

REPORT NUMBER: NCAPSIDE-MGA-2008-005

**NEW CAR ASSESSMENT PROGRAM
SIDE IMPACT TEST**

**TOYOTA MOTOR CORPORATION
2008 TOYOTA HIGHLANDER 4X2
NHTSA NUMBER: M85111**

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



Test Date: September 19, 2007

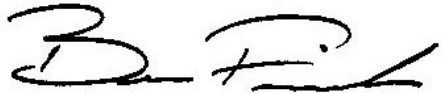
Report Date: October 19, 2007

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 DTNH22-03-D-12005.

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Technical Report Documentation Page

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16. Abstract A 55/28 km/h 90° Moving Deformable Barrier NCAP side impact was conducted on the subject 2008 Toyota Highlander 4x2 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 September 19, 2007. The impact velocity of the Moving Deformable Barrier (MDB) was 62.6 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 284 mm at level 3. The test vehicle's occupant performance is as follows: <table style="margin-left: auto; margin-right: auto; border: none; width: 80%;"> <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;">28.0</td> <td style="text-align: center;">37.8</td> </tr> <tr> <td>Left Lower Rib (LLR) Accel., g</td> <td style="text-align: center;">31.4</td> <td style="text-align: center;">40.9</td> </tr> <tr> <td>Lower Spine (T₁₂) Accel., g</td> <td style="text-align: center;">28.0</td> <td style="text-align: center;">44.0</td> </tr> <tr> <td>Thoracic Trauma Index (TTI)</td> <td style="text-align: center;">30</td> <td style="text-align: center;">42</td> </tr> <tr> <td>Pelvis (PEV) Accel., g</td> <td style="text-align: center;">59.7</td> <td style="text-align: center;">72.0</td> </tr> <tr> <td>HIC</td> <td style="text-align: center;">90</td> <td style="text-align: center;">134</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	28.0	37.8	Left Lower Rib (LLR) Accel., g	31.4	40.9	Lower Spine (T ₁₂) Accel., g	28.0	44.0	Thoracic Trauma Index (TTI)	30	42	Pelvis (PEV) Accel., g	59.7	72.0	HIC	90	134
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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																						
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SECTION 1

PURPOSE AND TEST PROCEDURE

PURPOSE

This side impact test was conducted as part of the FY' 2008 test program sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-03-D-12005. The purpose of this test was to evaluate side impact protection in a 2008 Toyota Highlander 4x2 manufactured by Toyota Motor Corporation.

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 2008 Toyota Highlander 4x2 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 62.6 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 2068.4 kg and the test weight of the MDB was 1360.8 kg. The test was conducted at MGA Research Corporation in Burlington, Wisconsin, on September 19, 2007.

One (1) real-time motion picture camera and ten (10) 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/HIIIs) can be found in Appendix A. Two 50th percentile adult male SID/HIIIs 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/HIII 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-one (21) 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 284 mm at level 3, 1650 mm rearward of the vertical impact point. The driver and passenger SID/HIIIs, 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/HIII response data traces. Appendix C contains the dummy calibration data. Appendix D contains the child dummy data.

The occupant data is summarized below:

ATD position	HIC	T ¹	T ²	TTI (G's)	Peak Pelvis (G's)
Driver	90	47.3	83.3	30	59.7
Passenger	134	54.4	90.4	42	72.0

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:
MDB CG X, Y, and Z after 260 msec.

DATA SHEET NO. 1**GENERAL TEST AND VEHICLE PARAMETER DATA**Test Vehicle: 2008 Toyota Highlander 4x2NHTSA No. M85111Test Program: NCAP Side ImpactTest Date: 9/19/2007**TEST VEHICLE INFORMATION**

Make	Toyota
Model	Highlander
Body Style	SUV
NHTSA No.	M85111
VIN	JTEDS41A582002056
Color	Sandy Beach Metallic
Delivery Date	9/14/2007
Odometer Reading (mile)	111
Dealer	Wilde Toyota
Transmission	Automatic
Final Drive	Front
Number of Cylinders	6
Engine Displacement (L)	3.5
Engine Placement	Lateral
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	No
Power Seats	No
Pretensioners	Yes
Load Limiters	Yes
Bucket Seats	Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Toyota Motor Corporation
Date of Manufacture	06/07

GVWR (kg)	2630
GAWR Front (kg)	1340
GAWR Rear (kg)	1530

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bucket	Bench	
Number Of Occupants	2	3	2	7
Capacity Wt. (VCW) (kg)				544
Cargo Wt. (RCLW) (kg)				68

DATA SHEET NO. 1 (continued)**GENERAL TEST AND VEHICLE PARAMETER DATA**Test Vehicle: 2008 Toyota Highlander 4x2NHTSA No. M85111Test Program: NCAP Side ImpactTest Date: 9/19/2007**TEST VEHICLE WEIGHTS**

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	521.6	411.0		583.8	503.9	
Right	kg	523.9	389.6		528.9	451.8	
Ratio	%	56.6	43.4		53.8	46.2	
Totals	kg	1045.5	800.6	1846.1	1112.7	955.7	2068.4

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1846.1
Weight of 2 P572M ATDs	kg	161.5
Rated Cargo/Luggage Weight (RCLW)	kg	68
Calculated Vehicle Target Weight (TVTW)	kg	2075.6

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

Weight of Ballast in Cargo Area: 11.3 kg**TEST VEHICLE ATTITUDES AND CG**

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	829	839	836	847	1210
As Tested	mm	821	837	811	826	1289
Fully Loaded	mm	819	835	804	824	

TEST VEHICLE VERTICAL IMPACT LINE DATA

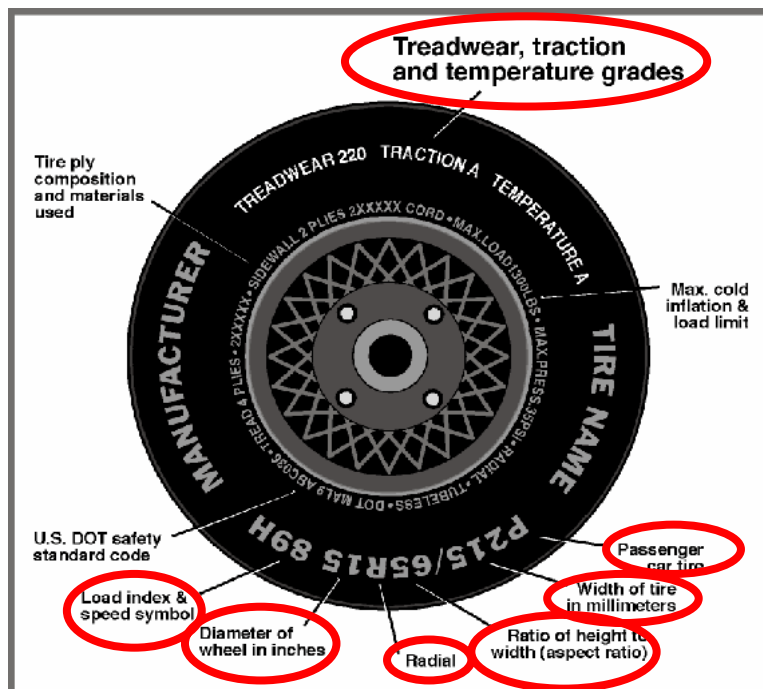
Measurement Description	Units	Value
Test Vehicle Wheel Base	mm	2790
Target Impact Point Aft of Front Axle	mm	455
Actual Impact Point Aft of Front Axle	mm	464

DATA SHEET NO. 2

TEST VEHICLE TIRE INFORMATION

Test Vehicle: 2008 Toyota Highlander 4x2
 Test Program: NCAP Side Impact

NHTSA No. M85111
 Test Date: 9/19/2007



DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold / Test Pressure (kPa)	210	210
Recommended Tire Size	P245/65R17	P245/65R17
Tire Size on Vehicle	P245/65R17	P245/65R17
Tire Manufacturer	Bridgestone	Bridgestone
Tire Name	Dueler H/L	Dueler H/L
Tire Type	Passenger M+S	Passenger M+S
Tire Width (mm)	245	245
Ratio of Height to Width (aspect ratio)	65	65
Radial	R	R
Wheel Diameter	17	17
Load Index & Speed Symbol	105S	105S
Treadwear	400	400
Traction Grade	B	B
Temperature Grade	B	B

DATA SHEET NO. 3 **TEST VEHICLE INFORMATION**

Test Vehicle: 2008 Toyota Highlander 4x2
 Test Program: NCAP Side Impact

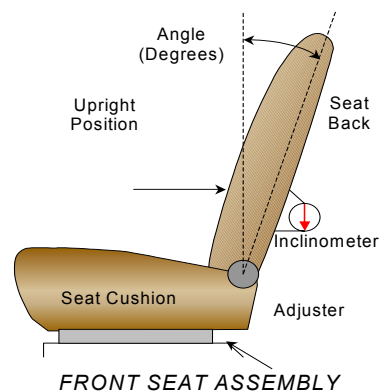
NHTSA No. M85111
 Test Date: 9/19/2007

NORMAL 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 seat back angle: 6th detent with for forward-most detent defined as 0. For the 2nd row seat back angle: 2nd detent with for forward-most detent defined as 0.

Driver seat back angle: 6th detent (forward-most as 0)

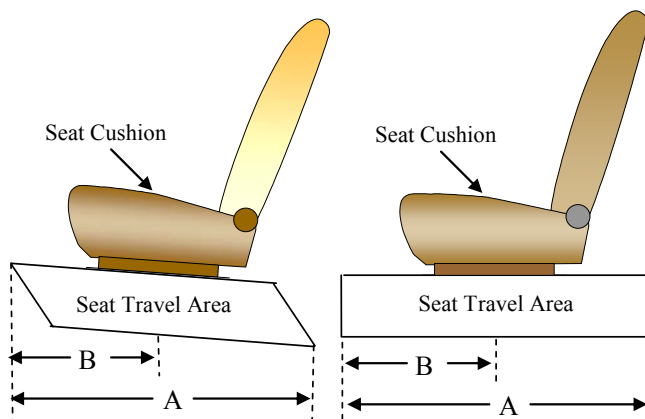
Passenger seat back angle: 2nd detent (forward-most as 0)



SEAT FORE/AFT POSITIONS

SEAT FORE/AFT POSITIONS

	Total Fore/Aft Travel	Placed in position #
Driver Seat	17 detents	8 th detent (1 st as 0)
Rear Seat	9 detents	4 th detent (1 st as 0)



DATA SHEET NO. 3 (CONTINUED)

TEST VEHICLE INFORMATION

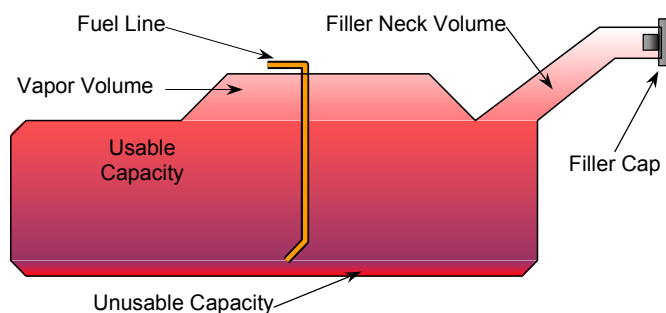
Test Vehicle: 2008 Toyota Highlander 4x2
 Test Program: NCAP Side Impact

NHTSA No. M85111
 Test Date: 9/19/2007

FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	72.7
Usable Capacity of "Optional" Tank	
92-94% of Usable Capacity	66.8 – 68.3
Actual Amount of Solvent used	67.4
1/3 of Usable Capacity	24.2

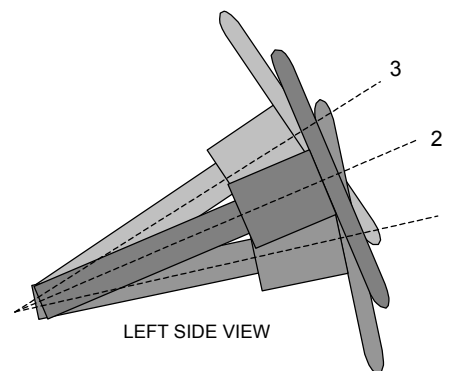
The test vehicle is equipped with an electric fuel pump. The fuel pump is activated when the ignition is turned on.



VEHICLE FUEL TANK ASSEMBLY

STEERING COLUMN ADJUSTMENT

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



STEERING COLUMN ASSEMBLY

STEERING COLUMN POSITIONS

	Fore/Aft Position (mm)	Degrees
Lowermost position No. 1	40	61.8
Geometric center position No. 2	20	63.3
Uppermost position No. 3	0	64.8

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

Test Vehicle: 2008 Toyota Highlander 4x2
 Test Program: NCAP Side Impact

NHTSA No. M85111
 Test Date: 9/19/2007

MDB SPECIFICATIONS

Measurement Description	Length (mm)
Overall Width of Framework Carriage	1252
Overall Length Including Honeycomb Face	4115
Wheel base of Framework Carriage	2588
C.G. Location aft of Front Axle	1101

MDB WEIGHTS

	Units	Front Axle	Rear Axle	Total
Left	kg	473.5	219.5	
Right	kg	308.3	359.5	
Ratio	%	57.5	42.5	
Totals	kg	781.8	579.0	1360.8

SPEED AND IMPACT ANGLE DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.1 to 62.7	62.6
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	62.6
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	9 rearward
Vertical Offset	mm	+/-20	7 up

DATA SHEET NO. 5**POST TEST OBSERVATIONS**

Test Vehicle: 2008 Toyota Highlander 4x2
 Test Program: NCAP Side Impact

NHTSA No. M85111
 Test Date: 9/19/2007

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	Door Panel	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	Doors were unlocked	Doors were 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 rear window broke
Other Notable Effects	None

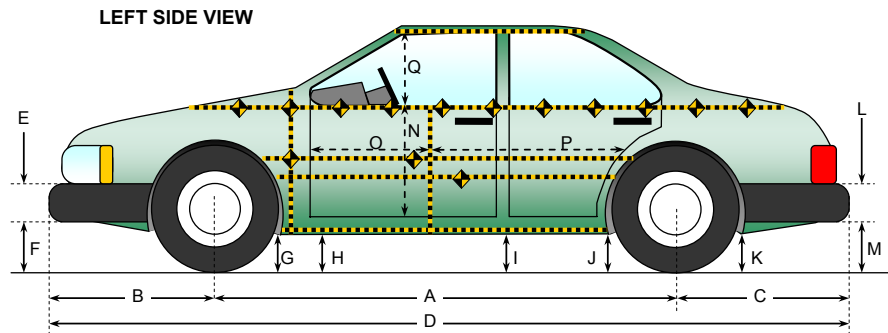
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Occupant Location 01		Occupant Location 04	
	Installed	Operation	Installed	Operation
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: 2008 Toyota Highlander 4x2
 Test Program: NCAP Side Impact

NHTSA No. M85111
 Test Date: 9/19/2007



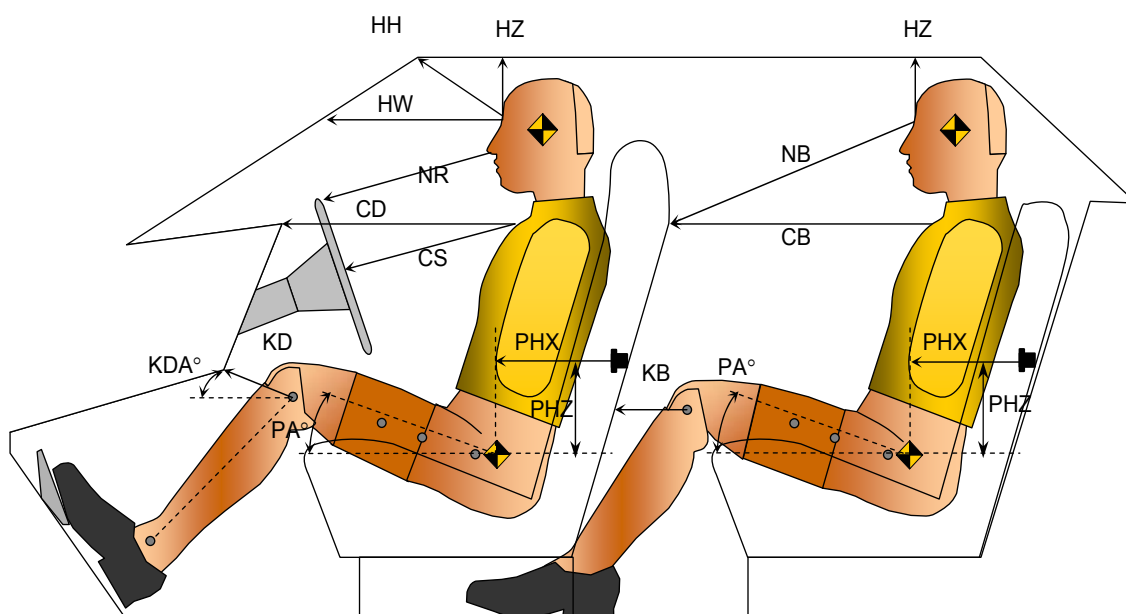
All Measurements in mm

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2790	2766	24
B	Front Axle to FSOV	934	934	0
C	Rear Axle to RSOV	1076	1061	15
D	Total Length at Centerline	4800	4761	39
E	Front Bumper Thickness	274	274	0
F	Front Bumper Bottom to Ground	386	404	-18
G	Sill Height at Front Wheel Well	276	290	-14
H	Sill Height at Front Door Leading Edge	275	299	-24
I	Sill Height at "B" Pillar	275	289	-14
J1	Sill Height at Rear Wheel Well	245	231	14
J2	Pinch Weld Height at Rear Wheel Well	251	237	14
K	Sill Height Aft of Rear Wheel Well	334	316	18
L	Rear Bumper Thickness	158	158	0
M	Rear Bumper Bottom to Ground	360	357	3
N	Sill Height to Window Bottom Sill	726	784	-58
O	Front Door Leading Edge to Impact CL	804	636	168
P	Rear Door Trailing Edge to Impact CL	1141	1105	36
Q	Front Window Opening	429	421	8
R	Right Side Length	4054	4055	-1
S	Left Side Length	4054	4024	30
T	Vehicle Width at "B" Post	1886	1774	112

DATA SHEET NO. 7
SID/HII LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2008 Toyota Highlander 4x2
 Test Program: NCAP Side Impact

NHTSA No. M85111
 Test Date: 9/19/2007

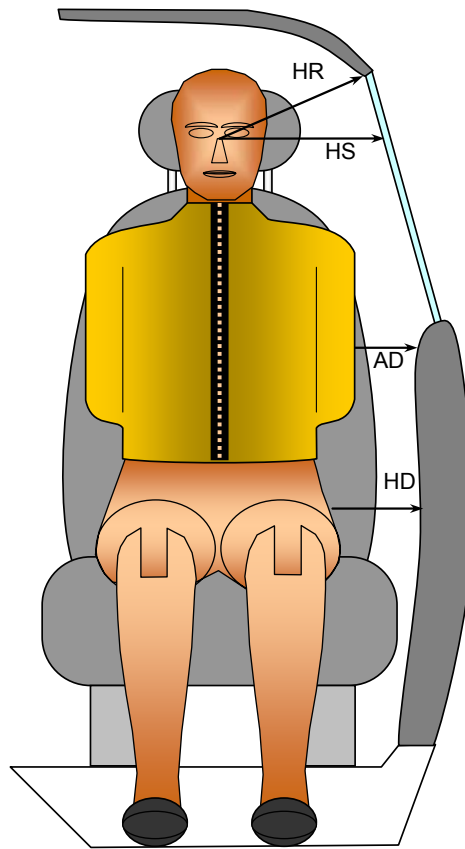


Driver Code	Pass. Code	Measurement Description	Driver S/N 271		Passenger S/N 272	
			Length(mm)	Angle(°)	Length(mm)	Angle(°)
HH		Head to Header	436			
HW		Head to Windshield	737			
HZ	HZ	Head to Roof	207		208	
NR	NB	Nose to Rim/Nose to Seatback	481		596	
CD	CB	Chest to Dash or Seatback	555		521	
CS		Chest to Steering Wheel	357			
KDL	KBL	Left Knee to Dash or Seatback	183	26.3	223	29.4
KDR	KBR	Right Knee to Dash or Seatback	148	24.1	236	23.0
PA	PA	Pelvic Angle		23.3		23.6
PHX	PHX	H-Point to Striker (X-Axis)	217		286	
PHZ	PHZ	H-Point to Striker (Z-Axis)	182		259	

DATA SHEET NO. 8
SID/HIII LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2008 Toyota Highlander 4x2
 Test Program: NCAP Side Impact

NHTSA No. M85111
 Test Date: 9/19/2007



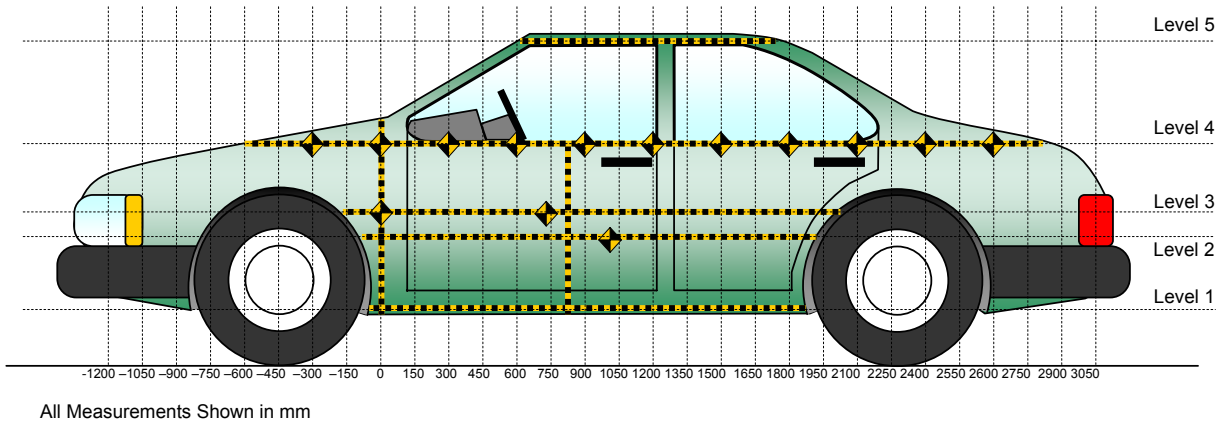
FRONT VIEW OF DUMMY

Code	Measurement Description	Units	Driver S/N 271	Passenger S/N 272
HR	Head to Side Header	mm	219	217
HS	Head to Side Window	mm	332	328
AD	Arm to Door	mm	114	152
HD	H-Point to Door	mm	161	154

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

Test Vehicle: 2008 Toyota Highlander 4x2
 Test Program: NCAP Side Impact

NHTSA No. M85111
 Test Date: 9/19/2007



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	17	1350	1659
4	Window Sill	113	1500	1119
3	Mid Door	284	1650	688
2	Occupant H-Point	278	1650	659
1	Sill Top	228	1650	443
	Maximum Penetration	284		

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

Test Vehicle: 2008 Toyota Highlander 4x2
 Test Program: NCAP Side Impact

NHTSA No. M85111
 Test Date: 9/19/2007

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-900				299					309					10	
-750				280					299					19	
-600				270					298					28	
-450				262					300					38	
-300				258					301					43	
-150				257					285					28	
0	162	148	147	248		202	189	190	278		40	41	43	30	
150	160	153	153	241		326	355	372	275		166	202	219	34	
300	167	162	160	240		369	379	388	292		202	217	228	52	
450	168	162	160	241		377	386	400	289		209	224	240	48	
600	169	160	160	240	450	379	389	400	302	462	210	229	240	62	12
750	170	160	160	239	448	378	386	398	308	459	208	226	238	69	11
900	170	161	160	239	448	374	386	401	296	459	204	225	241	57	11
1050	171	161	160	240	448	376	382	401	313	463	205	221	241	73	15
1200	172	163	162	242	448	380	413	418	339	465	208	250	256	97	17
1350	172	166	163	244	499	384	428	431	353	466	212	262	268	109	17
1500	169	168	166	246	450	391	434	445	359	467	222	266	279	113	17
1650	163	162	162	249	452	391	440	446	353	467	228	278	284	104	15
1800	165	152	152	252	456	350	419	420	318	470	185	267	268	66	14
1950		149	147	255	461		280	285	281	471		131	138	26	10
2100				260	464				275	471				15	7
2250				263	468				304	475				41	7
2400				270	473				301	476				31	3
2550				276	477				301	482				25	5
2700				284	484				305	486				21	2
2850				296	500				310	498				14	-2
3000				318					320					2	

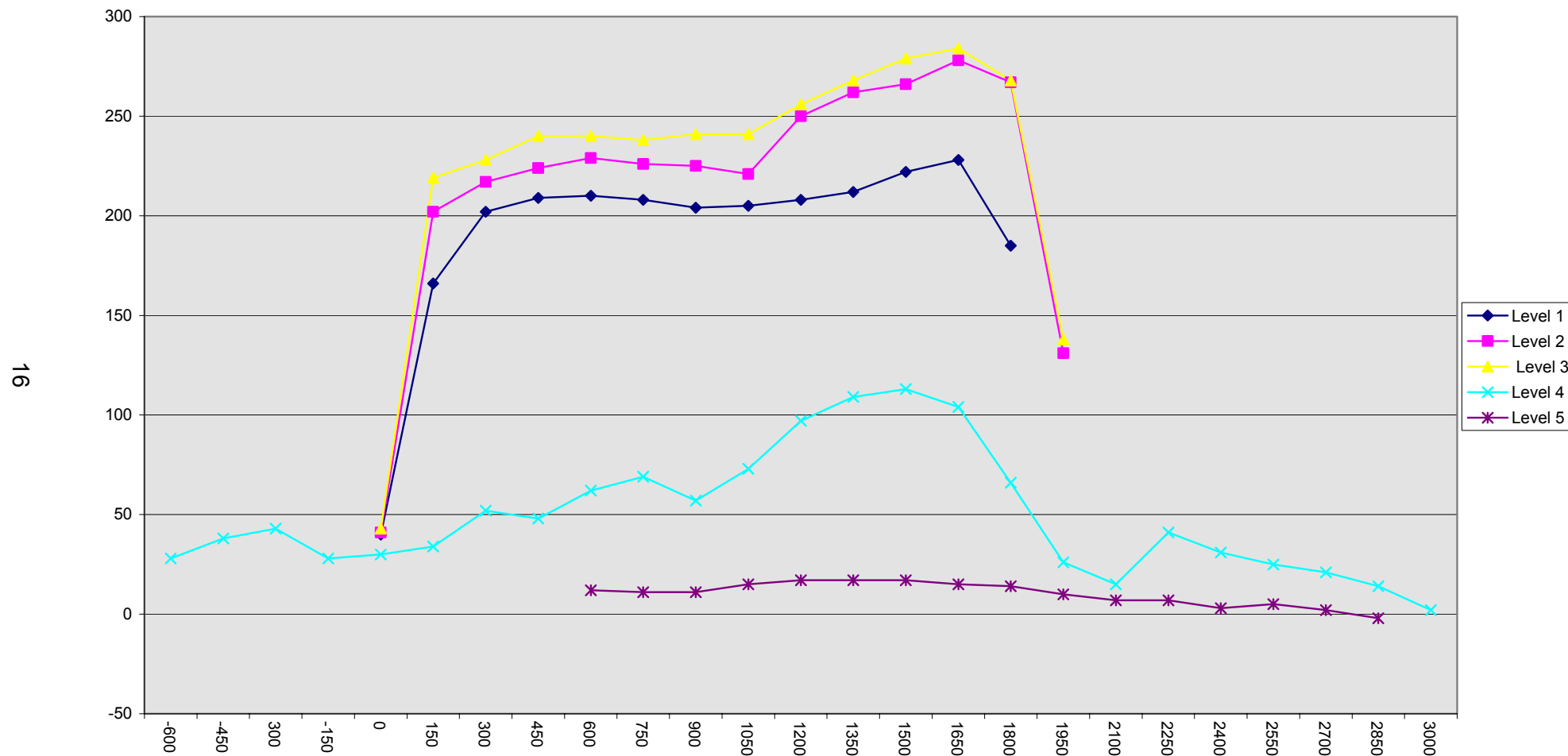
Reference plane is parallel to test vehicle longitudinal centerline.

Given dimensions = Reference plane to car body

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

Test Vehicle: 2008 Toyota Highlander 4x2
Test Program: NCAP Side Impact

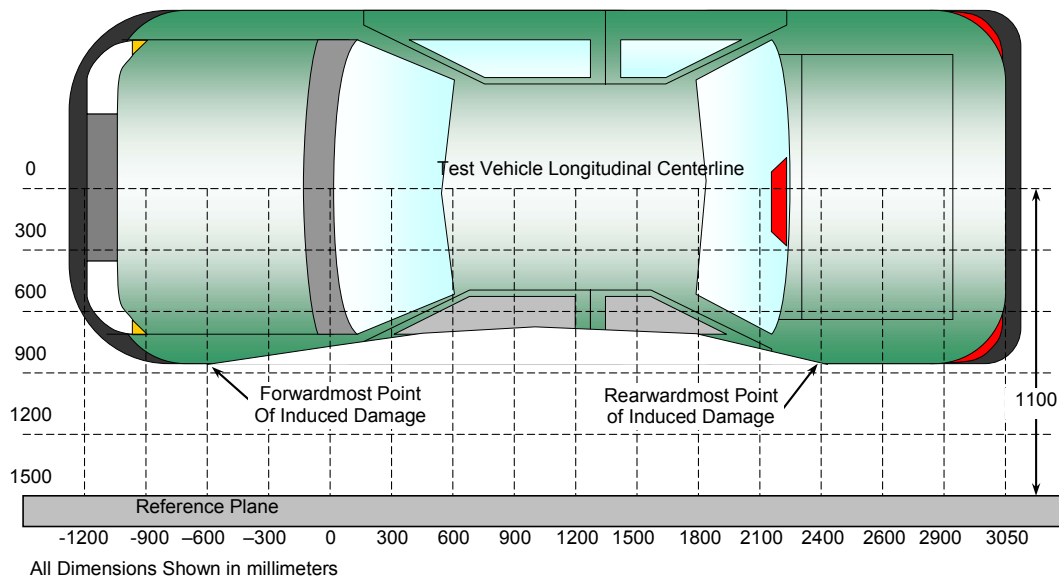
NHTSA No. M85111
Test Date: 9/19/2007



DATA SHEET NO. 11 **VEHICLE DAMAGE PROFILE DISTANCES**

Test Vehicle: 2008 Toyota Highlander 4x2
 Test Program: NCAP Side Impact

NHTSA No. M85111
 Test Date: 9/19/2007



TOP VIEW

DAMAGE PROFILE DISTANCES

DPD	Distance from Impact Point in mm	Level	Pre-Test (mm)	Post-Test (mm)	Max Static Crush (mm)
1	3000	4	318	320	2
2	2220	4	262	306	44
3	1440	3	162	461	299
4	660	3	160	430	270
5	-120	4	255	285	30
6	-900	4	299	309	10

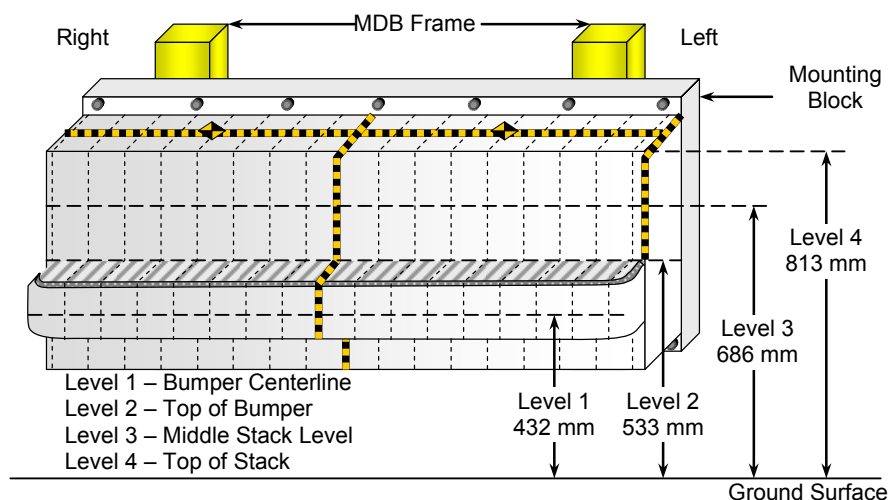
Reference plane is parallel to test vehicle longitudinal centerline.
 Given dimensions = Reference plane to car body.

DATA SHEET NO. 12

DEFORMABLE BARRIER HONEYCOMB FACE STATIC CRUSH

Test Vehicle: 2008 Toyota Highlander 4x2
 Test Program: NCAP Side Impact

NHTSA No. M85111
 Test Date: 9/19/2007



DEFORMABLE BARRIER STATIC CRUSH

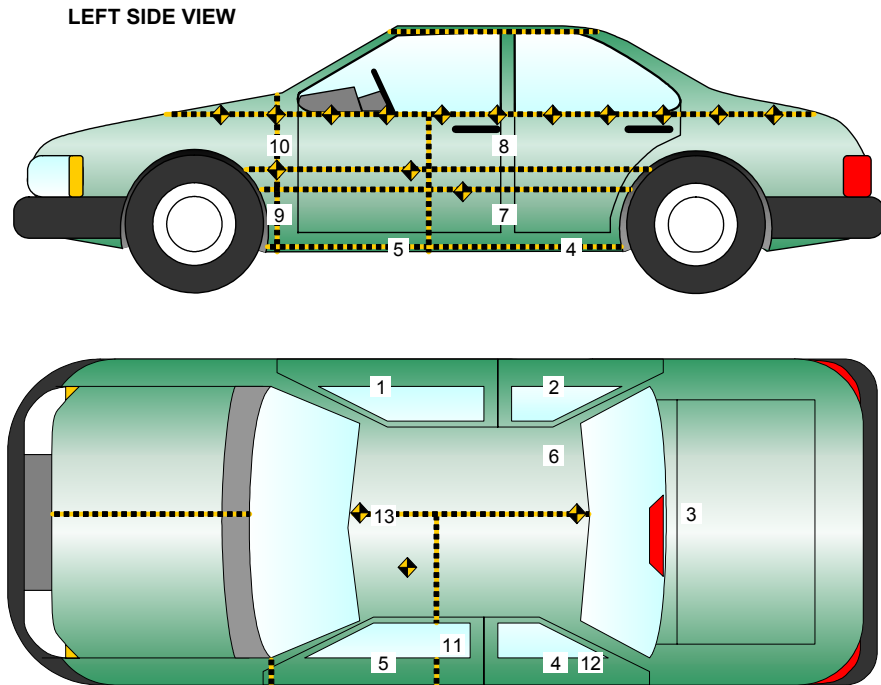
Stack Level	Distance Right of Center								C _L	Distance Left of Center							
	800	700	600	500	400	300	200	100		100	200	300	400	500	600	700	800
1	168	170	167	171	172	179	182	185	191	183	183	180	176	182	183	181	169
2	84	85	86	87	85	87	80	85	83	91	91	89	87	86	88	93	100
3	18	9	12	16	30	40	75	62	59	43	38	31	29	32	39	55	86
4	35	14	11	15	24	38	55	72	51	37	35	33	39	52	70	76	114

All Dimensions in mm

DATA SHEET NO. 13
VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2008 Toyota Highlander 4x2
 Test Program: NCAP Side Impact

NHTSA No. M85111
 Test Date: 9/19/2007



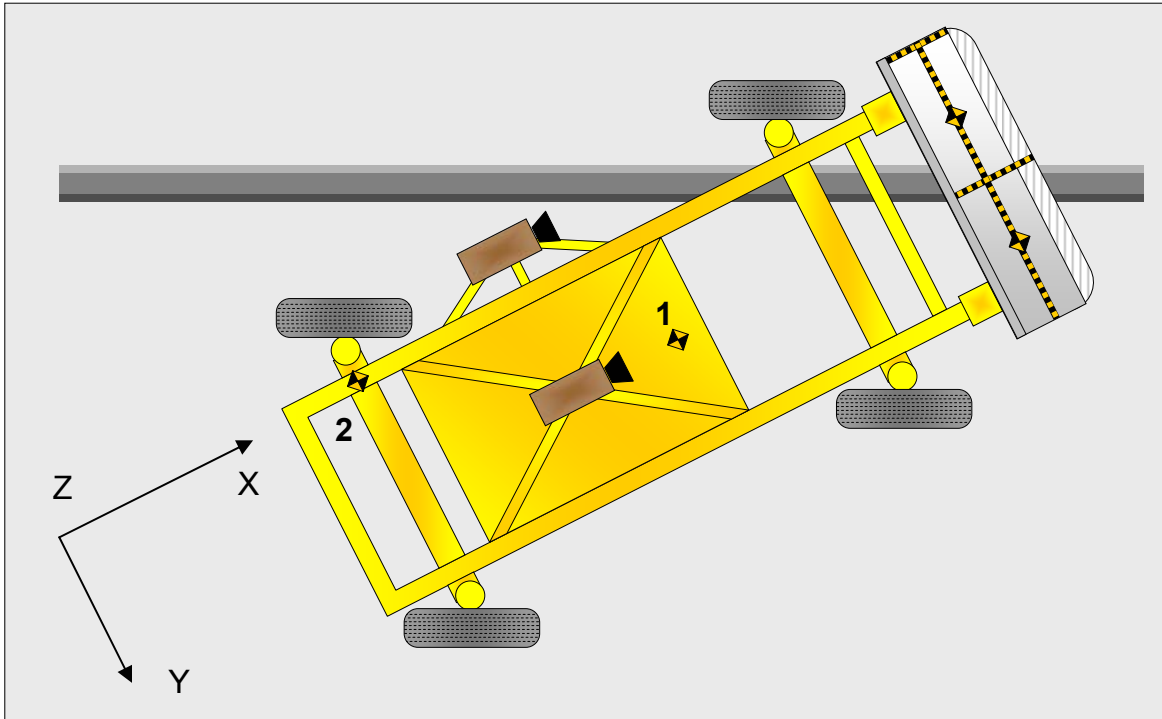
Loc. No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Right Sill at Front Seat	2775	757	297
2	Right Sill at Rear Seat	1795	752	297
3	Rear Floorpan Above Axle	1045	0	680
4	Left Sill at Rear Door	1805	-753	290
5	Left Sill at Front Door	2780	-758	294
6	Rear Occupant Compartment	1873	400	515
7	Left Lower B-Post	2266	-795	710
8	Left Middle B-Post	2300	-790	1020
9	Left Lower A-Post	3200	-740	590
10	Left Middle A-Post	3380	-860	945
11	Front Seat Track	2361	-531	503
12	Rear Seat Track or Structure	1880	-513	521
13	Vehicle CG	2645	0	395

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: 2008 Toyota Highlander 4x2
 Test Program: NCAP Side Impact

NHTSA No. M85111
 Test Date: 9/19/2007



Loc. No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	MDB CG	-1092	0	-483
2	MDB Rear	-2591	-625	-622

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: 2008 Toyota Highlander 4x2
Test Program: NCAP Side Impact

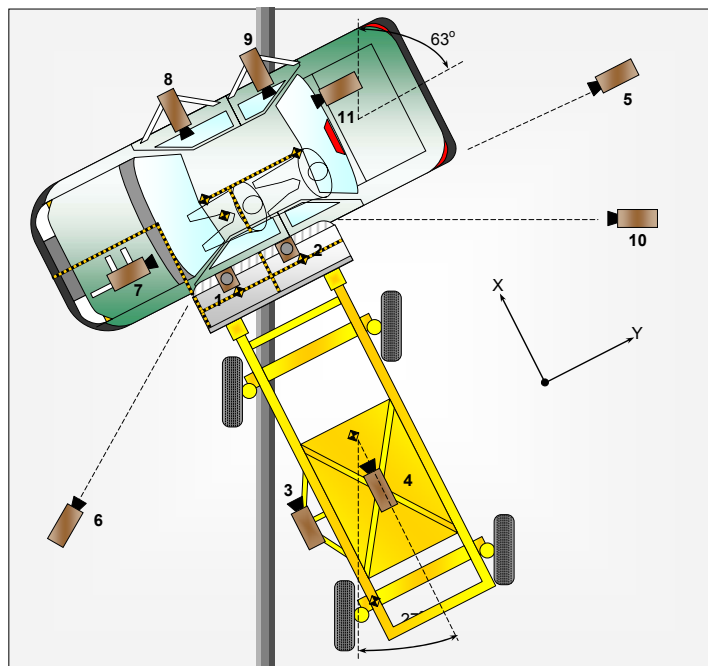
NHTSA No. M85111
Test Date: 9/19/2007

	Elements	Pre-Test (mm)
1	Total Length	4800
2	Total Width	1886
3	Bumper Top Height	746
4	Bumper Bottom Height	564
5	Longitudinal Member Top Height	764
6	Distance between Longitudinal Members	798
7	Longitudinal Member Width	63
8	Engine Top Height	842
9	Engine Bottom Height	229
10	Engine and gearbox width	772
11	Front bumper-engine distance	488
12	Front shock absorber fixing height	1016
13	Bonnet leading edge height	1008
14	Front shock absorber fixing width	1209
15	Front bumper – front axle distance	926
16	Front axle – a pillar distance	574
17	A-pillar – B-pillar distance	1128
18	B-Pillar – rear axle distance	1177
19	B-pillar – C-pillar distance	1052
20	Roof sill bottom height	1621
21	Roof sill top height	1673
22	Floor sill bottom height	229
23	Floor sill top height	444

DATA SHEET NO. 16
HIGH SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2008 Toyota Highlander 4x2
 Test Program: NCAP Side Impact

NHTSA No. M85111
 Test Date: 9/19/2007



No.	Camera View	Location (mm)			Lens (mm)	Film Speed (fps)
		X	Y	Z		
1	Overhead Close-up	100	0	5050	50	1000
2	Overhead Overall	-340	0	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	-1210	5150	1325	24	1000
6	Left Side, Ground Level, Overall	1150	-5200	1310	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
11	Onboard Child Seat				12.5	1000

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: 2008 Toyota Highlander 4x2
 Test Program: NCAP Side Impact

NHTSA No. M85111
 Test Date: 9/19/2007

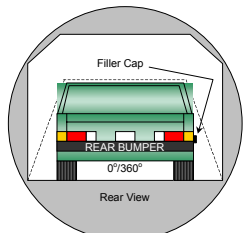
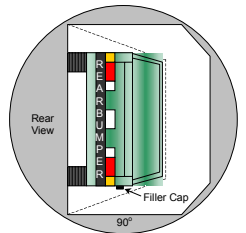
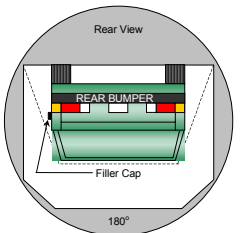
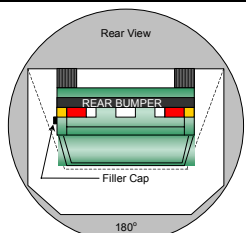
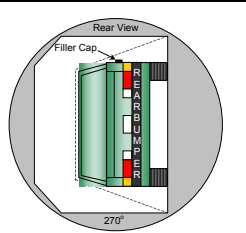
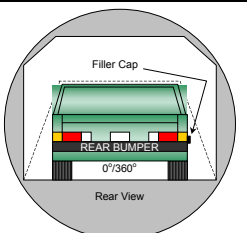
FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 21° C Test Time: 7:35 pm

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°	121	300	First 5	0
90° to 180°	120	300	First 5	0
180° to 270°	118	300	First 5	0
270° to 360°	117	300	First 5	0

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PHOTOGRAPHS

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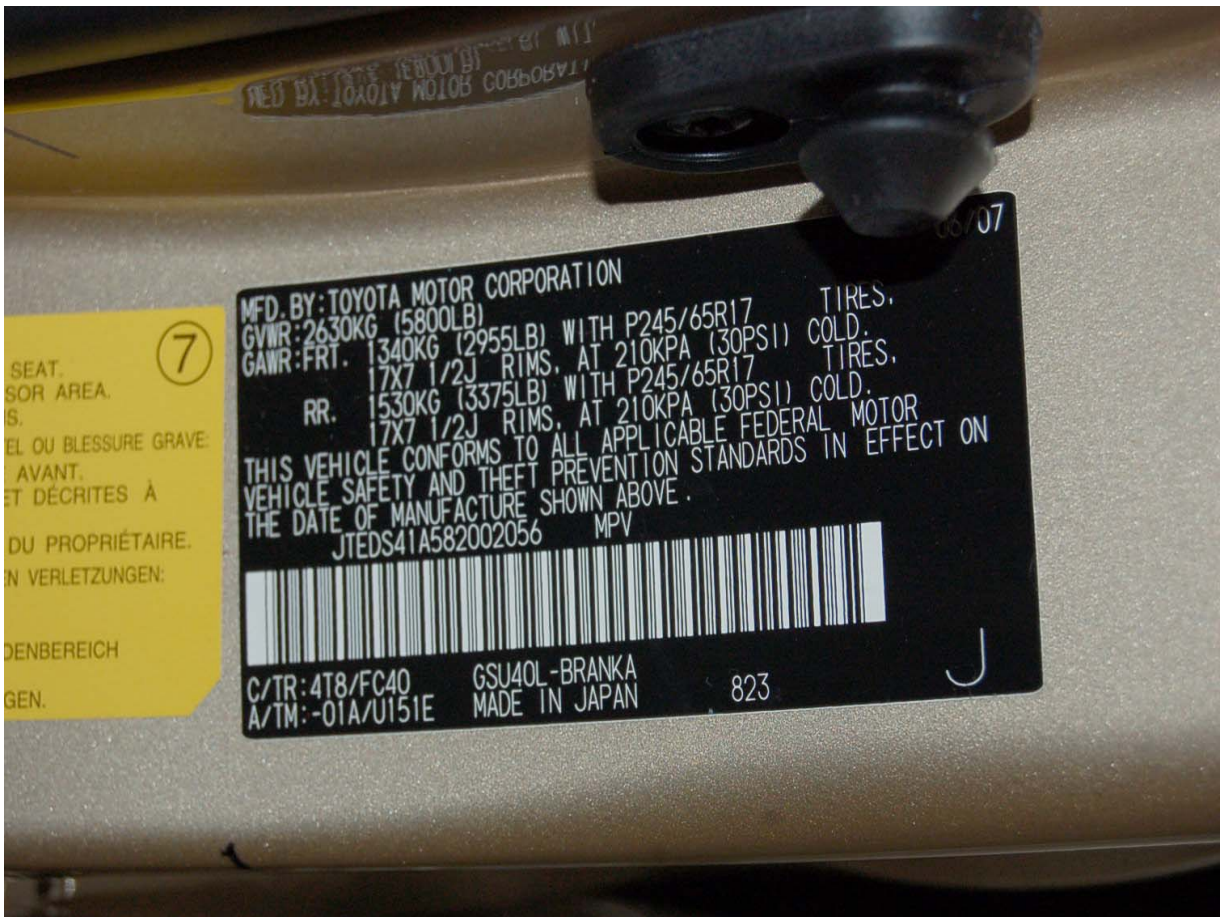
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Left Front $\frac{3}{4}$ View, As Received



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



Manufacturer's Label



Tire Placard



Pre-Test Front View



Post-Test Front View



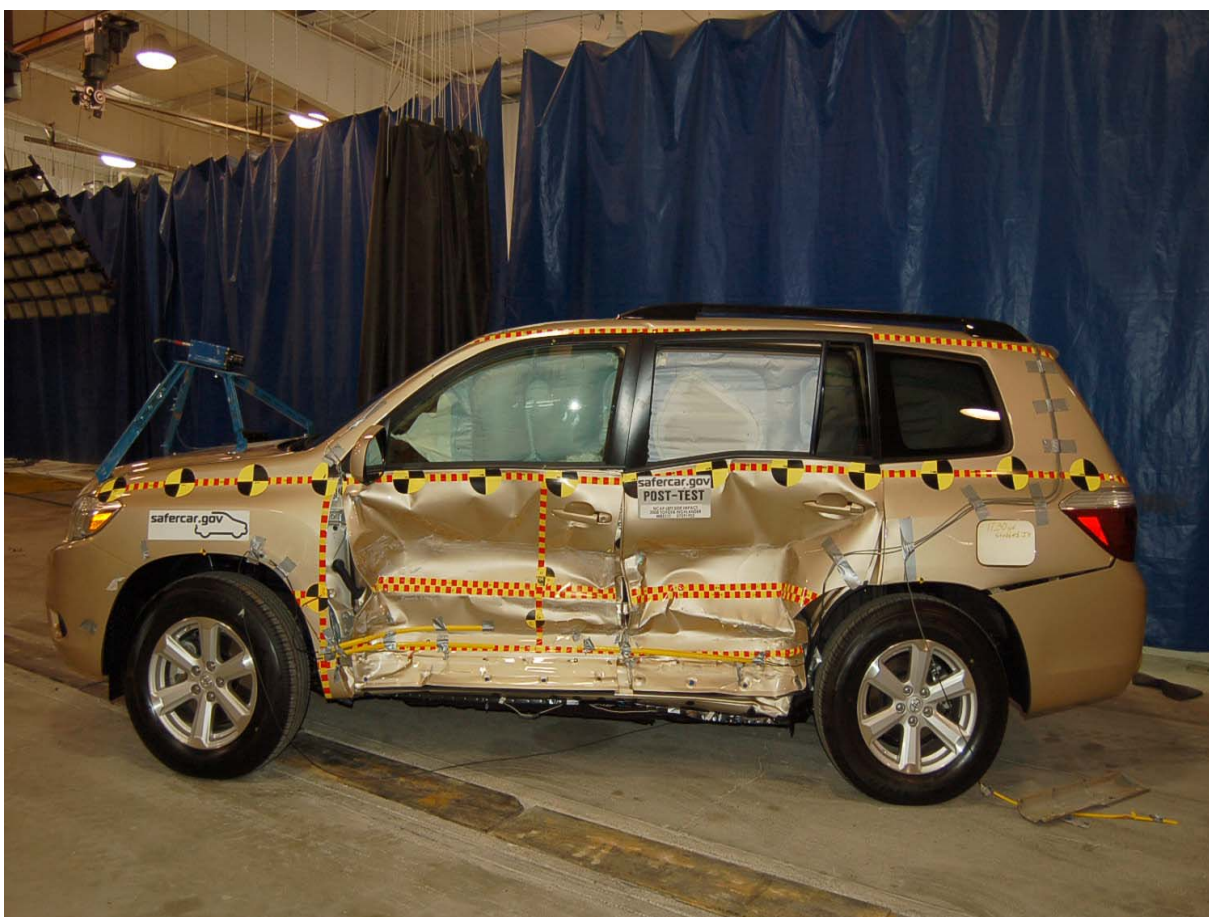
Pre-Test Left Front $\frac{3}{4}$ View



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



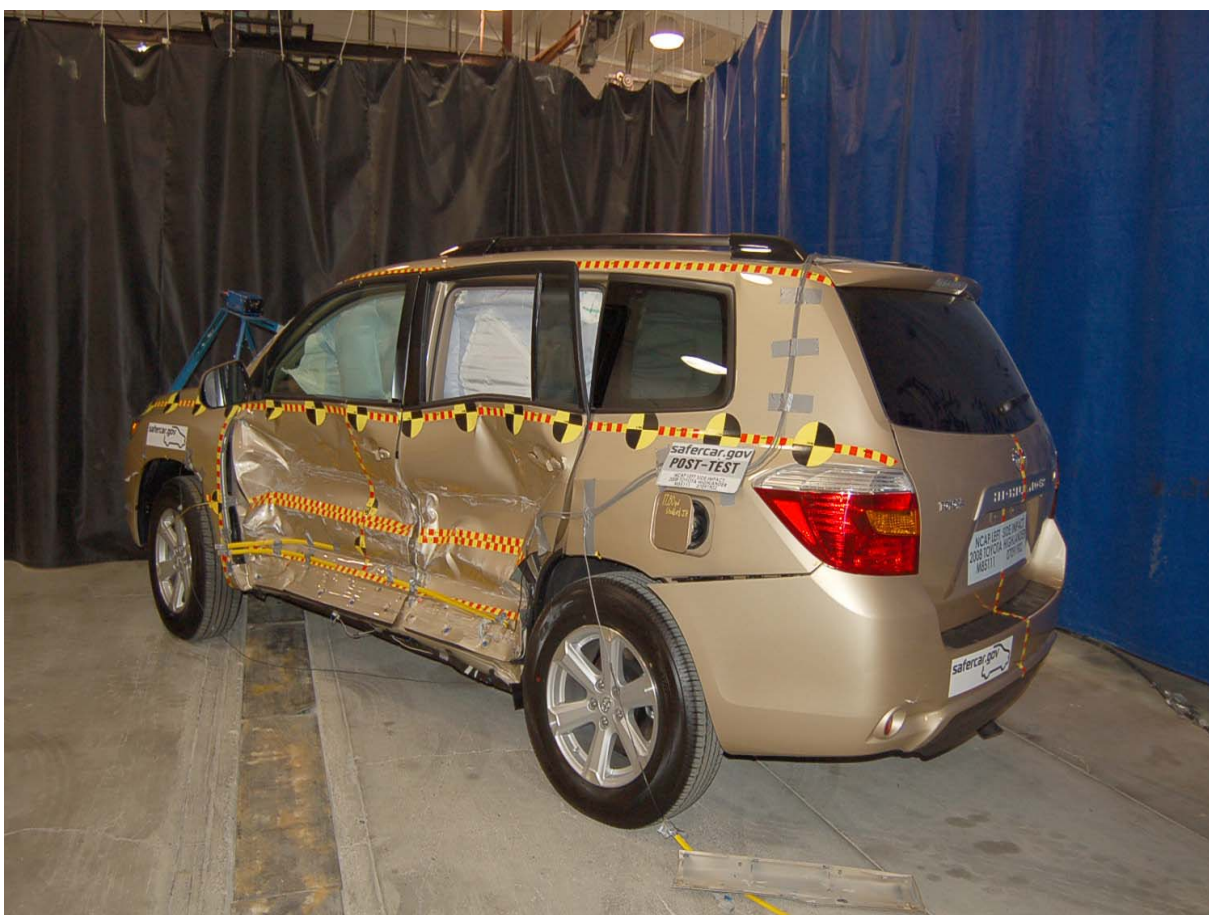
Pre-Test Left Side View



Post-Test Left Side View



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



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



Pre-Test Rear View



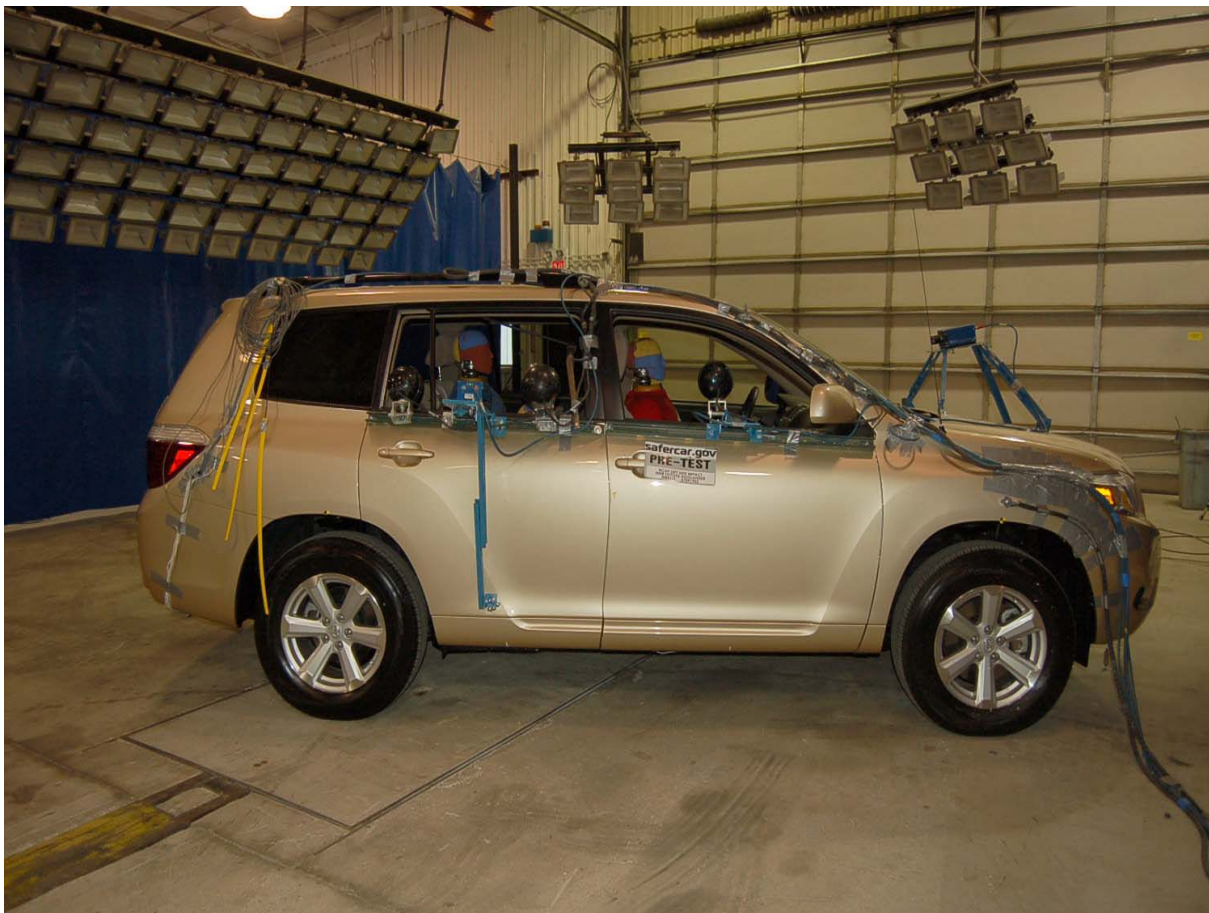
Post-Test Rear View



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 $\frac{3}{4}$ View



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



Pre-Test Overhead View



Post-Test Overhead View



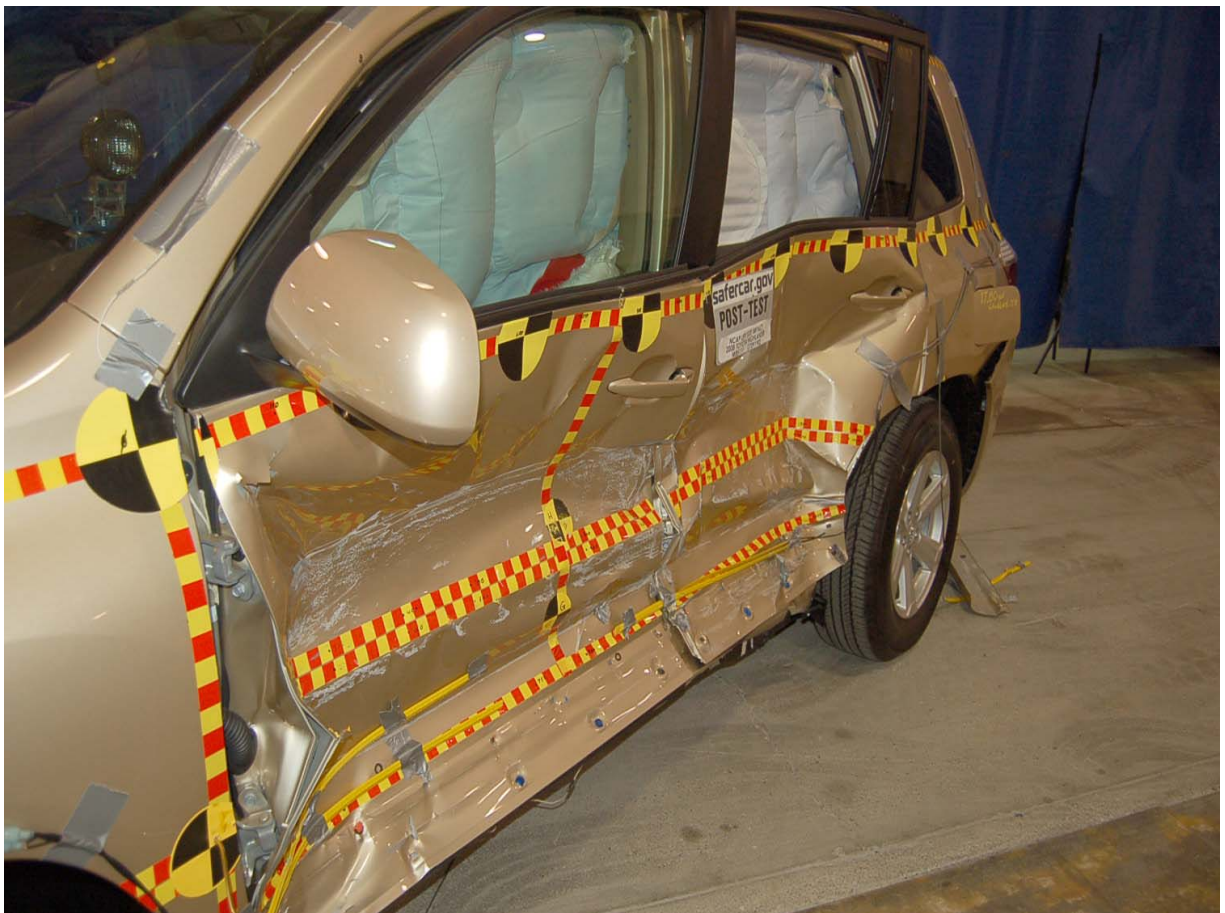
Pre-Test Left Impact Point



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



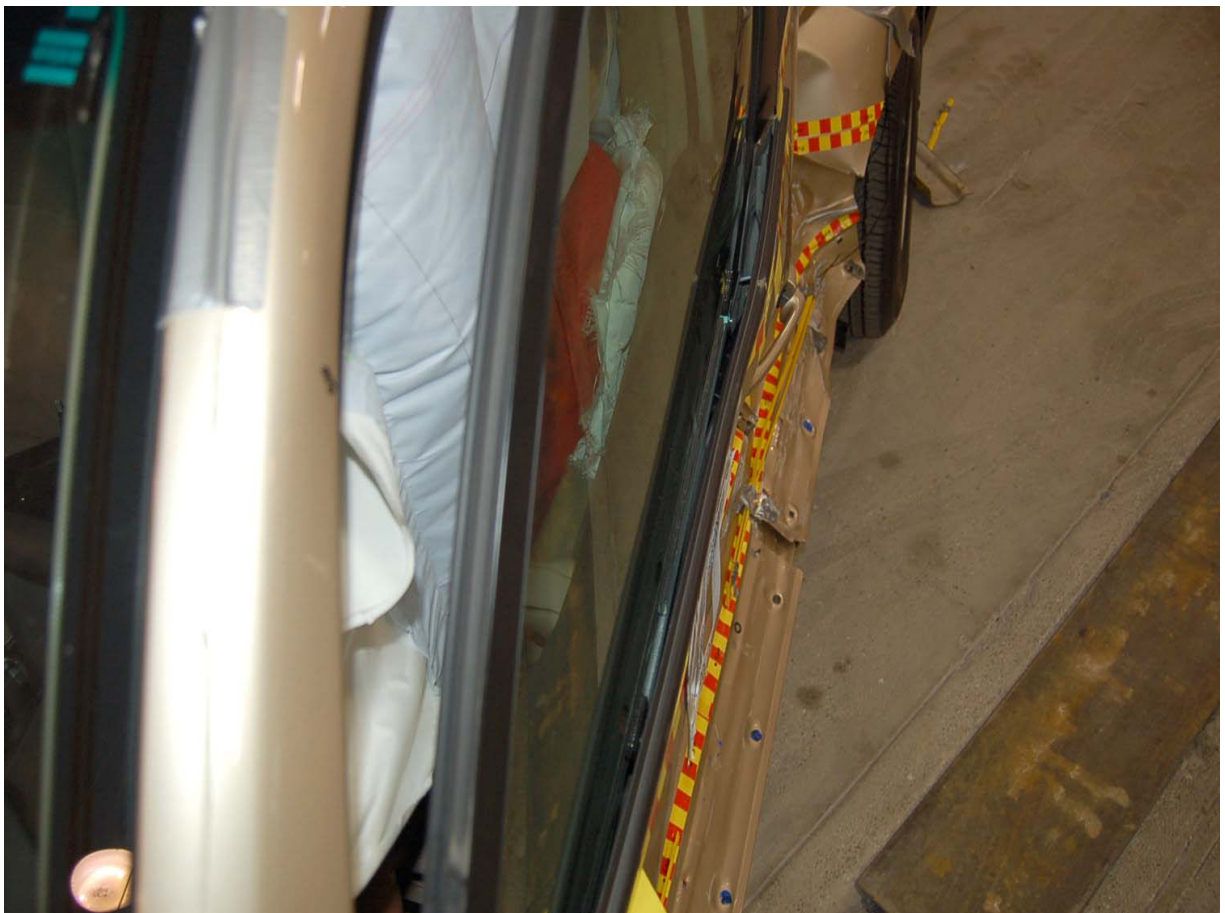
Post-Test Left Side Impact Close-up



Pre-Test 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)



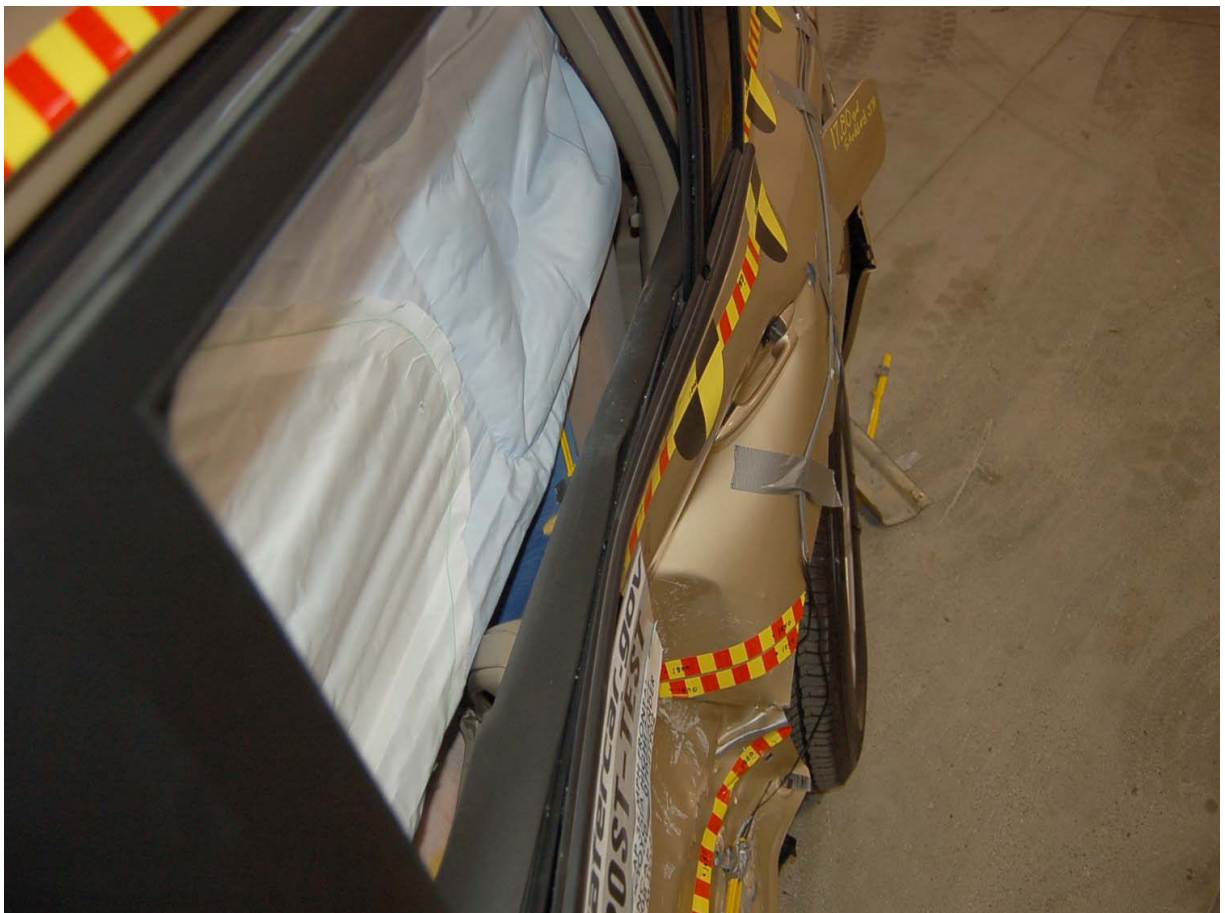
Pre-Test Driver Dummy Right Side View



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)



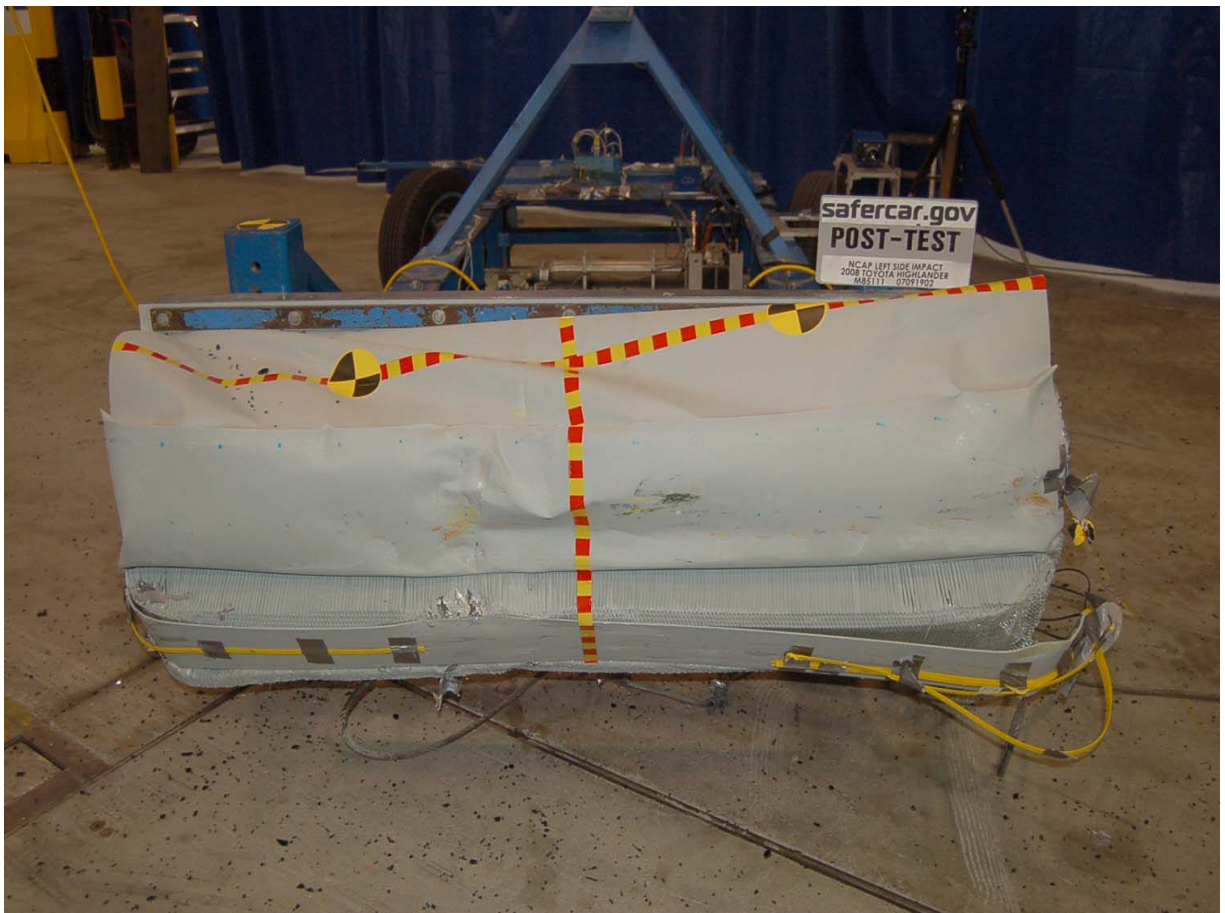
Pre-Test Passenger Dummy Right Side View



Post-Test Passenger Dummy Right Side View



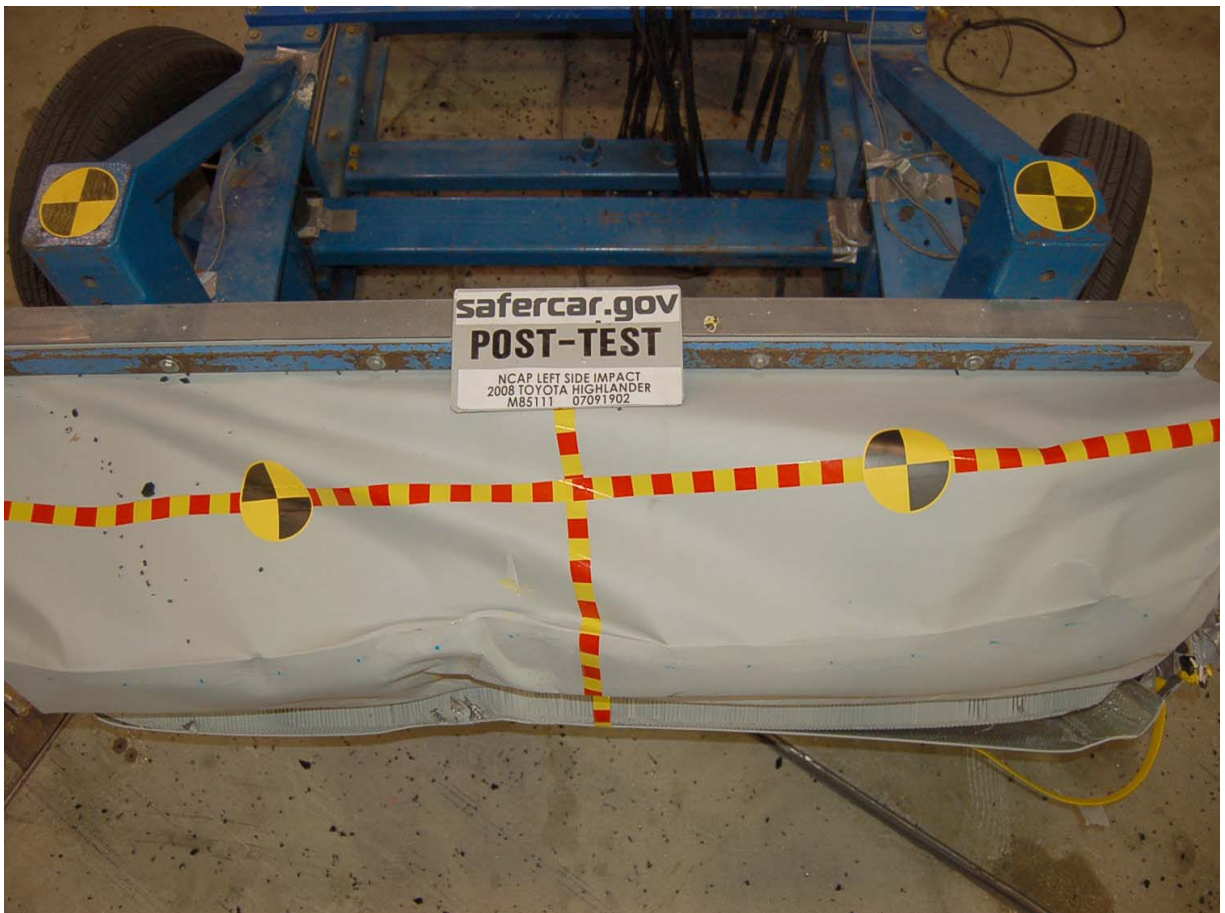
Pre-Test Front View of Deformable Barrier



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



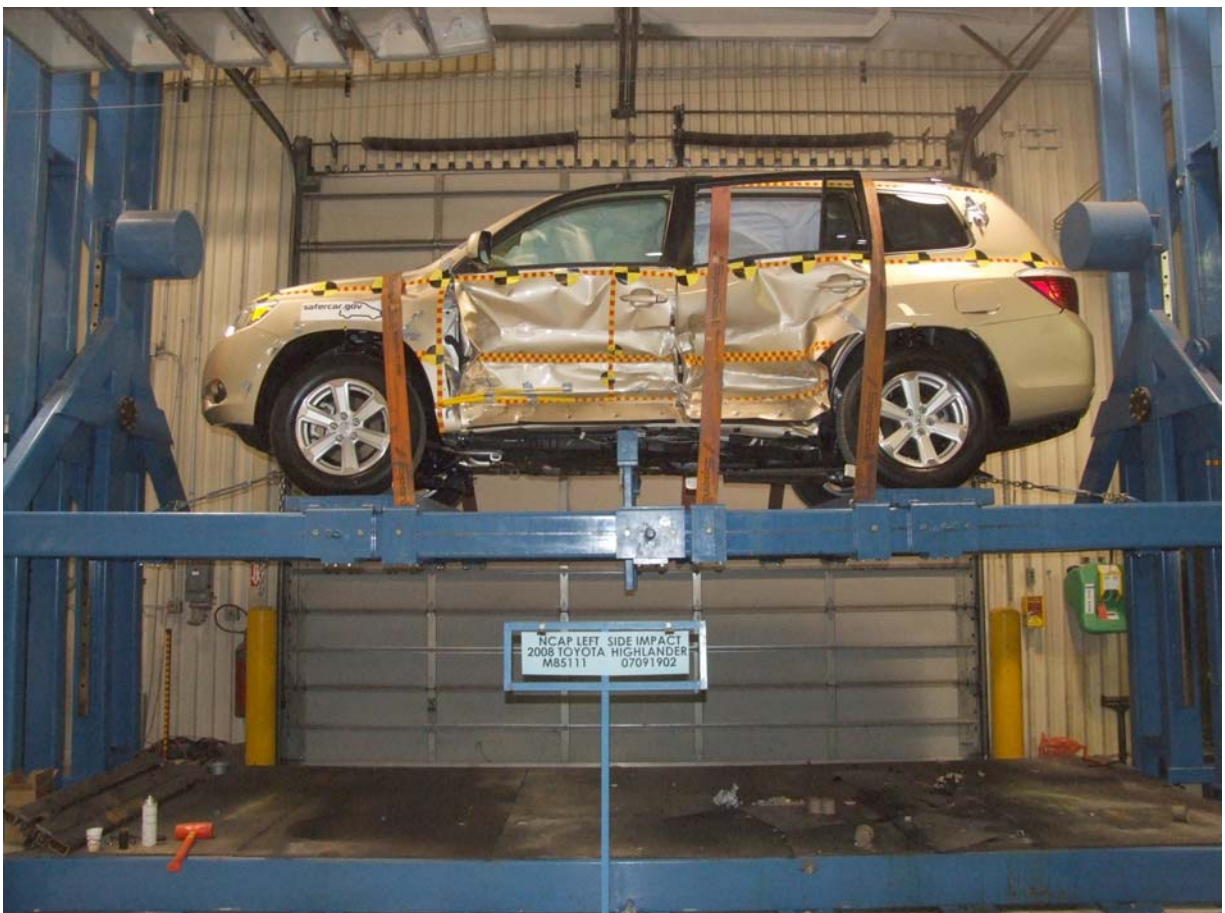
Vehicle on Rollover Device (90 Degrees)



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



Post-Test Driver Dummy Torso Contact



Post-Test Driver Dummy Contact



Post-Test Passenger Dummy Head Contact



Post-Test Passenger Dummy Contact

APPENDIX B

SID/HIII RESPONSE DATA TRACES

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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

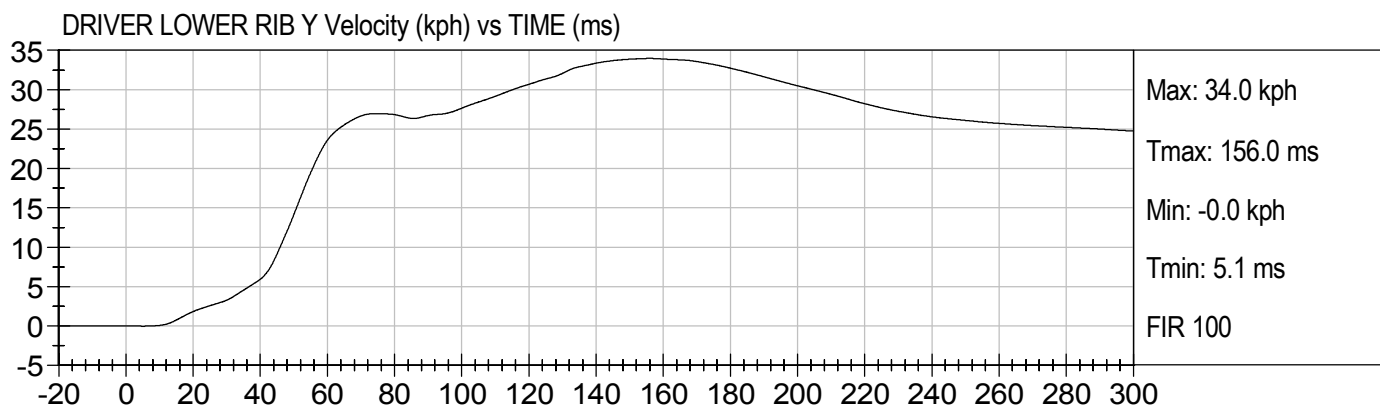
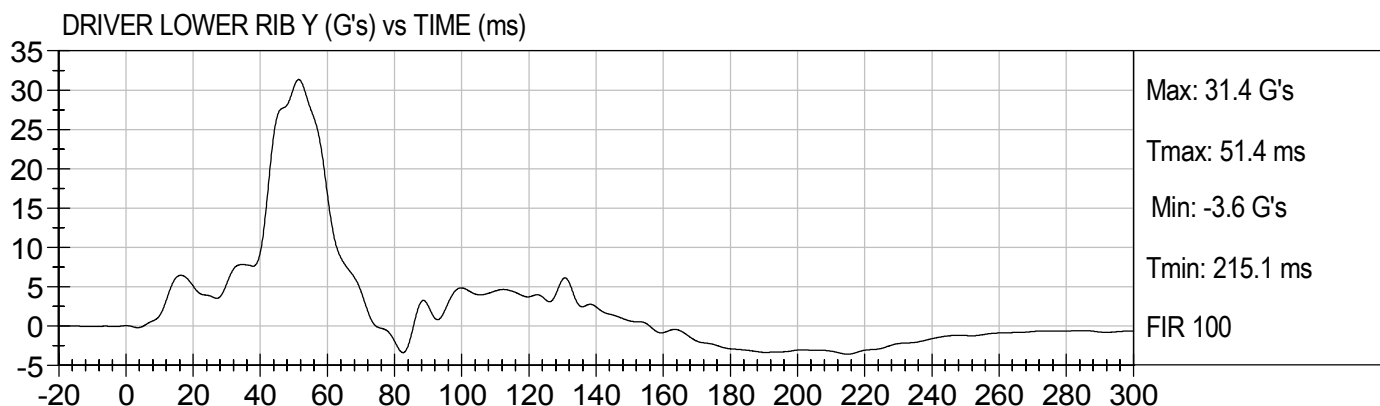
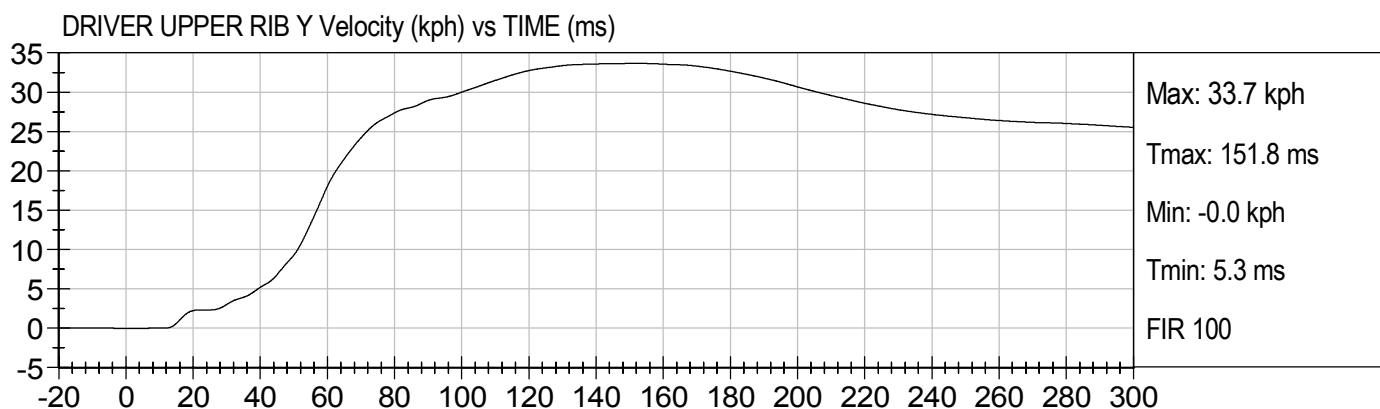
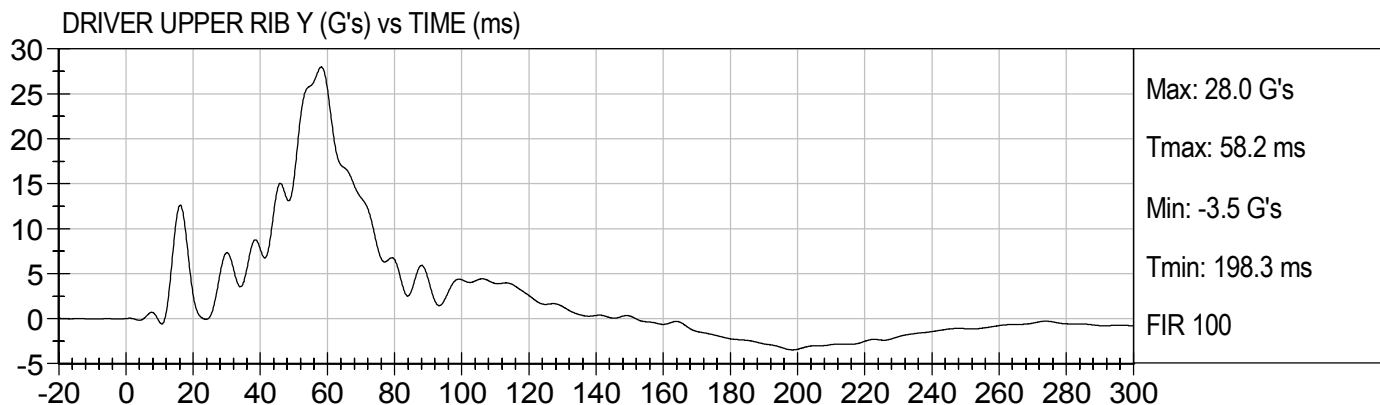
Driver Upper Neck Force Y

Driver Upper Neck Force Z

Driver Upper Neck Moment X

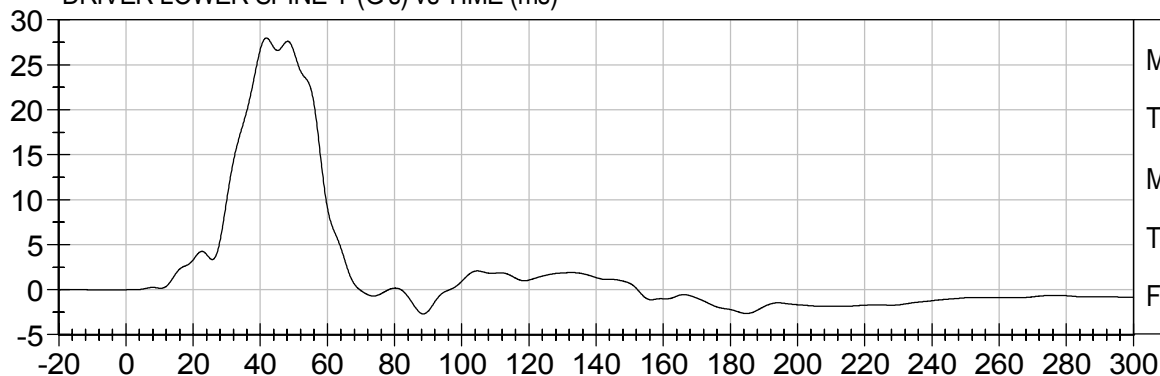
Driver Upper Neck Moment Y
Driver Upper Neck Moment Z
Driver Upper Rib Redundant Y
Driver Lower Rib Redundant Y
Driver Lower Spine Redundant Y
Driver Pelvis Redundant Y
Driver Thorax Contact
Driver Pelvis Contact
Passenger Head X Primary
Passenger Head Y Primary
Passenger Head Z Primary
Passenger Head 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 Left Rear 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



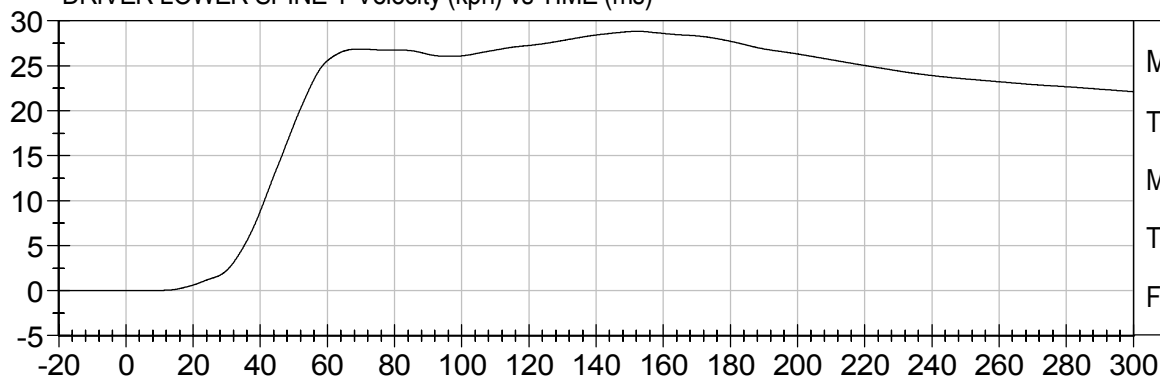


DRIVER LOWER SPINE Y (G's) vs TIME (ms)



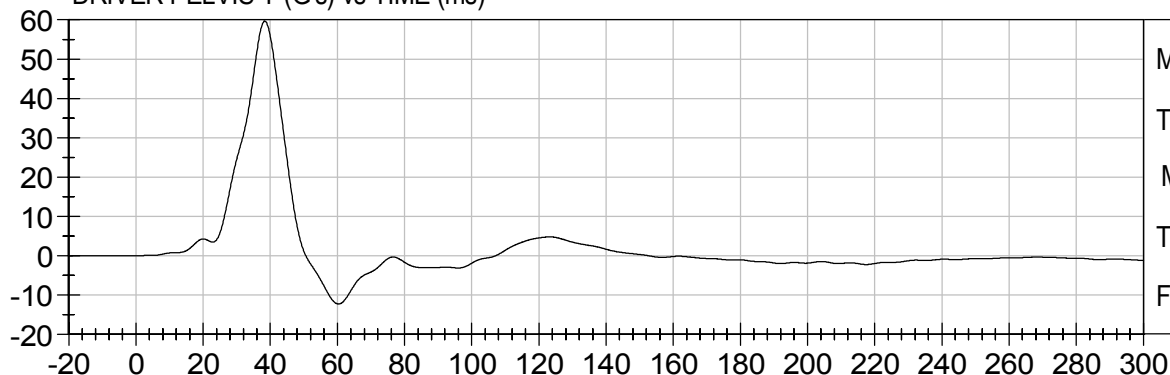
Max: 28.0 G's
Tmax: 41.9 ms
Min: -2.7 G's
Tmin: 88.3 ms
FIR 100

DRIVER LOWER SPINE Y Velocity (kph) vs TIME (ms)



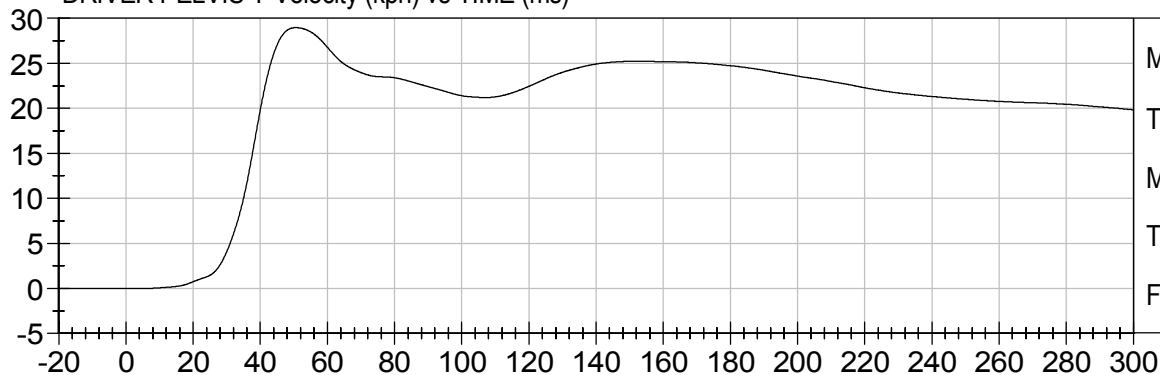
Max: 28.8 kph
Tmax: 152.3 ms
Min: -0.0 kph
Tmin: 3.4 ms
FIR 100

DRIVER PELVIS Y (G's) vs TIME (ms)

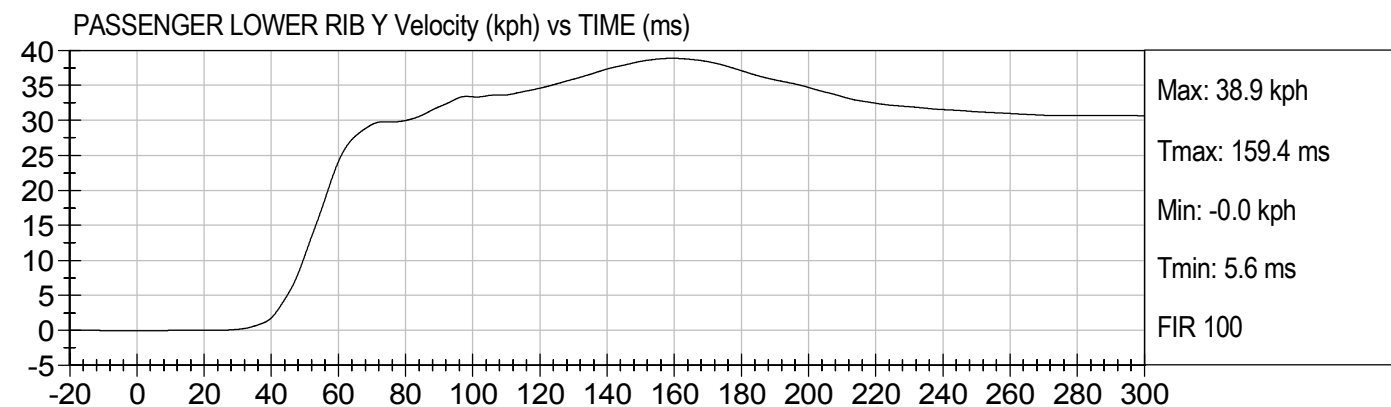
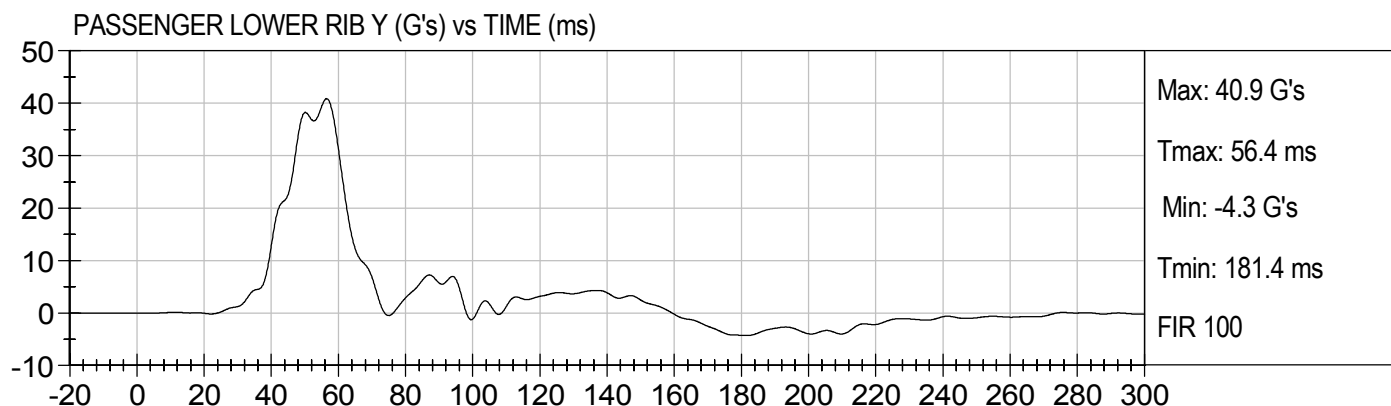
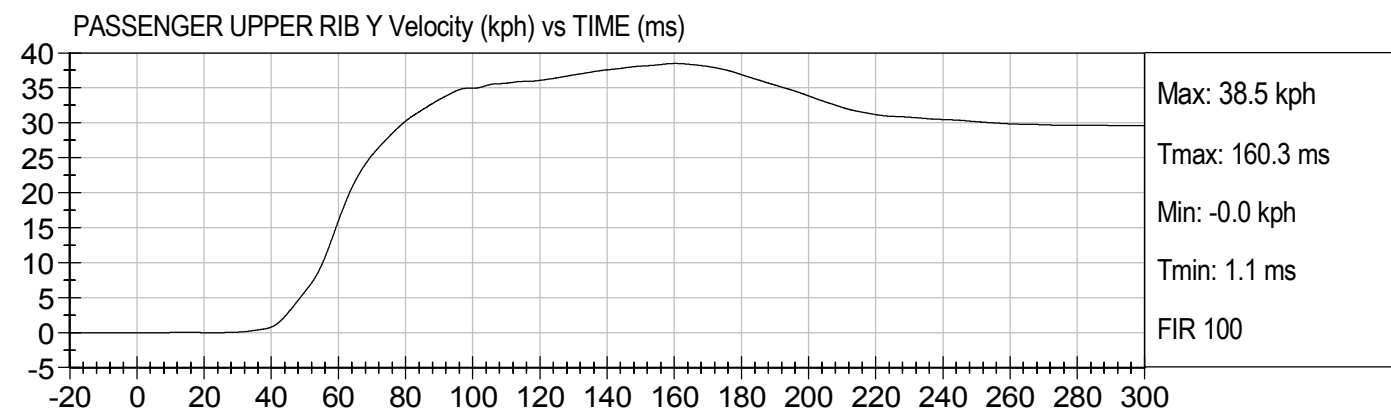
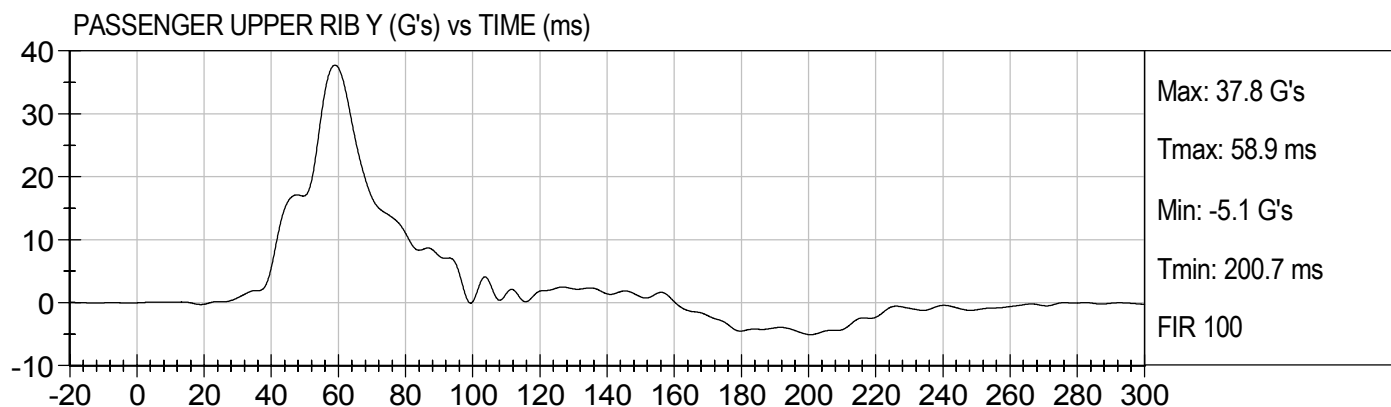


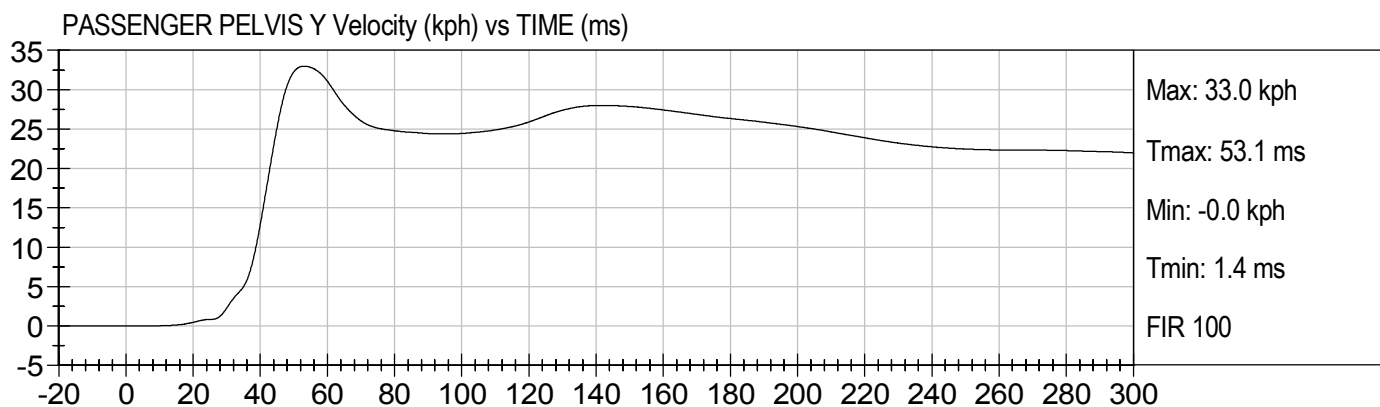
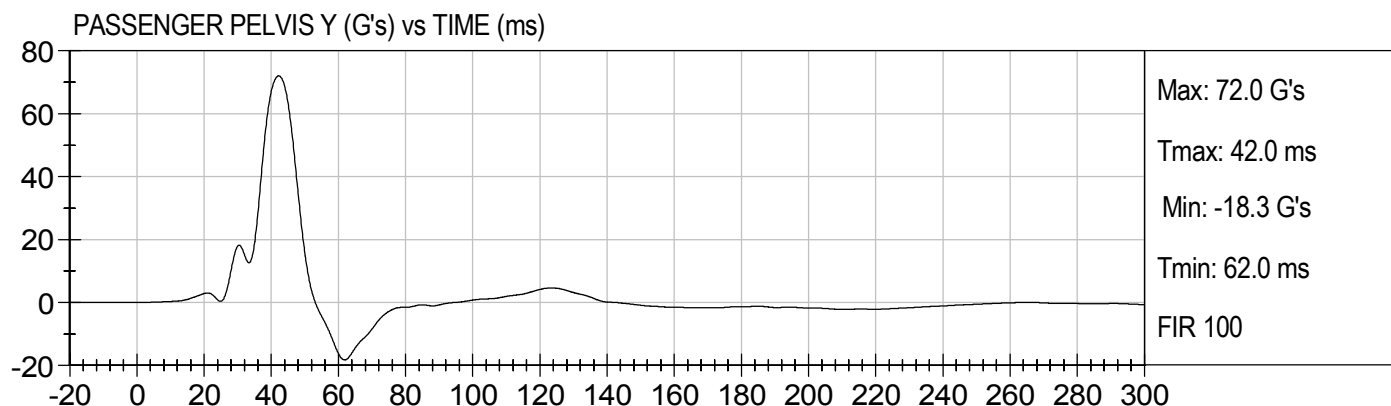
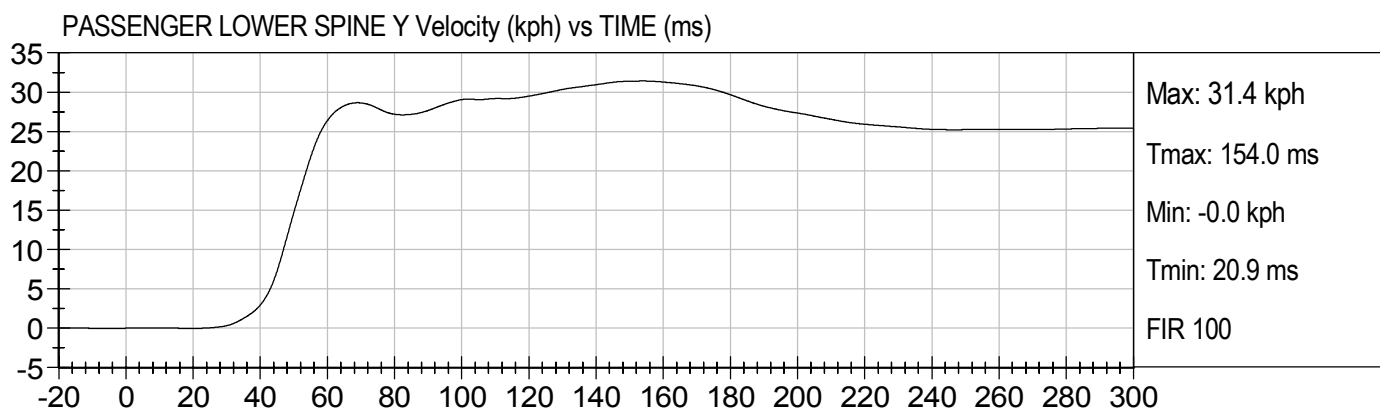
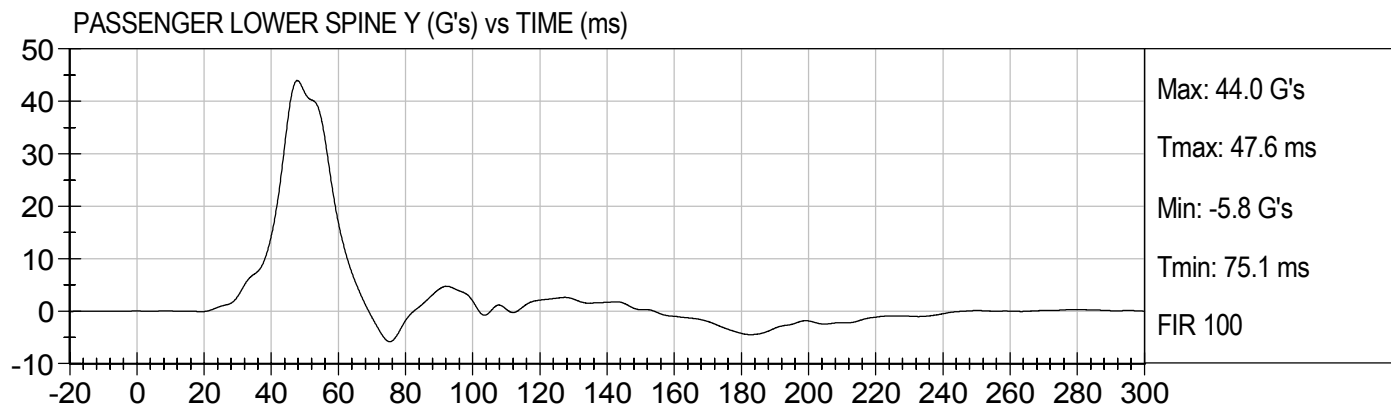
Max: 59.7 G's
Tmax: 38.2 ms
Min: -12.2 G's
Tmin: 60.1 ms
FIR 100

DRIVER PELVIS Y Velocity (kph) vs TIME (ms)



Max: 29.0 kph
Tmax: 50.6 ms
Min: -0.0 kph
Tmin: 0.2 ms
FIR 100





APPENDIX C
DUMMY CALIBRATION DATA

CERTIFICATION DATA

Dummy Serial Number: 271

Calibration Test Results Summary

Dummy Serial Number: 271

Pre-Test Calibration

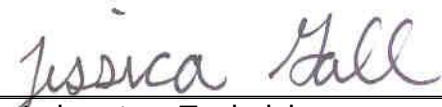
External Dimensions:	The dummy passed all external dimension requirements.
Head Drop Test:	The head passed all drop test requirements.
Neck Pendulum Test:	The neck passed all pendulum test requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Pelvic Impact Test:	The pelvis 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: D07288

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	


Laboratory Technician


Approved By

9/17/2007
Test Date

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

ATD Serial No: 271

Test I.D: D072881

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	39	Pass
Peak Resultant Acceleration	G's	120 to 150	134	Pass
Is Resultant Curve Unimodal?	Yes/No	15% of peak	Yes	Pass
Peak Longitudnal Acceleration	G's	+/- 15	-14.0	Pass
Overall Test Results				Pass


Laboratory Technician


Approved By

9/17/07
Test Date



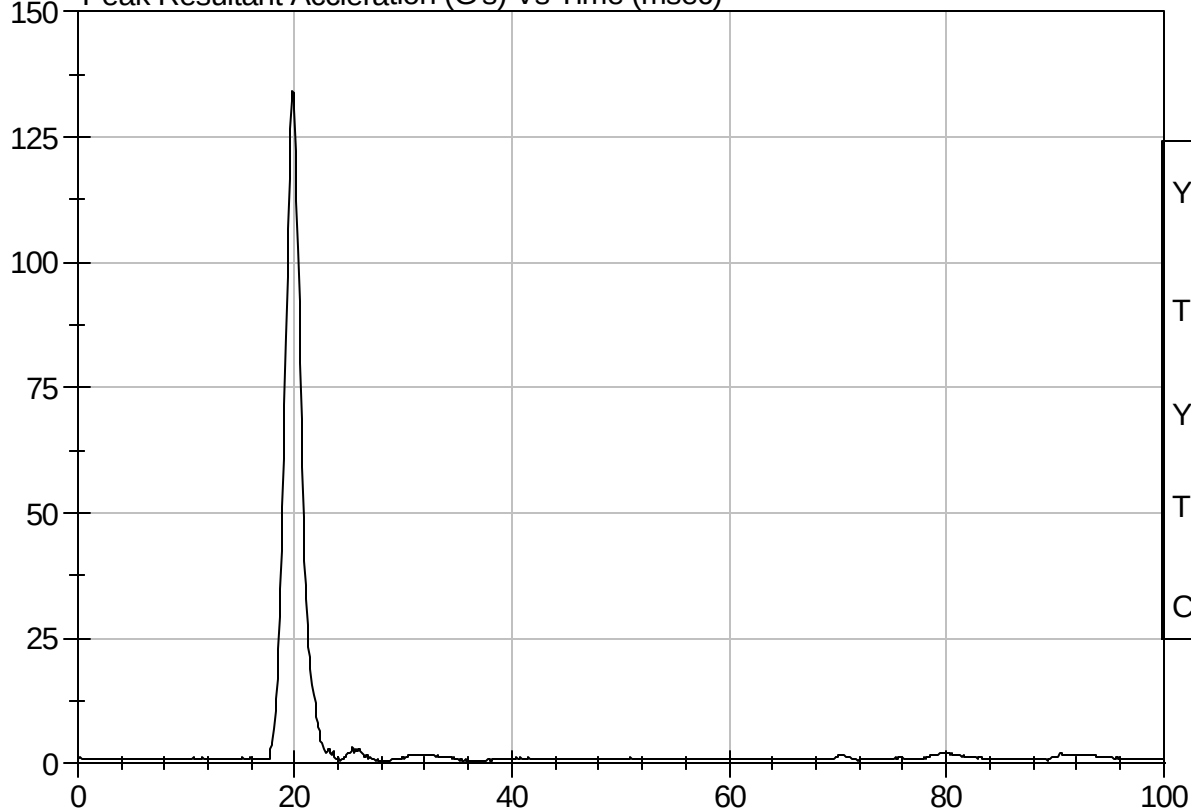
Test Description: Head Drop

Test Date: 9/17/07

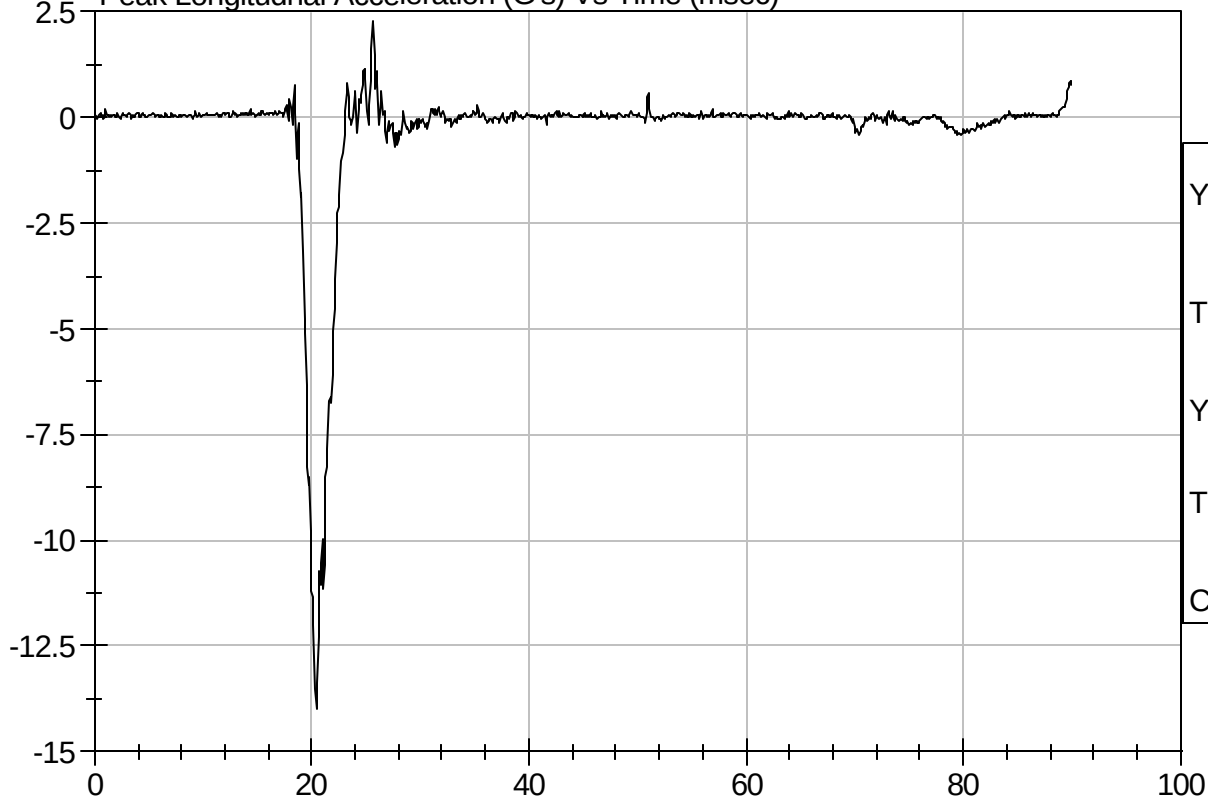
Component: D072881

Speed: 0 ft/s, 0 m/s

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



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



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

ATD Serial No: 271

Test I.D: D072882

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	20.9	Pass
Laboratory Relative Humidity	%	10 to 70	40	Pass
Probe Velocity	m/s	4.22 - 4.31	4.23	Pass
Upper Rib	G's	37 - 46	44	Pass
Lower Rib	G's	37 - 46	44	Pass
Lower Spine	G's	15 - 22	17	Pass
Overall Test Results				Pass


Laboratory Technician

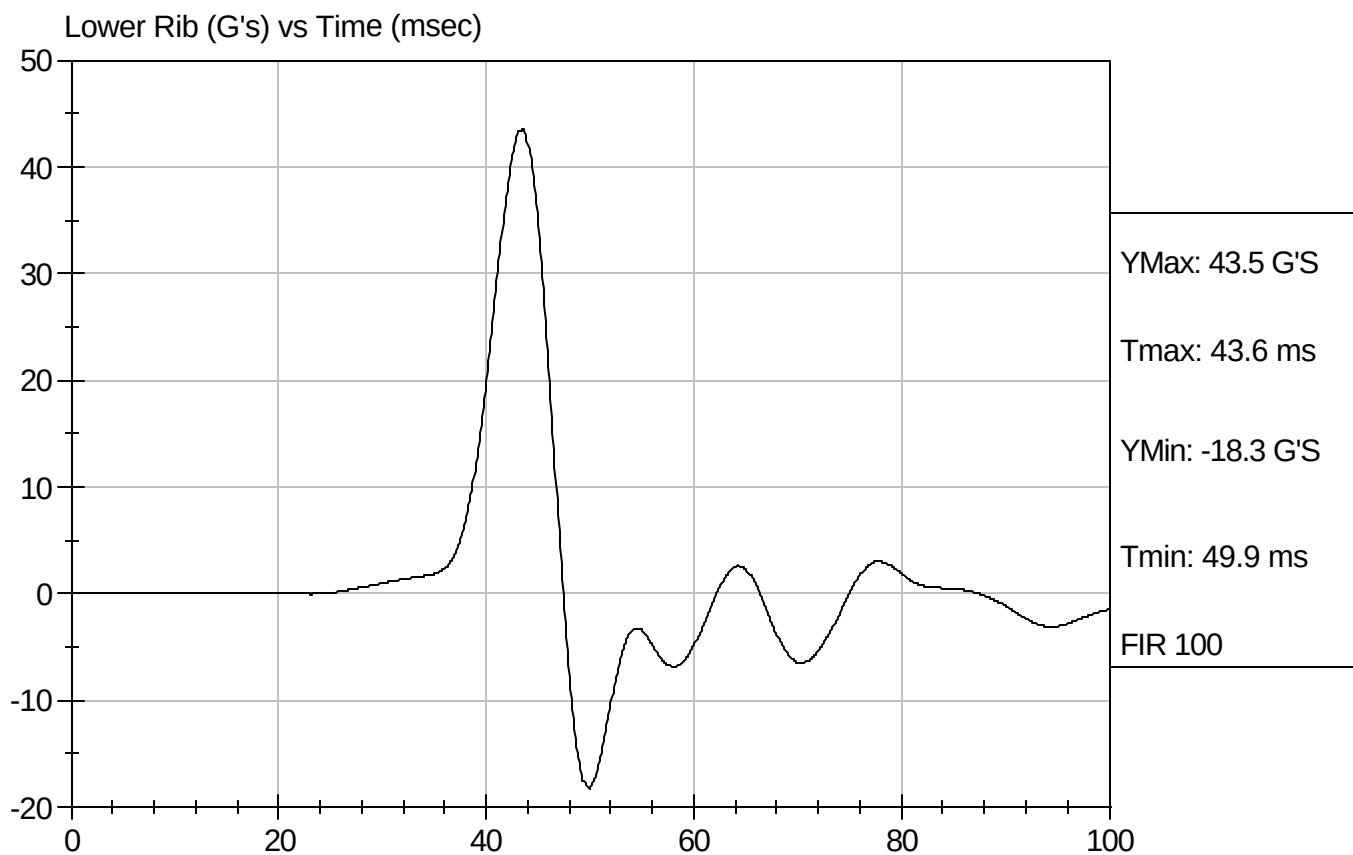
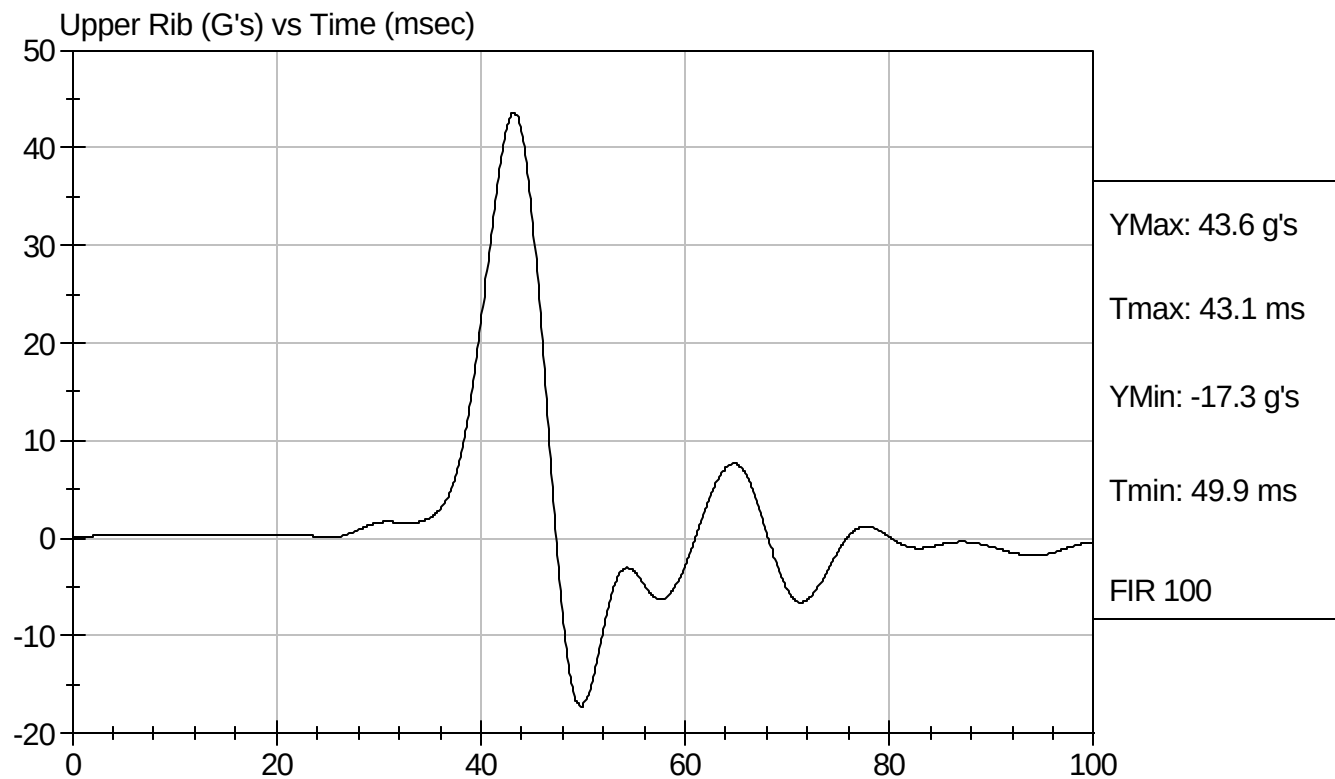

Approved By

9/17/07
Test Date



Test Desc: Thorax Impact
Component ID: D072882

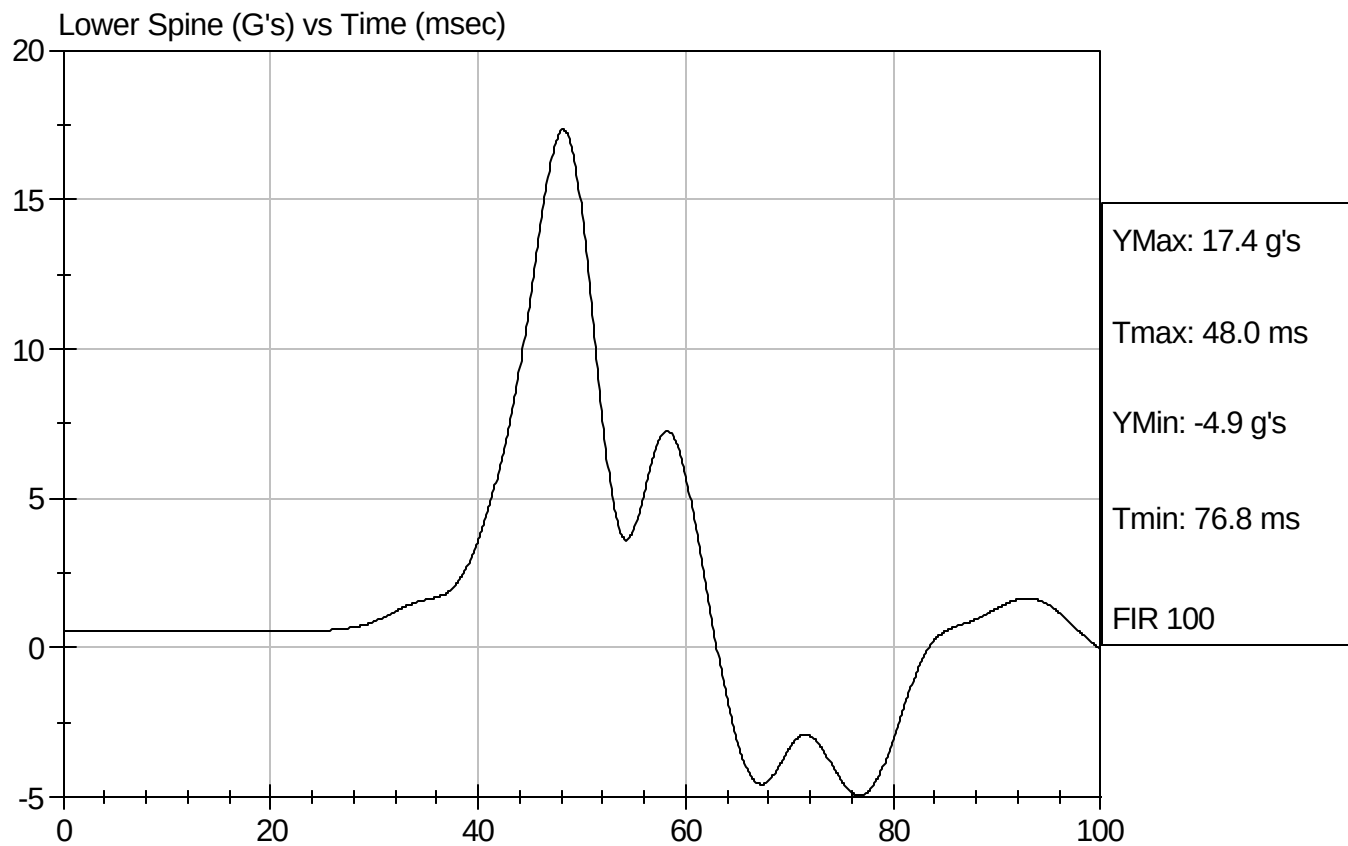
Test Date: 9/17/07
Speed: 13.89 ft/sec, 4.23 m/sec





Test Desc: Thorax Impact
Component ID: D072882

Test Date: 9/17/07
Speed: 13.89 ft/sec, 4.23 m/sec



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

ATD Serial No: 271

Test I.D: D072883

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	20.7	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	44	Pass
Overall Test Results			Pass	


Laboratory Technician

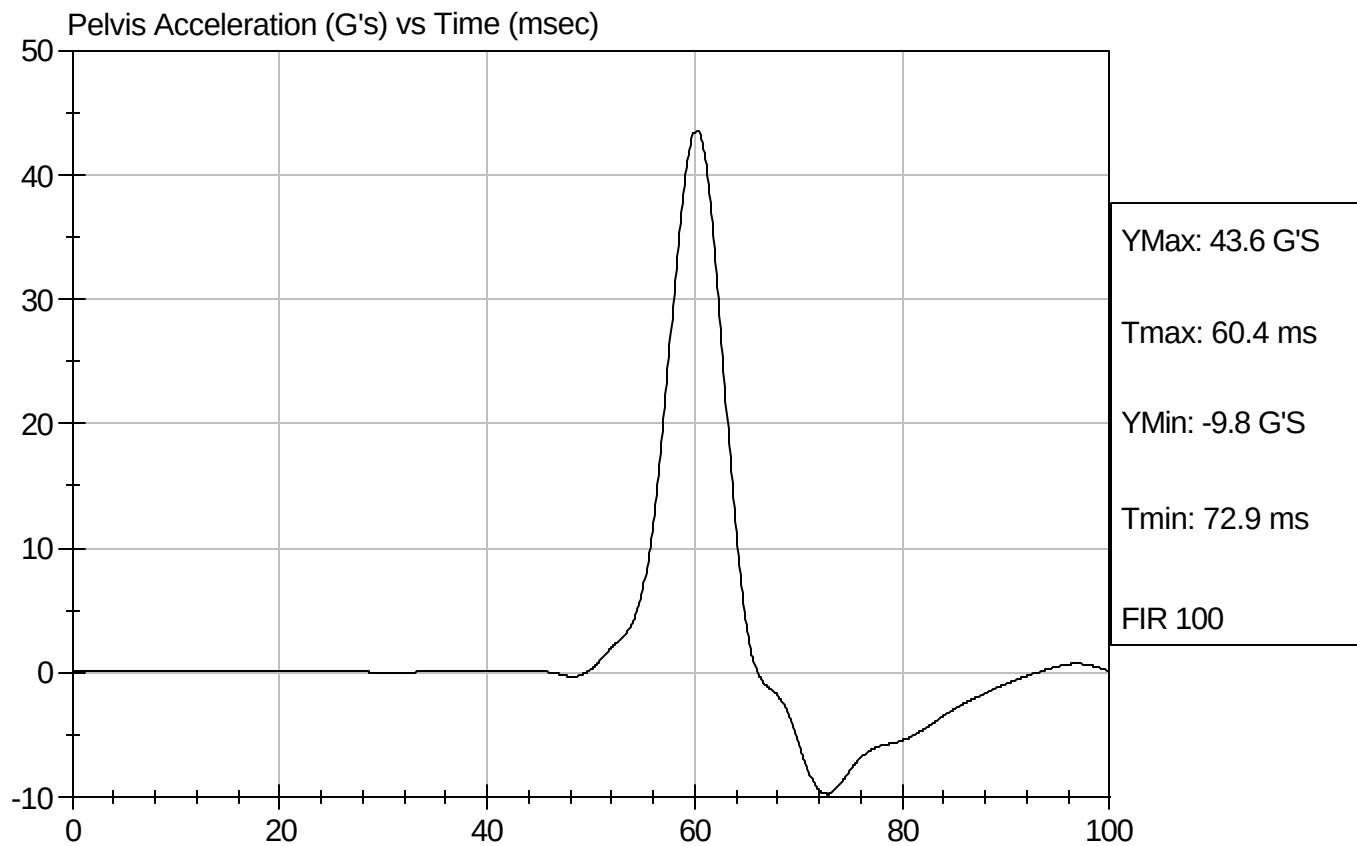

Approved By

9/17/07
Test Date



Test Desc: Pelvis Impact
Component ID: D072883

Test Date: 9/17/07
Speed: 14.1 ft/sec, 4.30 m/sec



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

ATD Serial No: 271

Test I.D: D072884

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	39	Pass
Force At 12.7 mm	N	104 -162	144	Pass
Force At 19 mm	N	163 - 222	199	Pass
Force At 25.4 mm	N	222 - 280	271	Pass
Force At 33 mm	N	325 - 391	364	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

9/17/07
Test Date

David Winkelbauer
Approved By

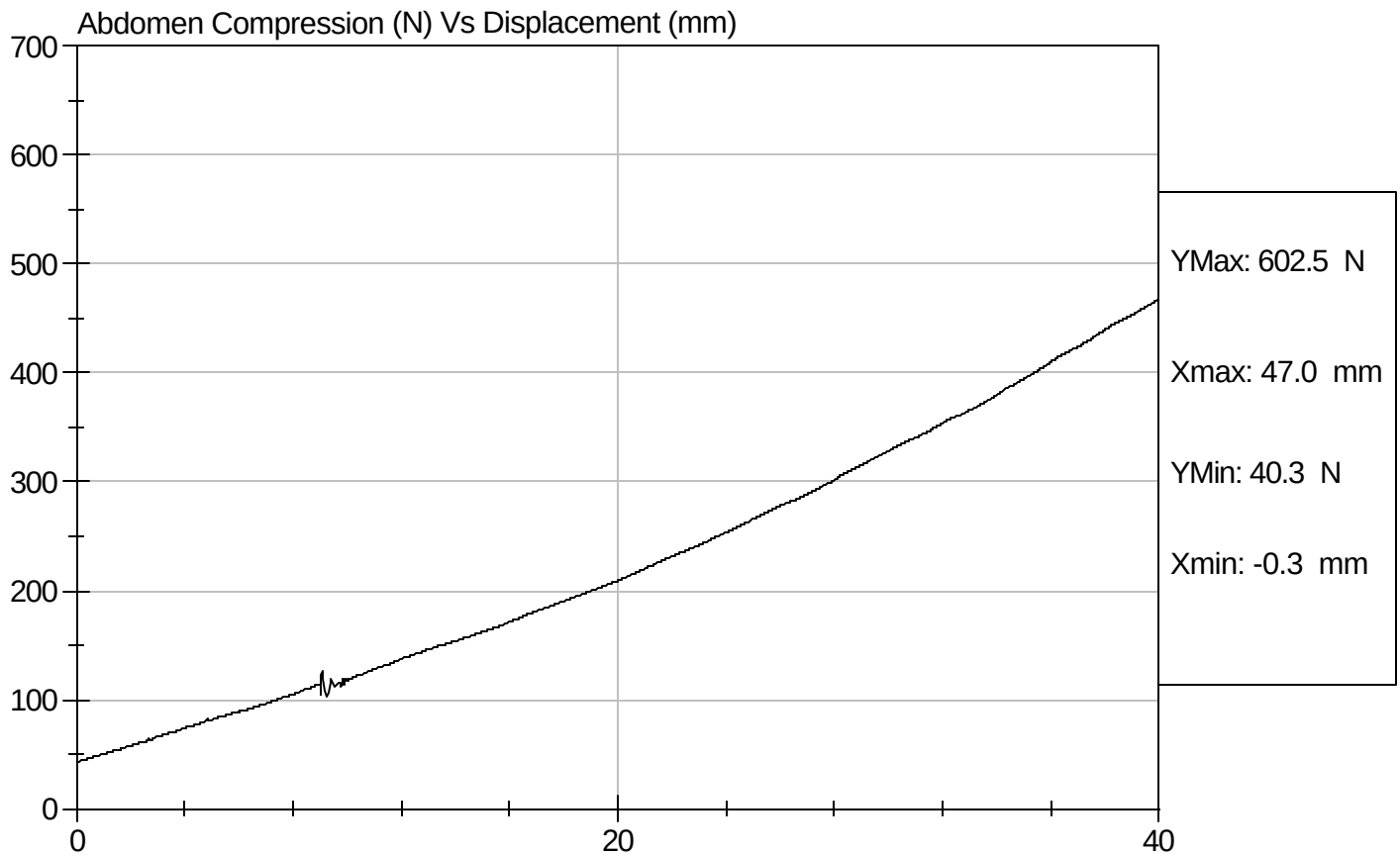


Test Description: Abdomen Compression

Test Date: 9/17/07

Component: D072884

Speed: 0 ft/sec, 0 m/sec



SID Calibration Data Sheet
Side Impact Dummy
Lumbar Flexion Calibration

ATD Serial No: 271

Test I.D: D072885

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	20.6	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	118.7	Pass
Force At 30 deg	N	151.2 - 204.6	167.5	Pass
Force At 40 deg	N	204.6 - 258.0	233.7	Pass
Return Angle	Deg	12 Maximum	4	Pass
Overall Test Results			Pass	


Laboratory Technician


Approved By

9/17/07
Test Date

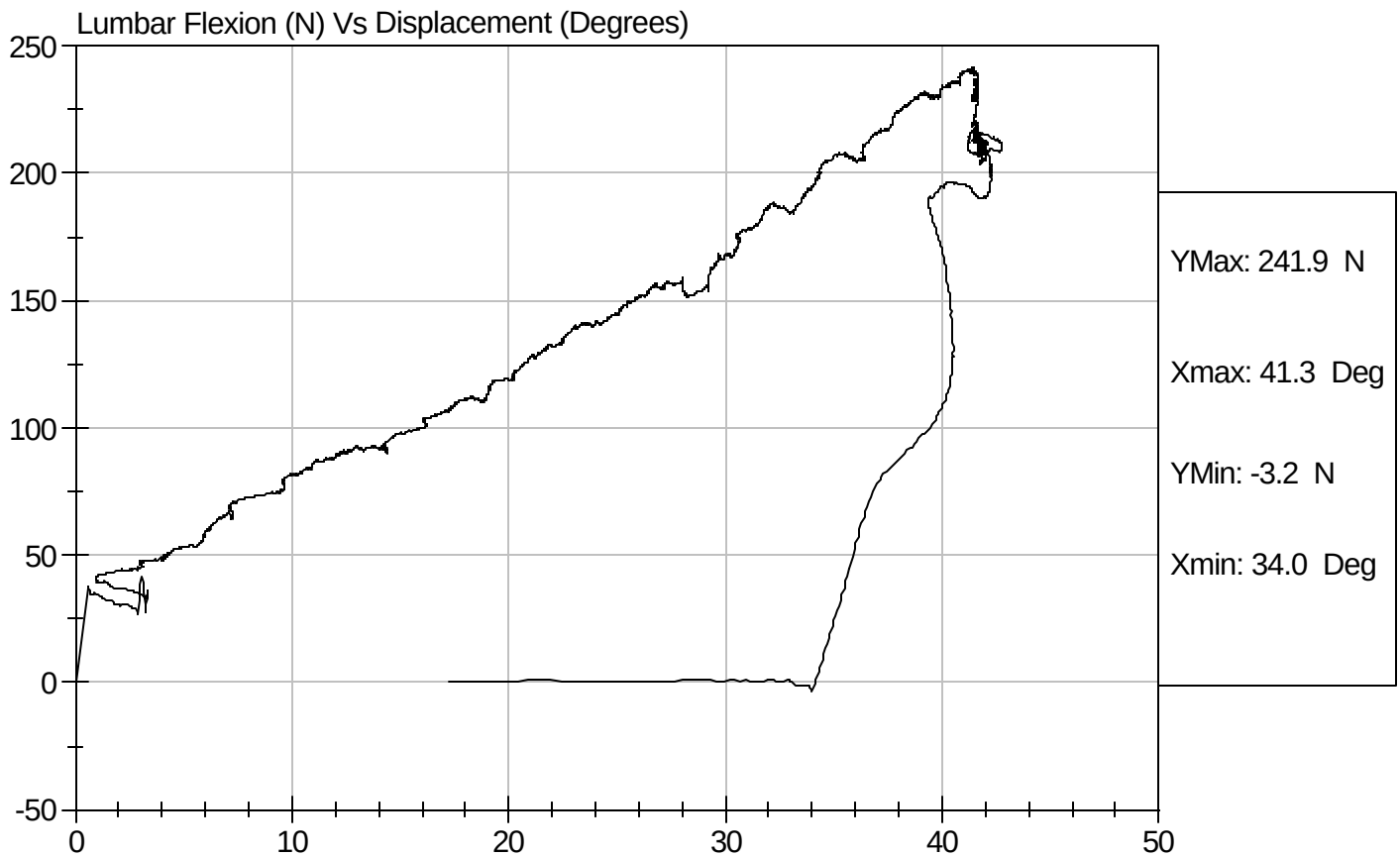


Test Description: Lumbar Flexion

Test Date: 9/17/07

Component: D072885

Speed: 0 ft/sec, 0 m/sec



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

ATD Serial No: 271

Test I.D: D072889

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	20.6	Pass
Laboratory Relative Humidity		%	10 to 70	42	Pass
Impact Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 msec	m/s	1.96 to 2.55	2.14	Pass
	20 msec	m/s	4.12 to 5.10	4.39	Pass
	30 msec	m/s	5.73 to 7.01	6.22	Pass
	40 to 70 msec	m/s	6.27 to 7.64	6.81	Pass
Midsagittal Plane Max Rotation		deg	66 to 82	70	Pass
Head Rotation Peak to Zero - Decay Time		msec	58 to 67	59	Pass
Max. Mx at Occipital Condyles		Nm	73 to 88	75	Pass
Mx Peak To Zero - Decay Time		msec	49 to 64	63	Pass
Mx Peak to Max. Head Rotation		msec	2 to 16	15	Pass


 Laboratory Technician


 Approved By

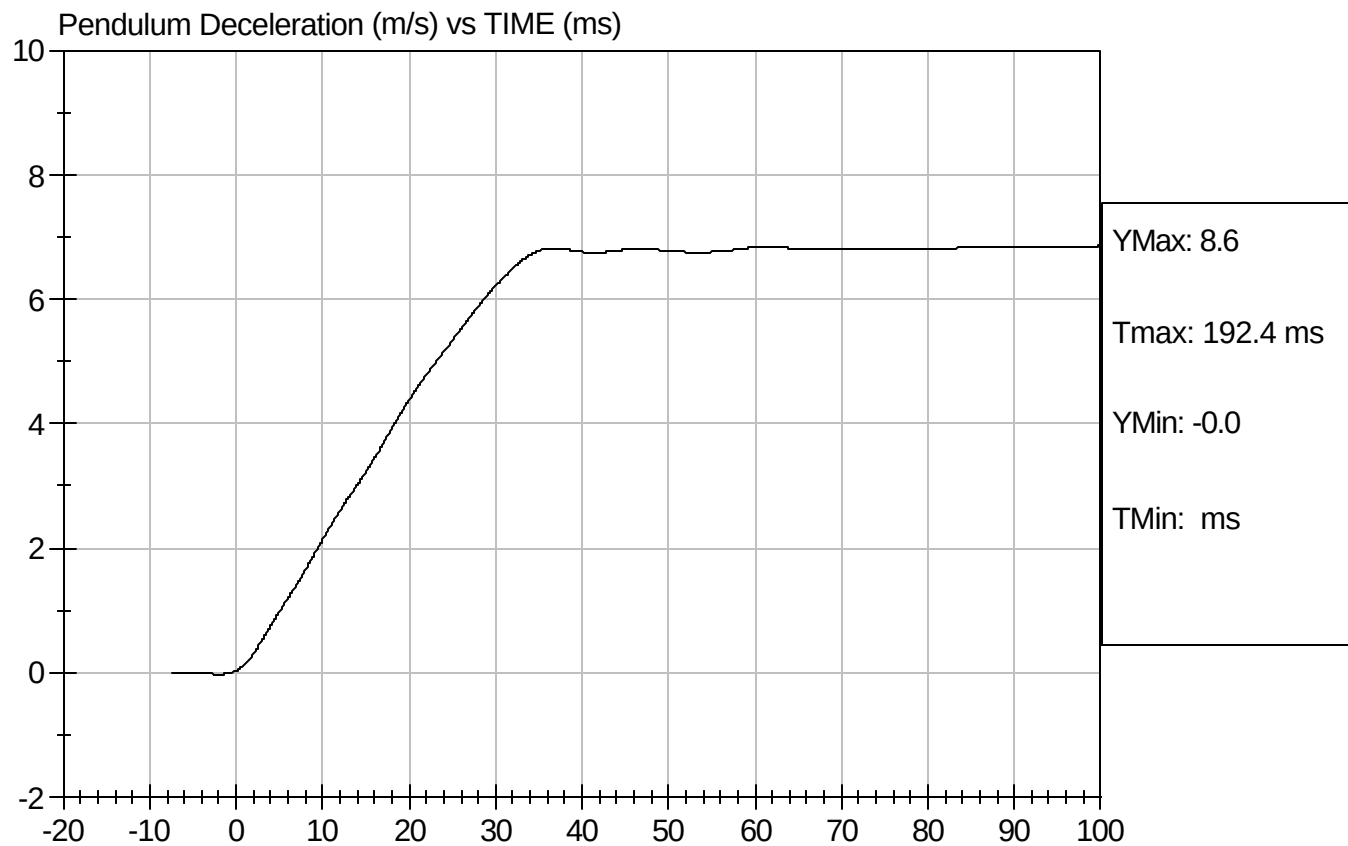
9/17/07

Test Date



Test Desc: Neck Bending
Component ID: D072889

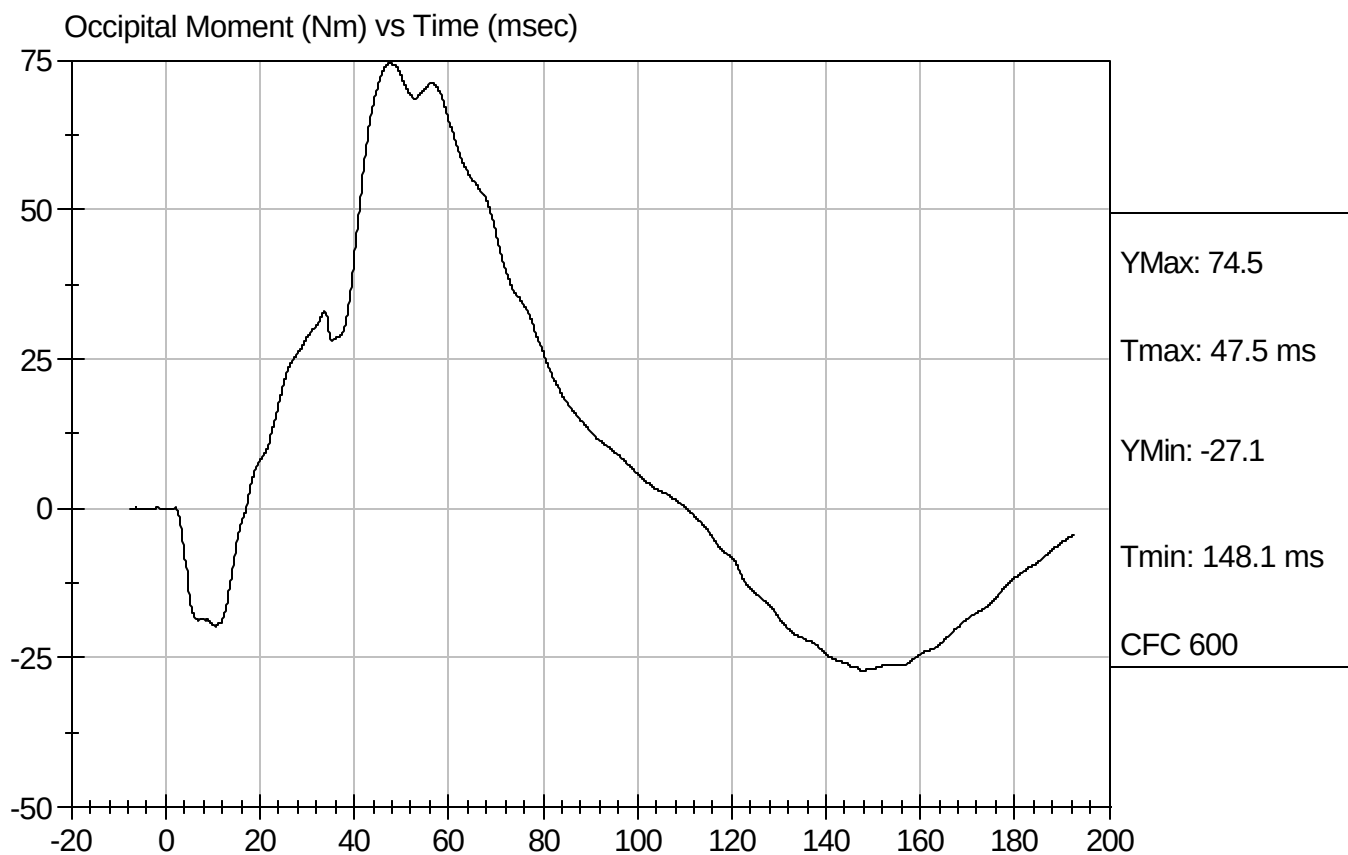
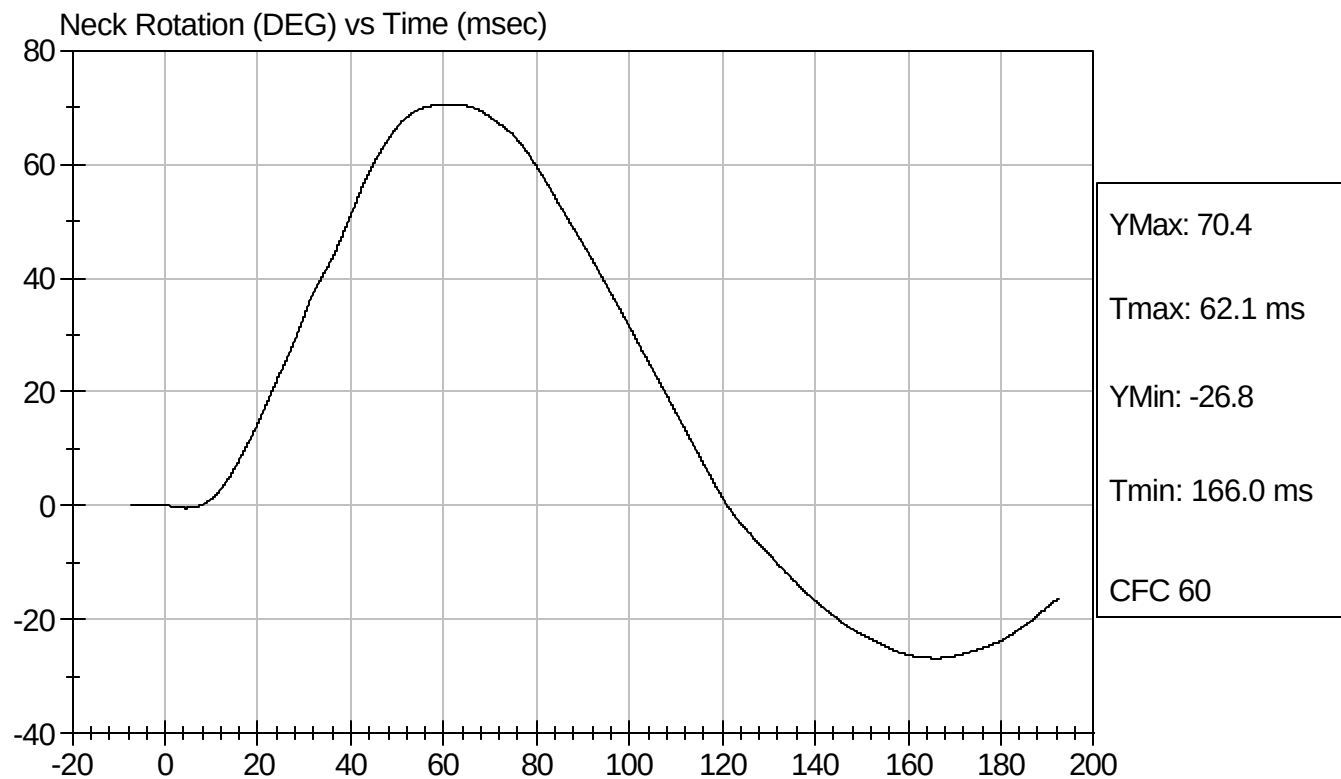
Test Date: 9/17/07
Speed: 23.148 ft/sec, 7.06 m/sec





Test Desc: Neck Bending
Component ID: D072889

Test Date: 9/17/07
Speed: 23.148 ft/sec, 7.06 m/sec



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: D072941

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	39	Pass
Peak Resultant Acceleration	G's	120 to 150	138	Pass
Is Resultant Curve Unimodal?	Yes/No	15% of peak	Yes	Pass
Peak Longitudnal Acceleration	G's	+/- 15	-10.0	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

9/19/07
Test Date

David Winkelbauer
Approved By



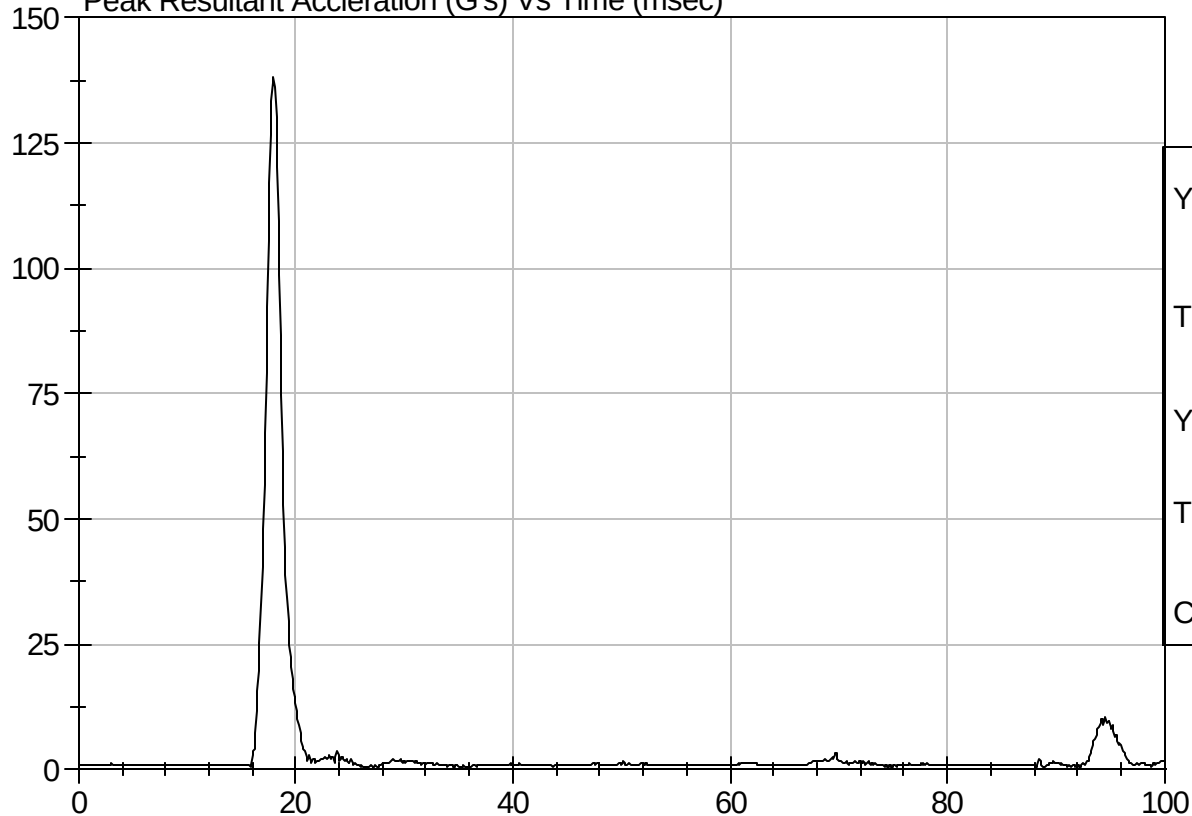
Test Description: Head Drop

Test Date: 9/19/07

Component: D072941

Speed: 0 ft/s, 0 m/s

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



YMax: 138.2 G

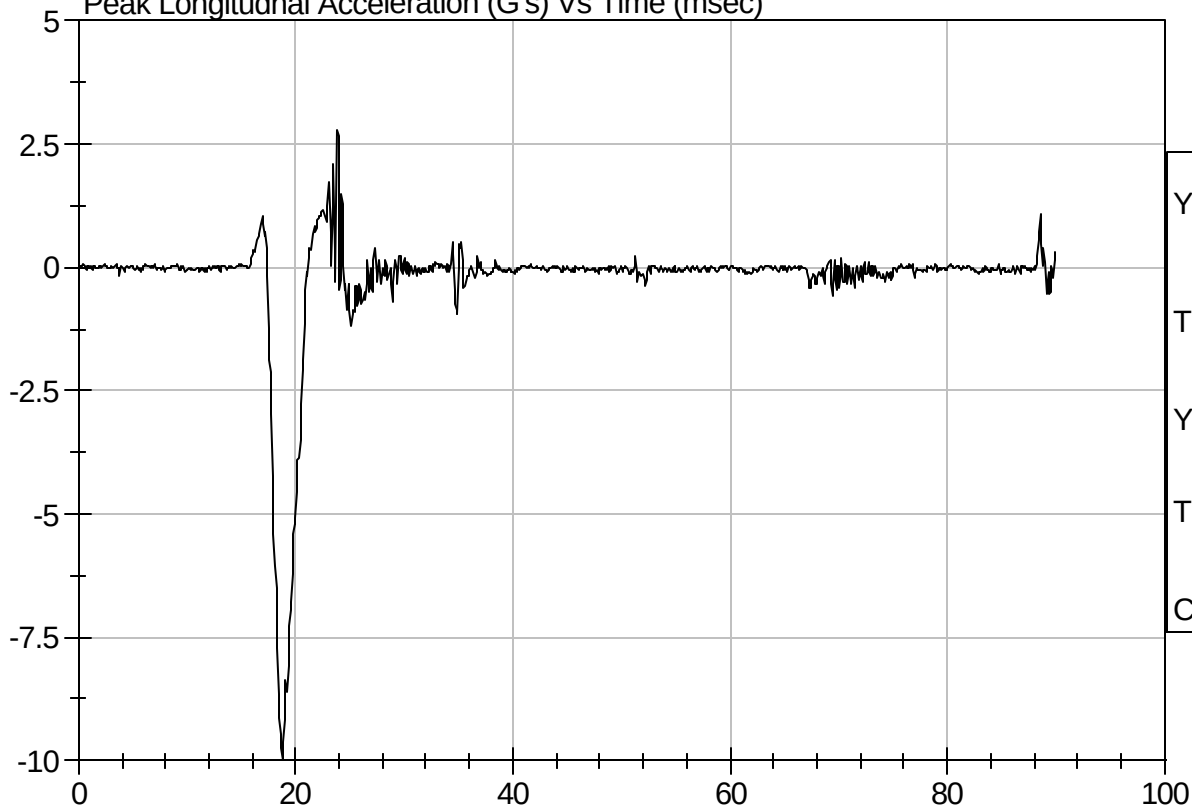
Tmax: 18.0 ms

YMin: 0.3 G

Tmin: 27.2 ms

CFC 1000

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



YMax: 2.8 G

Tmax: 23.8 ms

YMin: -10.0 G

Tmin: 18.8 ms

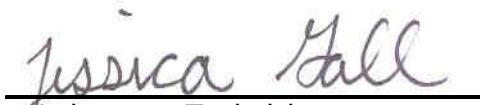
CFC 1000

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

ATD Serial No: 271

Test I.D: D072942

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	20.9	Pass
Laboratory Relative Humidity	%	10 to 70	39	Pass
Probe Velocity	m/s	4.22 - 4.31	4.23	Pass
Upper Rib	G's	37 - 46	45	Pass
Lower Rib	G's	37 - 46	43	Pass
Lower Spine	G's	15 - 22	19	Pass
Overall Test Results				Pass


Laboratory Technician

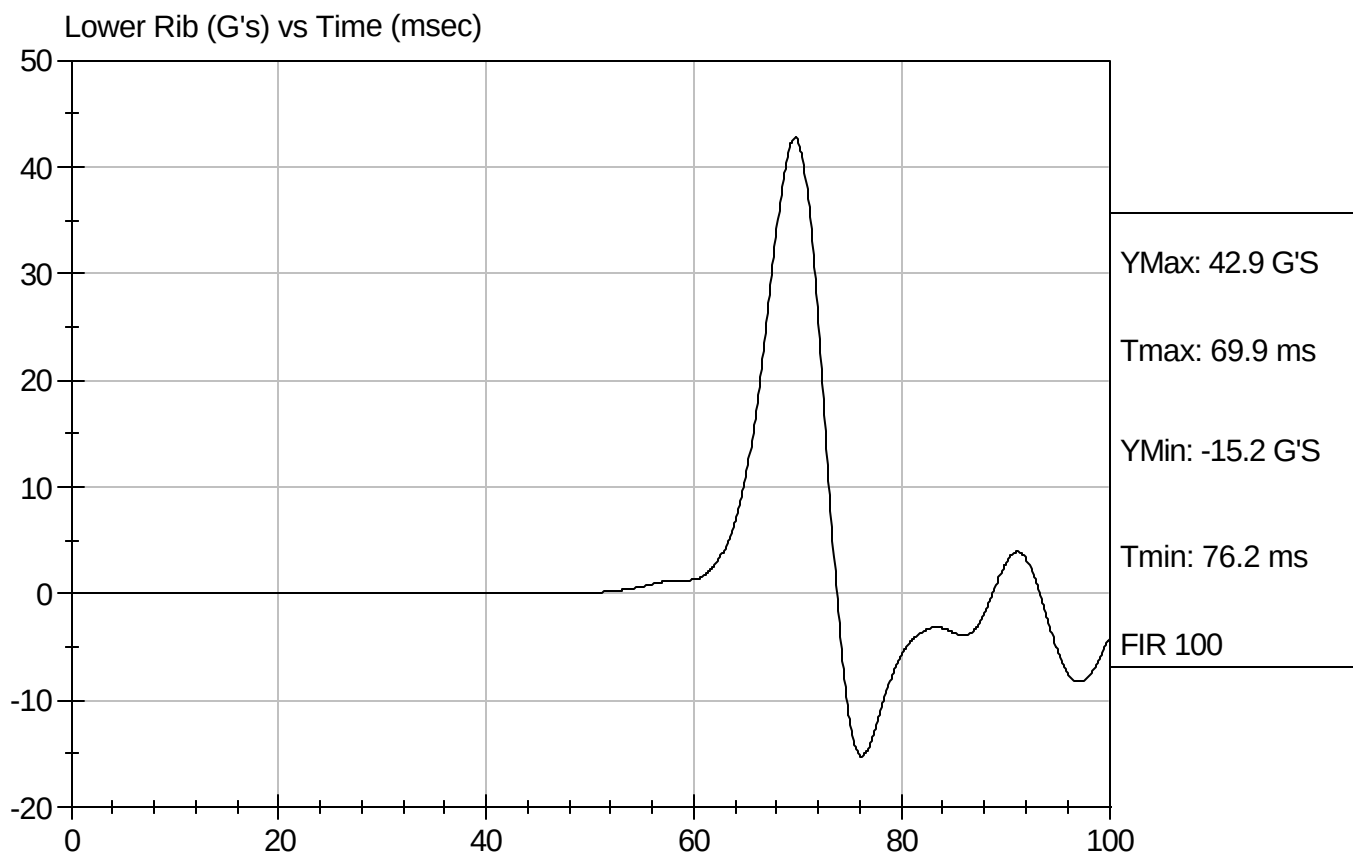
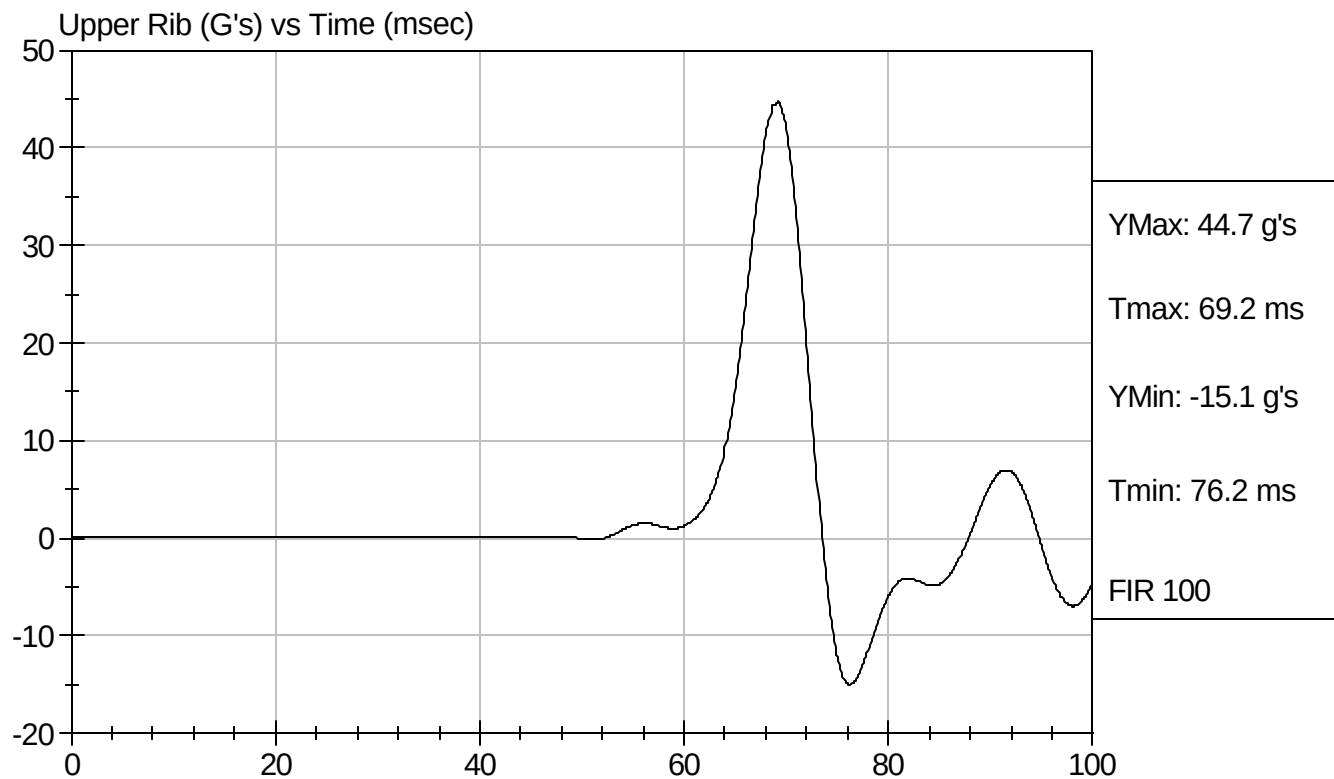

Approved By

9/19/07
Test Date



Test Desc: Thorax Impact
Component ID: D072942

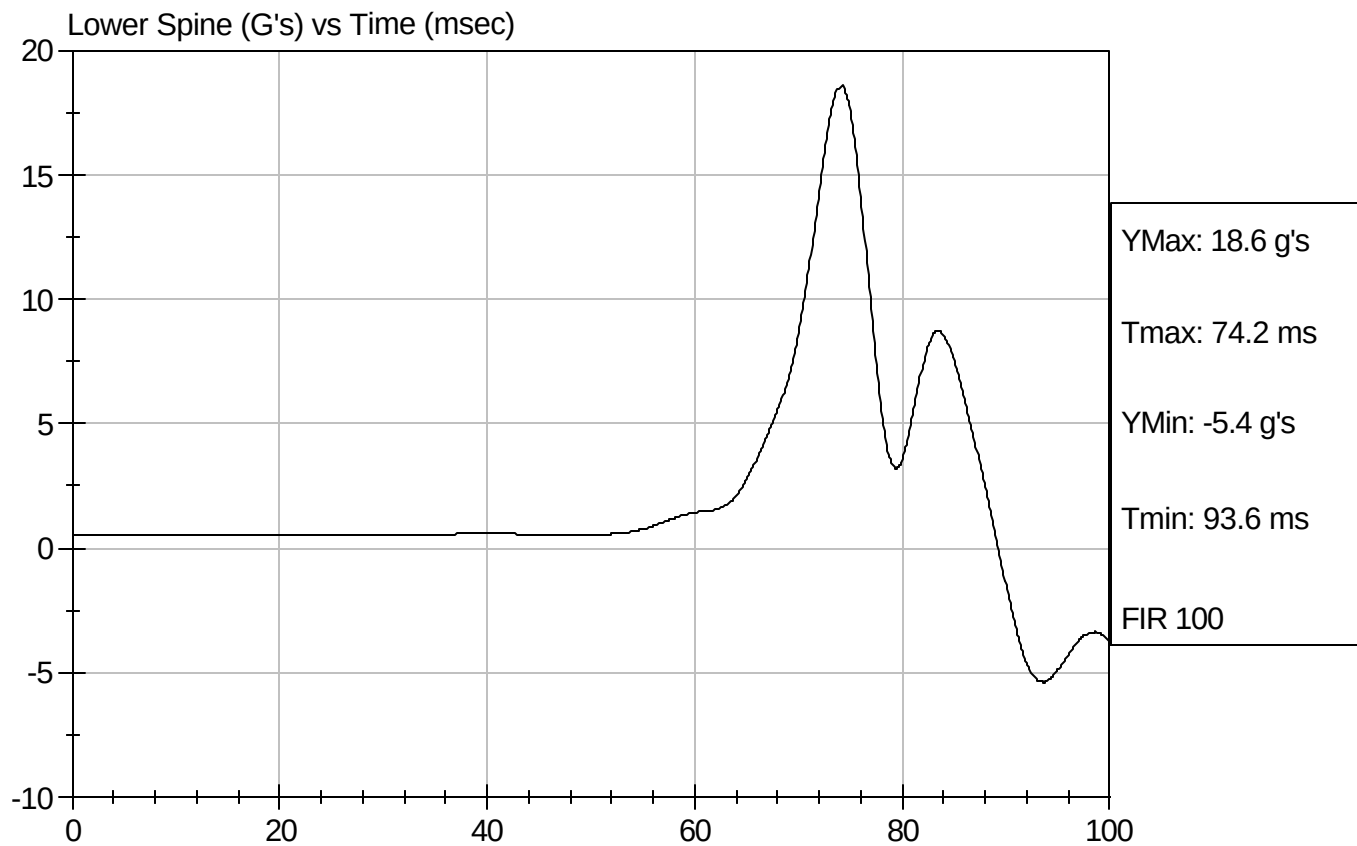
Test Date: 9/19/07
Speed: 13.89 ft/sec, 4.23 m/sec





Test Desc: Thorax Impact
Component ID: D072942

Test Date: 9/19/07
Speed: 13.89 ft/sec, 4.23 m/sec



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

ATD Serial No: 271

Test I.D: D072943

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	20.9	Pass
Laboratory Relative Humidity	%	10 to 70	39	Pass
Probe Velocity	m/s	4.27 - 4.33	4.31	Pass
Pelvis Acceleration	G's	40 - 60	41	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

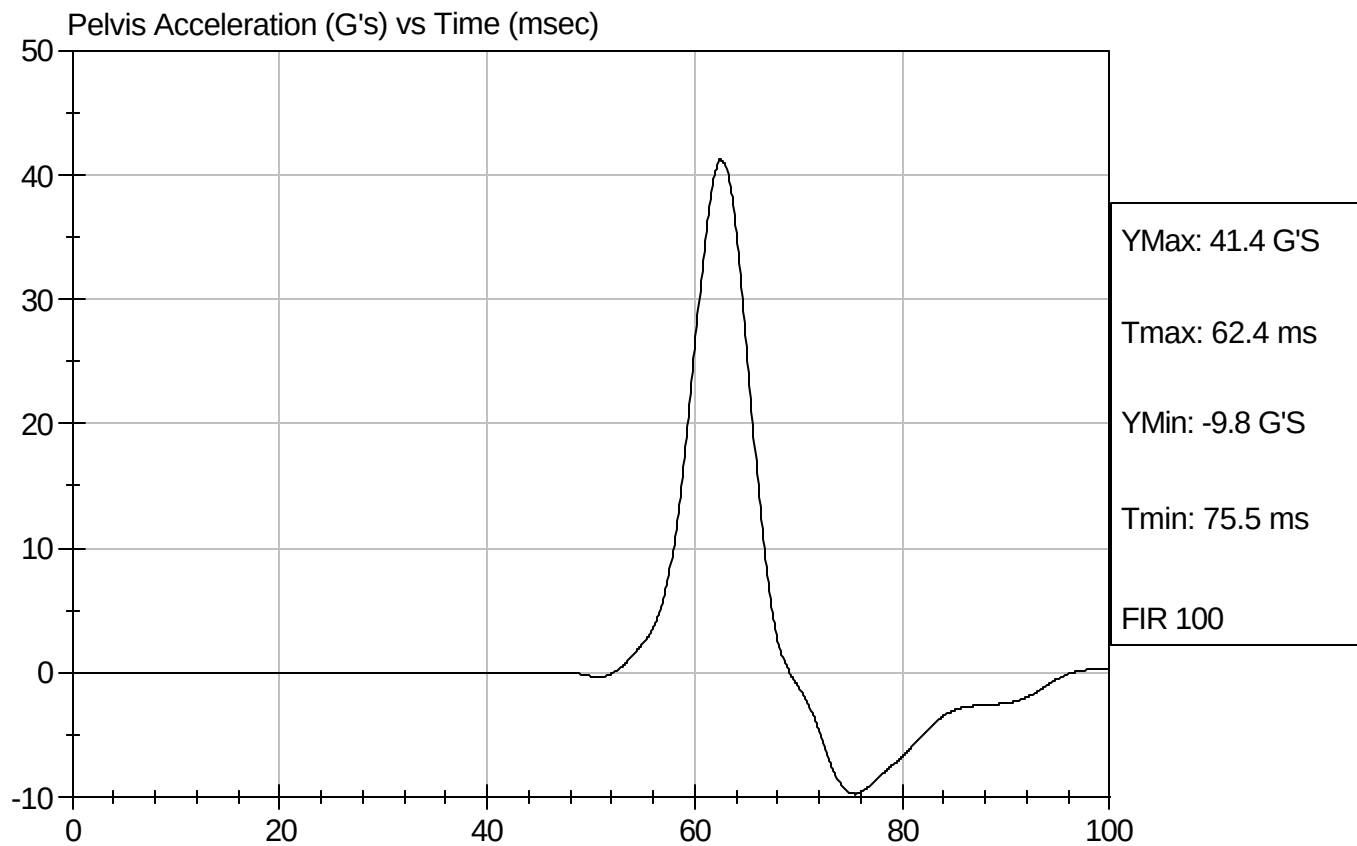
David Winkelbauer
Approved By

9/19/07
Test Date



Test Desc: Pelvis Impact
Component ID: D072943

Test Date: 9/19/07
Speed: 14.14 ft/sec, 4.31 m/sec



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

ATD Serial No: 271

Test I.D: D072944

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	20.9	Pass
Laboratory Relative Humidity	%	10 to 70	39	Pass
Force At 12.7 mm	N	104 -162	132	Pass
Force At 19 mm	N	163 - 222	185	Pass
Force At 25.4 mm	N	222 - 280	245	Pass
Force At 33 mm	N	325 - 391	338	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

9/19/07
Test Date

David Winkelbauer
Approved By

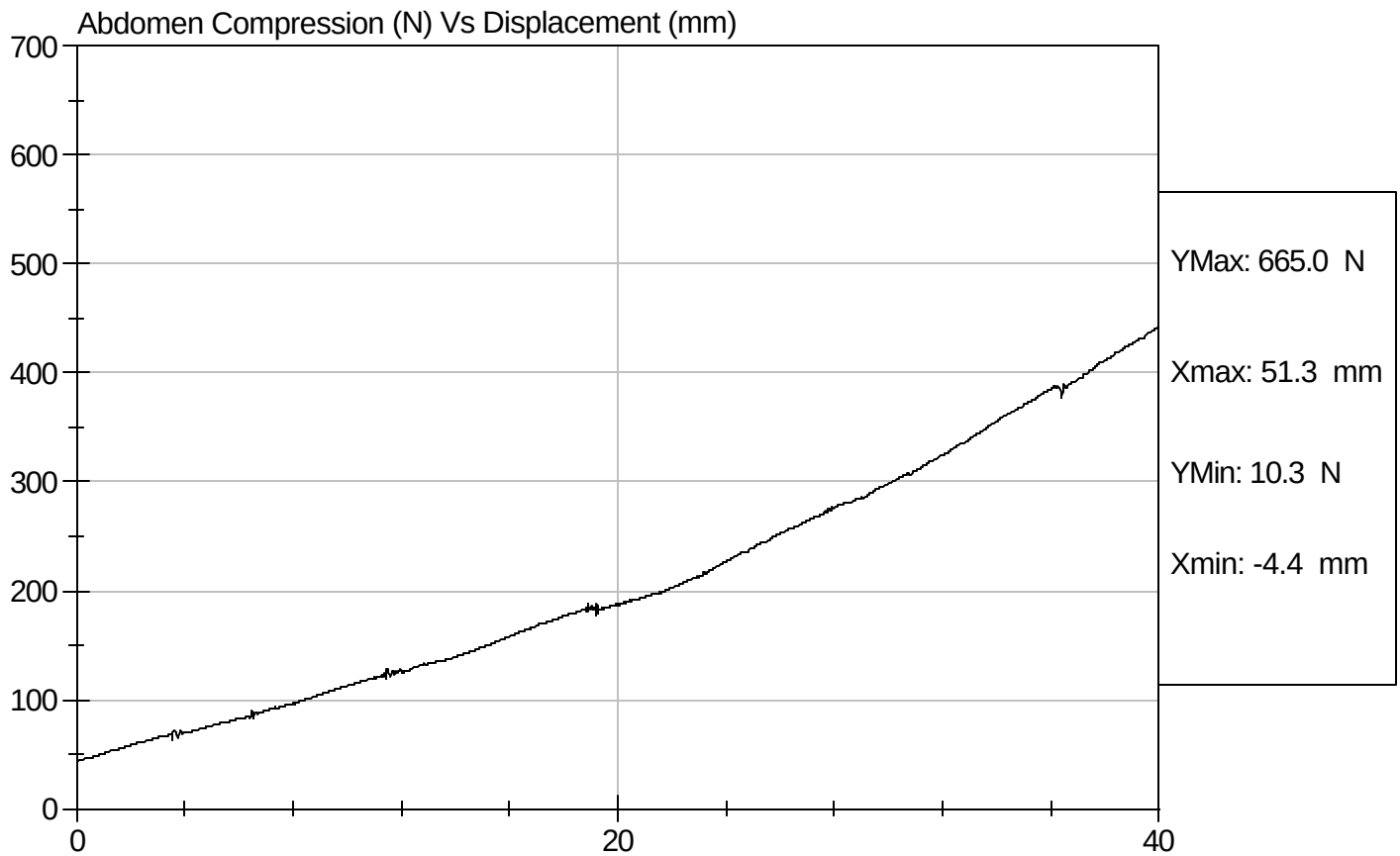


Test Description: Abdomen Compression

Test Date: 9/19/07

Component: D072944

Speed: 0 ft/sec, 0 m/sec



SID Calibration Data Sheet
Side Impact Dummy
Lumbar Flexion Calibration

ATD Serial No: 271

Test I.D: D072945

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	20.9	Pass
Laboratory Relative Humidity	%	10 to 70	39	Pass
Force At 0 deg	N	0 - 26.7	0	Pass
Force At 20 deg	N	97.9 - 151.2	136.5	Pass
Force At 30 deg	N	151.2 - 204.6	180.4	Pass
Force At 40 deg	N	204.6 - 258.0	249.2	Pass
Return Angle	Deg	12 Maximum	5	Pass
Overall Test Results			Pass	

Jessica Hall
Laboratory Technician

9/19/07
Test Date

David Winkelbauer
Approved By

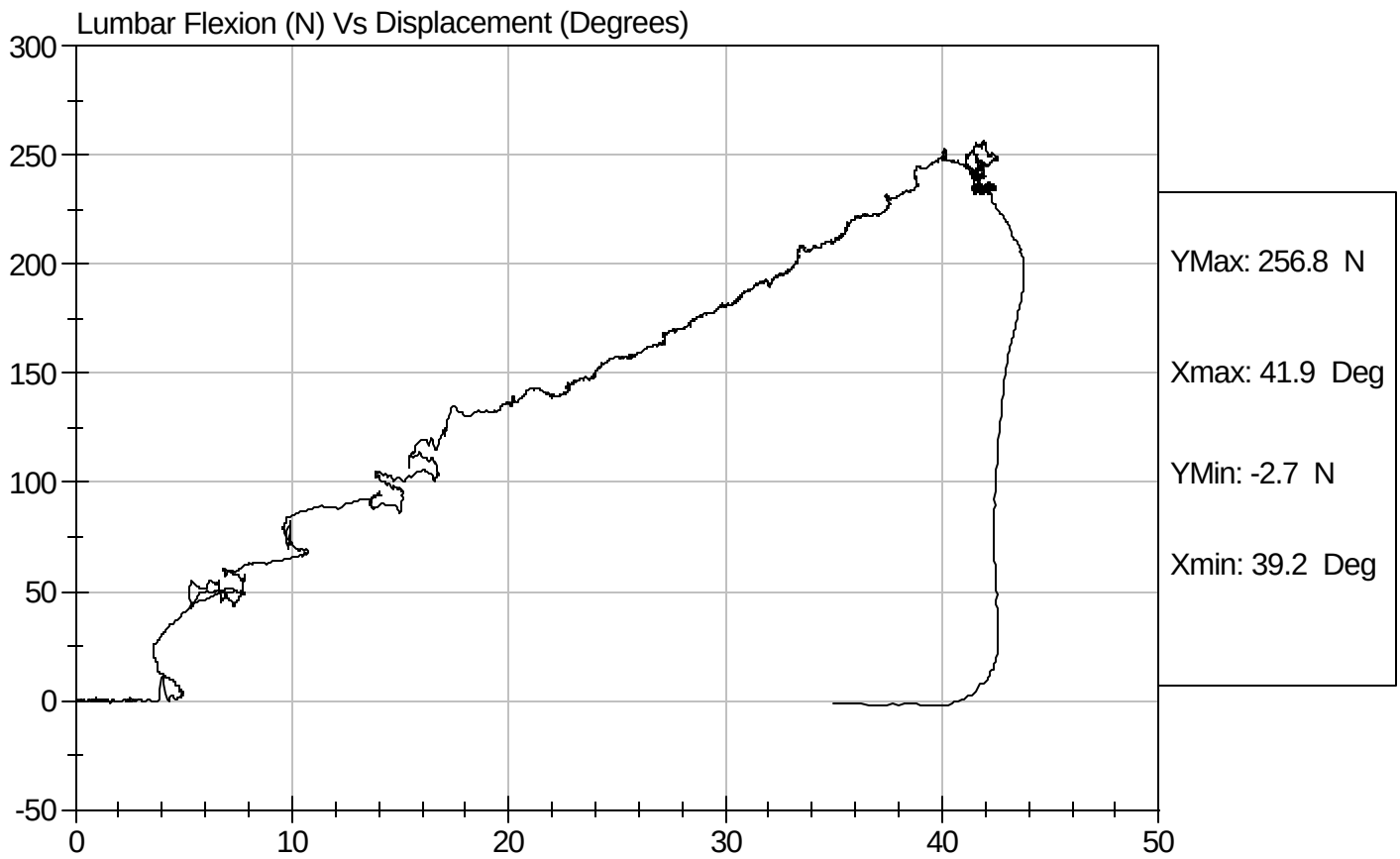


Test Description: Lumbar Flexion

Test Date: 9/19/07

Component: D072945

Speed: 0 ft/sec, 0 m/sec

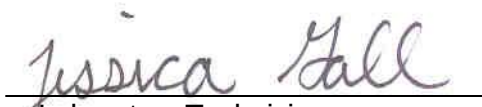


SID/HIII Calibration Data Sheet
Side Impact Dummy (SID)
Neck Pendulum Test

ATD Serial No: 271

Test I.D: D072949

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.0	Pass
Laboratory Relative Humidity		%	10 to 70	39	Pass
Impact Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 msec	m/s	1.96 to 2.55	2.46	Pass
	20 msec	m/s	4.12 to 5.10	4.86	Pass
	30 msec	m/s	5.73 to 7.01	6.66	Pass
	40 to 70 msec	m/s	6.27 to 7.64	6.71	Pass
Midsagittal Plane Max Rotation		deg	66 to 82	75	Pass
Head Rotation Peak to Zero - Decay Time		msec	58 to 67	62	Pass
Max. Mx at Occipital Condyles		Nm	73 to 88	76	Pass
Mx Peak To Zero - Decay Time		msec	49 to 64	54	Pass
Mx Peak to Max. Head Rotation		msec	2 to 16	5	Pass


 Laboratory Technician

9/19/07

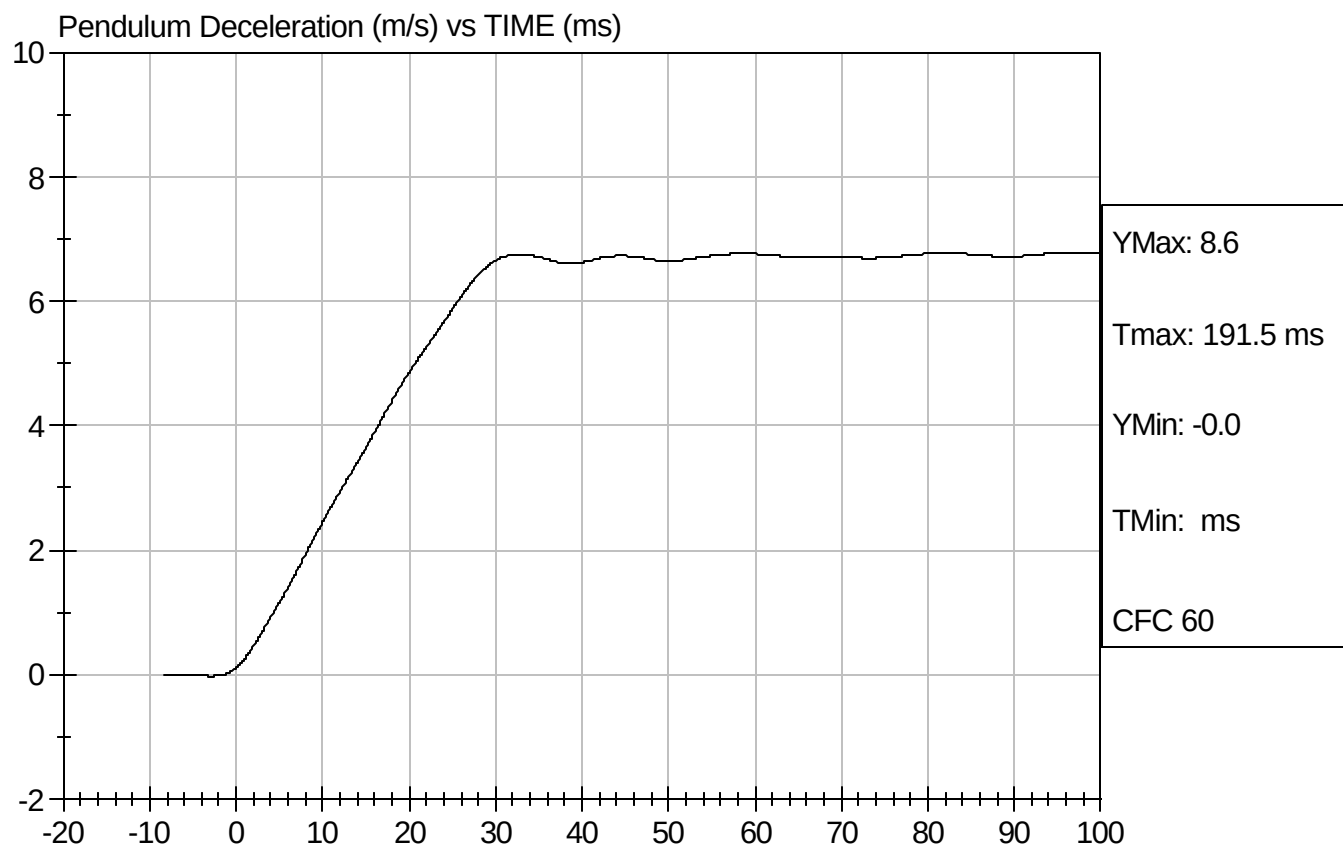
Test Date


 Approved By



Test Desc: Neck Bending
Component ID: D072949

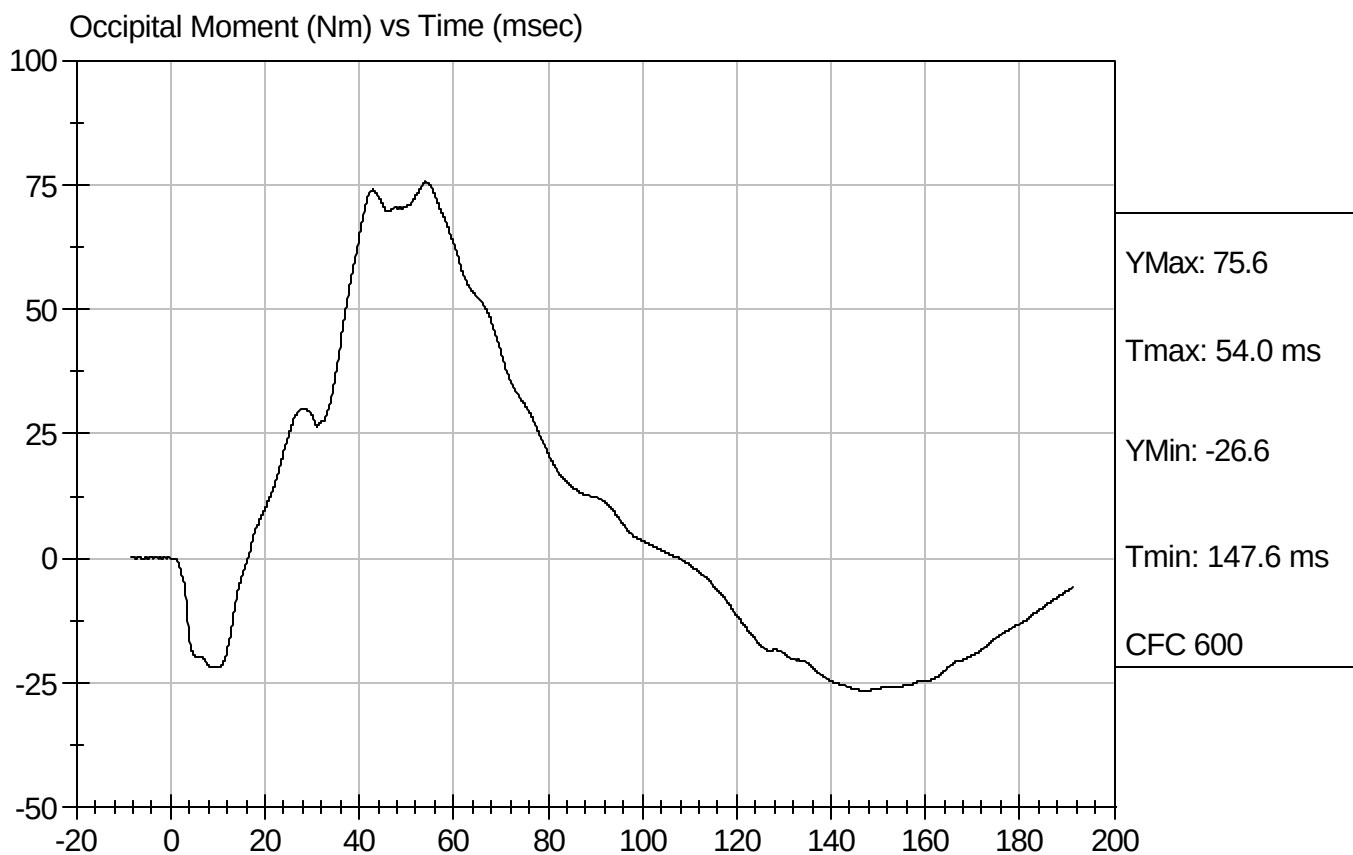
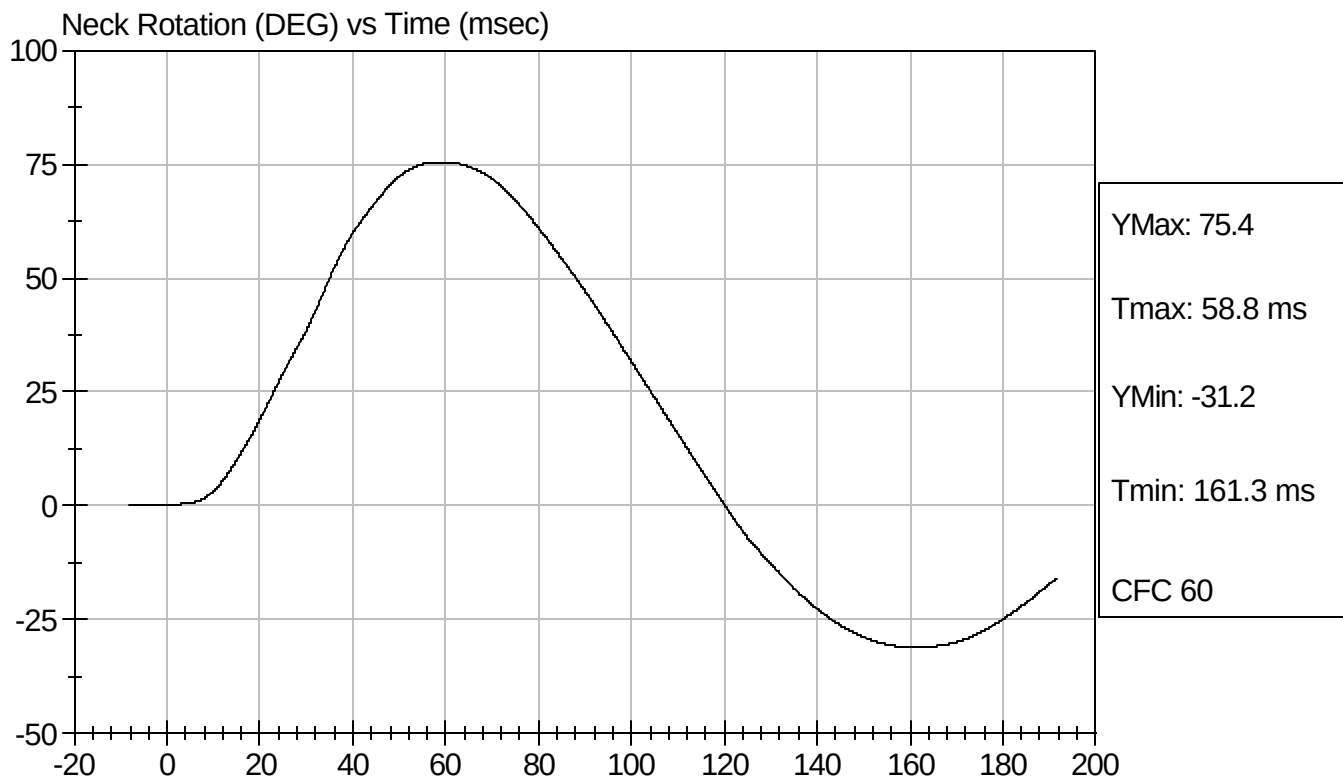
Test Date: 9/19/07
Speed: 23.15 ft/sec, 7.06 m/sec





Test Desc: Neck Bending
Component ID: D072949

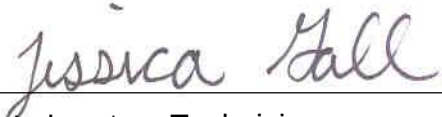
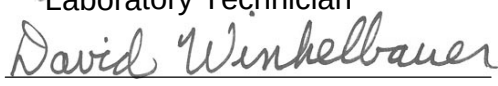
Test Date: 9/19/07
Speed: 23.15 ft/sec, 7.06 m/sec



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


Laboratory Technician

Approved By

9/19/2007
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.

SID Calibration Data Sheet
Side Impact Dummy
External Measurements

ATD Serial No: 272

Test I.D: D07289

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

9/17/2007

Test Date

David Winkelbauer
Approved By

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

ATD Serial No: 272

Test I.D: D072891

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	39	Pass
Peak Resultant Acceleration	G's	120 to 150	143	Pass
Is Resultant Curve Unimodal?	Yes/No	15% of peak	Yes	Pass
Peak Longitudnal Acceleration	G's	+/- 15	-10.2	Pass
			Overall Test Results	Pass


Laboratory Technician


Approved By

9/17/07
Test Date



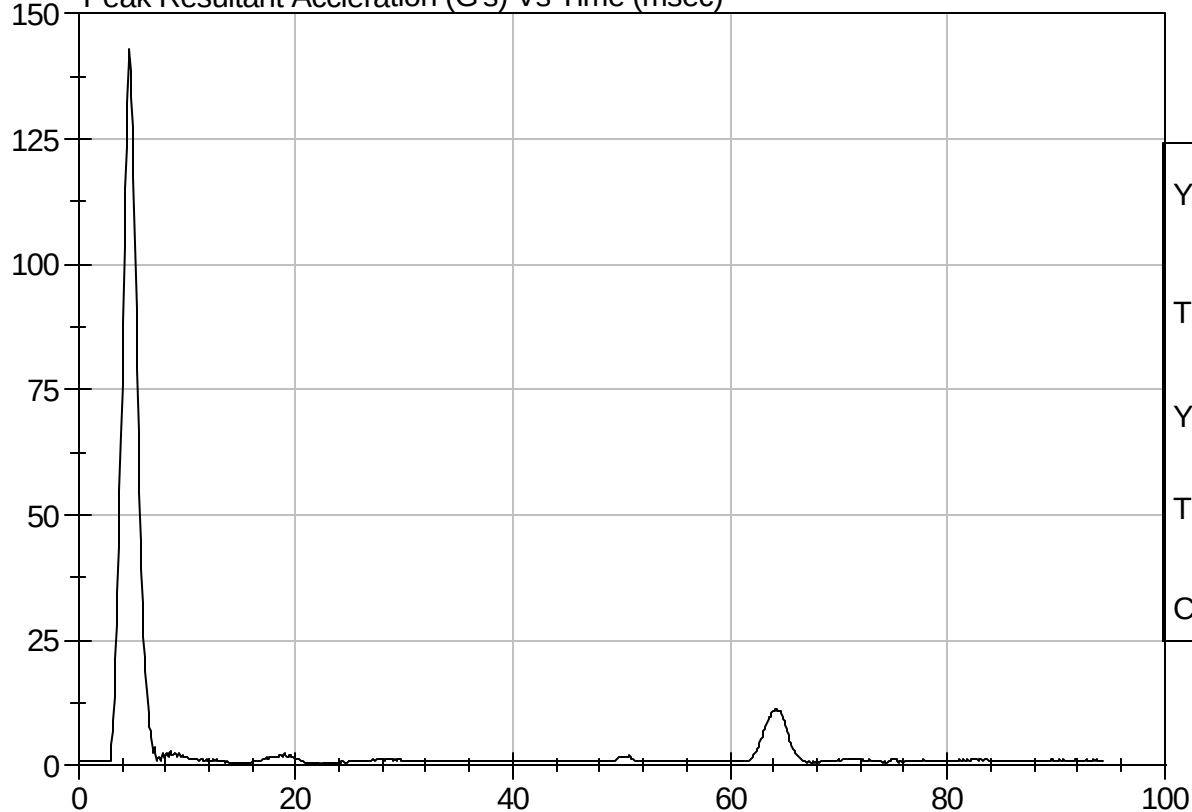
Test Description: Head Drop

Test Date: 9/17/07

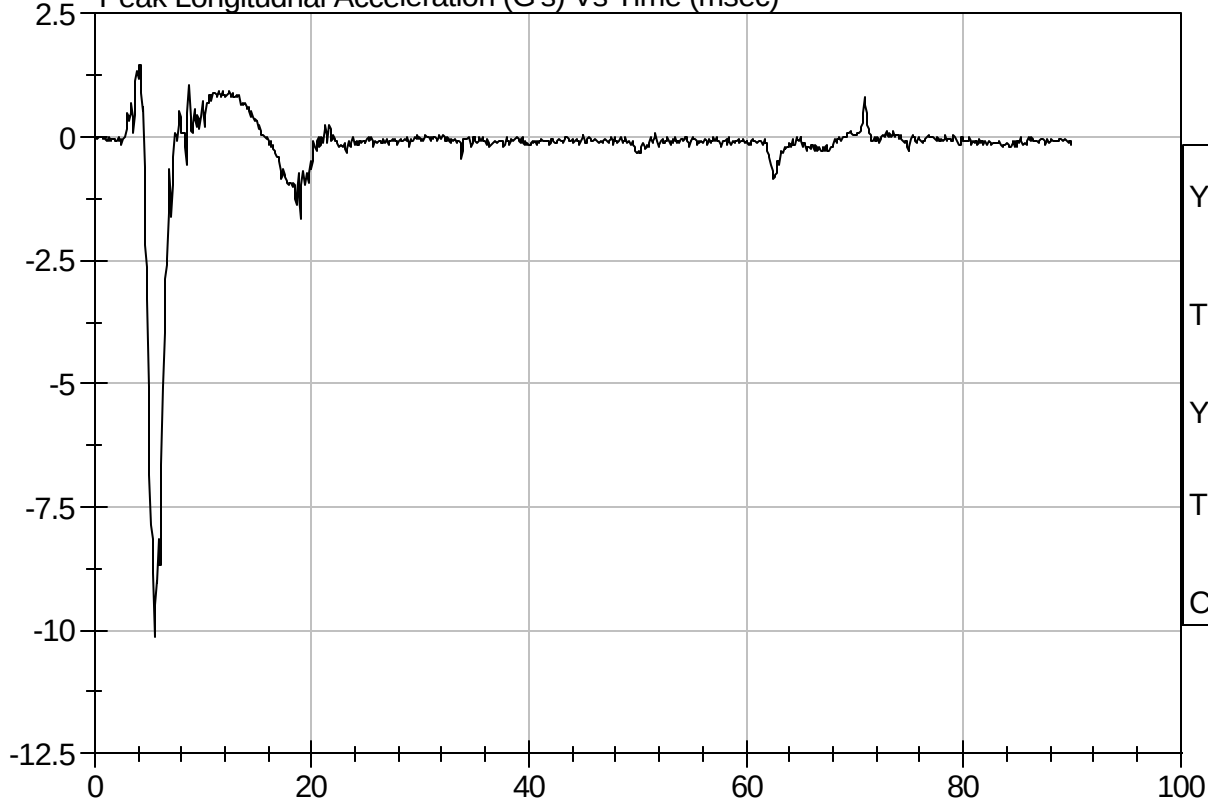
Component: D072891

Speed: 0 ft/s, 0 m/s

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



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



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

ATD Serial No: 272

Test I.D: D072892

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	40	Pass
Probe Velocity	m/s	4.22 - 4.31	4.30	Pass
Upper Rib	G's	37 - 46	37	Pass
Lower Rib	G's	37 - 46	39	Pass
Lower Spine	G's	15 - 22	21	Pass
Overall Test Results				Pass


Laboratory Technician

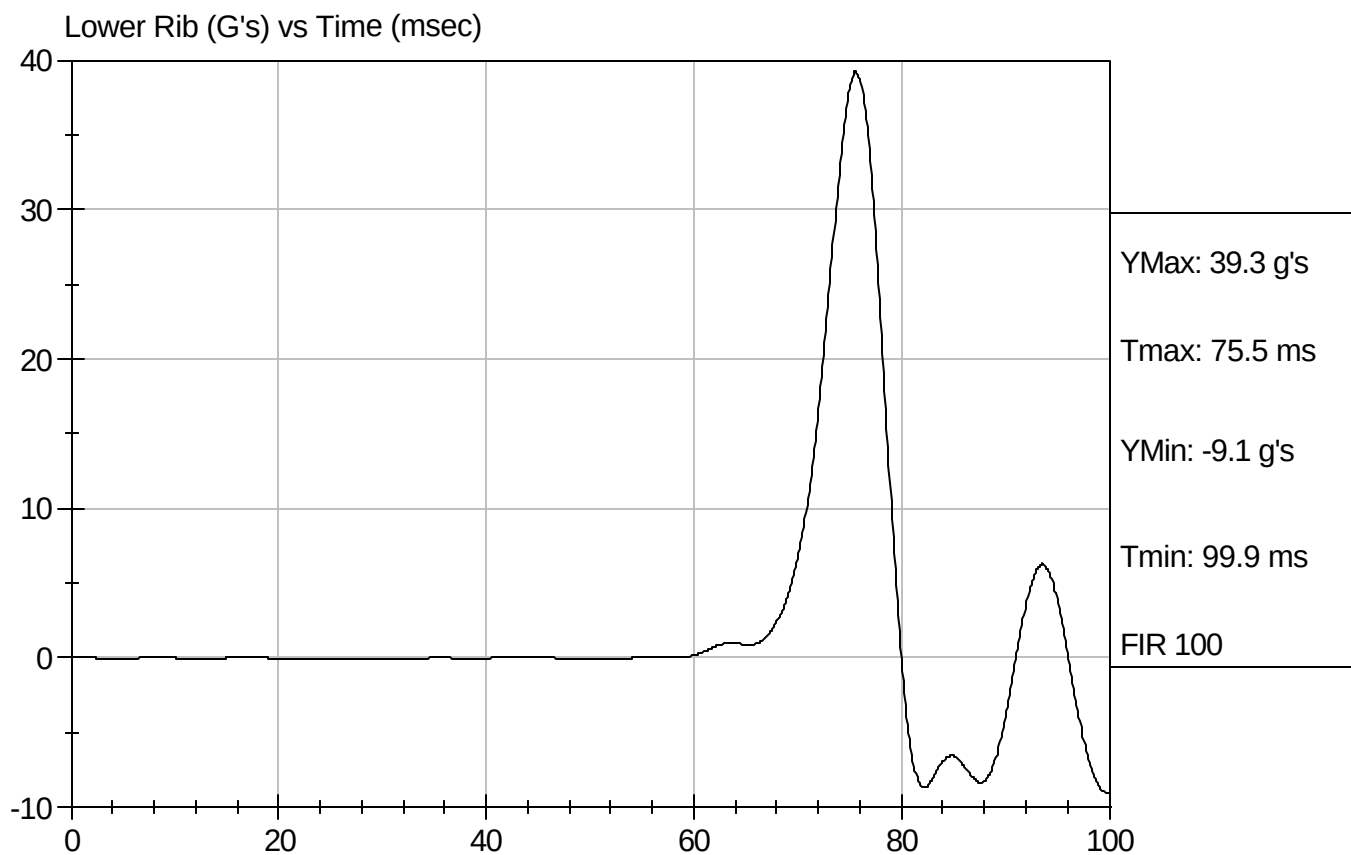
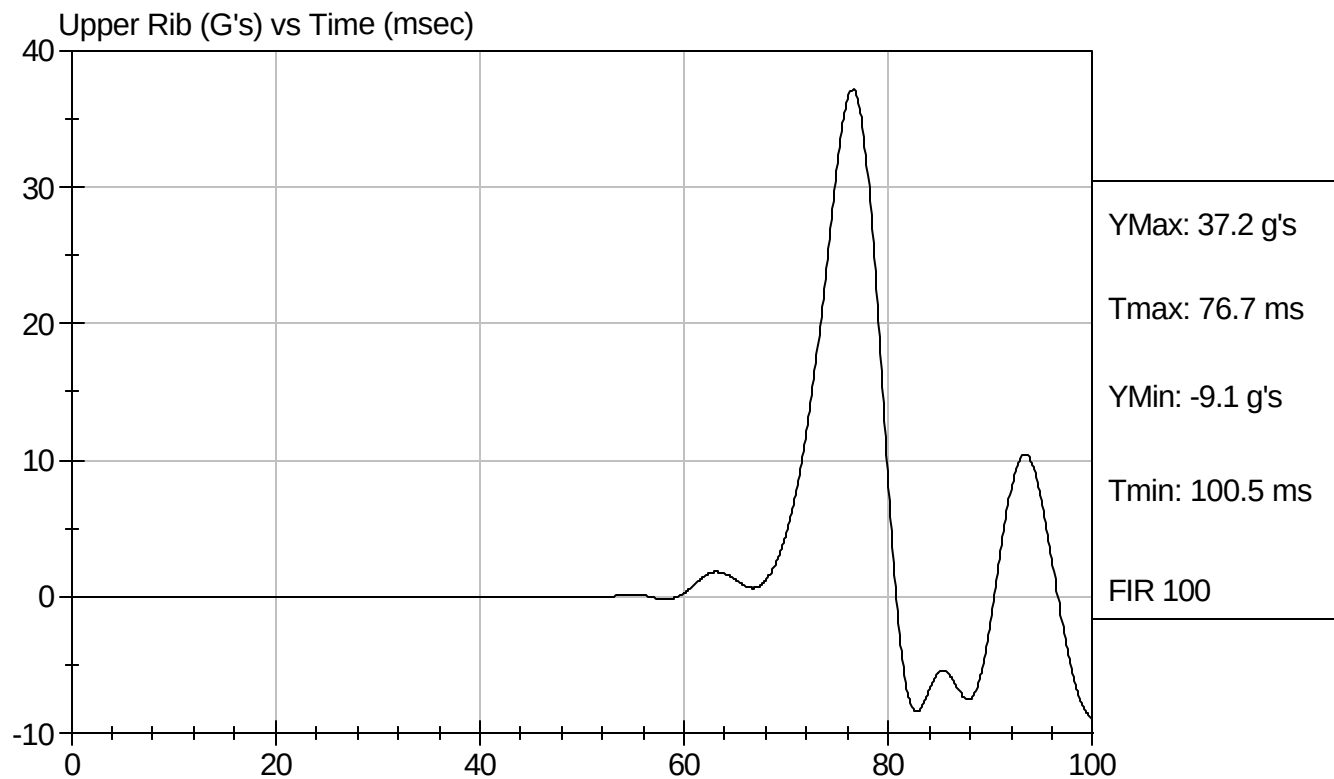

Approved By

9/17/07
Test Date



Test Desc: Thorax Impact
Component ID: D072892

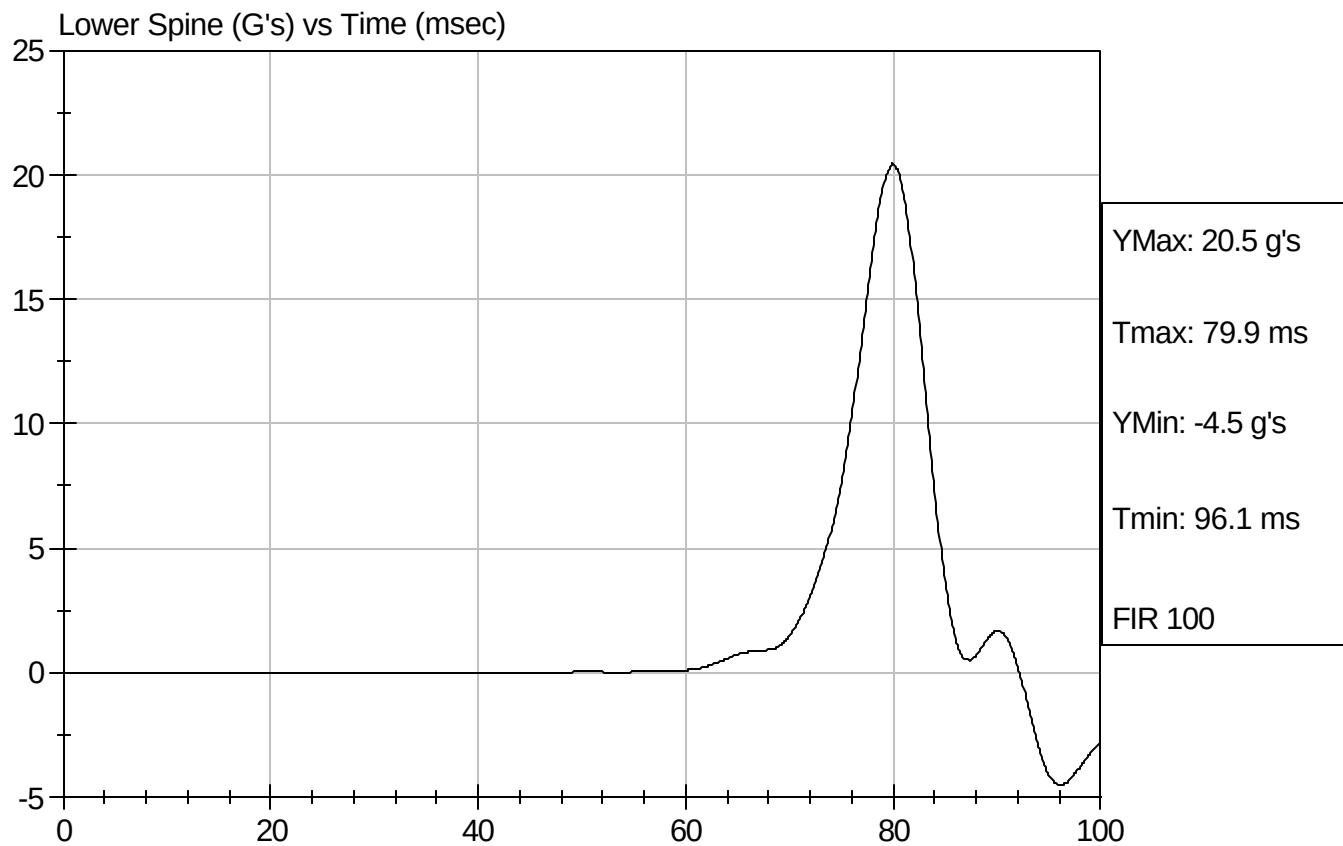
Test Date: 9/17/07
Speed: 14.12 ft/sec, 4.30 m/sec





Test Desc: Thorax Impact
Component ID: D072892

Test Date: 9/17/07
Speed: 14.12 ft/sec, 4.30 m/sec



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

ATD Serial No: 272

Test I.D: D072893

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	20.9	Pass
Laboratory Relative Humidity	%	10 to 70	38	Pass
Probe Velocity	m/s	4.27 - 4.33	4.30	Pass
Pelvis Acceleration	G's	40 - 60	43	Pass
Overall Test Results				Pass


Laboratory Technician

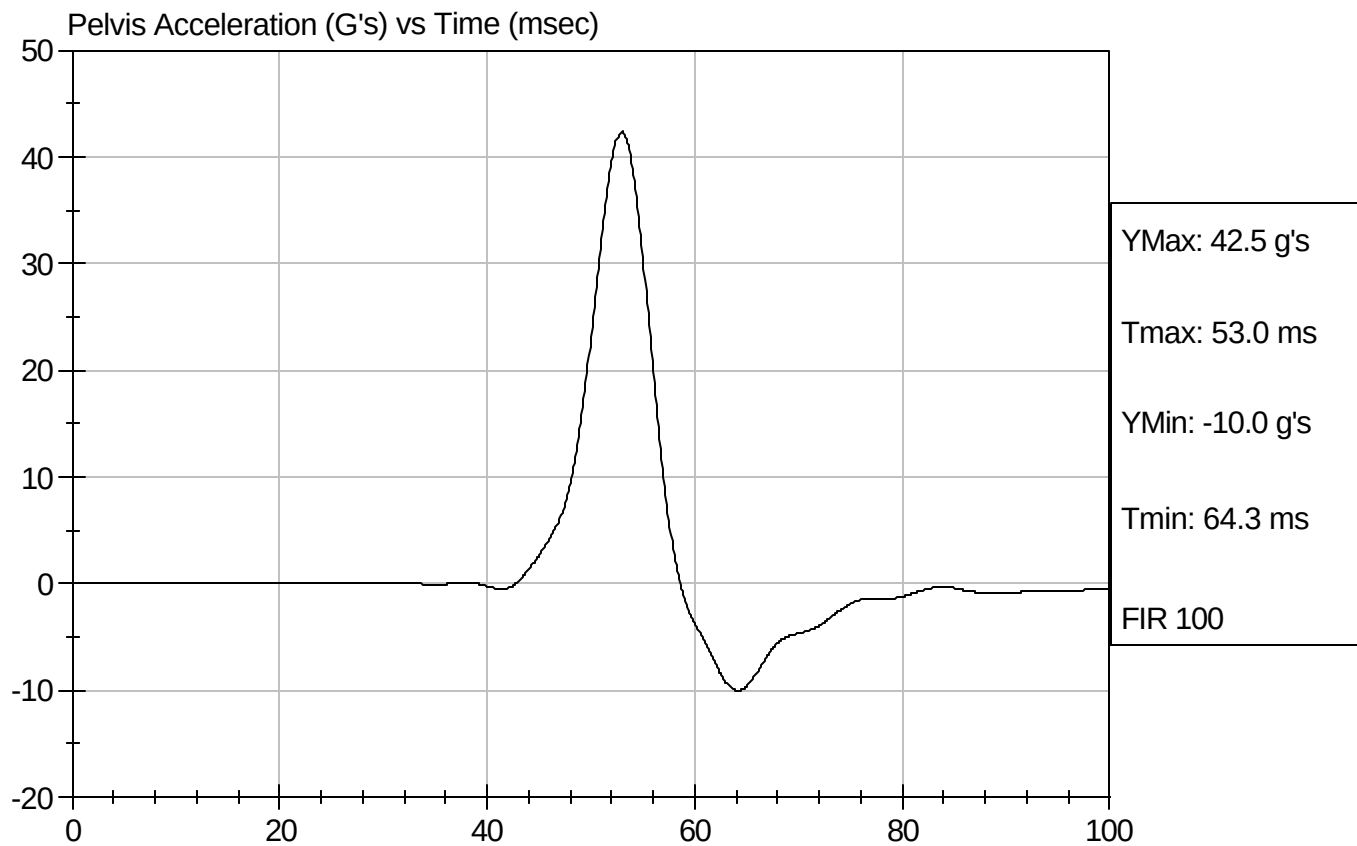

Approved By

9/17/07
Test Date



Test Desc: Pelvis Impact
Component ID: D072893

Test Date: 9/17/07
Speed: 14.12 ft/sec, 4.30 m/sec



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

ATD Serial No: 272

Test I.D: D072894

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	39	Pass
Force At 12.7 mm	N	104 -162	130	Pass
Force At 19 mm	N	163 - 222	178	Pass
Force At 25.4 mm	N	222 - 280	237	Pass
Force At 33 mm	N	325 - 391	326	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

9/17/07
Test Date

David Winkelbauer
Approved By

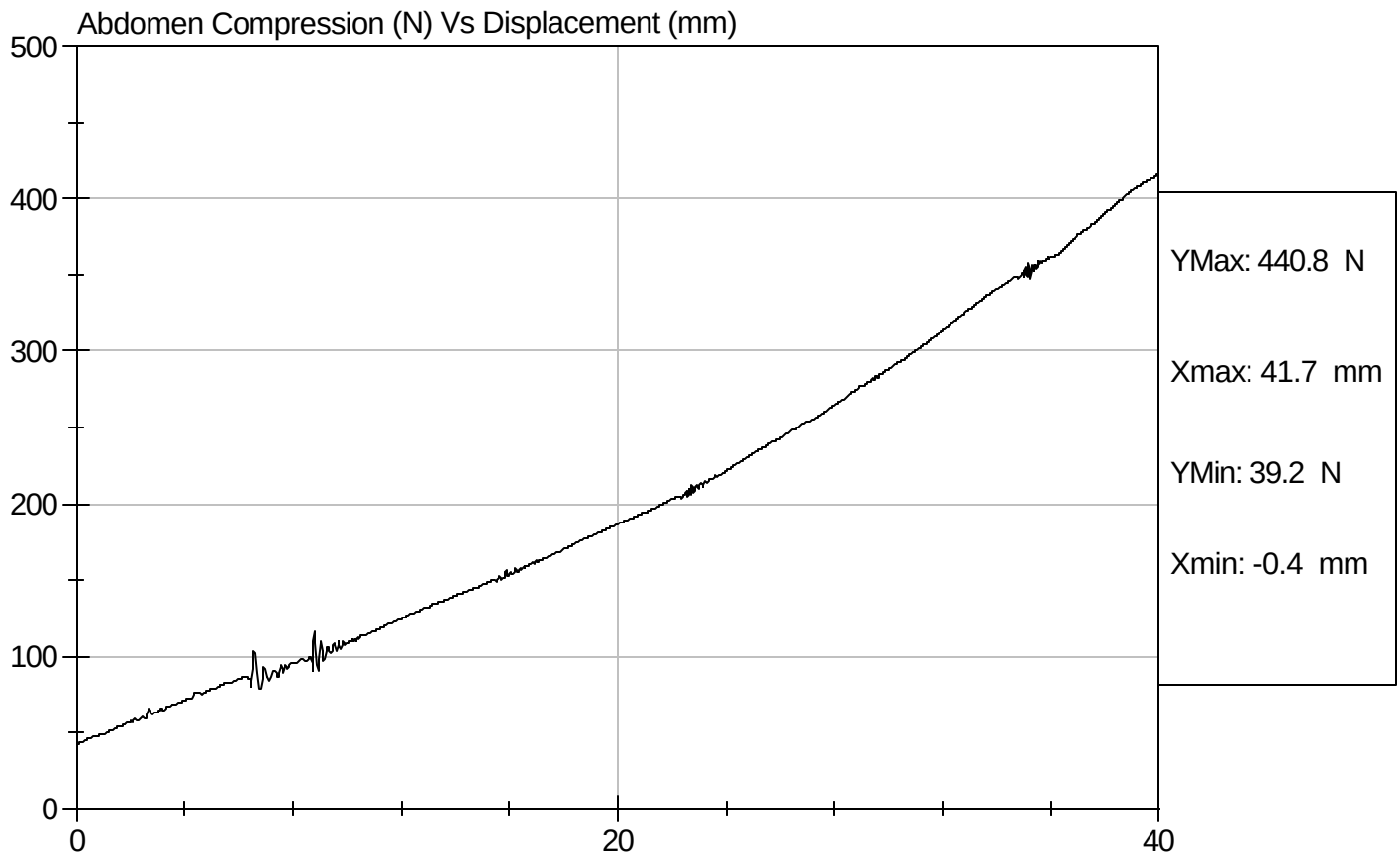


Test Description: Abdomen Compression

Test Date: 9/17/07

Component: D072894

Speed: 0 ft/sec, 0 m/sec



SID Calibration Data Sheet
Side Impact Dummy
Lumbar Flexion Calibration

ATD Serial No: 272

Test I.D: D072895

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	20.7	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	117.8	Pass
Force At 30 deg	N	151.2 - 204.6	184.9	Pass
Force At 40 deg	N	204.6 - 258.0	254.3	Pass
Return Angle	Deg	12 Maximum	6	Pass
Overall Test Results			Pass	


Laboratory Technician


Approved By

9/17/07
Test Date

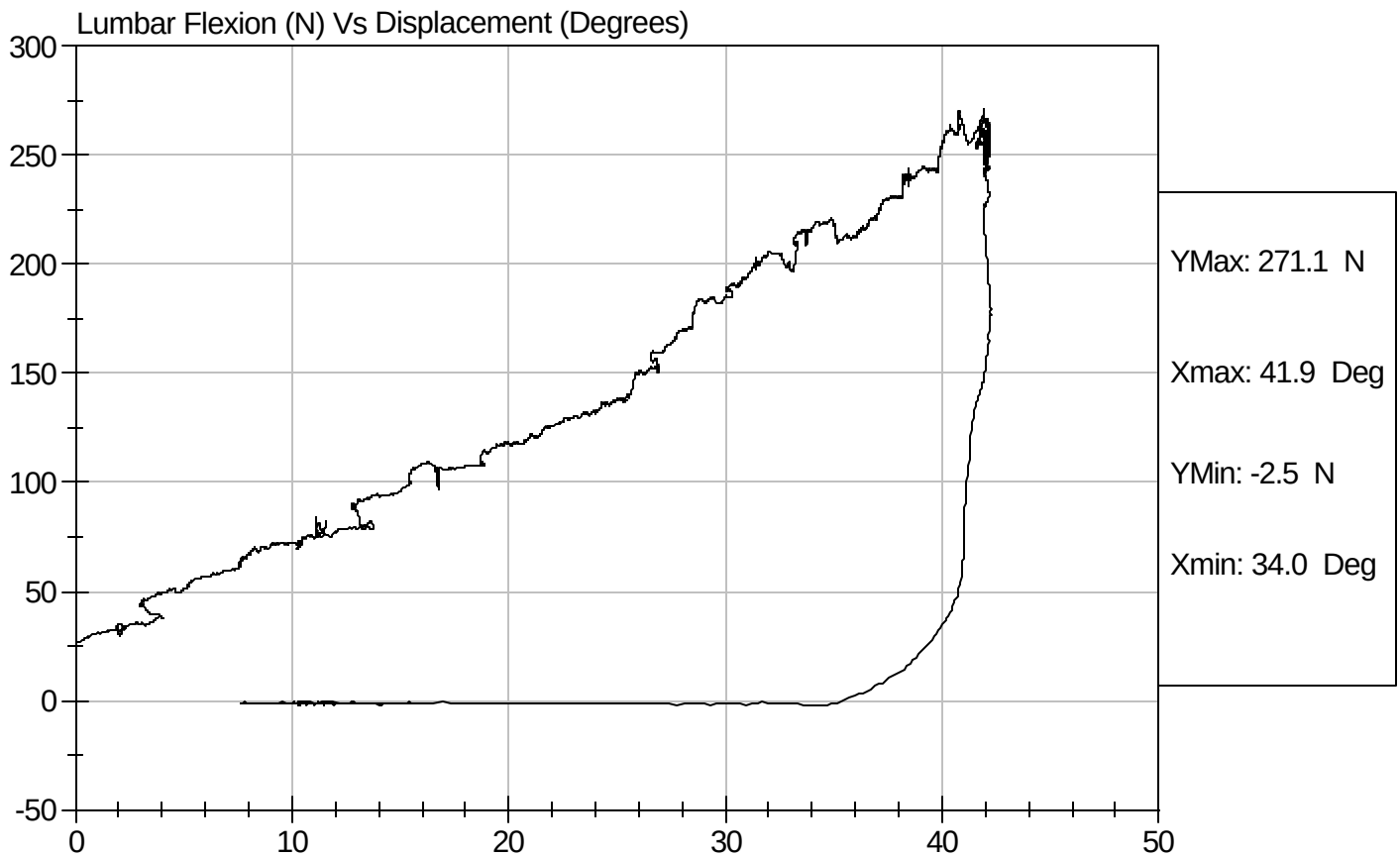


Test Description: Lumbar Flexion

Test Date: 9/17/07

Component: D072895

Speed: 0 ft/sec, 0 m/sec



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

ATD Serial No: 272

Test I.D: D072899

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	20.6	Pass
Laboratory Relative Humidity		%	10 to 70	42	Pass
Impact Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 msec	m/s	1.96 to 2.55	2.26	Pass
	20 msec	m/s	4.12 to 5.10	4.56	Pass
	30 msec	m/s	5.73 to 7.01	6.36	Pass
	40 to 70 msec	m/s	6.27 to 7.64	6.80	Pass
Midsagittal Plane Max Rotation		deg	66 to 82	71	Pass
Head Rotation Peak to Zero - Decay Time		msec	58 to 67	60	Pass
Max. Mx at Occipital Condyles		Nm	73 to 88	74	Pass
Mx Peak To Zero - Decay Time		msec	49 to 64	59	Pass
Mx Peak to Max. Head Rotation		msec	2 to 16	12	Pass


 Laboratory Technician


 Approved By

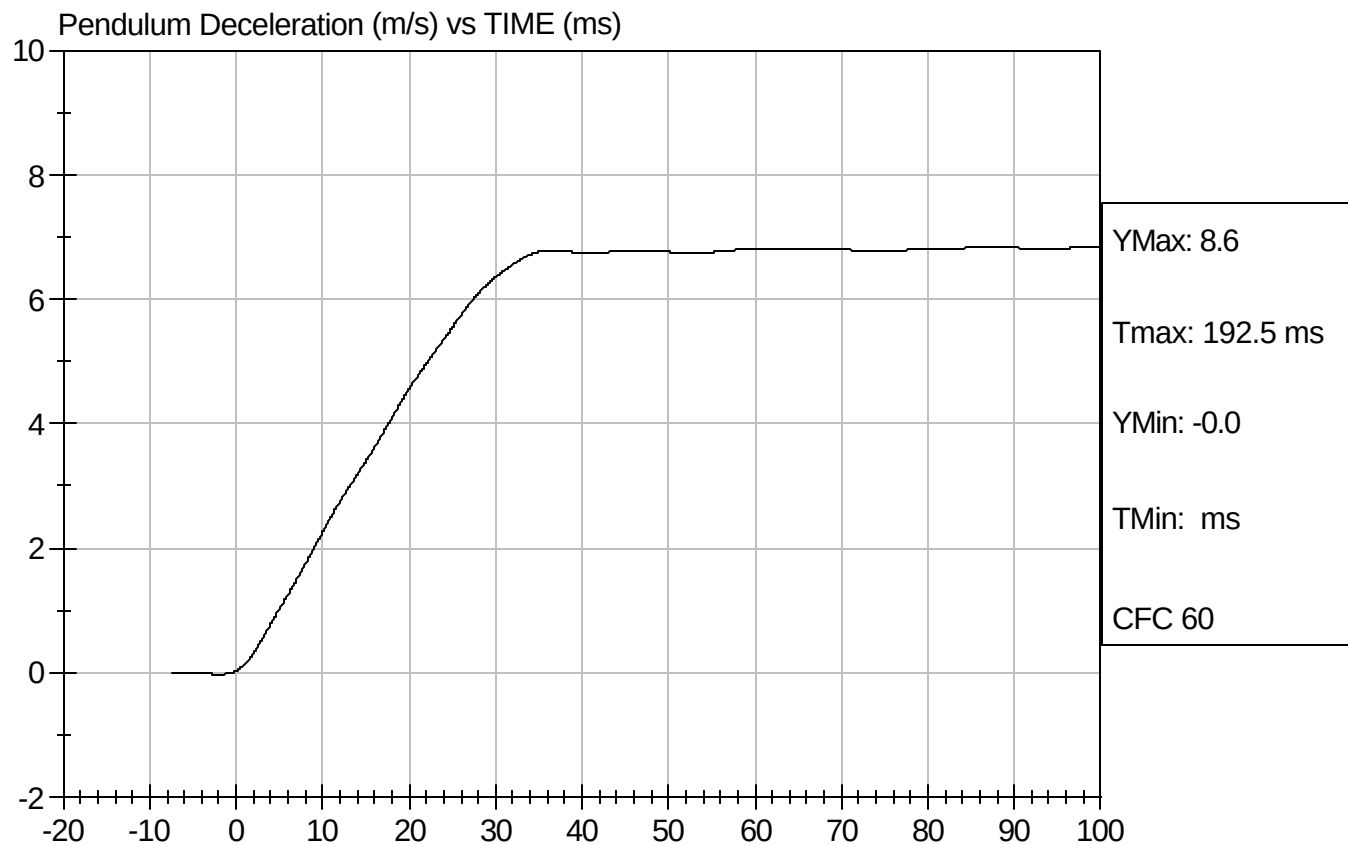
9/17/07

Test Date



Test Desc: Neck Bending
Component ID: D072899

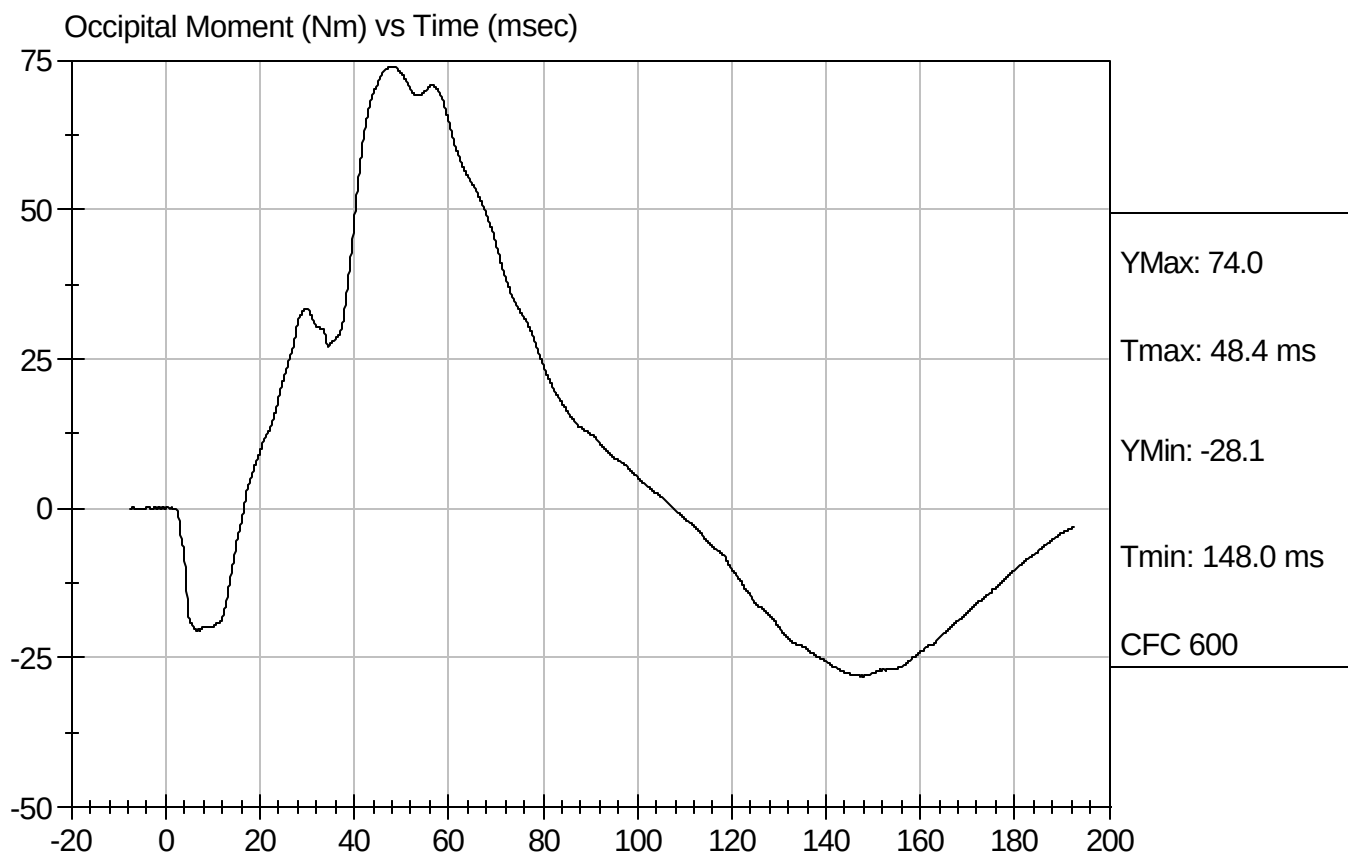
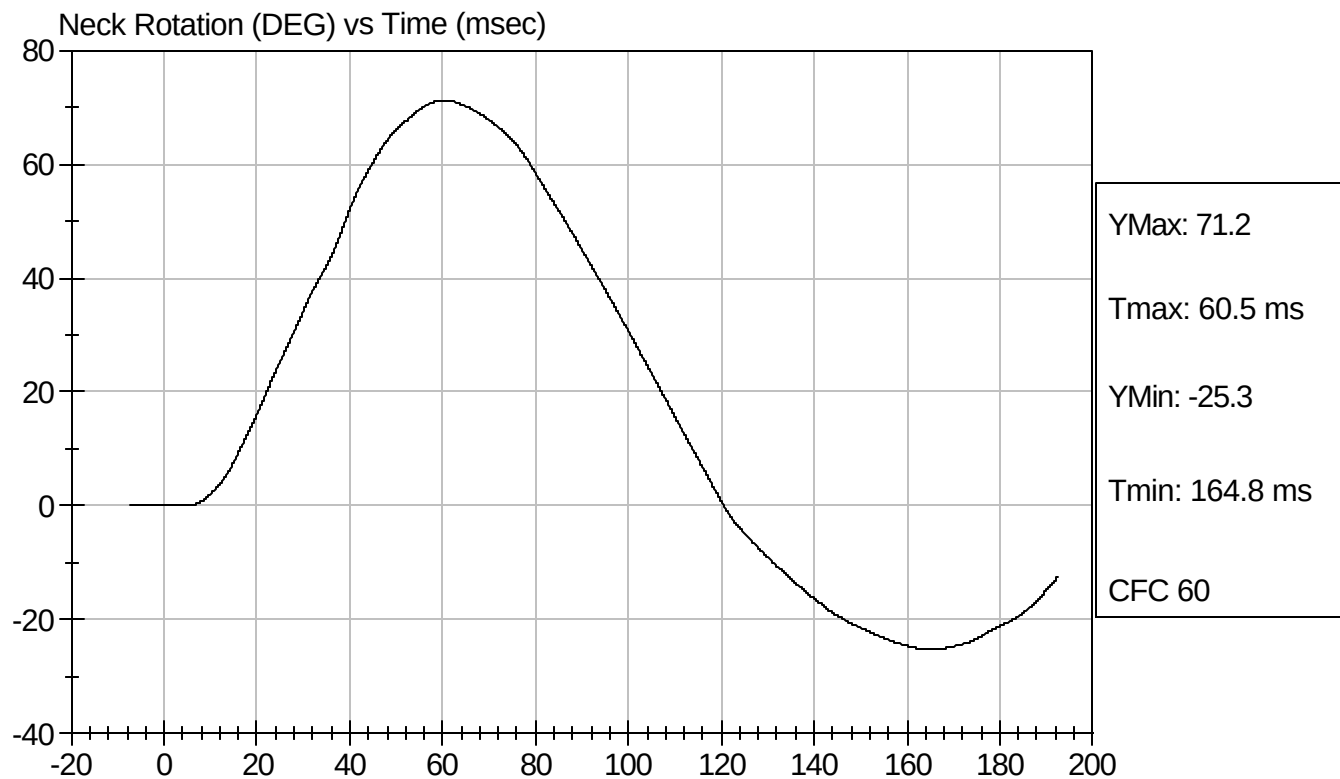
Test Date: 9/17/07
Speed: 23.148 ft/sec, 7.06 m/sec





Test Desc: Neck Bending
Component ID: D072899

Test Date: 9/17/07
Speed: 23.148 ft/sec, 7.06 m/sec



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

ATD Serial No: 272

Test I.D: D072951

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	37	Pass
Peak Resultant Acceleration	G's	120 to 150	146	Pass
Is Resultant Curve Unimodal?	Yes/No	15% of peak	Yes	Pass
Peak Longitudnal Acceleration	G's	+/- 15	-12.6	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

9/19/07
Test Date

David Winkelbauer
Approved By



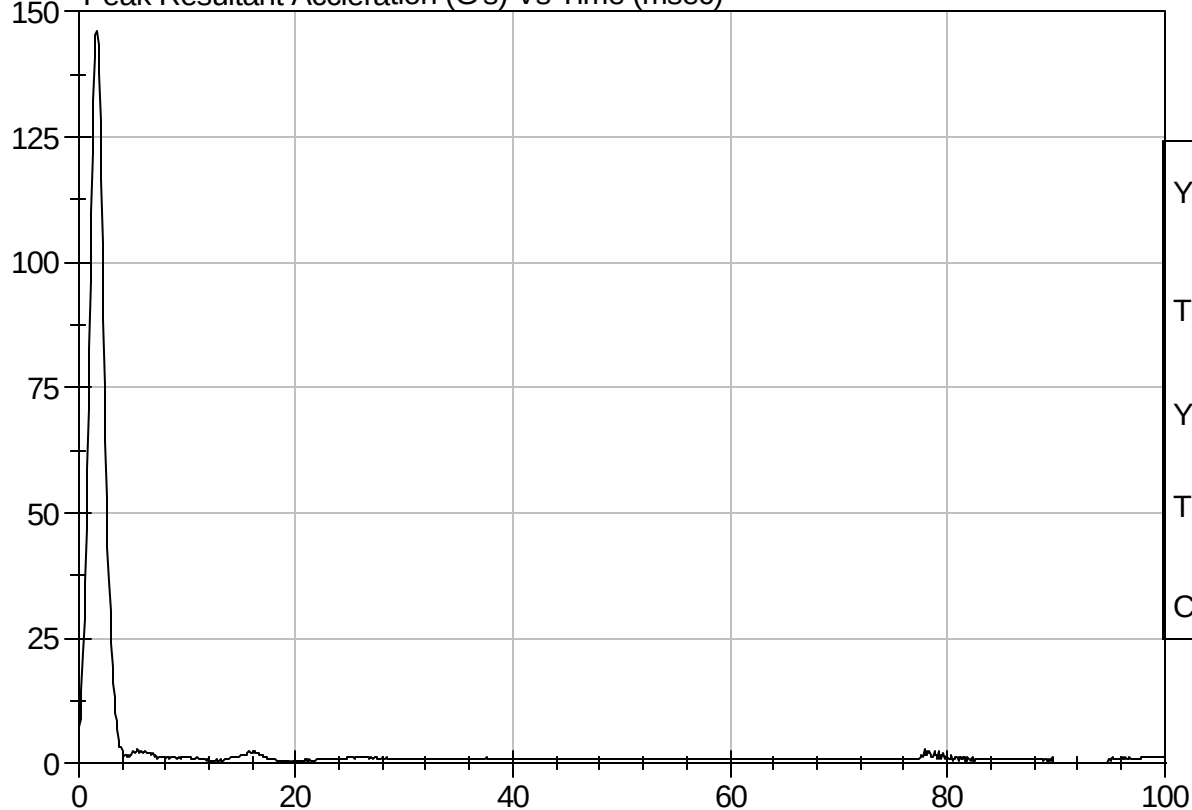
Test Description: Head Drop

Test Date: 9/19/07

Component: D072951

Speed: 0 ft/s, 0.00 m/s

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



YMax: 146.1 G

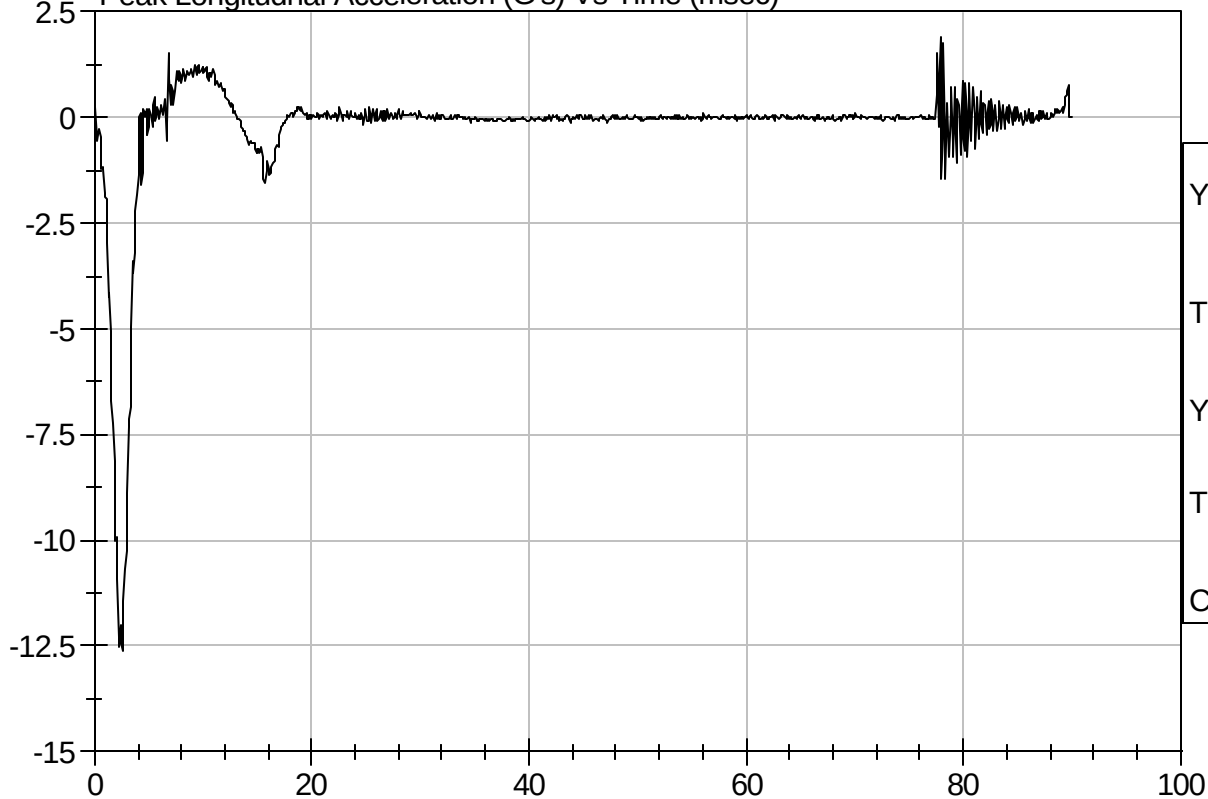
Tmax: 1.7 ms

YMin: 0.0 G

Tmin: 89.8 ms

CFC 1000

Peak Longitudnal Acceleration (G's) Vs Time (msec)



YMax: 1.9 G

Tmax: 77.9 ms

YMin: -12.6 G

Tmin: 2.6 ms

CFC 1000

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

ATD Serial No: 272

Test I.D: D072952

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	20.9	Pass
Laboratory Relative Humidity	%	10 to 70	39	Pass
Probe Velocity	m/s	4.22 - 4.31	4.30	Pass
Upper Rib	G's	37 - 46	39	Pass
Lower Rib	G's	37 - 46	38	Pass
Lower Spine	G's	15 - 22	20	Pass
Overall Test Results				Pass


Laboratory Technician

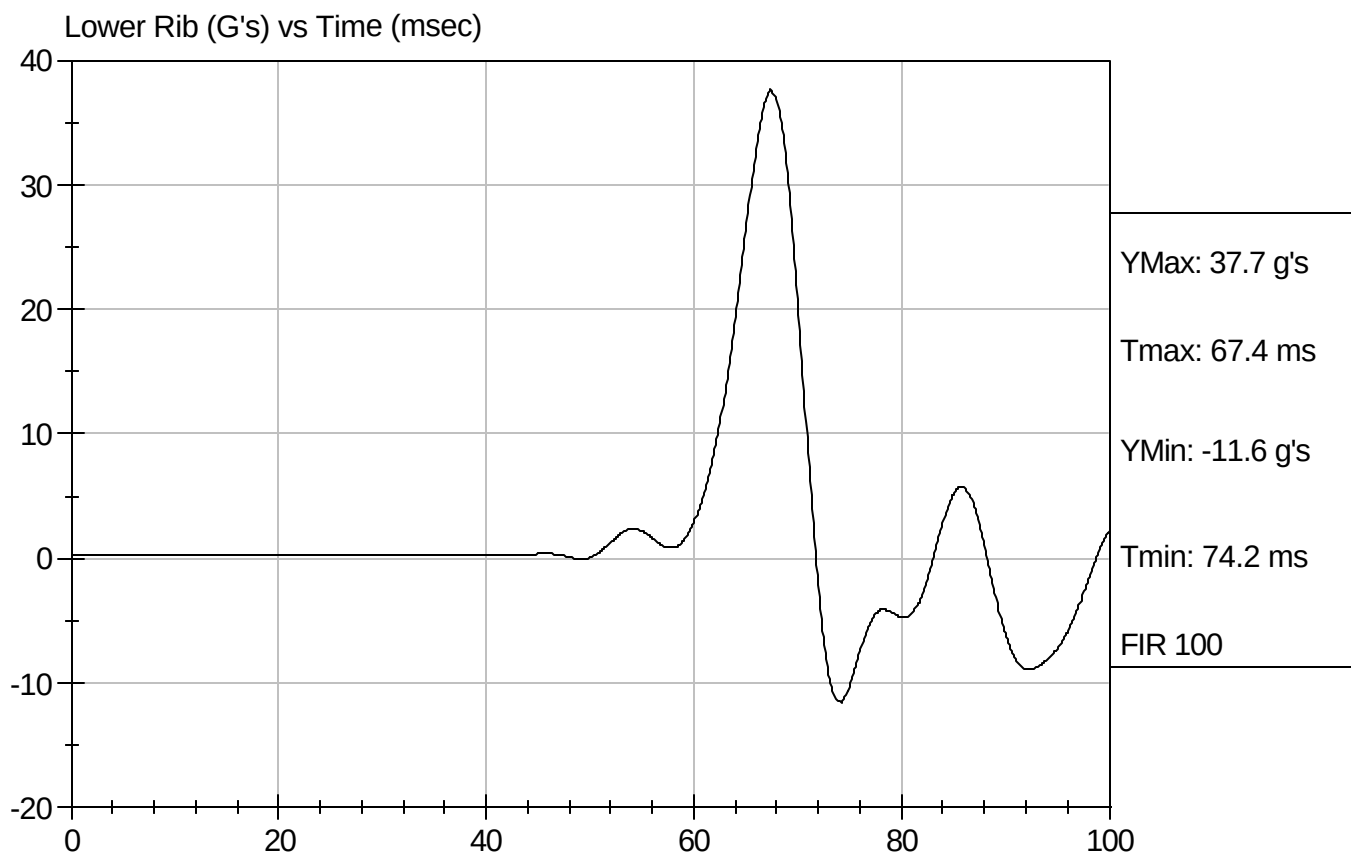
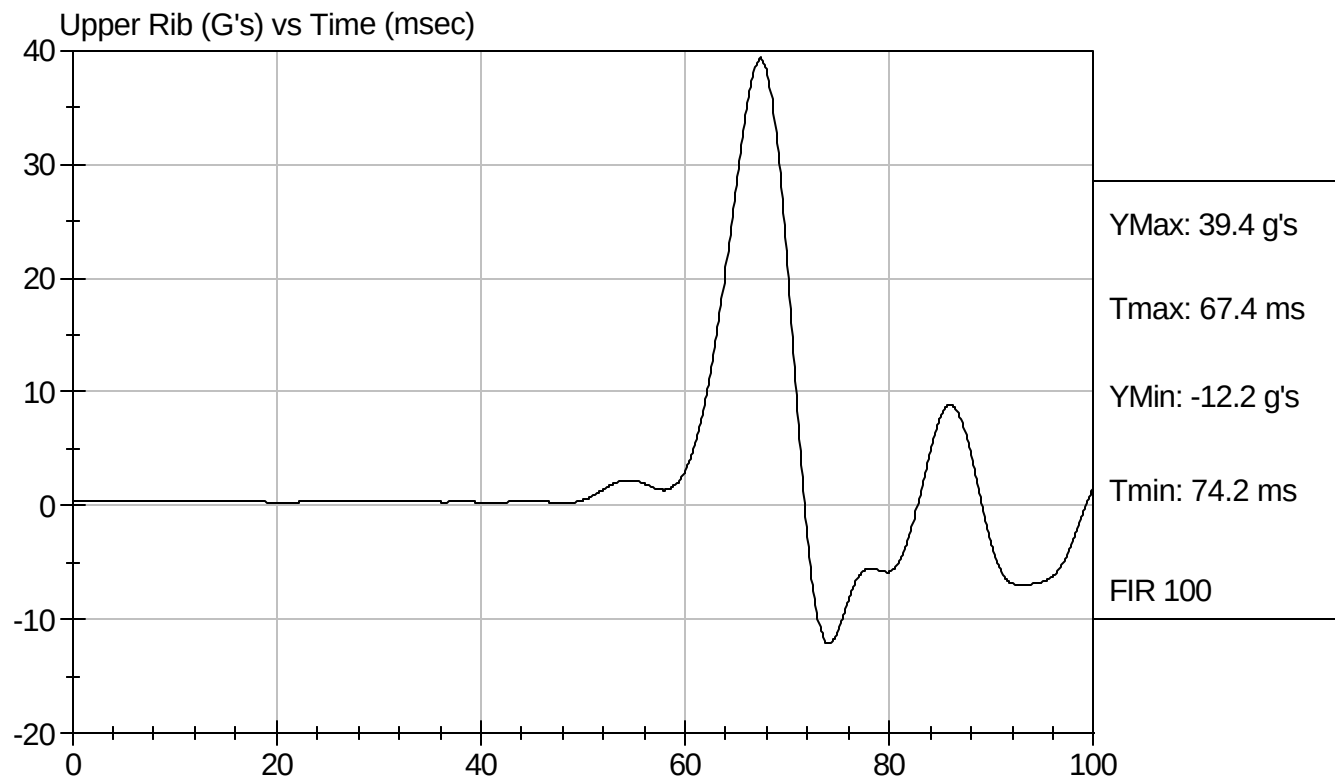

Approved By

9/19/07
Test Date



Test Desc: Thorax Impact
Component ID: D072952

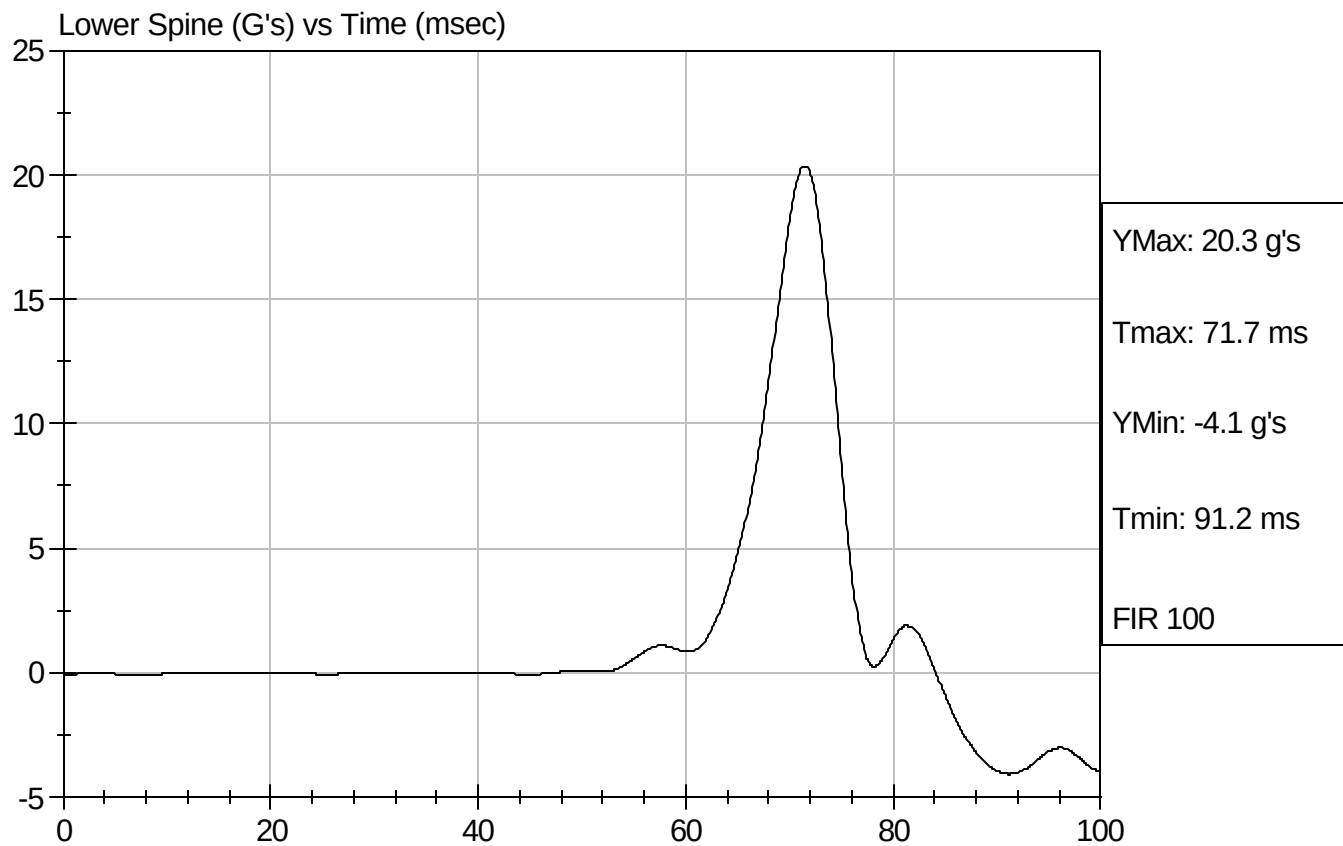
Test Date: 9/19/07
Speed: 14.1 ft/sec, 4.30 m/sec





Test Desc: Thorax Impact
Component ID: D072952

Test Date: 9/19/07
Speed: 14.1 ft/sec, 4.30 m/sec



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

ATD Serial No: 272

Test I.D: D072953

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	20.9	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	41	Pass
			Overall Test Results	Pass

Jessica Hall
Laboratory Technician

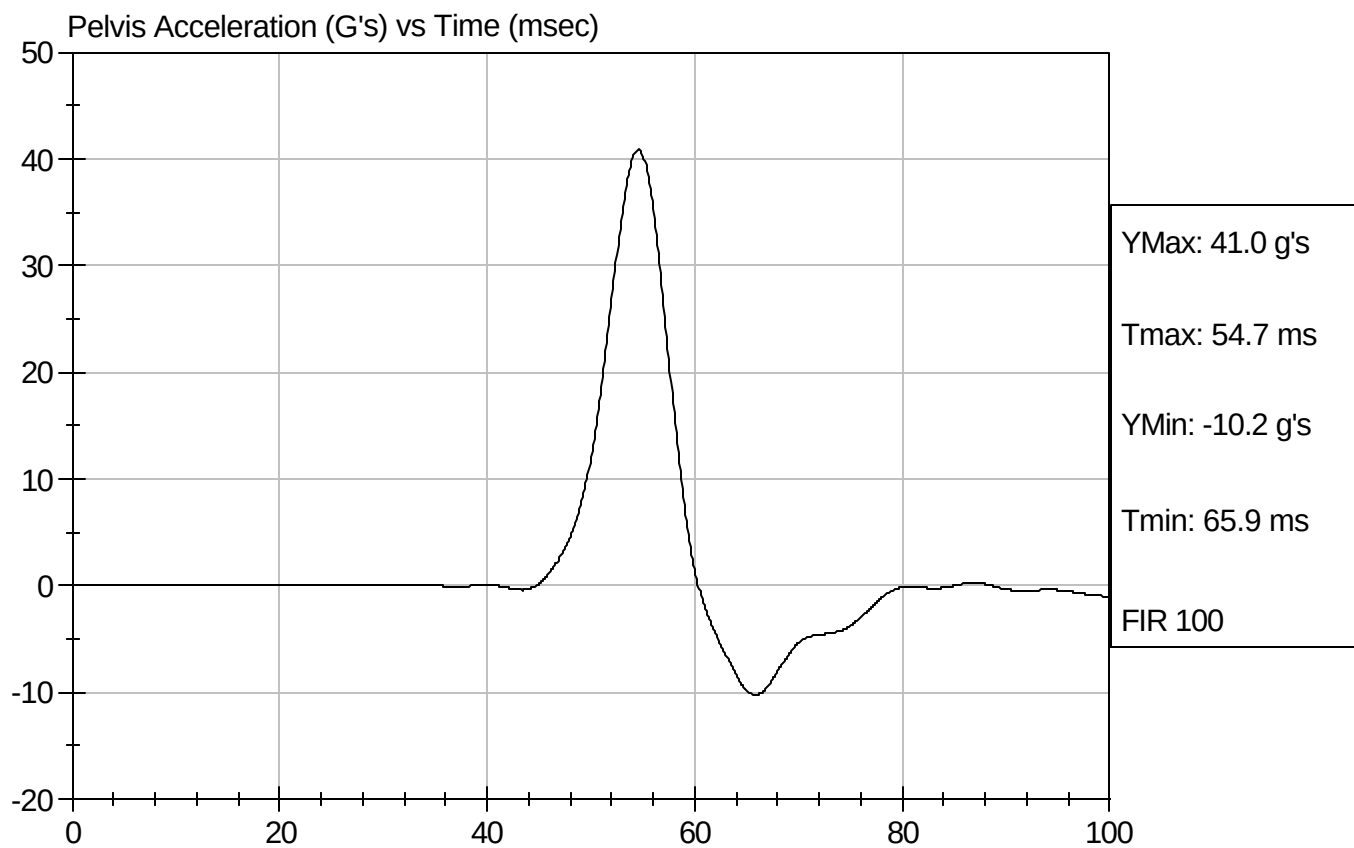
David Winkelbauer
Approved By

9/19/07
Test Date



Test Desc: Pelvis Impact
Component ID: D072953

Test Date: 9/19/07
Speed: 14.124 ft/sec, 4.30 m/sec



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

ATD Serial No: 272

Test I.D: D072954

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	39	Pass
Force At 12.7 mm	N	104 -162	130	Pass
Force At 19 mm	N	163 - 222	180	Pass
Force At 25.4 mm	N	222 - 280	238	Pass
Force At 33 mm	N	325 - 391	330	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

9/19/07
Test Date

David Winkelbauer
Approved By

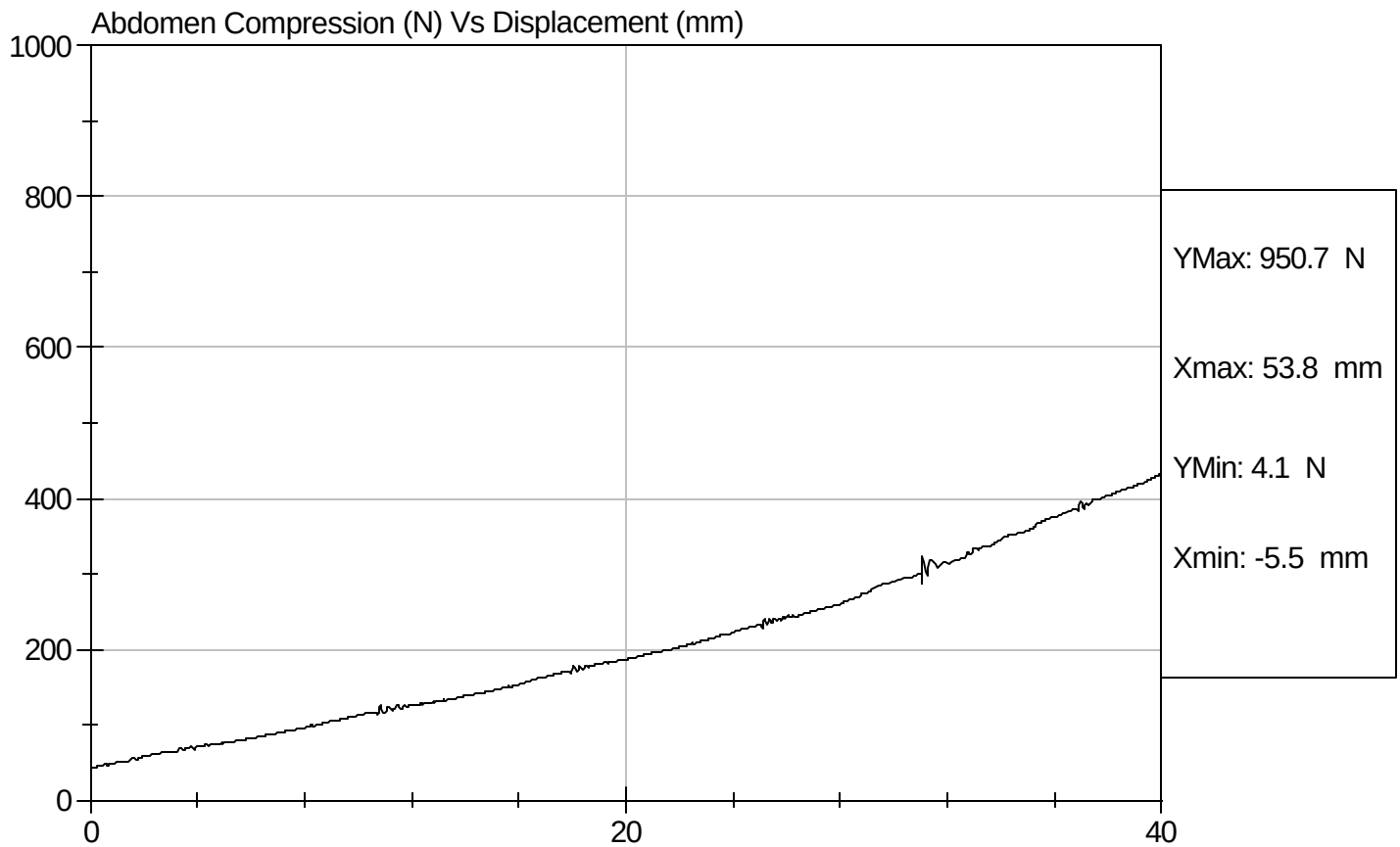


Test Description: Abdomen Compression

Test Date: 9/19/07

Component: D072954

Speed: 0 ft/sec, 0 m/sec



SID Calibration Data Sheet
Side Impact Dummy
Lumbar Flexion Calibration

ATD Serial No: 272

Test I.D: D072955

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	39	Pass
Force At 0 deg	N	0 - 26.7	0	Pass
Force At 20 deg	N	97.9 - 151.2	130.2	Pass
Force At 30 deg	N	151.2 - 204.6	165.1	Pass
Force At 40 deg	N	204.6 - 258.0	223.2	Pass
Return Angle	Deg	12 Maximum	6	Pass
Overall Test Results			Pass	


Laboratory Technician


Approved By

9/19/07
Test Date

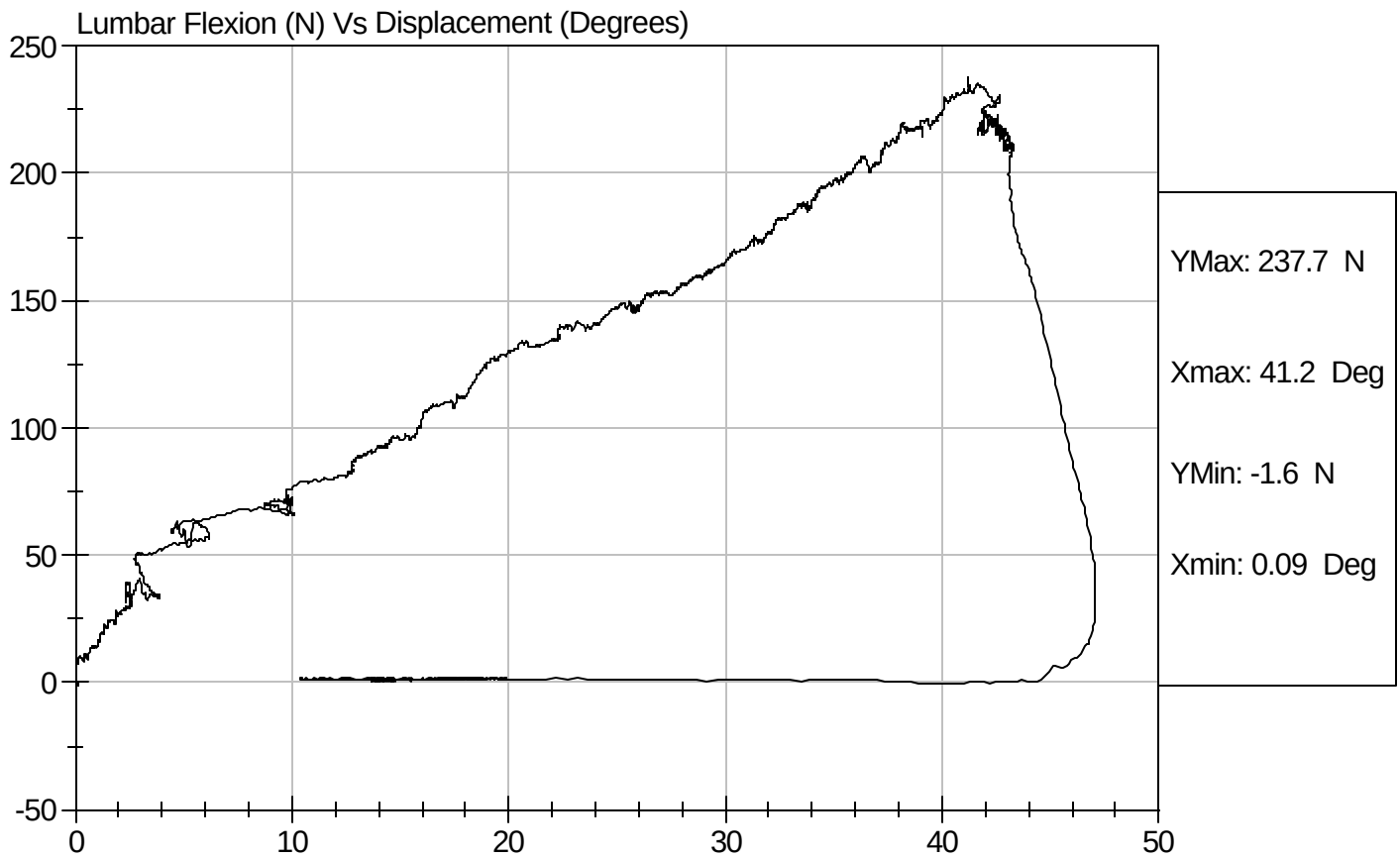


Test Description: Lumbar Flexion

Test Date: 9/19/07

Component: D072955

Speed: 0 ft/sec, 0 m/sec

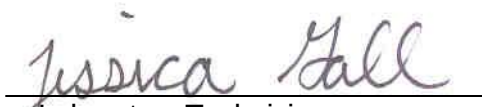


SID/HIII Calibration Data Sheet
Side Impact Dummy (SID)
Neck Pendulum Test

ATD Serial No: 272

Test I.D: D072959

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.0	Pass
Laboratory Relative Humidity		%	10 to 70	39	Pass
Impact Velocity		m/s	6.89 to 7.13	6.96	Pass
Pendulum Deceleration	10 msec	m/s	1.96 to 2.55	2.40	Pass
	20 msec	m/s	4.12 to 5.10	4.80	Pass
	30 msec	m/s	5.73 to 7.01	6.61	Pass
	40 to 70 msec	m/s	6.27 to 7.64	6.65	Pass
Midsagittal Plane Max Rotation		deg	66 to 82	75	Pass
Head Rotation Peak to Zero - Decay Time		msec	58 to 67	60	Pass
Max. Mx at Occipital Condyles		Nm	73 to 88	74	Pass
Mx Peak To Zero - Decay Time		msec	49 to 64	51	Pass
Mx Peak to Max. Head Rotation		msec	2 to 16	6	Pass


 Laboratory Technician


 Approved By

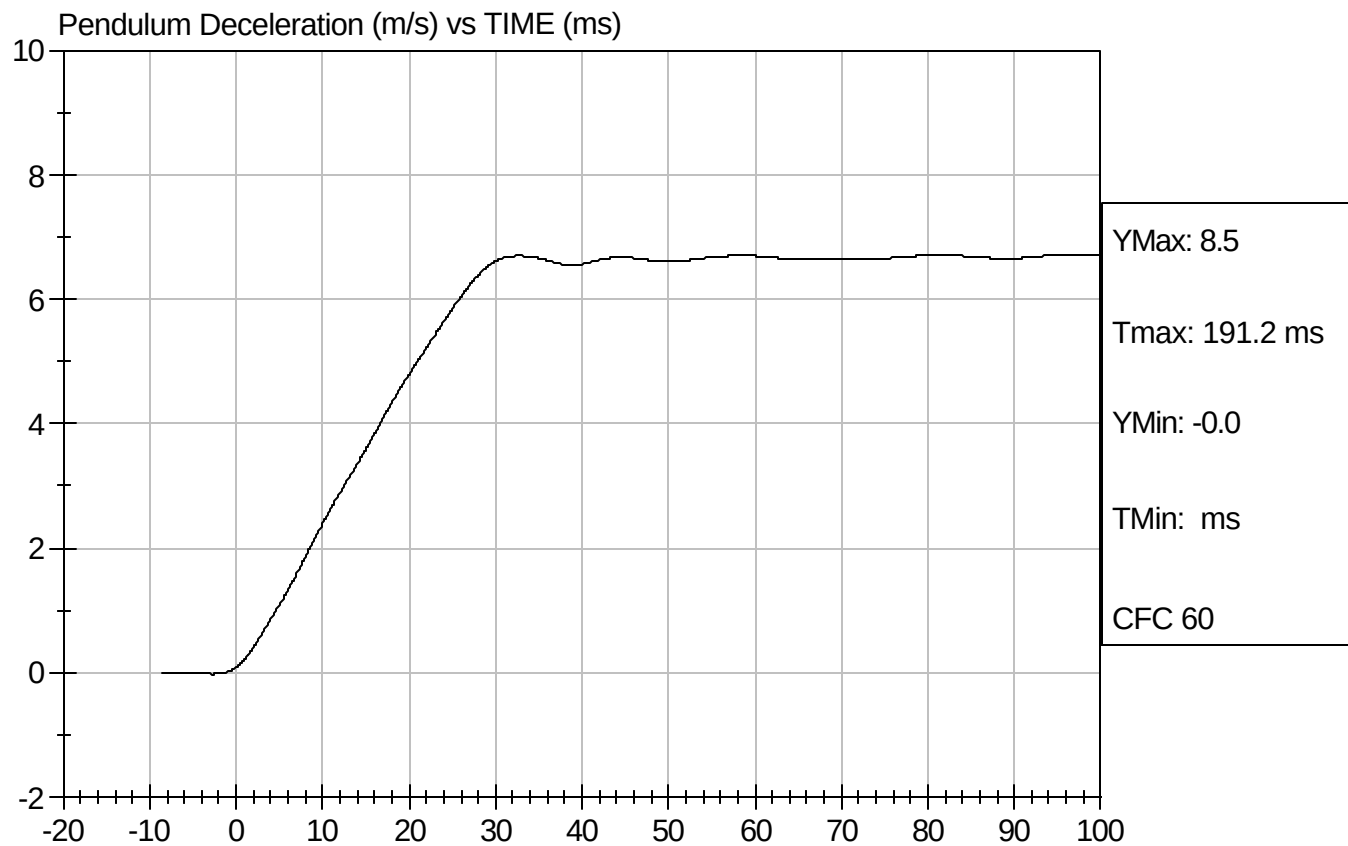
9/19/07

Test Date



Test Desc: Neck Bending
Component ID: D072959

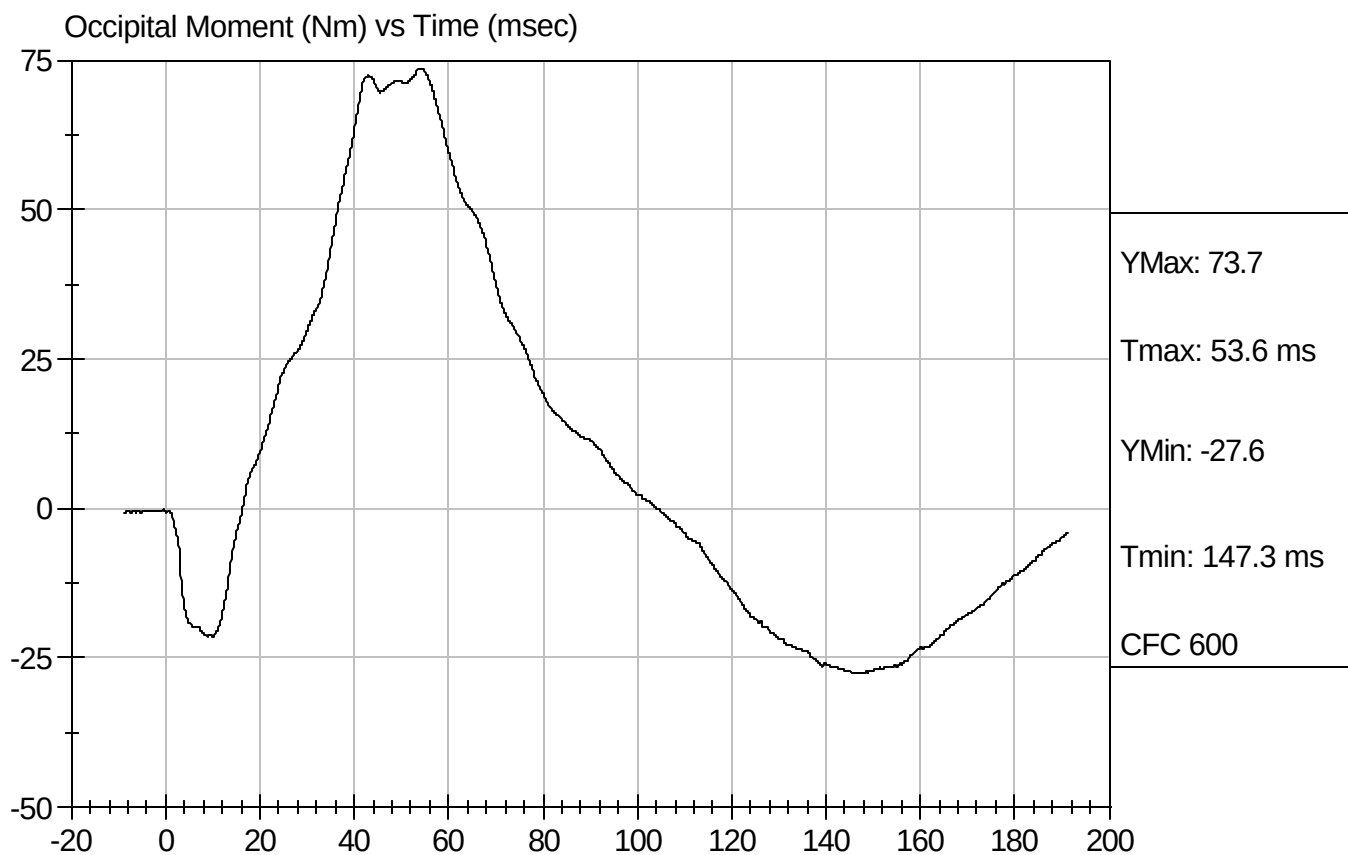
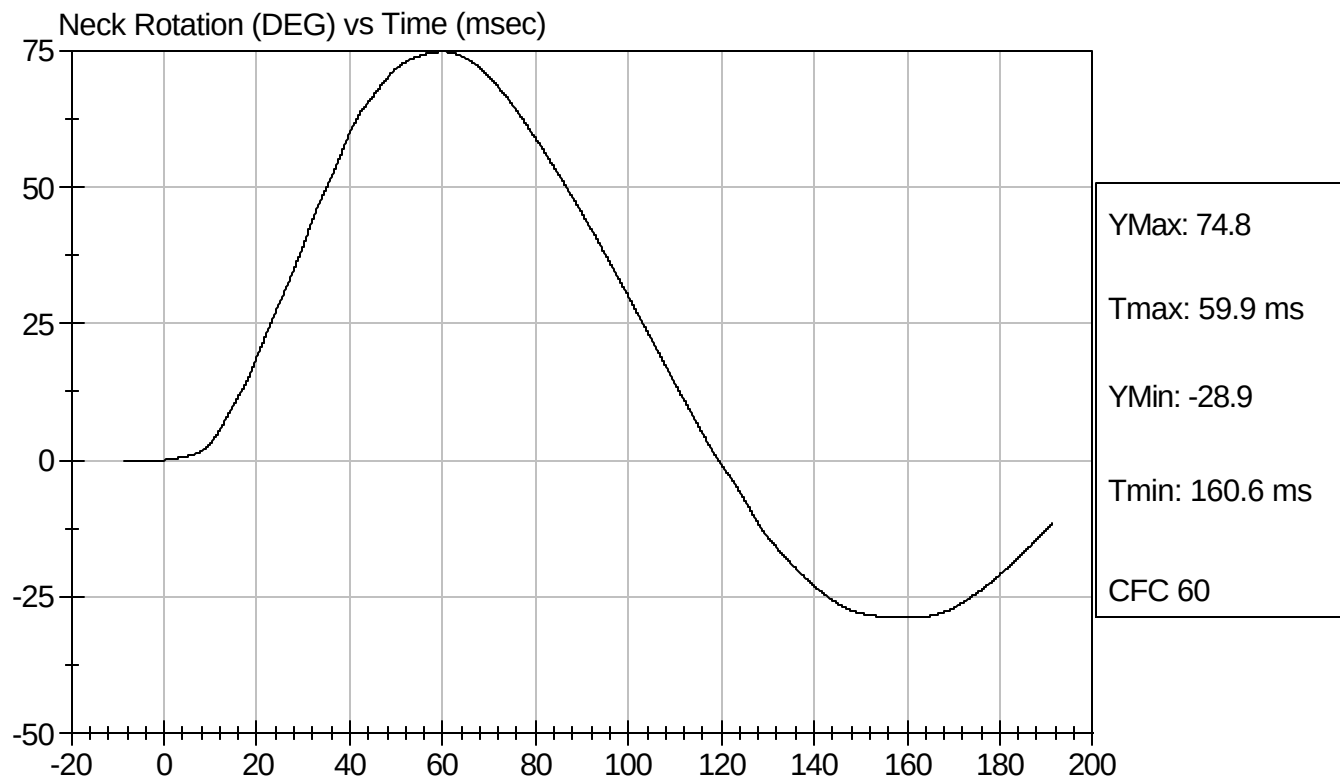
Test Date: 9/19/07
Speed: 22.831 ft/sec, 6.96 m/sec





Test Desc: Neck Bending
Component ID: D072959

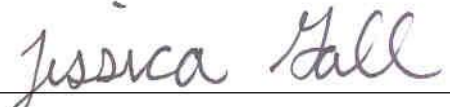
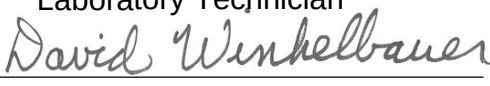
Test Date: 9/19/07
Speed: 22.831 ft/sec, 6.96 m/sec



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


Laboratory Technician

Approved By

9/19/2007
Test Date

APPENDIX D
CHILD DUMMY DATA

SUMMARY OF TEST

Measurement Description	Units	Threshold	P3 ATD
Head Injury Criteria (HIC36)	N/A	N/A	99
Head Injury Criteria (HIC15)	N/A	390	43
Max. Thorax Accel. (3msec Clip)	G's	50	22

The child dummy was instrumented with head, chest, and upper six axial neck force and moment sensors.

The right rear (Position 3) child dummy (S/N 093) was calibrated previous to this test. Child dummy certification information can be found in this Appendix.

Position 3 was rear facing and used the vehicle LATCH attachment.

TEST VEHICLE WEIGHTS

	Units	As Tested (ATW) (Axle)		
		Front	Rear	Total
Left	kg	583.8	503.9	
Right	kg	528.9	451.8	
Ratio	%	53.8	46.2	
Totals	kg	1112.7	955.7	2068.4

As tested weight of vehicle includes two ATDs, one CRABI with CRS, cargo, equipment and instrumentation.

TEST NOTES

There was no valid data collected for:

Right Rear Passenger Neck Moment X after 25 msec.

TEST DUMMY INFORMATION

Description	Position 3 CRS
Dummy Type / Serial No.	12 month old CRABI / 093
Number of Data Channels	12
Restraint System	Graco Snugride (Rear Facing)

POST TEST SEAT DATA

Location	Seat Movement (mm)	Seat Back Failure
P1 (Left Front)	0	None
P2 (Right Front)	0	None
P3 (Right Rear)	0	None
P4 (Left Rear)	0	None

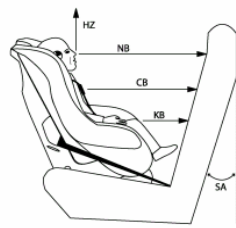
VISIBLE DUMMY CONTACT POINTS

Description	Position 3 CRS
Head Contact	Back of Head to CRS
Upper Torso Contact	None
Lower Torso Contact	None
Left Foot Contact	None
Right Foot Contact	None

CHILD DUMMY POSITIONING IN VEHICLE

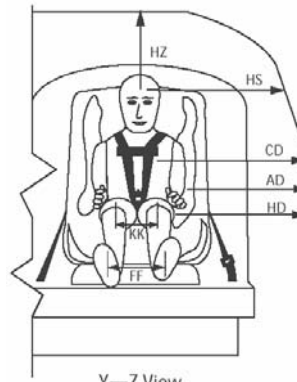
Child Restraint System (Position 3)	Graco Snugride (Rear Facing)
NHTSA No.	M85111

Dummy Measurements for Rear-facing CRS Passengers



X—Z View

HZ	-	Head to Roof
NB	-	Nose to Front of Back Seat
CB	-	Chest to Front of Back Seat
KB	-	Knee to Front of Back Seat
SA	-	Seat Back Angle



Y—Z View

X—Z View

HZ	-	Head to Roof
HS	-	Head to Side Window
CD	-	Chest to Door
AD	-	Arm to Door
HD	-	H-Point to Door
KK	-	Knee to Knee
FF	-	Foot to Foot
NB	-	Nose to Front Seat Back
CB	-	Chest to Front Seat Back
KB	-	Knee to Front Seat Back
TB	-	Toe to Front Seat Back
SA	-	Seat Back Angle

Measurement	Pre-Test (mm)	Post-Test (mm)
	P3 CRS (093)	P3 CRS (093)
SA (deg)	9.0	8.9
HS	430	419
CD	392	383
AD	280	275
HD	328	312
HZ	480	477
NB	586	589
CB	455	561
KK	107	98
FF	109	126
KB - LEFT	216	189
KB - RIGHT	217	225
TB - LEFT	71	82
TB - RIGHT	79	171

All dimensions in mm (unless noted)
P3 – Right Rear Passenger (Rear Facing)

CRS PERFORMANCE DATA

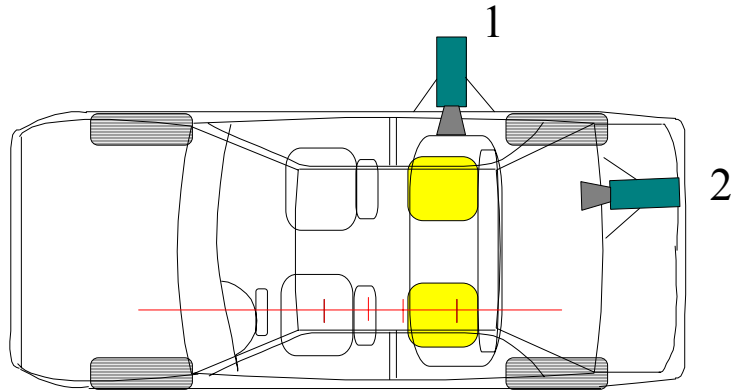
Child Restraint System (Position 3)	Graco Snugride (Rear Facing)
NHTSA No.	M85111

POSITION 3 CRS POST-TEST INSPECTION

Location	Damage	Remarks
Upper Tether Strap		
Upper Tether Buckle		
Upper Tether Hook		
Vehicle Upper Tether Anchor		
Lower Anchor Strap	None	
Lower Anchor Buckle		
Lower Anchor Hooks	None	
Vehicle Lower CRS Anchors	None	
Harness Connections	None	
Cracks on CRS	None	
Fabric Tears on CRS	None	
Vehicle Seat Structure	None	
Vehicle Seat Fabric Tears	None	
Child Dummy	None	CRABI 12 Month Old

CRS CAMERA DATA

Child Restraint System (Position 3)	Graco Snugride (Rear Facing)
NHTSA No.	M85111



No.	Camera View	Location (mm) *			Angle (deg)	Lens (mm)	Speed (fps)
		X	Y	Z			
1	Vehicle Onboard Rear SID/HIII, Side					8	1000
2	Onboard Child Seat					12.5	1000

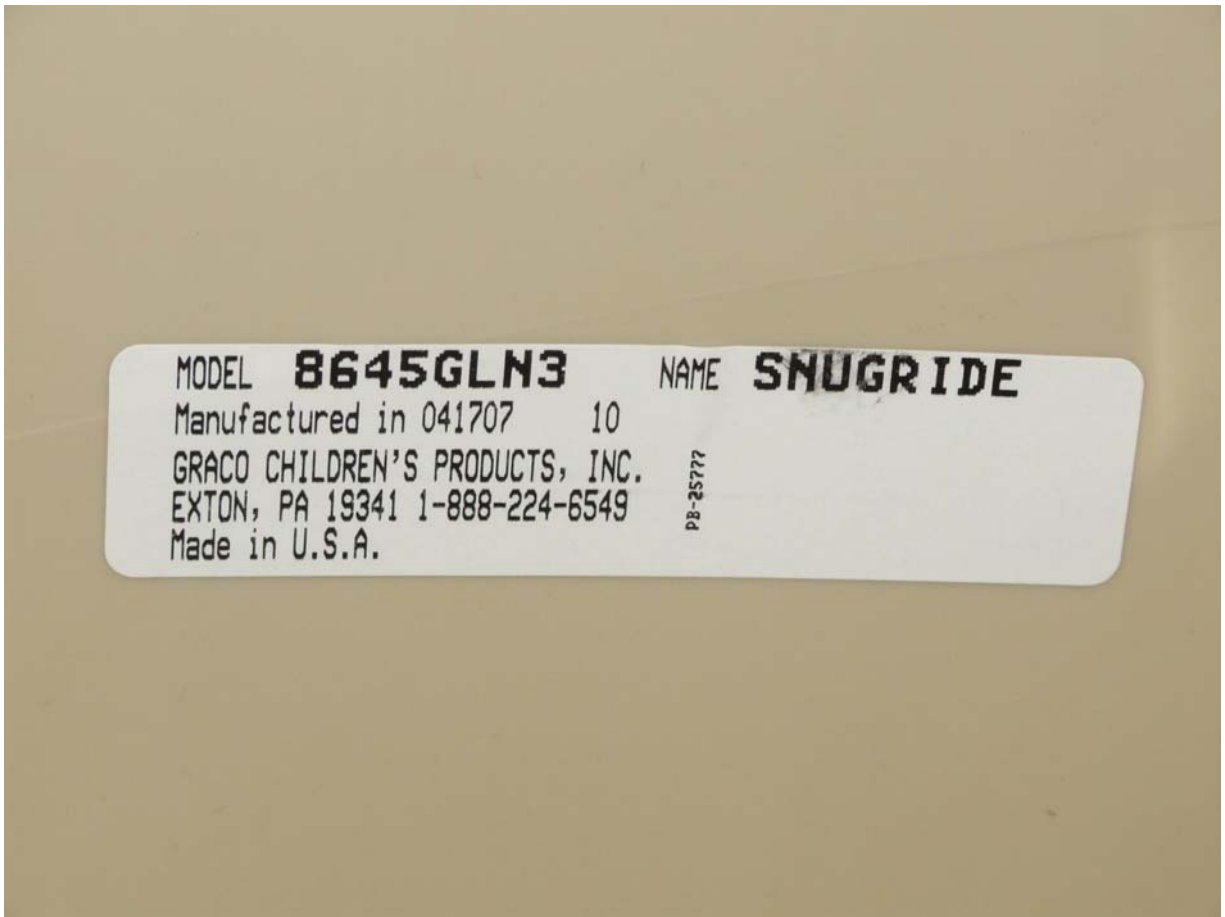
***COORDINATES:**

- +X = film plane rearward of barrier
- +Y = film plane to right of monorail centerline
- +Z = film plane above ground level

PHOTOGRAPHS

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Close-up View of Position 3 CRS Label



Pre-Test Front View of Position 3 CRS



Post-Test Front View of Position 3 CRS



Pre-Test Rear View of Position 3 CRS



Post-Test Rear View of Position 3 CRS



Pre-Test Left Side View of Position 3 CRS



Post-Test Left Side View of Position 3 CRS



Pre-Test Right Side View of Position 3 CRS



Post-Test Right Side View of Position 3 CRS



Pre-Test Position 3 Left Side View



Pre-Test Position 3 Right Side View



Post-Test Position 3 Right Side View

CHILD DUMMY RESPONSE DATA TRACES

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

RRP Child Seat X Acceleration vs. Time

RRP Child Seat Y Acceleration vs. Time

RRP Child Seat Z Acceleration vs. Time

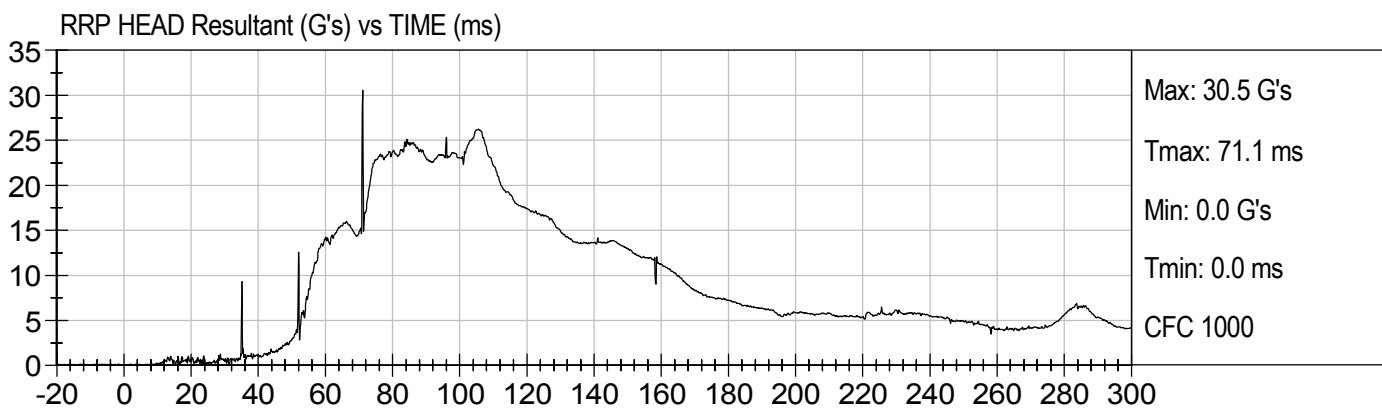
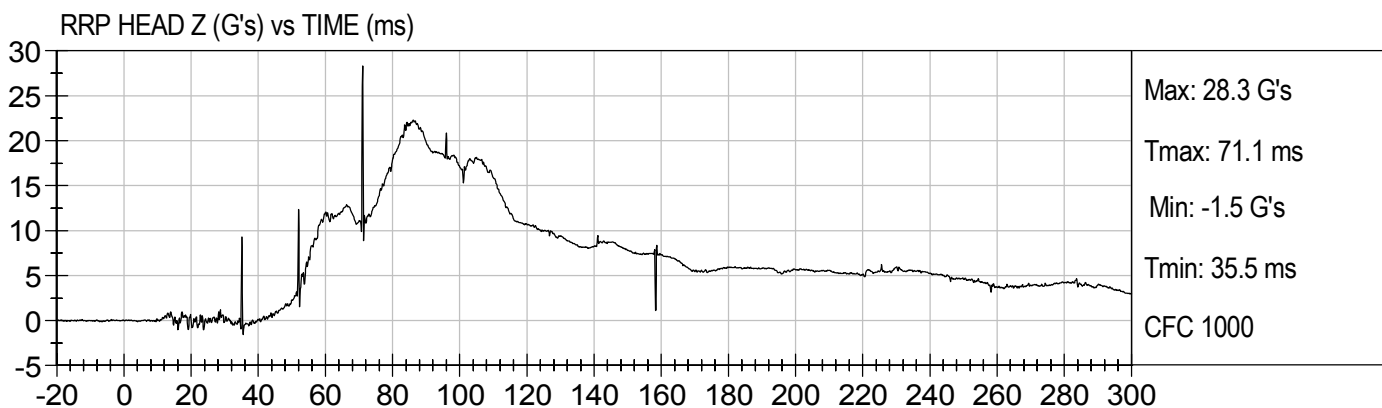
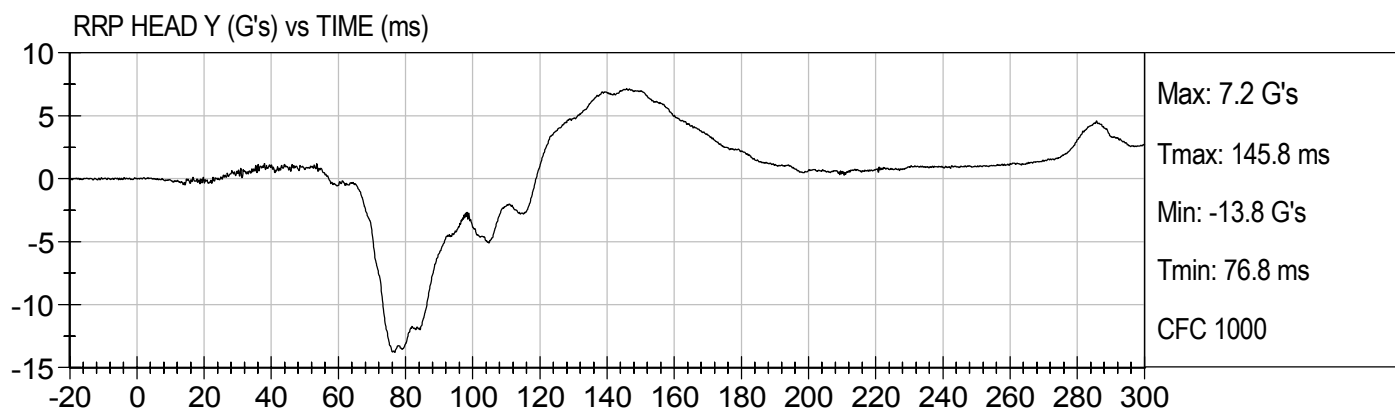
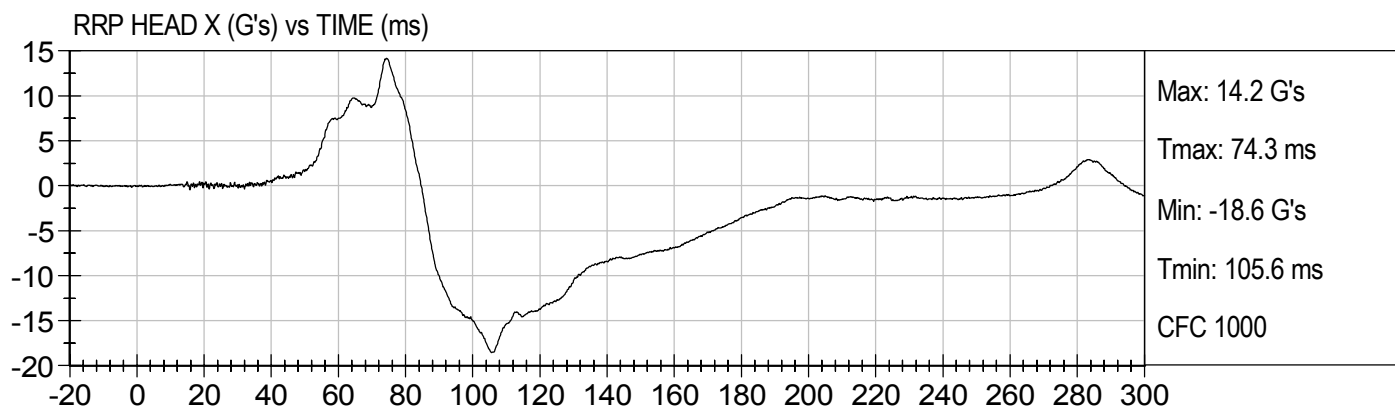
RRP Child Seat Resultant Acceleration vs. Time



LEFT SIDE NCAP
2008 TOYOTA HIGHLANDER

M85111

Test Date: 09/19/2007
Speed: 38.9 mph (62.6 km/h)

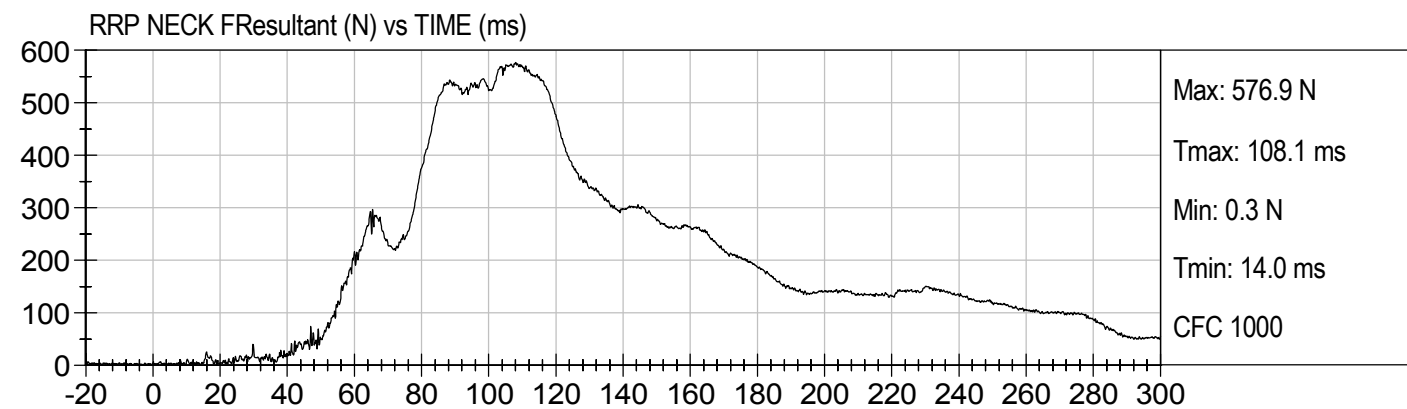
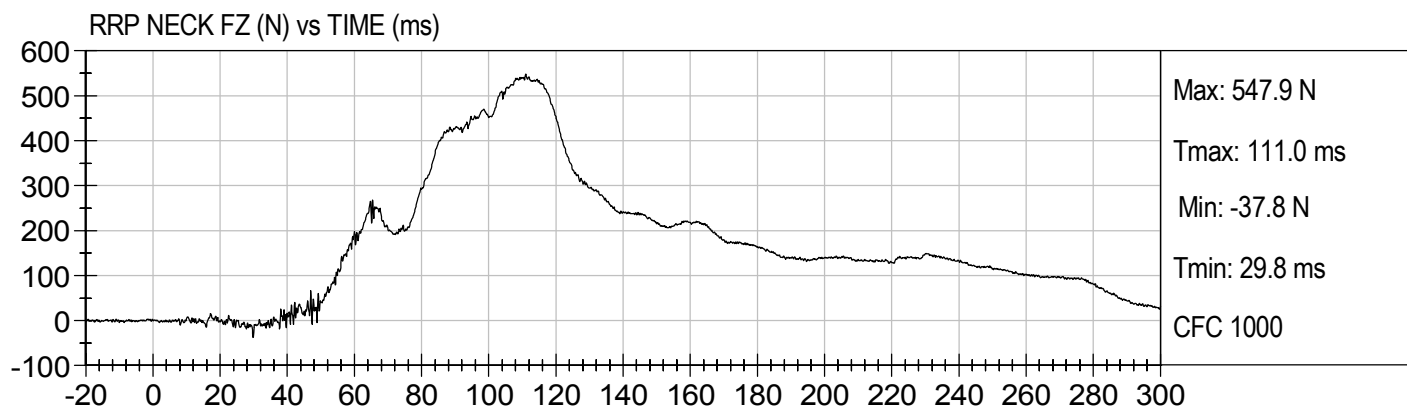
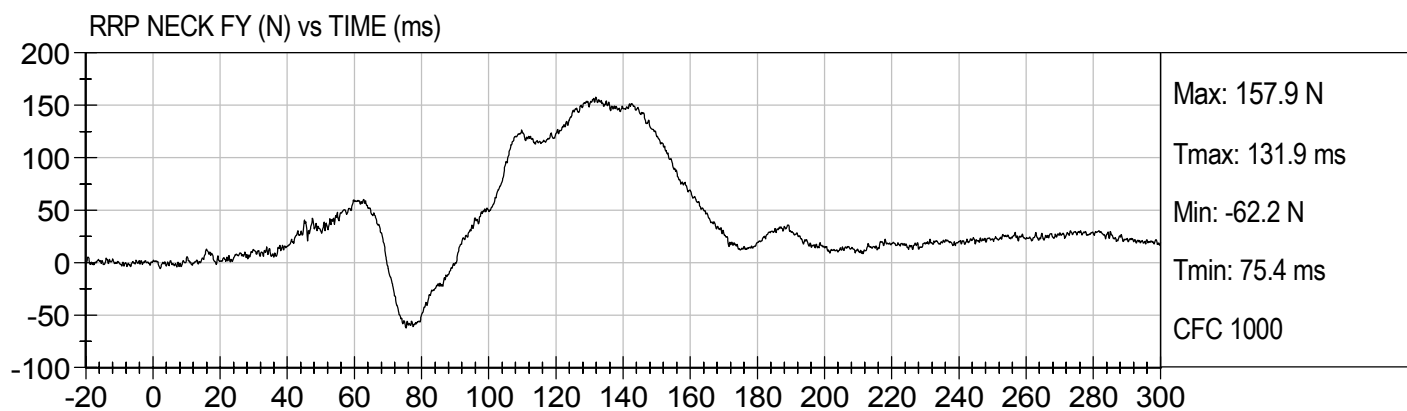
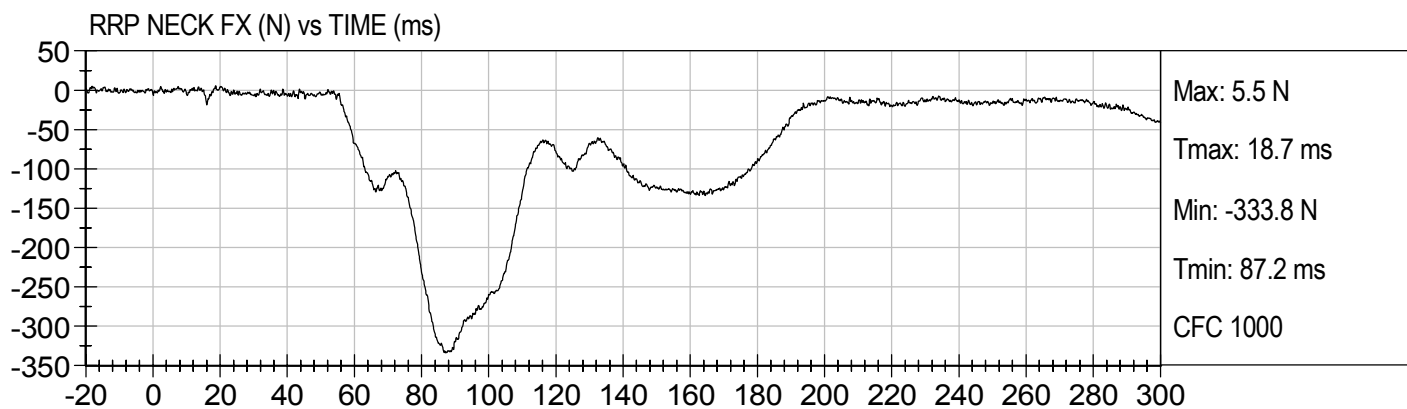


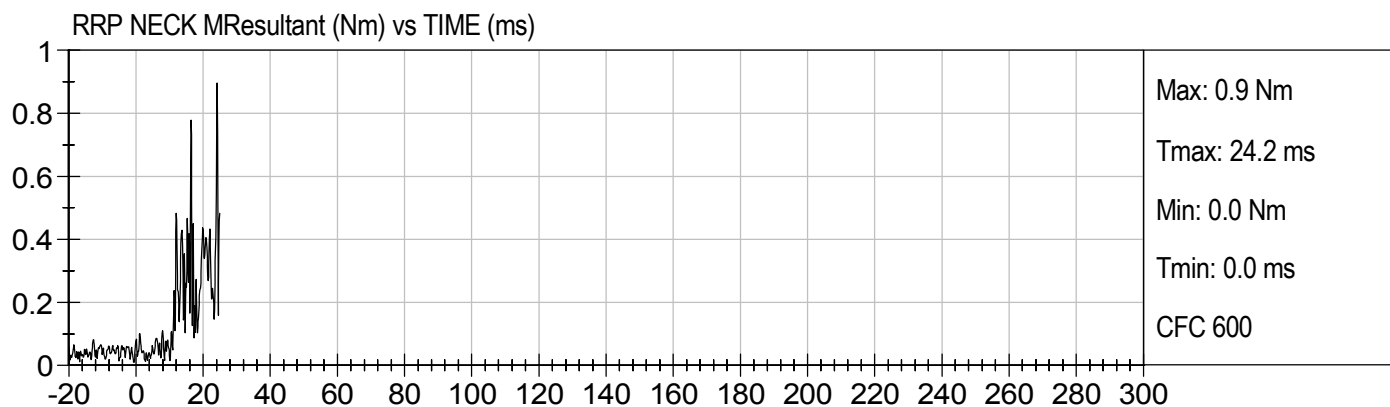
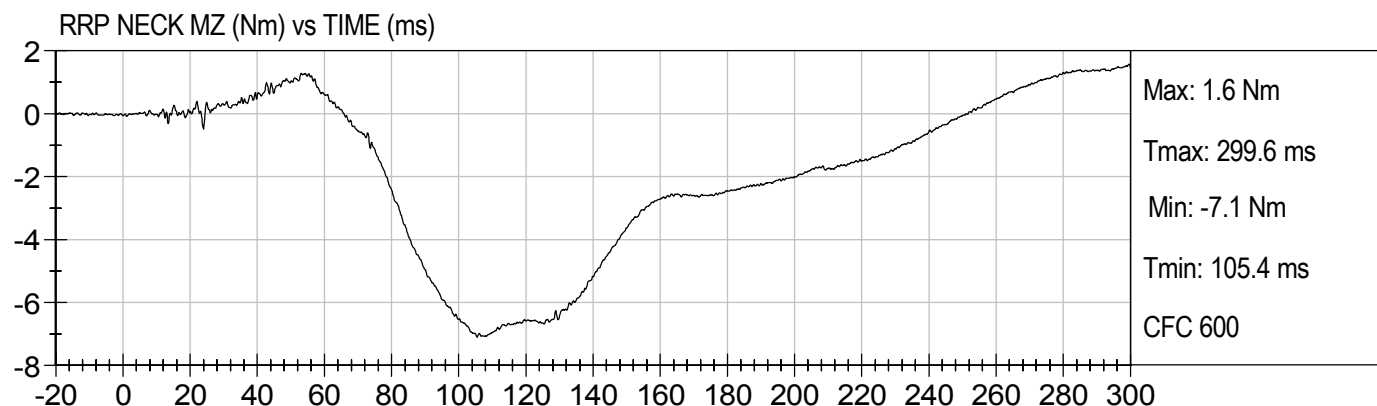
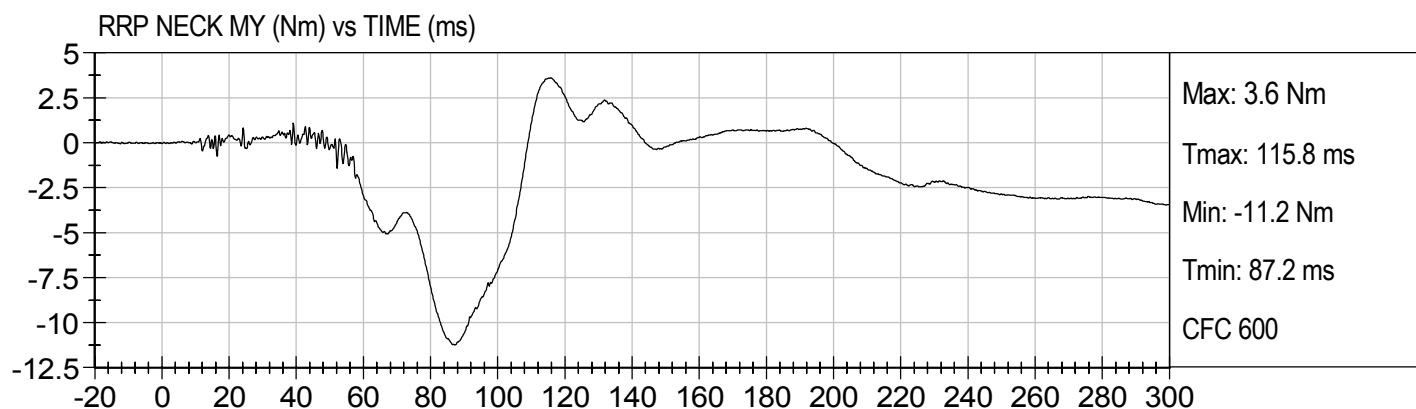
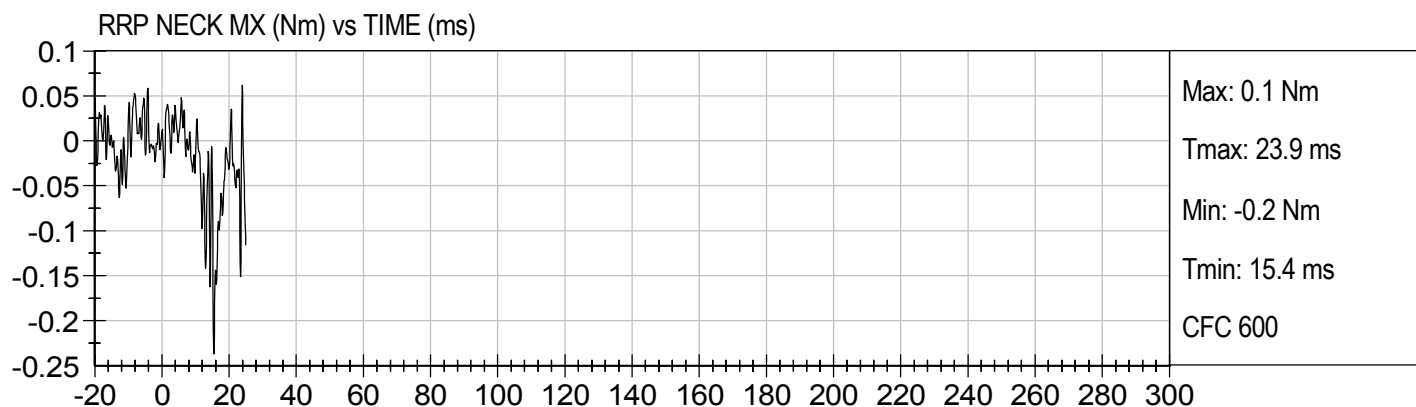


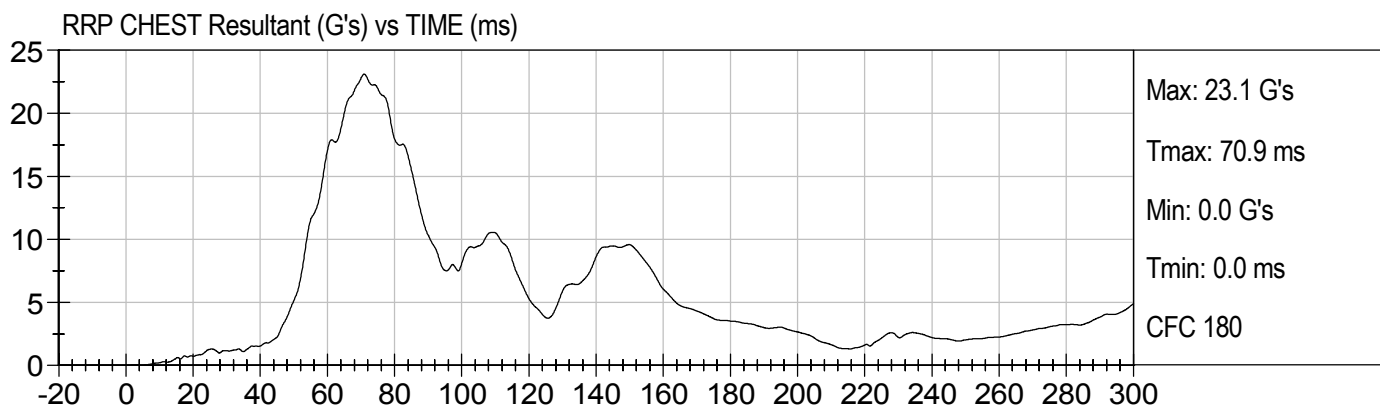
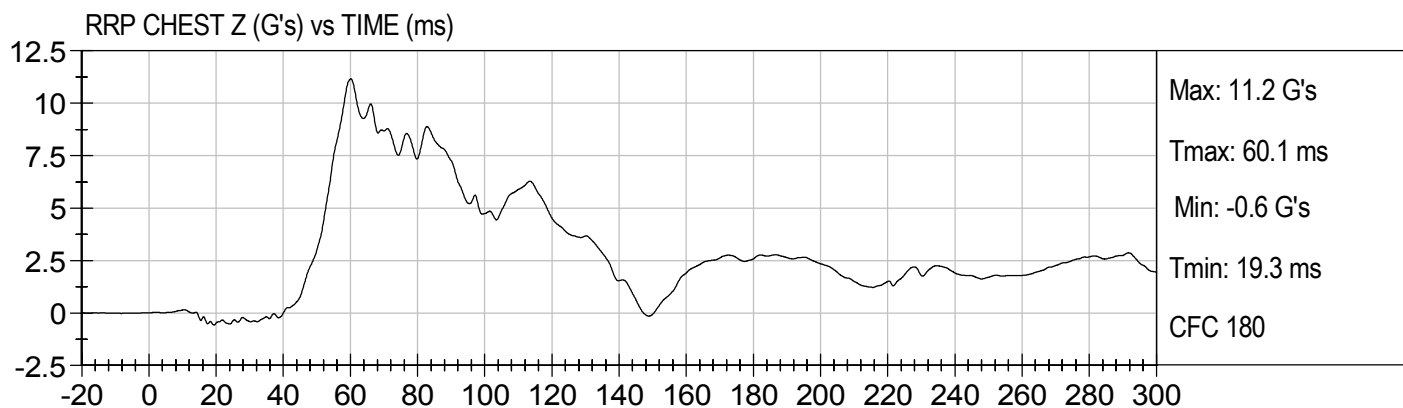
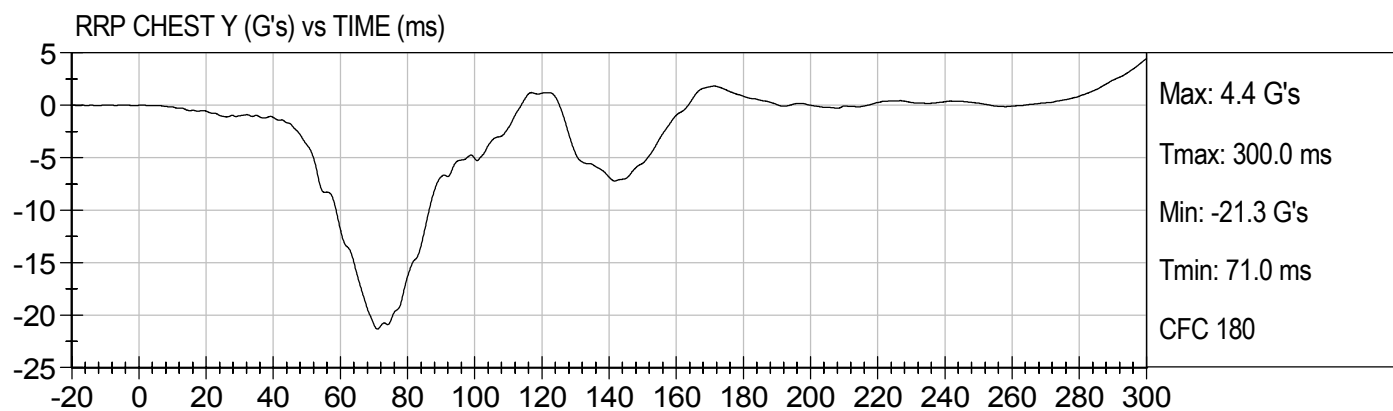
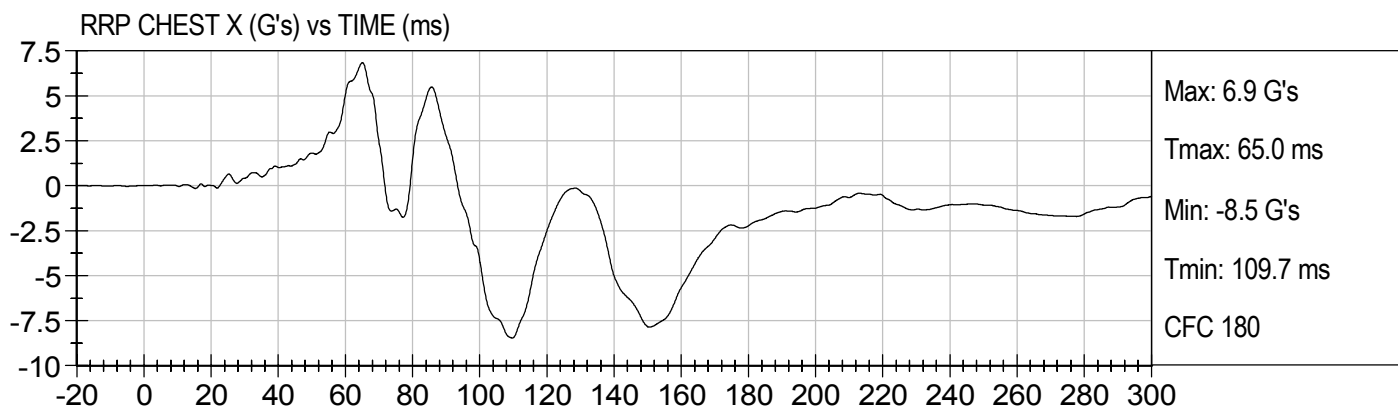
LEFT SIDE NCAP
2008 TOYOTA HIGHLANDER

M85111

Test Date: 09/19/2007
Speed: 38.9 mph (62.6 km/h)







CHILD DUMMY CALIBRATION INFORMATION

MGA RESEARCH CORPORATION
FRONT HEAD DROP TEST
CRABI 12 MONTH

ATD Serial No: 093

Test ID: D072541

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	47	Pass
Peak Resultant Acceleration	G's	100 to 120	110	Pass
Peak Lateral Acceleration	G's	+/- 15	-3	Pass
Unimodal	N/A	within 17% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

8/23/07

Test Date

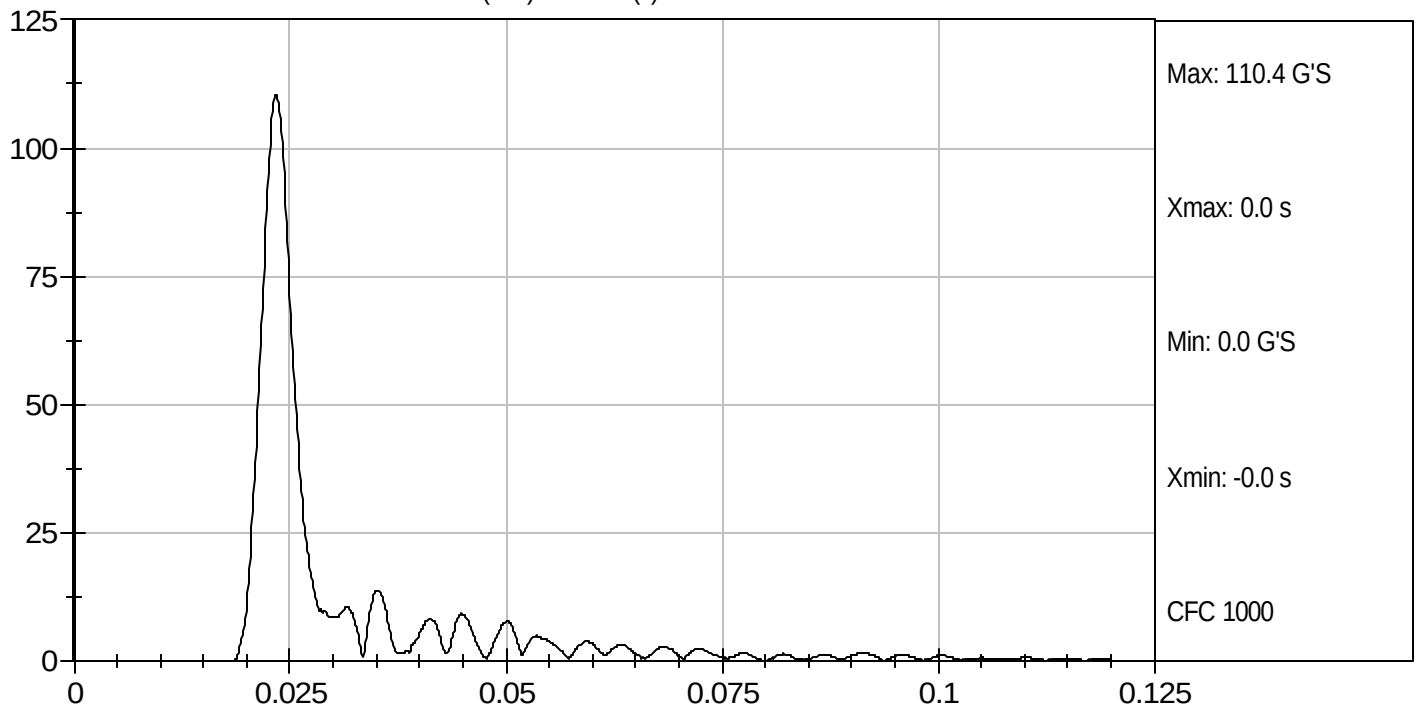

Approved By



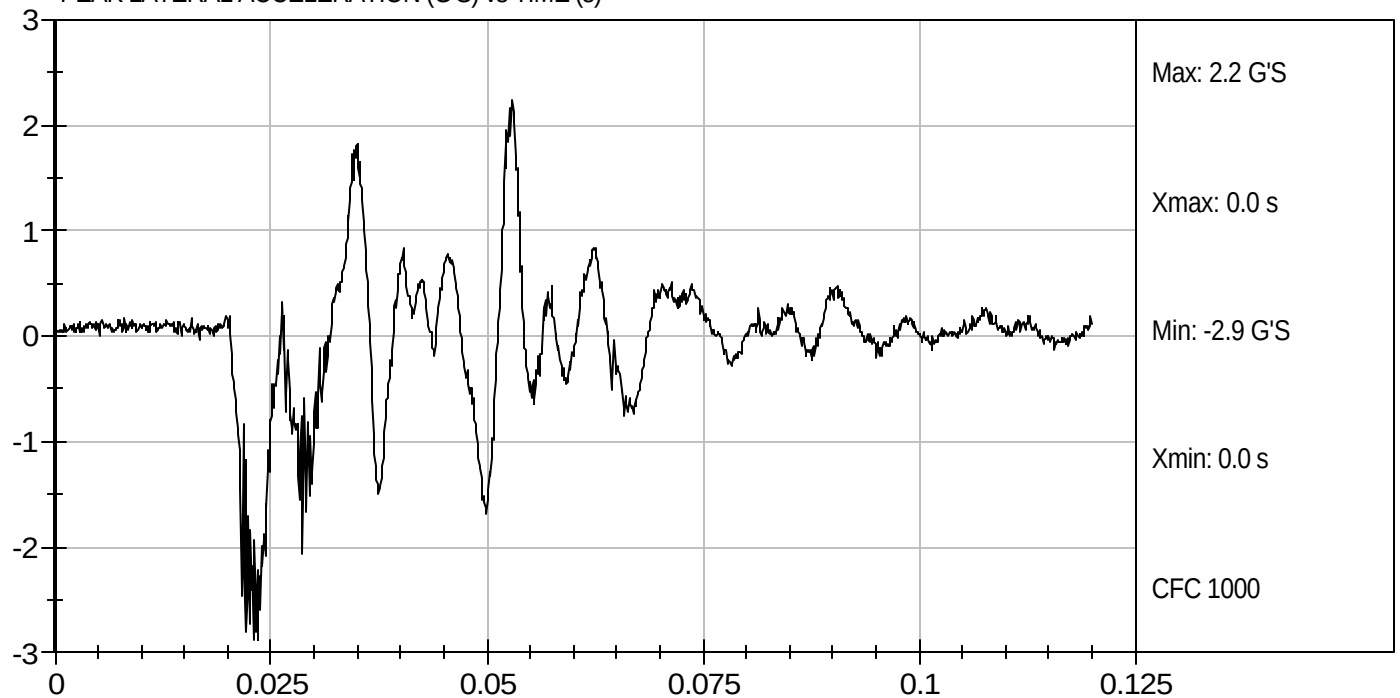
Test Desc: Head Drop
Component ID: D072541

Test Date: 8/23/07
Velocity: 0 ft/s, 0 m/s

PEAK RESULTANT ACCELERATION (G'S) vs TIME (s)



PEAK LATERAL ACCELERATION (G'S) vs TIME (s)



MGA RESEARCH CORPORATION
NECK FLEXION TEST
CRABI 12 MONTH

ATD Serial No: 093

Test I.D: D072542

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	20.8	Pass
Humidity		%	10 to 70	46	Pass
Impact Velocity		m/s	5.1 to 5.3	5.2	Pass
Pendulum Deceleration	10 msec	m/s	1.6 to 2.3	1.9	Pass
	20 msec	m/s	3.4 to 4.2	3.6	Pass
	25 msec	m/s	4.3 to 5.2	4.4	Pass
D Plane Rotation		deg	75.0 to 86.0	83.1	Pass
Moment About Occipital Condyle		Nm	36.0 to 45.0	40.2	Pass
Positive Moment - Time Curve Decay to 5 Nm		msec	60 to 80	74	Pass
Overall Test Results				Pass	



Laboratory Technician

8/23/07

Test Date



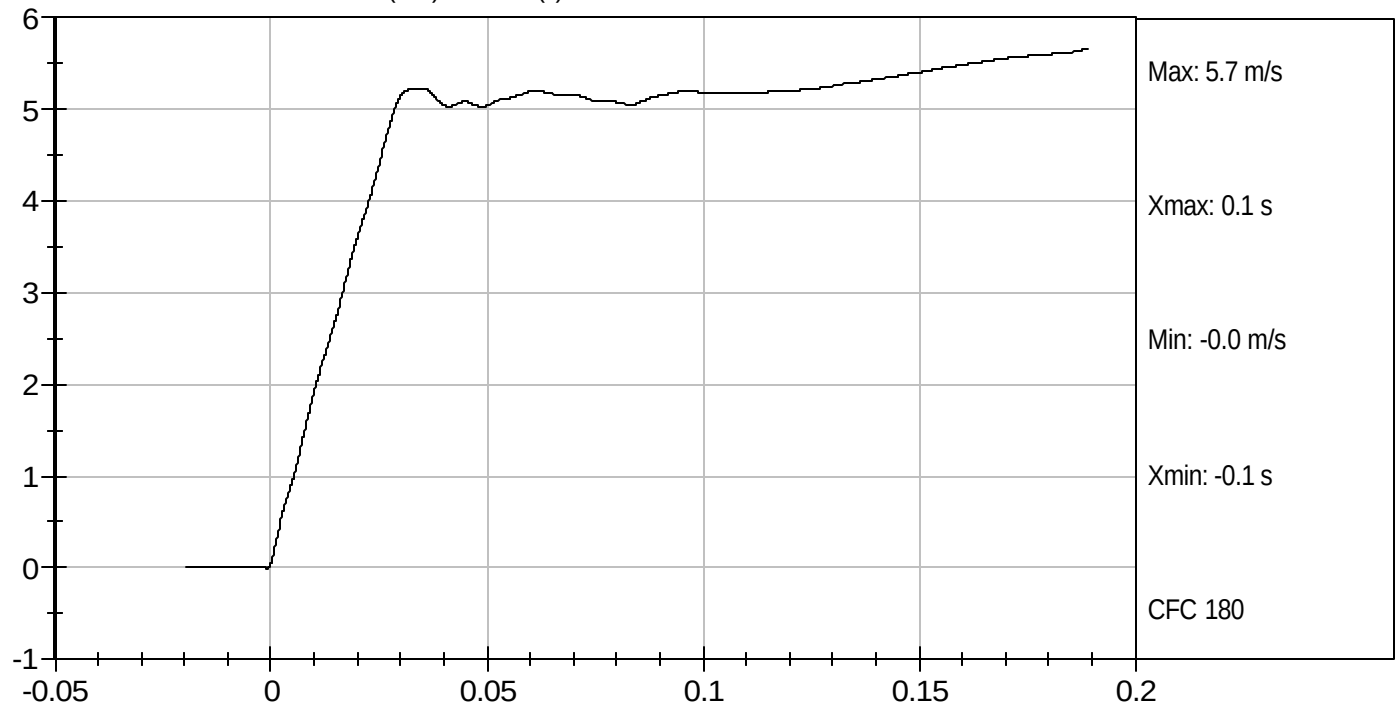
Approved By



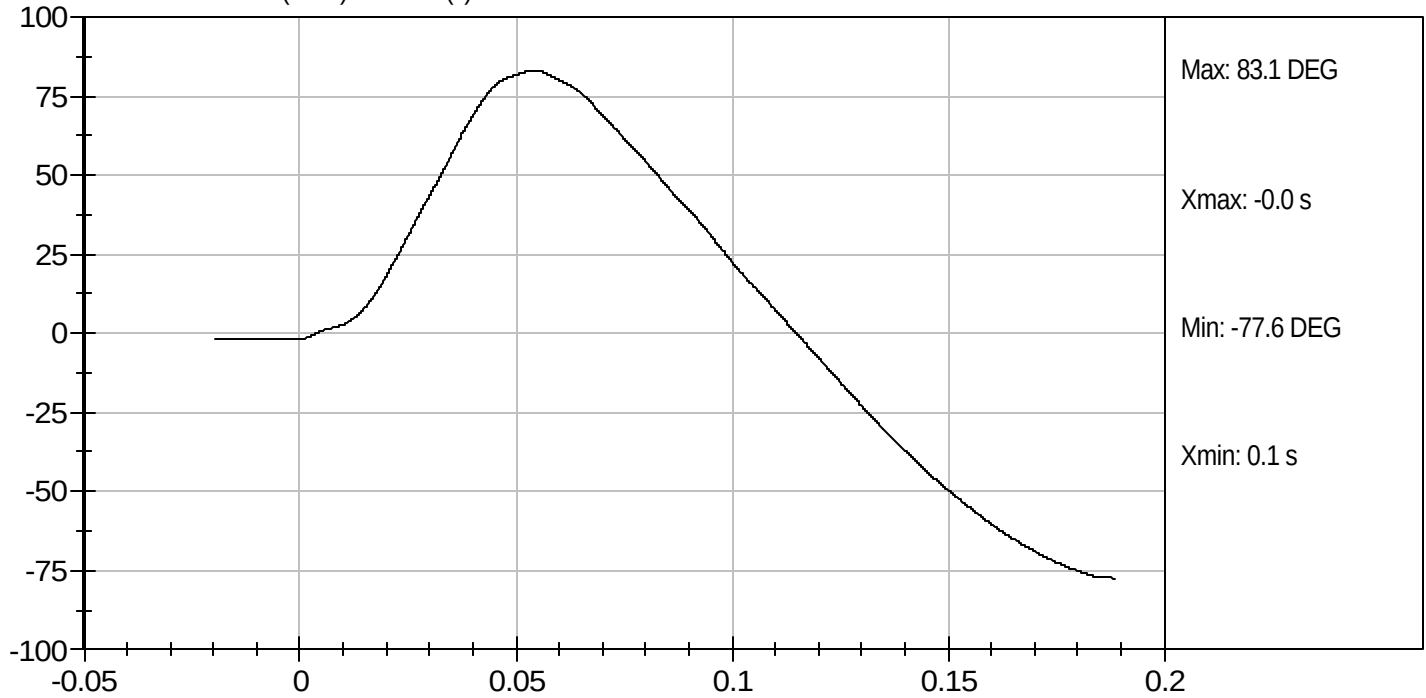
Test Desc: Neck Flexion
Component ID: D072542

Test Date: 8/23/07
Velocity: 17.006 ft/s, 5.2 m/s

PENDULUM DECELERATION (m/s) vs TIME (s)



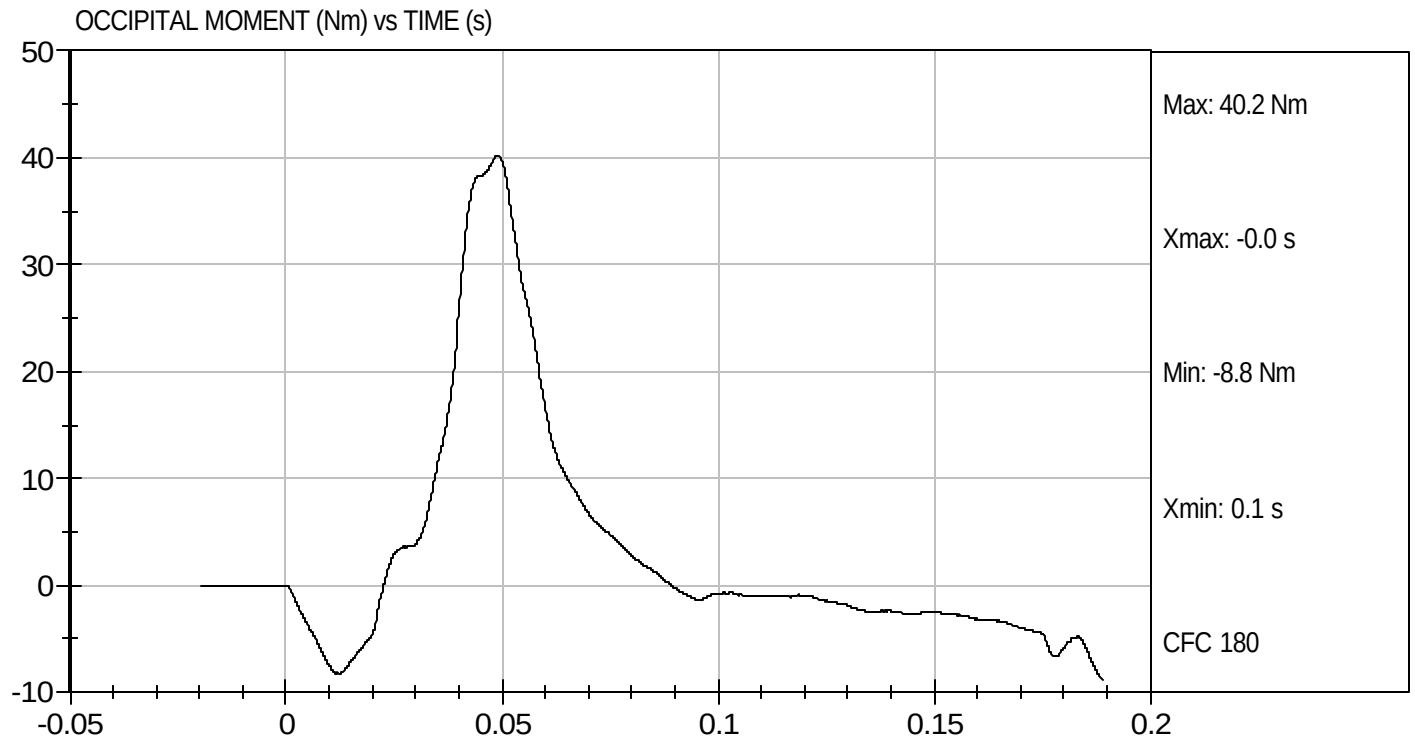
FLEXION ANGLE (DEG) vs TIME (s)





Test Desc: Neck Flexion
Component ID: D072542

Test Date: 8/23/07
Velocity: 17.006 ft/s, 5.2 m/s



MGA RESEARCH CORPORATION
NECK EXTENSION TEST
CRABI 12 MONTH

ATD Serial No: 093

Test I.D: D072543

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	20.8	Pass
Humidity		%	10 to 70	46	Pass
Pendulum Speed		m/s	2.4 to 2.6	2.5	Pass
Pendulum Deceleration	6 msec	m/s	0.8 to 1.2	1.0	Pass
	10 msec	m/s	1.5 to 2.1	2.0	Pass
	14 msec	m/s	2.2 to 2.9	2.3	Pass
D Plane Rotation		deg	80.0 to 92.0	80.3	Pass
Moment About Occipital Condyle		Nm	-23.0 to -12.0	-19.1	Pass
Negative Moment - Time Curve Decay to -5 Nm		msec	76 to 90	77	Pass
Overall Test Results				Pass	


 Laboratory Technician

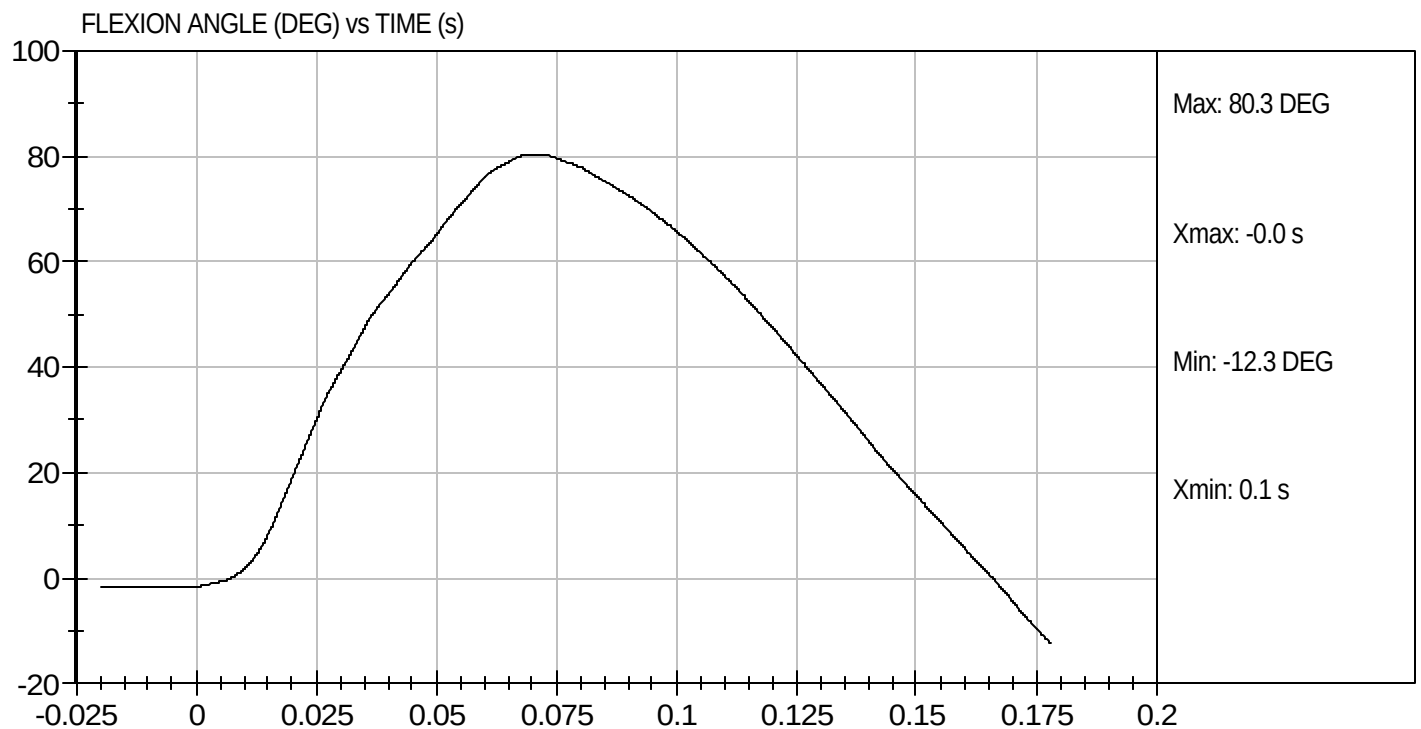
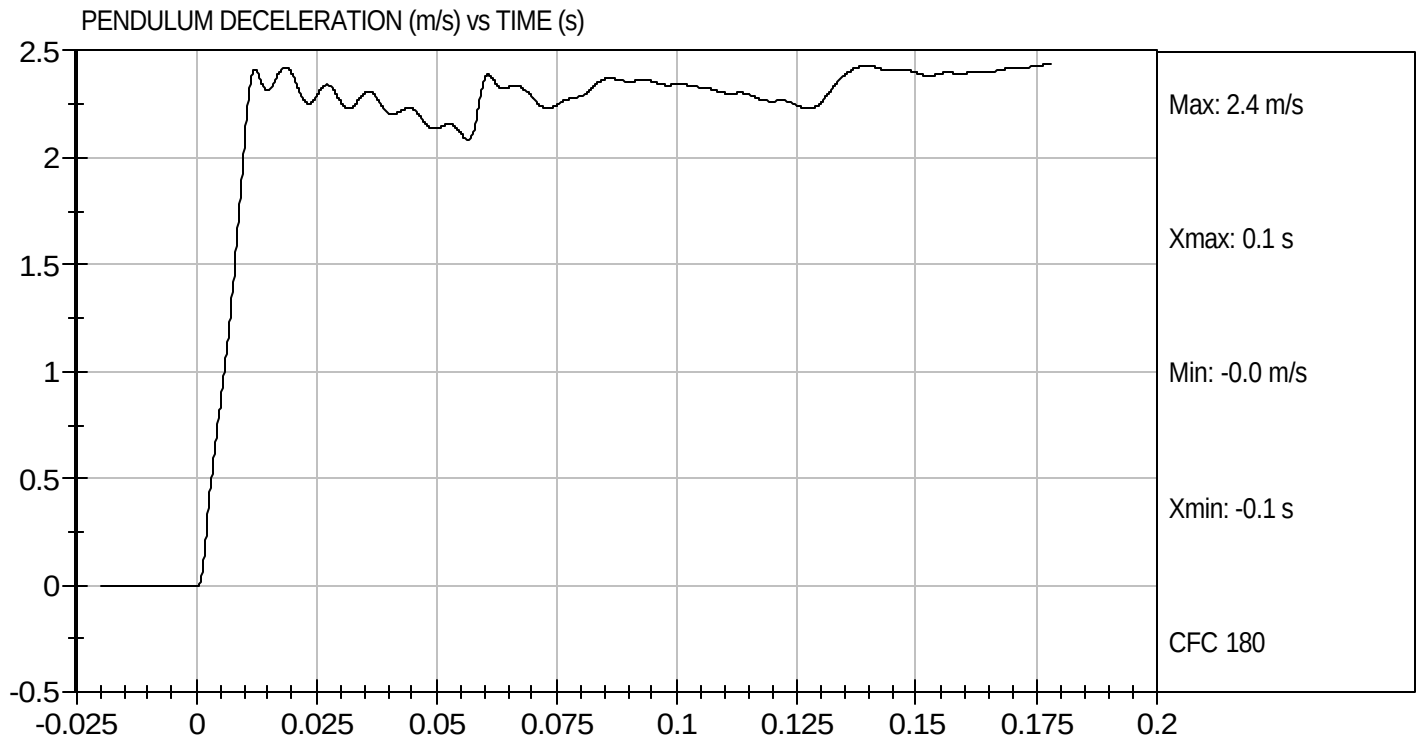
8/23/07
 Test Date


 Approved By



Test Desc: Neck Extension
Component ID: D072543

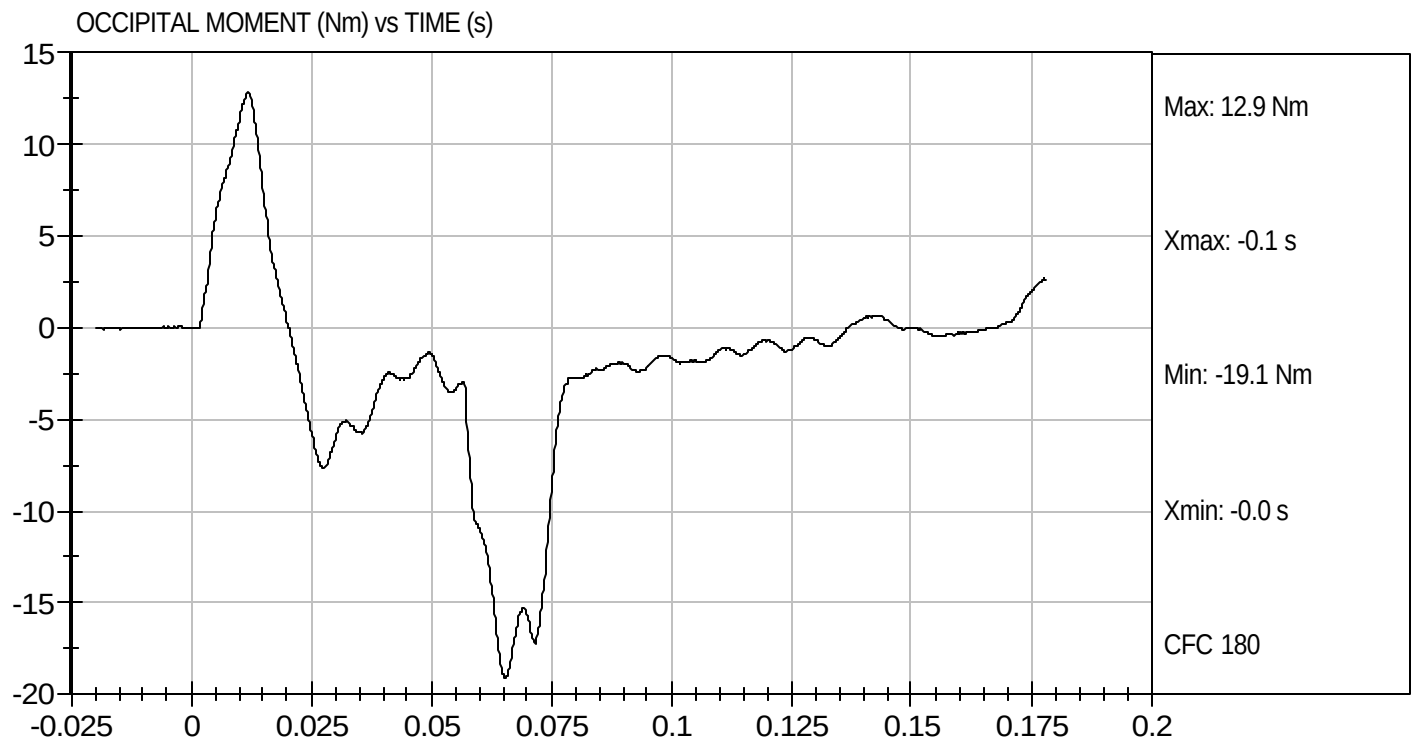
Test Date: 8/23/07
Velocity: 8.33 ft/s, 2.5 m/s





Test Desc: Neck Extension
Component ID: D072543

Test Date: 8/23/07
Velocity: 8.33 ft/s, 2.5 m/s



MGA RESEARCH CORPORATION
THORAX IMPACT TEST
CRABI 12 MONTH

ATD Serial No: 093

Test I.D: D072544

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	20.6	Pass
Laboratory Relative Humidity	%	10 to 70	43	Pass
Probe Speed	m/sec	4.9 to 5.1	5.03	Pass
Probe Force	kN	1.51 to 1.80	1.55	Pass
Overall Test Results				Pass


Laboratory Technician

8/23/07

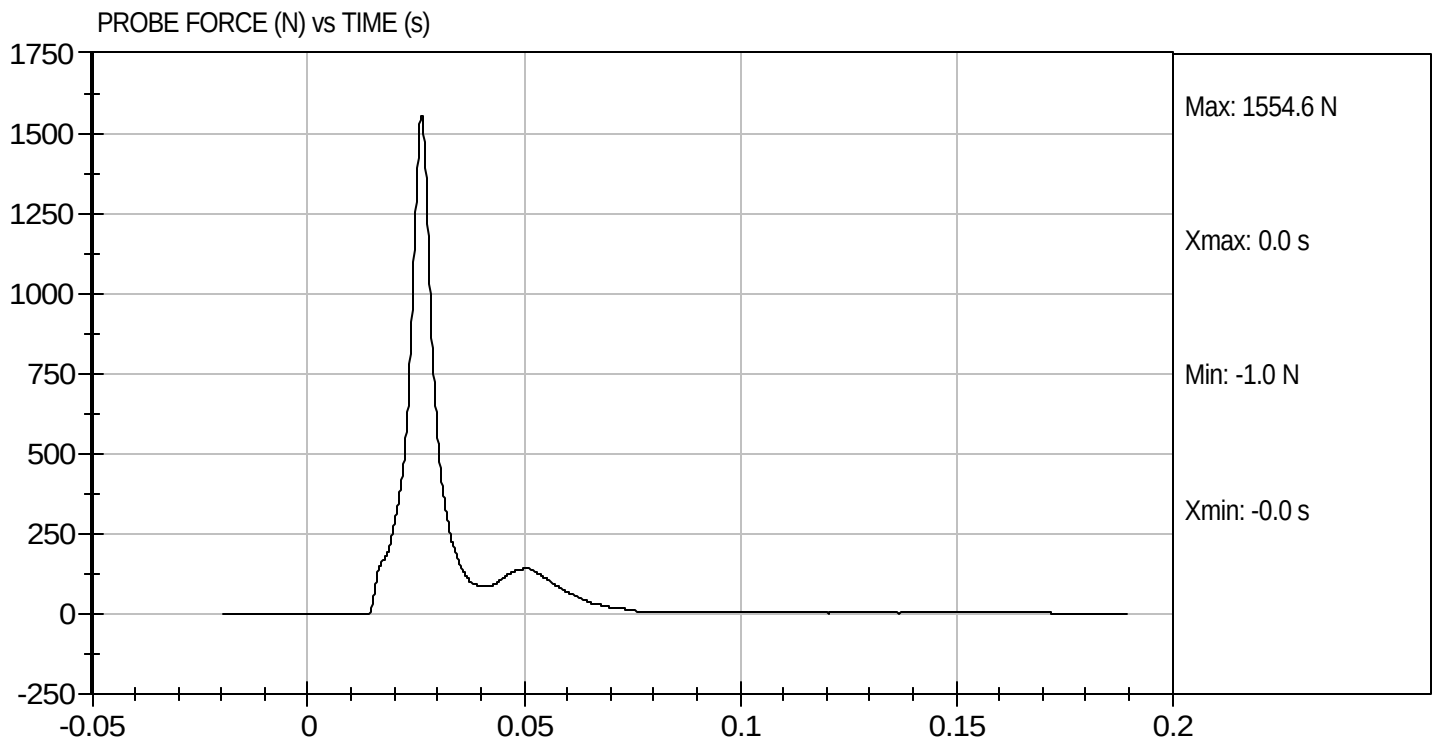
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D072544

Test Date: 8/23/07
Velocity: 16.5 ft/s, 5.03 m/s

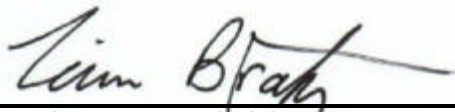


MGA RESEARCH CORPORATION
REAR HEAD DROP TEST
CRABI 12 MONTH

ATD Serial No: 093

Test ID: D072545

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	47	Pass
Peak Resultant Acceleration	G's	55 to 71	69	Pass
Peak Lateral Acceleration	G's	+/- 15	3	Pass
Unimodal	N/A	within 17% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician


Approved By

8/23/07
Test Date



Test Desc: Head Drop
Component ID: D072545

Test Date: 8/23/07
Velocity: 0 ft/s, 0 m/s

