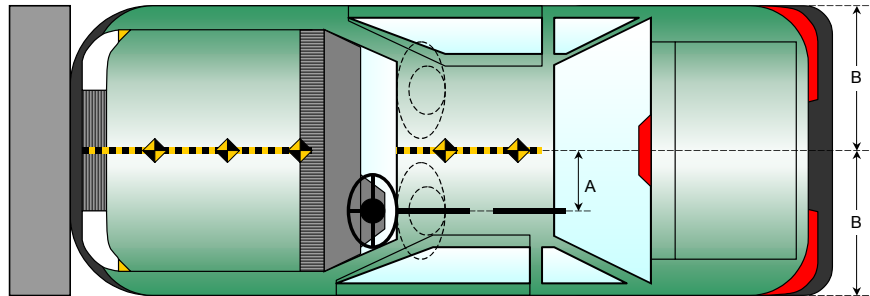


DATA SHEET NO. 12
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2008 Dodge Dakota Crew Cab ST 4x4
 Test Program: 35mph Frontal Impact

NHTSA No.: M80306
 Test Date: 10/26/2007

Item	Value
A	365
B	956
C	2520
D	660
E	2366
F	
G	
H	1955
I	1556
J	1138
K	1137
L	1715
M	1943
N	1712
O	1140
P	1140
Q	1554



DATA SHEET NO. 13
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2008 Dodge Dakota Crew Cab ST 4x4
 Test Program: 35mph Frontal Impact

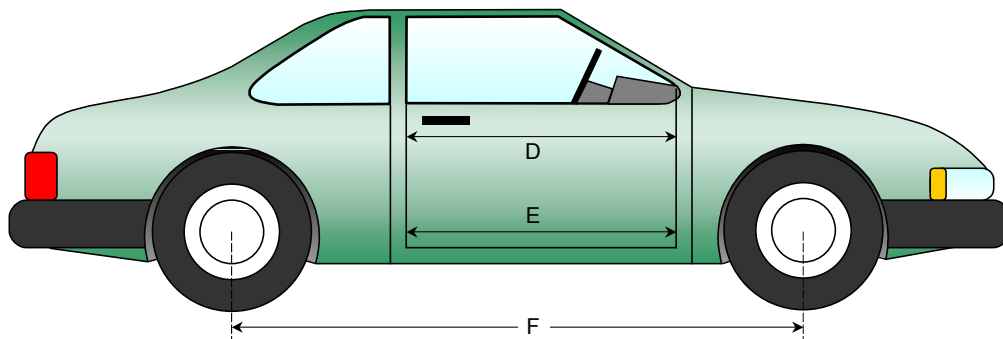
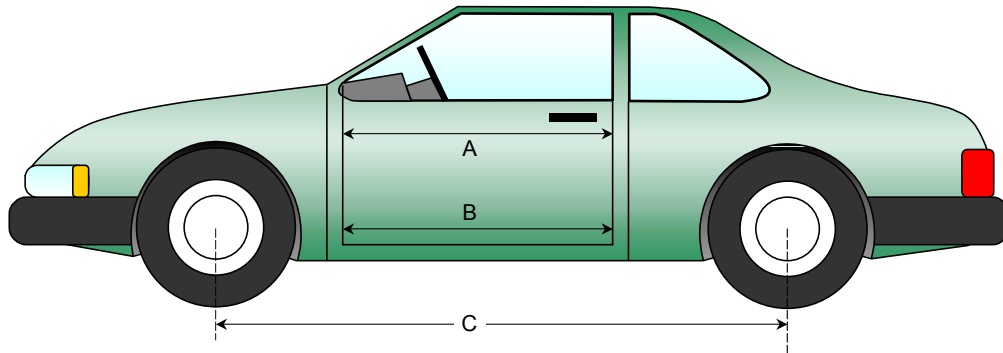
NHTSA No.: M80306
 Test Date: 10/26/2007

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	974	968	6
B	Left Side Lower	mm	877	874	3
D	Right Side Upper	mm	976	970	6
E	Right Side Lower	mm	893	886	7

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	3336	3295	41
F	Right Side Wheelbase	mm	3336	3286	50



DATA SHEET NO. 13... (continued)
VEHICLE INTRUSION MEASUREMENTS

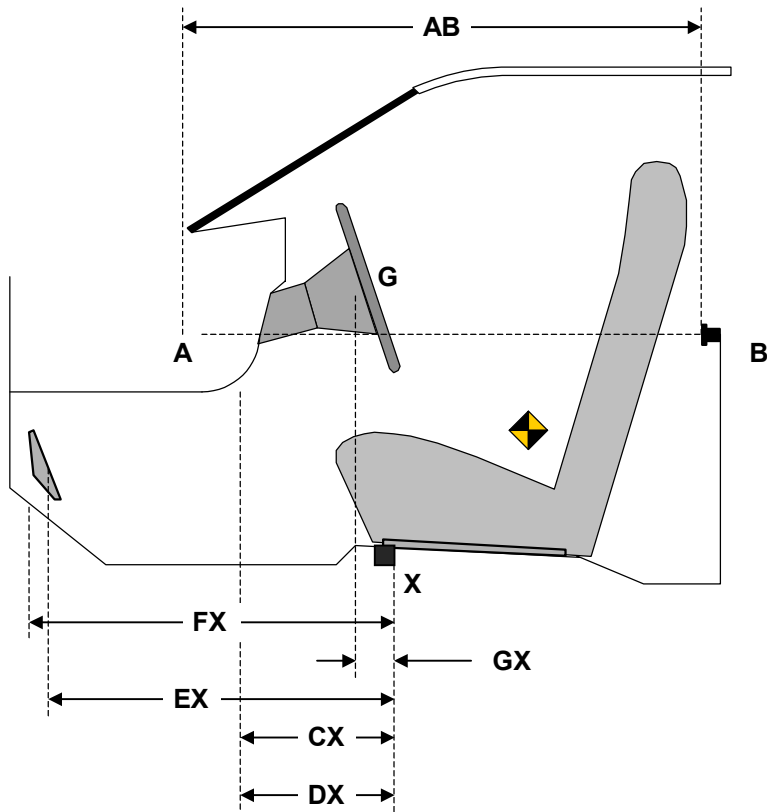
Test Vehicle: 2008 Dodge Dakota Crew Cab ST 4x4
 Test Program: 35mph Frontal Impact

NHTSA No.: M80306
 Test Date: 10/26/2007

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside window jam)	mm	709	709	0
CX	Left Knee Bolster to X	mm	269	272	-3
DX	Right Knee Bolster to X	mm	253	268	-15
EX	Brake Pedal to X	mm	518	534	-16
FX	Foot Rest to X	mm	661	641	20
GX	Center of Steering Column Wheel Hub to X	mm	32	61	-29

X = Front of Seat Track (stationary)

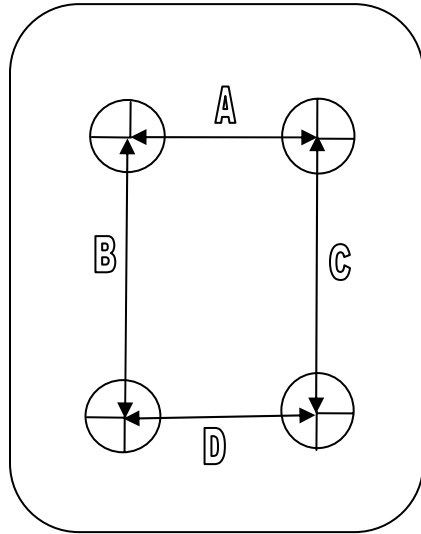


DRIVER COMPARTMENT

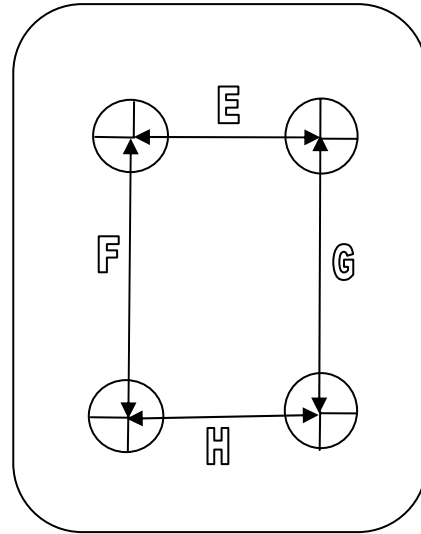
DATA SHEET NO. 13... (continued)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2008 Dodge Dakota Crew Cab ST 4x4
 Test Program: 35mph Frontal Impact

NHTSA No.: M80306
 Test Date: 10/26/2007



Driver



Passenger

UNDERBODY FLOORBOARD DEFORMATION

Measurement	Pre-Test	Post-Test	Difference
A	209	208	1
B	302	302	0
C	312	312	0
D	243	243	0
E	212	212	0
F	286	286	0
G	284	284	0
H	212	212	0

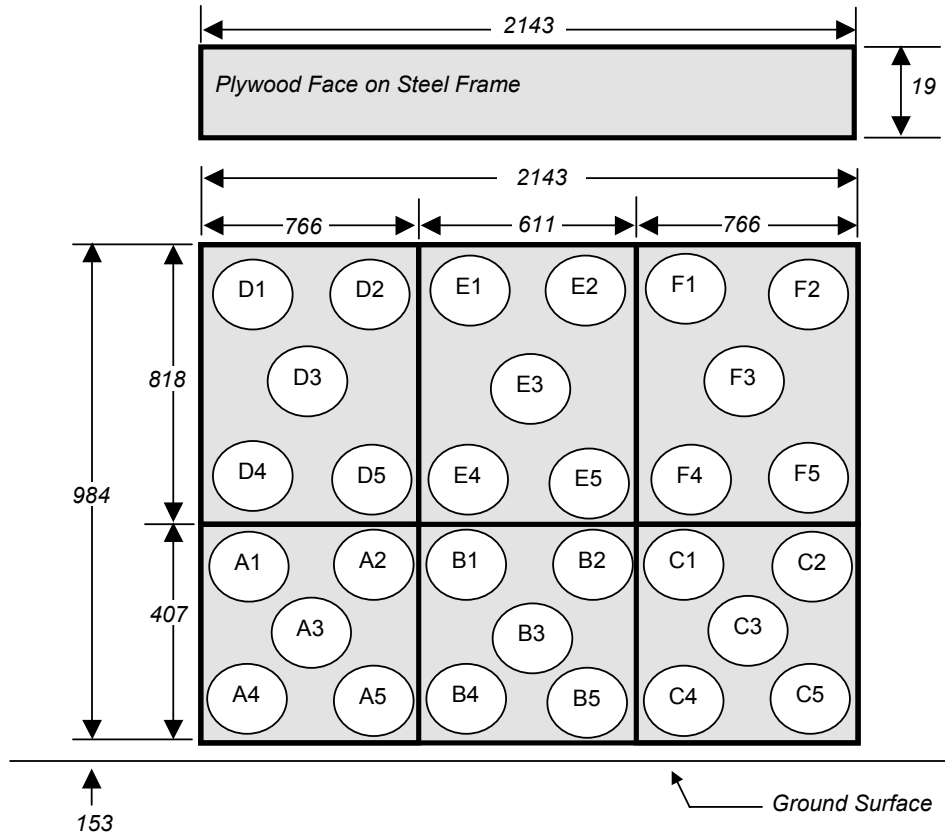
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LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle: 2008 Dodge Dakota Crew Cab ST 4x4
 Test Program: 35mph Frontal Impact

NHTSA No.: M80306
 Test Date: 10/26/2007

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. 15
ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2008 Dodge Dakota Crew Cab ST 4x4 NHTSA No.: M80306
 Test Program: 35mph Frontal Impact Test Date: 10/26/2007

VEHICLE INFORMATION

VIN: 1D7HW28K18S508163 Wheelbase (mm) : 3336
 Vehicle Size Category: Pickup Test Weight (kg) : 2336.9

ACCELEROMETER DATA

Accelerometer Locations: As per measurements on Page 12
 Cal. Procedure/Interval: MGA procedure / 6 month
 Integration Algorithm: Trapezoidal Linearity: > 99%
 Impact Velocity (km/h): 56.5
 Velocity Change (km/h): 63.1 Time of Separation (msec): 176

CRUSH PROFILE

Collision Deformation Classification: Frontal Midpoint of Damage: Centerline
 Damage Region Length (mm): 1340 Impact Mode: Frontal

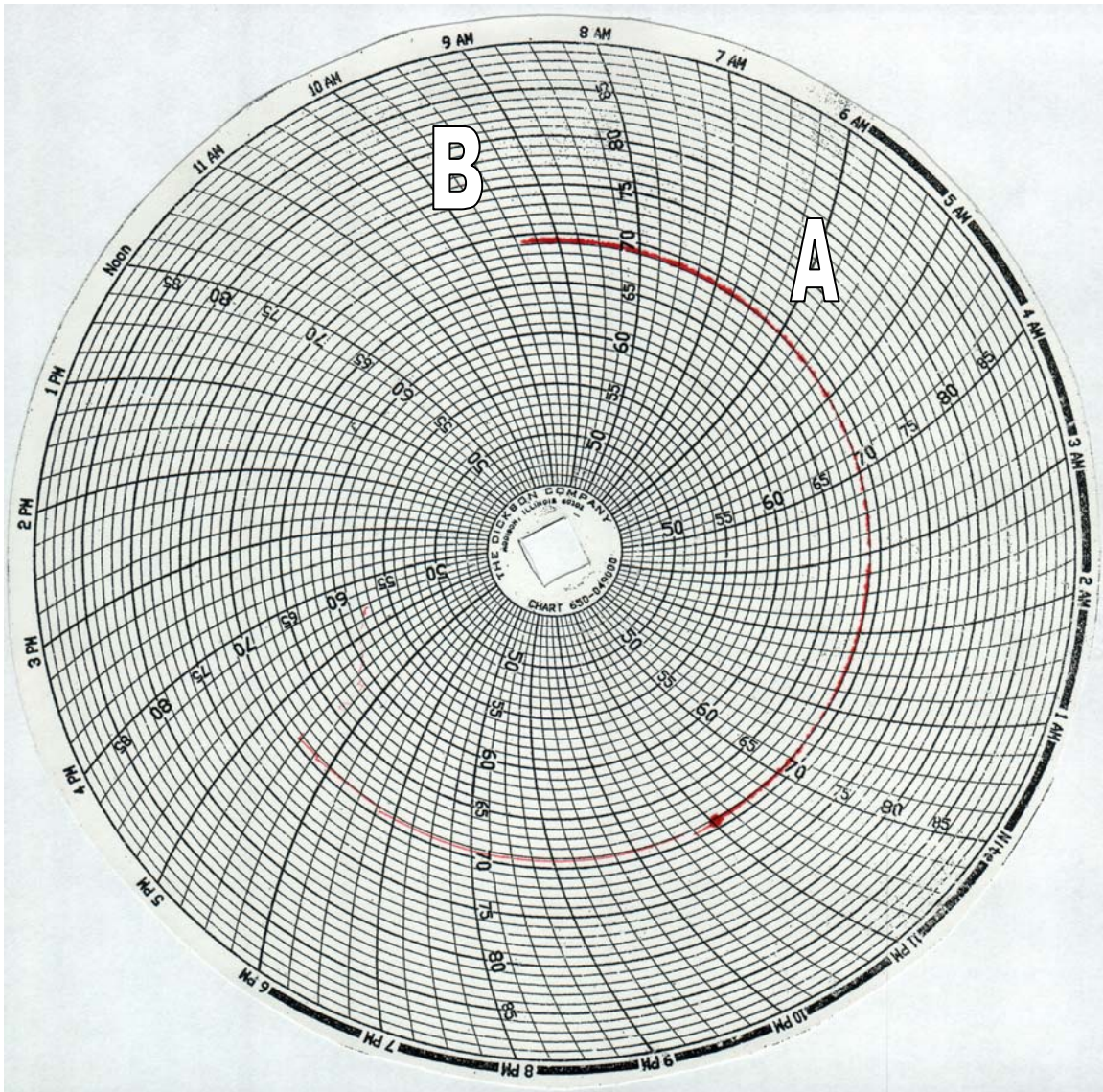
No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	5421	4912	509
C2	Crush zone 2 at left side	mm	5515	4937	578
C3	Crush zone 3 at left side	mm	5538	4920	618
C4	Crush zone 4 at right side	mm	5534	4916	618
C5	Crush zone 5 at right side	mm	5509	4922	587
C6	Crush zone 6 at right side	mm	5415	4887	528
L	C1 TO C6	mm	1340	1323	17

DATA SHEET NO. 16

DUMMY / VEHICLE TEMPERATURE STABILIZATION CHART

Test Vehicle: 2008 Dodge Dakota Crew Cab ST 4x4
Test Program: 35mph Frontal Impact

NHTSA No.: M80306
Test Date: 10/26/2007



A = Dummies installed in vehicle at 6:00 am

B = Test conducted at 9:58 am

APPENDIX A
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

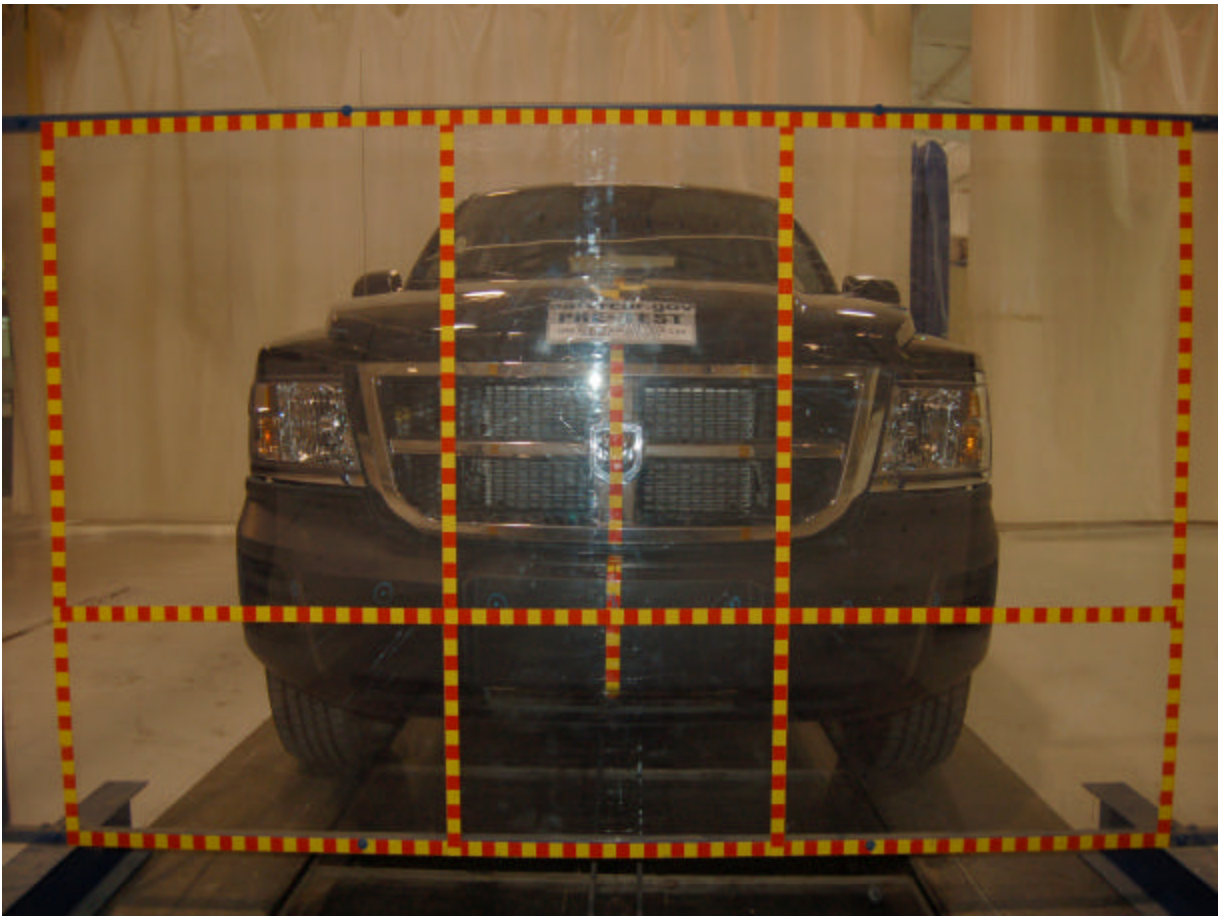
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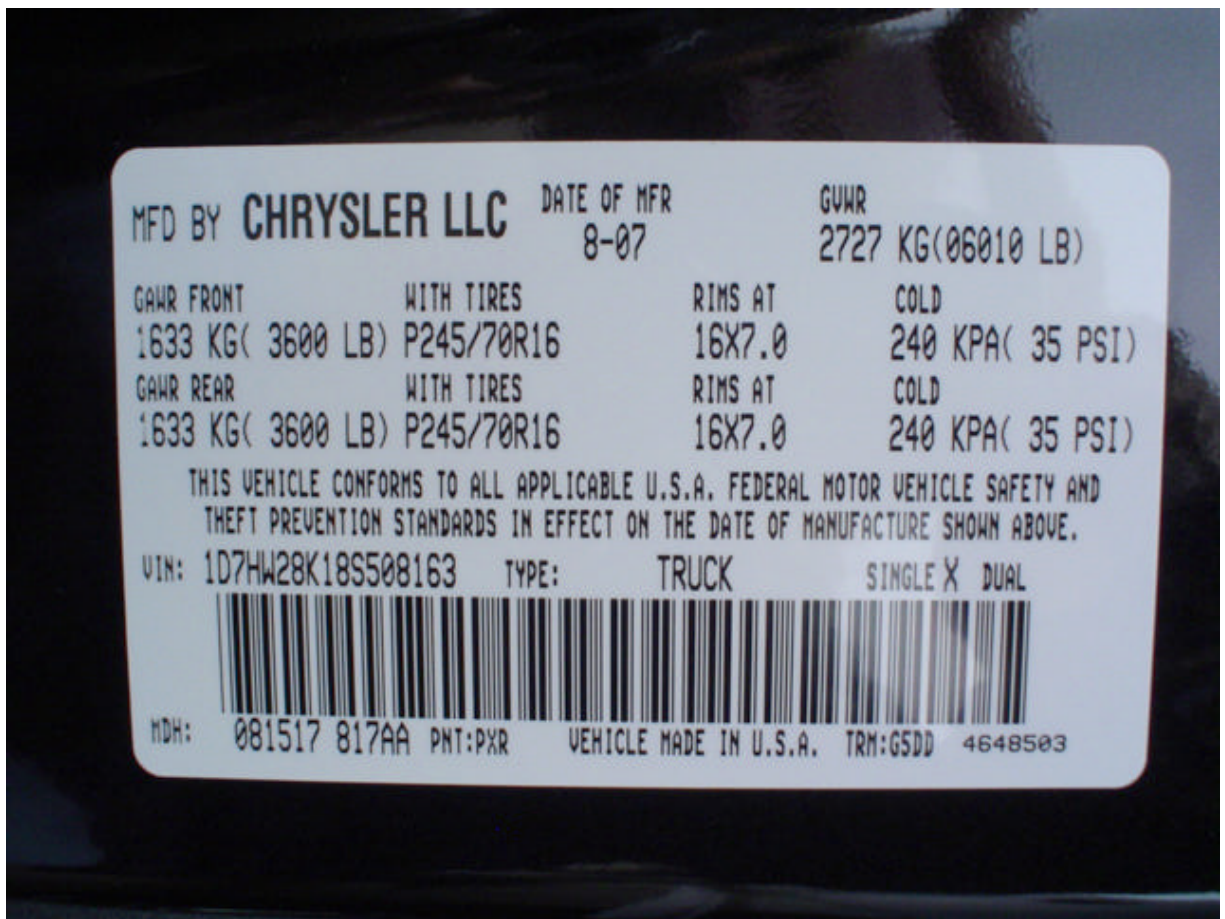
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Load Cell Location



Manufacturer's Label



Tire Placard



Left Front ¾ View, As Received



Right Rear ¾ View, As Received



Pre-Test Front View



Post-Test Front View



Pre-Test Left Side View



Post-Test Left Side View



Pre-Test Right Side View



Post-Test Right Side View



Pre-Test Right Front 3/4 View



Post-Test Right Front 3/4 View



Pre-Test Left Rear 3/4 View



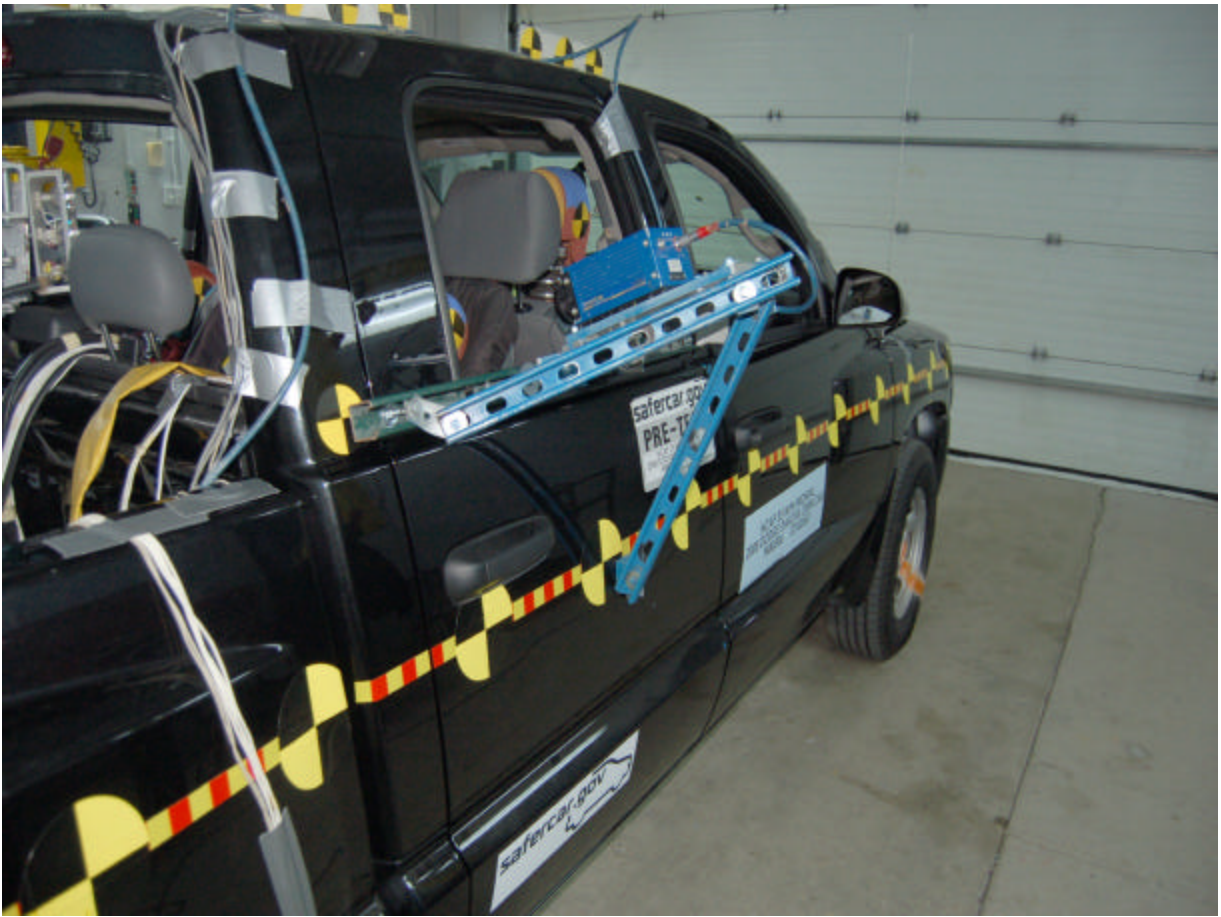
Post-Test Left Rear 3/4 View



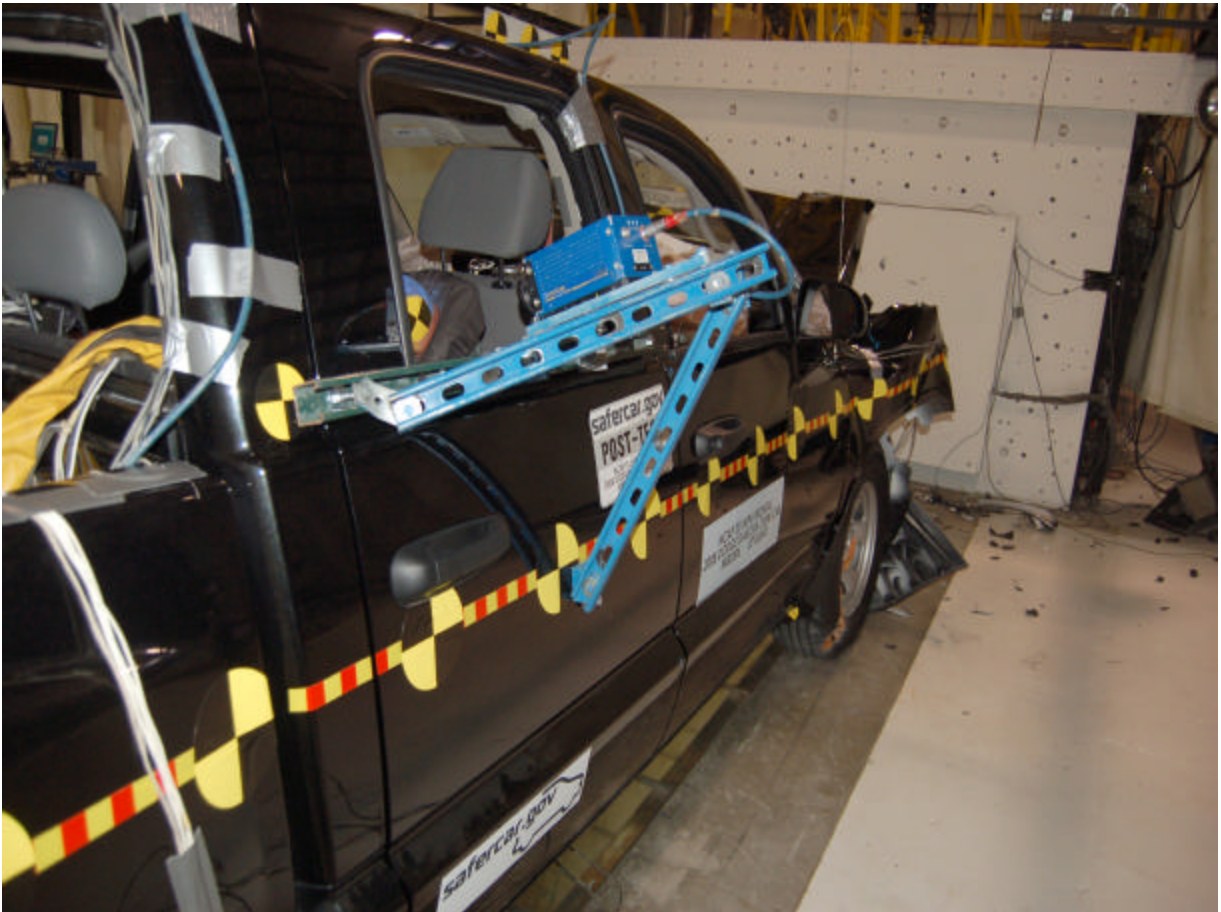
Pre-Test Left Side $\frac{3}{4}$ View of Doors



Post-Test Left Side $\frac{3}{4}$ View of Doors After Impact



Pre-Test Right Side 3/4 View of Doors



Post-Test Right Side 3/4 View of Doors After Impact



Pre-Test Windshield View



Post-Test Windshield View



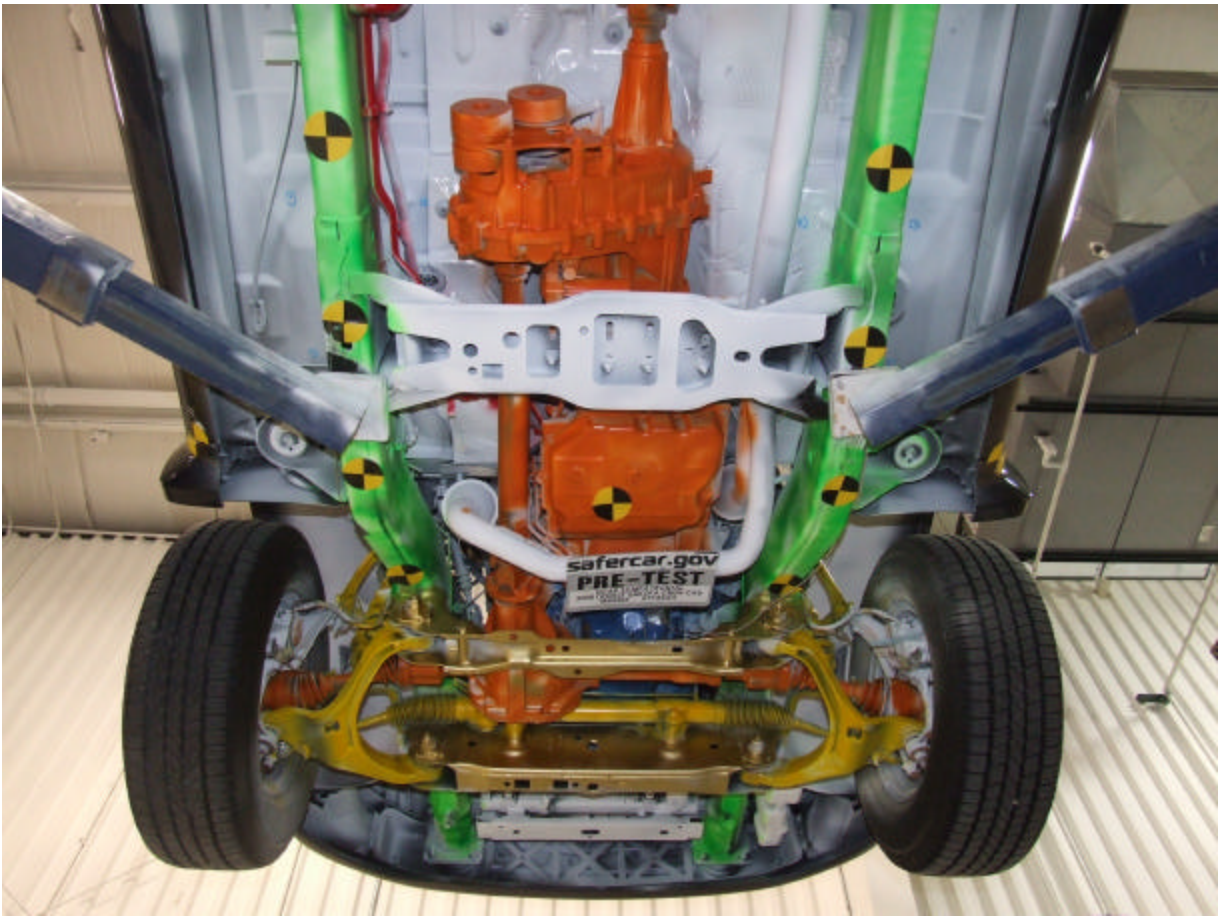
Pre-Test Engine Compartment View



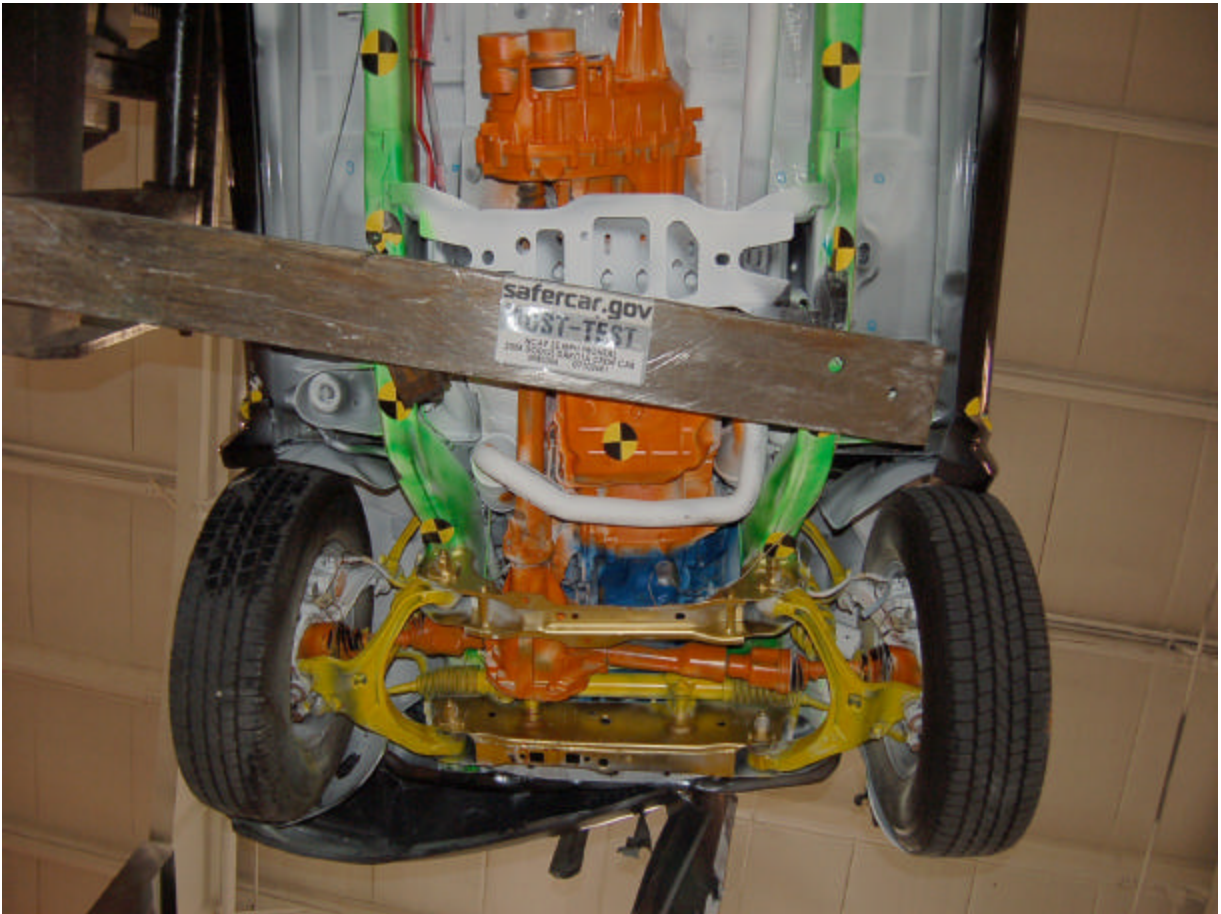
Pre-Test Fuel Cap View



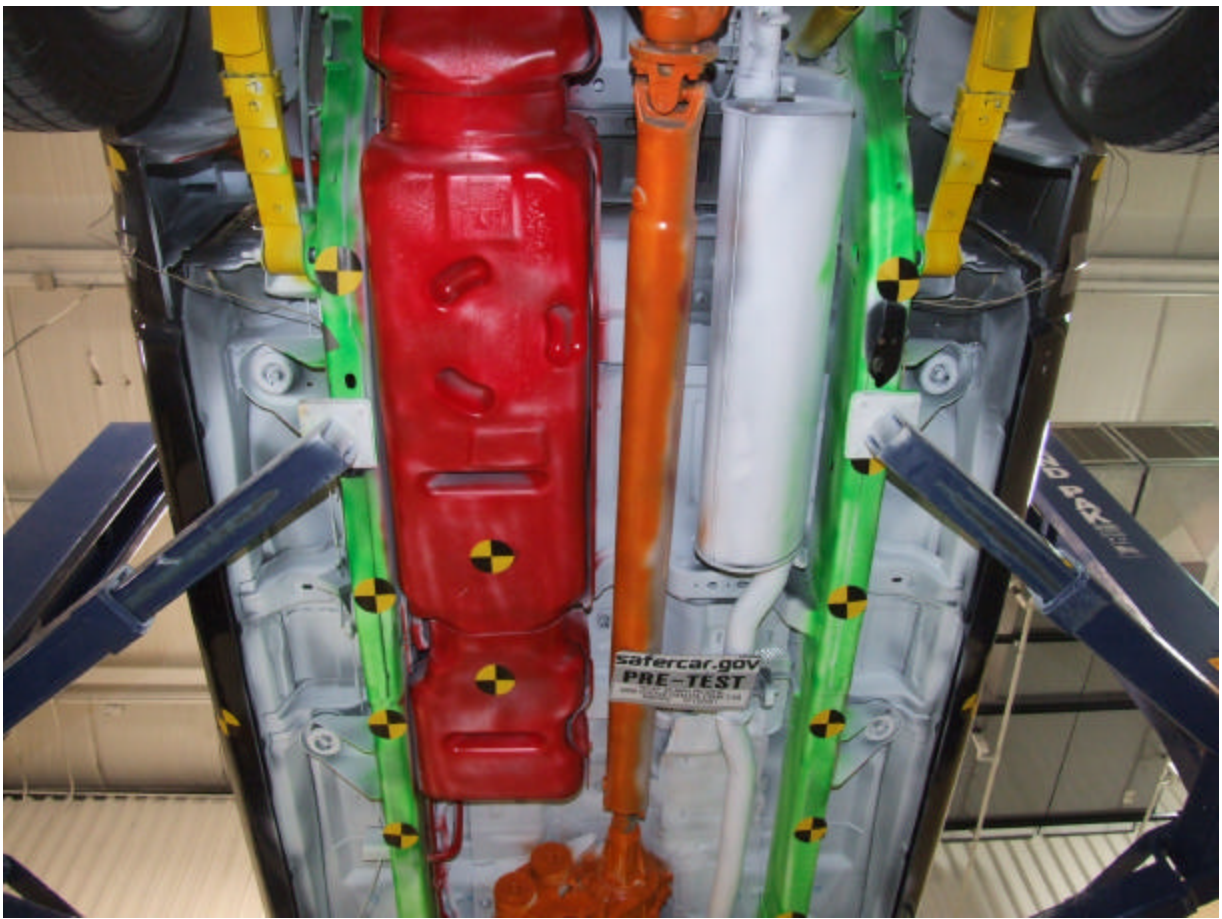
Post-Test Fuel Cap View



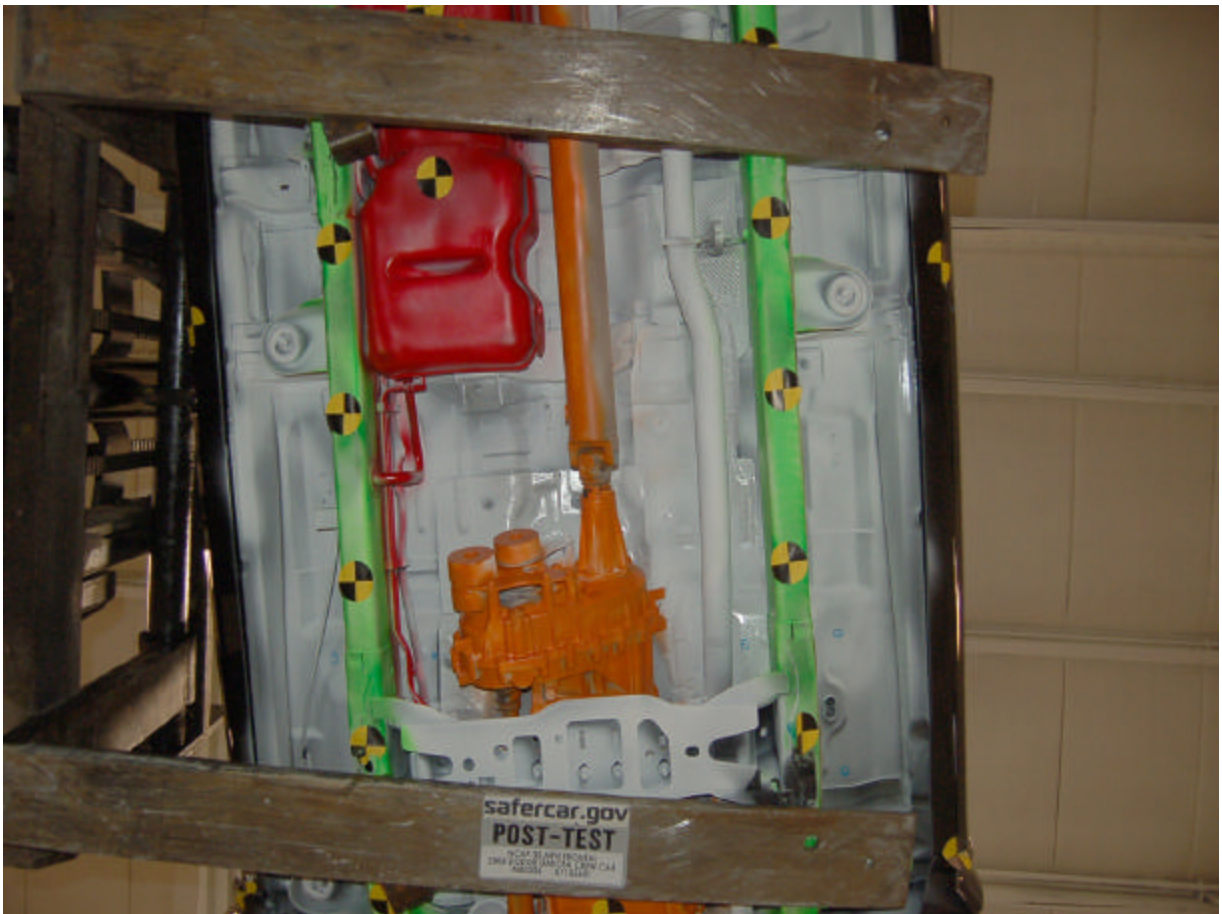
Pre-Test Front Underbody View



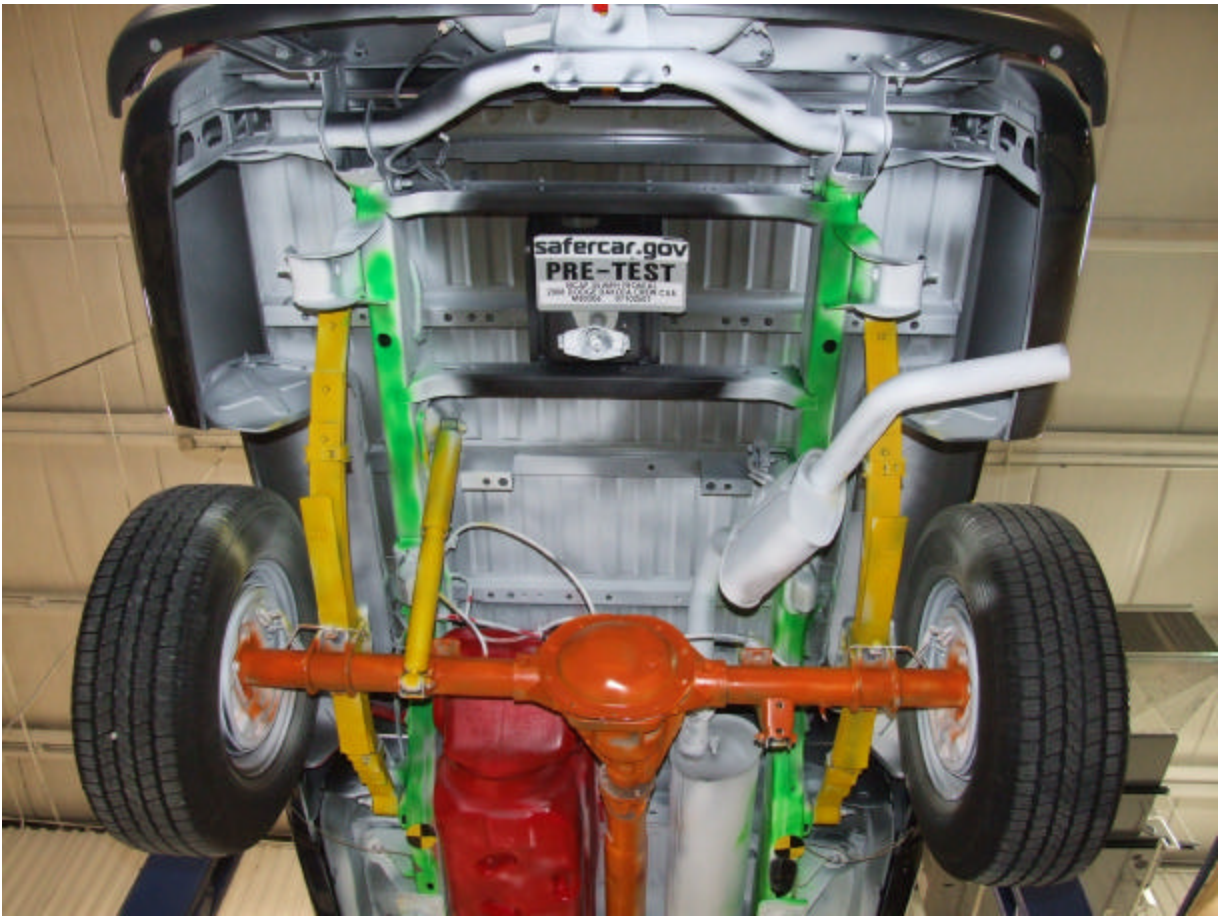
Post-Test Front Underbody View



Pre-Test Mid Underbody View



Post-Test Mid Underbody View



Pre-Test Rear Underbody View



Post-Test Rear Underbody View



Pre-Test Driver Dummy Front View (Head Position)



Post-Test Driver Dummy Front View (Head Position)



Pre-Test Driver Dummy (Through Window)



Post-Test Driver Dummy (Through Window)



Pre-Test Driver Dummy (Door Open)



Post-Test Driver Dummy (Door Open)



Pre-Test Driver Dummy Feet



Post-Test Driver Dummy Feet



Pre-Test Driver Side Knee Bolster



Post-Test Driver Side Knee Bolster



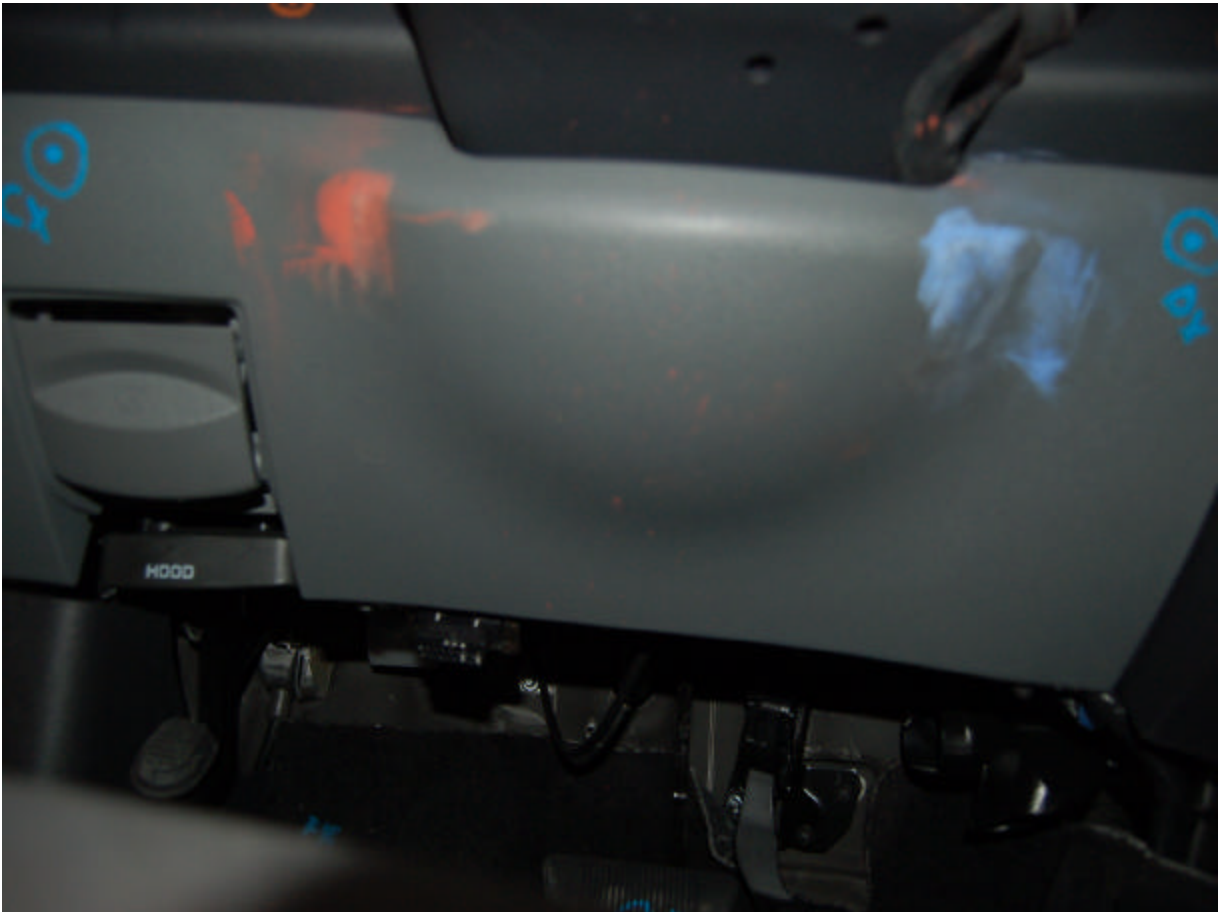
Pre-Test Driver Side Floor Pan



Post-Test Driver Side Floor Pan



Post-Test Driver Dummy Head Contact (headrest)



Post-Test Driver Dummy Knee Contact



Post-Test Driver Dummy Airbag Contact



Pre-Test Passenger Dummy Front View (Head Position)



Post-Test Passenger Dummy Front View (Head Position)



Pre-Test Passenger Dummy (Through Window)



Post-Test Passenger Dummy (Through Window)



Pre-Test Passenger Dummy (Door Open)



Post-Test Passenger Dummy (Door Open)



Pre-Test Passenger Dummy Feet



Post-Test Passenger Dummy Feet



Pre-Test Passenger Side Glove Box



Post-Test Passenger Side Glove Box



Pre-Test Passenger Side Floor Pan



Post-Test Passenger Side Floor Pan



Post-Test Passenger Dummy Head Contact (headrest)



Post-Test Passenger Dummy Knee Contact



Post-Test Passenger Dummy Airbag Contact



Rollover 90 Degrees



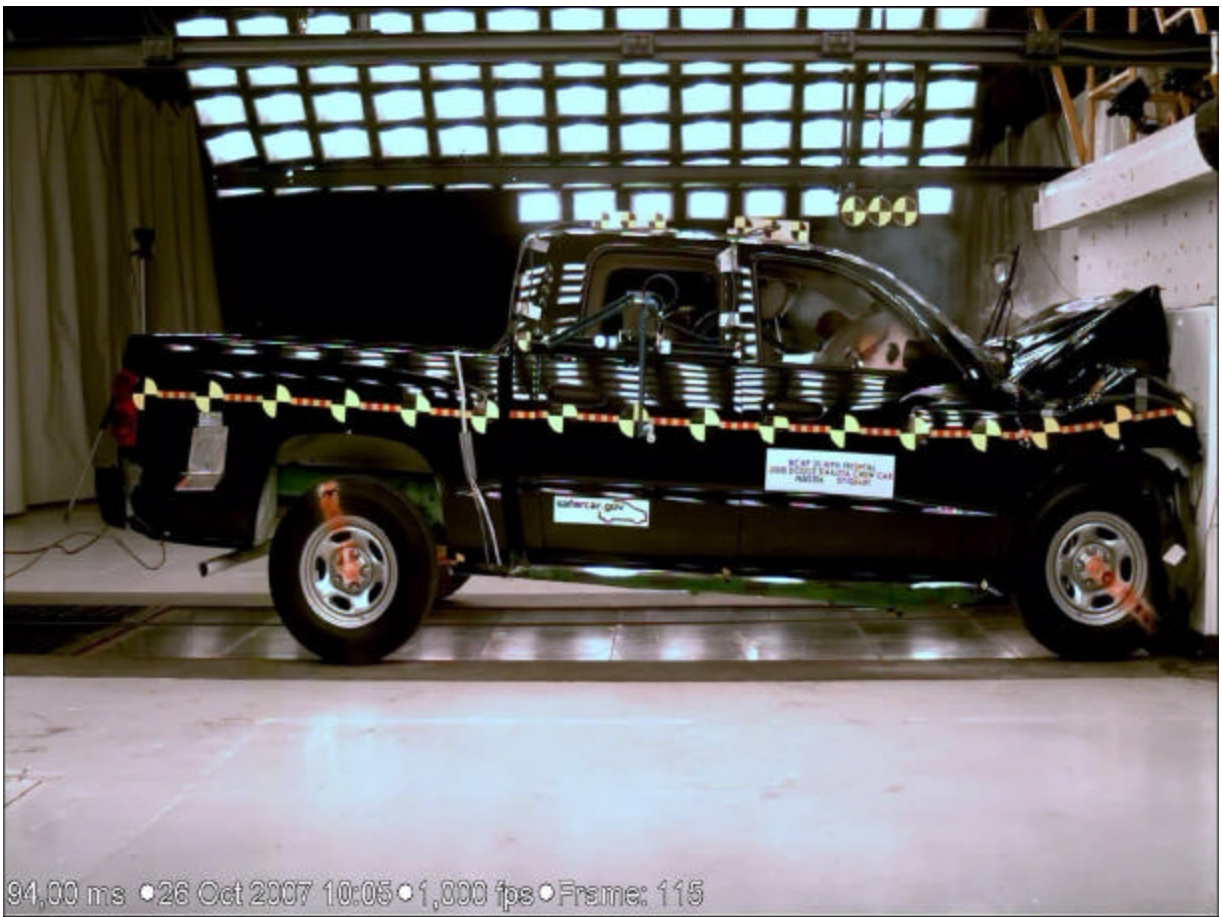
Rollover 180 Degrees



Rollover 270 Degrees



Rollover 360 Degrees



Vehicle Impact

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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 X

Driver Upper Neck Force Y

Driver Upper Neck Force Z

Driver Upper Neck Moment X

Driver Upper Neck Moment Y

Driver Upper Neck Moment Z

Driver Chest X Redundant

Driver Chest Y Redundant

Driver Chest Z Redundant

Driver Chest Displacement

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

Driver Left Lower Tibia Moment Y

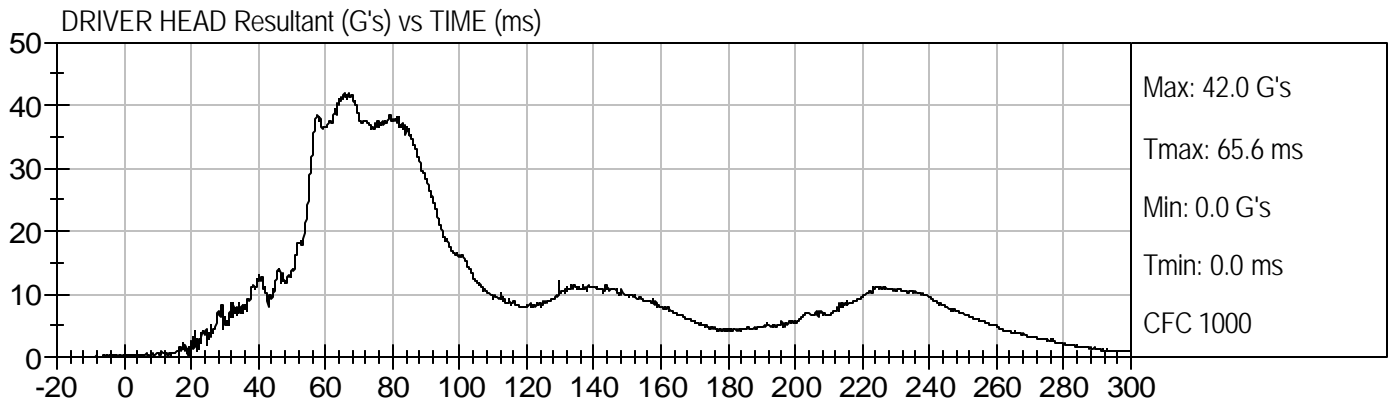
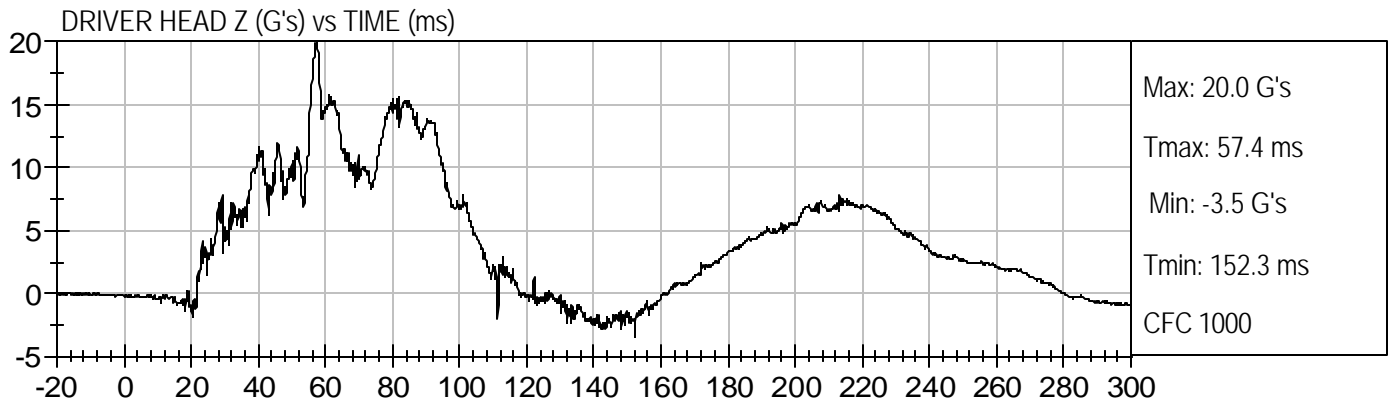
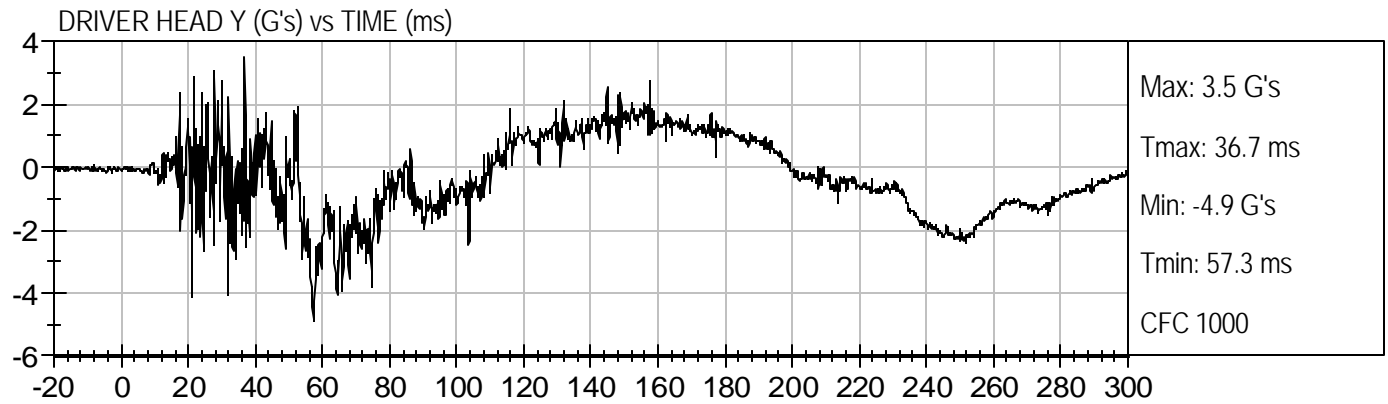
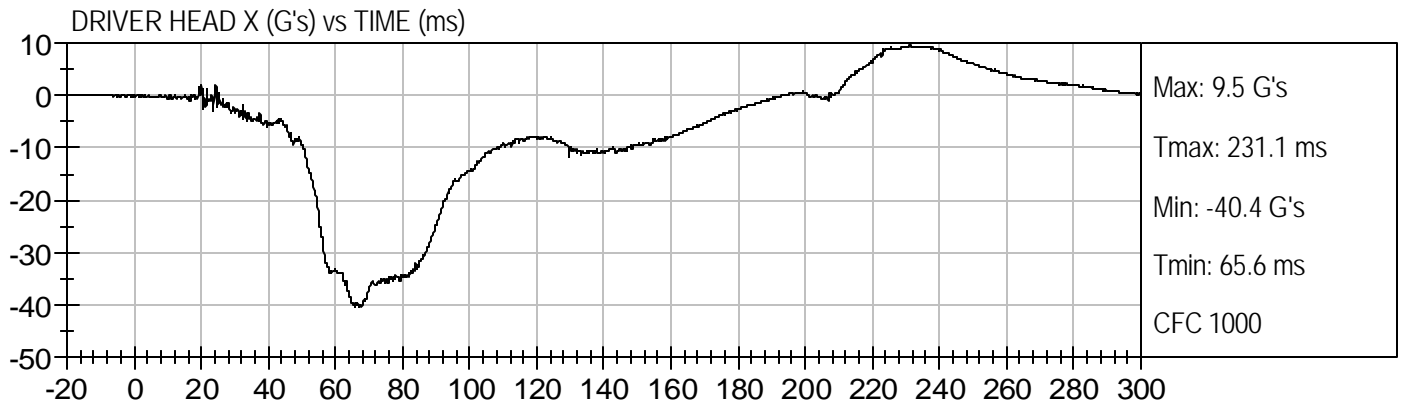
Driver Left Lower Tibia Force Z

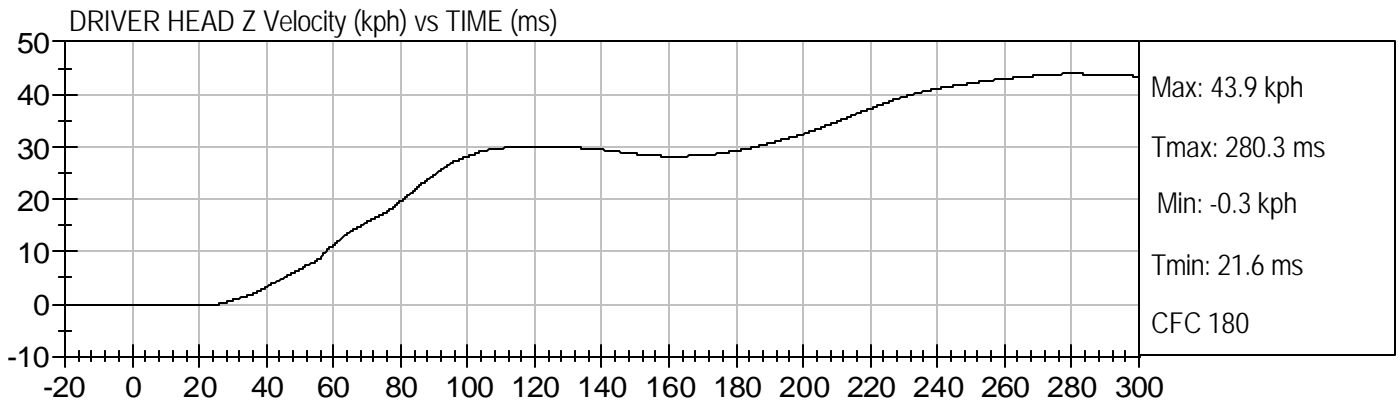
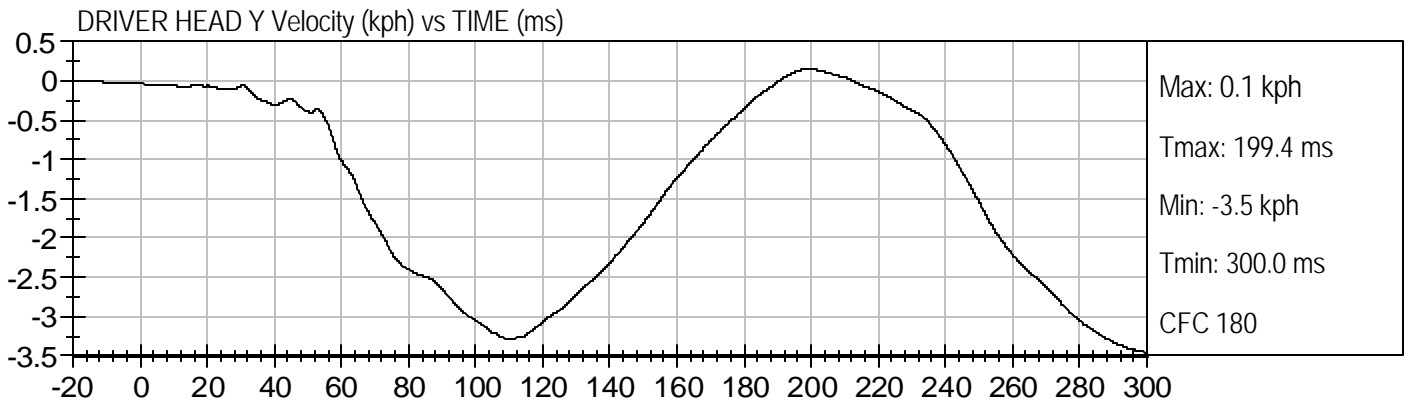
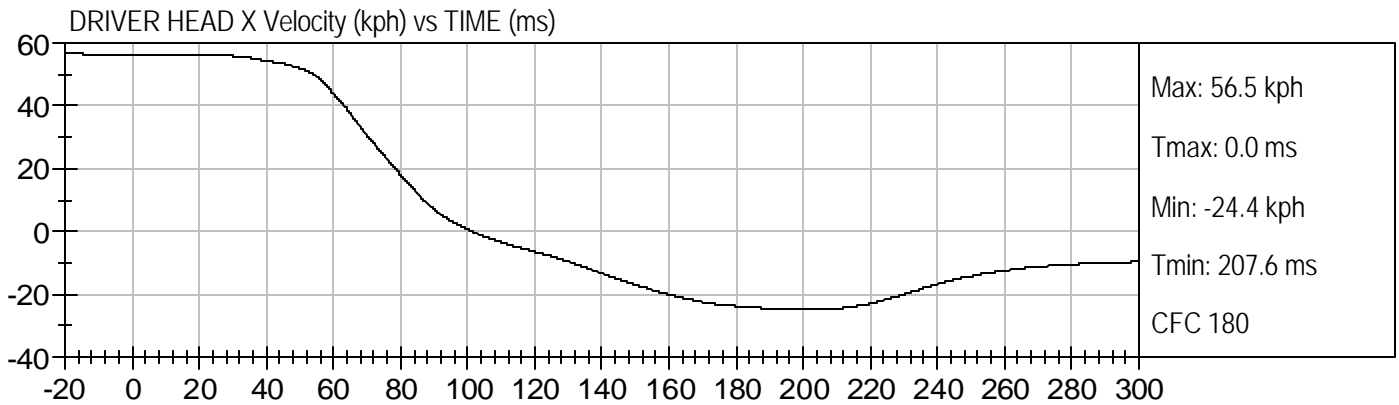
Driver Right Upper Tibia Moment X

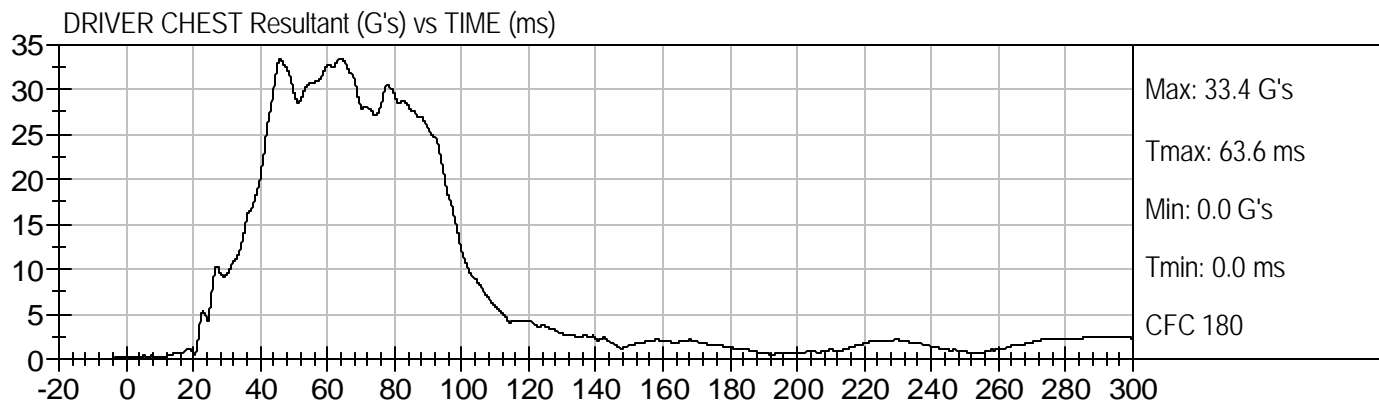
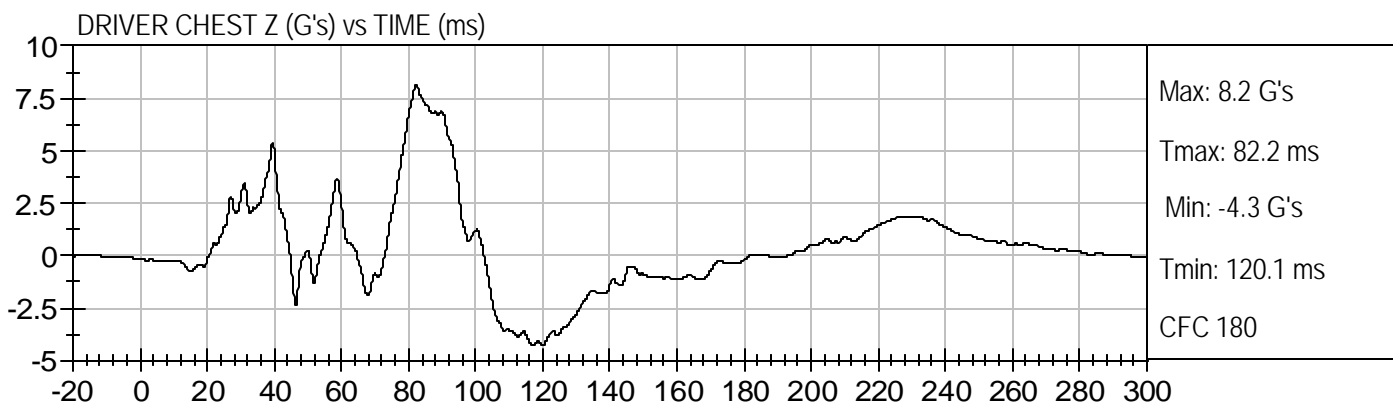
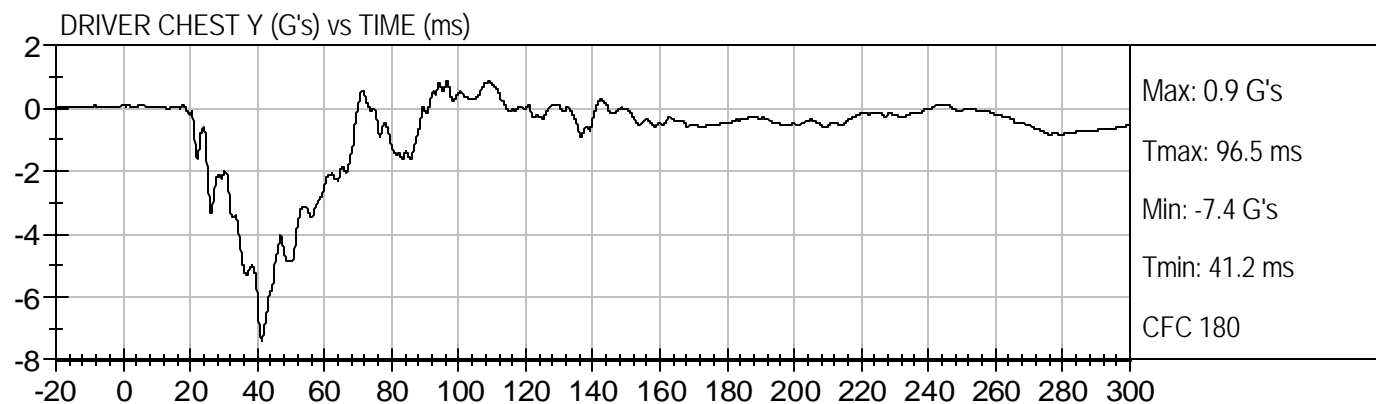
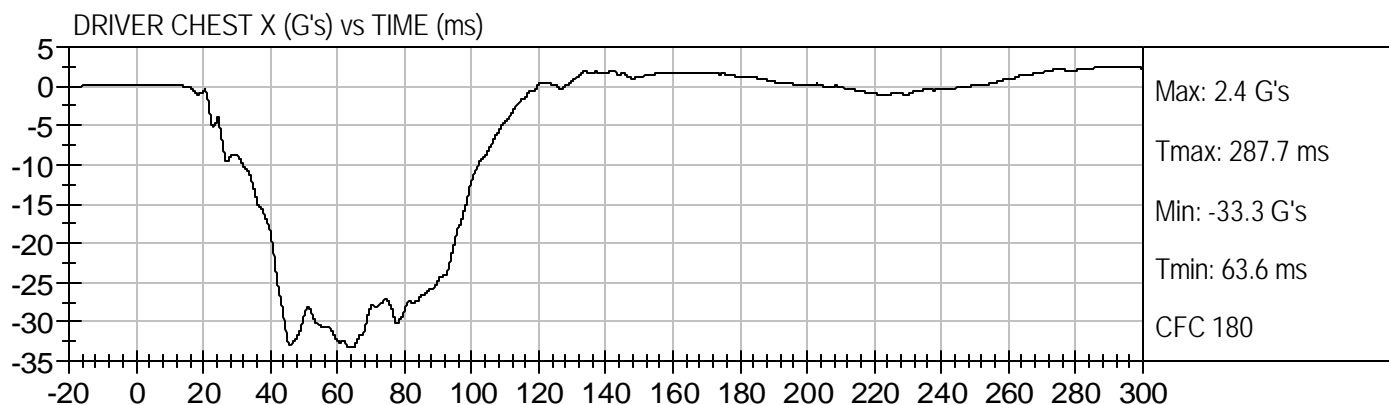
Driver Right Upper Tibia Moment Y

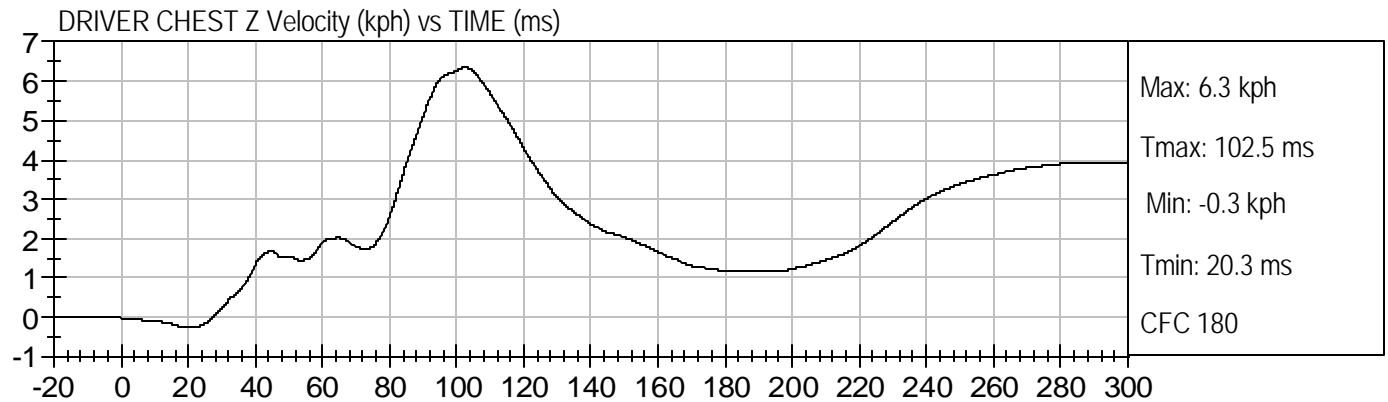
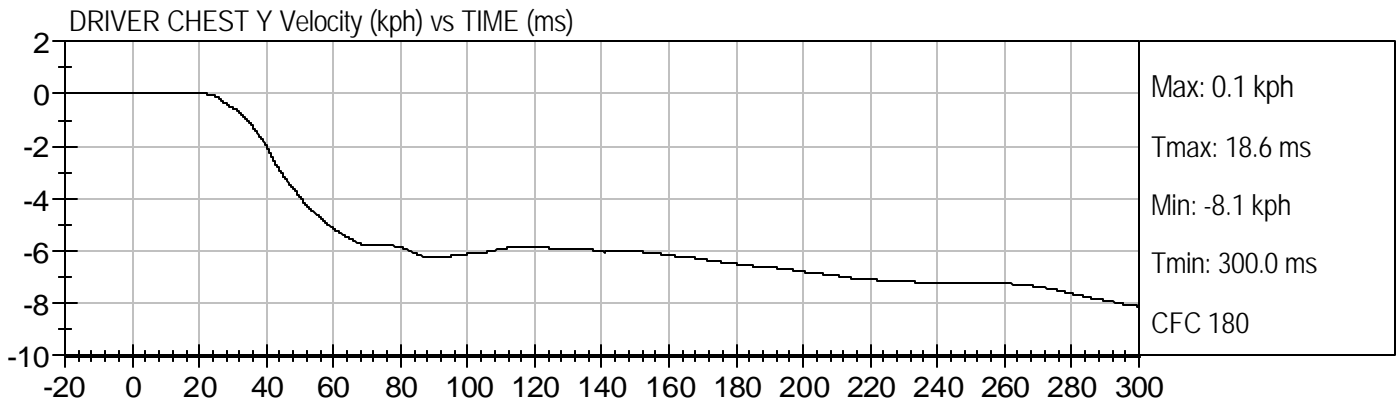
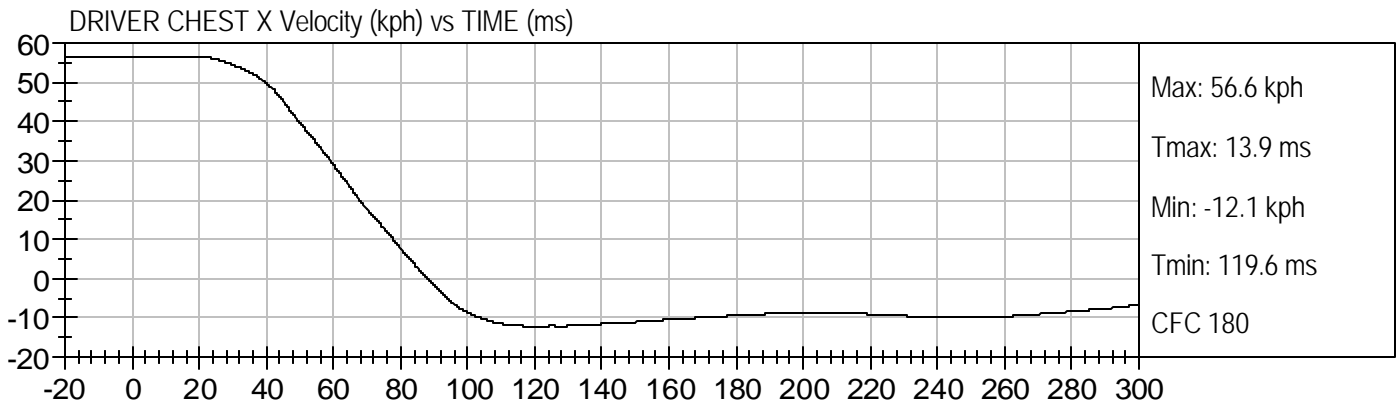
Driver Right Upper Tibia Force Z
Driver Right Lower Tibia Moment X
Driver Right Lower Tibia Moment Y
Driver Right Lower Tibia Force Z
Driver Left Foot Fore Z
Driver Left Foot Aft X
Driver Left Foot Aft Z
Driver Right Foot Fore Z
Driver Right Foot Aft X
Driver Right Foot Aft Z
Passenger Head X Redundant
Passenger Head Y Redundant
Passenger Head Z Redundant
Passenger Upper Neck Force X
Passenger Upper Neck Force Y
Passenger Upper Neck Force Z
Passenger Upper Neck Moment X
Passenger Upper Neck Moment Y
Passenger Upper Neck Moment Z
Passenger Chest X Redundant
Passenger Chest Y Redundant
Passenger Chest Z Redundant
Passenger Chest Displacement
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

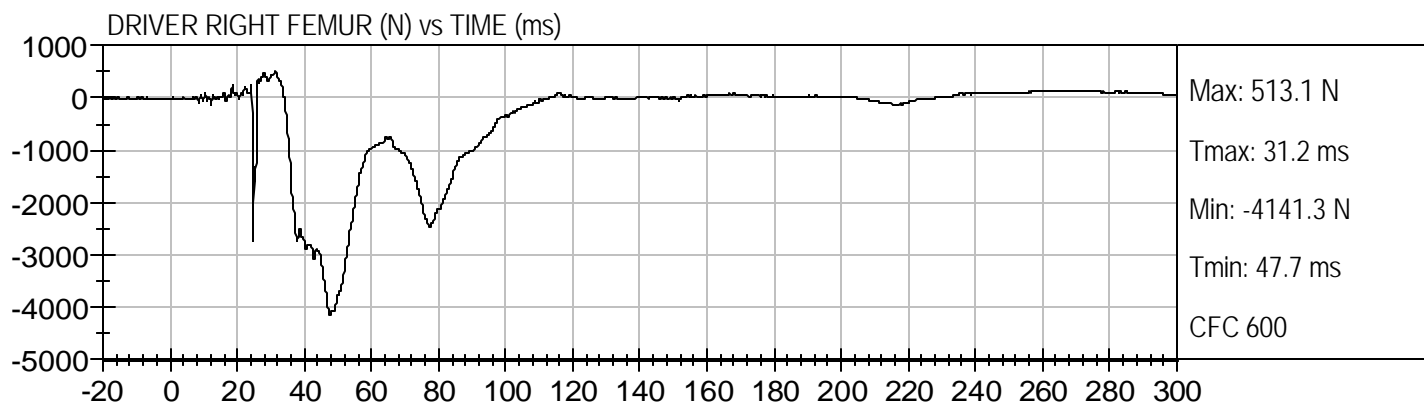
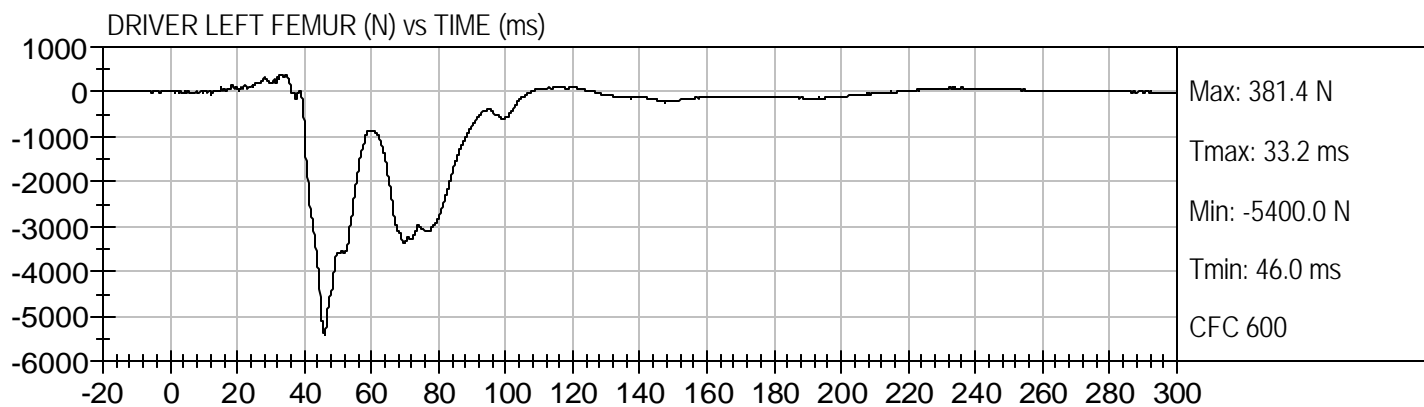
Passenger Left Lower Tibia Moment Y
Passenger Left Lower Tibia Force Z
Passenger Right Upper Tibia Moment X
Passenger Right Upper Tibia Moment Y
Passenger Right Upper Tibia Force Z
Passenger Right Lower Tibia Moment X
Passenger Right Lower Tibia Moment Y
Passenger Right Lower Tibia Force Z
Passenger 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
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

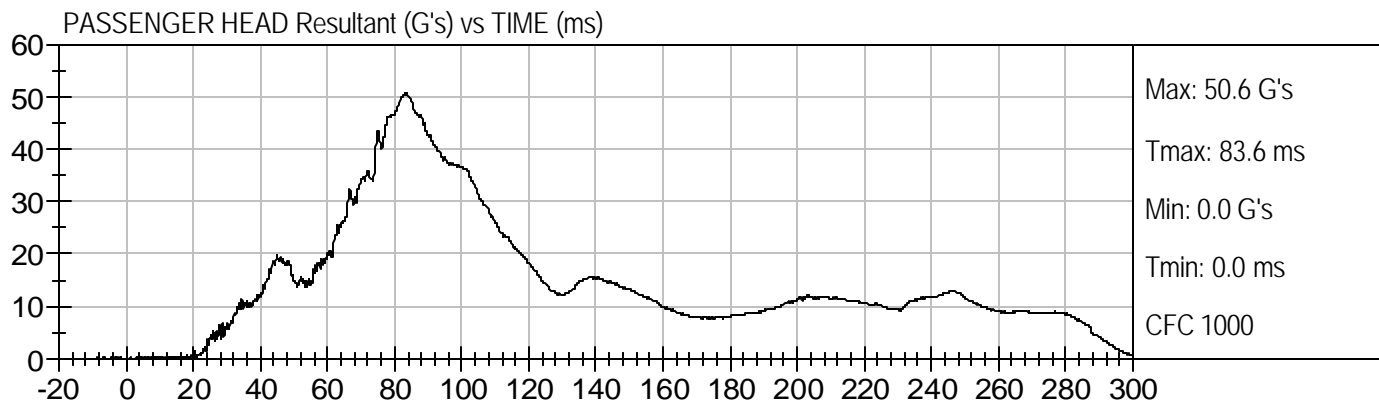
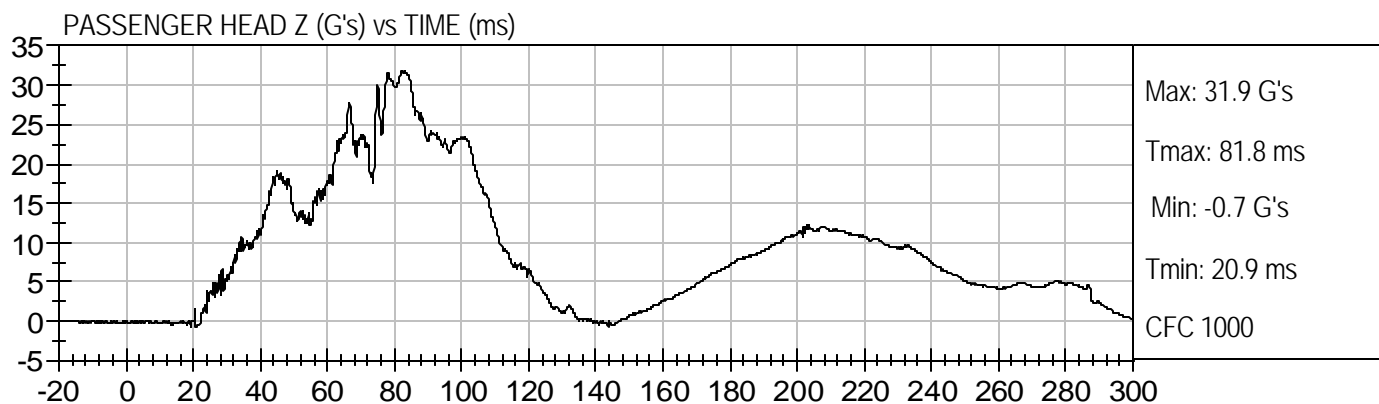
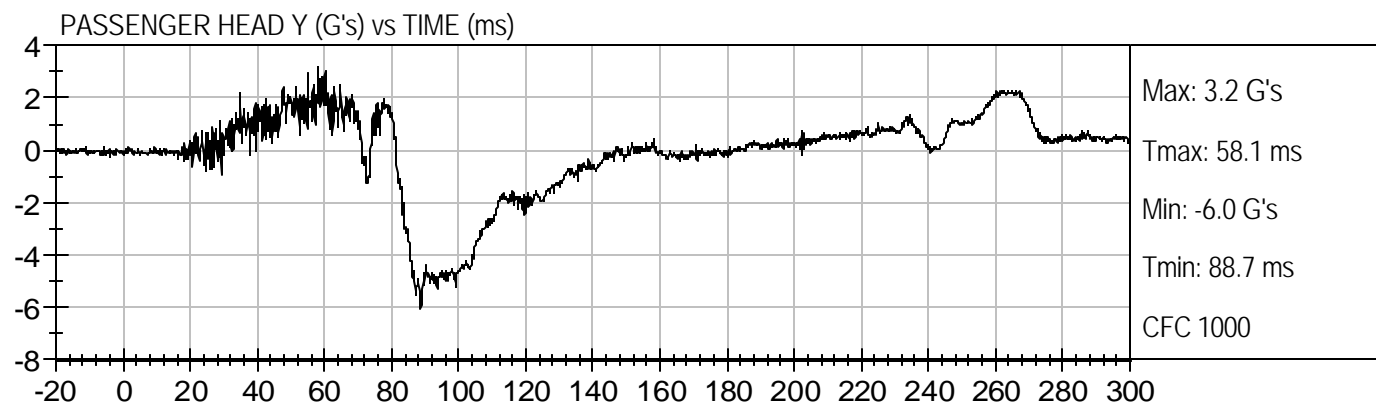
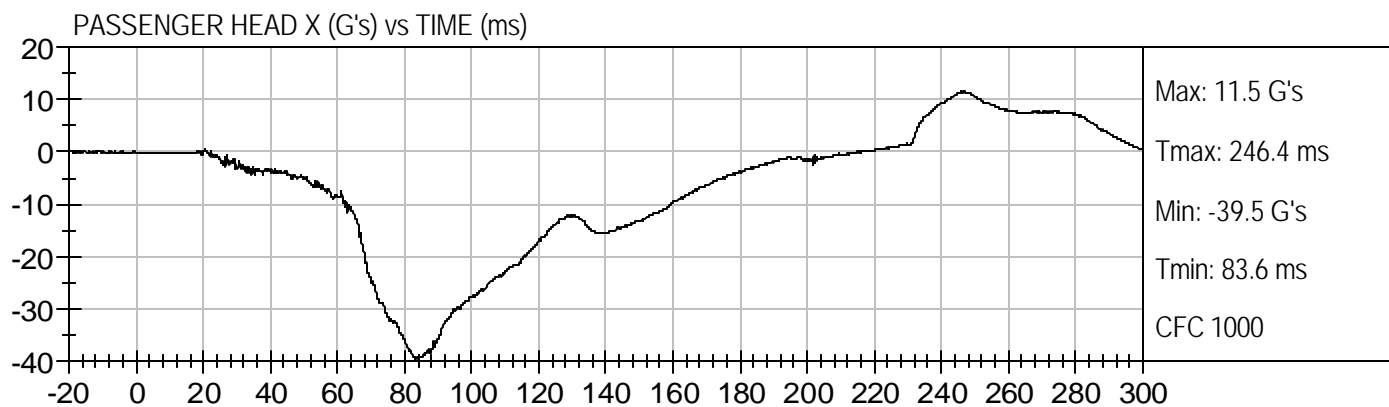


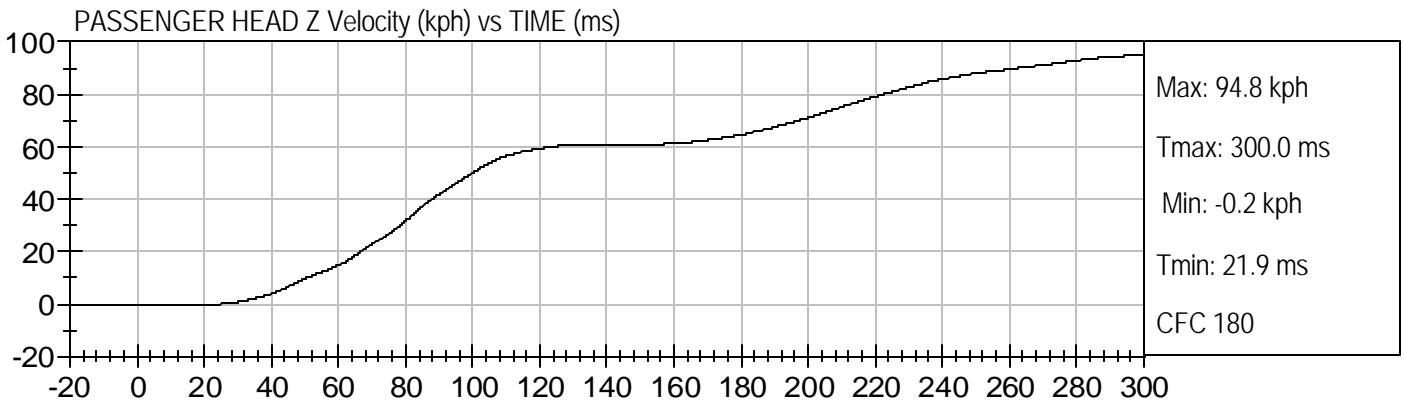
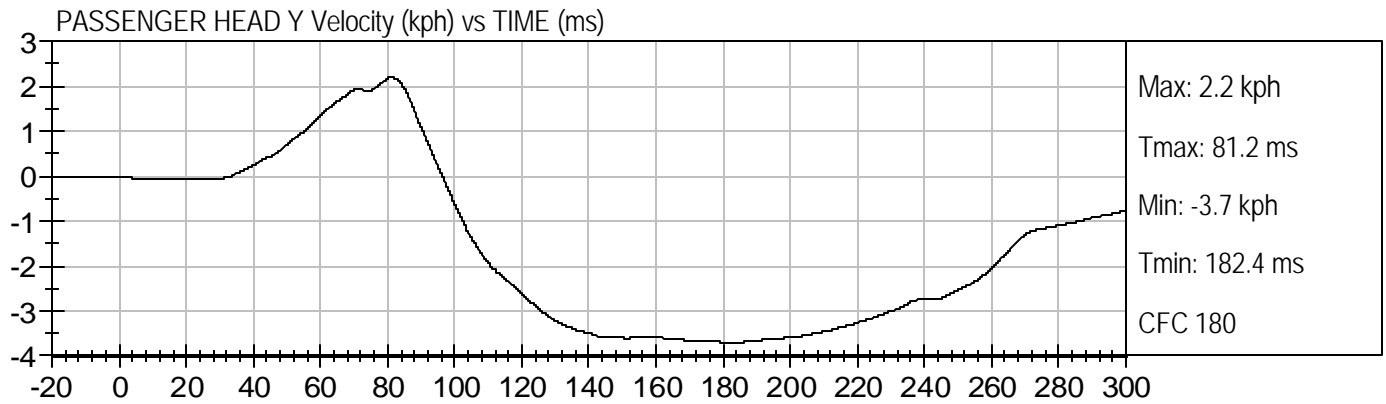
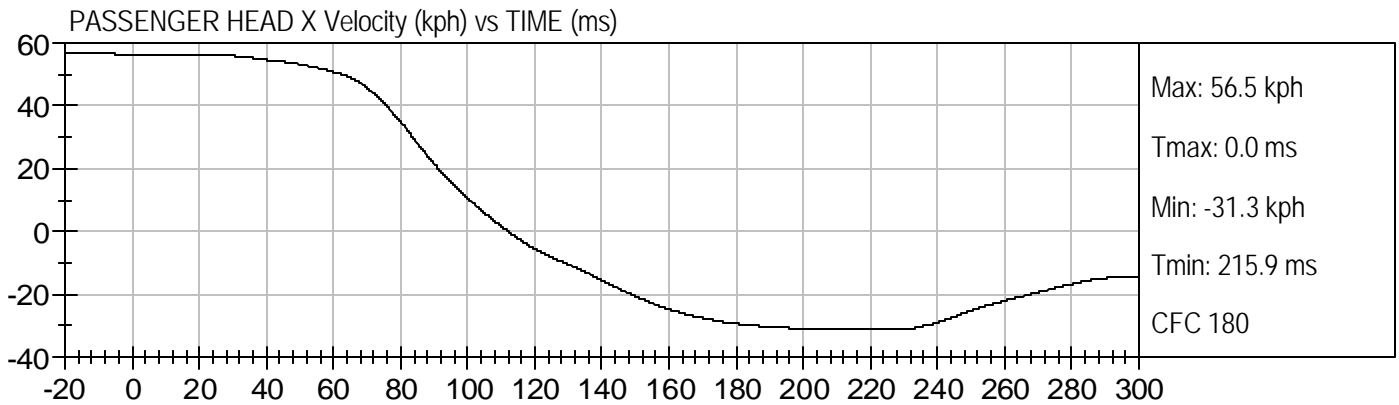


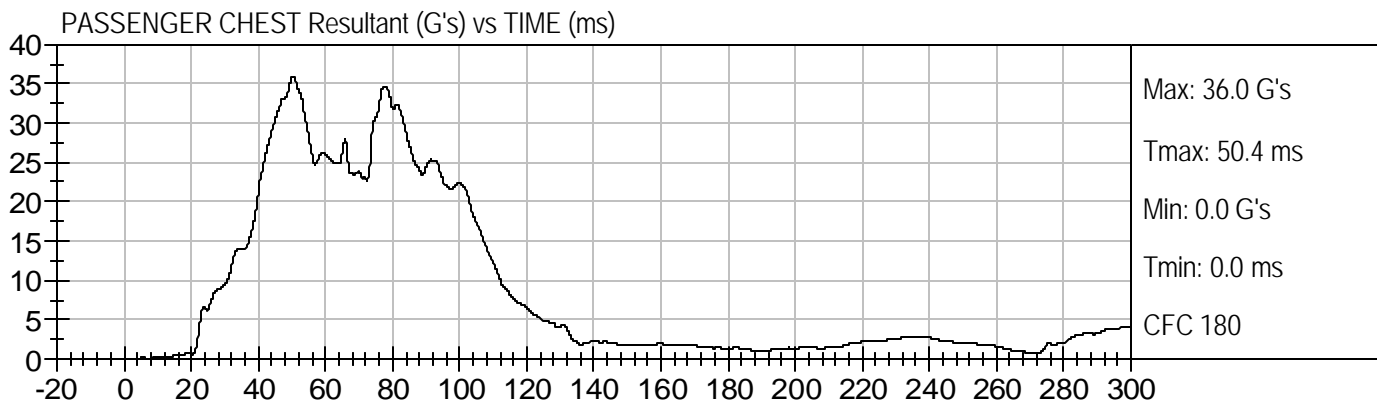
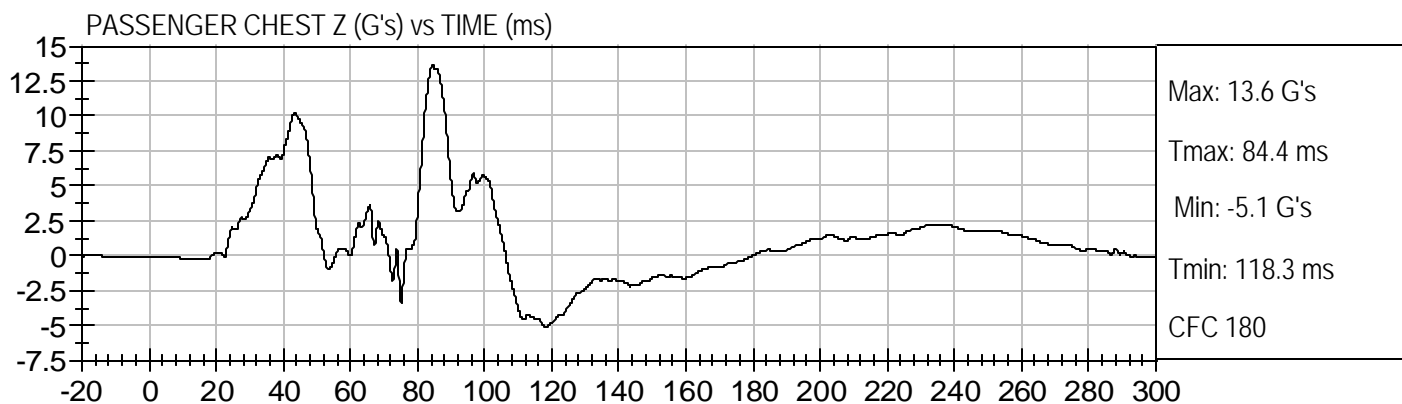
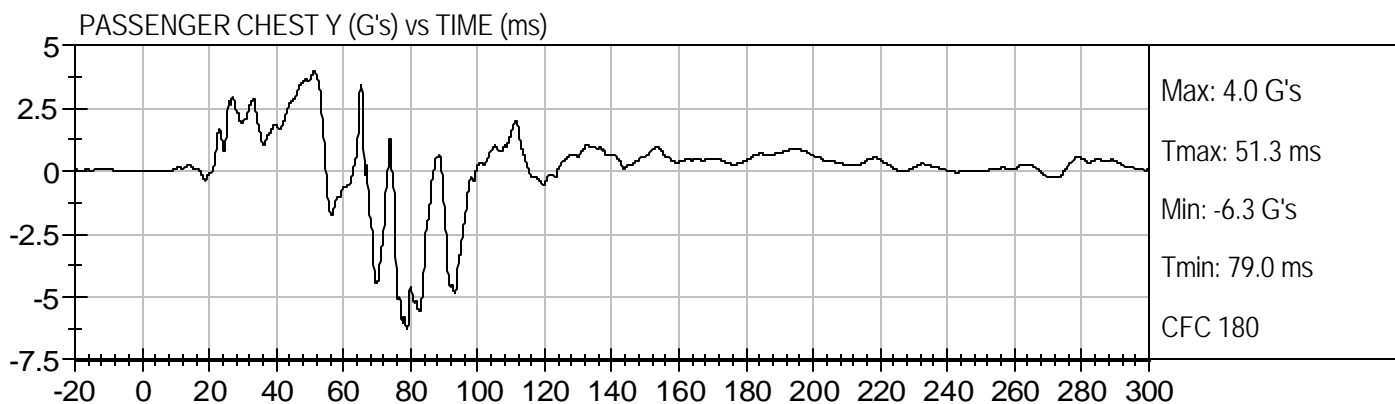
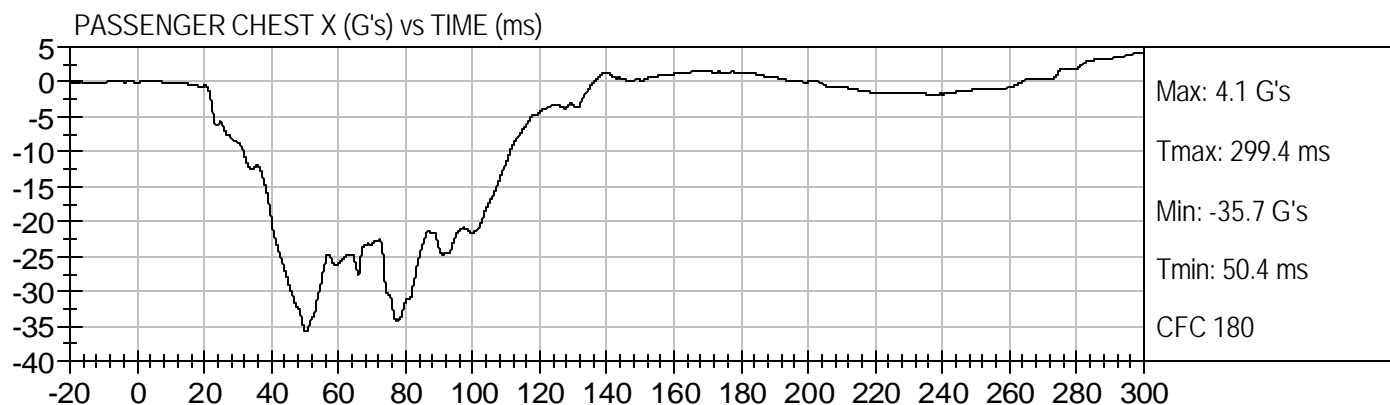


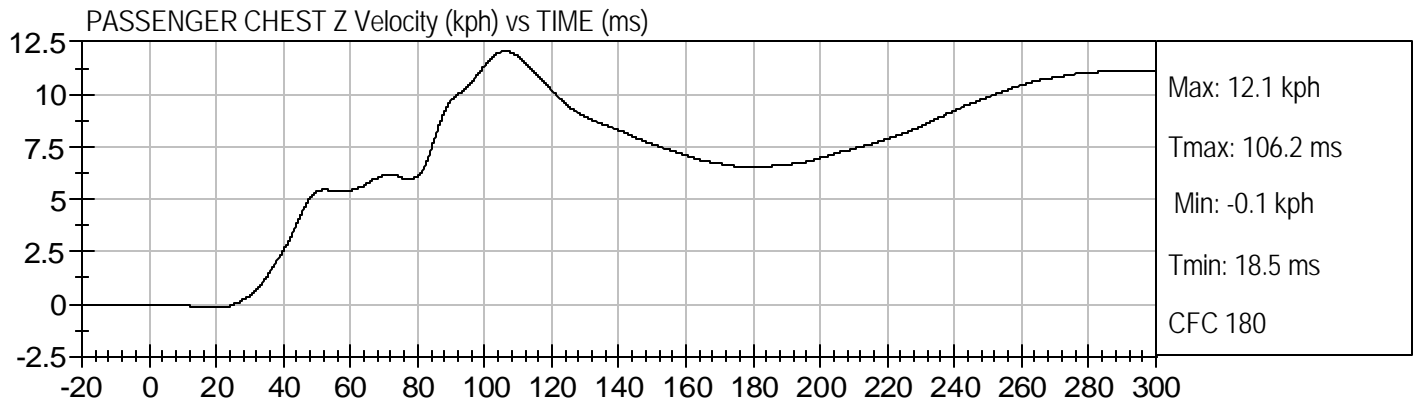
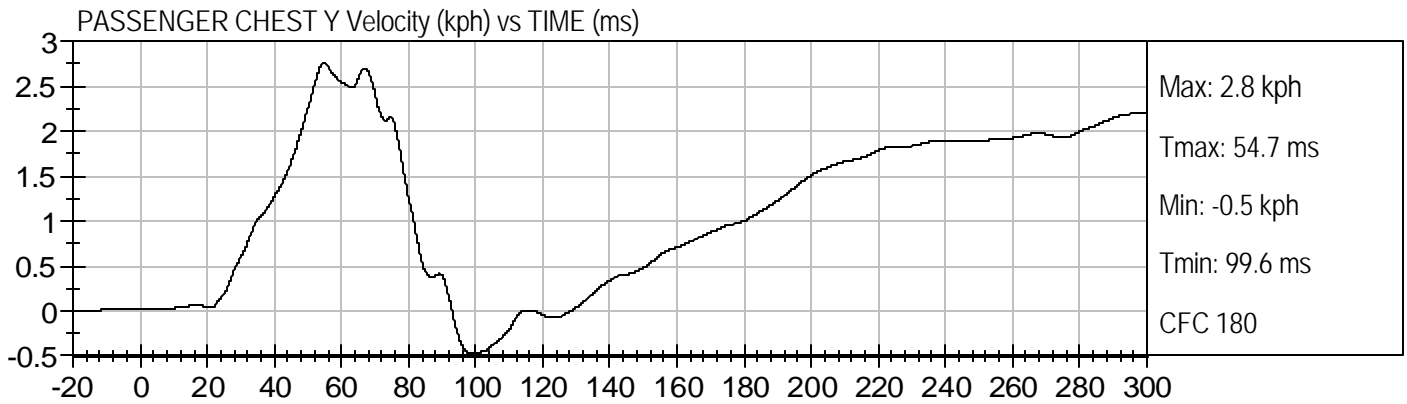
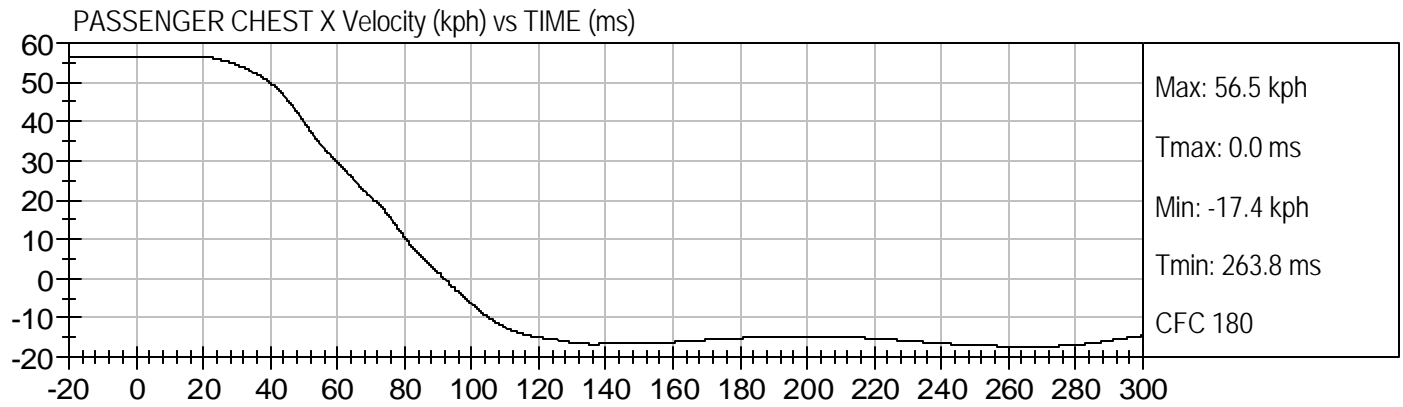


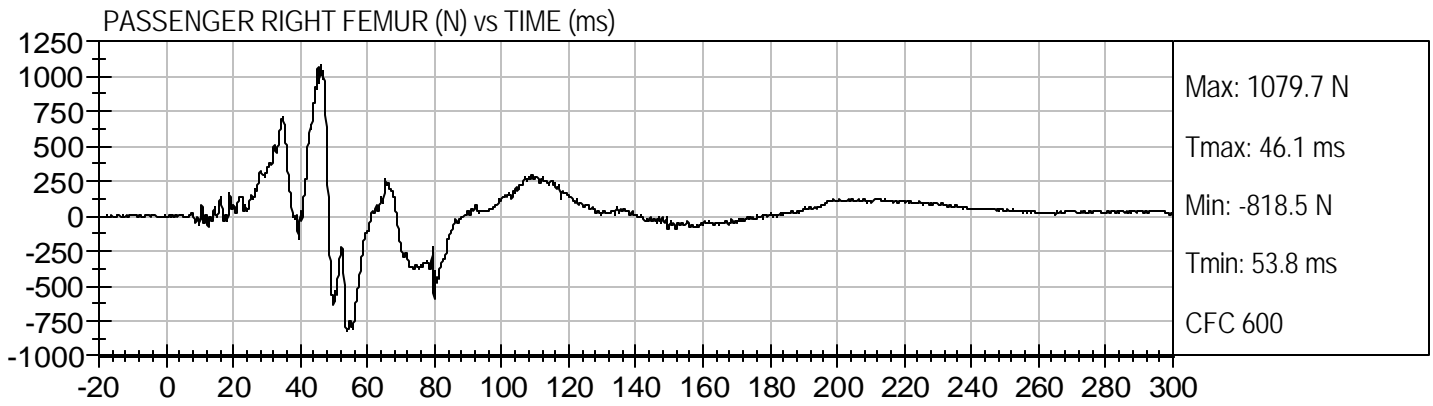
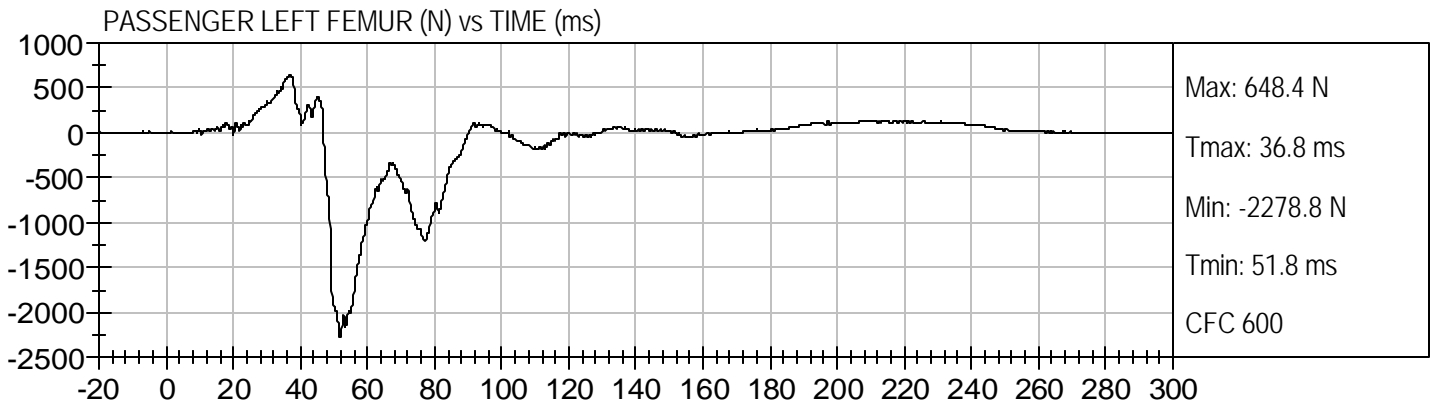












APPENDIX C
DUMMY CALIBRATION DATA

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

ATD Serial No: 065

Test ID: D073221


Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	20.6	Pass
Laboratory Relative Humidity	%	10 to 70	43	Pass
Peak Resultant Acceleration	G's	225 - 275	229	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-8.0	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass



 Laboratory Technician

10/19/07

 Test Date

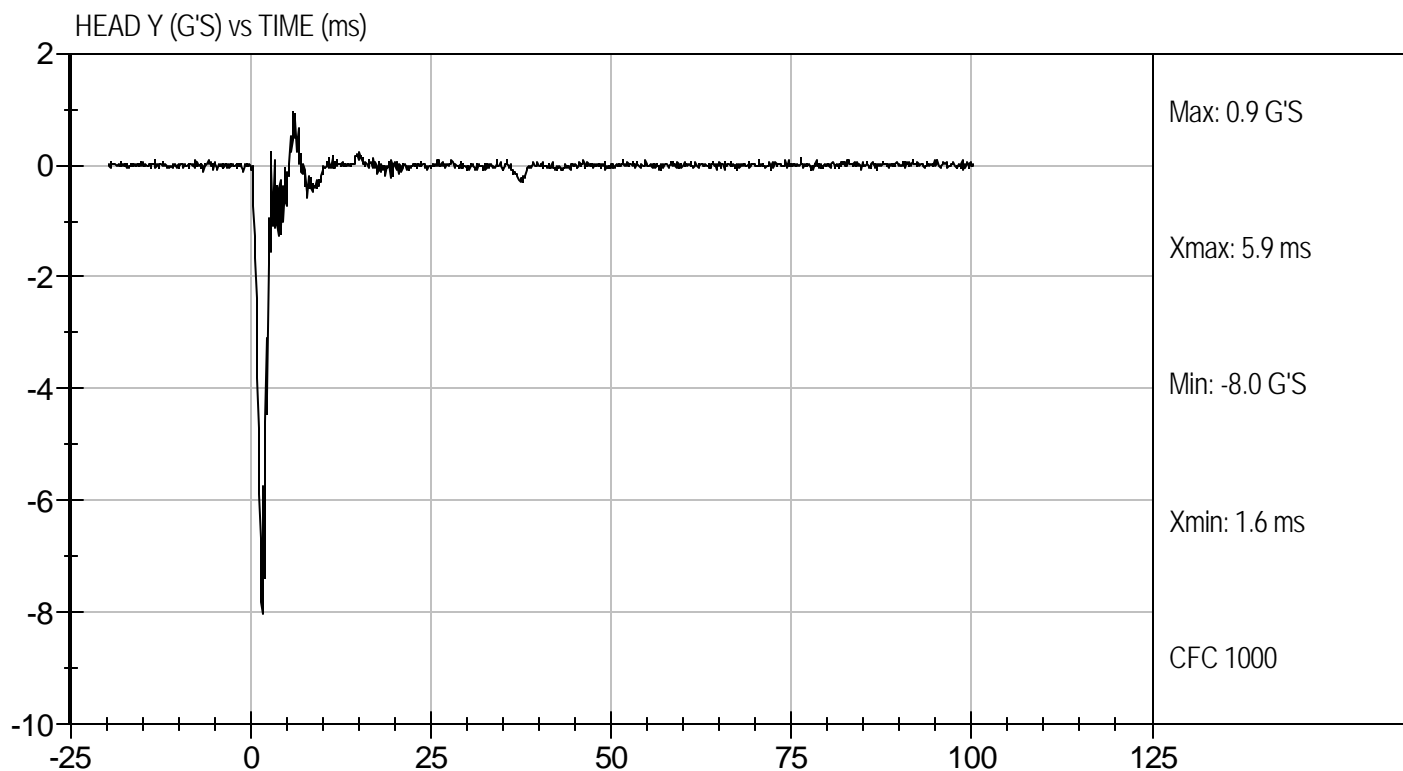
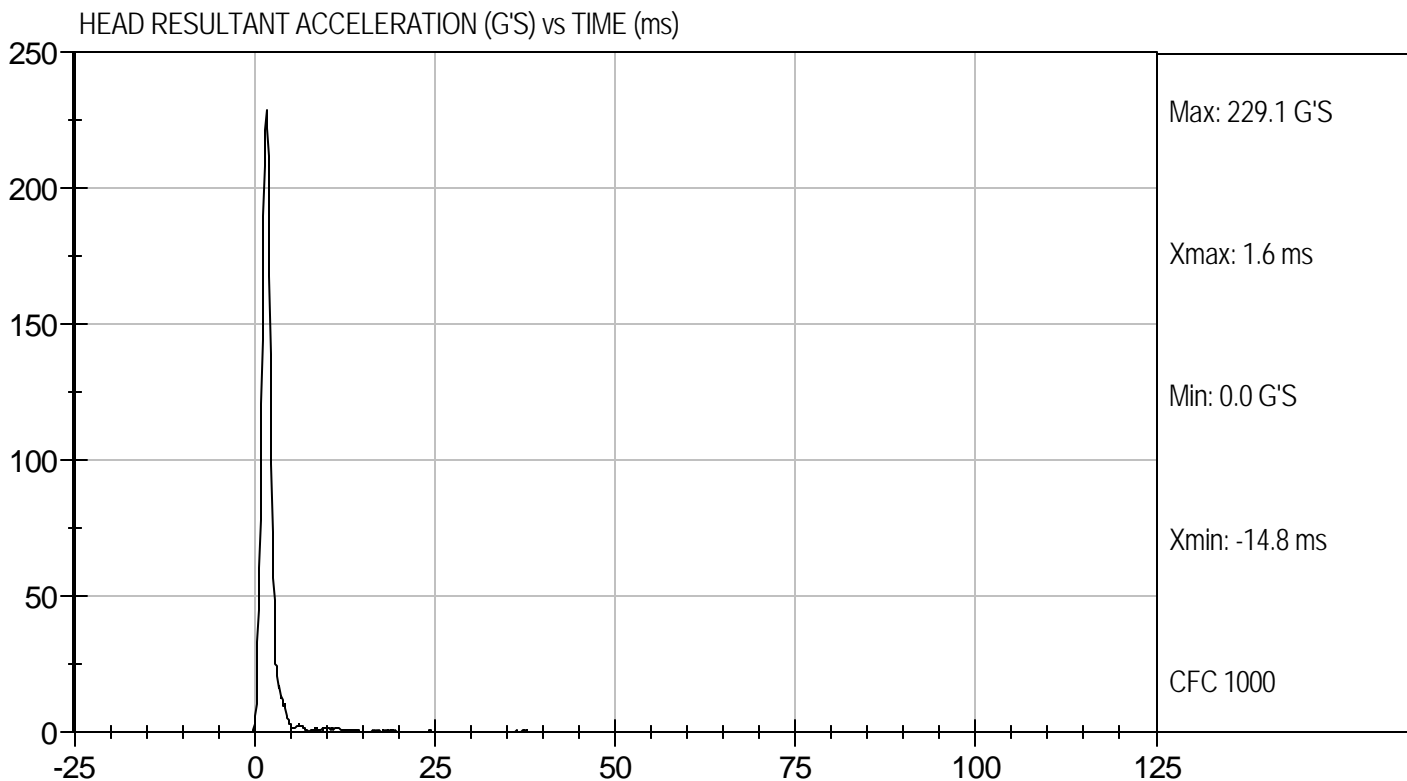


 Approved By



Test Desc: Head Drop
Component ID: D073221

Test Date: 10/19/07
Velocity: 0 ft/s, 0.00 m/s



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

ATD Serial No: 065

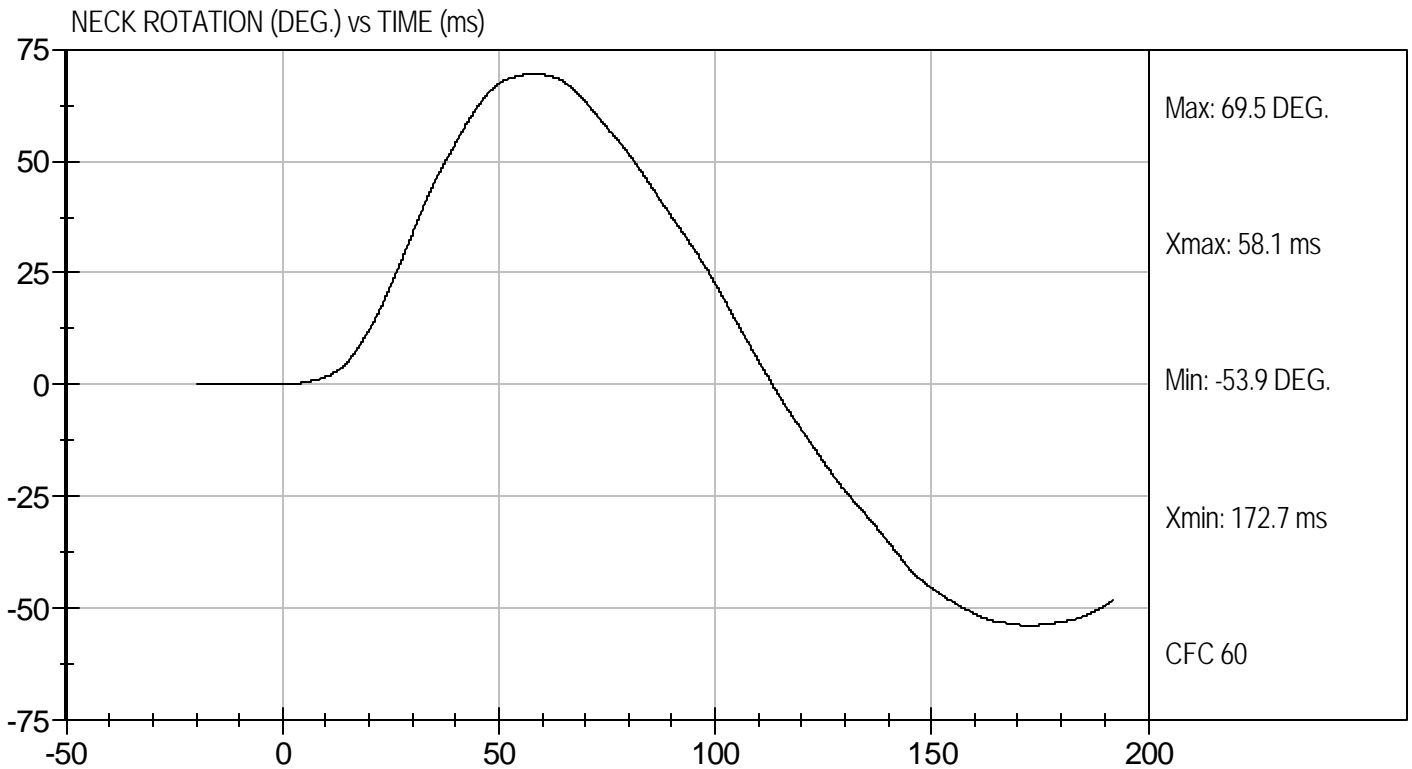
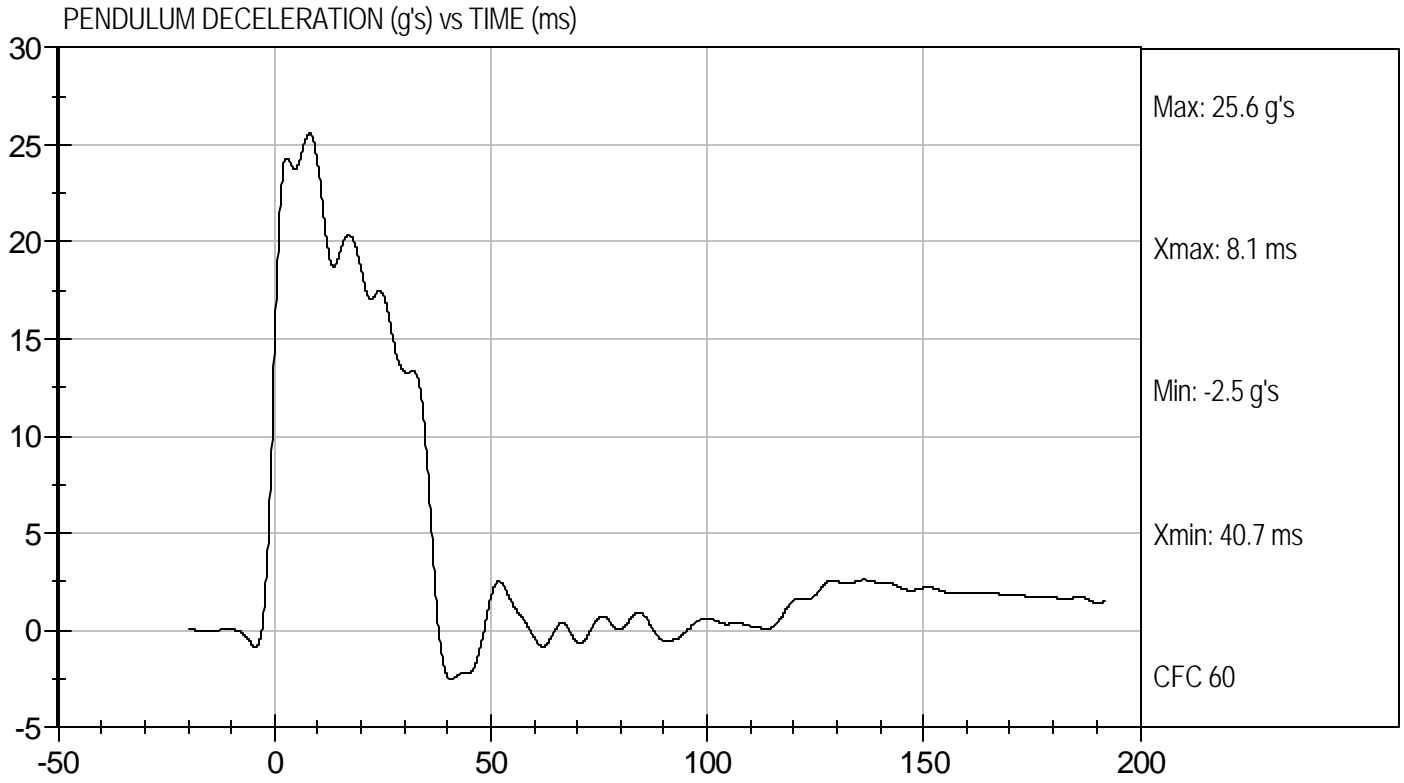
Test I.D.: D073222

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	20.8	Pass
Laboratory Relative Humidity		%	10 to 70	40	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.05	Pass
Pendulum Deceleration	10 msec	G's	22.50 to 27.50	24.00	Pass
	20 msec	G's	17.60 to 22.60	18.60	Pass
	30 msec	G's	12.50 to 18.50	13.31	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 29.0	13.34	Pass
Deceleration Decay Time to Cross 5 G's		msec	34.0 to 42.0	36.4	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	69.5	Pass
	Time	msec	57.0 to 64.0	58.1	Pass
"D" Plane Rotation Decay Time To Zero Crossing		msec	113.0 to 128.0	113.4	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	90.6	Pass
	Time	msec	47.0 to 58.0	48.5	Pass
Positive Moment Decay Time To Zero Crossing		msec	97.0 to 107.0	102.1	Pass
Overall Test Results					Pass


Laboratory Technician

10/19/07
Test Date

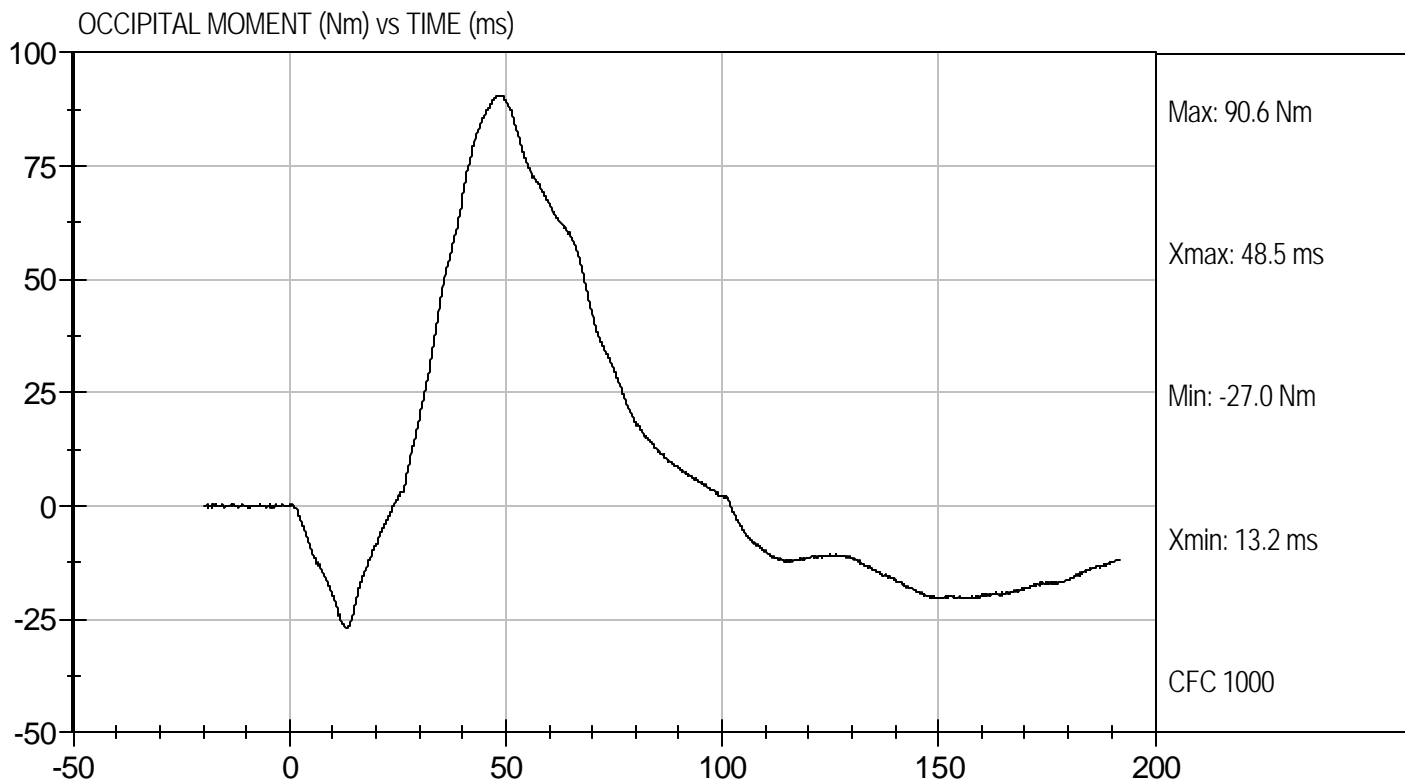

Approved By





Test Desc: Neck Flexion
Component ID: D073222

Test Date: 10/19/07
Velocity: 23.14 ft/s, 7.05 m/s



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

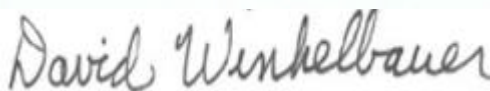
ATD Serial No: 065

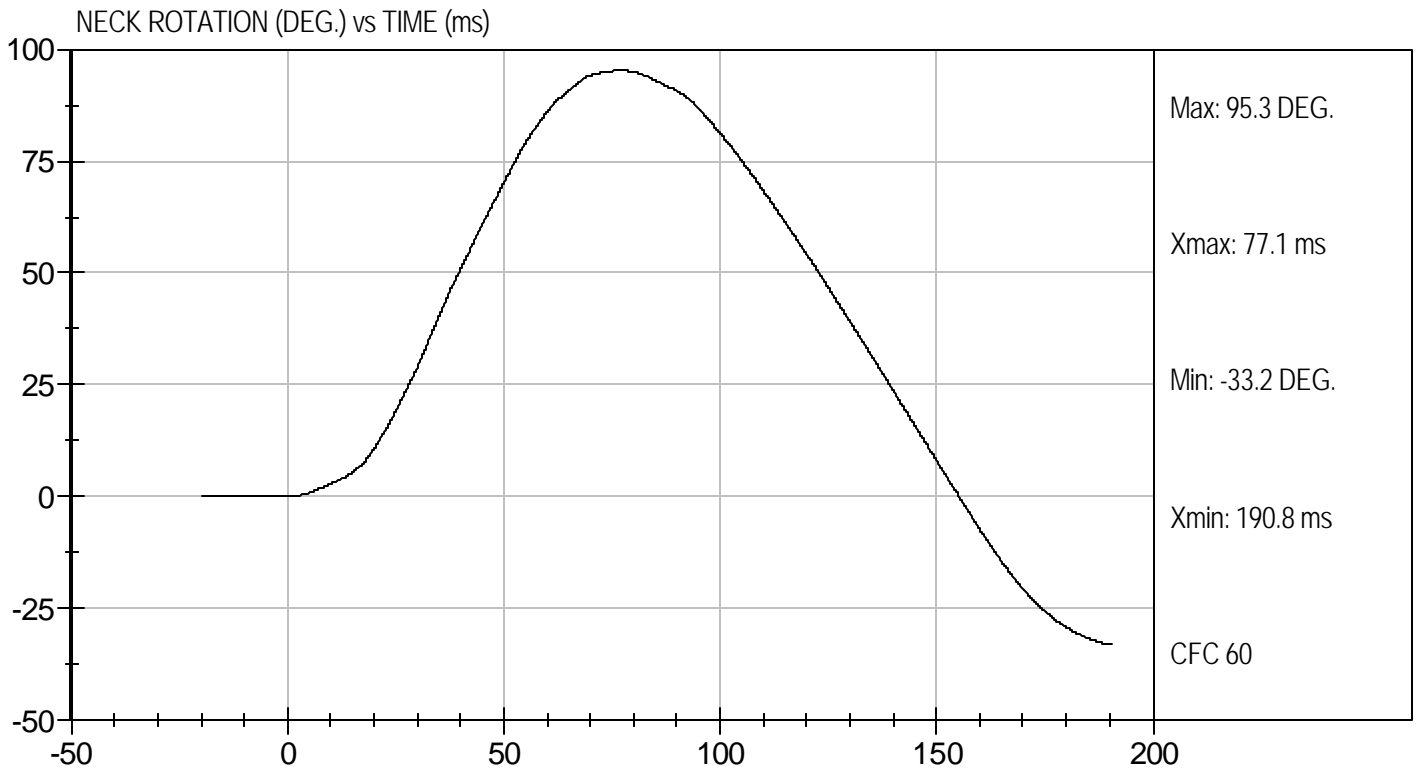
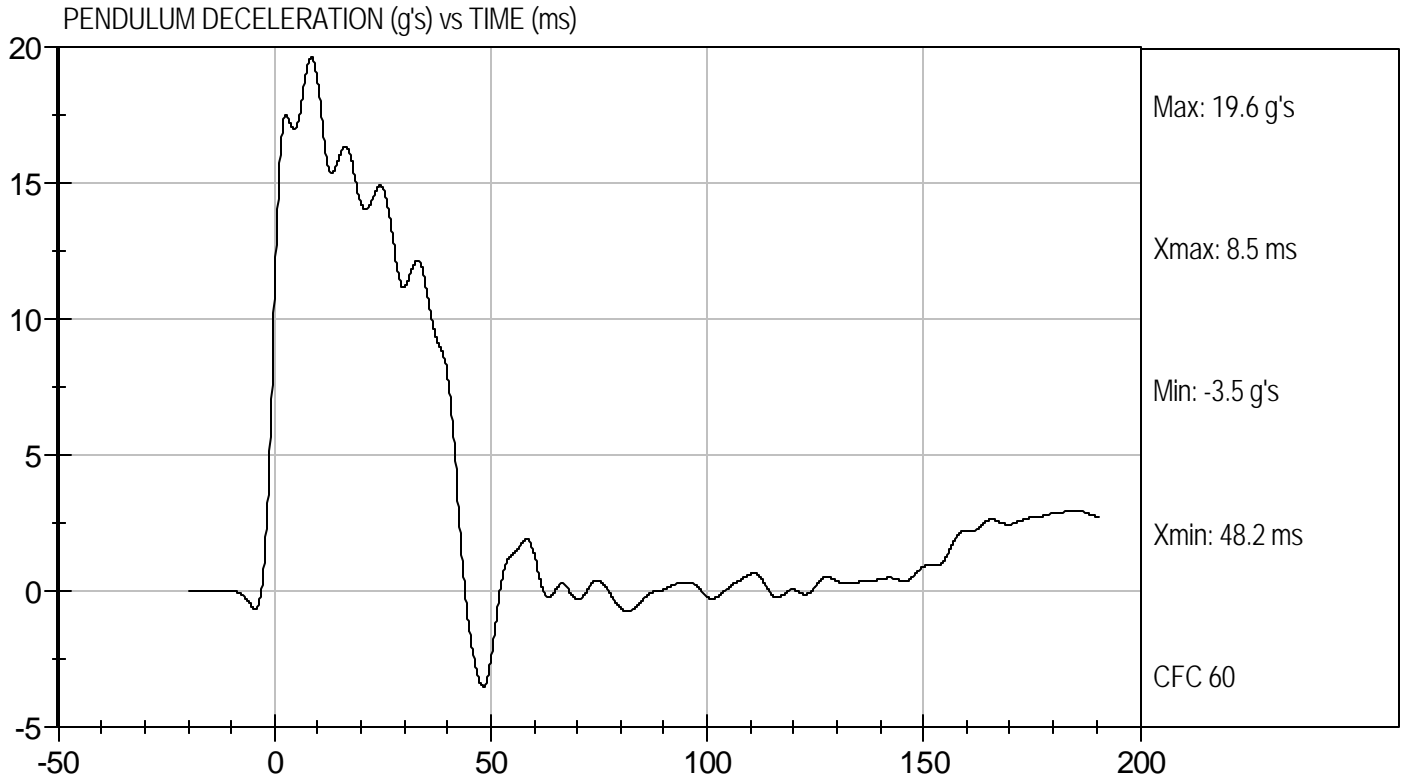
Test I.D.: D073223

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	44	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.12	Pass
Pendulum Deceleration	10 msec	G's	17.20 to 21.20	18.74	Pass
	20 msec	G's	14.00 to 19.00	14.25	Pass
	30 msec	G's	11.00 to 16.00	11.19	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 22.0	12.20	Pass
Deceleration Decay Time to Cross 5 G's		msec	38.0 to 46.0	41.8	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	95.3	Pass
	Time	msec	72.0 to 82.0	77.1	Pass
"D" Plane Rotation Decay Time To Zero Crossing		msec	147.0 to 174.0	155.4	Pass
Moment About Occipital Condyle	Maximum	N m	-52.9 to -79.9	-60.5	Pass
	Time	msec	65.0 to 79.0	71.0	Pass
Negative Moment Decay Time To Zero Crossing		msec	120.0 to 148.0	142.4	Pass
Overall Test Results					Pass


Laboratory Technician

10/22/07
Test Date

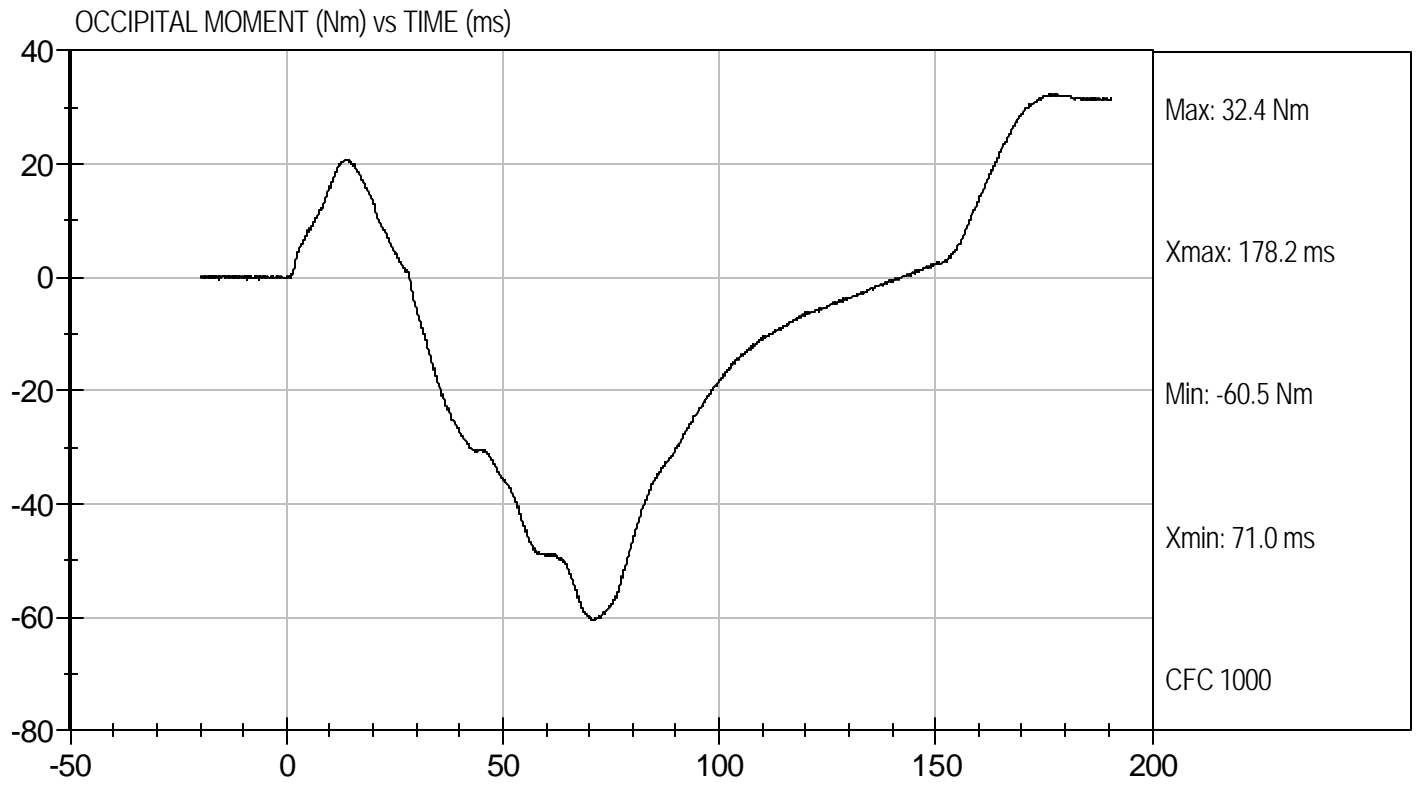

Approved By





Test Desc: Neck Extension
Component ID: D073223

Test Date: 10/22/07
Velocity: 20.08 ft/s, 6.12 m/s



**MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE**

ATD Serial No: 065

Test I.D: D073224

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	20.9	Pass
Laboratory Relative Humidity	%	10 to 70	44	Pass
Probe Velocity	m/s	6.58 to 6.82	6.68	Pass
Peak Probe Force	N	5159 to 5893	5,570	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.66	Pass
Internal Hysteresis	%	69 to 85	71	Pass
Overall Test Results				Pass



Laboratory Technician

10/19/07

Test Date

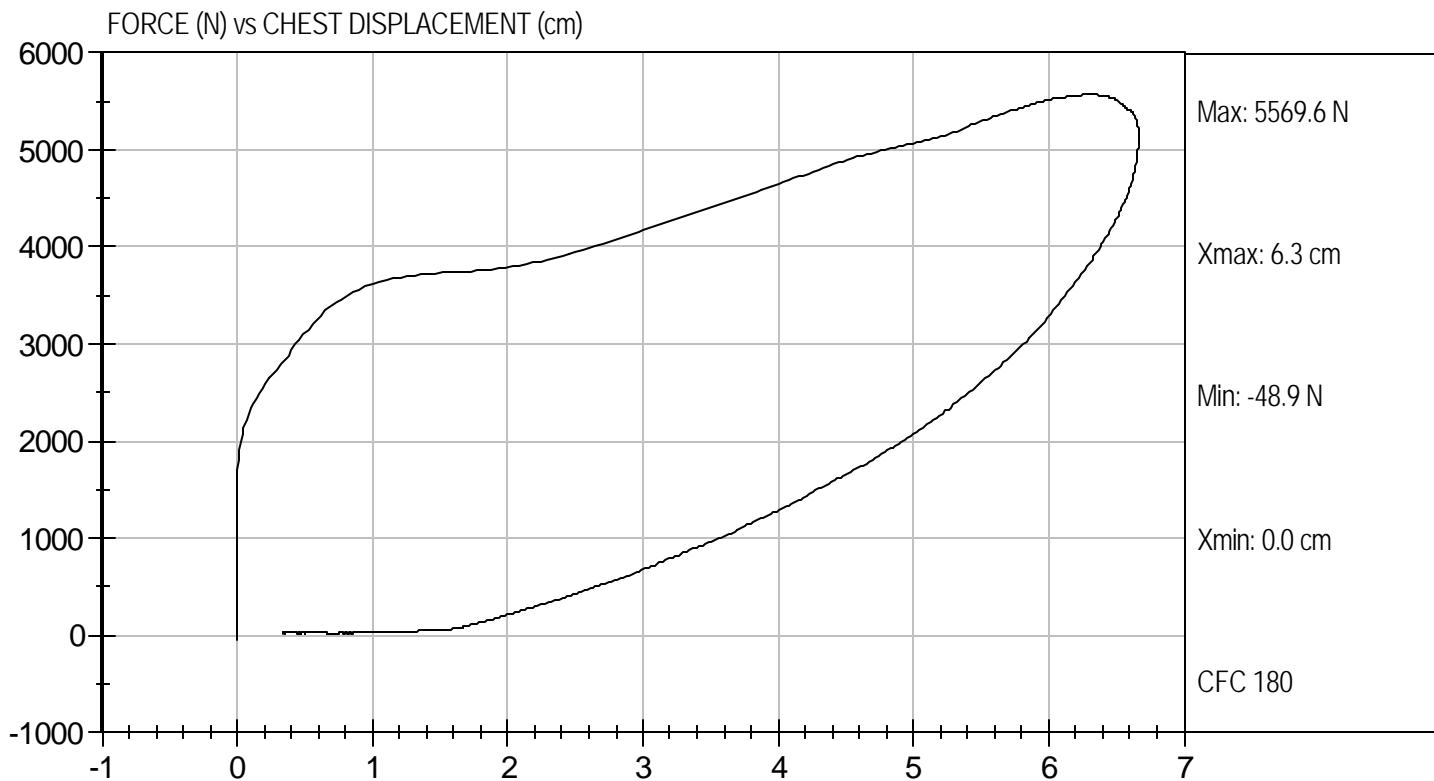


Approved By



Test Desc: Thorax Impact
Component ID: D073224

Test Date: 10/19/07
Velocity: 21.929 ft/s, 6.68 m/s



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

ATD Serial No: 065

Test I.D: D073225

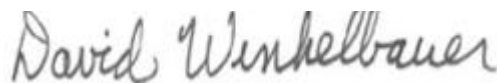
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	40	Pass
Probe Velocity	m/sec	2.07 to 2.13	2.09	Pass
Peak Probe Force	Newtons	4715 to 5782	5,200	Pass
Overall Test Results				Pass



 Laboratory Technician

10/19/07

 Test Date

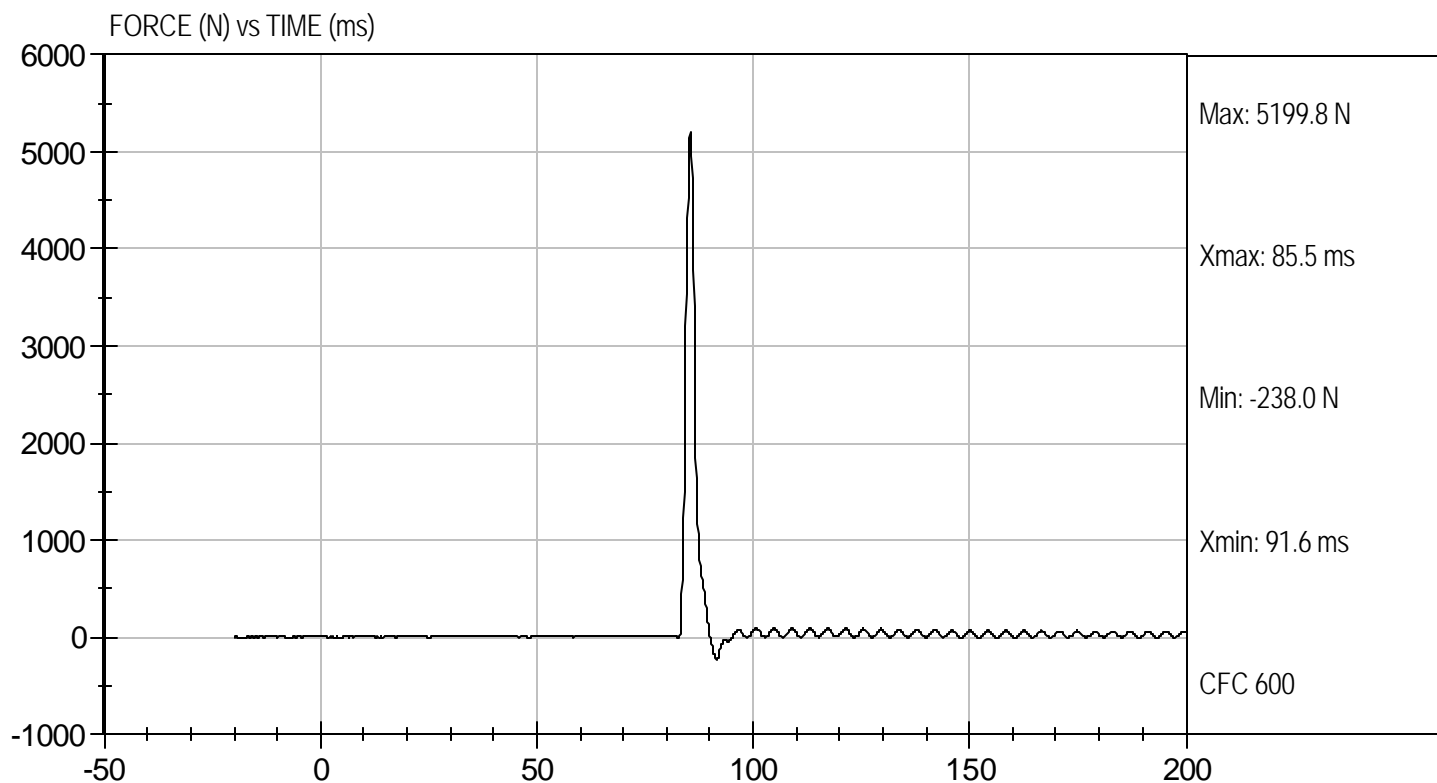


 Approved By



Test Desc: Right Knee
Component ID: D073225

Test Date: 10/19/07
Velocity: 6.85 ft/s, 2.09 m/s



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

ATD Serial No: 065

Test I.D: D073226

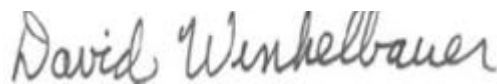
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	40	Pass
Probe Velocity	m/sec	2.07 to 2.13	2.10	Pass
Peak Probe Force	Newtons	4715 to 5782	5,346	Pass
Overall Test Results				Pass



 Laboratory Technician

10/19/07

 Test Date

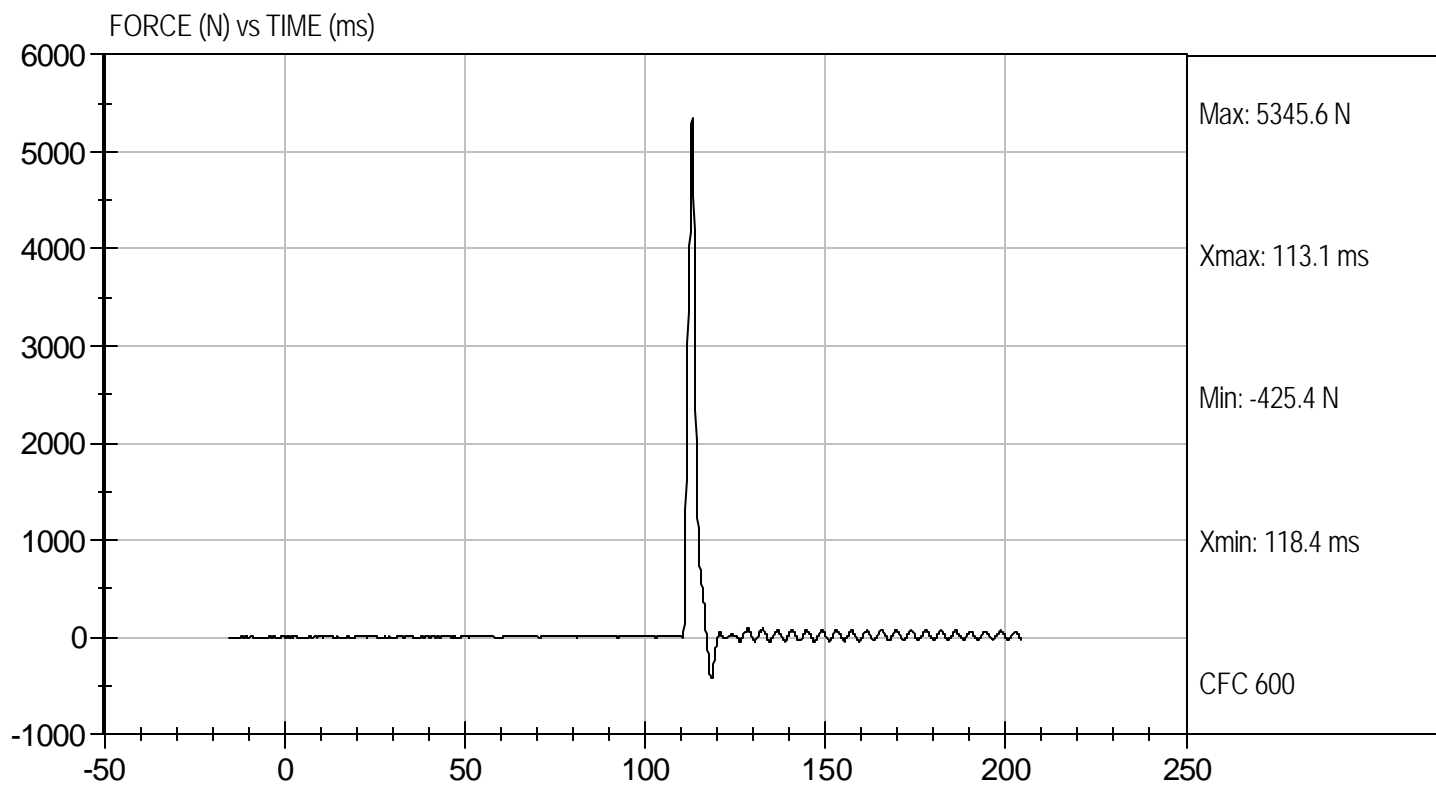


 Approved By



Test Desc: Left Knee
Component ID: D073226

Test Date: 10/19/07
Velocity: 6.89 ft/s, 2.10 m/s



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

ATD Serial No: 065

Test I.D: D073220


Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	20.7	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	45	45	Pass
Rotation Rate	deg/sec	5 -10	8	8	Pass
30 Degrees	Nm	94.9 Nm Max	68.5	60.2	Pass
150 ft-lbf / 203.4 Nm	Deg	40- 50 Degree Max Rotation	41	41	Pass
Overall Test Results					Pass



 Laboratory Technician

10/19/07

 Test Date

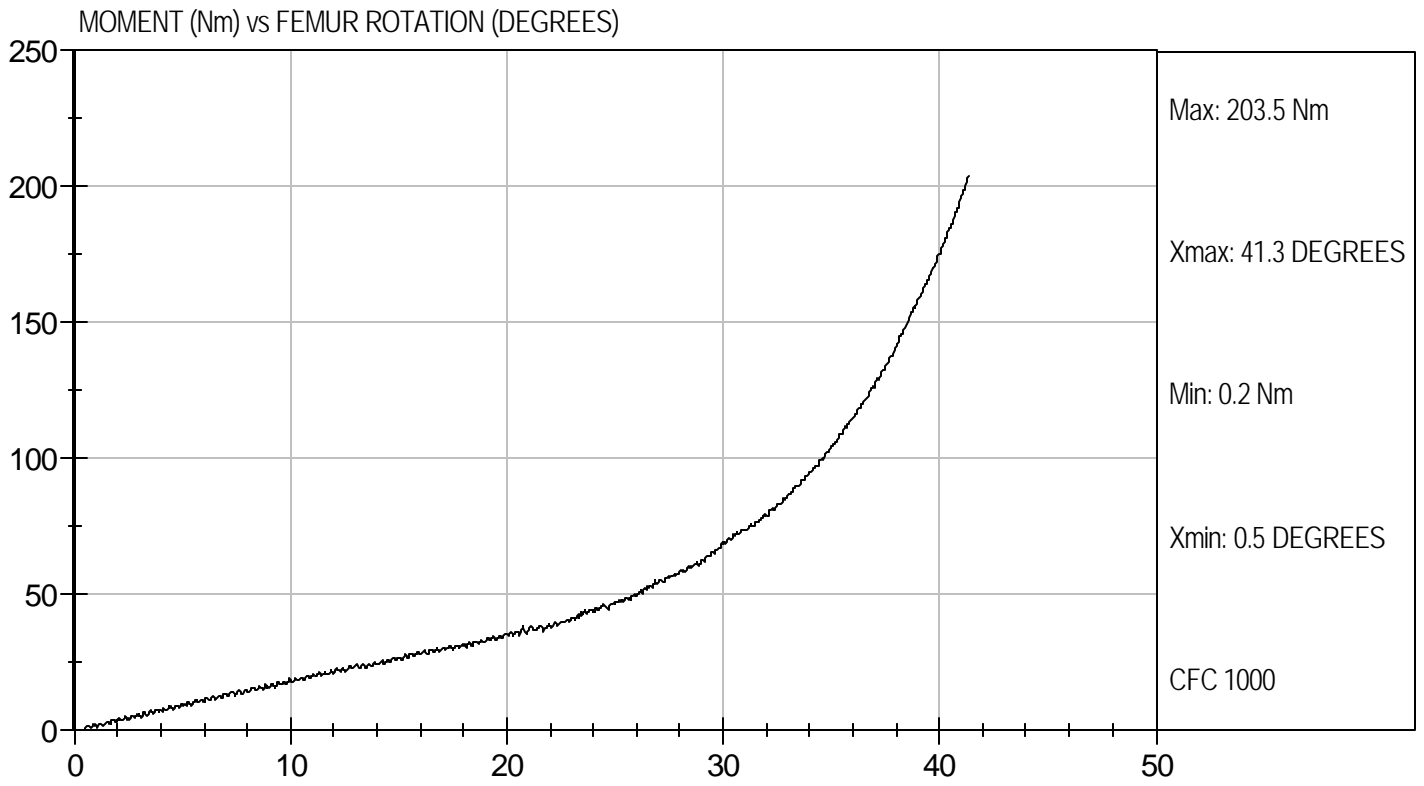


 Approved By



Test Desc: Hip Femur Flexion
Component ID: D073229

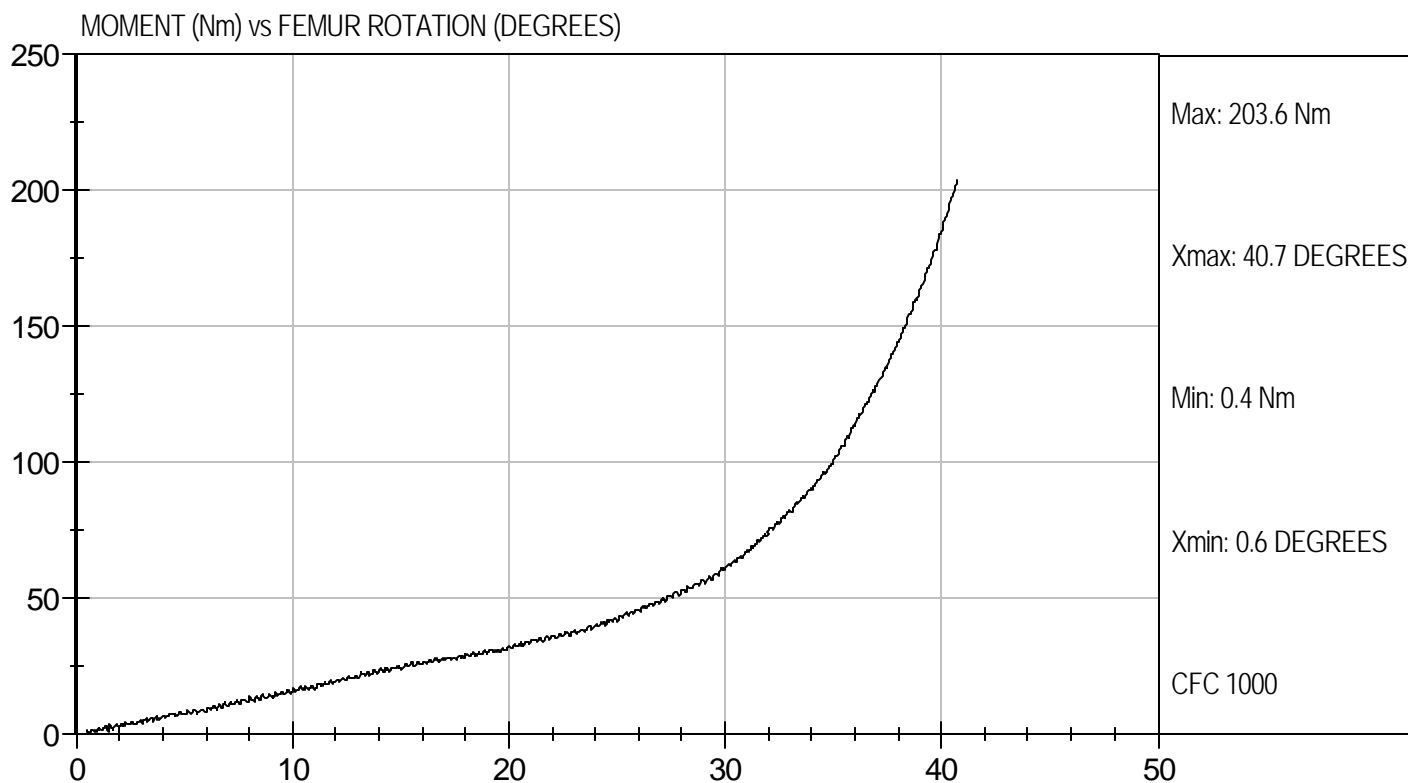
Test Date: 10/19/07
Velocity: 0 ft/s, 0.00 m/s





Test Desc: Hip Femur Flexion
Component ID: D073220

Test Date: 10/19/07
Velocity: 0 ft/s, 0.00 m/s



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

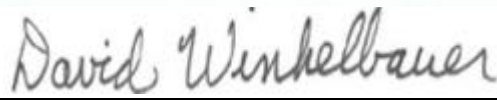
ATD Serial No: 066

Test ID: D073231

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	20.6	Pass
Laboratory Relative Humidity	%	10 to 70	43	Pass
Peak Resultant Acceleration	G's	225 - 275	274	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-13.6	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


 Laboratory Technician

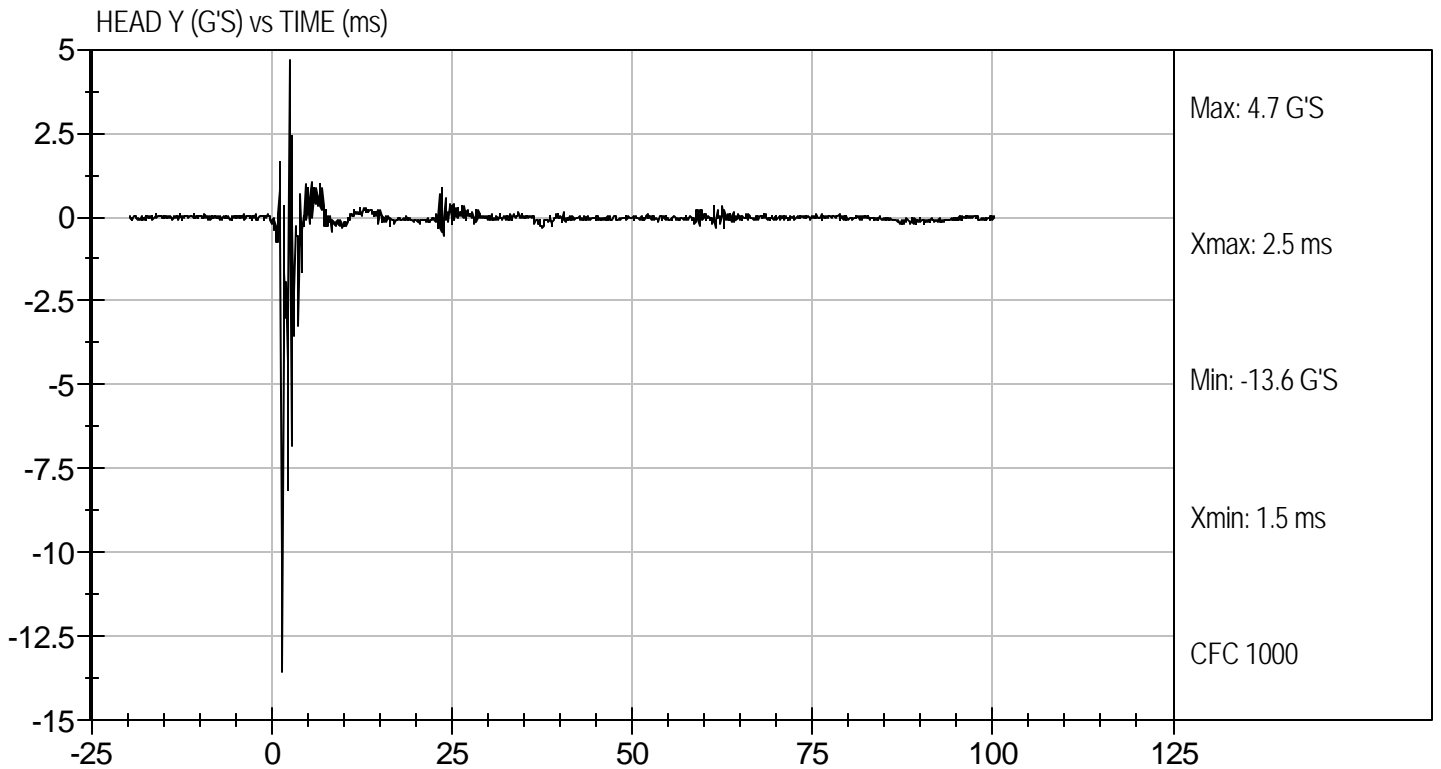
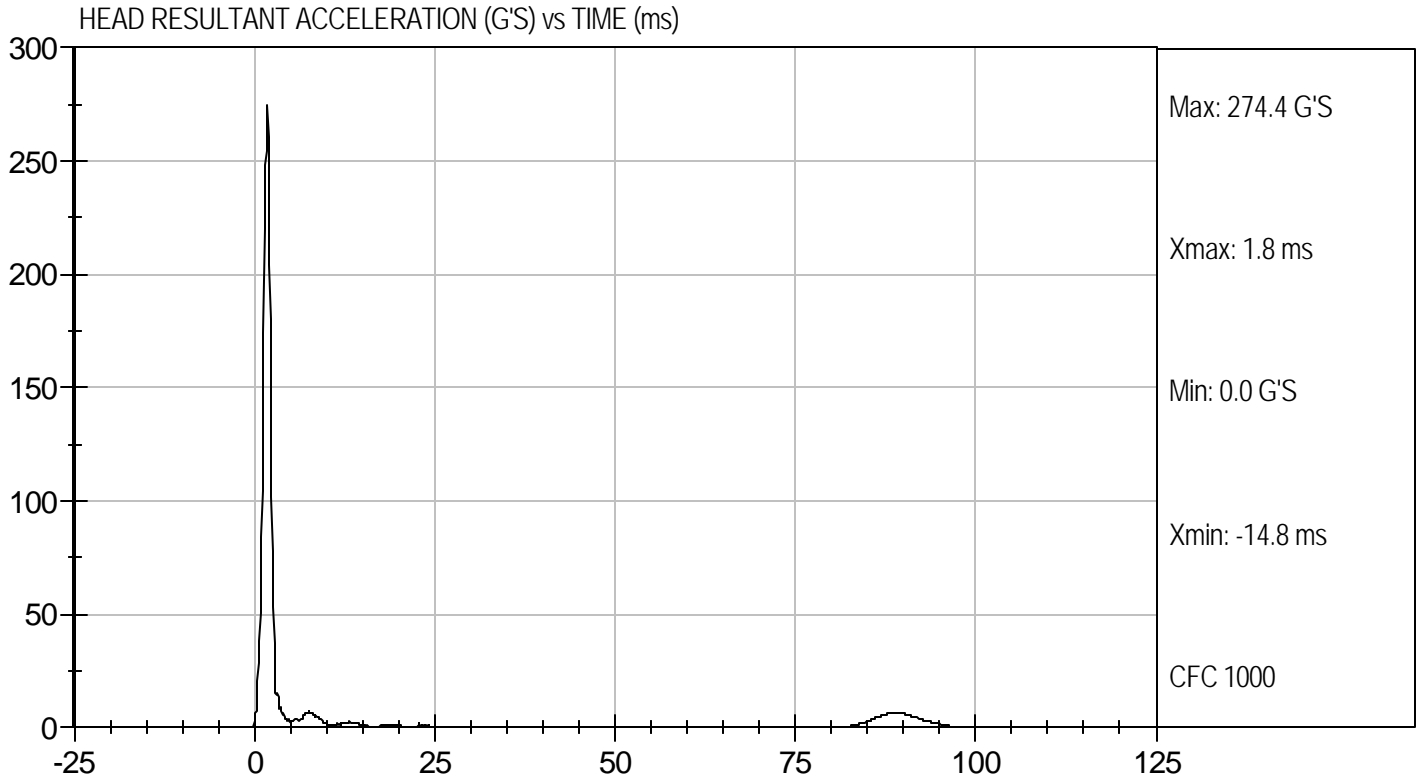
10/19/07
 Test Date


 Approved By



Test Desc: Head Drop
Component ID: D073231

Test Date: 10/19/07
Velocity: 0 ft/s, 0.00 m/s



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


ATD Serial No: 066

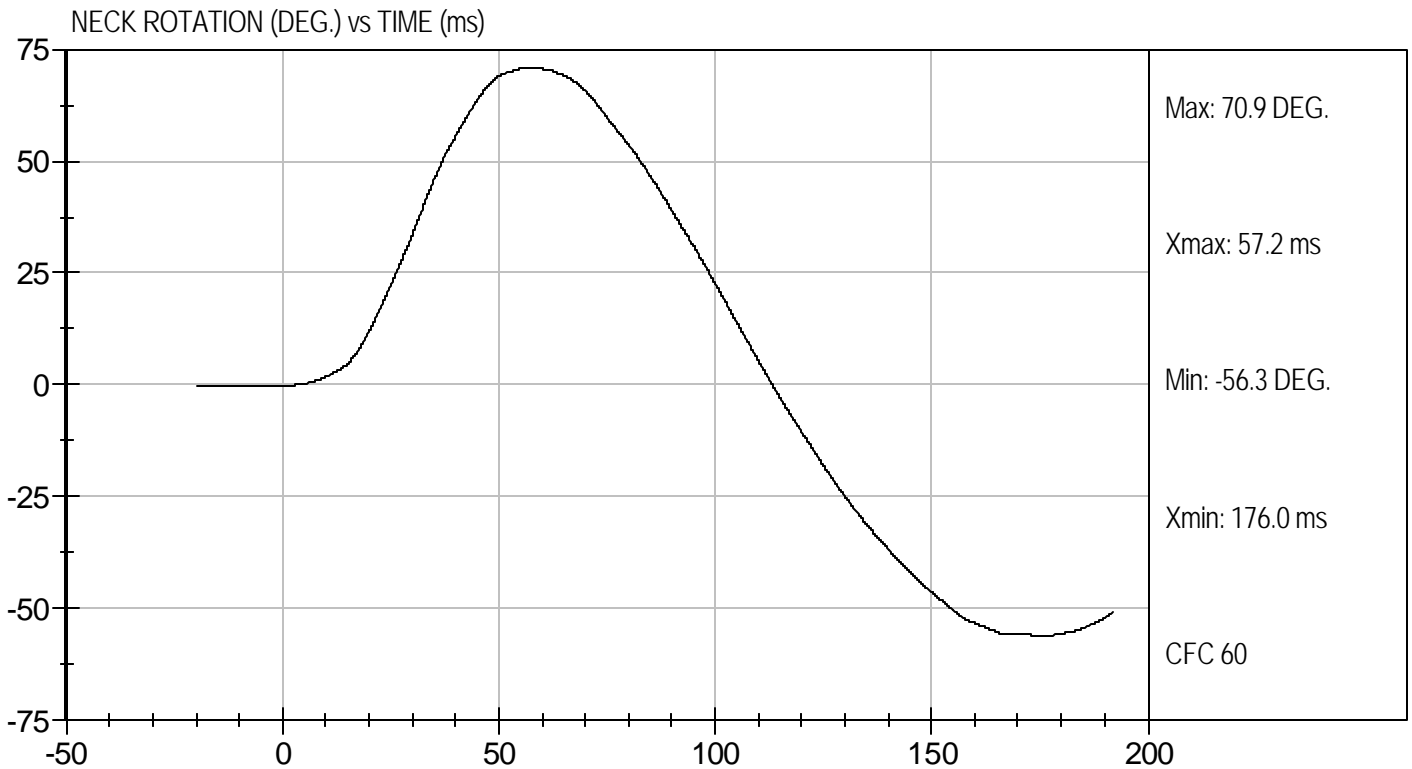
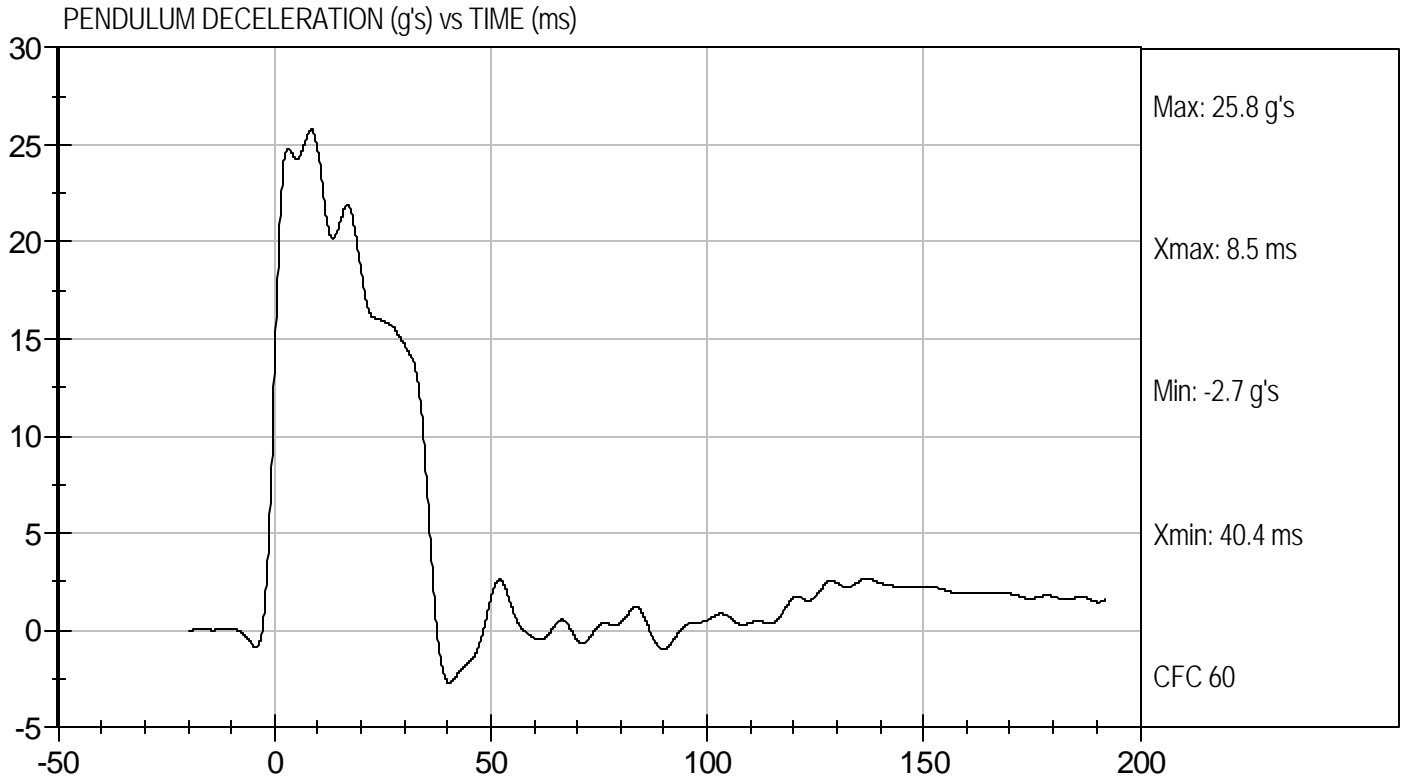
Test I.D.: D073232

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	43	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.05	Pass
Pendulum Deceleration	10 msec	G's	22.50 to 27.50	24.58	Pass
	20 msec	G's	17.60 to 22.60	18.36	Pass
	30 msec	G's	12.50 to 18.50	14.71	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 29.0	14.67	Pass
Deceleration Decay Time to Cross 5 G's		msec	34.0 to 42.0	36.0	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	70.9	Pass
	Time	msec	57.0 to 64.0	57.2	Pass
"D" Plane Rotation Decay Time To Zero Crossing		msec	113.0 to 128.0	113.3	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	88.4	Pass
	Time	msec	47.0 to 58.0	48.1	Pass
Positive Moment Decay Time To Zero Crossing		msec	97.0 to 107.0	99.3	Pass
Overall Test Results					Pass


Laboratory Technician

10/22/07
Test Date

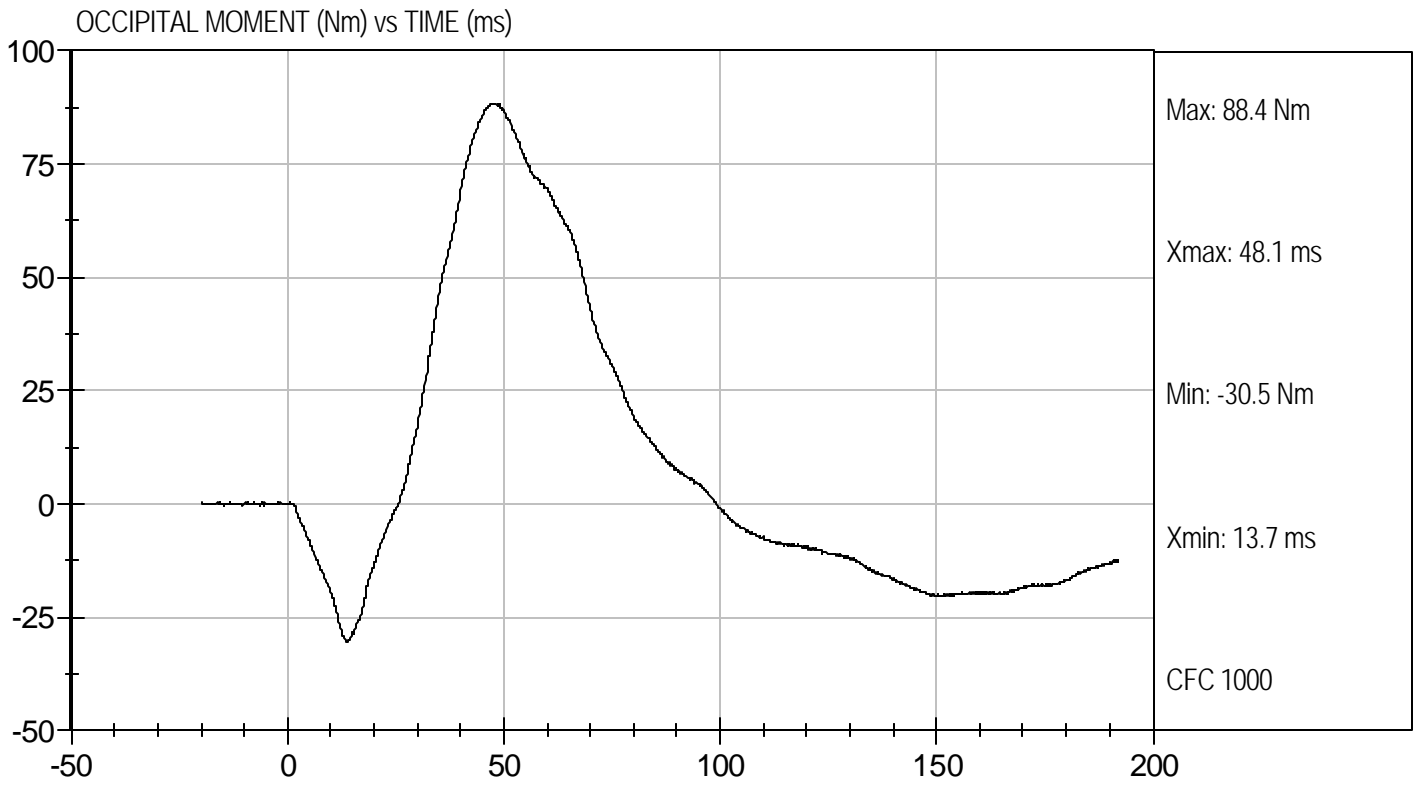

Approved By





Test Desc: Neck Flexion
Component ID: D073232

Test Date: 10/22/07
Velocity: 23.14 ft/s, 7.05 m/s



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


ATD Serial No: 066

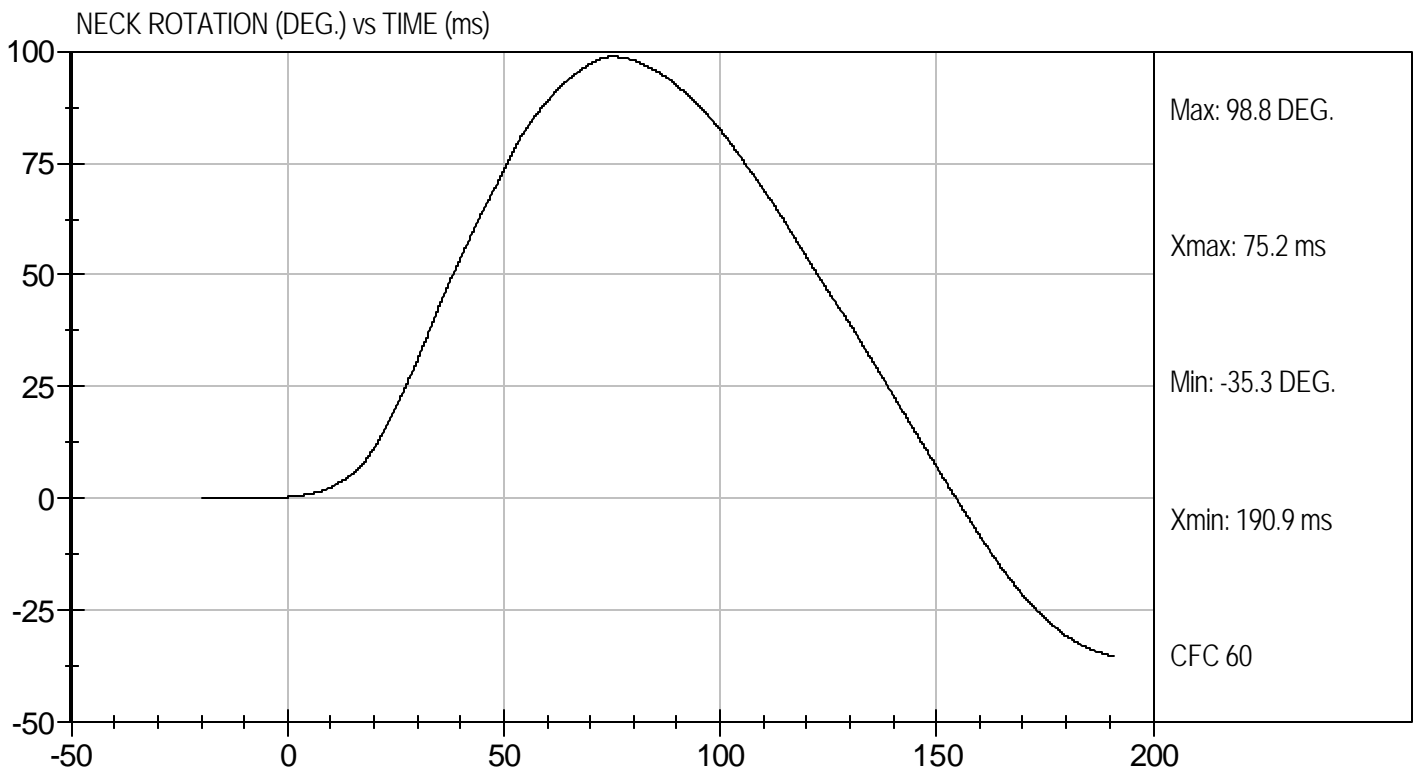
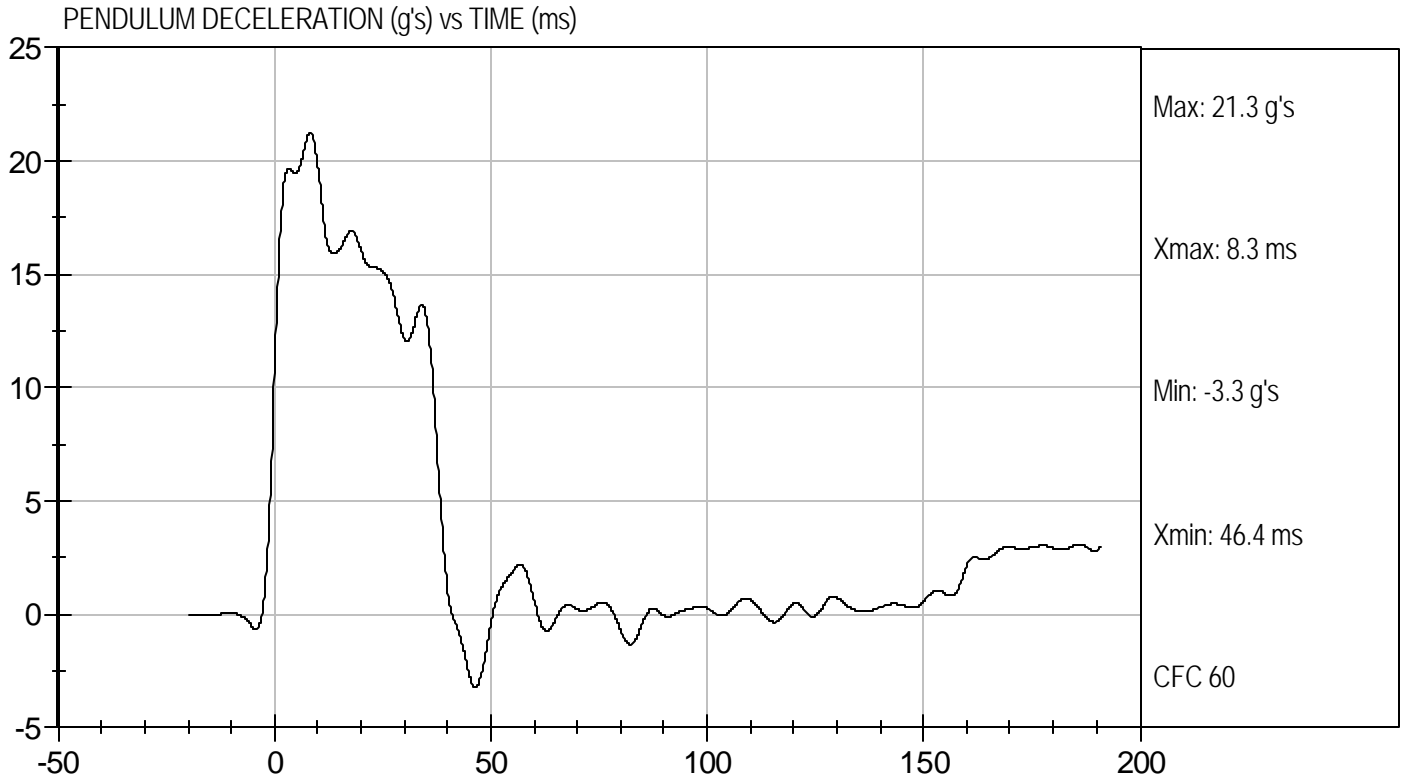
Test I.D.: D073233

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	20.8	Pass
Laboratory Relative Humidity		%	10 to 70	43	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.12	Pass
Pendulum Deceleration	10 msec	G's	17.20 to 21.20	19.78	Pass
	20 msec	G's	14.00 to 19.00	16.05	Pass
	30 msec	G's	11.00 to 16.00	12.12	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 22.0	13.65	Pass
Deceleration Decay Time to Cross 5 G's		msec	38.0 to 46.0	38.4	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	98.8	Pass
	Time	msec	72.0 to 82.0	75.2	Pass
"D" Plane Rotation Decay Time To Zero Crossing		msec	147.0 to 174.0	154.7	Pass
Moment About Occipital Condyle	Maximum	N m	-52.9 to -79.9	-62.6	Pass
	Time	msec	65.0 to 79.0	70.5	Pass
Negative Moment Decay Time To Zero Crossing		msec	120.0 to 148.0	144.5	Pass
Overall Test Results					Pass


Laboratory Technician

10/22/07
Test Date

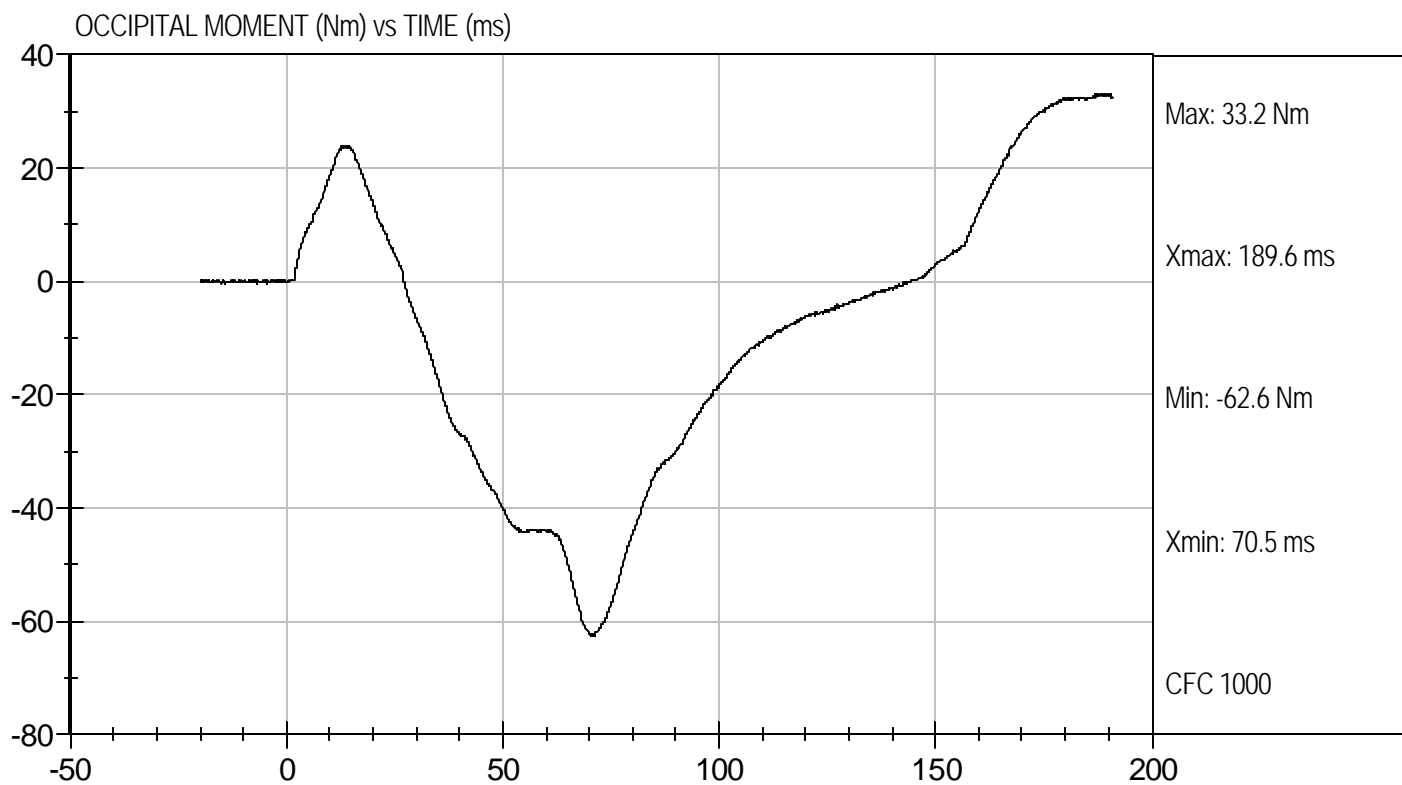

Approved By





Test Desc: Neck Extension
Component ID: D073233

Test Date: 10/22/07
Velocity: 20.08 ft/s, 6.12 m/s



**MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE**

ATD Serial No: 066

Test I.D: D073234

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	20.9	Pass
Laboratory Relative Humidity	%	10 to 70	45	Pass
Probe Velocity	m/s	6.58 to 6.82	6.68	Pass
Peak Probe Force	N	5159 to 5893	5,281	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.79	Pass
Internal Hysteresis	%	69 to 85	70	Pass
Overall Test Results				Pass



Laboratory Technician

10/19/07

Test Date

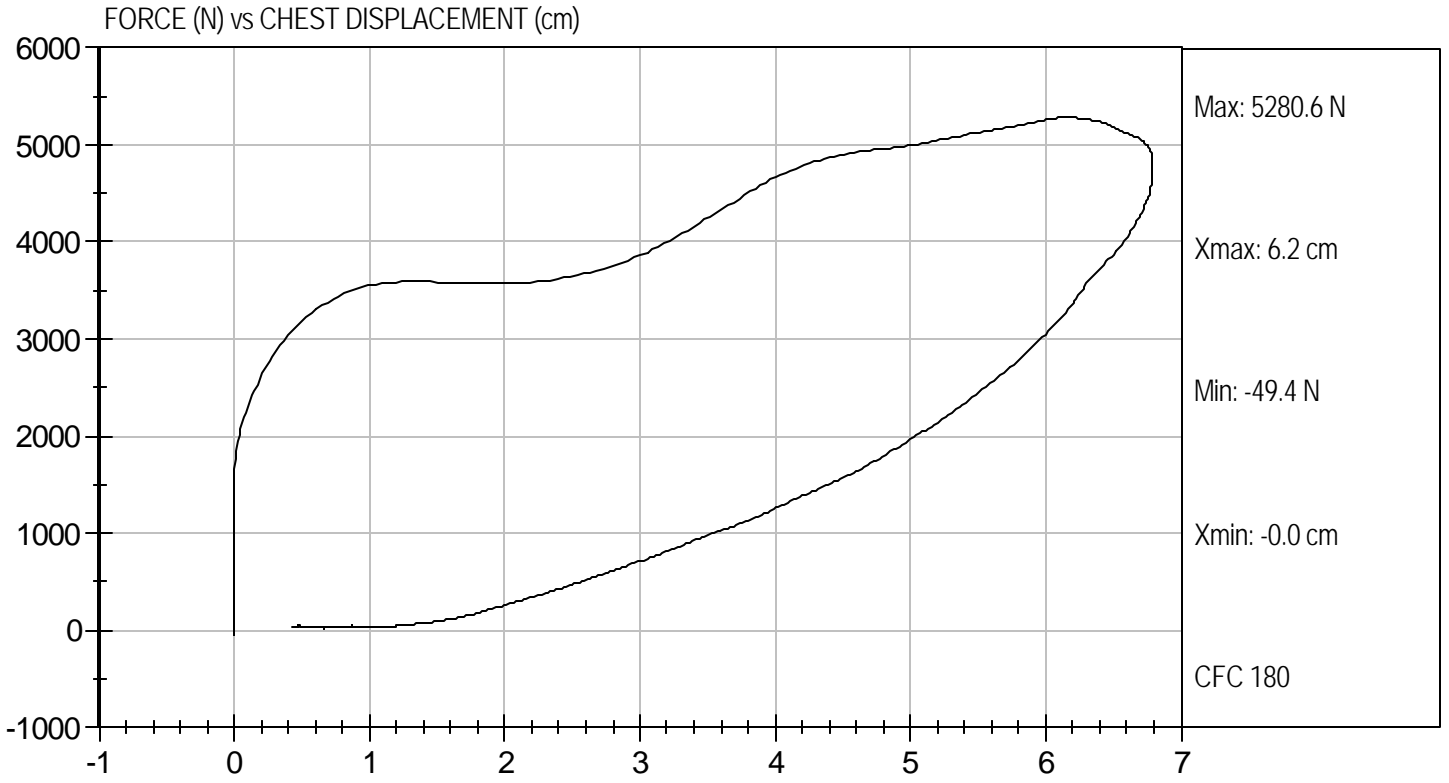


Approved By



Test Desc: Thorax Impact
Component ID: D073234

Test Date: 10/19/07
Velocity: 21.929 ft/s, 6.68 m/s



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

ATD Serial No: 066

Test I.D: D073235


Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	41	Pass
Probe Velocity	m/sec	2.07 to 2.13	2.09	Pass
Peak Probe Force	Newtons	4715 to 5782	5,020	Pass
Overall Test Results				Pass



Laboratory Technician

10/19/07

Test Date

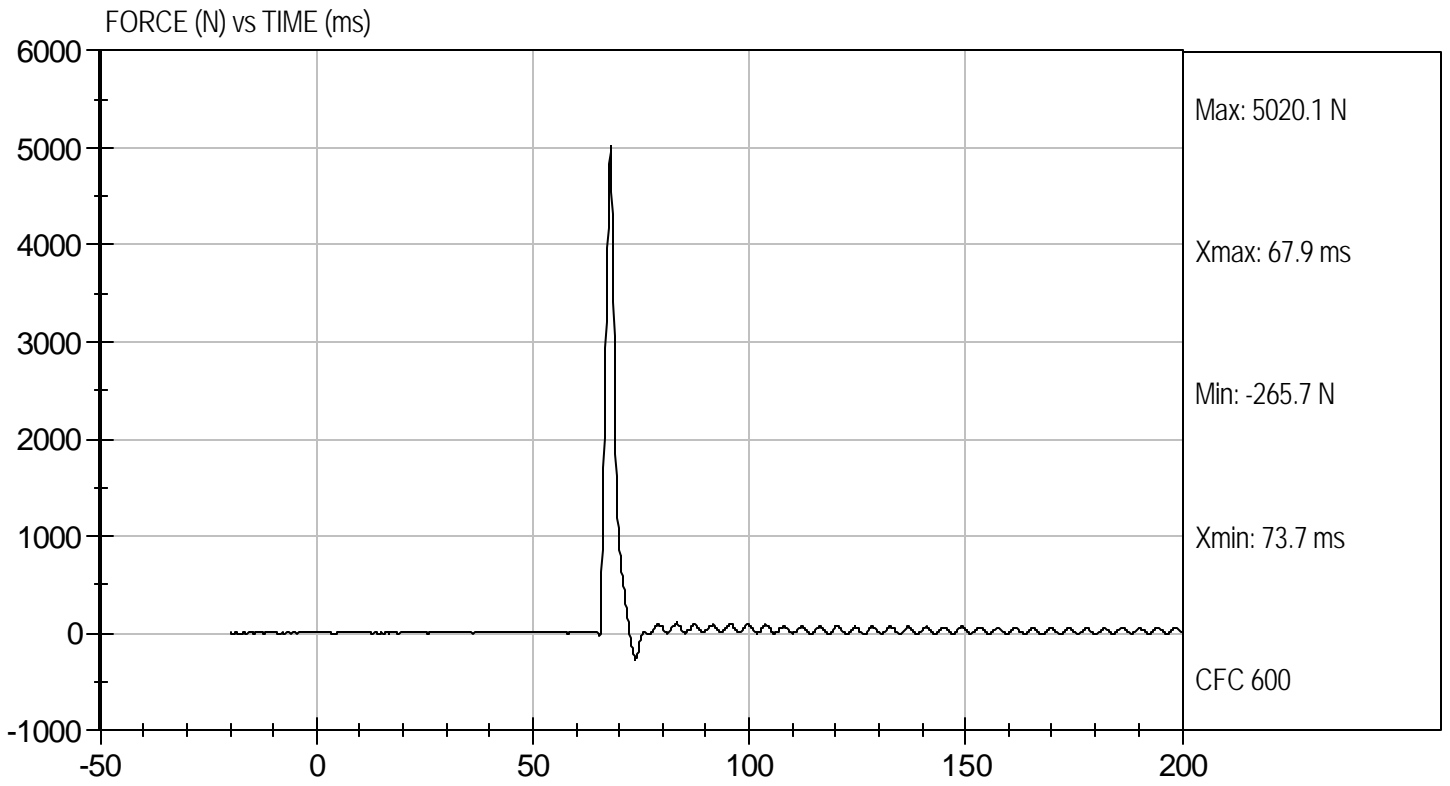


Approved By



Test Desc: Right Knee
Component ID: D073235

Test Date: 10/19/07
Velocity: 6.85 ft/s, 2.09 m/s



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

ATD Serial No: 066

Test I.D.: D073236


Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	41	Pass
Probe Velocity	m/sec	2.07 to 2.13	2.10	Pass
Peak Probe Force	Newtons	4715 to 5782	4,931	Pass
Overall Test Results				Pass



Laboratory Technician

10/19/07

Test Date

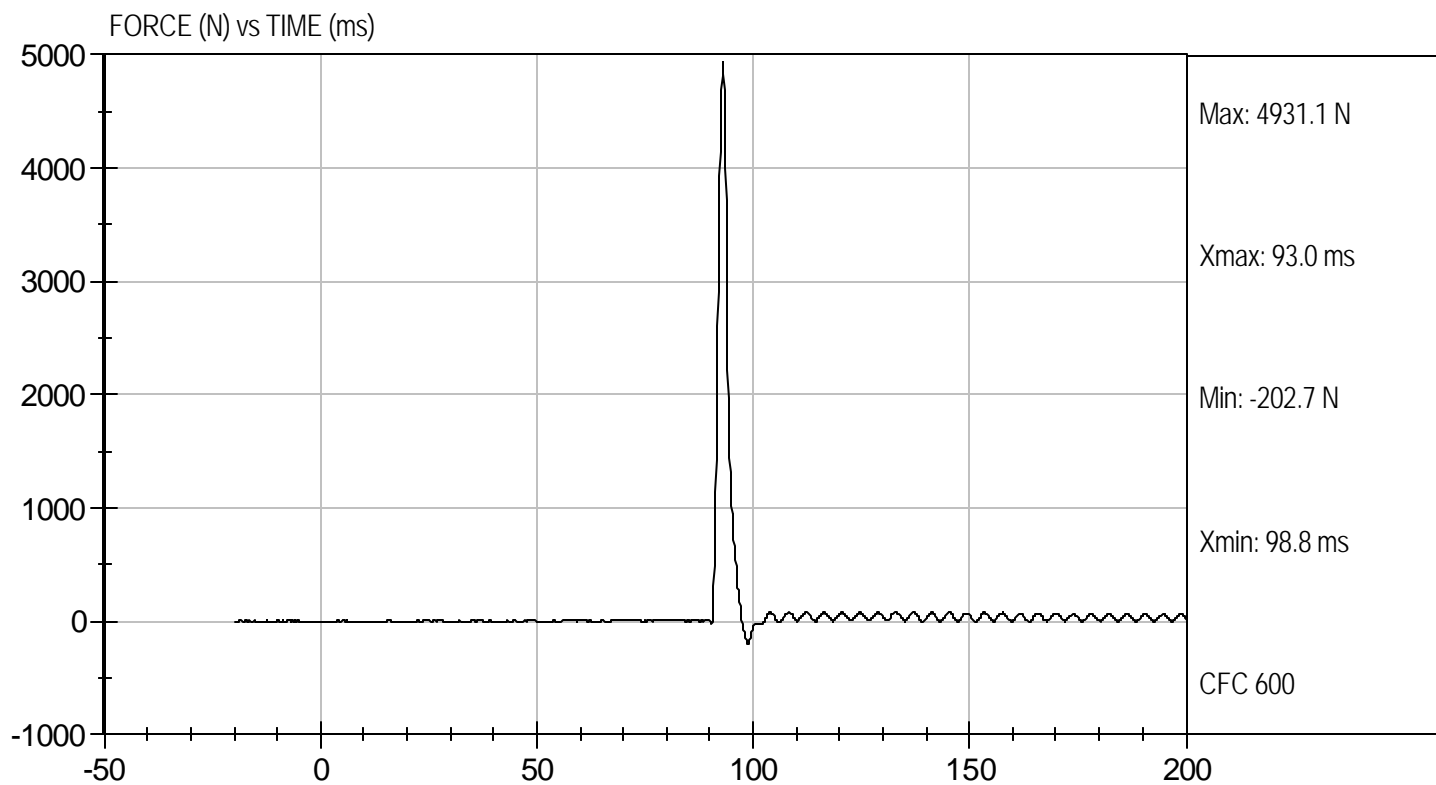


Approved By



Test Desc: Left Knee
Component ID: D073236

Test Date: 10/19/07
Velocity: 6.89 ft/s, 2.10 m/s



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

ATD Serial No: 066

Test I.D: D073230


Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	20.9	20.9	Pass
Laboratory Relative Humidity	%	10 to 70	43	43	Pass
Rotation Rate	deg/sec	5 -10	8	8	Pass
30 Degrees	Nm	94.9 Nm Max	72.3	61.9	Pass
150 ft-lbf / 203.4 Nm	Deg	40- 50 Degree Max Rotation	40	40	Pass
Overall Test Results					Pass



Laboratory Technician

10/19/07

Test Date

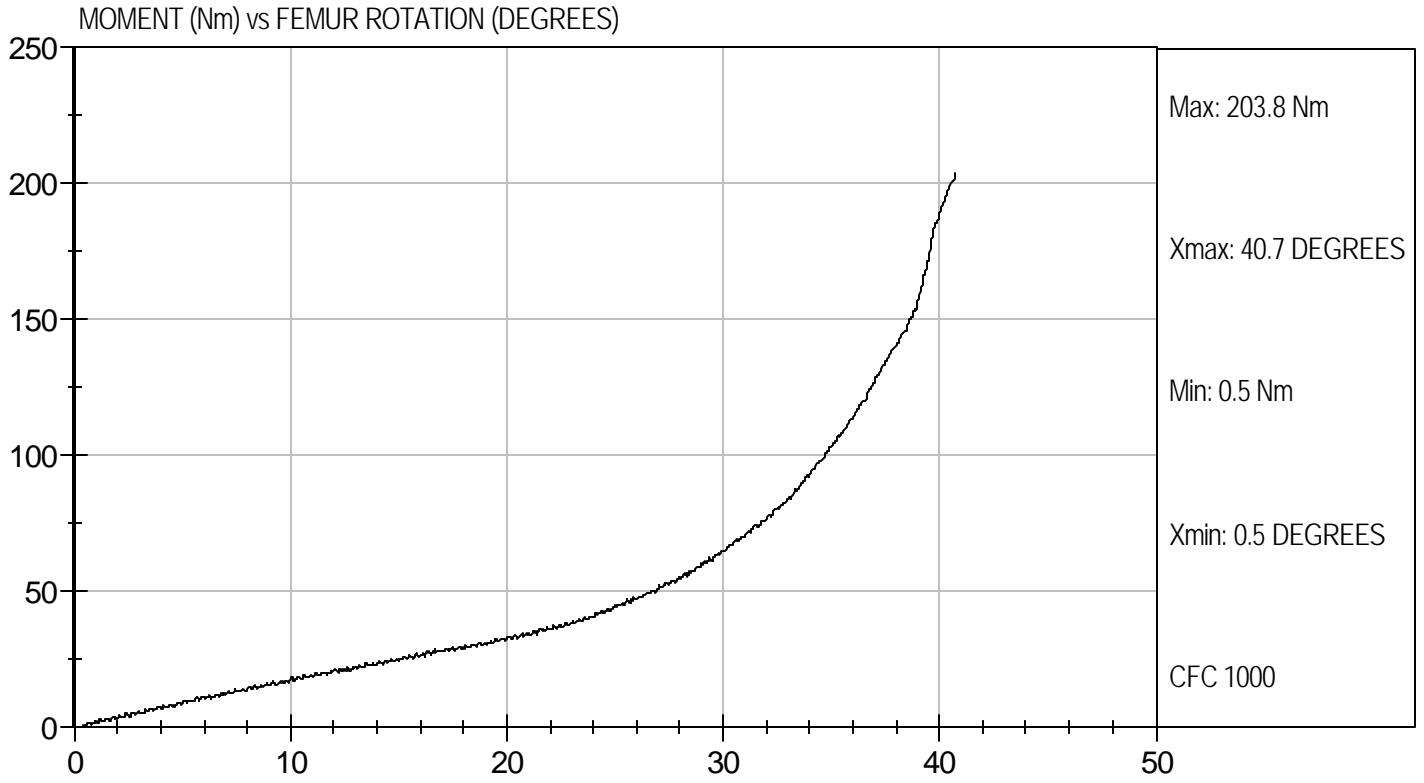


Approved By



Test Desc: Hip Femur Flexion
Component ID: D073239

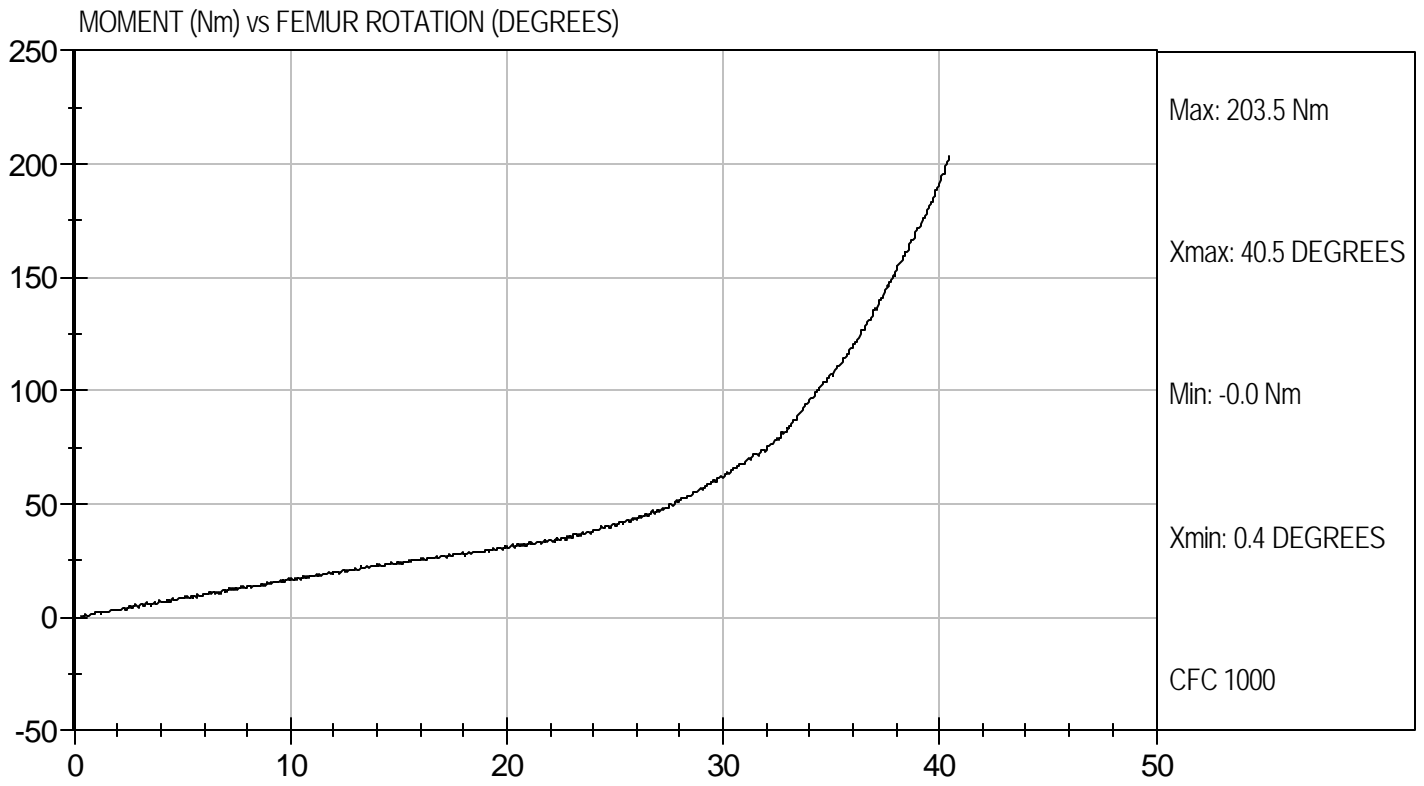
Test Date: 10/19/07
Velocity: 0 ft/s, 0.00 m/s





Test Desc: Hip Femur Flexion
Component ID: D073230

Test Date: 10/19/07
Velocity: 0 ft/s, 0.00 m/s



APPENDIX D
CHILD DUMMY DATA

SUMMARY OF TEST

Measurement Description	Units	Threshold	P3 ATD	P4 ATD
Head Injury Criteria (HIC36)	N/A	N/A	567	318
Head Injury Criteria (HIC15)	N/A	390	313	318
Max. Thorax Accel. (3msec Clip)	G's	50	48	36

Both child dummies were instrumented with head, chest, and upper six axial neck force and moment sensors.

The right rear (Position 3) child dummy (S/N 093) and left rear (Position 4) child dummy (S/N 090) were calibrated previous to this test. Child dummy certification information can be found in this Appendix.

Positions 3 and 4 were rear facing and used the vehicle LATCH attachment.

TEST VEHICLE WEIGHTS

	Units	As Tested (ATW) (Axle)		
		Front	Rear	Total
Left	kg	665.9	531.2	
Right	kg	623.2	516.6	
Ratio	%	55.2	44.8	
Totals	kg	1289.1	1047.8	2336.9

As tested weight of vehicle includes two ATDs, two CRABIs with CRS, cargo, equipment and instrumentation.

TEST NOTES

The P4 CRS became unfastened from its base.

TEST DUMMY INFORMATION

Description	Position 3 CRS	Position 4 CRS
Dummy Type / Serial No.	12 month old CRABI / 093	12 month old CRABI / 090
Number of Data Channels	12	12
Restraint System	Graco Safe Seat (Rear Facing)	Combi Centre (Rear Facing)

POST TEST SEAT DATA

Location	Seat Movement (mm)	Seat Back Failure
P1 (Left Front)	0	None
P2 (Right Front)	0	None
P3 (Right Rear)	0	None
P4 (Left Rear)	0	None

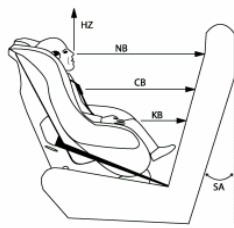
VISIBLE DUMMY CONTACT POINTS

Description	Position 3 CRS	Position 4 CRS
Head Contact	None	Driver seat back
Upper Torso Contact	None	None
Lower Torso Contact	None	None
Left Foot Contact	Foot to vehicle rear seat	Foot to carrying handle
Right Foot Contact	Foot to vehicle rear seat	Foot to carrying handle

CHILD DUMMY POSITIONING IN VEHICLE

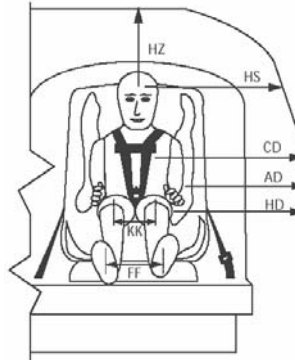
Child Restraint System (Position 3)	Graco Safe Seat (Rear Facing)
NHTSA No.	M80306

Dummy Measurements for Rear-facing CRS Passengers



X—Z View

HZ	-	Head to Roof
NB	-	Nose to Front of Back Seat
CB	-	Chest to Front of Back Seat
KB	-	Knee to Front of Back Seat
SA	-	Seat Back Angle



Y—Z View

X—Z View

HZ	-	Head to Roof
HS	-	Head to Side Window
CD	-	Chest to Door
AD	-	Arm to Door
HD	-	H-Point to Door
KK	-	Knee to Knee
FF	-	Foot to Foot
NB	-	Nose to Front Seat Back
CB	-	Chest to Front Seat Back
KB	-	Knee to Front Seat Back
TB	-	Toe to Front Seat Back
SA	-	Seat Back Angle

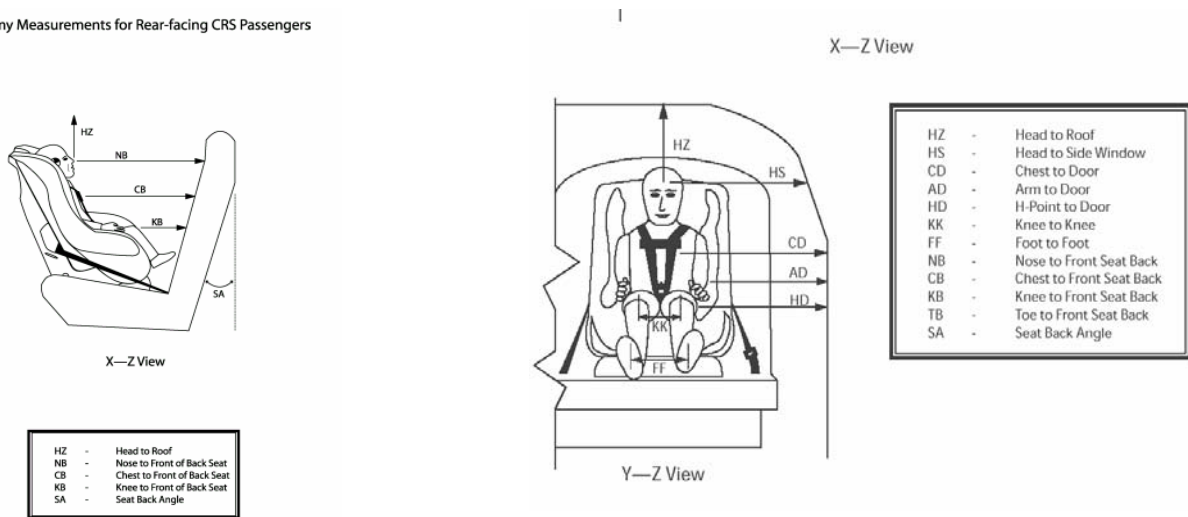
Measurement	Pre-Test (mm)	Post-Test (mm)
	P3 CRS (093)	P3 CRS (093)
SA (deg)		
HS	377	372
CD	351	345
AD	232	223
HD	278	280
HZ	411	403
NB	501	531
CB	392	415
KK	111	120
FF	122	119
KB - LEFT	185	195
KB - RIGHT	177	187
TB - LEFT	50	84
TB - RIGHT	55	82

All dimensions in mm (unless noted)
P3 – Right Rear Passenger (Rear Facing)

CHILD DUMMY POSITIONING IN VEHICLE

Child Restraint System (Position 4)	Combi Centre (Rear Facing)
NHTSA No.	M80306

Dummy Measurements for Rear-facing CRS Passengers



Measurement	Pre-Test (mm)	Post-Test (mm)
	P4 CRS (090)	P4 CRS (090)
SA (deg)		
HS	372	810
CD	348	720
AD	225	562
HD	287	610
HZ	406	675
NB	476	450
CB	355	365
KK	110	105
FF	95	105
KB - LEFT	180	220
KB - RIGHT	195	265
TB - LEFT	48	130
TB - RIGHT	31	185

All dimensions in mm (unless noted)
 P4 – Left Rear Passenger (Rear facing)

CRS PERFORMANCE DATA

Child Restraint System (Position 3)	Graco Safe Seat (Rear Facing)
Child Restraint System (Position 4)	Combi Centre (Rear Facing)
NHTSA No.	M80306

POSITION 3 CRS POST-TEST INSPECTION

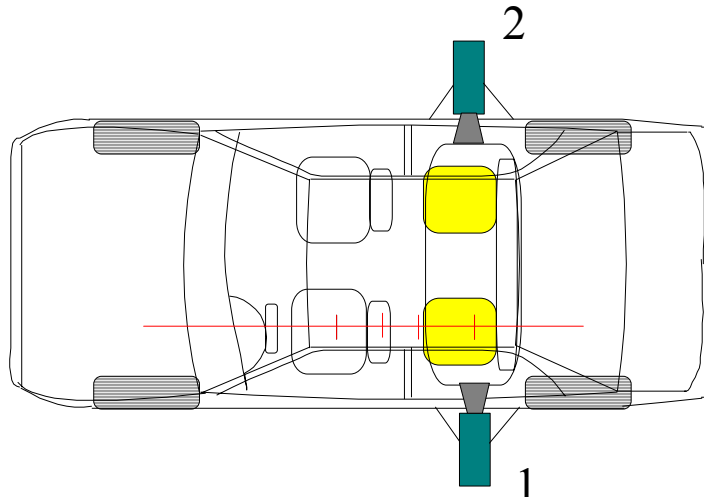
Location	Damage	Remarks
Upper Tether Strap		
Upper Tether Buckle		
Upper Tether Hook		
Vehicle Upper Tether Anchor		
Lower Anchor Strap		
Lower Anchor Buckle		
Lower Anchor Hooks	None	
Vehicle Lower CRS Anchors	None	
Five Point Harness Connections	None	
Cracks on CRS	None	
Fabric Tears on CRS	None	
Vehicle Seat Structure	None	
Vehicle Seat Fabric Tears	None	
Child Dummy	None	CRABI 12 Month Old

POSITION 4 CRS POST-TEST INSPECTION

Location	Damage	Remarks
Upper Tether Strap		
Upper Tether Buckle		
Upper Tether Hook		
Vehicle Upper Tether Anchor		
Lower Anchor Strap		
Lower Anchor Buckle		
Lower Anchor Hooks	None	
Vehicle Lower CRS Anchors	None	
Five Point Harness Connections	None	
Cracks on CRS	None	
Fabric Tears on CRS	None	
Vehicle Seat Structure	None	
Vehicle Seat Fabric Tears	None	
Child Dummy	None	CRABI 12 Month Old

CRS CAMERA DATA

Child Restraint System (Position 3)	Graco Safe Seat (Rear Facing)
Child Restraint System (Position 4)	Combi Centre (Rear Facing)
NHTSA No.	M80306



No.	Camera View	Location (mm) *			Angle (deg)	Lens (mm)	Speed (fps)
		X	Y	Z			
1	Left Side CRS Lateral View					8	1000
2	Right Side CRS Lateral View					8	1000

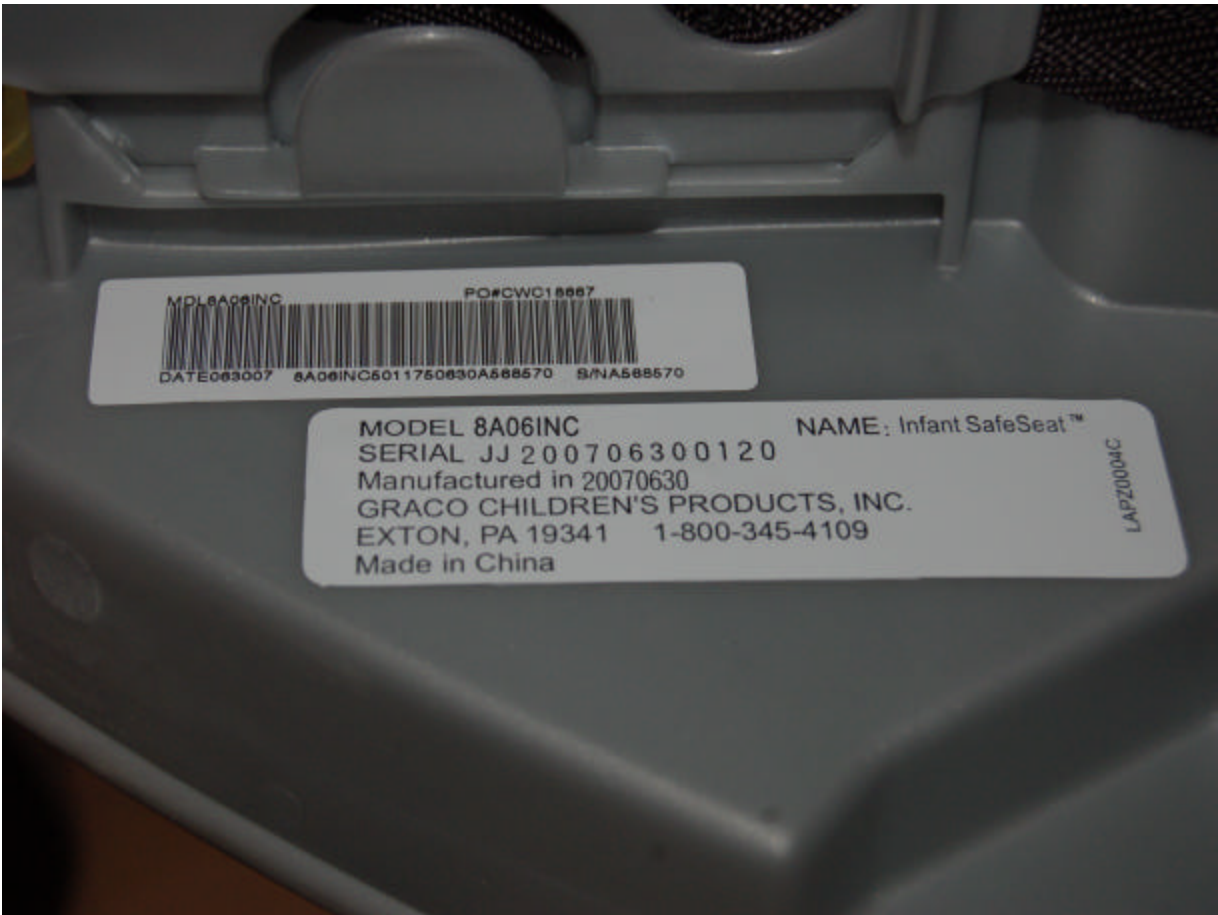
***COORDINATES:**

- +X = film plane rearward of barrier
- +Y = film plane to right of monorail centerline
- +Z = film plane above ground level

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Close-up View of Position 3 CRS Label



Pre-Test Front View of Position 3 CRS



Post-Test Front View of Position 3 CRS



Pre-Test Rear View of Position 3 CRS



Post-Test Rear View of Position 3 CRS



Pre-Test Left Side View of Position 3 CRS



Post-Test Left Side View of Position 3 CRS



Pre-Test Right Side View of Position 3 CRS



Post-Test Right Side View of Position 3 CRS



Close-up View of Position 4 CRS Label



Pre-Test Front View of Position 4 CRS



Post-Test Front View of Position 4 CRS



Pre-Test Rear View of Position 4 CRS



Post-Test Rear View of Position 4 CRS



Pre-Test Left Side View of Position 4 CRS



Post-Test Left Side View of Position 4 CRS



Pre-Test Right Side View of Position 4 CRS



Post-Test Right Side View of Position 4 CRS



Pre-Test Position 3 Left Side View



Post-Test Position 3 Left Side View



Pre-Test Position 4 Left Side View



Post-Test Position 4 Left Side View



Pre-Test Position 3 Right Side View



Post-Test Position 3 Right Side View



Pre-Test Position 4 Right Side View



Post-Test Position 4 Right Side View



Post-Test Position 4 Head Contact (Driver Seatback)



Post-Test Position 4 Foot Contact (Handle of CRS)



Post-Test Position 3 Foot Contact

CHILD DUMMY RESPONSE DATA TRACES

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

LRP Child Upper Neck Force X vs. Time

LRP Child Upper Neck Force Y vs. Time

LRP Child Upper Neck Force Z vs. Time

LRP Child Upper Neck Force Resultant vs. Time

LRP Child Upper Neck Moment X vs. Time

LRP Child Upper Neck Moment Y vs. Time

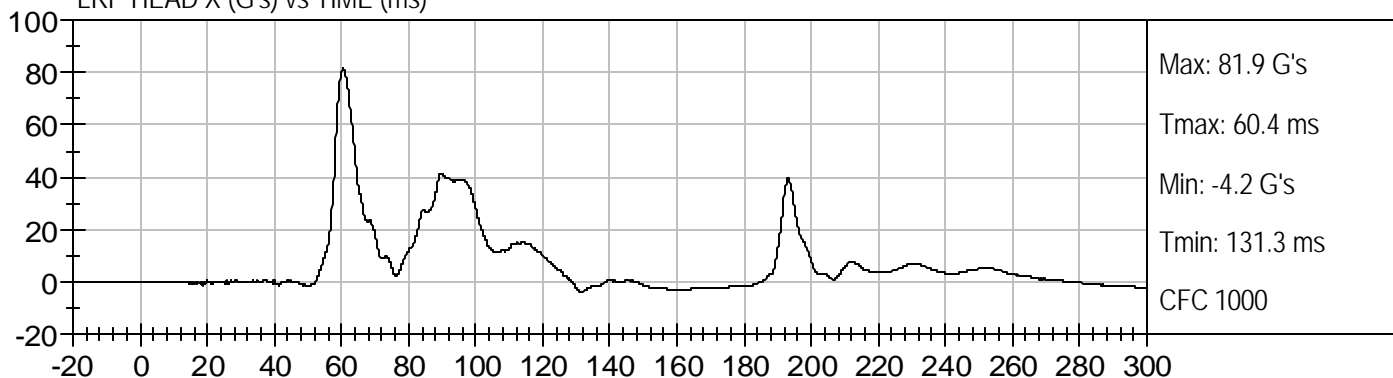
LRP Child Upper Neck Moment Z vs. Time

LRP Child Upper Neck Moment Resultant vs. Time

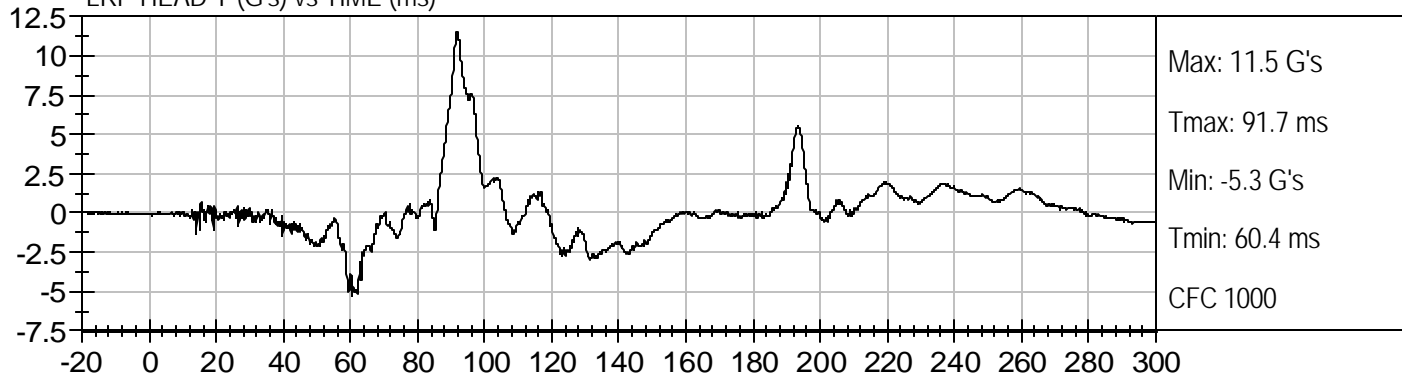
RRP Child Upper Neck Force X vs. Time
RRP Child Upper Neck Force Y vs. Time
RRP Child Upper Neck Force Z vs. Time
RRP Child Upper Neck Force Resultant vs. Time
RRP Child Upper Neck Moment X vs. Time
RRP Child Upper Neck Moment Y vs. Time
RRP Child Upper Neck Moment Z vs. Time
RRP Child Upper Neck Moment Resultant vs. Time
LRP Child Seat X Acceleration vs. Time
LRP Child Seat Y Acceleration vs. Time
LRP Child Seat Z Acceleration vs. Time
LRP Child Seat Resultant Acceleration vs. Time
RRP Child Seat X Acceleration vs. Time
RRP Child Seat Y Acceleration vs. Time
RRP Child Seat Z Acceleration vs. Time
RRP Child Seat Resultant Acceleration vs. Time



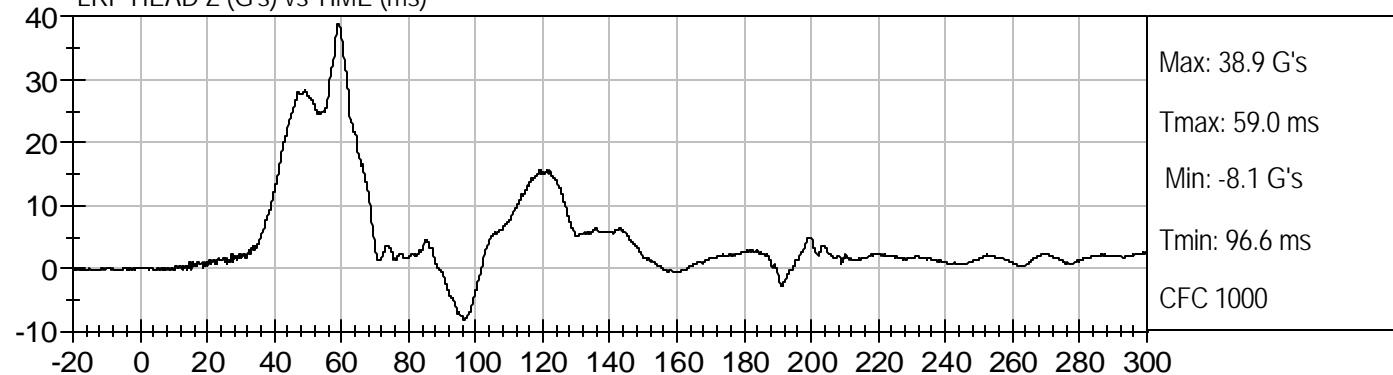
LRP HEAD X (G's) vs TIME (ms)



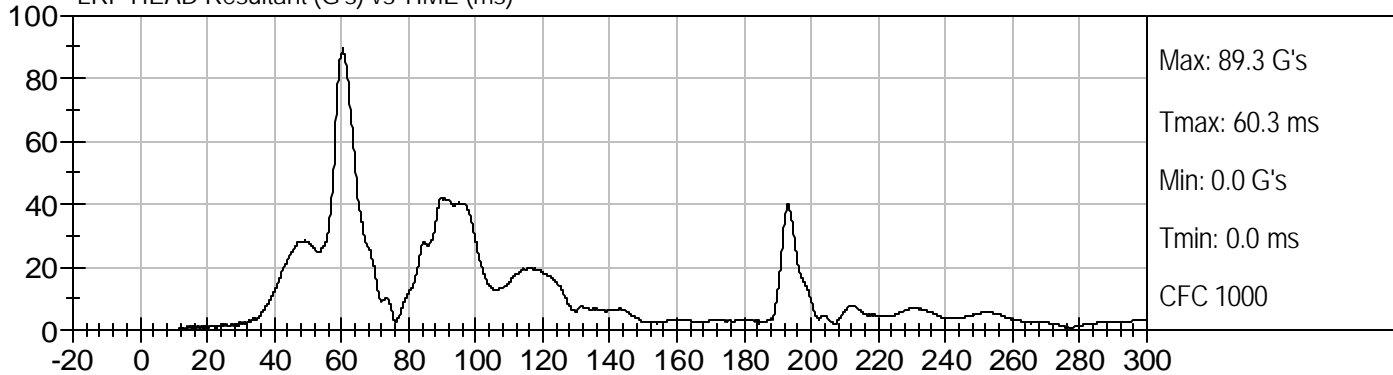
LRP HEAD Y (G's) vs TIME (ms)

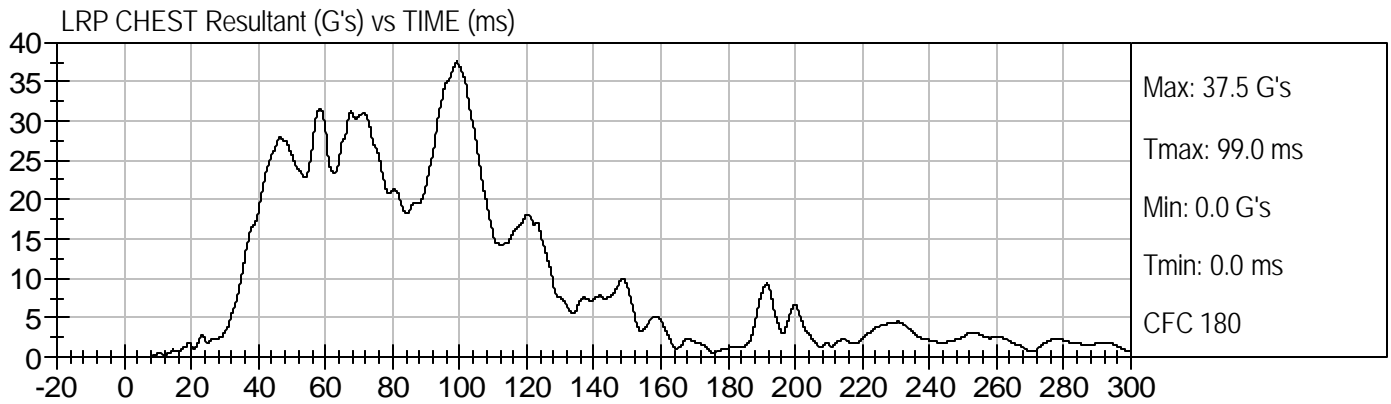
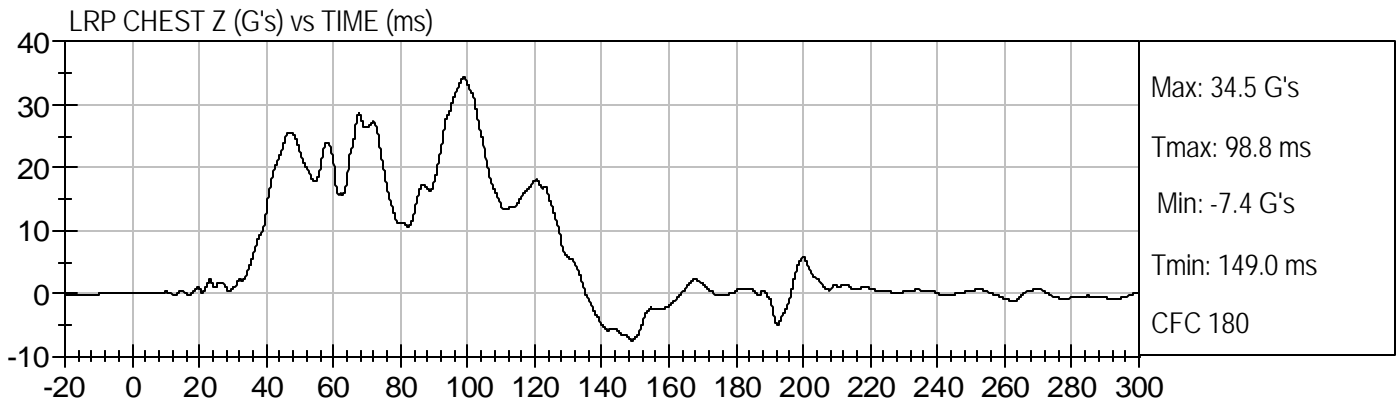
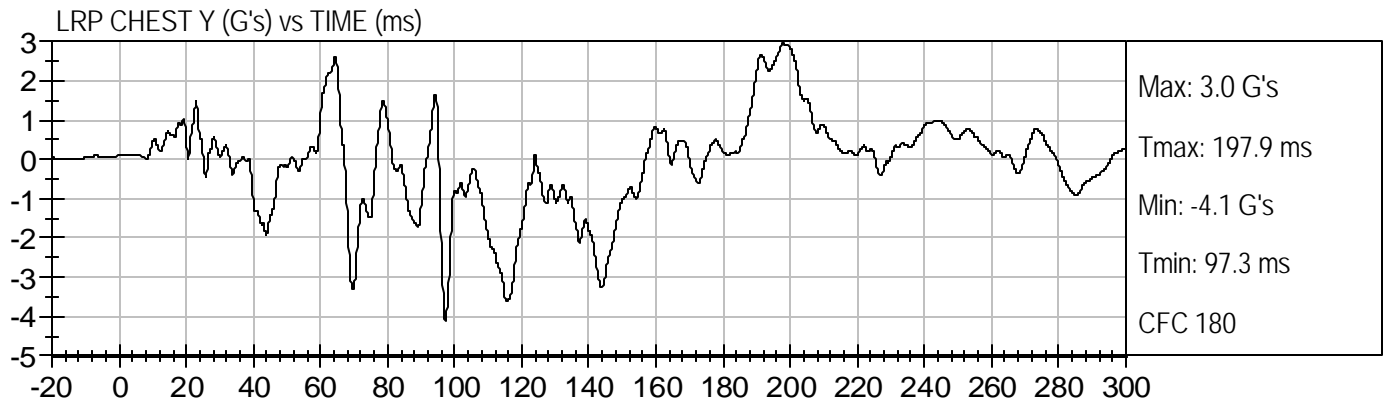
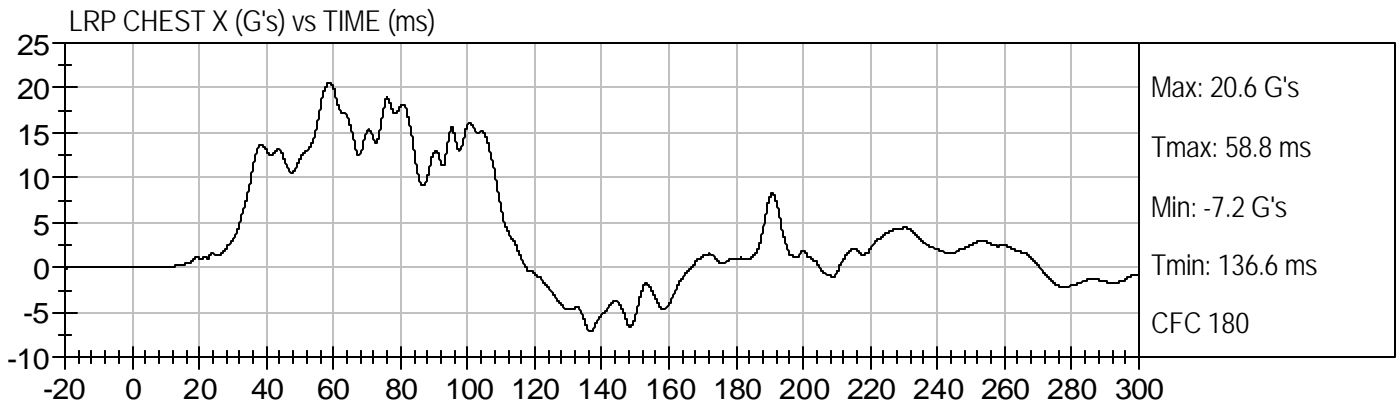


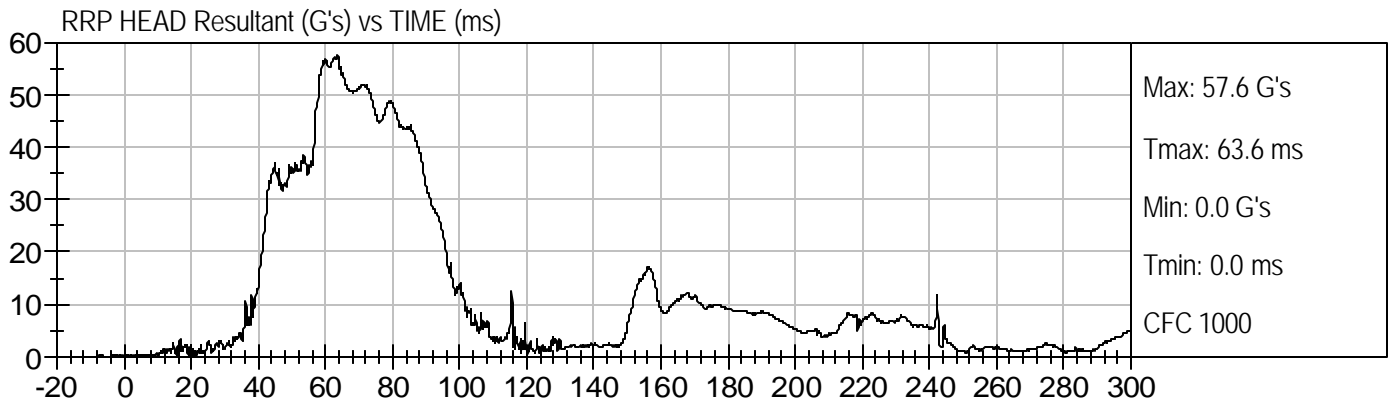
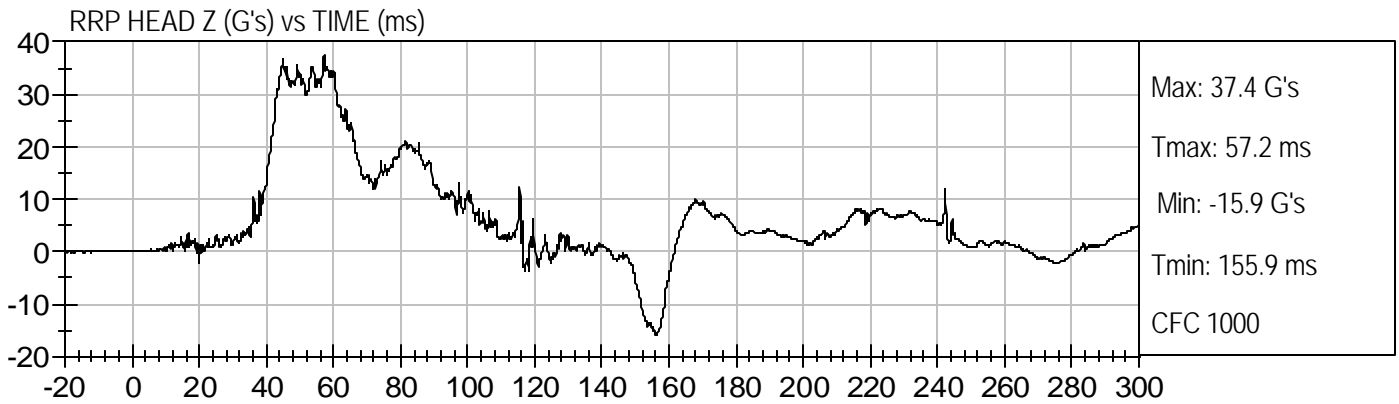
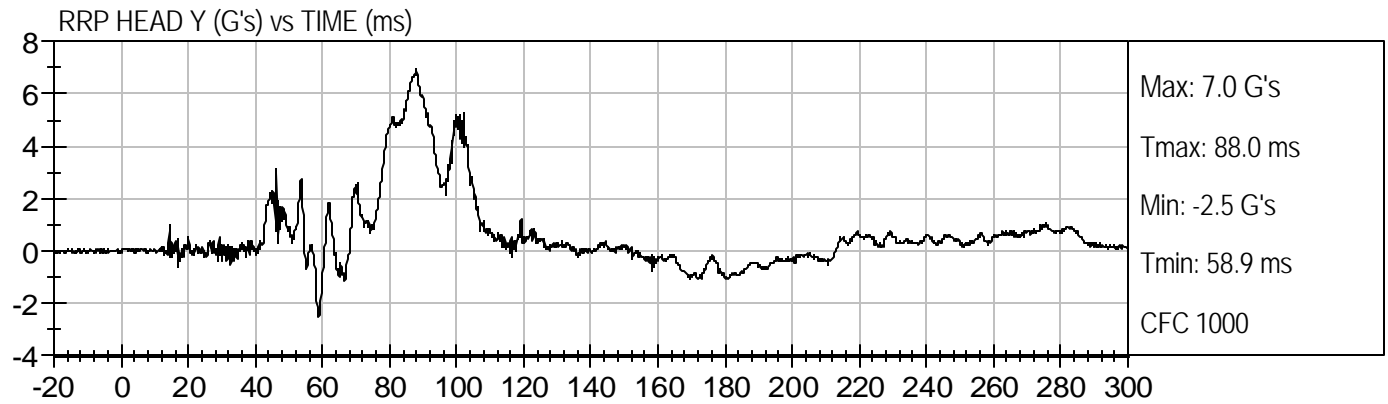
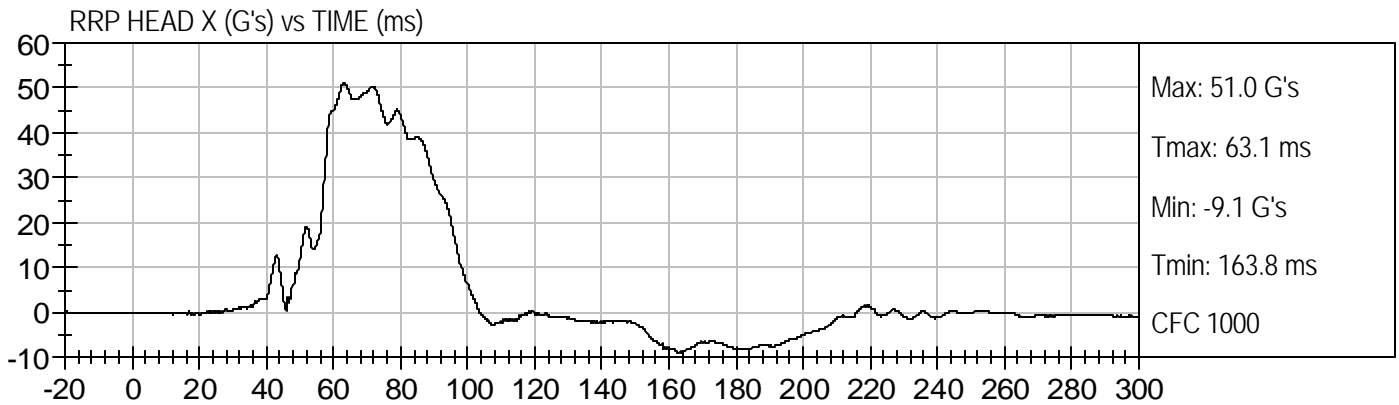
LRP HEAD Z (G's) vs TIME (ms)

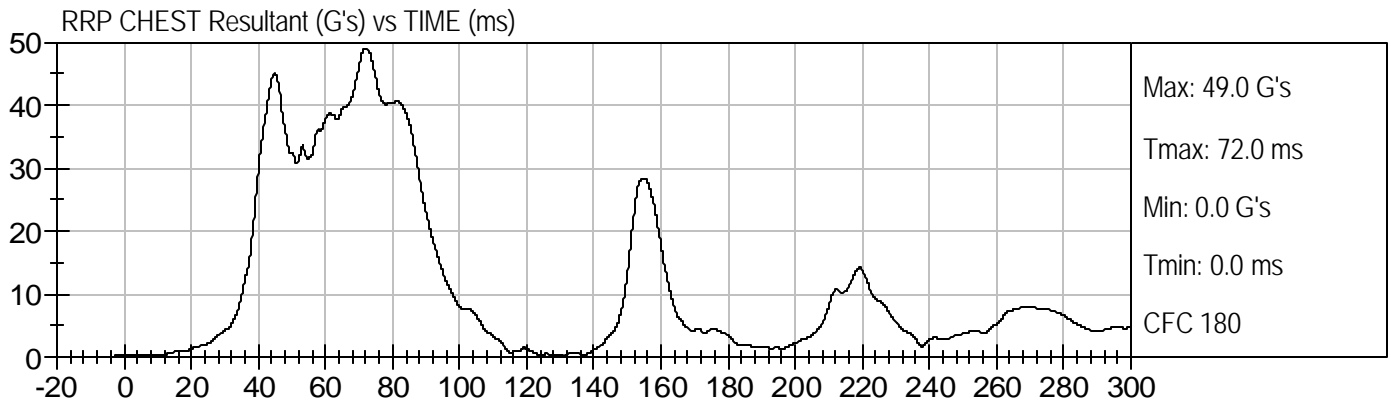
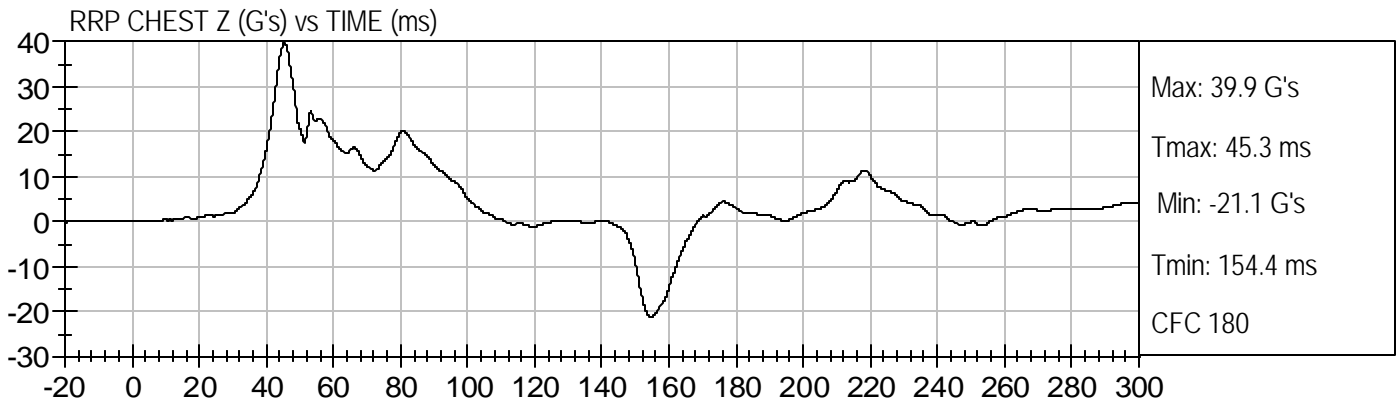
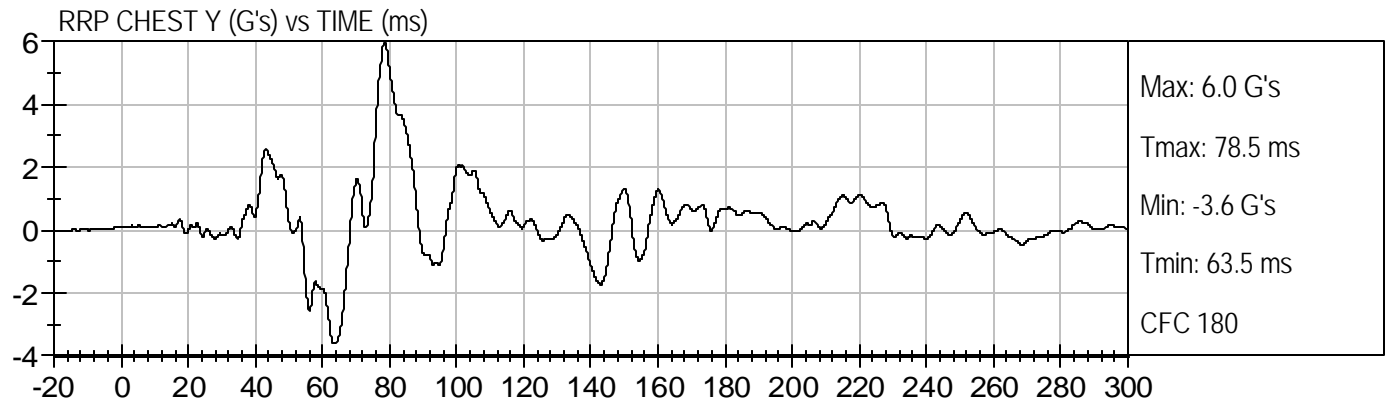
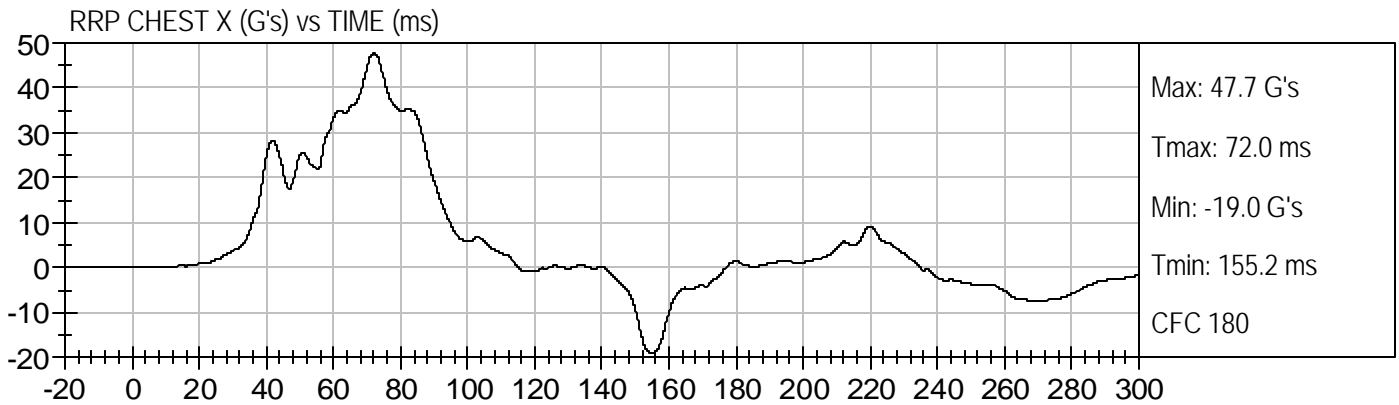


LRP HEAD Resultant (G's) vs TIME (ms)









CHILD DUMMY CALIBRATION INFORMATION

MGA RESEARCH CORPORATION
FRONT HEAD DROP TEST
CRABI 12 MONTH

ATD Serial No: 093

Test ID: D072541


Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	47	Pass
Peak Resultant Acceleration	G's	100 to 120	110	Pass
Peak Lateral Acceleration	G's	+/- 15	-3	Pass
Unimodal	N/A	within 17% of peak	Yes	Pass
Overall Test Results				Pass



 Laboratory Technician

8/23/07

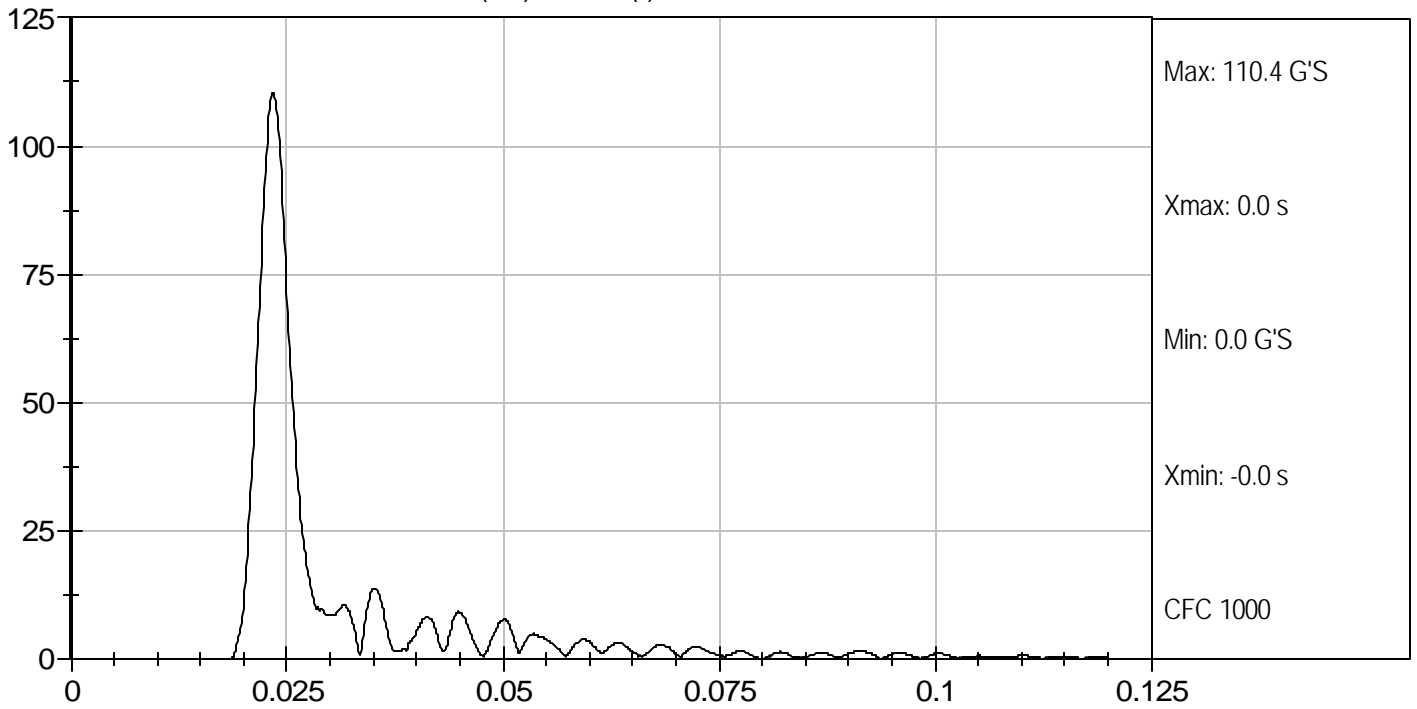
 Test Date



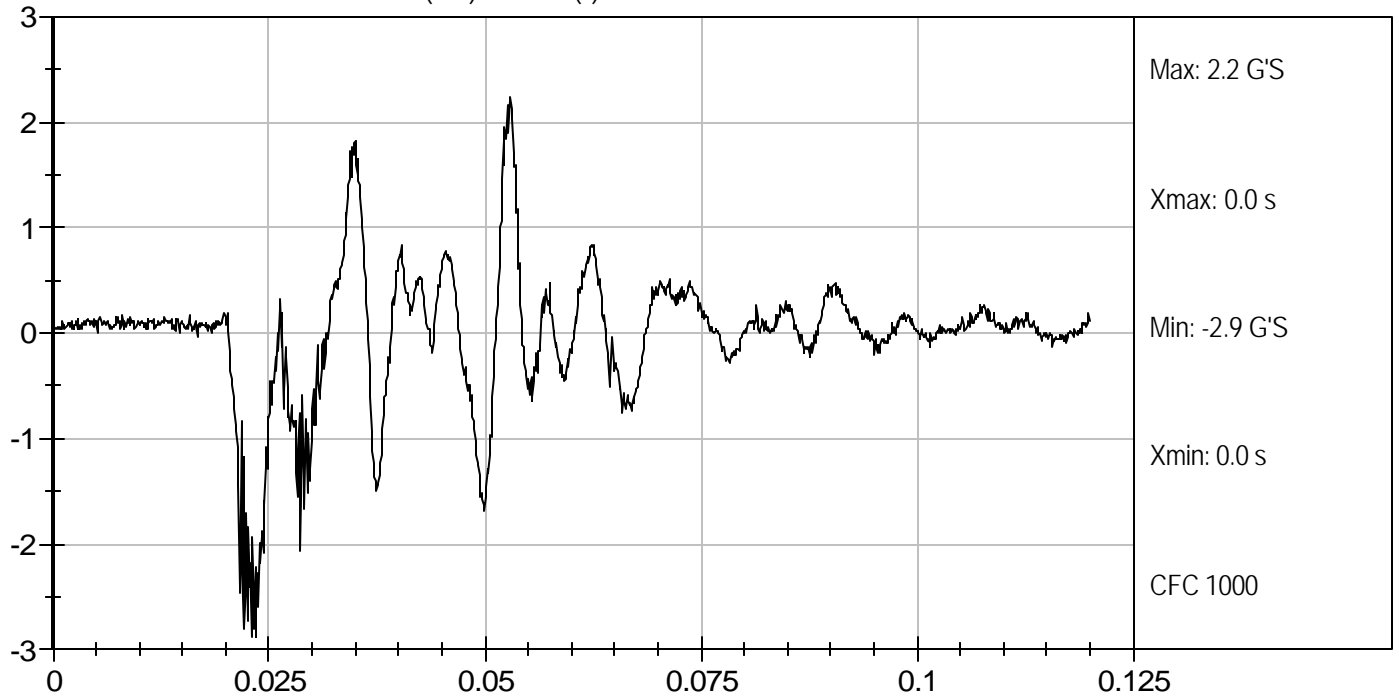
 Approved By



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



PEAK LATERAL ACCELERATION (G'S) vs TIME (s)



**MGA RESEARCH CORPORATION
NECK FLEXION TEST
CRABI 12 MONTH**

ATD Serial No: 093

Test I.D.: D072542

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	20.8	Pass
Humidity		%	10 to 70	46	Pass
Impact Velocity		m/s	5.1 to 5.3	5.2	Pass
Pendulum Deceleration	10 msec	m/s	1.6 to 2.3	1.9	Pass
	20 msec	m/s	3.4 to 4.2	3.6	Pass
	25 msec	m/s	4.3 to 5.2	4.4	Pass
D Plane Rotation		deg	75.0 to 86.0	83.1	Pass
Moment About Occipital Condyle		Nm	36.0 to 45.0	40.2	Pass
Positive Moment - Time Curve Decay to 5 Nm		msec	60 to 80	74	Pass
Overall Test Results					Pass



Laboratory Technician

8/23/07

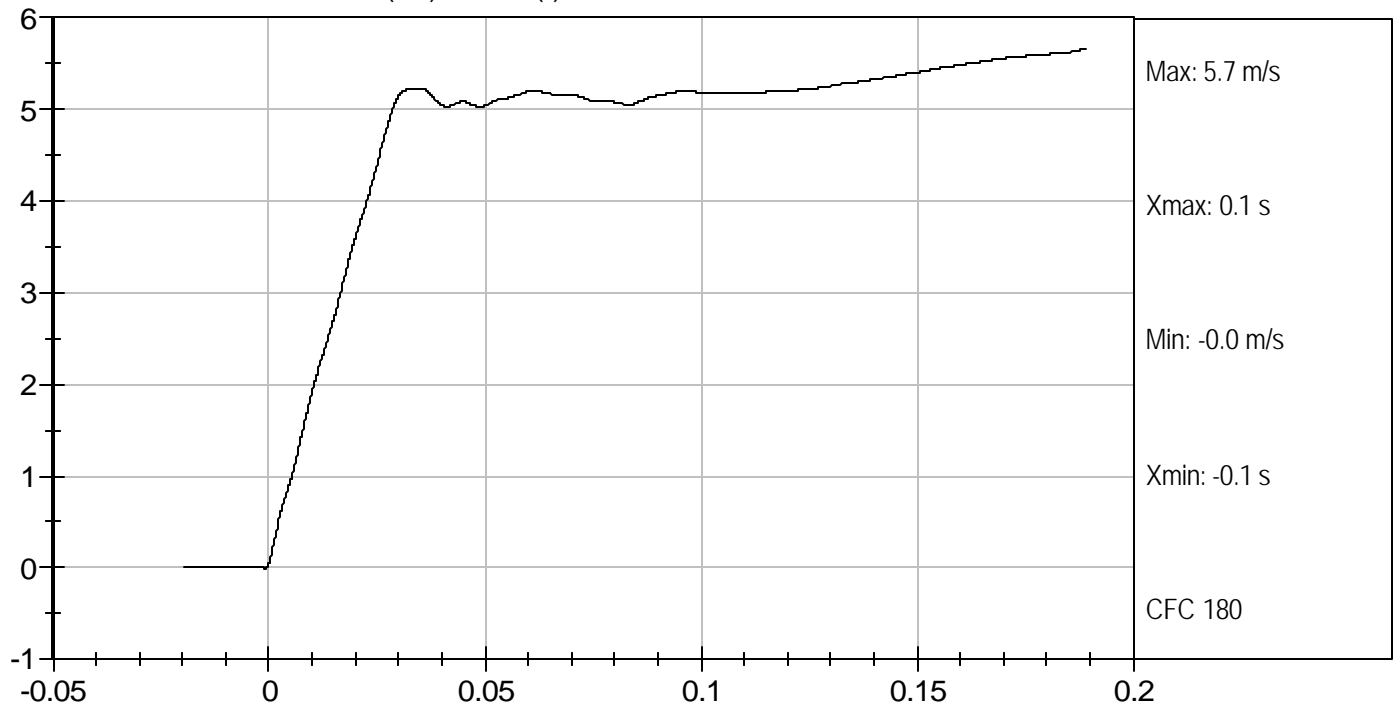
Test Date



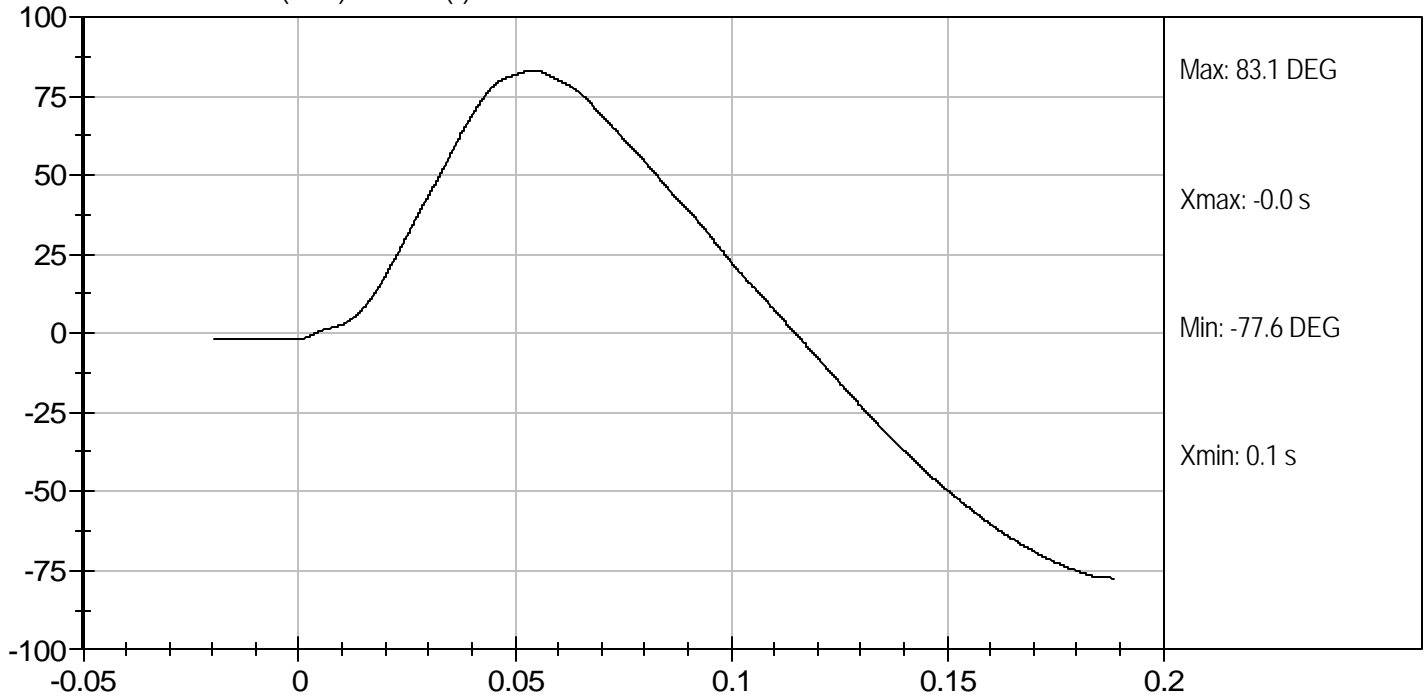
Approved By



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



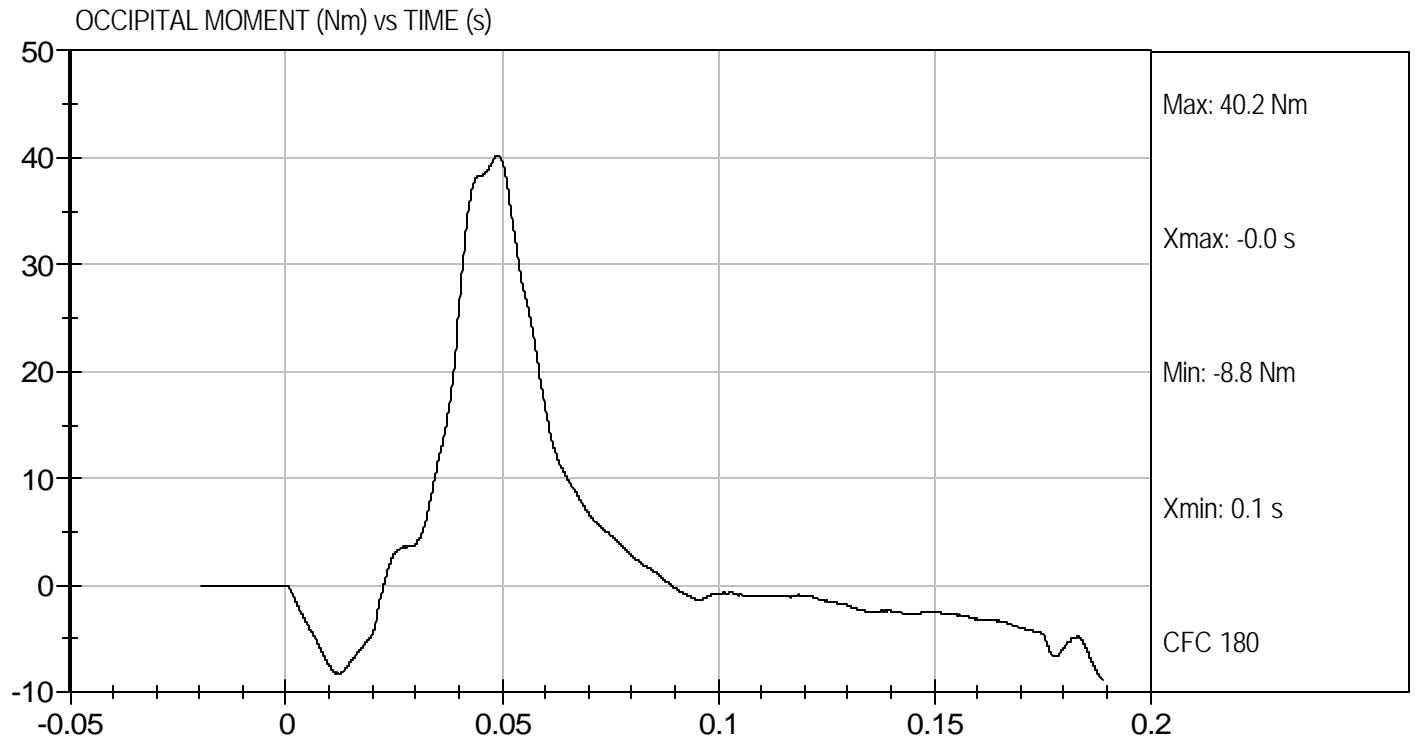
FLEXION ANGLE (DEG) vs TIME (s)





Test Desc: Neck Flexion
Component ID: D072542

Test Date: 8/23/07
Velocity: 17.006 ft/s, 5.2 m/s



**MGA RESEARCH CORPORATION
NECK EXTENSION TEST
CRABI 12 MONTH**

ATD Serial No: 093

Test I.D.: D072543

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	20.8	Pass
Humidity		%	10 to 70	46	Pass
Pendulum Speed		m/s	2.4 to 2.6	2.5	Pass
Pendulum Deceleration	6 msec	m/s	0.8 to 1.2	1.0	Pass
	10 msec	m/s	1.5 to 2.1	2.0	Pass
	14 msec	m/s	2.2 to 2.9	2.3	Pass
D Plane Rotation		deg	80.0 to 92.0	80.3	Pass
Moment About Occipital Condyle		Nm	-23.0 to -12.0	-19.1	Pass
Negative Moment - Time Curve Decay to -5 Nm		msec	76 to 90	77	Pass
Overall Test Results					Pass



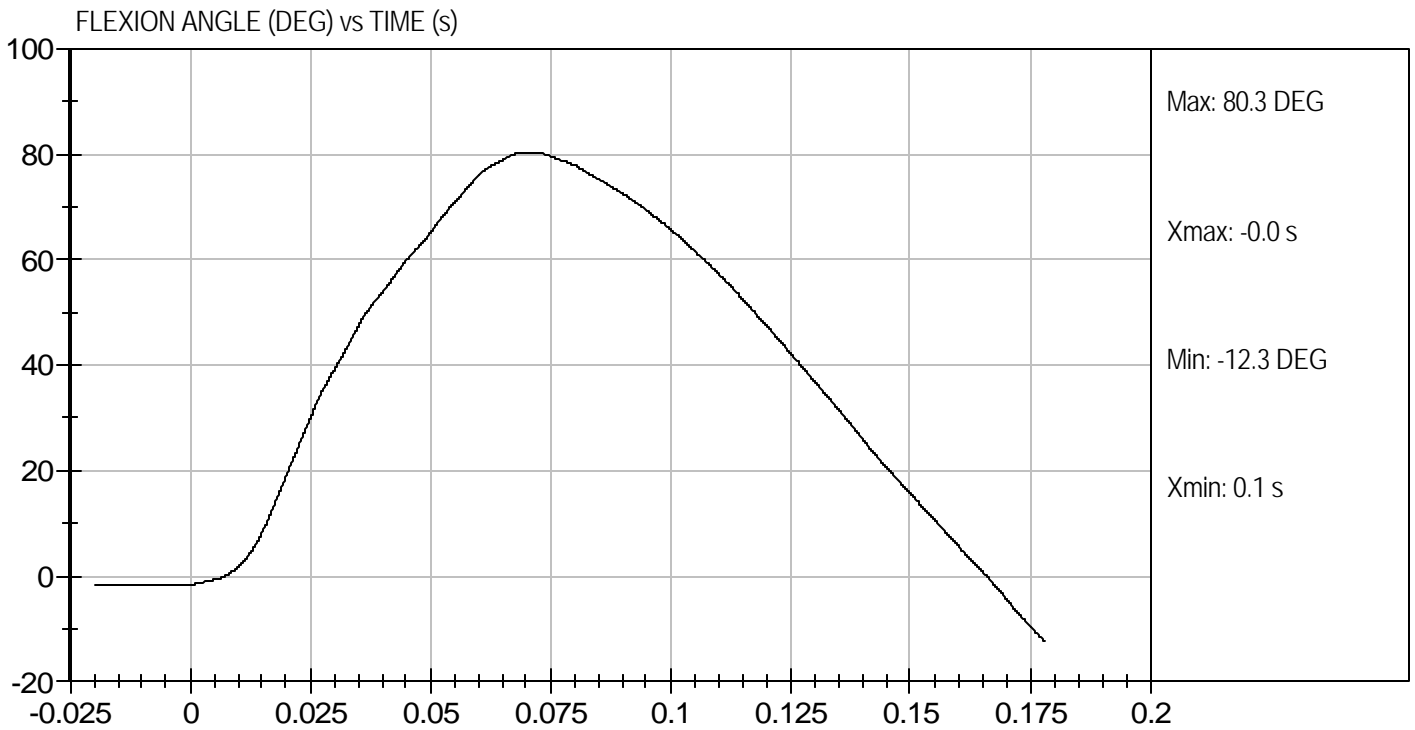
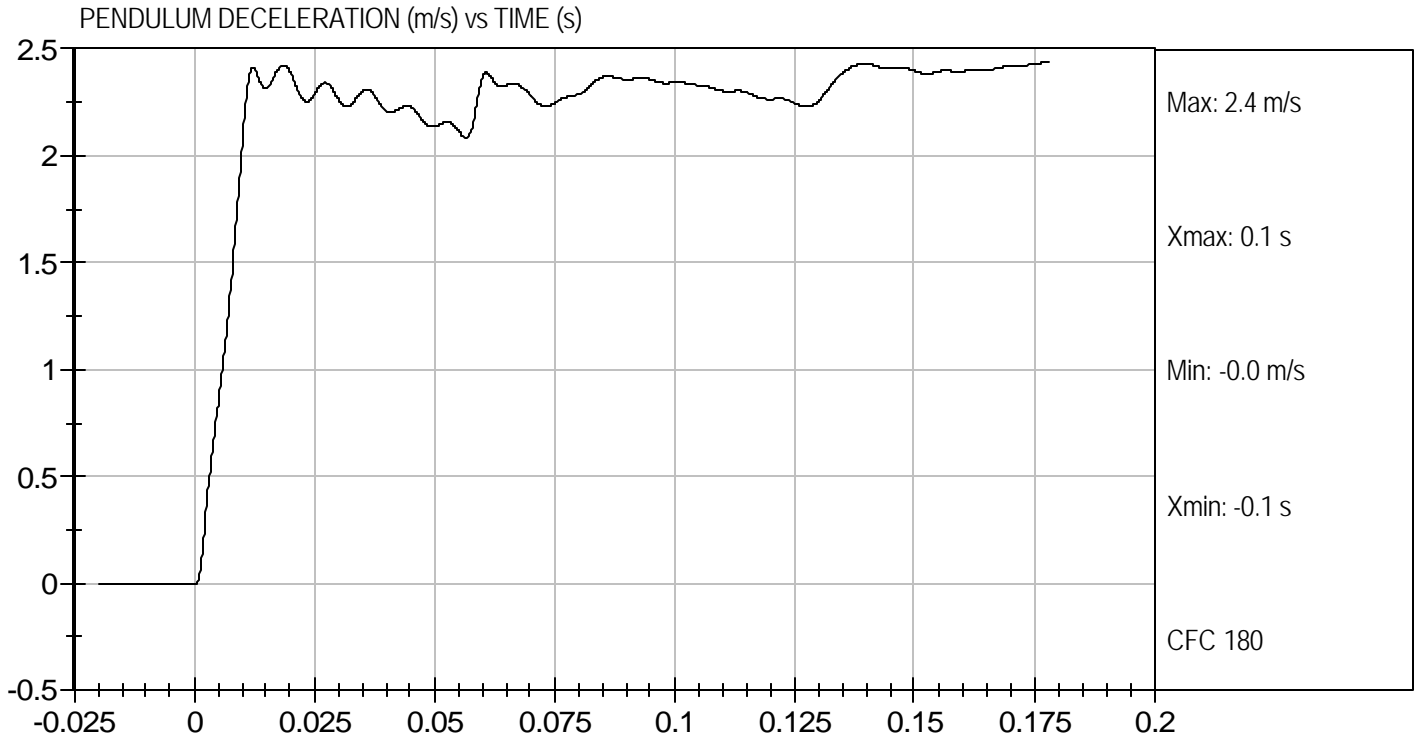
Laboratory Technician

8/23/07

Test Date

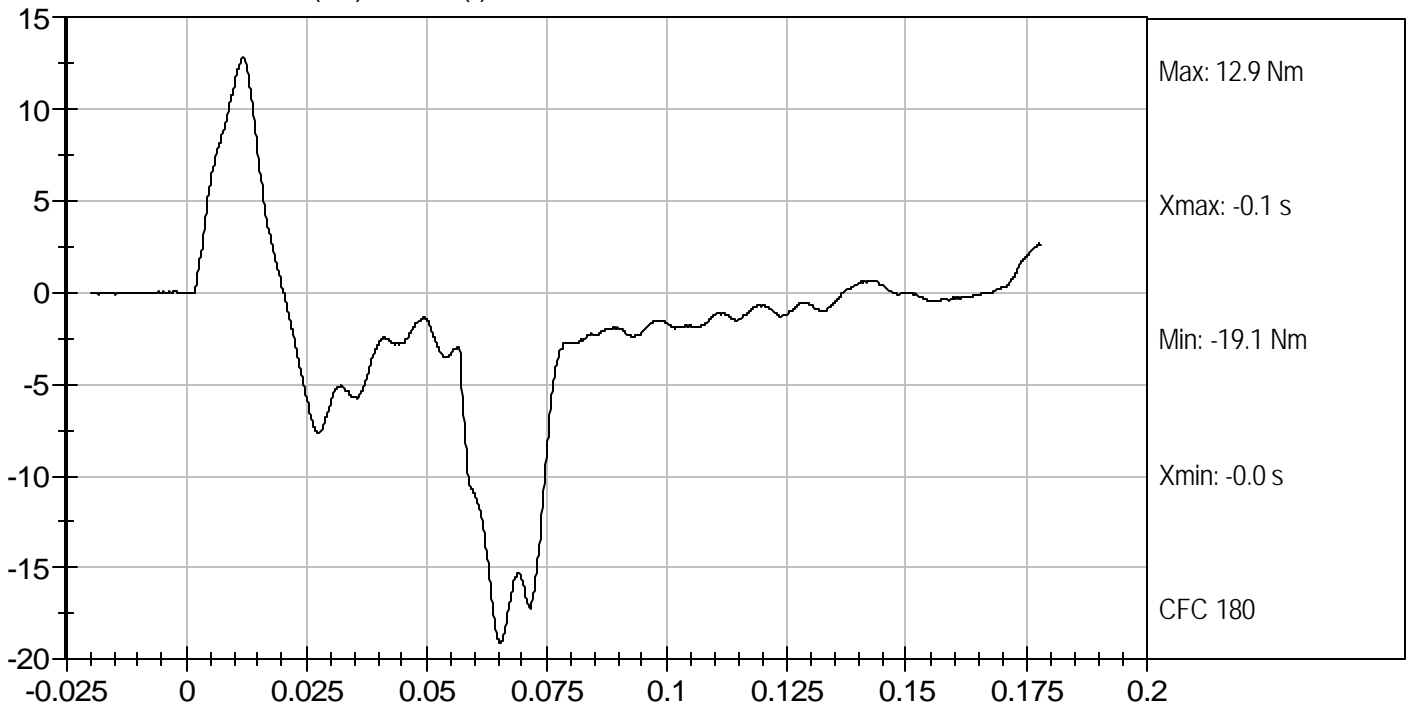


Approved By





OCCIPITAL MOMENT (Nm) vs TIME (s)



MGA RESEARCH CORPORATION
THORAX IMPACT TEST
CRABI 12 MONTH

ATD Serial No: 093

Test I.D: D072544


Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	20.6	Pass
Laboratory Relative Humidity	%	10 to 70	43	Pass
Probe Speed	m/sec	4.9 to 5.1	5.03	Pass
Probe Force	kN	1.51 to 1.80	1.55	Pass
Overall Test Results				Pass



 Laboratory Technician

8/23/07

Test Date

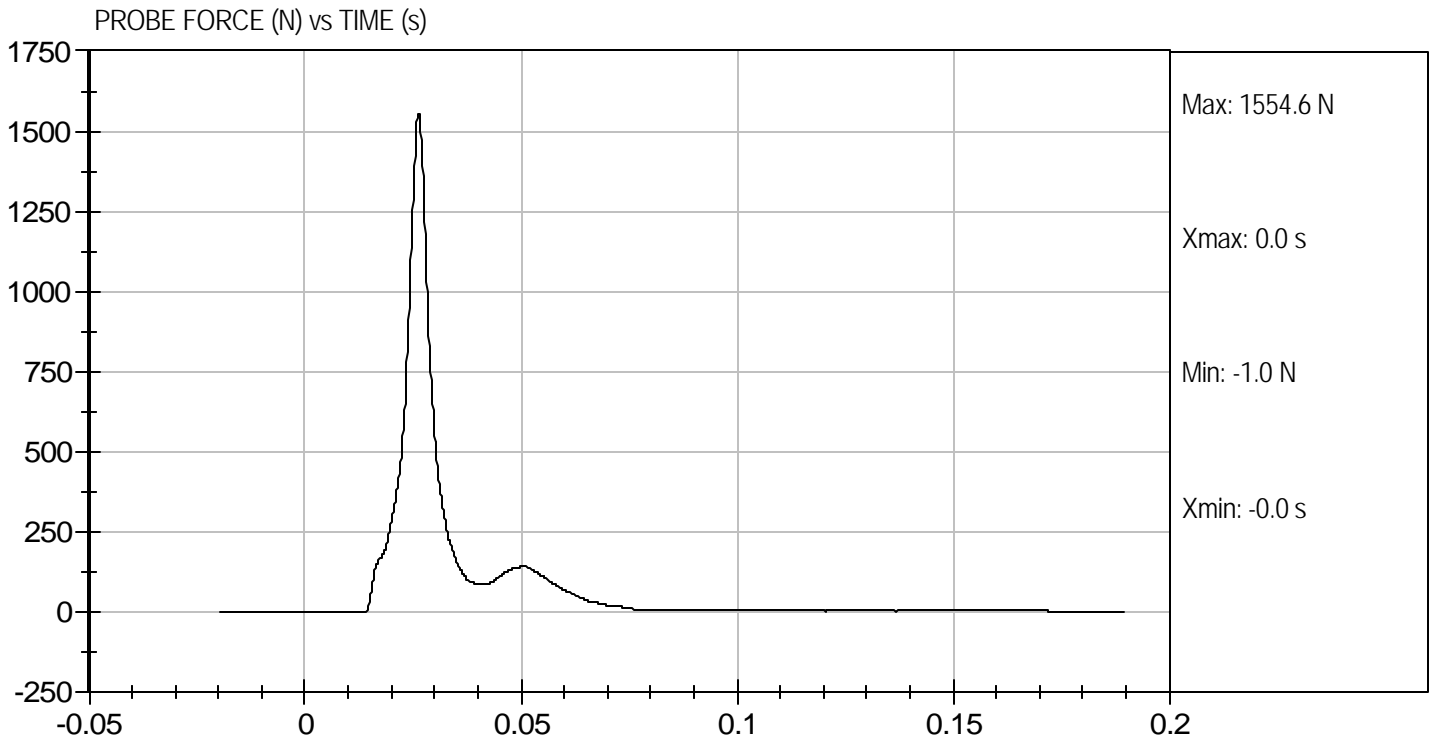


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Test Desc: Thorax Impact
Component ID: D072544

Test Date: 8/23/07
Velocity: 16.5 ft/s, 5.03 m/s



MGA RESEARCH CORPORATION
REAR HEAD DROP TEST
CRABI 12 MONTH

ATD Serial No: 093

Test ID: D072545

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	47	Pass
Peak Resultant Acceleration	G's	55 to 71	69	Pass
Peak Lateral Acceleration	G's	+/- 15	3	Pass
Unimodal	N/A	within 17% of peak	Yes	Pass
Overall Test Results				Pass

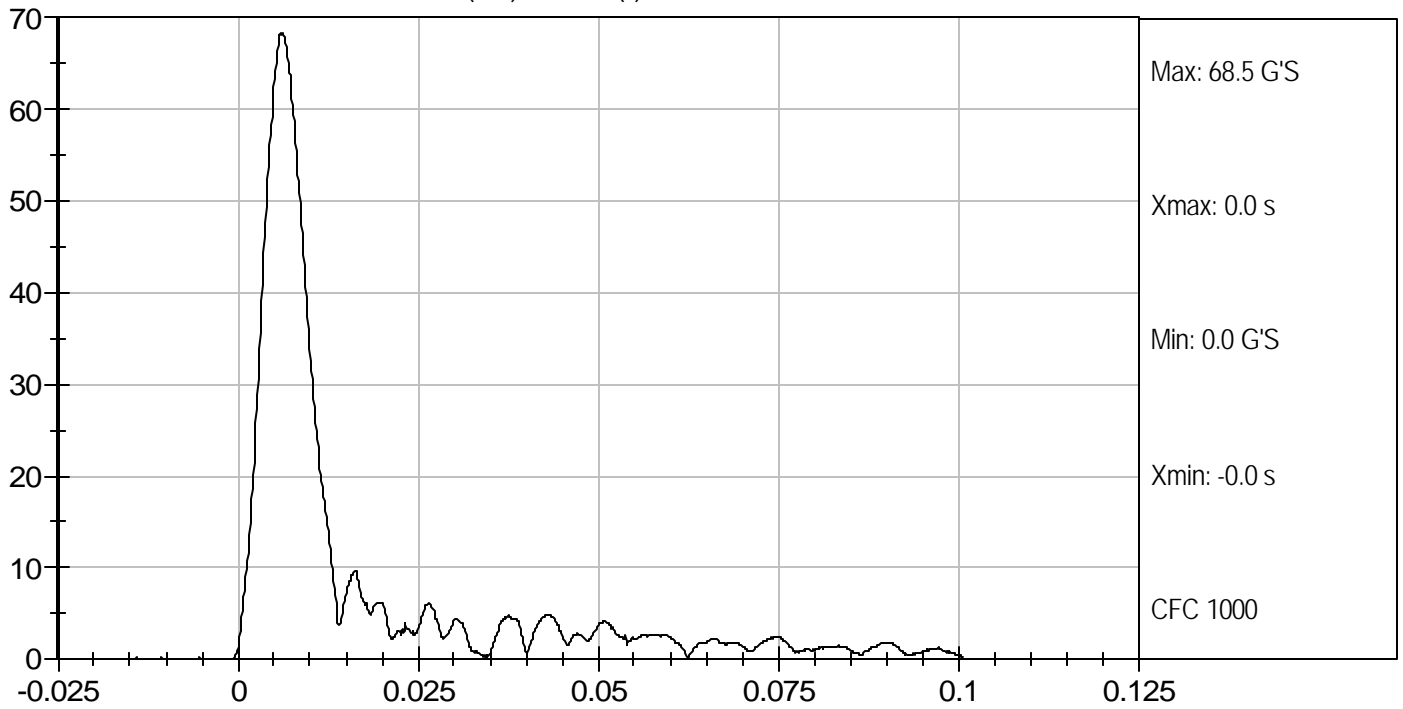

 Laboratory Technician

8/23/07
 Test Date

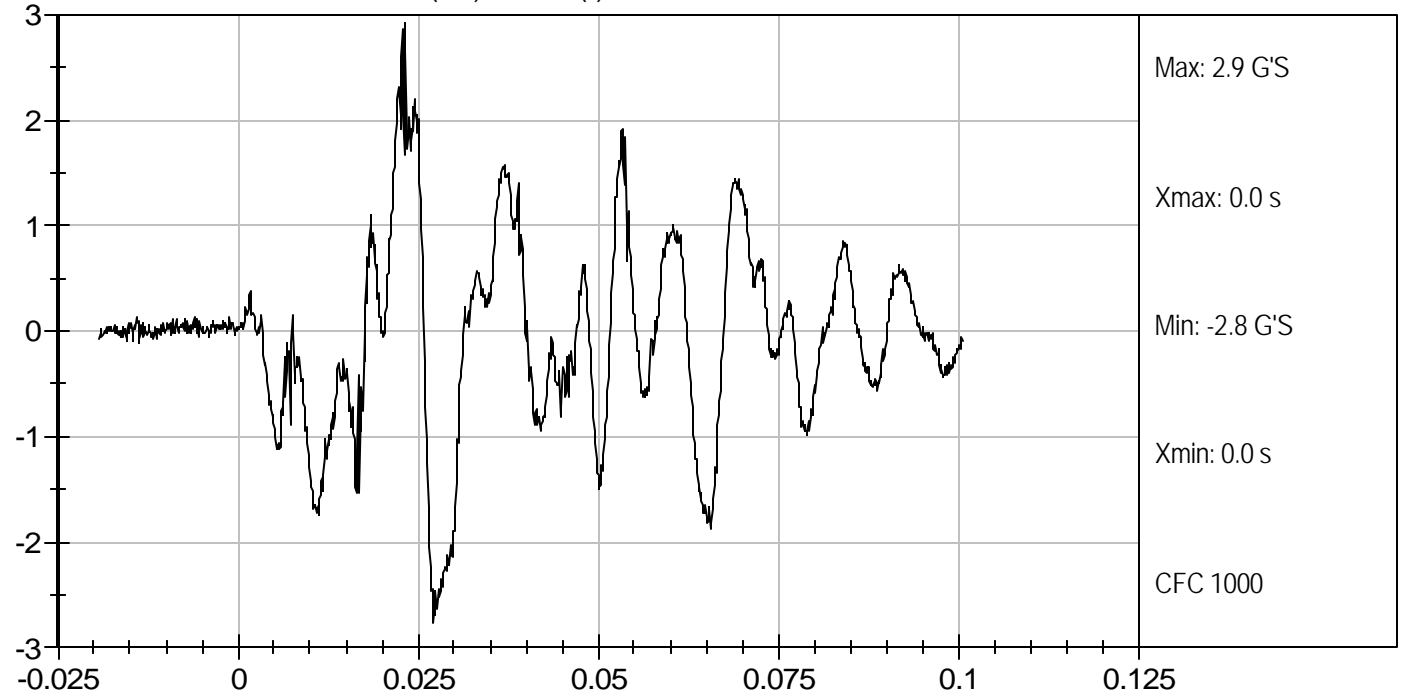

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PEAK RESULTANT ACCELERATION (G'S) vs TIME (s)



PEAK LATERAL ACCELERATION (G'S) vs TIME (s)



MGA RESEARCH CORPORATION
FRONT HEAD DROP TEST
CRABI 12 MONTH


ATD Serial No: 090

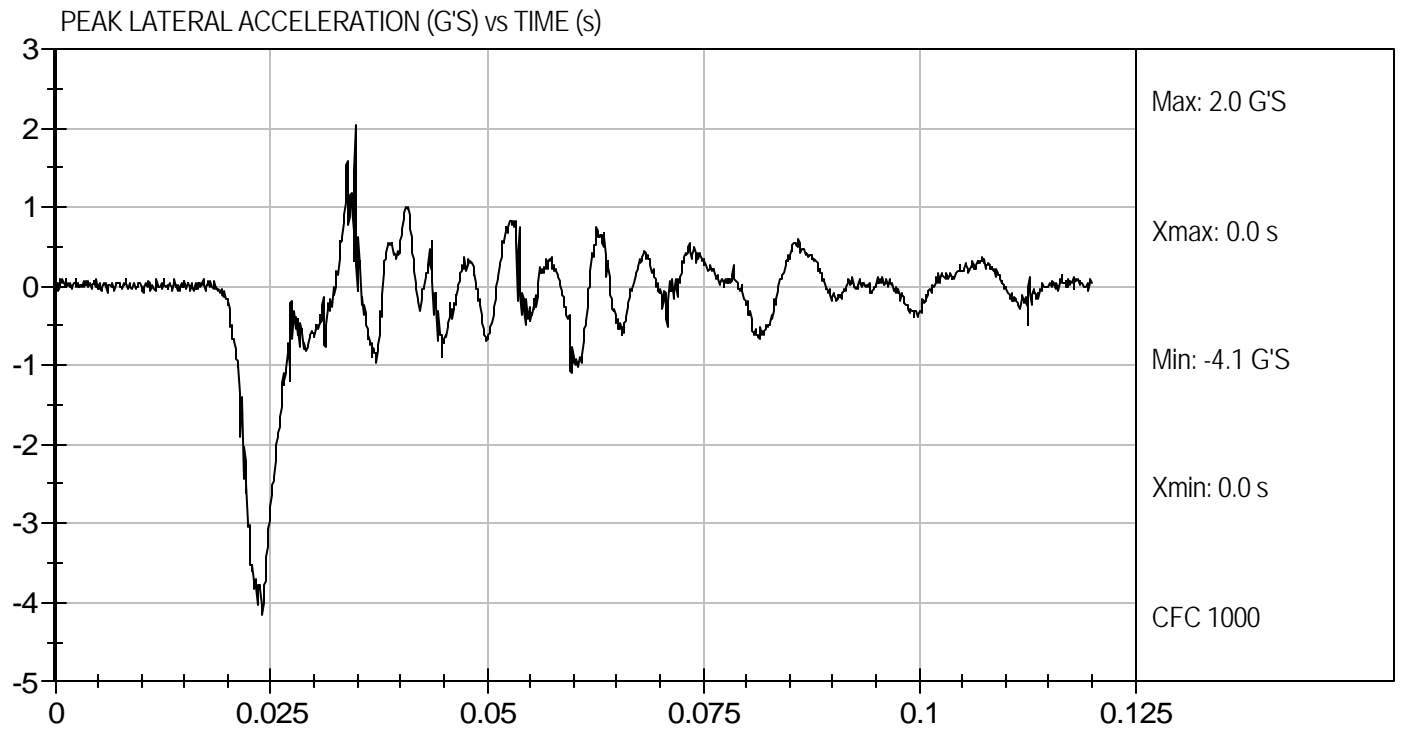
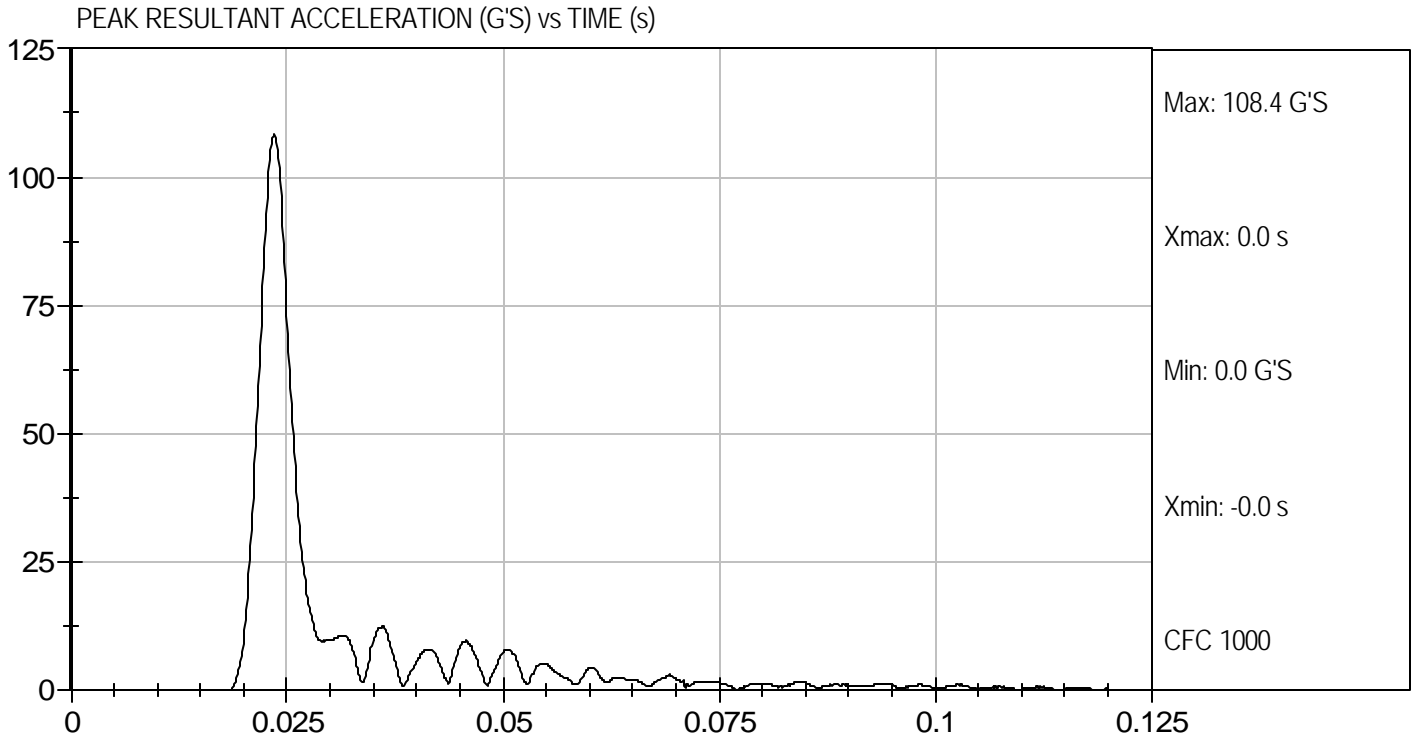
Test ID: D072531

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	45	Pass
Peak Resultant Acceleration	G's	100 to 120	108	Pass
Peak Lateral Acceleration	G's	+/- 15	-4	Pass
Unimodal	N/A	within 17% of peak	Yes	Pass
Overall Test Results				Pass


 Laboratory Technician

8/23/07
 Test Date


 Approved By



**MGA RESEARCH CORPORATION
NECK FLEXION TEST
CRABI 12 MONTH**

ATD Serial No: 090

Test I.D.: D072532

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	20.7	Pass
Humidity		%	10 to 70	46	Pass
Impact Velocity		m/s	5.1 to 5.3	5.2	Pass
Pendulum Deceleration	10 msec	m/s	1.6 to 2.3	2.0	Pass
	20 msec	m/s	3.4 to 4.2	3.6	Pass
	25 msec	m/s	4.3 to 5.2	4.3	Pass
D Plane Rotation		deg	75.0 to 86.0	79.7	Pass
Moment About Occipital Condyle		Nm	36.0 to 45.0	37.0	Pass
Positive Moment - Time Curve Decay to 5 Nm		msec	60 to 80	75	Pass
Overall Test Results					Pass



Laboratory Technician

8/23/07

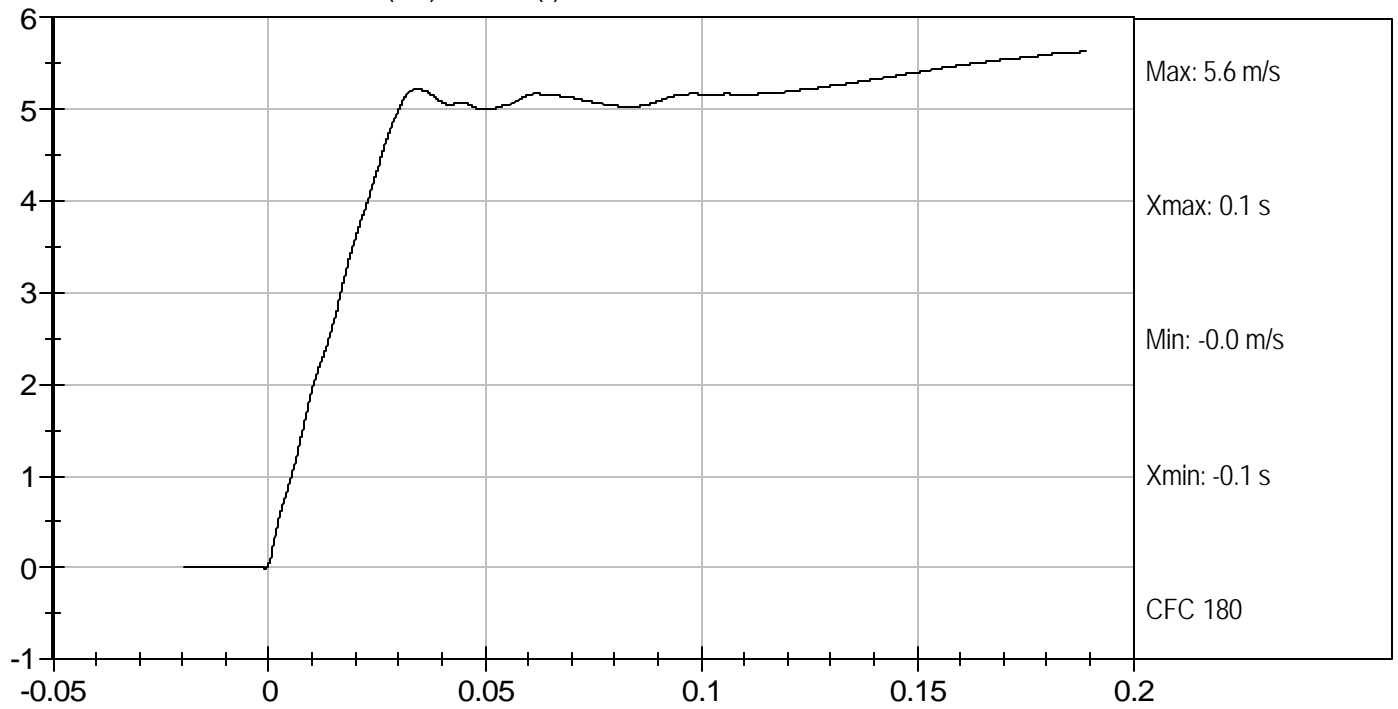
Test Date



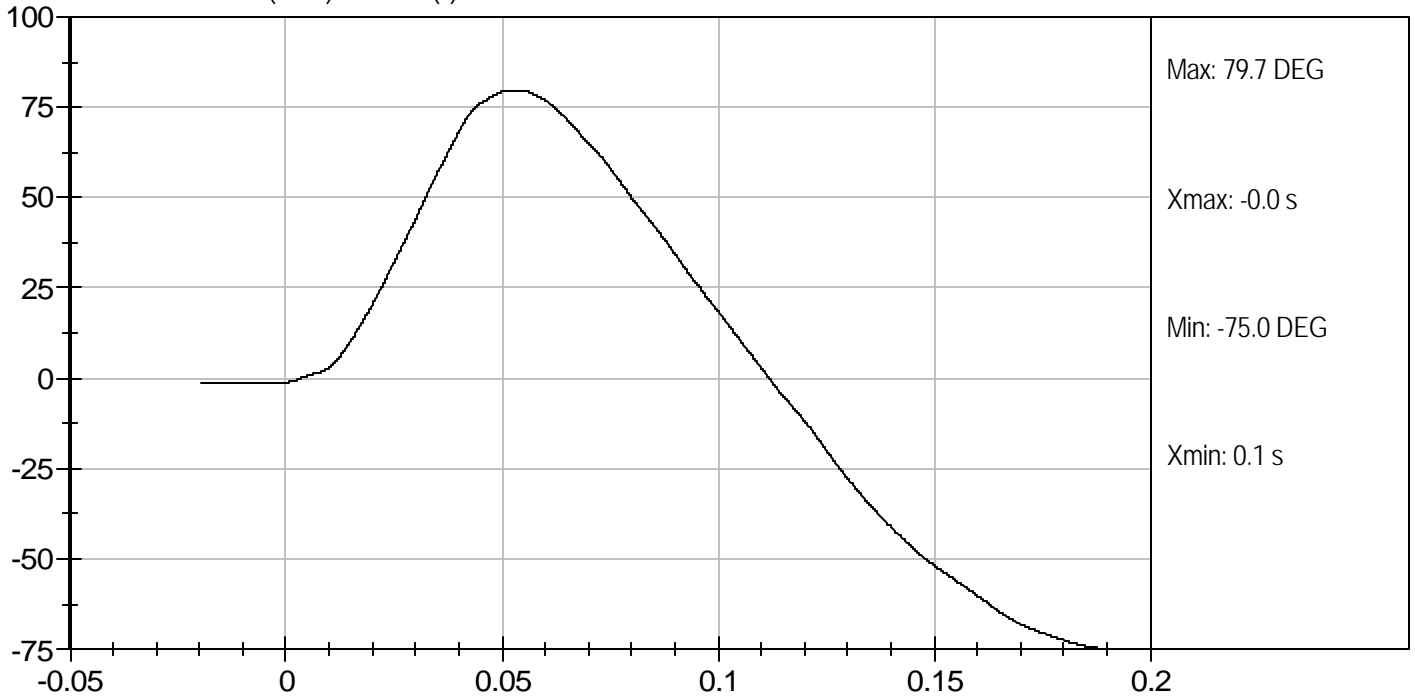
Approved By



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



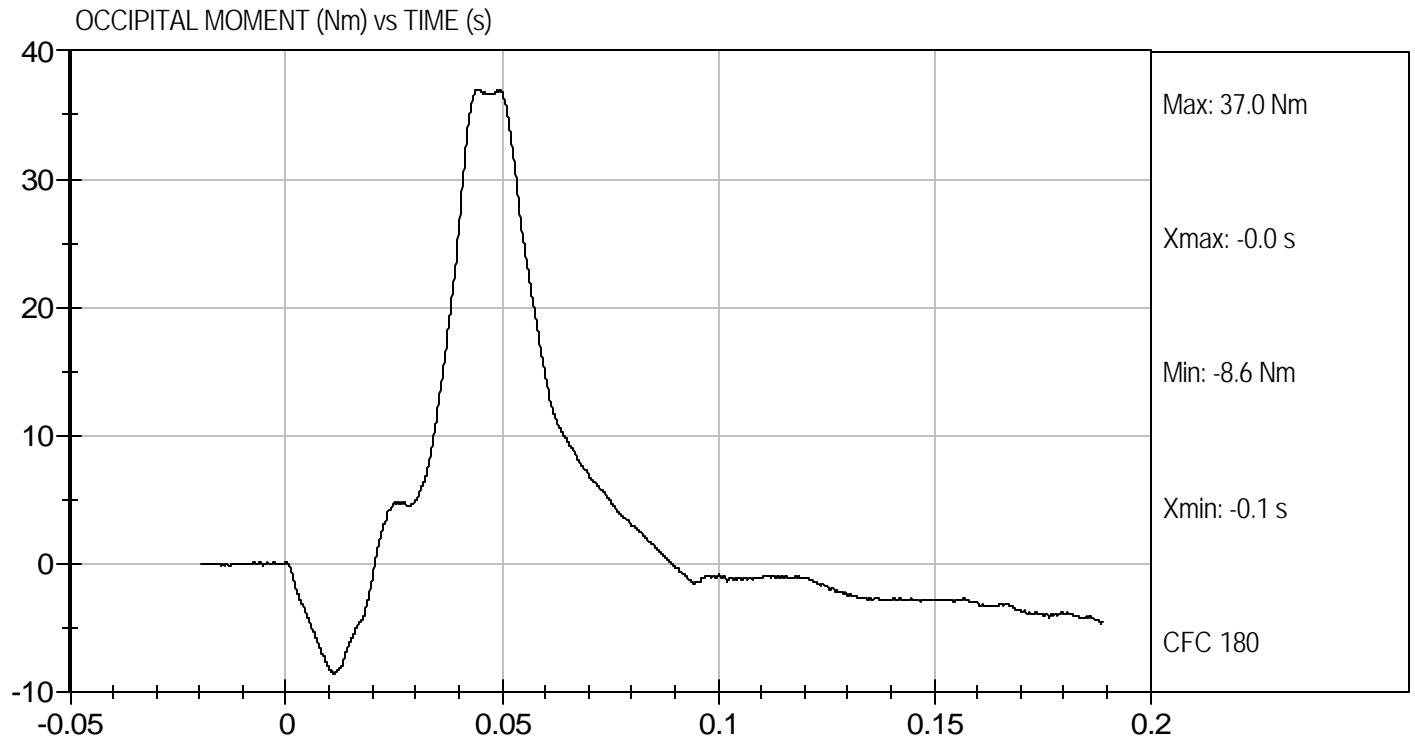
FLEXION ANGLE (DEG) vs TIME (s)





Test Desc: Neck Flexion
Component ID: D072532

Test Date: 8/23/07
Velocity: 17.182 ft/s, 5.2 m/s



MGA RESEARCH CORPORATION
NECK EXTENSION TEST
CRABI 12 MONTH

ATD Serial No: 090

Test I.D.: D072533

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	20.7	Pass
Humidity		%	10 to 70	46	Pass
Pendulum Speed		m/s	2.4 to 2.6	2.5	Pass
Pendulum Deceleration	6 msec	m/s	0.8 to 1.2	0.9	Pass
	10 msec	m/s	1.5 to 2.1	1.7	Pass
	14 msec	m/s	2.2 to 2.9	2.3	Pass
D Plane Rotation		deg	80.0 to 92.0	80.2	Pass
Moment About Occipital Condyle		Nm	-23.0 to -12.0	-14.8	Pass
Negative Moment - Time Curve Decay to -5 Nm		msec	76 to 90	84	Pass
Overall Test Results					Pass



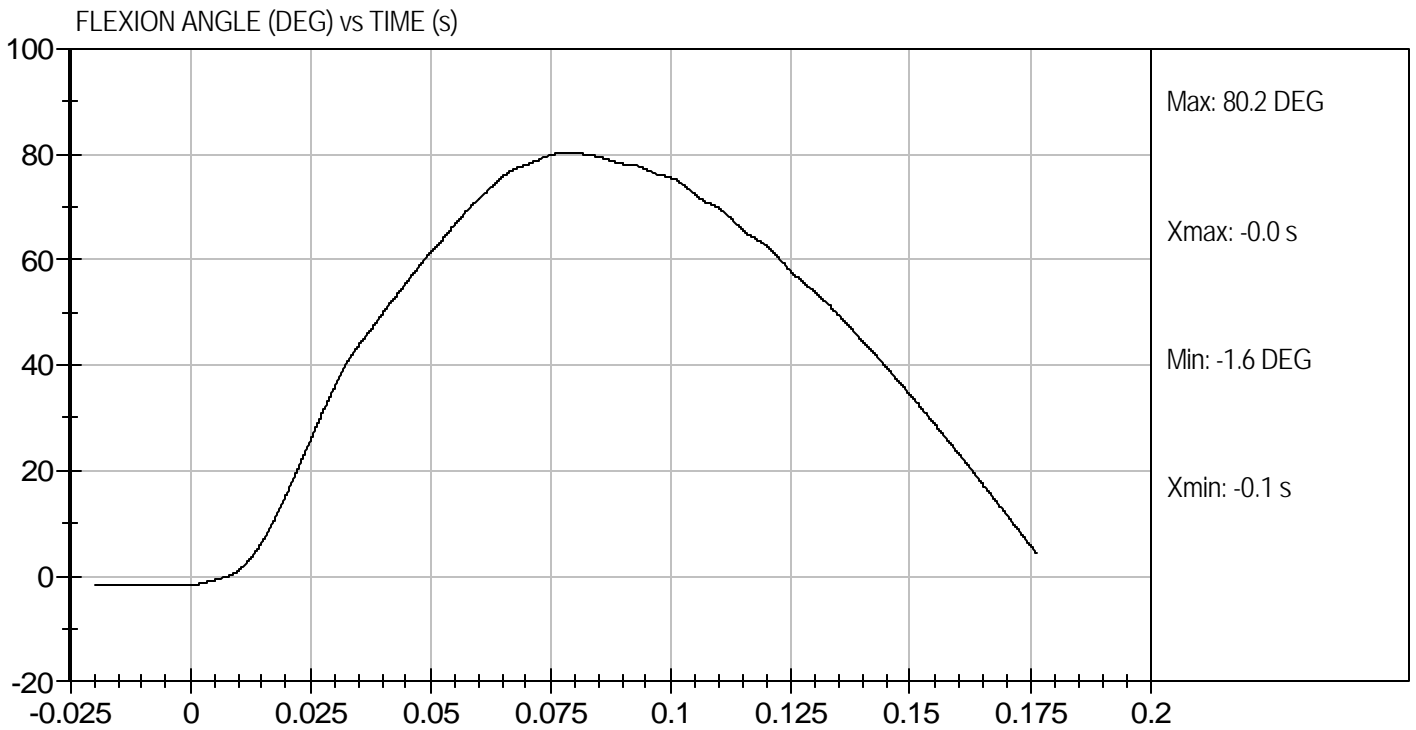
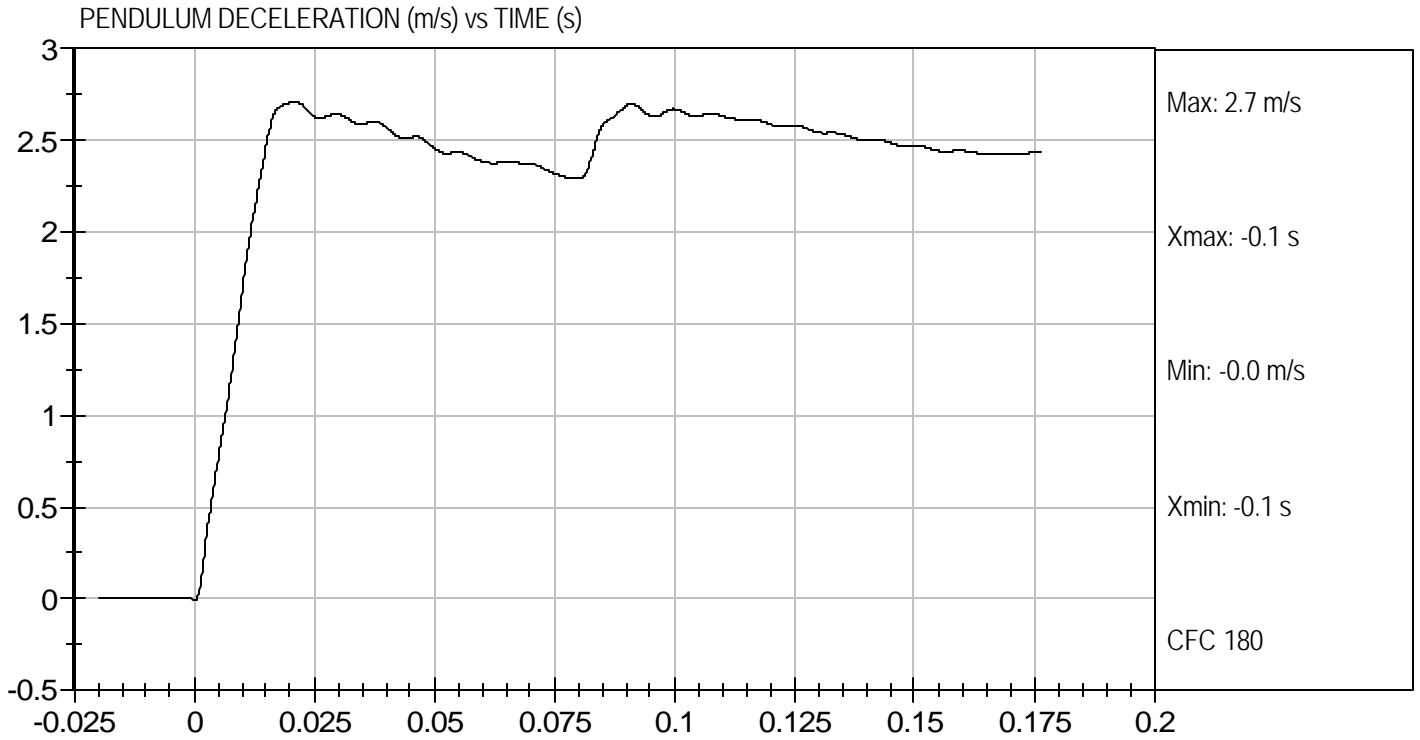
Laboratory Technician

8/23/07

Test Date



Approved By

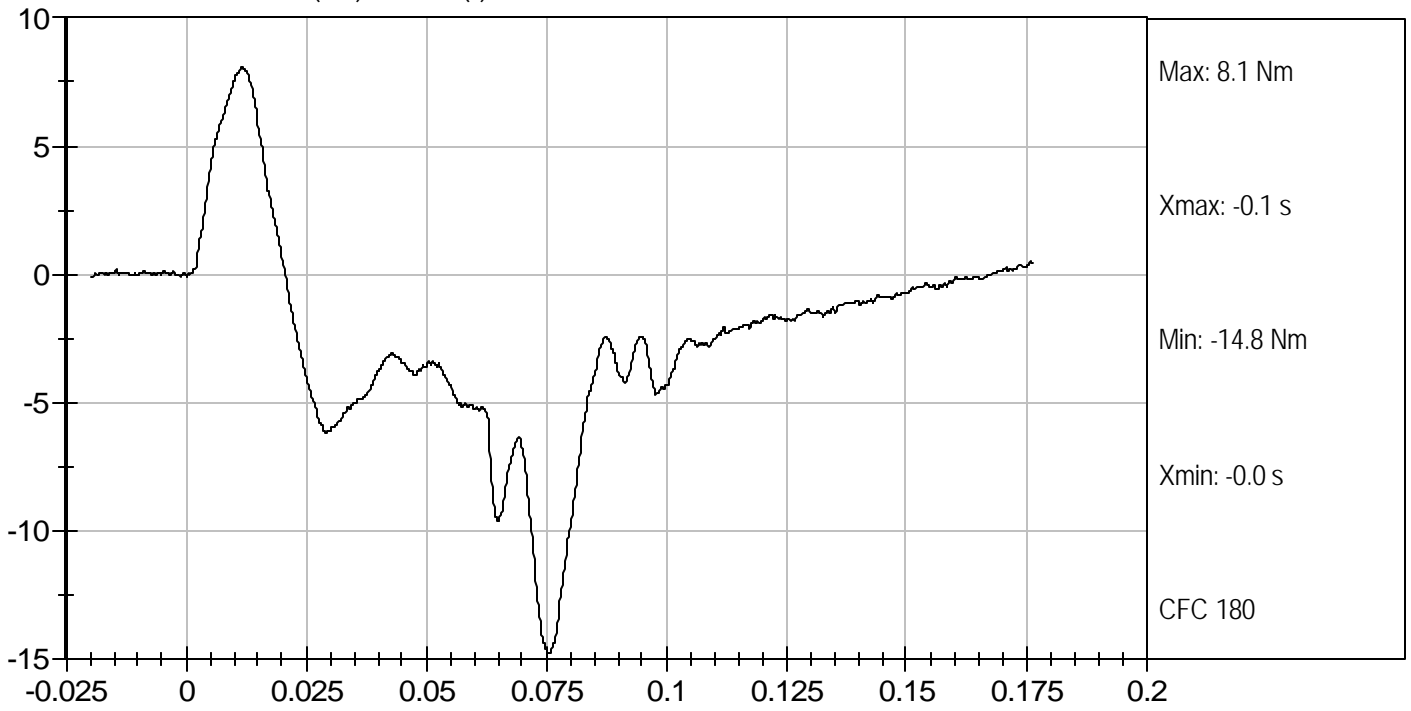




Test Desc: Neck Flexion
Component ID: D072533

Test Date: 8/23/07
Velocity: 8.33 ft/s, 2.5 m/s

OCCIPITAL MOMENT (Nm) vs TIME (s)



MGA RESEARCH CORPORATION
THORAX IMPACT TEST
CRABI 12 MONTH

ATD Serial No: 090

Test I.D: D072534

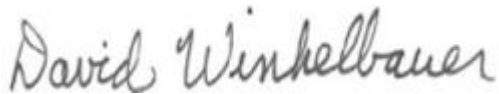
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	20.6	Pass
Laboratory Relative Humidity	%	10 to 70	43	Pass
Probe Speed	m/sec	4.9 to 5.1	5.03	Pass
Probe Force	kN	1.51 to 1.80	1.55	Pass
Overall Test Results				Pass



Laboratory Technician

8/23/07

Test Date

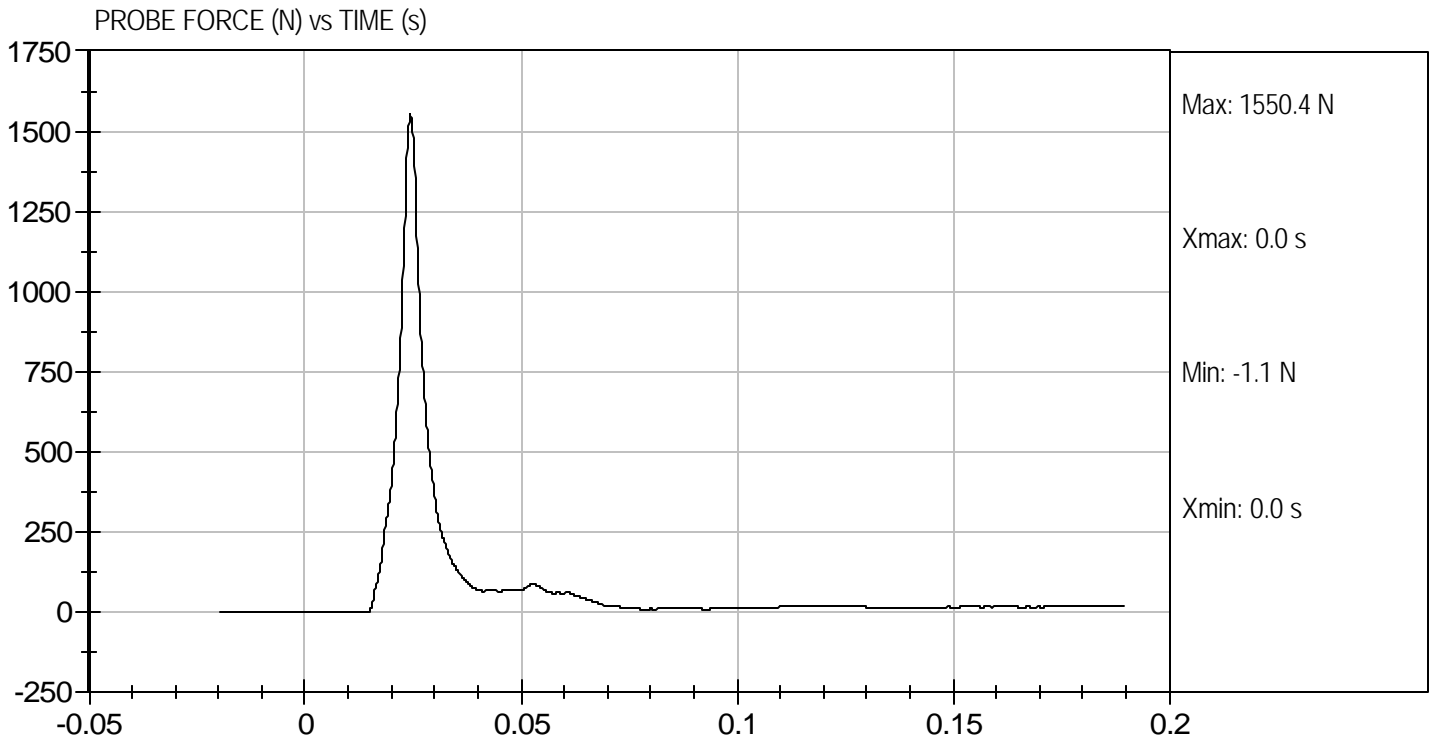


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Test Desc: Thorax Impact
Component ID: D072534

Test Date: 8/23/07
Velocity: 16.501 ft/s, 5.03 m/s



MGA RESEARCH CORPORATION
REAR HEAD DROP TEST
CRABI 12 MONTH


ATD Serial No: 090

Test ID: D072535

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	45	Pass
Peak Resultant Acceleration	G's	55 to 71	67	Pass
Peak Lateral Acceleration	G's	+/- 15	-3	Pass
Unimodal	N/A	within 17% of peak	Yes	Pass
Overall Test Results				Pass

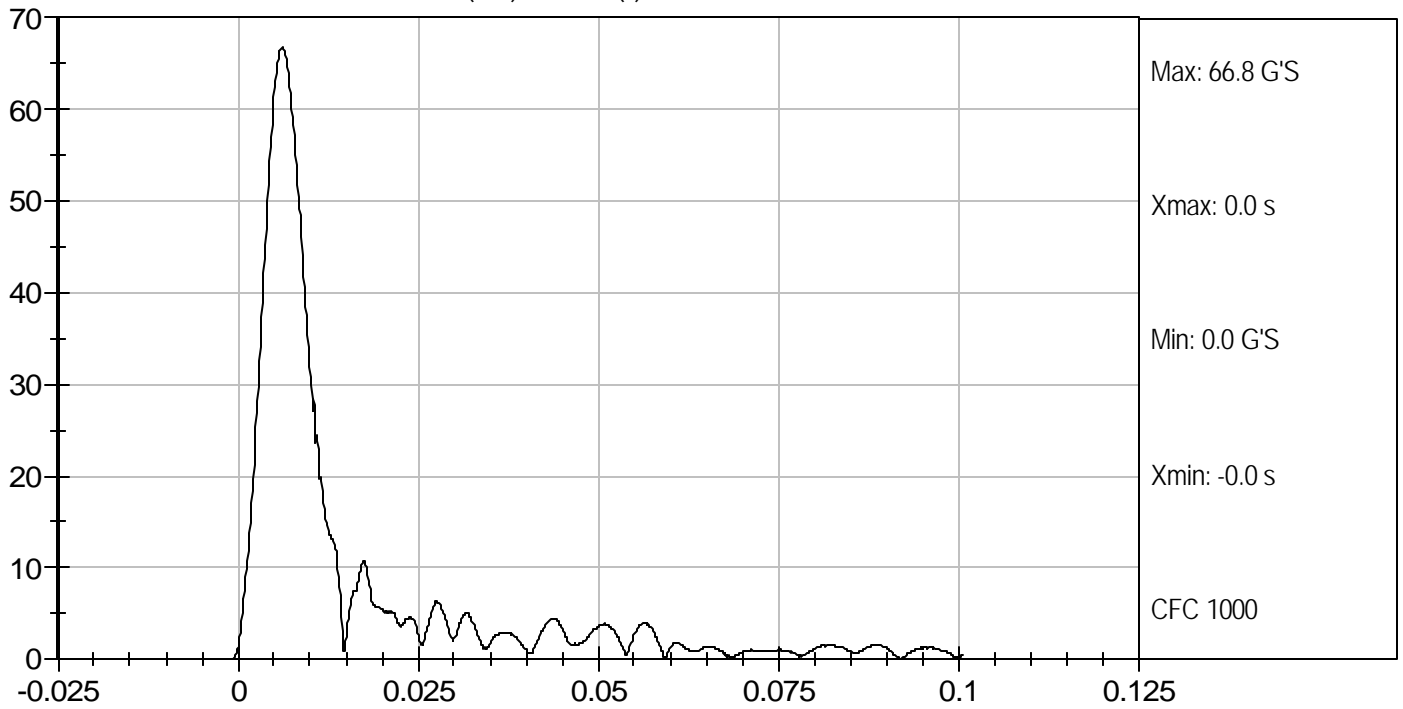

 Laboratory Technician

8/23/07
 Test Date


 Approved By



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



PEAK LATERAL ACCELERATION (G'S) vs TIME (s)

