REPORT NUMBER TR-P28003-14-NC

NEW CAR ASSESSMENT PROGRAM
SIDE IMPACT TEST

KIA MOTORS CORPORATION
2010 KIA SOUL PLUS
5-DOOR MPV

NHTSA NUMBER: MA0507

Prepared By:
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APRIL 27, 2009

FINAL REPORT

PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF CRASHWORTHINESS STANDARDS
RULEMAKING
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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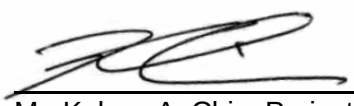
Prepared by:  Date: April 27, 2009

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Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipients Catalog No.
TR-P28003-14-NC		

4. Title and Subtitle	5. Report Date
Final Report of Side Impact New Car Assessment Program Testing of a 2010 Kia Soul Plus 5-Door MPV NHTSA No. MA0507	April 27, 2009
	6. Performing Organization Code KAR

7. Authors	8. Performing Organization Report No.
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9. Performing Organization Name and Address	10. Work Unit No.
Karco Engineering, LLC 9270 Holly Rd. Adelanto, CA, 92301	**11. Contract or Grant No.** DTNH22-03-D-32005

12. Sponsoring Agency Name and Address	13. Type of Report and Period Covered
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	Final Test Report
	14. Sponsoring Agency Code DOT/NHTSA/NRM/OCS

15. Supplementary Notes

16. Abstract

A 55/28 km/h 90 deg. Moving Deformable Barrier Side Impact NCAP Test was conducted on the subject 2010 Kia Soul Plus 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 April 27, 2009. The impact velocity of the Moving Deformable Barrier was 61.67 km/h and the outside ambient temperature at the struck (driver's) side of the vehicle was 22.2 deg. C. The target vehicle's maximum post-test static crush was 270 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	38.0	61.5
Left Lower Rib (LLR) G's	29.5	58.7
Lower Spine (T_{12}) G's	44.8	74.6
Thoracic Trauma Index (TTI) G's	41.0	68.0
Pelvis (PEV) G's	43.3	83.2

17. Key Words	18. Distribution Statement
New Car Assessment Program (NCAP) Side Impact Moving Deformable Barrier (MDB) Side Impact Dummy (SID/HIII)	Copies of this report are available from: National Highway Traffic Safety Admin. NHTSA Technical Reference Division 1200 New Jersey Ave., SE, Room W43-410 Washington, DC 20590

19. Security Classification of this report	20. Security Classification of this page	21. No. of Pages	22. Price
UNCLASSIFIED	UNCLASSIFIED	134	

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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' 2009 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 2010 Kia Soul Plus 5-Door MPV manufactured by Kia 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 2010 Kia Soul Plus 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 61.67 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 1502.0 kg and the test weight of the MDB was 1361 kg. The test was conducted at KARCO Engineering, LLC in Adelanto, California, on April 27, 2009.

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	Yes	Yes	No	
Head Airbag	No		No	
Curtain Airbag	Yes	Yes	Yes	Yes

The test vehicle was instrumented with twelve (12) 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

Both the driver and passenger doors remained closed during the impact. The test vehicle sustained a maximum static crush of 270 mm at level 3, 1350 mm rearward of the left vertical impact point. The driver SID/Hybrid III, Serial No. 275 and the passenger SID/Hybrid III, Serial No. 274 were calibrated prior to this test. The SID/Hybrid III injury criteria are summarized as follows:

Measurement	Units	Driver	Passenger
Thoracic Trauma Index (TTI)	G's	41	68
Peak Pelvic G's (PEV)	G's	43	83

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.

SECTION 3

OCCUPANT AND VEHICLE INFORMATION SHEETS

Test Vehicle: 2010 Kia Soul Plus 5-Door MPV NHTSA No.: MA0507

Test Program: 55/28 km/h Side Impact NCAP Test Date: 04/27/09

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	1.609344
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	^oF	^oC	=(tf -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: 2010 Kia Soul Plus 5-Door MPV NHTSA No.: MA0507

Test Program: 55/28 km/h Side Impact NCAP Test Date: 04/27/09

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	MA0507	Anti-Lock Brakes	Yes
Make	Kia	All Wheel Drive	No
Model	Soul Plus	Power Steering	Yes
Body Style	5-Door MPV	Driver Front Airbag	Yes
Vin No.	KNDJT2A2XA7028341	Driver Side Torso Airbag	Yes
Color	Green	Driver Side Head Airbag	No
Delivery Date	4/10/2009	Driver Curtain/Airbag	Yes
Odometer (Miles)	85.0	Rear Pass. Airbag	No
Dealer	Hi-Desert Kia	Rear Pass. Side Airbag	No
Transmission	4-Speed Automatic	Rear Pass. Head Airbag	No
Final Drive	Front	Rear Pass. Curtain/Airbag	Yes
Type/No. Cyl.	Inline 4	Pre-Tensioners	Yes
Engine Disp. (L)	2.0	Load Limiters	Yes
Engine Placement	Transverse	Bucket Seats	Yes
Roof Rack	No	Air Cond.	Yes
Sunroof/T-Top	No	AM/FM CD	Yes
Tinted Glass	Yes	Tilt Steering	Yes
Traction Control	Yes	Automatic Door Locks	No
Power Brakes	Yes	Power Windows	Yes
Front Disc	Yes	Power Seats	No
Rear Disc	Yes	Other	N/A

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

DATA FROM CERTIFICATION LABEL

Manufactured By	Kia Motors Corporation	GVWR (kg)	1760
		GAWR Front (kg)	980
Date of Manufacture	Jan-09	GAWR Rear (kg)	970

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench		
Number of Occupants	2	3		5
Capacity Weight (VCW) (kg)				385
Cargo Weight (RCLW) (kg)				45

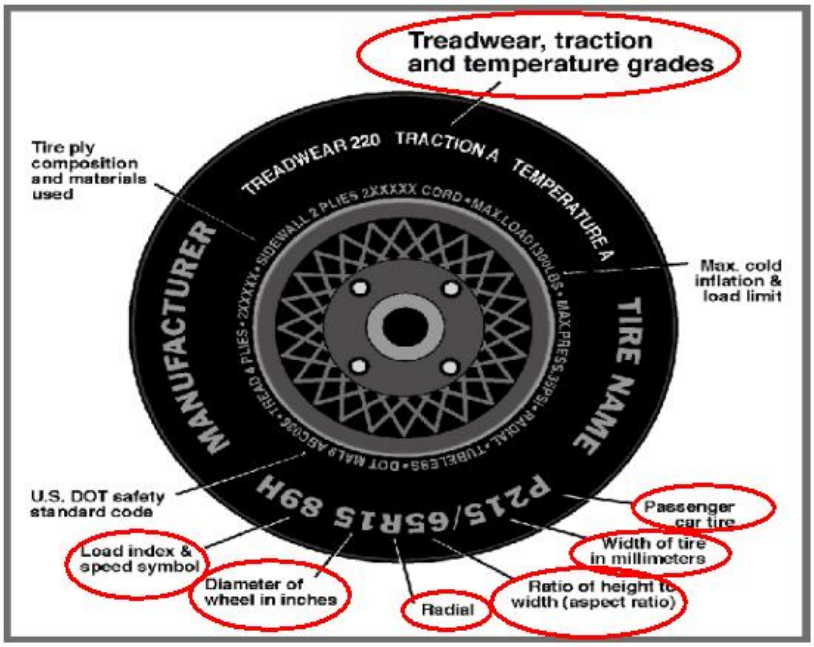
DATA SHEET NO. 1...(CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2010 Kia Soul Plus 5-Door MPV NHTSA No.: MA0507

Test Program: 55/28 km/h Side Impact NCAP Test Date: 04/27/09

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)	300	300
Cold Pressure (kpa)	230	230
Recommended Tire Size	P205/55R16	P205/55R16
Tire Size on Vehicle	P205/55R16	P205/55R16
Tire Manufacturer	Nexen	Nexen
Treadwear	440	440
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	1 Polyester, 2 Steel, 1 Nylon	1 Polyester, 2 Steel, 1 Nylon
Load Index/Speed Symbol	89H	89H
Tire Material	Polyester, Steel, Nylon	Polyester, Steel, Nylon
DOT Safety Code Right	8E8K BHML 5108	8E8K BHML 5108
DOT Safety Code Left	8E8K BHML 5108	8E8K BHML 5108

DATA SHEET NO. 1...(CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2010 Kia Soul Plus 5-Door MPV NHTSA No.: MA0507

Test Program: 55/28 km/h Side Impact NCAP Test Date: 04/27/09

TEST VEHICLE WEIGHTS

	Units	As Delivered Weights (UVW)			As Tested Weights (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	397.5	256.5	654.0	447.0	326.0	773.0
Right	kg	404.0	242.5	646.5	429.0	300.0	729.0
Ratio	%	61.6	38.4	100.0	58.3	41.7	100.0
Total	kg	801.5	499.0	1300.5	876.0	626.0	1502.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1300.5
Weight of 2 P572 ATDs	kg	162.0
Rated Cargo/Luggage Wt (RCLW)	kg	44.8
Calculated Vehicle Target Wt (TVTW)	kg	1507.3

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG Aft of Front Axle
As Delivered	mm	686	691	702	703	978
As Tested	mm	675	685	672	683	1062
Fully Loaded	mm	673	685	672	682	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Test Vehicle Wheel Base	mm	2548
Total Vehicle Length at Left Side	mm	2880
Total Vehicle Length at Centerline	mm	4083
Total Vehicle Length at Right Side	mm	2883
Weight of Ballast in Cargo Area	kg	0
Amount of Stoddard Solvent Added	L	44.64

TEST VEHICLE VERTICAL IMPACT LINE DATA

Measurement Description	Units	Value
Test Vehicle Wheel Base	mm	2548
Target Impact Point Aft of Front Axle	mm	335
Actual Impact Point Aft of Front Axle	mm	336

DATA SHEET NO. 1...(CONTINUED)

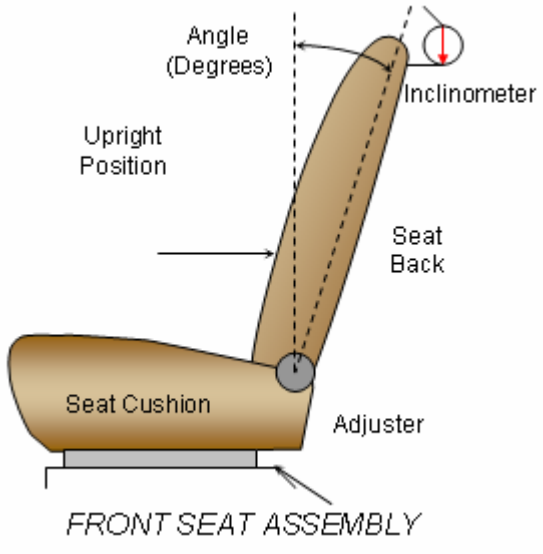
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2010 Kia Soul Plus 5-Door MPV NHTSA No.: MA0507

Test Program: 55/28 km/h Side Impact NCAP Test Date: 04/27/09

NOMINAL DESIGN RIDING POSITION

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



SEAT BACK ANGLES

	Deg.
Driver w/seated Dummy	3.0 @ Headrest
Passenger w/seated Dummy	Fixed

SEAT FORE/AFT POSITIONS

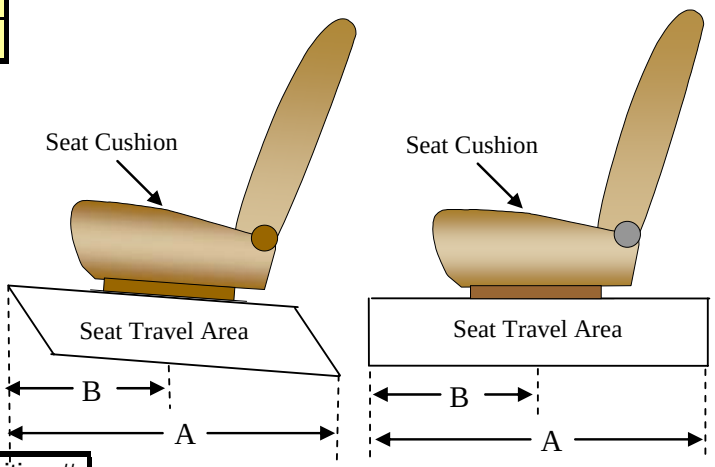
The total seat travel was measured from forward most position at the highest vertical seat height to rearmost position at the lowest vertical seat height. The seat was set at the longitudinal mid position. There were vertical adjustments on the driver seat that was equipped with the vehicle. There were 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	23 Detents	12th Detent
Rear Seat	Fixed	Fixed

SEAT BELT UPPER ANCHORAGE

Position number one (1) is the uppermost position



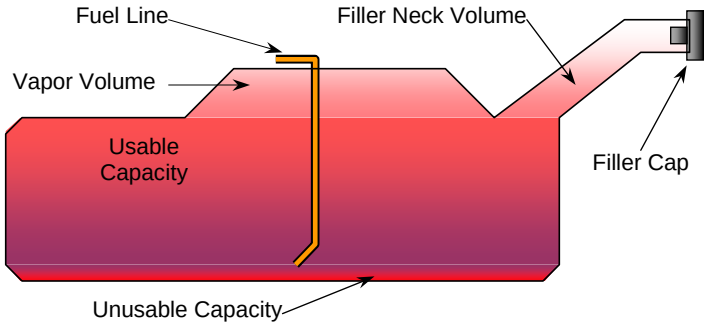
SEAT BELT UPPER ANCHORAGE

	Total # of Positions	Placed in Position #
Driver Seat	4	2
Rear Seat	Fixed	Fixed

FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	48.00
Usable Capacity of "Optional" Tank	
Usable Capacity used for FMVSS 301	44.15 to 45.11
Actual Amount of Solvent used	44.64

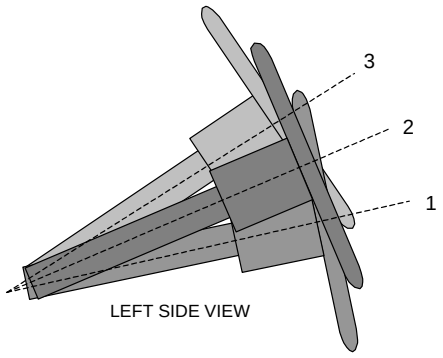
The test vehicle is equipped with an electric fuel pump. The fuel pump will operate for approximately two (2) seconds with the ignition in the "ON" position, after which the fuel pump automatically shuts off. The fuel filler door is located on the left rear fender. The standard fuel tank occupies the 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 positon No. 1	25.5	
Geometric center position No. 2	27.5	
Uppermost position No. 3	29.4	

DATA SHEET NO. 2

TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle: 2010 Kia Soul Plus 5-Door MPV NHTSA No.: MA0507

Test Program: 55/28 km/h Side Impact NCAP Test Date: 04/27/09

TEST VEHICLE WEIGHTS

	Units	As Delivered Weights (UVW)			As Tested Weights (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	397.5	256.5	654.0	447.0	326.0	773.0
Right	kg	404.0	242.5	646.5	429.0	300.0	729.0
Ratio	%	61.6	38.4	100.0	58.3	41.7	100.0
Total	kg	801.5	499.0	1300.5	876.0	626.0	1502.0

MAXIMUM EXTERIOR STATIC CRUSH

Level	Measured Parameter	Units	Maximum Crush	Above Ground
Level 1	Sill Top Height	mm	105	293
Level 2	Occupant H-Point	mm	243	645
Level 3	Mid Door	mm	270	728
Level 4	Window Sill	mm	159	884
Level 5	Window top	mm	28	1542
N/A	Maximum Penetration	mm	270	

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: 2010 Kia Soul Plus 5-Door MPV NHTSA No.: MA0507

Test Program: 55/28 km/h Side Impact NCAP Test Date: 04/27/09

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	61.67
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	61.79
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	210
B	Top of Bumper	533	700	Left	120
C	Mid Level	686	800	Right	115
D	Top of Stack	813	800	Right	183

MDB INSTRUMENTATION AND CAMERAS

Accelerometers	5
Contact Switches	1
High Speed Cameras	2

DATA SHEET NO. 4

POST-TEST OBSERVATIONS

Test Vehicle: 2010 Kia Soul Plus 5-Door MPV NHTSA No.: MA0507

Test Program: 55/28 km/h Side Impact NCAP Test Date: 04/27/09

TEST DUMMY INFORMATION AND CONTACT POINTS

Description	Front Seat SID/Hybrid III	Rear Seat SID/Hybrid III
Dummy Type/Serial No.	P572F, SID/No. 275	P572F, SID/No. 274
Head Contact	Curtain Airbag, Headrest	Curtain Airbag, Headliner, Headrest
Upper Torso Contact	Side Airbag	Door Panel
Lower Torso Contact	Side Airbag	Door Panel
Left Knee Contact	Door Panel	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	Remained closed and latched, jammed	Remained closed and latched, jammed
Right Side Door Opening	Remained closed and latched, operational.	Remained closed and latched, operational.
Seat Movement	None	None
Seatback Failure	None	None

POST-TEST STRUCUTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	No separation occurred.
Sill Seperation	No separation occurred.
Windshield Damage	Cracked
Window Damage	None
Other Notable Effects	None

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Left Front (Driver) Occupant Location 1		Left Rear (Passenger) Occupant Location 2	
	Installed	Deployed	Installed	Deployed
Front Airbag	Yes	No	No	
Side Airbag	Yes	Yes	No	
Head Airbag	No		No	
Curtain Airbag	Yes	Yes	Yes	Yes
Pre-Tensioners	Yes		No	
Load Limiters	Yes		Yes	

MDB LEFT EDGE IMPACT DATA

Measured Parameter	Units	Requirement	Value
Horizontal Offset	mm	+/- 50	+1 Right)
Vertical Offset	mm	+/-20	+6 (Up)

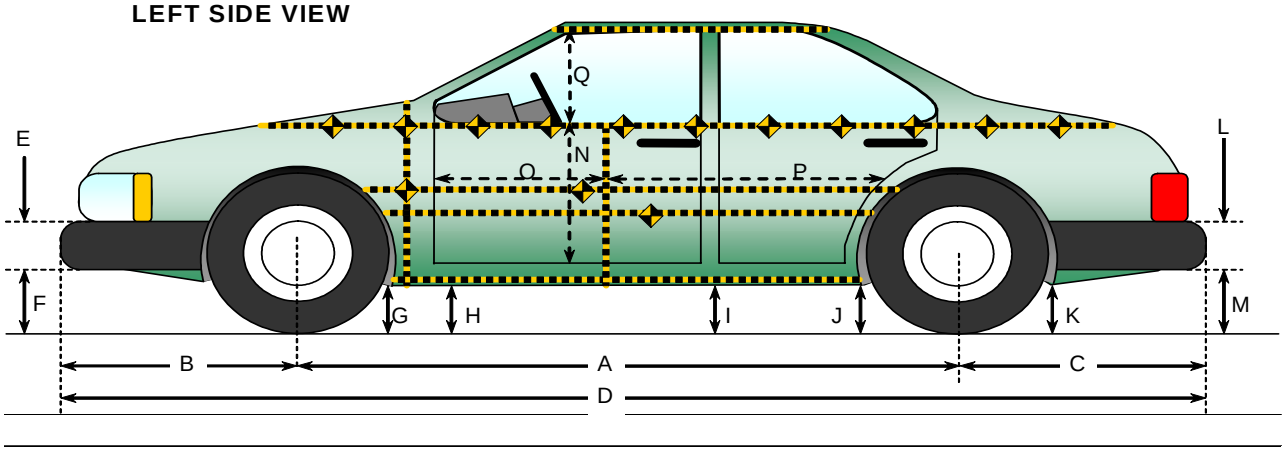
DATA SHEET NO. 5

VEHICLE PRE-TEST AND POST-TEST MEASUREMENTS

Test Vehicle: 2010 Kia Soul Plus 5-Door MPV NHTSA No.: MA0507

Test Program: 55/28 km/h Side Impact NCAP Test Date: 04/27/09

LEFT SIDE VIEW



VEHICLE PRE AND POST-TEST MEASUREMENT INFORMATION

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2548	2550	2
B	Front Axle to FSOV	813	806	-7
C	Rear Axle to RSOV	722	715	-7
D	Total Length at Centerline	4083	4070	-13
E	Front Bumper Thickness	235	328	93
F	Front Bumper Bottom to Ground	357	290	-67
G	Sill Height at Front Wheel Well	244	252	9
H	Sill Height at Front Door Leading Edge	239	253	14
I	Sill Height at "B" Pillar	251	322	70
J1	Sill Height at Rear Wheel Well	264	335	71
J2	Pinch Weld Height at Rear Wheel Well	233	282	49
K	Sill Height aft of Rear Wheel Well	317	347	31
L	Rear Bumper Thickness	224	225	1
M	Rear Bumper Bottom to Ground	356	390	33
N	Sill Height to Window Bottom Sill	654	635	-19
O	Front Door Leading Edge to Impact CL	126	145	20
P	Rear Door Trailing Edge to Impact CL	2103	2078	-25
Q	Front Window Opening	441	462	22
R	Right Side Length	2880	2886	5
S	Left Side Length	2883	2841	-42
T	Vehicle Width at "B" Post	1767	1558	-210

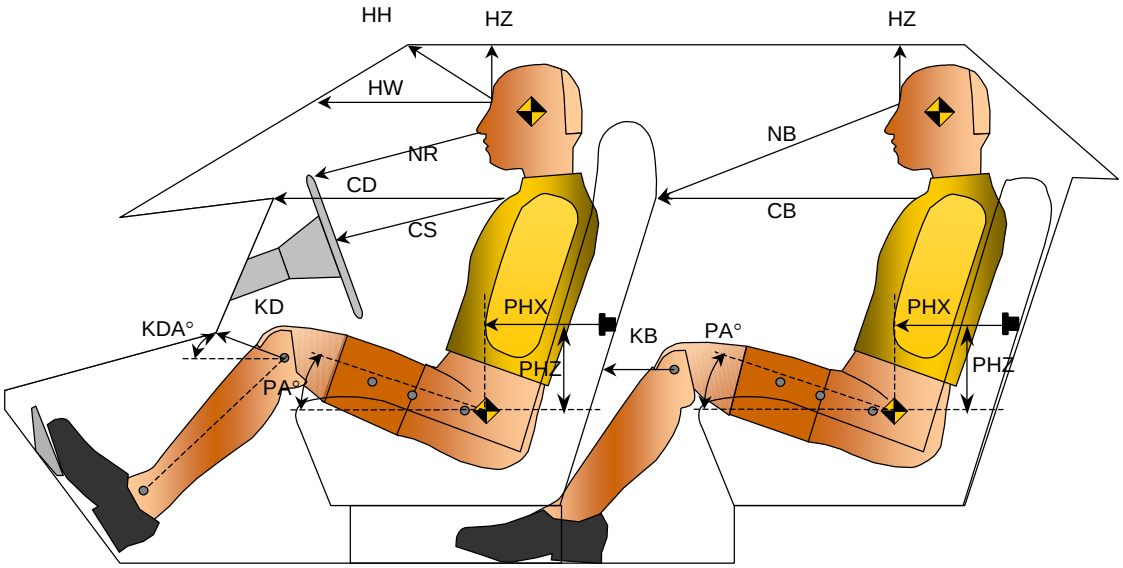
All Dimensions shown in millimeters

DATA SHEET NO. 6

SID/HIII LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2010 Kia Soul Plus 5-Door MPV NHTSA No.: MA0507

Test Program: 55/28 km/h Side Impact NCAP Test Date: 04/27/09



LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Pass. Code	Measurement Description	Driver		Passenger	
			Length(mm)	Angle	Length(mm)	Angle
HH		Head to Header	501	20.1		
HW		Head to Windshield	686	0.0		
HZ	HZ	Head to Roof	216	90.0	220	90.0
NR	NB	Nose to Rim/Nose to Seat Back	507	18.0	611	17.0
CD	CB	Chest to Dash or Seat Back	527	8.9	539	4.0
CS		Chest to Steering Wheel	342	19.0		
KDL	KBL	Left Knee to Dash or Seat Back	169	19.0	230	24.5
KDR	KBR	Right Knee to Dash or Seat Back	166		232	
PA	PA	Pelvic Angle		23.1		18.6
PHX	PHX	H-Point to Striker (X-Axis)	221		245	
PHZ	PHZ	H-Point to Striker (Z-Axis)	112		242	

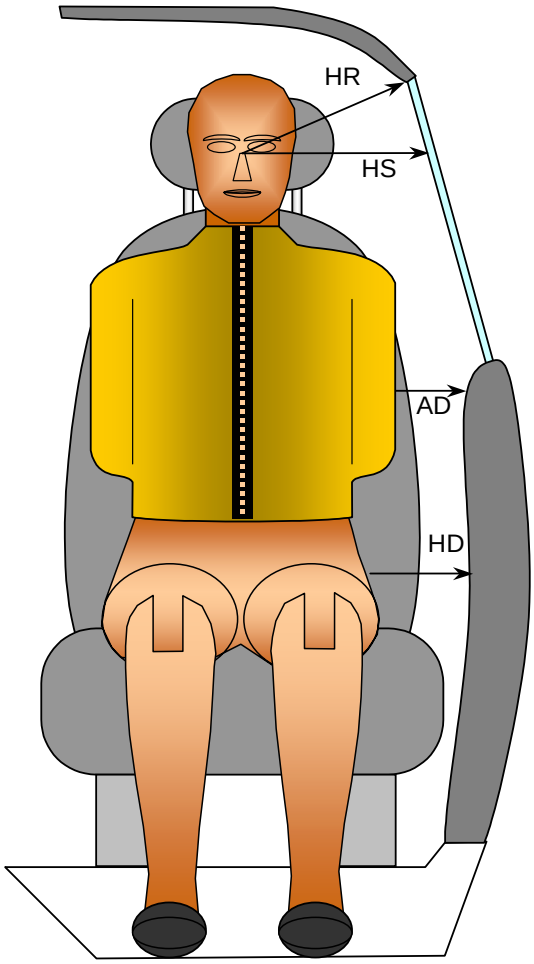
All Dimensions shown in millimeters

DATA SHEET NO. 7

SID/HIII LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2010 Kia Soul Plus 5-Door MPV NHTSA No.: MA0507

Test Program: 55/28 km/h Side Impact NCAP Test Date: 04/27/09



FRONT VIEW OF DUMMY

LATERAL CLEARANCE DIMENSION INFORMATION

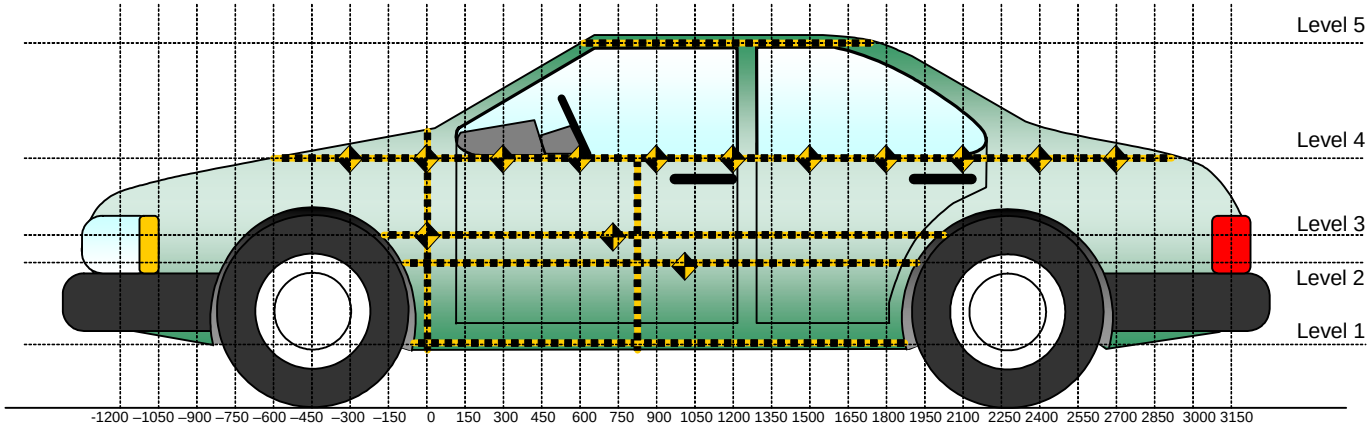
Code	Measurement Description	Units	Driver	Passenger
HR	Head to Side Header	mm	301	285
HS	Head to Side Window	mm	350	340
AD	Arm to Door	mm	101	80
HD	H-Point to Door	mm	142	165

DATA SHEET NO. 8

VEHICLE SIDE MEASUREMENTS

Test Vehicle: 2010 Kia Soul Plus 5-Door MPV NHTSA No.: MA0507

Test Program: 55/28 km/h Side Impact NCAP Test Date: 04/27/09



All Measurements Shown in mm

LEFT SIDE VIEW

Measurements are taken with vehicle in the as tested condition.
Measurments taken 900 mm right of impact reference.
All measurements below in mm.

Level	Measurement Description	Height Above Ground
1	Sill Top	293
2	Occupant H-Point	645
3	Mid Door	728
4	Window Sill	884
5	Window Top	1542

All Dimensions shown in millimeters

DATA SHEET NO. 9

VEHICLE EXTERIOR CRUSH PROFILES

Test Vehicle: 2010 Kia Soul Plus 5-Door MPV NHTSA No.: MA0507

Test Program: 55/28 km/h Side Impact NCAP Test Date: 04/27/09

	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															
-150		596	603	761			659	656	783			63	52	22	
0		609	628	727			692	695	750			83	67	23	
150	682	646	642	711		732	844	802	725		51	198	160	13	
300	687	643	638	701		791	865	859	731		105	222	220	31	
450	682	640	635	690		786	878	864	751		105	239	229	61	
600	678	637	632	683		784	876	865	763		105	239	232	80	
750	675	635	630	676	870	780	865	864	767	892	105	230	234	91	23
900	675	633	629	671	867	769	850	872	773	892	94	217	244	103	25
1050	676	632	627	665	865	766	860	857	782	891	90	228	230	117	25
1200	677	631	627	662	863	758	874	865	803	891	82	242	238	141	28
1350	677	631	627	660	860	750	865	897	819	883	73	235	270	159	22
1500	680	630	628	659	860	745	866	892	782	882	65	236	264	123	22
1650	682	630	629	658	860	742	873	888	757	881	60	243	259	99	21
1800	670	609	628	659	861	715	839	856	738	883	45	229	228	79	22
1950		591	597	661	862		681	735	713	882		90	138	51	20
2100			589	665	864			656	678	880			67	13	16
2250			588	674	868			634	703	880			46	29	12
2400			596	690	877			626	706	883			30	16	6
2550															
2700															
2850															
3000															

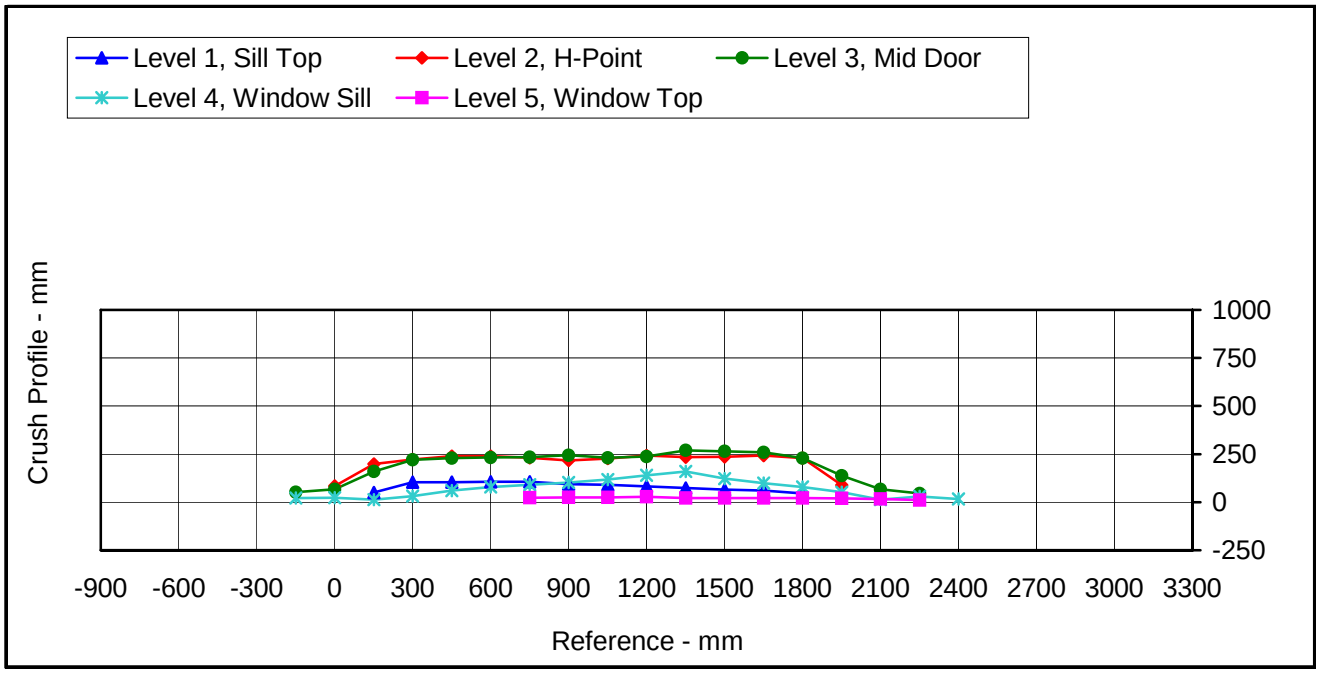
All Dimensions shown in millimeters.

DATA SHEET NO. 9…(CONTINUED)

VEHICLE EXTERIOR CRUSH PROFILES

Test Vehicle: 2010 Kia Soul Plus 5-Door MPV NHTSA No.: MA0507

Test Program: 55/28 km/h Side Impact NCAP Test Date: 04/27/09



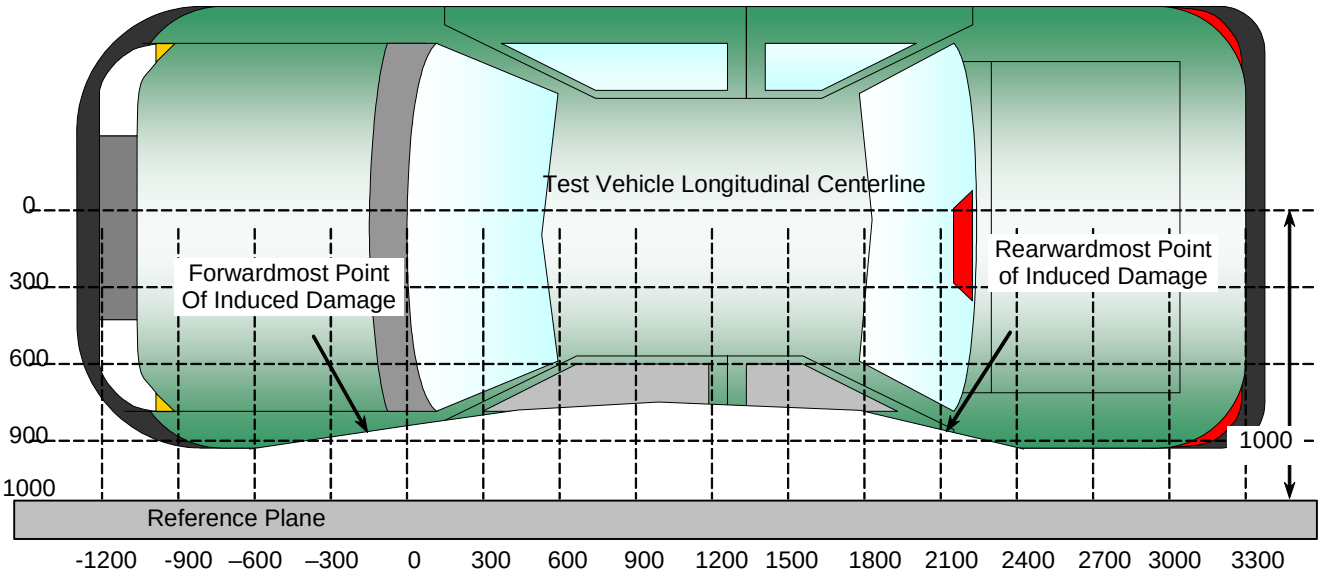
	Units	Level 1	Level 2	Level 3	Level 4	Level 5
Maximum Crush	mm	105	243	270	159	28
Distance from Impact	mm	750	1650	1350	1350	1200

DATA SHEET NO. 10

VEHICLE DAMAGE PROFILE DISTANCES

Test Vehicle: 2010 Kia Soul Plus 5-Door MPV NHTSA No.: MA0507

Test Program: 55/28 km/h Side Impact NCAP Test Date: 04/27/09



All Dimensions Shown in millimeters

TOP VIEW

DAMAGE PROFILE DISTANCES

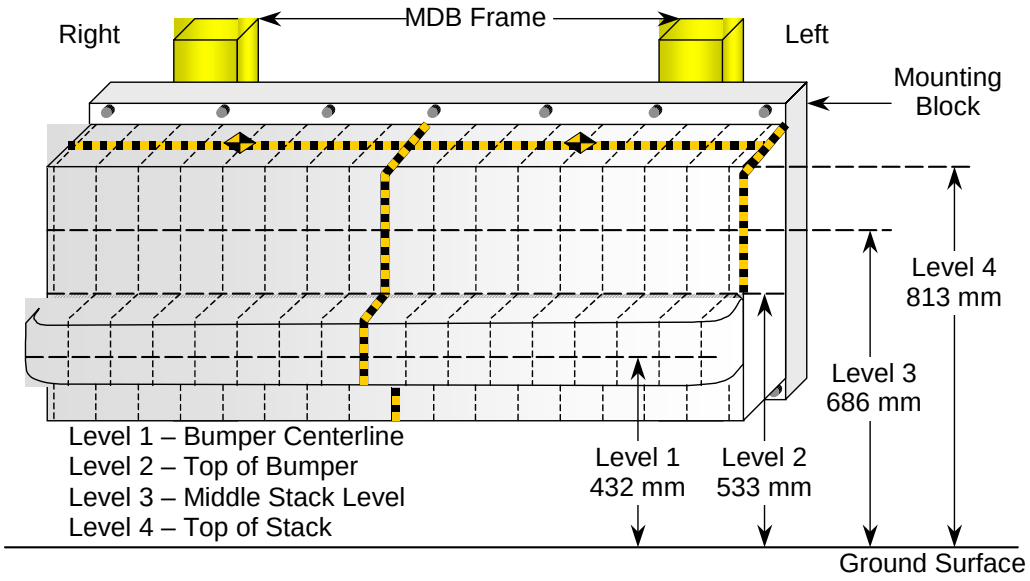
DPD	Distance From Impact Point in mm	Level	Pre-Test (mm)	Post-Test (mm)	Max. Static Crush (mm)
1	2250	3	588	634	46
2	1800	2	609	839	230
3	1350	3	627	897	270
4	900	3	629	872	243
5	450	2	640	878	238
6	0	2	609	692	83

DATA SHEET NO. 11

DEFORMABLE BARRIER HONEYCOMB FACE STATIC CRUSH

Test Vehicle: 2010 Kia Soul Plus 5-Door MPV NHTSA No.: MA0507

Test Program: 55/28 km/h Side Impact NCAP Test Date: 04/27/09



DEFORMABLE BARRIER STATIC CRUSH

Stack Level	Distance Right of Center								C/L	Distance Left of Center							
	800	700	600	500	400	300	200	100	0	100	200	300	400	500	600	700	800
1	728	708	703	697	693	689	688	682	683	672	670	665	660	653	652	648	665
2	739	740	731	724	713	698	694	696	693	690	686	692	690	688	687	684	685
3	663	651	646	644	646	650	671	666	657	647	645	646	648	653	664	684	735
4	689	659	643	634	643	666	687	664	659	656	657	663	668	679	708	749	803

All Dimensions in mm

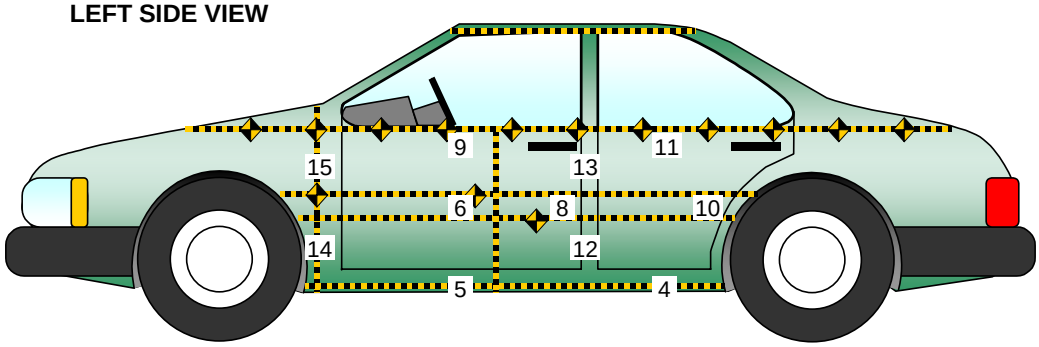
DATA SHEET NO. 12

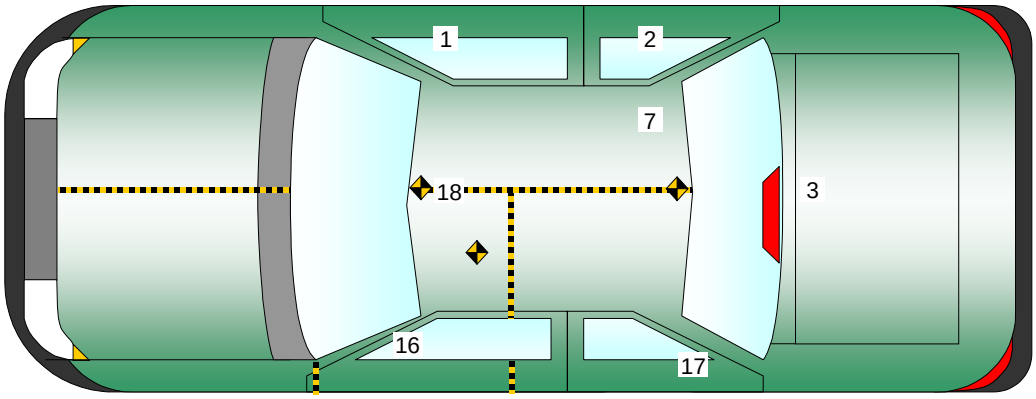
VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2010 Kia Soul Plus 5-Door MPV NHTSA No.: MA0507

Test Program: 55/28 km/h Side Impact NCAP Test Date: 04/27/09

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 LOCATION AND DATA SUMMARY

Test Vehicle: 2010 Kia Soul Plus 5-Door MPV NHTSA No.: MA0507

Test Program: 55/28 km/h Side Impact NCAP Test Date: 04/27/09

VEHICLE ACCELEROMETER LOCATIONS

Loc. No.	Accelerometer Location	Measurements (mm)			
		X	Y	Z	
1	Right Sill at Front Seat	3510	349	400	
2	Right Sill at Rear Seat	2383	-676	410	
3	Rear Floorpan Above Axle	902	0	340	
4	Left Sill at Rear Door	1541	414	232	
5	Left Sill at Front Door	2108	397	232	
6	Front Door Centerline				1
7	Rt. Rear Occ. Compartment	1417	-671	424	
8	Front Door Mid-Rear				1
9	Front Door Upper Centerline				1
10	Rear Door Mid-Rear				1
11	Rear Door Upper Centerline				1
12	B-Post Lower	1782	669	680	
13	B-Post Middle	1747	671	889	
14	A-Post Lower	2767	777	612	
15	A-Post Middle	2772	775	872	
16	Front Seat Track	2096	592	420	
17	Rear Seat Structure				1
18	Vehicle CG	2258	185	375	

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

1.) Not installed

DATA SHEET NO. 13

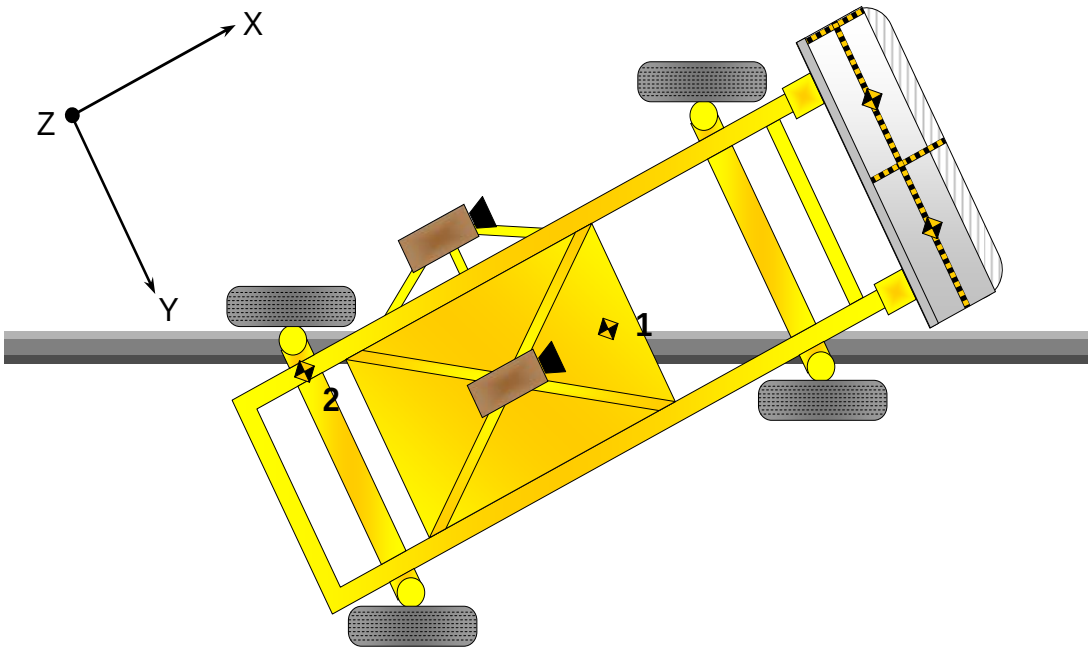
MDB ACCELEROMETER LOCATION S

Test Vehicle: 2010 Kia Soul Plus 5-Door MPV NHTSA No.: MA0507

Test Program: 55/28 km/h Side Impact NCAP Test Date: 04/27/09

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

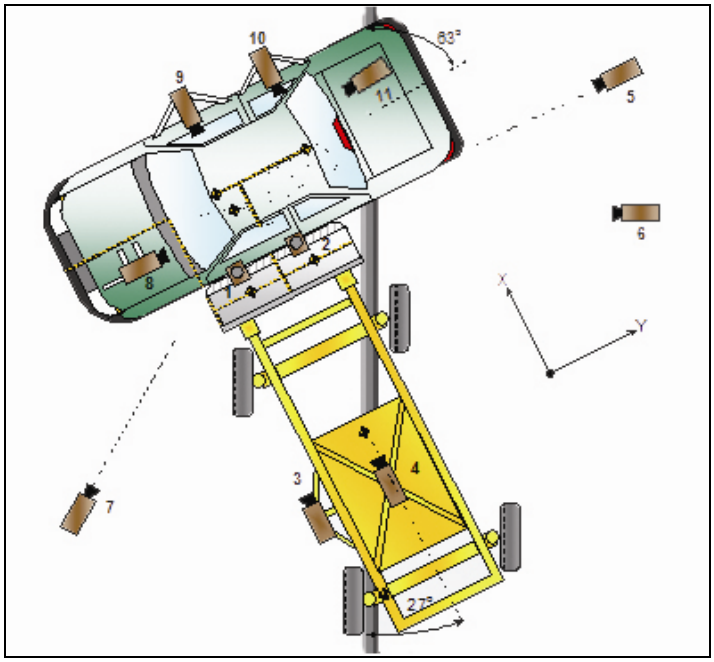


DATA SHEET NO. 14

HIGH SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2010 Kia Soul Plus 5-Door MPV NHTSA No.: MA0507

Test Program: 55/28 km/h Side Impact NCAP Test Date: 04/27/09



No.	Camera View	Location (mm)			Angle (deg)	Lens (mm)	Film Speed (FPS)
		X	Y	Z			
Doc	Real Time Inrun	-2484	-3958	-1506	0		30
Doc	Real Time Left Front	-2266	3549	-1475	-2		30
1	Overhead Overall	1220	2287	-5486	-90	14	1000
2	Overhead Close-Up	609	2287	-5102	-90	Zoom	1000
3	Left Impact Point (MDB)	-2134	0	-1143	-2	12	1000
4	Side Overal (MDB)	-3912	838	-1829	-4	12	1000
5	Rear	-64	20485	-1348	0	105	1000
6	Left Rear (MDB)	-2137	-1302	-339	-4	85	1000
7	Left Front	-2266	-3564	-1475	-2	24	1000
8	Driver Front (O.B.)	523	-575	-1289	-7	35	1000
9	Driver Side (O.B.)	1827	810	-1167	-9	20	1000
10	Passenger Side (O.B.)	1803	1769	-1210	-7	20	1000

All measurements are made relative to the point of impact.

DATA SHEET NO. 15

FMVSS 301 FUEL SYSTEM INTEGRITY POST-IMPACT DATA

Test Vehicle: 2010 Kia Soul Plus 5-Door MPV NHTSA No.: MA0507

Test Program: 55/28 km/h Side Impact NCAP Test Date: 04/27/09

Test Time: 1:10 PM Temperature: 23.3 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)

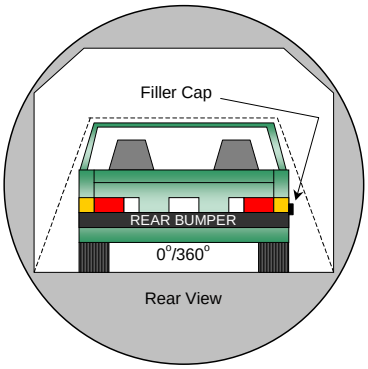
D. Spillage Details: No leakage occurred

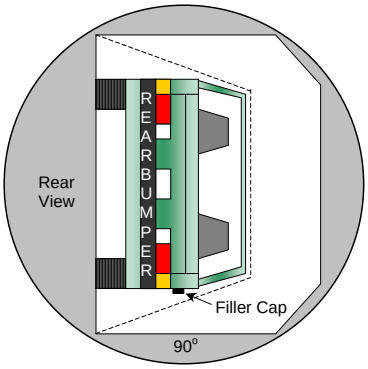
DATA SHEET NO. 16

FMVSS 301 STATIC ROLLOVER DATA

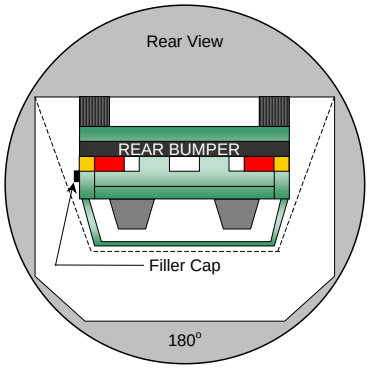
Test Vehicle: 2010 Kia Soul Plus 5-Door MPV NHTSA No.: MA0507

Test Program: 55/28 km/h Side Impact NCAP Test Date: 04/27/09

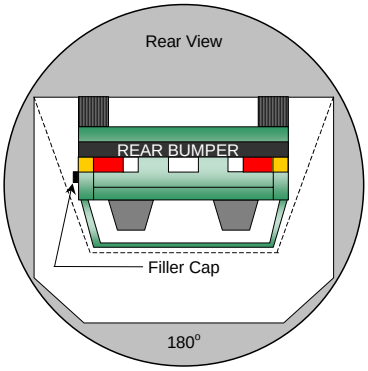




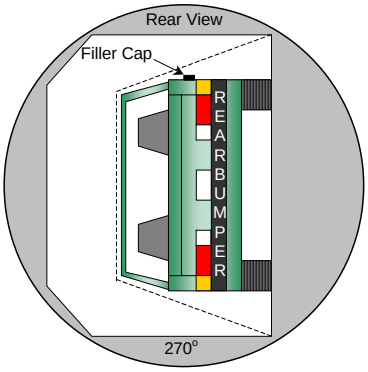
0° to 90°

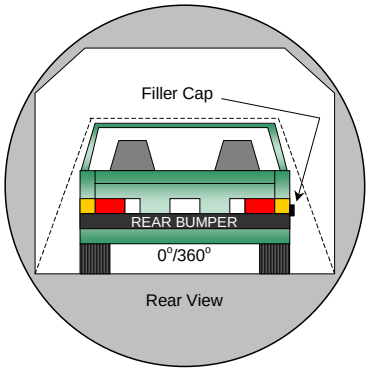


90° to 180°



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: 2010 Kia Soul Plus 5-Door MPV NHTSA No.: MA0507

Test Program: 55/28 km/h Side Impact NCAP Test Date: 04/27/09

SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	83	300	383
90° to 180°	81	302	383
180° to 270°	78	300	378
270° to 360°	80	301	381

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

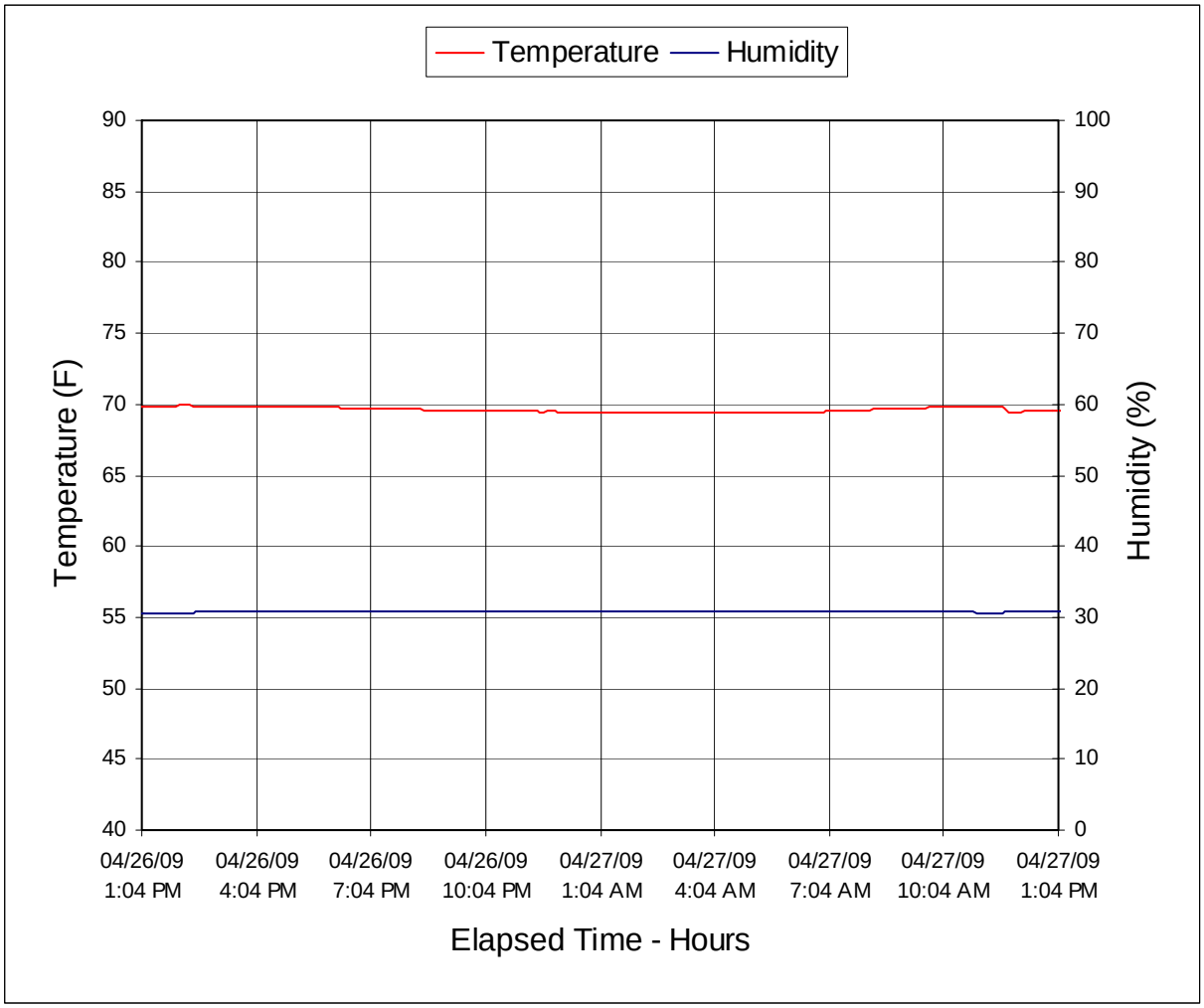
Test Phase	Spillage Location
0° to 90°	None
90° to 180°	None
180° to 270°	None
270° to 360°	None

DATA SHEET NO. 17

DUMMY / VEHICLE TEMPERATURE STABILIZATION

Test Vehicle: 2010 Kia Soul Plus 5-Door MPV NHTSA No.: MA0507

Test Program: 55/28 km/h Side Impact NCAP Test Date: 04/27/09



APPENDIX A
PHOTOGRAPHS

LIST OF PHOTOGRAPHS

Figure A-1: Right Front ¾ View, as Received

Figure A-2: Left Rear ¾ View, as Received

Figure A-3: Manufacturer's Label

Figure A-4: Tire Placard

Figure A-5: Pre-Test Front View

Figure A-6: Post-Test Front View

Figure A-7: Pre-Test Left Front ¾ View

Figure A-8: Post-Test Left Front ¾ View

Figure A-9: Pre-Test Left Side View

Figure A-10: Post-Test Left Side View

Figure A-11: Pre-Test Left Rear ¾ View

Figure A-12: Post-Test Left Rear ¾ View

Figure A-13: Pre-Test Rear View

Figure A-14: Post-Test Rear View

Figure A-15: Pre-Test Right Rear ¾ View

Figure A-16: Post-Test Right Rear ¾ View

Figure A-17: Pre-Test Right Side View

Figure A-18: Post-Test Right Side View

Figure A-19: Pre-Test Right Front ¾ View

Figure A-20: Post-Test Right Front ¾ 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

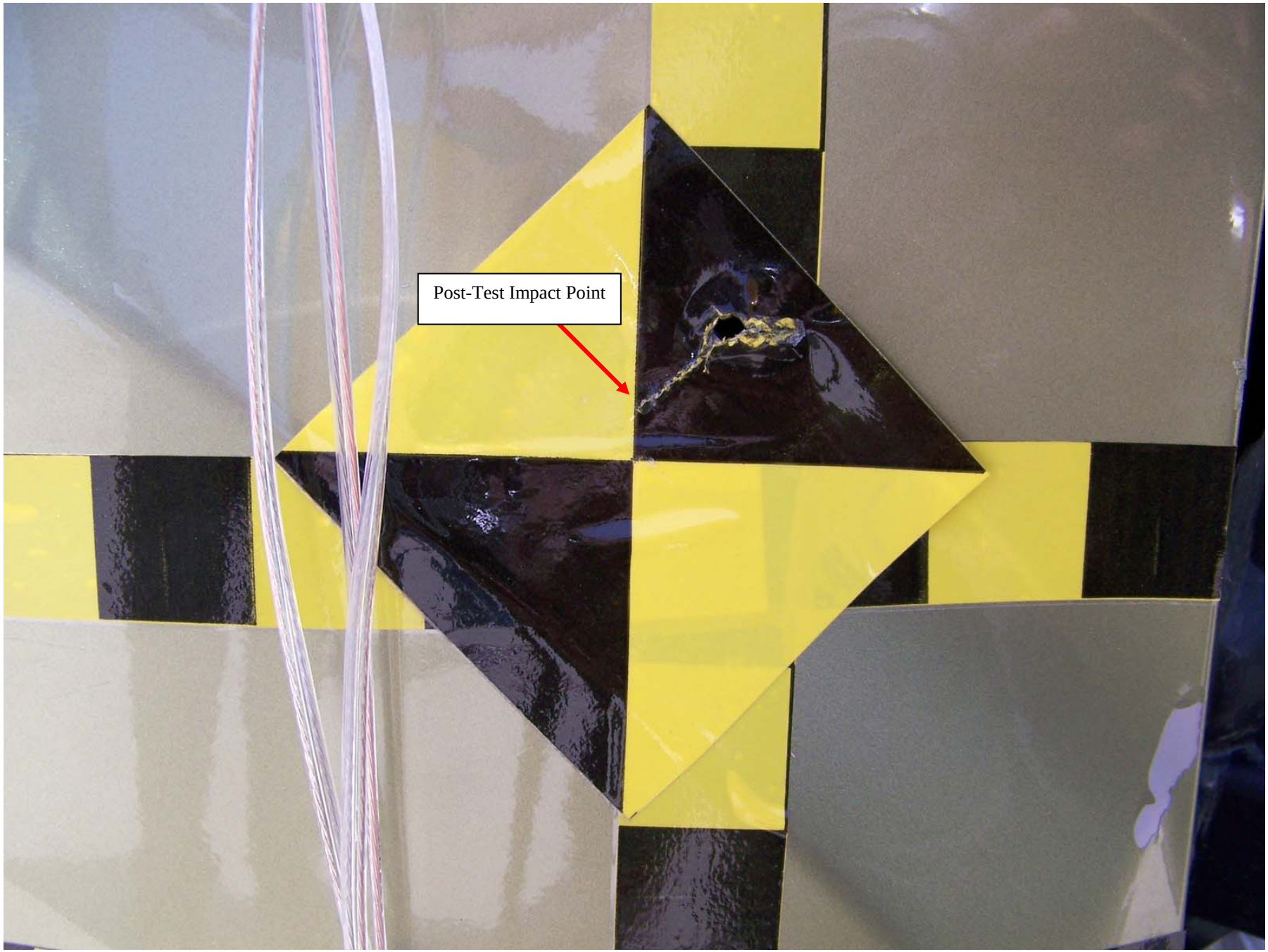


Figure A-26: Post-Test Left Impact Point

Figure A-27: Pre-Test Front ¾ View of Left Side Door

Figure A-28: Post-Test Front ¾ View of Left Side Door

Figure A-29: Pre-Test Rear ¾ View of Left Side Door

Figure A-30: Post-Test Rear ¾ 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)

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

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)

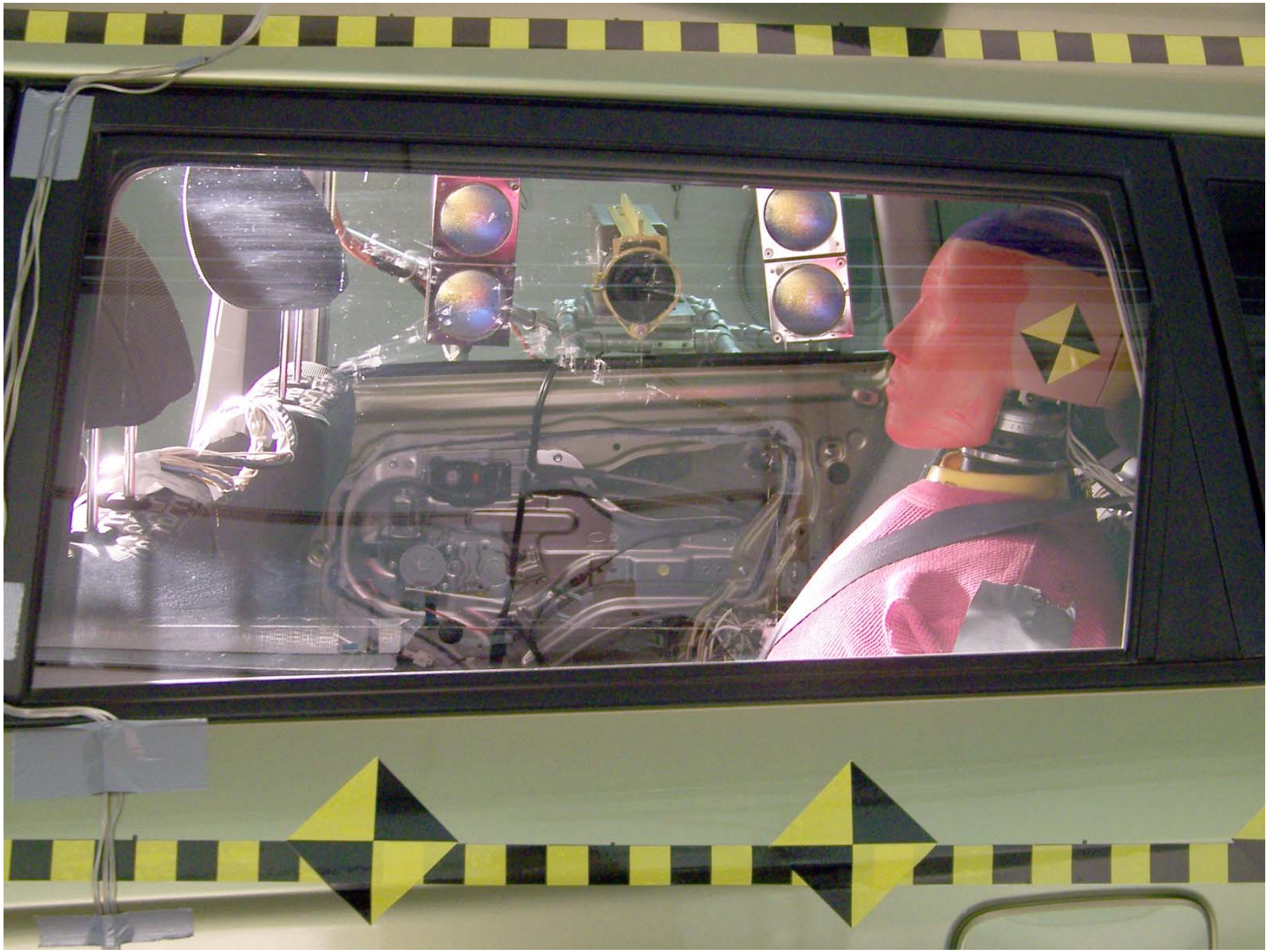


Figure A-45: Pre-Test Passenger Dummy Left Side (Through Window)

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

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

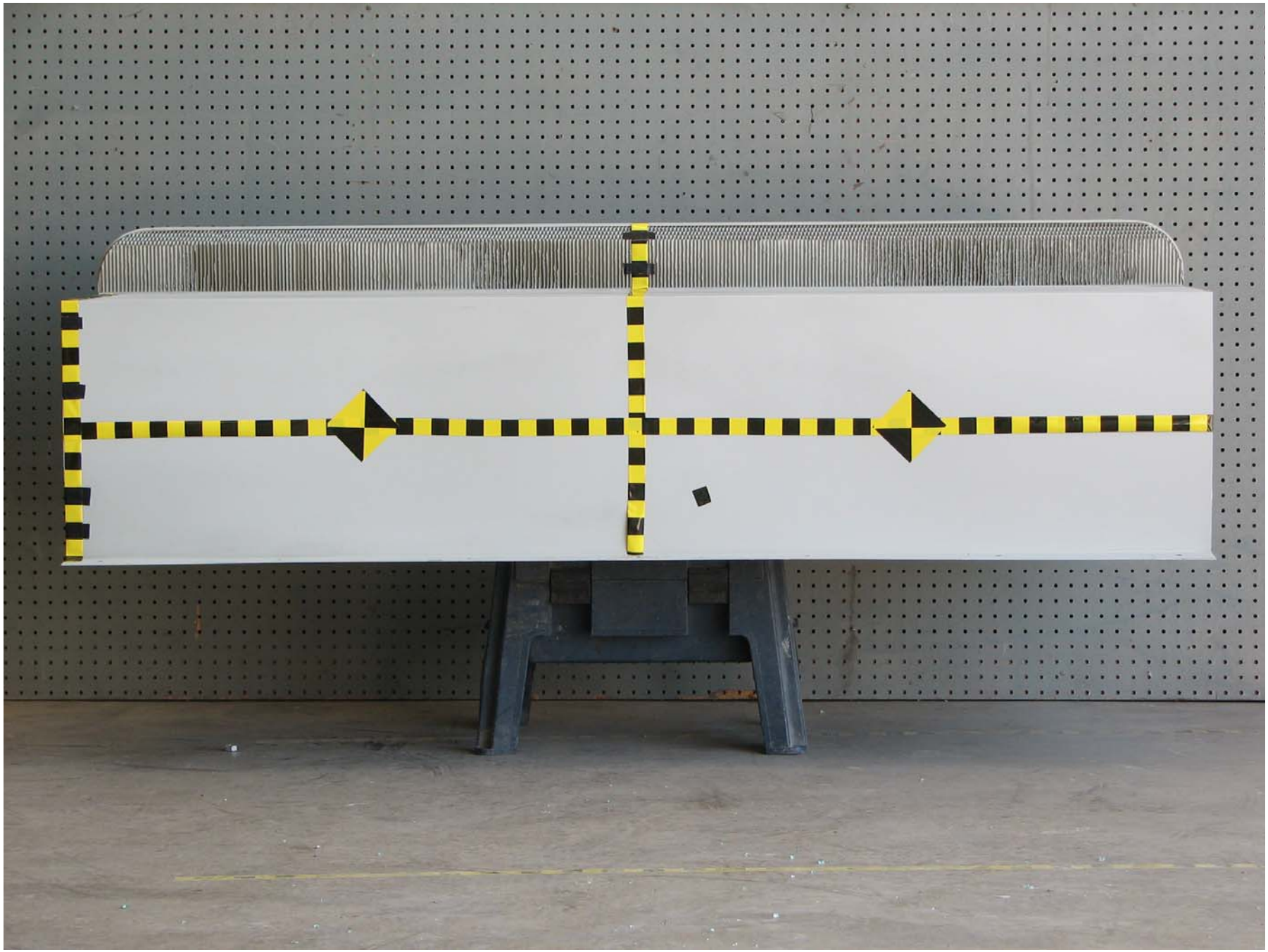


Figure A-55: Pre-Test Top View of Deformable Barrier

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°)

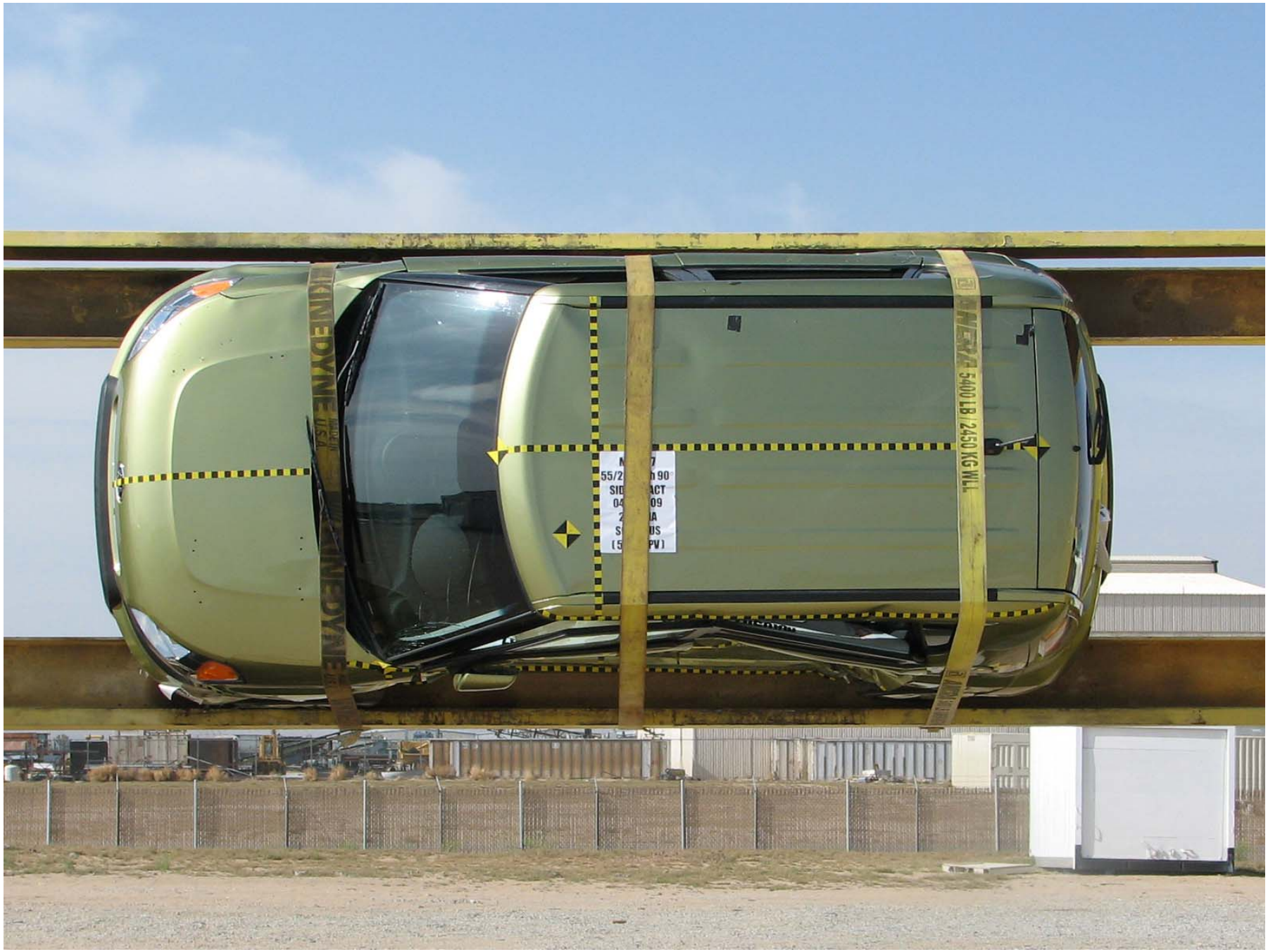


Figure A-62: Vehicle on Rollover Device (90°)

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

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

Figure A-65: Timers

Figure A-66: Vehicle Impact

APPENDIX B

SID/HIII, VEHICLE AND MDB RESPONSE DATA

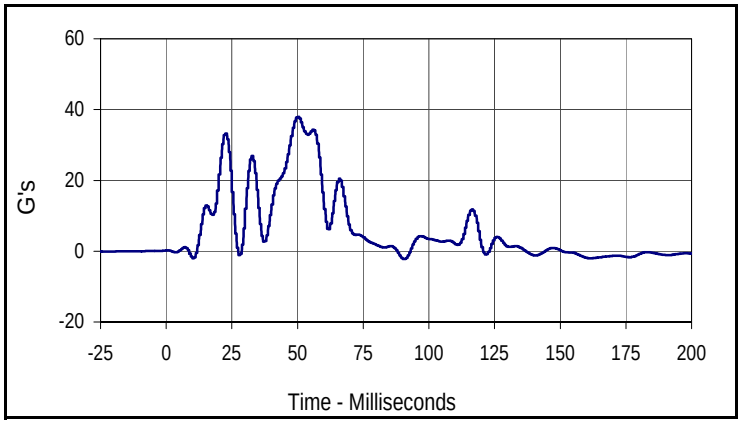
LIST OF DATA PLOTS

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

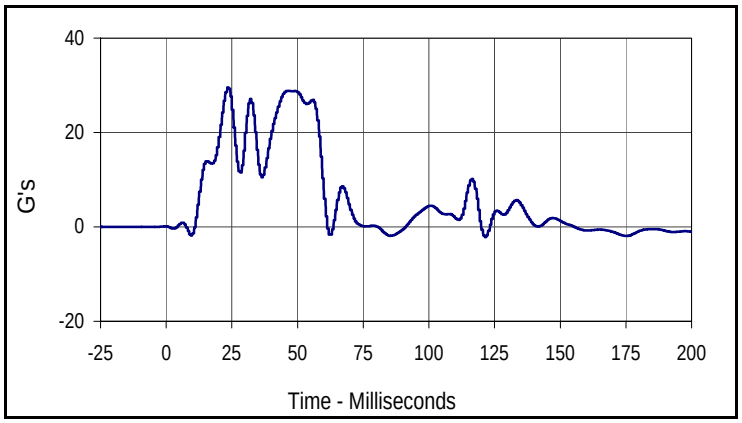
LIST OF DATA PLOTS…(CONTINUED)

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

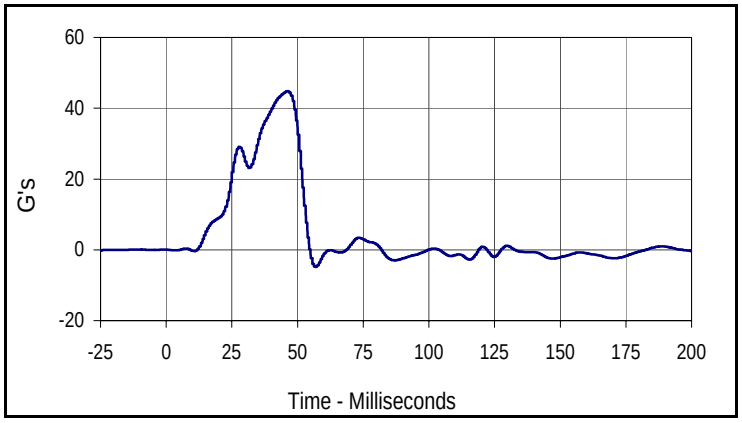
Test Vehicle:	2010 Kia Soul Plus 5-Door MPV	Test Date:	4/27/09
Test Program:	55/28 km/h Side Impact NCAP	NHTSA No.:	MA0507



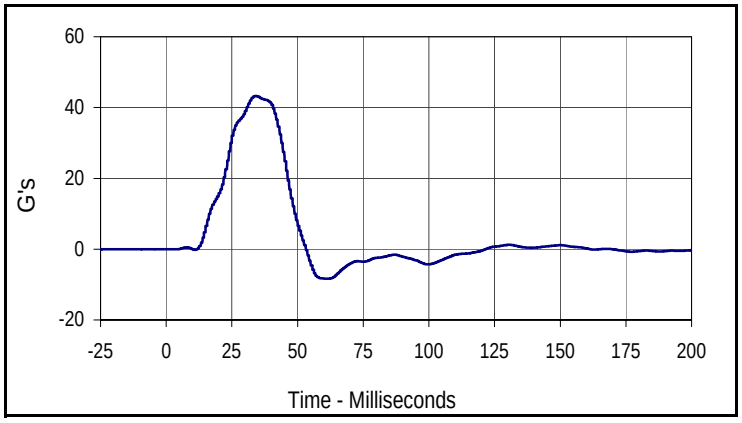
Curve Description			
Driver Upper Rib Y Primary			
CURNO	Type	SAE Class	Units
001	FIR	FIR100	G's
Max	Time	Min	Time
38.0	50.0	-2.2	90.7



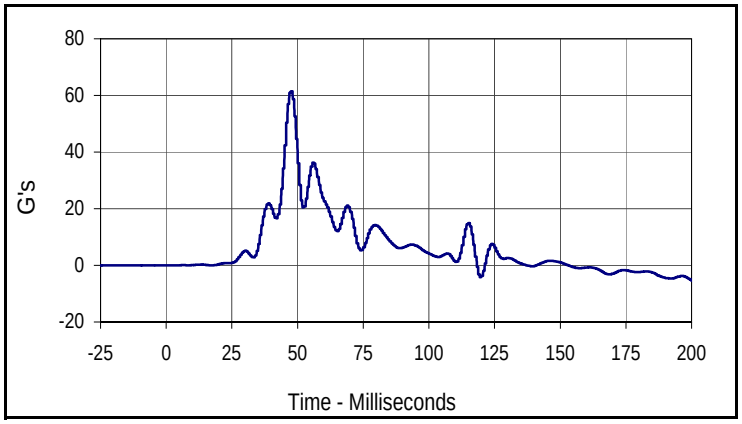
Curve Description			
Driver Lower Rib Y Primary			
CURNO	Type	SAE Class	Units
002	FIR	FIR100	G's
Max	Time	Min	Time
29.5	23.2	-2.2	121.3



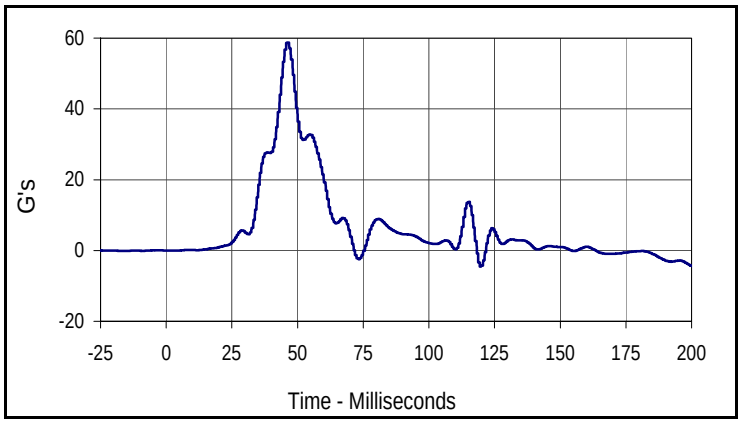
Curve Description			
Driver Lower Spine Y Primary			
CURNO	Type	SAE Class	Units
003	FIR	FIR100	G's
Max	Time	Min	Time
44.8	46.3	-4.8	56.9



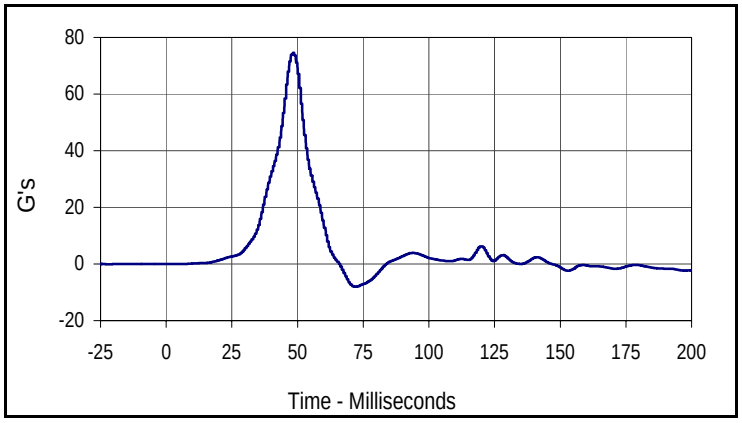
Curve Description			
Driver Pelvis Primary Y			
CURNO	Type	SAE Class	Units
004	FIR	FIR100	G's
Max	Time	Min	Time
43.3	33.8	-8.4	61.3



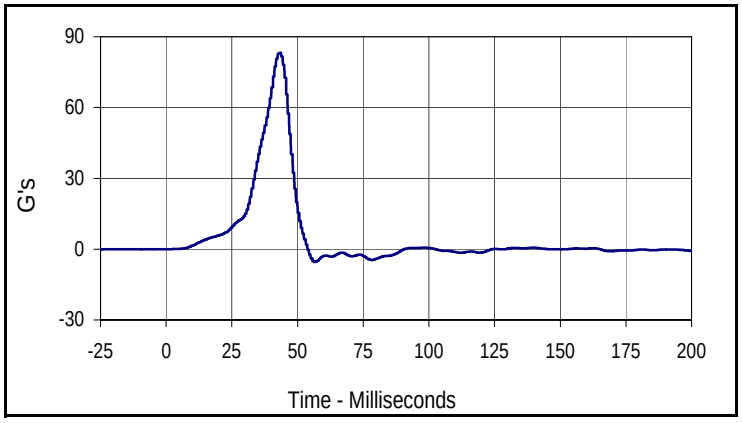
Curve Description			
Passenger Upper Rib Y Primary			
CURNO	Type	SAE Class	Units
005	FIR	FIR100	G's
Max	Time	Min	Time
61.5	47.5	-5.5	200.7



Curve Description			
Passenger Lower Rib Y Primary			
CURNO	Type	SAE Class	Units
006	FIR	FIR100	G's
Max	Time	Min	Time
58.7	46.3	-4.5	119.4



Curve Description			
Passenger Lower Spine Y Primary			
CURNO	Type	SAE Class	Units
007	FIR	FIR100	G's
Max	Time	Min	Time
74.6	48.2	-8.1	71.9



Curve Description			
Passenger Pelvis Y Primary			
CURNO	Type	SAE Class	Units
008	FIR	FIR100	G's
Max	Time	Min	Time
83.2	43.2	-5.5	56.3

APPENDIX C
SID/HIII CONFIGURATION AND PERFORMANCE VERIFICATION DATA

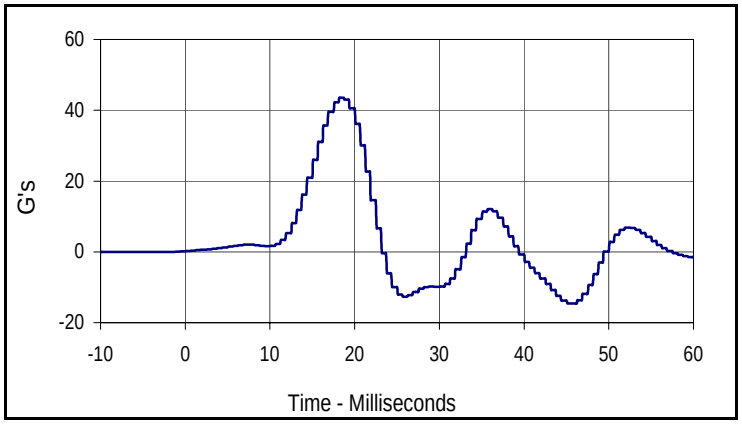
APPENDIX C
PRE-TEST SID / HIII CONFIGURATION AND PERFORMANCE VERIFICATION DATA

Test Program:	SID / HIII External Measurements	Test Date:	4/16/09
ATD Serial No.:	275	Test I.D.:	N/A

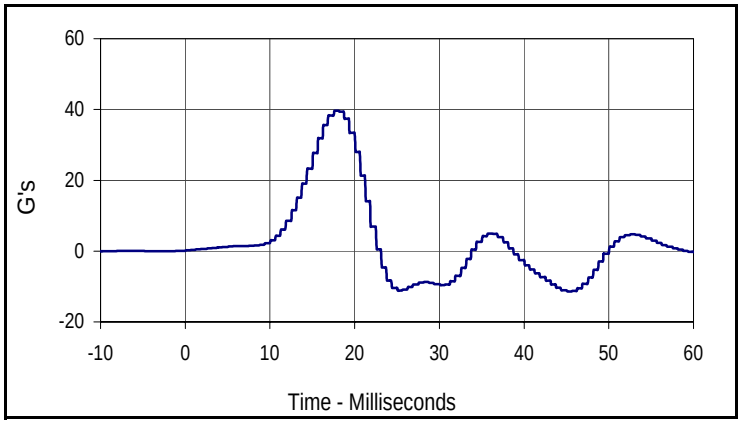
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	^{o}C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
SH- Seated Height	mm	889 to 909	898	Pass
HP- Hip Point Height	mm	99 (reference)	99	Pass
RH- Rib Height	mm	502 to 520	515	Pass
KH- Knee Pivot From Back Line	mm	511 to 526	519	Pass
KV- Knee Pivot From Floor	mm	490 to 505	500	Pass
HW- Hip Width	mm	356 to 391	363	Pass
		Overall Test Results		Pass

Test Program:	SID / HIII Thorax Lateral Impact	Test Date:	4/16/09
ATD Serial No.:	275	Test I.D.:	TH275A

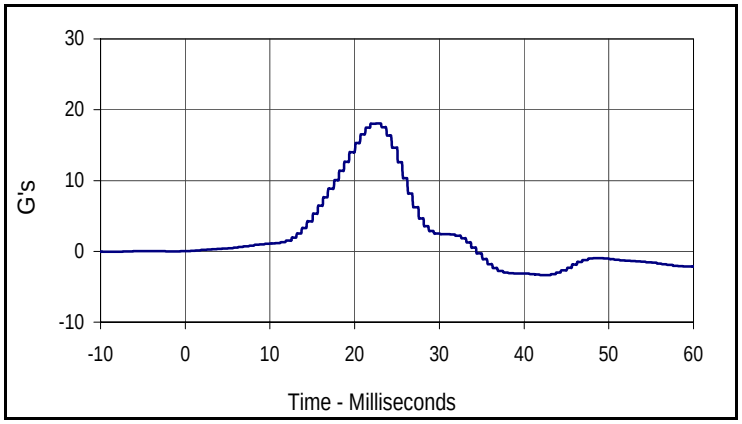
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	4.21 to 4.33	4.27	Pass
Upper Rib Acceleration	G's	37.0 to 46.0	43.6	Pass
Lower Rib Acceleration	G's	37.0 to 46.0	39.7	Pass
Thoracic Spine Acceleration	G's	15.0 to 22.0	18.1	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
43.6	18.2	-14.5	45.7



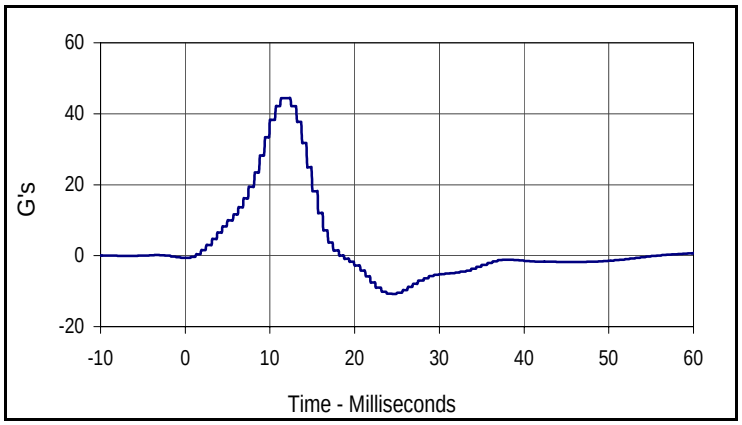
Curve Description			
Lower Rib Y Primary			
CURNO	Type	SAE Class	Units
002	FIL	FIR100	G's
Max	Time	Min	Time
39.7	17.6	-11.4	45.1



Curve Description			
Lower Spine Y Primary			
CURNO	Type	SAE Class	Units
003	FIL	FIR100	G's
Max	Time	Min	Time
18.1	22.6	-3.3	41.9

Test Program:	SID / HIII Pelvis Lateral Impact	Test Date:	4/16/09
ATD Serial No.:	275	Test I.D.:	P275C

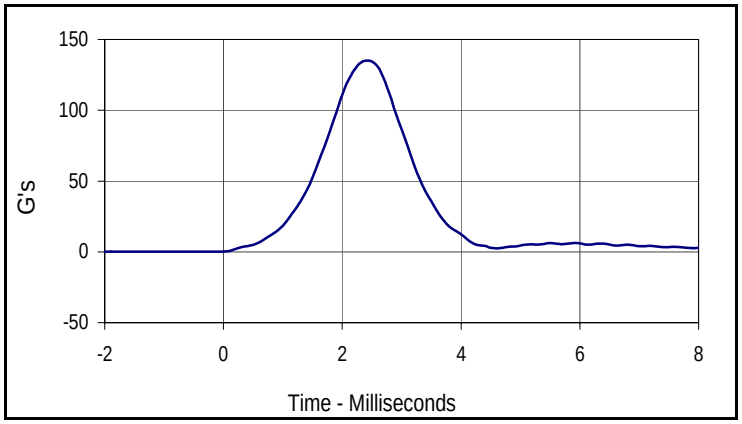
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	4.21 to 4.33	4.27	Pass
Peak Pelvis Acceleration	G's	40.0 to 60.0	44.4	Pass
Acceleration Time Above 20 G's	Msec.	3.0 to 7.0	6.70	Pass
		Overall Test Results		Pass



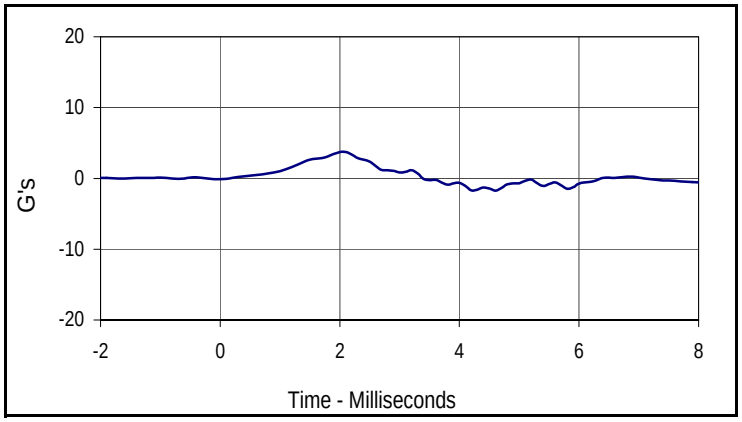
Curve Description			
Pelvis Y Primary			
CURNO	Type	SAE Class	Units
001	FIL	FIR100	G's
Max	Time	Min	Time
44.4	11.9	-10.8	24.4

Test Program:	SID / HIII Head Drop Lateral Impact Test	Test Date:	4/16/09
ATD Serial No.:	275	Test I.D.:	HD275A

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	120.0 to 150.0	135.1	Pass
Peak Longitudinal Acceleration	G's	≤15.0	3.7	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse	%	<15	4.6	Pass
		Overall Test Results		Pass



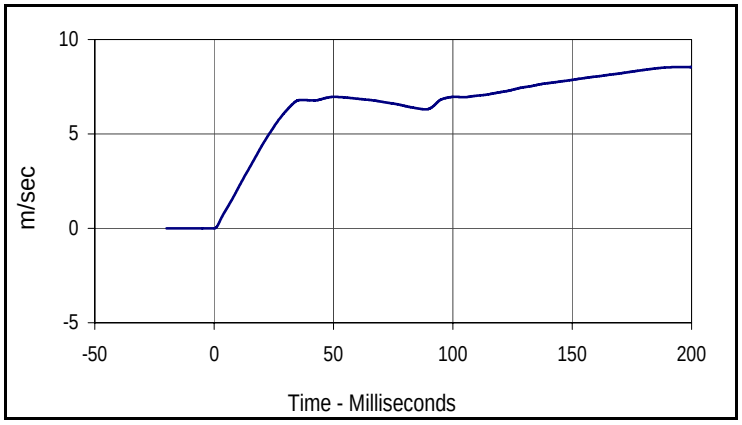
Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
135.1	2.4	0.1	0.0



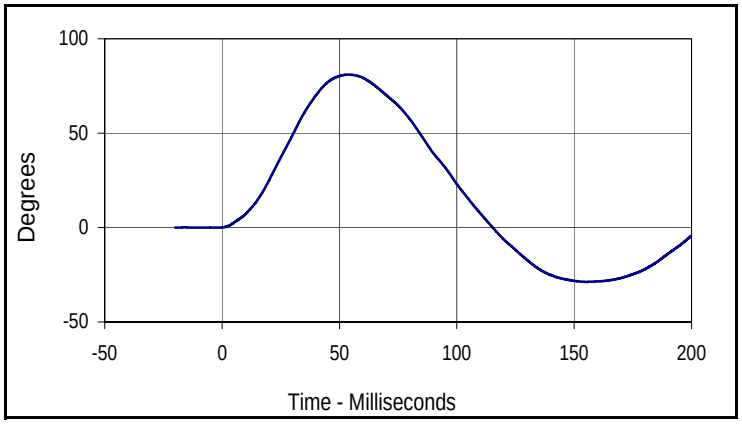
Curve Description			
Head X			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
3.7	2.1	-1.7	4.6

Test Program:	SID / HIII Neck Pendulum Lateral Test	Test Date:	4/16/09
ATD Serial No.:	275	Test I.D.:	N275C

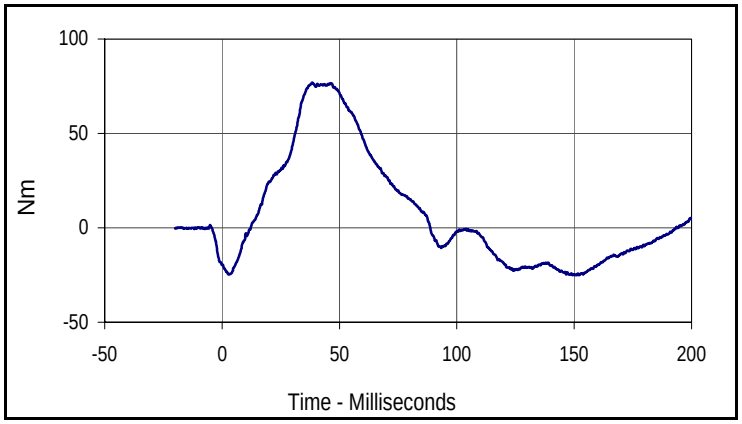
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/sec	6.89 to 7.13	7.07	Pass
Pendulum Deceleration	10 Msec.	m/sec	1.96 to 2.55	2.12	Pass
	20 Msec.	m/sec	4.12 to 5.10	4.38	Pass
	30 Msec.	m/sec	5.73 to 7.01	6.21	Pass
	40 to 70	m/sec	6.27 to 7.64	6.96	Pass
"D" Plane Rotation	Max	Degrees	66.0 to 82.0	81.0	Pass
Max Rotation Time After Peak Moment		Msec.	2.0 to 16.0	15.5	Pass
Rotation Time From Peak to Zero Angle		Msec.	58.0 to 67.0	61.5	Pass
Moment About Occipital Condyle		Nm	73.0 to 88.0	76.9	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
81.0	53.8	-28.7	155.3



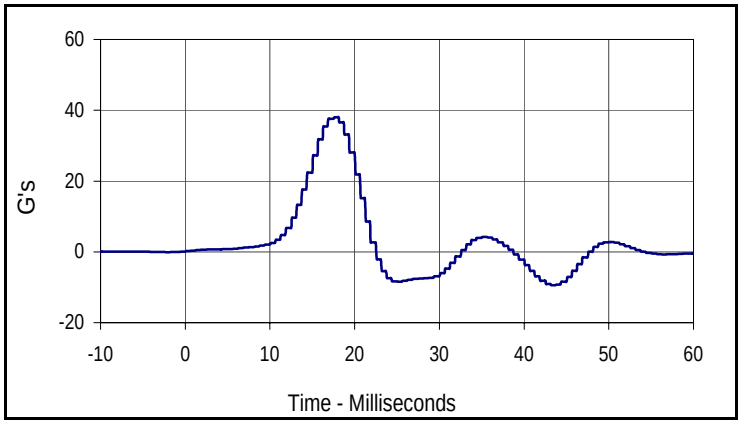
Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
004	FIL	600	Nm
Max	Time	Min	Time
76.9	38.3	-25.2	151.0

Test Program:	SID / HIII External Measurements	Test Date:	4/16/09
ATD Serial No.:	274	Test I.D.:	N/A

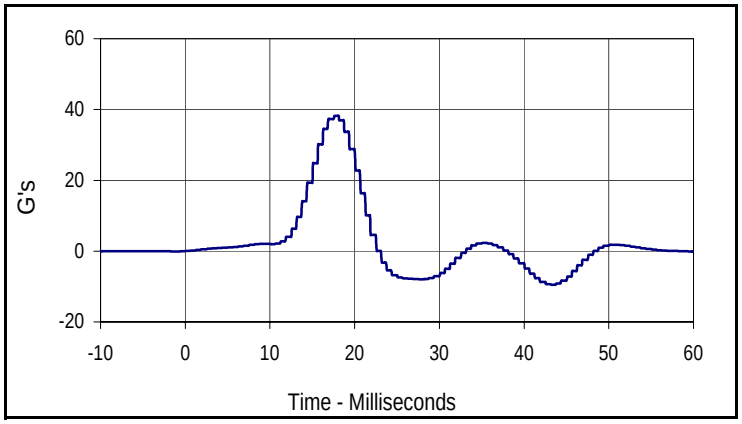
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	^{o}C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
SH- Seated Height	mm	889 to 909	897	Pass
HP- Hip Point Height	mm	99 (reference)	99	Pass
RH- Rib Height	mm	502 to 520	516	Pass
KH- Knee Pivot From Back Line	mm	511 to 526	520	Pass
KV- Knee Pivot From Floor	mm	490 to 505	500	Pass
HW- Hip Width	mm	356 to 391	364	Pass
		Overall Test Results		Pass

Test Program:	SID / HIII Thorax Lateral Impact	Test Date:	4/16/09
ATD Serial No.:	274	Test I.D.:	TH274A

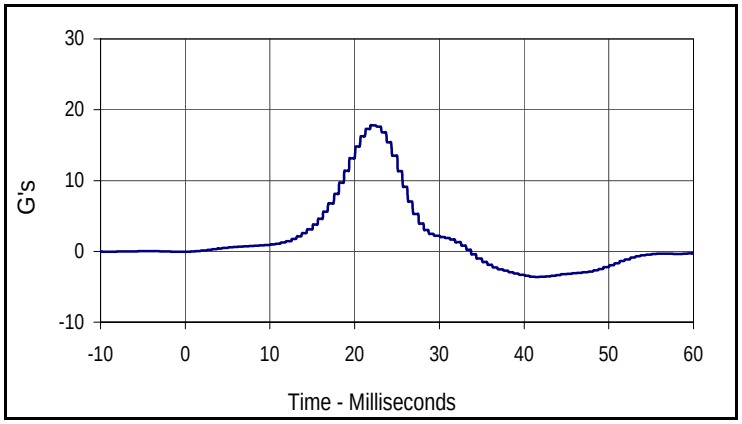
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	4.21 to 4.33	4.23	Pass
Upper Rib Acceleration	G's	37.0 to 46.0	38.1	Pass
Lower Rib Acceleration	G's	37.0 to 46.0	38.2	Pass
Thoracic Spine Acceleration	G's	15.0 to 22.0	17.8	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
38.1	17.6	-9.4	43.2



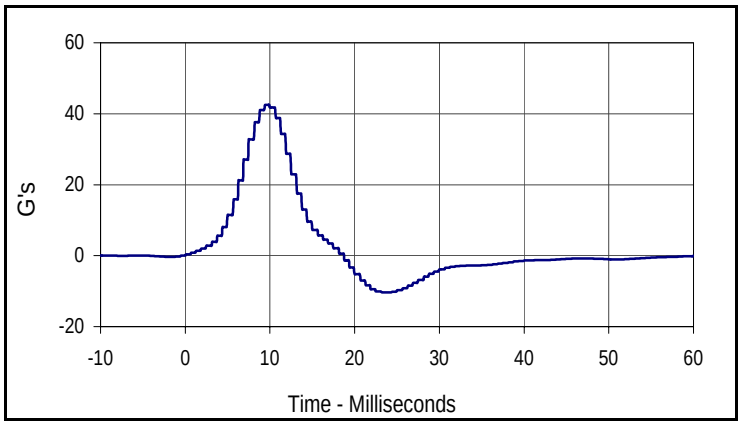
Curve Description			
Lower Rib Y Primary			
CURNO	Type	SAE Class	Units
002	FIL	FIR100	G's
Max	Time	Min	Time
38.2	17.6	-9.5	43.2



Curve Description			
Lower Spine Y Primary			
CURNO	Type	SAE Class	Units
003	FIL	FIR100	G's
Max	Time	Min	Time
17.8	21.9	-3.6	41.3

Test Program:	SID / HIII Pelvis Lateral Impact	Test Date:	4/16/09
ATD Serial No.:	274	Test I.D.:	PL274A

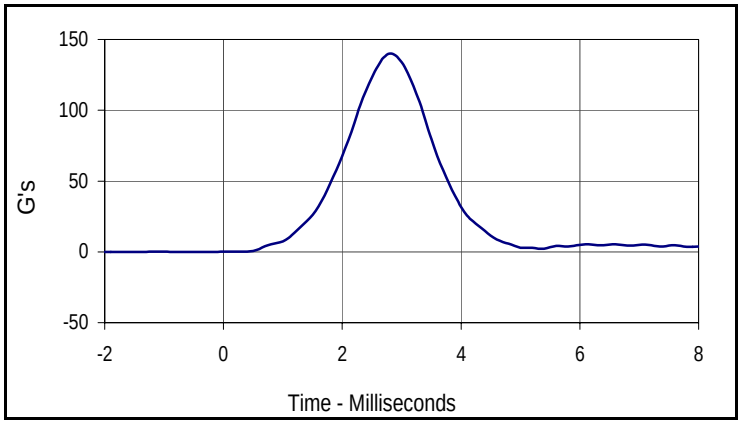
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	4.21 to 4.33	4.27	Pass
Peak Pelvis Acceleration	G's	40.0 to 60.0	42.5	Pass
Acceleration Time Above 20 G's	Msec.	3.0 to 7.0	4.90	Pass
		Overall Test Results		Pass



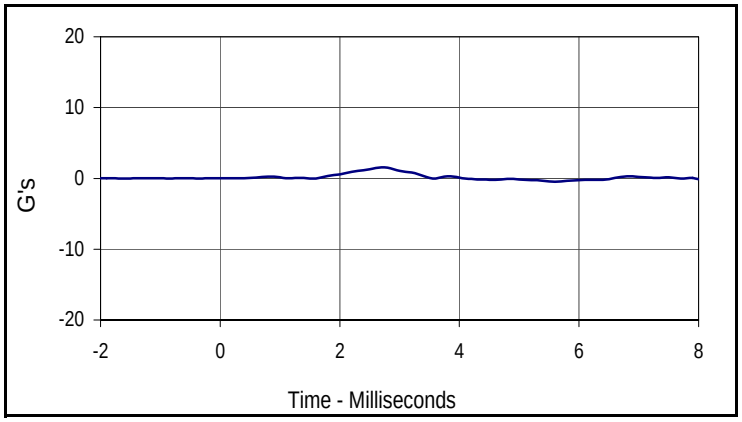
Curve Description			
Pelvis Y Primary			
CURNO	Type	SAE Class	Units
001	FIL	FIR100	G's
Max	Time	Min	Time
42.5	9.4	-10.3	23.8

Test Program:	SID / HIII Head Drop Lateral Impact Test	Test Date:	4/16/09
ATD Serial No.:	274	Test I.D.:	HD274A

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	120.0 to 150.0	140.1	Pass
Peak Longitudinal Acceleration	G's	≤15.0	1.6	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse	%	<15	3.8	Pass
		Overall Test Results		Pass



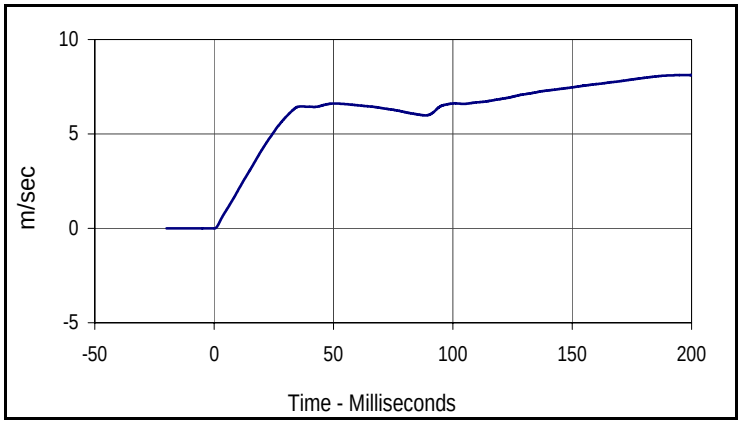
Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
140.1	2.8	0.0	-1.5



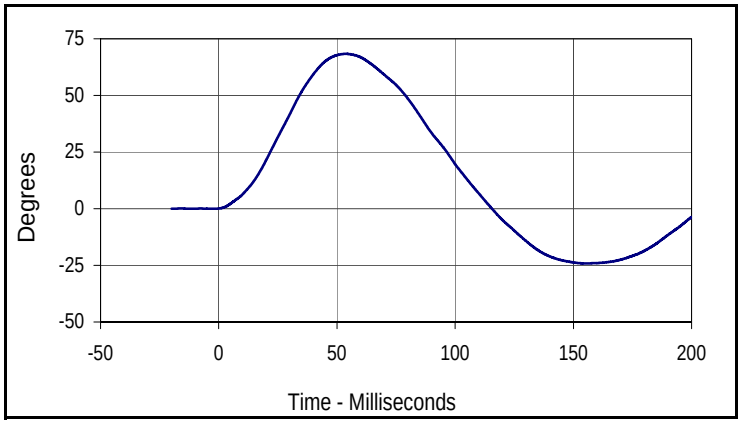
Curve Description			
Head X			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
1.6	2.7	-0.5	5.6

Test Program:	SID / HIII Neck Pendulum Lateral Test	Test Date:	4/16/09
ATD Serial No.:	274	Test I.D.:	N274A

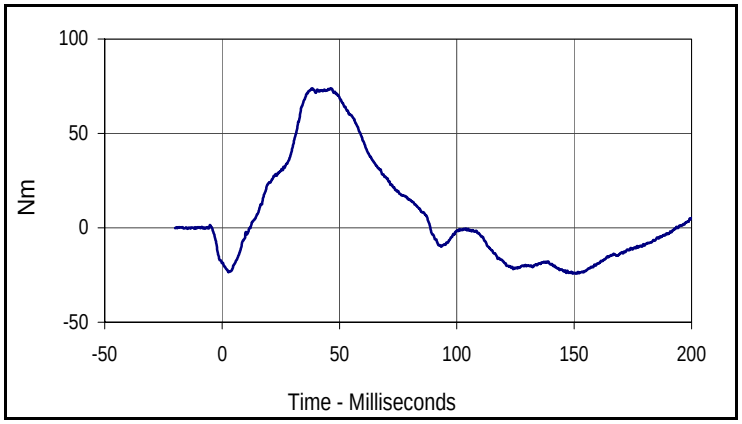
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/sec	6.89 to 7.13	7.11	Pass
Pendulum Deceleration	10 Msec.	m/sec	1.96 to 2.55	2.01	Pass
	20 Msec.	m/sec	4.12 to 5.10	4.16	Pass
	30 Msec.	m/sec	5.73 to 7.01	5.89	Pass
	40 to 70	m/sec	6.27 to 7.64	6.61	Pass
"D" Plane Rotation	Max	Degrees	66.0 to 82.0	68.3	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	73.9	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
8.1	196.6	0.0	-0.1



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
68.3	53.7	-24.2	155.3



Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
004	FIL	600	Nm
Max	Time	Min	Time
73.9	38.3	-24.3	151.1

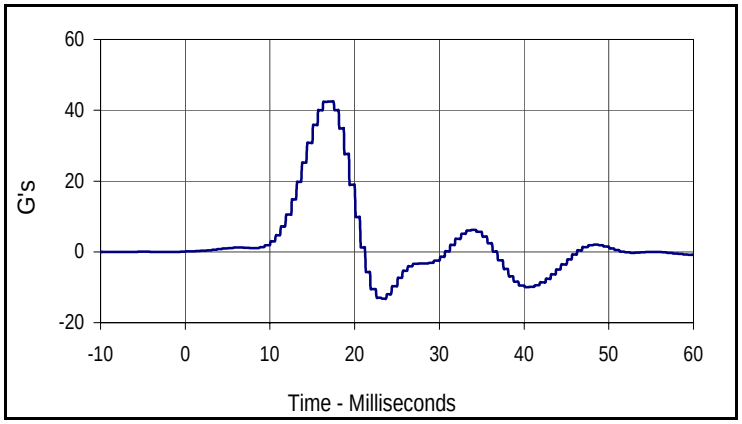
APPENDIX C
POST-TEST SID / HIII CONFIGURATION AND PERFORMANCE VERIFICATION DATA

Test Program:	SID / HIII External Measurements	Test Date:	4/29/09
ATD Serial No.:	275	Test I.D.:	N/A

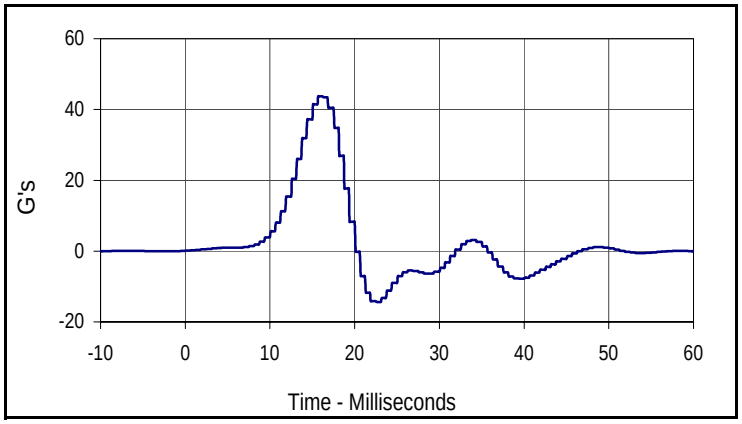
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	^{o}C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
SH- Seated Height	mm	889 to 909	898	Pass
HP- Hip Point Height	mm	99 (reference)	99	Pass
RH- Rib Height	mm	502 to 520	515	Pass
KH- Knee Pivot From Back Line	mm	511 to 526	521	Pass
KV- Knee Pivot From Floor	mm	490 to 505	501	Pass
HW- Hip Width	mm	356 to 391	365	Pass
		Overall Test Results		Pass

Test Program:	SID / HIII Thorax Lateral Impact	Test Date:	4/29/09
ATD Serial No.:	275	Test I.D.:	TH275C

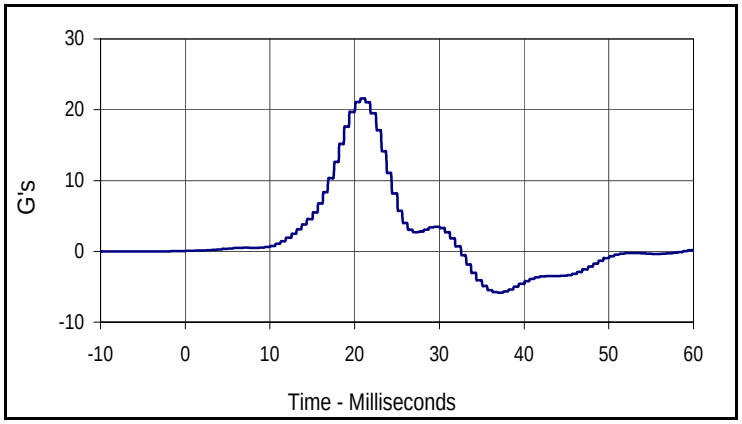
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	4.21 to 4.33	4.32	Pass
Upper Rib Acceleration	G's	37.0 to 46.0	42.5	Pass
Lower Rib Acceleration	G's	37.0 to 46.0	43.7	Pass
Thoracic Spine Acceleration	G's	15.0 to 22.0	21.6	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	16.9	-13.2	23.2



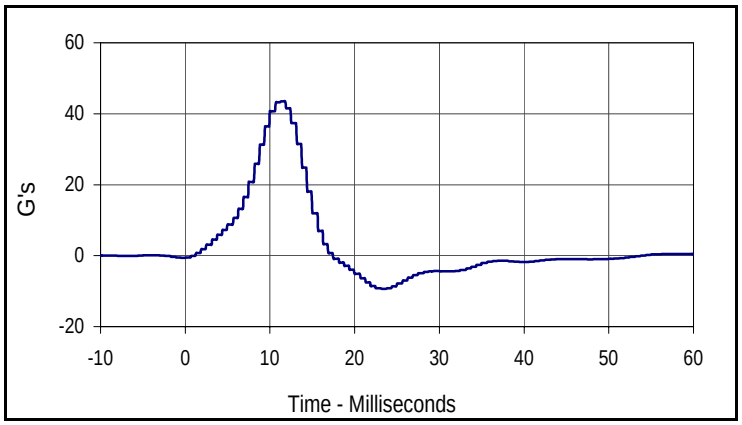
Curve Description			
Lower Rib Y Primary			
CURNO	Type	SAE Class	Units
002	FIL	FIR100	G's
Max	Time	Min	Time
43.7	15.7	-14.4	22.6



Curve Description			
Lower Spine Y Primary			
CURNO	Type	SAE Class	Units
003	FIL	FIR100	G's
Max	Time	Min	Time
21.6	20.7	-5.8	36.9

Test Program:	SID / HIII Pelvis Lateral Impact	Test Date:	4/29/09
ATD Serial No.:	275	Test I.D.:	PL275D

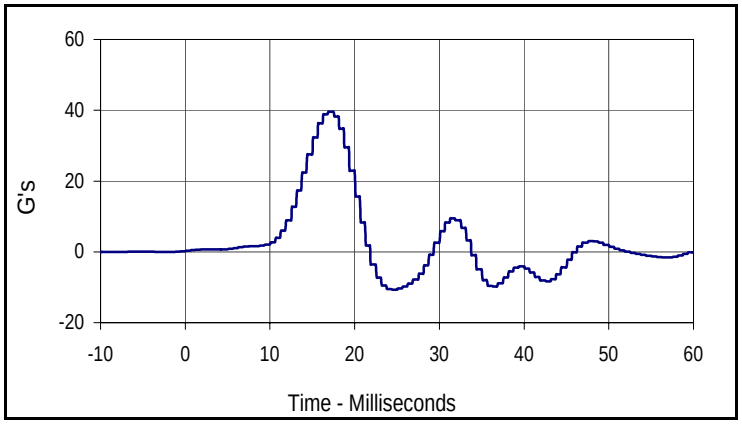
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	4.21 to 4.33	4.27	Pass
Peak Pelvis Acceleration	G's	40.0 to 60.0	43.5	Pass
Acceleration Time Above 20 G's	Msec.	3.0 to 7.0	4.90	Pass
		Overall Test Results		Pass



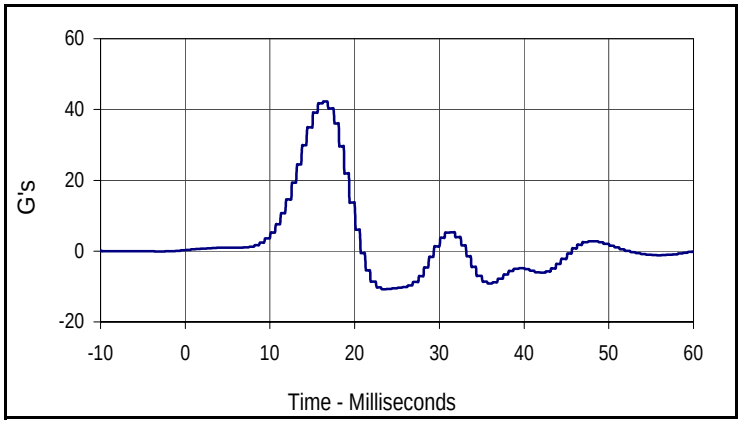
Curve Description			
Pelvis Y Primary			
CURNO	Type	SAE Class	Units
001	FIL	FIR100	G's
Max	Time	Min	Time
43.5	11.3	-9.4	23.2

Test Program:	SID / HIII Thorax Lateral Impact	Test Date:	4/29/09
ATD Serial No.:	275	Test I.D.:	TH275B

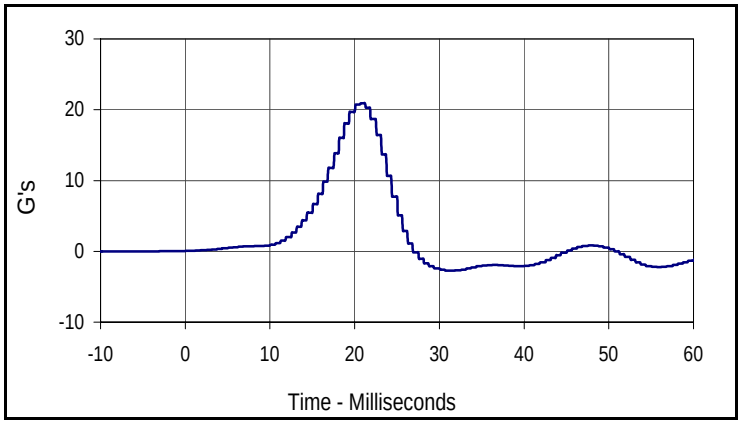
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	4.21 to 4.33	4.33	Pass
Upper Rib Acceleration	G's	37.0 to 46.0	39.5	Pass
Lower Rib Acceleration	G's	37.0 to 46.0	42.3	Pass
Thoracic Spine Acceleration	G's	15.0 to 22.0	20.9	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
39.5	16.9	-10.7	24.4



Curve Description			
Lower Rib Y Primary			
CURNO	Type	SAE Class	Units
002	FIL	FIR100	G's
Max	Time	Min	Time
42.3	16.3	-10.8	23.2

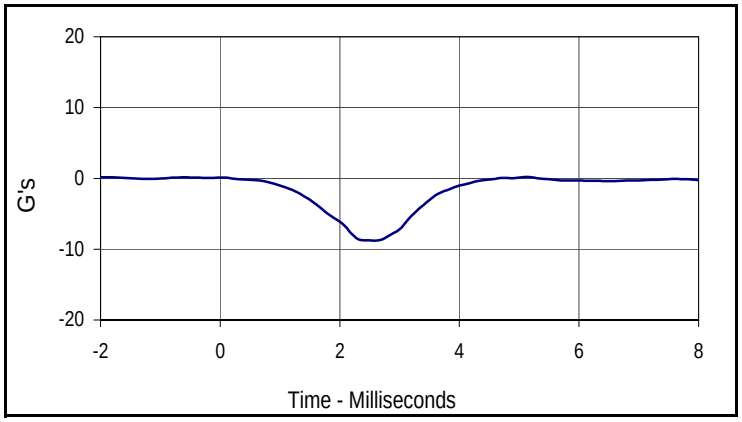


Curve Description			
Lower Spine Y Primary			
CURNO	Type	SAE Class	Units
003	FIL	FIR100	G's
Max	Time	Min	Time
20.9	20.7	-2.7	31.3

Test Program:	SID / HIII Head Drop Lateral Impact Test	Test Date:	4/29/09
ATD Serial No.:	275	Test I.D.:	HD274A

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	120.0 to 150.0	137.2	Pass
Peak Longitudinal Acceleration	G's	≤15.0	8.8	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse	%	<15	1.3	Pass
		Overall Test Results		Pass

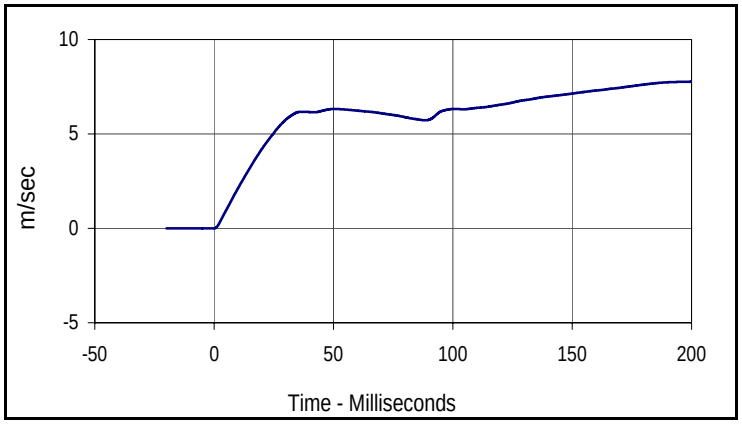
Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
137.2	2.6	0.2	-1.5



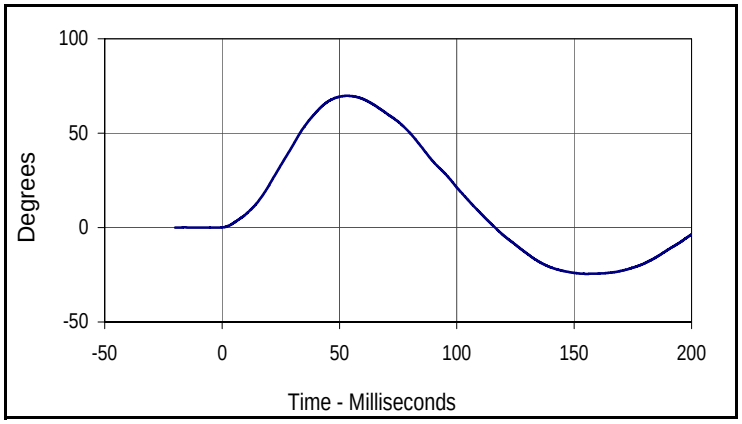
Curve Description			
Head X			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
0.2	5.1	-8.8	2.6

Test Program:	SID / HIII Neck Pendulum Lateral Test	Test Date:	4/29/09
ATD Serial No.:	275	Test I.D.:	N275B

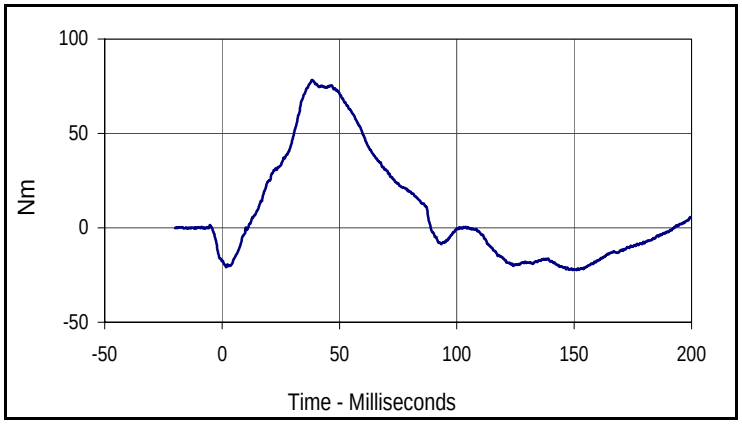
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/sec	6.89 to 7.13	7.07	Pass
Pendulum Deceleration	10 Msec.	m/sec	1.96 to 2.55	2.13	Pass
	20 Msec.	m/sec	4.12 to 5.10	4.20	Pass
	30 Msec.	m/sec	5.73 to 7.01	5.76	Pass
	40 to 70	m/sec	6.27 to 7.64	6.32	Pass
"D" Plane Rotation	Max	Degrees	66.0 to 82.0	69.8	Pass
Max Rotation Time After Peak Moment		Msec.	2.0 to 16.0	15.0	Pass
Rotation Time From Peak to Zero Angle		Msec.	58.0 to 67.0	63.0	Pass
Moment About Occipital Condyle		Nm	73.0 to 88.0	78.3	Pass
Positive Moment Decay, Time To 0 Nm		Msec.	49.0 to 64.0	50.6	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	180	m/sec
Max	Time	Min	Time
7.8	196.6	0.0	-0.1



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
69.8	53.3	-24.5	155.4



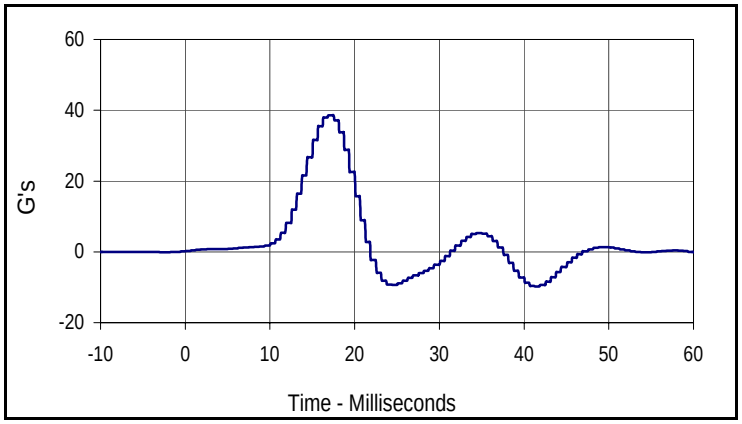
Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
004	FIL	600	Nm
Max	Time	Min	Time
78.3	38.3	-22.4	151.1

Test Program:	SID / HIII External Measurements	Test Date:	4/29/09
ATD Serial No.:	274	Test I.D.:	N/A

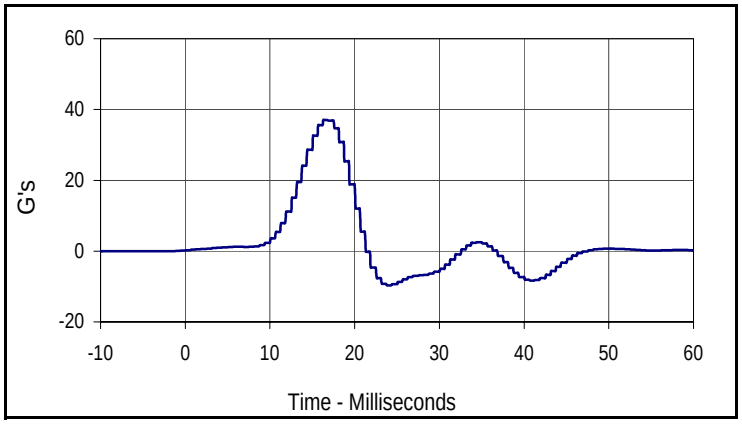
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	^{o}C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
SH- Seated Height	mm	889 to 909	895	Pass
HP- Hip Point Height	mm	99 (reference)	99	Pass
RH- Rib Height	mm	502 to 520	515	Pass
KH- Knee Pivot From Back Line	mm	511 to 526	519	Pass
KV- Knee Pivot From Floor	mm	490 to 505	501	Pass
HW- Hip Width	mm	356 to 391	363	Pass
		Overall Test Results		Pass

Test Program:	SID / HIII Thorax Lateral Impact	Test Date:	4/29/09
ATD Serial No.:	274	Test I.D.:	TH274B

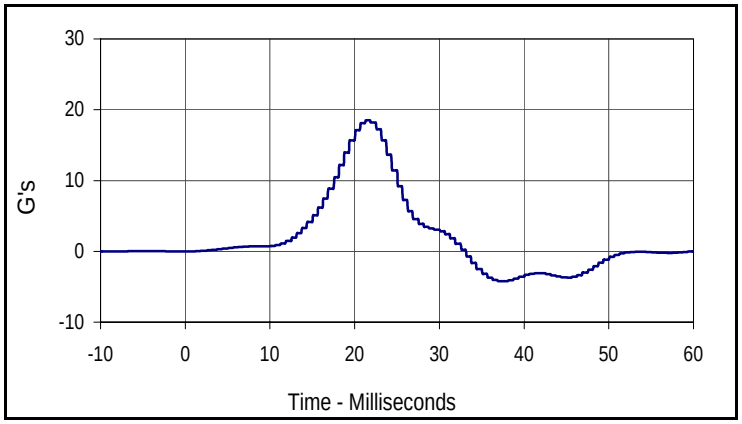
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	4.21 to 4.33	4.23	Pass
Upper Rib Acceleration	G's	37.0 to 46.0	38.5	Pass
Lower Rib Acceleration	G's	37.0 to 46.0	37.1	Pass
Thoracic Spine Acceleration	G's	15.0 to 22.0	18.5	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
38.5	16.9	-9.8	41.3



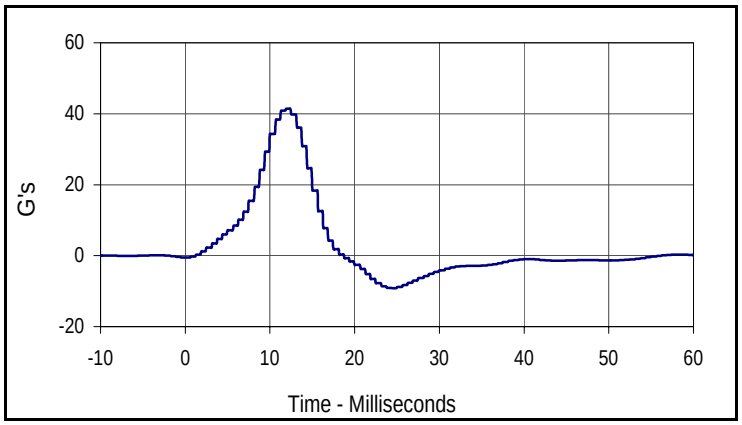
Curve Description			
Lower Rib Y Primary			
CURNO	Type	SAE Class	Units
002	FIL	FIR100	G's
Max	Time	Min	Time
37.1	16.3	-9.7	23.8



Curve Description			
Lower Spine Y Primary			
CURNO	Type	SAE Class	Units
003	FIL	FIR100	G's
Max	Time	Min	Time
18.5	21.3	-4.2	36.9

Test Program:	SID / HIII Pelvis Lateral Impact	Test Date:	4/29/09
ATD Serial No.:	274	Test I.D.:	PL274B

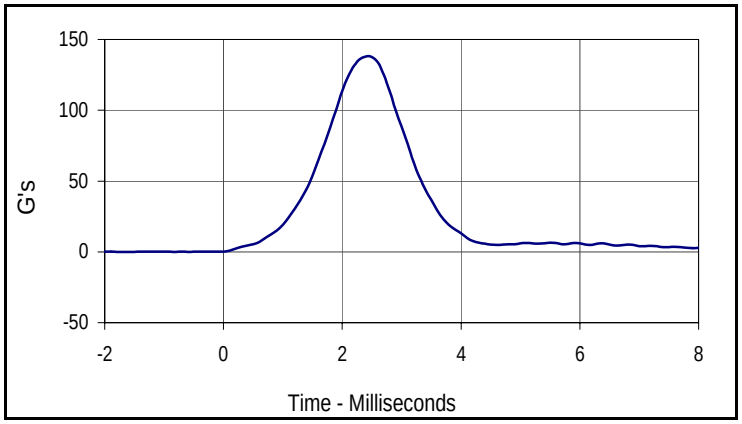
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.6	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	4.21 to 4.33	4.28	Pass
Peak Pelvis Acceleration	G's	40.0 to 60.0	41.5	Pass
Acceleration Time Above 20 G's	Msec.	3.0 to 7.0	6.10	Pass
		Overall Test Results		Pass



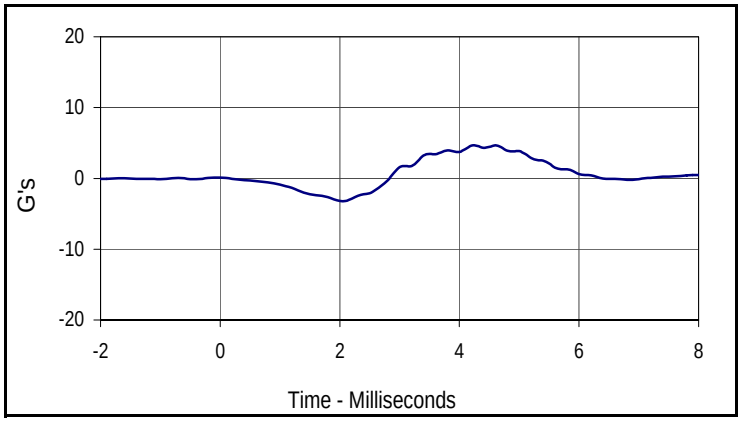
Curve Description			
Pelvis Y Primary			
CURNO	Type	SAE Class	Units
001	FIL	FIR100	G's
Max	Time	Min	Time
41.5	11.9	-9.1	24.4

Test Program:	SID / HIII Head Drop Lateral Impact Test	Test Date:	4/29/09
ATD Serial No.:	274	Test I.D.:	HD274A

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	120.0 to 150.0	138.1	Pass
Peak Longitudinal Acceleration	G's	≤15.0	4.7	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse	%	<15	4.7	Pass
		Overall Test Results		Pass



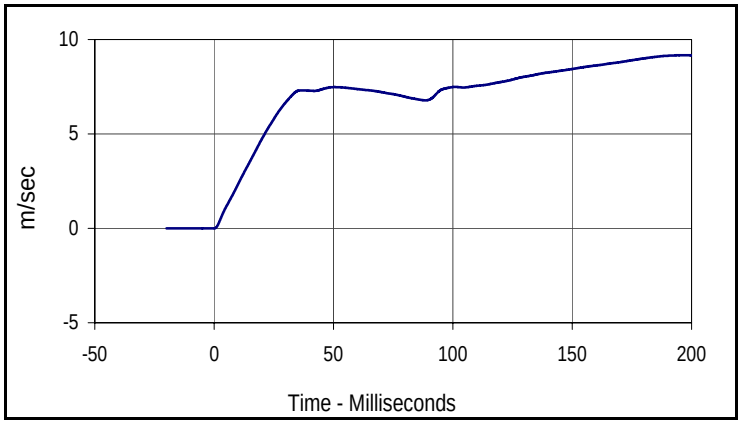
Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
138.1	2.4	0.0	-1.7



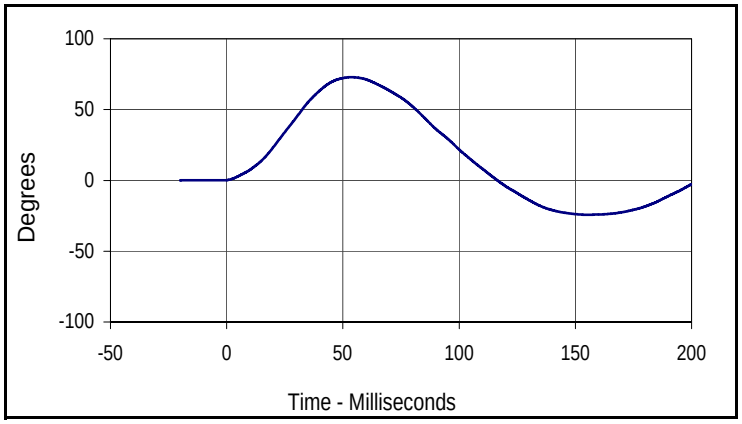
Curve Description			
Head X			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
4.7	4.6	-3.2	2.1

Test Program:	SID / HIII Neck Pendulum Lateral Test	Test Date:	4/29/09
ATD Serial No.:	274	Test I.D.:	N274B

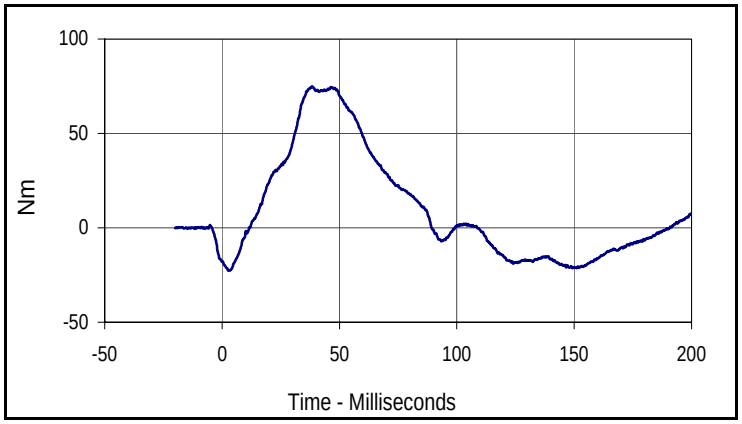
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/sec	6.89 to 7.13	7.03	Pass
Pendulum Deceleration	10 Msec.	m/sec	1.96 to 2.55	2.34	Pass
	20 Msec.	m/sec	4.12 to 5.10	4.74	Pass
	30 Msec.	m/sec	5.73 to 7.01	6.68	Pass
	40 to 70	m/sec	6.27 to 7.64	7.48	Pass
"D" Plane Rotation	Max	Degrees	66.0 to 82.0	72.9	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	62.8	Pass
Moment About Occipital Condyle		Nm	73.0 to 88.0	74.9	Pass
Positive Moment Decay, Time To 0 Nm		Msec.	49.0 to 64.0	51.0	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	180	m/sec
Max	Time	Min	Time
9.2	196.6	0.0	-0.1



Curve Description			
"D" Plane Rotation			
CURNO	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
72.9	53.7	-24.3	155.3



Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
004	FIL	600	Nm
Max	Time	Min	Time
74.9	38.3	-22.8	2.7