

REPORT NUMBER: NCAP-MGA-2008-006

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

**DAIMLERCHRYSLER AG STUTTGART
2008 MERCEDES-BENZ C300
NHTSA NUMBER: M80508**

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



Test Date: October 9, 2007

Final Report Date: November 8, 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**

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.

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

Prepared by: 
Joe Fleck, Project Engineer

Date: 11/08/07

Reviewed by: 
David Winkelbauer, Facility Director

Date: 11/08/07

Technical Report Documentation Page

1. Report No. NCAP-MGA-2008-006	2. Government Accession No.	3. Recipient's Catalog No.																										
4. Title and Subtitle Final Report of New Car Assessment Program Testing of a 2008 Mercedes-Benz C300 NHTSA No.: M80508		5. Report Date November 8, 2007																										
		6. Performing Organization Code MGA																										
7. Author(s) Joe Fleck, Project Engineer		8. Performing Organization Report No. NCAP-MGA-2008-006																										
9. Performing Organization Name and Address MGA Research Corporation 5000 Warren Road Burlington, WI 53105		10. Work Unit No.																										
		11. Contract or Grant No. DTNH22-06-D-00028																										
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Rulemaking, Office of Crashworthiness Standards 1200 New Jersey Ave, SE, Room W43-410, NVS-111 Washington, D.C. 20590		13. Type of Report and Period Covered Final Report 10/09/2007 – 11/08/2007																										
		14. Sponsoring Agency Code NVS-111																										
15. Supplementary Notes																												
16. Abstract A frontal barrier impact was conducted on a 2008 Mercedes-Benz C300 at MGA Research Corporation on October 9, 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 56.2 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 460 mm located on 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" style="width: 100%; margin-top: 10px; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;"><u>Measurement Description</u></th> <th style="text-align: left;"><u>Units</u></th> <th style="text-align: left;"><u>Threshold</u></th> <th style="text-align: left;"><u>Driver ATD</u></th> <th style="text-align: left;"><u>Pass. ATD</u></th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC)</td> <td>N/A</td> <td>1000</td> <td>393</td> <td>490</td> </tr> <tr> <td>Max. Thorax Accel. (3ms Clip)</td> <td>G's</td> <td>60</td> <td>46</td> <td>48</td> </tr> <tr> <td>Left Femur Force</td> <td>Newton</td> <td>10009</td> <td>-4455</td> <td>-3982</td> </tr> <tr> <td>Right Femur Force</td> <td>Newton</td> <td>10009</td> <td>-3796</td> <td>-3979</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	393	490	Max. Thorax Accel. (3ms Clip)	G's	60	46	48	Left Femur Force	Newton	10009	-4455	-3982	Right Femur Force	Newton	10009	-3796	-3979
<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	393	490																								
Max. Thorax Accel. (3ms Clip)	G's	60	46	48																								
Left Femur Force	Newton	10009	-4455	-3982																								
Right Femur Force	Newton	10009	-3796	-3979																								
17. Key Words 56.3 km/h NCAP Frontal Barrier Impact Test New Car Assessment Program (NCAP) 2008 Mercedes-Benz C300 NHTSA No: M80508		18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Adm. Technical Ref. Division, 1200 New Jersey Ave, SE Washington, D.C. 20590																										
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 175	22. Price																									

Form DOT F1700.7 (8-72)

TABLE OF CONTENTS

<u>Section</u>		<u>Page No</u>
1	Purpose and Summary of the Test	1
2	Occupant and Vehicle Information / Data Sheets	3

<u>Data Sheet No.</u>		<u>Page No.</u>
1	Crash Test Summary	3
2	General Test and Vehicle Parameter Data	4
3	Test Vehicle Tire Information	6
4	Test Vehicle Information	7
5	Dummy Positioning in Vehicle	9
6	Seat Belt Positioning Data	11
7	Vehicle Accelerometer Locations	12
8	Summary of FMVSS 212 and FMVSS 219 (Partial) Data	13
9	Summary of FMVSS 301 Data	14
10	Vehicle Measurements	15
11	Camera Locations	18
12	Photographic Reference Target Locations	20
13	Vehicle Intrusion Measurements	21
14	Load Cell Locations on Fixed Barrier	24
15	Accident Investigation Division Data	25
16	Dummy/Vehicle Temperature Stabilization Chart	26

<u>Appendix</u>		
A	Photographs	A
B	Dummy Response Data Traces	B
C	Dummy Calibration Data	C

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 Mercedes-Benz at a velocity of 56.2 kph. The test was performed at MGA Research Corporation on October 9, 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. 066) and right-front passenger (position 2) ATD (Serial No. 065) 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 460 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 and side header. 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, visor, and side header. 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	393	49.8	85.8	46	60.4	63.4	-32	-4455	-3796
Passenger	490	62.2	98.2	48	70.4	73.4	-27	-3982	-3979

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 Mercedes-Benz C300
 Test Program: 35mph Frontal Impact

NHTSA No.: M80508
 Test Date: 10/09/2007

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)	None	None
Seat Back Failure	None	None
Glazing Damage	The windshield cracked.	

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	392
Center	mm	415
Right Side	mm	376
Average	mm	394

BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Shoulder belt length as measured on ATD	mm	911	892
Lap belt length as measured on ATD	mm	631	661
Remainder of belt on reel	mm	1479	1462
Total belt length for continuous webbing systems	mm	3021	3015

DATA SHEET NO. 2
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2008 Mercedes-Benz C300
 Test Program: 35mph Frontal Impact

NHTSA No.: M80508
 Test Date: 10/09/2007

TEST VEHICLE INFORMATION

Manufacturer	Mercedes-Benz
Model	C300
Body Style	Sedan
NHTSA No.	M80508
VIN	WDDGF81X28F051358
Color	Black
Delivery Date	9/24/2007
Odometer Reading (mile)	50
Dealer	Waukesha Imports
Transmission	Automatic
Final Drive	4 Wheel
Number of Cylinders	6
Engine Displacement (L)	3.0
Engine Placement	Longitudinal
Automatic Door Lock (ADL)	Yes
Owners Manual Details Instructions on Disabling ADLs	Yes
Bucket Seats	Yes

TEST VEHICLE OPTIONS

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

DATA FROM CERTIFICATION LABEL

Manufactured By	DaimlerChrysler AG Stuttgart
Date of Manufacture	08/07

GVWR (kg)	2120
GAWR Front (kg)	1070
GAWR Rear (kg)	1085

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench		
Number of Occupants	2	3		5
Capacity Wt. (VCW) (kg)				370
Cargo Wt. (RCLW) (kg)				30

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

Test Vehicle: 2008 Mercedes-Benz C300
 Test Program: 35mph Frontal Impact

NHTSA No.: M80508
 Test Date: 10/09/2007

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	450.4	380.1		489.9	433.6	
Right	kg	469.0	379.2		505.8	435.0	
Ratio	%	54.8	45.2		53.4	46.6	
Totals	kg	919.4	759.3	1678.7	995.7	868.6	1864.3

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1678.7
Weight of 2 P572E ATDs	kg	156.0
Rated Cargo/Luggage Weight (RCLW)	kg	30
Calculated Vehicle Target Weight (TVTW)	kg	1864.7

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	688	685	684	684	1248
As Tested	mm	673	671	649	653	1286
Post Test	mm	665	674	663	647	

Vehicle Wheelbase (mm): 2760

Weight of Ballast secured in cargo area (kg): 0

Vehicle Components Removed: Tail lights, rear seat headrests, trunk interior, spare tire and tools, jack, trunk lid, rear bumper and cover, heat shields, and side mirrors

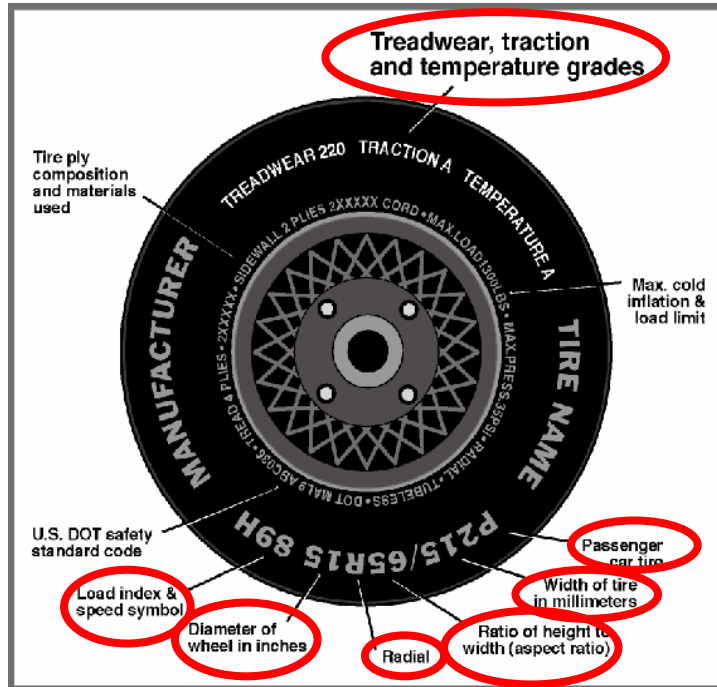
Ballast weight does not include instrumentation and data acquisition system.

DATA SHEET NO. 3

TEST VEHICLE TIRE INFORMATION

Test Vehicle: 2008 Mercedes-Benz C300
 Test Program: 35mph Frontal Impact

NHTSA No.: M80508
 Test Date: 10/09/2007



DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	210	240
Recommended Tire Size	225/45R17	225/45R17
Tire Size on Vehicle	225/45R17	225/45R17
Tire Manufacturer	Continental	Continental
Tire Name	Contipro Contact	Contipro Contact
Tire Type	Passenger	Passenger
Tire Width (mm)	225	225
Ratio of Height to Width (aspect ratio)	45	45
Radial	R	R
Wheel Diameter	17	17
Load Index & Speed Symbol	91H	91H
Treadwear	400	400
Traction Grade	AA	AA
Temperature Grade	A	A

DATA SHEET NO. 4 **TEST VEHICLE INFORMATION**

Test Vehicle: 2008 Mercedes-Benz C300
 Test Program: 35mph Frontal Impact

NHTSA No.: M80508
 Test Date: 10/09/2007

NORMAL DESIGN RIDING POSITION

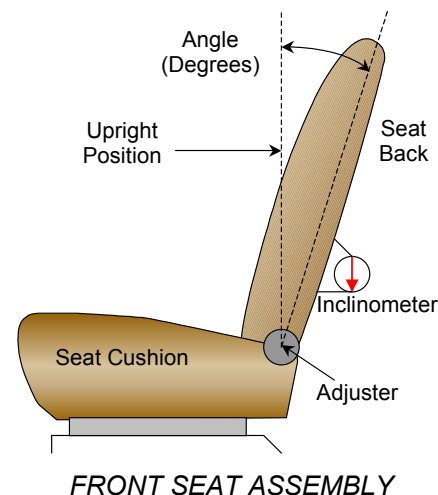
The driver and passenger seat back is positioned to the manufacturer's designated angle. The procedure is as follows: Measure at seat back, set at 21 degrees.

Driver seat back angle: 21.6 degrees at seat back

Passenger seat back angle: 21.0 degrees at seat back

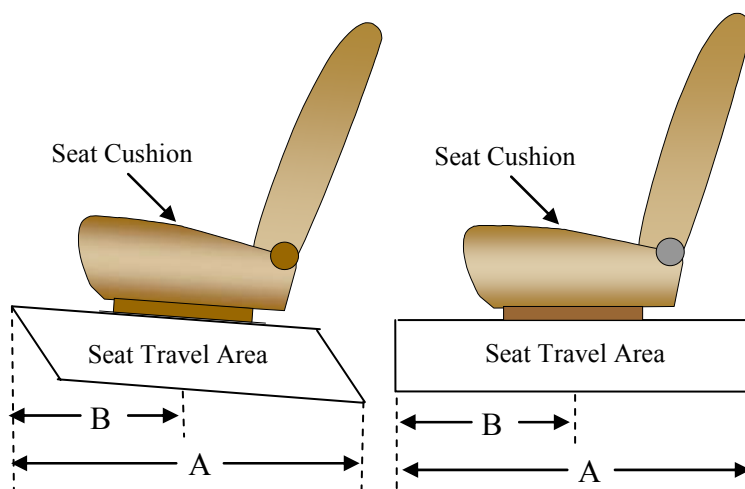
SEAT FORE/AFT POSITIONING

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	285 mm	142 mm
Passenger Seat	285 mm	142 mm



ADJUSTABLE D-RING POSITION

The driver and passenger D-rings were placed in position 1 with the uppermost detent defined as 0.



DATA SHEET NO. 4...(CONTINUED)

TEST VEHICLE INFORMATION

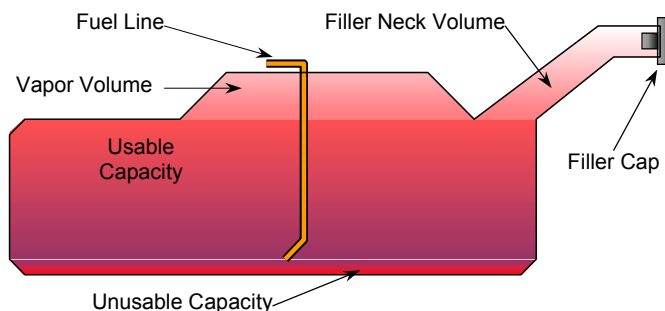
Test Vehicle: 2008 Mercedes-Benz C300
Test Program: 35mph Frontal Impact

NHTSA No.: M80508
Test Date: 10/09/2007

FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	66.0
Usable Capacity of "Optional" Tank	
92-94% of Usable Capacity	60.7 – 62.0
Actual Amount of Solvent used	61.7
1/3 of Usable Capacity	22.0

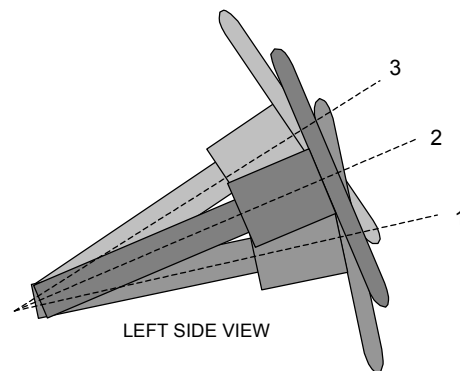
The test vehicle is equipped with an electric fuel pump. The fuel pump is in operation if the ignition is switched to the "ON" position. After about 15 seconds, the pump switches back to standby mode if the engine is not started.



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

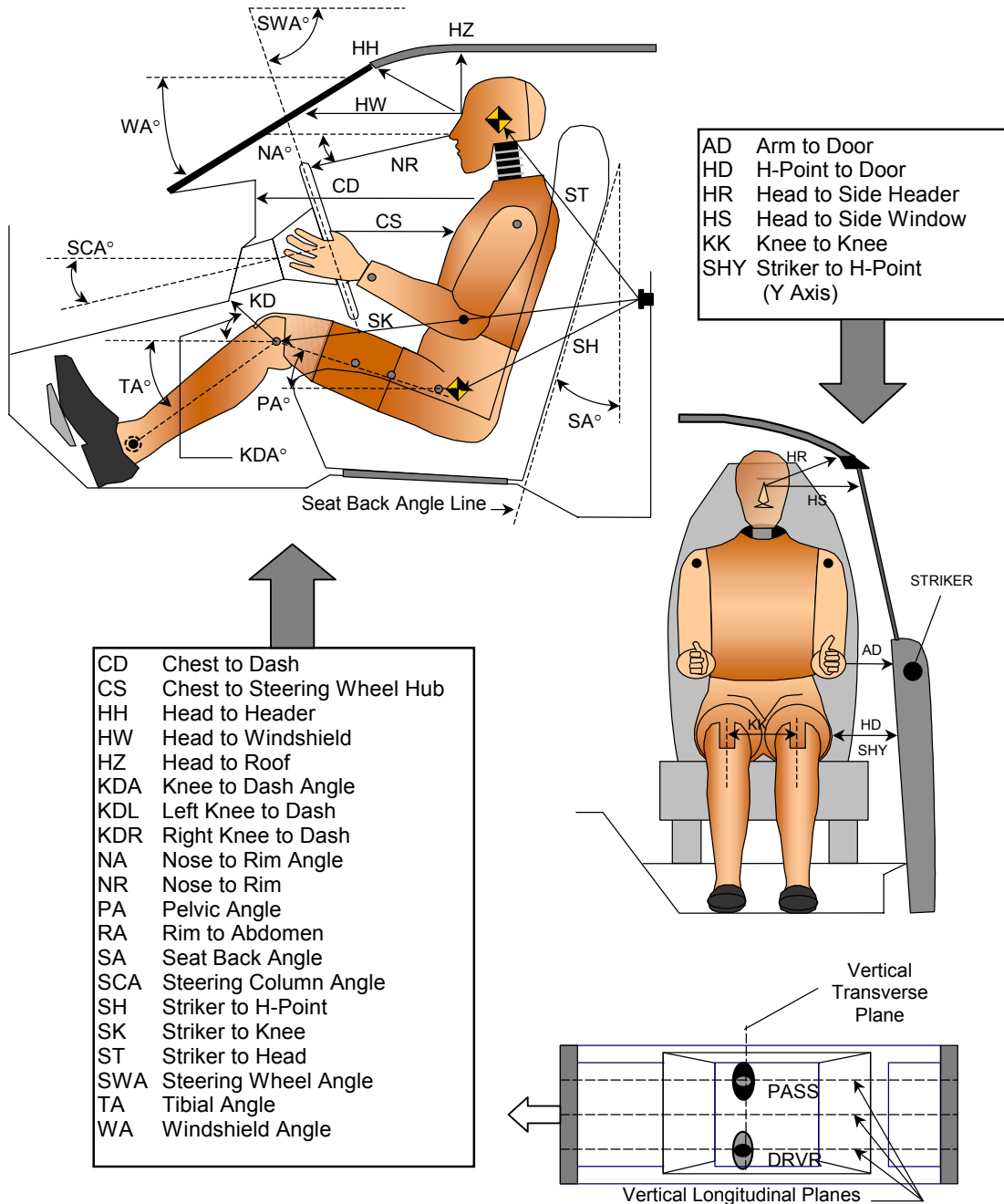
	Fore/Aft Position (mm)	Degrees
Lowermost position No. 1	0	65.0
Geometric center position No. 2	30	67.5
Uppermost position No. 3	60	70.0

DATA SHEET NO. 5 **DUMMY POSITIONING IN VEHICLE**

Test Vehicle: 2008 Mercedes-Benz C300
 Test Program: 35mph Frontal Impact

NHTSA No.: M80508
 Test Date: 10/09/2007

DUMMY MEASUREMENTS FOR FRONT SEAT OCCUPANTS



DATA SHEET NO. 5... (CONTINUED)

DUMMY POSITIONING IN VEHICLE

Test Vehicle: 2008 Mercedes-Benz C300
 Test Program: 35mph Frontal Impact

NHTSA No.: M80508
 Test Date: 10/09/2007

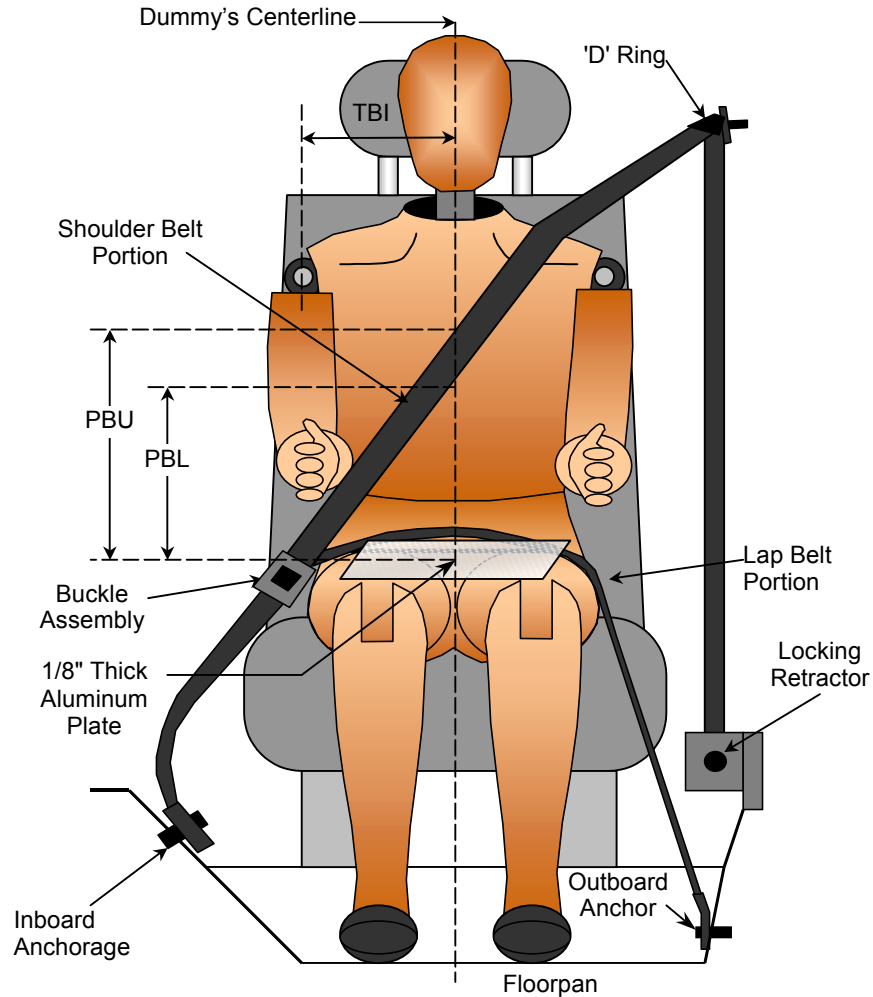
TEST DUMMY POSITION MEASUREMENTS

Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA	Windshield Angle		28.7		
SWA	Steering Wheel Angle		67.5		
SCA	Steering Column Angle		23.0		
SA	Seat Back Angle		21.6		21.0
HZ	Head to Roof (Z)	154	90	142	90
HH	Head to Header	286	25.2	301	25.0
HW	Head to Windshield	576	0	573	0
HR	Head to Side Header (Y)	193		187	
NR	Nose to Rim	374	9.5		
CD	Chest to Dash	504		508	
CS	Chest to Steering Hub	294	0		
RA	Rim to Abdomen	180	0		
KDL	Left Knee to Dash	151	30.1	162	
KDR	Right Knee to Dash	138		167	40.2
PA	Pelvic Angle		23.6		22.5
TA	Tibia Angle		41.7		33.6
KK	Knee to Knee (Y)	290		272	
SK	Striker to Knee	565	99.4	580	103.3
ST	Striker to Head	419	8.4	423	9.1
SH	Striker to H-Point	307	141.8	285	143.8
SHY	Striker to H-Point (Y)	214		232	
HS	Head to Side Window	309		292	
HD	H-Point to Door (Y)	129		123	
AD	Arm to Door (Y)	87		103	
AA	Ankle to Ankle	302		205	

DATA SHEET NO. 6 **SEAT BELT POSITIONING DATA**

Test Vehicle: 2008 Mercedes-Benz C300
 Test Program: 35mph Frontal Impact

NHTSA No.: M80508
 Test Date: 10/09/2007



SEAT BELT POSITIONING MEASUREMENTS

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

DATA SHEET NO. 7
VEHICLE ACCELEROMETER LOCATIONS

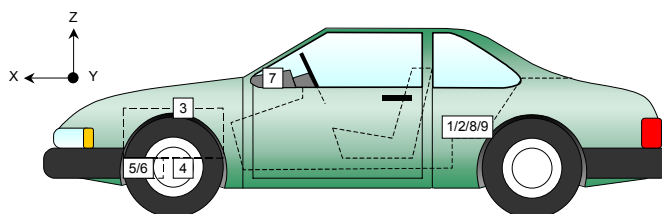
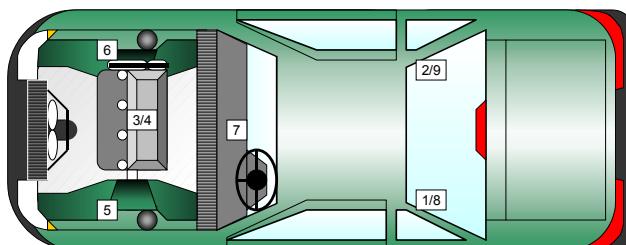
Test Vehicle: 2008 Mercedes-Benz C300
 Test Program: 35mph Frontal Impact

NHTSA No.: M80508
 Test Date: 10/09/2007

VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear X-Member X	1862	-346	282
2	Right Rear X-Member X	1862	346	282
3	Engine Top X	3881	0	789
4	Engine Bottom X	3718	0	186
5	Left Brake Caliper X	3736	-651	187
6	Right Brake Caliper X	3736	651	187
7	Instrument Panel X			
8	Left Rear X-Member Z	1862	-346	282
9	Right Rear X-Member Z	1862	346	282

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 Mercedes-Benz C300

NHTSA No.: M80508

Test Program: 35mph Frontal Impact

Test Date: 10/09/2007

Windshield Mounting Details:

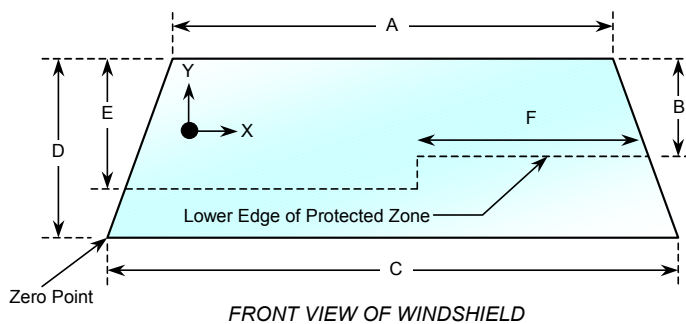
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

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	2064	2064	100
Right Side	2064	2064	100
Total	4128	4128	100



Item	Units	Value
A	mm	1154
B	mm	417
C	mm	1420
D	mm	777
E	mm	498
F	mm	526

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 Mercedes-Benz C300
 Test Program: 35mph Frontal Impact

NHTSA No.: M80508
 Test Date: 10/09/2007

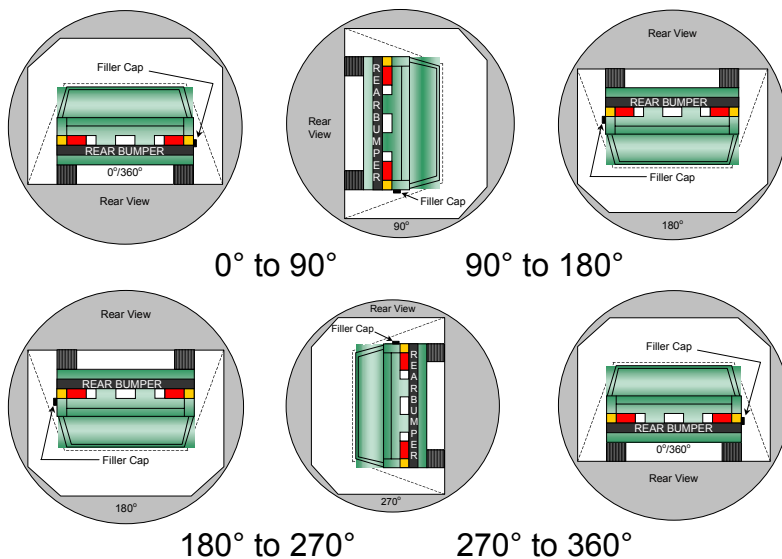
FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 21° C Test Time: 10:30 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°	131	300	0
90° to 180°	113	300	0
180° to 270°	117	300	0
270° to 360°	122	300	0

DATA SHEET NO. 10
VEHICLE MEASUREMENTS

Test Vehicle: 2008 Mercedes-Benz C300
Test Program: 35mph Frontal Impact

NHTSA No.: M80508
Test Date: 10/09/2007

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total length of vehicle at centerline	mm	4599	4139	460
2	RSOV to front of engine	mm	4073	3864	209
3	RSOV to firewall centerline	mm	3502	3414	88
4	RSOV to leading edge of right door	mm	3187	3174	13
5	RSOV to leading edge of left door	mm	3182	3181	1
6	RSOV to lower leading edge of right door	mm	3209	3196	13
7	RSOV to lower leading edge of left door	mm	3206	3189	17
8	RSOV to upper leading edge of right door	mm	2092	2090	2
9	RSOV to upper leading edge of left door	mm	2101	2091	10
10	RSOV to lower trailing edge of right door	mm	2135	2135	0
11	RSOV to lower trailing edge of left door	mm	2134	2122	12
12	RSOV to bottom of right 'A' pillar	mm	3073	3066	7
13	RSOV to bottom of left 'A' pillar	mm	3074	3064	10
14	RSOV to firewall on right side	mm	3269	3251	18
15	RSOV to firewall on left side	mm	3249	3247	2
16	RSOV to steering column	mm	2684	2724	-40
17	Center of steering column to left 'A' pillar	mm	368	380	-12
18	Center of steering column to headlining	mm	417	452	-35
19	RSOV to right side of front bumper	mm	4456	4145	311
20	RSOV to left side of front bumper	mm	4457	4162	295
21	Length of engine block	mm	459	459	0
RD	RSOV to right side of dash panel	mm	2906	2880	26
CD	RSOV to center of dash panel	mm	2878	2858	20
LD	RSOV to left side of dash panel	mm	2883	2858	25

DATA SHEET NO. 10... (continued)

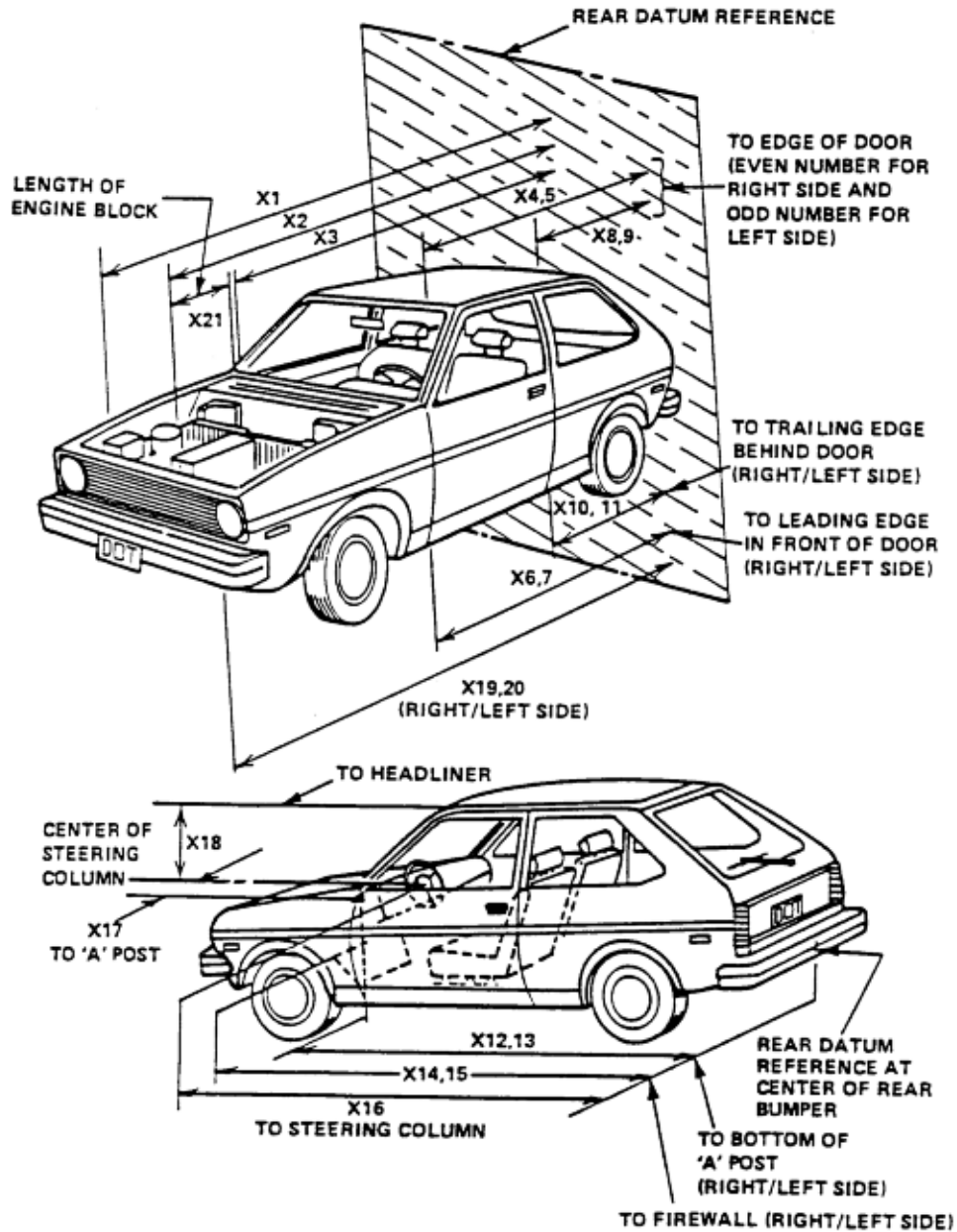
VEHICLE MEASUREMENTS

Test Vehicle: 2008 Mercedes-Benz C300

NHTSA No.: M80508

Test Program: 35mph Frontal Impact

Test Date: 10/09/2007



DATA SHEET NO. 10... (continued)**VEHICLE MEASUREMENTS**Test Vehicle: 2008 Mercedes-Benz C300NHTSA No.: M80508Test Program: 35mph Frontal ImpactTest Date: 10/09/2007**Target Vehicle Structural Measurement**

	Elements	Pre-Test (mm)
1	Total Length	4599
2	Total Width	1774
3	Bumper Top Height	493
4	Bumper Bottom Height	420
5	Longitudinal Member Top Height	511
6	Distance between Longitudinal Members	785
7	Longitudinal Member Width	60
8	Engine Top Height	847
9	Engine Bottom Height	181
10	Engine and gearbox width	744
11	Front bumper-engine distance	500
12	Front shock absorber fixing height	859
13	Bonnet leading edge height	759
14	Front shock absorber fixing width	1175
15	Front bumper – front axle distance	782
16	Front axle – a pillar distance	624
17	A-pillar – B-pillar distance	1090
18	B-Pillar – rear axle distance	1051
19	B-pillar – C-pillar distance	627
20	Roof sill bottom height	1277
21	Roof sill top height	1392
22	Floor sill bottom height	182
23	Floor sill top height	385

DATA SHEET NO. 11
CAMERA LOCATIONS

Test Vehicle: 2008 Mercedes-Benz C300
Test Program: 35mph Frontal Impact

NHTSA No.: M80508
Test Date: 10/09/2007

No.	Camera View	Location (mm) *			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Side View				13	24
2	Left Front View	1310	-4750	1200	24	1000
3	Steering Column Top	1120	-4990	1210	25	1000
4	Steering Column Bottom	1125	-5000	1160	25	1000
5	Driver Close-up	1360	-5750	1240	35	1000
6	Driver Angle	6870	-5200	2040	50	1000
7	On board Driver Side				8	1000
8	On board Passenger Side				8	1000
9	Right Overall	2150	7020	1280	24	1000
10	Right Passenger Half	1350	4820	1190	24	1000
11	Right Close-up	1420	5810	1300	35	1000
12	Right Angle	6980	5150	2200	50	1000
13	Windshield	-285	0	2860	12.5	1000
14	Top Driver	-135	-470	2180	24	1000
15	Top Passenger	-110	420	2180	24	1000
16	Pit Front	1180	0	-3150	24	1000
17	Pit Rear	3150	0	-3150	24	1000

***COORDINATES:**

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

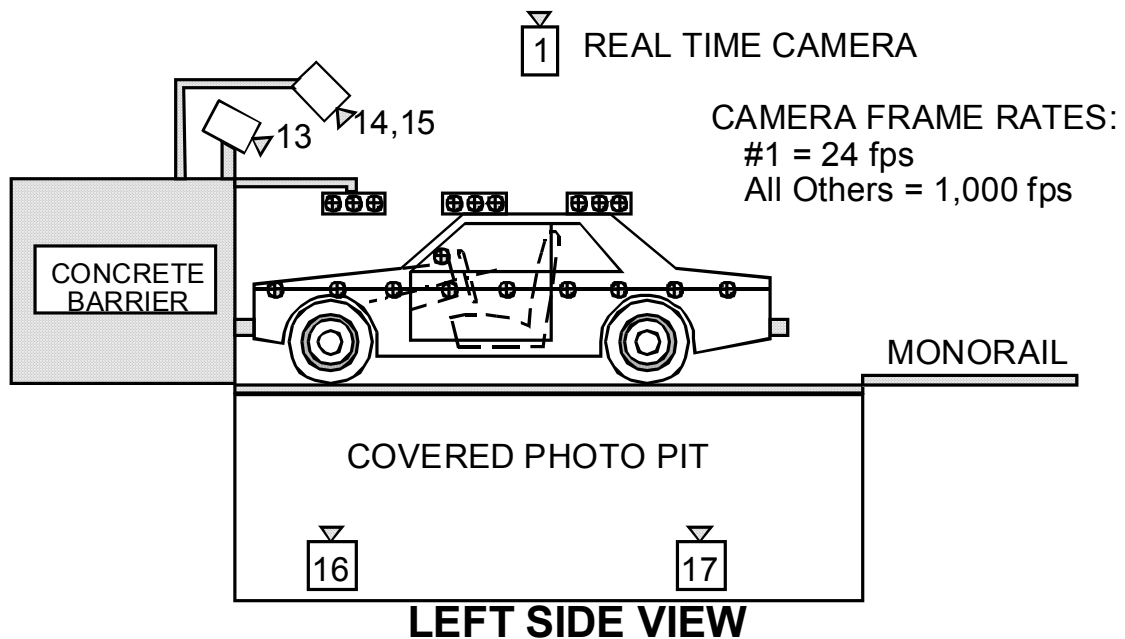
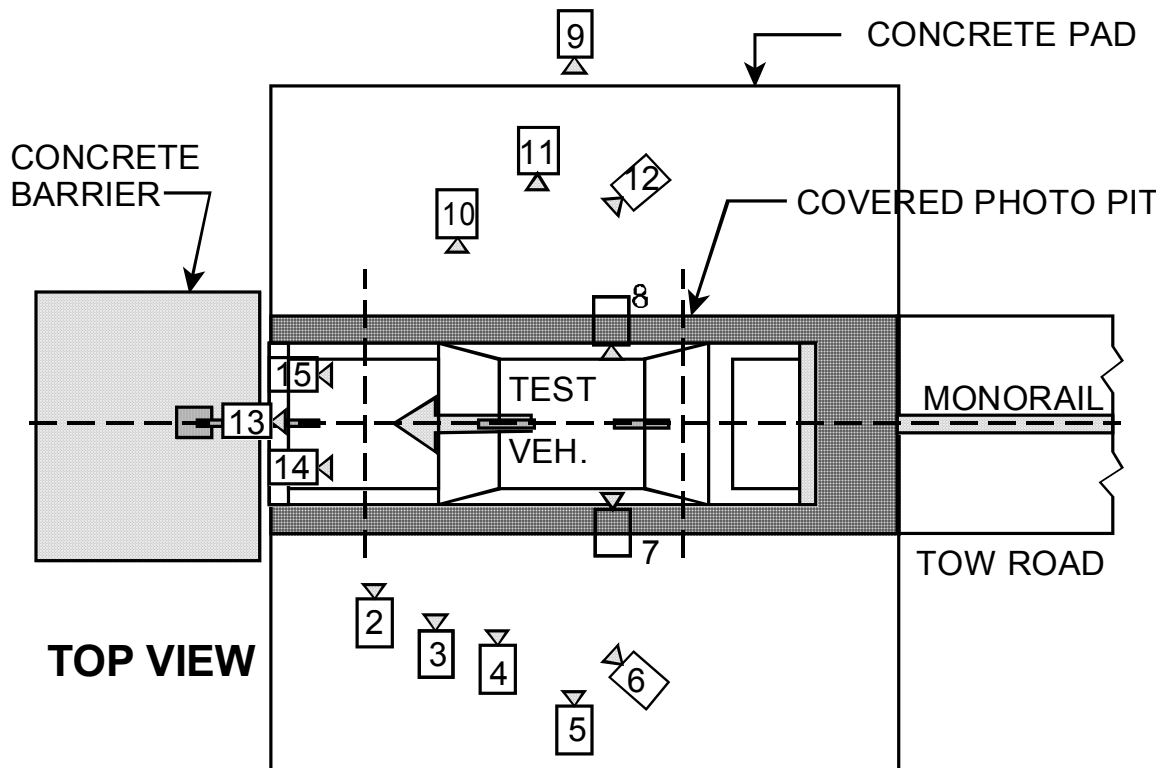
DATA SHEET NO. 11... (continued)

CAMERA LOCATIONS

Test Vehicle: 2008 Mercedes-Benz C300
Test Program: 35mph Frontal Impact

NHTSA No.: M80508
Test Date: 10/09/2007

CAMERA POSITIONS FOR FRONTAL IMPACTS

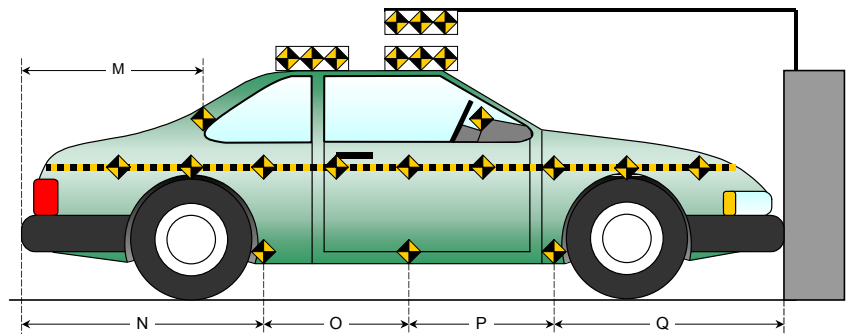
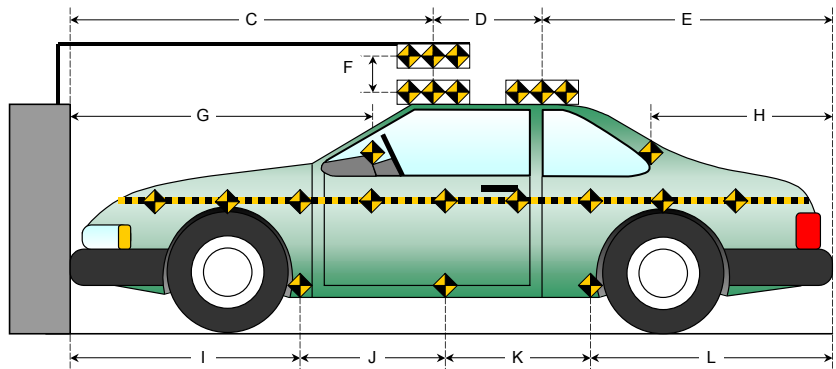
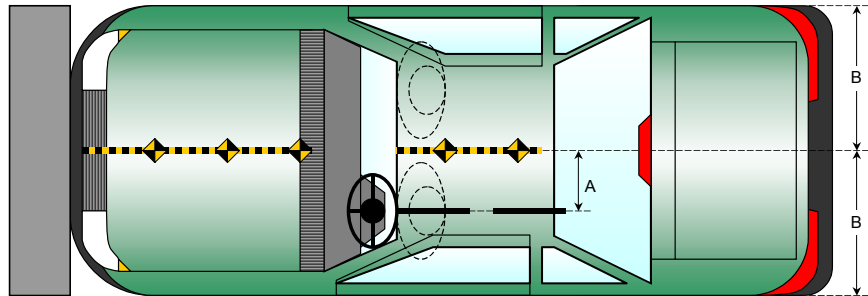


DATA SHEET NO. 12
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2008 Mercedes-Benz C300
 Test Program: 35mph Frontal Impact

NHTSA No.: M80508
 Test Date: 10/09/2007

Item	Value
A	365
B	888
C	2132
D	915
E	1552
F	204
G	
H	1038
I	1194
J	960
K	960
L	1485
M	1045
N	1484
O	960
P	960
Q	1195



DATA SHEET NO. 13
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2008 Mercedes-Benz C300
 Test Program: 35mph Frontal Impact

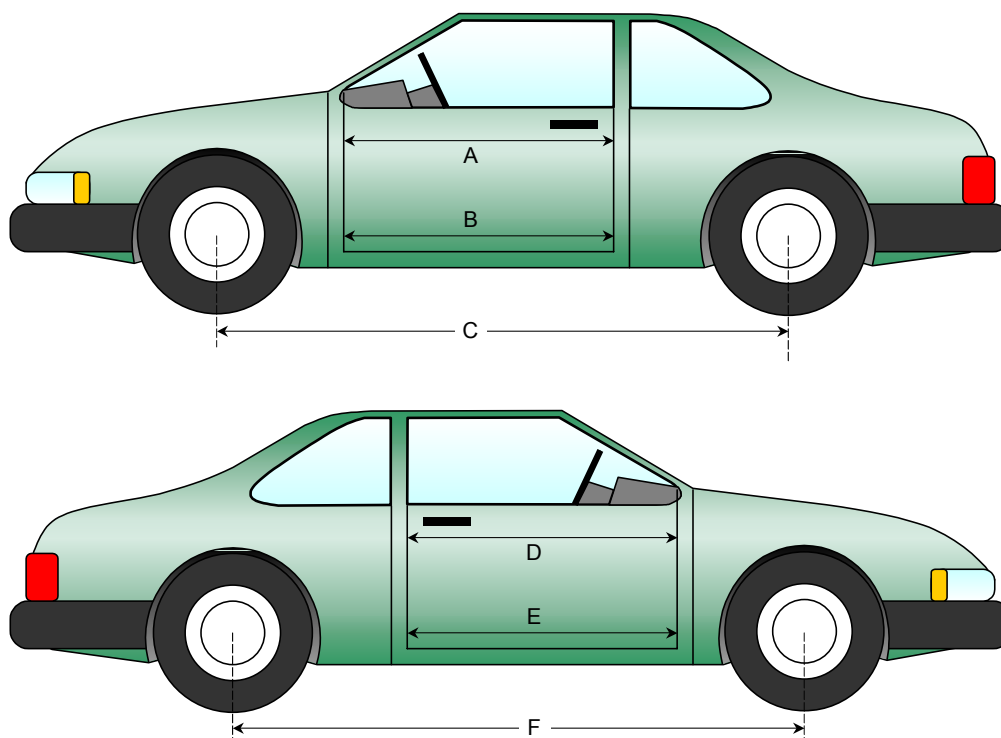
NHTSA No.: M80508
 Test Date: 10/09/2007

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	913	908	5
B	Left Side Lower	mm	821	821	0
D	Right Side Upper	mm	913	910	3
E	Right Side Lower	mm	821	820	1

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2763	2637	126
F	Right Side Wheelbase	mm	2763	2645	118



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

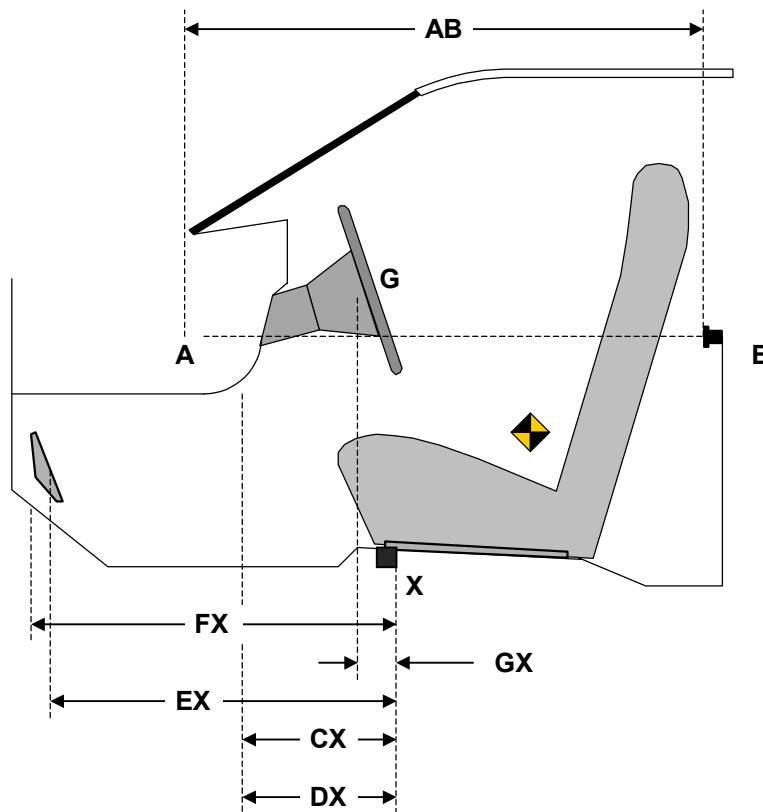
Test Vehicle: 2008 Mercedes-Benz C300
 Test Program: 35mph Frontal Impact

NHTSA No.: M80508
 Test Date: 10/09/2007

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside window jam)	mm	728	726	2
CX	Left Knee Bolster to X	mm	315	314	1
DX	Right Knee Bolster to X	mm	309	307	2
EX	Brake Pedal to X	mm	614	558	56
FX	Foot Rest to X	mm	639	638	1
GX	Center of Steering Column Wheel Hub to X	mm	89	144	-55

X = Front of Seat Track (stationary)

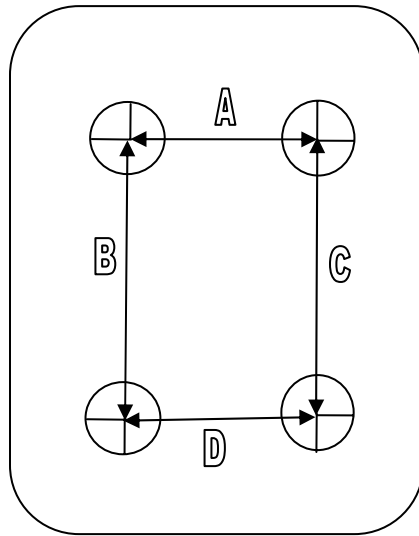


DRIVER COMPARTMENT

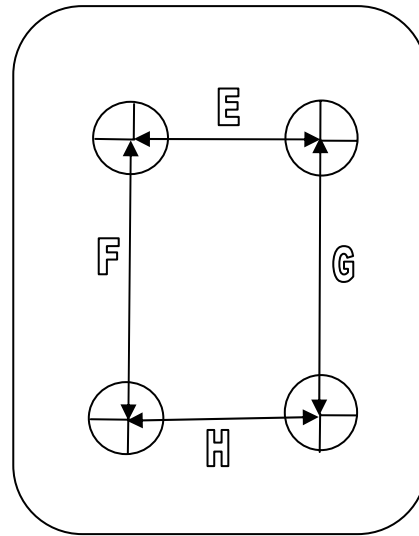
DATA SHEET NO. 13... (continued)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2008 Mercedes-Benz C300
 Test Program: 35mph Frontal Impact

NHTSA No.: M80508
 Test Date: 10/09/2007



Driver



Passenger

UNDERBODY FLOORBOARD DEFORMATION

Measurement	Pre-Test	Post-Test	Difference
A	380	376	4
B	295	292	3
C	323	323	0
D	372	372	0
E	367	364	3
F	305	305	0
G	327	327	0
H	374	374	0

DATA SHEET NO. 14

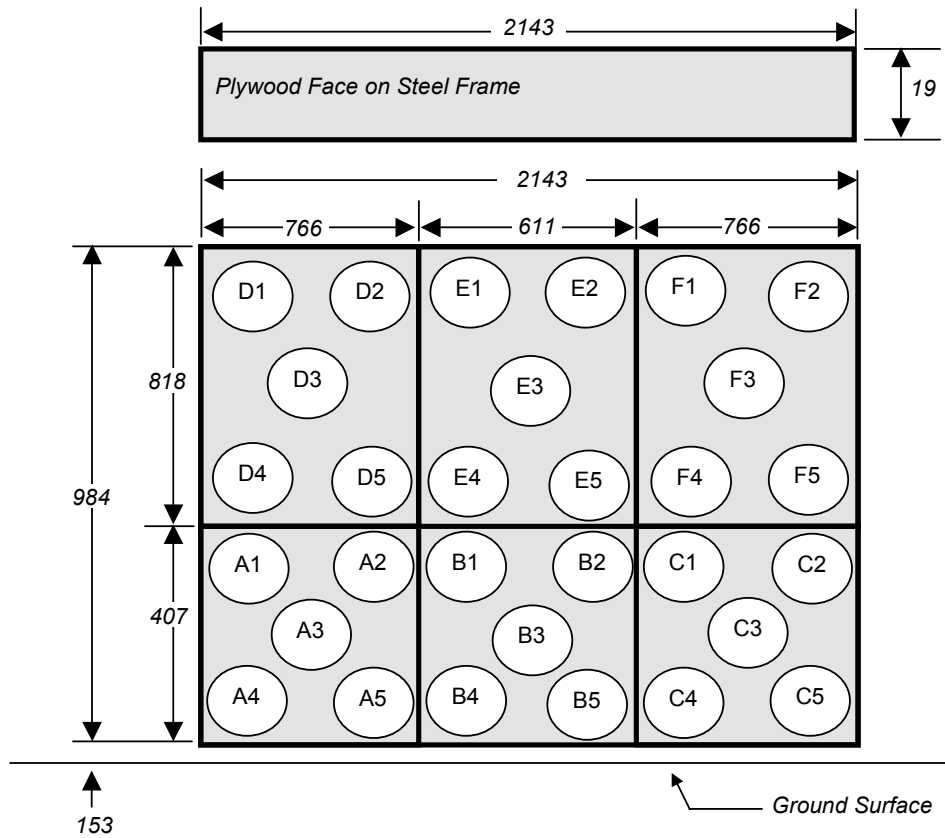
LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle: 2008 Mercedes-Benz C300
 Test Program: 35mph Frontal Impact

NHTSA No.: M80508
 Test Date: 10/09/2007

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 Mercedes-Benz C300
 Test Program: 35mph Frontal Impact

NHTSA No.: M80508
 Test Date: 10/09/2007

VEHICLE INFORMATION

VIN: WDDGF81X28F051358 Wheelbase (mm) : 2760
 Vehicle Size Category: Sedan Test Weight (kg) : 1864.3

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): 56.2
 Velocity Change (km/h): 63.9 Time of Separation (msec): 88

CRUSH PROFILE

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

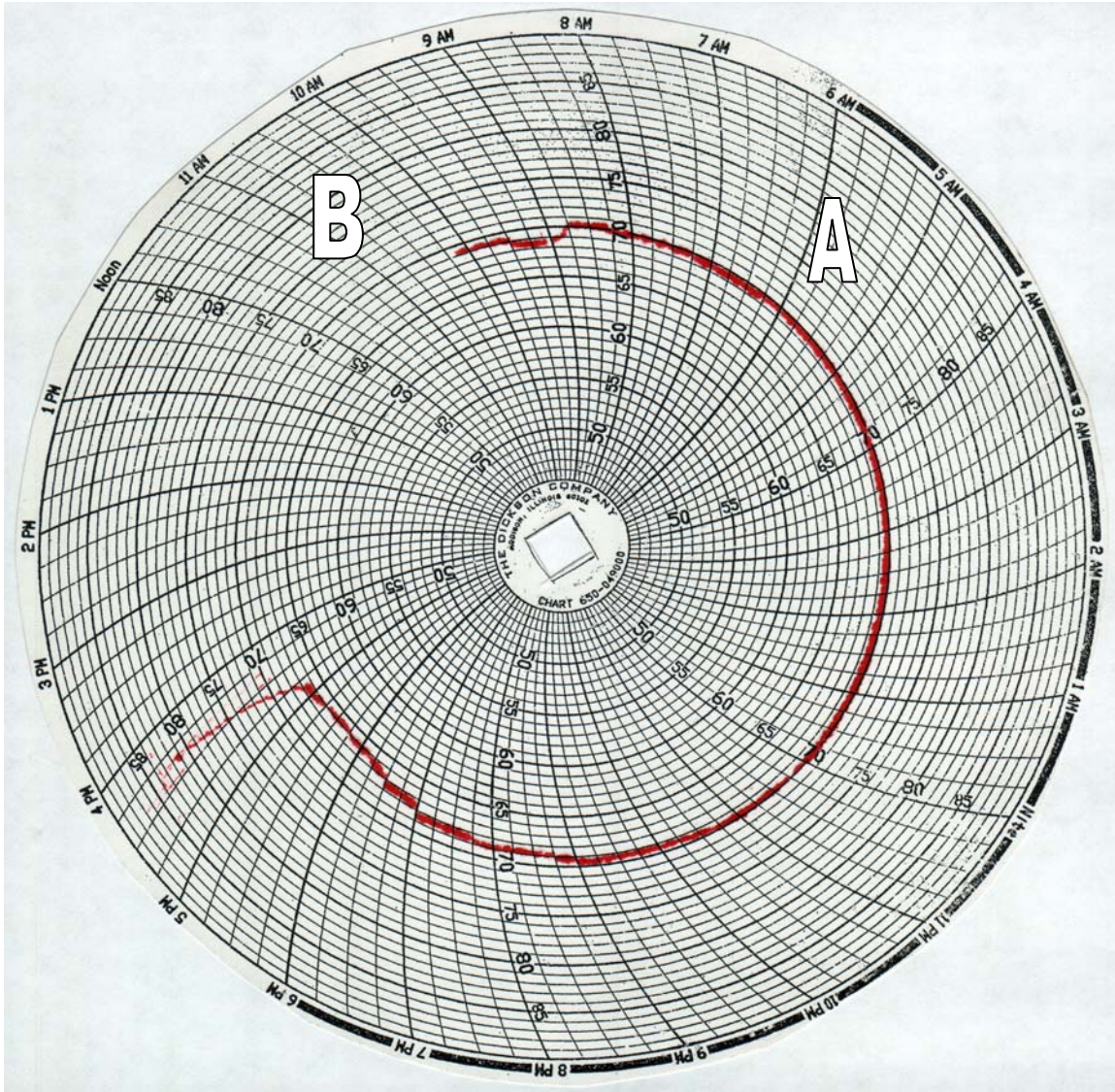
No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	4457	4162	295
C2	Crush zone 2 at left side	mm	4530	4114	416
C3	Crush zone 3 at left side	mm	4574	4126	448
C4	Crush zone 4 at right side	mm	4577	4124	453
C5	Crush zone 5 at right side	mm	4532	4115	417
C6	Crush zone 6 at right side	mm	4456	4145	311
L	C1 TO C6	mm	1375	1353	22

DATA SHEET NO. 16

DUMMY / VEHICLE TEMPERATURE STABILIZATION CHART

Test Vehicle: 2008 Mercedes-Benz C300
Test Program: 35mph Frontal Impact

NHTSA No.: M80508
Test Date: 10/09/2007



A = Dummies installed in vehicle at 6:00 am

B = Test conducted at 10:30 am

APPENDIX A
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

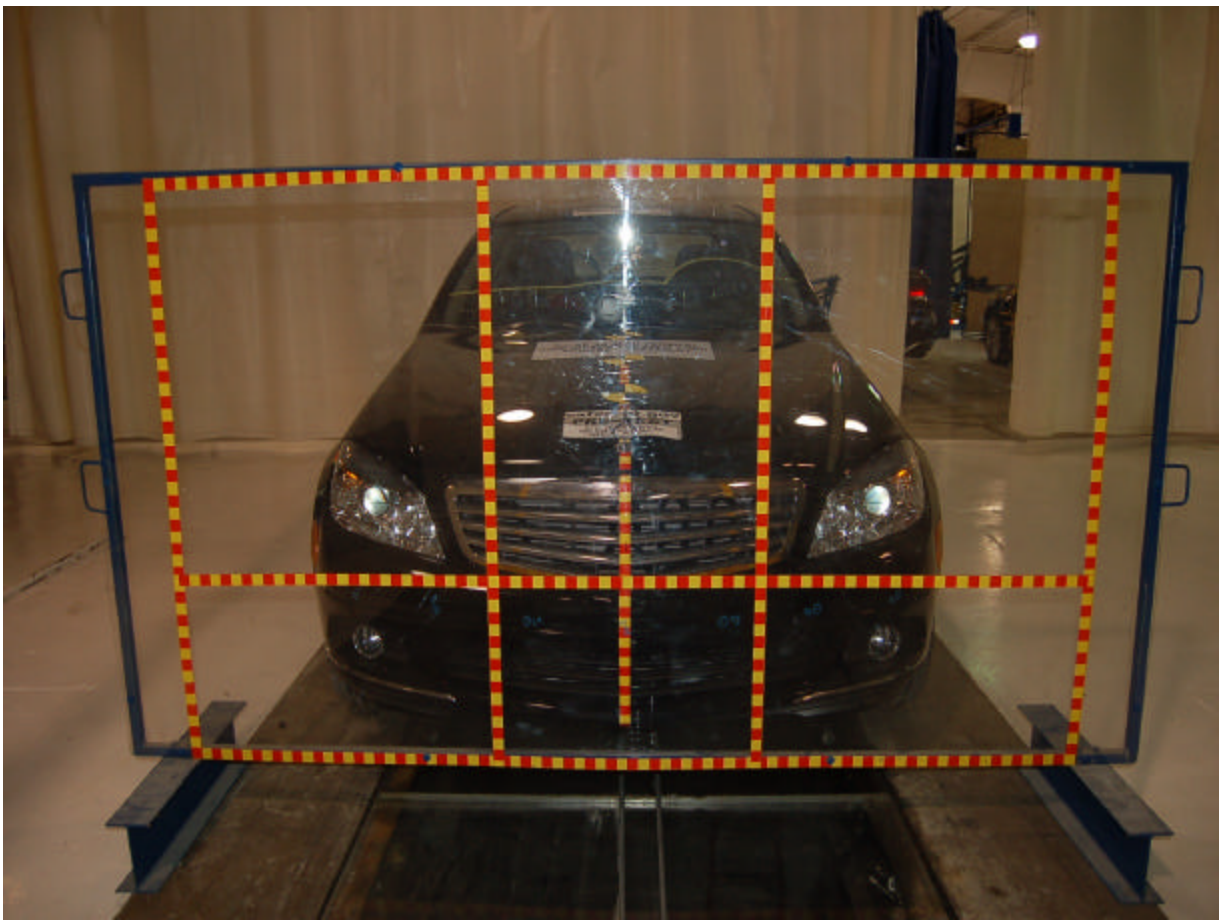
		<u>Page No.</u>
Photo No. 1.	Load Cell Location	A-1
Photo No. 2.	Manufacturer's Label	A-2
Photo No. 3.	Tire Placard	A-2
Photo No. 4.	Left Front $\frac{3}{4}$ View, As Received	A-3
Photo No. 5.	Right Rear $\frac{3}{4}$ View, As Received	A-3
Photo No. 6.	Pre-Test Front View	A-4
Photo No. 7.	Post-Test Front View	A-4
Photo No. 8.	Pre-Test Left Side View	A-5
Photo No. 9.	Post-Test Left Side View	A-5
Photo No. 10.	Pre-Test Right Side View	A-6
Photo No. 11.	Post-Test Right Side View	A-6
Photo No. 12.	Pre-Test Right Front $\frac{3}{4}$ View	A-7
Photo No. 13.	Post-Test Right Front $\frac{3}{4}$ View	A-7
Photo No. 14.	Pre-Test Left Rear $\frac{3}{4}$ View	A-8
Photo No. 15.	Post-Test Left Rear $\frac{3}{4}$ View	A-8
Photo No. 16.	Pre-Test Left Side $\frac{3}{4}$ View of Doors	A-9
Photo No. 17.	Post-Test Left Side $\frac{3}{4}$ View of Doors After Impact	A-9
Photo No. 18.	Pre-Test Right Side $\frac{3}{4}$ View of Doors	A-10
Photo No. 19.	Post-Test Right Side $\frac{3}{4}$ View of Doors After Impact	A-10
Photo No. 20.	Pre-Test Windshield View	A-11
Photo No. 21.	Post-Test Windshield View	A-11
Photo No. 22.	Pre-Test Engine Compartment View	A-12
Photo No. 23.	Post-Test Engine Compartment View	A-12
Photo No. 24.	Pre-Test Fuel Cap View	A-13
Photo No. 25.	Post-Test Fuel Cap View	A-13
Photo No. 26.	Pre-Test Front Underbody View	A-14
Photo No. 27.	Post-Test Front Underbody View	A-14

Page No.

Photo No. 28.	Pre-Test Mid Front Underbody View	A-15
Photo No. 29.	Pre-Test Mid Rear Underbody View	A-15
Photo No. 30.	Post-Test Mid Underbody View	A-16
Photo No. 31.	Pre-Test Rear Underbody View	A-17
Photo No. 32.	Post-Test Rear Underbody View	A-17
Photo No. 33.	Pre-Test Driver Dummy Front View (Head Position)	A-18
Photo No. 34.	Post-Test Driver Dummy Front View (Head Position)	A-18
Photo No. 35.	Pre-Test Driver Dummy (Through Window)	A-19
Photo No. 36.	Post-Test Driver Dummy (Through Window)	A-19
Photo No. 37.	Pre-Test Driver Dummy (Door Open)	A-20
Photo No. 38.	Post-Test Driver Dummy (Door Open)	A-20
Photo No. 39.	Pre-Test Driver Dummy Feet	A-21
Photo No. 40.	Post-Test Driver Dummy Feet	A-21
Photo No. 41.	Pre-Test Driver Side Knee Bolster	A-22
Photo No. 42.	Post-Test Driver Side Knee Bolster	A-22
Photo No. 43.	Pre-Test Driver Side Floor Pan	A-23
Photo No. 44.	Post-Test Driver Side Floor Pan	A-23
Photo No. 45.	Post-Test Driver Dummy Head Contact (headrest)	A-24
Photo No. 46.	Post-Test Driver Dummy Head Contact (side header)	A-24
Photo No. 47.	Post-Test Driver Dummy Knee Contact	A-25
Photo No. 48.	Post-Test Driver Dummy Airbag Contact	A-25
Photo No. 49.	Pre-Test Passenger Dummy Front View (Head Position)	A-26
Photo No. 50.	Post-Test Passenger Dummy Front View (Head Position)	A-26
Photo No. 51.	Pre-Test Passenger Dummy (Through Window)	A-27
Photo No. 52.	Post-Test Passenger Dummy (Through Window)	A-27
Photo No. 53.	Pre-Test Passenger Dummy (Door Open)	A-28
Photo No. 54.	Post-Test Passenger Dummy (Door Open)	A-28
Photo No. 55.	Pre-Test Passenger Dummy Feet	A-29
Photo No. 56.	Post-Test Passenger Dummy Feet	A-29

Page No.

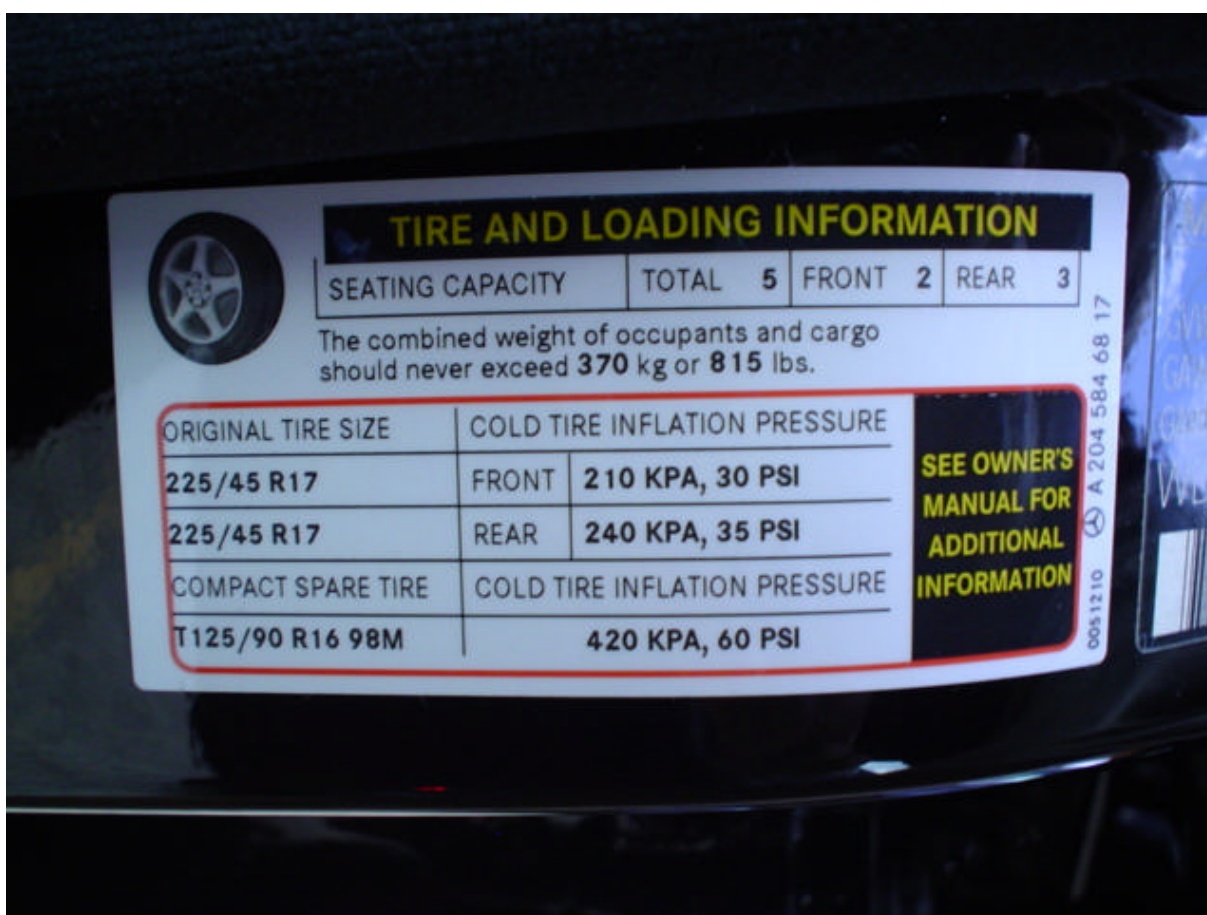
Photo No. 57.	Pre-Test Passenger Side Glove Box	A-30
Photo No. 58.	Post-Test Passenger Side Glove Box	A-30
Photo No. 59.	Pre-Test Passenger Side Floor Pan	A-31
Photo No. 60.	Post-Test Passenger Side Floor Pan	A-31
Photo No. 61.	Post-Test Passenger Dummy Head Contact (headrest)	A-32
Photo No. 62.	Post-Test Passenger Dummy Head Contact (visor & side header)	A-32
Photo No. 63.	Post-Test Passenger Dummy Knee Contact	A-33
Photo No. 64.	Post-Test Passenger Dummy Airbag Contact	A-33
Photo No. 65.	Rollover 90 Degrees	A-34
Photo No. 66.	Rollover 180 Degrees	A-34
Photo No. 67.	Rollover 270 Degrees	A-35
Photo No. 68.	Rollover 360 Degrees	A-35
Photo No. 69.	Vehicle Impact	A-36



Load Cell Location



Manufacturer's Label



Tire Placard



Left Front $\frac{3}{4}$ View, As Received



Right Rear $\frac{3}{4}$ 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 $\frac{3}{4}$ View



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



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



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



Pre-Test Left Side 3/4 View of Doors



Post-Test Left Side 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



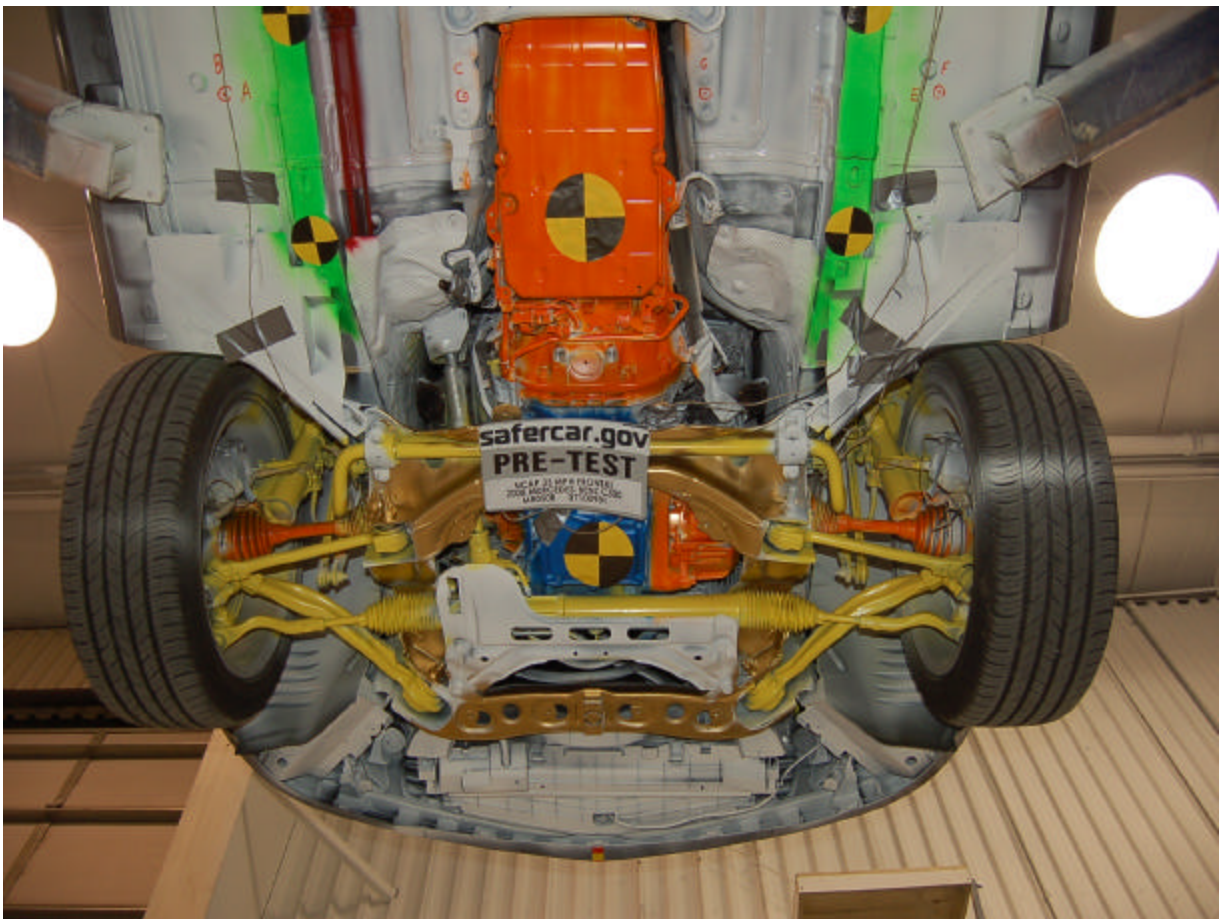
Post-Test Engine Compartment View



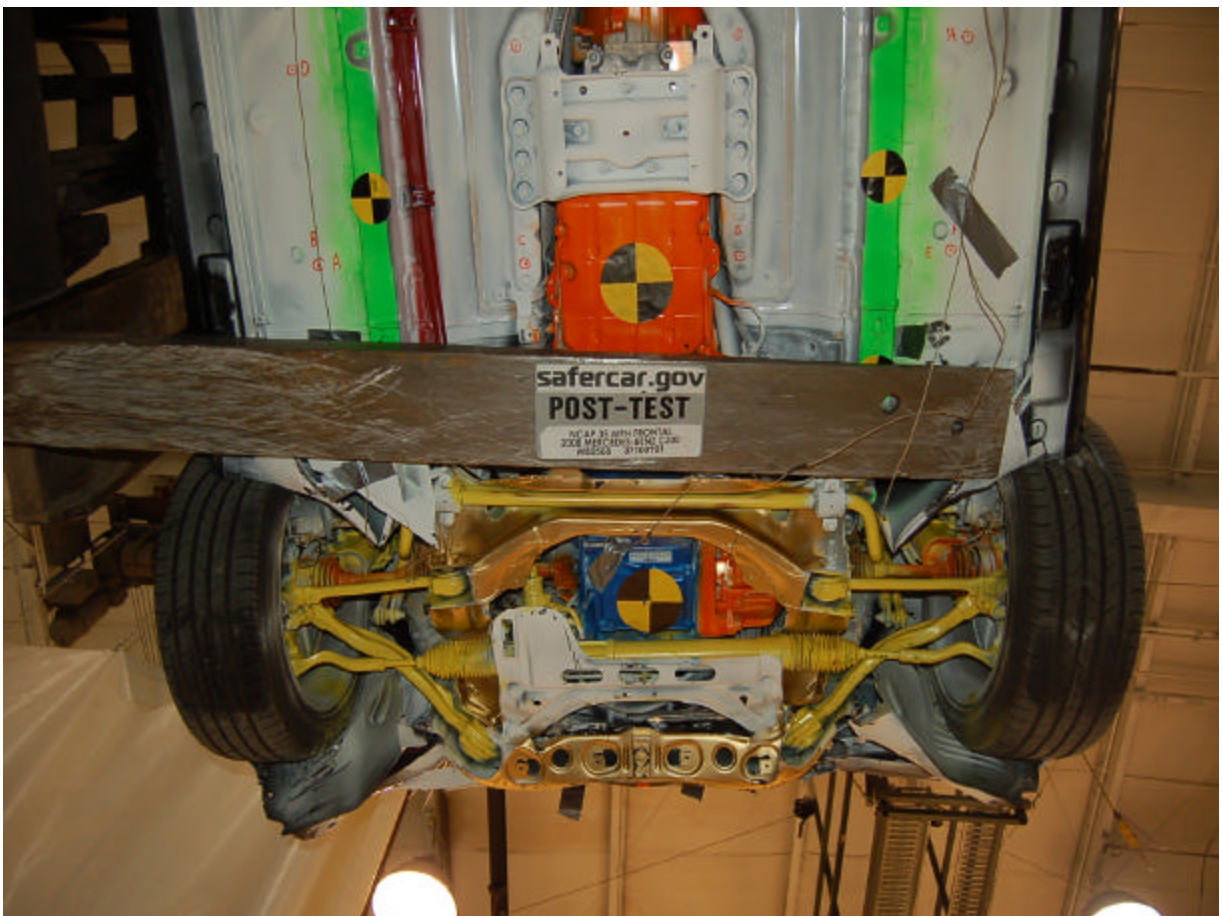
Pre-Test Fuel Cap View



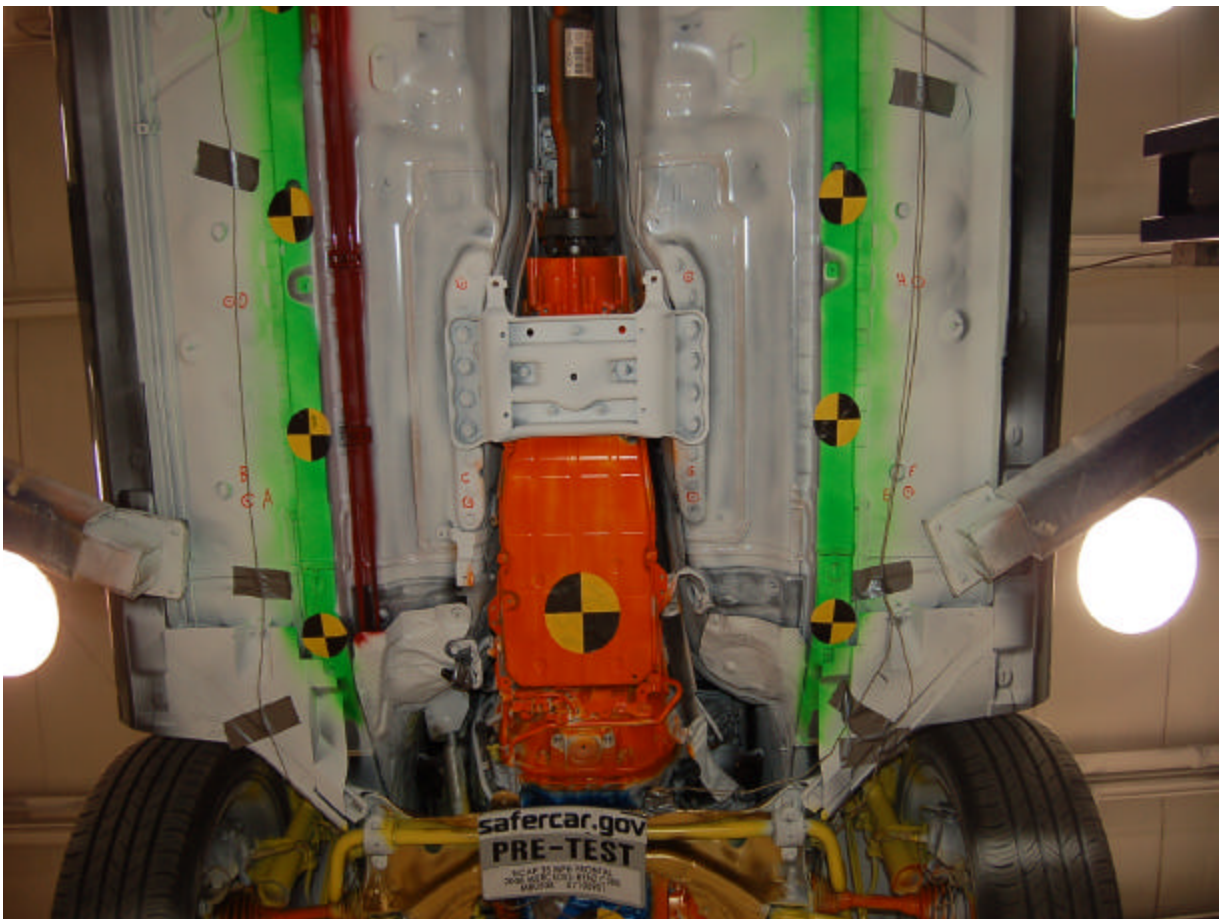
Post-Test Fuel Cap View



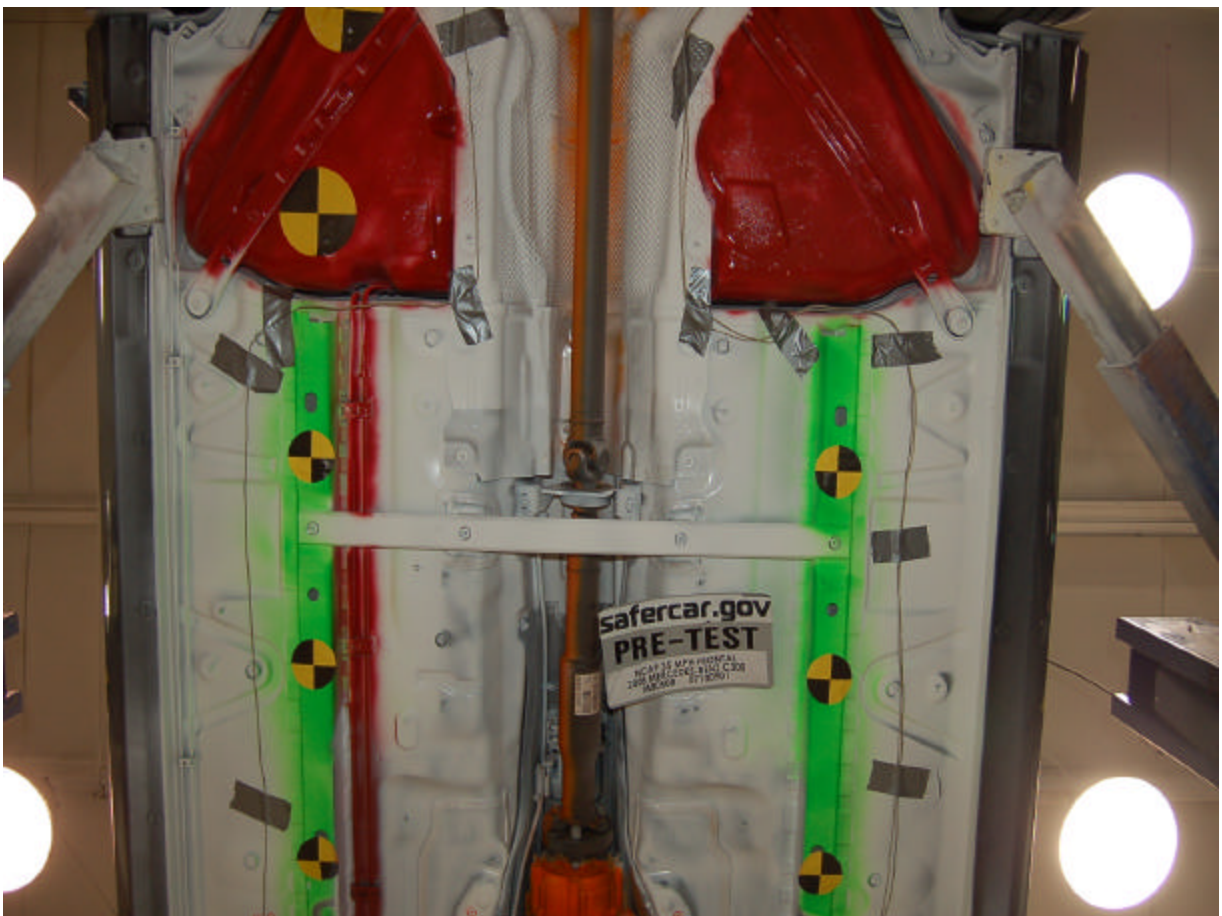
Pre-Test Front Underbody View



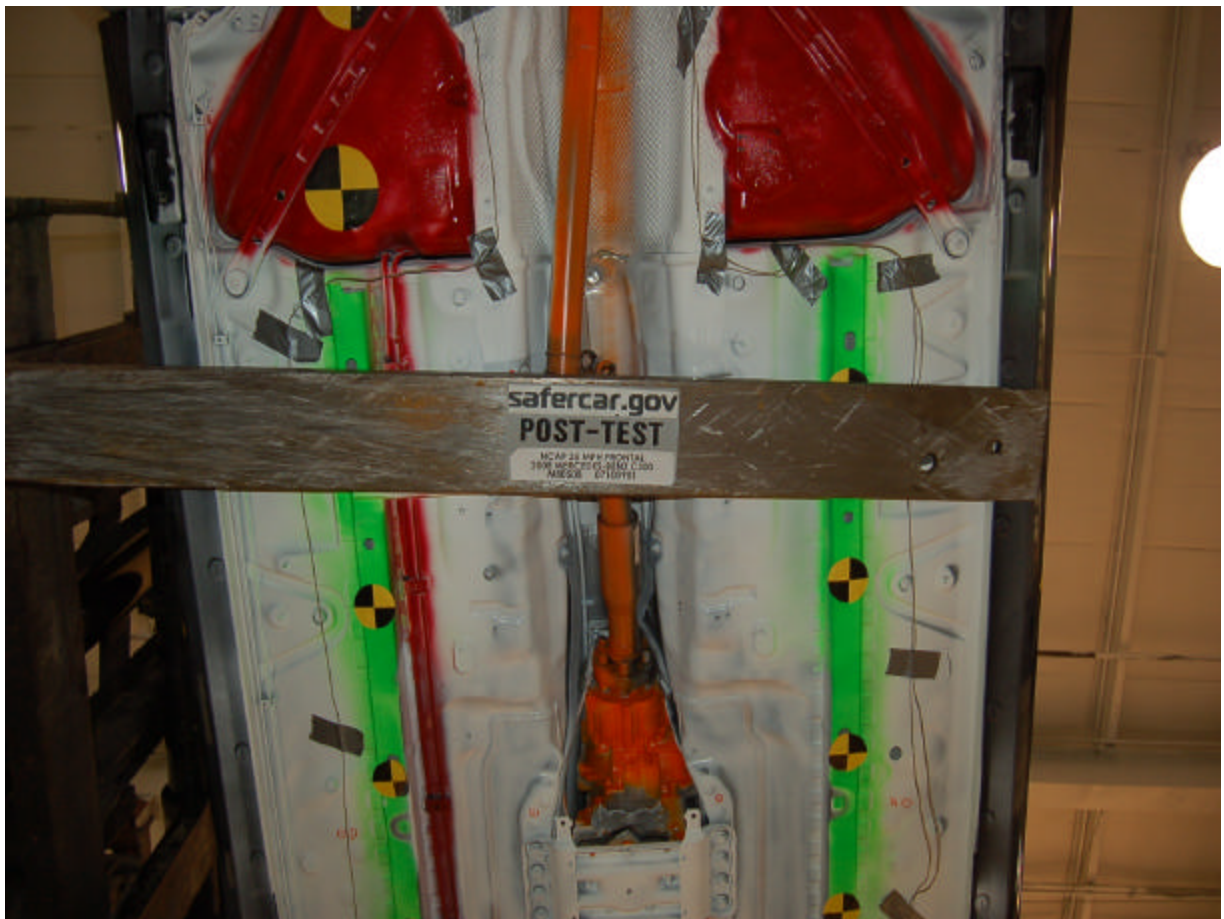
Post-Test Front Underbody View



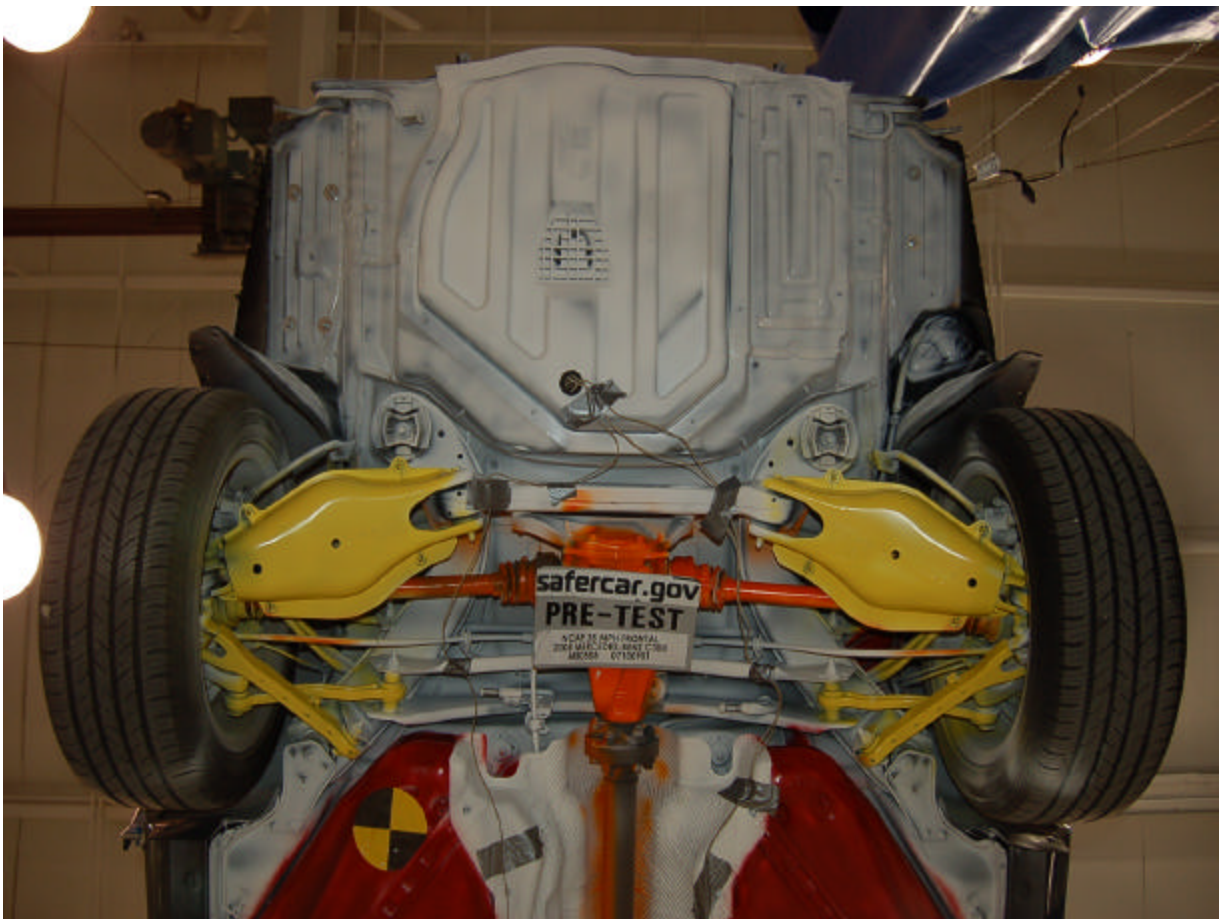
Pre-Test Mid Front Underbody View



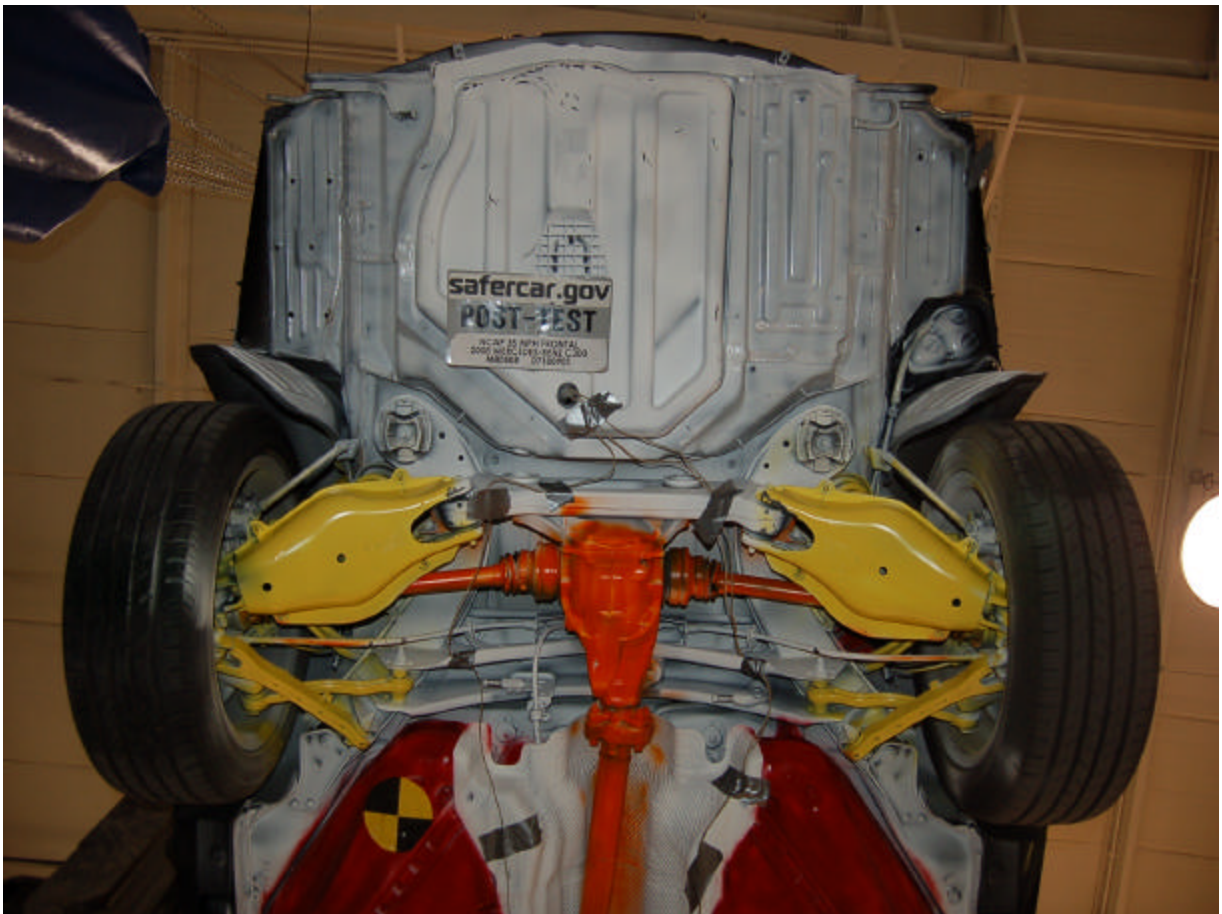
Pre-Test Mid Rear Underbody View



Post-Test Mid Underbody View



Pre-Test Rear Underbody View



Post-Test Rear Underbody View



Pre-Test 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



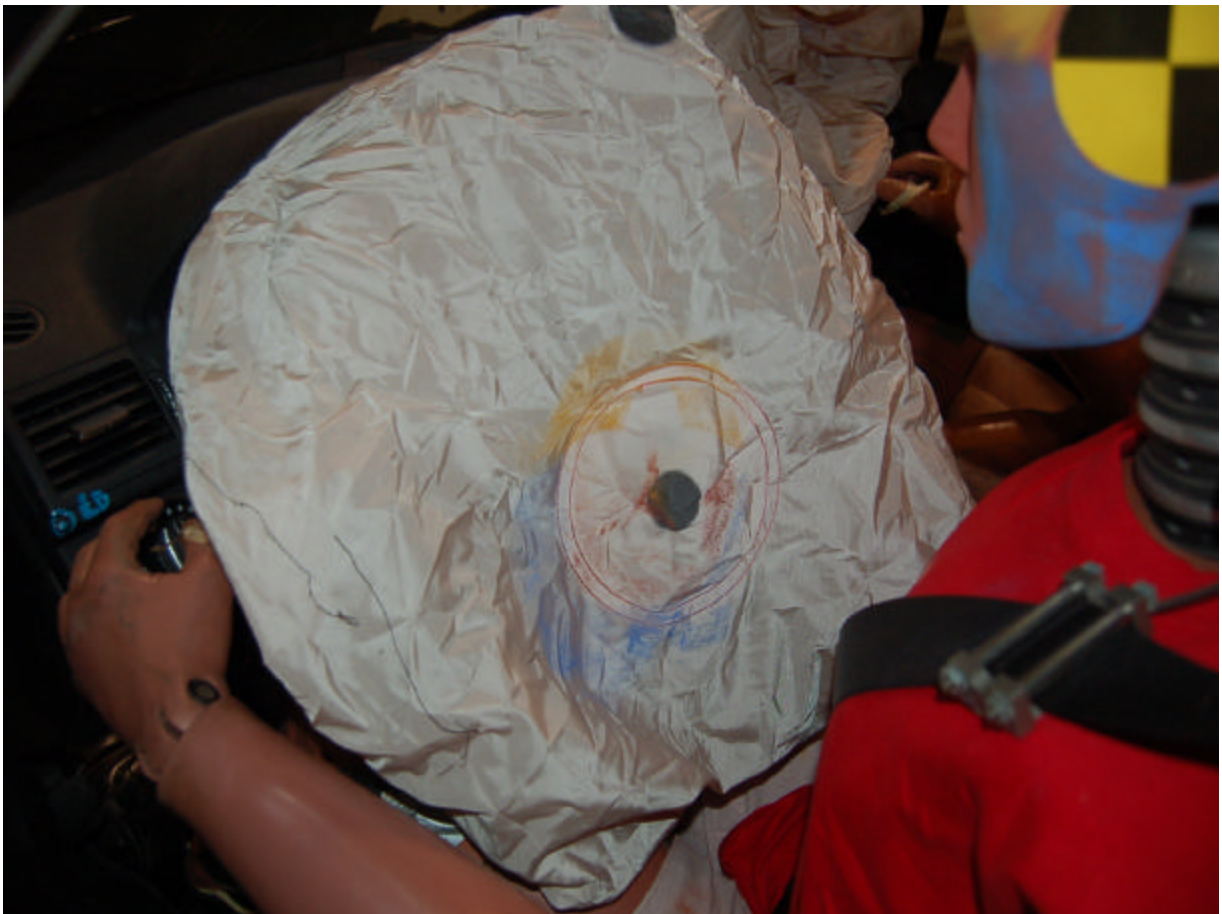
Post-Test Driver Dummy Head Contact (headrest)



Post-Test Driver Dummy Head Contact (side header)



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



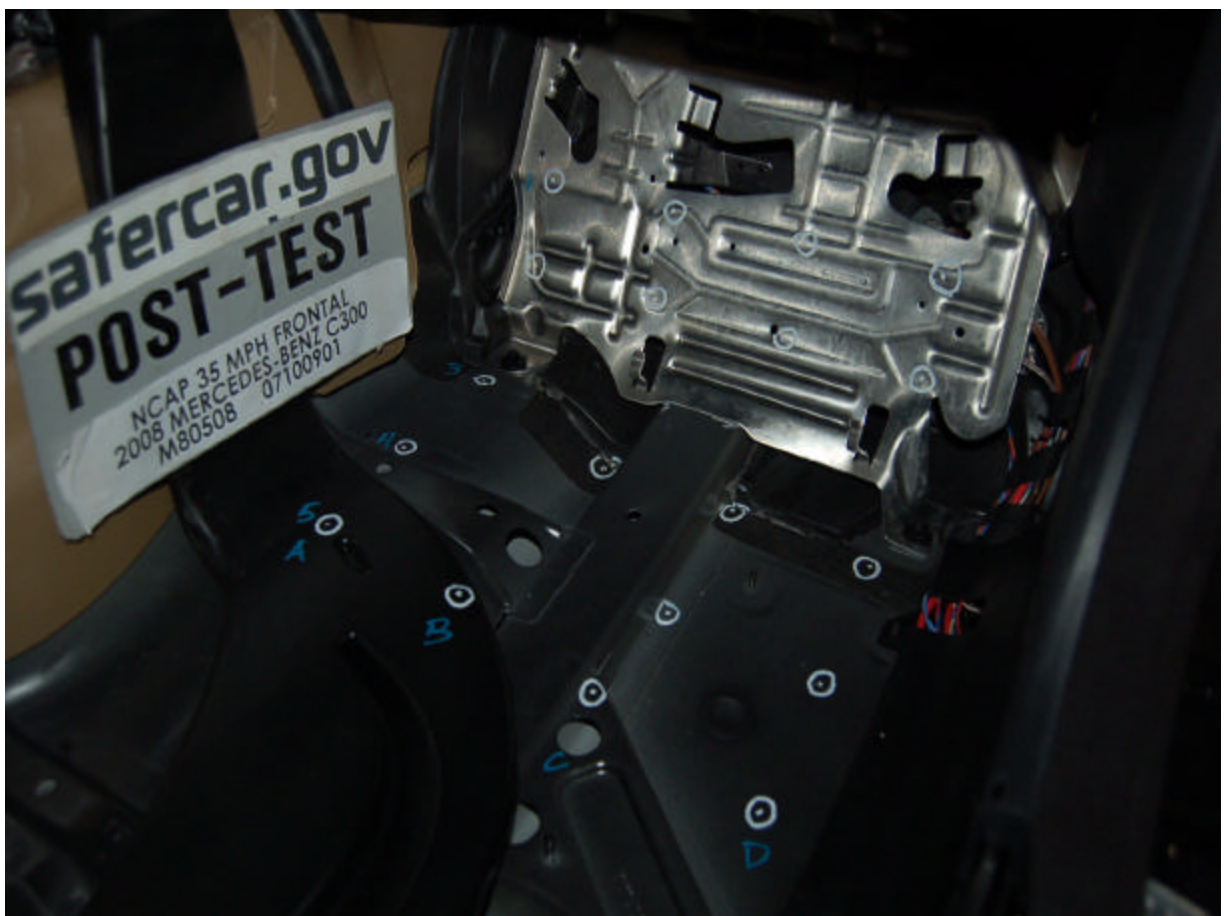
Pre-Test Passenger Side Glove Box



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 Head Contact (visor & side header)



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

APPENDIX B
DUMMY RESPONSE DATA TRACES

TABLE OF DATA PLOTS

Page No.

List of Data Plots Provided in the Test Report

Figure No. 1.	Driver Head X Acceleration vs. Time	B-1
Figure No. 2.	Driver Head Y Acceleration vs. Time	B-1
Figure No. 3.	Driver Head Z Acceleration vs. Time	B-1
Figure No. 4.	Driver Head Resultant Acceleration vs. Time	B-1
Figure No. 5.	Driver Head X Velocity vs. Time	B-2
Figure No. 6.	Driver Head Y Velocity vs. Time	B-2
Figure No. 7.	Driver Head Z Velocity vs. Time	B-2
Figure No. 8.	Driver Chest X Acceleration vs. Time	B-3
Figure No. 9.	Driver Chest Y Acceleration vs. Time	B-3
Figure No. 10.	Driver Chest Z Acceleration vs. Time	B-3
Figure No. 11.	Driver Chest Resultant Acceleration vs. Time	B-3
Figure No. 12.	Driver Chest X Velocity vs. Time	B-4
Figure No. 13.	Driver Chest Y Velocity vs. Time	B-4
Figure No. 14.	Driver Chest Z Velocity vs. Time	B-4
Figure No. 15.	Driver Left Femur Force vs. Time	B-5
Figure No. 16.	Driver Right Femur Force vs. Time	B-5
Figure No. 17.	Passenger Head X Acceleration vs. Time	B-6
Figure No. 18.	Passenger Head Y Acceleration vs. Time	B-6
Figure No. 19.	Passenger Head Z Acceleration vs. Time	B-6
Figure No. 20.	Passenger Head Resultant Acceleration vs. Time	B-6
Figure No. 21.	Passenger Head X Velocity vs. Time	B-7
Figure No. 22.	Passenger Head Y Velocity vs. Time	B-7
Figure No. 23.	Passenger Head Z Velocity vs. Time	B-7
Figure No. 24.	Passenger Chest X Acceleration vs. Time	B-8
Figure No. 25.	Passenger Chest Y Acceleration vs. Time	B-8
Figure No. 26.	Passenger Chest Z Acceleration vs. Time	B-8
Figure No. 27.	Passenger Chest Resultant Acceleration vs. Time	B-8
Figure No. 28.	Passenger Chest X Velocity vs. Time	B-9

Figure No. 29.	Passenger Chest Y Velocity vs. Time	B-9
Figure No. 30.	Passenger Chest Z Velocity vs. Time	B-9
Figure No. 31.	Passenger Left Femur Force vs. Time	B-10
Figure No. 32.	Passenger Right Femur Force vs. Time	B-10

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

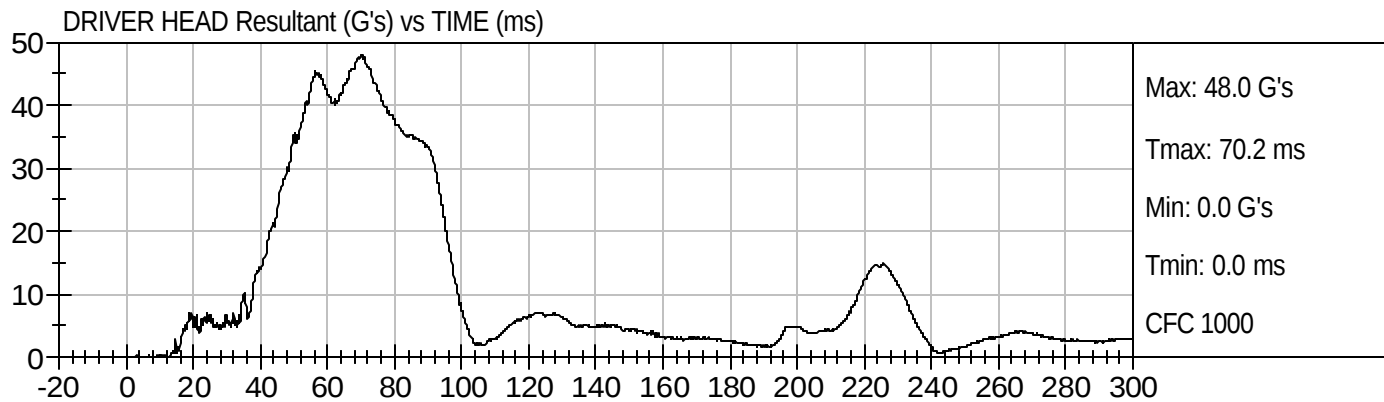
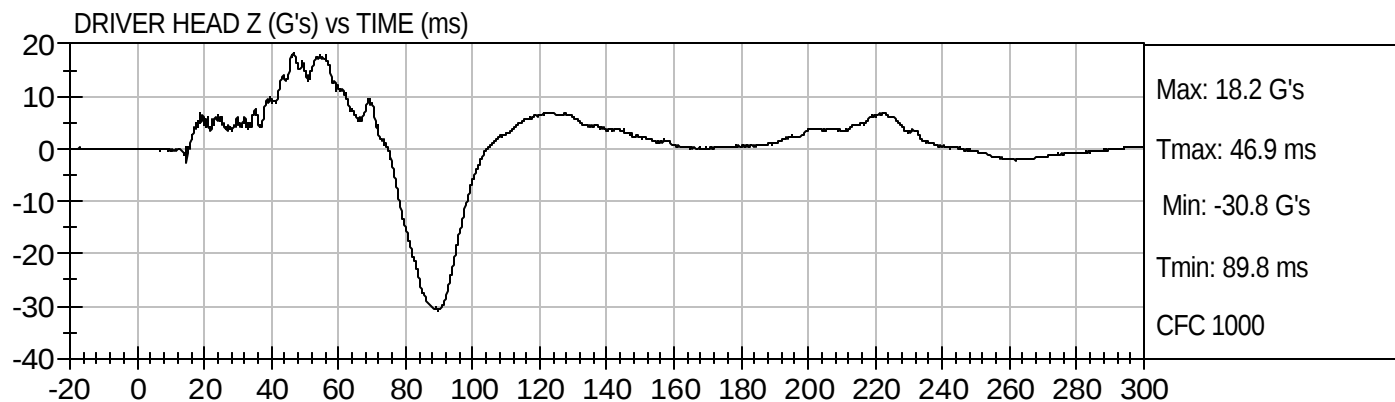
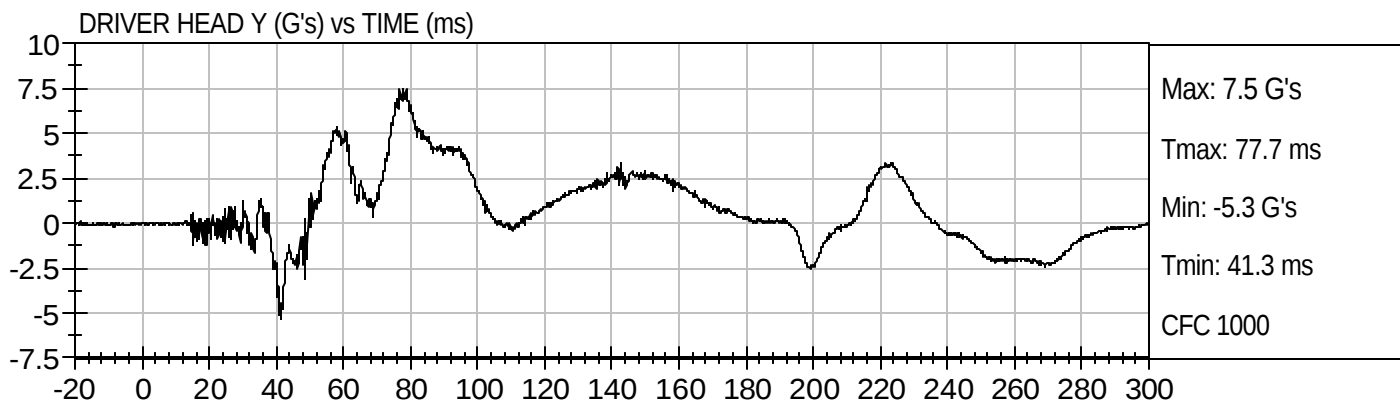
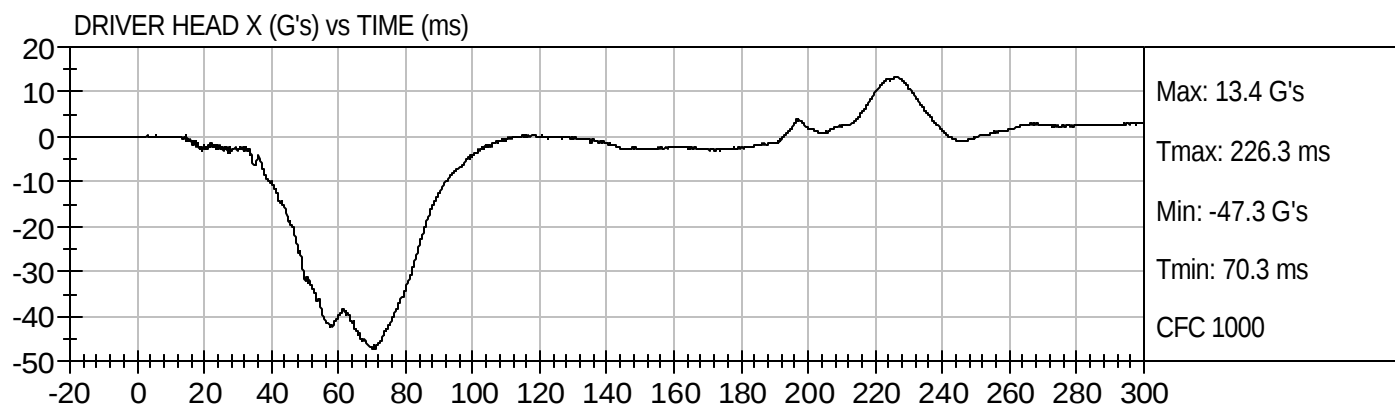
Driver Left Lower Tibia Force Z

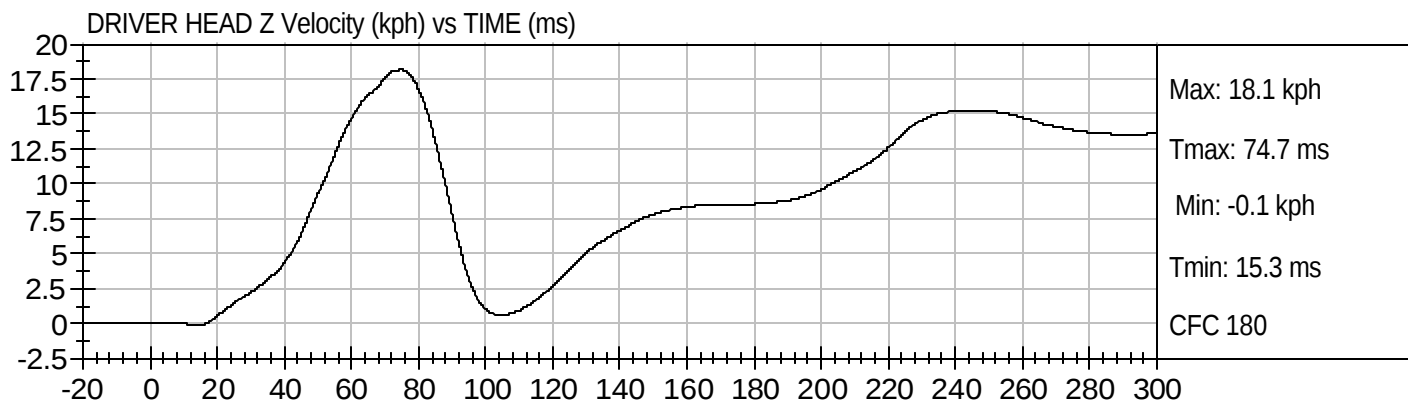
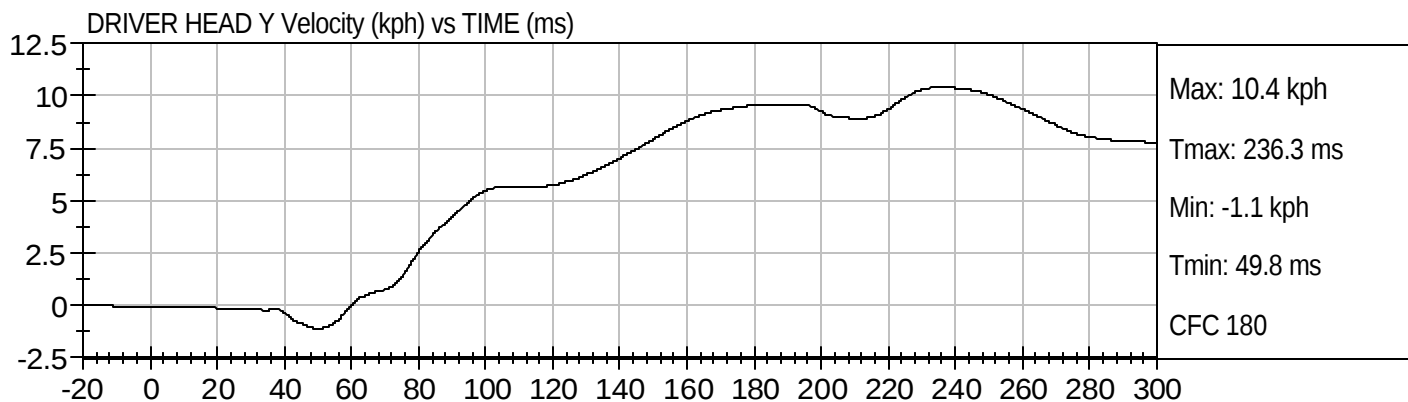
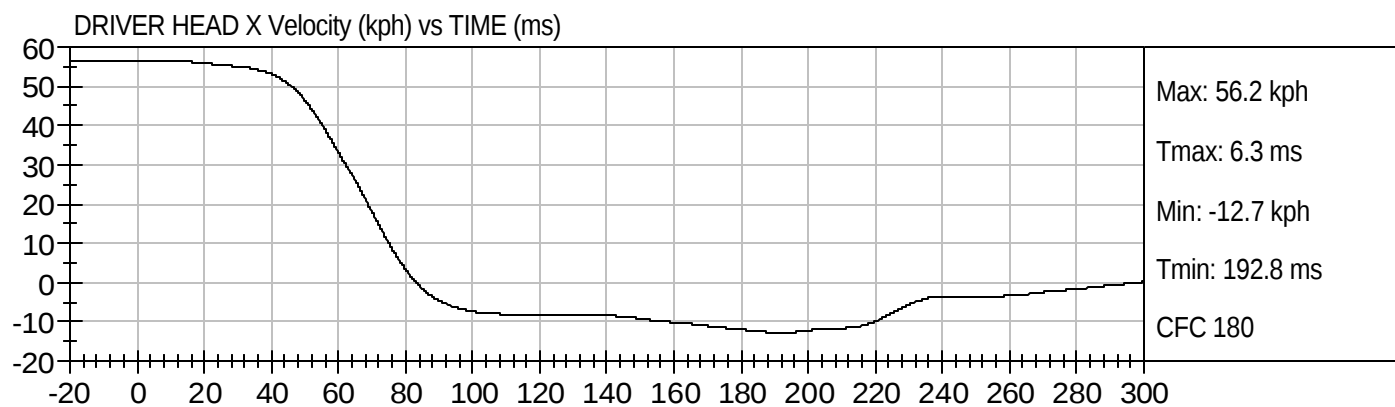
Driver Right Upper Tibia Moment X

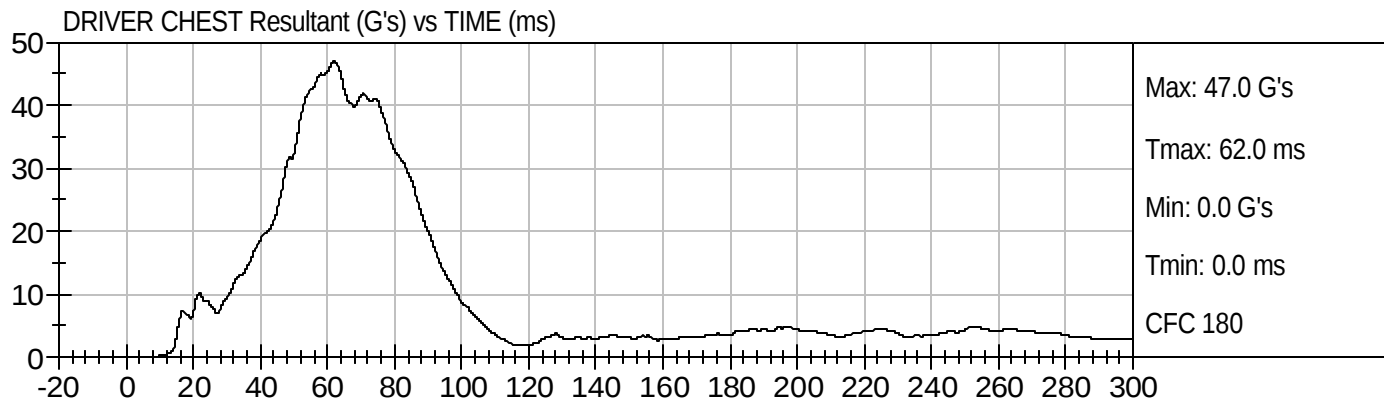
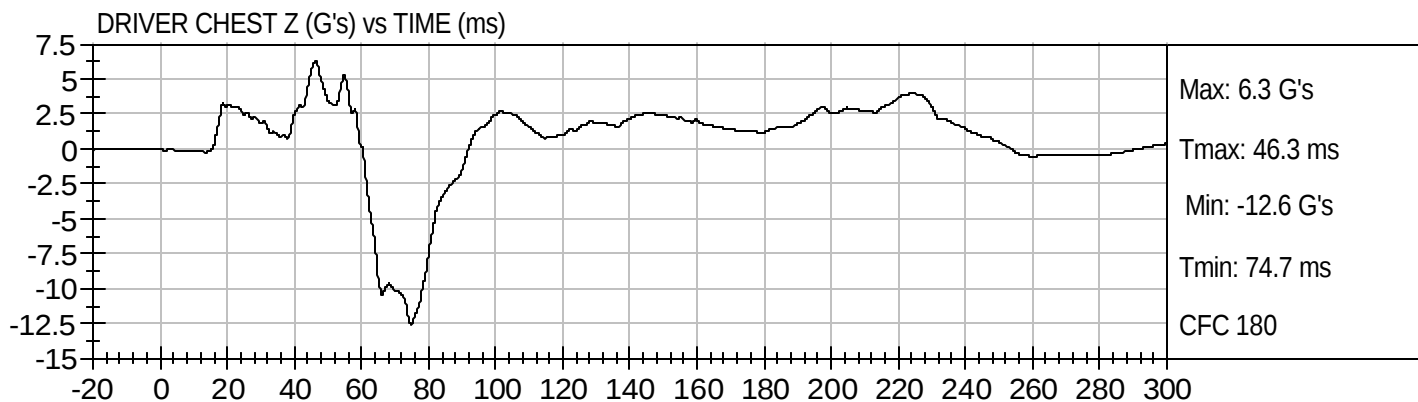
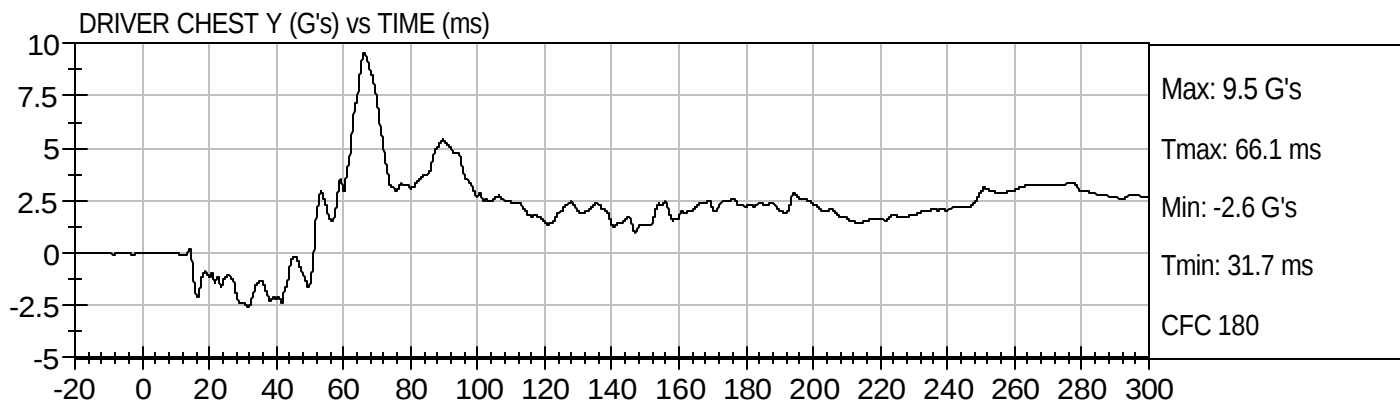
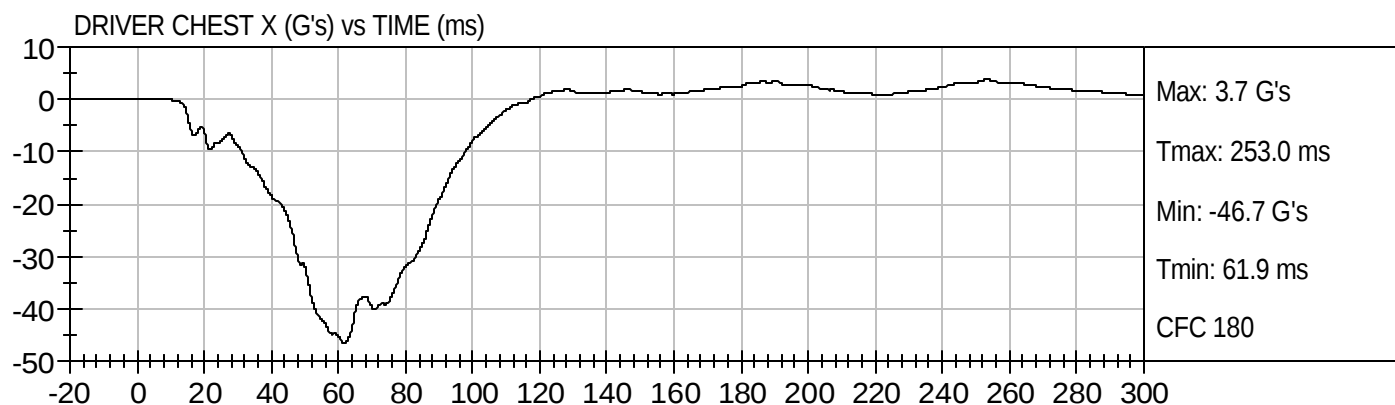
Driver Right Upper Tibia Moment Y

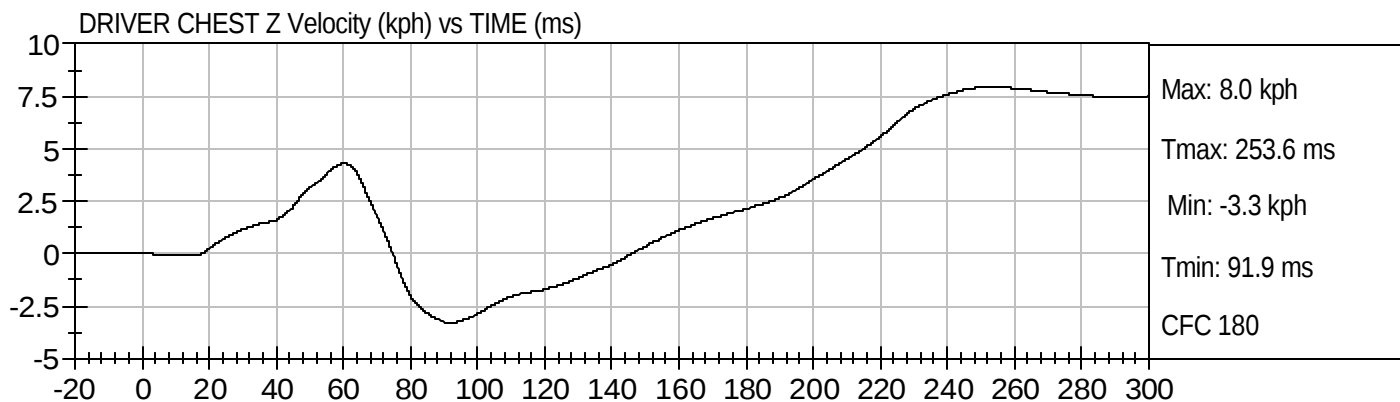
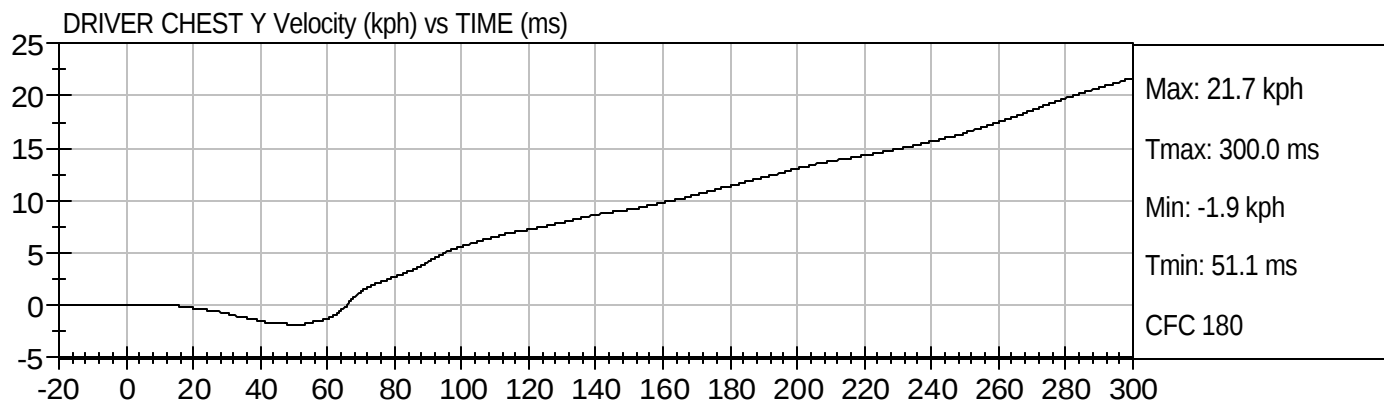
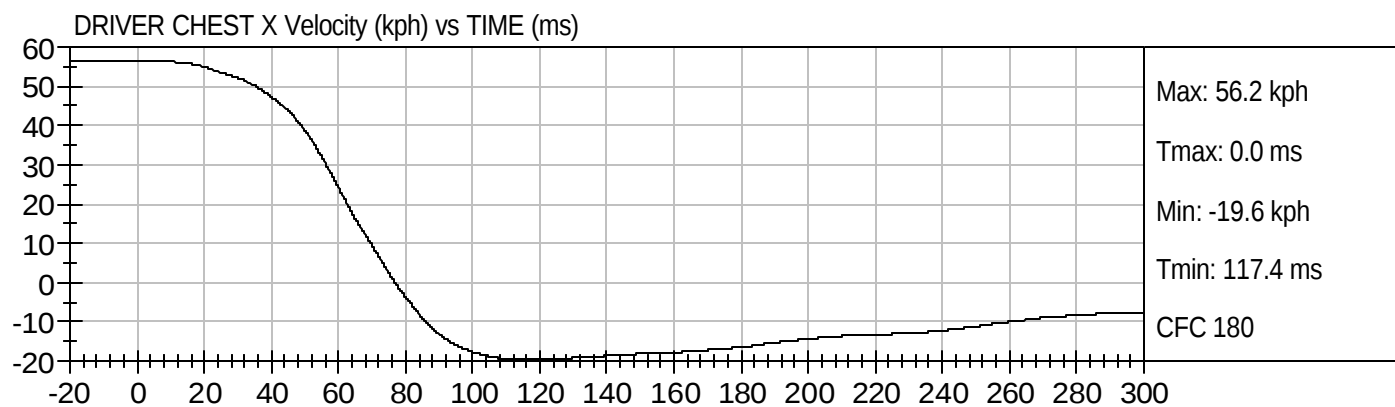
Driver Right Upper Tibia Force Z
Driver Right Lower Tibia Moment X
Driver Right Lower Tibia Moment Y
Driver Right Lower Tibia Force Z
Driver Left Foot Fore Z
Driver Left Foot Aft X
Driver Left Foot Aft Z
Driver Right Foot Fore Z
Driver Right Foot Aft X
Driver Right Foot Aft Z
Passenger Head X Redundant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

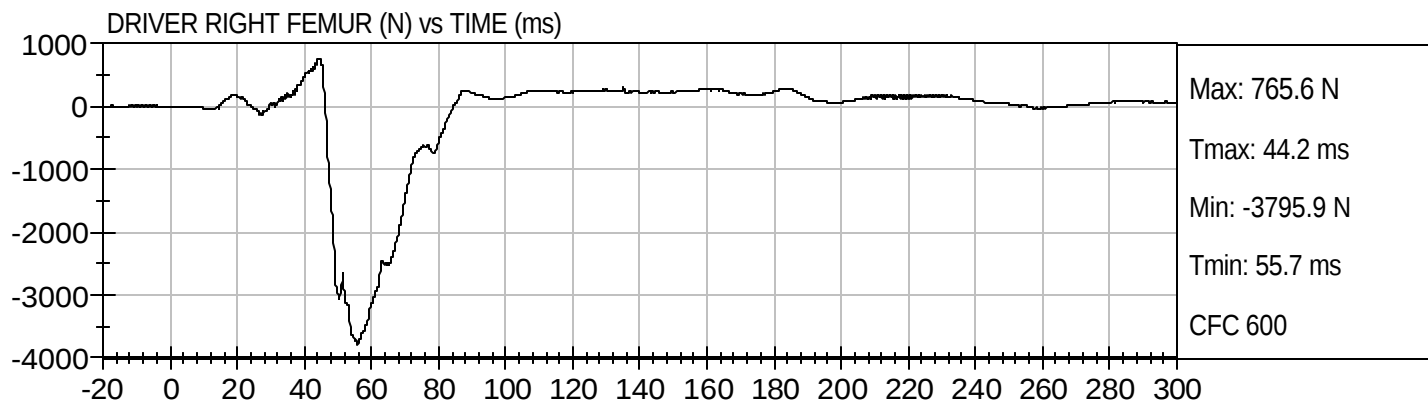
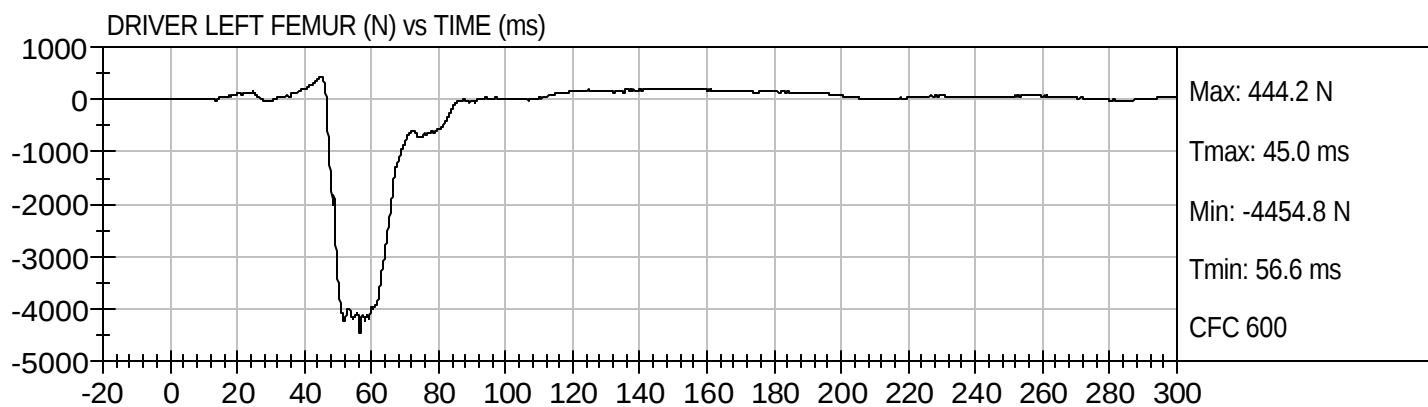
Passenger Left Lower Tibia Moment Y
Passenger Left Lower Tibia Force Z
Passenger Right Upper Tibia Moment X
Passenger Right Upper Tibia Moment Y
Passenger Right Upper Tibia Force Z
Passenger Right Lower Tibia Moment X
Passenger Right Lower Tibia Moment Y
Passenger Right Lower Tibia Force Z
Passenger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

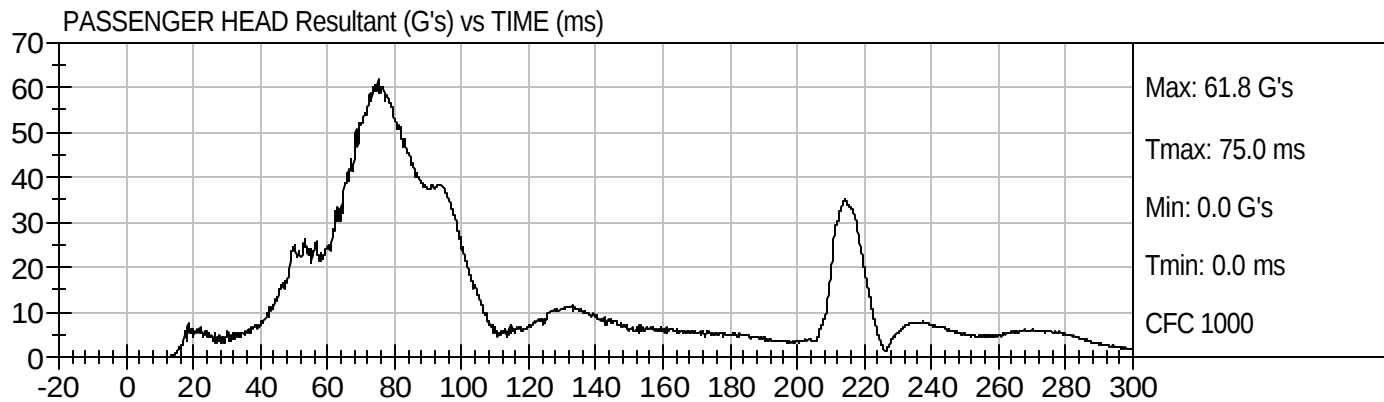
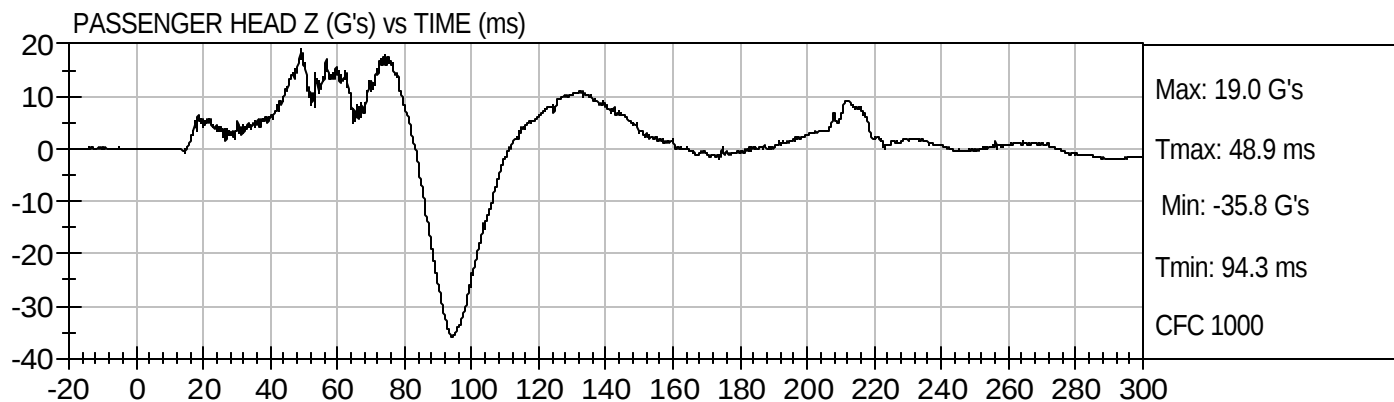
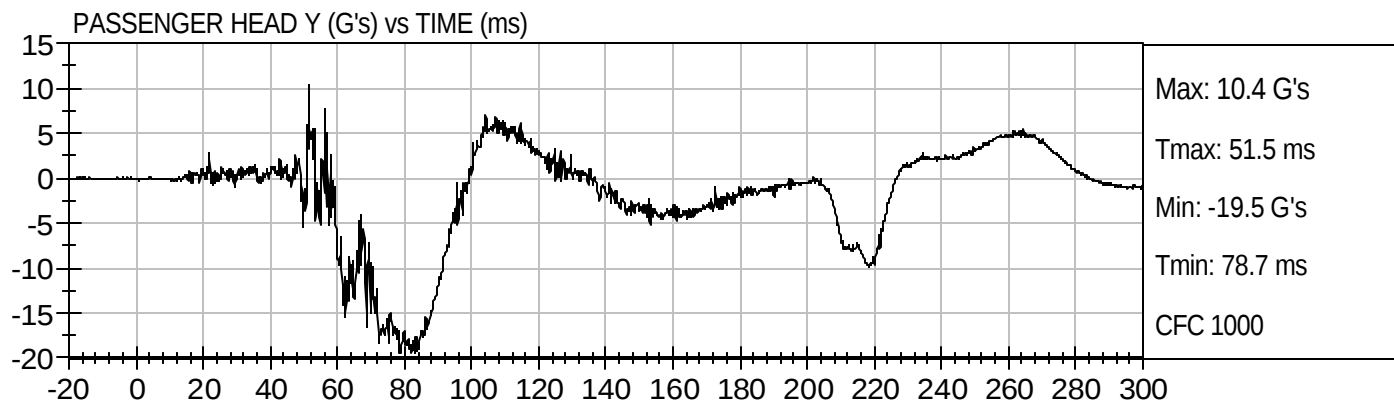
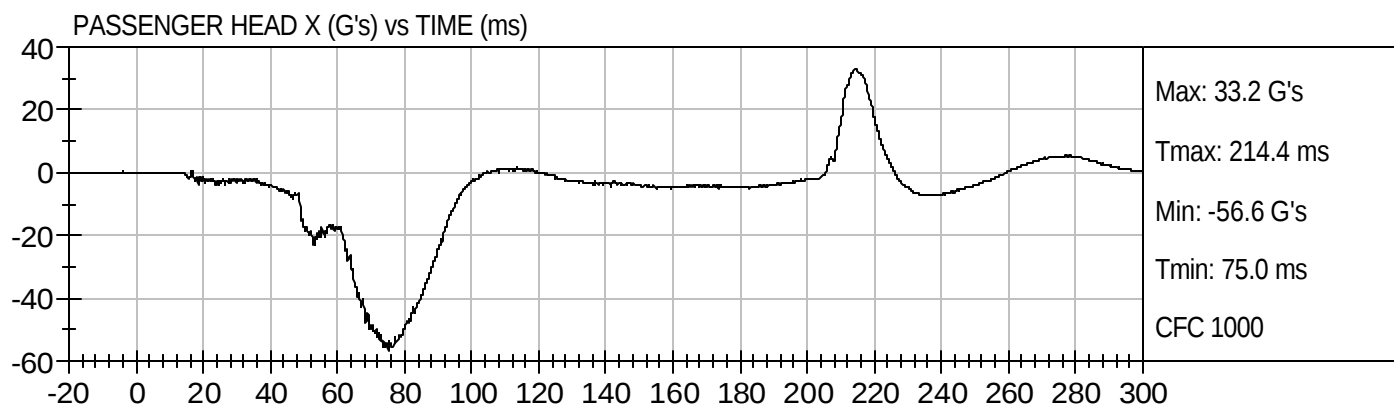


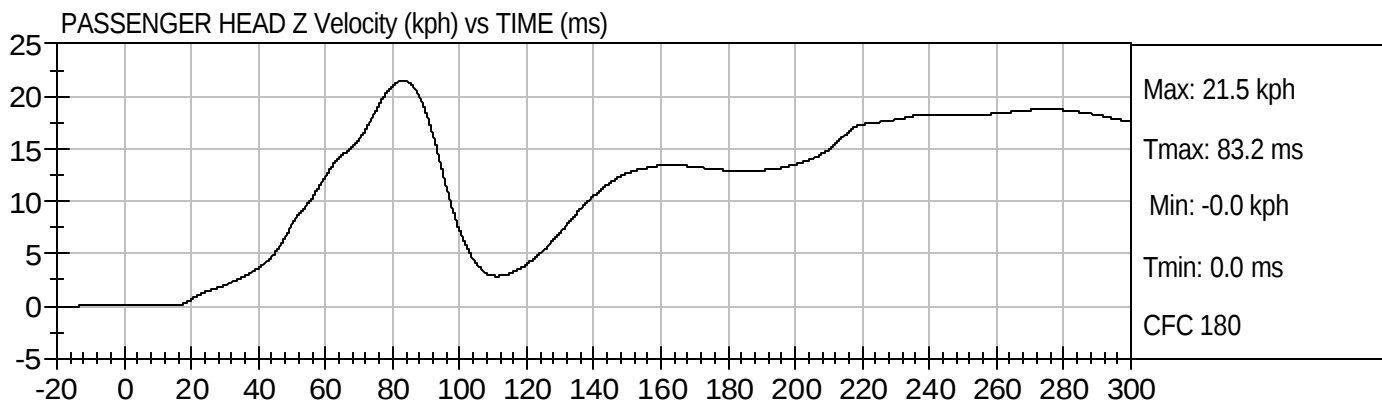
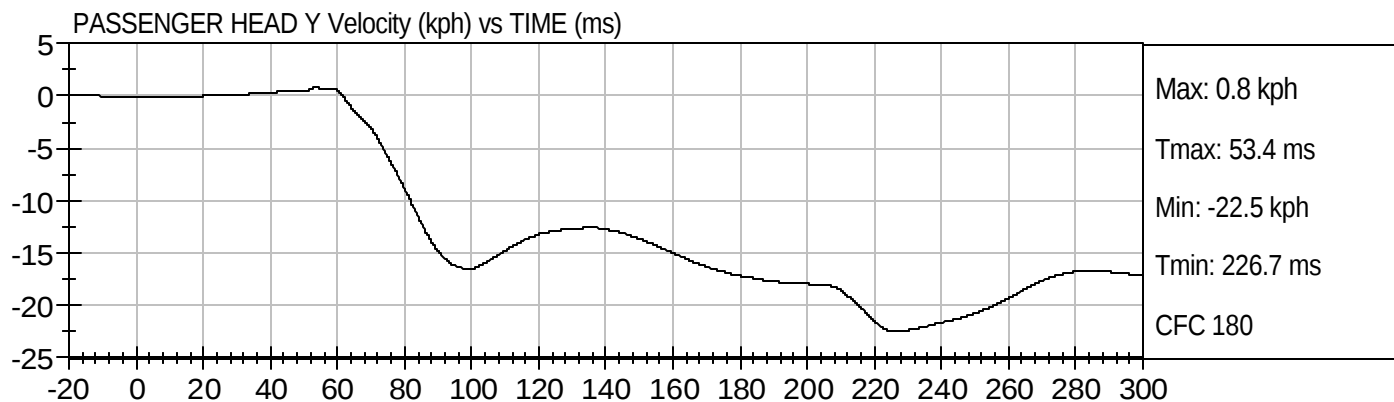
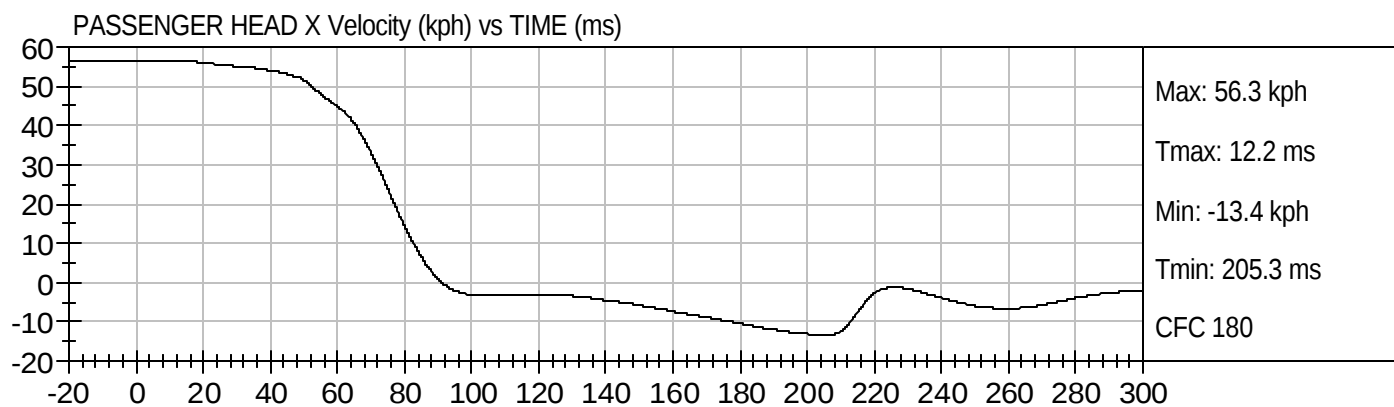


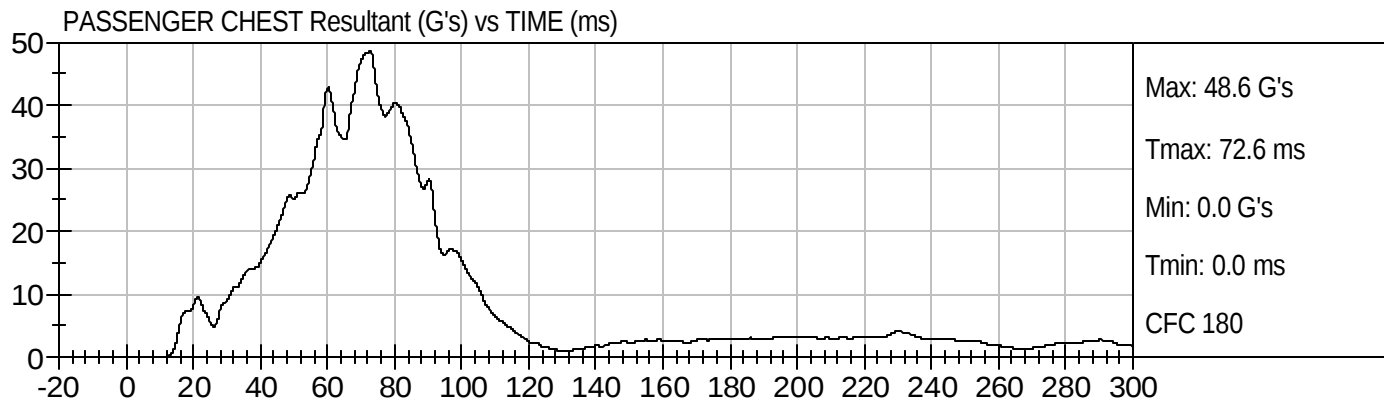
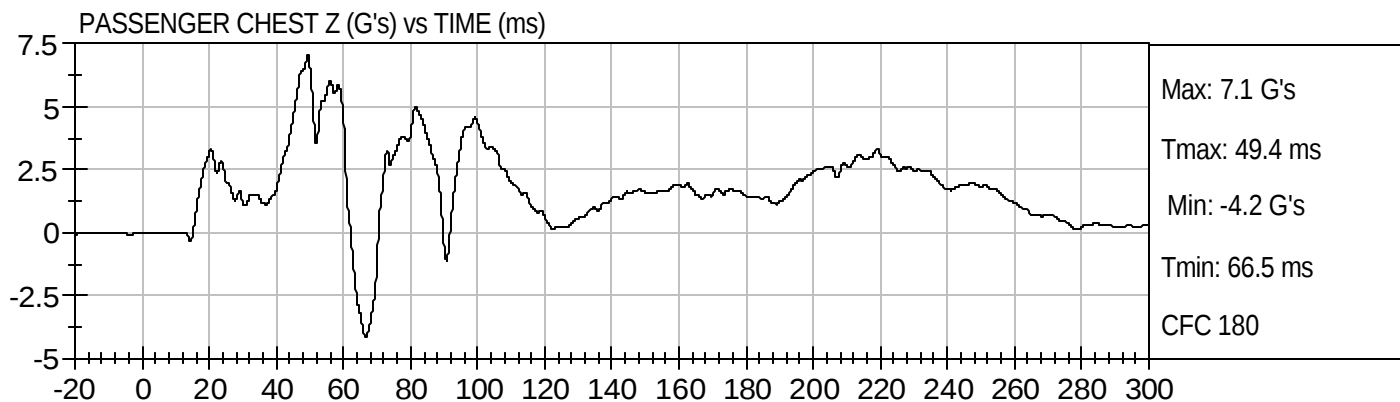
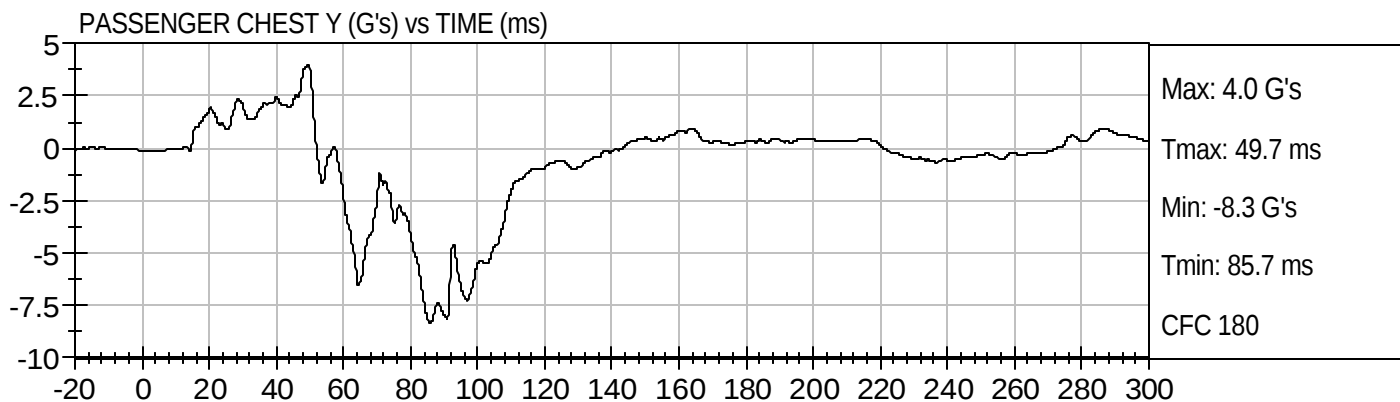
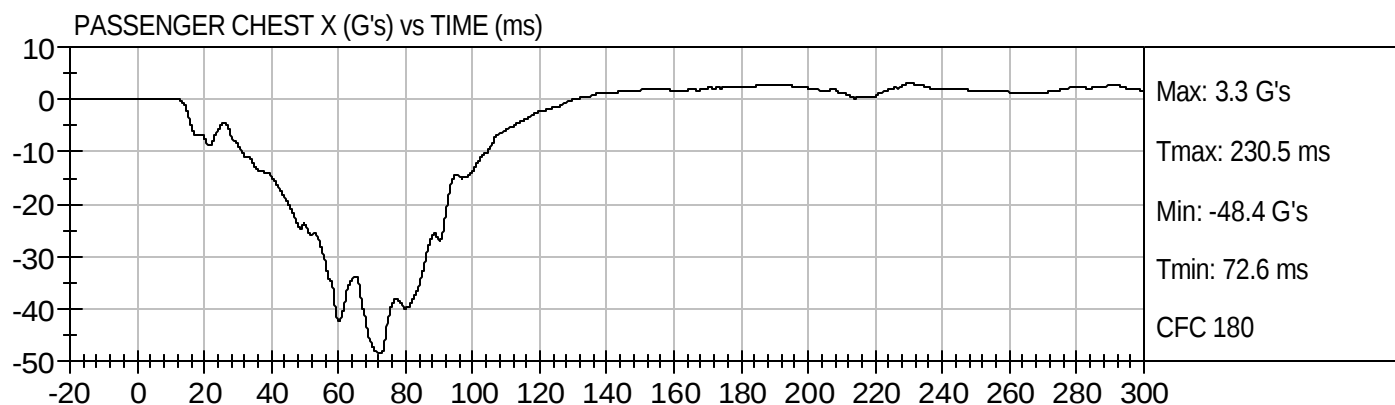


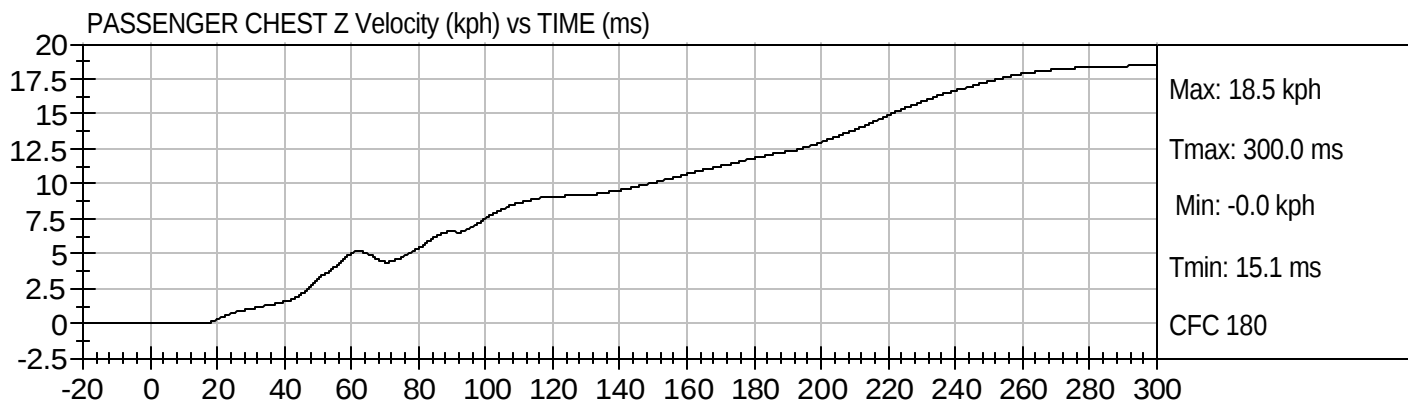
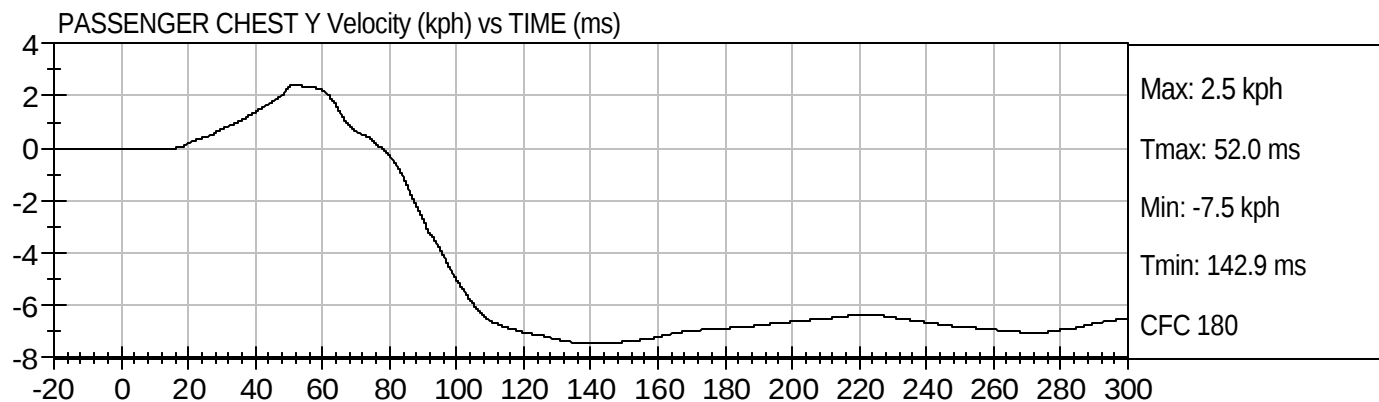
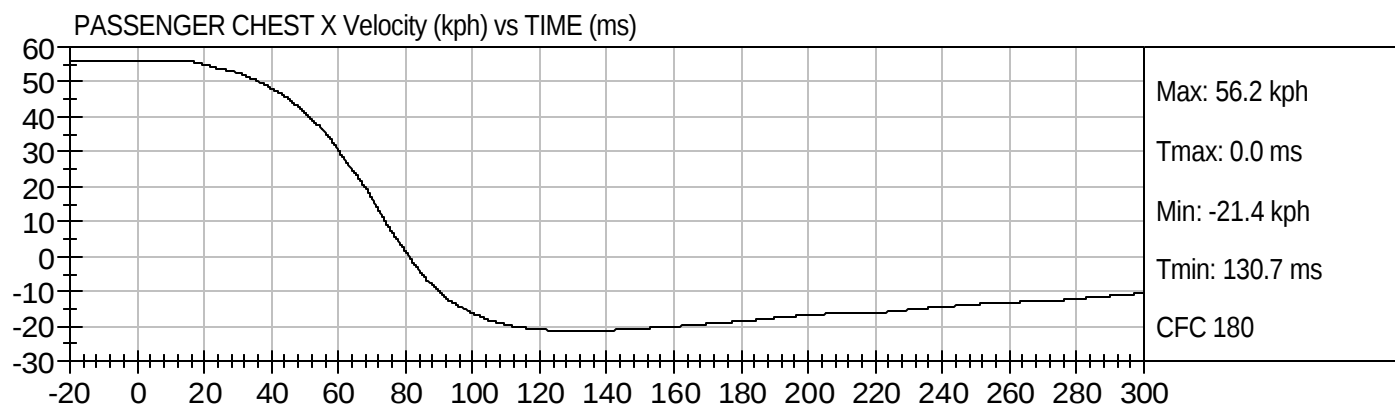


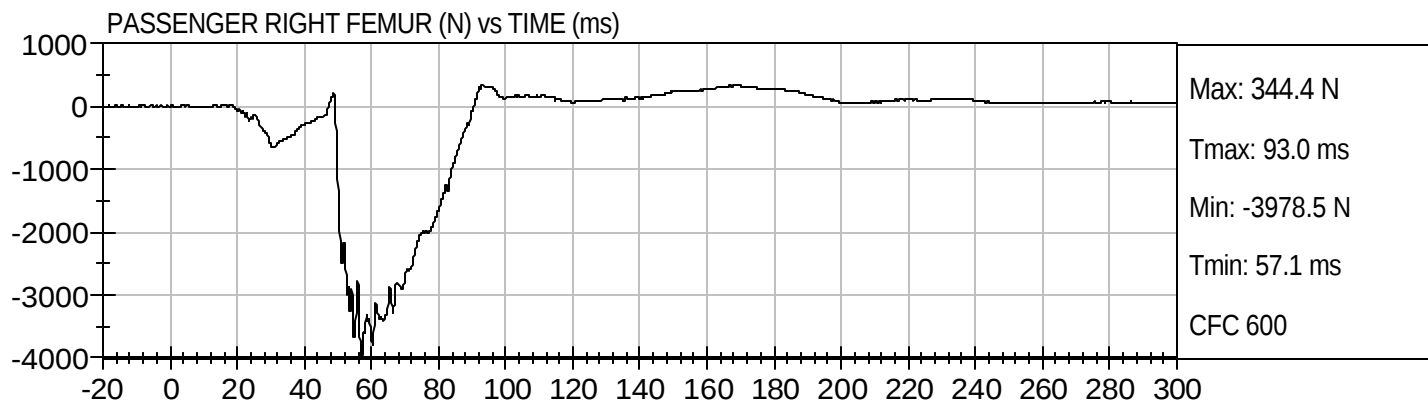
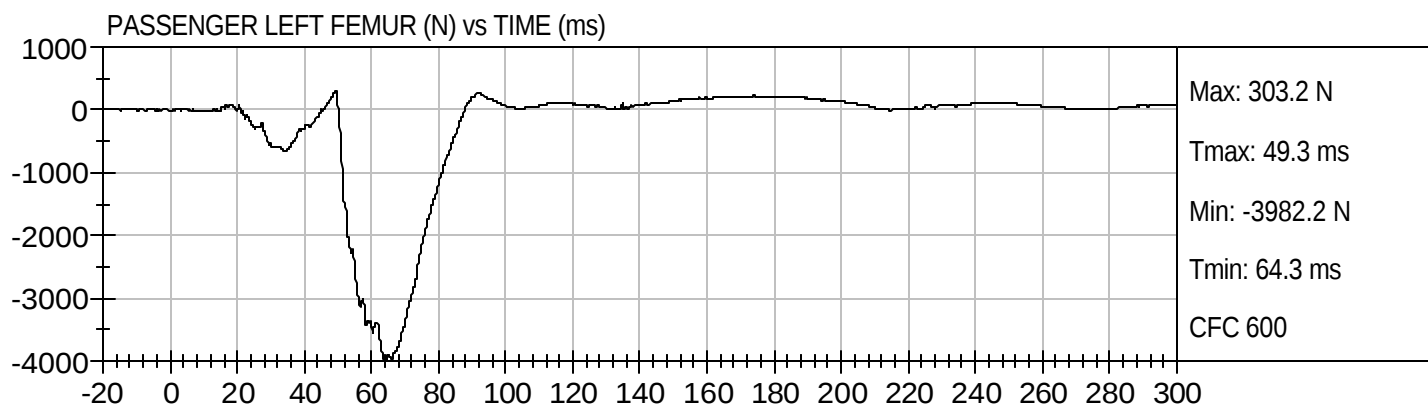












APPENDIX C
DUMMY CALIBRATION DATA

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

ATD Serial No: 066

Test ID: D073101

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	48	Pass
Peak Resultant Acceleration	G's	225 - 275	246	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-6.0	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

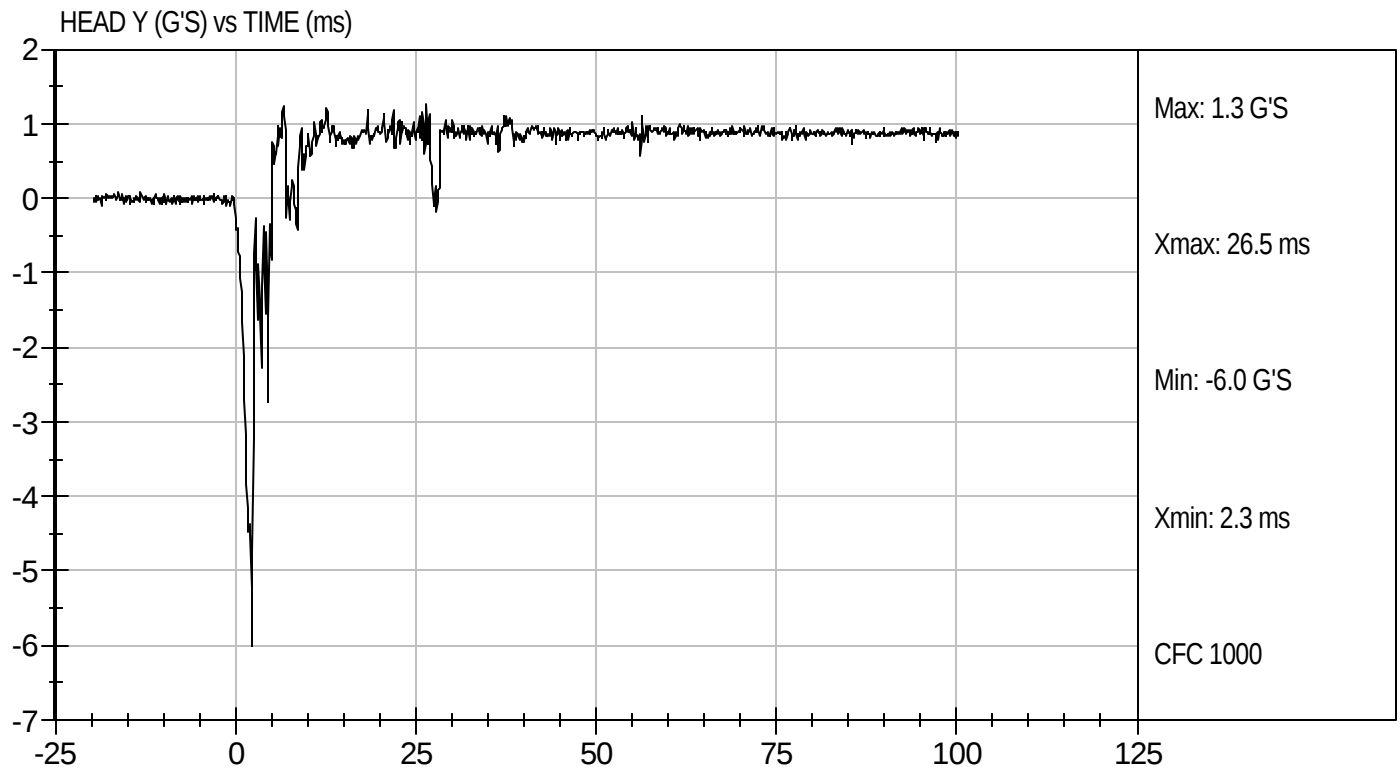
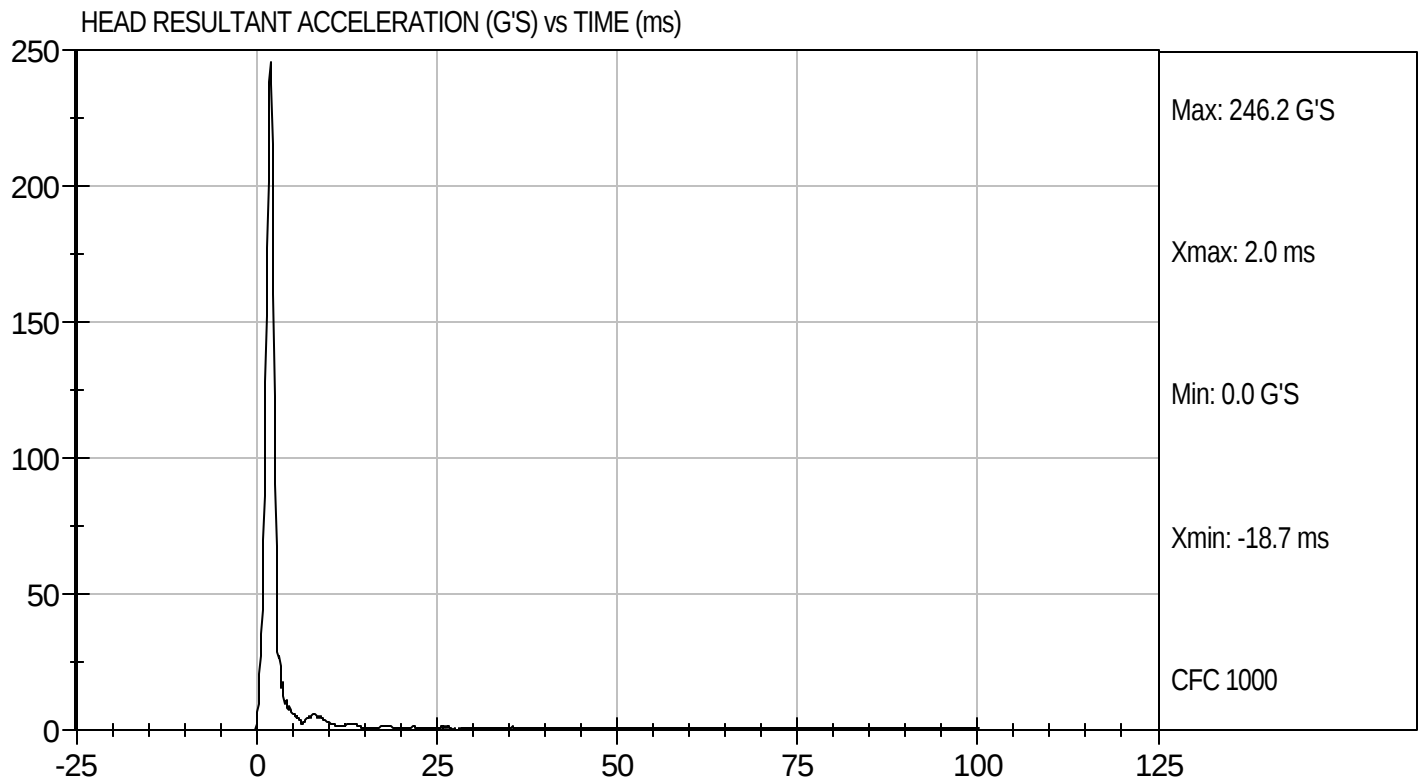
10/3/07
Test Date


Approved By



Test Desc: Head Drop
Component ID: D073101

Test Date: 10/3/07
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: D073102

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	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	23.13	Pass
	20 msec	G's	17.60 to 22.60	20.11	Pass
	30 msec	G's	12.50 to 18.50	12.96	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 29.0	14.29	Pass
Deceleration Decay Time to Cross 5 G's		msec	34.0 to 42.0	39.4	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	70.3	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	113.4	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	92.6	Pass
	Time	msec	47.0 to 58.0	52.0	Pass
Positive Moment Decay Time To Zero Crossing		msec	97.0 to 107.0	100.3	Pass
Overall Test Results					Pass


 Laboratory Technician

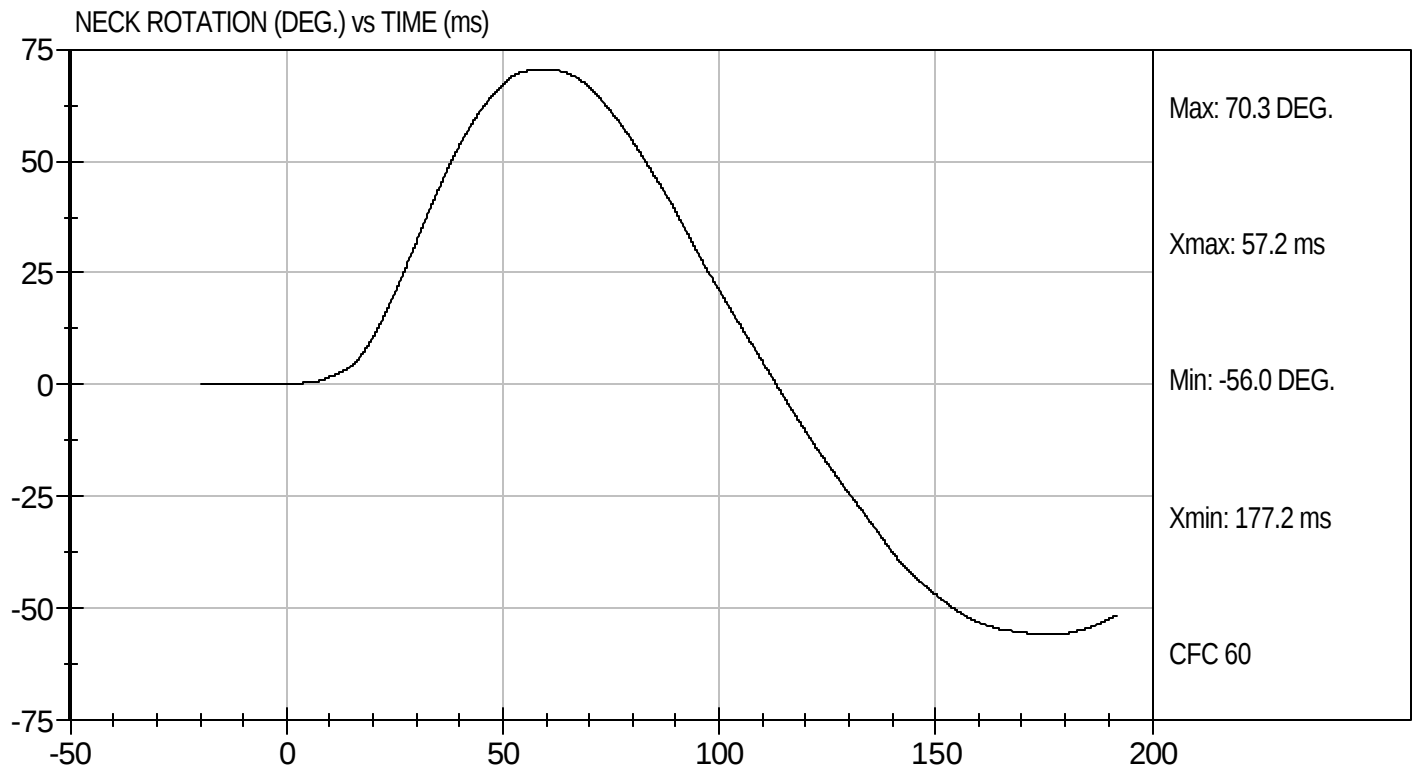
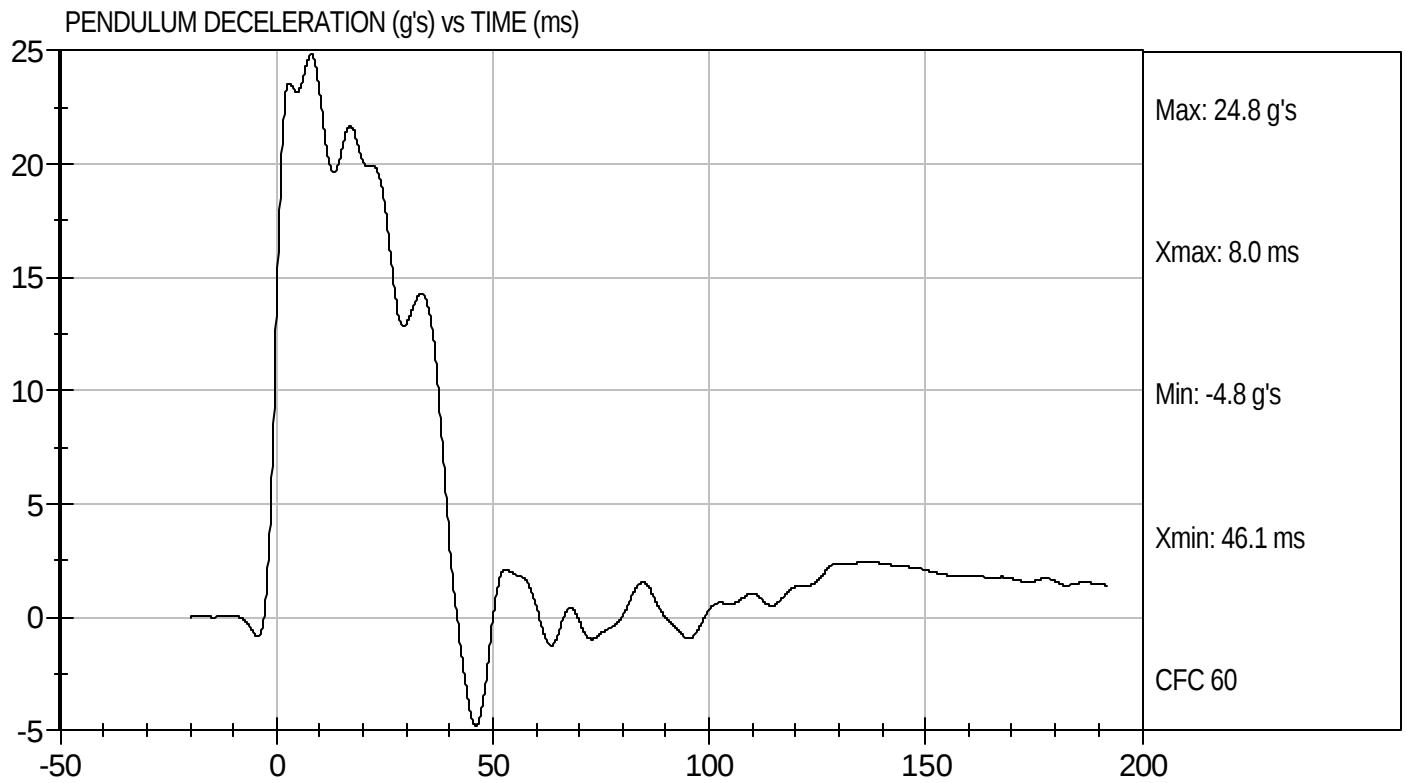
10/3/07
 Test Date


 Approved By



Test Desc: Neck Flexion
Component ID: D073102

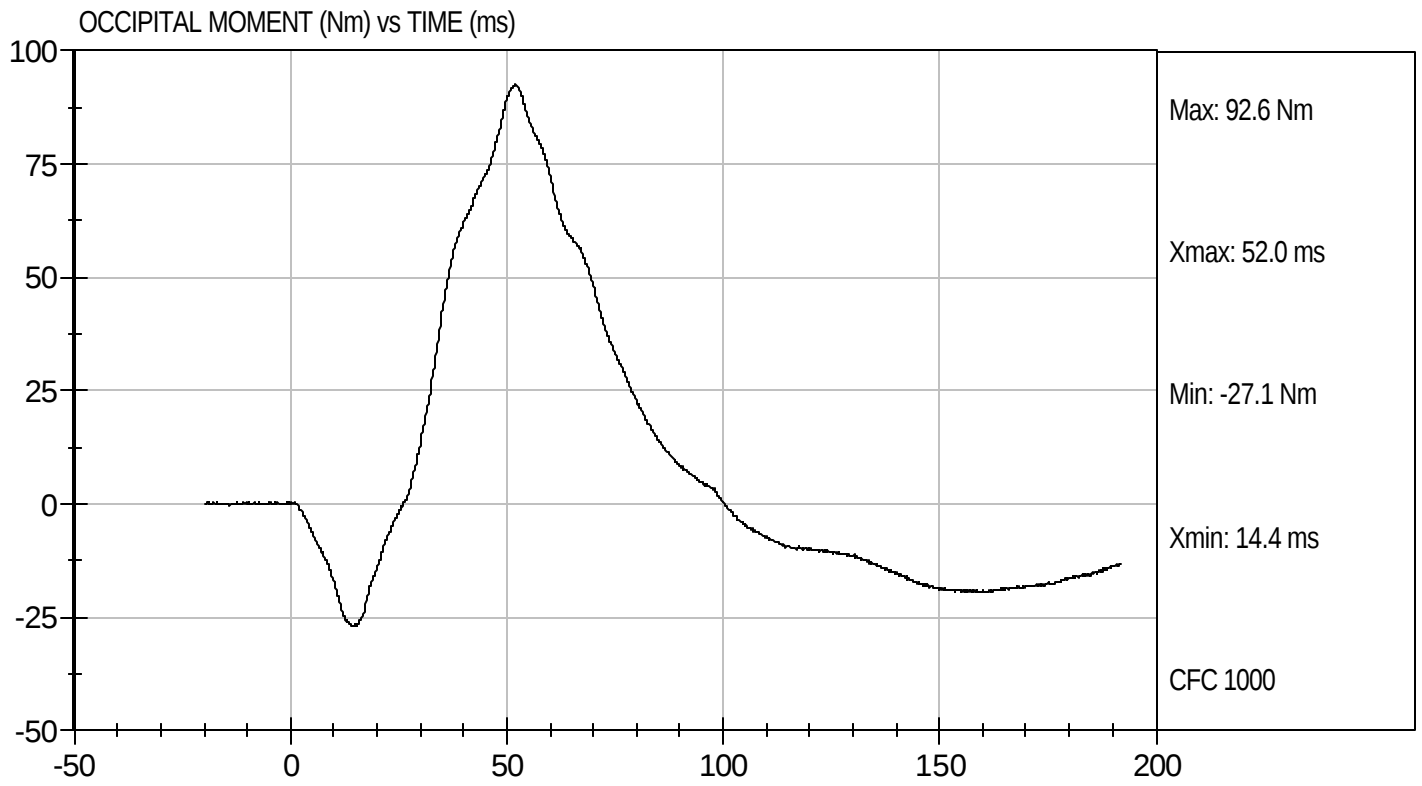
Test Date: 10/3/07
Velocity: 23.14 ft/s, 7.05 m/s





Test Desc: Neck Flexion
Component ID: D073102

Test Date: 10/3/07
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: D073103

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	38	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.12	Pass
Pendulum Deceleration	10 msec	G's	17.20 to 21.20	20.65	Pass
	20 msec	G's	14.00 to 19.00	16.68	Pass
	30 msec	G's	11.00 to 16.00	12.17	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 22.0	13.77	Pass
Deceleration Decay Time to Cross 5 G's		msec	38.0 to 46.0	38.1	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	100.2	Pass
	Time	msec	72.0 to 82.0	73.7	Pass
"D" Plane Rotation Decay Time To Zero Crossing		msec	147.0 to 174.0	152.6	Pass
Moment About Occipital Condyle	Maximum	N m	-52.9 to -79.9	-67.8	Pass
	Time	msec	65.0 to 79.0	70.4	Pass
Negative Moment Decay Time To Zero Crossing		msec	120.0 to 148.0	142.8	Pass
Overall Test Results					Pass


 Laboratory Technician

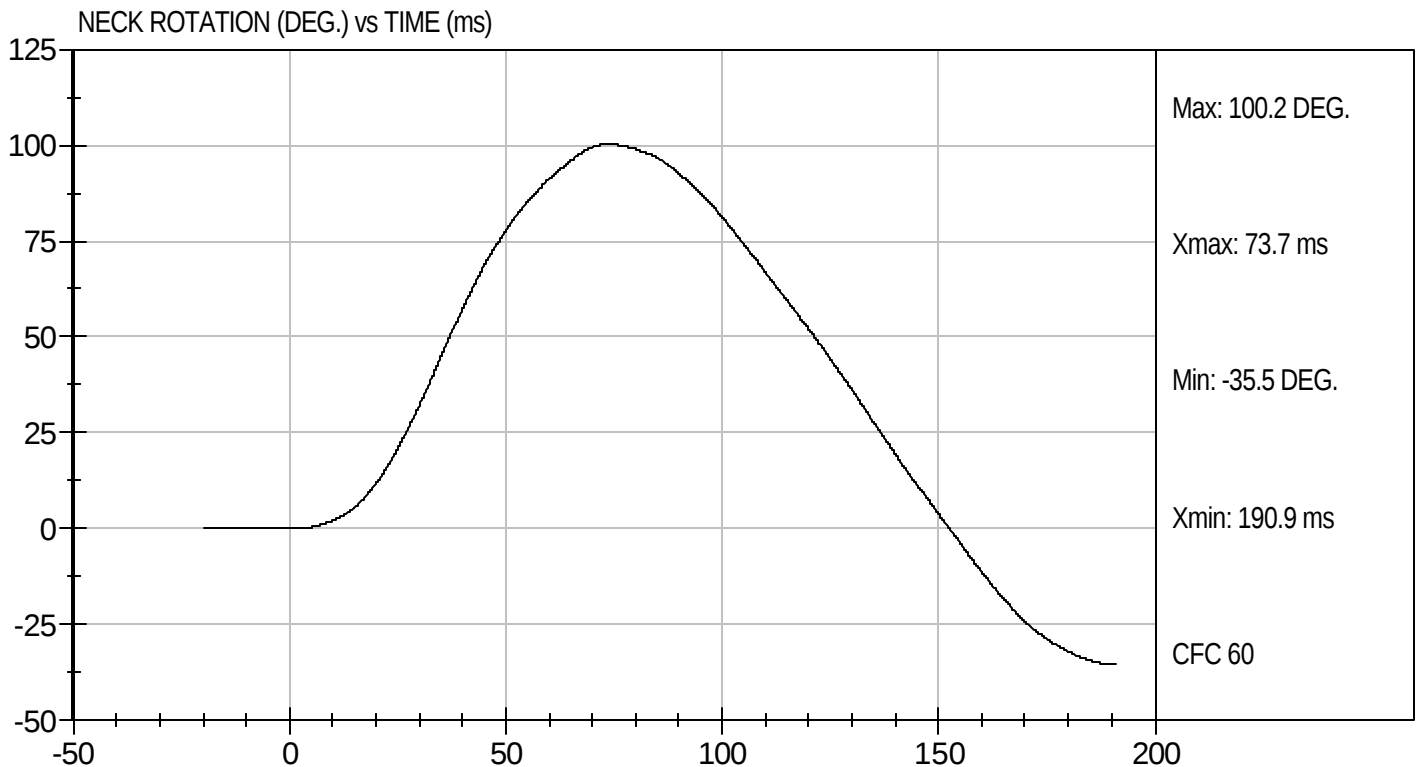
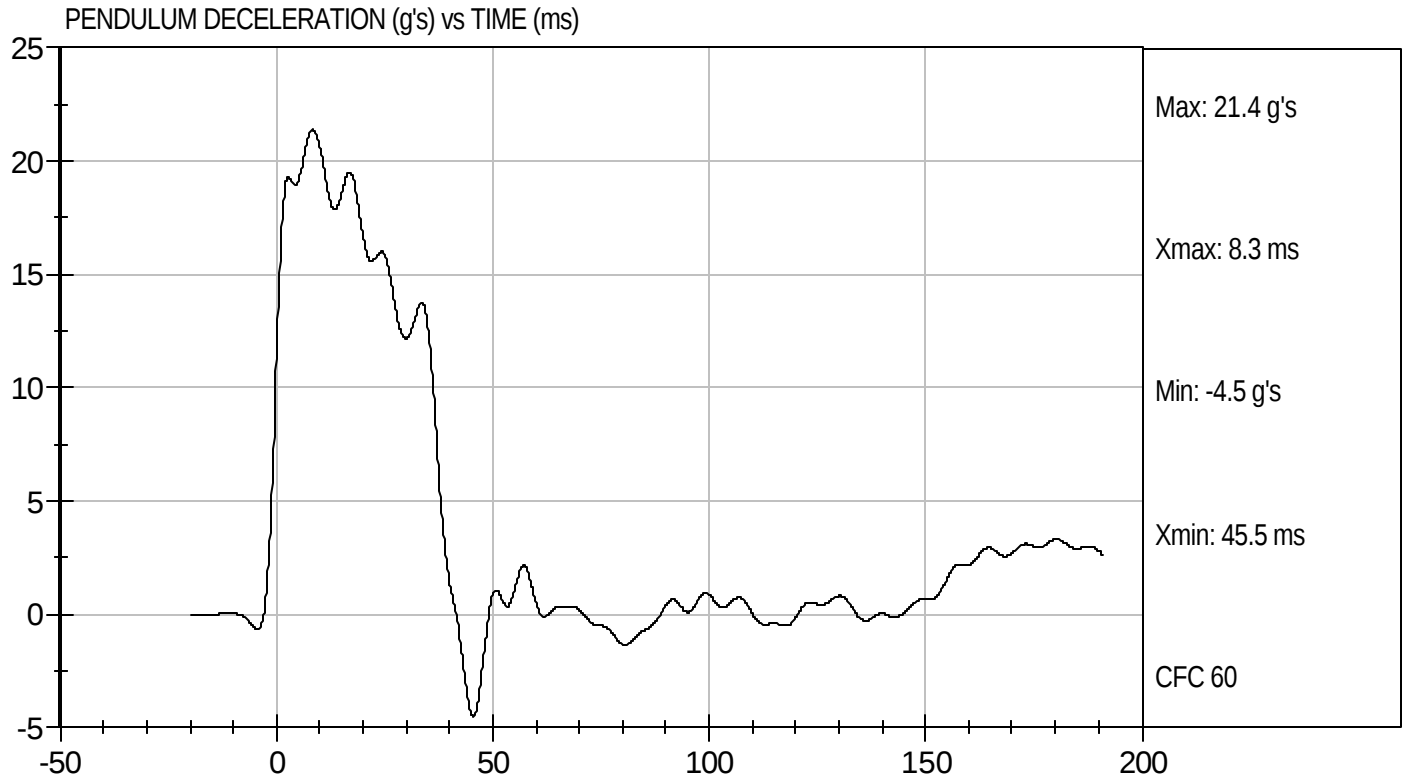
10/3/07
 Test Date


 Approved By



Test Desc: Neck Extension
Component ID: D073103

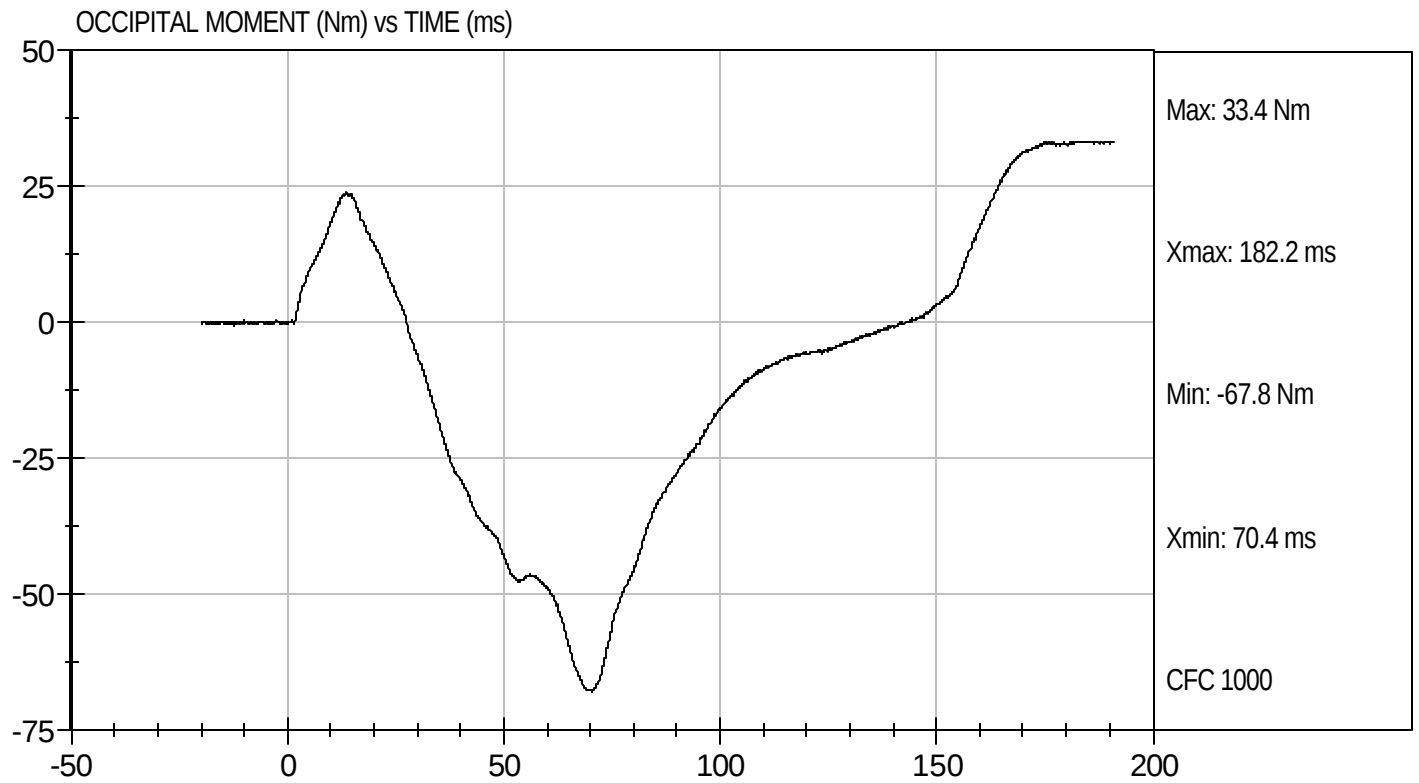
Test Date: 10/3/07
Velocity: 20.08 ft/s, 6.12 m/s





Test Desc: Neck Extension
Component ID: D073103

Test Date: 10/3/07
Velocity: 20.08 ft/s, 6.12 m/s



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE

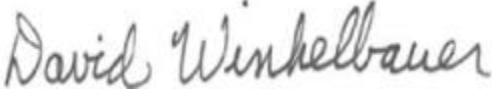
ATD Serial No: 066

Test I.D: D073104

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
Probe Velocity	m/s	6.58 to 6.82	6.77	Pass
Peak Probe Force	N	5159 to 5893	5,413	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.66	Pass
Internal Hysteresis	%	69 to 85	69	Pass
			Overall Test Results	Pass



Laboratory Technician



Approved By

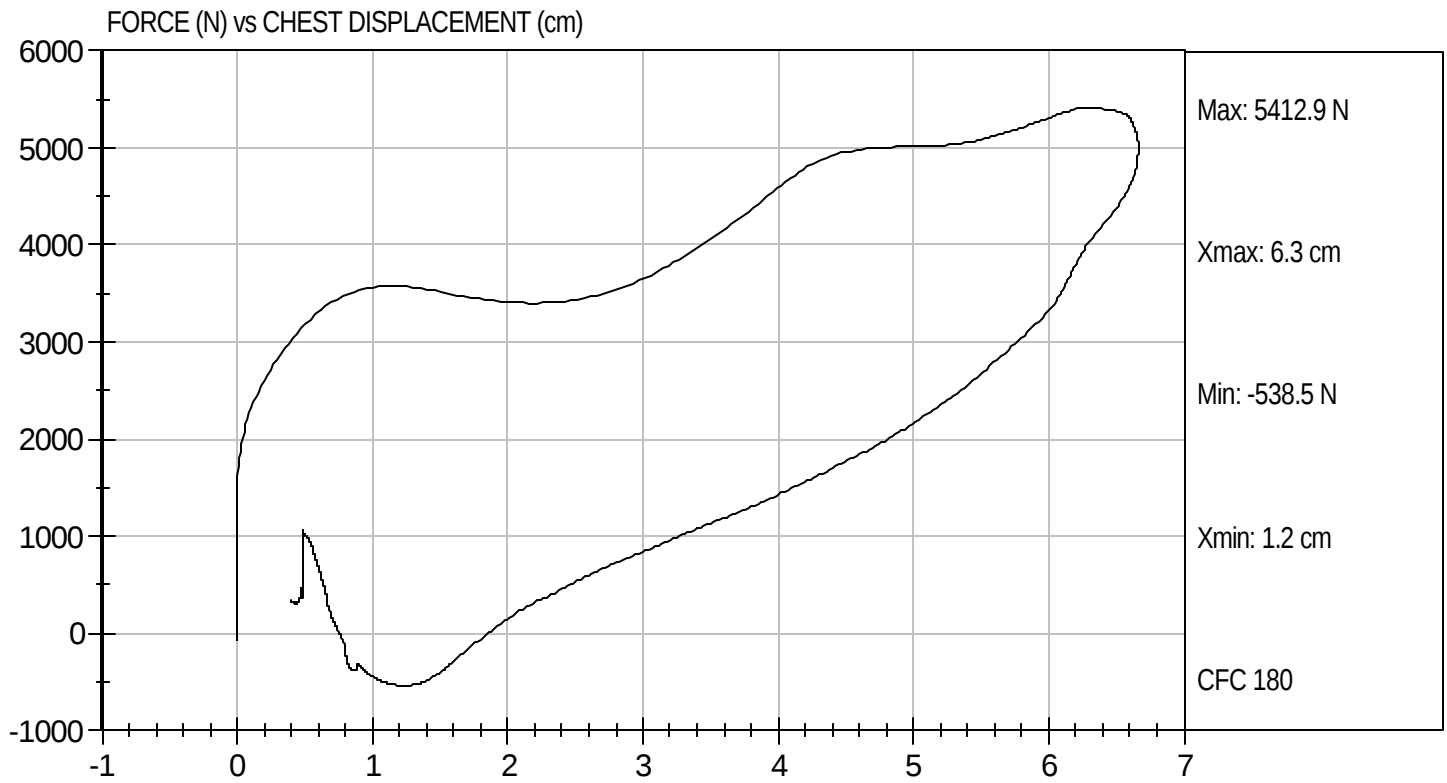
10/3/07

Test Date



Test Desc: Thorax Impact
Component ID: D073104

Test Date: 10/3/07
Velocity: 22.22 ft/s, 6.77 m/s



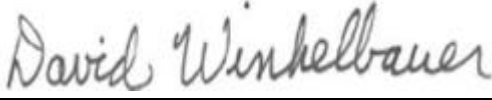
MGA RESEARCH CORPORATION
RIGHT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 066

Test I.D: D073105

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	39	Pass
Probe Velocity	m/sec	2.07 to 2.13	2.08	Pass
Peak Probe Force	Newtons	4715 to 5782	5,538	Pass
Overall Test Results				Pass


Laboratory Technician

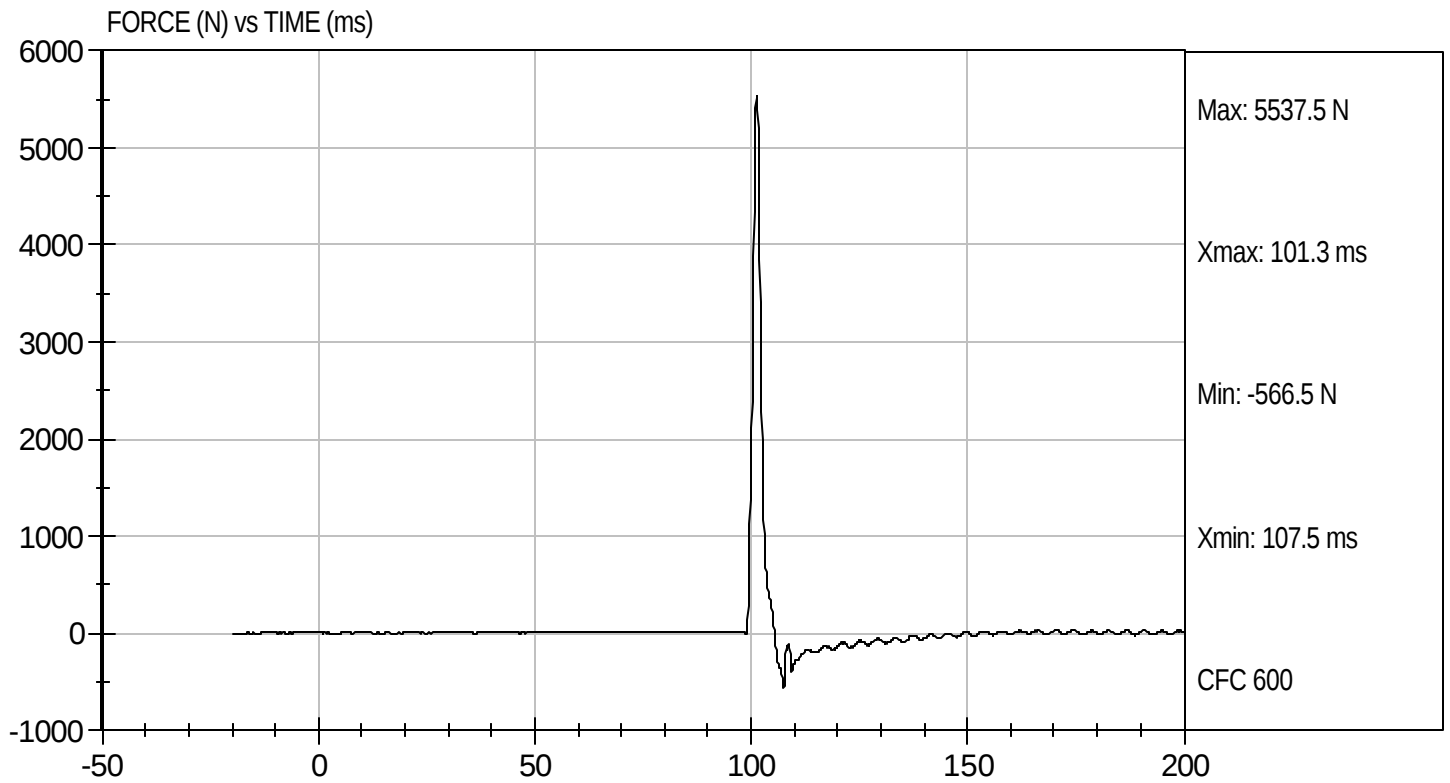

Approved By

10/3/07
Test Date



Test Desc: Right Knee
Component ID: D073105

Test Date: 10/3/07
Velocity: 6.83 ft/s, 2.08 m/s



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

ATD Serial No: 066

Test I.D: D073106

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	39	Pass
Probe Velocity	m/sec	2.07 to 2.13	2.11	Pass
Peak Probe Force	Newtons	4715 to 5782	5,298	Pass
Overall Test Results				Pass



Laboratory Technician

10/3/07
Test Date

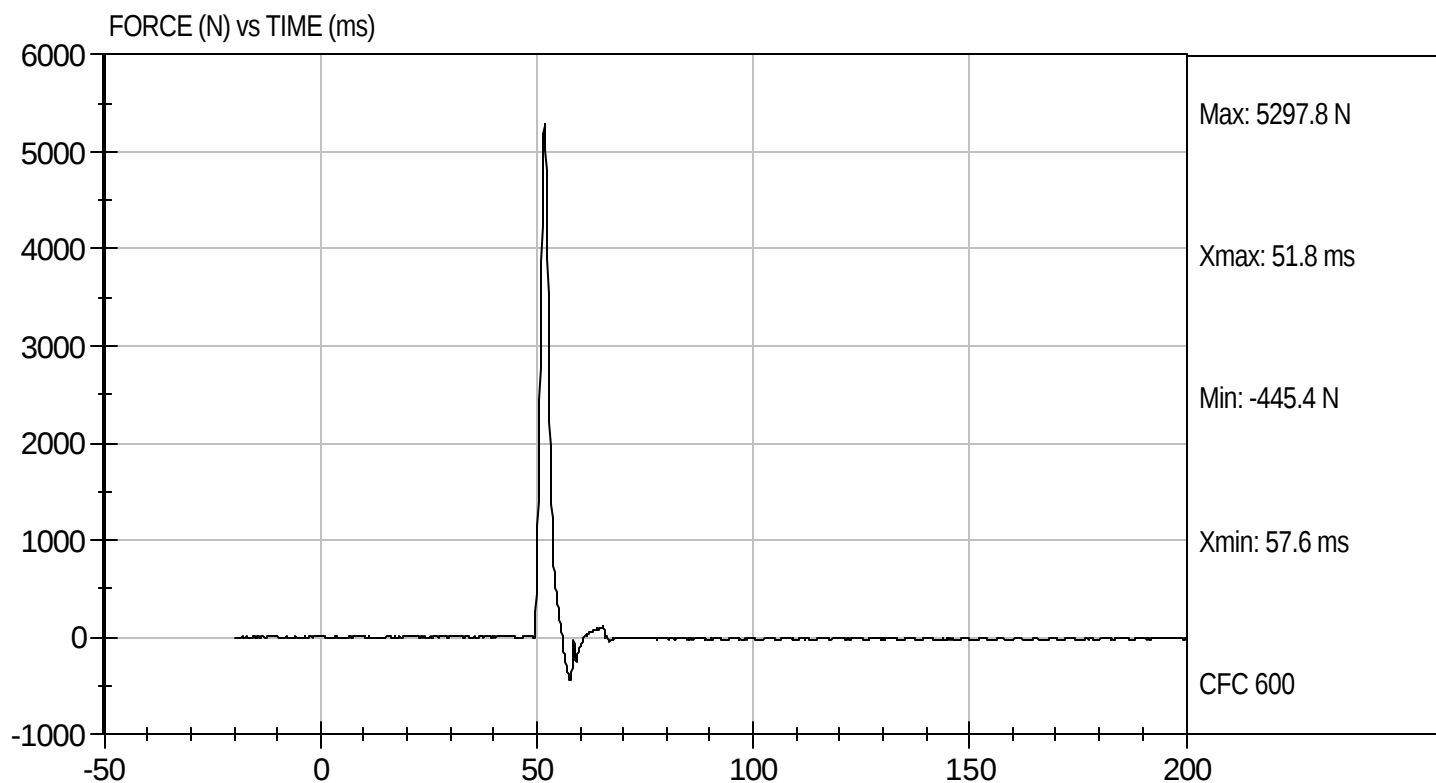


Approved By



Test Desc: Left Knee
Component ID: D073106

Test Date: 10/3/07
Velocity: 6.91 ft/s, 2.11 m/s



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

ATD Serial No: 066

Test I.D: D073100

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	20.8	20.8	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	66.7	52.2	Pass
150 ft-lbf / 203.4 Nm	Deg	40- 50 Degree Max Rotation	41	42	Pass
Overall Test Results					Pass


 Laboratory Technician

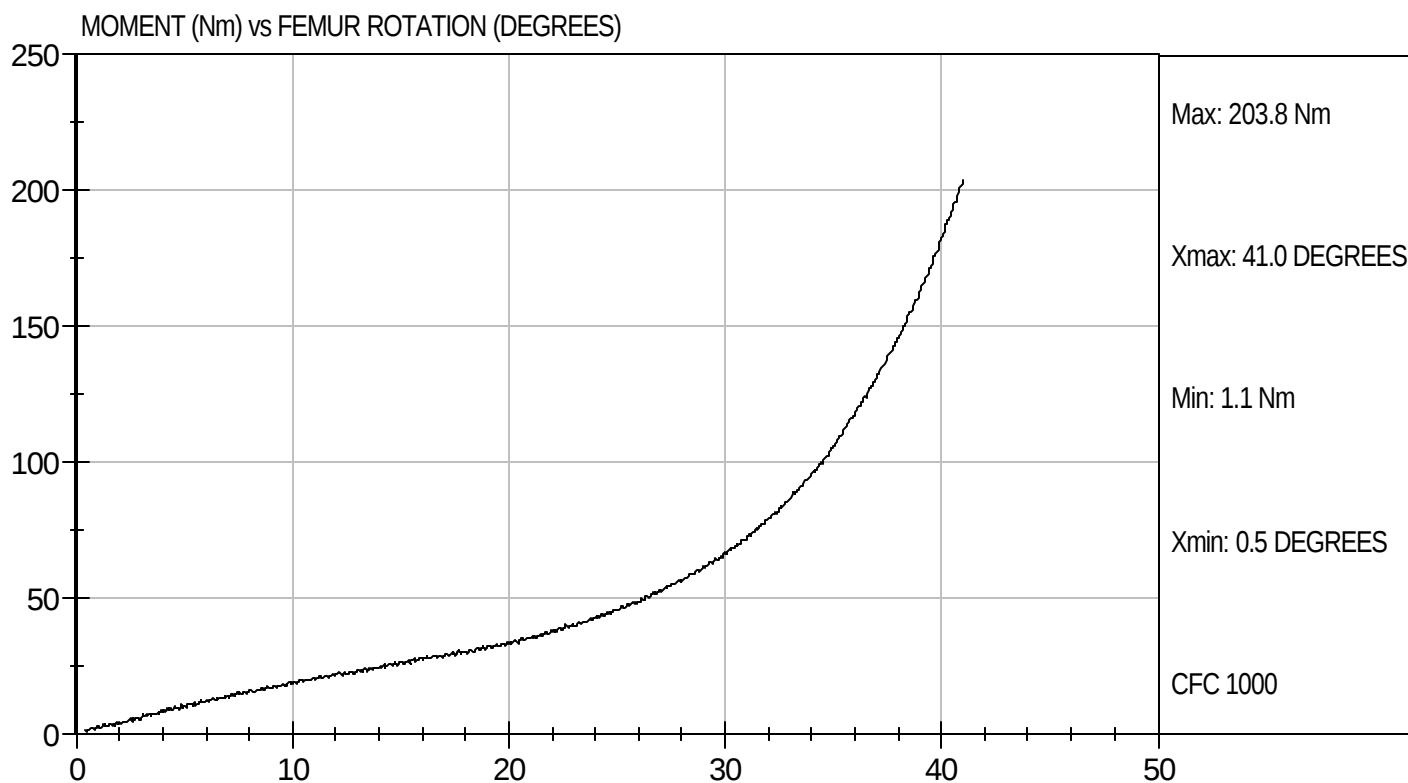
10/3/07
 Test Date


 Approved By



Test Desc: Hip Femur Flexion
Component ID: D073109

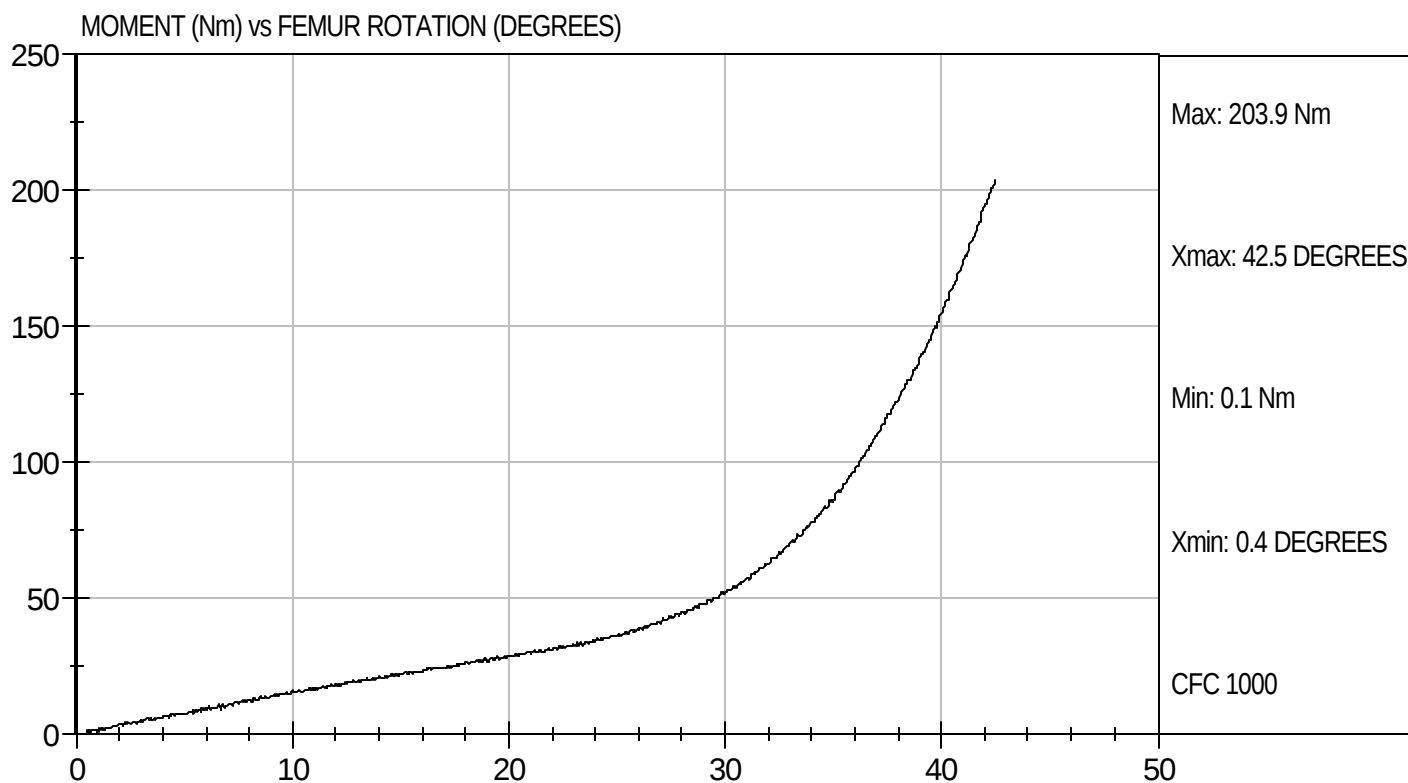
Test Date: 10/3/07
Velocity: 0 ft/s, 0.00 m/s





Test Desc: Hip Femur Flexion
Component ID: D073100

Test Date: 10/3/07
Velocity: 0 ft/s, 0.00 m/s



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

ATD Serial No: 065

Test ID: D073091

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	48	Pass
Peak Resultant Acceleration	G's	225 - 275	247	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-5.1	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results			Pass	


 Laboratory Technician

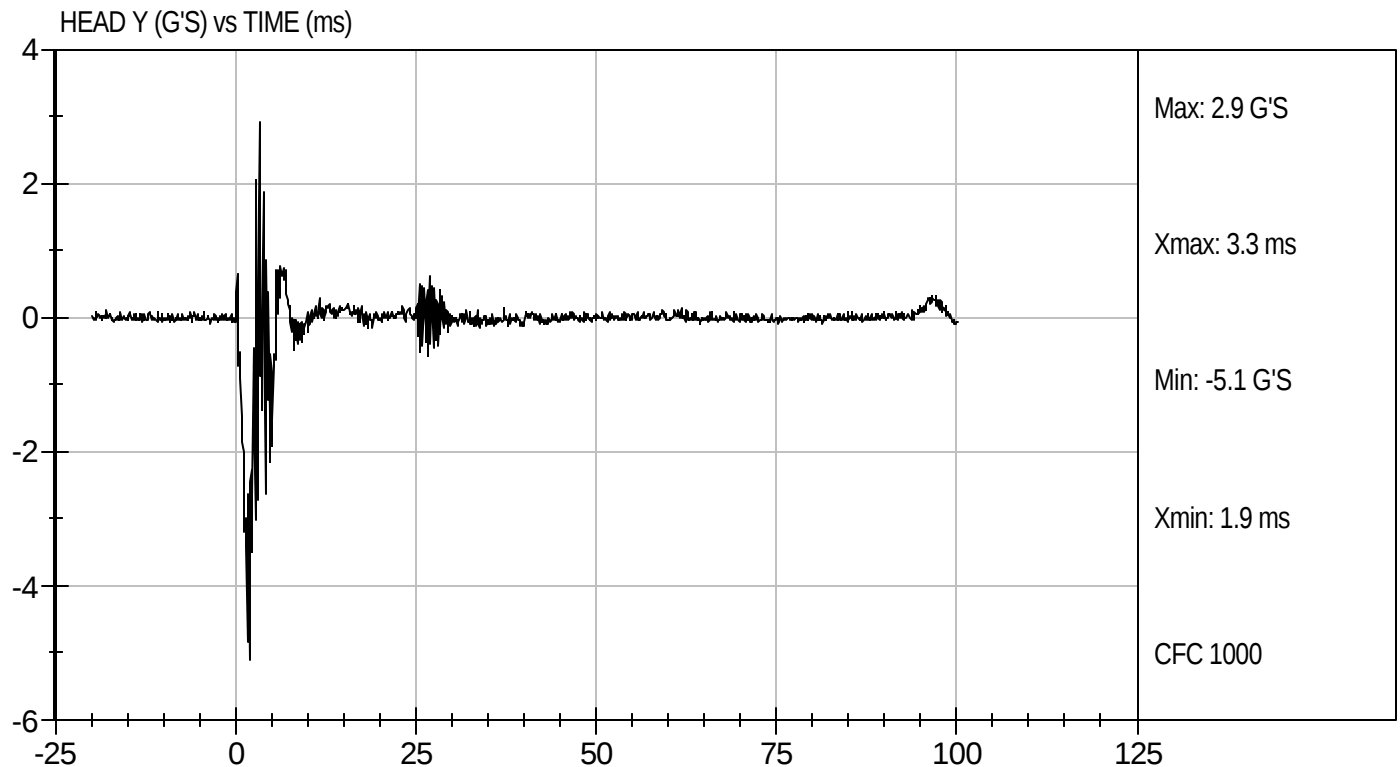
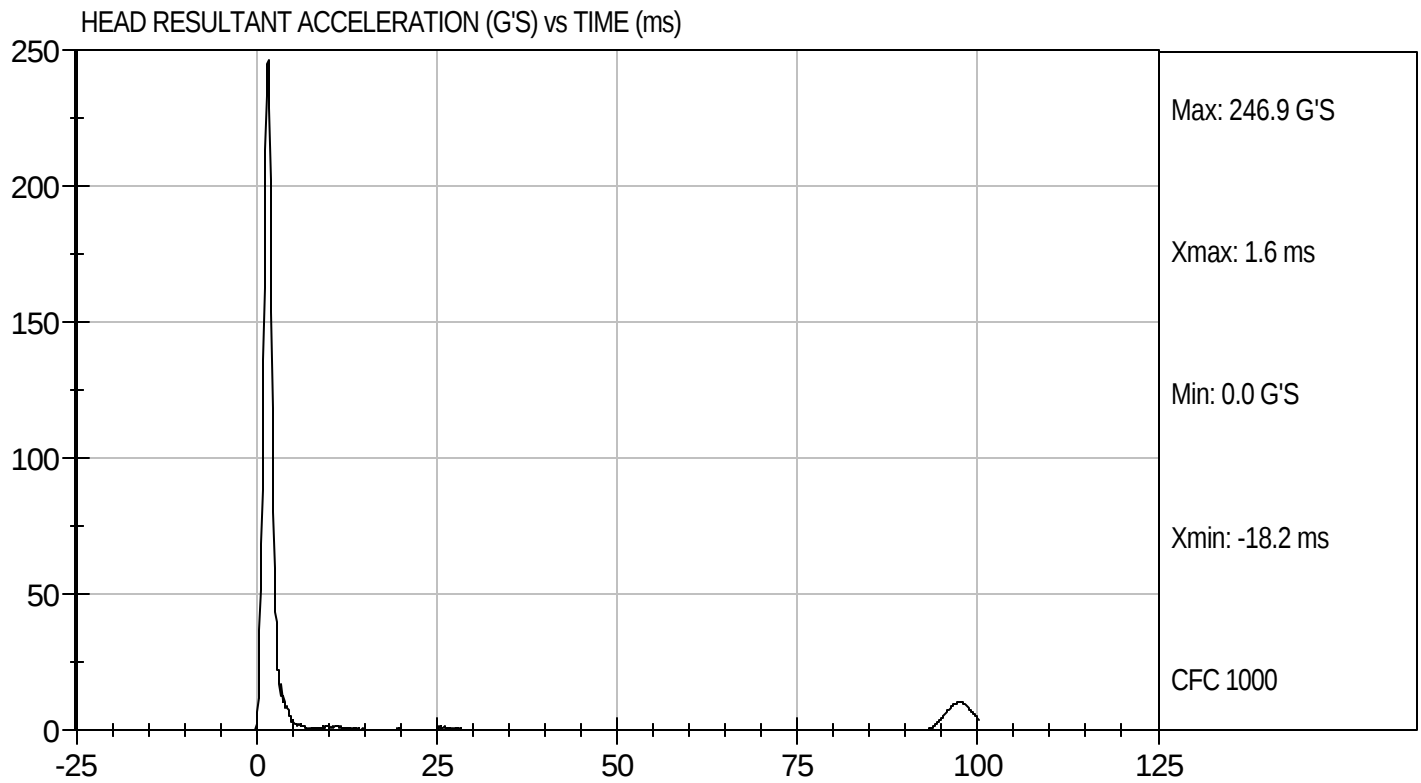
10/3/07
 Test Date


 Approved By



Test Desc: Head Drop
Component ID: D073091

Test Date: 10/3/07
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: D073092

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	6.89 to 7.13	7.05	Pass
Pendulum Deceleration	10 msec	G's	22.50 to 27.50	22.84	Pass
	20 msec	G's	17.60 to 22.60	19.49	Pass
	30 msec	G's	12.50 to 18.50	14.22	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 29.0	14.21	Pass
Deceleration Decay Time to Cross 5 G's		msec	34.0 to 42.0	36.6	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	72.2	Pass
	Time	msec	57.0 to 64.0	60.3	Pass
"D" Plane Rotation Decay Time To Zero Crossing		msec	113.0 to 128.0	113.2	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	93.0	Pass
	Time	msec	47.0 to 58.0	47.7	Pass
Positive Moment Decay Time To Zero Crossing		msec	97.0 to 107.0	103.0	Pass
Overall Test Results					Pass


 Laboratory Technician

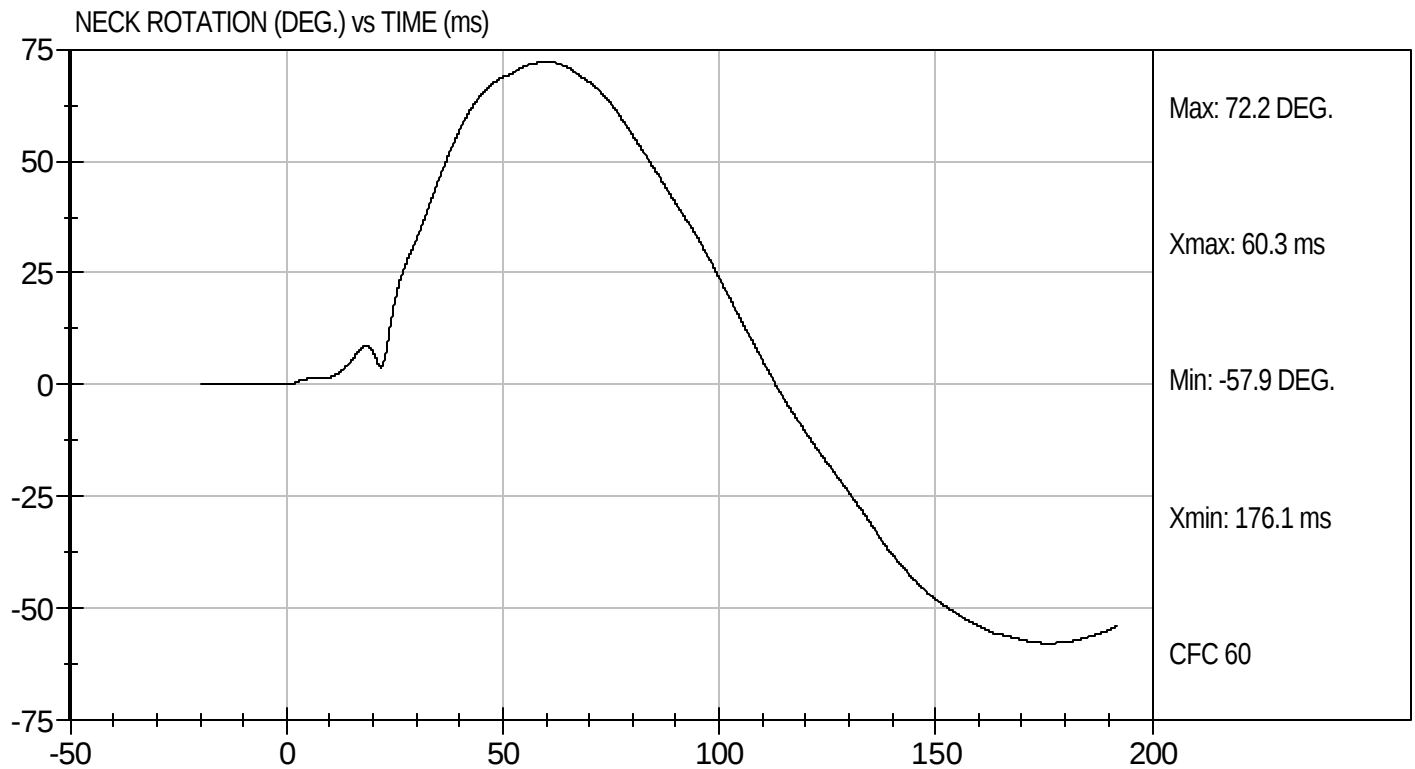
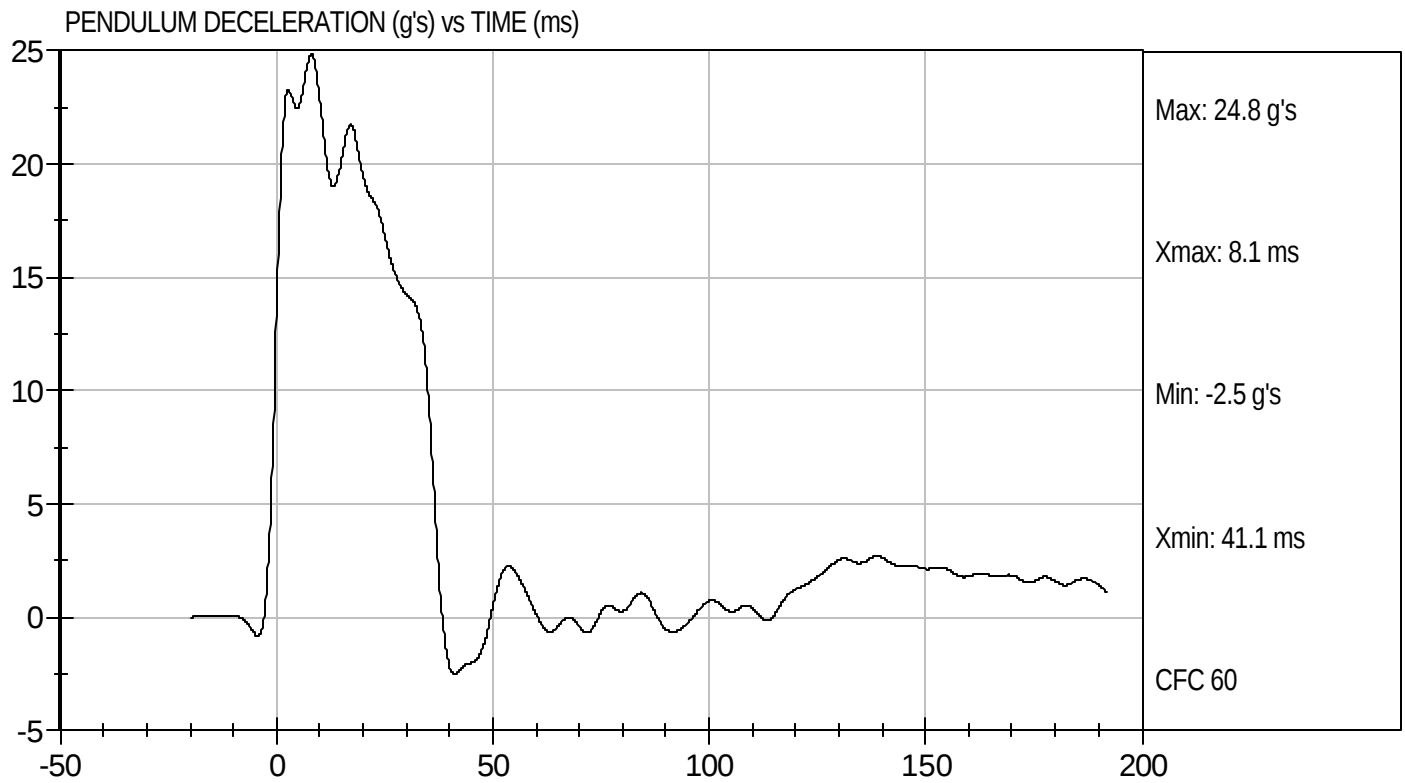
10/3/07
 Test Date


 Approved By



Test Desc: Neck Flexion
Component ID: D073092

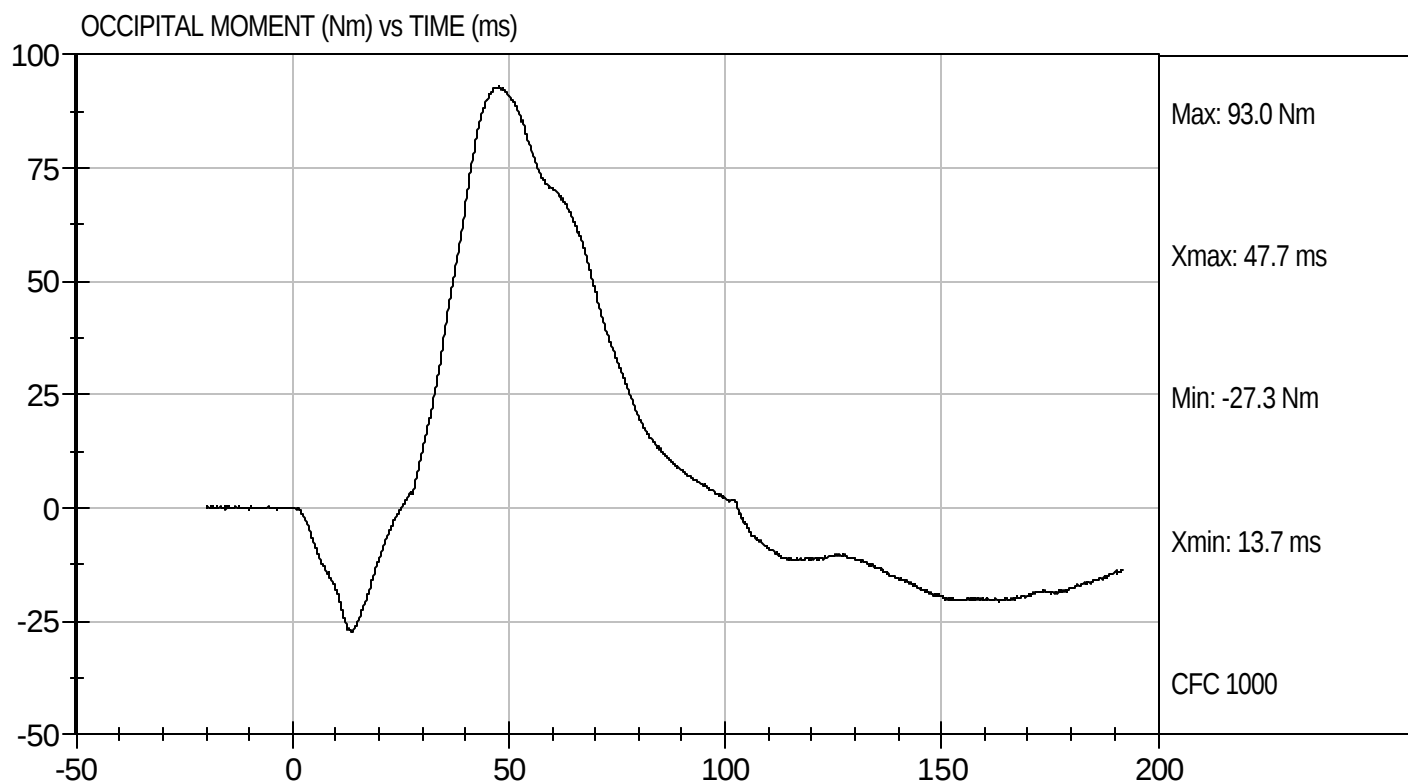
Test Date: 10/3/07
Velocity: 23.14 ft/s, 7.05 m/s





Test Desc: Neck Flexion
Component ID: D073092

Test Date: 10/3/07
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: D073093

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	20.7	Pass
Laboratory Relative Humidity		%	10 to 70	40	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.12	Pass
Pendulum Deceleration	10 msec	G's	17.20 to 21.20	18.16	Pass
	20 msec	G's	14.00 to 19.00	15.37	Pass
	30 msec	G's	11.00 to 16.00	11.96	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 22.0	12.40	Pass
Deceleration Decay Time to Cross 5 G's		msec	38.0 to 46.0	39.1	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	83.8	Pass
	Time	msec	72.0 to 82.0	76.0	Pass
"D" Plane Rotation Decay Time To Zero Crossing		msec	147.0 to 174.0	149.6	Pass
Moment About Occipital Condyle	Maximum	N m	-52.9 to -79.9	-61.9	Pass
	Time	msec	65.0 to 79.0	70.9	Pass
Negative Moment Decay Time To Zero Crossing		msec	120.0 to 148.0	140.7	Pass
Overall Test Results					Pass


 Laboratory Technician

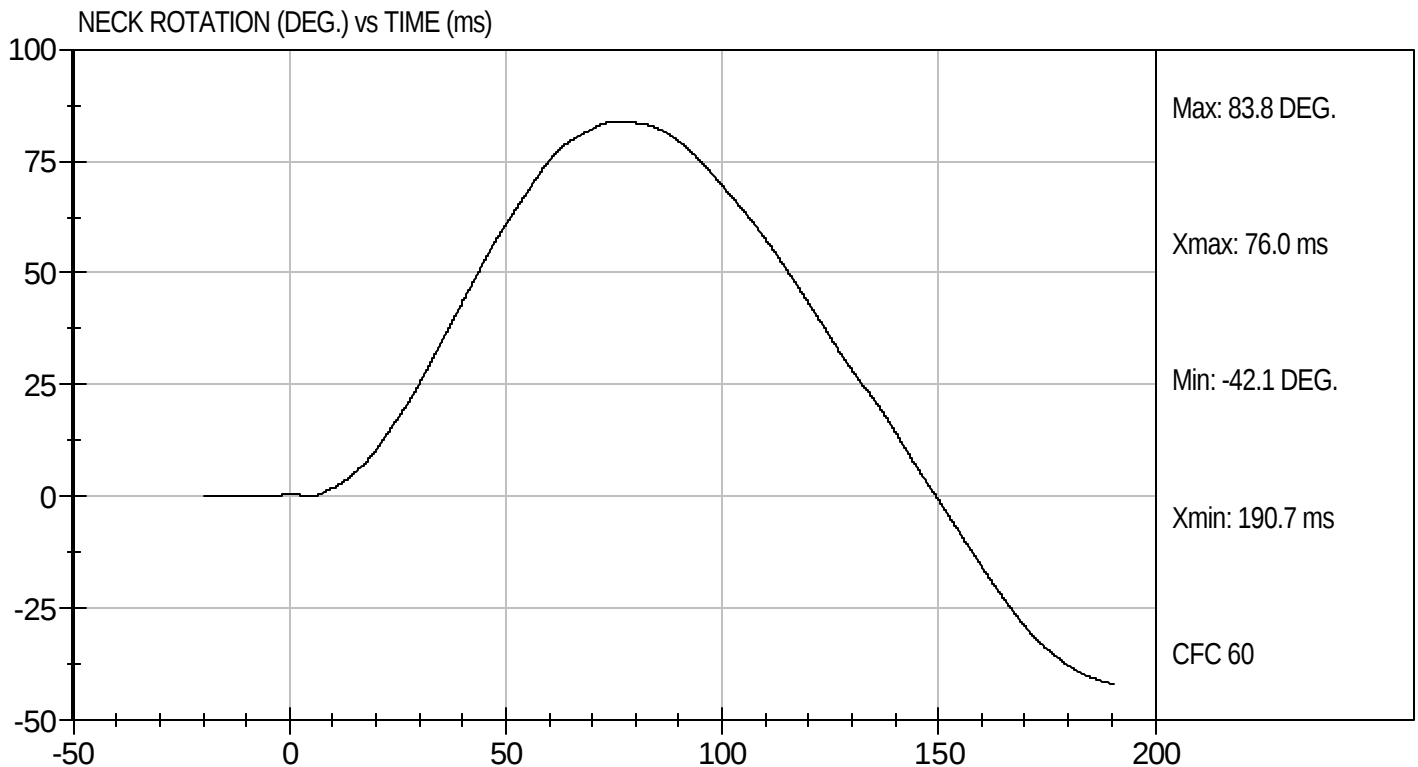
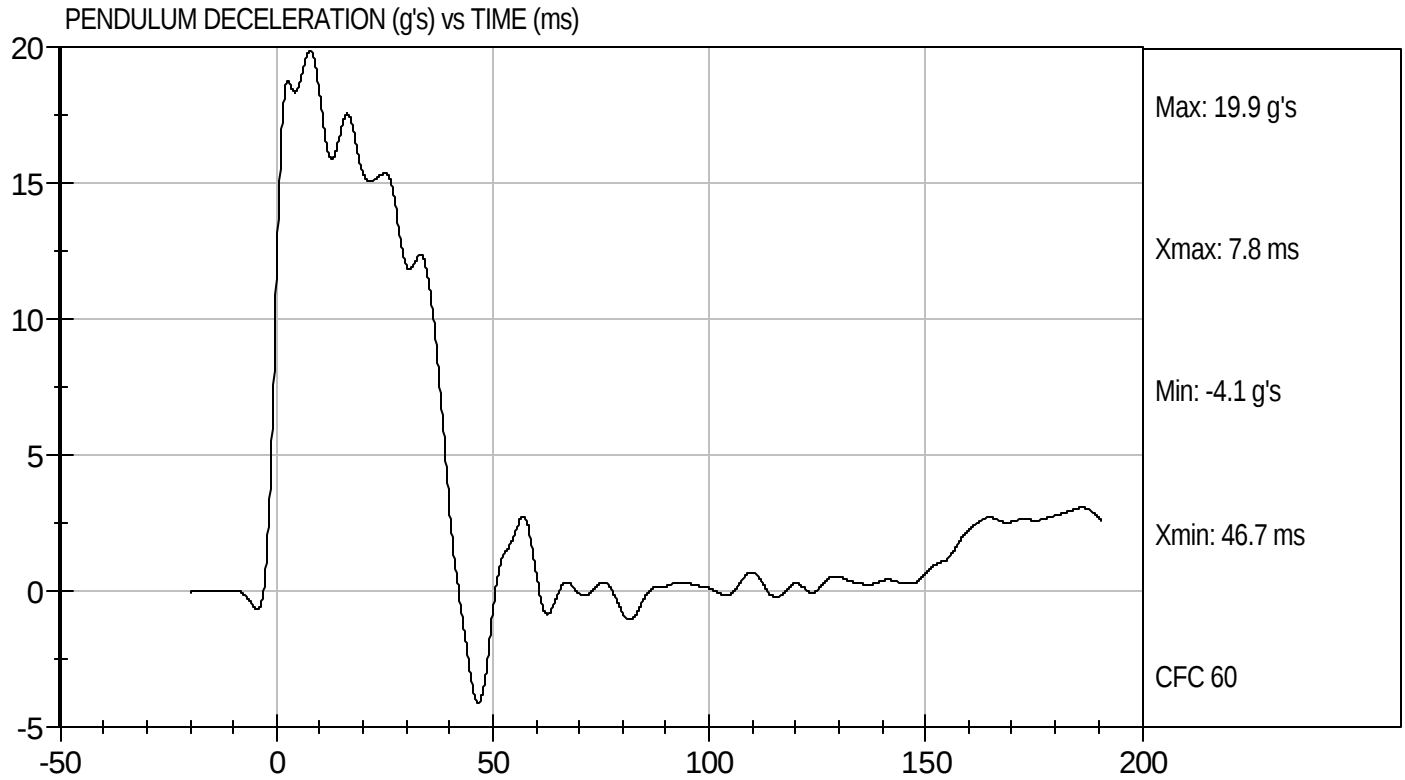
10/3/07
 Test Date


 Approved By



Test Desc: Neck Extension
Component ID: D073093

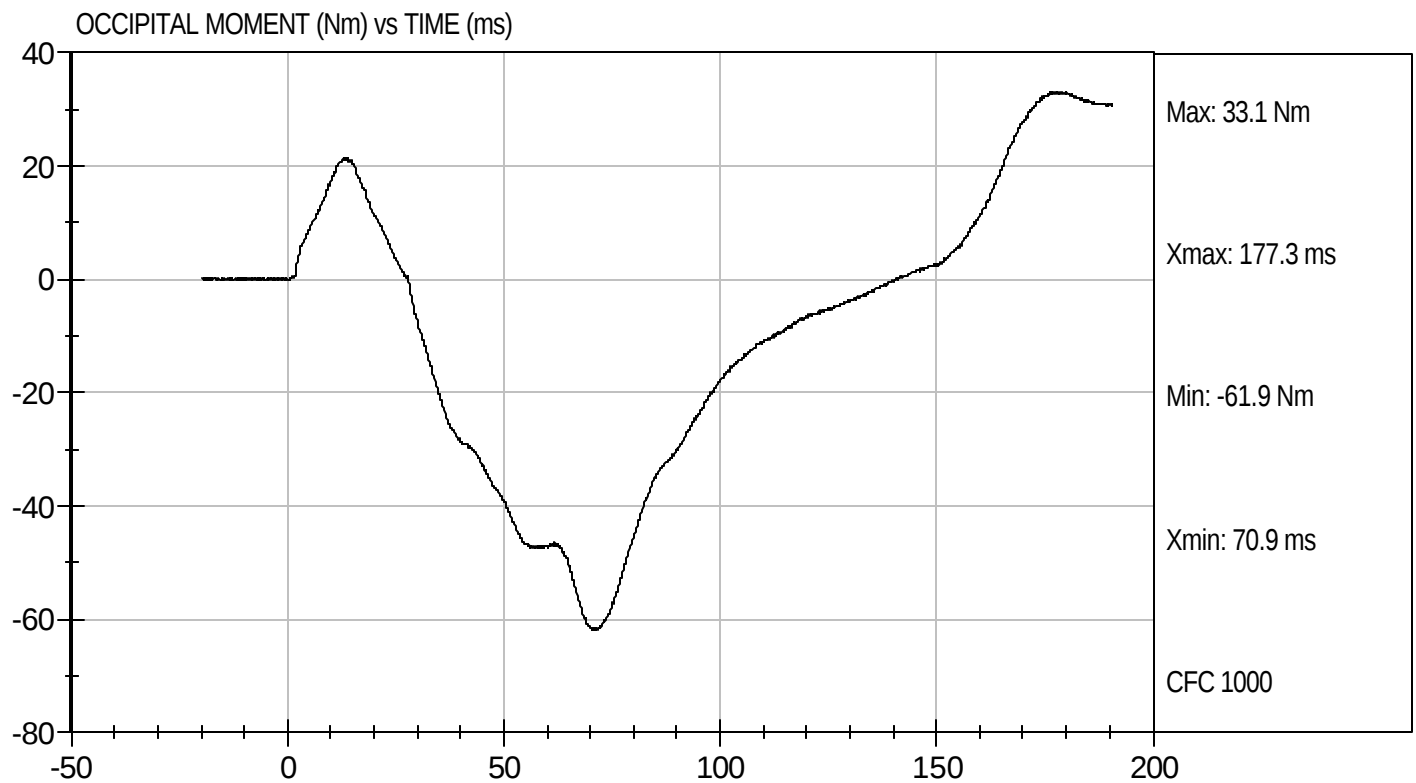
Test Date: 10/3/07
Velocity: 20.08 ft/s, 6.12 m/s





Test Desc: Neck Extension
Component ID: D073093

Test Date: 10/3/07
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: D073094

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
Probe Velocity	m/s	6.58 to 6.82	6.77	Pass
Peak Probe Force	N	5159 to 5893	5,261	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.50	Pass
Internal Hysteresis	%	69 to 85	74	Pass
Overall Test Results			Pass	


Laboratory Technician

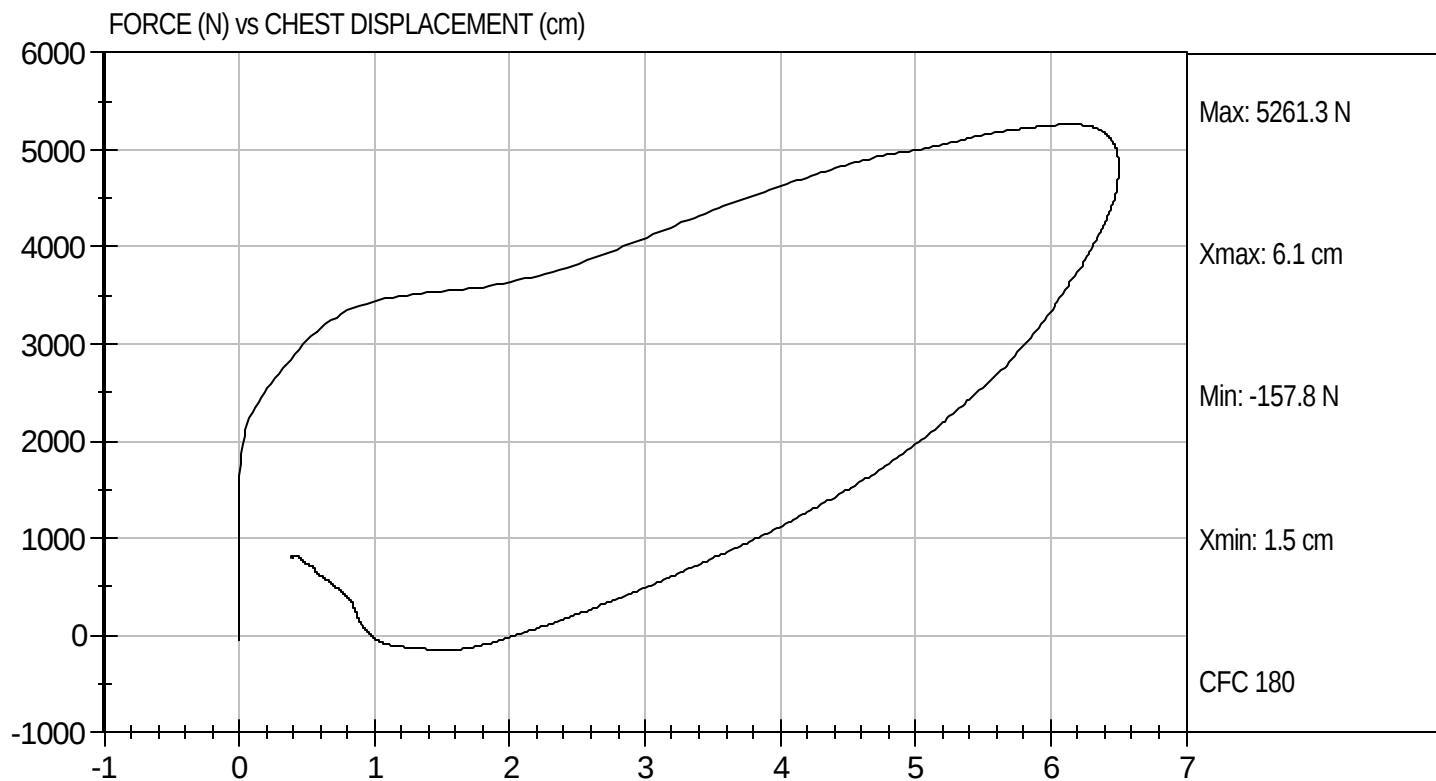

Approved By

10/3/07
Test Date



Test Desc: Thorax Impact
Component ID: D073094

Test Date: 10/3/07
Velocity: 22.22 ft/s, 6.77 m/s



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

ATD Serial No: 065

Test I.D: D073095

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	39	Pass
Probe Velocity	m/sec	2.07 to 2.13	2.11	Pass
Peak Probe Force	Newtons	4715 to 5782	5,469	Pass
Overall Test Results				Pass



Laboratory Technician



Approved By

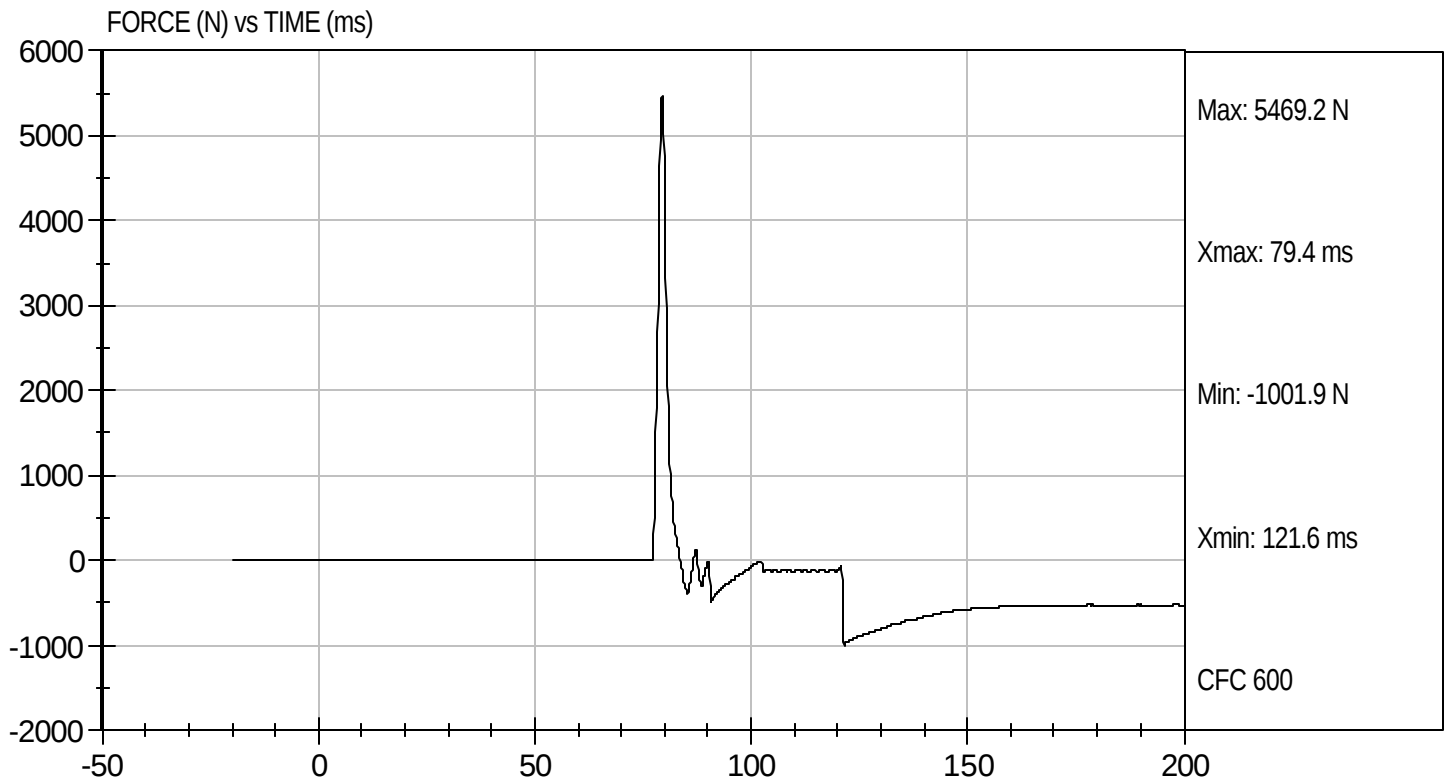
10/3/07

Test Date



Test Desc: Right Knee
Component ID: D073095

Test Date: 10/3/07
Velocity: 6.91 ft/s, 2.11 m/s



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

ATD Serial No: 065

Test I.D: D073096

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	39	Pass
Probe Velocity	m/sec	2.07 to 2.13	2.09	Pass
Peak Probe Force	Newtons	4715 to 5782	5,542	Pass
Overall Test Results				Pass


Laboratory Technician

10/3/07

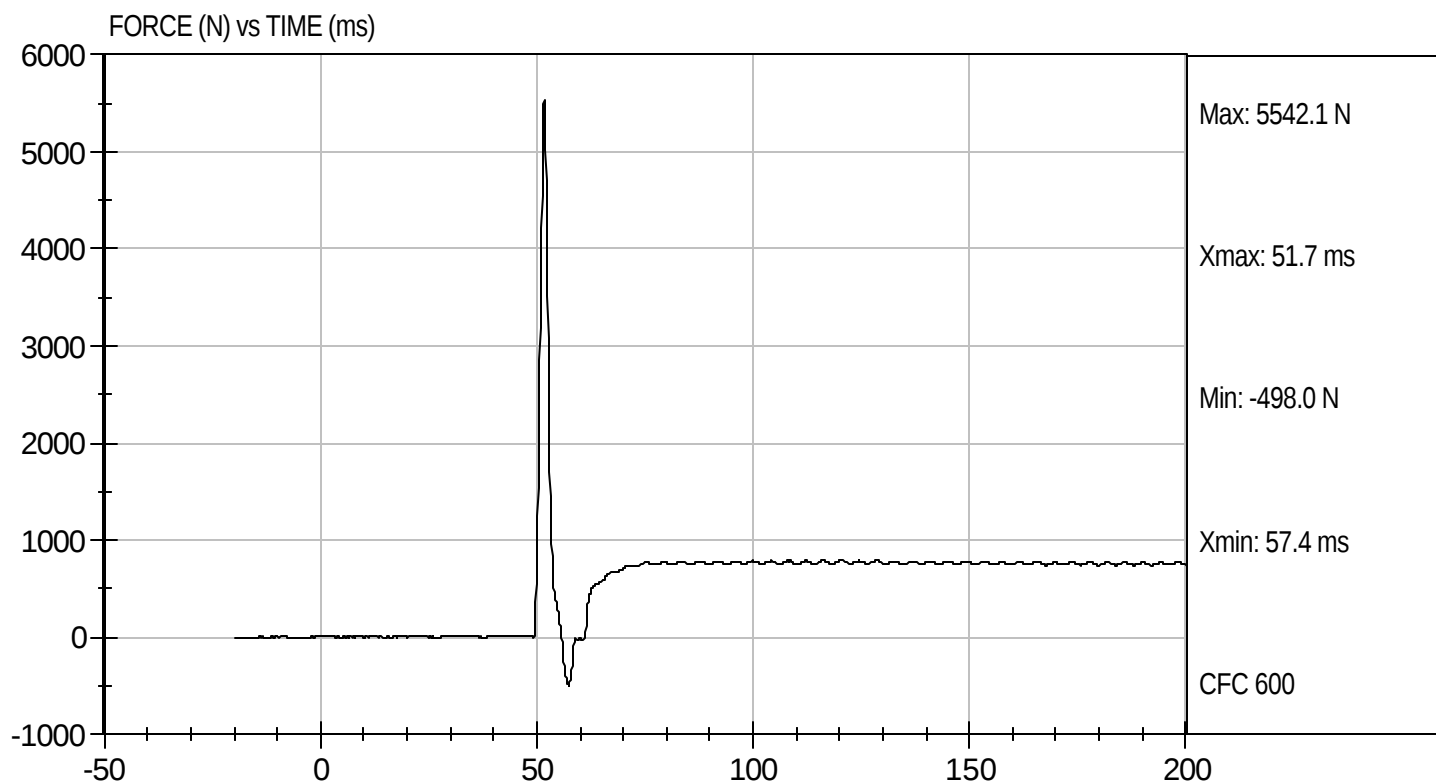
Test Date


Approved By



Test Desc: Left Knee
Component ID: D073096

Test Date: 10/3/07
Velocity: 6.86 ft/s, 2.09 m/s



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

ATD Serial No: 065

Test I.D: D073090

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	20.8	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	48	48	Pass
Rotation Rate	deg/sec	5 -10	8	8	Pass
30 Degrees	Nm	94.9 Nm Max	62.5	59.4	Pass
150 ft-lbf / 203.4 Nm	Deg	40- 50 Degree Max Rotation	43	41	Pass
Overall Test Results					Pass


 Laboratory Technician

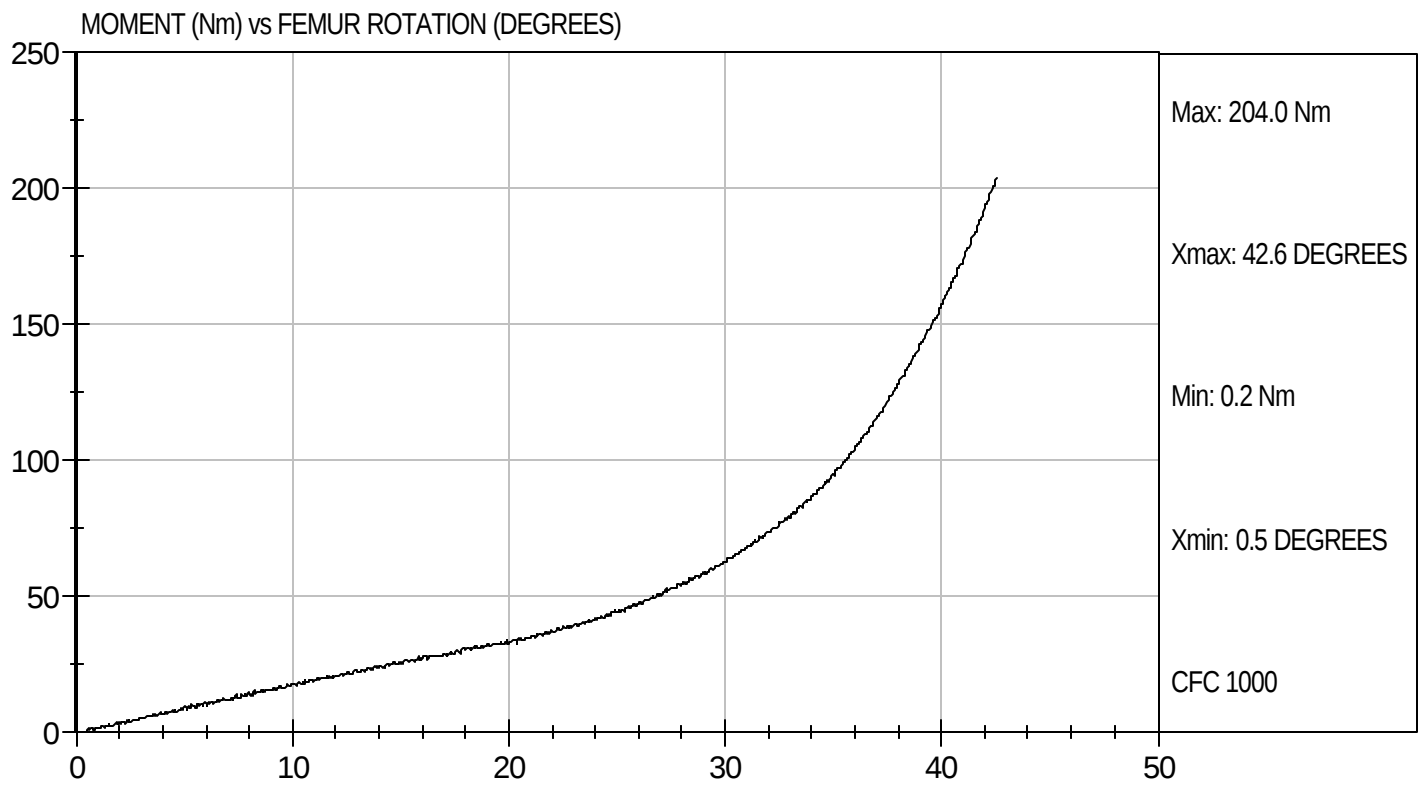
10/3/07
 Test Date


 Approved By



Test Desc: Hip Femur Flexion
Component ID: D073099

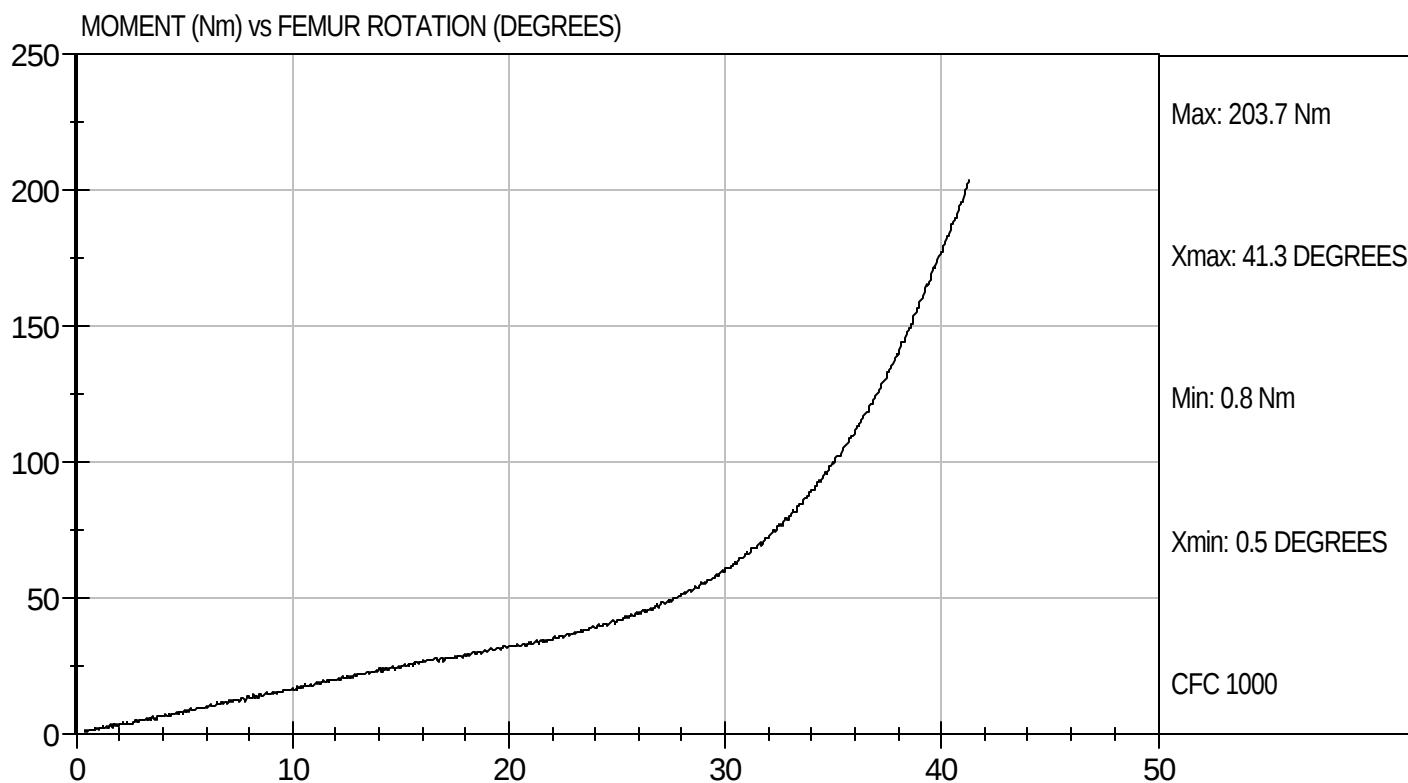
Test Date: 10/3/07
Velocity: 0 ft/s, 0.00 m/s





Test Desc: Hip Femur Flexion
Component ID: D073090

Test Date: 10/3/07
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	1137	1288
Head Injury Criteria (HIC15)	N/A	390	687	753
Max. Thorax Accel. (3msec Clip)	G's	50	68	61

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	489.9	433.6	
Right	kg	505.8	435.0	
Ratio	%	53.4	46.6	
Totals	kg	995.7	868.6	1864.3

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

TEST NOTES

There was no valid data collected for:

Left Rear Passenger Neck Force Y after 75 msec.

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 Snugride (Rear Facing)	Britax Companion (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

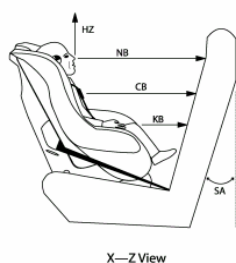
VISIBLE DUMMY CONTACT POINTS

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

CHILD DUMMY POSITIONING IN VEHICLE

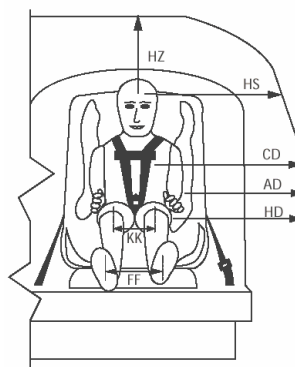
Child Restraint System (Position 3)	Graco Snuggly (Rear Facing)
NHTSA No.	M80508

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

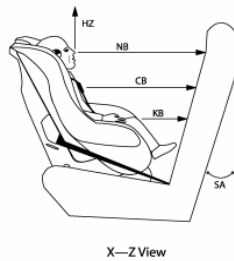
Measurement	Pre-Test (mm)	Post-Test (mm)
	P3 CRS (093)	P3 CRS (093)
SA (deg)	30	30
HS	379	393
CD	374	374
AD	250	254
HD	306	315
HZ	364	371
NB	552	593
CB	456	487
KK	102	105
FF	96	92
KB - LEFT	209	205
KB - RIGHT	204	197
TB - LEFT	56	67
TB - RIGHT	58	158

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

CHILD DUMMY POSITIONING IN VEHICLE

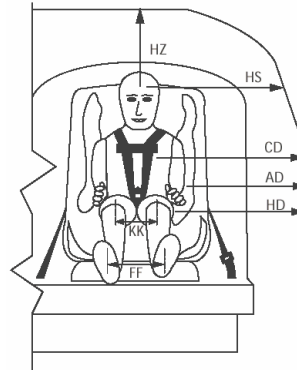
Child Restraint System (Position 4)	Britax Companion (Rear Facing)
NHTSA No.	M80508

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)
	P4 CRS (090)	P4 CRS (090)
SA (deg)	30	30
HS	366	363
CD	379	345
AD	253	255
HD	304	310
HZ	384	329
NB	505	155
CB	437	202
KK	139	183
FF	137	273
KB - LEFT	178	89
KB - RIGHT	182	93
TB - LEFT	12	115
TB - RIGHT	17	135

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

CRS PERFORMANCE DATA

Child Restraint System (Position 3)	Graco Snugride (Rear Facing)
Child Restraint System (Position 4)	Britax Companion (Rear Facing)
NHTSA No.	M80508

POSITION 3 CRS POST-TEST INSPECTION

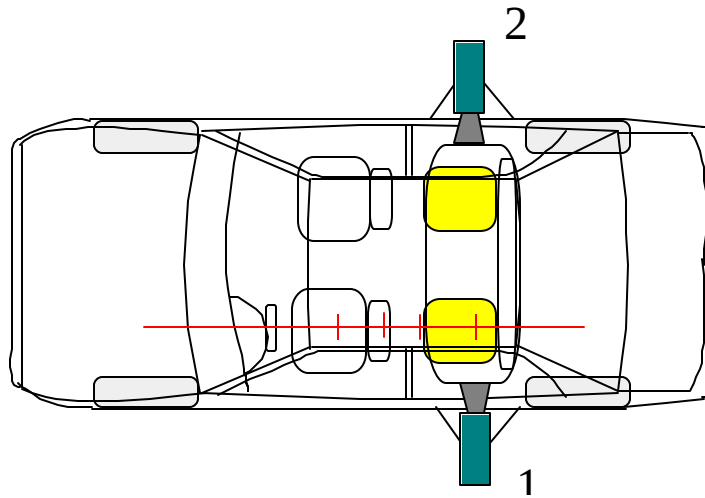
Location	Damage	Remarks
Upper Tether Strap		
Upper Tether Buckle		
Upper Tether Hook		
Vehicle Upper Tether Anchor		
Lower Anchor Strap	None	
Lower Anchor Buckle		
Lower Anchor Hooks	None	
Vehicle Lower CRS Anchors	None	
Five Point Harness Connections	None	
Cracks on CRS	Yes	On Base (see photos)
Fabric 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	None	
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 Snugride (Rear Facing)
Child Restraint System (Position 4)	Britax Companion (Rear Facing)
NHTSA No.	M80508



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

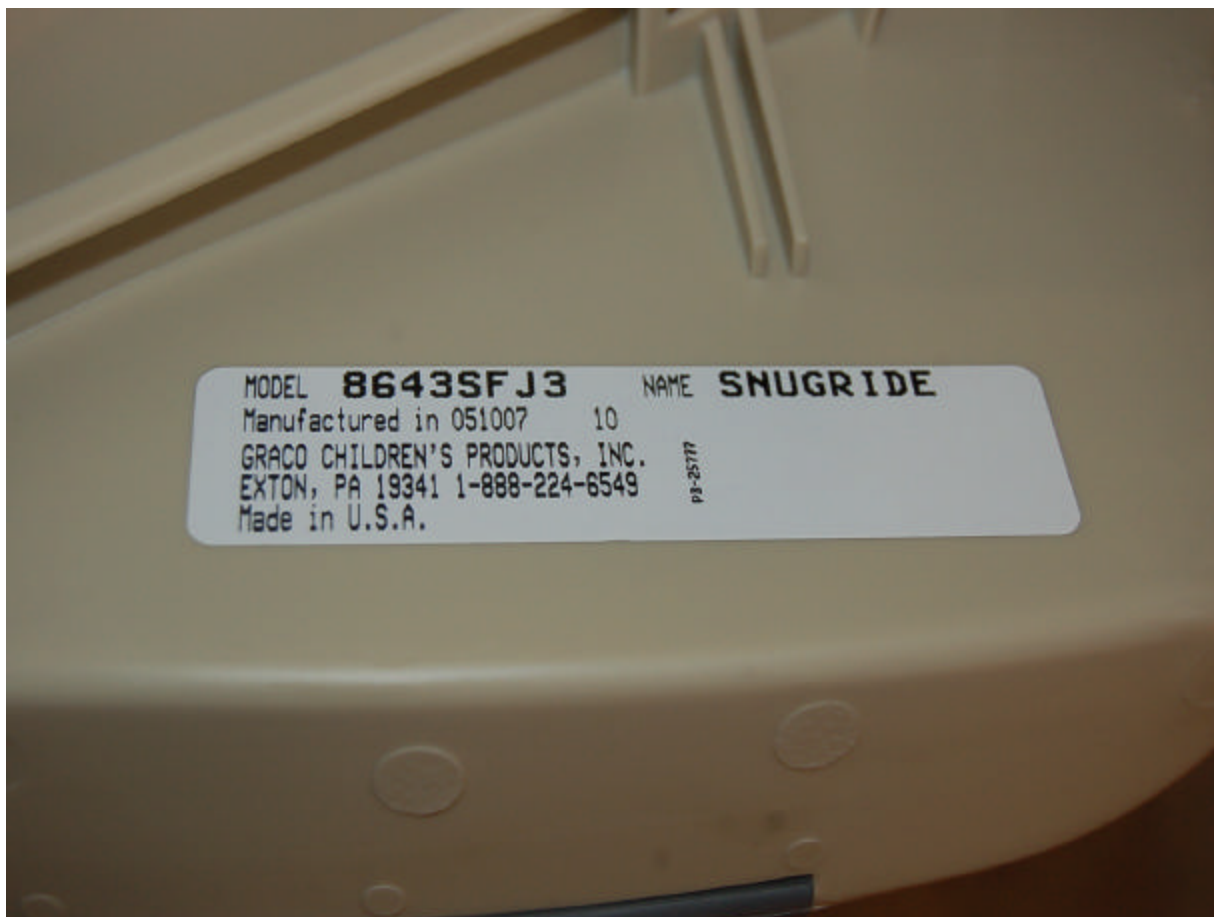
+Y = film plane to right of monorail centerline

+Z = film plane above ground level

PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

		<u>Page No.</u>
Figure No. 1.	Close-up View of Position 3 CRS Label	D-8
Figure No. 2.	Pre-Test Front View of Position 3 CRS	D-9
Figure No. 3.	Post-Test Front View of Position 3 CRS	D-9
Figure No. 4.	Pre-Test Rear View of Position 3 CRS	D-10
Figure No. 5.	Post-Test Rear View of Position 3 CRS	D-10
Figure No. 6.	Pre-Test Left Side View of Position 3 CRS	D-11
Figure No. 7.	Post-Test Left Side View of Position 3 CRS	D-11
Figure No. 8.	Pre-Test Right Side View of Position 3 CRS	D-12
Figure No. 9.	Post-Test Right Side View of Position 3 CRS	D-12
Figure No. 10.	Close-up View of Position 4 CRS Label	D-13
Figure No. 11.	Pre-Test Front View of Position 4 CRS	D-14
Figure No. 12.	Post-Test Front View of Position 4 CRS	D-14
Figure No. 13.	Pre-Test Rear View of Position 4 CRS	D-15
Figure No. 14.	Post-Test Rear View of Position 4 CRS	D-15
Figure No. 15.	Pre-Test Left Side View of Position 4 CRS	D-16
Figure No. 16.	Post-Test Left Side View of Position 4 CRS	D-16
Figure No. 17.	Pre-Test Right Side View of Position 4 CRS	D-17
Figure No. 18.	Post-Test Right Side View of Position 4 CRS	D-17
Figure No. 19.	Pre-Test Position 3 Left Side View	D-18
Figure No. 20.	Post-Test Position 3 Left Side View	D-18
Figure No. 21.	Pre-Test Position 4 Left Side View	D-19
Figure No. 22.	Post-Test Position 4 Left Side View	D-19
Figure No. 23.	Pre-Test Position 3 Right Side View	D-20
Figure No. 24.	Post-Test Position 3 Right Side View	D-20
Figure No. 25.	Pre-Test Position 4 Right Side View	D-21
Figure No. 26.	Post-Test Position 4 Right Side View	D-21
Figure No. 27.	Post-Test Position 3 Infant Seat Base View #1	D-22
Figure No. 28.	Post-Test Position 3 Infant Seat Base View #2	D-22
Figure No. 29.	Post-Test Position 3 Infant Seat Base View #3	D-23



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



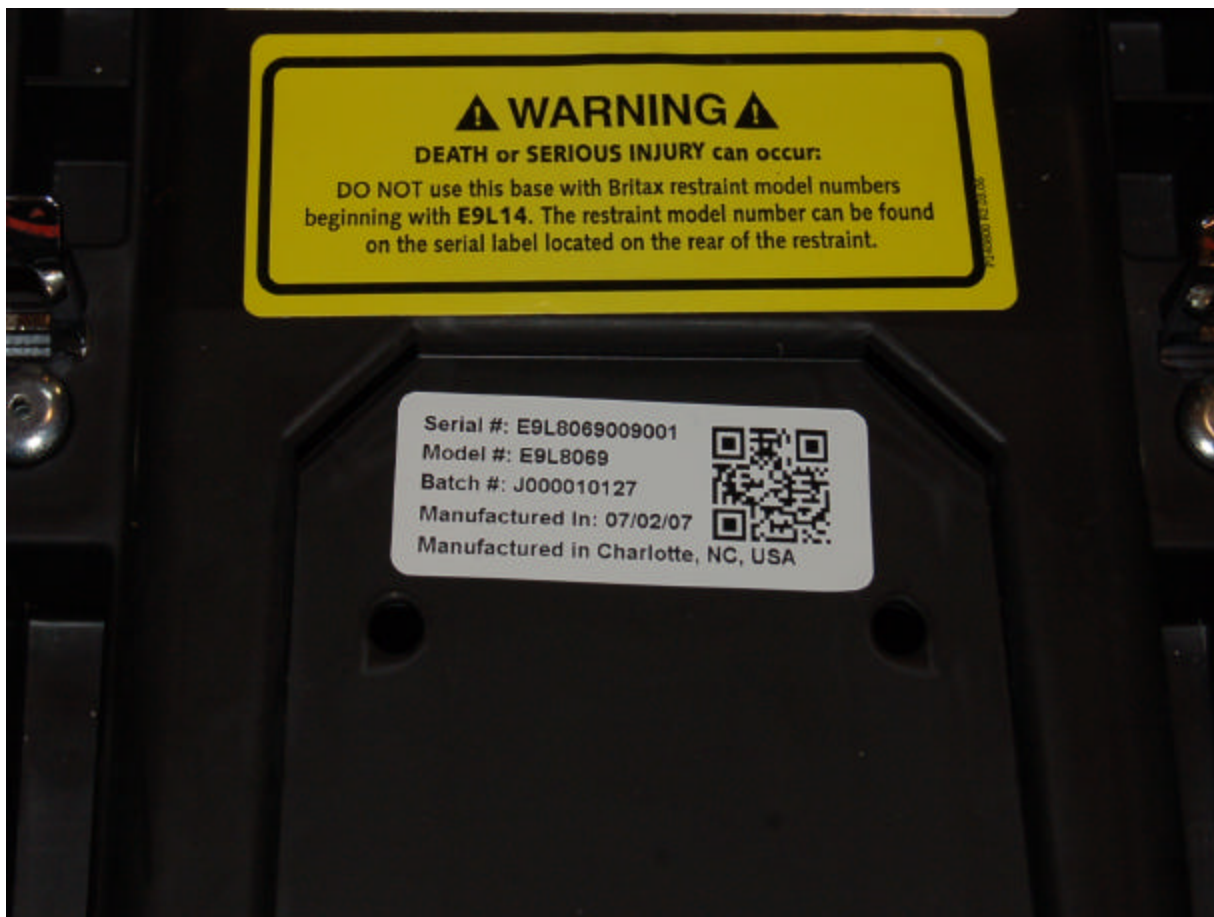
Post-Test Left Side View of Position 3 CRS



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 3 Infant Seat Base View #1



Post-Test Position 3 Infant Seat Base View #2

CHILD DUMMY RESPONSE DATA TRACES

TABLE OF DATA PLOTS

Page No.

List of Data Plots Provided in this Section

Figure No. 30.	LRP Child Head X Acceleration vs. Time	D-26
Figure No. 31.	LRP Child Head Y Acceleration vs. Time	D-26
Figure No. 32.	LRP Child Head Z Acceleration vs. Time	D-26
Figure No. 33.	LRP Child Head Resultant Acceleration vs. Time	D-26
Figure No. 34.	LRP Child Chest X Acceleration vs. Time	D-27
Figure No. 35.	LRP Child Chest Y Acceleration vs. Time	D-27
Figure No. 36.	LRP Child Chest Z Acceleration vs. Time	D-27
Figure No. 37.	LRP Child Chest Resultant Acceleration vs. Time	D-27
Figure No. 38.	RRP Child Head X Acceleration vs. Time	D-28
Figure No. 39.	RRP Child Head Y Acceleration vs. Time	D-28
Figure No. 40.	RRP Child Head Z Acceleration vs. Time	D-28
Figure No. 41.	RRP Child Head Resultant Acceleration vs. Time	D-28
Figure No. 42.	RRP Child Chest X Acceleration vs. Time	D-29
Figure No. 43.	RRP Child Chest Y Acceleration vs. Time	D-29
Figure No. 44.	RRP Child Chest Z Acceleration vs. Time	D-29
Figure No. 45.	RRP Child Chest Resultant Acceleration vs. Time	D-29

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

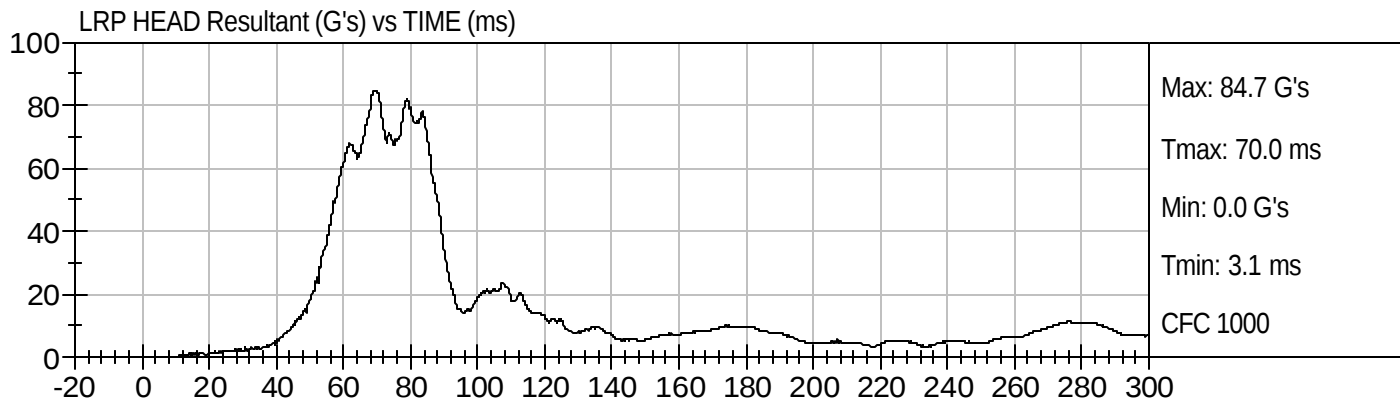
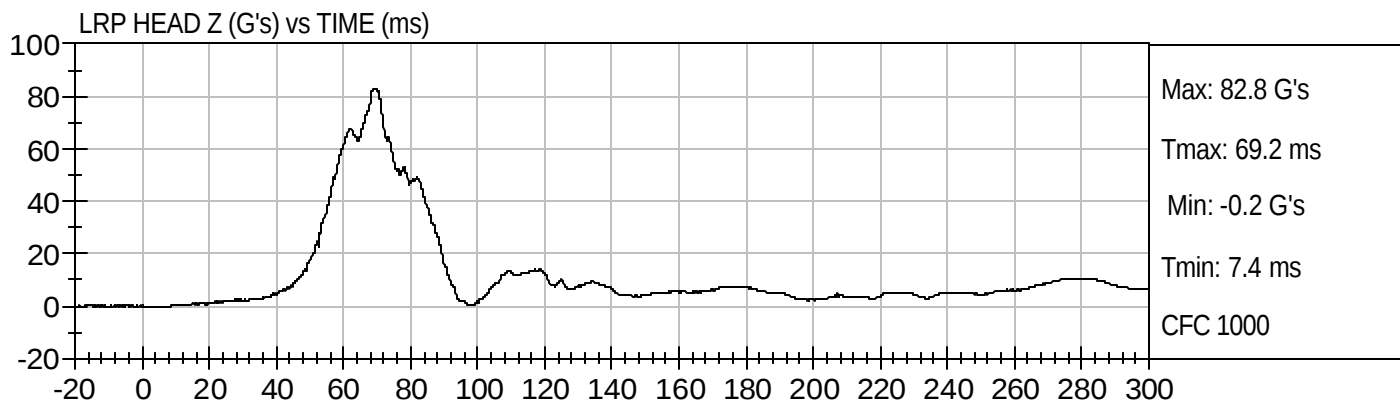
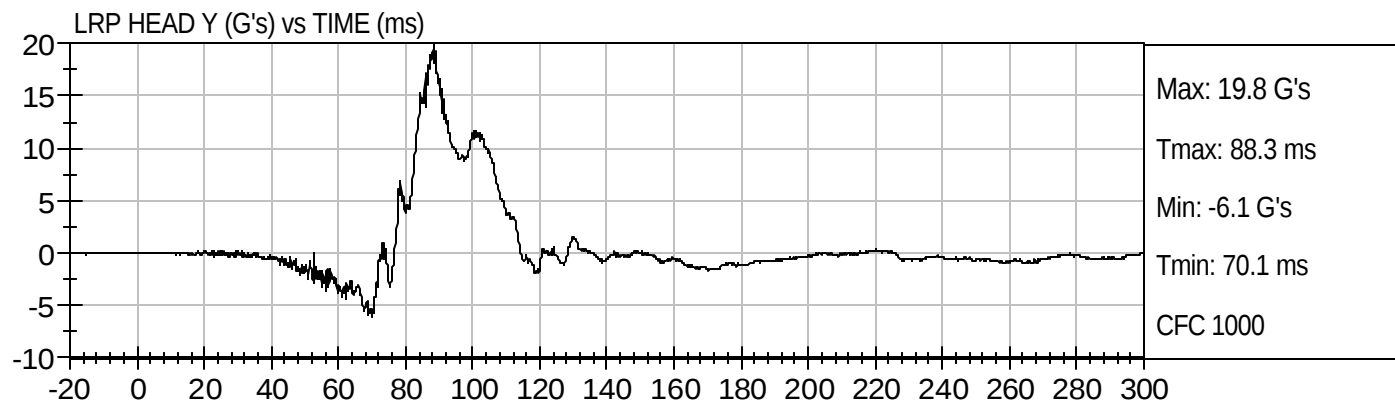
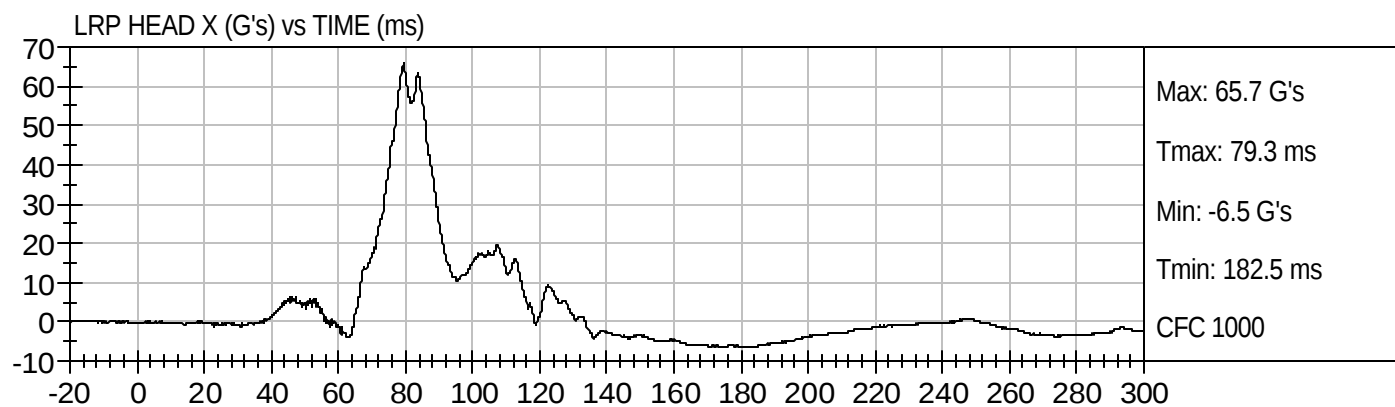
LRP Child Upper Neck Moment X vs. Time

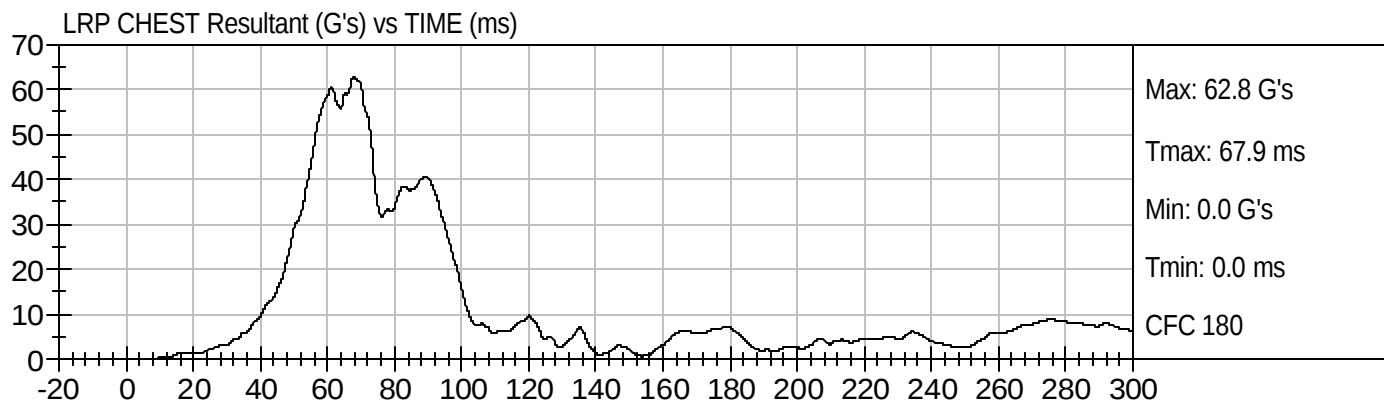
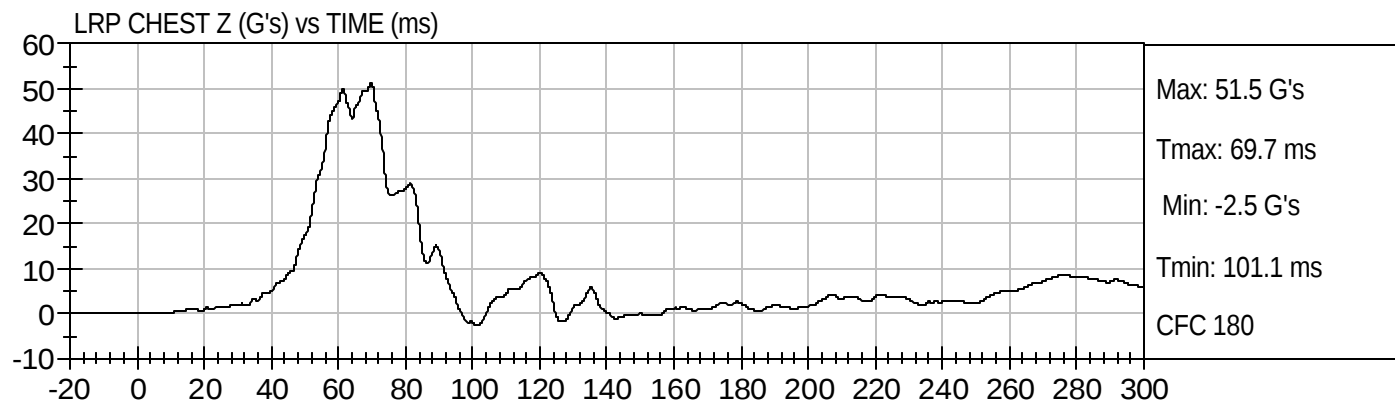
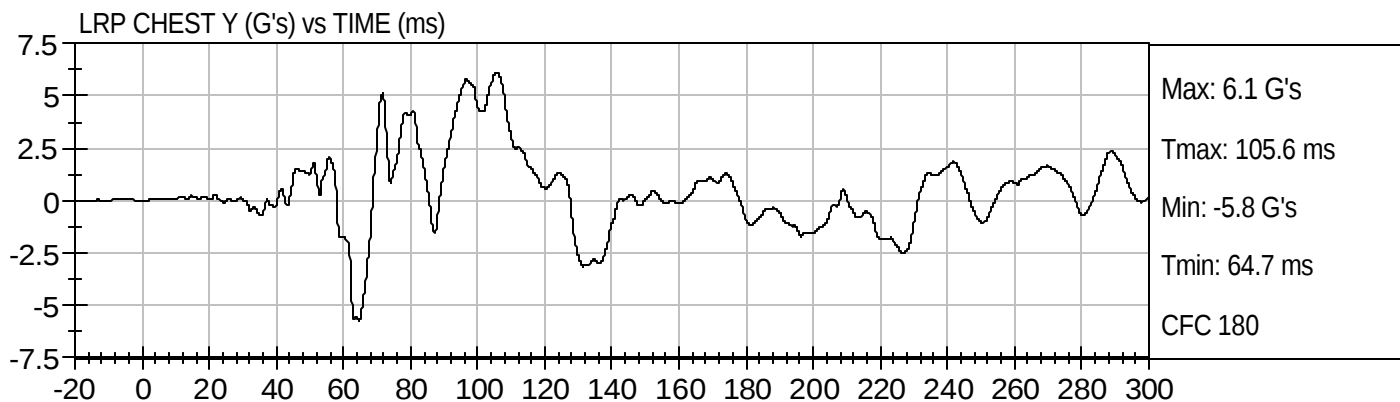
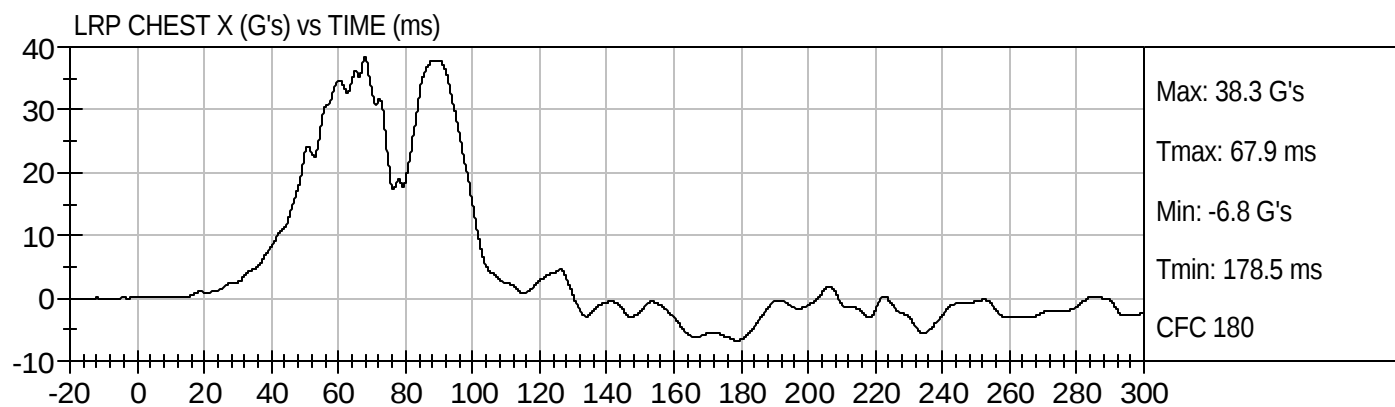
LRP Child Upper Neck Moment Y vs. Time

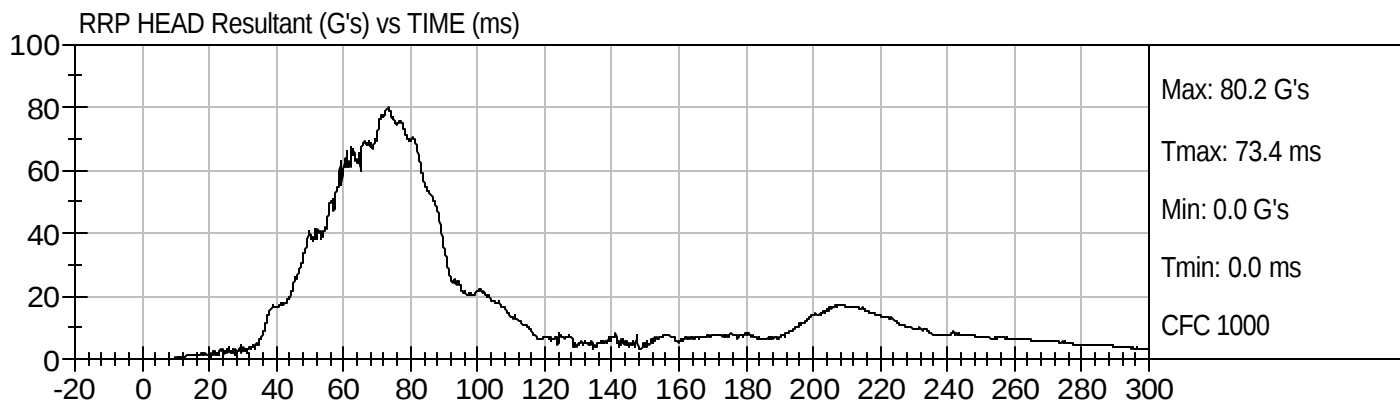
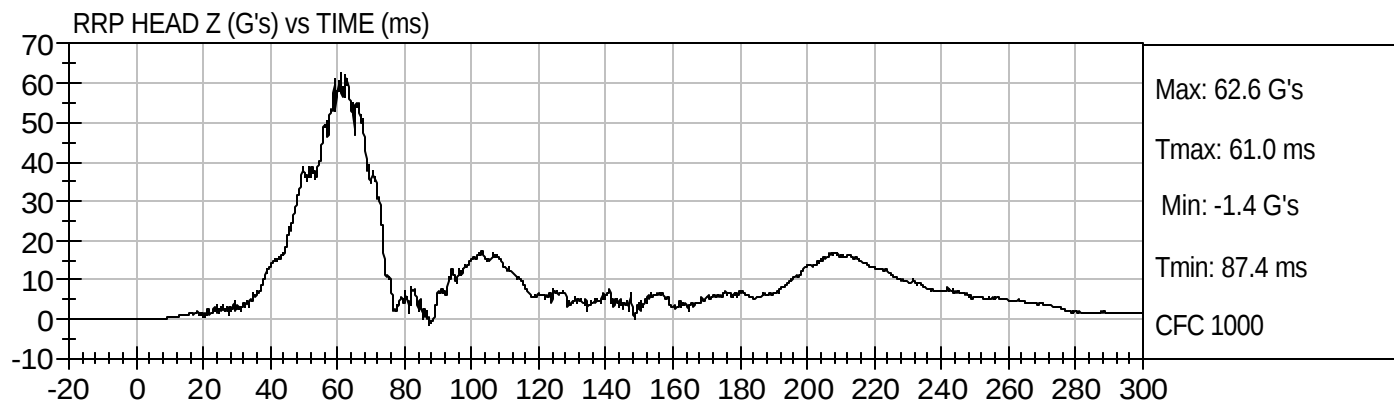
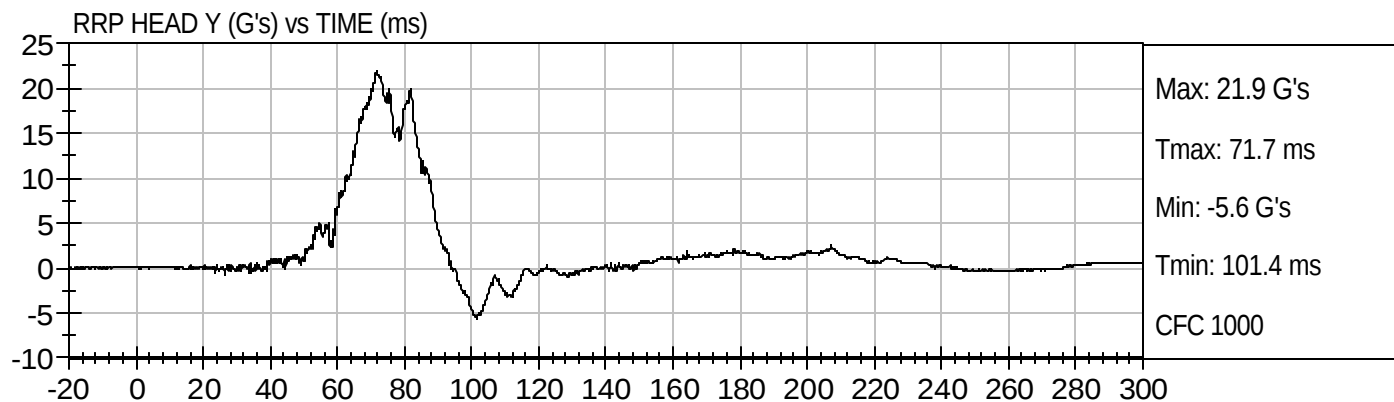
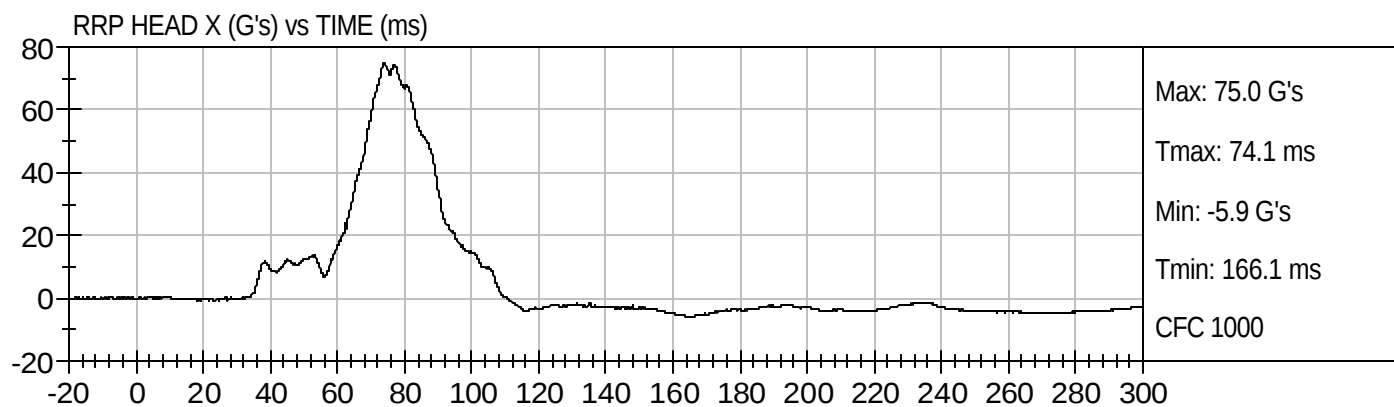
LRP Child Upper Neck Moment Z vs. Time

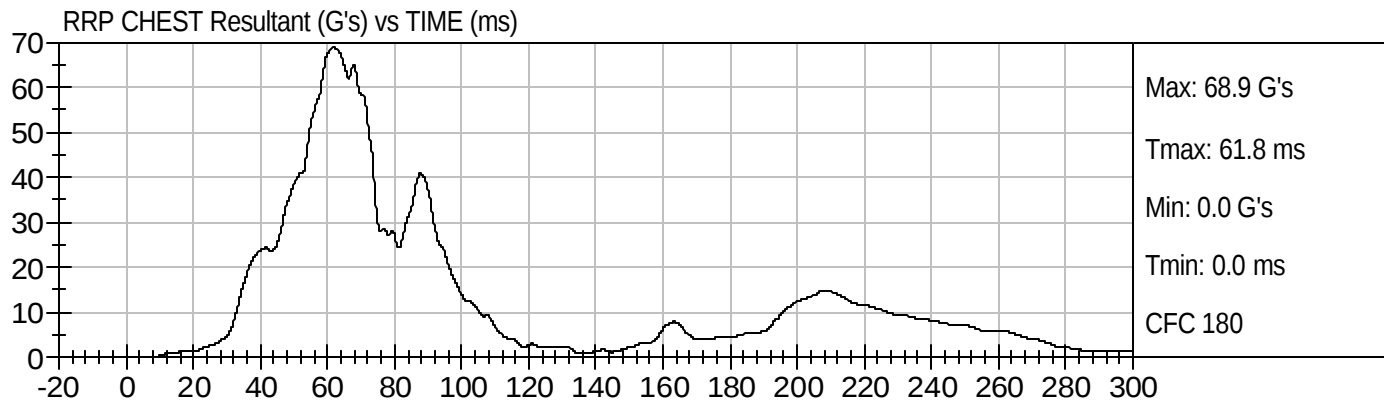
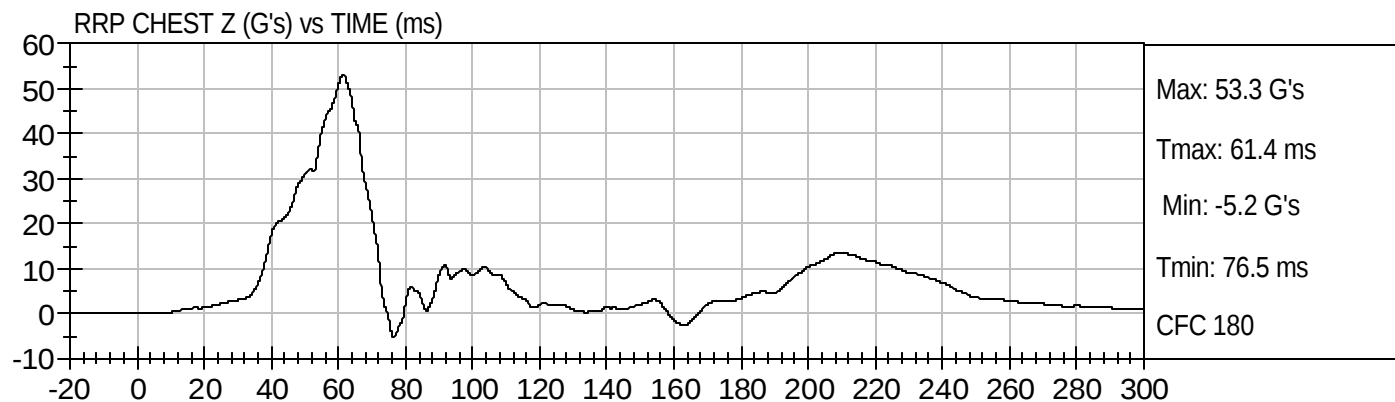
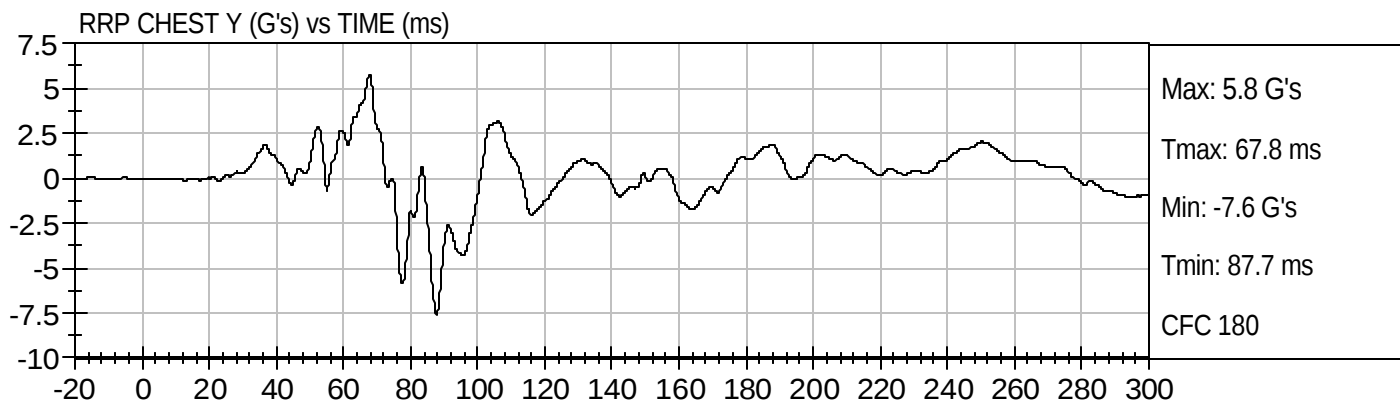
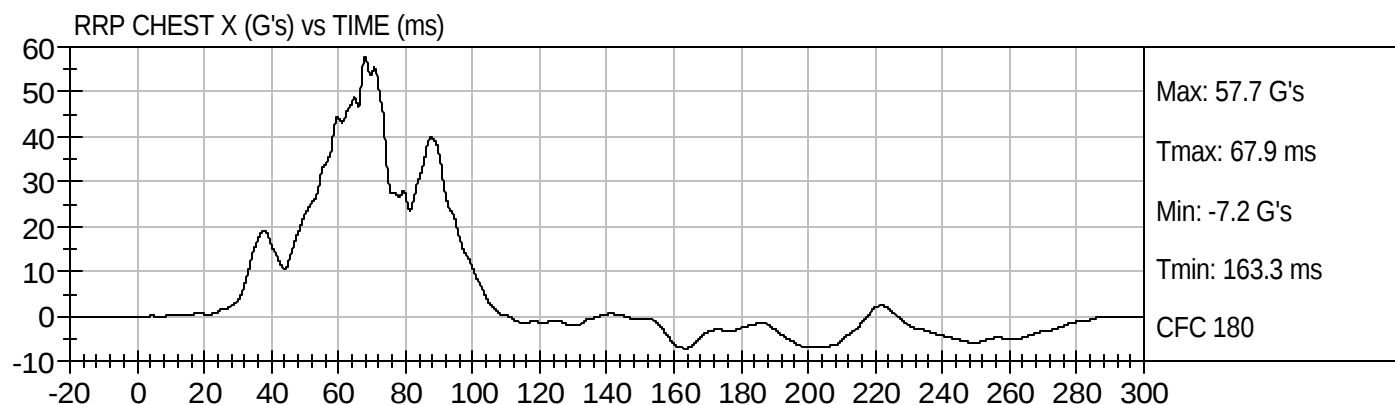
LRP Child Upper Neck Moment Resultant vs. Time

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









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


Approved By

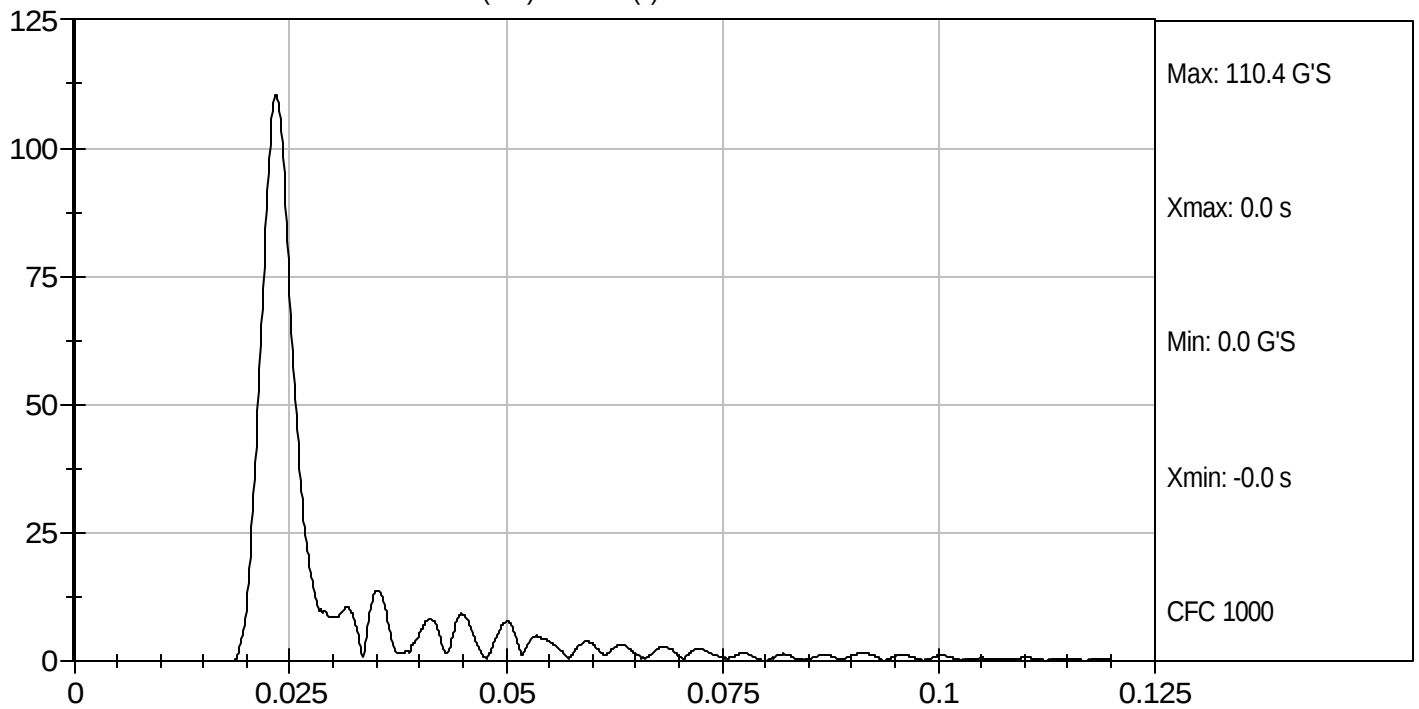
8/23/07
Test Date



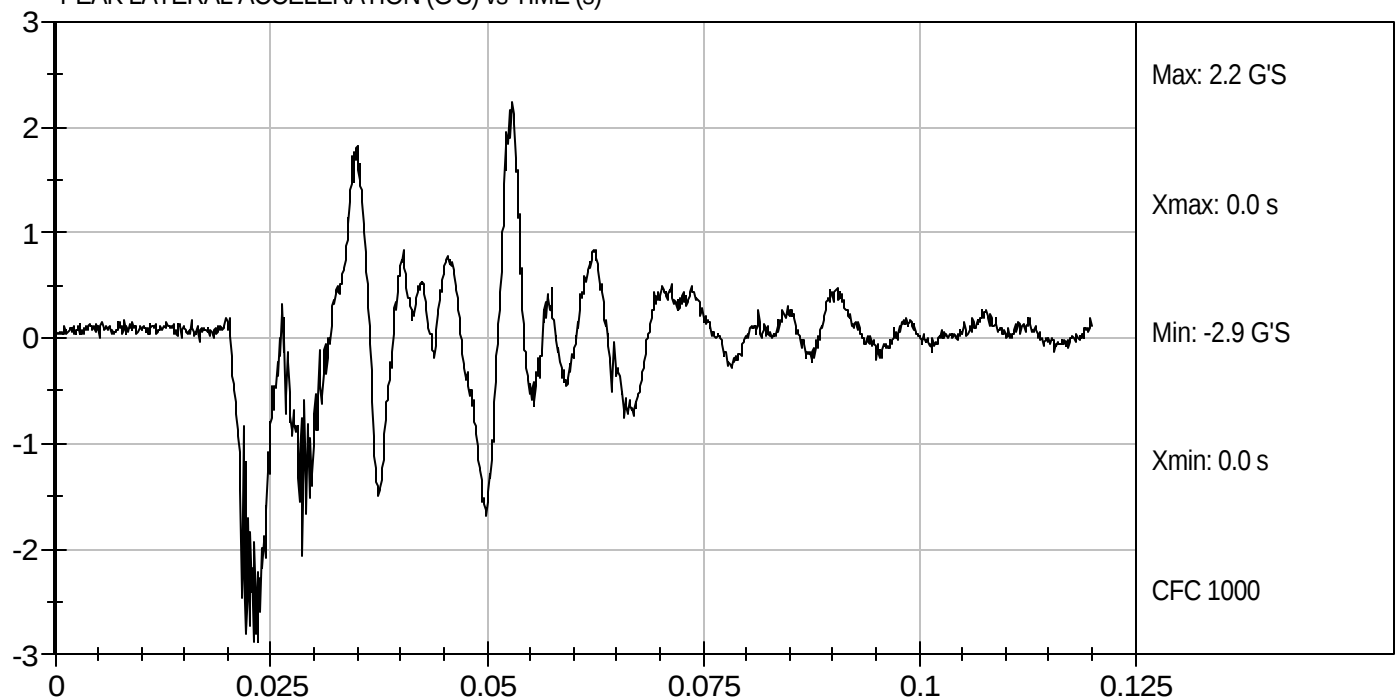
Test Desc: Head Drop
Component ID: D072541

Test Date: 8/23/07
Velocity: 0 ft/s, 0 m/s

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



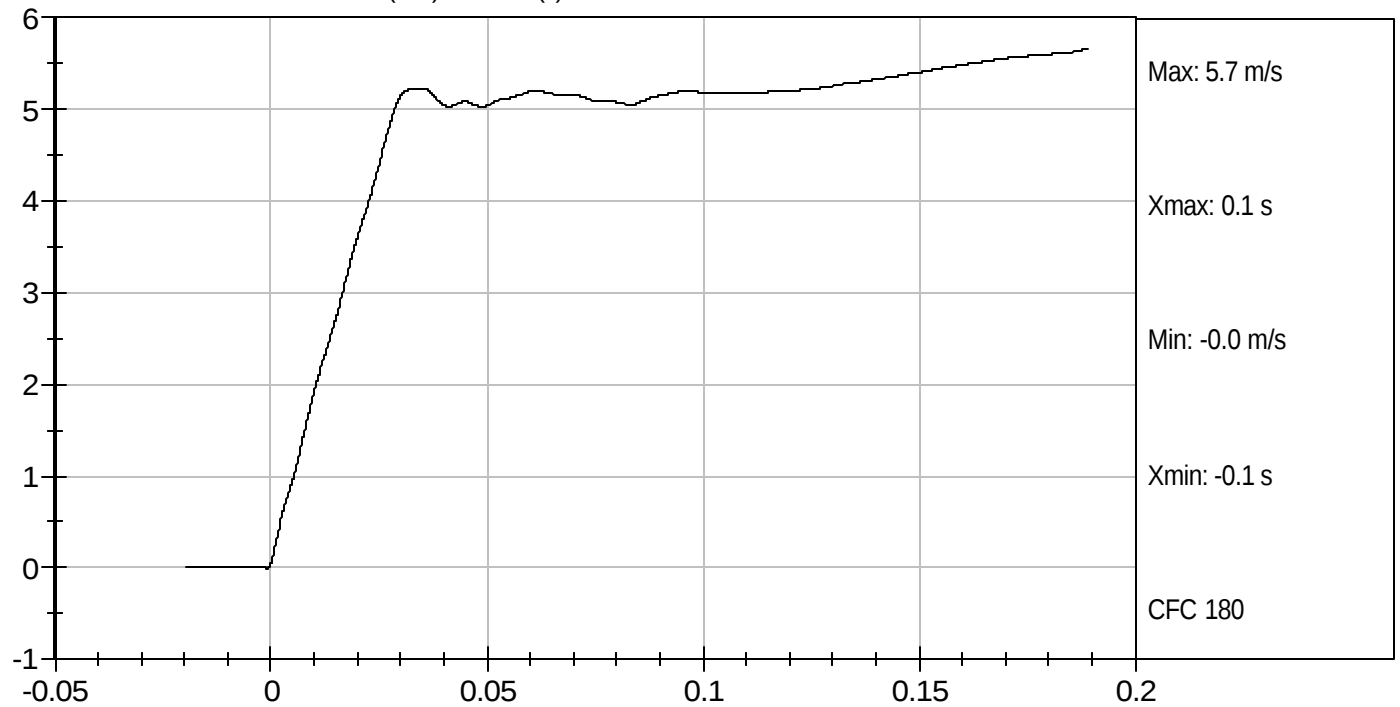
Approved By



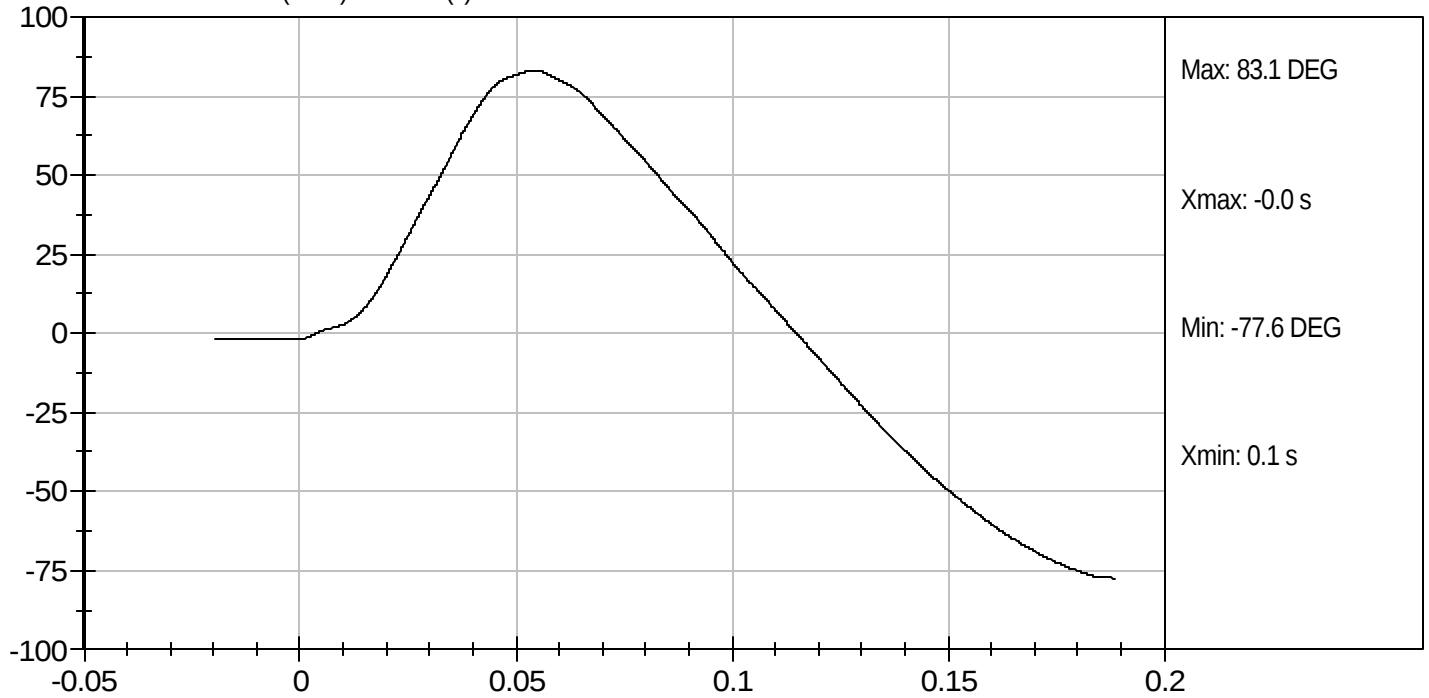
Test Desc: Neck Flexion
Component ID: D072542

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

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



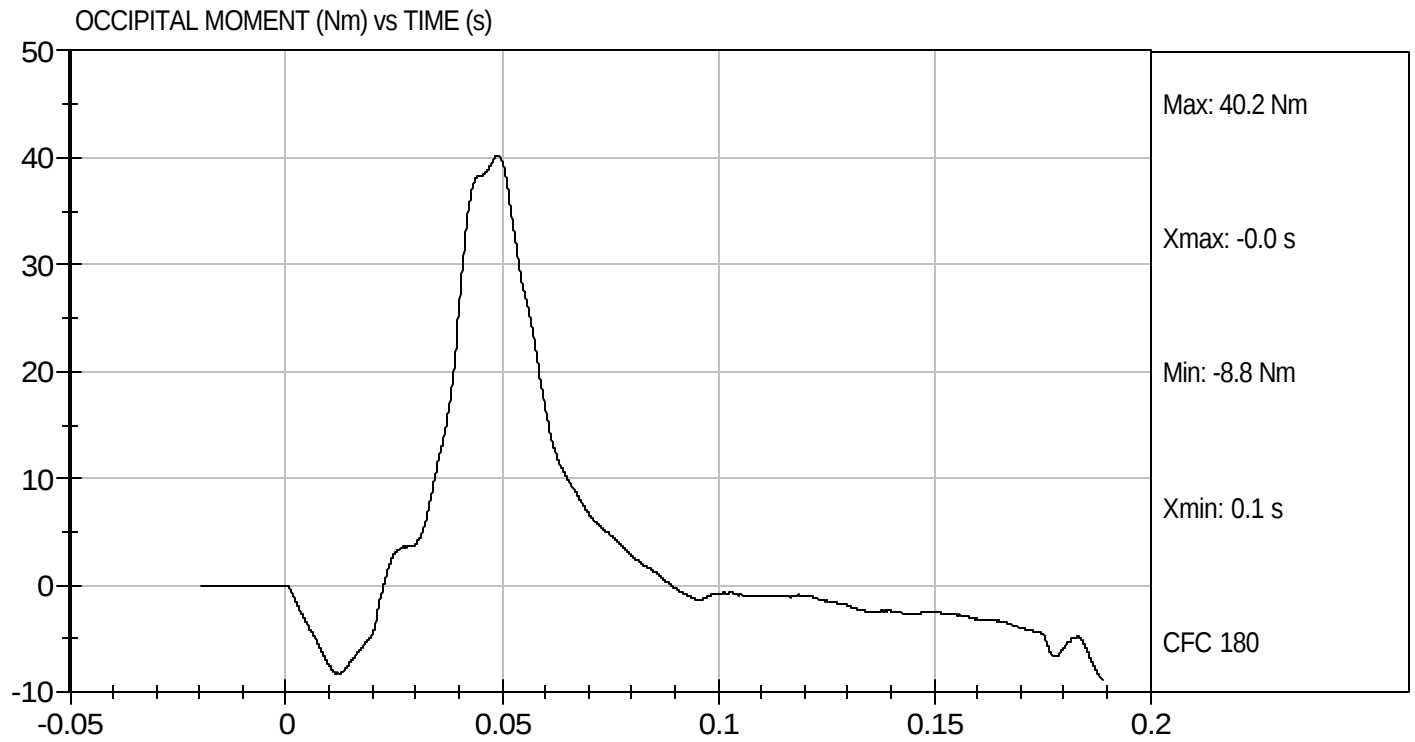
FLEXION ANGLE (DEG) vs TIME (s)





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

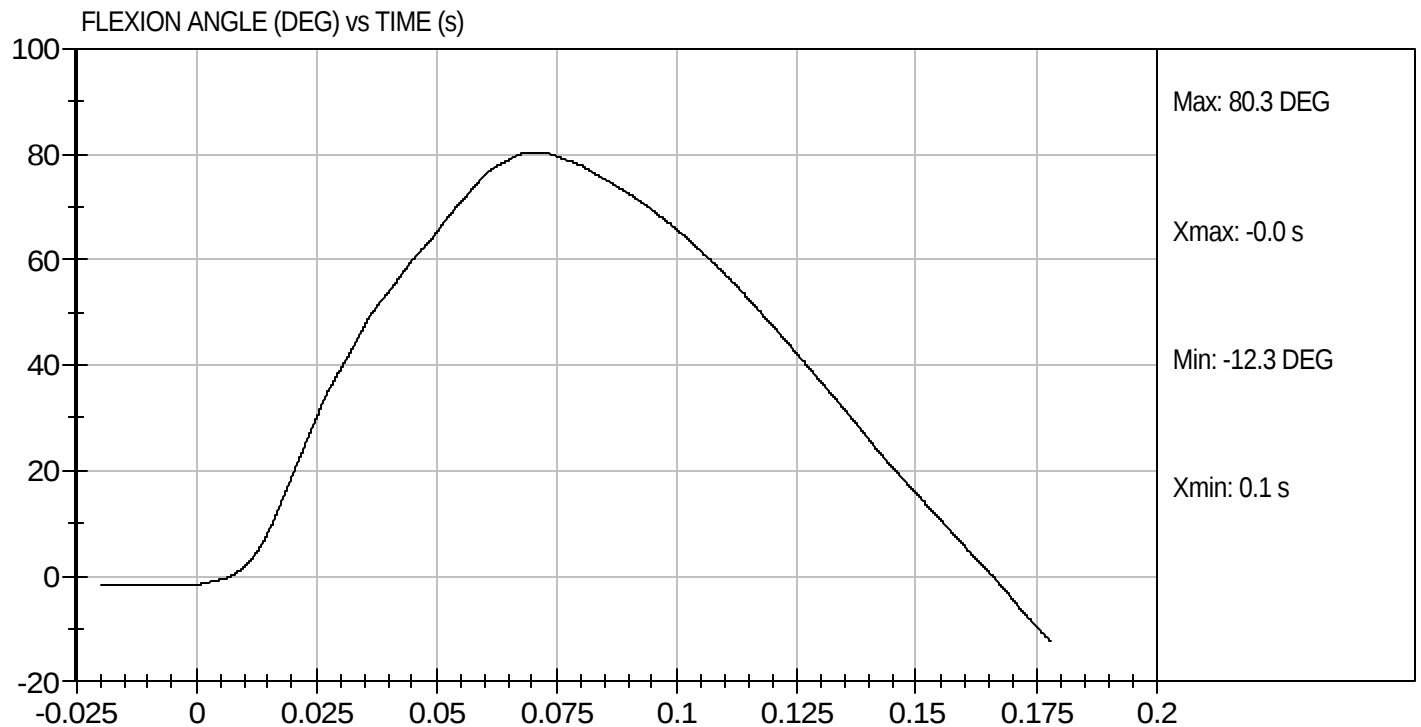
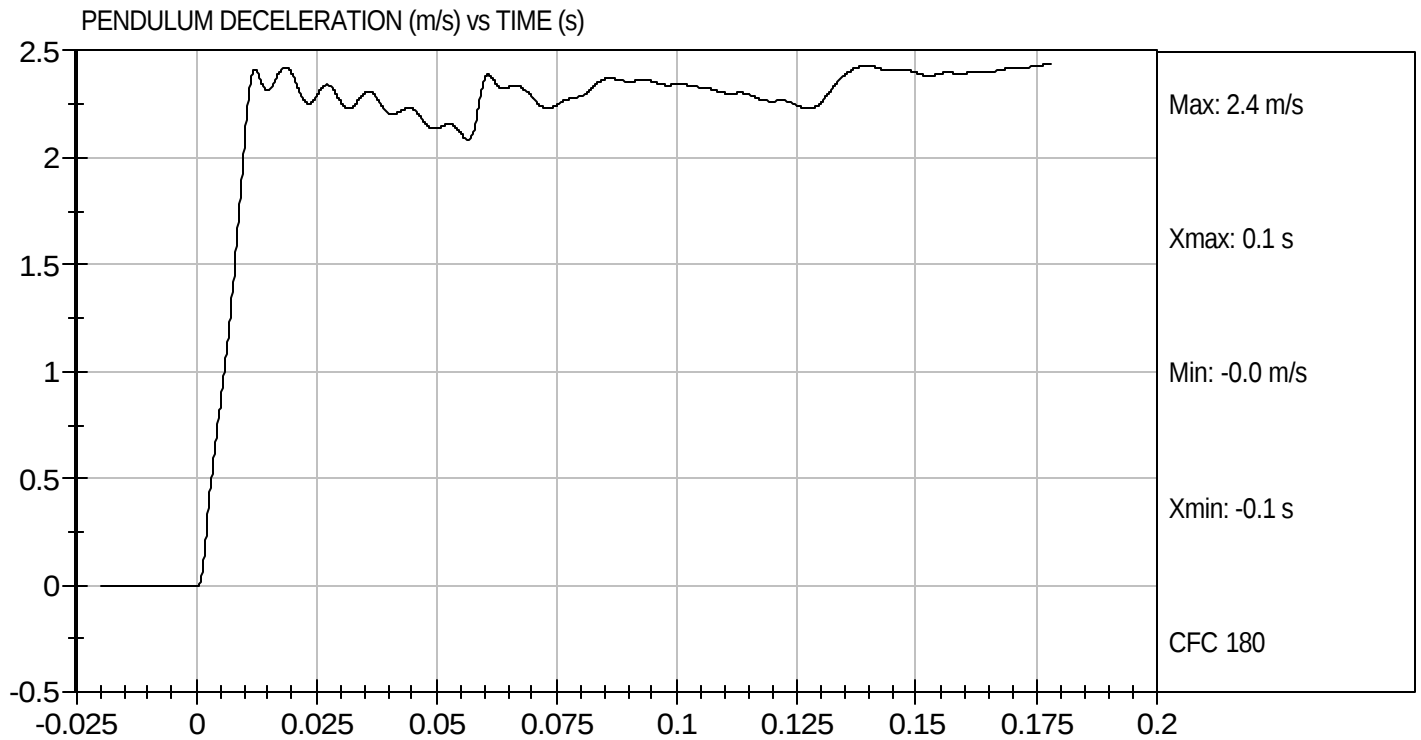


Approved By



Test Desc: Neck Extension
Component ID: D072543

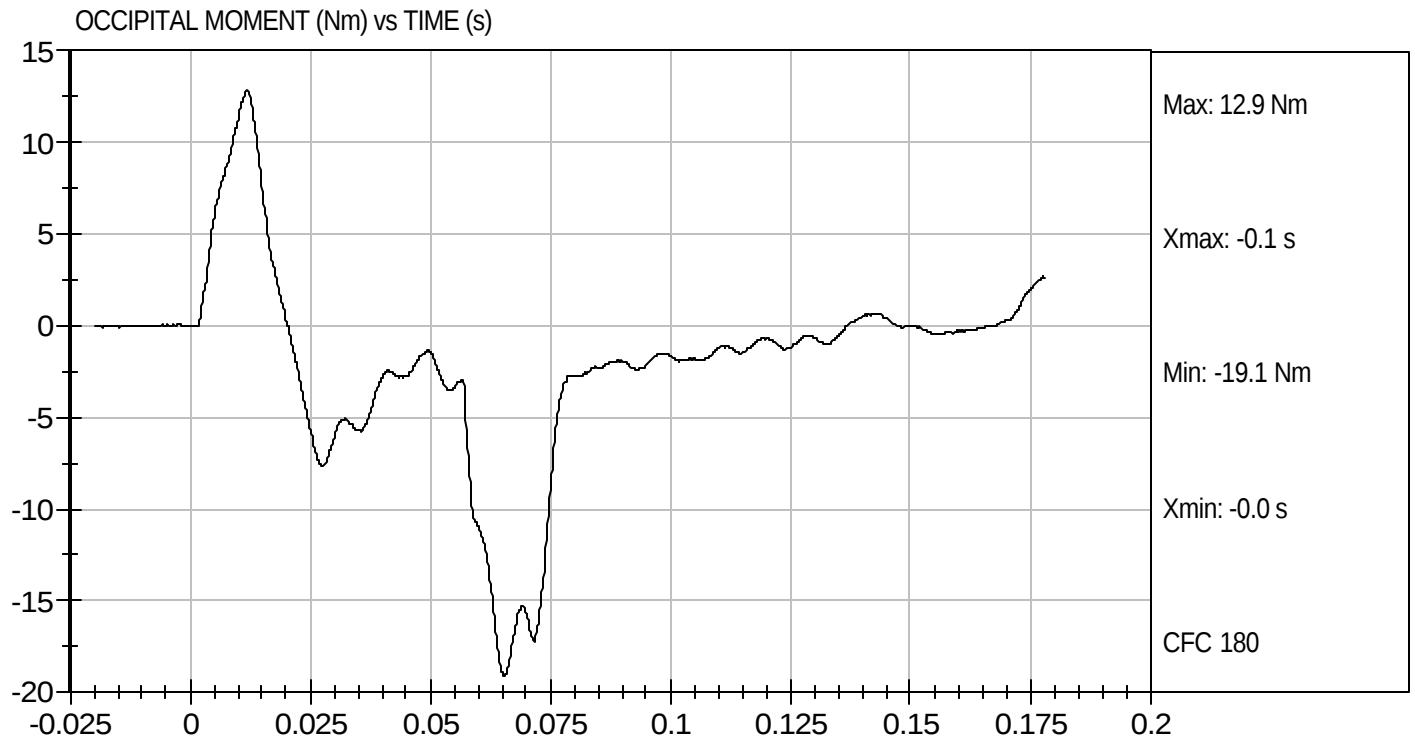
Test Date: 8/23/07
Velocity: 8.33 ft/s, 2.5 m/s





Test Desc: Neck Extension
Component ID: D072543

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

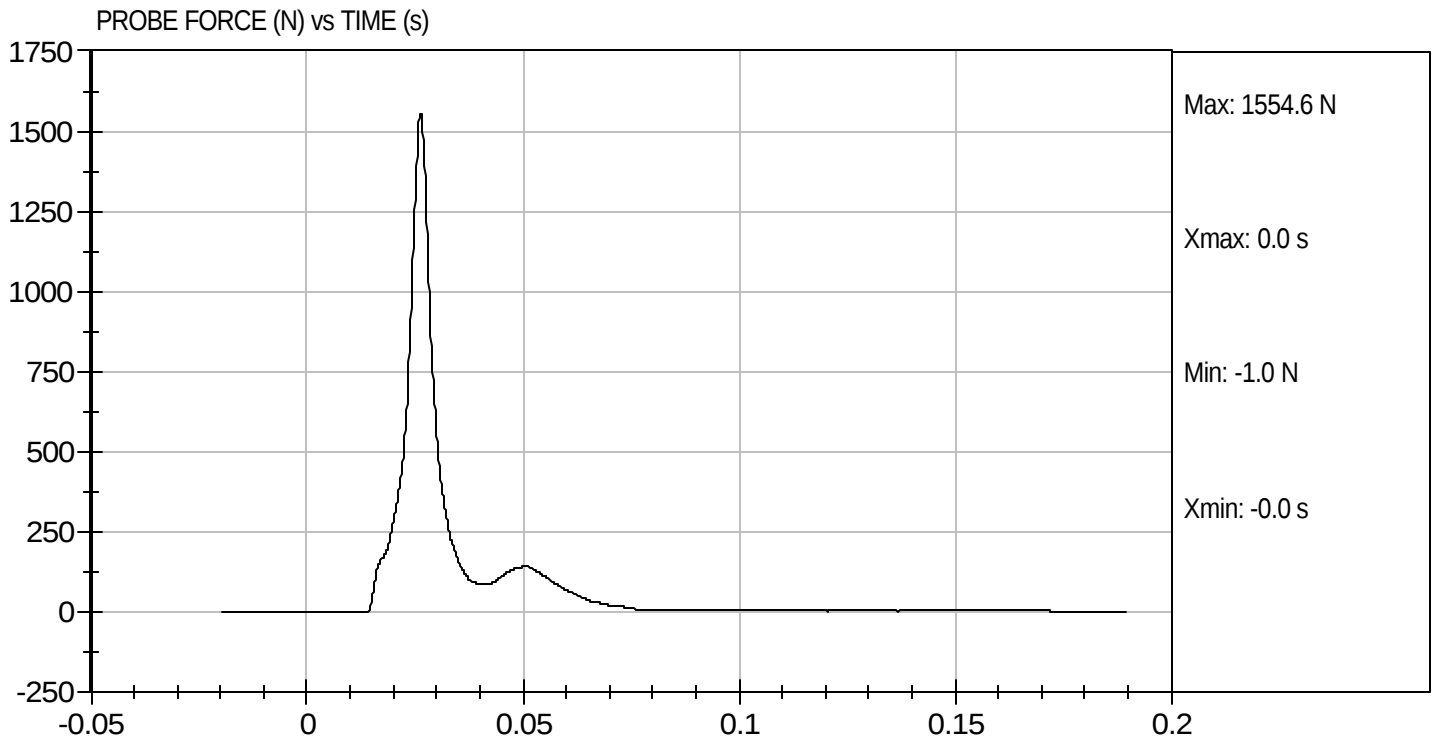
Test Date


Approved By



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

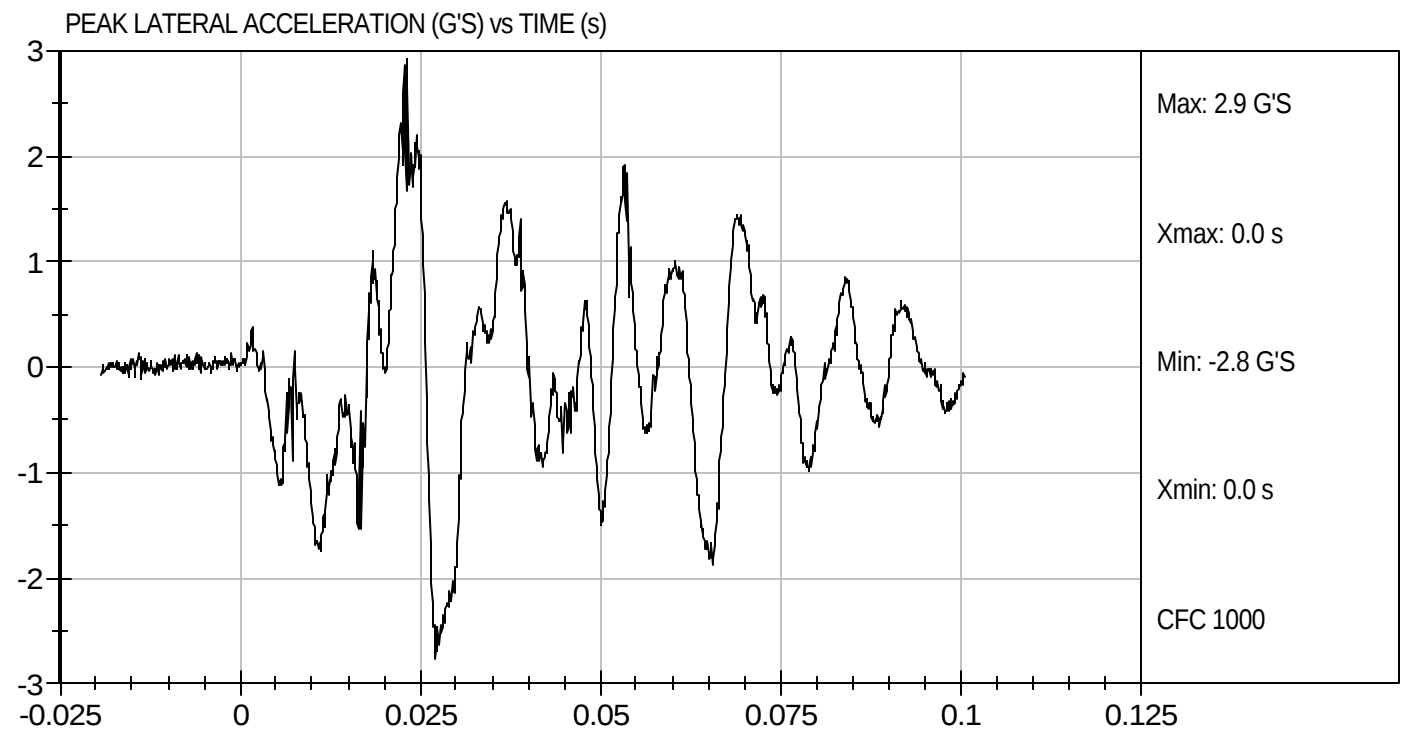
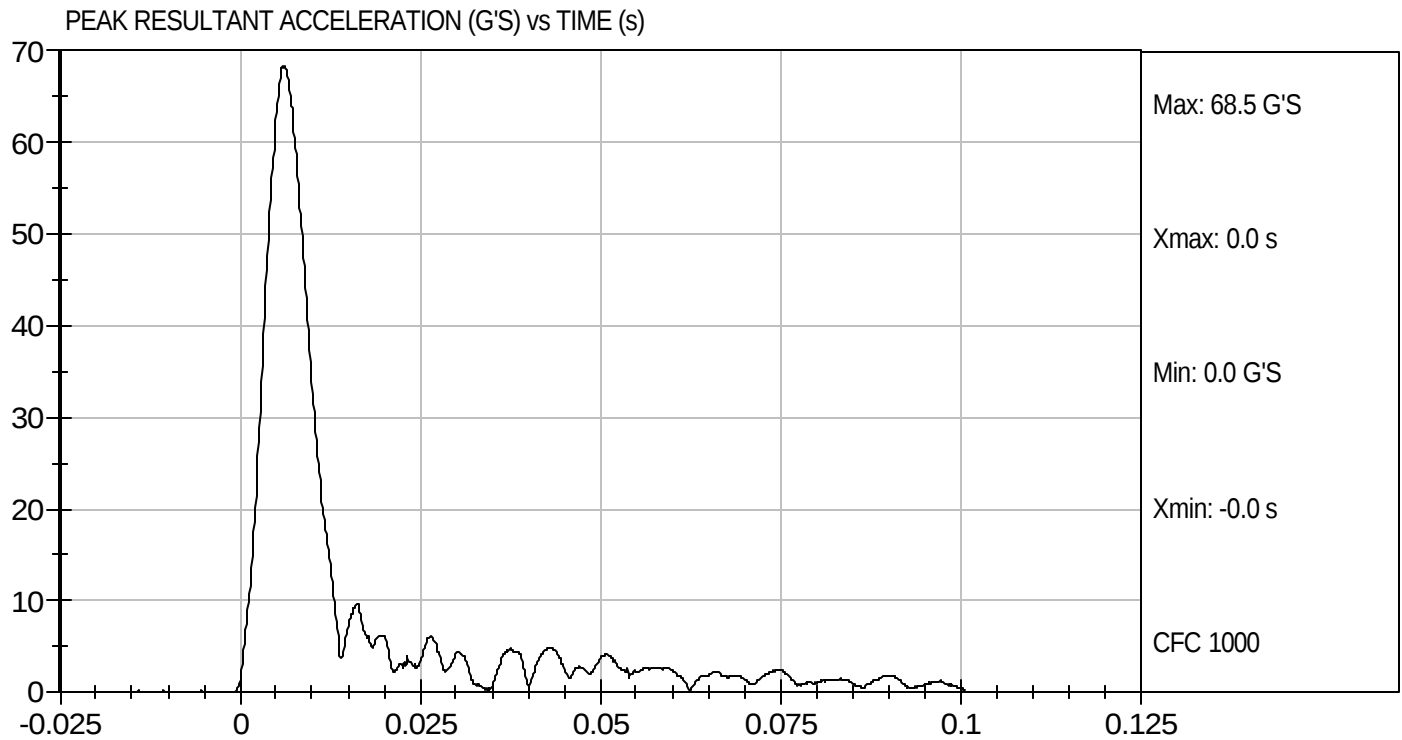

Approved By

8/23/07
Test Date



Test Desc: Head Drop
Component ID: D072545

Test Date: 8/23/07
Velocity: 0 ft/s, 0 m/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


Approved By

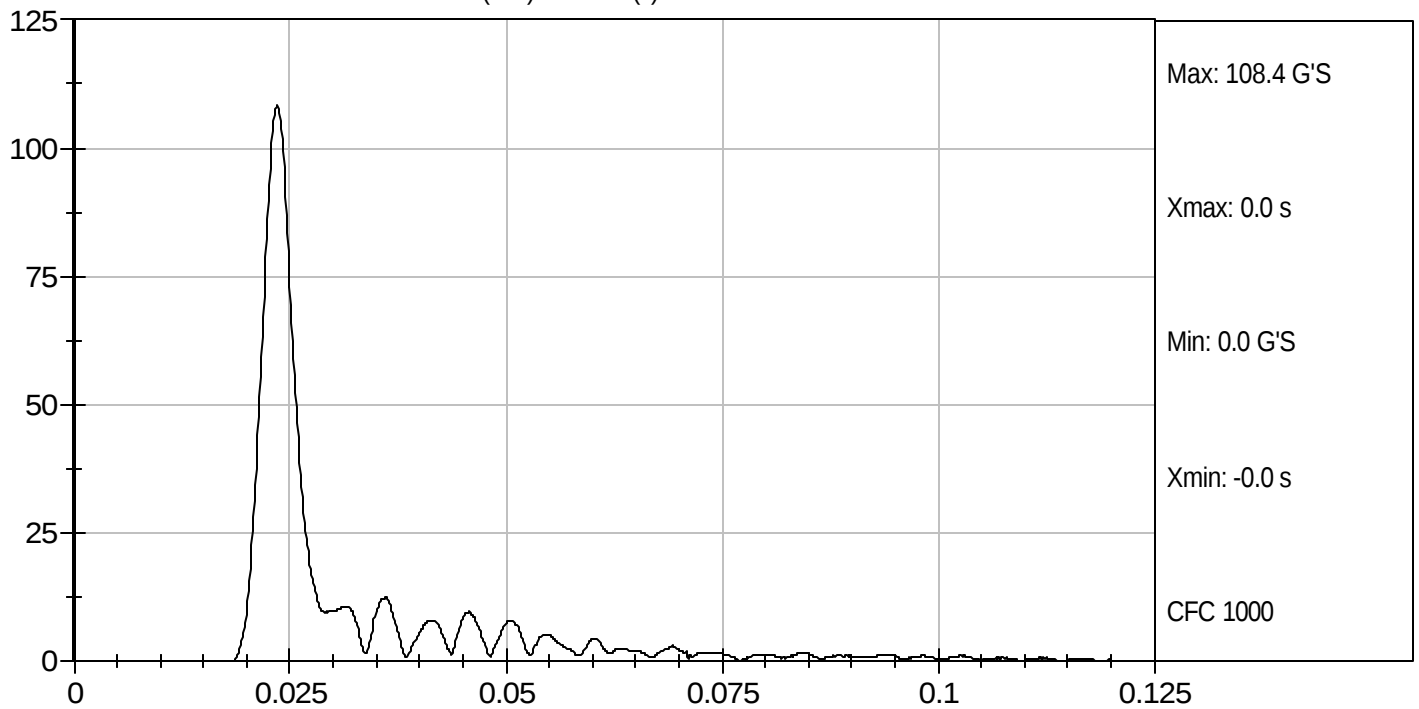
8/23/07
Test Date



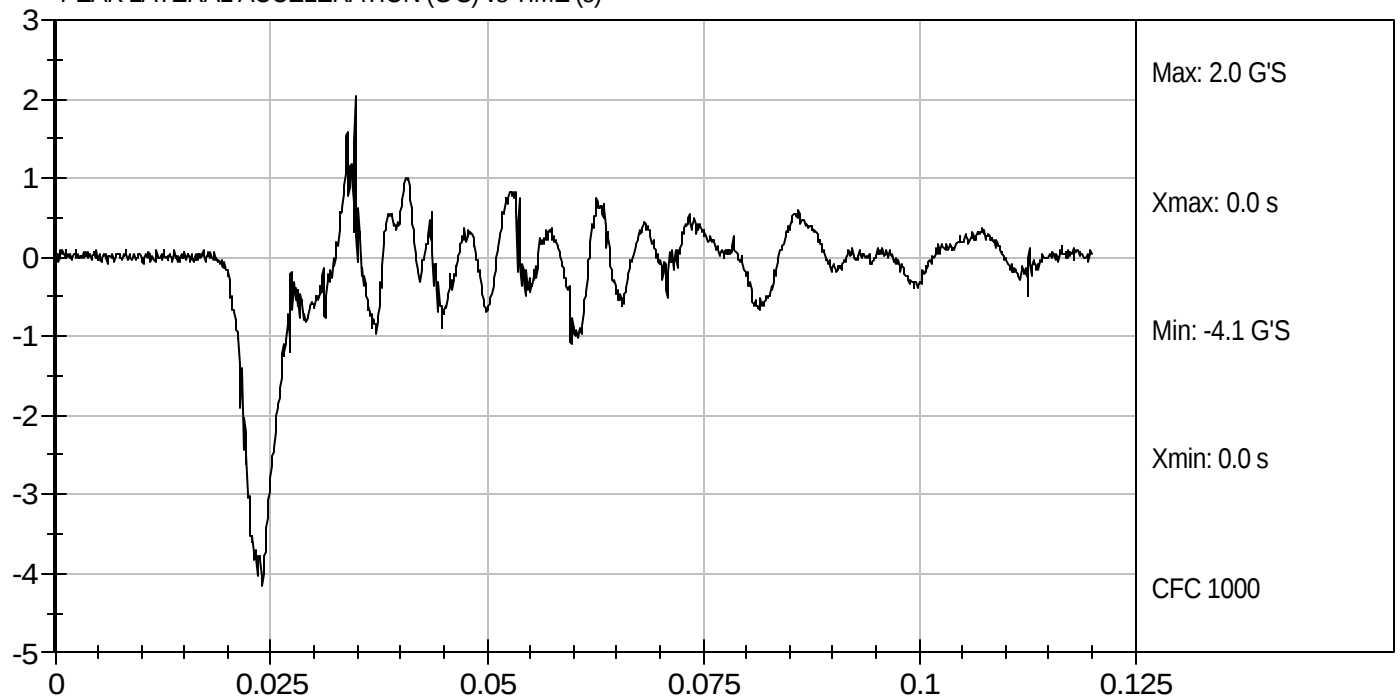
Test Desc: Head Drop
Component ID: D072531

Test Date: 8/23/07
Velocity: 0 ft/s, 0 m/s

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: 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



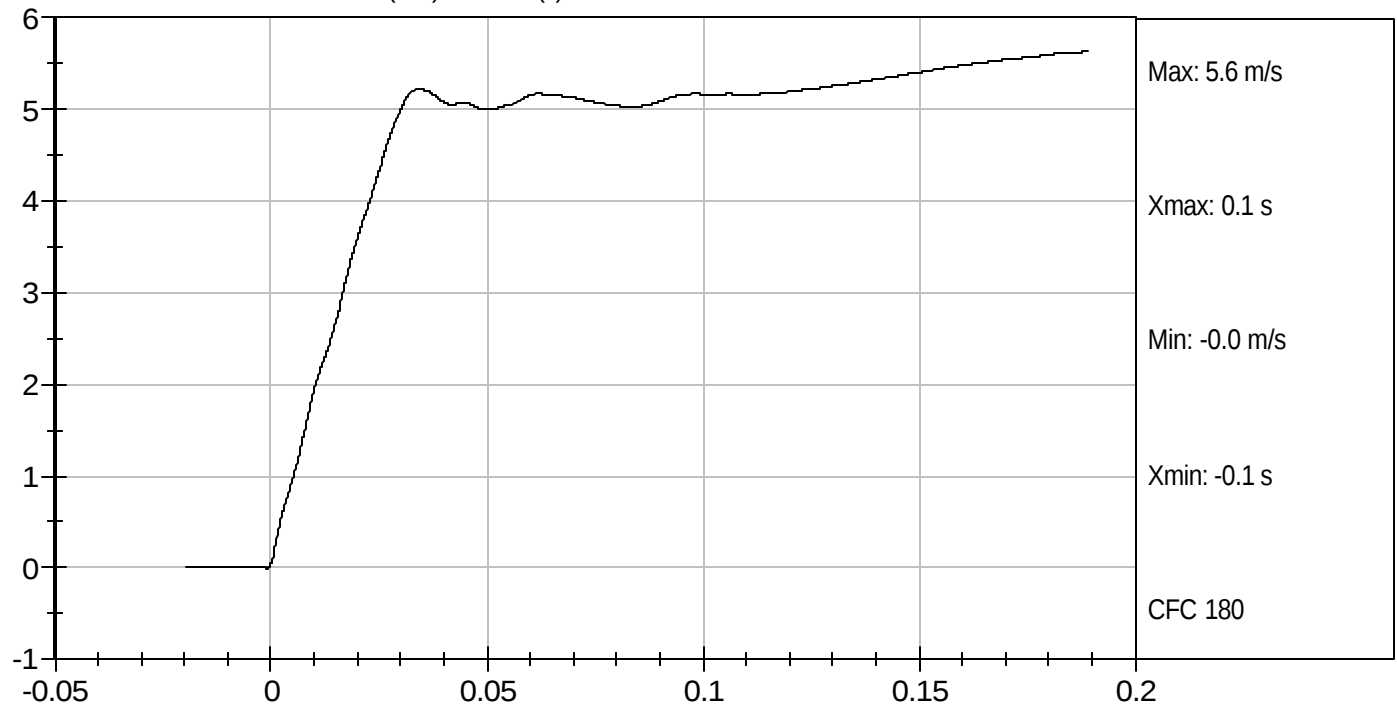
Approved By



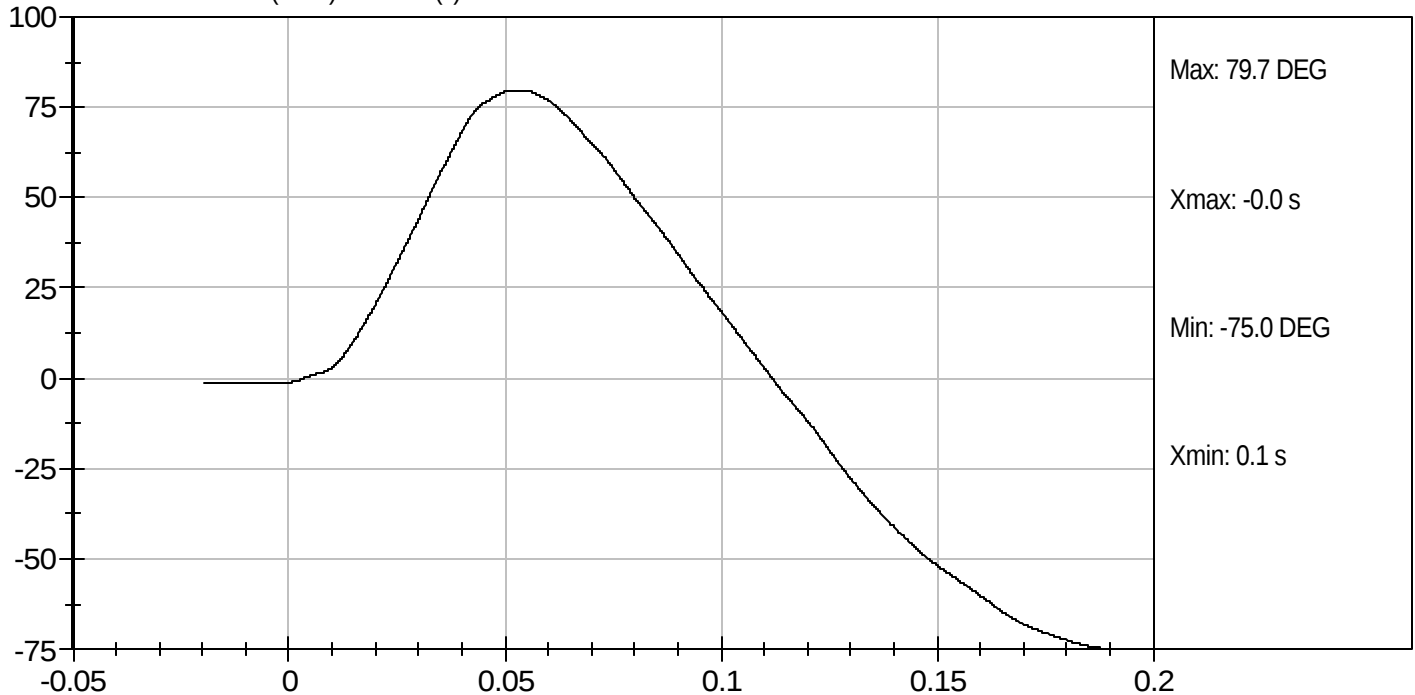
Test Desc: Neck Flexion
Component ID: D072532

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

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



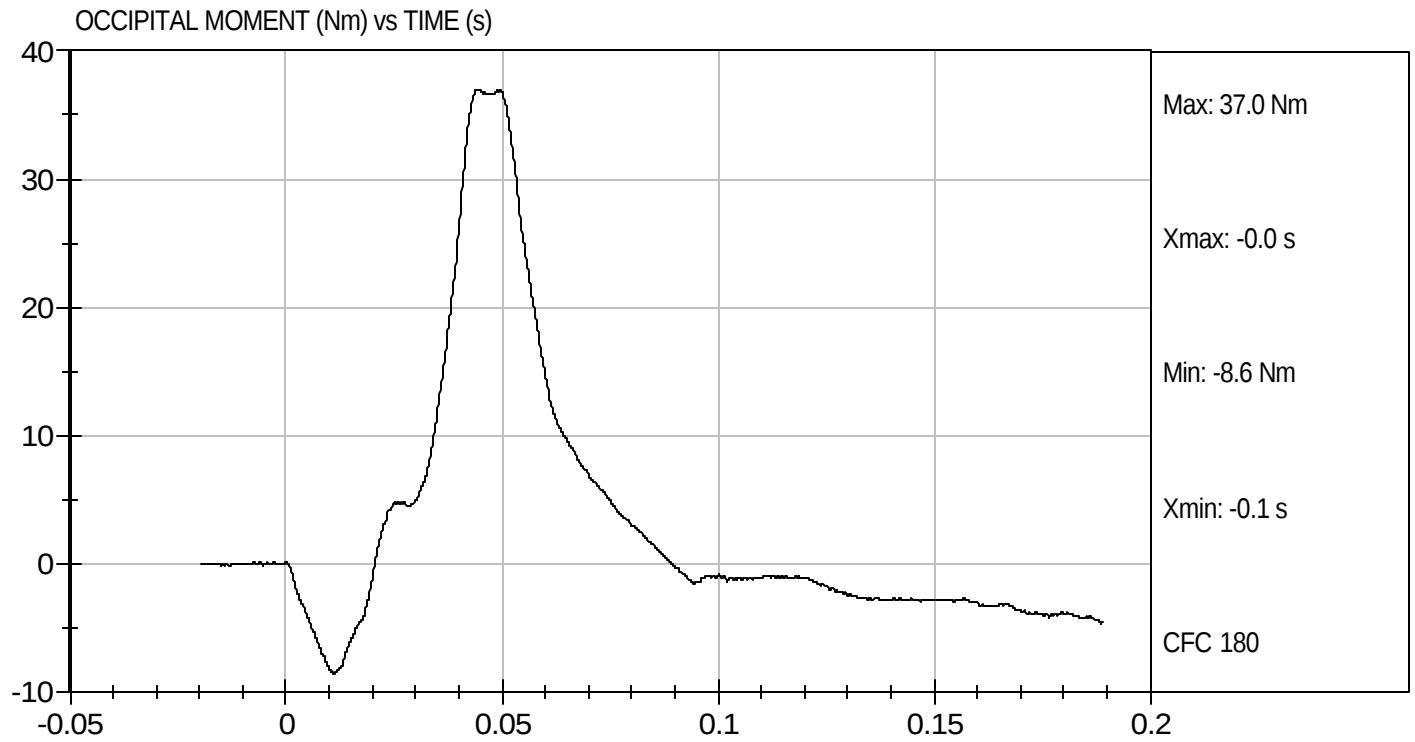
FLEXION ANGLE (DEG) vs TIME (s)





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

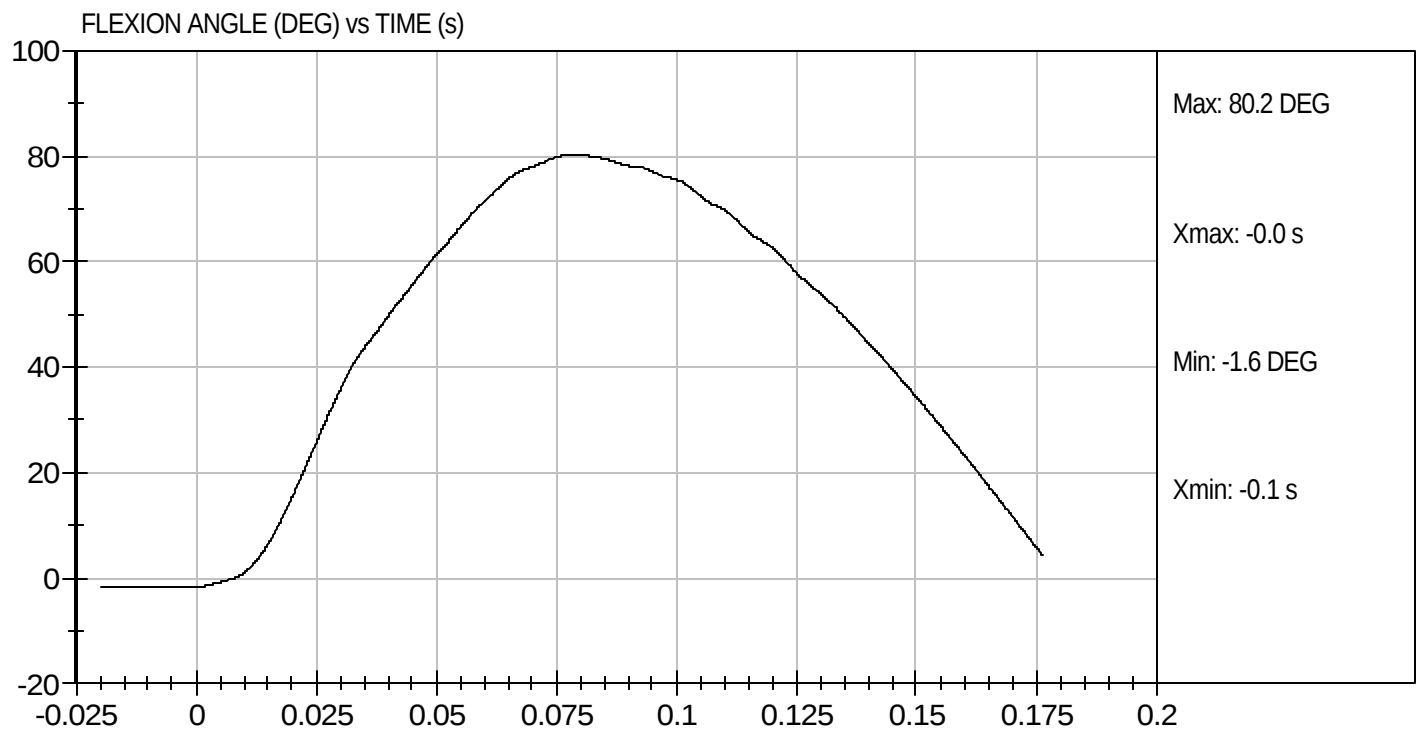
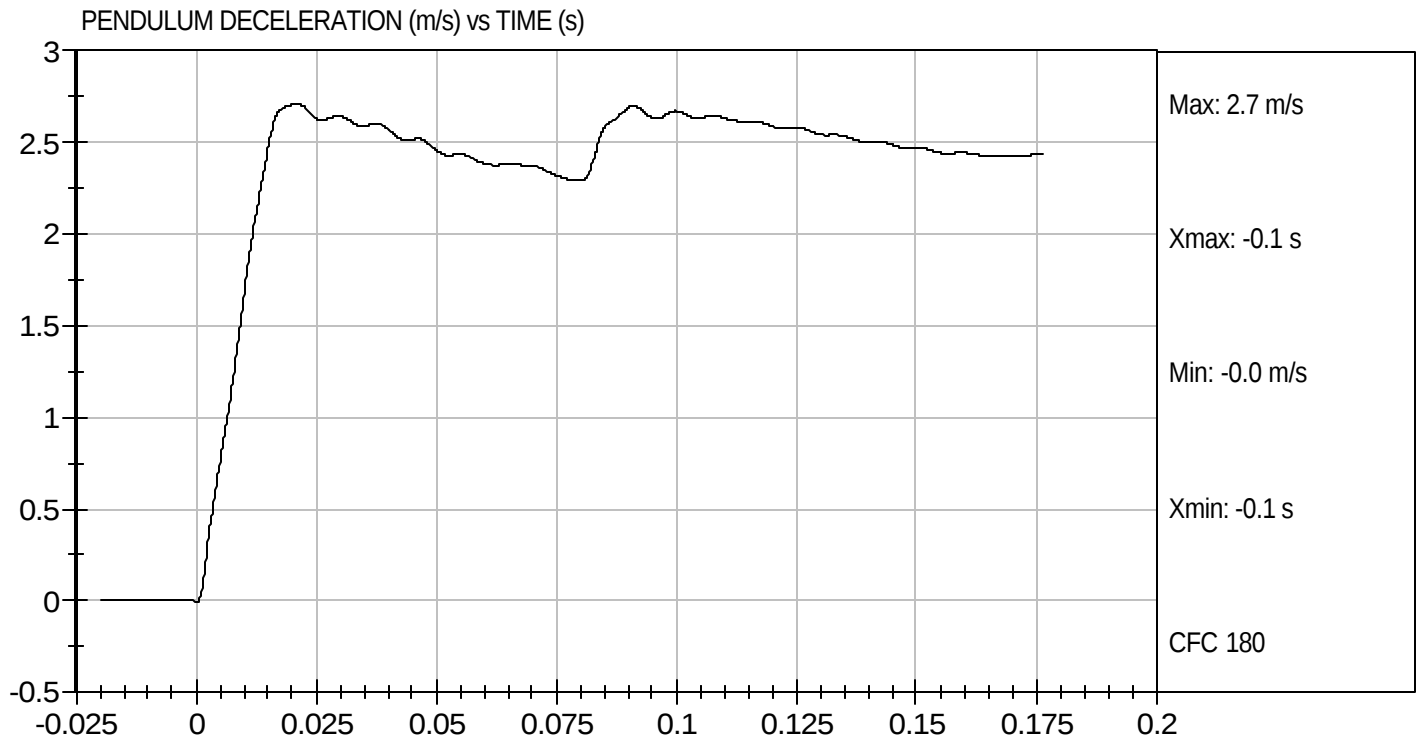
8/23/07
 Test Date


 Approved By



Test Desc: Neck Flexion
Component ID: D072533

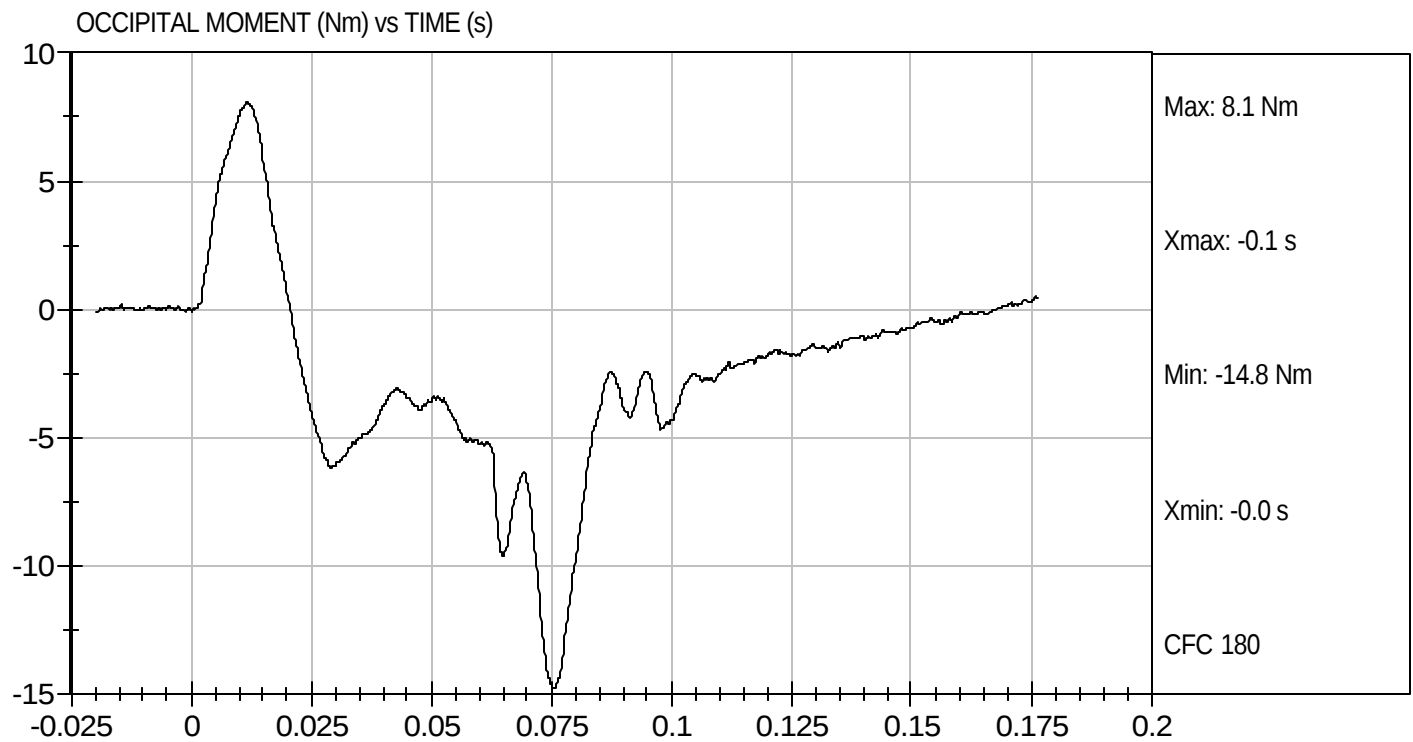
Test Date: 8/23/07
Velocity: 8.33 ft/s, 2.5 m/s





Test Desc: Neck Flexion
Component ID: D072533

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

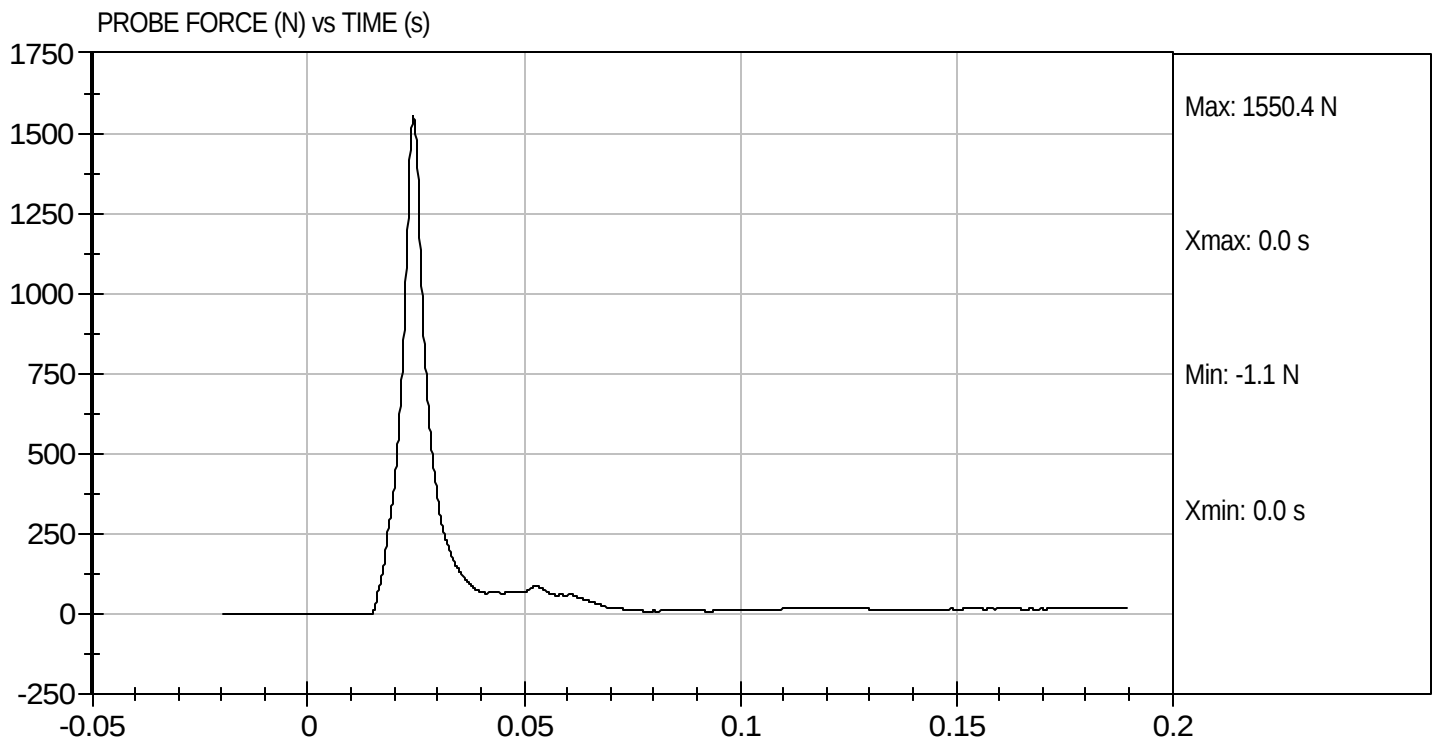


Approved By



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


Approved By

8/23/07
Test Date



Test Desc: Head Drop
Component ID: D072535

Test Date: 8/23/07
Velocity: 0 ft/s, 0 m/s

