

REPORT NUMBER: NCAP-MGA-2006-002

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

**NISSAN MOTOR CORPORATION LTD.
2006 NISSAN ARMADA
NHTSA NUMBER: M65200**

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



Test Date: September 26, 2005

Final Report Date: October 31, 2005

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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Prepared by: 
Kristin Ebert, Project Engineer

Date: 10/31/05

Reviewed by: 
David Winkelbauer, Facility Director

Date: 10/31/05

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16. <i>Abstract</i> A 35.0 mph (56.3 km/h) frontal barrier impact was conducted on a 2006 Nissan Armada at MGA Research Corporation on September 26, 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 56.5 km/h. The ambient temperature at the barrier face at the time of impact was 21 degrees Celsius. The vehicle's maximum post test static crush is 516 mm located to the left of the vehicle's centerline. The test vehicle is equipped with a 3-point continuous belt system and an airbag in both front outboard seating positions. With respect to FMVSS 208 "Occupant Crash Protection", the occupant injury criteria summary is as follows: <table style="width: 100%; margin-top: 10px;"> <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>510</td> <td>526</td> </tr> <tr> <td>Max. Thorax Accel. (3ms Clip)</td> <td>G's</td> <td>60</td> <td>44</td> <td>41</td> </tr> <tr> <td>Left Femur Force</td> <td>Newton</td> <td>10009</td> <td>*</td> <td>-3905</td> </tr> <tr> <td>Right Femur Force</td> <td>Newton</td> <td>10009</td> <td>**</td> <td>-1687</td> </tr> </tbody> </table> * No valid data after 56 msec. ** No valid data after 64 msec.				<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	510	526	Max. Thorax Accel. (3ms Clip)	G's	60	44	41	Left Femur Force	Newton	10009	*	-3905	Right Femur Force	Newton	10009	**	-1687
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SECTION 1

PURPOSE AND SUMMARY OF TEST

PURPOSE

This 56.3 km/h frontal barrier impact test is part of the Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under contract number DTNH22-01-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 Nissan Armada at a velocity of 56.5 kph. The test was performed at MGA Research Corporation on September 26, 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. 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 104 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 516 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 and seatback. The driver's 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	510	59.1	95.1	44	60.4	63.4	-22.9	*	**
Passenger	526	62.3	98.3	41	66.9	69.9	-24.1	-3905	-1687

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 Left Femur – after 56msec

** Driver Right Femur – after 64msec

Passenger Left Ankle X – after 70msec

SECTION 2
OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

DATA SHEET NO. 1
CRASH TEST SUMMARY

Test Vehicle: 2006 Nissan Armada
 Test Program: 35mph Frontal Impact

NHTSA No.: M65200
 Test Date: 9/26/2005

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	555
Center	mm	562
Right Side	mm	525
Average	mm	547

BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Shoulder belt length as measured on ATD	mm	886	928
Lap belt length as measured on ATD	mm	835	944
Remainder of belt on reel	mm	1475	1422
Total belt length for continuous webbing systems	mm	3196	3294

DATA SHEET NO. 2**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2006 Nissan Armada
 Test Program: 35mph Frontal Impact

NHTSA No.: M65200
 Test Date: 9/26/2005

TEST VEHICLE INFORMATION

Manufacturer	Nissan
Model	Armada SE 4x4
Body Style	SUV
NHTSA No.	M65200
VIN	5N1AA08B16N701516
Color	Majestic Blue
Delivery Date	9/20/05
Odometer Reading (mile)	94
Dealer	Woodfield Nissan Inc.
Transmission	5 speed Automatic
Final Drive	Rear
Number of Cylinders	8
Engine Displacement (L)	5.6
Engine Placement	Longitudinal
Automatic Door Lock (ADL)	No
Owners Manual Details Instructions on Disabling ADLs	NA
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	No
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	Nissan Motor Corporation Ltd.
Date of Manufacture	08/05

GVWR (kg)	3175
GAWR Front (kg)	1542
GAWR Rear (kg)	1905

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Split Bench	Split Bench	
Number of Occupants	2	3	3	8
Capacity Wt. (VCW) (kg)				610
Cargo Wt. (RCLW) (kg)				65.3

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

Test Vehicle: 2006 Nissan Armada
 Test Program: 35mph Frontal Impact

NHTSA No.: M65200
 Test Date: 9/26/2005

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	663.5	595.5		697.5	674.5	
Right	kg	647.0	594.0		690.0	652.0	
Ratio	%	52.4	47.6		51.1	48.9	
Totals	kg	1310.5	1189.5	2500.0	1387.5	1326.5	2714.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	2500.0
Weight of 2 P572E ATDs	kg	156.0
Rated Cargo/Luggage Weight (RCLW)	kg	65.3
Calculated Vehicle Target Weight (TVTW)	kg	2721.3

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG(aft of front axle)
As Delivered	mm	937	941	980	983	1496
As Tested	mm	927	931	961	968	1537
Post Test	mm	834	860	938	945	

Vehicle Wheelbase (mm): 3144

Weight of Ballast secured in cargo area (kg): 21.8

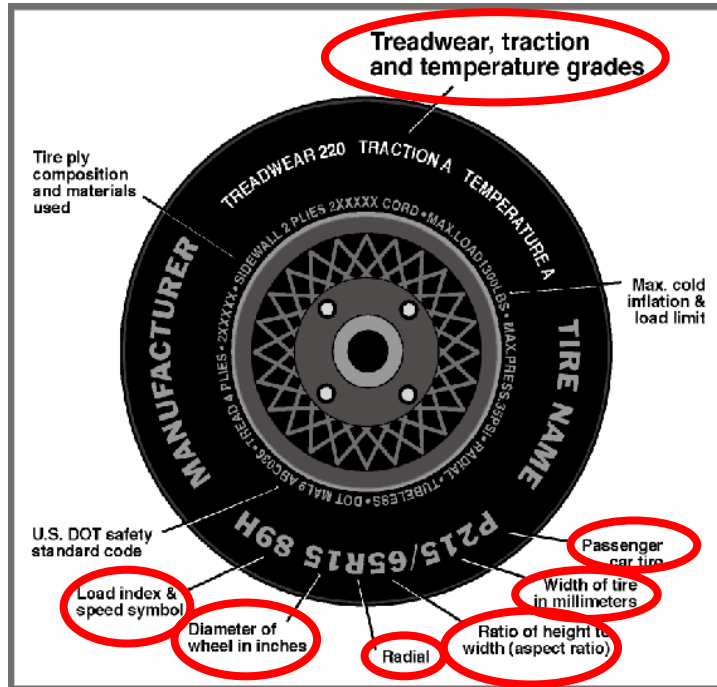
Vehicle Components Removed: jack and tools, trunk carpet, passenger side plastic in trunk

Ballast weight does not include instrumentation and data acquisition system.

DATA SHEET NO. 3 **TEST VEHICLE TIRE INFORMATION**

Test Vehicle: 2006 Nissan Armada
 Test Program: 35mph Frontal Impact

NHTSA No.: M65200
 Test Date: 9/26/2005



DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	240	240
Recommended Tire Size	P265/70R18	P265/70R18
Tire Size on Vehicle	P265/70R18	P265/70R18
Tire Manufacturer	Continental	Continental
Tire Name	Contitrac	Contitrac
Tire Type	All Season	All Season
Tire Width (mm)	265	265
Ratio of Height to Width (aspect ratio)	70	70
Radial	R	R
Wheel Diameter	18	18
Load Index & Speed Symbol	114S	114S
Treadwear	520	520
Traction Grade	A	A
Temperature Grade	B	B

DATA SHEET NO. 4
TEST VEHICLE INFORMATION

Test Vehicle: 2006 Nissan Armada
 Test Program: 35mph Frontal Impact

NHTSA No.: M65200
 Test Date: 9/26/2005

NORMAL DESIGN RIDING POSITION

The driver and passenger seat back is positioned to the manufacturer's designated angle of 11 degrees measured at the headrest rod. The procedure is as follows:

Driver seat back angle: 12.5 on headrest rod

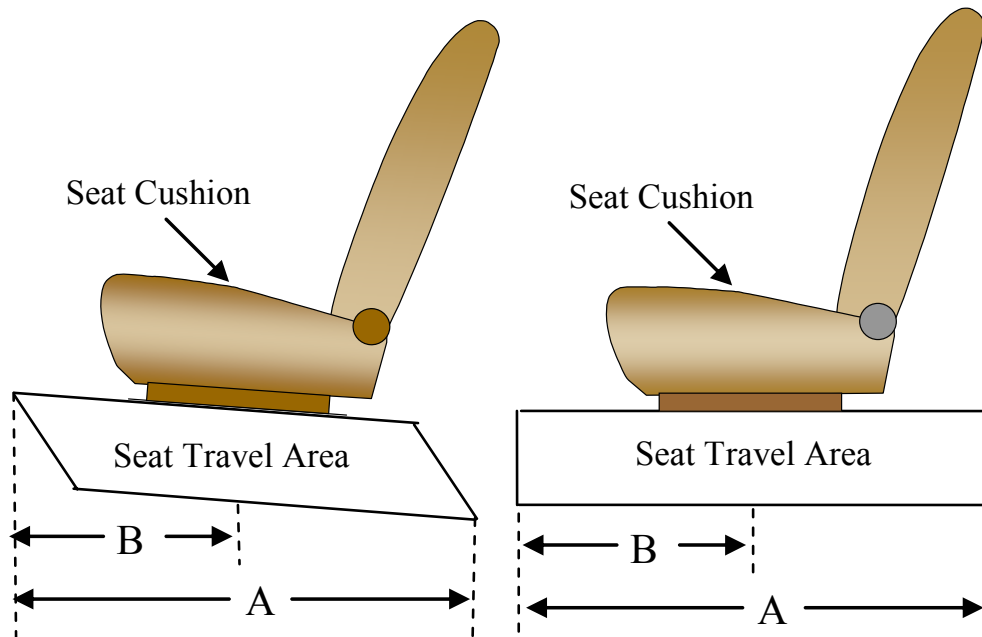
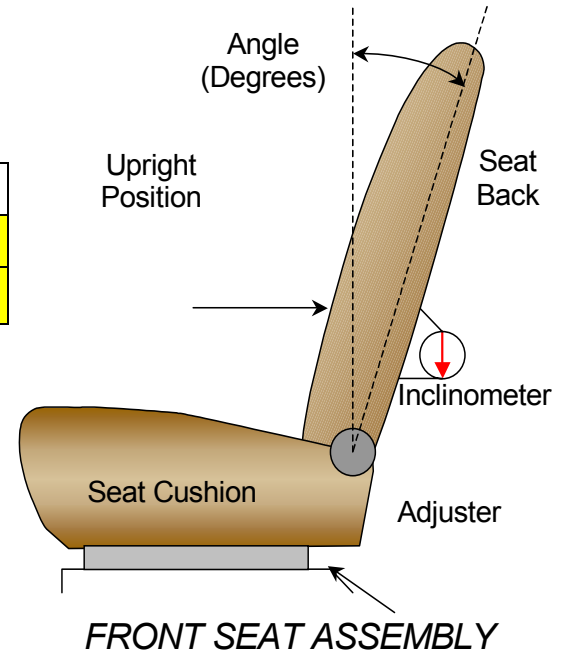
Passenger seat back angle: 8.9 on headrest rod

SEAT FORE/AFT POSITIONING

	Total Fore/Aft Travel	Placed in position #
Driver Seat	232mm	116 of 232mm
Passenger Seat	21 Detents	10 th detent (1 st as 0)

ADJUSTABLE D-RING POSITION

The D-Ring was placed in the uppermost position.



DATA SHEET NO. 4...(CONTINUED)

TEST VEHICLE INFORMATION

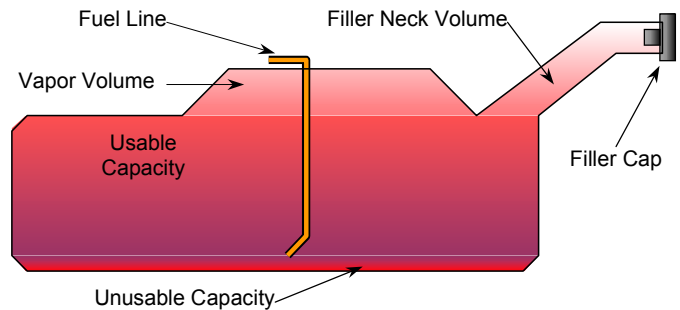
Test Vehicle: 2006 Nissan Armada
Test Program: 35mph Frontal Impact

NHTSA No.: M65200
Test Date: 9/26/2005

FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	106.0
Usable Capacity of "Optional" Tank	
92-94% of Usable Capacity	97.5 to 99.6
Actual Amount of Solvent used	98.4
1/3 of Usable Capacity	35.3

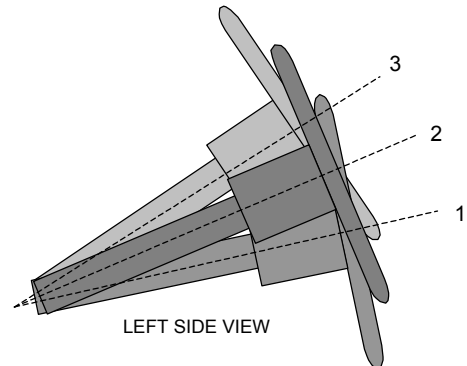
The test vehicle is equipped with an electric fuel pump.



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

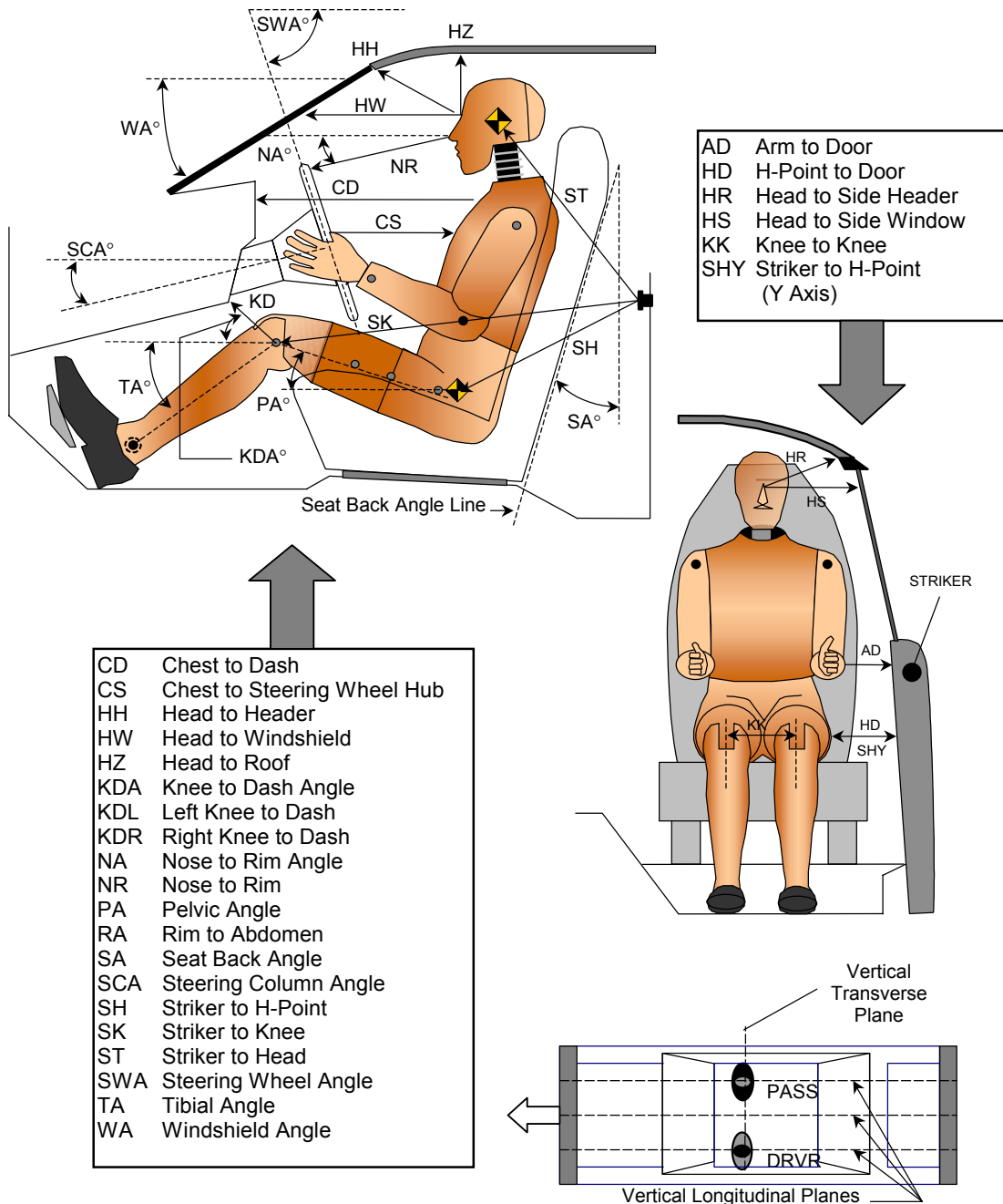
	Fore/Aft Position (mm)	Degrees
Lowermost position No. 1		21.3
Geometric center position No. 2		28.7
Uppermost position No. 3		36.2

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

Test Vehicle: 2006 Nissan Armada
 Test Program: 35mph Frontal Impact

NHTSA No.: M65200
 Test Date: 9/26/2005

DUMMY MEASUREMENTS FOR FRONT SEAT OCCUPANTS



DATA SHEET NO. 5... (CONTINUED)

DUMMY POSITIONING IN VEHICLE

Test Vehicle: 2006 Nissan Armada
Test Program: 35mph Frontal Impact

NHTSA No.: M65200
Test Date: 9/26/2005

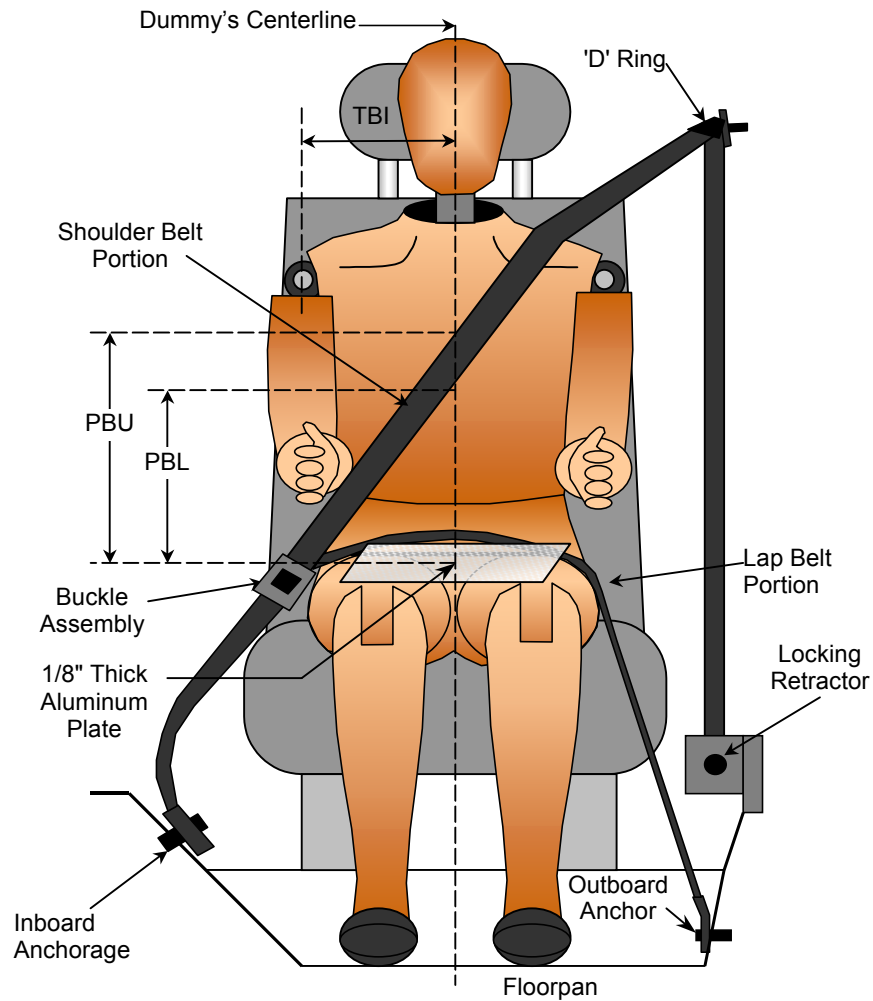
TEST DUMMY POSITION MEASUREMENTS

Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA	Windshield Angle		31.3		
SWA	Steering Wheel Angle		59.4		
SCA	Steering Column Angle		28.4		
SA	Seat Back Angle (headrest rod)		12.5		8.9
HZ	Head to Roof (Z)	269	90.0	231	90.0
HH	Head to Header	478	21.0	448	16.6
HW	Head to Windshield	813	0.0	709	0.0
HR	Head to Side Header (Y)	280		244	
NR	Nose to Rim	445	11.6		
CD	Chest to Dash	576		558	
CS	Chest to Steering Hub	337	12.2		
RA	Rim to Abdomen	203	0.0		
KDL	Left Knee to Dash	186	24.4	155	
KDR	Right Knee to Dash	156		162	27.3
PA	Pelvic Angle		24.3		21.5
TA	Tibia Angle		51.6		48.8
KK	Knee to Knee (Y)	330		295	
SK	Striker to Knee	640	90.5	690	90.2
ST	Striker to Head	600	14.1	658	16.5
SH	Striker to H-Point	273	107.0	278	96.0
SHY	Striker to H-Point (Y)	267		282	
HS	Head to Side Window	354		342	
HD	H-Point to Door (Y)	200		187	
AD	Arm to Door (Y)	143		146	
AA	Ankle to Ankle	335		245	

DATA SHEET NO. 6
SEAT BELT POSITIONING DATA

Test Vehicle: 2006 Nissan Armada
 Test Program: 35mph Frontal Impact

NHTSA No.: M65200
 Test Date: 9/26/2005



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	360	334
PBL - To surface of reference to belt lower edge	mm	281	249

DATA SHEET NO. 7
VEHICLE ACCELEROMETER LOCATIONS

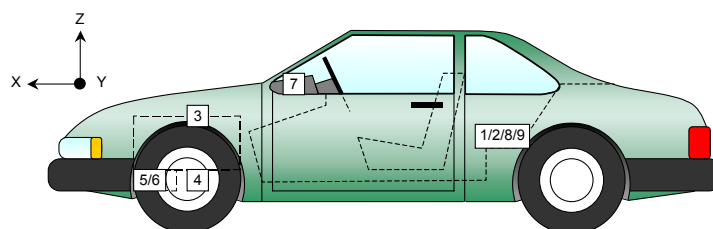
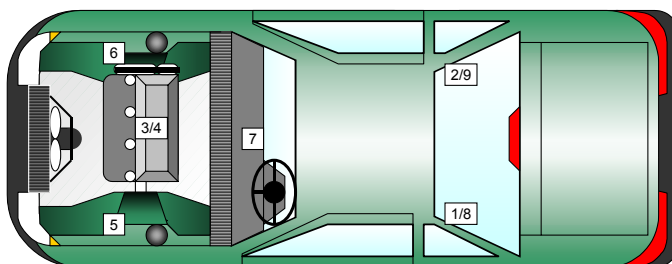
Test Vehicle: 2006 Nissan Armada
 Test Program: 35mph Frontal Impact

NHTSA No.: M65200
 Test Date: 9/26/2005

VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear X-Member X	2106	-330	771
2	Right Rear X-Member X	2104	347	773
3	Engine Top X	4468	20	1152
4	Engine Bottom X	4016	160	386
5	Left Brake Caliper X	4154	-756	511
6	Right Brake Caliper X	4154	759	513
7	Instrument Panel X	3544	0	1031
8	Left Rear X-Member Z	2106	-330	771
9	Right Rear X-Member Z	2104	347	773

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 Nissan Armada
 Test Program: 35mph Frontal Impact

NHTSA No.: M65200
 Test Date: 9/26/2005

Windshield Mounting Details:

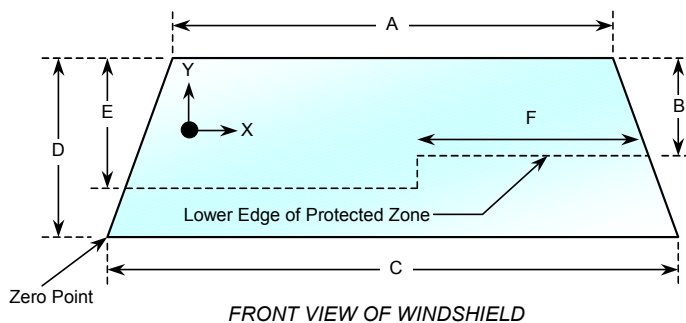
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

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	2276	2276	100
Right Side	2276	2276	100
Total	4552	4552	100



Item	Units	Value
A	mm	1367
B	mm	501
C	mm	1621
D	mm	782
E	mm	485
F	mm	546

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 Nissan Armada
 Test Program: 35mph Frontal Impact

NHTSA No.: M65200
 Test Date: 9/26/2005

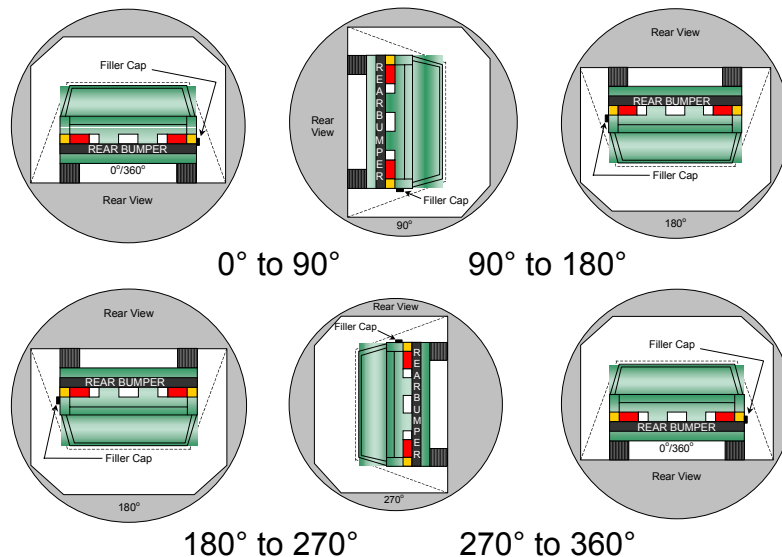
FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 21° C Test Time: 11:32 am

Stoddard Solvent Spillage Measurements

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

FMVSS 301 STATIC ROLLOVER DATA



1. The specified fixture rollover rate for each 90° of rotation is 60 to 180 seconds.

2. The position hold time at each position is 300 seconds (minimum).

3. Details of Stoddard Solvent spillage locations:
None

Test Phase	Rotation Time (sec.)	Hold Time (sec.)	Spillage (oz.)
0° to 90°	177	300	0
90° to 180°	159	300	0
180° to 270°	137	300	0
270° to 360°	160	300	0

DATA SHEET NO. 10
VEHICLE MEASUREMENTS

Test Vehicle: 2006 Nissan Armada
Test Program: 35mph Frontal Impact

NHTSA No.: M65200
Test Date: 9/26/2005

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total length of vehicle at centerline	mm	5206	4690	516
2	RSOV to front of engine	mm	4472	4398	74
3	RSOV to firewall centerline	mm	4276	4139	137
4	RSOV to leading edge of right door	mm	3712	3715	-3
5	RSOV to leading edge of left door	mm	3714	3672	42
6	RSOV to lower leading edge of right door	mm	3671	3686	-15
7	RSOV to lower leading edge of left door	mm	3688	3686	2
8	RSOV to upper leading edge of right door	mm	2532	2536	-4
9	RSOV to upper leading edge of left door	mm	2537	2517	20
10	RSOV to lower trailing edge of right door	mm	2511	2531	-20
11	RSOV to lower trailing edge of left door	mm	2513	2507	6
12	RSOV to bottom of right 'A' pillar	mm	3671	3674	-3
13	RSOV to bottom of left 'A' pillar	mm	3689	3675	14
14	RSOV to firewall on right side	mm	4212	4224	-12
15	RSOV to firewall on left side	mm	4237	4201	36
16	RSOV to steering column	mm	3257	3192	65
17	Center of steering column to left 'A' pillar	mm	345	336	9
18	Center of steering column to headlining	mm	412	409	3
19	RSOV to right side of front bumper	mm	5050	4642	408
20	RSOV to left side of front bumper	mm	5044	4620	424
21	Length of engine block	mm	603	603	0
RD	RSOV to right side of dash panel	mm	3508	3567	-59
CD	RSOV to center of dash panel	mm	3446	3362	84
LD	RSOV to left side of dash panel	mm	3504	3534	-30

VEHICLE MEASUREMENTS

NHTSA No.: M65200
Test Date: 9/26/2005



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

Test Vehicle: 2006 Nissan Armada
Test Program: 35mph Frontal Impact

NHTSA No.: M65200
Test Date: 9/26/2005

Target Vehicle Structural Measurement

	Elements	Pre-Test (mm)
1	Total Length	5206
2	Total Width	2100
3	Bumper Top Height	795
4	Bumper Bottom Height	670
5	Longitudinal Member Top Height	608
6	Distance between Longitudinal Members	775
7	Longitudinal Member Width	100
8	Engine Top Height	1164
9	Engine Bottom Height	308
10	Engine and gearbox width	603
11	Front bumper-engine distance	498
12	Front shock absorber fixing height	820
13	Bonnet leading edge height	1090
14	Front shock absorber fixing width	1160
15	Front bumper – front axle distance	871
16	Front axle – a pillar distance	480
17	A-pillar – B-pillar distance	1320
18	B-pillar – rear axle distance	1335
19	B-pillar – C-pillar distance	860
20	Roof sill bottom height	1755
21	Roof sill top height	1835
22	Floor sill bottom height	400
23	Floor sill top height	510

DATA SHEET NO. 11
CAMERA LOCATIONS

Test Vehicle: 2006 Nissan Armada
Test Program: 35mph Frontal Impact

NHTSA No.: M65200
Test Date: 9/26/2005

No.	Camera View	Location (mm) *			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Side View				13	24
2	Left Front View	1210	-5960	1415	24	1000
3	Steering Column Top	1425	-5435	1480	25	1000
4	Steering Column Bottom	1430	-5440	1030	25	1000
5	Driver Close-up	1605	-6605	1475	35	1000
6	Driver Angle	6735	-5135	2090	50	1000
7	On board Driver Side					
8	On board Passenger Side					
9	Right Overall	2380	8685	1420	24	1000
10	Right Passenger Half	1085	6295	1470	24	1000
11	Right Close-up	1535	6650	1485	35	1000
12	Right Angle	6590	4855	2090	50	1000
13	Windshield	-250	0	2370	19	1000
14	Top Driver	75	-405	2130	12.5	1000
15	Top Passenger	120	535	2130	12.5	1000
16	Pit Front	1040	0	-3150	24	1000
17	Pit Rear	3450	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.

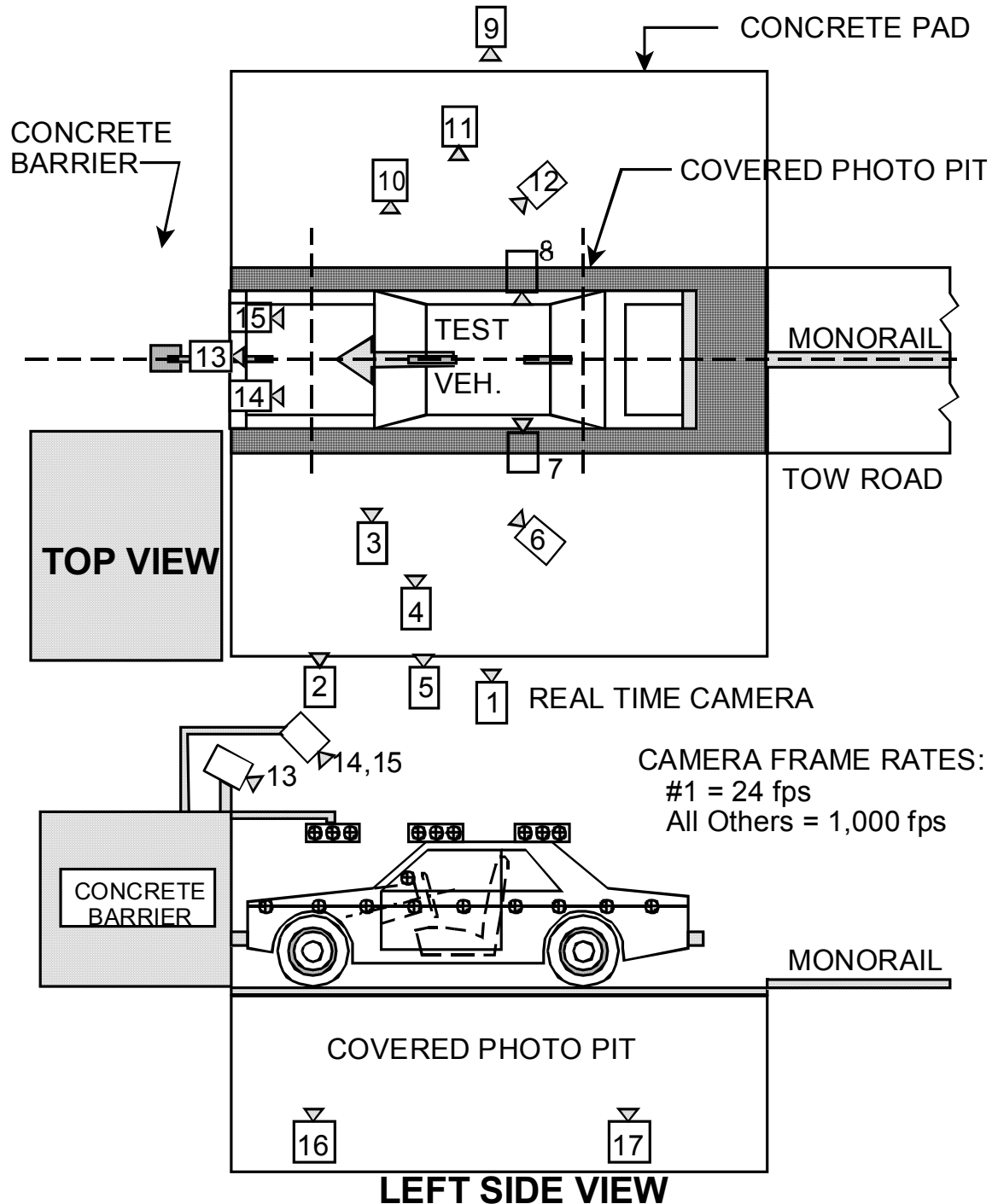
DATA SHEET NO. 11... (continued)

CAMERA LOCATIONS

Test Vehicle: 2006 Nissan Armada
Test Program: 35mph Frontal Impact

NHTSA No.: M65200
Test Date: 9/26/2005

CAMERA POSITIONS FOR FRONTAL IMPACTS

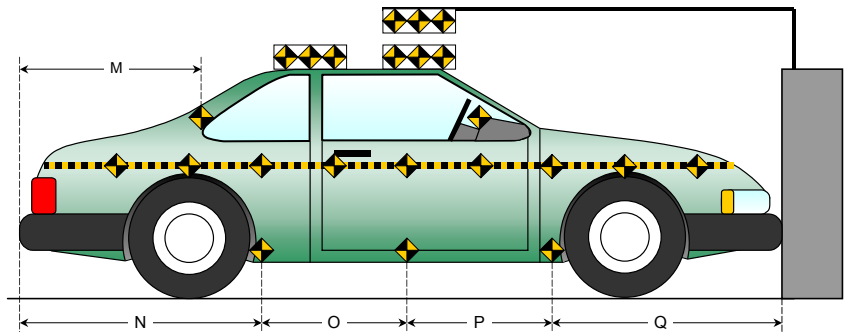
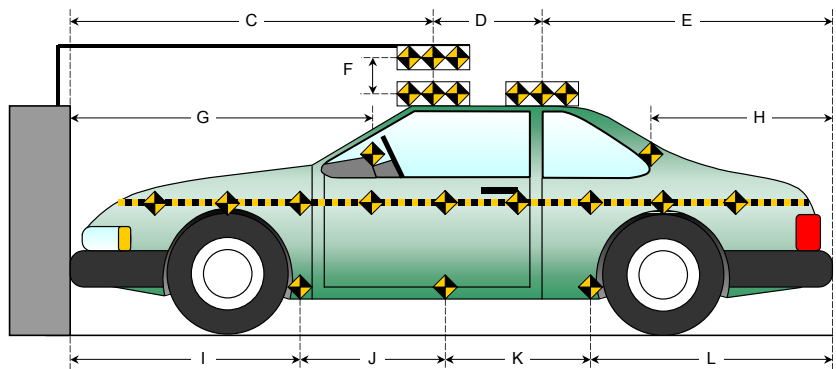
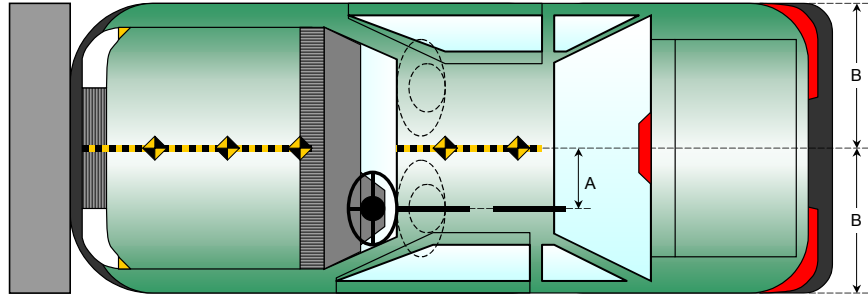


DATA SHEET NO. 12
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2006 Nissan Armada
 Test Program: 35mph Frontal Impact

NHTSA No.: M65200
 Test Date: 9/26/2005

Item	Value
A	449
B	1050
C	2365
D	610
E	2231
F	81
G	
H	1423
I	1424
J	1003
K	1007
L	1772
M	1423
N	1769
O	1005
P	1007
Q	1425



DATA SHEET NO. 13
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2006 Nissan Armada
 Test Program: 35mph Frontal Impact

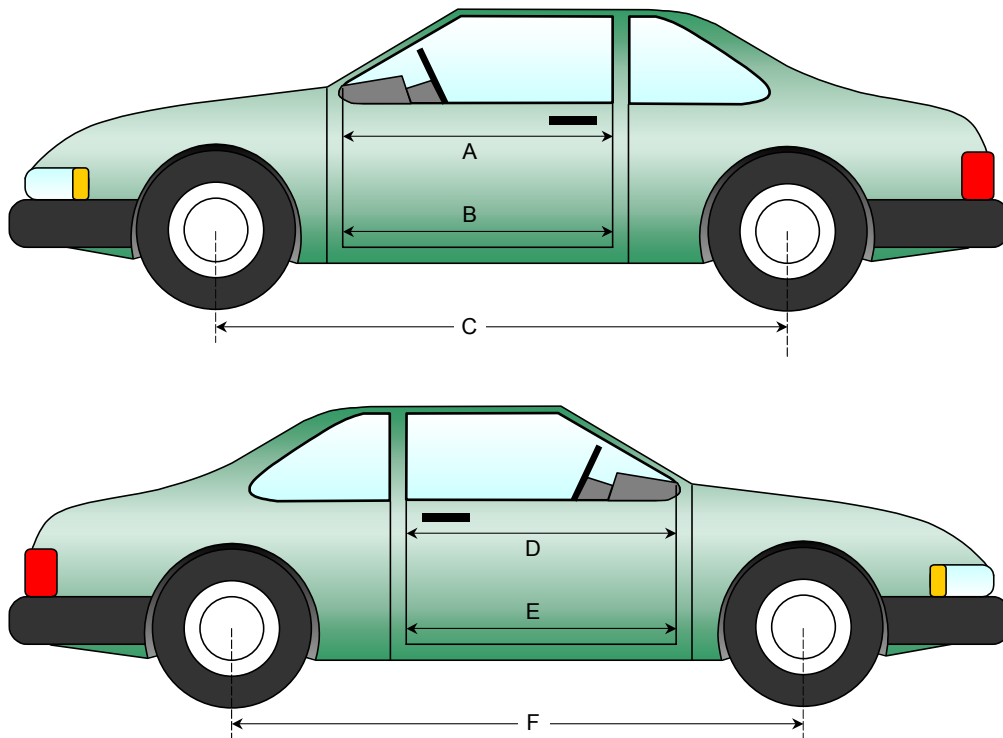
NHTSA No.: M65200
 Test Date: 9/26/2005

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	1086	1087	-1
B	Left Side Lower	mm	1052	1051	1
D	Right Side Upper	mm	1095	1096	-1
E	Right Side Lower	mm	1062	1059	3

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	3144	3078	66
F	Right Side Wheelbase	mm	3144	3076	68



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

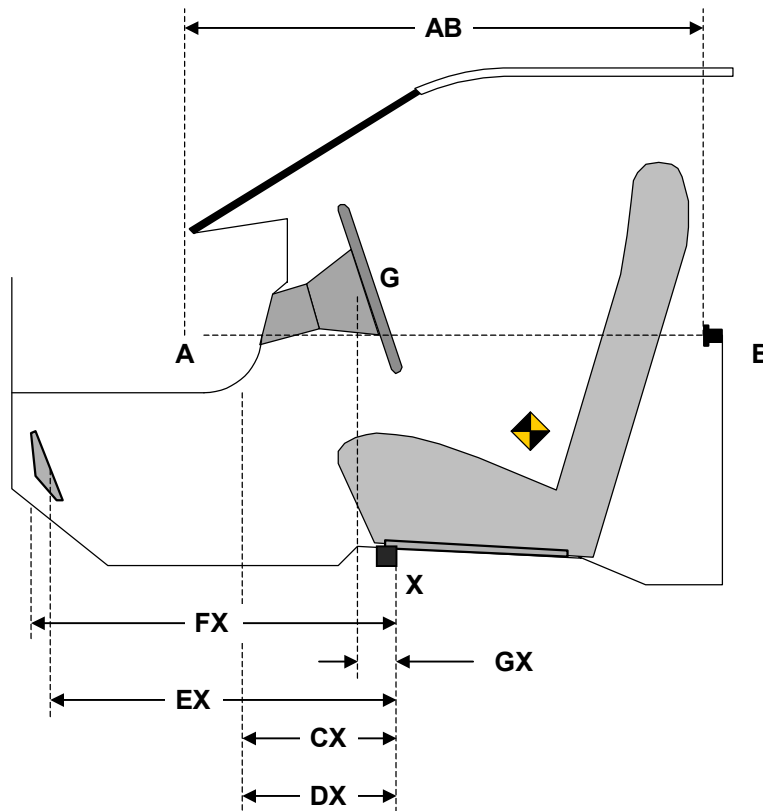
Test Vehicle: 2006 Nissan Armada
 Test Program: 35mph Frontal Impact

NHTSA No.: M65200
 Test Date: 9/26/2005

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside window jam)	mm	871	869	2
CX	Left Knee Bolster to X	mm	308	305	3
DX	Right Knee Bolster to X	mm	275	268	7
EX	Brake Pedal to X	mm	530	528	2
FX	Foot Rest to X	mm	550	550	0
GX	Center of Steering Column Wheel Hub to X	mm	82	78	4

X = Front of Seat Track (stationary)

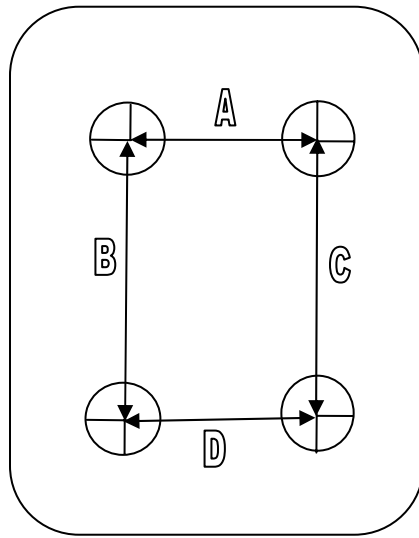


DRIVER COMPARTMENT

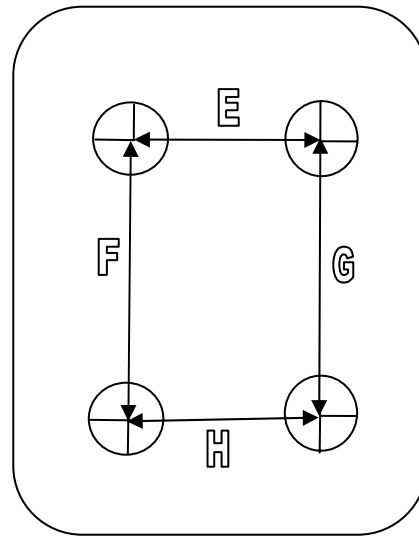
DATA SHEET NO. 13... (continued)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2006 Nissan Armada
 Test Program: 35mph Frontal Impact

NHTSA No.: M65200
 Test Date: 9/26/2005



Driver



Passenger

UNDERBODY FLOORBOARD DEFORMATION

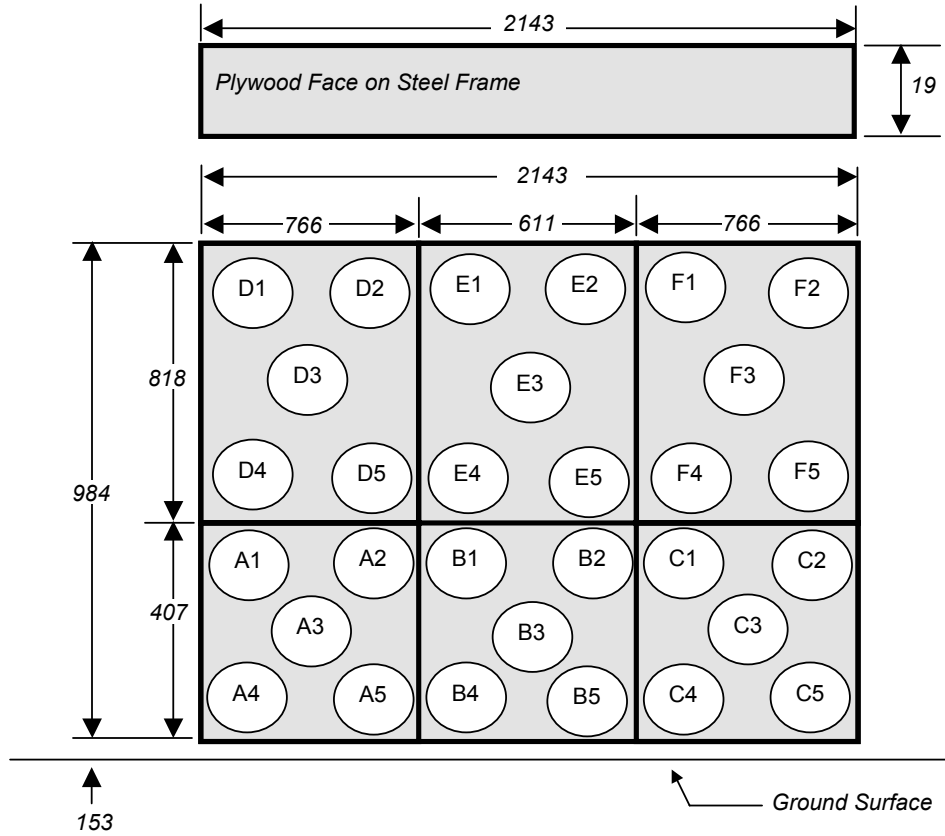
Measurement	Pre-Test	Post-Test	Difference
A	403	403	0
B	355	362	-7
C	287	261	26
D	391	400	-9
E	447	422	25
F	321	322	-1
G	311	308	3
H	449	458	-9

DATA SHEET NO. 14
LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle: 2006 Nissan Armada
 Test Program: 35mph Frontal Impact

NHTSA No.: M65200
 Test Date: 9/26/2005

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 Nissan Armada
 Test Program: 35mph Frontal Impact

NHTSA No.: M65200
 Test Date: 9/26/2005

VEHICLE INFORMATION

VIN: 5N1AA08B16N701516 Wheelbase (mm) : 3144
 Vehicle Size Category: SUV Test Weight (kg) : 2714.0

ACCELEROMETER DATA

Accelerometer Locations: As per measurements on Page 12
 Cal. Procedure/Interval: MGA procedure / 6 month
 Integration Algorithm: Trapezoidal Linearity: > 99%
 Impact Velocity (km/h): 56.5
 Velocity Change (km/h): 63.2 Time of Separation (msec): 101

CRUSH PROFILE

Collision Deformation Classification: Frontal Midpoint of Damage: Centerline
 Damage Region Length (mm): 1831 Impact Mode: Frontal

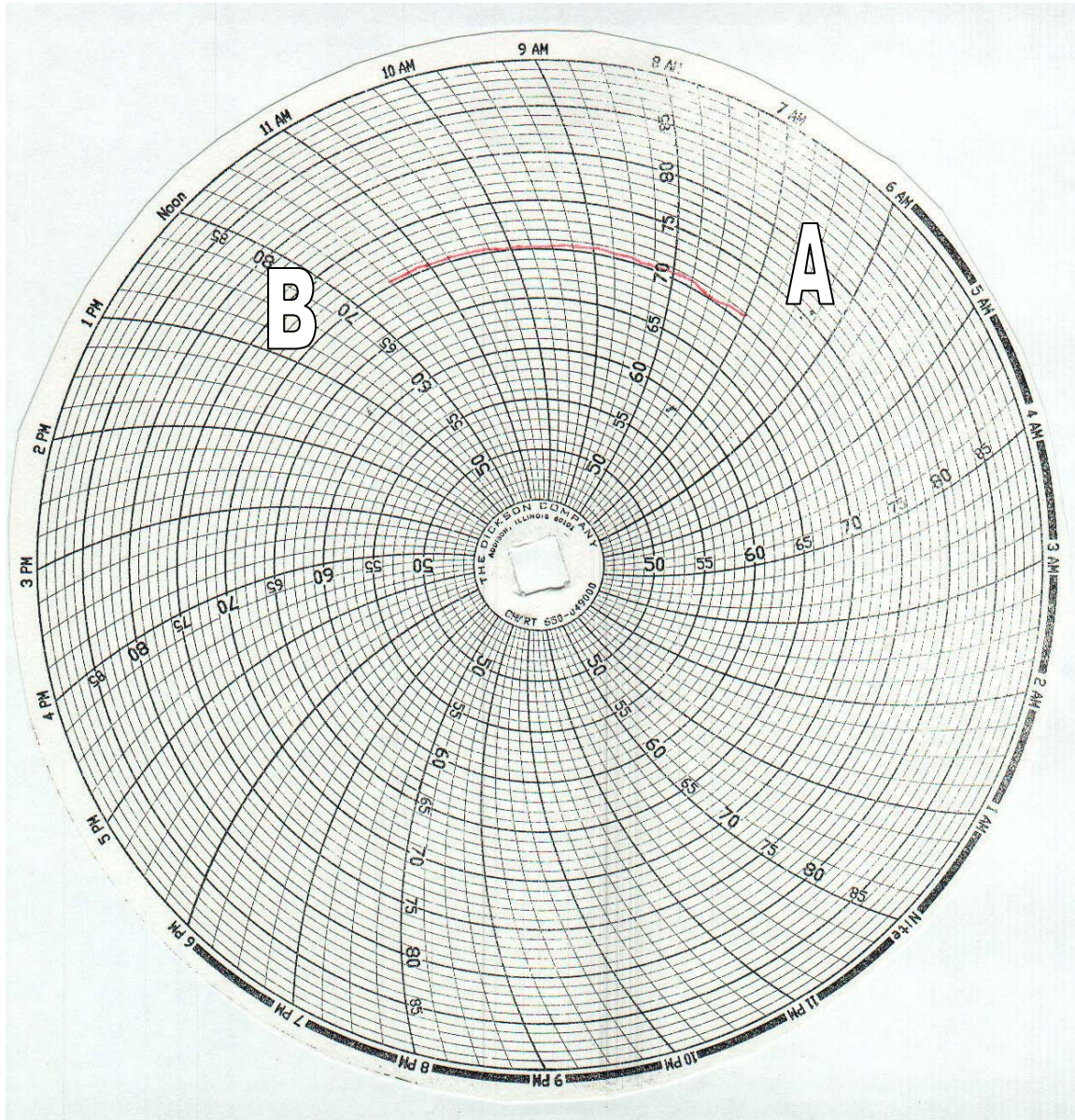
No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	5044	4718	326
C2	Crush zone 2 at left side	mm	5158	4725	433
C3	Crush zone 3 at left side	mm	5201	4685	516
C4	Crush zone 4 at right side	mm	5198	4721	477
C5	Crush zone 5 at right side	mm	5158	4724	434
C6	Crush zone 6 at right side	mm	5050	4805	245
L	C1 TO C6	mm	1831	1846	-15

DATA SHEET NO. 16

DUMMY / VEHICLE TEMPERATURE STABILIZATION CHART

Test Vehicle: 2006 Nissan Armada
Test Program: 35mph Frontal Impact

NHTSA No.: M65200
Test Date: 9/26/2005



A = Dummies installed in vehicle at 7:00 am

B = Test conducted at 11:32 am

APPENDIX A
PHOTOGRAPHS

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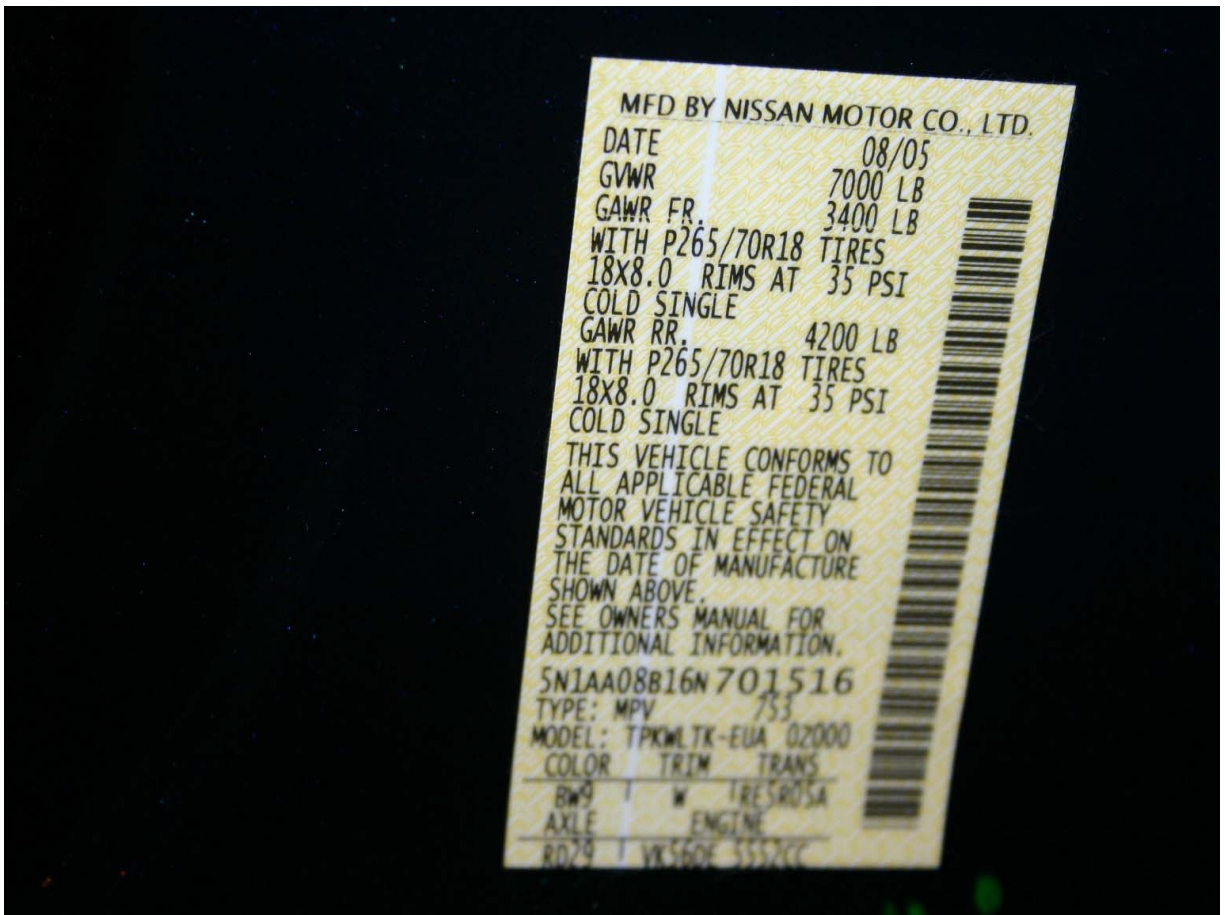
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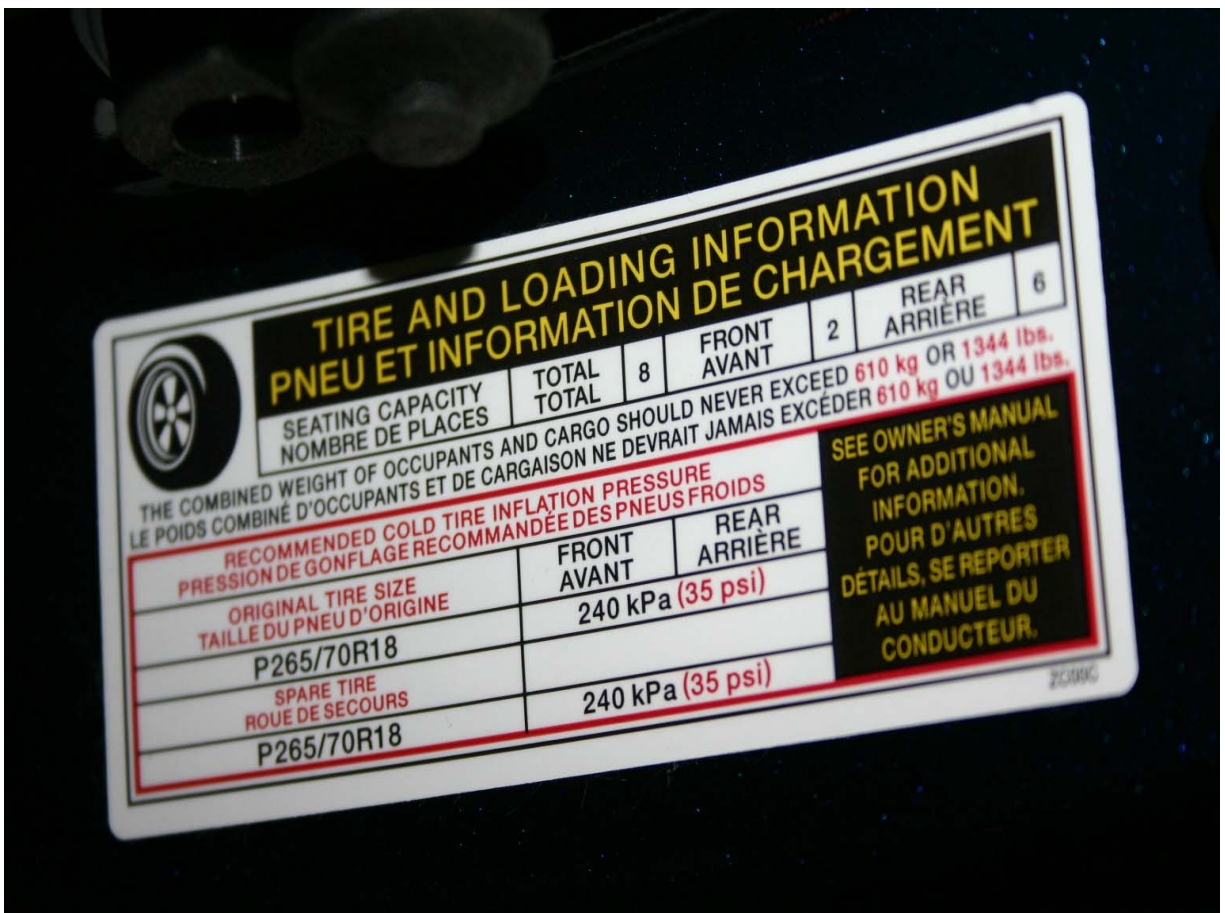
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Load Cell Location



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



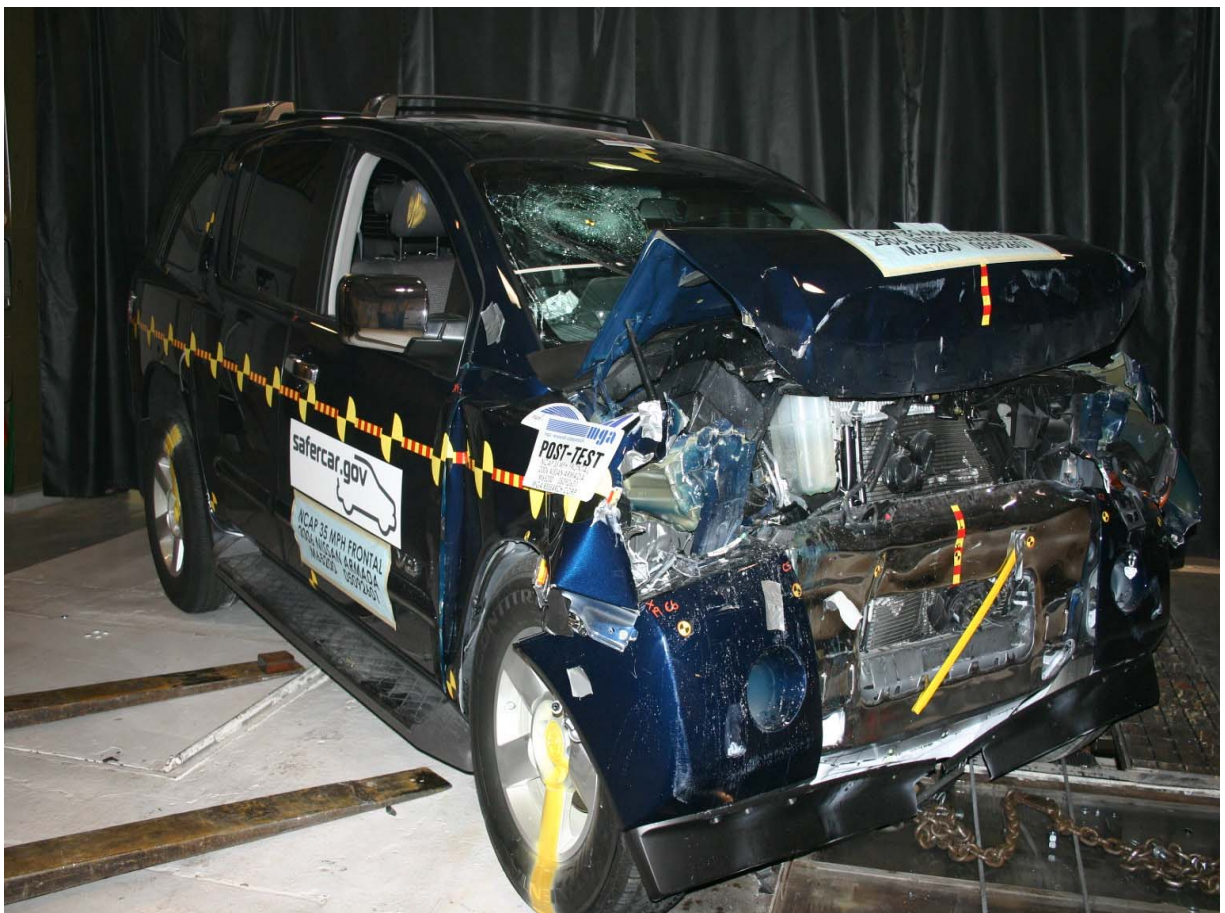
Pre-Test Right Side View



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



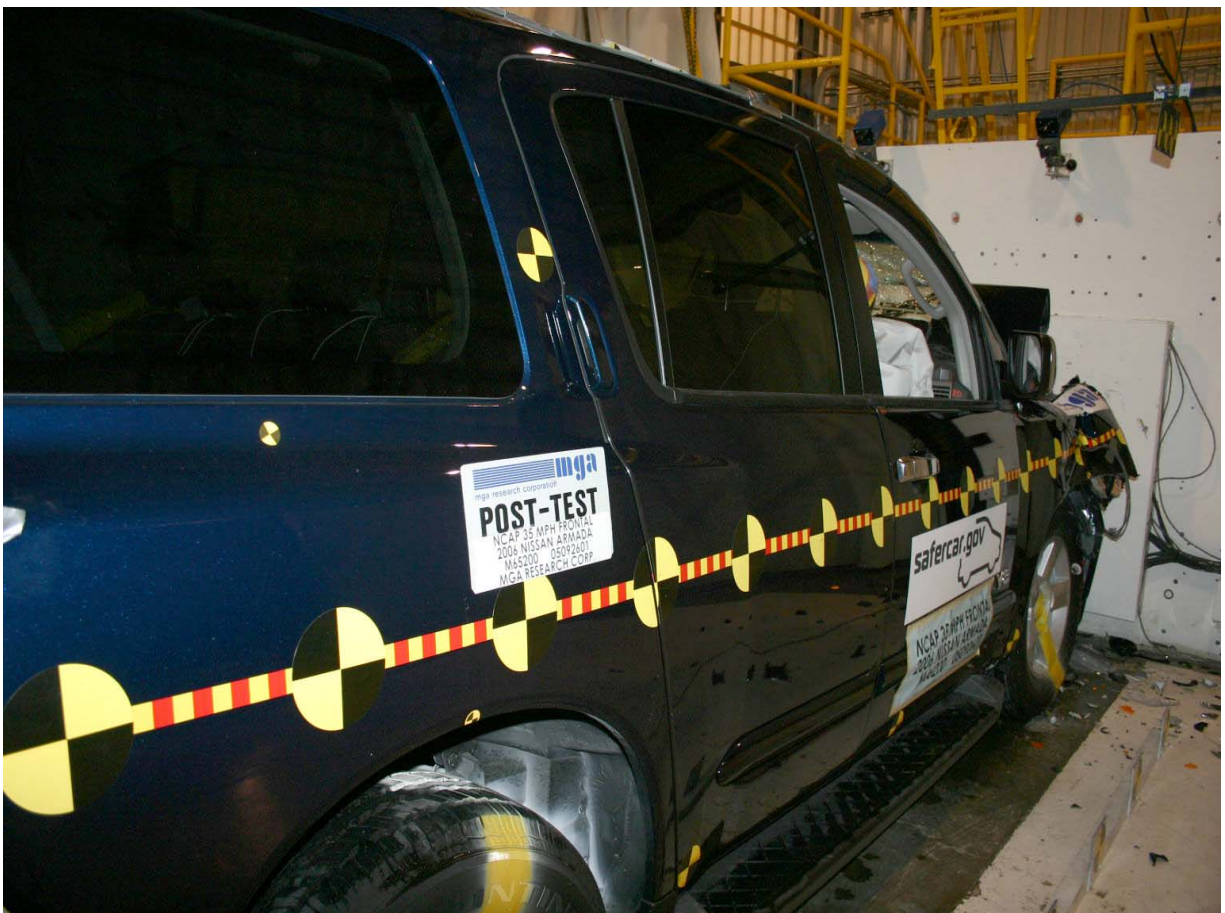
Pre-Test Left Side 3/4 View of Doors After Impact



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



Pre-Test Right Side ¾ View of Doors After Impact



Post-Test Right Side ¾ View of Doors After Impact



Pre-Test Windshield View



Post-Test Windshield View



Pre-Test Engine Compartment View



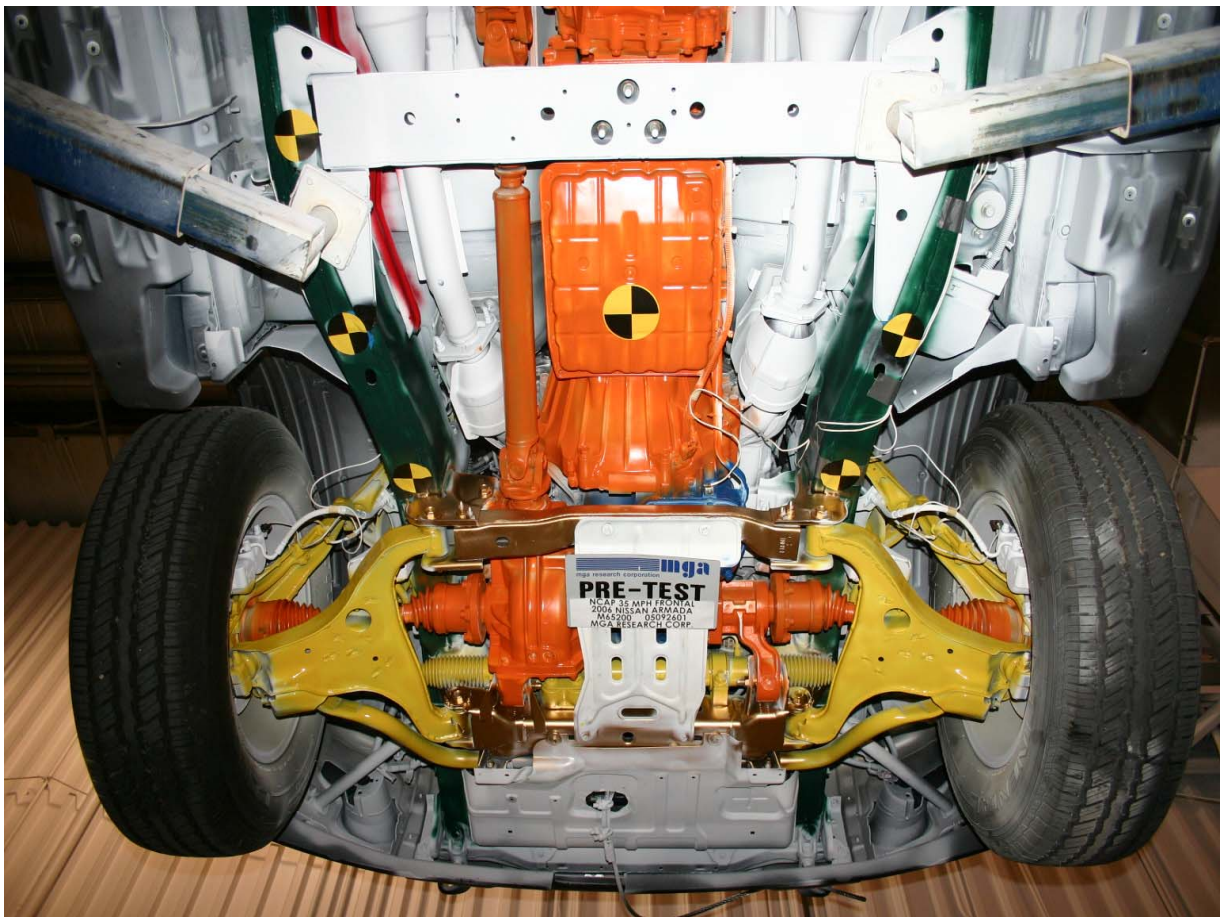
Post-Test Engine Compartment View



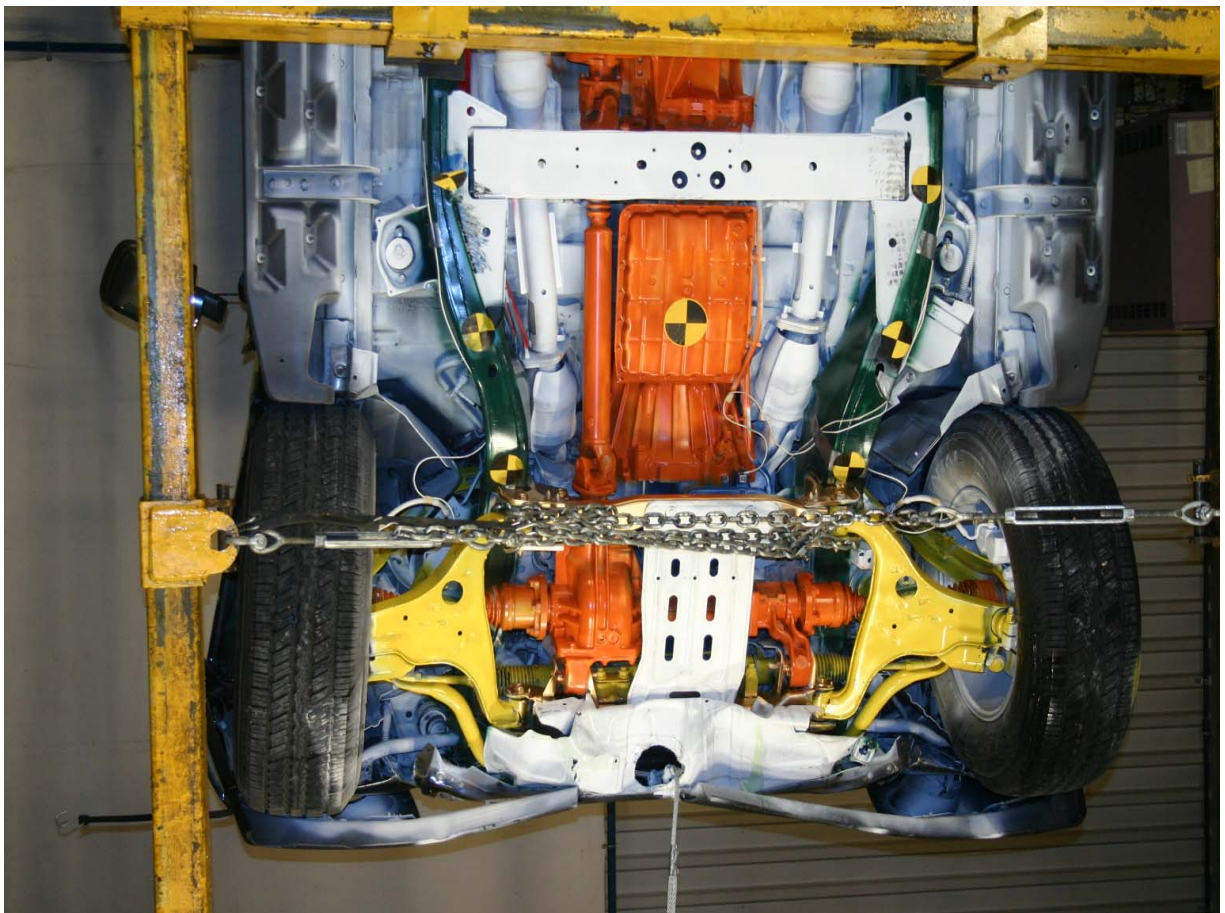
Pre-Test Fuel Cap View



Post-Test Fuel Cap View



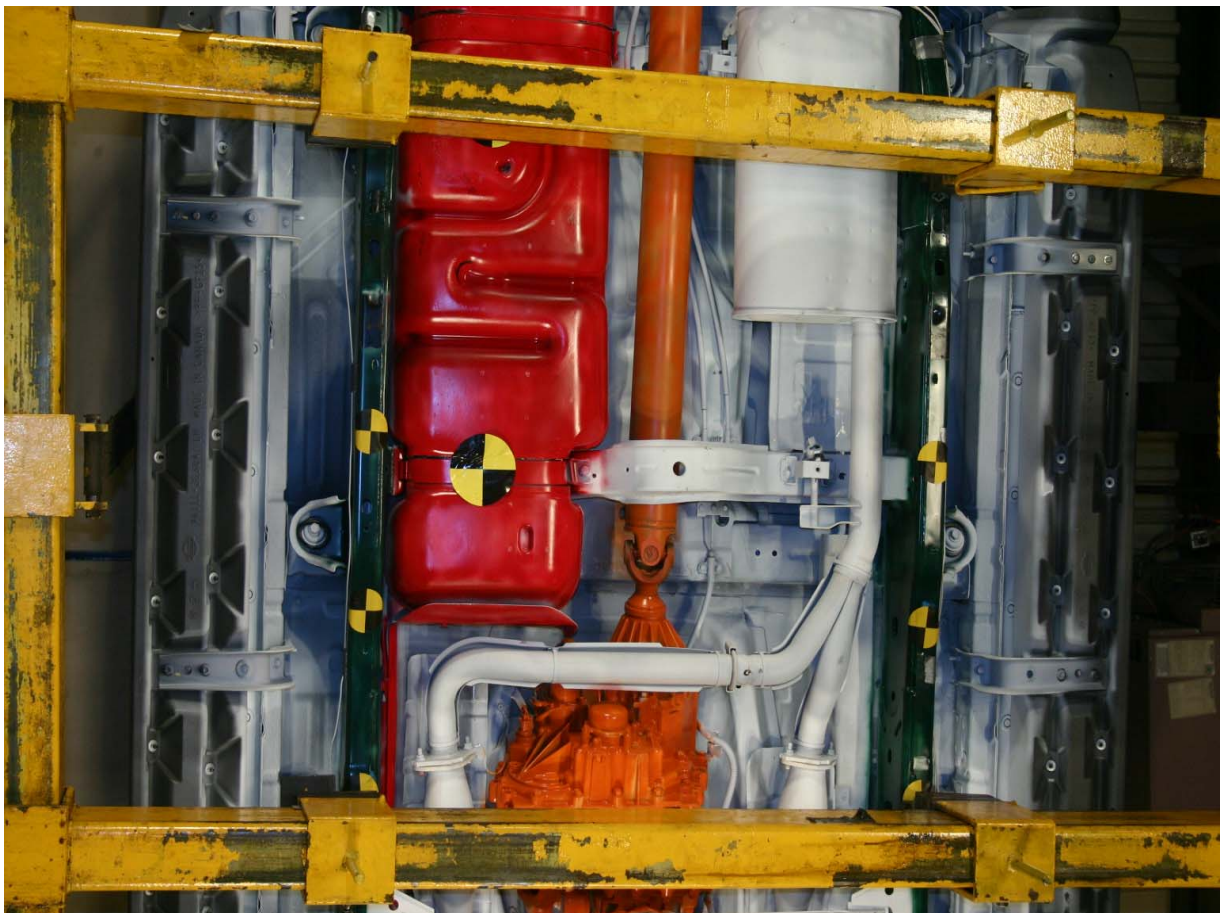
Pre-Test Front Underbody View



Post-Test Front Underbody View



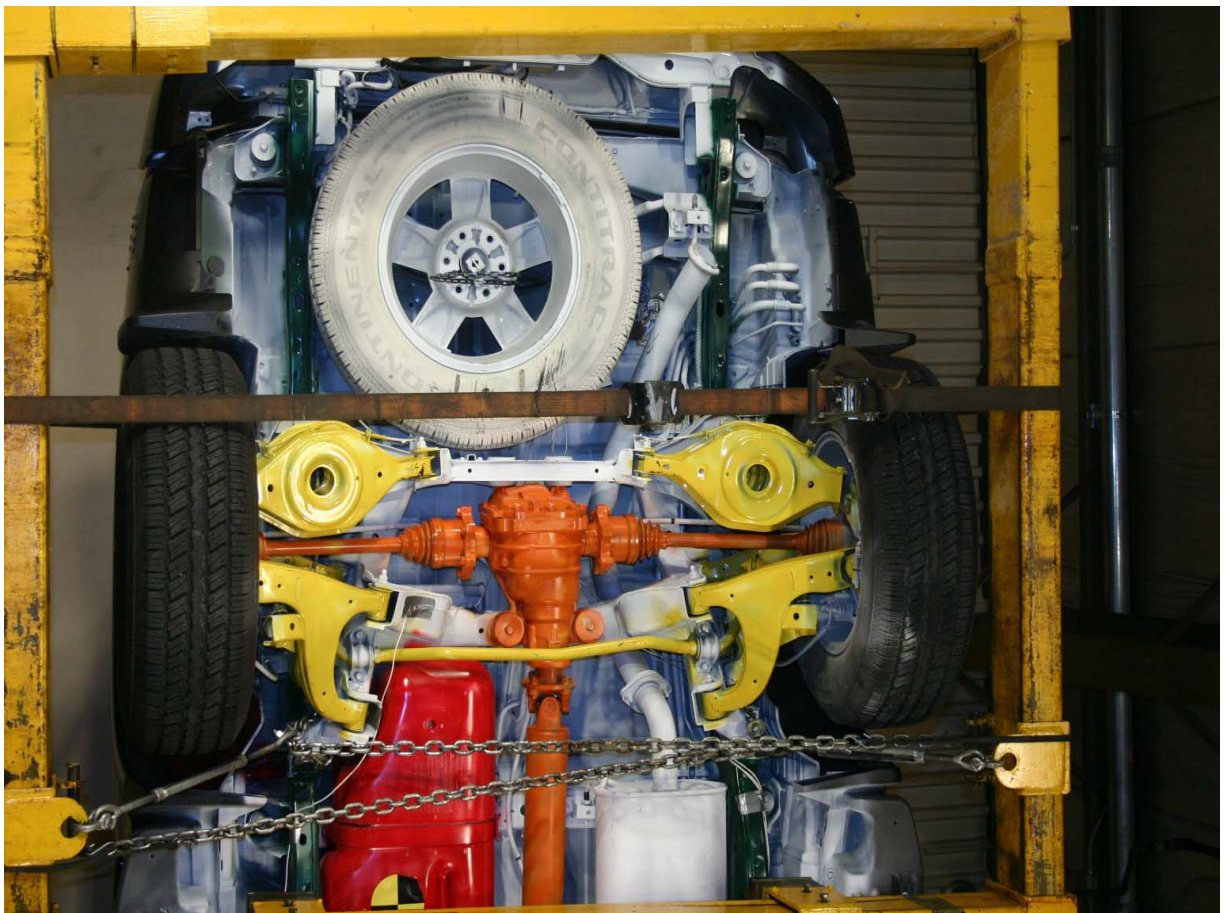
Pre-Test Mid Underbody View



Post-Test Mid Underbody View



Pre-Test Rear Underbody View



Post-Test Rear Underbody View



Pre-Test Driver Dummy Front View (Head Position)



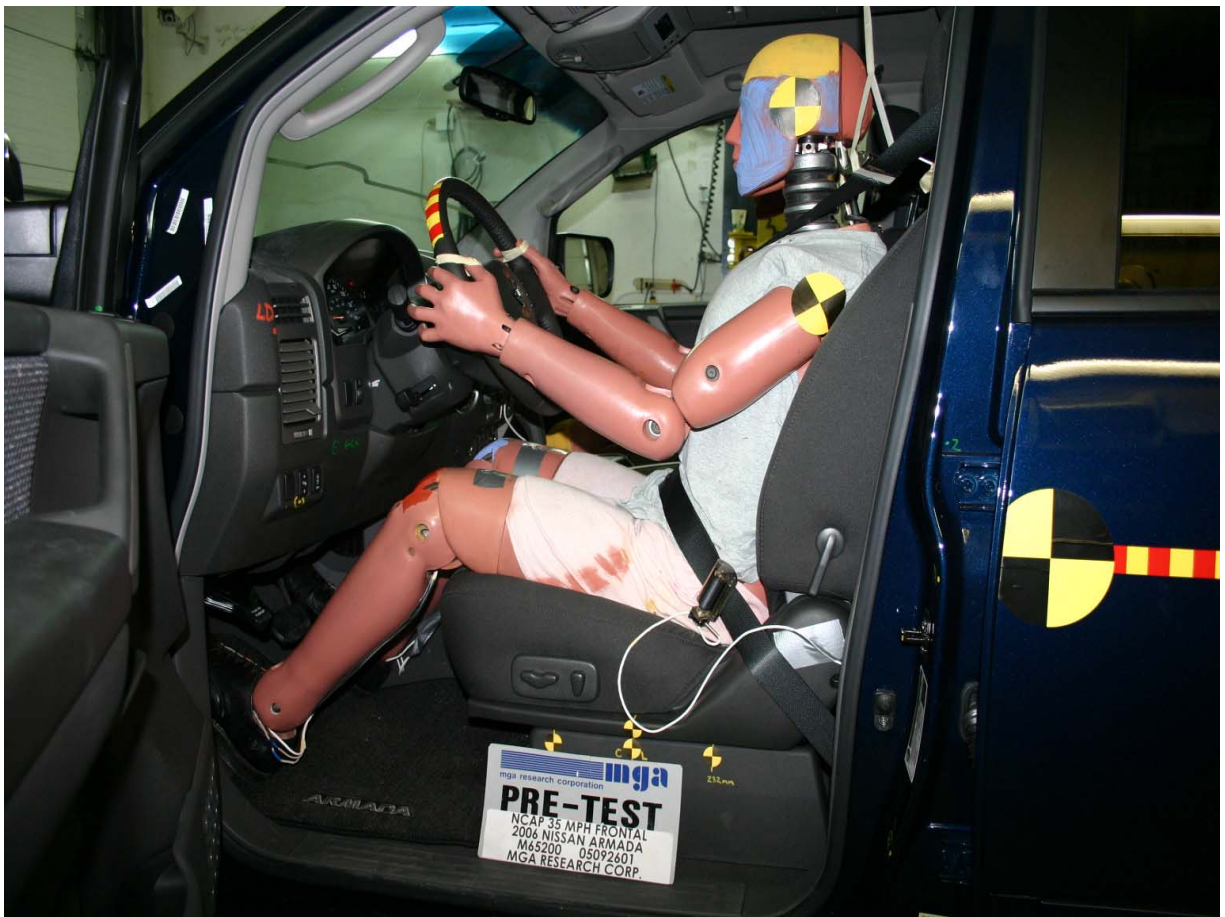
Post-Test Driver Dummy Front View (Head Position)



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



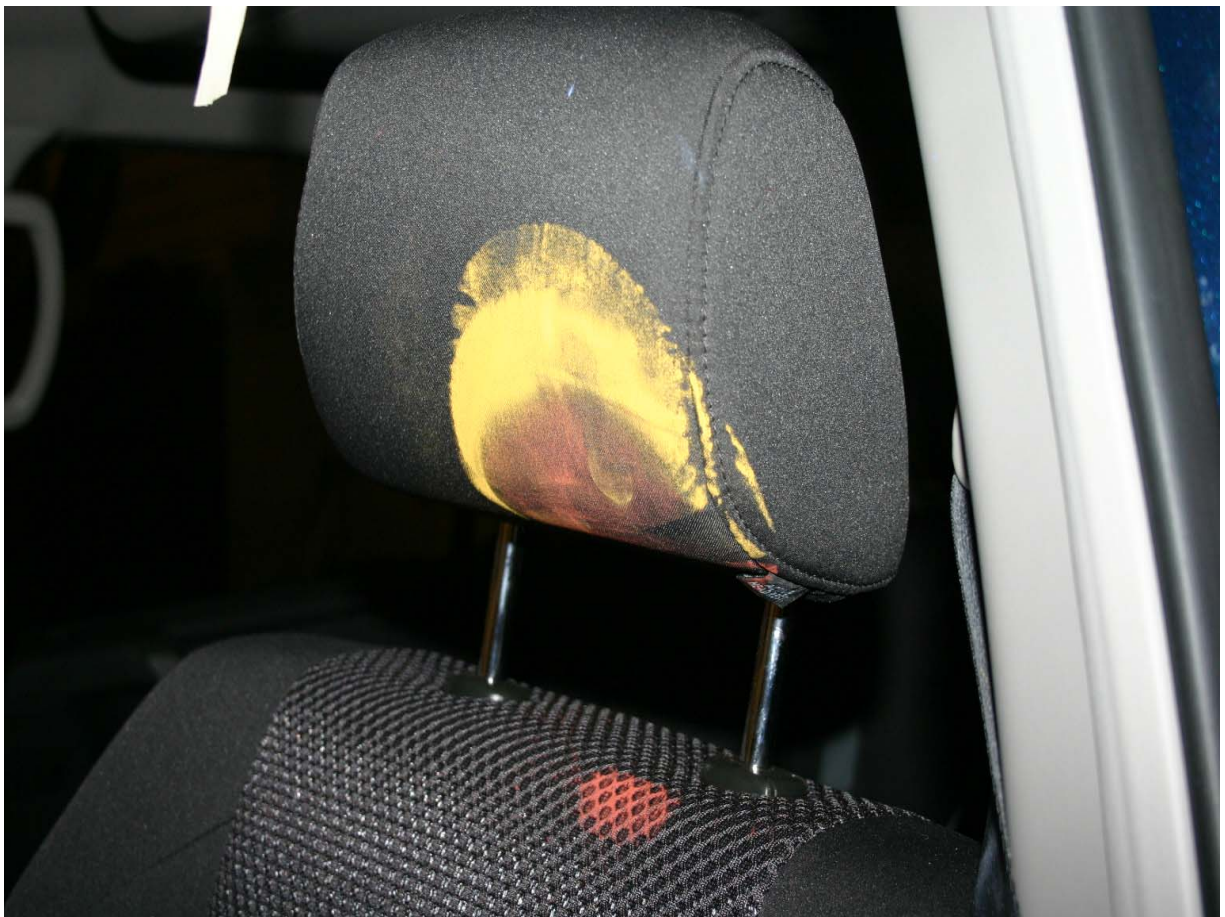
Post-Test Driver Side Knee Bolster



Pre-Test Driver Side Floor Pan



Post-Test Driver Side Floor Pan



Post-Test Driver Dummy Head Contact



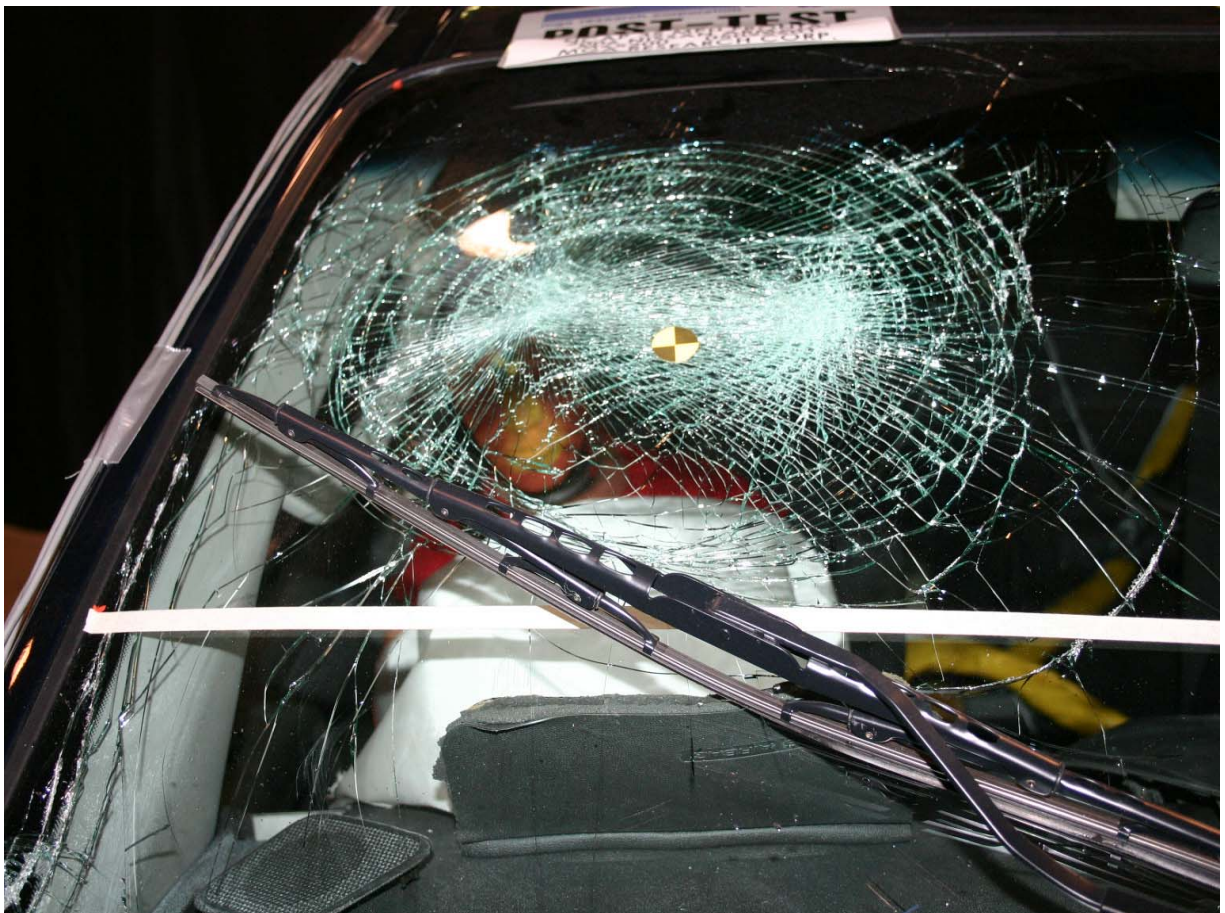
Post-Test Driver Dummy Knee Contact



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)



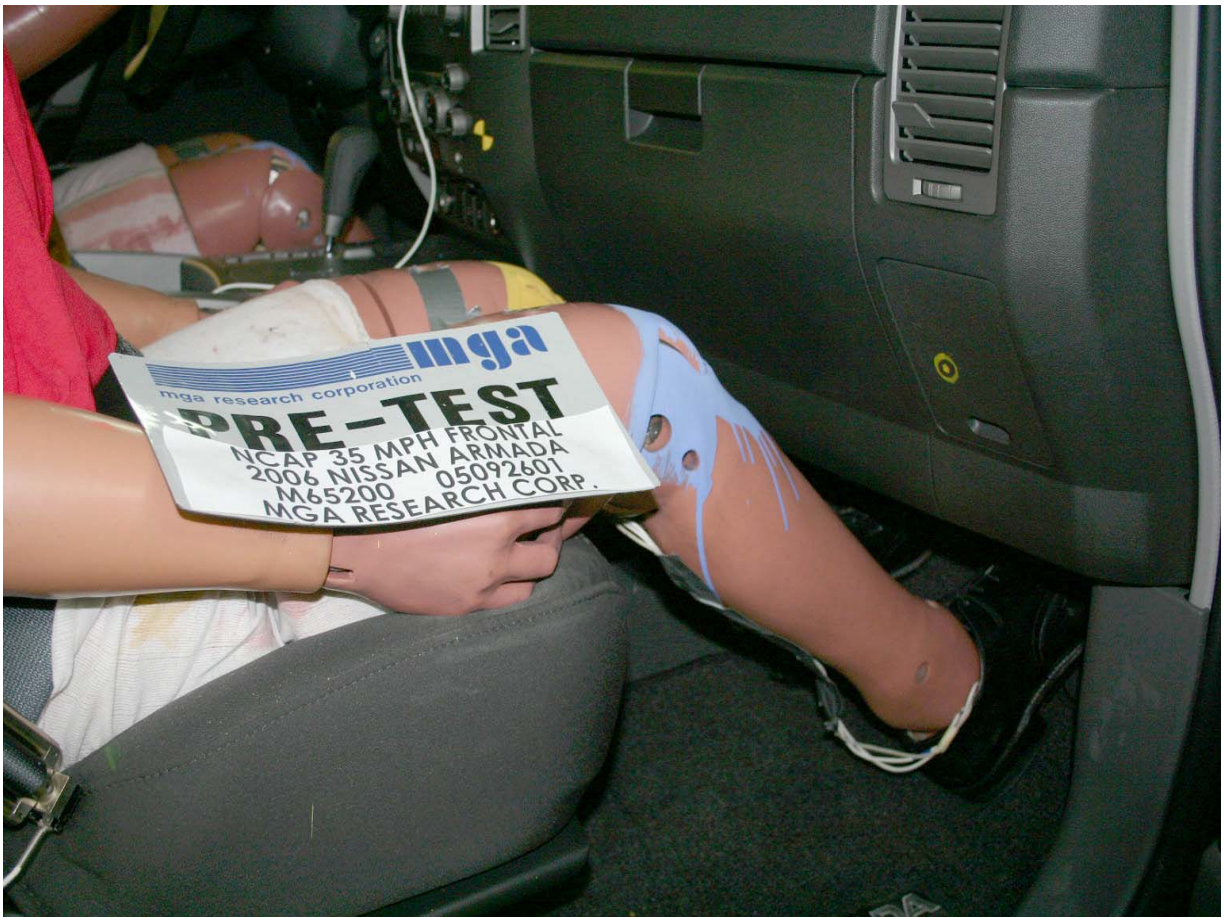
Post-Test Passenger Dummy (Door Open)



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



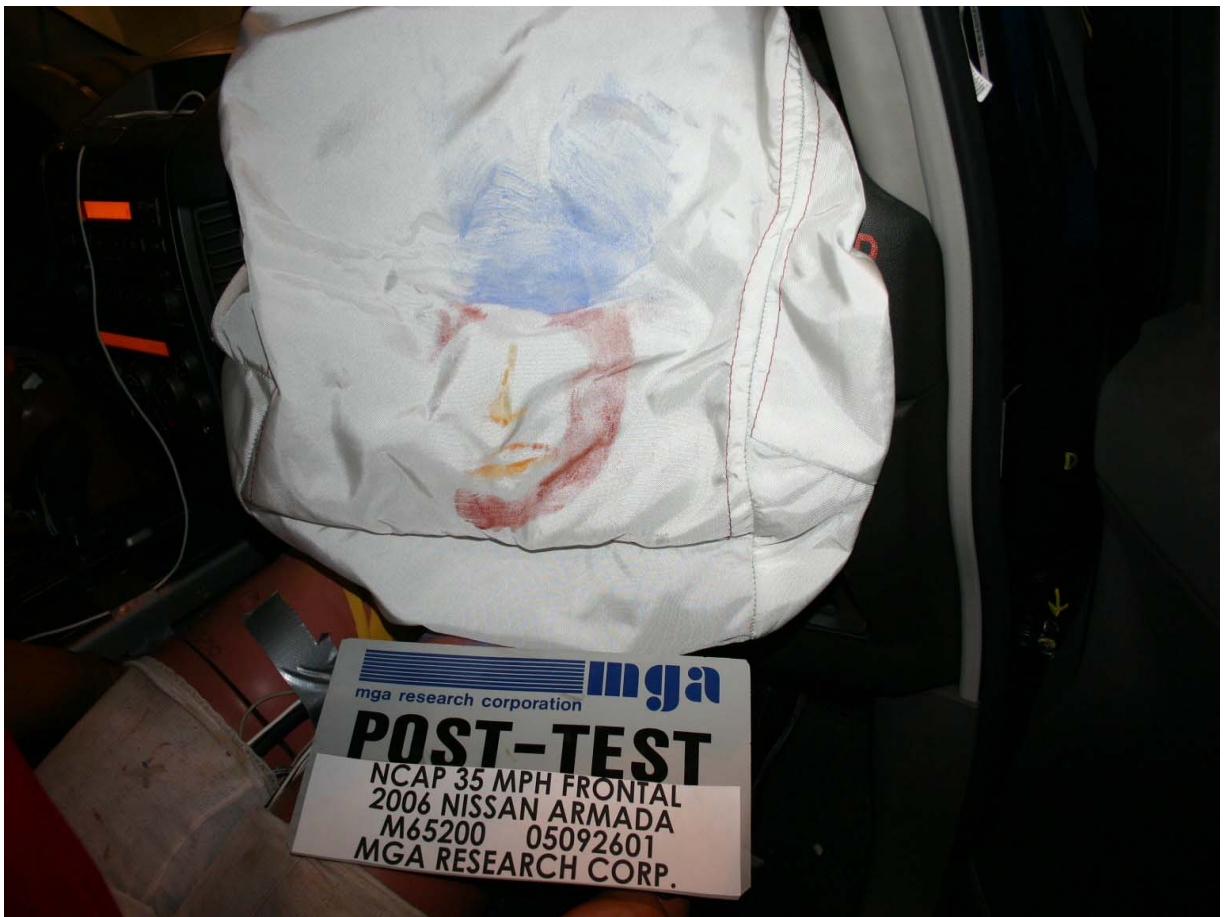
Post-Test Passenger Side Floor Pan



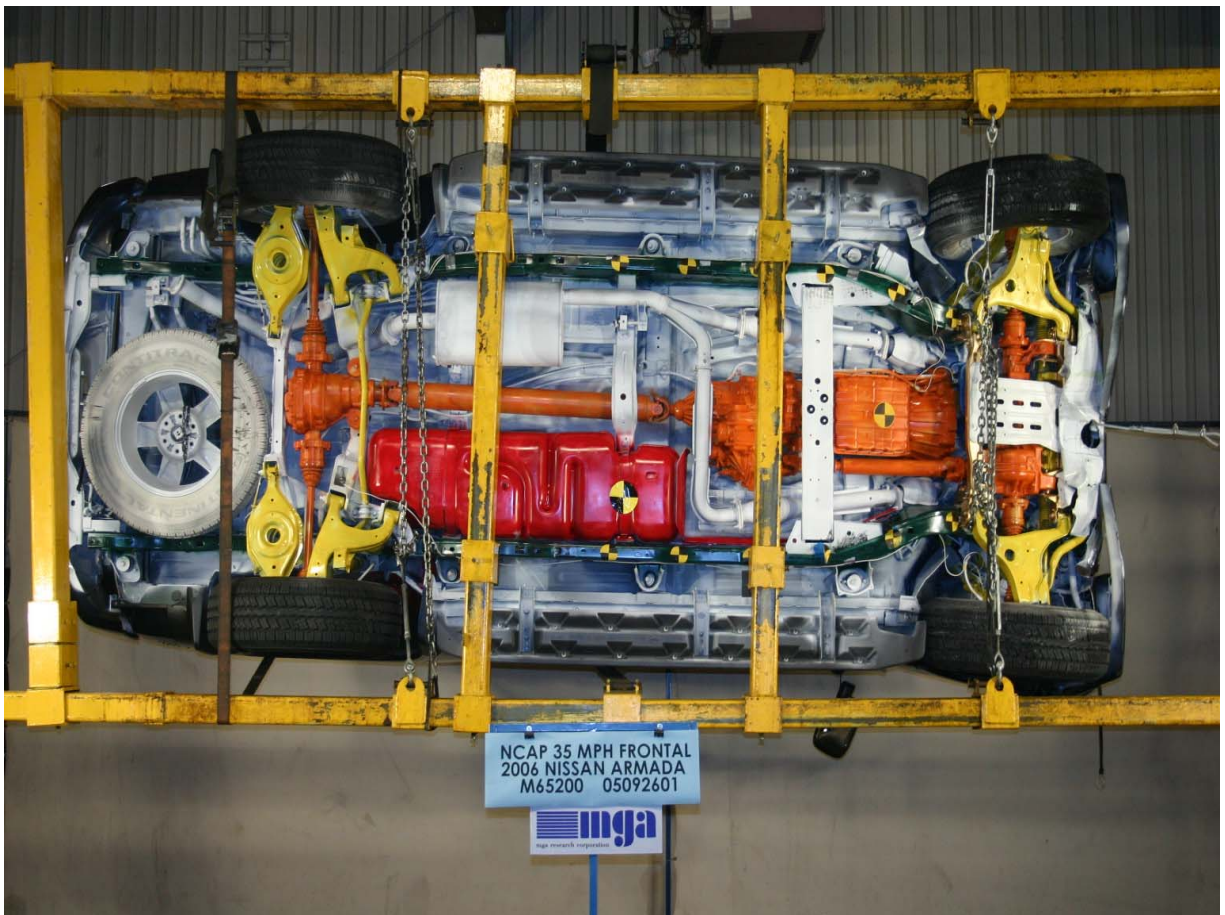
Post-Test Passenger Dummy Head Contact



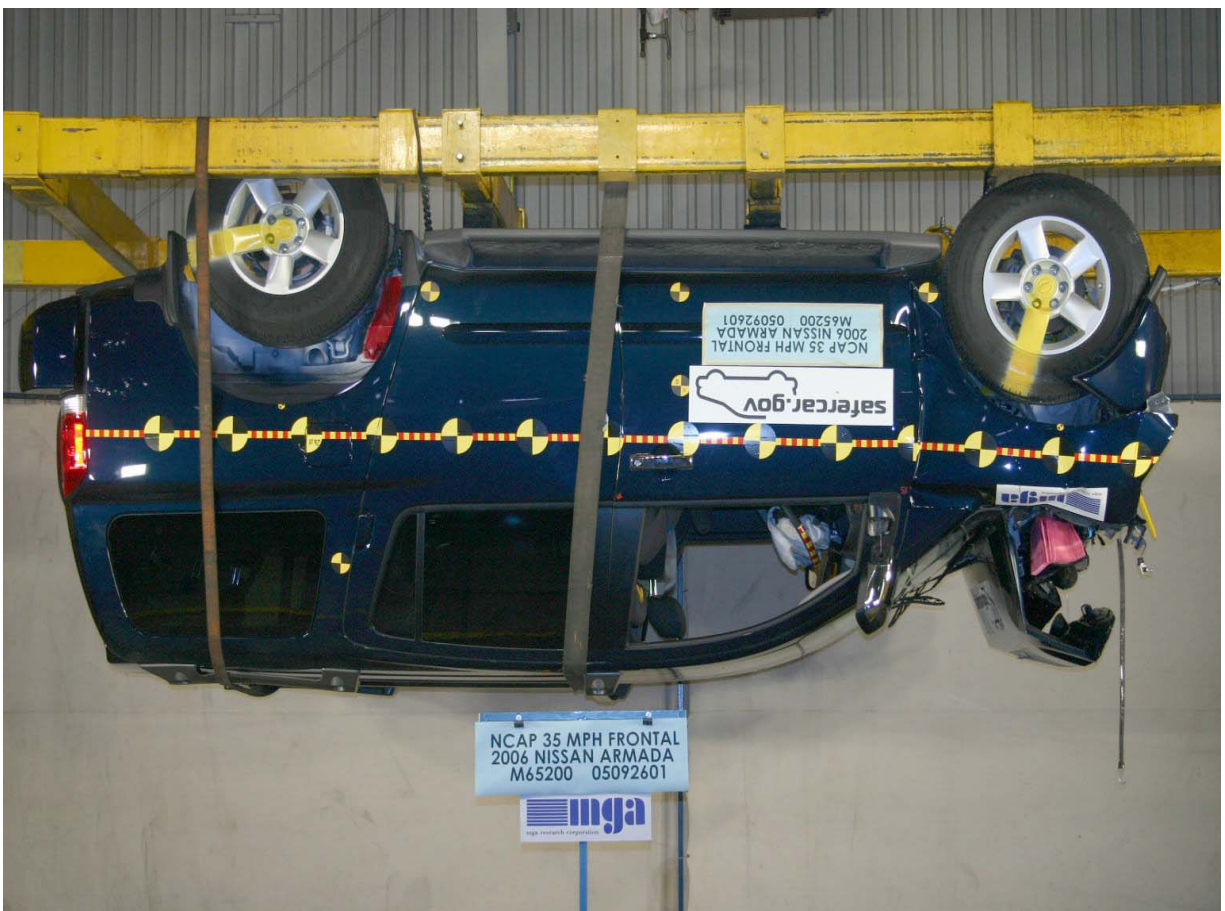
Post-Test Passenger Dummy Knee Contact



Post-Test Passenger Dummy Airbag Contact



Vehicle on Rollover Device at 90 Degrees



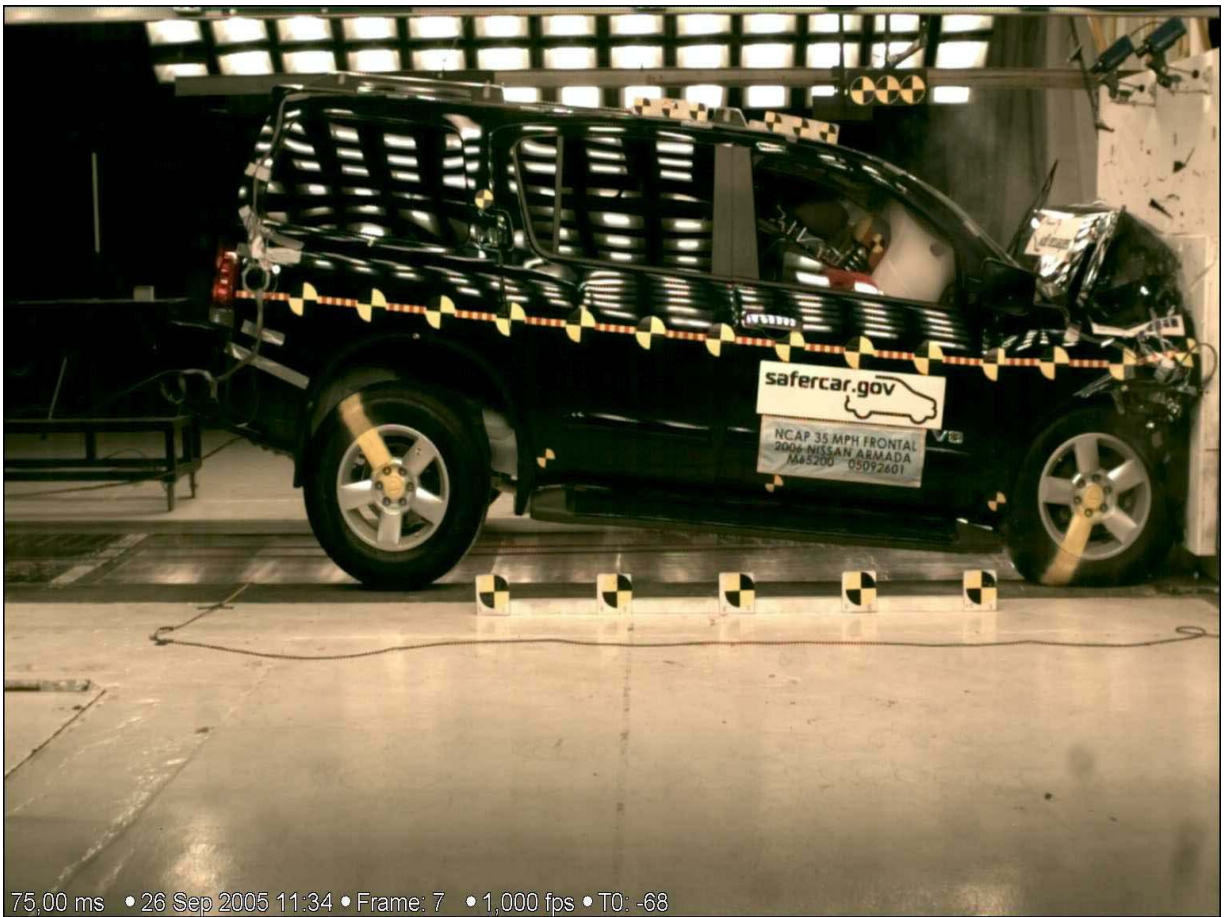
Vehicle on Rollover Device at 180 Degrees



Vehicle on Rollover Device at 270 Degrees



Vehicle on Rollover Device at 360 Degrees



75,00 ms • 26 Sep 2005 11:34 • Frame: 7 • 1,000 fps • T0: -68

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

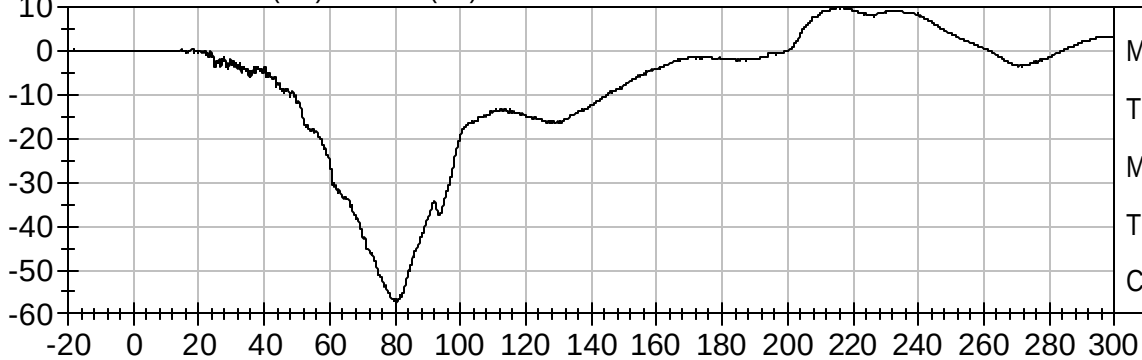
Driver Right Upper Tibia Moment Y

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

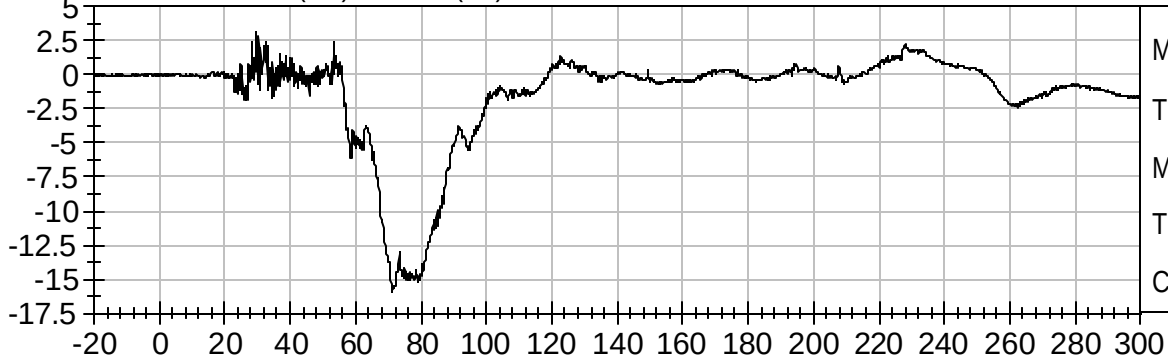
Passenger Left Lower Tibia Moment Y
Passenger Left Lower Tibia Force Z
Passenger Right Upper Tibia Moment X
Passenger Right Upper Tibia Moment Y
Passenger Right Upper Tibia Force Z
Passenger Right Lower Tibia Moment X
Passenger Right Lower Tibia Moment Y
Passenger Right Lower Tibia Force Z
Passenger 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
Vehicle Instrument Panel 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
Barrier Contact



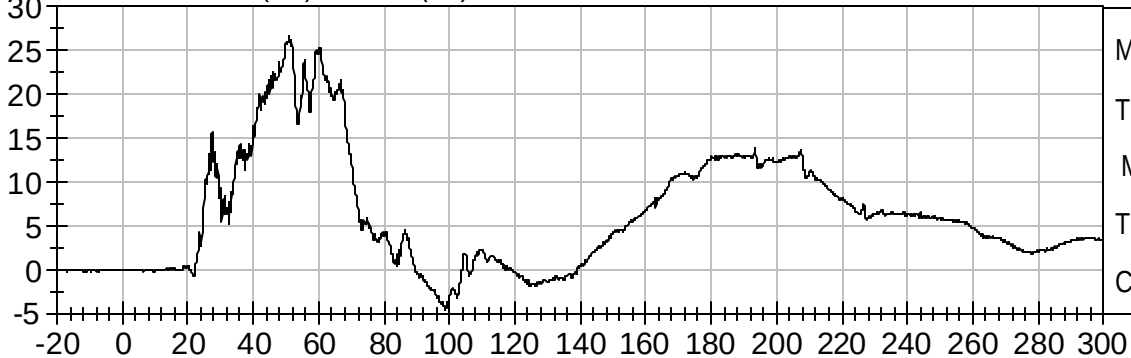
DRIVER HEAD X (G's) vs TIME (ms)



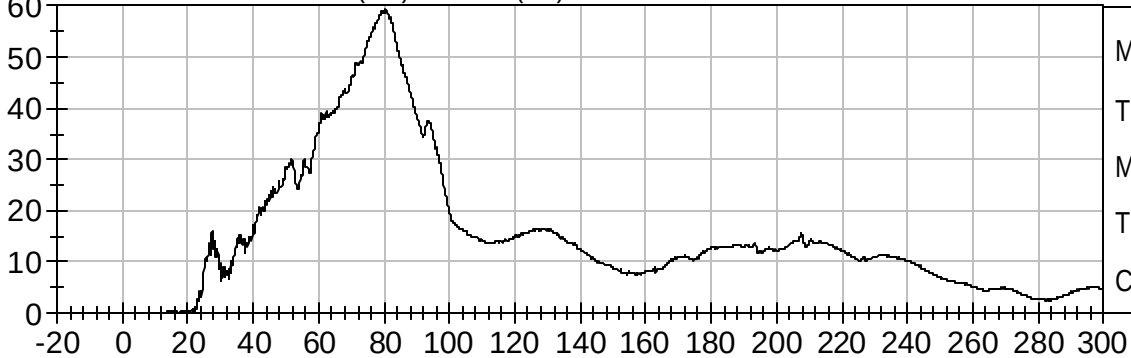
DRIVER HEAD Y (G's) vs TIME (ms)



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

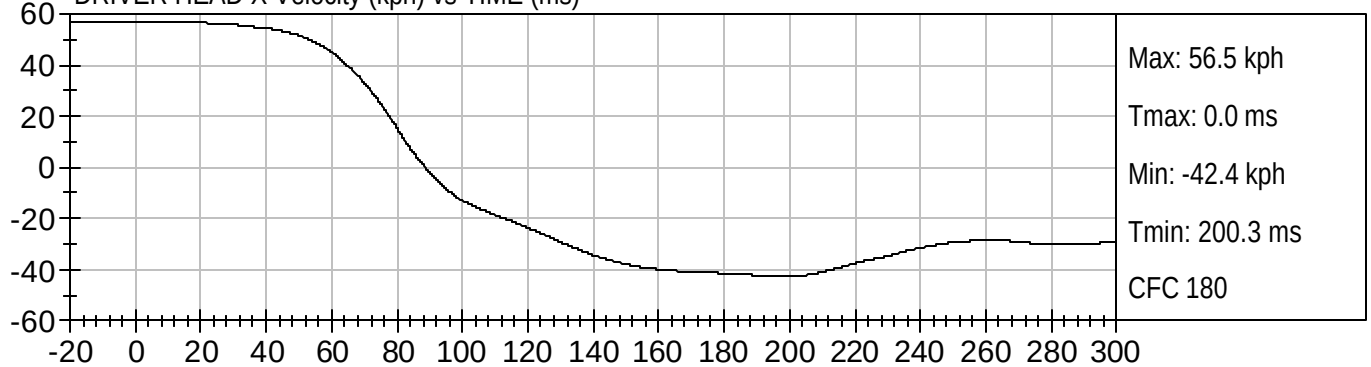


DRIVER HEAD Resultant (G's) vs TIME (ms)

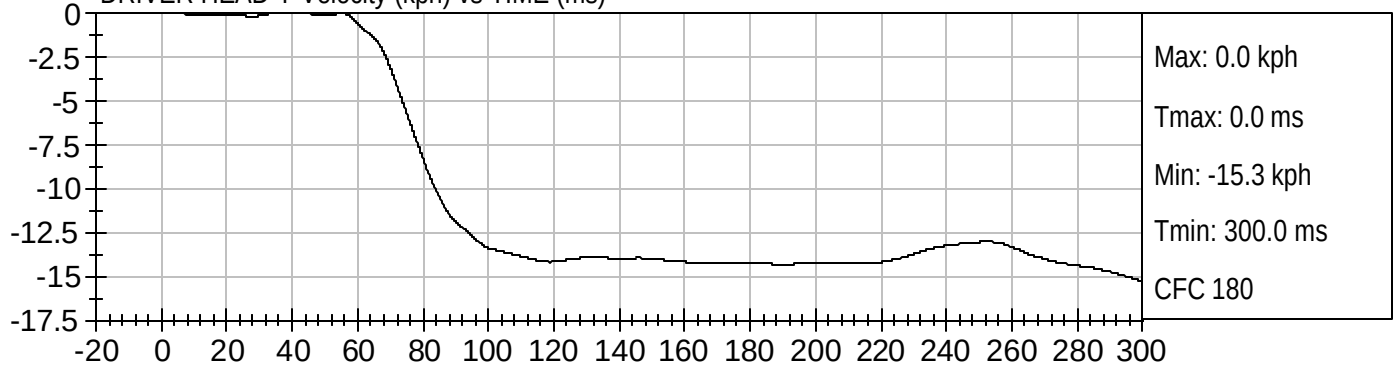




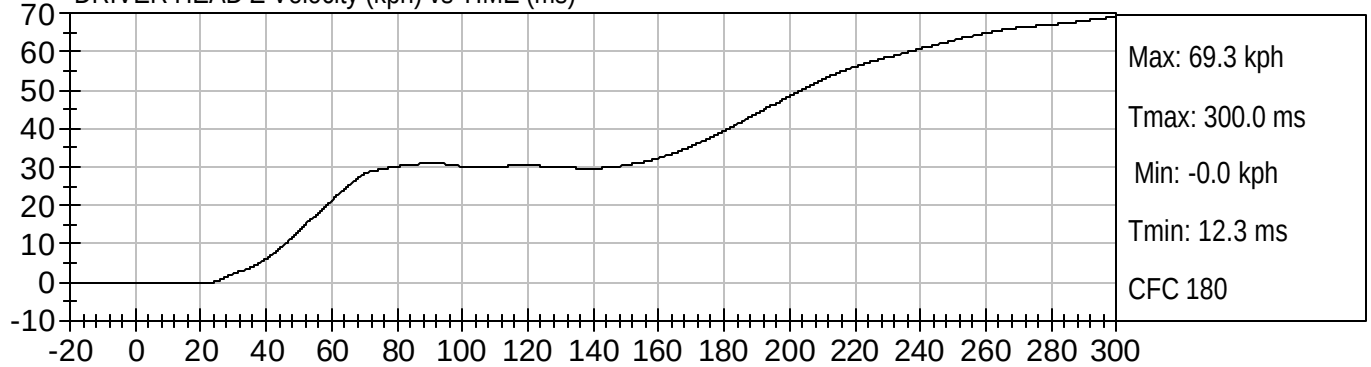
DRIVER HEAD X Velocity (kph) vs TIME (ms)

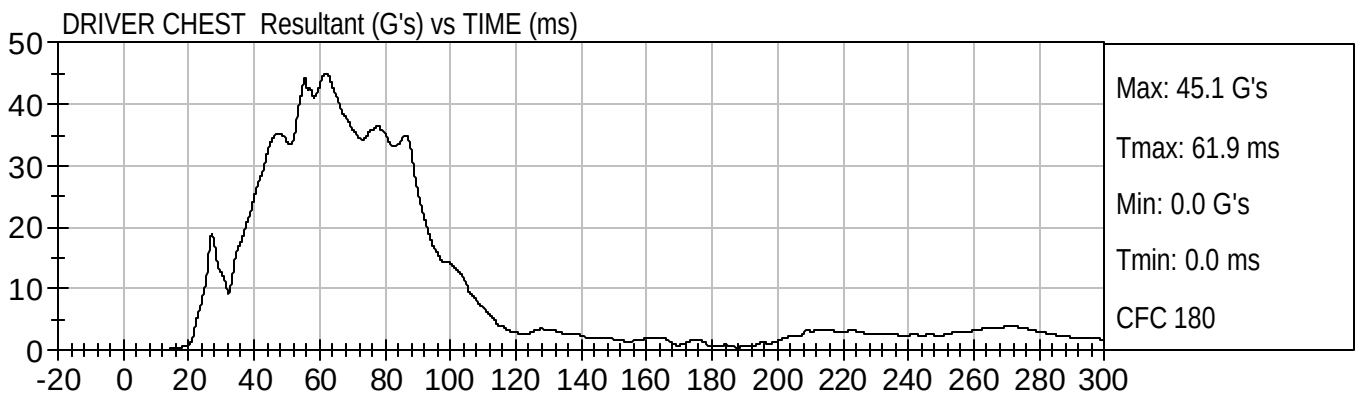
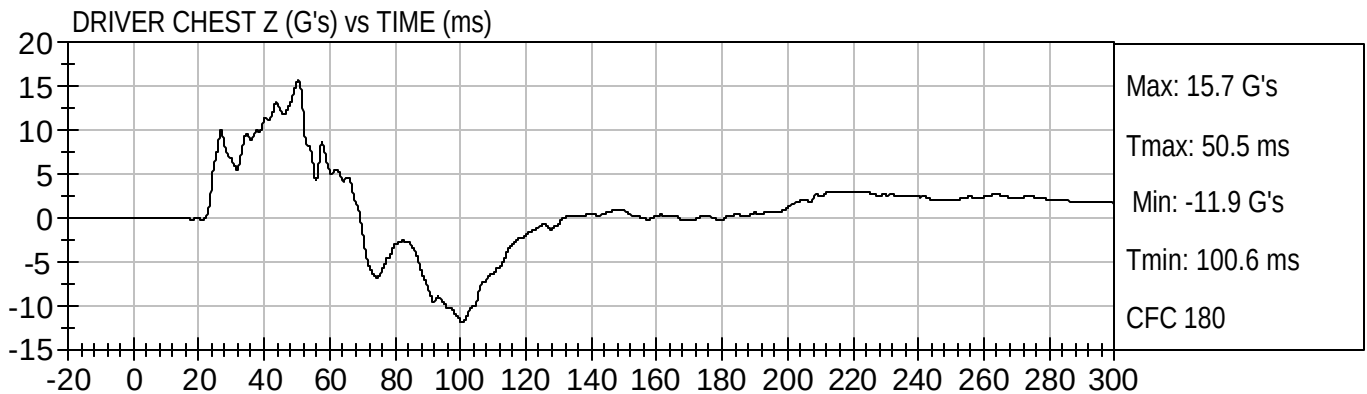
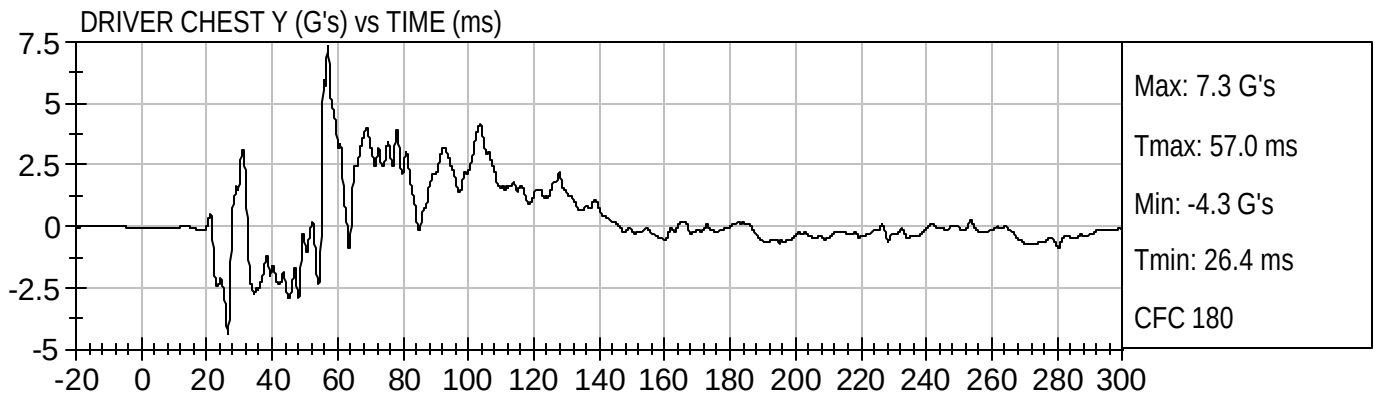
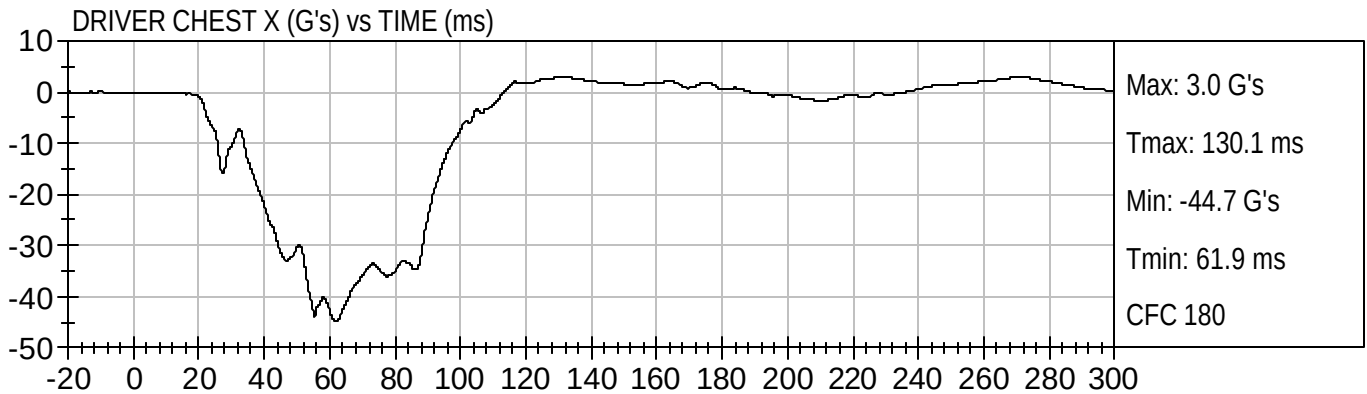


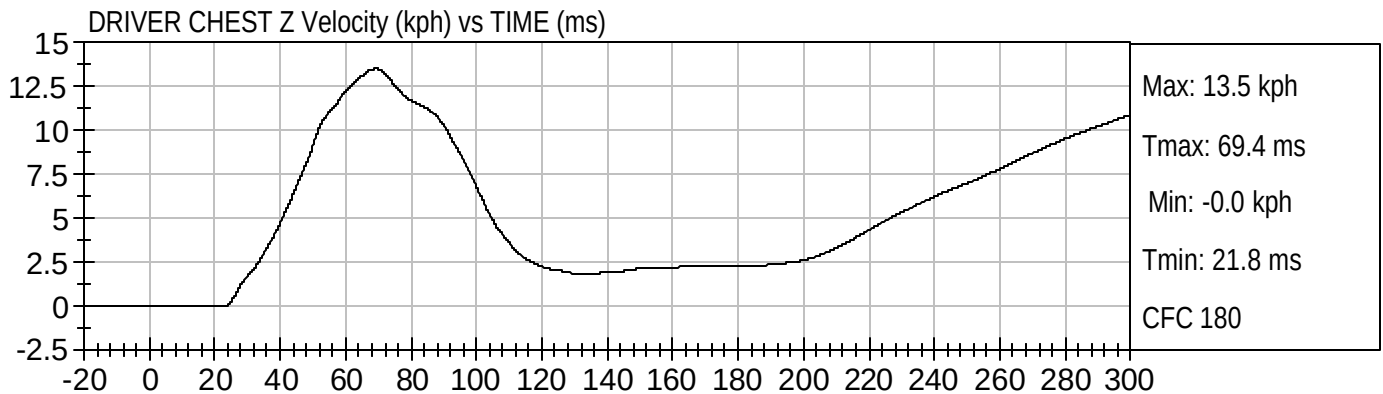
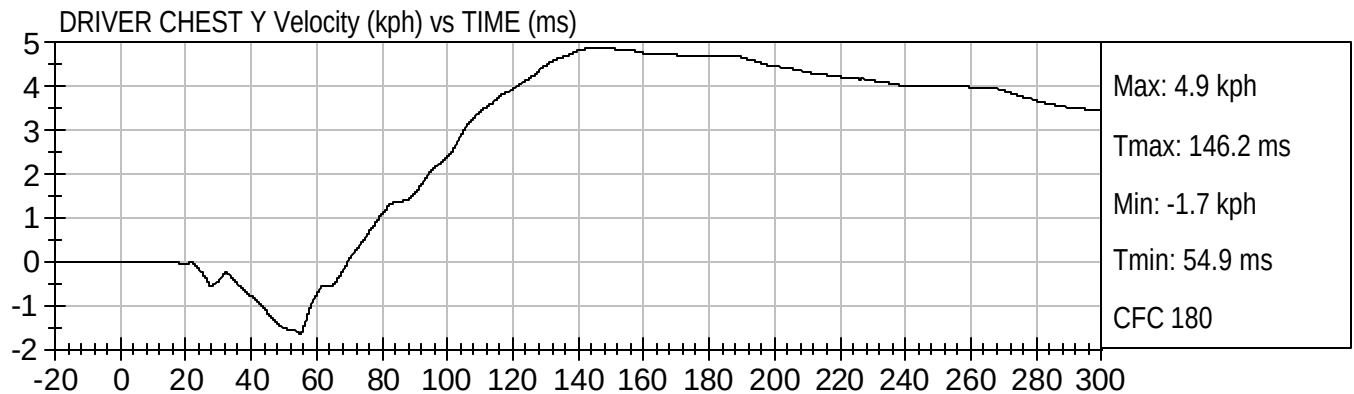
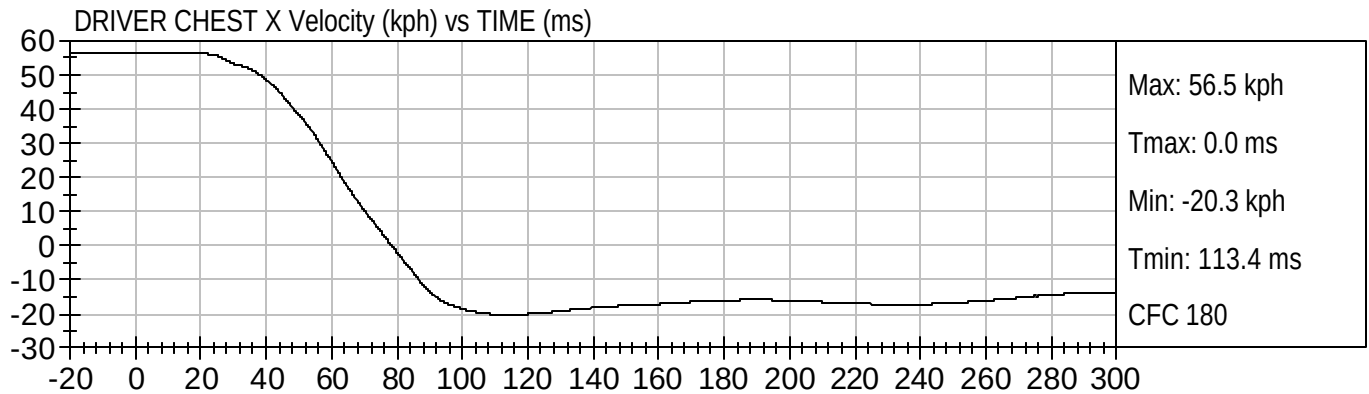
DRIVER HEAD Y Velocity (kph) vs TIME (ms)



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

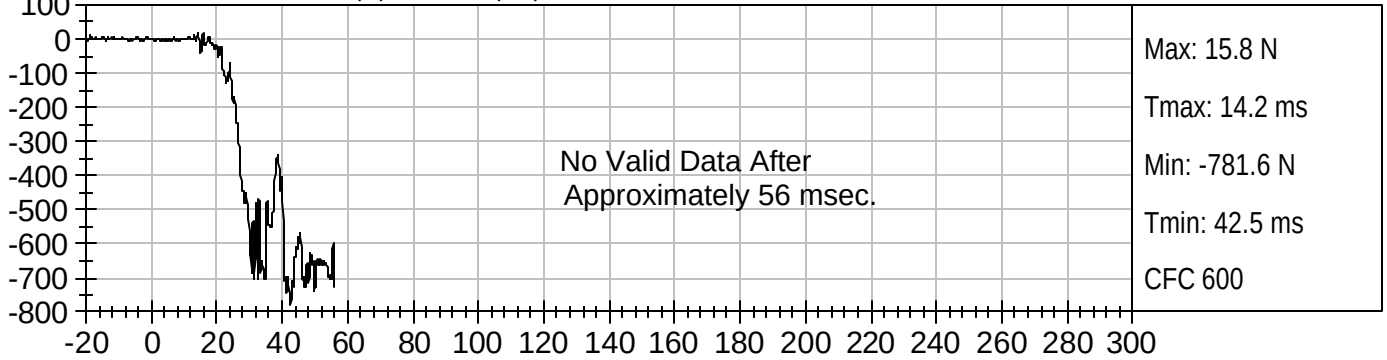




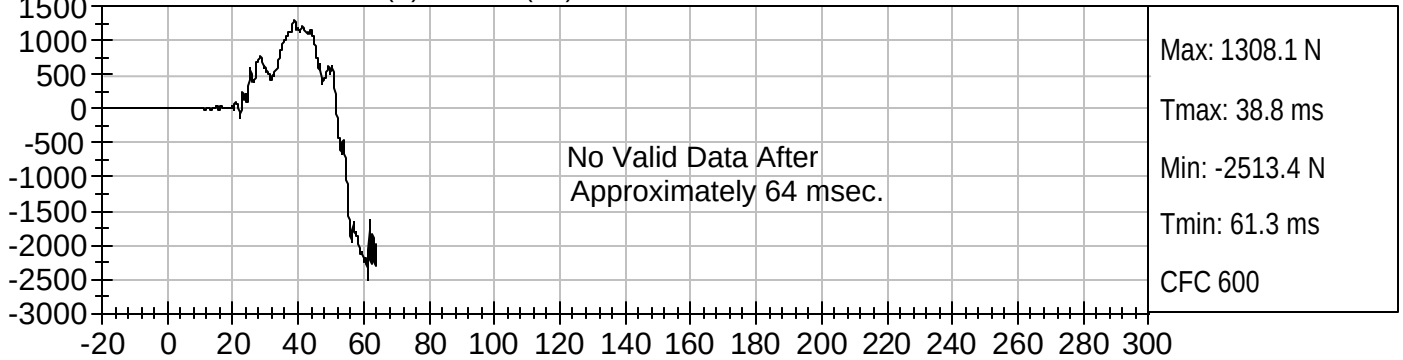


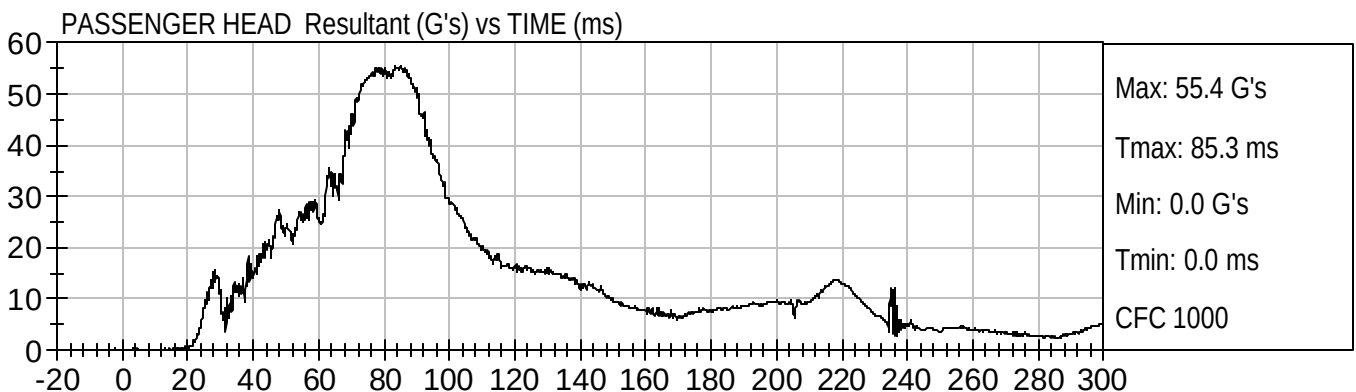
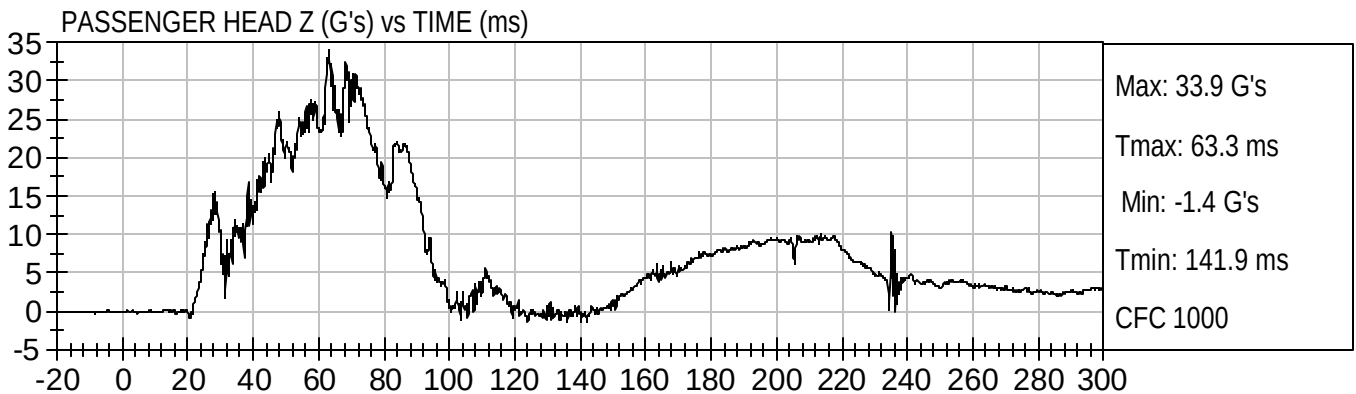
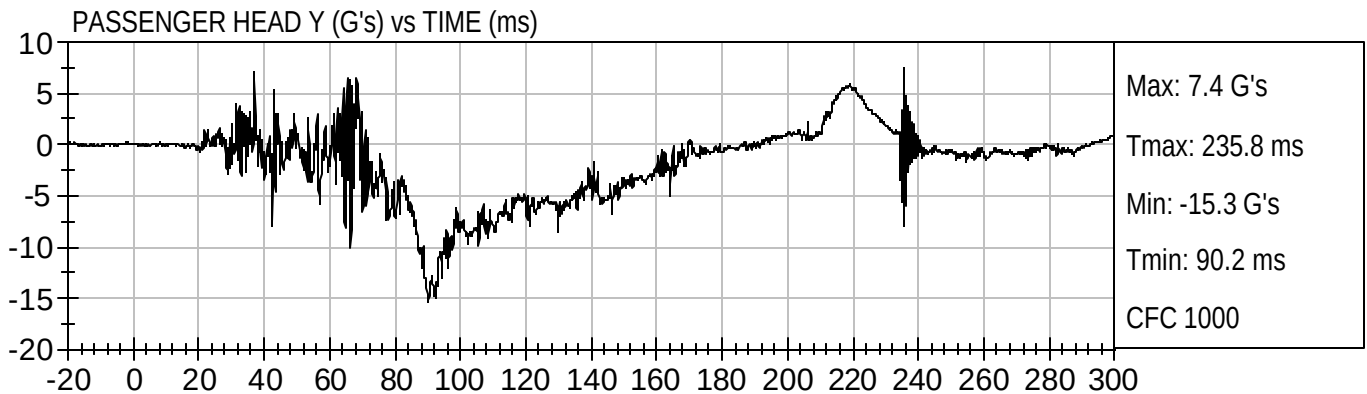
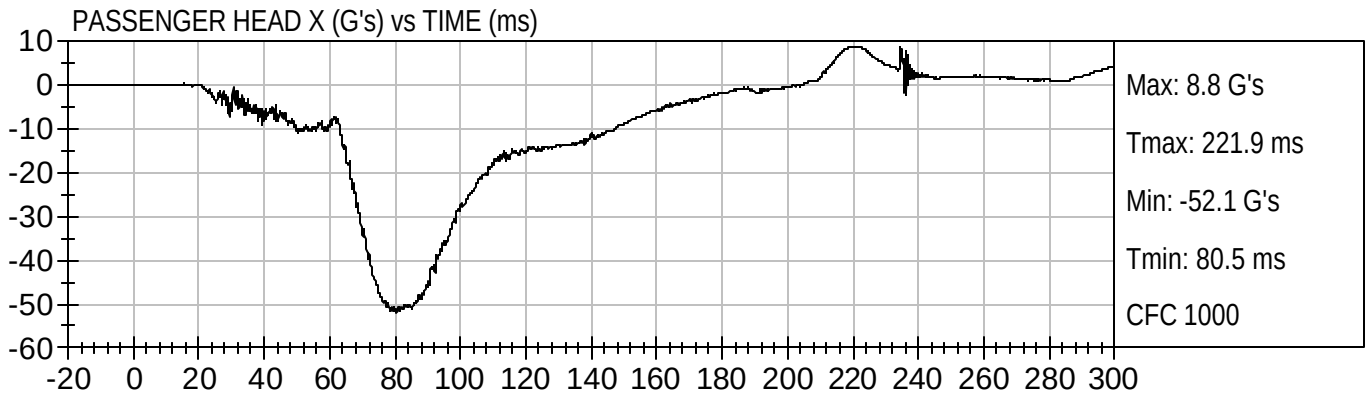


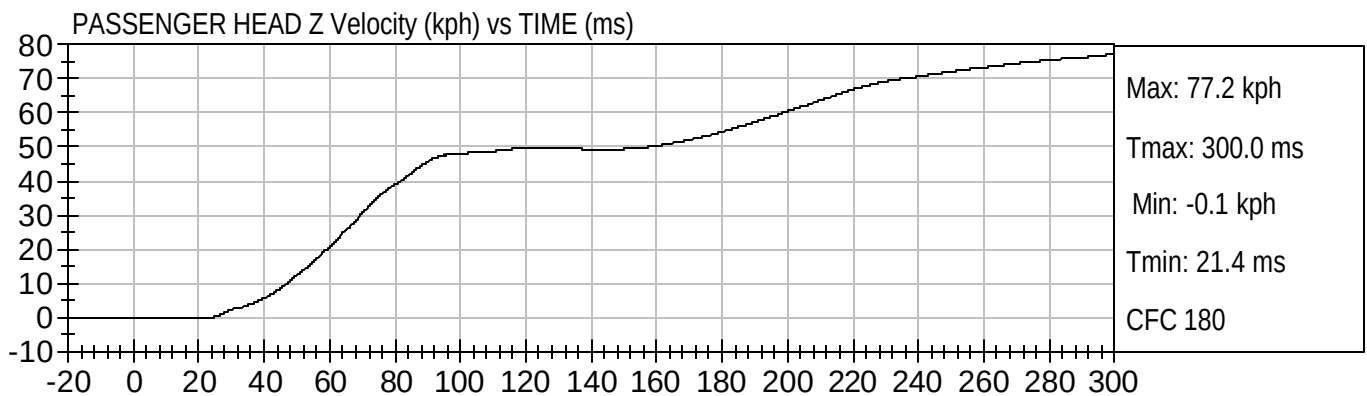
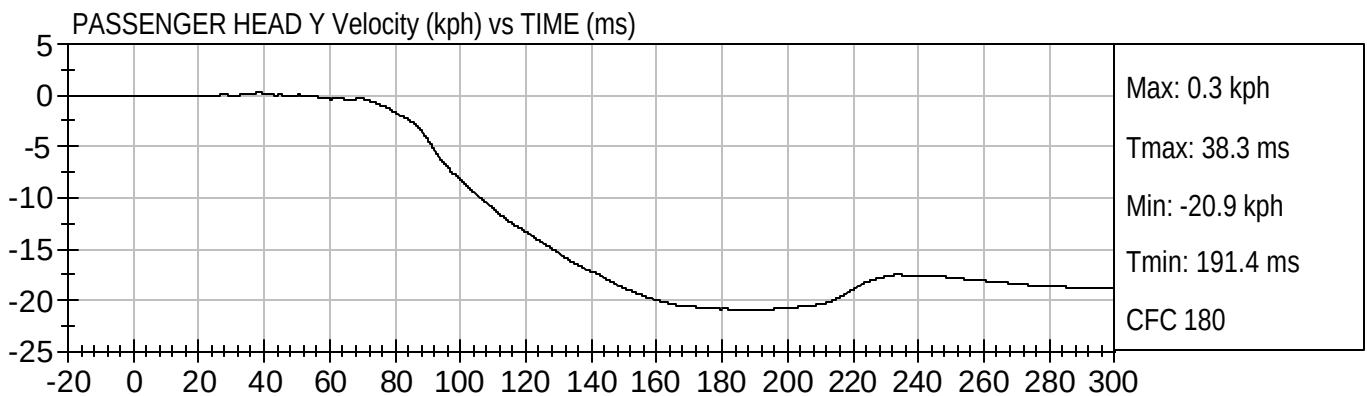
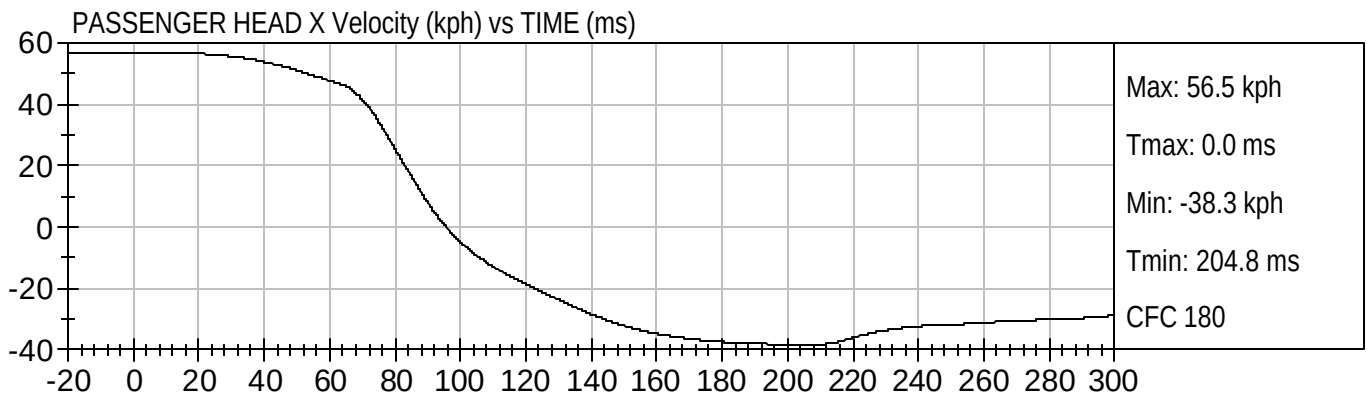
DRIVER LEFT FEMUR (N) vs TIME (ms)

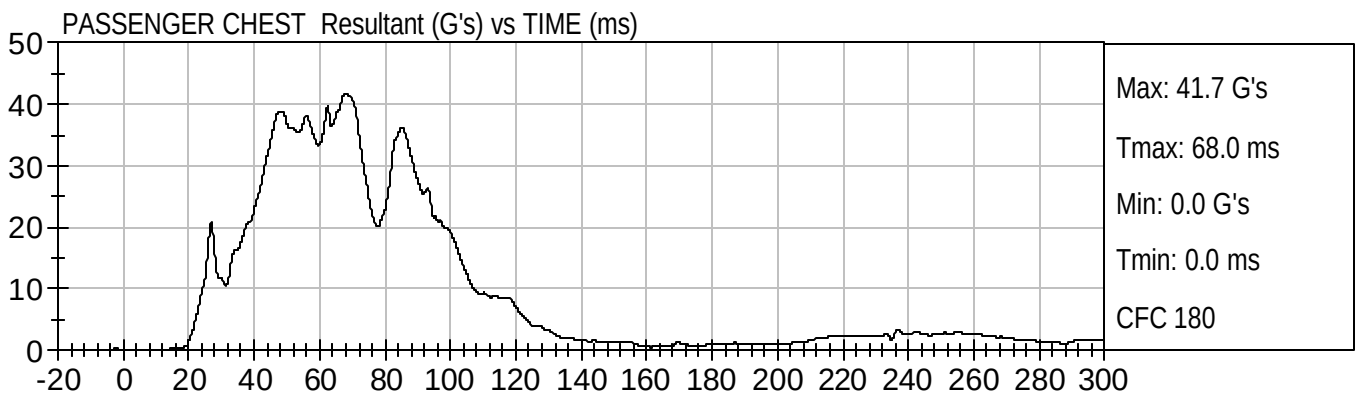
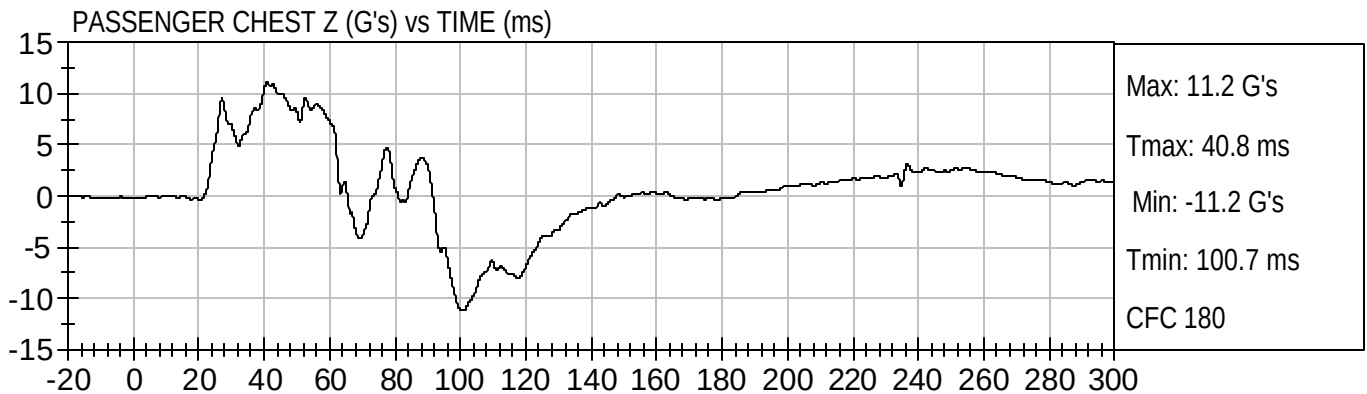
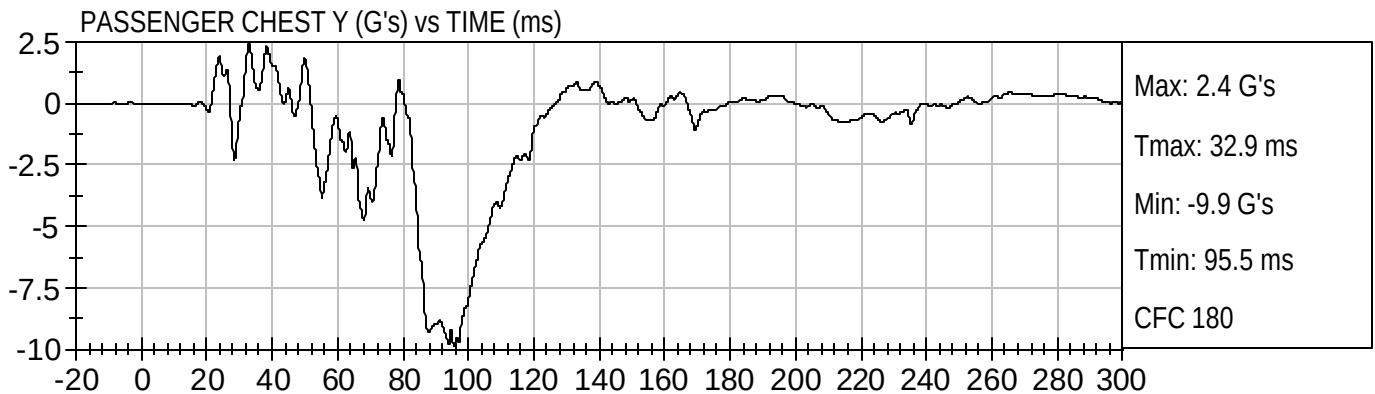
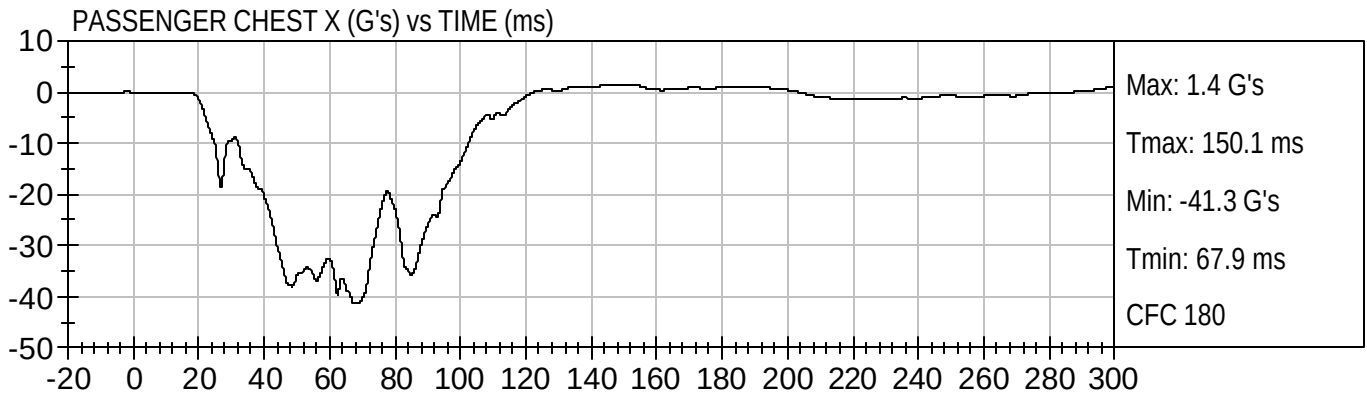


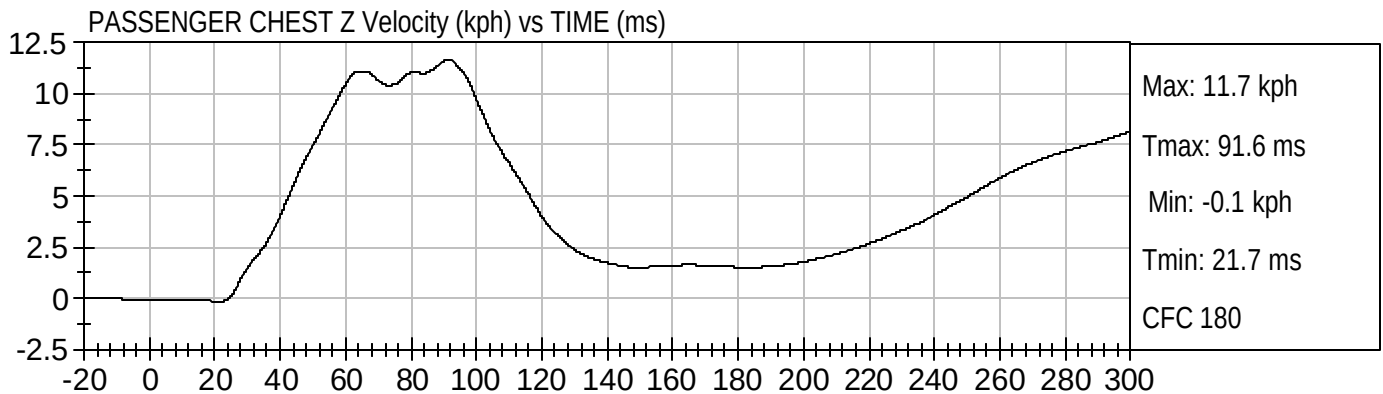
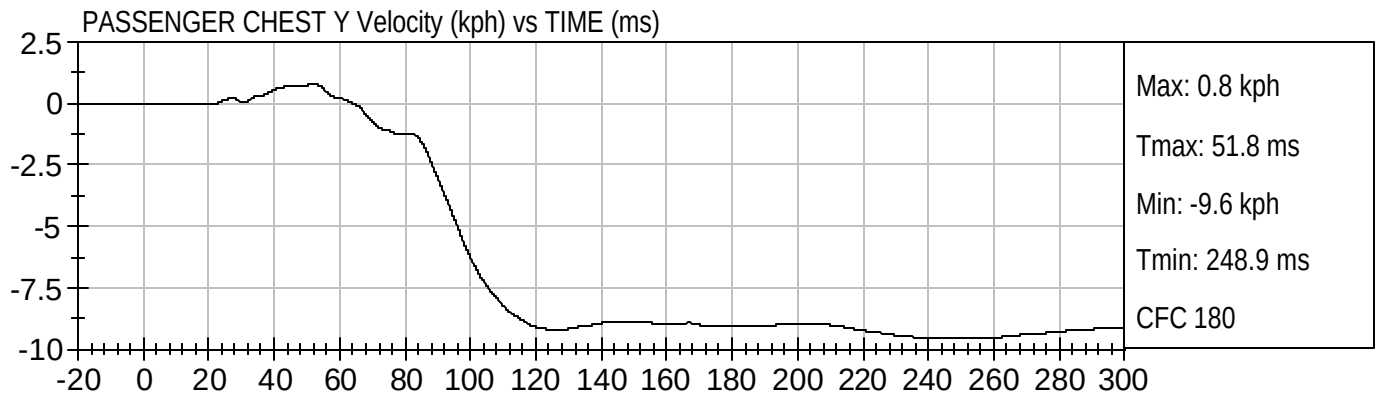
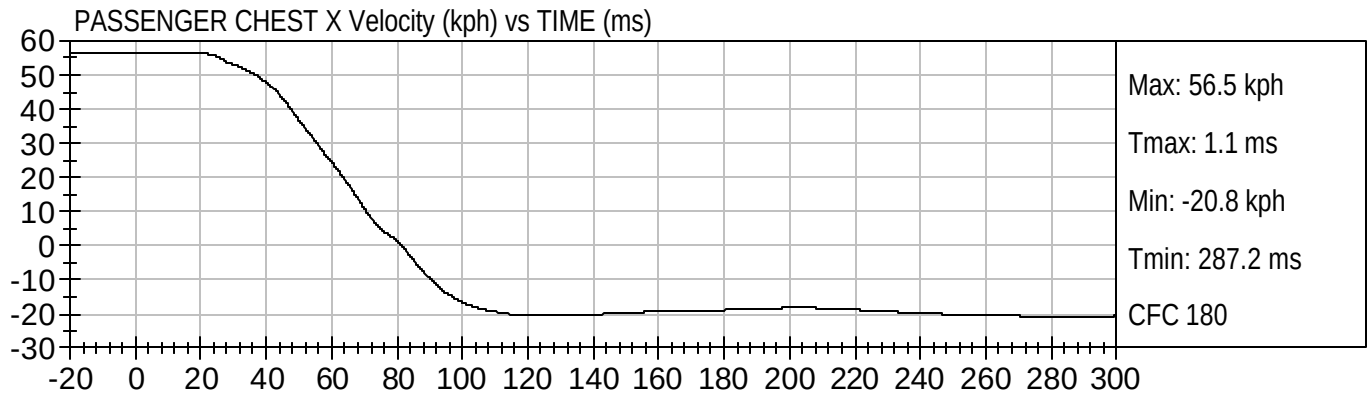
DRIVER RIGHT FEMUR (N) vs TIME (ms)

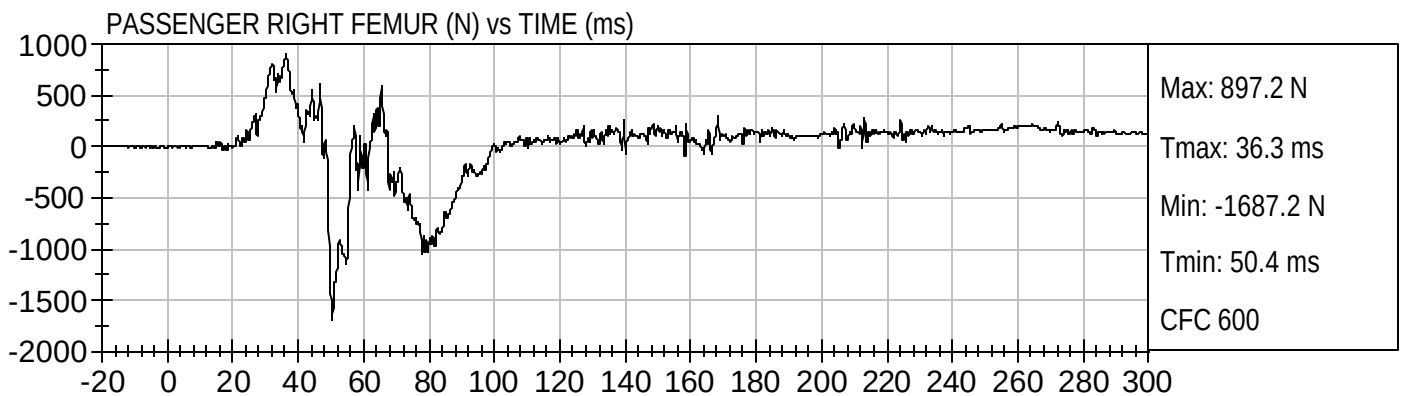
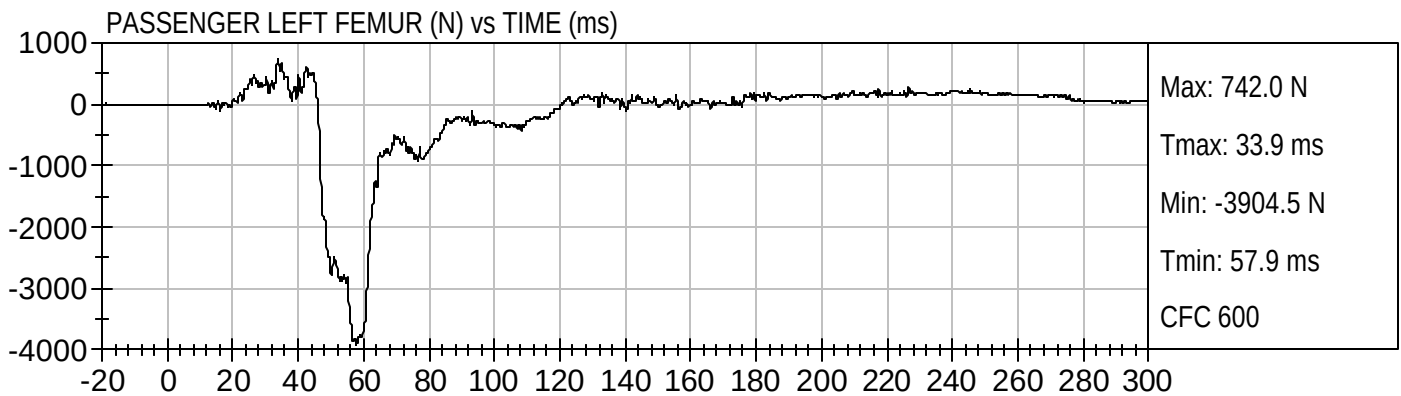












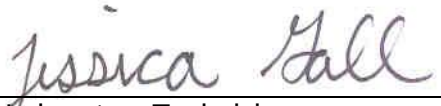
APPENDIX C
DUMMY CALIBRATION DATA

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

ATD Serial No: 066

Test ID: D052221

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	43	Pass
Peak Resultant Acceleration	G's	225 - 275	235	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	9.8	Pass
Unimodal	Yes/No	NA	Yes	Pass
Oscillations	Yes/No	within 10% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

08/08/2005
Test Date


Approved By



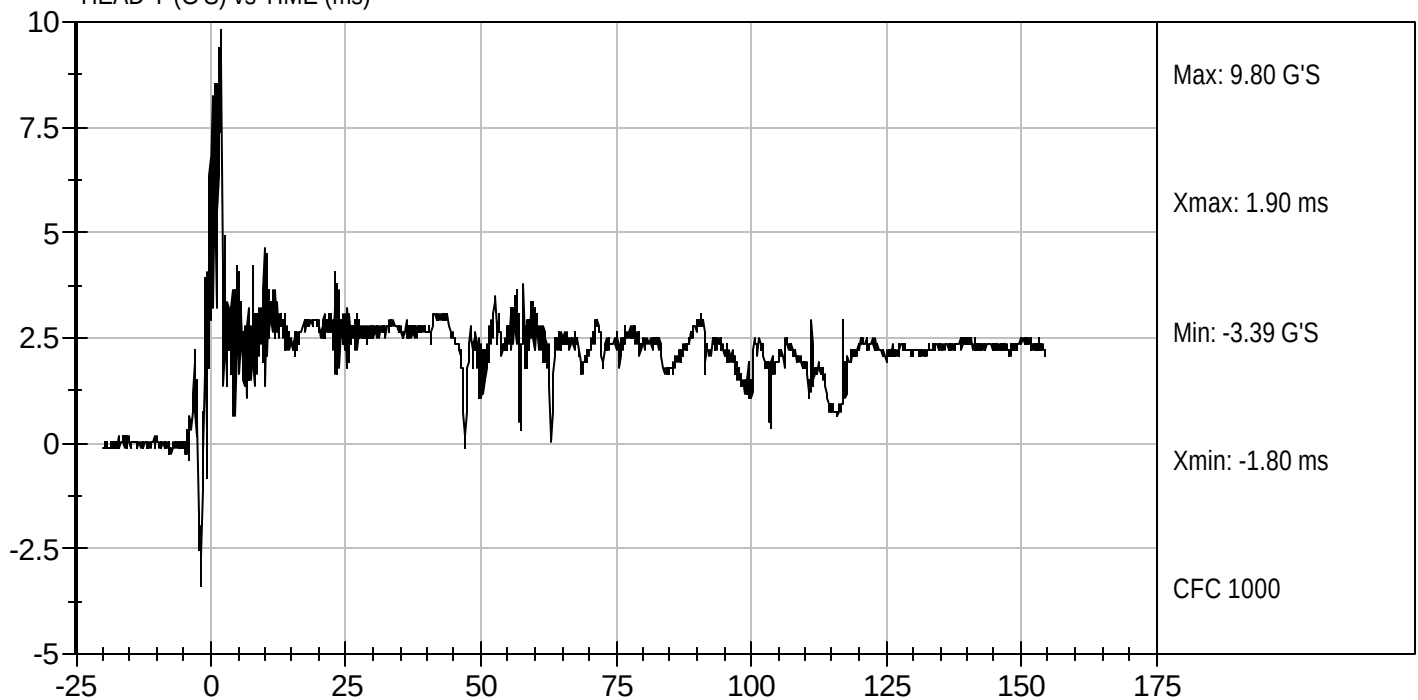
Test Desc: Head Drop
Componet ID: D052221

Test Date: 08/08/2005
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: D052222

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	22.1	Pass
Laboratory Relative Humidity		%	10 to 70	42	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.07	Pass
Pendulum Deceleration	10 msec	G's	22.50 to 27.50	25.23	Pass
	20 msec	G's	17.60 to 22.60	21.17	Pass
	30 msec	G's	12.50 to 18.50	16.35	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 29.0	16.31	Pass
Deceleration Decay Time to Cross 5 G's		msec	34.0 to 42.0	35.6	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	75.0	Pass
	Time	msec	57.0 to 64.0	57.1	Pass
"D" Plane Rotation Decay Time To Zero Crossing		msec	113.0 to 128.0	113.5	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	97.1	Pass
	Time	msec	47.0 to 58.0	47.7	Pass
Positive Moment Decay Time To Zero Crossing		msec	97.0 to 107.0	100.2	Pass
Overall Test Results					Pass


 Laboratory Technician

08/09/2005
 Test Date

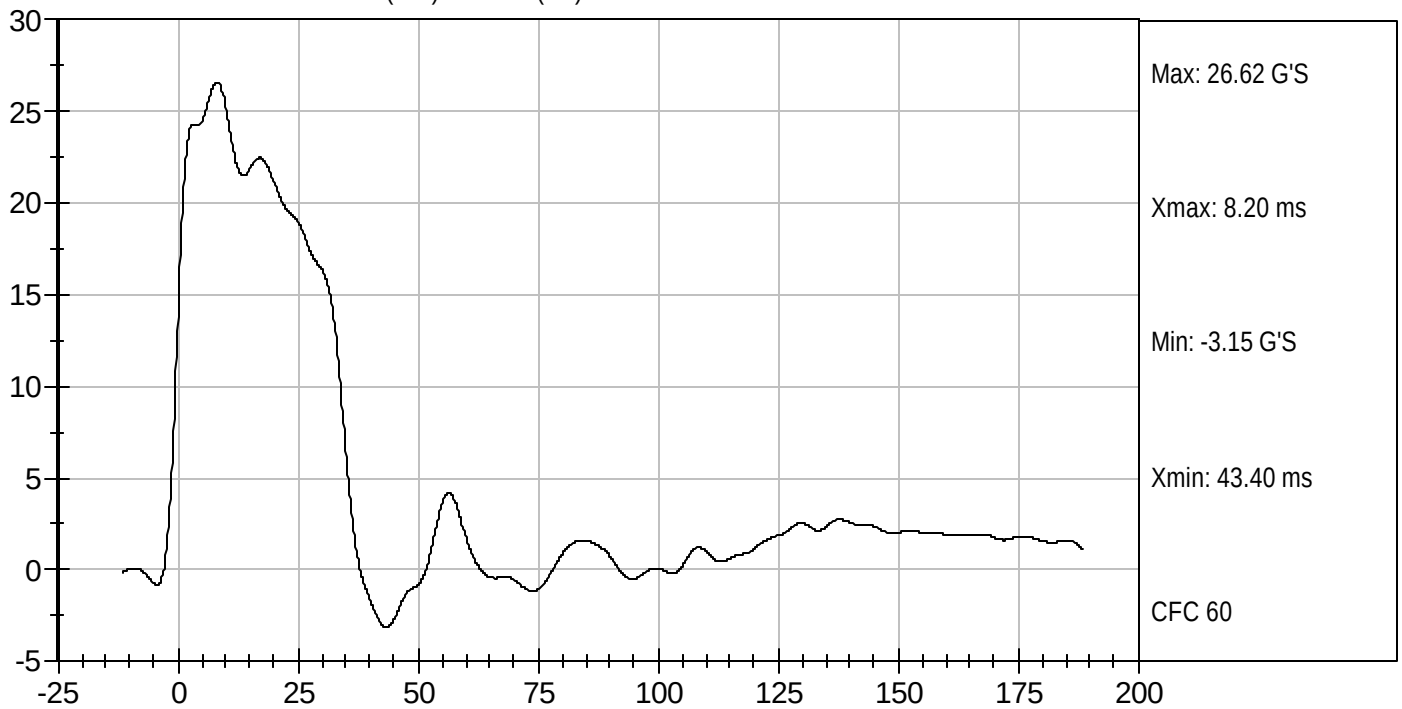

 Approved By



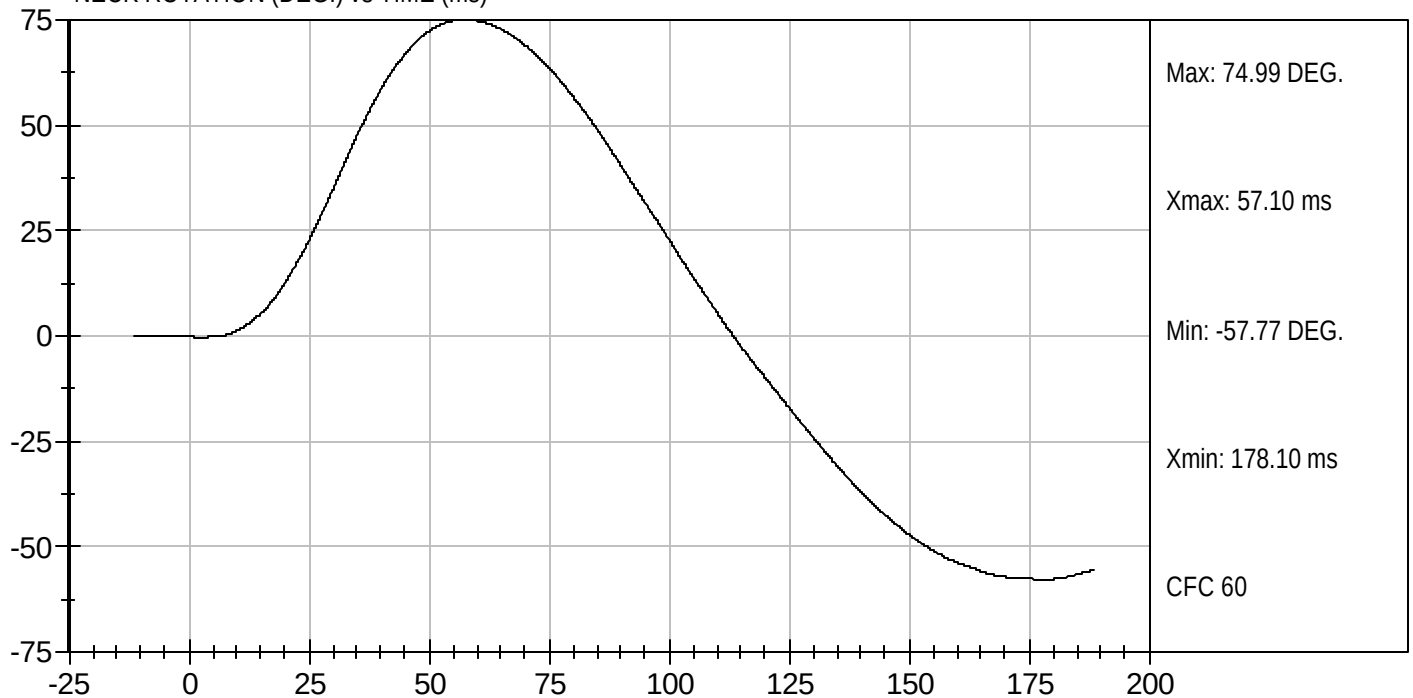
Test Desc: Neck Flexion
Componet ID: D052222

Test Date: 08/09/2005
Velocity: 23.19 ft/s, 7.07 m/s

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



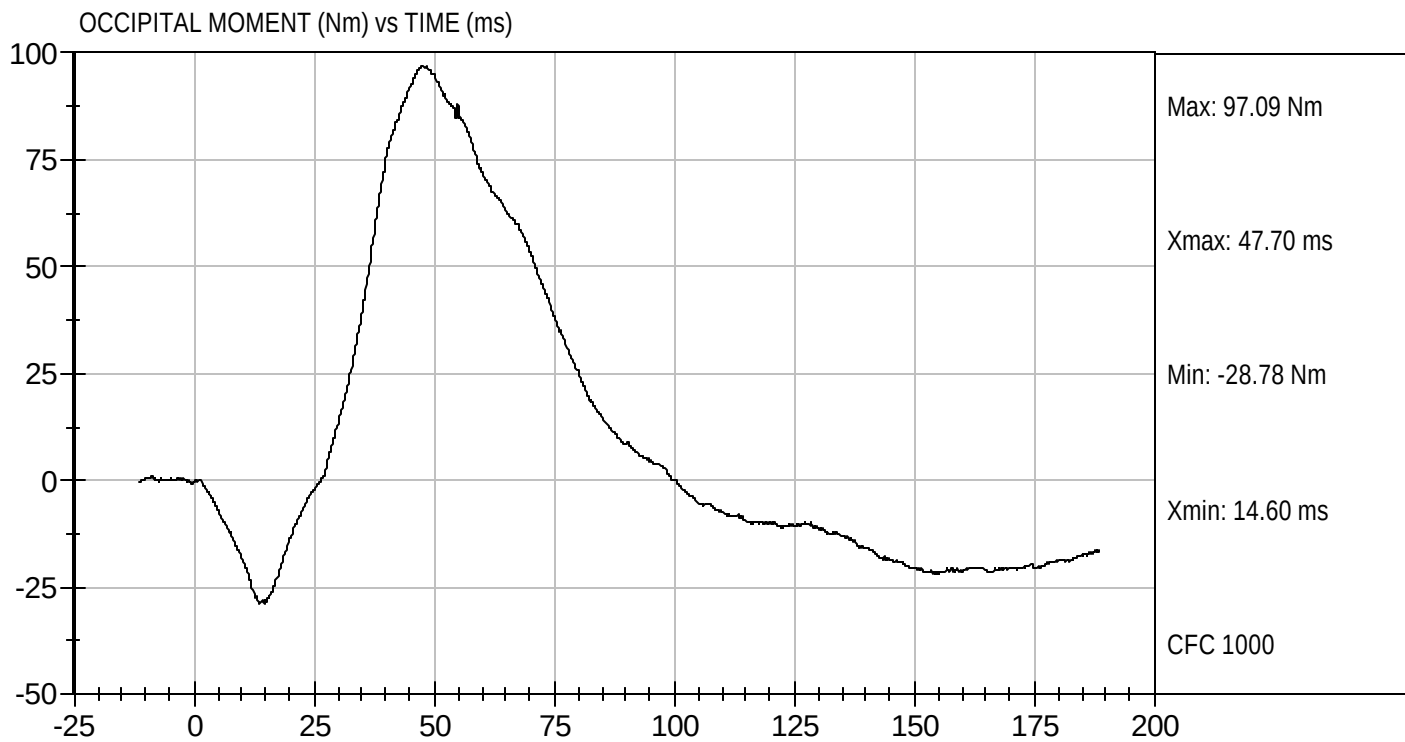
NECK ROTATION (DEG.) vs TIME (ms)





Test Desc: Neck Flexion
Componet ID: D052222

Test Date: 08/09/2005
Velocity: 23.19 ft/s, 7.07 m/s



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

ATD Serial No: 066

Test I.D: D052223

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity		%	10 to 70	45	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.11	Pass
Pendulum Deceleration	10 msec	G's	17.20 to 21.20	18.80	Pass
	20 msec	G's	14.00 to 19.00	16.15	Pass
	30 msec	G's	11.00 to 16.00	12.81	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 22.0	12.90	Pass
Deceleration Decay Time to Cross 5 G's		msec	38.0 to 46.0	42.1	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	101.2	Pass
	Time	msec	72.0 to 82.0	79.0	Pass
"D" Plane Rotation Decay Time To Zero Crossing		msec	147.0 to 174.0	157.7	Pass
Moment About Occipital Condyle	Maximum	N m	-52.9 to -79.9	-67.0	Pass
	Time	msec	65.0 to 79.0	74.7	Pass
Negative Moment Decay Time To Zero Crossing		msec	120.0 to 148.0	146.2	Pass
Overall Test Results					Pass


 Laboratory Technician

08/09/2005
 Test Date

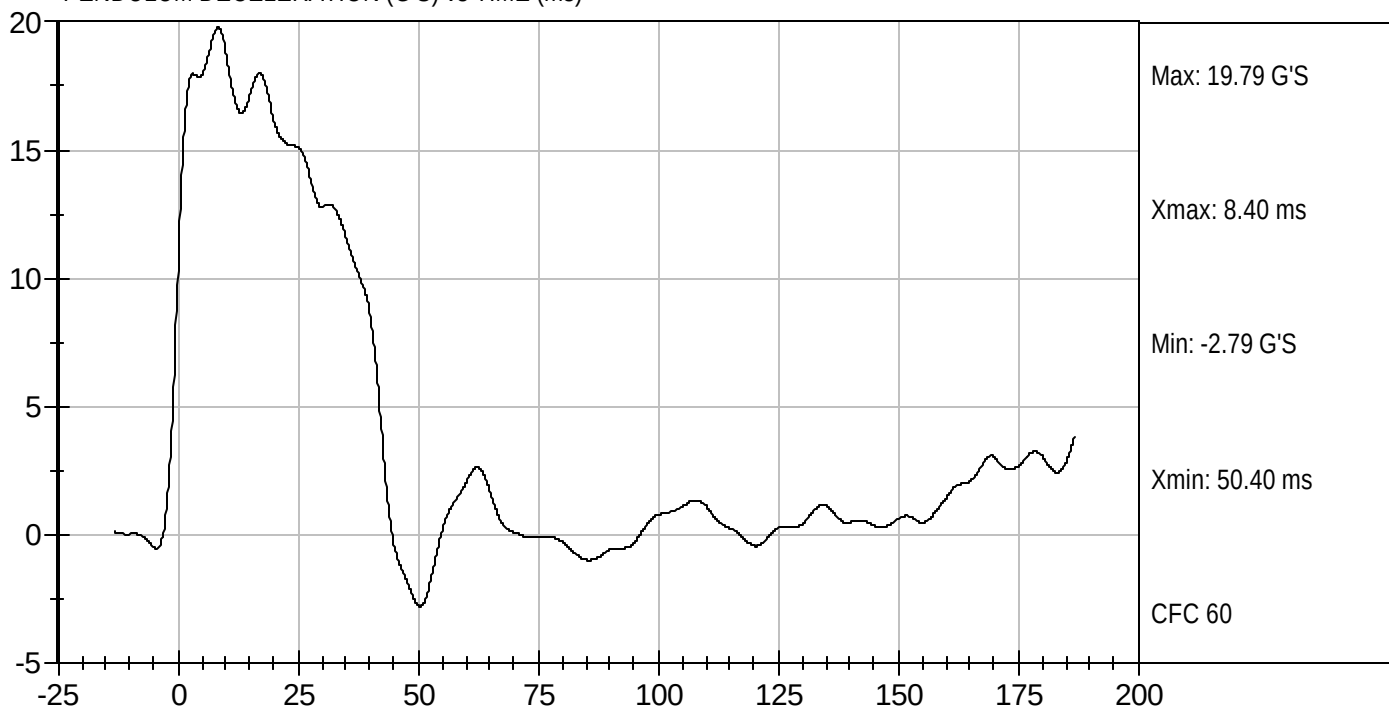

 Approved By



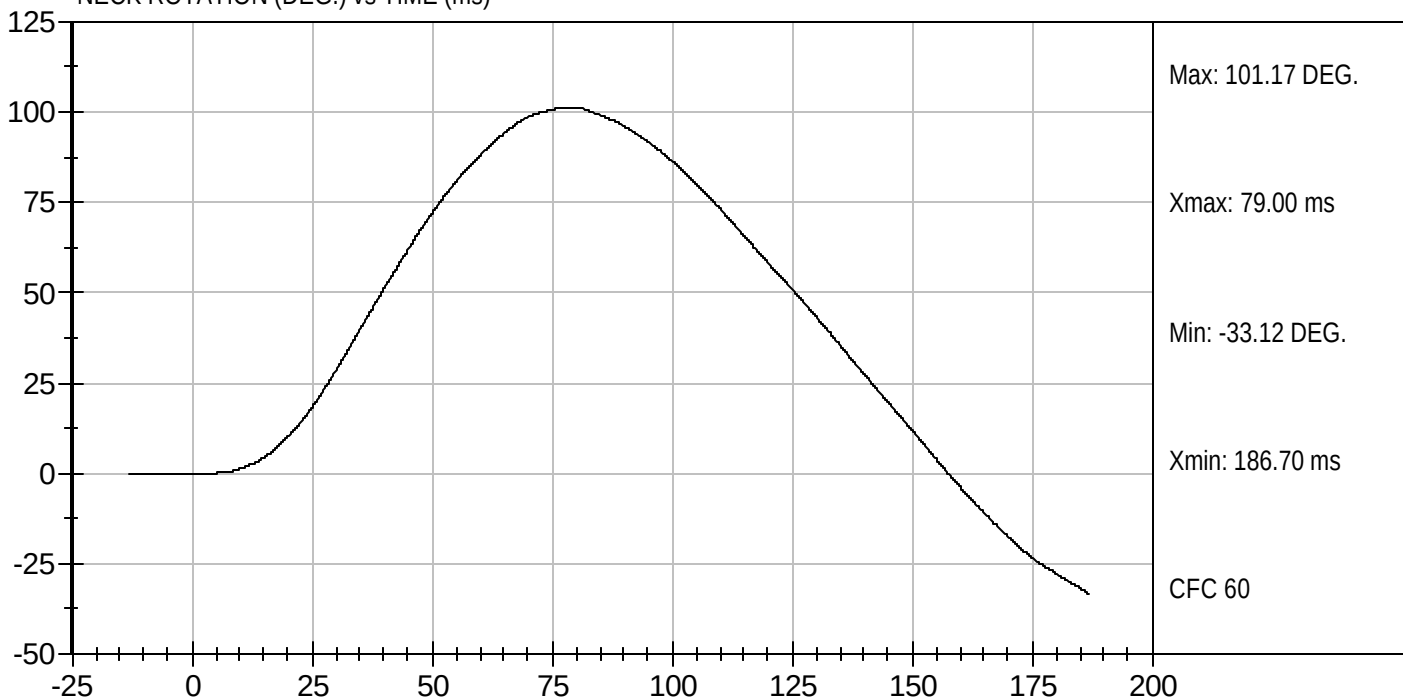
Test Desc: Neck Extension
Componet ID: D052223

Test Date: 08/09/2005
Velocity: 20.05 ft/s, 6.11 m/s

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



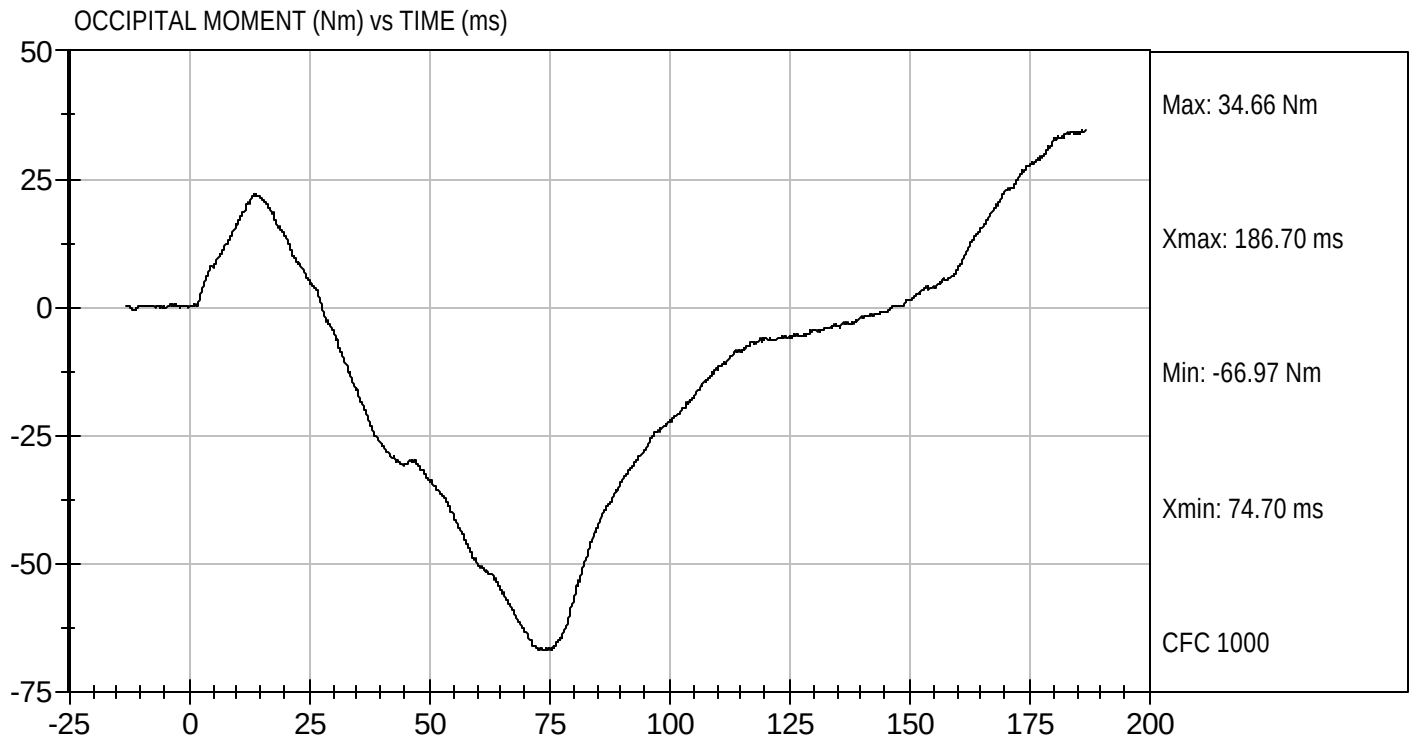
NECK ROTATION (DEG.) vs TIME (ms)





Test Desc: Neck Extension
Componet ID: D052223

Test Date: 08/09/2005
Velocity: 20.05 ft/s, 6.11 m/s



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 066

Test I.D: D052224

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	45	Pass
Probe Velocity	m/s	6.58 to 6.82	6.70	Pass
Peak Probe Force	N	5159 to 5893	5,655	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.87	Pass
Internal Hysteresis	%	69 to 85	71	Pass
Overall Test Results			Pass	



Laboratory Technician

08/09/2005
Test Date

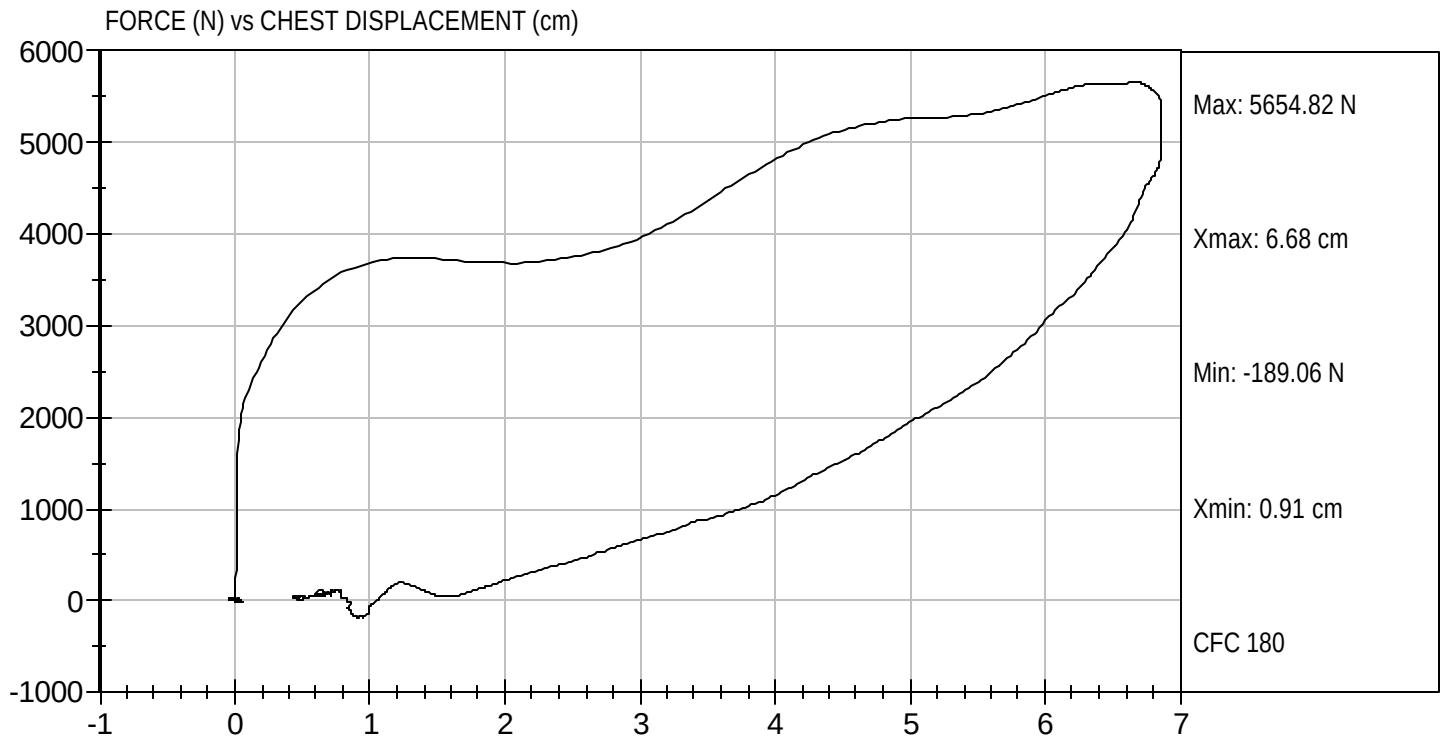


Approved By



Test Desc: Thorax Impact
Componet ID: D052224

Test Date: 08/09/2005
Velocity: 21.99 ft/s, 6.70 m/s



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

ATD Serial No: 066

Test I.D: D052225

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	44	Pass
Probe Velocity	m/sec	2.07 to 2.13	2.12	Pass
Peak Probe Force	Newtons	4715 to 5782	5,205	Pass
Overall Test Results				Pass


Laboratory Technician

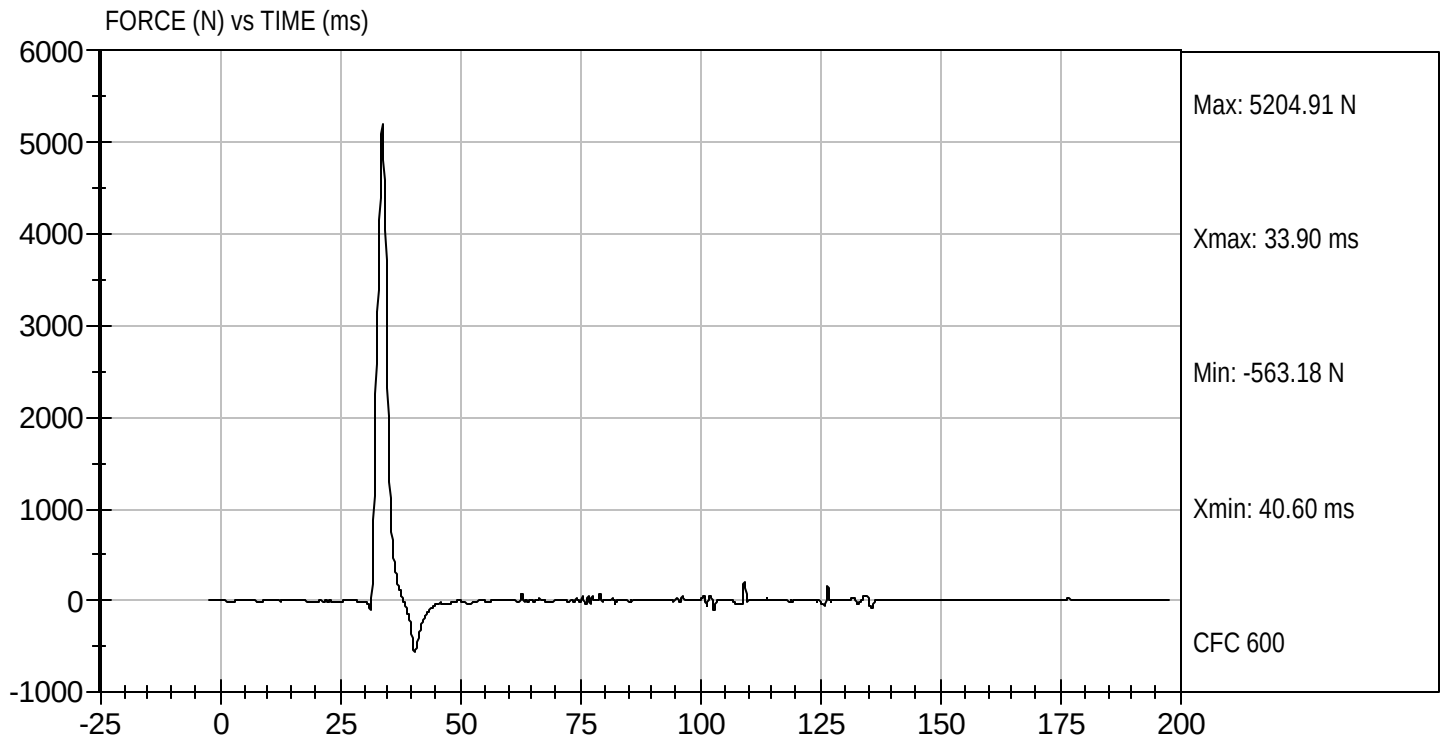
08/09/2005
Test Date


Approved By



Test Desc: Right Knee
Componet ID: D052225

Test Date: 08/09/2005
Velocity: 6.94 ft/s, 2.12 m/s



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

ATD Serial No: 066

Test I.D: D052226

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	45	Pass
Probe Velocity	m/sec	2.07 to 2.13	2.11	Pass
Peak Probe Force	Newtons	4715 to 5782	5,022	Pass
Overall Test Results				Pass


Laboratory Technician

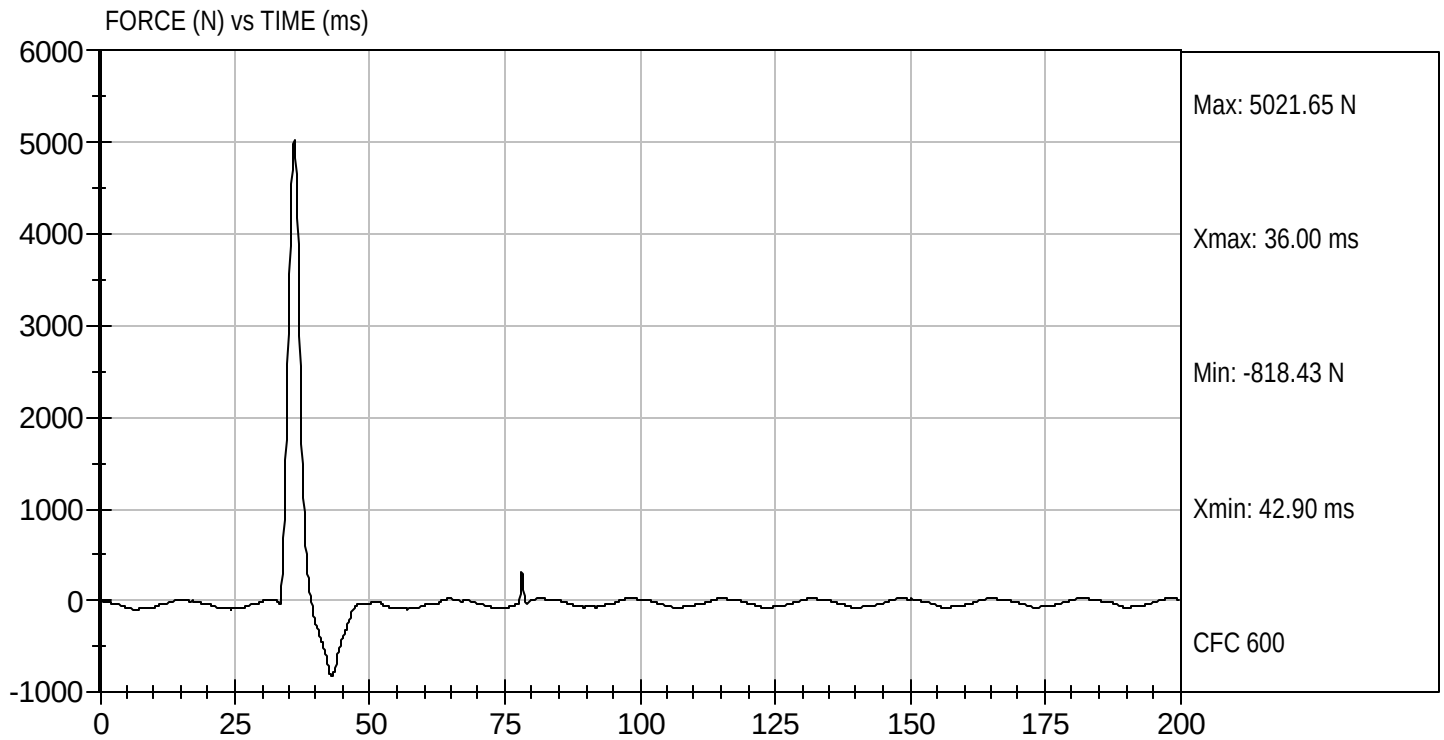
08/09/2005
Test Date


Approved By



Test Desc: Left Knee
Componet ID: D052226

Test Date: 08/09/2005
Velocity: 6.91 ft/s, 2.11 m/s



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

ATD Serial No: 066

Test I.D: D052220

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	46	46	Pass
Rotation Rate	deg/sec	5 -10	8	8	Pass
30 Degrees	Nm	94.9 Nm Max	87.4	72.2	Pass
150 ft-lbf / 203.4 Nm	Deg	40- 50 Degree Max Rotation	42	40	Pass
Overall Test Results					Pass


 Laboratory Technician

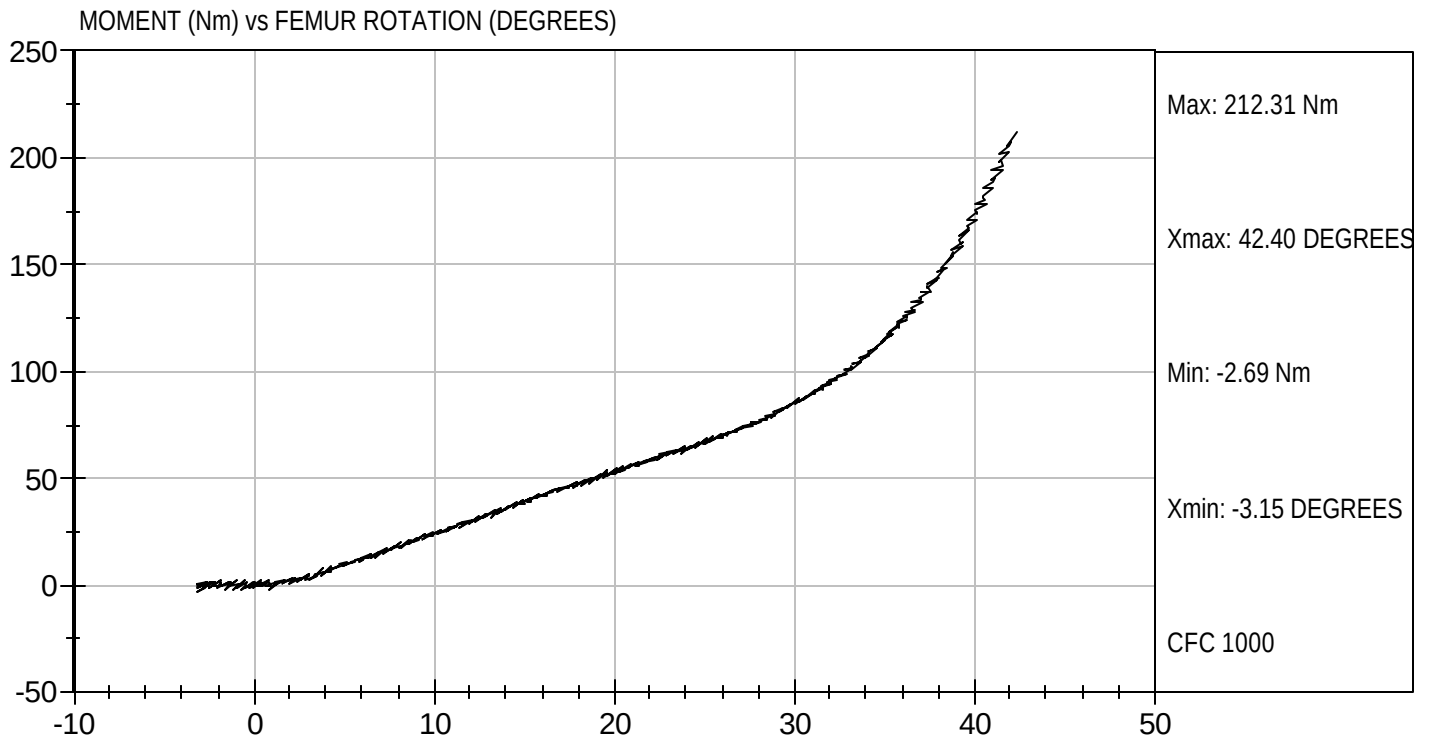
08/09/2005
 Test Date


 Approved By



Test Desc: Hip Femur Flexion
Componet ID: D052229

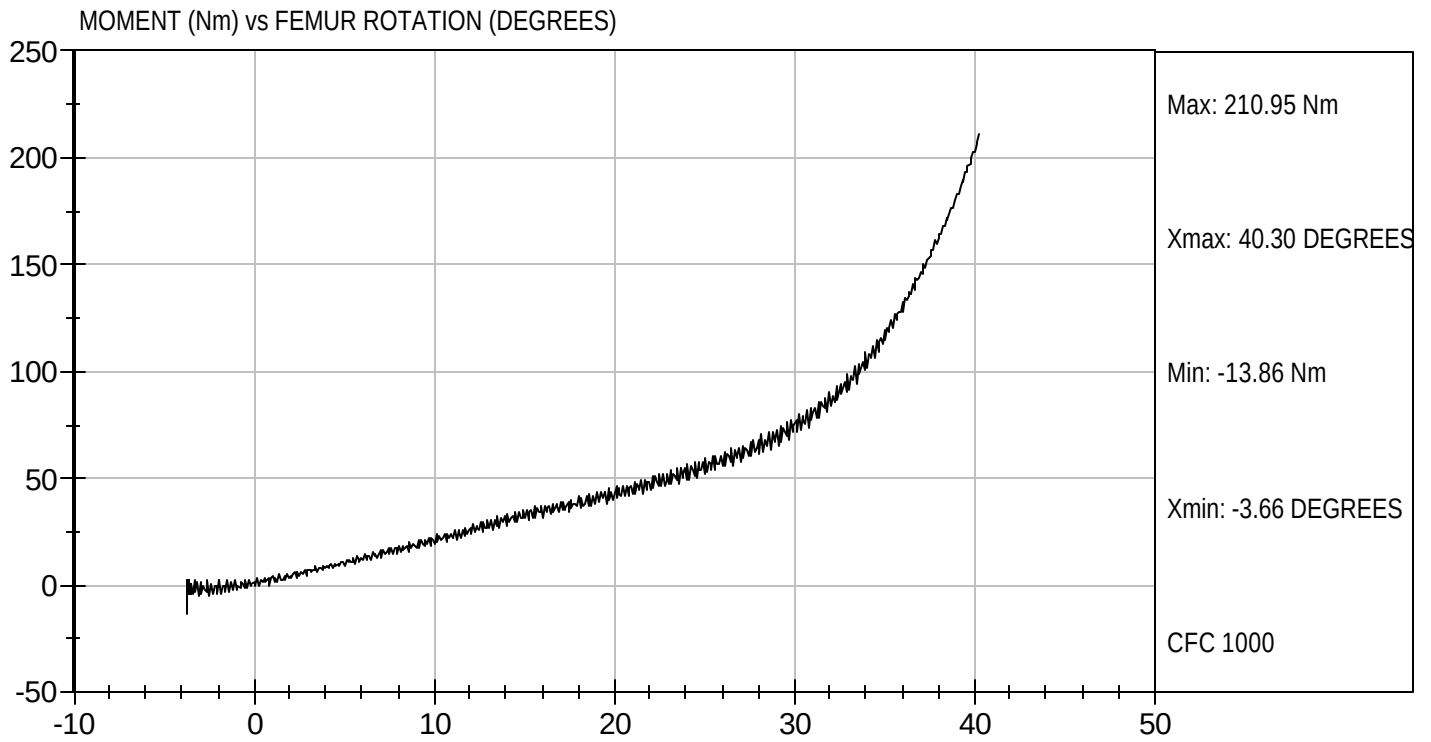
Test Date: 08/09/2005
Velocity: 0 ft/s, 0.00 m/s





Test Desc: Hip Femur Flexion
Componet ID: D052220

Test Date: 08/09/2005
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: D052211

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	20.9	Pass
Laboratory Relative Humidity	%	10 to 70	42	Pass
Peak Resultant Acceleration	G's	225 - 275	230	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	7.9	Pass
Unimodal	Yes/No	NA	Yes	Pass
Oscillations	Yes/No	within 10% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

08/08/2005
Test Date

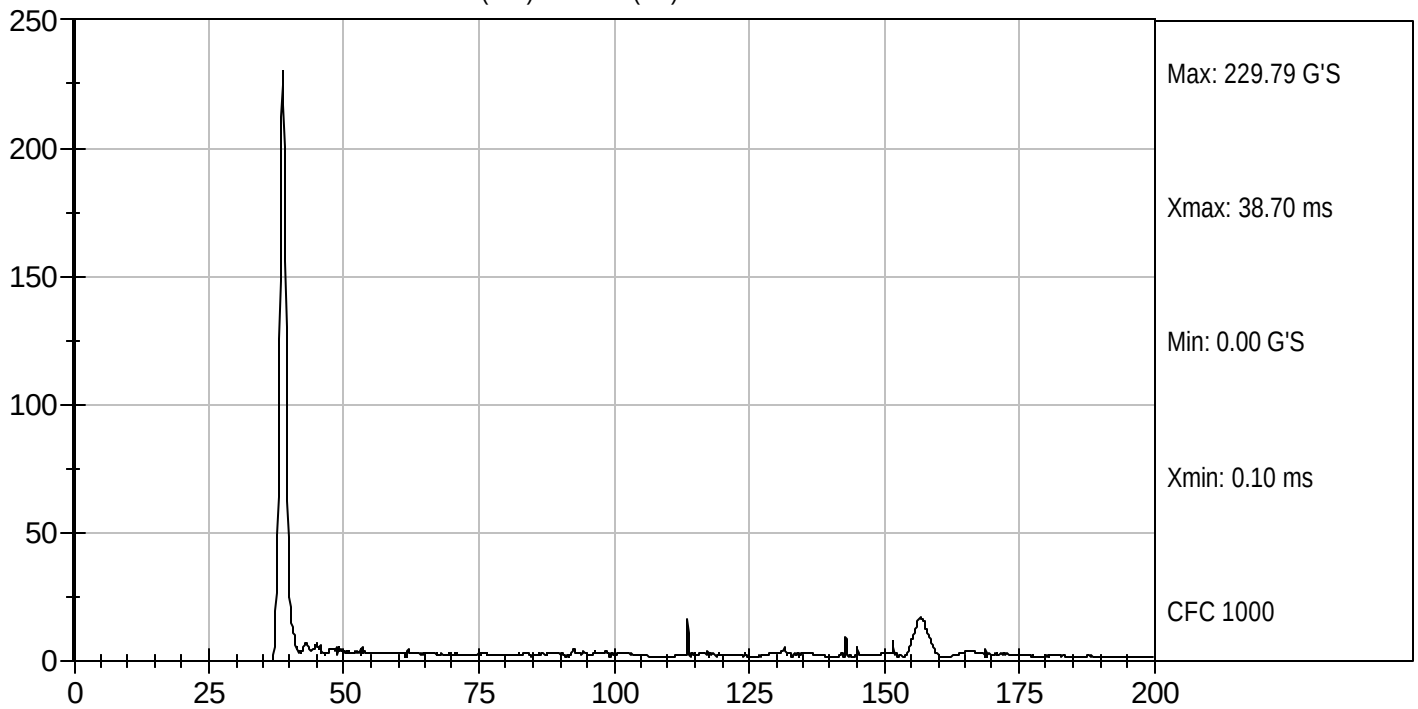

Approved By



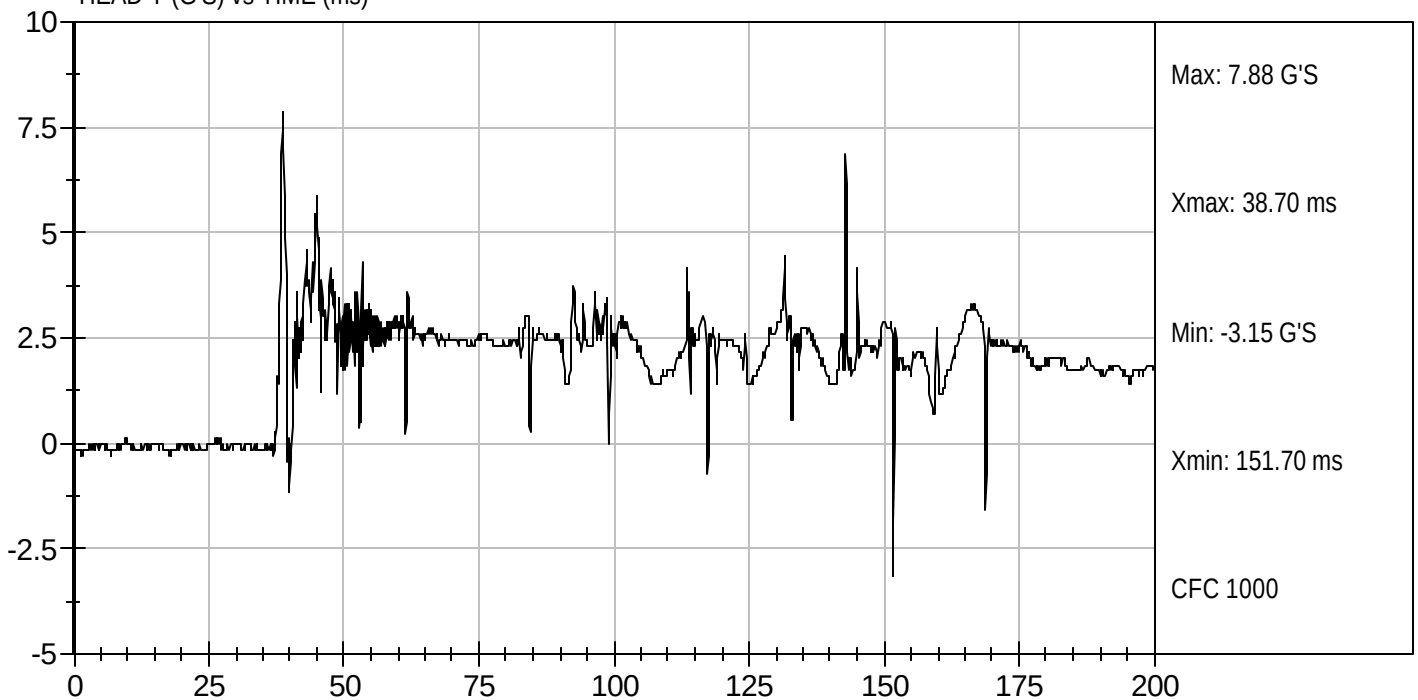
Test Desc: Head Drop
Componet ID: D052211

Test Date: 08/08/2005
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: D052212

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	42	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.04	Pass
Pendulum Deceleration	10 msec	G's	22.50 to 27.50	25.03	Pass
	20 msec	G's	17.60 to 22.60	21.19	Pass
	30 msec	G's	12.50 to 18.50	15.87	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 29.0	15.79	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	74.5	Pass
	Time	msec	57.0 to 64.0	57.6	Pass
"D" Plane Rotation Decay Time To Zero Crossing		msec	113.0 to 128.0	114.1	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	102.5	Pass
	Time	msec	47.0 to 58.0	48.3	Pass
Positive Moment Decay Time To Zero Crossing		msec	97.0 to 107.0	103.2	Pass
Overall Test Results					Pass


 Laboratory Technician

08/08/2005
 Test Date

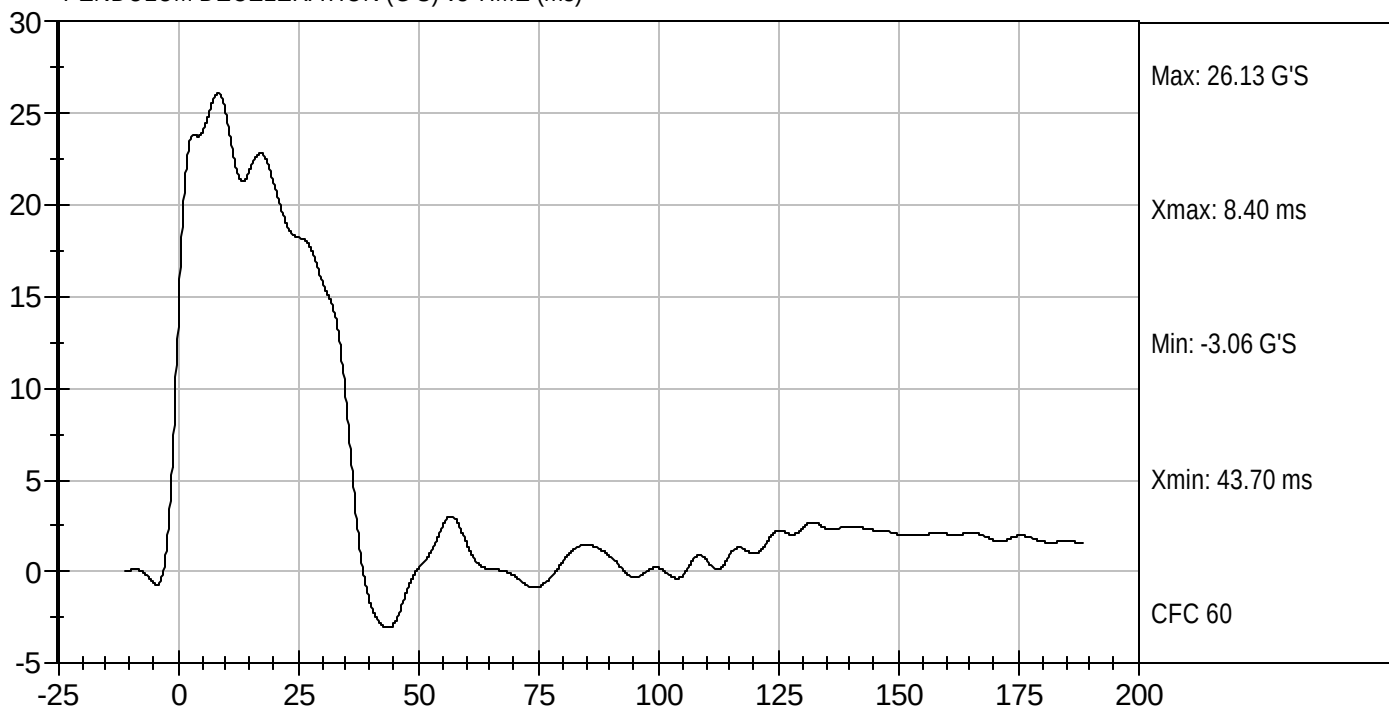

 Approved By



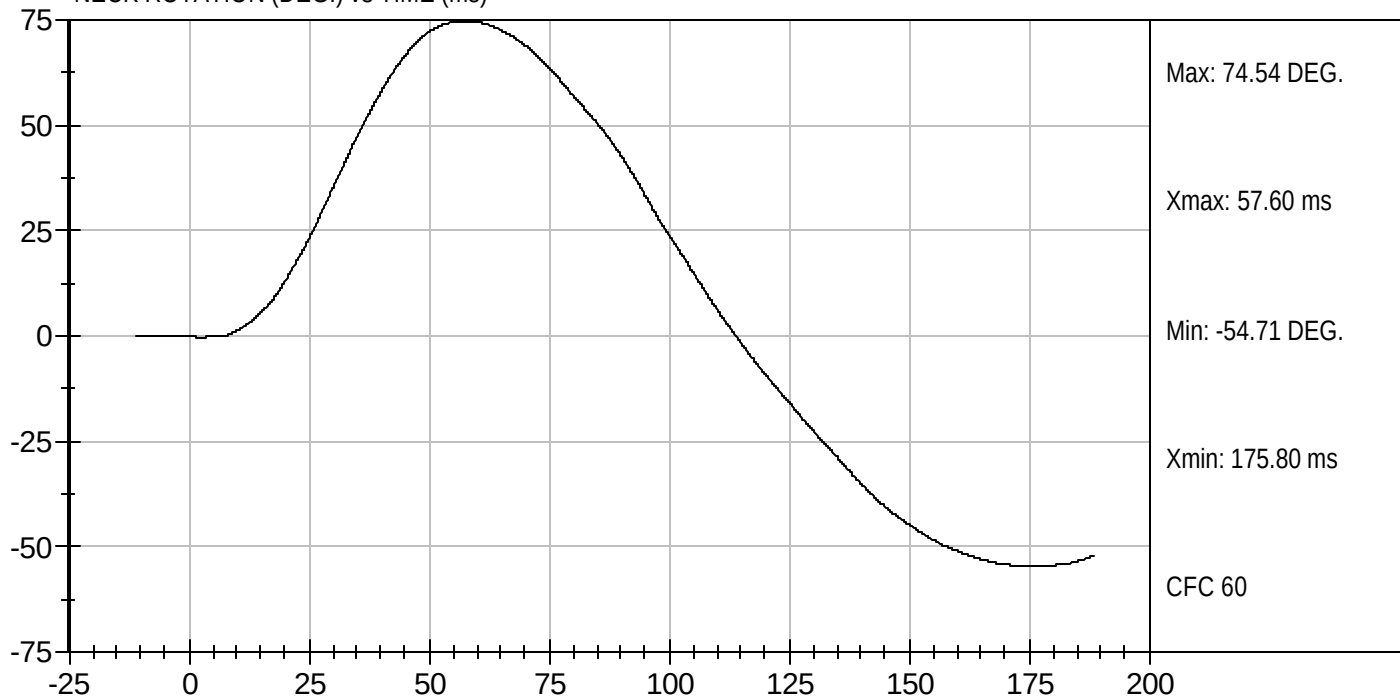
Test Desc: Neck Flexion
Componet ID: D052212

Test Date: 08/08/2005
Velocity: 23.11 ft/s, 7.04 m/s

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



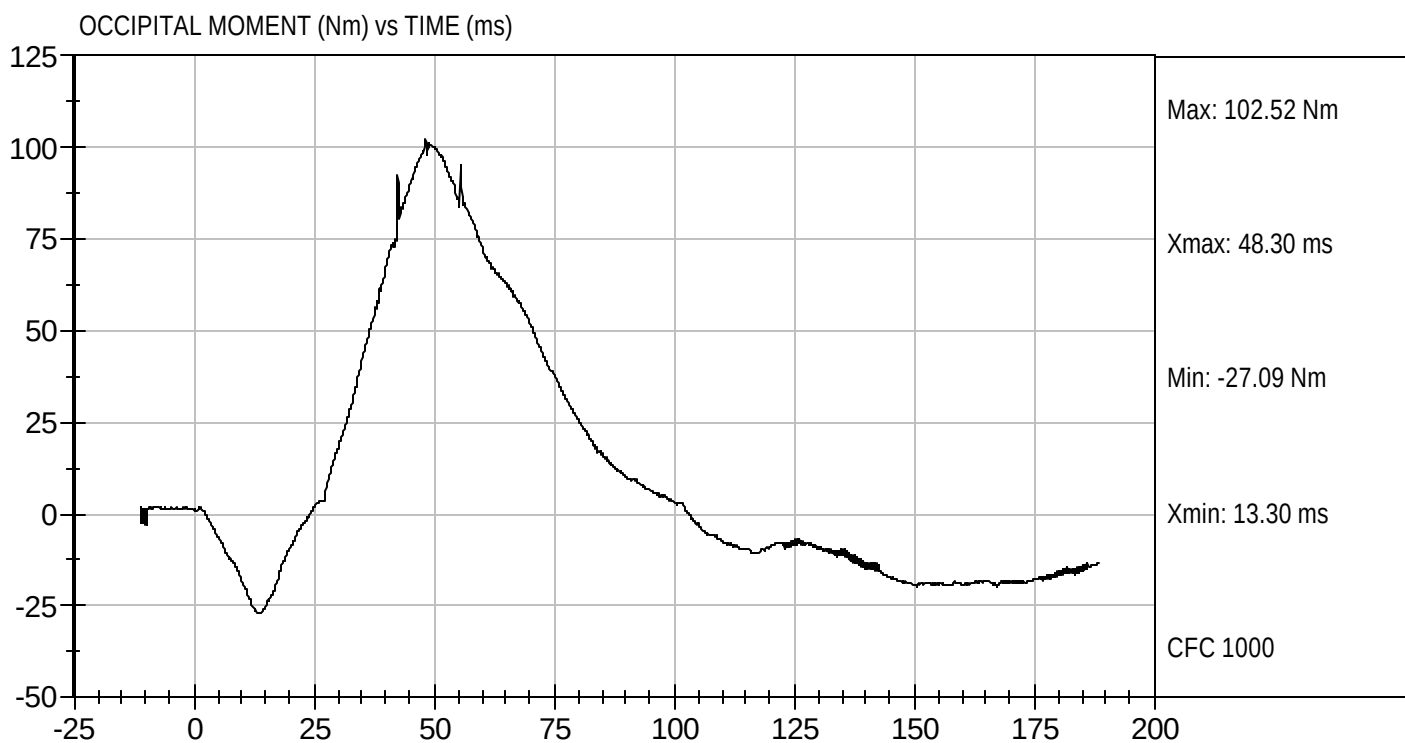
NECK ROTATION (DEG.) vs TIME (ms)





Test Desc: Neck Flexion
Componet ID: D052212

Test Date: 08/08/2005
Velocity: 23.11 ft/s, 7.04 m/s



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

ATD Serial No: 065

Test I.D: D052213

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity		%	10 to 70	43	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.09	Pass
Pendulum Deceleration	10 msec	G's	17.20 to 21.20	20.48	Pass
	20 msec	G's	14.00 to 19.00	17.03	Pass
	30 msec	G's	11.00 to 16.00	12.45	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 22.0	13.08	Pass
Deceleration Decay Time to Cross 5 G's		msec	38.0 to 46.0	38.8	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	100.5	Pass
	Time	msec	72.0 to 82.0	76.2	Pass
"D" Plane Rotation Decay Time To Zero Crossing		msec	147.0 to 174.0	155.2	Pass
Moment About Occipital Condyle	Maximum	N m	-52.9 to -79.9	-72.9	Pass
	Time	msec	65.0 to 79.0	71.5	Pass
Negative Moment Decay Time To Zero Crossing		msec	120.0 to 148.0	143.8	Pass
Overall Test Results					Pass


 Laboratory Technician

08/08/2005
 Test Date

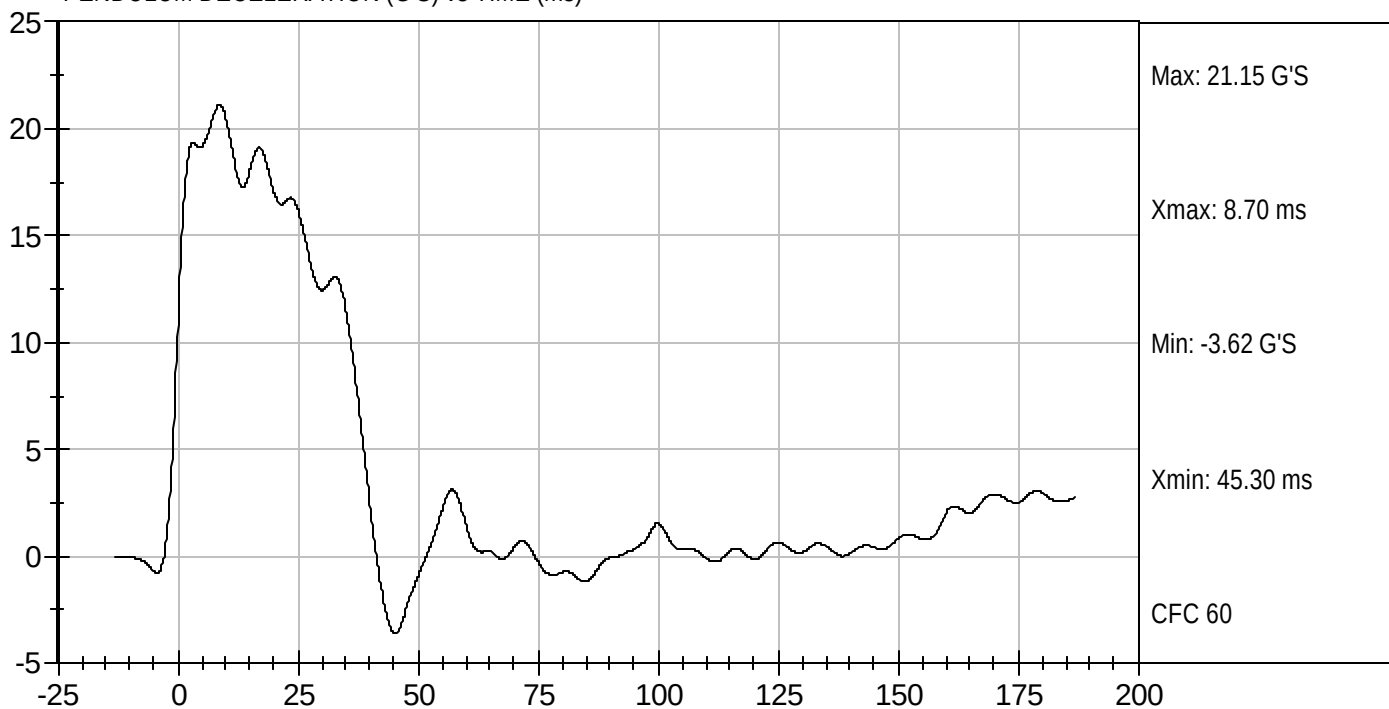

 Approved By



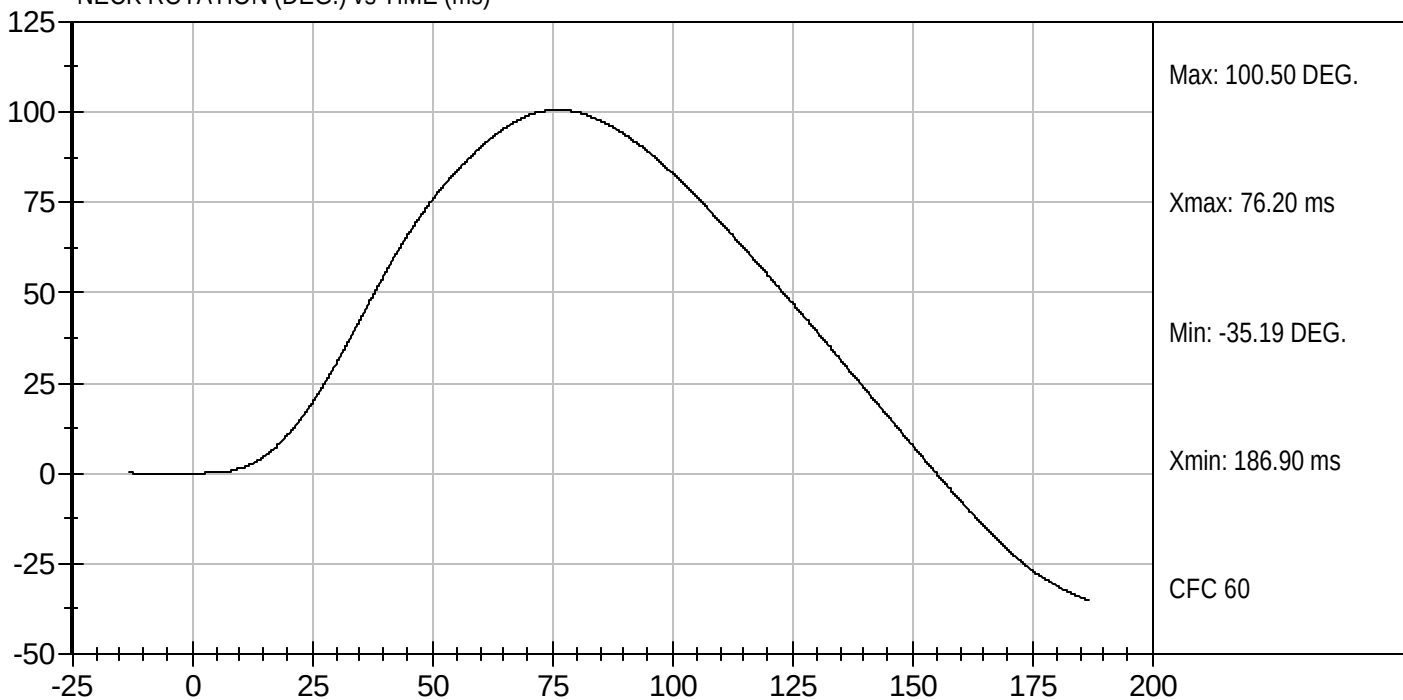
Test Desc: Neck Extension
Componet ID: D052213

Test Date: 08/08/2005
Velocity: 19.99 ft/s, 6.09 m/s

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



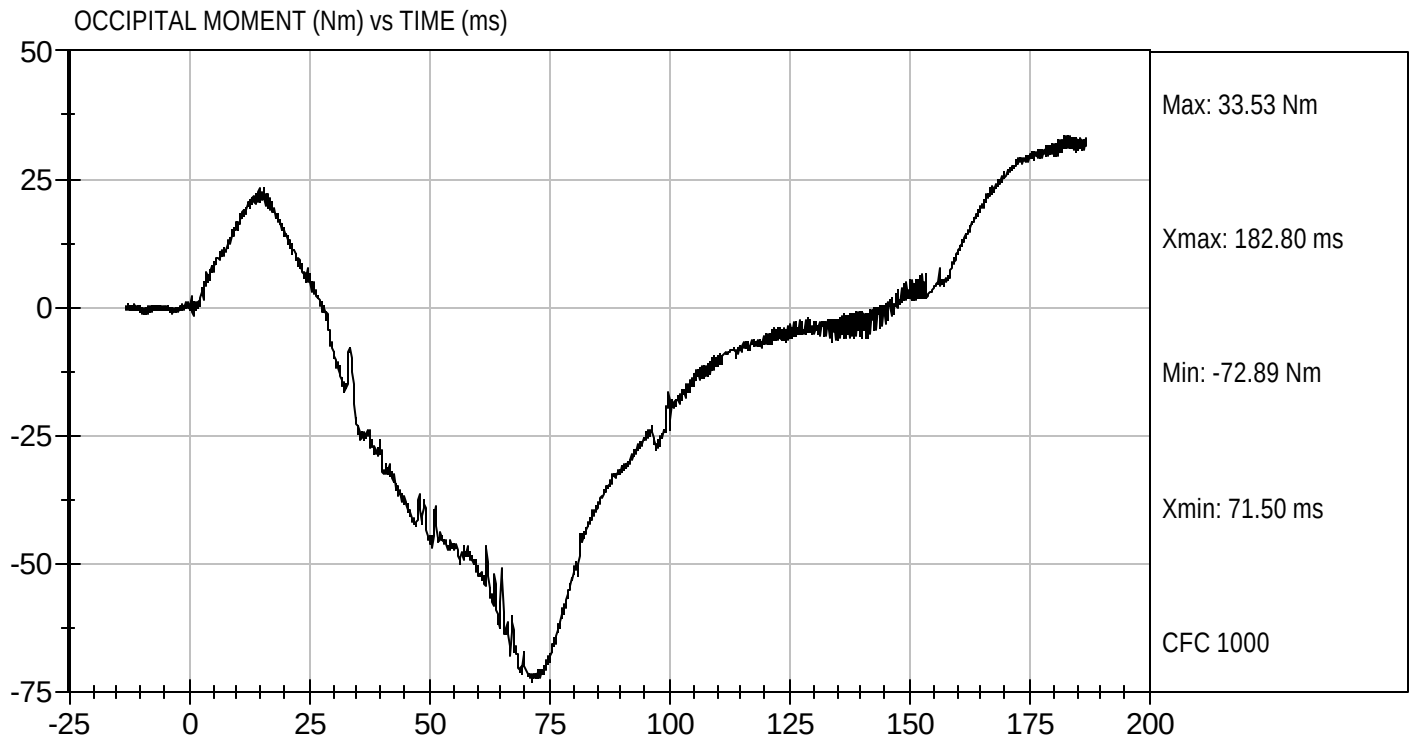
NECK ROTATION (DEG.) vs TIME (ms)





Test Desc: Neck Extension
Componet ID: D052213

Test Date: 08/08/2005
Velocity: 19.99 ft/s, 6.09 m/s



MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 065

Test I.D: D052214

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	45	Pass
Probe Velocity	m/s	6.58 to 6.82	6.63	Pass
Peak Probe Force	N	5159 to 5893	5,517	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.93	Pass
Internal Hysteresis	%	69 to 85	73	Pass
Overall Test Results			Pass	



Laboratory Technician

08/09/2005

Test Date

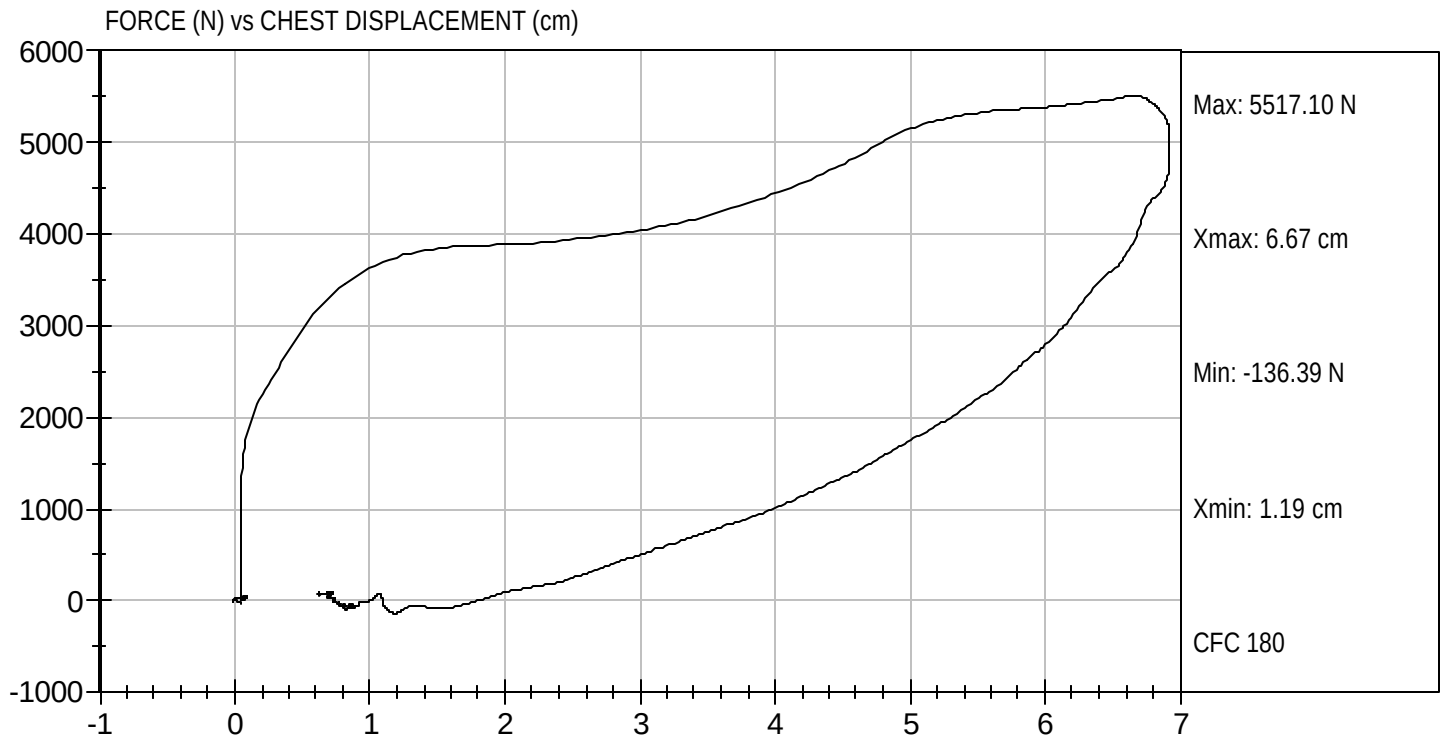


Approved By



Test Desc: Thorax Impact
Componet ID: D052214

Test Date: 08/09/2005
Velocity: 21.74 ft/s, 6.63 m/s



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

ATD Serial No: 065

Test I.D: D052215

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	46	Pass
Probe Velocity	m/sec	2.07 to 2.13	2.12	Pass
Peak Probe Force	Newtons	4715 to 5782	5,186	Pass
Overall Test Results				Pass


Laboratory Technician

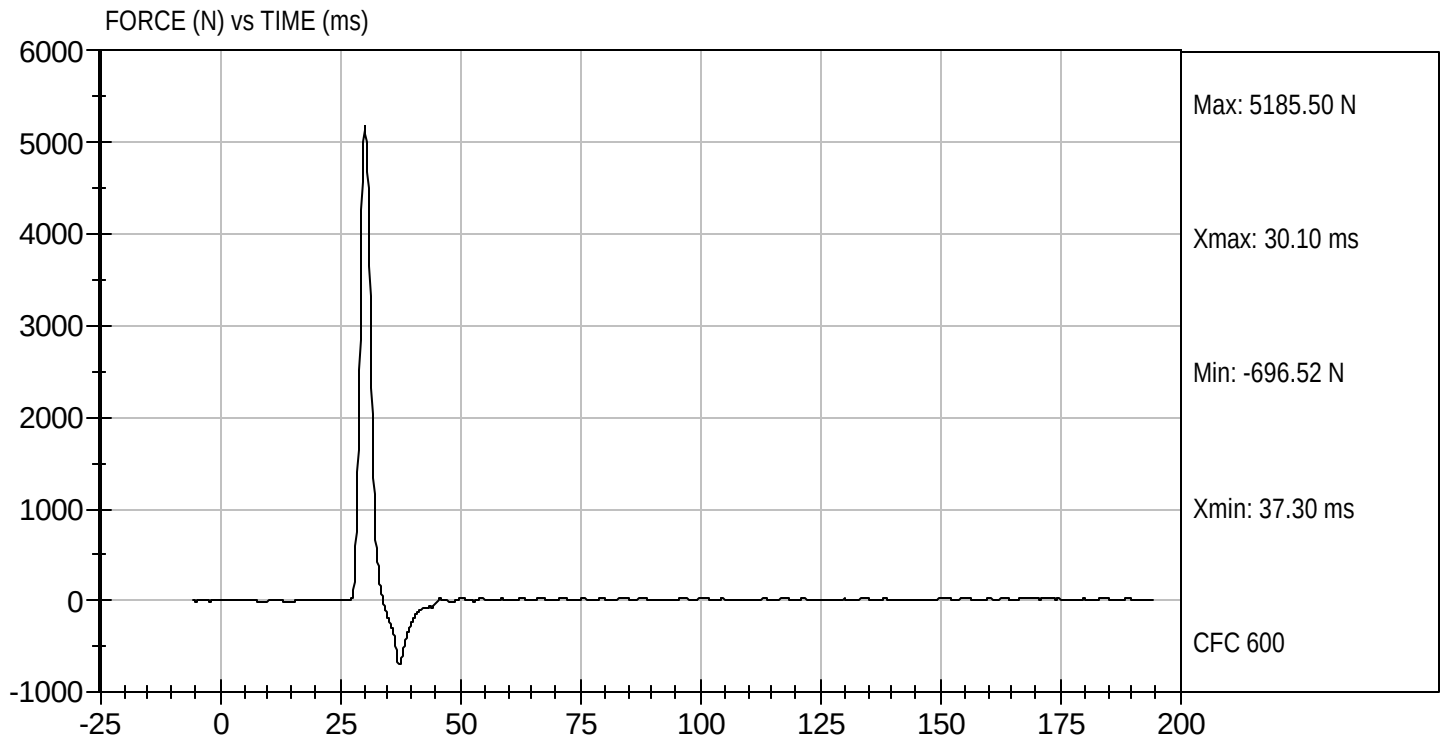
08/09/2005
Test Date


Approved By



Test Desc: Right Knee
Componet ID: D052215

Test Date: 08/09/2005
Velocity: 6.97 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: D052216

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	44	Pass
Probe Velocity	m/sec	2.07 to 2.13	2.11	Pass
Peak Probe Force	Newtons	4715 to 5782	4,977	Pass
Overall Test Results				Pass


Laboratory Technician

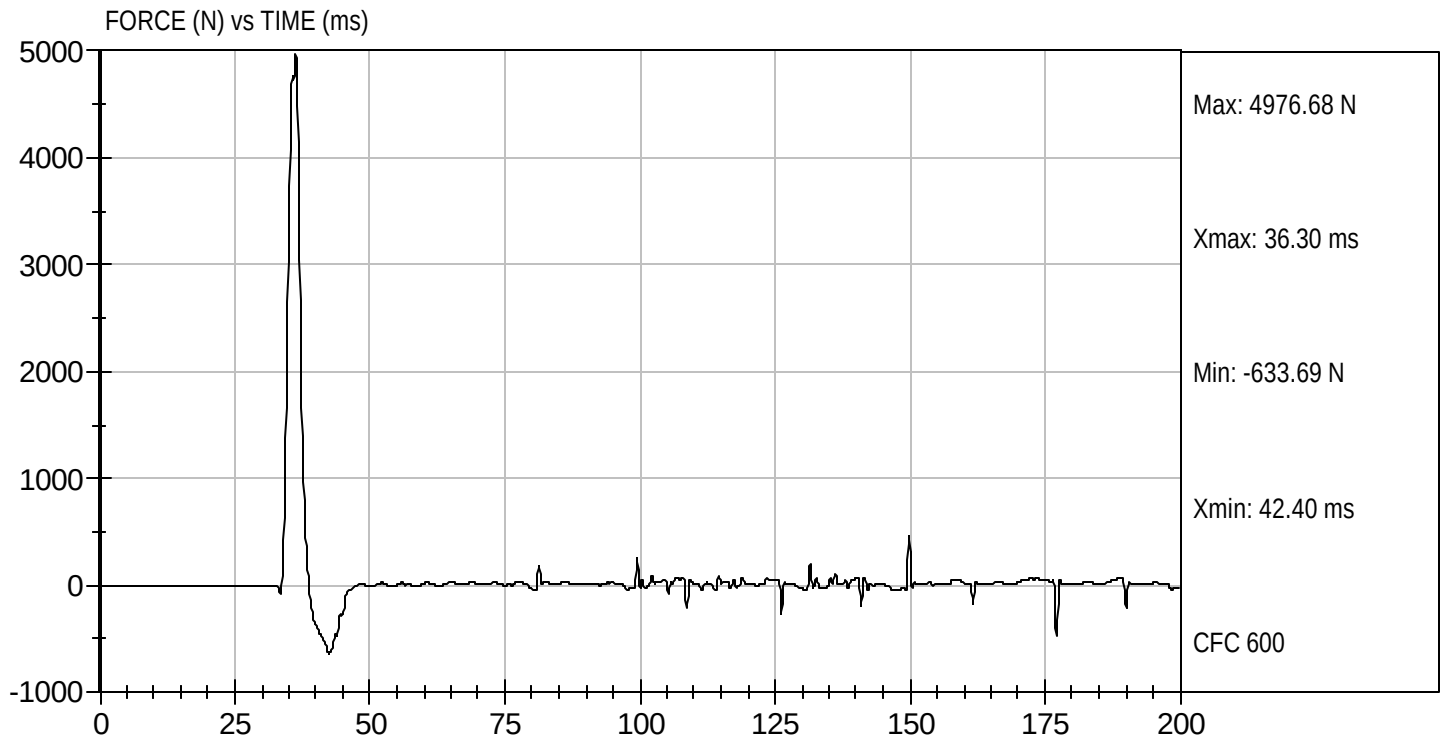
08/09/2005
Test Date


Approved By



Test Desc: Left Knee
Componet ID: D052216

Test Date: 08/09/2005
Velocity: 6.93 ft/s, 2.11 m/s



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

ATD Serial No: 065

Test I.D: D052210

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	45	45	Pass
Rotation Rate	deg/sec	5 -10	8	8	Pass
30 Degrees	Nm	94.9 Nm Max	84.5	67.6	Pass
150 ft-lbf / 203.4 Nm	Deg	40- 50 Degree Max Rotation	44	44	Pass
Overall Test Results					Pass


 Laboratory Technician

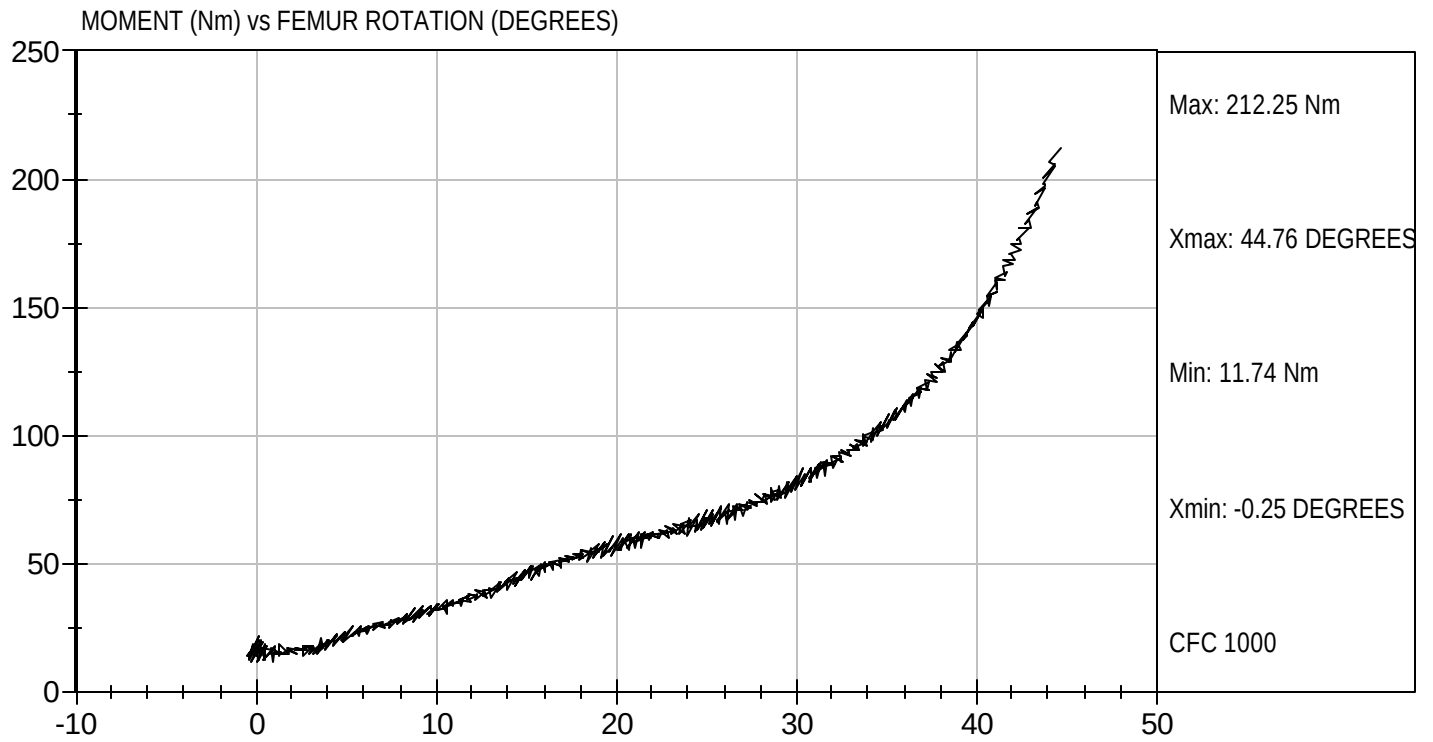
08/09/2005
 Test Date


 Approved By



Test Desc: Hip Femur Flexion
Componet ID: D052219

Test Date: 08/09/2005
Velocity: 0 ft/s, 0.00 m/s





Test Desc: Hip Femur Flexion
Componet ID: D052210

Test Date: 08/09/2005
Velocity: 0 ft/s, 0.00 m/s

