

REPORT NUMBER: SNCAP-KAR-11-007

**NEW CAR ASSESSMENT PROGRAM (NCAP)
MOVING DEFORMABLE BARRIER SIDE IMPACT TEST**

**FUJI HEAVY INDUSTRIES LTD.
2011 SUBARU OUTBACK 2.5I AWD 5-DOOR MPV**

NHTSA No: MB5501

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



AUGUST 11, 2010

FINAL REPORT

**PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF CRASHWORTHINESS STANDARDS
1200 NEW JERSEY AVE, SE
ROOM W43-410
WASHINGTON, D.C. 20590**

TECHNICAL REPORT DOCUMENTATION PAGE

1. Report No. SNCAP-KAR-11-007	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle Final Report of New Car Assessment Program Side Impact Testing of a 2011 Subaru Outback 2.5i AWD 5-Door MPV NHTSA No. MB5501		5. Report Date August 19, 2010
		6. Performing Organization Code KAR
7. Authors Mr. Kelsey A. Chiu, Engineering Department Supervisor, KARCO Mr. Frank Richardson, Program Manager, KARCO		8. Performing Organization Report No. TR-P30003-08-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. DTNH22-09-D-00122
12. Sponsoring Agency Name and Address U. S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards 1200 New Jersey Ave., SE, Room W43-410 Washington, D.C 20590		13. Type of Report and Period Covered Final Test Report, August 2010
		14. Sponsoring Agency Code NPS-10
15. Supplementary Notes		

16. Abstract

A 55/28 km/h 90 deg. Moving Deformable Barrier NCAP Side Impact Test was conducted on the subject 2011 Subaru Outback 2.5i AWD 5-Door MPV in accordance with the specifications of the Office of Crash Worthiness Standards Test Procedure for the generation of consumer information on vehicle side crash protection. The test was conducted at KARCO Engineering, LLC in Adelanto, CA, on August 11, 2010.

The impact velocity of the Moving Deformable Barrier was 61.97 km/h and the outside ambient temperature at the struck (driver's) side of the vehicle was 35.0 deg. C. The target vehicle's maximum post-test static crush was 239 mm located at level 3. The test vehicle's occupant performance data is as follows:

Measurement Description	Driver ATD (ES-2re)		
	Units	Threshold	Result
Head Injury Criteria (HIC ₃₆)		1000	79.3
Maximum Thorax Rib Deflection	mm	44	28.7
Total Abdominal Force	N	2500	979
Pubic Symphysis Force	N	6000	2263

Measurement Description	Passenger ATD (SID-IIs)		
	Units	Threshold	Result
Head Injury Criteria (HIC ₃₆)		1000	211.0
Lower Spine Resultant Acceleration	g	82	46
Total Pelvic Force (Sum of Acetubular and Iliac Forces)	N	5525	4732

The two doors on the struck side of the vehicle did not separate from the body at the hinges or latches, and the opposite doors did not open during the side impact event.

17. Key Words New Car Assessment Program (NCAP) Side Impact Moving Deformable Barrier (MDB) ES-2re SID-IIs		18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Admin. Technical Reference Division 1200 New Jersey Ave., SE Room W43-410 Washington, DC 20590	
19. Security Classification of this report UNCLASSIFIED	20. Security Classification of this page UNCLASSIFIED	21. No. of Pages 121	22. Price

TABLE OF CONTENTS

<u>Section</u>		<u>Page</u>
1	Purpose and Summary of the Test	1
2	Occupant and Vehicle Information/Data Sheets	3
<u>Data Sheet</u>		<u>Page</u>
1	General Test and Vehicle Parameter Data	4
2	Seat Adjustment, Fuel Systems, and Steering Wheel Data	7
3	Dummy Longitudinal Clearance Dimensions	9
4	Dummy Lateral Clearance Dimensions	10
5	Camera Locations and Data	11
6	Vehicle Accelerometer Locations	12
7	MDB Accelerometer Locations	13
8	Test Vehicle Summary of Results	14
9	Moving Deformable Barrier (MDB) Summary of Results	15
10	Post-Test Observations	16
11	Vehicle Profile Measurements	17
12	Vehicle Exterior Crush Measurements	18
13	Vehicle Damage Profile Distances	21
14	Exterior Static Crush for Impactor Face	22
15	FMVSS No. 301 Fuel System Integrity Post-Impact Data	23
16	Dummy/Vehicle Temperature Stabilization	24
<u>Appendix</u>		<u>Page</u>
A	Photographs	A
B	Dummy Response Data	B
C	Dummy Calibration Data	C

SECTION 1

PURPOSE AND SUMMARY OF TEST

PURPOSE

This moving deformable barrier side impact test is part of the MY 2011 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under contract number DTNH22-09-D-00122. The purpose of this test is to generate comparative side impact performance in a 2011 Subaru Outback 2.5i AWD 5-Door MPV. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Laboratory Test Procedure dated January 2010.

SUMMARY

A 2011 Subaru Outback 2.5i AWD 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 61.97 km/h (38.50 mph). The target vehicle was stationary and was positioned at an angle of 63° to the line of forward motion. The side impact test was conducted by KARCO Engineering, LLC. in Adelanto, California, on August 11, 2010. Pre- and post-test photographs of the test vehicle, the MDB, and the dummies (ES-2re and SID-IIs) are included in Appendix A of this report.

Dummies were placed in the driver and left rear designated seating positions according to instructions specified in the OCWS Side Impact Laboratory Test Procedure, dated January 2010. The side impact event was documented by 11 cameras. Camera locations are included in Data Sheet No. 5 of this report.

The dummies were instrumented in the following manner:

DRIVER ATD (ES-2re)

Head Accelerometers

Thorax Rib 1 to Rib 3 Potentiometers

Abdomen Forward, Middle, and Rear Load Cells

Lower Spine Accelerometers

Pubic Load Cell

PASSENGER ATD (SID-IIs)

Head Accelerometers

Thorax Upper, Middle and Lower Rib Potentiometers

Abdomen Upper and Lower Rib Potentiometers
 Lower Spine Accelerometers
 Iliac Load Cell
 Acetabulum Load Cell

Dummy injury values were recorded as follows:

Measurement Description	Units	Driver ATD (ES-2re)	
		Threshold	Result
Head Injury Criteria (HIC ₃₆)		1000	79.3
Maximum Thorax Rib Deflection	mm	44	28.7
Combined Abdominal Force	N	2500	979
Pubic Symphysis Force	N	6000	2263

Measurement Description	Units	Passenger ATD (SID-IIs)	
		Threshold	Result
Head Injury Criteria (HIC ₃₆)		1000	211
Lower Spine (T12) Resultant Acceleration	g	82	46
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	4732

Supplemental restraint information is given below:

Restraint Type	Left Front (Driver)		Left Rear (Passenger)	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	No	No	
Knee Airbag	No		No	
Side Airbag 1 (Torso/Pelvis)	Yes	Yes	No	
Side Airbag 2 (Curtain)	Yes	Yes	Yes	Yes
Seat Belt Pretensioner	Yes	Yes	No	
Seat Belt Load Limiter	Yes	Yes	No	
Other				

GENERAL COMMENTS

Both the front and rear doors on the struck side of the vehicle remained closed and latched. There was no separation at the hinges or latches. Both doors on the non-struck side remained closed and latched. No dummy injury values exceeded the threshold values.

SECTION 2

OCCUPANT AND VEHICLE INFORMATION/DATA SHEETS

Test Vehicle: 2011 Subaru Outback 2.5i AWD 5-Door MPV NHTSA No. MB5501
Test Program: MDB Side Impact Test Test Date: 08/11/10

CONVERSION FACTORS

Quantity	Typical Application	Std Units	Metric Unit	Multiply By
Mass	Vehicle Weight	lb	kg	0.4536
Linear Velocity	Impact Velocity	miles/hr	km/hr	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	°F	°C	$=(t_f - 32)/1.8$
Force	Dynamic Forces	lbf	N	4.448
Moment	Torque	lbf/ft	Nm	1.355

DATA SHEET NO. 1

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2011 Subaru Outback 2.5i AWD 5-Door MPV NHTSA No. MB5501
 Test Program: MDB Side Impact Test Test Date: 08/11/10

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA Number	MB5501	Anti-Lock Brakes	Yes
Model Year	2011	All Wheel Drive	No
Make	Subaru	Power Steering	Yes
Model	Outback	Driver Front Airbag	Yes
Body Style	5-Door MPV	Driver Curtain Airbag	Yes
VIN	4S4BRBAC2B1317516	Driver Head/Torso Airbag	No
Body Color	Graphite Gray Metallic	Driver Torso Airbag	No
Delivery Date	7/27/2010	Driver Torso/Pelvis Airbag	Yes
Odometer Reading (km / mi)	29/18	Driver Pelvis Airbag	No
Dealer	Irvine Subaru	Driver Knee Airbag	No
Transmission	6-Speed Manual	Rear Pass. Curtain Airbag	Yes
Final Drive	AWD	Rear Pass. Head/Torso Airbag	No
Type / No. of Cylinders	Horizontally Opposed 4	Rear Pass. Torso Airbag	No
Engine Displacement (L)	2.5	Rear Pass. Torso/Pelvis Airbag	No
Engine Placement	Longitudinal	Rear Pass. Pelvis Airbag	No
Roof Rack	Yes	Pretensioners	Yes
Sunroof / T-Top	No	Load Limiters	Yes
Tinted Glass	No	Automatic Door Locks	No
Traction Control	Yes	Bucket Seats	Yes
Power Brakes	Yes	Tilt Steering	Yes
Front Disc	Yes	Other	TPMS
Rear Disc	Yes	Other	VDC
Does Owner's Manual provide instructions to turn off automatic door locks?			No

DATA FROM CERTIFICATION LABEL

Manufactured By	Fuji Heavy Industries Ltd.	GVWR (kg)	2080
Date of Manufacture	Jun-10	GAWR Front (kg)	1070
		GAWR Rear (kg)	1060

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity	2	3		5	
Capacity Weight (VCW) (kg)				408.0	A
DSC x 68.04 (kg)				340.2	B
Cargo Weight (RCLW) (kg)				67.8	A-B

VEHICLE SEAT TYPE

Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						w/ Lever	w/ Knob
Front Seat	Yes					Yes	
Rear or Second Row Seat		Yes			Yes		
Third Row Seat							

DATA SHEET NO. 1 ... (CONTINUED)

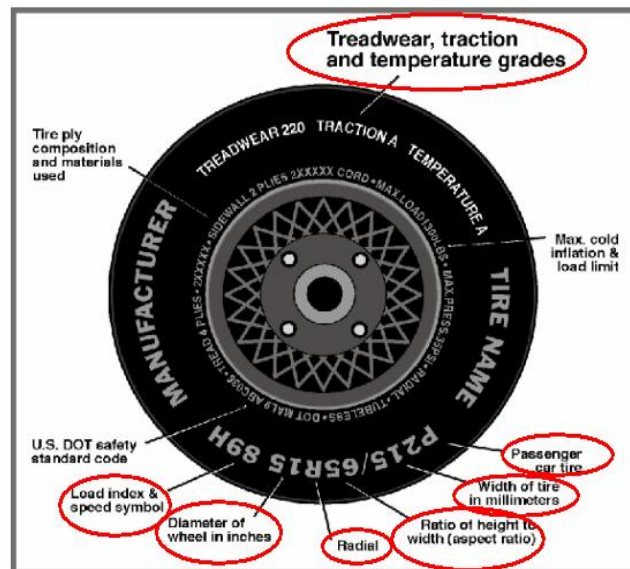
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2011 Subaru Outback 2.5i AWD 5-Door MPV

NHTSA No. MB5501

Test Program: MDB Side Impact Test

Test Date: 08/11/10



VEHICLE TIRE INFORMATION

Measured Parameter	Front	Rear
Max. Tire Pressure (kpa)	300	300
Cold Pressure (kpa)	220	210
Recommended Tire Size	215/70R16	215/70R16
Tire Size on Vehicle	215/70R16	215/70R16
Tire Model	Continental	Continental
Tire Manufacturer	Conti Pro Contact	Conti Pro Contact
Treadwear	540	540
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	2 Polyester, 1 Polyamide, 2 Steel	2 Polyester, 1 Polyamide, 2 Steel
Load Index/Speed Symbol	99S	99S
Tire Material	Polyester, Polyamide, Steel	Polyester, Polyamide, Steel
DOT Safety Code Right	A309 3PK 1810	A309 3PK 1810
DOT Safety Code Left	A309 3PK 1810	A309 3PK 1810

DATA SHEET NO. 1 ... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2011 Subaru Outback 2.5i AWD 5-Door MPV NHTSA No. MB5501
 Test Program: MDB Side Impact Test Test Date: 08/11/10

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	436.0	350.0		467.5	441.5		471.0	444.5	
Right	kg	405.0	332.5		411.0	389.0		407.0	393.0	
Ratio	%	55.2%	44.8%	100.0%	51.4%	48.6%	100.0%	51.2%	48.8%	100.0%
Total	kg	841.0	682.5	1523.5	878.5	830.5	1709.0	878.0	837.5	1715.5

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1523.5	A
Actual Weight of 2 P572 ATDs Used	kg	125.0	B
Rated Cargo/Luggage Wt (RCLW)	kg	67.8	C
Calculated Vehicle Target Wt (TVTWT)	kg	1716.3	A+B+C

TEST VEHICLE ATTITUDES

Condition	Units	LF	RF	LR	RR	CG (Aft of Front Axle)
Fully Loaded	mm	788	805	785	798	1340
As Tested	mm	790	796	780	795	1334

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheelbase	mm	2745
Total Vehicle Length at Left Side	mm	3149
Total Vehicle Length at Centerline	mm	4780
Total Vehicle Length at Right Side	mm	3149
Weight of Ballast in Cargo Area	kg	61.5
Weight of Vehicle Components Removed	kg	34.5
Amount of Stoddard Solvent in Fuel Tank	L	65.15

Vehicle components removed to make Target Vehicle Test Weight:

Non-struck side door panels, 6.5kg; trunk liner, 2.5kg; trunk lining and foam, 7.0 kg; spare tire and tools, 16.5kg; hubcaps, 2.0kg

TEST VEHICLE VERTICAL IMPACT LINE DATA

Measurement Description	Units	Value
Target Impact Point Aft of Front Axle (at level 3)	mm	430
Actual Impact Point Aft of Front Axle	mm	449

DATA SHEET NO. 2

SEAT ADJUSTMENT, FUEL SYSTEMS, AND STEERING WHEEL DATA

Test Vehicle: 2011 Subaru Outback 2.5i AWD 5-Door MPV

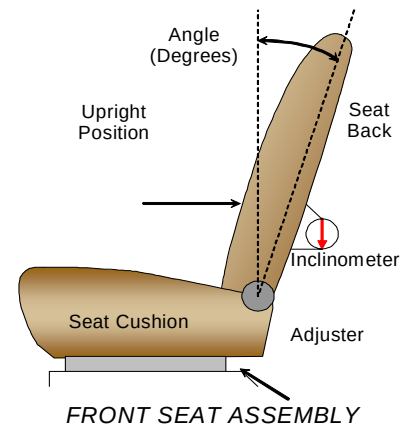
NHTSA No. MB5501

Test Program: MDB Side Impact Test

Test Date: 08/11/10

NOMINAL DESIGN RIDING POSITION

The driver's seat back is set to the manufacturer's designated seat angle, measured from the seat back immediately above the seat pocket relative to the rocker sill. The passenger's seat back is fixed and measured from the headrest post.



SEAT BACK ANGLES

	Degrees (°)
Driver w/Seated Dummy	10.8
Passenger w/Seated Dummy	0.3

SEAT FORE/AFT POSITION

Driver seat travel is measured with the seat cushion at the mid angle and the lowermost position. The seat is set to the middle of the fore-aft travel. The passenger seat is fixed.

SEAT FORE/AFT POSITIONS

Seating Position	Total Fore/Aft Travel	Placed in Position
Driver Seat	249	125
Rear Seat	Fixed	Fixed

SEAT BELT UPPER ANCHORAGE

The seat belt upper anchorage is positioned to the manufacturer's design position, the driver for a 50th percentile adult male ATD, the left rear passenger for a 5th percentile adult female ATD. Position number one (1) is the uppermost position.

SEAT BELT UPPER ANCHORAGES

Seating Position	Total No. of Positions	Placed in Position
Driver Seat	5	2
Rear Seat	Fixed	Fixed

DATA SHEET NO. 2 ... (CONTINUED)

SEAT ADJUSTMENT, FUEL SYSTEMS, AND STEERING WHEEL DATA

Test Vehicle: 2011 Subaru Outback 2.5i AWD 5-Door MPV

NHTSA No. MB5501

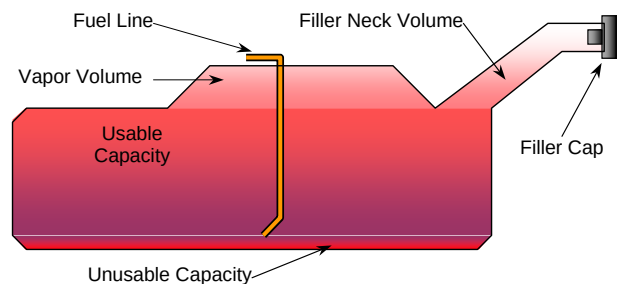
Test Program: MDB Side Impact Test

Test Date: 08/11/10

FUEL TANK CAPACITY

Description	Liters
Usable Capacity of "Standard Tank"	70.03
Usable Capacity of "Optional Tank"	
Usable Capacity Used for FMVSS 301	70.03
Actual Amount of Stoddard Solvent Used	65.15

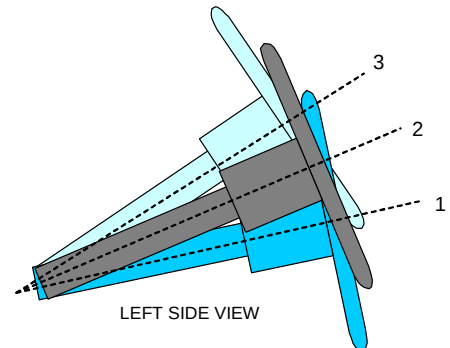
The test vehicle is equipped with an electric fuel pump. The fuel pump is activated when the ignition is turned on. The fuel filler door is located on the right rear fender. The standard fuel tank occupies the area under the rear seat.



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. A digital inclinometer is used to measure a plate which is placed across the rim of the steering wheel for angular measurements. A tape measure is used with a reference mark on the steering column to measure telescoping travel.



STEERING COLUMN ASSEMBLY

STEERING COLUMN POSITIONING

	Degrees	Fore-Aft Position (mm)
Lowermost Position, No. 1	21.3	71
Geometric Center Position, No. 2	22.3	92
Uppermost Position, No. 3	23.4	112
Telescoping Steering Wheel Travel		41
Test Position	22.3	92

DATA SHEET NO. 3

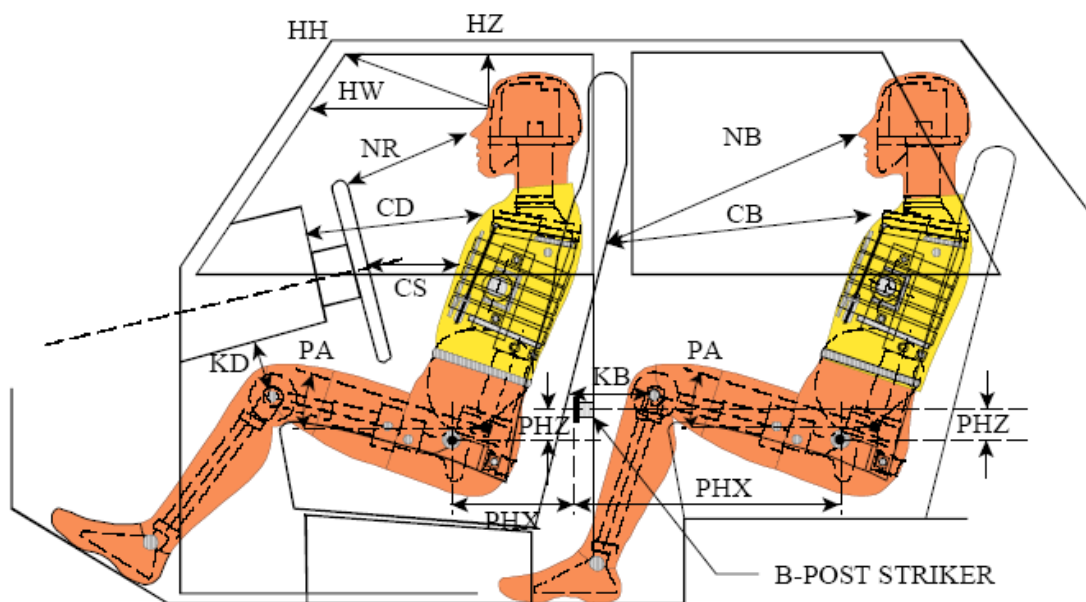
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2011 Subaru Outback 2.5i AWD 5-Door MPV

NHTSA No. MB5501

Test Program: MDB Side Impact Test

Test Date: 08/11/10



LEFT SIDE VIEW

NOTE: 2-DOOR VEHICLE SHOWN.
REAR DUMMY PHX & PHZ
MEASUREMENTS FOR A 4-DOOR
VEHICLE WOULD USE THE C-POST
STRIKER AS A REFERENCE POINT

DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Pass. Code	Description	Driver		Passenger	
			Length (mm)	Angle (°)	Length (mm)	Angle (°)
HH		Head to Header	448	14.5		
HW		Head to Windshield	692	0.0		
HZ	HZ	Head to Roof	230	90.0	322	90.0
NR	NB	Nose to Rim/Seat Back	532	13.3	519	17.1
CD	CB	Chest to Dash/Seat Back	614	2.9	523	0.0
CS		Chest to Steering Wheel	368	0.0		
KDL	KBL	Left Knee to Dash/Seat Back	197	25.7	267	50.2
KDR	KBR	Right Knee to Dash/Seat Back	197	31.7	262	43.0
PA	PA	Pelvic Angle		18.6		24.4
PHX	PHX	H-Point to Striker (x-axis)	192	0.0	275	0.0
PHZ	PHZ	H-Point to Striker (z-axis)	168	90.0	264	90.0
SA	SA	Seat Back Angle		10.8		0.3

DATA SHEET NO. 4

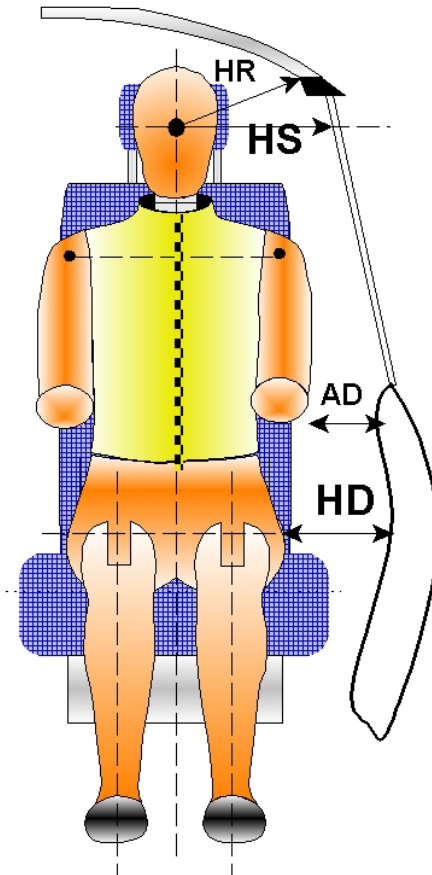
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2011 Subaru Outback 2.5i AWD 5-Door MPV

NHTSA No. MB5501

Test Program: MDB Side Impact Test

Test Date: 08/11/10



DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver	Passenger
HR	Head to Side Header	mm	252	320
HS	Head to Side Window	mm	329	378
AD	Arm to Door	mm	87	154
HD	H-Point to Door	mm	153	185

DATA SHEET NO. 5

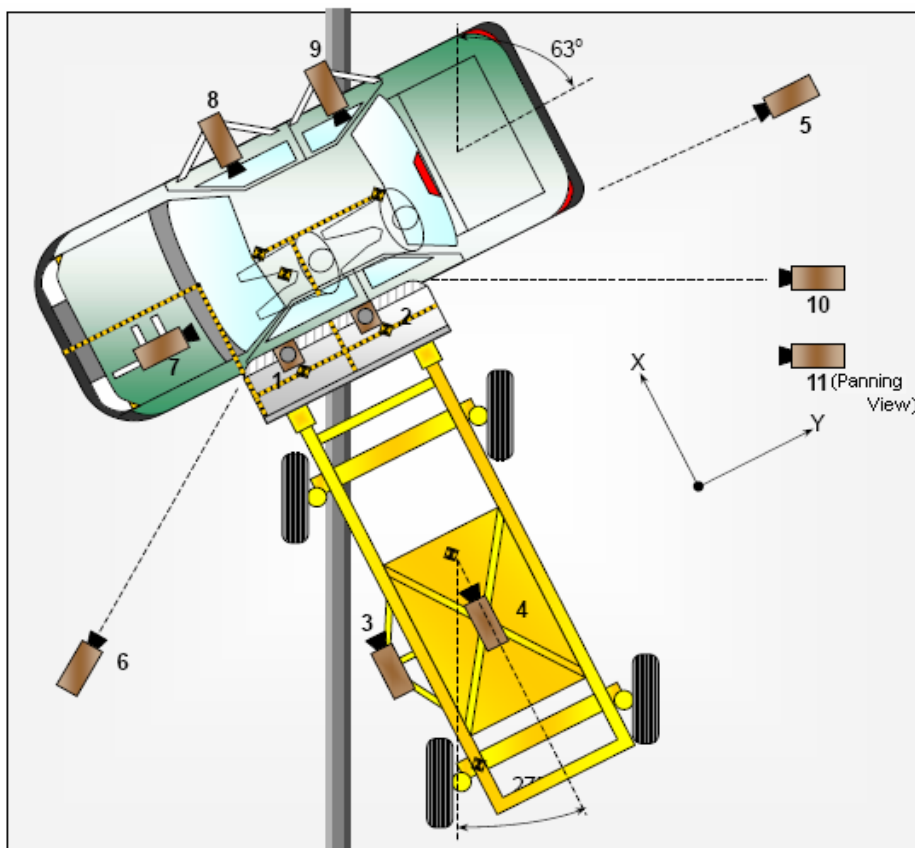
CAMERA LOCATIONS AND DATA

Test Vehicle: 2011 Subaru Outback 2.5i AWD 5-Door MPV

NHTSA No. MB5501

Test Program: MDB Side Impact Test

Test Date: 08/11/10



CAMERA LOCATIONS AND DATA

Camera No.	View	Coordinates (mm)			Angle	Lens (mm)	Film Speed (fps)
		X*	Y*	Z*			
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	-4	25	1000
4	Side Overall (MDB)	-3912	838	-1829	-1	12	1000
5	Rear	-64	2485	-1348	0	105	1000
6	Left Front	-2266	-3564	-1475	0	24	1000
7	Driver Front (On-Board)	545	-500	-1278	-3	35	1000
8	Driver Side (On-Board)	1553	-798	-1188	-1	14	1000
9	Passenger Side (On-Board)	1644	-1791	-1222	-1	20	1000
10	Real Time Left Rear					Zoom	30
11	Real Time Inrun	-2484	-3958	-1506		Zoom	30

Reference: Impact Point Projected to Ground

+X = To Front of MDB, +Y = To Right of MDB, +Z = Down

*All measurements accurate to ± 6 mm

DATA SHEET NO. 6

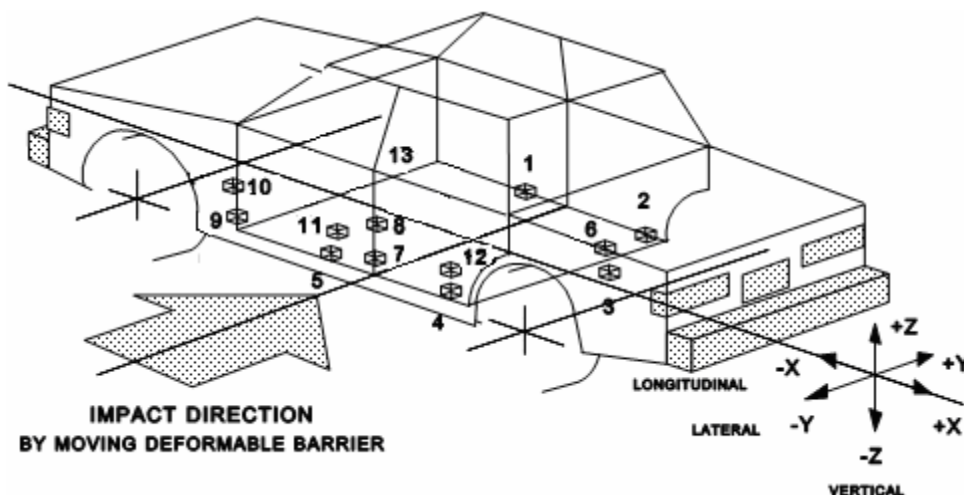
VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2011 Subaru Outback 2.5i AWD 5-Door MPV

NHTSA No. MB5501

Test Program: MDB Side Impact Test

Test Date: 08/11/10



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

Loc. No.	Sensor Description	Coordinates (mm)		
		X	Y	Z
1	Right Sill at Front Seat	2740	-680	445
2	Right Sill at Rear Seat	1790	-690	450
3	Rear Floorpan Above Axle	985	-105	650
4	Left Sill at Rear Door	1730	415	275
5	Left Sill at Front Door	2650	415	275
6	Right Rear Occupant Compartment	2240	-270	350
7	B-Pillar Lower	2120	687	660
8	B-Pillar Mid	2120	687	810
9	A-Pillar Lower	3305	800	678
10	A-Pillar Mid	3305	800	860
11	Front Seat Track	2340	580	385
12	Rear Seat Structure			
13	Vehicle CG	2045	0	495

Reference: X – Rear surface of vehicle (+ forward)
Y – Vehicle centerline (+ to right)
Z – Ground Plane (+ up)

¹ – Not installed.

DATA SHEET NO. 7

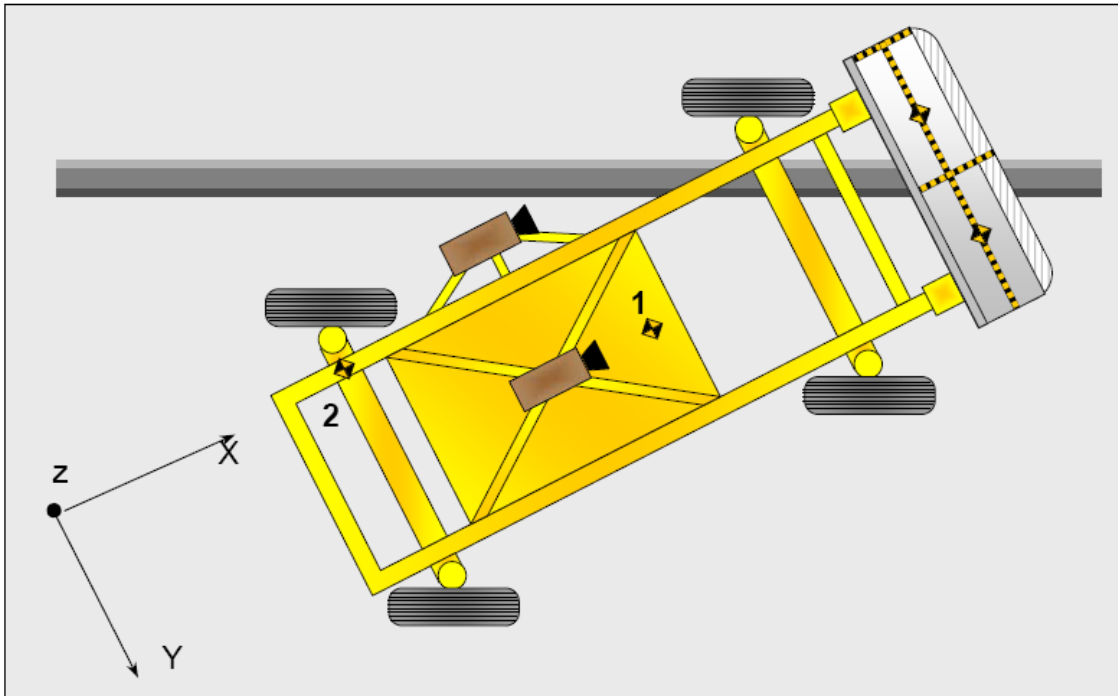
MDB ACCELEROMETER LOCATIONS

Test Vehicle: 2011 Subaru Outback 2.5i AWD 5-Door MPV

NHTSA No. MB5501

Test Program: MDB Side Impact Test

Test Date: 08/11/10



MDB ACCELEROMETER LOCATIONS

Loc. No.	Accelerometer Location	Measurement		
		X	Y	Z
1	MDB CG	-1195	0	430
2	MDB Rear	-2642	-593	608

Reference: X – Face of MDB (+ rearward)
Y – MDB Centerline (+ to right)
Z – Ground plane (+ up)

DATA SHEET NO. 8**TEST VEHICLE SUMMARY OF RESULTS**Test Vehicle: 2011 Subaru Outback 2.5i AWD 5-Door MPVNHTSA No. MB5501Test Program: MDB Side Impact TestTest Date: 08/11/10**MAXIMUM EXTERIOR CRUSH**

Level	Description	Units	Maximum Crush	Above Ground
1	Sill Top Height	mm	46	329
2	Occupant H-Point Height	mm	204	606
3	Mid-Door Height	mm	239	698
4	Window Sill Height	mm	120	1003
5	Window Top Height	mm	24	1502
	Maximum Penetration	mm	239	

INSTRUMENTATION

Driver Dummy Channels	16
Passenger Dummy Channels	16
Airbag Timing Sensors	4
Vehicle Structure Accelerometers	21
MDB Accelerometers	5
Total No. of Contact Switches	8
Total	70

CAMERA COVERAGE

High-Speed Vehicle On-Board	3
High-Speed Vehicle Off-Board	5
High-Speed MDB On-Board	2
Real Time Panning	1
Total	11

DATA SHEET NO. 9**MOVING DEFORMABLE BARRIER (MDB) SUMMARY OF RESULTS**Test Vehicle: 2011 Subaru Outback 2.5i AWD 5-Door MPVNHTSA No. MB5501Test Program: MDB Side Impact TestTest Date: 08/11/10**MDB SPECIFICATIONS**

Measurement Description	Length (mm)
Overall Width of Framework Carriage	1251
Overall Length including Honeycomb Face	4023
Wheel Base of Framework Carriage	2595
C.G. location aft of Front Axle	1118

MDB WEIGHTS

	Units	Front Axle	Rear Axle	Total
Left	kg	402	298	
Right	kg	377	292	
Ratio	%	56.9%	43.1%	
Totals	kg	779	590	1368

SPEED AND IMPACT DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.1 to 62.7	61.97
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	61.79
MDB CL to Target Vehicle CL	degrees	88.5-91.5	90.4

MAXIMUM STATIC CRUSH OF HONEYCOMB FACE

Vertical Location			From Centerline		Max. Crush (mm)
Row	Description	Height (mm)	Distance (mm)	Direction	
1	Center of Bumper	432	800	Right	248
2	Top of Bumper	533	800	Right	156
3	Mid Level	686	800	Left	87
4	Top of Stack	813	800	Left	129

MDB INSTRUMENTATION AND CAMERAS

Accelerometers	5
Contact Switches	2

DATA SHEET NO. 10

POST-TEST OBSERVATIONS

Test Vehicle: 2011 Subaru Outback 2.5i AWD 5-Door MPV

NHTSA No. MB5501

Test Program: MDB Side Impact Test

Test Date: 08/11/10

TEST DUMMY INFORMATION AND CONTACT POINTS

Description	Front Seat Dummy (ES-2re)	Rear Seat Dummy (SID-IIs)
Dummy Type/Serial No.	ES-2re, S/N: F035	SID-IIs, S/N: 307
Head Contact	Curtain Airbag, Side Header, Headrest	Curtain Airbag
Upper Torso Contact	Side Airbag	Door Panel
Lower Torso Contact	Side Airbag	Door Panel
Left Knee Contact	Door Panel, Right Knee	Door Panel, Right Knee
Right Knee Contact	Left Knee	Left Knee

POST-TEST DOOR OPENING AND SEAT TRACK INFORMATION

Description	Front	Rear
Left Side Door Opening	Jammed shut	Jammed shut
Right Side Door Opening	Remained closed and operational	Remained closed and operational
Hatch and Other Doors	Remained closed and operational	Remained closed and operational
Seat Movement	None	None
Seatback Failure	No	No

POST-TEST STRUCTURAL OBSERVATIONS

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

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Left Front (Driver) Occupant Location 1		Left Rear (Passenger) Occupant Location 4	
	Installed	Deployed	Installed	Deployed
Frontal Airbag	Yes	No	No	
Knee Airbag	No		No	
Side Airbag 1 (Torso/Pelvis)	Yes	Yes	No	
Side Airbag 2 (Curtain)	Yes	Yes	Yes	Yes
Seat Belt Pretensioner	Yes	Yes	No	
Seat Belt Load Limiter	Yes	Yes	No	
Other				

VEHICLE SPEED AND IMPACT DATA

Measured Parameter	Units	Requirement	Value
Horizontal Offset	mm	+/- 50	+19 (Right)
Vertical Offset	mm	+/- 20	+3 (Up)

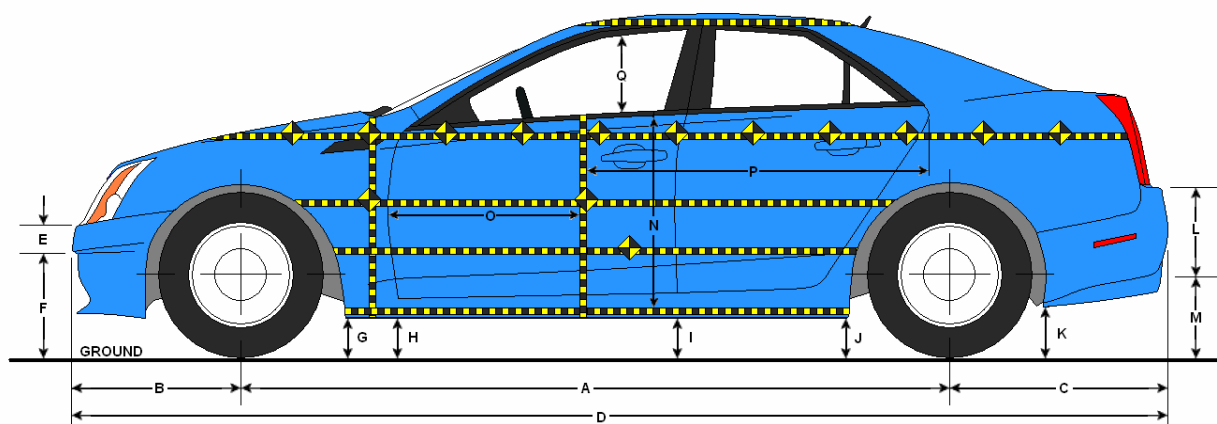
DATA SHEET NO. 11
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2011 Subaru Outback 2.5i AWD 5-Door MPV

NHTSA No. MB5501

Test Program: MDB Side Impact Test

Test Date: 08/11/10



VEHICLE PRE AND POST-TEST MEASUREMENT INFORMATION

Code	Dimension	Measurement (mm)		
		Pre	Post	Difference
A	Wheelbase	2745	2741	-4
B	Front Axle to FSOV	962	974	12
C	Rear Axle to RSOV	1073	1070	-3
D	Total Length at Centerline	4780	4785	5
E	Front Bumper Thickness	148	148	0
F	Front Bumper Bottom to Ground	475	508	33
G	Sill Height at Front Wheel Well	258	309	51
H	Sill Height at Front Door Leading Edge	263	314	51
I	Sill Height at B-Pillar	259	324	65
J1	Sill Height at Rear Wheel Well	247	337	90
J2	Pinch Weld Height at Rear Wheel Well	234	311	77
K	Sill Height Aft of Rear Wheel Well	277	367	90
L	Rear Bumper Thickness	103	104	1
M	Bottom of Rear Bumper to Ground	487	585	98
N	Sill Height to Window Bottom Sill	632	627	-5
O	Front Door Leading Edge to Impact CL	790	743	-47
P	Rear Door Trailing Edge to Impact CL	1397	1373	-24
Q	Front Window Opening	450	461	11
R	Right Side Length	3149	3169	20
S	Left Side Length	3149	3155	6
T	Vehicle Width at B-Pillar	1784	1653	-131

DATA SHEET NO. 12

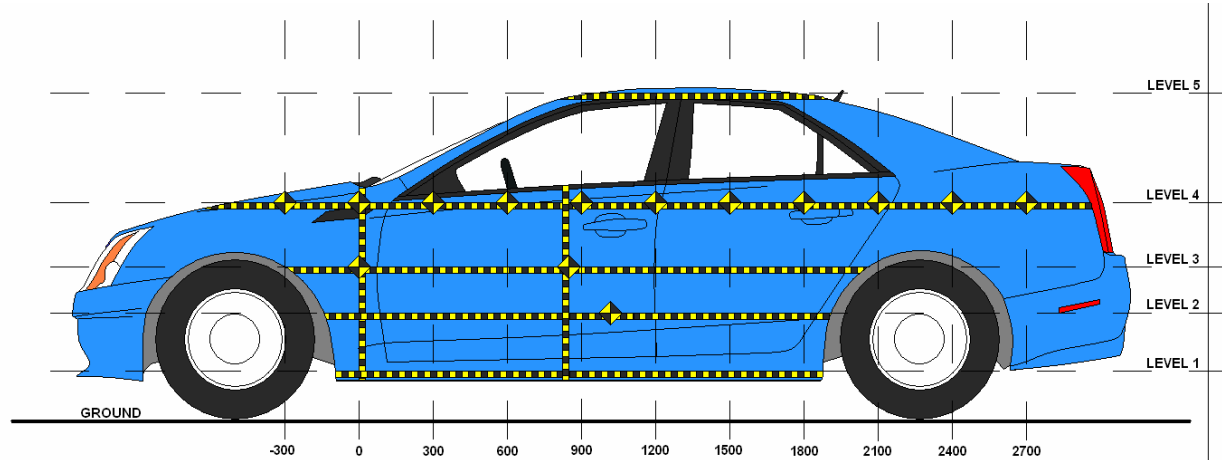
VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2011 Subaru Outback 2.5i AWD 5-Door MPV

NHTSA No. MB5501

Test Program: MDB Side Impact Test

Test Date: 08/11/10



LEFT SIDE VIEW

Level	Description	Height Above Ground (mm)
1	Sill Top Height	329
2	Occupant H-Point Height	606
3	Mid-Door Height	698
4	Window Sill Height	1003
5	Window Top Height	1502

DATA SHEET NO. 12 ... (CONTINUED)

VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2011 Subaru Outback 2.5i AWD 5-Door MPV

NHTSA No. MB5501

Test Program: MDB Side Impact Test

Test Date: 08/11/10

	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-900															
-750															
-600															
-450															
-300				708					726					18	
-150			588	697				616	717				28	20	
0	613	602	610	691		619	623	634	703		6	21	24	12	
150	645	619	615	691		657	788	780	712		12	169	165	21	
300	649	619	613	685		665	791	806	715		16	172	193	30	
450	649	617	612	676		669	788	816	724		20	171	204	48	
600	650	616	610	670		676	784	827	735		26	168	217	65	
750	650	614	609	665		678	785	832	729		28	171	223	64	
900	650	614	609	655	888	681	780	837	723	900	31	166	228	68	12
1050	650	615	610	649	877	684	781	828	715	887	34	166	218	66	10
1200	650	616	611	642	871	687	776	804	747	885	37	160	193	105	14
1350	650	617	612	638	870	690	784	834	758	883	40	167	222	120	13
1500	650	619	613	638	870	693	806	852	734	885	43	187	239	96	15
1650	650	621	615	638	873	694	825	846	713	888	44	204	231	75	15
1800	638	620	617	639	876	684	824	833	695	891	46	204	216	56	15
1950		596	598	642	882		665	726	674	899		69	128	32	17
2100				644	890				650	909				6	19
2250				648	901				681	925				33	24
2400				652	917				676	934				24	17
2550				659					672					13	
2700				665					672					7	
2850				674					678					4	

MAXIMUM CRUSH DATA

	Level 1	Level 2	Level 3	Level 4	Level 5
Maximum Crush (mm)	46	204	239	120	24
Distance from Impact (mm)	1800	1650	1500	1350	2250

DATA SHEET NO. 12 ... (CONTINUED)

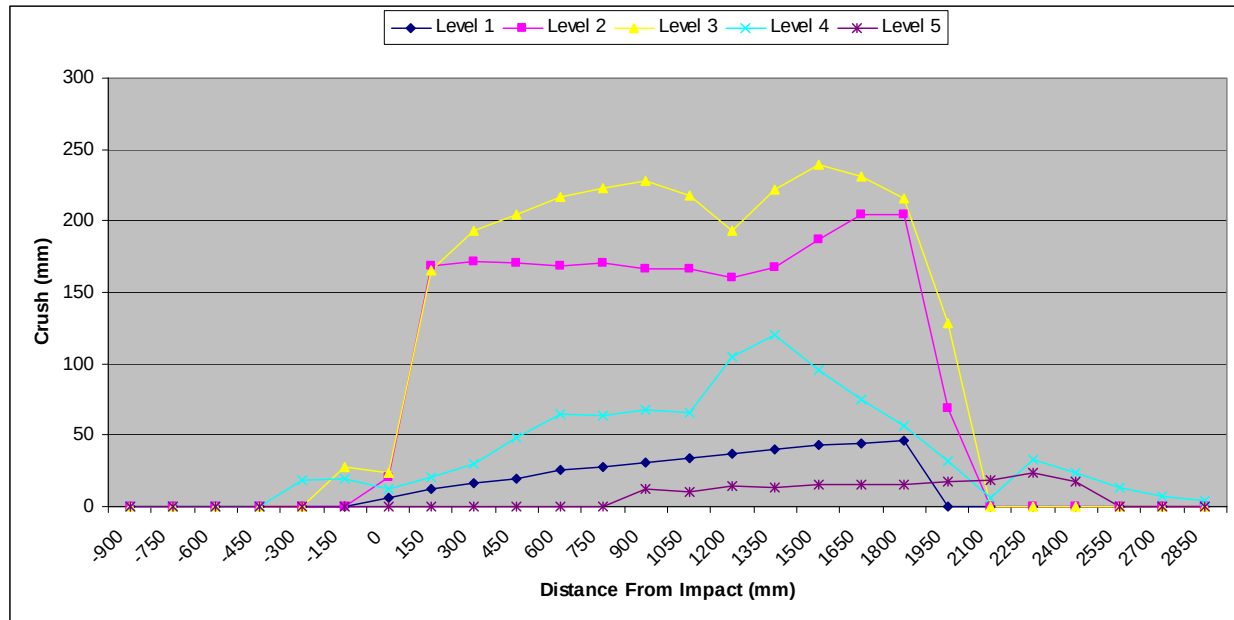
VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2011 Subaru Outback 2.5i AWD 5-Door MPV

NHTSA No. MB5501

Test Program: MDB Side Impact Test

Test Date: 08/11/10



DATA SHEET NO. 13

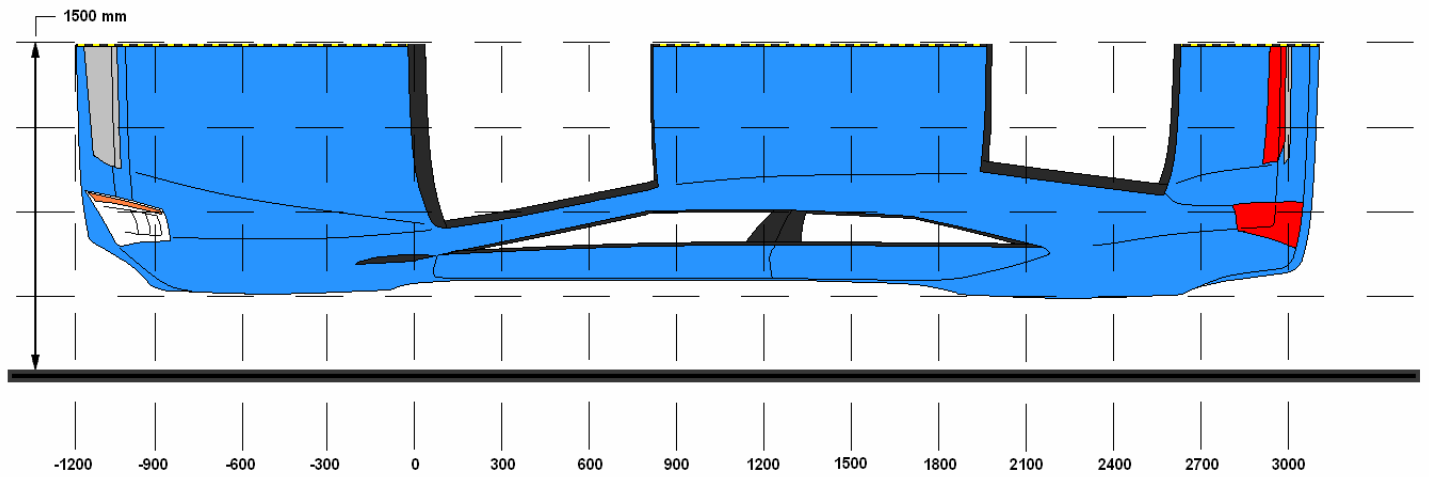
VEHICLE DAMAGE PROFILE DISTANCES

Test Vehicle: 2011 Subaru Outback 2.5i AWD 5-Door MPV

NHTSA No. MB5501

Test Program: MDB Side Impact Test

Test Date: 08/11/10



TOP VIEW

DAMAGE PROFILE DISTANCES

DPD	Distance From Impact Point in mm	Level	Pre-Test (mm)	Post-Test (mm)	Max. Static Crush (mm)
1	1950	3	598	726	128
2	1500	3	613	852	239
3	1050	3	610	828	218
4	600	3	610	827	217
5	150	2	619	788	169
6	-300	4	708	726	18

DATA SHEET NO. 14

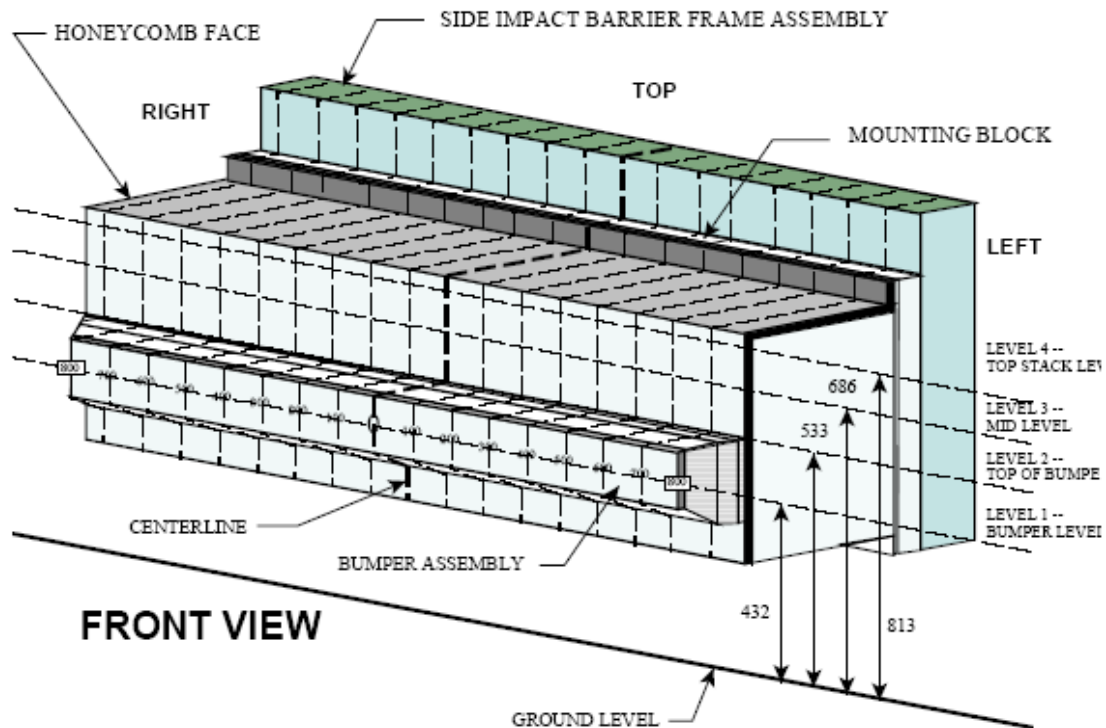
EXTERIOR STATIC CRUSH FOR IMPACTOR FACE

Test Vehicle: 2011 Subaru Outback 2.5i AWD 5-Door MPV

NHTSA No. MB5501

Test Program: MDB Side Impact Test

Test Date: 08/11/10



NOTE: Dimensions are shown in millimeters, mm

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	248	236	233	229	228	222	218	216	212	206	200	199	196	191	189	191	196
2	156	151	148	141	141	128	130	119	114	112	113	109	107	104	102	99	99
3	71	58	51	59	59	64	74	52	42	39	39	38	39	44	49	60	87
4	121	88	60	44	50	74	90	79	-478	46	49	49	49	59	71	89	129

All dimensions in millimeters.

DATA SHEET NO. 15

FMVSS NO. 301 FUEL SYSTEM INTEGRITY POST-IMPACT DATA

Test Vehicle: 2011 Subaru Outback 2.5i AWD 5-Door MPV

NHTSA No. MB5501

Test Program: MDB Side Impact Test

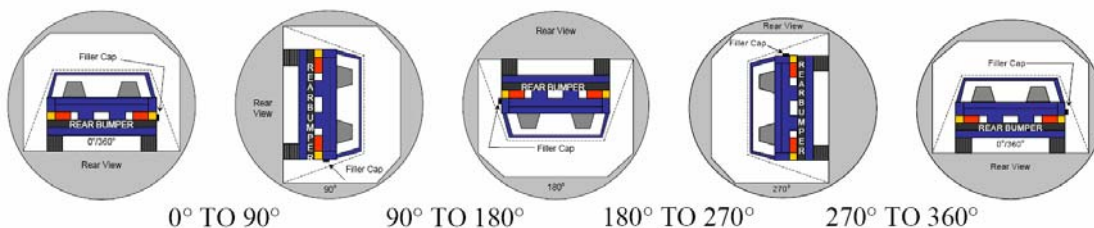
Test Date: 08/11/10

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 35°

Test Time: 12:17 PM

- A. From impact until vehicle motion ceases: 0 oz.
(Maximum allowable = 1 oz.)
- B. For the 5 minute period after motion ceases: 0 oz.
(Maximum allowable = 5 oz.)
- C. For the following 25 minutes: 0 oz.
(Maximum allowable = 1 oz./minute)
- D. Spillage Details: No spillage occurred



SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° To 90°	82	303	385
90° To 180°	85	300	385
180° To 270°	79	300	379
270° To 360°	83	300	383

FMVSS 301 SPILLAGE TABLE

Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0° To 90°	0	0		
90° To 180°	0			
180° To 270°	0			
270° To 360°	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. 16

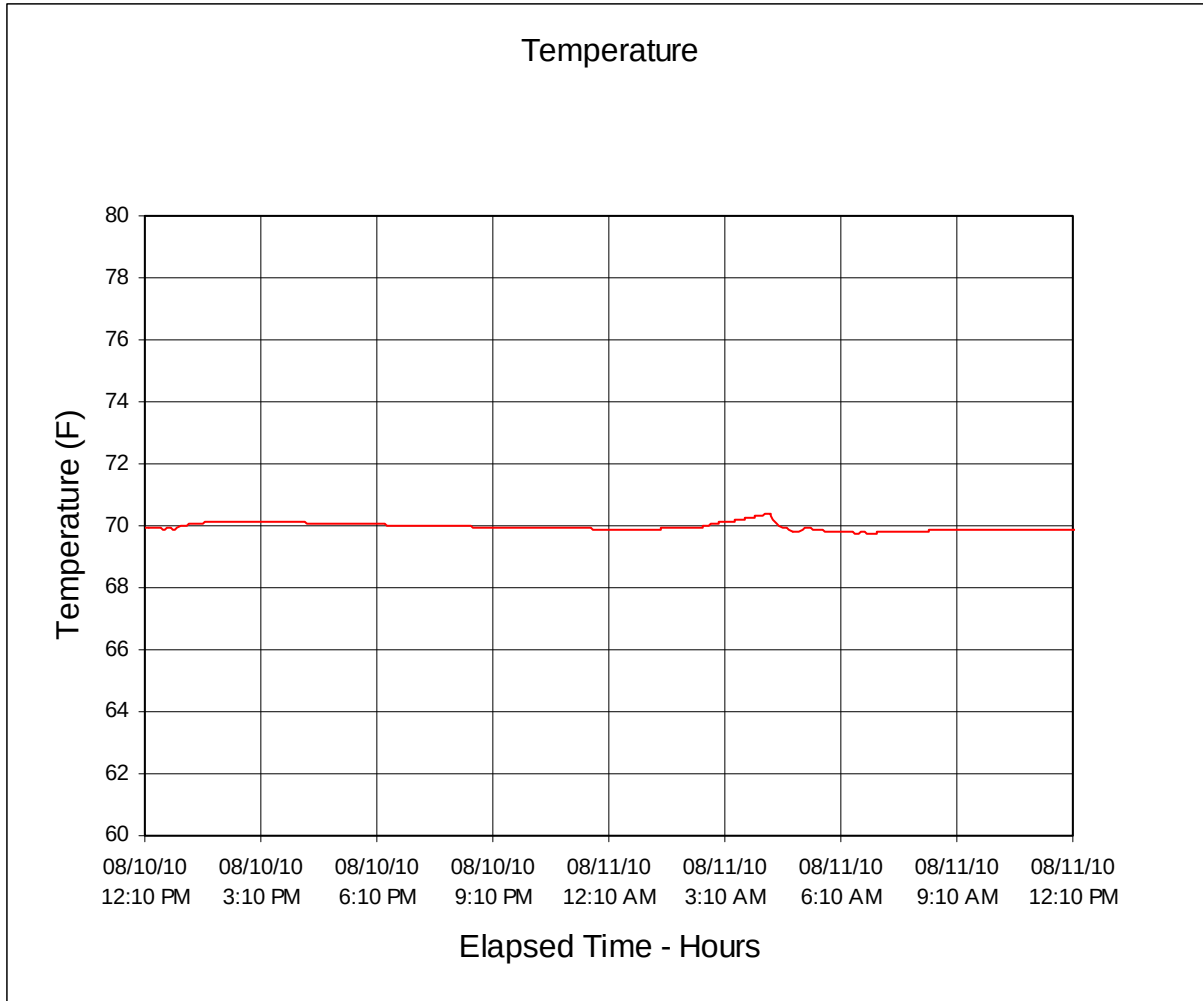
DUMMY / VEHICLE TEMPERATURE STABILIZATION

Test Vehicle: 2011 Subaru Outback 2.5i AWD 5-Door MPV

NHTSA No. MB5501

Test Program: MDB Side Impact Test

Test Date: 08/11/10



APPENDIX A
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

Figure		Page
1	2011 Subaru Outback 2.5i AWD Side MDB As Delivered	A-1
2	2011 Subaru Outback 2.5i AWD Side MDB As Delivered	A-1
3	Pre-Test Frontal View of Test Vehicle	A-2
4	Post-Test Frontal View of Test Vehicle	A-2
5	Pre-Test Left Front Three-Quarter View of Test Vehicle	A-3
6	Post-Test Left Front Three-Quarter View of Test Vehicle	A-3
7	Pre-Test Left Side View of Test Vehicle	A-4
8	Post-Test Left Side View of Test Vehicle	A-4
9	Pre-Test Left Rear Three-Quarter View of Test Vehicle	A-5
10	Post-Test Left Rear Three-Quarter View of Impact Zone	A-5
11	Pre-Test Rear View of Test Vehicle	A-6
12	Post-Test Rear View of Test Vehicle	A-6
13	Pre-Test Right Side View of Test Vehicle	A-7
14	Post-Test Right Side View of Test Vehicle	A-7
15	Pre-Test Overhead View of Test Vehicle with MDB Positioned Against Side of Test Vehicle	A-8
16	Post-Test Overhead View of Test Vehicle and MDB	A-8
17	Pre-Test Left Side View of MDB Positioned Against Side of Test Vehicle	A-9
18	Pre-Test Right Side View of MDB Positioned Against Side of Test Vehicle	A-9
19	Pre-Test Close-Up View of Impact Point Target	A-10
20	Post-Test Close-Up View of Impact Point Target	A-10
21	Pre-Test Left Front Door Latch Close-Up	A-11
22	Post-Test Left Front Door Latch Close-Up	A-11
23	Pre-Test Left Rear Door Latch Close-Up	A-12
24	Post-Test Left Rear Door Latch Close-Up	A-12
25	Pre-Test Front Close-Up View of Driver Dummy	A-13
26	Post-Test Front Close-Up View of Driver Dummy	A-13
27	Pre-Test Left Side View of Driver Dummy Showing Belt, Chalking, and Contact Switches	A-14
28	Pre-Test Left Side View of Driver Dummy Shoulder and Door Top View	A-14
29	Post-Test Left Side View of Driver Dummy Shoulder and Door Top View	A-15
30	Pre-Test Frontal View of Driver Seat Back Prior to Dummy Positioning	A-15
31	Pre-Test Frontal View of Driver Dummy Head and Shoulders in Relation to Head Restraint	A-16
32	Pre-Test Frontal View of Driver Seat Pan Prior to Dummy Positioning	A-16
33	Pre-Test Overhead View of Driver Dummy Thighs on Seat Pan	A-17
34	Pre-Test Placement of Driver Dummy's Feet	A-17
35	Pre-Test View of Belt Anchorage for Driver Dummy	A-18

TABLE OF PHOTOGRAPHS ... (CONTINUED)

Figure		Page
36	Pre-Test Left Side View of Steering Wheel	A-18
37	Pre-Test View of Parking Brake	A-19
38	Pre-Test Close-Up Left Side View of Driver Seat Track	A-19
39	Pre-test Close-Up Left Side View of Driver Seat Back	A-20
40	Pre-Test Close-Up View of Driver Seat Back or Head Restraint	A-20
41	Pre-Test Driver Dummy and Door Clearance View	A-21
42	Post-Test Driver Dummy and Door Clearance View	A-21
43	Pre-Test Right Side View of Driver Dummy and Front Seat of Occupant Compartment	A-22
44	Post-Test Right Side View of Driver Dummy and Front Seat Occupant Compartment	A-22
45	Pre-Test Driver Inner Door Panel View	A-23
46	Post-Test Driver Inner Door Panel View Showing Driver Dummy Contact Locations	A-23
47	Post-Test Driver Dummy Close-Up Head Contact with Vehicle	A-24
48	Post-Test Driver Dummy Close-Up Head Contact with Side Airbag View	A-24
49	Post-Test Driver Dummy Close-Up Torso Contact with Vehicle Interior View	A-25
50	Post-Test Driver Dummy Close-Up Torso Contact with Side Airbag View	A-25
51	Post-Test Driver Dummy Close-Up Pelvis Contact	A-26
52	Post-Test Driver Dummy Close-Up Pelvis Contact with Side Airbag View	A-26
53	Pre-Test Left Side View of Rear Passenger Dummy Showing Belt, Chalking, and Contact Switches	A-27
54	Pre-Test Left Side View of Rear Passenger Dummy Shoulder and Door Top View	A-27
55	Post-Test Left Side View of Rear Passenger Dummy Shoulder and Door Top View	A-28
56	Pre-Test Frontal View of Rear Passenger Seat Back Prior to Dummy Positioning	A-28
57	Pre-Test Frontal View of Rear Passenger Dummy Head and Shoulders in Relation to Head Restraint	A-29
58	Pre-Test Overhead View of Rear Passenger Seat Pan Prior to Dummy Positioning	A-29
59	Pre-Test Overhead View of Rear Passenger Dummy Thighs on Seat Pan	A-30
60	Pre-Test View of Rear Passenger Dummy's Neck Showing Position of Adjustable Neck Bracket	A-30
61	Pre-Test View of Rear Passenger Dummy's Head Showing Dummy's Head is Level	A-31
62	Pre-Test Placement of Rear Passenger Dummy's Feet	A-31
63	Pre-Test View of Belt Anchorage for Rear Passenger Dummy	A-32
64	Pre-Test Close-Up Left Side View of Rear Passenger Seat Track	A-32
65	Pre-Test Close-Up Left Side View of Rear Passenger Seat Back	A-33
66	Pre-Test Close-Up View of Rear Passenger Seat Back or Head Restraint	A-33
67	Pre-Test Rear Passenger Dummy and Door Clearance View	A-34
68	Post-Test Rear Passenger Dummy and Door Clearance View	A-34
69	Pre-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment	A-35
70	Post-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment	A-35

TABLE OF PHOTOGRAPHS ... (CONTINUED)

Figure		Page
71	Pre-Test Rear Passenger Inner Door Panel View	A-36
72	Post-Test Rear Passenger Inner Door Panel View Showing Dummy Contact Locations	A-36
73	Post-Test Rear Passenger Dummy Close-Up Head Contact with Vehicle View	A-37
74	Post-Test Rear Passenger Dummy Close-Up Head Contact with Side Airbag View	A-37
75	Post-Test Rear Passenger Dummy Close-Up Torso Contact with Vehicle Interior View	A-38
76	Post-Test Rear Passenger Dummy Close-Up Torso Contact with Side Airbag View	A-38
77	Post-Test Rear Passenger Dummy Close-Up Pelvis Contact View	A-39
78	Post-Test Rear Passenger Dummy Close-Up Pelvis Contact with Side Airbag View	A-39
79	Pre-Test View of Fuel Filler Cap or Fuel Filler Neck	A-40
80	Post-Test View of Fuel Filler Cap or Fuel Filler Neck	A-40
81	Pre-Test Front View of MDB Impactor Face	A-41
82	Post-Test Front View of MDB Impactor Face	A-41
83	Pre-Test Top View of MDB Impactor Face	A-42
84	Post-Test Top View of MDB Impactor Face	A-42
85	Pre-Test Left Side View of MDB Impactor Face	A-43
86	Post-Test Left Side View of MDB Impactor Face	A-43
87	Pre-Test Right Side View of MDB Impactor Face	A-44
88	Post-Test Right Side View of MDB Impactor Face	A-44
89	Close-Up View of Vehicle's Certification Label	A-45
90	Close-Up View of Vehicle's Tire Information Placard or Label	A-45
91	Pre-Test Ballast View	A-46
92	Post-Test Primary and Redundant Speed Trap Read-Out	A-46
93	FMVSS No. 301-305 Rollover 0 Degrees	A-47
94	FMVSS No. 301-305 Rollover 90 Degrees	A-47
95	FMVSS No. 301-305 Rollover 180 Degrees	A-48
96	FMVSS No. 301-305 Rollover 270 Degrees	A-48
97	FMVSS No. 301-305 Rollover 360 Degrees	A-49
98	2011 Subaru Outback 2.5i AWD Side MDB Impact Event	A-49
99	Monroney Label	A-50
100	Driver Head Restraint Use and Adjustment Information from Vehicle Owner's Manual	A-50
101	Left Rear Passenger Head Restraint Use and Adjustment Information from Vehicle Owner's Manual	A-51



FIGURE 1. 2011 Subaru Outback 2.5i AWD Side MDB As Delivered



FIGURE 2. 2011 Subaru Outback 2.5i AWD Side MDB As Delivered



FIGURE 3. Pre-Test Frontal View of Test Vehicle



FIGURE 4. Post-Test Frontal View of Test Vehicle



FIGURE 5. Pre-Test Left Front Three-Quarter View of Test Vehicle



FIGURE 6. Post-Test Left Front Three-Quarter View of Test Vehicle



FIGURE 7. Pre-Test Left Side View of Test Vehicle



FIGURE 8. Post-Test Left Side View of Test Vehicle



FIGURE 9. Pre-Test Left Rear Three-Quarter View of Test Vehicle



FIGURE 10. Post-Test Left Rear Three-Quarter View of Impact Zone



FIGURE 11. Pre-Test Rear View of Test Vehicle



FIGURE 12. Post-Test Rear View of Test Vehicle



FIGURE 13. Pre-Test Right Side View of Test Vehicle



FIGURE 14. Post-Test Right Side View of Test Vehicle



FIGURE 15. Pre-Test Overhead View of Test Vehicle
with MDB Positioned Against Side of Test Vehicle



FIGURE 16. Post-Test Overhead View of Test Vehicle and MDB



FIGURE 17. Pre-Test Left Side View of MDB Positioned
Against Side of Test Vehicle



FIGURE 18. Pre-Test Right Side View of MDB Positioned
Against Side of Test Vehicle



FIGURE 19. Pre-Test Close-Up View of Impact Point Target



FIGURE 20. Post-Test Close-Up View of Impact Point Target



FIGURE 21. Pre-Test Left Front Door Latch Close-Up



FIGURE 22. Post-Test Left Front Door Latch Close-Up



FIGURE 23. Pre-Test Left Rear Door Latch Close-Up



FIGURE 24. Post-Test Left Rear Door Latch Close-Up



FIGURE 25. Pre-Test Front Close-Up View of Driver Dummy



FIGURE 26. Post-Test Front Close-Up View of Driver Dummy



FIGURE 27. Pre-Test Left Side View of Driver Dummy
Showing Belt, Chalking, and Contact Switches



FIGURE 28. Pre-Test Left Side View of Driver Dummy Shoulder and Door Top View



FIGURE 29. Post-Test Left Side View of Driver Dummy Shoulder and Door Top View



FIGURE 30. Pre-Test Frontal View of Driver Seat Back Prior to Dummy Positioning



FIGURE 31. Pre-Test Frontal View of Driver Dummy Head and Shoulders in Relation to Head Restraint



FIGURE 32. Pre-Test Frontal View of Driver Seat Pan Prior to Dummy Positioning



FIGURE 33. Pre-Test Overhead View of Driver Dummy Thighs on Seat Pan



FIGURE 34. Pre-Test Placement of Driver Dummy's Feet

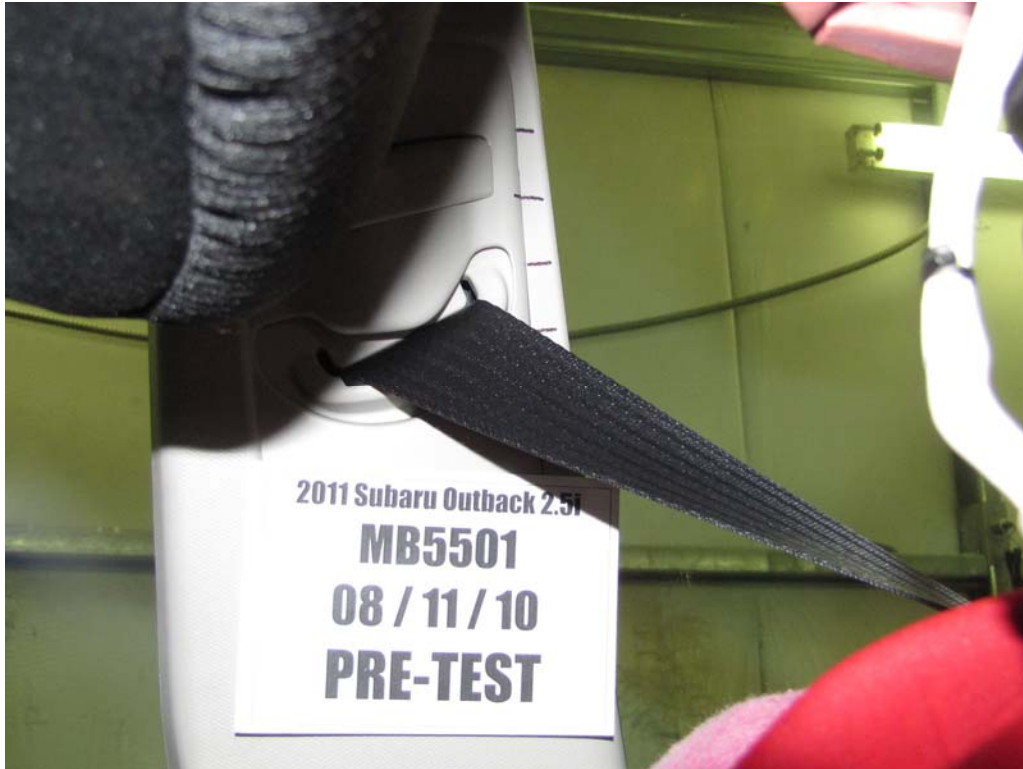


FIGURE 35. Pre-Test View of Belt Anchorage for Driver Dummy



FIGURE 36. Pre-Test Left Side View of Steering Wheel



FIGURE 37. Pre-Test View of Parking Brake



FIGURE 38. Pre-Test Close-Up Left Side View of Driver Seat Track

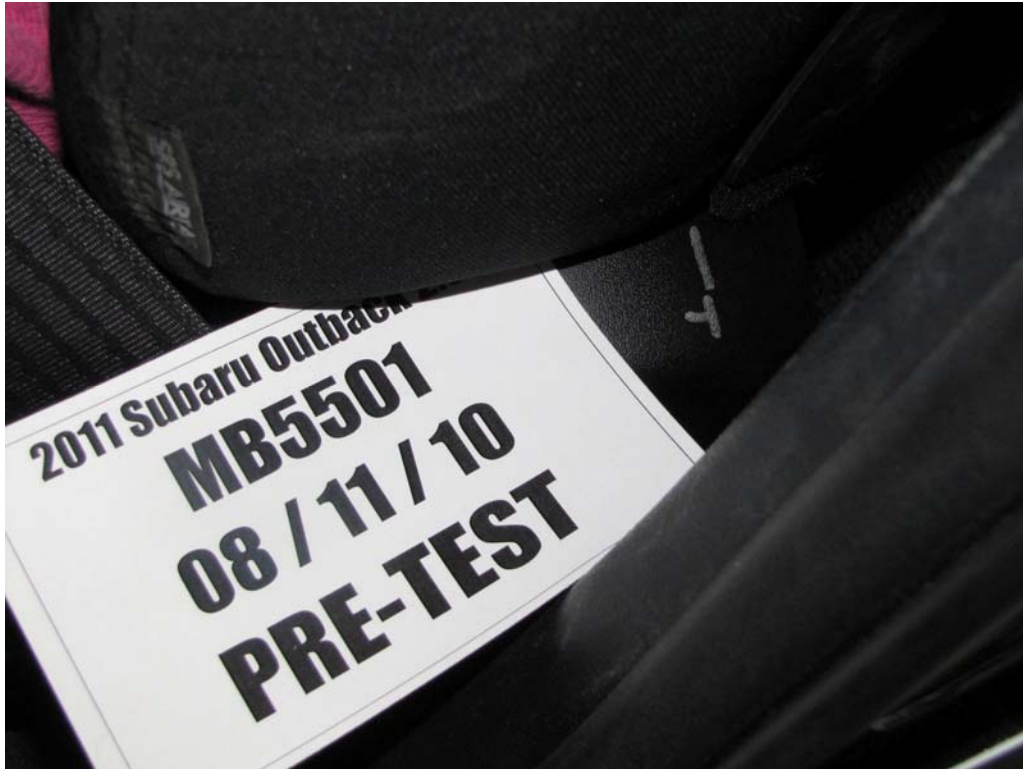


FIGURE 39. Pre-Test Close-Up Left Side View of Driver Seat Back



FIGURE 40. Pre-Test Close-Up View of Driver Seat Back or Head Restraint



FIGURE 41. Pre-Test Driver Dummy and Door Clearance View



FIGURE 42. Post-Test Driver Dummy and Door Clearance View



FIGURE 43. Pre-Test Right Side View of Driver Dummy and Front Seat Occupant Compartment



FIGURE 44. Post-Test Right Side View of Driver Dummy and Front Seat Occupant Compartment



FIGURE 45. Pre-Test Driver Inner Door Panel View



FIGURE 46. Post-Test Driver Inner Door Panel View
Showing Driver Dummy Contact Locations



FIGURE 47. Post-Test Driver Dummy Close-Up Head Contact with Vehicle



FIGURE 48. Post-Test Driver Dummy Close-Up Head Contact with Side Airbag View



FIGURE 49. Post-Test Driver Dummy Close-Up Torso Contact with Vehicle Interior View



FIGURE 50. Post-Test Driver Dummy Close-Up Torso Contact with Side Airbag View

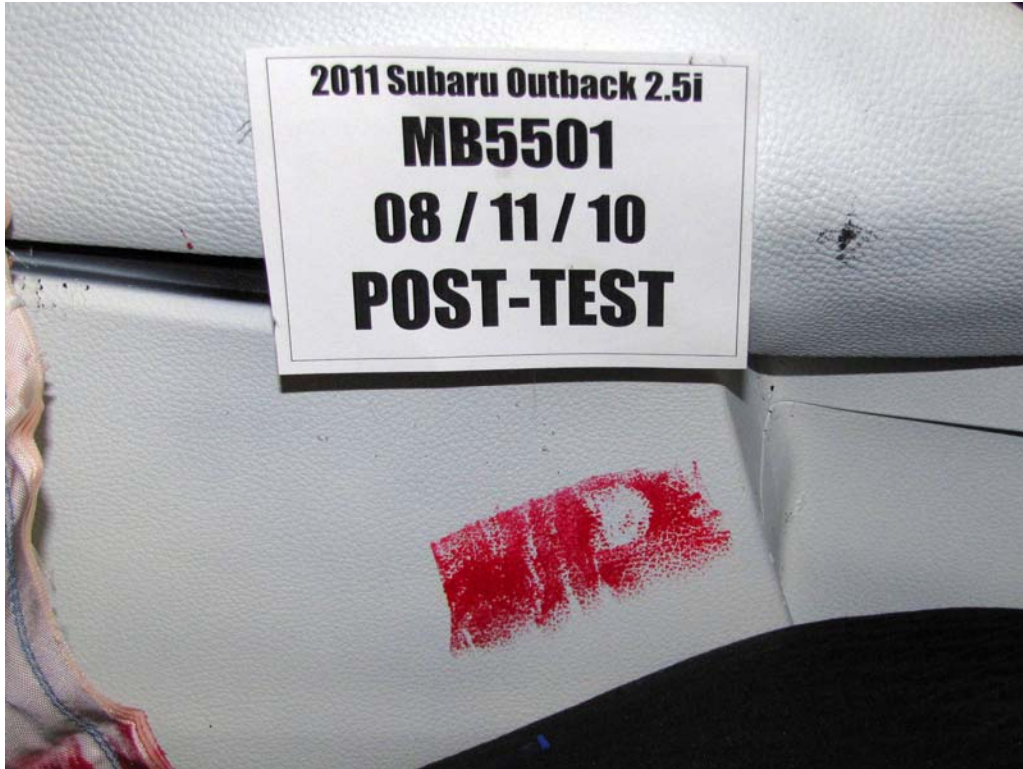


FIGURE 51. Post-Test Driver Dummy Close-Up Pelvis Contact



FIGURE 52. Post-Test Driver Dummy Close-Up Pelvis Contact with Side Airbag View



FIGURE 53. Pre-Test Left Side View of Rear Passenger Dummy
Showing Belt, Chalking, and Contact Switches



FIGURE 54. Pre-Test Left Side View of Rear Passenger Dummy
Shoulder and Door Top View



FIGURE 55. Post-Test Left Side View of Rear Passenger Dummy
Shoulder and Door Top View



FIGURE 56. Pre-Test Frontal View of Rear Passenger Seat Back Prior to Dummy Positioning



FIGURE 57. Pre-Test Frontal View of Rear Passenger Dummy
Head and Shoulders in Relation to Head Restraint

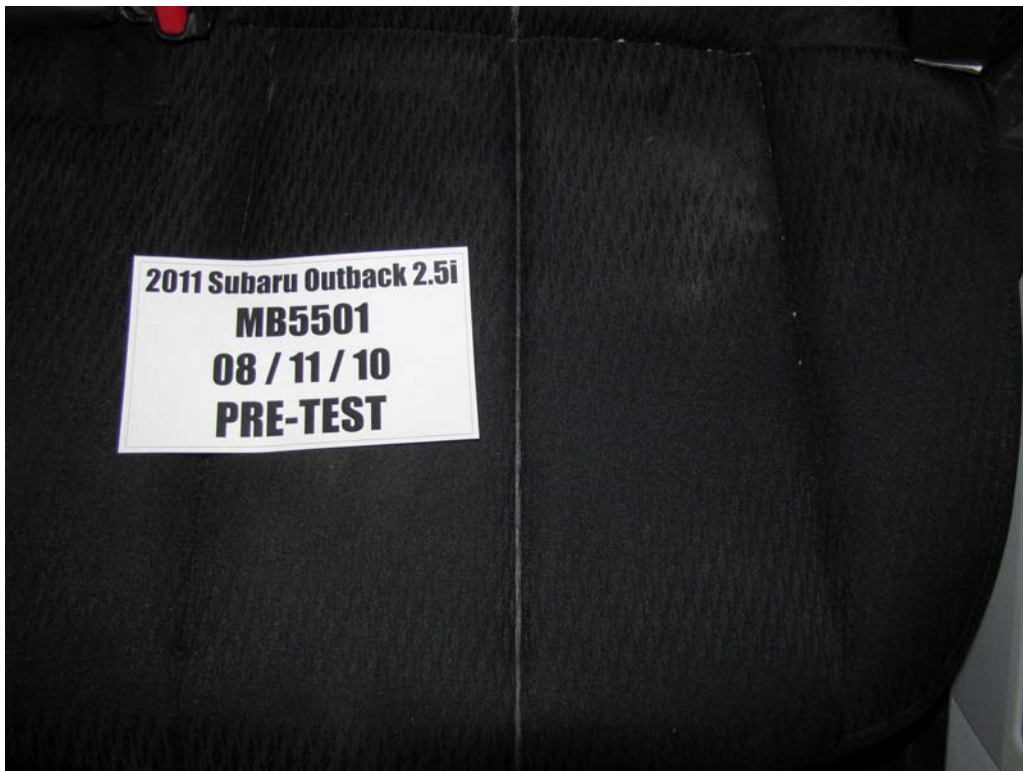


FIGURE 58. Pre-Test Overhead View of Rear Passenger
Seat Pan Prior to Dummy Positioning



FIGURE 59. Pre-Test Overhead View of Rear Passenger Dummy Thighs on Seat Pan



FIGURE 60. Pre-Test View of Rear Passenger Dummy's Neck
Showing Position of Adjustable Neck Bracket



FIGURE 61. Pre-Test View of Rear Passenger Dummy's Head
Showing Dummy's Head is Level



FIGURE 62. Pre-Test Placement of Rear Passenger Dummy's Feet

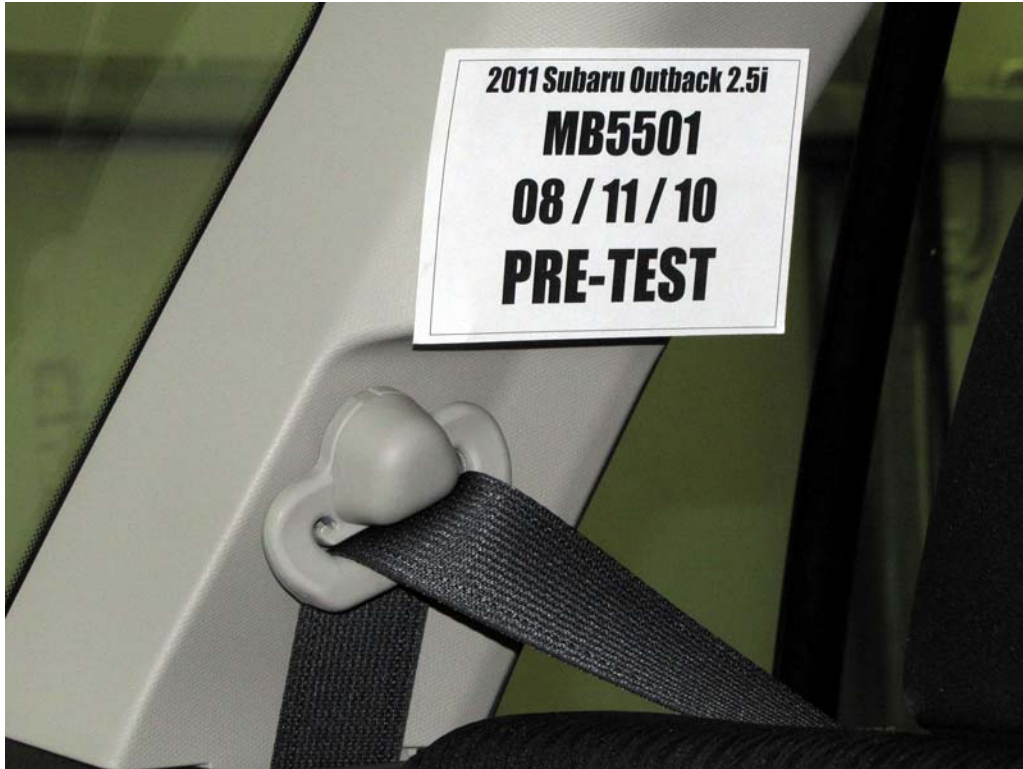


FIGURE 63. Pre-Test View of Belt Anchorage for Rear Passenger Dummy



FIGURE 64. Pre-Test Close-Up Left Side View of Rear Passenger Seat Track



FIGURE 65. Pre-Test Close-Up Left Side View of Rear Passenger Seat Back



FIGURE 66. Pre-Test Close-Up View of Rear Passenger Seat Back or Head Restraint



FIGURE 67. Pre-Test Rear Passenger Dummy and Door Clearance View

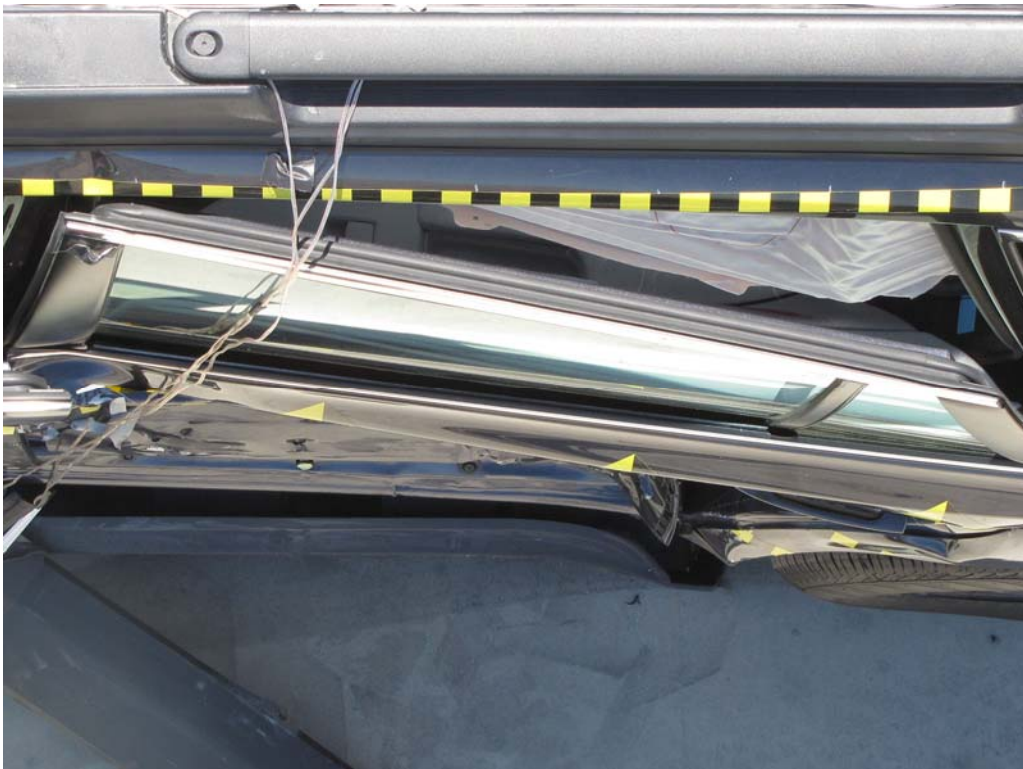


FIGURE 68. Post-Test Rear Passenger Dummy and Door Clearance View



FIGURE 69. Pre-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment



FIGURE 70. Post-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment



FIGURE 71. Pre-Test Rear Passenger Inner Door Panel View



FIGURE 72. Post-Test Rear Passenger Inner Door Panel View
Showing Dummy Contact Locations

No Dummy Head Contact with Vehicle Interior

Photo Not Applicable

FIGURE 73. Post-Test Rear Passenger Dummy Close-Up
Head Contact with Vehicle View



FIGURE 74. Post-Test Rear Passenger Dummy Close-Up
Head Contact with Side Airbag View



FIGURE 75. Post-Test Rear Passenger Dummy Close-Up
Torso Contact with Vehicle Interior View

No Dummy Torso Contact with Side Airbag

Photo Not Applicable

FIGURE 76. Post-Test Rear Passenger Dummy Close-Up
Torso Contact with Side Airbag View



FIGURE 77. Post-Test Rear Passenger Dummy Close-Up Pelvis Contact View

No Dummy Pelvis Contact with Side Airbag

Photo Not Applicable

FIGURE 78. Post-Test Rear Passenger Dummy Close-Up
Pelvis Contact with Side Airbag View



FIGURE 79. Pre-Test View of Fuel Filler Cap or Fuel Filler Neck



FIGURE 80. Post-Test View of Fuel Filler Cap or Fuel Filler Neck



FIGURE 81. Pre-Test Front View of MDB Impactor Face



FIGURE 82. Post-Test Front View of MDB Impactor Face



FIGURE 83. Pre-Test Top View of MDB Impactor Face



FIGURE 84. Post-Test Top View of MDB Impactor Face



FIGURE 85. Pre-Test Left Side View of MDB Impactor Face

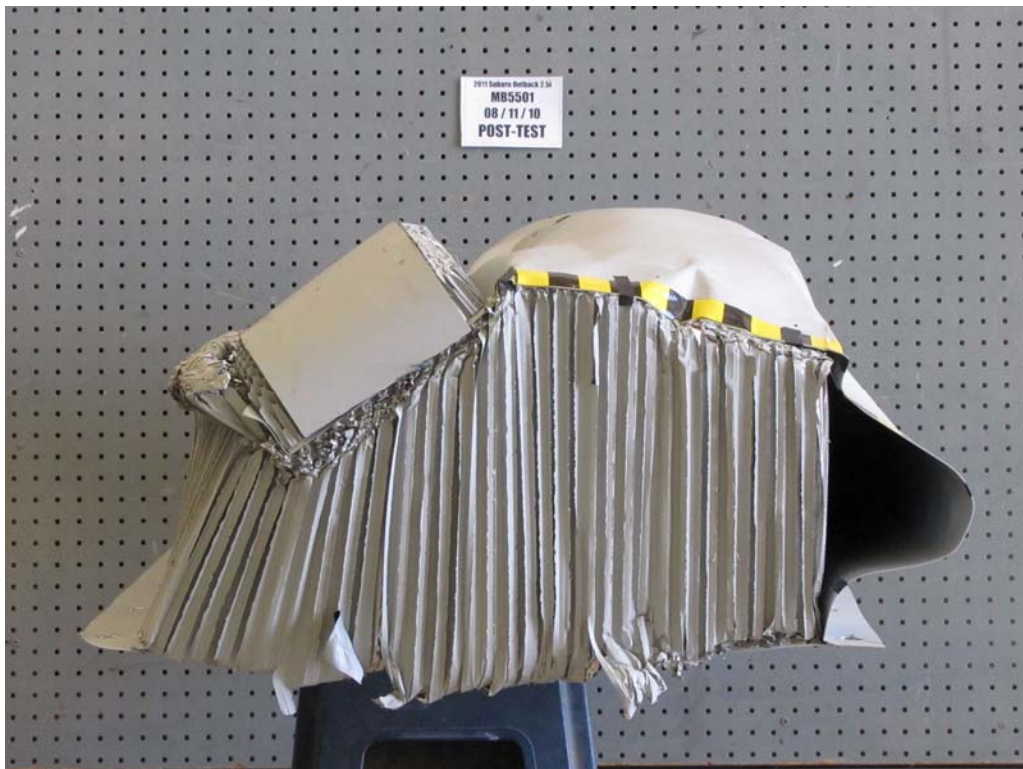


FIGURE 86. Post-Test Left Side View of MDB Impactor Face



FIGURE 87. Pre-Test Right Side View of MDB Impactor Face



FIGURE 88. Post-Test Right Side View of MDB Impactor Face



FIGURE 89. Close-Up View of Vehicle's Certification Label



FIGURE 90. Close-Up View of Vehicle's Tire Information Placard

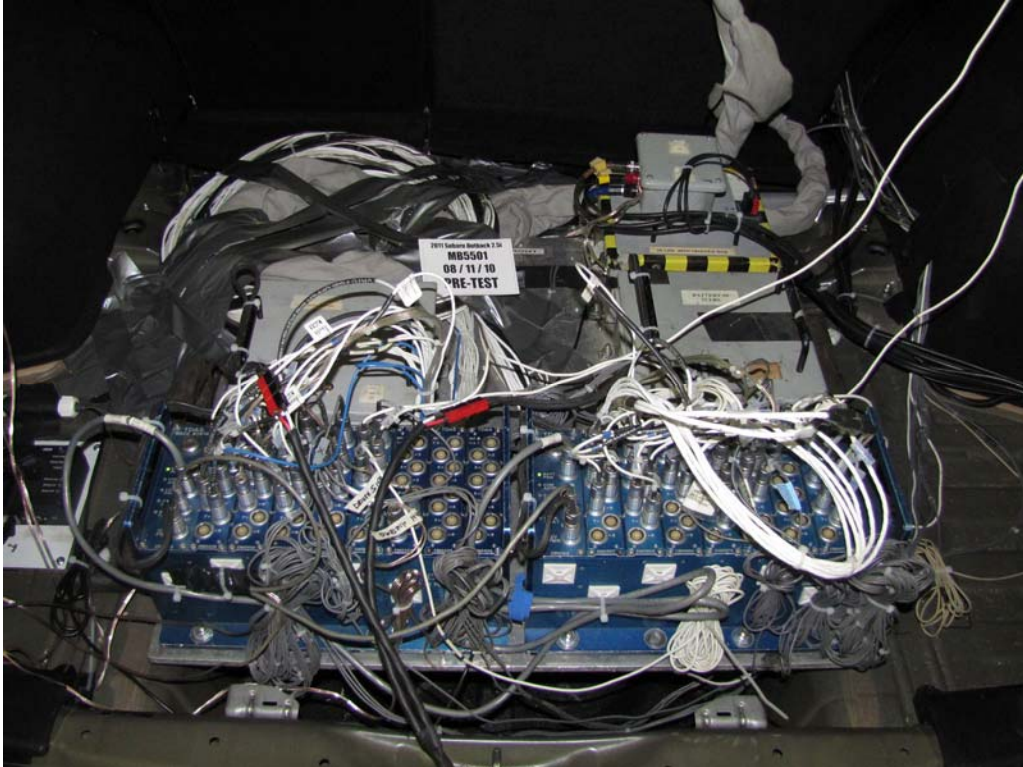


FIGURE 91. Pre-Test Ballast View



FIGURE 92. Post-Test Primary and Redundant Speed Trap Read-Out



FIGURE 93. FMVSS No. 301-305 Rollover 0 Degrees

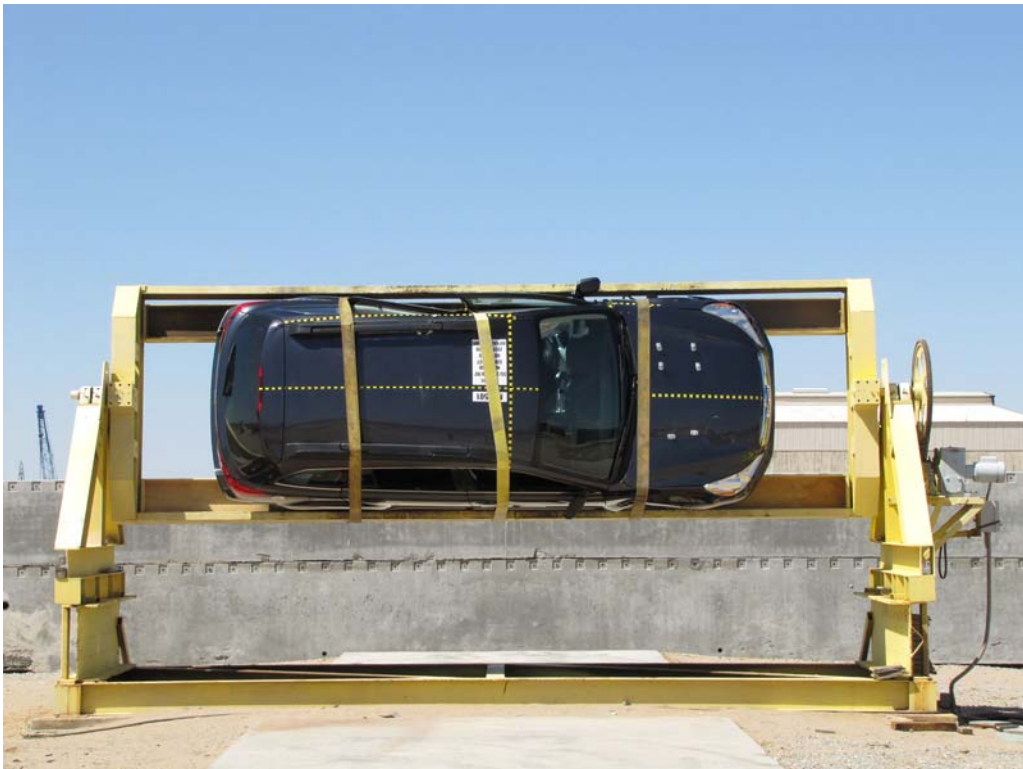


FIGURE 94. FMVSS No. 301-305 Rollover 90 Degrees



FIGURE 95. FMVSS No. 301-305 Rollover 180 Degrees

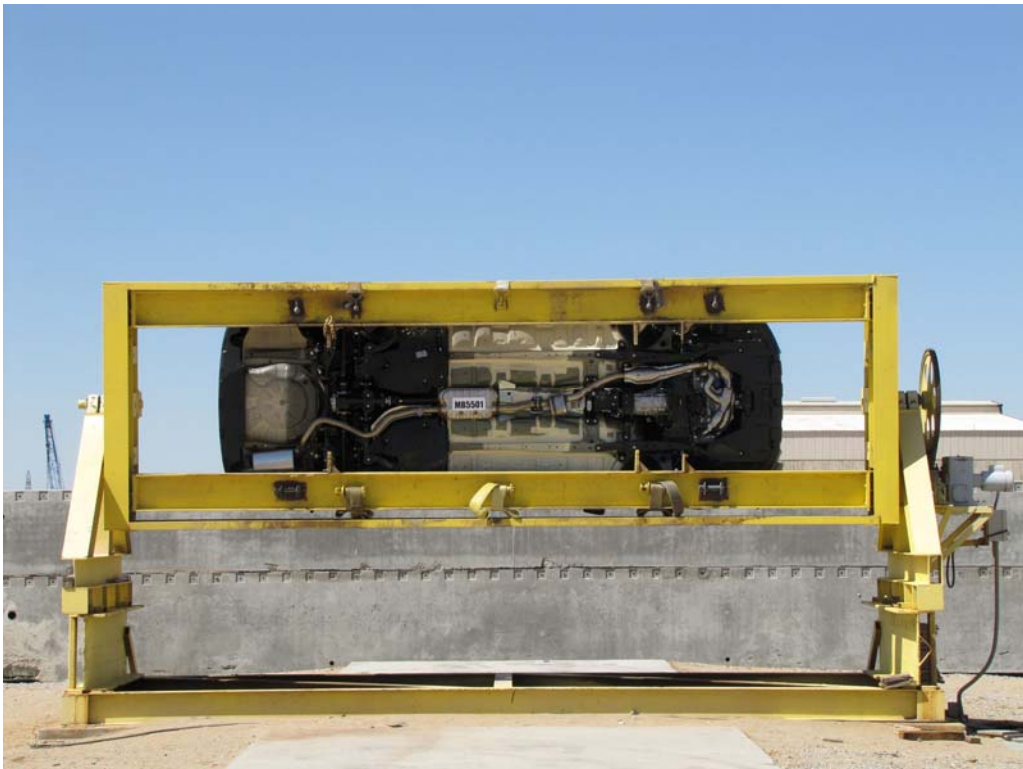


FIGURE 96. FMVSS No. 301-305 Rollover 270 Degrees



FIGURE 97. FMVSS No. 301-305 Rollover 360 Degrees



FIGURE 98. 2011 Subaru Outback 2.5i AWD Side MDB Impact Event

SUBARU

VIN: 4S4BRBAC8B1323045
 Model/Code: 2011 Subaru Outback 2.5i / BDA
 Exterior Color: Graphite Gray Metallic
 Lufayette, IN
 Dealer by / Carrier: Truck / 605-601126

OUTBACK

STANDARD FEATURES		GOVERNMENT SAFETY RATINGS	OPTIONAL EQUIPMENT AND OTHER ITEMS
SAFETY Symmetrical All-Wheel Drive (AWD) Vehicle Dynamics Control (VDC) Anti-Lock Brakes: 4-Wheel Disc Subaru Advanced Frontal Air Bag System Side-Curtain Airbags Front Seat Side-Impact Air Bags 3-Point Seatbelts, All Seating Positions LATCH System for Child Safety Seats Anti-Theft Alarm & Immobilizer System Tire Pressure Monitoring System (TPMS) Roll-over Sensor Brake Assist	COMFORT, CONVENIENCE AND INTERIOR 8 Cupholders AM/FM Stereo with CD Player Auxiliary Audio Jack Air Conditioning w/air Filtration System Carpeted Floor Mats, Cargo Area Mat Cruise Control Electronic Parking Brake Multi-Function Trip Computer Outside Temperature Gauge Power Windows, Door Locks and Mirrors Remote Keyless Entry System Steering Wheel Audio & Cruise Controls 60/40 Fold-Down/Recline Rear Seatback Tilt / Telescopic Steering Wheel	Frontal Driver Not Rated Passenger Not Rated Crash Side Front Seat Not Rated Rear Seat Not Rated Roll-over Not Rated Star ratings based on the risk of injury in a single vehicle crash. Star ratings range from 1 to 5 stars (★★★★★), with 5 being the highest. Source: National Highway Traffic Safety Administration (NHTSA) VISIT www.safercar.gov or 1-800-327-4236	Manufacturer's Suggested Retail Price \$23,495.00 Full Tank of Gas INCLD Bluetooth Connect Kit \$460.00 Partial Zero Emission (Pzev) Super-Ultra Low Emission Veh Pzev Certified Where Required Pzev Warranty State Specific
PERFORMANCE AND EXTERIOR 2.5L Horizontally-Opposed 4-Cyl Engine Auto Lights w/ Daytime Running Lights Intermittent Front/Rear Wipers Fully Independent Raised Suspension Roof Rails w/ Integrated Cross Bars Traction Control		Destination and Delivery \$725.00 Total Suggested Retail Price \$24,680.00 ASK ABOUT ADDED SECURITY It could be the most important option you choose. After-warranty mechanical repair protection up to 100,000 miles. Nobody protects your Subaru like Subaru! THE ONLY EXTENDED SERVICE CONTRACT BACKED BY SUBARU LIMITED WARRANTY/ROADSIDE ASSISTANCE 3 Year / 36,000 Miles Basic 5 Year / 60,000 Miles Powertrain 5 Year/Unlimited Mileage Rust Perforation 3 Yrs / 36,000 Miles 24/7 Roadside Assistance See Owner Info Kit & Warranty For Details SHIP TO: 090694 SOLD TO: 090694 IRVINE SUBARU 23663 ROCKFIELD BLVD LAKE FOREST, CA 92630 IRVINE SUBARU 23663 ROCKFIELD BLVD LAKE FOREST, CA 92630 4S4BRBAC8B1323045 *This is a registered trade name of Subaru Inc. Subaru is a registered trademark of Subaru Corporation. ©2010 Subaru Inc.	

EPA Fuel Economy Estimates

CITY MPG
19
Expected range for most drivers 15 to 23 MPG

Estimated Annual Fuel Cost
\$1,774
based on 15,000 miles at \$2.60 per gallon

Highway MPG
27
Expected range for most drivers 22 to 32 MPG

Combined Fuel Economy
22
Your actual mileage will vary depending on how you drive and maintain your vehicle.
At SUV - AWD Calif. Emission Control Syst.

See the FREE Fuel Economy Guide at dealers or www.fueleconomy.gov

FIGURE 99. Monroney Label

1-6-Seat, seatbelt and SRS airbags

Head restraint adjustment

Both the driver's seat and the front passenger's seat are equipped with head restraints.

The head restraint should be adjusted so that the center of the head restraint is closest to the top of the occupant's ears.

To raise:
Pull the head restraint up.

To lower:
Push the head restraint down while pressing the release button on the top of the seatback.

To remove:
While pressing the release button, pull out the head restraint.

To install:
Install the head restraint into the holes that are located on the top of the seatback until the head restraint locks.

WARNING

- Never drive the vehicle with the head restraints removed because they are designed to reduce the risk of serious neck injury in the event that the vehicle is struck from the rear. Therefore, when you remove the head restraints, you must reinstall all head restraints to protect vehicle occupants.
- All occupants, including the driver, should not operate a vehicle or sit in a vehicle's seat until the head restraints are placed in their proper positions in order to minimize the risk of neck injury in the event of a collision.

Seat heater (if equipped)

1) HIGH - Rapid heating
 2) LOW - Normal heating
 3) OFF - Off
 A) Left-hand side
 B) Right-hand side

The seat heater operates when the ignition switch is either in the "Acc" or "ON" position.

To turn on the seat heater, press the "LOW" or "HIGH" position on the switch, as desired, depending on the temperature.

Selecting the "HIGH" position will cause the seat to heat up quicker.

To turn off the seat heater, slightly press the opposite side of the current position.

The indicator located on the switch illuminates when the seat heater is in operation. When the vehicle's interior is warmed enough or before you leave the vehicle, be sure to turn the switch off.

CAUTION

- There is a possibility that people with delicate skin may suffer slight burns even at low temperatures if they use the seat heater for a long period of time. When using the heater, always be sure to warm the persons concerned.

NOTE

Use of the seat heater for a long period of time while the engine is not running can cause battery discharge.

Do not put anything on the seat which insulates against heat, such as a blanket, cushion, or similar items. This may cause the seat heater to overheat.

Rear seats

WARNING

Seatbelts provide maximum restraint when the occupant sits well back and upright in the seat. Do not put cushions or any other materials between occupants and seatbacks or seat cushions. If you do so, the risk of sliding under the lap belt and of the lap belt sliding up over the abdomen will increase, and both can result in serious internal injury or death.

- CONTINUED -

FIGURE 100. Driver Head Restraint Use and Adjustment
Information from Vehicle Owner's Manual

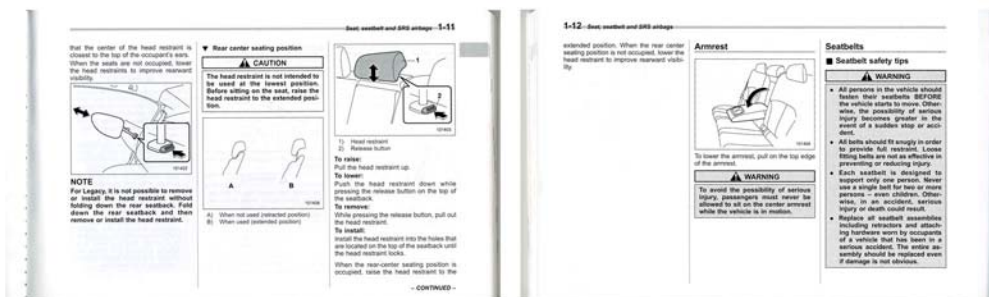
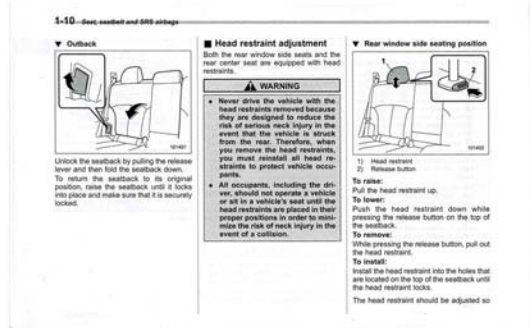


FIGURE 101. Left Rear Passenger Head Restraint Use and Adjustment Information from Vehicle Owner's Manual

APPENDIX B
DUMMY RESPONSE DATA

TABLE OF DATA PLOTS

Plot		Page
1	Driver Head Acceleration (X) Primary vs. Time	B-1
2	Driver Head Acceleration (Y) Primary vs. Time	B-1
3	Driver Head Acceleration (Z) Primary vs. Time	B-1
4	Driver Head Resultant Acceleration Primary vs. Time	B-1
5	Driver Upper Thorax Rib Deflection (Y) vs. Time	B-2
6	Driver Middle Thorax Rib Deflection (Y) vs. Time	B-2
7	Driver Lower Thorax Rib Deflection (Y) vs. Time	B-2
8	Driver Thorax Rib Deflection Maximum vs. Time	B-2
9	Driver Anterior Abdominal Force (Y) vs. Time	B-3
10	Driver Middle Abdominal Force (Y) vs. Time	B-3
11	Driver Posterior Abdominal Force (Y) vs. Time	B-3
12	Driver Total Abdominal Force (Y) vs. Time	B-3
13	Driver Pubic Symphysis Force (Y) vs. Time	B-4
14	Passenger Head Acceleration (X) vs. Time Primary	B-5
15	Passenger Head Acceleration (Y) vs. Time Primary	B-5
16	Passenger Head Acceleration (Z) vs. Time Primary	B-5
17	Passenger Head Resultant Acceleration Primary vs. Time	B-5
18	Passenger Lower Spine T12 Acceleration (X) vs. Time	B-6
19	Passenger Lower Spine T12 Acceleration (Y) vs. Time	B-6
20	Passenger Lower Spine T12 Acceleration (Z) vs. Time	B-6
21	Passenger Lower Spine T12 Resultant Acceleration vs. Time	B-6
22	Passenger Iliac Force on Impact Side (Y) vs. Time	B-7
23	Passenger Acetabulum Force on Impact Side (Y) vs. Time	B-7
24	Passenger Total Pelvic Force on Impact Side (Y) vs. Time	B-7

The following additional data 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

Driver & Passenger Dummy Instrumentation Data

Driver Lower Spine T12 Acceleration (X)

Driver Lower Spine T12 Acceleration (Y)

Driver Lower Spine T12 Acceleration (Z)

Passenger Upper Thorax Rib Deflection (Y)

Passenger Middle Thorax Rib Deflection (Y)

Passenger Lower Thorax Rib Deflection (Y)
Passenger Upper Abdomen Rib Deflection (Y)
Passenger Lower Abdomen Rib Deflection (Y)
Driver Head Acceleration Redundant (X)
Driver Head Acceleration Redundant (Y)
Driver Head Acceleration Redundant (Z)
Driver Shoulder Contact Switch
Driver Torso Contact Switch
Driver Pelvis Contact Switch
Passenger Head Acceleration Redundant (X)
Passenger Head Acceleration Redundant (Y)
Passenger Head Acceleration Redundant (Z)
Passenger Shoulder Contact Switch
Passenger Torso Contact Switch
Passenger Pelvis Contact Switch

Vehicle Instrumentation Data

Driver Side Airbag Timing
Driver Side Curtain Airbag Timing
Passenger Side Airbag Timing (if applicable)
Passenger Side Curtain Airbag Timing (if different from Driver)
Right Side Sill at Front Seat Acceleration (X)
Right Side Sill at Front Seat Acceleration (Y)
Right Side Sill at Front Seat Acceleration (Z)
Right Side Sill at Rear Seat Acceleration (X)
Right Side Sill at Rear Seat Acceleration (Y)
Right Side Sill at Rear Seat Acceleration (Z)
Rear Floorpan Above Axle Acceleration (X)
Rear Floorpan Above Axle Acceleration (Y)
Rear Floorpan Above Axle Acceleration (Z)
Left Side Sill at Front Seat Acceleration (Y)
Left Side Sill at Rear Seat Acceleration (Y)
Right Rear Occupant Compartment Acceleration (Y)
Lower A-Post Acceleration (Y)
Upper A-Post Acceleration (Y)
Lower B-Post Acceleration (Y)
Upper B-Post Acceleration (Y)

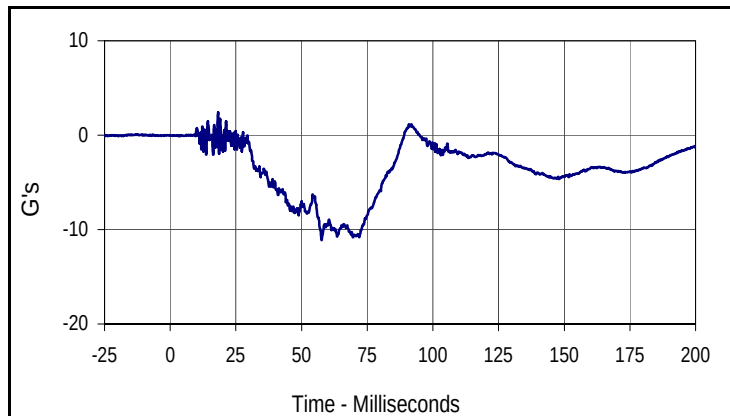
Front Seat Track Acceleration (Y)
Rear Seat Track Acceleration (Y)
Vehicle Center of Gravity Acceleration (X)
Vehicle Center of Gravity Acceleration (Y)
Vehicle Center of Gravity Acceleration (Z)

MDB Instrumentation Data

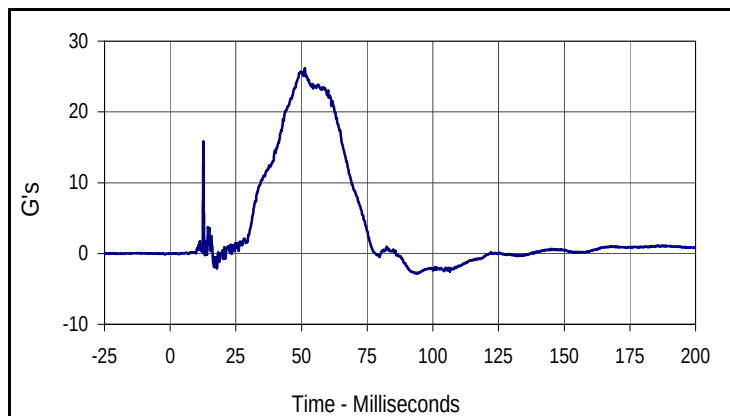
MDB Center of Gravity Acceleration (X)
MDB Center of Gravity Acceleration (Y)
MDB Center of Gravity Acceleration (Z)
MDB Rear Acceleration (X)
MDB Rear Acceleration (Y)
Left MDB Contact Switch
Right MDB Contact Switch

Test Vehicle: 2011 Subaru Outback 2.5i AWD 5-Door MPV
 Test Program: 61 km/h (38 mph) Side Impact NCAP 27° Moving Deformable Barrier Test

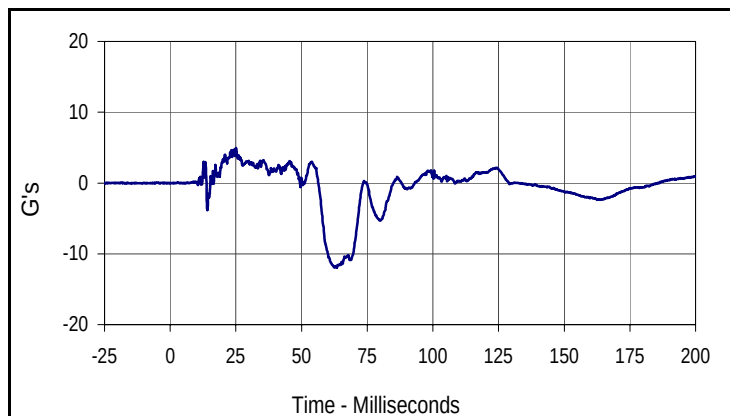
Test Date: 8/11/10
 NHTSA No.: MB5501



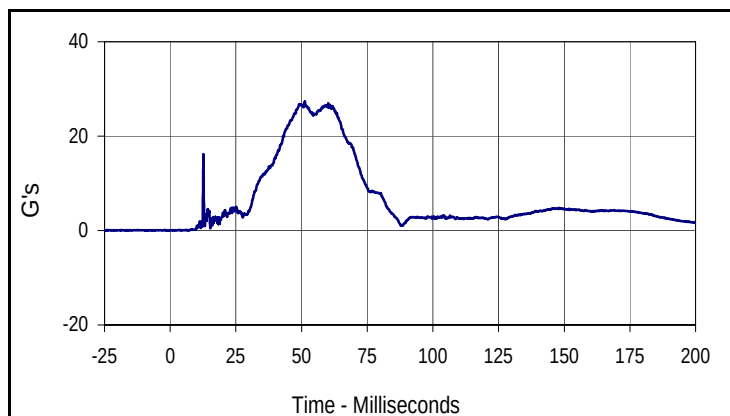
Curve Description			
Driver Head Acceleration X Primary			
CURNO	Type	SAE Class	Units
001	FIL	1000	G's
Max	Time	Min	Time
2.4	18.2	-11.1	57.6



Curve Description			
Driver Head Acceleration Y Primary			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
26.1	51.2	-2.8	94.2



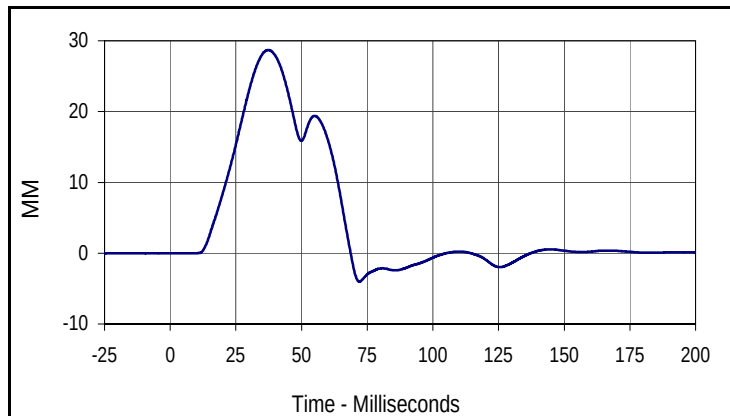
Curve Description			
Driver Head Acceleration Z Primary			
CURNO	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
5.0	25.1	-11.9	63.5



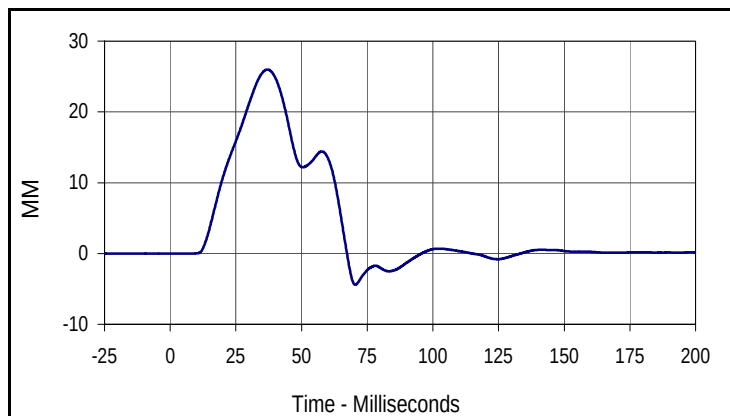
Curve Description			
Driver Head Resultant Acceleration Primary			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
27.3	51.2	0.0	1.3

Test Vehicle: 2011 Subaru Outback 2.5i AWD 5-Door MPV
 Test Program: 61 km/h (38 mph) Side Impact NCAP 27° Moving Deformable Barrier Test

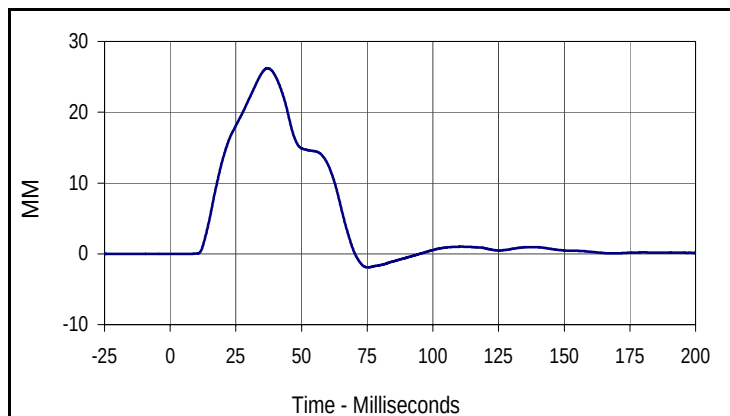
Test Date: 8/11/10
 NHTSA No.: MB5501



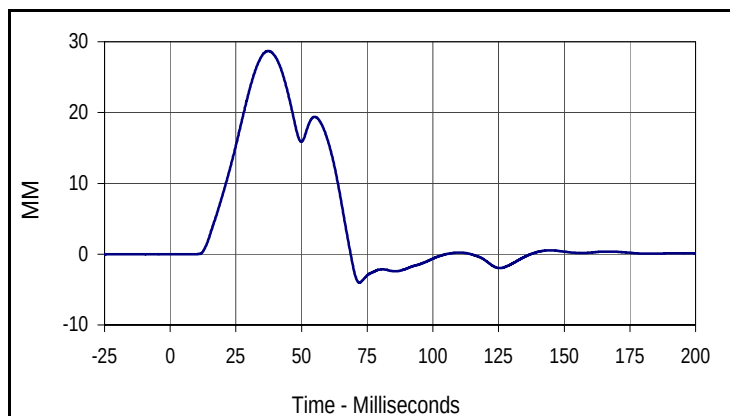
Curve Description			
Driver Upper Thorax Rib Deflection Y			
CURNO	Type	SAE Class	Units
007	FIL	180	MM
Max	Time	Min	Time
28.7	37.3	-4.0	72.0



Curve Description			
Driver Middle Thorax Rib Deflection Y			
CURNO	Type	SAE Class	Units
008	FIL	180	MM
Max	Time	Min	Time
26.0	37.0	-4.4	70.5



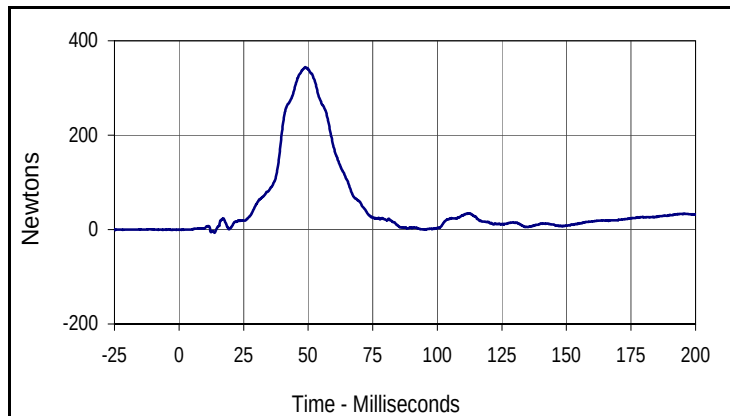
Curve Description			
Driver Lower Thorax Rib Deflection Y			
CURNO	Type	SAE Class	Units
009	FIL	180	MM
Max	Time	Min	Time
26.2	37.1	-1.9	75.2



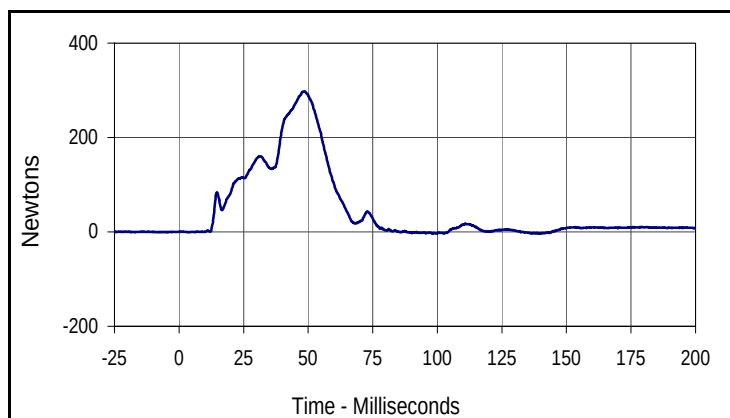
Curve Description			
Driver Thorax Rib Deflection Maximum			
CURNO	Type	SAE Class	Units
010	FIL	180	MM
Max	Time	Min	Time
28.7	37.3	-4.0	72.0

Test Vehicle: 2011 Subaru Outback 2.5i AWD 5-Door MPV
 Test Program: 61 km/h (38 mph) Side Impact NCAP 27° Moving Deformable Barrier Test

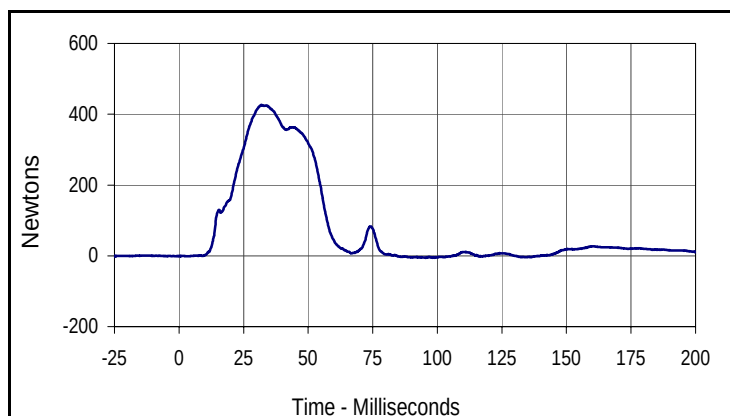
Test Date: 8/11/10
 NHTSA No.: MB5501



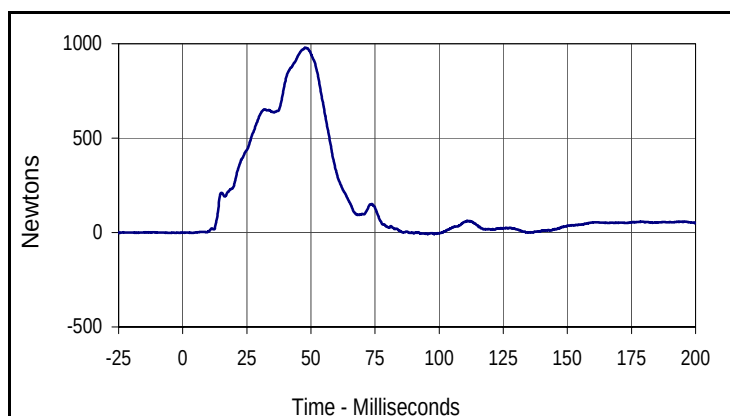
Curve Description			
Driver Anterior Abdominal Force Y			
CURNO	Type	SAE Class	Units
013	FIL	600	Newtons
Max	Time	Min	Time
344.3	48.9	-6.7	13.7



Curve Description			
Driver Middle Abdominal Force Y			
CURNO	Type	SAE Class	Units
014	FIL	600	Newtons
Max	Time	Min	Time
297.3	48.7	-3.9	139.3



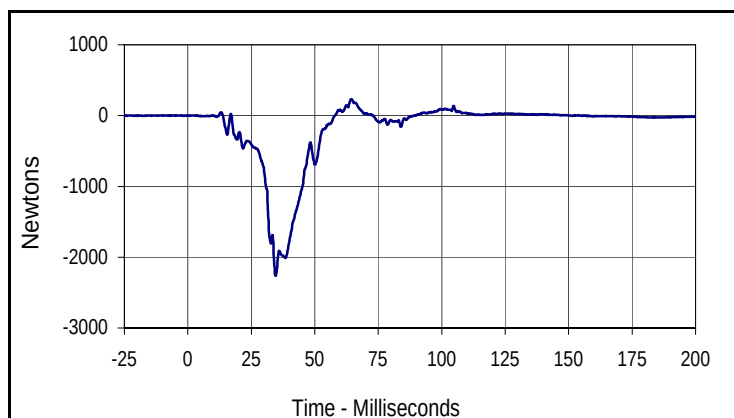
Curve Description			
Driver Posterior Abdominal Force Y			
CURNO	Type	SAE Class	Units
015	FIL	600	Newtons
Max	Time	Min	Time
426.4	31.9	-5.4	95.5



Curve Description			
Driver Total Abdominal Force			
CURNO	Type	SAE Class	Units
013	RES	600	Newtons
Max	Time	Min	Time
978.9	47.8	-7.9	98.1

Test Vehicle: 2011 Subaru Outback 2.5i AWD 5-Door MPV
 Test Program: 61 km/h (38 mph) Side Impact NCAP 27° Moving Deformable Barrier Test

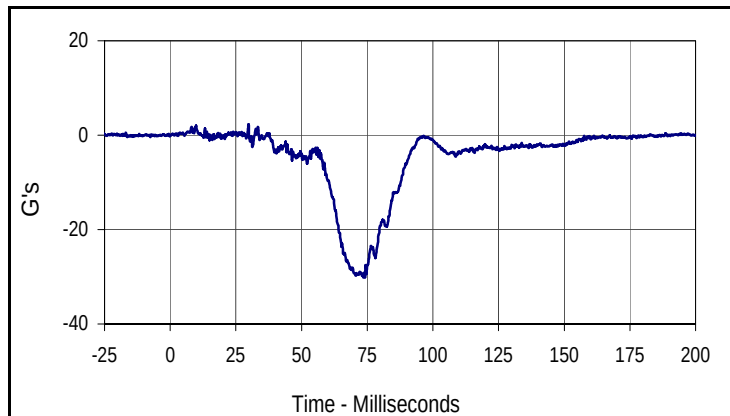
Test Date: 8/11/10
 NHTSA No.: MB5501



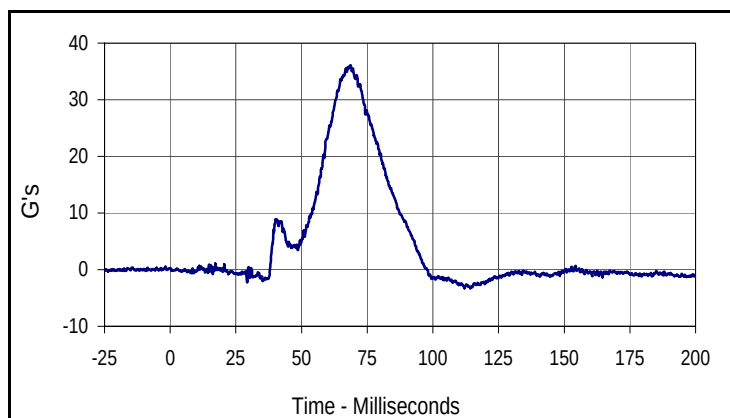
Curve Description			
Driver Pubic Symphysis Force Y			
CURNO	Type	SAE Class	Units
016	FIL	600	Newtons
Max	Time	Min	Time
233.8	64.3	-2263.0	34.6

Test Vehicle: 2011 Subaru Outback 2.5i AWD 5-Door MPV
 Test Program: 61 km/h (38 mph) Side Impact NCAP 27° Moving Deformable Barrier Test

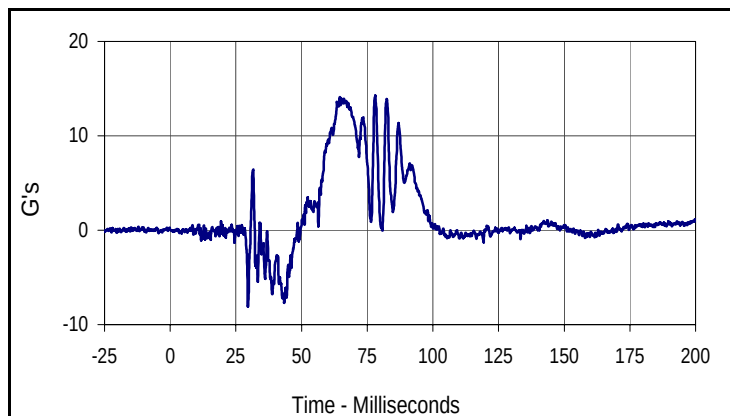
Test Date: 8/11/10
 NHTSA No.: MB5501



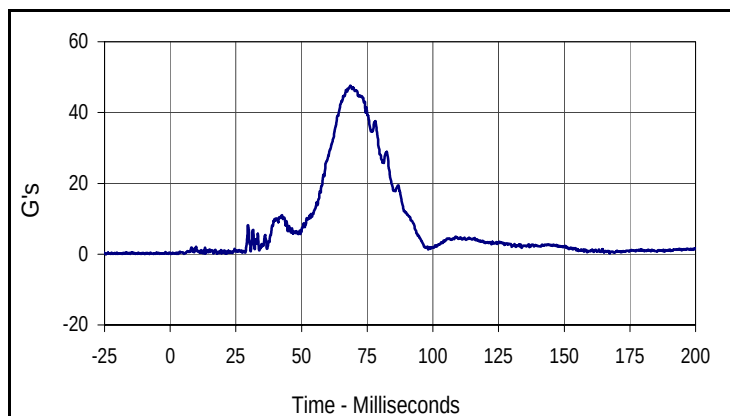
Curve Description			
Passenger Head Acceleration X Primary			
CURNO	Type	SAE Class	Units
021	FIL	1000	G's
Max	Time	Min	Time
2.3	29.8	-30.2	73.5



Curve Description			
Passenger Head Acceleration Y Primary			
CURNO	Type	SAE Class	Units
022	FIL	1000	G's
Max	Time	Min	Time
36.1	68.6	-3.3	114.2



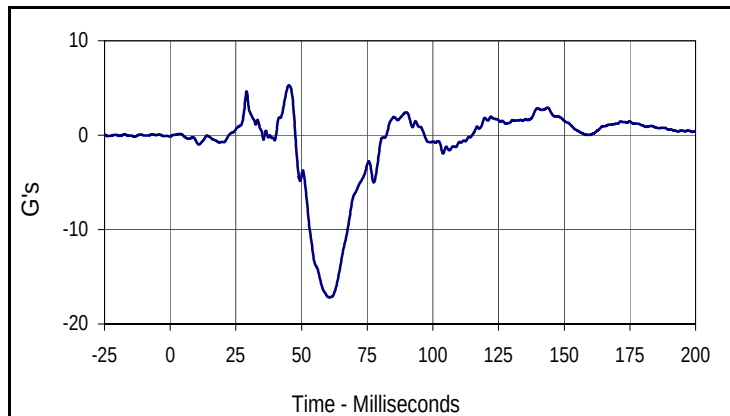
Curve Description			
Passenger Head Acceleration Z Primary			
CURNO	Type	SAE Class	Units
023	FIL	1000	G's
Max	Time	Min	Time
14.3	78.0	-8.1	29.6



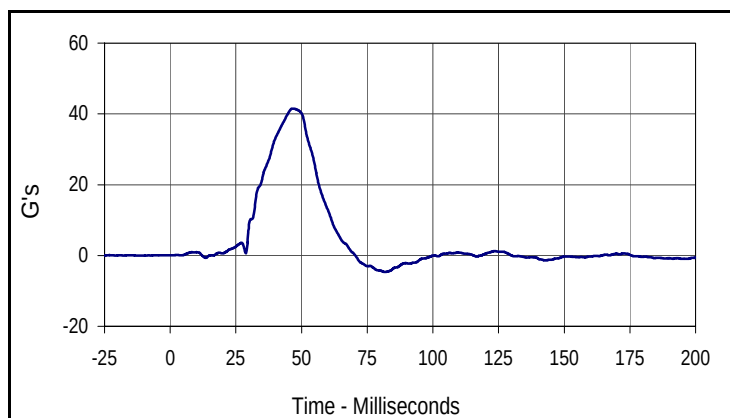
Curve Description			
Passenger Head Acceleration Resultant Primary			
CURNO	Type	SAE Class	Units
021	RES	1000	G's
Max	Time	Min	Time
47.6	68.6	0.0	3.1

Test Vehicle: 2011 Subaru Outback 2.5i AWD 5-Door MPV
 Test Program: 61 km/h (38 mph) Side Impact NCAP 27° Moving Deformable Barrier Test

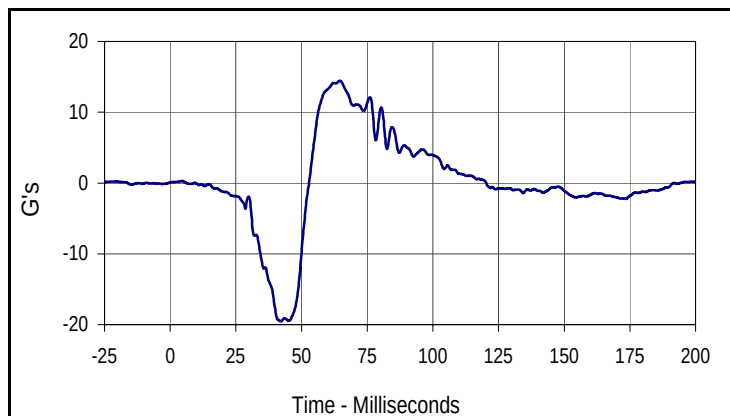
Test Date: 8/11/10
 NHTSA No.: MB5501



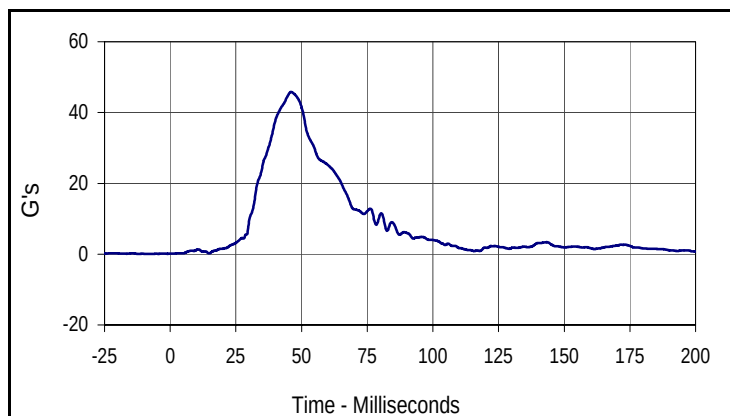
Curve Description			
Passenger Lower Spine T12 Acceleration X			
CURNO	Type	SAE Class	Units
037	FIL	180	G's
Max	Time	Min	Time
5.3	45.2	-17.2	60.5



Curve Description			
Passenger Lower Spine T12 Acceleration Y			
CURNO	Type	SAE Class	Units
038	FIL	180	G's
Max	Time	Min	Time
41.5	46.8	-4.6	81.6



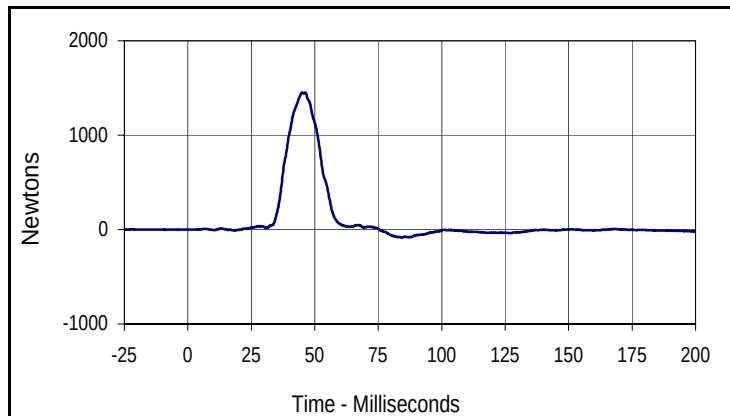
Curve Description			
Passenger Lower Spine T12 Acceleration Z			
CURNO	Type	SAE Class	Units
039	FIL	180	G's
Max	Time	Min	Time
14.4	64.6	-19.5	42.1



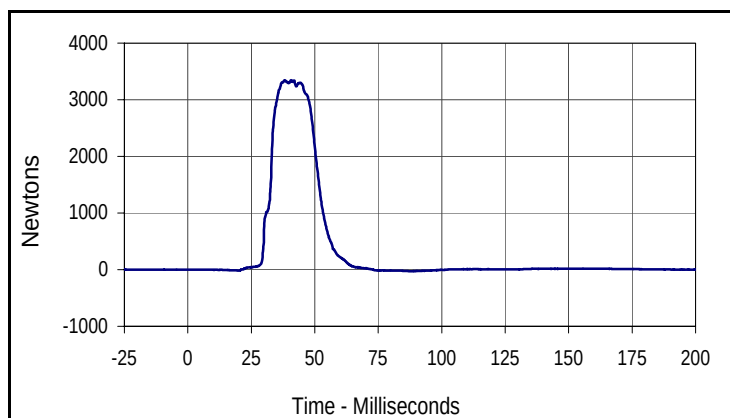
Curve Description			
Passenger Lower Spine T12 Acceleration Resultant			
CURNO	Type	SAE Class	Units
037	RES	180	G's
Max	Time	Min	Time
45.8	46.0	0.2	0.7

Test Vehicle: 2011 Subaru Outback 2.5i AWD 5-Door MPV
 Test Program: 61 km/h (38 mph) Side Impact NCAP 27° Moving Deformable Barrier Test

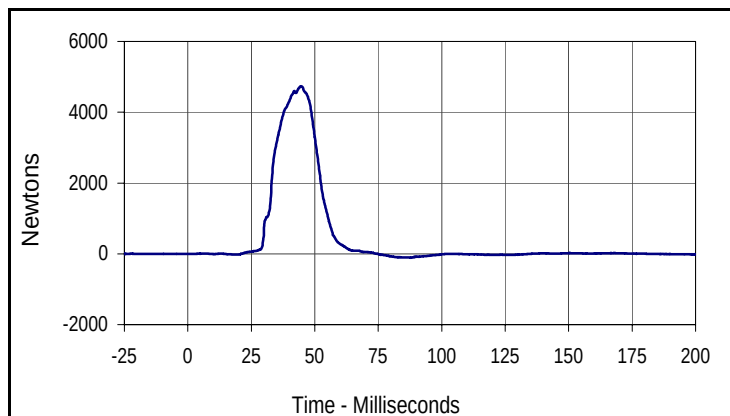
Test Date: 8/11/10
 NHTSA No.: MB5501



Curve Description			
Passenger Iliac Wing Force on Impact Side Y			
CURNO	Type	SAE Class	Units
043	FIL	600	Newtons
Max	Time	Min	Time
1451.3	46.3	-83.5	84.1



Curve Description			
Passenger Acetabulum Force on Impact Side Y			
CURNO	Type	SAE Class	Units
042	FIL	600	Newtons
Max	Time	Min	Time
3346.1	40.7	-28.2	87.6



Curve Description			
Passenger Total Pelvic Force			
CURNO	Type	SAE Class	Units
042	SUM	600	Newtons
Max	Time	Min	Time
4732.1	44.6	-107.6	87.7

APPENDIX C
DUMMY CALIBRATION DATA

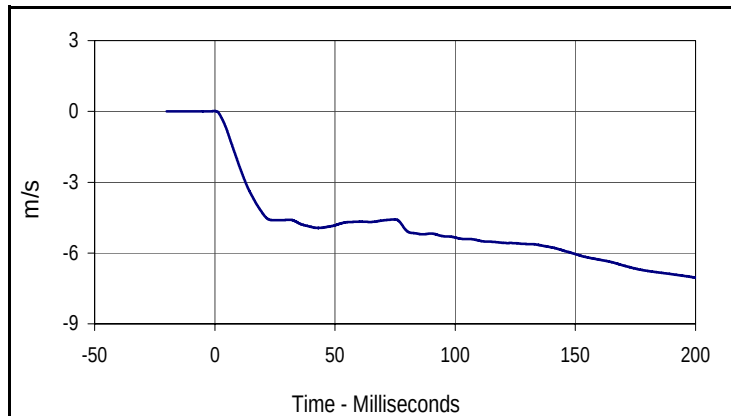
APPENDIX C
PRE-TEST / HIII CONFIGURATION AND PERFORMANCE VERIFICATION DATA

Test Program: ES2re Neck Calibration
 ATD Serial No.: F035

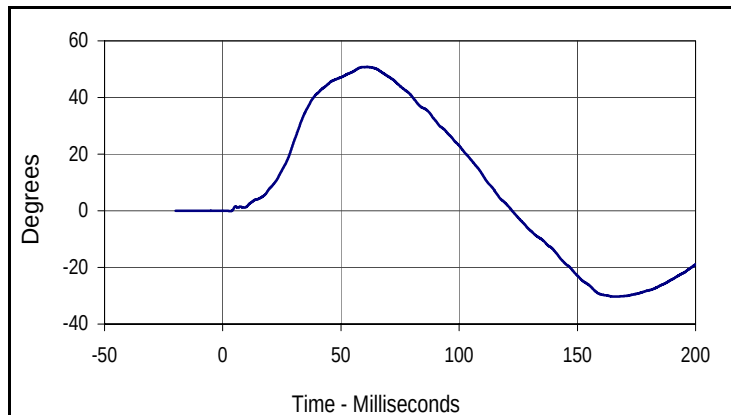
Test Date: 8/6/10
 Test I.D.: NB07B



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	3.30 to 3.50	3.36	Pass
Pendulum Deceleration	1 msec	m/s	0.0 to -.050	-0.007	Pass
	3 msec	m/s	-.250 to -.375	-0.314	Pass
	14 msec	m/s	-3.20 to -3.70	-3.29	Pass
Headform Rotation	Max	Degrees	49.0 to 58.0	50.8	Pass
	Time	msec	54.0 to 66.0	60.9	Pass
Maximum Rotation To Time Zero Crossing		msec	53.0 to 88.0	61.6	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	60	m/s
Max	Time	Min	Time
0.0	0.1	-7.0	200.0



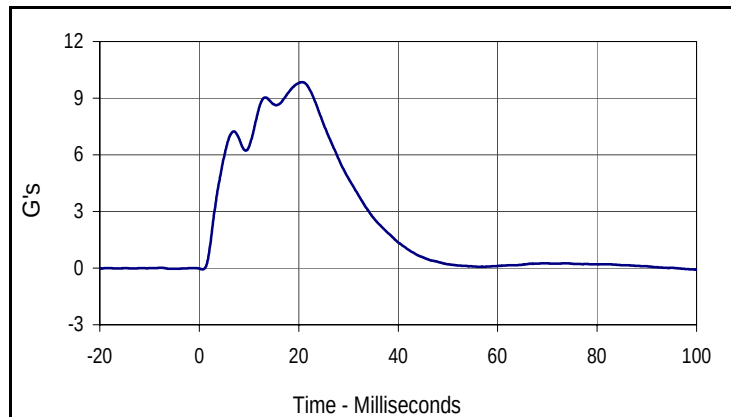
Curve Description			
Headform Rotation			
CURNO	Type	SAE Class	Units
002	FIL	180	Degrees
Max	Time	Min	Time
50.8	60.9	-30.3	164.9

Test Program: ES2re Shoulder Calibration
 ATD Serial No.: F035

Test Date: 8/6/10
 Test I.D.: SH07B



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
Probe Velocity	m/s	4.20 to 4.40	4.27	Pass
Peak Impactor Acceleration	G's	7.5 to 10.5	9.9	Pass
Overall Test Results				Pass



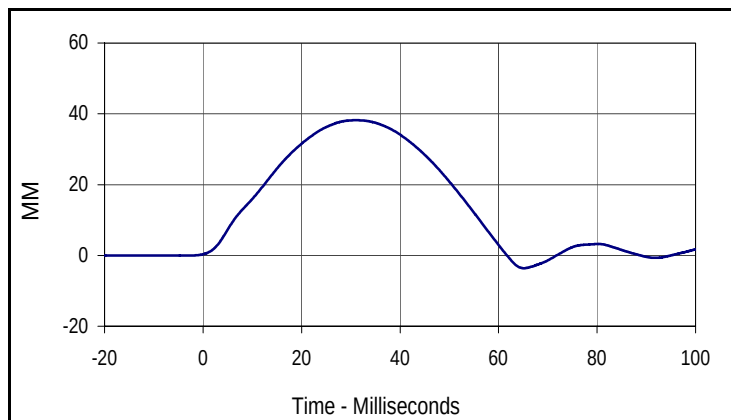
Curve Description			
Probe Impactor Acceleration			
CURNO	Type	SAE Class	Units
001	FIL	180	G's
Max	Time	Min	Time
9.9	20.7	-0.1	99.9

Test Program: ES2re Rib Module Calibration
 ATD Serial No.: F035 Rib #1

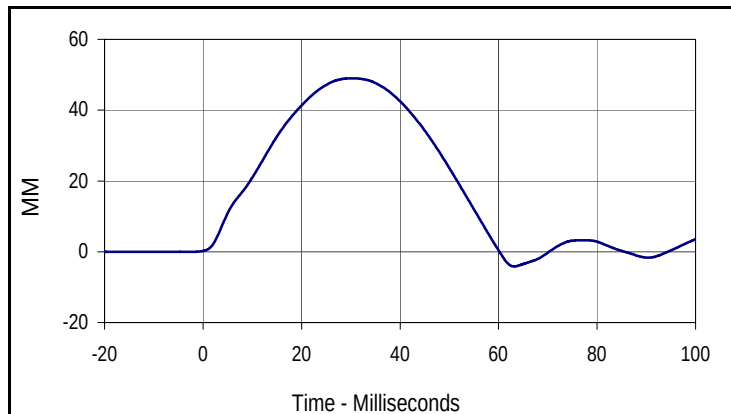
Test Date: 8/6/10
 Test I.D.: RIB07D



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
Peak Rib Deflection at 459 MM Drop Height	MM	36 to 40	38.2	Pass
Peak Rib Deflection at 815 MM Drop Height	MM	46 to 51	49.0	Pass
Overall Test Results			Pass	



Curve Description			
Upper Rib Deflection (459 MM Drop Height)			
CURNO	Type	SAE Class	Units
001	FIL	180	MM
Max	Time	Min	Time
38.2	31.1	-3.6	65.1



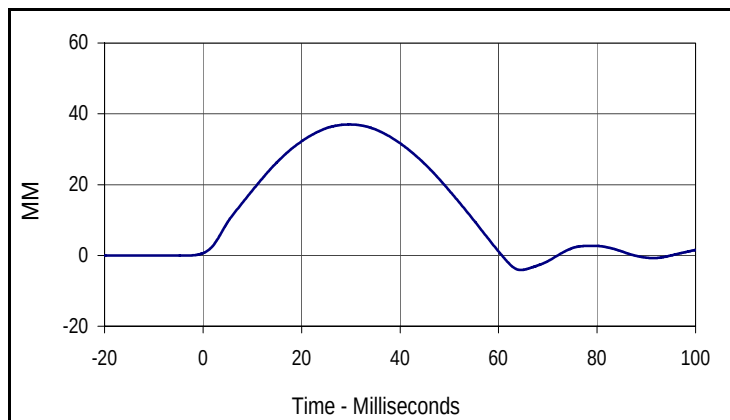
Curve Description			
Upper Rib Deflection (815 MM Drop Height)			
CURNO	Type	SAE Class	Units
001	FIL	180	MM
Max	Time	Min	Time
49.0	30.2	-4.1	63.2

Test Program: ES2re Rib Module Calibration
 ATD Serial No.: F035 Rib #2

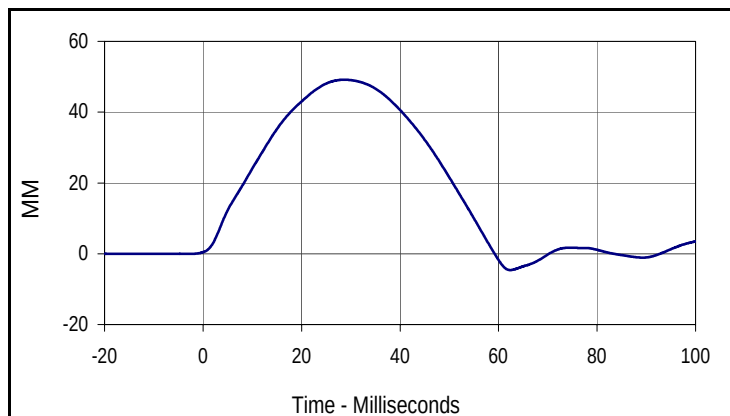
Test Date: 8/6/10
 Test I.D.: RIB07E



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
Peak Rib Deflection at 459 MM Drop Height	MM	36 to 40	37.0	Pass
Peak Rib Deflection at 815 MM Drop Height	MM	46 to 51	49.2	Pass
Overall Test Results			Pass	



Curve Description			
Middle Rib Deflection (459 MM Drop Height)			
CURNO	Type	SAE Class	Units
001	FIL	180	MM
Max	Time	Min	Time
37.0	29.7	-4.1	64.5



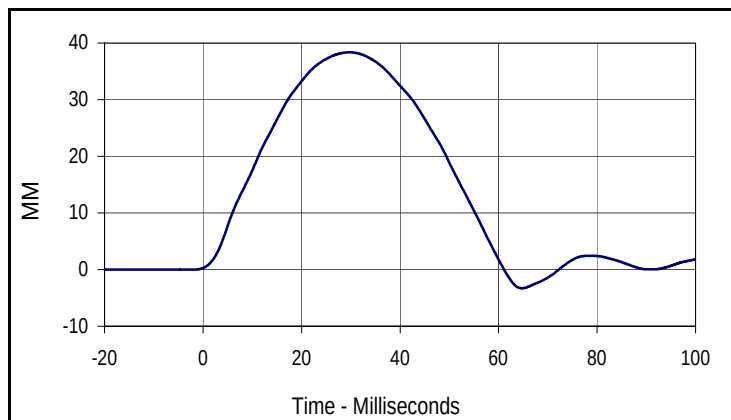
Curve Description			
Middle Rib Deflection (815 MM Drop Height)			
CURNO	Type	SAE Class	Units
001	FIL	180	MM
Max	Time	Min	Time
49.2	28.7	-4.6	62.4

Test Program: ES2re Rib Module Calibration
 ATD Serial No.: F035 Rib #3

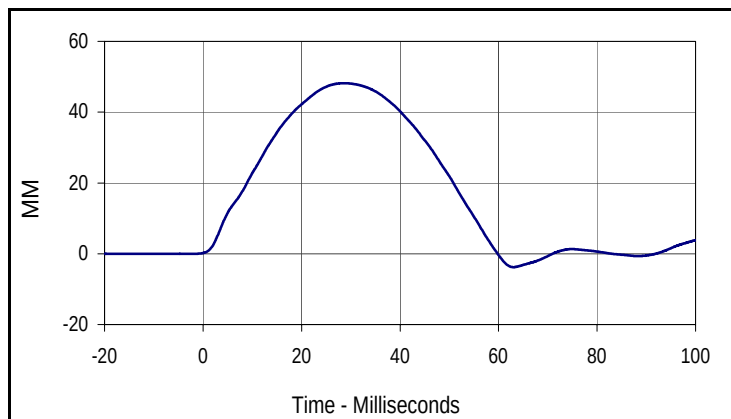
Test Date: 8/6/10
 Test I.D.: RIB07F



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
Peak Rib Deflection at 459 MM Drop Height	MM	36 to 40	38.4	Pass
Peak Rib Deflection at 815 MM Drop Height	MM	46 to 51	48.2	Pass
Overall Test Results			Pass	



Curve Description			
Lower Rib Deflection (459 MM Drop Height)			
CURNO	Type	SAE Class	Units
001	FIL	180	MM
Max	Time	Min	Time
38.4	29.7	-3.3	64.7



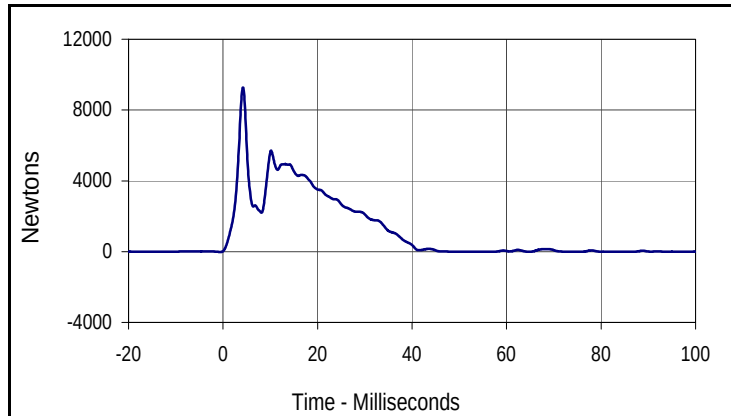
Curve Description			
Lower Rib Deflection (815 MM Drop Height)			
CURNO	Type	SAE Class	Units
001	FIL	180	MM
Max	Time	Min	Time
48.2	28.6	-3.8	63.0

Test Program: ES2re Thorax Calibration
 ATD Serial No.: F035

Test Date: 8/6/10
 Test I.D.: TH07A



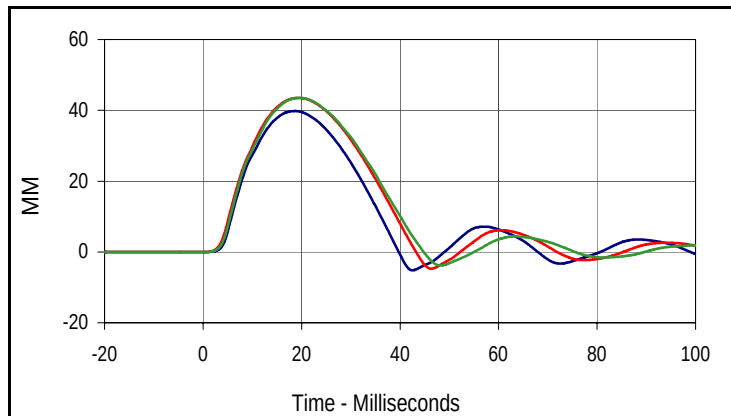
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Probe Velocity	m/s	5.40 to 5.60	5.49	Pass
Impactor Force	N	5100 to 6200	5702.2	Pass
	msec	> 6.0 msec	10.2	Pass
Upper Rib Deflection	MM	34 to 41	39.8	Pass
Middle Rib Deflection	MM	37 to 45	43.5	Pass
Lower Rib Deflection	MM	37 to 44	43.5	Pass
Overall Test Results			Pass	



Curve Description

Impactor Force

CURNO	Type	SAE Class	Units
001	FIL	180	Newtons
Max	Time	Min	Time
9274.1	4.2	-27.8	-0.5



Curve Description

Upper, Middle, Lower Rib Deflections

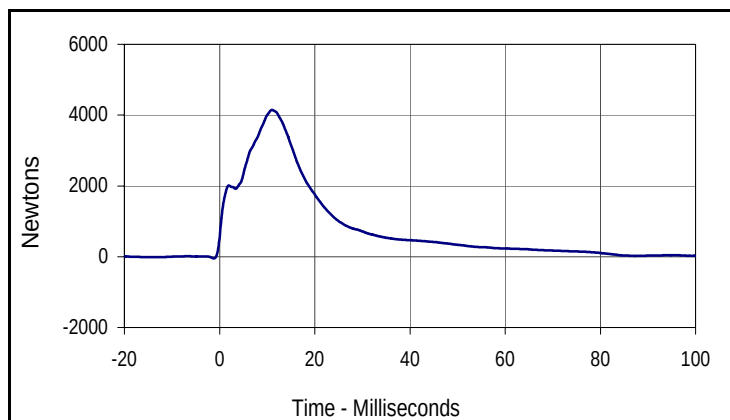
CURNO(s)	Type	SAE Class	Units
002-003-004	FIL	180	MM
Max (Upper)	Time	Min (Upper)	Time
39.8	18.7	-5.2	42.5
Max (Middle)	Time	Min (Middle)	Time
43.5	19.4	-4.7	46.4
Max (Lower)	Time	Min (Lower)	Time
43.5	19.5	-3.8	48.2

Test Program: ES2re Abodomen Calibration
 ATD Serial No.: F035

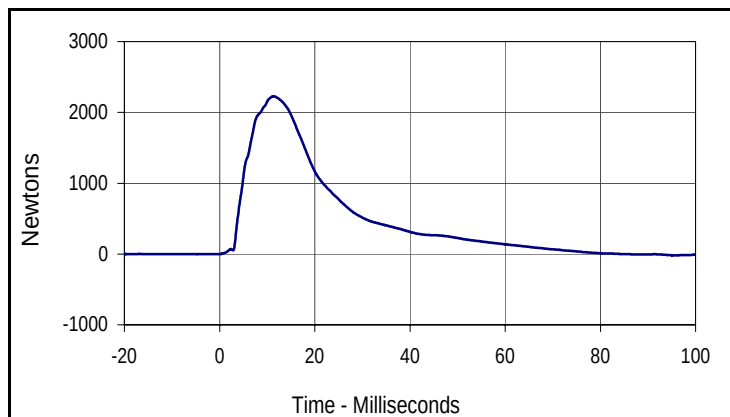
Test Date: 8/6/10
 Test I.D.: ABD07B



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
Probe Velocity	m/s	3.90 to 4.10	4.07	Pass
Impactor Force	N	4000 to 4800	4146.1	Pass
	msec	10.6 to 13.0	11.0	Pass
Abdominal Force	N	2200 to 2700	2227.5	Pass
	msec	10.0 to 12.3	11.4	Pass
Overall Test Results				Pass



Curve Description			
Impactor Force			
CURNO	Type	SAE Class	Units
001	FIL	180	Newtons
Max	Time	Min	Time
4146.1	11.0	-48.9	-1.2



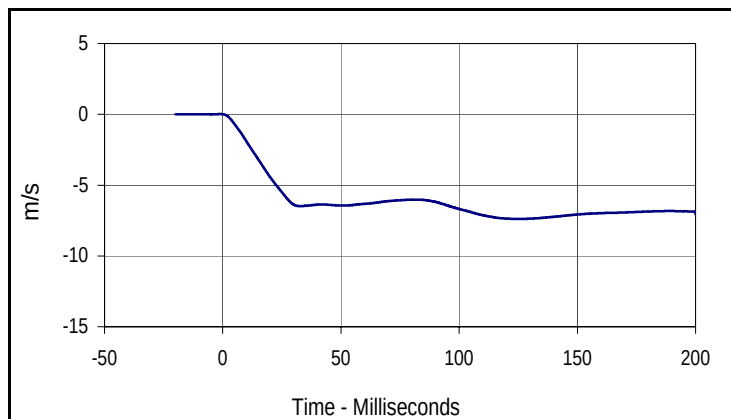
Curve Description			
Abdomen Sum Resultant			
CURNO	Type	SAE Class	Units
002	RES	600	Newtons
Max	Time	Min	Time
2227.5	11.4	-18.9	95.8

Test Program: ES2re Lumbar Spine Calibration
 ATD Serial No.: F035

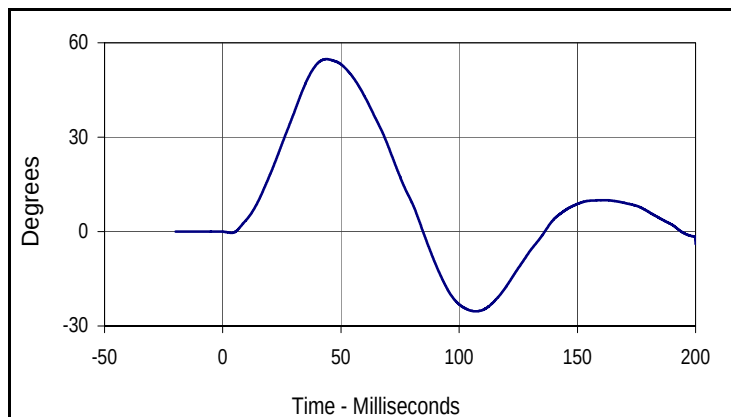
Test Date: 8/6/10
 Test I.D.: SP07B



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	5.95 to 6.15	6.02	Pass
Pendulum Deceleration	1 msec	m/s	0.0 to -.050	-0.030	Pass
	3.7 msec	m/s	-.240 to -.425	-0.412	Pass
	27 msec	m/s	-5.80 to -6.50	-5.90	Pass
	30 msec	m/s	< -6.50	-6.38	Pass
Headform Rotation	Max	Degrees	45.0 to 55.0	54.8	Pass
	Time	msec	39.0 to 53.0	43.9	Pass
Maximum Rotation To Time Zero Crossing		msec	37.0 to 57.0	40.9	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	60	m/s
Max	Time	Min	Time
0.0	-1.0	-7.4	125.4



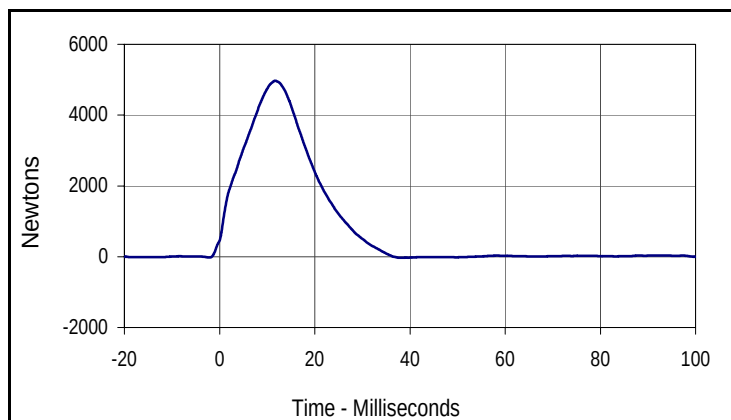
Curve Description			
Headform Rotation			
CURNO	Type	SAE Class	Units
002	FIL	180	Degrees
Max	Time	Min	Time
54.8	43.9	-25.3	107.0

Test Program: ES2re Pelvis Calibration
 ATD Serial No.: F035

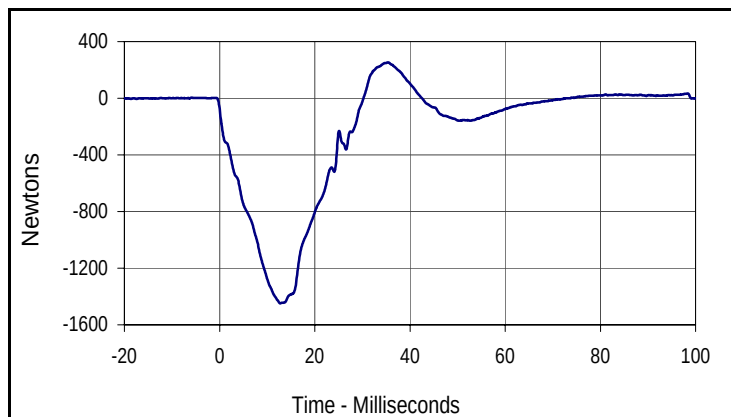
Test Date: 8/6/10
 Test I.D.: PL06B



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
Probe Velocity	m/s	4.20 to 4.40	4.27	Pass
Impactor Force	N	4700 to 5400	4967.9	Pass
	msec	11.8 to 16.1	11.8	Pass
Pubic Symphysis Load	N	-1230 to -1590	-1448.4	Pass
	msec	12.2 to 17.0	12.8	Pass
Overall Test Results				Pass



Curve Description			
Impactor Force			
CURNO	Type	SAE Class	Units
001	FIL	180	Newtons
Max	Time	Min	Time
4969.1	11.7	-30.3	38.5



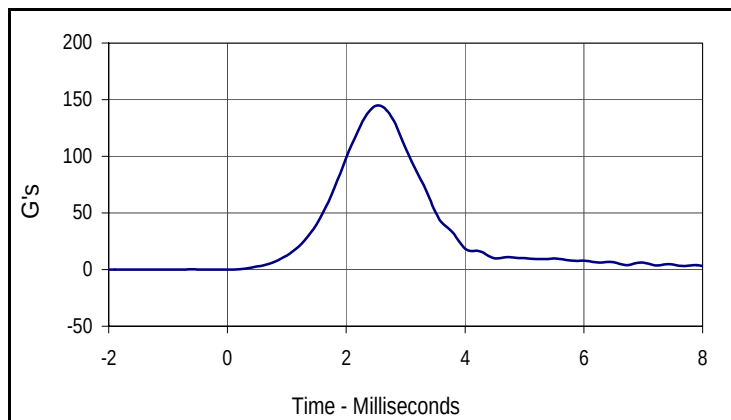
Curve Description			
Pubic FY			
CURNO	Type	SAE Class	Units
002	FIL	600	Newtons
Max	Time	Min	Time
254.1	35.4	-1448.4	12.8

Test Program: ES2re Lateral Head Drop Calibration
 ATD Serial No.: F035

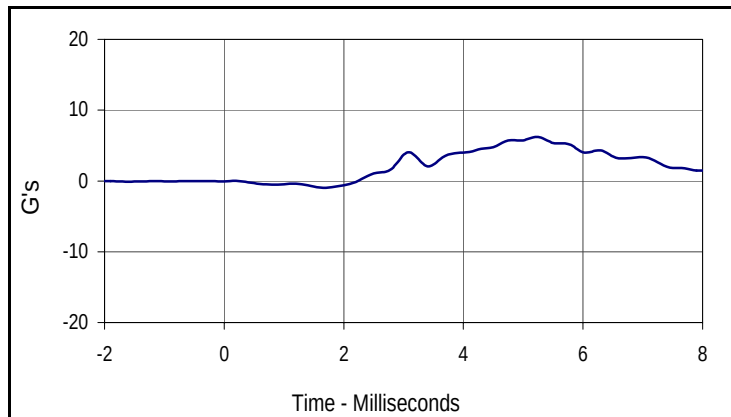
Test Date: 8/6/10
 Test I.D.: HD07A



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
Peak Resultant Acceleration	G's	125 to 155	144.6	Pass
Peak Longitudinal Acceleration	G's	≤15	6.2	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse	%	<15	7.1	Pass
Overall Test Results			Pass	



Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
144.6	2.5	0.0	-2.0



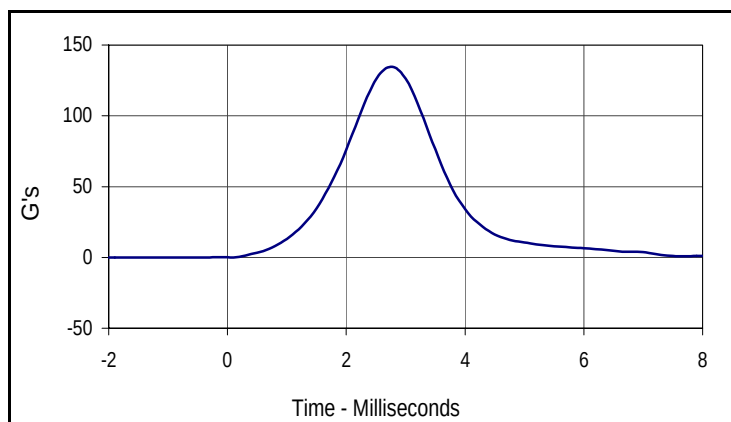
Curve Description			
Head X			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
6.2	5.2	-1.0	1.7

Test Program: SID IIs Lateral Head Drop Calibration
 ATD Serial No.: 307

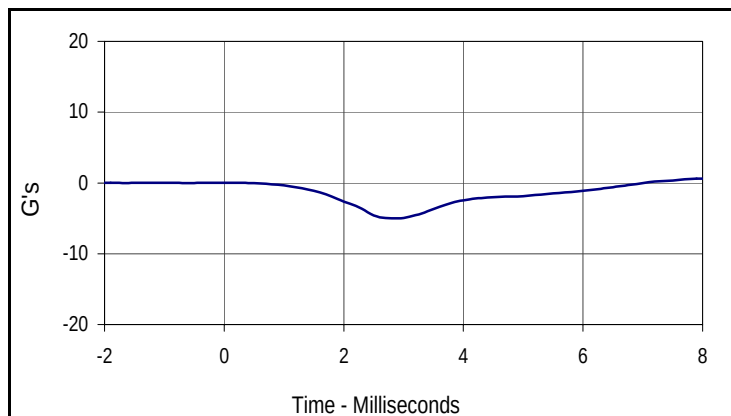
Test Date: 8/7/10
 Test I.D.: HD07B



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
Peak Resultant Acceleration	G's	115 to 137	134.4	Pass
Peak Longitudinal Acceleration	G's	≤15	5.0	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse	%	<15	7.8	Pass
Overall Test Results			Pass	



Curve Description			
Head Resultant			
CURNO	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
134.4	2.8	0.0	-1.9



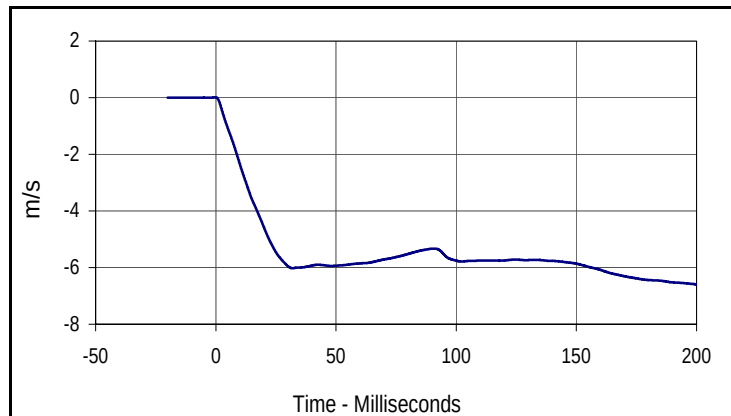
Curve Description			
Head X			
CURNO	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
0.0	-0.1	-5.0	2.9

Test Program: SID IIs Neck Calibration
 ATD Serial No.: 307

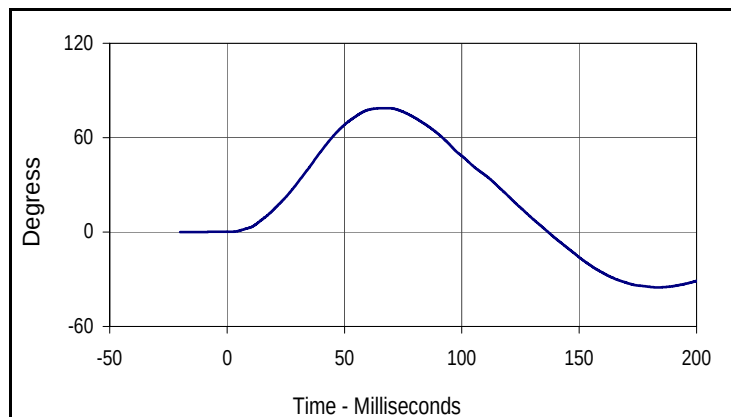
Test Date: 8/12/10
 Test I.D.: NB07B



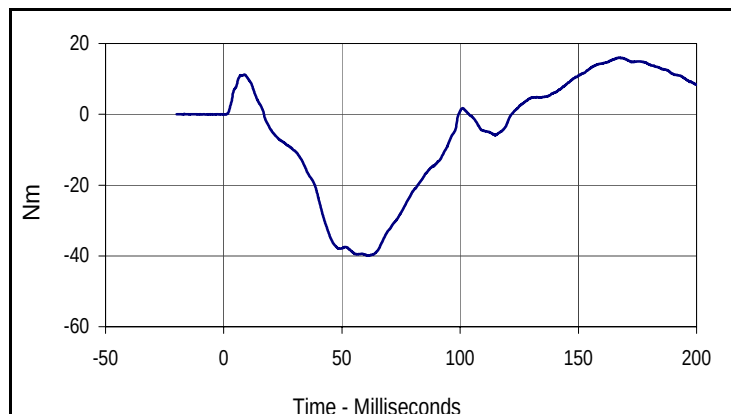
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
Pendulum Velocity		m/s	5.51 to 5.63	5.59	Pass
Pendulum Deceleration	10 msec	m/s	-2.20 to -2.80	-2.3	Pass
	15 msec	m/s	-3.30 to -4.10	-3.6	Pass
	20 msec	m/s	-4.40 to -5.40	-4.6	Pass
	25 msec	m/s	-5.40 to -6.10	-5.5	Pass
	25-100 msec	m/s	-5.50 to -6.20	-6.0	Pass
Translation-Rotation	Max	Degrees	71.0 to 81.0	78.8	Pass
	Time	msec	50.0 to 70.0	68.1	Pass
Peak Occipital Condyle Moment		Nm	-36.0 to -44.0	-39.9	Pass
Decaying Moment Time to Cross 0 Nm		msec	102.0 to 126.0	121.8	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
0.0	-0.3	-6.6	200.0



Curve Description			
Maximum Translation Rotation			
CURNO	Type	SAE Class	Units
002	FIL	60	Degress
Max	Time	Min	Time
78.8	68.1	-35.2	183.4



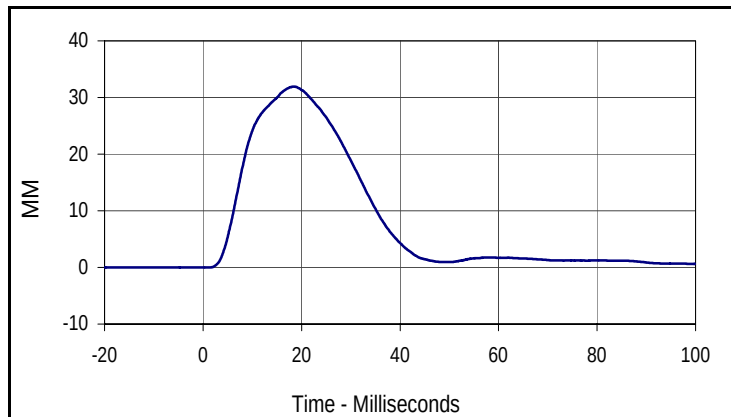
Curve Description			
Moment About Occipital Condyle			
CURNO	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
16.0	167.5	-39.9	61.2

Test Program: SID IIs Shoulder Calibration
 ATD Serial No.: 307

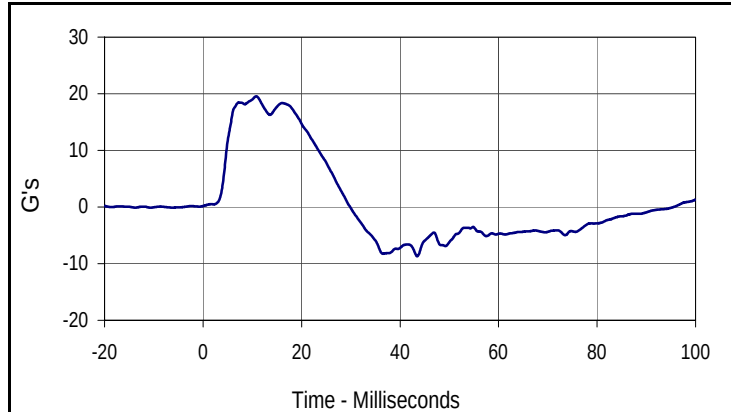
Test Date: 8/7/10
 Test I.D.: SH06C



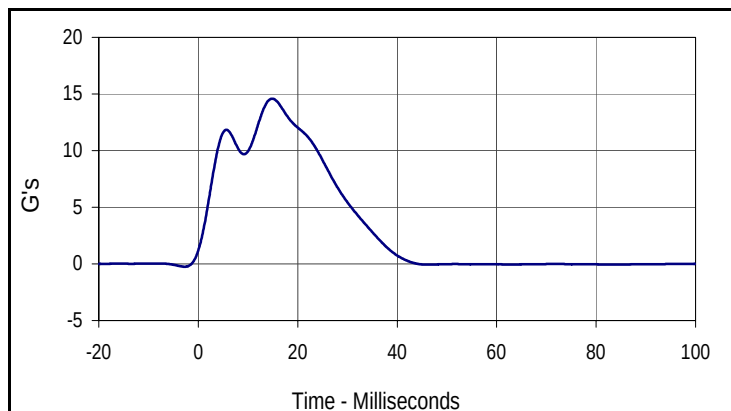
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity	m/s	4.20 to 4.40	4.27	Pass
Shoulder Deflection	MM	28 to 37	31.9	Pass
Peak Upper Spine Y Acceleration	G's	17 to 22	19.6	Pass
Peak Impactor Acceleration	G's	13 to 18	14.6	Pass
Overall Test Results			Pass	



Curve Description			
Shoulder Acceleration			
CURNO	Type	SAE Class	Units
001	FIL	180	MM
Max	Time	Min	Time
31.9	18.5	0.0	-19.4



Curve Description			
Upper Spine Y Acceleration			
CURNO	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
19.6	10.8	-8.7	43.5



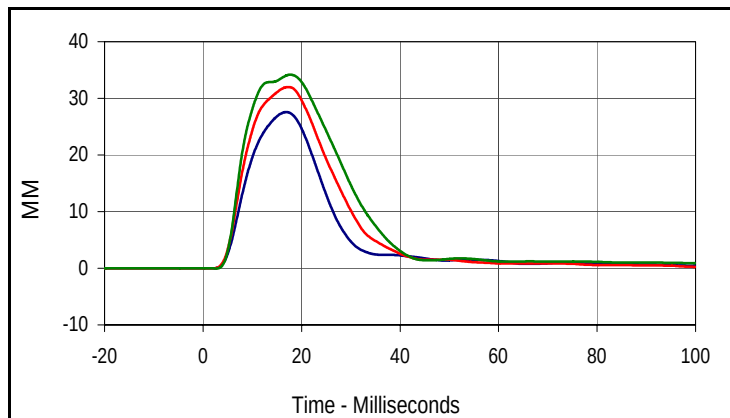
Curve Description			
Impactor Acceleration			
CURNO	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
14.6	14.9	-0.2	-2.7

Test Program: SID IIs Thorax with Arm Calibration
 ATD Serial No.: 307

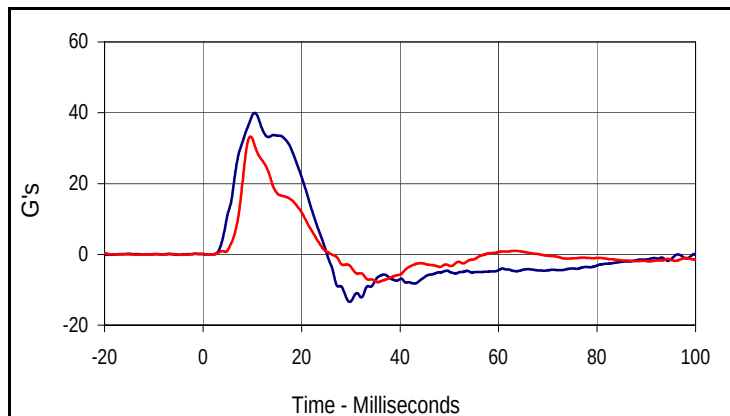
Test Date: 8/7/10
 Test I.D.: TH07B



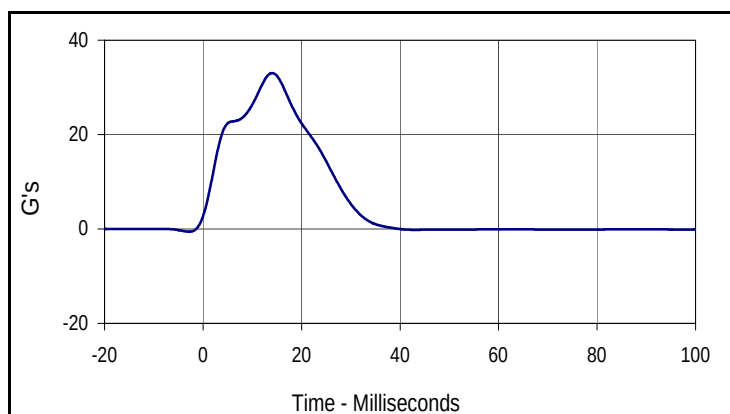
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity	m/s	6.60 to 6.80	6.73	Pass
Shoulder Deflection	MM	31 to 40	35.3	Pass
Upper Thorax Rib Deflection	MM	25 to 32	27.6	Pass
Middle Thorax Rib Deflection	MM	30 to 36	32.0	Pass
Lower Thorax Rib Deflection	MM	32 to 38	34.2	Pass
Peak Upper Spine Y Acceleration	G's	34 to 43	39.9	Pass
Peak Lower Spine Y Acceleration	G's	29 to 37	33.3	Pass
Peak Impactor Acceleration After 5 msec.	G's	30 to 36	33.0	Pass
Overall Test Results			Pass	



Curve Description			
Upper Thorax Deflection			
CURNO	Type	SAE Class	Units
001	FIL	180	MM
Max	Time	Min	Time
27.6	16.9	0.0	1.9
Middle Thorax Deflection			
Max	Time	Min	Time
32.0	17.3	0.0	2.0
Lower Thorax Deflection			
Max	Time	Min	Time
34.2	17.7	0.0	2.7



Curve Description			
Upper Spine Y Acceleration			
CURNO	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
39.9	10.5	-13.4	29.8
Lower Spine Y Acceleration			
CURNO	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
33.3	9.6	-7.9	35.5



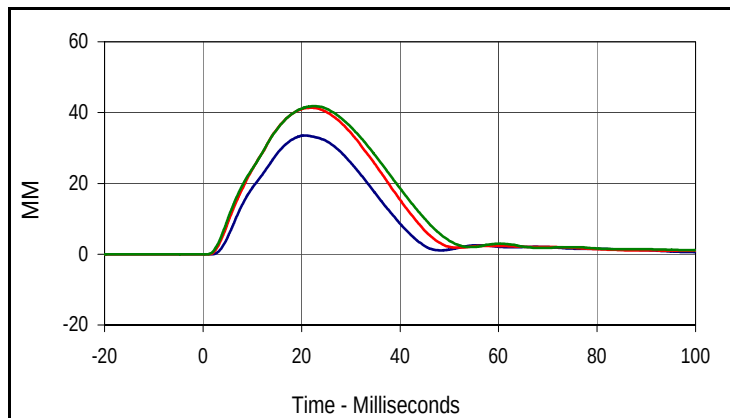
Curve Description			
Impactor Acceleration			
CURNO	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
33.0	14.0	-0.6	-2.8

Test Program: SID IIs Thorax w/o Arm Calibration
 ATD Serial No.: 307

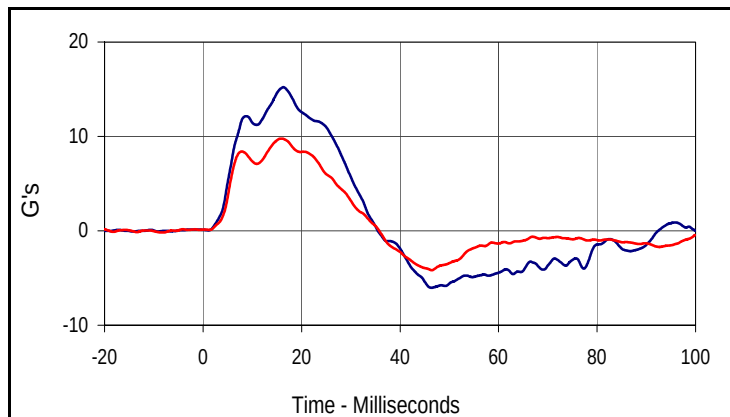
Test Date: 8/7/10
 Test I.D.: TOA07A



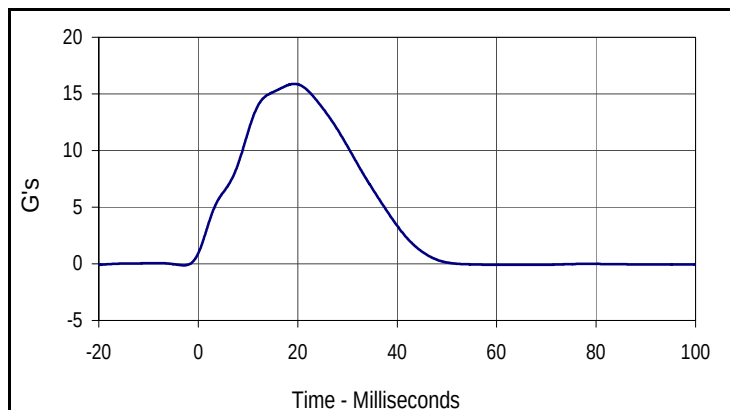
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity	m/s	4.20 to 4.40	4.27	Pass
Upper Thorax Rib Deflection	MM	32 to 40	33.5	Pass
Middle Thorax Rib Deflection	MM	39 to 45	41.3	Pass
Lower Thorax Rib Deflection	MM	35 to 43	41.8	Pass
Peak Upper Spine Y Acceleration	G's	13 to 17	15.2	Pass
Peak Lower Spine Y Acceleration	G's	7 to 11	9.8	Pass
Peak Impactor Acceleration	G's	14 to 18	15.9	Pass
Overall Test Results			Pass	



Curve Description			
Upper Thorax Deflection			
CURNO	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
33.5	20.6	0.0	0.3
Middle Thorax Deflection			
Max	Time	Min	Time
41.3	22.0	0.0	-17.4
Lower Thorax Deflection			
Max	Time	Min	Time
41.8	22.4	0.0	-18.3



Curve Description			
Upper Spine Y Acceleration			
CURNO	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
15.2	16.3	-6.0	46.3
Lower Spine Y Acceleration			
CURNO	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
9.8	15.9	-4.2	46.5



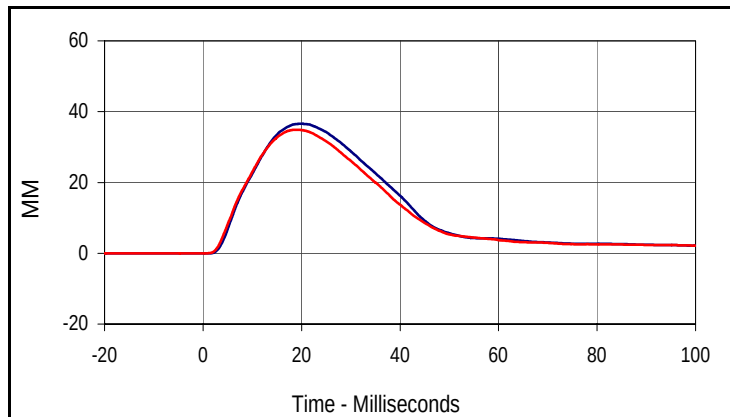
Curve Description			
Impactor Acceleration			
CURNO	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
15.9	19.3	-0.1	-2.9

Test Program: SID IIs Abdomen Calibration
 ATD Serial No.: 307

Test Date: 8/7/10
 Test I.D.: AB07B

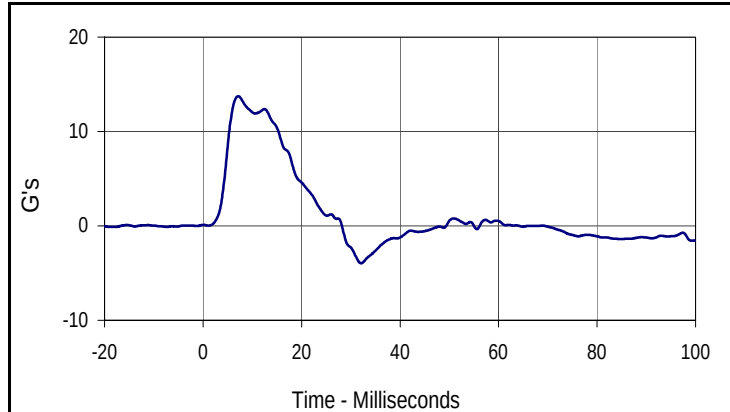


Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity	m/s	4.20 to 4.40	4.20	Pass
Upper Abdominal Rib Deflection	MM	36 to 47	36.6	Pass
Lower Abdominal Rib Deflection	MM	33 to 44	34.9	Pass
Peak Lower Spine Y Acceleration	G's	9 to 14	13.7	Pass
Peak Impactor Acceleration	G's	12 to 16	15.0	Pass
Overall Test Results			Pass	

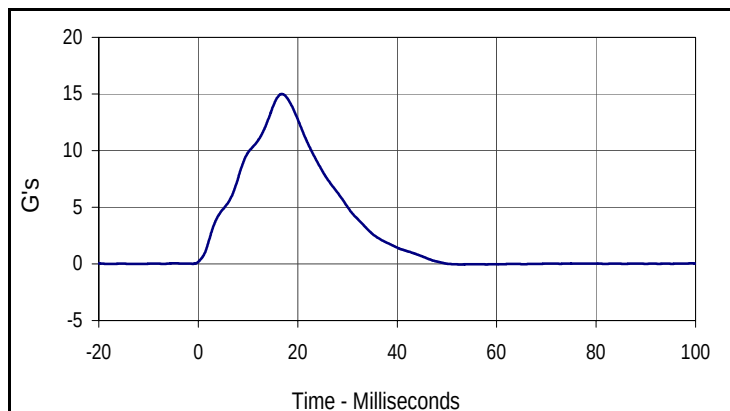


Curve Description			
Upper Abdominal Rib Deflection			
CURNO	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
36.6	19.8	0.0	-14.9

Curve Description			
Lower Abdominal Rib Deflection			
CURNO	Type	SAE Class	Units
002	FIL	600	MM
Max	Time	Min	Time
34.9	18.9	0.0	-11.6



Curve Description			
Lower Spine Y Acceleration			
CURNO	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
13.7	7.1	-4.0	32.1



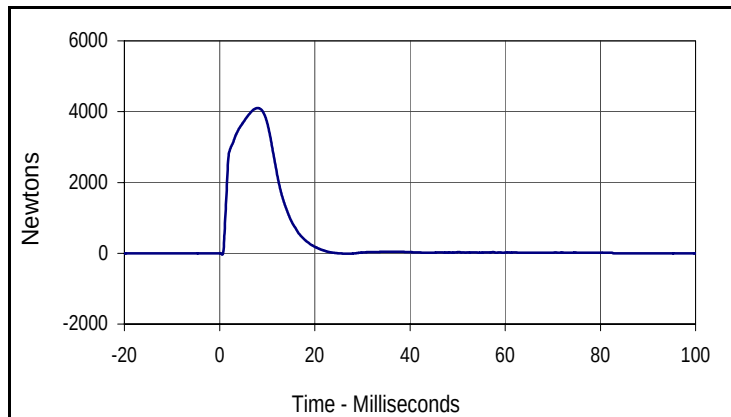
Curve Description			
Impactor Acceleration			
CURNO	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
15.0	16.8	-0.1	52.9

Test Program: SID IIs Pelvis Acetabulum Calibration
 ATD Serial No.: 307

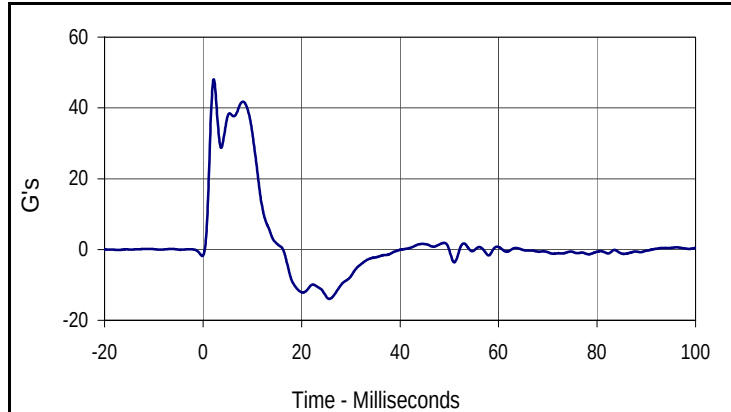
Test Date: 8/7/10
 Test I.D.: PA07B



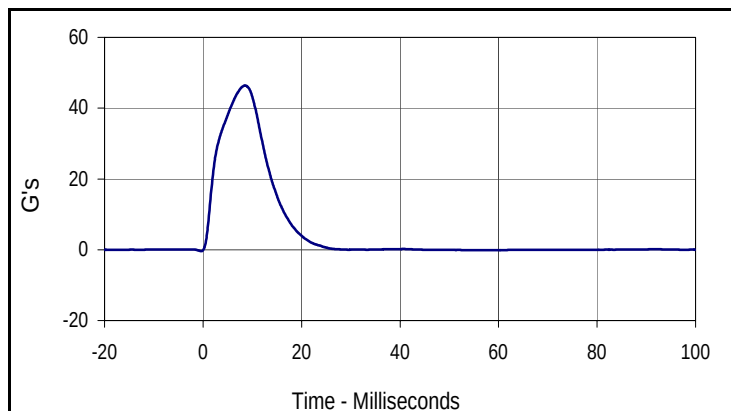
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity	m/s	6.60 to 6.80	6.69	Pass
Peak Acetabulum Force	Newtons	3600 to 4300	4101.5	Pass
Peak Pelvis Y Acceleration After 6 msec.	G's	34 to 42	41.7	Pass
Peak Impactor Acceleration	G's	38 to 47	46.4	Pass
Overall Test Results			Pass	



Curve Description			
Pelvis Acetabulum Force			
CURNO	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
4101.5	8.0	-35.2	0.6



Curve Description			
Pelvis Y Acceleration			
CURNO	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
48.1	2.2	-14.0	25.6



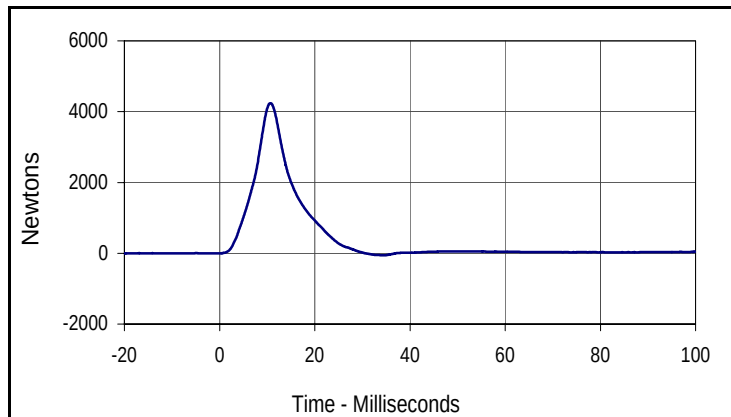
Curve Description			
Impactor Acceleration			
CURNO	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
46.4	8.5	-0.4	-0.4

Test Program: SID IIs Pelvis Iliac Calibration
 ATD Serial No.: 307

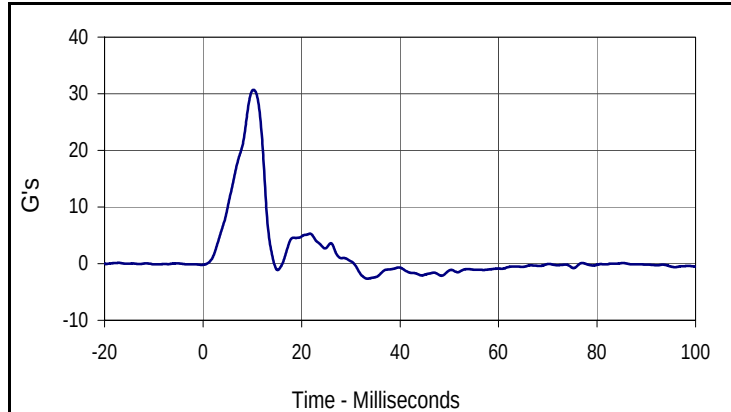
Test Date: 8/7/10
 Test I.D.: PL07B



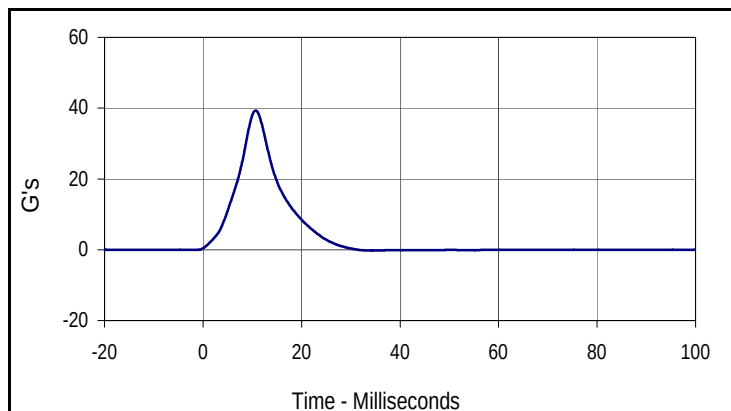
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
Pendulum Velocity	m/s	4.2 to 4.4	4.20	Pass
Peak Iliac Force	Newtons	4100 to 5100	4238.7	Pass
Peak Pelvis Y Acceleration	G's	28 to 39	30.7	Pass
Peak Impactor Acceleration	G's	36 to 45	39.3	Pass
Overall Test Results			Pass	



Curve Description			
Pelvis Iliac Force			
CURNO	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
4238.7	10.7	-58.7	34.4



Curve Description			
Pelvis Y Acceleration			
CURNO	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
30.7	10.2	-2.7	33.4



Curve Description			
Impactor Acceleration			
CURNO	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
39.3	10.7	-0.2	35.3

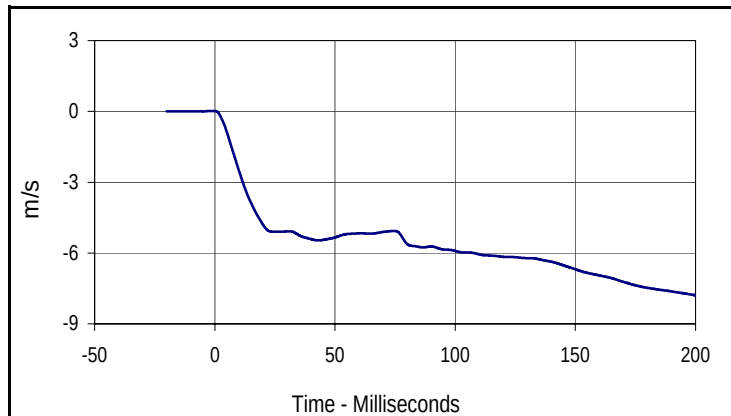
APPENDIX C
POST-TEST / HIII CONFIGURATION AND PERFORMANCE VERIFICATION DATA

Test Program: ES2re Neck Calibration
 ATD Serial No.: F035

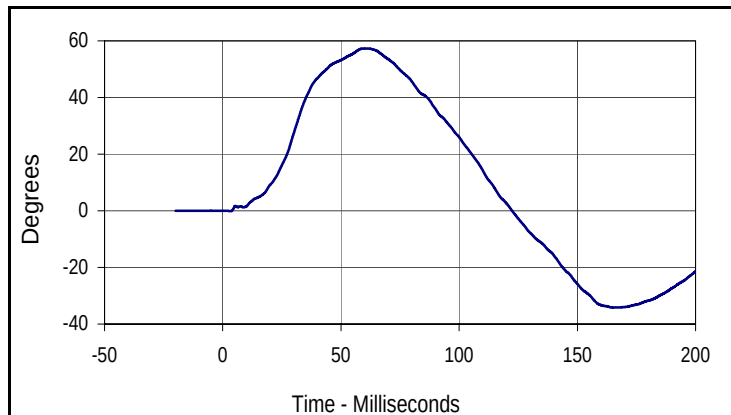
Test Date: 8/12/10
 Test I.D.: NB08B



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	3.30 to 3.50	3.38	Pass
Pendulum Deceleration	1 msec	m/s	0.0 to -.050	-0.008	Pass
	3 msec	m/s	-.250 to -.375	-0.347	Pass
	14 msec	m/s	-3.20 to -3.70	-3.64	Pass
Headform Rotation	Max	Degrees	49.0 to 58.0	57.3	Pass
	Time	msec	54.0 to 66.0	60.9	Pass
Maximum Rotation To Time Zero Crossing		msec	53.0 to 88.0	61.6	Pass
			Overall Test Results		Pass



Curve Description			
Pendulum Velocity			
CURNO	Type	SAE Class	Units
001	FIL	60	m/s
Max	Time	Min	Time
0.0	0.1	-7.8	200.0



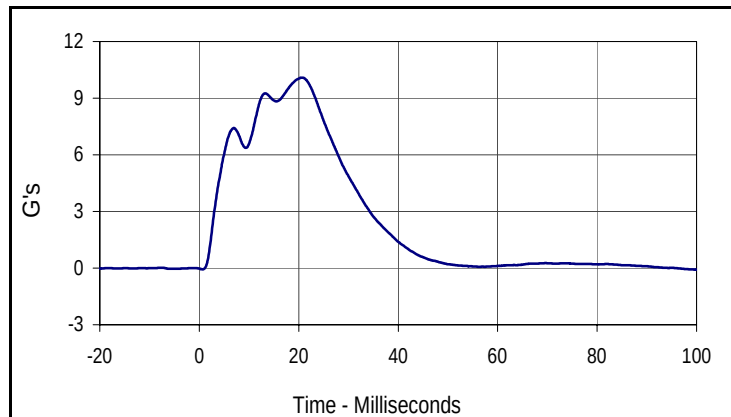
Curve Description			
Headform Rotation			
CURNO	Type	SAE Class	Units
002	FIL	180	Degrees
Max	Time	Min	Time
57.3	60.9	-34.2	164.9

Test Program: ES2re Shoulder Calibration
 ATD Serial No.: F035

Test Date: 8/12/10
 Test I.D.: SH07B



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
Probe Velocity	m/s	4.20 to 4.40	4.34	Pass
Peak Impactor Acceleration	G's	7.5 to 10.5	10.1	Pass
Overall Test Results			Pass	



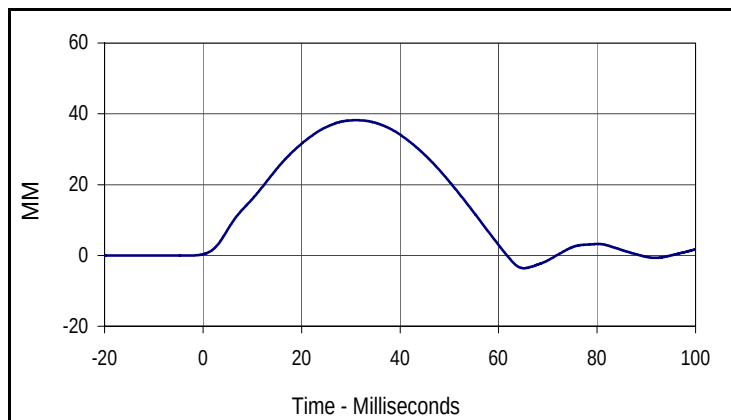
Curve Description			
Probe Impactor Acceleration			
CURNO	Type	SAE Class	Units
001	FIL	180	G's
Max	Time	Min	Time
10.1	20.7	-0.1	99.9

Test Program: ES2re Rib Module Calibration
 ATD Serial No.: F035 Rib #1

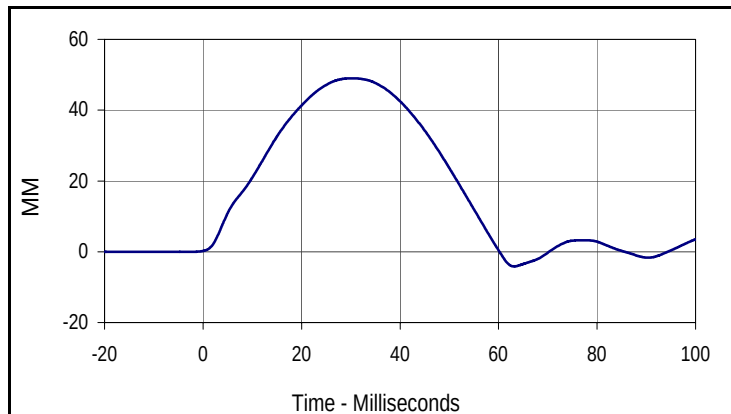
Test Date: 8/12/10
 Test I.D.: RIB08A



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
Peak Rib Deflection at 459 MM Drop Height	MM	36 to 40	38.2	Pass
Peak Rib Deflection at 815 MM Drop Height	MM	46 to 51	49.0	Pass
Overall Test Results			Pass	



Curve Description			
Upper Rib Deflection (459 MM Drop Height)			
CURNO	Type	SAE Class	Units
001	FIL	180	MM
Max	Time	Min	Time
38.2	31.1	-3.6	65.1



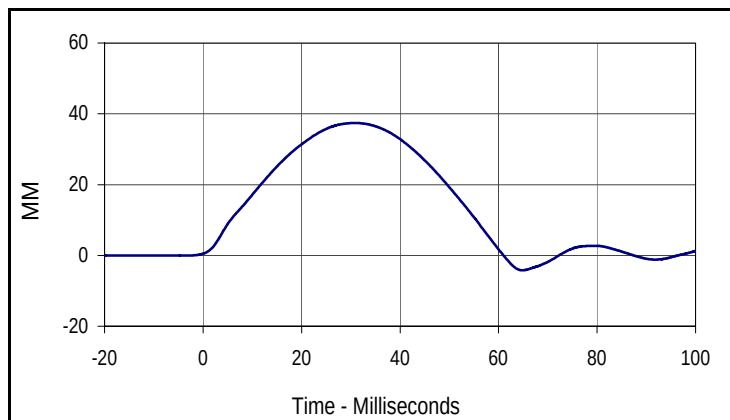
Curve Description			
Upper Rib Deflection (815 MM Drop Height)			
CURNO	Type	SAE Class	Units
001	FIL	180	MM
Max	Time	Min	Time
49.0	30.2	-4.1	63.2

Test Program: ES2re Rib Module Calibration
 ATD Serial No.: F035 Rib #2

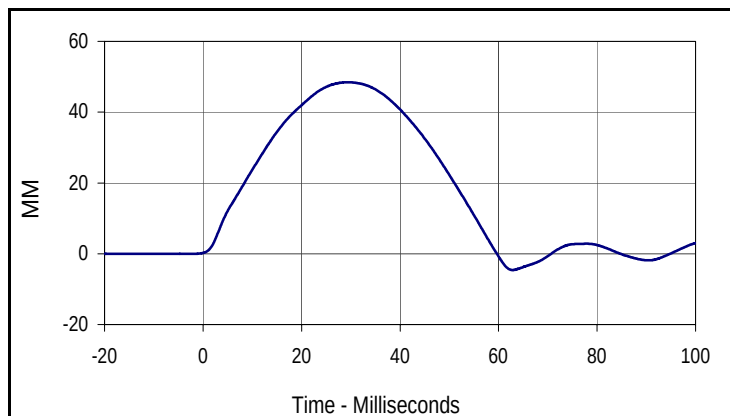
Test Date: 8/12/10
 Test I.D.: RIB08B



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
Peak Rib Deflection at 459 MM Drop Height	MM	36 to 40	37.4	Pass
Peak Rib Deflection at 815 MM Drop Height	MM	46 to 51	48.4	Pass
Overall Test Results			Pass	



Curve Description			
Middle Rib Deflection (459 MM Drop Height)			
CURNO	Type	SAE Class	Units
001	FIL	180	MM
Max	Time	Min	Time
37.4	30.9	-4.2	64.8



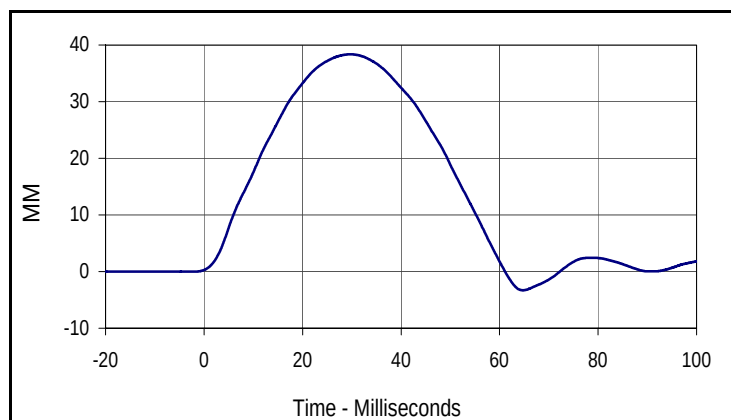
Curve Description			
Middle Rib Deflection (815 MM Drop Height)			
CURNO	Type	SAE Class	Units
001	FIL	180	MM
Max	Time	Min	Time
48.4	29.4	-4.6	62.9

Test Program: ES2re Rib Module Calibration
 ATD Serial No.: F035 Rib #3

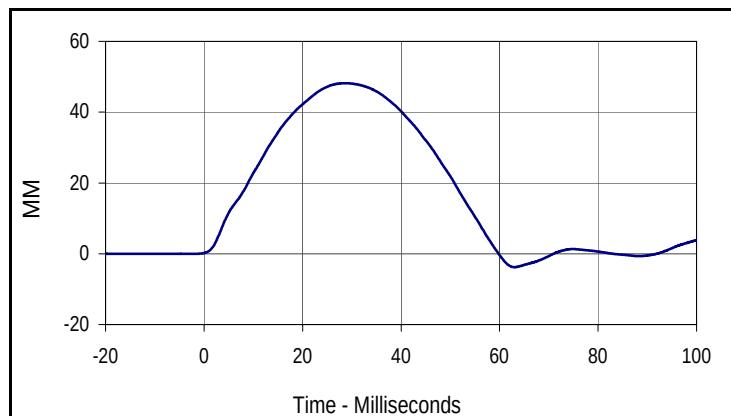
Test Date: 8/12/10
 Test I.D.: RIB08C



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
Peak Rib Deflection at 459 MM Drop Height	MM	36 to 40	38.4	Pass
Peak Rib Deflection at 815 MM Drop Height	MM	46 to 51	48.2	Pass
Overall Test Results			Pass	



Curve Description			
Lower Rib Deflection			
CURNO	Type	SAE Class	Units
001	FIL	180	MM
Max	Time	Min	Time
38.4	29.7	-3.3	64.7



Curve Description			
Lower Rib Deflection			
CURNO	Type	SAE Class	Units
001	FIL	180	MM
Max	Time	Min	Time
48.2	28.6	-3.8	63.0