REPORT NUMBER: NCAP-MGA-2008-015

NEW CAR ASSESSMENT PROGRAM
FRONTAL BARRIER IMPACT TEST

CHRYSLER LLC
2009 DODGE JOURNEY SXT AWD
NHTSA NUMBER: M90300

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

Test Date: March 27, 2008

Final Report Date: April 14, 2008

FINAL REPORT

PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
RULEMAKING
OFFICE OF CRASHWORTHINESS STANDARDS
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This final test report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, in response to Contract Number DTNH22-06-D-00028.

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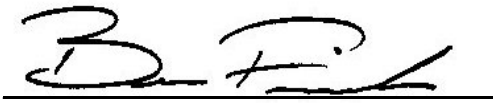
Prepared by:  Date: 4/14/08
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Technical Report Documentation Page

1. Report No. NCAP-MGA-2008-015	*2. Government Accession No.*	*3. Recipient's Catalog No.*	
4. Title and Subtitle Final Report of New Car Assessment Program Testing of a 2009 Dodge Journey SXT AWD NHTSA No.: M90300		*5. Report Date* April 14, 2008 *6. Performing Organization Code* MGA	
7. Author(s) Ben Fischer, Project Engineer		*8. Performing Organization Report No.* NCAP-MGA-2008-015	
9. Performing Organization Name and Address MGA Research Corporation 5000 Warren Road Burlington, WI 53105		*10. Work Unit No.* *11. Contract or Grant No.* DTNH22-06-D-00028	
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Rulemaking, Office of Crashworthiness Standards 1200 New Jersey Ave, SE, Room W43-410, NVS-111 Washington, D.C. 20590		*13. Type of Report and Period Covered* Final Report 3/27/2008 – 4/14/2008 *14. Sponsoring Agency Code* NVS-111	
15. Supplementary Notes			

16. Abstract

A frontal barrier impact was conducted on a 2009 Dodge Journey SXT AWD at MGA Research Corporation on March 27, 2008. 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 628 mm located at the vehicle's centerline. The test vehicle is equipped with a 3-point continuous belt system and an airbag in both front outboard seating positions. With respect to FMVSS 208 "Occupant Crash Protection", the occupant injury criteria summary is as follows:

Measurement Description	Units	Threshold	Driver ATD	Pass. ATD
Head Injury Criteria (HIC)	N/A	1000	293	552
Max. Thorax Accel. (3ms Clip)	G's	60	42	35
Left Femur Force	Newton	10009	-4541	-4386
Right Femur Force	Newton	10009	-4194	-3001

17. Key Words 56.3 km/h NCAP Frontal Barrier Impact Test New Car Assessment Program (NCAP) 2009 Dodge Journey SXT AWD NHTSA No: M90300		*18. Distribution Statement* Copies of this report are available from: National Highway Traffic Safety Adm. Technical Ref. Division, 1200 New Jersey Ave, SE Washington, D.C. 20590	
19. Security Classif. (of this report) Unclassified	*20. Security Classif. (of this page)* Unclassified	*21. No. of Pages* 120	22. Price

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 DTNH22-06-D-00028. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for an impact in excess of the current 48.3 kph requirements.

SUMMARY

A load cell barrier was impacted by a 2009 Dodge Journey SXT AWD at a velocity of 56.6 kph. The test was performed at MGA Research Corporation on March 27, 2008. 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 628 mm and both the driver and passenger side doors remained closed and latched during the impact event and were operable after the impact.

The driver's head and chest contacted the airbag. The driver's head also contacted the headrest. The driver's knees contacted the knee bolster. The passenger's head and chest contacted the airbag. The passenger's head also contacted the headrest. The passenger's knees contacted the glove box.

The occupant data is summarized below:

ATD position	HIC	T^1	T^2	Clip (g)	T^1	T^2	Chest Disp. (mm)	Left Femur (N)	Right Femur (N)
Driver	293	57.4	91.3	42	66.6	69.6	-28	-4541	-4194
Passenger	552	73.7	105.9	35	58.7	61.7	-27	-4386	-3001

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

TEST NOTES

There was no valid data collected for:

Passenger Shoulder Belt after 85 msec.
Left Rear Seat Crossmember X after 40 msec.
Bottom of Engine X after 40 msec.

SECTION 2

OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

DATA SHEET NO. 1

CRASH TEST SUMMARY

Test Vehicle: 2009 Dodge Journey SXT AWD
Test Program: 35mph Frontal Impact
NHTSA No.: M90300
Test Date: 3/27/2008

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	Windshield cracked.	

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	560
Center	mm	545
Right Side	mm	568
Average	mm	558

BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Shoulder belt length as measured on ATD	mm	855	865
Lap belt length as measured on ATD	mm	560	555
Remainder of belt on reel	mm	1735	1586
Total belt length for continuous webbing systems	mm	3150	3006

DATA SHEET NO. 2

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2009 Dodge Journey SXT AWD
Test Program: 35mph Frontal Impact
NHTSA No.: M90300
Test Date: 3/27/2008

TEST VEHICLE INFORMATION

Manufacturer	Dodge
Model	Journey
Body Style	MPV
NHTSA No.	M90300
VIN	3D4GH57V49T134129
Color	Brilliant Black Crystal
Delivery Date	3/4/2008
Odometer Reading (mile)	182
Dealer	Boucher Fleet Group
Transmission	Automatic
Final Drive	AWD
Number of Cylinders	6
Engine Displacement (L)	3.5
Engine Placement	Lateral
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	Yes
Rear Passenger Side Curtain Airbag	Yes
Rear Passenger Side Torso Airbag	No
Force Limiter	Yes
Pretensioner	Yes
Power Steering	Yes
Power Door Locks	Yes
Tilt Wheel	Yes
Air Conditioning	Yes
Anti-lock Brakes	Yes
Traction Control	Yes
All Wheel Drive	Yes
Power Seats (Driver Only)	Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Chrysler LLC
Date of Manufacture	1-08

GVWR (kg)	2382
GAWR Front (kg)	1248
GAWR Rear (kg)	1316

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench		
Number of Occupants	2	3		5
Capacity Wt. (VCW) (kg)				408
Cargo Wt. (RCLW) (kg)				68

DATA SHEET NO. 2... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2009 Dodge Journey SXT AWD
Test Program: 35mph Frontal Impact
NHTSA No.: M90300
Test Date: 3/27/2008

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	566.1	411.9		600.5	486.7	
Right	kg	528.0	413.7		556.6	491.7	
Ratio	%	57.0	43.0		54.2	45.8	
Totals	kg	1094.1	825.6	1919.7	1157.1	978.4	2135.5

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1919.7
Weight of 2 P572E ATDs	kg	156.0
Rated Cargo/Luggage Weight (RCLW)	kg	68
Calculated Vehicle Target Weight (TVTW)	kg	2143.7

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	804	804	818	816	1243
As Tested	mm	805	809	800	800	1325
Post Test	mm	780	850	774	814	

Vehicle Wheelbase (mm): 2891
Weight of Ballast secured in cargo area (kg): 27.2

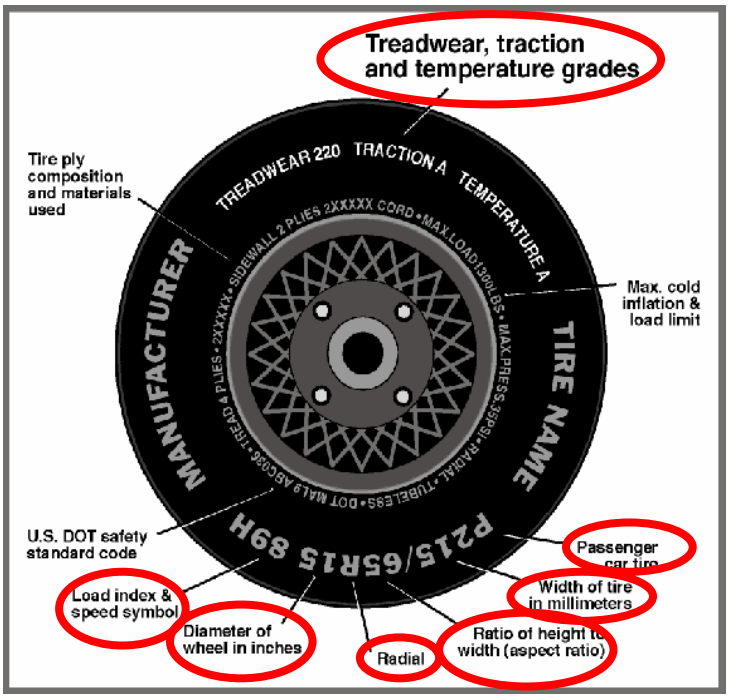
Vehicle Components Removed: Jack, cargo carpet and floor cover

Ballast weight does not include instrumentation and data acquisition system.

DATA SHEET NO. 3

TEST VEHICLE TIRE INFORMATION

Test Vehicle: 2009 Dodge Journey SXT AWD NHTSA No.: M90300
Test Program: 35mph Frontal Impact Test Date: 3/27/2008



DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	240	240
Recommended Tire Size	225/55R19	225/55R19
Tire Size on Vehicle	225/55R19	225/55R19
Tire Manufacturer	Kumho	Kumho
Tire Name	SOLUS	SOLUS
Tire Type	Light Truck	Light Truck
Tire Width (mm)	225	225
Ratio of Height to Width (aspect ratio)	55	55
Radial	R	R
Wheel Diameter	19	19
Load Index & Speed Symbol	99T	99T
Treadwear		
Traction Grade		
Temperature Grade		

DATA SHEET NO. 4

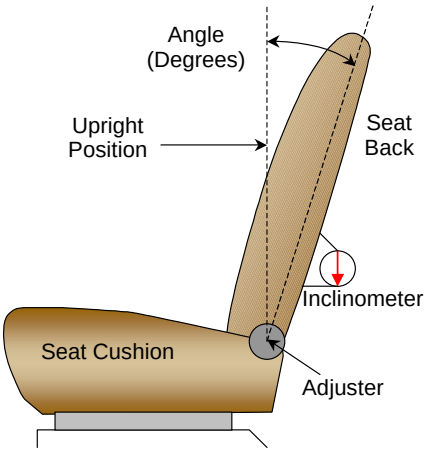
TEST VEHICLE INFORMATION

Test Vehicle: 2009 Dodge Journey SXT AWD NHTSA No.: M90300
Test Program: 35mph Frontal Impact Test Date: 3/27/2008

NORMAL DESIGN RIDING POSITION

The driver and passenger seat back is positioned to the manufacturer's designated angle. The procedure is as follows: Set the seat back angles at 19.4 degrees (measured from upright position).

Driver seat back angle: 20.8° (from upright position)
Passenger seat back angle: 21.9° (from upright position)



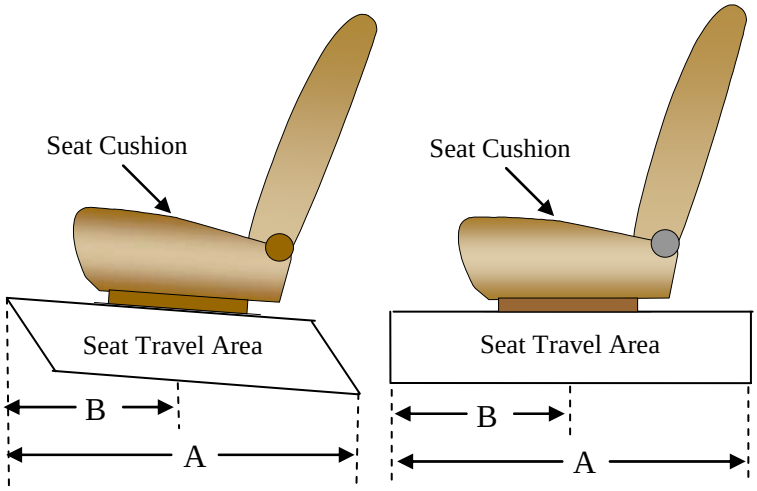
FRONT SEAT ASSEMBLY

SEAT FORE/AFT POSITIONING

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	312 mm	156 mm
Passenger Seat	260 mm	130 mm

ADJUSTABLE D-RING POSITION

The driver and passenger D-rings were set at the mid position.



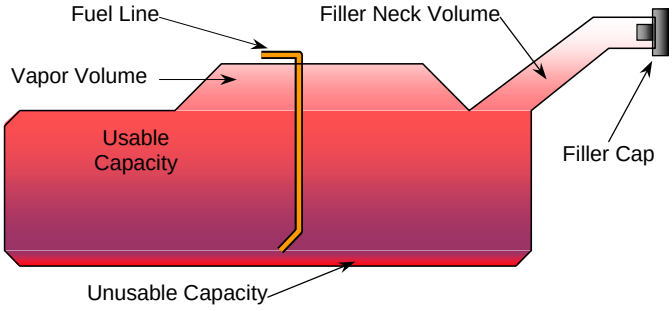
DATA SHEET NO. 4…(CONTINUED)
TEST VEHICLE INFORMATION

Test Vehicle: 2009 Dodge Journey SXT AWD NHTSA No.: M90300
Test Program: 35mph Frontal Impact Test Date: 3/27/2008

FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	78.7
Usable Capacity of "Optional" Tank	
92-94% of Usable Capacity	72.4 to 74.0
Actual Amount of Solvent used	73.7
1/3 of Usable Capacity	26.2

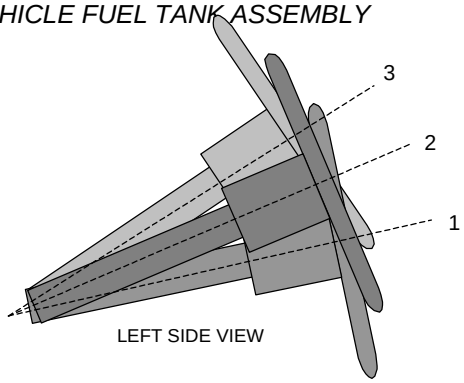
The test vehicle is equipped with an electric fuel pump. The fuel pump runs during normal vehicle operation. The pump must see a minimal engine speed of 400 rpm in order to activate. (The pump will prime for 2 seconds at key on also). Pump will turn off if airbag deployment signal is detected.



VEHICLE FUEL TANK ASSEMBLY

STEERING COLUMN ADJUSTMENT

Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when moved through its full range of motion. An aluminum plate is placed across the rim of the steering wheel, an inclinometer is placed on the plate and the angle is measured.



STEERING COLUMN ASSEMBLY

STEERING COLUMN POSITIONS

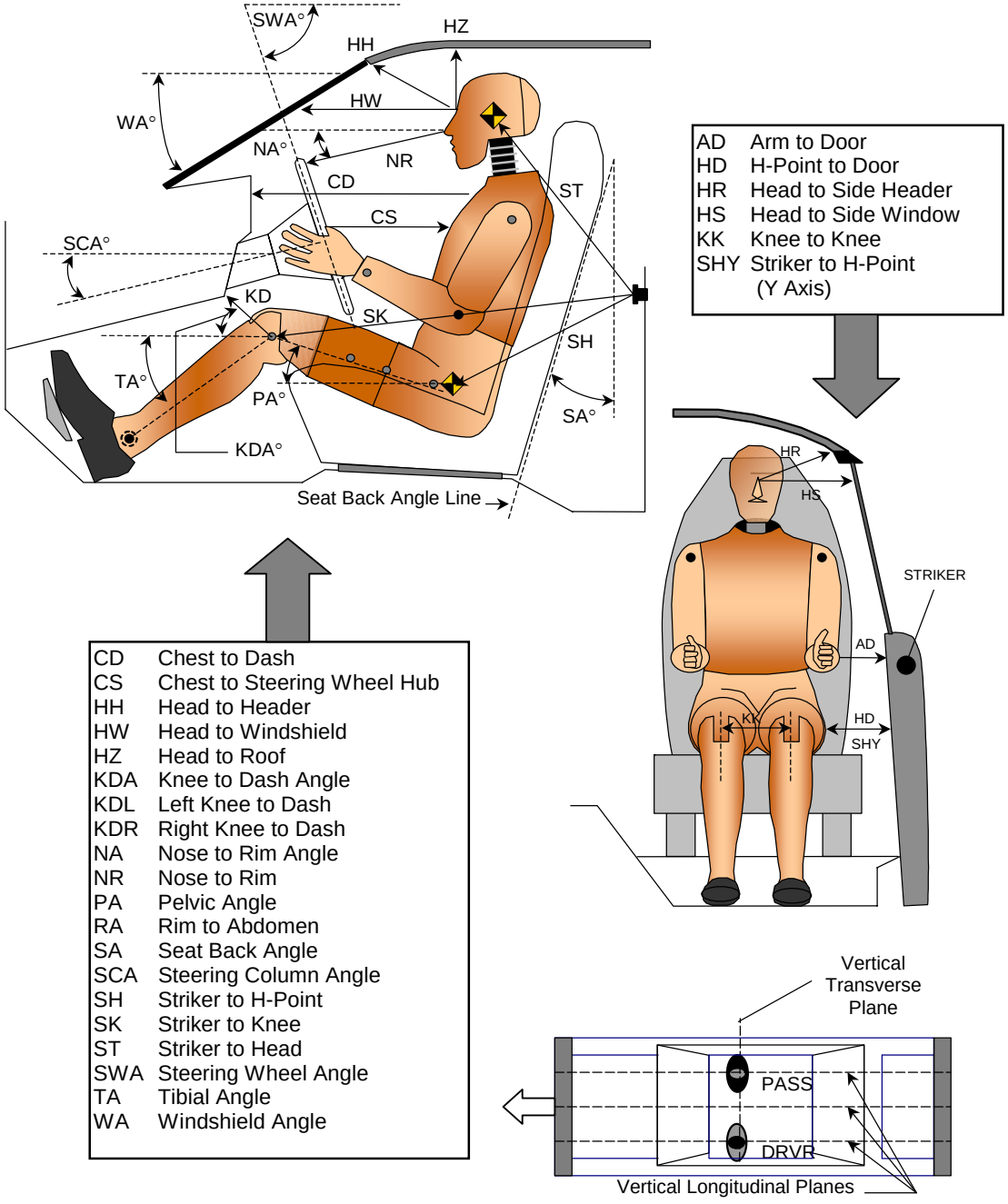
	Fore/Aft Position (mm)	Degrees
Lowermost position No. 1	0	64.0
Geometric center position No. 2	22 mm	67.0
Uppermost position No. 3	44 mm	70.0

DATA SHEET NO. 5

DUMMY POSITIONING IN VEHICLE

Test Vehicle: 2009 Dodge Journey SXT AWD
Test Program: 35mph Frontal Impact
NHTSA No.: M90300
Test Date: 3/27/2008

DUMMY MEASUREMENTS FOR FRONT SEAT OCCUPANTS



DATA SHEET NO. 5... (CONTINUED)

DUMMY POSITIONING IN VEHICLE

Test Vehicle: 2009 Dodge Journey SXT AWD NHTSA No.: M90300
Test Program: 35mph Frontal Impact Test Date: 3/27/2008

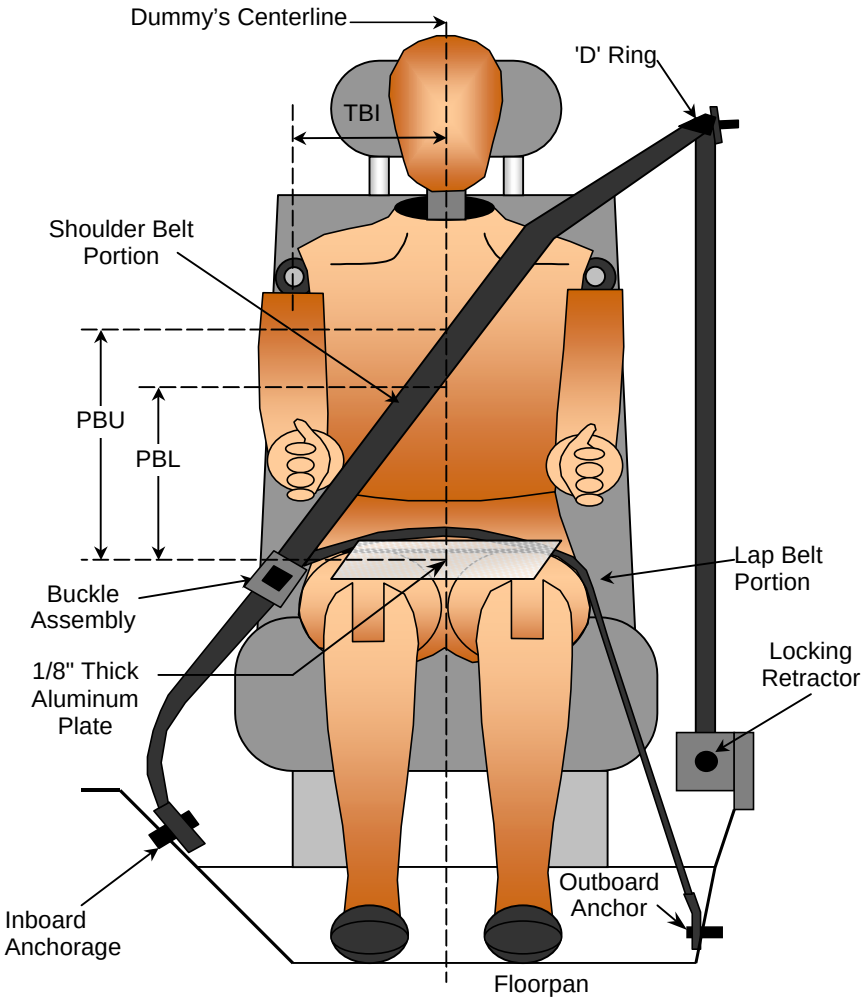
TEST DUMMY POSITION MEASUREMENTS

Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA	Windshield Angle		29.1		
SWA	Steering Wheel Angle		67.0		
SCA	Steering Column Angle		23.8		
SA	Seat Back Angle		20.8		21.9
HZ	Head to Roof (Z)	268	90	241	90
HH	Head to Header	417	23.5	415	20.4
HW	Head to Windshield	772	0	763	0
HR	Head to Side Header (Y)	254		242	
NR	Nose to Rim	388	12.7		
CD	Chest to Dash	553		555	
CS	Chest to Steering Hub	315	6.8		
RA	Rim to Abdomen	183	0		
KDL	Left Knee to Dash	176	21.8	138	
KDR	Right Knee to Dash	168		143	39.7
PA	Pelvic Angle		23.2		21.2
TA	Tibia Angle		51.8		55.0
KK	Knee to Knee (Y)	319		272	
SK	Striker to Knee	582	93.3	586	96.7
ST	Striker to Head	504	7.6	529	9.2
SH	Striker to H-Point	250	125.7	244	129.3
SHY	Striker to H-Point (Y)	268		271	
HS	Head to Side Window	371		371	
HD	H-Point to Door (Y)	130		143	
AD	Arm to Door (Y)	127		152	
AA	Ankle to Ankle	294		210	

DATA SHEET NO. 6

SEAT BELT POSITIONING DATA

Test Vehicle: 2009 Dodge Journey SXT AWD
Test Program: 35mph Frontal Impact
NHTSA No.: M90300
Test Date: 3/27/2008



SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU - Top surface of reference to belt upper edge	mm	355	355
PBL - To surface of reference to belt lower edge	mm	270	270

DATA SHEET NO. 7

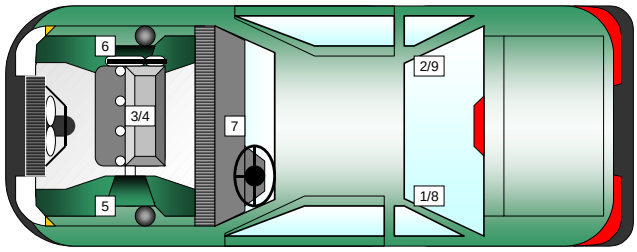
VEHICLE ACCELEROMETER LOCATIONS

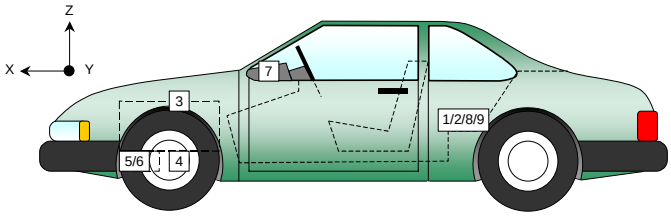
Test Vehicle: 2009 Dodge Journey SXT AWD
Test Program: 35mph Frontal Impact
NHTSA No.: M90300
Test Date: 3/27/2008

VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear X-Member X	1902	-405	437
2	Right Rear X-Member X	1902	407	437
3	Engine Top X	4126	0	932
4	Engine Bottom X	4221	0	355
5	Left Brake Caliper X	4001	-704	263
6	Right Brake Caliper X	4001	704	263
7	Instrument Panel X			
8	Left Rear X-Member Z	1902	-405	437
9	Right Rear X-Member Z	1902	407	437

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: 2009 Dodge Journey SXT AWD NHTSA No.: M90300
Test Program: 35mph Frontal Impact Test Date: 3/27/2008

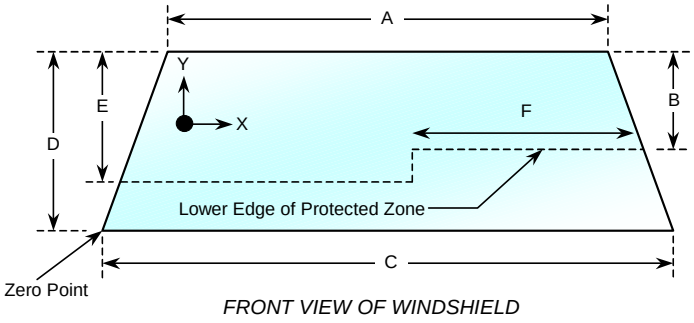
Windshield Mounting Details:
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

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	2286	2286	100
Right Side	2286	2286	100
Total	4572	4572	100



FRONT VIEW OF WINDSHIELD

Item	Units	Value
A	mm	1322
B	mm	553
C	mm	1590
D	mm	830
E	mm	553
F	mm	570

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: 2009 Dodge Journey SXT AWD NHTSA No.: M90300
Test Program: 35mph Frontal Impact Test Date: 3/27/2008

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 21° C Test Time: 10:54 am

Stoddard Solvent Spillage Measurements

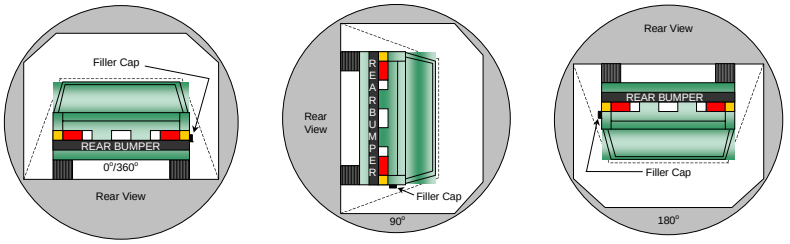
A. From impact until vehicle motion ceases: 0 oz.
(Maximum Allowable = 1 ounce)

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

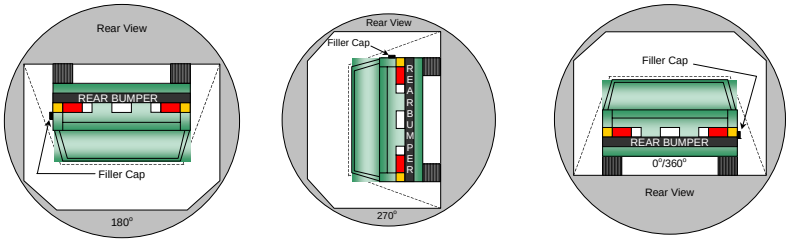
C. For the following 25 minutes: 0 oz.
(Maximum Allowable = 1 oz. /minute)

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°	124	300	0
90° to 180°	118	300	0
180° to 270°	111	300	0
270° to 360°	116	300	0

DATA SHEET NO. 10

VEHICLE MEASUREMENTS

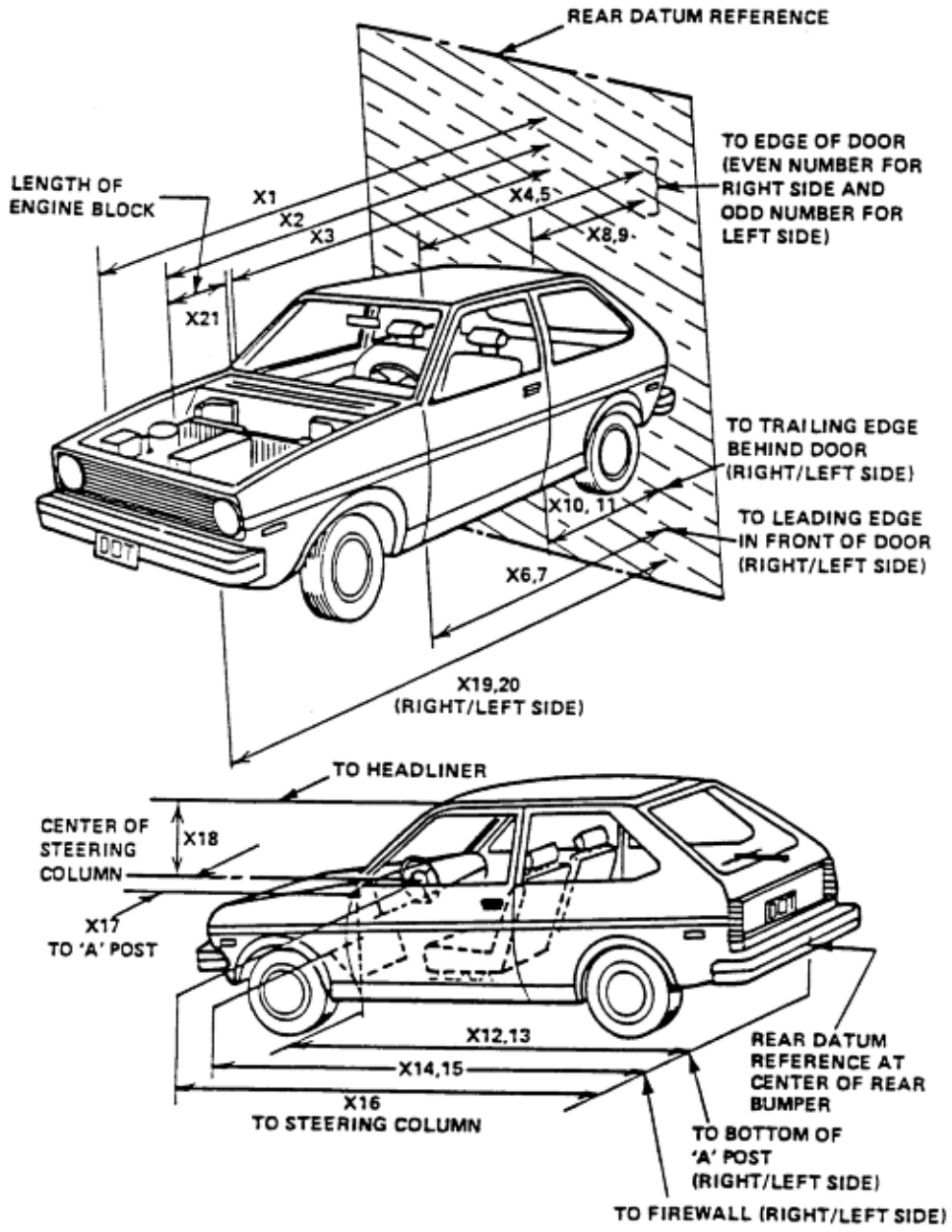
Test Vehicle: 2009 Dodge Journey SXT AWD NHTSA No.: M90300
Test Program: 35mph Frontal Impact Test Date: 3/27/2008

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total length of vehicle at centerline	mm	4866	4238	628
2	RSOV to front of engine	mm	4319	3883	436
3	RSOV to firewall centerline	mm	3564	3498	66
4	RSOV to leading edge of right door	mm	3354	3355	-1
5	RSOV to leading edge of left door	mm	3354	3364	-10
6	RSOV to lower leading edge of right door	mm	3314	3298	16
7	RSOV to lower leading edge of left door	mm	3307	3295	12
8	RSOV to upper leading edge of right door	mm	2258	2235	23
9	RSOV to upper leading edge of left door	mm	2255	2244	11
10	RSOV to lower trailing edge of right door	mm	2273	2264	9
11	RSOV to lower trailing edge of left door	mm	2267	2260	7
12	RSOV to bottom of right 'A' pillar	mm	3320	3300	20
13	RSOV to bottom of left 'A' pillar	mm	3310	3296	14
14	RSOV to firewall on right side	mm	3638	3650	-12
15	RSOV to firewall on left side	mm	3649	3640	9
16	RSOV to steering column	mm	2893	2872	21
17	Center of steering column to left 'A' pillar	mm	424	440	-16
18	Center of steering column to headlining	mm	460	482	-22
19	RSOV to right side of front bumper	mm	4705	4200	505
20	RSOV to left side of front bumper	mm	4705	4208	497
21	Length of engine block	mm	423	423	0
RD	RSOV to right side of dash panel	mm	3091	3100	-9
CD	RSOV to center of dash panel	mm	3130	3156	-26
LD	RSOV to left side of dash panel	mm	3104	3085	19

DATA SHEET NO. 10... (continued)

VEHICLE MEASUREMENTS

Test Vehicle: 2009 Dodge Journey SXT AWD NHTSA No.: M90300
Test Program: 35mph Frontal Impact Test Date: 3/27/2008



DATA SHEET NO. 10... (continued)

VEHICLE MEASUREMENTS

Test Vehicle: 2009 Dodge Journey SXT AWD NHTSA No.: M90300
Test Program: 35mph Frontal Impact Test Date: 3/27/2008

Target Vehicle Structural Measurement

	Elements	Pre-Test (mm)
1	Total Length	4866
2	Total Width	1833
3	Bumper Top Height	612
4	Bumper Bottom Height	488
5	Longitudinal Member Top Height	660
6	Distance between Longitudinal Members	1045
7	Longitudinal Member Width	62
8	Engine Top Height	972
9	Engine Bottom Height	240
10	Engine and gearbox width	644
11	Front bumper-engine distance	473
12	Front shock absorber fixing height	928
13	Bonnet leading edge height	883
14	Front shock absorber fixing width	1134
15	Front bumper – front axle distance	993
16	Front axle – a pillar distance	523
17	A-pillar – B-pillar distance	1092
18	B-Pillar – rear axle distance	1282
19	B-pillar – C-pillar distance	1080
20	Roof sill bottom height	1600
21	Roof sill top height	1640
22	Floor sill bottom height	283
23	Floor sill top height	365

DATA SHEET NO. 11

CAMERA LOCATIONS

Test Vehicle: 2009 Dodge Journey SXT AWD
Test Program: 35mph Frontal Impact
NHTSA No.: M90300
Test Date: 3/27/2008

No.	Camera View	Location (mm) *			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Side View				13	24
2	Left Front View	1180	-5120	1155	24	1000
3	Steering Column Top	1535	-5620	1260	25	1000
4	Steering Column Bottom	1535	-5620	880	25	1000
5	Driver Close-up	1635	-5865	1570	35	1000
6	Driver Angle	6890	-5345	2140	50	1000
7	On board Driver Side					
8	On board Passenger Side					
9	Right Overall	2165	6055	1345	19	1000
10	Right Passenger Half	1250	5250	1140	24	1000
11	Right Close-up	1460	5710	1565	35	1000
12	Right Angle	6745	6055	2120	50	1000
13	Windshield	-295	0	2830	12.5	1000
14	Top Driver	-135	-450	2240	24	1000
15	Top Passenger	-110	505	2240	24	1000
16	Pit Front	1130	0	-3150	24	1000
17	Pit Rear	3390	0	-3150	24	1000

*COORDINATES:

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

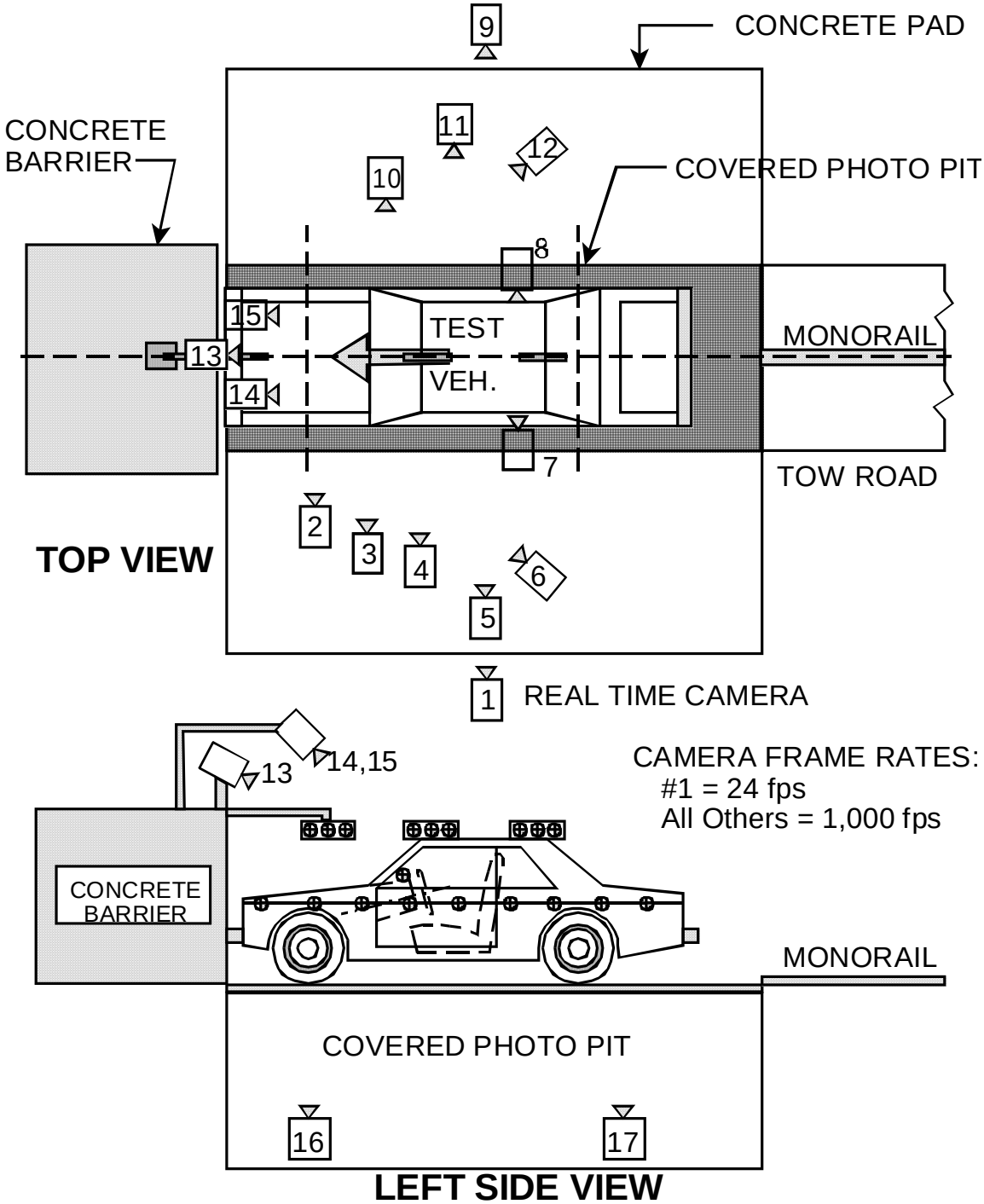
Cameras 7 & 8 were not used for this test.

DATA SHEET NO. 11... (continued)

CAMERA LOCATIONS

Test Vehicle: 2009 Dodge Journey SXT AWD NHTSA No.: M90300
Test Program: 35mph Frontal Impact Test Date: 3/27/2008

CAMERA POSITIONS FOR FRONTAL IMPACTS



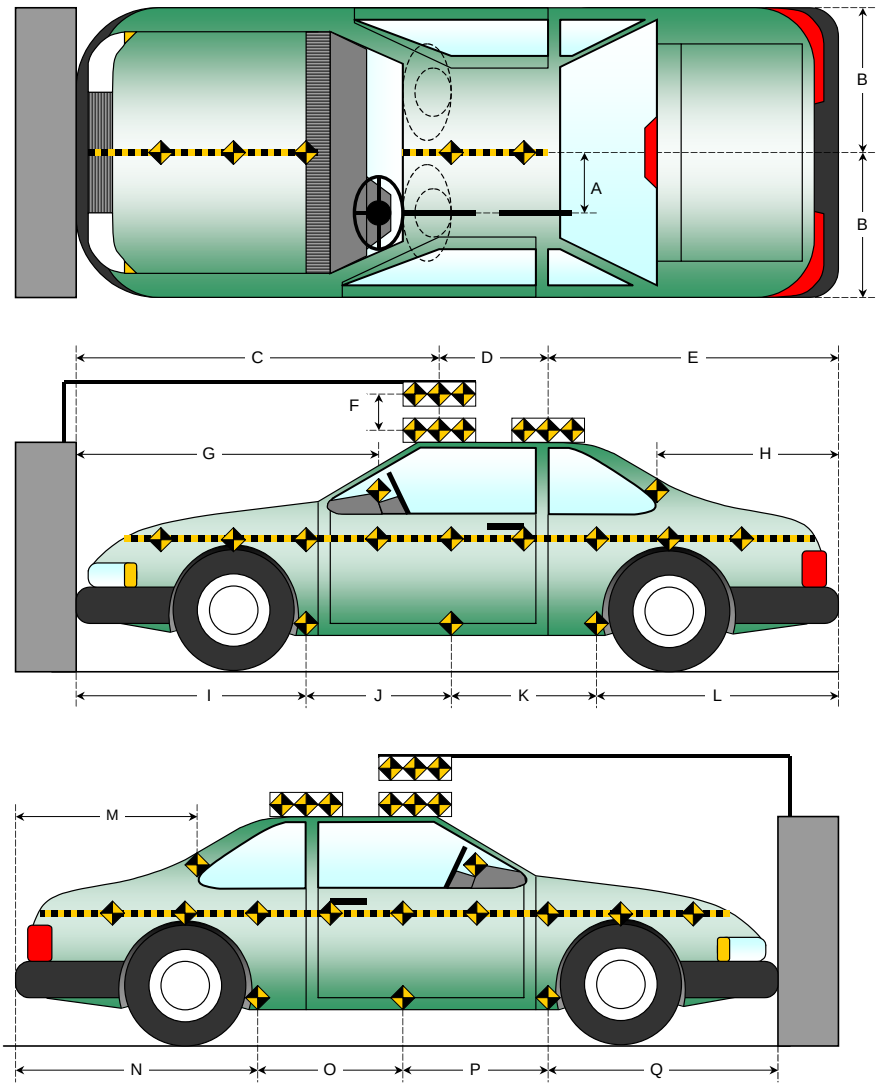
DATA SHEET NO. 12

PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2009 Dodge Journey SXT AWD
Test Program: 35mph Frontal Impact

NHTSA No.: M90300
Test Date: 3/27/2008

Item	Value
A	381
B	917
C	2482
D	915
E	1469
F	11
G	
H	568
I	1475
J	964
K	966
L	1461
M	577
N	1465
O	966
P	966
Q	1469



DATA SHEET NO. 13

VEHICLE INTRUSION MEASUREMENTS

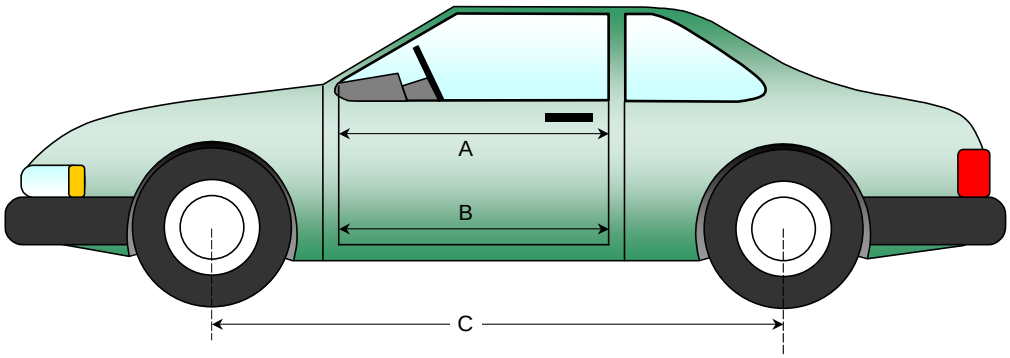
Test Vehicle: 2009 Dodge Journey SXT AWD
Test Program: 35mph Frontal Impact
NHTSA No.: M90300
Test Date: 3/27/2008

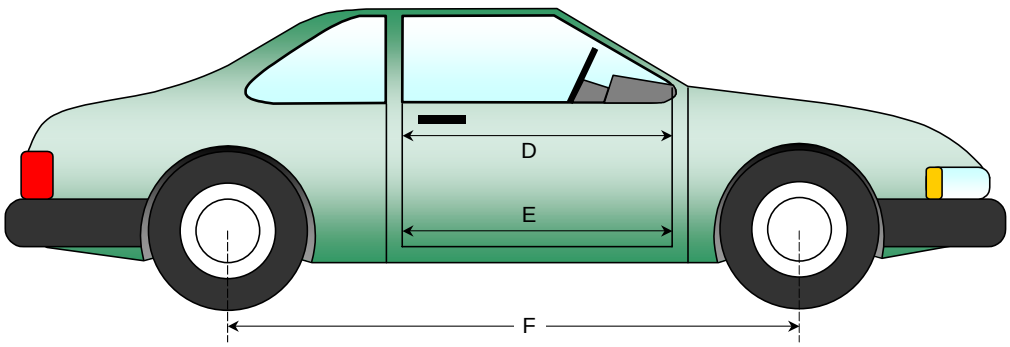
DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	985	981	4
B	Left Side Lower	mm	818	815	3
D	Right Side Upper	mm	986	982	4
E	Right Side Lower	mm	833	829	4

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2891	2767	124
F	Right Side Wheelbase	mm	2891	2821	70





DATA SHEET NO. 13... (continued)

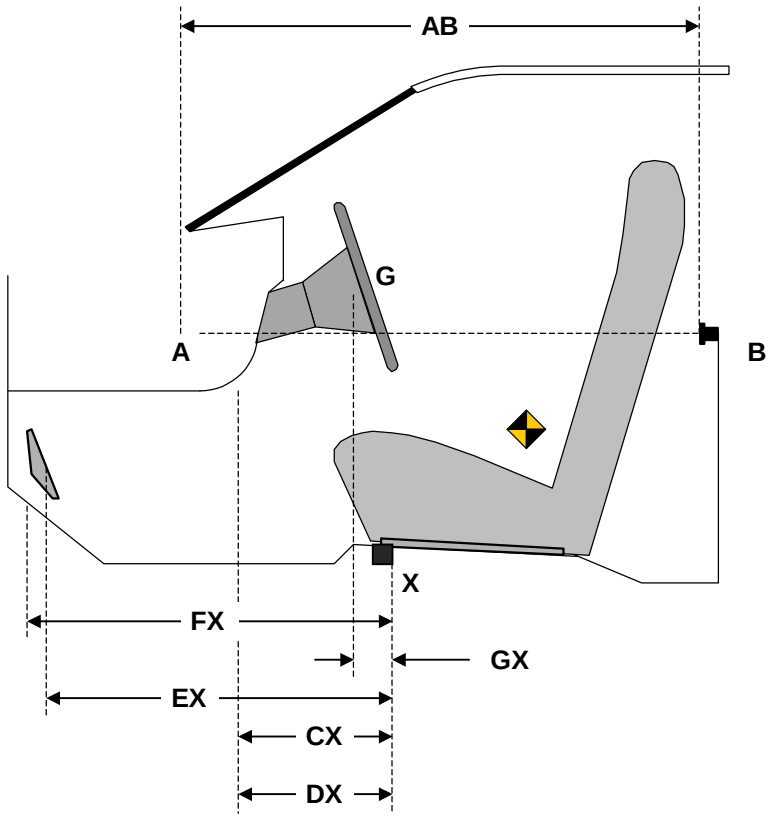
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2009 Dodge Journey SXT AWD
Test Program: 35mph Frontal Impact
NHTSA No.: M90300
Test Date: 3/27/2008

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside window jam)	mm	853	851	2
CX	Left Knee Bolster to X	mm	335	343	-8
DX	Right Knee Bolster to X	mm	327	335	-8
EX	Brake Pedal to X	mm	526	445	81
FX	Foot Rest to X	mm	522	498	24
GX	Center of Steering Column Wheel Hub to X	mm	83	99	-16

X = Front of Seat Track (stationary)

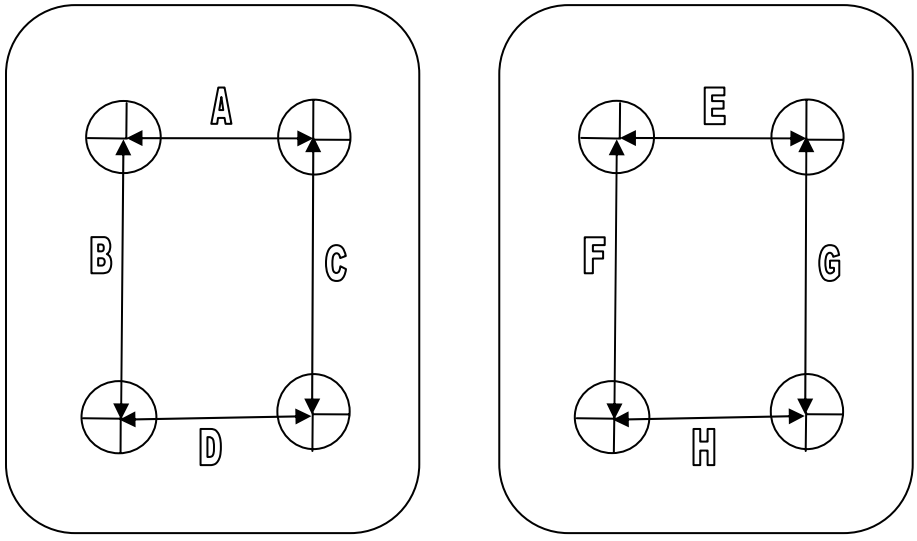


DRIVER COMPARTMENT

DATA SHEET NO. 13... (continued)

VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2009 Dodge Journey SXT AWD NHTSA No.: M90300
Test Program: 35mph Frontal Impact Test Date: 3/27/2008



Driver Passenger

UNDERBODY FLOORBOARD DEFORMATION

Measurement	Pre-Test	Post-Test	Difference
A	414	414	0
B	343	341	2
C	353	354	1
D	446	440	6
E	360	360	0
F	370	370	0
G	358	357	1
H	408	408	0

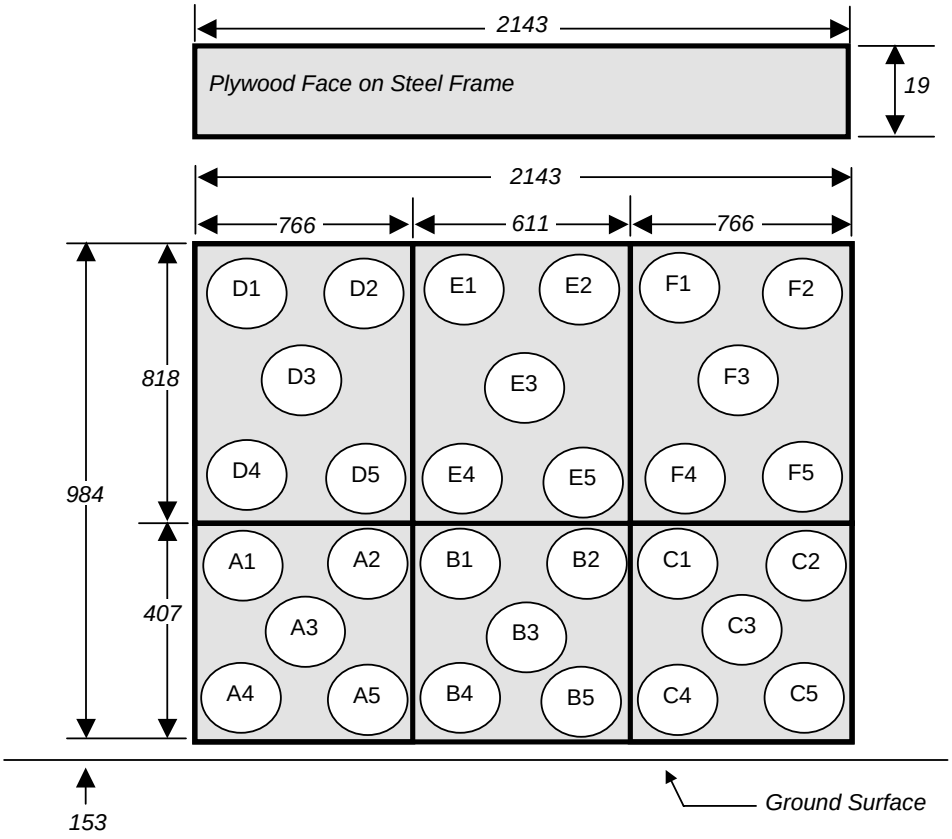
DATA SHEET NO. 14

LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle: 2009 Dodge Journey SXT AWD NHTSA No.: M90300
Test Program: 35mph Frontal Impact Test Date: 3/27/2008

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: 2009 Dodge Journey SXT AWD NHTSA No.: M90300
Test Program: 35mph Frontal Impact Test Date: 3/27/2008

VEHICLE INFORMATION

VIN: 3D4GH57V49T134129 Wheelbase (mm): 2891
Vehicle Size Category: MPV Test Weight (kg): 2135.5

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): 64.0
Time of Separation (msec): 93.3

CRUSH PROFILE

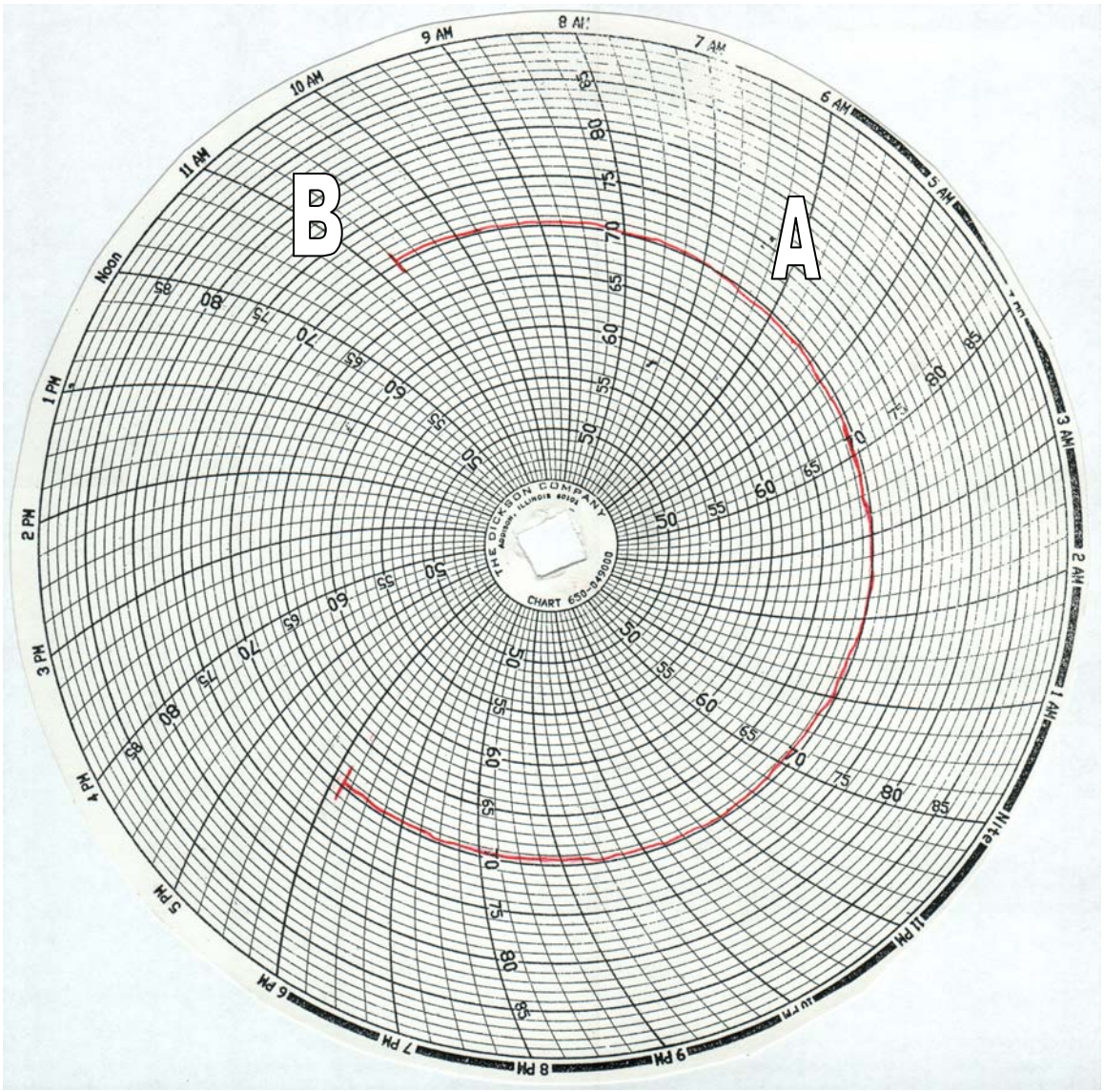
Collision Deformation Classification: Frontal Midpoint of Damage: Centerline
Damage Region Length (mm): 1152 Impact Mode: Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	4705	4208	497
C2	Crush zone 2 at left side	mm	4796	4221	575
C3	Crush zone 3 at left side	mm	4844	4230	614
C4	Crush zone 4 at right side	mm	4846	4233	613
C5	Crush zone 5 at right side	mm	4801	4235	566
C6	Crush zone 6 at right side	mm	4705	4200	505
L	C1 TO C6	mm	1326	1299	27

DATA SHEET NO. 16

DUMMY / VEHICLE TEMPERATURE STABILIZATION CHART

Test Vehicle: 2009 Dodge Journey SXT AWD NHTSA No.: M90300
Test Program: 35mph Frontal Impact Test Date: 3/27/2008



A = Dummies installed in vehicle at 6:00 am

B = Test conducted at 10:45 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

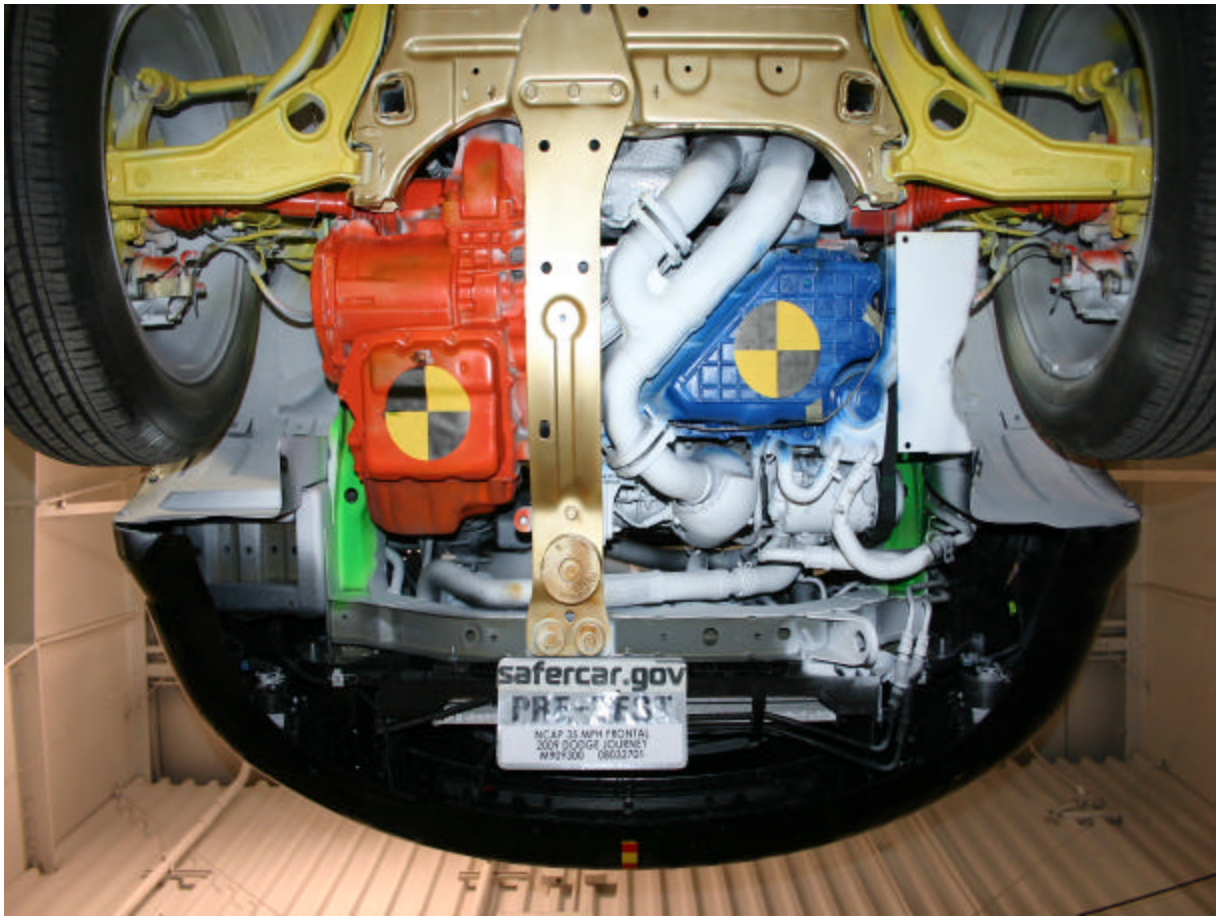
Post-Test Windshield View

Pre-Test Engine Compartment View

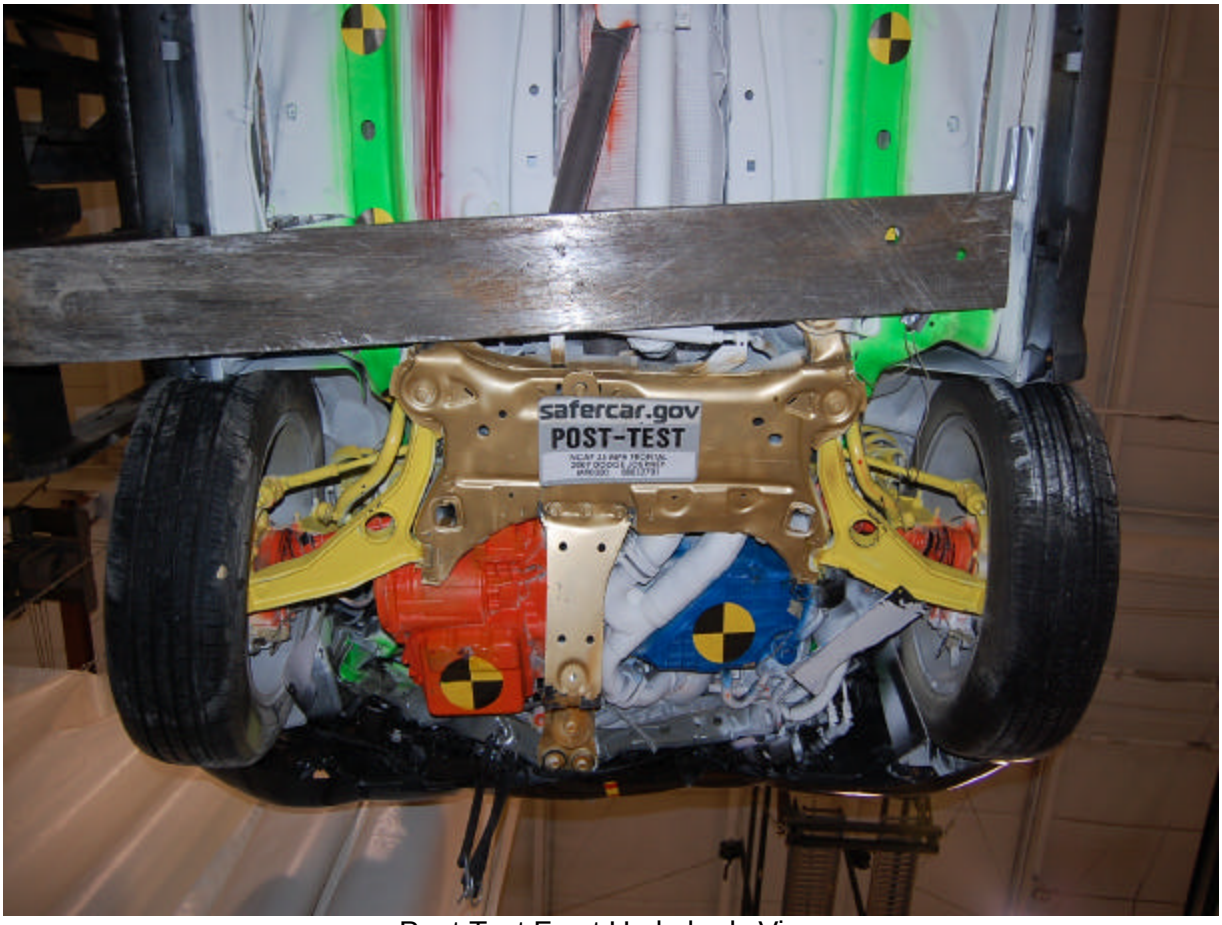
Post-Test Engine Compartment View

Pre-Test Fuel Cap View

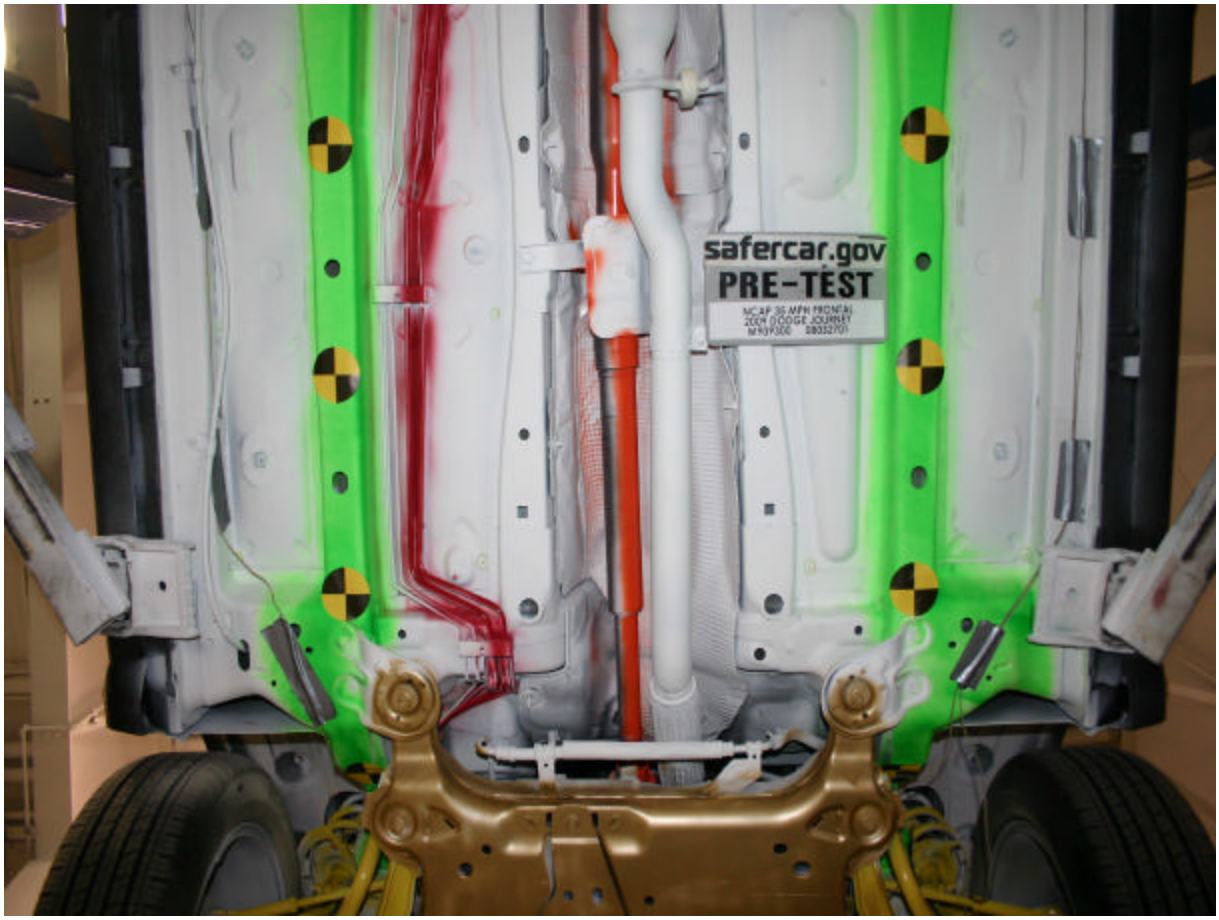
Post-Test Fuel Cap View



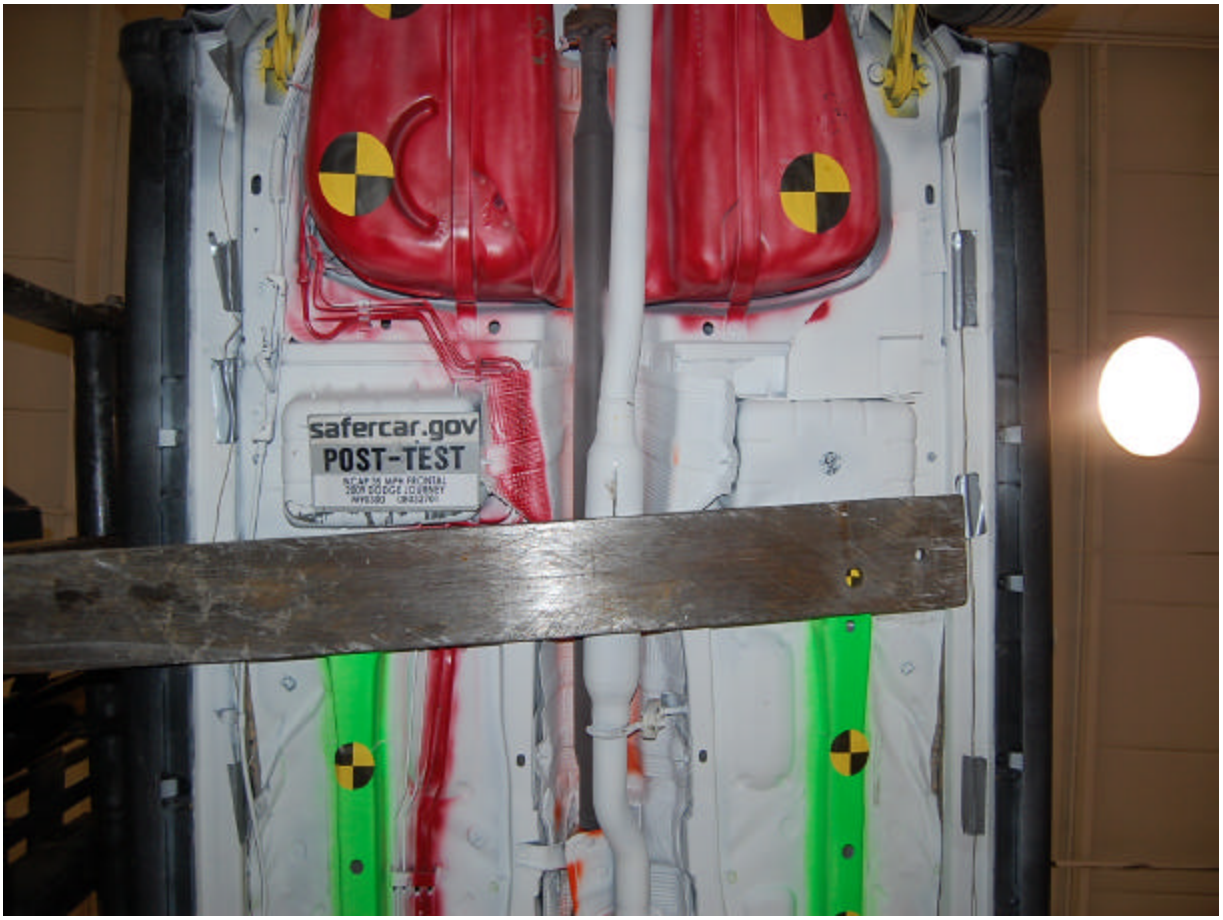
Pre-Test Front Underbody View



Post-Test Front Underbody View

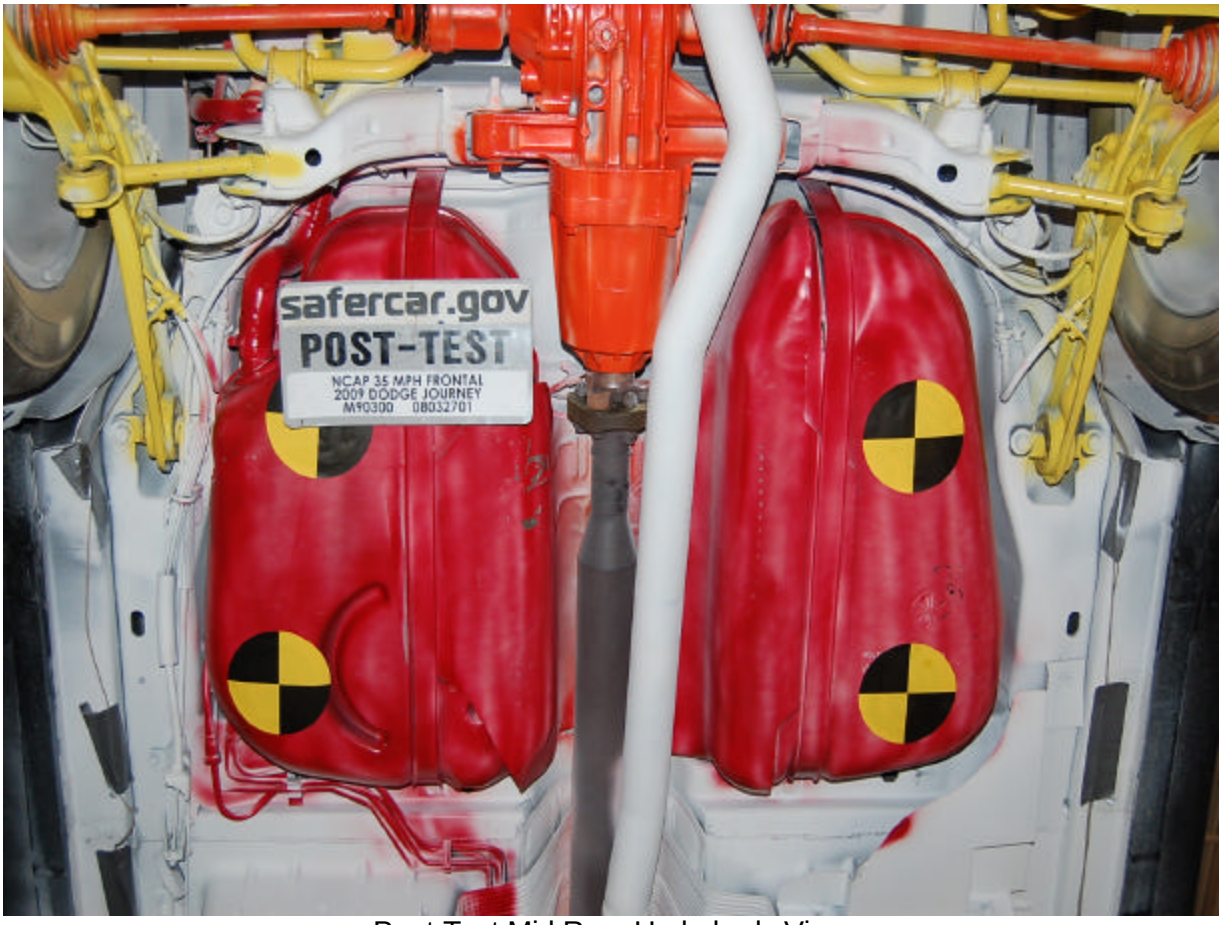


Pre-Test Mid Front Underbody View



Post-Test Mid Front Underbody View

Pre-Test Mid Rear Underbody View



Post-Test Mid Rear Underbody View

Pre-Test Rear Underbody View

Post-Test Rear Underbody View

Pre-Test Driver Dummy Front View (Head Position)

Post-Test Driver Dummy Front View (Head Position)

Pre-Test Driver Dummy (Through Window)

Post-Test Driver Dummy (Through Window)

Pre-Test Driver Dummy (Door Open)

Post-Test Driver Dummy (Door Open)

Pre-Test Driver Dummy Feet

Post-Test Driver Dummy Feet

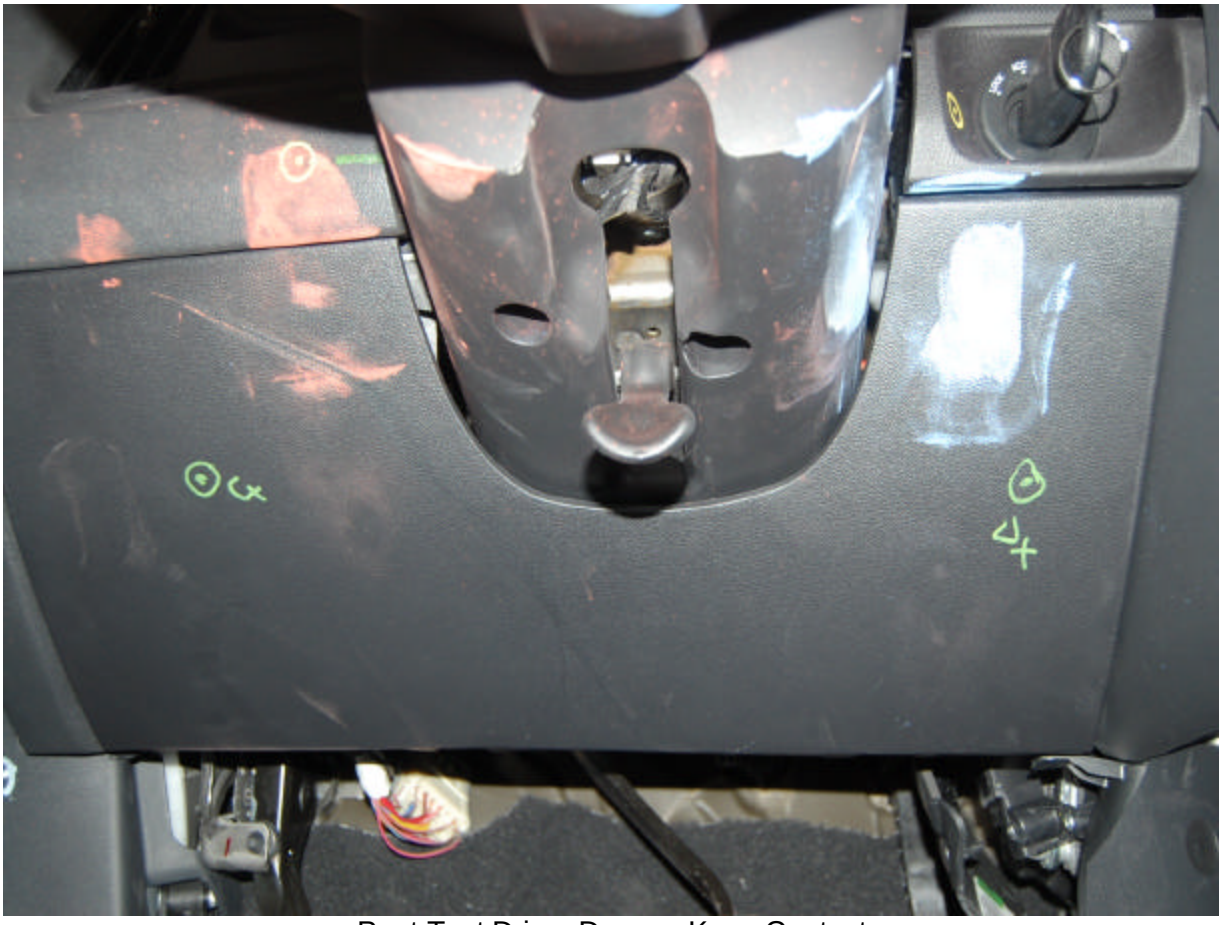
Pre-Test Driver Side Knee Bolster

Post-Test Driver Side Knee Bolster

Pre-Test Driver Side Floor Pan

Post-Test Driver Side Floor Pan

Post-Test Driver Dummy Head Contact (Headrest)



Post-Test Driver Dummy Knee Contact

Post-Test Driver Dummy Airbag Contact

Pre-Test Passenger Dummy Front View (Head Position)

Post-Test Passenger Dummy Front View (Head Position)

Pre-Test Passenger Dummy (Through Window)

Post-Test Passenger Dummy (Through Window)

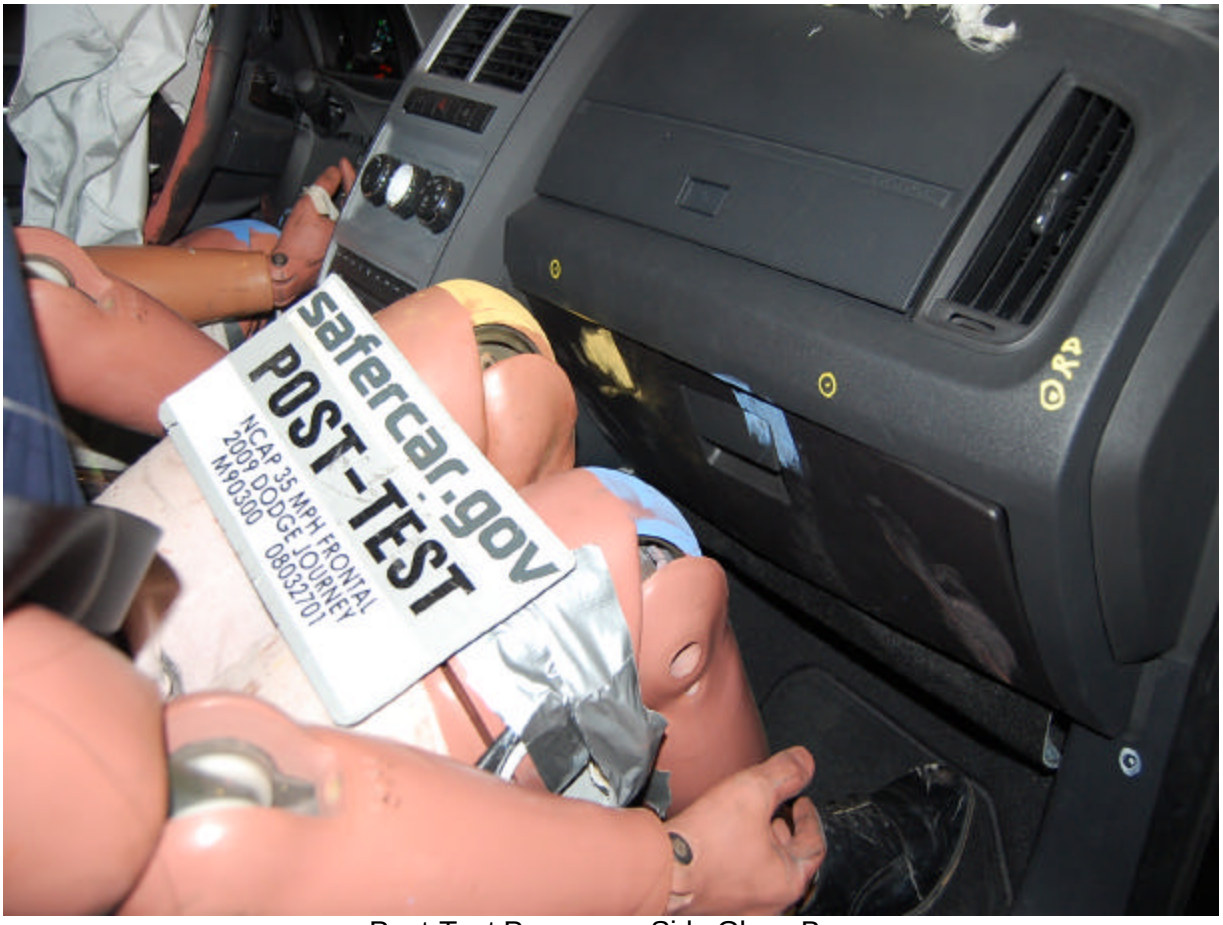
Pre-Test Passenger Dummy (Door Open)

Post-Test Passenger Dummy (Door Open)

Pre-Test Passenger Dummy Feet

Post-Test Passenger Dummy Feet

Pre-Test Passenger Side Glove Box



Post-Test Passenger Side Glove Box

Pre-Test Passenger Side Floor Pan

Post-Test Passenger Side Floor Pan

Post-Test Passenger Dummy Head Contact (Headrest)

Post-Test Passenger Dummy Knee Contact

Post-Test Passenger Dummy Airbag Contact

Rollover 90 Degrees

Rollover 180 Degrees

Rollover 270 Degrees

Rollover 360 Degrees

Vehicle Impact

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 Left

Barrier Force – Upper Center

Barrier Force – Upper Right

Barrier Force – Lower Left

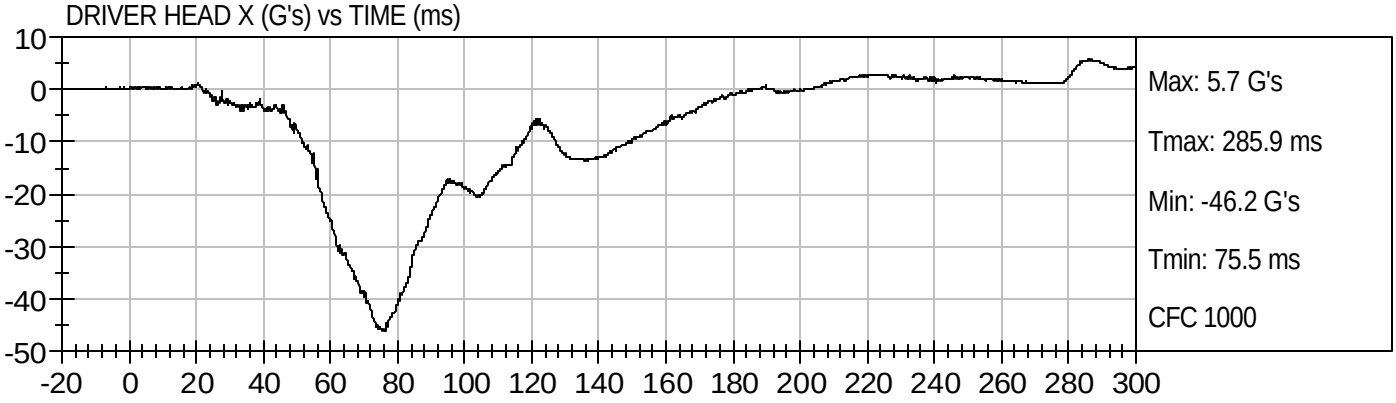
Barrier Force – Lower Center

Barrier Force – Lower Right

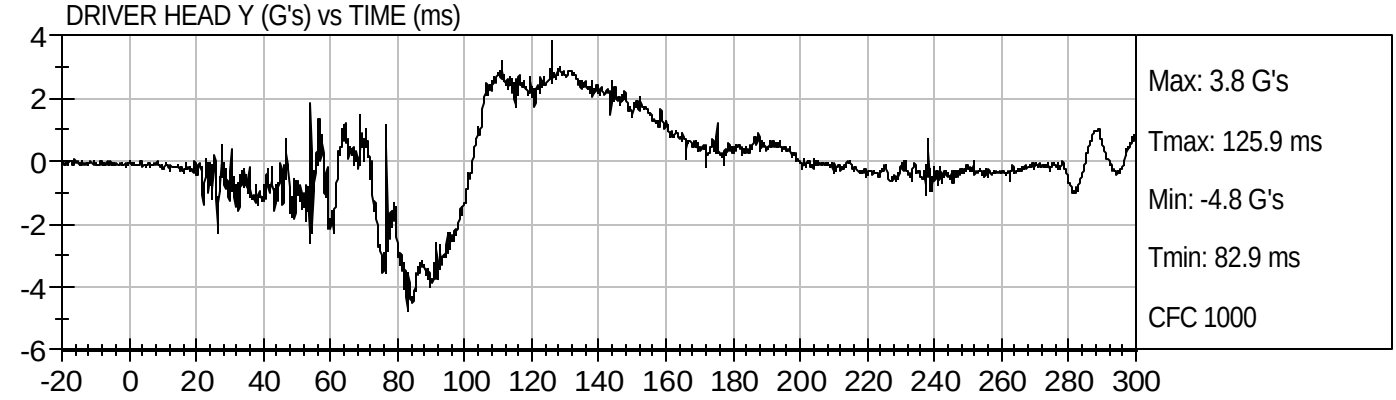
NCAP FRONTAL
2009 DODGE JOURNEY M90300

Test Date: 03/27/2008
Speed: 35.2 mph (56.6 km/h)

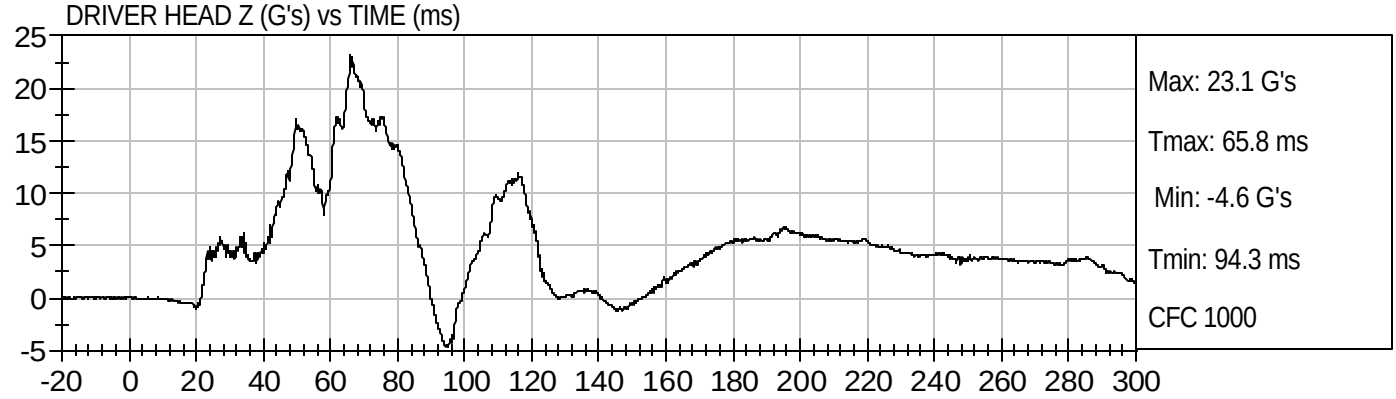
DRIVER HEAD X (G's) vs TIME (ms)



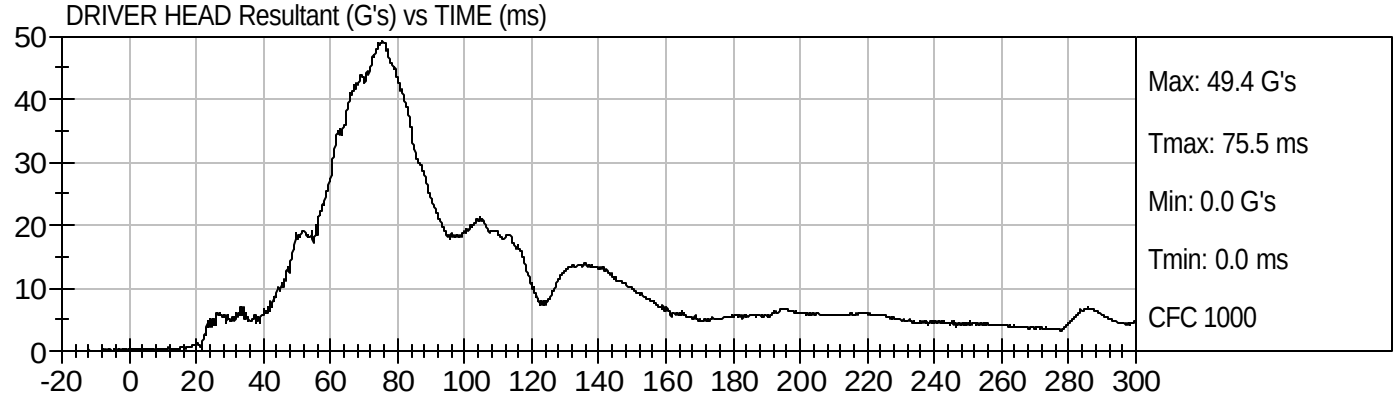
DRIVER HEAD Y (G's) vs TIME (ms)



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

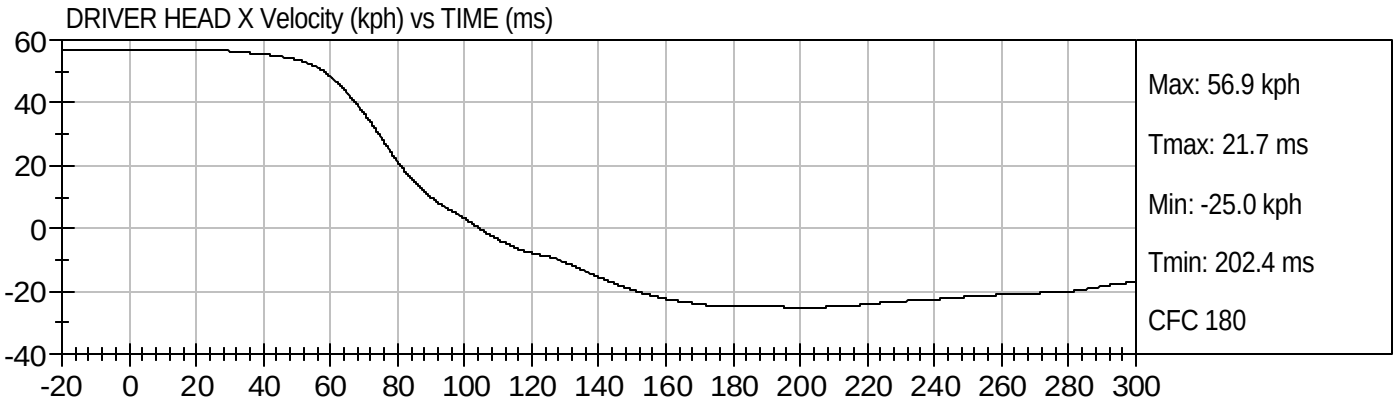


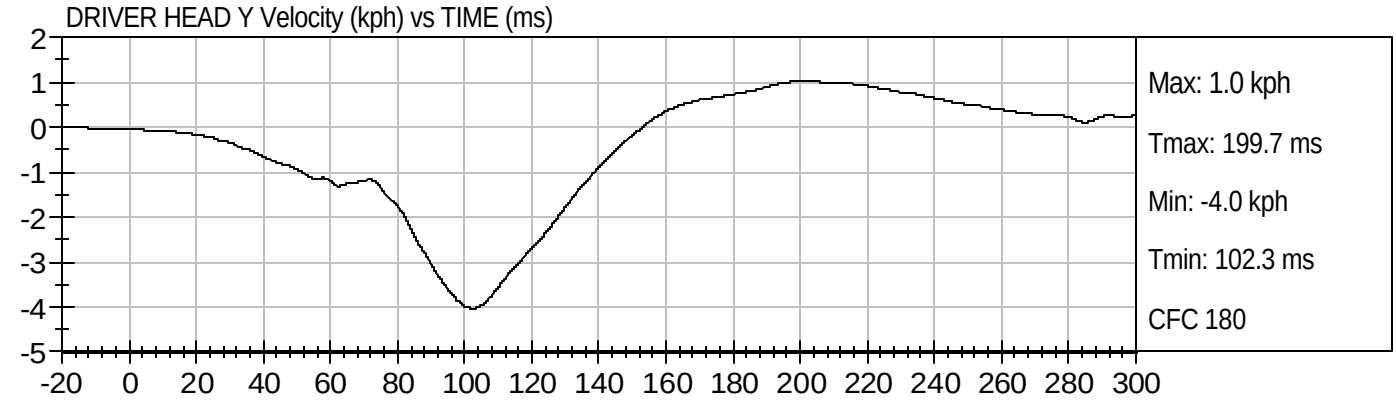
DRIVER HEAD Resultant (G's) vs TIME (ms)

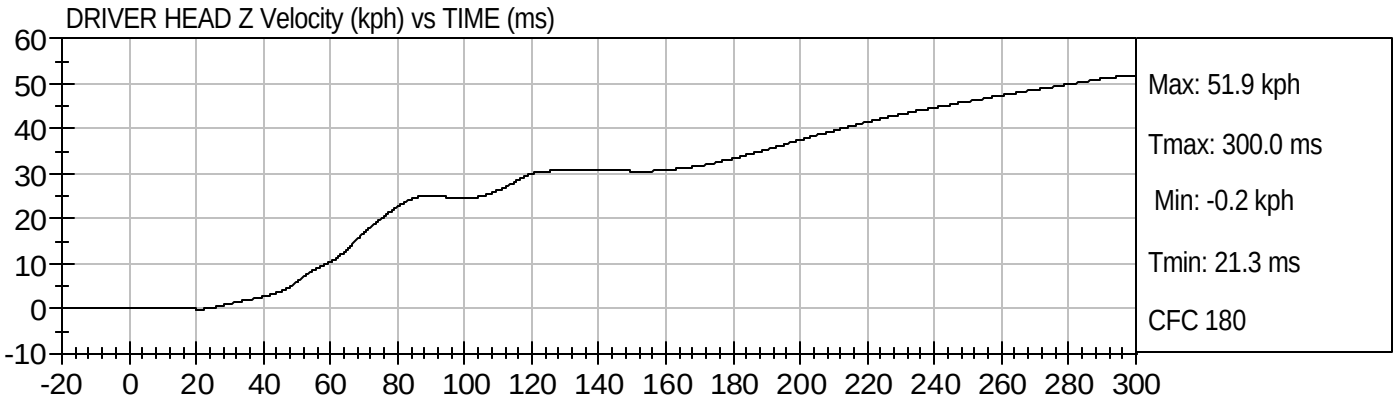


NCAP FRONTAL
2009 DODGE JOURNEY M90300

Test Date: 03/27/2008
Speed: 35.2 mph (56.6 km/h)

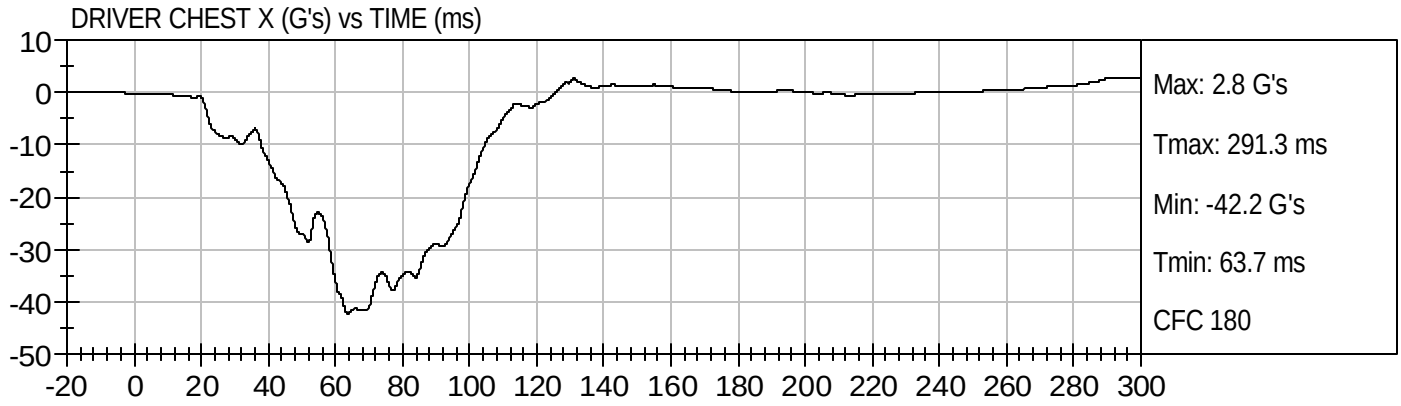


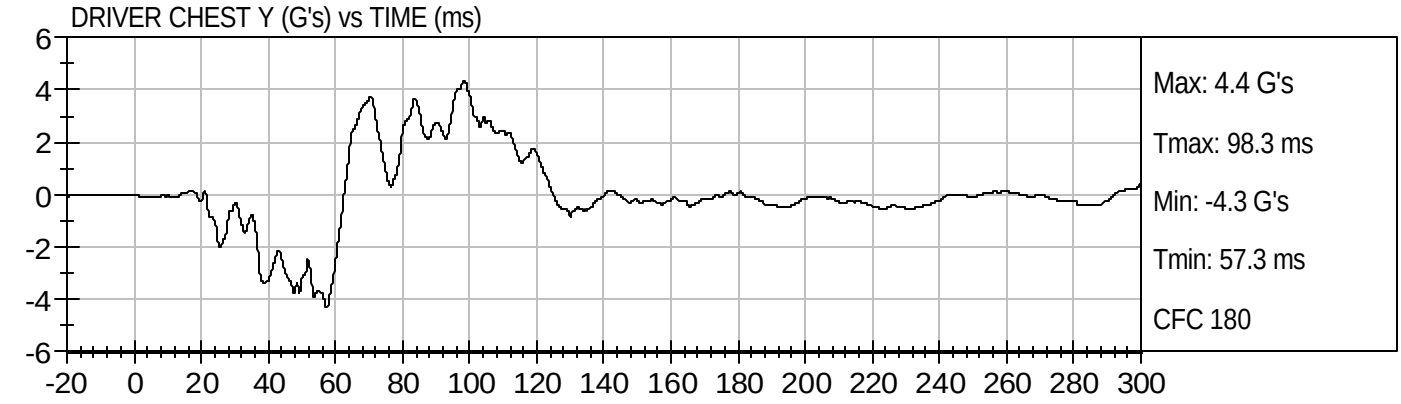


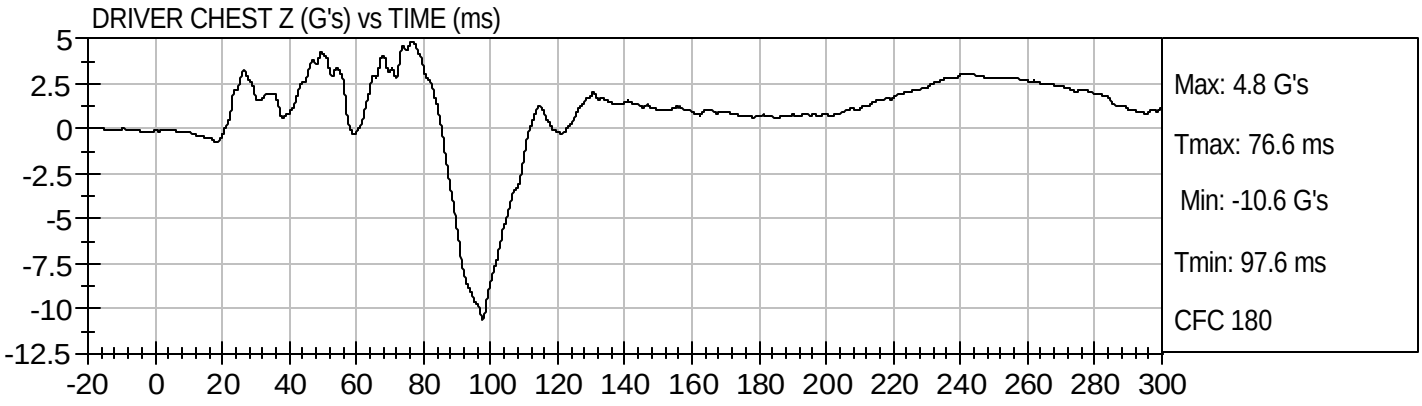


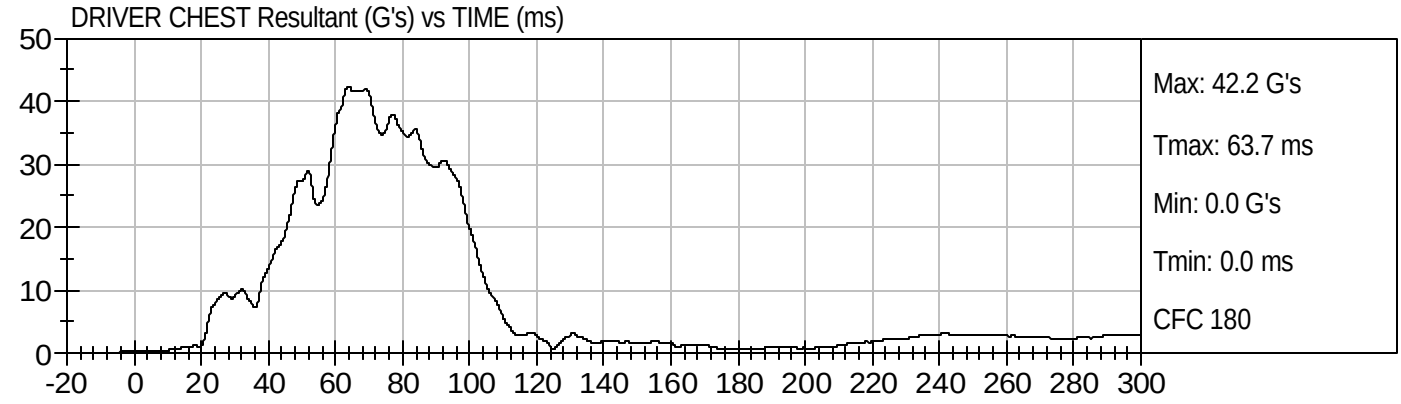
NCAP FRONTAL
2009 DODGE JOURNEY M90300

Test Date: 03/27/2008
Speed: 35.2 mph (56.6 km/h)



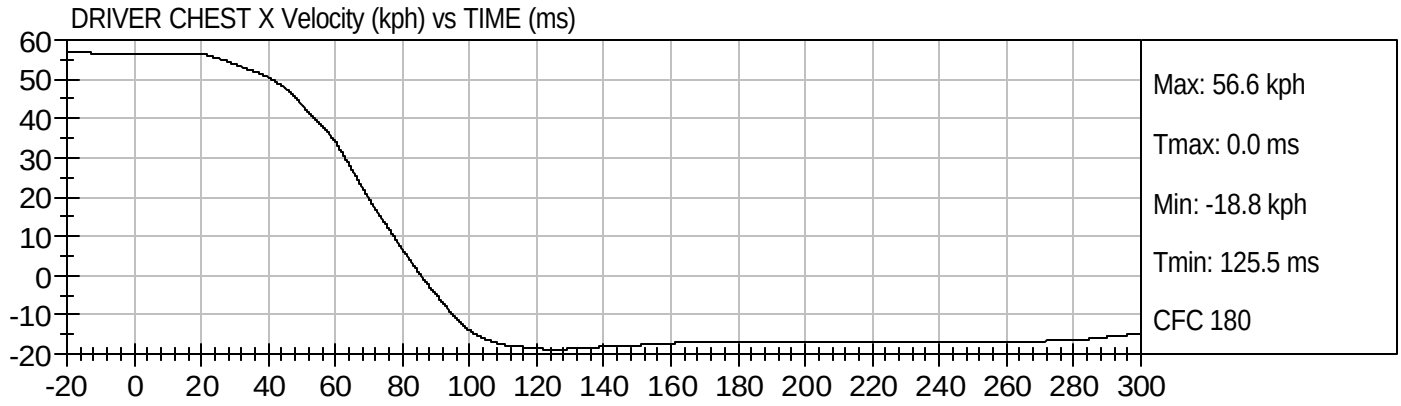


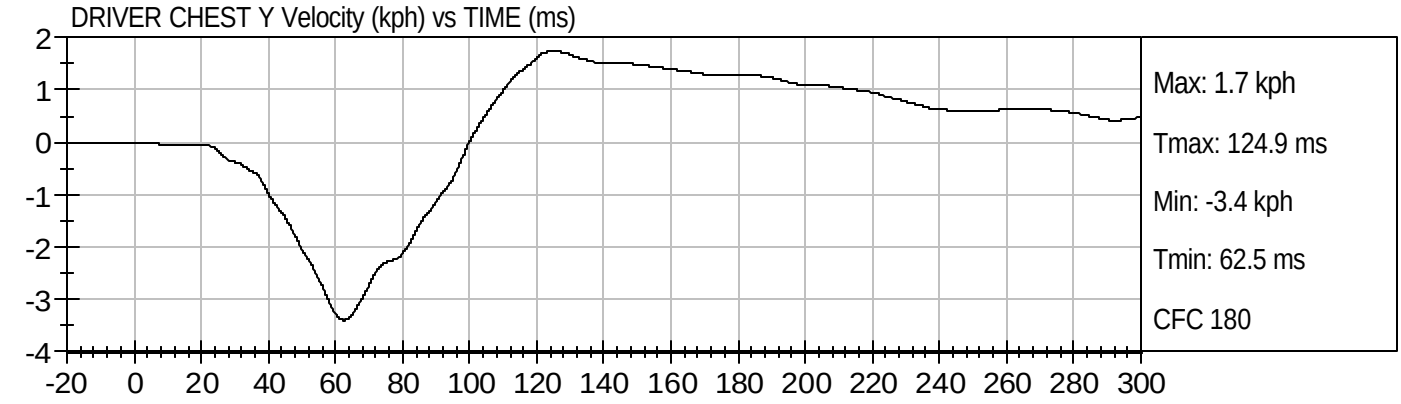


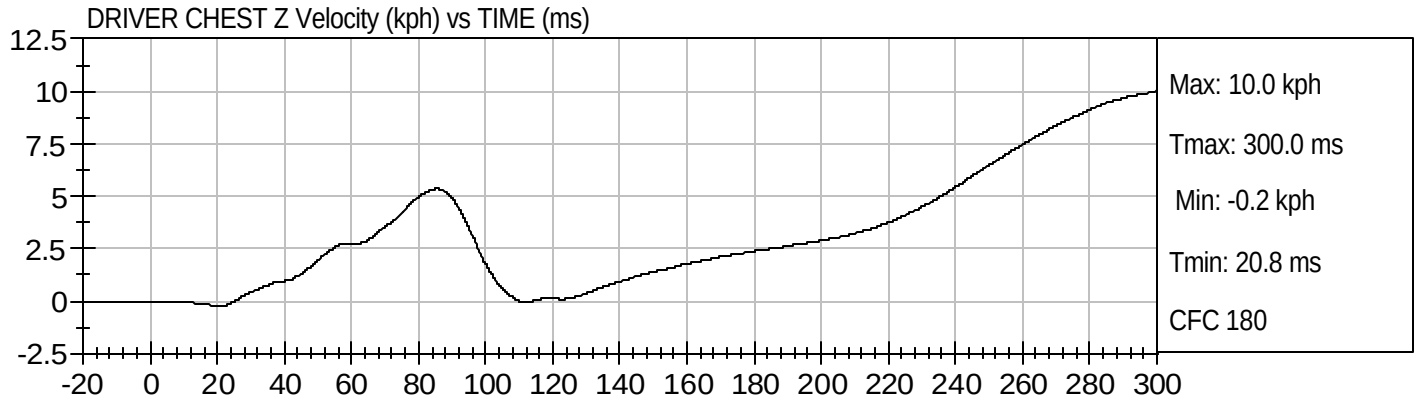


NCAP FRONTAL
2009 DODGE JOURNEY M90300

Test Date: 03/27/2008
Speed: 35.2 mph (56.6 km/h)

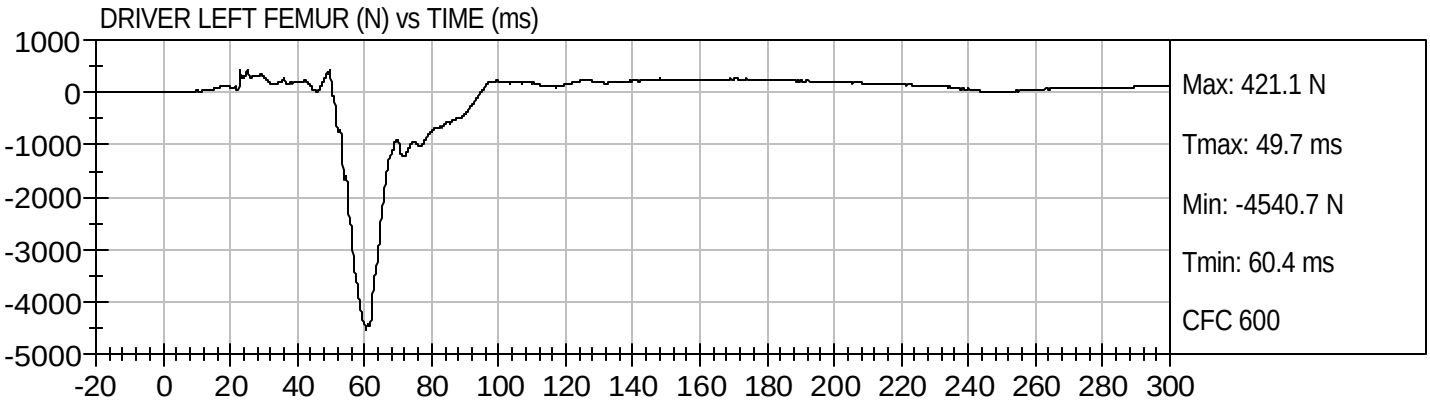


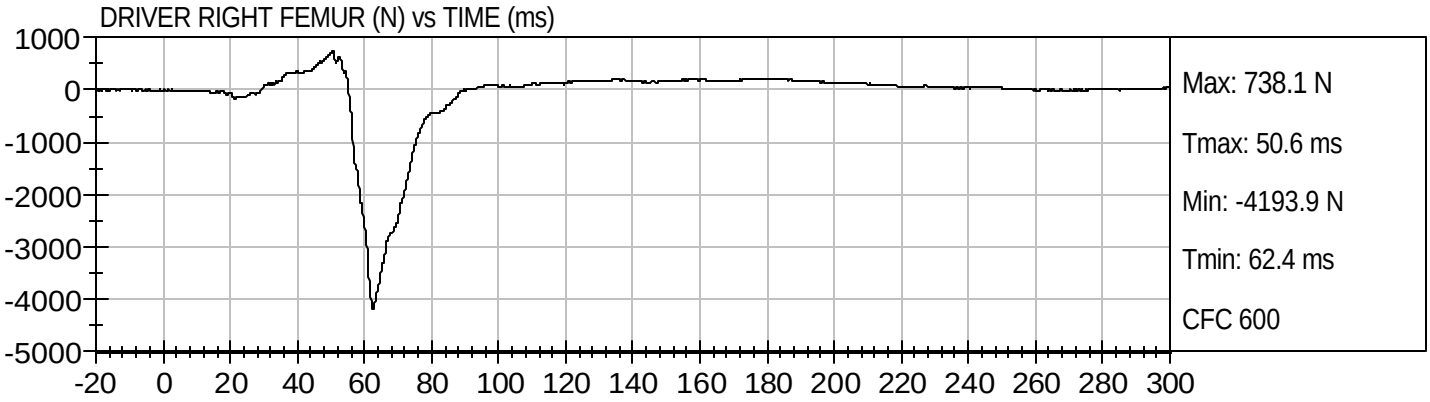




NCAP FRONTAL
2009 DODGE JOURNEY M90300

Test Date: 03/27/2008
Speed: 35.2 mph (56.6 km/h)

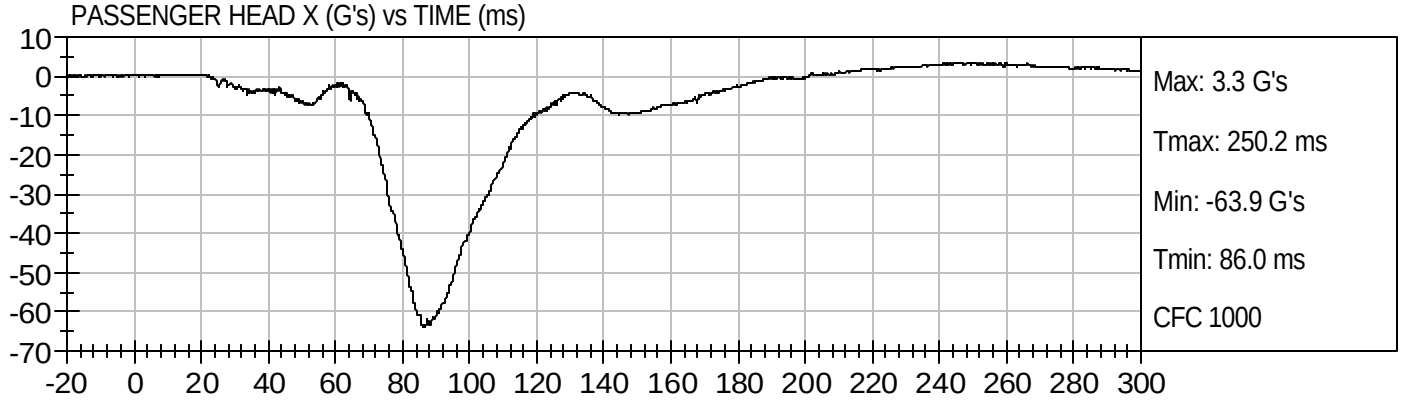




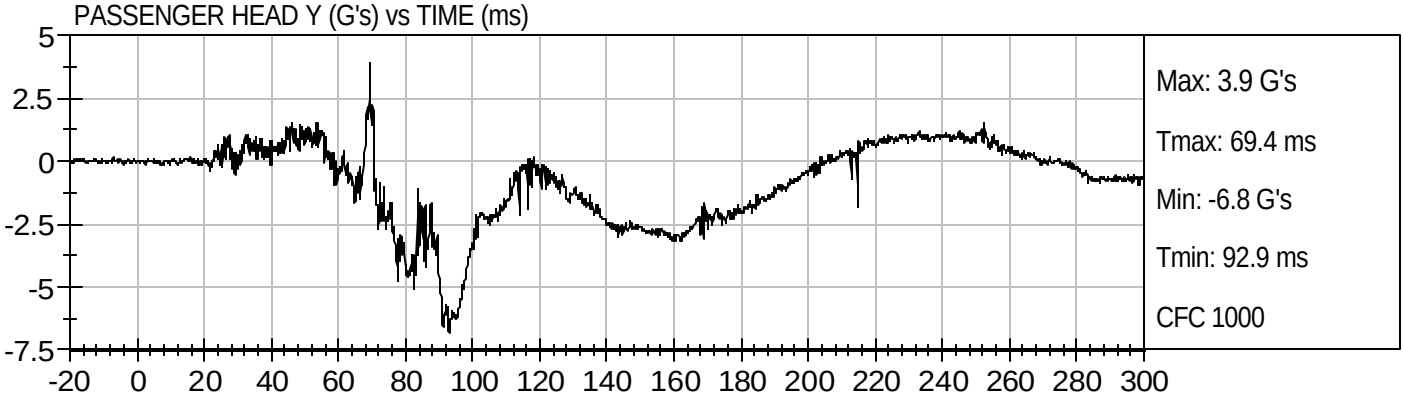
NCAP FRONTAL
2009 DODGE JOURNEY M90300

Test Date: 03/27/2008
Speed: 35.2 mph (56.6 km/h)

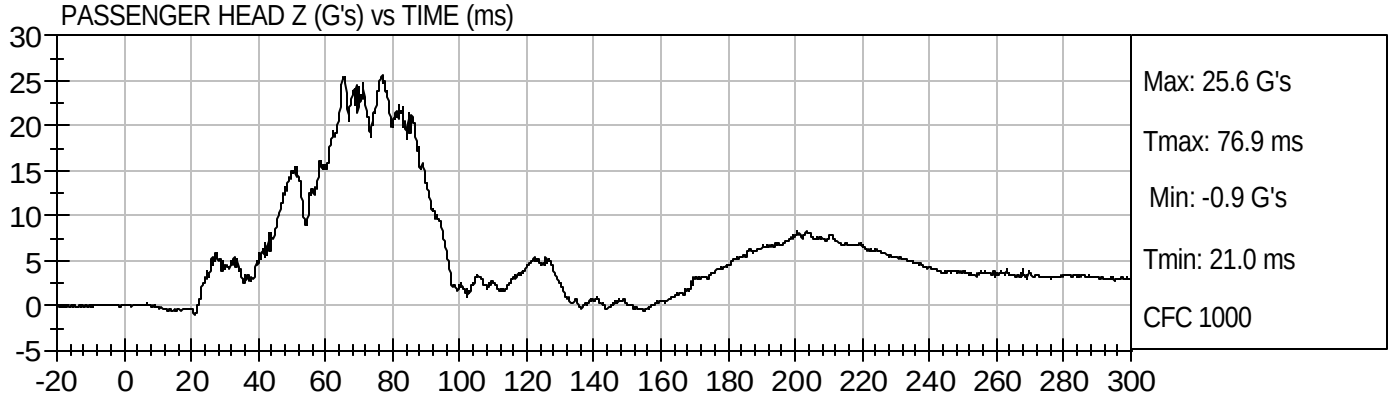
PASSENGER HEAD X (G's) vs TIME (ms)



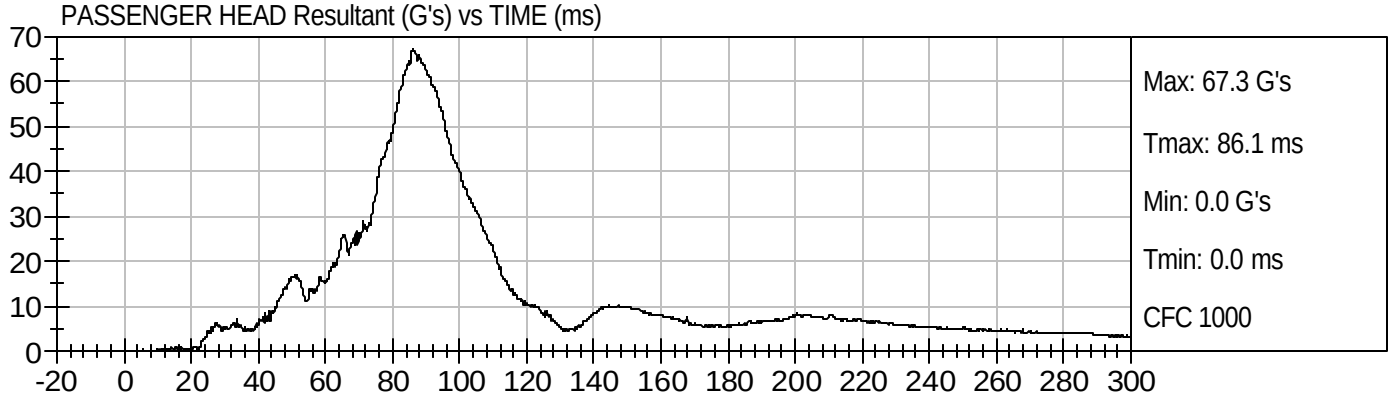
PASSENGER HEAD Y (G's) vs TIME (ms)



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



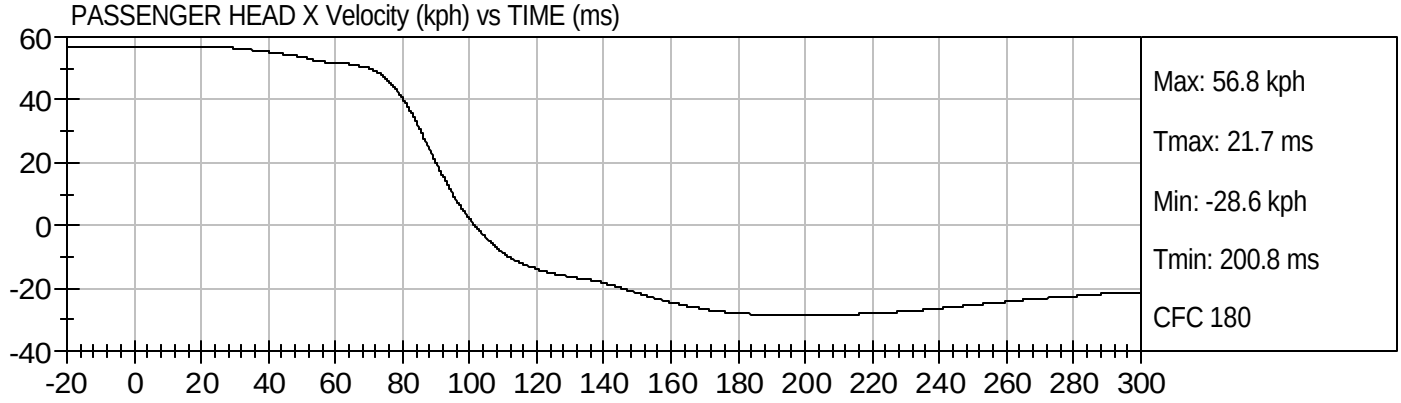
PASSENGER HEAD Resultant (G's) vs TIME (ms)



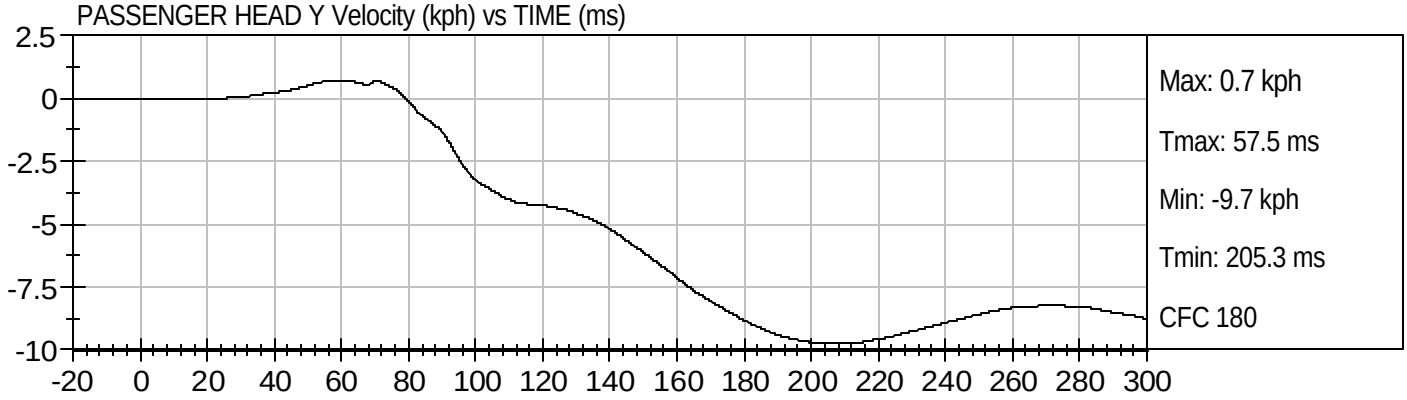
NCAP FRONTAL
2009 DODGE JOURNEY M90300

Test Date: 03/27/2008
Speed: 35.2 mph (56.6 km/h)

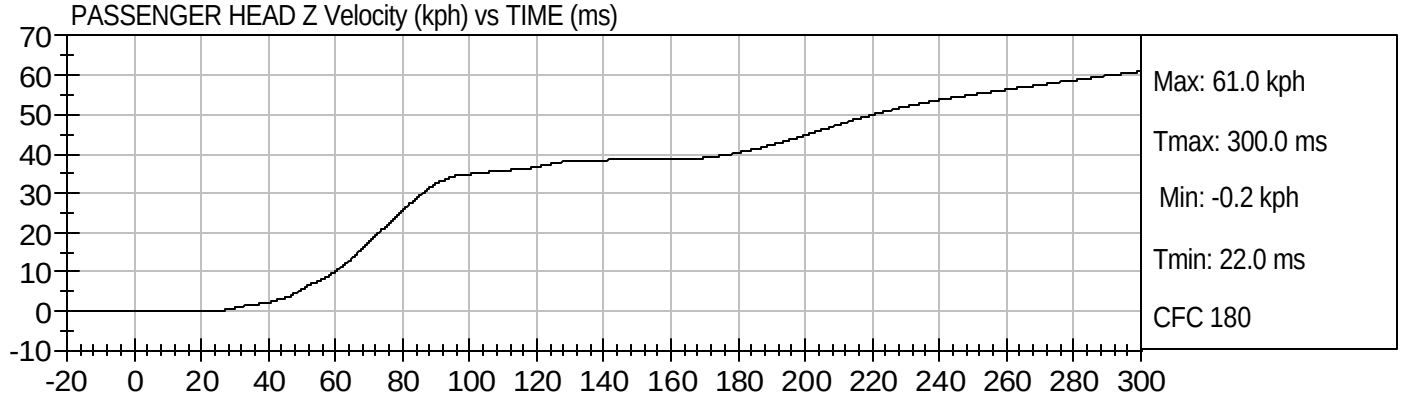
PASSENGER HEAD X Velocity (kph) vs TIME (ms)



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



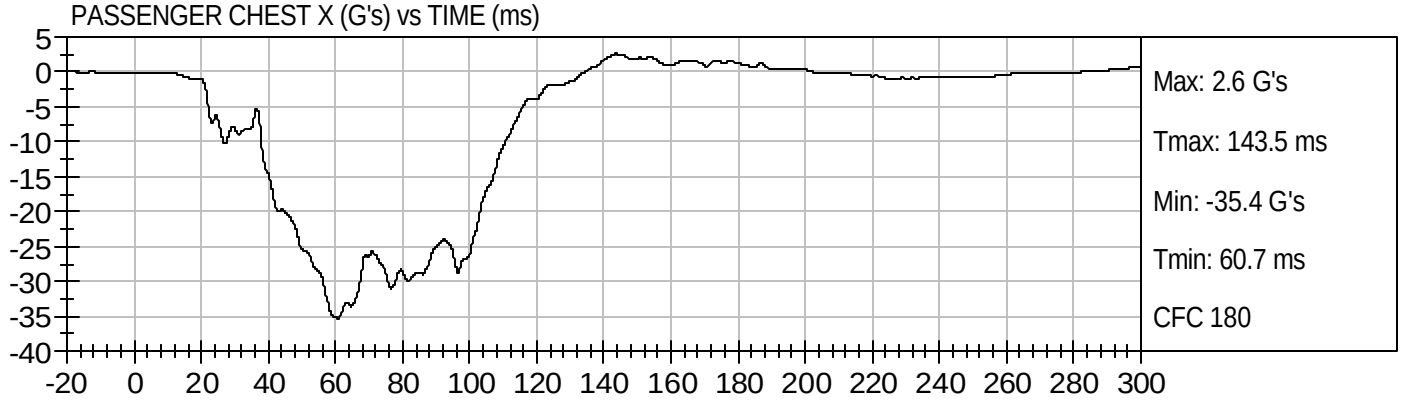
PASSENGER HEAD Z Velocity (kph) vs TIME (ms)



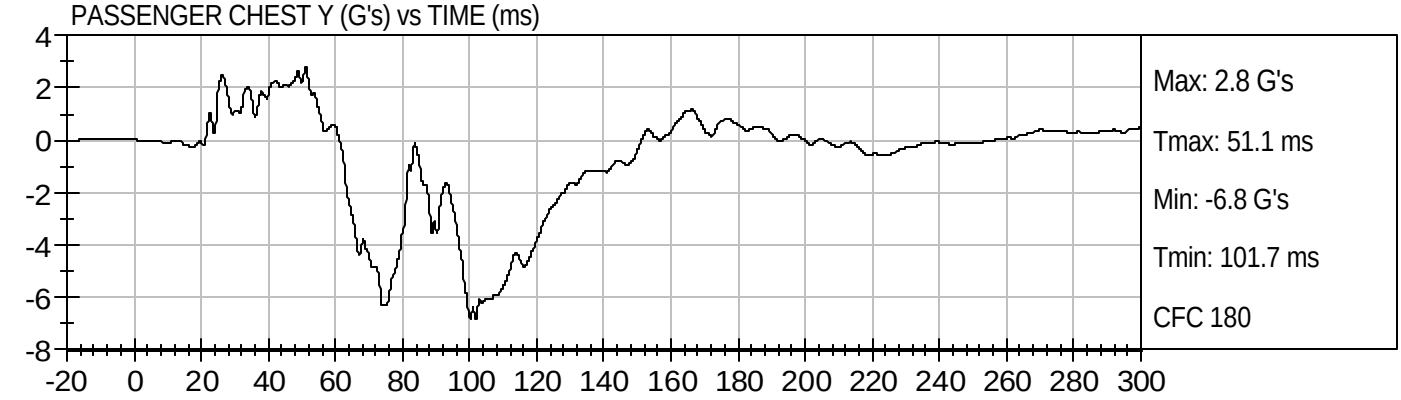
NCAP FRONTAL
2009 DODGE JOURNEY M90300

Test Date: 03/27/2008
Speed: 35.2 mph (56.6 km/h)

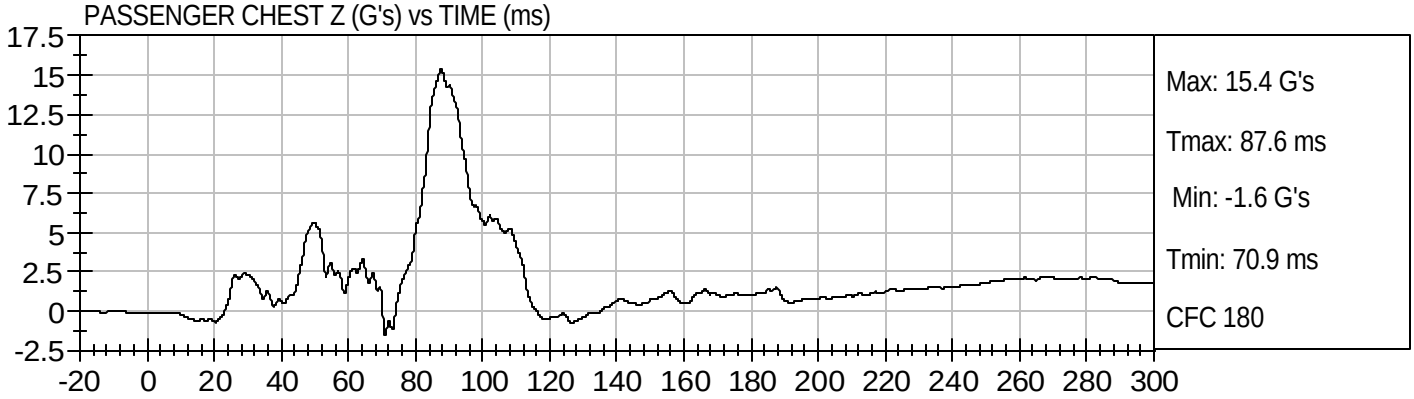
PASSENGER CHEST X (G's) vs TIME (ms)



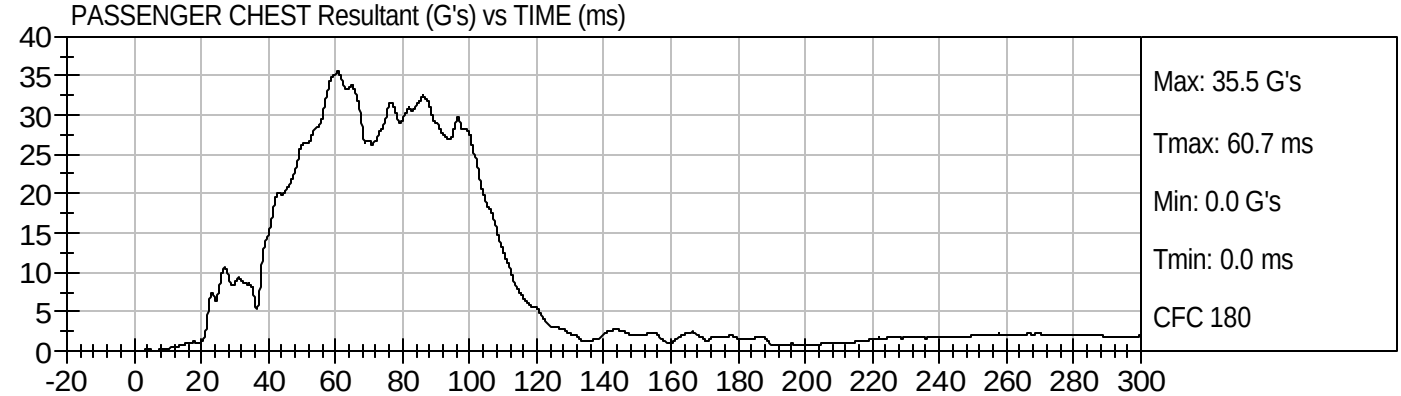
PASSENGER CHEST Y (G's) vs TIME (ms)



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



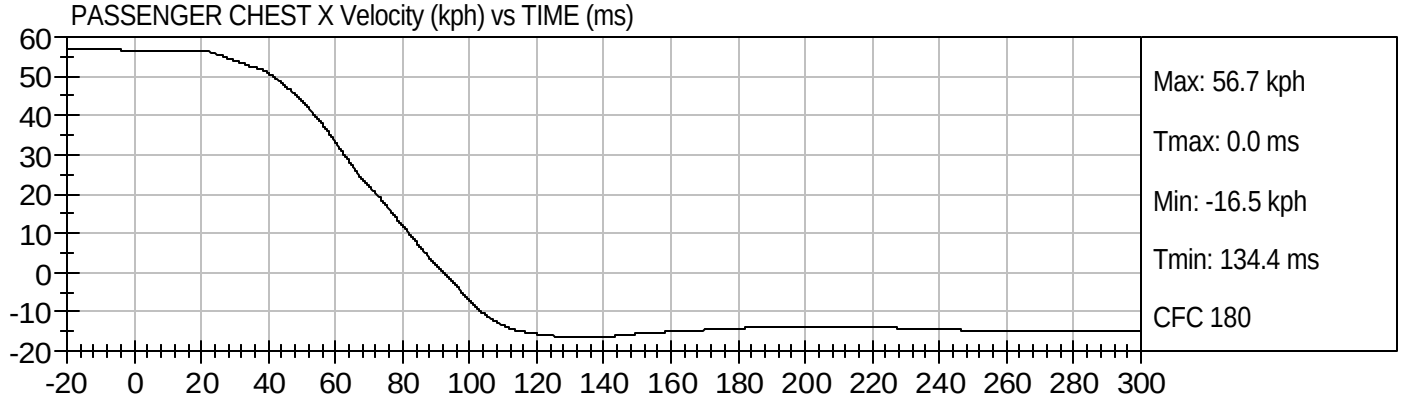
PASSENGER CHEST Resultant (G's) vs TIME (ms)



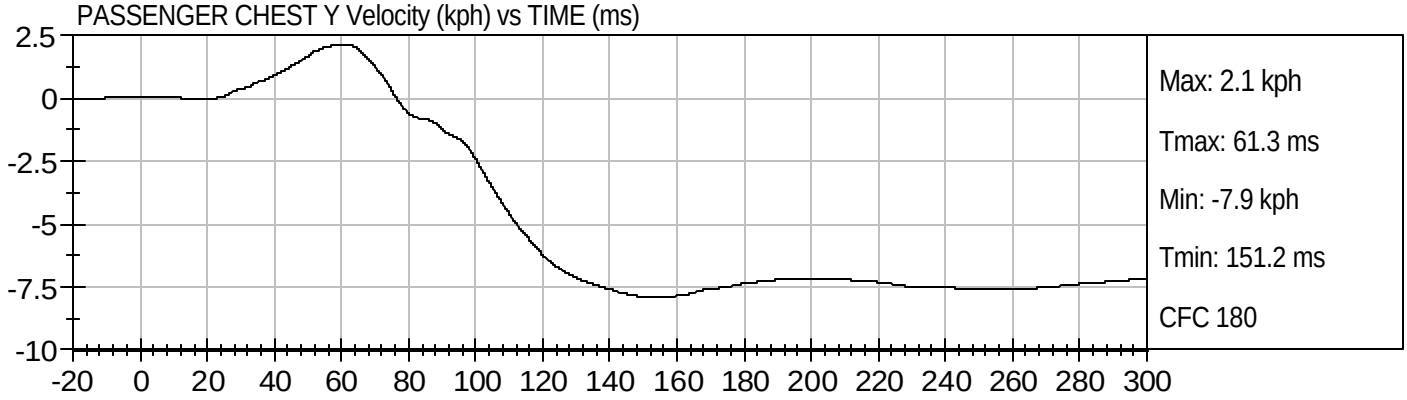
NCAP FRONTAL
2009 DODGE JOURNEY M90300

Test Date: 03/27/2008
Speed: 35.2 mph (56.6 km/h)

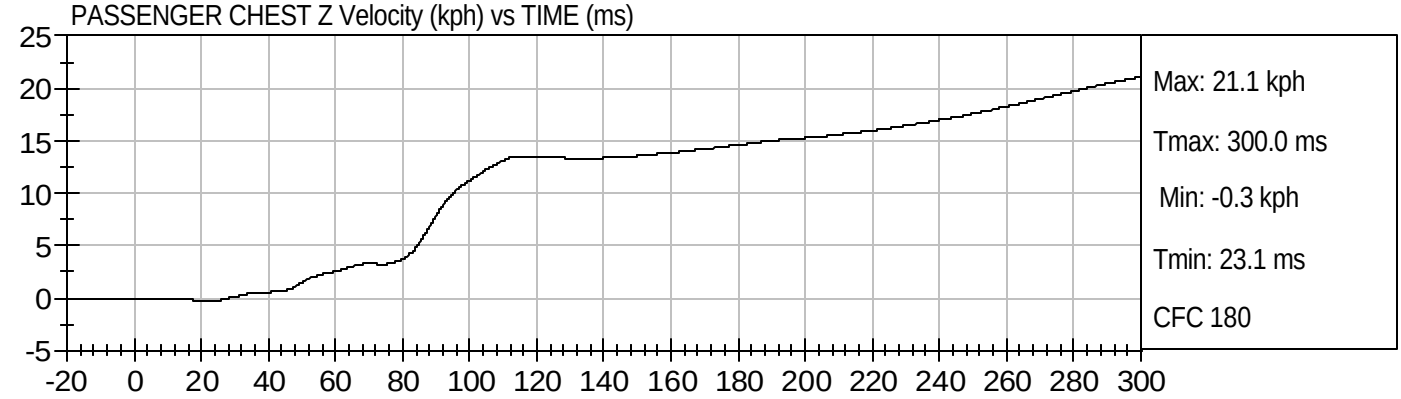
PASSENGER CHEST X Velocity (kph) vs TIME (ms)



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



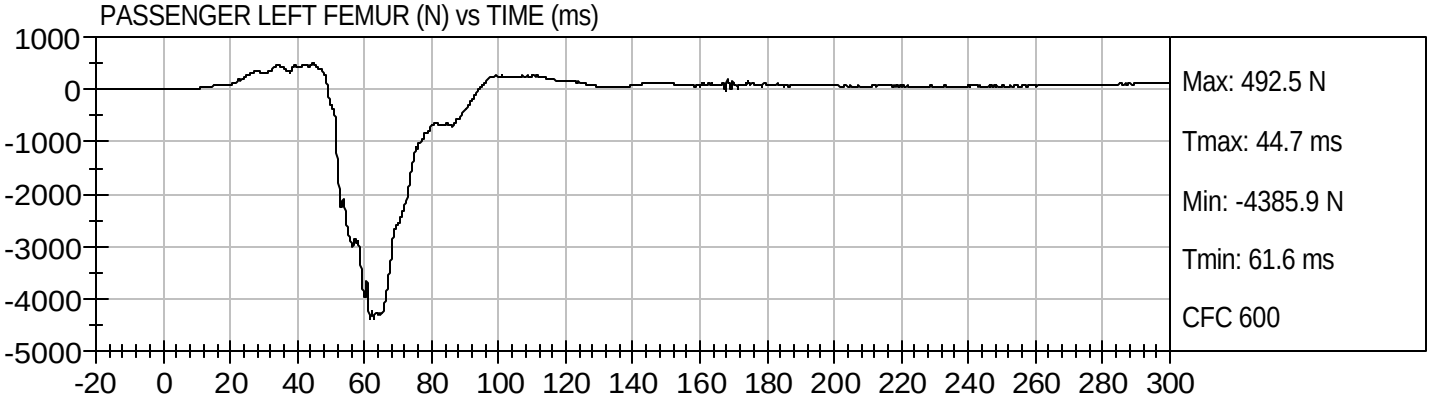
PASSENGER CHEST Z Velocity (kph) vs TIME (ms)



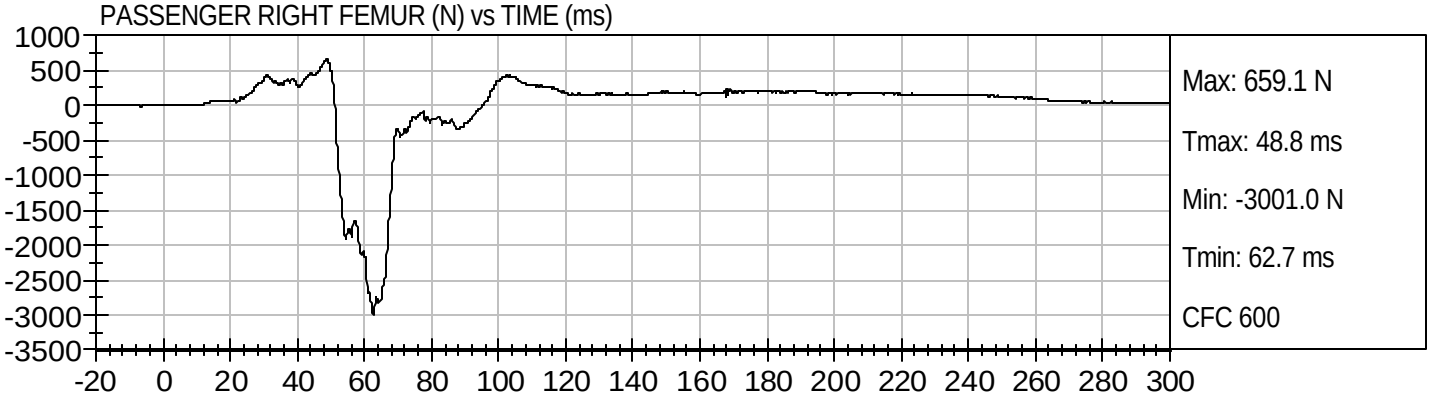
NCAP FRONTAL
2009 DODGE JOURNEY M90300

Test Date: 03/27/2008
Speed: 35.2 mph (56.6 km/h)

PASSENGER LEFT FEMUR (N) vs TIME (ms)



PASSENGER 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: 065 **Test ID:** D08851

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	19	Pass
Peak Resultant Acceleration	G's	225 - 275	230	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-13.4	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
		Overall Test Results		Pass

Jessica Hall
Laboratory Technician

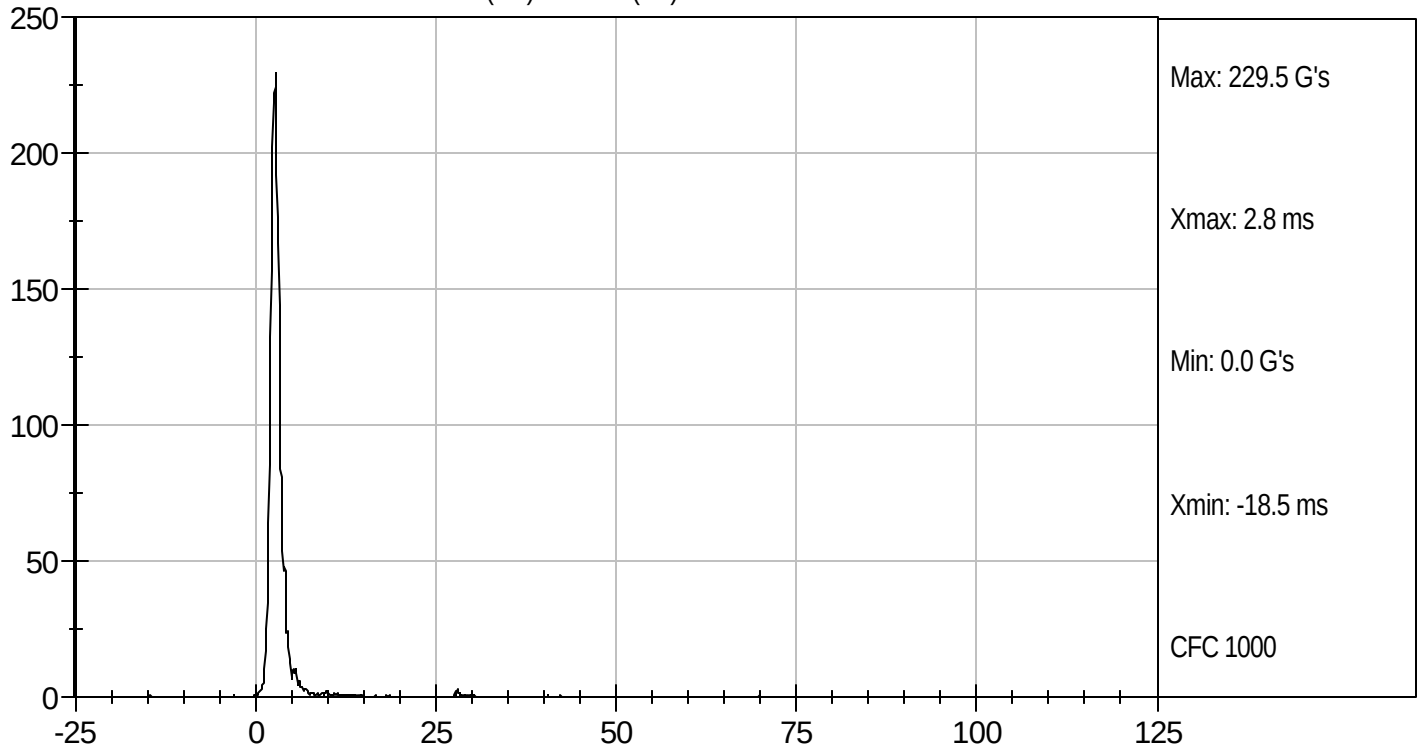
3/24/08
Test Date

David Winkelbauer
Approved By

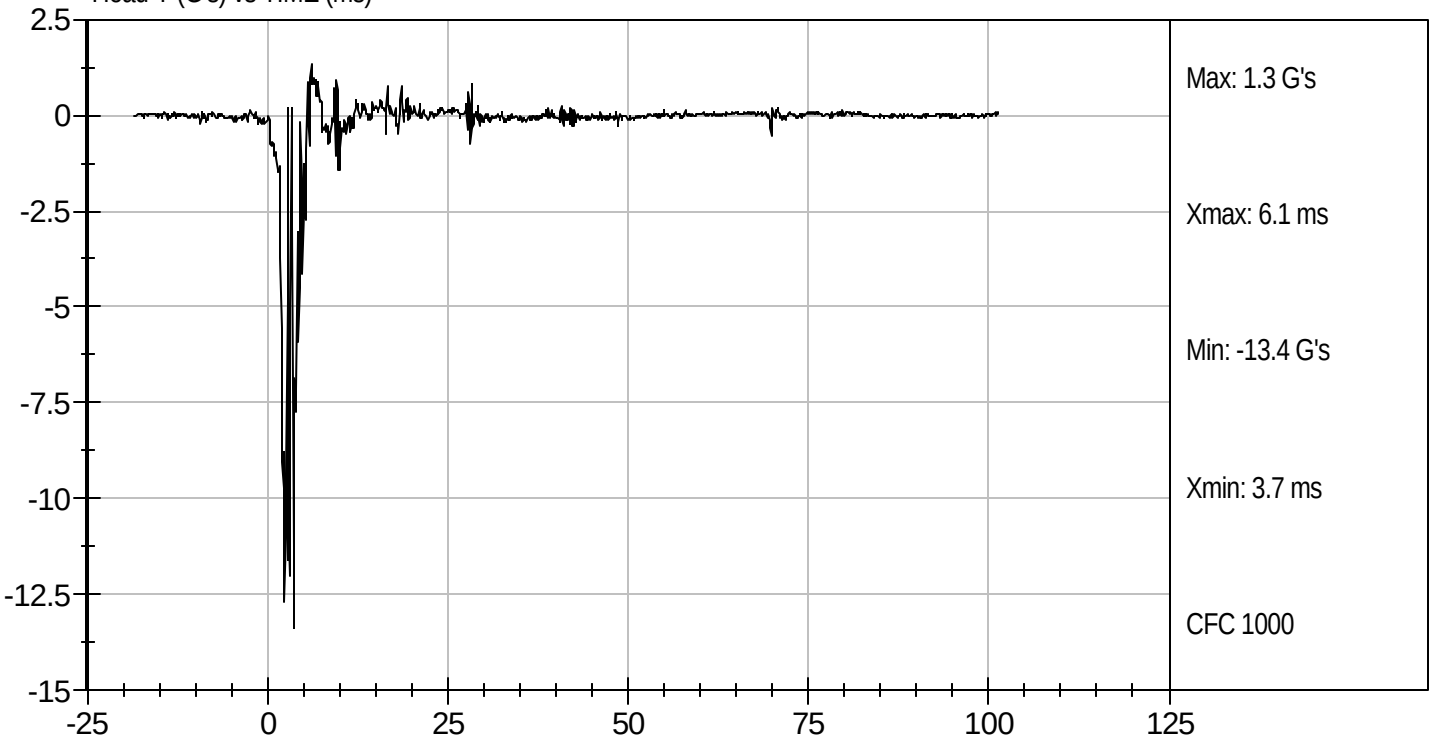
Test Desc: Head Drop
Component ID: D08851

Test Date: 3/24/08
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:** D08852

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity		%	10 to 70	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	22.66	Pass
	20 msec	G's	17.60 to 22.60	19.61	Pass
	30 msec	G's	12.50 to 18.50	14.43	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 29.0	14.69	Pass
Deceleration Decay Time to Cross 5 G's		msec	34.0 to 42.0	37.7	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	71.0	Pass
	Time	msec	57.0 to 64.0	59.5	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	94.5	Pass
	Time	msec	47.0 to 58.0	50.4	Pass
Positive Moment Decay Time To Zero Crossing		msec	97.0 to 107.0	102.5	Pass
			Overall Test Results		Pass

Laboratory Technician

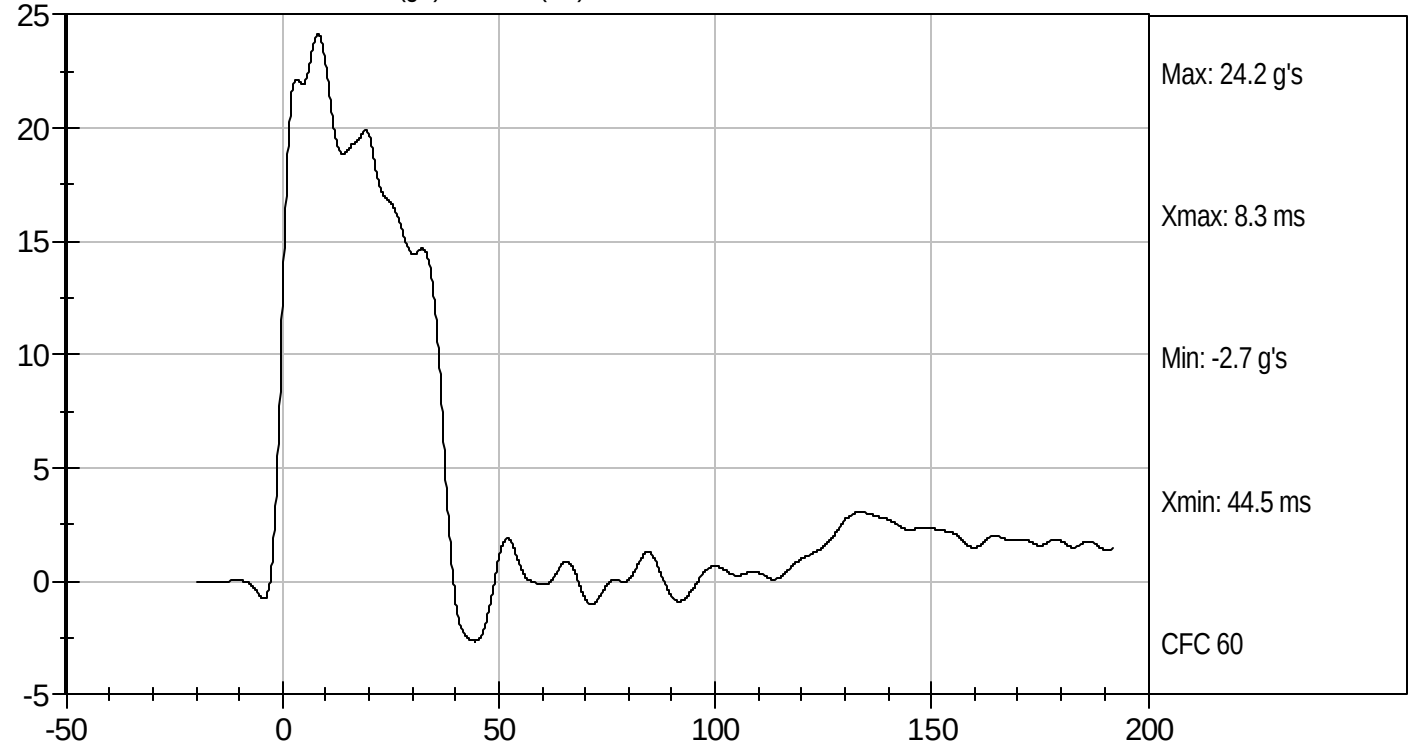
3/24/08
Test Date

David Winkelbauer
Approved By

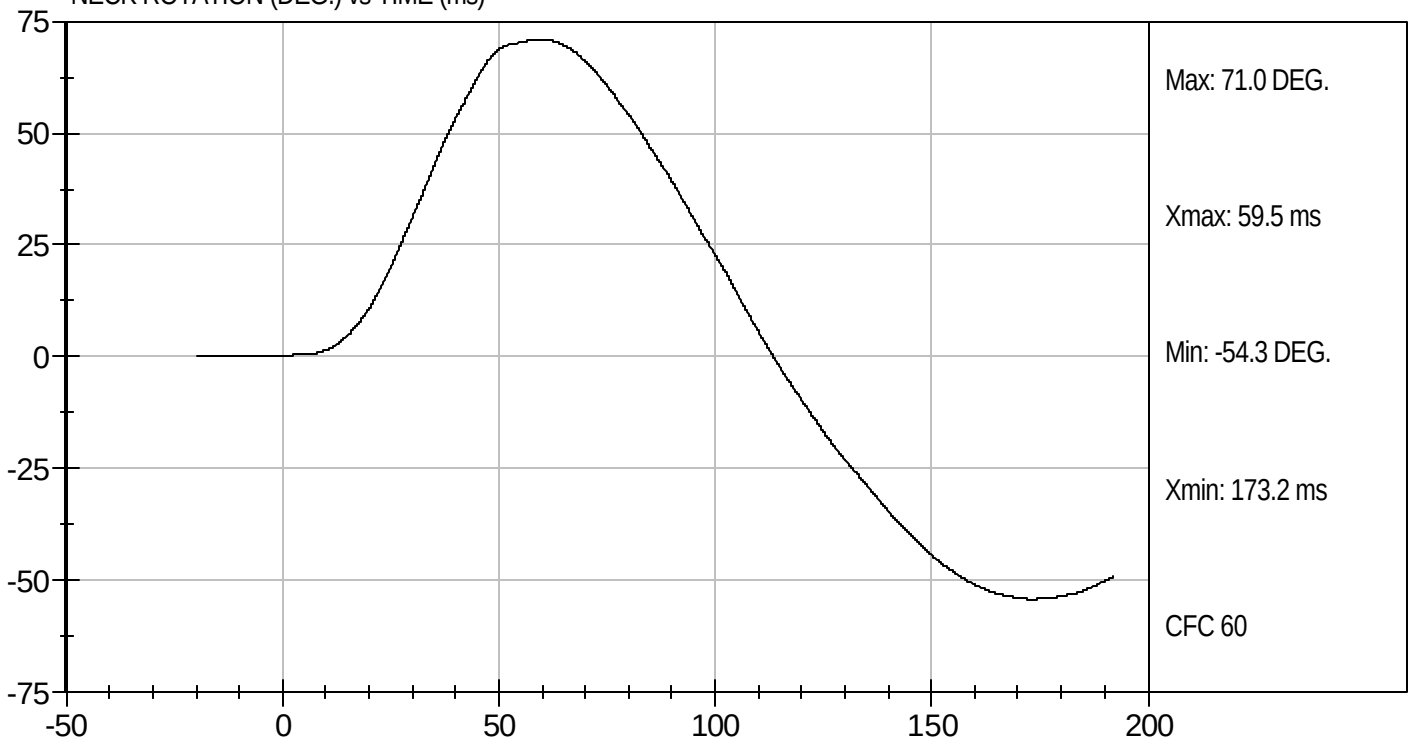
Test Desc: Neck Flexion
Component ID: D08852

Test Date: 3/24/08
Velocity: 23.148 ft/s, 7.06 m/s

PENDULUM DECELERATION (g's) vs TIME (ms)

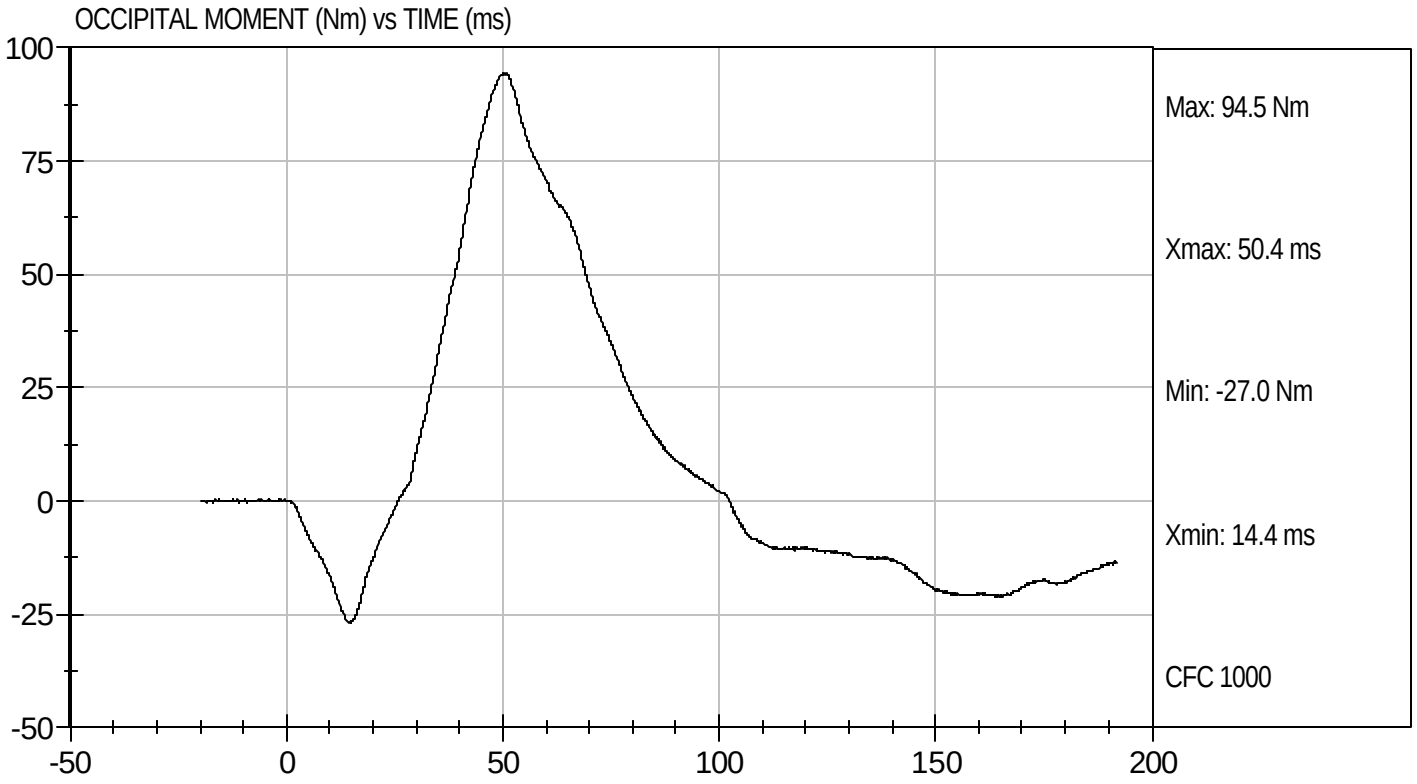


NECK ROTATION (DEG.) vs TIME (ms)



Test Desc: Neck Flexion
Component ID: D08852

Test Date: 3/24/08
Velocity: 23.148 ft/s, 7.06 m/s



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 065 **Test I.D:** D08853

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity		%	10 to 70	19	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.05	Pass
Pendulum Deceleration	10 msec	G's	17.20 to 21.20	17.25	Pass
	20 msec	G's	14.00 to 19.00	15.40	Pass
	30 msec	G's	11.00 to 16.00	13.01	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	40.5	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	97.8	Pass
	Time	msec	72.0 to 82.0	76.6	Pass
"D" Plane Rotation Decay Time To Zero Crossing		msec	147.0 to 174.0	155.3	Pass
Moment About Occipital Condyle	Maximum	N m	-52.9 to -79.9	-62.4	Pass
	Time	msec	65.0 to 79.0	72.4	Pass
Negative Moment Decay Time To Zero Crossing		msec	120.0 to 148.0	143.1	Pass
			Overall Test Results		Pass

Laboratory Technician

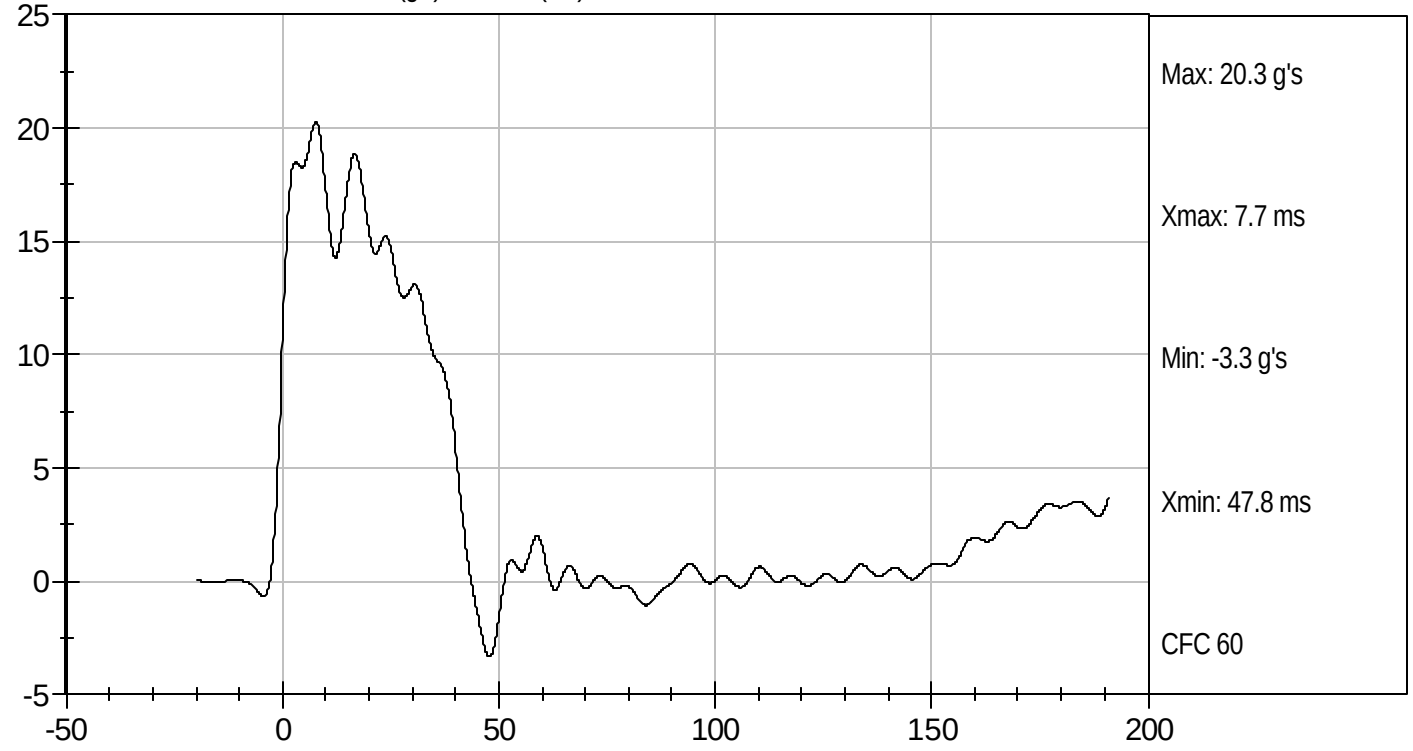
3/24/08
Test Date

David Winkelbauer
Approved By

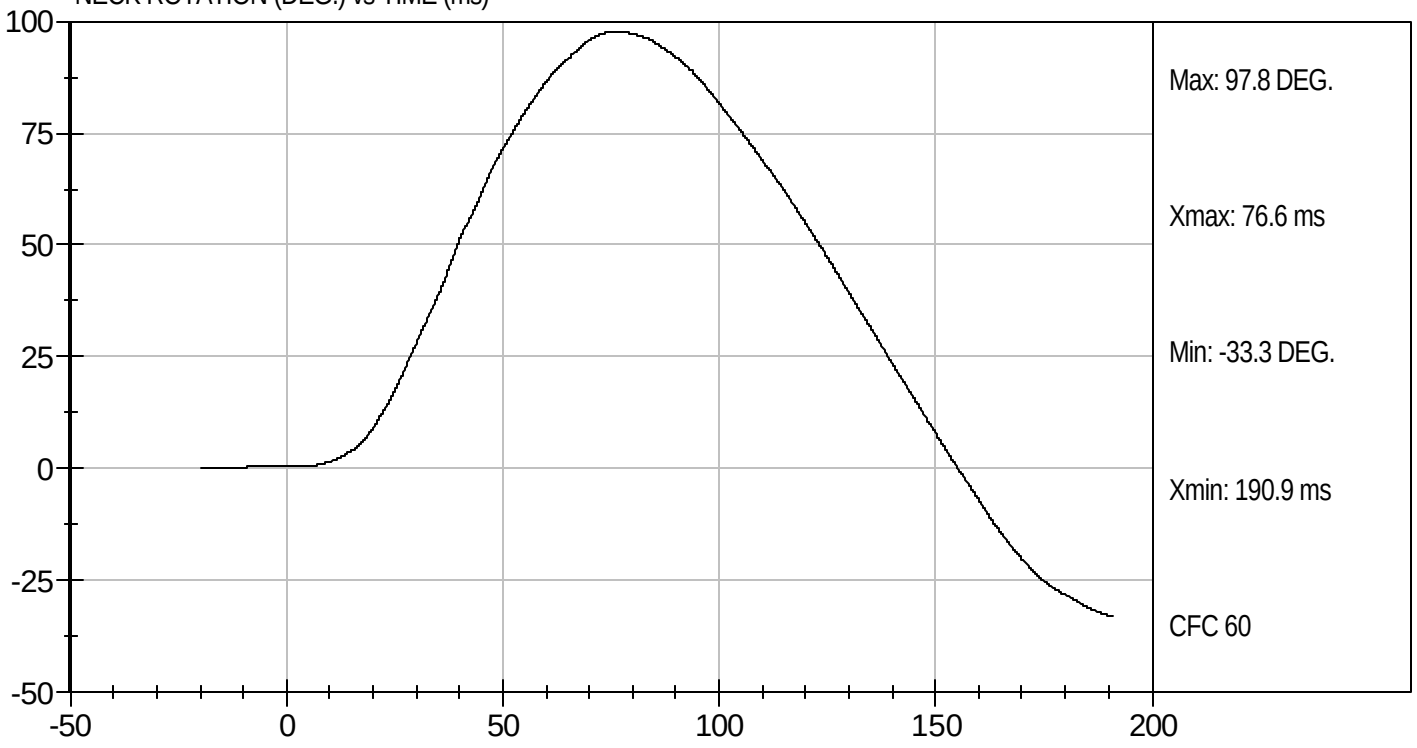
Test Desc: Neck Extension
Component ID: D08853

Test Date: 3/24/08
Velocity: 19.841 ft/s, 6.05 m/s

PENDULUM DECELERATION (g's) vs TIME (ms)

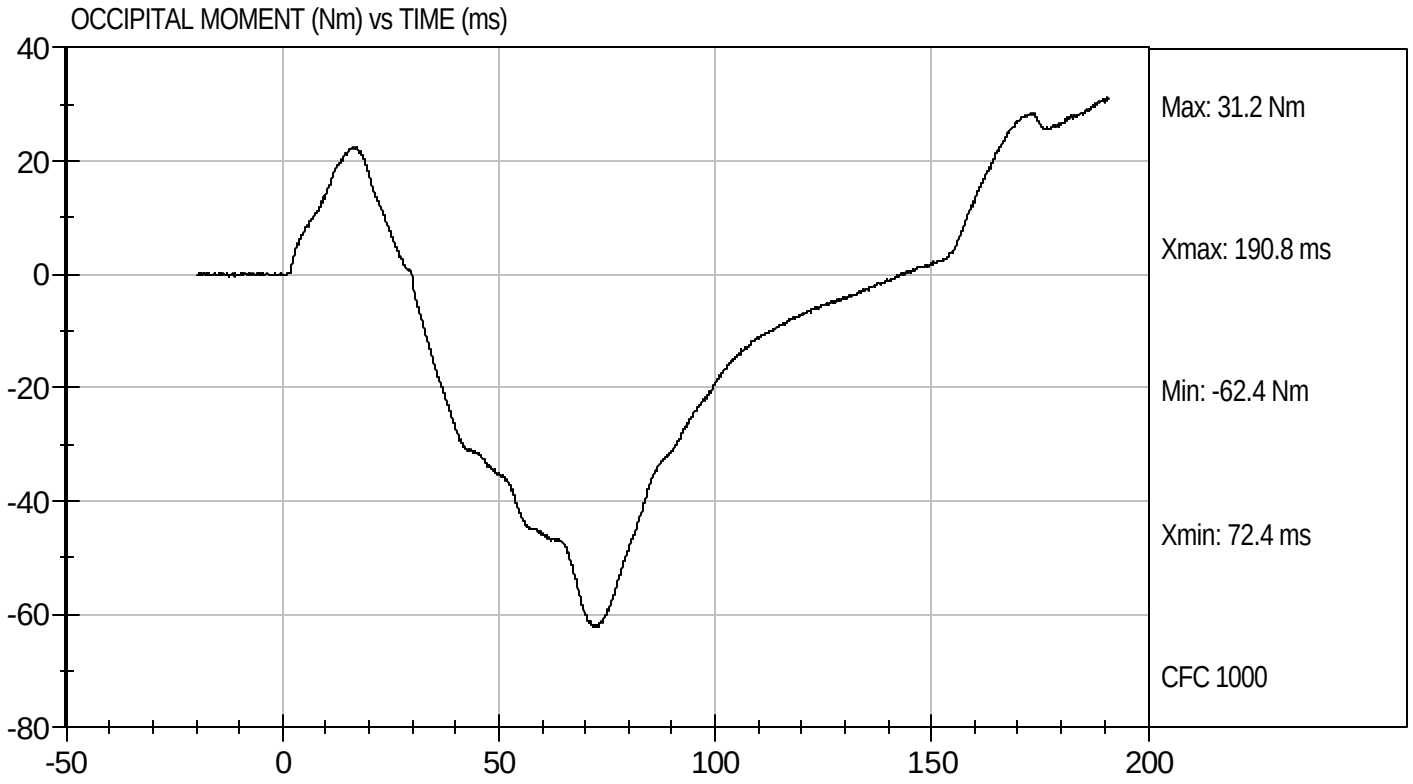


NECK ROTATION (DEG.) vs TIME (ms)



Test Desc: Neck Extension
Component ID: D08853

Test Date: 3/24/08
Velocity: 19.841 ft/s, 6.05 m/s



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 065 **Test I.D:** D08854

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	22	Pass
Probe Velocity	m/s	6.58 to 6.82	6.77	Pass
Peak Probe Force	N	5159 to 5893	5,380	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.71	Pass
Internal Hysteresis	%	69 to 85	72	Pass
		Overall Test Results		Pass

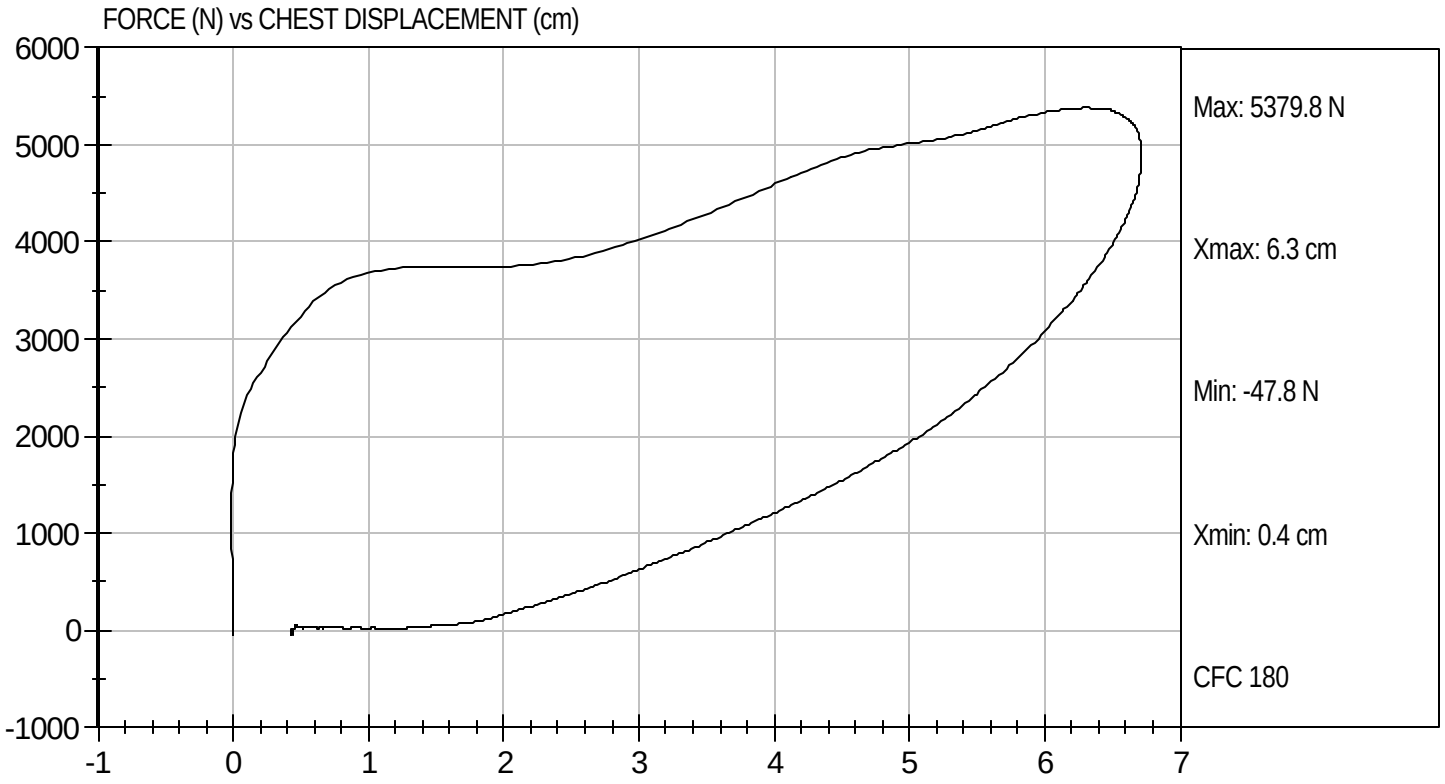
Laboratory Technician

3/25/08
Test Date

David Winkelbauer
Approved By

Test Desc: Thorax Impact
Component ID: D08854

Test Date: 3/25/08
Velocity: 22.22 ft/s, 6.77 m/s



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 065 **Test I.D:** D08855

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	19	Pass
Probe Velocity	m/sec	2.07 to 2.13	2.11	Pass
Peak Probe Force	Newtons	4715 to 5782	5,665	Pass
		Overall Test Results		Pass

Laboratory Technician

3/24/08

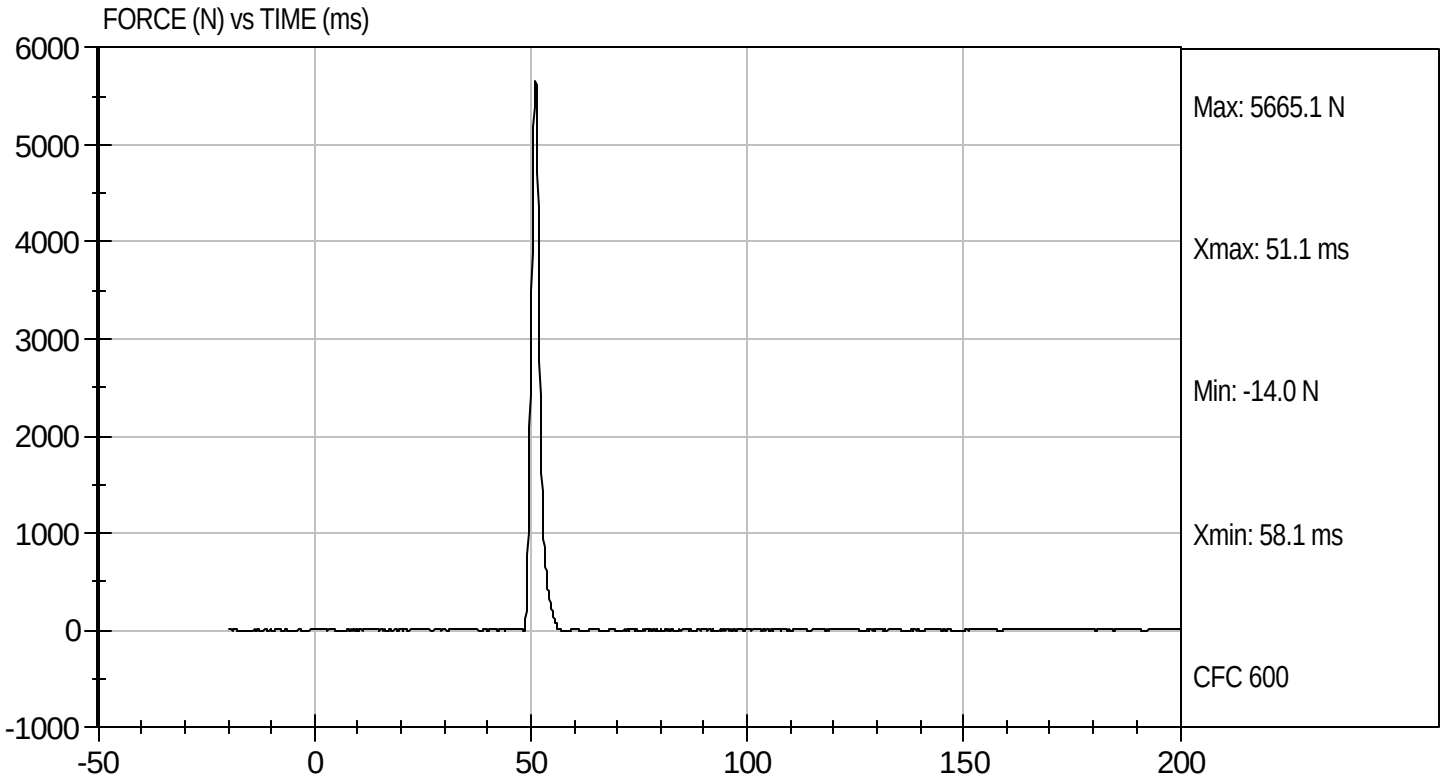
Test Date

David Winkelbauer

Approved By

Test Desc: Right Knee
Component ID: D08855

Test Date: 3/24/08
Velocity: 6.91 ft/s, 2.11 m/s



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 065 **Test I.D:** D08856

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	19	Pass
Probe Velocity	m/sec	2.07 to 2.13	2.10	Pass
Peak Probe Force	Newtons	4715 to 5782	4,979	Pass
		Overall Test Results		Pass

Laboratory Technician

3/24/08

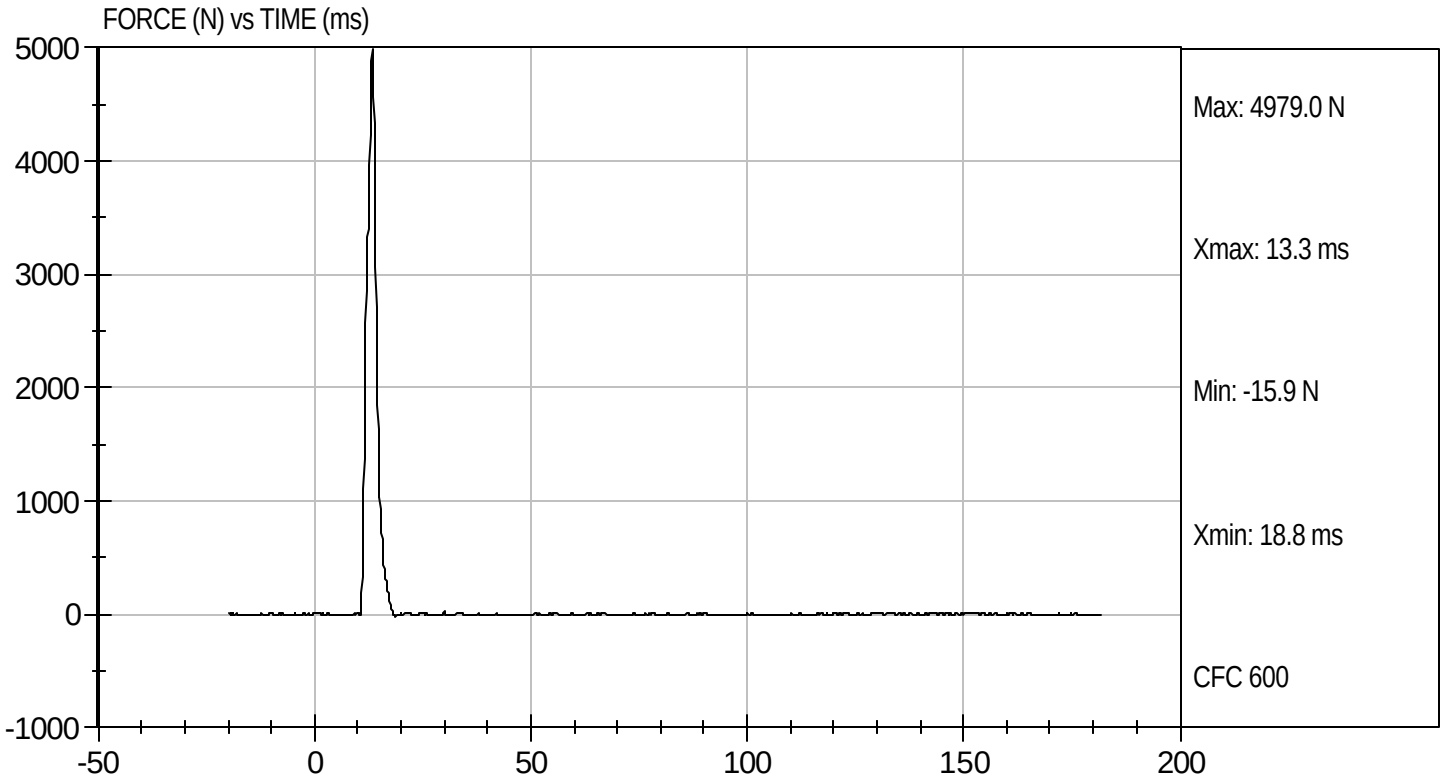
Test Date

David Winkelbauer

Approved By

Test Desc: Left Knee
Component ID: D08856

Test Date: 3/24/08
Velocity: 6.89 ft/s, 2.10 m/s



MGA RESEARCH CORPORATION

HIP-FEMUR FLEXION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 065 **Test I.D:** D08850

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.9	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	19	19	Pass
Rotation Rate	deg/sec	5 -10	8	8	Pass
30 Degrees	Nm	94.9 Nm Max	70.2	61.9	Pass
150 ft-lbf / 203.4 Nm	Deg	40- 50 Degree Max Rotation	42	41	Pass
		Overall Test Results			Pass

Laboratory Technician

3/24/08

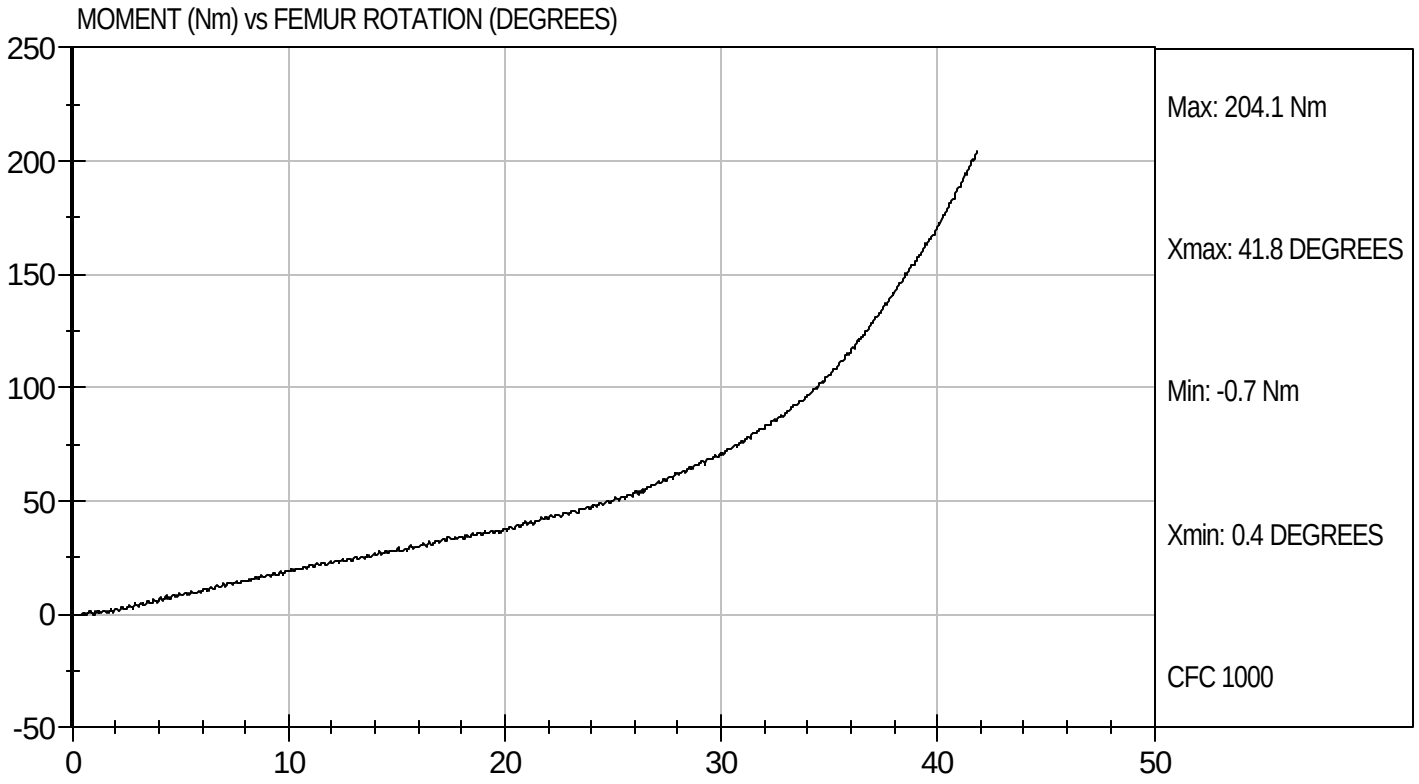
Test Date

David Winkelbauer

Approved By

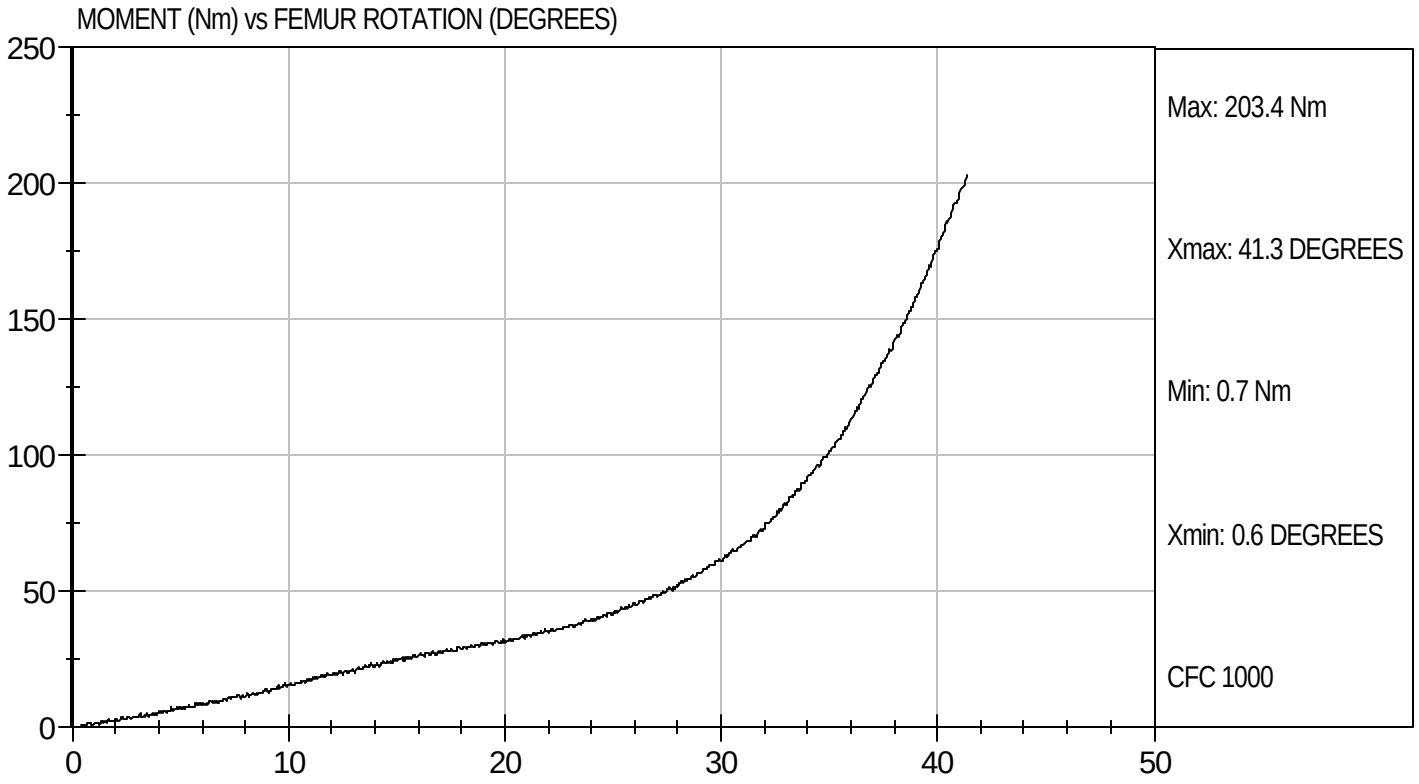
Test Desc: Hip Femur Flexion
Component ID: D08859

Test Date: 3/24/08
Velocity: 0 ft/s, 0.00 m/s



Test Desc: Hip Femur Flexion
Component ID: D08850

Test Date: 2/24/08
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:** D08861

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	19	Pass
Peak Resultant Acceleration	G's	225 - 275	244	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-13.6	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
		Overall Test Results		Pass

Jessica Gall
Laboratory Technician

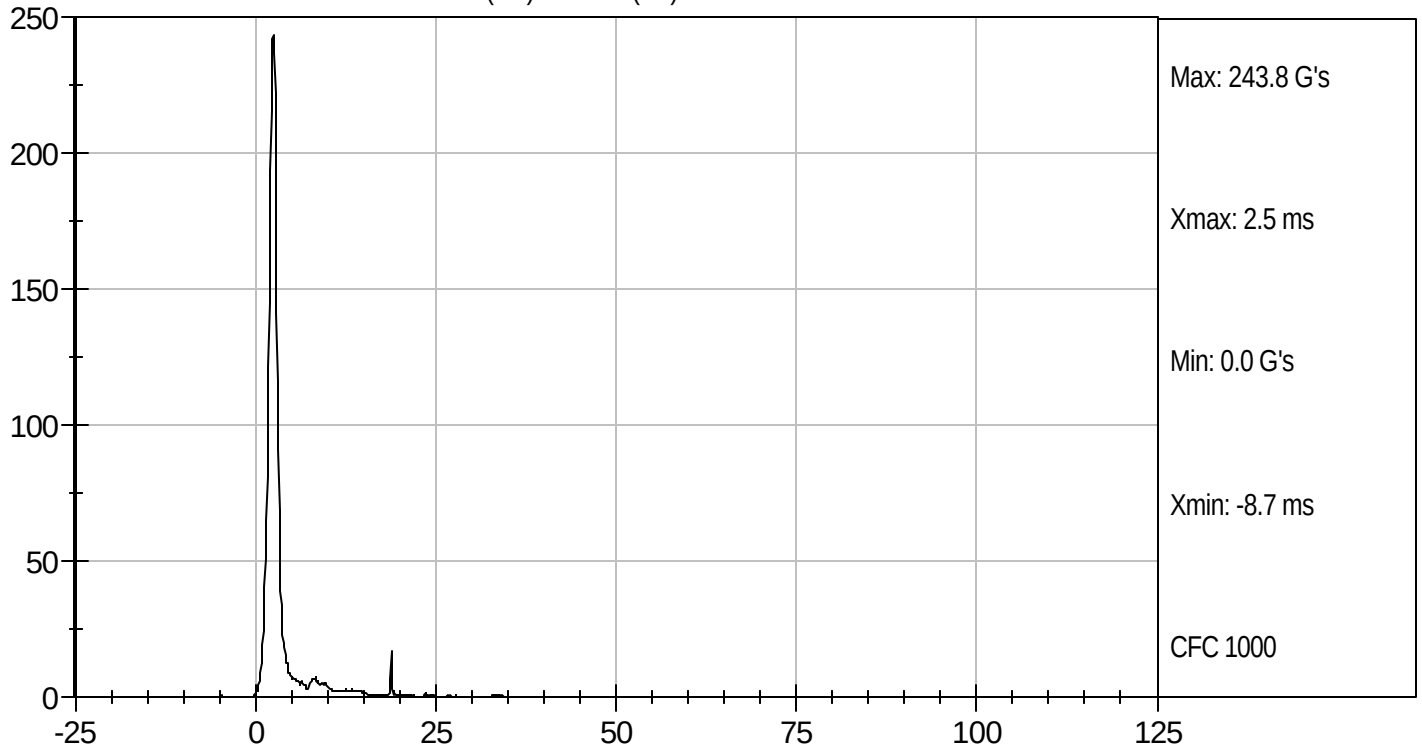
3/24/08
Test Date

David Winkelbauer
Approved By

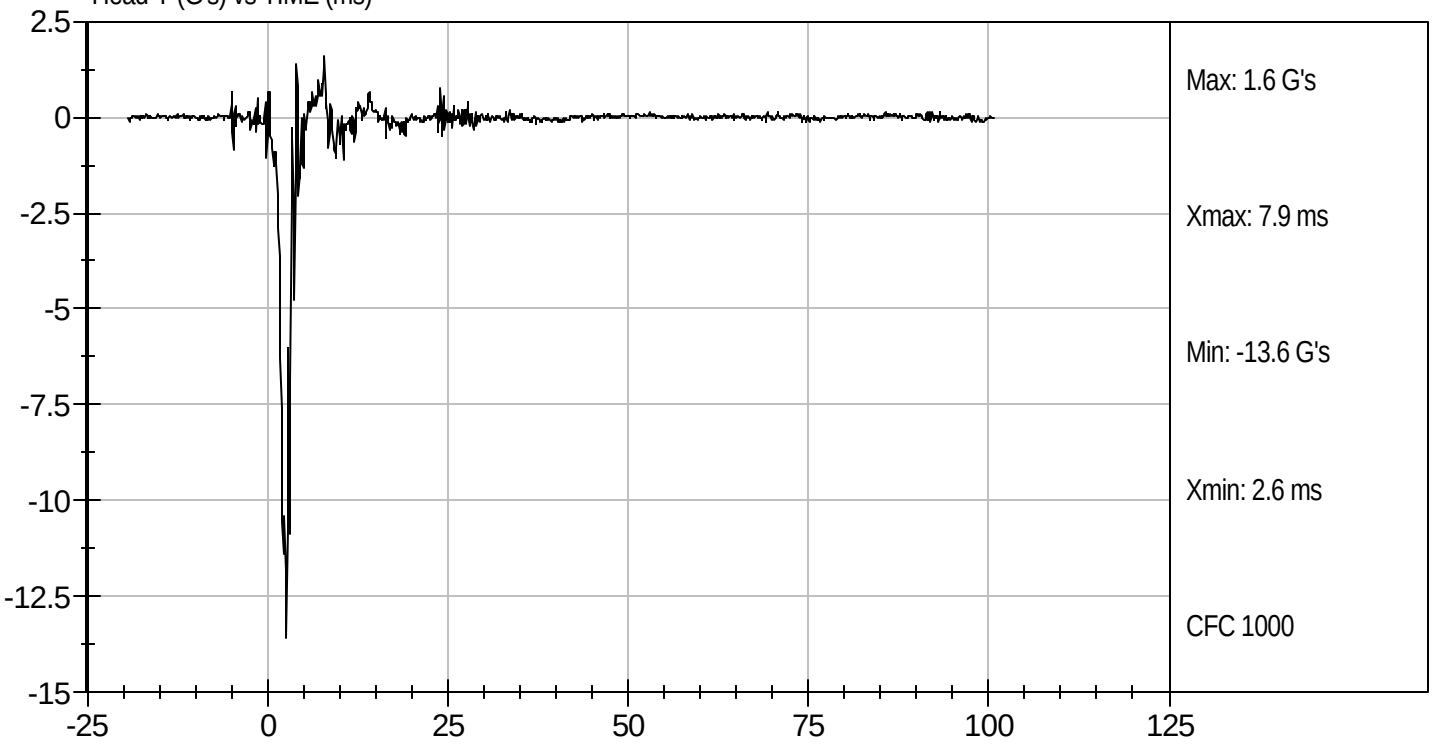
Test Desc: Head Drop
Component ID: D08861

Test Date: 3/24/08
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:** D08862

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity		%	10 to 70	19	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.05	Pass
Pendulum Deceleration	10 msec	G's	22.50 to 27.50	24.24	Pass
	20 msec	G's	17.60 to 22.60	18.44	Pass
	30 msec	G's	12.50 to 18.50	13.89	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 29.0	13.84	Pass
Deceleration Decay Time to Cross 5 G's		msec	34.0 to 42.0	35.7	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	70.1	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	113.1	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	93.3	Pass
	Time	msec	47.0 to 58.0	47.0	Pass
Positive Moment Decay Time To Zero Crossing		msec	97.0 to 107.0	97.7	Pass
			Overall Test Results		Pass

Laboratory Technician

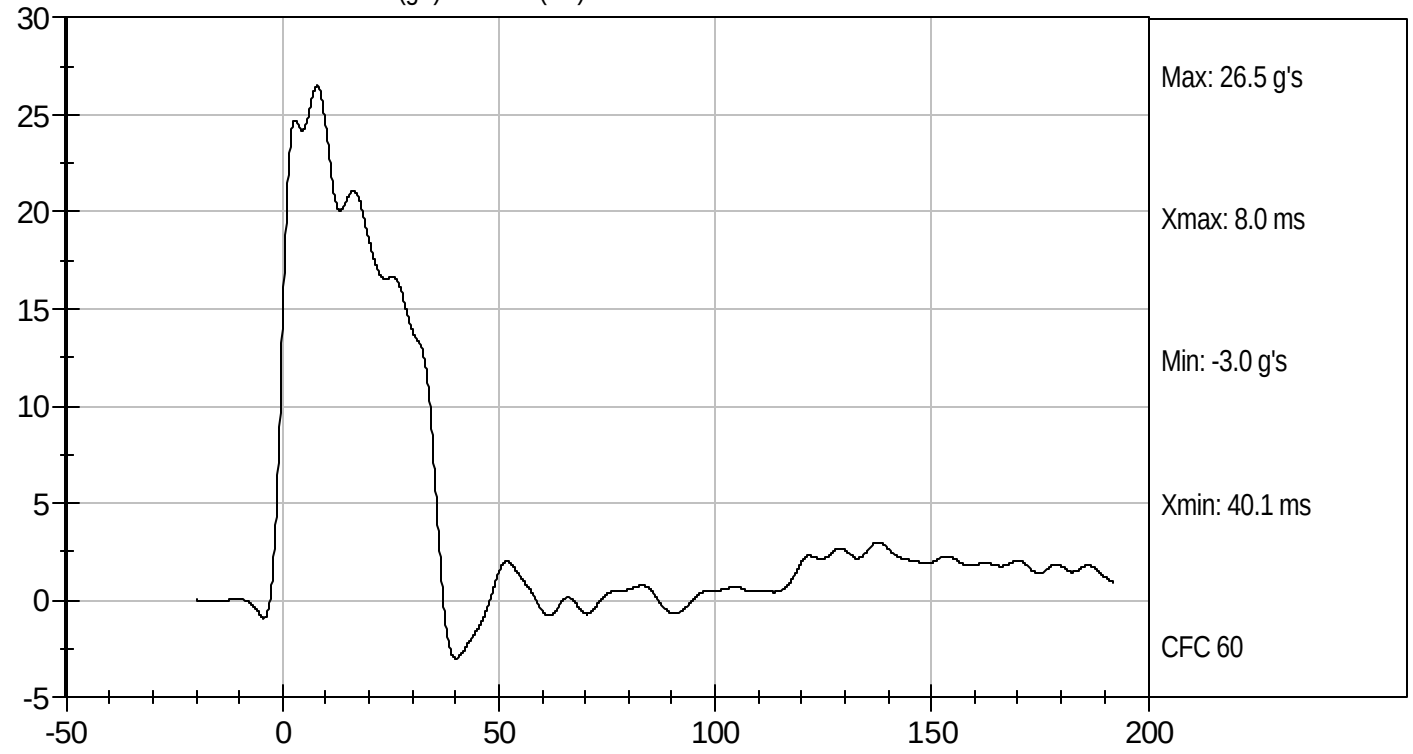
3/25/08
Test Date

Approved By

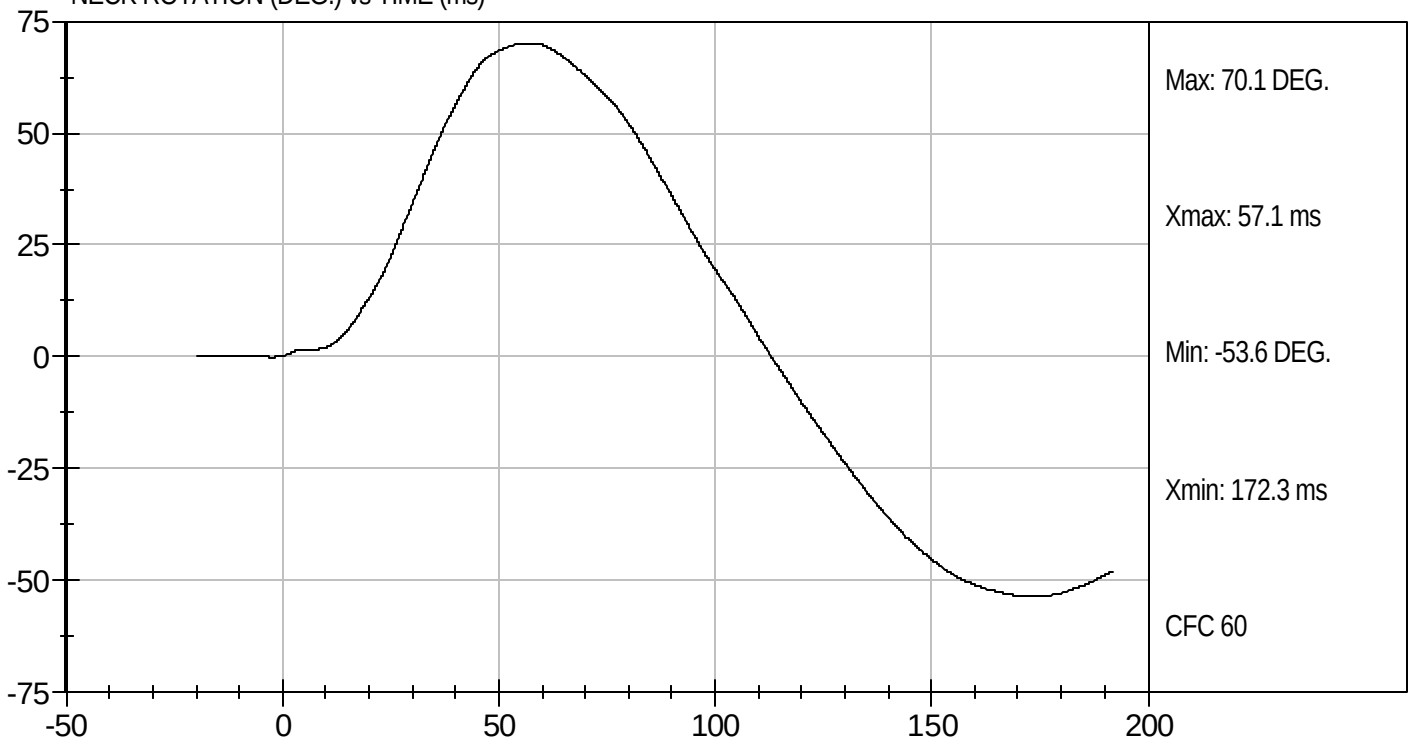
Test Desc: Neck Flexion
Component ID: D08862

Test Date: 3/25/08
Velocity: 23.14 ft/s, 7.05 m/s

PENDULUM DECELERATION (g's) vs TIME (ms)

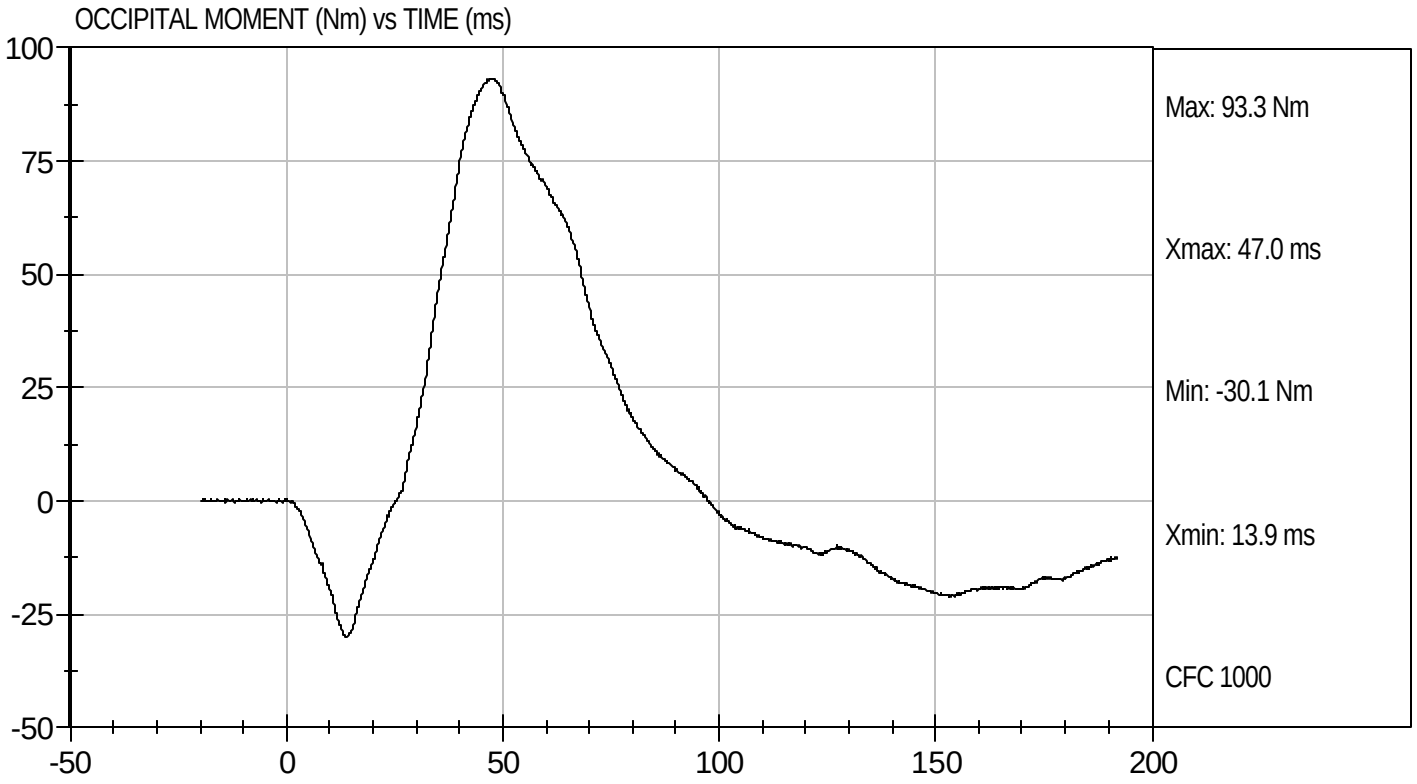


NECK ROTATION (DEG.) vs TIME (ms)



Test Desc: Neck Flexion
Component ID: D08862

Test Date: 3/25/08
Velocity: 23.14 ft/s, 7.05 m/s



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 066 **Test I.D:** D08863

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.0	Pass
Laboratory Relative Humidity		%	10 to 70	21	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.12	Pass
Pendulum Deceleration	10 msec	G's	17.20 to 21.20	19.42	Pass
	20 msec	G's	14.00 to 19.00	15.05	Pass
	30 msec	G's	11.00 to 16.00	11.64	Pass
Peak Pendulum Deceleration After 30 msec		G's	<= 22.0	11.62	Pass
Deceleration Decay Time to Cross 5 G's		msec	38.0 to 46.0	41.2	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	96.4	Pass
	Time	msec	72.0 to 82.0	76.3	Pass
"D" Plane Rotation Decay Time To Zero Crossing		msec	147.0 to 174.0	154.7	Pass
Moment About Occipital Condyle	Maximum	N m	-52.9 to -79.9	-63.8	Pass
	Time	msec	65.0 to 79.0	72.0	Pass
Negative Moment Decay Time To Zero Crossing		msec	120.0 to 148.0	143.7	Pass
			Overall Test Results		Pass

Laboratory Technician

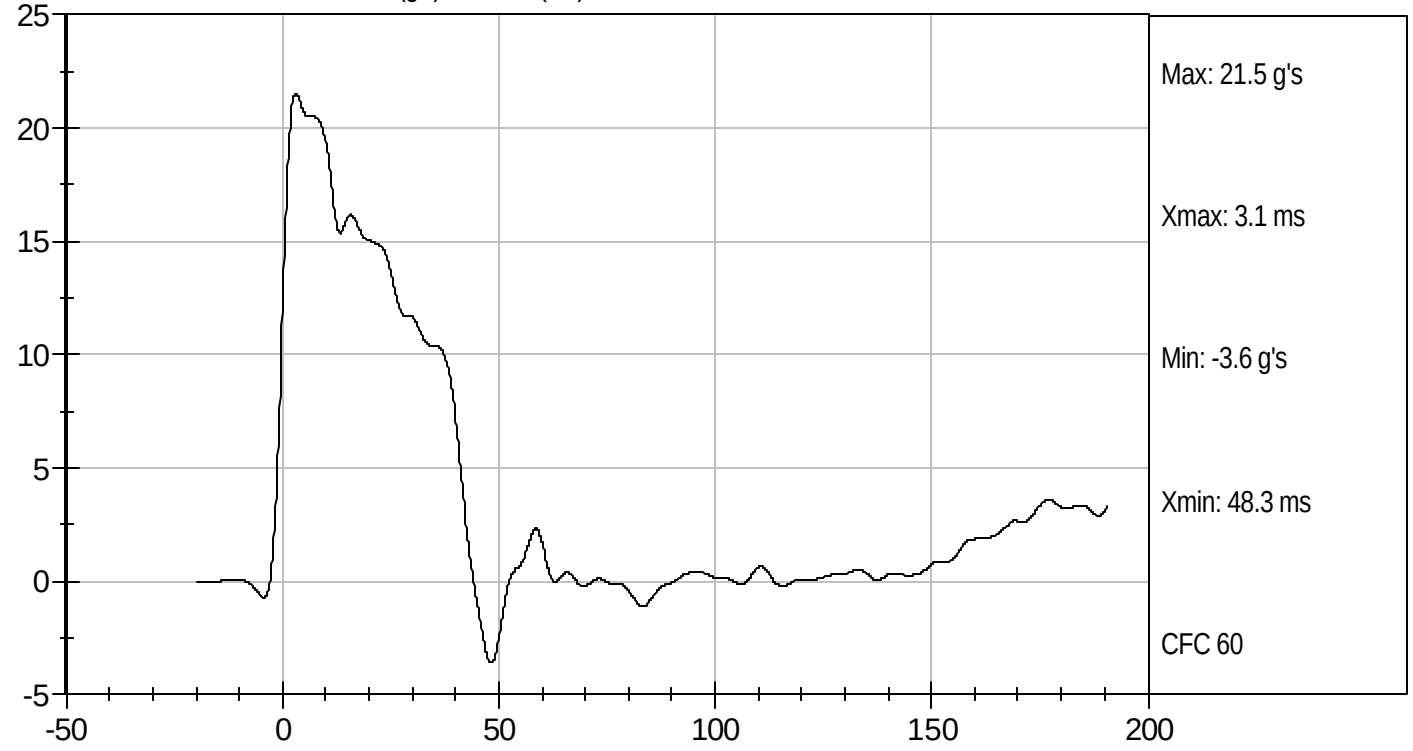
3/25/08
Test Date

Approved By

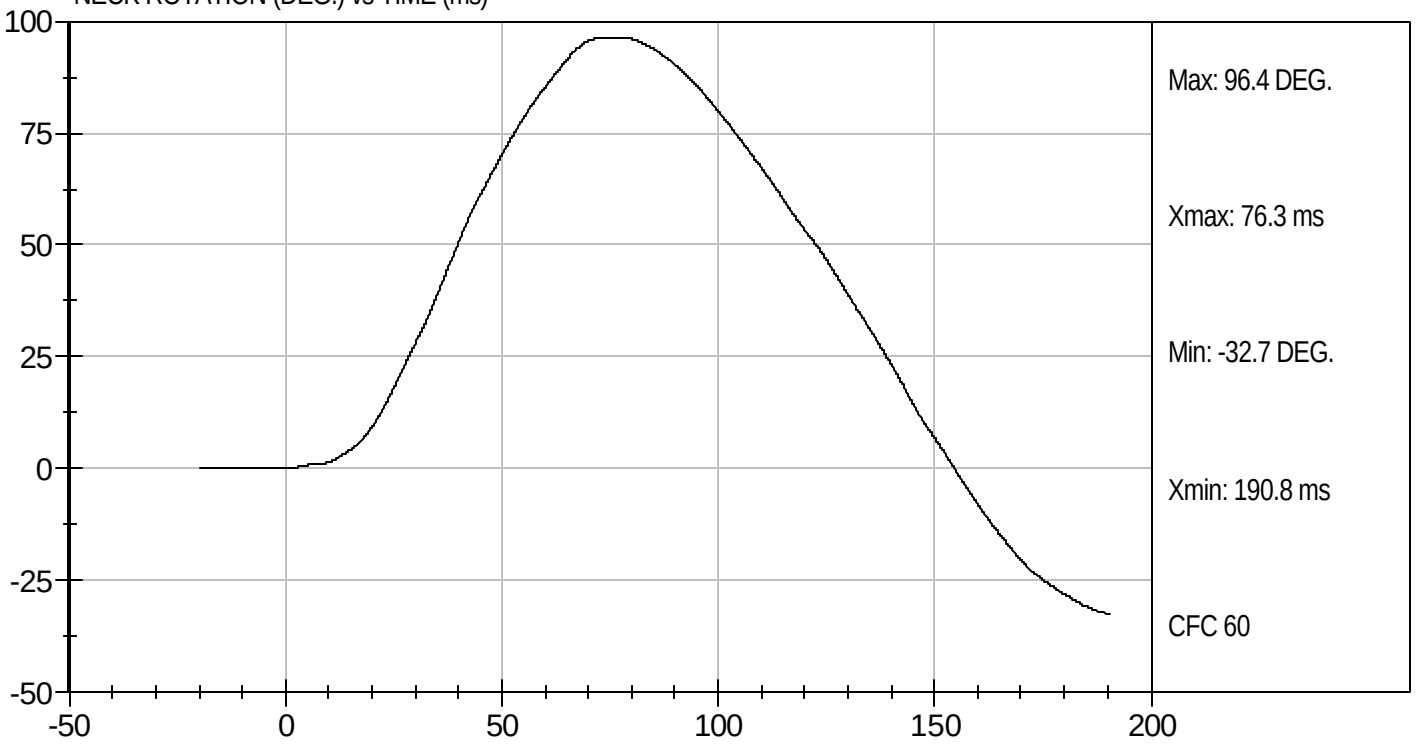
Test Desc: Neck Extension
Component ID: D08863

Test Date: 3/25/08
Velocity: 20.08 ft/s, 6.12 m/s

PENDULUM DECELERATION (g's) vs TIME (ms)

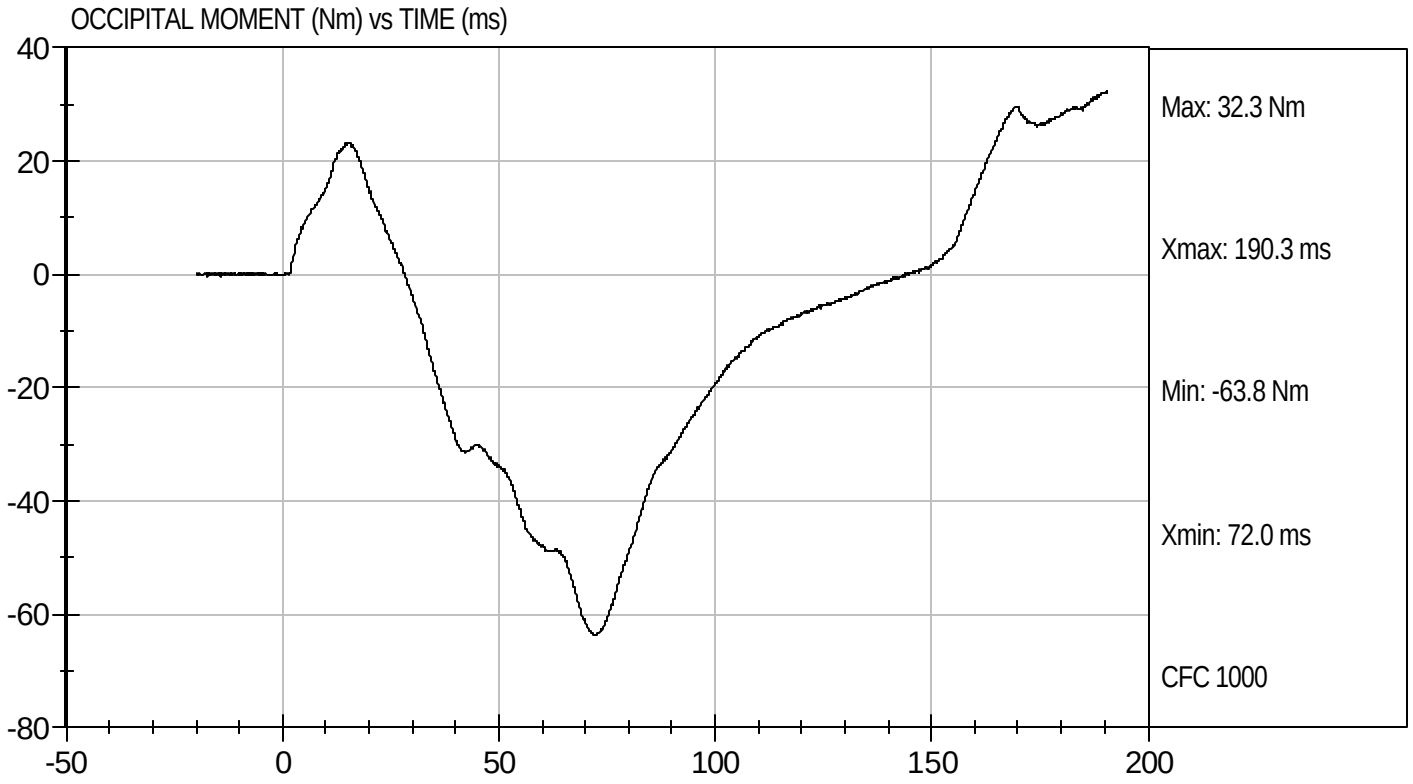


NECK ROTATION (DEG.) vs TIME (ms)



Test Desc: Neck Extension
Component ID: D08863

Test Date: 3/25/08
Velocity: 20.08 ft/s, 6.12 m/s



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 066 **Test I.D:** D08864

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
Probe Velocity	m/s	6.58 to 6.82	6.77	Pass
Peak Probe Force	N	5159 to 5893	5,406	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.65	Pass
Internal Hysteresis	%	69 to 85	72	Pass
		Overall Test Results		Pass

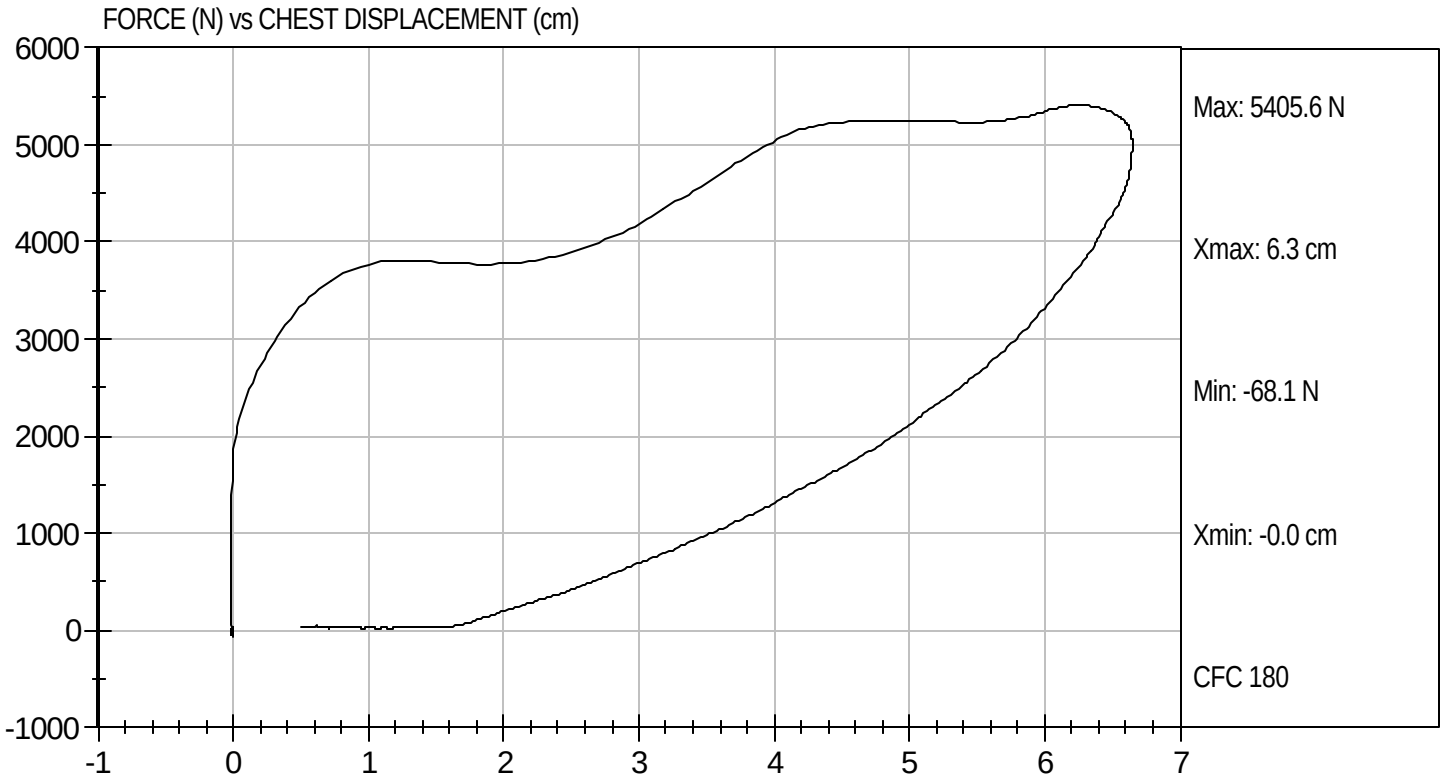
Laboratory Technician

3/25/08
Test Date

David Winkelbauer
Approved By

Test Desc: Thorax Impact
Component ID: D08864

Test Date: 3/25/08
Velocity: 22.22 ft/s, 6.77 m/s



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 066 **Test I.D:** D08865

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	19	Pass
Probe Velocity	m/sec	2.07 to 2.13	2.08	Pass
Peak Probe Force	Newtons	4715 to 5782	5,026	Pass
		Overall Test Results		Pass

Laboratory Technician

3/24/08

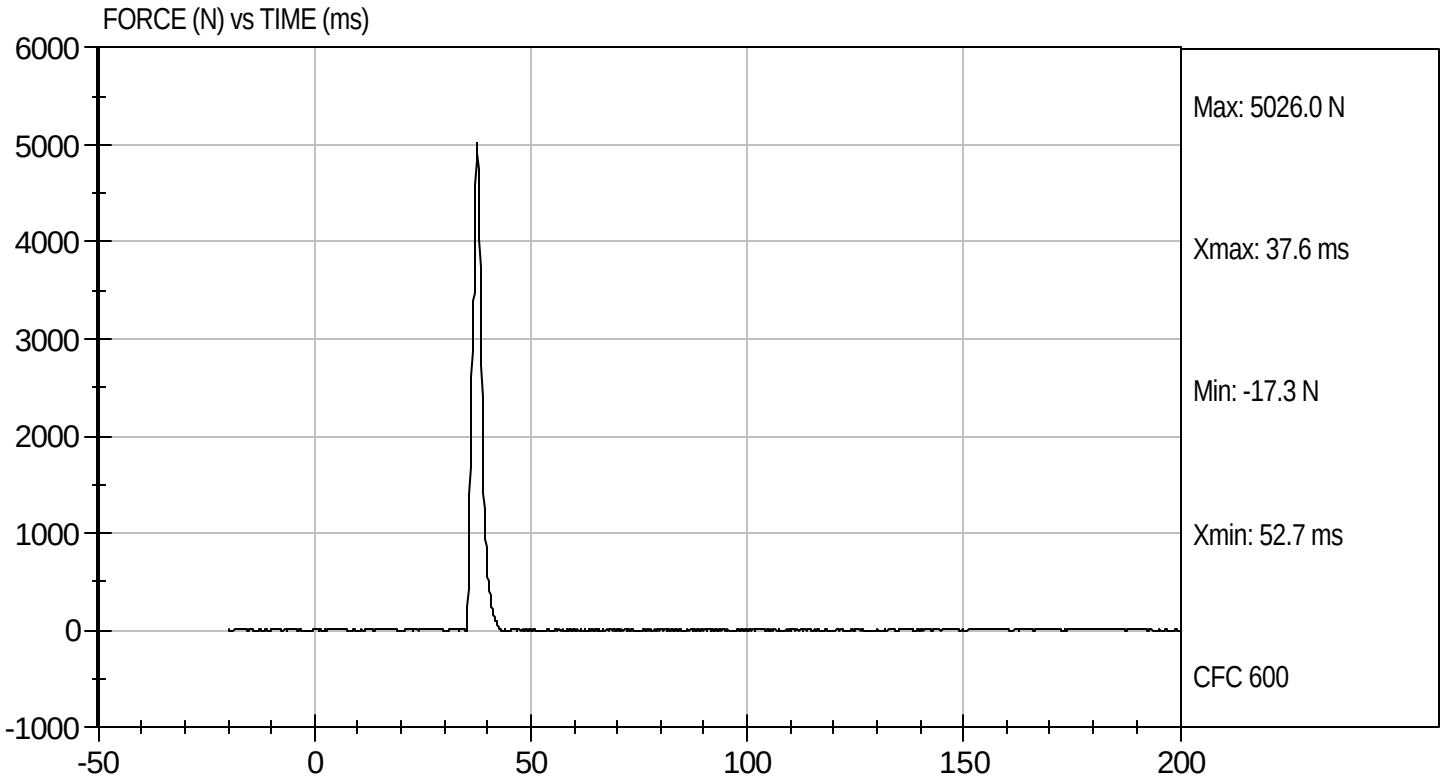
Test Date

David Winkelbauer

Approved By

Test Desc: Right Knee
Component ID: D08865

Test Date: 3/24/08
Velocity: 6.83 ft/s, 2.08 m/s



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 066 **Test I.D:** D08866

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	19	Pass
Probe Velocity	m/sec	2.07 to 2.13	2.08	Pass
Peak Probe Force	Newtons	4715 to 5782	5,370	Pass
		Overall Test Results		Pass

Laboratory Technician

3/24/08

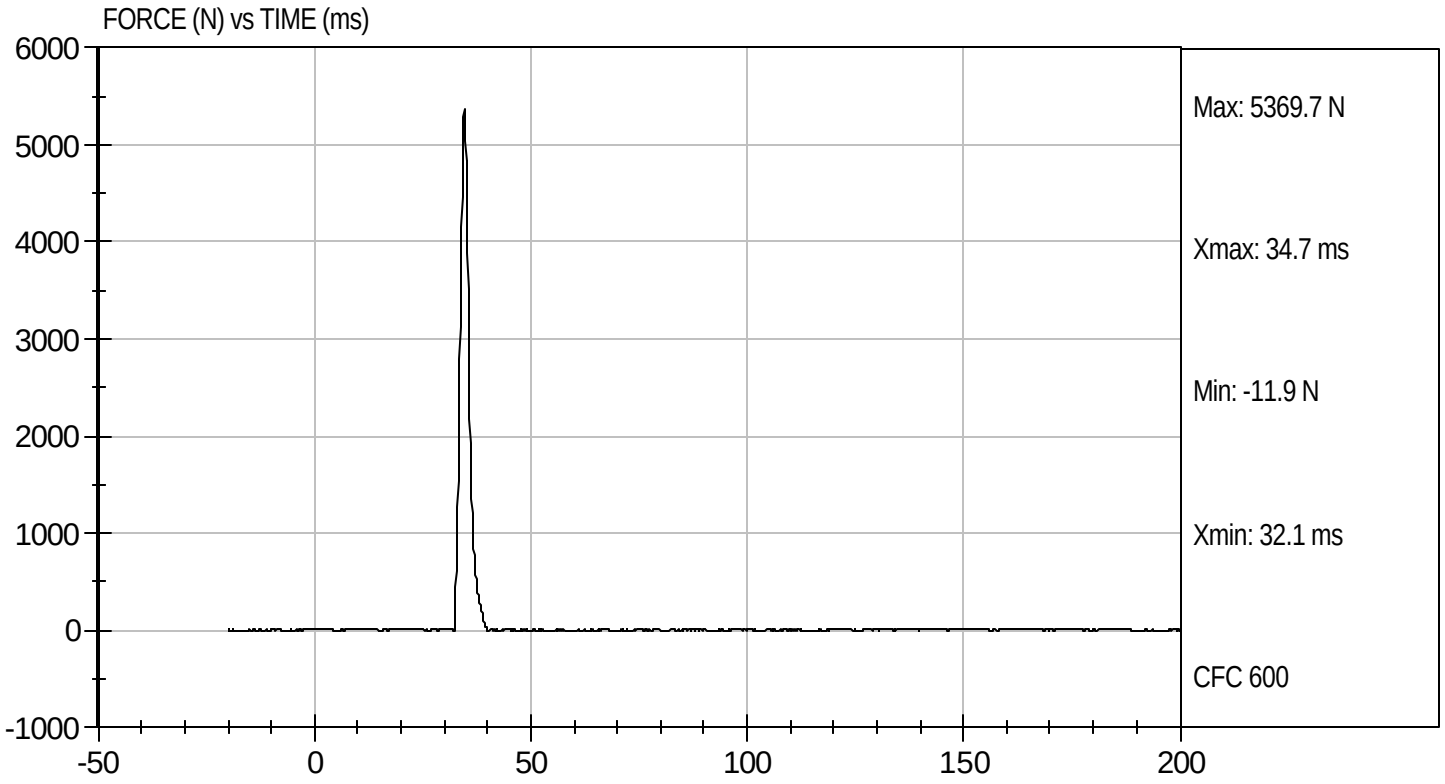
Test Date

David Winkelbauer

Approved By

Test Desc: Left Knee
Component ID: D08866

Test Date: 3/24/08
Velocity: 6.83 ft/s, 2.08 m/s



MGA RESEARCH CORPORATION

HIP-FEMUR FLEXION TEST

HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 066 **Test I.D:** D08860

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.9	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	19	19	Pass
Rotation Rate	deg/sec	5 -10	8	8	Pass
30 Degrees	Nm	94.9 Nm Max	72.3	62.1	Pass
150 ft-lbf / 203.4 Nm	Deg	40- 50 Degree Max Rotation	40	41	Pass
		Overall Test Results			Pass

Laboratory Technician

3/24/08

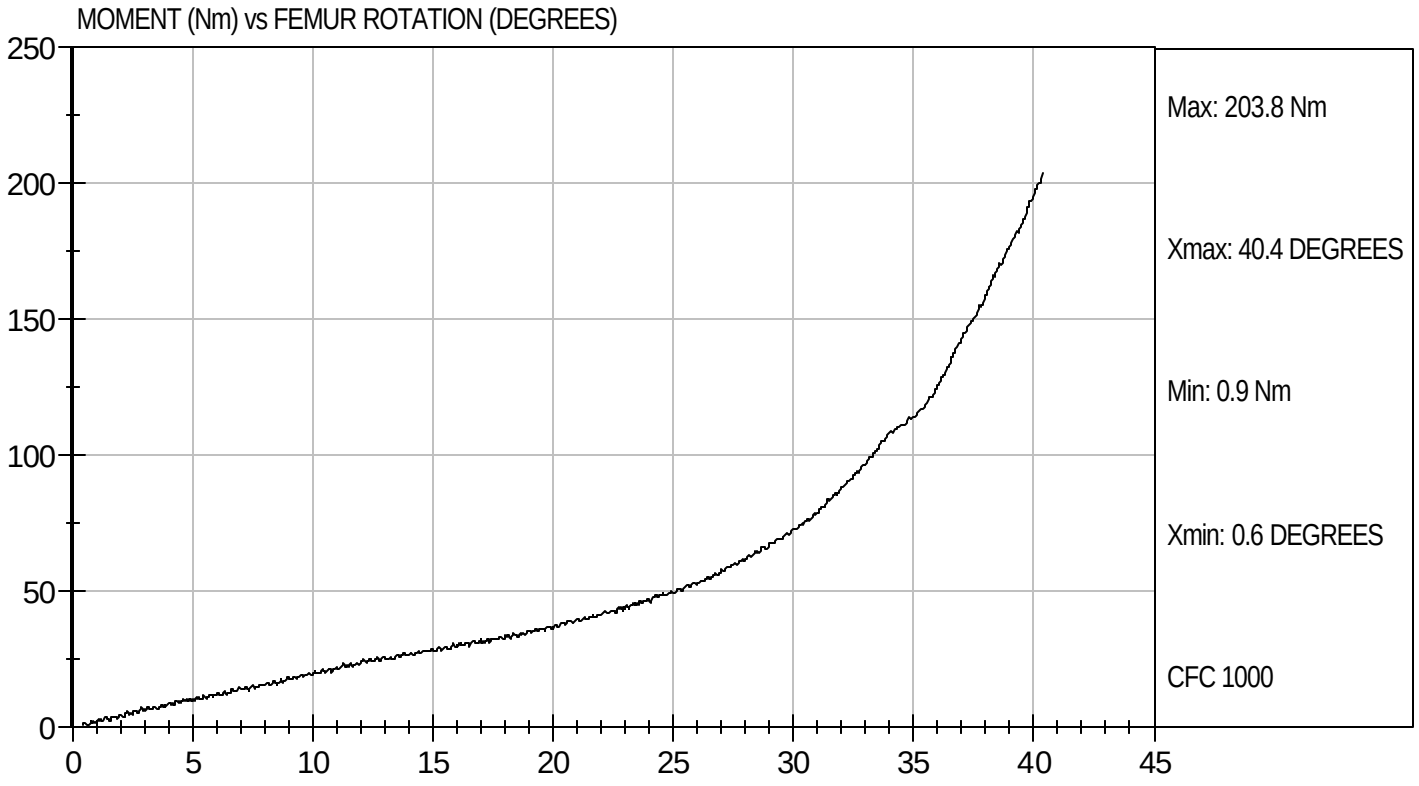
Test Date

David Winkelbauer

Approved By

Test Desc: Hip Femur Flexion
Component ID: D08869

Test Date: 3/24/08
Velocity: 0 ft/s, 0.00 m/s



Test Desc: Hip Femur Flexion
Component ID: D08860

Test Date: 2/24/08
Velocity: 0 ft/s, 0.00 m/s