

REPORT NUMBER TR-P27180-01-NC

**NEW CAR ASSESSMENT PROGRAM
SIDE IMPACT TEST**

**GENERAL MOTORS CORPORATION
2007 CHEVROLET SUBURBAN LS
5-DOOR MPV**

NHTSA NUMBER: G70120

**Prepared By:
KARCO ENGINEERING, LLC
9270 HOLLY ROAD
ADELANTO, CALIFORNIA 92301**



AUGUST 21, 2007

FINAL REPORT

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Prepared by:  Date: August 21, 2007
Mr. Johnny H. Dutto Project Engineer
KARCO Engineering, LLC

Reviewed by:  Date: August 21, 2007
Mr. Michael L. Dunlap, Director of Operations
KARCO Engineering, LLC

Approved by:  Date: August 21, 2007
Mr. Frank D. Richardson, Program Manager
KARCO Engineering, LLC

FINAL REPORT ACCEPTED BY:

Manager, Side Impact NCAP

Date of Acceptance

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16. Abstract A 55/28 km/h 90 deg. Moving Deformable Barrier Side Impact NCAP Test was conducted on the subject 2007 Chevrolet Suburban LS 5-Door MPV in accordance with the specifications of the Office of Crash Worthiness Standards Test Procedures for the generation of consumer information on vehicle side crash protection. The test was conducted at KARCO Engineering, LLC in Adelanto, CA, on August 21, 2007. The impact velocity of the Moving Deformable Barrier was 62.00 km/h and the outside ambient temperature at the struck (driver's) side of the vehicle was 37.8 deg. C. The target vehicle's maximum post-test static crush was 297 mm located at level 3. The test vehicle's occupant performance data is as follows:			
Measurement Description	Driver SID/HIII	Pass. SID/HIII	
Left Upper Rib (LUR) G's	27.0	9.9	
Left Lower Rib (LLR) G's	31.0	16.1	
Lower Spine (T ₁₂) G's	30.4	14.0	
Thoracic Trauma Index (TTI) G's	31.0	15.0	
Pelvis (PEV) G's	36.8	19.7	
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SECTION 1

PURPOSE AND TEST PROCEDURE

1.1 PURPOSE

This Side Impact NCAP test is conducted as part of the FY' 2007 test program sponsored by the National Highway Traffic Safety Administration (NHTSA), under contract No. DTNH22-03-D-32005. The purpose of this test is to generate comparative side impact data on a 2007 Chevrolet Suburban LS 5-Door MPV manufactured by General Motors Corporation.

1.2 TEST PROCEDURE

The side impact test was conducted in accordance with the current National Highway Traffic Safety Administration (NHTSA), Office of Crashworthiness Standards (OCS), laboratory test procedure NCAP Side Impact Testing, dated November 2002. The procedures for receiving, inspection, testing, and reporting of test results are described in the test procedures and are not repeated in this report.

SECTION 2

SUMMARY OF SIDE IMPACT TEST

2.1 SUMMARY OF SIDE IMPACT NCAP TEST

A model year 2007 Chevrolet Suburban LS 5-Door MPV was impacted on the left (driver's) side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 62.00 km/h. The specified impact velocity range is from 61.14 to 62.75 km/h. The test (target) vehicle was stationary and positioned 63° to the line of forward motion. The weight of the vehicle as tested was 2840 kg and the test weight of the MDB was 1361 kg. The test was conducted at KARCO Engineering, LLC in Adelanto, California, on August 21, 2007.

Two (2) real-time cameras and ten (10) high-speed video cameras were used to document the impact event. Camera locations and pertinent camera information is documented in the data sheets. Pre- and post-test photographs of the vehicle and SID/HIIIs can be found in Appendix A. Two 50th percentile adult male Side Impact Dummies, Hybrid III (SID/HIIIs) were placed in the driver's and left rear passenger designated seating positions according to the test procedure. Each SID/HIII is instrumented with contact switches on the pelvis, thorax and six-axis neck load cells, and fourteen accelerometers in the following locations:

- Left Upper Rib (LUR) uni-axial accelerometer (Y-axis primary and redundant)
- Left Lower Rib (LLR) uni-axial accelerometer (Y-axis primary and redundant)
- Lower Thoracic Spine (T12) uni-axial accelerometer (Y-axis primary and redundant)
- Pelvic (PEV) section uni-axial accelerometer (Y-axis primary and redundant)
- Head Center of Gravity (CG) tri-axial accelerometers (X, Y, and Z axes primary and redundant)

SUPPLEMENTAL RESTRAINT INFORMATION

Restraint Type	Left Front Driver		Left Rear (Passenger)	
	Installed	Deployed	Installed	Deployed
Front Airbag	Yes	No	No	
Side Torso Airbag	No		No	
Head Airbag	No		No	
Curtain Airbag	Yes	Yes	Yes	Yes

SECTION 2...(CONTINUED)

The test vehicle was instrumented with twenty-one (21) structural accelerometers and the MDB was instrumented with five (5) accelerometers and one (1) contact switch on the right bumper to compare left side to right side bumper impact timing. All data channels were recorded with the fully self contained on-board Data Acquisition System (DAS). The data was digitally sampled at 10,000 samples per second and processed per Appendix V of the Test Procedure.

2.2 GENERAL COMMENTS

The driver and passenger doors remained closed during impact. The test vehicle sustained a maximum static crush of 297 mm at level 3, 1350 mm rearward of the left vertical impact point. The driver SID/Hybrid III, Serial No. 274 and the passenger SID/Hybrid III, Serial No. 275 were calibrated prior to this test. The SID/Hybrid III injury criteria is summarized as follows:

Measurement	Units	Driver	Passenger
Thoracic Trauma Index (TTI)	G's	31	15
Peak Pelvic G's (PEV)	G's	37	20

Tests summaries and post-test observations are presented in Section 3. Appendix A contains the still photograph prints. Appendix B contains the driver and passenger SID/HIIIs, vehicle, and MDB response data traces. Appendix C contains the SID Configuration and performance verification data. Appendix contains the Child Restraint System data.

SECTION 3

OCCUPANT AND VEHICLE INFORMATION SHEETS

Test Vehicle: 2007 Chevrolet Suburban LS 5-Door MPV

NHTSA No.: G70120

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 8/21/07

CONVERSION FACTORS USED IN THIS REPORT*

Quantity	Typical Application	Std Units	Metric Unit	Multiply By
Mass	Vehicle Weight	lb	kg	0.4536
Linear Velocity	Impact Velocity	mile/h	km/h	1.609
Length or Distance	Measurements	in	mm	25.4
Volume	Fuel Systems	gal	liter	3.785
Volume	Small Fluids	oz	mL	29.573
Pressure	Tire Pressures	lbf/in ²	kPa	7.0
Volume	Liquid	gal	liter	3.785
Temperature	General Use	°F	°C	$=(t_f - 32)/1.8$
Force	Dynamic Forces	lbf	N	4.448
Moment	Torque	lbf/ft	Nm	1.355

* Based on the Recommended Practice in SAE J916, May 85

DATA SHEET NO. 1

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2007 Chevrolet Suburban LS 5-Door MPV

NHTSA No.: G70120

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 8/21/07

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	G70120
Make	Chevrolet
Model	Suburban LS
Body Style	5-Door MPV
Vin No.	1GNFC16J77R283002
Color	Red
Delivery Date	8/2/2007
Odometer (Miles)	159.0
Dealer	Center Chevrolet
Transmission	4-Speed Automatic
Final Drive	Rear
Type/No. Cyl.	V-8
Engine Disp. (L)	5.3
Engine Placement	Longitudinal
Roof Rack	Yes
Sunroof/T-Top	No
Tinted Glass	Yes
Traction Control	Yes
Power Brakes	Yes
Front Disc	Yes
Rear Disc	Yes

Anti-Lock Brakes	Yes
All Wheel Drive	No
Power Steering	Yes
Driver Front Airbag	Yes
Driver Side Torso Airbag	No
Driver Side Head Airbag	No
Driver Curtain/Airbag	Yes
Rear Pass. Airbag	No
Rear Pass. Side Airbag	No
Rear Pass. Head Airbag	No
Rear Pass. Curtain/Airbag	Yes
Pre-Tensioners	Yes
Load Limiters	Yes
Bucket Seats	Yes
Air Cond.	Yes
AM/FM CD	Yes
Tilt Steering	Yes
Automatic Door Locks	Yes
Power Windows	Yes
Power Seats	Yes
Other	None

Does Owners Manual provide instructions to turn off automatic door locks.

No

DATA FROM CERTIFICATION LABEL

Manufactured By	General Motors Corporation
Date of Manufacture	Sep-06

GVWR (kg)	3266
GAWR Front (kg)	1497
GAWR Rear (kg)	1905

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench	Bench	
Number of Occupants	3	3	2	8
Capacity Weight (VCW) (kg)				698
Cargo Weight (RCLW) (kg)				136

DATA SHEET NO. 1...(CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

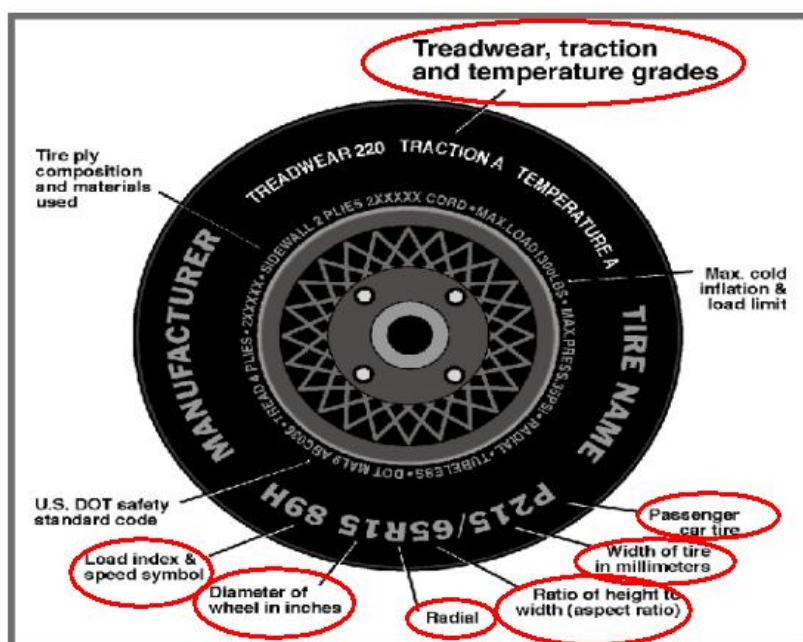
Test Vehicle: 2007 Chevrolet Suburban LS 5-Door MPV

NHTSA No.: G70120

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 8/21/07

Collect year, make, model, VIN, items circled in red, and tire manufacturer and tire name.



TIRE INFORMATION

Measured Parameter	Front	Rear
Max. Tire Pressure (kpa)	308	308
Cold Pressure (kpa)	210	210
Recommended Tire Size	P265/70R17	P265/70R17
Tire Size on Vehicle	P265/70R17	P265/70R17
Tire Manufacturer	Goodyear	Goodyear
Treadwear	340	340
Traction	A	A
Temperature Grades	B	B
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Polyester, 2 Steel	2 Polyester, 2 Steel
Load Index/Speed Symbol	113S	113S
Tire Material	Polyester, Steel	Polyester, Steel
DOT Safety Code Right	4BT6 FOOR	4BT6 FOOR
DOT Safety Code Left	4BT6 FOOR	4BT6 FOOR

DATA SHEET NO. 1...(CONTINUED)**GENERAL TEST AND VEHICLE PARAMETER DATA**Test Vehicle: 2007 Chevrolet Suburban LS 5-Door MPVNHTSA No.: G70120Test Program: 55/28 km/h Side Impact NCAPTest Date: 8/21/07**TEST VEHICLE WEIGHTS**

	Units	As Delivered Weights (UVW)			As Tested Weights (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	649	616	1265	679	797	1476
Right	kg	649	637	1286	630	734	1364
Ratio	%	50.9	49.1	100.0	46.1	53.9	100.0
Totals	kg	1298	1253	2551	1309	1531	2840

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	2551
Weight of 2 P572 ATD's	kg	161
Rated Cargo/Luggage Wt. (RCLW)	kg	136
Calculated Vehicle Target Wt. (TVTW)	kg	2848

TEST VEHICLE ATTITUDE AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	896	896	950	957	1624
As Tested	mm	898	902	907	926	1783
Fully Loaded	mm	885	886	910	917	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Test Vehicle Wheel Base	mm	3307
Total Vehicle Length at Left Side	mm	4085
Total Vehicle Length at Centerline	mm	5634
Total Vehicle Length at Right Side	mm	4085
Weight of Ballast In Cargo Area	kg	153
Amount of Stoddard Solvent in Fuel Tank	liters	104.4

TEST VEHICLE VERTICAL IMPACT LINE DATA

Measurement Description	Units	Value
Test Vehicle Wheel Base	mm	3307
Target Impact Point Aft of Front Axle	mm	508
Actual Impact Point Aft of Front Axle	mm	511

DATA SHEET NO. 1...(CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2007 Chevrolet Suburban LS 5-Door MPV

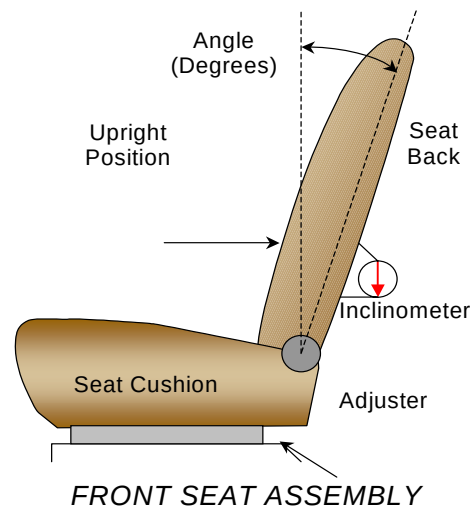
NHTSA No.: G70120

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 8/21/07

NOMINAL DESIGN RIDING POSITION

The driver and passenger seat backs are positioned to the manufacturer's designated angle. The procedure is as follows: Seat back angle was measured at the seat back using a digital inclinometer.



SEAT BACK ANGLES

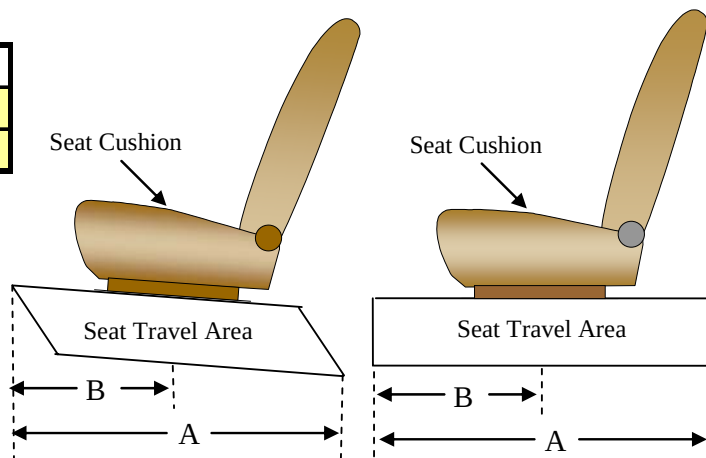
	Deg.
Driver w/seated Dummy	19.3 @ Seat back
Passenger w/seated Dummy	N/A

SEAT FORE/AFT POSITIONS

The total seat travel was measured from forward most position at the highest vertical seat height to rearmost position at the lowest vertical seat height. The seat was set at the longitudinal mid position. There were vertical adjustments on the driver seat that was equipped with the vehicle. There were no adjustments on the passenger seat. The driver seat was placed at the lowermost position.

SEAT FORE/AFT POSITIONING

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	240 mm	120 mm
Rear Seat	N/A	N/A



SEAT BELT UPPER ANCHORAGE

Position number zero (0) is the uppermost position

SEAT BELT UPPER ANCHORAGE

	Total # of Positions	Placed in Position #
Driver Seat	5	2
Rear Seat	Fixed	Fixed

DATA SHEET NO. 1...(CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2007 Chevrolet Suburban LS 5-Door MPV

NHTSA No.: G70120

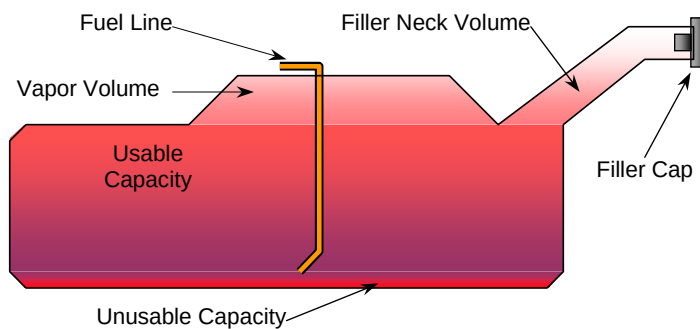
Test Program: 55/28 km/h Side Impact NCAP

Test Date: 8/21/07

FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	112.04
Usable Capacity of "Optional" Tank	
Usable Capacity used for FMVSS 301	103.07 to 105.30
Actual Amount of Solvent used	104.40

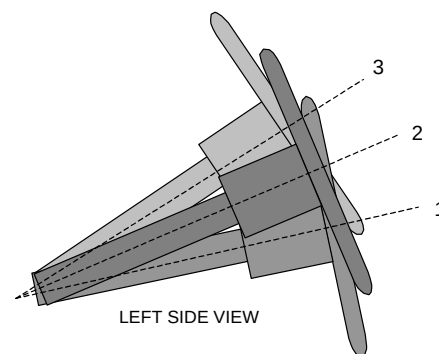
The test vehicle is equipped with an electric fuel pump. The fuel pump will run when the engine is running. It will also run briefly when the ignition key is turned to the "on" position without starting the engine. The fuel filler door is located on the left rear fender. The standard fuel tank occupies the area under the rear seat.



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

	Degrees	Fore/Aft Position (mm)
Lowermost position No. 1	11.5	
Geometric center position No. 2	22.7	
Uppermost position No. 3	34.2	

DATA SHEET NO. 2**TEST VEHICLE SUMMARY OF RESULTS**Test Vehicle: 2007 Chevrolet Suburban LS 5-Door MPVNHTSA No.: G70120Test Program: 55/28 km/h Side Impact NCAPTest Date: 8/21/07**MAXIMUM EXTERIOR STATIC CRUSH**

Level	Measured Parameter	Units	Maximum Crush	Above Ground
Level 1	Sill Top Height	mm	183	337
Level 2	Occupant H-Point	mm	288	826
Level 3	Mid Door	mm	297	801
Level 4	Window Sill	mm	205	1146
Level 5	Window top	mm	65	1762
N/A	Maximum Penetration	mm	297	

INSTRUMENTATION

Driver SID/Hybrid III Accelerometers	20
Passenger SID/Hybrid III Accelerometers	20
Vehicle Structure Accelerometers	21
MDB Accelerometers	5
Total No. of Contact Switches	5
Total	71

CAMERA COVERAGE

High Speed, Vehicle On-Board	3
High Speed, Off-Board	4
High Speed, MDB On-Board	3
Real Time, Panning	2
Total	12

DATA SHEET NO. 3**MOVING DEFORMABLE BARRIER (MDB) SUMMARY OF RESULTS**Test Vehicle: 2007 Chevrolet Suburban LS 5-Door MPVNHTSA No.: G70120Test Program: 55/28 km/h Side Impact NCAPTest Date: 8/21/07**MDB SPECIFICATIONS (mm)**

Measurement Description	Length
Overall Width of Framework Carriage	1252
Overall Length including Honeycomb Face	4115
Wheel Base of Framework Carriage	2590
C.G. location aft of Front Axle	1127

MDB WEIGHTS

	Units	Front Axle	Rear Axle	Total
Left	kg	384	308	
Right	kg	385	284	
Ratio	%	56.5	43.5	
Totals	kg	769	592	1361

SPEED AND IMPACT DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.1 to 62.7	62.00
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	61.96
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	89.5

MAXIMUM STATIC CRUSH OF HONEYCOMB FACE (mm)

Vertical Location			From Centerline		Max. Crush
Row	Description	Height	Distance	Direction	
A	Center of Bumper	432	800	Left	152
B	Top of Bumper	533	700	Left	120
C	Mid Level	686	800	Left	129
D	Top of Stack	813	800	Right	182

MDB INSTRUMENTATION AND CAMERAS

Accelerometers	5
Contact Switches	1
High Speed Cameras	2

DATA SHEET NO. 4**POST-TEST OBSERVATIONS**Test Vehicle: 2007 Chevrolet Suburban LS 5-Door MPVNHTSA No.: G70120Test Program: 55/28 km/h Side Impact NCAPTest Date: 8/21/07**TEST DUMMY INFORMATION AND CONTACT POINTS**

Description	Front Seat SID/Hybrid III	Rear Seat SID/Hybrid III
Dummy Type / Serial No.	P572F, SID / No. 274	P572F, SID / No. 275
Head Contact	Curtain Airbag / Headrest	Curtain Airbag / Headliner
Upper Torso Contact	Door Panel	Door Panel
Lower Torso Contact	Door Panel	Door Panel
Left Knee Contact	Door Panel	Right Knee
Right Knee Contact	None	Left Knee

POST-TEST DOOR OPENING AND SEAT TRACK INFORMATION

Description	Front	Rear
Left Side Door Opening	Door remained closed and latched, jammed	Door remained closed and latched, jammed
Right Side Door Opening	Remained closed and latched, operational	Remained closed and latched, operational
Seat Movement	None	None
Seat Back Failure	None	None

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	No separation
Sill Separation	Front & Rear passenger side sill separated
Windshield Damage	Cracked
Window Damage	None
Other Notable Effects	None

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Left Front (Driver) Occupant Location 01		Left Rear (Passenger) Occupant Location 04	
	Installed	Operation	Installed	Operation
Front Airbag	Yes	No	No	
Side Torso Airbag	No		No	
Head Airbag	No		No	
Curtain Airbag	Yes	Yes	Yes	Yes
Seat Belt Pretensioner	Yes		No	
Seat Belt Load Limiter	Yes		No	

MDB LEFT EDGE IMPACT POINT DATA

Measured Parameter	Units	Requirement	Value
Horizontal Offset	mm	+/- 50	0
Vertical Offset	mm	+/- 20	+6 (above)

DATA SHEET NO. 5

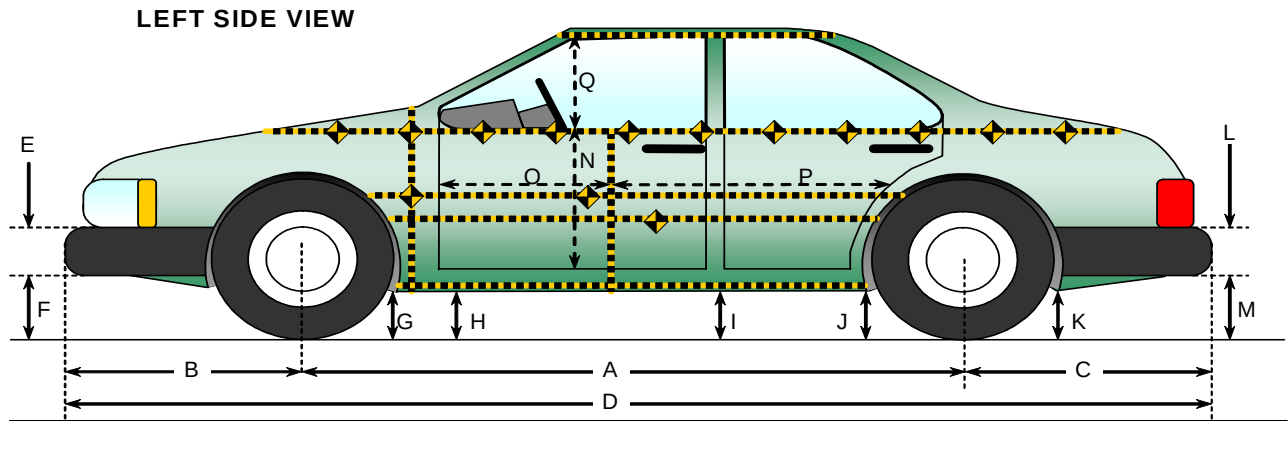
VEHICLE PRE-TEST AND POST-TEST MEASUREMENTS

Test Vehicle: 2007 Chevrolet Suburban LS 5-Door MPV

NHTSA No.: G70120

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 8/21/07



VEHICLE PRE AND POST-TEST MEASUREMENT INFORMATION

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	3307	3285	-22
B	Front Axle to FSOV	984	1002	18
C	Rear Axle to RSOV	1350	1353	3
D	Total Length at Centerline	5634	5630	-4
E	Front Bumper Thickness	410	387	-23
F	Front Bumper Bottom to Ground	261	335	74
G	Sill Height at Front Wheel Well	256	267	11
H	Sill Height at Front Door Leading Edge	257	265	8
I	Sill Height at "B" Pillar	257	255	-2
J1	Sill Height at Rear Wheel Well	275	286	11
J2	Pinch Weld Height at Rear Wheel Well	262	284	22
K	Sill Height aft of Rear Wheel Well	329	361	32
L	Rear Bumper Thickness	278	314	36
M	Rear Bumper Bottom to Ground	391	403	12
N	Sill Height to Window Bottom Sill	815	798	-17
O	Front Door Leading Edge to Impact CL	793	780	-13
P	Rear Door Trailing Edge to Impact CL	1348	1305	-43
Q	Front Window Opening	462	486	24
R	Right Side Length	4085	4090	5
S	Left Side Length	4085	4022	-63
T	Vehicle Width at "B" Post	1967	1829	-138

DATA SHEET NO. 6

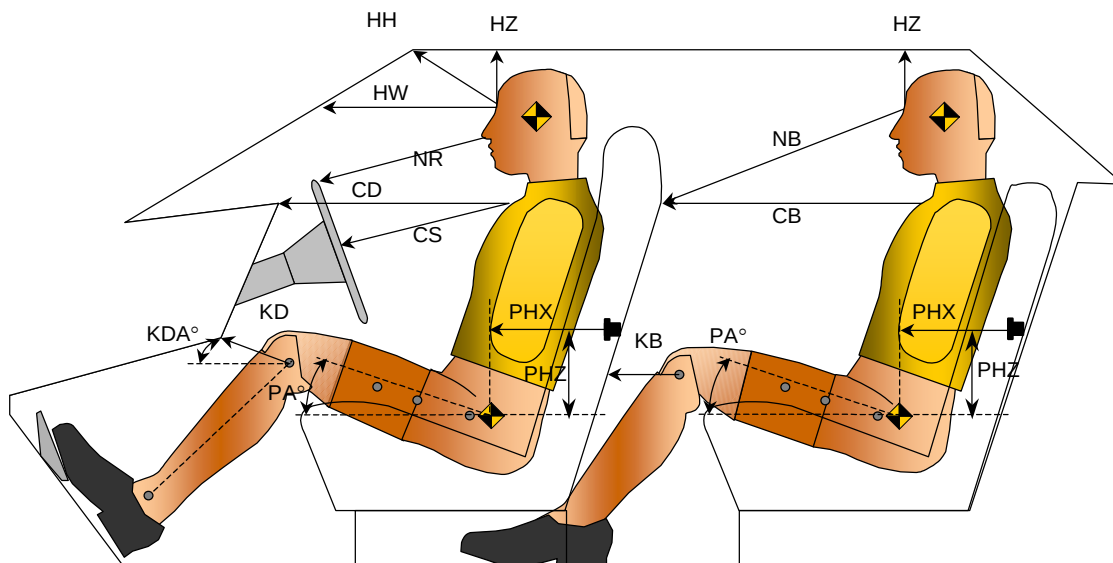
SID/HIII LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2007 Chevrolet Suburban LS 5-Door MPV

NHTSA No.: G70120

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 8/21/07



LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Pass. Code	Measurement Description	Driver		Passenger	
			Length(mm)	Angle	Length(mm)	Angle
HH		Head to Header	529	21.0		
HW		Head to Windshield	662	0.0		
HZ	HZ	Head to Roof	258	90.0	170	90.0
NR	NB	Nose to Rim/Nose to Seat Back	455	10.0	664	15.0
CD	CB	Chest to Dash or Seat Back	531	6.0	630	0.0
CS		Chest to Steering Wheel	330	9.0		
KDL	KBL	Left Knee to Dash or Seat Back	172	26.0	300	0.0
KDR	KBR	Right Knee to Dash or Seat Back	155		298	
PA	PA	Pelvic Angle		23.4		23.6
PHX	PHX	H-Point to Striker (X-Axis)	309		283	
PHZ	PHZ	H-Point to Striker (Z-Axis)	27		8	

DATA SHEET NO. 7

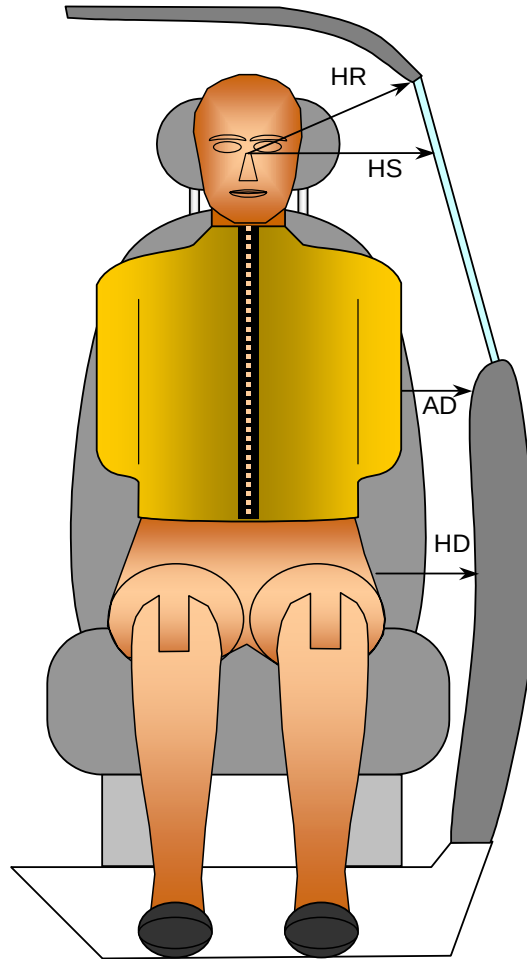
SID/HII LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2007 Chevrolet Suburban LS 5-Door MPV

NHTSA No.: G70120

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 8/21/07



FRONT VIEW OF DUMMY

LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver	Passenger
HR	Head to Side Header	mm	245	290
HS	Head to Side Window	mm	310	370
AD	Arm to Door	mm	118	136
HD	H-Point to Door	mm	194	208

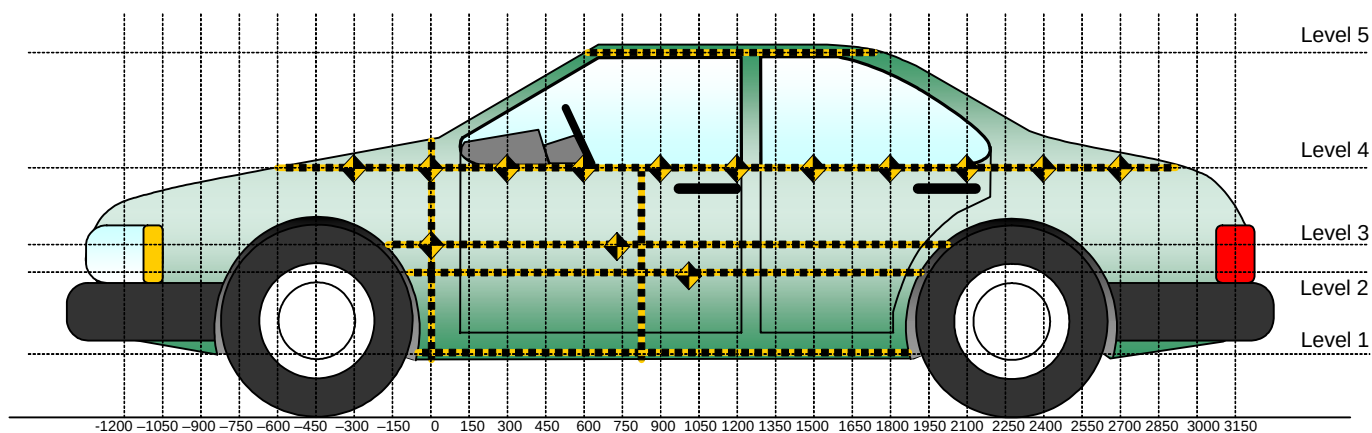
DATA SHEET NO. 8 **VEHICLE SIDE MEASUREMENTS**

Test Vehicle: 2007 Chevrolet Suburban LS 5-Door MPV

NHTSA No.: G70120

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 8/21/07



All Measurements Shown in mm

LEFT SIDE VIEW

Measurements are taken with vehicle in the as tested condition.

Measurements taken 900 mm right of impact reference.

All measurements below in mm.

Level	Measurement Description	Height Above Ground
1	Sill Top	337
2	Occupant H-Point	826
3	Mid Door	801
4	Window Sill	1146
5	Window Top	1762

All Dimensions shown in millimeters

DATA SHEET NO. 9

VEHICLE EXTERIOR CRUSH PROFILES

Test Vehicle: 2007 Chevrolet Suburban LS 5-Door MPV

NHTSA No.: G70120

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 8/21/07

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-900															
-750															
-600															
-450															
-300				572					633					61	
-150		503	503	566			556	562	623			53	59	57	
0	614	514	511	561		686	582	580	625		72	68	69	64	
150	661	516	516	555		787	639	641	598		126	123	125	43	
300	673	514	514	556		811	668	692	621		138	154	178	65	
450	673	513	511	552		822	681	716	639		149	168	205	87	
600	674	511	511	550	806	831	706	736	656	746	157	195	225	106	-60
750	673	514	509	546	801	847	731	758	676	768	174	217	249	130	-33
900	673	509	509	547	796	838	751	776	696	781	165	242	267	149	-15
1050	673	509	509	544	791	836	763	797	714	806	163	254	288	170	15
1200	673	509	509	546	791	840	780	796	737	818	167	271	287	191	27
1350	673	509	510	543	791	844	797	807	748	856	171	288	297	205	65
1500	663	510	510	545	793	846	786	801	719	831	183	276	291	174	38
1650	674	511	510	542	793	834	760	789	689	799	160	249	279	147	6
1800	674	512	511	544	794	821	736	771	658	774	147	224	260	114	-20
1950	674	513	513	542	793	810	699	726	631	752	136	186	213	89	-41
2100	655	513	514	545	796	797	666	706	599	718	142	153	192	54	-78
2250		506	499	545	799		596	632	592	861		90	133	47	62
2400				546					628					82	
2550				547					630					83	
2700															
2850															
3000															

All Dimensions shown in millimeters.

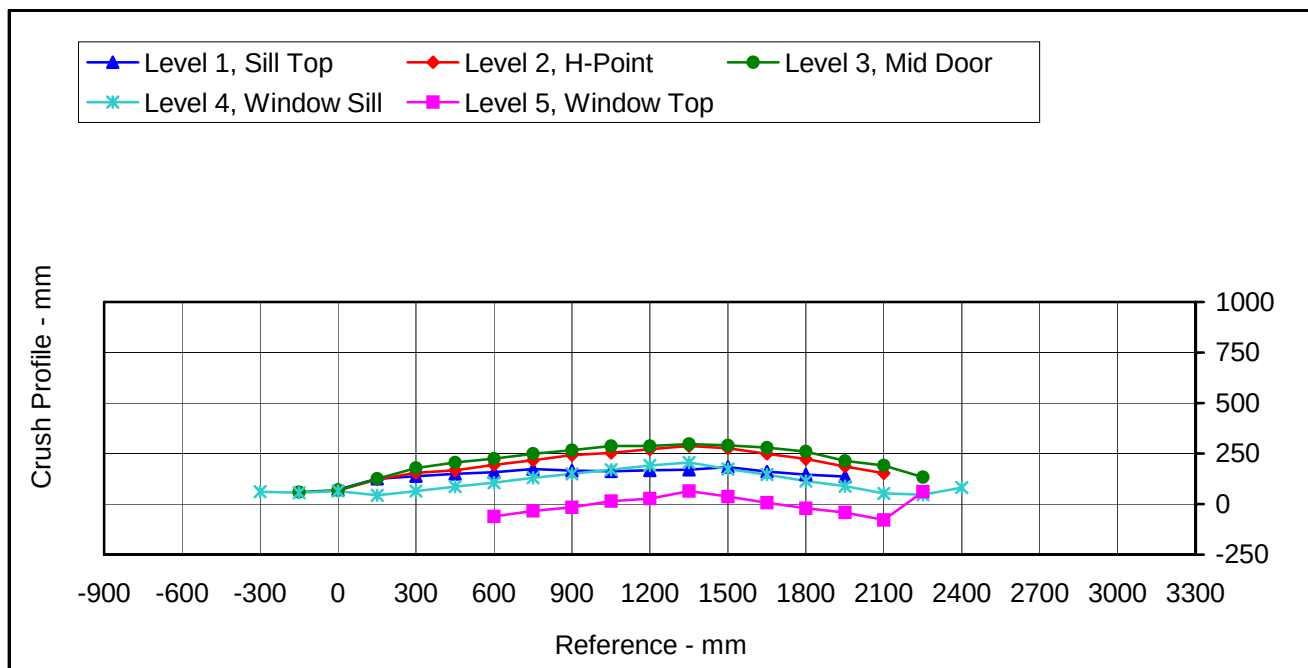
DATA SHEET NO. 9...(CONTINUED)
VEHICLE EXTERIOR CRUSH PROFILES

Test Vehicle: 2007 Chevrolet Suburban LS 5-Door MPV

NHTSA No.: G70120

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 8/21/07



	Units	Level 1	Level 2	Level 3	Level 4	Level 5
Maximum Crush	mm	183	288	297	205	65
Distance from Impact	mm	1200	1500	1350	1200	1350

DATA SHEET NO. 10

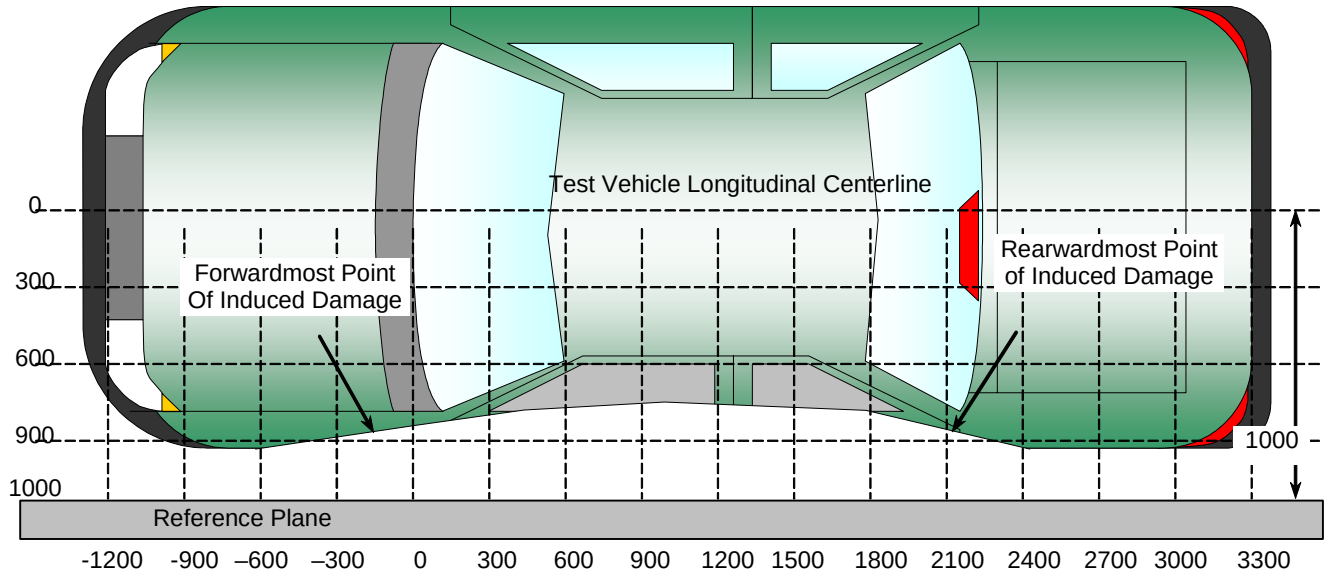
VEHICLE DAMAGE PROFILE DISTANCES

Test Vehicle: 2007 Chevrolet Suburban LS 5-Door MPV

NHTSA No.: G70120

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 8/21/07



All Dimensions Shown in millimeters

TOP VIEW

DAMAGE PROFILE DISTANCES

DPD	Distance From Impact Point in mm	Level	Pre-Test (mm)	Post-Test (mm)	Max. Static Crush (mm)
1	2250	3	499	632	133
2	1800	3	511	771	260
3	1350	3	510	807	297
4	900	3	509	776	267
5	450	3	511	716	205
6	0	1	614	686	72

DATA SHEET NO. 11

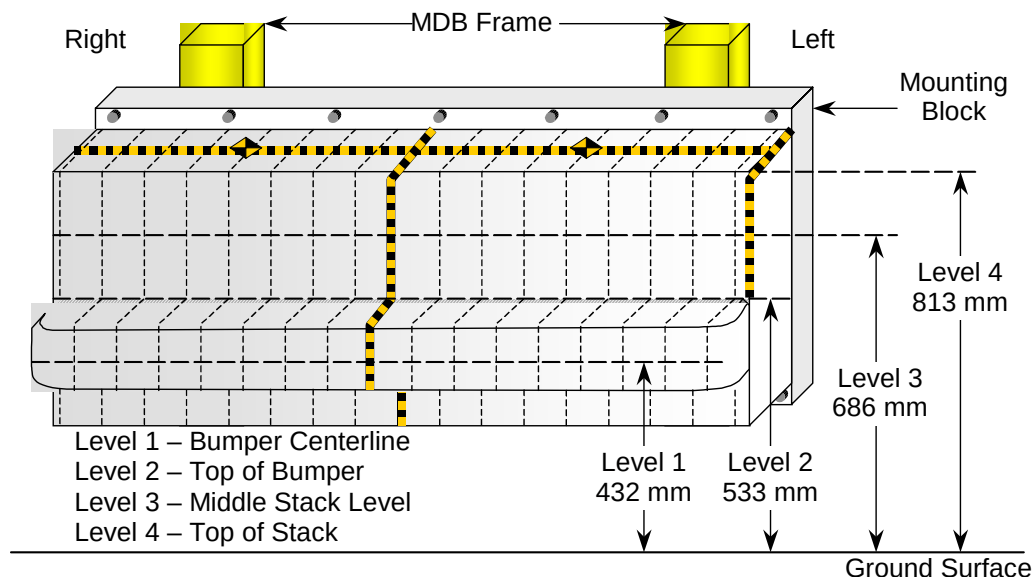
DEFORMABLE BARRIER HONEYCOMB FACE STATIC CRUSH

Test Vehicle: 2007 Chevrolet Suburban LS 5-Door MPV

NHTSA No.: G70120

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 8/21/07



DEFORMABLE BARRIER STATIC CRUSH

Stack Level	Distance Right of Center								C/L	Distance Left of Center							
	800	700	600	500	400	300	200	100		100	200	300	400	500	600	700	800
1	668	626	612	610	611	613	617	618	620	623	627	631	637	642	648	652	670
2	731	719	712	708	697	697	699	701	703	717	718	726	728	735	738	740	711
3	733	702	691	694	693	692	676	656	654	653	656	659	663	672	682	698	749
4	802	776	748	727	722	743	712	682	673	678	684	696	705	716	735	753	779

All Dimensions in mm

DATA SHEET NO. 12

VEHICLE ACCELEROMETER LOCATIONS

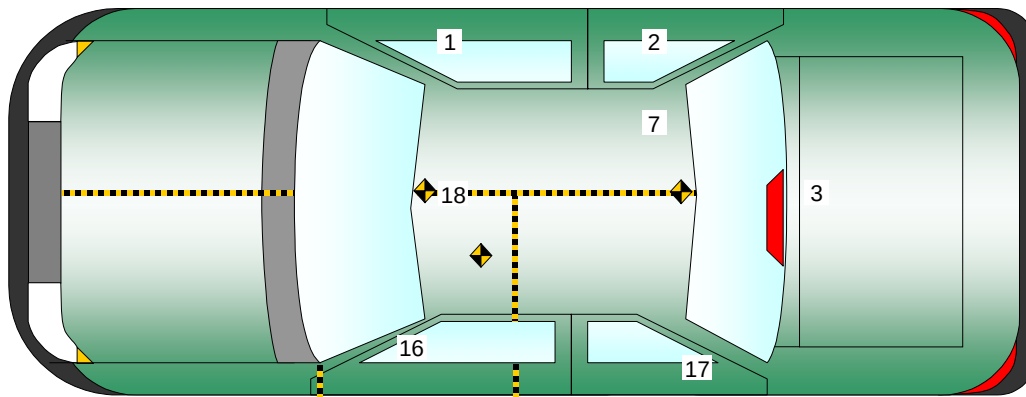
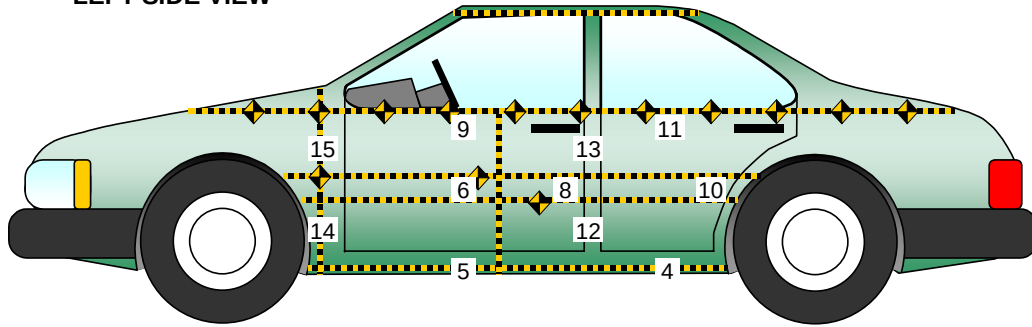
Test Vehicle: 2007 Chevrolet Suburban LS 5-Door MPV

NHTSA No.: G70120

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 8/21/07

LEFT SIDE VIEW



No.	Location
1	Right Sill at Front Seat
2	Right Sill at Rear Seat
3	Rear Floorpan Above Axle
4	Left Sill at Rear Door
5	Left Sill at Front Door
6	Left Front Door Centerline
7	Right Rear Occupant Compartment
8	Left Front Door Mid-Rear
9	Left Front Door Upper Centerline

No.	Location
10	Left Rear Door Mid-Rear
11	Left Rear Door Upper Centerline
12	Left Lower B-Post
13	Left Middle B-Post
14	Left Lower A-Post
15	Left Middle A-Post
16	Front Seat Track
17	Rear Seat Track or Structure
18	Vehicle CG

DATA SHEET NO. 12...(CONTINUED)
VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2007 Chevrolet Suburban LS 5-Door MPV

NHTSA No.: G70120

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 8/21/07

VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

Loc. No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Right Sill at Front Seat	3320	690	520
2	Right Sill at Rear Seat	2300	690	520
3	Rear Floorpan Above Axle	1410	335	900
4	Left Sill at Rear Door	2390	555	220
5	Left Sill at Front Door	3170	-665	220
6	Front Door Centerline			
7	Rt. Rear Occ. Compartment	2925	450	535
8	Front Door Mid-Rear			
9	Front Door Upper Centerline			
10	Rear Door Mid-Rear			
11	Rear Door Upper Centerline			
12	B-Post Lower	2860	-790	890
13	B-Post Middle	2860	-790	1110
14	A-Post Lower	4010	-900	550
15	A-Post Middle	4010	-900	905
16	Front Seat Track	3420	-610	675
17	Rear Seat Structure	2530	-280	620
18	Vehicle CG	3715	310	532

Reference Planes: X=From Rear Surface of Vehicle, Y=Vehicle Centerline, Z=Ground Plane

1.) Not installed

DATA SHEET NO. 13
MDB ACCELEROMETER LOCATIONS

Test Vehicle: 2007 Chevrolet Suburban LS 5-Door MPV

Test Program: 55/28 km/h Side Impact NCAP

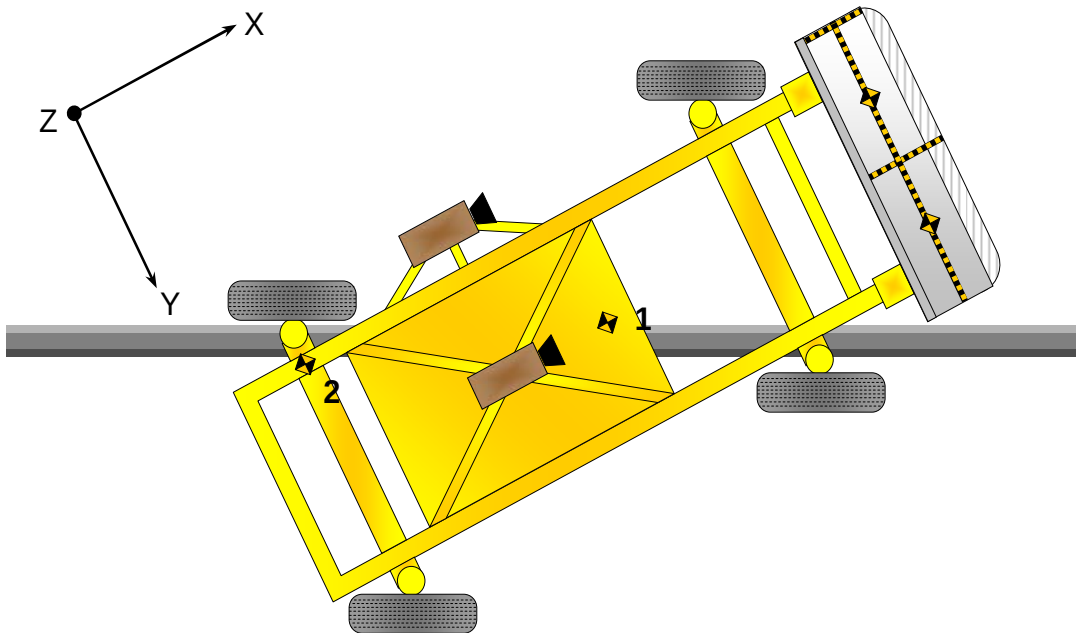
NHTSA No.: G70120

Test Date: 8/21/07

MDB ACCELEROMETER LOCATIONS

Loc. No.	Accelerometer Locations	Measurements (mm)		
		X	Y	Z
1	MDB CG	-1195	0	430
2	MDB Rear	-2642	-593	608

Reference Points: X - MDB Front Axle
Y - MDB Centerline
Z - Ground Plane



DATA SHEET NO. 14

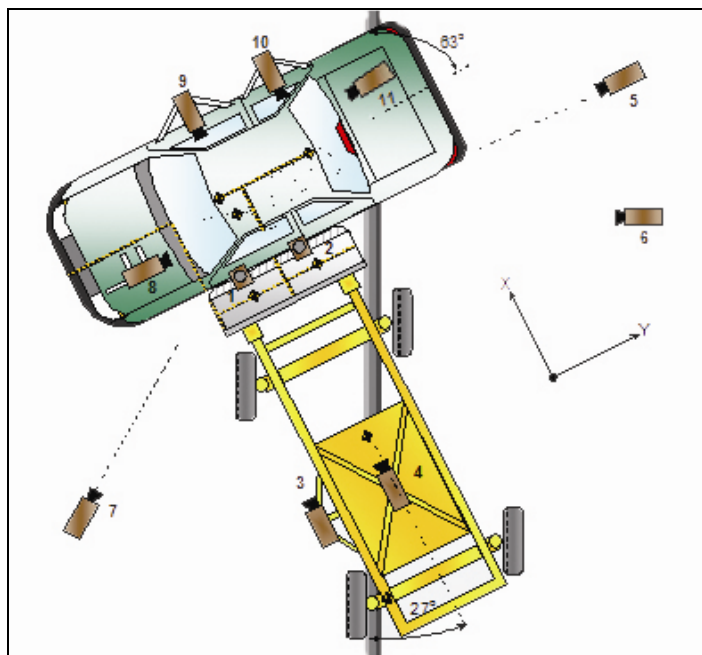
HIGH SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2007 Chevrolet Suburban LS 5-Door MPV

NHTSA No.: G70120

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 8/21/07



No.	Camera View	Location (mm)			Angle (deg.)	Lens (mm)	Film Speed (fps)
		X	Y	Z			
Doc	Real Time Inrun	-2484	-3958	-1506			30
Doc	Real Time Left Front	-2266	3549	-1475	-2		30
1	Overhead Overall	1220	2287	-5486	-90	14mm	1000
2	Overhead Close Up	609	2287	-5102	-90	Zoom	1000
3	Left Impact Point (MDB)	-2134	0	-1143	-2	12mm	1000
4	Side Overall (MDB)	-3912	838	-1829	-4	12mm	1000
5	Rear	-64	20485	-1348	0	105mm	1000
6	Left Rear (MDB)	-2137	-1302	-339	-4	85mm	1000
7	Left Front	-2266	-3564	-1475	-2	24mm	1000
8	Driver Front (O.B.)	490	570	-1560	-7	35mm	1000
9	Driver Side (O.B.)	810	1880	-1520	-2	20mm	1000
10	Passenger Side (O.B.)	1750	1880	-1610	-2	20mm	1000

All measurements are relative to the point of impact.

DATA SHEET NO. 15

FMVSS 301 FUEL SYSTEM INTEGRITY POST-IMPACT DATA

Test Vehicle: 2007 Chevrolet Suburban LS 5-Door MPV NHTSA No.: G70120

Test Program: 55/28 km/h Side Impact NCAP Test Date: 8/21/07

Test Time: 2:28 PM Temperature: 37.8 Deg. C.

Stoddard Solvent Spillage Measurements

- A. From impact until vehicle motion ceases: 0.0 oz.
(Maximum Allowable = 1 ounce)
- B. For the 5 minute period after motion ceases: 0.0 oz.
(Maximum Allowable = 5 ounces)
- C. For the following 25 minutes: 0.0 oz.
(Maximum Allowable = 1 oz./minute)
- D. Spillage Details: No leakage occurred

DATA SHEET NO. 16

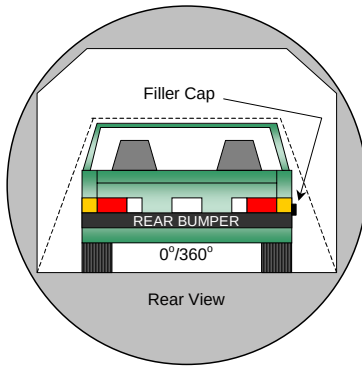
FMVSS 301 STATIC ROLLOVER DATA

Test Vehicle: 2007 Chevrolet Suburban LS 5-Door MPV

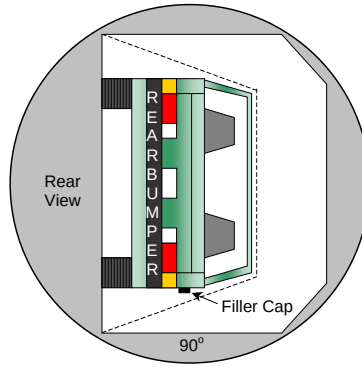
NHTSA No.: G70120

Test Program: 55/28 km/h Side Impact NCAP

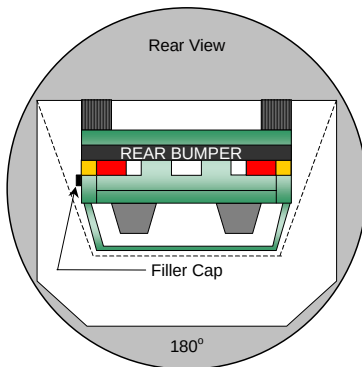
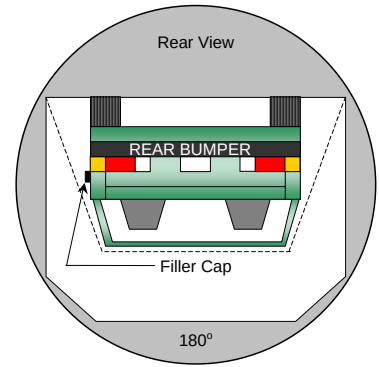
Test Date: 8/21/07



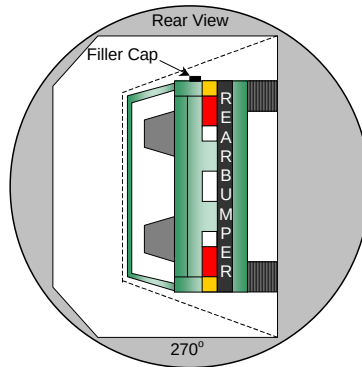
0° to 90°



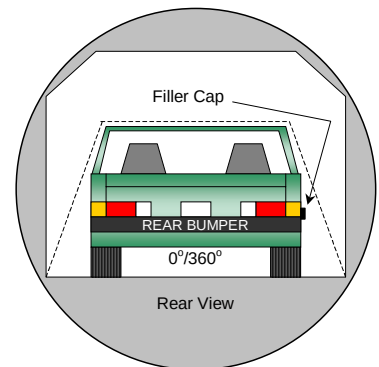
90° to 180°



180° to 270°



270° to 360°



1. The specified fixture rollover rate for each 90° of rotation is 60 to 120 seconds.
 2. The position hold time at each position is 300 seconds (minimum).
 3. Details of Stoddard Solvent spillage locations.
- No solvent leakage occurred during static rollover testing.

DATA SHEET NO. 16...(CONTINUED)**FMVSS 301 STATIC ROLLOVER DATA SHEET**Test Vehicle: 2007 Chevrolet Suburban LS 5-Door MPVNHTSA No.: G70120Test Program: 55/28 km/h Side Impact NCAPTest Date: 8/21/07**SOLVENT COLLECTION TIME TABLE IN SECONDS**

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	82	300	382
90° to 180°	84	300	384
180° to 270°	81	300	381
270° to 360°	83	300	383

FMVSS 301 SPILLAGE TABLE REQUIREMENT (oz.)

First 5 Minutes	5.0
Sixth Minute	1.0
Seventh Minute	1.0
Eighth Minute	1.0

Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0° to 90°	0	0	0	0
90° to 180°	0	0	0	0
180° to 270°	0	0	0	0
270° to 360°	0	0	0	0

SOLVENT SPILLAGE LOCATION TABLE

Test Phase	Spillage Location
0° to 90°	None
90° to 180°	None
180° to 270°	None
270° to 360°	None

DATA SHEET NO. 17

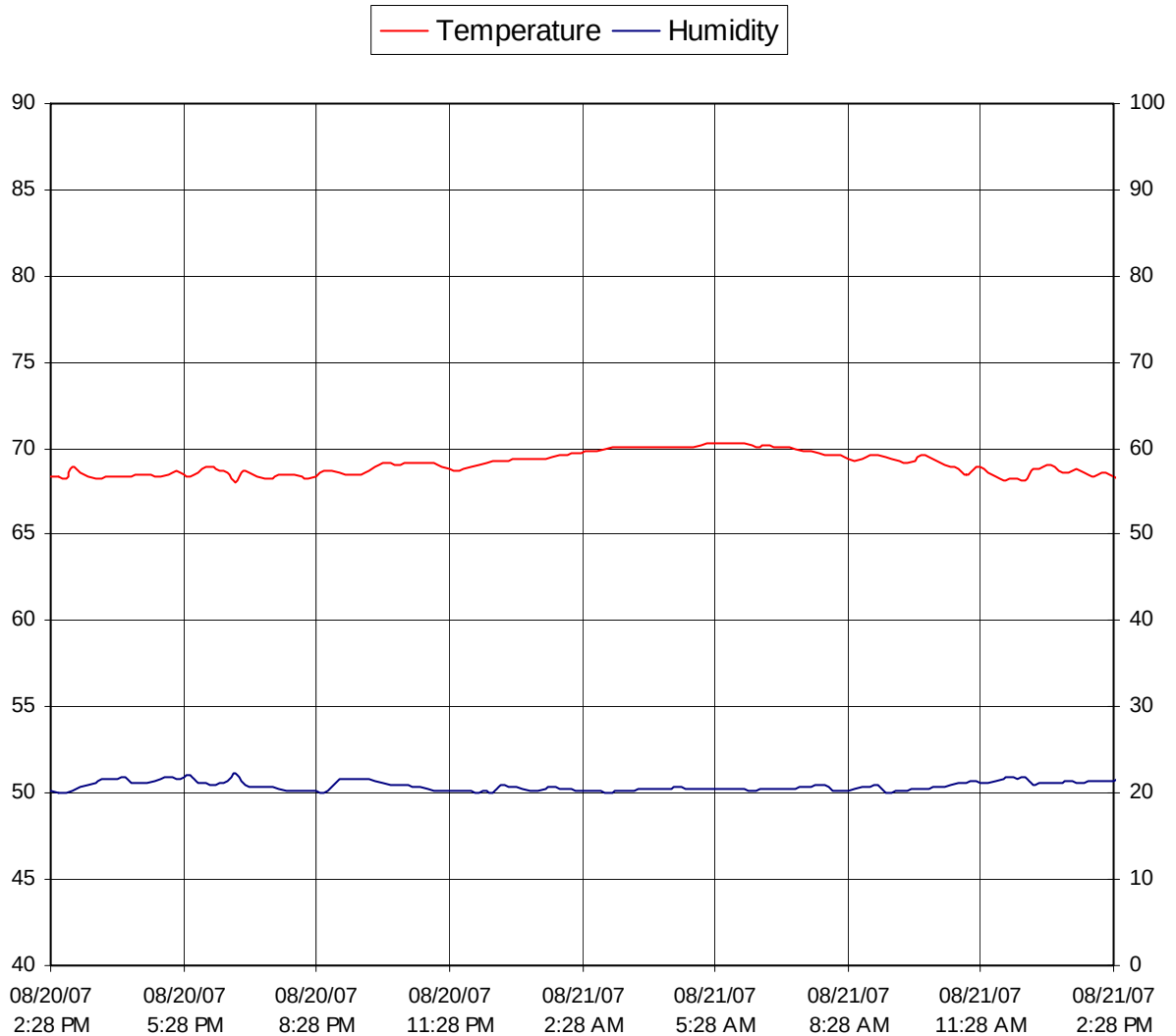
DUMMY / VEHICLE TEMPERATURE STABILIZATION

Test Vehicle: 2007 Chevrolet Suburban LS 5-Door MPV

NHTSA No.: G70120

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 8/21/07



APPENDIX A
PHOTOGRAPHS

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A-33	Pre-Test Left Rear Door	A-33
A-34	Post-Test Left Rear Door	A-34

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Figure A-1: Left Front $\frac{3}{4}$ View, as Received



Figure A-2: Right Rear $\frac{3}{4}$ View, as Received



MFD BY GENERAL MOTORS CORP.

09/06

GVWR
3266KG(7200LB)

GAWR FRT
1497KG(3300LB)

GAWR RR
1905KG(4200LB)

THIS VEHICLE CONFORMS TO ALL APPLICABLE U.S. FEDERAL MOTOR
VEHICLE SAFETY STANDARDS IN EFFECT ON THE DATE OF
MANUFACTURE SHOWN ABOVE.

1GNFC16J77R283002

TYPE: M.P.V.

MODEL: C10906

CQ5S TIRE SIZE SPEED RTG

RIM

COLD TIRE PRESSURE

FRT P265/70R17 S

17X7.5J

210KPA(30PSI)

RR P265/70R17 S

17X7.5J

210KPA(30PSI)

SPA P265/70R17 S

17X7.5J

240KPA(35PSI)

SEE OWNER'S MANUAL  FOR MORE INFORMATION.

F 103
T 339

Figure A-3: Manufacturer's Label



TIRE AND LOADING INFORMATION

SEATING CAPACITY : TOTAL 8 : FRONT 3 : REAR 5

The combined weight of occupants and cargo should never exceed 698 kg or 1539 lbs.

TIRE	ORIGINAL SIZE		COLD TIRE PRESSURE	SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION
FRONT	P265/70R17	S	210 kPa, 30 PSI	
REAR	P265/70R17	S	210 kPa, 30 PSI	
SPARE	P265/70R17	S	240 kPa, 35 PSI	

1GNFC16J77R283002

Figure A-4: Tire Placard



Figure A-5: Pre-Test Front View



Figure A-6: Post-Test Front View





Figure A-8: Post-Test Left Front $\frac{3}{4}$ View



Figure A-9: Pre-Test Left Side View



Figure A-10: Post-Test Left Side View



Figure A-11: Pre-Test Left Rear $\frac{3}{4}$ View



Figure A-12: Post-Test Left Rear $\frac{3}{4}$ View



Figure A-13: Pre-Test Rear View



Figure A-14: Post-Test Rear View



Figure A-15: Pre-Test Right Rear $\frac{3}{4}$ View



Figure A-16: Post-Test Right Rear $\frac{3}{4}$ View



Figure A-17: Pre-Test Right Side View



Figure A-18: Post-Test Right Side View



Figure A-19: Pre-Test Right Front $\frac{3}{4}$ View



Figure A-20: Post-Test Right Front $\frac{3}{4}$ View



Figure A-21: Pre-Test Overhead View



Figure A-22: Post-Test Overhead View



Figure A-23: Pre-Test Overhead Close-up View



Figure A-24: Post-Test Overhead Close-up View



Figure A-25: Pre-Test Left Impact Point



Post-Test Impact Point

Figure A-26: Post-Test Left Impact Point



Figure A-27: Pre-Test Front $\frac{3}{4}$ View of Left Side Door



Figure A-28: Post-Test Front $\frac{3}{4}$ View of Left Side Door



Figure A-29: Pre-Test Rear $\frac{3}{4}$ View of Left Side Door



Figure A-30: Post-Test Rear $\frac{3}{4}$ View of Left Side Door



Figure A-31: Pre-Test Left Front Door



Figure A-32: Post-Test Left Front Door



Figure A-33: Pre-Test Left Rear Door



Figure A-34: Post-Test Left Rear Door



Figure A-35: Pre-Test Driver Dummy (Door Open)

This Space Intentionally Left Blank



Figure A-36: Pre-Test Driver Dummy (Through Window)



Figure A-37: Post-Test Driver Dummy (Through Window)



Figure A-38: Pre-Test Driver Dummy Clearance From Door



Figure A-39: Post-Test Driver Dummy Clearance From Door

**Photograph Not
Available**

Figure A-40: Pre-Test Driver Dummy Right Side View



Figure A-41: Post-Test Driver Dummy Right Side View



Figure A-42: Pre-Test Front Door Panel (Interior)



Figure A-43: Post-Test Front Door Panel (Interior)



Figure A-44: Pre-Test Passenger Dummy Left Side (Door Open)

This Space Intentionally Left Blank



Figure A-45: Pre-Test Passenger Dummy Left Side (Through Window)



Figure A-46: Post-Test Passenger Dummy Left Side (Through Window)



Figure A-47: Pre-Test Passenger Dummy Clearance From Door



Figure A-48: Post-Test Passenger Dummy Clearance From Door

**Photograph Not
Available**

Figure A-49: Pre-Test Passenger Dummy Right Side View



Figure A-50: Post-Test Passenger Dummy Right Side View



Figure A-51: Pre-Test Rear Door Panel (Interior)



Figure A-52: Post-Test Rear Door Panel (Interior)



Figure A-53: Pre-Test Front View of Deformable Barrier



Figure A-54: Post-Test Front View of Deformable Barrier



Figure A-55: Pre-Test Top View of Deformable Barrier



Figure A-56: Post-Test Top View of Deformable Barrier



Figure A-57: Pre-Test Right Side View of Deformable Barrier



Figure A-58: Post-Test Right Side View of Deformable Barrier



Figure A-59: Pre-Test Left Side View of Deformable Barrier



Figure A-60: Post-Test Left Side View of Deformable Barrier



Figure A-61: Vehicle on Rollover Device (0°)



Figure A-62: Vehicle on Rollover Device (90°)



Figure A-63: Vehicle on Rollover Device (180°)

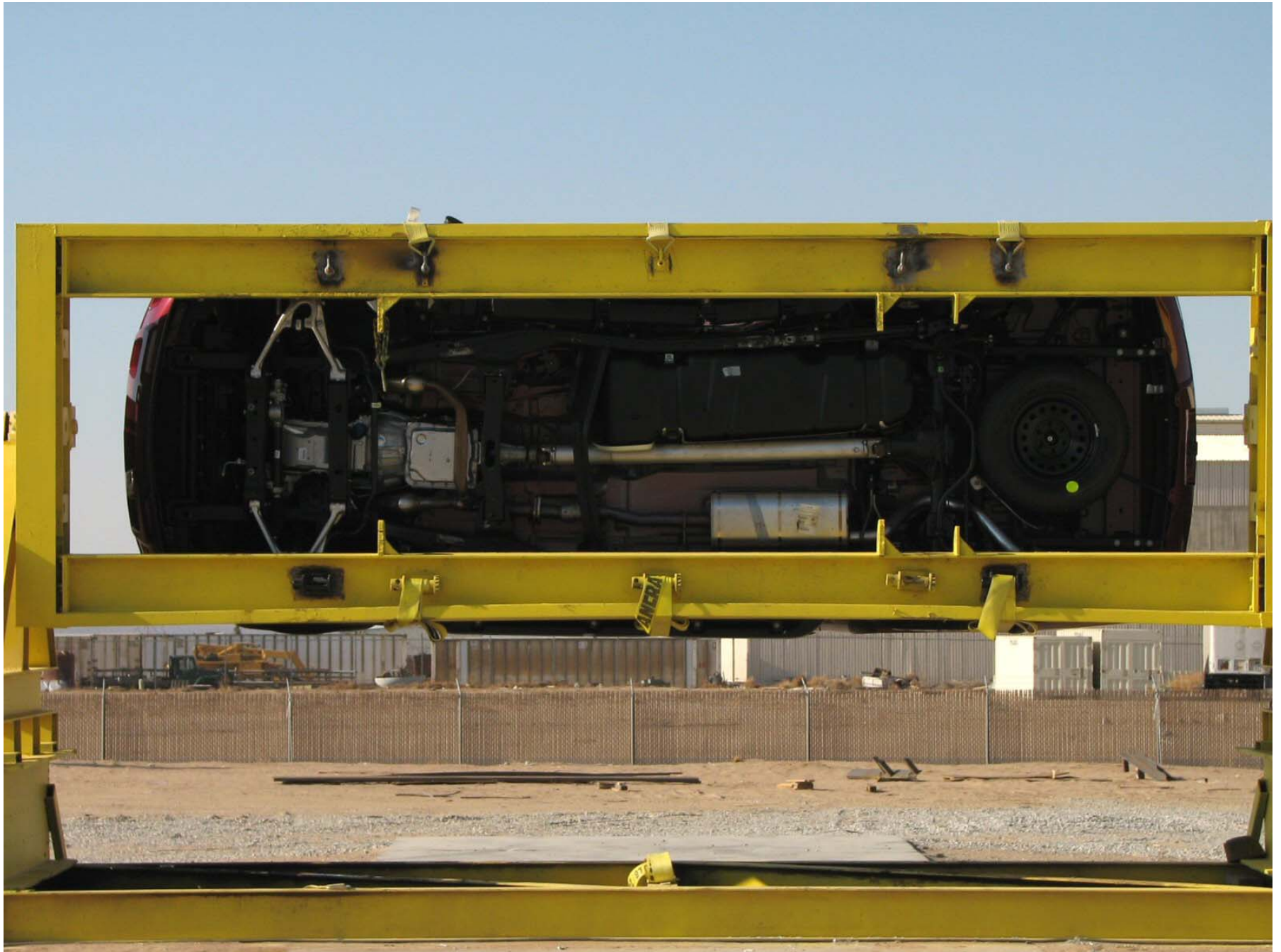


Figure A-64: Vehicle on Rollover Device (270°)



Figure A-65: Vehicle Impact

APPENDIX B
SID/HIII, VEHICLE AND MDB RESPONSE DATA

LIST OF DATA PLOTS

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B-1	Driver Upper Rib Primary Y
	Driver Lower Rib Primary Y
	Driver Lower Spine Primary Y
	Driver Pelvis Primary Y
B-2	Passenger Upper Rib Primary Y
	Passenger Lower Rib Primary Y
	Passenger Lower Spine Primary Y
	Passenger Pelvis Primary Y

The following additional data plots for this test can be obtained from the research and development section of the NHTSA website. The website can be found at www.NHTSA.dot.gov

LIST OF DATA PLOTS...(CONTINUED)

Driver Head X Primary
Driver Head Y Primary
Driver Head Z Primary
Driver Head Resultant Primary
Driver Head Primary X Velocity
Driver Head Primary Y Velocity
Driver Head Primary Z Velocity
Driver Head X Redundant
Driver Head Y Redundant
Driver Head Z Redundant
Driver Head Resultant Redundant
Driver Head Redundant X Velocity
Driver Head Redundant Y Velocity
Driver Head Redundant Z Velocity
Driver Upper Neck Force X
Driver Upper Neck Force Y
Driver Upper Neck Force Z
Driver Upper Neck Force Resultant
Driver Upper Neck Moment X
Driver Upper Neck Moment Y
Driver Upper Neck Moment Z
Driver Upper Neck Moment Resultant
Driver Upper Rib Primary Y Velocity
Driver Lower Rib Primary Y Velocity
Driver Lower Spine Primary Y Velocity
Driver Pelvis Primary Y Velocity
Driver Upper Rib Redundant Y
Driver Lower Rib Redundant Y
Driver Lower Spine Redundant Y
Driver Pelvis Redundant Y

LIST OF DATA PLOTS...(CONTINUED)

Driver Upper Rib Redundant Y Velocity
Driver Lower Rib Redundant Y Velocity
Driver Lower Spine Redundant Y Velocity
Driver Pelvis Redundant Y Velocity
Driver Thorax Contact
Driver Pelvis Contact
Passenger Head X Primary
Passenger Head Y Primary
Passenger Head Z Primary
Passenger Head Resultant Primary
Passenger Head Primary X Velocity
Passenger Head Primary Y Velocity
Passenger Head Primary Z Velocity
Passenger Head X Redundant
Passenger Head Y Redundant
Passenger Head Z Redundant
Passenger Head Resultant Redundant
Passenger Head Redundant X Velocity
Passenger Head Redundant Y Velocity
Passenger Head Redundant Z Velocity
Passenger Upper Neck Force X
Passenger Upper Neck Force Y
Passenger Upper Neck Force Z
Passenger Upper Neck Force Resultant
Passenger Upper Neck Moment X
Passenger Upper Neck Moment Y
Passenger Upper Neck Moment Z
Passenger Upper Neck Moment Resultant

LIST OF DATA PLOTS...(CONTINUED)

Passenger Upper Rib Primary Y Velocity
Passenger Lower Rib Primary Y Velocity
Passenger Lower Spine Primary Y Velocity
Passenger Pelvis Primary Y Velocity
Passenger Upper Rib Redundant Y
Passenger Lower Rib Redundant Y
Passenger Lower Spine Redundant Y
Passenger Pelvis Redundant Y
Passenger Upper Rib Redundant Y Velocity
Passenger Lower Rib Redundant Y Velocity
Passenger Lower Spine Redundant Y Velocity
Passenger Pelvis Redundant Y Velocity
Passenger Thorax Contact
Passenger Pelvis Contact
Vehicle Right Sill at Front Seat X
Vehicle Right Sill at Front Seat Y
Vehicle Right Sill at Front Seat Z
Vehicle Right Sill Front Seat Resultant
Vehicle Right Sill at Front Seat X Velocity
Vehicle Right Sill at Front Seat Y Velocity
Vehicle Right Sill at Front Seat Z Velocity
Vehicle Right Sill at Rear Seat X
Vehicle Right Sill at Rear Seat Y
Vehicle Right Sill at Rear Seat Z
Vehicle Right Sill Rear Seat Resultant
Vehicle Right Sill at Rear Seat X Velocity
Vehicle Right Sill at Rear Seat Y Velocity
Vehicle Right Sill at Rear Seat Z Velocity
Vehicle Rear Floor Above Axle X
Vehicle Rear Floor Above Axle Y
Vehicle Rear Floor Above Axle Z
Vehicle Rear Floor Above Axle Resultant
Vehicle Rear Floor Above Axle X Velocity
Vehicle Rear Floor Above Axle Y Velocity
Vehicle Rear Floor Above Axle Z Velocity

LIST OF DATA PLOTS...(CONTINUED)

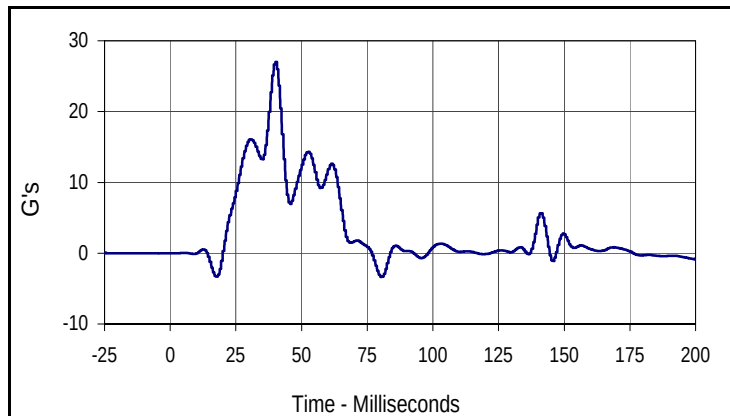
Vehicle Left Sill at Rear Door Y
Vehicle Left Sill at Front Door Y
Vehicle Left Sill at Rear Door Y Velocity
Vehicle Left Sill at Front Door Y Velocity
Vehicle Left Front Door C/L Y
Vehicle Right Rear Occupant Compartment
Vehicle Left Front Door Mid Rear Y
Vehicle Left Front Door Upper CL Y
Vehicle Left Front Door CL Y Velocity
Vehicle Right Rear Occupant Compartment Y Velocity
Vehicle Left Front Door Mid Rear Y Velocity
Vehicle Left Rear Door Upper CL Y Velocity
Vehicle Left Rear Door Mid Rear Y
Vehicle Left Rear Door Upper C/L Y
Vehicle Left Rear Door Mid Rear Y Velocity
Vehicle Left Rear Door Upper CL Y Velocity
Vehicle B-Post Lower Y
Vehicle B-Post Middle Y
Vehicle B-Post Lower Y Velocity
Vehicle B-Post Middle Y Velocity
Vehicle A-Post Lower Y
Vehicle A-Post Middle Y
Vehicle A-Post Lower Y Velocity
Vehicle A-Post Middle Y Velocity
Vehicle Left Front Seat Track
Vehicle Rear Seat Structure
Vehicle Left Front Seat Track Y Velocity
Vehicle Rear Seat Structure Y Velocity
Vehicle CG X
Vehicle CG Y
Vehicle CG Z
Vehicle CG Resultant
Vehicle CG X Velocity
Vehicle CG Y Velocity
Vehicle CG Z Velocity

LIST OF DATA PLOTS...(CONTINUED)

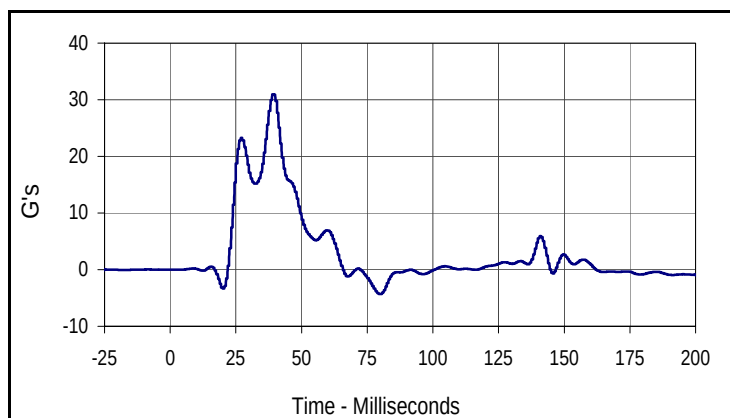
Driver Upper Rib Primary Y
Driver Lower Rib Primary Y
Driver Lower Spine Primary Y
Driver Pelvis Primary Y
Driver Upper Rib Redundant Y
Driver Lower Rib Redundant Y
Driver Lower Spine Redundant Y
Driver Pelvis Redundant Y
Passenger Upper Rib Primary Y
Passenger Lower Rib Primary Y
Passenger Lower Spine Primary Y
Passenger Pelvis Primary Y
Passenger Upper Rib Redundant Y
Passenger Lower Rib Redundant Y
Passenger Lower Spine Redundant Y
Passenger Pelvis Redundant Y
MDB CG X
MDB CG Y
MDB CG Z
MDB CG Resultant
MDB CG X Velocity
MDB CG Y Velocity
MDB CG Z Velocity
MDB Rear X
MDB Rear Y
MDB Rear X Velocity
MDB Rear Y Velocity
MDB Right Bumper Contact

Test Vehicle: 2007 Chevrolet Suburban LS 5-Door MPV
 Test Program: 55/28 km/h Side Impact NCAP

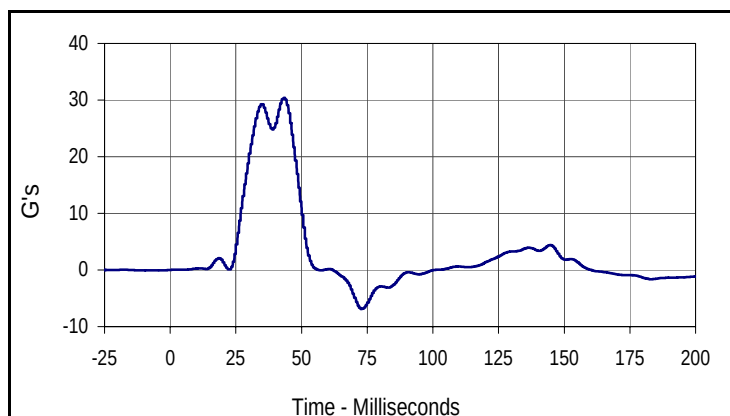
Test Date: 8/21/07
 NHTSA No.: G70120



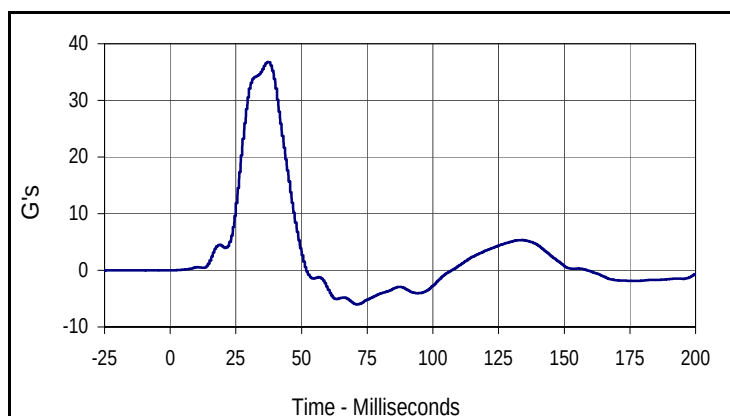
Curve Description			
Driver Upper Rib Y Primary			
CURNO	Type	SAE Class	Units
001	FIR	FIR100	G's
Max	Time	Min	Time
27.0	40.0	-3.3	80.0



Curve Description			
Driver Lower Rib Y Primary			
CURNO	Type	SAE Class	Units
002	FIR	FIR100	G's
Max	Time	Min	Time
31.0	38.8	-4.3	79.4



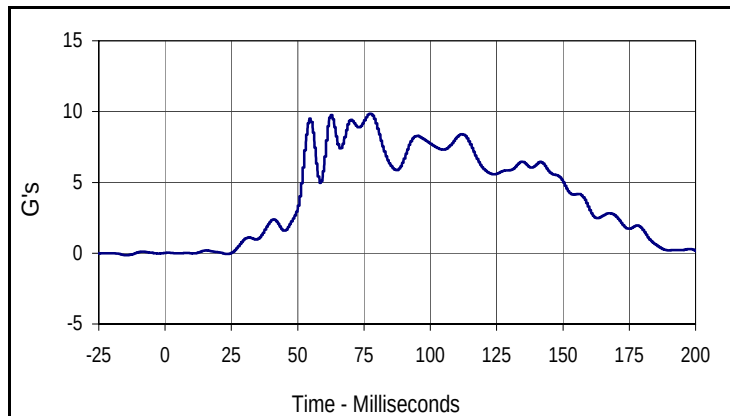
Curve Description			
Driver Lower Spine Y Primary			
CURNO	Type	SAE Class	Units
003	FIR	FIR100	G's
Max	Time	Min	Time
30.4	43.2	-6.9	72.5



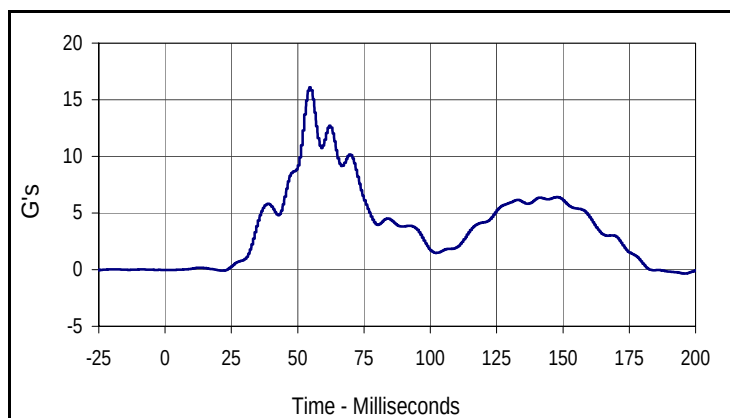
Curve Description			
Driver Pelvis Y Primary			
CURNO	Type	SAE Class	Units
004	FIR	FIR100	G's
Max	Time	Min	Time
36.8	36.9	-6.0	70.7

Test Vehicle: 2007 Chevrolet Suburban LS 5-Door MPV
 Test Program: 55/28 km/h Side Impact NCAP

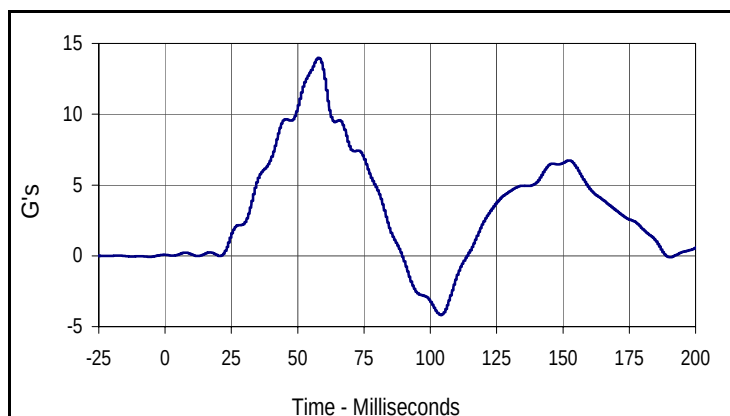
Test Date: 8/21/07
 NHTSA No.: G70120



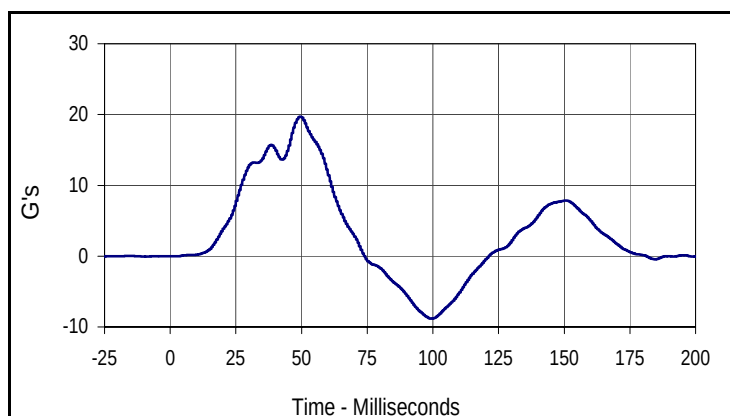
Curve Description			
Passenger Upper Rib Y Primary			
CURNO	Type	SAE Class	Units
005	FIR	FIR100	G's
Max	Time	Min	Time
9.9	76.9	-0.9	253.8



Curve Description			
Passenger Lower Rib Y Primary			
CURNO	Type	SAE Class	Units
006	FIR	FIR100	G's
Max	Time	Min	Time
16.1	54.4	-0.7	241.9



Curve Description			
Passenger Lower Spine Y Primary			
CURNO	Type	SAE Class	Units
007	FIR	FIR100	G's
Max	Time	Min	Time
14.0	57.5	-4.2	103.8



Curve Description			
Passenger Pelvis Primary Y			
CURNO	Type	SAE Class	Units
008	FIR	FIR100	G's
Max	Time	Min	Time
19.7	49.4	-8.8	99.4

APPENDIX C
SID/HIII CONFIGURATION AND PERFORMANCE VERIFICATION DATA

APPENDIX C
PRE-TEST SID / HIII CONFIGURATION AND PERFORMANCE VERIFICATION DATA

Test Program: SID / HIII External Measurements
ATD Serial No.: 274

Test Date: 8/17/07
Test I.D.: N/A



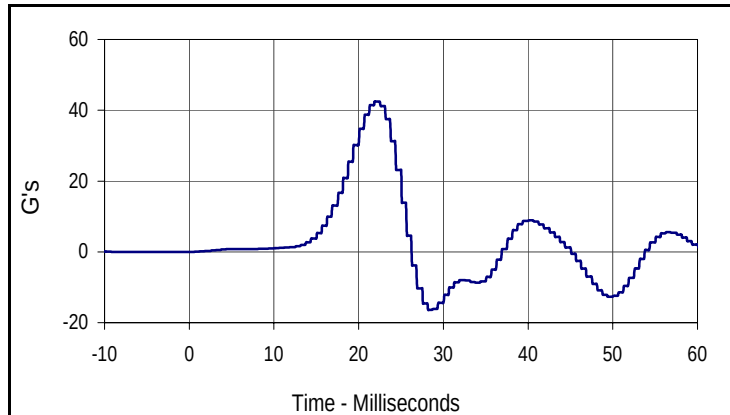
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
SH- Seated Height	mm	889 to 909	893	Pass
HP- Hip Point Height	mm	99 (reference)	99	Pass
RH- Rib Height	mm	502 to 520	510	Pass
KH- Knee Pivot From Back Line	mm	511 to 526	516	Pass
KV- Knee Pivot From Floor	mm	490 to 505	498	Pass
HW- Hip Width	mm	356 to 391	359	Pass
Overall Test Results				Pass

Test Program: SID / HIII Thorax Lateral Impact
 ATD Serial No.: 274

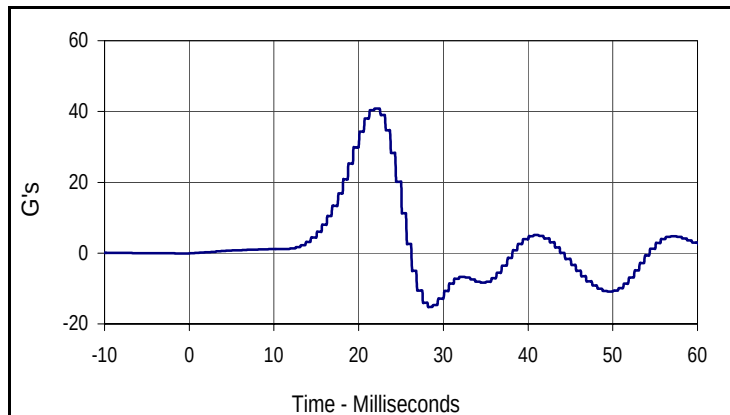
Test Date: 8/17/07
 Test I.D.: TH08U



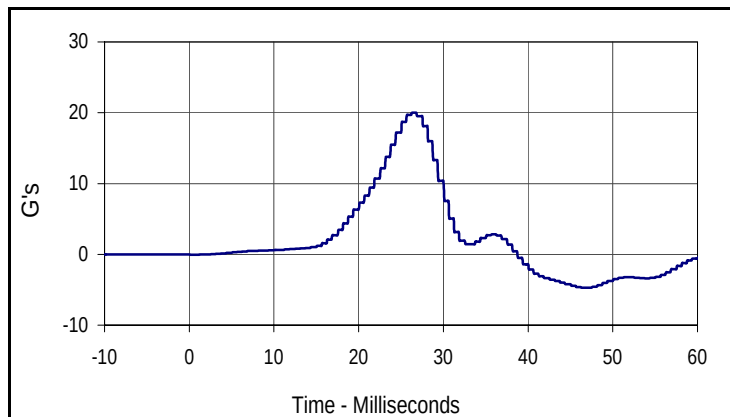
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	4.21 to 4.33	4.30	Pass
Upper Rib Acceleration	G's	37.0 to 46.0	42.5	Pass
Lower Rib Acceleration	G's	37.0 to 46.0	40.8	Pass
Thoracic Spine Acceleration	G's	15.0 to 22.0	20.0	Pass
Overall Test Results			Pass	



Curve Description			
Upper Rib Y Primary			
CURNO	Type	SAE Class	Units
001	FIL	FIR100	G's
Max	Time	Min	Time
42.5	21.9	-16.4	28.2



Curve Description			
Lower Rib Y Primary			
CURNO	Type	SAE Class	Units
002	FIL	FIR100	G's
Max	Time	Min	Time
40.8	21.9	-15.2	28.2



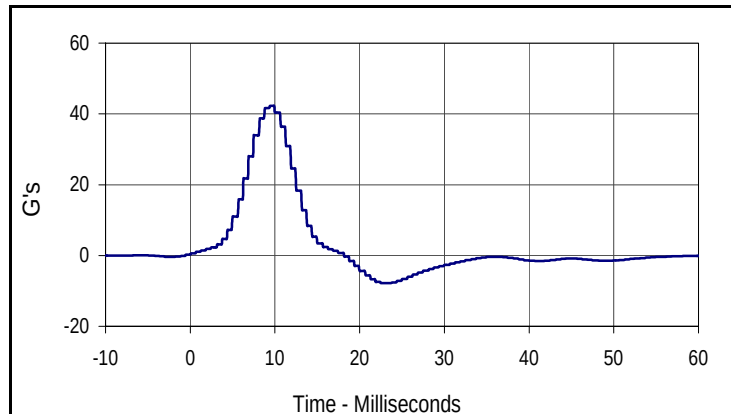
Curve Description			
Lower Spine Y Primary			
CURNO	Type	SAE Class	Units
003	FIL	FIR100	G's
Max	Time	Min	Time
20.0	26.3	-4.7	46.3

Test Program: SID / HIII Pelvis Lateral Impact
 ATD Serial No.: 274

Test Date: 8/17/07
 Test I.D.: PL08U



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	4.21 to 4.33	4.32	Pass
Peak Pelvis Acceleration	G's	40.0 to 60.0	42.2	Pass
Acceleration Time Above 20 G's	Msec.	3.0 to 7.0	4.90	Pass
Overall Test Results				Pass



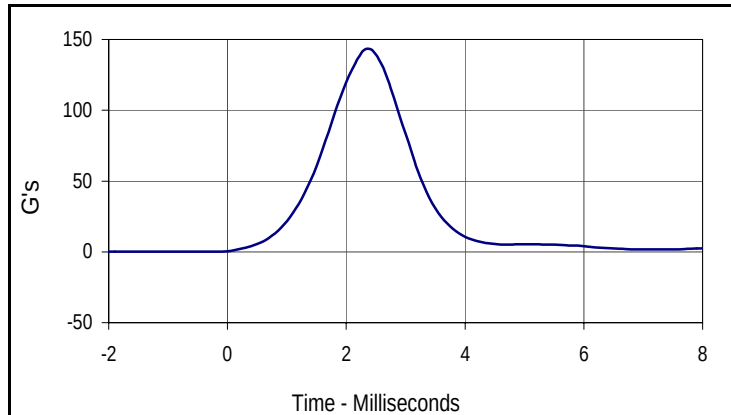
Curve Description			
Pelvis Y Primary			
CURNO	Type	SAE Class	Units
001	FIL	FIR100	G's
Max	Time	Min	Time
42.2	9.4	-7.8	23.2

Test Program: SID / HIII Head Drop Lateral Impact Test
 ATD Serial No.: 274

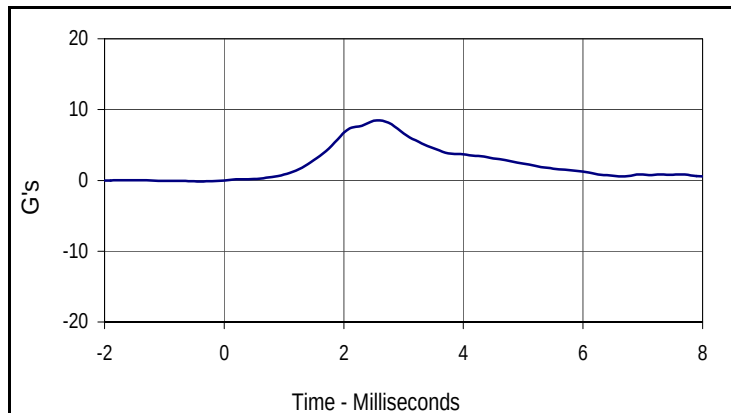
Test Date: 8/17/07
 Test I.D.: HD08U



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Peak Resultant Acceleration	G's	120.0 to 150.0	143.3	Pass
Peak Longitudinal Acceleration	G's	≤15.0	8.5	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse	%	<15	3.8	Pass
Overall Test Results			Pass	



Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
143.3	2.4	0.1	-1.0



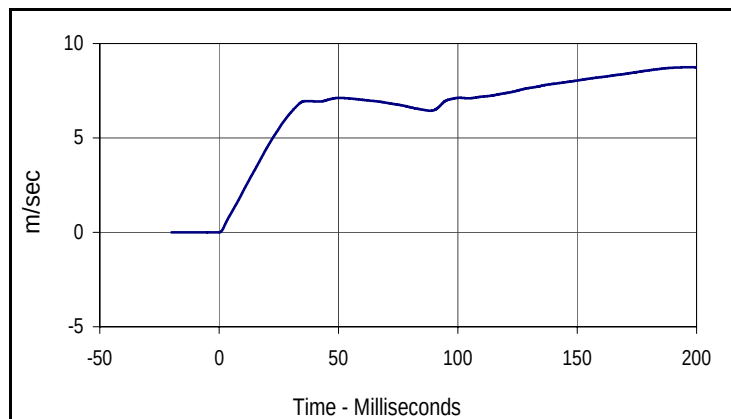
Curve Description			
Head X			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
8.5	2.6	-0.1	-0.4

Test Program: SID / HIII Neck Pendulum Lateral Test
 ATD Serial No.: 274

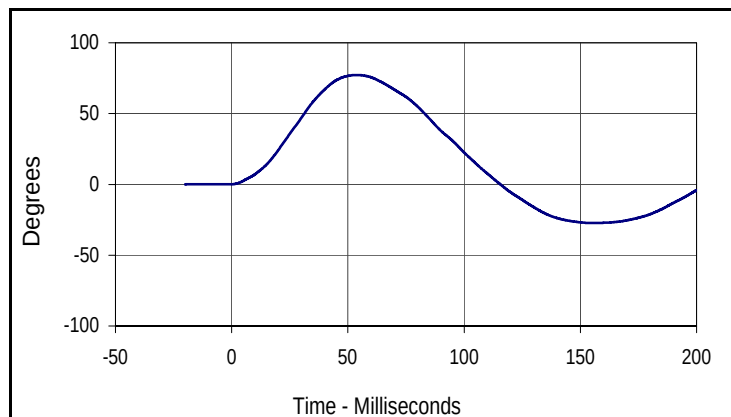
Test Date: 8/17/07
 Test I.D.: NB08U



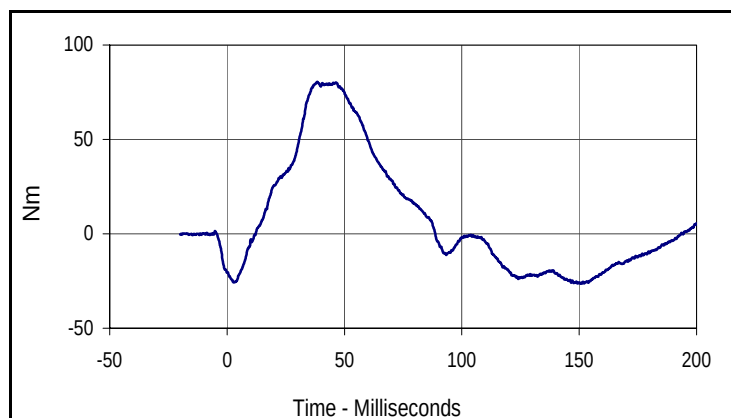
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/sec	6.89 to 7.13	7.09	Pass
Pendulum Deceleration	10 Msec.	m/sec	1.96 to 2.55	2.17	Pass
	20 Msec.	m/sec	4.12 to 5.10	4.48	Pass
	30 Msec.	m/sec	5.73 to 7.01	6.35	Pass
	40 to 70	m/sec	6.27 to 7.64	7.12	Pass
"D" Plane Rotation	Max	Degrees	66.0 to 82.0	77.3	Pass
Max Rotation Time After Peak Moment		Msec.	2.0 to 16.0	15.4	Pass
Rotation Time From Peak to Zero Angle		Msec.	58.0 to 67.0	61.9	Pass
Moment About Occipital Condyle		Nm	73.0 to 88.0	80.5	Pass
Positive Moment Decay, Time To 0 Nm		Msec.	49.0 to 64.0	50.4	Pass
Overall Test Results				Pass	



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	180	m/sec
Max	Time	Min	Time
8.7	196.6	0.0	-0.1



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
77.3	53.7	-27.3	155.3



Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
004	FIL	600	Nm
Max	Time	Min	Time
80.5	38.3	-26.4	151.0

Test Program: SID / HIII External Measurements
 ATD Serial No.: 275

Test Date: 8/15/07
 Test I.D.: N/A



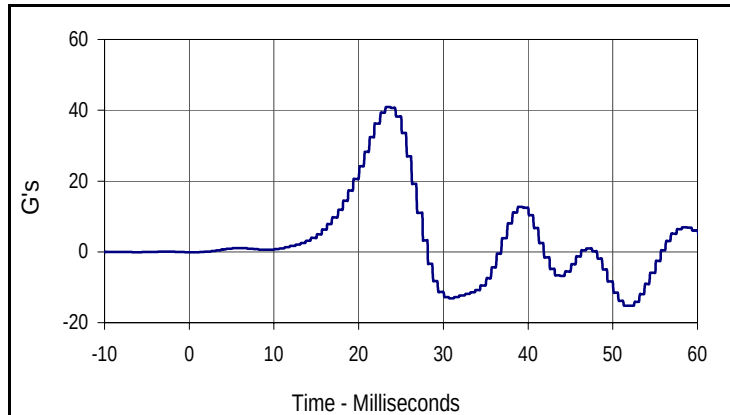
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
SH- Seated Height	mm	889 to 909	893	Pass
HP- Hip Point Height	mm	99 (reference)	99	Pass
RH- Rib Height	mm	502 to 520	504	Pass
KH- Knee Pivot From Back Line	mm	511 to 526	518	Pass
KV- Knee Pivot From Floor	mm	490 to 505	498	Pass
HW- Hip Width	mm	356 to 391	359	Pass
Overall Test Results				Pass

Test Program: SID / HIII Thorax Lateral Impact
 ATD Serial No.: 275

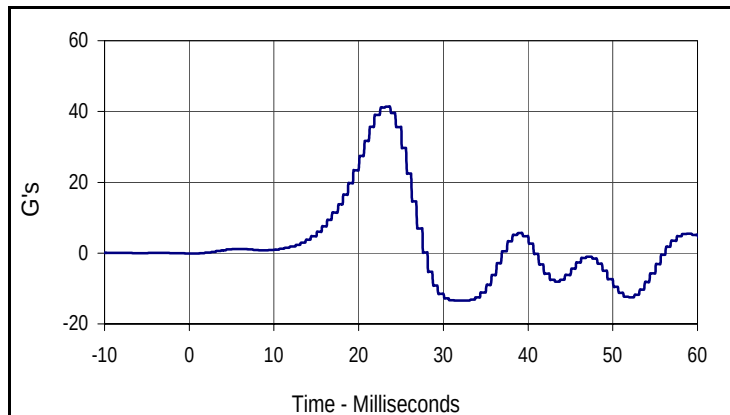
Test Date: 8/17/07
 Test I.D.: TH08T



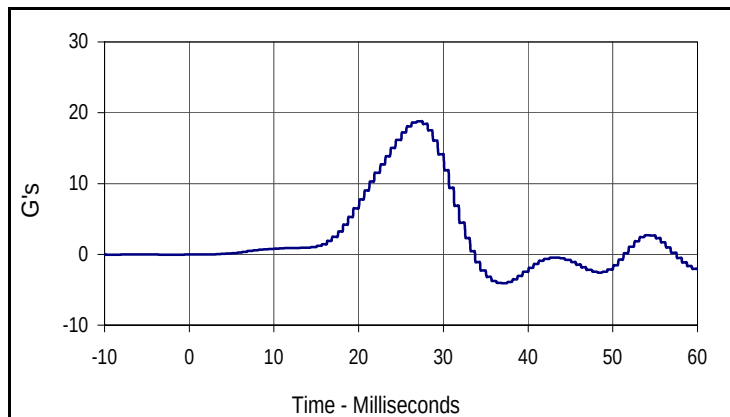
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	4.21 to 4.33	4.25	Pass
Upper Rib Acceleration	G's	37.0 to 46.0	40.9	Pass
Lower Rib Acceleration	G's	37.0 to 46.0	41.4	Pass
Thoracic Spine Acceleration	G's	15.0 to 22.0	18.8	Pass
Overall Test Results			Pass	



Curve Description			
Upper Rib Y Primary			
CURNO	Type	SAE Class	Units
001	FIL	FIR100	G's
Max	Time	Min	Time
40.9	23.2	-15.2	51.9



Curve Description			
Lower Rib Y Primary			
CURNO	Type	SAE Class	Units
002	FIL	FIR100	G's
Max	Time	Min	Time
41.4	23.2	-13.4	31.9



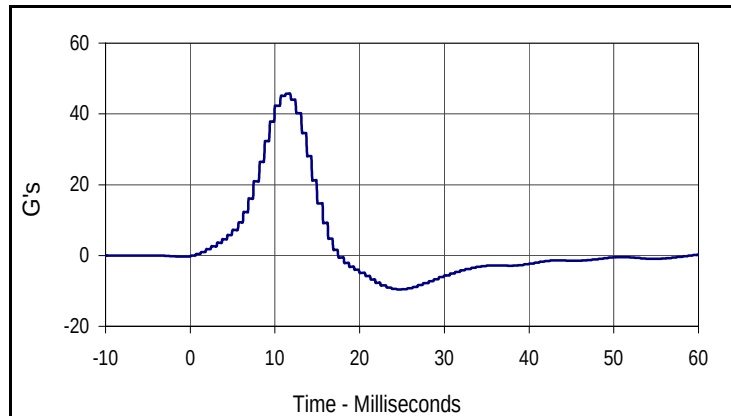
Curve Description			
Lower Spine Y Primary			
CURNO	Type	SAE Class	Units
003	FIL	FIR100	G's
Max	Time	Min	Time
18.8	26.9	-4.1	36.9

Test Program: SID / HIII Pelvis Lateral Impact
 ATD Serial No.: 275

Test Date: 8/17/07
 Test I.D.: PL08T



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	4.21 to 4.33	4.45	Fail
Peak Pelvis Acceleration	G's	40.0 to 60.0	45.7	Pass
Acceleration Time Above 20 G's	Msec.	3.0 to 7.0	4.90	Pass
Overall Test Results				Fail



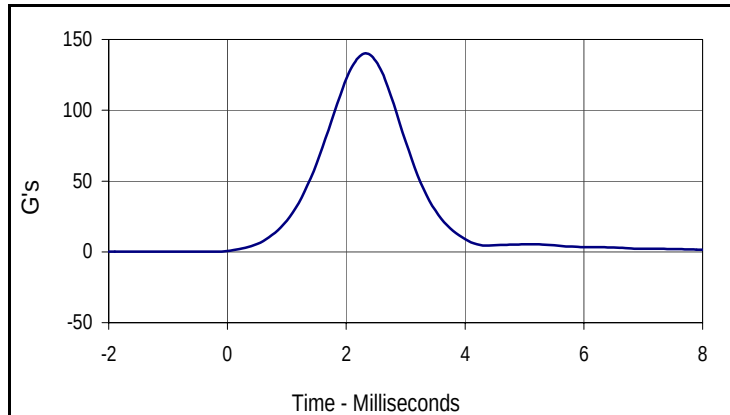
Curve Description			
Pelvis Y Primary			
CURNO	Type	SAE Class	Units
001	FIL	FIR100	G's
Max	Time	Min	Time
45.7	11.3	-9.6	24.4

Test Program: SID / HIII Head Drop Lateral Impact Test
 ATD Serial No.: 275

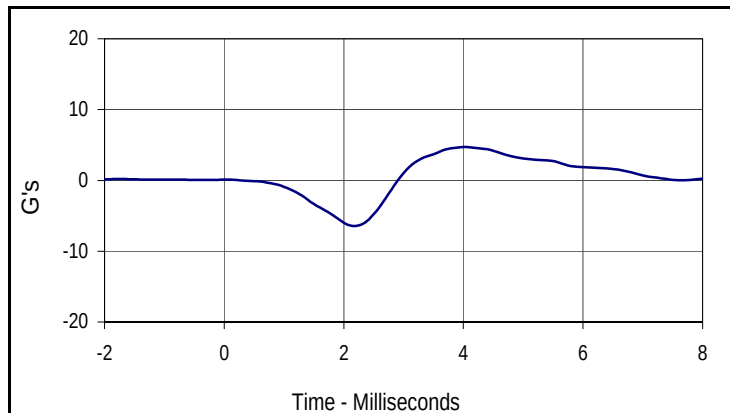
Test Date: 8/17/07
 Test I.D.: HD08T



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Peak Resultant Acceleration	G's	120.0 to 150.0	140.0	Pass
Peak Longitudinal Acceleration	G's	≤15.0	6.4	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse	%	<15	3.8	Pass
Overall Test Results			Pass	



Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
140.0	2.3	0.1	-1.0



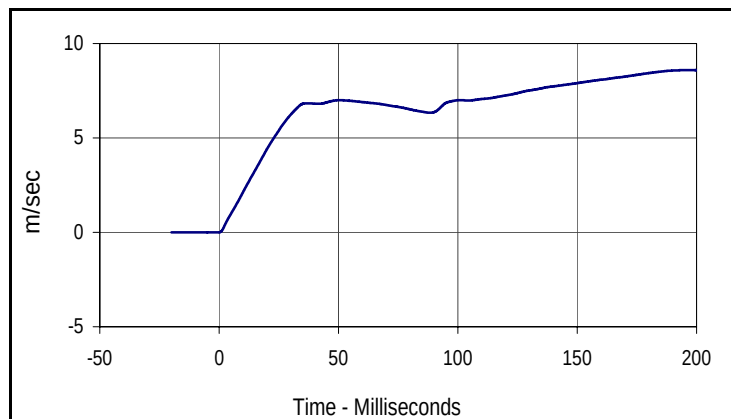
Curve Description			
Head X			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
4.7	4.0	-6.4	2.2

Test Program: SID / HIII Neck Pendulum Lateral Test
 ATD Serial No.: 275

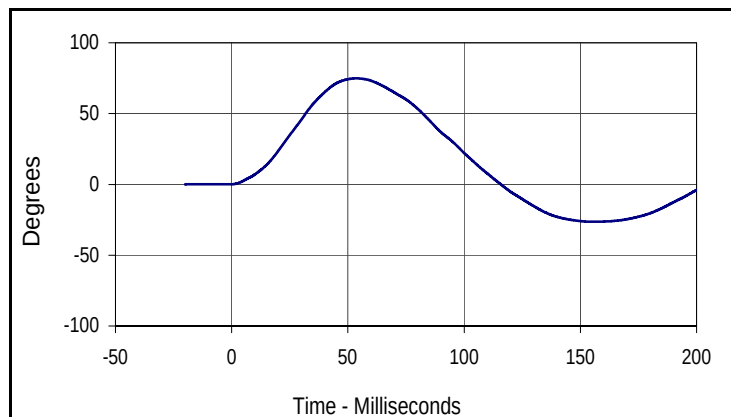
Test Date: 8/17/07
 Test I.D.: NB08T



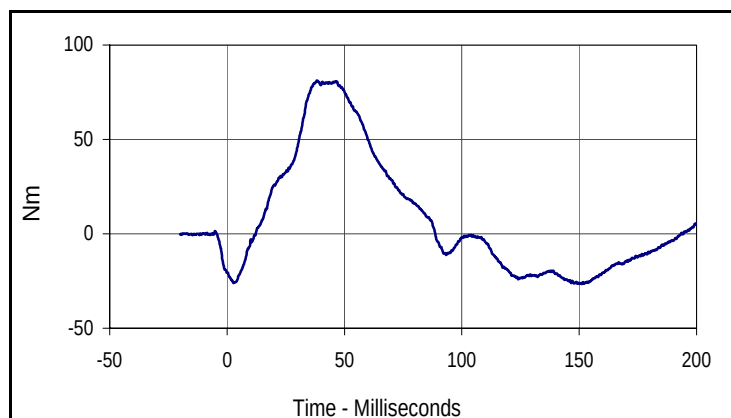
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/sec	6.89 to 7.13	7.01	Pass
Pendulum Deceleration	10 Msec.	m/sec	1.96 to 2.55	2.13	Pass
	20 Msec.	m/sec	4.12 to 5.10	4.40	Pass
	30 Msec.	m/sec	5.73 to 7.01	6.24	Pass
	40 to 70	m/sec	6.27 to 7.64	7.00	Pass
"D" Plane Rotation	Max	Degrees	66.0 to 82.0	74.9	Pass
Max Rotation Time After Peak Moment		Msec.	2.0 to 16.0	15.3	Pass
Rotation Time From Peak to Zero Angle		Msec.	58.0 to 67.0	62.2	Pass
Moment About Occipital Condyle		Nm	73.0 to 88.0	81.2	Pass
Positive Moment Decay, Time To 0 Nm		Msec.	49.0 to 64.0	50.4	Pass
Overall Test Results					Pass



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	180	m/sec
Max	Time	Min	Time
8.6	196.6	0.0	-0.1



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
74.9	53.6	-26.4	155.3



Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
004	FIL	600	Nm
Max	Time	Min	Time
81.2	38.3	-26.6	151.0

APPENDIX C
POST-TEST SID / HIII CONFIGURATION AND PERFORMANCE VERIFICATION DATA

Test Program: SID / HIII External Measurements
 ATD Serial No.: 274

Test Date: 8/22/07
 Test I.D.: N/A



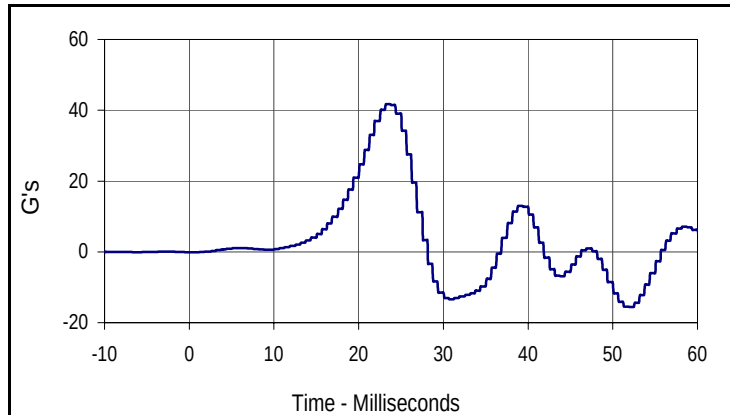
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
SH- Seated Height	mm	889 to 909	896	Pass
HP- Hip Point Height	mm	99 (reference)	99	Pass
RH- Rib Height	mm	502 to 520	511	Pass
KH- Knee Pivot From Back Line	mm	511 to 526	518	Pass
KV- Knee Pivot From Floor	mm	490 to 505	500	Pass
HW- Hip Width	mm	356 to 391	372	Pass
Overall Test Results				Pass

Test Program: SID / HIII Thorax Lateral Impact
 ATD Serial No.: 274

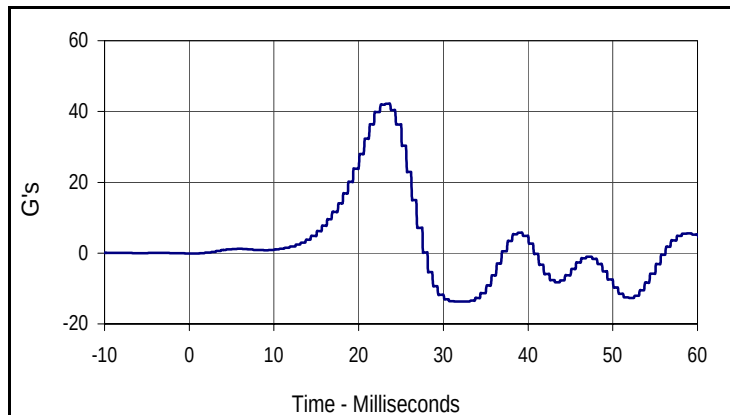
Test Date: 8/22/07
 Test I.D.: TH08V



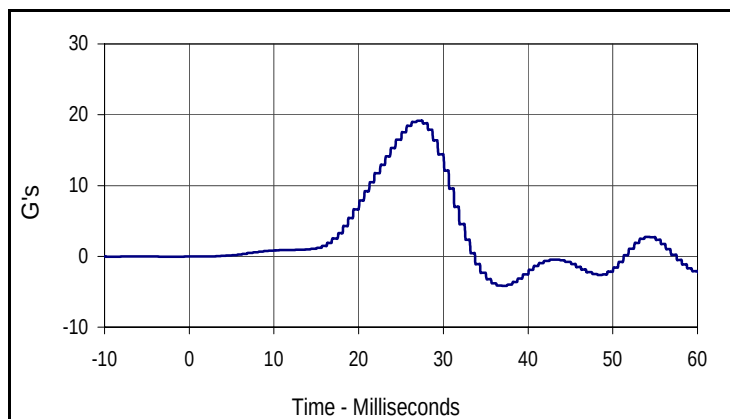
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	4.21 to 4.33	4.30	Pass
Upper Rib Acceleration	G's	37.0 to 46.0	41.8	Pass
Lower Rib Acceleration	G's	37.0 to 46.0	42.2	Pass
Thoracic Spine Acceleration	G's	15.0 to 22.0	19.2	Pass
Overall Test Results			Pass	



Curve Description			
Upper Rib Y Primary			
CURNO	Type	SAE Class	Units
001	FIL	FIR100	G's
Max	Time	Min	Time
41.8	23.2	-15.5	51.9



Curve Description			
Lower Rib Y Primary			
CURNO	Type	SAE Class	Units
002	FIL	FIR100	G's
Max	Time	Min	Time
42.2	23.2	-13.7	31.9



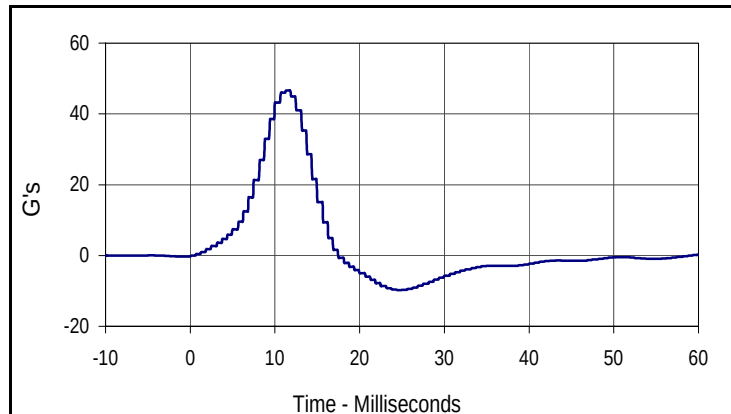
Curve Description			
Lower Spine Y Primary			
CURNO	Type	SAE Class	Units
003	FIL	FIR100	G's
Max	Time	Min	Time
19.2	26.9	-4.2	36.9

Test Program: SID / HIII Pelvis Lateral Impact
 ATD Serial No.: 274

Test Date: 8/22/07
 Test I.D.: PL08V



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	4.21 to 4.33	4.29	Pass
Peak Pelvis Acceleration	G's	40.0 to 60.0	46.6	Pass
Acceleration Time Above 20 G's	Msec.	3.0 to 7.0	4.90	Pass
Overall Test Results				Pass



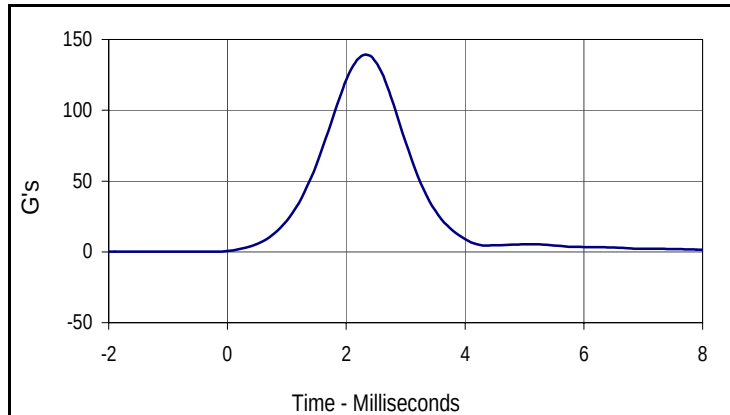
Curve Description			
Pelvis Y Primary			
CURNO	Type	SAE Class	Units
001	FIL	FIR100	G's
Max	Time	Min	Time
46.6	11.3	-9.8	24.4

Test Program: SID / HIII Head Drop Lateral Impact Test
 ATD Serial No.: 274

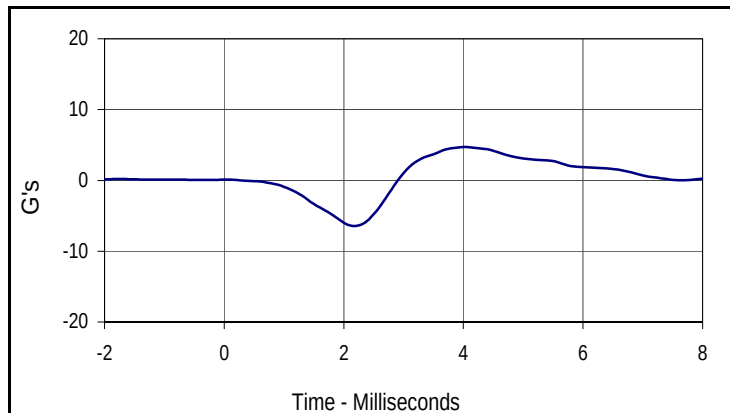
Test Date: 8/22/07
 Test I.D.: HD08V



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Peak Resultant Acceleration	G's	120.0 to 150.0	139.2	Pass
Peak Longitudinal Acceleration	G's	≤15.0	6.4	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse	%	<15	3.8	Pass
Overall Test Results			Pass	



Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
139.2	2.3	0.1	-1.0



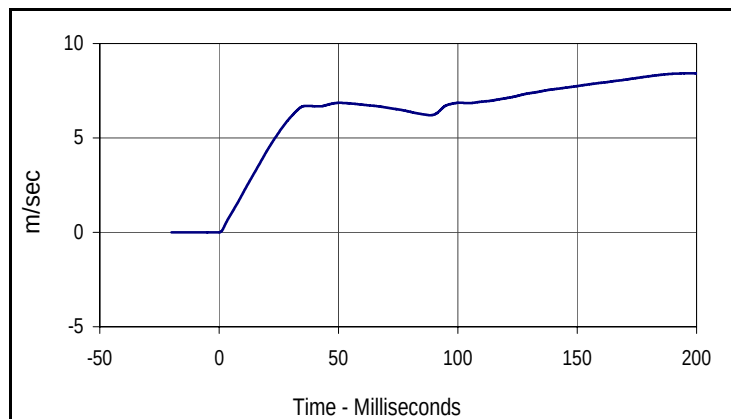
Curve Description			
Head X			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
4.7	4.0	-6.4	2.2

Test Program: SID / HIII Neck Pendulum Lateral Test
 ATD Serial No.: 274

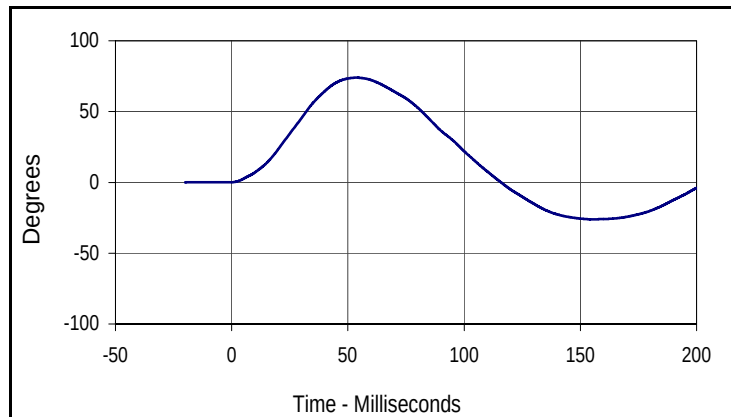
Test Date: 8/22/07
 Test I.D.: NB08V



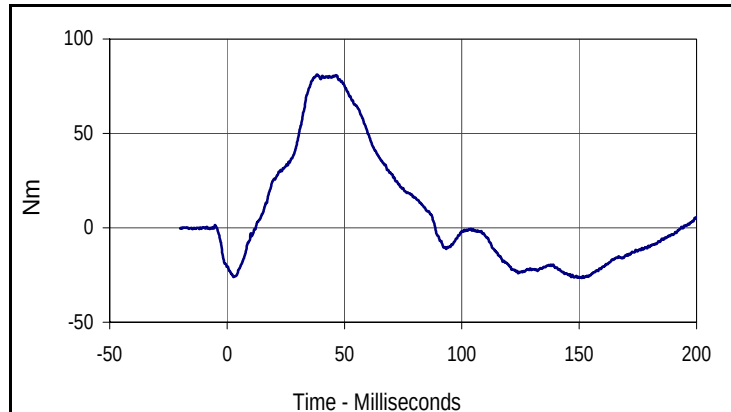
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/sec	6.89 to 7.13	7.00	Pass
Pendulum Deceleration	10 Msec.	m/sec	1.96 to 2.55	2.09	Pass
	20 Msec.	m/sec	4.12 to 5.10	4.31	Pass
	30 Msec.	m/sec	5.73 to 7.01	6.11	Pass
	40 to 70	m/sec	6.27 to 7.64	6.86	Pass
"D" Plane Rotation	Max	Degrees	66.0 to 82.0	74.0	Pass
Max Rotation Time After Peak Moment		Msec.	2.0 to 16.0	15.2	Pass
Rotation Time From Peak to Zero Angle		Msec.	58.0 to 67.0	62.4	Pass
Moment About Occipital Condyle		Nm	73.0 to 88.0	81.2	Pass
Positive Moment Decay, Time To 0 Nm		Msec.	49.0 to 64.0	50.4	Pass
Overall Test Results					Pass



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	180	m/sec
Max	Time	Min	Time
8.4	196.6	0.0	-0.1



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
74.0	53.5	-26.1	155.3



Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
004	FIL	600	Nm
Max	Time	Min	Time
81.2	38.3	-26.6	151.0

Test Program: SID / HIII External Measurements
ATD Serial No.: 275

Test Date: 8/22/07
Test I.D.: N/A



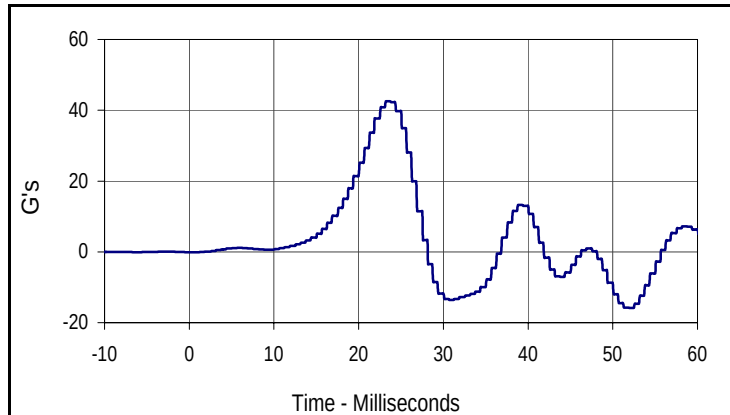
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
SH- Seated Height	mm	889 to 909	902	Pass
HP- Hip Point Height	mm	99 (reference)	99	Pass
RH- Rib Height	mm	502 to 520	510	Pass
KH- Knee Pivot From Back Line	mm	511 to 526	516	Pass
KV- Knee Pivot From Floor	mm	490 to 505	499	Pass
HW- Hip Width	mm	356 to 391	375	Pass
Overall Test Results				Pass

Test Program: SID / HIII Thorax Lateral Impact
 ATD Serial No.: 275

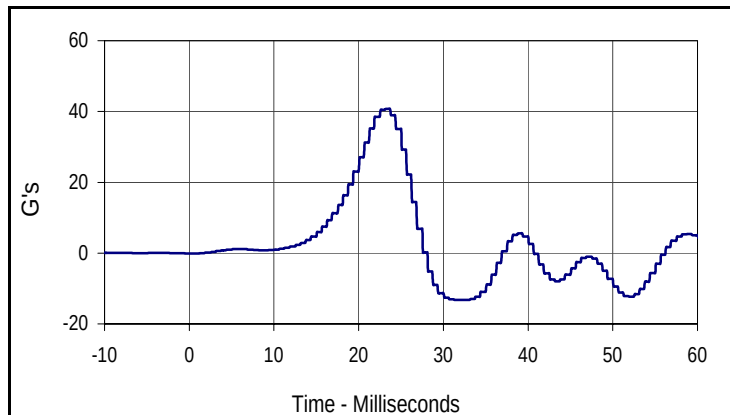
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 Test I.D.: TH08W



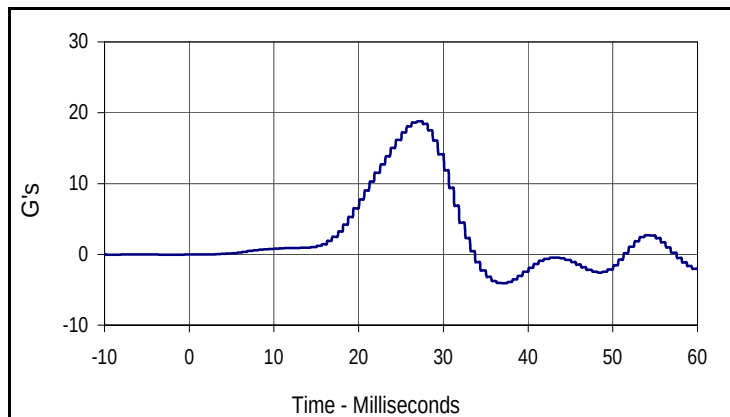
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	4.21 to 4.33	4.25	Pass
Upper Rib Acceleration	G's	37.0 to 46.0	42.6	Pass
Lower Rib Acceleration	G's	37.0 to 46.0	40.8	Pass
Thoracic Spine Acceleration	G's	15.0 to 22.0	18.8	Pass
Overall Test Results			Pass	



Curve Description			
Upper Rib Y Primary			
CURNO	Type	SAE Class	Units
001	FIL	FIR100	G's
Max	Time	Min	Time
42.6	23.2	-15.8	51.9



Curve Description			
Lower Rib Y Primary			
CURNO	Type	SAE Class	Units
002	FIL	FIR100	G's
Max	Time	Min	Time
40.8	23.2	-13.2	31.9



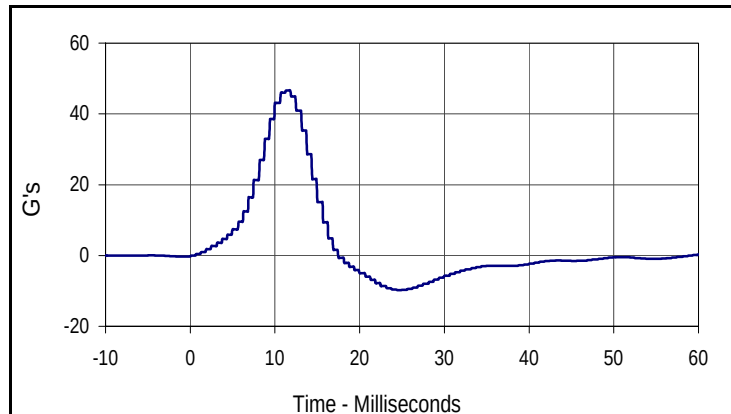
Curve Description			
Lower Spine Y Primary			
CURNO	Type	SAE Class	Units
003	FIL	FIR100	G's
Max	Time	Min	Time
18.8	26.9	-4.1	36.9

Test Program: SID / HIII Pelvis Lateral Impact
 ATD Serial No.: 275

Test Date: 8/22/07
 Test I.D.: PL08W



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	4.21 to 4.33	4.28	Pass
Peak Pelvis Acceleration	G's	40.0 to 60.0	46.6	Pass
Acceleration Time Above 20 G's	Msec.	3.0 to 7.0	4.90	Pass
Overall Test Results				Pass



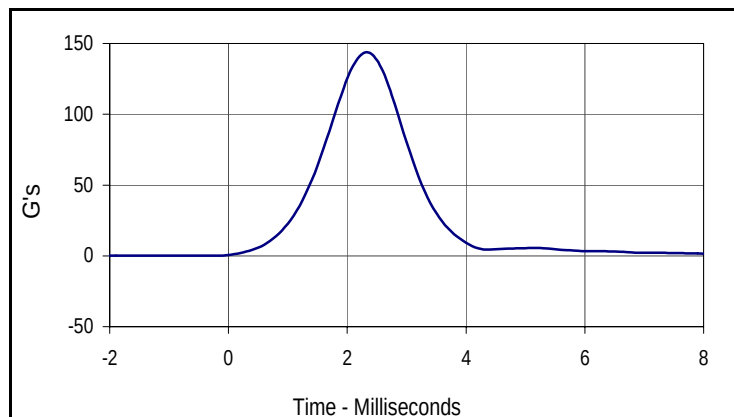
Curve Description			
Pelvis Y Primary			
CURNO	Type	SAE Class	Units
001	FIL	FIR100	G's
Max	Time	Min	Time
46.6	11.3	-9.8	24.4

Test Program: SID / HIII Head Drop Lateral Impact Test
 ATD Serial No.: 275

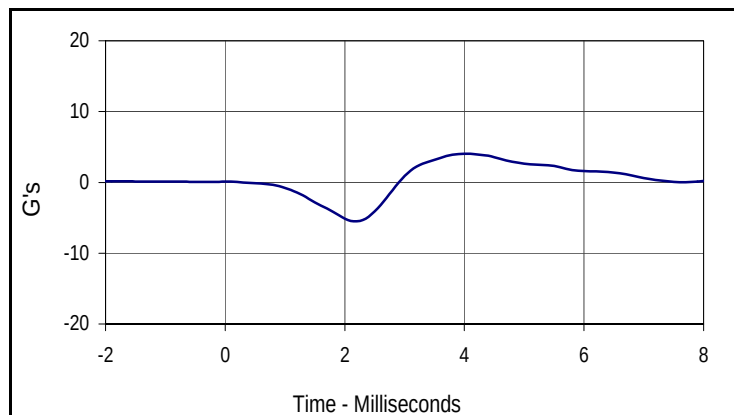
Test Date: 8/22/07
 Test I.D.: HD08W



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Peak Resultant Acceleration	G's	120.0 to 150.0	143.6	Pass
Peak Longitudinal Acceleration	G's	≤15.0	5.5	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse	%	<15	3.8	Pass
Overall Test Results			Pass	



Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
143.6	2.3	0.1	-1.0



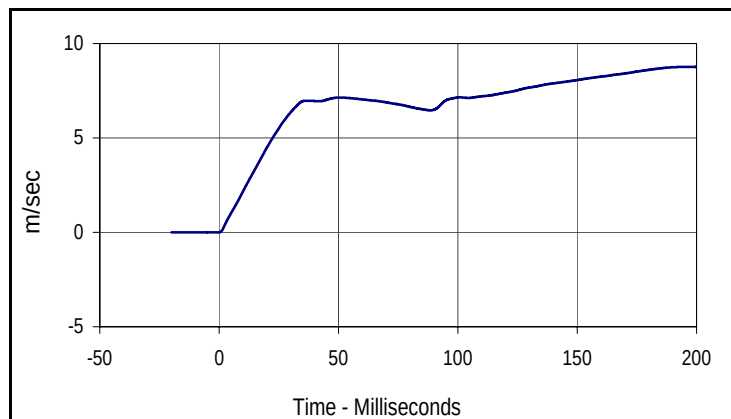
Curve Description			
Head X			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
4.0	4.0	-5.5	2.2

Test Program: SID / HIII Neck Pendulum Lateral Test
 ATD Serial No.: 275

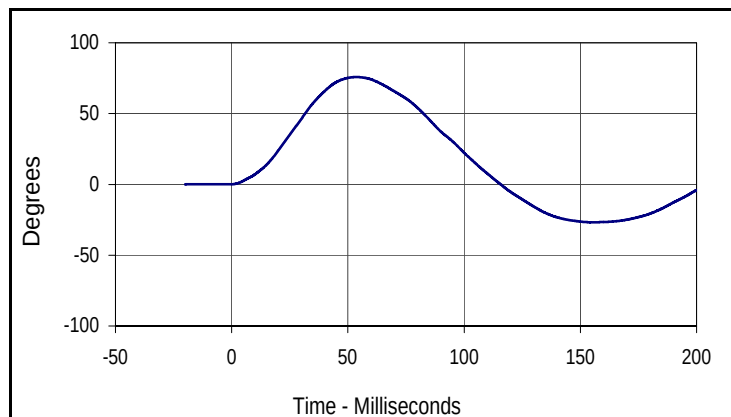
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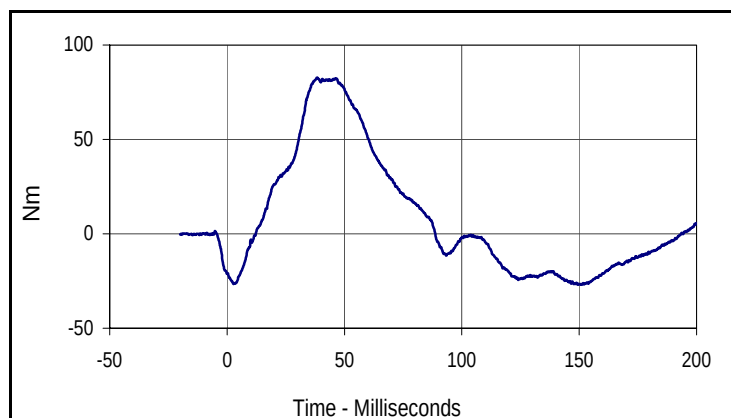
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/sec	6.89 to 7.13	7.03	Pass
Pendulum Deceleration	10 Msec.	m/sec	1.96 to 2.55	2.18	Pass
	20 Msec.	m/sec	4.12 to 5.10	4.49	Pass
	30 Msec.	m/sec	5.73 to 7.01	6.37	Pass
	40 to 70	m/sec	6.27 to 7.64	7.14	Pass
"D" Plane Rotation	Max	Degrees	66.0 to 82.0	75.8	Pass
Max Rotation Time After Peak Moment		Msec.	2.0 to 16.0	15.3	Pass
Rotation Time From Peak to Zero Angle		Msec.	58.0 to 67.0	62.2	Pass
Moment About Occipital Condyle		Nm	73.0 to 88.0	82.7	Pass
Positive Moment Decay, Time To 0 Nm		Msec.	49.0 to 64.0	50.4	Pass
Overall Test Results					Pass



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	180	m/sec
Max	Time	Min	Time
8.8	196.6	0.0	-0.1



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
75.8	53.6	-26.8	155.3



Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
004	FIL	600	Nm
Max	Time	Min	Time
82.7	38.3	-27.0	151.0

APPENDIX D
CHILD RESTRAINT SYSTEM

REPORT NUMBER TR-P27180-01-NC

**NEW CAR ASSESSMENT PROGRAM
SIDE IMPACT TEST**

**GENERAL MOTORS CORPORATION
2007 CHEVROLET SUBURBAN LS
5-DOOR MPV**

NHTSA NUMBER: G70120

**PREPARED BY:
KARCO ENGINEERING, LLC
9270 HOLLY ROAD
ADELANTO, CALIFORNIA 92301**



AUGUST 21, 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, D.C. 20590**

This final test report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, in response to Contract Number DTNH22-03-D-32005.

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Prepared by: 
Mr. Johnny H. Dutto, Project Engineer
KARCO Engineering, LLC

Date: August 21, 2007

Reviewed by: 
Mr. Michael L. Dunlap, Quality Assurance Manager
KARCO Engineering, LLC

Date: August 21, 2007

Approved by: 
Mr. Frank D. Richardson, Program Manager
KARCO Engineering, LLC

Date: August 21, 2007

FINAL REPORT ACCEPTED BY:

Manager, New Car Assessment Program

Date of Acceptance

COTR, NCAP Frontal Impact Program

Date of Acceptance

Technical Report Documentation Page

1. Report No. TR-P27180-01-NC		2. Government Accession No.		3. Recipients Catalog No.	
4. Title and Subtitle Final Report of a Compass I-410 CRS NHTSA No. G70120				5. Report Date August 21, 2007	
				6. Performing Organization Code KAR	
7. Authors Mr. Johnny H. Dutto, Project Engineer, Karco Mr. Frank Richardson, Program Manager, Karco				8. Performing Organization Report No. TR-P27180-01-NC	
9. Performing Organization Name and Address Karco Engineering, LLC 9270 Holly Rd. Adelanto, CA, 92301				10. Work Unit No.	
				11. Contract or Grant No. DTNH22-03-D-32005	
12. Sponsoring Agency Name and Address 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, D.C 20590				13. Type of Report and Period Covered Final Test Report	
				14. Sponsoring Agency Code DOT/NHTSA/NRM/OCS	
15. Supplementary Notes					
16. Abstract A side impact test was conducted on the subject CRS Compass I-410 in conjunction with side impact NCAP testing on a 2007 Chevrolet Suburban LS 5-Door MPV and in accordance with the specifications of the Office of Crashworthiness Standards Test Procedure for the determination of CRS crashworthiness. This test was conducted at Karco Engineering, LLC on August 21, 2007.					
Measurement Description		Units	Threshold	Right Rear (P3)	
Head Injury Criteria (HIC15)		N/A	390	26.5	
3 msec. Chest Clip		G's	50	16.1	
17. Key Words New Car Assessment Program (Side Impact NCAP) Side Impact Moving Deformable Barrier (MDB) Final Report of a Compass I-410 CRS				18. Distribution of Statement Copies of this report available from: NHTSA Technical Reference Division National Highway Traffic Safety Admin. 1200 New Jersey Ave SE, W43-410 Washington, D.C. 20590	
19. Security Classification (this report) Unclassified		20. Security Classification (this page) Unclassified		21. No. of Pages 44	22. Price

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SECTION D-1

PURPOSE AND SUMMARY OF TEST G70120

The purpose of this test is to obtain CRS performance data during a 55/28 km/h 90 deg. Moving Deformable Barrier Side Impact NCAP Test

The Side Impact NCAP test was conducted in accordance with the Office of Crashworthiness Standards (OCS) NCAP Laboratory Test Procedure.

SUMMARY

One 12-month old CRABI (P3) was instrumented with head, chest, and six-axis upper neck load cells. A tri-axial accelerometer was installed on the CRS and the CRS base. Seat belt load cells were placed on the inboard and outboard lower tethers.

The right rear (Serial No. 017) CRABI was calibrated prior to this test. CRABI calibration information is found in Section D-4.

CHILD DUMMY VALUES		
Location	HIC15 Value	3 Msec. Chest Clip
CRABI (P3)	26.5	16.1

DATA SHEET NO.1
CRASH TEST SUMMARY

Test Vehicle: 2007 Chevrolet Suburban LS 5-Door MPV

NHTSA No.: G70120

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 8/21/07

CHILD RESTRAINT SYSTEM INFORMATION

Description	Position #3 CRS
Manufacturer	Compass
Model Name	I-410
Model No.	0000426
Type	Infant
Forward/Rearward	Rearward

VISIBLE DUMMY CONTACT POINTS

Description	Position #3 CRS
Head Contact	Left and Right Side of CRS
Chest Contact	None
Abdomen Contact	None
Left Knee Contact	None
Right Knee Contact	None
Left Toe Contact	Seatback
Right Toe Contact	Seatback

POST-TEST DOOR OPENINGS

Description	Position #3 CRS
Right Rear Door	Opened without tools, Remained closed during test

CAMERAS

Description	Standard
High Speed	1
Real Time	0
Total	1

DATA CHANNELS

CRABI (P3) Sensors	13
Belt Sensors	2
CRS Sensors	6
Total	21

DATA SHEET NO.2
VEHICLE PARAMETER DATA

Test Vehicle: 2007 Chevrolet Suburban LS 5-Door MPV

NHTSA No.: G70120

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 8/21/07

TEST VEHICLE WEIGHTS

	Units	As Delivered Weights (UVW)			As Tested Weights (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	649	616	1265	679	797	1476
Right	kg	649	637	1286	630	734	1364
Ratio	%	50.9	49.1	100.0	46.1	53.9	100.0
Totals	kg	1298	1253	2551	1309	1531	2840

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	2551
Weight of 2 P572 ATD's	kg	161
Rated Cargo/Luggage Wt. (RCLW)	kg	136
Calculated Vehicle Target Wt. (TVTW)	kg	2848

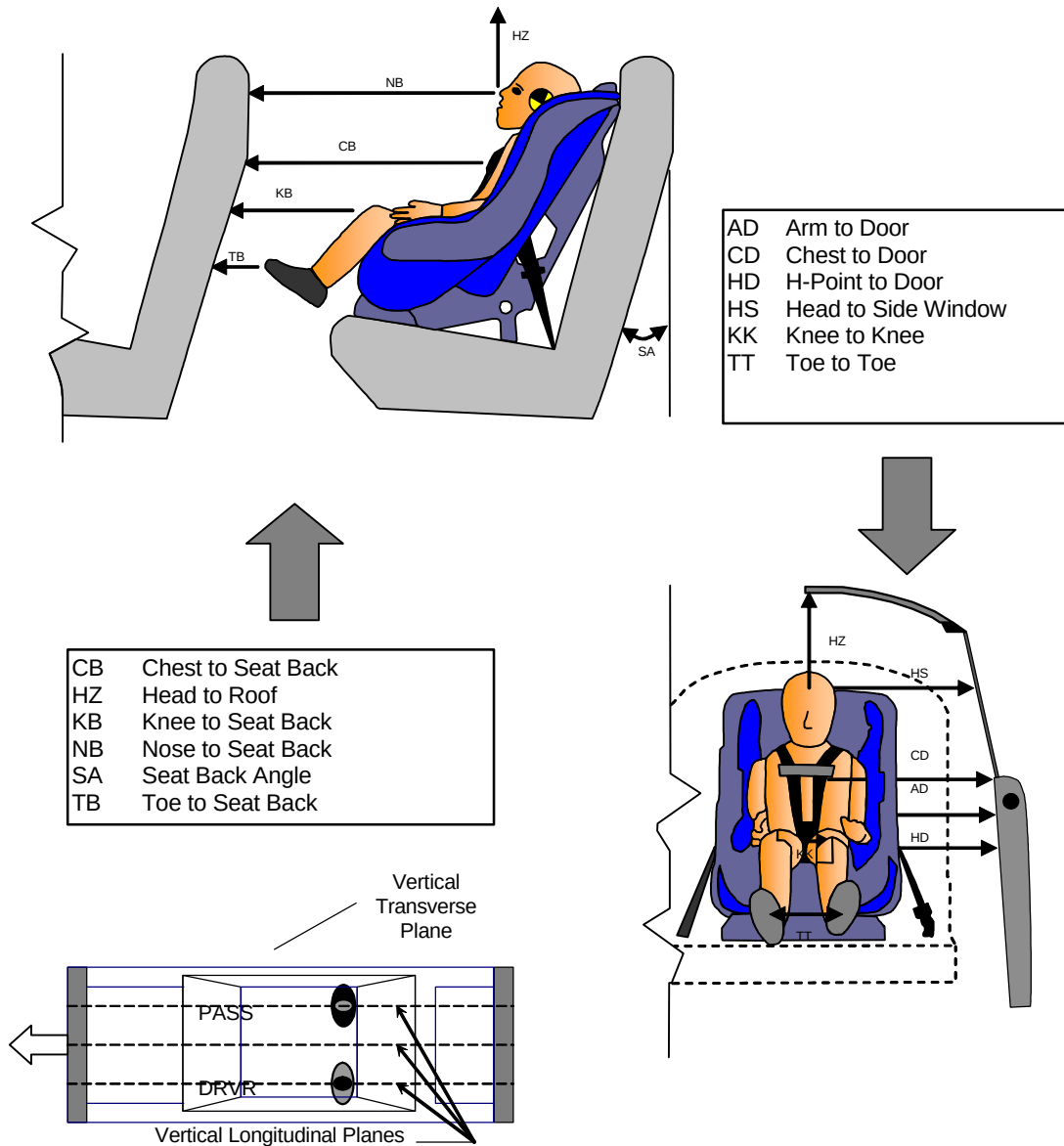
DATA SHEET NO.3 **CRABI POSITIONING IN VEHICLE**

Test Vehicle: 2007 Chevrolet Suburban LS 5-Door MPV

NHTSA No.: G70120

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 8/21/07



DUMMY MEASUREMENTS FOR REAR SEAT OCCUPANTS

DATA SHEET NO.3
CRABI POSITIONING IN VEHICLE...(CONTINUED)

Test Vehicle: 2007 Chevrolet Suburban LS 5-Door MPV

NHTSA No.: G70120

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 8/21/07

CRABI POSITION MEASUREMENTS

Code	Measurement	P3 (Passenger's Side)	
		Length (mm)	Angle (°)
SA	Seat Back Angle		23.0
HZ	Head to Roof (Z)	384	
CD	Chest to Door	375	
KK	Knee to Knee (Y)	110	
HS	Head to Side Window	360	
HD	H-Point to Door (Y)	310	
AD	Arm to Door	280	
NB	Nose to Seat Back	460	
CB	Chest to Seat Back	390	
FF	Foot to Foot	105	
KB-Left	Knee to Seat Back	170	
KB-Right	Knee to Seat Back	168	
TB-Left	Toe to Seat Back	42	
TB-Right	Toe to Seat Back	47	

DATA SHEET NO.4
CRS PERFORMANCE DATA

Test Vehicle: 2007 Chevrolet Suburban LS 5-Door MPV

NHTSA No.: G70120

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 8/21/07

CRS PERFORMANCE DATA

Location	CRS (P3)	
	Damage	Post-Test
Upper Tether Strap		
Upper Tether Buckle		
Upper Tether Hook		
Veh. Upper Tether Anchor		
Lower Anchor Strap	No	None
Lower Anchor Buckle	No	None
Lower Anchor Hooks	No	None
Veh. Lower CRS Anchors	No	None
5-Point Harness Connections	No	None
Cracks on CRS	No	None
Fabric Tears on CRS	No	None
Vehicle Seat Structure	No	None
Vehicle Seat Fabric Tears	No	None

DATA SHEET NO. 5
CRS ACCELEROMETER LOCATIONS

Test Vehicle: 2007 Chevrolet Suburban LS 5-Door MPV

NHTSA No.: G70120

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 8/21/07

CRS ACCELEROMETER PRE-TEST LOCATIONS

Loc. No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	CRS	2290	610	1110
2	CRS Base	2315	625	1000

Reference Planes: X=From Rear Surface of Vehicle, Y=Vehicle Centerline, Z=Ground Plane

DATA SHEET NO.6
CRS CAMERA LOCATIONS AND DATA

Test Vehicle: 2007 Chevrolet Suburban LS 5-Door MPV

NHTSA No.: G70120

Test Program: 55/28 km/h Side Impact NCAP

Test Date: 8/21/07

CAMERA LOCATIONS

No.	Camera View	Location(mm)			Angle (Deg.)	Film Plane to Head	Lens (mm)	Speed (fps)
		X	Y	Z				
1	Passenger CRS (O.B.)	2500	1650	-1610	-2	n/a	10	1000

X = Barrier Face Y = Monorail Centerline Z = Ground DNR = Did Not Run NTM = No Time Marks

SECTION D2

PHOTOGRAPHS

LIST OF PHOTOGRAPHS

Figure		Page
1	Close-up, Position 3 CRS Label	D-1
2	Pre-Test Frontal View of Position 3 CRS	D-2
3	Post-Test Frontal View of Position 3 CRS	D-3
4	Pre-Test Rear View of Position 3 CRS	D-4
5	Post-Test Rear View of Position 3 CRS	D-5
6	Pre-Test Left Side View of Position 3 CRS	D-6
7	Post-Test Left Side View of Position 3 CRS	D-7
8	Pre-Test Right Side View of Position 3 CRS	D-8
9	Post-Test Right Side View of Position 3 CRS	D-9
10	Pre-Test Position 3 Front View (Head and Seat Belt Position)	D-10
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12	Pre-Test Position 3 Front View (Seat Belt Position)	D-12
13	Post-Test Position 3 Front View (Seat Belt Position)	D-13
14	Pre-Test Position 3 Right Side View	D-14
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16	Pre-Test Position 3 Left Side View	D-16
17	Post-Test Position 3 Left Side View	D-17
18	Post-Test Position 3 Dummy Legs	D-18



Figure D2-1: Position 3 CRS Label

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Figure D2-2: Pre-Test Frontal View of Position 3 CRS



Figure D2-3: Post-Test Frontal View of Position 3 CRS



Figure D2-4: Pre-Test Rear View of Position 3 CRS



Figure D2-5: Post-Test Rear View of Position 3 CRS



Figure D2-6: Pre-Test Left Side View of Position 3 CRS



Figure D2-7: Post-Test Left Side View of Position 3 CRS



Figure D2-8: Pre-Test Right Side View of Position 3 CRS



Figure D2-9: Post-Test Right Side View of Position 3 CRS



Figure D2-10: Pre-Test Position 3 Front View (Head and Seat Belt Position)



Figure D2-11: Post-Test Position 3 Front View (Head and Seat Belt Position)



Figure D2-12: Pre-Test Position 3 Front View (Seat Belt Position)



Figure D2-13: Post-Test Position 3 Front View (Seat Belt Position)



Figure D2-14: Pre-Test Position 3 Right Side View



Figure D2-15: Post-Test Position 3 Right Side View



Figure D2-16: Pre-Test Position 3 Right Side View (Through Window)



Figure D2-17: Post-Test Position 3 Right Side View (Through Window)



SECTION D3

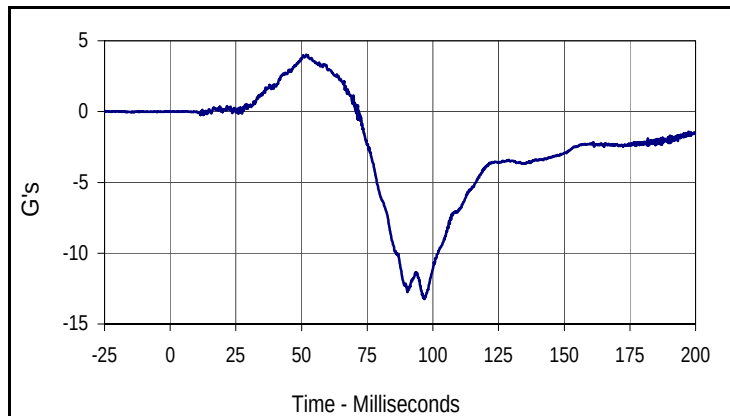
CRABI RESPONSE AND CRS DATA TRACES

LIST OF DATA PLOTS

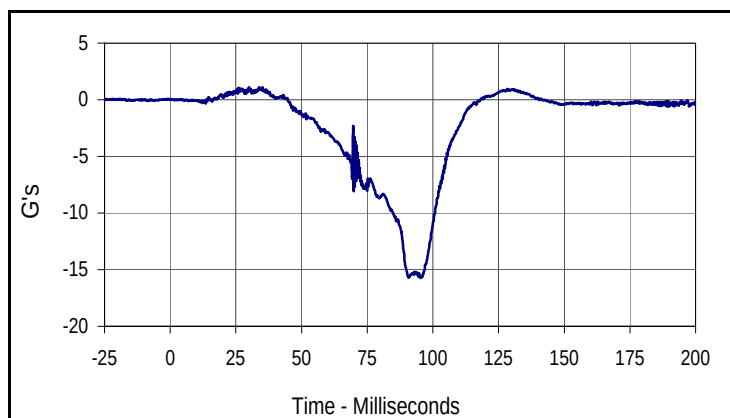
<u>Data Plot</u>	<u>Page</u>
D3-1	Right Rear CRABI Head X
	Right Rear CRABI Head Y
	Right Rear CRABI Head Z
	Right Rear CRABI Head Resultant
D3-2	Right Rear CRABI Chest X
	Right Rear CRABI Chest Y
	Right Rear CRABI Chest Z
	Right Rear CRABI Chest Resultant

Test Vehicle: 2007 Chevrolet Suburban LS 5-Door MPV
 Test Program: 55/28 km/h Side Impact NCAP

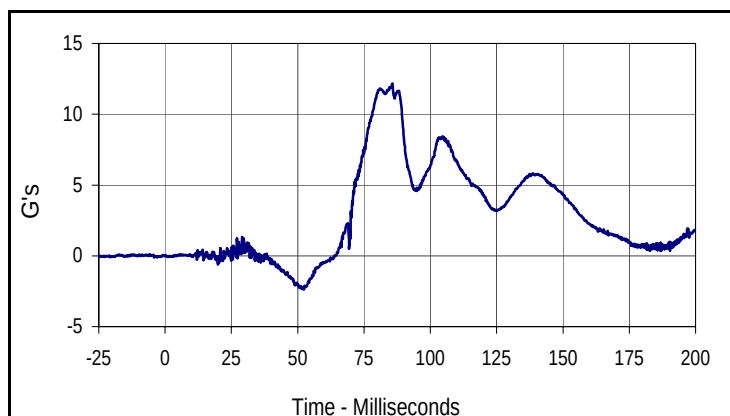
Test Date: 8/21/07
 NHTSA No.: G70120



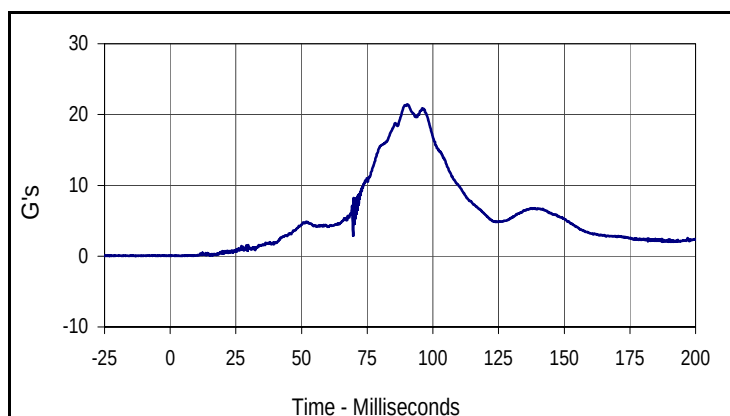
Curve Description			
CRABI Head X (P3)			
CURNO	Type	SAE Class	Units
072	FIL	1000	G's
Max	Time	Min	Time
4.0	51.8	-13.2	96.8



Curve Description			
CRABI Head Y (P3)			
CURNO	Type	SAE Class	Units
073	FIL	1000	G's
Max	Time	Min	Time
1.1	33.8	-15.7	95.3



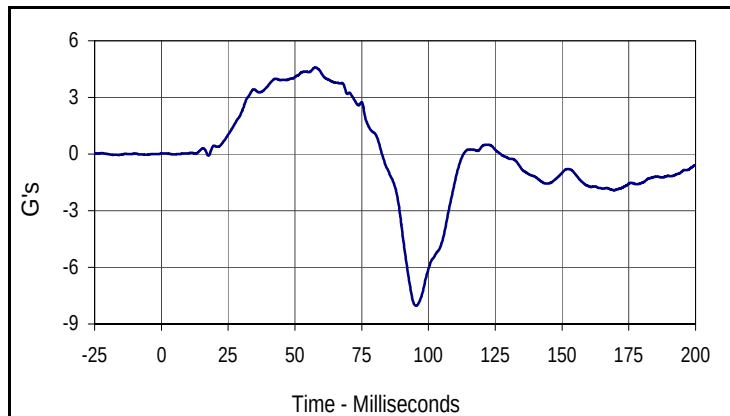
Curve Description			
CRABI Head Z (P3)			
CURNO	Type	SAE Class	Units
074	FIL	1000	G's
Max	Time	Min	Time
12.2	85.7	-2.4	52.3



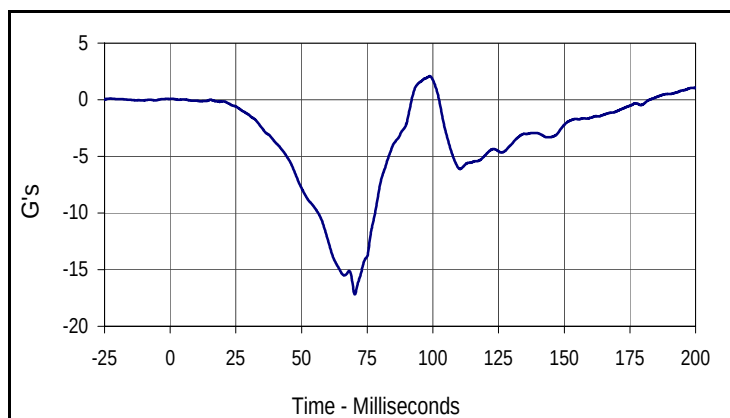
Curve Description			
CRABI Head Resultant (P3)			
CURNO	Type	SAE Class	Units
072	RES	1000	G's
Max	Time	Min	Time
21.5	90.2	0.0	4.2

Test Vehicle: 2007 Chevrolet Suburban LS 5-Door MPV
 Test Program: 55/28 km/h Side Impact NCAP

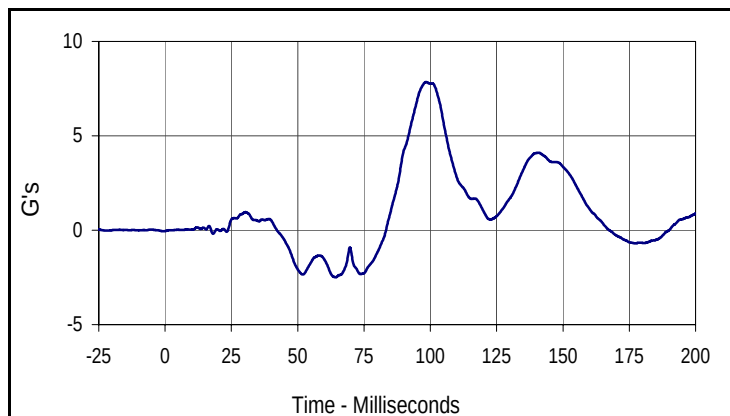
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 NHTSA No.: G70120



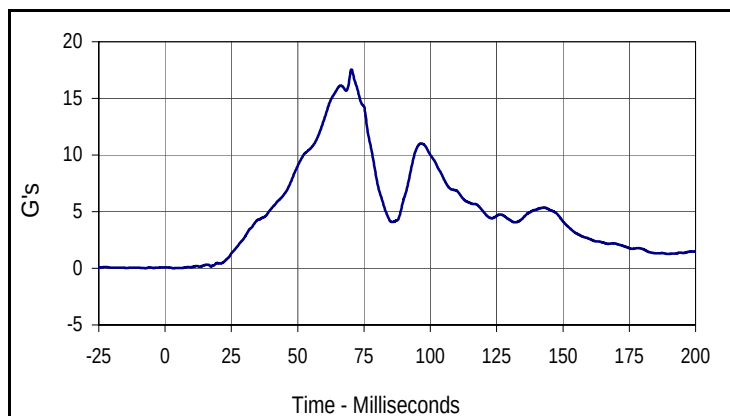
Curve Description			
CRABI Chest X (P3)			
CURNO	Type	SAE Class	Units
082	FIL	180	G's
Max	Time	Min	Time
4.6	57.6	-8.0	95.4



Curve Description			
CRABI Chest Y (P3)			
CURNO	Type	SAE Class	Units
083	FIL	180	G's
Max	Time	Min	Time
2.1	98.8	-17.2	70.3



Curve Description			
CRABI Chest Z (P3)			
CURNO	Type	SAE Class	Units
084	FIL	180	G's
Max	Time	Min	Time
7.8	98.4	-2.5	64.3



Curve Description			
CRABI Chest Resultant (P3)			
CURNO	Type	SAE Class	Units
082	RES	180	G's
Max	Time	Min	Time
17.5	70.3	0.0	3.2

SECTION D4

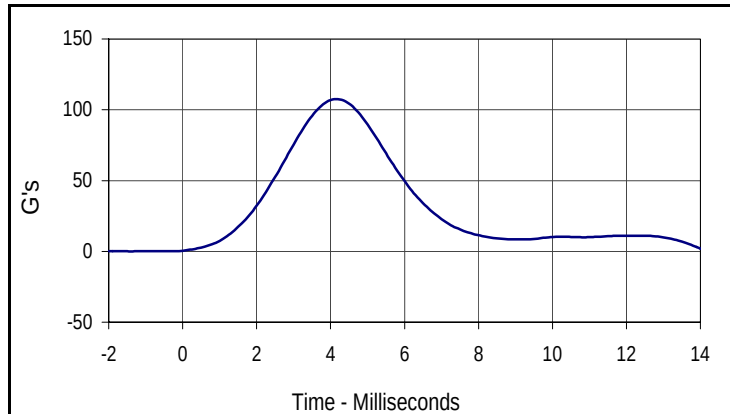
CRABI CALIBRATION INFORMATION

Test Program: CRABI 12 Month Old Frontal Head Drop Test
 ATD Serial No.: 017

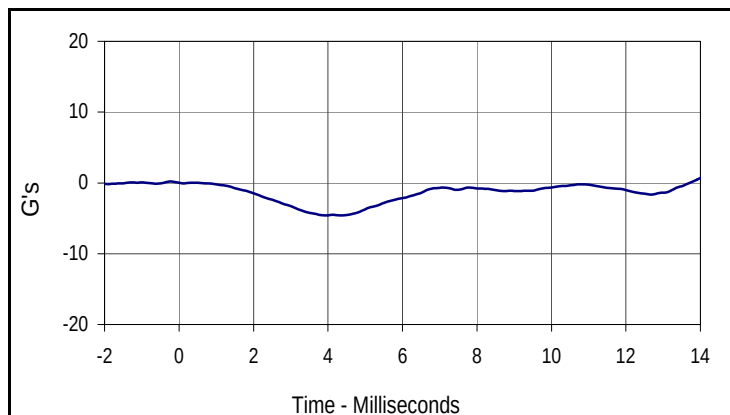
Test Date: 8/15/07
 Test I.D.: FHD080



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Peak Resultant Acceleration	G's	100.0 to 120.0	107.5	Pass
Peak Lateral Acceleration	G's	≤15.0	4.6	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Overall Test Results				Pass



Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
107.5	4.2	0.0	-1.4



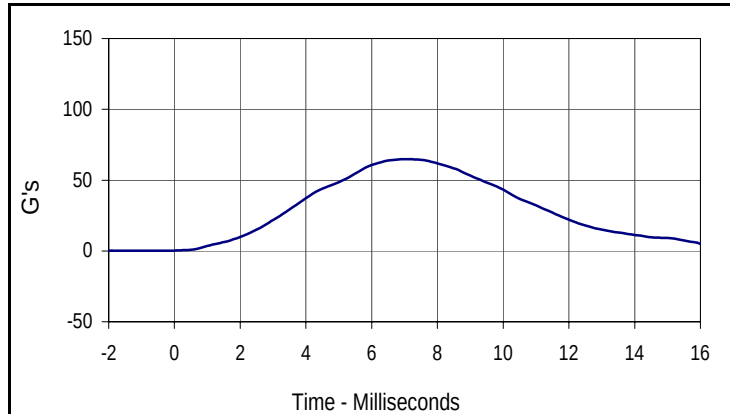
Curve Description			
Head Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
0.2	-0.2	-4.6	3.9

Test Program: CRABI 12 Month Old Rear Head Drop Test
 ATD Serial No.: 017

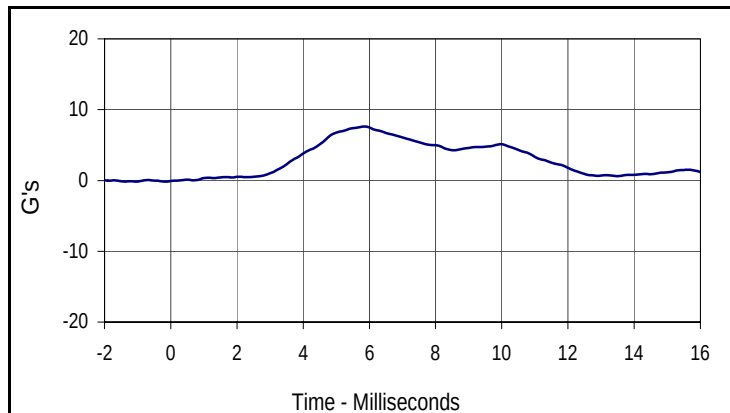
Test Date: 8/15/07
 Test I.D.: RHD080



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Peak Resultant Acceleration	G's	55.0 to 71.0	60.6	Pass
Peak Lateral Acceleration	G's	≤15.0	7.6	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Overall Test Results				Pass



Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
60.6	6.0	0.1	-0.9



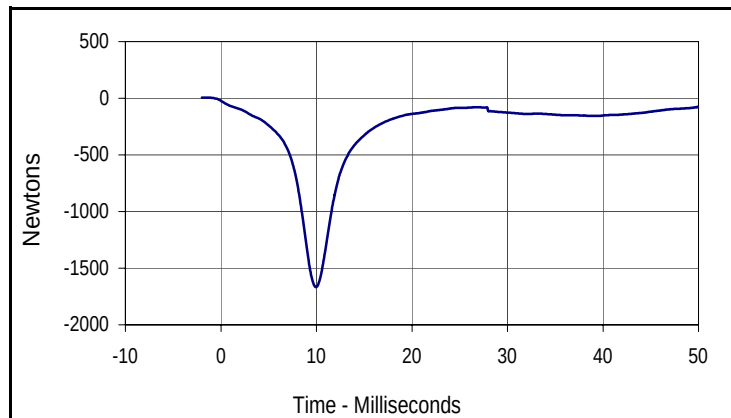
Curve Description			
Head Y			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
7.6	5.8	-0.2	-1.4

Test Program: CRABI 12 Month Old Thorax Impact Test
 ATD Serial No.: 017

Test Date: 8/15/07
 Test I.D.: CH080



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity at T=0	m/sec	4.90 to 5.10	4.98	Pass
Peak Probe Force	Newtons	-1514 to -1796	-1666	Pass
Overall Test Results				Pass



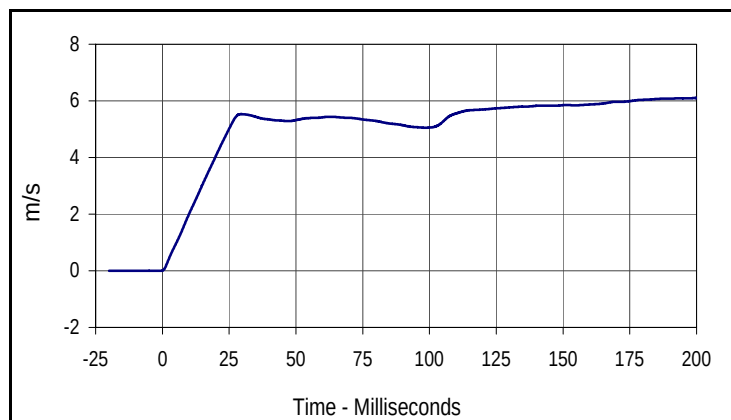
Curve Description			
Probe Force			
CURNO	Type	SAE Class	Units
001	FIL	180	Newtons
Max	Time	Min	Time
6.1	-1.6	-1665.7	10.0

Test Program: CRABI 12 Month Old Neck Flexion Test
 ATD Serial No.: 017

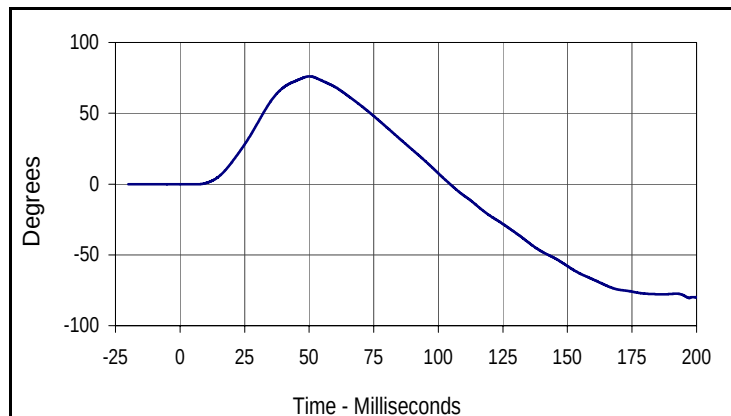
Test Date: 8/15/07
 Test I.D.: NF080



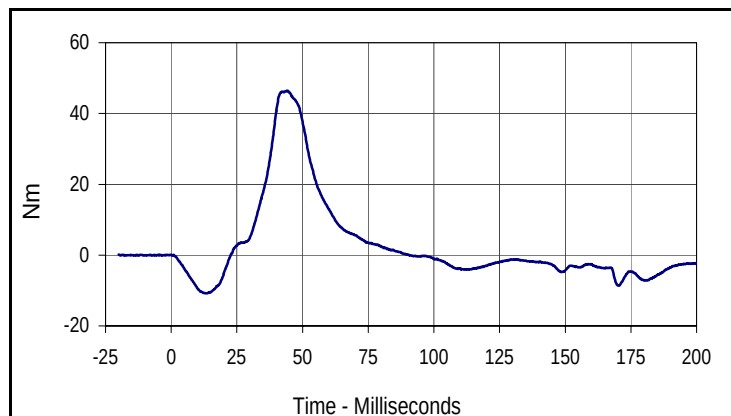
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/s	5.10 to 5.30	5.23	Pass
Pendulum Deceleration	10 Msec.	m/s	1.6 to 2.3	2.0	Pass
	20 Msec.	m/s	3.4 to 4.2	4.1	Pass
	25 Msec.	m/s	4.3 to 5.2	5.0	Pass
"D" Plane Rotation	Max	Degrees	75.0 to 86.0	76.1	Pass
Peak Moment in Rotation	Max	Nm	36.0 to 45.0	43.4	Pass
Positive Moment Decay, Time To 5 Nm		Msec.	60.0 to 80.0	71.5	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
6.1	199.3	0.0	-0.7



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
76.1	50.1	-80.5	197.1



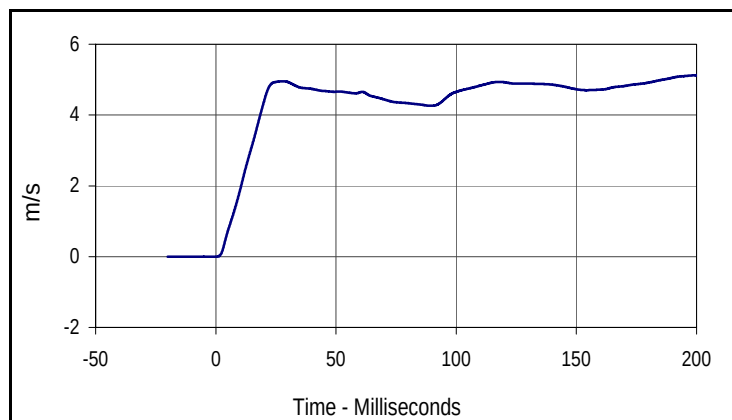
Curve Description			
Upper Neck Force Y			
CURNO	Type	SAE Class	Units
002	FIL	600	Nm
Max	Time	Min	Time
46.4	44.3	-10.8	13.5

Test Program: CRABI 12 Month Old Neck Extension Test
 ATD Serial No.: 017

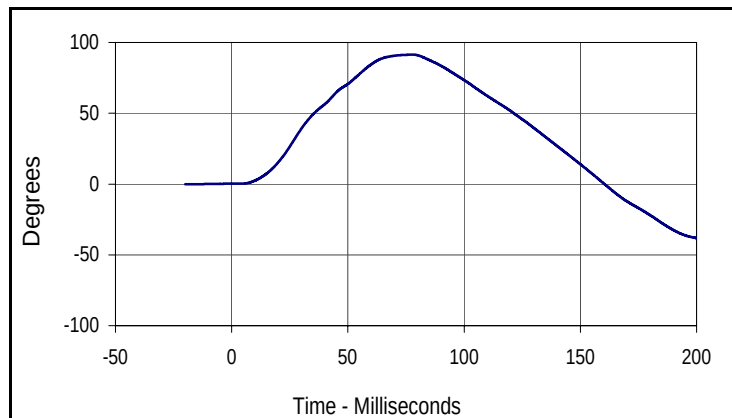
Test Date: 8/15/07
 Test I.D.: NE080



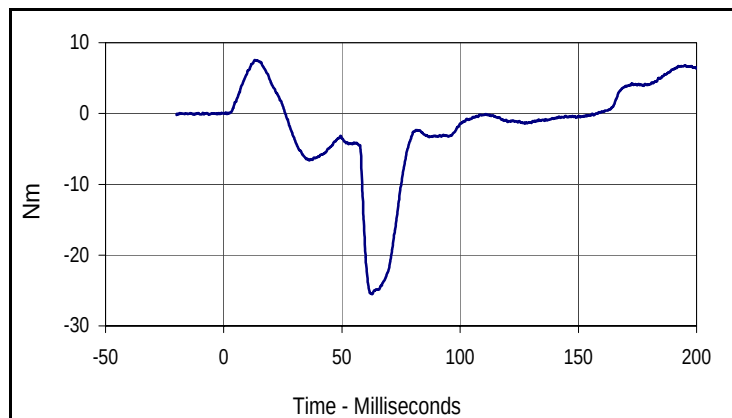
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/s	2.4 to 2.6	2.40	Pass
Pendulum Deceleration	6 Msec.	m/s	0.8 to 1.2	0.9	Pass
	10 Msec.	m/s	1.5 to 2.1	1.9	Pass
	14 Msec.	m/s	2.2 to 2.9	2.9	Pass
"D" Plane Rotation	Max	Degrees	80.0 to 92.0	91.4	Pass
Peak Moment in Rotation	Max	Nm	-12 to -23	-17.1	Pass
Positive Moment Decay, Time To -5 Nm		Msec.	76.0 to 90.0	77.8	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
5.1	200.0	0.0	0.1



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
91.4	77.7	-38.1	200.0



Curve Description			
Upper Neck Moment Y			
CURNO	Type	SAE Class	Units
002	FIL	600	Nm
Max	Time	Min	Time
7.5	13.2	-25.5	62.8

Test Program: CRABI 12 Month Old External Dimensions
 ATD Serial No.: 017

Test Date: 8/15/07
 Test I.D.: N/A



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
A - Total sitting height	mm	456.0 to 471.2	459	Pass
B - Shoulder pivot height	mm	276.6 to 291.8	282	Pass
C - "H" point height	mm	27.9 to 38.1	31	Pass
D - "H" point from backline	mm	40.1 to 50.3	42	Pass
E - Shoulder pivot from back	mm	50.3 to 60.5	54	Pass
F - Thigh clearance	mm	63.0 to 73.2	66	Pass
G - Elbow pivot to fingertip	mm	176.6 to 191.8	180	Pass
I - Shoulder pivot to elbow pivot	mm	99.1 to 114.3	103	Pass
J - Elbow rest height	mm	150.1 to 165.3	152	Pass
K - Buttock to knee length	mm	202.7 to 217.9	209	Pass
L - Popliteal length	mm	138.7 to 153.9	146	Pass
M - Knee pivot height	mm	165.1 to 180.3	168	Pass
N - Buttock popliteal length	mm	144.8 to 160.0	150	Pass
O - Chest depth with jacket	mm	107.5 to 122.7	108	Pass
P - Foot length	mm	92.4 to 102.6	99	Pass
Q- Stature	mm	727.7 to 753.1	N/A	N/A
R - Buttock to knee pivot length	mm	178.5 to 188.7	179	Pass
S - Head Breadth	mm	124.4 to 134.6	130	Pass
T - Head Depth	mm	149.9 to 165.1	156	Pass
U - Hip breadth	mm	158.5 to 173.7	164	Pass
V - Shoulder breadth	mm	200.7 to 215.9	211	Pass
W - Foot breadth	mm	39.1 to 49.3	41	Pass
Y - Chest circumference with jacket	mm	452.4 to 477.8	460	Pass
Z - Waist circumference	mm	447.0 to 472.4	460	Pass
AA - Reference location for dimension Y & O	mm	256.5 to 266.7	260	Pass
BB - Reference Location For dimension Z	mm	106.7 to 116.9	111	Pass
CC - Shoulder Height	mm	299.7 to 314.9	305	Pass
DD - Chin Height	mm	289.6 to 304.8	297	Pass
Overall Test Results				Pass