

REPORT NUMBER: NCAPSIDE-MGA-2010-005

**NEW CAR ASSESSMENT PROGRAM
SIDE IMPACT TEST**

**FUJI HEAVY INDUSTRIES LTD.
2010 SUBARU OUTBACK MPV
NHTSA NUMBER: MA5503**

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



Test Date: October 20, 2009

Report Date: November 10, 2009

FINAL REPORT

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

This final test report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, in response to Contract Number DTNH22-09-D-00124.

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

Prepared by: 
Joe Fleck, Project Engineer

Date: 11/10/2009

Reviewed by: 
David Winkelbauer, Director of Operations

Date: 11/10/2009

Technical Report Documentation Page

1. Report No. NCAPSIDE-MGA-2010-005	2. Government Accession No.	3. Recipient's Catalog No.																						
4. Title and Subtitle Final Report of New Car Assessment Program Side Impact Testing of 2010 Subaru Outback MPV NHTSA No.: MA5503		5. Report Date November 10, 2009																						
		6. Performing Organization Code MGA																						
7. Author(s) Joe Fleck, Project Engineer David Winkelbauer, Director of Operations		8. Performing Organization Report No. NCAPSIDE-MGA-2010-005																						
9. Performing Organization Name and Address MGA Research Corporation 5000 Warren Road Burlington, WI 53105		10. Work Unit No.																						
		11. Contract or Grant No. DTNH22-09-D-00124																						
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Rulemaking, Office of Crashworthiness Standards 1200 New Jersey Ave, SE, Room W43-410, NVS-111 Washington, D.C. 20590		13. Type of Report and Period Covered: <i>Final Report</i> 10/20/2009 to 11/10/2009																						
		14. Sponsoring Agency Code NVS-111																						
15. Supplementary Notes																								
16. Abstract A 55/28 km/h 90° Moving Deformable Barrier NCAP side impact was conducted on the subject 2010 Subaru Outback MPV to obtain new car assessment and research data indicant of FMVSS No. 214D performance. The test was conducted at MGA Research Corporation, in Burlington, Wisconsin, on October 20, 2009. The impact velocity of the Moving Deformable Barrier (MDB) was 62.4 km/h, and the ambient temperature at the struck side (drivers) of the vehicle was 21°C. The target vehicle's maximum post test static crush was 240 mm at level 3. The test vehicle's occupant performance is as follows: <table style="margin-left: auto; margin-right: auto; border: none;"> <thead> <tr> <th></th> <th style="text-align: center;"><u>DRIVER</u></th> <th style="text-align: center;"><u>PASS.</u></th> </tr> </thead> <tbody> <tr> <td>Left Upper Rib (LUR) Accel., g</td> <td style="text-align: center;">28.1</td> <td style="text-align: center;">33.3</td> </tr> <tr> <td>Left Lower Rib (LLR) Accel., g</td> <td style="text-align: center;">22.2</td> <td style="text-align: center;">40.2</td> </tr> <tr> <td>Lower Spine (T₁₂) Accel., g</td> <td style="text-align: center;">26.8</td> <td style="text-align: center;">38.4</td> </tr> <tr> <td>Thoracic Trauma Index (TTI)</td> <td style="text-align: center;">27</td> <td style="text-align: center;">39</td> </tr> <tr> <td>Pelvis (PEV) Accel., g</td> <td style="text-align: center;">48.8</td> <td style="text-align: center;">52.9</td> </tr> <tr> <td>HIC</td> <td style="text-align: center;">78</td> <td style="text-align: center;">169</td> </tr> </tbody> </table> The 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.					<u>DRIVER</u>	<u>PASS.</u>	Left Upper Rib (LUR) Accel., g	28.1	33.3	Left Lower Rib (LLR) Accel., g	22.2	40.2	Lower Spine (T ₁₂) Accel., g	26.8	38.4	Thoracic Trauma Index (TTI)	27	39	Pelvis (PEV) Accel., g	48.8	52.9	HIC	78	169
	<u>DRIVER</u>	<u>PASS.</u>																						
Left Upper Rib (LUR) Accel., g	28.1	33.3																						
Left Lower Rib (LLR) Accel., g	22.2	40.2																						
Lower Spine (T ₁₂) Accel., g	26.8	38.4																						
Thoracic Trauma Index (TTI)	27	39																						
Pelvis (PEV) Accel., g	48.8	52.9																						
HIC	78	169																						
17. Key Words New Car Assessment Program (NCAP) Side Impact Side Impact Hybrid III Dummy (SID/HIII) Occupant Side Impact Protection		18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Adm. Technical Ref. Division, 1200 New Jersey Ave, SE Washington, D.C. 20590																						
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 140	22. Price																					

Form DOT F1700.7 (8-72)

TABLE OF CONTENTS

<u>Section</u>		<u>Page No.</u>
1	Purpose and Test Procedure	1
2	Summary of NCAP Side Impact Test	2
<u>Data Sheet No.</u>		<u>Page No.</u>
1	General Test and Vehicle Parameter Data	4
2	Test Vehicle Tire Information	6
3	Test Vehicle Information	7
4	Moving Deformable Barrier (MDB) Summary of Results	9
5	Post Test Observations	10
6	Vehicle Pre-Test and Post Test Measurements	11
7	SID/HIII Longitudinal Clearance Dimensions	12
8	SID/HIII Lateral Clearance Dimensions	13
9	Vehicle Side Measurements	14
10	Vehicle Exterior Crush Profiles	15
11	Vehicle Damage Profile Distances	17
12	Deformable Barrier Honeycomb Face Static Crush	18
13	Vehicle Accelerometer Locations	19
14	MDB Accelerometer Locations	20
15	Vehicle Structural Measurements	21
16	High Speed Camera Locations and Data	22
17	Summary of FMVSS 301 Data	23
<u>Appendix</u>		
A	Photographs	A
B	SID/HIII Response Data Traces	B
C	Dummy Calibration Data	C

SECTION 1

PURPOSE AND TEST PROCEDURE

PURPOSE

This side impact test was conducted as part of the test program sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-09-D-00124. The purpose of this test was to evaluate side impact protection in a 2010 Subaru Outback MPV manufactured by Fuji Heavy Industries Ltd.

TEST PROCEDURE

The side impact test was conducted in accordance with the Laboratory Test Procedure for New Car Assessment Program Side Impact Testing dated November 2002 and the corresponding MGA Research Corporation Test Procedure MGA-NHTSA5. The procedures for receiving, inspection, testing, and reporting of test results are described in the test procedures and are not repeated in this report.

MGA does not endorse or certify products. The manufacturer's name appears solely for identification purposes.

SECTION 2

SUMMARY OF NCAP SIDE IMPACT TEST

A model year 2010 Subaru Outback MPV was impacted on the left (driver's) side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 62.4 km/h. The specified impact velocity range is from 61.1 to 62.7 km/h. The test (target) vehicle was stationary and positioned 63° to the line of forward motion. The weight of the vehicle as tested was 1762.7 kg and the test weight of the MDB was 1361.5 kg. The test was conducted at MGA Research Corporation in Burlington, Wisconsin, on October 20, 2009.

One (1) real-time motion picture camera and nine (9) high-speed motion picture cameras were used to document the impact event. The pre-test and post-test conditions were recorded by one (1) real-time motion picture camera. Camera locations and pertinent camera information are documented in the data sheets. Pre- and post-test photographs of the vehicle and Side Impact Dummies (SID/HIIs) can be found in Appendix A. Two 50th percentile adult male SID/HIIs were placed in the driver and left rear passenger designated seating positions according to instructions specified in the Laboratory Test Procedure for New Car Assessment Program Side Impact Testing dated November 2002. Each SID/HII was instrumented in the following locations:

- Left Upper Rib (LUR) uni-axial accelerometer (Y-axis primary and redundant)
- Left Lower Rib (LLR) uni-axial accelerometer (Y-axis primary and redundant)
- Lower Thoracic Spine (T12) uni-axial accelerometer (Y-axis primary and redundant)
- Pelvic (PEV) section uni-axial accelerometer (Y-axis primary and redundant)
- Head Center of Gravity (CG) tri-axial accelerometers (X, Y and Z axes primary and redundant)
- Upper Neck load cell (Fx, Fy, Fz, Mx, My, Mz)

The test vehicle was instrumented with twenty (20) structural accelerometers and the MDB was instrumented with five (5) accelerometers and two (2) contact switches on the bumper to compare left side to right side bumper impact timing. All data channels were recorded with a fully self contained on-board DTS TDAS Pro Data Acquisition System. The data was digitally sampled at 10,000 samples per second and processed per Appendix V of the Test Procedure.

2.2 GENERAL COMMENTS

The test vehicle sustained a maximum static crush of 240 mm at level 3, 900 mm rearward of the vertical impact point. The driver and passenger SID/HIIs, Serial Nos. 271 and 272 respectively, were calibrated just prior to this test.

Appendix A contains the still photograph prints. Appendix B contains the SID/HII response data traces. Appendix C contains the dummy calibration data.

The occupant data is summarized below:

ATD position	HIC	T ¹	T ²	TTI (G's)	Peak Pelvis (G's)
Driver	78	42.7	78.7	27	48.8
Passenger	169	57.6	77.9	39	52.9

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

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

TEST NOTES

There was no valid data collected for:
Left Front Sill Y

MGA does not endorse or certify products. The manufacturer's name appears solely for identification purposes.

DATA SHEET NO. 1

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2010 Subaru Outback MPV
 Test Program: NCAP Side Impact

NHTSA No. MA5503
 Test Date: 10/20/2009

TEST VEHICLE INFORMATION

Make	Subaru
Model	Outback
Body Style	MPV
NHTSA No.	MA5503
VIN	4S4BRCAC4A1323905
Color	Azurite Blue Pearl
Delivery Date	9/24/2009
Odometer Reading (mile)	45 miles
Dealer	Wilde Subaru
Transmission	Manual
Final Drive	AWD
Number of Cylinders	4
Engine Displacement (L)	2.5
Engine Placement	Longitudinal
Automatic Door Locks (ADL)	No
Owner's Manual Details Instructions on Disabling ADLs	N/A

TEST VEHICLE OPTIONS

Driver Front Airbag	Yes
Driver Side Curtain Airbag	Yes
Driver Side Torso Airbag	Yes
Rear Passenger Side Curtain Airbag	Yes
Rear Passenger Side Torso Airbag	No
Power Steering	Yes
Power Door Locks	Yes
Tilt Wheel	Yes
Anti-lock Brakes	Yes
Traction Control	Yes
All Wheel Drive	Yes
Power Seats	No
Pretensioners	Yes
Load Limiters	Yes
Bucket Seats	Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Fuji Heavy Industries Ltd.
Date of Manufacture	08/09

GVWR (kg)	2080
GAWR Front (kg)	1070
GAWR Rear (kg)	1060

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

DATA SHEET NO. 1 (continued)**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2010 Subaru Outback MPV
 Test Program: NCAP Side Impact

NHTSA No. MA5503
 Test Date: 10/20/2009

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	424.6	357.9		477.2	451.8	
Right	kg	420.9	336.6		419.1	414.6	
Ratio	%	54.9	45.1		50.8	49.2	
Totals	kg	845.5	694.5	1540.0	896.3	866.4	1762.7

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1540.0
Weight of 2 P572M ATDs	kg	161.5
Rated Cargo/Luggage Weight (RCLW)	kg	68
Calculated Vehicle Target Weight (TVTW)	kg	1769.5

* Actual As Tested Weight (ATW) will be TVTW -5/-10 kg

Weight of Ballast in Trunk (kg): 45.4

TEST VEHICLE ATTITUDES AND CG

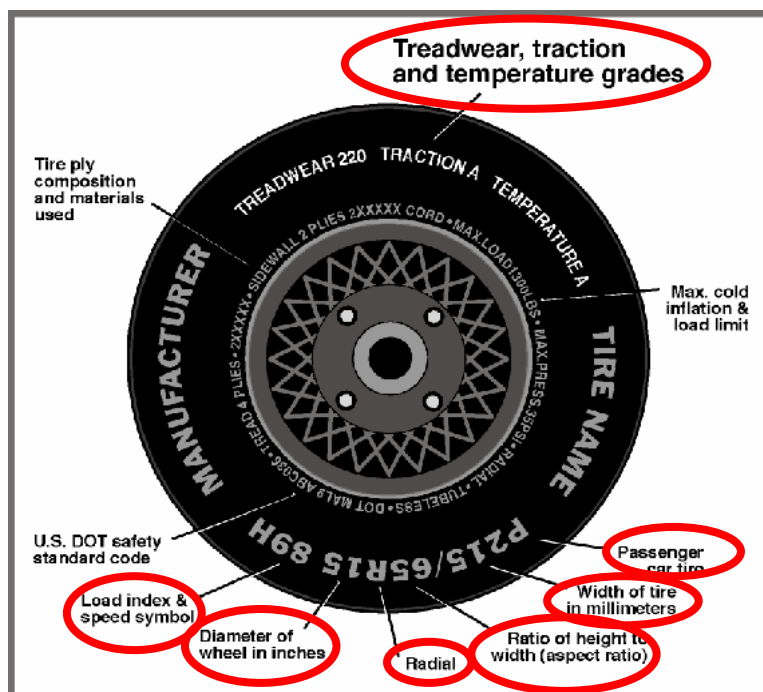
	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	783	790	805	813	1236
As Tested	mm	780	791	775	788	1347
Fully Loaded	mm	771	791	768	785	

TEST VEHICLE VERTICAL IMPACT LINE DATA

Measurement Description	Units	Value
Test Vehicle Wheel Base	mm	2740
Target Impact Point Aft of Front Axle	mm	430
Actual Impact Point Aft of Front Axle	mm	419

TEST VEHICLE TIRE INFORMATION

NHTSA No. MA5503
Test Date: 10/20/2009



DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Test Pressure (kPa)	220	210
Recommended Tire Size	P215/70R16	P215/70R16
Tire Size on Vehicle	P215/70R16	P215/70R16
Tire Manufacturer	Continental	Continental
Tire Name	ContiPro Contact	ContiPro Contact
Tire Type	Passenger	Passenger
Tire Width (mm)	215	215
Ratio of Height to Width (aspect ratio)	70	70
Radial	R	R
Wheel Diameter	16	16
Load Index & Speed Symbol	99S	99S
Treadwear	540	540
Traction Grade	A	A
Temperature Grade	A	A

DATA SHEET NO. 3
TEST VEHICLE INFORMATION

Test Vehicle: 2010 Subaru Outback MPV
Test Program: NCAP Side Impact

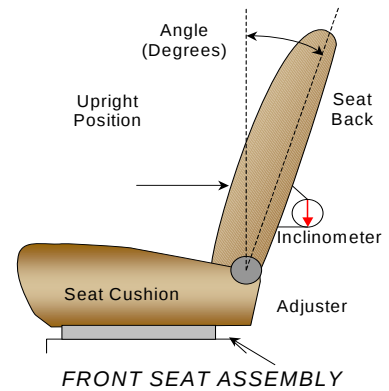
NHTSA No. MA5503
Test Date: 10/20/2009

NOMINAL DESIGN RIDING POSITION

The driver and passenger seat back is positioned to the manufacturer's designated angle. The procedure is as follows: For the driver's seat, set seat back in 8th detent with the forward-most detent defined as 0). The left rear passenger's seat is not adjustable.

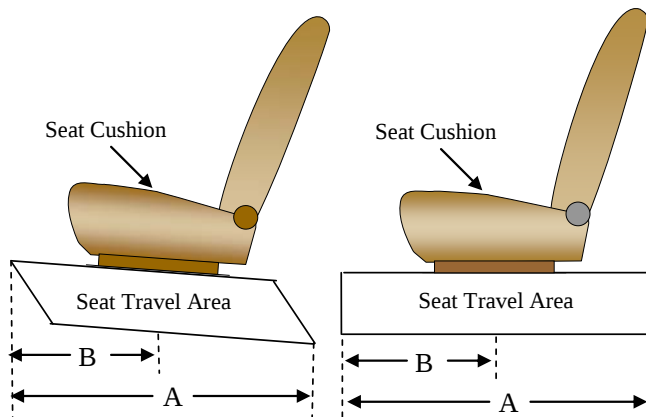
Driver seat back angle: 8th detent (forward-most as 0)

Passenger seat back angle: fixed



SEAT FORE/AFT POSITIONS

	Total Fore/Aft Travel	Placed in position #
Driver Seat	26 detents	10 th detent (forward-most as 0)
Rear Seat	Fixed	Fixed



DATA SHEET NO. 3 (CONTINUED)

TEST VEHICLE INFORMATION

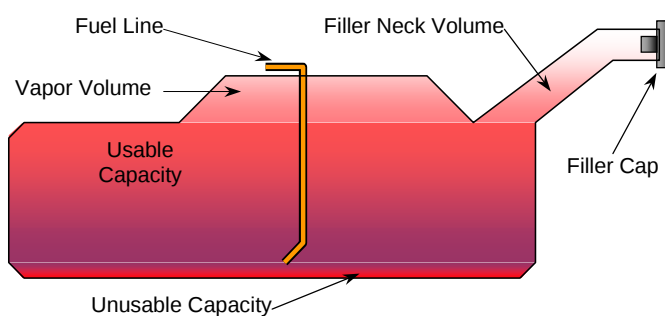
Test Vehicle: 2010 Subaru Outback MPV
 Test Program: NCAP Side Impact

NHTSA No. MA5503
 Test Date: 10/20/2009

FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	70.0
Usable Capacity of "Optional" Tank	
92-94% of Usable Capacity	64.4 to 65.8
Actual Amount of Solvent used	65.1
1/3 of Usable Capacity	23.3

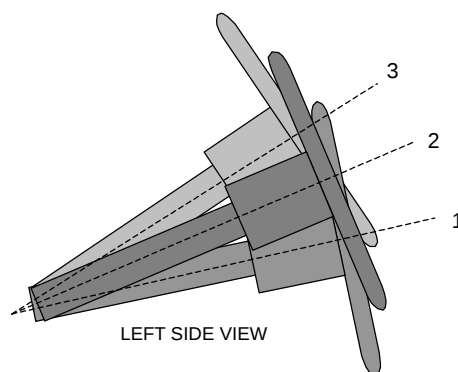
The test vehicle is equipped with an electric fuel pump. The pump normally operates when the vehicle's electrical system is activated.



VEHICLE FUEL TANK ASSEMBLY

STEERING COLUMN ADJUSTMENT

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



STEERING COLUMN ASSEMBLY

STEERING COLUMN POSITION

	Fore/Aft (mm)	Degrees
Lowermost position No. 1	135	65.5
Geometric center position No. 2	155	67.0
Uppermost position No. 3	175	68.5

DATA SHEET NO. 4**MOVING DEFORMABLE BARRIER (MDB) SUMMARY OF RESULTS**

Test Vehicle: 2010 Subaru Outback MPV
 Test Program: NCAP Side Impact

NHTSA No. MA5503
 Test Date: 10/20/2009

MDB SPECIFICATIONS

Measurement Description	Length (mm)
Overall Width of Framework Carriage	1252
Overall Length Including Honeycomb Face	4115
Wheel base of Framework Carriage	2592
C.G. Location aft of Front Axle	1129

MDB WEIGHTS

	Units	Front Axle	Rear Axle	Total
Left	kg	411.8	281.6	
Right	kg	356.8	311.3	
Ratio	%	56.5	43.5	
Totals	kg	768.6	592.9	1361.5

SPEED AND IMPACT ANGLE DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.1 to 62.7	62.4
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	62.4
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	89.9

POST TEST OBSERVATIONS
MDB LEFT EDGE IMPACT POINT DATA

Measured Parameter	Units	Requirement	Value
Horizontal Offset	mm	+/- 50	11 forward
Vertical Offset	mm	+/-20	1 up

DATA SHEET NO. 5

POST TEST OBSERVATIONS

Test Vehicle: 2010 Subaru Outback MPV
 Test Program: NCAP Side Impact

NHTSA No. MA5503
 Test Date: 10/20/2009

TEST DUMMY INFORMATION AND CONTACT POINTS

Description	Front Seat SID/HIII	Rear Seat SID/HIII
Dummy Type / Serial No.	SID HIII / 271	SID HIII / 272
Head Contact	Curtain Airbag, Headrest	Curtain Airbag, Headrest
Upper Torso Contact	Side Airbag	Door Panel
Lower Torso Contact	Side Airbag	Door Panel
Left Knee Contact	Door Panel	Door Panel
Right Knee Contact	Left Knee	Left Knee

POST TEST DOOR OPENING AND SEAT TRACK INFORMATION

Description	Front	Rear
Locked/Unlocked Doors	Struck side door was unlocked; Non-struck side door was unlocked	Struck side door was unlocked; Non-struck side door was unlocked
Left Side Door Opening	Door remained closed and latched	Door remained closed and latched
Right Side Door Opening	Door remained closed and latched; Door opened without tools	Door remained closed and latched; Door opened without tools
Seat Movement	0	0
Seat Back Failure	None	None

POST TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	No Separation
Sill Separation	None
Windshield Damage	None
Window Damage	Left Front Window was broken.
Other Notable Effects	None

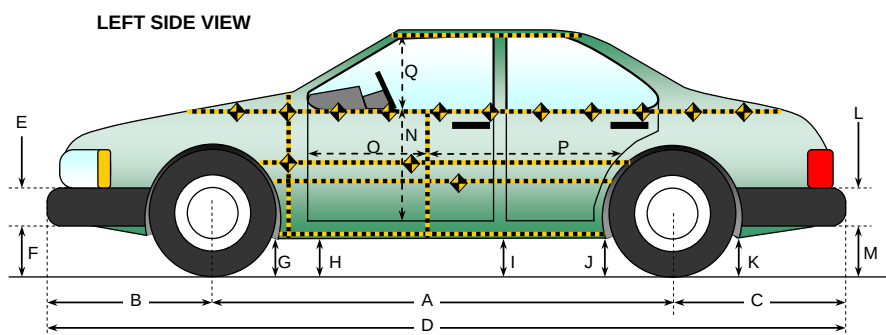
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

DATA SHEET NO. 6
VEHICLE PRE-TEST AND POST-TEST MEASUREMENTS

Test Vehicle: 2010 Subaru Outback MPV
 Test Program: NCAP Side Impact

NHTSA No. MA5503
 Test Date: 10/20/2009



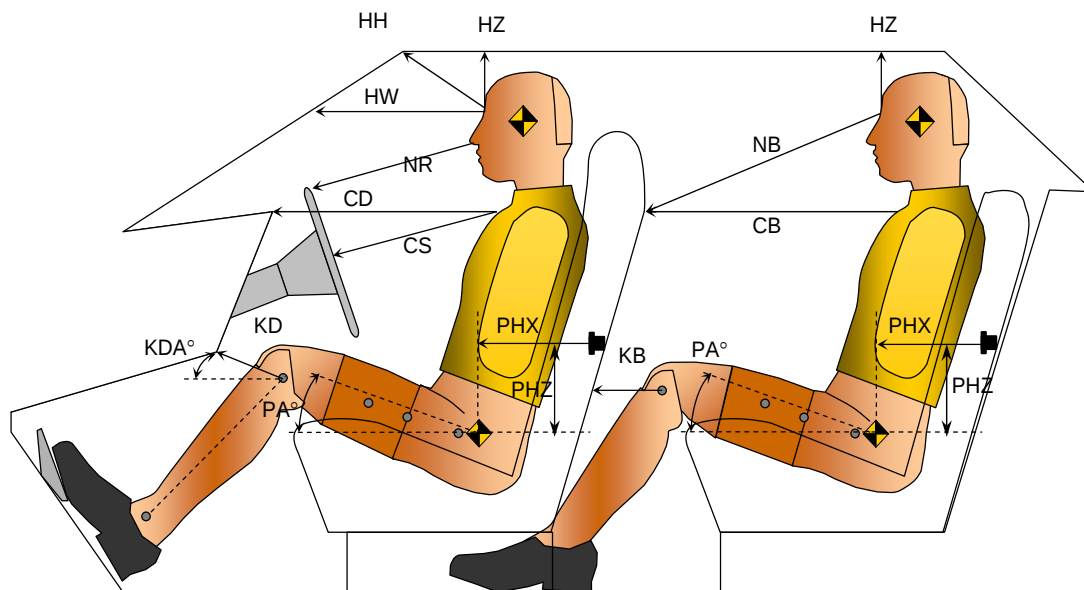
All Measurements in mm

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2740	2745	-5
B	Front Axle to FSOV	952	962	-10
C	Rear Axle to RSOV	1060	1071	-11
D	Total Length at Centerline	4752	4778	-26
E	Front Bumper Thickness	138	138	0
F	Front Bumper Bottom to Ground	305	343	-38
G	Sill Height at Front Wheel Well	253	280	-27
H	Sill Height at Front Door Leading Edge	248	285	-37
I	Sill Height at "B" Pillar	248	287	-39
J1	Sill Height at Rear Wheel Well	247	262	-15
J2	Pinch Weld Height at Rear Wheel Well	244	271	-27
K	Sill Height Aft of Rear Wheel Well	294	200	94
L	Rear Bumper Thickness	197	197	0
M	Rear Bumper Bottom to Ground	409	415	-6
N	Sill Height to Window Bottom Sill	721	638	83
O	Front Door Leading Edge to Impact CL	840	785	55
P	Rear Door Trailing Edge to Impact CL	1205	1160	45
Q	Front Window Opening	450	462	-12
R	Right Side Length	4050	4050	0
S	Left Side Length	4050	4025	25
T	Vehicle Width at "B" Post	1780	1575	205

DATA SHEET NO. 7
SID/HII LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2010 Subaru Outback MPV
 Test Program: NCAP Side Impact

NHTSA No. MA5503
 Test Date: 10/20/2009

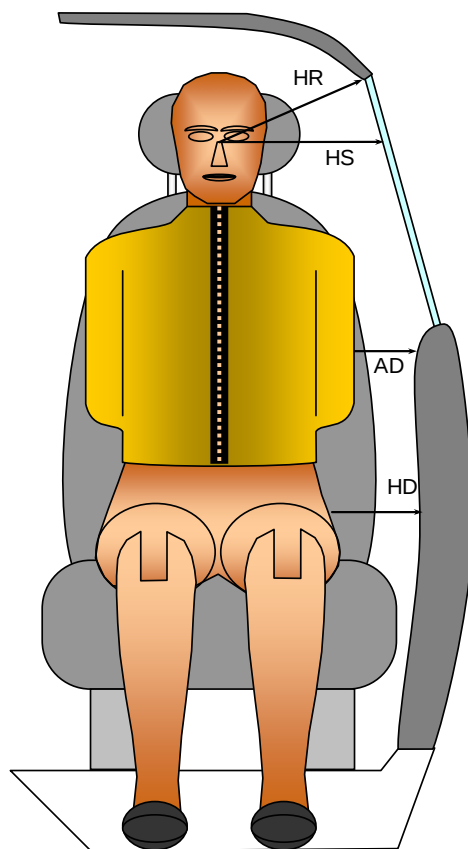


Driver Code	Pass. Code	Measurement Description	Driver S/N 271		Passenger S/N 272	
			Length(mm)	Angle(°)	Length(mm)	Angle(°)
HH		Head to Header	385			
HW		Head to Windshield	674			
HZ	HZ	Head to Roof	208		198	
NR	NB	Nose to Rim/Nose to Seatback	462		657	
CD	CB	Chest to Dash or Seatback	520		575	
CS		Chest to Steering Wheel	326			
KDL	KBL	Left Knee to Dash or Seatback	178	27.7	232	30.9
KDR	KBR	Right Knee to Dash or Seatback	164	27.8	234	31.3
PA	PA	Pelvic Angle		24.5		24.2
PHX	PHX	H-Point to Striker (X-Axis)	235		258	
PHZ	PHZ	H-Point to Striker (Z-Axis)	180		263	

DATA SHEET NO. 8
SID/HIII LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2010 Subaru Outback MPV
 Test Program: NCAP Side Impact

NHTSA No. MA5503
 Test Date: 10/20/2009



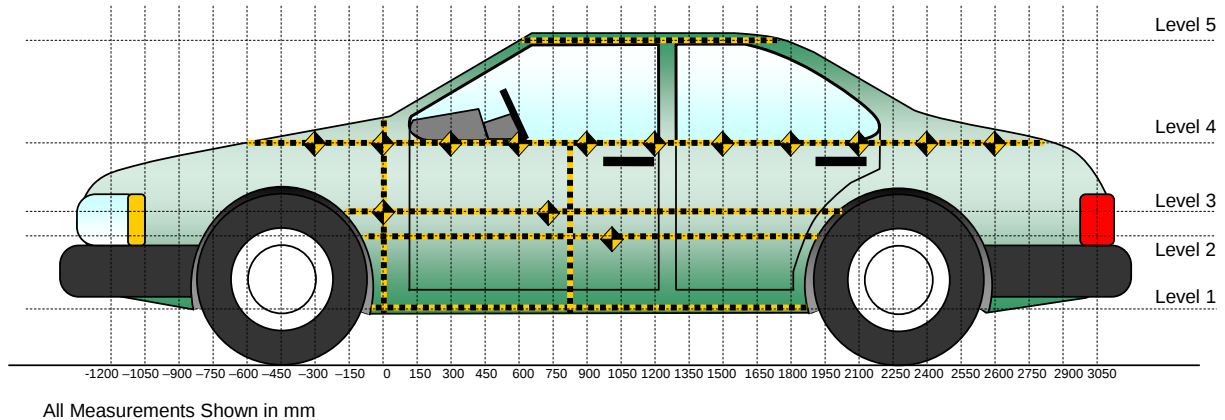
FRONT VIEW OF DUMMY

Code	Measurement Description	Units	Driver S/N 271	Passenger S/N 272
HR	Head to Side Header	mm	226	195
HS	Head to Side Window	mm	351	328
AD	Arm to Door	mm	108	83
HD	H-Point to Door	mm	148	137

DATA SHEET NO. 9 **VEHICLE SIDE MEASUREMENTS**

Test Vehicle: 2010 Subaru Outback MPV
 Test Program: NCAP Side Impact

NHTSA No. MA5503
 Test Date: 10/20/2009



LEFT SIDE VIEW

Measurements are taken with vehicle in the as tested condition.
 Measurements along the vertical 800 mm.
 All measurements below in mm.

Level	Measurement Description	Maximum Exterior Static Crush	Distance From Impact	Height Above Ground
5	Window	21	1200	1482
4	Window Sill	102	1200	1015
3	Mid Door	240	900	698
2	Occupant H-Point	210	1650	607
1	Sill Top	113	750	364
	Maximum Penetration	240		

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

Test Vehicle: 2010 Subaru Outback MPV
 Test Program: NCAP Side Impact

NHTSA No. MA5503
 Test Date: 10/20/2009

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-450				286					292					6	
-300				285					297					12	
-150			190	283				219	300				29	17	
0	210	204	211	281		254	251	258	301		44	47	47	20	
150	241	221	217	277		333	420	419	324		92	199	202	47	
300	244	220	215	276		347	419	420	331		103	199	205	55	
450	243	218	213	275		350	411	432	331		107	193	219	56	
600	243	216	211	273		354	403	443	341		111	187	232	68	
750	242	215	210	274	478	355	404	446	354	489	113	189	236	80	10
900	242	214	210	275	470	352	395	450	347	488	110	181	240	72	18
1050	241	215	210	275	471	350	390	441	336	488	109	175	231	61	17
1200	249	215	210	277	471	341	384	413	379	492	92	169	203	102	21
1350	242	215	210	280	474	345	396	446	377	494	103	181	236	97	20
1500	242	216	211	281	474	340	414	450	354	494	98	198	239	73	20
1650	241	218	212	284	475	349	428	444	337	493	108	210	232	53	18
1800	226	216	215	285	475	311	404	395	319	494	85	188	180	34	19
1950		191	195	288	476		262	291	302	494		71	96	14	18
2100			188	295	482			240	287	499			52	-8	17
2250				297	486				292	501				5	15
2400				303	491				327	504				24	13
2550				306	500				325	515				19	15
2700				311	511				329	520				18	9
2850				319					329					10	

Reference plane is parallel to test vehicle longitudinal centerline.

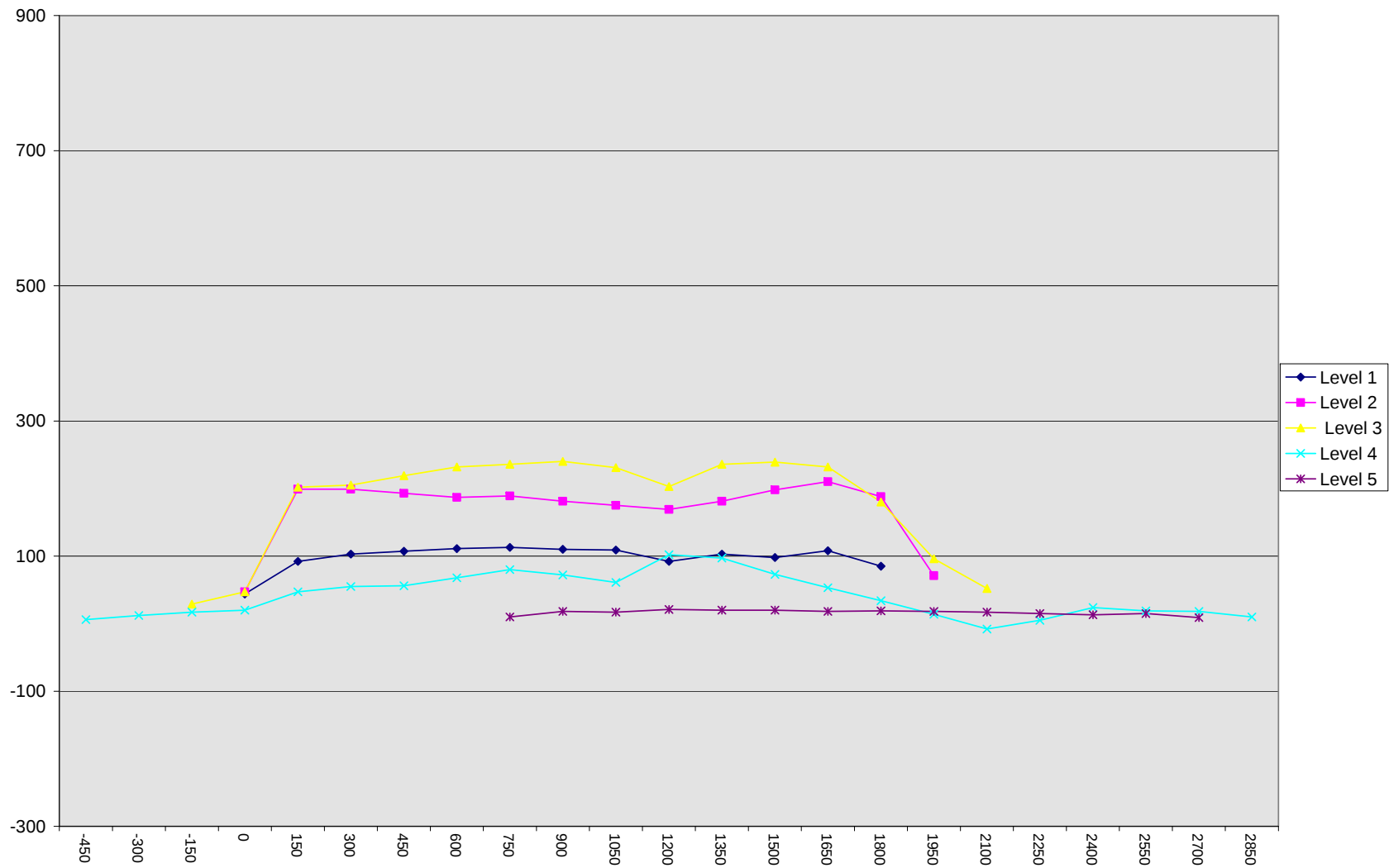
Given dimensions = Reference plane to car body

DATA SHEET NO. 10... (continued)
VEHICLE EXTERIOR CRUSH PROFILES

Test Vehicle: 2010 Subaru Outback MPV
Test Program: NCAP Side Impact

NHTSA No. MA5503
Test Date: 10/20/2009

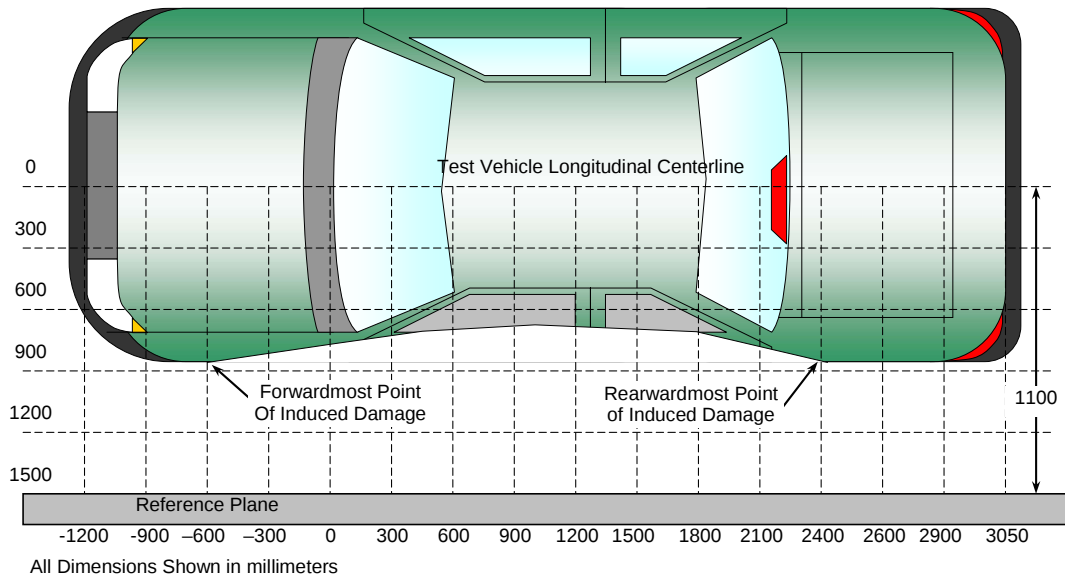
16



DATA SHEET NO. 11
VEHICLE DAMAGE PROFILE DISTANCES

Test Vehicle: 2010 Subaru Outback MPV
 Test Program: NCAP Side Impact

NHTSA No. MA5503
 Test Date: 10/20/2009



TOP VIEW

DAMAGE PROFILE DISTANCES

DPD	Distance from Impact Point in mm	Level	Pre-Test (mm)	Post-Test (mm)	Max Static Crush (mm)
1	2850	4	319	329	10
2	2200	5	483	500	17
3	1500	3	211	450	239
4	800	3	210	448	238
5	150	3	217	419	202
6	-450	4	286	292	6

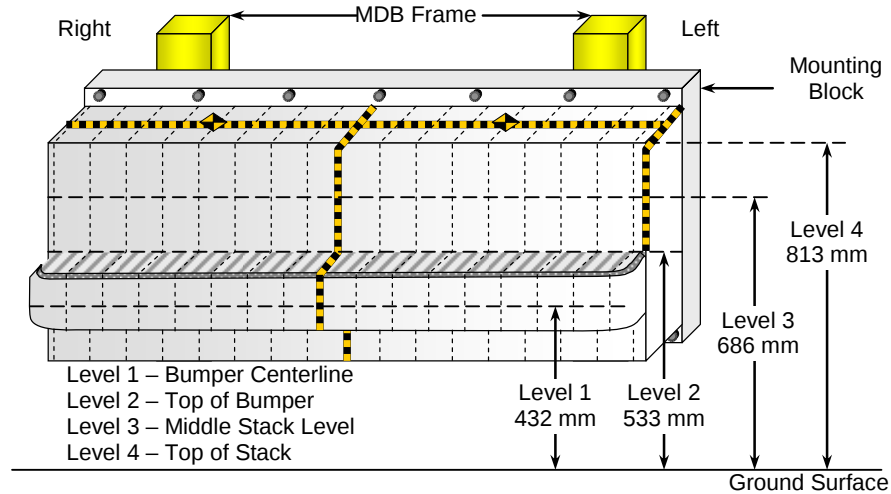
Reference plane is parallel to test vehicle longitudinal centerline.
 Given dimensions = Reference plane to car body.

DATA SHEET NO. 12

DEFORMABLE BARRIER HONEYCOMB FACE STATIC CRUSH

Test Vehicle: 2010 Subaru Outback MPV
 Test Program: NCAP Side Impact

NHTSA No. MA5503
 Test Date: 10/20/2009



DEFORMABLE BARRIER STATIC CRUSH

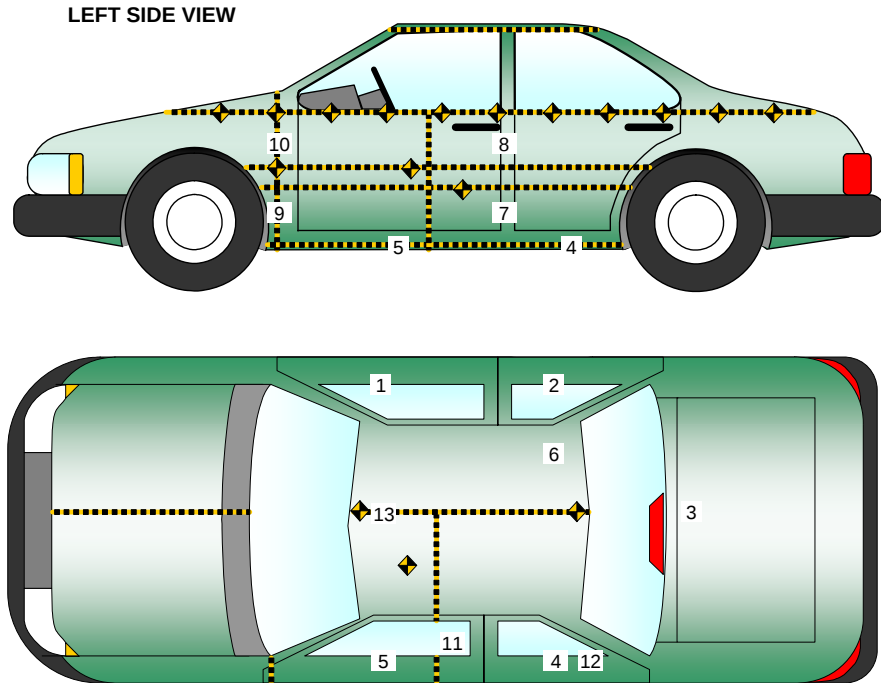
Stack Level	Distance Right of Center								C _L	Distance Left of Center							
	800	700	600	500	400	300	200	100		100	200	300	400	500	600	700	800
1	201	197	196	192	192	190	188	185	180	178	180	177	175	173	169	172	176
2	126	123	121	117	114	107	105	95	93	94	93	91	93	91	90	88	85
3	67	48	36	37	42	49	61	33	25	23	21	21	23	28	37	47	74
4	106	76	53	43	68	90	92	61	44	38	35	43	45	52	58	70	119

All Dimensions in mm

DATA SHEET NO. 13
VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2010 Subaru Outback MPV
 Test Program: NCAP Side Impact

NHTSA No. MA5503
 Test Date: 10/20/2009



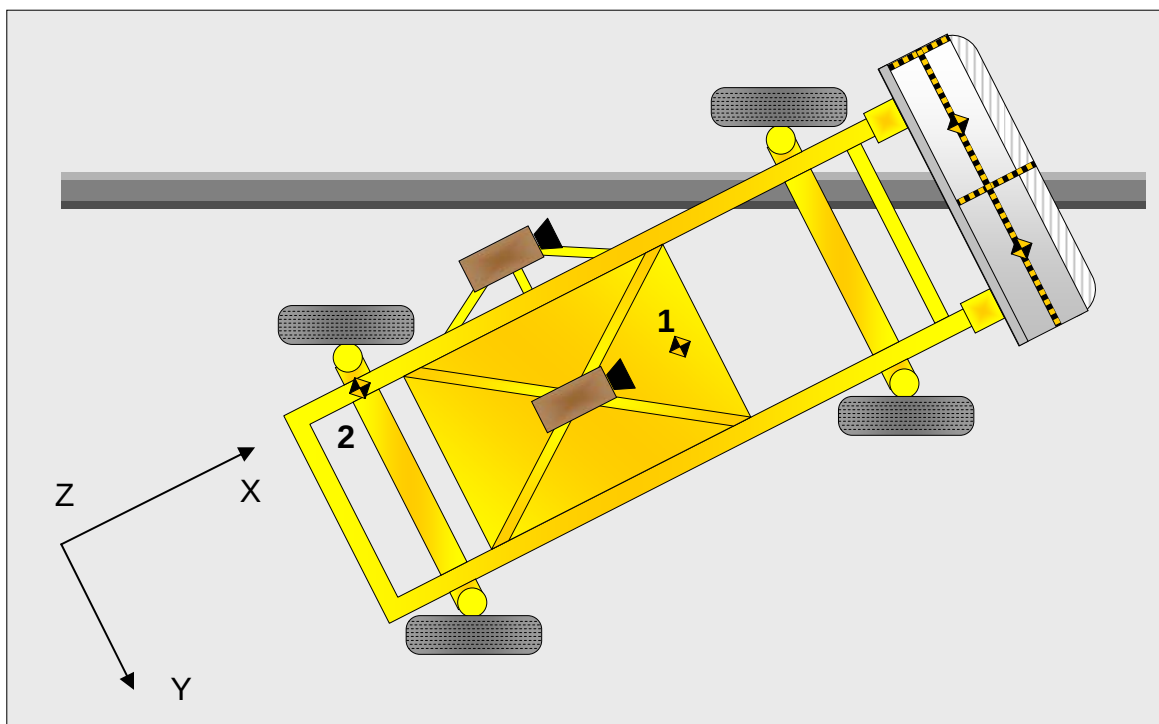
Loc. No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Right Sill at Front Seat	2699	720	-304
2	Right Sill at Rear Seat	1801	722	-310
3	Rear Floorpan Above Axle	999	0	-703
4	Left Sill at Rear Door	1792	-722	-307
5	Left Sill at Front Door	2697	-720	-305
6	Rear Occupant Compartment	1880	348	-552
7	Left Lower B-Post	2149	-726	-551
8	Left Middle B-Post	2220	-734	-895
9	Left Lower A-Post	3273	-710	-597
10	Left Middle A-Post	3285	-802	-868
11	Front Seat Track	2234	-551	-459
12	Rear Seat Track or Structure			
13	Vehicle CG	2450	0	-546

Reference Points X - Test Vehicle Rear Bumper (+ forward)
 Y - Test Vehicle Centerline (+ to right)
 Z - Ground Plane (+ down)

DATA SHEET NO. 14
MDB ACCELEROMETER LOCATIONS

Test Vehicle: 2010 Subaru Outback MPV
 Test Program: NCAP Side Impact

NHTSA No. MA5503
 Test Date: 10/20/2009



Loc. No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	MDB CG	-1105	0	-330
2	MDB Rear	-2580	-650	-625

Reference Points X - MDB Front Axle (+ forward)
 Y - MDB Centerline (+ to right)
 Z - Ground Plane (+ down)

DATA SHEET NO. 15
VEHICLE STRUCTURAL MEASUREMENTS

Test Vehicle: 2010 Subaru Outback MPV
Test Program: NCAP Side Impact

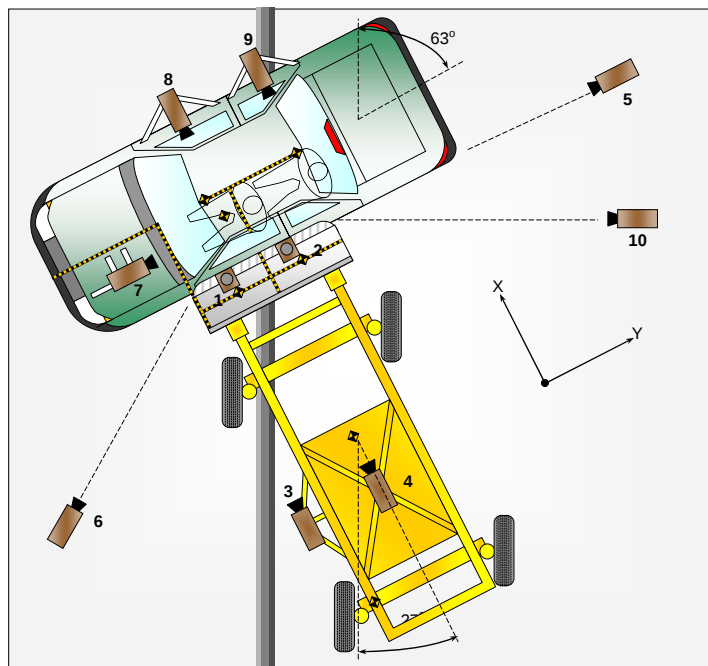
NHTSA No. MA5503
Test Date: 10/20/2009

	Elements	Pre-Test (mm)
1	Total Length	4752
2	Total Width	1780
3	Bumper Top Height	573
4	Bumper Bottom Height	487
5	Longitudinal Member Top Height	588
6	Distance between Longitudinal Members	868
7	Longitudinal Member Width	76
8	Engine Top Height	871
9	Engine Bottom Height	259
10	Engine and gearbox width	1050
11	Front bumper-engine distance	530
12	Front shock absorber fixing height	949
13	Bonnet leading edge height	836
14	Front shock absorber fixing width	1144
15	Front bumper – front axle distance	961
16	Front axle – a pillar distance	436
17	A-pillar – B-pillar distance	1170
18	B-Pillar – rear axle distance	1135
19	B-pillar – C-pillar distance	709
20	Roof sill bottom height	1379
21	Roof sill top height	1531
22	Floor sill bottom height	266
23	Floor sill top height	404

DATA SHEET NO. 16
HIGH SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2010 Subaru Outback MPV
 Test Program: NCAP Side Impact

NHTSA No. MA5503
 Test Date: 10/20/2009



No.	Camera View	Location (mm)			Lens (mm)	Film Speed (fps)
		X	Y	Z		
1	Overhead Close-up	-520	-275	-5055	50	1000
2	Overhead Overall	680	1245	-5050	14	1000
3	MDB Onboard, Impact Point Close-up				50	1000
4	MDB Onboard, Centerline of Impact				16	1000
5	Right Side, Ground Level, Overall	50	7250	-1220	24	1000
6	Left Side, Ground Level, Overall	-1460	-5210	-1210	24	1000
7	Vehicle Onboard Front SID/HIII, Front				12.5	1000
8	Vehicle Onboard Front SID/HIII, Side				8	1000
9	Vehicle Onboard Rear SID/HIII, Side				8	1000
10	Real Time Coverage				13	24

Reference Points X - Impact Line
 Y - MDB Left Edge Impact Point
 Z - Ground Plane

DATA SHEET NO. 17
SUMMARY OF FMVSS 301 DATA

Test Vehicle: 2010 Subaru Outback MPV
 Test Program: NCAP Side Impact

NHTSA No. MA5503
 Test Date: 10/20/2009

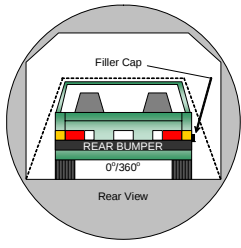
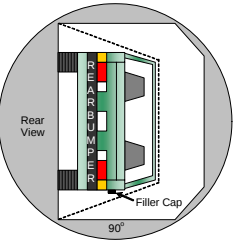
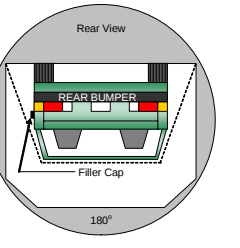
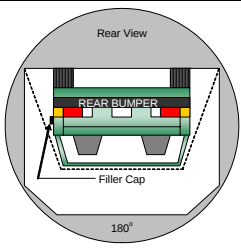
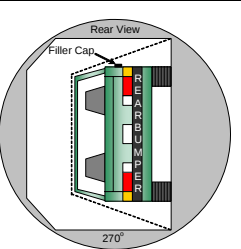
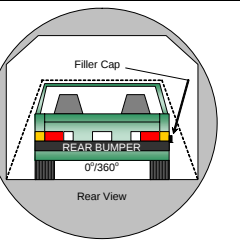
FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

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

Stoddard Solvent Spillage Measurements

- A. From impact until vehicle motion ceases: 0 oz.
 (Maximum Allowable = 1 ounce)
- B. For the 5 minute period after motion ceases: None
 (Maximum allowable = 5 ounces)
- C. For the following 25 minutes: None
 (Maximum allowable = 1 oz./minute)
- D. Spillage Details: None

FMVSS 301 STATIC ROLLOVER DATA

			1. The specified fixture rollover rate for each 90° of rotation is 60 to 180 seconds. 2. The position hold time at each position is 300 seconds (minimum). 3. Details of Stoddard Solvent spillage locations: None
0° to 90°		90° to 180°	
			
180° to 270°		270° to 360°	

Test Phase	Rotation Time (sec.)	Hold Time (sec.)	Spillage Collection Time (min)	Spillage (oz.)
0° to 90°	111	300	First 5	0
90° to 180°	117	300	First 5	0
180° to 270°	113	300	First 5	0
270° to 360°	118	300	First 5	0

APPENDIX A
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

	<u>Page No.</u>
Photo No. 1. Right Front $\frac{3}{4}$ View, As Received	A-1
Photo No. 2. Left Rear $\frac{3}{4}$ View, As Received	A-1
Photo No. 3. Manufacturer's Label	A-2
Photo No. 4. Tire Placard	A-2
Photo No. 5. Pre-Test Front View	A-3
Photo No. 6. Post-Test Front View	A-3
Photo No. 7. Pre-Test Left Front $\frac{3}{4}$ View	A-4
Photo No. 8. Post-Test Left Front $\frac{3}{4}$ View	A-4
Photo No. 9. Pre-Test Left Side View	A-5
Photo No. 10. Post-Test Left Side View	A-5
Photo No. 11. Pre-Test Left Rear $\frac{3}{4}$ View	A-6
Photo No. 12. Post-Test Left Rear $\frac{3}{4}$ View	A-6
Photo No. 13. Pre-Test Rear View	A-7
Photo No. 14. Post-Test Rear View	A-7
Photo No. 15. Pre-Test Right Rear $\frac{3}{4}$ View	A-8
Photo No. 16. Post-Test Right Rear $\frac{3}{4}$ View	A-8
Photo No. 17. Pre-Test Right Side View	A-9
Photo No. 18. Post-Test Right Side View	A-9
Photo No. 19. Pre-Test Right Front $\frac{3}{4}$ View	A-10
Photo No. 20. Post-Test Right Front $\frac{3}{4}$ View	A-10
Photo No. 21. Pre-Test Left Impact Point	A-11
Photo No. 22. Post-Test Left Impact Point	A-11
Photo No. 23. Pre-Test Front $\frac{3}{4}$ View of Left Side Doors	A-12
Photo No. 24. Post-Test Front $\frac{3}{4}$ View of Left Side Doors	A-12
Photo No. 25. Pre-Test Rear $\frac{3}{4}$ View of Left Side Doors	A-13
Photo No. 26. Post-Test Rear $\frac{3}{4}$ View of Left Side Doors	A-13
Photo No. 27. Pre-Test Left Side Impact Close-up	A-14
Photo No. 28. Post-Test Left Side Impact Close-up	A-14

	<u>Page No.</u>
Photo No. 29. Pre-Test Overhead View	A-15
Photo No. 30. Post-Test Overhead View	A-15
Photo No. 31. Pre-Test Overhead Close-up View	A-16
Photo No. 32. Post-Test Overhead Close-up View	A-16
Photo No. 33. Pre-Test Driver Dummy (Door Open)	A-17
Photo No. 34. Pre-Test Driver Dummy Clearance From Door	A-18
Photo No. 35. Post-Test Driver Dummy Clearance From Door	A-18
Photo No. 36. Pre-Test Driver Dummy (Through Window)	A-19
Photo No. 37. Post-Test Driver Dummy (Through Window)	A-19
Photo No. 38. Pre-Test Driver Dummy Right Side View	A-20
Photo No. 39. Post-Test Driver Dummy Right Side View	A-20
Photo No. 40. Pre-Test Passenger Dummy (Door Open)	A-21
Photo No. 41. Pre-Test Passenger Dummy Clearance From Door	A-22
Photo No. 42. Post-Test Passenger Dummy Clearance From Door	A-22
Photo No. 43. Pre-Test Passenger Dummy (Through Window)	A-23
Photo No. 44. Post-Test Passenger Dummy (Through Window)	A-23
Photo No. 45. Pre-Test Passenger Dummy Right Side View	A-24
Photo No. 46. Post-Test Passenger Dummy Right Side View	A-24
Photo No. 47. Pre-Test Front View of Deformable Barrier	A-25
Photo No. 48. Post-Test Front View of Deformable Barrier	A-25
Photo No. 49. Pre-Test Top View of Deformable Barrier	A-26
Photo No. 50. Post-Test Top View of Deformable Barrier	A-26
Photo No. 51. Pre-Test Right Side View of Deformable Barrier	A-27
Photo No. 52. Post-Test Right Side View of Deformable Barrier	A-27
Photo No. 53. Pre-Test Left Side View of Deformable Barrier	A-28
Photo No. 54. Post-Test Left Side View of Deformable Barrier	A-28
Photo No. 55. Vehicle on Rollover Device (90 Degrees)	A-29
Photo No. 56. Vehicle on Rollover Device (180 Degrees)	A-29
Photo No. 57. Vehicle on Rollover Device (270 Degrees)	A-30
Photo No. 58. Vehicle on Rollover Device (360 Degrees)	A-30

	<u>Page No.</u>
Photo No. 59. Vehicle Impact	A-31
Photo No. 60. Post-Test Driver Dummy Head Contact View	A-31
Photo No. 61. Post-Test Driver Dummy Upper Torso Contact	A-32
Photo No. 62. Post-Test Driver Dummy Lower Torso Contact	A-32
Photo No. 63. Post-Test Driver Dummy Contact	A-33
Photo No. 64. Post-Test Passenger Dummy Head Contact View	A-33
Photo No. 65. Post-Test Passenger Dummy Torso Contact	A-34
Photo No. 66. Post-Test Passenger Dummy Contact	A-34



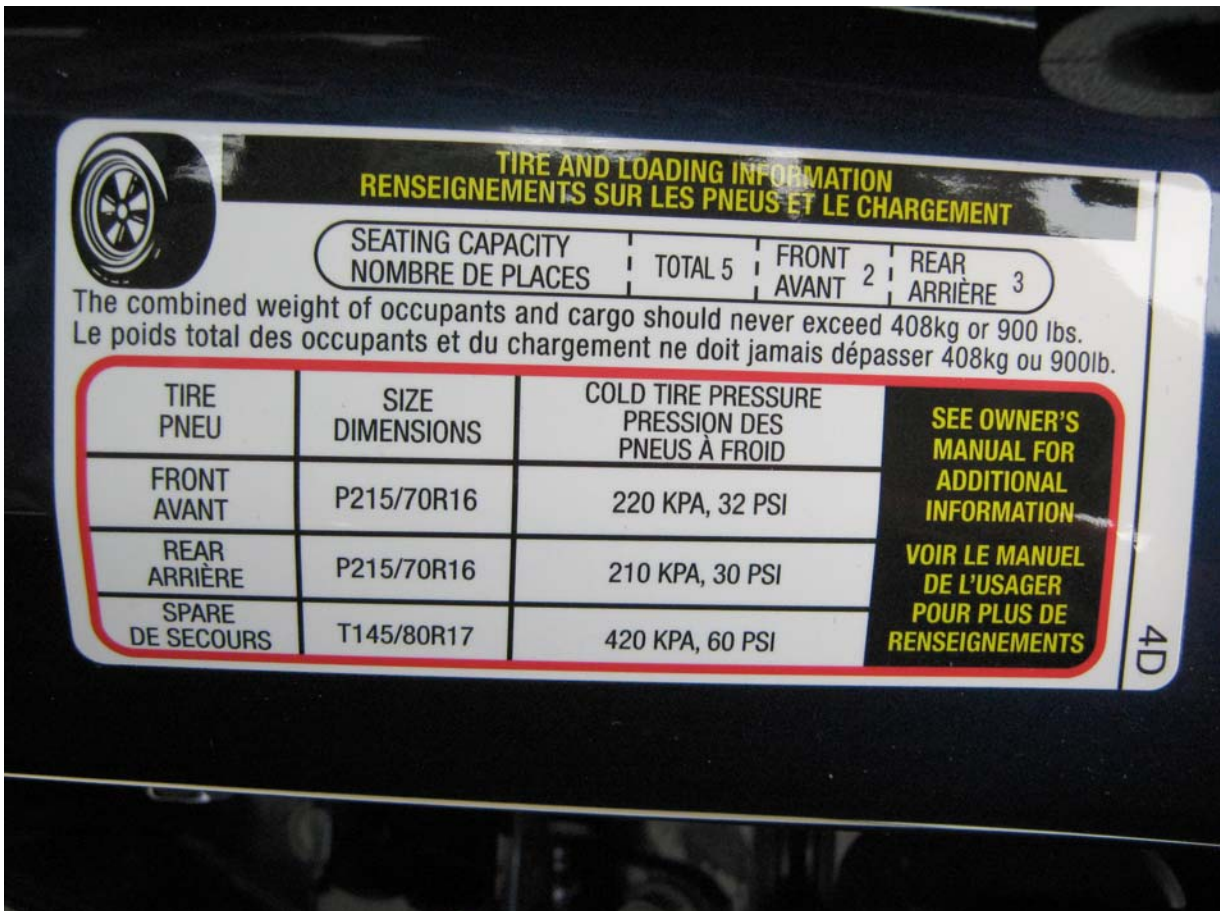
Right Front $\frac{3}{4}$ View, As Received



Left Rear $\frac{3}{4}$ View, As Received



Manufacturer's Label



Tire Placard



Pre-Test Front View



Post-Test Front View



Pre-Test Left Front $\frac{3}{4}$ View



Post-Test Left Front $\frac{3}{4}$ View



Pre-Test Left Side View



Post-Test Left Side View



Pre-Test Left Rear ¾ View



Post-Test Left Rear ¾ View



Pre-Test Rear View



Post-Test Rear View



Pre-Test Right Rear $\frac{3}{4}$ View



Post-Test Right Rear $\frac{3}{4}$ View



Pre-Test Right Side View



Post-Test Right Side View



Pre-Test Right Front ¾ View



Post-Test Right Front ¾ View



Pre-Test Left Impact Point



Post-Test Left Impact Point



Pre-Test Front $\frac{3}{4}$ View of Left Side Doors



Post-Test Front $\frac{3}{4}$ View of Left Side Doors



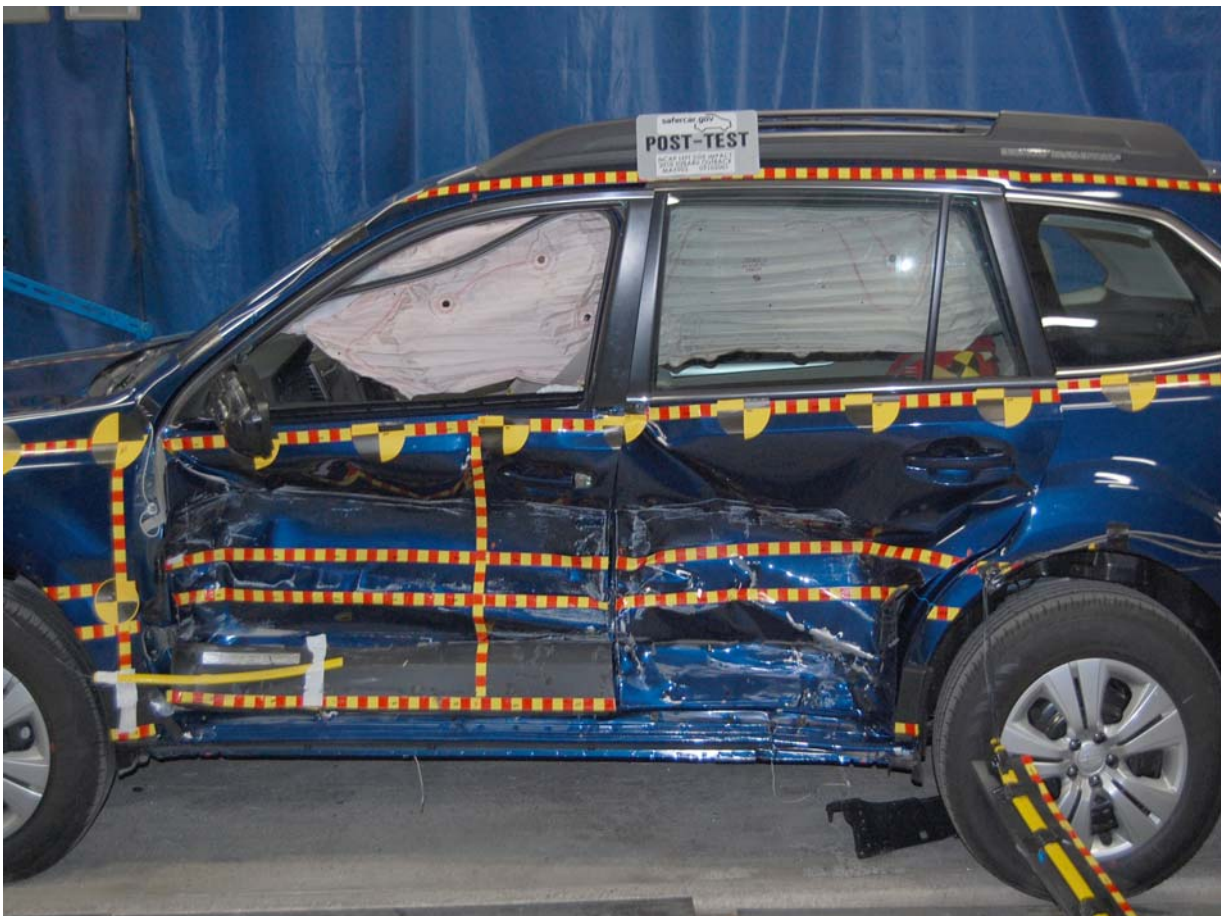
Pre-Test Rear $\frac{3}{4}$ View of Left Side Doors



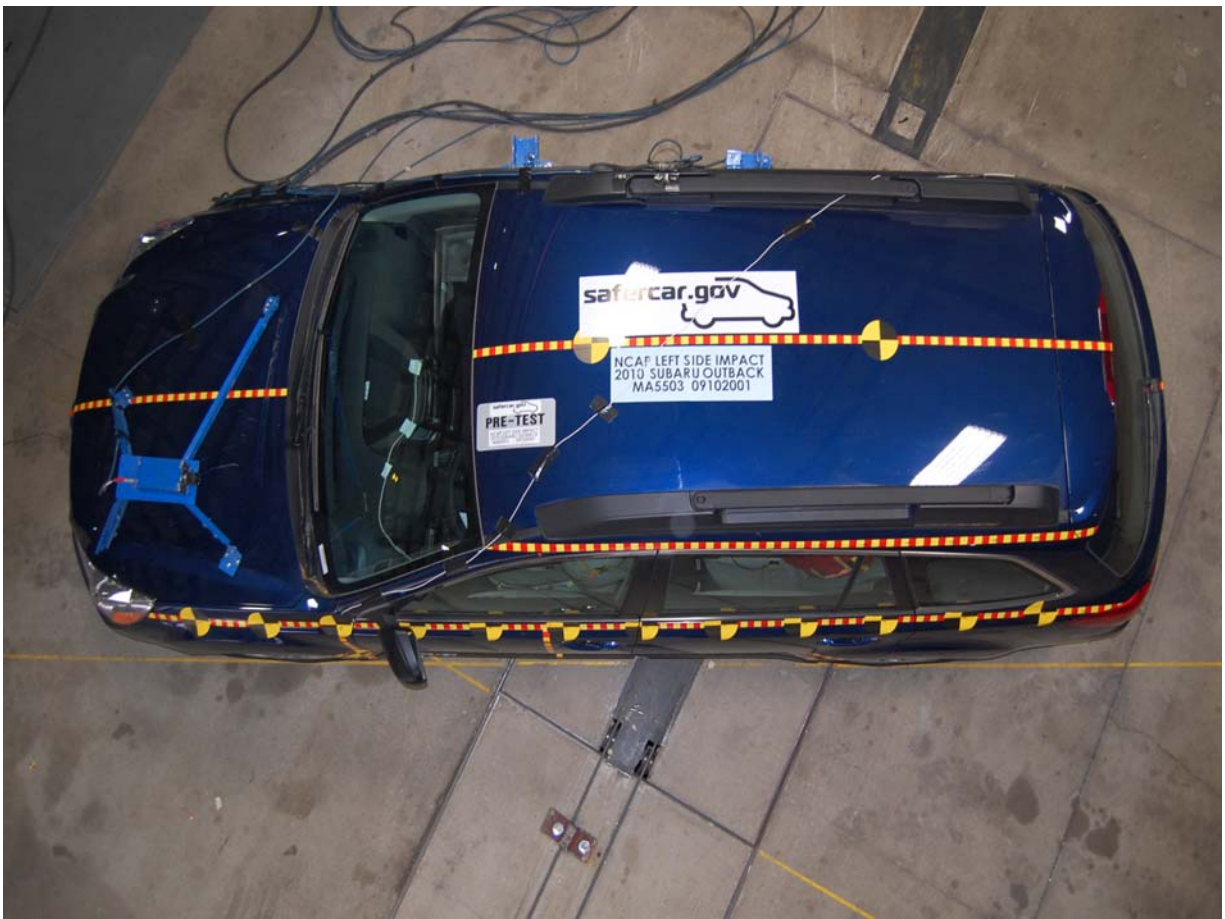
Post-Test Rear $\frac{3}{4}$ View of Left Side Doors



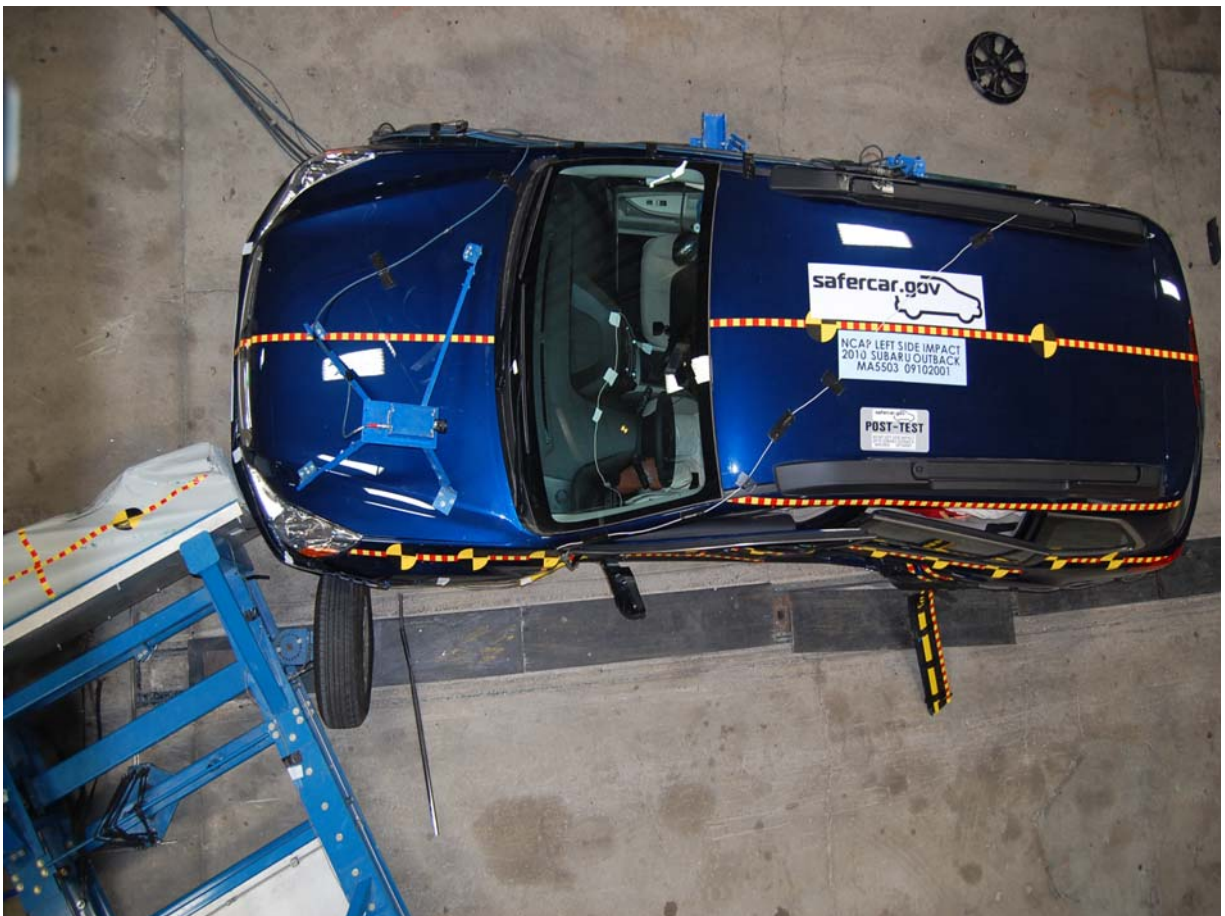
Pre-Test Left Side Impact Close-up



Post-Test Left Side Impact Close-up



Pre-Test Overhead View



Post-Test Overhead View



Pre-Test Overhead Close-up View



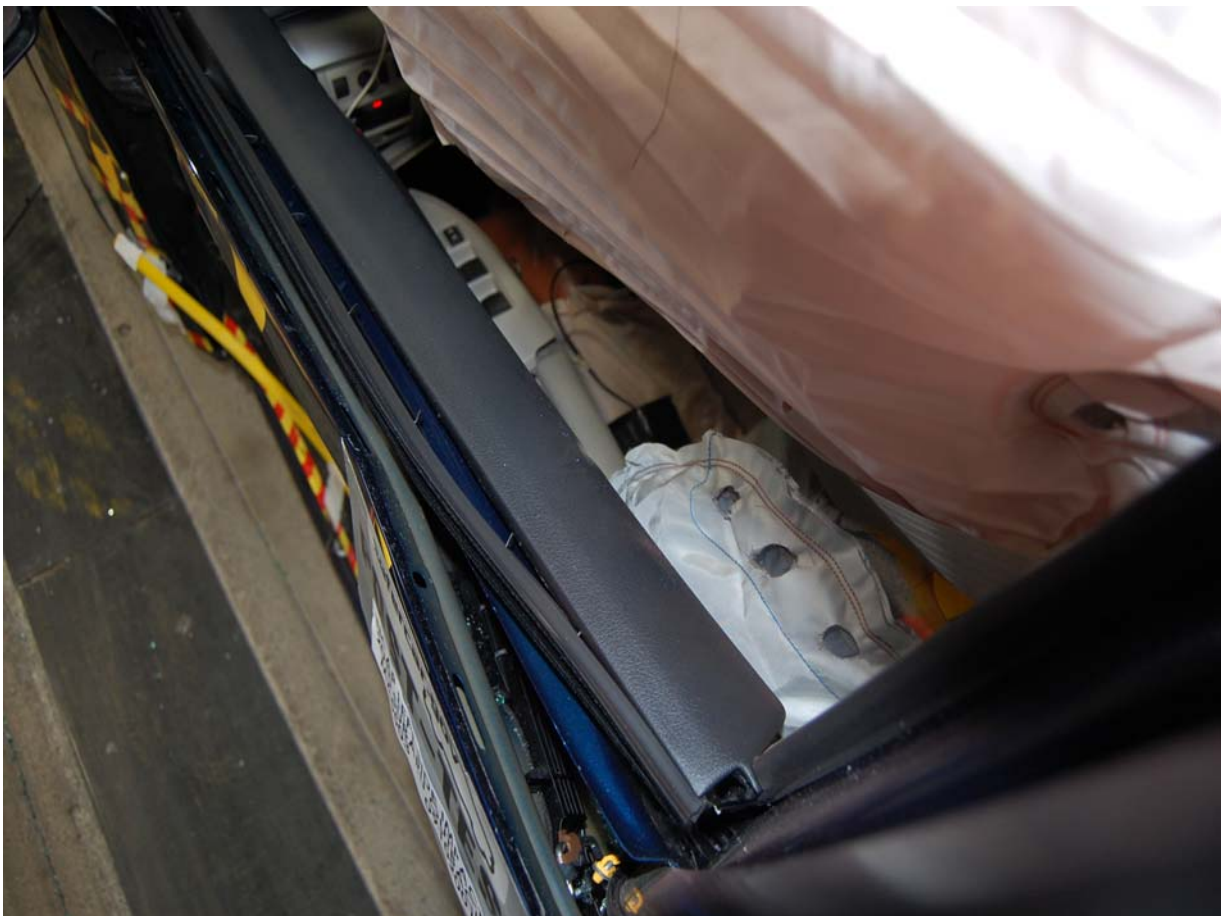
Post-Test Overhead Close-up View



Pre-Test Driver Dummy (Door Open)



Pre-Test Driver Dummy Clearance From Door



Post-Test Driver Dummy Clearance From Door



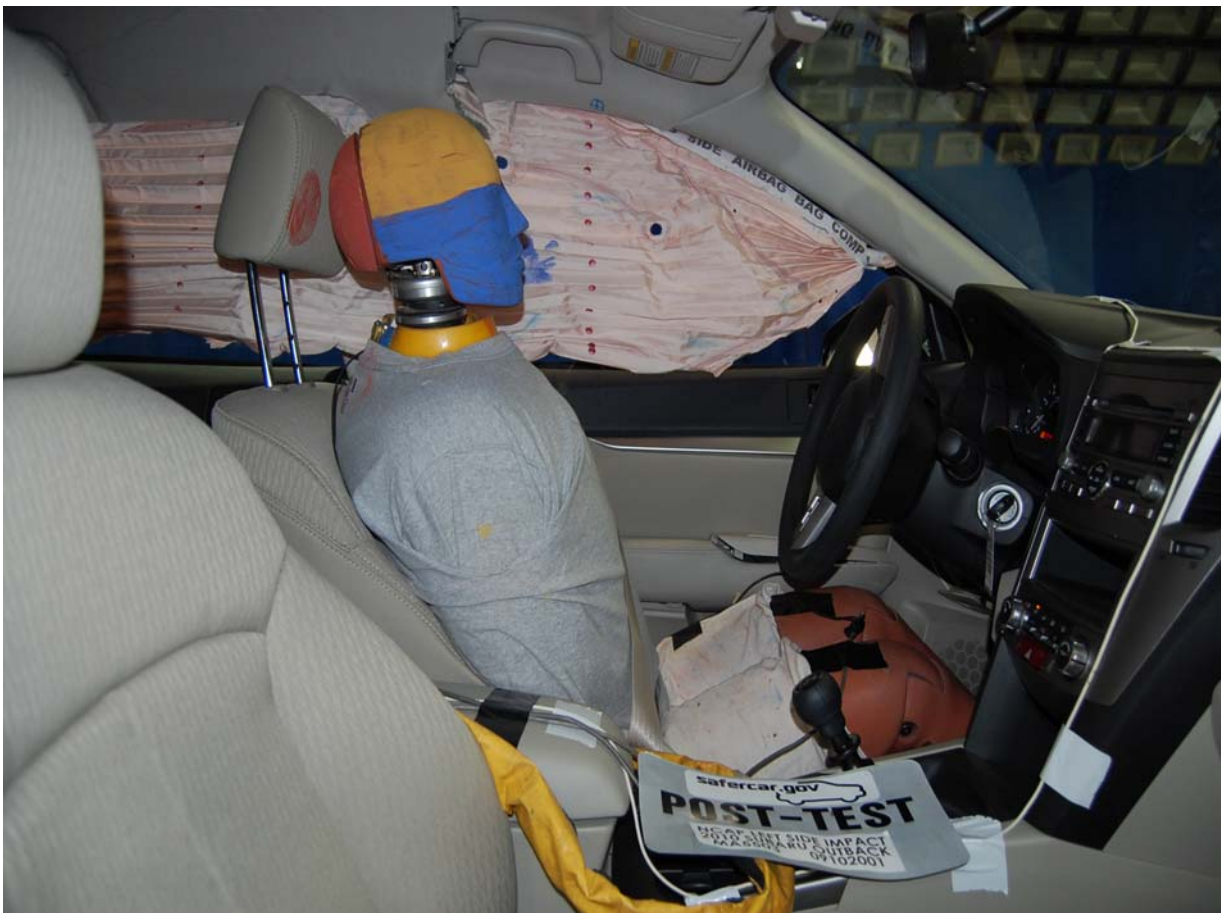
Pre-Test Driver Dummy (Through Window)



Post-Test Driver Dummy (Through Window)



Pre-Test Driver Dummy Right Side View



Post-Test Driver Dummy Right Side View



Pre-Test Passenger Dummy (Door Open)



Pre-Test Passenger Dummy Clearance From Door



Post-Test Passenger Dummy Clearance From Door



Pre-Test Passenger Dummy (Through Window)



Post-Test Passenger Dummy (Through Window)



Pre-Test Passenger Dummy Right Side View



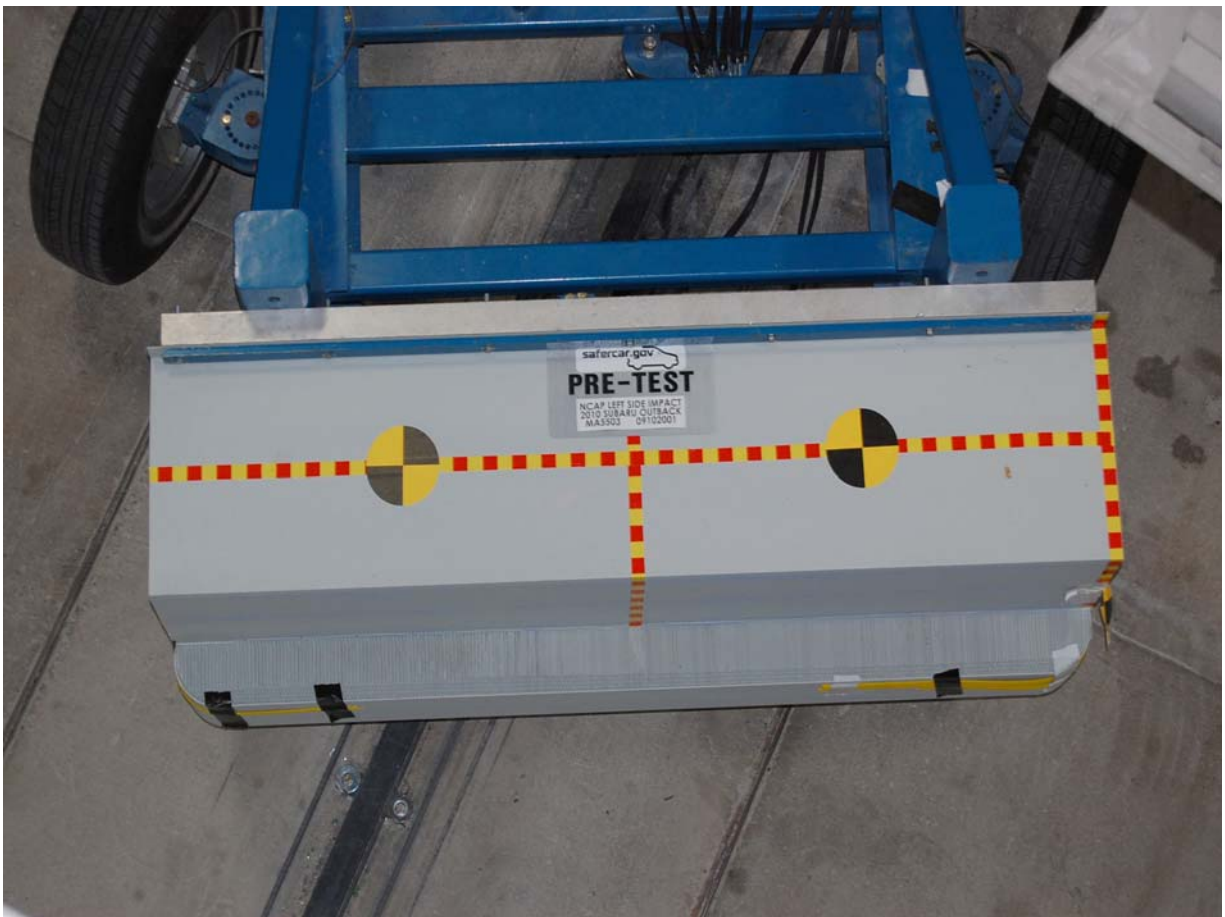
Post-Test Passenger Dummy Right Side View



Pre-Test Front View of Deformable Barrier



Post-Test Front View of Deformable Barrier



Pre-Test Top View of Deformable Barrier



Post-Test Top View of Deformable Barrier



Pre-Test Right Side View of Deformable Barrier



Post-Test Right Side View of Deformable Barrier



Pre-Test Left Side View of Deformable Barrier



Post-Test Left Side View of Deformable Barrier



Vehicle on Rollover Device (90 Degrees)



Vehicle on Rollover Device (180 Degrees)



Vehicle on Rollover Device (270 Degrees)



Vehicle on Rollover Device (360 Degrees)



Vehicle Impact



Post-Test Driver Dummy Head Contact View



Post-Test Driver Dummy Upper Torso Contact



Post-Test Driver Dummy Lower Torso Contact



Post-Test Driver Dummy Contact



Post-Test Passenger Dummy Head Contact View



Post-Test Passenger Dummy Torso Contact



Post-Test Passenger Dummy Contact

APPENDIX B
SID/HIII RESPONSE DATA TRACES

TABLE OF DATA PLOTS

Page No.

List of Data Plots Provided in the Test Report

Figure No. 1.	Driver Upper Rib Y Acceleration vs. Time	B-1
Figure No. 2.	Driver Upper Rib Y Velocity vs. Time	B-1
Figure No. 3.	Driver Lower Rib Y Acceleration vs. Time	B-1
Figure No. 4.	Driver Lower Rib Y Velocity vs. Time	B-1
Figure No. 5.	Driver Lower Spine Y Acceleration vs. Time	B-2
Figure No. 6.	Driver Lower Spine Y Velocity vs. Time	B-2
Figure No. 7.	Driver Pelvis Y Acceleration vs. Time	B-2
Figure No. 8.	Driver Pelvis Y Velocity vs. Time	B-2
Figure No. 9.	Passenger Upper Rib Y Acceleration vs. Time	B-3
Figure No. 10.	Passenger Upper Rib Y Velocity vs. Time	B-3
Figure No. 11.	Passenger Lower Rib Y Acceleration vs. Time	B-3
Figure No. 12.	Passenger Lower Rib Y Velocity vs. Time	B-3
Figure No. 13.	Passenger Lower Spine Y Acceleration vs. Time	B-4
Figure No. 14.	Passenger Lower Spine Y Velocity vs. Time	B-4
Figure No. 15.	Passenger Pelvis Y Acceleration vs. Time	B-4
Figure No. 16.	Passenger Pelvis Y Velocity vs. Time	B-4

The following dummy and vehicle response data can be found in the R&D section of the NHTSA website at www.nhtsa.dot.gov

Driver Head X Primary

Driver Head Y Primary

Driver Head Z Primary

Driver Head X Redundant

Driver Head Y Redundant

Driver Head Z Redundant

Driver Upper Neck Force X

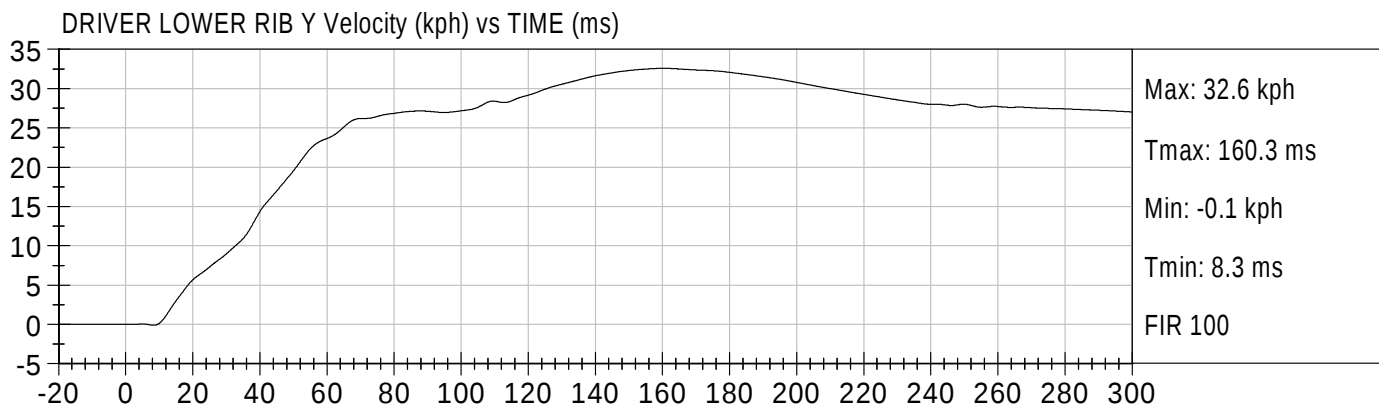
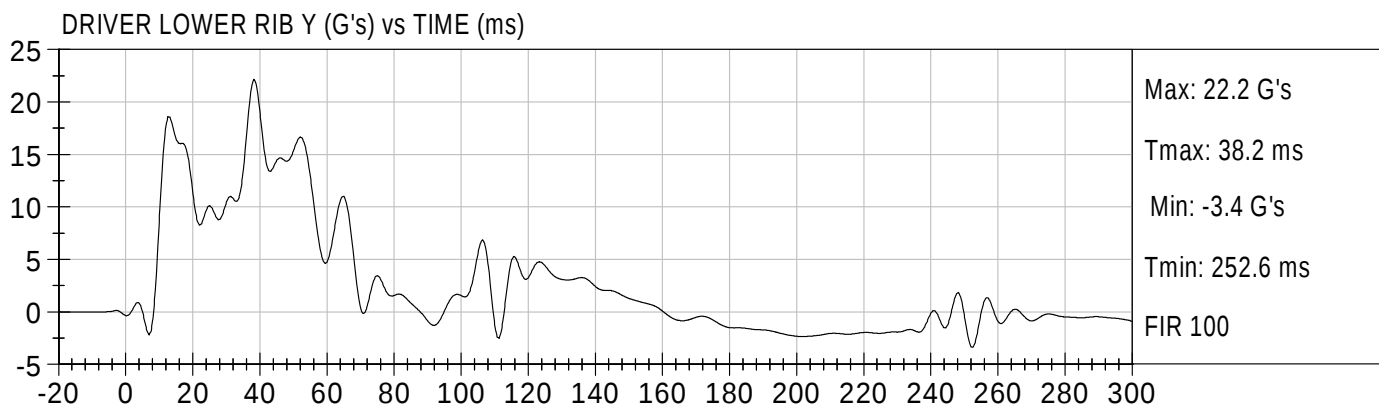
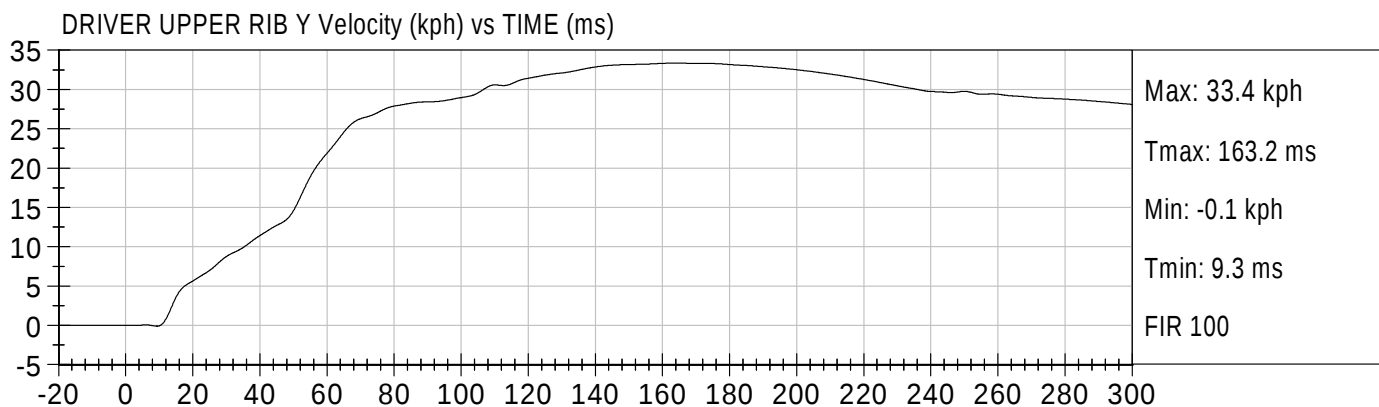
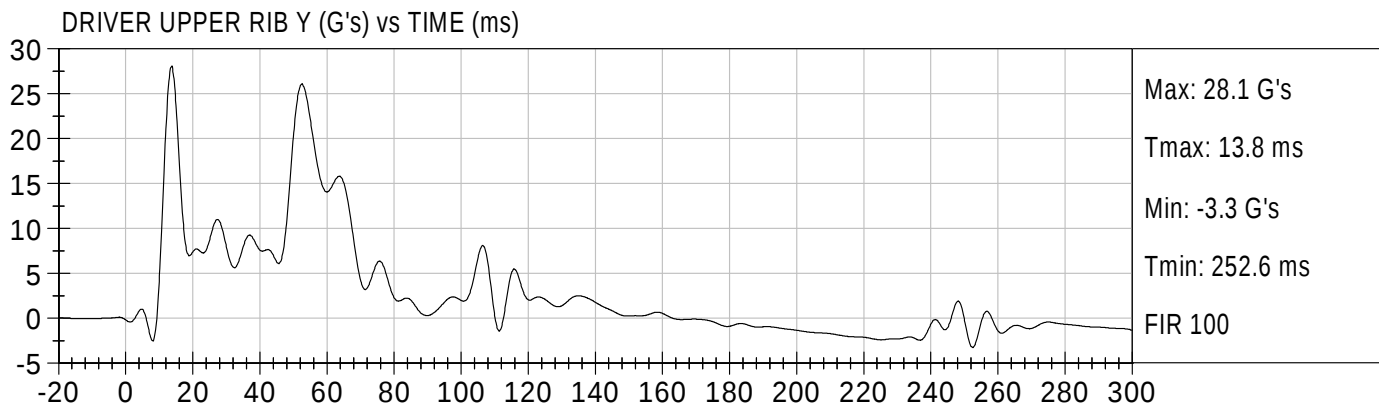
Driver Upper Neck Force Y

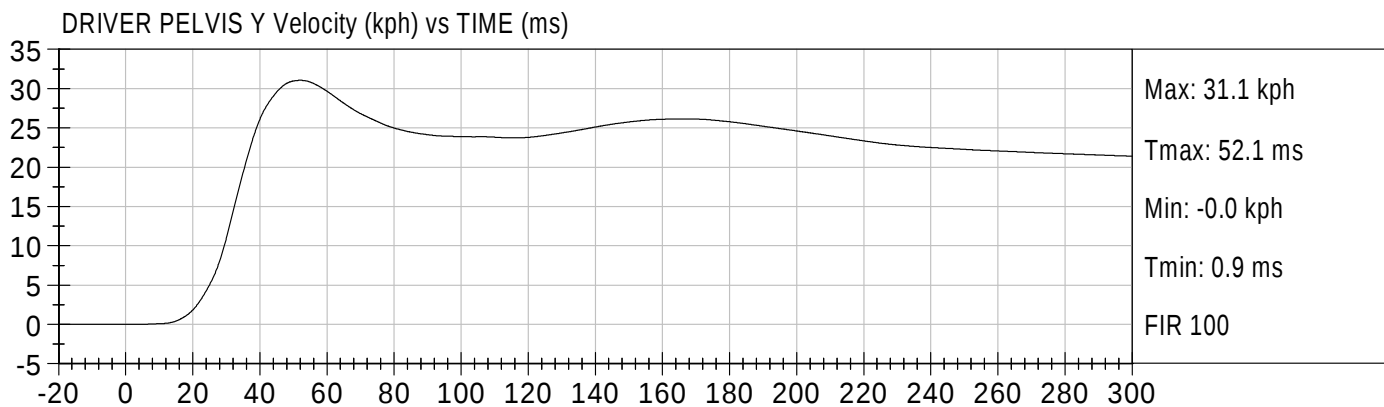
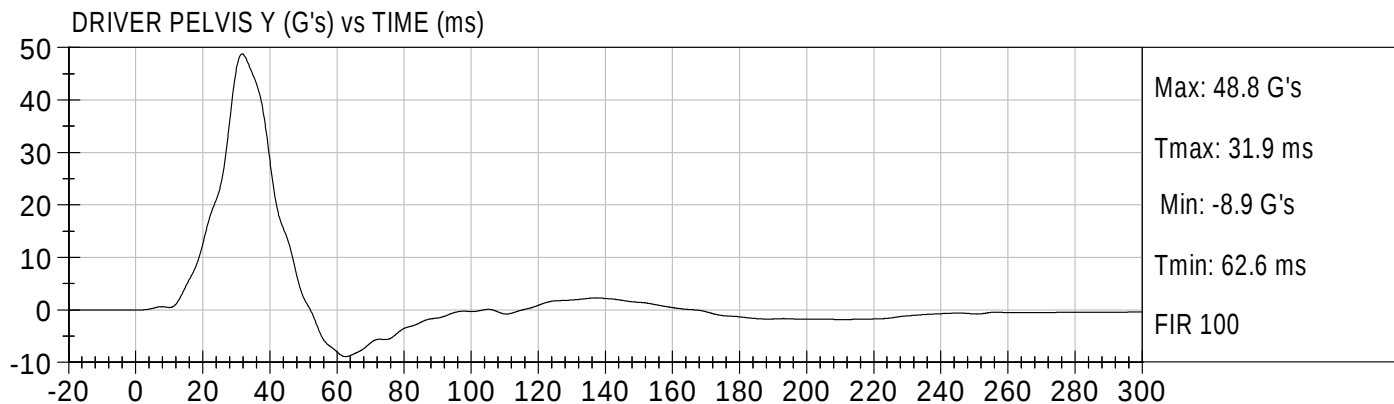
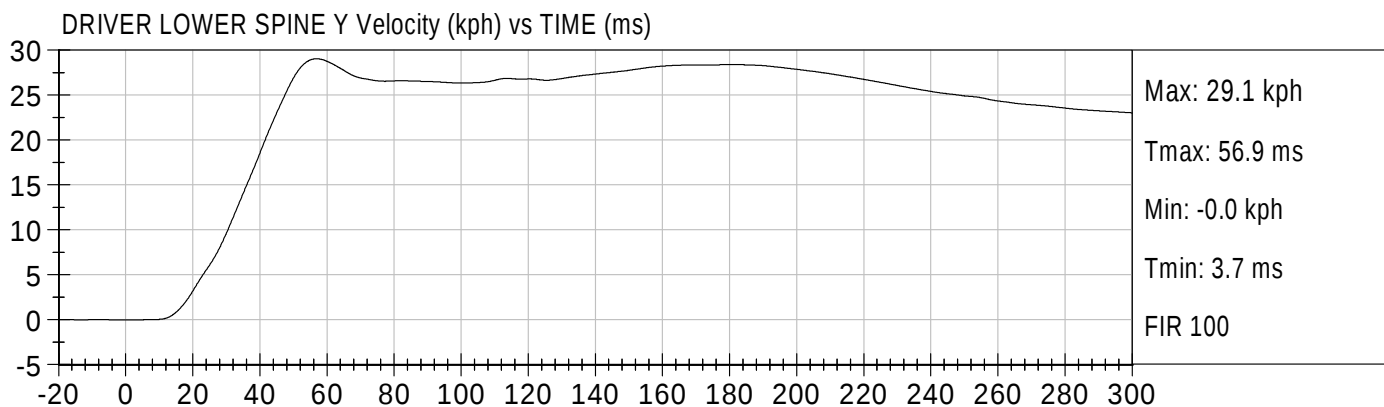
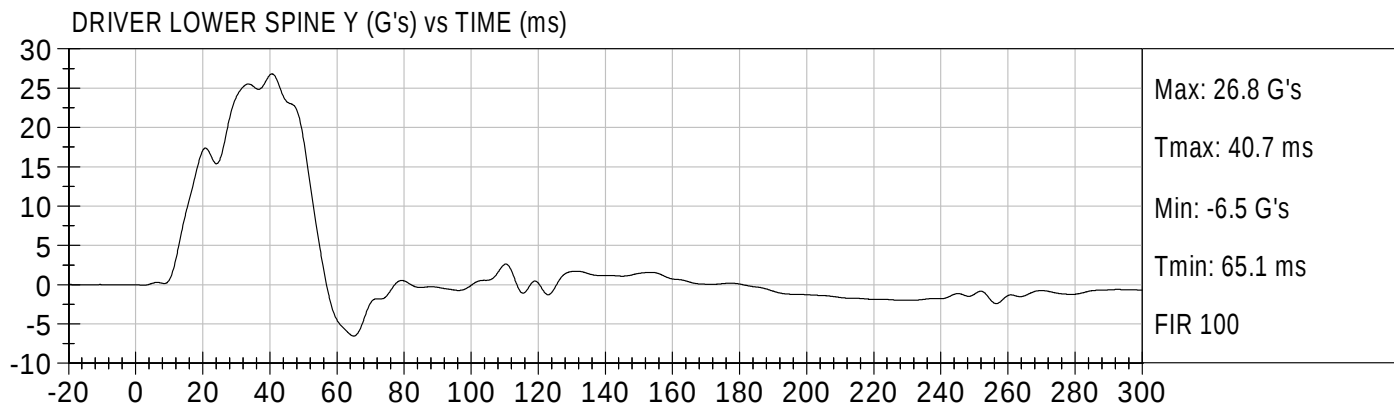
Driver Upper Neck Force Z

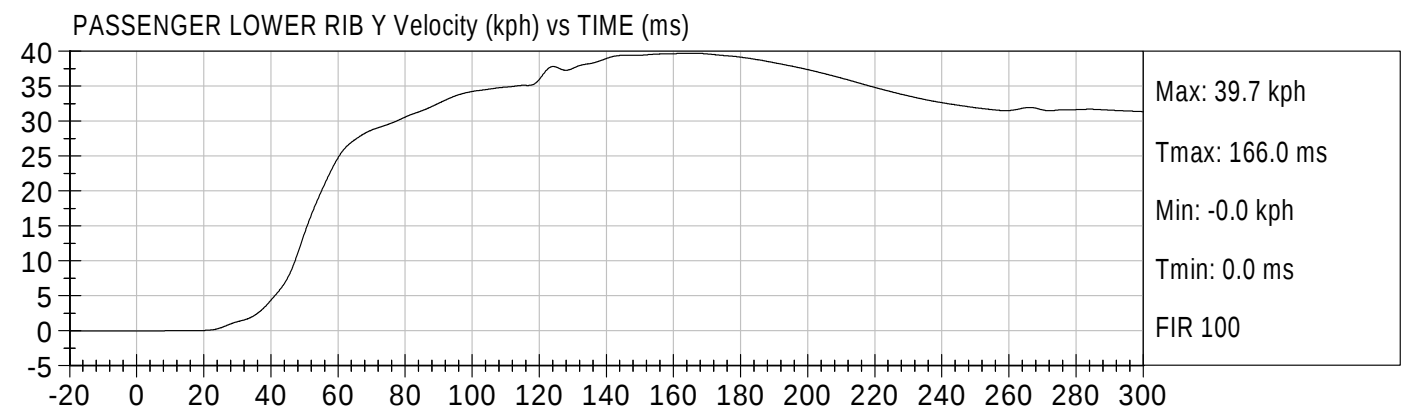
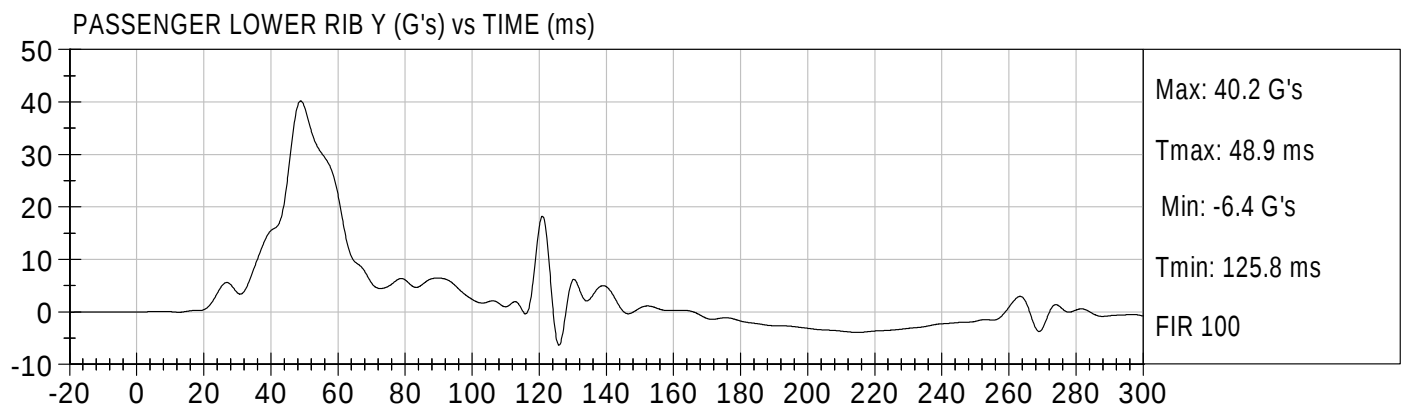
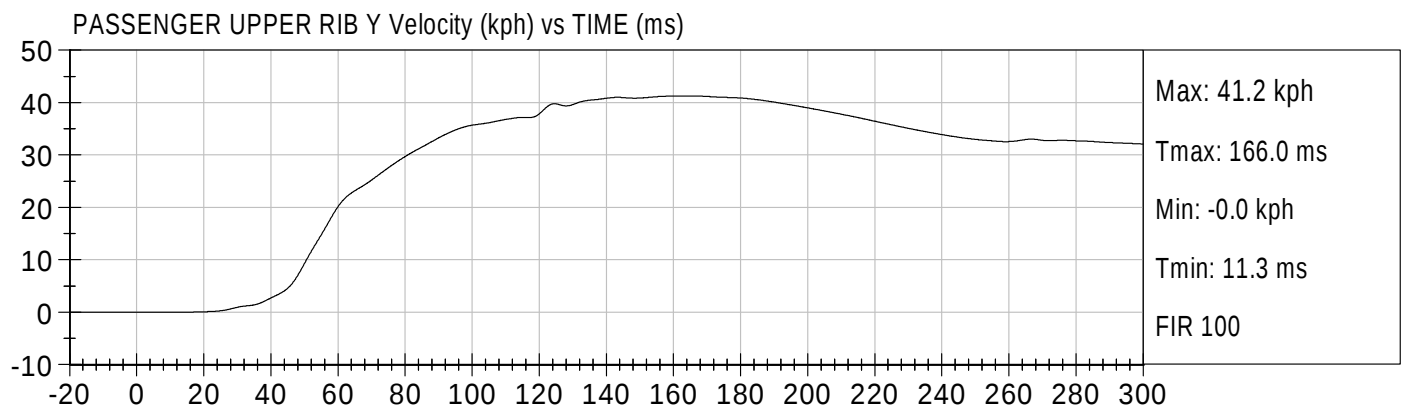
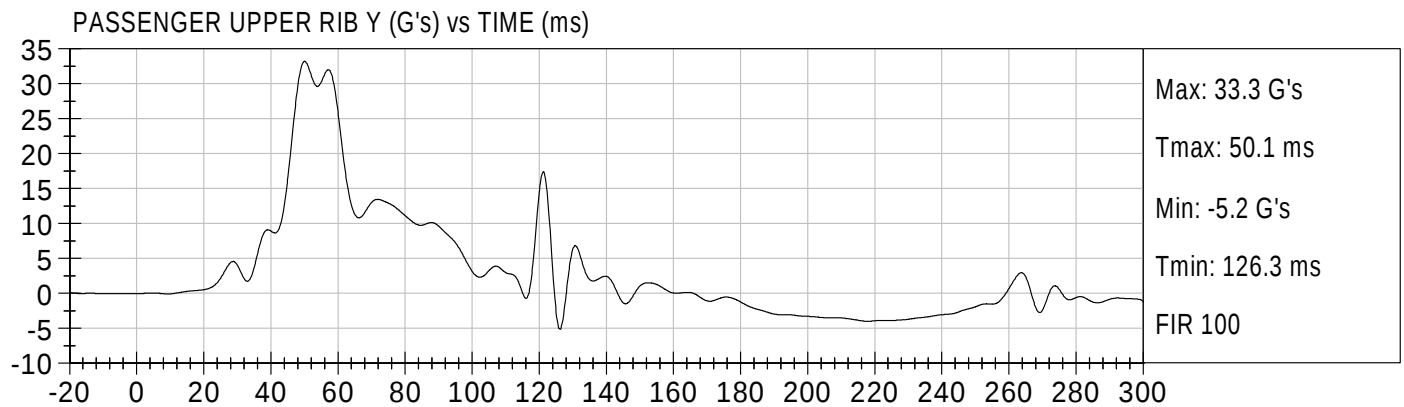
Driver Upper Neck Moment X

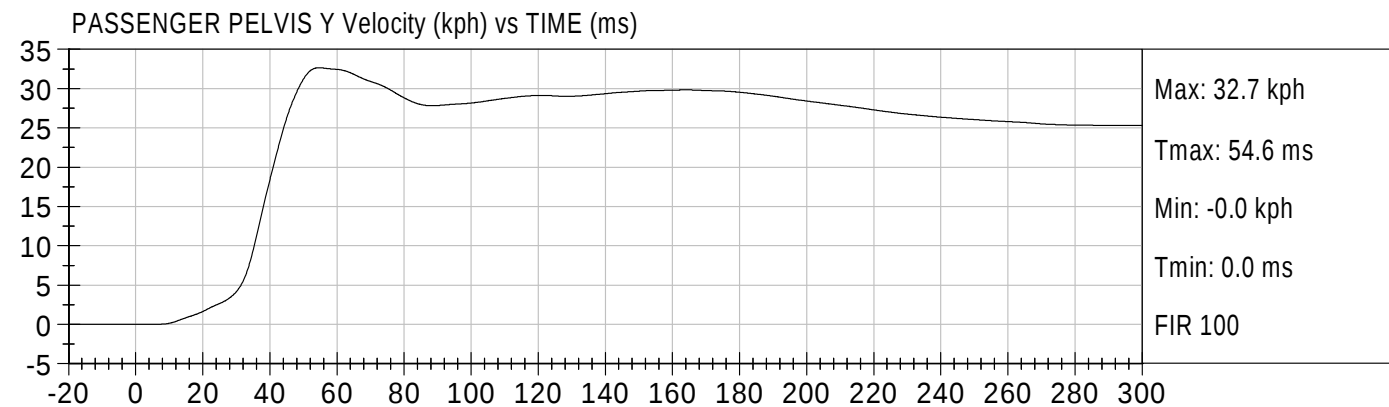
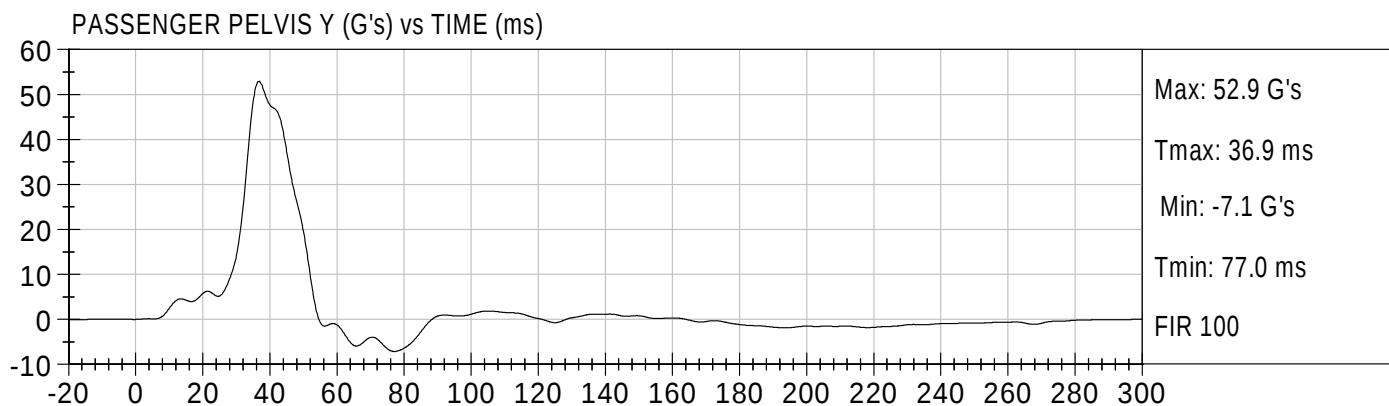
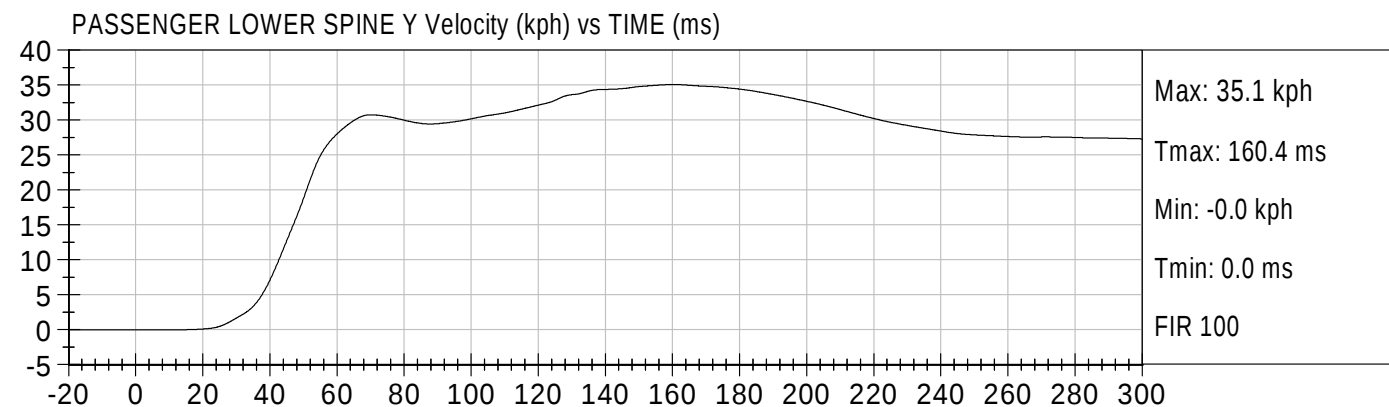
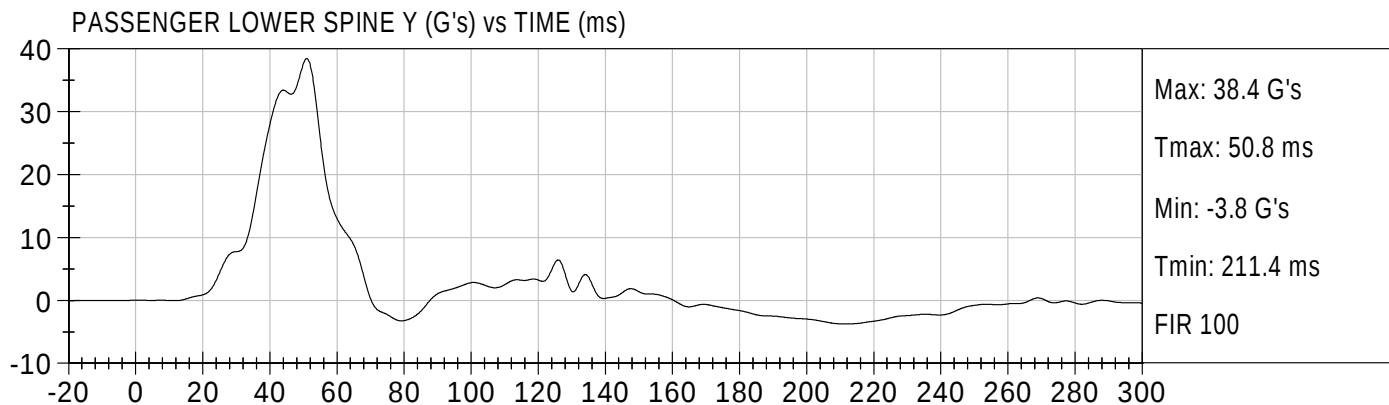
Driver Upper Neck Moment Y
Driver Upper Neck Moment Z
Driver Upper Rib Redundant Y
Driver Lower Rib Redundant Y
Driver Lower Spine Redundant Y
Driver Pelvis Redundant Y
Driver Thorax Contact
Driver Pelvis Contact
Passenger Head X Primary
Passenger Head Y Primary
Passenger Head Z Primary
Passenger Head X Redundant
Passenger Head Y Redundant
Passenger Head Z Redundant
Passenger Upper Neck Force X
Passenger Upper Neck Force Y
Passenger Upper Neck Force Z
Passenger Upper Neck Moment X
Passenger Upper Neck Moment Y
Passenger Upper Neck Moment Z
Passenger Upper Rib Redundant Y
Passenger Lower Rib Redundant Y
Passenger Lower Spine Redundant Y
Passenger Pelvis Redundant Y
Passenger Thorax Contact
Passenger Pelvis Contact
Vehicle Right Sill at Front Seat X
Vehicle Right Sill at Front Seat Y
Vehicle Right Sill at Front Seat Z
Vehicle Right Sill at Rear Seat X
Vehicle Right Sill at Rear Seat Y
Vehicle Right Sill at Rear Seat Z

Vehicle Rear Floor Above Axle X
Vehicle Rear Floor Above Axle Y
Vehicle Rear Floor Above Axle Z
Vehicle Left Sill at Rear Door Y
Vehicle Left Sill at Front Door Y
Vehicle Right Rear Occupant Compartment
Vehicle B-Post Lower Y
Vehicle B-Post Middle Y
Vehicle A-Post Lower Y
Vehicle A-Post Middle Y
Vehicle Left Front Seat Track
Vehicle CG X
Vehicle CG Y
Vehicle CG Z
MDB CG X
MDB CG Y
MDB CG Z
MDB Rear X
MDB Rear Y
MDB Left Bumper Contact
MDB Right Bumper Contact









APPENDIX C
DUMMY CALIBRATION DATA

CERTIFICATION DATA

Dummy Serial Number: 271

Calibration Test Results Summary

Dummy Serial Number: 271

Pre-Test Calibration

External Dimensions:	The dummy passed all external dimension requirements.
Head Drop Test:	The head passed all drop test requirements.
Neck Pendulum Test:	The neck passed all pendulum test requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Pelvic Impact Test:	The pelvis passed all impact test requirements.
Abdominal Compression Test:	The abdomen passed all compression test requirements.
Lumbar Flexion Test:	The lumbar passed all flexion test requirements.

SID Calibration Data Sheet
Side Impact Dummy
External Measurements

ATD Serial No: 271

Test I.D: D09262

Tested Parameter	Units	Specification	Result	Pass/Fail
SH - Seated Height	mm	889 - 909	905	Pass
RH - Rib Height	mm	501 - 521	502	Pass
HP - Hip Pivot Height	mm	99 ref.	99	Pass
RD - Rib from Back Line	mm	229 - 241	239	Pass
KV - Knee Pivot to Back Line	mm	511 - 526	526	Pass
SW - Knee Pivot to Floor	mm	490 - 505	497	Pass
HW - Hip Width	mm	356 - 391	371	Pass
Overall Test Results			Pass	

Jessica Hall
Laboratory Technician

David Winkelbauer
Approved By

10/19/2009
Test Date

SID/HIII Calibration Data Sheet
Side Impact Dummy
Head Drop Calibration (Lateral)

ATD Serial No: 271

Test I.D: D092621

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	43	Pass
Peak Resultant Acceleration	G's	120 to 150	144	Pass
Is Resultant Curve Unimodal?	N/A	15% of peak	Yes	Pass
Peak Longitudnal Acceleration	G's	+/- 15	6.2	Pass
			Overall Test Results	Pass

Jessica Gall
Laboratory Technician

David Winkelbauer
Approved By

10/19/09
Test Date



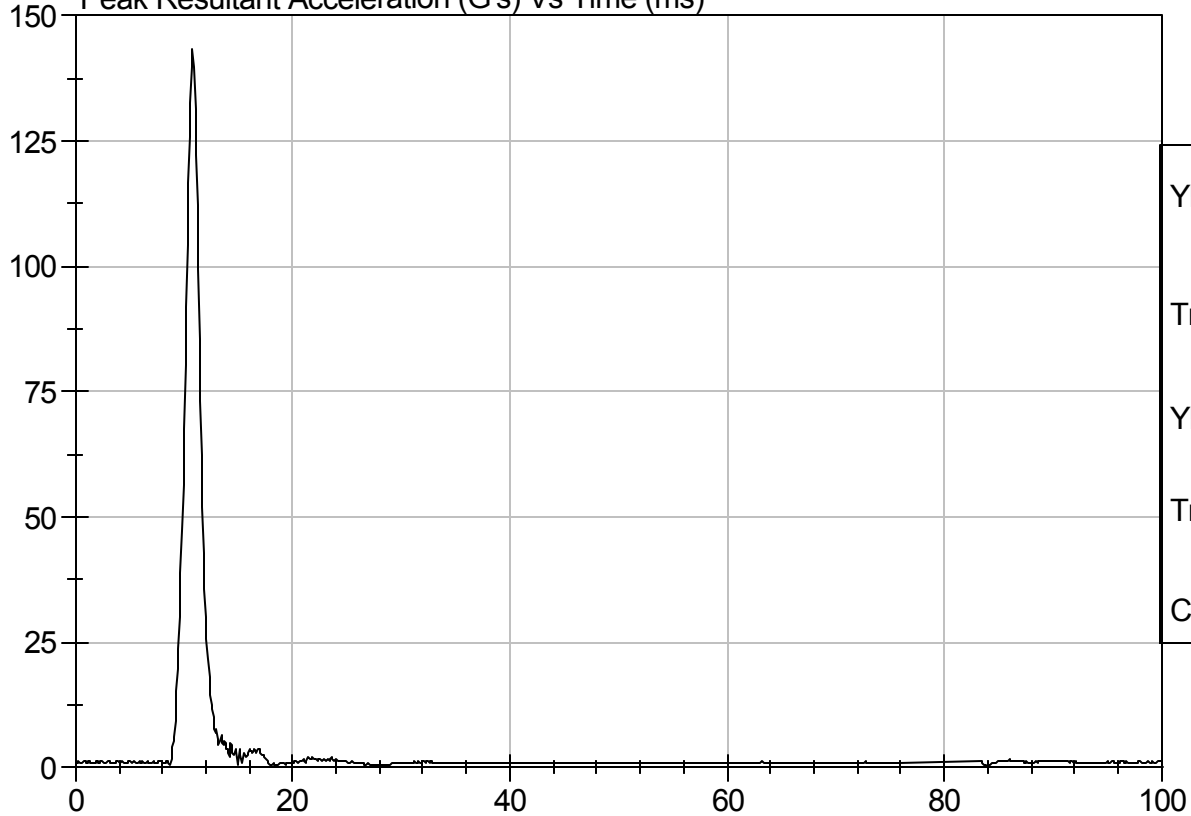
Test Description: Head Drop

Test Date: 10/19/09

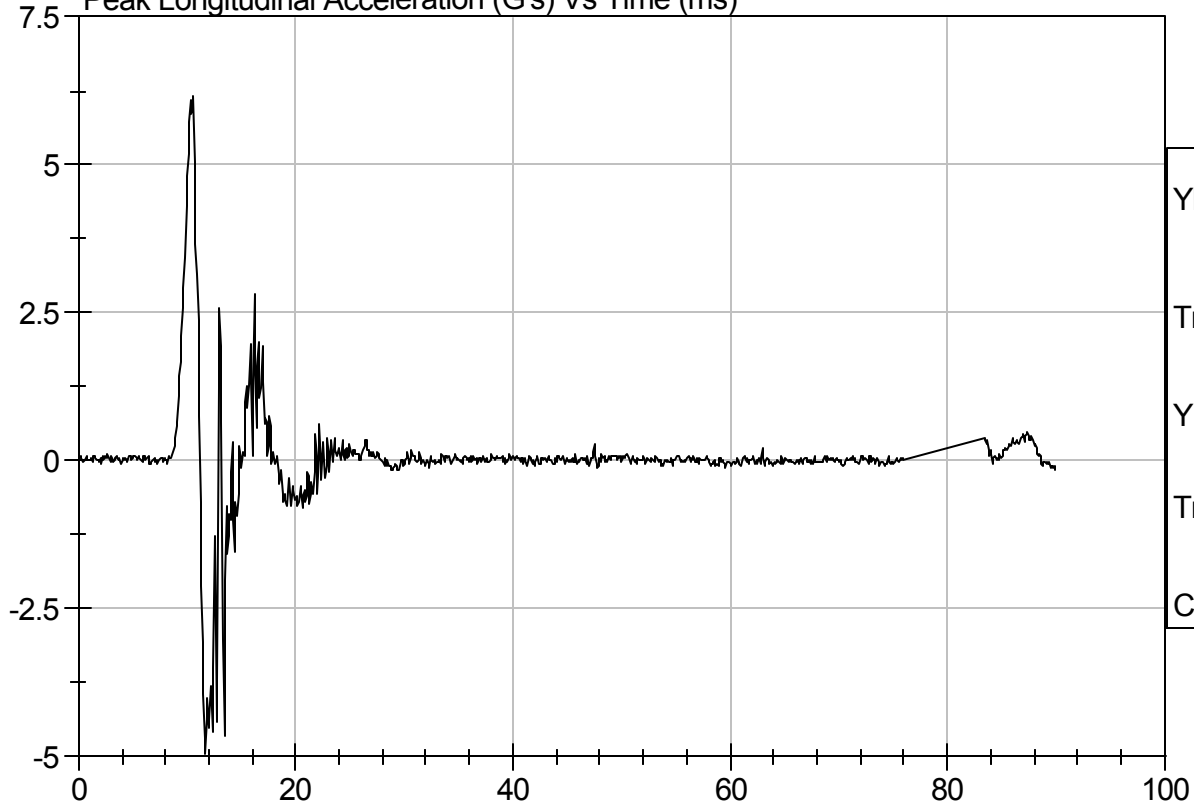
Component: D092621

Speed: 0 ft/s, 0 m/s

Peak Resultant Acceleration (G's) Vs Time (ms)



Peak Longitudinal Acceleration (G's) Vs Time (ms)



SID/HIII Calibration Data Sheet
Side Impact Dummy
Thorax Impact Test

ATD Serial No: 271

Test I.D: D092622

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	39	Pass
Probe Velocity	m/s	4.22 - 4.31	4.27	Pass
Upper Rib	G's	37 - 46	40	Pass
Lower Rib	G's	37 - 46	42	Pass
Lower Spine	G's	15 - 22	21	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

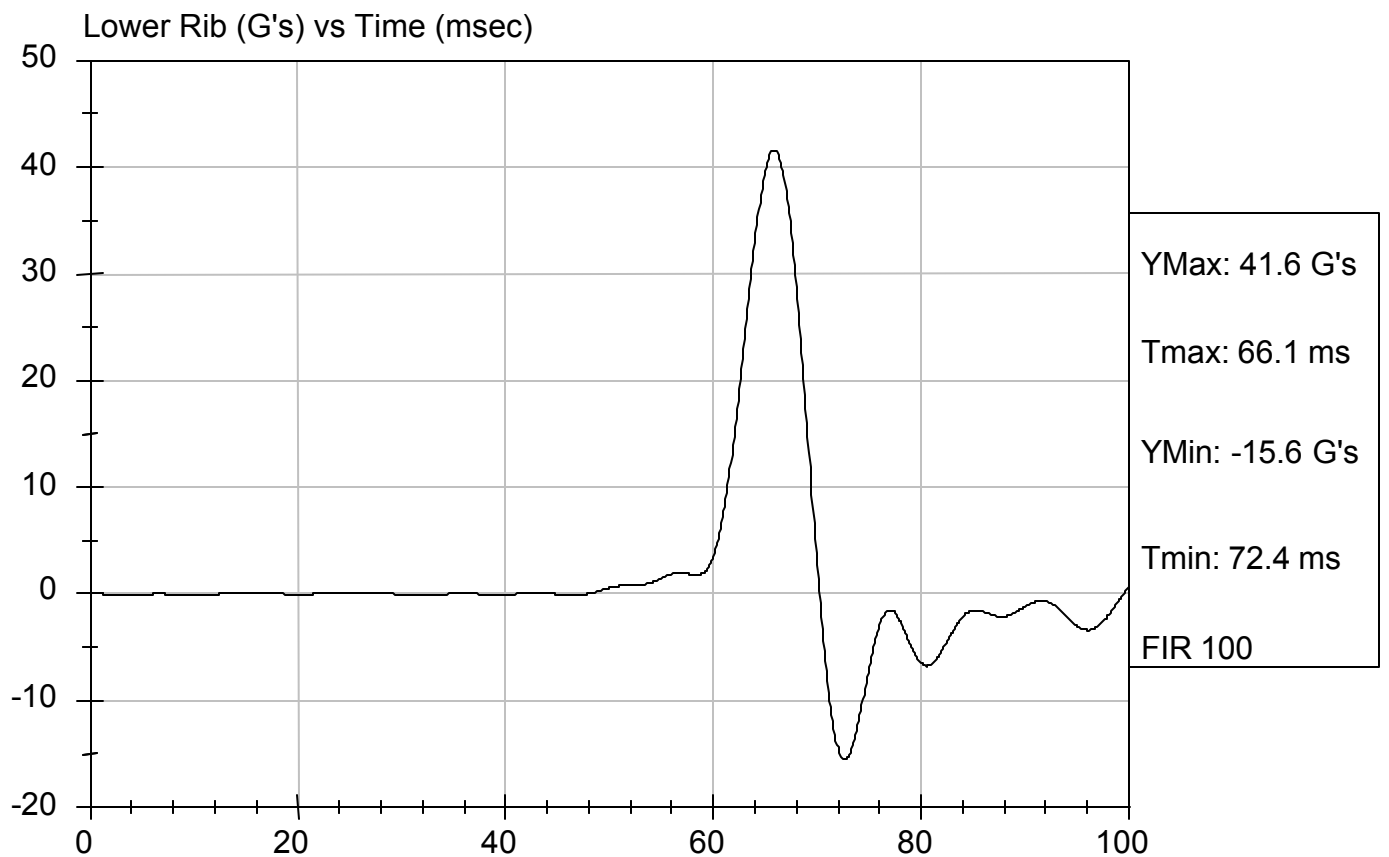
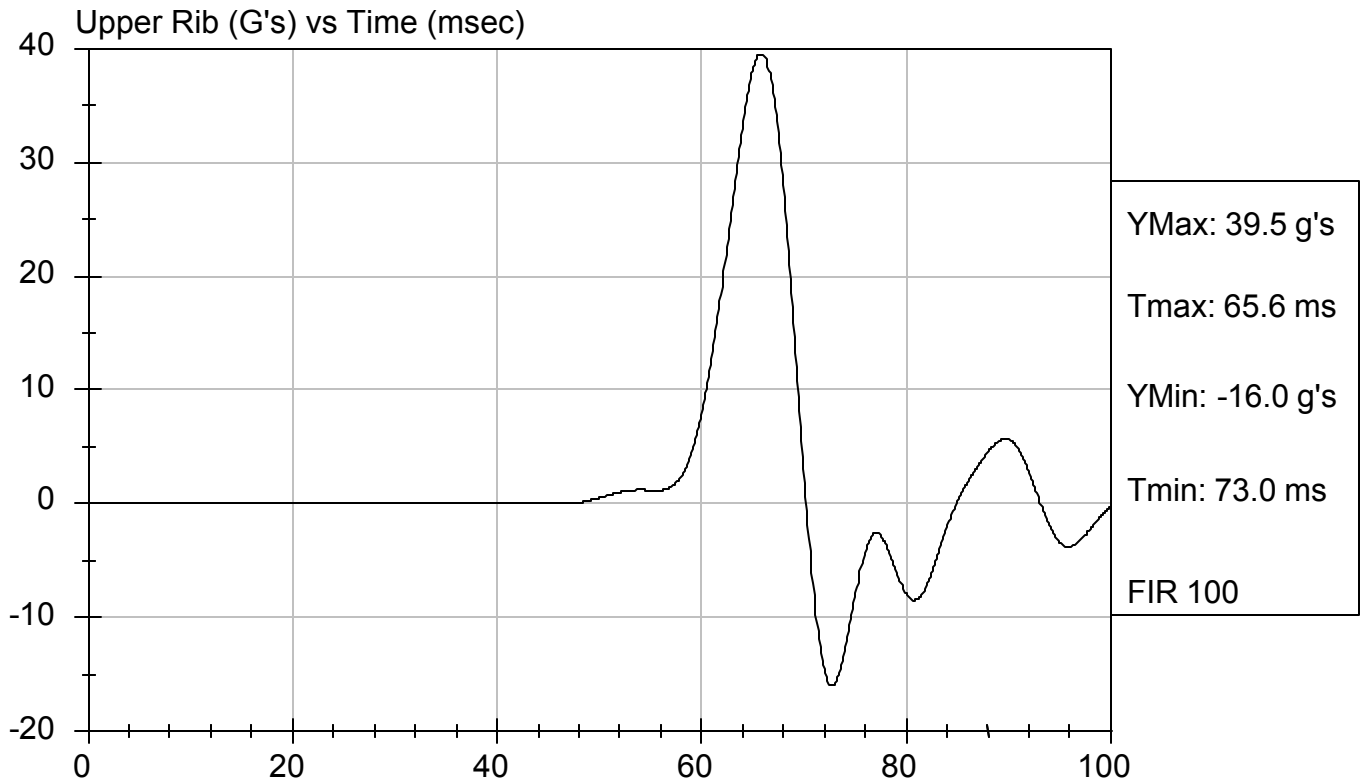
David Winkelbauer
Approved By

10/19/09
Test Date



Test Desc: Thorax Impact
Component ID: D092622

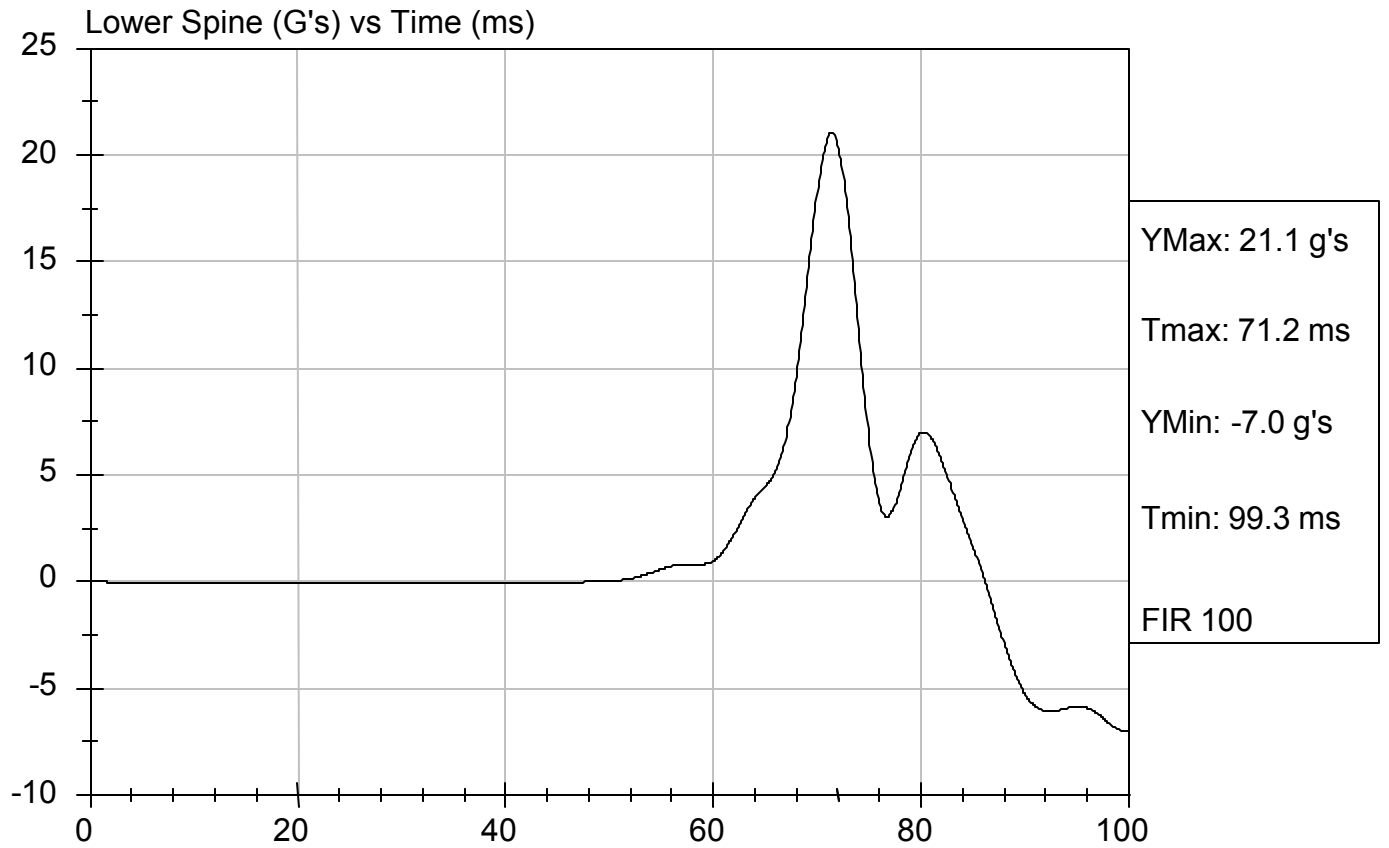
Test Date: 10/19/09
Speed: 14.01 ft/s, 4.27 m/s





Test Desc: Thorax Impact
Component ID: D092622

Test Date: 10/19/09
Speed: 14.01 ft/s, 4.27 m/s



SID/HIII Calibration Data Sheet
Side Impact Dummy
Pelvis Impact Test

ATD Serial No: 271

Test I.D: D092623

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	39	Pass
Probe Velocity	m/s	4.27 - 4.33	4.27	Pass
Pelvis Acceleration	G's	40 - 60	45	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

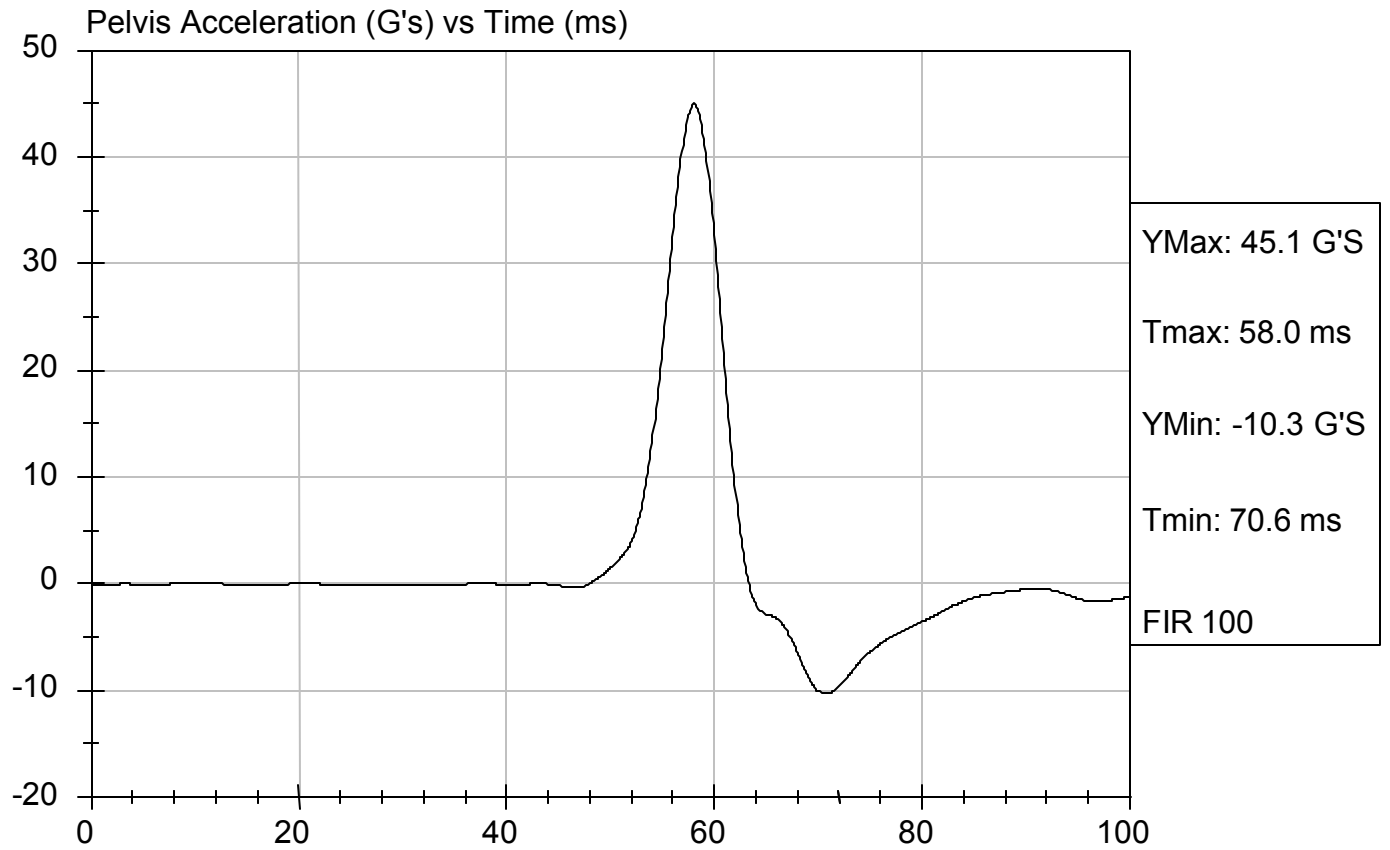
David Winkelbauer
Approved By

10/19/09
Test Date



Test Desc: Pelvis Impact
Component ID: D092623

Test Date: 10/19/09
Speed: 14.01 ft/s, 4.27 m/s



SID/HIII Calibration Data Sheet
Side Impact Dummy
Abdominal Compression Calibration (Pre-Load = 10 lbs)

ATD Serial No: 271

Test I.D: D092624

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	40	Pass
Force At 12.7 mm	N	104 -162	139	Pass
Force At 19 mm	N	163 - 222	202	Pass
Force At 25.4 mm	N	222 - 280	278	Pass
Force At 33 mm	N	325 - 391	382	Pass
Overall Test Results			Pass	

Jessica Hall
Laboratory Technician

10/19/09
Test Date

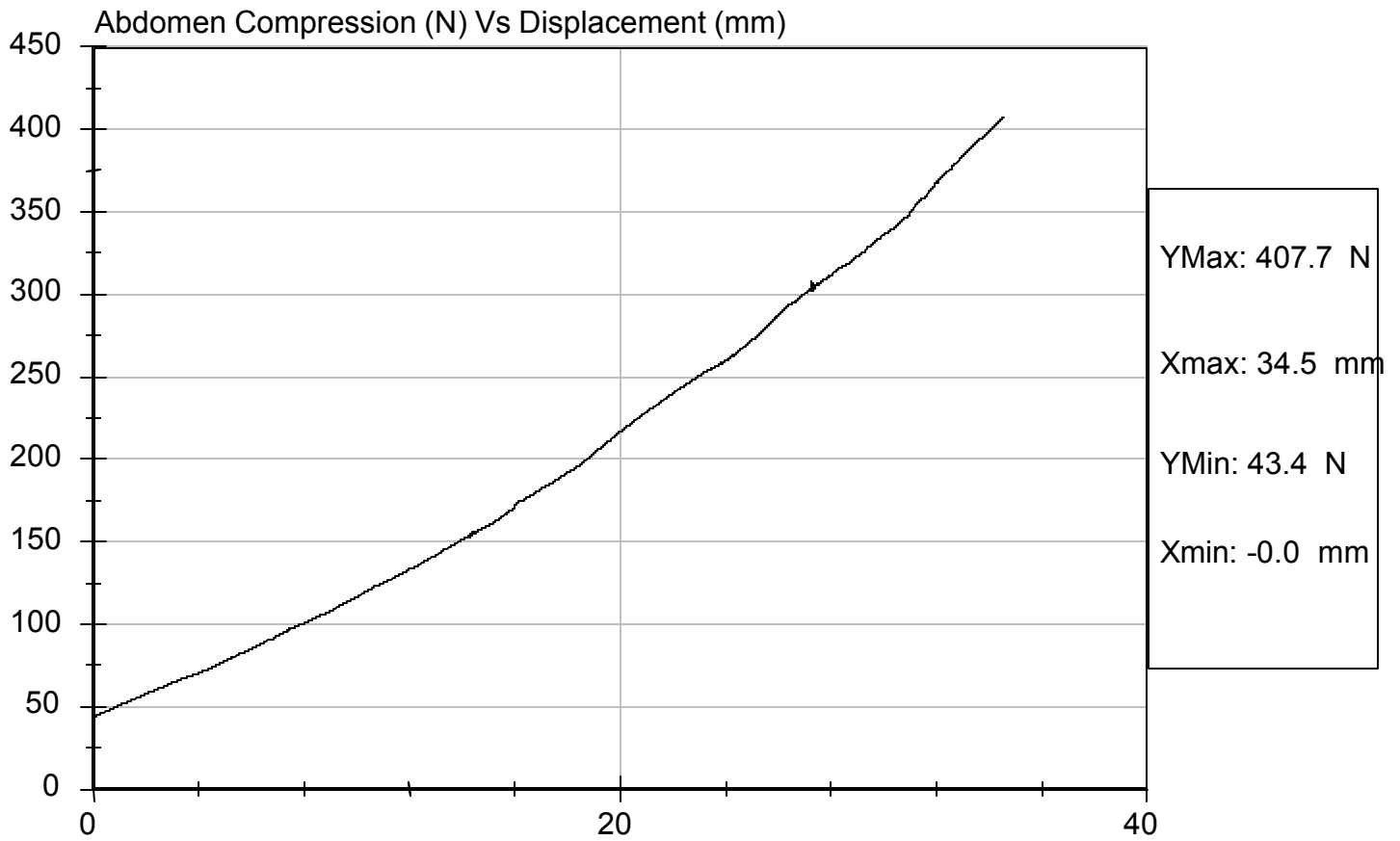
David Winkelbauer
Approved By



Test Description: Abdomen Compression Test Date: 10/19/09

Component: D092624

Speed: 0 ft/s, 0 m/s



SID/HIII Calibration Data Sheet
Side Impact Dummy
Lumbar Flexion Calibration

ATD Serial No: 271

Test I.D: D092625

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	40	Pass
Force At 0 deg	N	0 - 26.7	0	Pass
Force At 20 deg	N	97.9 - 151.2	133.3	Pass
Force At 30 deg	N	151.2 - 204.6	187.3	Pass
Force At 40 deg	N	204.6 - 258.0	242.8	Pass
Return Angle	Deg	12 Maximum	2	Pass
Overall Test Results			Pass	

Jessica Gall
Laboratory Technician

David Winkelbauer
Approved By

10/19/09
Test Date

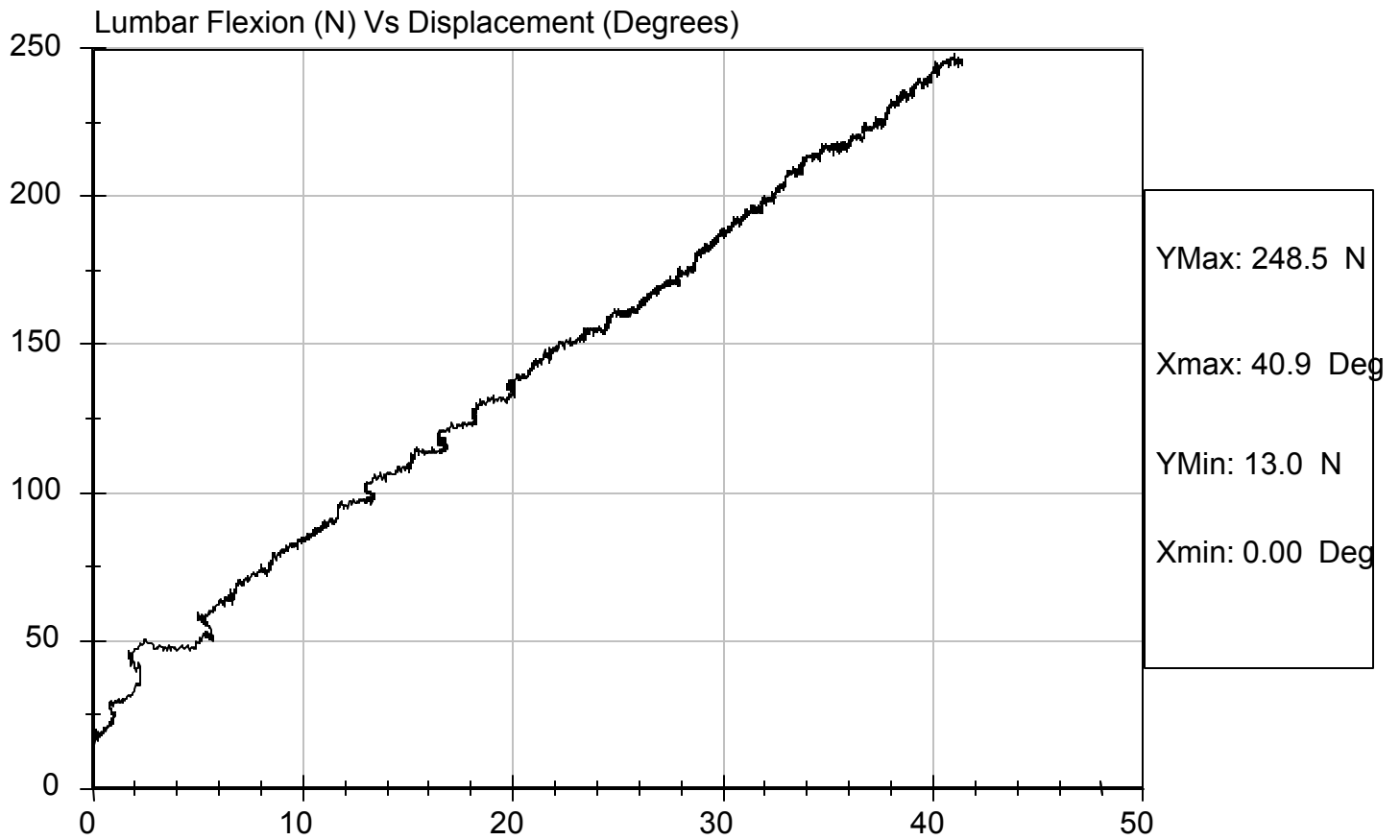


Test Description: Lumbar Flexion

Test Date: 10/19/09

Component: D092625

Speed: 0 ft/s, 0 m/s

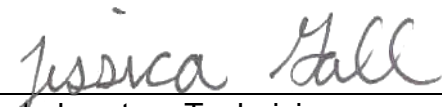


SID/HIII Calibration Data Sheet
Side Impact Dummy
Neck Pendulum Test

ATD Serial No: 271

Test I.D: D092629

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.5	Pass
Laboratory Relative Humidity		%	10 to 70	39	Pass
Impact Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	m/s	1.96 to 2.55	1.98	Pass
	20 ms	m/s	4.12 to 5.10	4.45	Pass
	30 ms	m/s	5.73 to 7.01	6.38	Pass
	40 to 70 ms	m/s	6.27 to 7.64	6.85	Pass
Midsaggital Plane Max Rotation		deg	66 to 82	71	Pass
Head Rotation Peak to Zero - Decay Time		ms	58 to 67	61	Pass
Max. Mx at Occipital Condyles		Nm	73 to 88	78	Pass
Mx Peak To Zero - Decay Time		ms	49 to 64	51	Pass
Mx Peak to Max. Head Rotation		ms	2 to 16	3	Pass


 Laboratory Technician

10/19/09

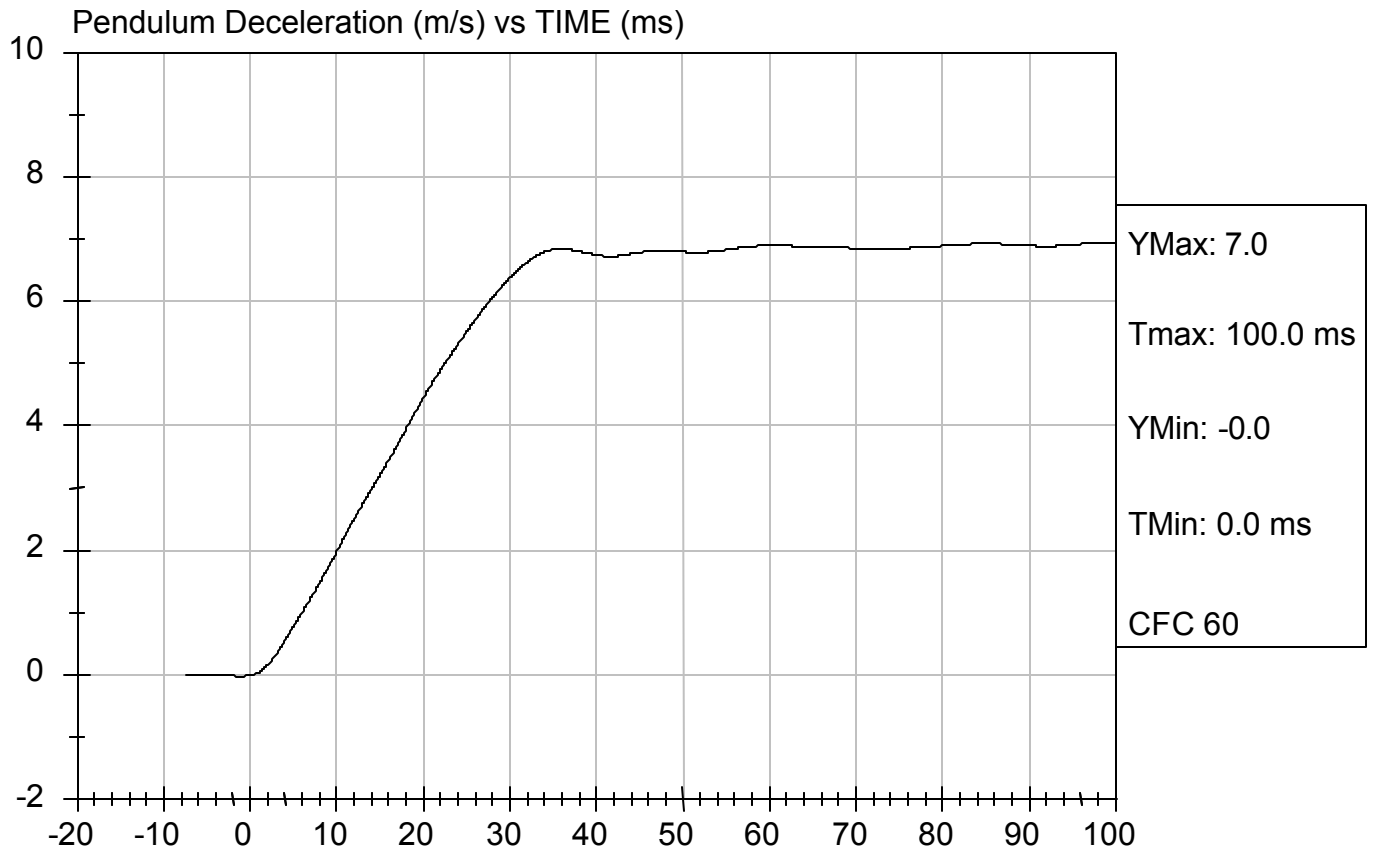
Test Date


 Approved By



Test Desc: Neck Bending
Component ID: D092629

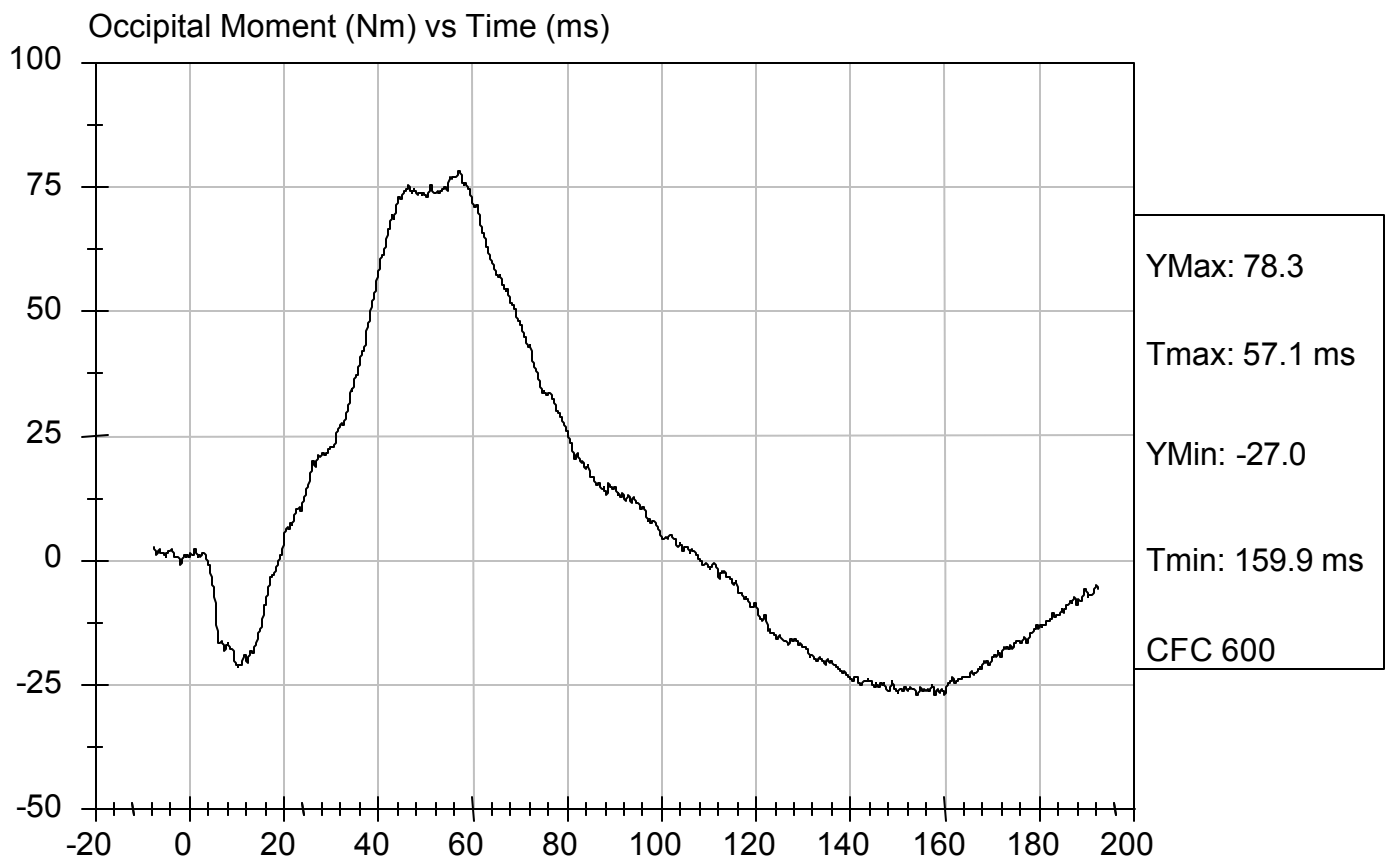
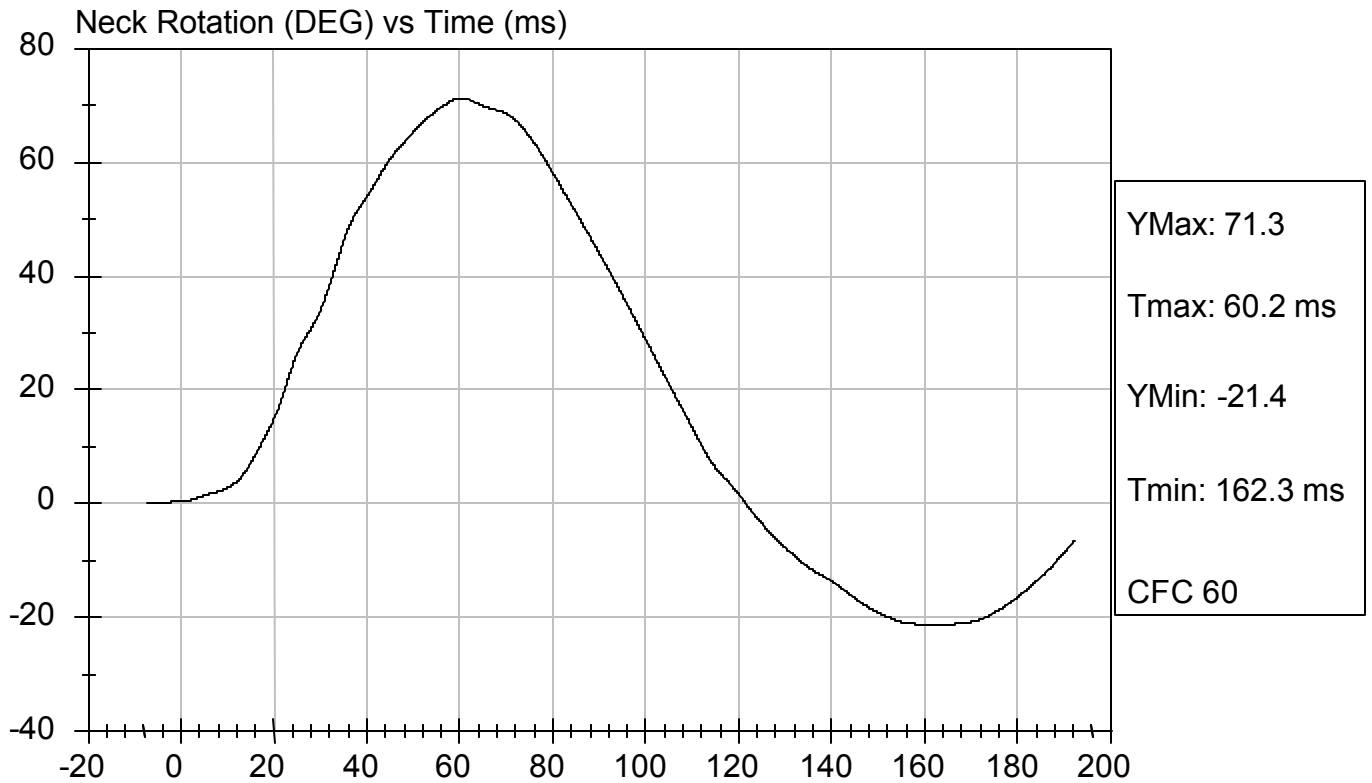
Test Date: 10/19/09
Speed: 23.15 ft/s, 7.06 m/s





Test Desc: Neck Bending
Component ID: D092629

Test Date: 10/19/09
Speed: 23.15 ft/s, 7.06 m/s



Calibration Test Results Summary

Dummy Serial Number: 271

Post-Test Calibration

External Dimensions:	The dummy passed all external dimension requirements.
Head Drop Test:	The head passed all drop test requirements.
Neck Pendulum Test:	The neck passed all pendulum test requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Pelvic Impact Test:	The pelvis passed all impact test requirements.
Abdominal Compression Test:	The abdomen passed all compression test requirements.
Lumbar Flexion Test:	The lumbar passed all flexion test requirements.

SID/HIII Calibration Data Sheet
Side Impact Dummy
Head Drop Calibration (Lateral)

ATD Serial No: 271

Test I.D: D092661

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	45	Pass
Peak Resultant Acceleration	G's	120 to 150	134	Pass
Is Resultant Curve Unimodal?	N/A	15% of peak	Yes	Pass
Peak Longitudnal Acceleration	G's	+/- 15	-10.1	Pass
Overall Test Results				Pass


Laboratory Technician

10/21/09
Test Date


Approved By



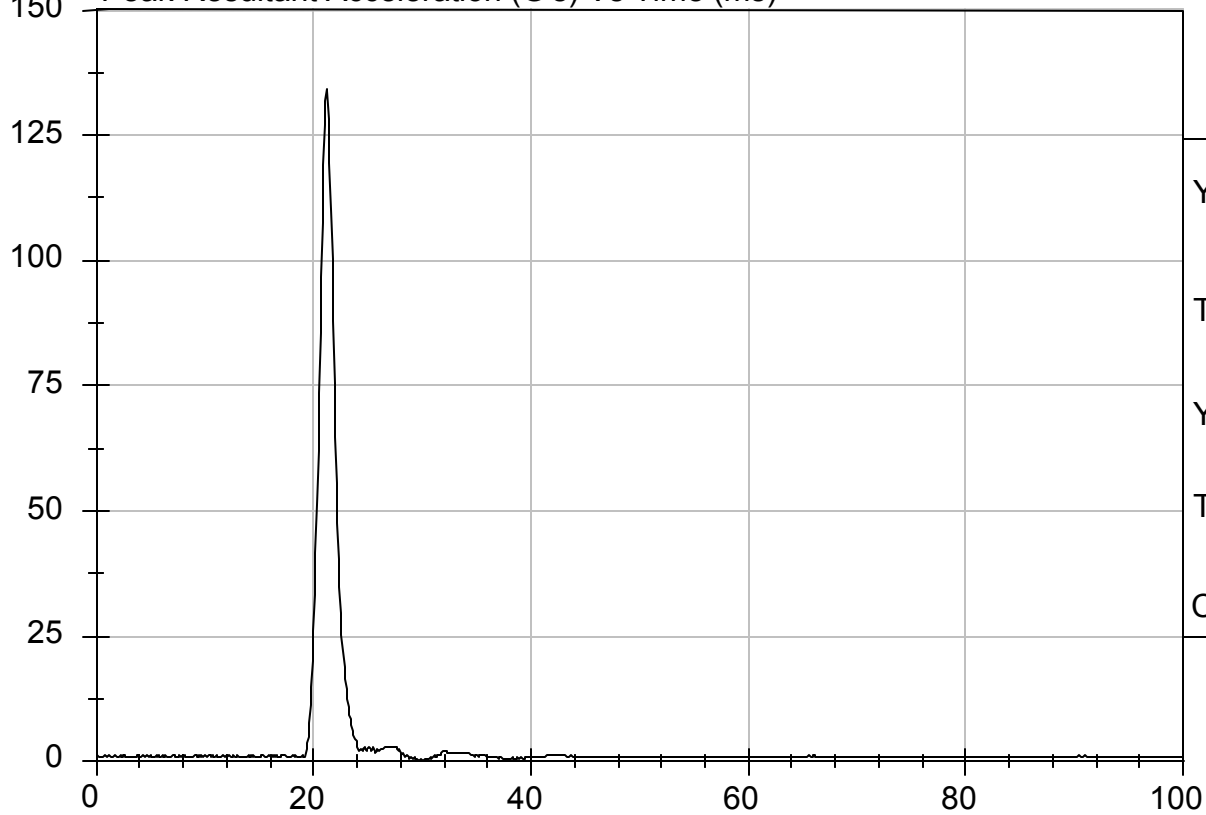
Test Description: Head Drop

Test Date: 10/21/09

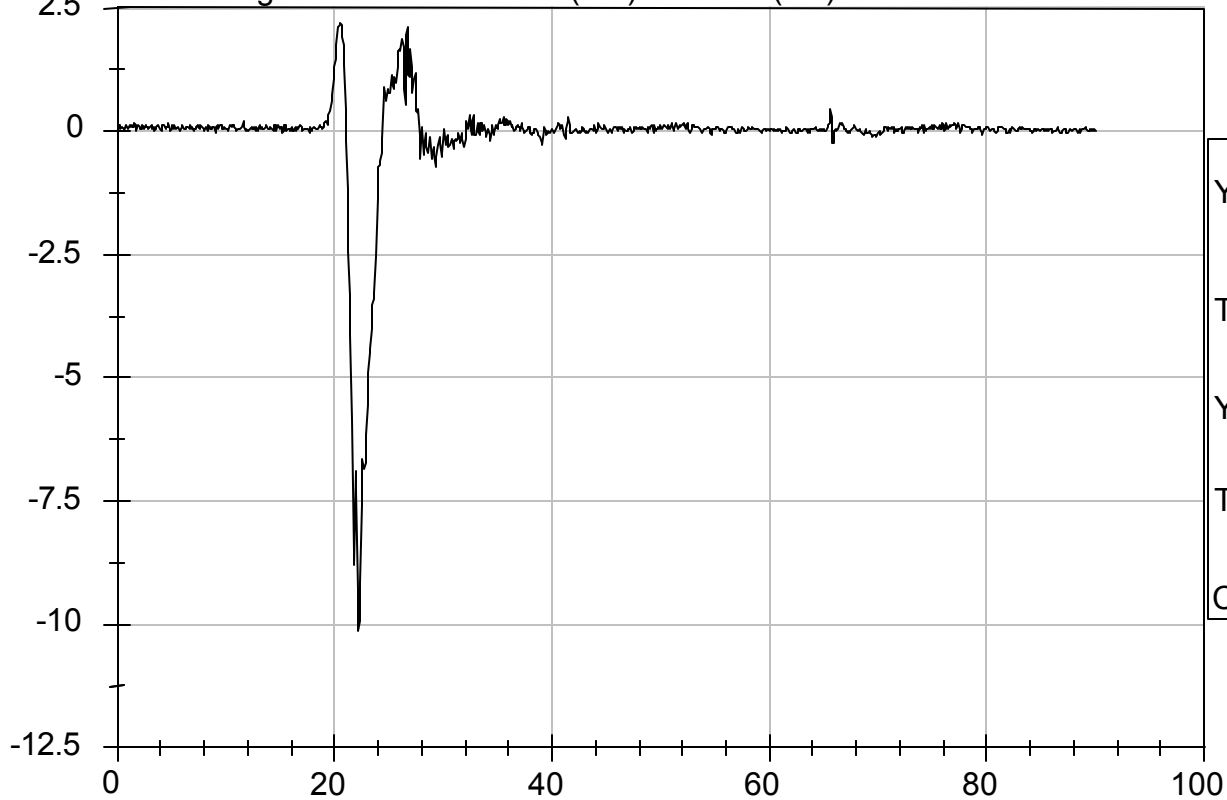
Component: D092661

Speed: 0 ft/s, 0 m/s

Peak Resultant Acceleration (G's) Vs Time (ms)



Peak Longitudinal Acceleration (G's) Vs Time (ms)



SID/HIII Calibration Data Sheet
Side Impact Dummy
Thorax Impact Test

ATD Serial No: 271

Test I.D: D092662

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	50	Pass
Probe Velocity	m/s	4.22 - 4.31	4.30	Pass
Upper Rib	G's	37 - 46	40	Pass
Lower Rib	G's	37 - 46	40	Pass
Lower Spine	G's	15 - 22	19	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

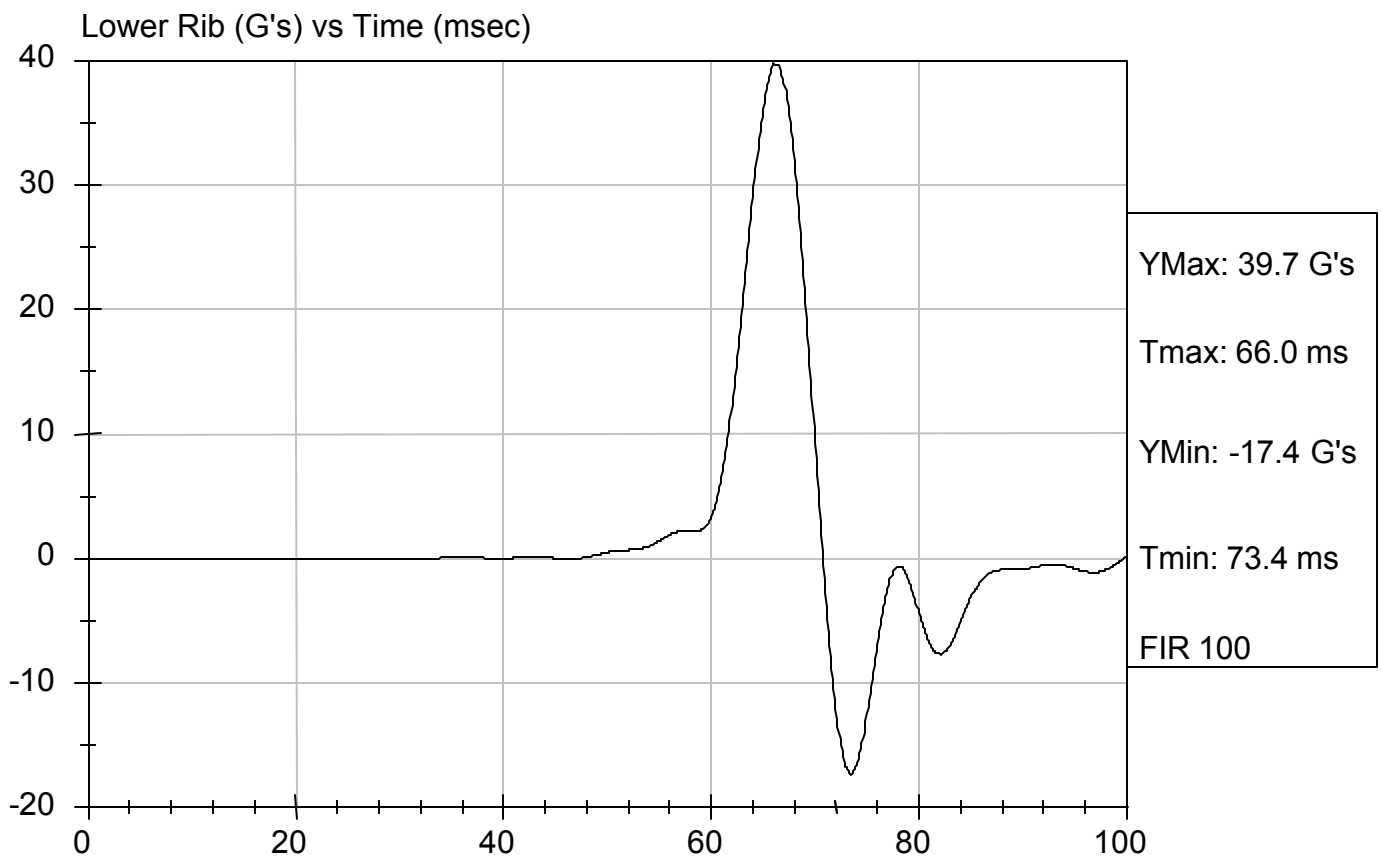
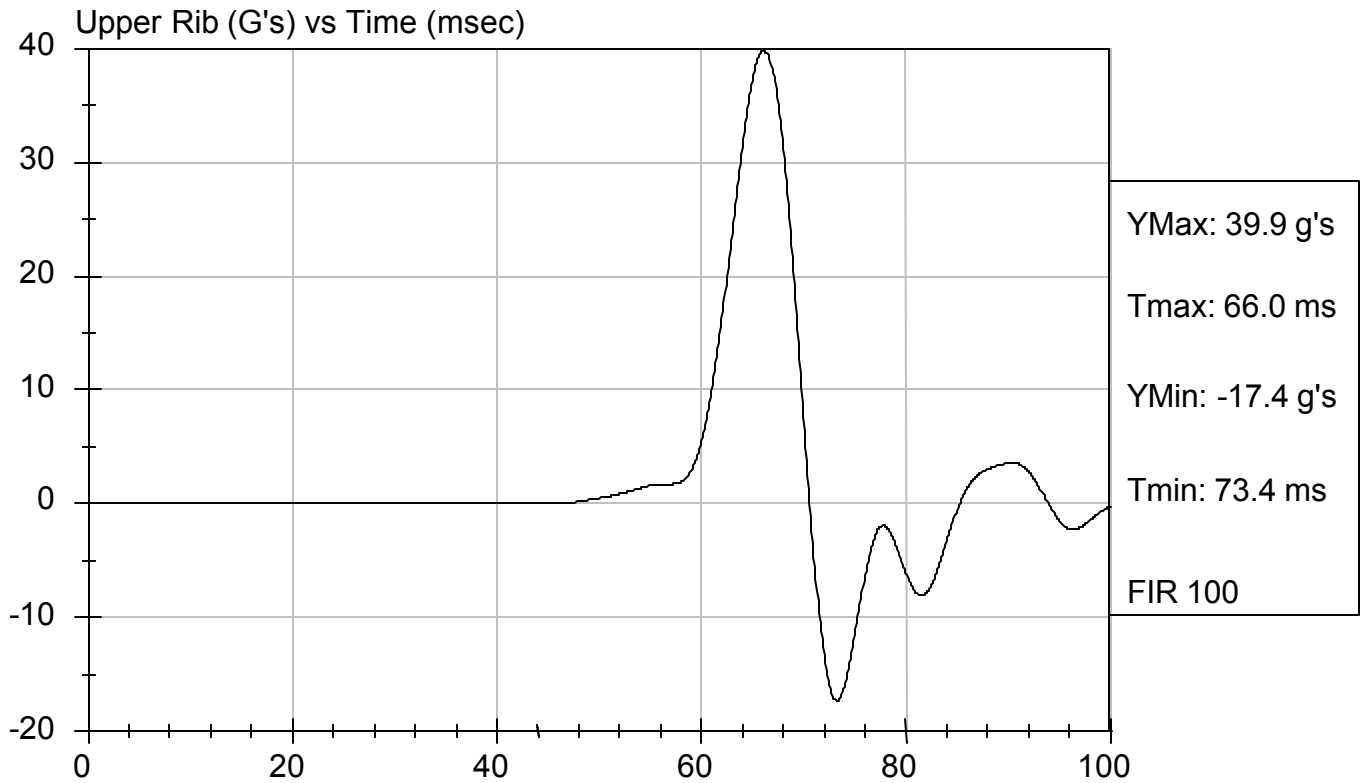
David Winkelbauer
Approved By

10/21/09
Test Date



Test Desc: Thorax Impact
Component ID: D092662

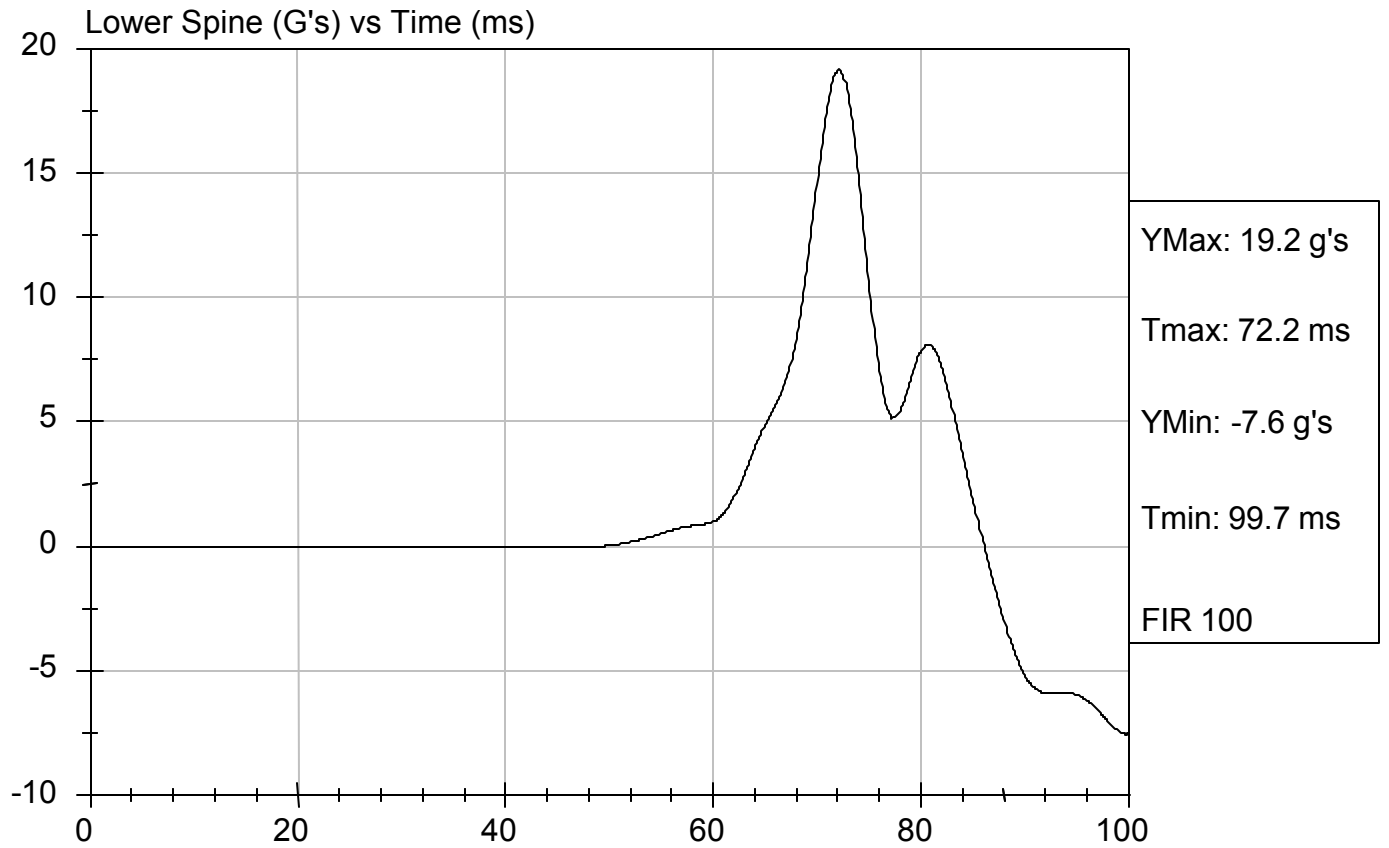
Test Date: 10/21/09
Speed: 14.12 ft/s, 4.30 m/s





Test Desc: Thorax Impact
Component ID: D092662

Test Date: 10/21/09
Speed: 14.12 ft/s, 4.30 m/s



SID/HIII Calibration Data Sheet
Side Impact Dummy
Pelvis Impact Test

ATD Serial No: 271

Test I.D: D092663

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	50	Pass
Probe Velocity	m/s	4.27 - 4.33	4.27	Pass
Pelvis Acceleration	G's	40 - 60	46	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

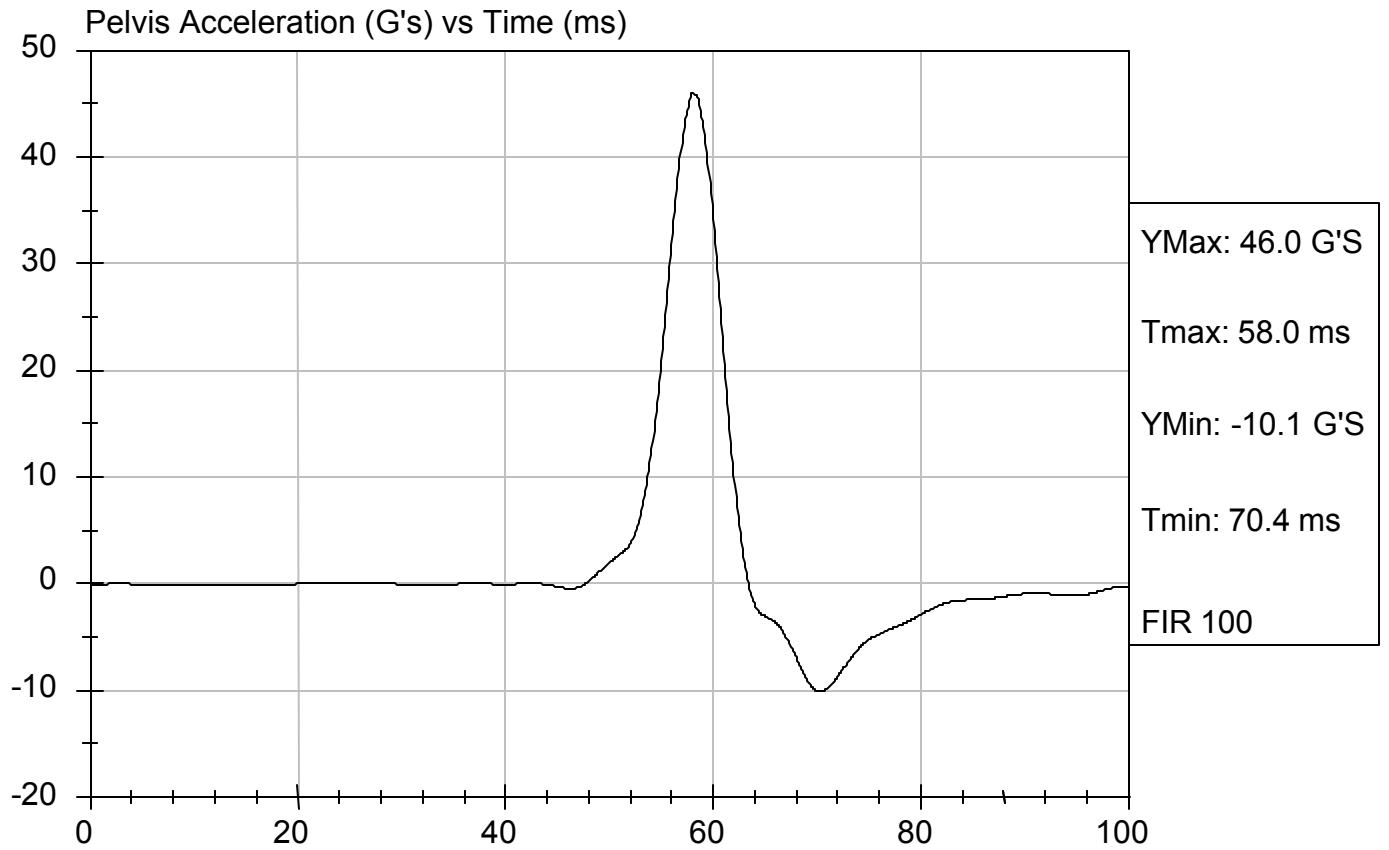
10/21/09
Test Date

David Winkelbauer
Approved By



Test Desc: Pelvis Impact
Component ID: D092663

Test Date: 10/21/09
Speed: 14.01 ft/s, 4.27 m/s



SID/HIII Calibration Data Sheet
Side Impact Dummy
Abdominal Compression Calibration (Pre-Load = 10 lbs)

ATD Serial No: 271

Test I.D: D092664

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	20.9	Pass
Laboratory Relative Humidity	%	10 to 70	41	Pass
Force At 12.7 mm	N	104 -162	135	Pass
Force At 19 mm	N	163 - 222	188	Pass
Force At 25.4 mm	N	222 - 280	250	Pass
Force At 33 mm	N	325 - 391	325.4	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

10/21/09
Test Date

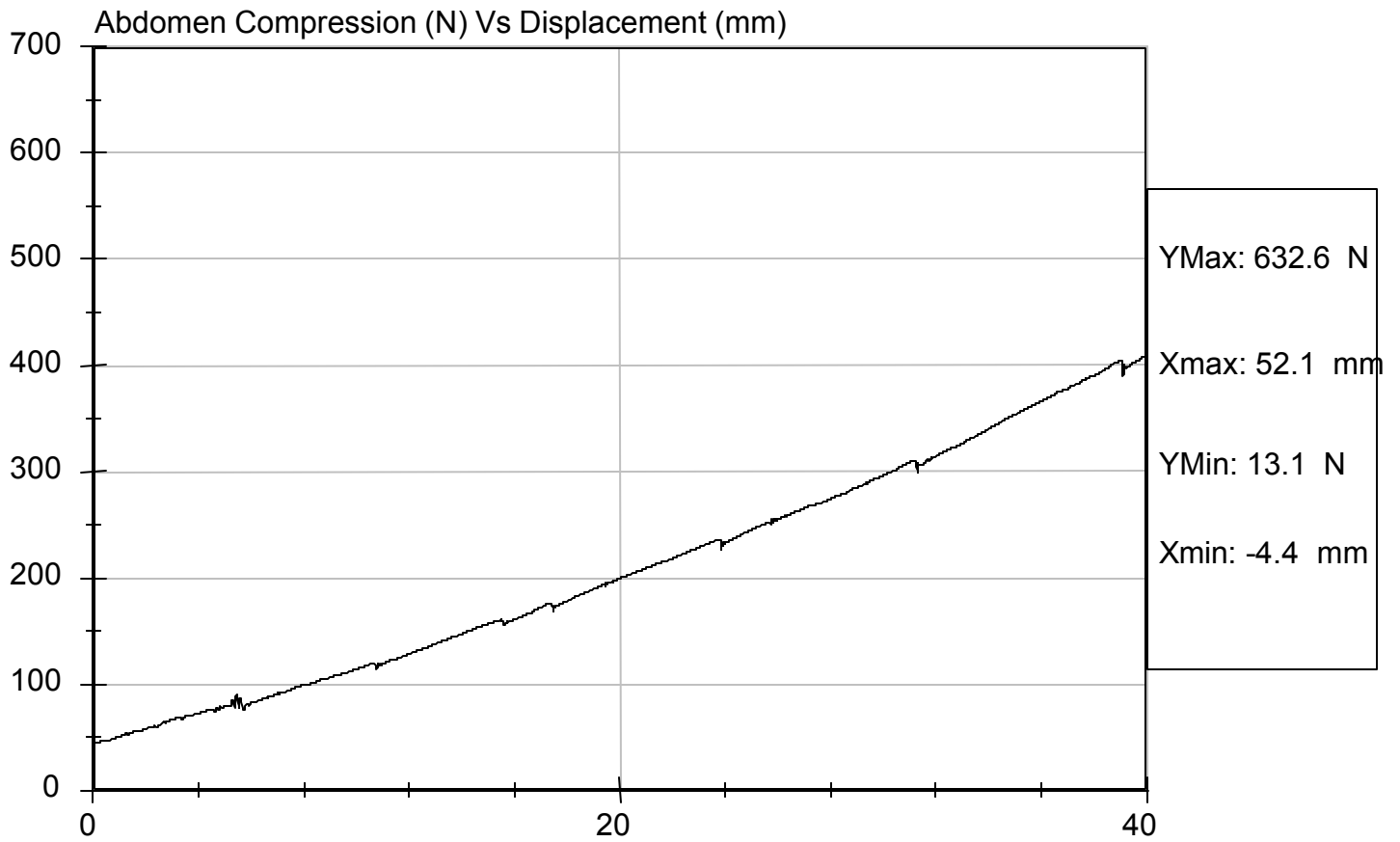
David Winkelbauer
Approved By



Test Description: Abdomen Compression Test Date: 10/21/09

Component: D092664

Speed: 0 ft/s, 0 m/s



SID/HIII Calibration Data Sheet
Side Impact Dummy
Lumbar Flexion Calibration

ATD Serial No: 271

Test I.D: D092665

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	41	Pass
Force At 0 deg	N	0 - 26.7	0	Pass
Force At 20 deg	N	97.9 - 151.2	111.7	Pass
Force At 30 deg	N	151.2 - 204.6	153.6	Pass
Force At 40 deg	N	204.6 - 258.0	223.1	Pass
Return Angle	Deg	12 Maximum	4	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

10/21/09
Test Date

David Winkelbauer
Approved By

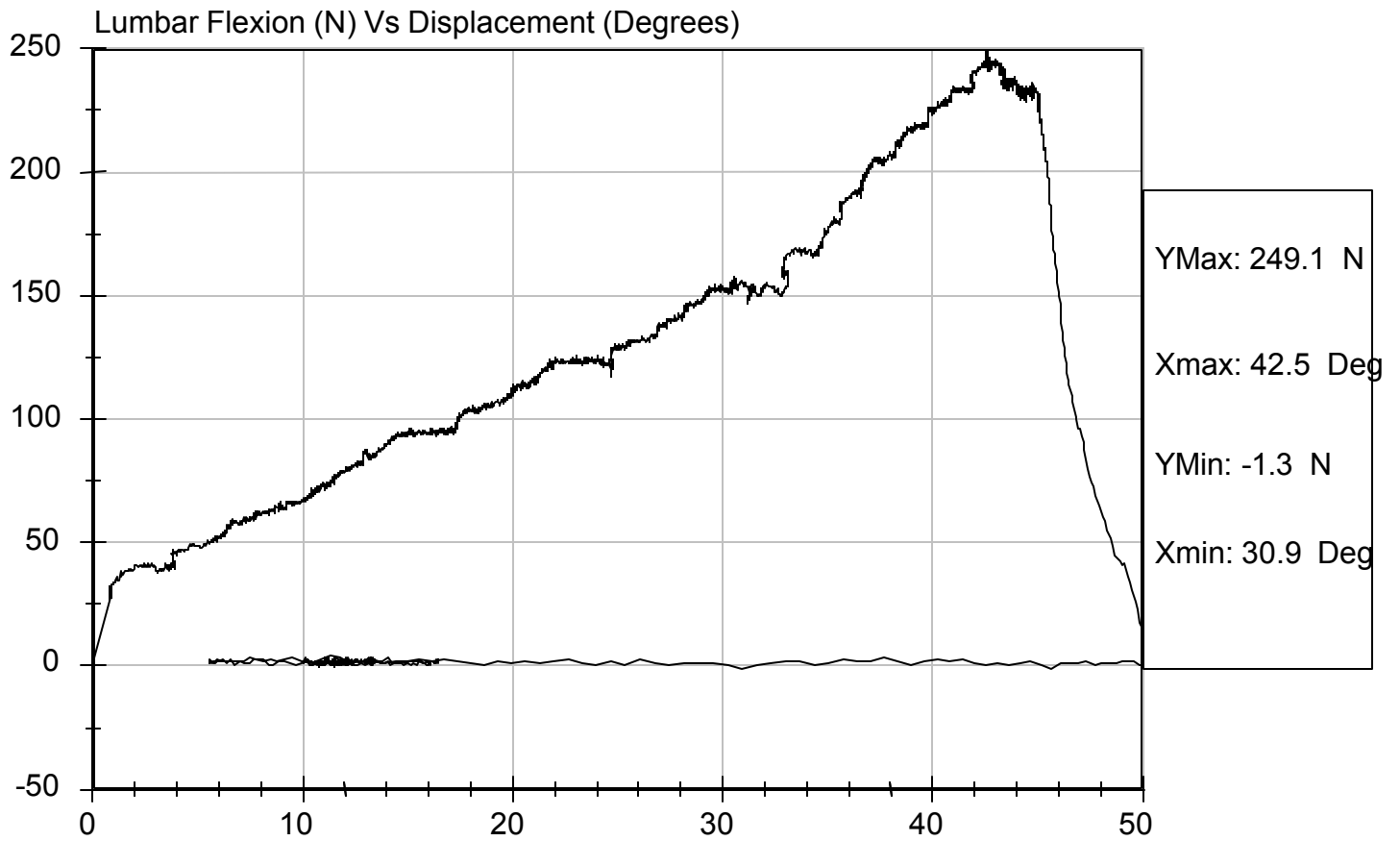


Test Description: Lumbar Flexion

Test Date: 10/21/09

Component: D092665

Speed: 0 ft/s, 0 m/s



SID/HIII Calibration Data Sheet
Side Impact Dummy
Neck Pendulum Test

ATD Serial No: 271

Test I.D: D092669

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.9	Pass
Laboratory Relative Humidity		%	10 to 70	47	Pass
Impact Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	m/s	1.96 to 2.55	1.98	Pass
	20 ms	m/s	4.12 to 5.10	4.32	Pass
	30 ms	m/s	5.73 to 7.01	6.26	Pass
	40 to 70 ms	m/s	6.27 to 7.64	6.91	Pass
Midsaggital Plane Max Rotation		deg	66 to 82	71	Pass
Head Rotation Peak to Zero - Decay Time		ms	58 to 67	58	Pass
Max. Mx at Occipital Condyles		Nm	73 to 88	77	Pass
Mx Peak To Zero - Decay Time		ms	49 to 64	60	Pass
Mx Peak to Max. Head Rotation		ms	2 to 16	15	Pass


 Laboratory Technician

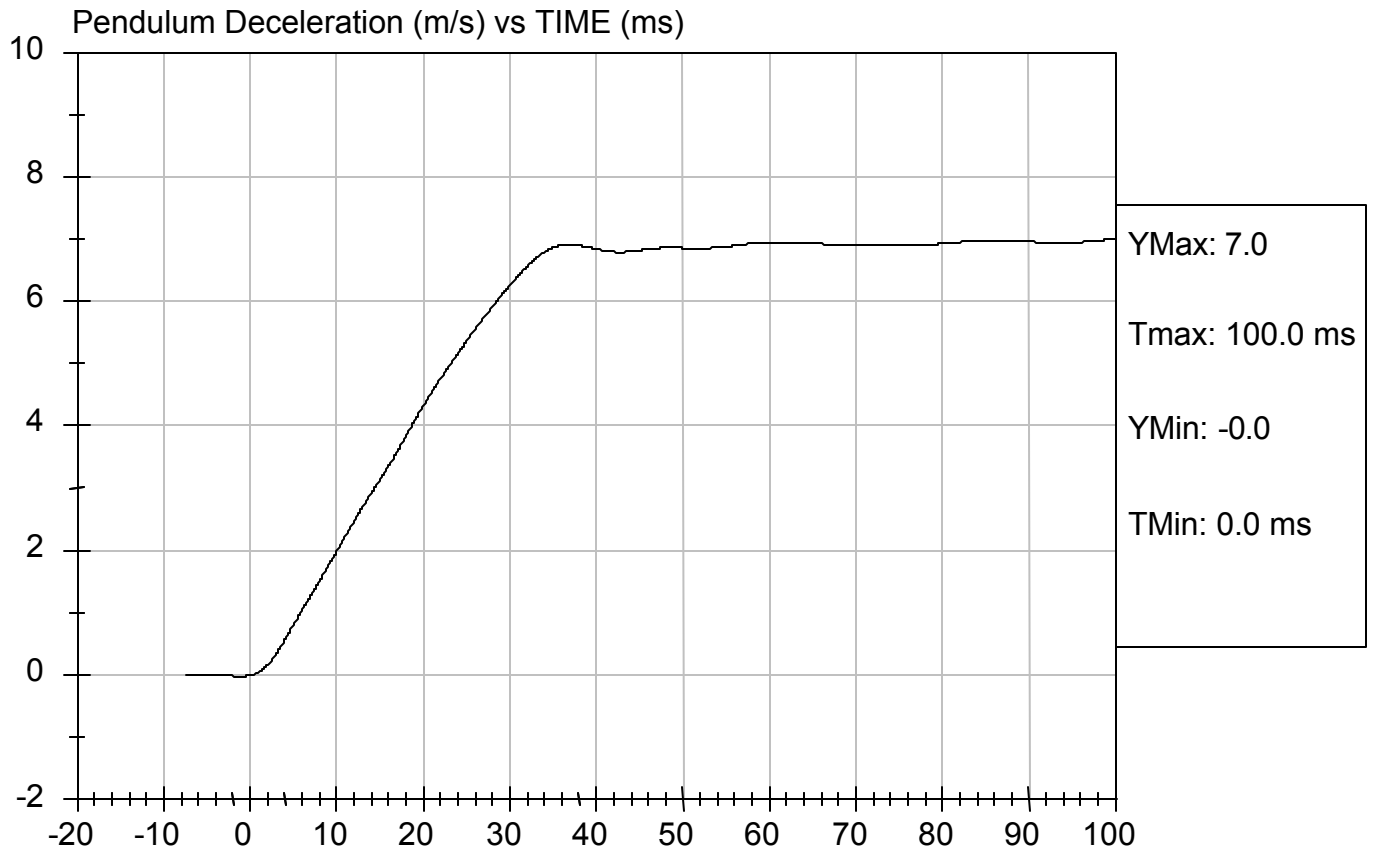

 Approved By

10/21/09
 Test Date



Test Desc: Neck Bending
Component ID: D092669

Test Date: 10/21/09
Speed: 23.15 ft/s, 7.06 m/s

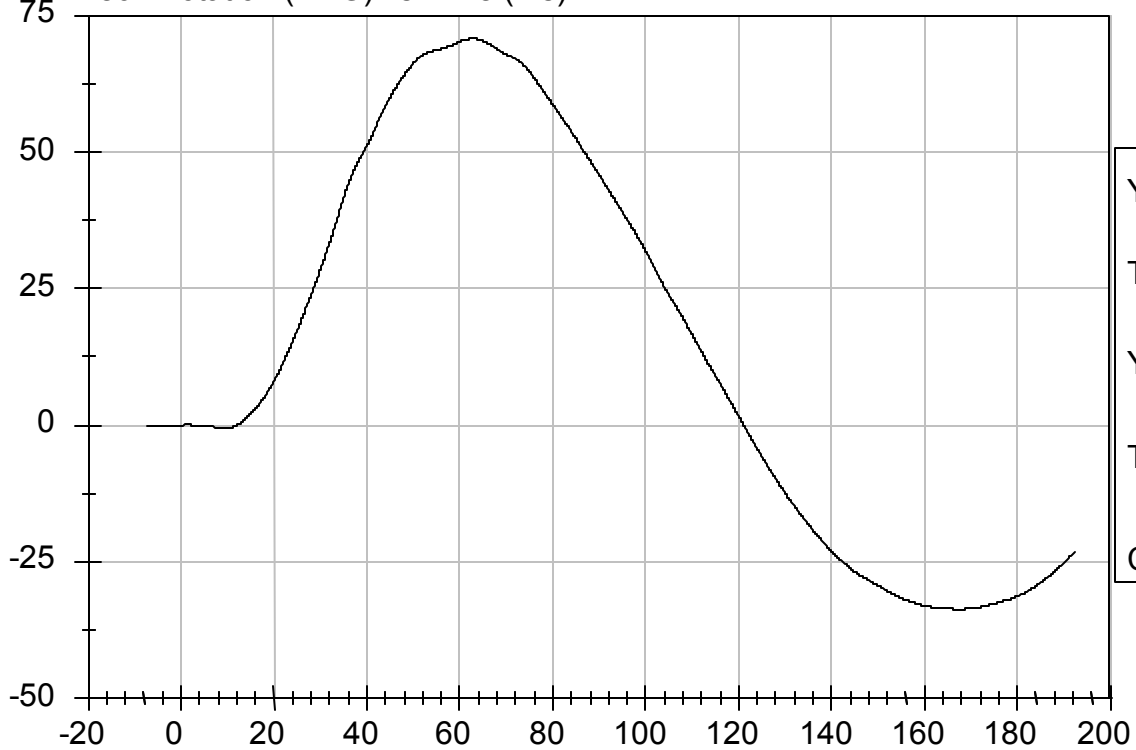




Test Desc: Neck Bending
Component ID: D092669

Test Date: 10/21/09
Speed: 23.15 ft/s, 7.06 m/s

Neck Rotation (DEG) vs Time (ms)



YMax: 70.7

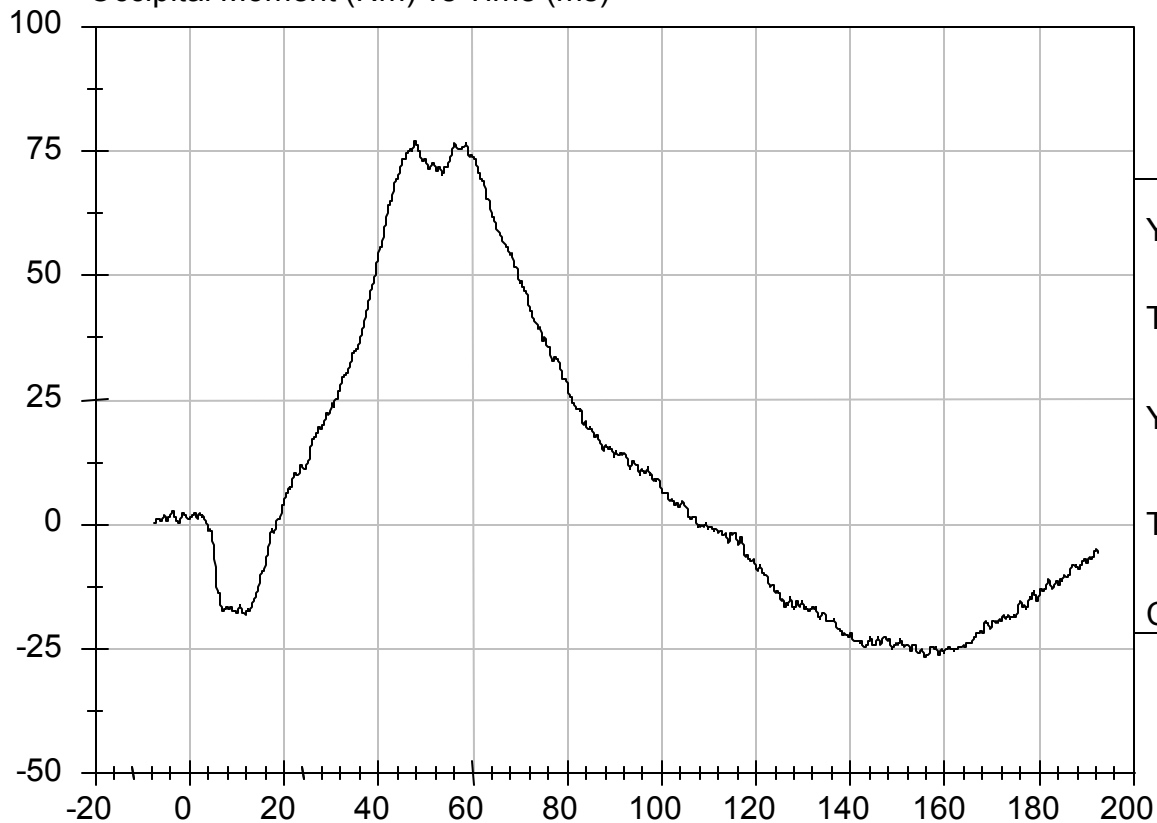
Tmax: 62.8 ms

YMin: -33.7

Tmin: 167.5 ms

CFC 60

Occipital Moment (Nm) vs Time (ms)



YMax: 77.0

Tmax: 47.7 ms

YMin: -26.8

Tmin: 155.8 ms

CFC 600

SID Calibration Data Sheet
Side Impact Dummy
Inspection Checklist

ATD Serial No: 271

Test Part	Items Checked	Result
Skin	Visual inspection	Pass
Head	Visual, ballast, accelerometer mount	Pass
Neck	Visual	Pass
Spine Box	Visual, ballast, accelerometer mount	Pass
Rib Cage	Visual, measure	Pass
Sternum	Visual	Pass
Lumbar Spine	Visual	Pass
Abdomen	Visual	Pass
Pelvis	Visual, palpate, accelerometer mount	Pass
Upper Legs	Visual	Pass
Knees	Visual	Pass
Lower Legs	Visual, range of motion	Pass
Ankles	Visual, range of motion	Pass
Feet	Visual, range of motion	Pass
Joints	1 to 2 g range	Pass
Other		Pass

Jessica Hall
 Laboratory Technician
David Winkelbauer
 Approved By

10/21/2009
 Test Date

CERTIFICATION DATA

Dummy Serial Number: 272

Calibration Test Results Summary

Dummy Serial Number: 272

Pre-Test Calibration

External Dimensions:	The dummy passed all external dimension requirements.
Head Drop Test:	The head passed all drop test requirements.
Neck Pendulum Test:	The neck passed all pendulum test requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Pelvic Impact Test:	The pelvis passed all impact test requirements.
Abdominal Compression Test:	The abdomen passed all compression test requirements.
Lumbar Flexion Test:	The lumbar passed all flexion test requirements. 2

SID Calibration Data Sheet
Side Impact Dummy
External Measurements

ATD Serial No: 272

Test I.D: D09263

Tested Parameter	Units	Specification	Result	Pass/Fail
SH - Seated Height	mm	889 - 909	907	Pass
RH - Rib Height	mm	501 - 521	520	Pass
HP - Hip Pivot Height	mm	99 ref.	99	Pass
RD - Rib from Back Line	mm	229 - 241	230	Pass
KV - Knee Pivot to Back Line	mm	511 - 526	525	Pass
SW - Knee Pivot to Floor	mm	490 - 505	495	Pass
HW - Hip Width	mm	356 - 391	358	Pass
Overall Test Results			Pass	

Jessica Hall
Laboratory Technician

David Winkelbauer
Approved By

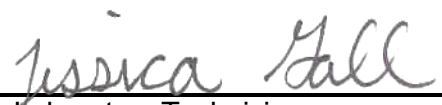
10/19/2009
Test Date

SID/HIII Calibration Data Sheet
Side Impact Dummy
Head Drop Calibration (Lateral)

ATD Serial No: 272

Test I.D: D092631

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	43	Pass
Peak Resultant Acceleration	G's	120 to 150	138	Pass
Is Resultant Curve Unimodal?	N/A	15% of peak	Yes	Pass
Peak Longitudnal Acceleration	G's	+/- 15	-6.8	Pass
Overall Test Results				Pass


Laboratory Technician


Approved By

10/19/09
Test Date



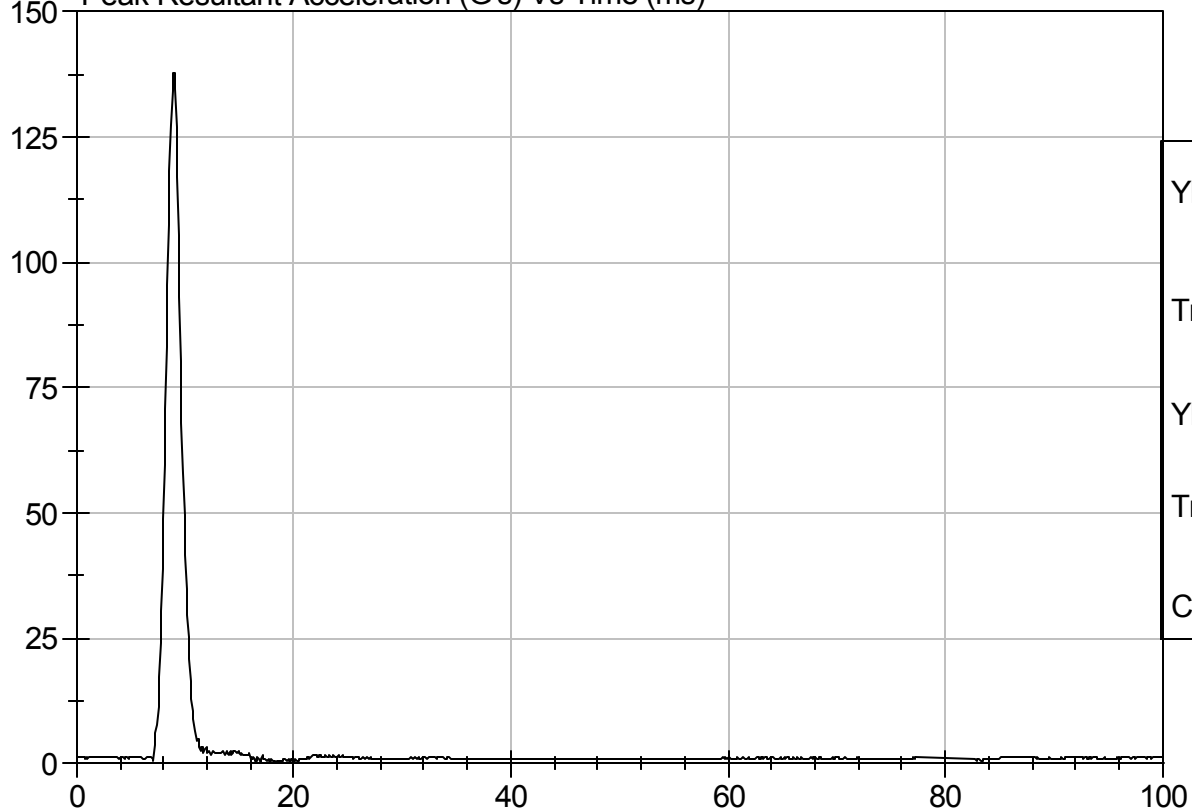
Test Description: Head Drop

Test Date: 10/19/09

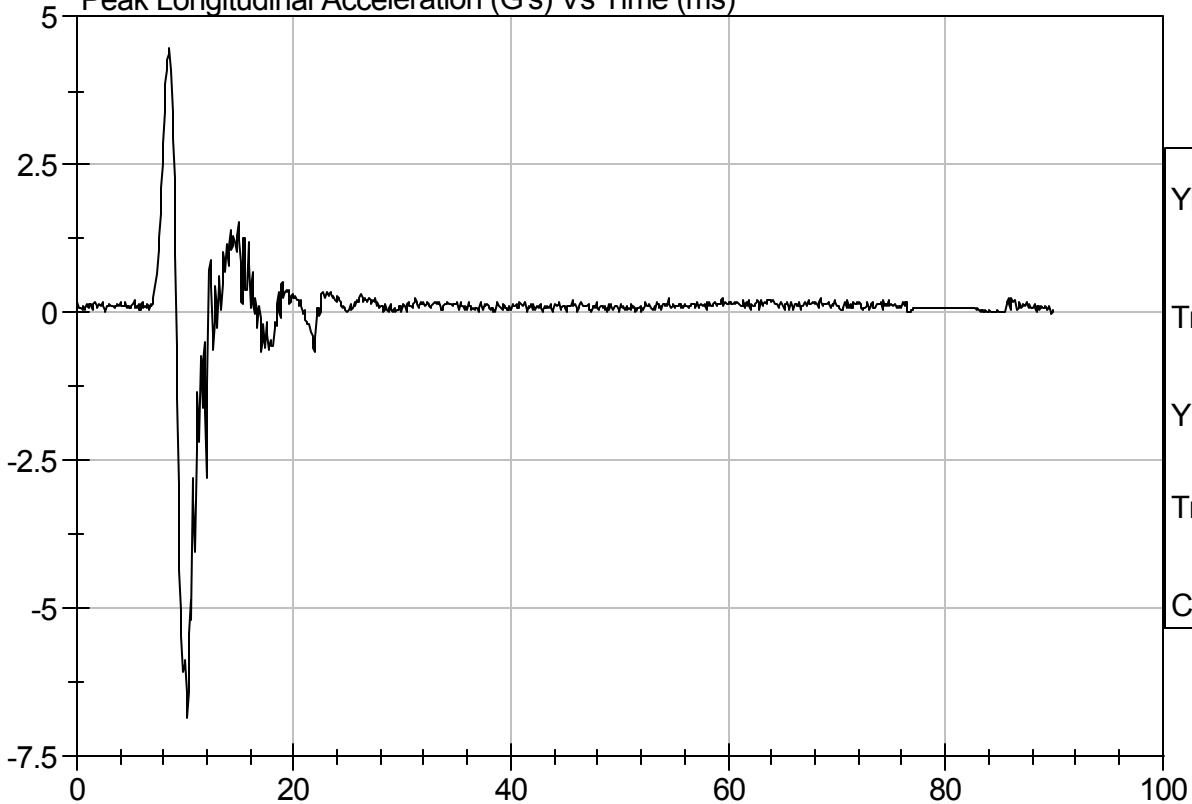
Component: D092631

Speed: 0 ft/s, 0 m/s

Peak Resultant Acceleration (G's) Vs Time (ms)



Peak Longitudinal Acceleration (G's) Vs Time (ms)



SID/HIII Calibration Data Sheet
Side Impact Dummy
Thorax Impact Test

ATD Serial No: 272

Test I.D: D092632

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	39	Pass
Probe Velocity	m/s	4.22 - 4.31	4.27	Pass
Upper Rib	G's	37 - 46	42	Pass
Lower Rib	G's	37 - 46	41	Pass
Lower Spine	G's	15 - 22	21	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

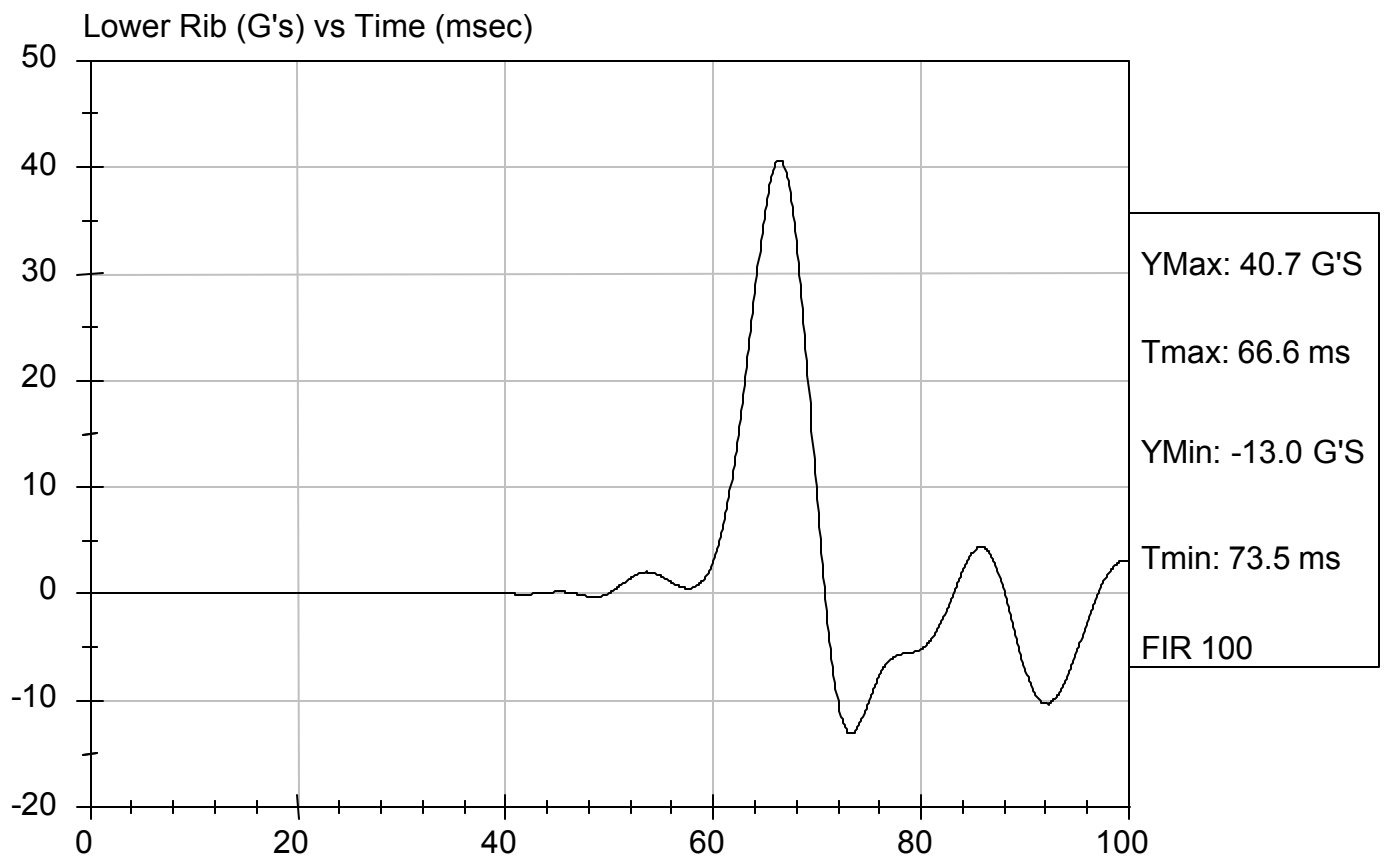
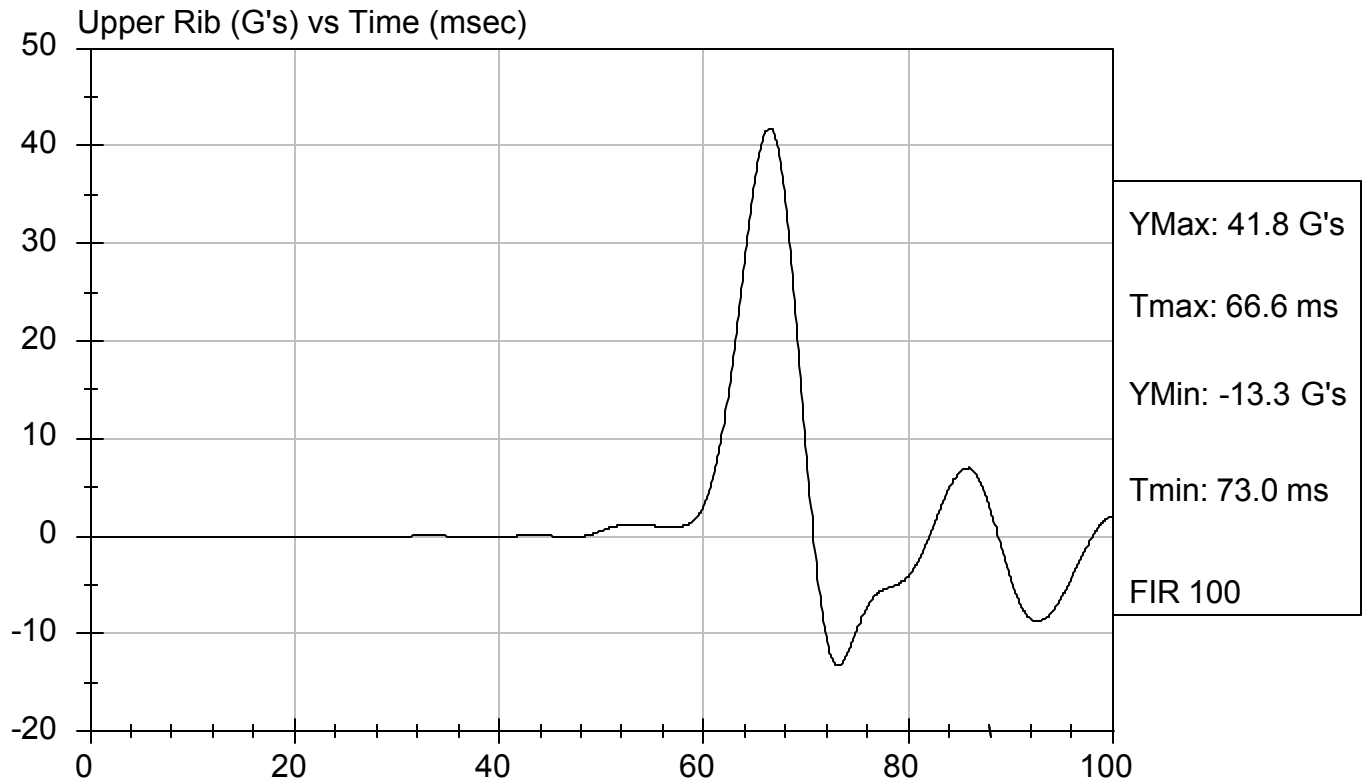
David Winkelbauer
Approved By

10/19/09
Test Date



Test Desc: Thorax Impact
Component ID: D092632

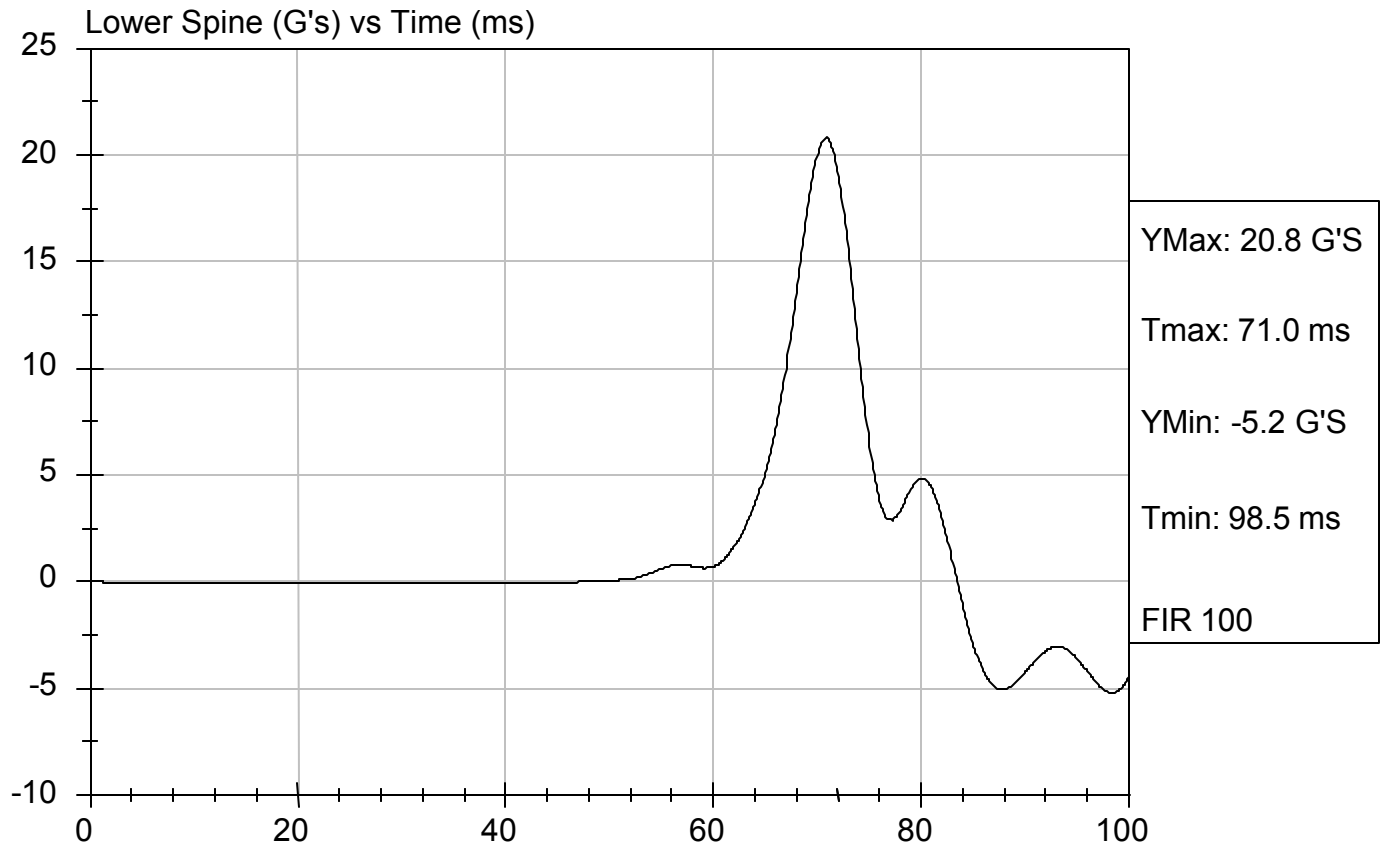
Test Date: 10/19/09
Speed: 14.01 ft/s, 4.27 m/s





Test Desc: Thorax Impact
Component ID: D092632

Test Date: 10/19/09
Speed: 14.01 ft/s, 4.27 m/s



SID/HIII Calibration Data Sheet

Side Impact Dummy

Pelvis Impact Test

ATD Serial No: 272

Test I.D: D092633

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	39	Pass
Probe Velocity	m/s	4.27 - 4.33	4.30	Pass
Pelvis Acceleration	G's	40 - 60	43	Pass
			Overall Test Results	Pass

Jessica Hall
Laboratory Technician

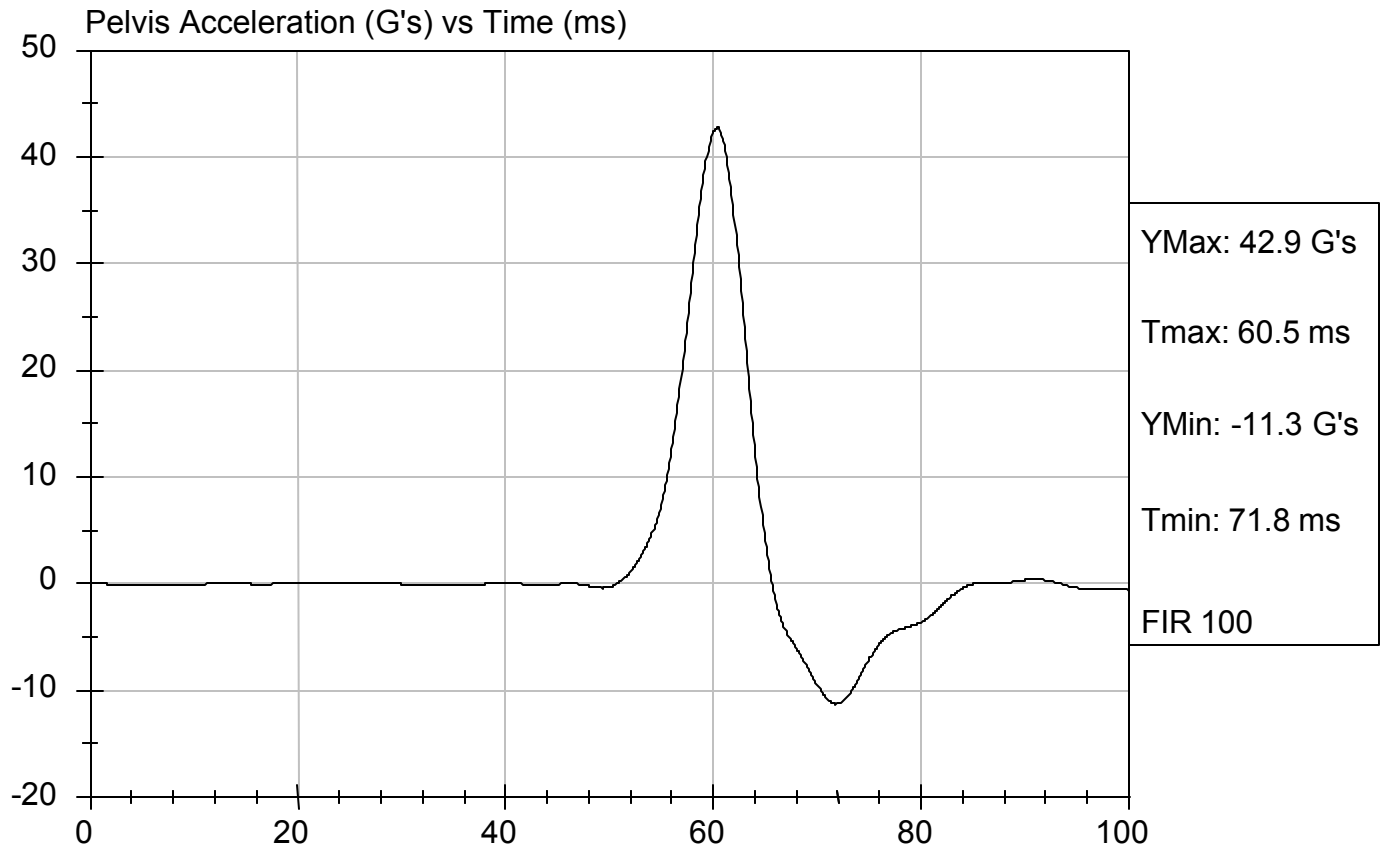
David Winkelbauer
Approved By

10/19/09
Test Date



Test Desc: Pelvis Impact
Component ID: D092633

Test Date: 10/19/09
Speed: 14.12 ft/s, 4.30 m/s



SID/HIII Calibration Data Sheet
Side Impact Dummy
Abdominal Compression Calibration (Pre-Load = 10 lbs)

ATD Serial No: 272

Test I.D: D092634

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	40	Pass
Force At 12.7 mm	N	104 -162	139	Pass
Force At 19 mm	N	163 - 222	196	Pass
Force At 25.4 mm	N	222 - 280	267	Pass
Force At 33 mm	N	325 - 391	364	Pass
Overall Test Results			Pass	

Jessica Hall
Laboratory Technician

10/19/09
Test Date

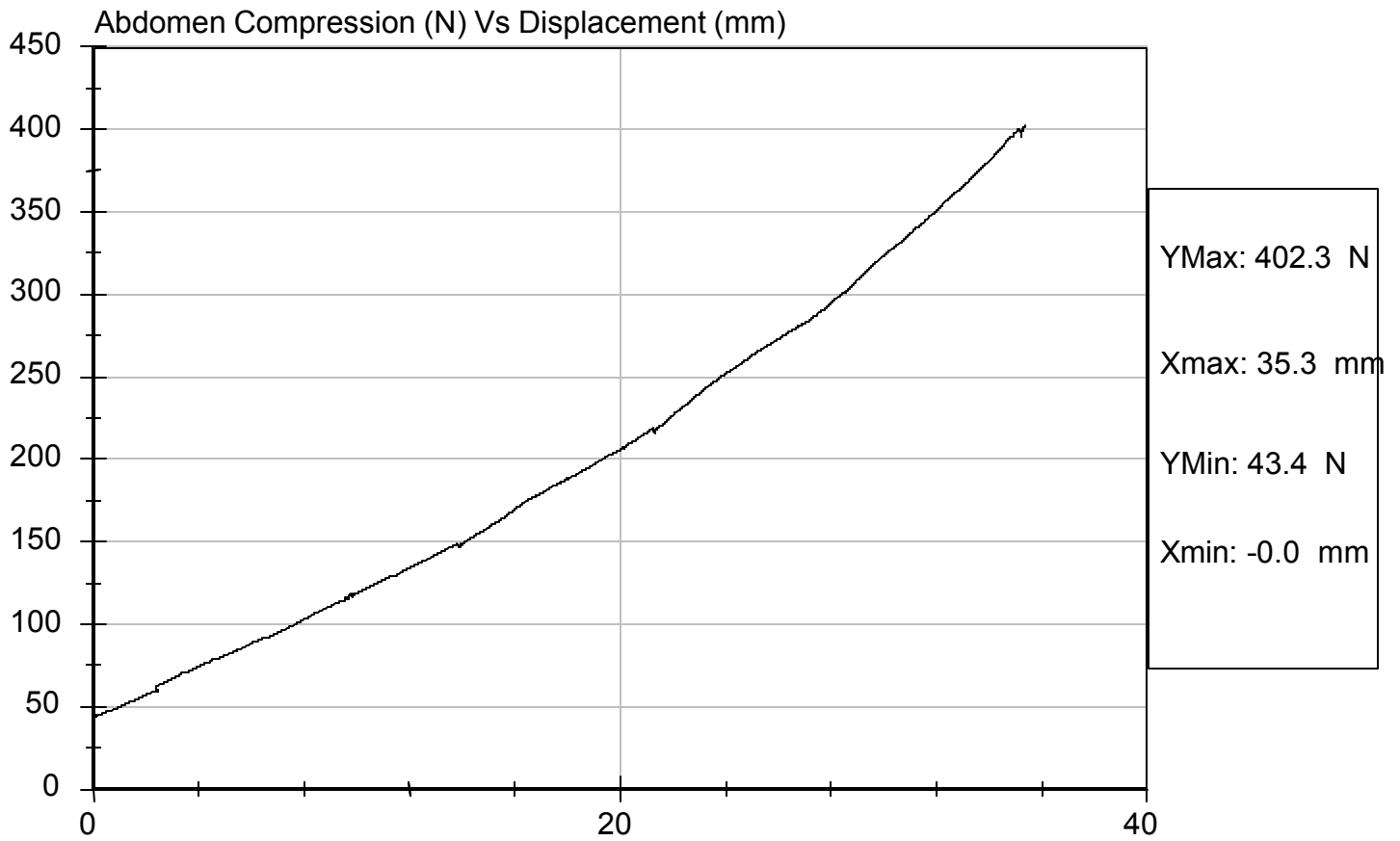
David Winkelbauer
Approved By



Test Description: Abdomen Compression Test Date: 10/19/09

Component: D092634

Speed: 0 ft/s, 0 m/s



SID/HIII Calibration Data Sheet
Side Impact Dummy
Lumbar Flexion Calibration

ATD Serial No: 272

Test I.D: D092635

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	40	Pass
Force At 0 deg	N	0 - 26.7	0	Pass
Force At 20 deg	N	97.9 - 151.2	128.9	Pass
Force At 30 deg	N	151.2 - 204.6	189.8	Pass
Force At 40 deg	N	204.6 - 258.0	240.0	Pass
Return Angle	Deg	12 Maximum	3	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

David Winkelbauer
Approved By

10/19/09
Test Date

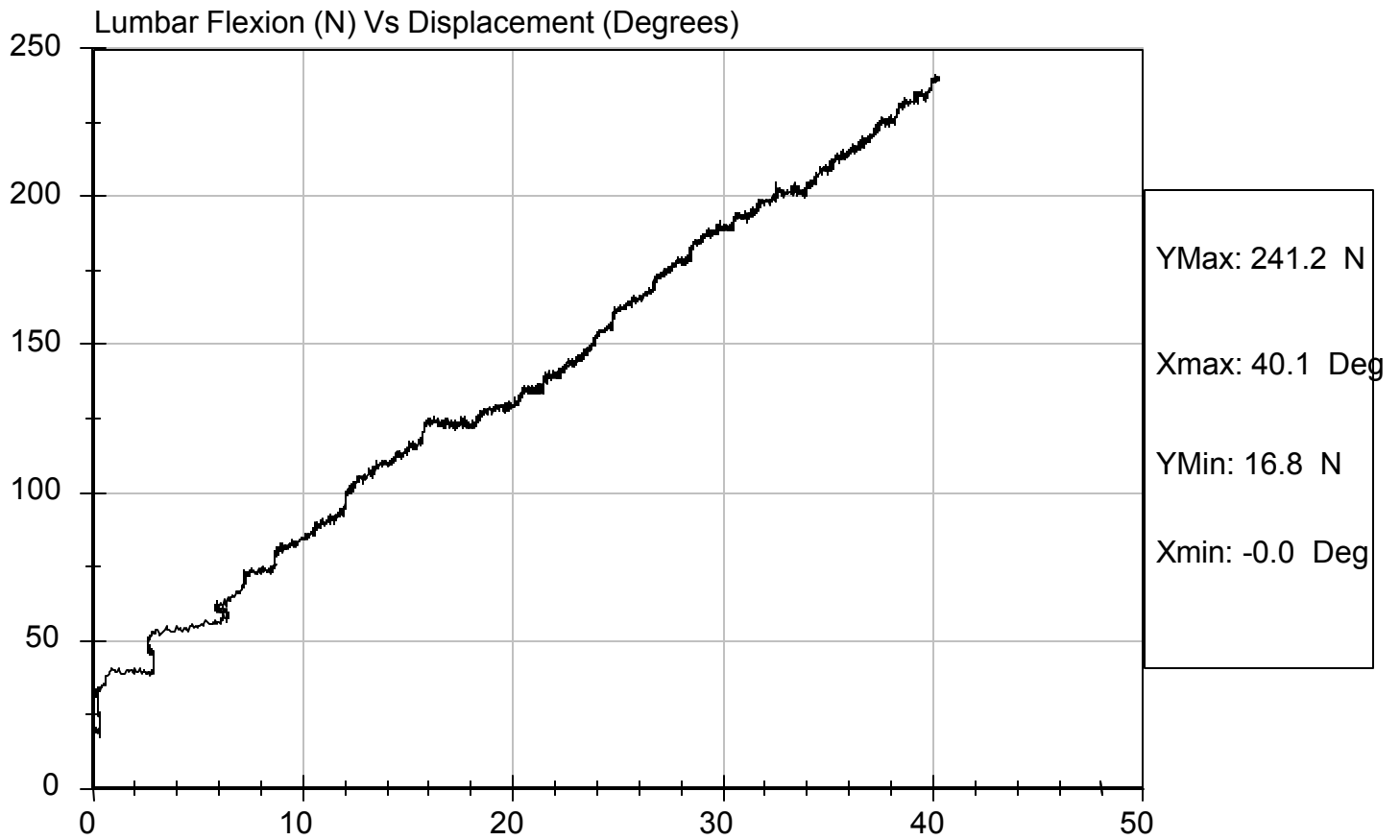


Test Description: Lumbar Flexion

Test Date: 10/19/09

Component: D092635

Speed: 0 ft/s, 0 m/s

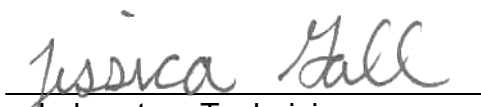


SID/HIII Calibration Data Sheet
Side Impact Dummy
Neck Pendulum Test

ATD Serial No: 272

Test I.D: D092639

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.5	Pass
Laboratory Relative Humidity		%	10 to 70	39	Pass
Impact Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	m/s	1.96 to 2.55	2.39	Pass
	20 ms	m/s	4.12 to 5.10	4.64	Pass
	30 ms	m/s	5.73 to 7.01	6.37	Pass
	40 to 70 ms	m/s	6.27 to 7.64	6.79	Pass
Midsaggital Plane Max Rotation		deg	66 to 82	71	Pass
Head Rotation Peak to Zero - Decay Time		ms	58 to 67	66	Pass
Max. Mx at Occipital Condyles		Nm	73 to 88	75	Pass
Mx Peak To Zero - Decay Time		ms	49 to 64	53	Pass
Mx Peak to Max. Head Rotation		ms	2 to 16	12	Pass


 Laboratory Technician

10/19/09

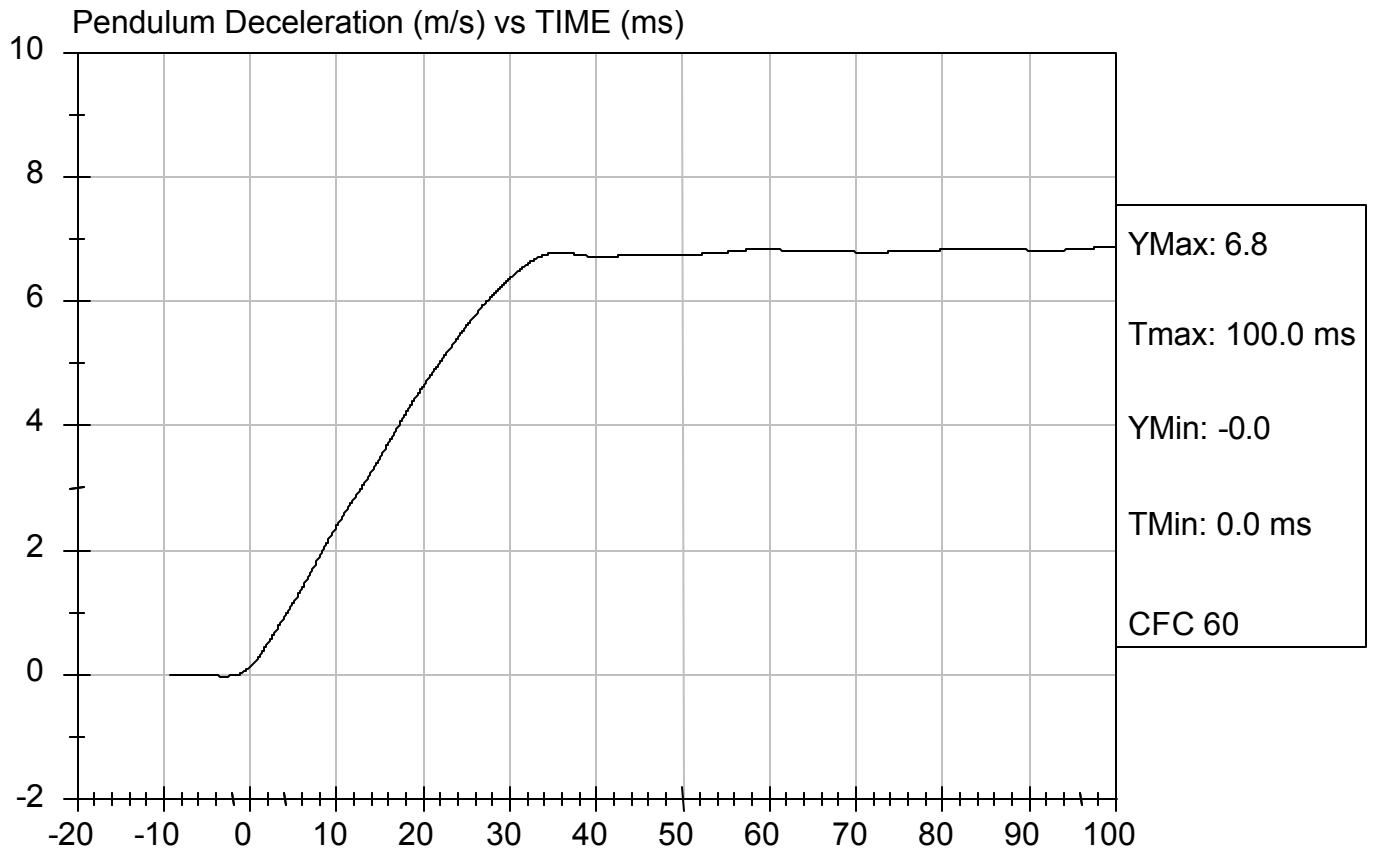
Test Date


 Approved By



Test Desc: Neck Bending
Component ID: D092639

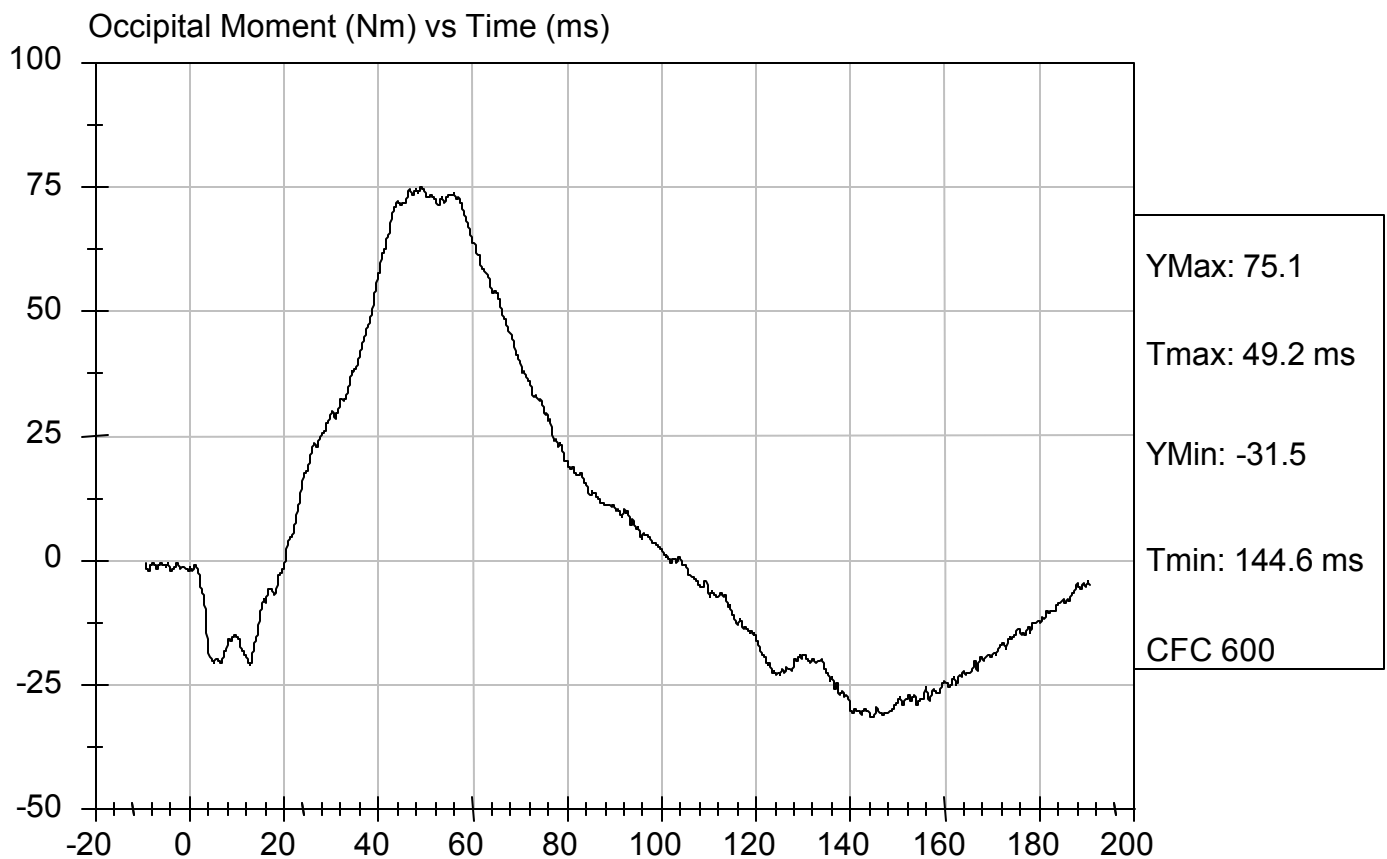
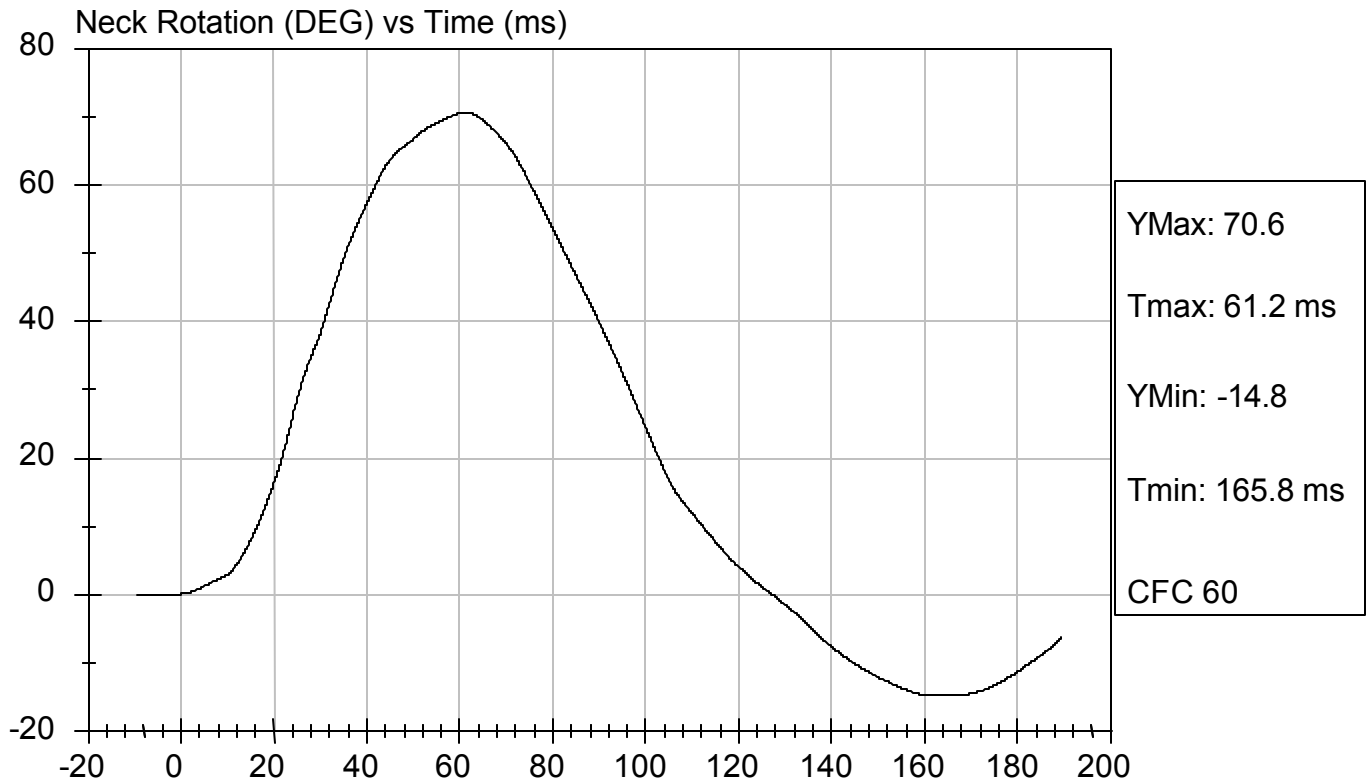
Test Date: 10/19/09
Speed: 23.15 ft/sec, 7.06 m/sec





Test Desc: Neck Bending
Component ID: D092639

Test Date: 10/19/09
Speed: 23.15 ft/s, 7.06 m/s



Calibration Test Results Summary

Dummy Serial Number: 272

Post-Test Calibration

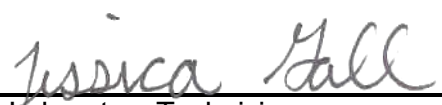
External Dimensions:	The dummy passed all external dimension requirements.
Head Drop Test:	The head passed all drop test requirements.
Neck Pendulum Test:	The neck passed all pendulum test requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Pelvic Impact Test:	The pelvis passed all impact test requirements.
Abdominal Compression Test:	The abdomen passed all compression test requirements.
Lumbar Flexion Test:	The lumbar passed all flexion test requirements.

SID Calibration Data Sheet
Side Impact Dummy
Head Drop Calibration (Lateral)

ATD Serial No: 272

Test I.D: D092671

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	47	Pass
Peak Resultant Acceleration	G's	120 to 150	139	Pass
Is Resultant Curve Unimodal?	N/A	15% of peak	Yes	Pass
Peak Longitudnal Acceleration	G's	+/- 15	-6.4	Pass
Overall Test Results				Pass


Laboratory Technician


Approved By

10/21/09
Test Date

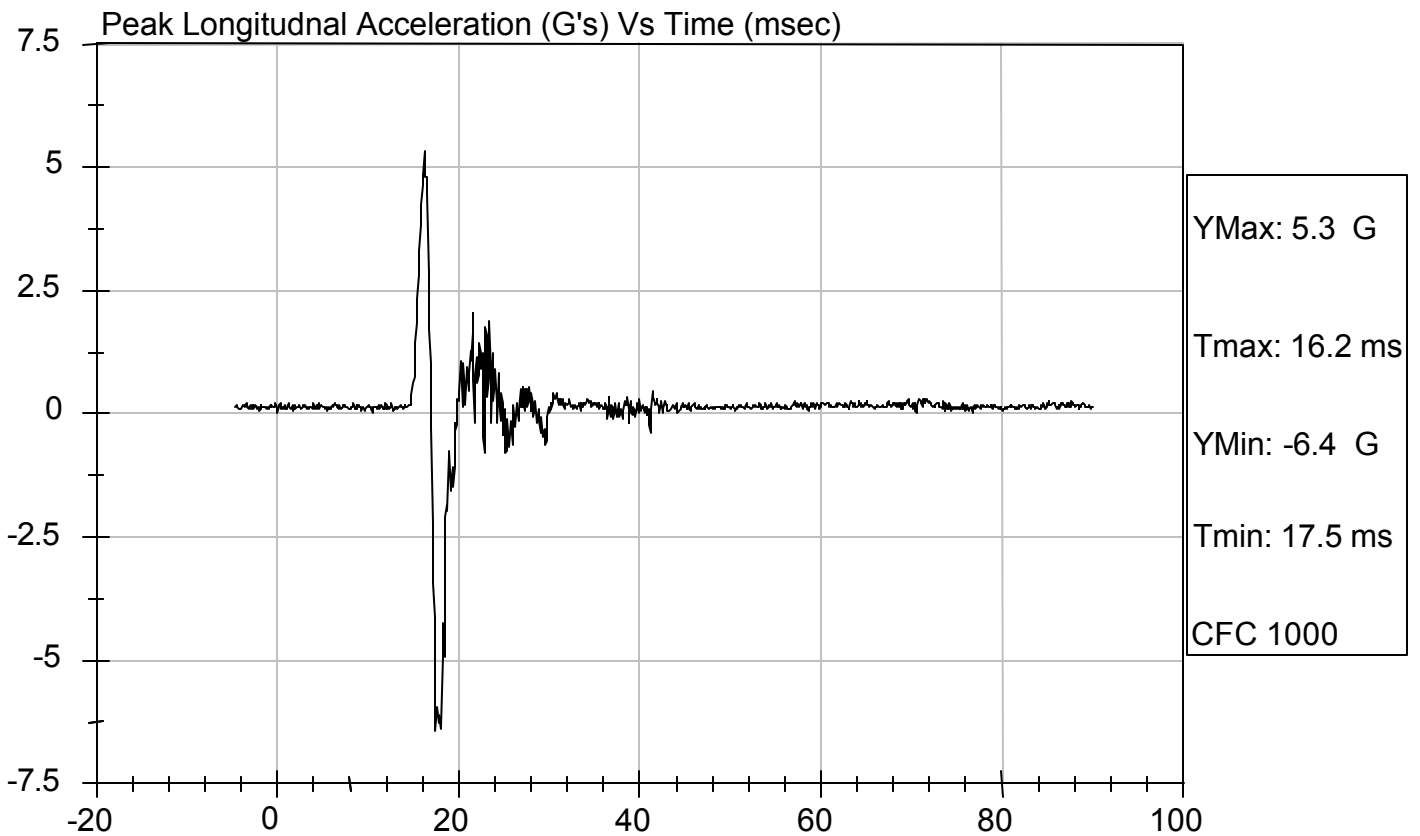
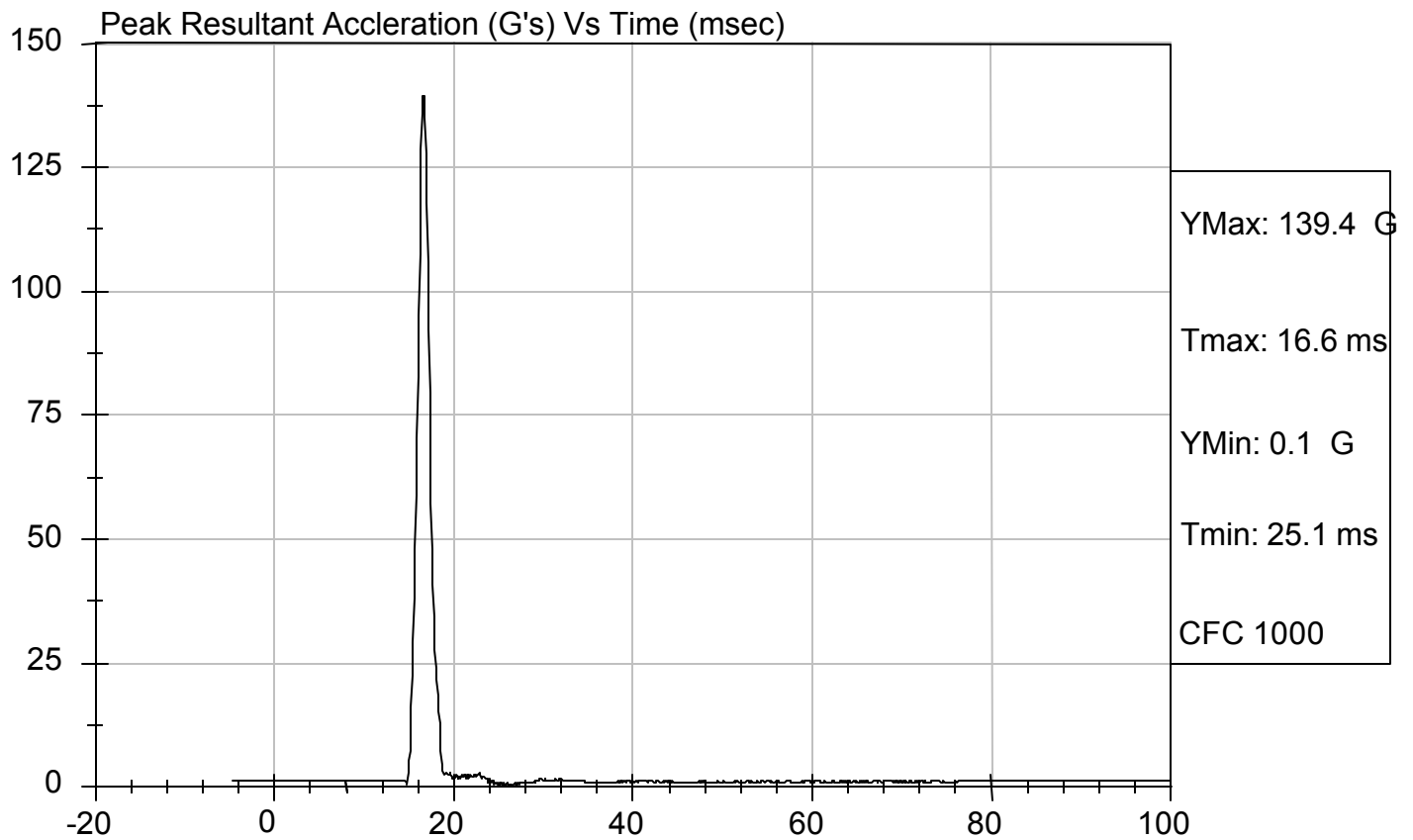


Test Description: Head Drop

Test Date: 10/21/09

Component: D092671

Speed: 0 ft/s, 0 m/s



SID/HIII Calibration Data Sheet
Side Impact Dummy
Thorax Impact Test

ATD Serial No: 272

Test I.D: D092672

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	48	Pass
Probe Velocity	m/s	4.22 - 4.31	4.30	Pass
Upper Rib	G's	37 - 46	40	Pass
Lower Rib	G's	37 - 46	38	Pass
Lower Spine	G's	15 - 22	19	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

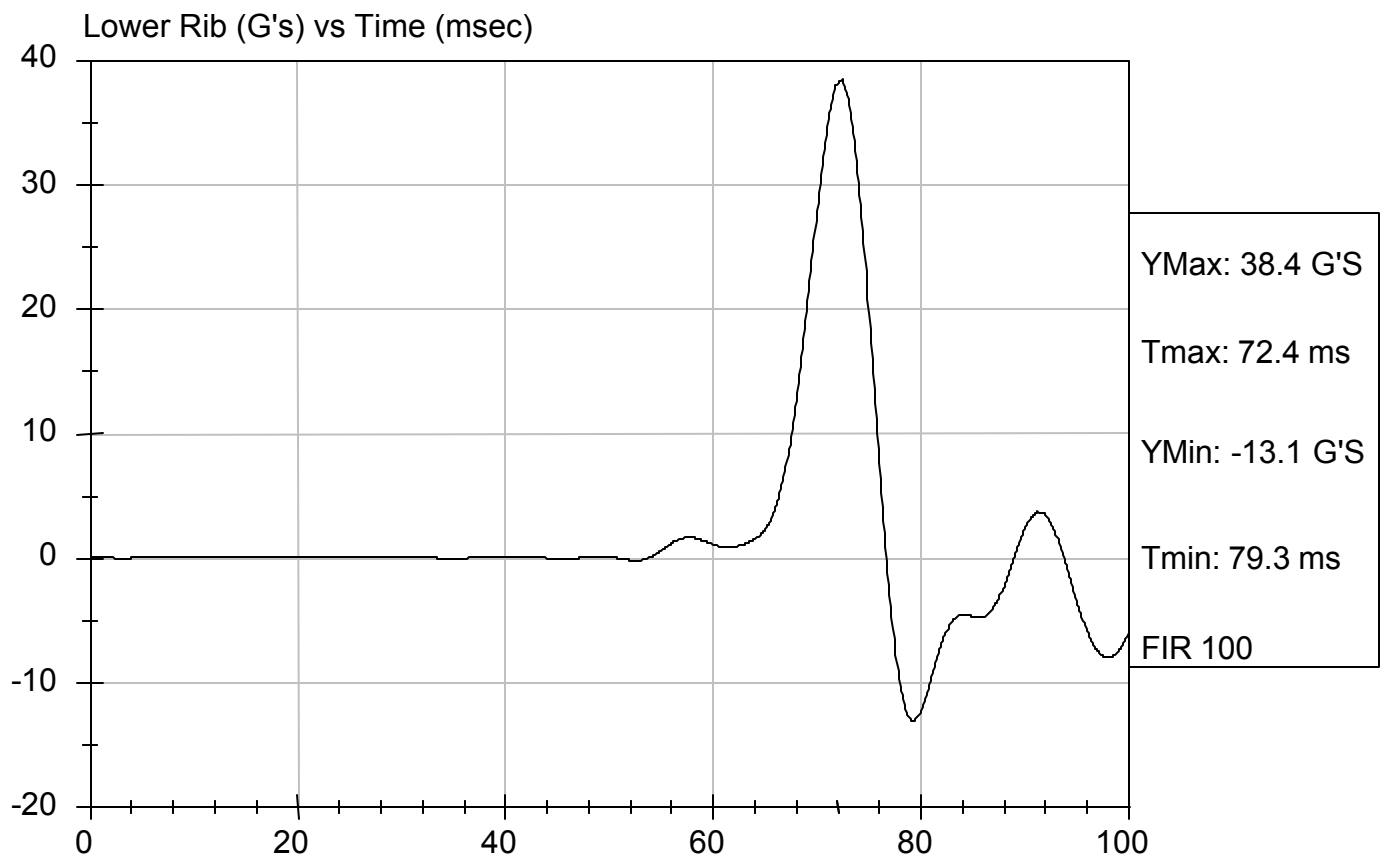
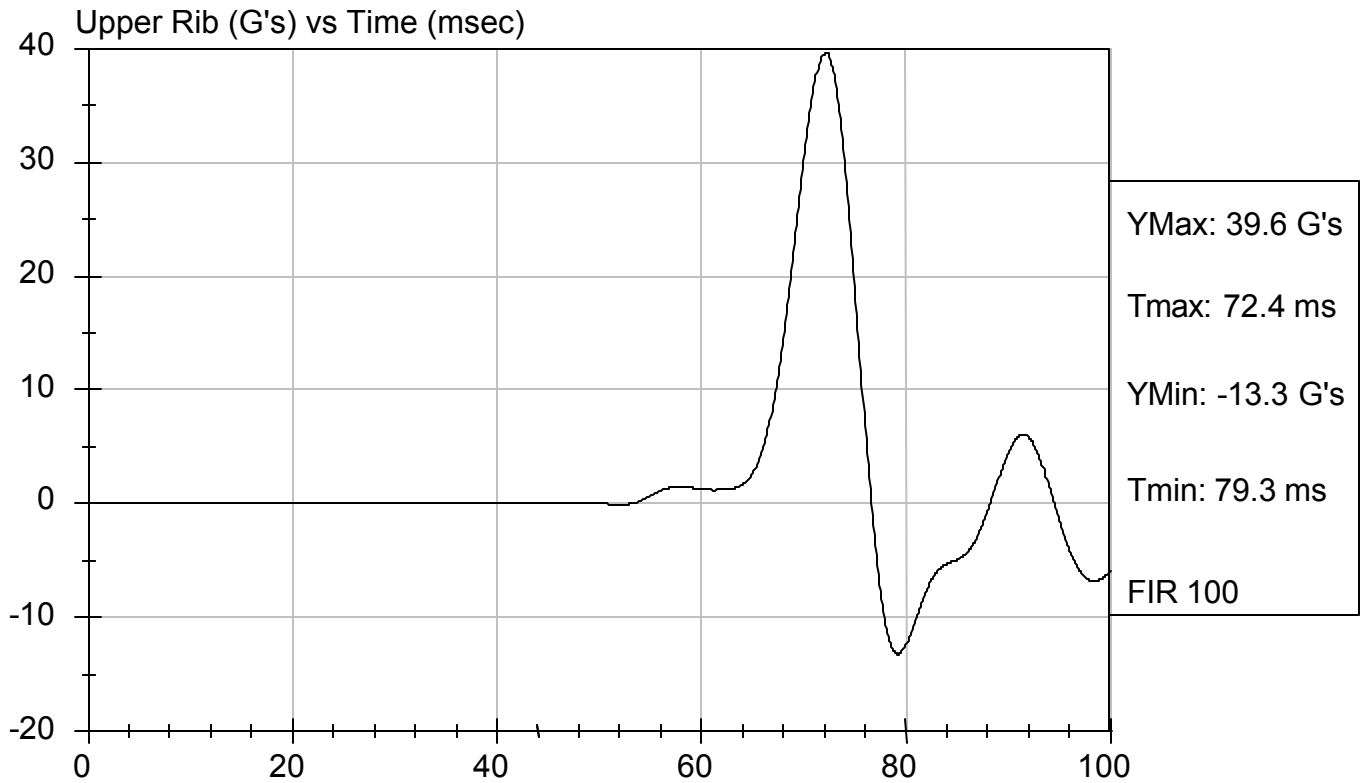
David Winkelbauer
Approved By

10/21/09
Test Date



Test Desc: Thorax Impact
Component ID: D092672

Test Date: 10/21/09
Speed: 14.12 ft/s, 4.30 m/s

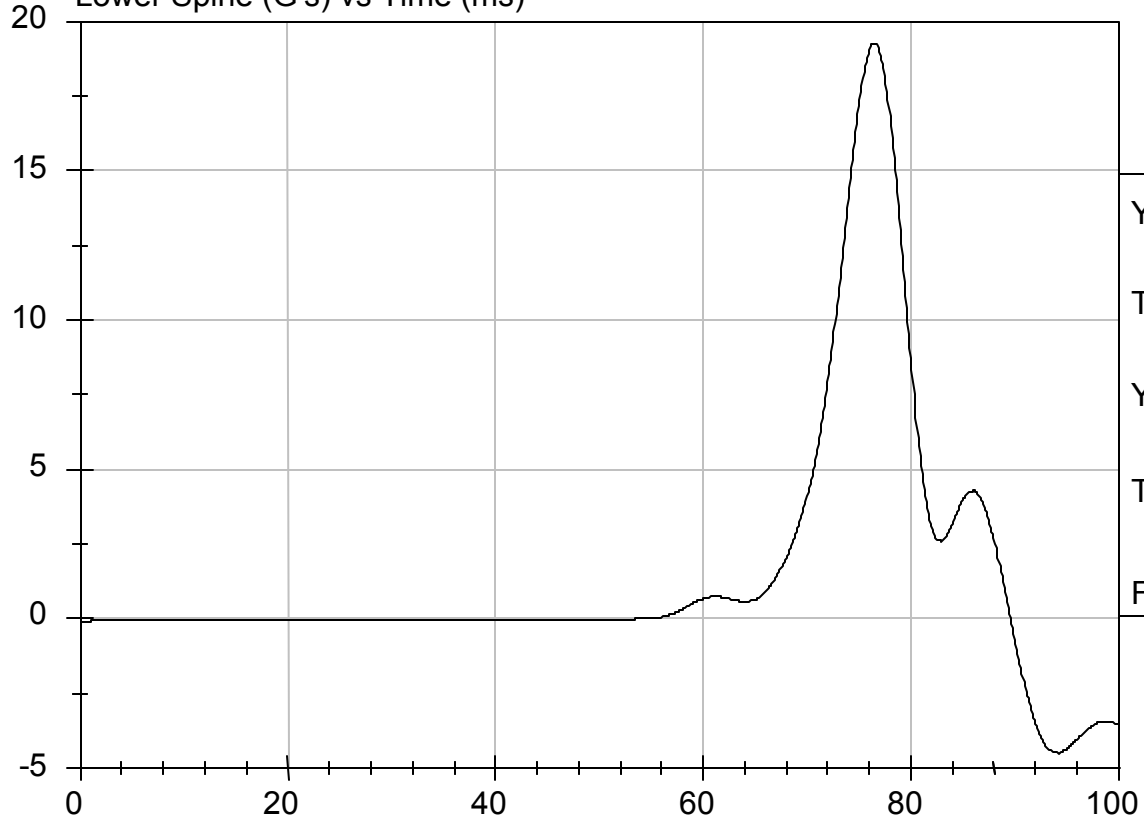




Test Desc: Thorax Impact
Component ID: D092672

Test Date: 10/21/09
Speed: 14.12 ft/s, 4.30 m/s

Lower Spine (G's) vs Time (ms)



YMax: 19.2 G'S

Tmax: 76.7 ms

YMin: -4.6 G'S

Tmin: 103.7 ms

FIR 100

SID/HIII Calibration Data Sheet

Side Impact Dummy

Pelvis Impact Test

ATD Serial No: 272

Test I.D: D092673

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	48	Pass
Probe Velocity	m/s	4.27 - 4.33	4.27	Pass
Pelvis Acceleration	G's	40 - 60	45	Pass
			Overall Test Results	Pass

Jessica Hall
Laboratory Technician

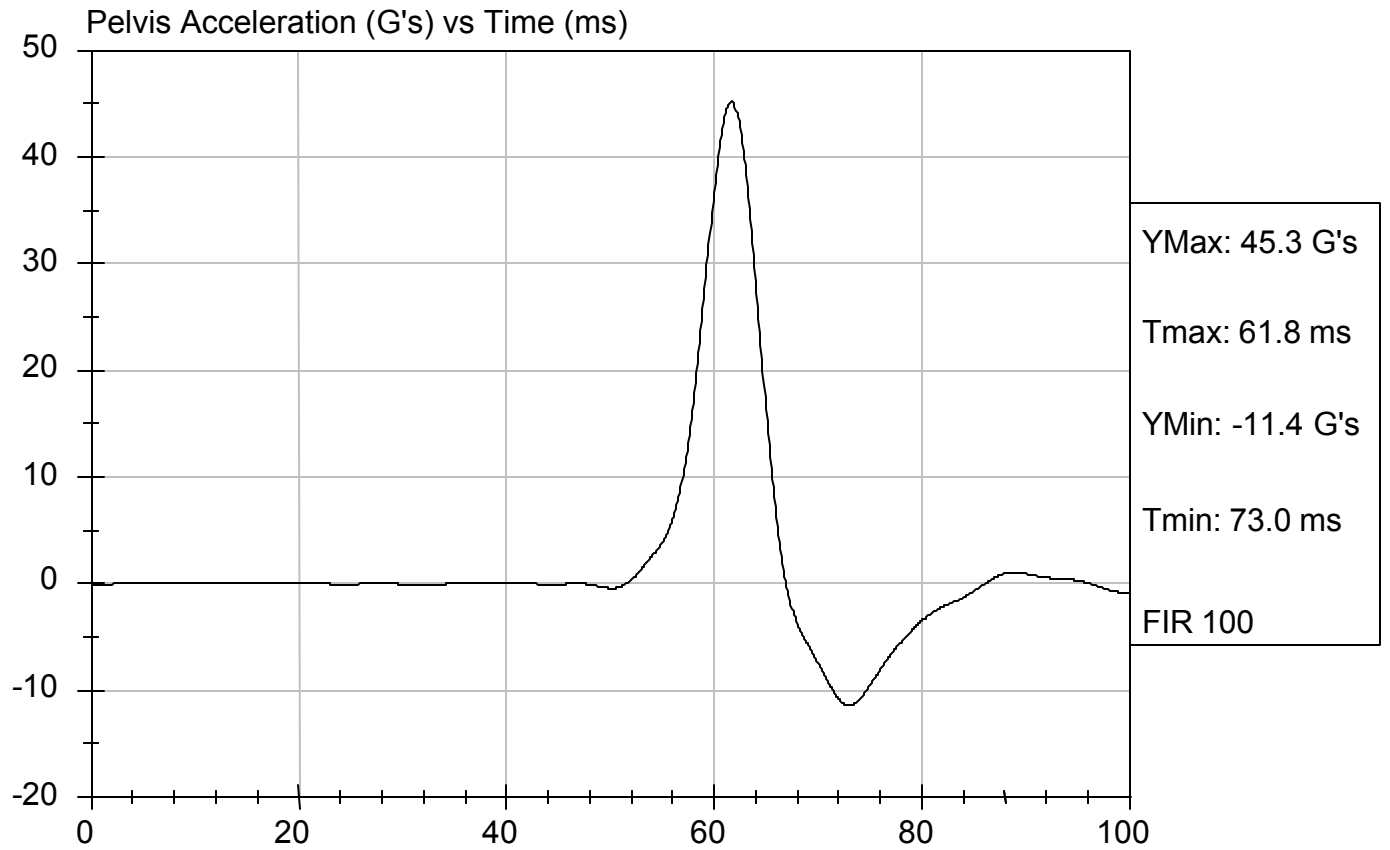
David Winkelbauer
Approved By

10/21/09
Test Date



Test Desc: Pelvis Impact
Component ID: D092673

Test Date: 10/21/09
Speed: 14.01 ft/s, 4.27 m/s



SID/HIII Calibration Data Sheet
Side Impact Dummy
Abdominal Compression Calibration (Pre-Load = 10 lbs)

ATD Serial No: 272

Test I.D: D092674

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	20.9	Pass
Laboratory Relative Humidity	%	10 to 70	41	Pass
Force At 12.7 mm	N	104 -162	130	Pass
Force At 19 mm	N	163 - 222	183	Pass
Force At 25.4 mm	N	222 - 280	243	Pass
Force At 33 mm	N	325 - 391	331.9	Pass
Overall Test Results			Pass	

Jessica Hall
Laboratory Technician

David Winkelbauer
Approved By

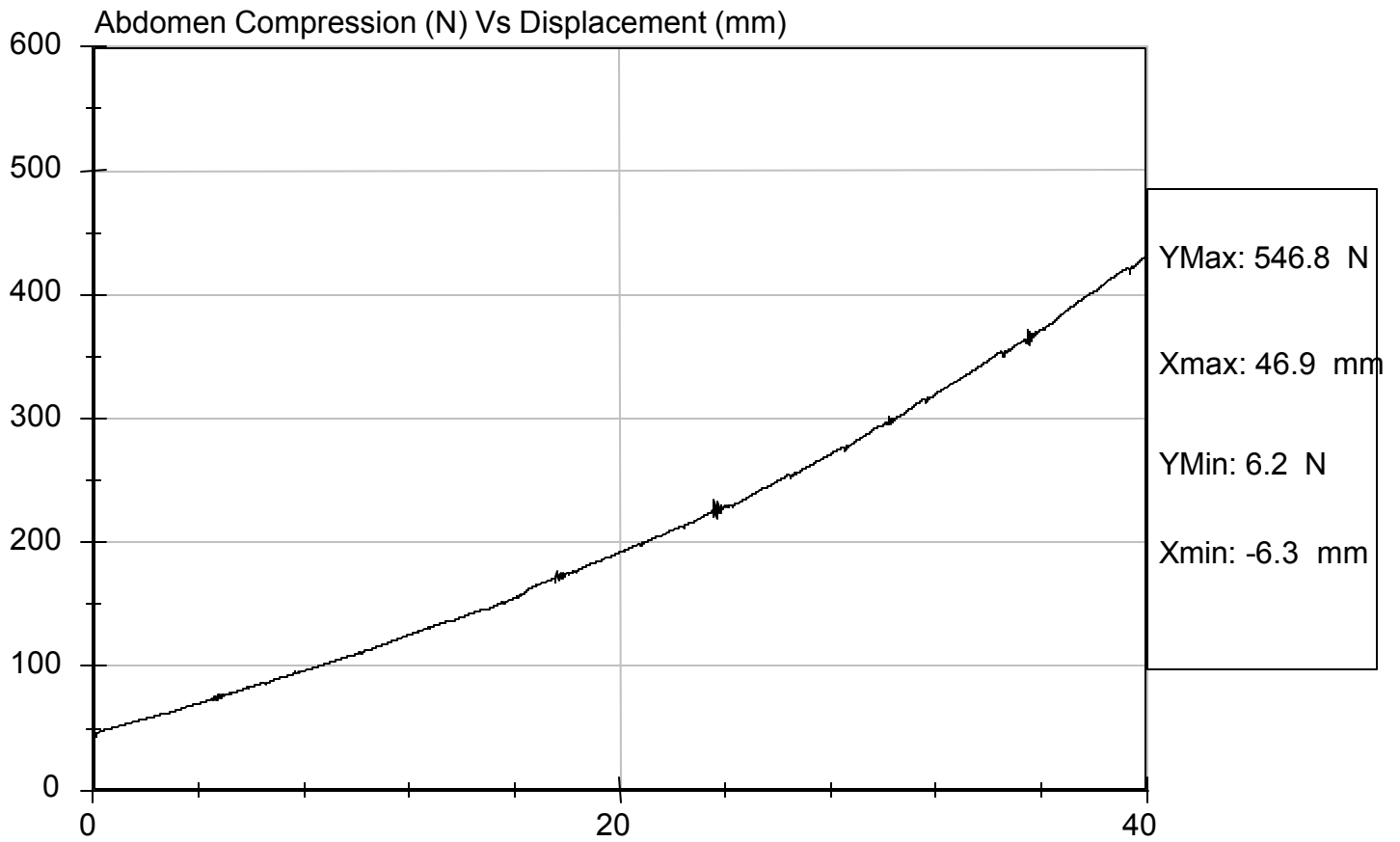
10/21/09
Test Date



Test Description: Abdomen Compression Test Date: 10/21/09

Component: D092674

Speed: 0 ft/s, 0 m/s



SID/HII Calibration Data Sheet
Side Impact Dummy
Lumbar Flexion Calibration

ATD Serial No: 272

Test I.D: D092675

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	40	Pass
Force At 0 deg	N	0 - 26.7	0	Pass
Force At 20 deg	N	97.9 - 151.2	127.3	Pass
Force At 30 deg	N	151.2 - 204.6	169.2	Pass
Force At 40 deg	N	204.6 - 258.0	221.5	Pass
Return Angle	Deg	12 Maximum	6	Pass
			Overall Test Results	Pass

Jessica Hall
Laboratory Technician

David Winkelbauer
Approved By

10/21/09
Test Date

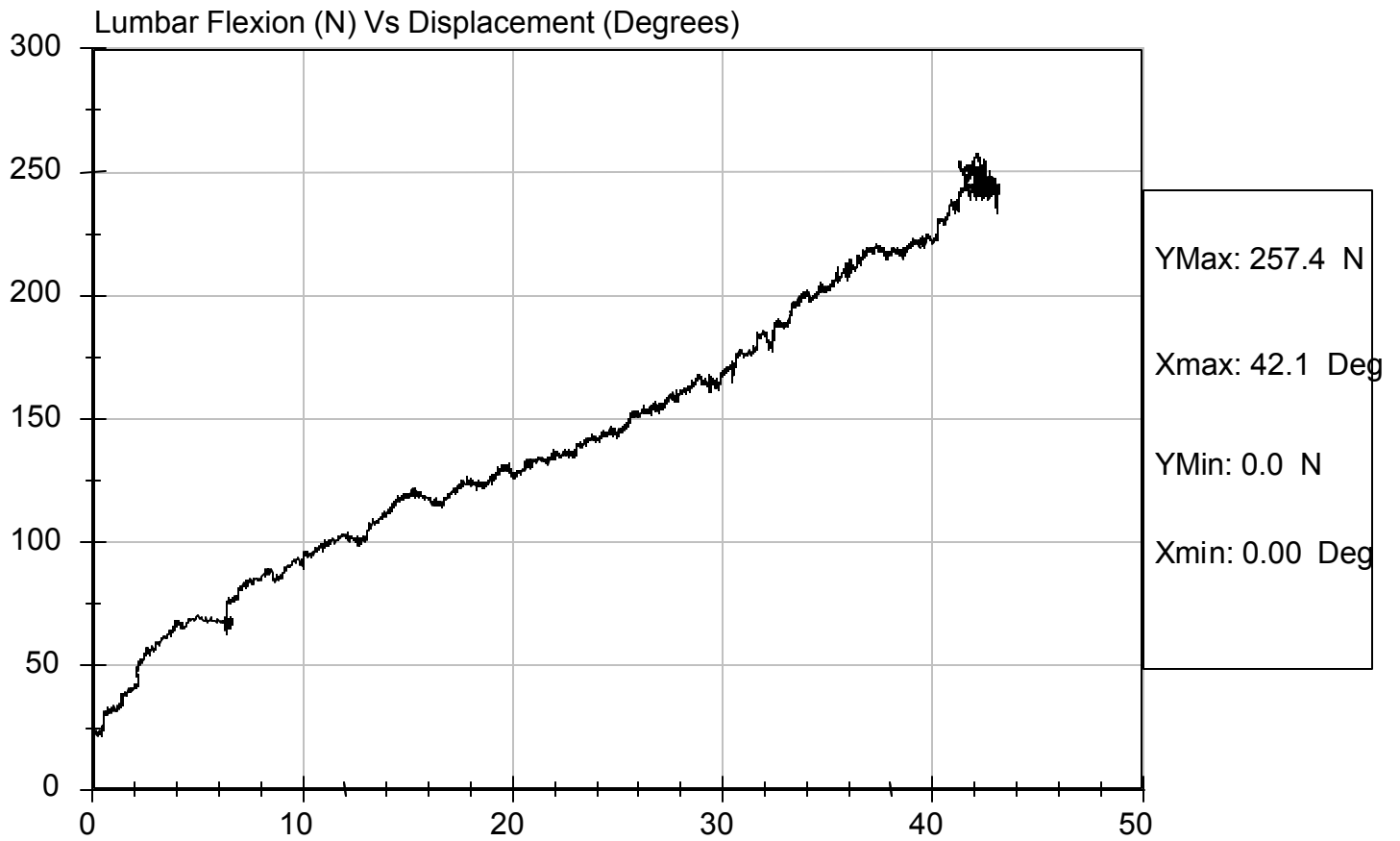


Test Description: Lumbar Flexion

Test Date: 10/21/09

Component: D092675

Speed: 0 ft/s, 0 m/s

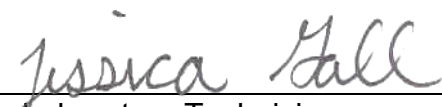


SID/HIII Calibration Data Sheet
Side Impact Dummy
Neck Pendulum Test

ATD Serial No: 272

Test I.D: D092679

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.9	Pass
Laboratory Relative Humidity		%	10 to 70	47	Pass
Impact Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	m/s	1.96 to 2.55	2.40	Pass
	20 ms	m/s	4.12 to 5.10	4.64	Pass
	30 ms	m/s	5.73 to 7.01	6.47	Pass
	40 to 70 ms	m/s	6.27 to 7.64	6.81	Pass
Midsaggital Plane Max Rotation		deg	66 to 82	73	Pass
Head Rotation Peak to Zero - Decay Time		ms	58 to 67	59	Pass
Max. Mx at Occipital Condyles		Nm	73 to 88	73	Pass
Mx Peak To Zero - Decay Time		ms	49 to 64	51	Pass
Mx Peak to Max. Head Rotation		ms	2 to 16	7	Pass


 Laboratory Technician

10/21/09

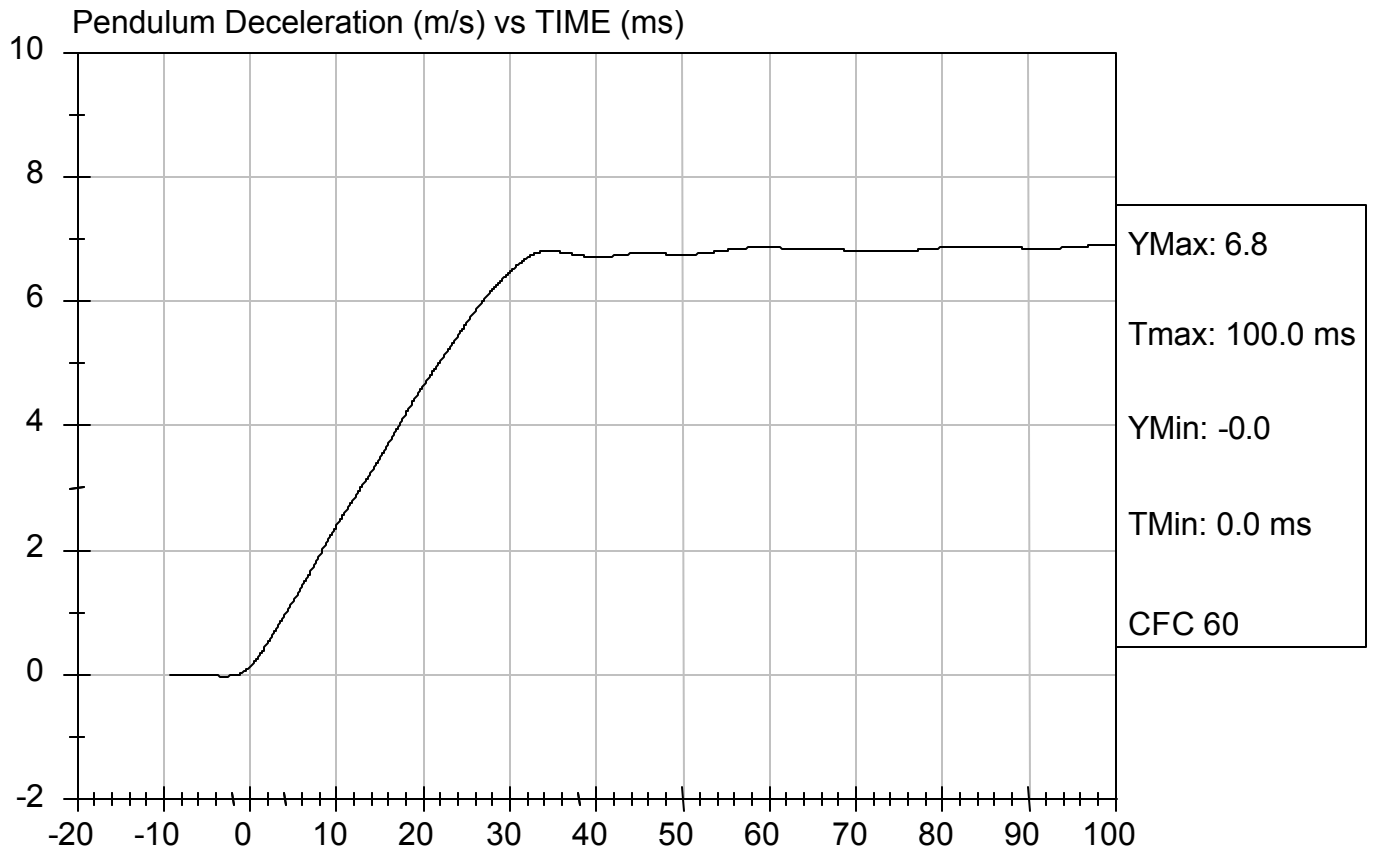
Test Date


 Approved By



Test Desc: Neck Bending
Component ID: D092679

Test Date: 10/21/09
Speed: 23.15 ft/sec, 7.06 m/sec

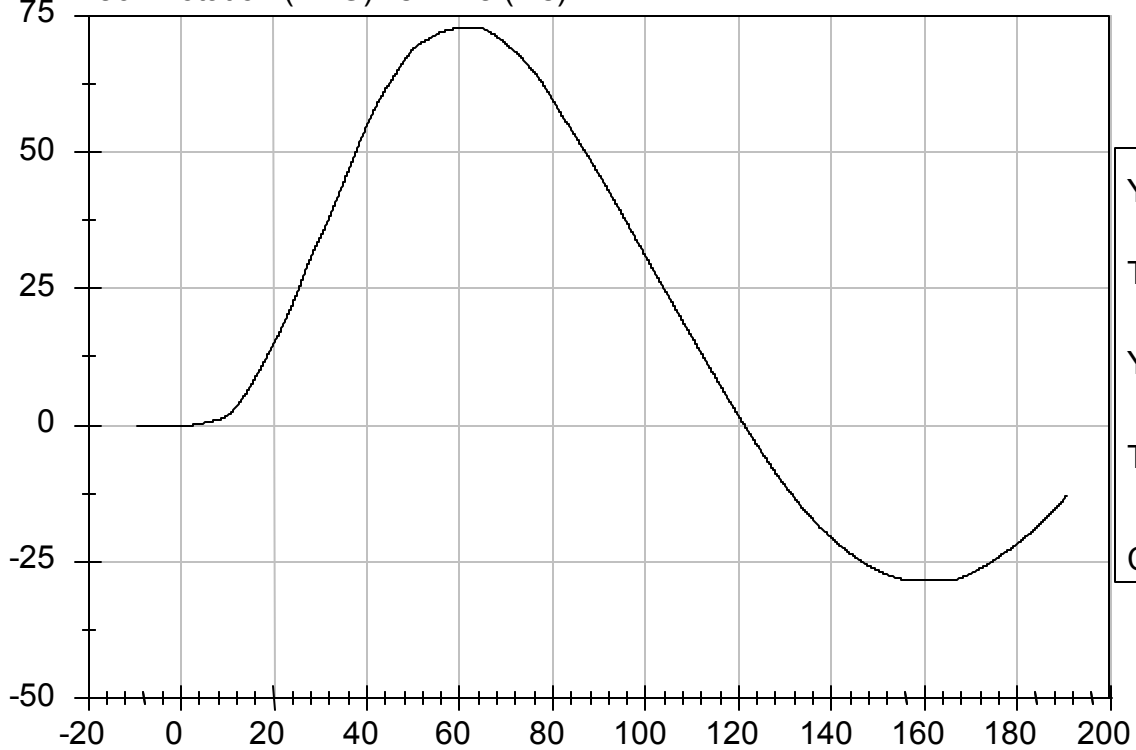




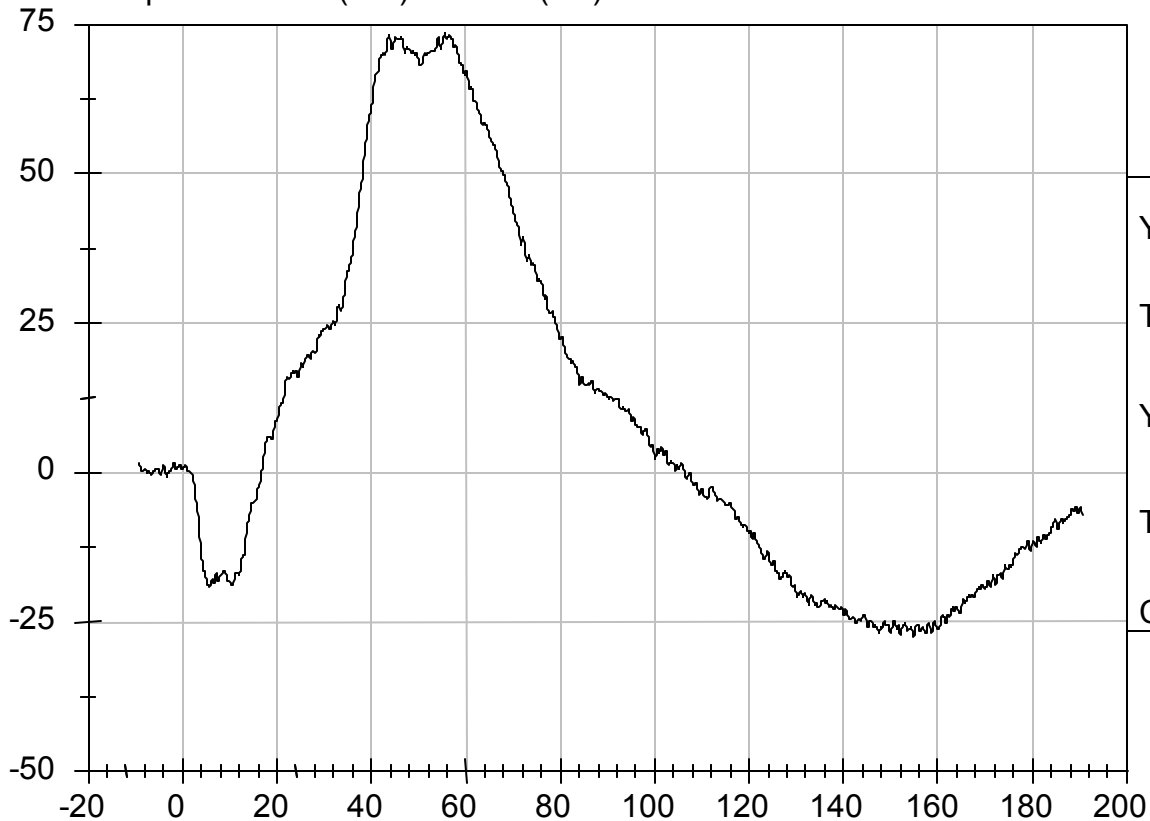
Test Desc: Neck Bending
Component ID: D092679

Test Date: 10/21/09
Speed: 23.15 ft/s, 7.06 m/s

Neck Rotation (DEG) vs Time (ms)



Occipital Moment (Nm) vs Time (ms)



SID Calibration Data Sheet
Side Impact Dummy
Inspection Checklist

ATD Serial No: 272

Test Part	Items Checked	Result
Skin	Visual inspection	Pass
Head	Visual, ballast, accelerometer mount	Pass
Neck	Visual	Pass
Spine Box	Visual, ballast, accelerometer mount	Pass
Rib Cage	Visual, measure	Pass
Sternum	Visual	Pass
Lumbar Spine	Visual	Pass
Abdomen	Visual	Pass
Pelvis	Visual, palpate, accelerometer mount	Pass
Upper Legs	Visual	Pass
Knees	Visual	Pass
Lower Legs	Visual, range of motion	Pass
Ankles	Visual, range of motion	Pass
Feet	Visual, range of motion	Pass
Joints	1 to 2 g range	Pass
Other		Pass

Jessica Hall
 Laboratory Technician
David Winkelbauer
 Approved By

10/21/2009
 Test Date