

REPORT NUMBER: NCAP-MGA-2006-011

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

**TOYOTA MOTOR CORPORATION
2007 TOYOTA YARIS
NHTSA NUMBER: M75102**

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



Test Date: May 16, 2006

Final Report Date: June 21, 2006

FINAL REPORT

**PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
RULEMAKING
OFFICE OF CRASHWORTHINESS STANDARDS
400 SEVENTH STREET, SW, ROOM 5311
WASHINGTON, D.C. 20590**

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16. Abstract A frontal barrier impact was conducted on a 2007 Toyota Yaris at MGA Research Corporation on May 16, 2006. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and foot well intrusion performance. The impact velocity was 56.3 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 546 mm located at the centerline of the vehicle. 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>427</td> <td>485</td> </tr> <tr> <td>Max. Thorax Accel. (3ms Clip)</td> <td>G's</td> <td>60</td> <td>45</td> <td>48</td> </tr> <tr> <td>Left Femur Force</td> <td>Newton</td> <td>10009</td> <td>-4893</td> <td>-1715</td> </tr> <tr> <td>Right Femur Force</td> <td>Newton</td> <td>10009</td> <td>-2829</td> <td>-598</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	427	485	Max. Thorax Accel. (3ms Clip)	G's	60	45	48	Left Femur Force	Newton	10009	-4893	-1715	Right Femur Force	Newton	10009	-2829	-598
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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 DTNH22-01-D-12005. 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 2007 Toyota Yaris at a velocity of 56.3 kph. The test was performed at MGA Research Corporation on May 16, 2006. Pre-and post-test photographs of the vehicle and dummies can be found in Appendix A.

One real-time camera and fourteen 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 546 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 bolster. The driver right knee contacted the steering column. The passenger's head and chest contacted the airbag. The passenger's head also contacted the headrest. The passenger's knees 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	427	62.5	98.5	45	67.6	70.6	-22	-4893	-2829
Passenger	485	62.2	91.0	48	70.8	73.8	-25	-1715	-598

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

TEST NOTES

There was no valid data collected for:

Driver Head X, Y, Z, Xr, Yr, Zr Accelerations – After 200 ms

Driver Neck Force Z – After 100 ms

Driver Lap Belt – After 180 ms

Right Brake Caliper X – After 40 ms

SECTION 2
OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

DATA SHEET NO. 1
CRASH TEST SUMMARY

Test Vehicle: 2007 Toyota Yaris
Test Program: 35mph Frontal Impact

NHTSA No.: M75102
Test Date: 5/16/2006

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	None	

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	1756
Center	mm	1689
Right Side	mm	1801
Average	mm	1749

BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Shoulder belt length as measured on ATD	mm	865	860
Lap belt length as measured on ATD	mm	860	840
Remainder of belt on reel	mm	1655	1776
Total belt length for continuous webbing systems	mm	3380	3476

DATA SHEET NO. 2
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2007 Toyota Yaris
 Test Program: 35mph Frontal Impact

NHTSA No.: M75102
 Test Date: 5/16/2006

TEST VEHICLE INFORMATION

Manufacturer	Toyota Motor Corporation
Model	Yaris
Body Style	Sedan
NHTSA No.	M75102
VIN	JTDBT923471016797
Color	Barcelona Red
Delivery Date	5/4/06
Odometer Reading (mile)	113
Dealer	Jack Safo
Transmission	Automatic
Final Drive	Front
Number of Cylinders	4
Engine Displacement (L)	1.5
Engine Placement	Lateral
Automatic Door Lock (ADL)	No
Owners Manual Details Instructions on Disabling ADLs	No
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	No
Tilt Wheel	Yes
Air Conditioning	Yes
Anti-lock Brakes	Yes
Traction Control	No
All Wheel Drive	No
Power Seats	No

DATA FROM CERTIFICATION LABEL

Manufactured By	Toyota Motor Corporation
Date of Manufacture	03/06

GVWR (kg)	1497
GAWR Front (kg)	835
GAWR Rear (kg)	826

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench		
Number of Occupants	2	3		5
Capacity Wt. (VCW) (kg)				383
Cargo Wt. (RCLW) (kg)				42.8

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

Test Vehicle: 2007 Toyota Yaris
 Test Program: 35mph Frontal Impact

NHTSA No.: M75102
 Test Date: 5/16/2006

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	332.5	215.9		379.7	268.5	
Right	kg	323.4	206.4		369.7	252.7	
Ratio	%	60.8	39.2		59.0	41.0	
Totals	kg	655.9	422.3	1078.2	749.4	521.2	1270.6

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1078.2
Weight of 2 P572E ATDs	kg	156.0
Rated Cargo/Luggage Weight (RCLW)	kg	42.8
Calculated Vehicle Target Weight (TVTW)	kg	1277.0

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	670	675	676	684	999
As Tested	mm	642	651	617	620	1046
Post Test	mm	644	680	621	620	

Vehicle Wheelbase (mm): 2551

Weight of Ballast secured in cargo area (kg): 11.3

Vehicle Components Removed: Spare tire, jack and tools, trunk carpet, rear seat

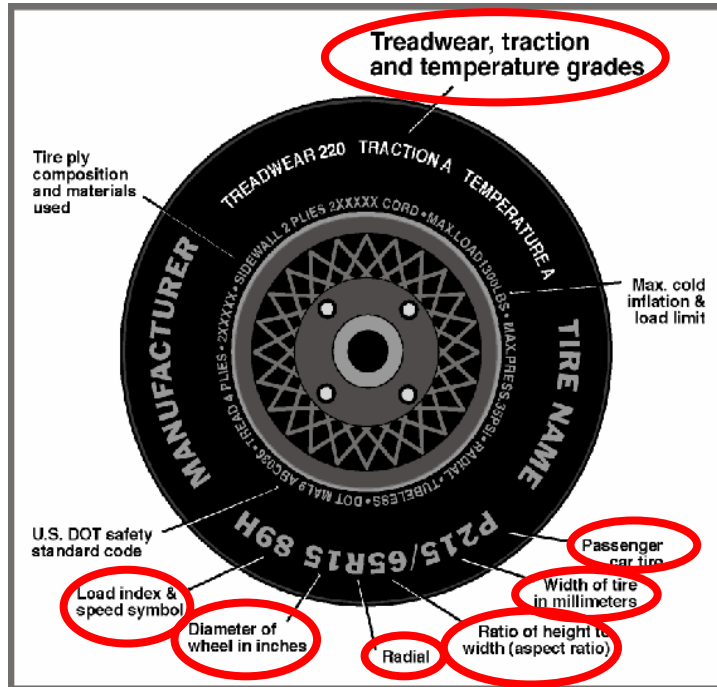
Ballast weight does not include instrumentation and data acquisition system.

DATA SHEET NO. 3

TEST VEHICLE TIRE INFORMATION

Test Vehicle: 2007 Toyota Yaris
 Test Program: 35mph Frontal Impact

NHTSA No.: M75102
 Test Date: 5/16/2006



DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Pressure (max)	220	220
Recommended Tire Size	P185/60R15	P185/60R15
Tire size on Vehicle	P185/60R15	P185/60R15
Tire Manufacturer	Goodyear	Goodyear
Tire Name	Eagle LS	Eagle LS
Tire Type	M + S	M + S
Tire Width (mm)	185	185
Ratio of Height to Width (aspect ratio)	60	60
Radial	Yes	Yes
Wheel Diameter	15	15
Load Index & Speed Symbol	84T	84T
Treadwear	360	360
Traction Grade	A	A
Temperature Grade	B	B

DATA SHEET NO. 4
TEST VEHICLE INFORMATION

Test Vehicle: 2007 Toyota Yaris
Test Program: 35mph Frontal Impact

NHTSA No.: M75102
Test Date: 5/16/2006

NORMAL DESIGN RIDING POSITION

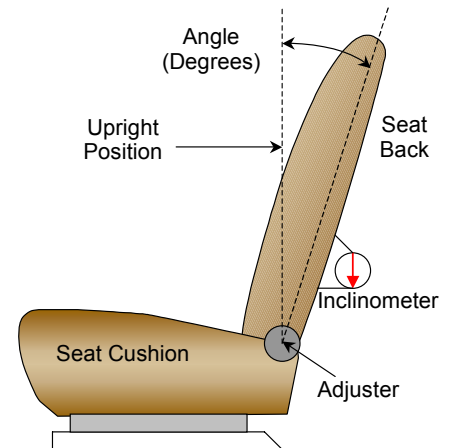
The driver and passenger seat back is positioned to the manufacturer's designated angle. The procedure is as follows: The driver and passenger seatback is placed in the fourth detent, first as zero.

Driver seat back angle: 4th detent, 1st as zero

Passenger seat back angle: 4th detent, 1st as zero

SEAT FORE/AFT POSITIONING

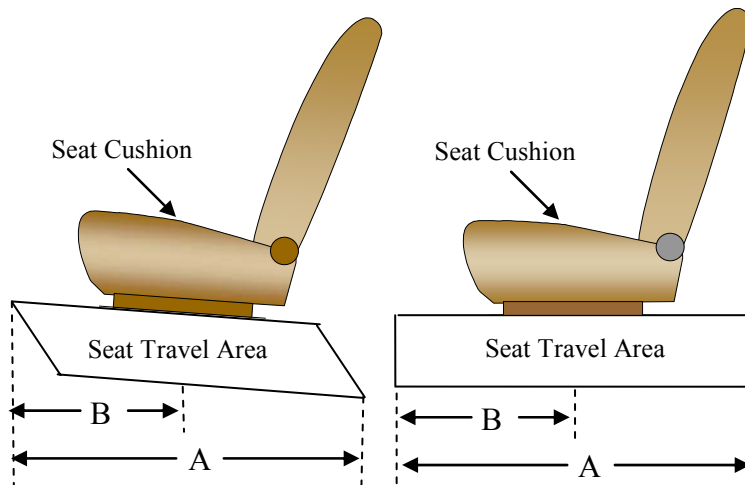
	Total Fore/Aft Travel	Placed in Position #
Driver Seat	17 detents	8, 1 st as zero
Passenger Seat	17 detents	8, 1 st as zero



FRONT SEAT ASSEMBLY

ADJUSTABLE D-RING POSITION

The D-Ring was placed in the first position with the uppermost position as zero.



DATA SHEET NO. 4...(CONTINUED)

TEST VEHICLE INFORMATION

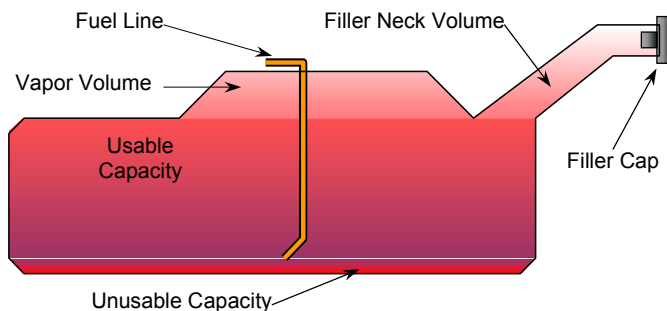
Test Vehicle: 2007 Toyota Yaris
 Test Program: 35mph Frontal Impact

NHTSA No.: M75102
 Test Date: 5/16/2006

FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	42.0
Usable Capacity of "Optional" Tank	
92-94% of Usable Capacity	38.6 – 39.5
Actual Amount of Solvent used	39.4
1/3 of Usable Capacity	14.0

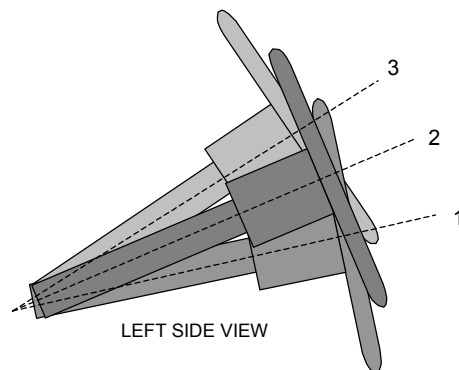
The test vehicle is equipped with an electric fuel pump. The fuel pump will pump fuel when ignition is on.



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

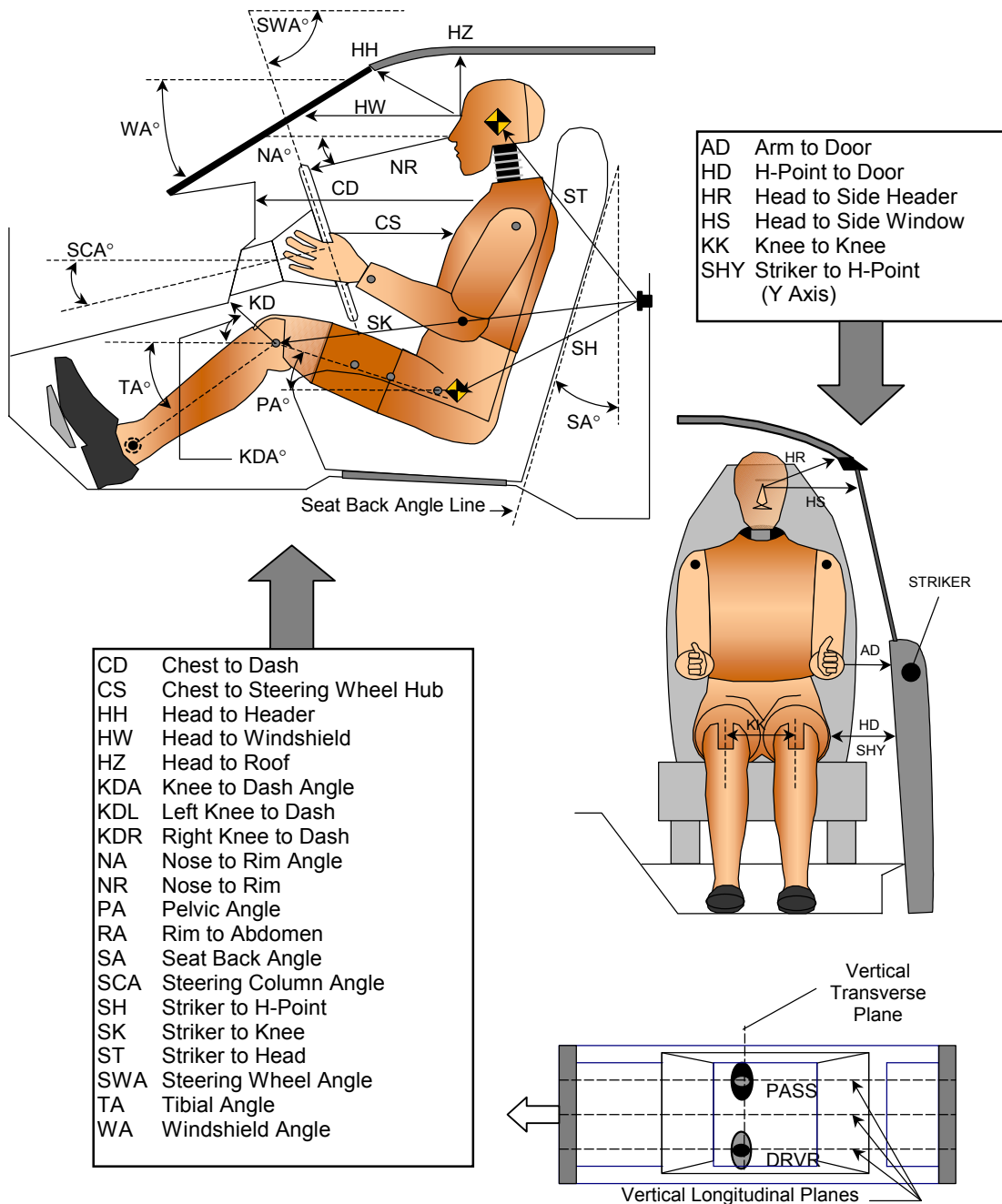
	Fore/Aft Position (mm)	Degrees
Lowermost position No. 1		24.9
Geometric center position No. 2		26.4
Uppermost position No. 3		27.8

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

Test Vehicle: 2007 Toyota Yaris
 Test Program: 35mph Frontal Impact

NHTSA No.: M75102
 Test Date: 5/16/2006

DUMMY MEASUREMENTS FOR FRONT SEAT OCCUPANTS



DATA SHEET NO. 5... (CONTINUED)

DUMMY POSITIONING IN VEHICLE

Test Vehicle: 2007 Toyota Yaris
 Test Program: 35mph Frontal Impact

NHTSA No.: M75102
 Test Date: 5/16/2006

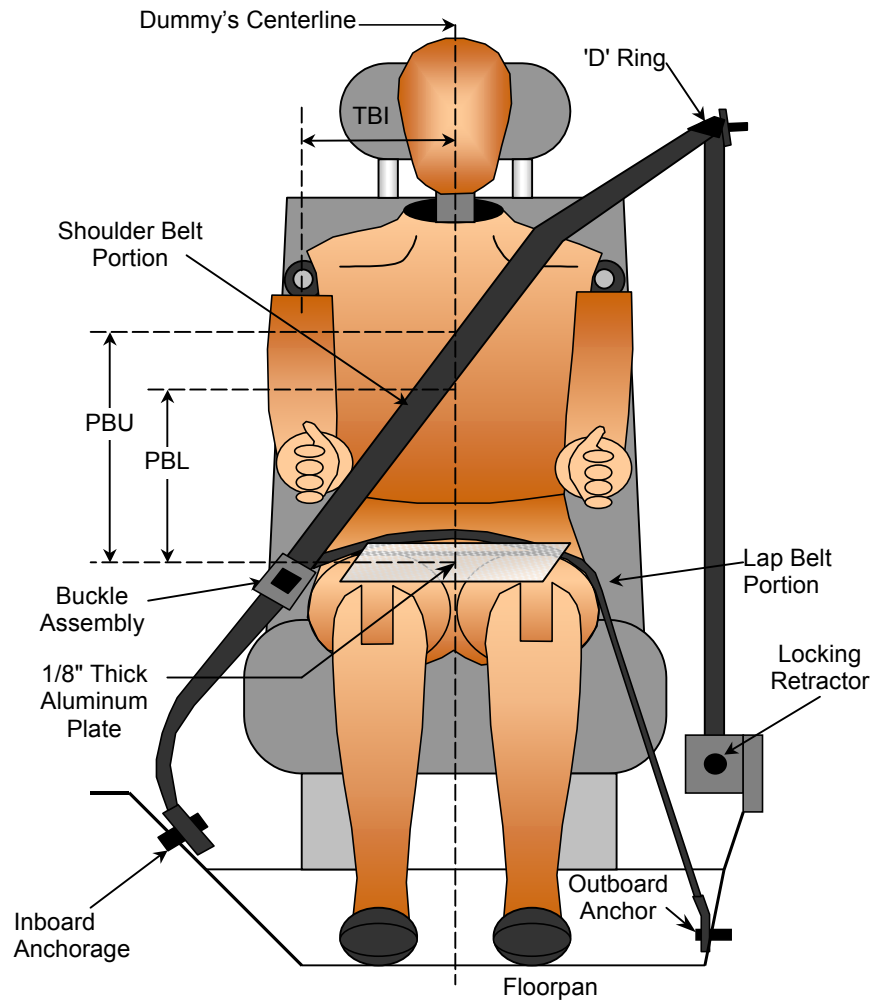
TEST DUMMY POSITION MEASUREMENTS

Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA	Windshield Angle		25.0		
SWA	Steering Wheel Angle		63.6		
SCA	Steering Column Angle		26.4		
SA	Seat Back Angle (headrest post)		3.2		2.6
HZ	Head to Roof (Z)	187	90	171	90
HH	Head to Header	397	18.4	381	18.9
HW	Head to Windshield	653	0	625	0
HR	Head to Side Header (Y)	202		190	
NR	Nose to Rim	437	14.0		
CD	Chest to Dash	681		573	
CS	Chest to Steering Hub	352	6.9		
RA	Rim to Abdomen	207	0		
KDL	Left Knee to Dash	139	27.3	170	
KDR	Right Knee to Dash	137		182	22.4
PA	Pelvic Angle		24.0		20.7
TA	Tibia Angle		48.5		50.4
KK	Knee to Knee (Y)	320		274	
SK	Striker to Knee	596	93.0	577	95.8
ST	Striker to Head	483	9.1	498	13.5
SH	Striker to H-Point	280	125.5	267	131.9
SHY	Striker to H-Point (Y)	255		250	
HS	Head to Side Window	302		284	
HD	H-Point to Door (Y)	143		136	
AD	Arm to Door (Y)	100		84	
AA	Ankle to Ankle	320		217	

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

Test Vehicle: 2007 Toyota Yaris
 Test Program: 35mph Frontal Impact

NHTSA No.: M75102
 Test Date: 5/16/2006



SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU - Top surface of reference to belt upper edge	mm	340	340
PBL - To surface of reference to belt lower edge	mm	260	260

DATA SHEET NO. 7
VEHICLE ACCELEROMETER LOCATIONS

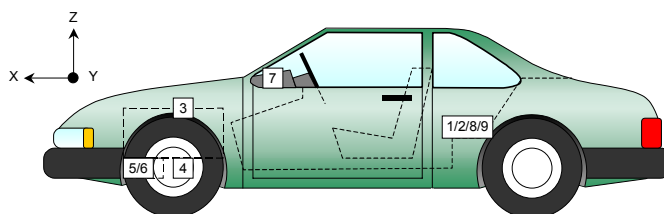
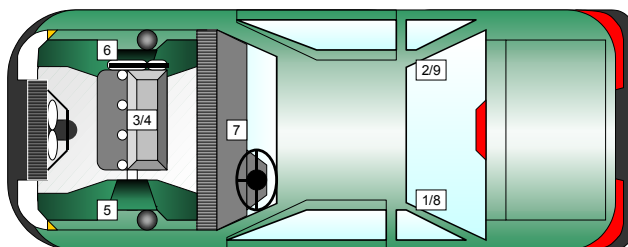
Test Vehicle: 2007 Toyota Yaris
 Test Program: 35mph Frontal Impact

NHTSA No.: M75102
 Test Date: 5/16/2006

VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear X-Member X	1287	-492	456
2	Right Rear X-Member X	1288	492	456
3	Engine Top X	3638	0	812
4	Engine Bottom X	3544	-45	231
5	Left Brake Caliper X	3570	-620	295
6	Right Brake Caliper X	3570	620	300
7	Instrument Panel X			
8	Left Rear X-Member Z	1287	-492	456
9	Right Rear X-Member Z	1288	492	456

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: 2007 Toyota Yaris
 Test Program: 35mph Frontal Impact

NHTSA No.: M75102
 Test Date: 5/16/2006

Windshield Mounting Details:

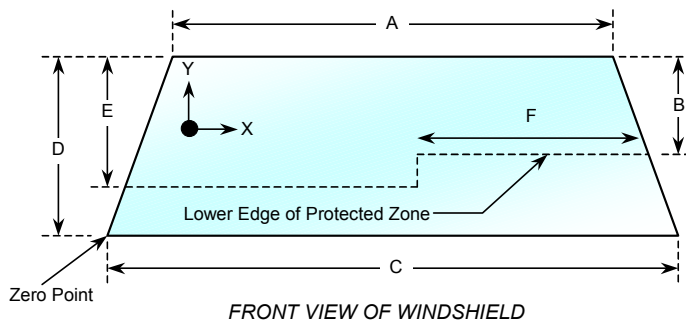
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

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	2021	2021	100
Right Side	2021	2021	100
Total	4042	4042	100



Item	Units	Value
A	mm	1070
B	mm	591
C	mm	1340
D	mm	816
E	mm	579
F	mm	360

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: 2007 Toyota Yaris
 Test Program: 35mph Frontal Impact

NHTSA No.: M75102
 Test Date: 5/16/2006

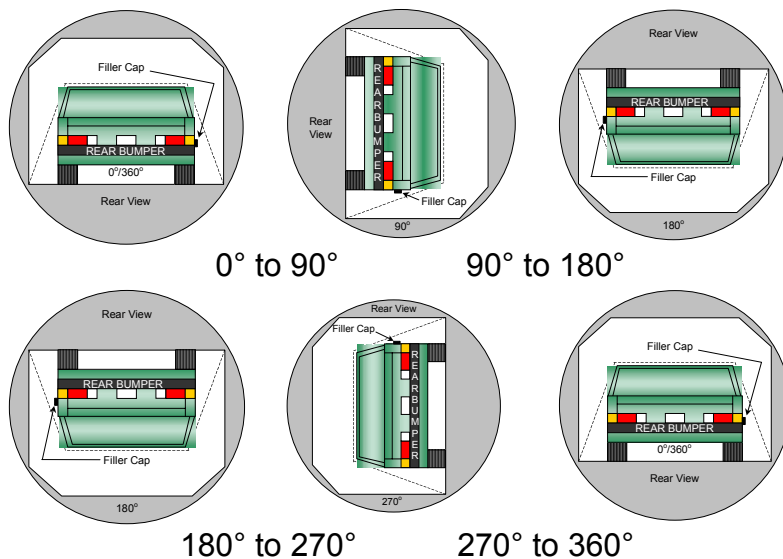
FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 21° C Test Time: 12:56 pm

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°	115	300	0
90° to 180°	118	300	0
180° to 270°	115	300	0
270° to 360°	116	300	0

DATA SHEET NO. 10
VEHICLE MEASUREMENTS

Test Vehicle: 2007 Toyota Yaris
Test Program: 35mph Frontal Impact

NHTSA No.: M75102
Test Date: 5/16/2006

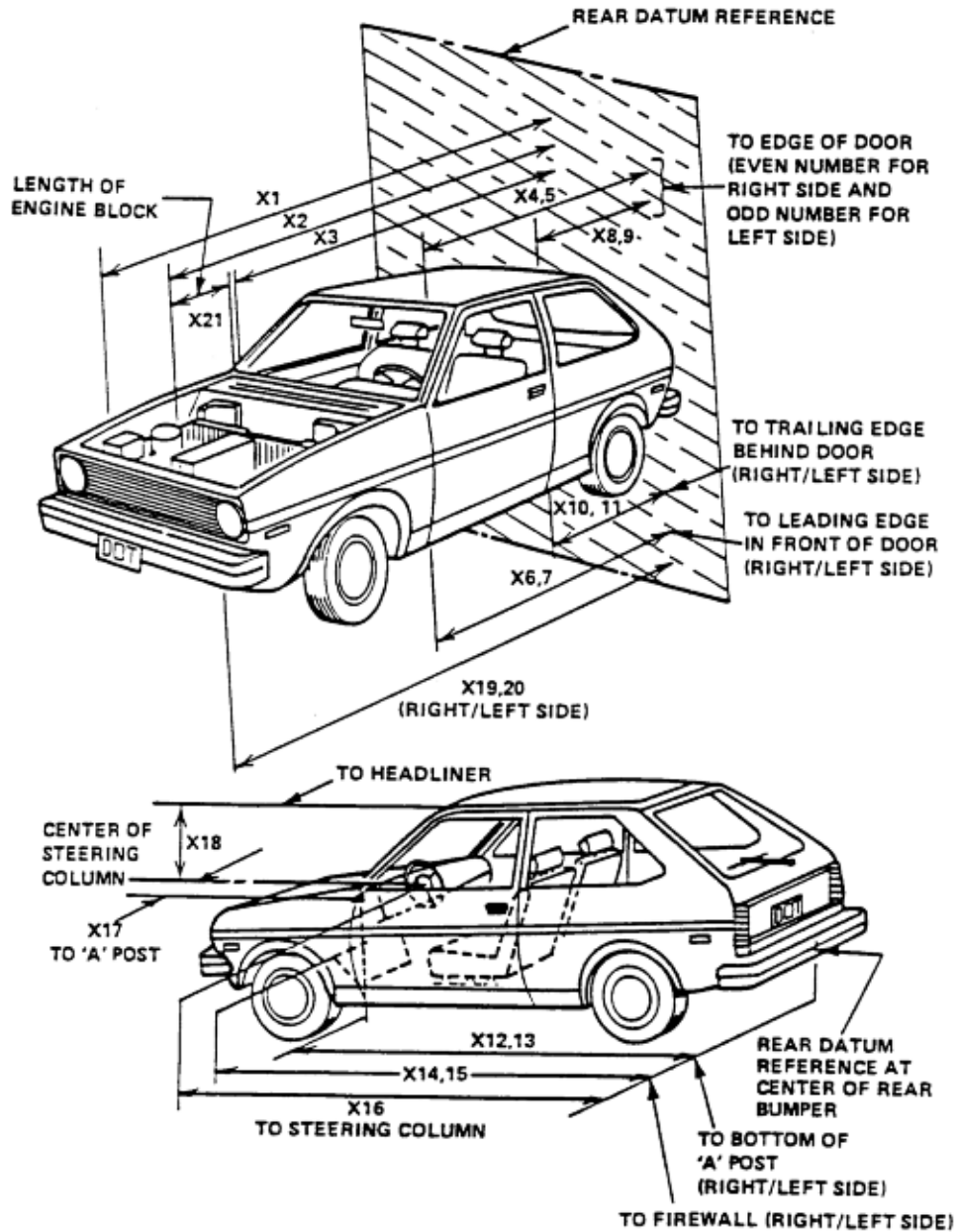
No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total length of vehicle at centerline	mm	4265	3719	546
2	RSOV to front of engine	mm	3835	3464	371
3	RSOV to firewall centerline	mm	3300	3299	1
4	RSOV to leading edge of right door	mm	3058	3064	-6
5	RSOV to leading edge of left door	mm	3054	3060	-6
6	RSOV to lower leading edge of right door	mm	3015	3012	3
7	RSOV to lower leading edge of left door	mm	3006	3011	-5
8	RSOV to upper leading edge of right door	mm	1982	1980	2
9	RSOV to upper leading edge of left door	mm	1979	1964	15
10	RSOV to lower trailing edge of right door	mm	1954	1956	-2
11	RSOV to lower trailing edge of left door	mm	1951	1950	1
12	RSOV to bottom of right 'A' pillar	mm	2968	2974	-6
13	RSOV to bottom of left 'A' pillar	mm	2973	2969	4
14	RSOV to firewall on right side	mm	3317	3332	-15
15	RSOV to firewall on left side	mm	3275	3356	-81
16	RSOV to steering column	mm	2595	2657	-62
17	Center of steering column to left 'A' pillar	mm	375	366	9
18	Center of steering column to headlining	mm	445	475	-30
19	RSOV to right side of front bumper	mm	4043	3732	311
20	RSOV to left side of front bumper	mm	4036	3746	290
21	Length of engine block	mm	450	450	0
RD	RSOV to right side of dash panel	mm	2823	2804	19
CD	RSOV to center of dash panel	mm	2894	2877	17
LD	RSOV to left side of dash panel	mm	2790	2778	12

DATA SHEET NO. 10... (continued)

VEHICLE MEASUREMENTS

Test Vehicle: 2007 Toyota Yaris
 Test Program: 35mph Frontal Impact

NHTSA No.: M75102
 Test Date: 5/16/2006



DATA SHEET NO. 10... (continued)**VEHICLE MEASUREMENTS**

Test Vehicle: 2007 Toyota Yaris
Test Program: 35mph Frontal Impact

NHTSA No.: M75102
Test Date: 5/16/2006

Target Vehicle Structural Measurement

	Elements	Pre-Test (mm)
1	Total Length	4265
2	Total Width	1695
3	Bumper Top Height	539
4	Bumper Bottom Height	400
5	Longitudinal Member Top Height	531
6	Distance between Longitudinal Members	836
7	Longitudinal Member Width	58
8	Engine Top Height	775
9	Engine Bottom Height	205
10	Engine and gearbox width	830
11	Front bumper-engine distance	445
12	Front shock absorber fixing height	927
13	Bonnet leading edge height	854
14	Front shock absorber fixing width	1133
15	Front bumper – front axle distance	842
16	Front axle – a pillar distance	377
17	A-pillar – B-pillar distance	1090
18	B-Pillar – rear axle distance	1083
19	B-pillar – C-pillar distance	920
20	Roof sill bottom height	1423
21	Roof sill top height	1453
22	Floor sill bottom height	238
23	Floor sill top height	307

DATA SHEET NO. 11
CAMERA LOCATIONS

Test Vehicle: 2007 Toyota Yaris
Test Program: 35mph Frontal Impact

NHTSA No.: M75102
Test Date: 5/16/2006

No.	Camera View	Location (mm) *			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Side View				13	24
2	Left Front View	1025	-4790	1305	24	1000
3	Steering Column Top	1200	-4755	1475	25	1000
4	Steering Column Bottom	1215	-4725	1025	25	1000
5	Driver Close-up	1270	-5485	1670	35	1000
6	Driver Angle	6400	-5030	1985	50	1000
7	On board Driver Side					
8	On board Passenger Side					
9	Right Overall	1650	6190	1480	19	1000
10	Right Passenger Half	945	4750	1420	24	1000
11	Right Close-up	1100	5630	1565	35	1000
12	Right Angle	6405	4850	2055	50	1000
13	Windshield	-285	0	2370	25	1000
14	Top Driver	-45	-395	2210	24	1000
15	Top Passenger	-65	460	2200	24	1000
16	Pit Front	1345	0	-3150	24	1000
17	Pit Rear	3115	0	-3150	24	1000

***COORDINATES:**

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

Note: Cameras 7 and 8 were not used for this test.

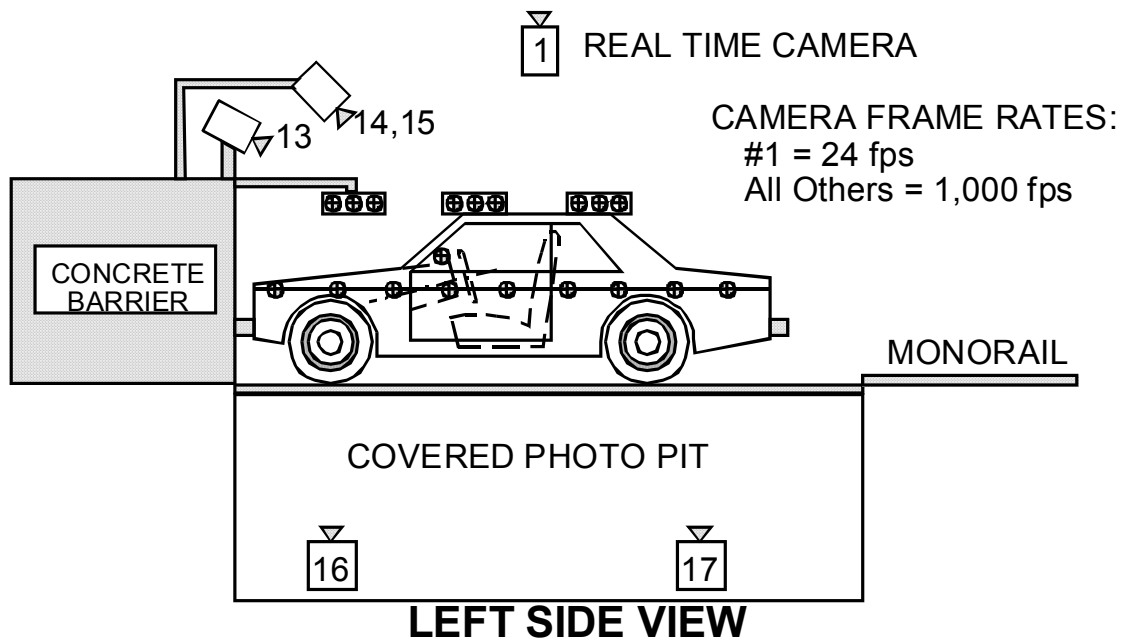
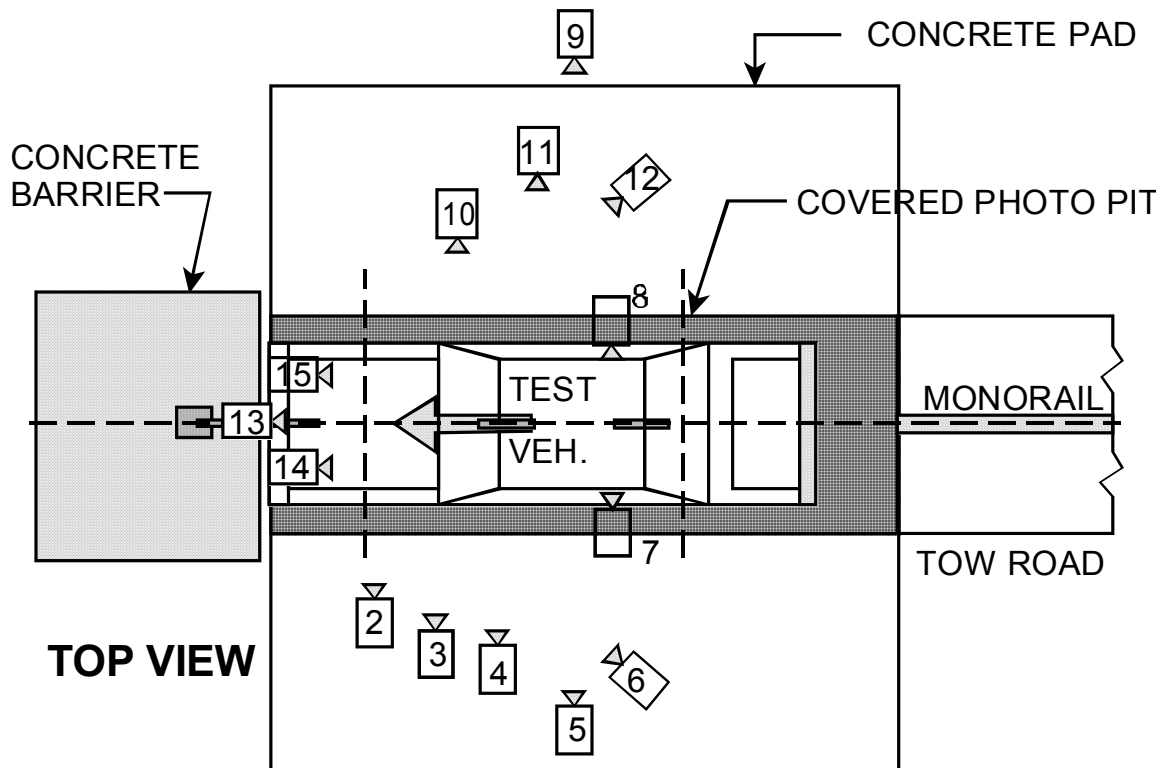
DATA SHEET NO. 11... (continued)

CAMERA LOCATIONS

Test Vehicle: 2007 Toyota Yaris
Test Program: 35mph Frontal Impact

NHTSA No.: M75102
Test Date: 5/16/2006

CAMERA POSITIONS FOR FRONTAL IMPACTS

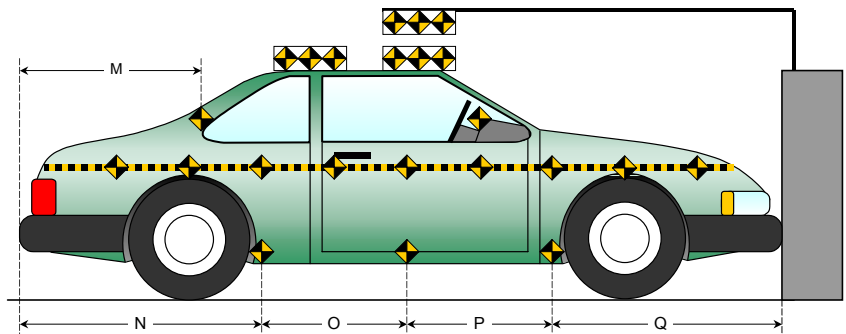
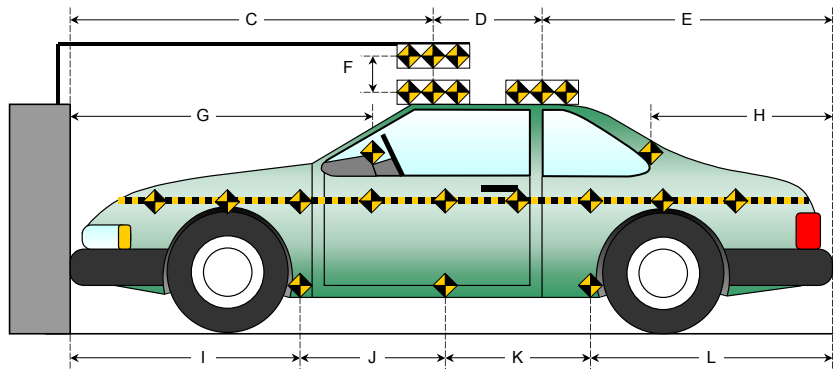
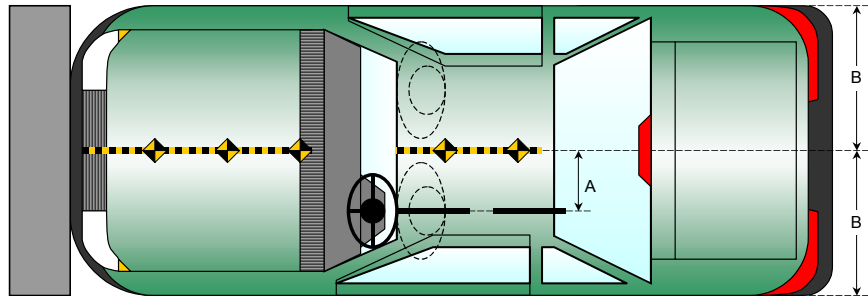


DATA SHEET NO. 12
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2007 Toyota Yaris
 Test Program: 35mph Frontal Impact

NHTSA No.: M75102
 Test Date: 5/16/2006

Item	Value
A	330
B	848
C	2110
D	610
E	1545
F	
G	
H	1050
I	1200
J	882
K	887
L	1296
M	1054
N	1302
O	884
P	886
Q	1193



DATA SHEET NO. 13
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2007 Toyota Yaris
 Test Program: 35mph Frontal Impact

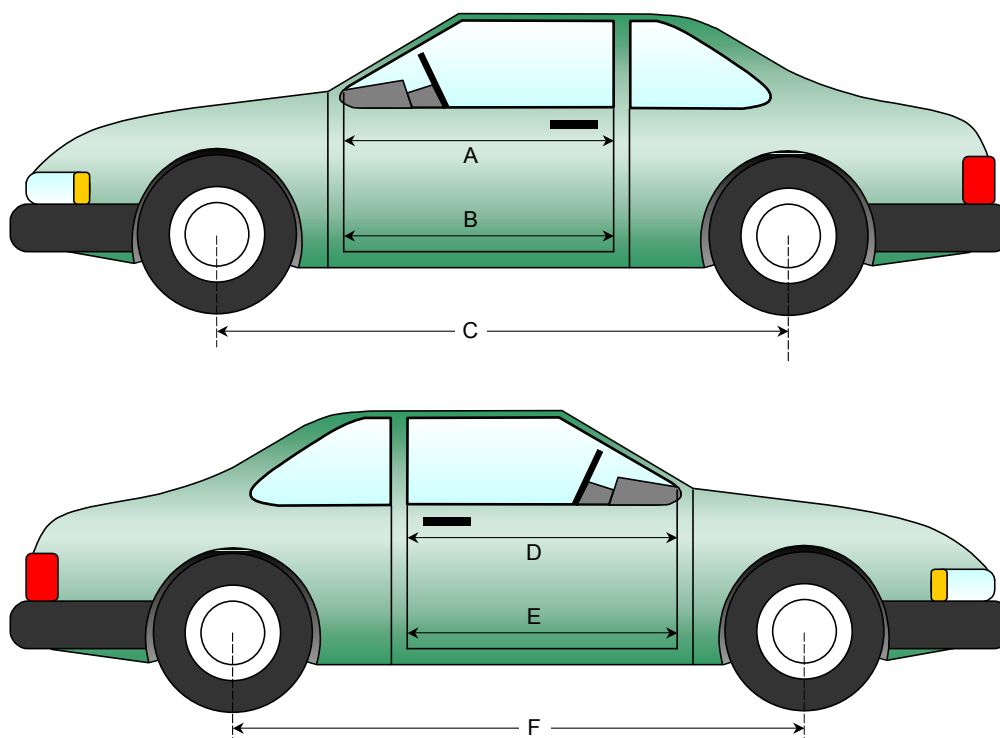
NHTSA No.: M75102
 Test Date: 5/16/2006

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	998	997	1
B	Left Side Lower	mm	845	843	2
D	Right Side Upper	mm	996	996	0
E	Right Side Lower	mm	865	865	0

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2551	2501	50
F	Right Side Wheelbase	mm	2551	2515	36



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

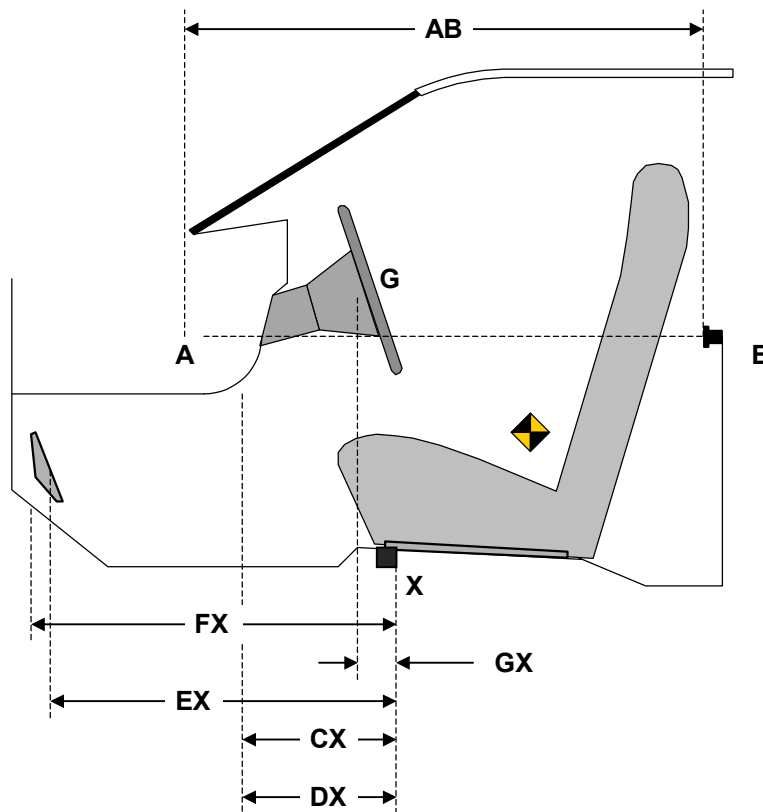
Test Vehicle: 2007 Toyota Yaris
 Test Program: 35mph Frontal Impact

NHTSA No.: M75102
 Test Date: 5/16/2006

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside window jam)	mm	998	997	1
CX	Left Knee Bolster to X	mm	243	272	-29
DX	Right Knee Bolster to X	mm	246	296	-50
EX	Brake Pedal to X	mm	527	547	-20
FX	Foot Rest to X	mm	578	578	0
GX	Center of Steering Column Wheel Hub to X	mm	67	163	-96

X = Front of Seat Track (stationary)

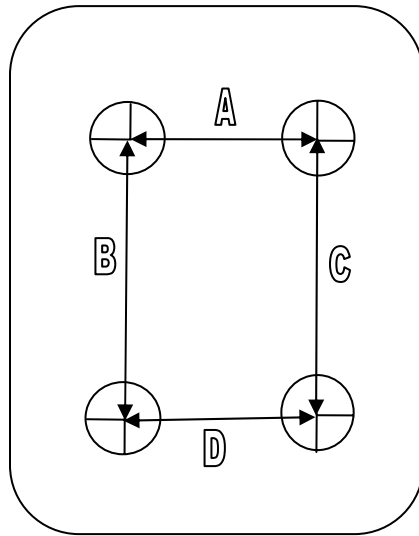


DRIVER COMPARTMENT

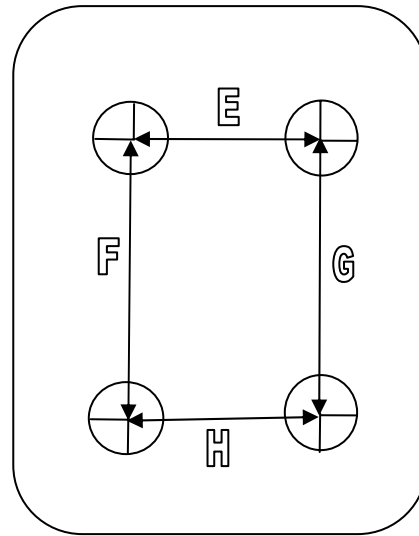
DATA SHEET NO. 13... (continued)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2007 Toyota Yaris
 Test Program: 35mph Frontal Impact

NHTSA No.: M75102
 Test Date: 5/16/2006



Driver



Passenger

UNDERBODY FLOORBOARD DEFORMATION

Measurement	Pre-Test	Post-Test	Difference
A	380	401	-21
B	353	366	-13
C	310	366	-56
D	415	404	11
E	380	372	8
F	330	332	-2
G	351	339	12
H	416	410	6

DATA SHEET NO. 14

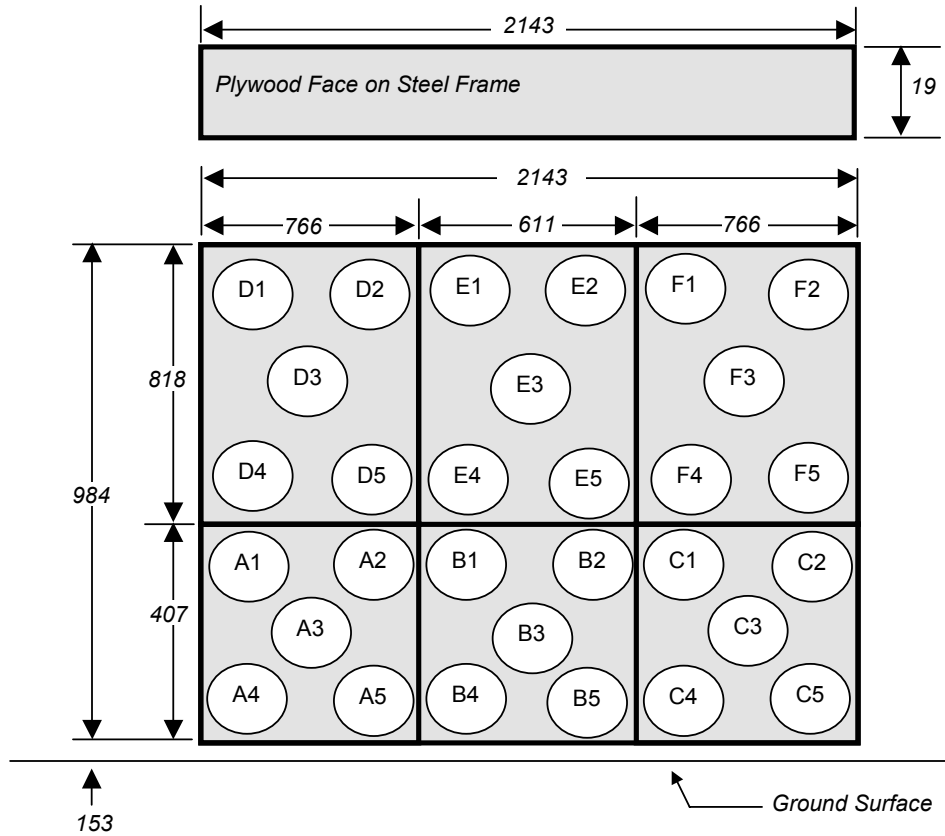
LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle: 2007 Toyota Yaris
Test Program: 35mph Frontal Impact

NHTSA No.: M75102
Test Date: 5/16/2006

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: 2007 Toyota Yaris
 Test Program: 35mph Frontal Impact

NHTSA No.: M75102
 Test Date: 5/16/2006

VEHICLE INFORMATION

VIN: JTDBT923471016797 Wheelbase (mm) : 2551
 Vehicle Size Category: Sedan Test Weight (kg) : 1270.6

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): 56.3
 Velocity Change (km/h): 65.3 Time of Separation (msec): 81

CRUSH PROFILE

Collision Deformation Classification: Frontal Midpoint of Damage: Centerline
 Damage Region Length (mm): 1518 Impact Mode: Frontal

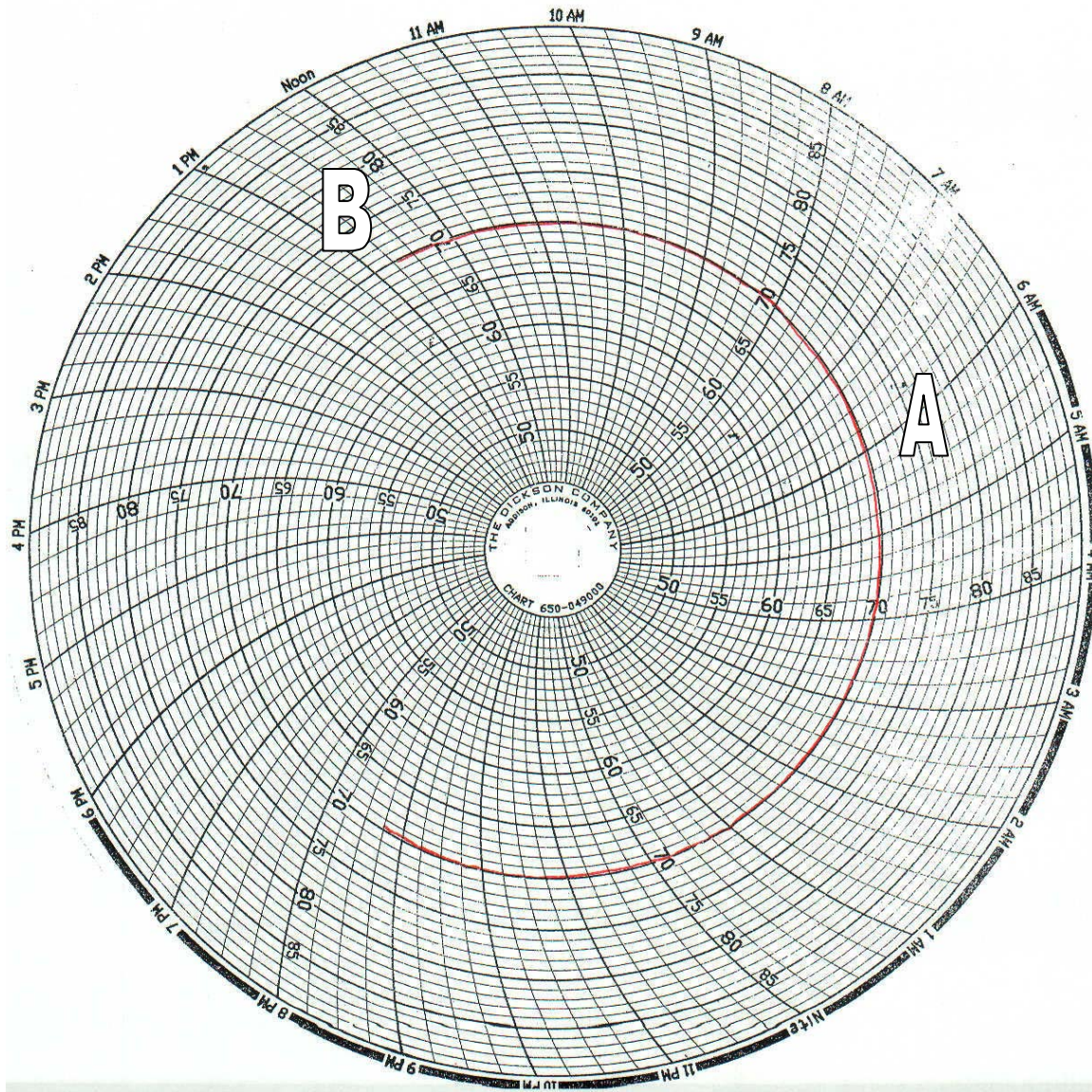
No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	4036	3746	290
C2	Crush zone 2 at left side	mm	4170	3722	448
C3	Crush zone 3 at left side	mm	4238	3729	509
C4	Crush zone 4 at right side	mm	4242	3715	527
C5	Crush zone 5 at right side	mm	4174	3705	469
C6	Crush zone 6 at right side	mm	4043	3732	311
L	C1 TO C6	mm	1518	1530	-12

DATA SHEET NO. 16

DUMMY / VEHICLE TEMPERATURE STABILIZATION CHART

Test Vehicle: 2007 Toyota Yaris
Test Program: 35mph Frontal Impact

NHTSA No.: M75102
Test Date: 5/16/2006



A = Dummies installed in vehicle at 6:00 am

B = Test conducted at 12:56 pm

APPENDIX A
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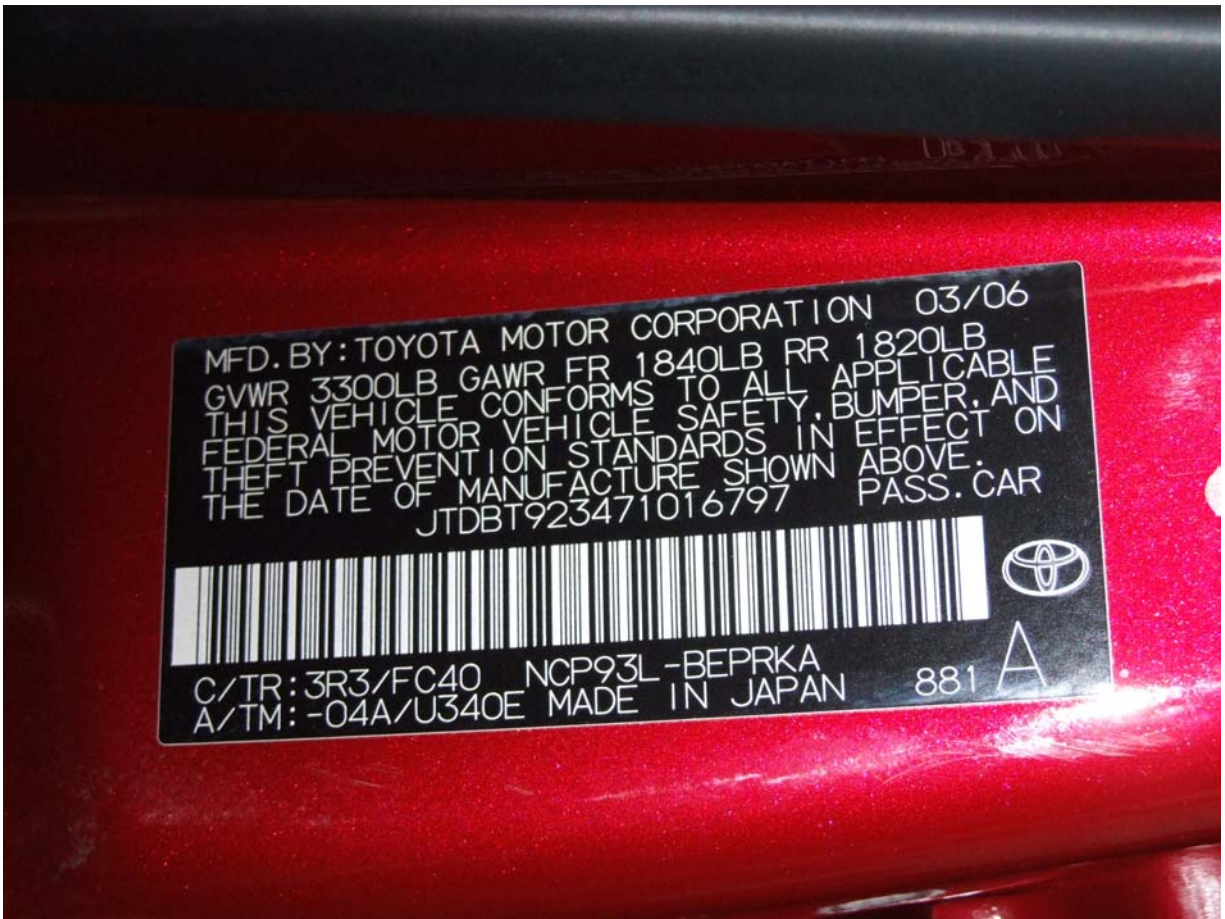
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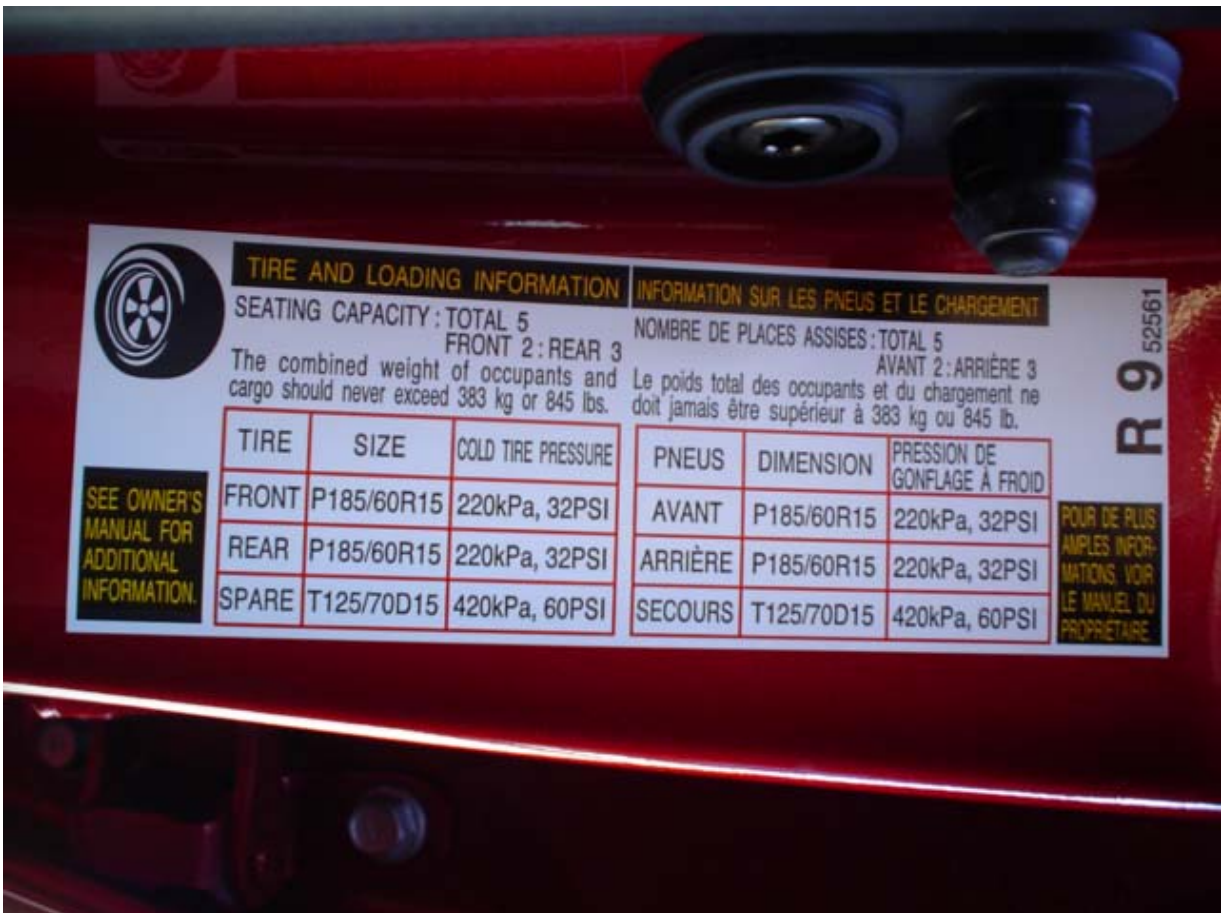
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Load Cell Location



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 $\frac{3}{4}$ View of Doors



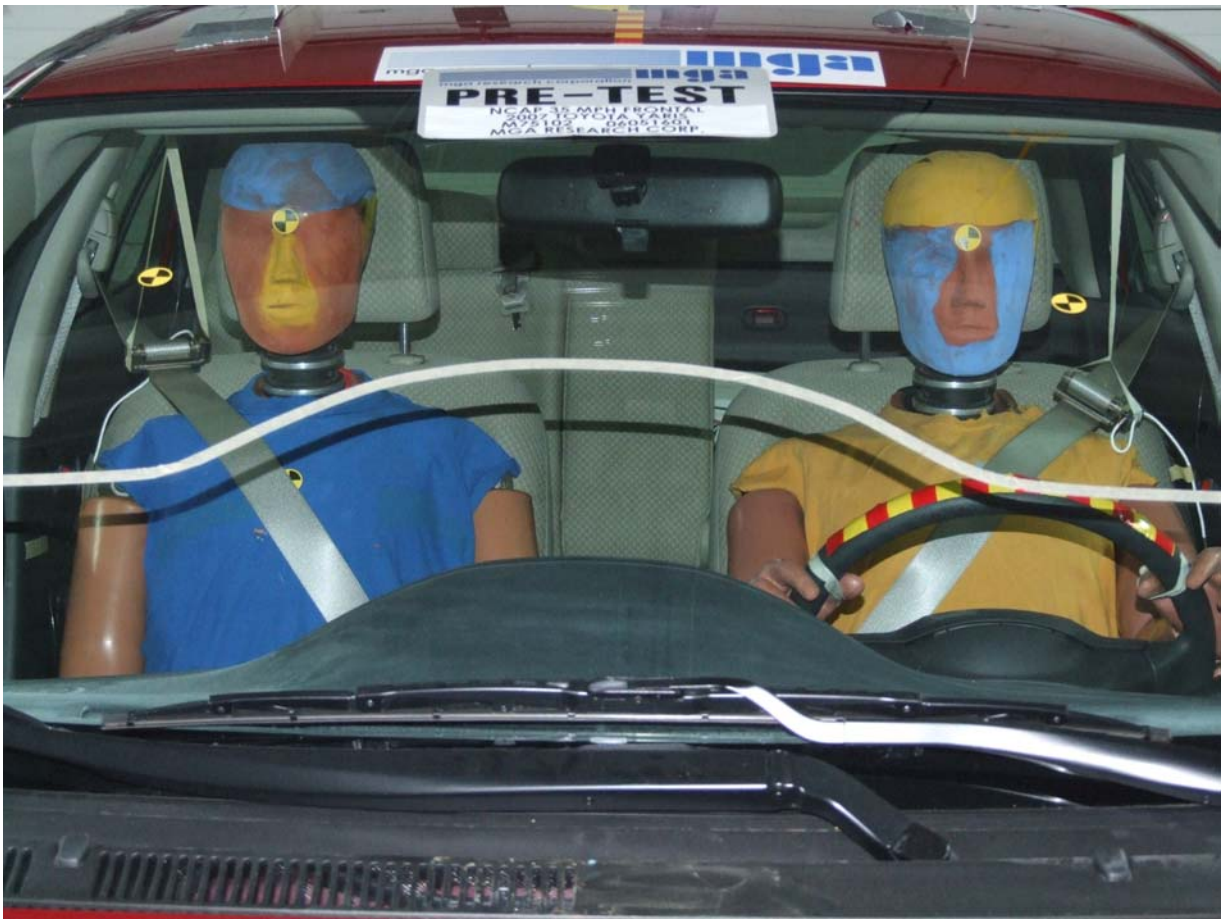
Post-Test Left Side $\frac{3}{4}$ View of Doors After Impact



Pre-Test Right Side ¾ View of Doors



Post-Test Right Side ¾ View of Doors After Impact



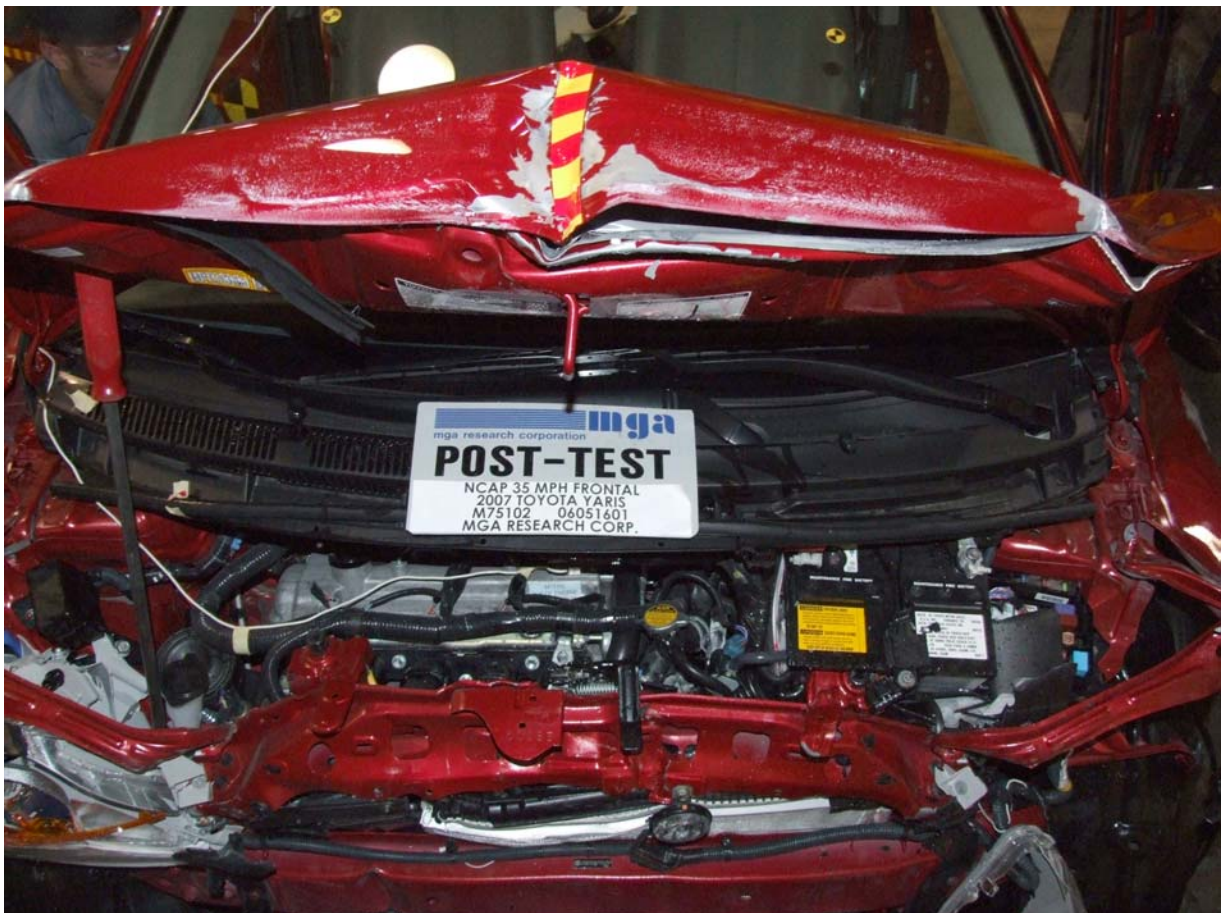
Pre-Test Windshield View



Post-Test Windshield View



Pre-Test Engine Compartment View



Post-Test Engine Compartment View



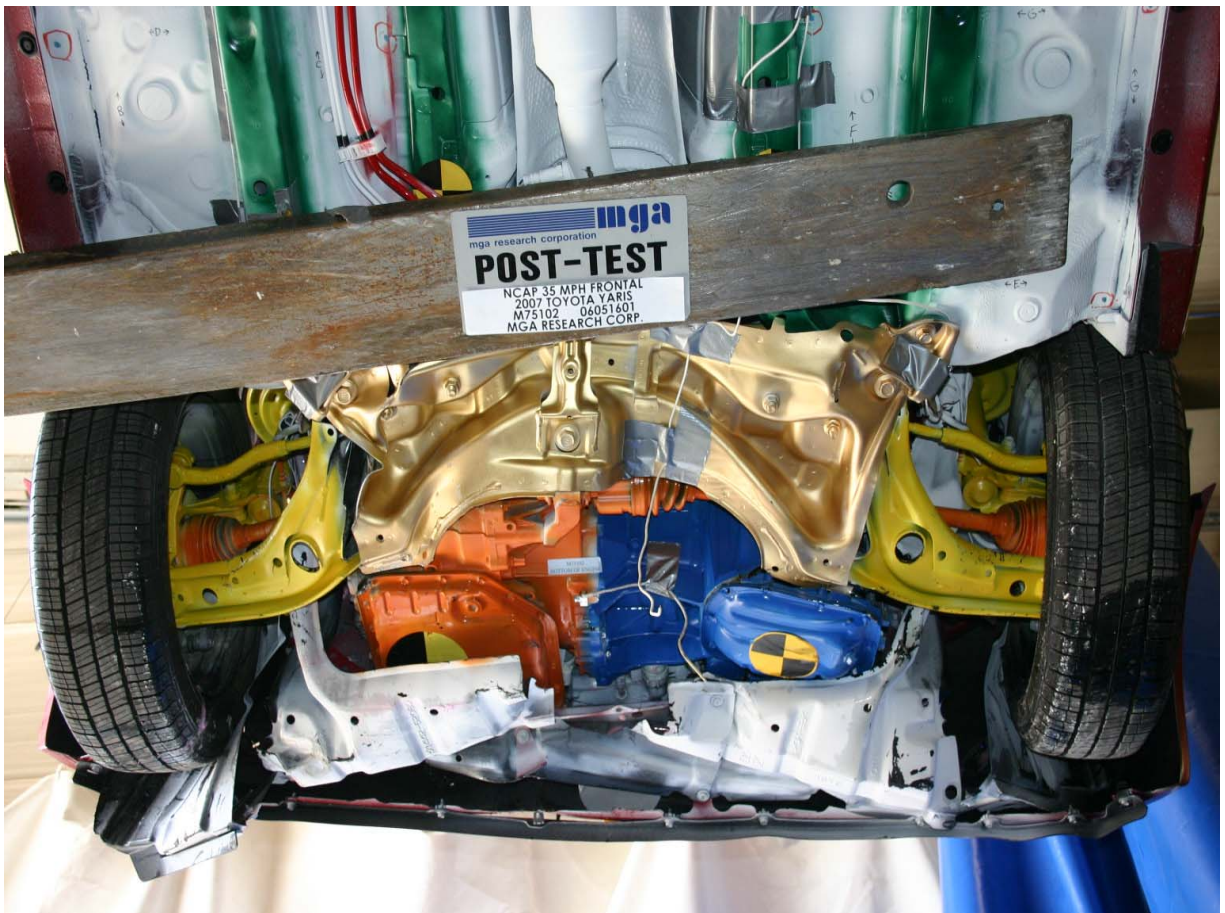
Pre-Test Fuel Cap View



Post-Test Fuel Cap View



Pre-Test Front Underbody View



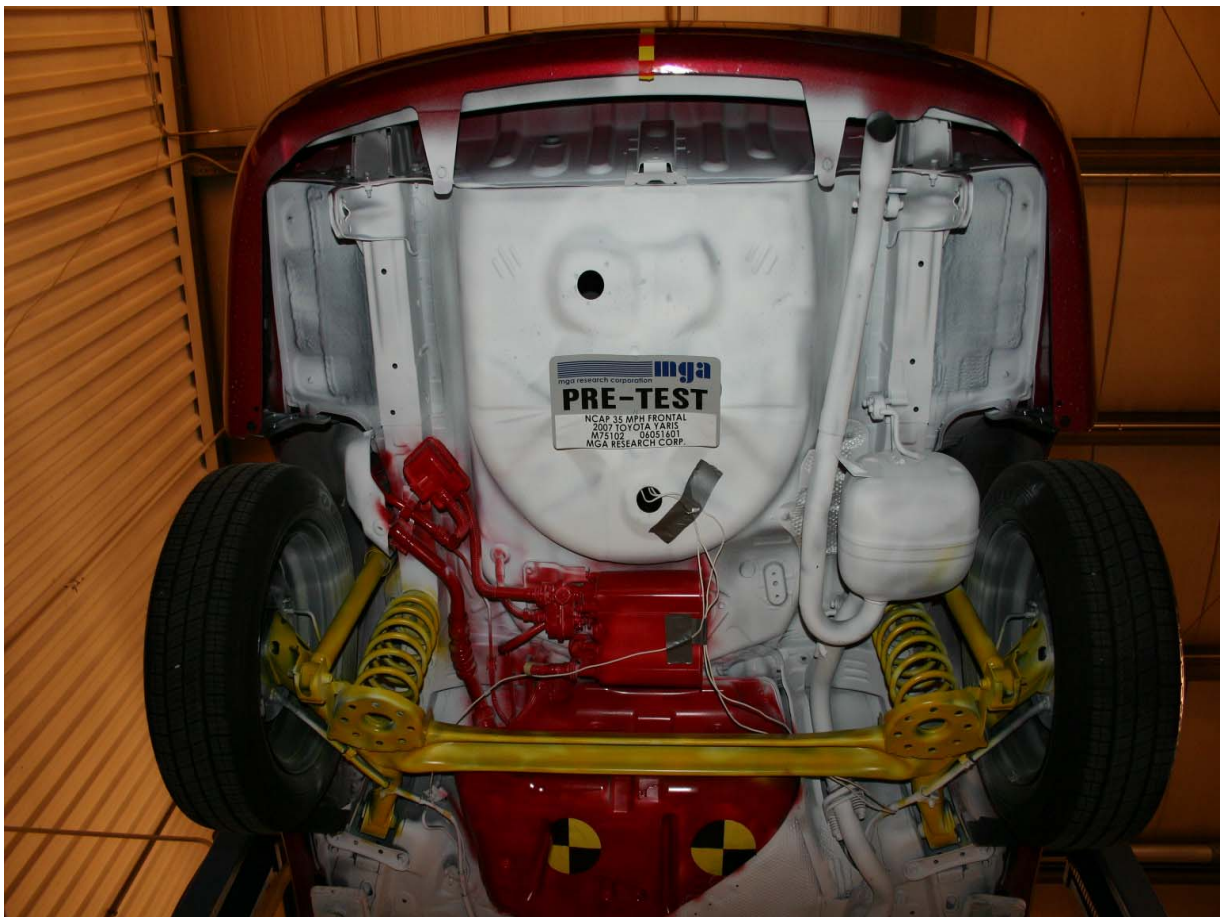
Post-Test Front Underbody View



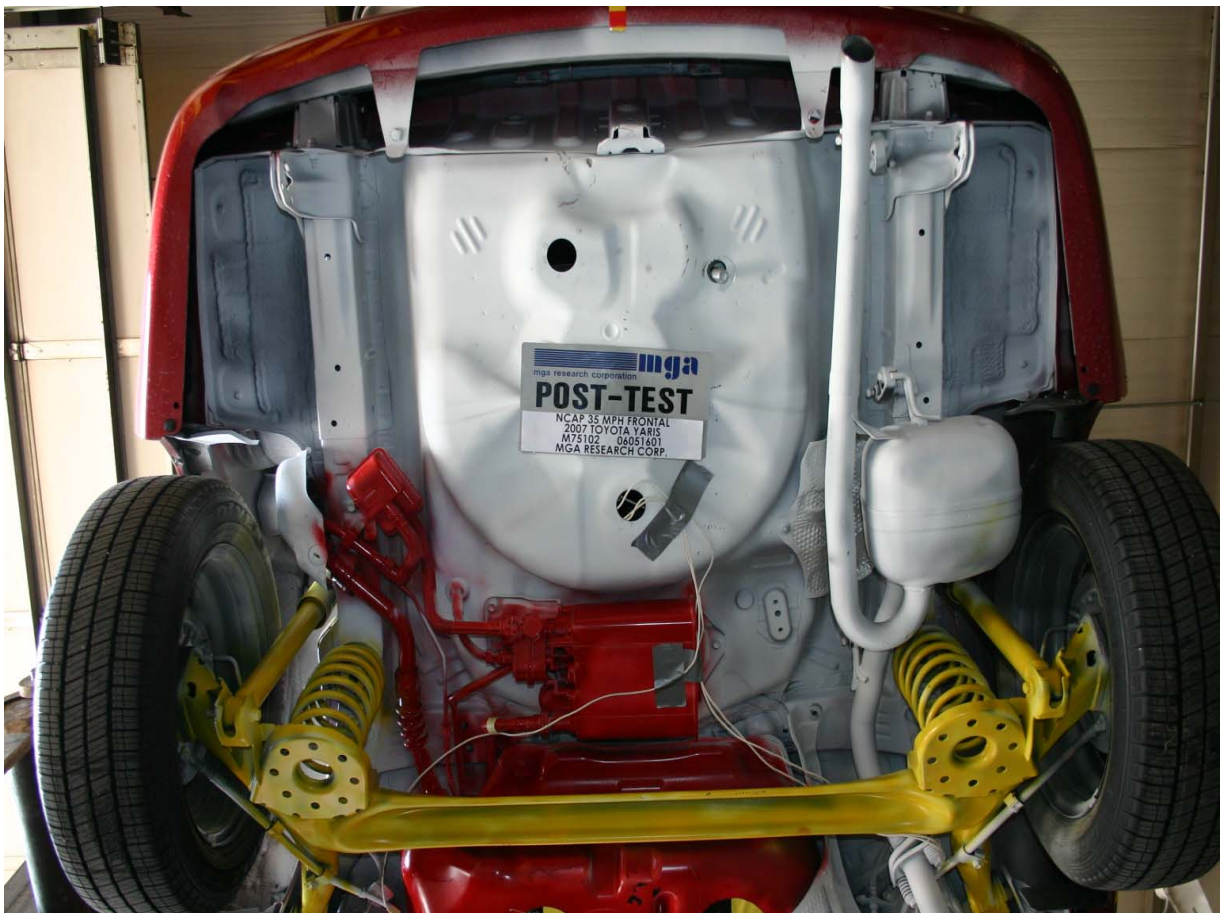
Pre-Test Mid Underbody View



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



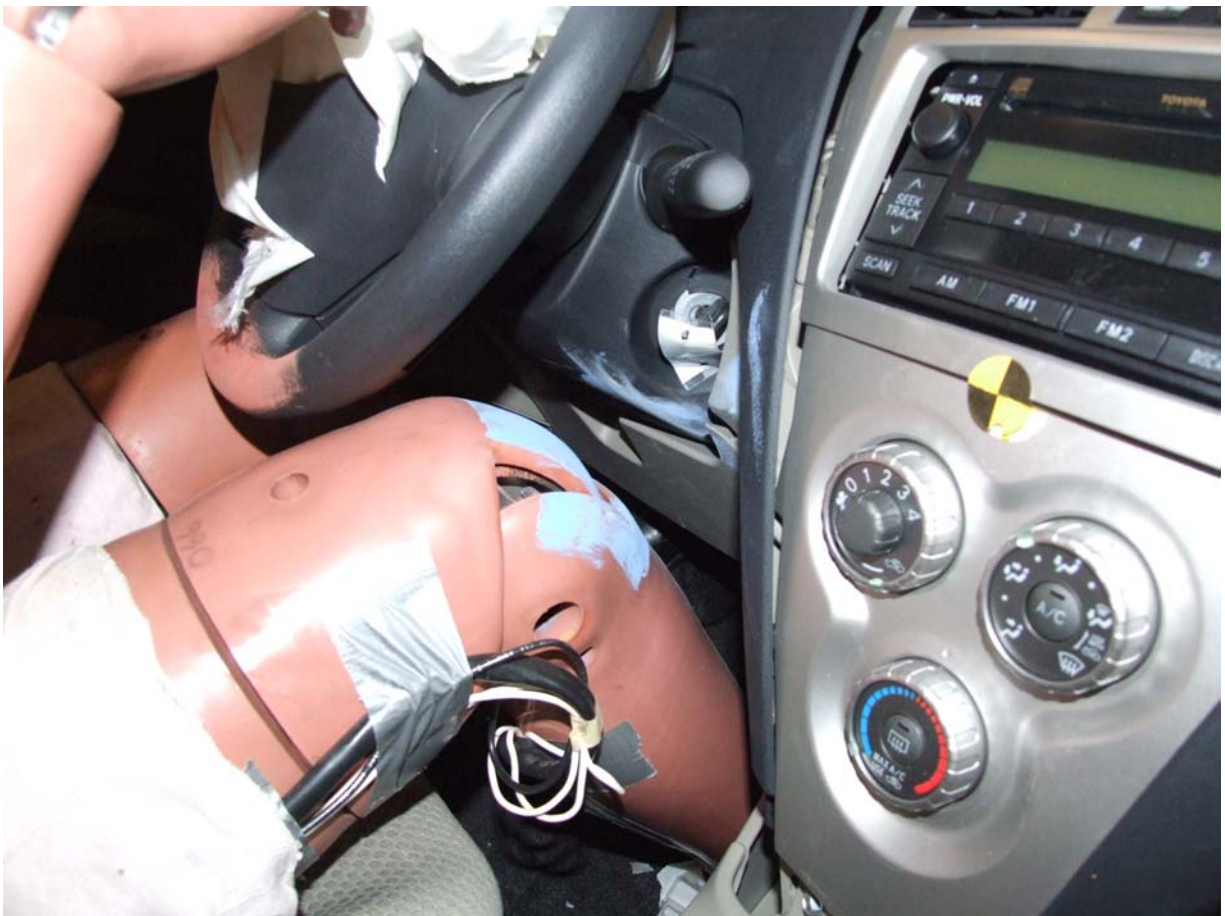
Post-Test Driver Side Floor Pan



Post-Test Driver Dummy Head Contact



Post-Test Driver Dummy Left Knee Contact



Post-Test Driver Dummy Right 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



Post-Test Passenger Dummy Knee Contact



Post-Test Passenger Dummy Airbag Contact



Vehicle on Rollover Device at 90 Degrees



Vehicle on Rollover Device at 180 Degrees



Vehicle on Rollover Device at 270 Degrees



Vehicle on Rollover Device at 360 Degrees



Vehicle Impact

APPENDIX B
DUMMY RESPONSE DATA TRACES

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

Driver Head X Redundant

Driver Head Y Redundant

Driver Head Z Redundant

Driver Upper Neck Force 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

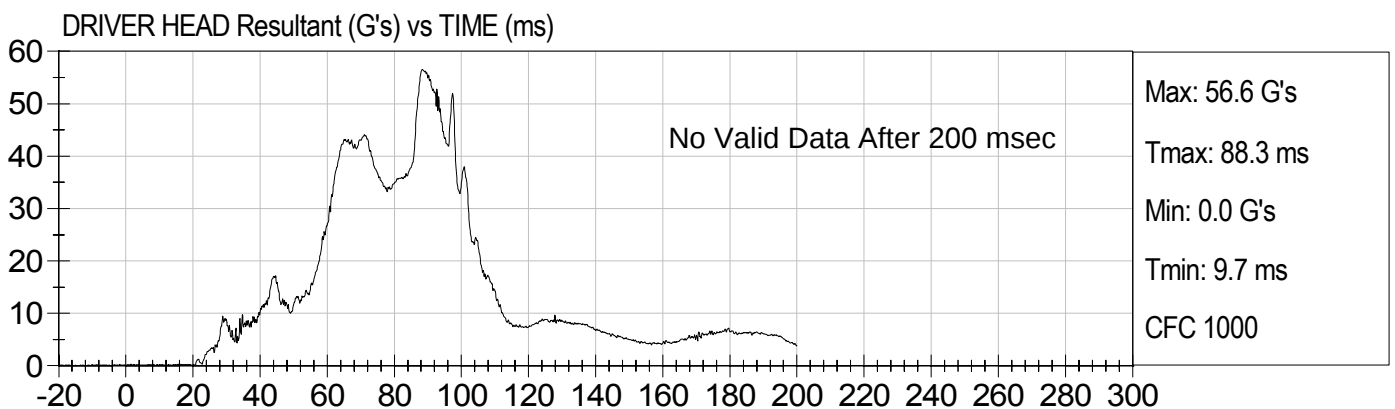
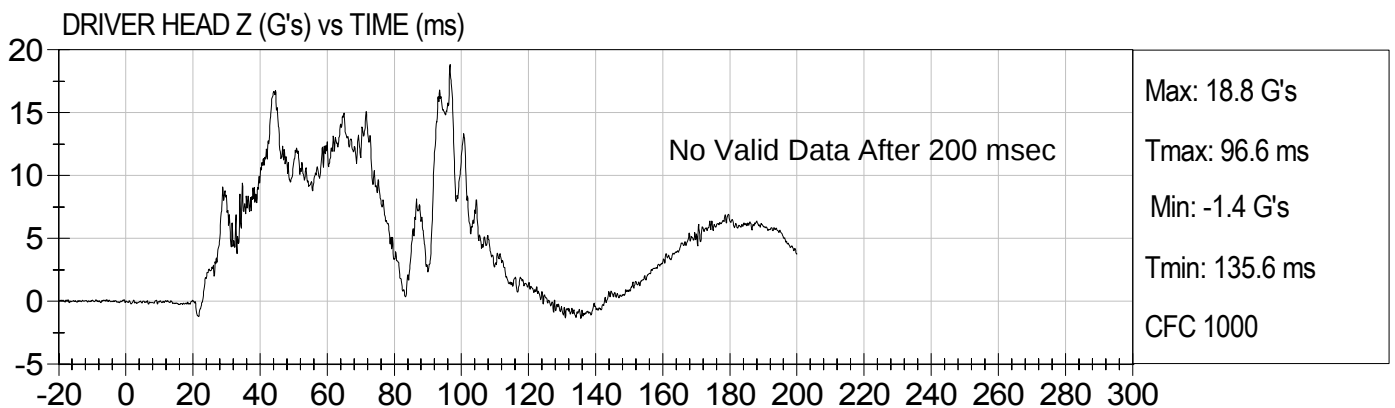
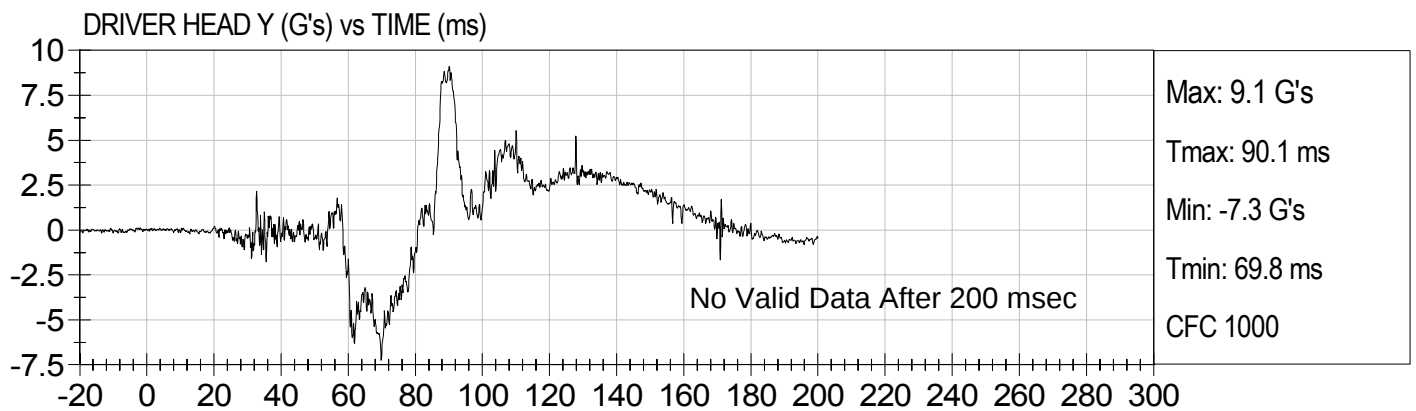
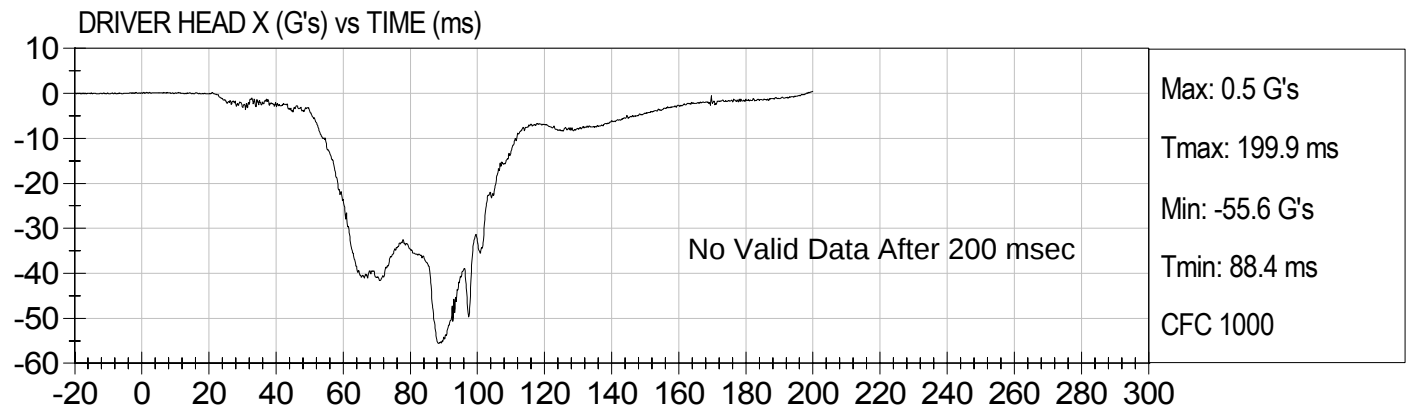
Driver Left Lower Tibia Force Z

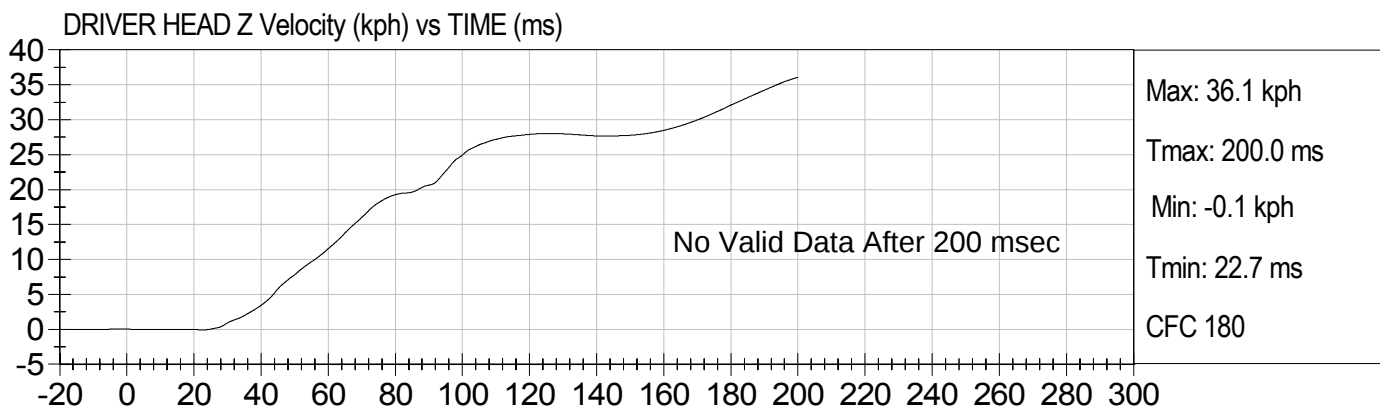
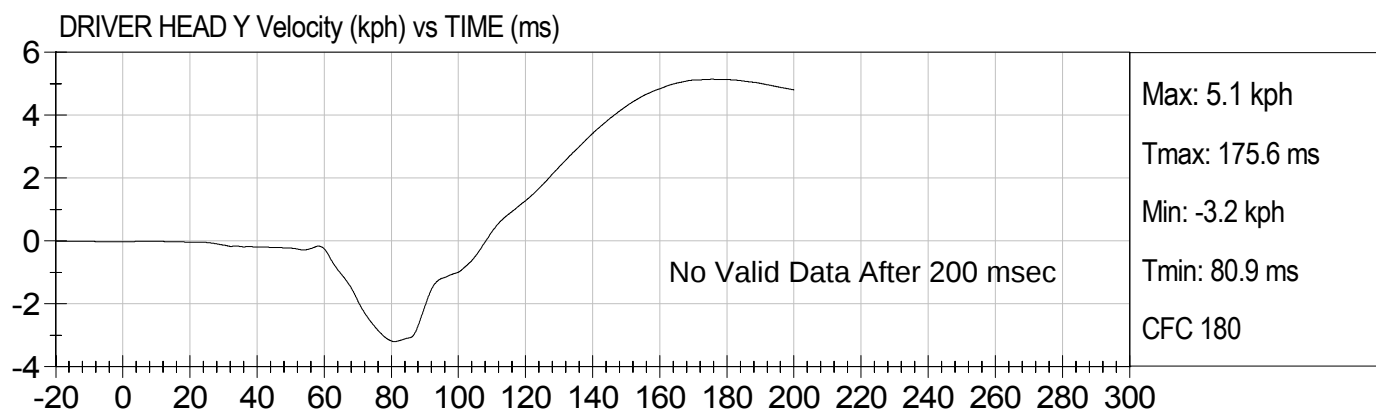
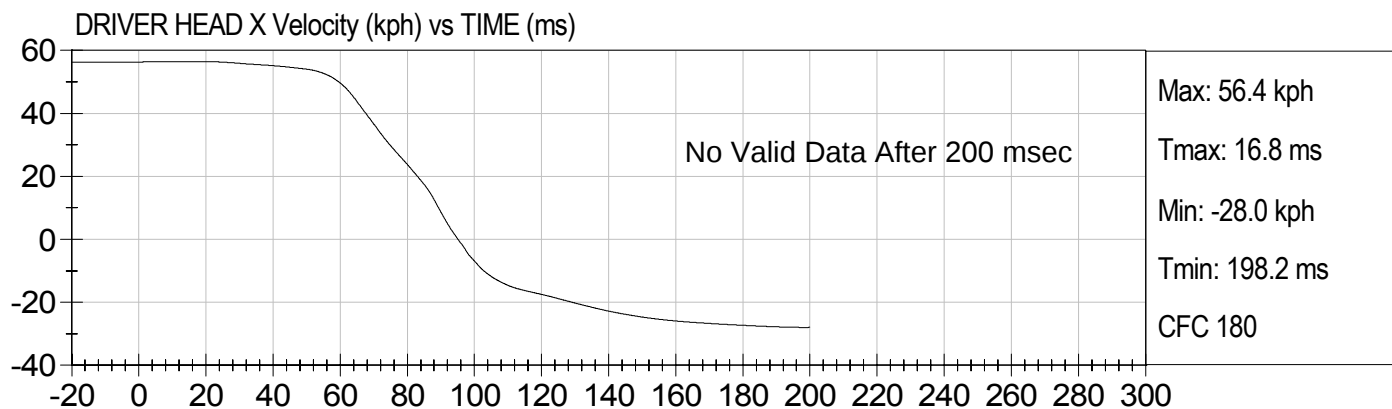
Driver Right Upper Tibia Moment X

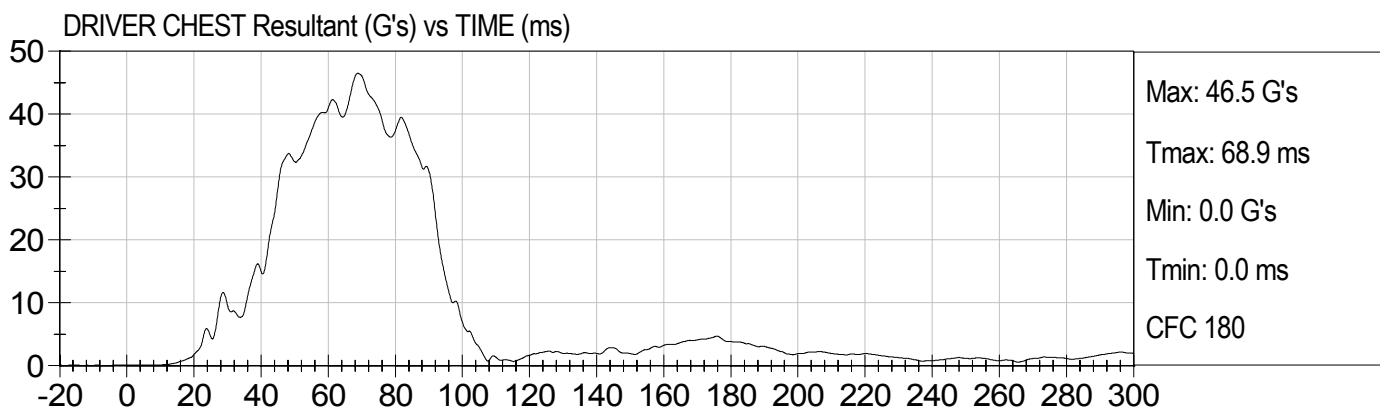
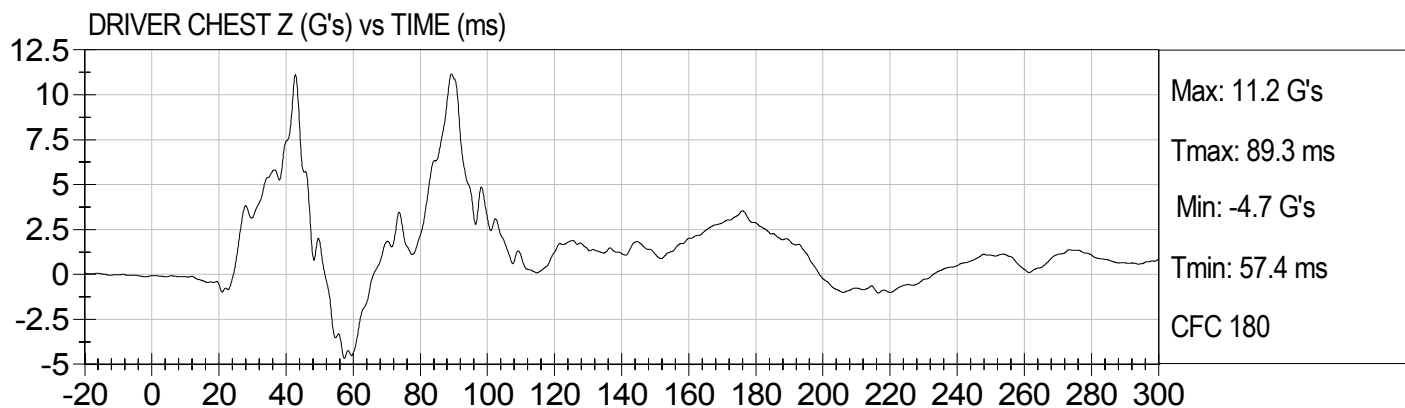
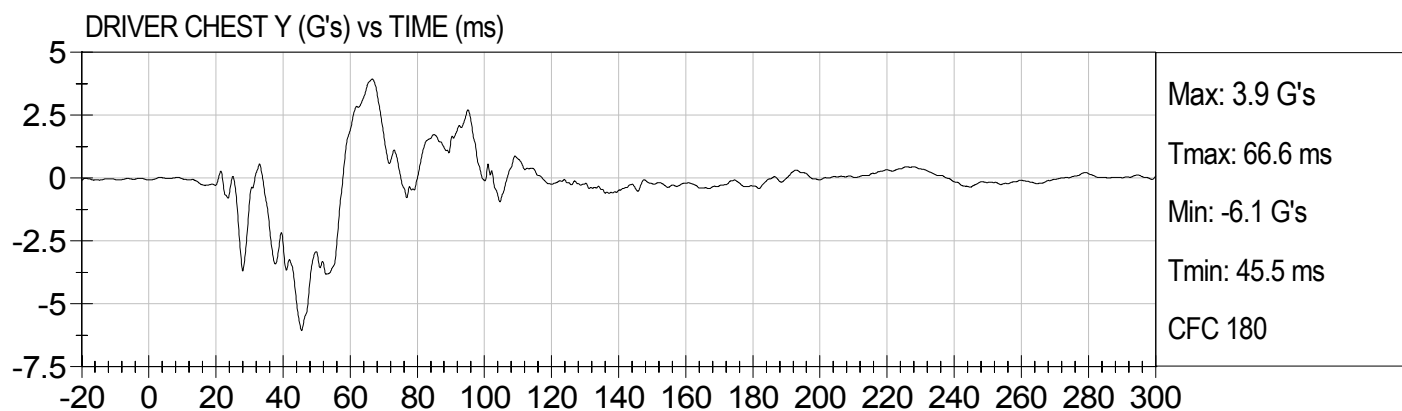
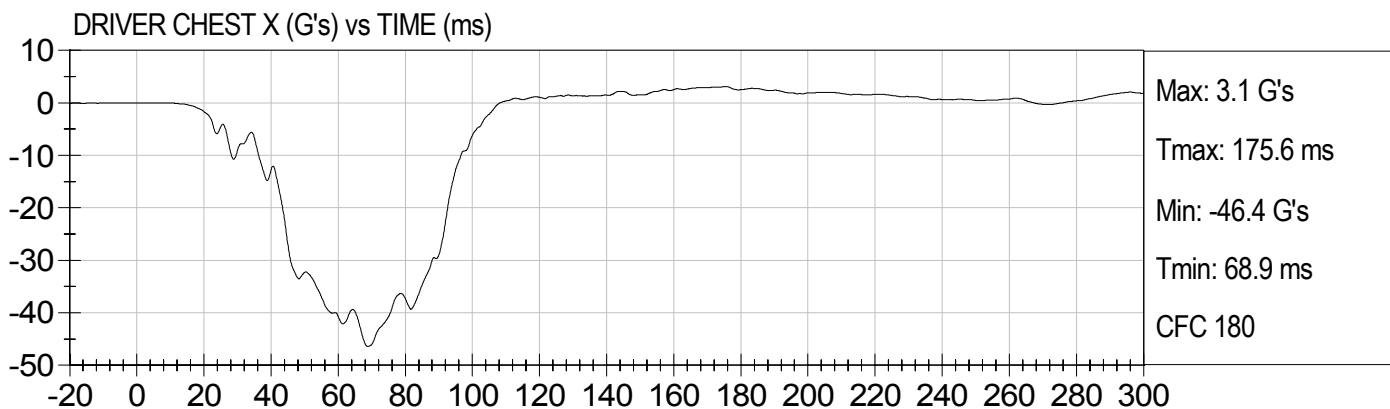
Driver Right Upper Tibia Moment Y

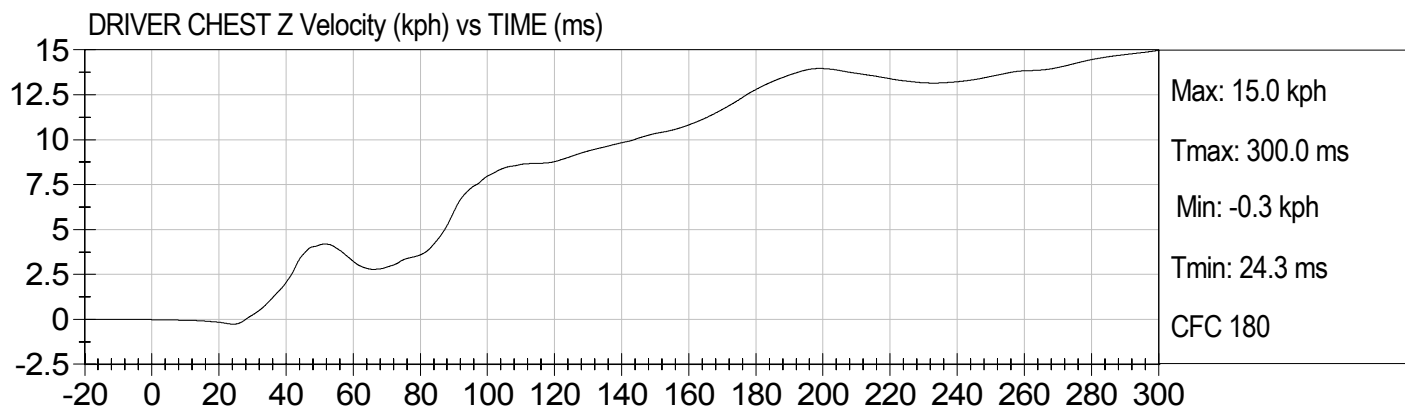
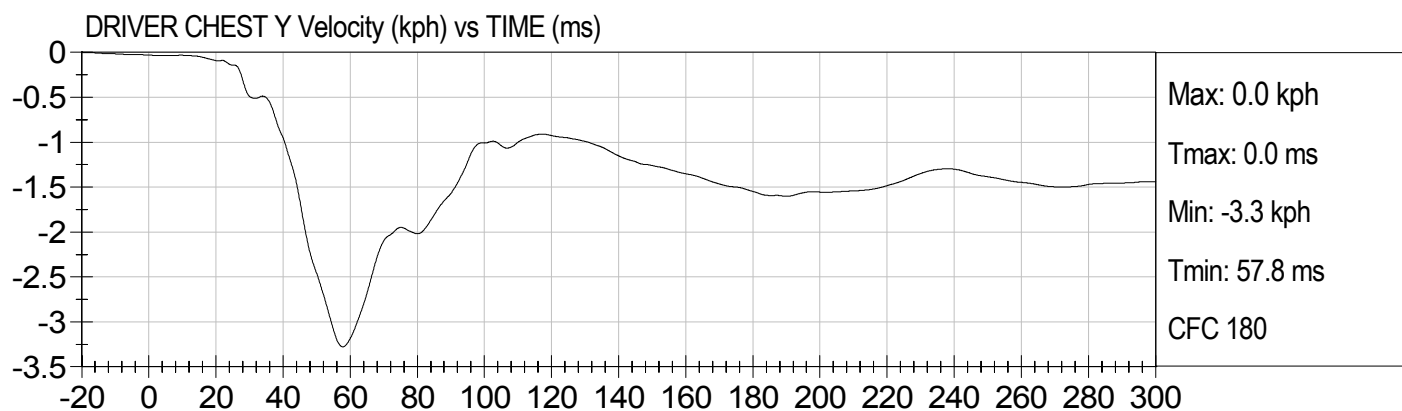
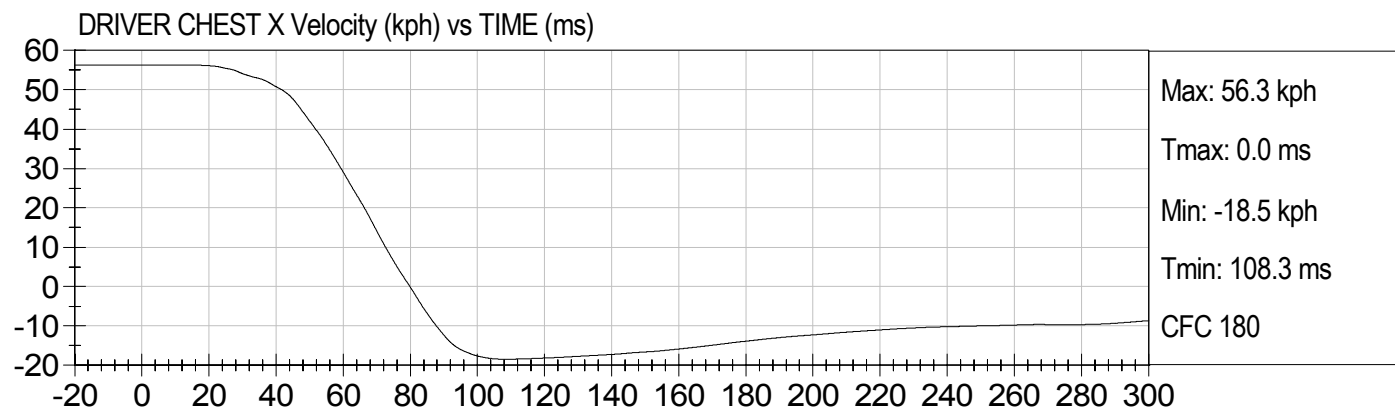
Driver Right Upper Tibia Force Z
Driver Right Lower Tibia Moment X
Driver Right Lower Tibia Moment Y
Driver Right Lower Tibia Force Z
Driver Left Foot Fore Z
Driver Left Foot Aft X
Driver Left Foot Aft Z
Driver Right Foot Fore Z
Driver Right Foot Aft X
Driver Right Foot Aft Z
Passenger Head X Redundant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

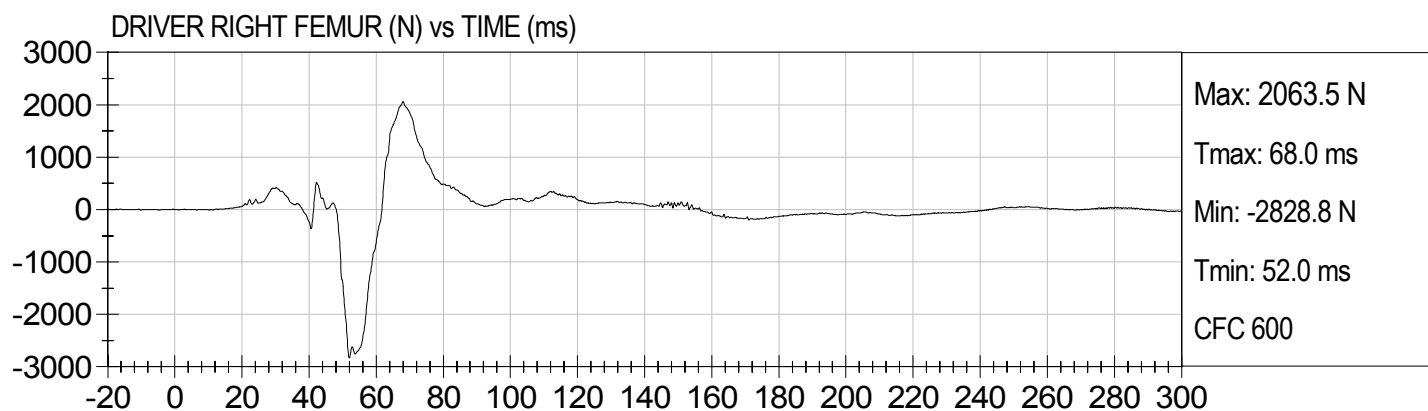
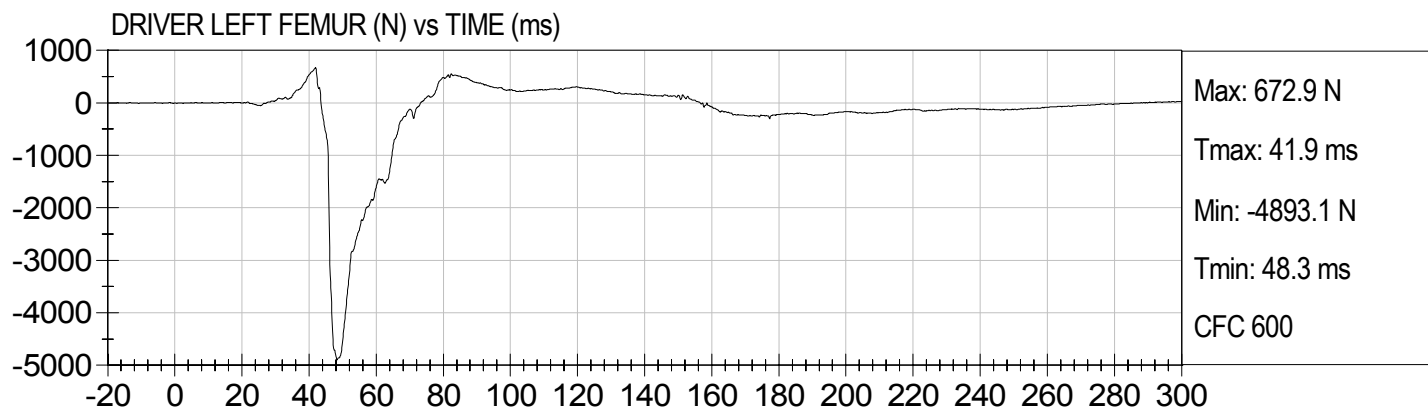
Passenger Left Lower Tibia Moment Y
Passenger Left Lower Tibia Force Z
Passenger Right Upper Tibia Moment X
Passenger Right Upper Tibia Moment Y
Passenger Right Upper Tibia Force Z
Passenger Right Lower Tibia Moment X
Passenger Right Lower Tibia Moment Y
Passenger Right Lower Tibia Force Z
Passenger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

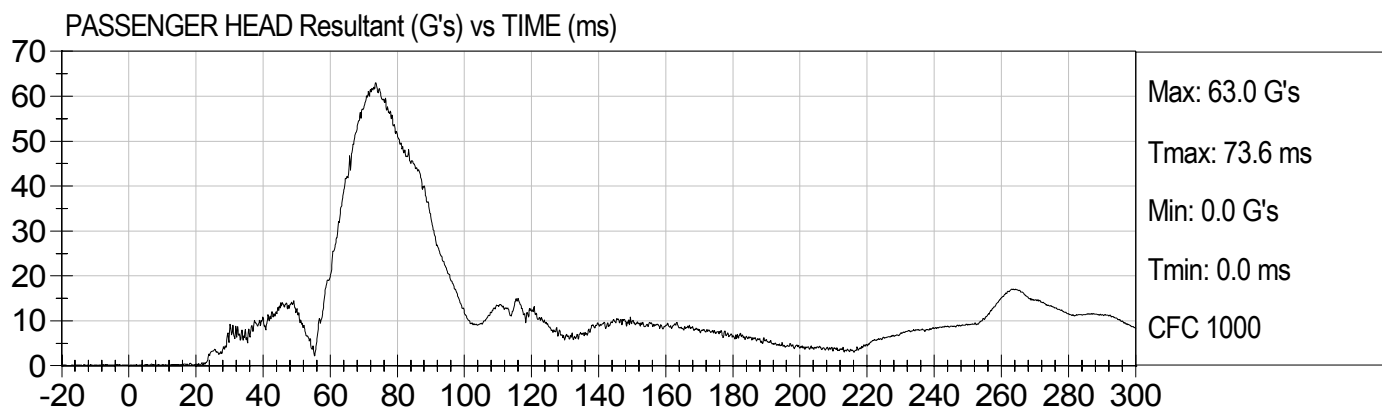
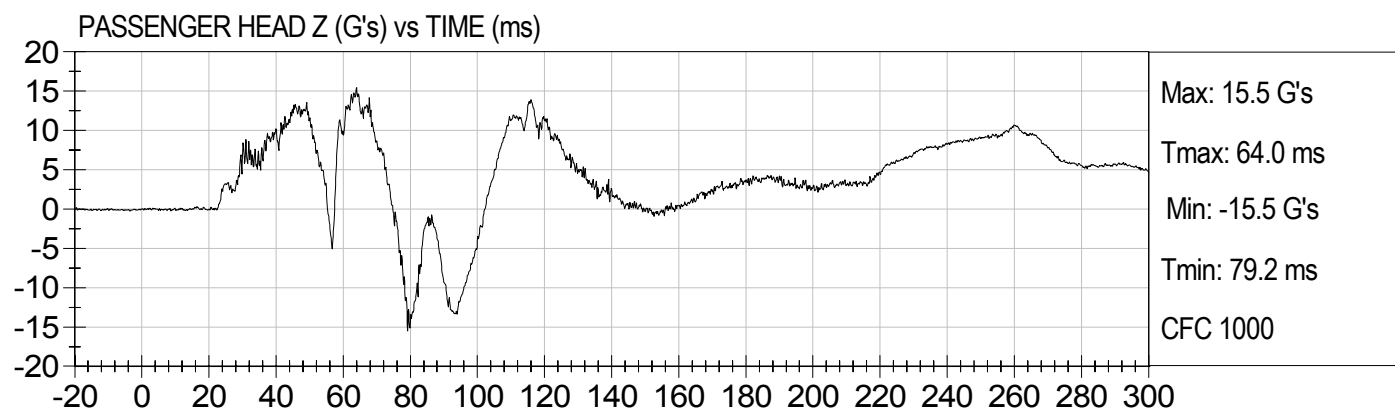
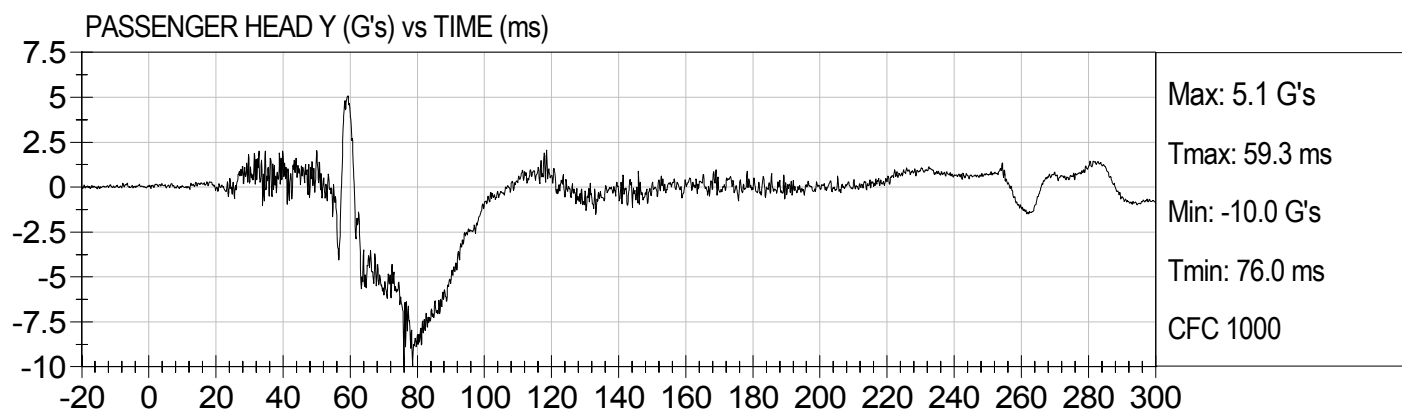
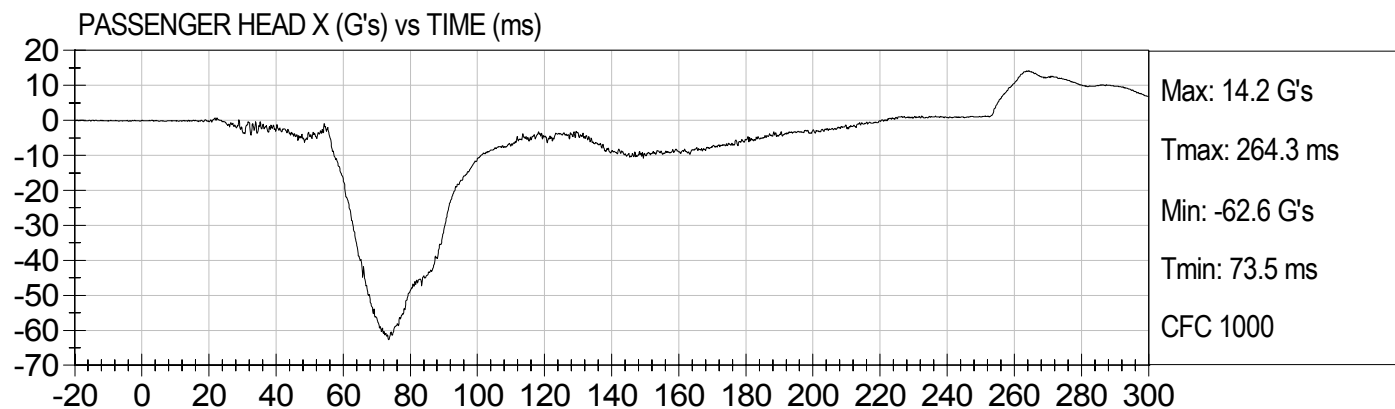


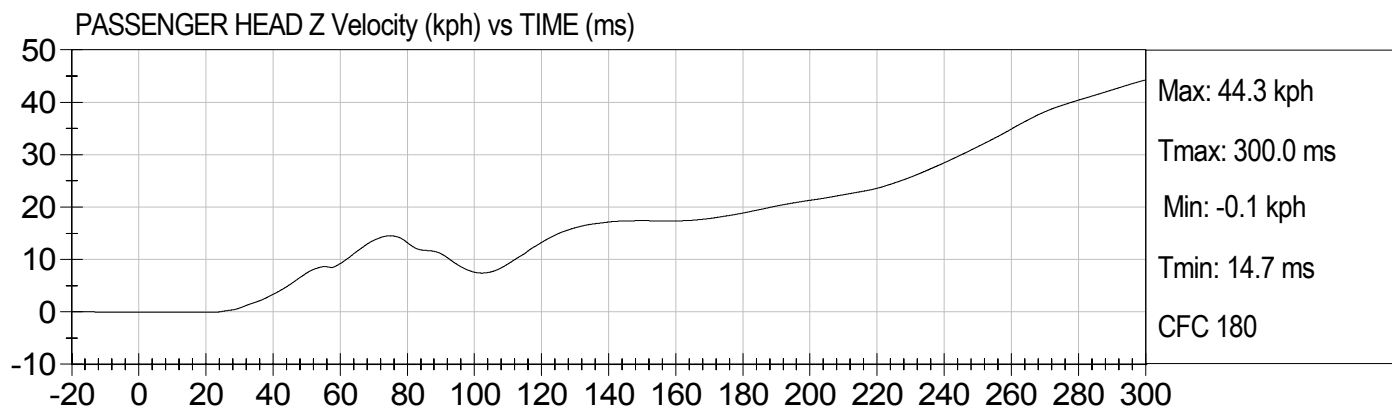
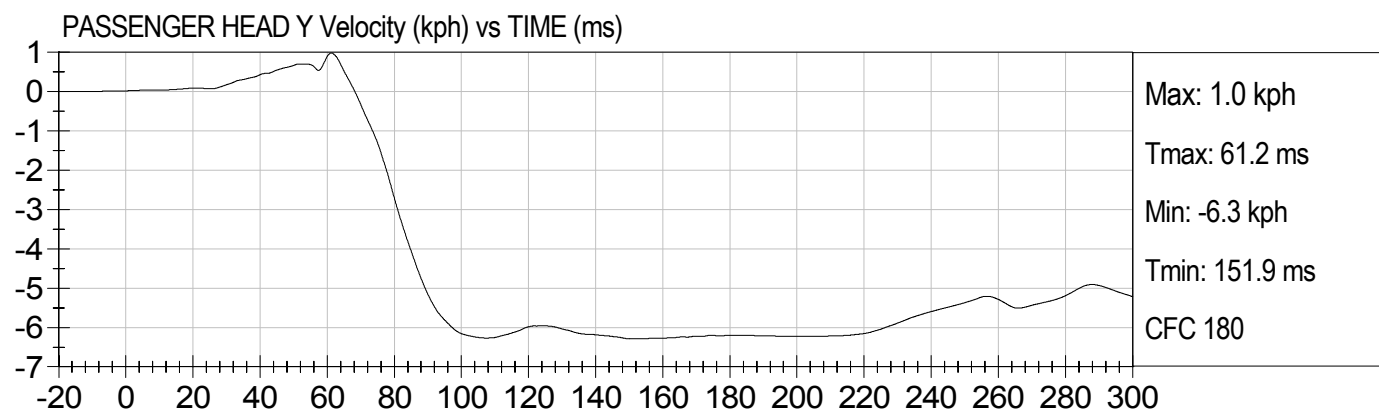
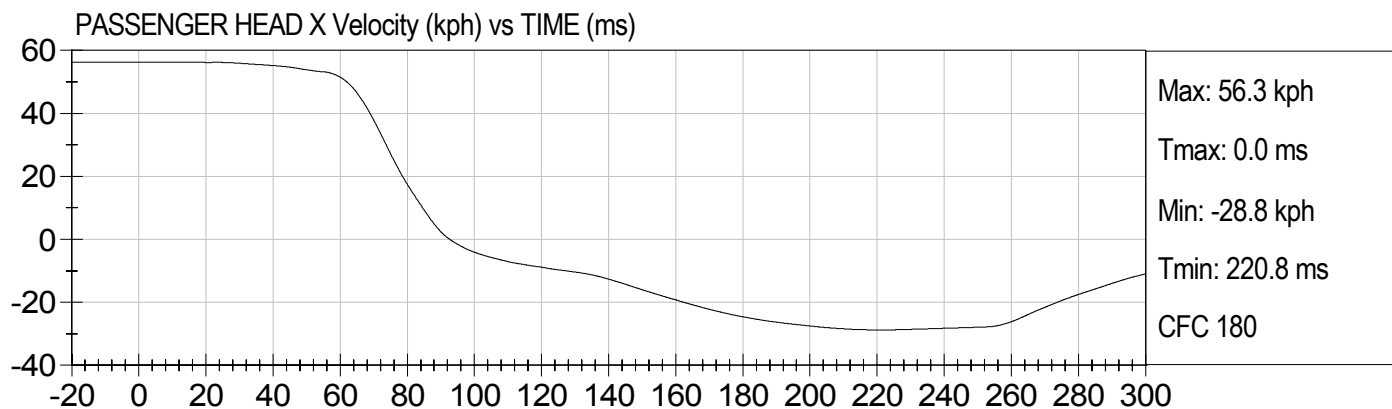


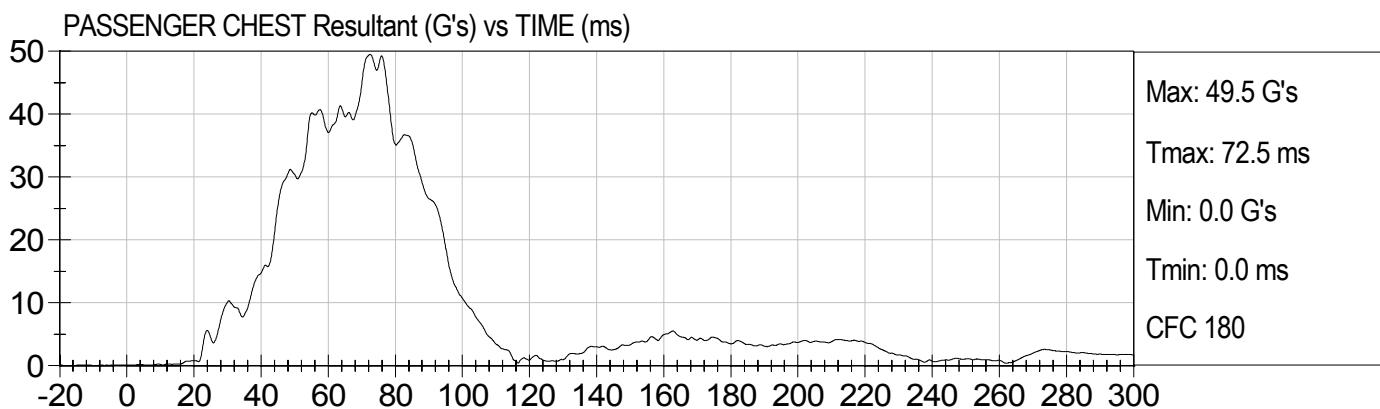
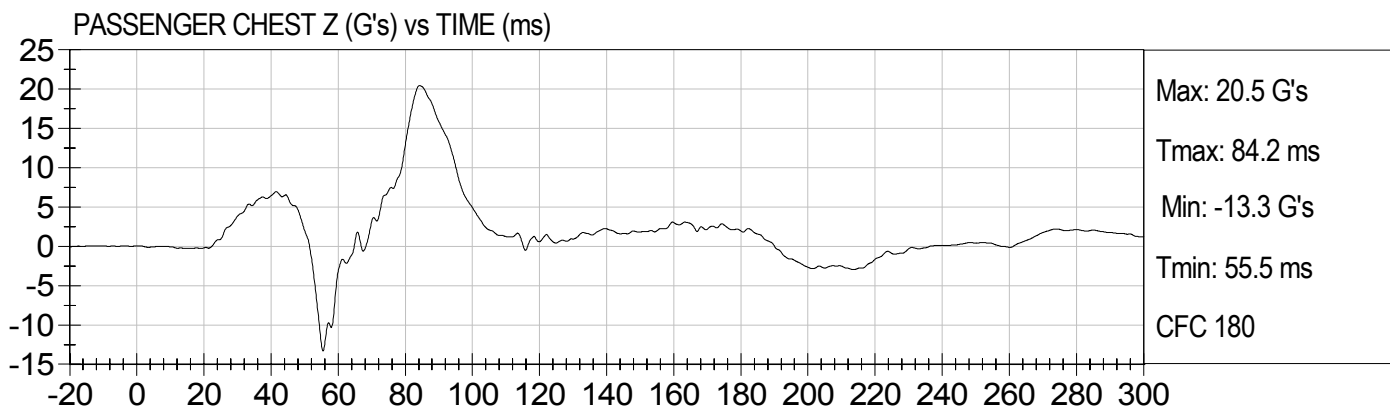
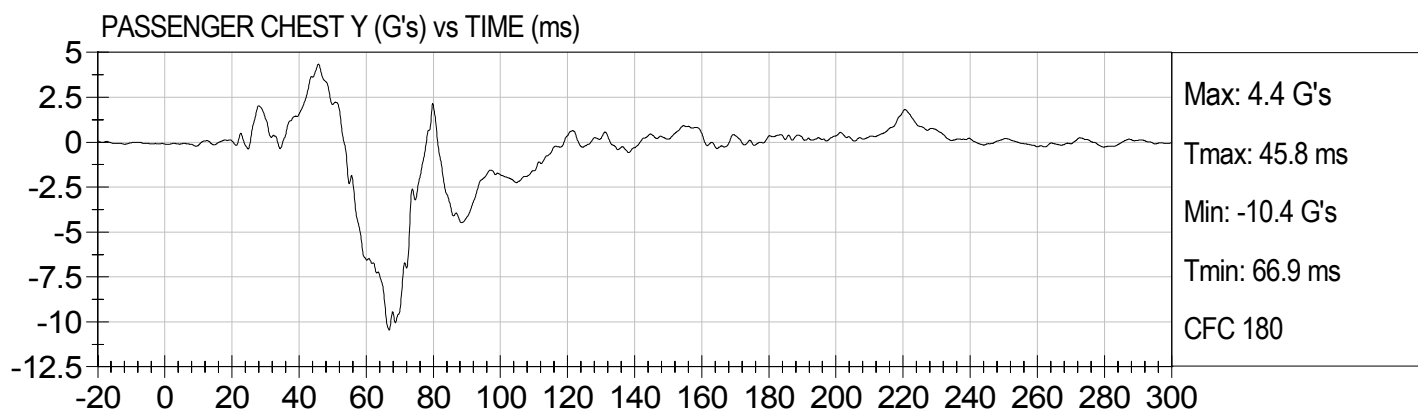
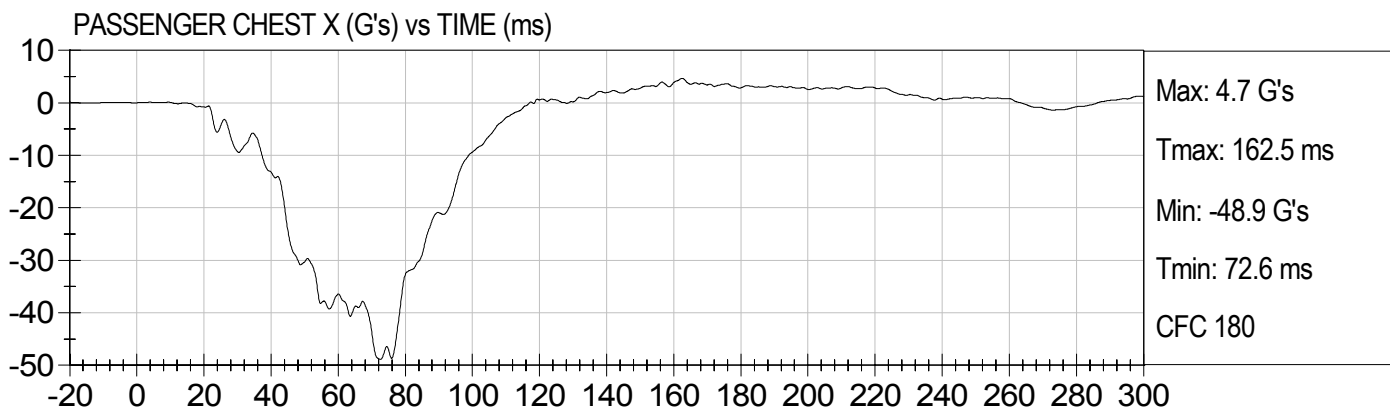


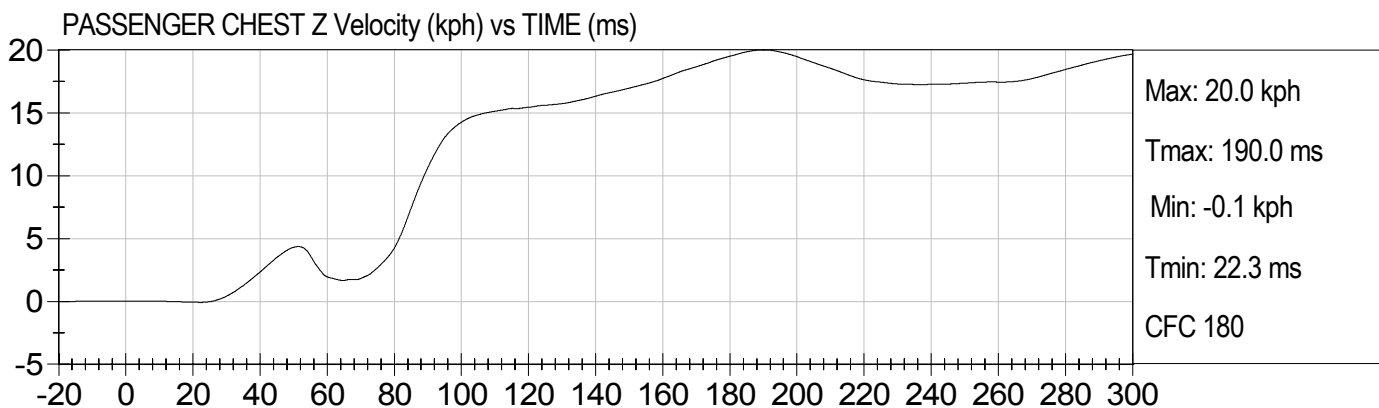
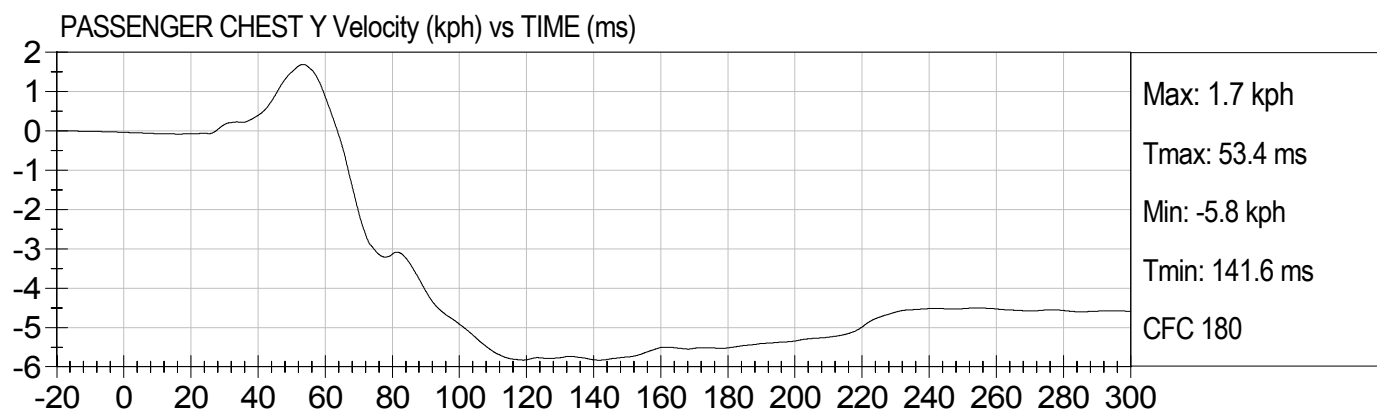
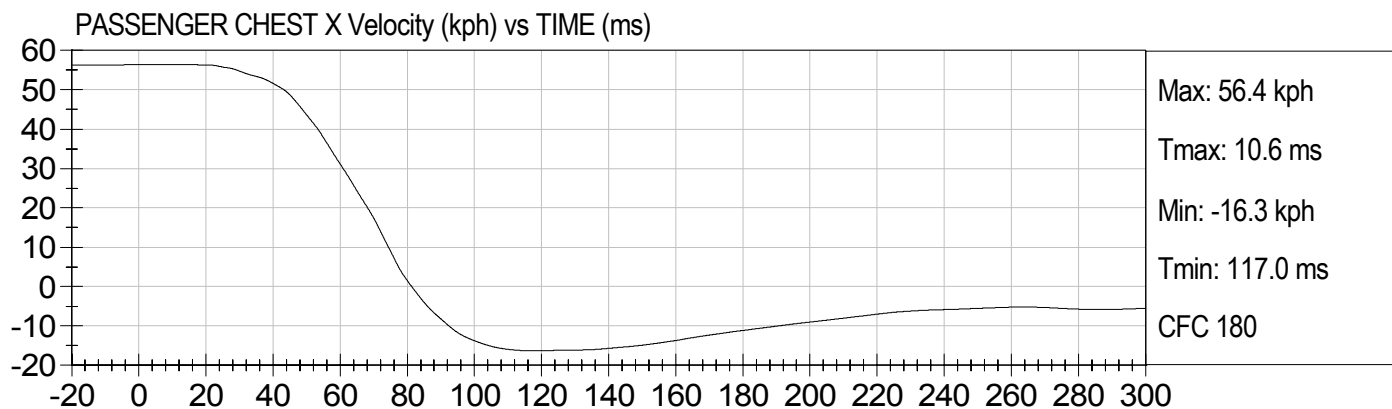


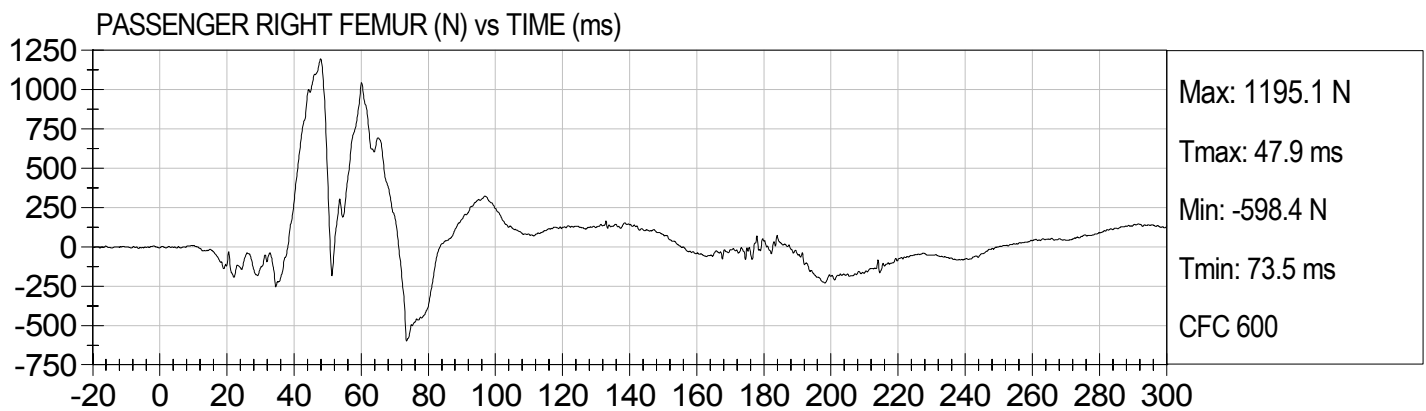
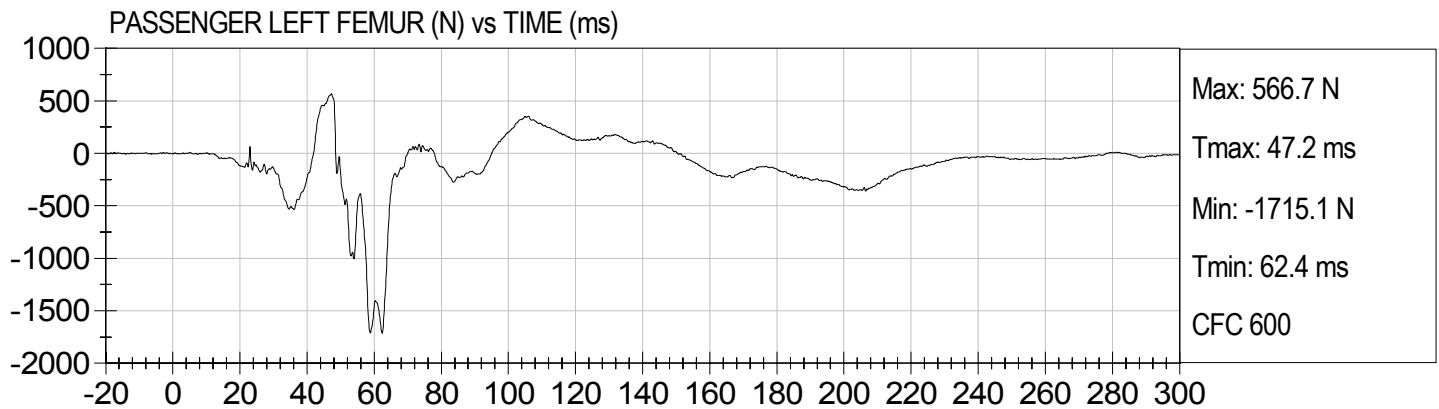












APPENDIX C
DUMMY CALIBRATION DATA

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

ATD Serial No: 066

Test ID: D061281

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	44	Pass
Peak Resultant Acceleration	G's	225 - 275	254	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	7.6	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
			Overall Test Results	Pass


Laboratory Technician


Approved By

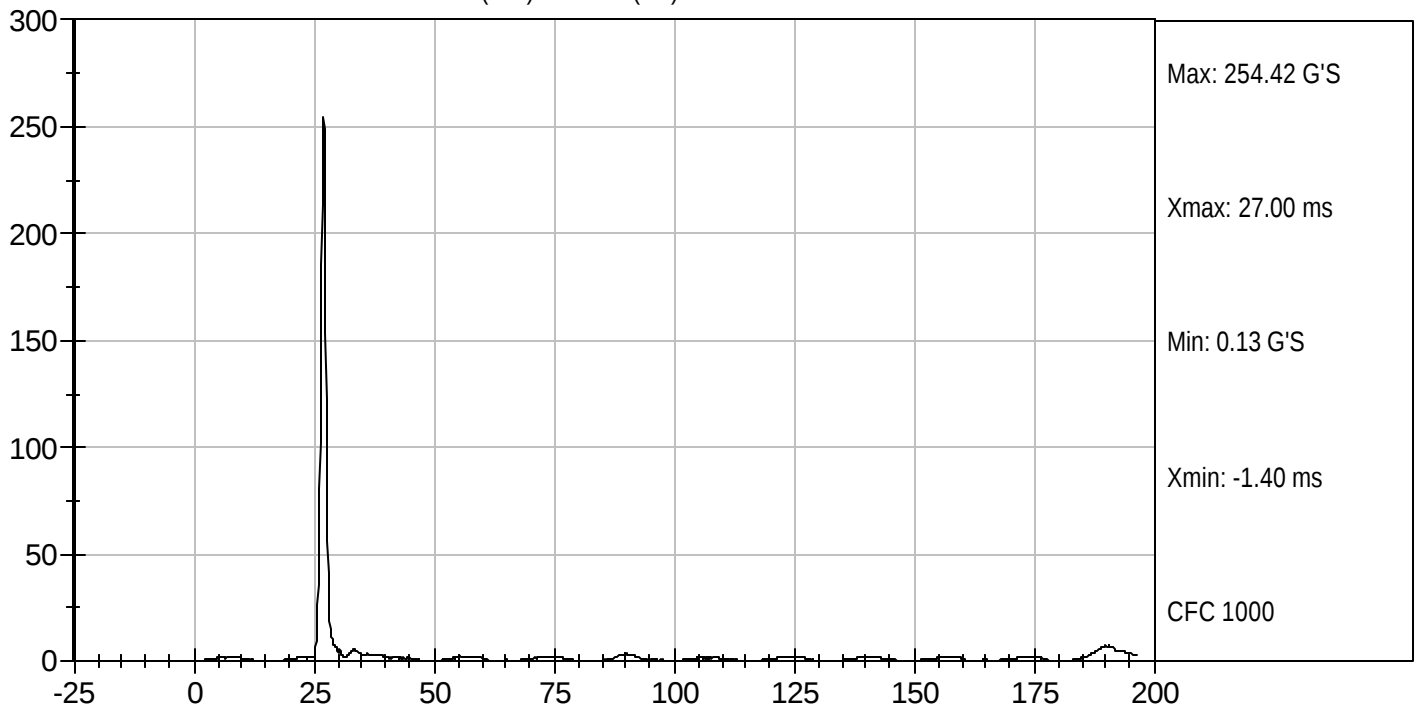
05/10/2006
Test Date



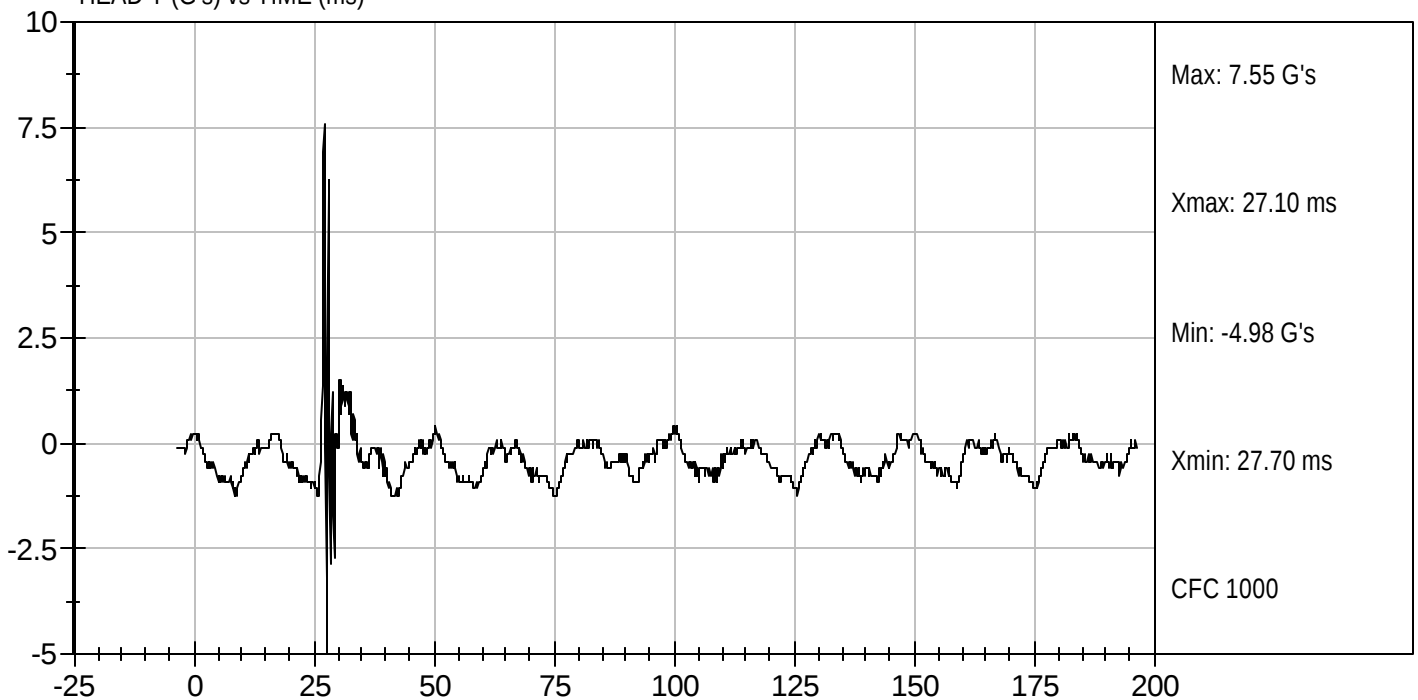
Test Desc: Head Drop
Componet ID: D061281

Test Date: 05/10/2006
Velocity: 0 ft/s, 0.00 m/s

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



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



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

ATD Serial No: 066

Test I.D: D061282

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity		%	10 to 70	48	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.09	Pass
Pendulum Deceleration	10 msec	G's	22.50 to 27.50	26.21	Pass
	20 msec	G's	17.60 to 22.60	20.79	Pass
	30 msec	G's	12.50 to 18.50	15.41	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 29.0	15.68	Pass
Deceleration Decay Time to Cross 5 G's		msec	34.0 to 42.0	37.6	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	72.1	Pass
	Time	msec	57.0 to 64.0	59.2	Pass
"D" Plane Rotation Decay Time To Zero Crossing		msec	113.0 to 128.0	114.2	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	93.8	Pass
	Time	msec	47.0 to 58.0	48.7	Pass
Positive Moment Decay Time To Zero Crossing		msec	97.0 to 107.0	100.2	Pass
Overall Test Results					Pass


 Laboratory Technician

05/11/2006
 Test Date

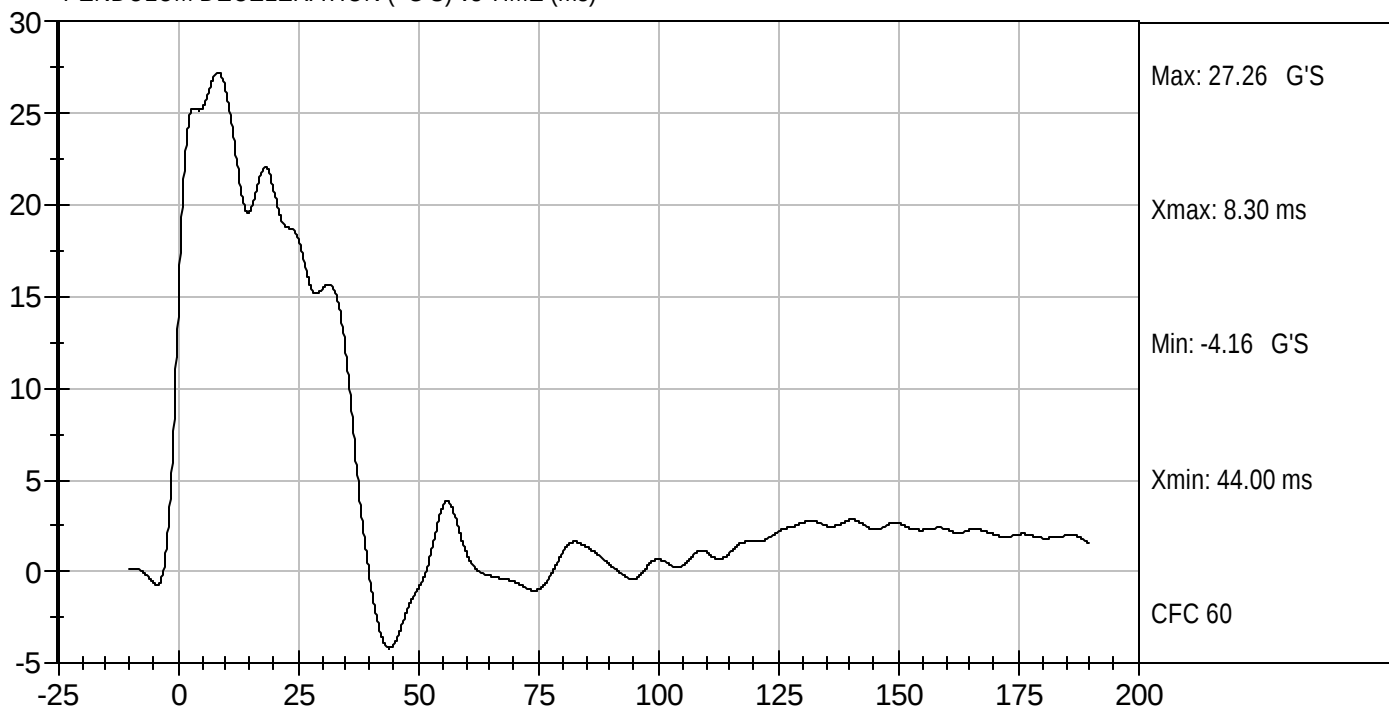

 Approved By



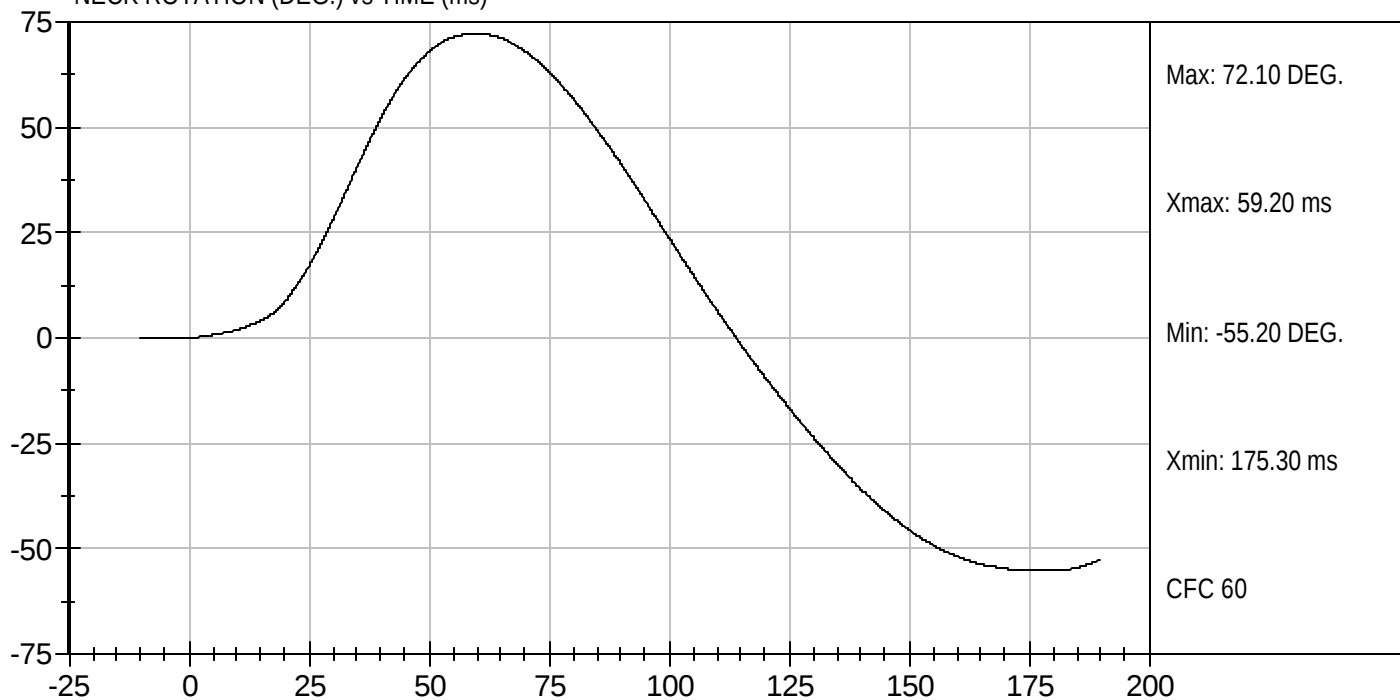
Test Desc: Neck Flexion
Componet ID: D061282

Test Date: 05/11/2006
Velocity: 23.26 ft/s, 7.09 m/s

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



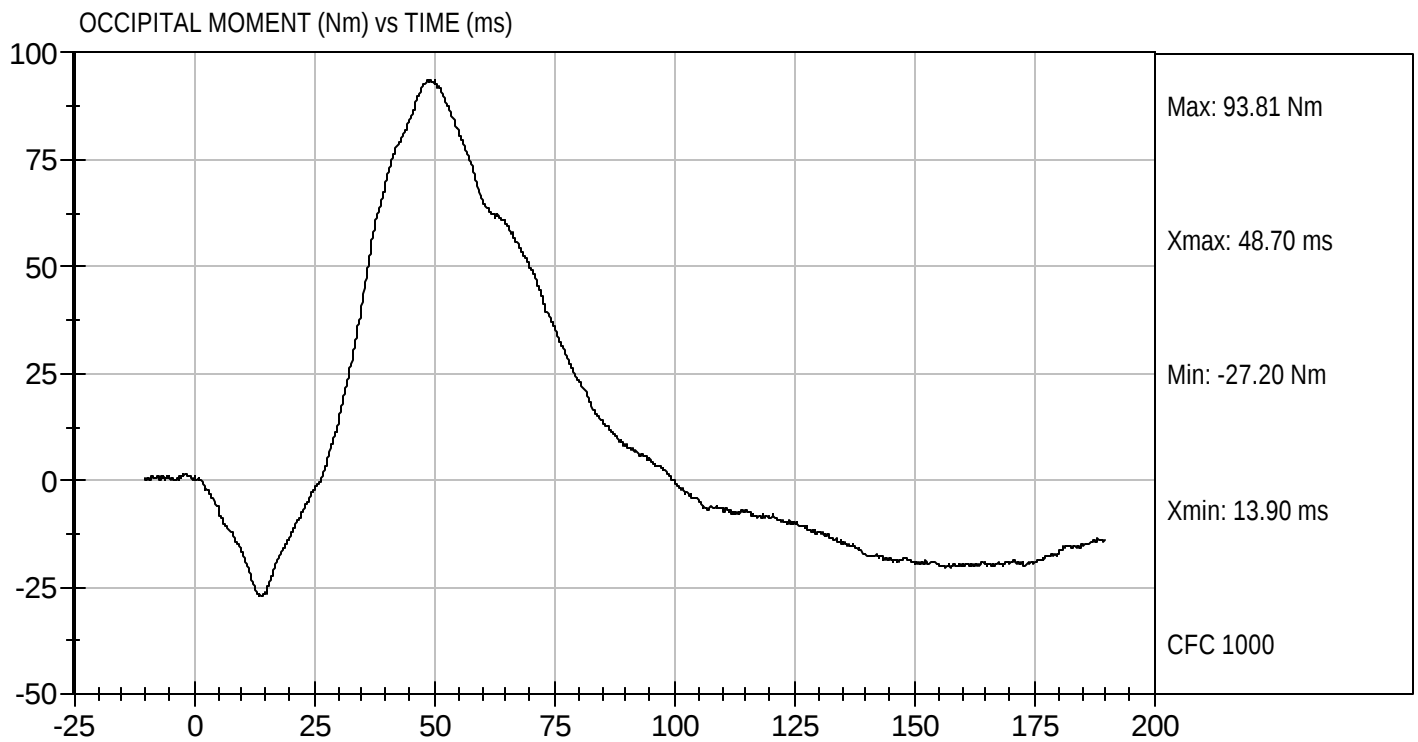
NECK ROTATION (DEG.) vs TIME (ms)





Test Desc: Neck Flexion
Componet ID: D061282

Test Date: 05/11/2006
Velocity: 23.26 ft/s, 7.09 m/s



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

ATD Serial No: 066

Test I.D: D061283

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity		%	10 to 70	47	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.14	Pass
Pendulum Deceleration	10 msec	G's	17.20 to 21.20	19.74	Pass
	20 msec	G's	14.00 to 19.00	17.82	Pass
	30 msec	G's	11.00 to 16.00	13.57	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 22.0	13.56	Pass
Deceleration Decay Time to Cross 5 G's		msec	38.0 to 46.0	40.4	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	101.1	Pass
	Time	msec	72.0 to 82.0	79.1	Pass
"D" Plane Rotation Decay Time To Zero Crossing		msec	147.0 to 174.0	155.0	Pass
Moment About Occipital Condyle	Maximum	N m	-52.9 to -79.9	-72.2	Pass
	Time	msec	65.0 to 79.0	72.0	Pass
Negative Moment Decay Time To Zero Crossing		msec	120.0 to 148.0	140.7	Pass
Overall Test Results					Pass


 Laboratory Technician

05/11/2006
 Test Date

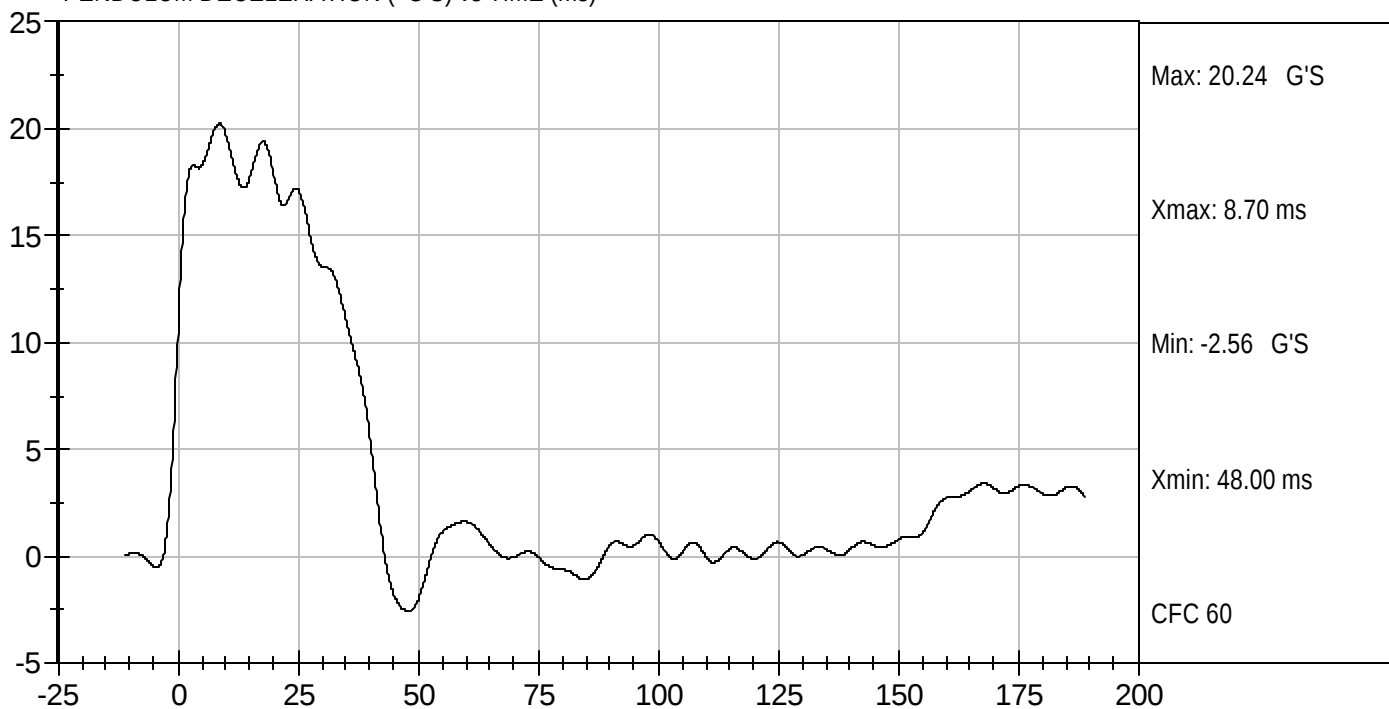

 Approved By



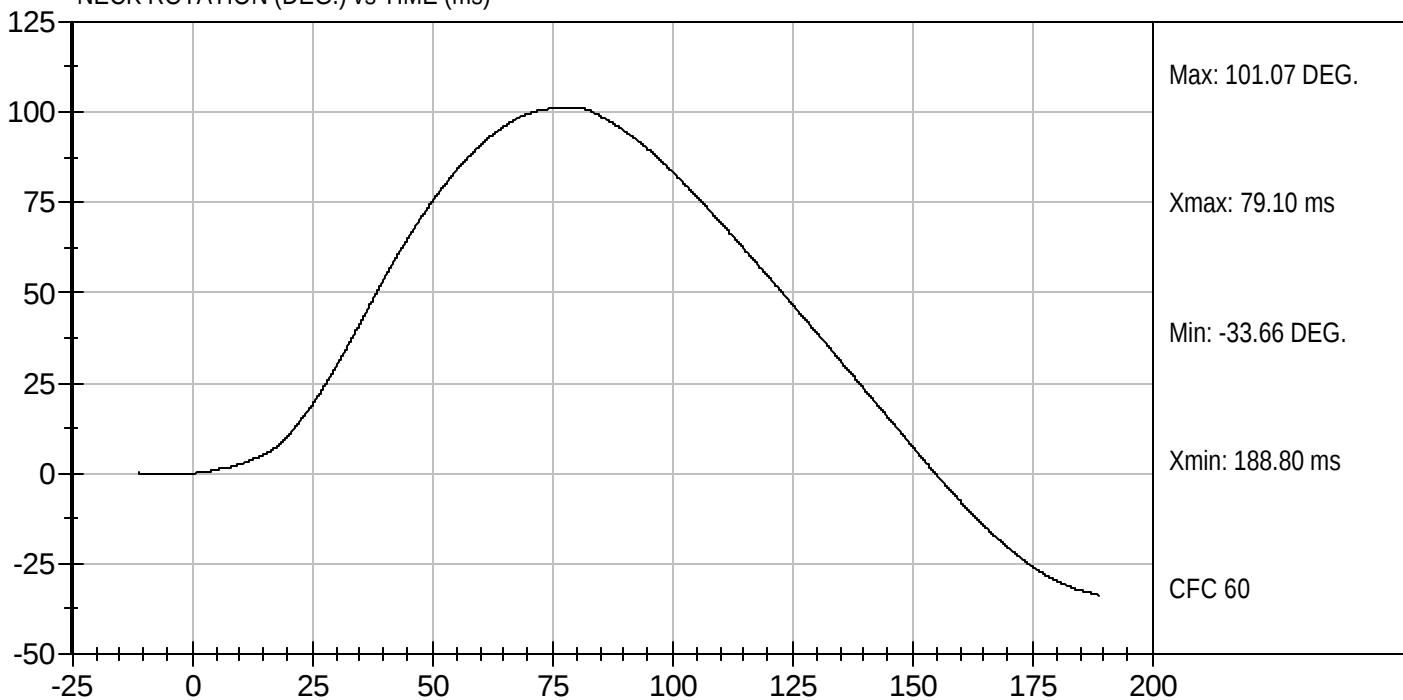
Test Desc: Neck Extension
Componet ID: D061283

Test Date: 05/11/2006
Velocity: 20.13 ft/s, 6.14 m/s

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



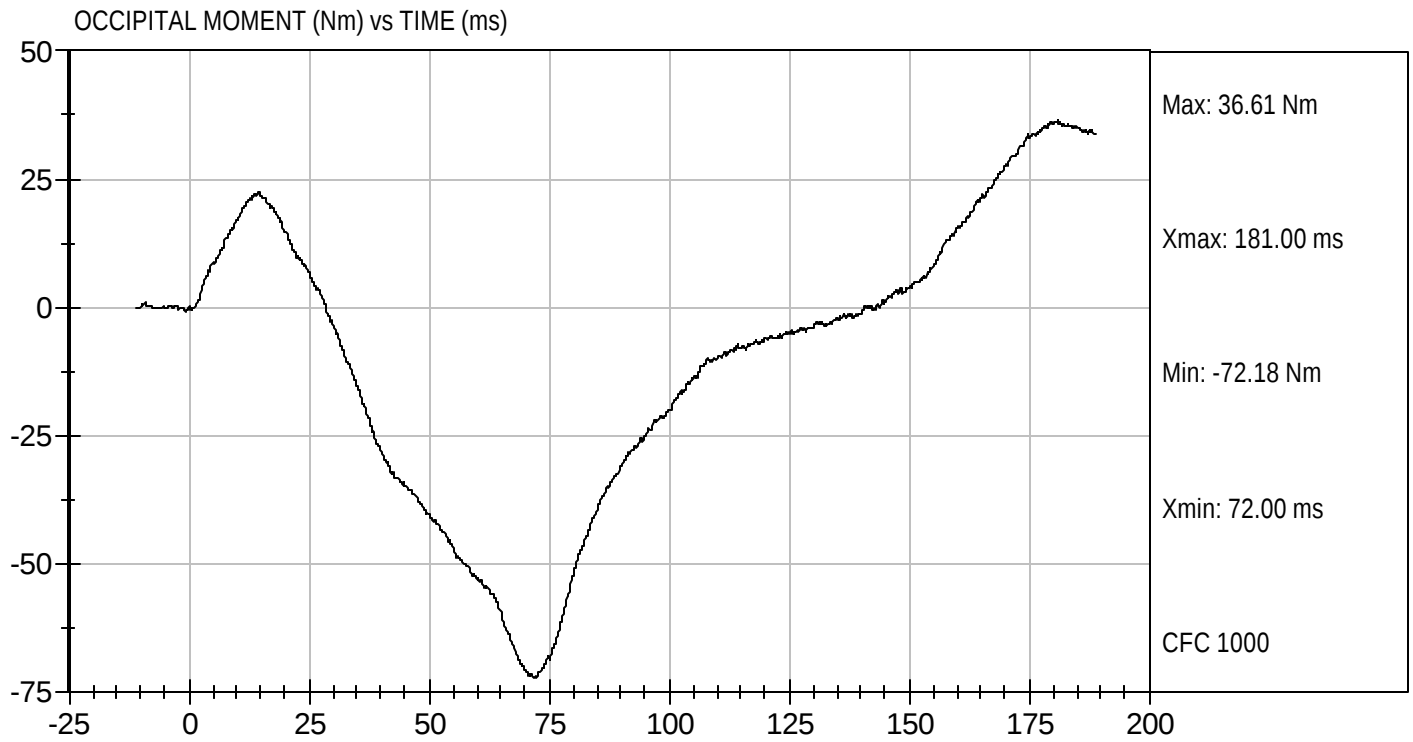
NECK ROTATION (DEG.) vs TIME (ms)





Test Desc: Neck Extension
Componet ID: D061283

Test Date: 05/11/2006
Velocity: 20.13 ft/s, 6.14 m/s



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 066

Test I.D: D061284

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	43	Pass
Probe Velocity	m/s	6.58 to 6.82	6.67	Pass
Peak Probe Force	N	5159 to 5893	5,499	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	7.08	Pass
Internal Hysteresis	%	69 to 85	69	Pass
			Overall Test Results	Pass


Laboratory Technician

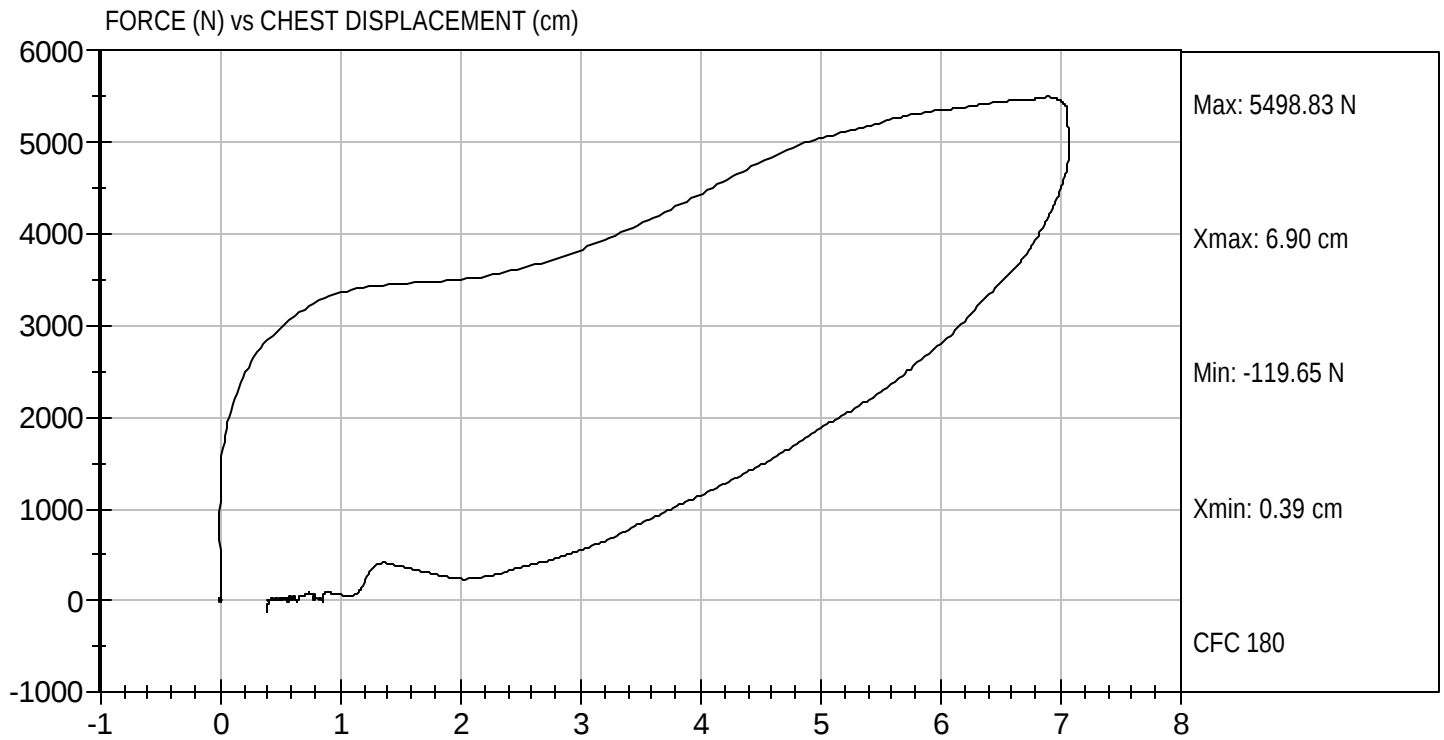

Approved By

05/11/2006
Test Date



Test Desc: Thorax Impact
Componet ID: D061284

Test Date: 05/11/2006
Velocity: 21.87 ft/s, 6.67 m/s



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

ATD Serial No: 066

Test I.D: D061285

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	48	Pass
Probe Velocity	m/sec	2.07 to 2.13	2.11	Pass
Peak Probe Force	Newtons	4715 to 5782	5,561	Pass
Overall Test Results				Pass


Laboratory Technician

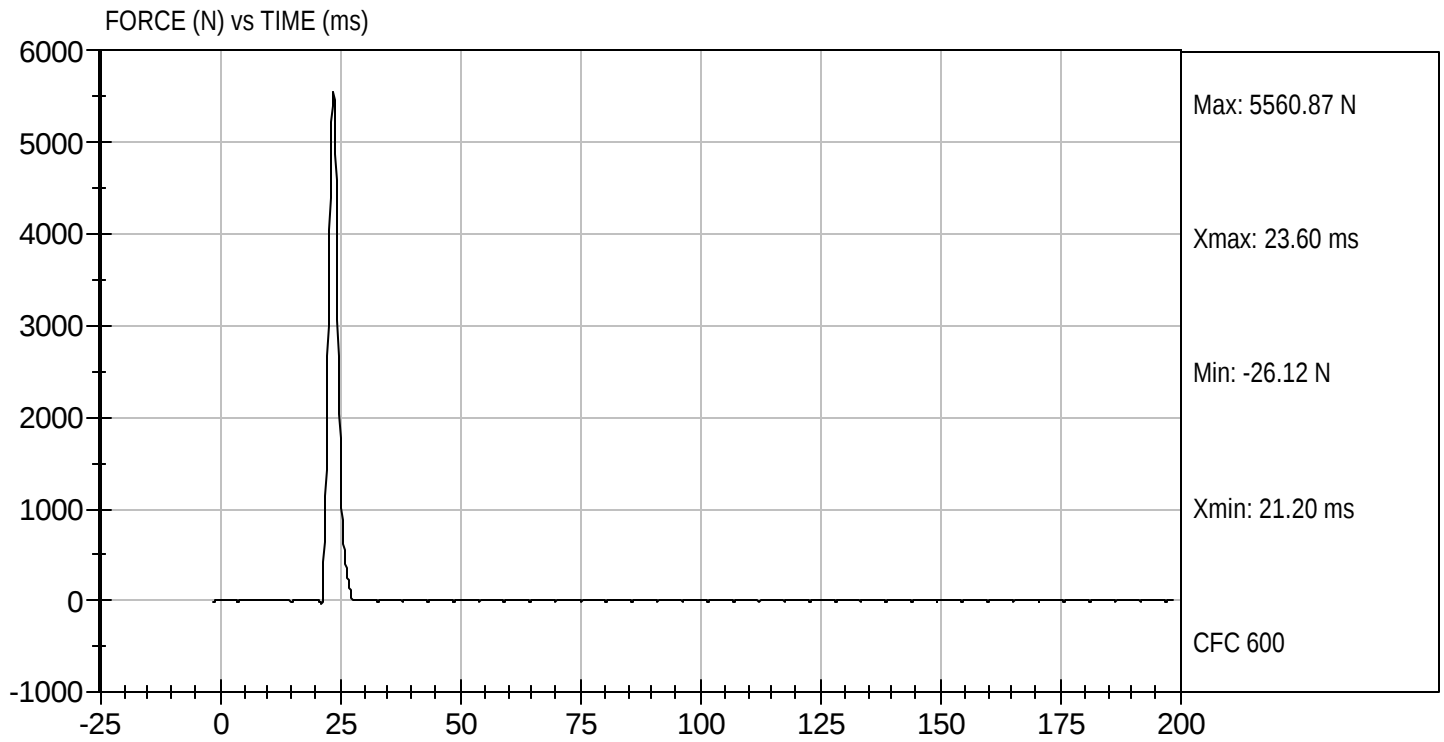

Approved By

05/11/2006
Test Date



Test Desc: Right Knee
Componet ID: D061285

Test Date: 05/11/2006
Velocity: 6.91 ft/s, 2.11 m/s



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

ATD Serial No: 066

Test I.D: D061286

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	48	Pass
Probe Velocity	m/sec	2.07 to 2.13	2.11	Pass
Peak Probe Force	Newtons	4715 to 5782	5,054	Pass
Overall Test Results				Pass


Laboratory Technician

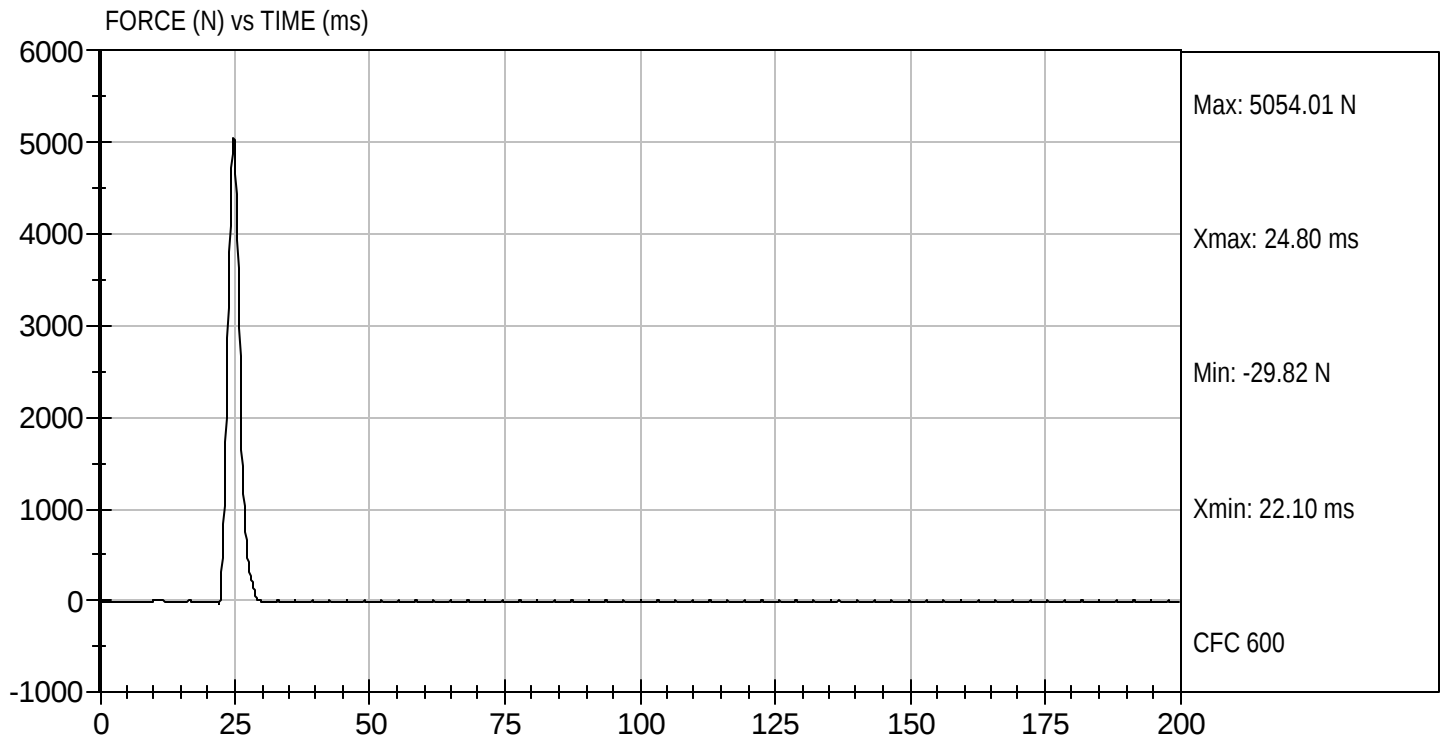

Approved By

05/11/2006
Test Date



Test Desc: Left Knee
Componet ID: D061286

Test Date: 05/11/2006
Velocity: 6.93 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: D061280

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.7	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	47	47	Pass
Rotation Rate	deg/sec	5 -10	8	8	Pass
30 Degrees	Nm	94.9 Nm Max	88.4	81.6	Pass
150 ft-lbf / 203.4 Nm	Deg	40- 50 Degree Max Rotation	43	42	Pass
Overall Test Results				Pass	


 Laboratory Technician

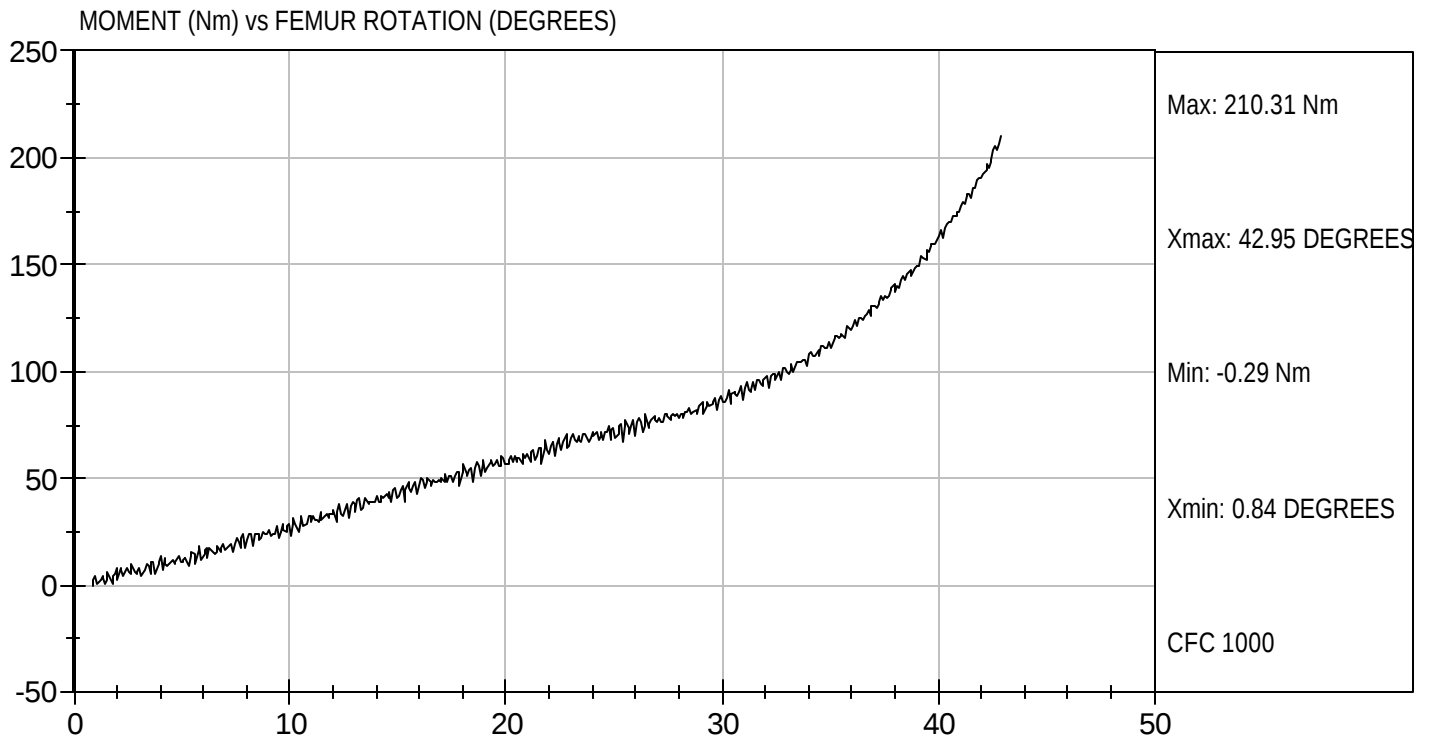
05/11/2006
 Test Date


 Approved By



Test Desc: Hip Femur Flexion
Componet ID: D061289

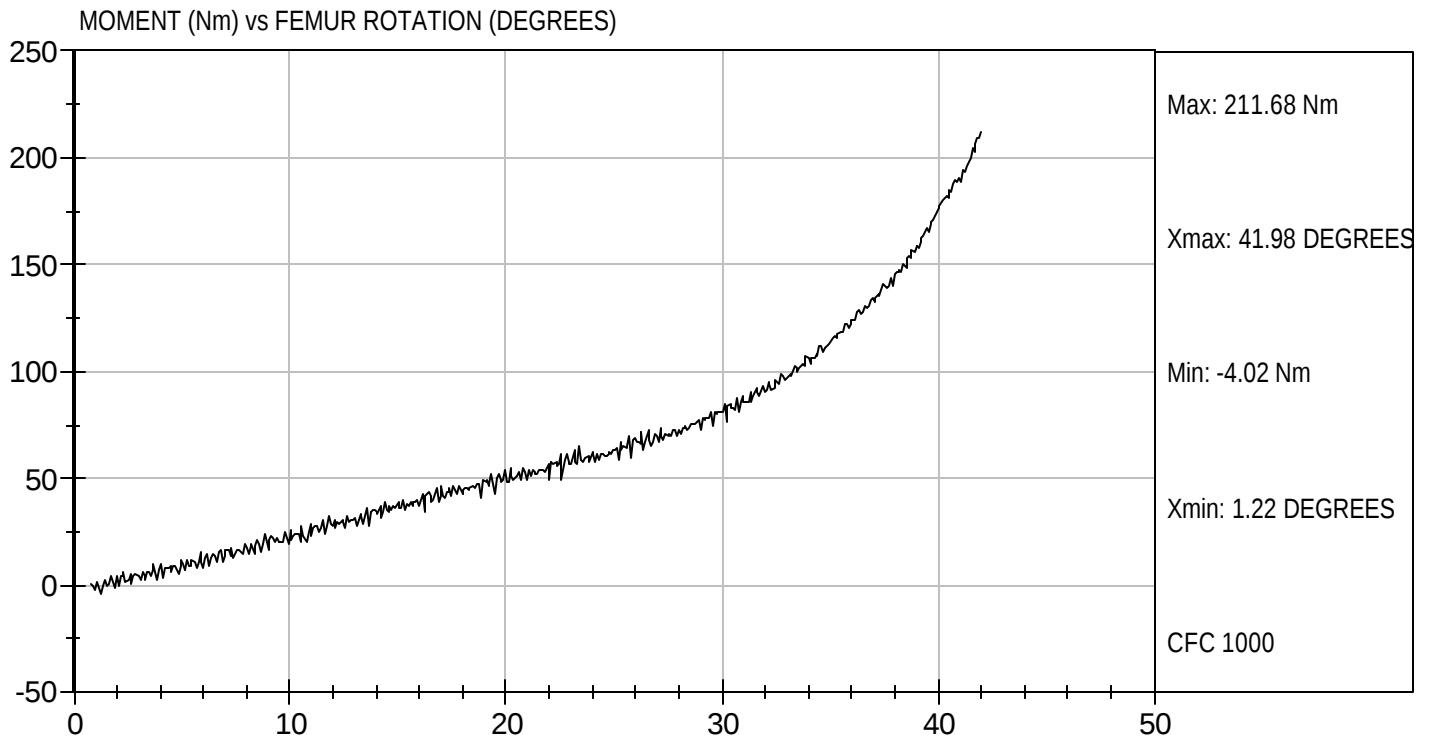
Test Date: 05/11/2006
Velocity: 0 ft/s, 0.00 m/s





Test Desc: Hip Femur Flexion
Componet ID: D061280

Test Date: 05/11/2006
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: D061271

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	44	Pass
Peak Resultant Acceleration	G's	225 - 275	230	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-7.8	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

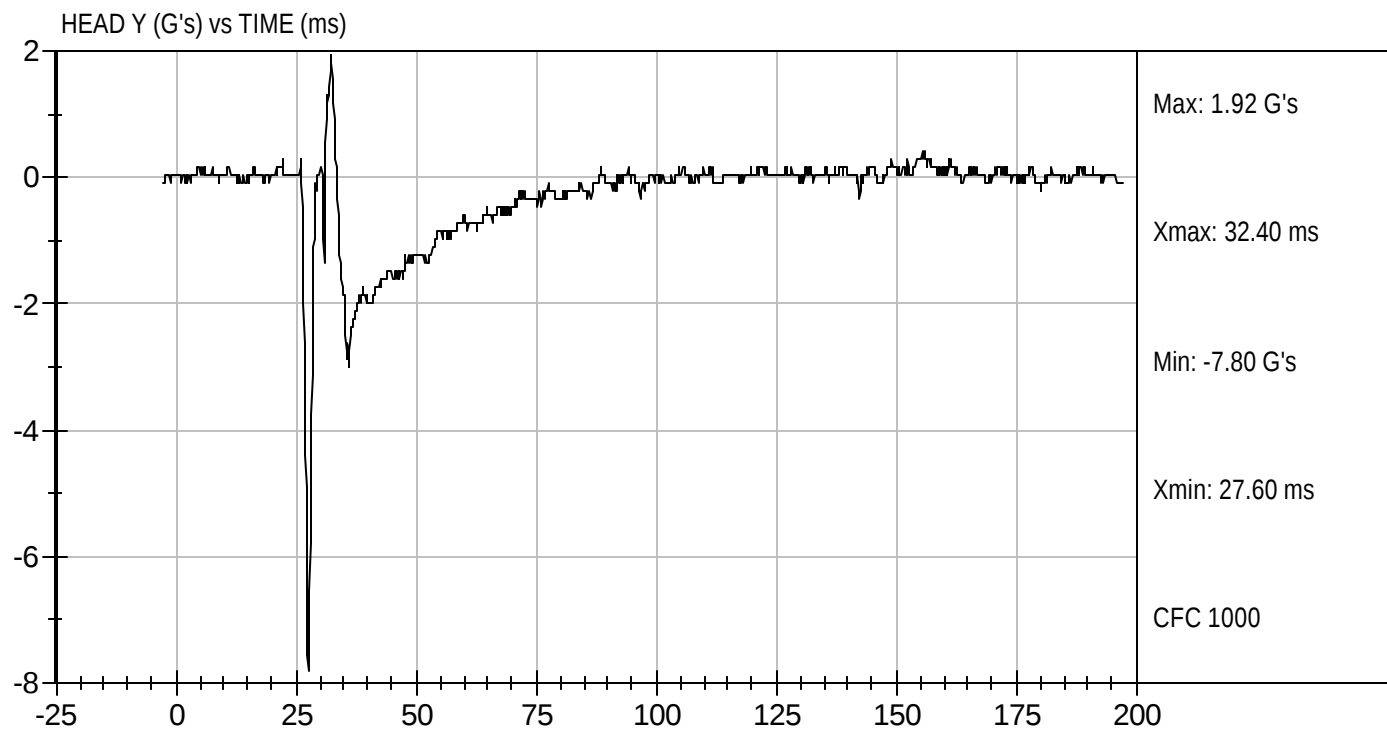
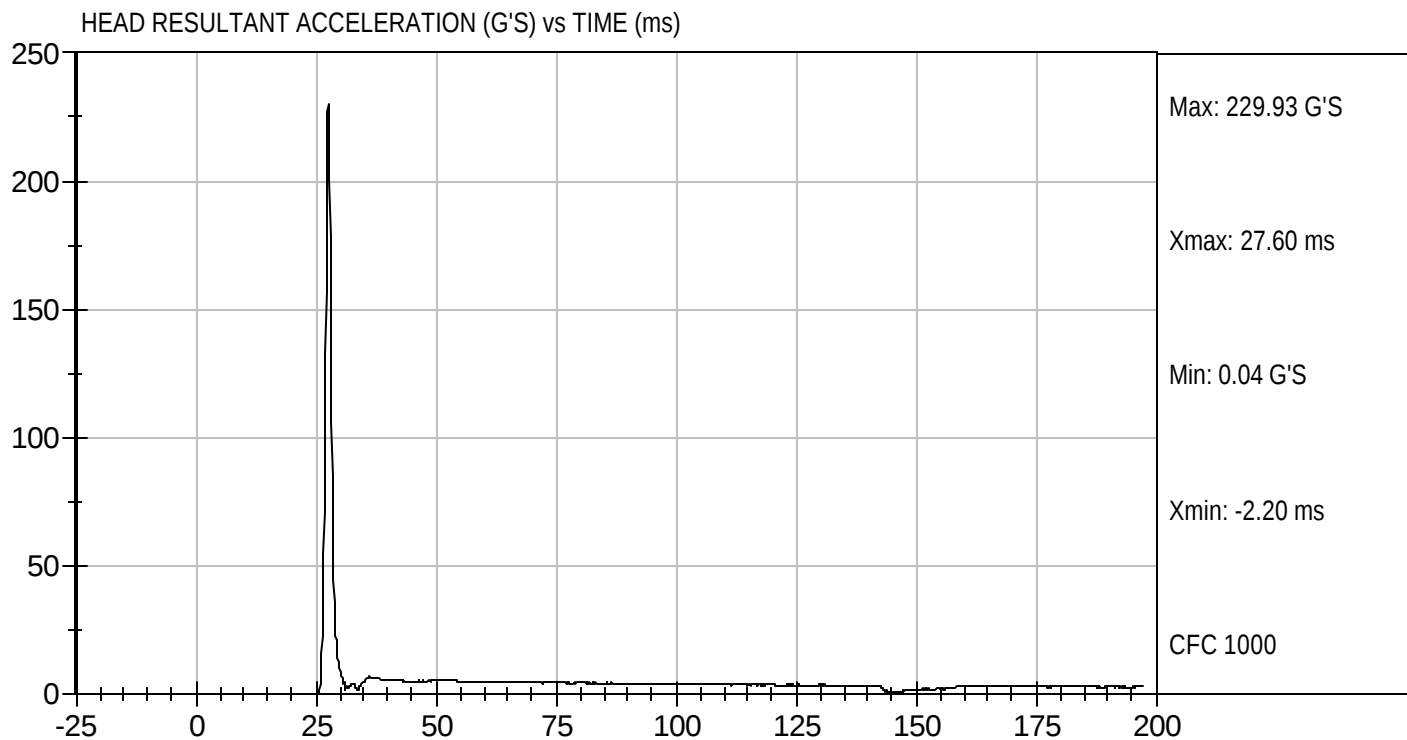

Approved By

05/10/2006
Test Date



Test Desc: Head Drop
Componet ID: D061271

Test Date: 05/10/2006
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: D061272

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity		%	10 to 70	47	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.01	Pass
Pendulum Deceleration	10 msec	G's	22.50 to 27.50	24.16	Pass
	20 msec	G's	17.60 to 22.60	20.87	Pass
	30 msec	G's	12.50 to 18.50	15.72	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 29.0	15.66	Pass
Deceleration Decay Time to Cross 5 G's		msec	34.0 to 42.0	36.7	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	72.6	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	114.3	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	90.3	Pass
	Time	msec	47.0 to 58.0	48.8	Pass
Positive Moment Decay Time To Zero Crossing		msec	97.0 to 107.0	103.8	Pass
Overall Test Results					Pass


 Laboratory Technician

05/11/2006
 Test Date

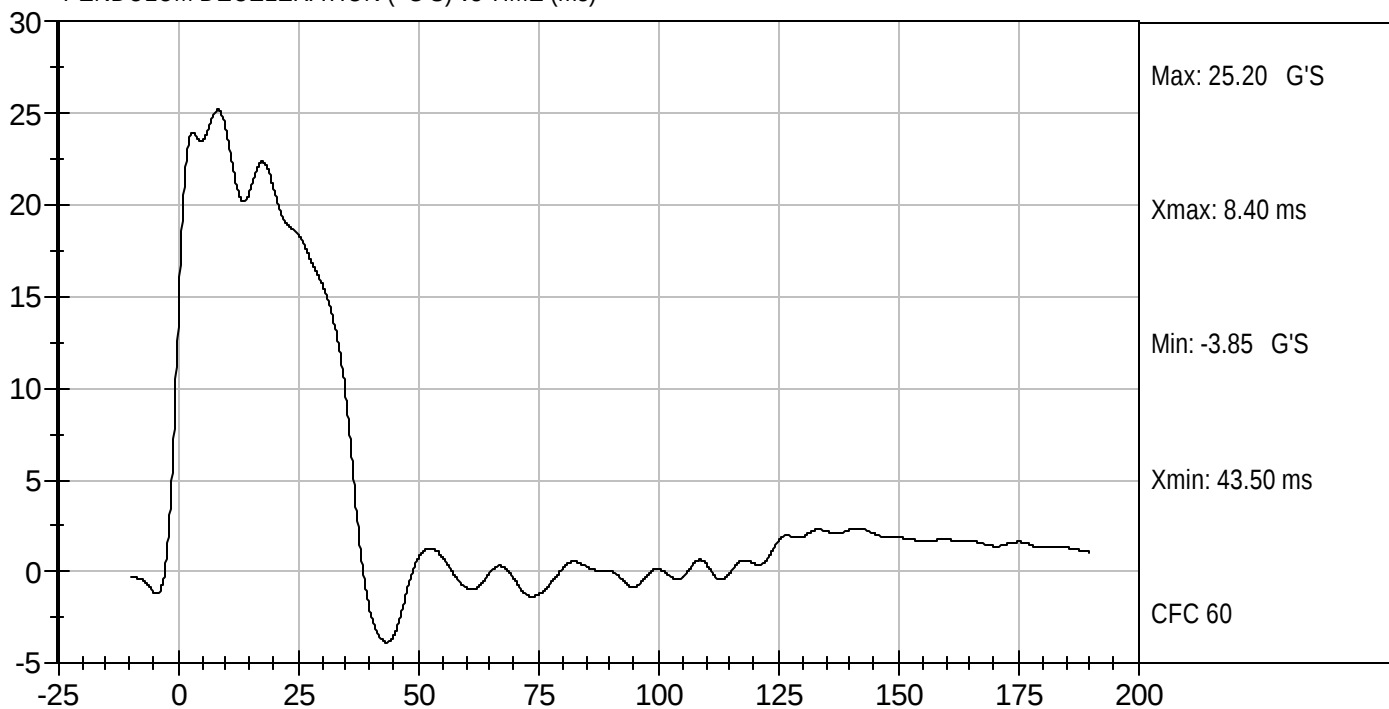

 Approved By



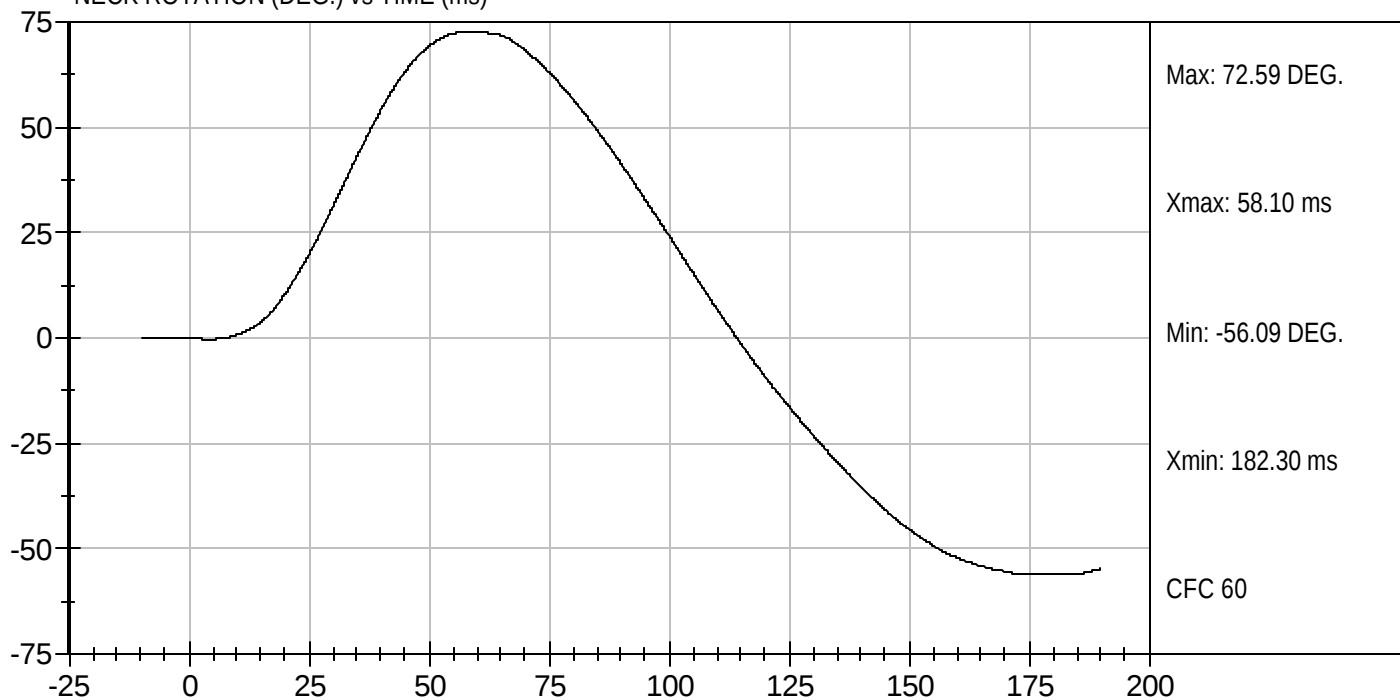
Test Desc: Neck Flexion
Componet ID: D061272

Test Date: 05/11/2006
Velocity: 22.99 ft/s, 7.01 m/s

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



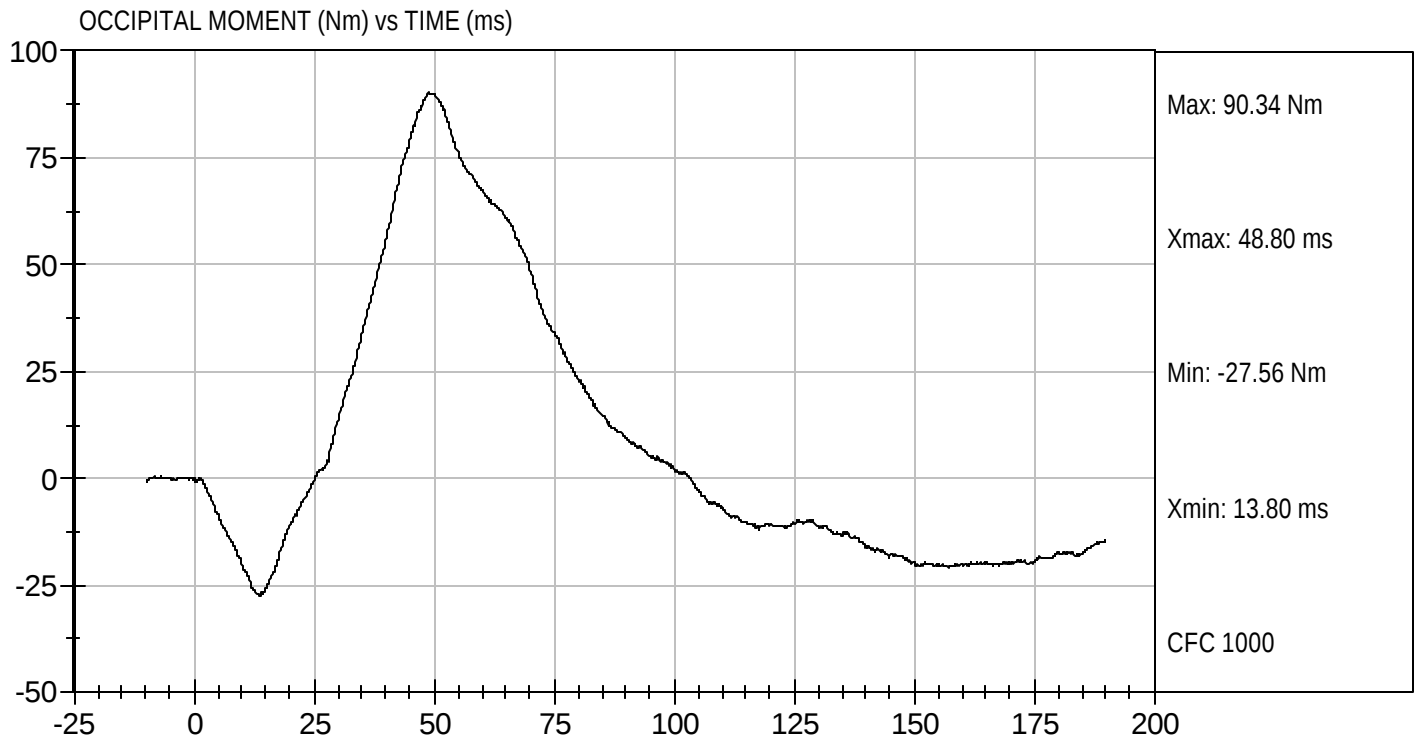
NECK ROTATION (DEG.) vs TIME (ms)





Test Desc: Neck Flexion
Componet ID: D061272

Test Date: 05/11/2006
Velocity: 22.99 ft/s, 7.01 m/s



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

ATD Serial No: 065

Test I.D: D061273

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity		%	10 to 70	46	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.14	Pass
Pendulum Deceleration	10 msec	G's	17.20 to 21.20	19.38	Pass
	20 msec	G's	14.00 to 19.00	17.18	Pass
	30 msec	G's	11.00 to 16.00	14.17	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 22.0	14.58	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	102.6	Pass
	Time	msec	72.0 to 82.0	78.4	Pass
"D" Plane Rotation Decay Time To Zero Crossing		msec	147.0 to 174.0	158.2	Pass
Moment About Occipital Condyle	Maximum	N m	-52.9 to -79.9	-73.3	Pass
	Time	msec	65.0 to 79.0	72.4	Pass
Negative Moment Decay Time To Zero Crossing		msec	120.0 to 148.0	145.6	Pass
Overall Test Results				Pass	


 Laboratory Technician

05/11/2006
 Test Date

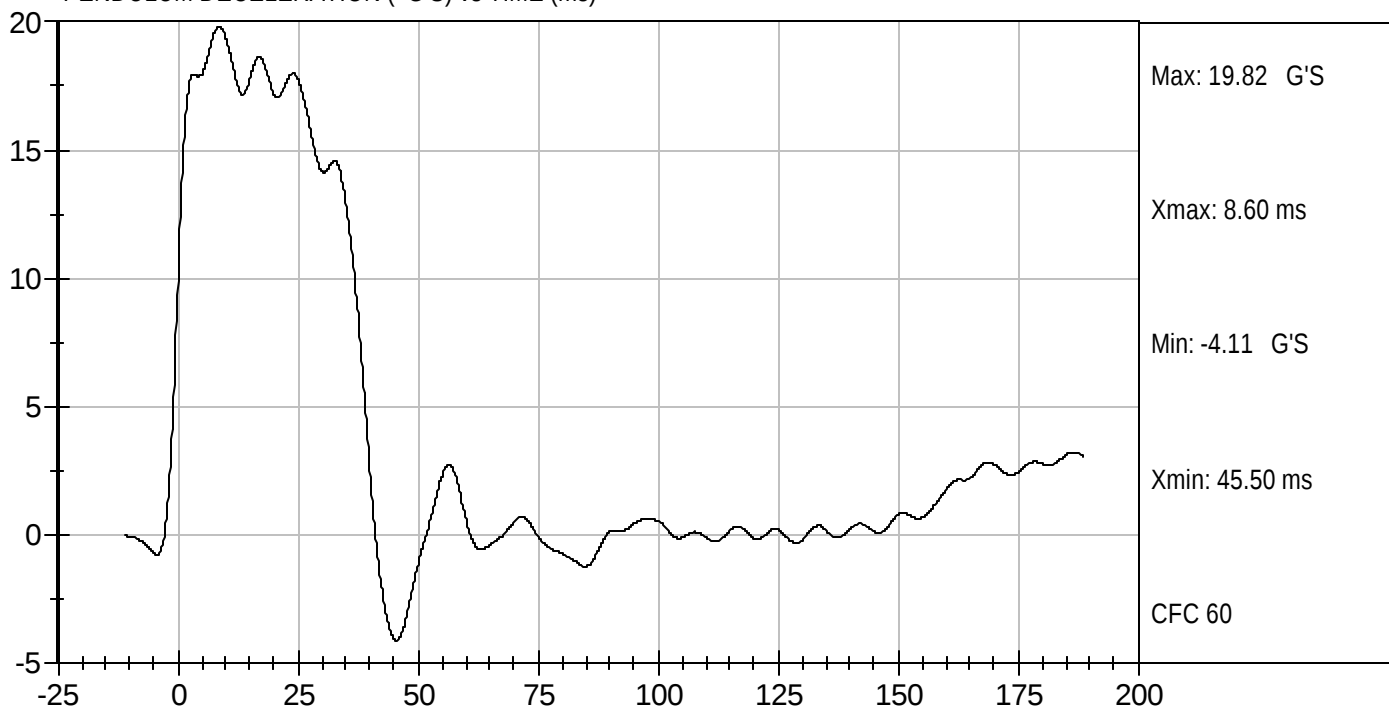

 Approved By



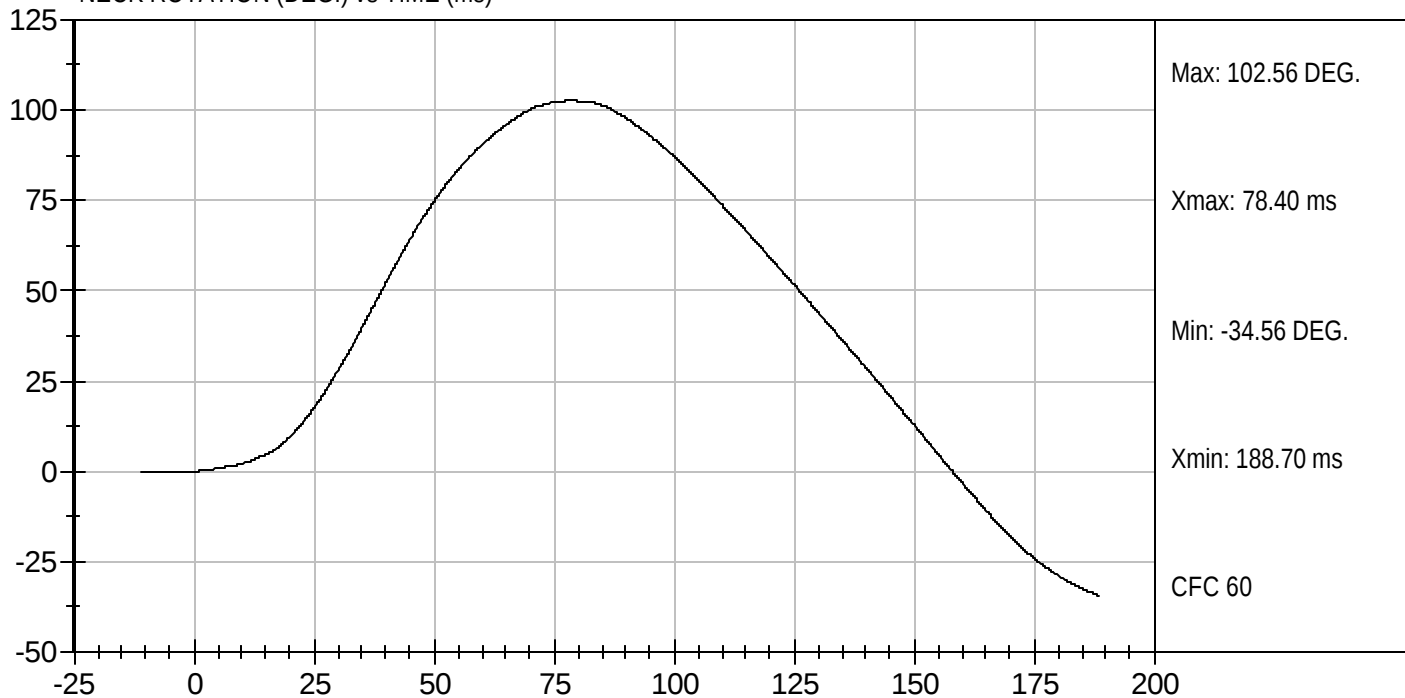
Test Desc: Neck Extension
Componet ID: D061273

Test Date: 05/11/2006
Velocity: 20.14 ft/s, 6.14 m/s

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



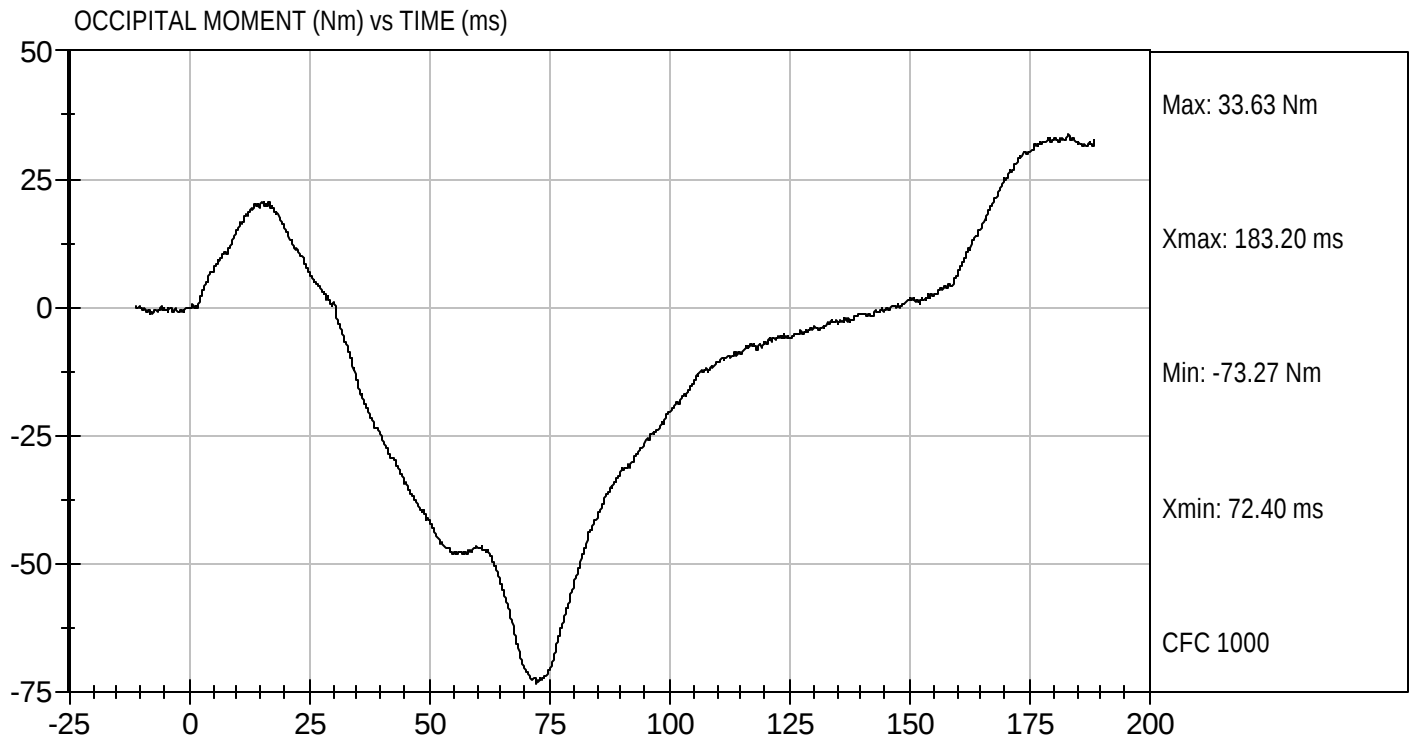
NECK ROTATION (DEG.) vs TIME (ms)





Test Desc: Neck Extension
Componet ID: D061273

Test Date: 05/11/2006
Velocity: 20.14 ft/s, 6.14 m/s



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 065

Test I.D: D061274

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	44	Pass
Probe Velocity	m/s	6.58 to 6.82	6.66	Pass
Peak Probe Force	N	5159 to 5893	5,754	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	7.10	Pass
Internal Hysteresis	%	69 to 85	71	Pass
			Overall Test Results	Pass


Laboratory Technician

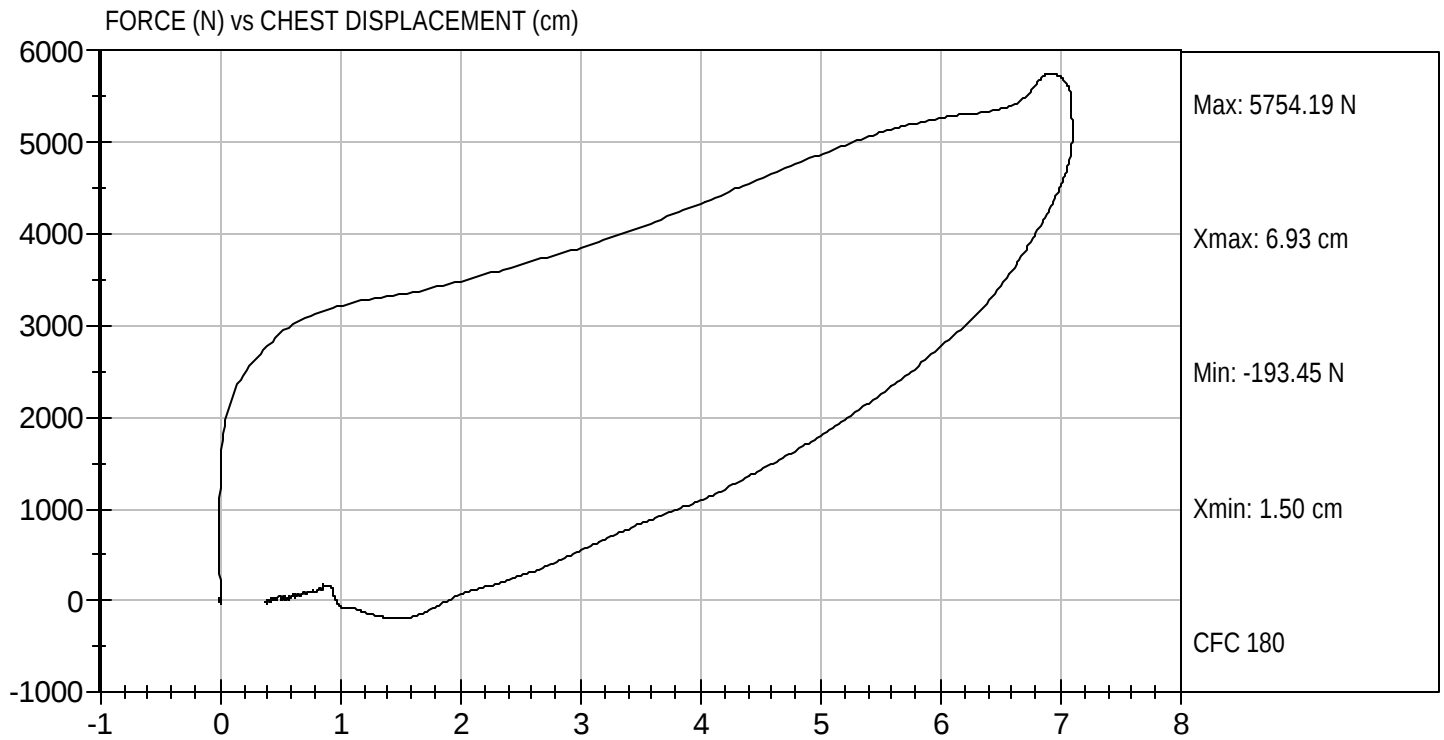

Approved By

05/11/2006
Test Date



Test Desc: Thorax Impact
Componet ID: D061274

Test Date: 05/11/2006
Velocity: 21.85 ft/s, 6.66 m/s



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

ATD Serial No: 065

Test I.D: D061275

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	48	Pass
Probe Velocity	m/sec	2.07 to 2.13	2.12	Pass
Peak Probe Force	Newtons	4715 to 5782	5,317	Pass
Overall Test Results				Pass


Laboratory Technician

05/11/2006

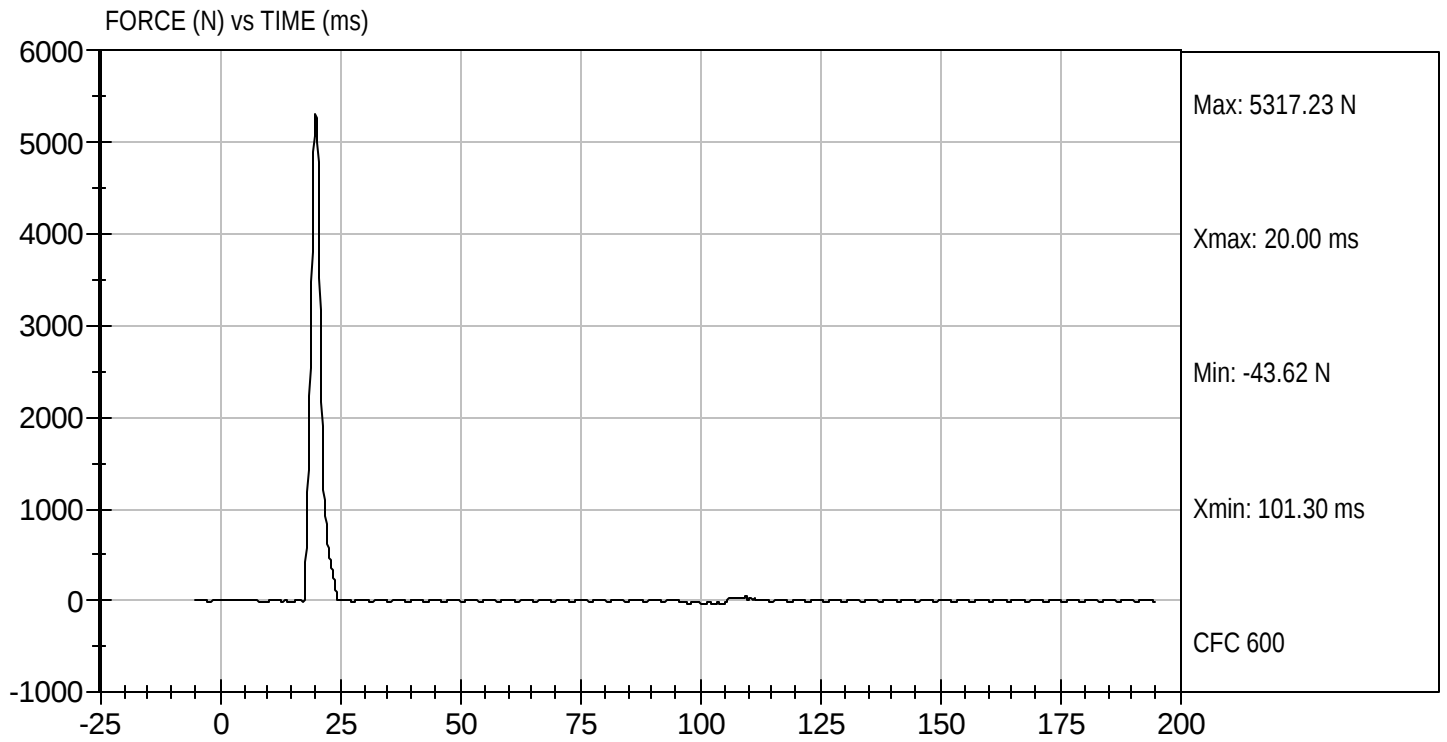
Test Date


Approved By



Test Desc: Right Knee
Componet ID: D061275

Test Date: 05/11/2006
Velocity: 6.94 ft/s, 2.12 m/s



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

ATD Serial No: 065

Test I.D: D061276

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	48	Pass
Probe Velocity	m/sec	2.07 to 2.13	2.08	Pass
Peak Probe Force	Newtons	4715 to 5782	5,699	Pass
Overall Test Results				Pass


Laboratory Technician

05/11/2006

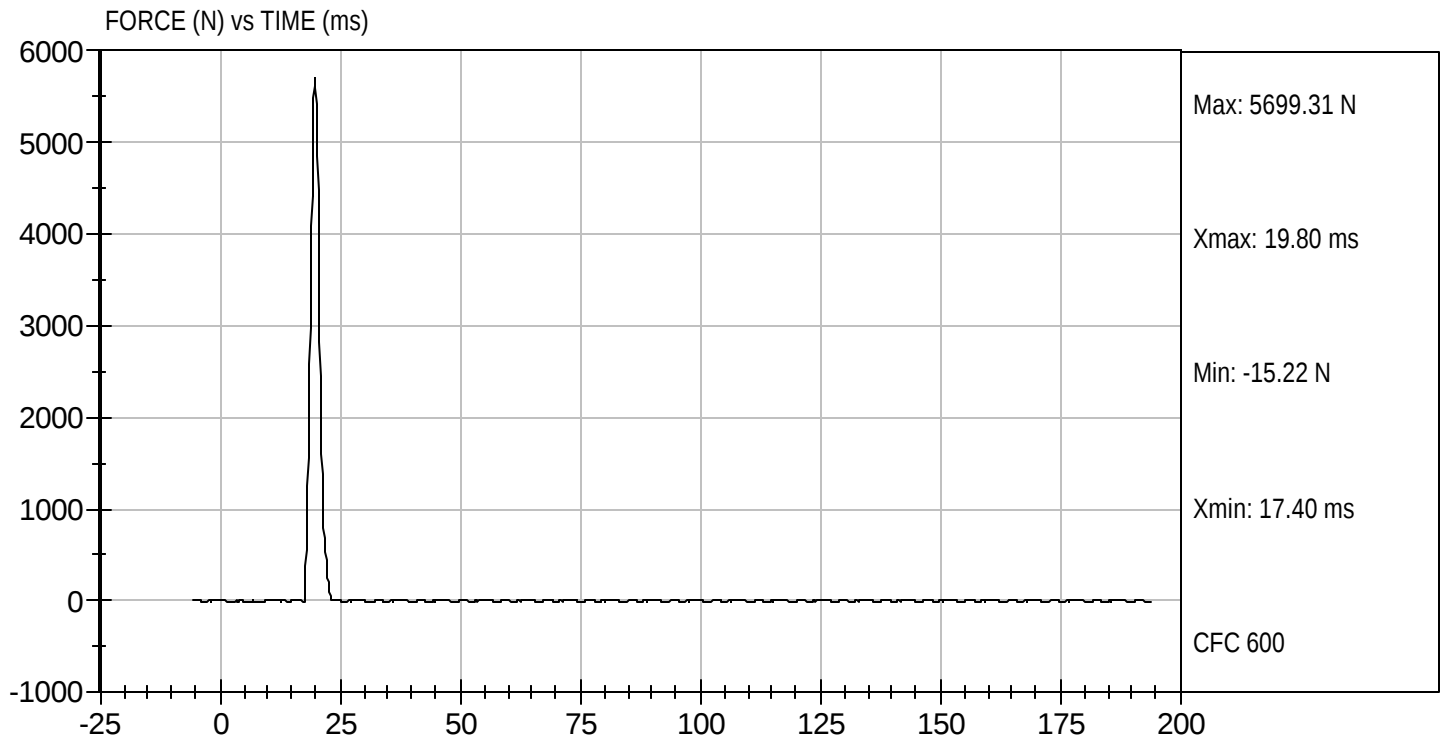
Test Date


Approved By



Test Desc: Left Knee
Componet ID: D061276

Test Date: 05/11/2006
Velocity: 6.82 ft/s, 2.08 m/s



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

ATD Serial No: 065

Test I.D: D061270

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.6	21.6	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	83.6	75.4	Pass
150 ft-lbf / 203.4 Nm	Deg	40- 50 Degree Max Rotation	43	43	Pass
Overall Test Results				Pass	


 Laboratory Technician

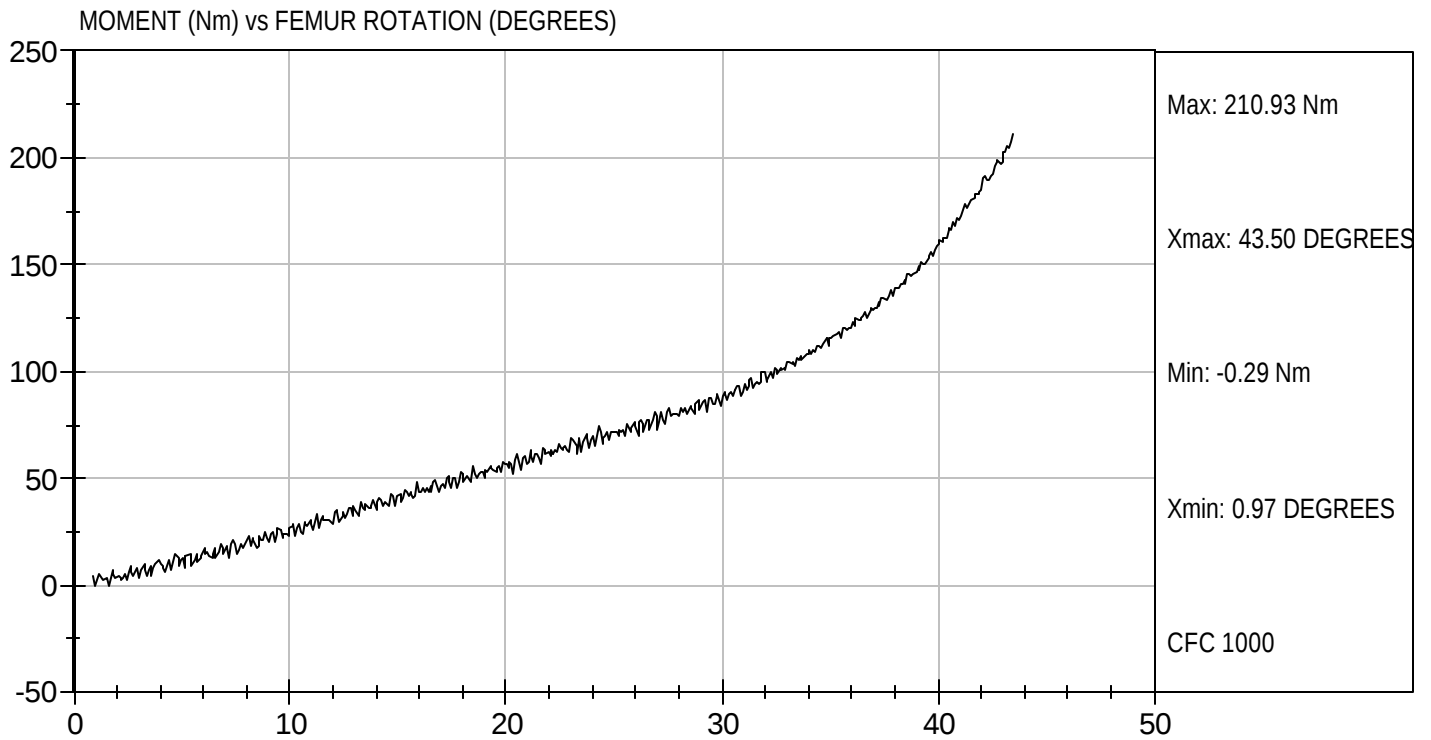
05/11/2006
 Test Date


 Approved By



Test Desc: Hip Femur Flexion
Componet ID: D061279

Test Date: 05/11/2006
Velocity: 0 ft/s, 0.00 m/s





Test Desc: Hip Femur Flexion
Componet ID: D061270

Test Date: 05/11/2006
Velocity: 0 ft/s, 0.00 m/s

