

REPORT NUMBER: NCAPSIDE-MGA-2007-001

**NEW CAR ASSESSMENT PROGRAM
SIDE IMPACT TEST**

**KIA MOTORS CORPORATION
2006 KIA OPTIMA LX
NHTSA NUMBER: M60519**

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



Test Date: September 22, 2006

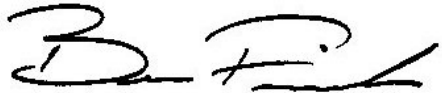
Report Date: October 13, 2006

FINAL REPORT

**PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
RULEMAKING
OFFICE OF CRASHWORTHINESS STANDARDS
400 SEVENTH STREET, SW, ROOM 5311
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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15. <i>Supplementary Notes</i>																								
16. <i>Abstract</i> A 55/28 km/h 90° Moving Deformable Barrier NCAP side impact was conducted on the subject 2006 Kia Optima LX 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 22, 2006. The impact velocity of the Moving Deformable Barrier (MDB) was 62.1 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 352 mm at level 2. 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;">40.9</td> <td style="text-align: center;">52.1</td> </tr> <tr> <td>Left Lower Rib (LLR) Accel., g</td> <td style="text-align: center;">38.7</td> <td style="text-align: center;">59.7</td> </tr> <tr> <td>Lower Spine (T₁₂) Accel., g</td> <td style="text-align: center;">52.3</td> <td style="text-align: center;">49.9</td> </tr> <tr> <td>Thoracic Trauma Index (TTI)</td> <td style="text-align: center;">47</td> <td style="text-align: center;">55</td> </tr> <tr> <td>Pelvis (PEV) Accel., g</td> <td style="text-align: center;">68.3</td> <td style="text-align: center;">73.3</td> </tr> <tr> <td>HIC</td> <td style="text-align: center;">187</td> <td style="text-align: center;">508</td> </tr> </tbody> </table>					<u>DRIVER</u>	<u>PASS.</u>	Left Upper Rib (LUR) Accel., g	40.9	52.1	Left Lower Rib (LLR) Accel., g	38.7	59.7	Lower Spine (T ₁₂) Accel., g	52.3	49.9	Thoracic Trauma Index (TTI)	47	55	Pelvis (PEV) Accel., g	68.3	73.3	HIC	187	508
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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.																								
17. <i>Key Words</i> New Car Assessment Program (NCAP) Side Impact Side Impact Hybrid III Dummy (SID/HIII) Occupant Side Impact Protection		18. <i>Distribution Statement</i> Copies of this report are available from: National Highway Traffic Safety Adm. Technical Ref. Division, Room 5108 (NPO-230) 400 Seventh Street, S.W. 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' 2006 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 2006 Kia Optima LX manufactured by Kia Motors 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 2006 Kia Optima LX 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 62.1 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 1665.2 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 22, 2006.

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/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 (20) structural accelerometers and the MDB was instrumented with six (6) 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 352 mm at level 2, 1050 mm rearward of the left vertical impact point. The driver and passenger SID/HIIIs, Serial Nos. 272 and 904 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.

The occupant data is summarized below:

ATD position	HIC	T ¹	T ²	TTI (G's)	Peak Pelvis (G's)
Driver	187	39.4	67.4	47	68.3
Passenger	508	49.4	64.4	55	73.3

SUPPLEMENTAL RESTRAINT INFORMATION

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

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

TEST NOTES

No valid data was collected for the following:

Passenger Lower Spine Yr after 110 msec.
Left Lower A-Post Y

DATA SHEET NO. 1**GENERAL TEST AND VEHICLE PARAMETER DATA**Test Vehicle: 2006 Kia Optima LXNHTSA No. M60519Test Program: NCAP Side ImpactTest Date: 9/22/2006**TEST VEHICLE INFORMATION**

Make	Kia
Model	Optima LX
Body Style	Sedan
NHTSA No.	M60519
VIN	KNAGE123765073730
Color	Black
Delivery Date	9/06/06
Odometer Reading (mile)	33
Dealer	Ricart Automotive
Transmission	Automatic
Final Drive	Front
Number of Cylinders	4
Engine Displacement (L)	2.4
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	No
All Wheel Drive	No
Power Seats	No
Pretensioners	Yes
Load Limiters	Yes
Bucket Seats	Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Kia Motors Corporation
Date of Manufacture	06/06

GVWR (kg)	1930
GAWR Front (kg)	1120
GAWR Rear (kg)	1020

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench		
Number Of Occupants	2	3		5
Capacity Wt. (VCW) (kg)				375
Cargo Wt. (RCLW) (kg)				35

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

Test Vehicle: 2006 Kia Optima LX
 Test Program: NCAP Side Impact

NHTSA No. M60519
 Test Date: 9/22/2006

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	454.1	281.2		509.4	363.3	
Right	kg	443.6	296.2		441.4	351.1	
Ratio	%	60.9	39.1		57.1	42.9	
Totals	kg	897.7	577.4	1475.1	950.8	714.4	1665.2

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1475.1
Weight of 2 P572M ATDs	kg	161.5
Rated Cargo/Luggage Weight (RCLW)	kg	35
Calculated Vehicle Target Weight (TVTW)	kg	1671.6

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

Weight of Ballast in Cargo Area: None

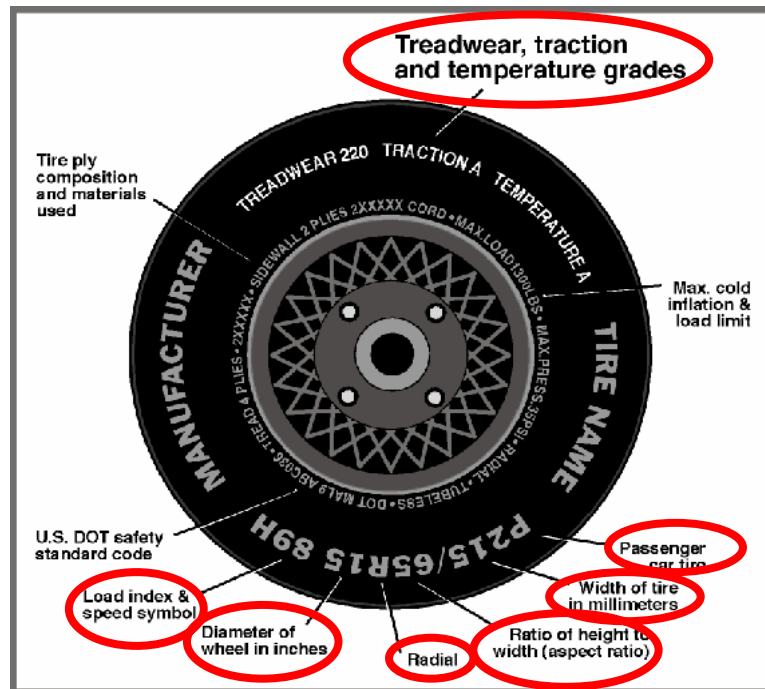
TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	697	701	706	703	1066
As Tested	mm	681	693	671	678	1169
Fully Loaded	mm	679	693	669	678	

TEST VEHICLE VERTICAL IMPACT LINE DATA

Measurement Description	Units	Value
Test Vehicle Wheel Base	mm	2724
Target Impact Point Aft of Front Axle	mm	422
Actual Impact Point Aft of Front Axle	mm	428

DATA SHEET NO. 2
TEST VEHICLE TIRE INFORMATION



DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold / Test Pressure (kPa)	210	210
Recommended Tire Size	205/60R16	205/60R16
Tire Size on Vehicle	205/60R16	205/60R16
Tire Manufacturer	Kumho	Kumho
Tire Name	Solus KH16	Solus KH16
Tire Type	M+S	M+S
Tire Width (mm)	205	205
Ratio of Height to Width (aspect ratio)	60	60
Radial	R	R
Wheel Diameter	16	16
Load Index & Speed Symbol	91H	91H
Treadwear	440	440
Traction Grade	AA	AA
Temperature Grade	A	A

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

Test Vehicle: 2006 Kia Optima LX
 Test Program: NCAP Side Impact

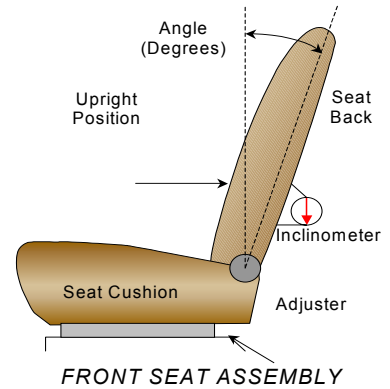
NHTSA No. M60519
 Test Date: 9/22/2006

NORMAL DESIGN RIDING POSITION

The driver and passenger seat back is positioned to the manufacturer's designated angle. The procedure is as follows:
 Adjust the back to the 12th latch position from the initial lock position.

Driver seat back angle: 12th notch (1st as 1)

Passenger seat back angle: non adjustable

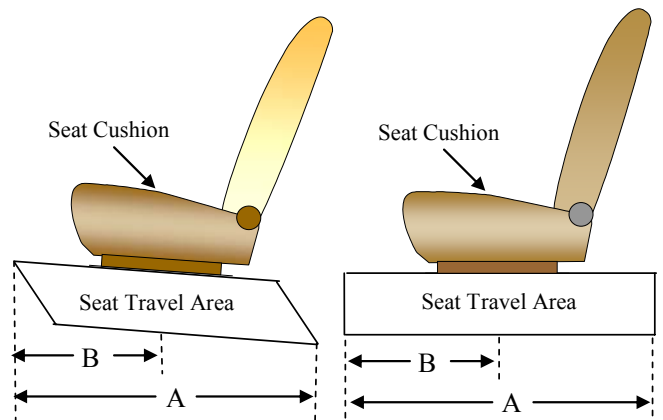


SEAT FORE/AFT POSITIONS

The seat should be positioned at the 13th lock position from the fore 1st lock position, then the distance between the end of track upper rail and track lower rail is to be 240 mm.

SEAT FORE/AFT POSITIONS

	Total Fore/Aft Travel	Placed in position #
Driver Seat	25 positions	13 th position
Rear Seat	non adjustable	non adjustable



DATA SHEET NO. 3 (CONTINUED)

TEST VEHICLE INFORMATION

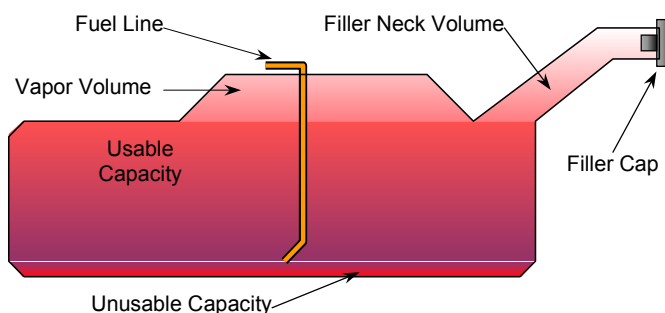
Test Vehicle: 2006 Kia Optima LX
Test Program: NCAP Side Impact

NHTSA No. M60519
Test Date: 9/22/2006

FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	62.0
Usable Capacity of "Optional" Tank	
92-94% of Usable Capacity	57.0 to 58.2
Actual Amount of Solvent used	57.3
1/3 of Usable Capacity	20.7

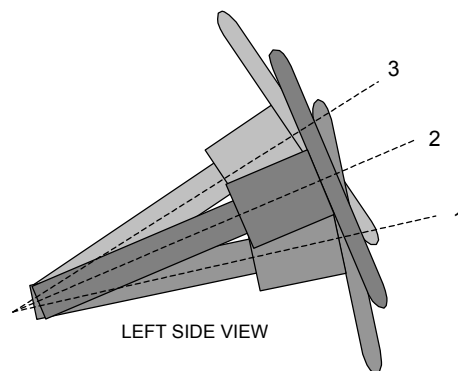
The vehicle is equipped with electric fuel pump.



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

	Fore/Aft (mm)	Degrees
Lowermost position No. 1		65.2
Geometric center position No. 2		67.3
Uppermost position No. 3		69.5

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

Test Vehicle: 2006 Kia Optima LX
Test Program: NCAP Side Impact

NHTSA No. M60519
Test Date: 9/22/2006

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	62.1
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	62.1
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	6 right
Vertical Offset	mm	+/-20	7 up

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

Test Vehicle: 2006 Kia Optima LX
 Test Program: NCAP Side Impact

NHTSA No. M60519
 Test Date: 9/22/2006

TEST DUMMY INFORMATION AND CONTACT POINTS

Description	Front Seat SID/HIII	Rear Seat SID/HIII
Dummy Type / Serial No.	SID HIII / 272	SID HIII / 904
Head Contact	Curtain Airbag, Headrest	Curtain Airbag, Headliner, Headrest
Upper Torso Contact	Side Airbag	Door Panel
Lower Torso Contact	Side Airbag	Door Panel
Left Knee Contact	Door Panel	Door Panel
Right Knee 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	Cracked
Window Damage	Cracked
Other Notable Effects	None

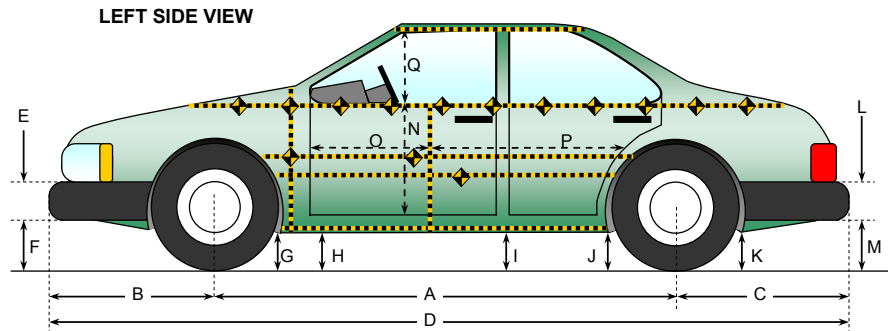
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Occupant Location 01		Occupant Location 04	
	Installed	Operation	Installed	Operation
Front Airbag	Yes	No	None	
Side Torso Airbag	Yes	Yes	None	
Head Airbag	None		None	
Curtain Airbag	Yes	Yes	Yes	Yes
Seat Belt Pretensioner	Yes		None	
Seat Belt Load Limiter	Yes		None	

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

Test Vehicle: 2006 Kia Optima LX
 Test Program: NCAP Side Impact

NHTSA No. M60519
 Test Date: 9/22/2006



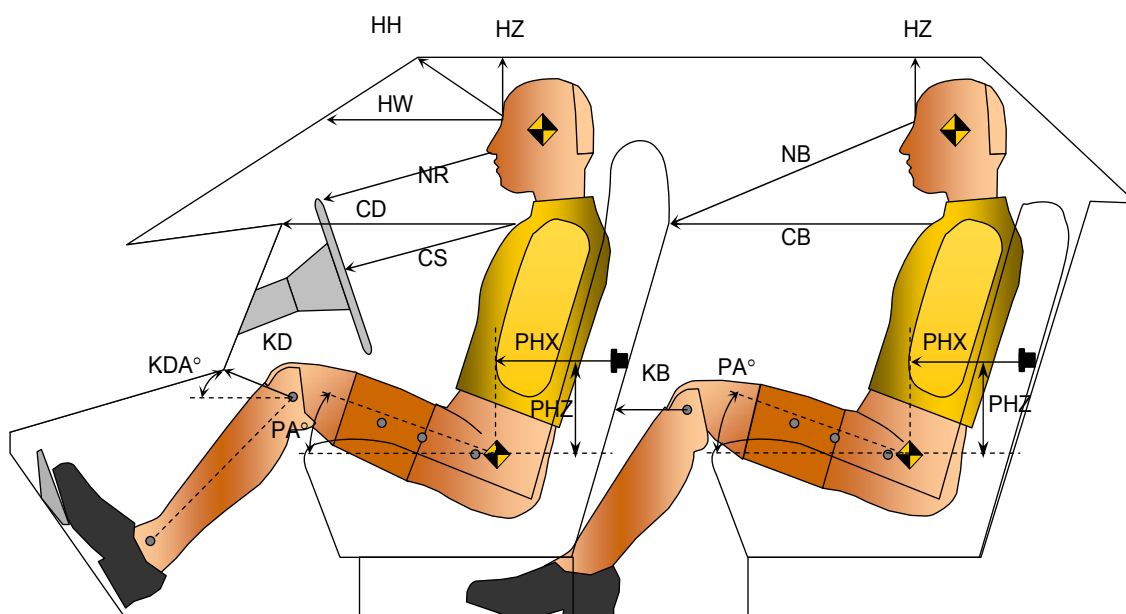
All Measurements in mm

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2724	2694	30
B	Front Axle to FSOV	853	858	-5
C	Rear Axle to RSOV	1061	1065	-4
D	Total Length at Centerline	4638	4617	21
E	Front Bumper Thickness	122	121	1
F	Front Bumper Bottom to Ground	241	258	-17
G	Sill Height at Front Wheel Well	172	172	0
H	Sill Height at Front Door Leading Edge	171	192	-21
I	Sill Height at "B" Pillar	171	174	-3
J1	Sill Height at Rear Wheel Well	169	156	13
J2	Pinch Weld Height at Rear Wheel Well	170	157	13
K	Sill Height Aft of Rear Wheel Well	231	221	10
L	Rear Bumper Thickness	216	214	2
M	Rear Bumper Bottom to Ground	278	173	105
N	Sill Height to Window Bottom Sill	712	667	45
O	Front Door Leading Edge to Impact CL	797	768	29
P	Rear Door Trailing Edge to Impact CL	1191	1145	46
Q	Front Window Opening	401	399	2
R	Right Side Length	3962	3962	0
S	Left Side Length	3962	3904	58
T	Vehicle Width at "B" Post	1798	1516	282

DATA SHEET NO. 7
SID/HII LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2006 Kia Optima LX
 Test Program: NCAP Side Impact

NHTSA No. M60519
 Test Date: 9/22/2006

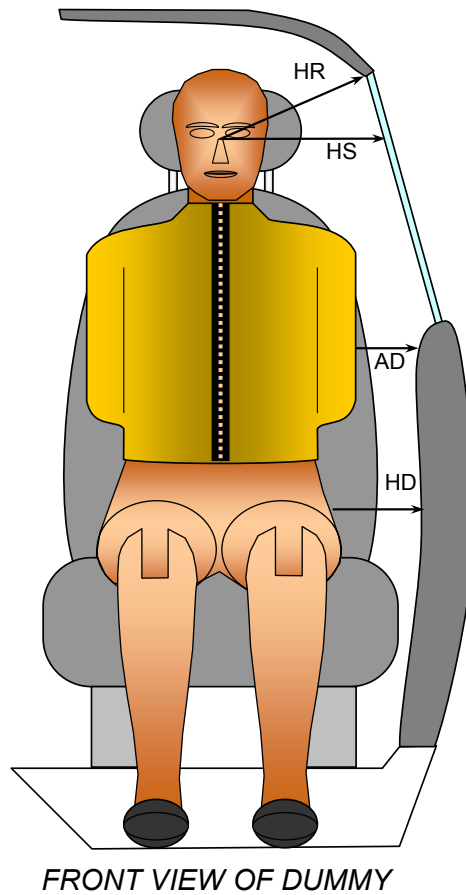


Driver Code	Pass. Code	Measurement Description	Driver S/N 272		Passenger S/N 904	
			Length(mm)	Angle(°)	Length(mm)	Angle(°)
HH		Head to Header	390			
HW		Head to Windshield	612			
HZ	HZ	Head to Roof	184		149	
NR	NB	Nose to Rim/Nose to Seatback	462		664	
CD	CB	Chest to Dash or Seatback	548		591	
CS		Chest to Steering Wheel	338			
KDL	KBL	Left Knee to Dash or Seatback	175	40.2	231	31.6
KDR	KBR	Right Knee to Dash or Seatback	149	33.8	236	34.9
PA	PA	Pelvic Angle		24.9		24.6
PHX	PHX	H-Point to Striker (X-Axis)	230		231	
PHZ	PHZ	H-Point to Striker (Z-Axis)	168		317	

DATA SHEET NO. 8
SID/HIII LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2006 Kia Optima LX
 Test Program: NCAP Side Impact

NHTSA No. M60519
 Test Date: 9/22/2006

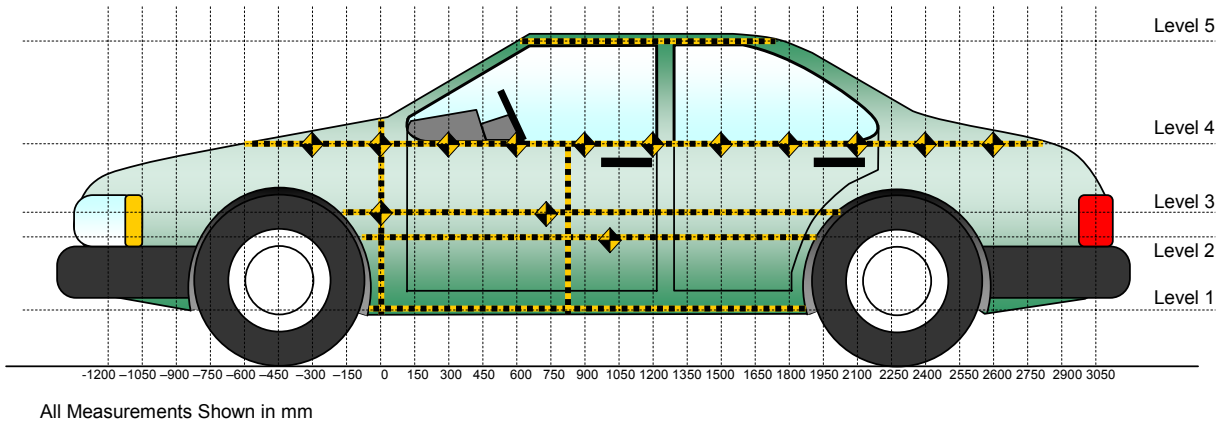


Code	Measurement Description	Units	Driver S/N 272	Passenger S/N 904
HR	Head to Side Header	mm	203	208
HS	Head to Side Window	mm	327	314
AD	Arm to Door	mm	127	131
HD	H-Point to Door	mm	154	202

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

Test Vehicle: 2006 Kia Optima LX
 Test Program: NCAP Side Impact

NHTSA No. M60519
 Test Date: 9/22/2006



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	66	1200	1413
4	Window Sill	224	1200	962
3	Mid Door	302	1200	636
2	Occupant H-Point	352	1050	552
1	Sill Top	188	1350	263
	Maximum Penetration	352		

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

Test Vehicle: 2006 Kia Optima LX
 Test Program: NCAP Side Impact

NHTSA No. M60519
 Test Date: 9/22/2006

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-750				332					333					1	
-600				320					326					6	
-450				307					325					18	
-300				297					334					37	
-150			195	290				237	321				42	31	
0	264	207	207	284		326	279	276	316		62	72	69	32	
150	260	207	206	284		386	454	410	335		126	247	204	51	
300	260	205	205	285		401	492	439	356		141	287	234	71	
450	259	205	204	283		414	495	472	383		155	290	268	100	
600	259	205	203	282		432	507	470	414		173	302	267	132	
750	260	204	203	281	530	447	521	481	448	554	187	317	278	167	24
900	262	204	203	280	525	446	542	488	466	556	184	338	285	186	31
1050	261	204	203	281	523	446	556	503	478	571	185	352	300	197	48
1200	263	205	204	285	521	448	533	506	509	587	185	328	302	224	66
1350	263	205	204	289	523	451	539	501	506	588	188	334	297	217	65
1500	260	205	205	290	522	442	538	486	494	578	182	333	281	204	56
1650	260	206	206	294	520	400	518	464	483	566	140	312	258	189	46
1800	261	208	208	295	521	389	484	429	430	552	128	276	221	135	31
1950		205	209	298	532		283	380	378	549		78	171	80	17
2100			200	303				241	334				41	31	
2250				308					344					36	
2400				316					346					30	
2550				323					347					24	
2700				332					351					19	
2850				345					354					9	
3000				360					360					0	

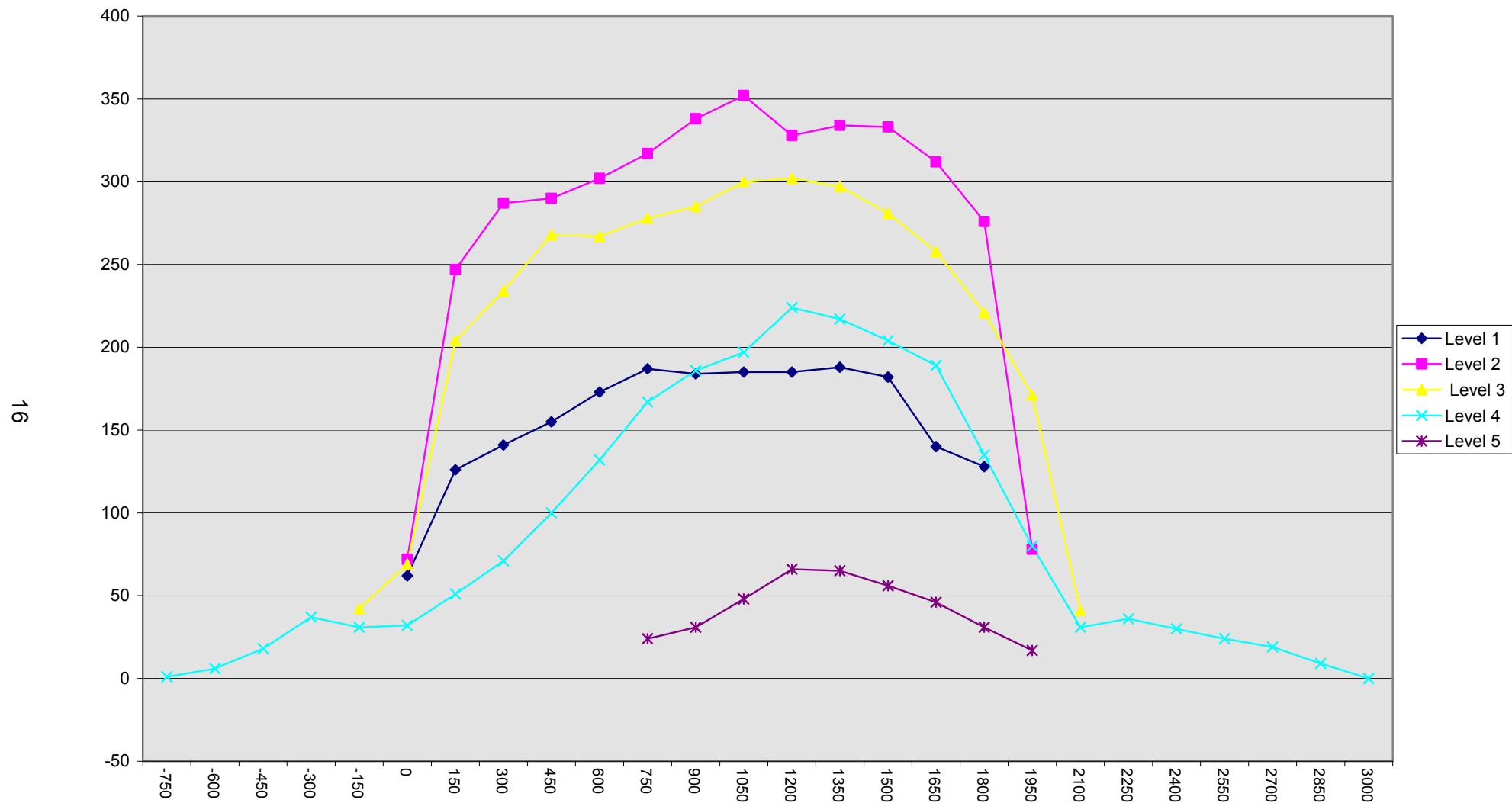
Reference plane is parallel to test vehicle longitudinal centerline.

Given dimensions = Reference plane to car body

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

Test Vehicle: 2006 Kia Optima LX
Test Program: NCAP Side Impact

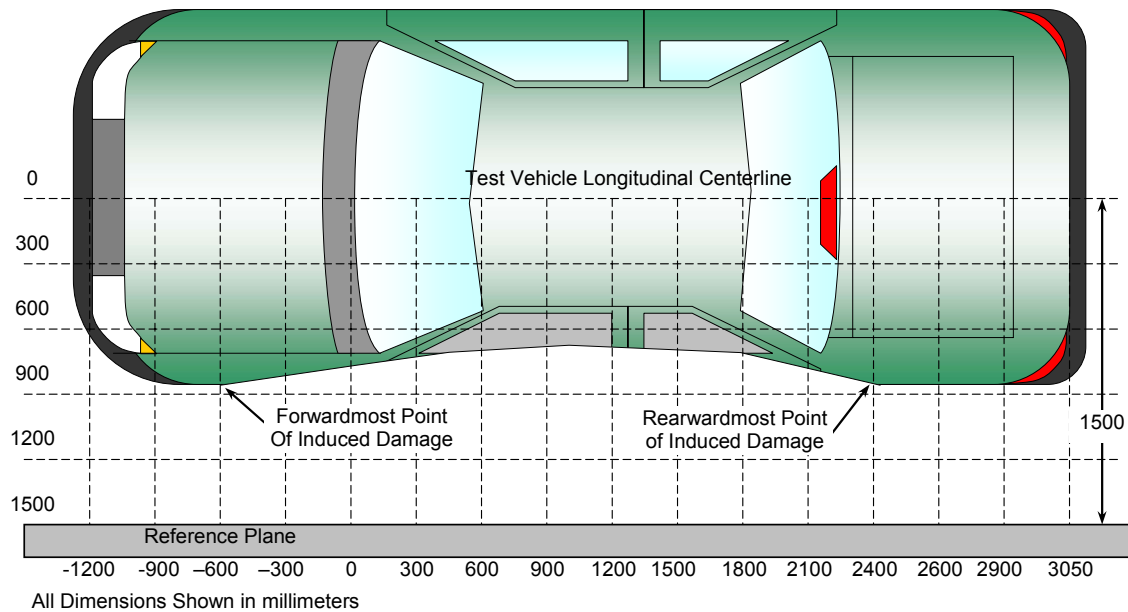
NHTSA No. M60519
Test Date: 9/22/2006



DATA SHEET NO. 11
VEHICLE DAMAGE PROFILE DISTANCES

Test Vehicle: 2006 Kia Optima LX
 Test Program: NCAP Side Impact

NHTSA No. M60519
 Test Date: 9/22/2006



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	360	360	0
2	2271	4	312	343	31
3	1426	2	205	537	332
4	702	2	204	511	307
5	-19	2	207	272	65
6	-750	4	332	333	1

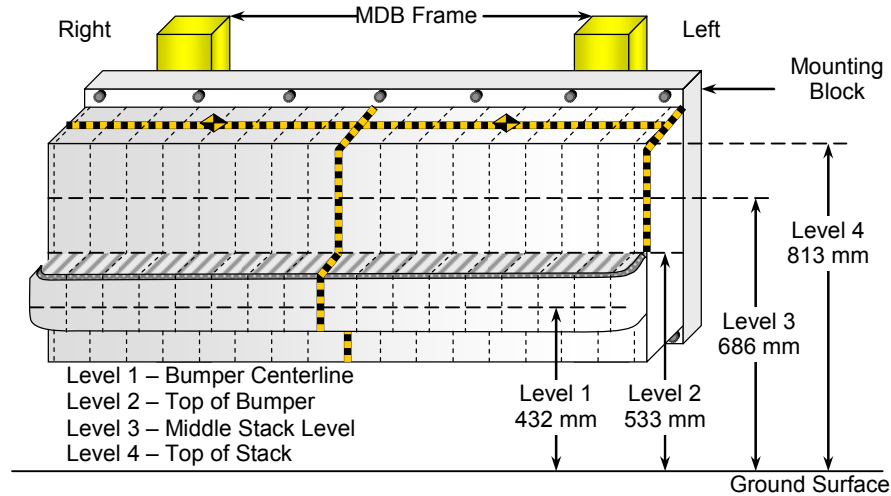
Reference plane is parallel to test vehicle longitudinal centerline.
 Given dimensions = Reference plane to car body.

DATA SHEET NO. 12

DEFORMABLE BARRIER HONEYCOMB FACE STATIC CRUSH

Test Vehicle: 2006 Kia Optima LX
 Test Program: NCAP Side Impact

NHTSA No. M60519
 Test Date: 9/22/2006



DEFORMABLE BARRIER STATIC CRUSH

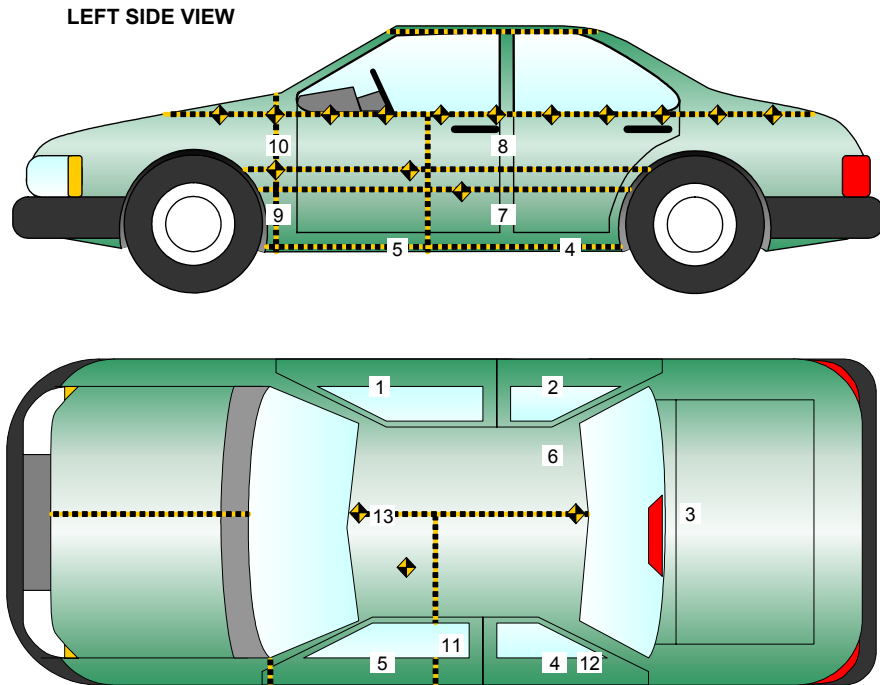
Stack Level	Distance Right of Center								C _L	Distance Left of Center							
	800	700	600	500	400	300	200	100		100	200	300	400	500	600	700	800
1	35	13	13	21	34	47	49	53	58	63	66	71	76	80	85	100	117
2	75	31	14	16	19	24	28	31	35	38	42	49	54	57	59	69	79
3	57	24	9	-3	-3	-1	16	10	2	4	6	10	13	19	37	68	108
4	64	20	-5	-4	3	16	40	44	36	22	16	25	38	58	79	103	154

All Dimensions in mm

DATA SHEET NO. 13
VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2006 Kia Optima LX
 Test Program: NCAP Side Impact

NHTSA No. M60519
 Test Date: 9/22/2006



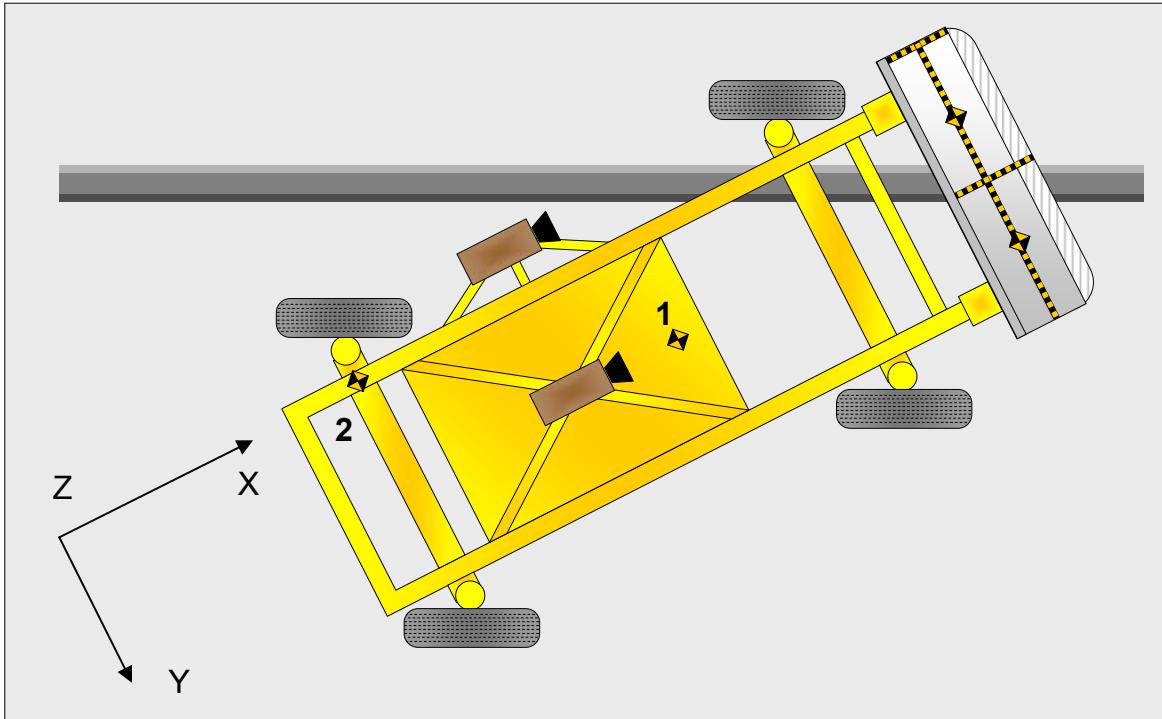
Loc. No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Right Sill at Front Seat	2712	706	200
2	Right Sill at Rear Seat	1638	710	246
3	Rear Floorpan Above Axle	980	0	500
4	Left Sill at Rear Door	1635	-685	260
5	Left Sill at Front Door	2720	-705	196
6	Rear Occupant Compartment	1860	345	366
7	Left Lower B-Post	2276	-740	420
8	Left Middle B-Post	2194	-735	823
9	Left Lower A-Post	3210	-755	482
10	Left Middle A-Post	3240	-820	768
11	Front Seat Track			
12	Rear Seat Track or Structure			
13	Vehicle CG	2736	0	366

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: 2006 Kia Optima LX
 Test Program: NCAP Side Impact

NHTSA No. M60519
 Test Date: 9/22/2006



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: 2006 Kia Optima LX
Test Program: NCAP Side Impact

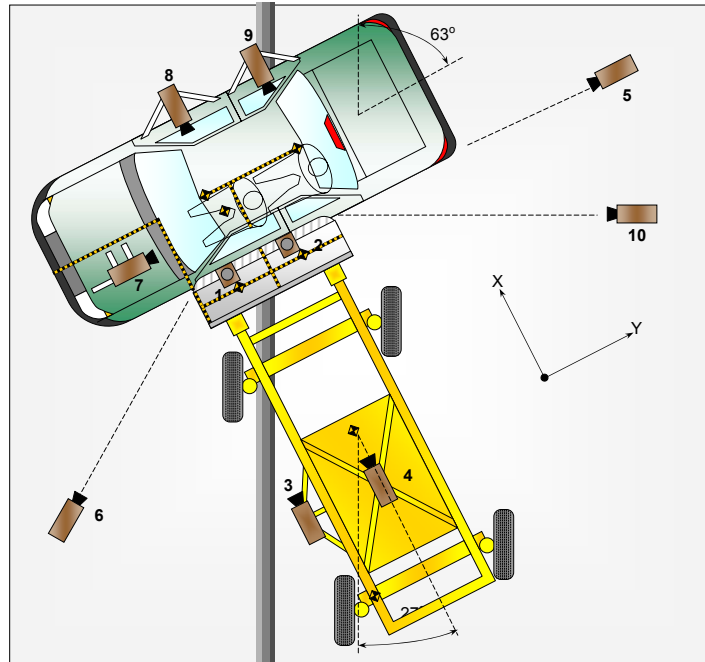
NHTSA No. M60519
Test Date: 9/22/2006

	Elements	Pre-Test (mm)
1	Total Length	4638
2	Total Width	1798
3	Bumper Top Height	536
4	Bumper Bottom Height	413
5	Longitudinal Member Top Height	525
6	Distance between Longitudinal Members	980
7	Longitudinal Member Width	70
8	Engine Top Height	850
9	Engine Bottom Height	187
10	Engine and gearbox width	1000
11	Front bumper-engine distance	460
12	Front shock absorber fixing height	855
13	Bonnet leading edge height	725
14	Front shock absorber fixing width	1180
15	Front bumper – front axle distance	920
16	Front axle – a pillar distance	475
17	A-pillar – B-pillar distance	1100
18	B-Pillar – rear axle distance	1147
19	B-pillar – C-pillar distance	1020
20	Roof sill bottom height	1415
21	Roof sill top height	1475
22	Floor sill bottom height	220
23	Floor sill top height	305

DATA SHEET NO. 16
HIGH SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2006 Kia Optima LX
 Test Program: NCAP Side Impact

NHTSA No. M60519
 Test Date: 9/22/2006



No.	Camera View	Location (mm)			Lens (mm)	Film Speed (fps)
		X	Y	Z		
1	Overhead Close-up	710	-160	4840	50	1000
2	Overhead Overall	-740	1170	4840	14	1000
3	MDB Onboard, Impact Point Close-up				50	1000
4	MDB Onboard, Centerline of Impact				25	1000
5	Right Side, Ground Level, Overall	-3055	6410	1220	24	1000
6	Left Side, Ground Level, Overall	2705	-3930	1095	24	1000
7	Vehicle Onboard Front SID/HIII, Front				12.5	1000
8	Vehicle Onboard Front SID/HIII, Side				10	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: 2006 Kia Optima LX
 Test Program: NCAP Side Impact

NHTSA No. M60519
 Test Date: 9/22/2006

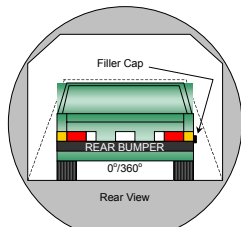
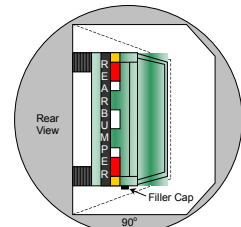
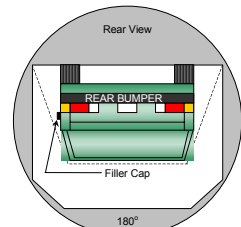
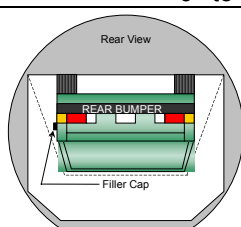
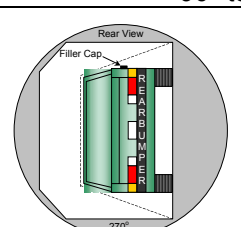
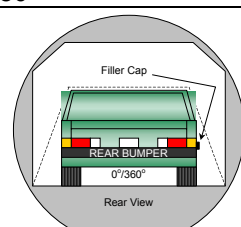
FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 21° C Test Time: 11:08 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°	120	300	First 5	0
90° to 180°	115	300	First 5	0
180° to 270°	119	300	First 5	0
270° to 360°	120	300	First 5	0

APPENDIX A
PHOTOGRAPHS

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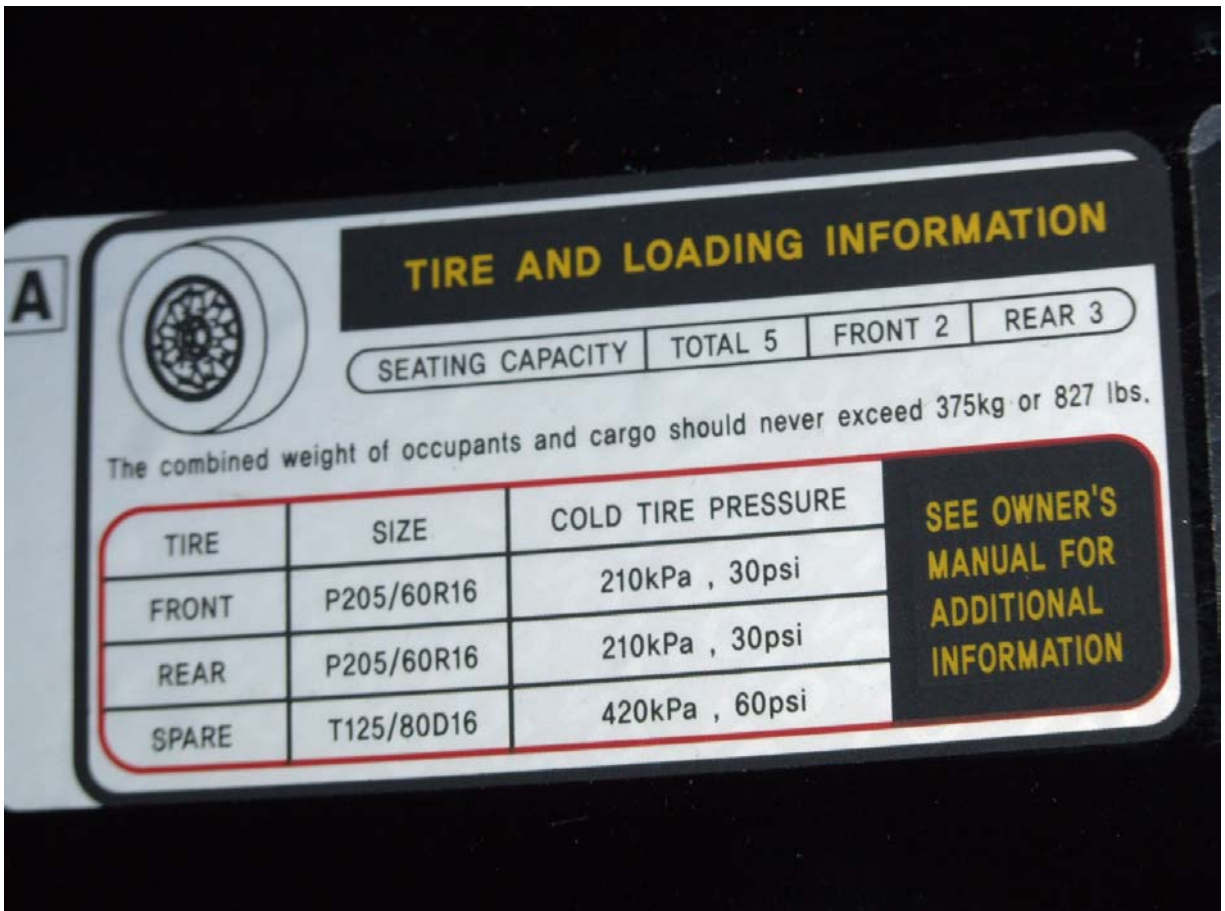
Left Front $\frac{3}{4}$ View, As Received



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



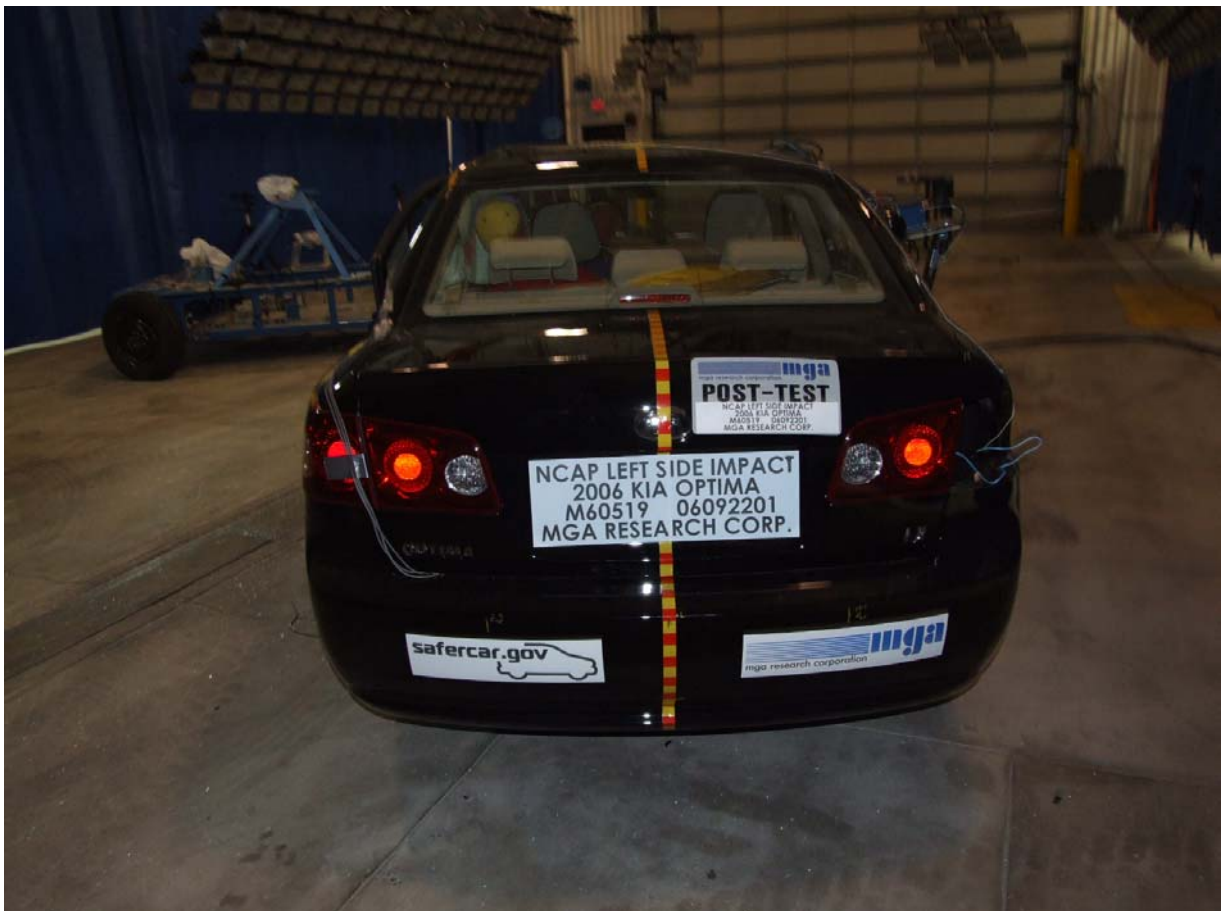
Pre-Test Left Rear $\frac{3}{4}$ View



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



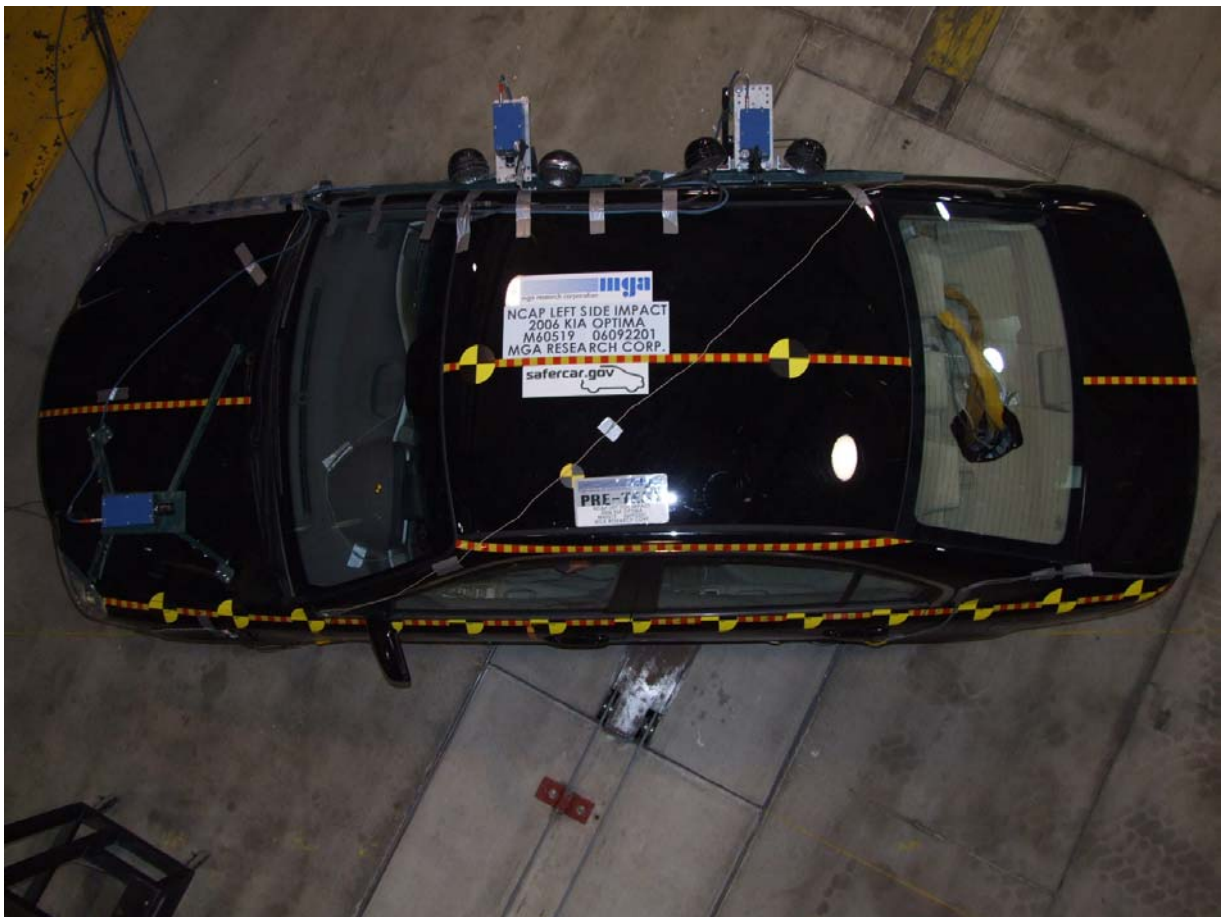
Post-Test Right Side View



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 Overhead Close-up View



Post-Test Overhead Close-up View



Pre-Test Left Impact Point



Post-Test Left Impact Point



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



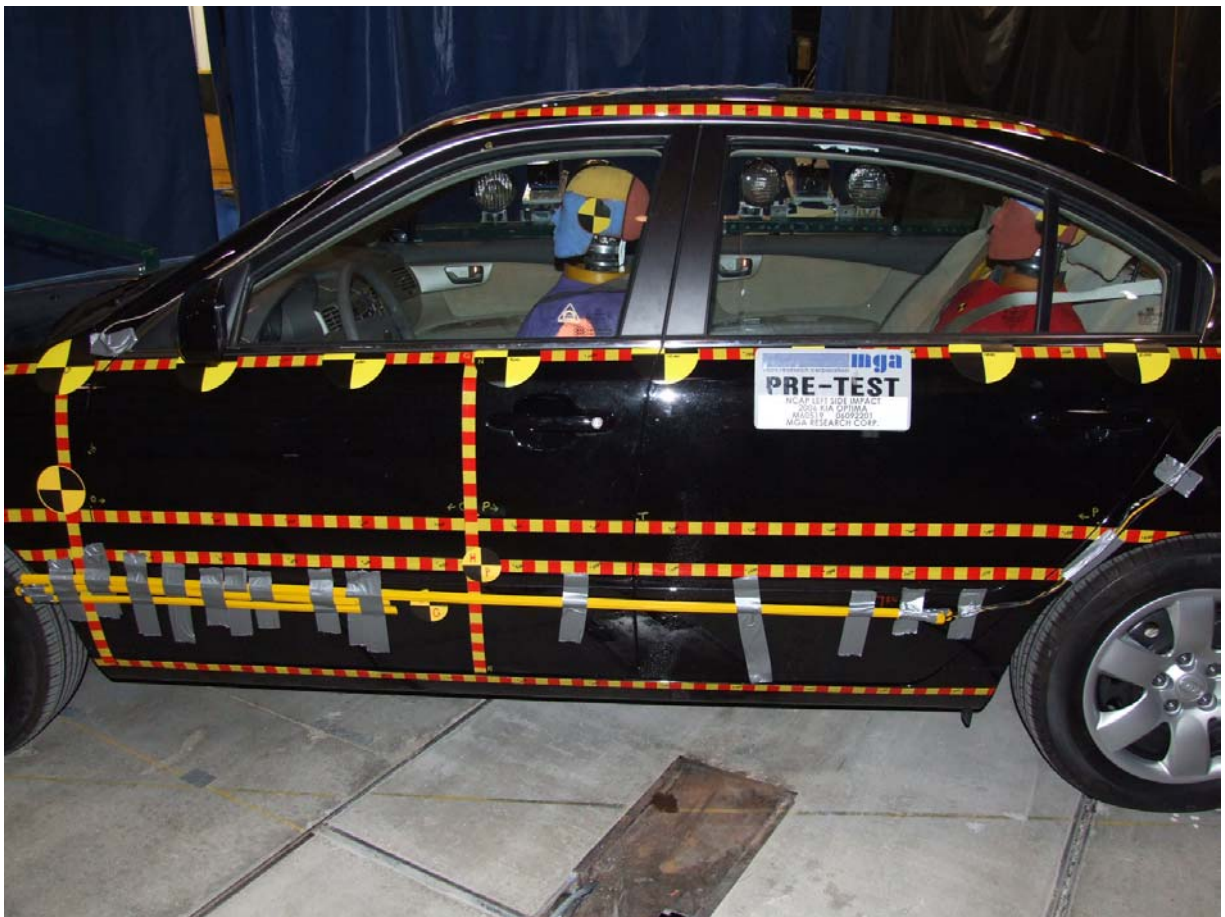
Post-Test Front $\frac{3}{4}$ View of Left Side Door



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



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



Pre-Test Left Side Impact Close-up



Post-Test Left Side Impact Close-up



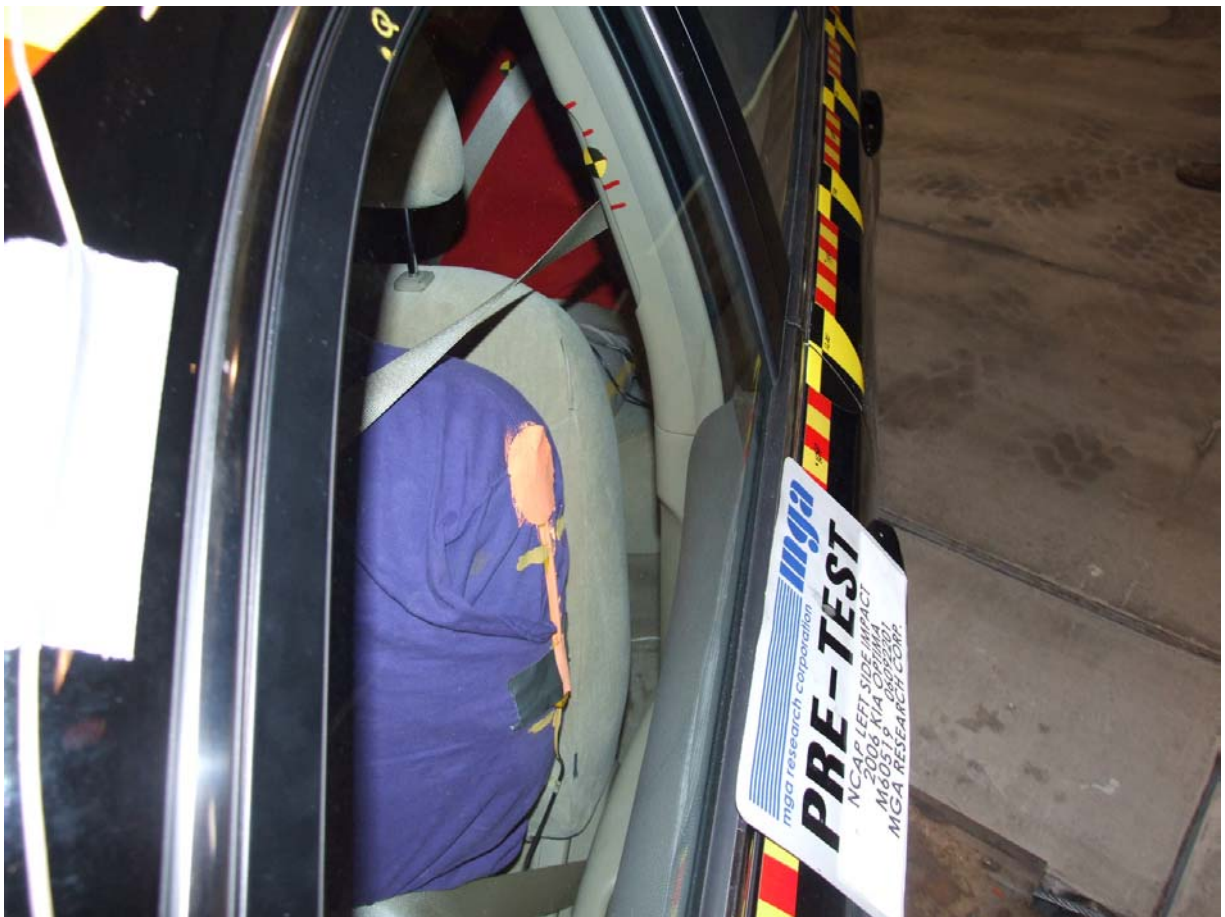
Pre-Test Driver Dummy (Door Open)



Pre-Test Driver Dummy (Through Window)



Post-Test Driver Dummy (Through Window)



Pre-Test Driver Dummy Clearance From Door



Post-Test Driver Dummy Clearance From Door



Pre-Test Driver Dummy Right Side View



Post-Test Driver Dummy Right Side View



Pre-Test Passenger Dummy (Door Open)



Pre-Test Passenger Dummy (Through Window)



Post-Test Passenger Dummy (Through Window)



Pre-Test Passenger Dummy Clearance From Door



Pre-Test Passenger Dummy Right Side View



Post-Test Passenger Dummy Right Side View



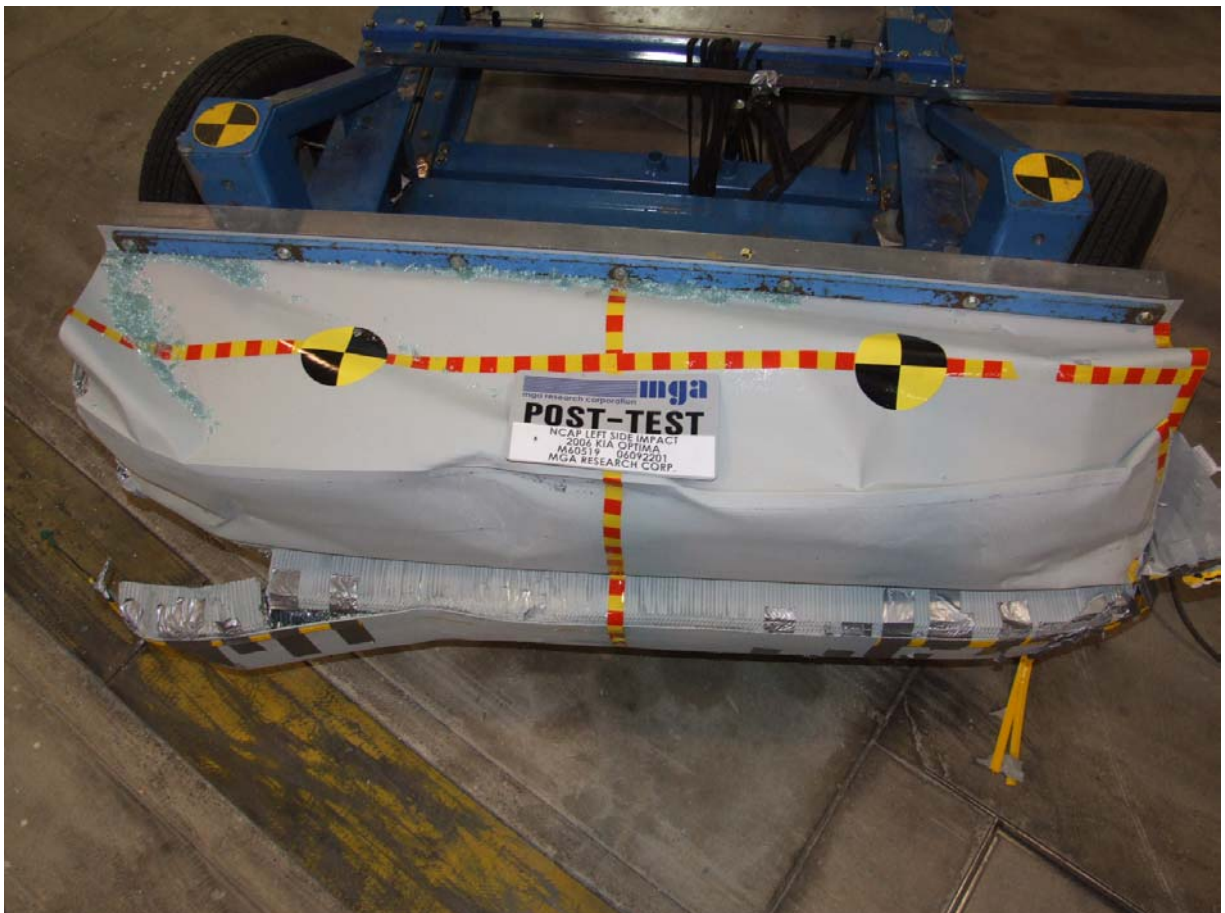
Pre-Test Front View of Deformable Barrier



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



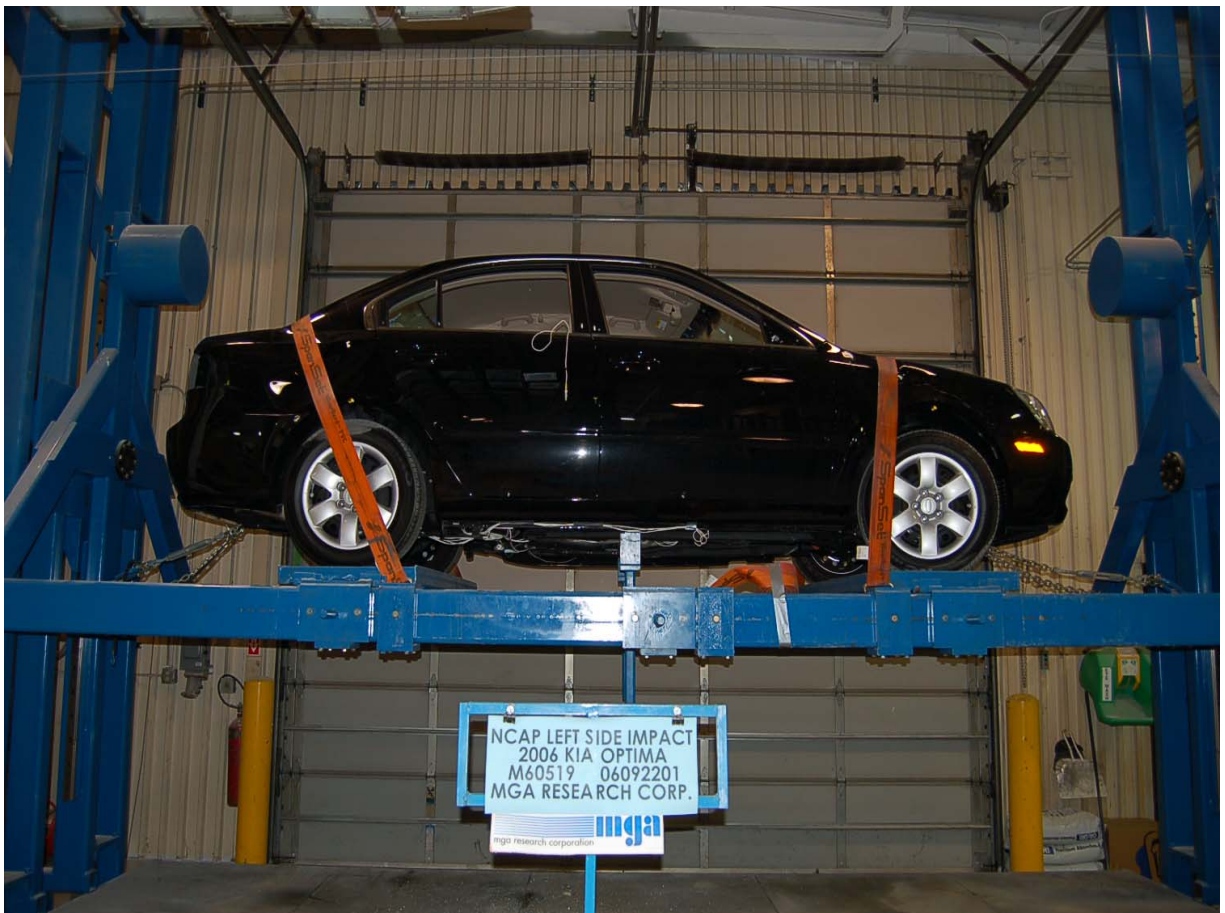
Post-Test Left Side View of Deformable Barrier



Vehicle on Rollover Device (90 Degrees)



Vehicle on Rollover Device (270 Degrees)



Vehicle on Rollover Device (360 Degrees)



Vehicle Impact



Post-Test Driver Dummy Head Contact



Post-Test Driver Dummy Torso Contact



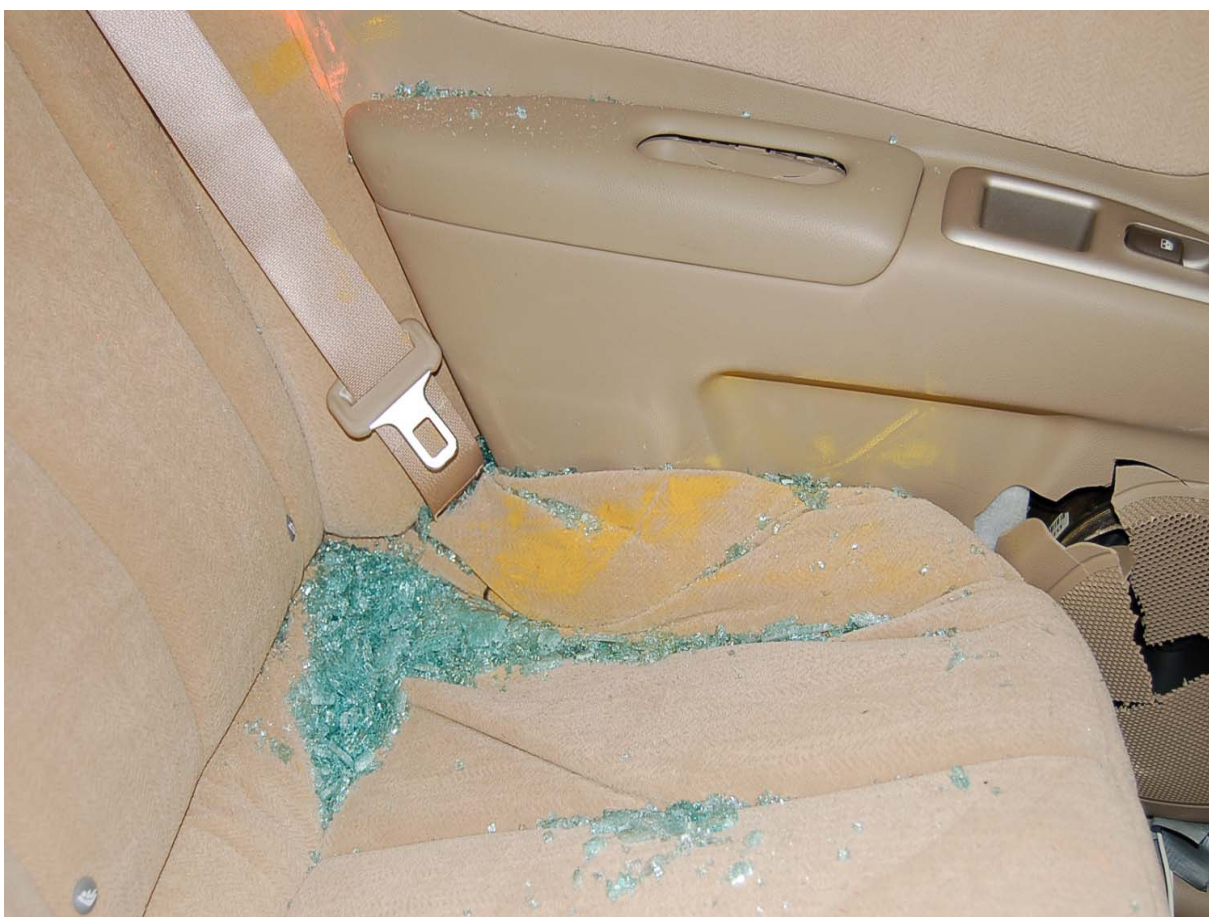
Post-Test Driver Dummy Contact



Post-Test Passenger Dummy Head Contact



Post-Test Passenger Dummy Upper Torso Contact



Post-Test Passenger Dummy Lower Torso 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

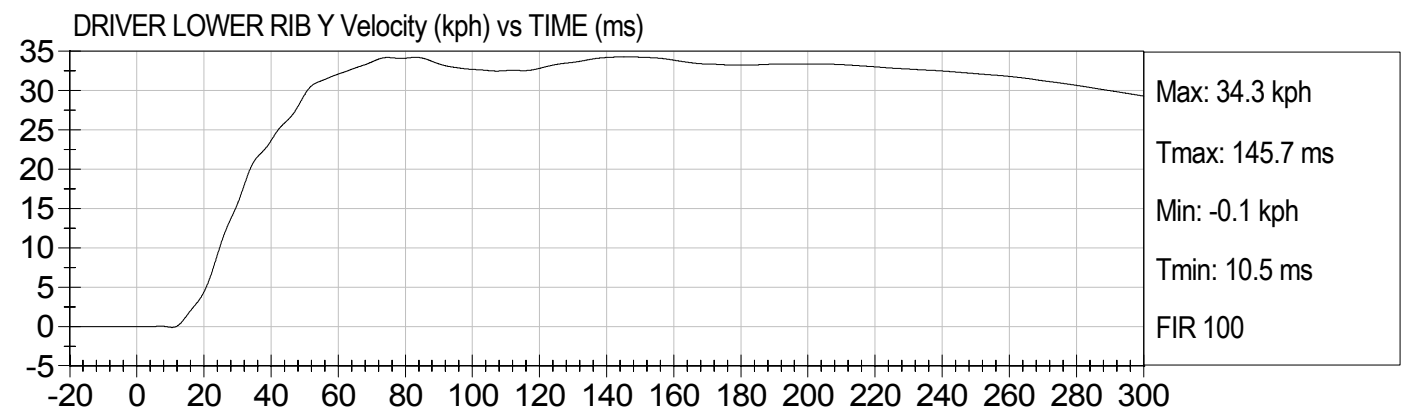
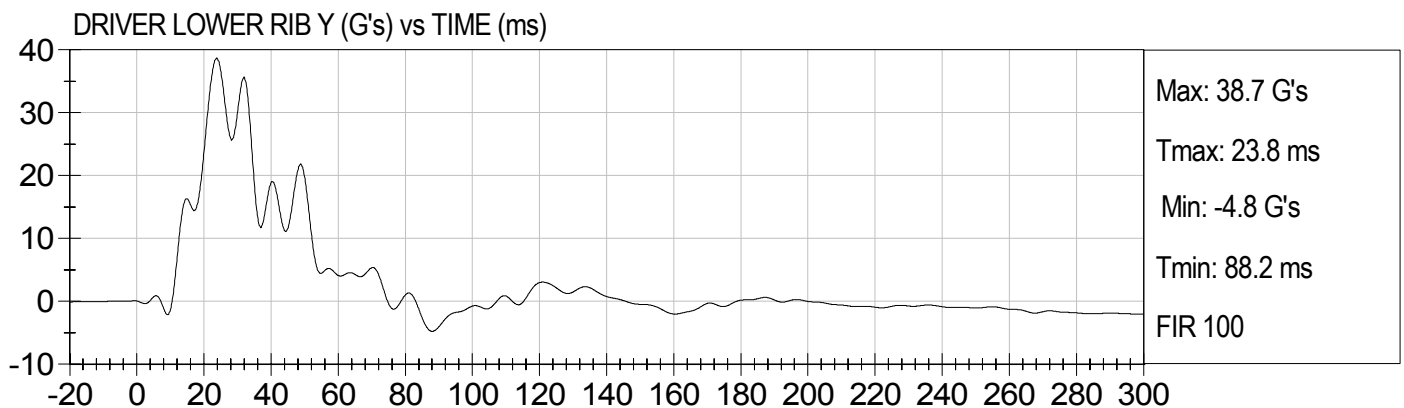
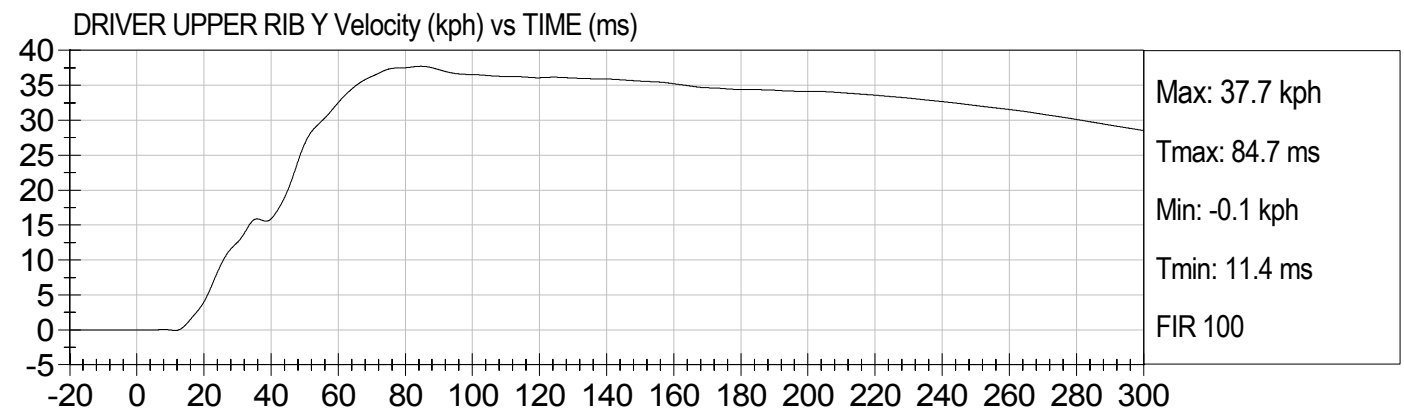
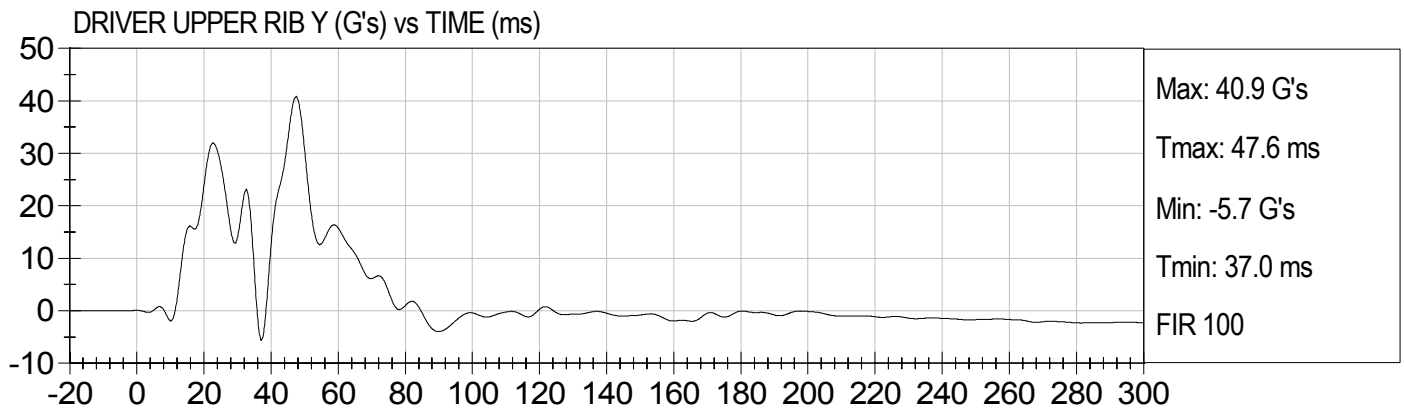
Driver Upper Neck Force Y

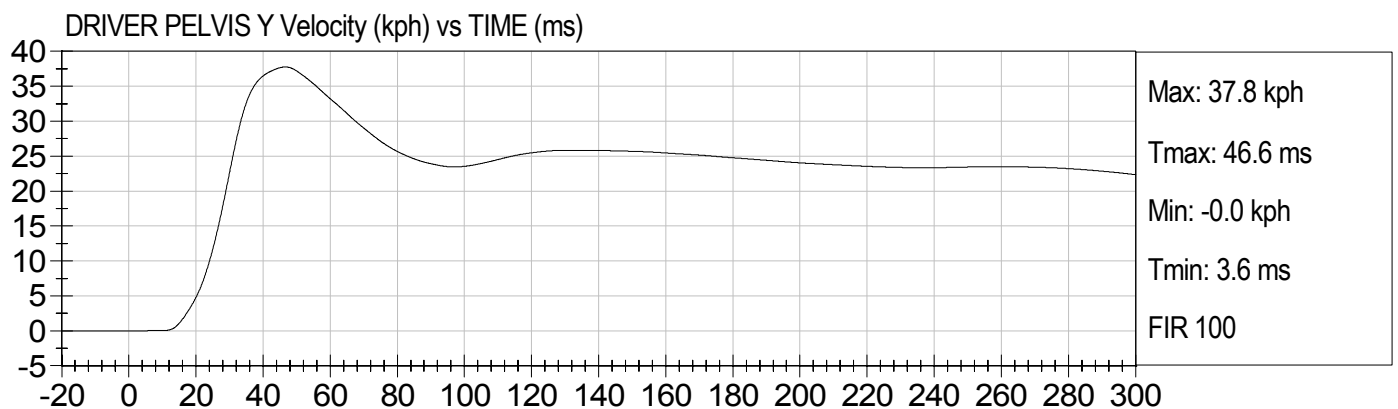
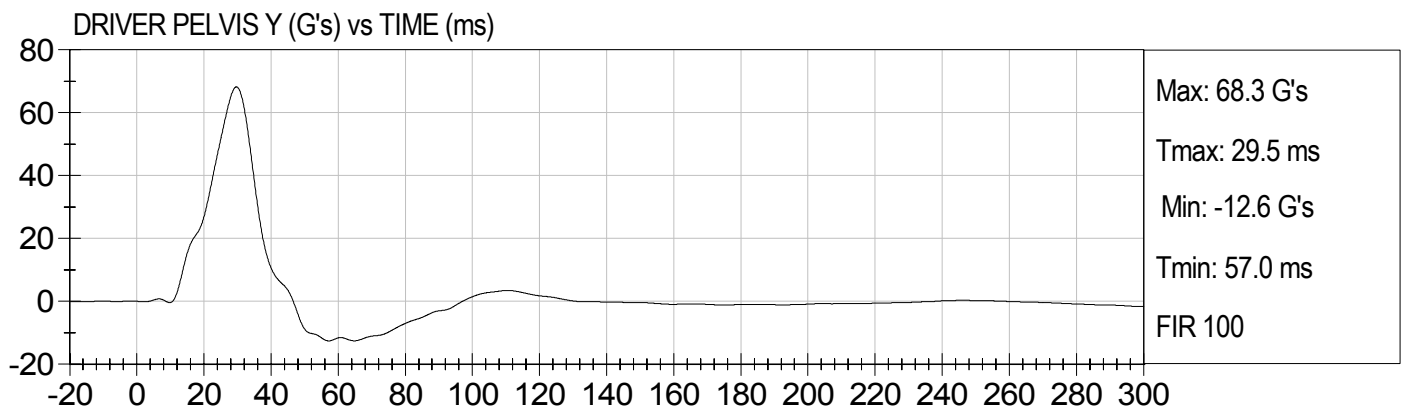
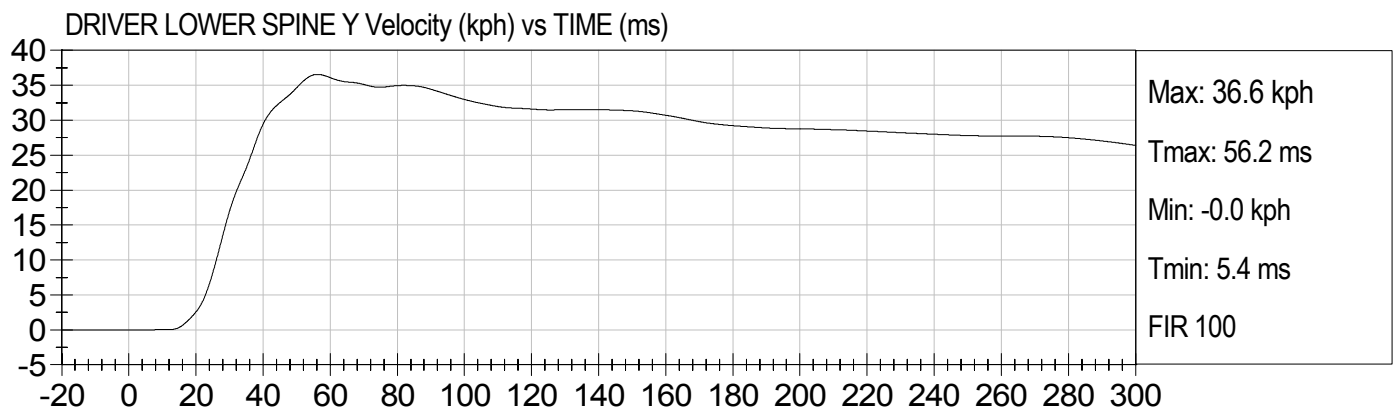
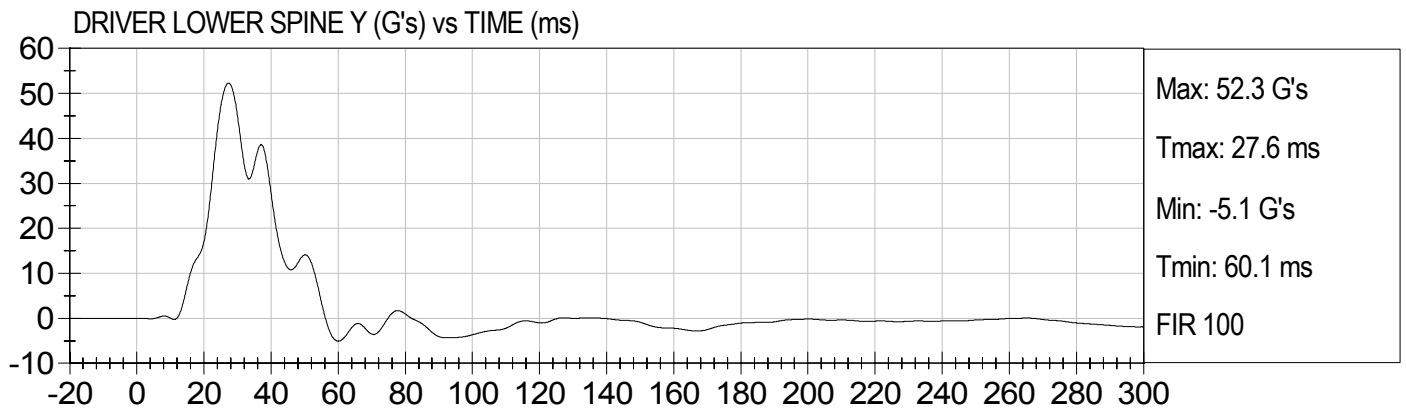
Driver Upper Neck Force Z

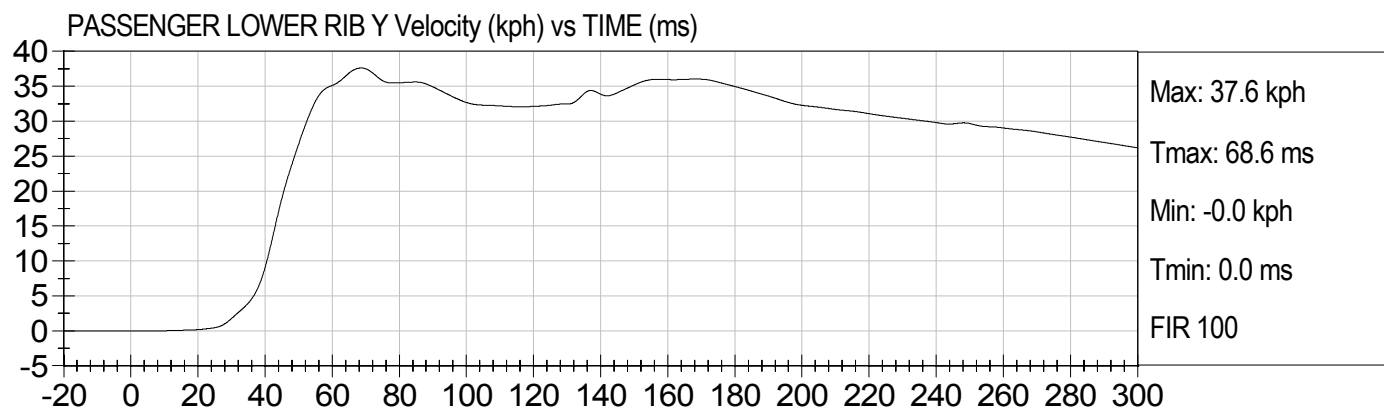
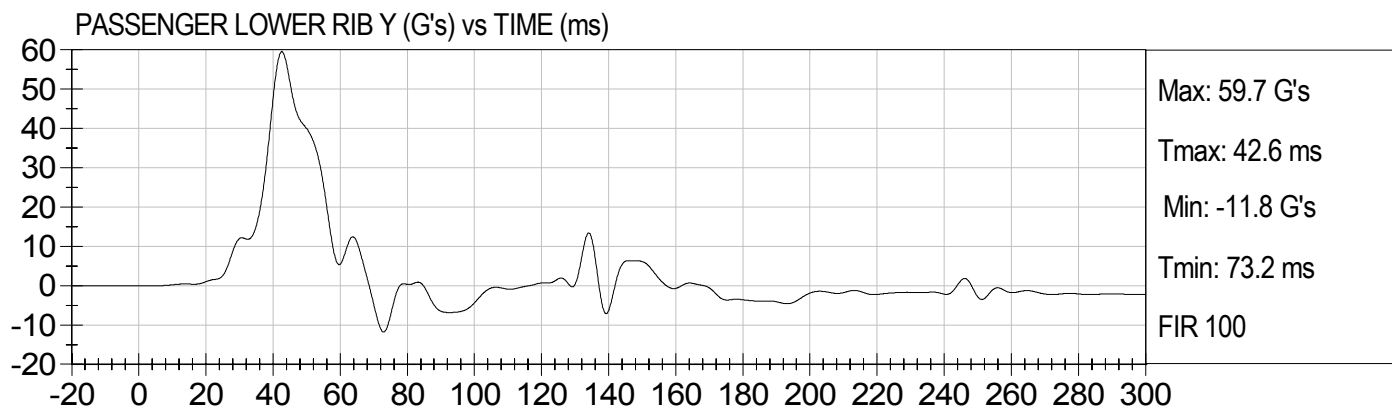
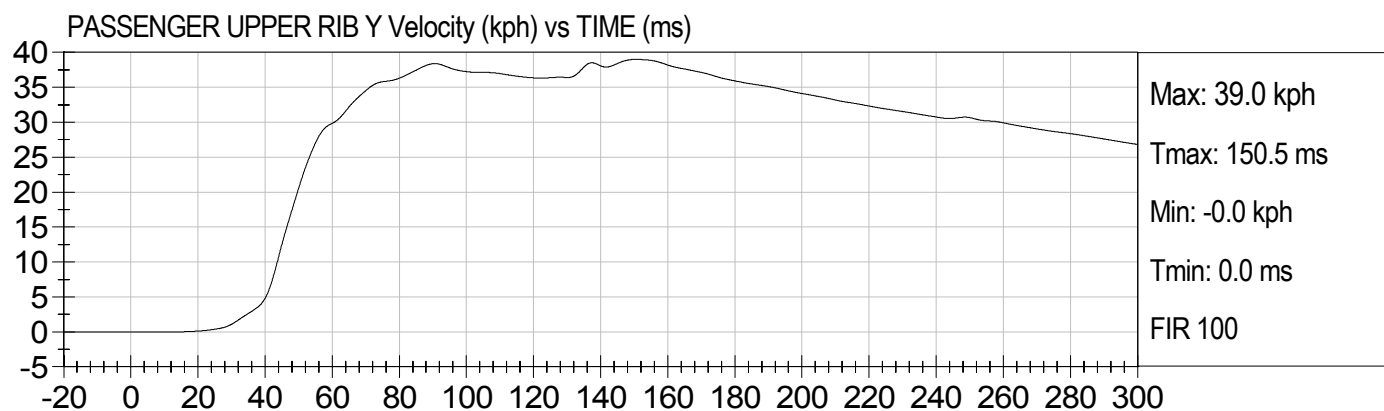
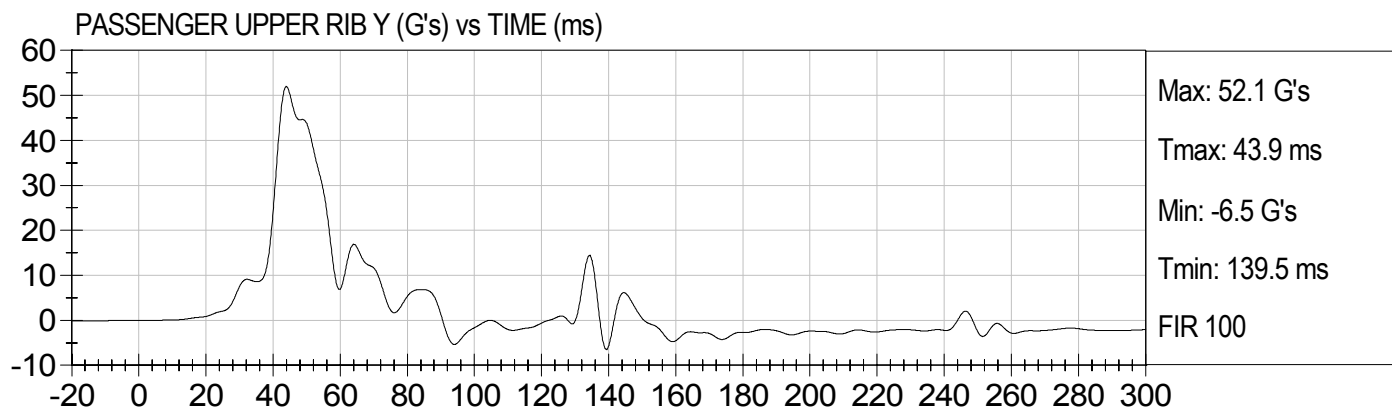
Driver Upper Neck Moment X

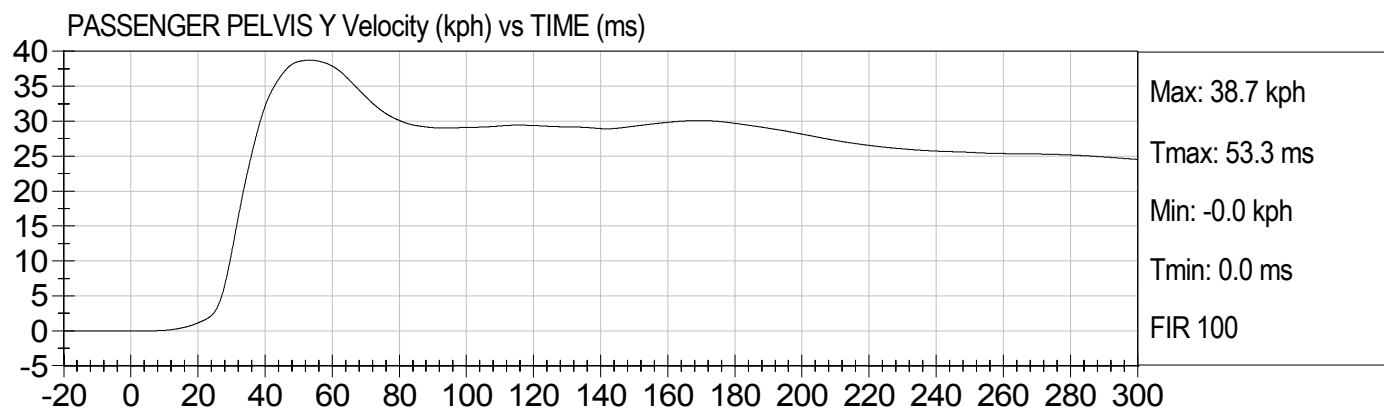
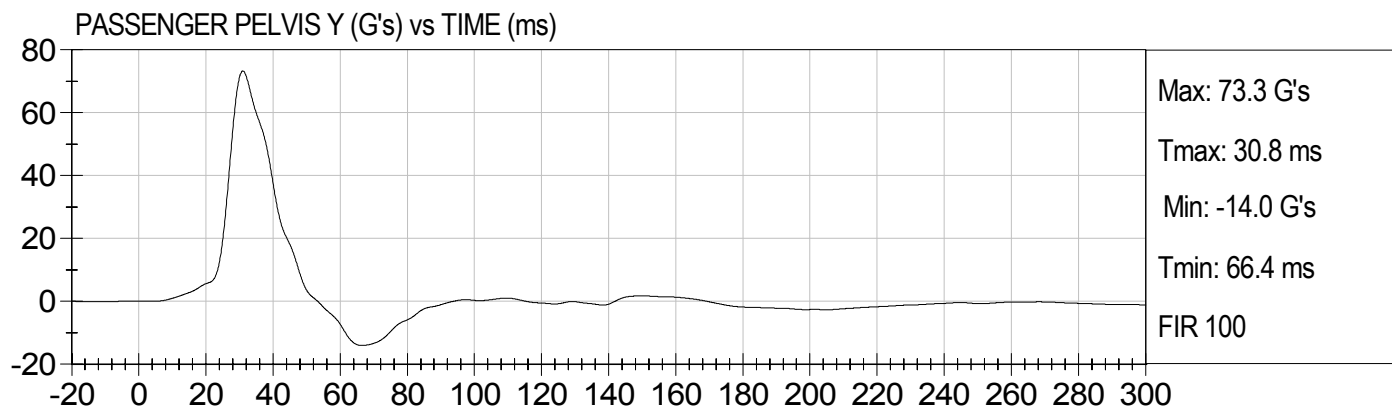
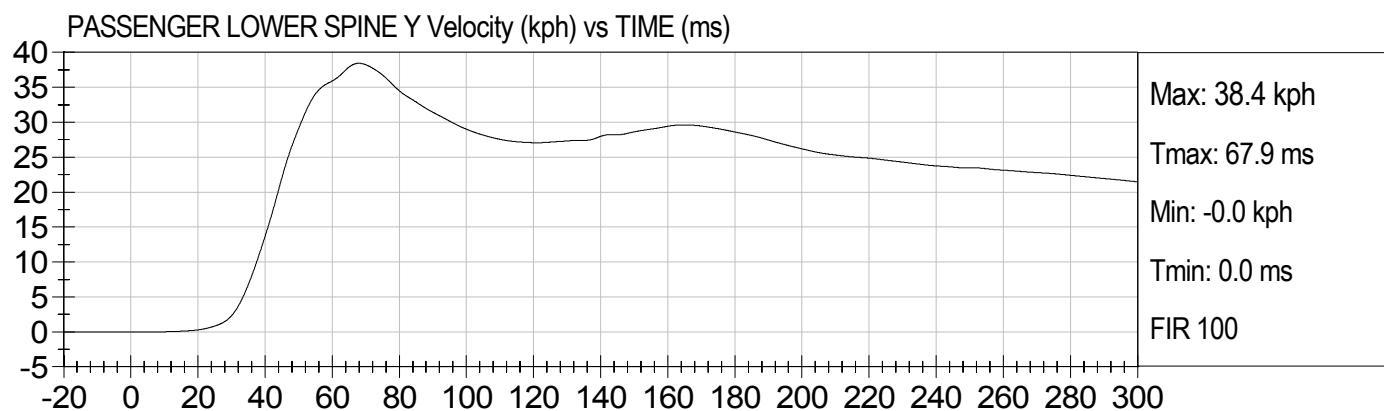
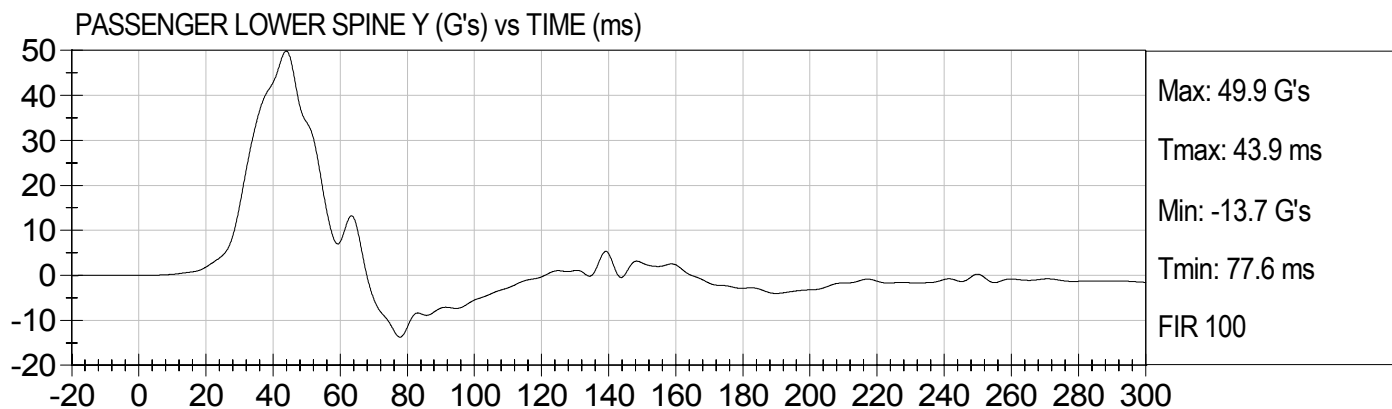
Driver Upper Neck Moment Y
Driver Upper Neck Moment Z
Driver Upper Rib Redundant Y
Driver Lower Rib Redundant Y
Driver Lower Spine Redundant Y
Driver Pelvis Redundant Y
Driver Thorax Contact
Driver Pelvis Contact
Passenger Head X Primary
Passenger Head Y Primary
Passenger Head Z Primary
Passenger Head 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 CG X
Vehicle CG Y
Vehicle CG Z
MDB CG X
MDB CG Y
MDB CG Z
MDB Rear X
MDB Rear Y
MDB Rear Z
MDB Left Bumper Contact
MDB Right Bumper Contact









APPENDIX C
DUMMY CALIBRATION DATA

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: D06263

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

08/29/2006
Test Date

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

ATD Serial No: 272

Test I.D: D062631

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	46	Pass
Peak Resultant Acceleration	G's	120 to 150	150	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

David Winkelbauer
Approved By

08/29/2006
Test Date



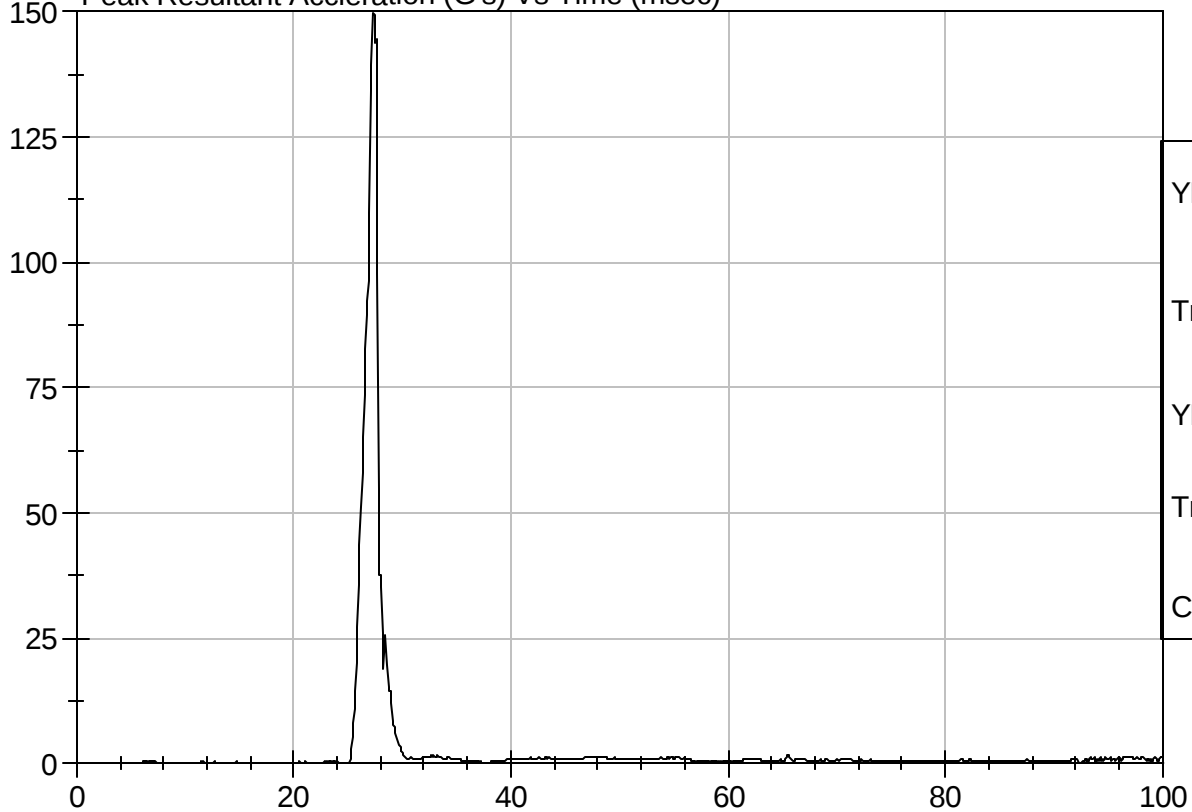
Test Description: Head Drop

Test Date: 08/29/2006

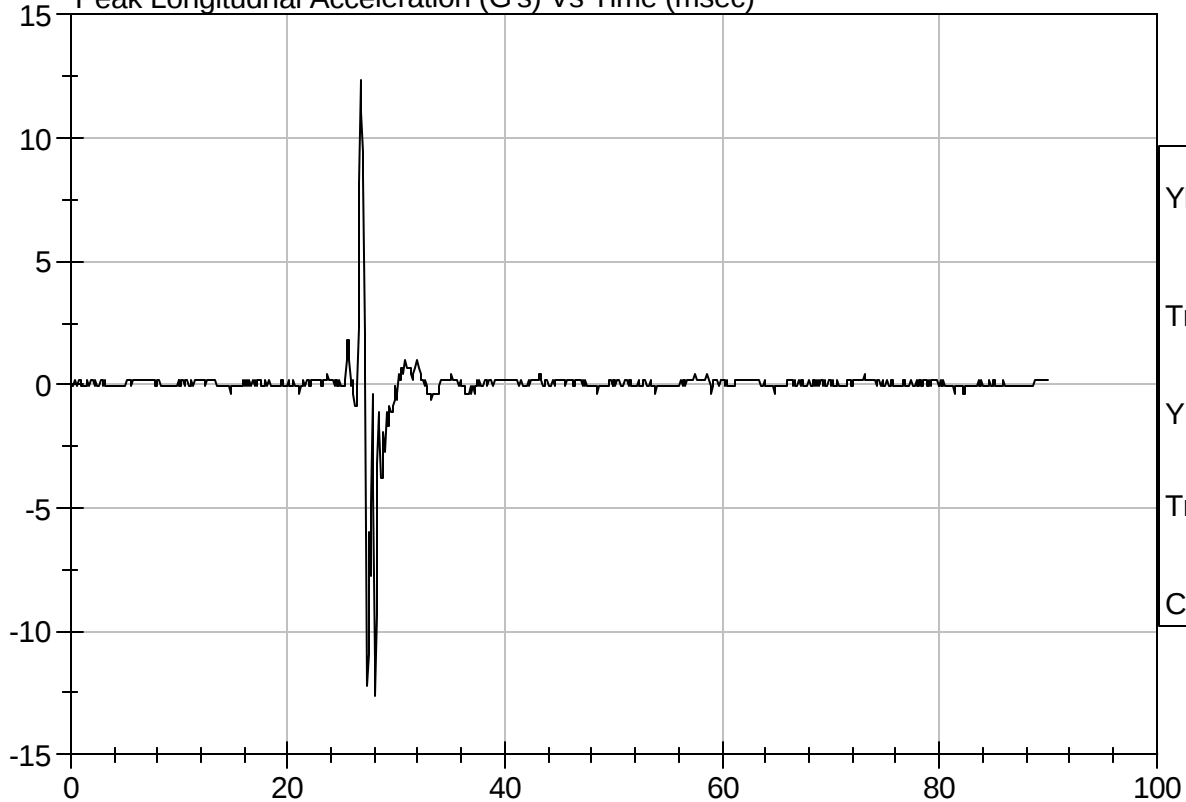
Component: D062631

Speed: 0 ft/s, 0.00 m/s

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



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



SID Calibration Data Sheet
Side Impact Dummy
Thorax Impact Test

ATD Serial No: 272

Test I.D: D062632

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	47	Pass
Probe Velocity	m/s	4.22 - 4.31	4.31	Pass
Upper Rib	G's	37 - 46	43	Pass
Lower Rib	G's	37 - 46	41	Pass
Lower Spine	G's	15 - 22	20	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

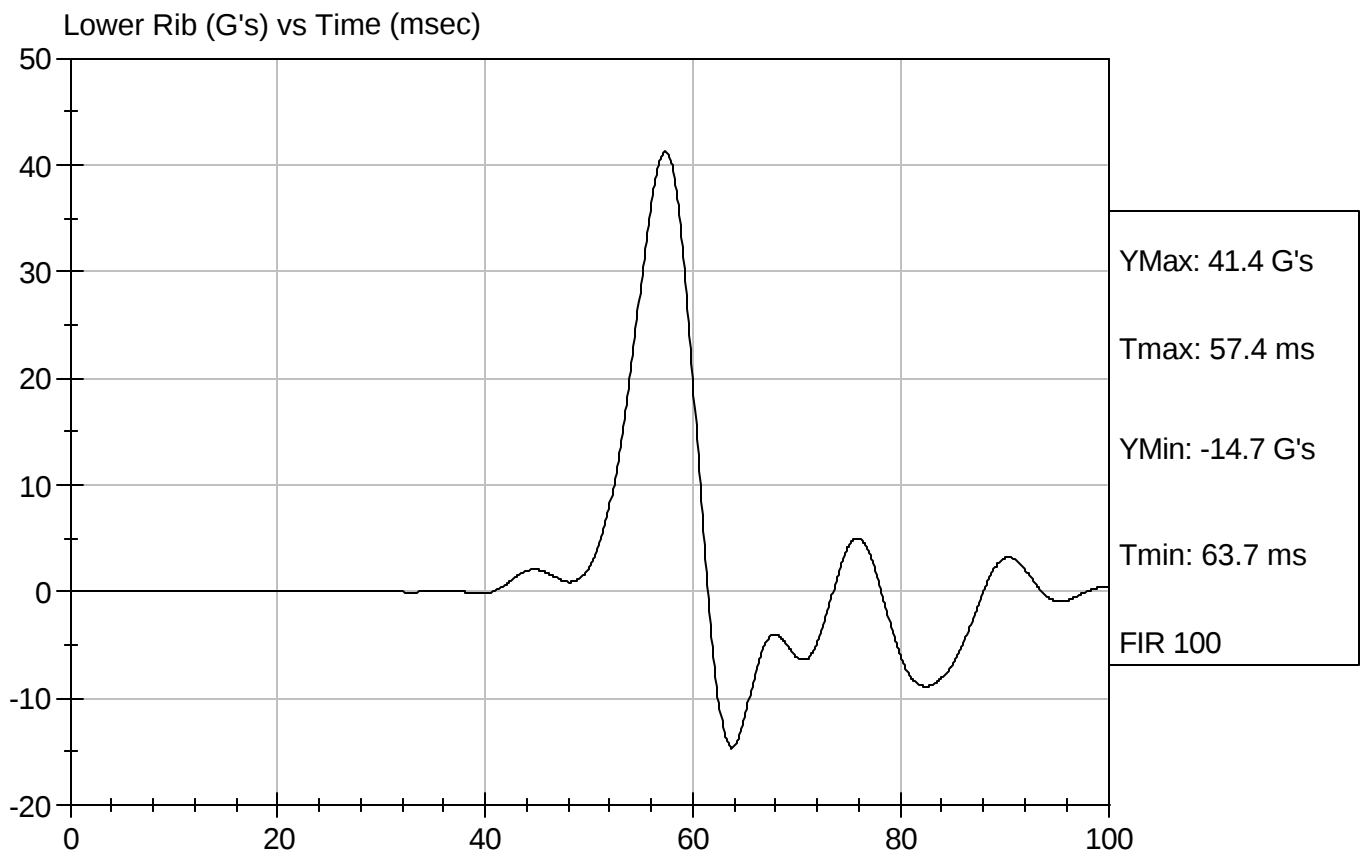
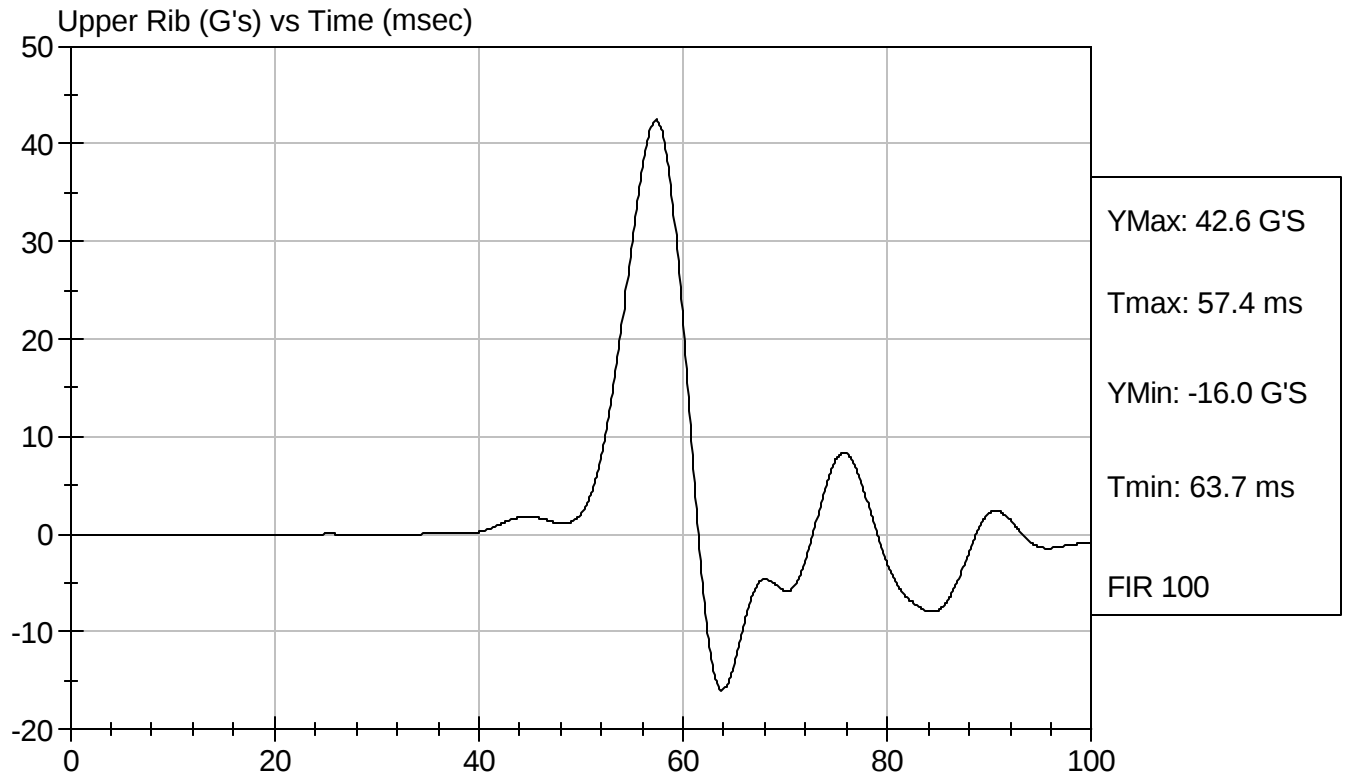
David Winkelbauer
Approved By

08/30/2006
Test Date



Test Desc: Thorax Impact
Component ID: D062632

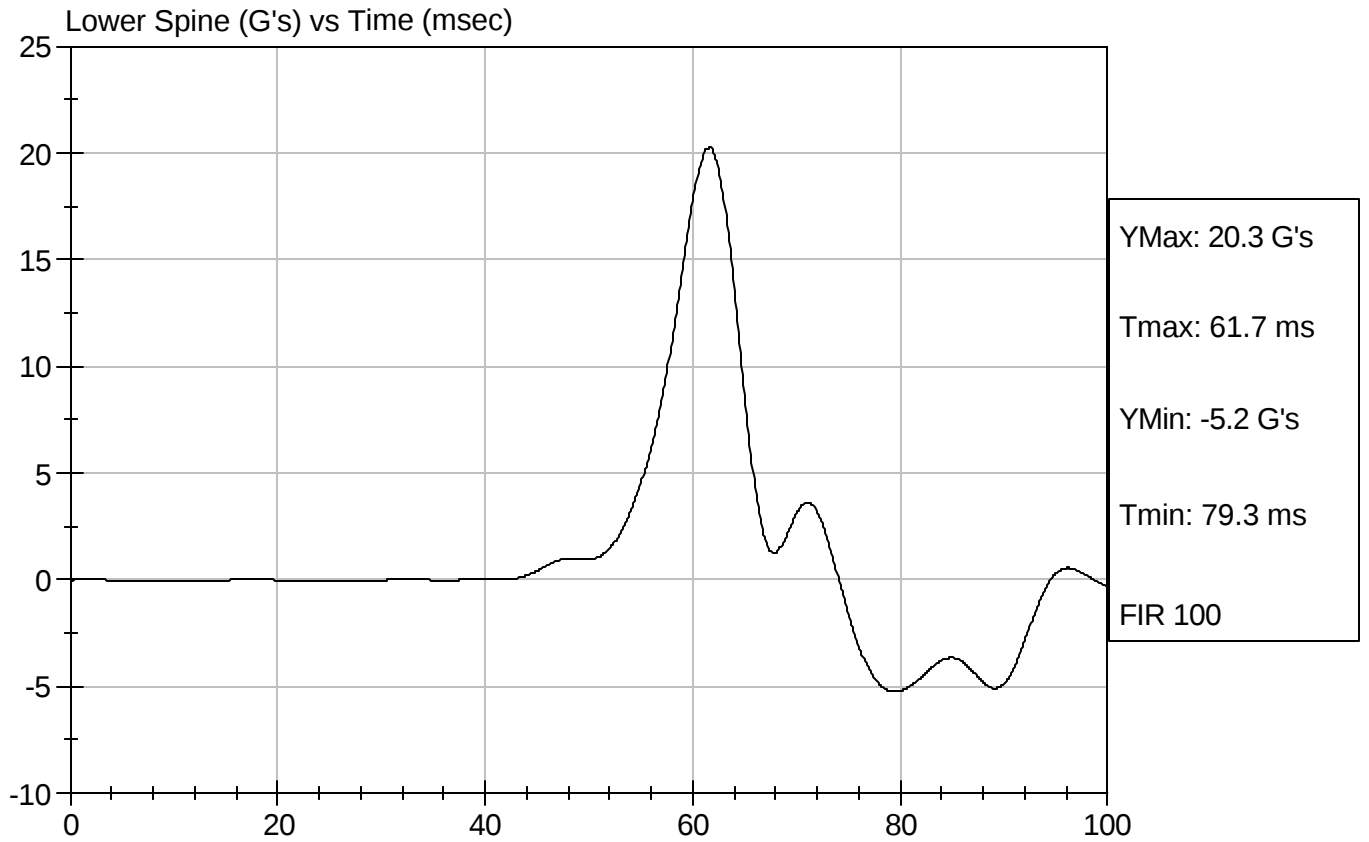
Test Date: 08/30/2006
Speed: 14.13 ft/sec, 4.31 m/sec





Test Desc: Thorax Impact
Component ID: D062632

Test Date: 08/30/2006
Speed: 14.13 ft/sec, 4.31 m/sec



SID Calibration Data Sheet
Side Impact Dummy
Pelvis Impact Test

ATD Serial No: 272

Test I.D: D062633

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	47	Pass
Probe Velocity	m/s	4.27 - 4.33	4.29	Pass
Pelvis Acceleration	G's	40 - 60	44	Pass
			Overall Test Results	Pass

Jessica Hall
Laboratory Technician

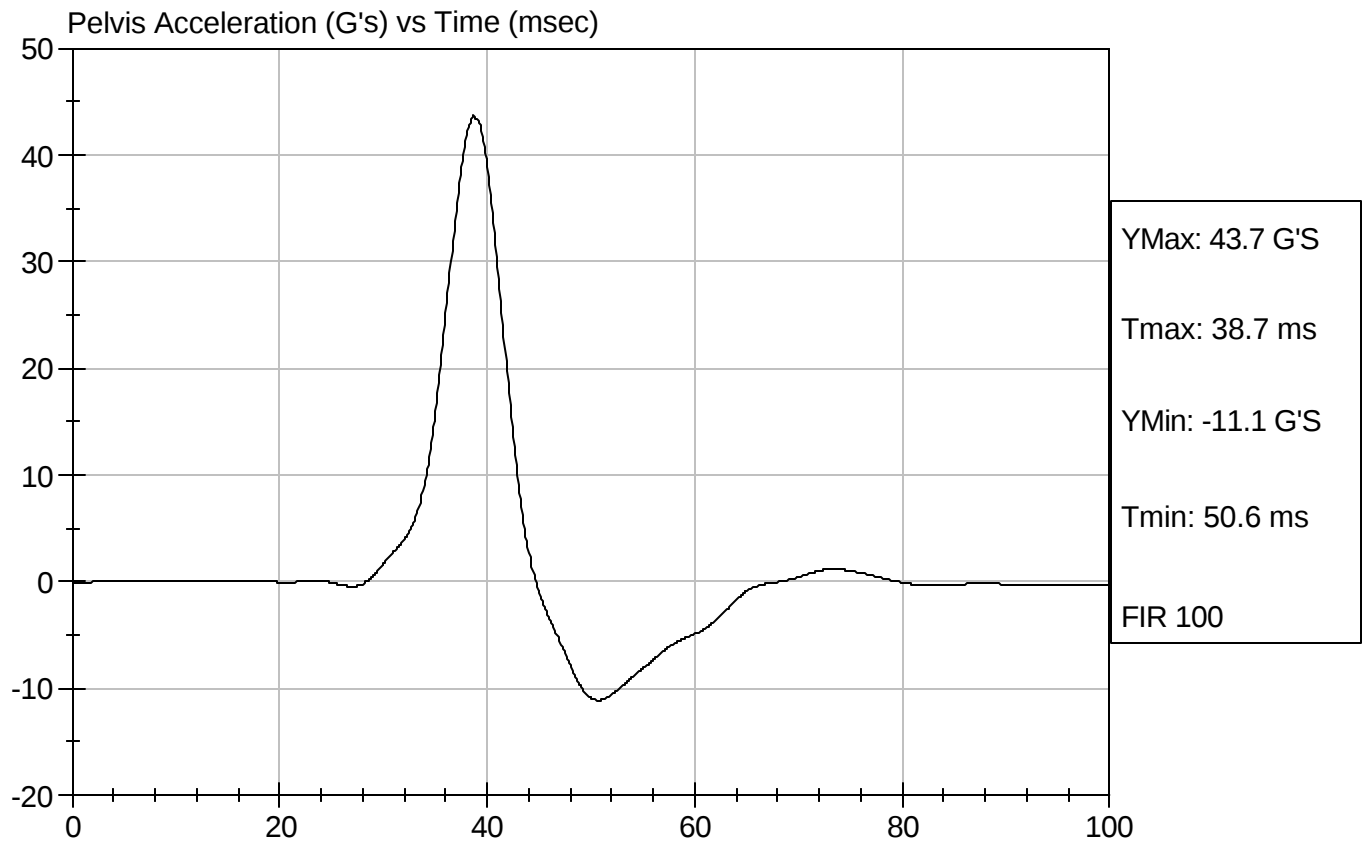
David Winkelbauer
Approved By

08/30/2006
Test Date



Test Desc: Pelvis Impact
Component ID: D062633

Test Date: 08/30/2006
Speed: 14.08 ft/sec, 4.29 m/sec

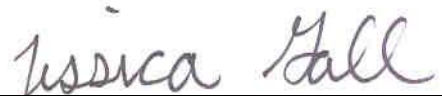


SID Calibration Data Sheet
Side Impact Dummy
Abdominal Compression Calibration (Pre-Load = 10 lbs)

ATD Serial No: 272

Test I.D: D062634

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	42	Pass
Force At 12.7 mm	N	104 -162	137	Pass
Force At 19 mm	N	163 - 222	191	Pass
Force At 25.4 mm	N	222 - 280	257	Pass
Force At 33 mm	N	325 - 391	355	Pass
			Overall Test Results	Pass


Laboratory Technician


Approved By

08/29/2006
Test Date

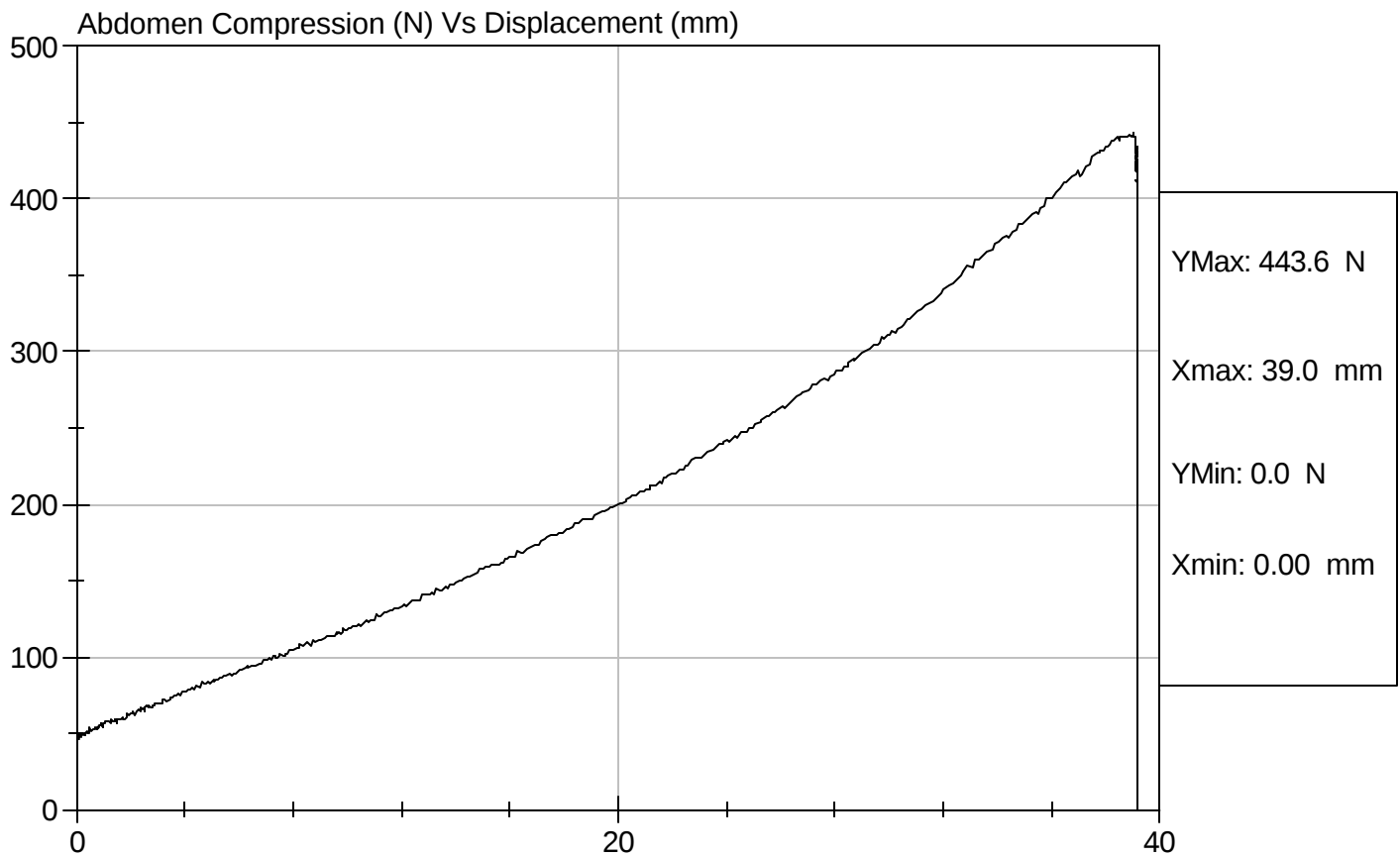


Test Description: Abdomen Compression

Test Date: 08/29/2006

Component: D062634

Speed: 0 ft/sec, 0 m/sec



SID Calibration Data Sheet
Side Impact Dummy
Lumbar Flexion Calibration

ATD Serial No: 272

Test I.D: D062635

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	43	Pass
Force At 0 deg	N	0 - 26.7	0.0	Pass
Force At 20 deg	N	97.9 - 151.2	132.0	Pass
Force At 30 deg	N	151.2 - 204.6	164.0	Pass
Force At 40 deg	N	204.6 - 258.0	212.1	Pass
Return Angle	Deg	12 Maximum	0	Pass
Overall Test Results			Pass	

Jessica Hall
Laboratory Technician

08/29/2006

Test Date

David Winkelbauer
Approved By

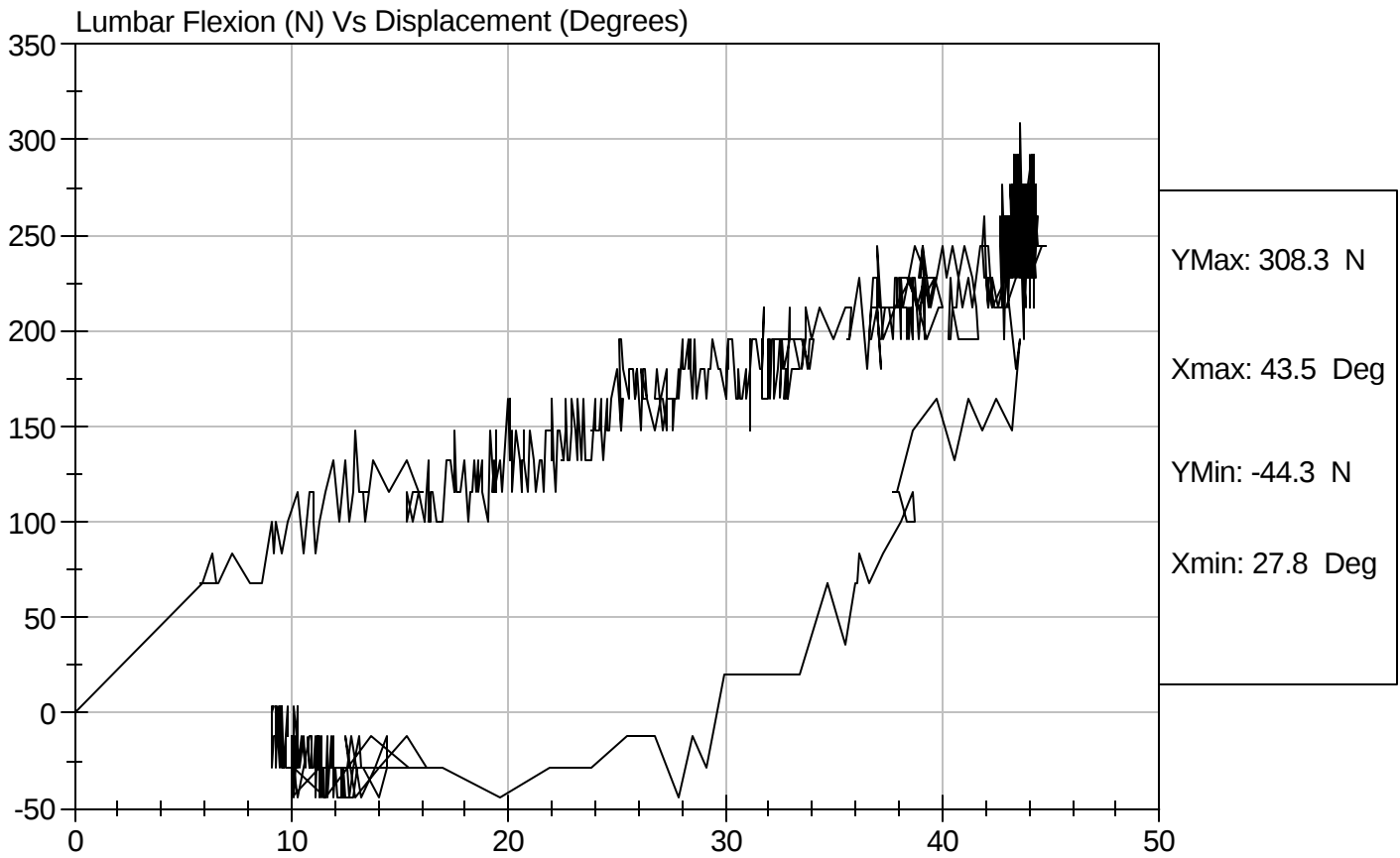


Test Description: Lumbar Flexion

Test Date: 08/29/2006

Component: D062635

Speed: 0 ft/sec, 0 m/sec



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

ATD Serial No: 272

Test I.D: D062639

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.4	Pass
Laboratory Relative Humidity		%	10 to 70	43	Pass
Impact Velocity		m/s	6.89 to 7.13	7.01	Pass
Pendulum Deceleration	10 msec	m/s	1.96 to 2.55	2.34	Pass
	20 msec	m/s	4.12 to 5.10	4.58	Pass
	30 msec	m/s	5.73 to 7.01	6.33	Pass
	40 to 70 msec	m/s	6.27 to 7.64	7.22	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	78	Pass
Mx Peak To Zero - Decay Time		msec	49 to 64	58	Pass
Mx Peak to Max. Head Rotation		msec	2 to 16	9	Pass


 Laboratory Technician

08/29/2006

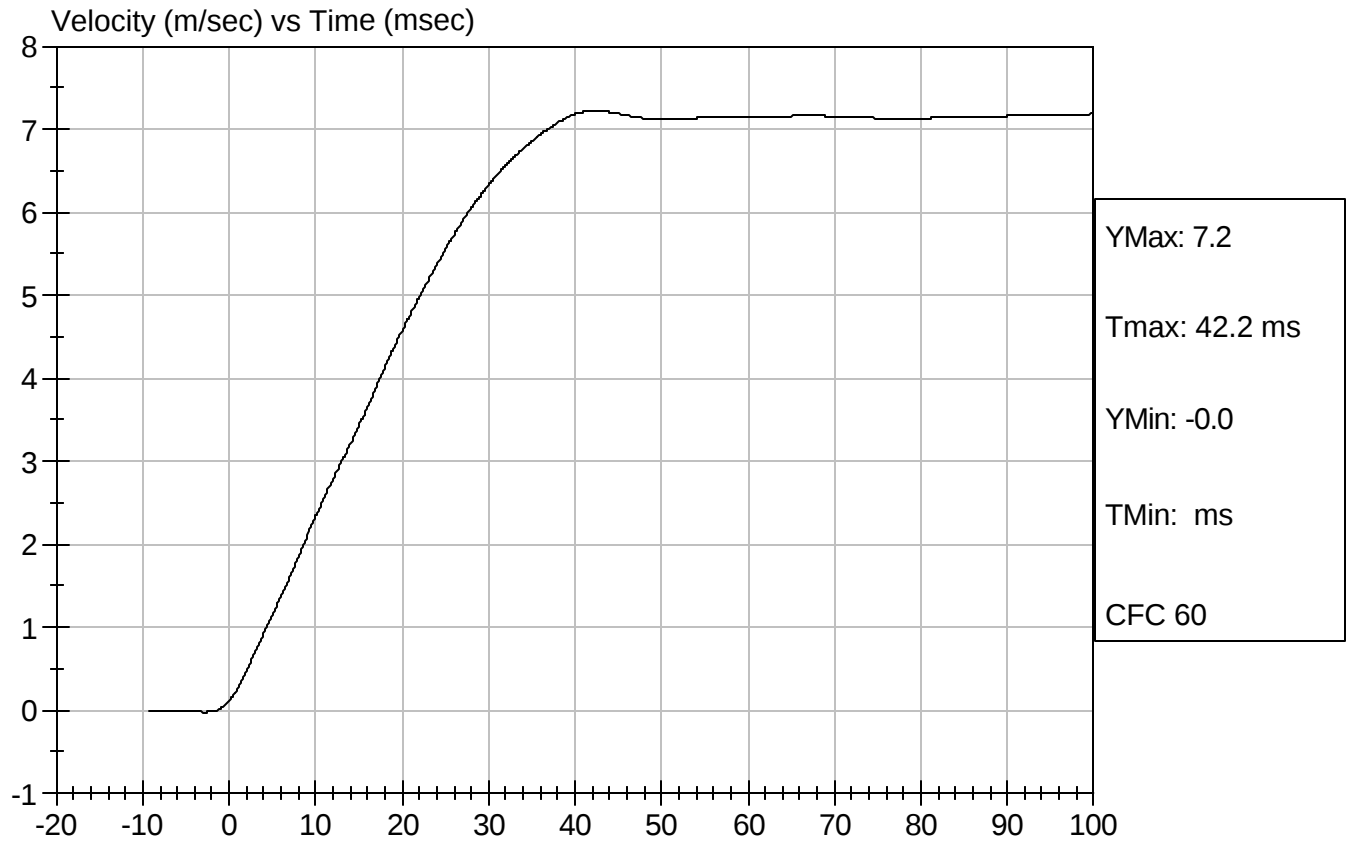
Test Date


 Approved By



Test Desc: Neck Bending
Component ID: D062639

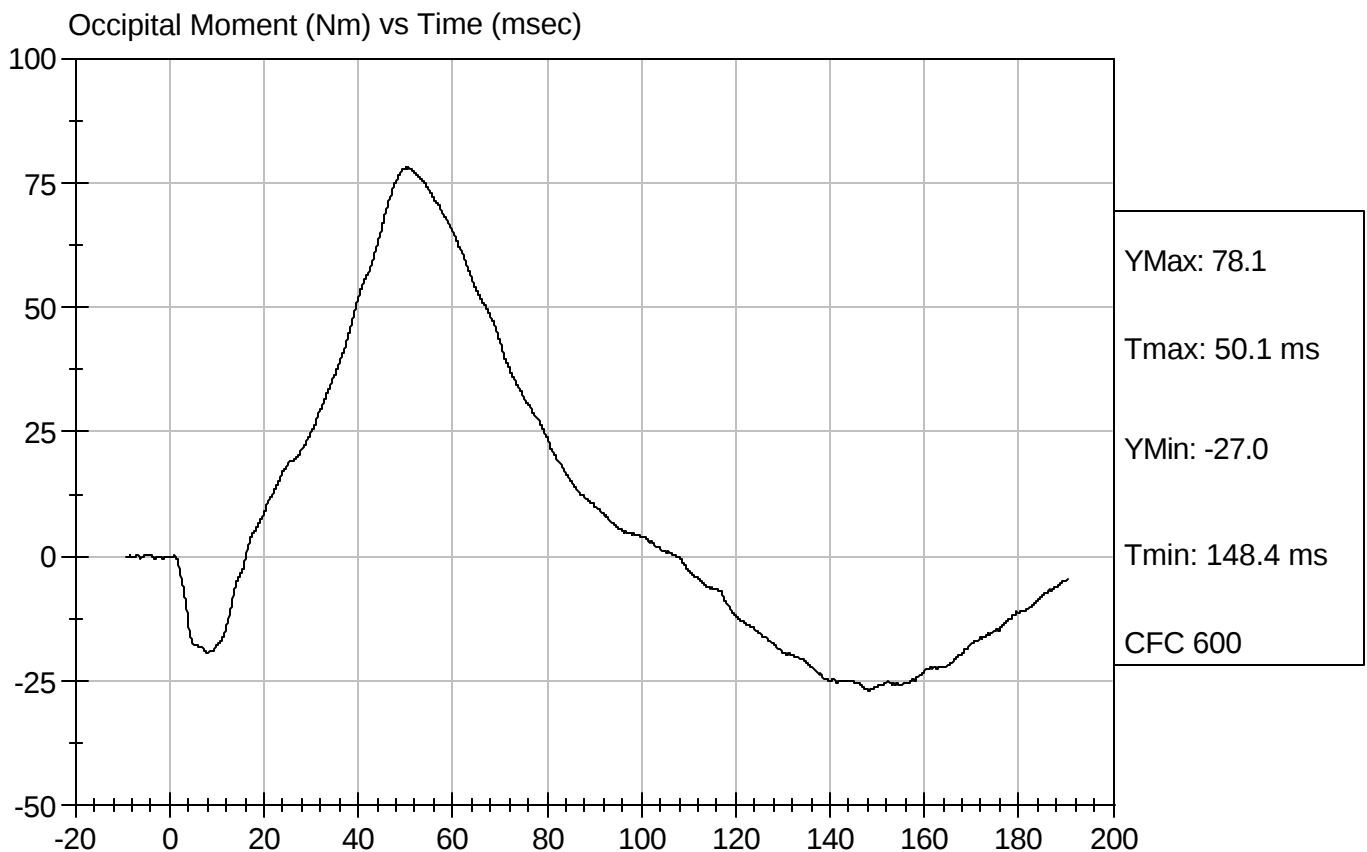
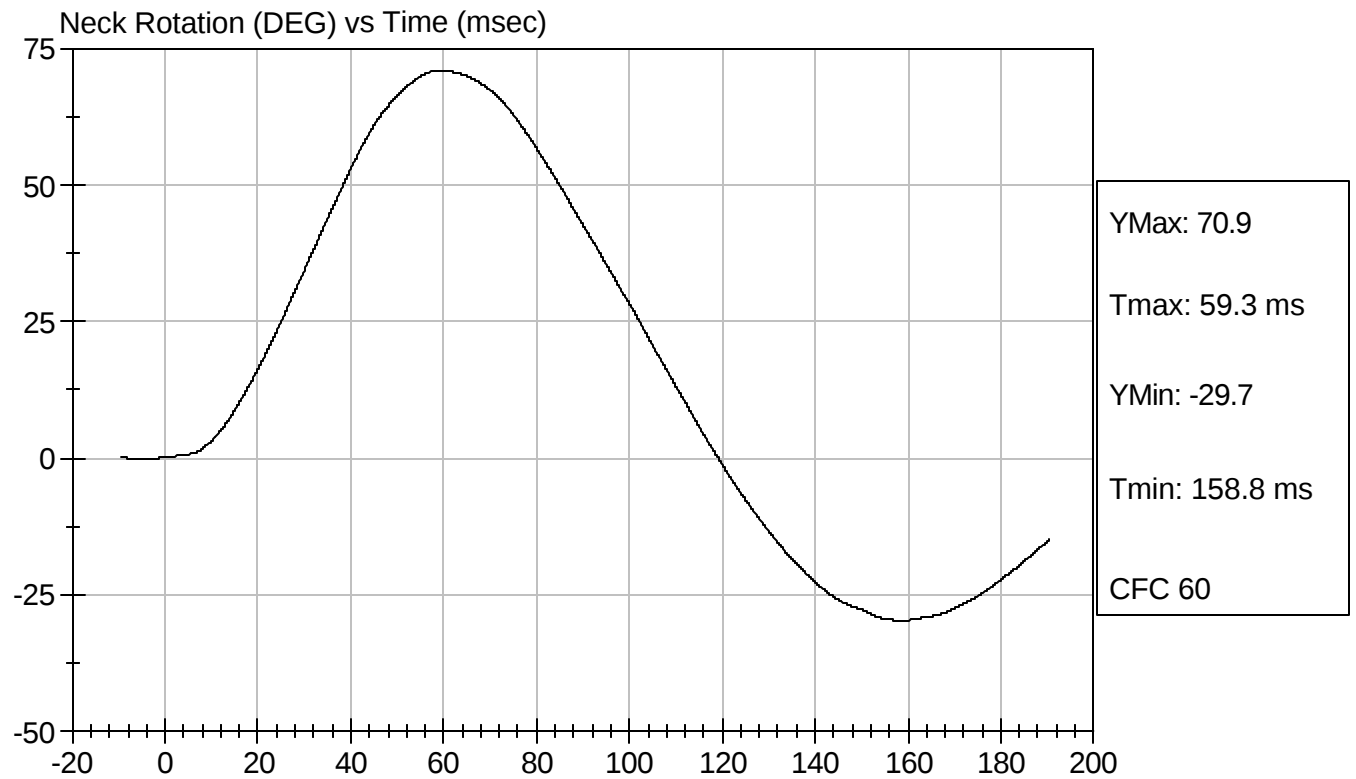
Test Date: 08/29/2006
Speed: 22.99 ft/sec, 7.01 m/sec





Test Desc: Neck Bending
Component ID: D062639

Test Date: 08/29/2006
Speed: 22.99 ft/sec, 7.01 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 Calibration Data Sheet
Side Impact Dummy
Head Drop Calibration (Lateral)

ATD Serial No: 272

Test I.D: D062871

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	40	Pass
Peak Resultant Acceleration	G's	120 to 150	131	Pass
Is Resultant Curve Unimodal?	Yes/No	15% of peak	Yes	Pass
Peak Longitudnal Acceleration	G's	+/- 15	-5.6	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

09/26/2006

Test Date

David Winkelbauer
Approved By



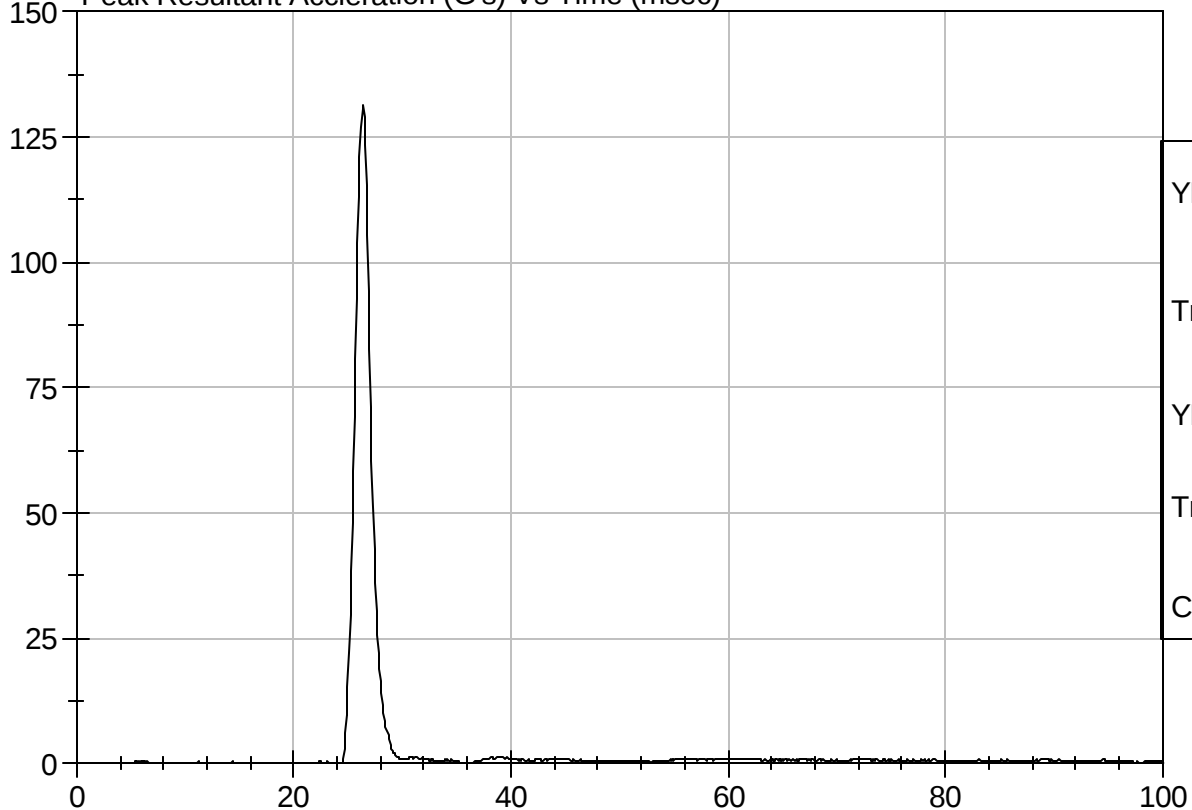
Test Description: Head Drop

Test Date: 09/26/2006

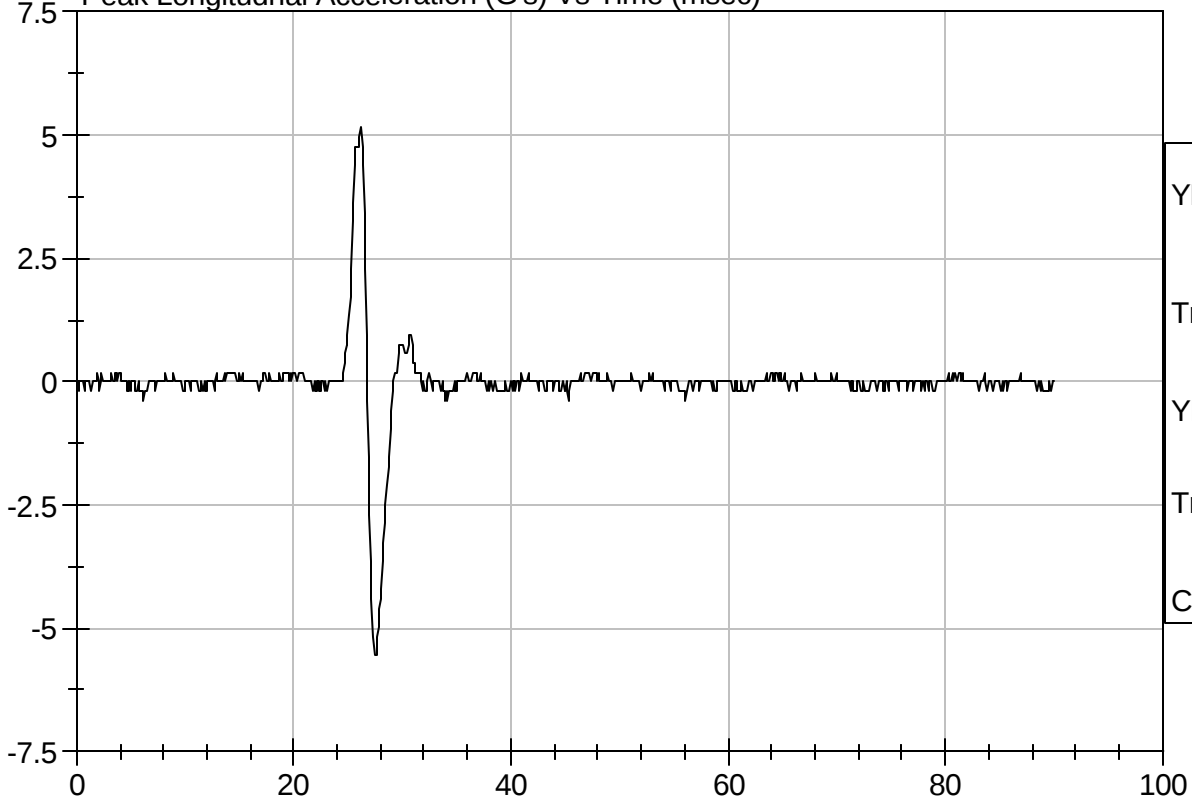
Component: D062871

Speed: 0 ft/s, 0.00 m/s

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



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



SID Calibration Data Sheet
Side Impact Dummy
Thorax Impact Test

ATD Serial No: 272

Test I.D: D062872

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	40	Pass
Probe Velocity	m/s	4.22 - 4.31	4.29	Pass
Upper Rib	G's	37 - 46	44	Pass
Lower Rib	G's	37 - 46	42	Pass
Lower Spine	G's	15 - 22	22	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

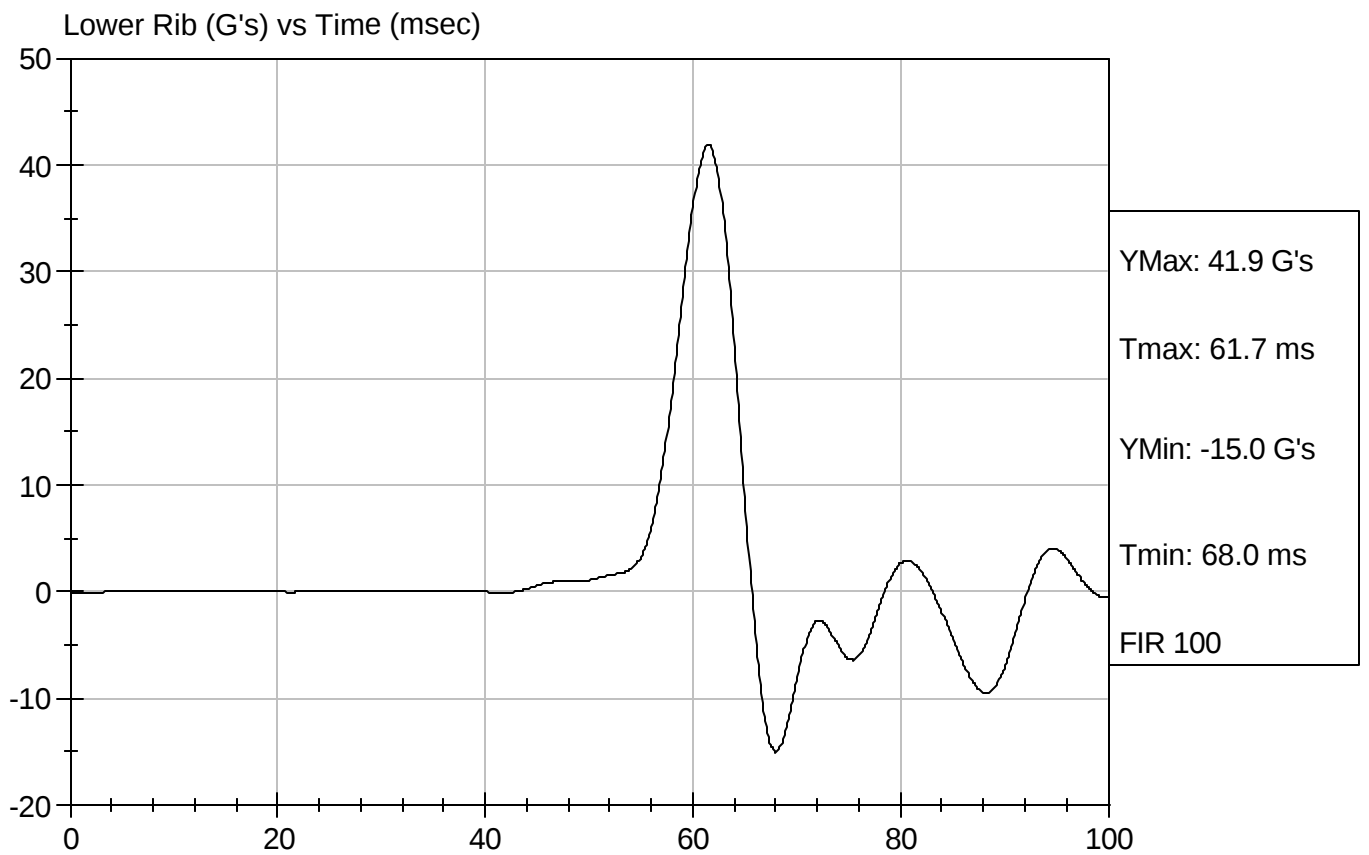
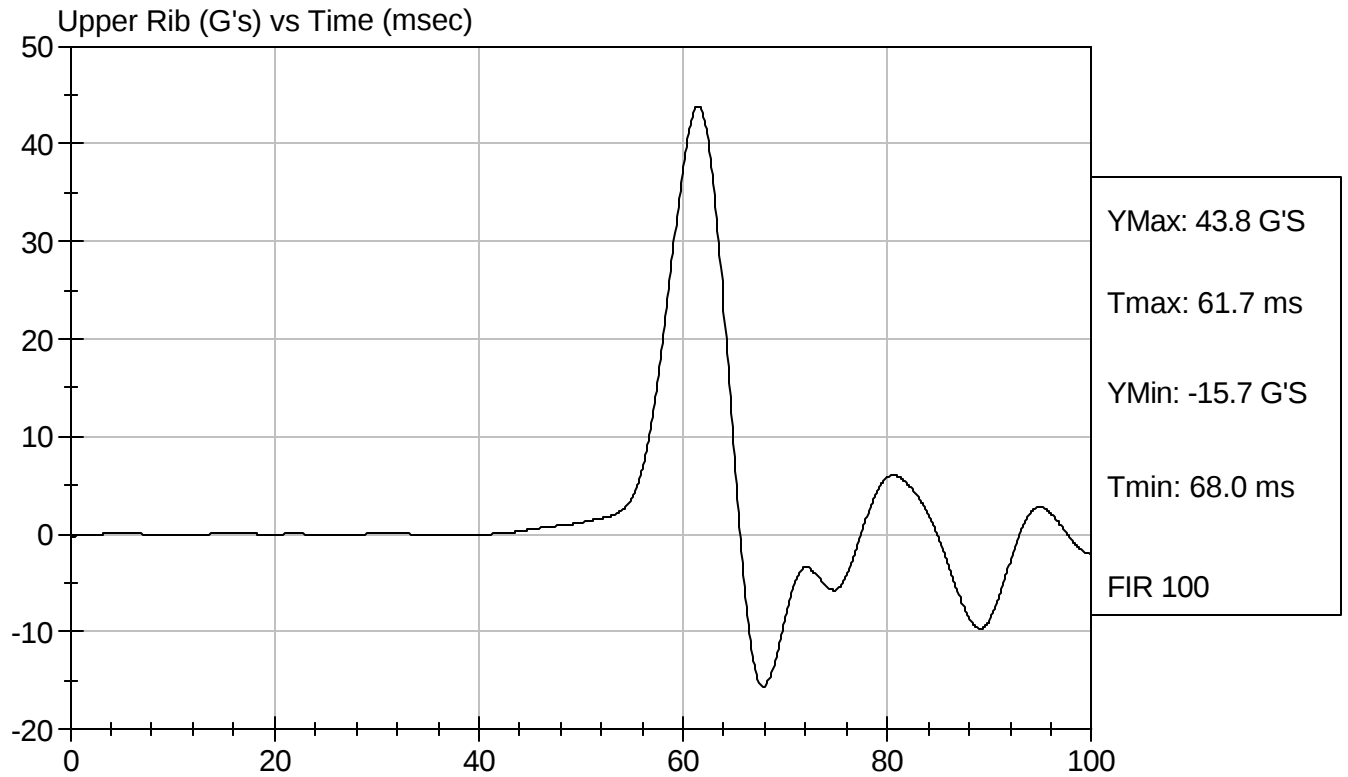
David Winkelbauer
Approved By

09/26/2006
Test Date



Test Desc: Thorax Impact
Component ID: D062872

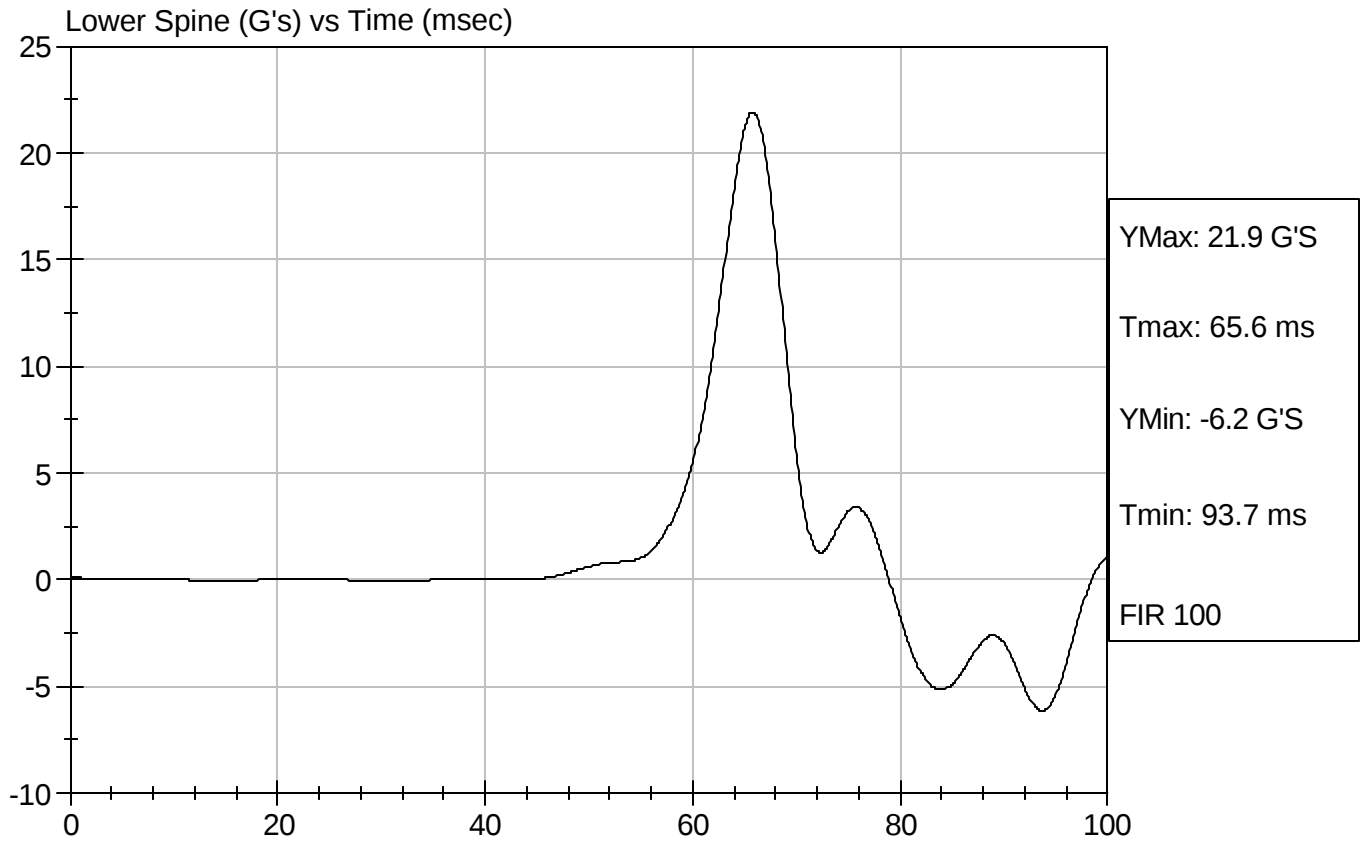
Test Date: 09/26/2006
Speed: 14.07 ft/sec, 4.29 m/sec





Test Desc: Thorax Impact
Component ID: D062872

Test Date: 09/26/2006
Speed: 14.07 ft/sec, 4.29 m/sec



SID Calibration Data Sheet
Side Impact Dummy
Pelvis Impact Test

ATD Serial No: 272

Test I.D: D062873

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	40	Pass
Probe Velocity	m/s	4.27 - 4.33	4.32	Pass
Pelvis Acceleration	G's	40 - 60	42	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

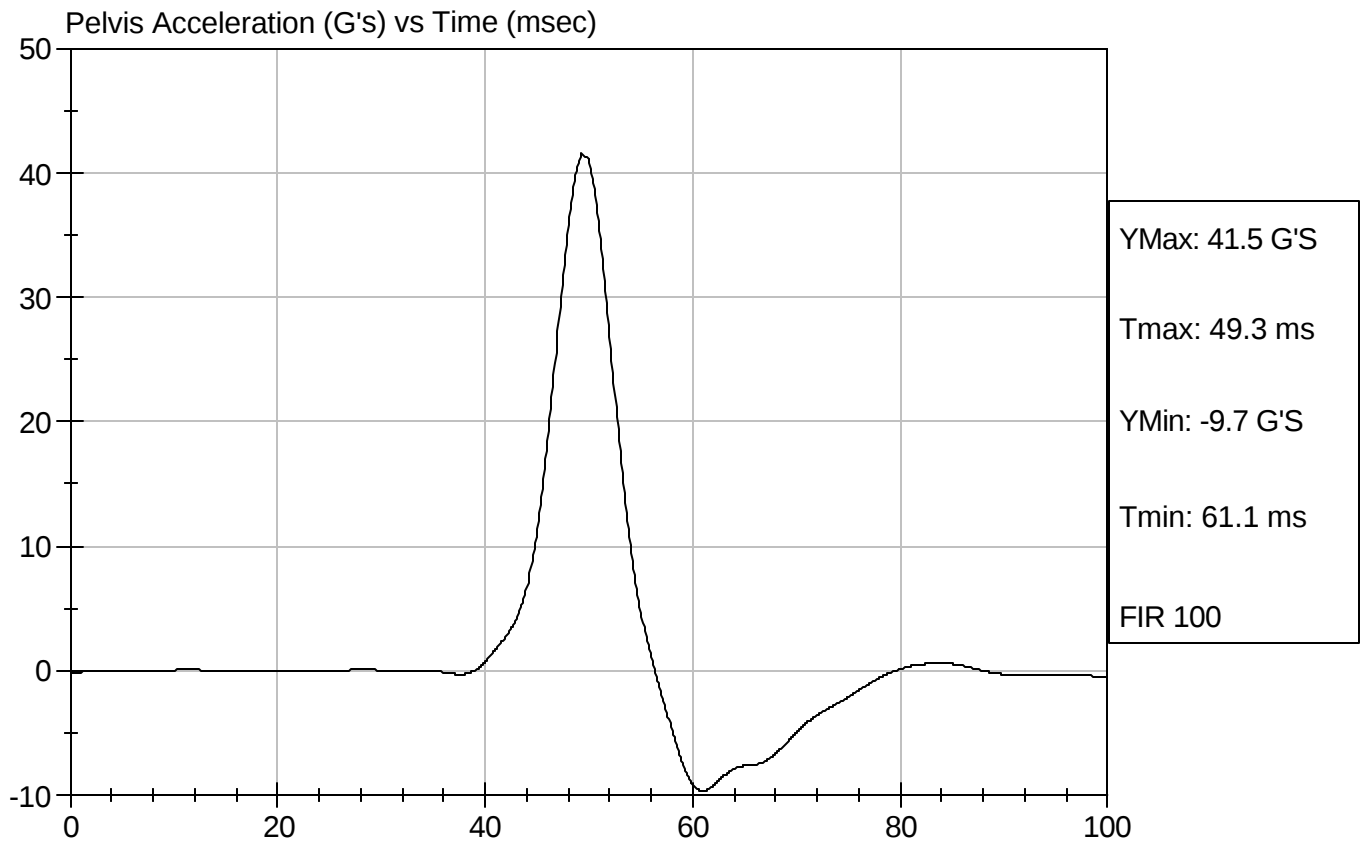
David Winkelbauer
Approved By

09/26/2006
Test Date



Test Desc: Pelvis Impact
Component ID: D062873

Test Date: 09/26/2006
Speed: 14.16 ft/sec, 4.32 m/sec



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

ATD Serial No: 272

Test I.D: D062874

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	40	Pass
Force At 12.7 mm	N	104 -162	130	Pass
Force At 19 mm	N	163 - 222	185	Pass
Force At 25.4 mm	N	222 - 280	247	Pass
Force At 33 mm	N	325 - 391	342	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

David Winkelbauer
Approved By

09/25/2006
Test Date

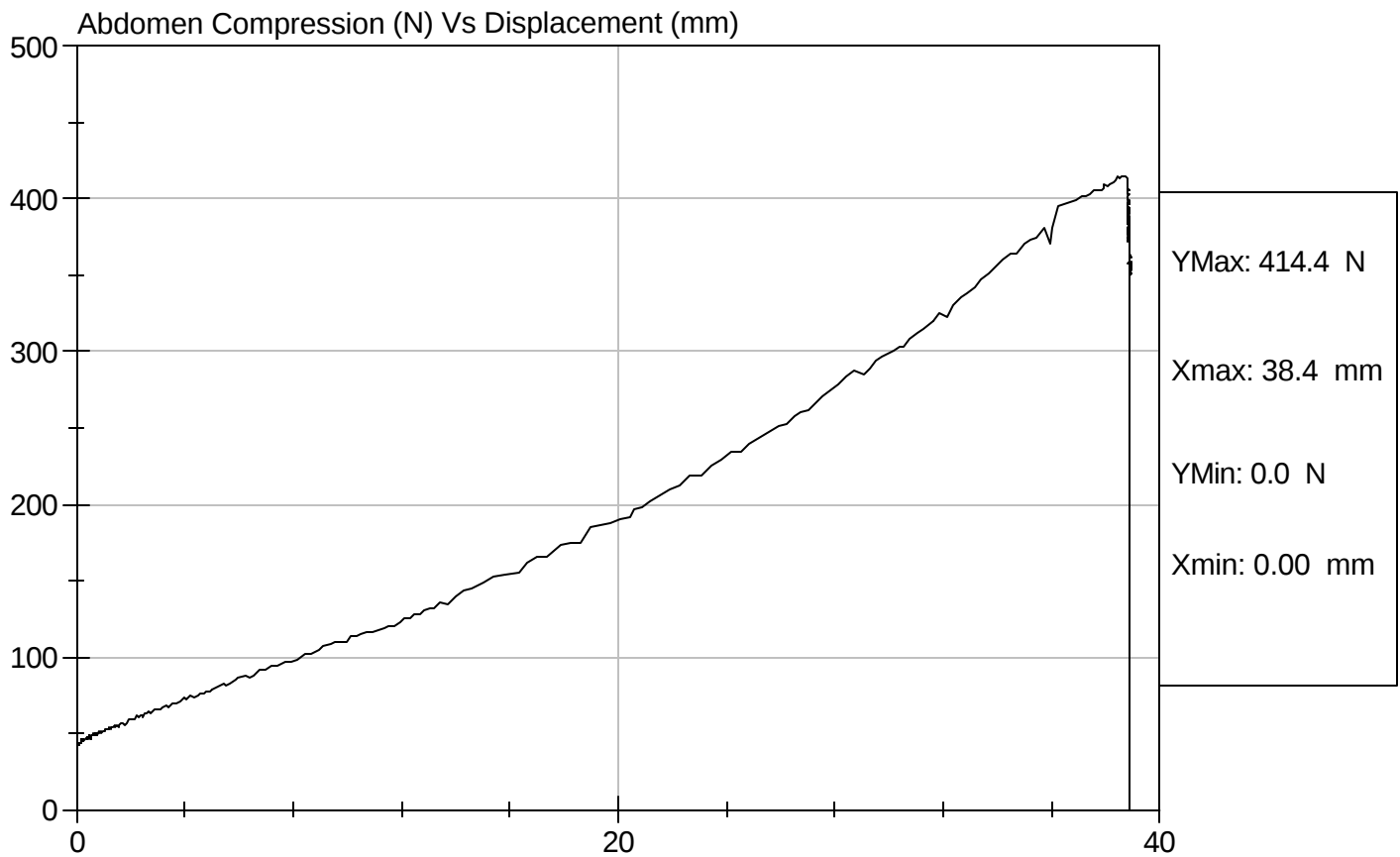


Test Description: Abdomen Compression

Test Date: 09/25/2006

Component: D062874

Speed: 0 ft/sec, 0 m/sec



SID Calibration Data Sheet
Side Impact Dummy
Lumbar Flexion Calibration

ATD Serial No: 272

Test I.D: D062875

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	0.0	Pass
Force At 20 deg	N	97.9 - 151.2	112.1	Pass
Force At 30 deg	N	151.2 - 204.6	176.2	Pass
Force At 40 deg	N	204.6 - 258.0	240.3	Pass
Return Angle	Deg	12 Maximum	4	Pass
			Overall Test Results	Pass

Jessica Hall
Laboratory Technician

09/25/2006
Test Date

David Winkelbauer
Approved By

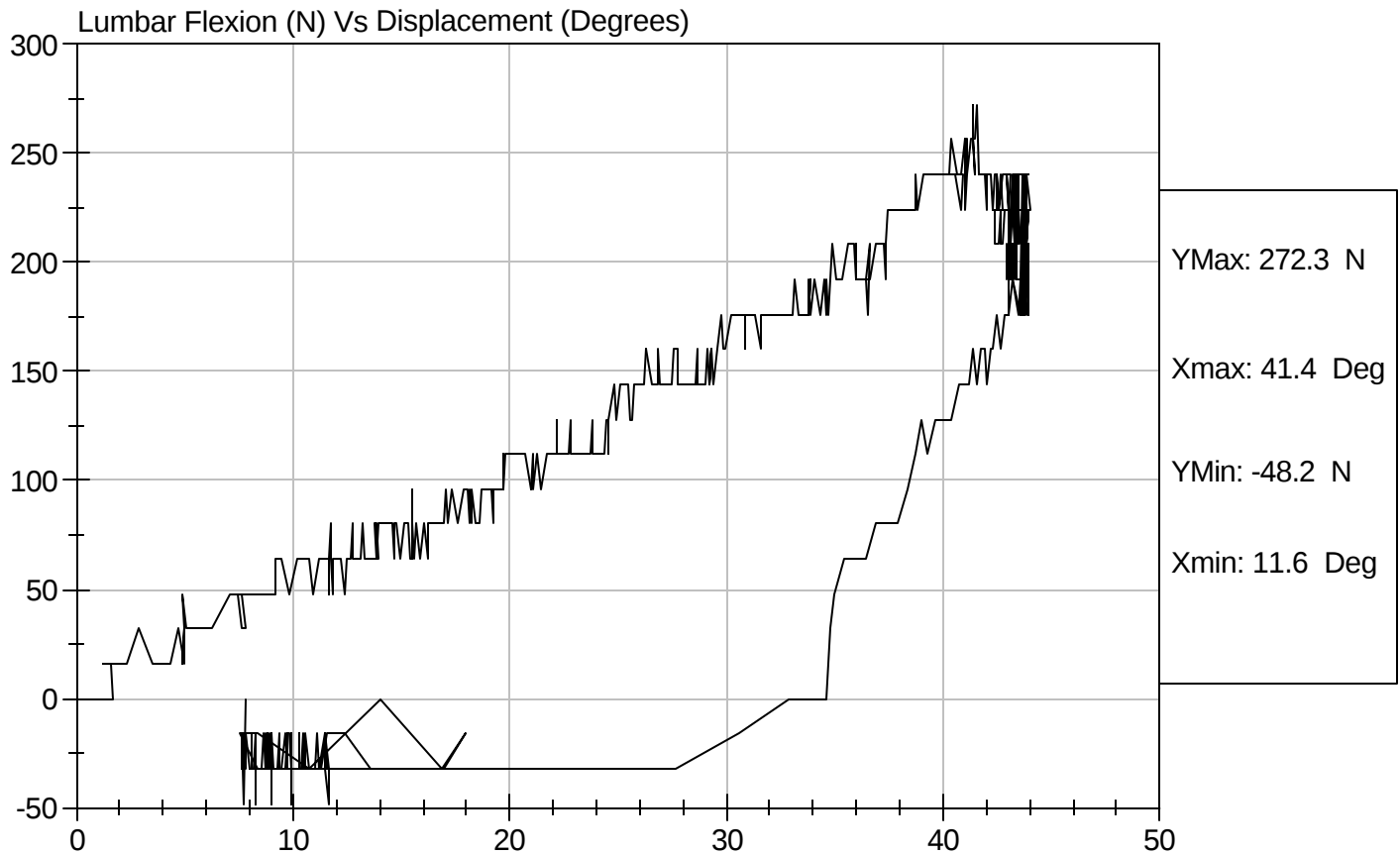


Test Description: Lumbar Flexion

Test Date: 09/25/2006

Component: D062875

Speed: 0 ft/sec, 0 m/sec



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

ATD Serial No: 272

Test I.D: D062879

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	40	Pass
Impact Velocity		m/s	6.89 to 7.13	6.90	Pass
Pendulum Deceleration	10 msec	m/s	1.96 to 2.55	2.24	Pass
	20 msec	m/s	4.12 to 5.10	4.48	Pass
	30 msec	m/s	5.73 to 7.01	6.38	Pass
	40 to 70 msec	m/s	6.27 to 7.64	6.81	Pass
Midsagittal Plane Max Rotation		deg	66 to 82	71	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	58	Pass
Mx Peak to Max. Head Rotation		msec	2 to 16	13	Pass


 Laboratory Technician

09/26/2006

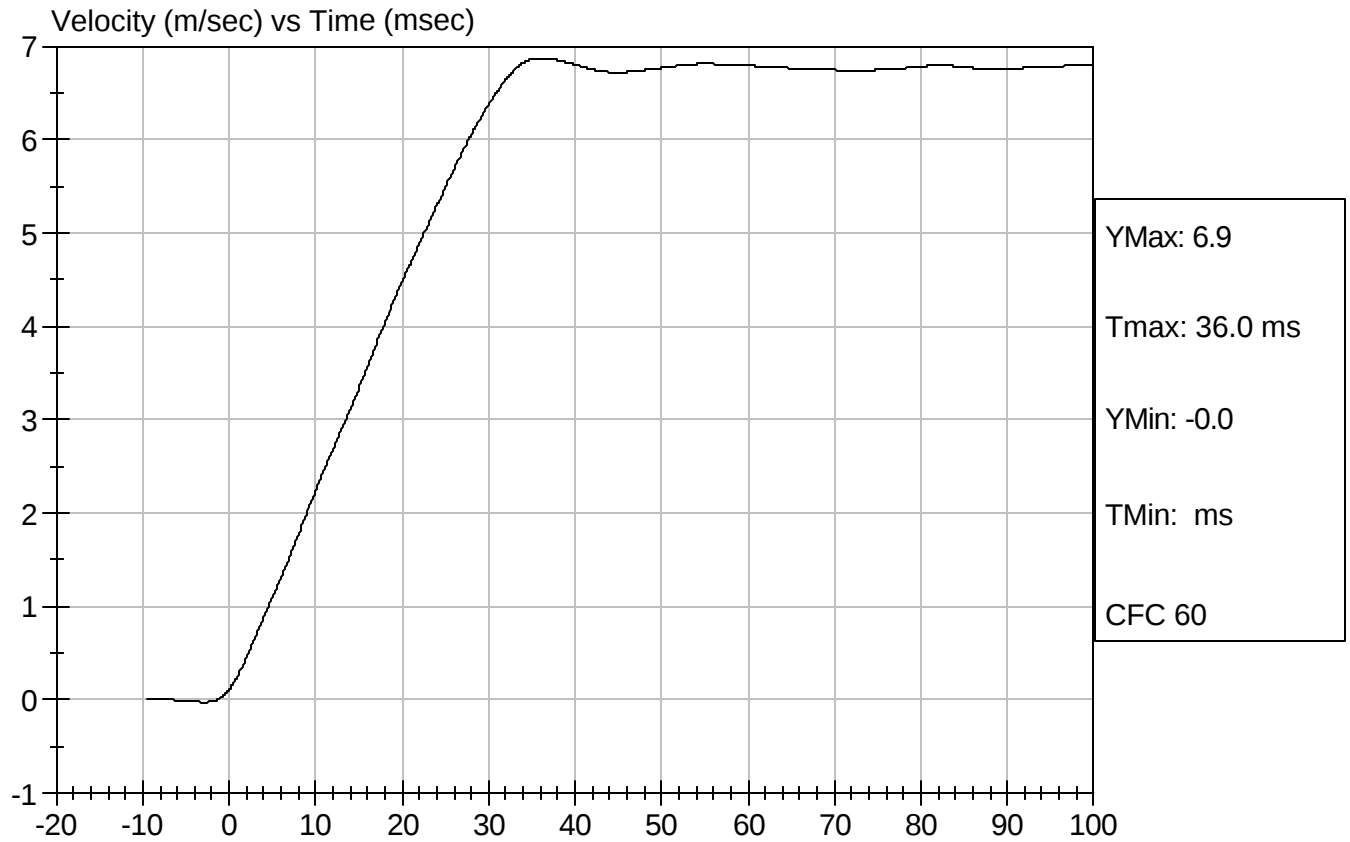
Test Date


 Approved By



Test Desc: Neck Bending
Component ID: D062879

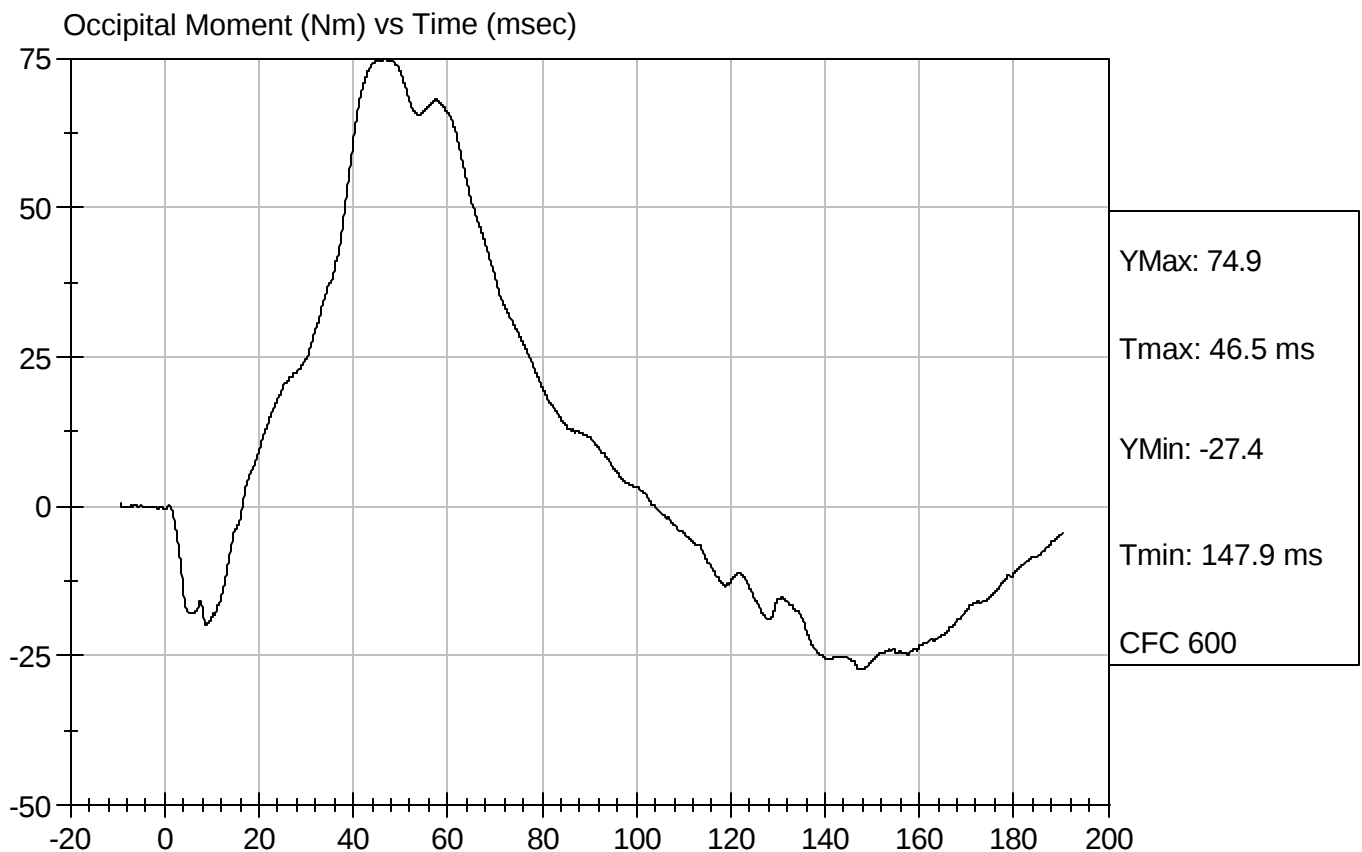
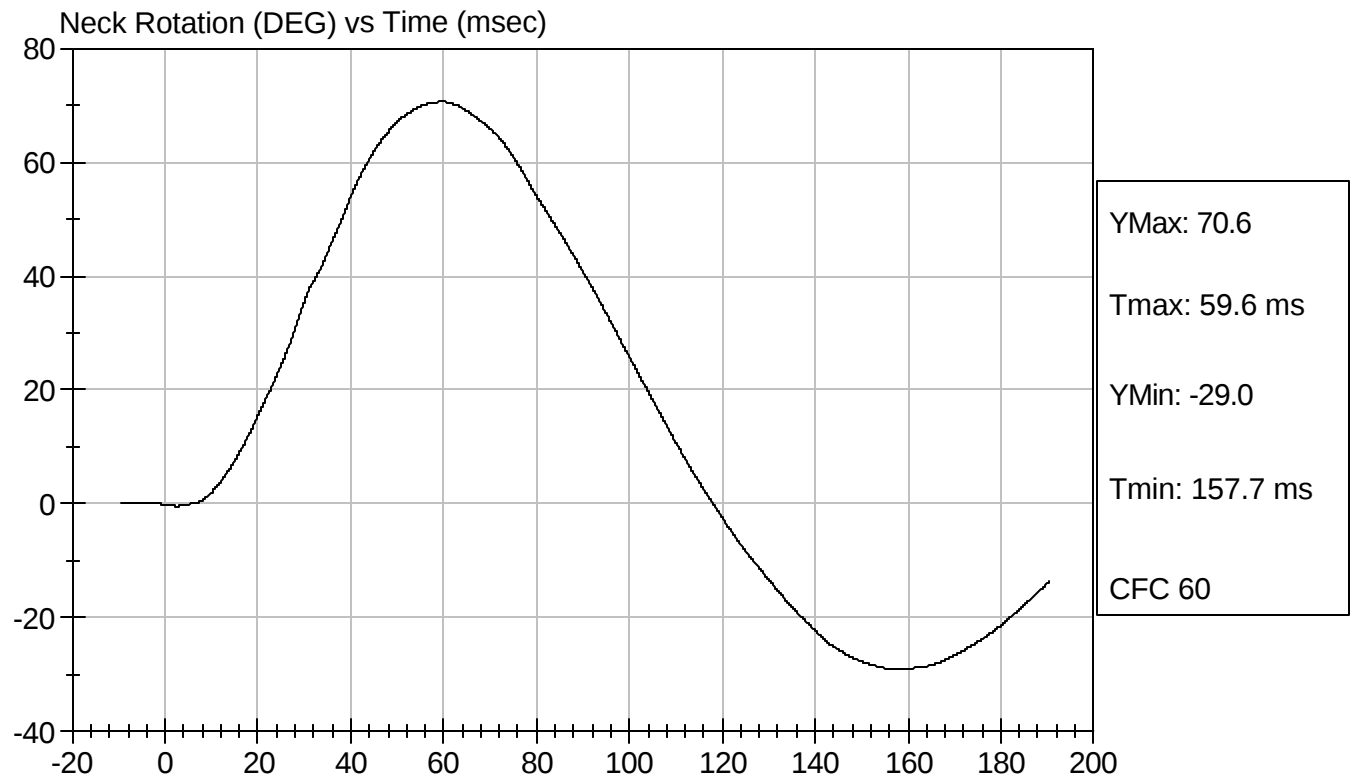
Test Date: 09/26/2006
Speed: 22.63 ft/sec, 6.90 m/sec





Test Desc: Neck Bending
Component ID: D062879

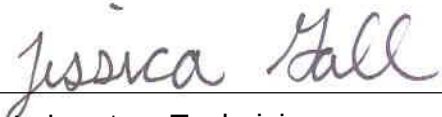
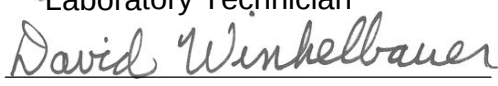
Test Date: 09/26/2006
Speed: 22.63 ft/sec, 6.90 m/sec



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

09/26/2006

Test Date

CERTIFICATION DATA

Dummy Serial Number: 904

Calibration Test Results Summary

Dummy Serial Number: 904

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: 904

Test I.D: D06264

Tested Parameter	Units	Specification	Result	Pass/Fail
SH - Seated Height	mm	889 - 909	906	Pass
RH - Rib Height	mm	501 - 521	508	Pass
HP - Hip Pivot Height	mm	99 ref.	99	Pass
RD - Rib from Back Line	mm	229 - 241	240	Pass
KV - Knee Pivot to Back Line	mm	511 - 526	523	Pass
SW - Knee Pivot to Floor	mm	490 - 505	496	Pass
HW - Hip Width	mm	356 - 391	360	Pass
Overall Test Results			Pass	

Jessica Hall
Laboratory Technician

David Winkelbauer
Approved By

08/29/2006
Test Date

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

ATD Serial No: 904

Test I.D: D062641

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	50	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	-8.0	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

08/29/2006

Test Date

David Winkelbauer
Approved By



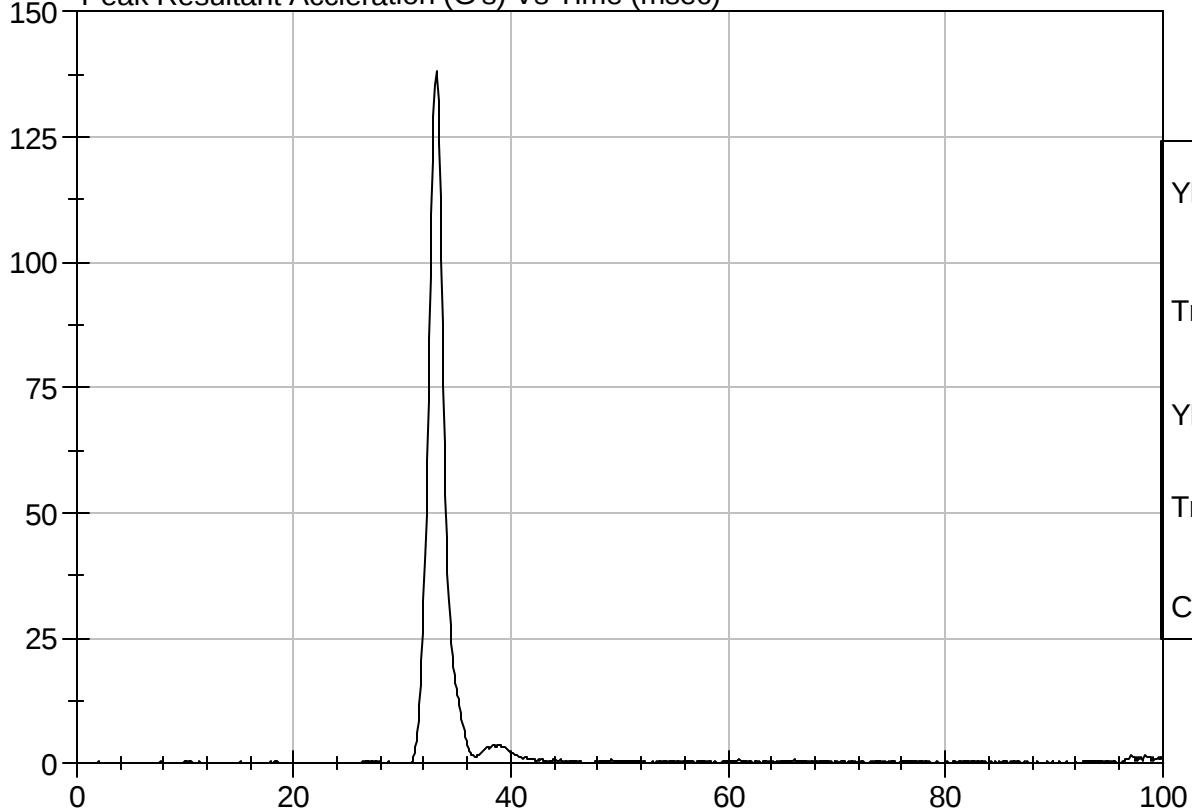
Test Description: Head Drop

Test Date: 08/29/2006

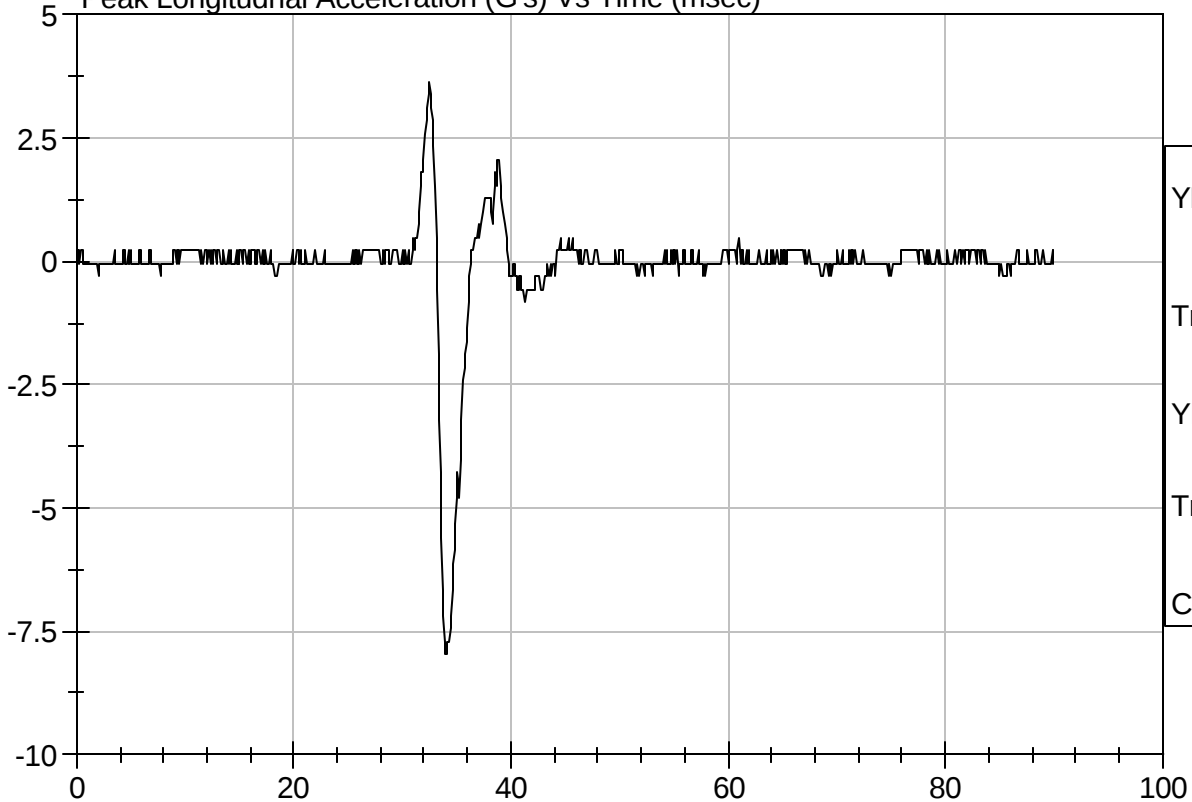
Component: D062641

Speed: 0 ft/s, 0.00 m/s

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



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



SID Calibration Data Sheet
Side Impact Dummy
Thorax Impact Test

ATD Serial No: 904

Test I.D: D062642

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	47	Pass
Probe Velocity	m/s	4.22 - 4.31	4.30	Pass
Upper Rib	G's	37 - 46	43	Pass
Lower Rib	G's	37 - 46	41	Pass
Lower Spine	G's	15 - 22	22	Pass
Overall Test Results				Pass


Laboratory Technician


Approved By

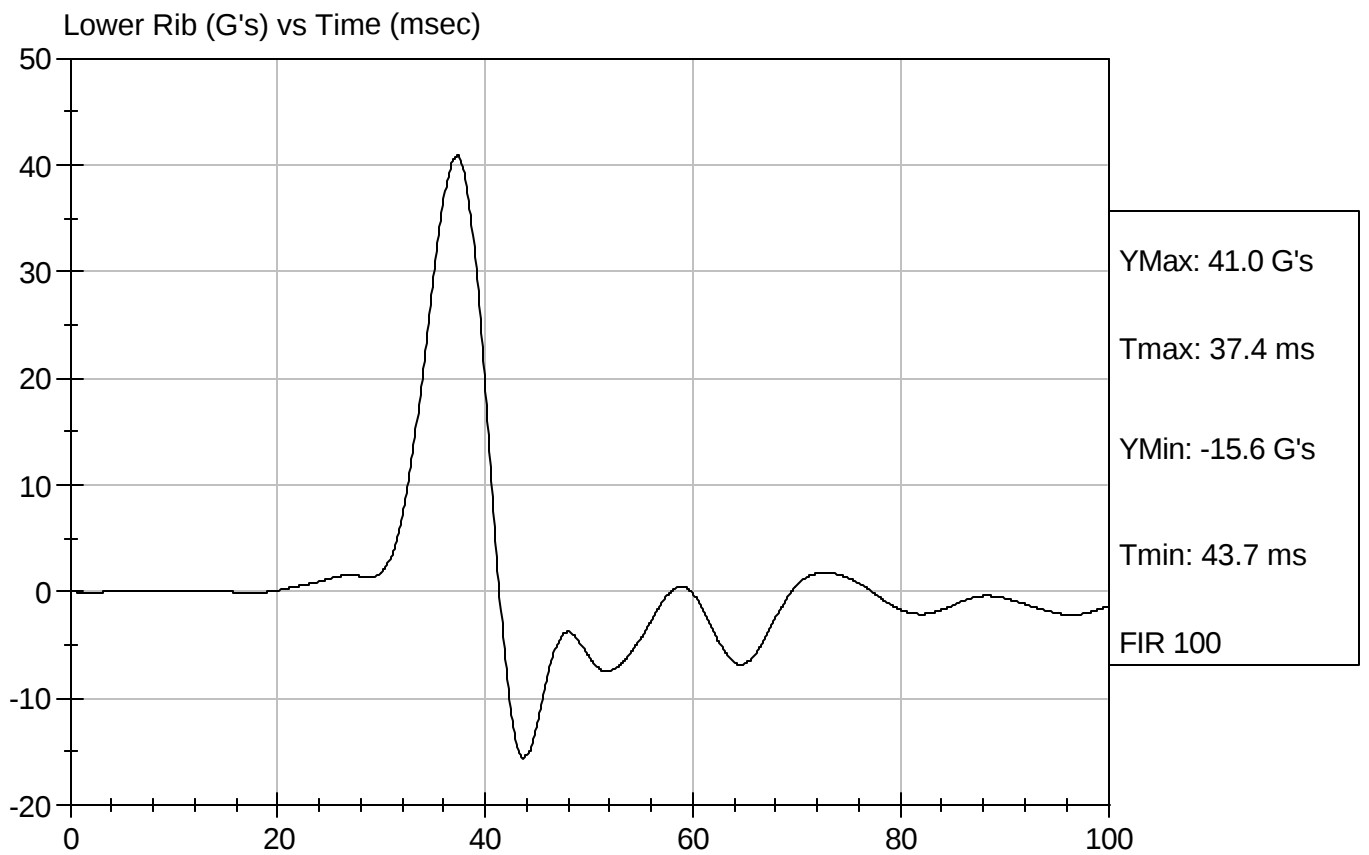
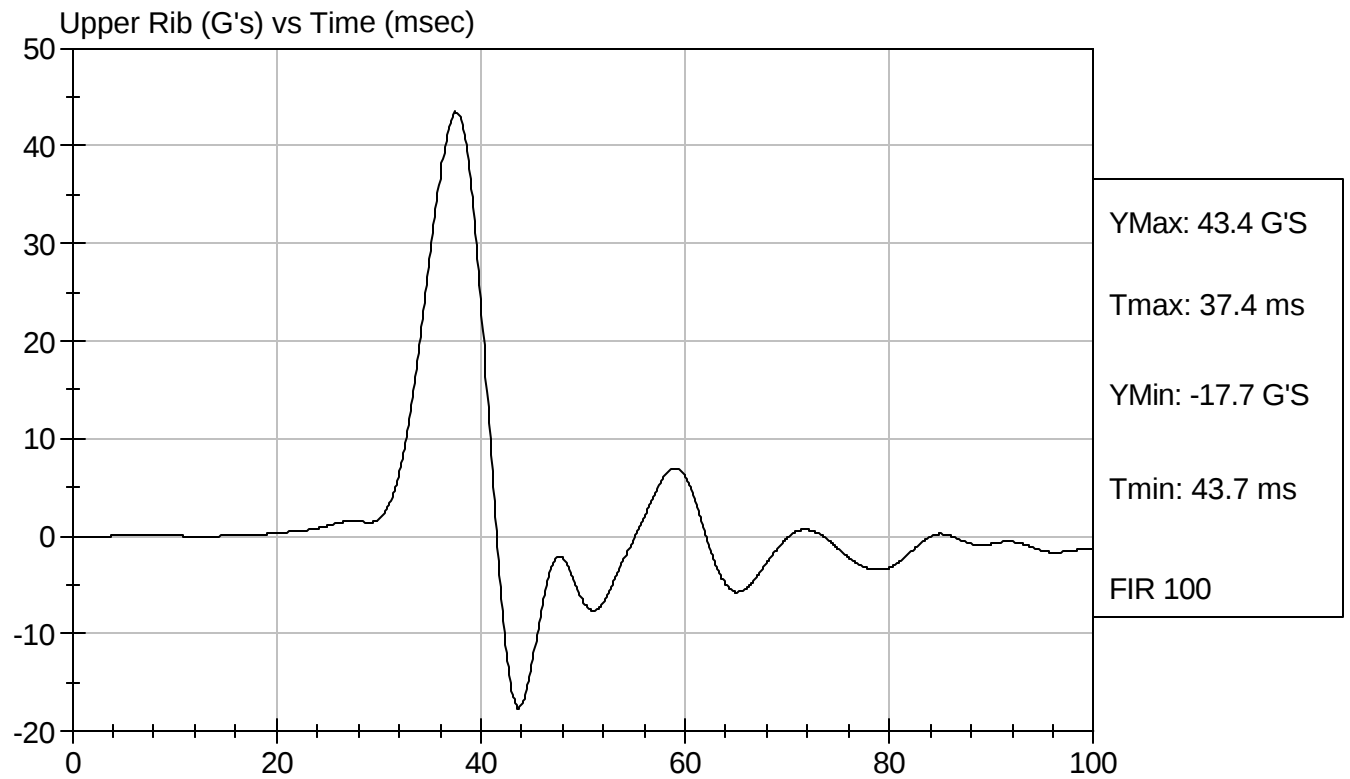
08/30/2006

Test Date



Test Desc: Thorax Impact
Component ID: D062642

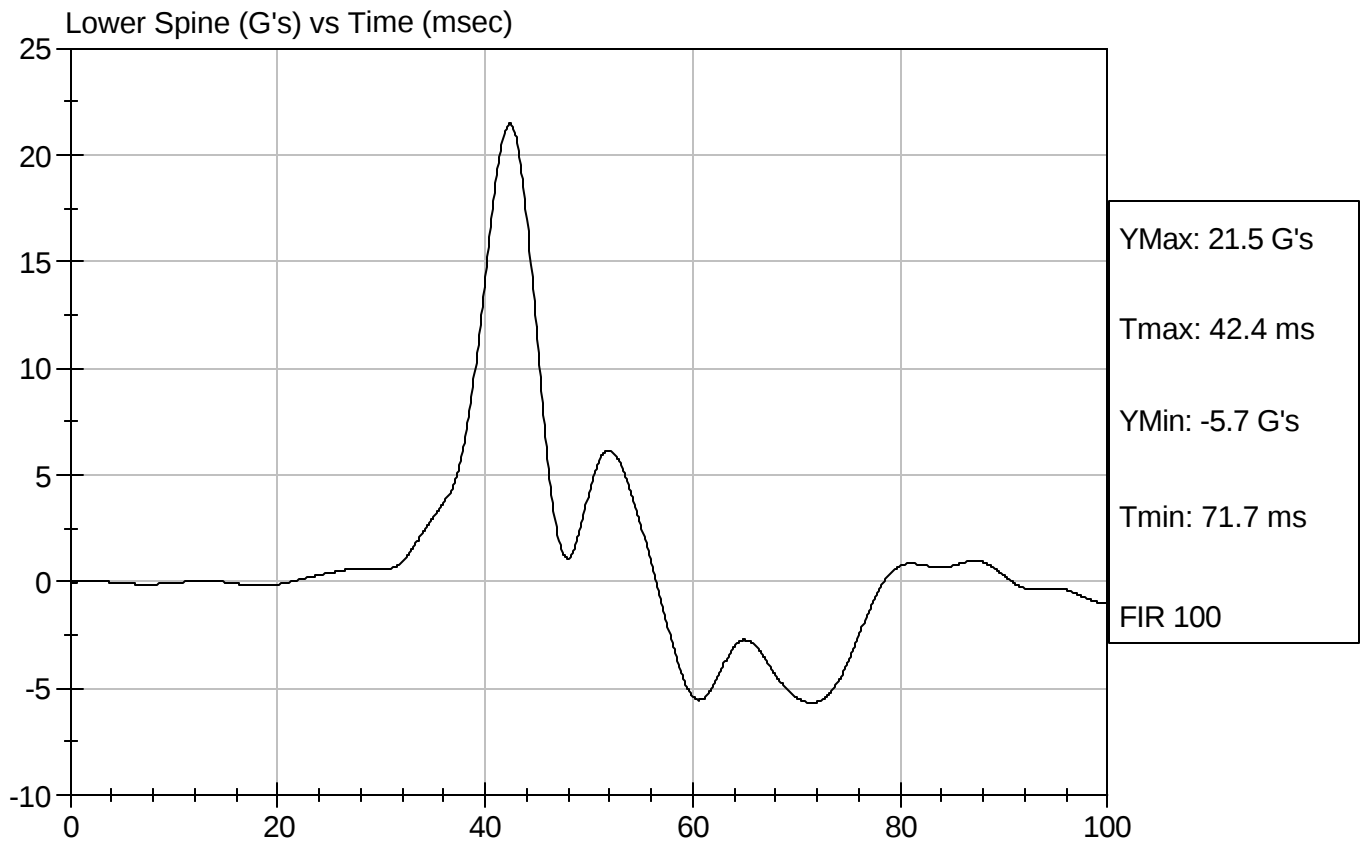
Test Date: 08/30/2006
Speed: 14.12 ft/sec, 4.30 m/sec





Test Desc: Thorax Impact
Component ID: D062642

Test Date: 08/30/2006
Speed: 14.12 ft/sec, 4.30 m/sec



SID Calibration Data Sheet
Side Impact Dummy
Pelvis Impact Test

ATD Serial No: 904

Test I.D: D062643

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	47	Pass
Probe Velocity	m/s	4.27 - 4.33	4.28	Pass
Pelvis Acceleration	G's	40 - 60	46	Pass
			Overall Test Results	Pass

Jessica Hall
Laboratory Technician

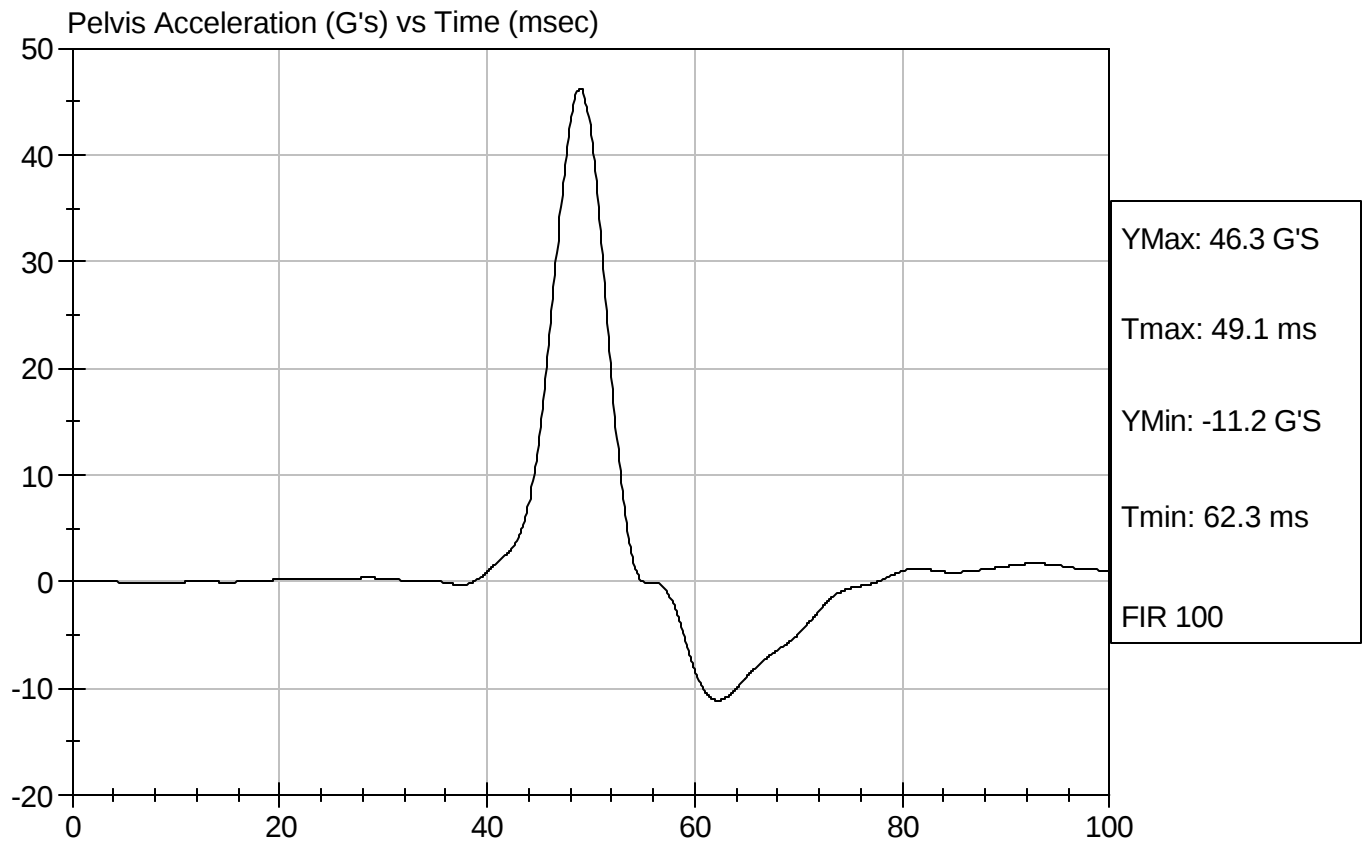
David Winkelbauer
Approved By

08/30/2006
Test Date



Test Desc: Pelvis Impact
Component ID: D062643

Test Date: 08/30/2006
Speed: 14.04 ft/sec, 4.28 m/sec



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

ATD Serial No: 904

Test I.D: D062644

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	42	Pass
Force At 12.7 mm	N	104 -162	134	Pass
Force At 19 mm	N	163 - 222	188	Pass
Force At 25.4 mm	N	222 - 280	251	Pass
Force At 33 mm	N	325 - 391	347	Pass
			Overall Test Results	Pass

Jessica Hall
Laboratory Technician

David Winkelbauer
Approved By

08/29/2006
Test Date

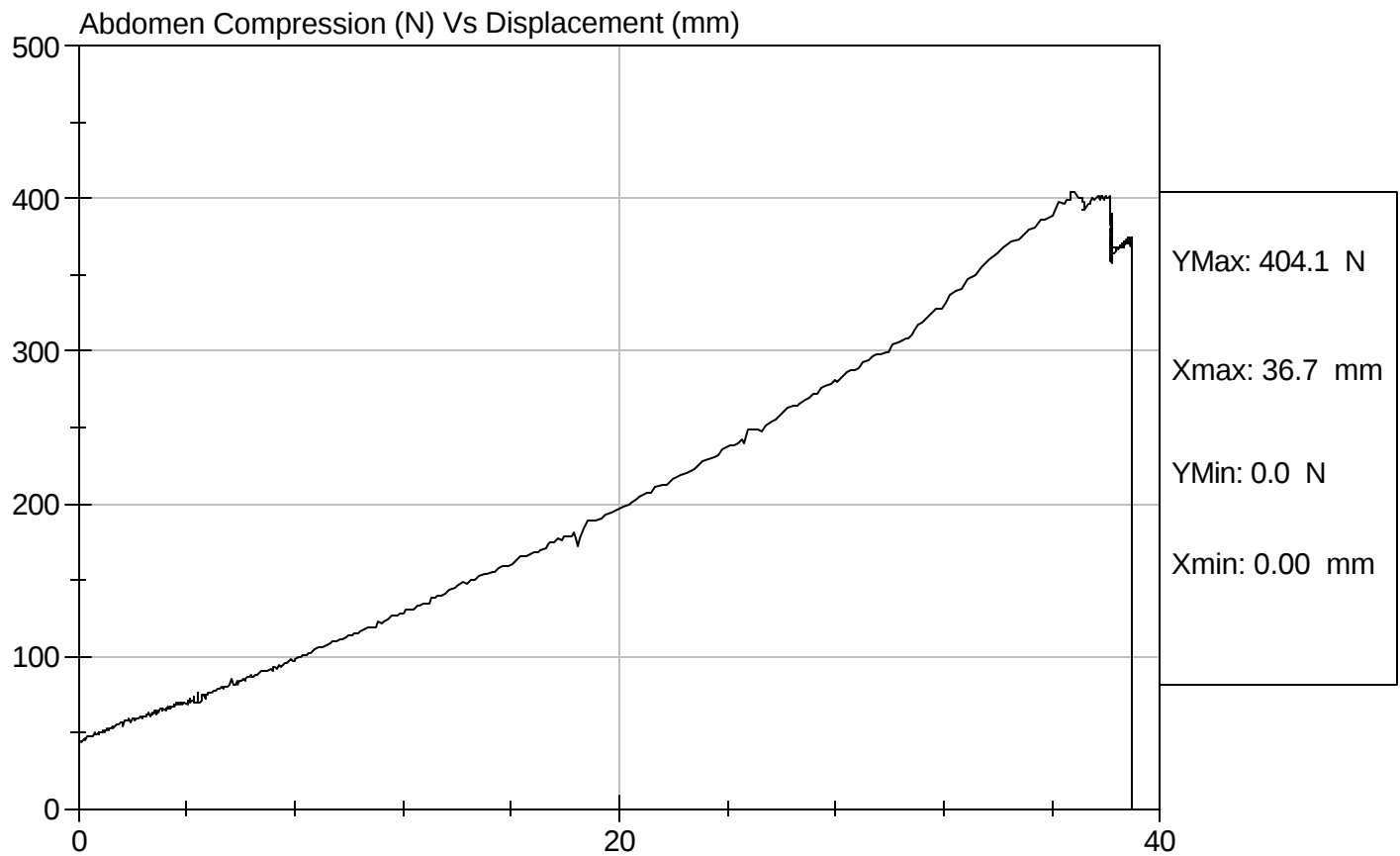


Test Description: Abdomen Compression

Test Date: 08/29/2006

Component: D062644

Speed: 0 ft/sec, 0 m/sec



SID Calibration Data Sheet
Side Impact Dummy
Lumbar Flexion Calibration

ATD Serial No: 904

Test I.D: D062645

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	43	Pass
Force At 0 deg	N	0 - 26.7	0.0	Pass
Force At 20 deg	N	97.9 - 151.2	121.4	Pass
Force At 30 deg	N	151.2 - 204.6	185.5	Pass
Force At 40 deg	N	204.6 - 258.0	217.6	Pass
Return Angle	Deg	12 Maximum	3	Pass
Overall Test Results			Pass	


Laboratory Technician


Approved By

08/29/2006

Test Date

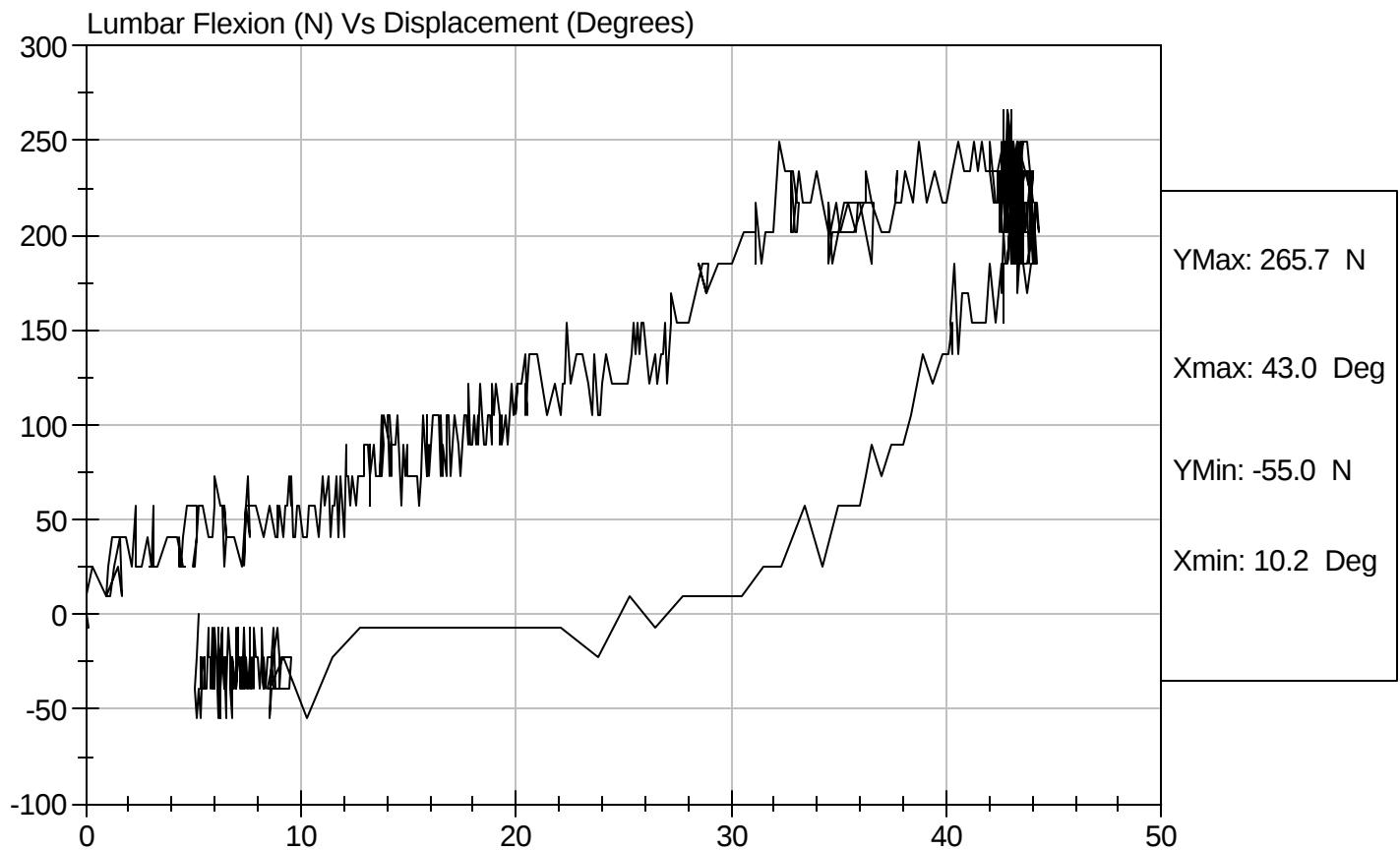


Test Description: Lumbar Flexion

Test Date: 08/29/2006

Component: D062645

Speed: 0 ft/sec, 0 m/sec



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

ATD Serial No: 904

Test I.D: D062649

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity		%	10 to 70	43	Pass
Impact Velocity		m/s	6.89 to 7.13	7.02	Pass
Pendulum Deceleration	10 msec	m/s	1.96 to 2.55	2.27	Pass
	20 msec	m/s	4.12 to 5.10	4.43	Pass
	30 msec	m/s	5.73 to 7.01	6.08	Pass
	40 to 70 msec	m/s	6.27 to 7.64	7.18	Pass
Midsagittal Plane Max Rotation		deg	66 to 82	71	Pass
Head Rotation Peak to Zero - Decay Time		msec	58 to 67	58	Pass
Max. Mx at Occipital Condyles		Nm	73 to 88	78	Pass
Mx Peak To Zero - Decay Time		msec	49 to 64	53	Pass
Mx Peak to Max. Head Rotation		msec	2 to 16	8	Pass


 Laboratory Technician

08/29/2006

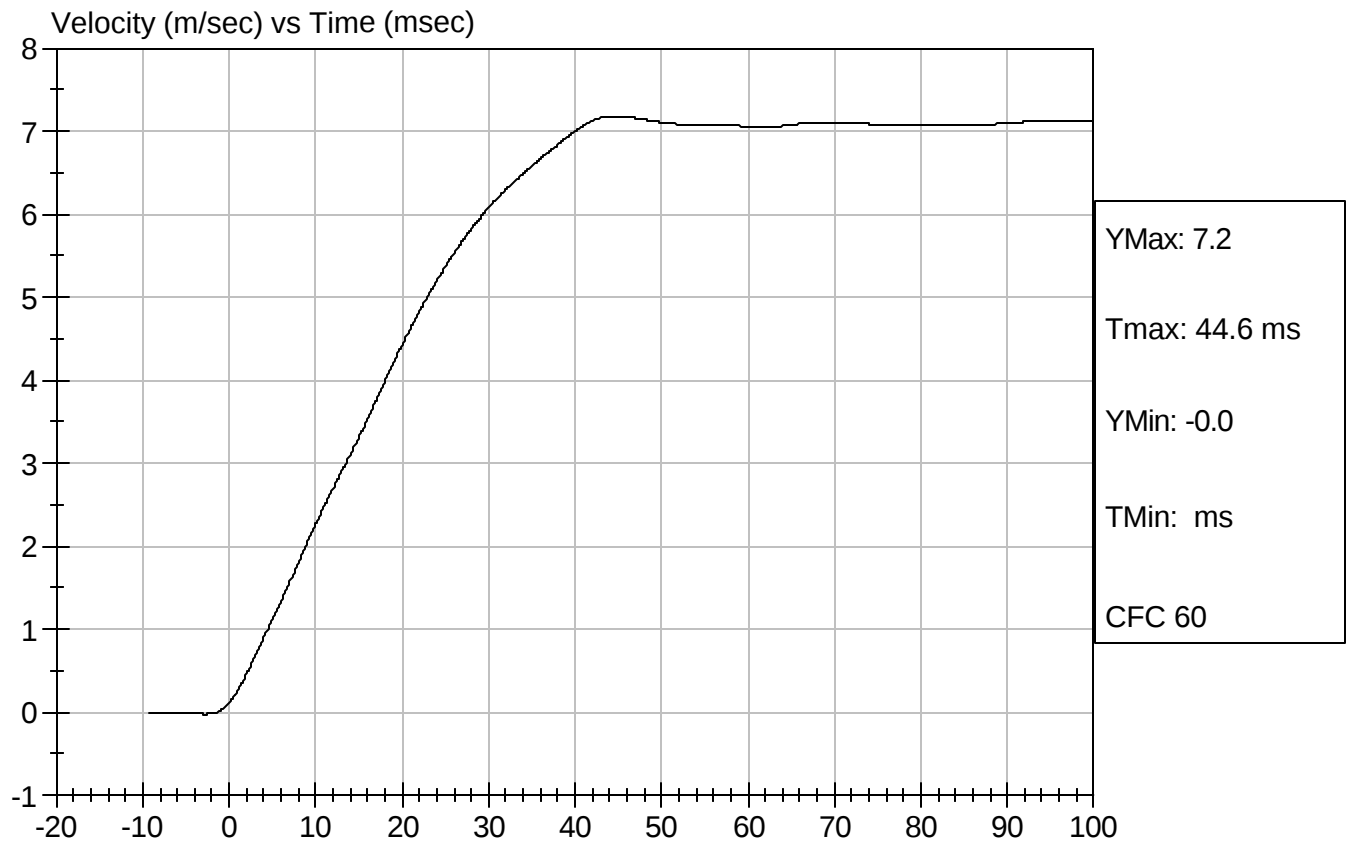
Test Date


 Approved By



Test Desc: Neck Bending
Component ID: D062649

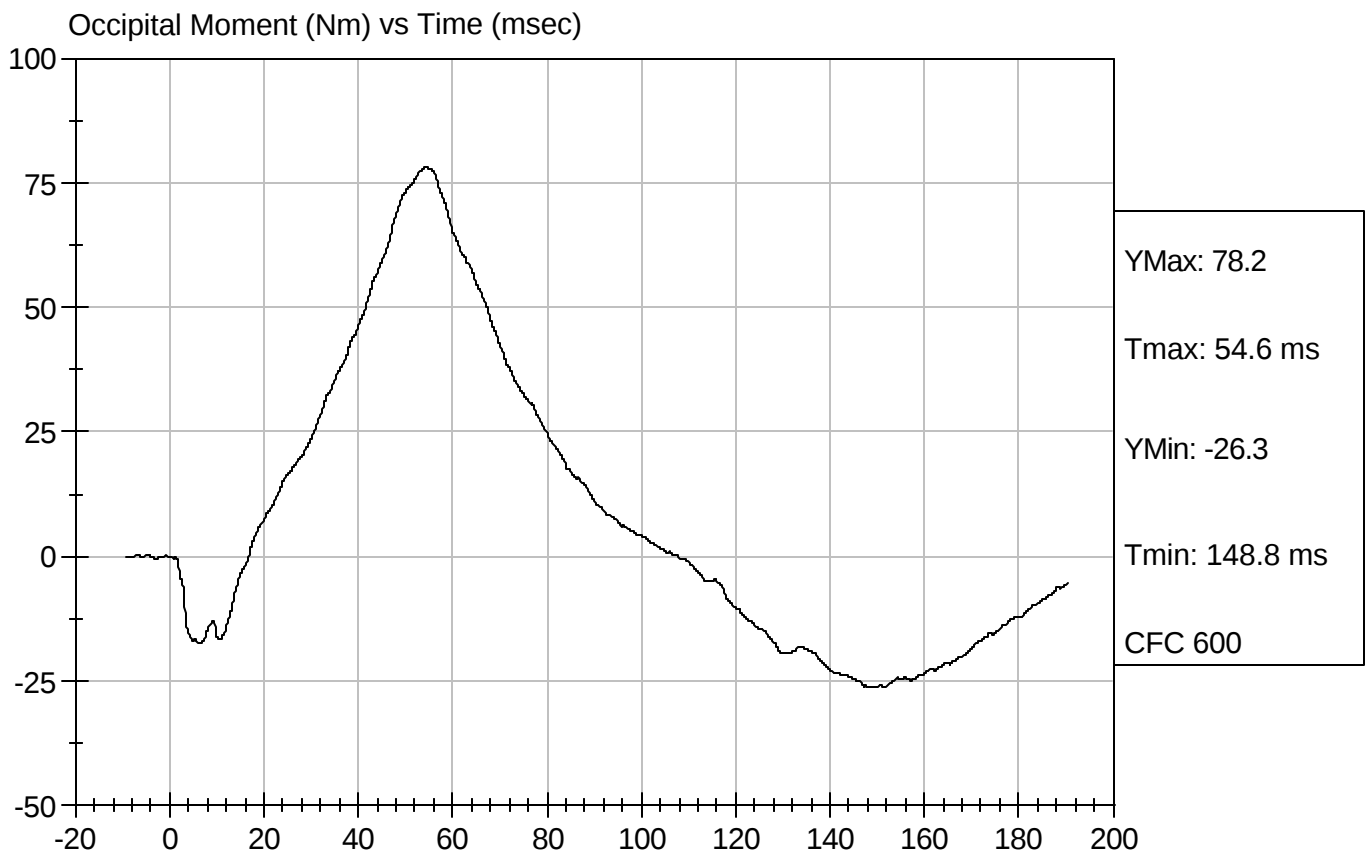
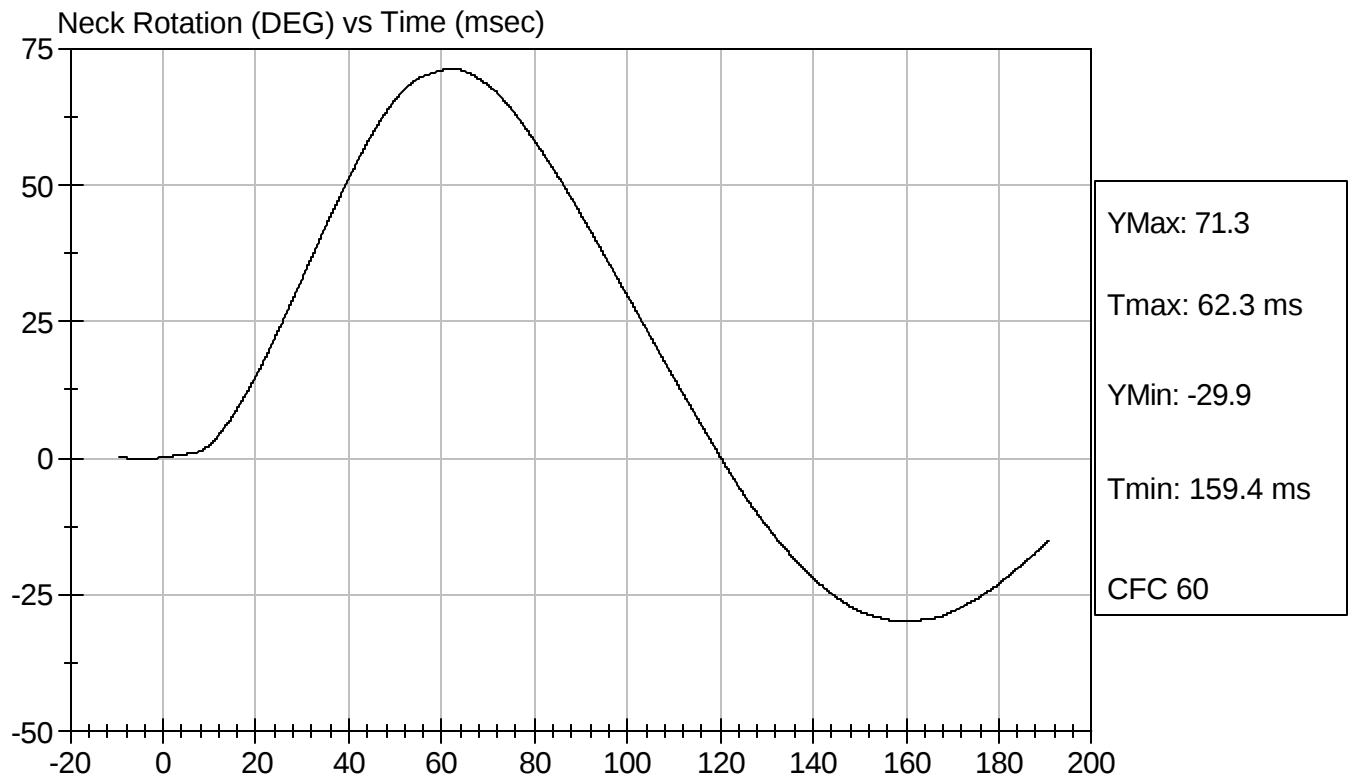
Test Date: 08/29/2006
Speed: 23.04 ft/sec, 7.02 m/sec





Test Desc: Neck Bending
Component ID: D062649

Test Date: 08/29/2006
Speed: 23.04 ft/sec, 7.02 m/sec



Calibration Test Results Summary

Dummy Serial Number: 904

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: 904

Test I.D: D062881

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	40	Pass
Peak Resultant Acceleration	G's	120 to 150	133	Pass
Is Resultant Curve Unimodal?	Yes/No	15% of peak	Yes	Pass
Peak Longitudnal Acceleration	G's	+/- 15	-8.5	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

09/26/2006

Test Date

David Winkelbauer
Approved By



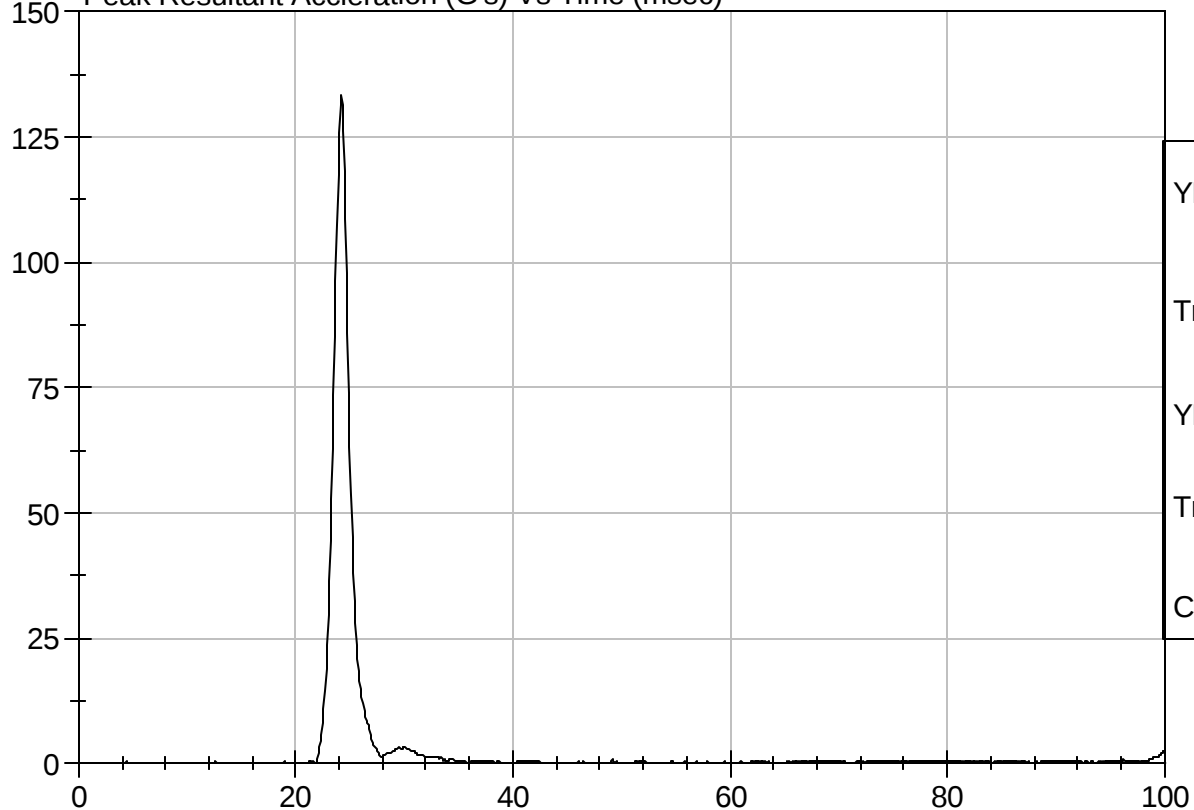
Test Description: Head Drop

Test Date: 09/26/2006

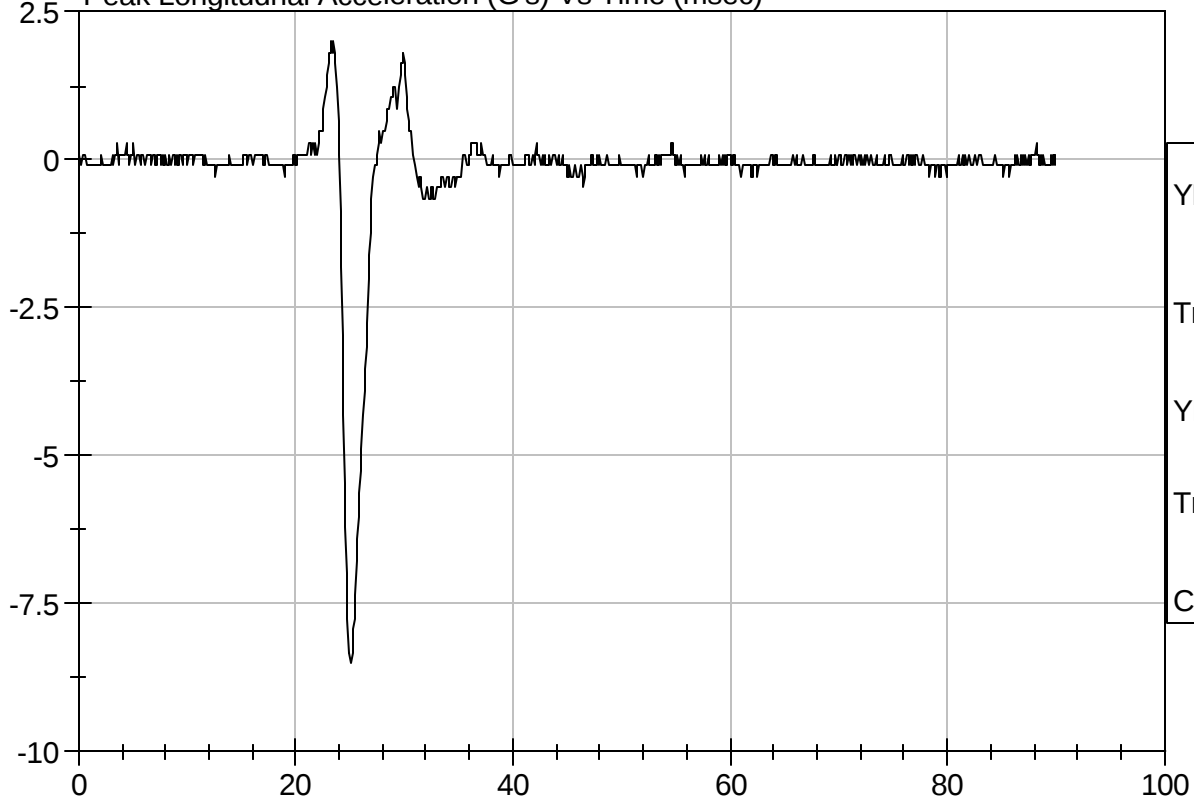
Component: D062881

Speed: 0 ft/s, 0.00 m/s

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



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



SID Calibration Data Sheet
Side Impact Dummy
Thorax Impact Test

ATD Serial No: 904

Test I.D: D062882

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	40	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	37	Pass
Lower Spine	G's	15 - 22	22	Pass
Overall Test Results				Pass


Laboratory Technician


Approved By

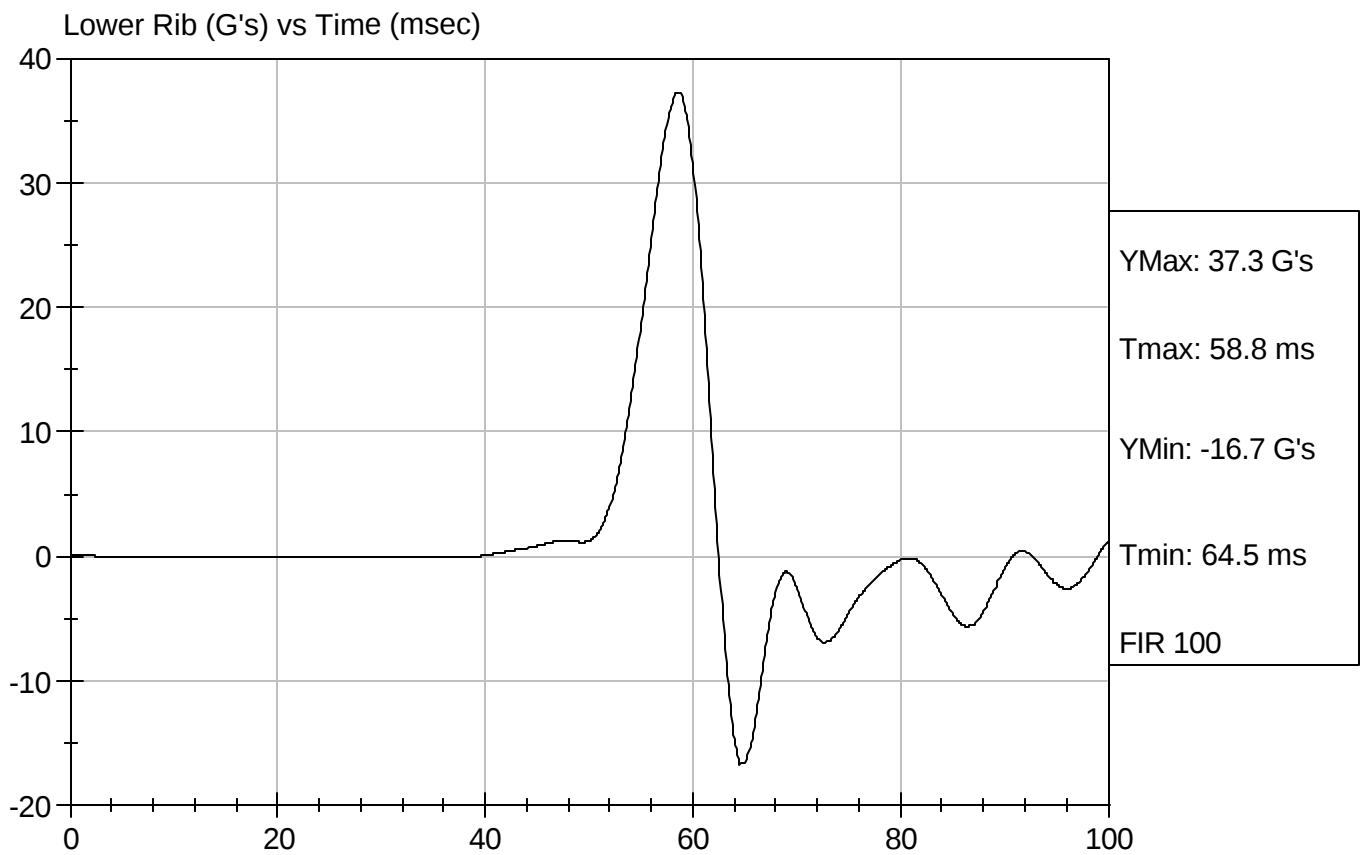
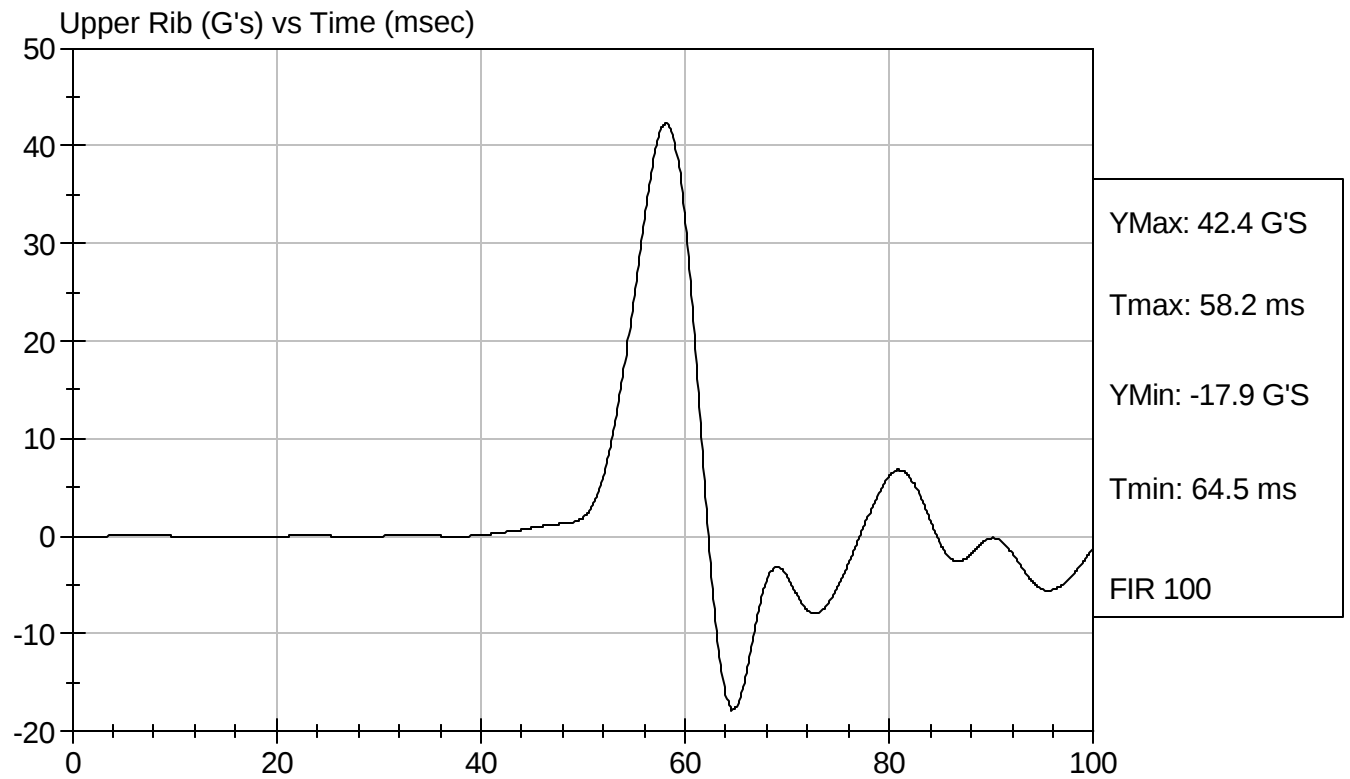
09/26/2006

Test Date



Test Desc: Thorax Impact
Component ID: D062882

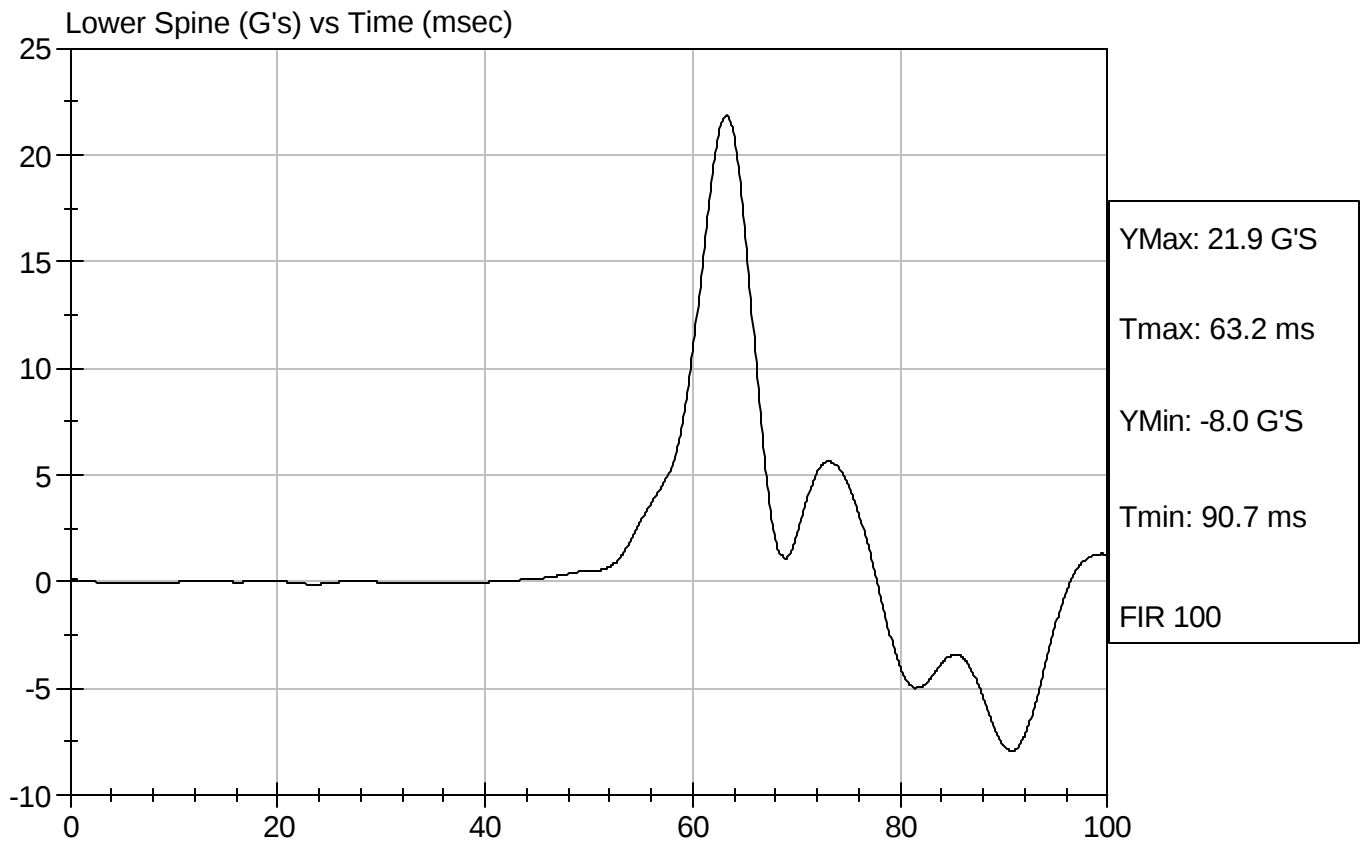
Test Date: 09/26/2006
Speed: 14.01 ft/sec, 4.27 m/sec





Test Desc: Thorax Impact
Component ID: D062882

Test Date: 09/26/2006
Speed: 14.01 ft/sec, 4.27 m/sec



SID Calibration Data Sheet
Side Impact Dummy
Pelvis Impact Test

ATD Serial No: 904

Test I.D: D062883

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	39	Pass
Probe Velocity	m/s	4.27 - 4.33	4.32	Pass
Pelvis Acceleration	G's	40 - 60	46	Pass
			Overall Test Results	Pass

Jessica Hall
Laboratory Technician

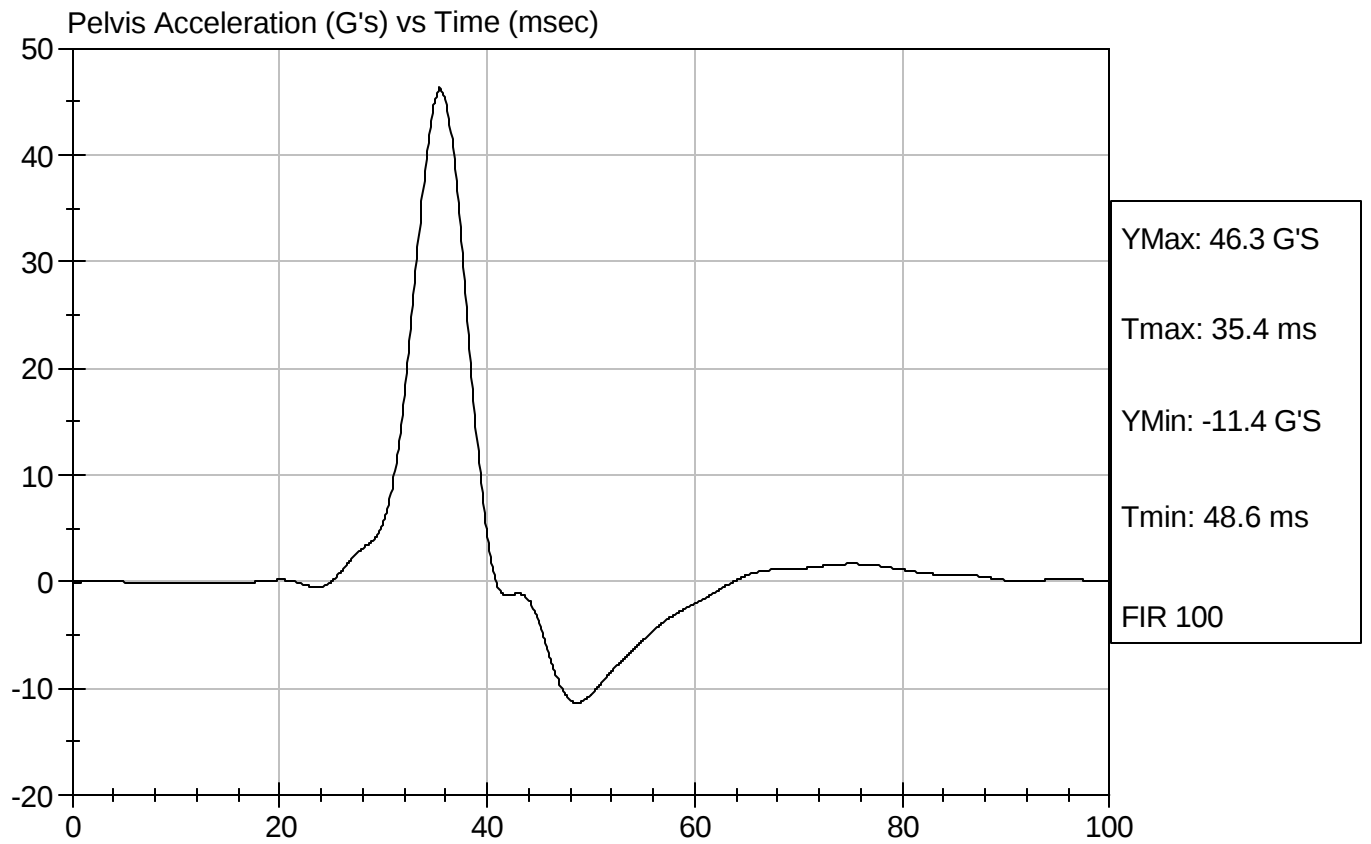
David Winkelbauer
Approved By

09/26/2006
Test Date



Test Desc: Pelvis Impact
Component ID: D062883

Test Date: 09/26/2006
Speed: 14.17 ft/sec, 4.32 m/sec



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

ATD Serial No: 904

Test I.D: D062884

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	40	Pass
Force At 12.7 mm	N	104 -162	140	Pass
Force At 19 mm	N	163 - 222	196	Pass
Force At 25.4 mm	N	222 - 280	260	Pass
Force At 33 mm	N	325 - 391	350	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

David Winkelbauer
Approved By

09/25/2006
Test Date

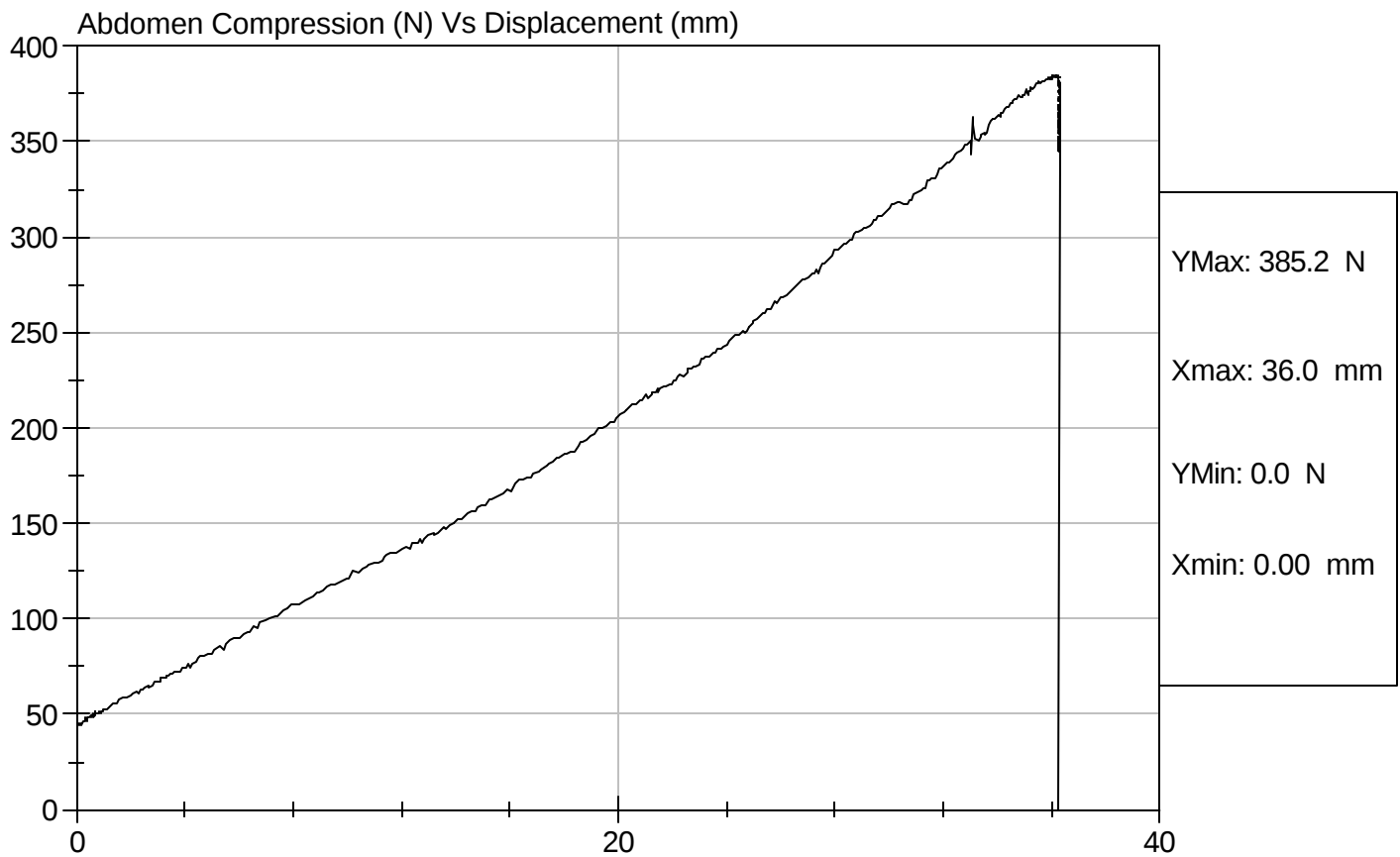


Test Description: Abdomen Compression

Test Date: 09/25/2006

Component: D062884

Speed: 0 ft/sec, 0 m/sec



SID Calibration Data Sheet
Side Impact Dummy
Lumbar Flexion Calibration

ATD Serial No: 904

Test I.D: D062885

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	0.0	Pass
Force At 20 deg	N	97.9 - 151.2	115.5	Pass
Force At 30 deg	N	151.2 - 204.6	163.6	Pass
Force At 40 deg	N	204.6 - 258.0	227.7	Pass
Return Angle	Deg	12 Maximum	3	Pass
Overall Test Results			Pass	


Laboratory Technician


Approved By

09/25/2006

Test Date

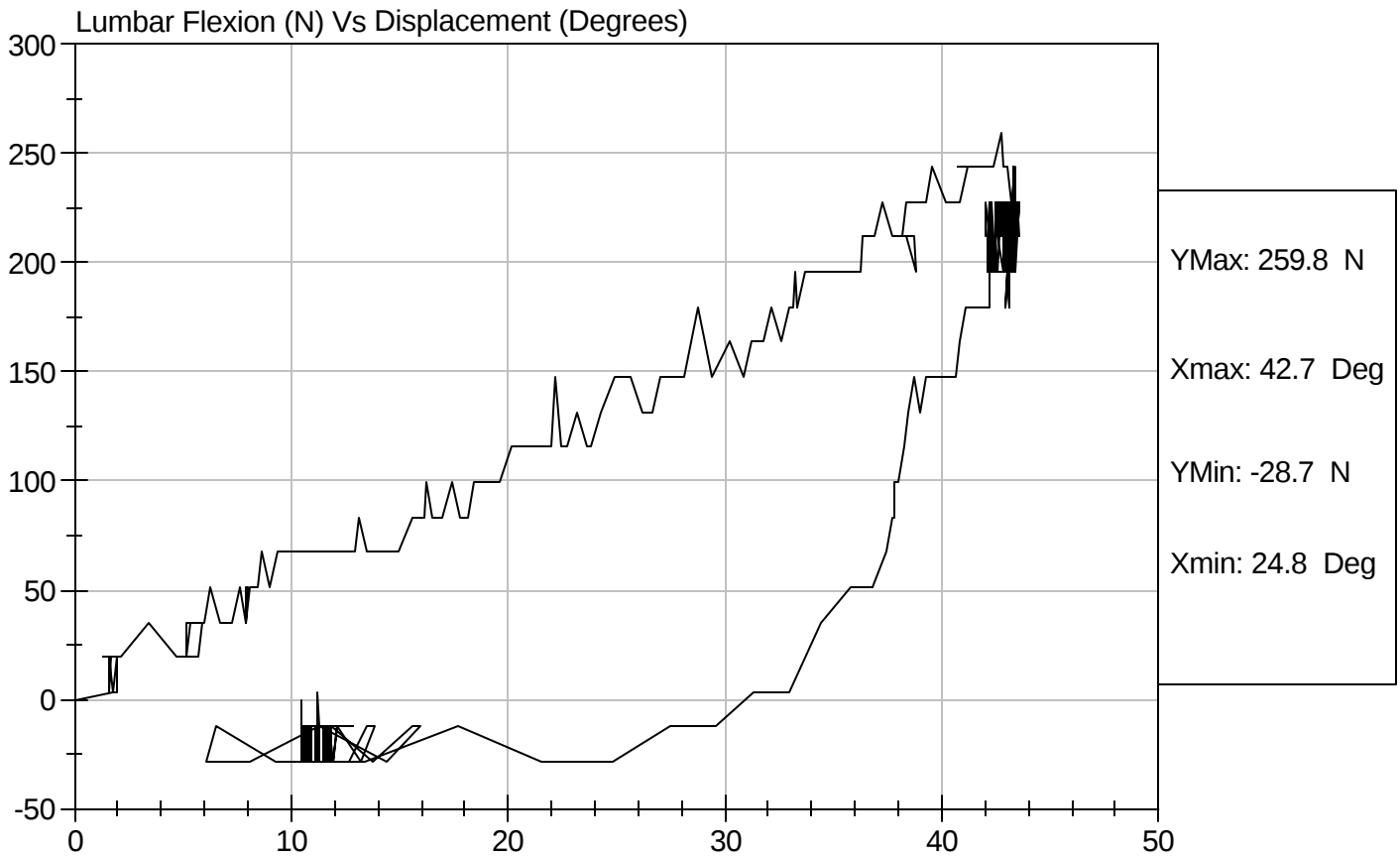


Test Description: Lumbar Flexion

Test Date: 09/25/2006

Component: D062885

Speed: 0 ft/sec, 0 m/sec



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

ATD Serial No: 904

Test I.D: D062889

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity		%	10 to 70	40	Pass
Impact Velocity		m/s	6.89 to 7.13	6.97	Pass
Pendulum Deceleration	10 msec	m/s	1.96 to 2.55	2.15	Pass
	20 msec	m/s	4.12 to 5.10	4.22	Pass
	30 msec	m/s	5.73 to 7.01	5.99	Pass
	40 to 70 msec	m/s	6.27 to 7.64	6.93	Pass
Midsagittal Plane Max Rotation		deg	66 to 82	72	Pass
Head Rotation Peak to Zero - Decay Time		msec	58 to 67	58	Pass
Max. Mx at Occipital Condyles		Nm	73 to 88	79	Pass
Mx Peak To Zero - Decay Time		msec	49 to 64	56	Pass
Mx Peak to Max. Head Rotation		msec	2 to 16	10	Pass



 Laboratory Technician

09/26/2006

Test Date

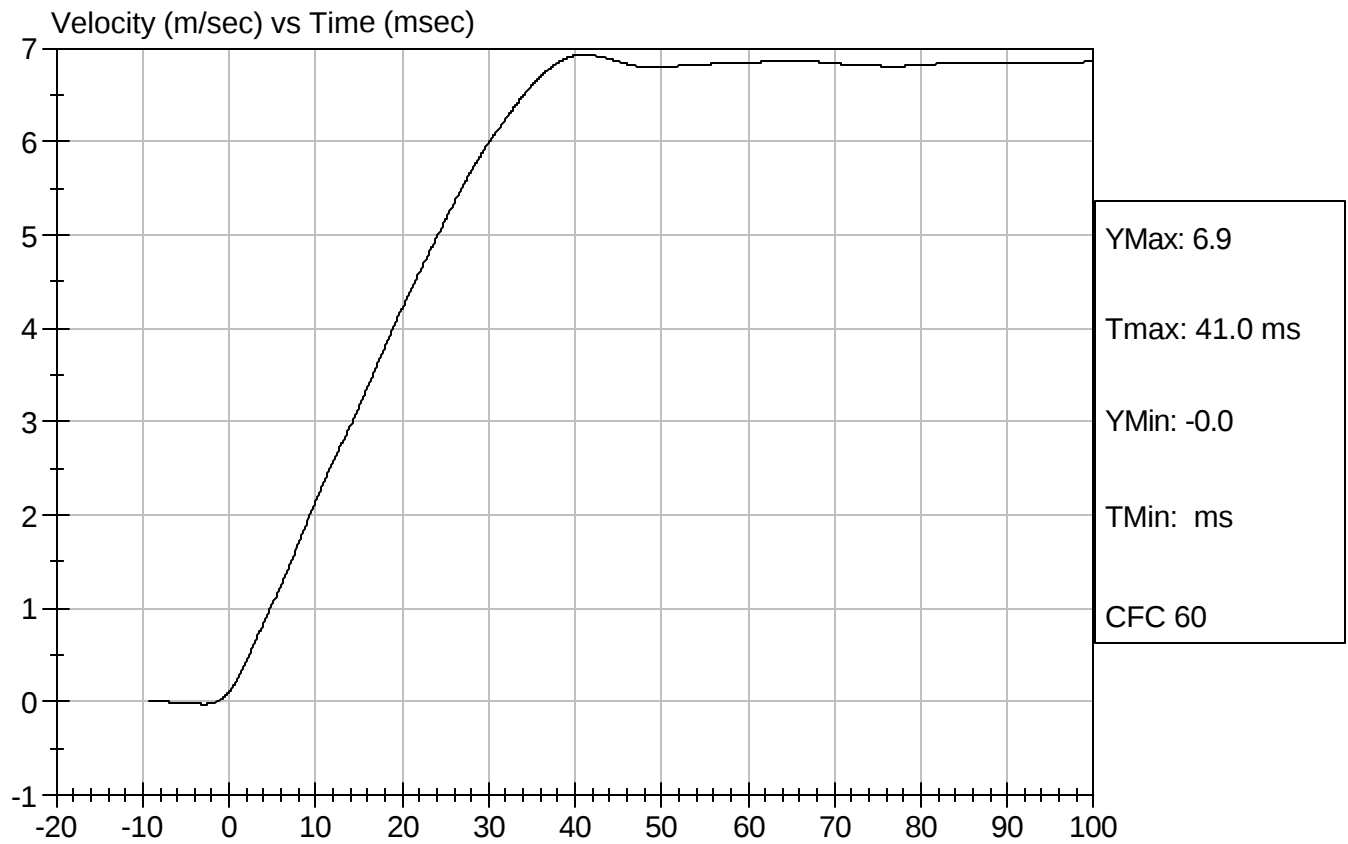


 Approved By



Test Desc: Neck Bending
Component ID: D062889

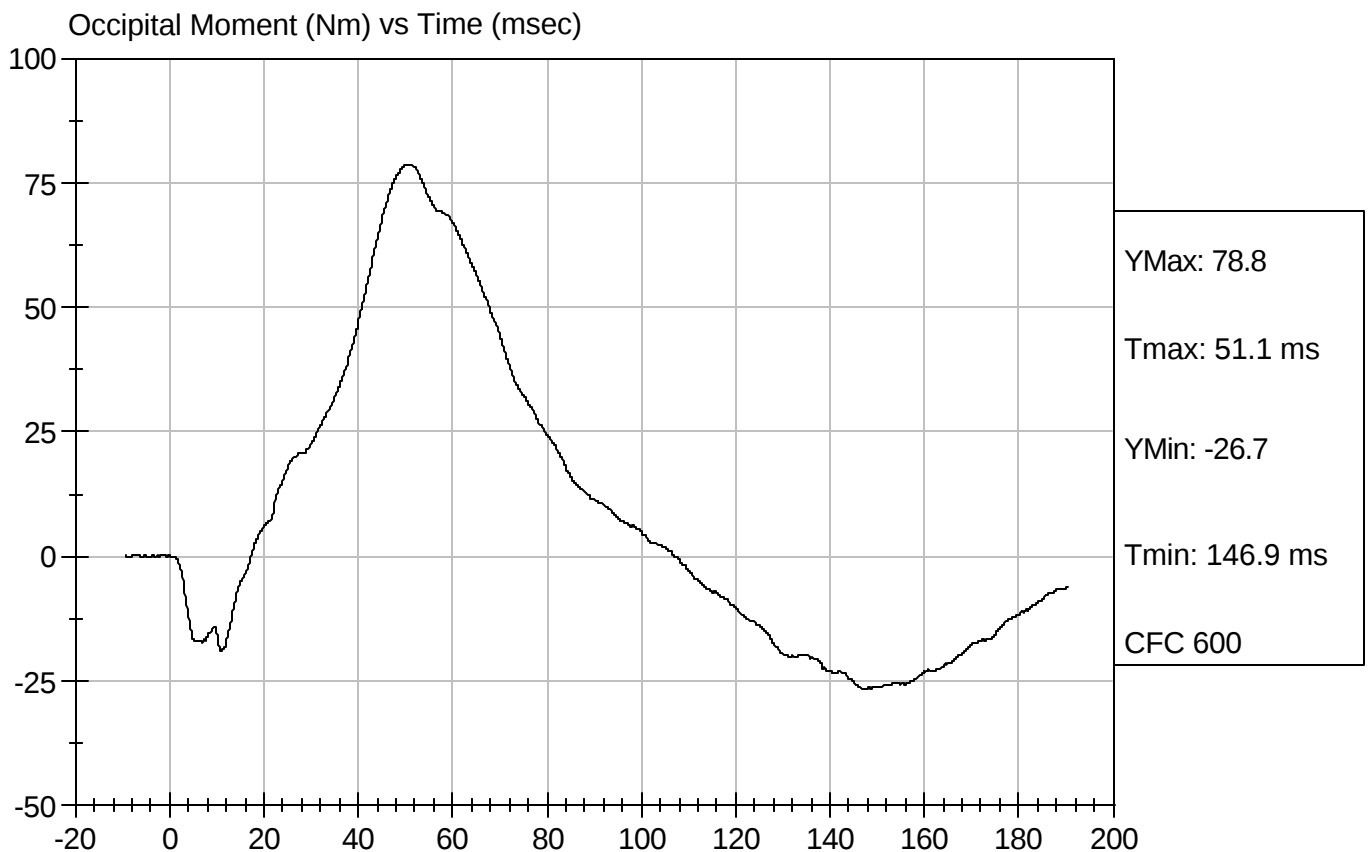
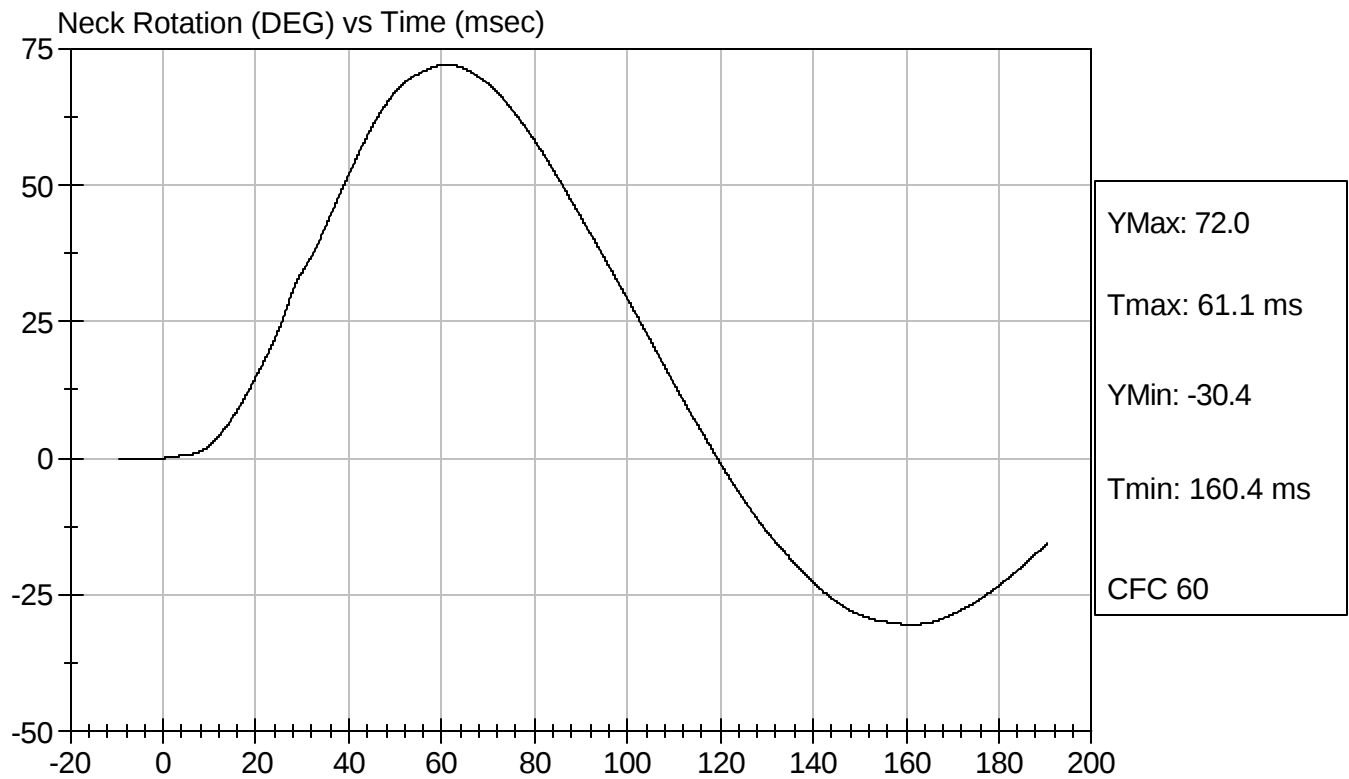
Test Date: 09/26/2006
Speed: 22.86 ft/sec, 6.97 m/sec





Test Desc: Neck Bending
Component ID: D062889

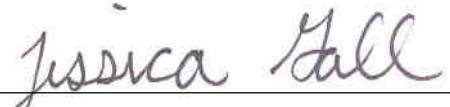
Test Date: 09/26/2006
Speed: 22.86 ft/sec, 6.97 m/sec



SID Calibration Data Sheet
Side Impact Dummy
Inspection Checklist

ATD Serial No: 904

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

09/26/2006

Test Date