

REPORT NUMBER: CAL-08-03

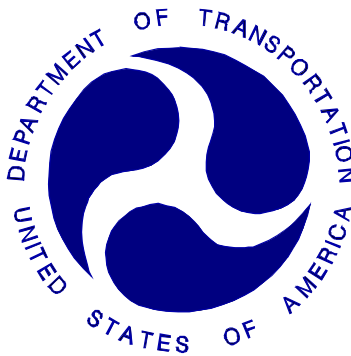
**NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST**

GENERAL MOTORS DE MEXICO
2008 SATURN VUE
MPV

NHTSA NUMBER: M80104

CALSPAN TEST NUMBER: 8806-NCAP-15

CALSPAN CORPORATION
TRANSPORTATION SCIENCES CENTER
P.O. BOX 400
BUFFALO, NEW YORK 14225



September 25, 2007

FINAL REPORT

PREPARED FOR:

U. S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Rulemaking
Office of Crashworthiness Standards
Mail Code: NVS-111
1200 New Jersey Ave SE, Room W43-410
Washington, DC 20590

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

Prepared by:

James Czarnecki, Project Engineer

Approved by:

David J. Travale, Program Manager
Transportation Science Center

Approval Date:

TECHNICAL REPORT STANDARD TITLE PAGE

1. <i>Report No.</i> CAL-08-03		2. <i>Government Accession No.</i>		3. <i>Recipient's Catalog No.</i>	
4. <i>Title and Subtitle</i> Final Report of NEW CAR ASSESSMENT PROGRAM (NCAP) Testing of a 2008 Saturn Vue MPV NHTSA No. M80104				5. <i>Report Date</i> September 25, 2007	
				6. <i>Performing Organization Code</i> CAL	
7. <i>Author(s)</i> David J. Travale, Program Manager James Czarnecki, Project Engineer				8. <i>Performing Organization Report No.</i> 8806-NCAP-15	
9. <i>Performing Organization Name and Address</i> Calspan Corporation 4455 Genesee Street Buffalo, New York 14225				10. <i>Work Unit No.</i>	
				11. <i>Contract or Grant No.</i> DTNH22-06-D-00024	
12. <i>Sponsoring Agency Name and Address</i> U.S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards Mail Code: NVS-111 1200 New Jersey Ave SE, Room W43-410 Washington, DC 20590				13. <i>Type of Report and Period Covered</i> Final Report September - October, 2007	
				14. <i>Sponsoring Agency Code</i> NVS-111	
15. <i>Supplementary Notes</i>					
16. <i>Abstract</i> A frontal load cell barrier test of a 2008 Saturn Vue MPV was performed at Calspan Corporation's crash test facility in Buffalo, New York, on September 25, 2007. The impact velocity was 56.17 kph and the temperature at the barrier face was 21 °C. The maximum post-test vehicle crush was 529 mm. The test vehicle was equipped with 3-point restraint systems, knee bolsters, and airbags at both the driver and right outboard passenger seating positions. With respect to FMVSS 208 "Occupant Crash Protection - Injury Criteria" both the driver and passenger appeared to comply with head, chest, and femur requirements. The occupant injury criteria summary is as follows:					
Measurement Description		Units	Threshold	Driver (061)	Passenger (064)
Head Injury Criteria (HIC - 36 ms)		-	1000	486.1	369.4
Maximum Thorax Acceleration (3 ms Clip)		g's	60 g's	44.1	41.4
Chest Displacement		mm	-76 mm	29.4	32.4
Left Femur Force		Newtons	-10000 N	4063.8	4649.8
Right Femur Force		Newtons	-10000 N	6693.7	2111.5
17. <i>Key Words</i> 56 kph Frontal Barrier Impact test New Car Assessment Program (NCAP)				18. <i>Distribution Statement</i> <u>Copies of this report are available from:</u> NHTSA Technical Reference Division National Highway Traffic Safety Admin. 1200 New Jersey Ave SE Washington, DC 20590	
19. <i>Security Classif. (of this report)</i> UNCLASSIFIED		20. <i>Security Classif. (of this page)</i> UNCLASSIFIED		21. <i>No. of Pages</i> 105	22. <i>Price</i>

Form DOT F1700.7 (8-69)

TABLE OF CONTENTS

<u>Section</u>		<u>Page No.</u>
1	PURPOSE AND SUMMARY OF NCAP TEST	1-1
2	OCCUPANT AND VEHICLE INFORMATION	2-1
<u>Data Sheet</u>	<u>Description</u>	
1.	CRASH TEST SUMMARY	2-1
2.	GENERAL TEST AND VEHICLE PARAMETER DATA	2-2
3.	TEST VEHICLE TIRE INFORMATION	2-4
4.	TEST VEHICLE INFORMATION	2-5
5.	DUMMY POSITIONING IN VEHICLE	2-7
6.	SEAT BELT POSITIONING DATA	2-9
7.	VEHICLE ACCELEROMETER LOCATIONS	2-10
8.	SUMMARY OF FMVSS 212 and FMVSS 219 (Partial) DATA	2-11
9.	SUMMARY OF FMVSS NO. 301 DATA	2-12
10.	VEHICLE MEASUREMENTS	2-13
11.	HIGH-SPEED CAMERA LOCATIONS	2-16
12.	VEHICLE REFERENCE PHOTO TARGET LOCATIONS	2-18
13.	VEHICLE INTRUSION MEASUREMENTS	2-19
14.	LOAD CELL LOCATIONS ON FIXED BARRIER	2-23
15.	ACCIDENT INVESTIGATION DIVISION DATA	2-24
16.	VEHICLE AND DUMMY TEMPERATURE STABILIZATION CHART	2-25
APPENDIX A	PHOTOGRAPHS	A-1
APPENDIX B	VEHICLE, LOAD CELL BARRIER AND DUMMY RESPONSE DATA	B-1
APPENDIX C	PART 572E DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION TESTS	C-1
APPENDIX D	DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION	D-1
APPENDIX E	VEHICLE INTERIOR INTRUSION MEASUREMENTS	E-1

SECTION 1

PURPOSE AND SUMMARY OF TEST

1.1 PURPOSE

This 56.17 kph frontal barrier impact test is part of the Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-06-D-00024. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for an impact speed in excess of the current 48.3 kph requirements.

The 56.17 kph frontal barrier impact test was conducted in accordance with the Office of Crashworthiness Standards Laboratory Indicant Test procedure.

1.2 TEST PROCEDURE

This 56.17 kph frontal barrier impact test was conducted in accordance with the Office of Crashworthiness Standards (OCS) New Car Assessment Program (NCAP) Laboratory Indicant Test Procedure, dated December 1999. Data was obtained indicant of FMVSS 208, "Occupant Crash Protection"; FMVSS 212, "Windshield Retention"; FMVSS 219, "Windshield Zone Intrusion (Partial)"; and FMVSS 301 "Fuel System Integrity" performance. Procedures for receiving, inspection testing and reporting of test results are described in the test procedures and are not repeated in this report.

One real-time camera and 16 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 heads, chest and pelvis triaxial accelerometers, chest displacement potentiometers, upper neck transducers, right/left femur load cells, and lower leg instrumentation. Seat belt load cells were also on the driver's and passenger's lap and shoulder belts to measure dummy torso and pelvic section loading. The driver (position 1) ATD (Serial No. 061) and the right-front passenger (position 2) ATD (Serial No.064) were calibrated previous to this test. Certification details, along with instrumentation calibration data, are found in Appendix C.

The vehicle, occupant, camera and measurement data are presented in Section 2. Appendix A contains the still photograph prints. The 160 channels of data were recorded on an on-board data acquisition system. Appendix B contains the vehicle, load cell barrier and dummy response data traces. Appendix C contains the dummy calibration data and Appendix D contains the transducer calibration dates.

1.3 SUMMARY OF FRONTAL BARRIER IMPACT TEST

A load cell barrier consisting of 36 load cells was impacted by a 2008 Saturn Vue MPV at a velocity of 56.17 kph. The test was performed at Calspan on September 25, 2007. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

The occupant data is summarized below.

ATD	HIC	T ₁	T ₂	Clip (g)	T ₁	T ₂	Chest Disp. (mm)	Left Femur (N)	Right Femur (N)
Driver	486.1	62.0	89.2	44.1	63.0	66.0	29.4	4063.8	6693.7
Passenger	369.4	65.2	101.2	41.4	69.4	72.4	32.4	4649.8	2111.5

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

TEST NOTES	
Data Channel	Anomalies
VIP1 Left Lower Tibia Mx	Channel opened from 61-67 ms
VIP2 Left Lower Tibia Fz	Channel Clipped

**SECTION 2
OCCUPANT AND VEHICLE INFORMATION**

**DATA SHEET NO. 1
CRASH TEST SUMMARY**

Vehicle NHTSA No.: M80104 Test Mode: 56.3 kph Frontal Barrier
 Test Date: September 25, 2007 Time: 13:30 Temperature: 21 °C
 Vehicle Make/Model/Body Style: 2008 Saturn Vue MPV
 Vehicle Test Weight: 2083 kg Impact Velocity: 56.17 kph (55.5 – 57.1 kph)
 Vehicle/Barrier Impact Angle: 0 ° Max Static Crush: 529 mm

ATD INFORMATION AND VISIBLE CONTACT POINTS

	DRIVER	PASSENGER
ATD Type:	Part 572E	Part 572E
Restraint System:	Seatbelt, Airbag, Side Curtain Airbag, Knee Bolster	Seatbelt, Airbag, Side Curtain Airbag, Knee Bolster
Head Contact:	Face to airbag , back of head to head restraint	Face to airbag , back of head to head restraint, right side of head to side curtain airbag
Abdomen Contact:	Airbag	Airbag
Chest Contact:	None	None
Left Knee Contact:	Knee Bolster	Knee Bolster
Right Knee Contact:	Knee Bolster	Knee Bolster

DOOR OPENING, SEAT TRACK AND GLAZING INFORMATION

Description	Driver Side	Passenger Side
Door Lock Status	Locked Condition	Locked Condition
Front Door Opening	Closed and operable without tools	Closed and operable without tools
Rear Door Opening	Closed and operable without tools	Closed and operable without tools
Hatch/Other Door Opening	Closed and operable without tools	
Front Seat Track Shift (mm)	0	0
Front Seat Back Failure	None	None
Glazing Damage	Windshield was cracked from airbag deployment	

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Left Side (mm)	Center (mm)	Right Side (mm)	Average (mm)
Value	524	482	502	503

BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Shoulder belt length as measured on ATD	mm	830	840
Lap belt length as measured on ATD	mm	770	760
Belt length from trim panel exit to bolt hole anchor point for continuous webbing systems	mm	135	135

DATA SHEET NO. 2
GENERAL TEST AND VEHICLE PARAMETER DATA

TEST VEHICLE INFORMATION:

Year/Make/Model/Body Style: 2008 Saturn Vue MPV

NHTSA No. : M80104 ; VIN: 3GSDL43N08S530985 ; Color: _____

Engine Data: 6 cylinders; _____ CID; 3.5 Liters; _____ cc

Placement: _____ Longitudinal or In-Line; _____ x _____ Transverse or Lateral

Transmission Data: 6 speeds; _____ Manual; _____ x _____ Automatic; _____ x _____ Overdrive

Final Drive: _____ Rear Wheel Drive; _____ Front Wheel Drive; _____ x _____ Four Wheel Drive

AUTOMATIC DOOR LOCKS:

Is test vehicle equipped with Automatic Door Locks (ADLs)? _____ x Yes; _____ - No;

Does vehicle owner's manual describe how to deactivate ADLs? _____ - Yes; _____ x No; _____ - N/A

DEALER AND DELIVERY INFORMATION:

Date Received: 8/21/07 ; Odometer Reading 42 km

Selling Dealer: Saturn of Orchard Park

Dealer Address: 3559 Southwestern Blvd Orchard Park NY 14127

TEST VEHICLE OPTIONS:

x AC; x Power Steering; x Power Brakes; x Power Locks; _____ Power Seats

x ABS; x Tilt Wheel; _____ x _____ Stability Control _____ x _____ Traction Control _____ x _____ Anti-Theft

SAFETY BELT FEATURES:

Driver: _____ x _____ Pretensioner (Shoulder); _____ x _____ Load Limiter; _____ x _____ Adjustable Anchorage

Passenger: _____ x _____ Pretensioner (Shoulder); _____ x _____ Load Limiter; _____ x _____ Adjustable Anchorage

AIRBAG FEATURES:

Position	Frontal	Knee Bolster	Side Torso	Side Head/Torso Combination	Side Curtain
Driver:	x	-	x	-	x
Passenger:	x	-	x	-	x
Rear Passenger:	-	-	-	-	-

DATA FROM VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured by: General Motors de Mexico

Date of Manufacture 07/07

GVWR: 2294 kg; GAWR: 1210 kg FRONT; 1280 kg REAR

VEHICLE CAPACITY DATA:

Type of Front Seats: _____ - Bench; _____ x _____ Bucket; _____ - Split Bench

Number of Occupants: _____ 2 Front; _____ 3 Rear; _____ 5 Total

Vehicle Capacity Weight (VCW) = _____ 413 kg

No. of Occupants x 68.04 kg = _____ 340.2 kg

Rated Cargo/Luggage Weight (RCLW) = _____ 72.8 kg

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

WEIGHT OF TEST VEHICLE AS RECEIVED FROM DEALER (with maximum fluids)= UDW:

	Left Side (kg)	Right Side (kg)	Ratio (%)	Total (kg)
Front =	539	557	58.7	1096.0
Rear =	406	365	41.3	771.0
Total Delivered Weight (UDW) =				1867.0

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Delivered Weight (UDW) =	1867.0	kg
Rated Cargo/Luggage Weight (RCLW) =	72.8	kg
Weight of 2 p.572 Dummies @ 76 each =	152	kg
TARGET TEST WEIGHT =	2091.8	kg

WEIGHT OF TEST VEHICLE WITH TWO DUMMIES AND 64.0 KG OF CARGO WEIGHT:

	Left Side (kg)	Right Side (kg)	Ratio (%)	Total (kg)
Front =	575	595	56.2	1170.0
Rear =	475	438	43.8	913.0
Total Vehicle Test Weight (ATW) =				2083.0

Weight of Ballast Secured in Vehicle Trunk Area¹ = 12 kg

Vehicle Components Removed for Weight Reduction: Rear tail lights

VEHICLE ATTITUDE (all dimension in millimeters):

	Left Front	Right Front	Left Rear	Right Rear	CG ²
AS DELIVERED:	802	802	812	818	1117.5
FULLY LOADED:	793	793	792	799	-
AS TESTED:	794	794	793	800	1186.1

Vehicle's Wheel Base: 2706 mm

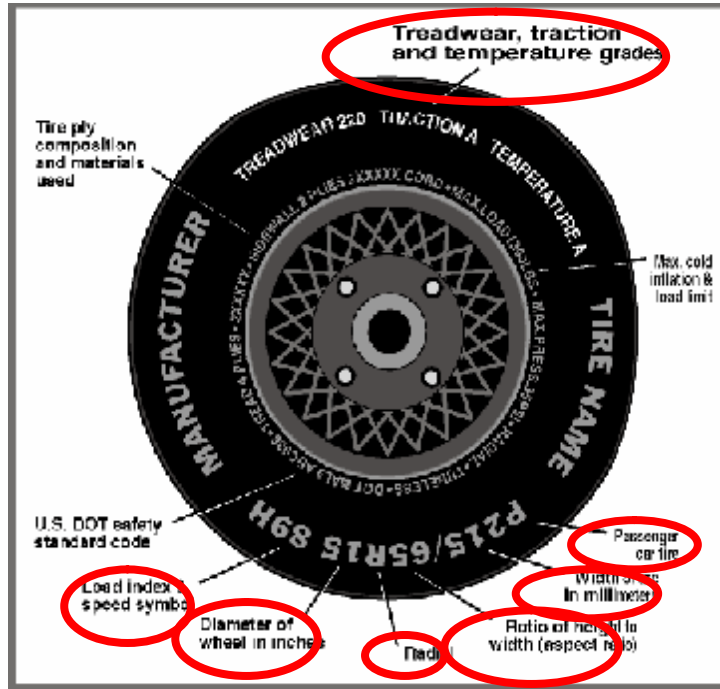
¹Ballast weight does not include the weight of instrumentation, on-board cameras and data acquisition system

²Rearward of the front axle centerline.

DATA SHEET NO. 3
TEST VEHICLE TIRE INFORMATION

Vehicle Year/Make/Model/Body Style: _____ 2008 Saturn Vue MPV

NHTSA Test No.: _____ M80104 _____ Test Date: _____ September 25, 2007



Measured Parameter	Front	Rear
Maximum Tire Pressure (from sidewall - kPa)	330	330
Cold Pressure (from tire placard - kPa)*	210	210
Recommended Tire Size (from tire placard)	P235/65R16	P235/65R16
Tire size on Vehicle	P235/65R16	P235/65R16
Tire Manufacturer	Firestone	Firestone
Tire Name	Destination LE	Destination LE
Tire Type	P235	P235
Tire Width (mm)	235	235
Ratio of Height to Width (aspect ratio)	65	65
Radial	Yes	Yes
Wheel Diameter	16	16
Load Index & Speed Symbol	101S	101S
Treadwear	480	480
Traction Grade	A	A
Temperature Grade	B	B

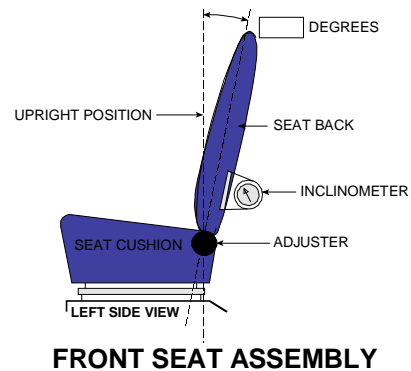
*Tire pressure used for test

DATA SHEET NO. 4
TEST VEHICLE INFORMATION

VEHICLE IDENTIFICATION:

Model Year : 2008 Vehicle Model: Saturn Vue Body Style : MPV

1. NOMINAL DESIGN RIDING POSITION:
for adjustable driver and passenger seat backs.
Please describe how to position the inclinometer to
measure the seat back angle. Include description of
the location of the adjustment latch detent, if
applicable.



Seat back angle for driver's seat: 25

Measurement instructions: Seat back angle is measured at 25 degrees starting from 1 degree full forward

Seat back angle for passenger's seat: 25

Measurement instructions: Seat back angle is measured at 25 degrees starting from 1 degree full forward

2. SEAT FORE AND AFT POSITIONING:

Positioning of the driver's seat: Seat travel is 252 mm – 126 mm midpoint

Detent 12 is midpoint with total of 25 detents

Positioning of the passenger's seat: Seat travel is 240 mm – 120 mm midpoint

Detent 12 is midpoint with total of 25 detents

3. FUEL TANK CAPACITY DATA:

3.1 A. "Usable Capacity" of the standard equipment fuel tank is 65.5 liters

B. "Usable Capacity" of the optional equipment fuel tank is - liters

C. "Usable Capacity" of the vehicle(s) used for certification
testing to requirements of FMVSS 301 = 60.3 to 61.6 liters

3.2 Actual Amount of Stoddard solvent added to vehicle for test = 60.5 liters

3.3 One-Third of Useable Capacity = 21.8 liters

3.4 Is vehicle equipped with electric fuel pump? Yes- x ; No-

If YES, explain the vehicle operating conditions under which the fuel pump will pump fuel.

With ignition turned "On"

DATA SHEET NO. 4
TEST VEHICLE INFORMATION (cont.)

4. STEERING COLUMN ADJUSTMENTS:

Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when it is moved through its full range of driving positions. If the tested vehicle has any of these adjustments, does your company use any specific procedures to determine the geometric center.

Operational Instructions: Steering wheel angle is 26 degrees

No telescoping feature

5. SEAT BELT UPPER ANCHORAGE:

Nominal design riding position: Placed in position GM representatives requested

5 positions located

6. AUTOMATIC DOOR LOCKS: Is test vehicle equipped with ADLs? x Yes; - No;

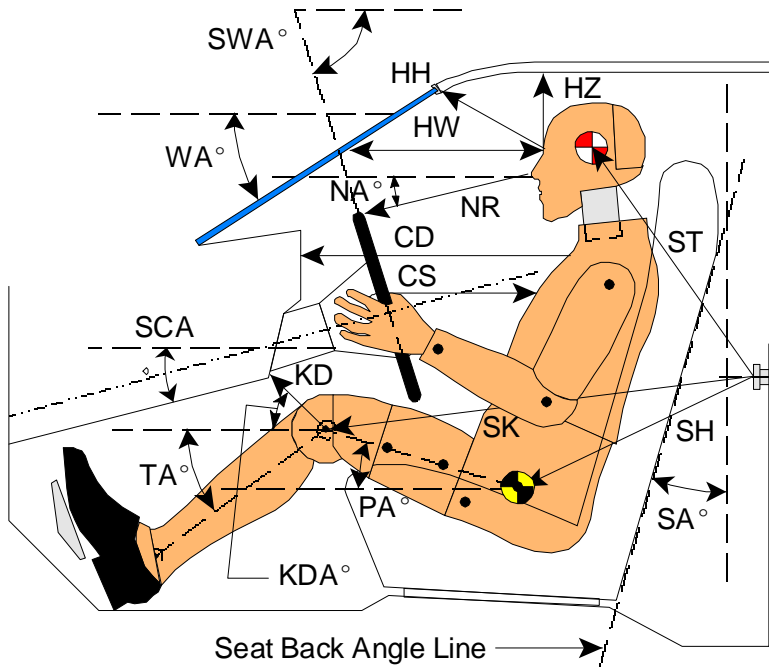
Does vehicle owner's manual describe how to deactivate ADLs? - Yes; x No; - N/A

Comments: None

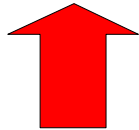
DATA SHEET NO. 5

FRONT SEAT DUMMY POSITIONING MEASUREMENTS IN VEHICLE

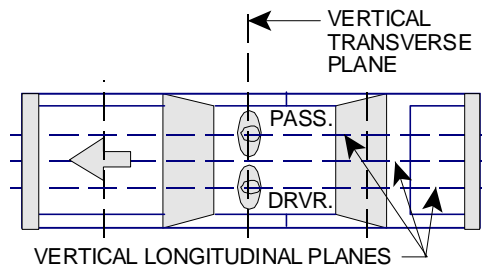
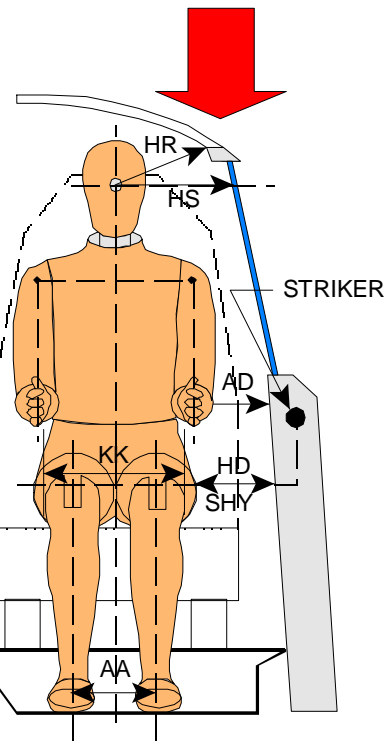
DUMMY MEASUREMENT FOR FRONT SEAT PASSENGERS



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



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



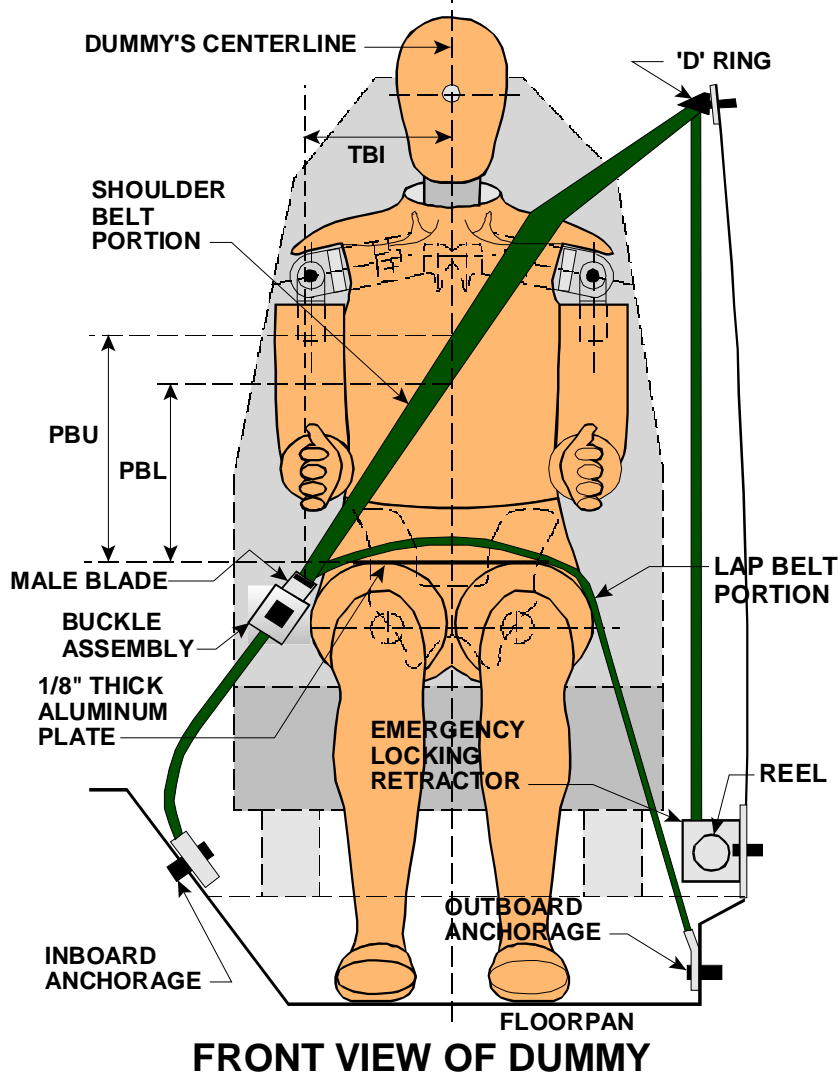
DATA SHEET NO. 5
FRONT SEAT DUMMY POSITIONING MEASUREMENTS IN VEHICLE (cont.)

	DRIVER (Serial #061)			PASS. (Serial #064)		
WA ^o	31 deg.			N/A		
SWA ^o	64 deg.			N/A		
SCA ^o	26 deg.			N/A		
SA ^o	25 deg.			25 deg.		
HZ	251			221		
HH	381			374		
HW	680			676		
HR	234			233		
NR	430	Angle	8 deg.	N/A		
CD	554			544		
CS	339			N/A		
RA	209			N/A		
KDL	161	Angle (KDA)	31 deg.	121		
KDR	125			154	Angle (KDA)	29 deg.
PA ^o	23.6 deg.			23.9 deg.		
TA ^o	55.0 deg.			49.0 deg.		
KK	339			270		
AA	343			261		
ST	505	Angle	81 deg.	541	Angle	80 deg.
SK	601	Angle	5 deg.	629	Angle	7 deg.
SH	259	Angle	33 deg.	269	Angle	33 deg.
SHY	245			249		
HS	334			331		
HD	140			129		
AD	105			108		

Dimensions in millimeters

DATA SHEET NO. 6
SEAT BELT POSITIONING DATA

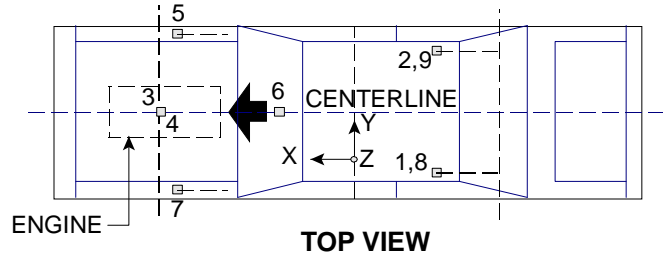
SEAT BELT POSITIONING DATA



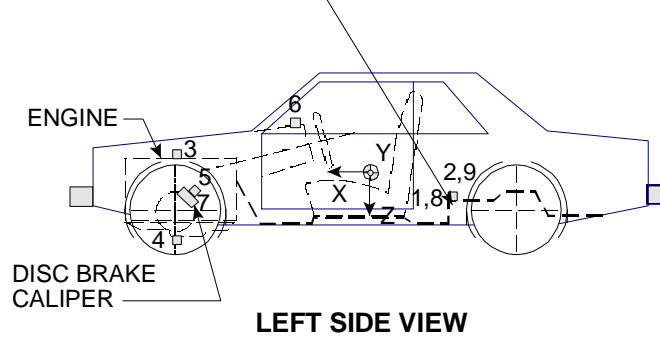
	DRIVER DUMMY (mm)	PASSENGER DUMMY (mm)
PBU -- Top surface of alum. plate to upper edge	330	320
PBL-- Top surface of alum. plate to belt lower edge	250	240
LAP BELT TENSION	10 N	10 N
SHOULDER BELT TENSION	Retractor	Retractor

DATA SHEET NO. 7
VEHICLE ACCELEROMETER LOCATIONS

VEHICLE ACCELEROMETER LOCATIONS



REAR SEAT CUSHION
ASSY. FRONT ATTACHMENT
BRACKET SUPPORT



No.	LOCATION	PRE-TEST LENGTH (mm)		
		X	Y	Z
1	Left Rear Seat Cross Member X	1803	-592	-409
2	Right Rear Seat Cross Member X	1833	593	-411
3	Top of Engine Block	3836	-162	-856
4	Bottom of Engine	3317	507	-257
5	Disc Brake Caliper @ Right Side	3511	763	-366
6	Instrument Panel**	0	0	-496
7	Disc Brake Caliper @Left Side	3564	-749	-455
8	Left Rear Seat Cross Member Z	1803	-592	-409
9	Right Rear Seat Cross Member Z	1833	593	-411

X – From rear surface of vehicle (+ forward)

Y – From vehicle centerline (+ right)

Z – From ground plane (+ up)

** Accelerometer was not requested by the COTR

DATA SHEET NO.8
SUMMARY OF FMVSS 212 and FMVSS 219 (Partial) DATA

DETAILS OF WINDSHIELD MOUNTING SUCH AS RETENTION METHOD, TRIM TYPE, ETC.:

Windshield is bonded in place and covered with a 12 mm molding.

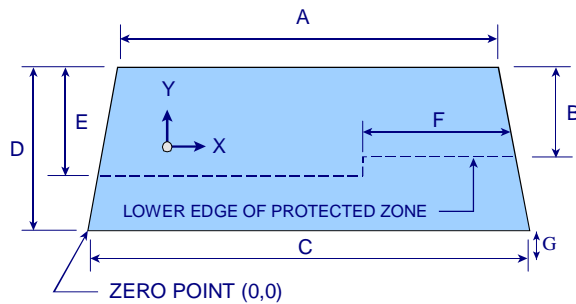
FMVSS 212 REQUIREMENTS:

The Post-Test periphery retention amount must be at least 75% of the Pre-Test periphery measurement for vehicles NOT equipped with automatic restraints, and 50% for each side of the windshield for vehicles equipped with automatic restraint systems for front occupants,

Temperature of windshield molding during test: 21°C.

FMVSS 212 TEST DATA

	WINDSHIELD PERIPHERY		% OF RETENTION
	PRE-TEST (mm)	POST-TEST (mm)	
RIGHT SIDE	2075.0	2075.0	100.0%
LEFT SIDE	2075.0	2075.0	100.0%
TOTAL	4150	4150	100.0%



DIMENSIONS (mm)	
A	1180
B	545
C	1440
D	765
E	546
F	507
G	12

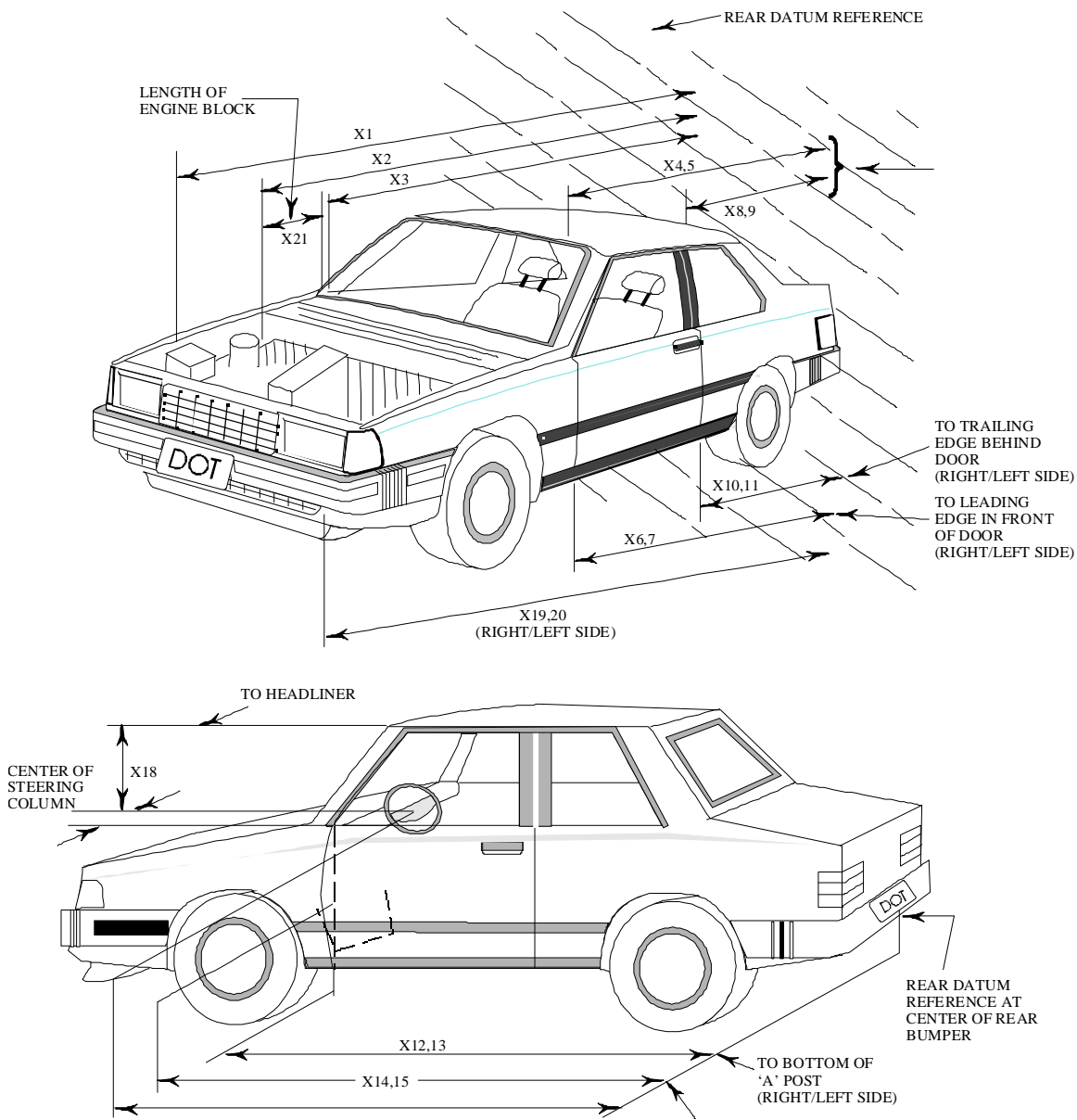
FRONT VIEW OF WINDSHIELD

FAILURE DETAILS: None

DETAILS OF WINDSHIELD GLASS PENETRATION GREATER THAN 6 mm:

	COORDINATES	
	X	Y
1.		
2.		
3.		
4.		

DATA SHEET NO. 10
TEST VEHICLE MEASUREMENTS



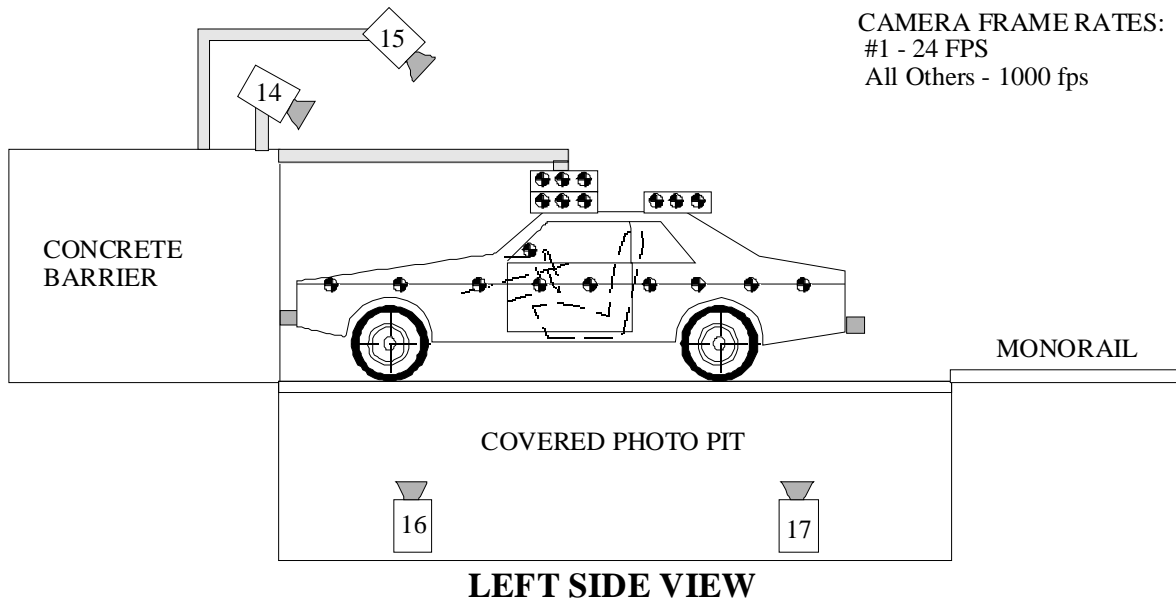
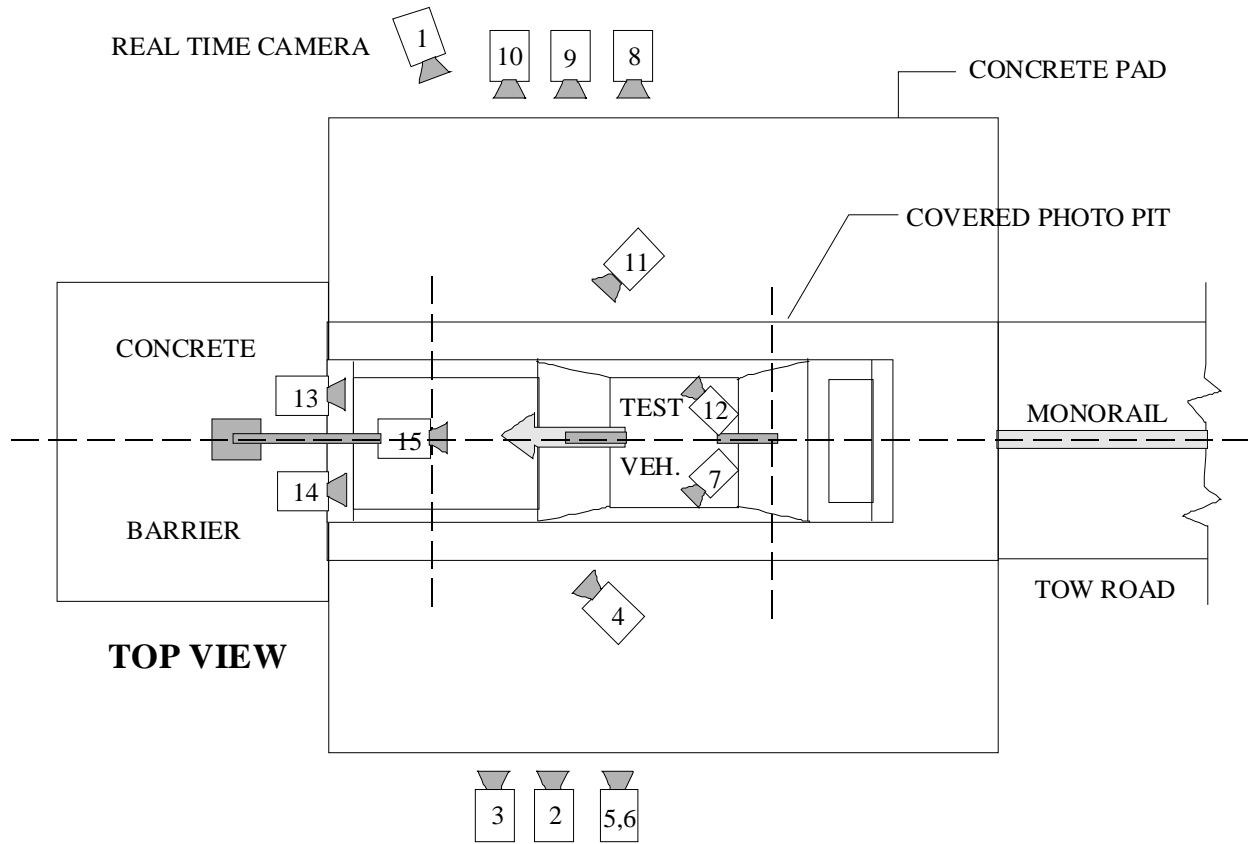
DATA SHEET NO.10
VEHICLE MEASUREMENTS (cont.)

NHTSA TEST No.: M80104 TEST DATE: September 25, 2007
VEHICLE MAKE/MODEL: 2008 Saturn Vue MPV

TARGET VEHICLE STRUCTURAL MEASUREMENTS

	Elements	Pre-Test (mm)
1	Total length	4577
2	Total Width	1764
3	Bumper Top Height	724
4	Bumper Bottom Height	583
5	Longitudinal Member Top Height	590
6	Distance Between Longitudinal Members	1008
7	Longitudinal Member Width	158
8	Engine top height	1034
9	Engine bottom height	220
10	Engine and gearbox width	693
11	Front bumper-engine distance	504
12	Front shock absorber fixing height	992
13	Bonnet leading edge height	937
14	Front shock absorber fixing width	1166
15	Front bumper – front axle distance	924
16	Front axle – A pillar distance	1114
17	A-pillar – B pillar distance	475
18	B-pillar – rear axle distance	1118
19	B-pillar – C Pillar distance	967
20	Roof sill bottom height	1597
21	Roof sill top height	1675
22	Floor sill bottom height	287
23	Floor sill top height	366

DATA SHEET NO.11
HIGH-SPEED CAMERA LOCATIONS



CAMERA FRAME RATES:
#1 - 24 FPS
All Others - 1000 fps

DATA SHEET NO.11
HIGH-SPEED CAMERA LOCATIONS (cont.)

NHTSA Test No.: M80104 Vehicle: 2008 Saturn Vue MPV

CAMERA NO.	VIEW	CAMERA POSITIONS (mm)*			ANGLE (deg)**	FILM PLANE TO HEAD TARGET	LENS (mm)	SPEED (fps)
		X	Y	Z				
1	Real-Time Camera	-	-	-	-	-	-	30
2	Overall Left Side	7191	1695	982	-2.8	6755	24	1000
3	Left Side View	9420	1055	961	-2.4	8984	50	1000
4	Driver and Interior View	7352	2725	2027	-8.9	-	50	500
5	Steering Column (Bottom)	7477	1955	1223	-2.9	7041	24	1000
6	Steering Column (Top)	7477	1955	1809	-8.4	7041	28-70	1000
7	Left CRS Lateral View	3283	2551	2351	-31.3	-	28	1000
8	Overall Right Side	7066	1715	954	-2.8	6630	28	1000
9	Right Side View	9287	1035	995	-2.1	8851	50	1000
10	Right Passenger View	6576	975	1211	-0.1	6140	50	1000
11	Passenger and Interior View	7409	2935	2000	-7.5	-	50	1000
12	Right CRS Lateral View	3021	2558	2190	-24.1	-	28	1000
13	Passenger Front View	620	-92	1987	-30.2	-	25	1000
14	Driver Front View	620	-92	1987	-33.6	-	25	1000
15	Windshield View	0	-530	3374	-51.2	-	25	1000
16	Pit View of Engine	0	615	-3048	90	-	13	1000
17	Pit View of Fuel Tank	0	2421	-3048	90	-	13	1000

*X = film plane to monorail centerline ** = referenced to horizontal plane

Y = film plane to impact location N.T. indicates No Timing

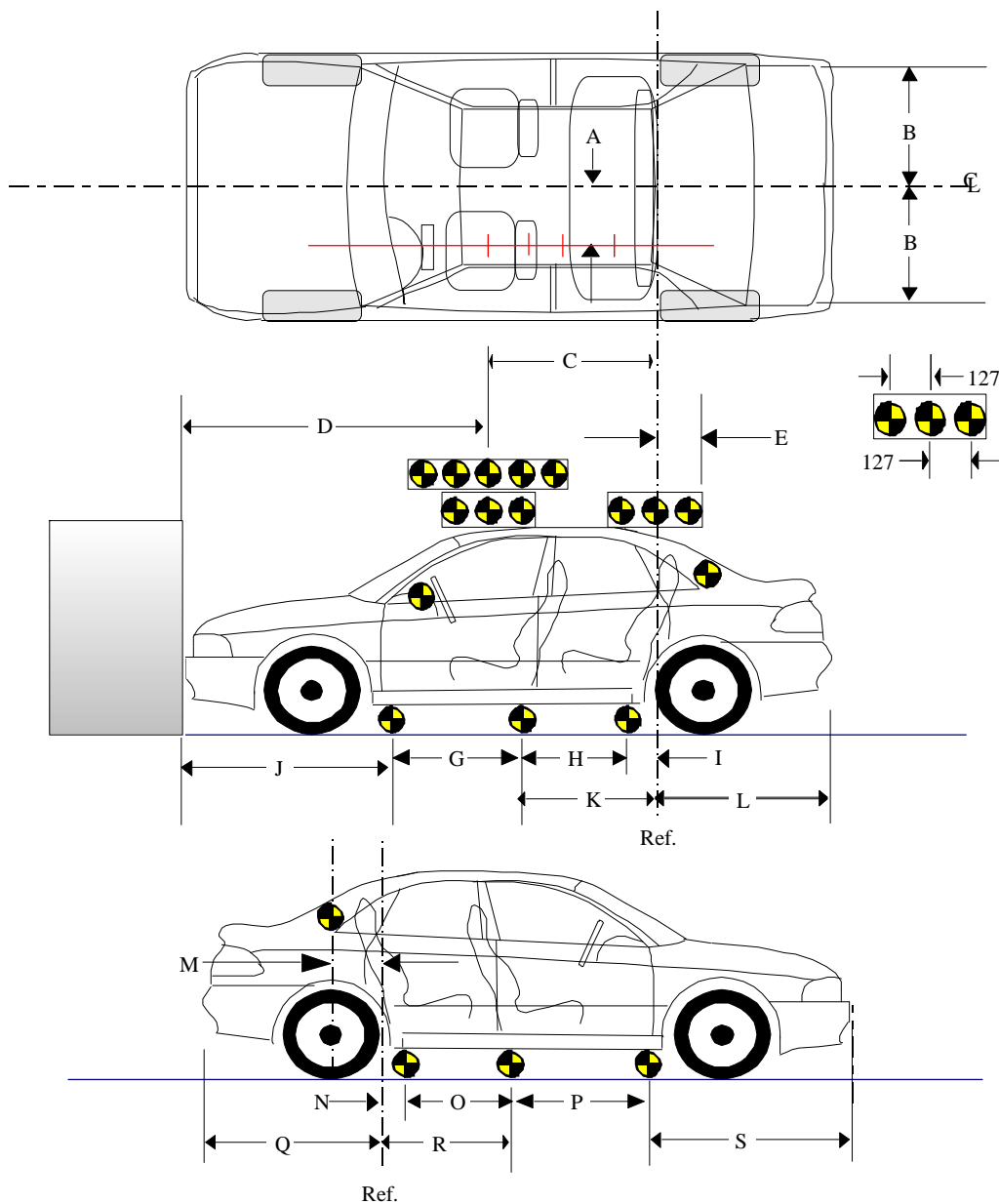
Z = film plane to ground

DATA SHEET NO. 12
VEHICLE REFERENCE PHOTO TARGET LOCATIONS

NHTSA Test No.: M80104 Vehicle: 2008 Saturn Vue MPV

(Dimensions in millimeters)

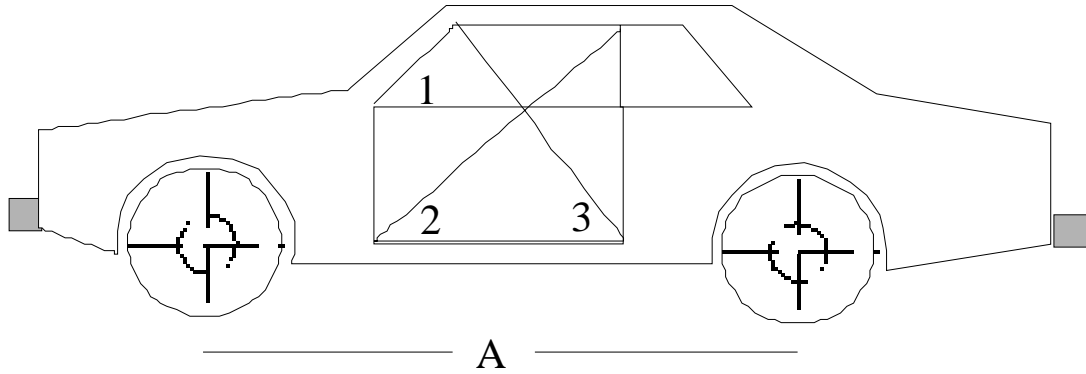
A	360
B	690
C	1221
D	2036
E	697
F	1535
G	972
H	771
I	123
J	1412
K	894
L	1299
M	1320
N	120
O	972
P	768
Q	1307
R	1092
S	1410



DATA SHEET NO. 13
VEHICLE INTRUSION MEASUREMENTS

NHTSA Test No.: M80104 Vehicle: 2008 Saturn Vue MPV

DOOR OPENING WIDTH AND WHEELBASE MEASUREMENTS



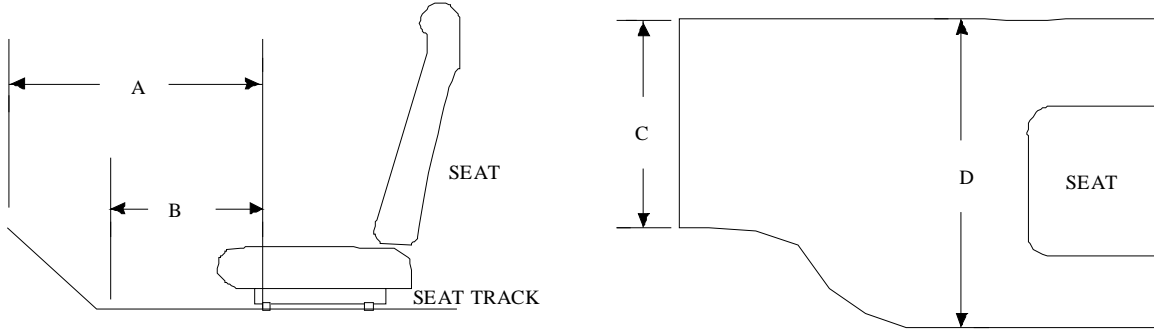
UNITS (mm)	LEFT			RIGHT		
MEASUREMENT	1	2	3	1	2	3
BEFORE TEST	957	1511	1108	956	1503	1109
AFTER TEST	952	1513	1110	953	1505	1110
DIFFERENCE	5	-2	-2	3	-2	-1

UNITS (mm)	A = WHEELBASE LEFT	A = WHEELBASE RIGHT
BEFORE TEST	2706	2706
AFTER TEST	2670	2663
DIFFERENCE	37	43

DATA SHEET NO.13
VEHICLE INTRUSION MEASUREMENTS (cont)

NHTSA Test No.: M80104 Vehicle: 2008 Saturn Vue MPV

STATIC FOOTWELL DEFORMATION



DRIVER

Measurement	Pre-Test	Post-Test	Difference
A	655	622	33
B	491	485	6
C	526	528	-2
D	534	524	10

PASSENGER

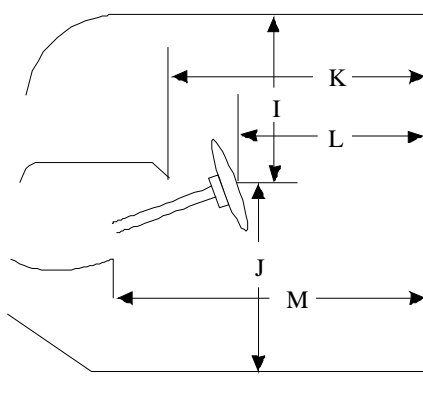
Measurement	Pre-Test	Post-Test	Difference
A	695	657	38
B	523	520	3
C	479	470	9
D	527	510	17

Units = mm

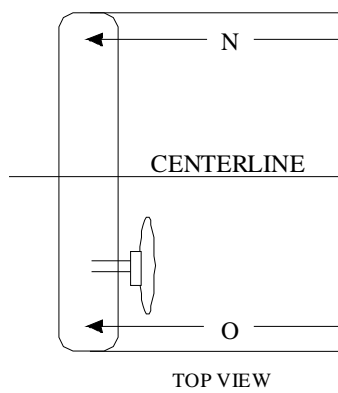
DATA SHEET NO.13
VEHICLE INTRUSION MEASUREMENTS (cont.)

NHTSA Test No.: M80104 Vehicle: 2008 Saturn Vue MPV

STATIC PASSENGER COMPARTMENT INTRUSION

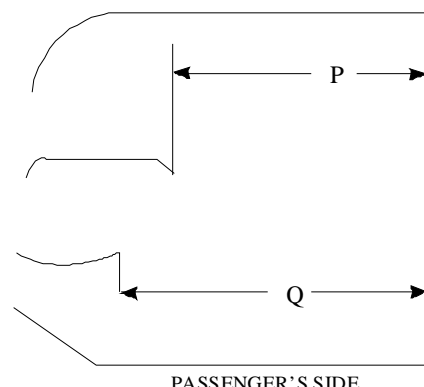


DRIVER'S SIDE



TOP VIEW

MEASUREMENTS
FROM C-PILLAR
BELT ANCHORAGE



PASSENGER'S SIDE

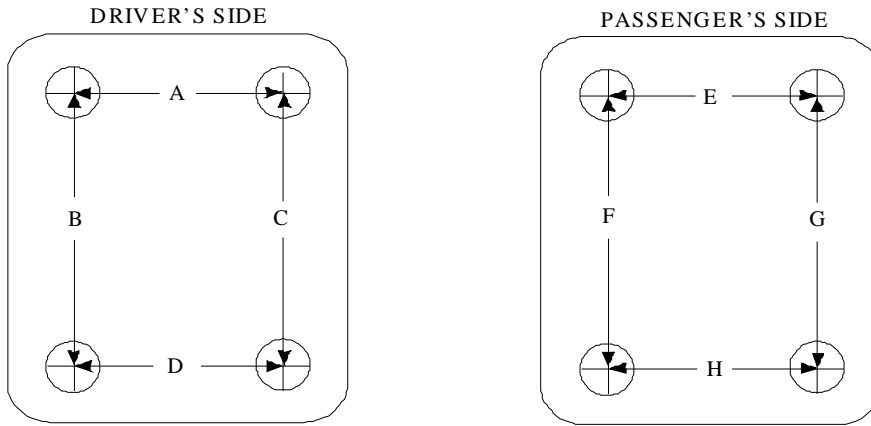
Measurement	Pre-Test	Post-Test	Difference
I	443	475	-32
J	709	693	16
K	766	757	9
L	574	607	-33
M	762	771	-9
N	757	756	1
O	754	741	13
P = K (PASS.)	867	872	-5
Q = M (PASS.)	764	765	-1

Units = mm

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

NHTSA Test No.: M80104 Vehicle: 2008 Saturn Vue MPV

FLOORBOARD DEFORMATION



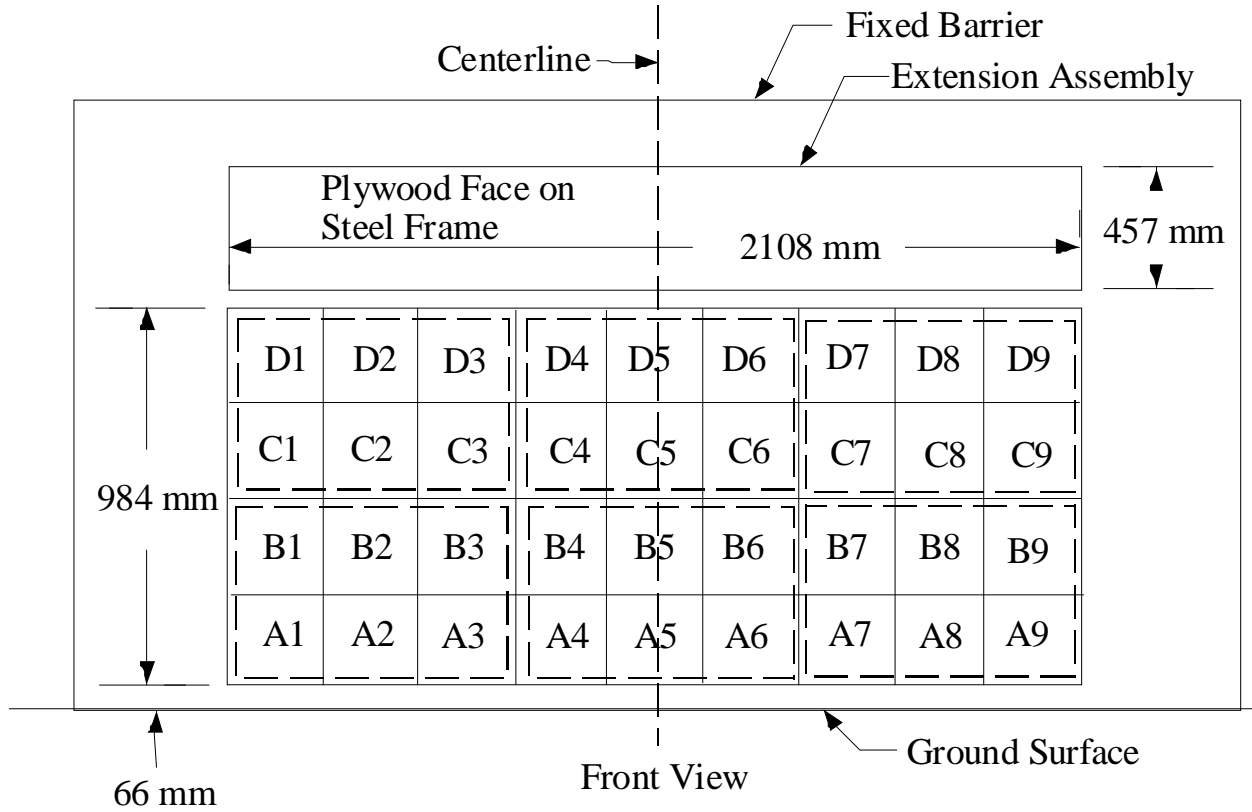
TOP VIEW THROUGH FLOOR PAN

Measurement	Pre-Test	Post-Test	Difference
A	526	528	-2
B	359	338	21
C	345	338	7
D	534	524	10
E	479	470	9
F	336	337	-1
G	291	287	4
H	527	510	17

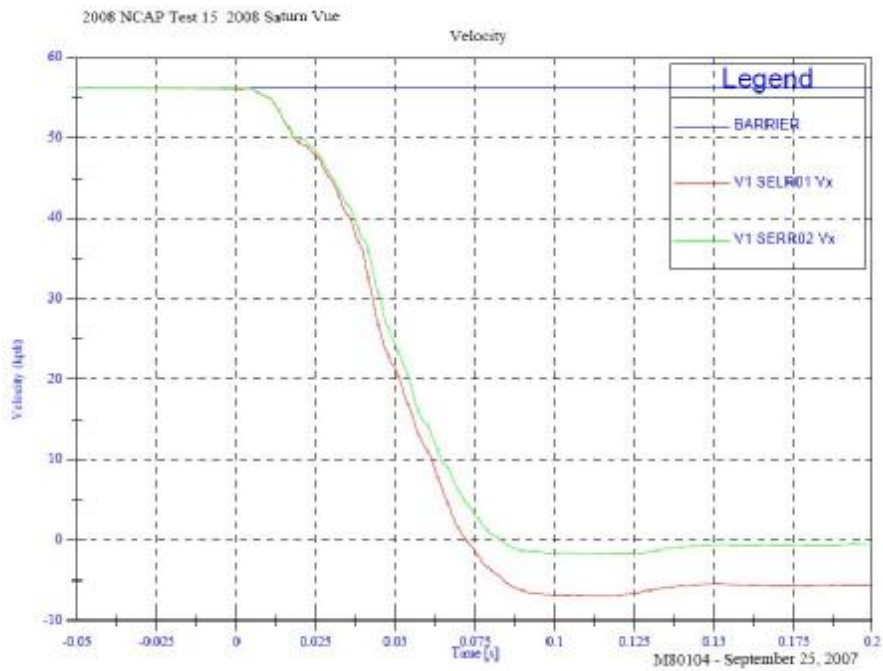
Units = mm

DATA SHEET NO.14
LOAD CELL LOCATIONS ON FIXED BARRIER

36 Load Cells
4 Rows
9 Columns



Momentum Plot



DATA SHEET NO. 15
ACCIDENT INVESTIGATION DIVISION DATA
FOR FRONTAL BARRIER IMPACT

Vehicle Make/Model/Body Style: Saturn Vue MPV

NHTSA Test No.: M80104 VIN: 3GSDL43N08S530985

Model Year: 2008 Build Date: 07/07 Test Date: September 25, 2007

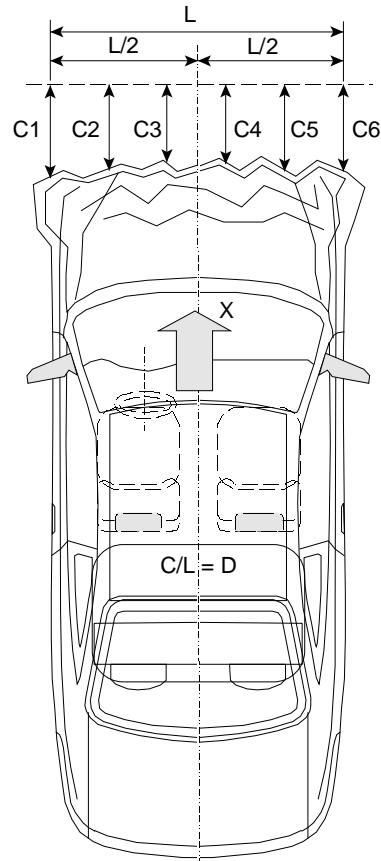
Vehicle Size Category: MPV Test Weight: 2083 kg

Vehicle Wheelbase: 2706 mm; Front Overhang: 925 mm; Overall Width: 1764 mm

Collision Deformation Classification (CDC) Code: 12FDEW3

Crush Depth Dimensions

	PRE (mm)	POST (mm)	DIFF (mm)
C1 =	4369	4023	346
C2 =	4530	4012	518
C3 =	4564	4041	523
C4 =	4562	4038	524
C5 =	4525	4003	522
C6 =	4366	4010	356



Midpoint of Damage: D = Vehicle Centerline (Longitudinal)

Length of Damaged Region:

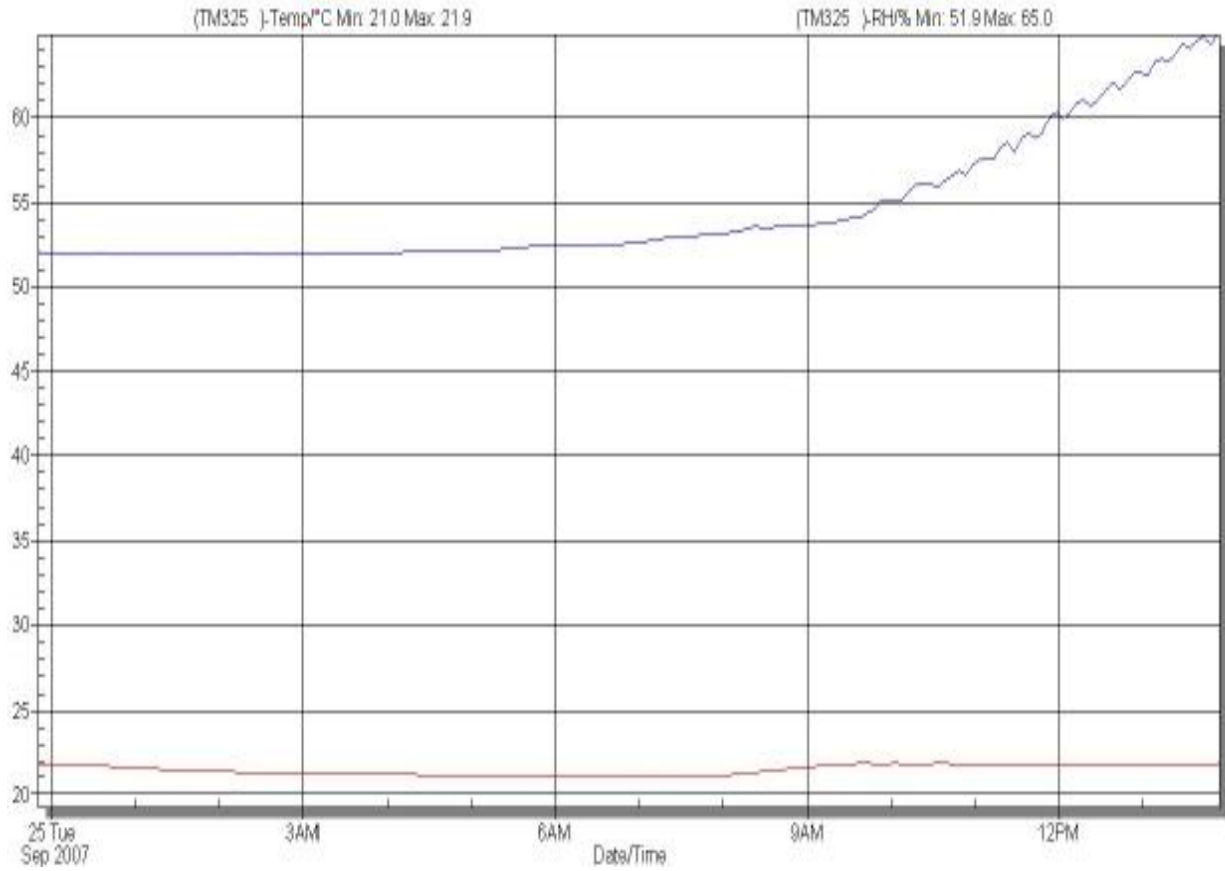
L1=	<u>1397</u>	mm
L2=	<u>698.5</u>	mm
L5=	<u>279.4</u>	mm

DATA SHEET NO.16
VEHICLE AND DUMMY TEMPERATURE STABILIZATION CHART

NHTSA Test No.: M80104 Vehicle: 2008 Saturn Vue MPV

9/25/2007 3:39:40.9

Downloaded Data - Tuesday, September 25, 2007



APPENDIX A
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

<u>Figure</u>	<u>Title</u>	<u>Page</u>
A-1	Load Cell Locations	A-4
A-2	Vehicle Certification Placard	A-5
A-3	Tire Placard	A-5
A-4	Right Front, As Received	A-6
A-5	Left Rear, As Received	A-6
A-6	Pre-Test Front View	A-7
A-7	Post-Test Front View	A-7
A-8	Pre-Test Left Side View	A-8
A-9	Post-Test Left Side View	A-8
A-10	Pre-Test Right Side View	A-9
A-11	Post-Test Right Side View	A-9
A-12	Pre-Test Right Front Three-Quarter View	A-10
A-13	Post-Test Right Front Three-Quarter View	A-10
A-14	Pre-Test Left Rear Three-Quarter View	A-11
A-15	Post-Test Left Rear Three-Quarter View	A-11
A-16	Left Rear Three-Quarter View Of Doors After Impact	A-12
A-17	Right Rear Three-Quarter View Of Doors After Impact	A-12
A-18	Pre-Test Windshield View	A-13
A-19	Post-Test Windshield View	A-13
A-20	Pre-Test Engine Compartment View	A-14
A-21	Post-Test Engine Compartment View	A-14
A-22	Pre-Test Fuel Cap View	A-15
A-23	Post-Test Fuel Cap View	A-15
A-24	Pre-Test Front Underbody View	A-16
A-25	Post-Test Front Underbody View	A-16
A-26	Pre-Test Mid Underbody View	A-17
A-27	Post-Test Mid Underbody View	A-17
A-28	Pre-Test Rear Underbody View	A-18
A-29	Post-Test Rear Underbody View	A-18
A-30	Pre-Test Driver Head Location	A-19
A-31	Post-Test Driver Head Location	A-19
A-32	Pre-Test Driver Position View	A-20
A-33	Post-Test Driver Position View	A-20
A-34	Pre-Test Driver And Interior View	A-21
A-35	Post-Test Driver And Interior View	A-21
A-36	Pre-Test Driver Feet View	A-22
A-37	Post-Test Driver Feet View	A-22
A-38	Pre-Test Driver Knee Bolster View	A-23
A-39	Post-Test Driver Knee Bolster View	A-23
A-40	Pre-Test Driver Floor Pan View	A-24
A-41	Post-Test Driver Floor Pan View	A-24
A-42	Post-Test Driver Head View	A-25
A-43	Post-Test Driver Contact To Airbag	A-25

TABLE OF PHOTOGRAPHS (CONTINUED)

<u>Figure</u>	<u>Title</u>	<u>Page</u>
A-44	Pre-Test Passenger Head Location	A-26
A-45	Post-Test Passenger Head Location	A-26
A-46	Pre-Test Passenger Position View	A-27
A-47	Post-Test Passenger Position View	A-27
A-48	Pre-Test Passenger And Interior View	A-28
A-49	Post-Test Passenger And Interior View	A-28
A-50	Pre-Test Passenger Feet View	A-29
A-51	Post-Test Passenger Feet View	A-29
A-52	Pre-Test Passenger Knee Bolster View	A-30
A-53	Post-Test Passenger Knee Bolster View	A-30
A-54	Pre-Test Passenger Floor Pan View	A-31
A-55	Post-Test Passenger Floor Pan View	A-31
A-56	Post-Test Passenger Head View	A-32
A-57	Post-Test Passenger Contact To Airbag	A-32
A-58	Rollover View - 90°	A-33
A-59	Rollover View - 180°	A-33
A-60	Rollover View - 270°	A-34
A-61	Rollover View - 360°	A-34
A-62	Impact View	A-35



Figure A-1: Load Cell Locations



Figure A-2: Vehicle Certification Placard



Figure A-3: Vehicle Tire Placard



Figure A-4: Right Front, As Received



Figure A-5: Left Rear, As Received



Figure A-6: Pre-Test Front View



Figure A-7: Post-Test Front View



Figure A-8: Pre-Test Left Side View



Figure A-9: Post-Test Left Side View



Figure A-10: Pre-Test Right Side View



Figure A-11: Post-Test Right Side View



Figure A-12: Pre-Test Right Front Three-Quarter View



Figure A-13: Post-Test Right Front Three-Quarter View



Figure A-14: Pre-Test Left Rear Three-Quarter View



Figure A-15: Post-Test Left Rear Three-Quarter View



Figure A-16: Left Rear Three-Quarter View of Doors After Impact



Figure A-17: Right Rear Three-Quarter View of Doors After Impact



Figure A-18: Pre-Test Windshield View



Figure A-19: Post-Test Windshield View

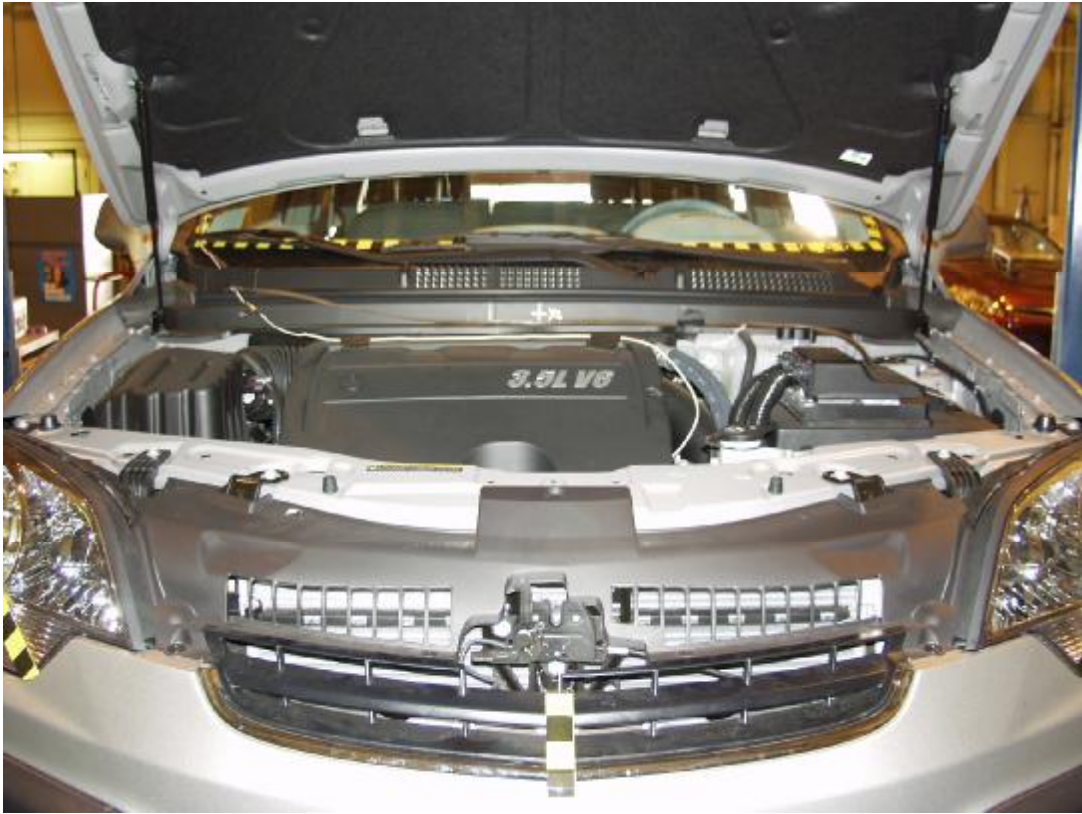


Figure A-20: Pre-Test Engine Compartment View



Figure A-21: Post-Test Engine Compartment View



Figure A-22: Pre-Test Fuel Cap View

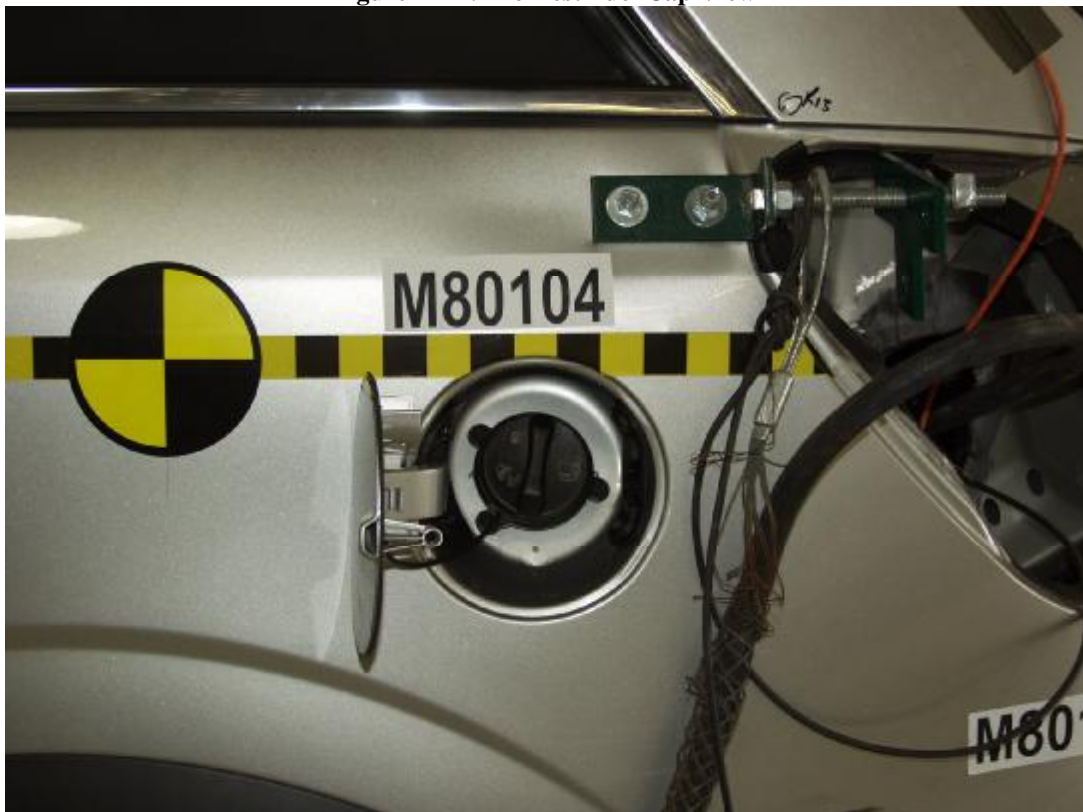


Figure A-23: Post-Test Fuel Cap View



Figure A-24: Pre-Test Front Underbody View



Figure A-25: Post-Test Front Underbody View



Figure A-26: Pre-Test Mid Underbody View



Figure A-27: Post-Test Mid Underbody View



Figure A-28: Pre-Test Rear Underbody View



Figure A-29: Post-Test Rear Underbody View



Figure A-30: Pre-Test Driver Head Location



Figure A-31: Post-Test Driver Head Location



Figure A-32: Pre-Test Driver Position View



Figure A-33: Post-Test Driver Position View



Figure A-34: Pre-Test Driver and Interior View



Figure A-35: Post-Test Driver and Interior View



Figure A-36: Pre-Test Driver Feet View



Figure A-37: Post-Test Driver Feet View



Figure A-38: Pre-Test Driver Knee Bolster View



Figure A-39: Post-Test Driver Knee Bolster View



Figure A-42: Post-Test Driver Head View



Figure A-43: Post-Test Driver Contact to Airbag



Figure A-44: Pre-Test Passenger Head Location

Figure A-45: Post-Test Passenger Head Location



Figure A-46: Pre-Test Passenger Position View



Figure A-47: Post-Test Passenger Position View



Figure A-48: Pre-Test Passenger and Interior View



Figure A-49: Post-Test Passenger and Interior View



Figure A-50: Pre-Test Passenger Feet View



Figure A-51: Post-Test Passenger Feet View



Figure A-52: Pre-Test Passenger Knee Bolster View



Figure A-53: Post-Test Passenger Knee Bolster View



Figure A-54: Pre-Test Passenger Floor Pan View



Figure A-55: Post-Test Passenger Floor Pan View



Figure A-56: Post-Test Passenger Head View



Figure A-57: Post-Test Passenger Contact to Airbag



Figure A-58: Rollover View - 90°



Figure A-59: Rollover View - 180°



Figure A-60: Rollover View - 270°



Figure A-61: Rollover View - 360°



Figure A-62: Impact View

APPENDIX B

DUMMY, VEHICLE AND LOAD CELL BARRIER RESPONSE DATA

**Hybrid III Dummy Sign Conventions
Load Cells and Special Transducers**

Transducer	SAE Sign Convention (positive unless noted)
Upper Neck Load Cell	Fx Head rearward Fy Head left Fz Neck in tension Mx Left ear to left shoulder My Chin to chest (flexion) Mz Chin to left shoulder (look left)
Chest Displacement Potentiometer	Compression is negative
Pelvic Load Cell (Lower Lumbar)	Fx Chest rearward Fy Chest left Fz Spine in tension
Femur Load Cell	Compression is negative
Upper Tibia Load Cell (right and left leg)	Mx Support tibia at ends, load left side center My Support tibia at ends, load front (shin) center
Lower Tibia Load Cell (right and left leg)	Fz Tibia in tension Mx Support tibia at ends, load left side center My Support tibia at ends, load front (shin) center

DATA CHANNEL FILTER CLASS SUMMARY

NHTSA TEST NO.: M80104

DATA TYPE	SAE FILTER CLASS (Hz)
Dummy Head Accelerations	1000
Dummy Chest Accelerations	180
Dummy Chest Displacements	600
Dummy Femur Forces	600
Dummy Belt Loads	60
Dummy Belt Displacements	180
Dummy Neck Forces	1000
Dummy Neck Moments	600
Vehicle Accelerations	60
Vehicle Velocity Integrations	180
Vehicle Displacement Integrations	180
Load Cell Barrier Forces	60

Table of Data Plots

PLOT	PLOT NAME[UNITS, CHANNEL FILTER CLASS]	PAGE
1	V1P1 Head CG x [g, CFC_1000]	B-8
2	V1P1 Head CG y [g, CFC_1000]	B-8
3	V1P1 Head CG z [g, CFC_1000]	B-8
4	V1P1 Head CG Resultant [g, CFC_1000]	B-8
5	V1P1 Chest x [g, CFC_180]	B-9
6	V1P1 Chest y [g, CFC_180]	B-9
7	V1P1 Chest z [g, CFC_180]	B-9
8	V1P1 Chest Resultant [g, CFC_180]	B-9
9	V1P1 Chest Compression x [mm, CFC_600]	B-10
10	V1P1 Left Femur z [N, CFC_600]	B-11
11	V1P1 Right Femur z [N, CFC_600]	B-11
12	V1P2 Head CG x [g, CFC_1000]	B-12
13	V1P2 Head CG y [g, CFC_1000]	B-12
14	V1P2 Head CG z [g, CFC_1000]	B-12
15	V1P2 Head CG Resultant [g, CFC_1000]	B-12
16	V1P2 Chest x [g, CFC_180]	B-13
17	V1P2 Chest y [g, CFC_180]	B-13
18	V1P2 Chest z [g, CFC_180]	B-13
19	V1P2 Chest Resultant [g, CFC_180]	B-13
20	V1P2 Chest Compression x [mm, CFC_600]	B-14
21	V1P2 Left Femur z [N, CFC_600]	B-15
22	V1P2 Right Femur z [N, CFC_600]	B-15

The following dummy, vehicle and load cell response data can be found in the research and development section of the NHTSA website at: www.nhtsa.dot.gov

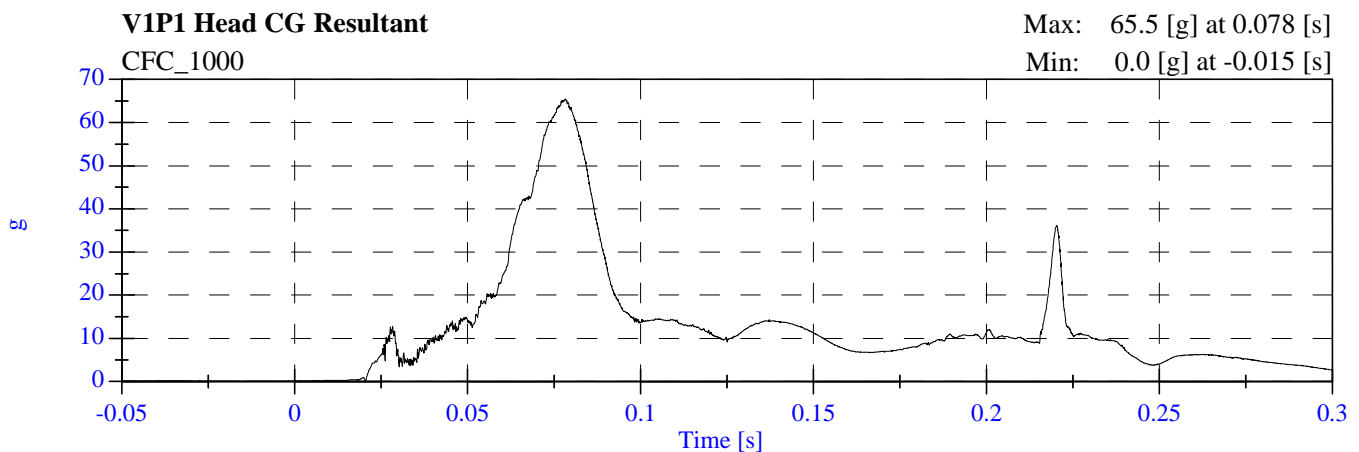
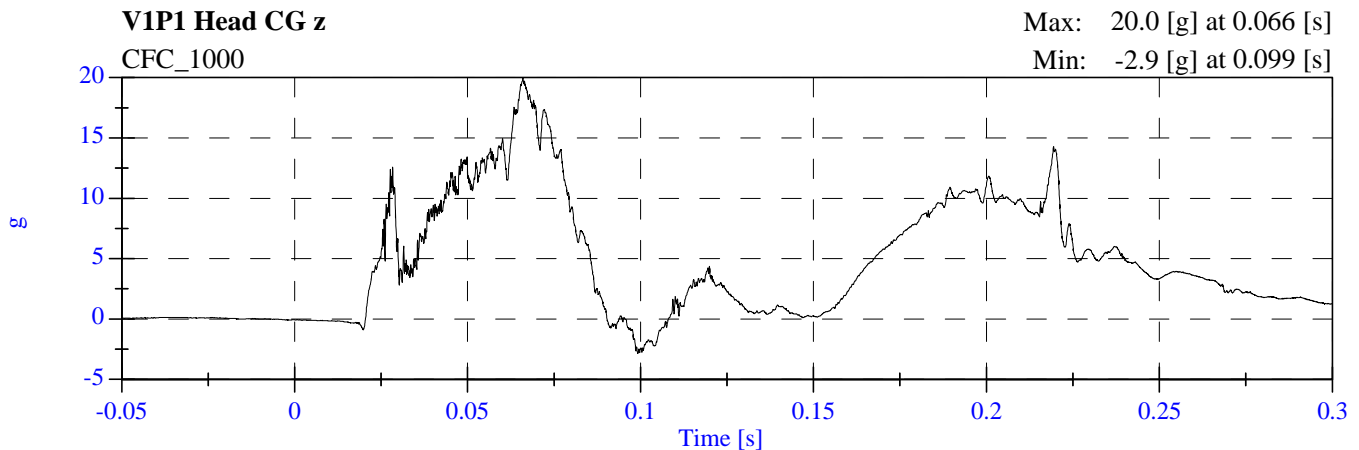
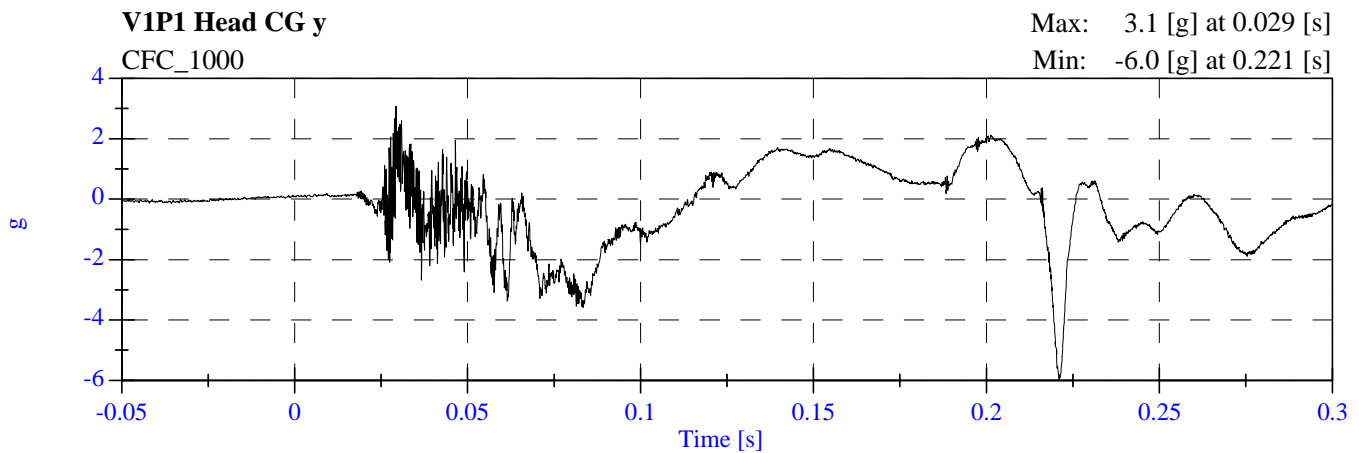
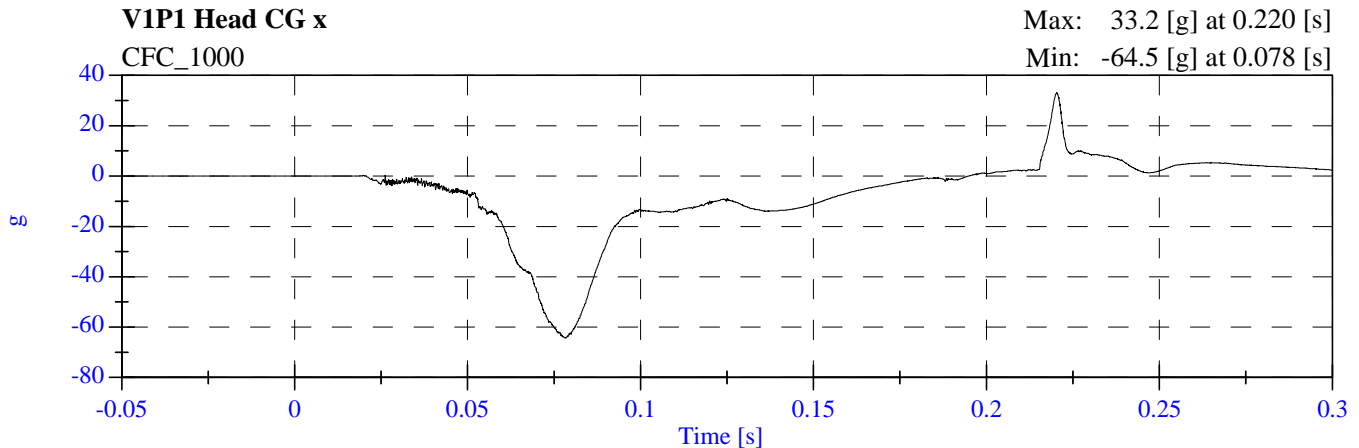
V1P1 Head 9 Array X Arm Ay	V1P1 Lap Belt Load
V1P1 Head 9 Array X Arm Az	V1P1 Shoulder Belt Load
V1P1 Head 9 Array Y Arm Ax	V1P2 Lap Belt Load
V1P1 Head 9 Array Y Arm Az	V1P2 Shoulder Belt Load
V1P1 Head 9 Array Z Arm Ax	V1 Left Rear #1x
V1P1 Head 9 Array Z Arm Ay	V1 Right Rear #2x
V1P1 Head CG Ax	V1 Engine Top #3x
V1P1 Head CG Ay	V1 Engine Bottom #4x
V1P1 Head CG Az	V1 Right Caliper #5x
V1P1 Head CG Red Ax	V1 Left Caliper #7x
V1P1 Head CG Red Ay	V1 Left Rear #8z
V1P1 Head CG Red Az	V1 Right Rear #9z
V1P1 Upper Neck Fx	
V1P1 Upper Neck Fy	
V1P1 Upper Neck Fz	
V1P1 Upper Neck Mx	
V1P1 Upper Neck My	
V1P1 Upper Neck Mz	
V1P1 Chest Ax	
V1P1 Chest Ay	
V1P1 Chest Az	
V1P1 Chest Red Ax	
V1P1 Chest Red Ay	
V1P1 Chest Red Az	
V1P1 Chest Compression	
V1P1 Pelvic Ax	
V1P1 Pelvic Ay	
V1P1 Pelvic Az	
V1P1 Left Femur Fz	
V1P1 Right Femur Fz	
V1P1 Left Upper Tibia Mx	
V1P1 Left Upper Tibia My	
V1P1 Left Lower Tibia Fz	
V1P1 Left Lower Tibia Mx	
V1P1 Left Lower Tibia My	
V1P1 Right Upper Tibia Fz	
V1P1 Right Upper Tibia Mx	
V1P1 Right Upper Tibia My	
V1P1 Right Lower Tibia Mx	
V1P1 Right Lower Tibia My	
V1P1 Left Foot Aft Ax	
V1P1 Left Foot Aft Az	
V1P1 Left Foot Fore Az	
V1P1 Right Foot Aft Ax	
V1P1 Right Foot Aft Az	
V1P1 Right Foot Fore z	
V1P2 Head 9 Array X Arm Ay	

V1P2 Head 9 Array X Arm Az	
V1P2 Head 9 Array Y Arm Ax	
V1P2 Head 9 Array Y Arm Az	
V1P2 Head 9 Array Z Arm Ax	
V1P2 Head 9 Array Z Arm Ay	
V1P2 Head CG Ax	
V1P2 Head CG Ay	
V1P2 Head CG Az	
V1P2 Head CG Red Ax	
V1P2 Head CG Red Ay	
V1P2 Head CG Red Az	
V1P2 Upper Neck Fx	
V1P2 Upper Neck Fy	
V1P2 Upper Neck Fz	
V1P2 Upper Neck Mx	
V1P2 Upper Neck My	
V1P2 Upper Neck Mz	
V1P2 Chest Ax	
V1P2 Chest Ay	
V1P2 Chest Az	
V1P2 Chest Red Ax	
V1P2 Chest Red Ay	
V1P2 Chest Red Az	
V1P2 Chest Compression	
V1P2 Pelvic Ax	
V1P2 Pelvic Ay	
V1P2 Pelvic Az	
V1P2 Left Femur Fz	
V1P2 Right Femur Fz	
V1P2 Left Upper Tibia Fz	
V1P2 Left Upper Tibia Mx	
V1P2 Left Upper Tibia My	
V1P2 Left Lower Tibia Mx	
V1P2 Left Lower Tibia My	
V1P2 Right Upper Tibia Mx	
V1P2 Right Upper Tibia My	
V1P2 Right Lower Tibia Fz	
V1P2 Right Lower Tibia Mx	
V1P2 Right Lower Tibia My	
V1P2 Left Foot Aft Ax	
V1P2 Left Foot Aft Az	
V1P2 Left Foot Fore Az	
V1P2 Right Foot Aft Ax	
V1P2 Right Foot Aft Az	
V1P2 Right Foot Fore Az	
Barrier Load Cell A1 Fx	
Barrier Load Cell A2 Fx	
Barrier Load Cell A3 Fx	
Barrier Load Cell A4 Fx	

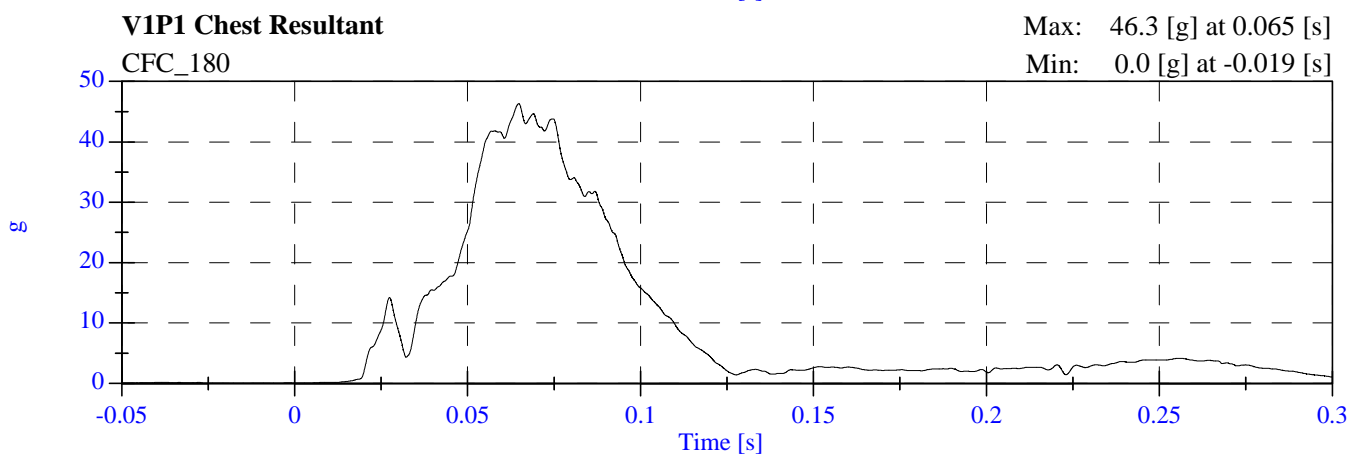
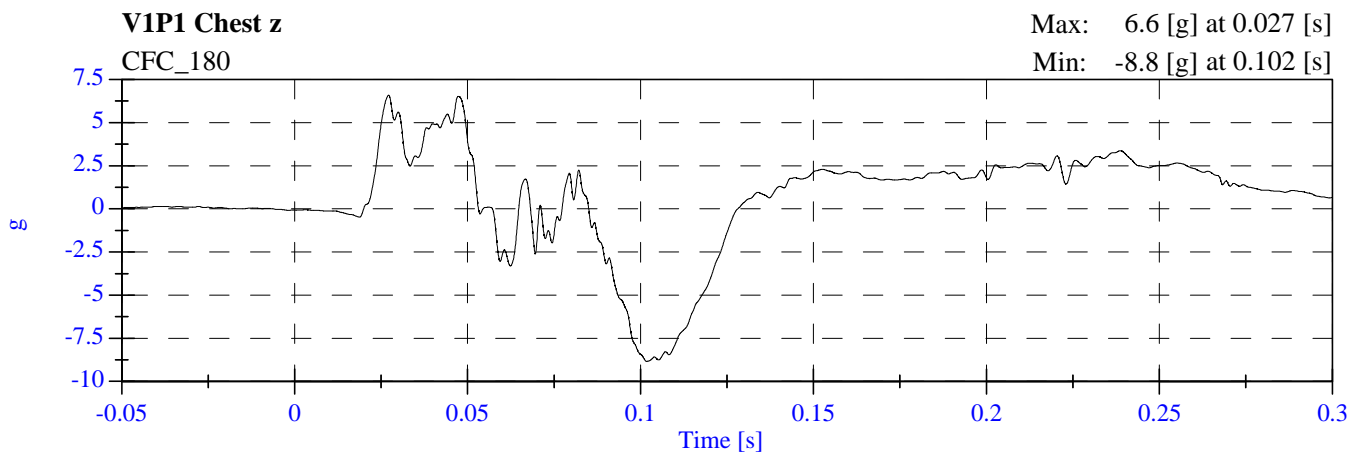
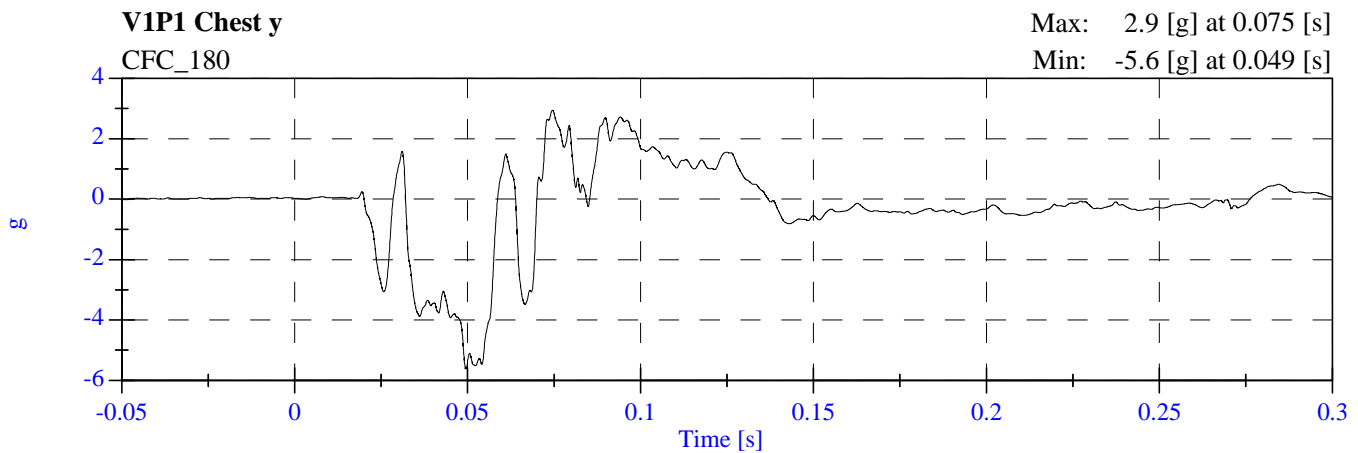
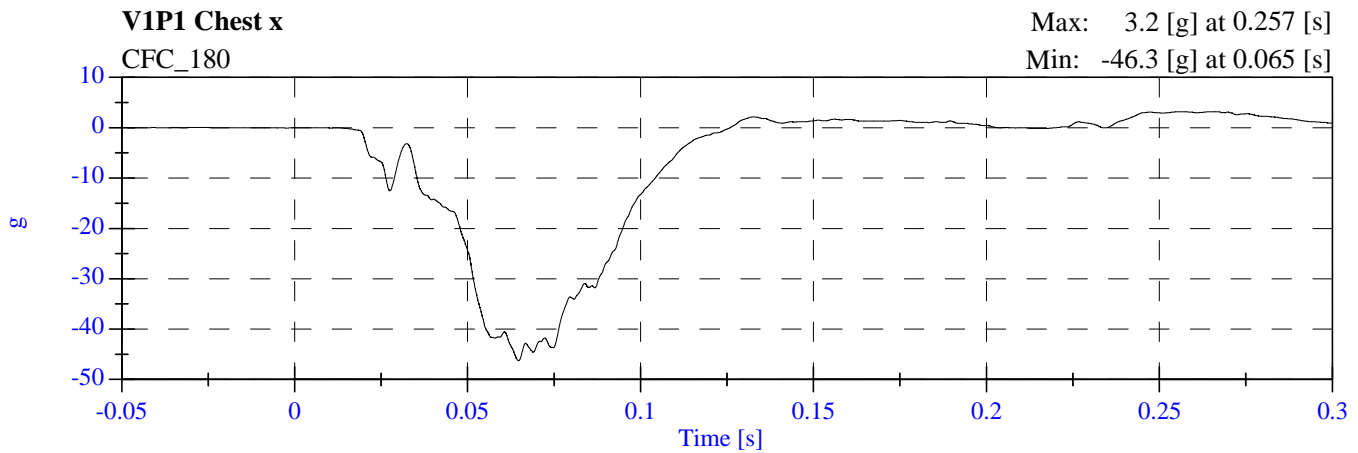
Barrier Load Cell A5 Fx	
Barrier Load Cell A6 Fx	
Barrier Load Cell A7 Fx	
Barrier Load Cell A8 Fx	
Barrier Load Cell A9 Fx	
Barrier Load Cell B1 Fx	
Barrier Load Cell B2 Fx	
Barrier Load Cell B3 Fx	
Barrier Load Cell B4 Fx	
Barrier Load Cell B5 Fx	
Barrier Load Cell B6 Fx	
Barrier Load Cell B7 Fx	
Barrier Load Cell B8 Fx	
Barrier Load Cell B9 Fx	
Barrier Load Cell C1 Fx	
Barrier Load Cell C2 Fx	
Barrier Load Cell C3 Fx	
Barrier Load Cell C4 Fx	
Barrier Load Cell C5 Fx	
Barrier Load Cell C6 Fx	
Barrier Load Cell C7 Fx	
Barrier Load Cell C8 Fx	
Barrier Load Cell C9 Fx	
Barrier Load Cell D1 Fx	
Barrier Load Cell D2 Fx	
Barrier Load Cell D3 Fx	
Barrier Load Cell D4 Fx	
Barrier Load Cell D5 Fx	
Barrier Load Cell D6 Fx	
Barrier Load Cell D7 Fx	
Barrier Load Cell D8 Fx	
Barrier Load Cell D9 Fx	

TEST NOTES	
Data Channel	Anomalies
V1P1 Left Lower Tibia Mx	Channel opened from 61-67 ms
V1P2 Left Lower Tibia Fz	Channel Clipped

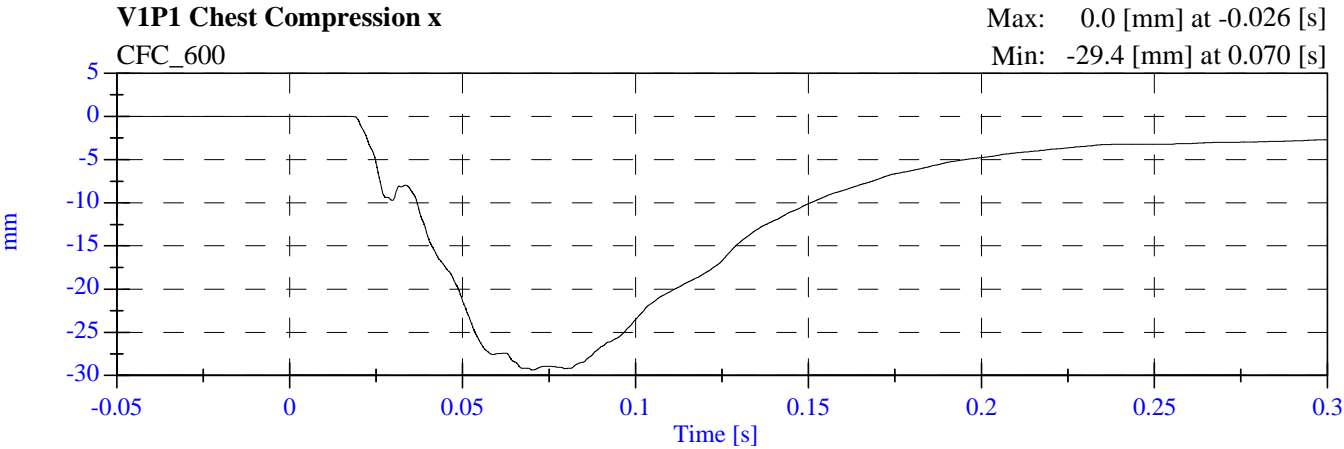
2008 NCAP Test 15 2008 Saturn Vue M80104 - September 25, 2007



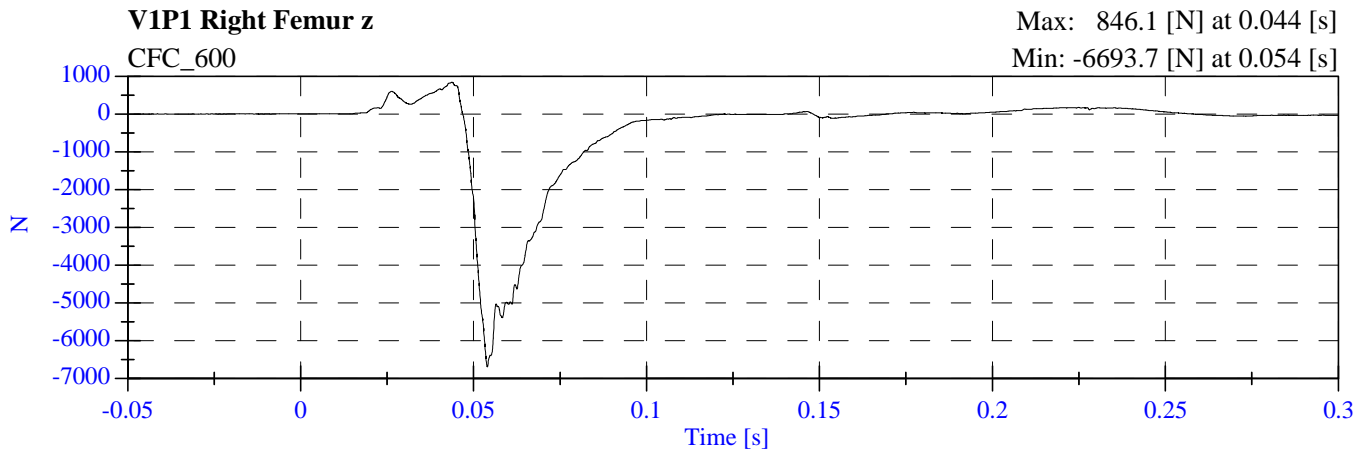
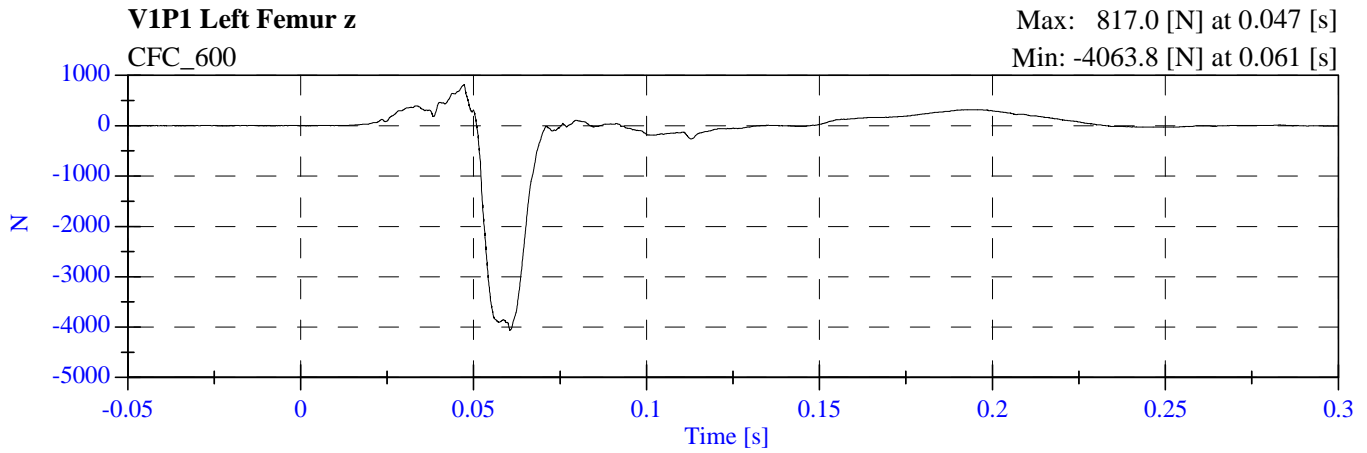
2008 NCAP Test 15 2008 Saturn Vue M80104 - September 25, 2007



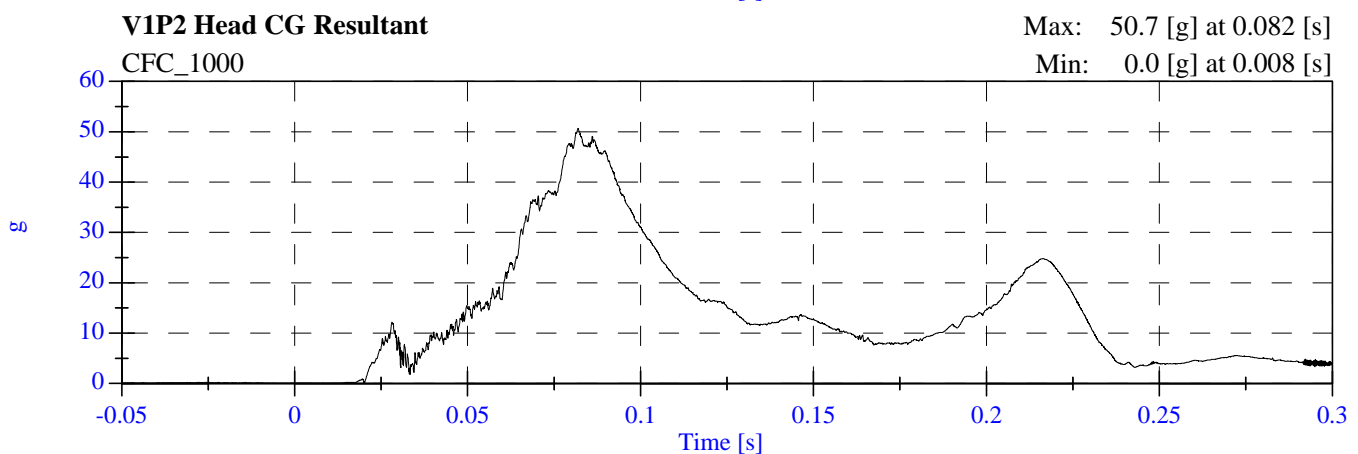
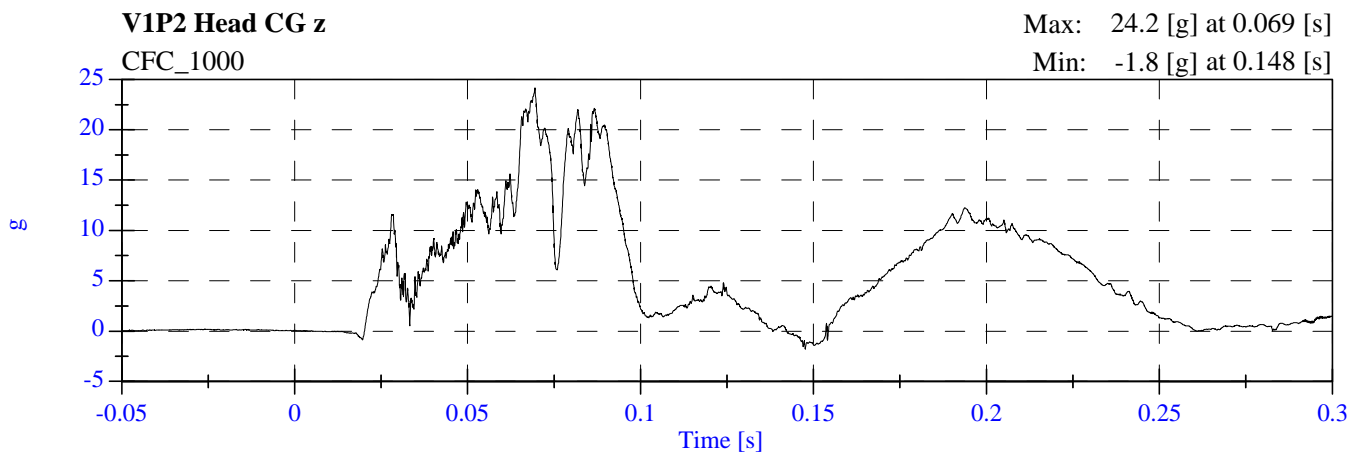
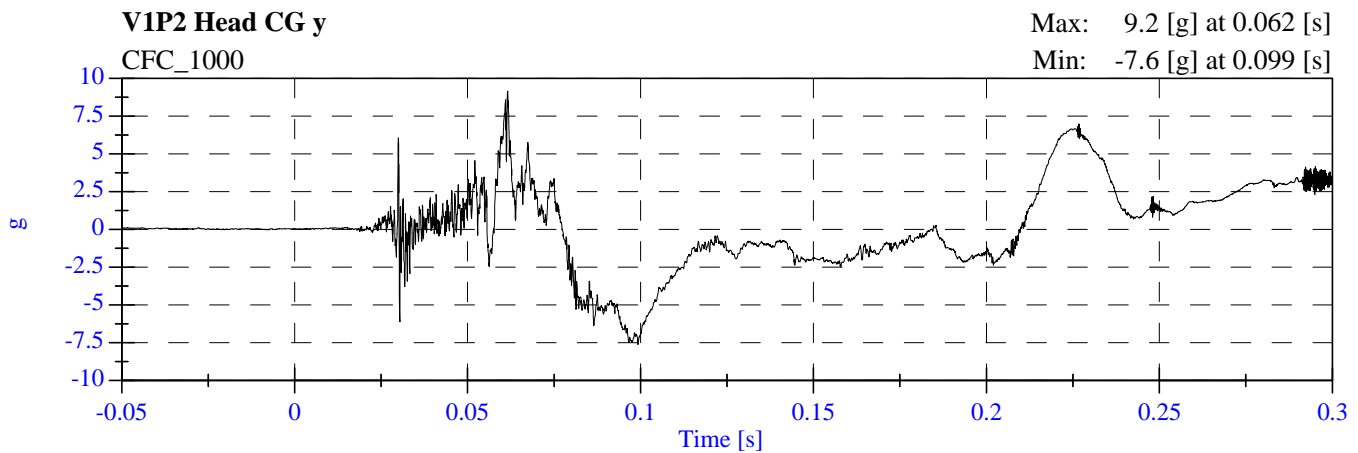
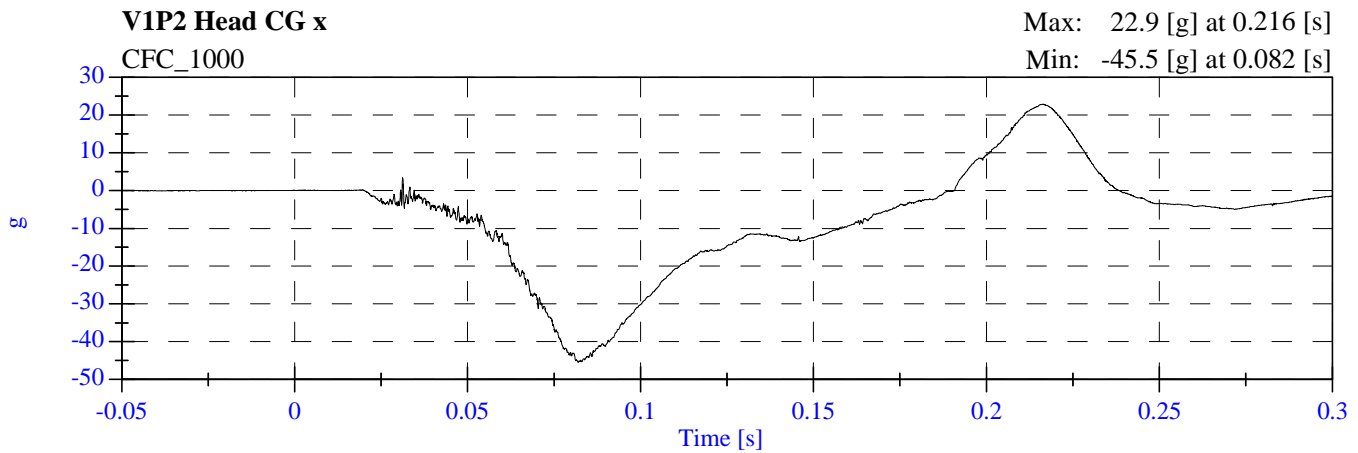
**2008 NCAP Test 15 2008 Saturn Vue
M80104 - September 25, 2007**



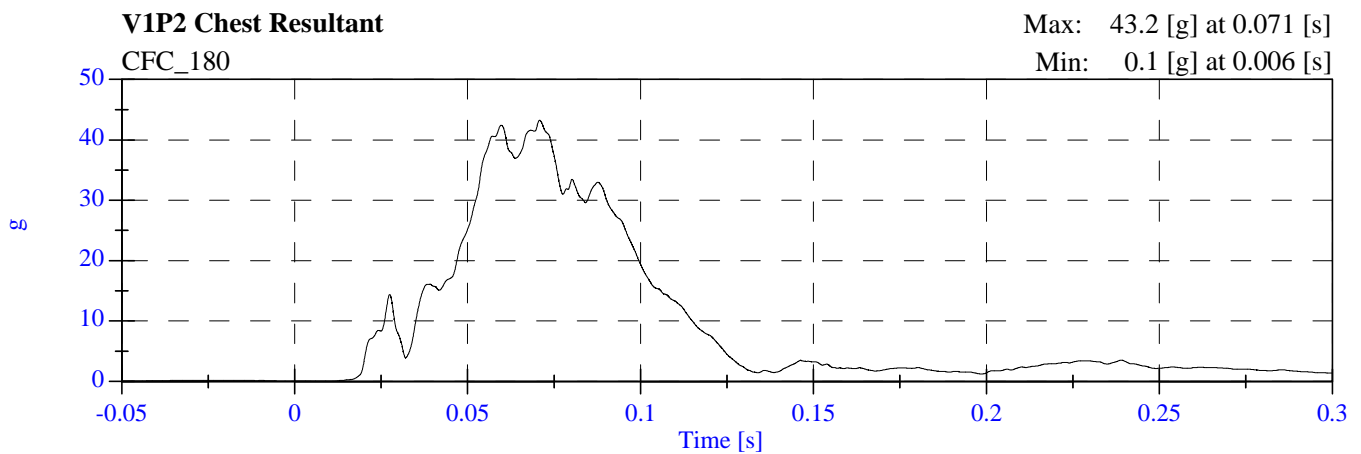
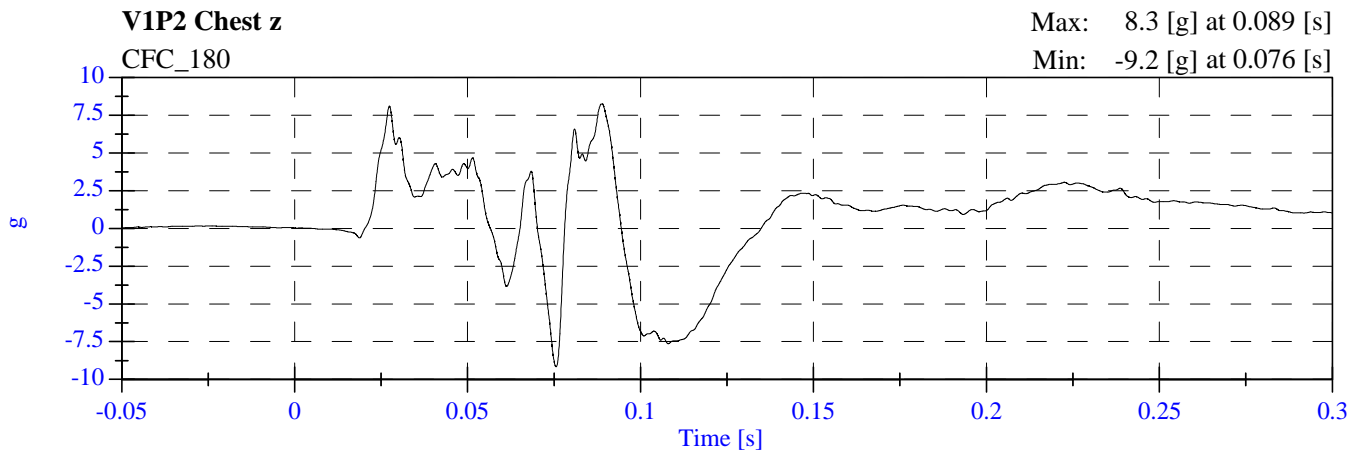
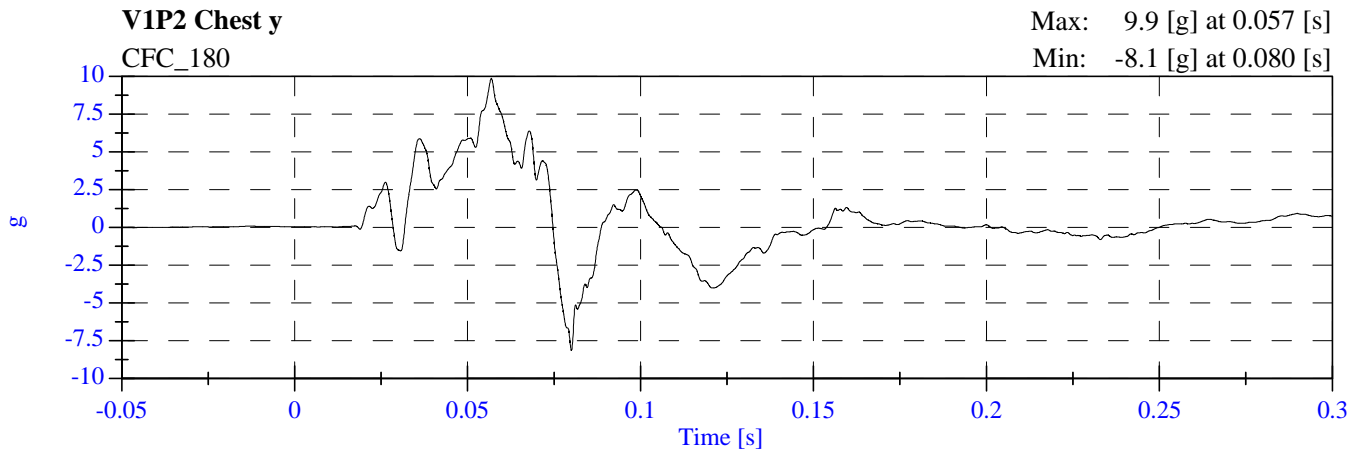
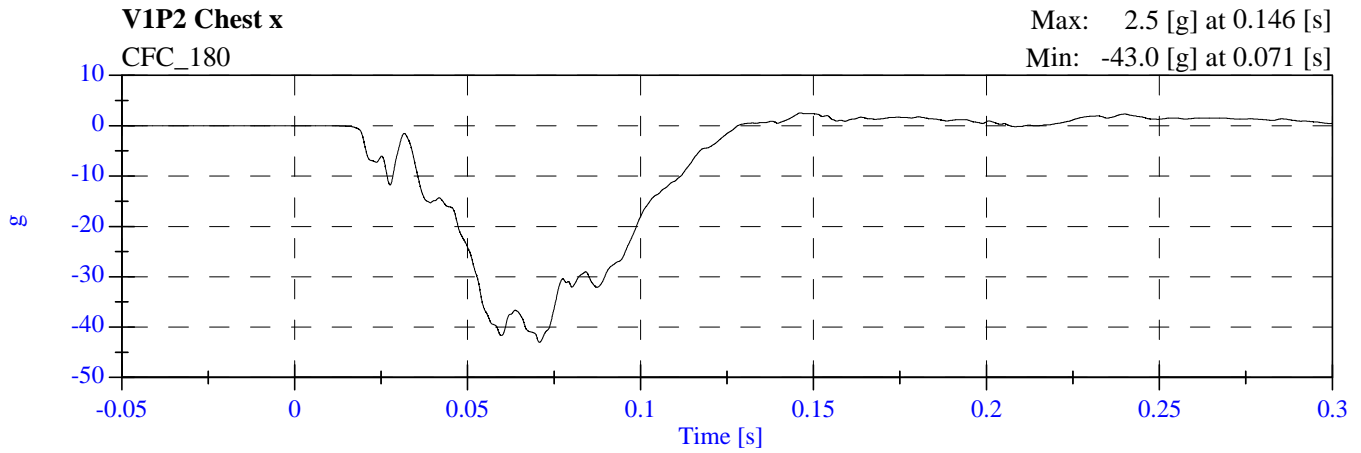
2008 NCAP Test 15 2008 Saturn Vue M80104 - September 25, 2007



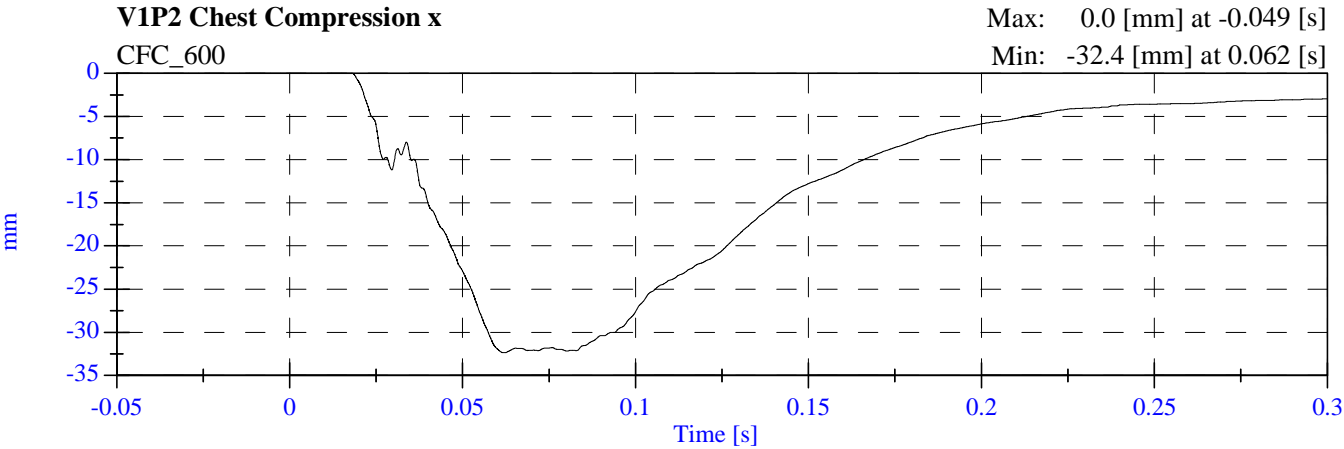
2008 NCAP Test 15 2008 Saturn Vue M80104 - September 25, 2007



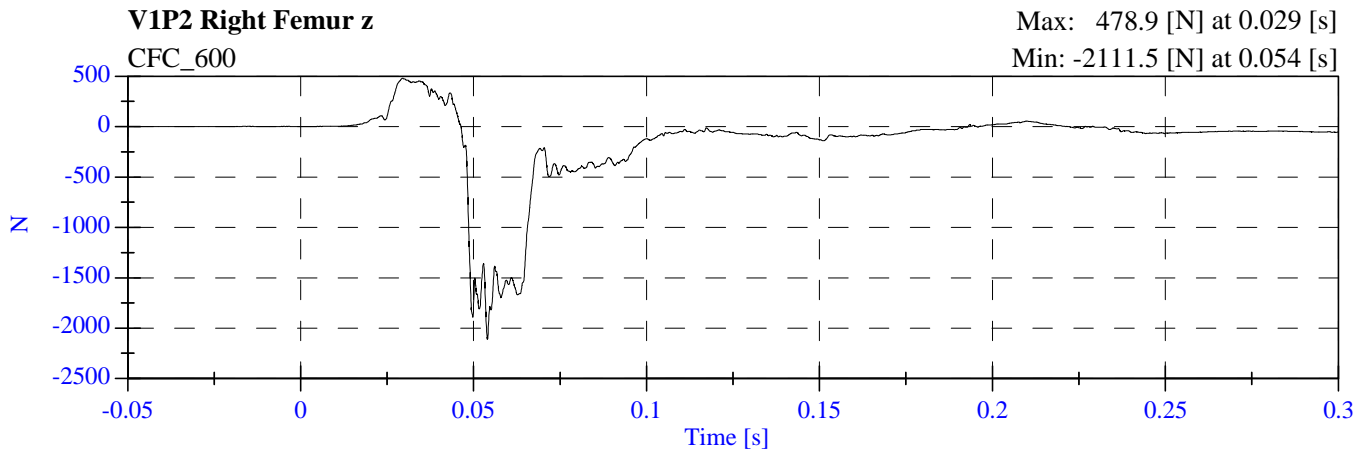
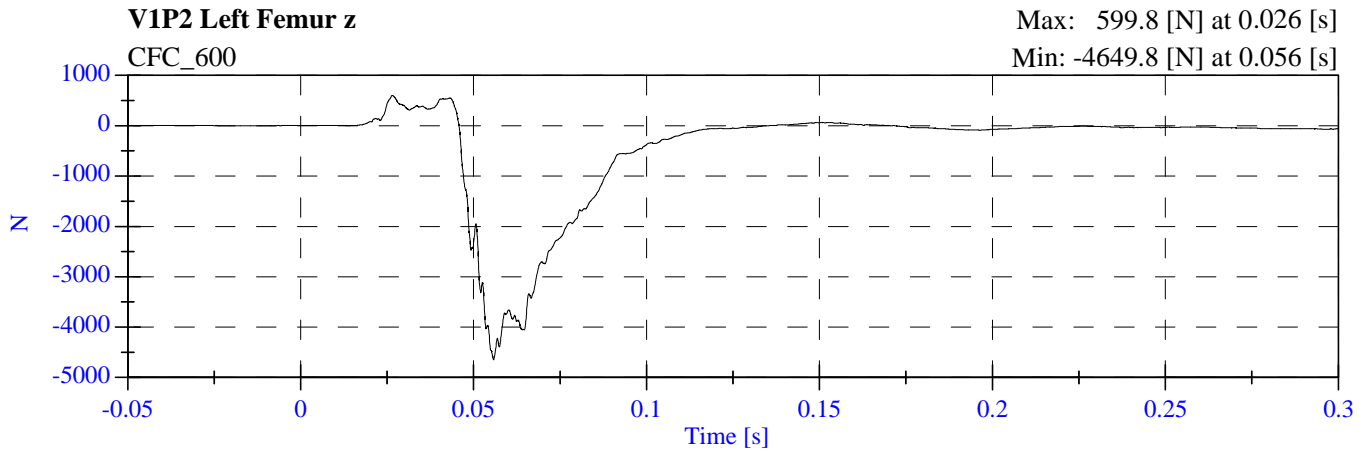
2008 NCAP Test 15 2008 Saturn Vue M80104 - September 25, 2007



**2008 NCAP Test 15 2008 Saturn Vue
M80104 - September 25, 2007**



**2008 NCAP Test 15 2008 Saturn Vue
M80104 - September 25, 2007**



APPENDIX C

**PART 572B/E DUMMY CONFIGURATION
AND PERFORMANCE VERIFICATION DATA SHEETS**

Appendix C contains the results from certification tests performed on the 50th percentile male anthropomorphic test devices utilized for this crash test. The results indicate that the dummies meet all of the performance requirements of the six standard tests as specified in 49 CFR Part 572, Federal Register, Volume 42, No. 25, dated February 7, 1977.

The tests were conducted at the Dummy Certification Test Facility of Calspan. A summary of the test results, and Part 572 specifications are included in this Appendix.

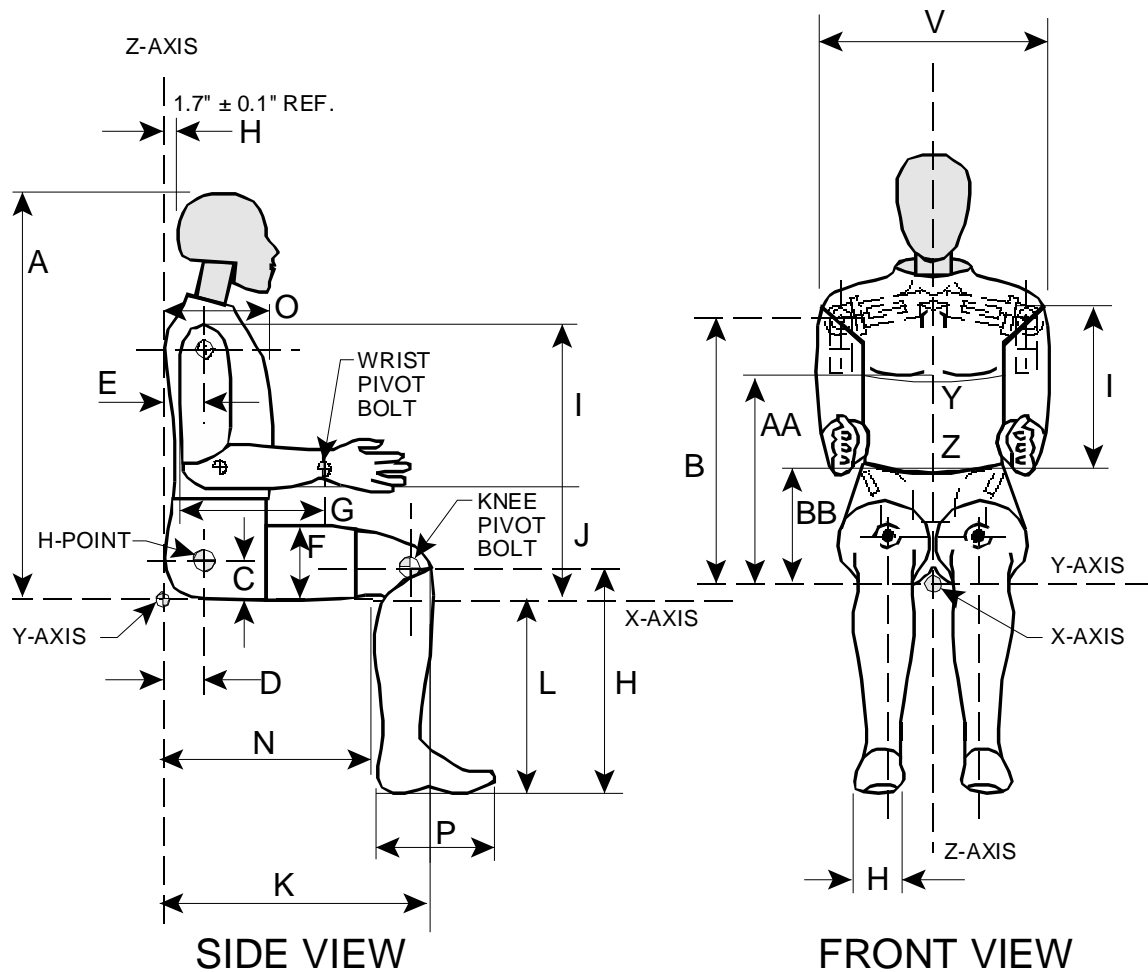
Dummy serial numbers and certification dates are:

<u>Position No./Location</u>	<u>Serial No.</u>	<u>Completion Date</u>
#1/Driver	061	8/16/07
#2/Right Front Passenger	064	8/16/07

Electronic Test Equipment

The complement of signal conditioning, recording and display equipment, in conjunction with dummy certification testing, can be found in New Car Assessment and Standards Indicant Testing Final Report No. 6525-V-1.

EXTERNAL DIMENSIONS SPECIFICATIONS



NOTE: Figure is referenced to the erect seated position. The curved lumbar does not allow the Hybrid III to be positioned in a perfect erect attitude. (REF: S572.31(A)(6))

PART 572E
HEAD DROP TEST

Dummy Serial Number 061
Sequential Test Number 1
Date 8/6/07
Workfile 061H 08/06/07

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	18.9 – 25.6 Deg C	21.1
Relative Humidity	10% - 70%	39.0
Peak Resultant Acceleration	225-275 G's	270.53
Peak Lateral Acceleration	15 G's Max	14.86
Is Acceleration Curve Unimodal?	YES	YES

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572E
NECK FLEXION TEST

Dummy Serial Number	061	
Sequential Test Number	1	
Date	8/15/07	6 Axis Neck Transducer
Workfile	061NF1 08/15/07	

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	20.6 – 22.2 Deg C	21.1
Relative Humidity	10% - 70%	35.0
Impact Velocity	6.89 – 7.13 m/s	6.98
Pendulum Deceleration	10 ms	22.50 - 27.50 G's
	20 ms	17.60 - 22.60 G's
	30 ms	12.50 - 18.50 G's
Max Pendulum G's Above 30 ms	29 G's Max	18.43
Deceleration - Time Curve Decay Time to 5 G's	34 - 42 ms	36.70
D Plane Rotation	Max	64 - 78 Deg
	Time	57 - 64 ms
Moment About Occipital Condyle	Max	88.13 – 108.47 N-m
	Time	47 - 58 ms
Rotation Angle - Time Curve Decay Time to Zero	113 - 128 ms	116.20
Positive Moment - Time Curve Decay Time to Zero	97 - 107 ms	98.40

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572E
NECK EXTENSION TEST

Dummy Serial Number	061	
Sequential Test Number	1	
Date	8/15/07	6 Axis Neck Transducer
Workfile	061NE1 08/15/07	

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature		20.6 – 22.2 Deg C	21.1
Relative Humidity		10% - 70%	35.0
Impact Velocity		5.94 – 6.19 m/s	6.07
Pendulum Deceleration	10 ms	17.20 - 21.20 G's	18.86
	20 ms	14.00 - 19.00 G's	17.83
	30 ms	11.00 - 16.00 G's	14.67
Max Pendulum G's Above 30 ms		22 G's Max	14.67
Deceleration - Time Curve Decay Time to 5 G's		38 - 46 ms	40.70
D Plane Rotation	Max	81 - 106 Deg	95.39
	Time	72 - 82 ms	76.90
Moment About Occipital Condyle	Max	-79.99 - -52.88 N-m	-66.37
	Time	65 - 79 ms	73.20
Rotation Angle - Time Curve Decay Time to Zero		147 - 174 ms	157.70
Positive Moment - Time Curve Decay Time to Zero		120 - 148 ms	138.20

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572E
THORAX IMPACT TEST

Dummy Serial Number 061
Sequential Test Number 1
Date 08/09/07
Workfile 061T 08/9/07

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	20.6 – 22.2 Deg C	21.1
Relative Humidity	10% - 70%	39.0
Pendulum Velocity	6.58 – 6.83 m/s	6.72
Maximum Deflection	63.50 – 72.64 mm	67.19
Maximum Resistive Force	5159.9 – 5893.9 N	5797.87
Internal Hysteresis	69 - 85 %	73.53

Remarks:

Laboratory Technician:

_____ B. Swiecicki

PART 572E
KNEE IMPACT TEST

Dummy Serial Number 061
 Sequential Test Number 1
 Date 8/16/07
 Workfile 061LF 061RF 8/16/07

TEST PARAMETER	SPECIFICATION	TEST RESULTS
LEFT KNEE		
Temperature	18.9 – 25.6 Deg C	21.1
Relative Humidity	10% - 70%	36.0
Probe Velocity	2.07 – 2.13 m/s	2.13
Peak Knee Impact Force	4715.1 – 5782.7 N	5202.55
RIGHT KNEE		
Temperature	18.9 – 25.6 Deg C	21.1
Relative Humidity	10% - 70%	36.0
Probe Velocity	2.07 – 2.13 m/s	2.13
Peak Knee Impact Force	4715.1 – 5782.7 N	5393.02

Remarks:

Laboratory Technician:

_____ B. Swiecicki

PART 572E
EXTERNAL DIMENSIONS

Dummy Serial Number 061
Sequential Test Number 1
Date 8/16/07

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature			21.1
Relative Humidity			36.0
Location for Chest Circumference	AA	16.9 - 17.1 in	17.0
Location for Waist Circumference	BB	8.9 - 9.1 in	9.0
Total Sitting Height	A	34.6 - 35.0 in	34.70
Shoulder Pivot Height	B	19.9 - 20.5 in	20.4
H-Point Height	C	3.3 - 3.5 in	3.5
H-Point from Backline	D	5.3 - 5.5 in	5.3
Shoulder Pivot from Backline	E	3.3 - 3.7 in	3.7
Thigh Clearance	F	5.5 - 6.1 in	6.1
Back of Elbow to Wrist Pivot	G	11.4 - 12.0 in	11.5
Skull Cap to Backline	H	1.6 - 1.8 in	1.7
Shoulder - Elbow Length	I	13.0 - 13.6 in	13.2
Elbow Rest Height	J	7.5 - 8.3 in	8.0
Buttock Knee Length	K	22.8 - 23.8 in	23.4
Popliteal Height	L	16.9 - 17.9 in	17.5
Knee Pivot Height	M	19.1 - 19.7 in	19.2
Buttock Popliteal Length	N	17.8 - 18.8 in	18.7
Chest Depth	O	8.4 - 9.0 in	8.4
Foot Length	P	9.9 - 10.5 in	10.1
Shoulder Breadth	V	16.6 - 17.2 in	16.8
Foot Breadth	W	3.6 - 4.2 in	3.9
Chest Circumference (With Jacket)	Y	38.2 - 39.4 in	38.5
Waist Circumference	Z	32.9 - 34.1 in	33.4

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572E
HEAD DROP TEST

Dummy Serial Number 064
Sequential Test Number 1
Date 8/6/07
Workfile 064H 8/6/07

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	18.9 – 25.6 Deg C	21.1
Relative Humidity	10% - 70%	39
Peak Resultant Acceleration	225-275 G's	258.34
Peak Lateral Acceleration	15 G's Max	4.63
Is Acceleration Curve Unimodal?	YES	YES

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572E
NECK FLEXION TEST

Dummy Serial Number 064
 Sequential Test Number 1
 Date 8/7/07
 Workfile 064NF 8/7/07

6 Axis Neck Transducer

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature		20.6 – 22.2 Deg C	21.1
Relative Humidity		10% - 70%	44.0
Impact Velocity		6.89 – 7.13 m/s	7.00
Pendulum Deceleration	10 ms	22.50 - 27.50 G's	24.26
	20 ms	17.60 - 22.60 G's	21.57
	30 ms	12.50 - 18.50 G's	16.93
Max Pendulum G's Above 30 ms		29 G's Max	16.93
Deceleration - Time Curve Decay Time to 5 G's		34 - 42 ms	38.00
D Plane Rotation	Max	64 - 78 Deg	68.68
	Time	57 - 64 ms	59.60
Moment About Occipital Condyle	Max	88.13 – 108.47 N-m	94.31
	Time	47 - 58 ms	52.00
Rotation Angle - Time Curve Decay Time to Zero		113 - 128 ms	115.10
Positive Moment - Time Curve Decay Time to Zero		97 - 107 ms	99.70

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572E
NECK EXTENSION TEST

Dummy Serial Number	064	
Sequential Test Number	1	
Date	8/7/07	6 Axis Neck Transducer
Workfile	064NE 8/7/07	

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	20.6 – 22.2 Deg C	21.1
Relative Humidity	10% - 70%	44.0
Impact Velocity	5.94 – 6.19 m/s	6.08
Pendulum Deceleration	10 ms	17.20 - 21.20 G's
	20 ms	14.00 - 19.00 G's
	30 ms	11.00 - 16.00 G's
Max Pendulum G's Above 30 ms	22 G's Max	13.99
Deceleration - Time Curve Decay Time to 5 G's	38 - 46 ms	45.00
D Plane Rotation	Max	81 - 106 Deg
	Time	72 - 82 ms
Moment About Occipital Condyle	Max	-79.99 - -52.88 N-m
	Time	65 - 79 ms
Rotation Angle - Time Curve Decay Time to Zero	147 - 174 ms	158.50
Positive Moment - Time Curve Decay Time to Zero	120 - 148 ms	141.50

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572E
THORAX IMPACT TEST

Dummy Serial Number 064
Sequential Test Number 1
Date 8/9/07
Workfile 064T 8/9/07

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	20.6 – 22.2 Deg C	21.1
Relative Humidity	10% - 70%	40.0
Pendulum Velocity	6.58 – 6.83 m/s	6.78
Maximum Deflection	63.50 – 72.64 mm	67.27
Maximum Resistive Force	5159.9 – 5893.9 N	5849.23
Internal Hysteresis	69 - 85 %	73.02

Remarks:

Laboratory Technician:

_____ B. Swiecicki

PART 572E
KNEE IMPACT TEST

Dummy Serial Number 064
 Sequential Test Number 1
 Date 8/16/07
 Workfile 064LF 064RF 8/16/07

TEST PARAMETER	SPECIFICATION	TEST RESULTS
LEFT KNEE		
Temperature	18.9 – 25.6 Deg C	21.1
Relative Humidity	10% - 70%	36.0
Probe Velocity	2.07 – 2.13 m/s	2.13
Peak Knee Impact Force	4715.1 – 5782.7 N	5555.56
RIGHT KNEE		
Temperature	18.9 – 25.6 Deg C	21.1
Relative Humidity	10% - 70%	36.0
Probe Velocity	2.07 – 2.13 m/s	2.13
Peak Knee Impact Force	4715.1 – 5782.7 N	5447.63

Remarks:

Laboratory Technician:

B. Swiecicki

PART 572E
EXTERNAL DIMENSIONS

Dummy Serial Number 064
Sequential Test Number 1
Date 8/16/07

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature			21.1
Relative Humidity			36.0
Location for Chest Circumference	AA	16.9 - 17.1 in	17.0
Location for Waist Circumference	BB	8.9 - 9.1 in	9.0
Total Sitting Height	A	34.6 - 35.0 in	34.6
Shoulder Pivot Height	B	19.9 - 20.5 in	20.5
H-Point Height	C	3.3 - 3.5 in	3.5
H-Point from Backline	D	5.3 - 5.5 in	5.5
Shoulder Pivot from Backline	E	3.3 - 3.7 in	3.5
Thigh Clearance	F	5.5 - 6.1 in	6.0
Back of Elbow to Wrist Pivot	G	11.4 - 12.0 in	11.5
Skull Cap to Backline	H	1.6 - 1.8 in	1.7
Shoulder - Elbow Length	I	13.0 - 13.6 in	13.2
Elbow Rest Height	J	7.5 - 8.3 in	7.8
Buttock Knee Length	K	22.8 - 23.8 in	23.5
Popliteal Height	L	16.9 - 17.9 in	17.5
Knee Pivot Height	M	19.1 - 19.7 in	19.1
Buttock Popliteal Length	N	17.8 - 18.8 in	18.7
Chest Depth	O	8.4 - 9.0 in	8.5
Foot Length	P	9.9 - 10.5 in	10.2
Shoulder Breadth	V	16.6 - 17.2 in	16.8
Foot Breadth	W	3.6 - 4.2 in	3.8
Chest Circumference (With Jacket)	Y	38.2 - 39.4 in	38.5
Waist Circumference	Z	32.9 - 34.1 in	33.4

Remarks:

Laboratory Technician:

B. Swiecicki

APPENDIX D

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENT CALIBRATION FOR DRIVER DUMMY
(Six Month Calibration Minimum)

DRIVER DUMMY (S/N 061)		Manufacturer	Serial #	Calibration	
				Last	Next
Head	X	ENDEVCO	AC-J20018	22-Jun-07	21-Dec-07
	Y	ENDEVCO	AC-P16755	22-Jun-07	21-Dec-07
	Z	ENDEVCO	AC-J14667	22-Jun-07	21-Dec-07
Head	X (R)	ENDEVCO	AC-J38127	22-Jun-07	21-Dec-07
	Y (R)	ENDEVCO	AC-J20569	22-Jun-07	21-Dec-07
	Z (R)	ENDEVCO	AC-J21963	22-Jun-07	21-Dec-07
Neck Load Cell	X	DENTON	LC-1916Fx	22-Jun-07	21-Dec-07
	Y	DENTON	LC-1916Fy	22-Jun-07	21-Dec-07
	Z	DENTON	LC-1916Fz	22-Jun-07	21-Dec-07
Neck Moment	X	DENTON	LC-1916Mx	22-Jun-07	21-Dec-07
	Y	DENTON	LC-1916My	22-Jun-07	21-Dec-07
	Z	DENTON	LC-1916Mz	22-Jun-07	21-Dec-07
Chest	X	ENDEVCO	AC-AAKC6	22-Jun-07	21-Dec-07
	Y	ENDEVCO	AC-AAKD0	22-Jun-07	21-Dec-07
	Z	ENDEVCO	AC-J27470	22-Jun-07	21-Dec-07
Chest	X (R)	ENDEVCO	AC-J21988	22-Jun-07	21-Dec-07
	Y (R)	ENDEVCO	AC-J20027	22-Jun-07	21-Dec-07
	Z (R)	ENDEVCO	AC-J36741	22-Jun-07	21-Dec-07
Chest Deflection	X	SERVO	DS-061	25-Jun-07	24-Dec-07
Pelvic	X	ENTRAN	AC-99H30-Z13	21-Jun-07	20-Dec-07
	Y	ENTRAN	AC-01G18-F14	21-Jun-07	20-Dec-07
	Z	ENTRAN	AC-02I02I05-F06	21-Jun-07	20-Dec-07

INSTRUMENT CALIBRATION FOR DRIVER DUMMY
(Six Month Calibration Minimum)

DRIVER DUMMY (S/N 061)	Manufacturer	Serial #	Calibration		
			Last	Next	
Left Femur Load Cell	Fz	DENTON	LC-1532	25-Jun-07	24-Dec-07
Right Femur Load Cell	Fz	DENTON	LC-1533	25-Jun-07	24-Dec-07
Left Upper Tibia	Mx	DENTON	LC-93Mx	26-Jun-07	25-Dec-07
	My	DENTON	LC-93My	26-Jun-07	25-Dec-07
Left Lower Tibia	Fz	DENTON	LC-093Fz	25-Jun-07	24-Dec-07
	Mx	DENTON	LC-093Mx	25-Jun-07	24-Dec-07
	My	DENTON	LC-093My	25-Jun-07	24-Dec-07
Right Upper Tibia	Mx	DENTON	LC-115Mx	25-Jun-07	24-Dec-07
	My	DENTON	LC-115My	25-Jun-07	24-Dec-07
Right Lower Tibia	Fz	DENTON	LC-116Fz	25-Jun-07	24-Dec-07
	Mx	DENTON	LC-116Mx	25-Jun-07	24-Dec-07
	My	DENTON	LC-116My	25-Jun-07	24-Dec-07
Left Foot Rear	X	ENDEVCO	AC-J18662	25-Jun-07	24-Dec-07
	Z	ENDEVCO	AC-J19927	25-Jun-07	24-Dec-07
Left Foot Front	Z	ENDEVCO	AC-J20030	25-Jun-07	24-Dec-07
Right Foot Rear	X	ENDEVCO	AC-DE54J	25-Jun-07	24-Dec-07
	Z	ENDEVCO	AC-J19440	25-Jun-07	24-Dec-07
Right Foot Front	Z	ENDEVCO	AC-J20382	25-Jun-07	24-Dec-07
Lap Belt Load Cell		First Technology	LC-156	11-Jul-06	11-Jul-07
Shoulder Belt Load Cell		First Technology	LC-159	11-Jul-06	11-Jul-07

INSTRUMENT CALIBRATION FOR PASSENGER DUMMY
(Six Month Calibration Minimum)

PASSENGER DUMMY (S/N 064)		Manufacturer	Serial #	Calibration	
				Last	Next
Head	X	ENDEVCO	20-Jun-07	AC-J27517	19-Dec-07
	Y	ENDEVCO	20-Jun-07	AC-AAKB1	19-Dec-07
	Z	ENDEVCO	20-Jun-07	AC-AAK48	19-Dec-07
Head	X (R)	ENDEVCO	20-Jun-07	AC-P16194	19-Dec-07
	Y (R)	ENDEVCO	20-Jun-07	AC-J14688	19-Dec-07
	Z (R)	ENDEVCO	20-Jun-07	AC-P21399	19-Dec-07
Neck Load Cell	X	DENTON	22-Jun-07	LC-1912Fx	21-Dec-07
	Y	DENTON	22-Jun-07	LC-1912Fy	21-Dec-07
	Z	DENTON	22-Jun-07	LC-1912Fz	21-Dec-07
Neck Moment	X	DENTON	22-Jun-07	LC-1912Mx	21-Dec-07
	Y	DENTON	22-Jun-07	LC-1912My	21-Dec-07
	Z	DENTON	22-Jun-07	LC-1912Mz	21-Dec-07
Chest	X	ENDEVCO	21-Jun-07	AC-J23946	20-Dec-07
	Y	ENDEVCO	21-Jun-07	AC-AGAC4	20-Dec-07
	Z	ENDEVCO	21-Jun-07	AC-P16225	20-Dec-07
Chest	X (R)	ENTRAN	21-Jun-07	AC-03E03E21-M20	20-Dec-07
	Y (R)	ENDEVCO	21-Jun-07	AC-P15638	20-Dec-07
	Z (R)	ENDEVCO	21-Jun-07	AC-P16517	20-Dec-07
Chest Deflection	X	SERVO	25-Jun-07	DS-064	24-Dec-07
Pelvic	X	ENDEVCO	21-Jun-07	AC-AJ5R0	20-Dec-07
	Y	ENDEVCO	21-Jun-07	AC-J22036	20-Dec-07
	Z	ENDEVCO	20-Jun-07	AC-P32204	19-Dec-07

INSTRUMENT CALIBRATION FOR PASSENGER DUMMY
(Six Month Calibration Minimum)

PASSENGER DUMMY (S/N 064)	Manufacturer	Serial #	Calibration		
			Last	Next	
Left Femur Load Cell	Fz	DENTON	LC-1525	25-Jun-07	24-Dec-07
Right Femur Load Cell	Fz	DENTON	LC-1526	25-Jun-07	24-Dec-07
Left Upper Tibia	Mx	DENTON	LC-404Mx	25-Jun-07	24-Dec-07
	My	DENTON	LC-404My	25-Jun-07	24-Dec-07
Left Lower Tibia	Fz	DENTON	LC-396Fz	25-Jun-07	24-Dec-07
	Mx	DENTON	LC-396Mx	25-Jun-07	24-Dec-07
	My	DENTON	LC-396My	25-Jun-07	24-Dec-07
Right Upper Tibia	Mx	DENTON	LC-374Mx	02-Dec-06	02-Jun-07
	My	DENTON	LC-374My	02-Dec-06	02-Jun-07
Right Lower Tibia	Fz	DENTON	LC-372Fz	14-Nov-06	15-May-07
	Mx	DENTON	LC-372Mx	14-Nov-06	15-May-07
	My	DENTON	LC-372My	14-Nov-06	15-May-07
Left Foot Rear	X	ENDEVCO	AC-J33376	25-Jun-07	24-Dec-07
	Z	ENDEVCO	AC-P16899	25-Jun-07	24-Dec-07
Left Foot Front	Z	ENDEVCO	AC-P17912	25-Jun-07	24-Dec-07
Right Foot Rear	X	ENDEVCO	AC-J20209	25-Jun-07	24-Dec-07
	Z	ENDEVCO	AC-J14234	25-Jun-07	24-Dec-07
Right Foot Front	Z	ENDEVCO	AC-J14669	25-Jun-07	24-Dec-07
Lap Belt Load Cell		First Technology	LC-173	11-Jul-06	11-Jul-07
Shoulder Belt Load Cell		First Technology	LC-178	11-Jul-06	11-Jul-07

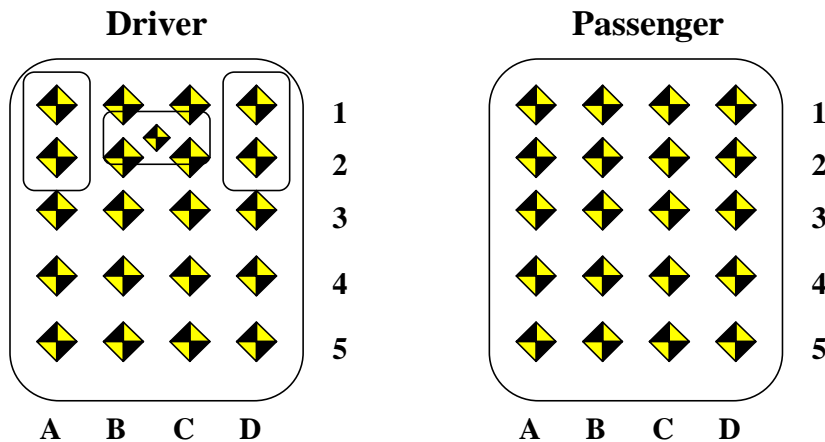
INSTRUMENT CALIBRATION FOR VEHICLE ACCELEROMETERS
(Six Month Calibration Minimum)

	Manufacturer	Serial #	Calibration	
			Last	Next
Left Seat Rear Crossmember X	ICS	FA2491	9/21/2007	3/20/2007
Right Rear Seat Crossmember X	ICS	FA2475	5/21/2007	11/20/2007
Top of Engine	ICS	FA2472	9/21/2007	3/20/2007
Bottom of Engine	ICS	FA2480	9/12/2007	3/11/2007
Right Disc Brake Caliper	ICS	FA2479	9/12/2007	3/11/2007
Left Disc Brake Caliper	ICS	FA2487	9/12/2007	3/11/2007
Left Seat Rear Crossmember Z	ICS	FA2490	9/21/2007	3/20/2007
Right Seat Rear Crossmember Z	ICS	FA2489	9/21/2007	3/20/2007

APPENDIX E

VEHICLE INTERIOR INTRUSION MEASUREMENTS

DRIVER SIDE INTRUSION MEASUREMENTS

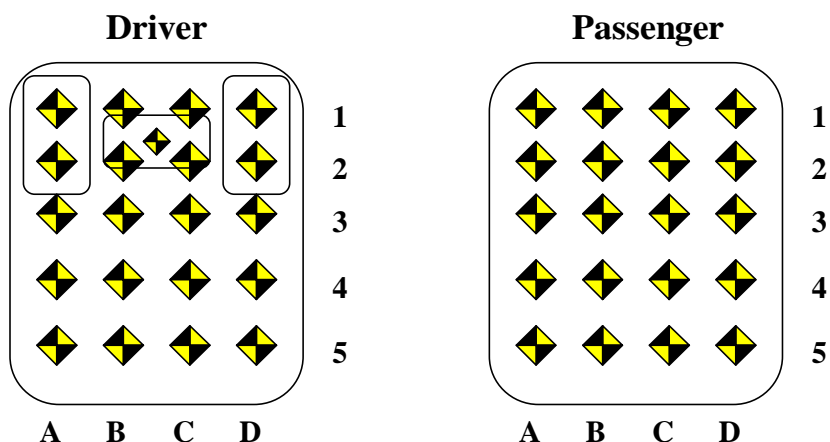


Driver Side Intrusion Measurements

Intrusion Location	PRE-TEST (mm)			POST-TEST (mm)			CHANGE (mm)		
	X	Y	Z	X	Y	Z	X	Y	Z
A1	3188	-579	-514	3180	-580	-535	8	1	21
B1	3251	-435	-509	3215	-420	-548	36	-15	39
C1	3250	-313	-489	3217	-299	-511	33	-14	22
D1	3267	-194	-505	3234	-191	-505	33	-3	0
A2	3115	-581	-437	3107	-579	-463	8	-2	26
B2	3167	-442	-429	3152	-432	-448	15	-10	19
C2	3166	-317	-414	3148	-308	-425	18	-9	11
D2	3200	-194	-422	3162	-179	-434	38	-15	12
A3	3052	-577	-372	3050	-577	-387	2	0	15
B3	3074	-440	-371	3072	-439	-375	2	-1	4
C3	3076	-314	-372	3073	-315	-361	3	1	-11
D3	3127	-192	-375	3118	-191	-359	9	-1	-16
A4	2983	-573	-368	2990	-576	-367	-7	3	-1
B4	2984	-448	-374	2983	-449	-373	1	1	-1
C4	2983	-317	-371	2984	-321	-349	-1	4	-22
D4	2983	-194	-379	2978	-200	-337	5	6	-42
A5	2898	-584	-370	2905	-576	-382	-7	-8	12
B5	2896	-444	-372	2898	-449	-365	-2	5	-7
C5	2900	-319	-376	2901	-324	-352	-1	5	-24
D5	2905	-192	-381	2898	-198	-348	7	6	-33
BP	3122	-342	-554	3131	-355	-553	-9	13	-1
G	2875	-524	-868	2881	-529	-865	-6	5	-3
H	2865	-225	-861	2880	-230	-851	-15	5	-10
L	2683	-366	-1088	2717	-367	-1054	-34	1	-34
AB	2581	-577	-475	2587	-586	-464	-6	9	-11

BP=Brake Pedal, G=Left side of bolster, H=Right side of bolster, L=Steering wheel center;
 AB = Front outboard seat anchor bolt

PASSENGER SIDE INTRUSION MEASUREMENTS



Passenger Side Intrusion Measurements

Intrusion Location	PRE-TEST (mm)			POST-TEST (mm)			CHANGE (mm)		
	X	Y	Z	X	Y	Z	X	Y	Z
A1	3290	213	-538	3234	201	-552	56	12	14
B1	3282	324	-530	3228	311	-537	54	13	7
C1	3277	450	-529	3236	413	-553	41	37	24
D1	3221	585	-528	3204	560	-542	17	25	14
A2	3206	212	-467	3185	195	-458	21	17	-9
B2	3211	326	-466	3201	306	-448	10	20	-18
C2	3207	453	-465	3168	420	-487	39	33	22
D2	3205	578	-465	3184	550	-477	21	28	12
A3	3079	201	-387	3082	188	-359	-3	13	-28
B3	3107	323	-389	3096	303	-386	11	20	-3
C3	3107	451	-390	3105	427	-380	2	24	-10
D3	3108	569	-392	3116	551	-383	-8	18	-9
A4	2984	198	-386	2983	182	-333	1	16	-53
B4	2982	331	-386	2985	316	-335	-3	15	-51
C4	2987	453	-388	2988	430	-366	-1	23	-22
D4	2991	576	-390	2997	553	-393	-6	23	3
A5	2870	200	-386	2876	188	-352	-6	12	-34
B5	2875	333	-385	2875	320	-348	0	13	-37
C5	2881	454	-388	2883	441	-369	-2	13	-19
D5	2882	574	-393	2893	554	-399	-11	20	6
R	2852	205	-873	2861	192	-867	-9	13	-6
S	2865	502	-884	2860	492	-876	5	10	-8
AB	2583	579	-478	2582	569	-463	1	10	-15

R=Left side of bolster, S=Right side of bolster, L=Steering wheel center;

AB = Front outboard seat anchor bolt