REPORT NUMBER: NCAP-MGA-2006-006

NEW CAR ASSESSMENT PROGRAM
FRONTAL BARRIER IMPACT TEST

GENERAL MOTORS CORPORATION
2006 CHEVROLET TRAILBLAZER EXT
NHTSA NUMBER: M60121

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

Test Date: December 12, 2005

Final Report Date: January 10, 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

This final test report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, in response to Contract Number DTNH22-01-D-12005.

Prepared by: Kristin L. Ebert Date: 1/10/06
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David Winkelbauer, Facility Director

Technical Report Documentation Page

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15. Supplementary Notes			

16. Abstract

A frontal barrier impact was conducted on a 2006 Chevrolet Trailblazer EXT at MGA Research Corporation on December 12, 2005. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and foot well intrusion performance. The impact velocity was 56.6 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 481 mm located at the left side 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:

Measurement Description	Units	Threshold	Driver ATD	Pass. ATD
Head Injury Criteria (HIC)	N/A	1000	590.5	598.5
Max. Thorax Accel. (3ms Clip)	G's	60	53.4	44.2
Left Femur Force	Newton	10009	-5445	-4159
Right Femur Force	Newton	10009	-6210	-3070

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Form DOT F1700.7 (8-72)

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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 2006 Chevrolet Trailblazer EXT at a velocity of 56.6 kph. The test was performed at MGA Research Corporation on December 12, 2005. 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. 065) and right-front passenger (position 2) ATD (Serial No. 066) were calibrated previous to this test. Certification details, along with instrumentation calibration data, are found in Appendix C.

The 102 channels of data were recorded on an on-board data acquisition system. Appendix B contains the dummy head, chest, and femur response data traces.

There was 100 percent windshield retention and no intrusion into the protected zone of the windshield during the event. There was no Stoddard Solvent leakage after the event or during any phase of the static rollover.

The maximum static crush of the vehicle was 481 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, chest, and abdomen contacted the airbag. The driver's head also contacted the headrest. The driver's left knee contacted the steering column and both knees contacted the bolster. The passenger's head and chest contacted the airbag. The passenger's head also contacted the headrest. The passenger's knees contacted the glove box.

The occupant data is summarized below:

ATD position	HIC	T^1	T^2	Clip (g)	T^1	T^2	Chest Disp. (mm)	Left Femur (N)	Right Femur (N)
Driver	590.5	55.1	91.1	53.4	63.5	66.5	-36.6	-5445	-6210
Passenger	598.5	63.1	99.1	44.2	72.1	75.1	*	-4159	-3070

***No valid data for Passenger Chest Displacement after 60msec**

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

TEST NOTES

No valid data was collected for the following:

Driver Right Ankle Z – after 236msec
Passenger Chest Displacement – after 60msec
Top of Engine X – after 40msec
Bottom of Engine X – after 14msec
Right Rear Seat Crossmember – after 200msec

The Instrument Panel X Accelerometer was not used for this test at the request of the NHTSA.

SECTION 2

OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

DATA SHEET NO. 1

CRASH TEST SUMMARY

Test Vehicle: 2006 Chevrolet Trailblazer EXT NHTSA No.: M60121
Test Program: 35mph Frontal Impact Test Date: 12/12/2005

DOOR OPENING AND SEAT TRACK INFORMATION

Description	Driver	Passenger
Locked/Unlocked Doors	Doors were unlocked	Doors were unlocked
Front Door Opening	Door remained closed and latched; Door opened without tools	Door remained closed and latched; Door opened without tools
Rear Door Opening	Door remained closed and latched; Door opened without tools	Door remained closed and latched; Door opened without tools
Seat Track Shift (mm)	0	0
Seat Back Failure	None	None
Glazing Damage	The windshield cracked	

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	98
Center	mm	35
Right Side	mm	0
Average	mm	44

BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Shoulder belt length as measured on ATD	mm	938	905
Lap belt length as measured on ATD	mm	659	662
Remainder of belt on reel	mm	953	962
Total belt length for continuous webbing systems	mm	2550	2529

DATA SHEET NO. 2

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2006 Chevrolet Trailblazer EXT NHTSA No.: M60121
Test Program: 35mph Frontal Impact Test Date: 12/12/2005

TEST VEHICLE INFORMATION

Manufacturer	General Motors
Model	Trailblazer EXT
Body Style	SUV
NHTSA No.	M60121
VIN	1GNET16S966102664
Color	Red
Delivery Date	12/2/05
Odometer Reading (mile)	189
Dealer	Boucher Chevrolet
Transmission	Automatic
Final Drive	Rear
Number of Cylinders	6
Engine Displacement (L)	4.2
Engine Placement	Longitudinal
Automatic Door Lock (ADL)	Yes
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	No
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
Traction Control	Yes
All Wheel Drive	No
Power Seats	Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	General Motors Corporation
Date of Manufacture	07/05

GVWR (kg)	2903
GAWR Front (kg)	1452
GAWR Rear (kg)	1542

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Split Bench	Split Bench	
Number of Occupants	2	3	2	7
Capacity Wt. (VCW) (kg)				631
Cargo Wt. (RCLW) (kg)				136.1

DATA SHEET NO. 2... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2006 Chevrolet Trailblazer EXT NHTSA No.: M60121
Test Program: 35mph Frontal Impact Test Date: 12/12/2005

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	613.3	539.8		640.9	656.3	
Right	kg	605.5	523.0		632.8	637.8	
Ratio	%	53.4	46.6		49.6	50.4	
Totals	kg	1218.8	1062.8	2281.6	1273.7	1294.1	2567.8

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	2281.6
Weight of 2 P572E ATDs	kg	156.0
Rated Cargo/Luggage Weight (RCLW)	kg	136.1
Calculated Vehicle Target Weight (TVTW)	kg	2573.7

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG(aft of front axle)
As Delivered	mm	838	843	877	880	1529
As Tested	mm	835	838	843	845	1654
Post Test	mm	857	883	847	855	

Vehicle Wheelbase (mm): 3282

Weight of Ballast secured in cargo area (kg): 104.3

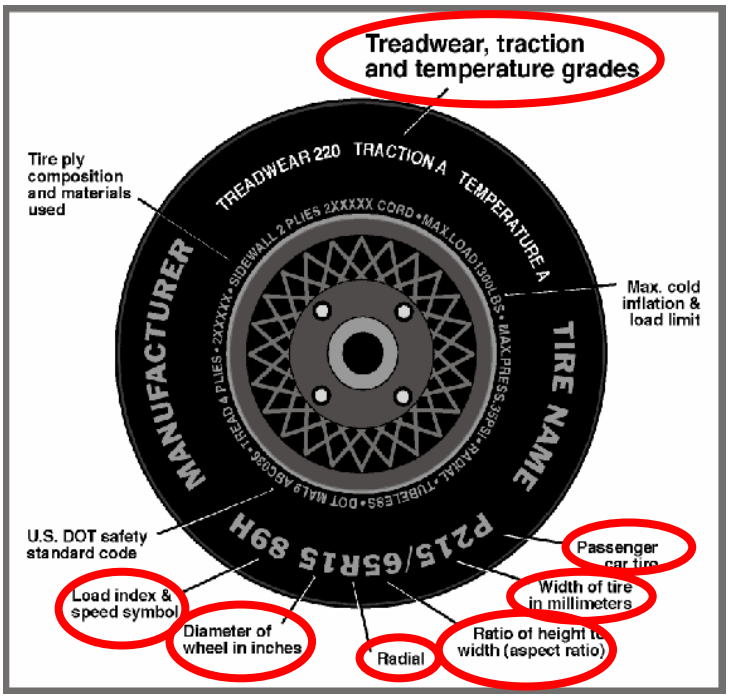
Vehicle Components Removed: None

Ballast weight does not include instrumentation and data acquisition system.

DATA SHEET NO. 3

TEST VEHICLE TIRE INFORMATION

Test Vehicle: 2006 Chevrolet Trailblazer EXT NHTSA No.: M60121
Test Program: 35mph Frontal Impact Test Date: 12/12/2005



DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Pressure (max)	210	240
Recommended Tire Size	P245/65R17	P245/65R17
Tire size on Vehicle	P245/65R17	P245/65R17
Tire Manufacturer	Continental	Continental
Tire Name	Contitrac TR	Contitrac TR
Tire Type	M+S	M+S
Tire Width (mm)	245	245
Ratio of Height to Width (aspect ratio)	65	65
Radial	R	R
Wheel Diameter	17	17
Load Index & Speed Symbol	105S	105S
Treadwear	520	520
Traction Grade	A	A
Temperature Grade	B	B

DATA SHEET NO. 4

TEST VEHICLE INFORMATION

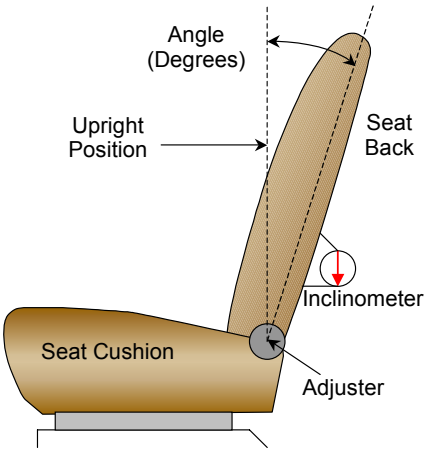
Test Vehicle: 2006 Chevrolet Trailblazer EXT NHTSA No.: M60121
Test Program: 35mph Frontal Impact Test Date: 12/12/2005

NORMAL DESIGN RIDING POSITION

The driver and passenger seat back is positioned to the manufacturer's designated angle. The procedure is as follows: Cut seat back to expose metal frame approximately 9-10 inches above the seat back pivot point near the outboard edge. Place inclinometer on metal frame and adjust seat back to 18.5 degrees. Measure without the dummy in the seat and again with the dummy in the seat (adjust seat back angle if needed to achieve 18.5 degrees).

Driver seat back angle: 18.5 on outboard metal seat frame

Passenger seat back angle: 18.1 on outboard metal seat frame



FRONT SEAT ASSEMBLY

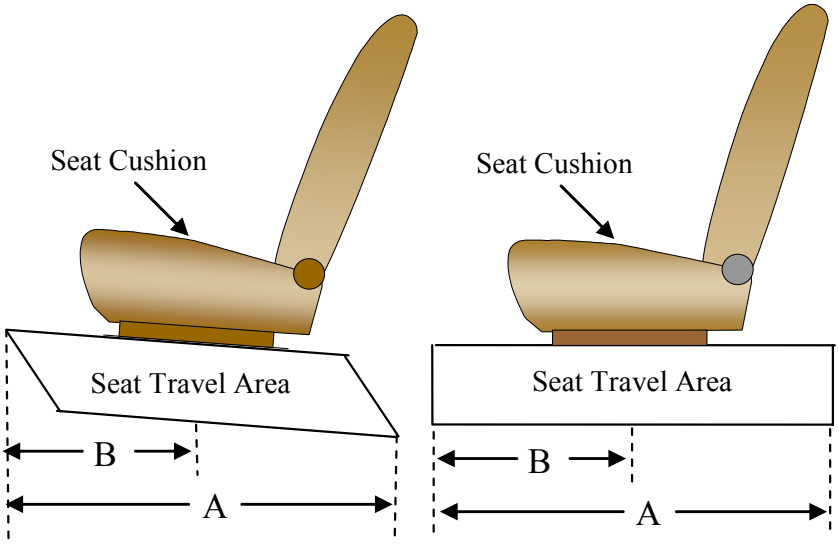
SEAT FORE/AFT POSITIONING

	Total Fore/Aft Travel	Placed in position #
Driver Seat	230mm*	115 of 230mm
Passenger Seat	220mm/23 detents	110mm/ 12th (1st as 1)

*Form 1 stated that the driver total seat travel was 220mm.
GM confirmed that by using the Trapezoid method,
the correct total seat travel for the driver is in fact 230mm.

ADJUSTABLE D-RING POSITION

The vehicle did not contain any D-Rings



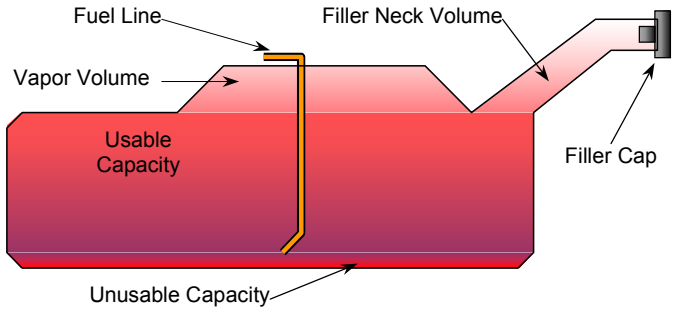
DATA SHEET NO. 4…(CONTINUED)
TEST VEHICLE INFORMATION

Test Vehicle: 2006 Chevrolet Trailblazer EXT NHTSA No.: M60121
Test Program: 35mph Frontal Impact Test Date: 12/12/2005

FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	96.1
Usable Capacity of "Optional" Tank	
92-94% of Usable Capacity	88.4 to 90.3
Actual Amount of Solvent used	90.1
1/3 of Usable Capacity	32.0

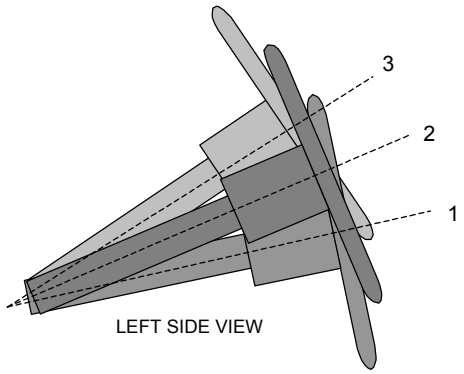
The test vehicle is equipped with an electric fuel pump that normally operates when the vehicle's electrical system is activated. The fuel pump will pump fuel when the engine is running.



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		11.5
Geometric center position No. 2		23.9
Uppermost position No. 3		36.2
Test Position		21.0

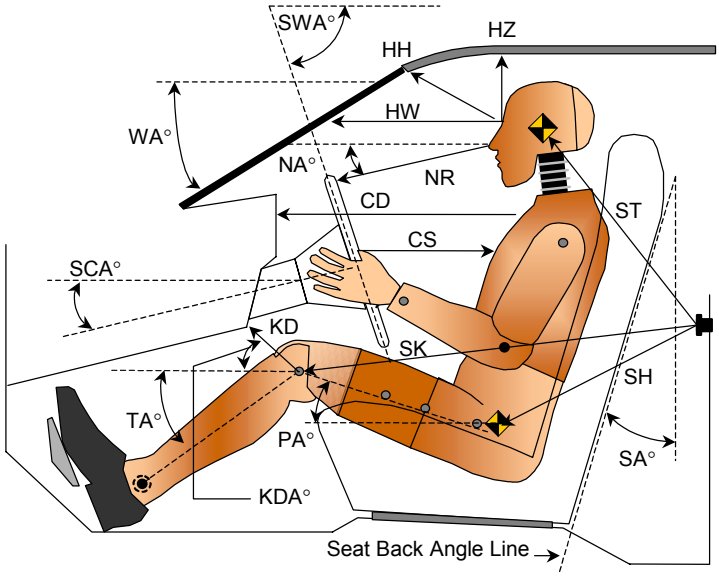
The steering column was placed in the 3rd detent of 6 with the uppermost detent defined as 0 according to Form 1.

DATA SHEET NO. 5

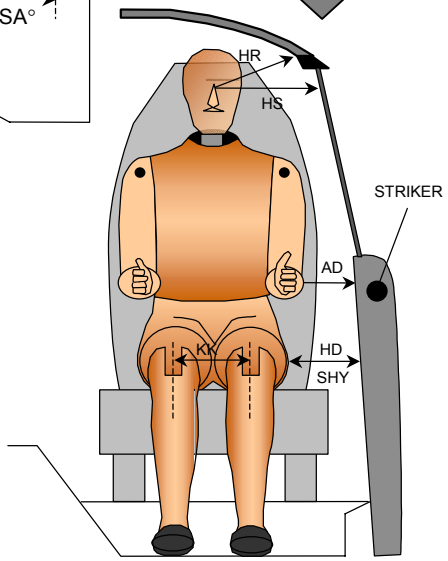
DUMMY POSITIONING IN VEHICLE

Test Vehicle:	2006 Chevrolet Trailblazer EXT	NHTSA No.:	M60121
Test Program:	35mph Frontal Impact	Test Date:	12/12/2005

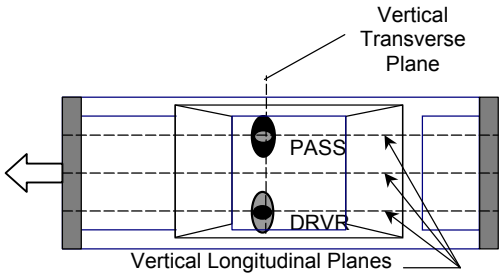
DUMMY MEASUREMENTS FOR FRONT SEAT OCCUPANTS



AD	Arm to Door
HD	H-Point to Door
HR	Head to Side Header
HS	Head to Side Window
KK	Knee to Knee
SHY	Striker to H-Point (Y Axis)



CD	Chest to Dash
CS	Chest to Steering Wheel Hub
HH	Head to Header
HW	Head to Windshield
HZ	Head to Roof
KDA	Knee to Dash Angle
KDL	Left Knee to Dash
KDR	Right Knee to Dash
NA	Nose to Rim Angle
NR	Nose to Rim
PA	Pelvic Angle
RA	Rim to Abdomen
SA	Seat Back Angle
SCA	Steering Column Angle
SH	Striker to H-Point
SK	Striker to Knee
ST	Striker to Head
SWA	Steering Wheel Angle
TA	Tibial Angle
WA	Windshield Angle



DATA SHEET NO. 5... (CONTINUED)

DUMMY POSITIONING IN VEHICLE

Test Vehicle: 2006 Chevrolet Trailblazer EXT NHTSA No.: M60121
Test Program: 35mph Frontal Impact Test Date: 12/12/2005

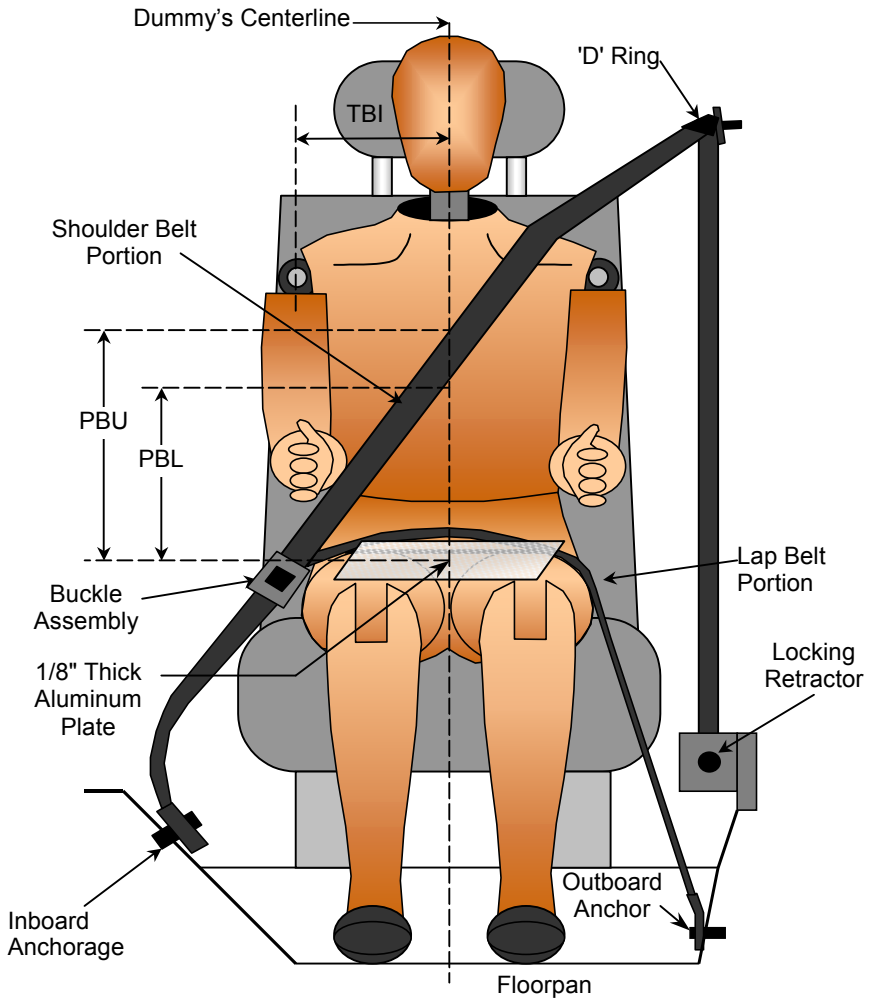
TEST DUMMY POSITION MEASUREMENTS

Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA	Windshield Angle		35.4		
SWA	Steering Wheel Angle		69.0		
SCA	Steering Column Angle		23.1		
SA	Seat Back Angle		18.5		18.1
HZ	Head to Roof (Z)	216	90.0	208	90.0
HH	Head to Header	428	18.3	471	15.4
HW	Head to Windshield	689	0.0	667	0.0
HR	Head to Side Header (Y)	232		227	
NR	Nose to Rim	402	21.5		
CD	Chest to Dash	590		536	
CS	Chest to Steering Hub	342	14.3		
RA	Rim to Abdomen	206	0.0		
KDL	Left Knee to Dash	181	36.4	172	
KDR	Right Knee to Dash	183		177	36.1
PA	Pelvic Angle		23.5		24.0
TA	Tibia Angle		48.9		48.2
KK	Knee to Knee (Y)	350		274	
SK	Striker to Knee	67.2	74.3	665	87.2
ST	Striker to Head	654	13.0	655	13.0
SH	Striker to H-Point	274	92.1	274	92.9
SHY	Striker to H-Point (Y)	268		268	
HS	Head to Side Window	347		346	
HD	H-Point to Door (Y)	189		156	
AD	Arm to Door (Y)	132		138	
AA	Ankle to Ankle	360		187	

DATA SHEET NO. 6

SEAT BELT POSITIONING DATA

Test Vehicle: 2006 Chevrolet Trailblazer EXT NHTSA No.: M60121
Test Program: 35mph Frontal Impact Test Date: 12/12/2005



SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
TBI - Dummy centerline to shoulder bolt	mm	225	225
PBU - Top surface of reference to belt upper edge	mm	327	324
PBL - To surface of reference to belt lower edge	mm	243	232

DATA SHEET NO. 7

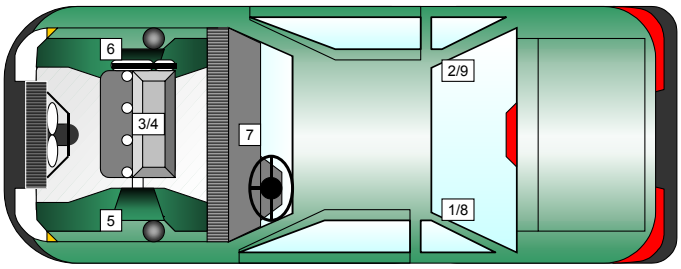
VEHICLE ACCELEROMETER LOCATIONS

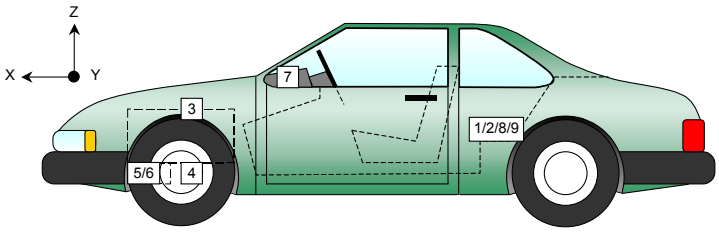
Test Vehicle: 2006 Chevrolet Trailblazer EXT NHTSA No.: M60121
Test Program: 35mph Frontal Impact Test Date: 12/12/2005

VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear X-Member X	1271	-271	728
2	Right Rear X-Member X	1272	271	729
3	Engine Top X	4556	15	1030
4	Engine Bottom X	4511	0	258
5	Left Brake Caliper X	4509	-670	345
6	Right Brake Caliper X	4510	670	345
7	Instrument Panel X			
8	Left Rear X-Member Z	1271	-271	728
9	Right Rear X-Member Z	1272	271	729

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: 2006 Chevrolet Trailblazer EXT NHTSA No.: M60121
Test Program: 35mph Frontal Impact Test Date: 12/12/2005

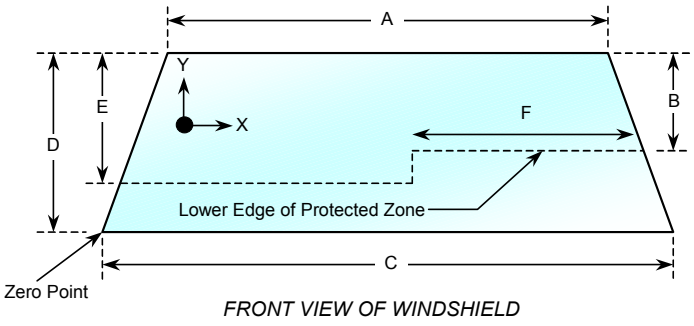
Windshield Mounting Details:
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

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	2090	2090	100
Right Side	2090	2090	100
Total	4180	4180	100



FRONT VIEW OF WINDSHIELD

Item	Units	Value
A	mm	1240
B	mm	380
C	mm	1505
D	mm	717
E	mm	452
F	mm	576

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: 2006 Chevrolet Trailblazer EXT NHTSA No.: M60121
Test Program: 35mph Frontal Impact Test Date: 12/12/2005

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 21° C Test Time: 11:35 am

Stoddard Solvent Spillage Measurements

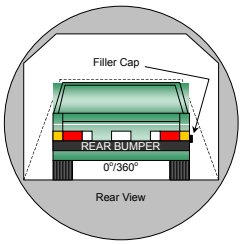
A. From impact until vehicle motion ceases: 0 oz.
(Maximum Allowable = 1 ounce)

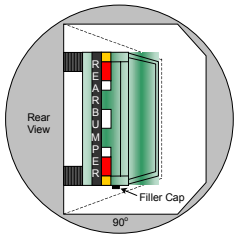
B. For the 5 minute period after motion ceases: 0 oz.
(Maximum Allowable = 5 ounces)

C. For the following 25 minutes: 0 oz.
(Maximum Allowable = 1 oz. /minute)

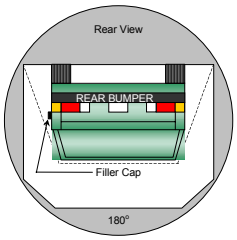
D. Spillage: None

FMVSS 301 STATIC ROLLOVER DATA

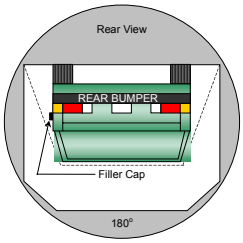




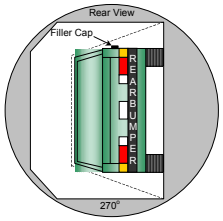
0° to 90°

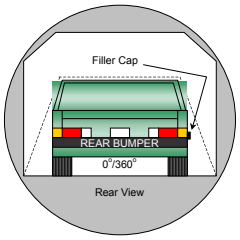


90° to 180°



180° to 270°





270° to 360°

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°	172	300	0
90° to 180°	140	300	0
180° to 270°	148	300	0
270° to 360°	152	300	0

DATA SHEET NO. 10

VEHICLE MEASUREMENTS

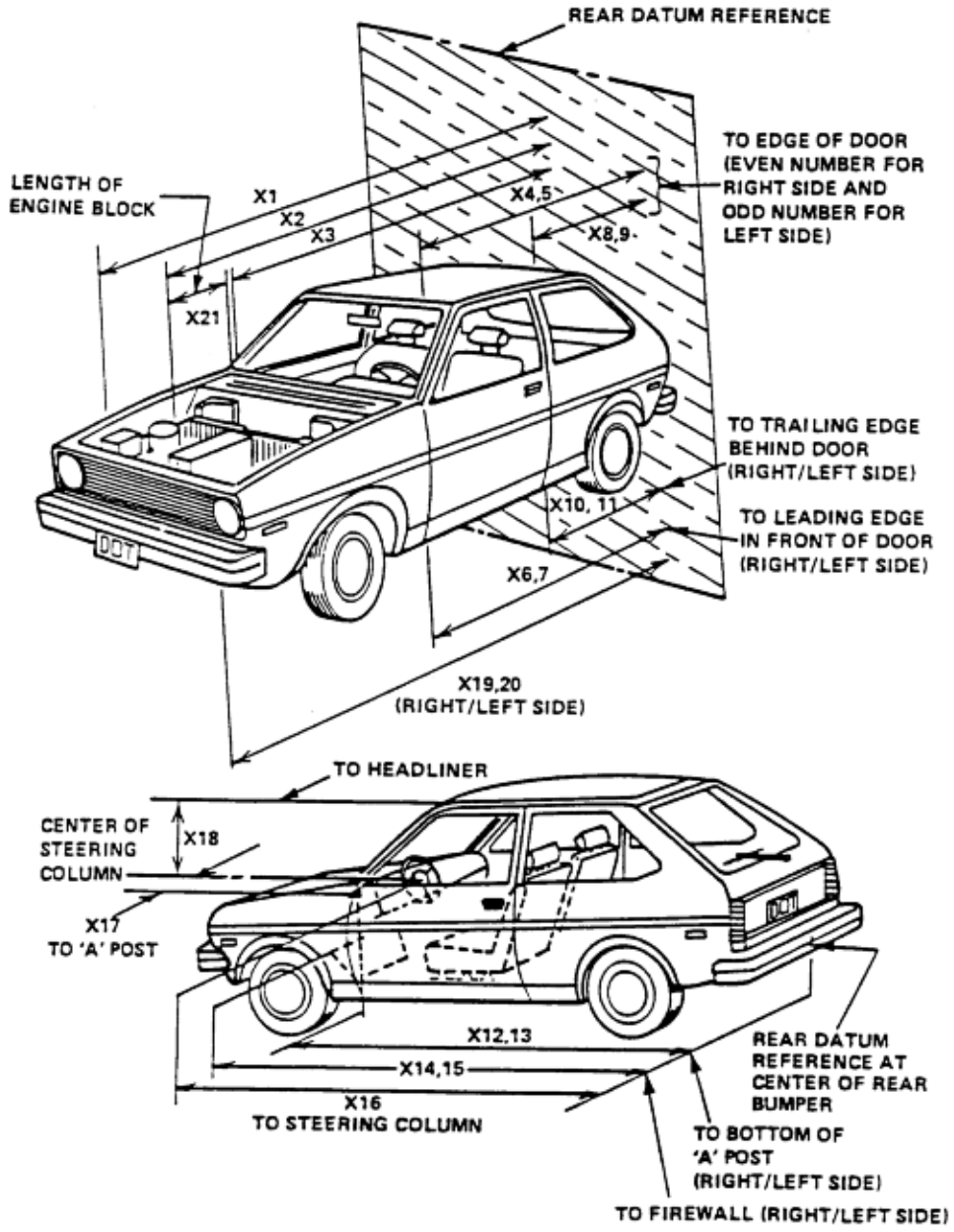
Test Vehicle: 2006 Chevrolet Trailblazer EXT NHTSA No.: M60121
Test Program: 35mph Frontal Impact Test Date: 12/12/2005

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total length of vehicle at centerline	mm	5237	4789	448
2	RSOV to front of engine	mm	4643	4418	225
3	RSOV to firewall centerline	mm	4131	3945	186
4	RSOV to leading edge of right door	mm	3782	3761	21
5	RSOV to leading edge of left door	mm	3780	3771	9
6	RSOV to lower leading edge of right door	mm	3695	3705	-10
7	RSOV to lower leading edge of left door	mm	3696	3686	10
8	RSOV to upper leading edge of right door	mm	2604	2581	23
9	RSOV to upper leading edge of left door	mm	2606	2572	34
10	RSOV to lower trailing edge of right door	mm	2570	2579	-9
11	RSOV to lower trailing edge of left door	mm	2568	2569	-1
12	RSOV to bottom of right 'A' pillar	mm	3708	3707	1
13	RSOV to bottom of left 'A' pillar	mm	3702	3694	8
14	RSOV to firewall on right side	mm	4129	4073	56
15	RSOV to firewall on left side	mm	4054	4031	23
16	RSOV to steering column	mm	3195	3162	33
17	Center of steering column to left 'A' pillar	mm	425	500	-75
18	Center of steering column to headlining	mm	443	508	-65
19	RSOV to right side of front bumper	mm	5080	4772	308
20	RSOV to left side of front bumper	mm	5080	4724	356
21	Length of engine block	mm	780	780	0
RD	RSOV to right side of dash panel	mm	3408	3393	15
CD	RSOV to center of dash panel	mm	3301	3340	-39
LD	RSOV to left side of dash panel	mm	3397	3345	52

DATA SHEET NO. 10... (continued)

VEHICLE MEASUREMENTS

Test Vehicle:	2006 Chevrolet Trailblazer EXT	NHTSA No.:	M60121
Test Program:	35mph Frontal Impact	Test Date:	12/12/2005



DATA SHEET NO. 10... (continued)

VEHICLE MEASUREMENTS

Test Vehicle: 2006 Chevrolet Trailblazer EXT NHTSA No.: M60121
Test Program: 35mph Frontal Impact Test Date: 12/12/2005

Target Vehicle Structural Measurement

	Elements	Pre-Test (mm)
1	Total Length	5237
2	Total Width	1832
3	Bumper Top Height	590
4	Bumper Bottom Height	460
5	Longitudinal Member Top Height	600
6	Distance between Longitudinal Members	805
7	Longitudinal Member Width	86
8	Engine Top Height	1020
9	Engine Bottom Height	264
10	Engine and gearbox width	1660
11	Front bumper-engine distance	558
12	Front shock absorber fixing height	822
13	Bonnet leading edge height	940
14	Front shock absorber fixing width	950
15	Front bumper – front axle distance	845
16	Front axle – a pillar distance	574
17	A-pillar – B-pillar distance	1204
18	B-Pillar – rear axle distance	1498
19	B-pillar – C-pillar distance	1065
20	Roof sill bottom height	1723
21	Roof sill top height	1784
22	Floor sill bottom height	315
23	Floor sill top height	410

DATA SHEET NO. 11

CAMERA LOCATIONS

Test Vehicle: 2006 Chevrolet Trailblazer EXT NHTSA No.: M60121
Test Program: 35mph Frontal Impact Test Date: 12/12/2005

No.	Camera View	Location (mm) *			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Side View				13	24
2	Left Front View	1075	-5315	1380	24	1000
3	Steering Column Top	1715	-6580	1480	25	1000
4	Steering Column Bottom	1730	-6565	1025	25	1000
5	Driver Close-up	2110	-6930	1475	35	1000
6	Driver Angle	7185	-6270	2155	50	1000
7	On board Driver Side					
8	On board Passenger Side					
9	Right Overall	2380	8270	1360	24	1000
10	Right Passenger Half	1095	5255	1470	24	1000
11	Right Close-up	1735	6920	1630	35	1000
12	Right Angle	6995	5180	2205	50	1000
13	Windshield	-285	0	2370	19	1000
14	Top Driver	-170	-425	2270	16	1000
15	Top Passenger	-175	535	2280	16	1000
16	Pit Front	1010	0	-3150	24	1000
17	Pit Rear	3100	0	-3150	24	1000

*COORDINATES:

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

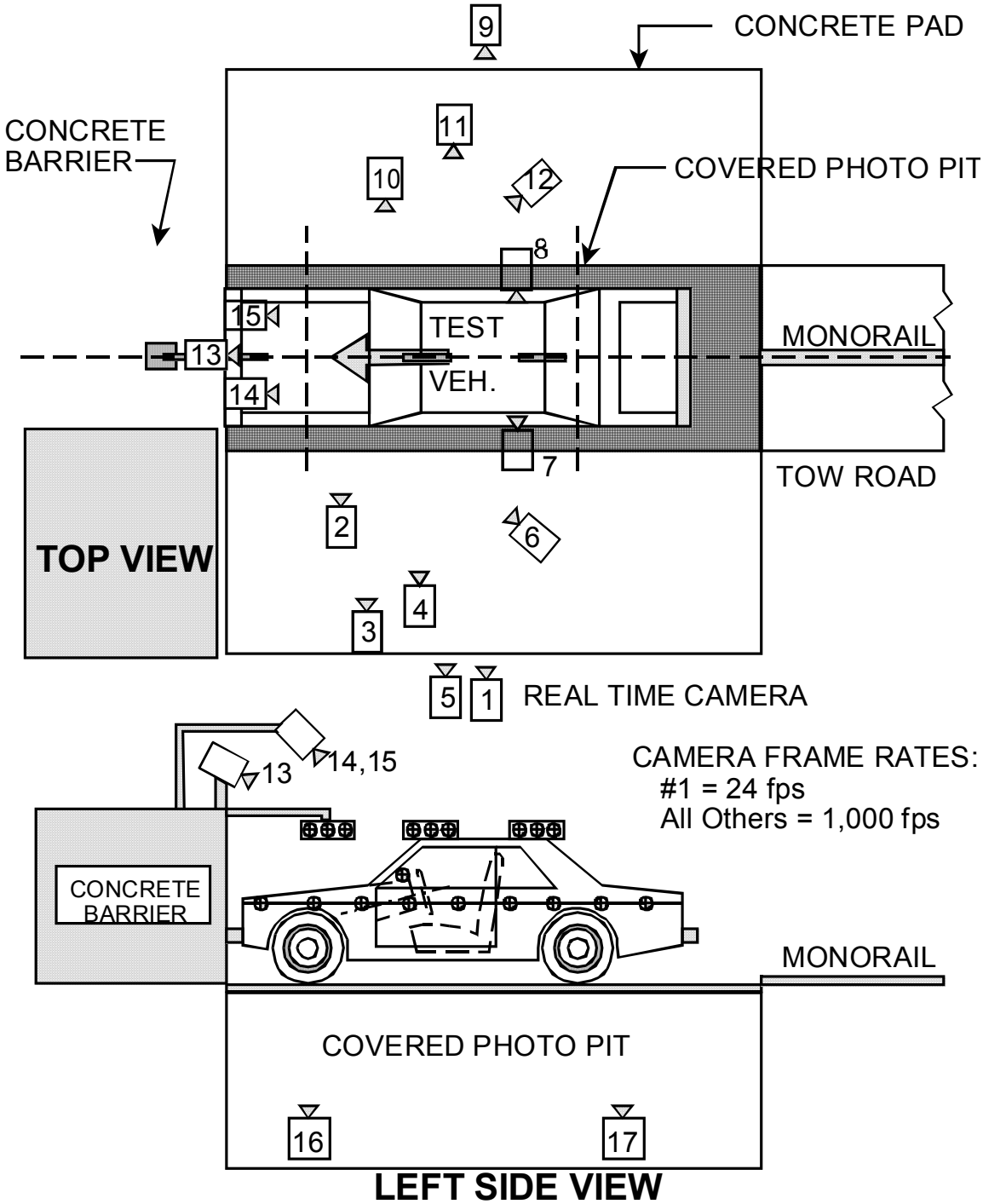
Note: Cameras 7 and 8 were not used for this test.

DATA SHEET NO. 11... (continued)

CAMERA LOCATIONS

Test Vehicle:	2006 Chevrolet Trailblazer EXT	NHTSA No.:	M60121
Test Program:	35mph Frontal Impact	Test Date:	12/12/2005

CAMERA POSITIONS FOR FRONTAL IMPACTS



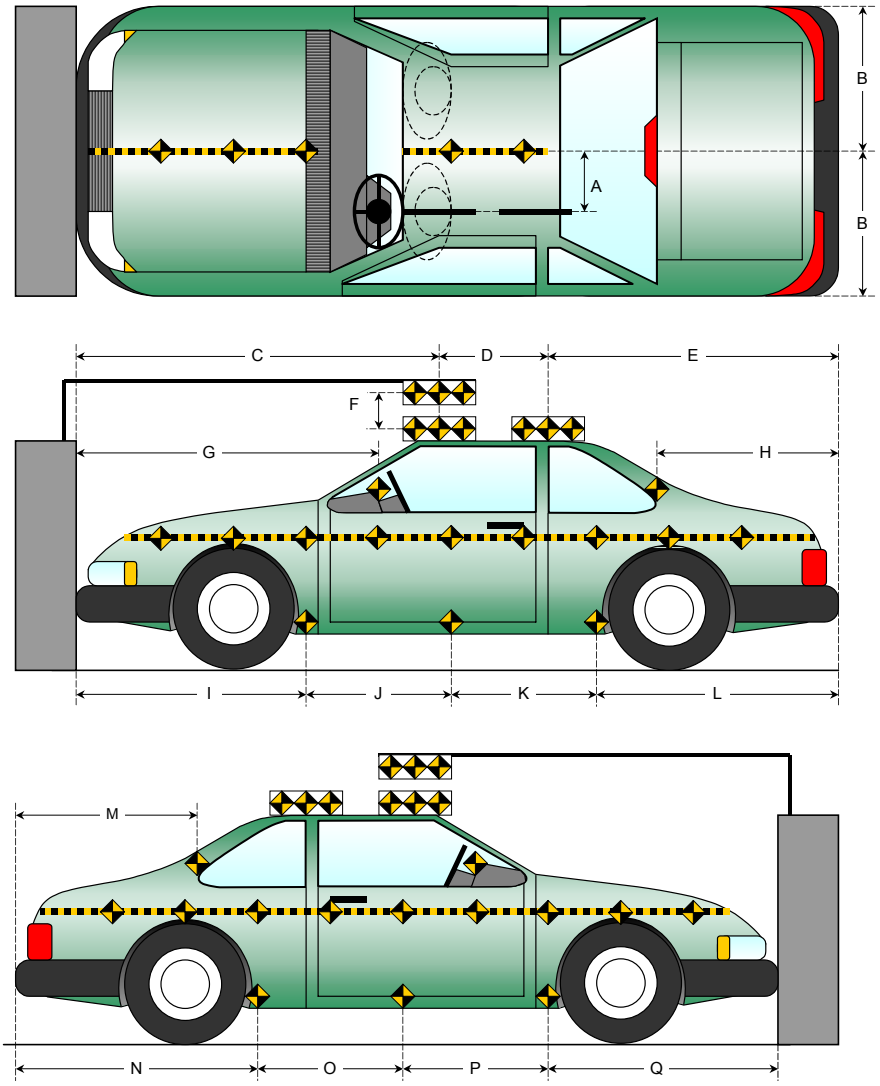
LEFT SIDE VIEW

DATA SHEET NO. 12

PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2006 Chevrolet Trailblazer EXT NHTSA No.: M60121
Test Program: 35mph Frontal Impact Test Date: 12/12/2005

Item	Value
A	389
B	916
C	2351
D	610
E	2276
F	86
G	
H	1595
I	1909
J	1105
K	1155
L	1068
M	1622
N	1065
O	1160
P	1105
Q	1907



DATA SHEET NO. 13

VEHICLE INTRUSION MEASUREMENTS

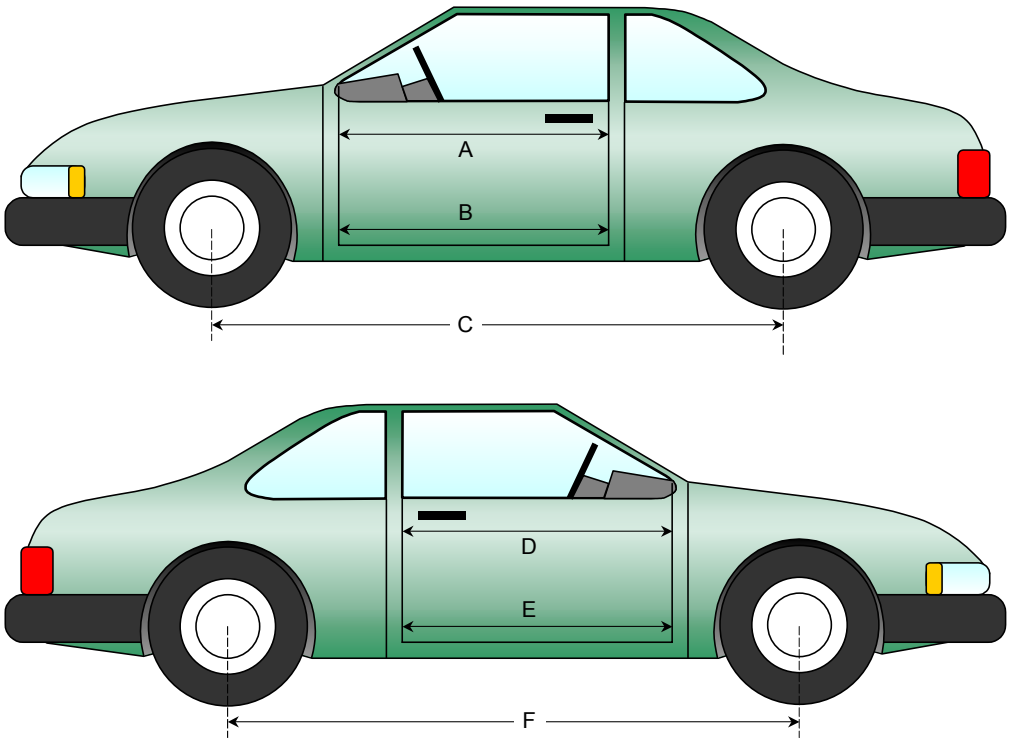
Test Vehicle: 2006 Chevrolet Trailblazer EXT
Test Program: 35mph Frontal Impact
NHTSA No.: M60121
Test Date: 12/12/2005

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	1060	1025	35
B	Left Side Lower	mm	973	965	8
D	Right Side Upper	mm	1055	1032	23
E	Right Side Lower	mm	980	966	14

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	3281	3212	69
F	Right Side Wheelbase	mm	3282	3215	67



DATA SHEET NO. 13... (continued)

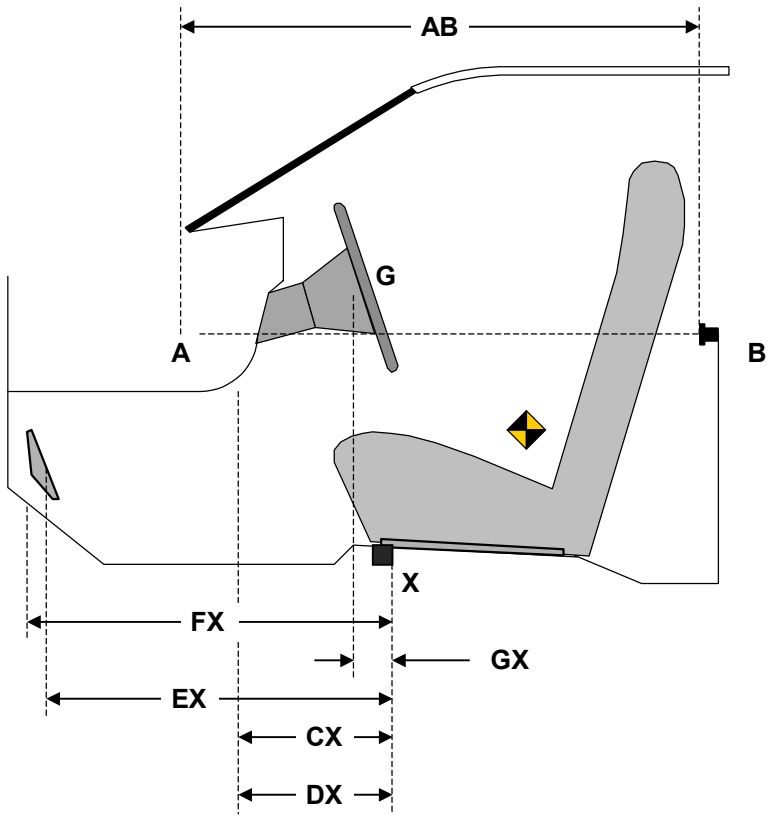
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2006 Chevrolet Trailblazer EXT NHTSA No.: M60121
Test Program: 35mph Frontal Impact Test Date: 12/12/2005

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside window jam)	mm	870	869	1
CX	Left Knee Bolster to X	mm	270	215	55
DX	Right Knee Bolster to X	mm	270	229	41
EX	Brake Pedal to X	mm	545	352	193
FX	Foot Rest to X	mm	590	580	10
GX	Center of Steering Column Wheel Hub to X	mm	62	18	44

X = Front of Seat Track (stationary)

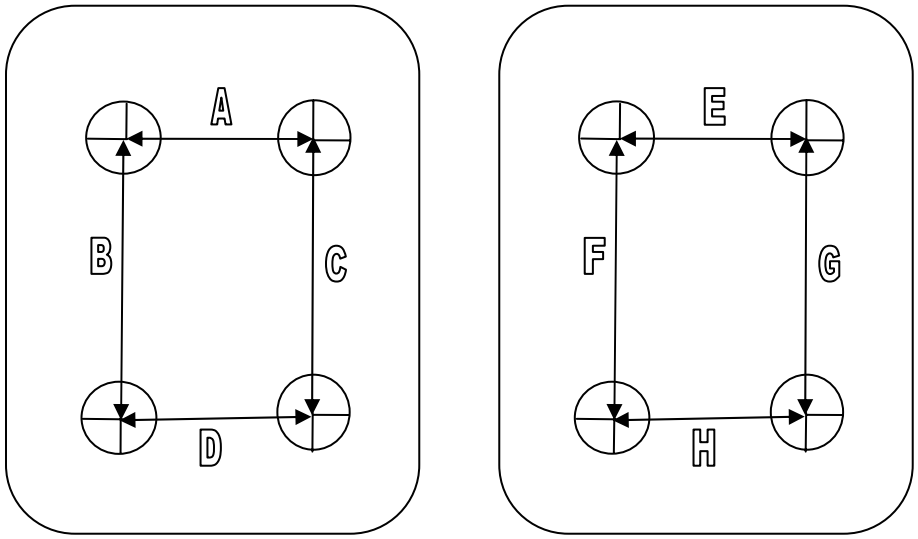


DRIVER COMPARTMENT

DATA SHEET NO. 13... (continued)

VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2006 Chevrolet Trailblazer EXT NHTSA No.: M60121
Test Program: 35mph Frontal Impact Test Date: 12/12/2005



Driver Passenger

UNDERBODY FLOORBOARD DEFORMATION

Measurement	Pre-Test	Post-Test	Difference
A	113	113	0
B	215	215	0
C	217	217	0
D	123	123	0
E	320	320	0
F	150	150	0
G	155	155	0
H	315	315	0

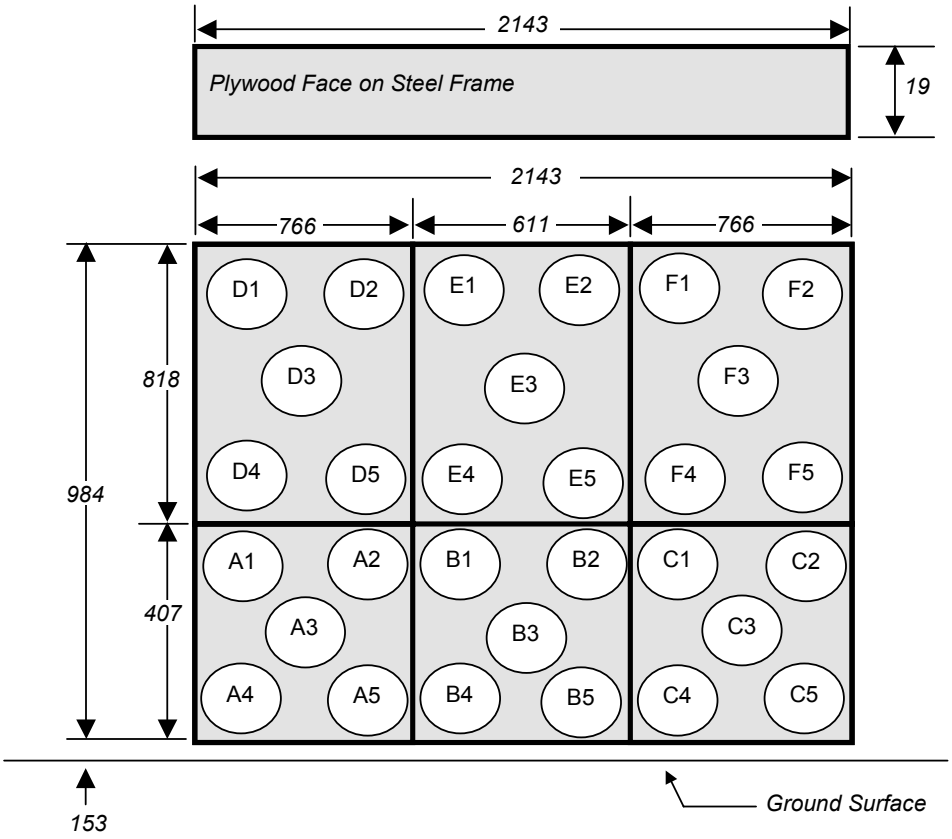
DATA SHEET NO. 14

LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle: 2006 Chevrolet Trailblazer EXT NHTSA No.: M60121
Test Program: 35mph Frontal Impact Test Date: 12/12/2005

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: 2006 Chevrolet Trailblazer EXT NHTSA No.: M60121
Test Program: 35mph Frontal Impact Test Date: 12/12/2005

VEHICLE INFORMATION

VIN: 1GNET16S966102664 Wheelbase (mm) : 3282
Vehicle Size Category: SUV Test Weight (kg) : 2567.8

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): 56.6
Velocity Change (km/h): 59.6 Time of Separation (msec): 118

CRUSH PROFILE

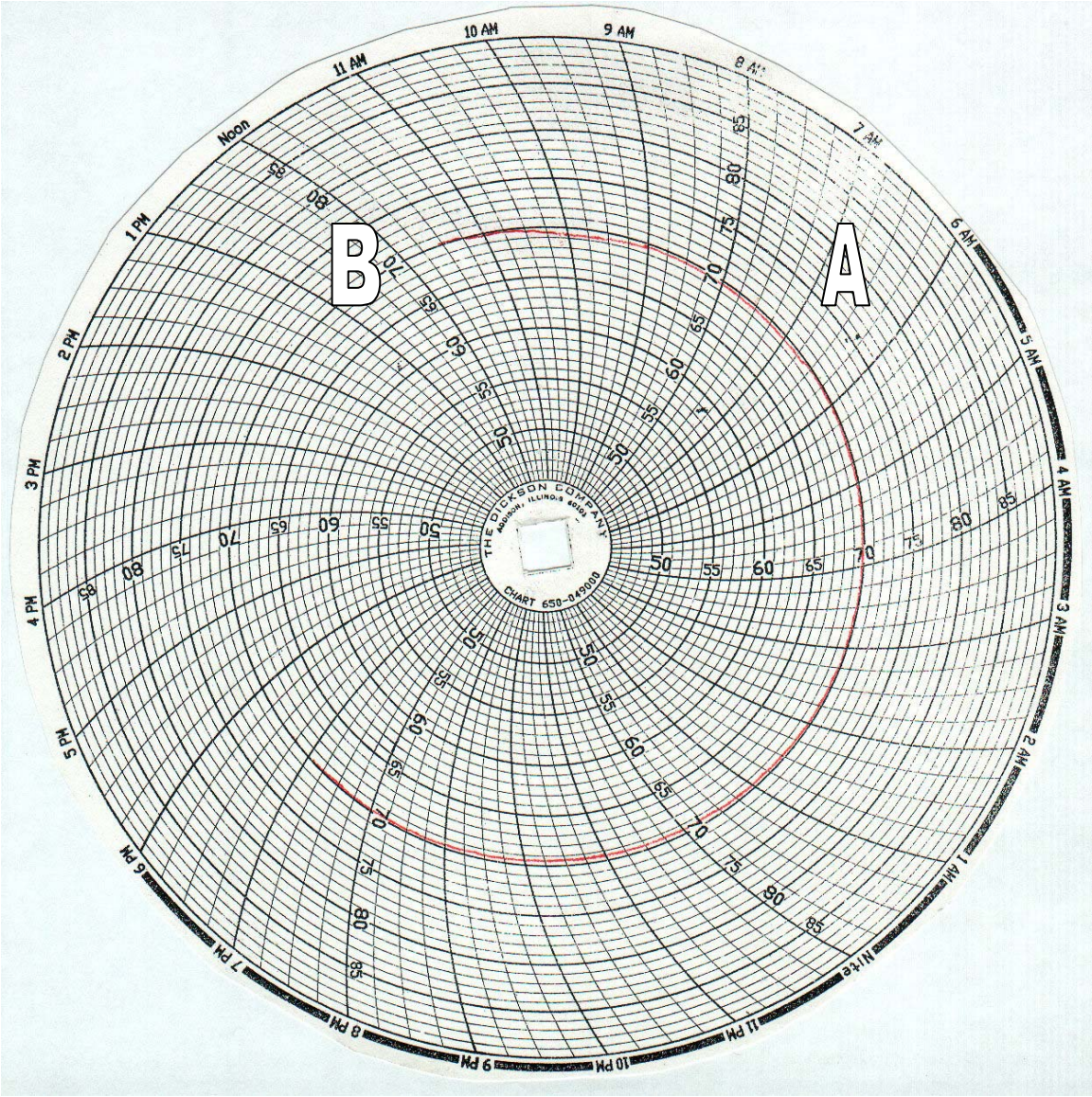
Collision Deformation Classification: Frontal Midpoint of Damage: Centerline
Damage Region Length (mm): 1656 Impact Mode: Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	5080	4724	356
C2	Crush zone 2 at left side	mm	5190	4709	481
C3	Crush zone 3 at left side	mm	5234	4761	473
C4	Crush zone 4 at right side	mm	5228	4809	419
C5	Crush zone 5 at right side	mm	5191	4826	365
C6	Crush zone 6 at right side	mm	5080	4772	308
L	C1 TO C6	mm	1656	1618	38

DATA SHEET NO. 16

DUMMY / VEHICLE TEMPERATURE STABILIZATION CHART

Test Vehicle:	2006 Chevrolet Trailblazer EXT	NHTSA No.:	M60121
Test Program:	35mph Frontal Impact	Test Date:	12/12/2005



A = Dummies installed in vehicle at 7:00 am

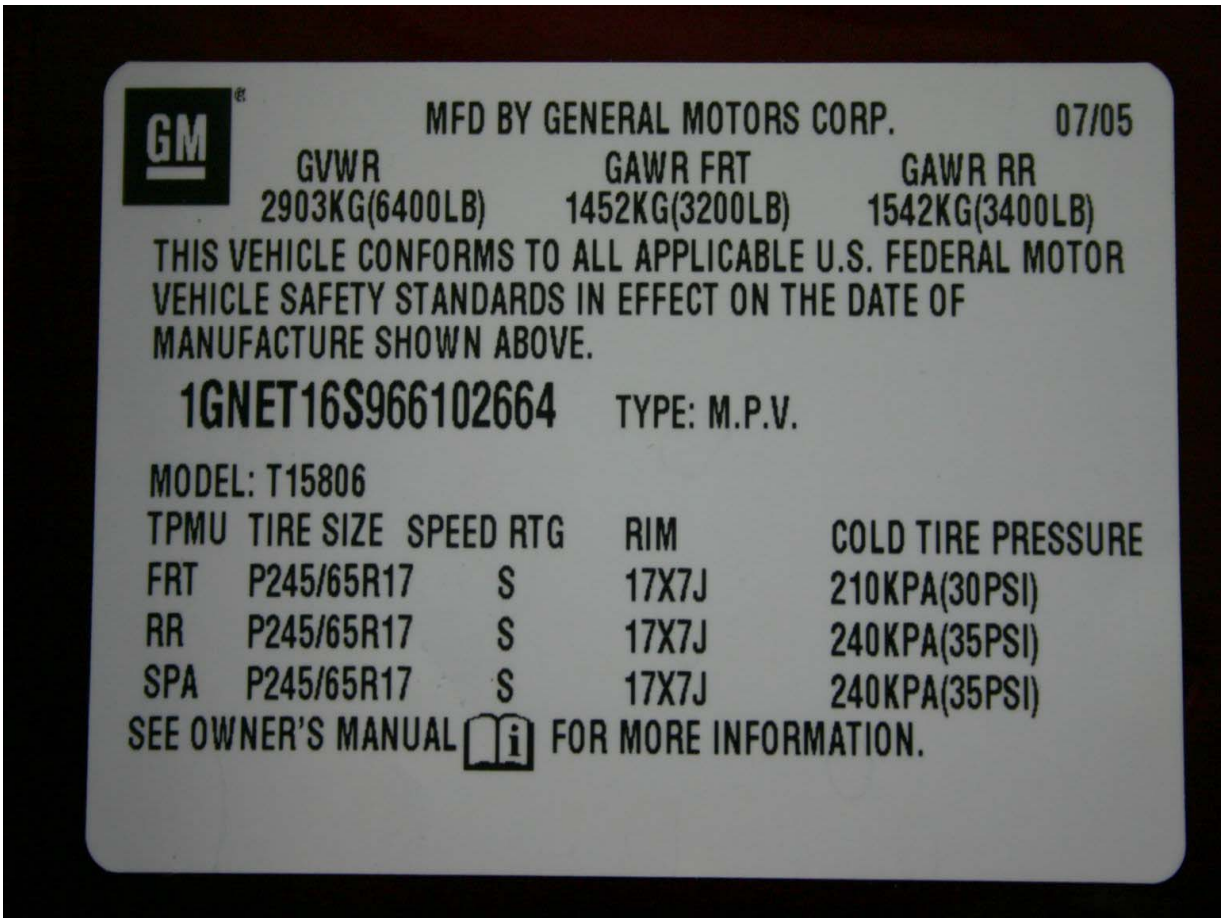
B = Test conducted at 11:35 am

APPENDIX A

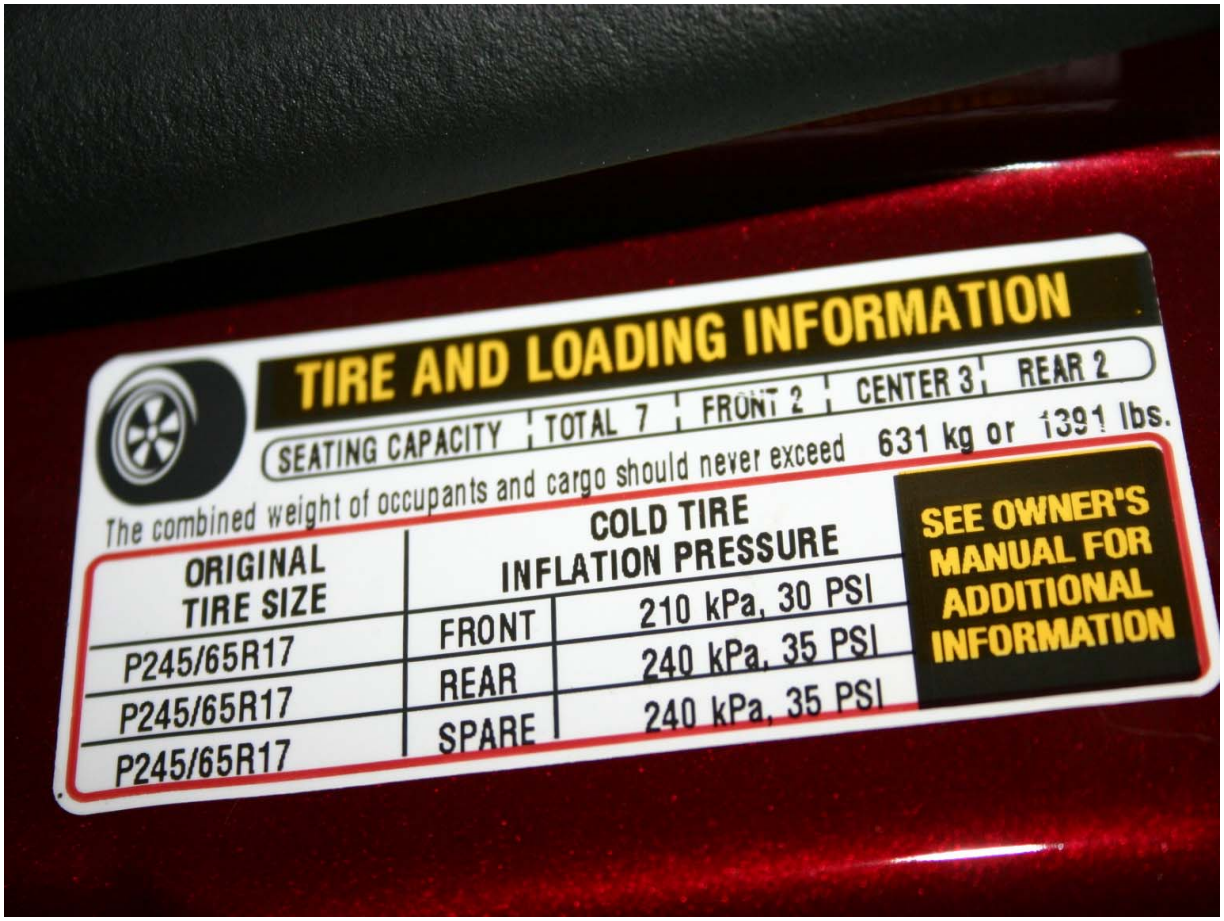
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

Load Cell Location



Manufacturer's Label

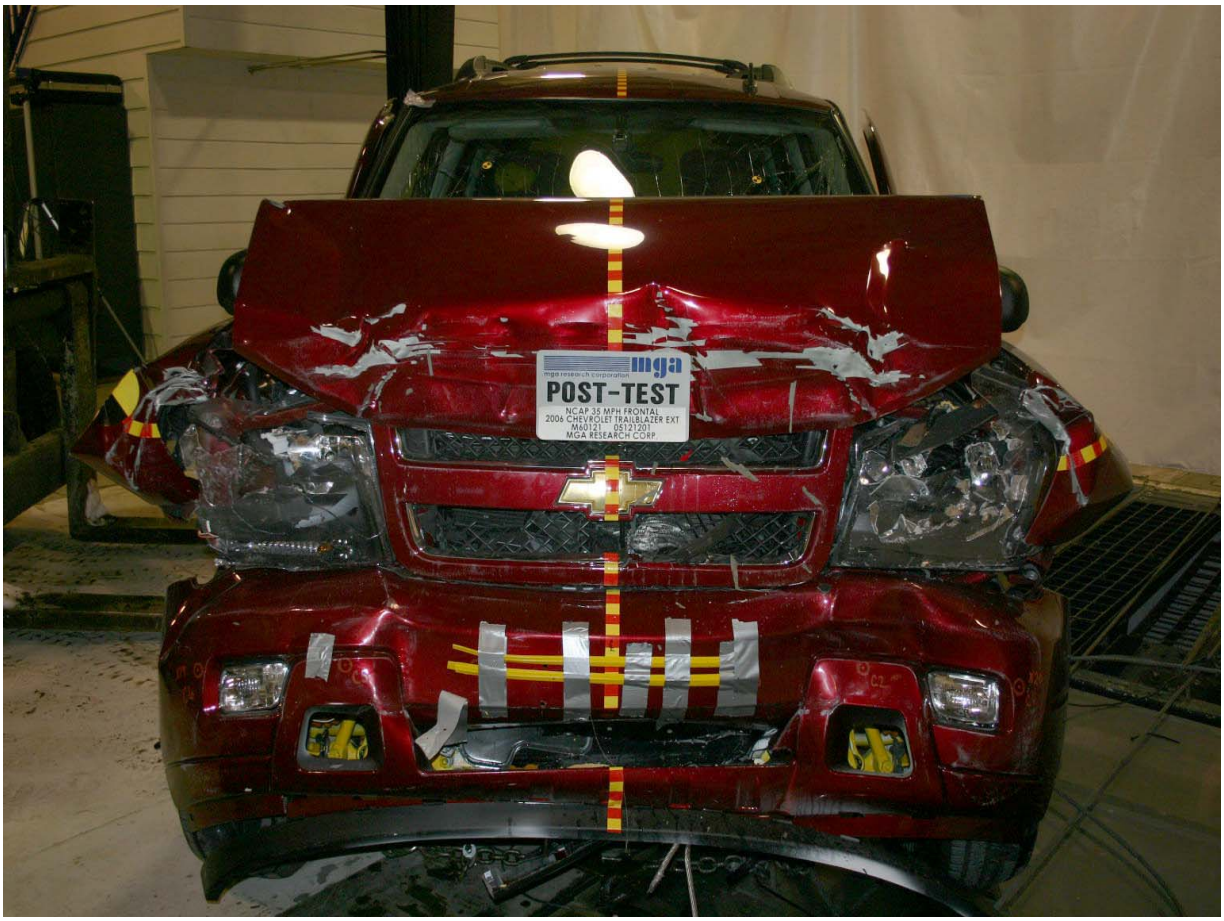


Tire Placard

Left Front ¾ View, As Received

Right Rear ¾ View, As Received

Pre-Test Front View



Post-Test Front View

Pre-Test Left Side View

Post-Test Left Side View

Pre-Test Right Side View

Post-Test Right Side View

Pre-Test Right Front ¾ View

Post-Test Right Front ¾ View

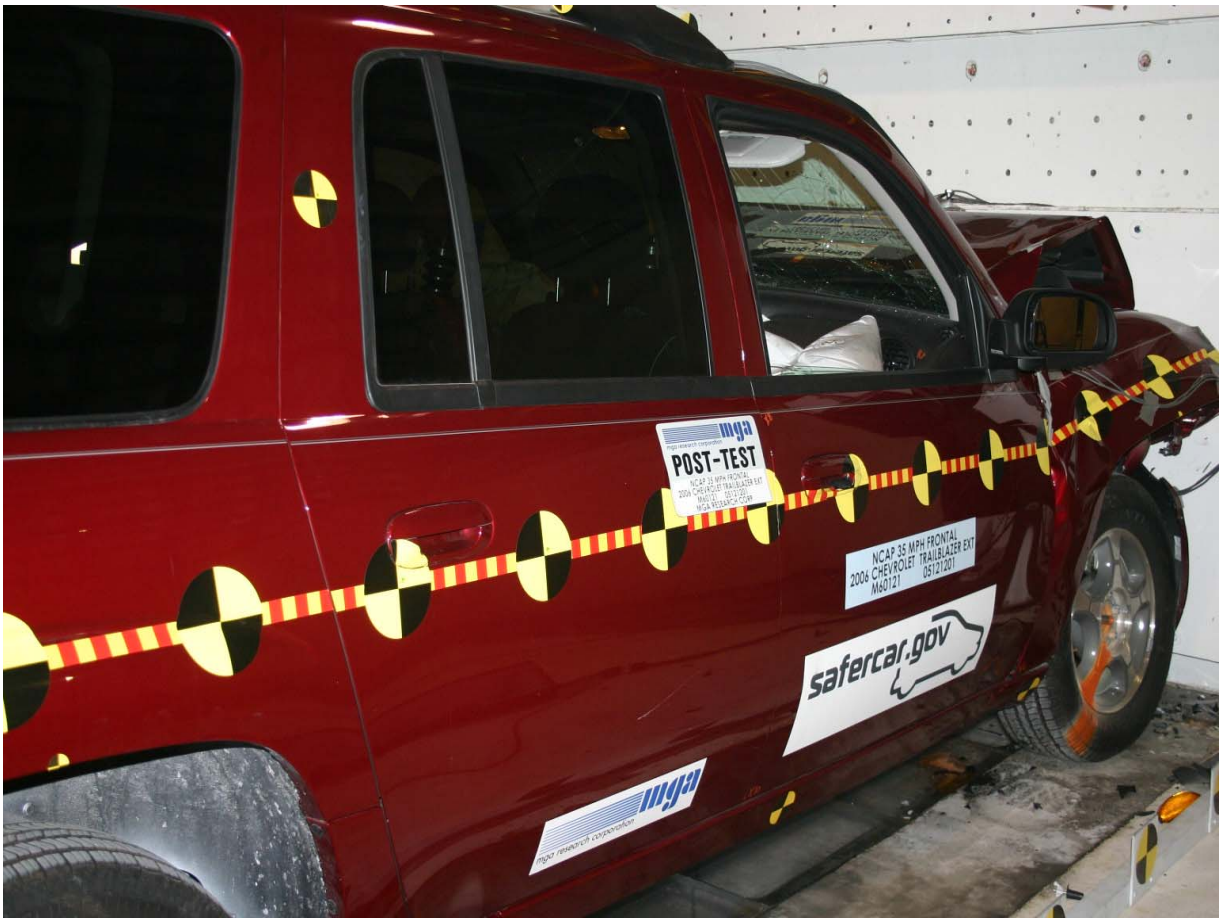
Pre-Test Left Rear ¾ View

Post-Test Left Rear ¾ View

Pre-Test Left Side ¾ View of Doors

Post-Test Left Side ¾ View of Doors After Impact

Pre-Test Right Side ¾ View of Doors

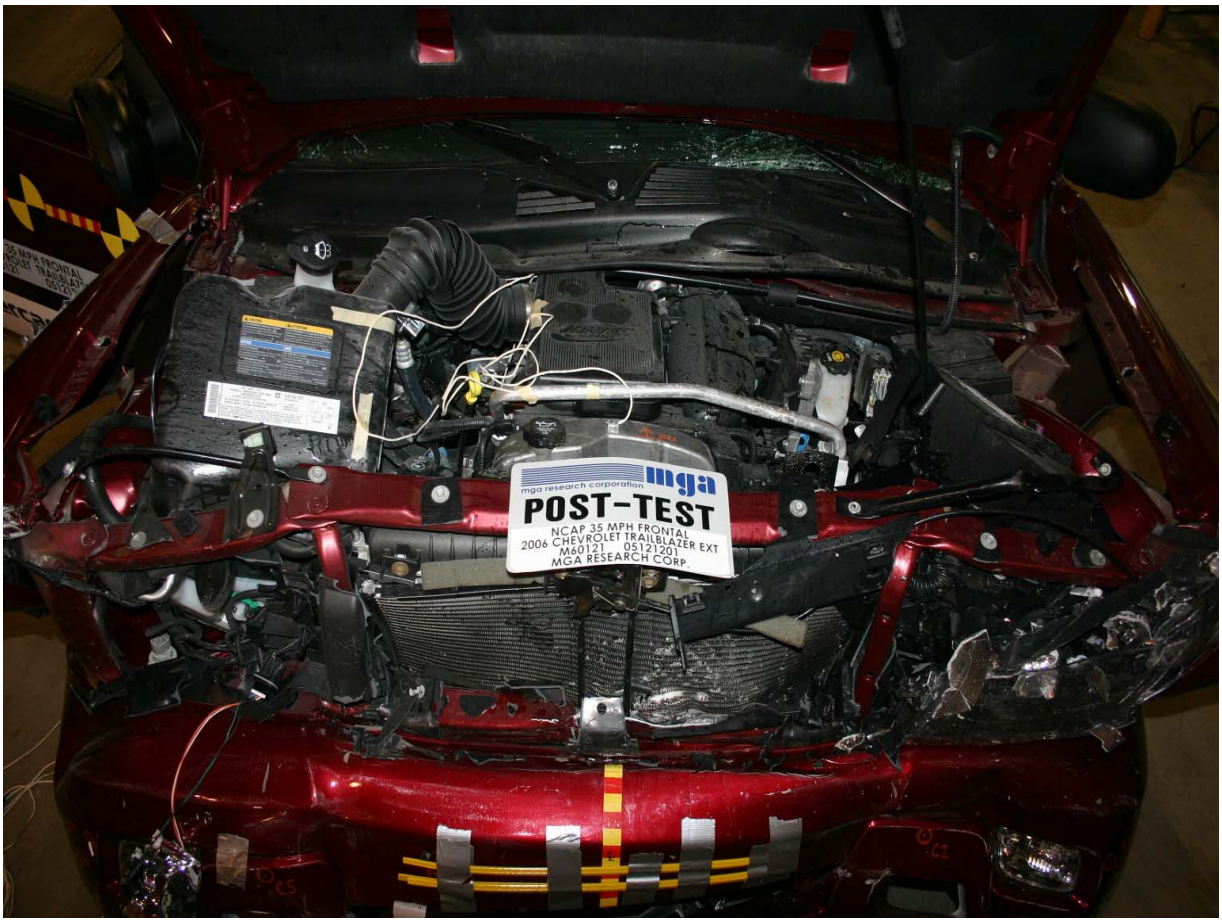


Post-Test Right Side ¾ View of Doors After Impact

Pre-Test Windshield View

Post-Test Windshield View

Pre-Test Engine Compartment View

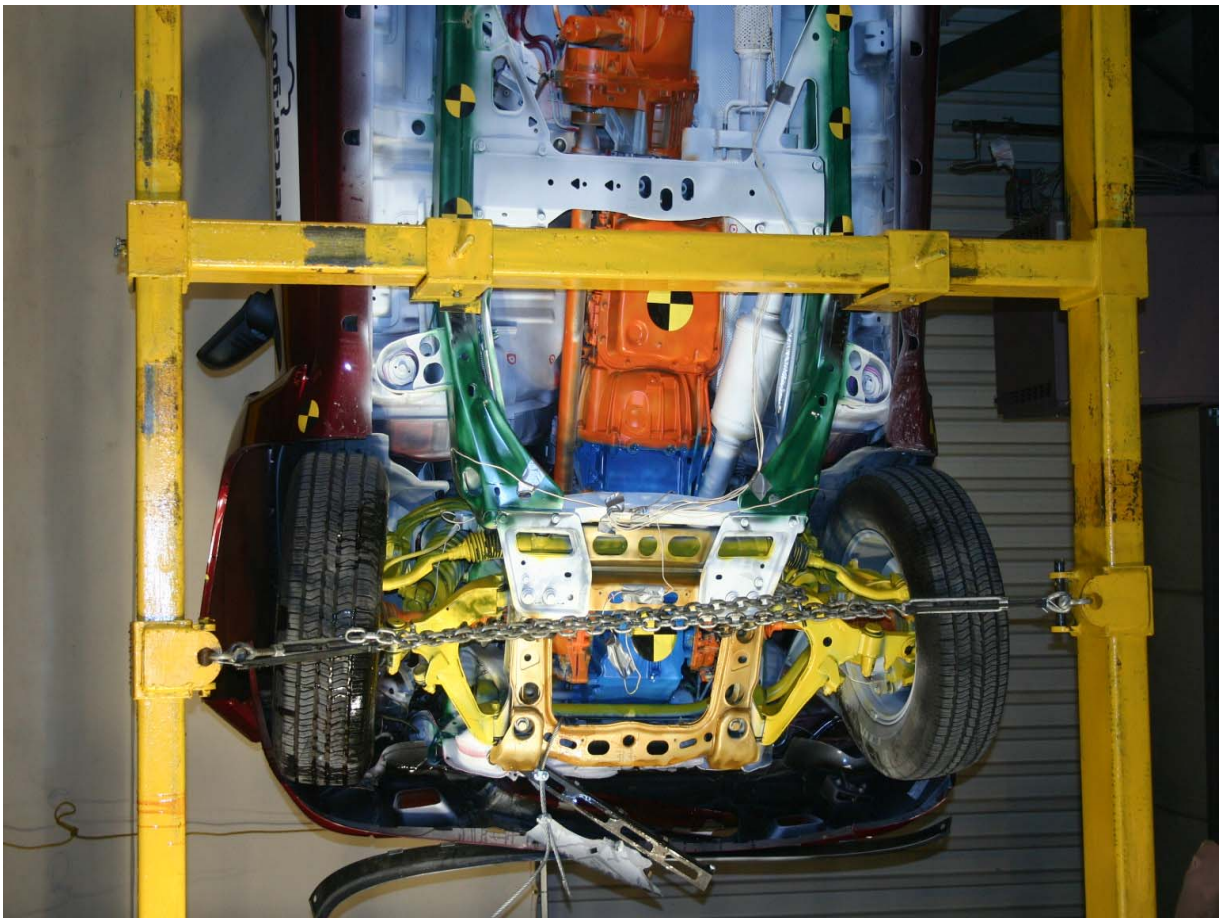


Post-Test Engine Compartment View

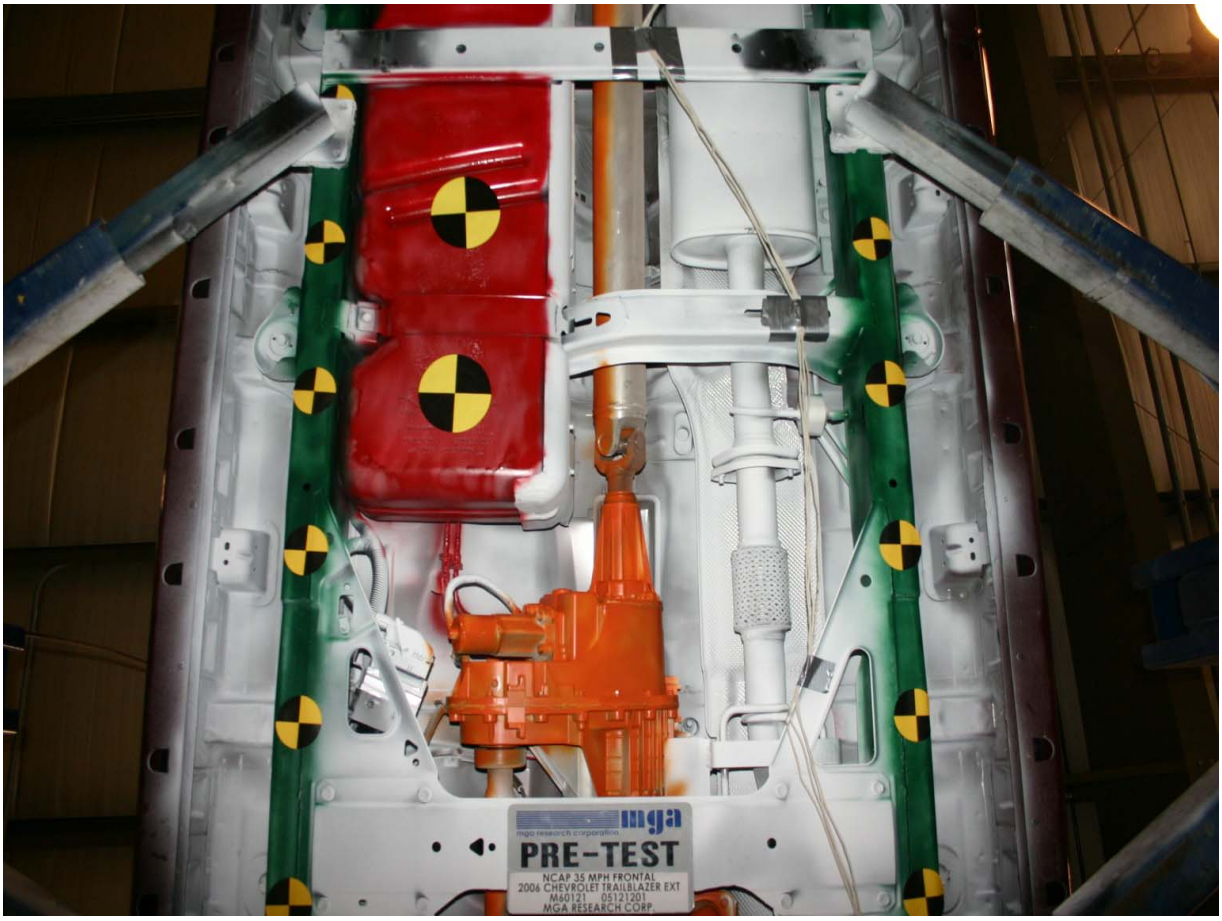
Pre-Test Fuel Cap View

Post-Test Fuel Cap View

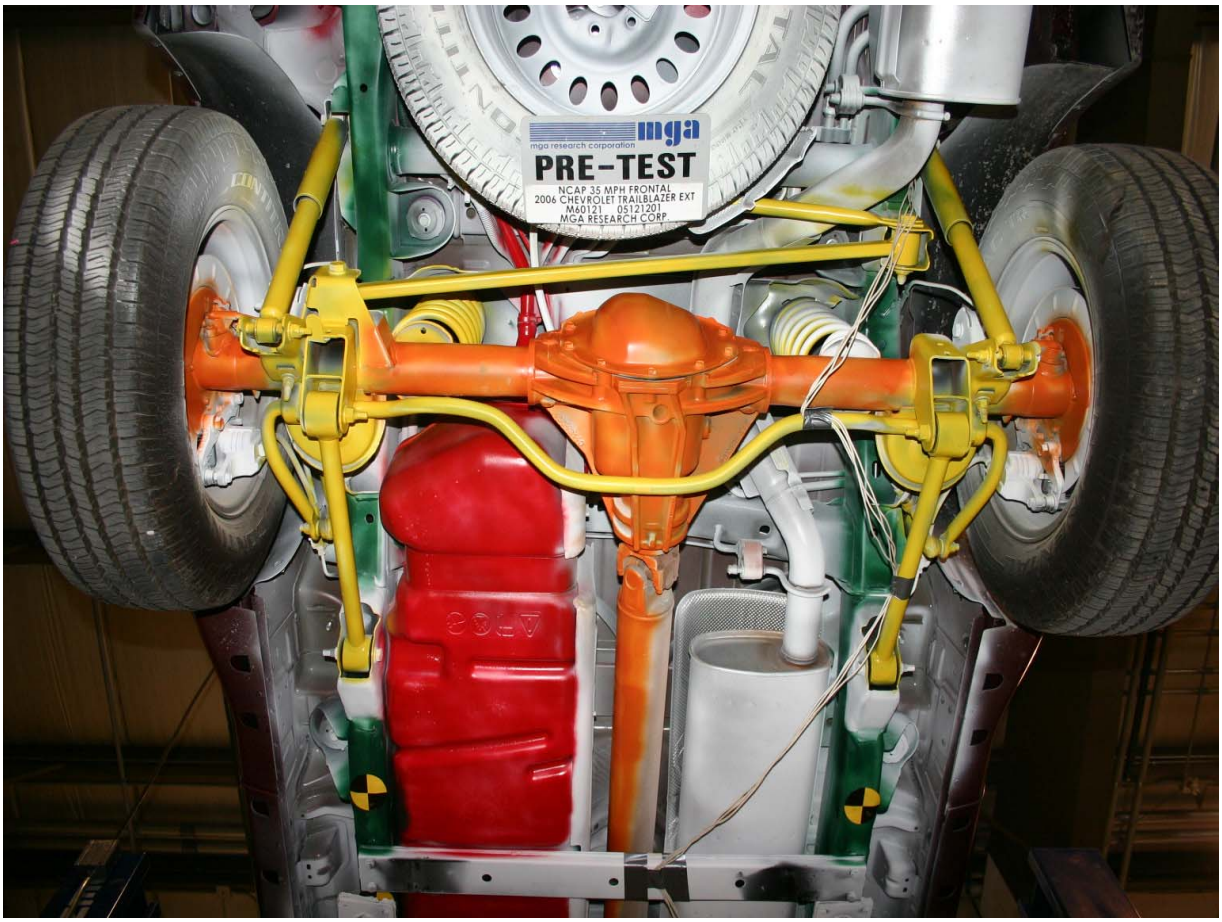
Pre-Test Front Underbody View



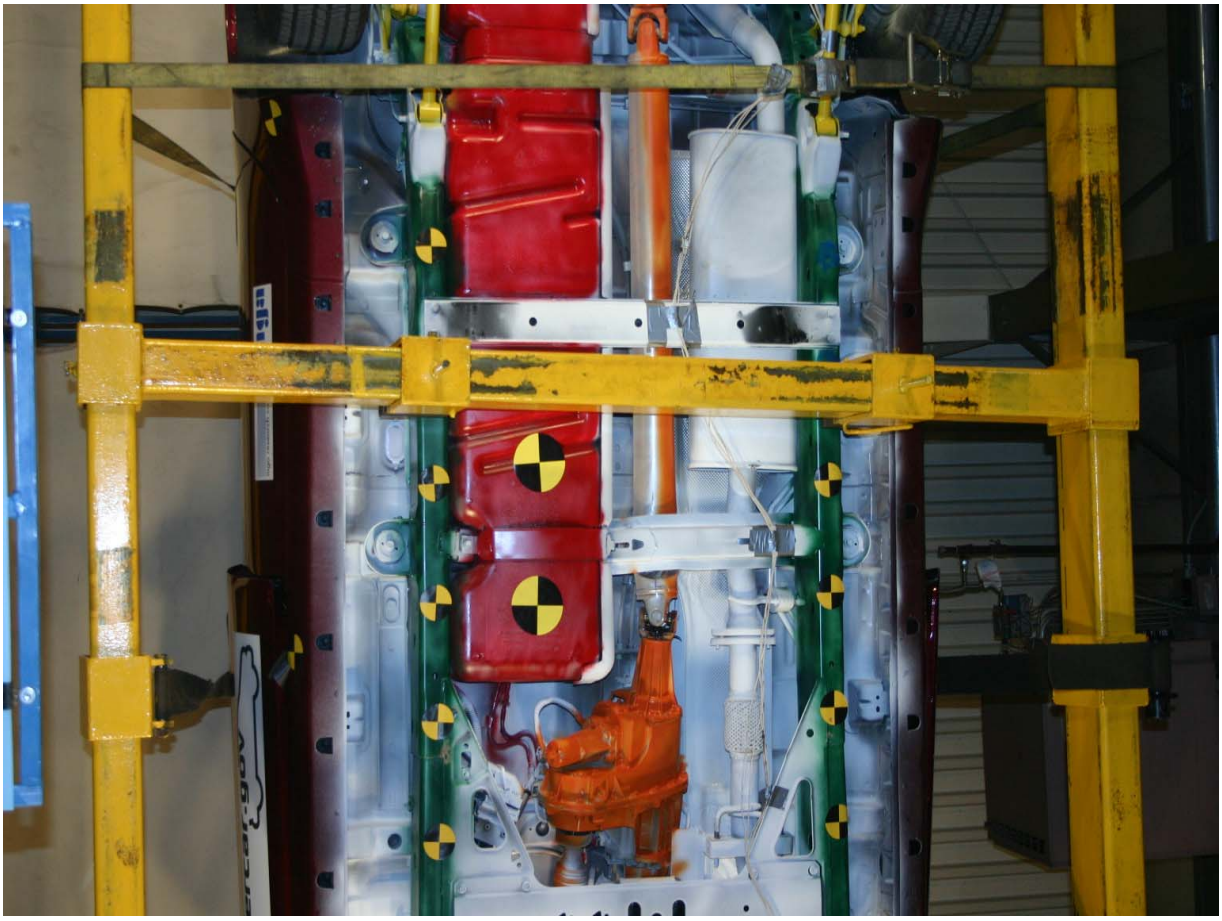
Post-Test Front Underbody View



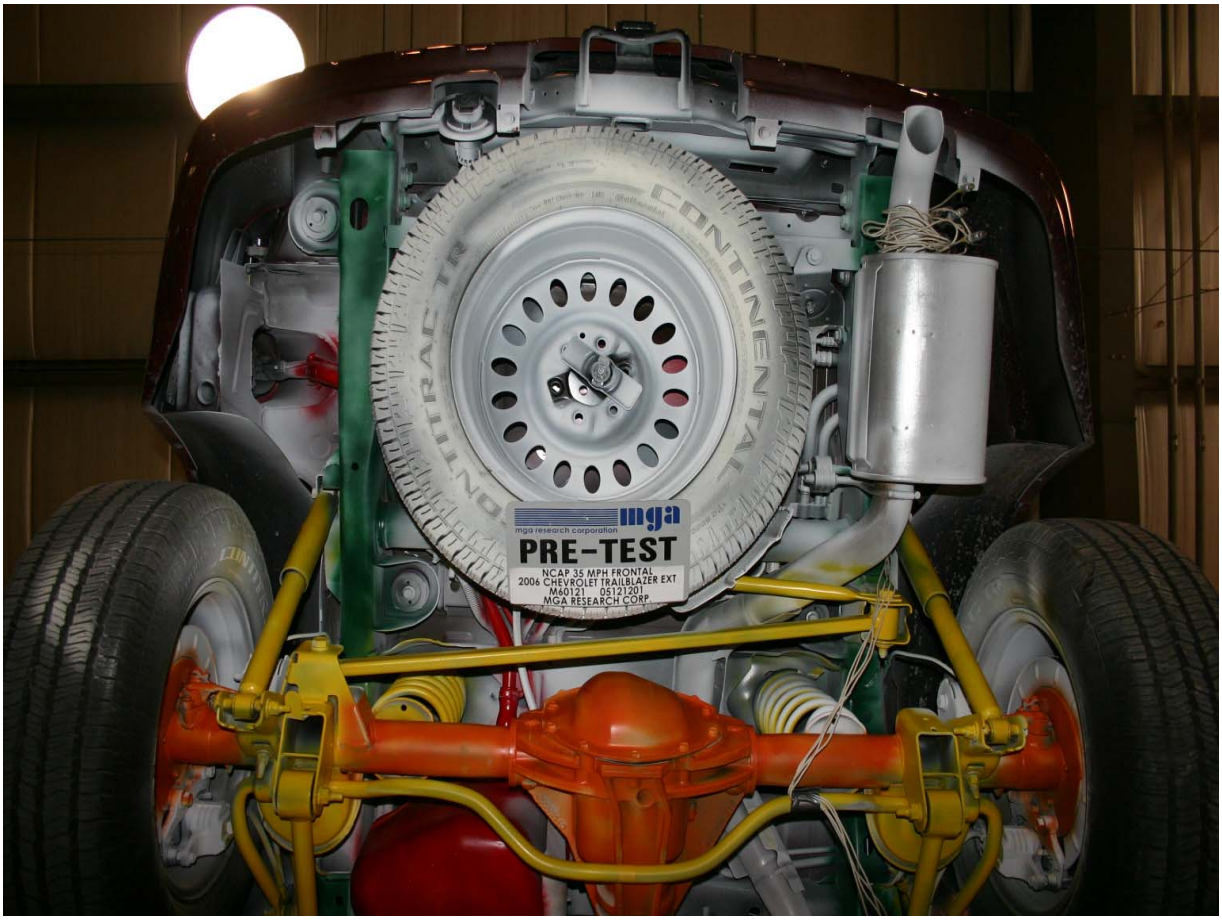
Pre-Test Front Mid Underbody View



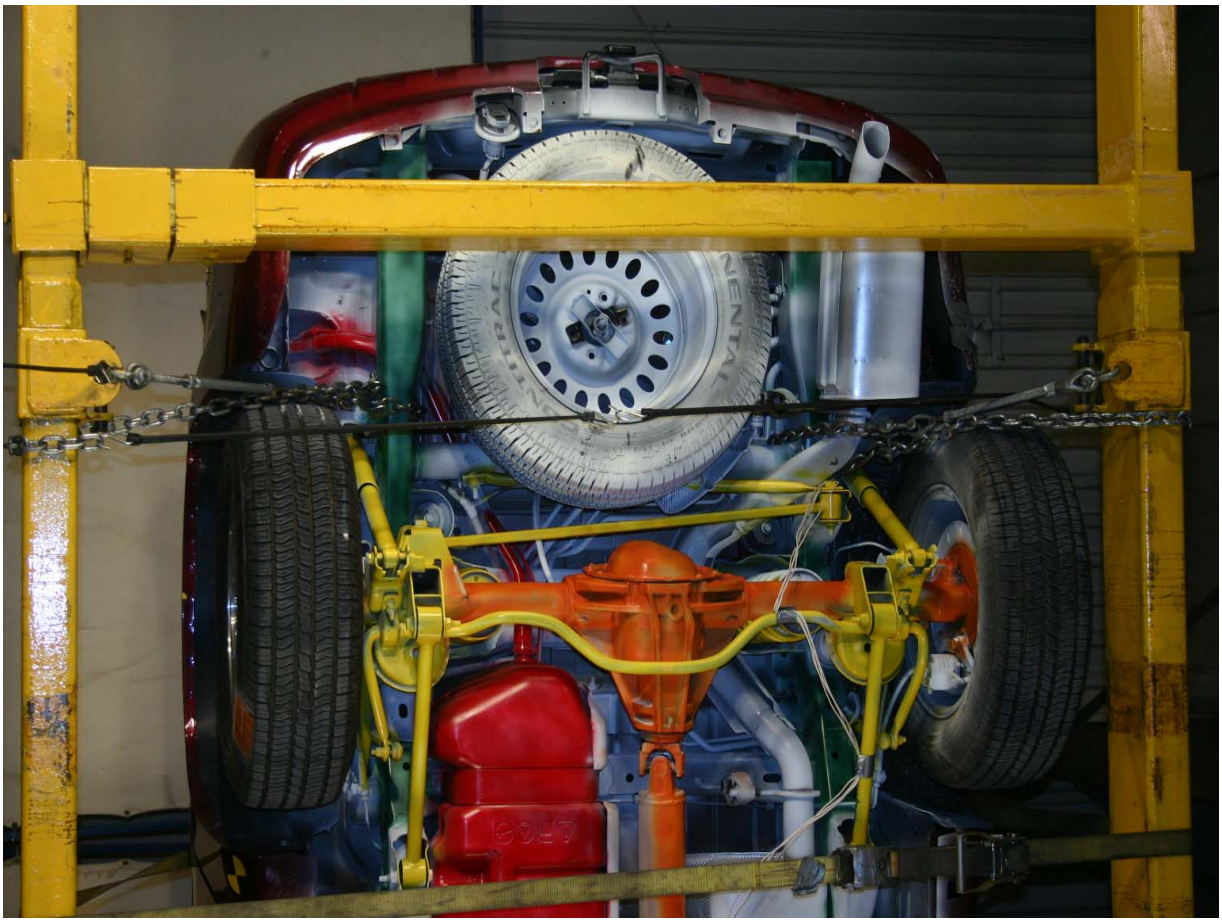
Pre-Test Rear Mid Underbody View



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

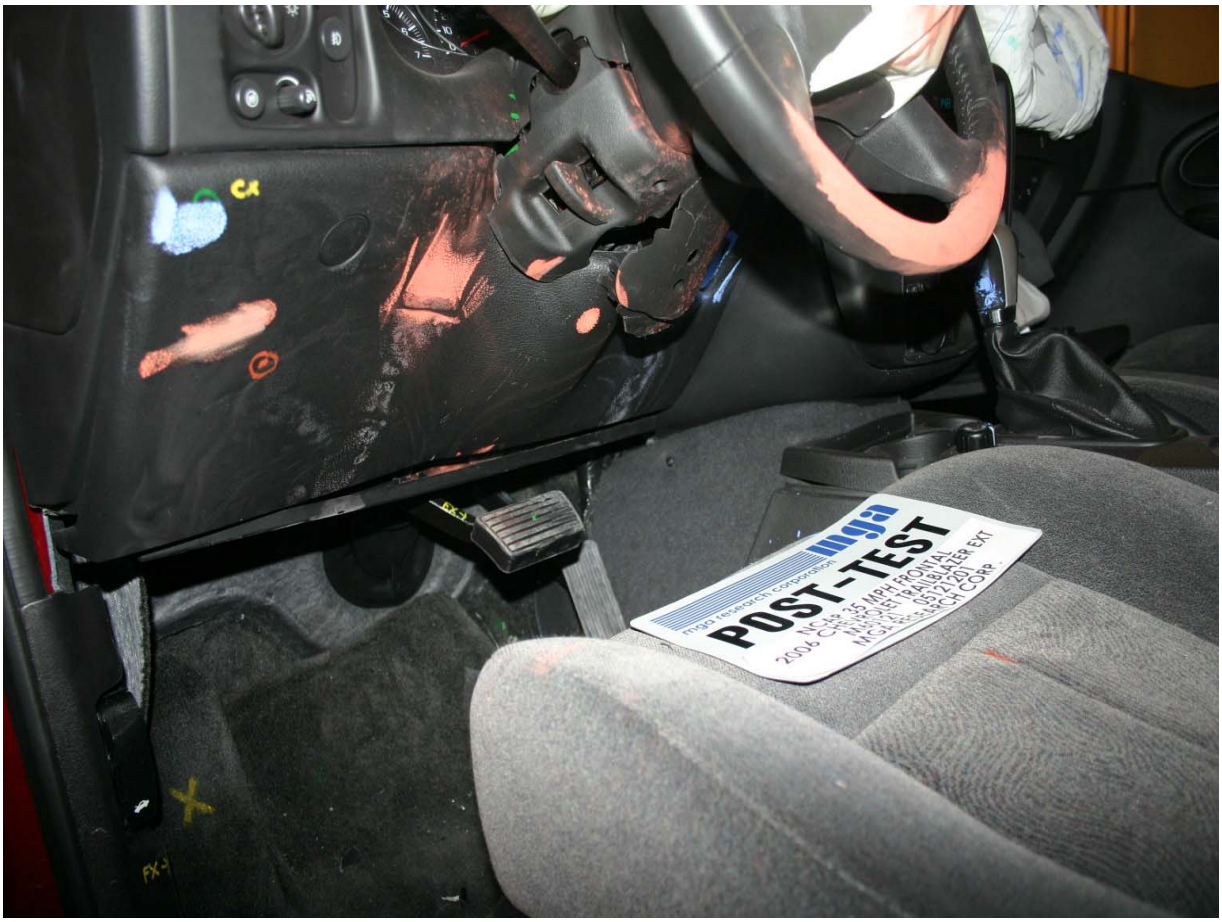
Pre-Test Driver Side Knee Bolster

Post-Test Driver Side Knee Bolster

Pre-Test Driver Side Floor Pan

Post-Test Driver Side Floor Pan

Post-Test Driver Dummy Head Contact



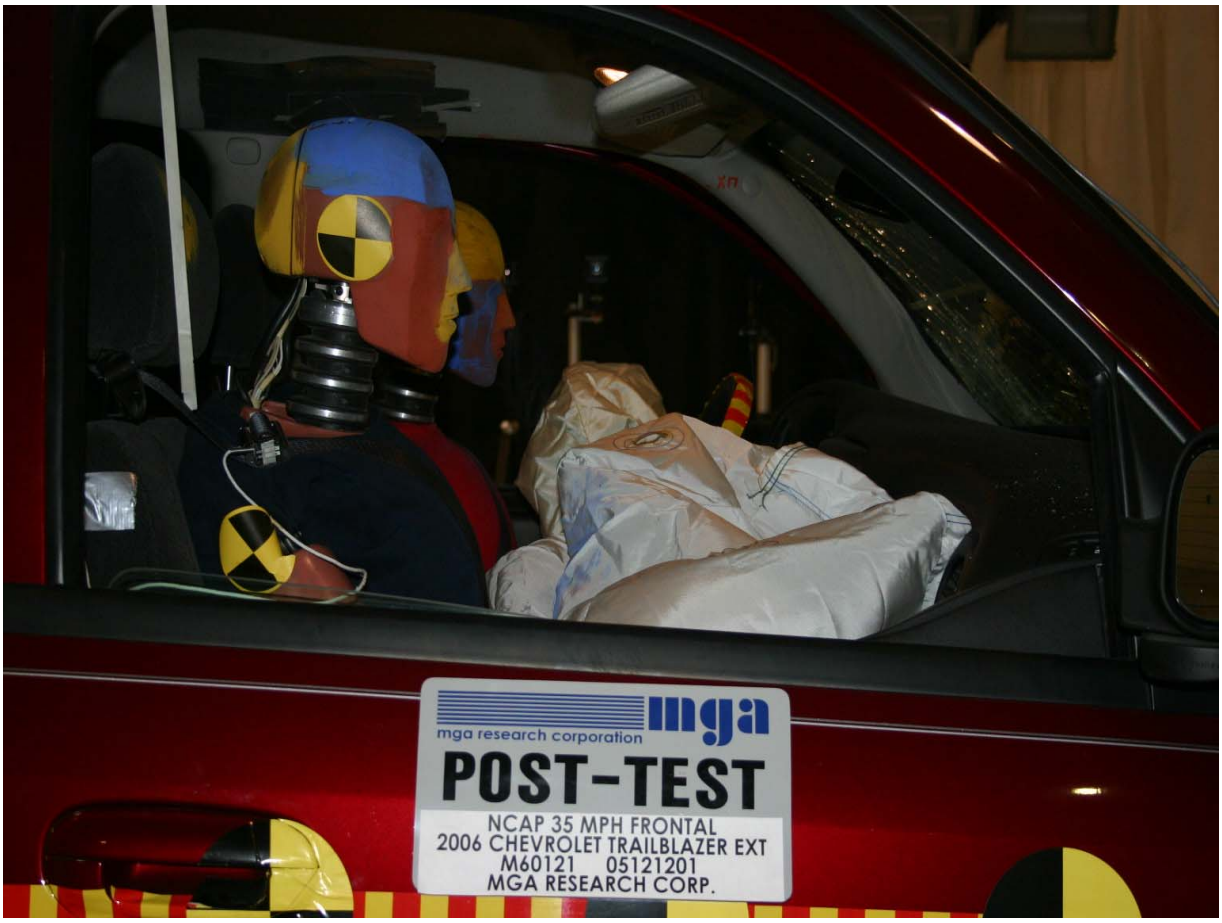
Post-Test Driver Dummy Knee Contact

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

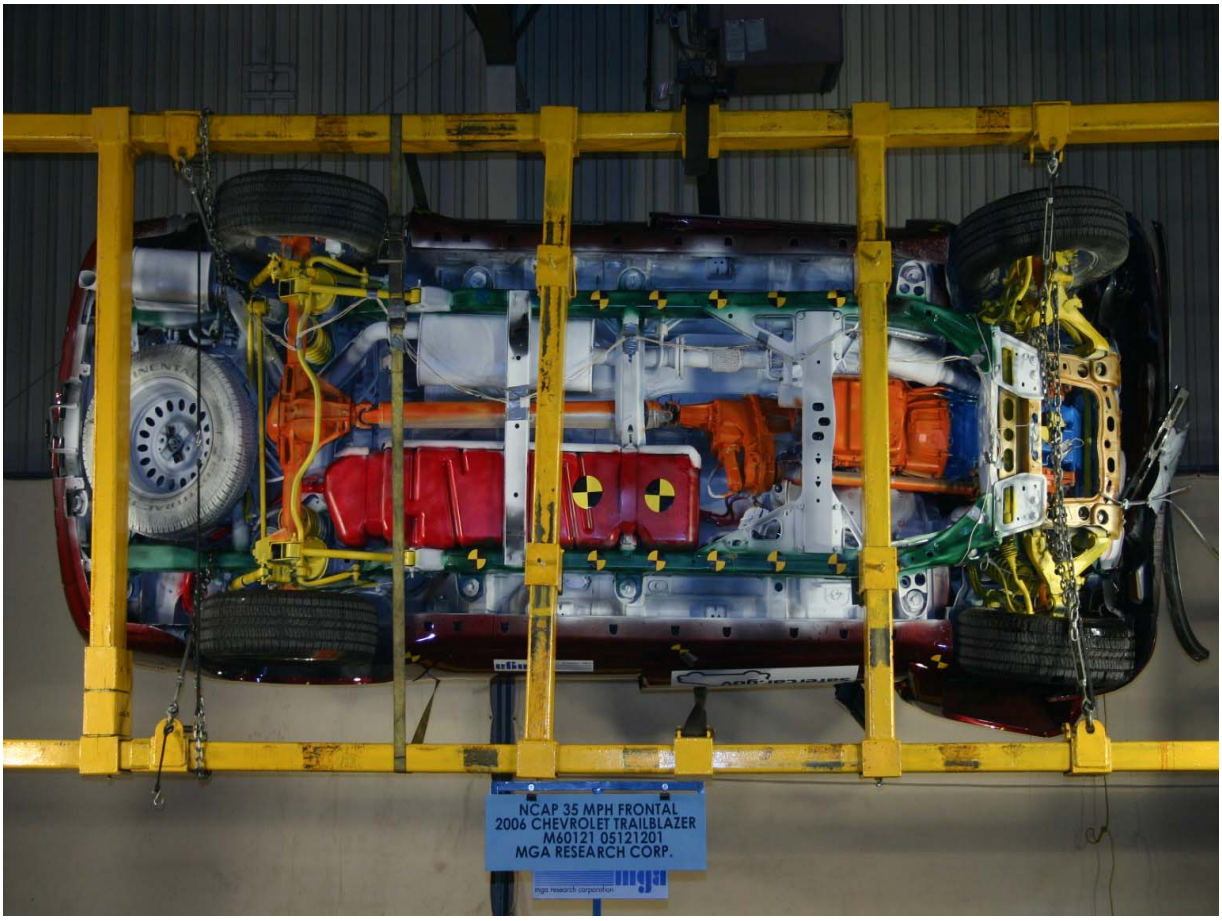
Pre-Test Passenger Side Floor Pan

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

TABLE OF DATA PLOTS

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 Right

Barrier Force – Upper Center

Barrier Force – Upper Right

Barrier Force – Lower Right

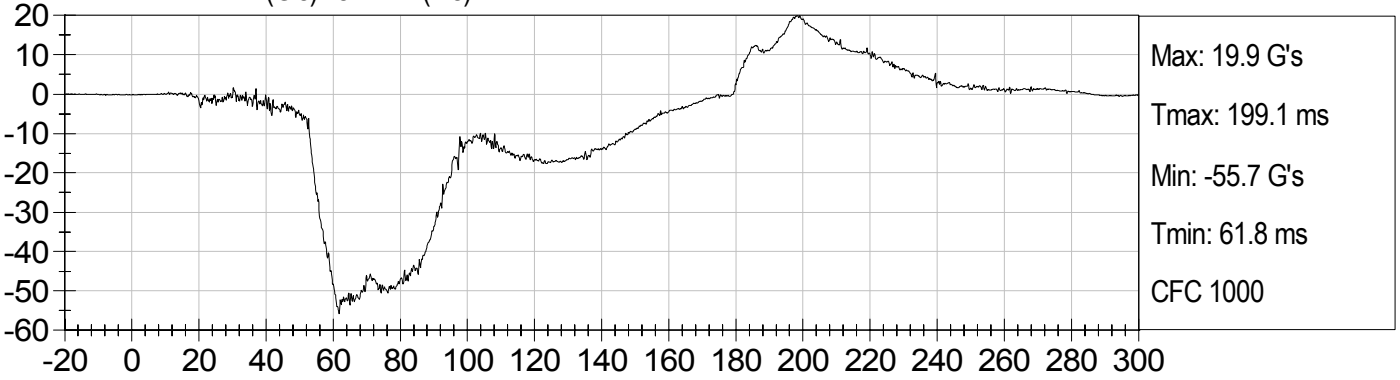
Barrier Force – Lower Center

Barrier Force – Lower Right

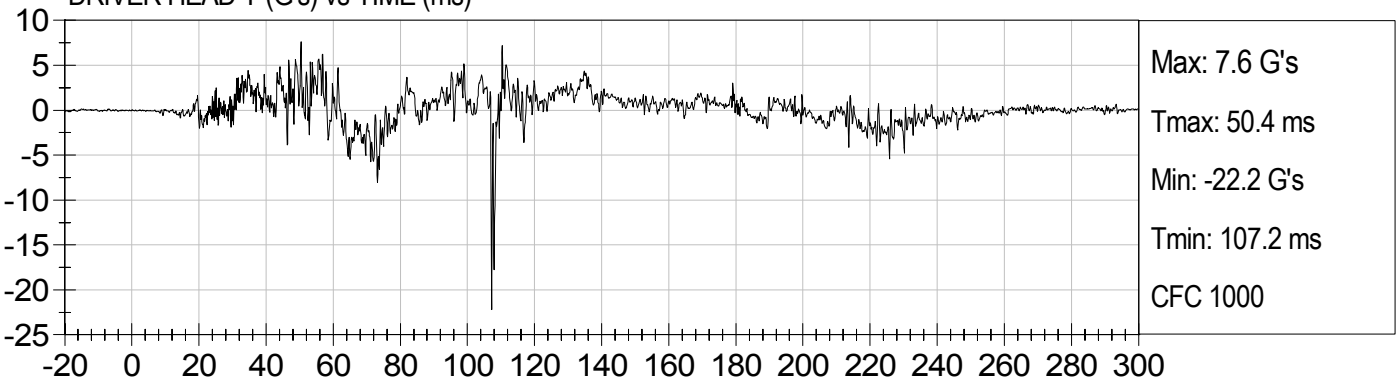
35MPH NCAP FRONTAL
2006 CHEVROLET TRAILBLAZER EXT (M60121)

Test Date: 12/12/2005
Speed: 35.2 mph (56.6 km/h)

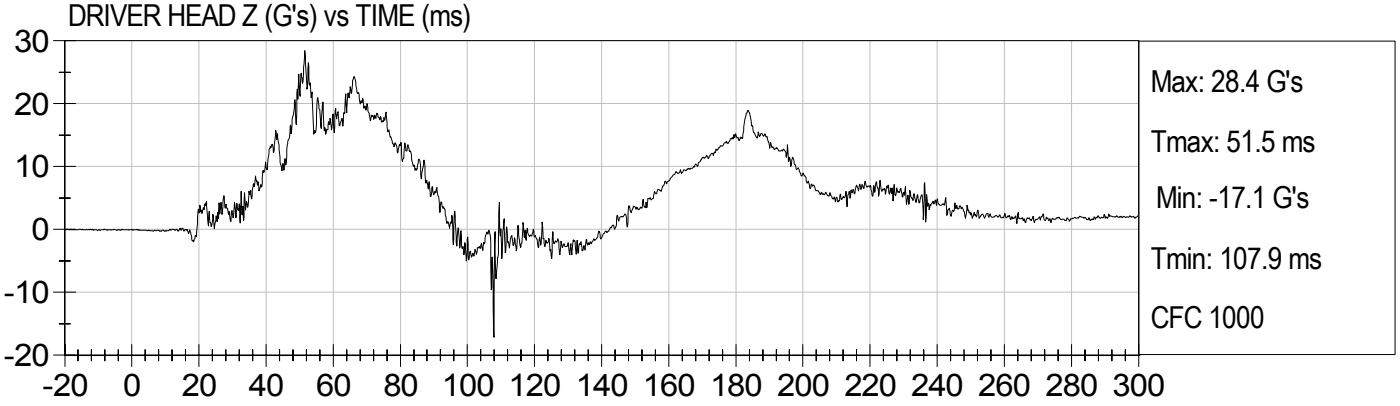
DRIVER HEAD X (G's) vs TIME (ms)



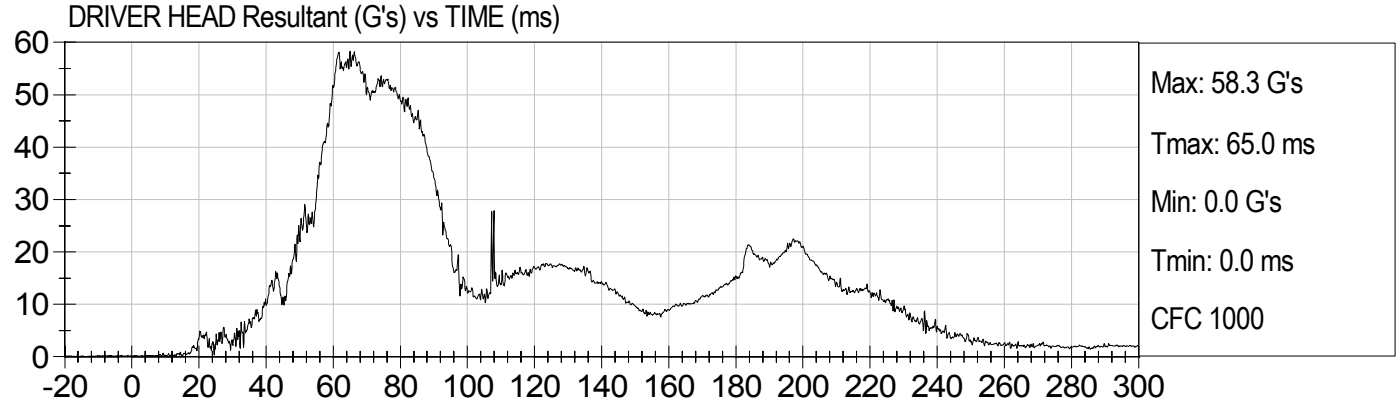
DRIVER HEAD Y (G's) vs TIME (ms)



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



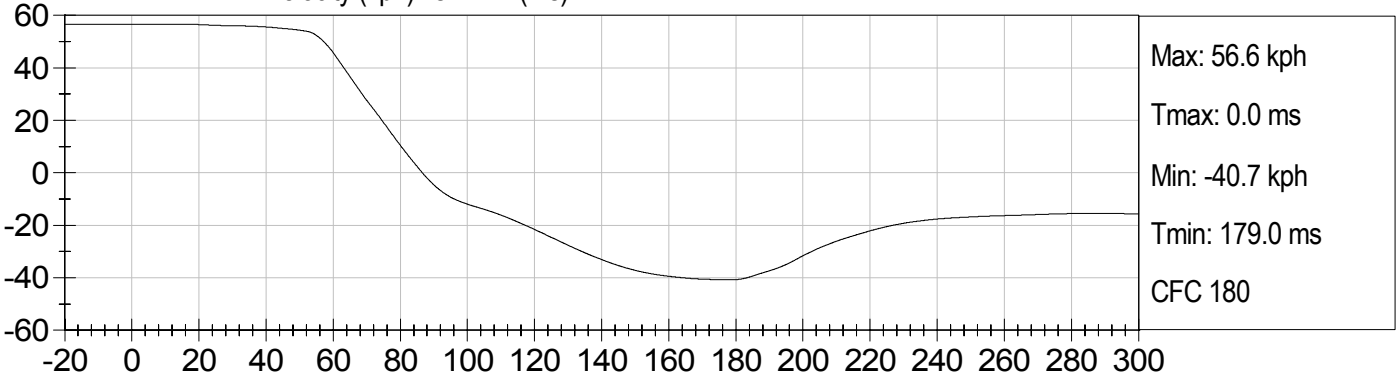
DRIVER HEAD Resultant (G's) vs TIME (ms)



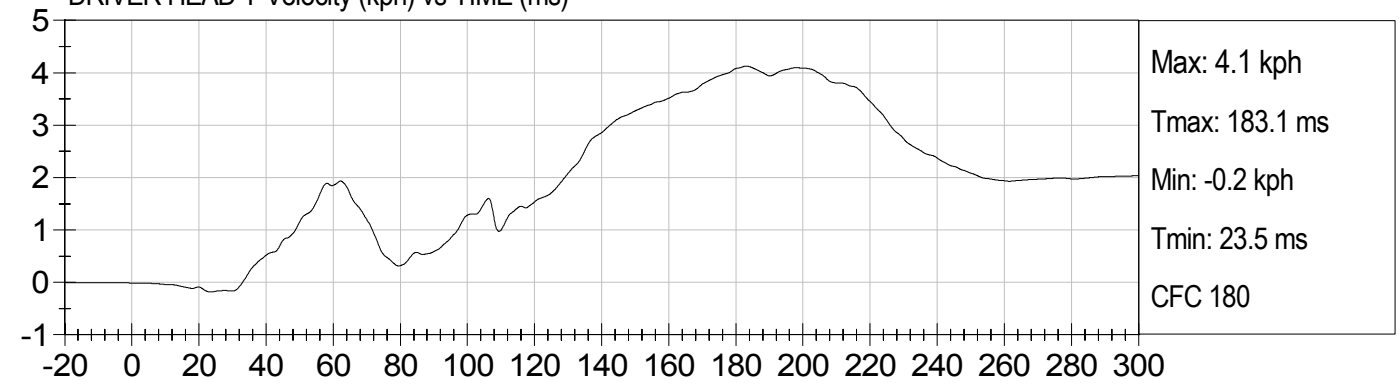
35MPH NCAP FRONTAL
2006 CHEVROLET TRAILBLAZER EXT (M60121)

Test Date: 12/12/2005
Speed: 35.2 mph (56.6 km/h)

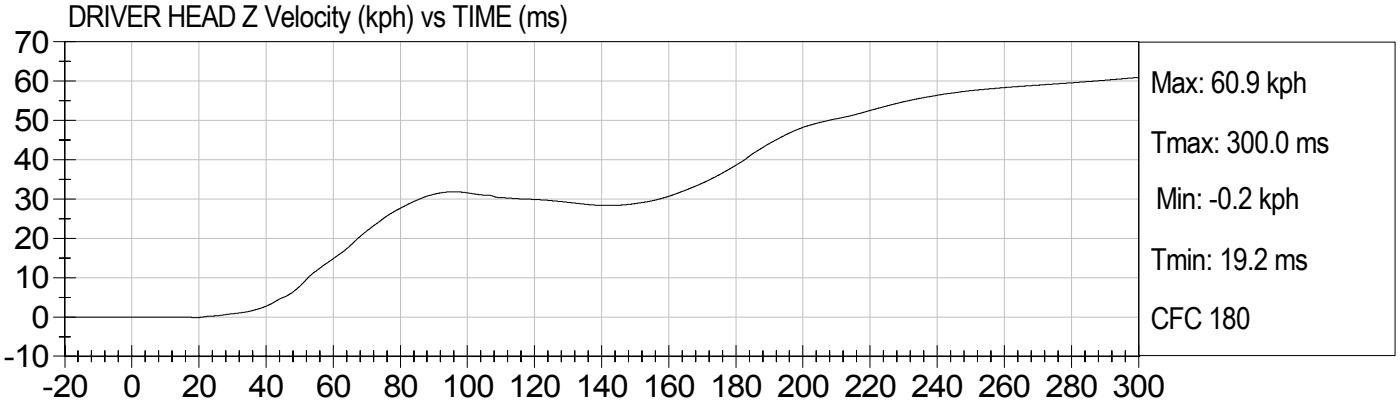
DRIVER HEAD X Velocity (kph) vs TIME (ms)



DRIVER HEAD Y Velocity (kph) vs TIME (ms)



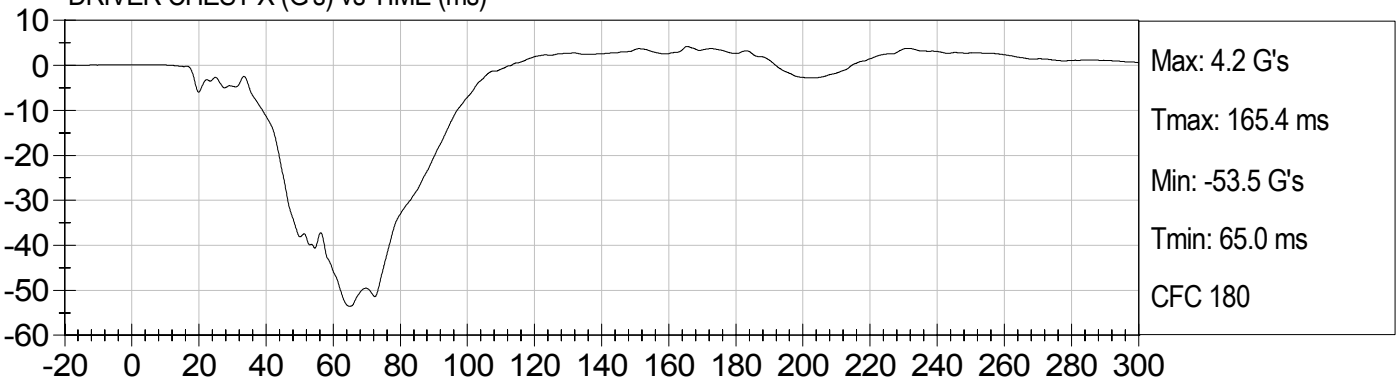
DRIVER HEAD Z Velocity (kph) vs TIME (ms)



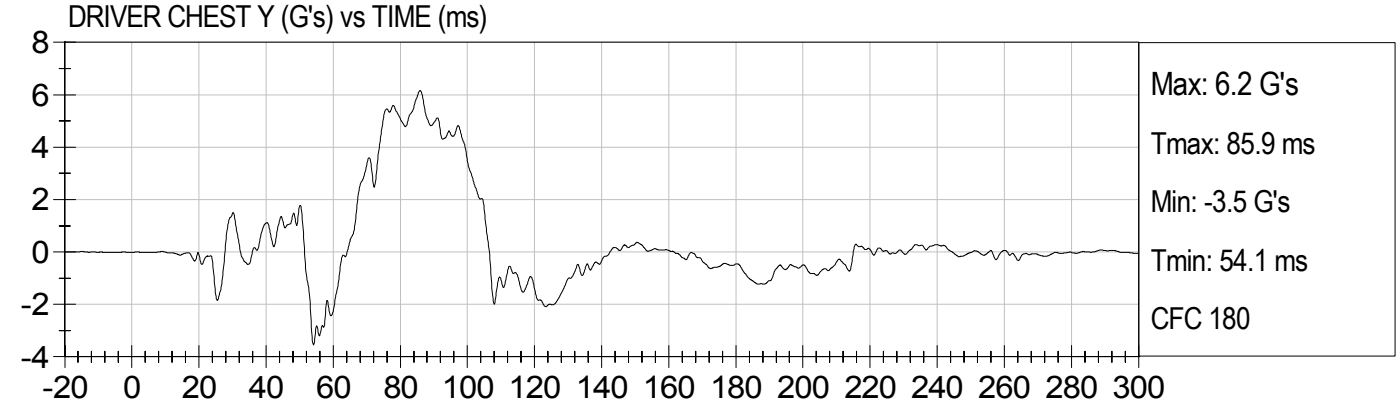
35MPH NCAP FRONTAL
2006 CHEVROLET TRAILBLAZER EXT (M60121)

Test Date: 12/12/2005
Speed: 35.2 mph (56.6 km/h)

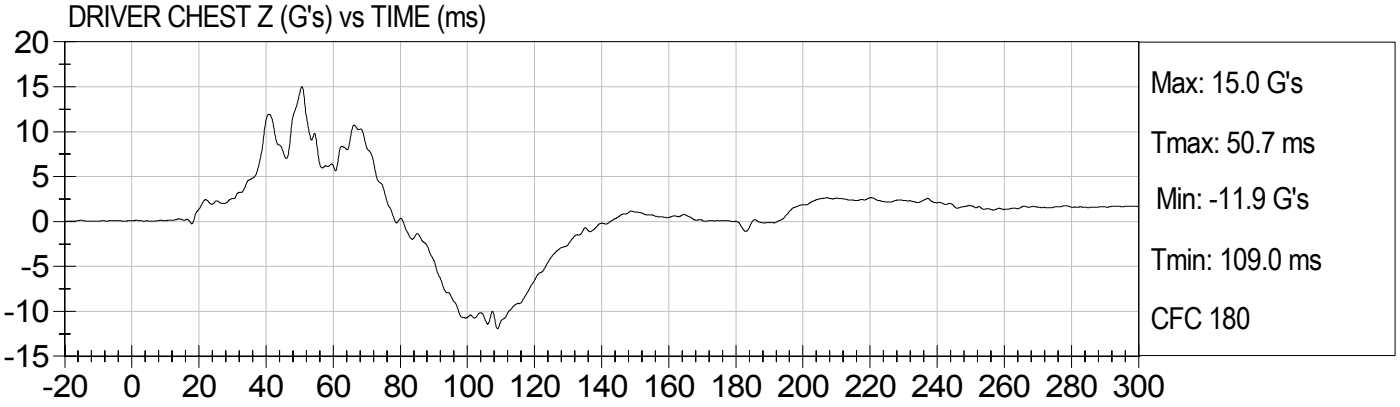
DRIVER CHEST X (G's) vs TIME (ms)



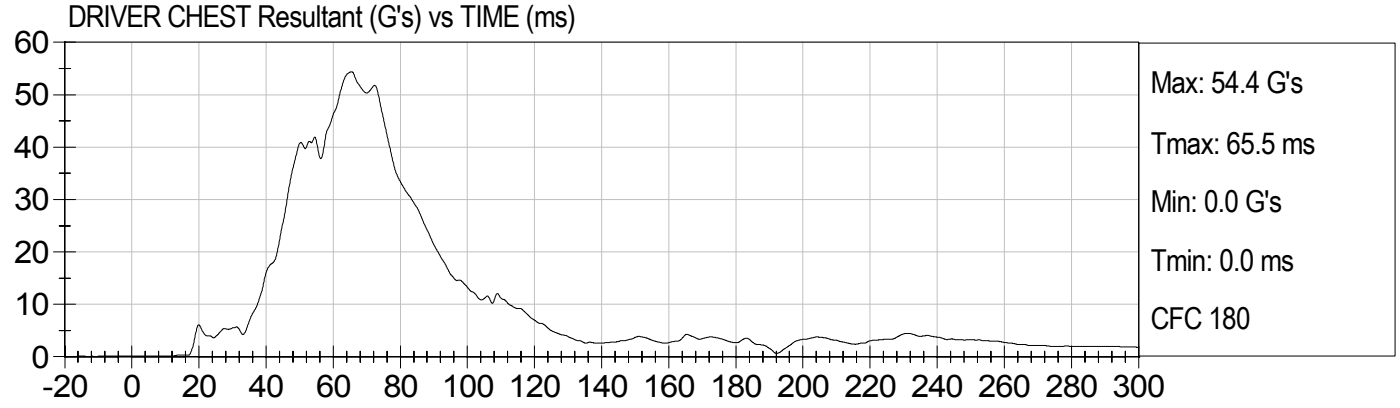
DRIVER CHEST Y (G's) vs TIME (ms)



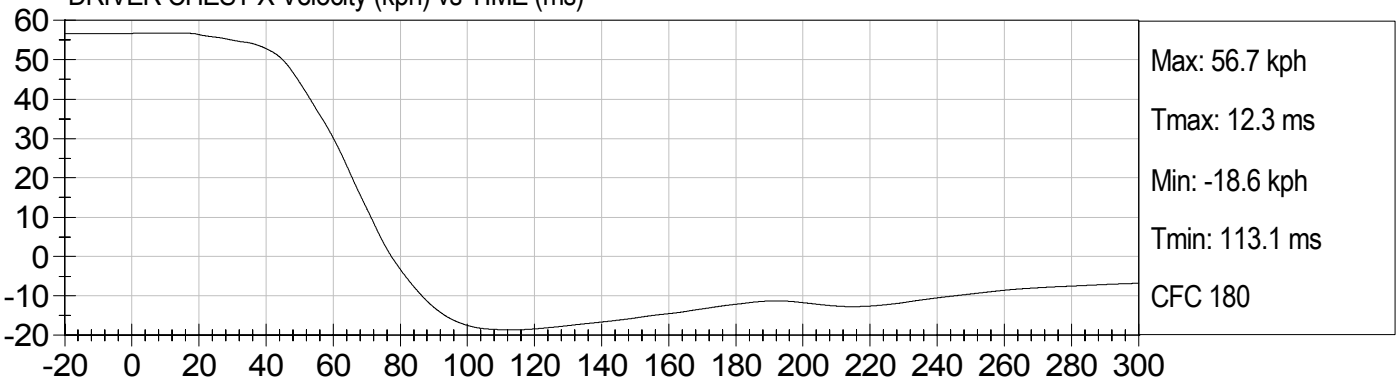
DRIVER CHEST Z (G's) vs TIME (ms)



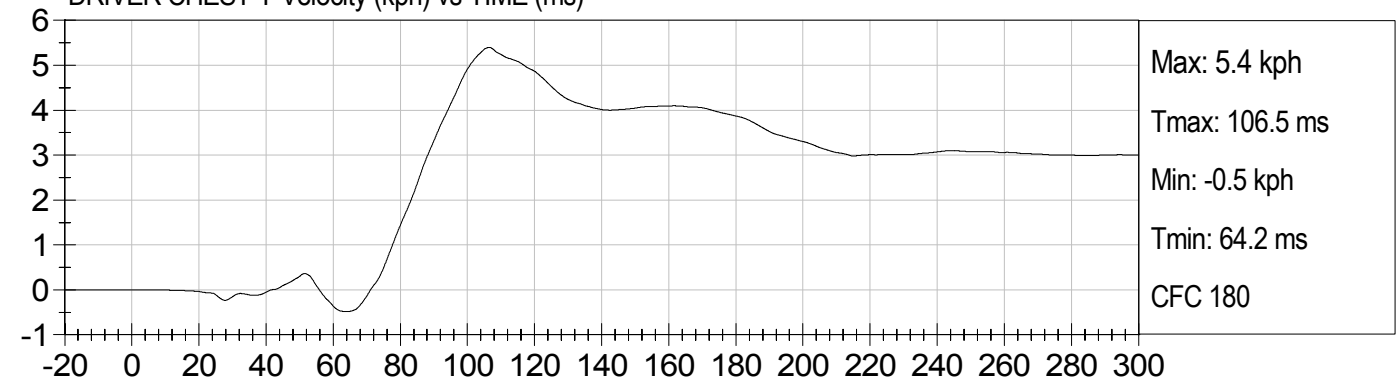
DRIVER CHEST Resultant (G's) vs TIME (ms)



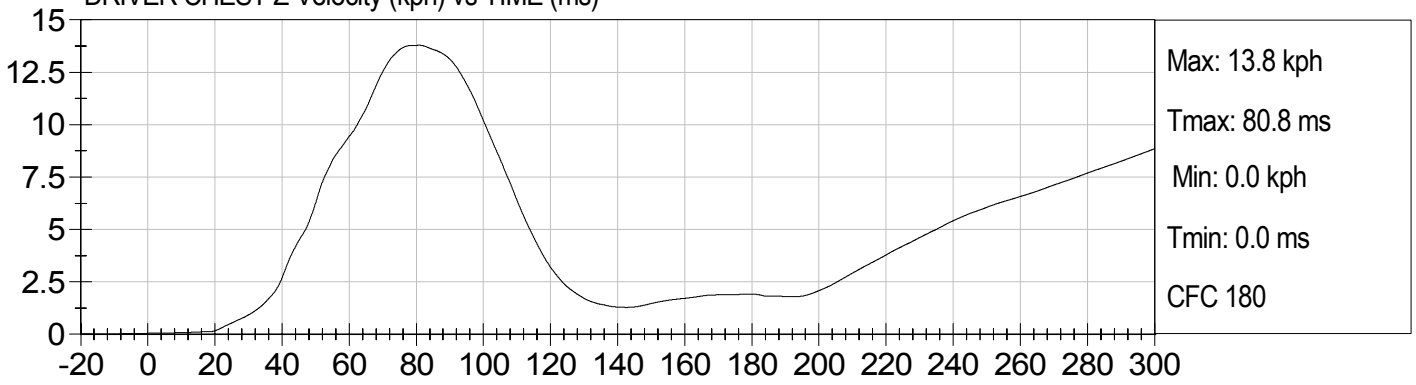
DRIVER CHEST X Velocity (kph) vs TIME (ms)



DRIVER CHEST Y Velocity (kph) vs TIME (ms)

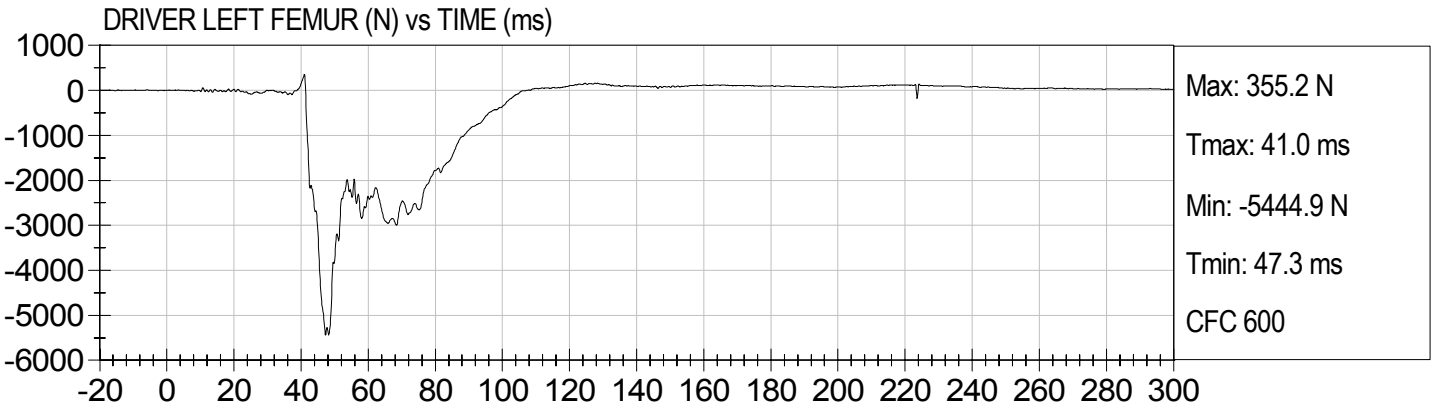


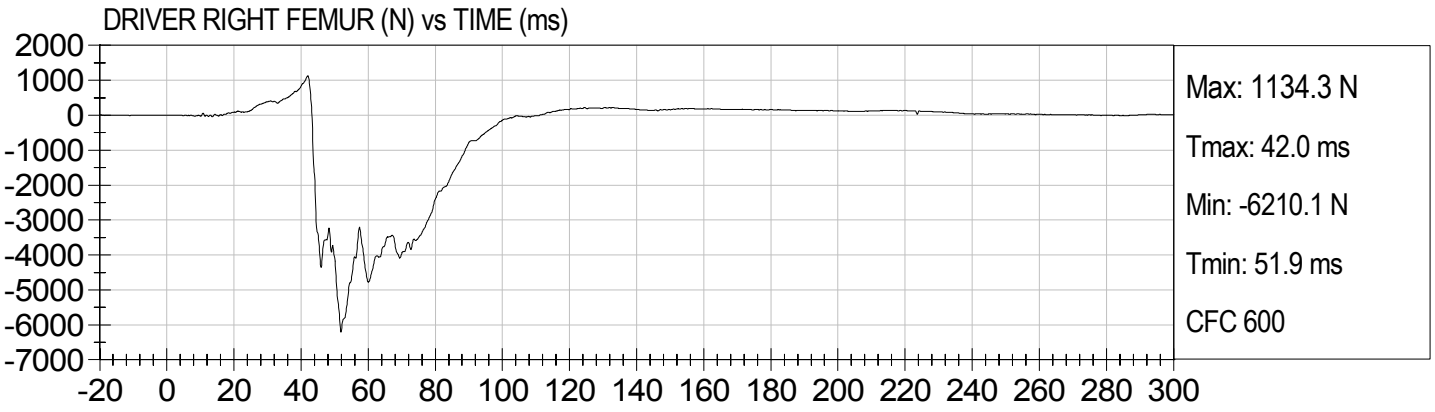
DRIVER CHEST Z Velocity (kph) vs TIME (ms)



35MPH NCAP FRONTAL
2006 CHEVROLET TRAILBLAZER EXT (M60121)

Test Date: 12/12/2005
Speed: 35.2 mph (56.6 km/h)

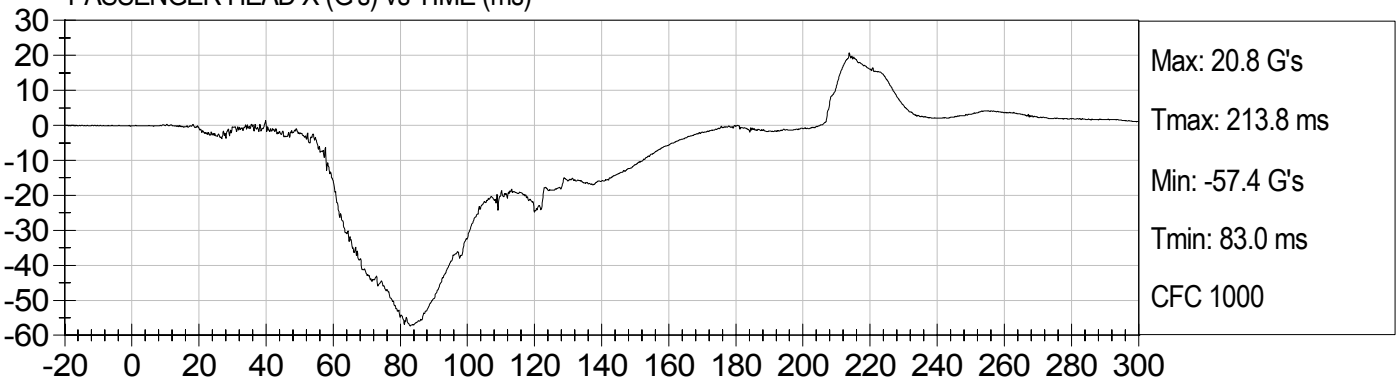




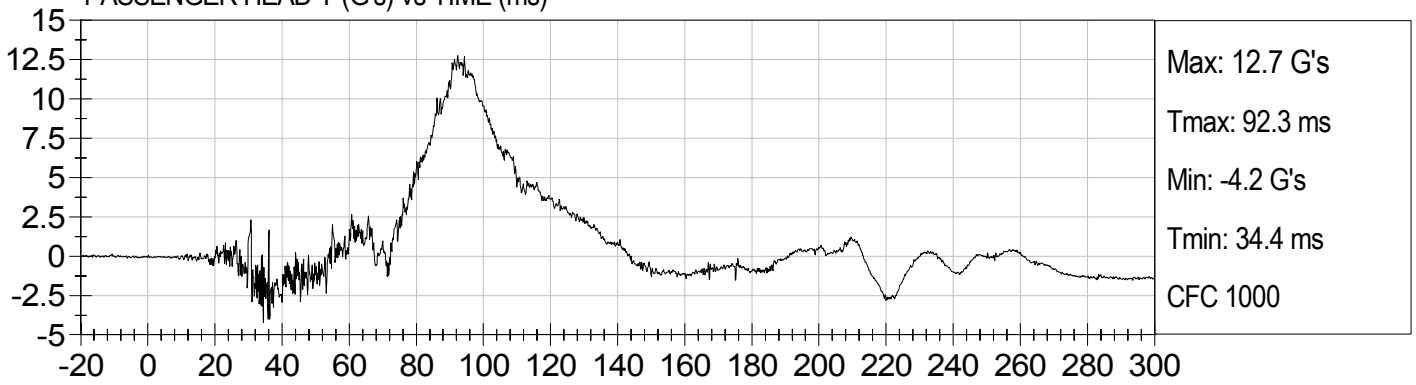
35MPH NCAP FRONTAL
2006 CHEVROLET TRAILBLAZER EXT (M60121)

Test Date: 12/12/2005
Speed: 35.2 mph (56.6 km/h)

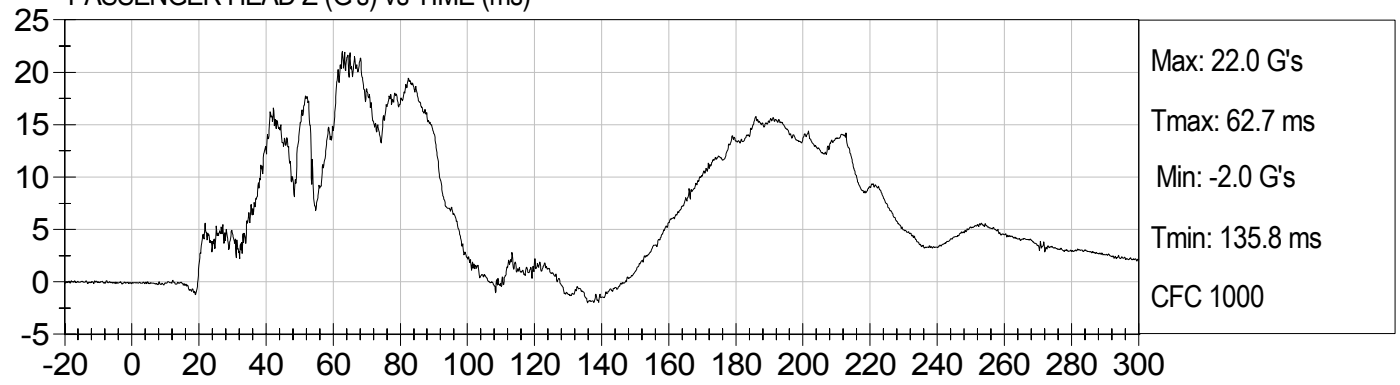
PASSENGER HEAD X (G's) vs TIME (ms)



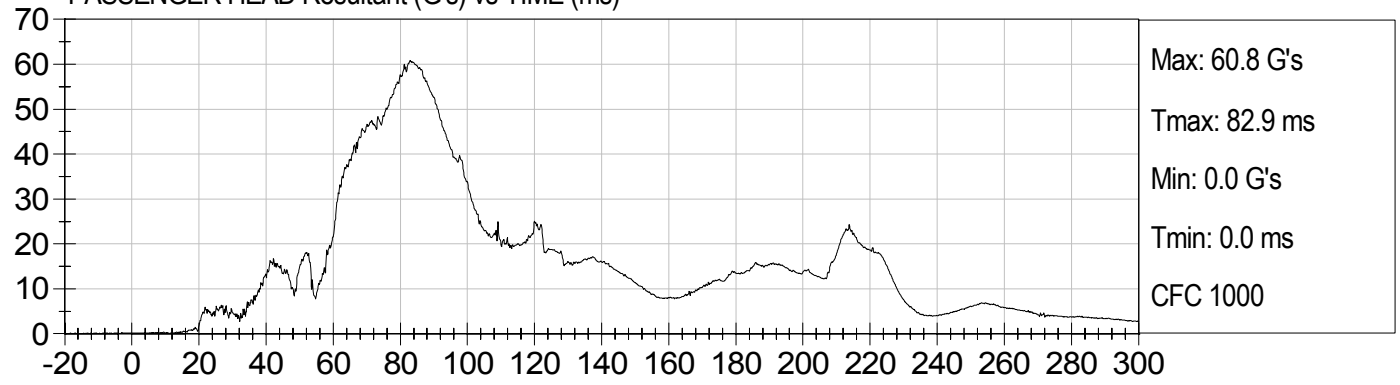
PASSENGER HEAD Y (G's) vs TIME (ms)



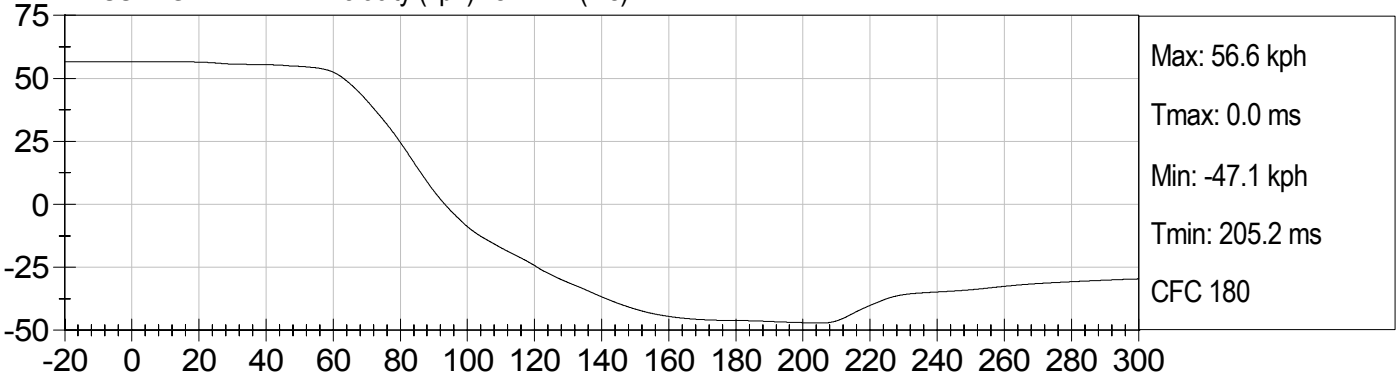
PASSENGER HEAD Z (G's) vs TIME (ms)



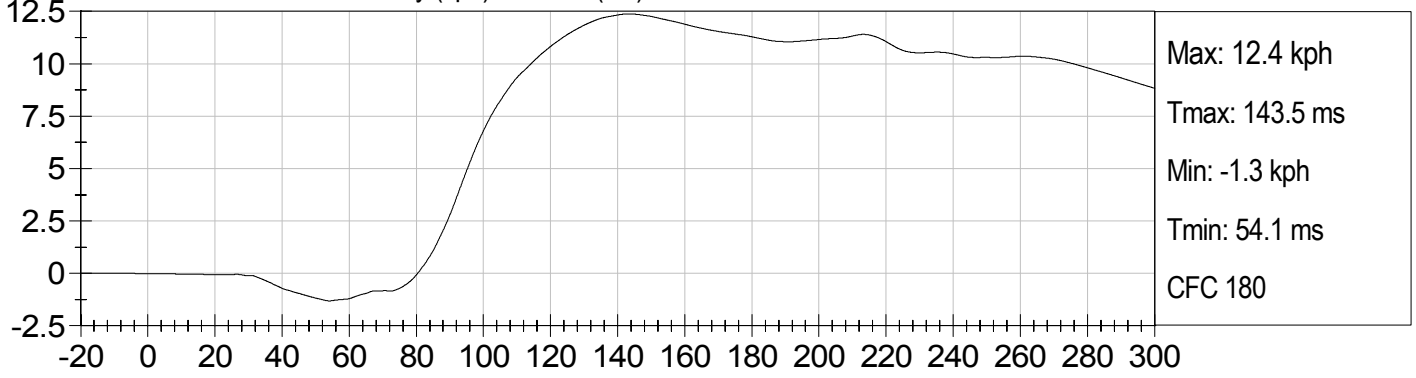
PASSENGER HEAD Resultant (G's) vs TIME (ms)



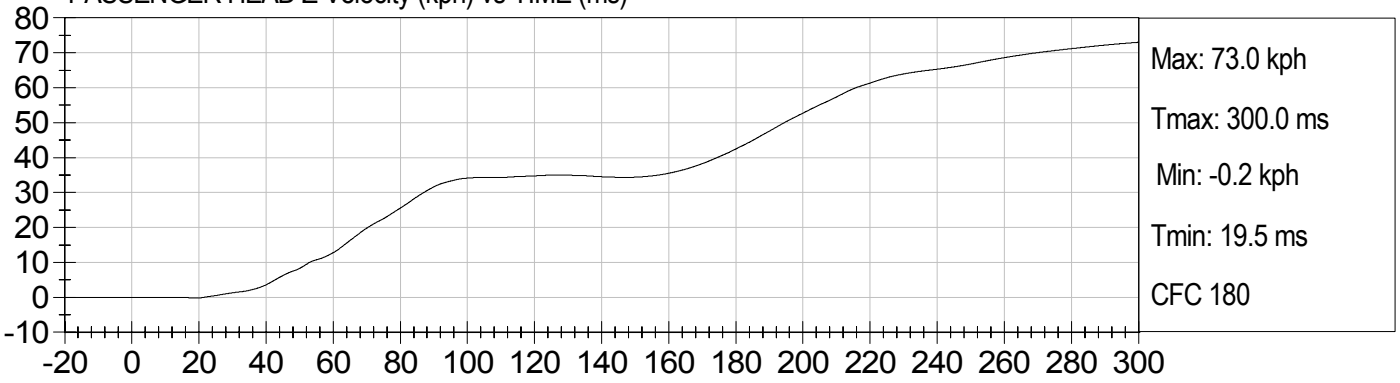
PASSENGER HEAD X Velocity (kph) vs TIME (ms)



PASSENGER HEAD Y Velocity (kph) vs TIME (ms)



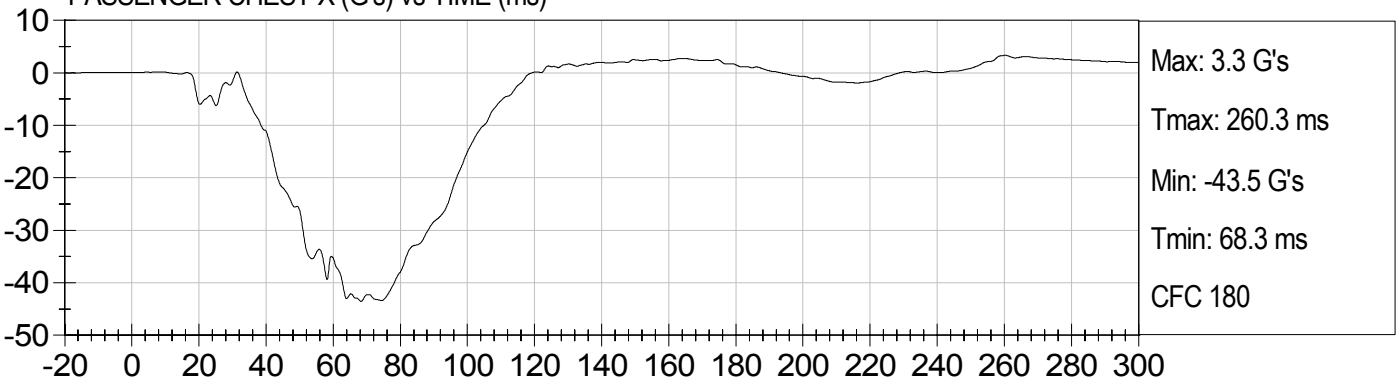
PASSENGER HEAD Z Velocity (kph) vs TIME (ms)



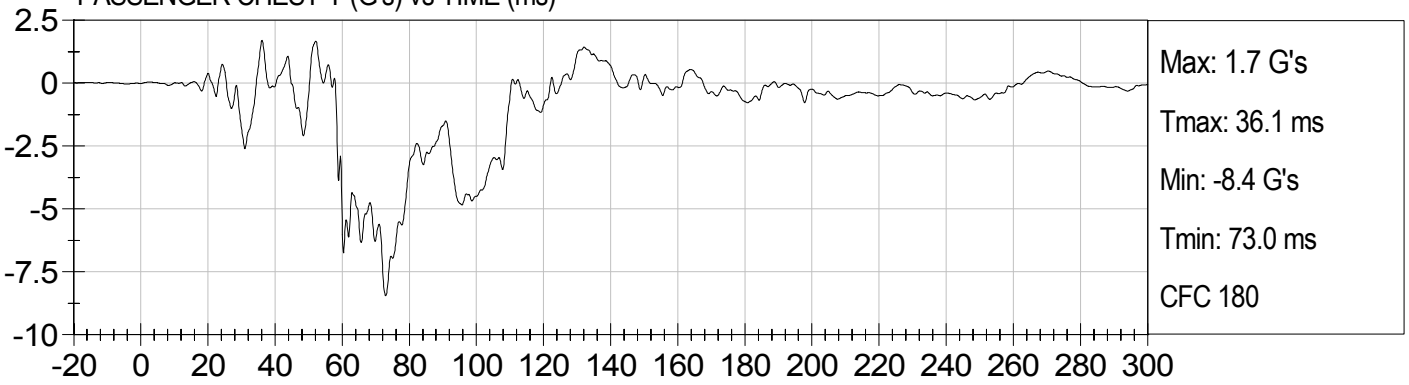
35MPH NCAP FRONTAL
2006 CHEVROLET TRAILBLAZER EXT (M60121)

Test Date: 12/12/2005
Speed: 35.2 mph (56.6 km/h)

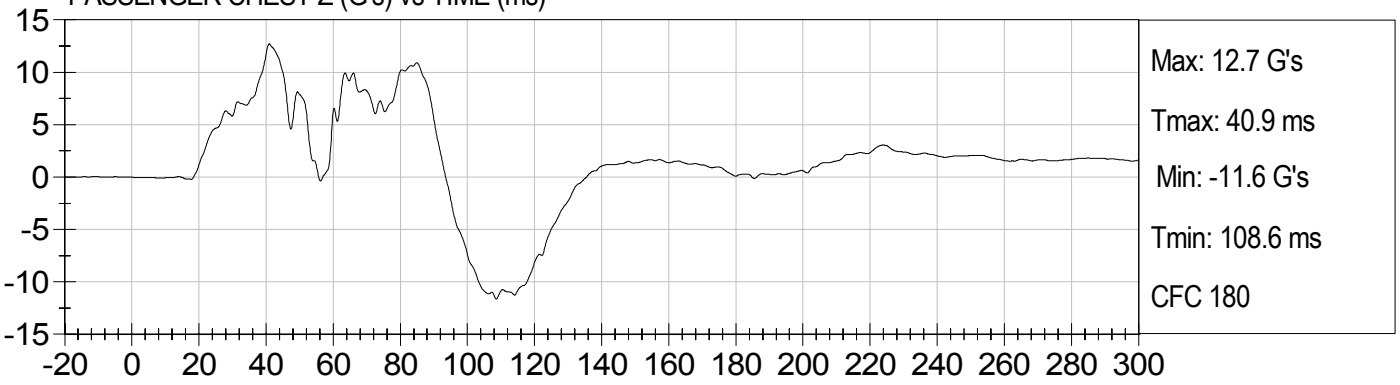
PASSENGER CHEST X (G's) vs TIME (ms)



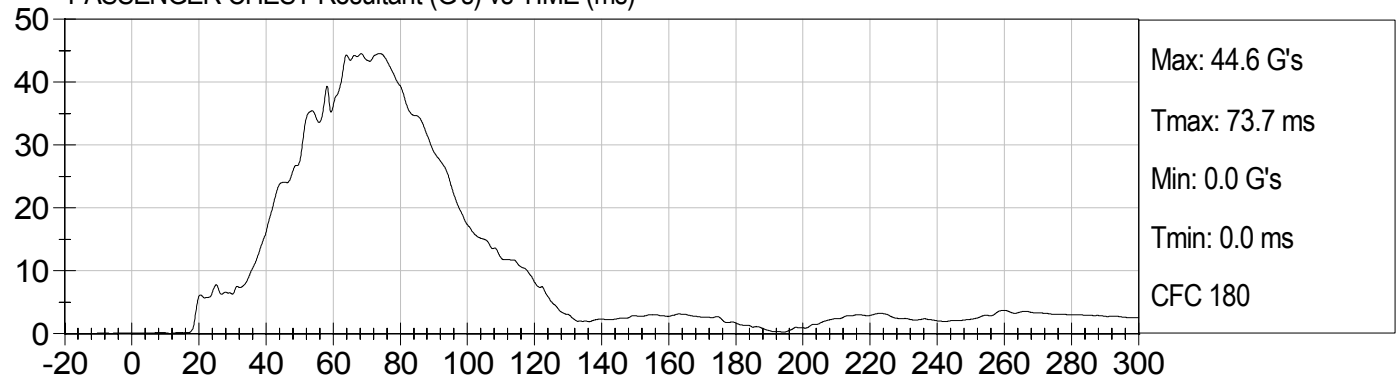
PASSENGER CHEST Y (G's) vs TIME (ms)

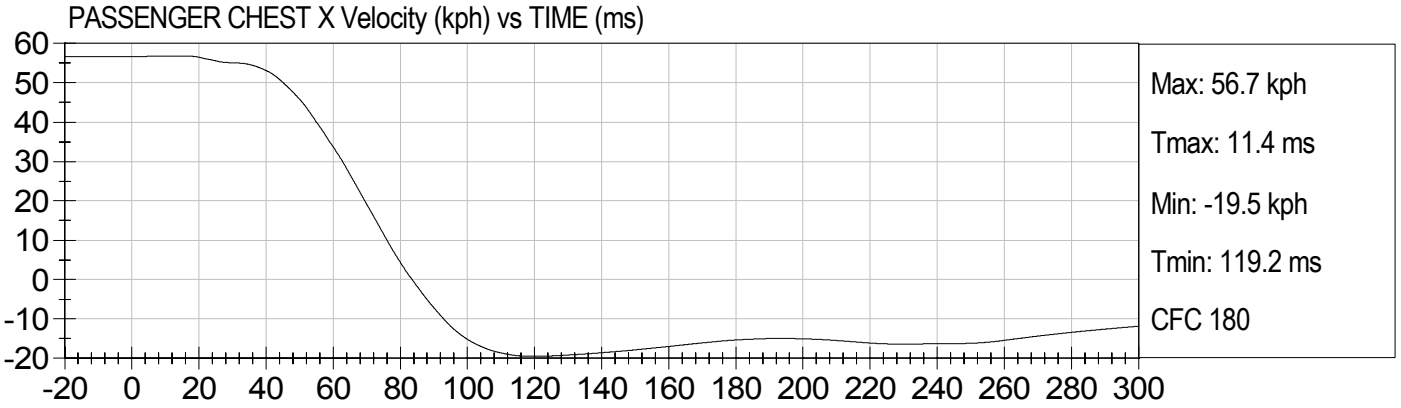


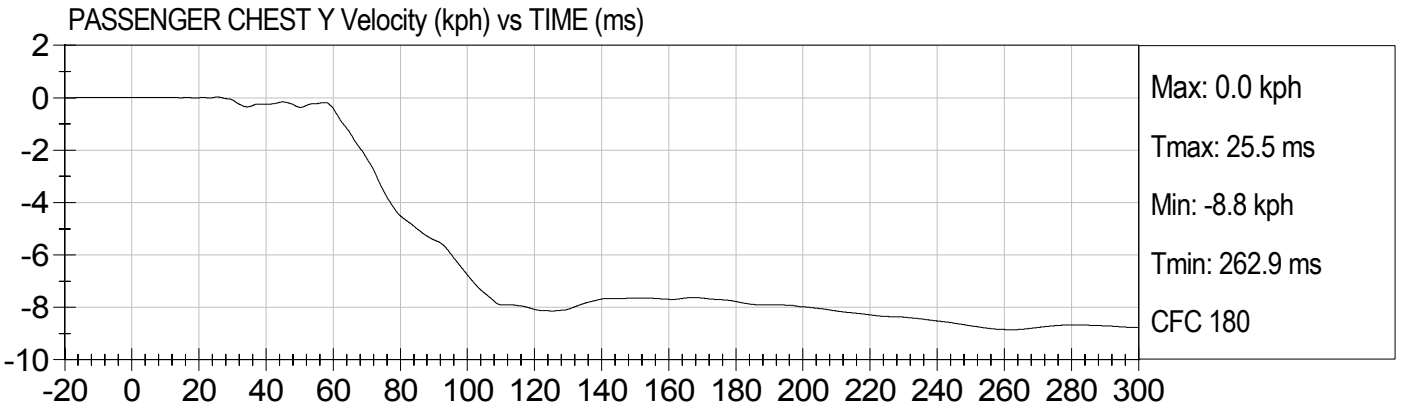
PASSENGER CHEST Z (G's) vs TIME (ms)

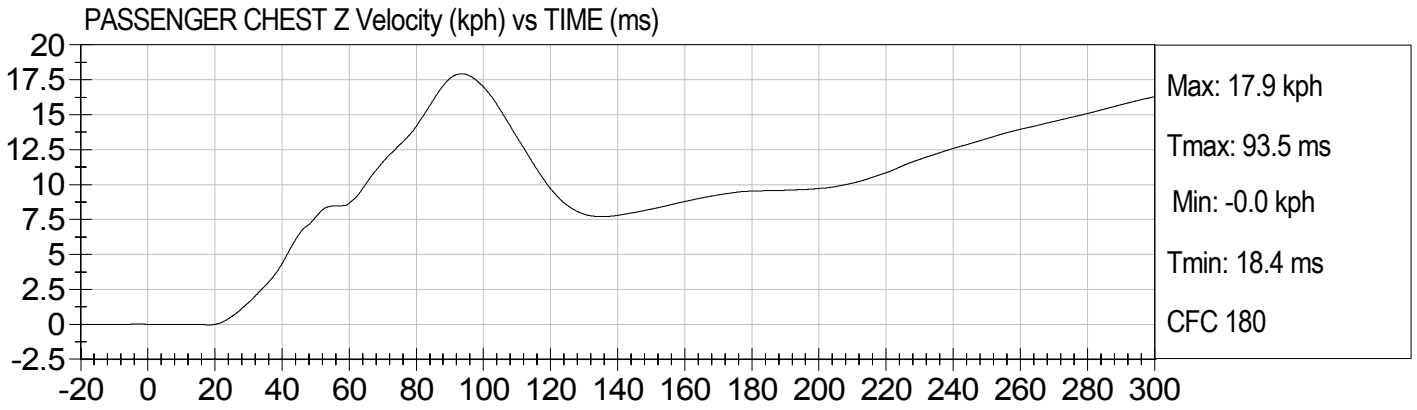


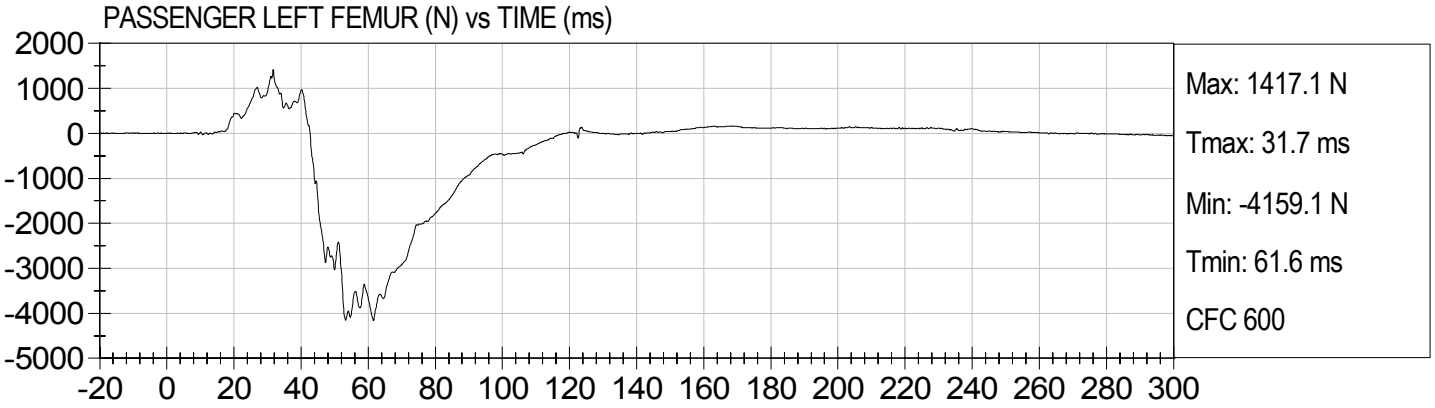
PASSENGER CHEST Resultant (G's) vs TIME (ms)

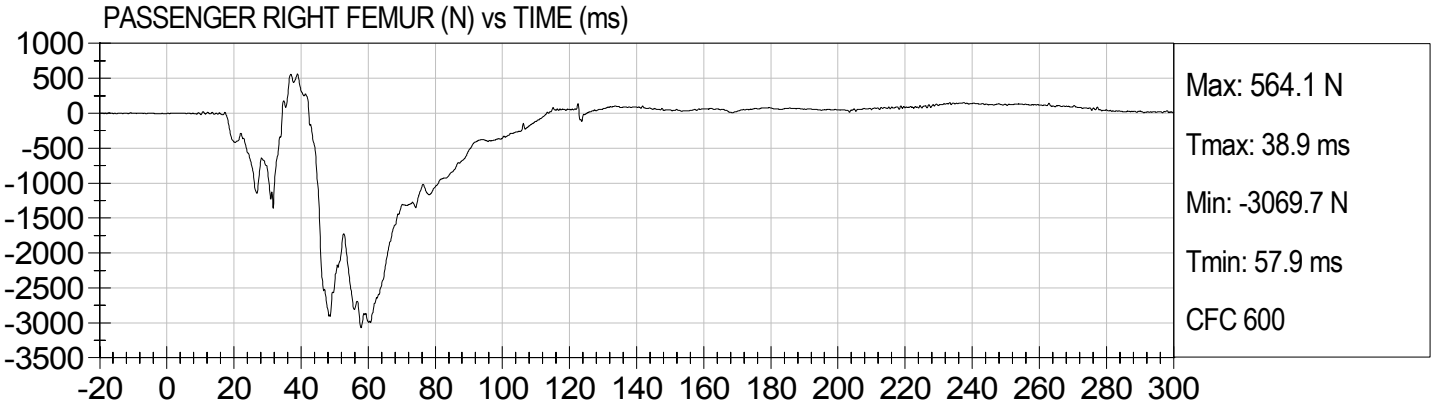



PASSENGER CHEST X Velocity (kph) vs TIME (ms)
60
50
40
30
20
10
0
-10
-20
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 56.7 kph
Tmax: 11.4 ms
Min: -19.5 kph
Tmin: 119.2 ms
CFC 180


PASSENGER CHEST Y Velocity (kph) vs TIME (ms)
2
0
-2
-4
-6
-8
-10
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 0.0 kph
Tmax: 25.5 ms
Min: -8.8 kph
Tmin: 262.9 ms
CFC 180


PASSENGER CHEST Z Velocity (kph) vs TIME (ms)
20
17.5
15
12.5
10
7.5
5
2.5
0
-2.5
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 17.9 kph
Tmax: 93.5 ms
Min: -0.0 kph
Tmin: 18.4 ms
CFC 180


PASSENGER LEFT FEMUR (N) vs TIME (ms)
2000
1000
0
-1000
-2000
-3000
-4000
-5000
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 1417.1 N
Tmax: 31.7 ms
Min: -4159.1 N
Tmin: 61.6 ms
CFC 600


PASSENGER RIGHT FEMUR (N) vs TIME (ms)
1000
500
0
-500
-1000
-1500
-2000
-2500
-3000
-3500
-20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
Max: 564.1 N
Tmax: 38.9 ms
Min: -3069.7 N
Tmin: 57.9 ms
CFC 600

APPENDIX C

DUMMY CALIBRATION DATA

MGA RESEARCH CORPORATION

HEAD DROP TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 065 **Test ID:** D053011

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	20.3	Pass
Laboratory Relative Humidity	%	10 to 70	18.3	Pass
Peak Resultant Acceleration	G's	225 - 275	234	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	13.3	Pass
Unimodal	Yes/No	NA	Yes	Pass
Oscillations	Yes/No	within 10% of peak	Yes	Pass
		Overall Test Results		Pass

Tim Brady
Laboratory Technician

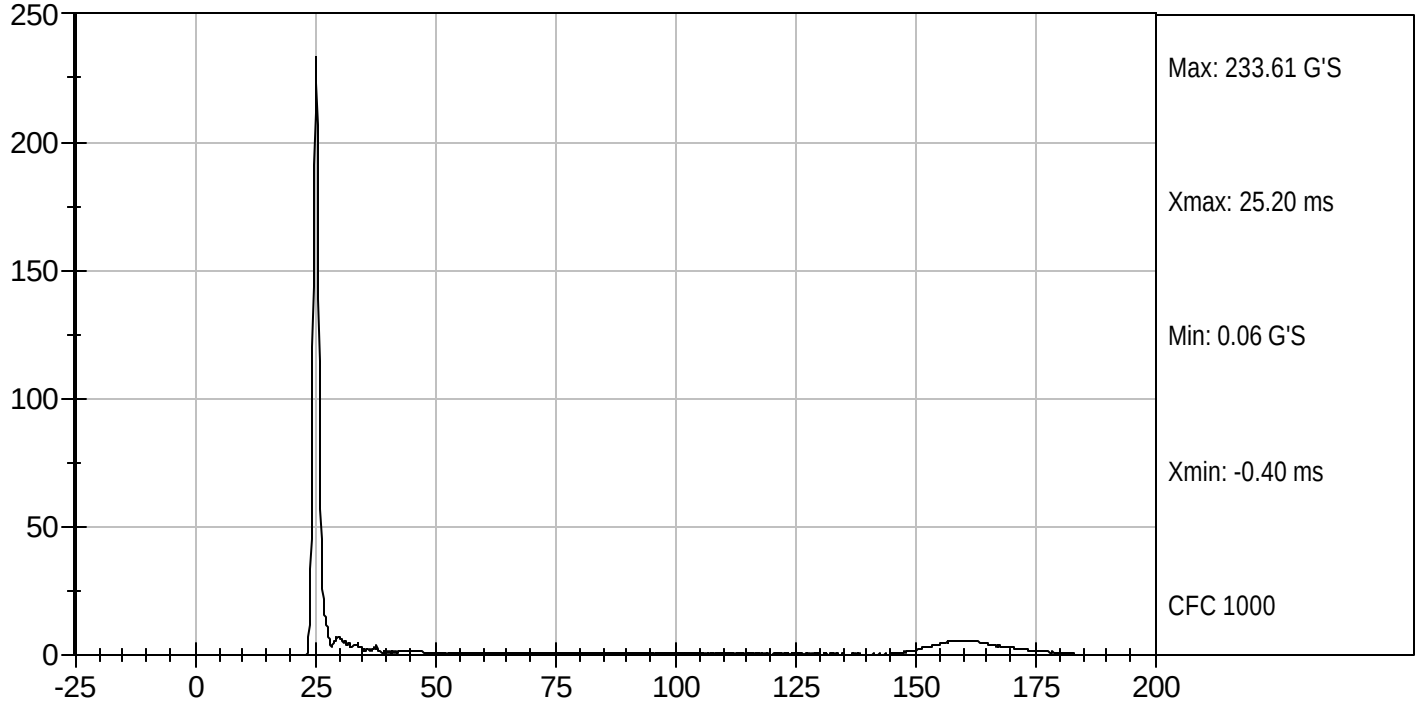
11/16/2005
Test Date

David Winkelbauer
Approved By

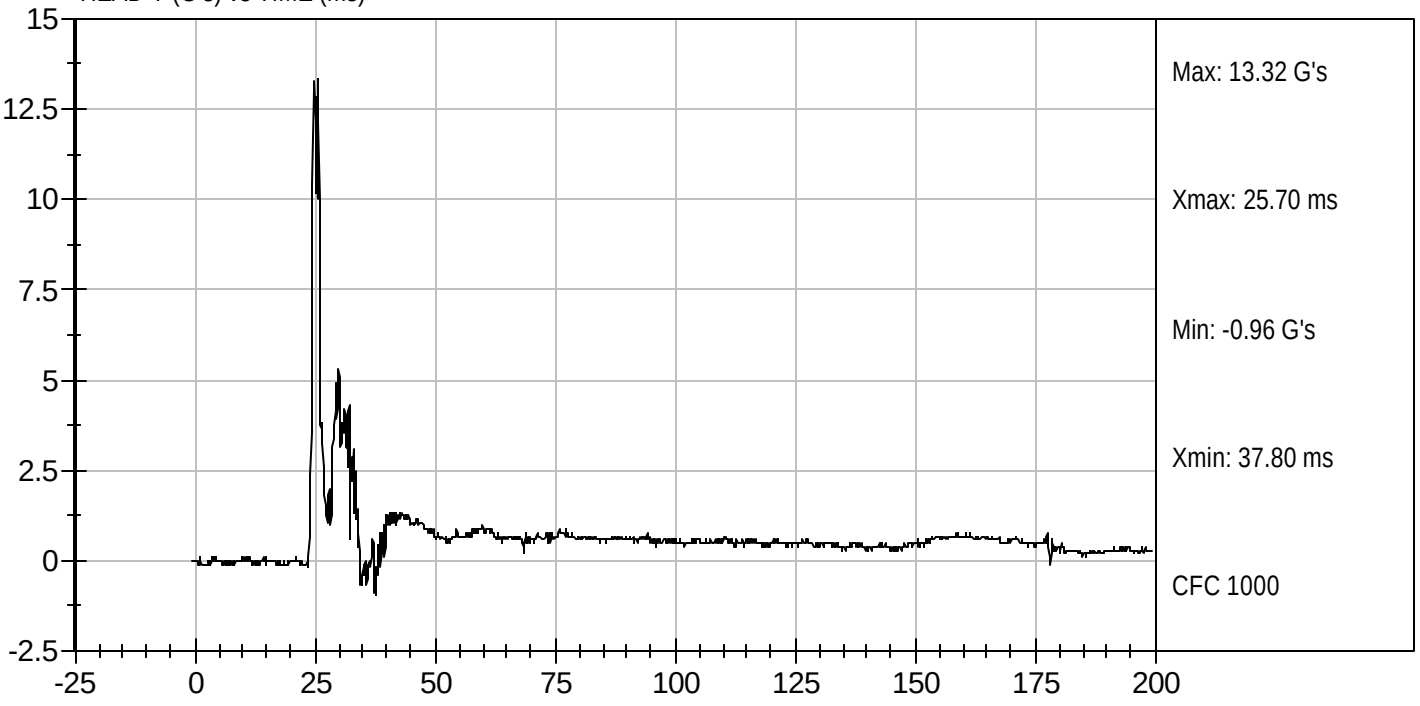
Test Desc: Head Drop
Componet ID: D053011

Test Date: 11/16/2005
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: 065 **Test I.D:** D053012

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	19	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 msec	G's	22.50 to 27.50	24.59	Pass
	20 msec	G's	17.60 to 22.60	20.44	Pass
	30 msec	G's	12.50 to 18.50	15.31	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 29.0	15.26	Pass
Deceleration Decay Time to Cross 5 G's		msec	34.0 to 42.0	36.5	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	71.5	Pass
	Time	msec	57.0 to 64.0	58.8	Pass
"D" Plane Rotation Decay Time To Zero Crossing		msec	113.0 to 128.0	113.6	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	96.7	Pass
	Time	msec	47.0 to 58.0	49.9	Pass
Positive Moment Decay Time To Zero Crossing		msec	97.0 to 107.0	103.1	Pass
			Overall Test Results		Pass

Laboratory Technician

11/16/2005
Test Date

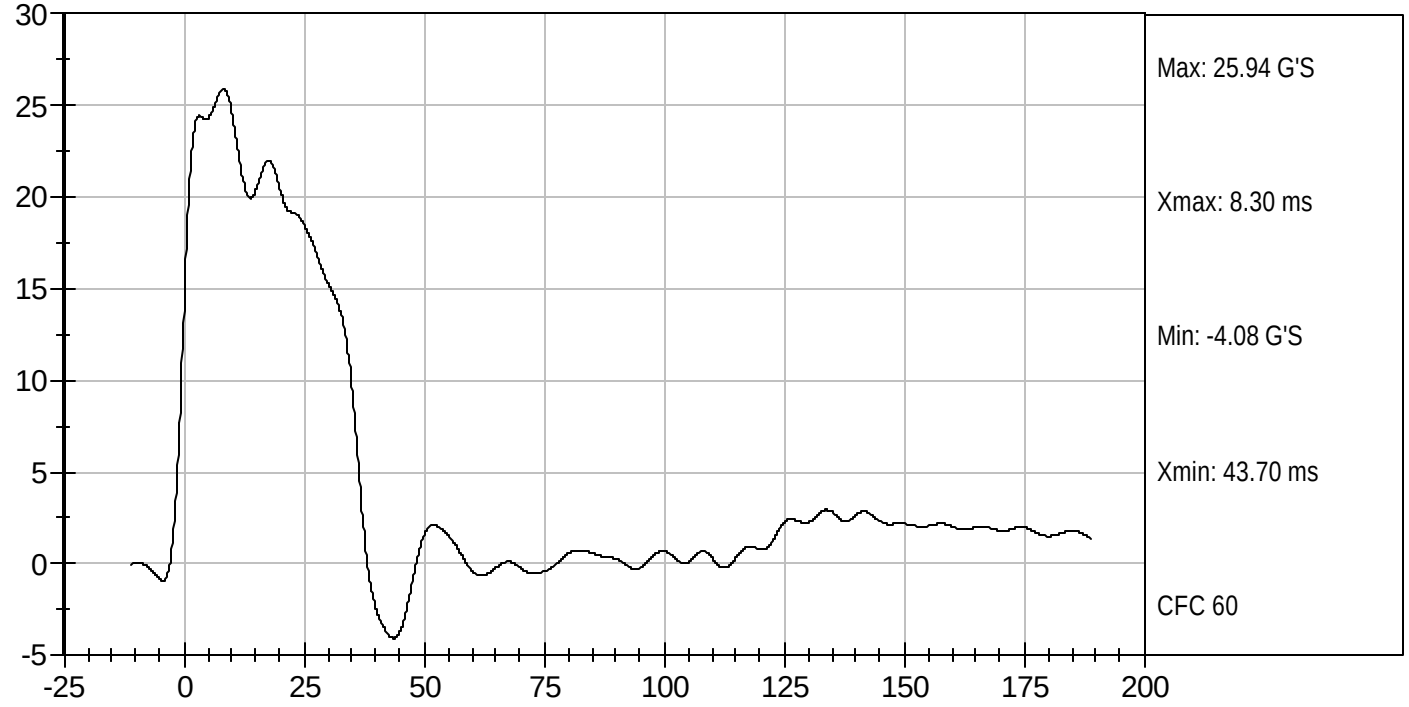
David Winkelbauer

Approved By

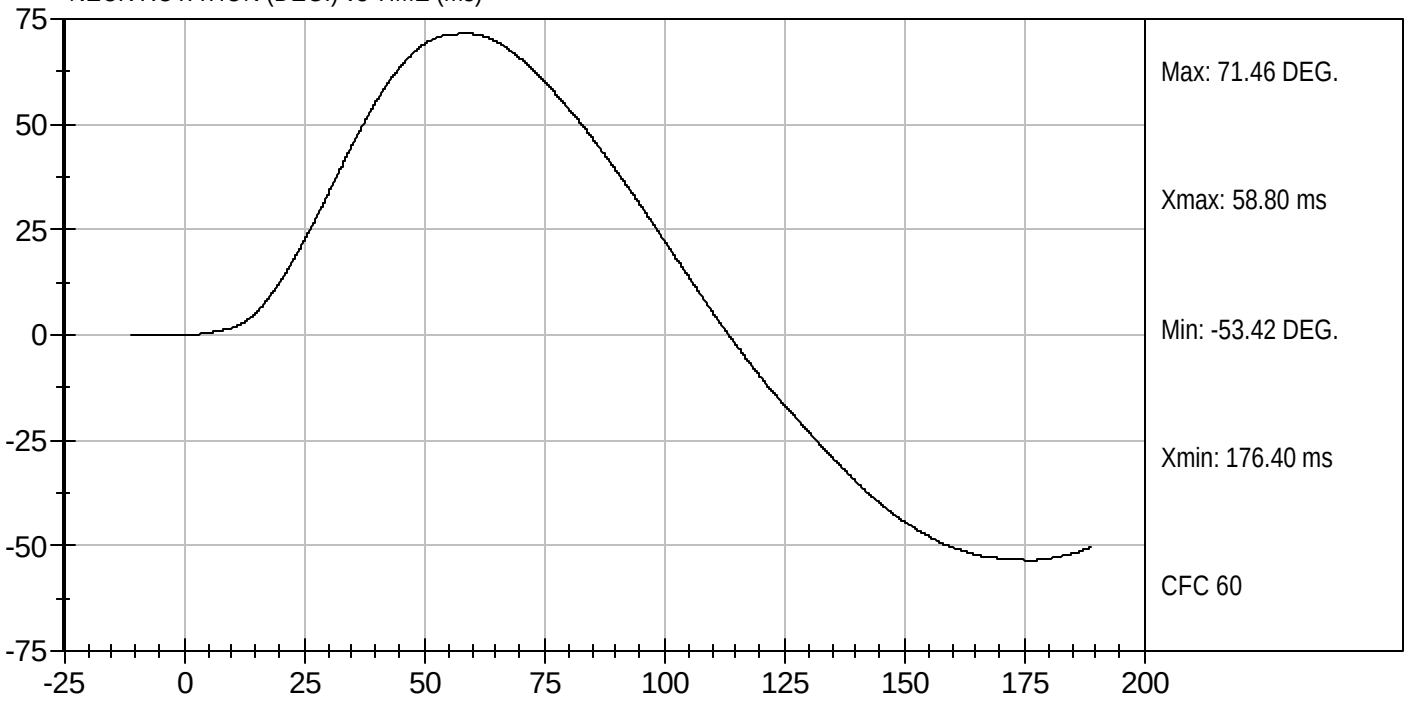
Test Desc: Neck Flexion
Componet ID: D053012

Test Date: 11/16/2005
Velocity: 23.17 ft/s, 7.06 m/s

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

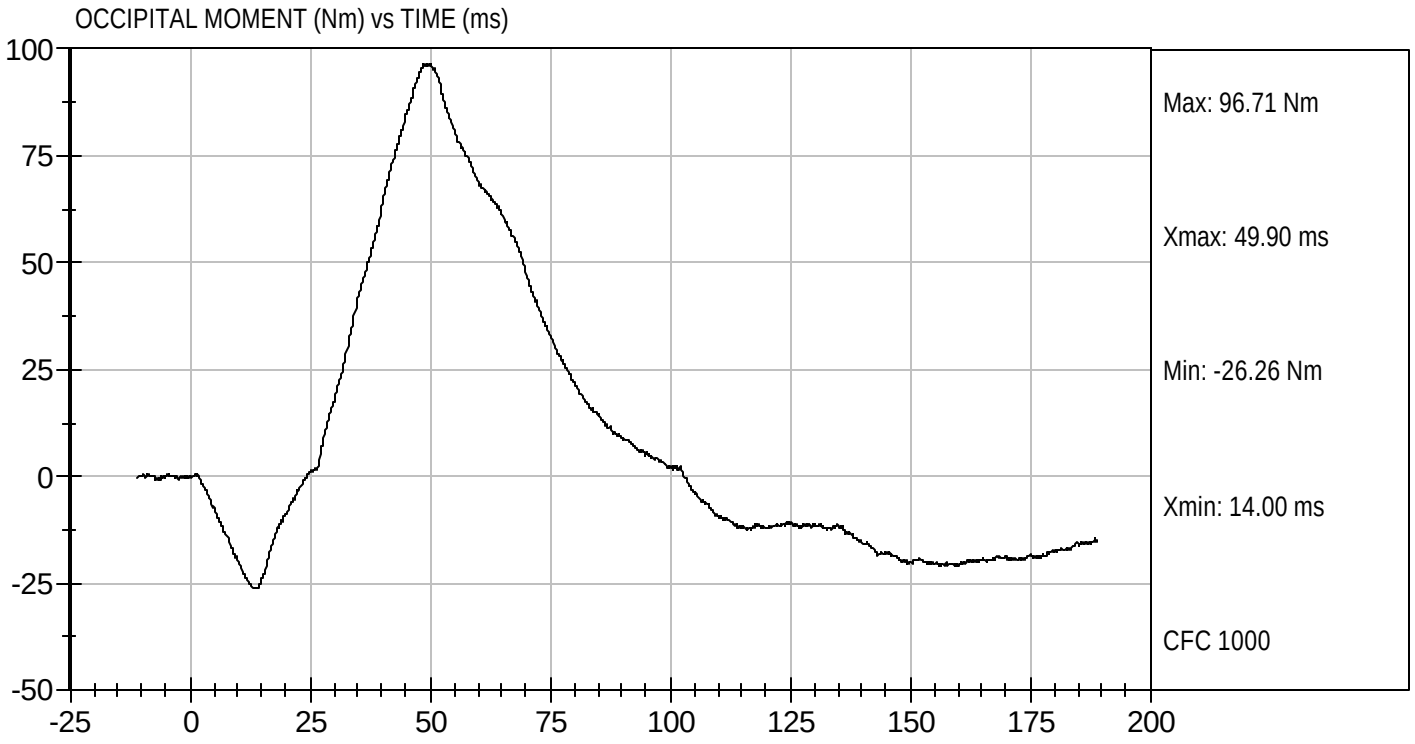


NECK ROTATION (DEG.) vs TIME (ms)



Test Desc: Neck Flexion
Componet ID: D053012

Test Date: 11/16/2005
Velocity: 23.17 ft/s, 7.06 m/s



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 065 **Test I.D:** D053013

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	25	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.14	Pass
Pendulum Deceleration	10 msec	G's	17.20 to 21.20	17.54	Pass
	20 msec	G's	14.00 to 19.00	15.48	Pass
	30 msec	G's	11.00 to 16.00	11.30	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 22.0	11.27	Pass
Deceleration Decay Time to Cross 5 G's		msec	38.0 to 46.0	46.0	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	98.2	Pass
	Time	msec	72.0 to 82.0	81.9	Pass
"D" Plane Rotation Decay Time To Zero Crossing		msec	147.0 to 174.0	162.1	Pass
Moment About Occipital Condyle	Maximum	N m	-52.9 to -79.9	-59.5	Pass
	Time	msec	65.0 to 79.0	75.4	Pass
Negative Moment Decay Time To Zero Crossing		msec	120.0 to 148.0	148.0	Pass
			Overall Test Results		Pass

Laboratory Technician

11/17/2005
Test Date

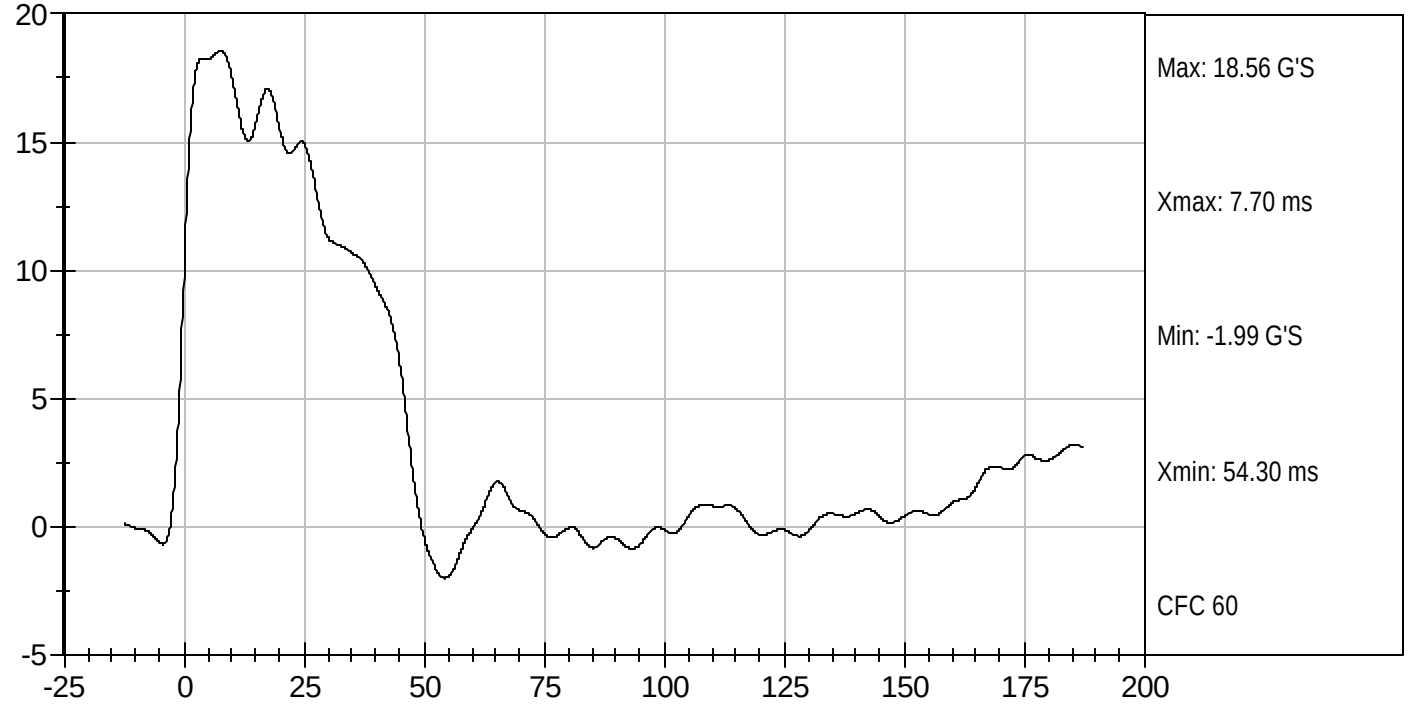
David Winkelbauer

Approved By

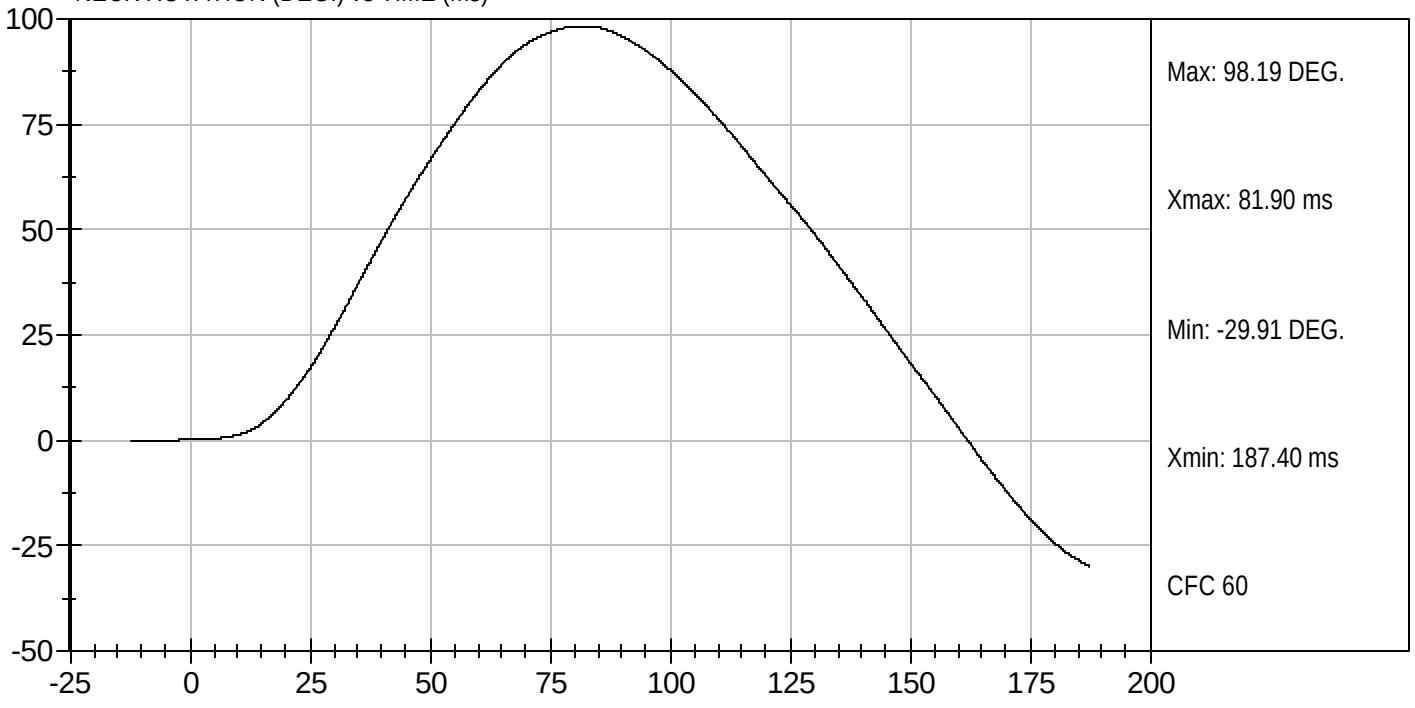
Test Desc: Neck Extension
Componet ID: D053013

Test Date: 11/17/2005
Velocity: 20.13 ft/s, 6.14 m/s

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

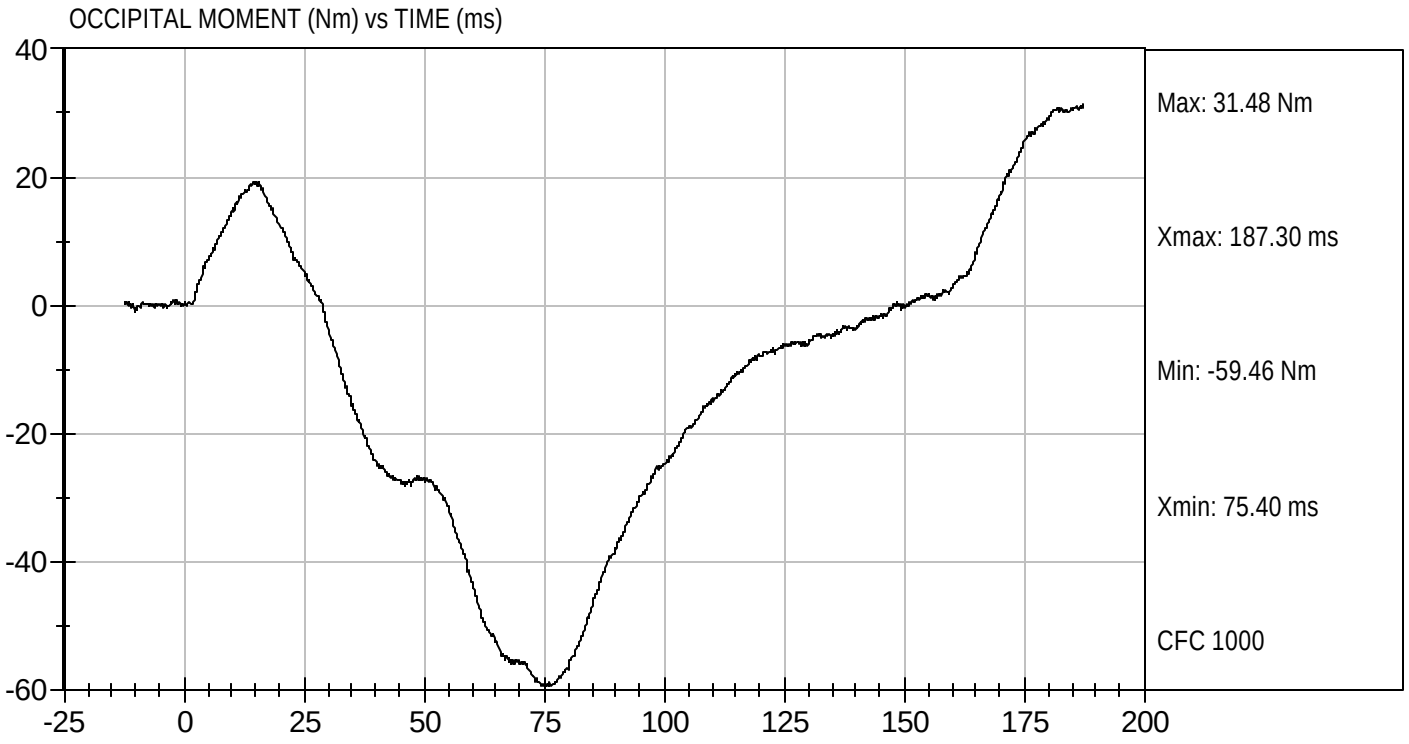


NECK ROTATION (DEG.) vs TIME (ms)



Test Desc: Neck Extension
Componet ID: D053013

Test Date: 11/17/2005
Velocity: 20.13 ft/s, 6.14 m/s



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 065 **Test I.D:** D053014

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	16	Pass
Probe Velocity	m/s	6.58 to 6.82	6.69	Pass
Peak Probe Force	N	5159 to 5893	5,507	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.97	Pass
Internal Hysteresis	%	69 to 85	73	Pass
		Overall Test Results		Pass

Laboratory Technician

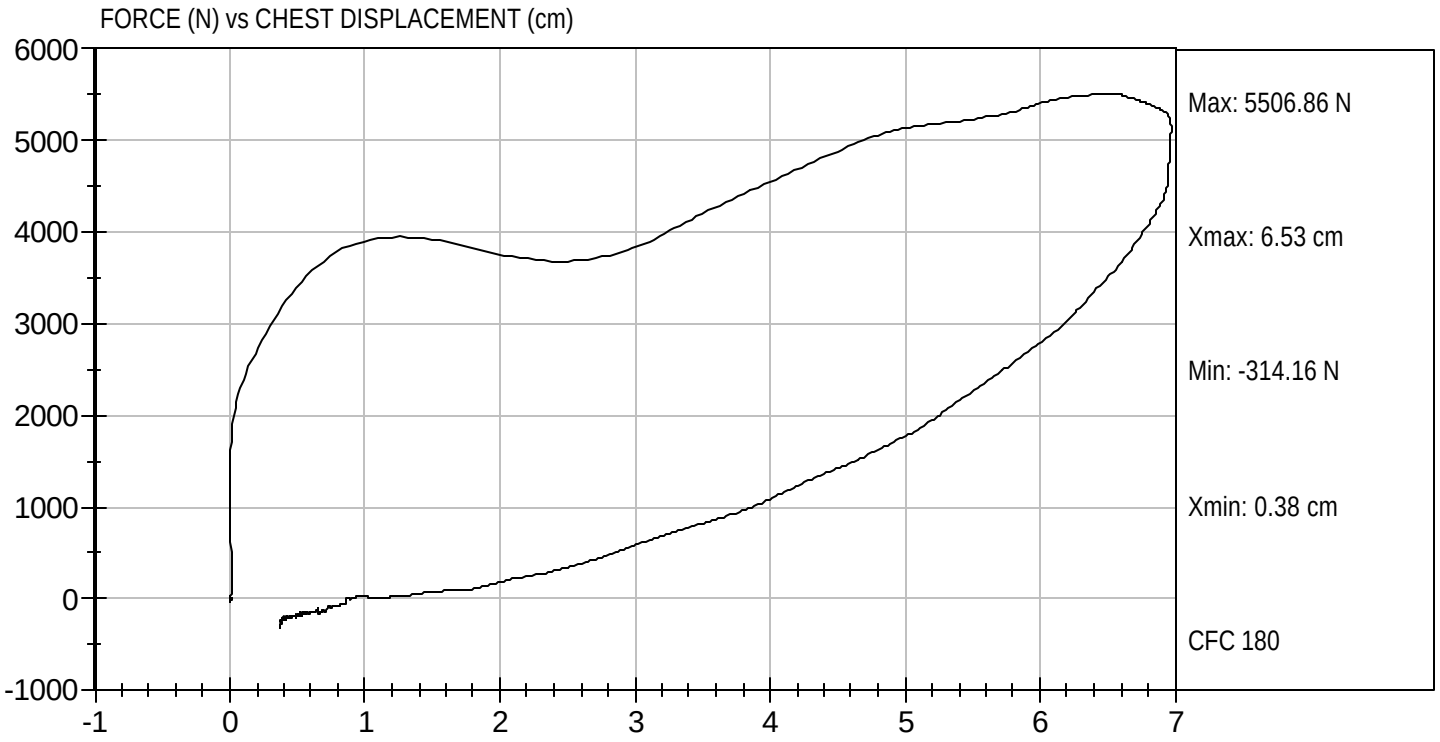
11/17/2005

Test Date

Approved By

Test Desc: Thorax Impact
Componet ID: D053014

Test Date: 11/17/2005
Velocity: 21.95 ft/s, 6.69 m/s



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 065 **Test I.D:** D053015

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	21	Pass
Probe Velocity	m/sec	2.07 to 2.13	2.09	Pass
Peak Probe Force	Newtons	4715 to 5782	5,360	Pass
		Overall Test Results		Pass

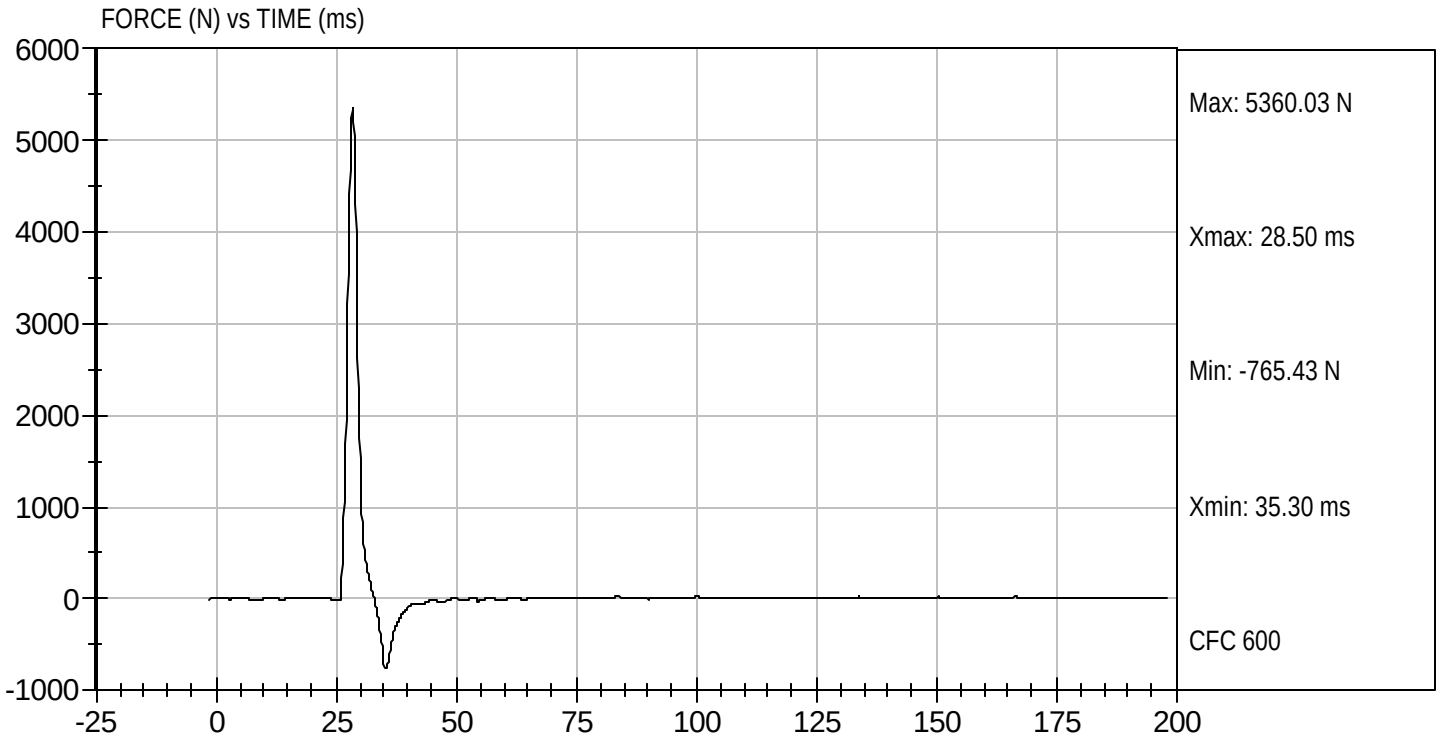
Laboratory Technician

11/17/2005
Test Date

David Winkelbauer
Approved By

Test Desc: Right Knee
Componet ID: D053015

Test Date: 11/17/2005
Velocity: 6.86 ft/s, 2.09 m/s



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 065 **Test I.D:** D053016

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	21	Pass
Probe Velocity	m/sec	2.07 to 2.13	2.12	Pass
Peak Probe Force	Newtons	4715 to 5782	5,136	Pass
		Overall Test Results		Pass

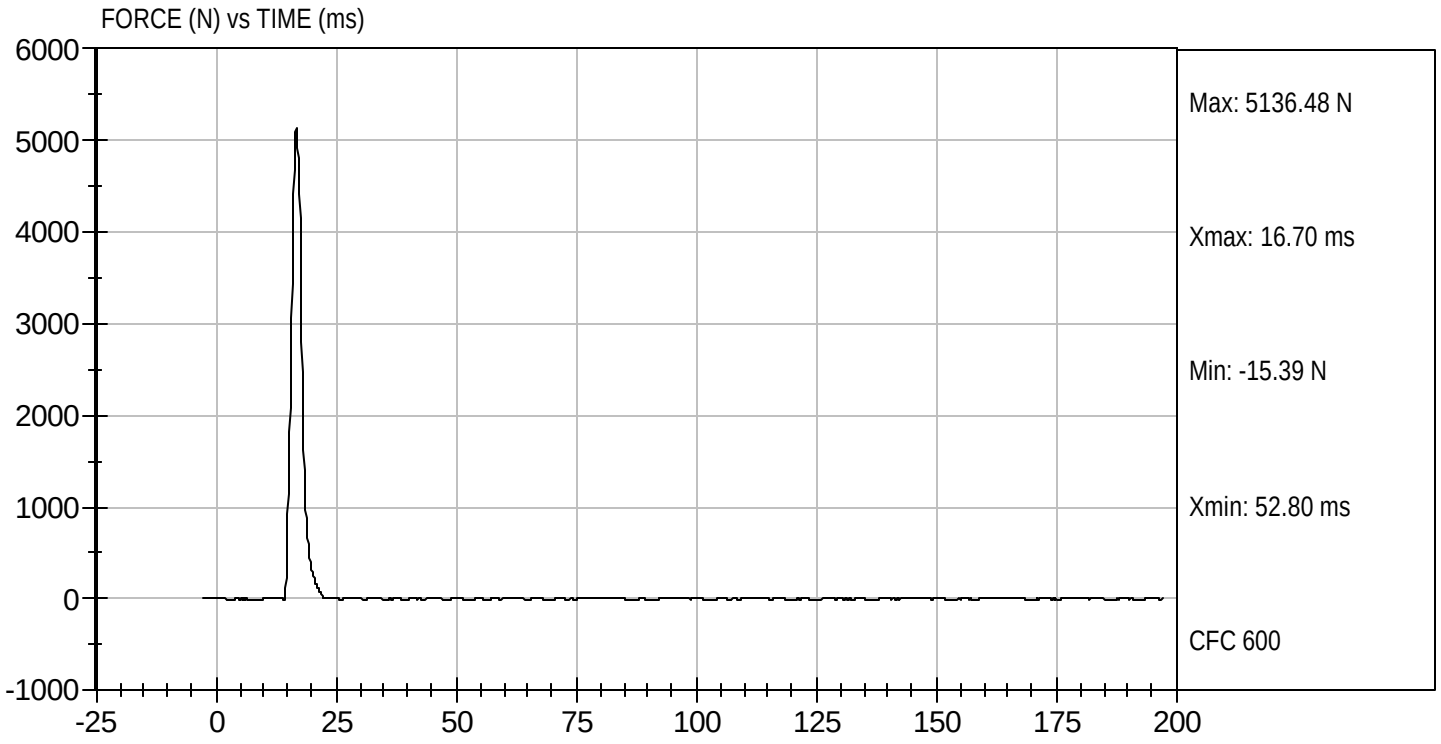
Laboratory Technician

11/17/2005
Test Date

David Winkelbauer
Approved By

Test Desc: Left Knee
Componet ID: D053016

Test Date: 11/17/2005
Velocity: 6.97 ft/s, 2.12 m/s



MGA RESEARCH CORPORATION

HIP-FEMUR FLEXION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 065 **Test I.D:** D053010

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	20.7	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	21	21	Pass
Rotation Rate	deg/sec	5 -10	8	8	Pass
30 Degrees	Nm	94.9 Nm Max	66.3	76.9	Pass
150 ft-lbf / 203.4 Nm	Deg	40- 50 Degree Max Rotation	46	45	Pass
		Overall Test Results			Pass

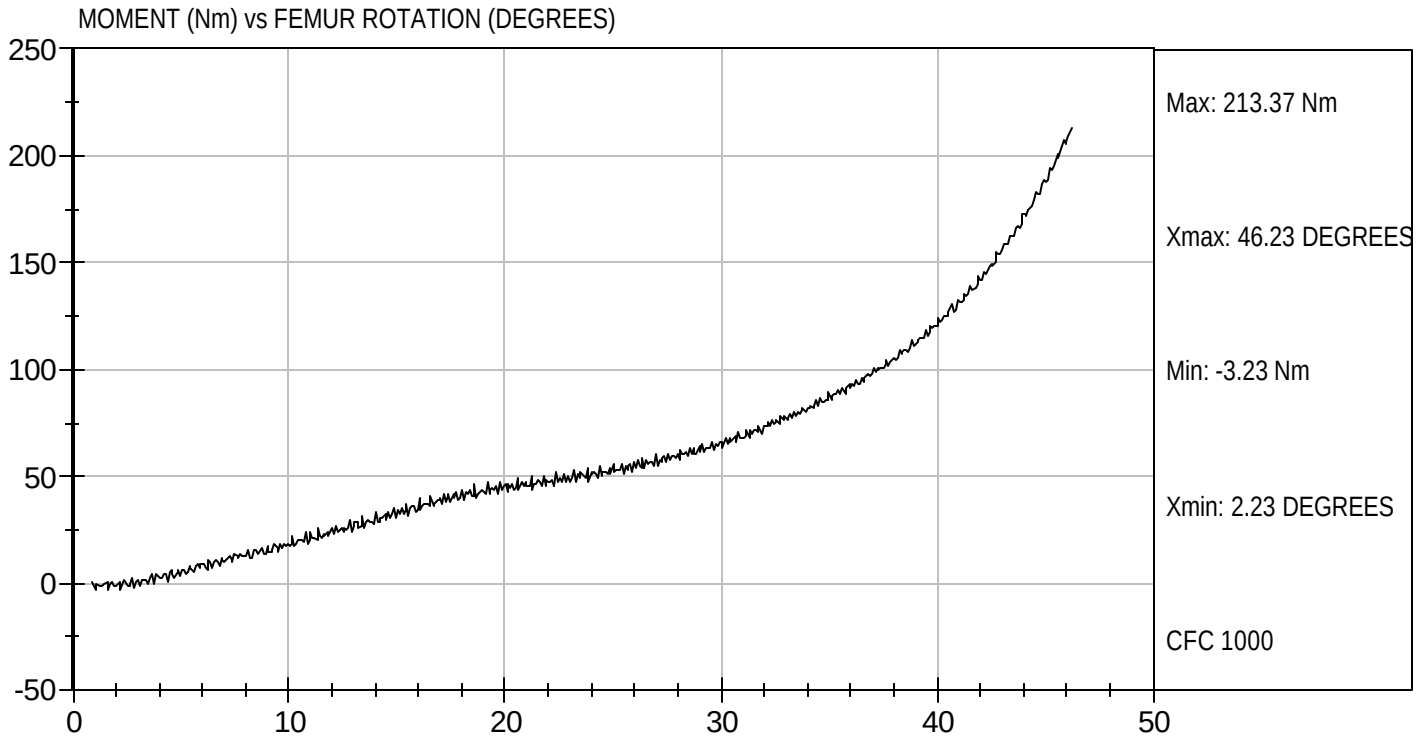
Laboratory Technician

11/17/2005
Test Date

Approved By

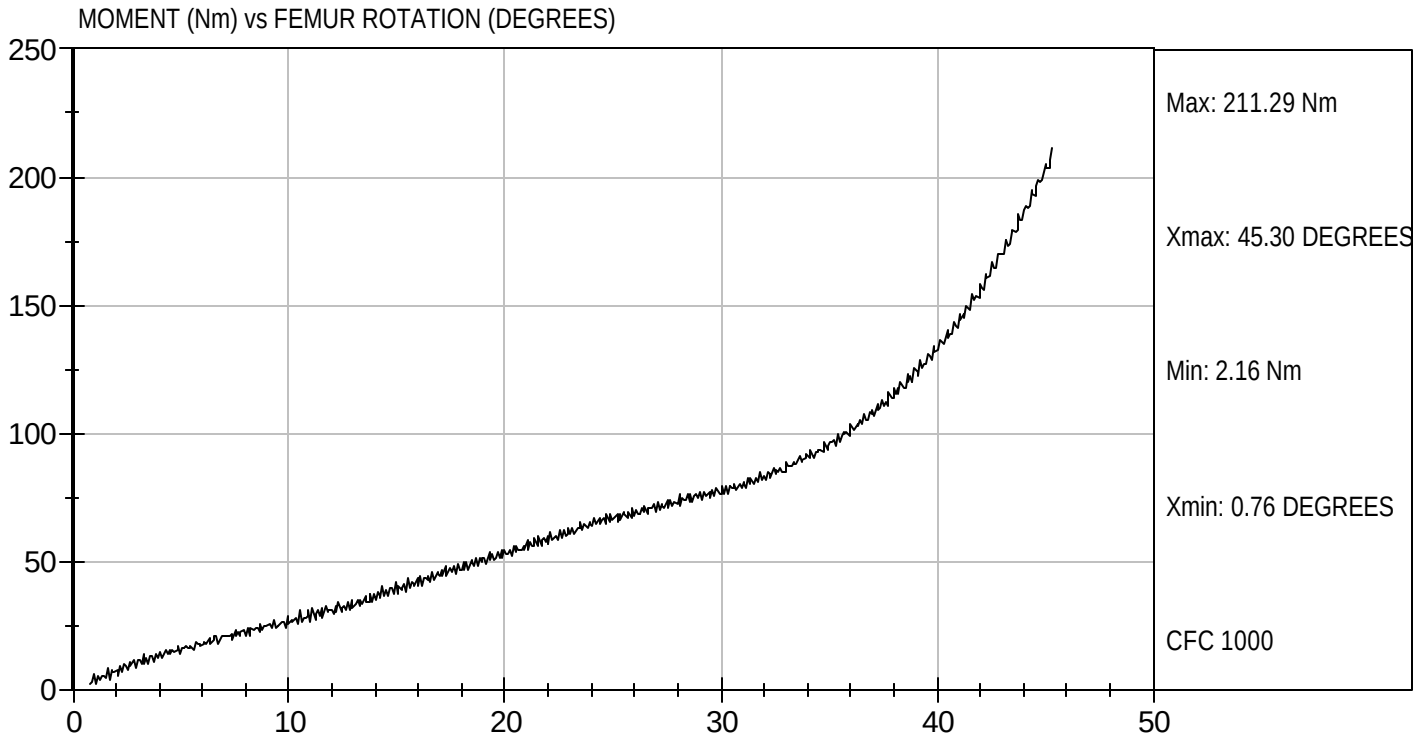
Test Desc: Hip Femur Flexion
Componet ID: D053019

Test Date: 11/17/2005
Velocity: 0 ft/s, 0.00 m/s



Test Desc: Hip Femur Flexion
Componet ID: D053010

Test Date: 11/17/2005
Velocity: 0 ft/s, 0.00 m/s



MGA RESEARCH CORPORATION

HEAD DROP TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 066 **Test ID:** D053021

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	20.4	Pass
Laboratory Relative Humidity	%	10 to 70	18.0	Pass
Peak Resultant Acceleration	G's	225 - 275	260	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	11.7	Pass
Unimodal	Yes/No	NA	Yes	Pass
Oscillations	Yes/No	within 10% of peak	Yes	Pass
		Overall Test Results		Pass

Laboratory Technician

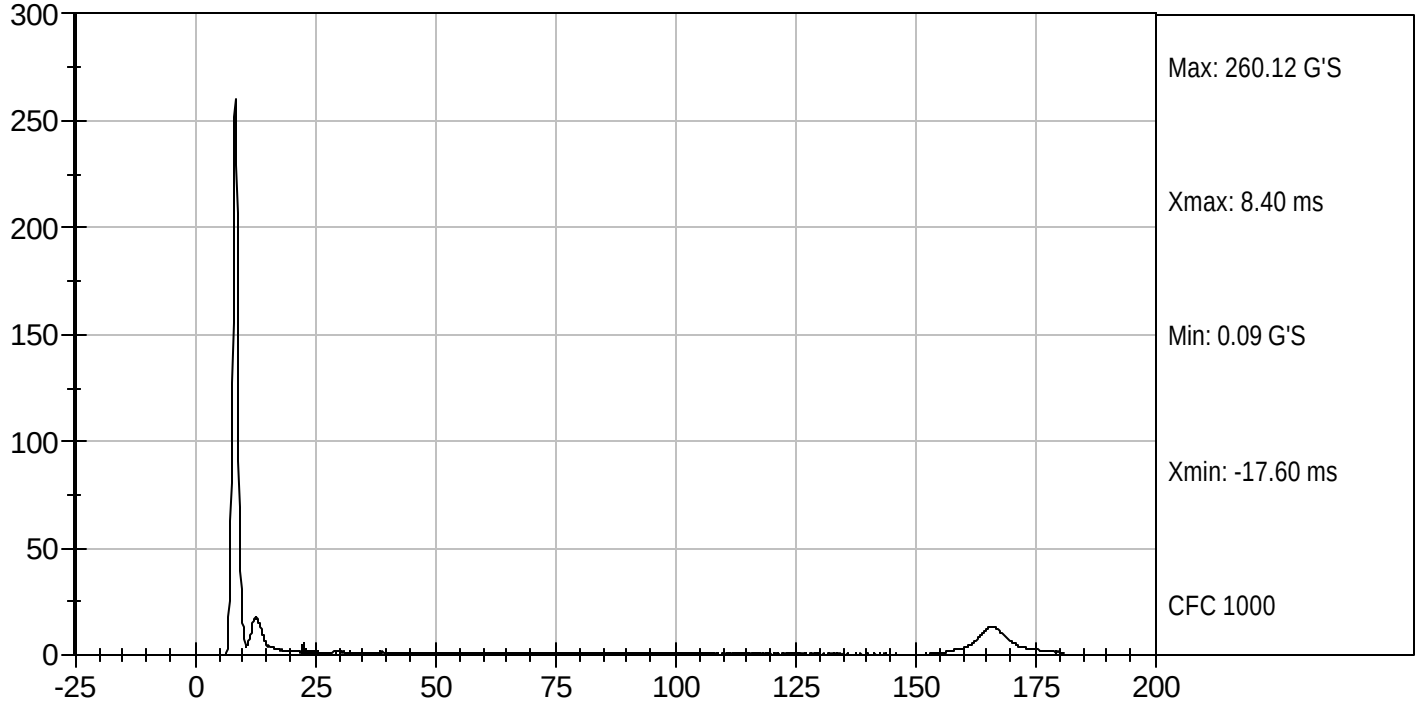
11/16/2005
Test Date

Approved By

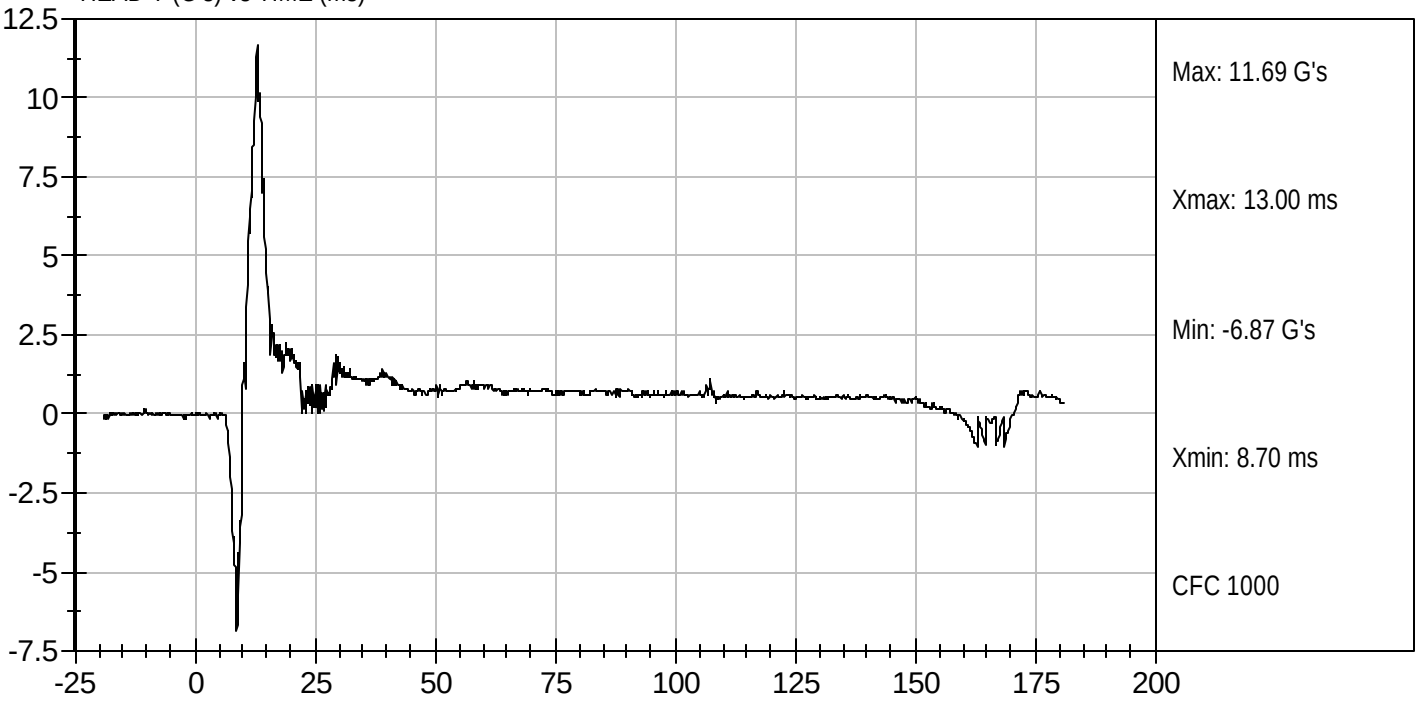
Test Desc: Head Drop
Componet ID: D053021

Test Date: 11/16/2005
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:** D053022

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	21	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.07	Pass
Pendulum Deceleration	10 msec	G's	22.50 to 27.50	23.65	Pass
	20 msec	G's	17.60 to 22.60	19.41	Pass
	30 msec	G's	12.50 to 18.50	14.28	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 29.0	14.23	Pass
Deceleration Decay Time to Cross 5 G's		msec	34.0 to 42.0	39.5	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	70.9	Pass
	Time	msec	57.0 to 64.0	60.0	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	94.6	Pass
	Time	msec	47.0 to 58.0	52.7	Pass
Positive Moment Decay Time To Zero Crossing		msec	97.0 to 107.0	102.1	Pass
			Overall Test Results		Pass

Laboratory Technician

11/17/2005
Test Date

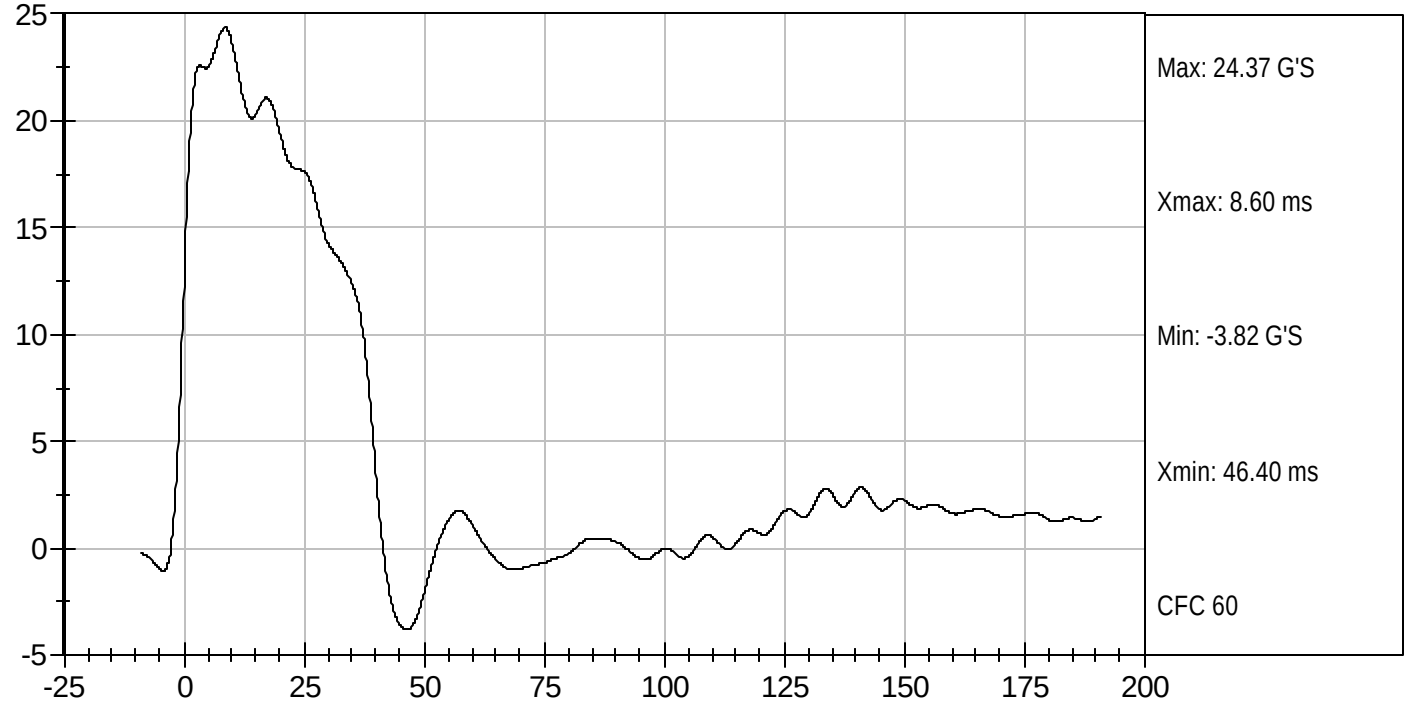
David Winkelbauer

Approved By

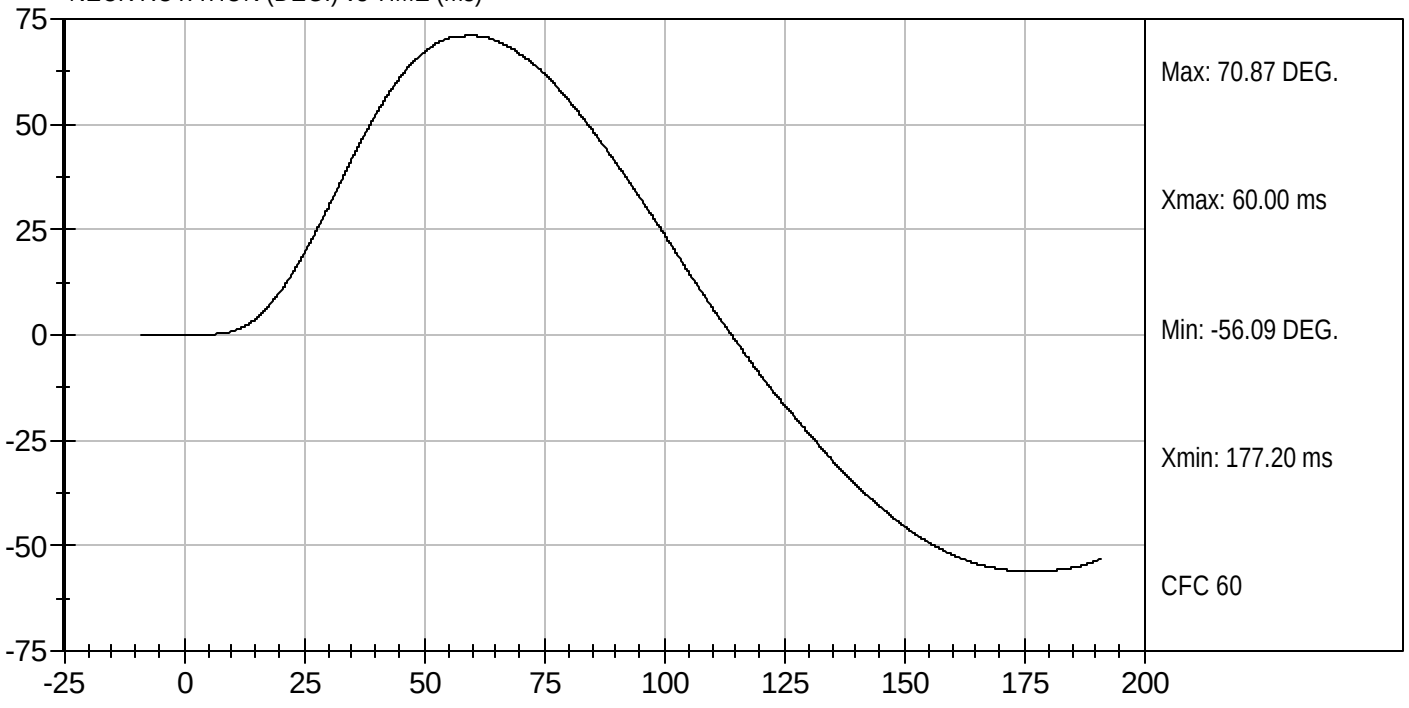
Test Desc: Neck Flexion
Componet ID: D053022

Test Date: 11/17/2005
Velocity: 23.20 ft/s, 7.07 m/s

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

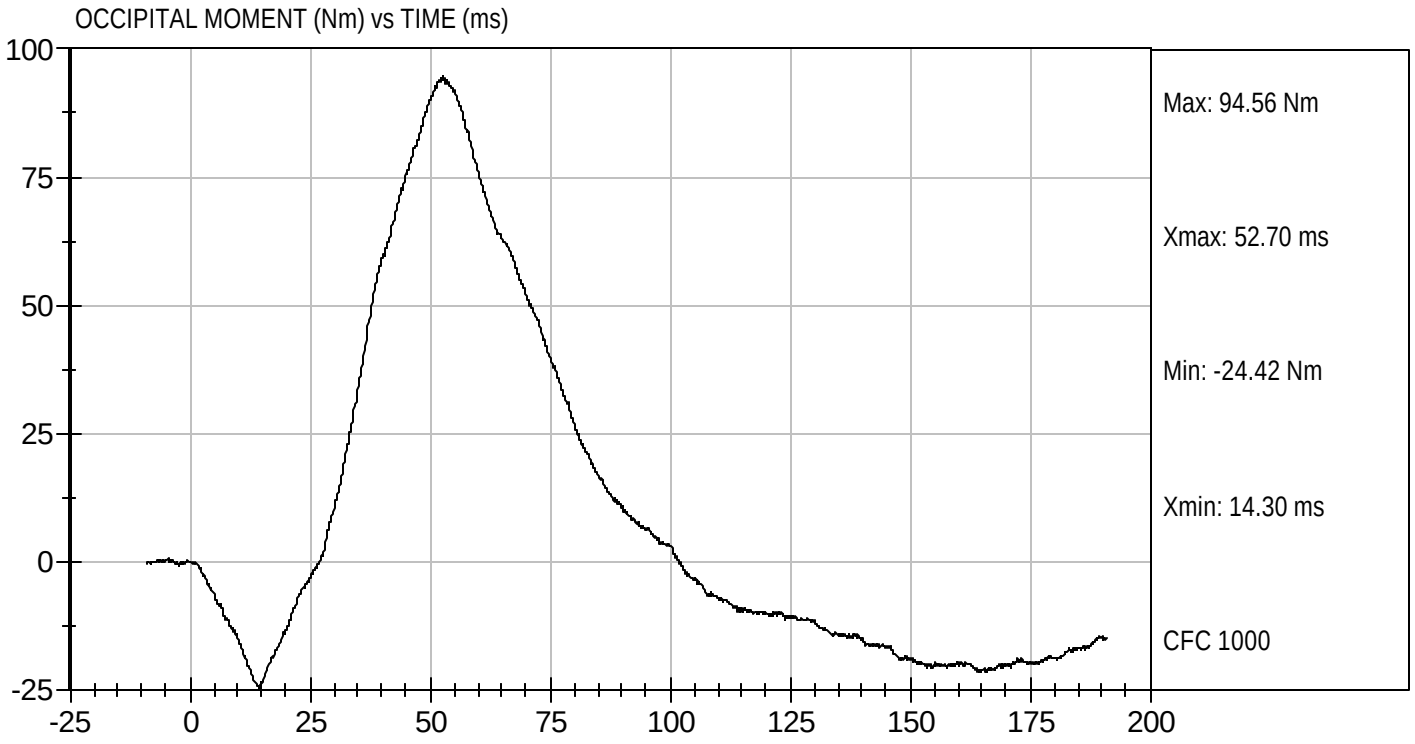


NECK ROTATION (DEG.) vs TIME (ms)



Test Desc: Neck Flexion
Componet ID: D053022

Test Date: 11/17/2005
Velocity: 23.20 ft/s, 7.07 m/s



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 066 **Test I.D:** D053023

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	21	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.09	Pass
Pendulum Deceleration	10 msec	G's	17.20 to 21.20	19.60	Pass
	20 msec	G's	14.00 to 19.00	16.64	Pass
	30 msec	G's	11.00 to 16.00	12.11	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 22.0	12.08	Pass
Deceleration Decay Time to Cross 5 G's		msec	38.0 to 46.0	41.5	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	99.5	Pass
	Time	msec	72.0 to 82.0	80.3	Pass
"D" Plane Rotation Decay Time To Zero Crossing		msec	147.0 to 174.0	158.3	Pass
Moment About Occipital Condyle	Maximum	N m	-52.9 to -79.9	-64.9	Pass
	Time	msec	65.0 to 79.0	73.4	Pass
Negative Moment Decay Time To Zero Crossing		msec	120.0 to 148.0	146.8	Pass
			Overall Test Results		Pass

Laboratory Technician

11/17/2005
Test Date

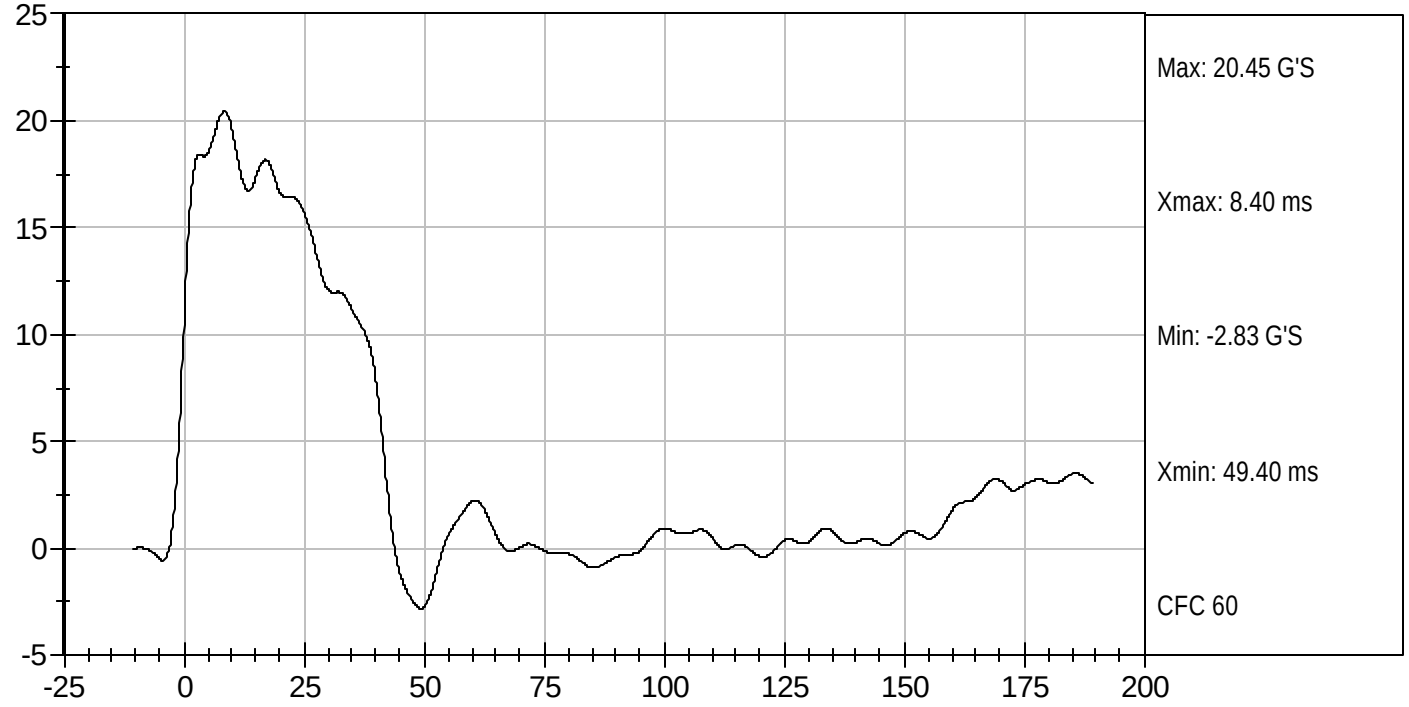
David Winkelbauer

Approved By

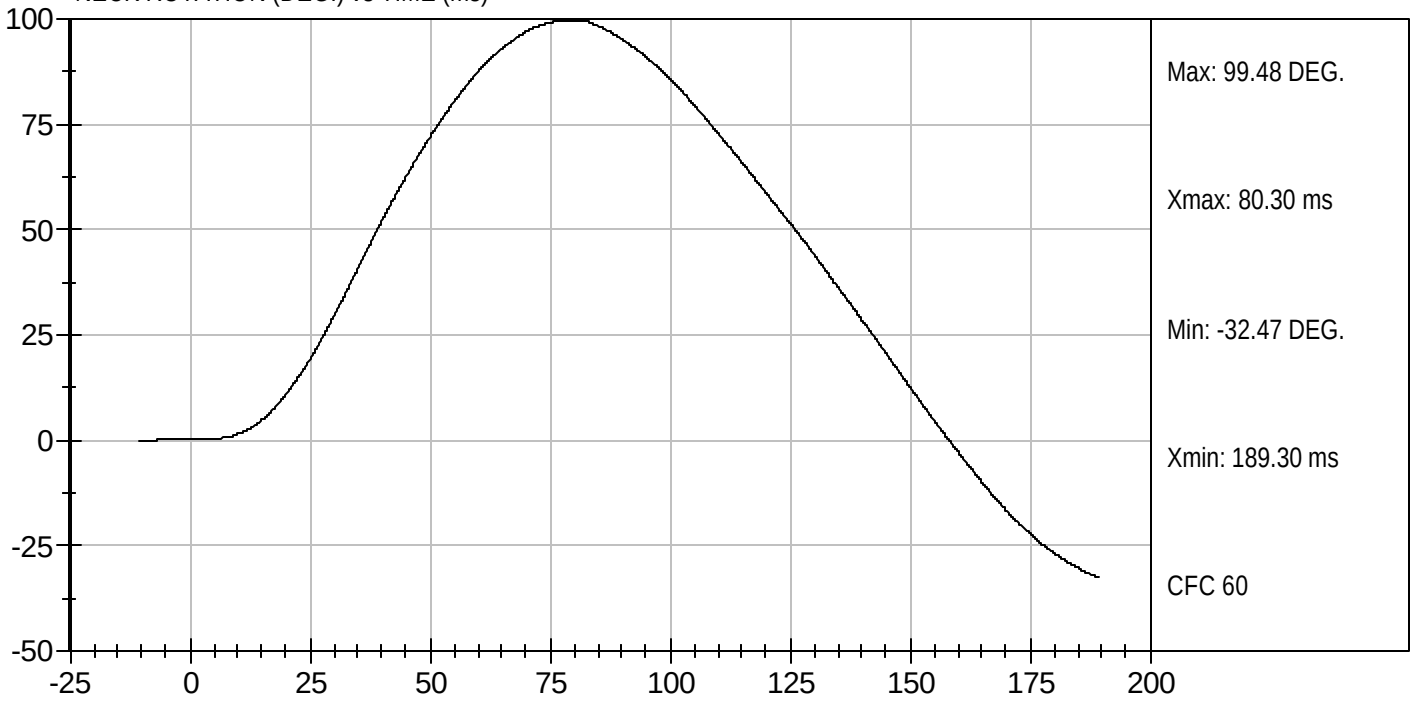
Test Desc: Neck Extension
Componet ID: D053023

Test Date: 11/17/2005
Velocity: 19.97 ft/s, 6.09 m/s

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

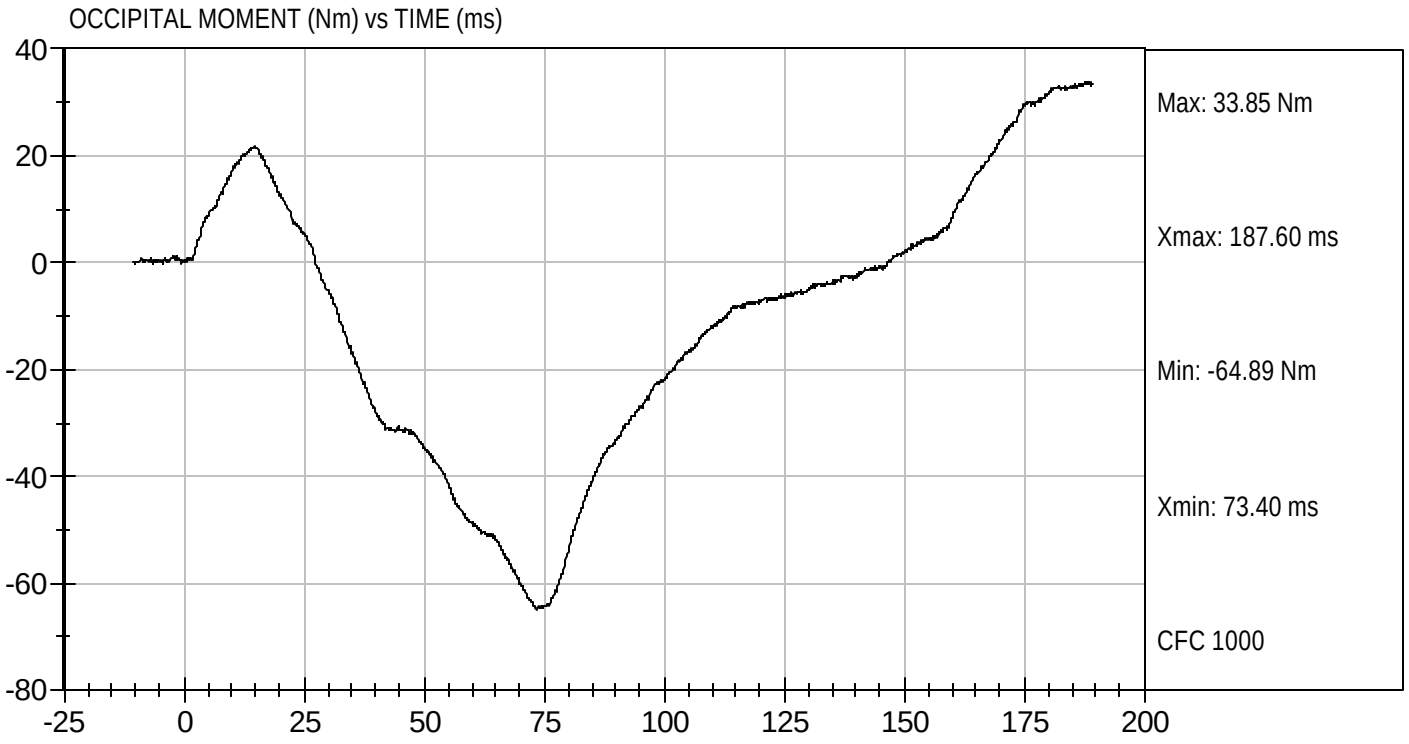


NECK ROTATION (DEG.) vs TIME (ms)



Test Desc: Neck Extension
Componet ID: D053023

Test Date: 11/17/2005
Velocity: 19.97 ft/s, 6.09 m/s



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 066 **Test I.D:** D053024

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	17	Pass
Probe Velocity	m/s	6.58 to 6.82	6.69	Pass
Peak Probe Force	N	5159 to 5893	5,628	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	7.03	Pass
Internal Hysteresis	%	69 to 85	71	Pass
		Overall Test Results		Pass

Laboratory Technician

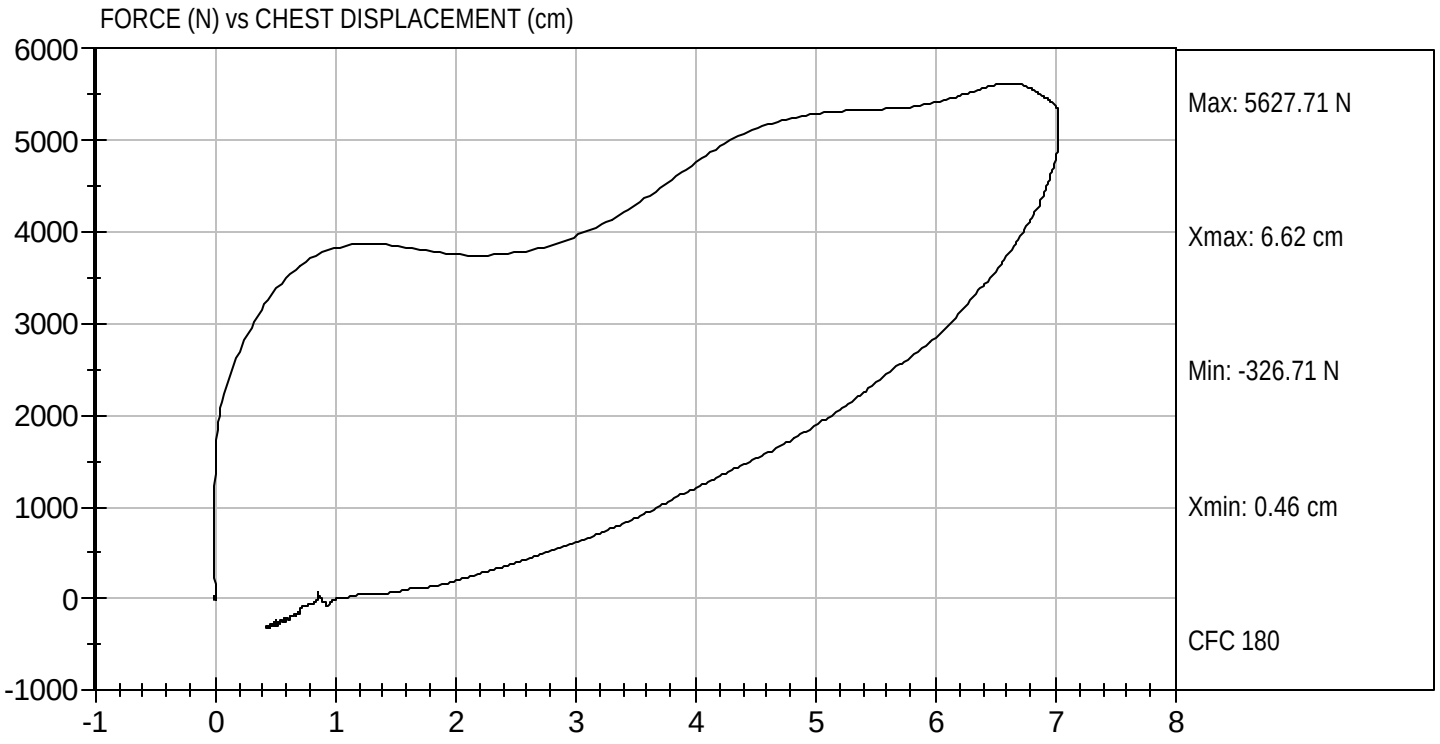
11/17/2005

Test Date

Approved By

Test Desc: Thorax Impact
Componet ID: D053024

Test Date: 11/17/2005
Velocity: 21.96 ft/s, 6.69 m/s



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 066 **Test I.D:** D053025

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	22	Pass
Probe Velocity	m/sec	2.07 to 2.13	2.10	Pass
Peak Probe Force	Newtons	4715 to 5782	4,824	Pass
		Overall Test Results		Pass

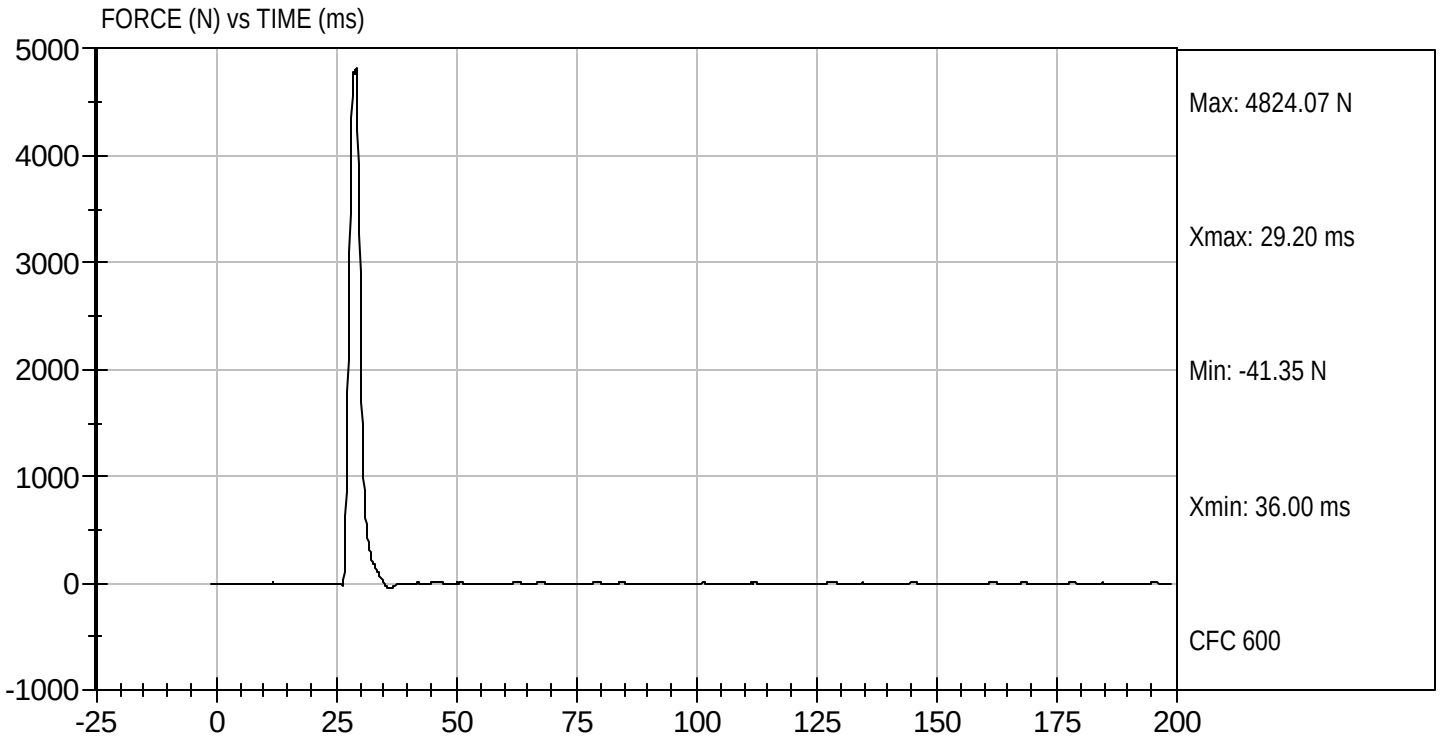
Laboratory Technician

11/17/2005
Test Date

David Winkelbauer
Approved By

Test Desc: Right Knee
Componet ID: D053025

Test Date: 11/17/2005
Velocity: 6.9 ft/s, 2.10 m/s



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 066 **Test I.D:** D053026

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	22	Pass
Probe Velocity	m/sec	2.07 to 2.13	2.12	Pass
Peak Probe Force	Newtons	4715 to 5782	4,845	Pass
		Overall Test Results		Pass

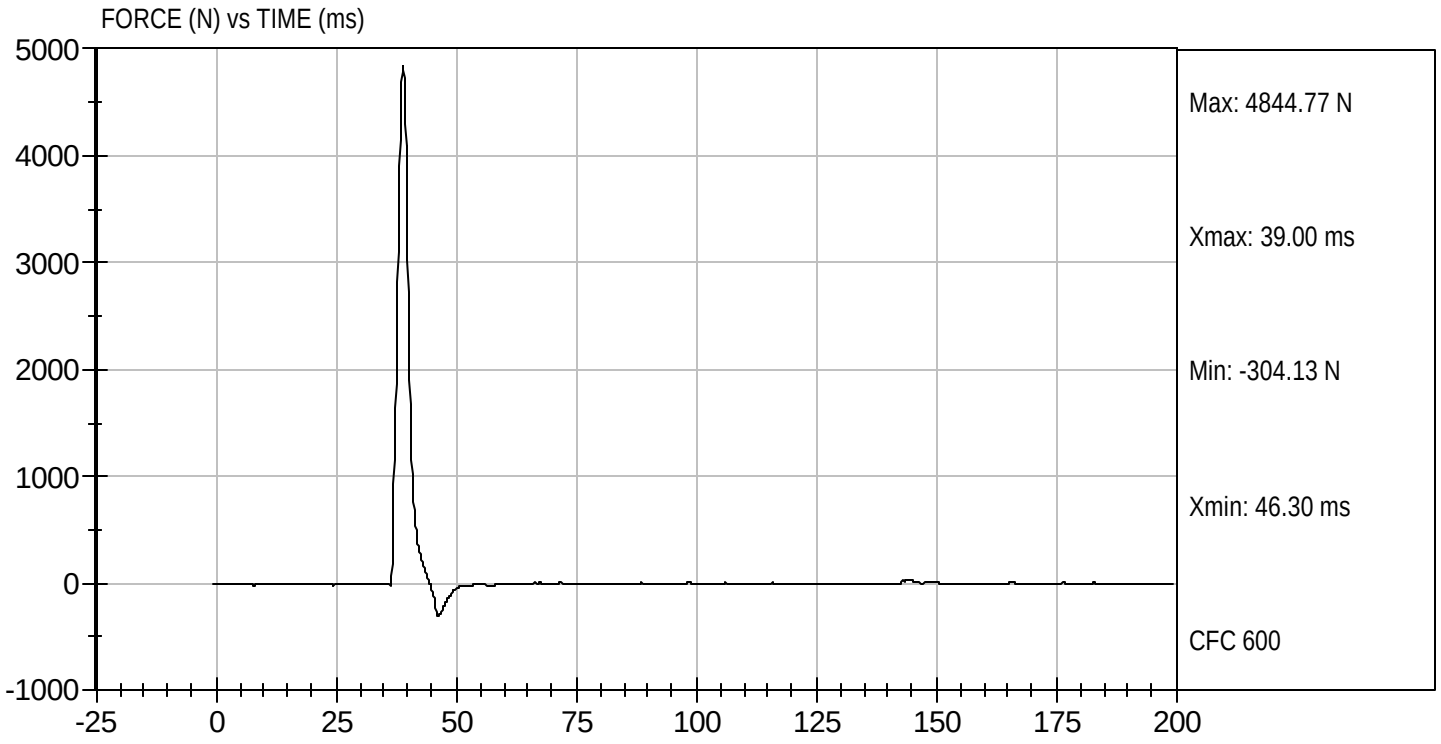
Laboratory Technician

11/17/2005
Test Date

Approved By

Test Desc: Left Knee
Componet ID: D053026

Test Date: 11/17/2005
Velocity: 6.95 ft/s, 2.12 m/s



MGA RESEARCH CORPORATION

HIP-FEMUR FLEXION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 066 **Test I.D:** D053020

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	20.7	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	21	21	Pass
Rotation Rate	deg/sec	5 -10	8	8	Pass
30 Degrees	Nm	94.9 Nm Max	83.6	93.6	Pass
150 ft-lbf / 203.4 Nm	Deg	40- 50 Degree Max Rotation	44	42	Pass
		Overall Test Results			Pass

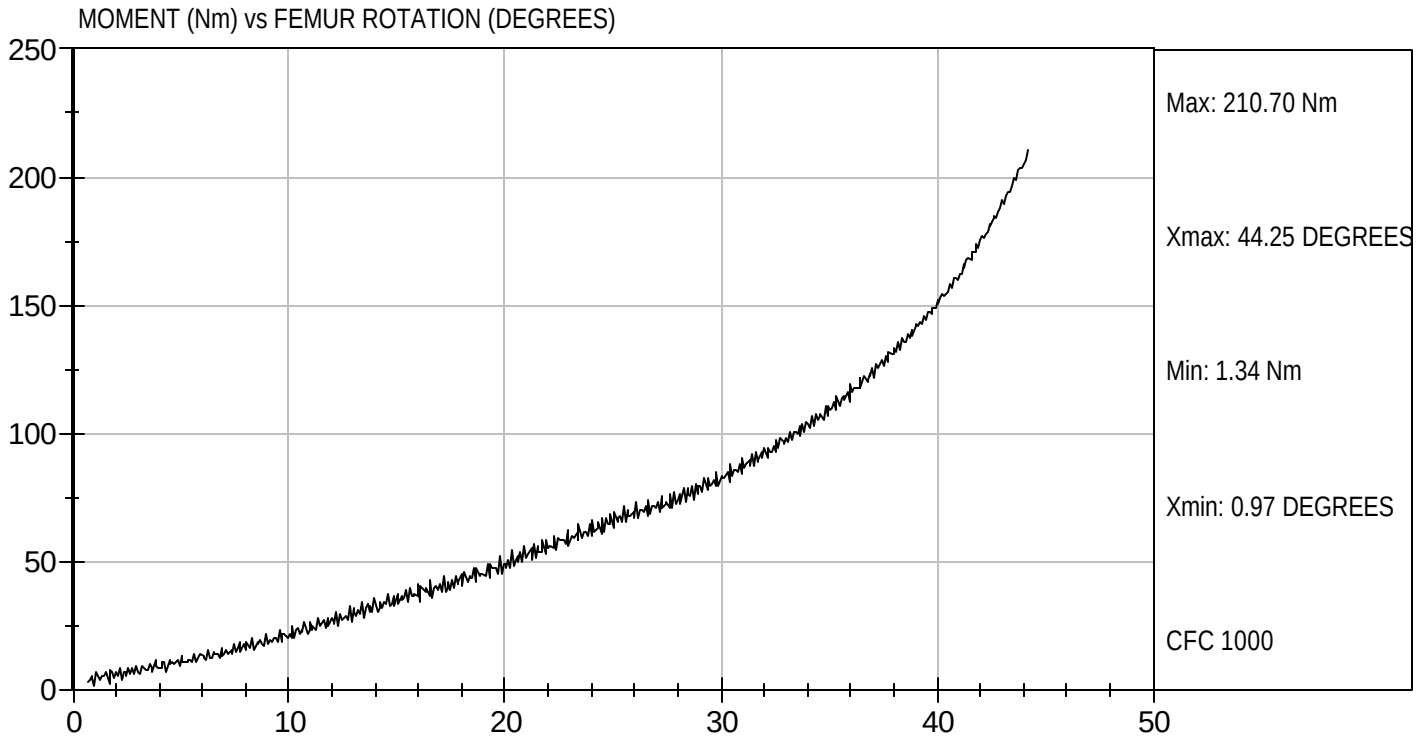
Laboratory Technician

11/17/2005
Test Date

David Winkelbauer
Approved By

Test Desc: Hip Femur Flexion
Componet ID: D053029

Test Date: 11/17/2005
Velocity: 0 ft/s, 0.00 m/s



Test Desc: Hip Femur Flexion
Componet ID: D053020

Test Date: 11/17/2005
Velocity: 0 ft/s, 0.00 m/s