

REPORT NUMBER: NCAPSIDE-MGA-2008-011

**NEW CAR ASSESSMENT PROGRAM
SIDE IMPACT TEST**

**BAYERISCHE MOTORENWERKE
2008 BMW X5
NHTSA NUMBER: M80505**

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



Test Date: December 20, 2007

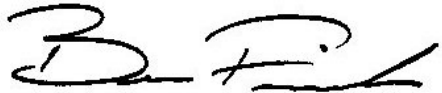
Report Date: February 5, 2008

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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Date: 2/05/08

Technical Report Documentation Page

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		6. Performing Organization Code MGA																						
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16. Abstract A 55/28 km/h 90° Moving Deformable Barrier NCAP side impact was conducted on the subject 2008 BMW X5 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 December 20, 2007. 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 195 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;">23.0</td> <td style="text-align: center;">19.6</td> </tr> <tr> <td>Left Lower Rib (LLR) Accel., g</td> <td style="text-align: center;">21.8</td> <td style="text-align: center;">18.5</td> </tr> <tr> <td>Lower Spine (T₁₂) Accel., g</td> <td style="text-align: center;">17.0</td> <td style="text-align: center;">24.6</td> </tr> <tr> <td>Thoracic Trauma Index (TTI)</td> <td style="text-align: center;">20</td> <td style="text-align: center;">22</td> </tr> <tr> <td>Pelvis (PEV) Accel., g</td> <td style="text-align: center;">19.0</td> <td style="text-align: center;">27.0</td> </tr> <tr> <td>HIC</td> <td style="text-align: center;">68</td> <td style="text-align: center;">46</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	23.0	19.6	Left Lower Rib (LLR) Accel., g	21.8	18.5	Lower Spine (T ₁₂) Accel., g	17.0	24.6	Thoracic Trauma Index (TTI)	20	22	Pelvis (PEV) Accel., g	19.0	27.0	HIC	68	46
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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 BMW X5 manufactured by Bayerische Motorenwerke.

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 BMW X5 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 2454.0 kg and the test weight of the MDB was 1360.8 kg. The test was conducted at MGA Research Corporation in Burlington, Wisconsin, on December 20, 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 (20) structural accelerometers and the MDB was instrumented with five (5) accelerometers and two (2) contact switches on the bumper to compare left side to right side bumper impact timing. All data channels were recorded with a fully self contained on-board DTS TDAS Pro Data Acquisition System. The data was digitally sampled at 10,000 samples per second and processed per Appendix V of the Test Procedure.

2.2 GENERAL COMMENTS

The test vehicle sustained a maximum static crush of 195 mm at level 2, 1650 mm rearward of the vertical impact point. The driver and passenger SID/HIIIs, Serial Nos. 271 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. 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	68	53.1	89.1	20	19.0
Passenger	46	59.6	95.6	22	27.0

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:
Floorpan @ Rear Axle Z after 8 msec.
Left Lower B-Post Y after 11 msec.
Left Mid B-Post Y after 7 msec.
Vehicle CG Y after 35 msec.
MDB Rear Y after 60 msec.

DATA SHEET NO. 1**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2008 BMW X5
 Test Program: NCAP Side Impact

NHTSA No. M80505
 Test Date: 12/20/2007

TEST VEHICLE INFORMATION

Make	BMW
Model	X5
Body Style	SUV
NHTSA No.	M80505
VIN	5UXFE43528L001881
Color	Silver
Delivery Date	12/06/2007
Odometer Reading (mile)	76
Dealer	BMW of Riverside
Transmission	Automatic
Final Drive	AWD
Number of Cylinders	6
Engine Displacement (L)	3.0
Engine Placement	Longitudinal
Automatic Door Locks (ADL)	Yes
Owner's Manual Details Instructions on Disabling ADLs	Yes

TEST VEHICLE OPTIONS

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

DATA FROM CERTIFICATION LABEL

Manufactured By	Bayerische Motorenwerke
Date of Manufacture	10/07

GVWR (kg)	2725
GAWR Front (kg)	1260
GAWR Rear (kg)	1560

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bucket		
Number Of Occupants	2	3		5
Capacity Wt. (VCW) (kg)				524
Cargo Wt. (RCLW) (kg)				136

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

Test Vehicle: 2008 BMW X5
 Test Program: NCAP Side Impact

NHTSA No. M80505
 Test Date: 12/20/2007

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	520.3	552.5		550.7	682.7	
Right	kg	526.2	564.7		541.6	679.0	
Ratio	%	48.4	51.6		44.5	55.5	
Totals	kg	1046.5	1117.2	2163.7	1092.3	1361.7	2454.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	2163.7
Weight of 2 P572M ATDs	kg	161.5
Rated Cargo/Luggage Weight (RCLW)	kg	136
Calculated Vehicle Target Weight (TVTW)	kg	2461.2

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

Weight of Ballast in Cargo Area: 73.5 kg

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	824	820	823	825	1513
As Tested	mm	816	819	802	805	1626
Fully Loaded	mm	812	819	793	803	

TEST VEHICLE VERTICAL IMPACT LINE DATA

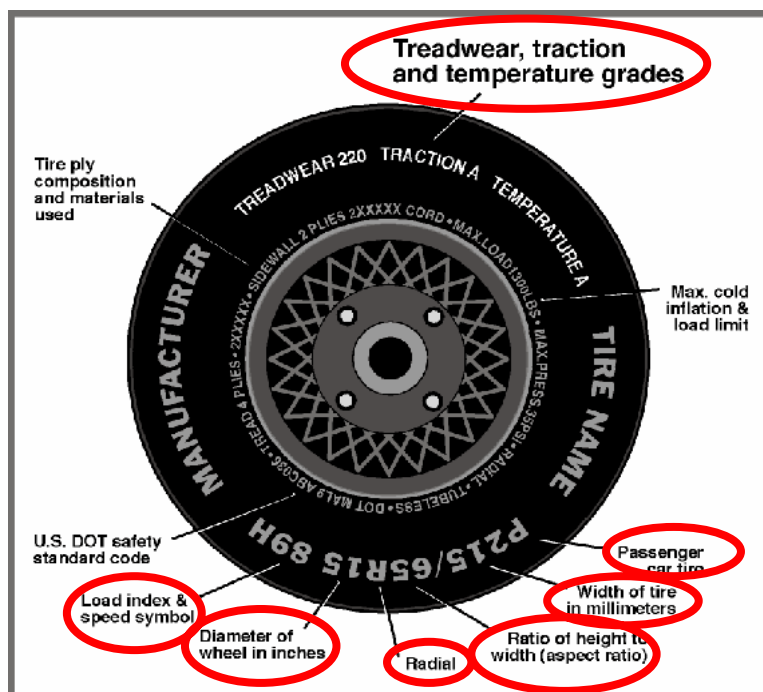
Measurement Description	Units	Value
Test Vehicle Wheel Base	mm	2930
Target Impact Point Aft of Front Axle	mm	508
Actual Impact Point Aft of Front Axle	mm	491

DATA SHEET NO. 2

TEST VEHICLE TIRE INFORMATION

Test Vehicle: 2008 BMW X5
 Test Program: NCAP Side Impact

NHTSA No. M80505
 Test Date: 12/20/2007



DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	345	345
Cold / Test Pressure (kPa)	220	220
Recommended Tire Size	255/55R18	255/55R18
Tire Size on Vehicle	255/55R18	255/55R18
Tire Manufacturer	Bridgestone	Bridgestone
Tire Name	Dueler H/L	Dueler H/L
Tire Type	Passenger	Passenger
Tire Width (mm)	255	255
Ratio of Height to Width (aspect ratio)	55	55
Radial	R	R
Wheel Diameter	18	18
Load Index & Speed Symbol	109H	109H
Treadwear	300	300
Traction Grade	A	A
Temperature Grade	A	A

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

Test Vehicle: 2008 BMW X5
 Test Program: NCAP Side Impact

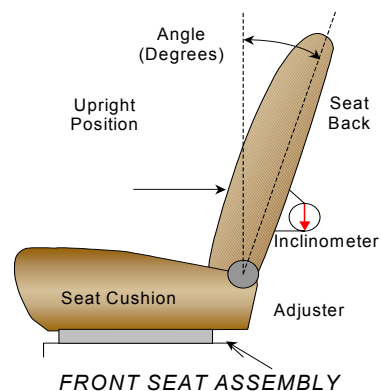
NHTSA No. M80505
 Test Date: 12/20/2007

NORMAL DESIGN RIDING POSITION

The driver and passenger seat back is positioned to the manufacturer's designated angle. The procedure is as follows:
 Set seat back angle at 24.0 degrees measured from upright position for both the driver and passenger.

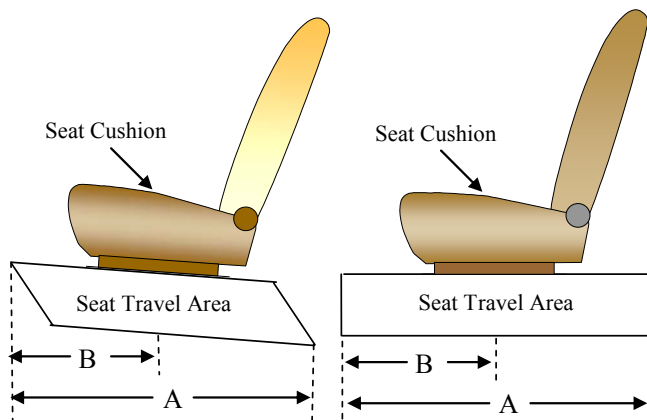
Driver seat back angle: 24.0 degrees

Passenger seat back angle: Fixed



SEAT FORE/AFT POSITIONS

	Total Fore/Aft Travel	Placed in position #
Driver Seat	293 mm	146 mm
Rear Seat	Fixed	Fixed



DATA SHEET NO. 3 (CONTINUED)

TEST VEHICLE INFORMATION

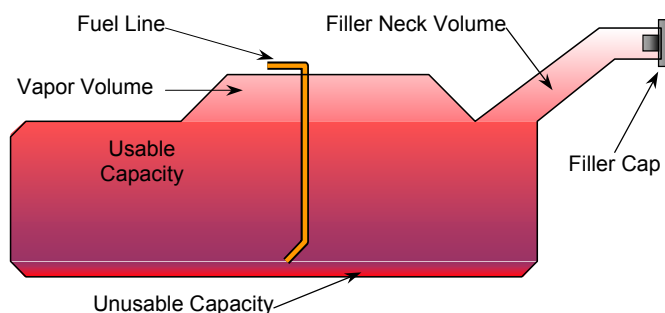
Test Vehicle: 2008 BMW X5
Test Program: NCAP Side Impact

NHTSA No. M80505
Test Date: 12/20/2007

FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	85.2
Usable Capacity of "Optional" Tank	
92-94% of Usable Capacity	78.3 to 80.1
Actual Amount of Solvent used	80.1
1/3 of Usable Capacity	28.4

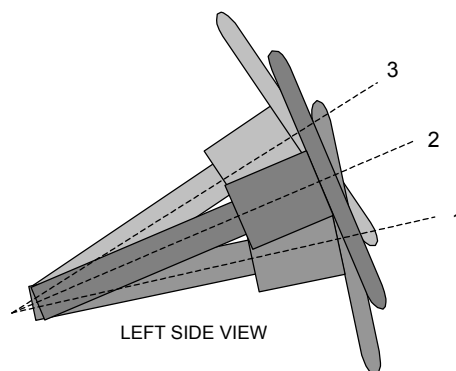
The test vehicle is equipped with an electric fuel pump. When ignition is on, the fuel pump starts to run until the target pressure is reached. The pump then stops until the engine is started; the pump then runs continuously.



VEHICLE FUEL TANK ASSEMBLY

STEERING COLUMN ADJUSTMENT

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



STEERING COLUMN ASSEMBLY

STEERING COLUMN POSITION

	Fore/Aft (mm)	Degrees
Lowermost position No. 1	0	65.4
Geometric center position No. 2	20 mm	67.5
Uppermost position No. 3	40 mm	69.6

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

Test Vehicle: 2008 BMW X5
 Test Program: NCAP Side Impact

NHTSA No. M80505
 Test Date: 12/20/2007

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	62.1
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	89.7

POST TEST OBSERVATIONS
MDB LEFT EDGE IMPACT POINT DATA

Measured Parameter	Units	Requirement	Value
Horizontal Offset	mm	+/- 50	17 forward
Vertical Offset	mm	+/-20	3 up

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

Test Vehicle: 2008 BMW X5
 Test Program: NCAP Side Impact

NHTSA No. M80505
 Test Date: 12/20/2007

TEST DUMMY INFORMATION AND CONTACT POINTS

Description	Front Seat SID/HIII	Rear Seat SID/HIII
Dummy Type / Serial No.	SID HIII / 271	SID HIII / 904
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

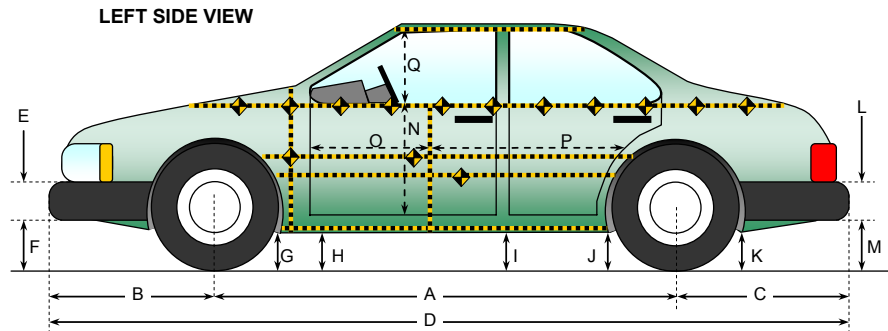
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

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

Test Vehicle: 2008 BMW X5
 Test Program: NCAP Side Impact

NHTSA No. M80505
 Test Date: 12/20/2007



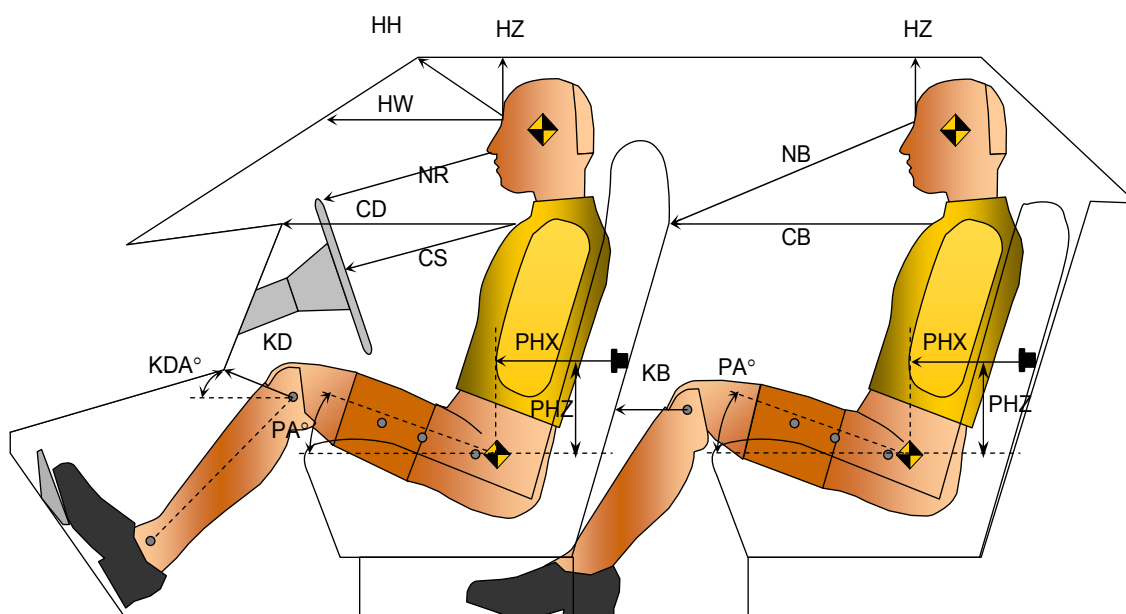
All Measurements in mm

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2930	2933	-3
B	Front Axle to FSOV	845	835	10
C	Rear Axle to RSOV	1045	1056	-11
D	Total Length at Centerline	4820	4824	-4
E	Front Bumper Thickness	91	91	0
F	Front Bumper Bottom to Ground	297	301	-4
G	Sill Height at Front Wheel Well	241	309	-68
H	Sill Height at Front Door Leading Edge	230	230	0
I	Sill Height at "B" Pillar	256	246	10
J1	Sill Height at Rear Wheel Well	218	229	-11
J2	Pinch Weld Height at Rear Wheel Well	249	250	-1
K	Sill Height Aft of Rear Wheel Well	293	294	-1
L	Rear Bumper Thickness	217	217	0
M	Rear Bumper Bottom to Ground	324	327	-3
N	Sill Height to Window Bottom Sill	764	748	16
O	Front Door Leading Edge to Impact CL	707	693	14
P	Rear Door Trailing Edge to Impact CL	1279	1260	19
Q	Front Window Opening	470	468	2
R	Right Side Length	3866	3866	0
S	Left Side Length	3866	3856	10
T	Vehicle Width at "B" Post	1903	1806	97

DATA SHEET NO. 7
SID/HII LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2008 BMW X5
 Test Program: NCAP Side Impact

NHTSA No. M80505
 Test Date: 12/20/2007

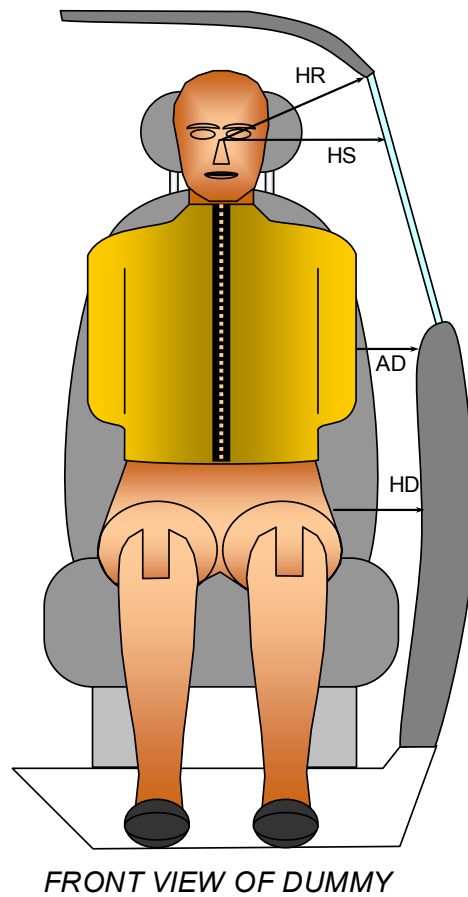


Driver Code	Pass. Code	Measurement Description	Driver S/N 271		Passenger S/N 904	
			Length(mm)	Angle(°)	Length(mm)	Angle(°)
HH		Head to Header	393			
HW		Head to Windshield	671			
HZ	HZ	Head to Roof	171		167	
NR	NB	Nose to Rim/Nose to Seatback	458		584	
CD	CB	Chest to Dash or Seatback	532		529	
CS		Chest to Steering Wheel	335			
KDL	KBL	Left Knee to Dash or Seatback	195	34.6	240	25.1
KDR	KBR	Right Knee to Dash or Seatback	158	37.2	234	25.4
PA	PA	Pelvic Angle		23.1		24.0
PHX	PHX	H-Point to Striker (X-Axis)	144		218	
PHZ	PHZ	H-Point to Striker (Z-Axis)	186		170	

DATA SHEET NO. 8
SID/HIII LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2008 BMW X5
 Test Program: NCAP Side Impact

NHTSA No. M80505
 Test Date: 12/20/2007

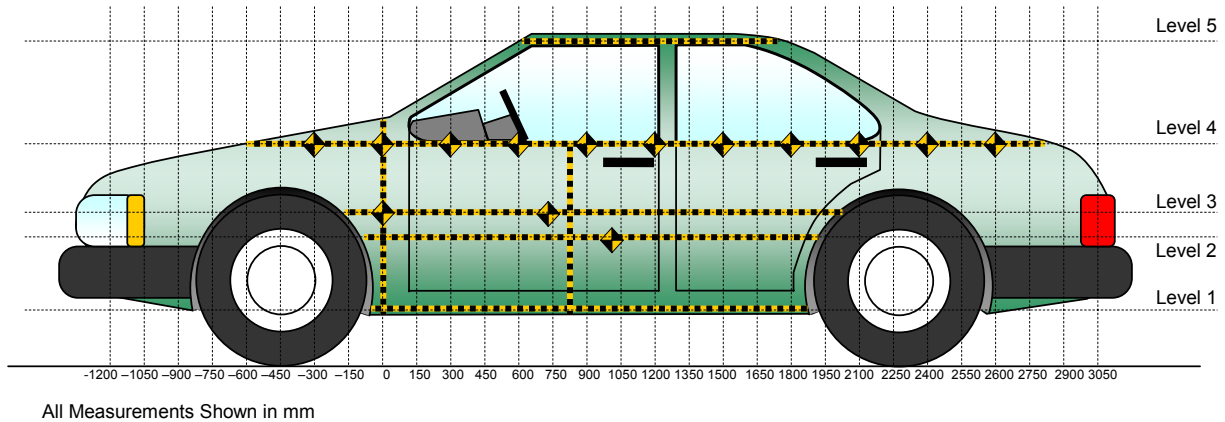


Code	Measurement Description	Units	Driver S/N 271	Passenger S/N 904
HR	Head to Side Header	mm	197	200
HS	Head to Side Window	mm	310	324
AD	Arm to Door	mm	65	114
HD	H-Point to Door	mm	182	182

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

Test Vehicle: 2008 BMW X5
 Test Program: NCAP Side Impact

NHTSA No. M80505
 Test Date: 12/20/2007



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	18	900	1643
4	Window Sill	62	1800	1092
3	Mid Door	190	1650	773
2	Occupant H-Point	195	1650	737
1	Sill Top	88	1650	395
	Maximum Penetration	195		

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

Test Vehicle: 2008 BMW X5
Test Program: NCAP Side Impact

NHTSA No. M80505
Test Date: 12/20/2007

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-900				369					371					2	
-750				339					343					4	
-600				308					314					6	
-450				285					290					5	
-300				262					270					8	
-150		137	135	247			141	141	256			4	6	9	
0	185	154	157	235		180	164	168	244		-5	10	11	9	
150	217	168	170	224		214	245	235	230		-3	77	65	6	
300	222	160	162	219		283	276	265	216		61	116	103	-3	
450	218	153	155	212		285	279	268	215		67	126	113	3	
600	214	147	149	207		286	281	289	213		71	134	140	6	
750	211	142	145	202	471	288	298	294	211	481	77	156	149	9	10
900	209	140	141	198	450	287	303	298	209	468	78	163	157	11	18
1050	208	138	140	196	449	264	295	295	211	462	56	157	155	15	13
1200	207	138	139	194	446	263	261	264	222	461	56	123	125	28	15
1350	206	139	141	192	449	281	272	276	245	464	75	133	135	53	15
1500	209	142	144	191	450	291	309	306	243	463	82	167	162	52	13
1650	210	146	147	192	450	298	341	337	247	466	88	195	190	55	16
1800	194	150	152	192	453	252	333	327	254	469	58	183	175	62	16
1950	164	143	144	192	455	171	263	247	222	468	7	120	103	30	13
2100		129	128	195	458		148	188	201	474		19	60	6	16

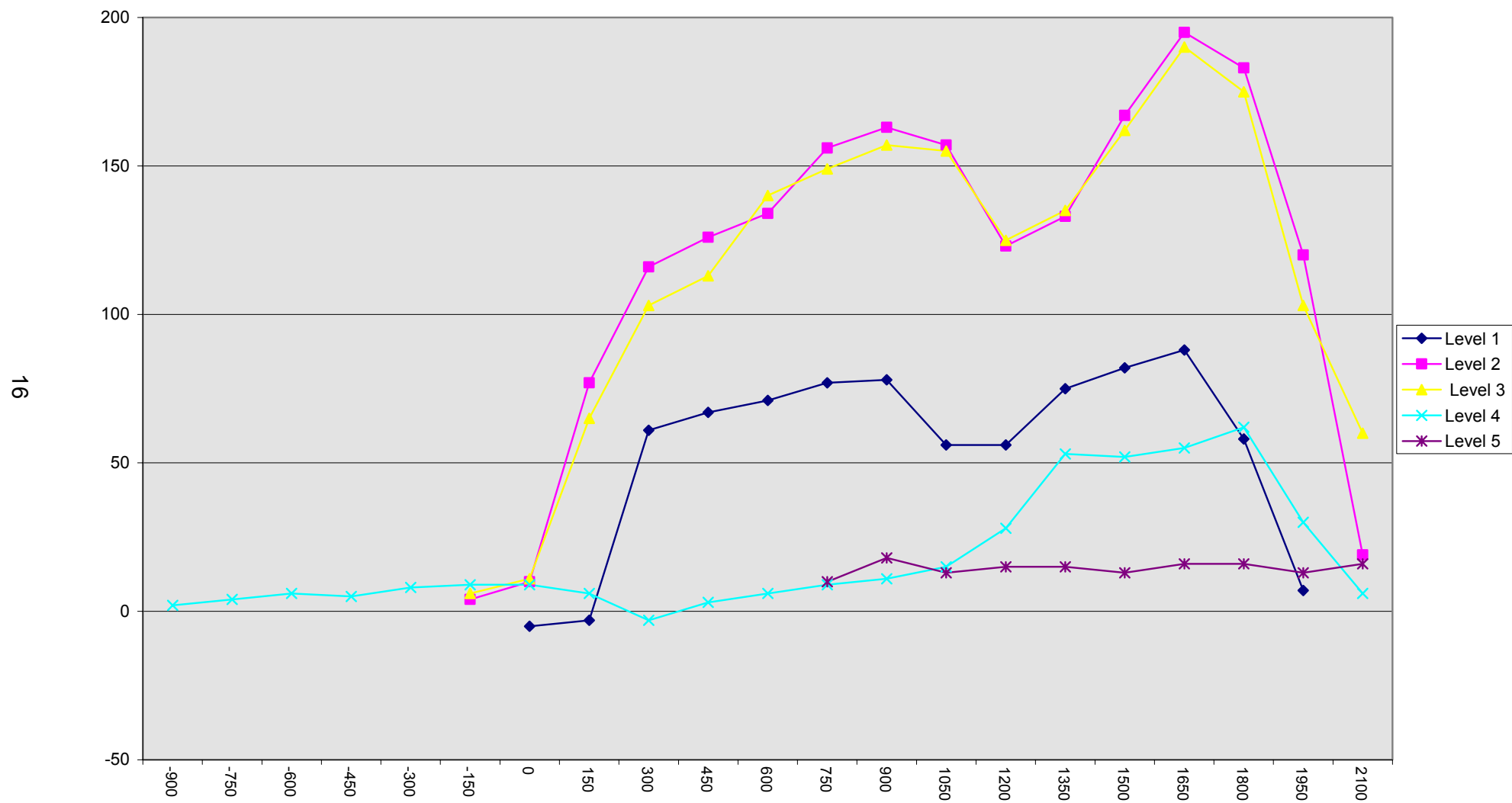
Reference plane is parallel to test vehicle longitudinal centerline.

Given dimensions = Reference plane to car body

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

Test Vehicle: 2008 BMW X5
Test Program: NCAP Side Impact

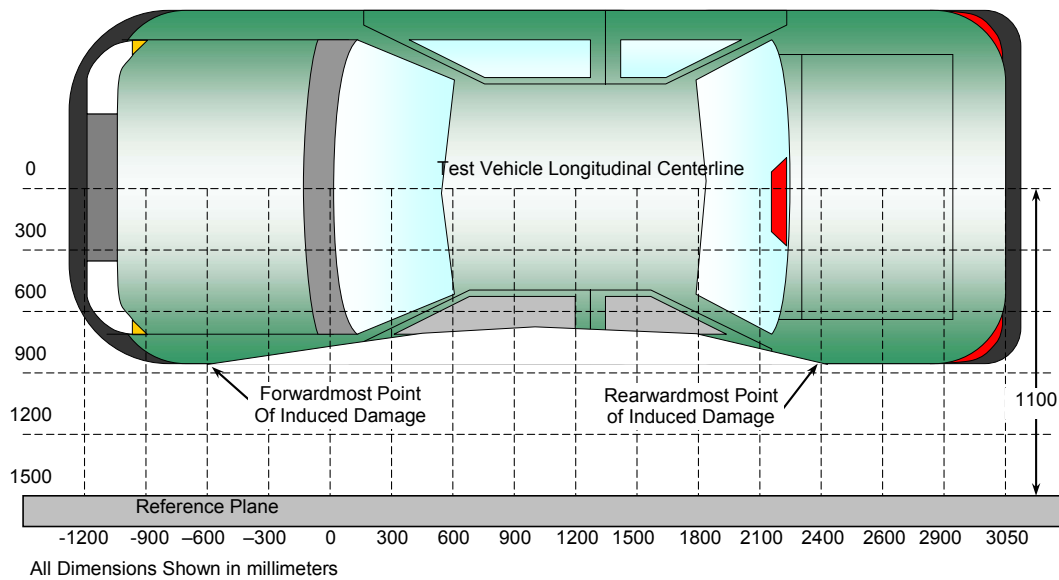
NHTSA No. M80505
Test Date: 12/20/2007



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

Test Vehicle: 2008 BMW X5
 Test Program: NCAP Side Impact

NHTSA No. M80505
 Test Date: 12/20/2007



TOP VIEW

DAMAGE PROFILE DISTANCES

DPD	Distance from Impact Point in mm	Level	Pre-Test (mm)	Post-Test (mm)	Max Static Crush (mm)
1	2100	4	195	201	6
2	1384	1	207	329	122
3	885	1	210	316	106
4	299	1	222	282	60
5	-300	4	262	270	8
6	-900	4	369	371	2

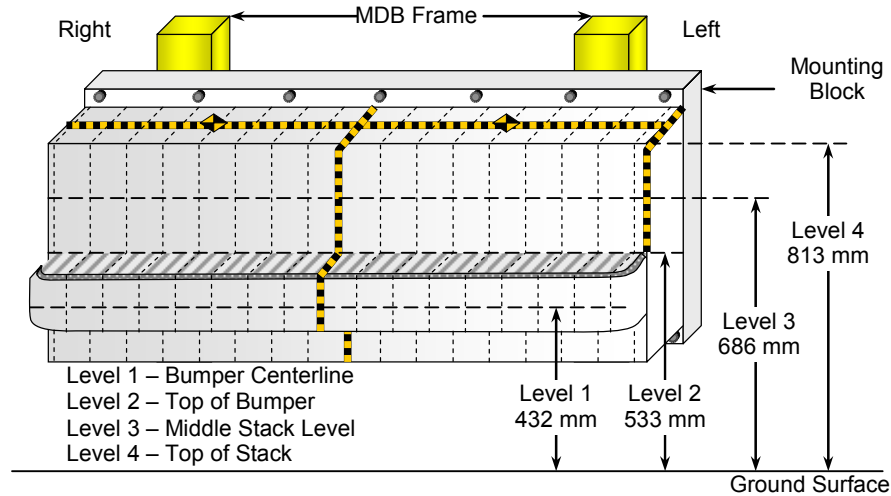
Reference plane is parallel to test vehicle longitudinal centerline.
 Given dimensions = Reference plane to car body.

DATA SHEET NO. 12

DEFORMABLE BARRIER HONEYCOMB FACE STATIC CRUSH

Test Vehicle: 2008 BMW X5
 Test Program: NCAP Side Impact

NHTSA No. M80505
 Test Date: 12/20/2007



DEFORMABLE BARRIER STATIC CRUSH

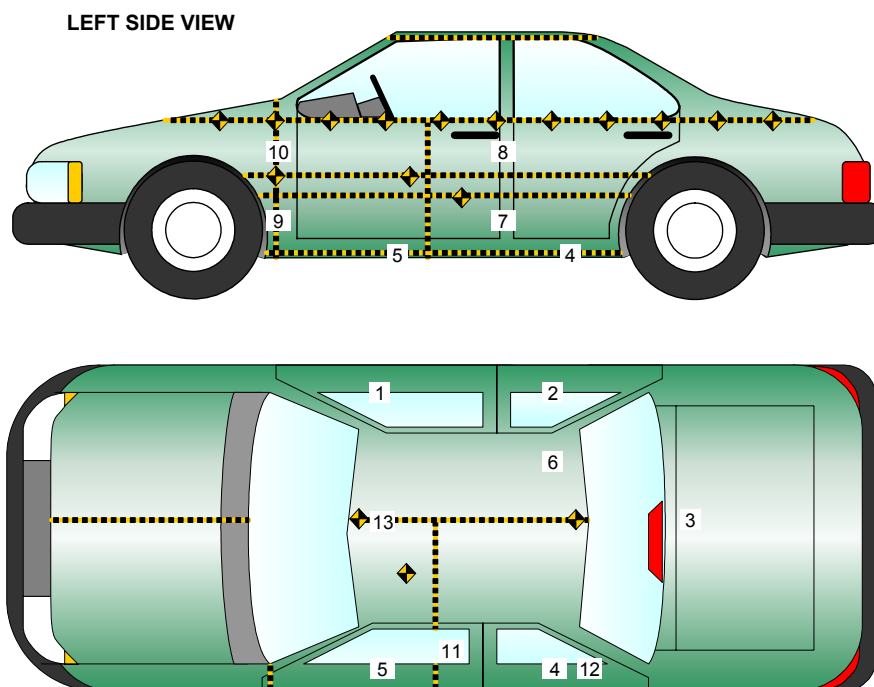
Stack Level	Distance Right of Center								C _L	Distance Left of Center							
	800	700	600	500	400	300	200	100		100	200	300	400	500	600	700	800
1	233	238	240	244	249	254	259	250	225	209	209	212	205	218	223	225	230
2	180	187	195	199	194	200	208	187	174	158	165	166	169	172	175	178	183
3	97	109	121	140	175	188	157	129	115	106	101	98	99	107	124	165	179
4	114	120	131	149	180	185	150	127	123	123	127	124	143	155	184	202	233

All Dimensions in mm

DATA SHEET NO. 13
VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2008 BMW X5
 Test Program: NCAP Side Impact

NHTSA No. M80505
 Test Date: 12/20/2007



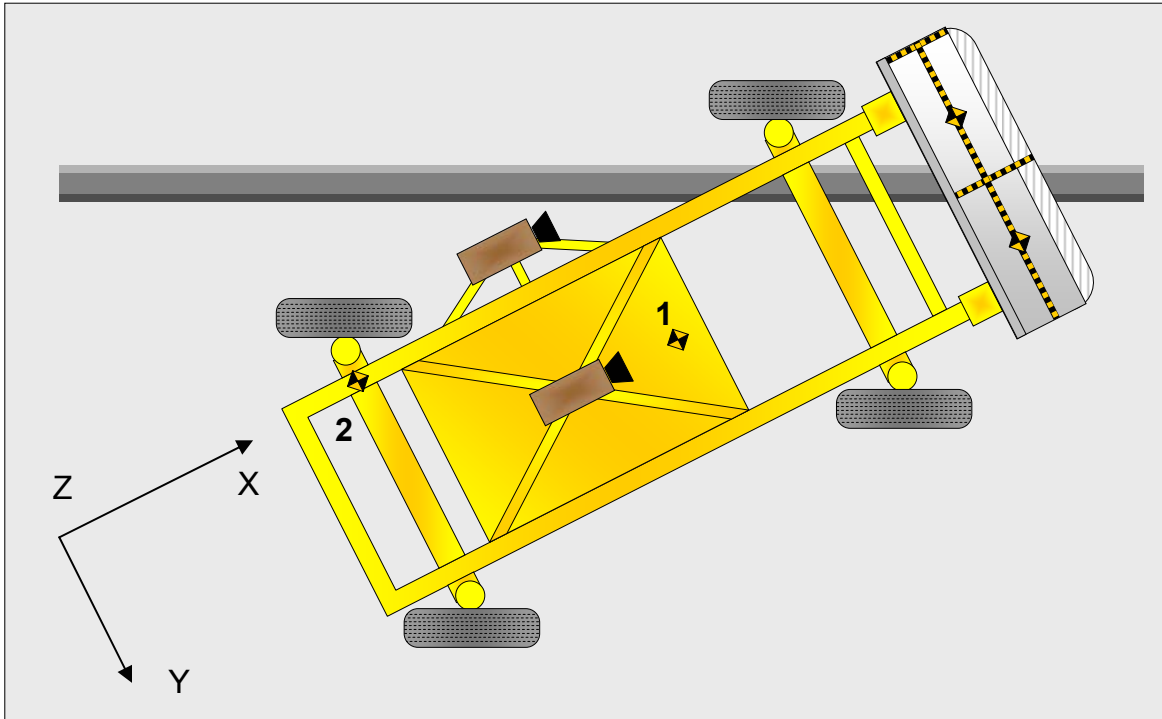
Loc. No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Right Sill at Front Seat	2722	683	270
2	Right Sill at Rear Seat	1711	685	270
3	Rear Floorpan Above Axle	894	0	597
4	Left Sill at Rear Door	1714	-701	270
5	Left Sill at Front Door	2722	-701	270
6	Rear Occupant Compartment	1852	431	591
7	Left Lower B-Post	2127	-770	675
8	Left Middle B-Post	2097	-772	960
9	Left Lower A-Post	3248	-765	495
10	Left Middle A-Post	3268	-970	925
11	Front Seat Track			
12	Rear Seat Track or Structure			
13	Vehicle CG	2322	0	522

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 BMW X5
 Test Program: NCAP Side Impact

NHTSA No. M80505
 Test Date: 12/20/2007



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 BMW X5
Test Program: NCAP Side Impact

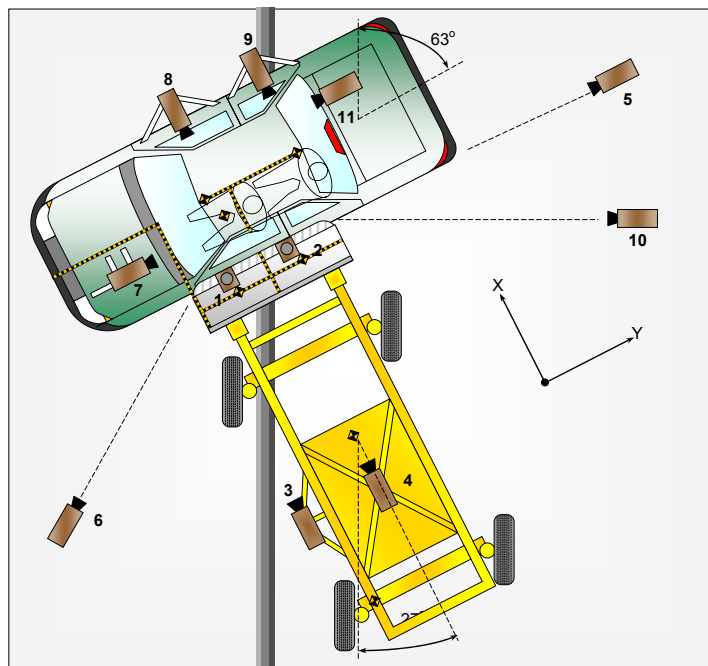
NHTSA No. M80505
Test Date: 12/20/2007

	Elements	Pre-Test (mm)
1	Total Length	4820
2	Total Width	1903
3	Bumper Top Height	603
4	Bumper Bottom Height	512
5	Longitudinal Member Top Height	626
6	Distance between Longitudinal Members	794
7	Longitudinal Member Width	68
8	Engine Top Height	929
9	Engine Bottom Height	252
10	Engine and gearbox width	574
11	Front bumper-engine distance	519
12	Front shock absorber fixing height	890
13	Bonnet leading edge height	905
14	Front shock absorber fixing width	932
15	Front bumper – front axle distance	857
16	Front axle – a pillar distance	676
17	A-pillar – B-pillar distance	1098
18	B-Pillar – rear axle distance	1182
19	B-pillar – C-pillar distance	710
20	Roof sill bottom height	1651
21	Roof sill top height	1693
22	Floor sill bottom height	267
23	Floor sill top height	390

DATA SHEET NO. 16
HIGH SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2008 BMW X5
 Test Program: NCAP Side Impact

NHTSA No. M80505
 Test Date: 12/20/2007



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	1180	5100	1280	24	1000
6	Left Side, Ground Level, Overall	1200	-4975	1200	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	On Board Child Seat				10	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 BMW X5
 Test Program: NCAP Side Impact

NHTSA No. M80505
 Test Date: 12/20/2007

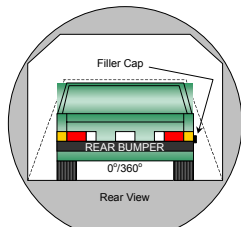
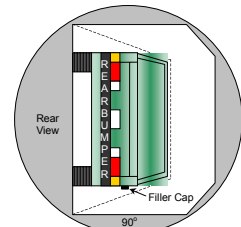
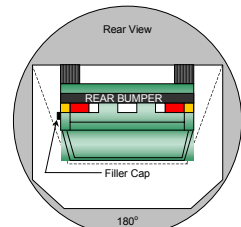
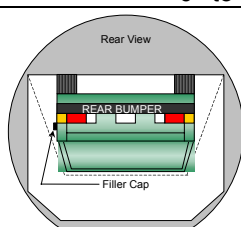
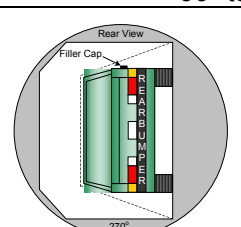
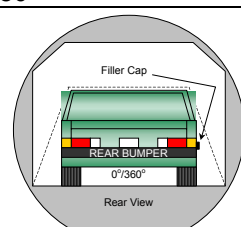
FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 21° C Test Time: 12 :02 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°	117	300	First 5	0
180° to 270°	119	300	First 5	0
270° to 360°	118	300	First 5	0

APPENDIX A
PHOTOGRAPHS

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Left Front ¾ View, As Received



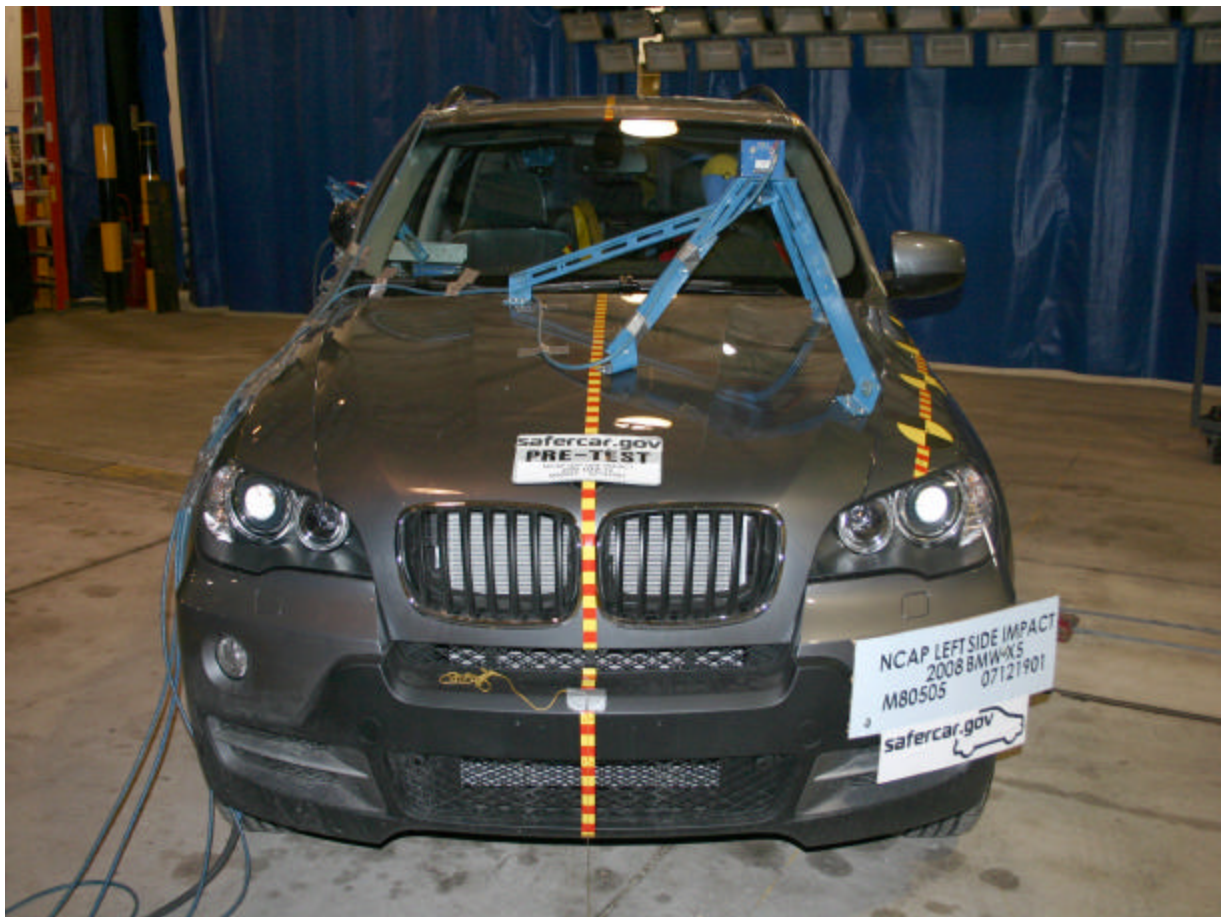
Right Rear ¾ View, As Received



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 3/4 View



Post-Test Right Front 3/4 View



Pre-Test Left Impact Point



Post-Test Left Impact Point



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



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



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



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



Pre-Test Left Side Impact Close-up



Post-Test Left Side Impact Close-up



Pre-Test Overhead View



Post-Test Overhead View



Pre-Test Overhead Close-up View



Post-Test Overhead Close-up View



Pre-Test Driver Dummy (Door Open)



Pre-Test Driver Dummy Clearance From Door



Post-Test Driver Dummy Clearance From Door



Pre-Test Driver Dummy (Through Window)



Post-Test Driver Dummy (Through Window)



Pre-Test Driver Dummy Right Side View



Post-Test Driver Dummy Right Side View



Pre-Test Passenger Dummy (Door Open)



Pre-Test Passenger Dummy Clearance From Door



Post-Test Passenger Dummy Clearance From Door



Pre-Test Passenger Dummy (Through Window)



Post-Test Passenger Dummy (Through Window)



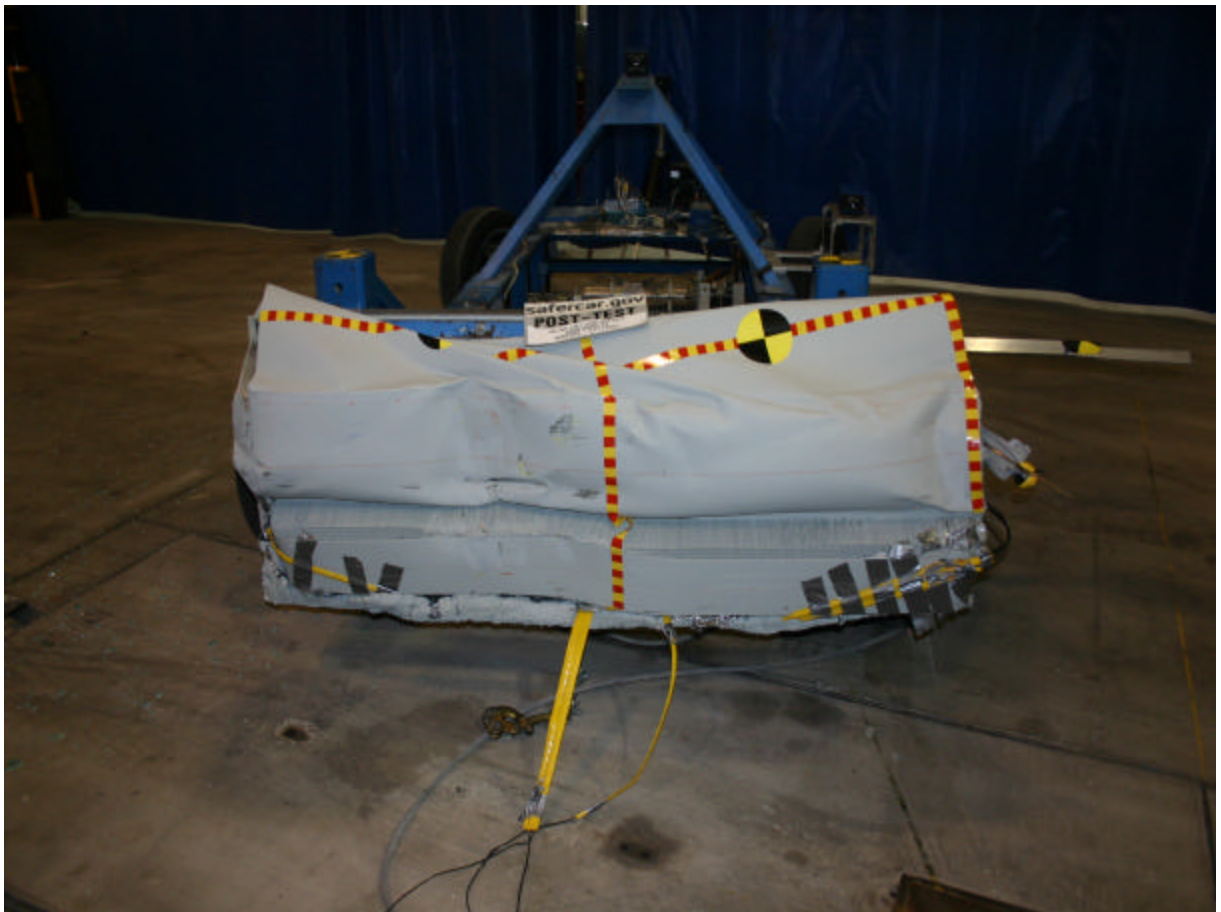
Pre-Test Passenger Dummy Right Side View



Post-Test Passenger Dummy Right Side View



Pre-Test Front View of Deformable Barrier



Post-Test Front View of Deformable Barrier



Pre-Test Top View of Deformable Barrier



Post-Test Top View of Deformable Barrier



Pre-Test Right Side View of Deformable Barrier



Post-Test Right Side View of Deformable Barrier



Pre-Test Left Side View of Deformable Barrier



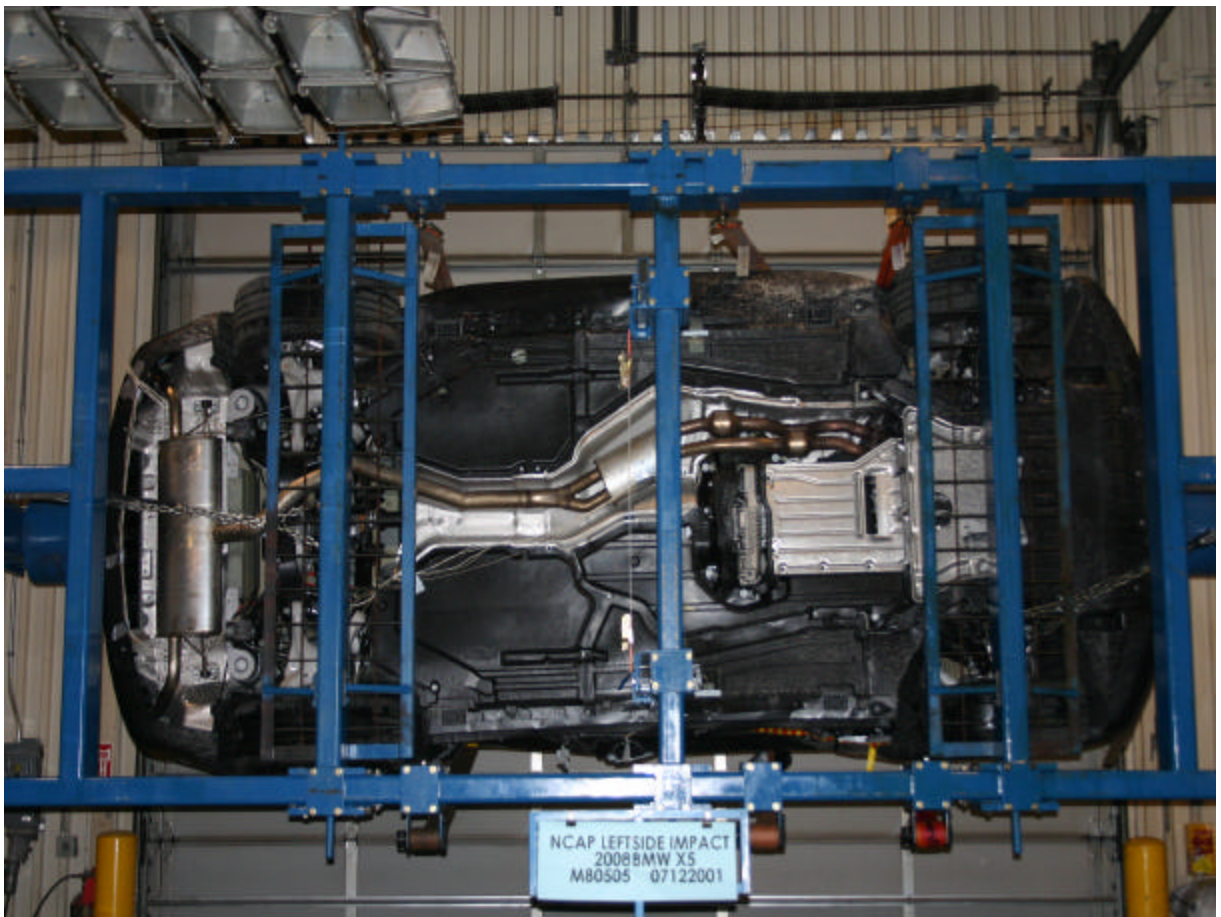
Post-Test Left Side View of Deformable Barrier



Vehicle on Rollover Device (90 Degrees)



Vehicle on Rollover Device (180 Degrees)



Vehicle on Rollover Device (270 Degrees)



Vehicle on Rollover Device (360 Degrees)



Vehicle Impact



Post-Test Driver Dummy Head Contact



Post-Test Driver Dummy Torso Contact



Post-Test Driver Dummy Contact



Post-Test Passenger Dummy Head Contact



Post-Test Passenger Dummy 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

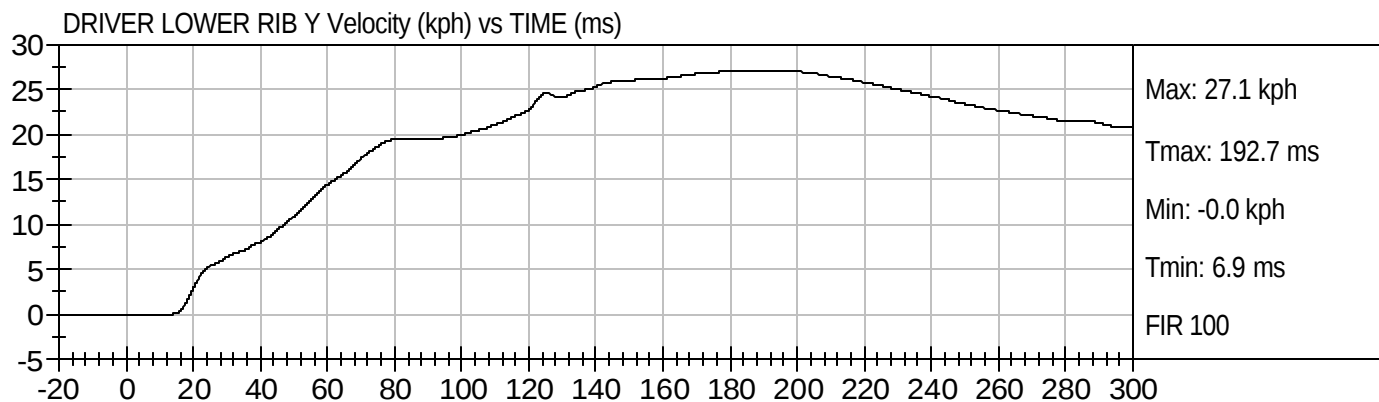
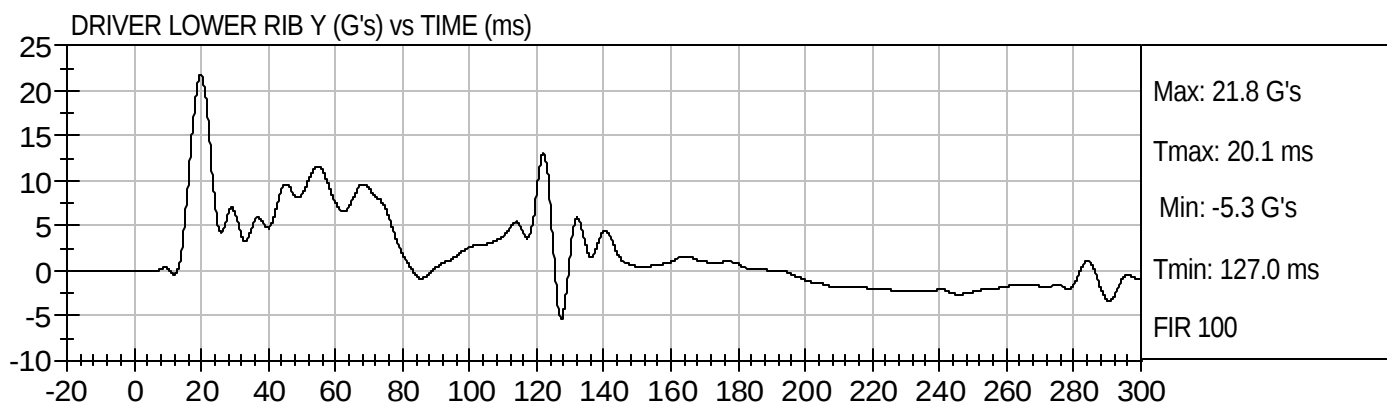
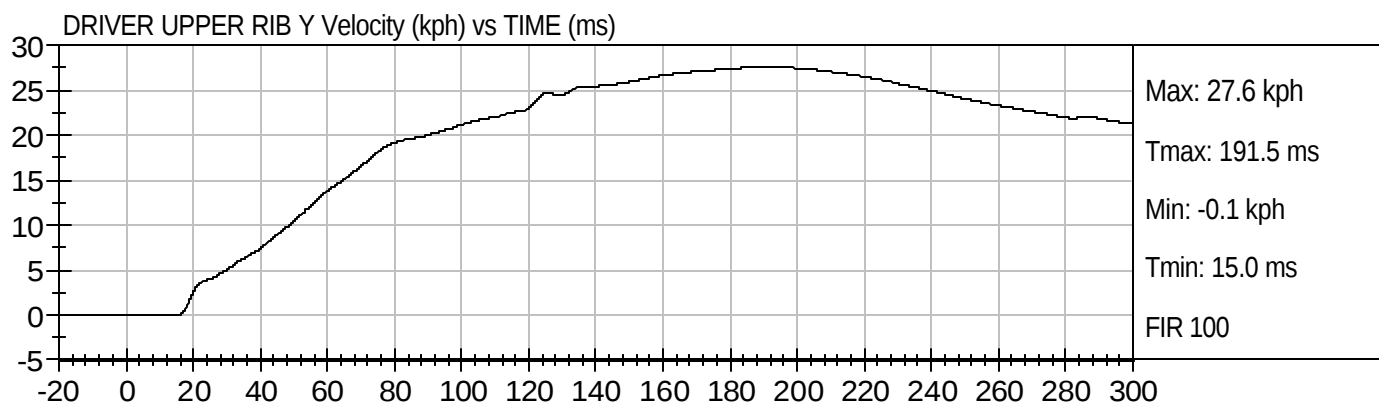
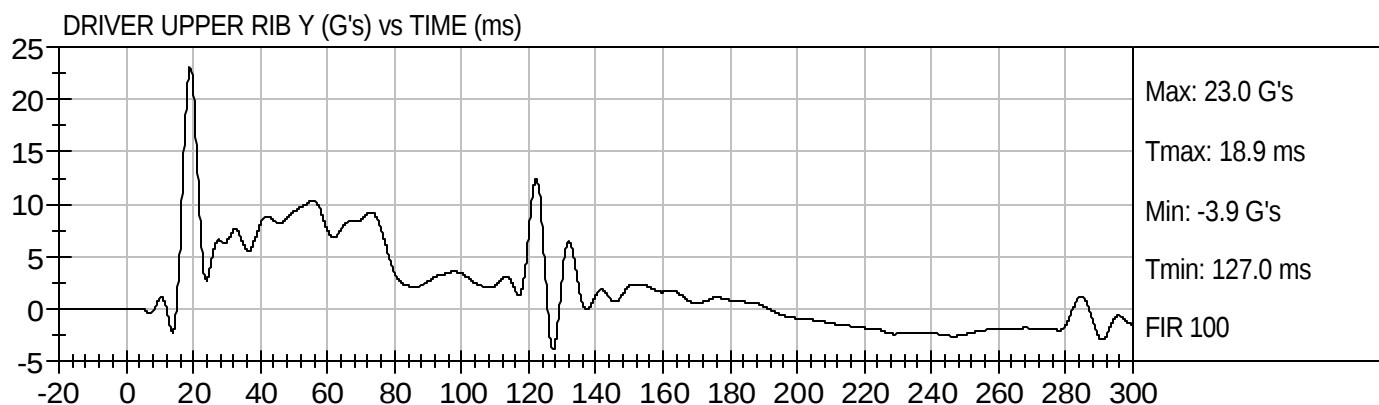
Driver Upper Neck Moment Y
Driver Upper Neck Moment Z
Driver Upper Rib Redundant Y
Driver Lower Rib Redundant Y
Driver Lower Spine Redundant Y
Driver Pelvis Redundant Y
Driver Thorax Contact
Driver Pelvis Contact
Passenger Head X Primary
Passenger Head Y Primary
Passenger Head Z Primary
Passenger Head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

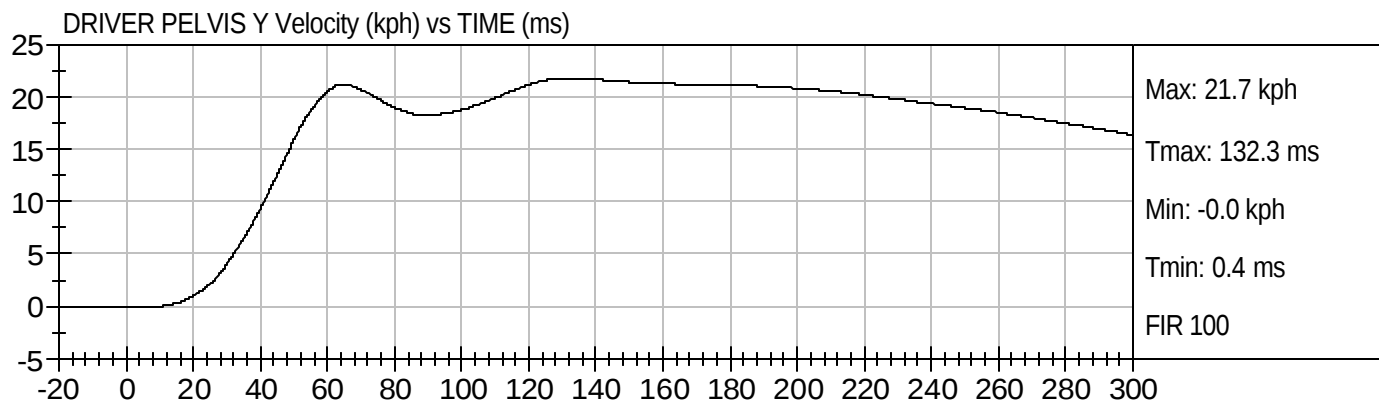
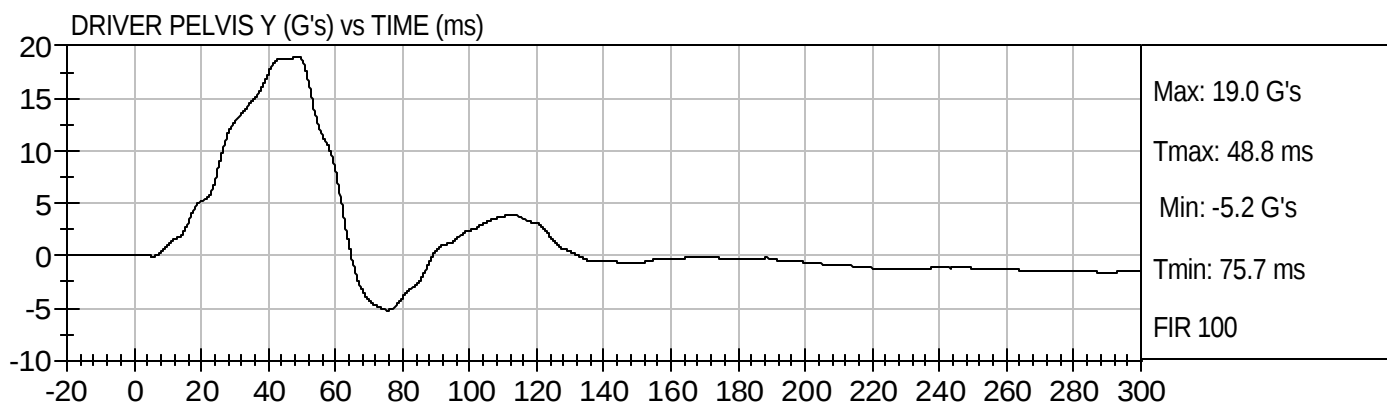
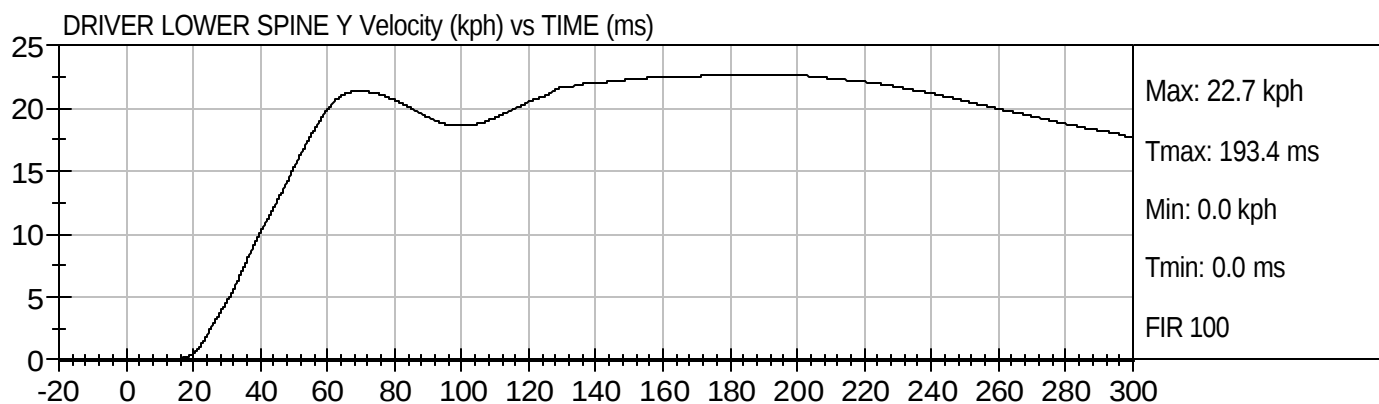
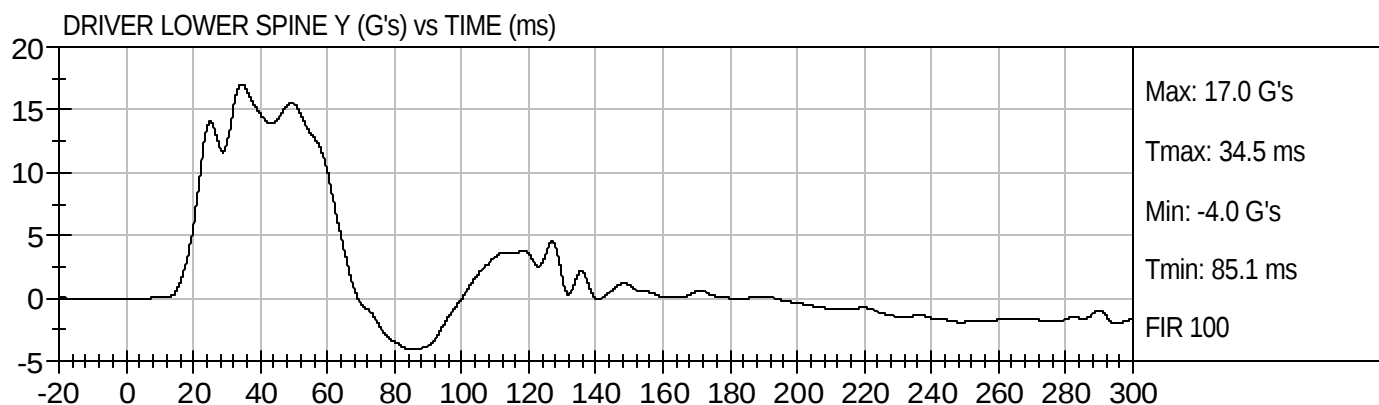
Vehicle Rear Floor Above Axle X
Vehicle Rear Floor Above Axle Y
Vehicle Rear Floor Above Axle Z
Vehicle Left Sill at Rear Door Y
Vehicle Left Sill at Front Door Y
Vehicle Right Rear Occupant Compartment
Vehicle B-Post Lower Y
Vehicle B-Post Middle Y
Vehicle A-Post Lower Y
Vehicle A-Post Middle Y
Vehicle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



NCAP LEFT SIDE
2008 BMW X5 M80505

Test Date: 12/20/2007
Speed: 38.6 mph (62.1 km/h)

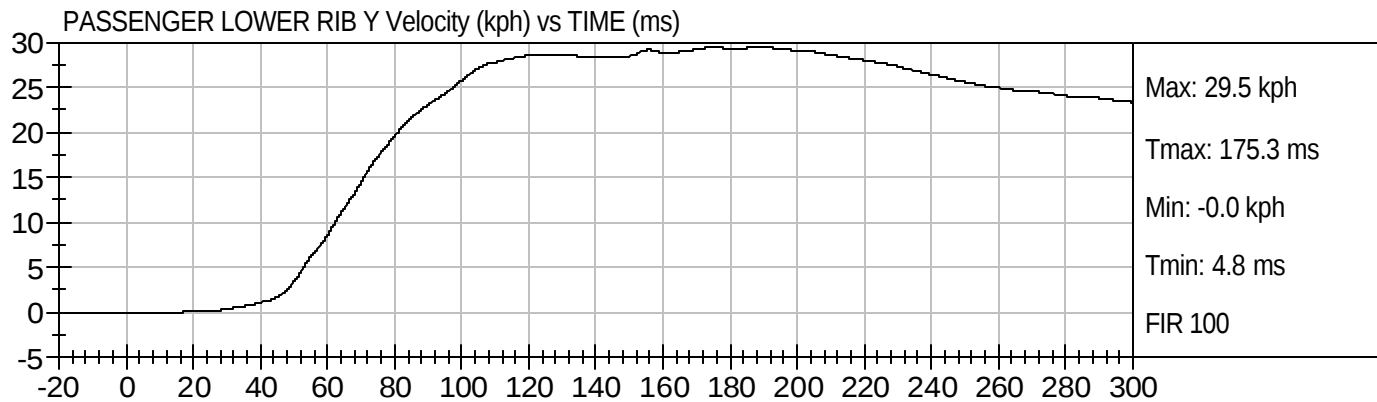
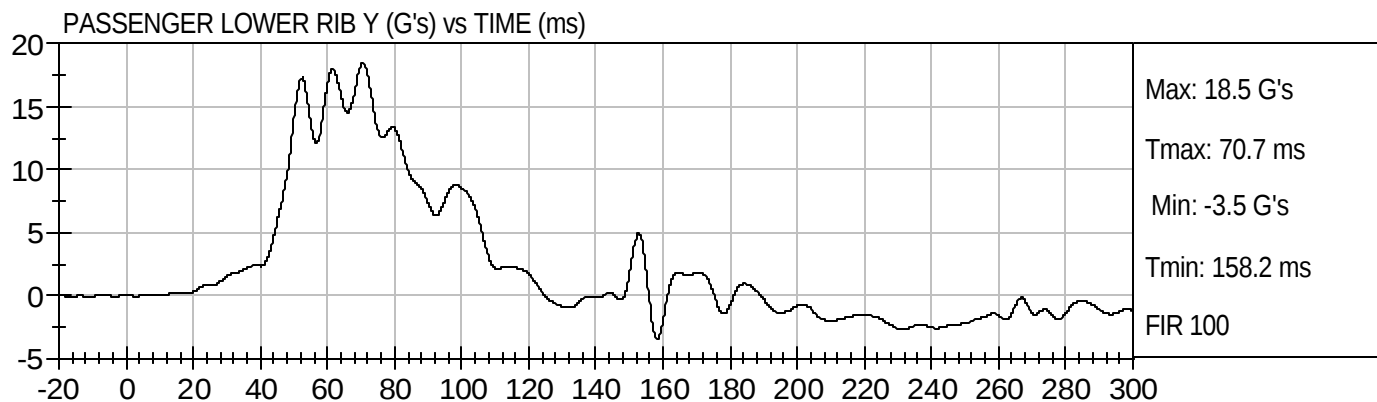
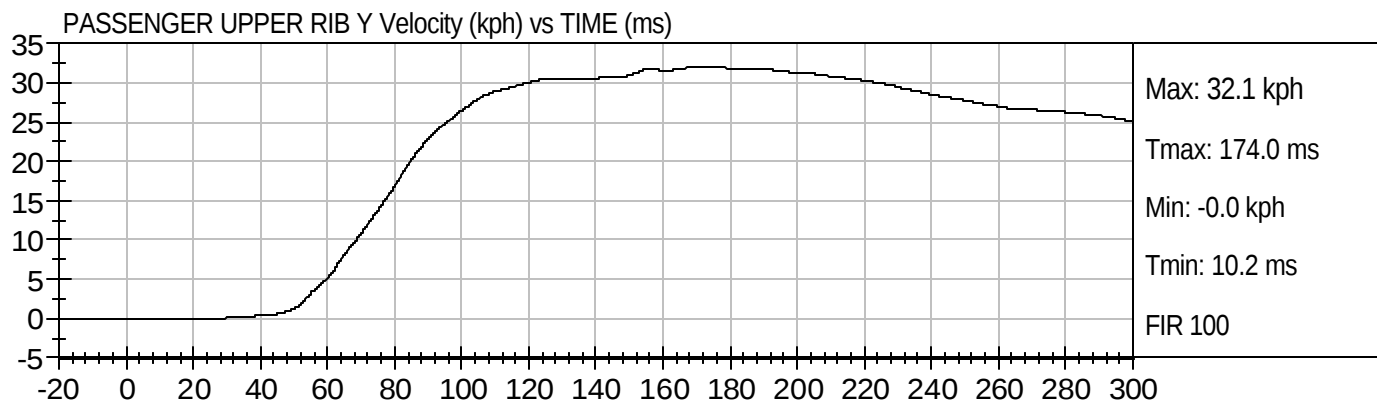
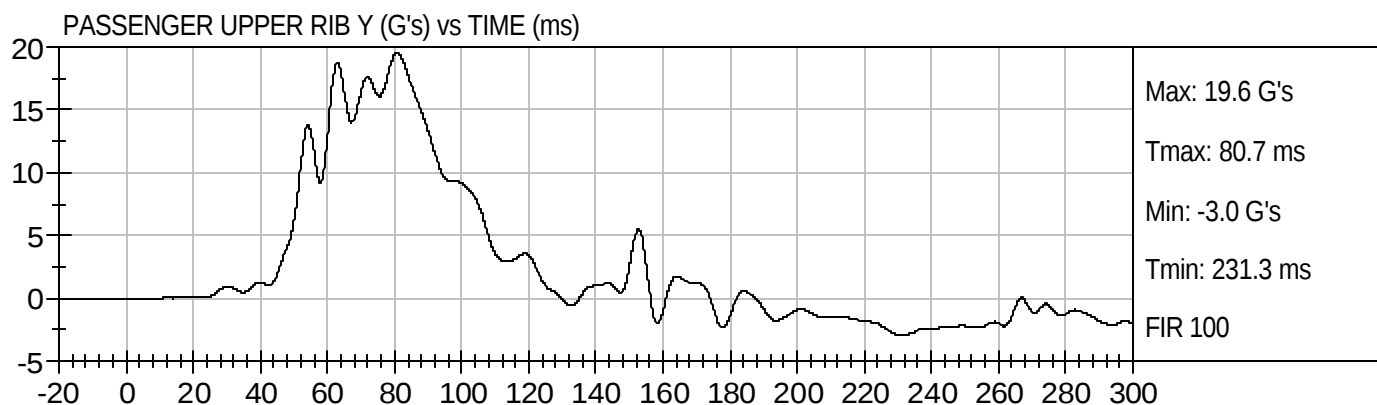






NCAP LEFT SIDE
2008 BMW X5 M80505

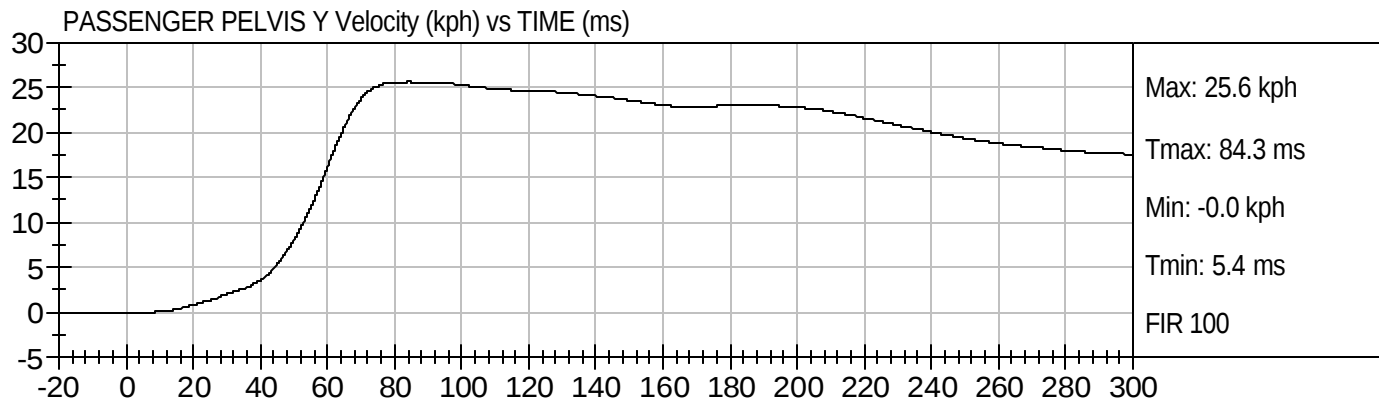
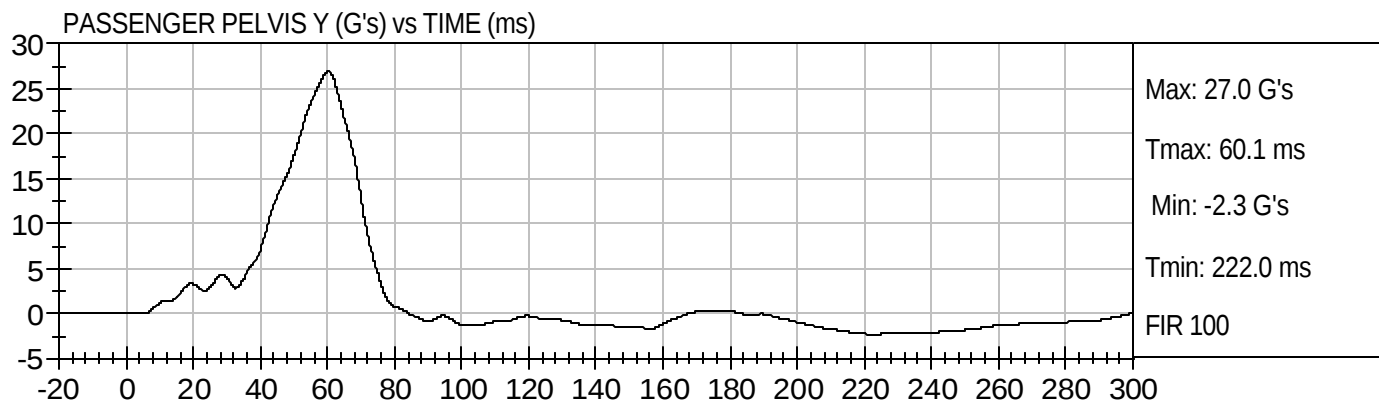
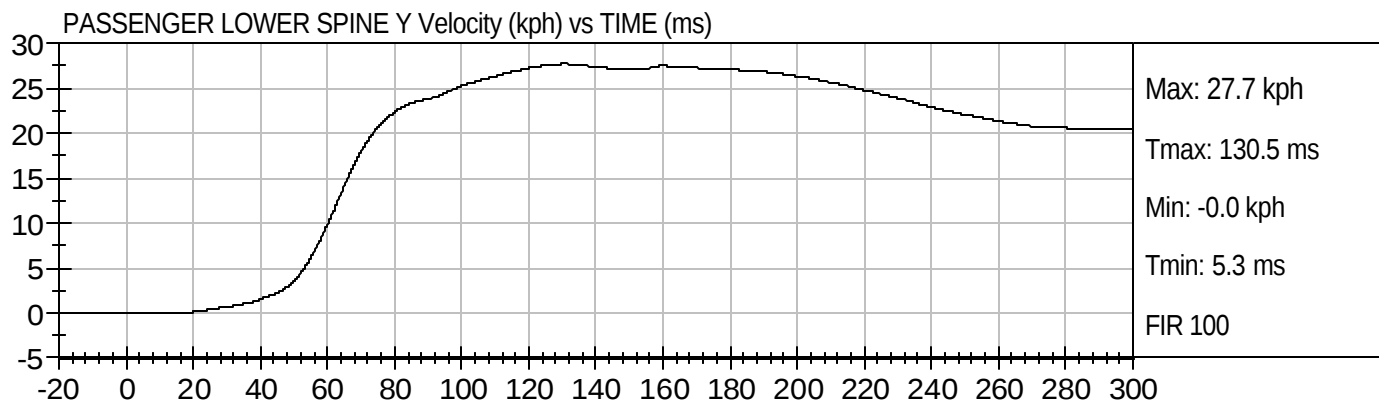
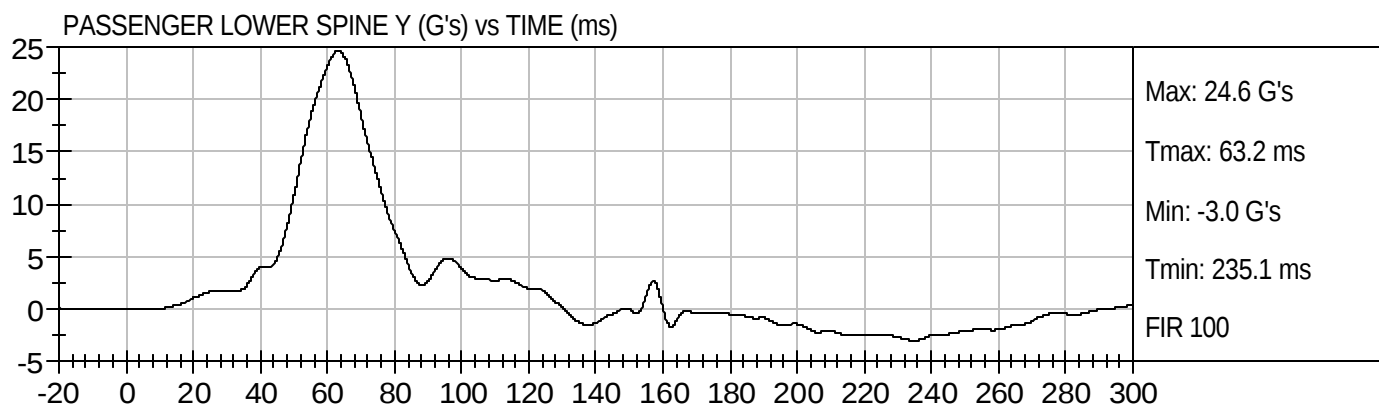
Test Date: 12/20/2007
Speed: 38.6 mph (62.1 km/h)





NCAP LEFT SIDE
2008 BMW X5 M80505

Test Date: 12/20/2007
Speed: 38.6 mph (62.1 km/h)



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: D07360

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

Jessica Gall
Laboratory Technician

12/17/2007

Test Date

David Winkelbauer
Approved By

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

ATD Serial No: 271

Test I.D: D073601

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	20.6	Pass
Laboratory Relative Humidity	%	10 to 70	18	Pass
Peak Resultant Acceleration	G's	120 to 150	139	Pass
Is Resultant Curve Unimodal?	N/A	15% of peak	Yes	Pass
Peak Longitudnal Acceleration	G's	+/- 15	7.7	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

12/17/07
Test Date

David Winkelbauer
Approved By



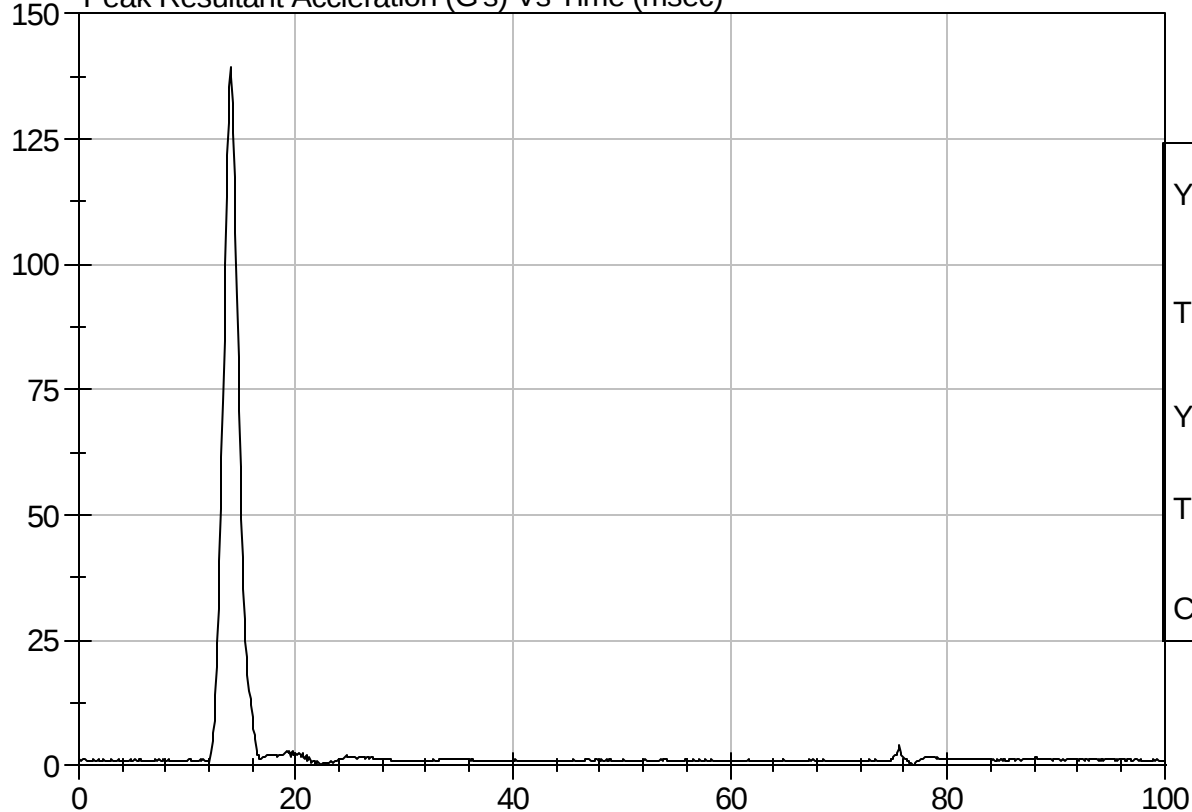
Test Description: Head Drop

Test Date: 12/17/07

Component: D073601

Speed: 0 ft/s, 0 m/s

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



YMax: 139.4 G

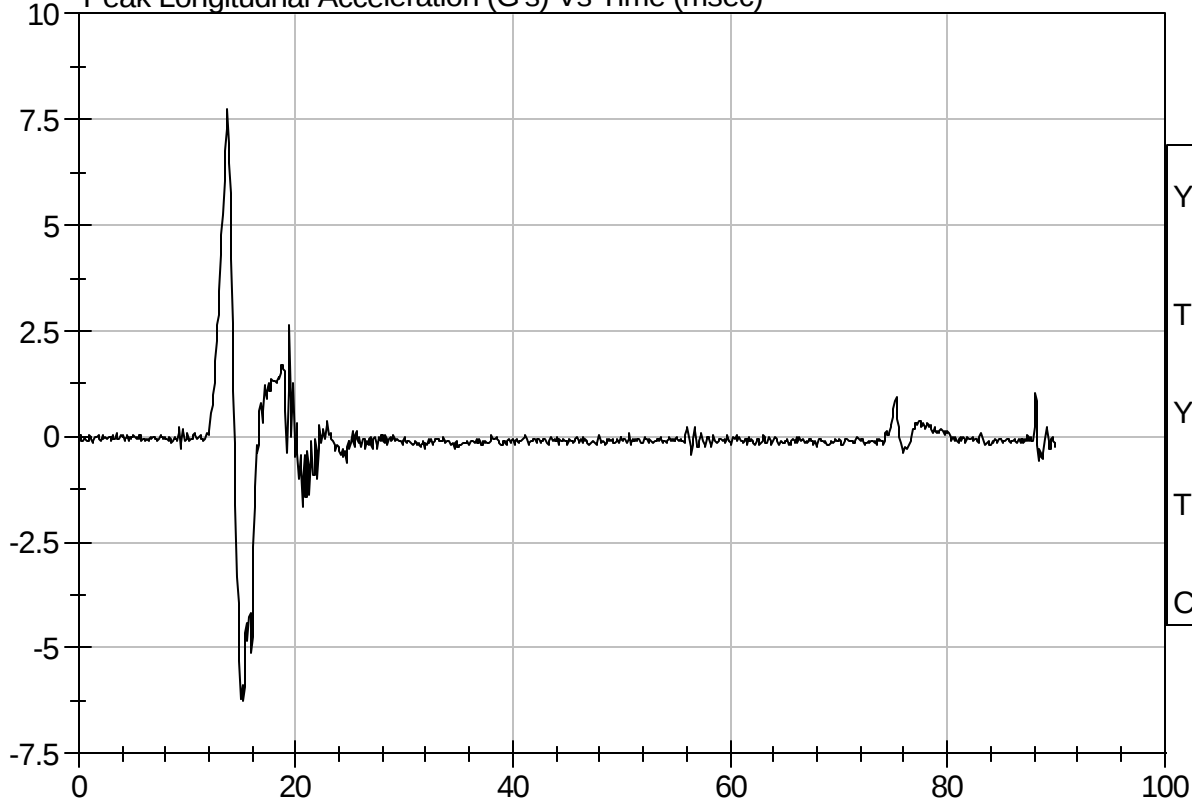
Tmax: 14.0 ms

YMin: 0.1 G

Tmin: 22.3 ms

CFC 1000

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



YMax: 7.7 G

Tmax: 13.7 ms

YMin: -6.3 G

Tmin: 15.2 ms

CFC 1000

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

ATD Serial No: 271

Test I.D: D073602

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	20.7	Pass
Laboratory Relative Humidity	%	10 to 70	17	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	42	Pass
Lower Spine	G's	15 - 22	19	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

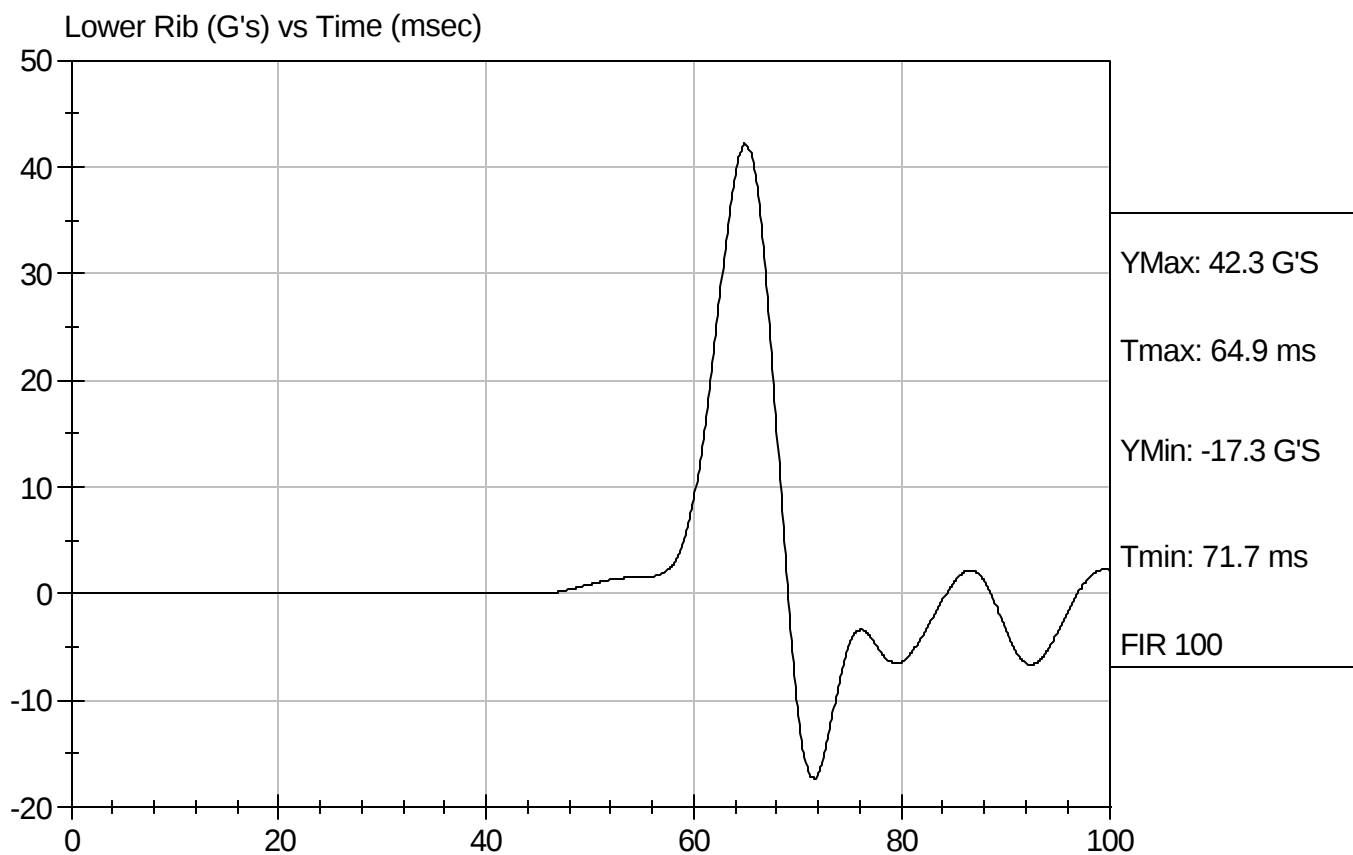
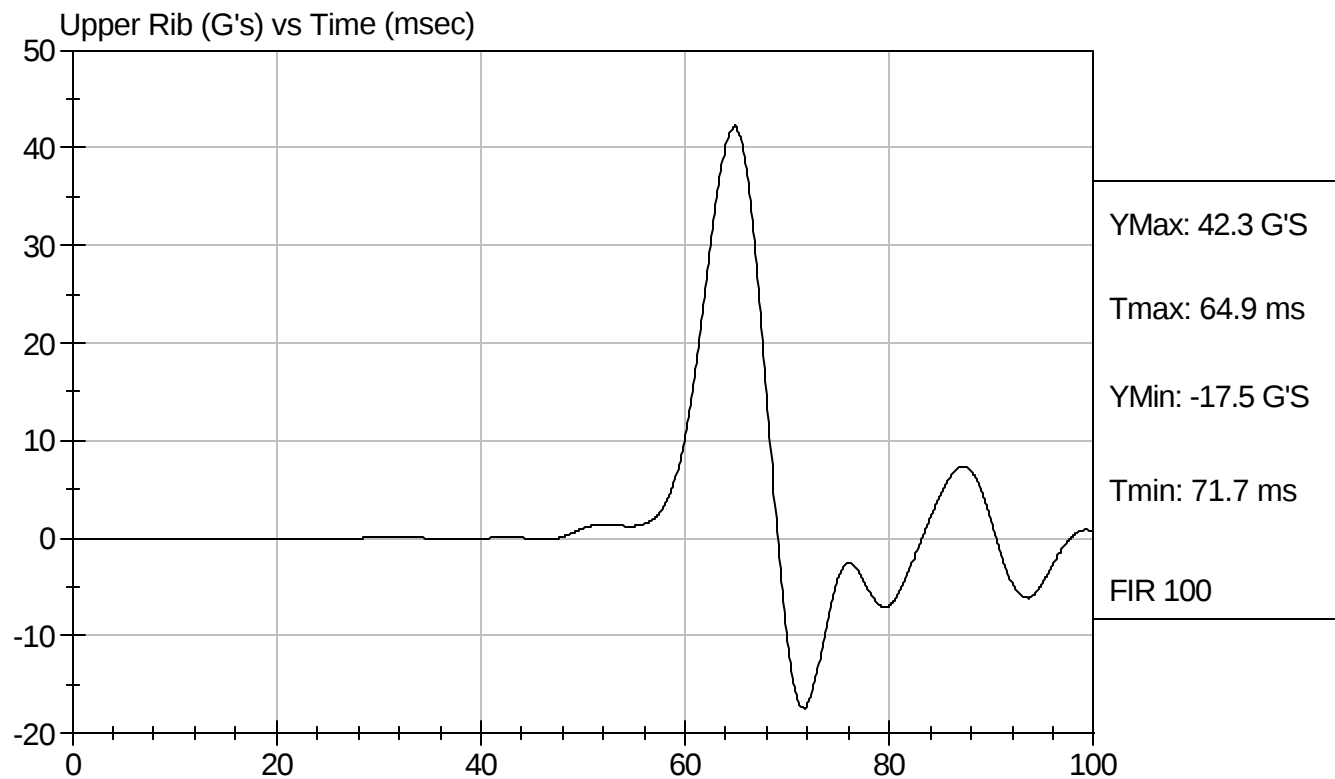
12/17/07
Test Date

David Winkelbauer
Approved By



Test Desc: Thorax Impact
Component ID: D073602

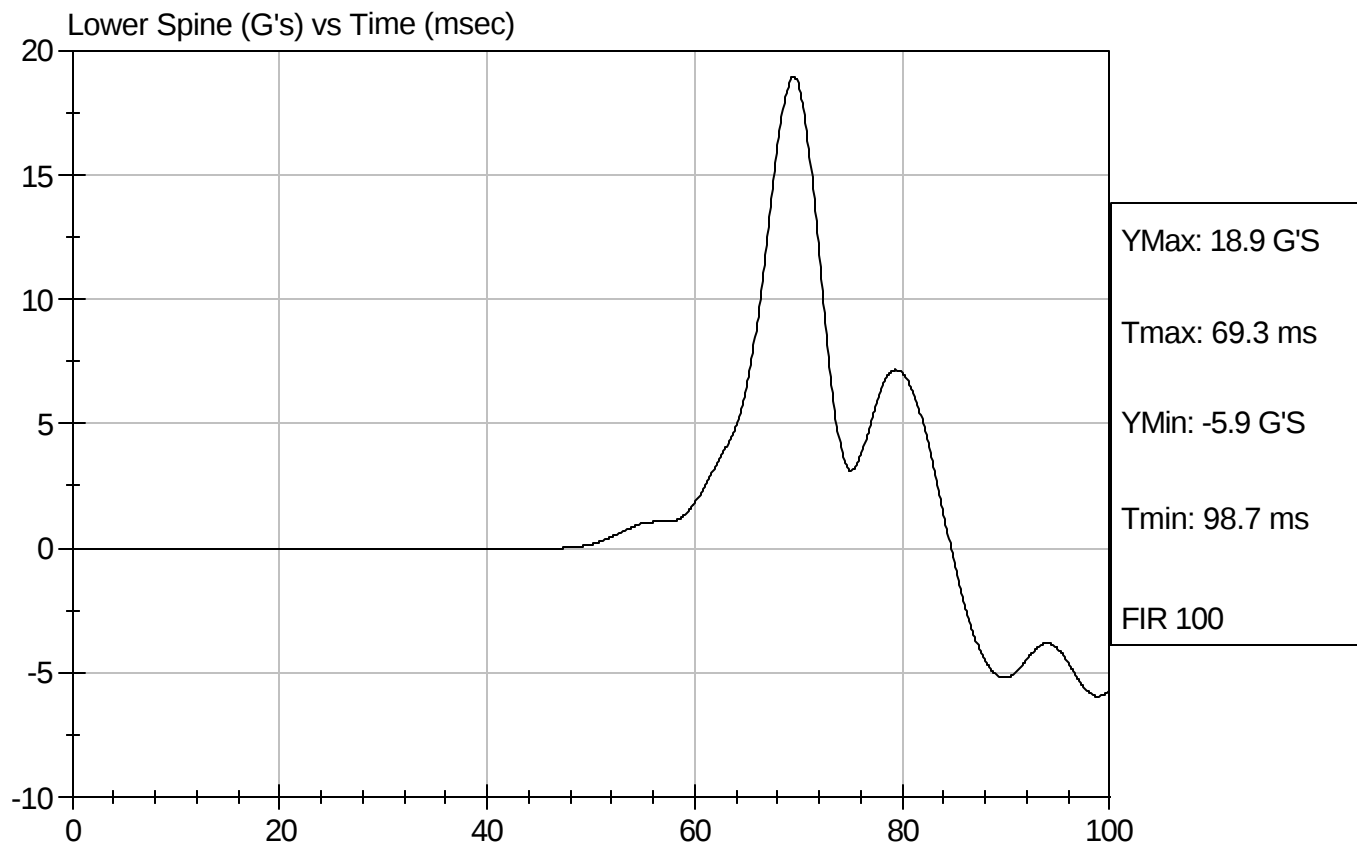
Test Date: 12/17/07
Speed: 14.01 ft/sec, 4.27 m/sec





Test Desc: Thorax Impact
Component ID: D073602

Test Date: 12/17/07
Speed: 14.01 ft/sec, 4.27 m/sec



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

ATD Serial No: 271

Test I.D: D073603

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	17	Pass
Probe Velocity	m/s	4.27 - 4.33	4.32	Pass
Pelvis Acceleration	G's	40 - 60	47	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

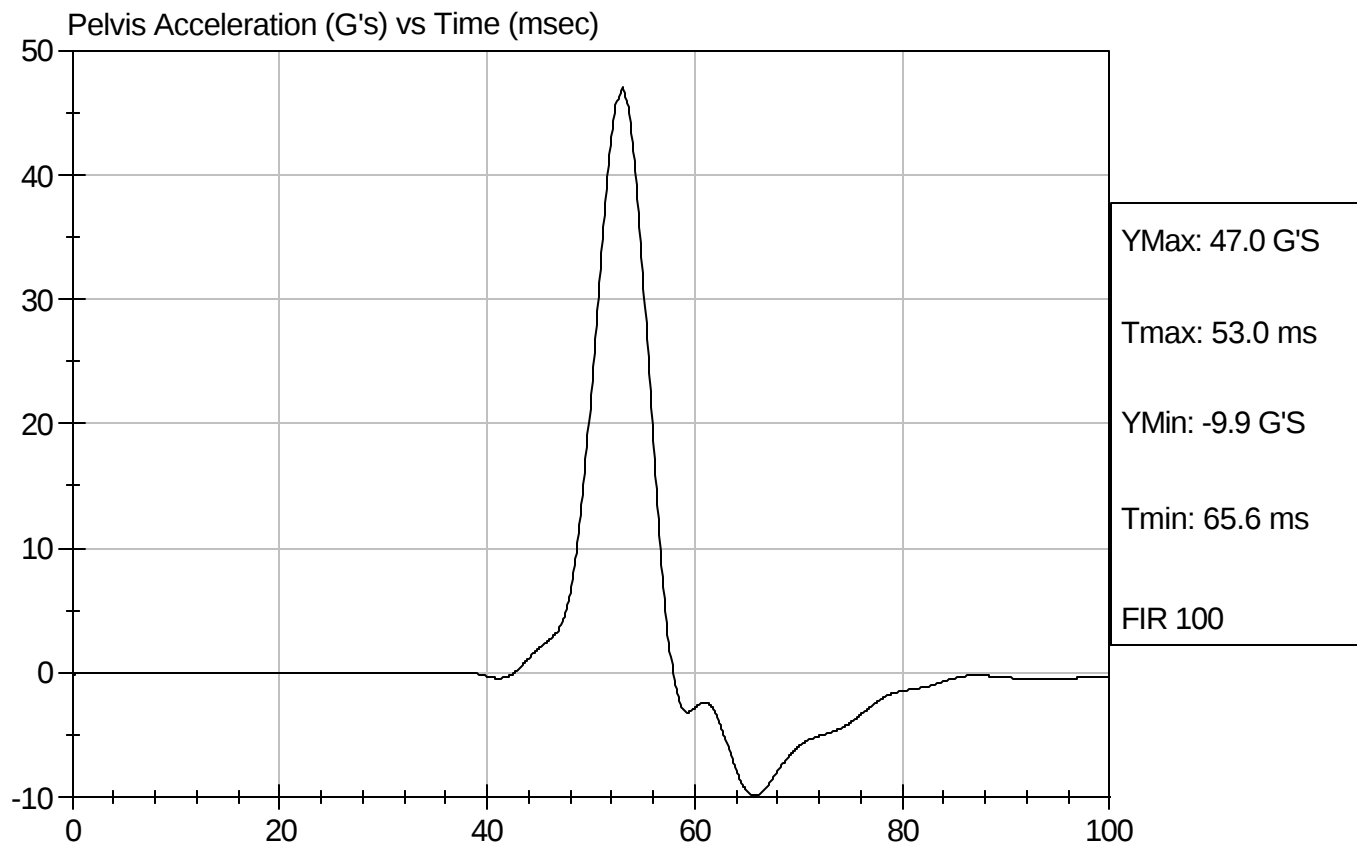
12/17/07
Test Date

David Winkelbauer
Approved By



Test Desc: Pelvis Impact
Component ID: D073603

Test Date: 12/17/07
Speed: 14.18 ft/sec, 4.32 m/sec



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

ATD Serial No: 271

Test I.D: D073604

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	20.6	Pass
Laboratory Relative Humidity	%	10 to 70	18	Pass
Force At 12.7 mm	N	104 -162	143	Pass
Force At 19 mm	N	163 - 222	198	Pass
Force At 25.4 mm	N	222 - 280	263	Pass
Force At 33 mm	N	325 - 391	350	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

12/17/07
Test Date

David Winkelbauer
Approved By

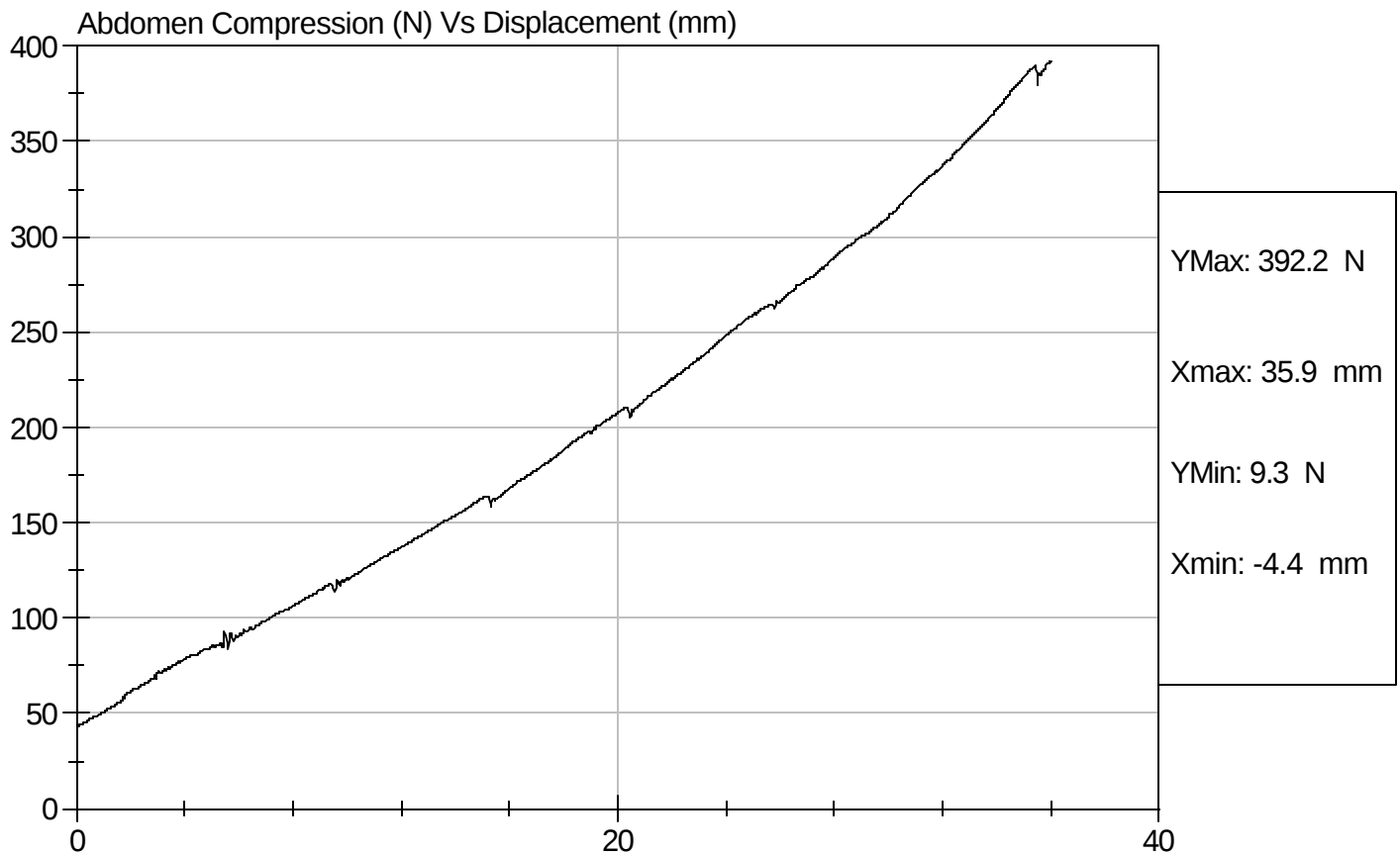


Test Description: Abdomen Compression

Test Date: 12/17/07

Component: D073604

Speed: 0 ft/sec, 0 m/sec



SID Calibration Data Sheet
Side Impact Dummy
Lumbar Flexion Calibration

ATD Serial No: 271

Test I.D: D073605

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	18	Pass
Force At 0 deg	N	0 - 26.7	0	Pass
Force At 20 deg	N	97.9 - 151.2	143.2	Pass
Force At 30 deg	N	151.2 - 204.6	184.0	Pass
Force At 40 deg	N	204.6 - 258.0	213.5	Pass
Return Angle	Deg	12 Maximum	6	Pass
Overall Test Results			Pass	

Jessica Hall
Laboratory Technician

12/17/07
Test Date

David Winkelbauer
Approved By

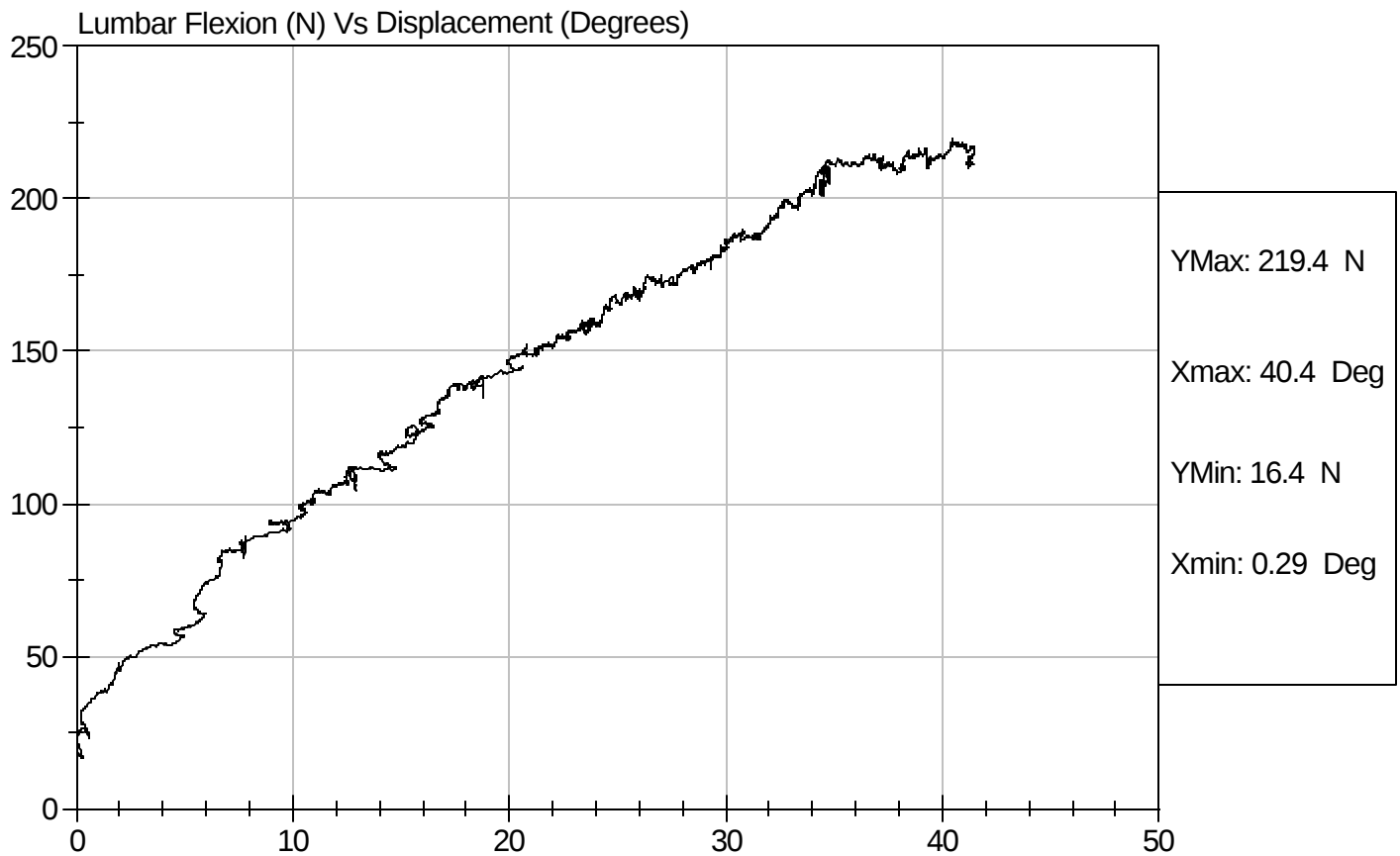


Test Description: Lumbar Flexion

Test Date: 12/17/07

Component: D073605

Speed: 0 ft/sec, 0 m/sec

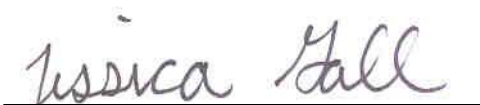


SID/HIII Calibration Data Sheet
Side Impact Dummy
Neck Pendulum Test

ATD Serial No: 271

Test I.D: D073609

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	18	Pass
Impact Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 msec	m/s	1.96 to 2.55	2.42	Pass
	20 msec	m/s	4.12 to 5.10	4.80	Pass
	30 msec	m/s	5.73 to 7.01	6.51	Pass
	40 to 70 msec	m/s	6.27 to 7.64	6.55	Pass
Midsagittal Plane Max Rotation		deg	66 to 82	75	Pass
Head Rotation Peak to Zero - Decay Time		msec	58 to 67	59	Pass
Max. Mx at Occipital Condyles		Nm	73 to 88	77	Pass
Mx Peak To Zero - Decay Time		msec	49 to 64	52	Pass
Mx Peak to Max. Head Rotation		msec	2 to 16	5	Pass


Laboratory Technician

12/17/07

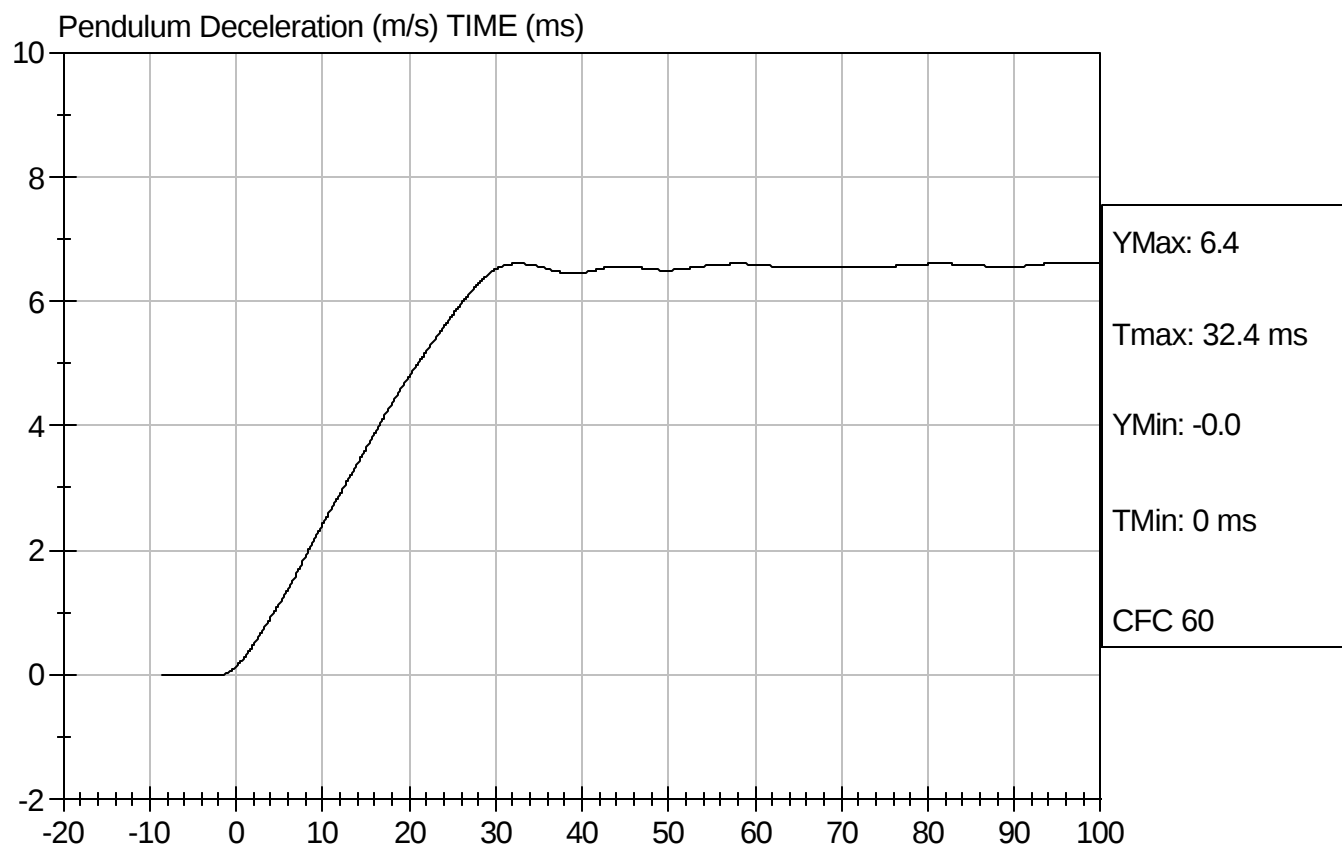
Test Date


Approved By



Test Desc: Neck Bending
Component ID: D073609

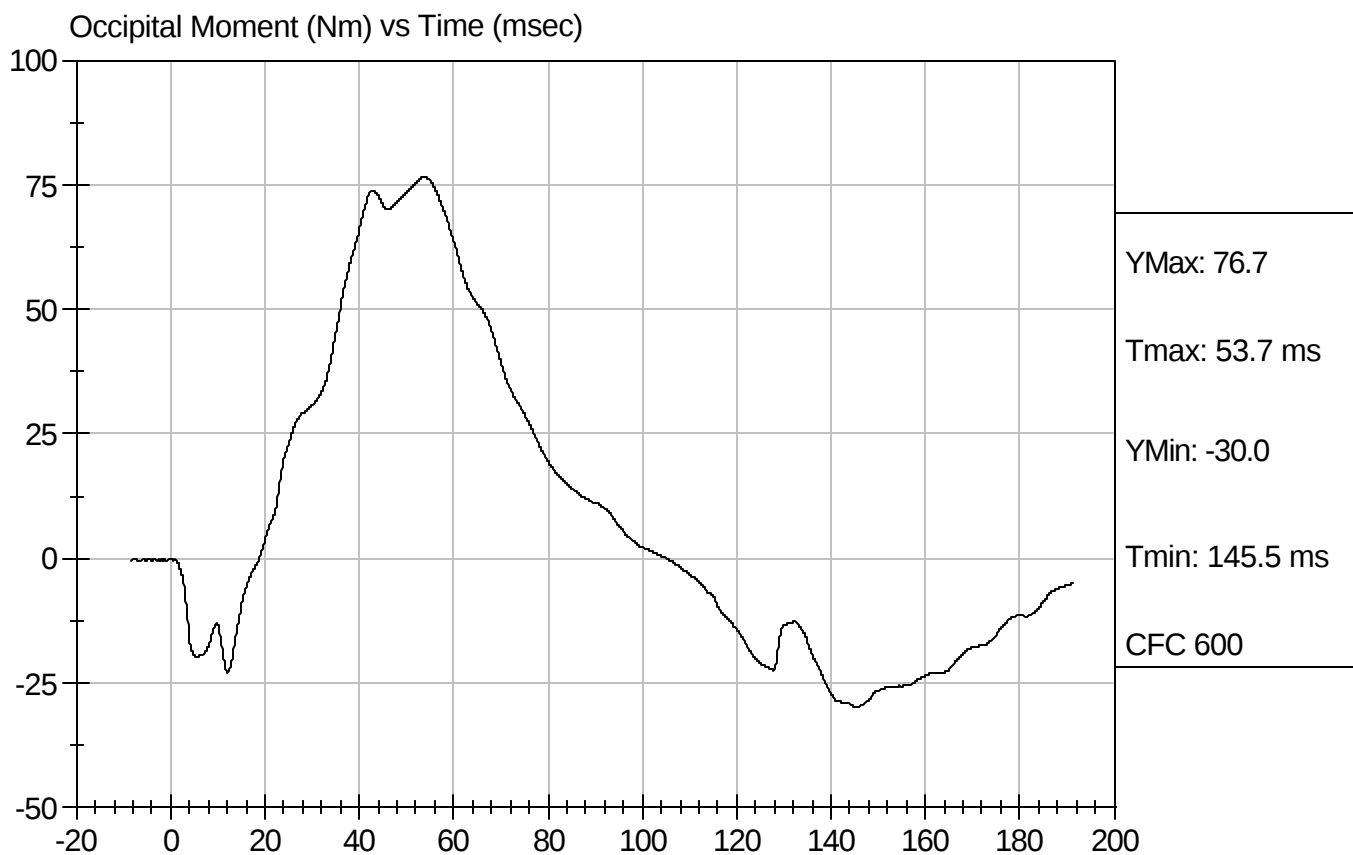
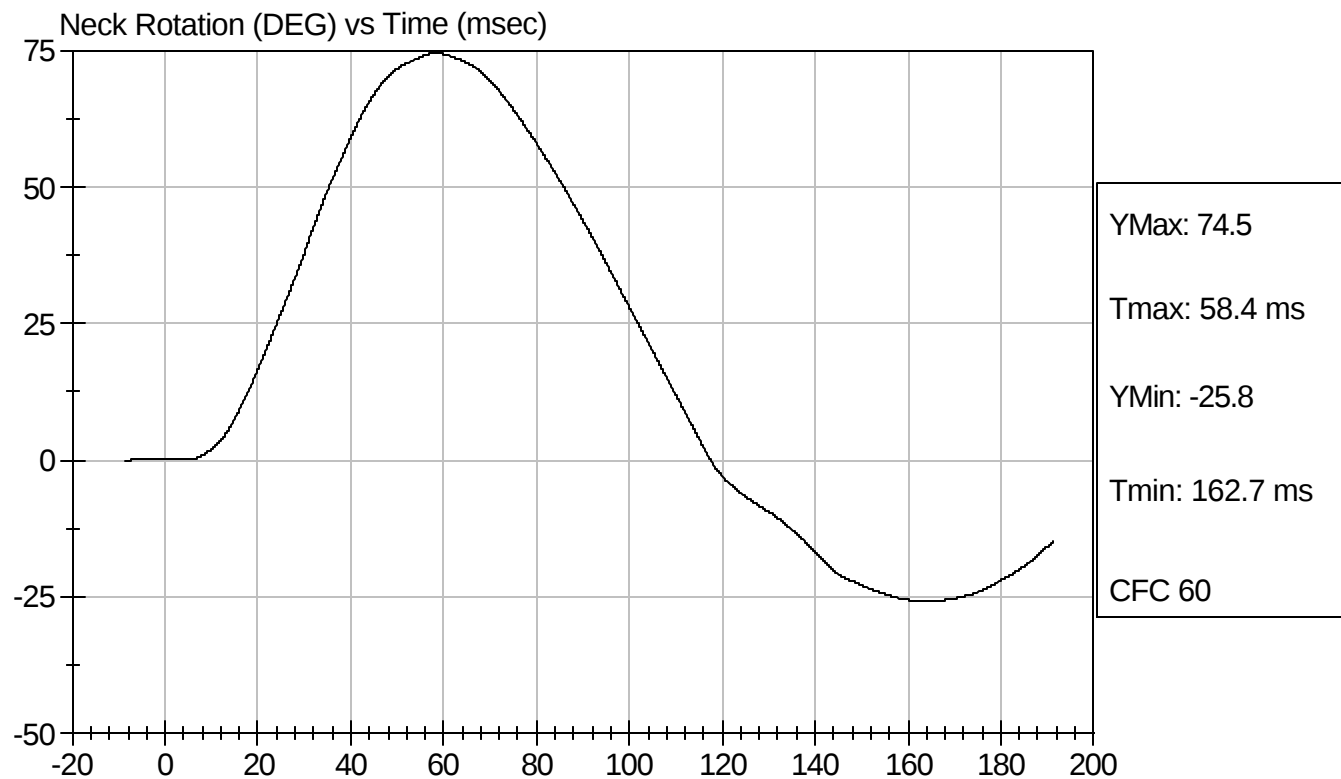
Test Date: 12/17/07
Speed: 23.15 ft/sec, 7.06 m/sec





Test Desc: Neck Bending
Component ID: D073609

Test Date: 12/17/07
Speed: 23.15 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: D073641

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	28	Pass
Peak Resultant Acceleration	G's	120 to 150	135	Pass
Is Resultant Curve Unimodal?	N/A	15% of peak	Yes	Pass
Peak Longitudnal Acceleration	G's	+/- 15	7.0	Pass
Overall Test Results				Pass

Jessica Gall
Laboratory Technician

12/21/07
Test Date

David Winkelbauer
Approved By



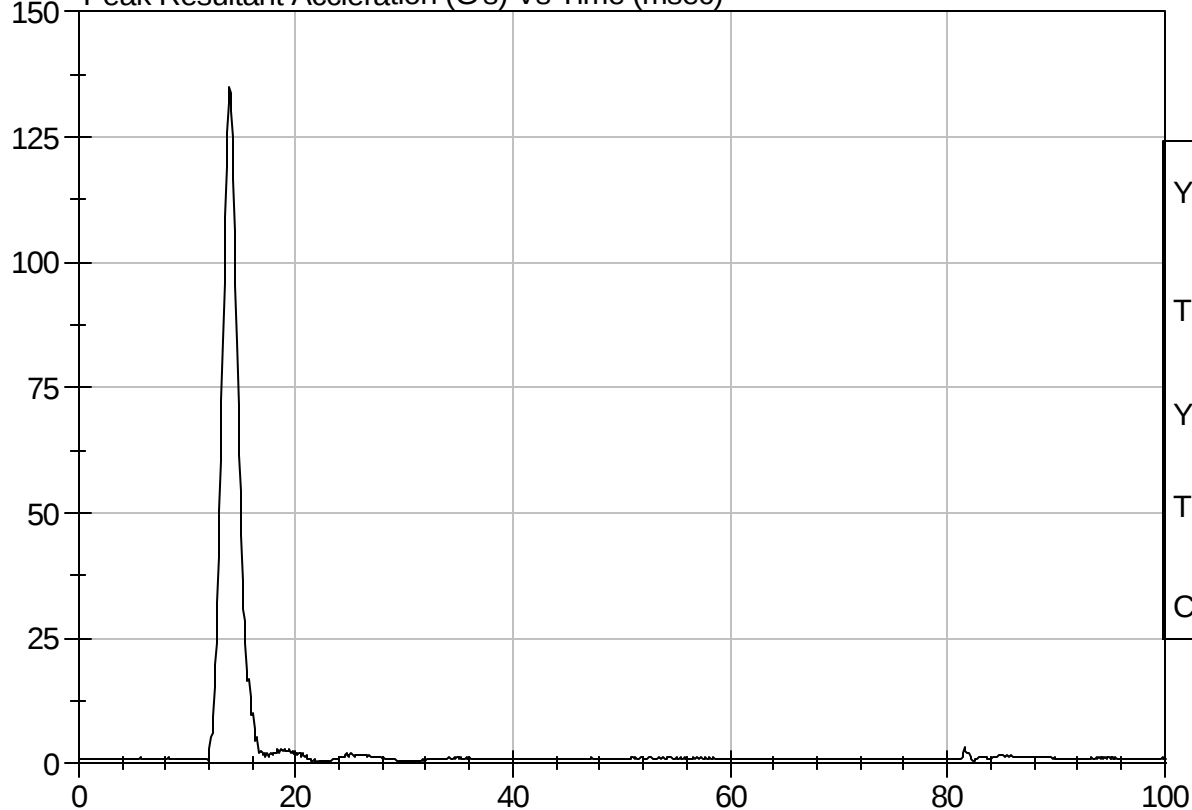
Test Description: Head Drop

Test Date: 12/21/07

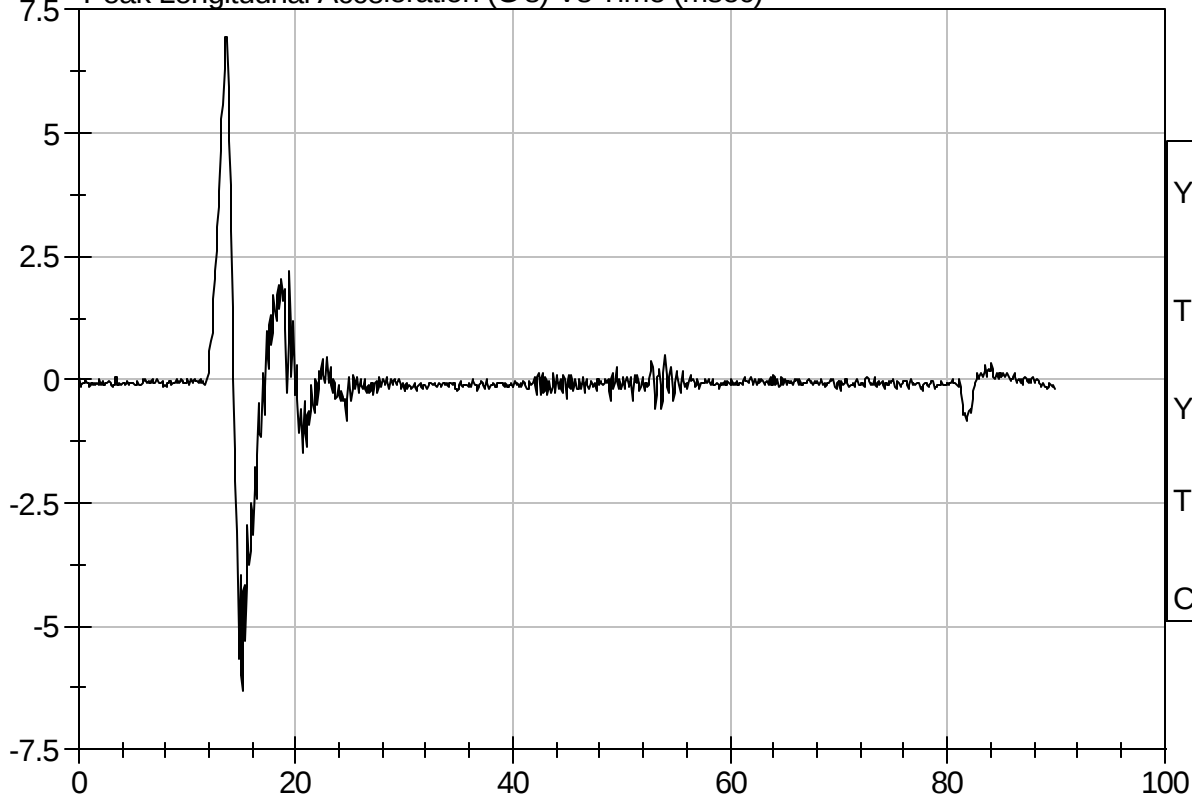
Component: D073641

Speed: 0 ft/s, 0.00 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: D073642

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Probe Velocity	m/s	4.22 - 4.31	4.27	Pass
Upper Rib	G's	37 - 46	44	Pass
Lower Rib	G's	37 - 46	44	Pass
Lower Spine	G's	15 - 22	20	Pass
Overall Test Results				Pass


Laboratory Technician

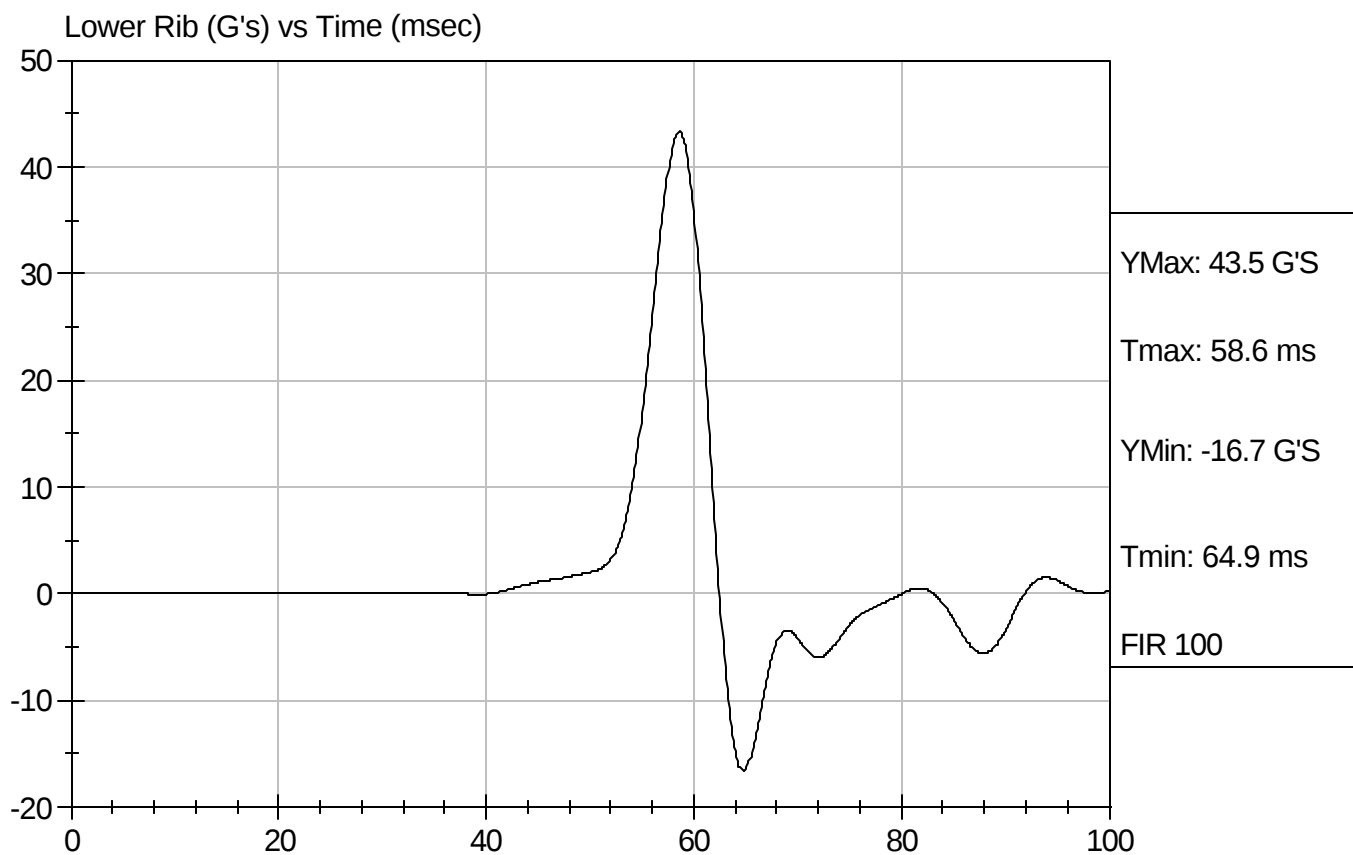
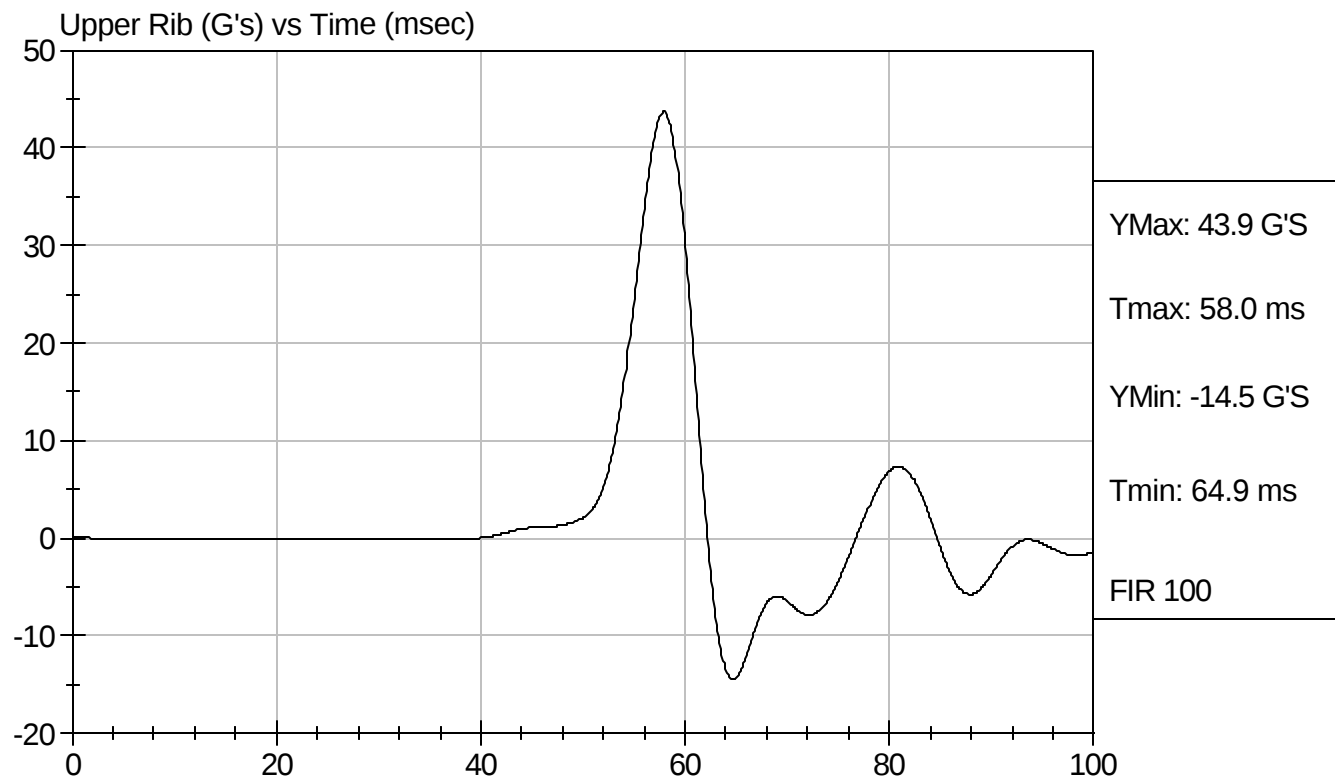

Approved By

12/21/07
Test Date



Test Desc: Thorax Impact
Component ID: D073642

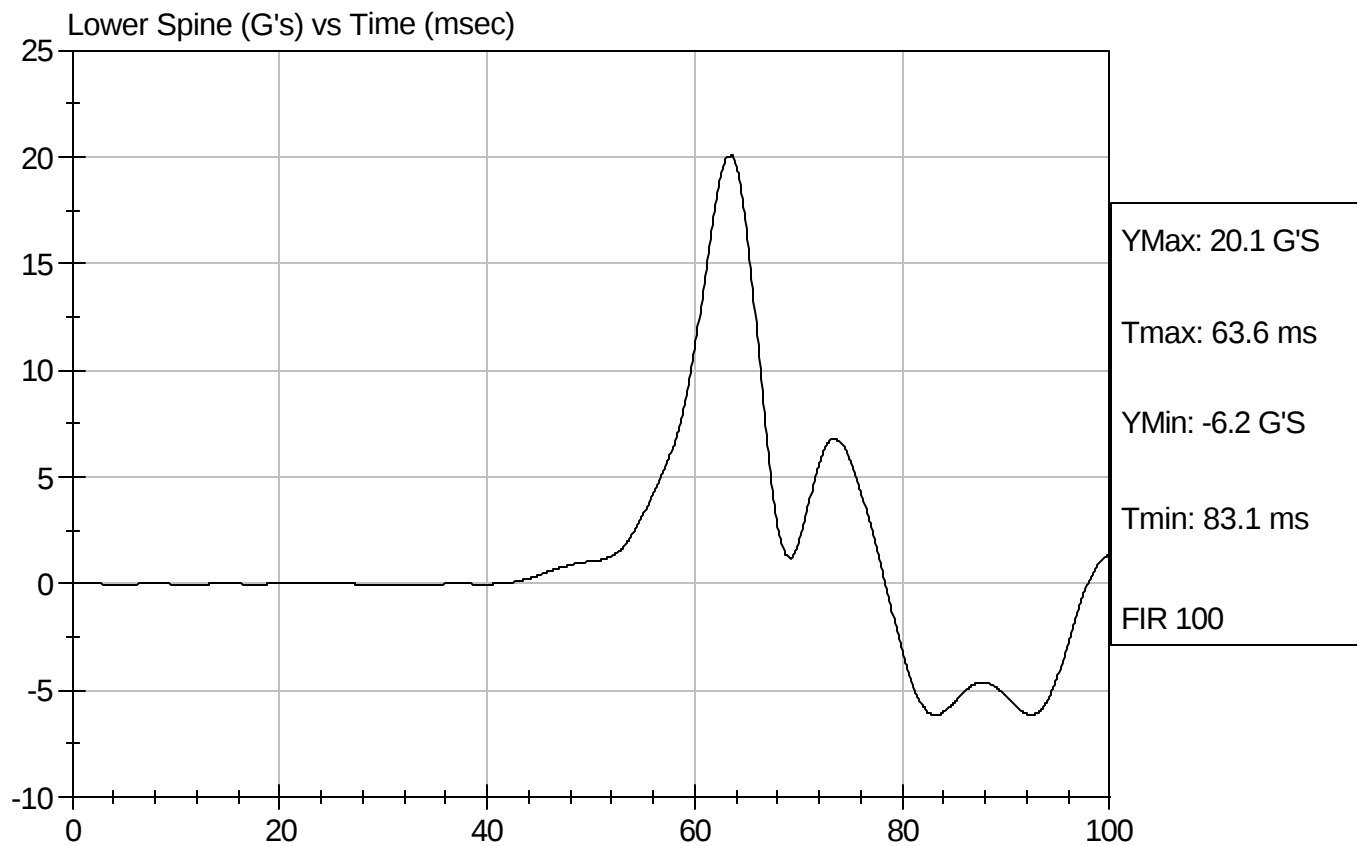
Test Date: 12/21/07
Speed: 14.00 ft/sec, 4.27 m/sec





Test Desc: Thorax Impact
Component ID: D073642

Test Date: 12/21/07
Speed: 14.00 ft/sec, 4.27 m/sec



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

ATD Serial No: 271

Test I.D: D073643

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	28	Pass
Probe Velocity	m/s	4.27 - 4.33	4.27	Pass
Pelvis Acceleration	G's	40 - 60	44	Pass
Overall Test Results				Pass

Jessica Gall
Laboratory Technician

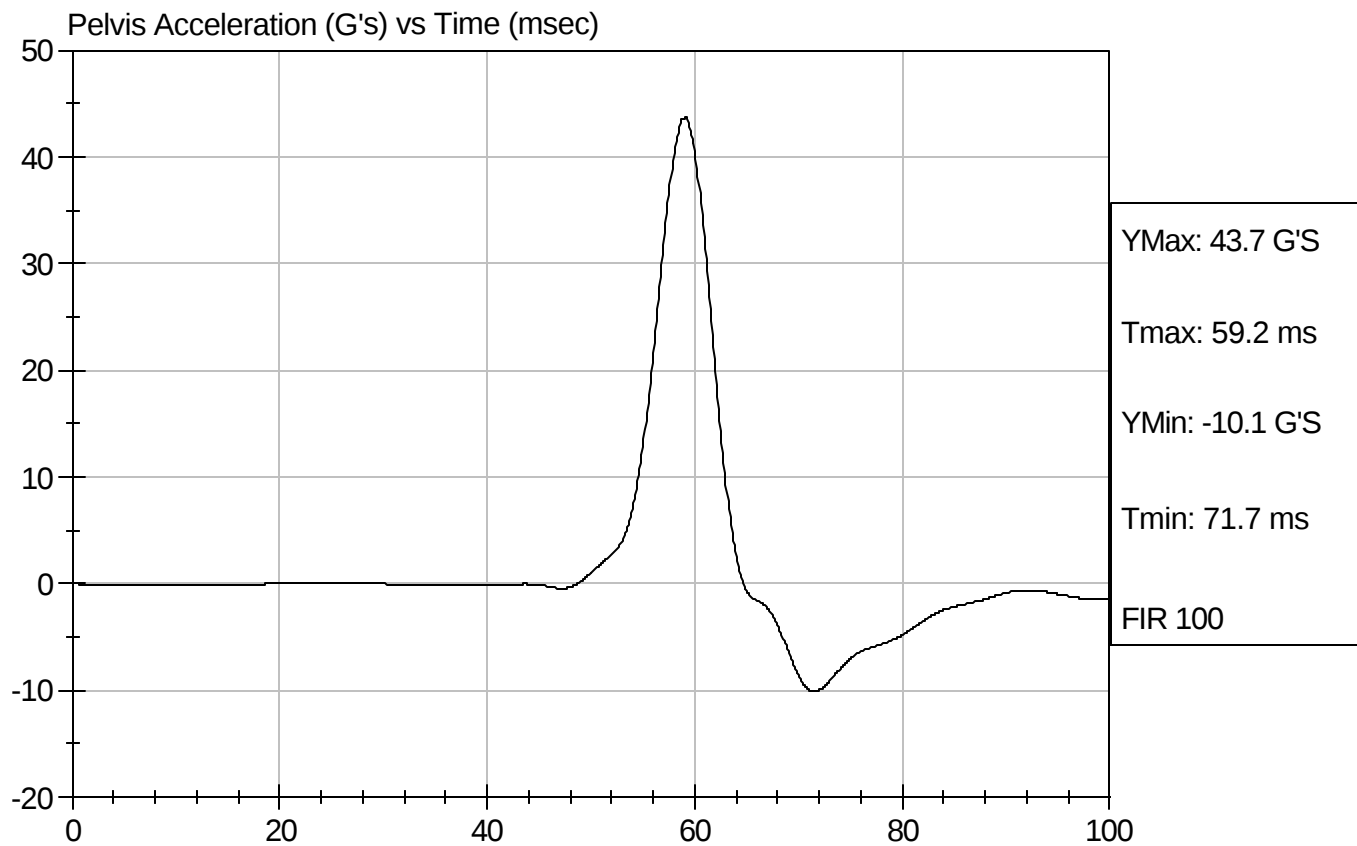
David Winkelbauer
Approved By

12/21/07
Test Date



Test Desc: Pelvis Impact
Component ID: D073643

Test Date: 12/21/07
Speed: 14.01 ft/sec, 4.27 m/sec



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

ATD Serial No: 271

Test I.D.: D073644

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	28	Pass
Force At 12.7 mm	N	104 -162	149	Pass
Force At 19 mm	N	163 - 222	202	Pass
Force At 25.4 mm	N	222 - 280	271	Pass
Force At 33 mm	N	325 - 391	355	Pass
Overall Test Results				Pass

Jessica Gall
Laboratory Technician

12/21/07
Test Date

David Winkelbauer
Approved By

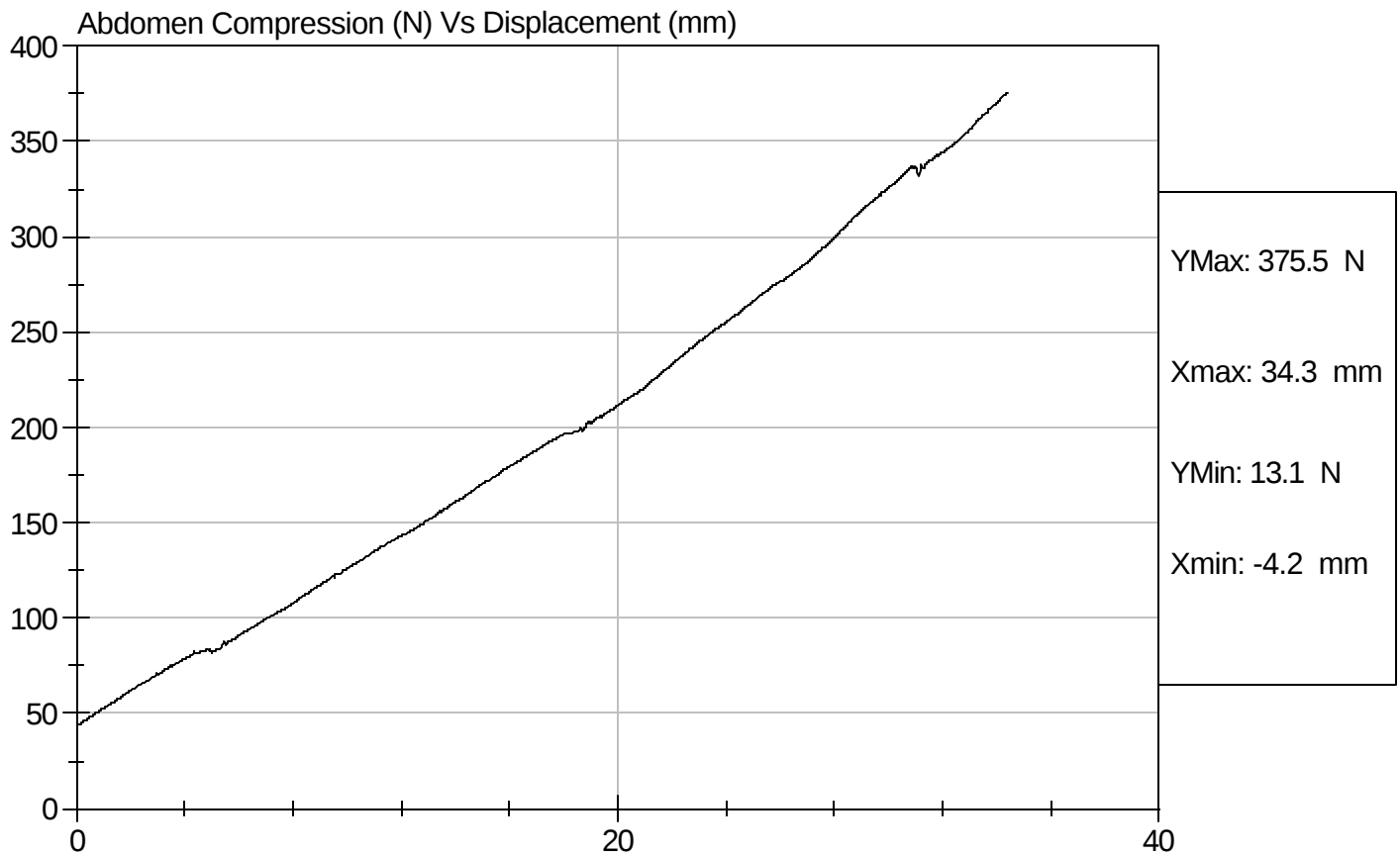


Test Description: Abdomen Compression

Test Date: 12/21/07

Component: D073644

Speed: 0 ft/sec, 0 m/sec



SID Calibration Data Sheet
Side Impact Dummy
Lumbar Flexion Calibration

ATD Serial No: 271

Test I.D: D073645

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	28	Pass
Force At 0 deg	N	0 - 26.7	0	Pass
Force At 20 deg	N	97.9 - 151.2	126.5	Pass
Force At 30 deg	N	151.2 - 204.6	170.5	Pass
Force At 40 deg	N	204.6 - 258.0	219.9	Pass
Return Angle	Deg	12 Maximum	5	Pass
Overall Test Results			Pass	

Jessica Hall
Laboratory Technician

12/21/07
Test Date

David Winkelbauer
Approved By

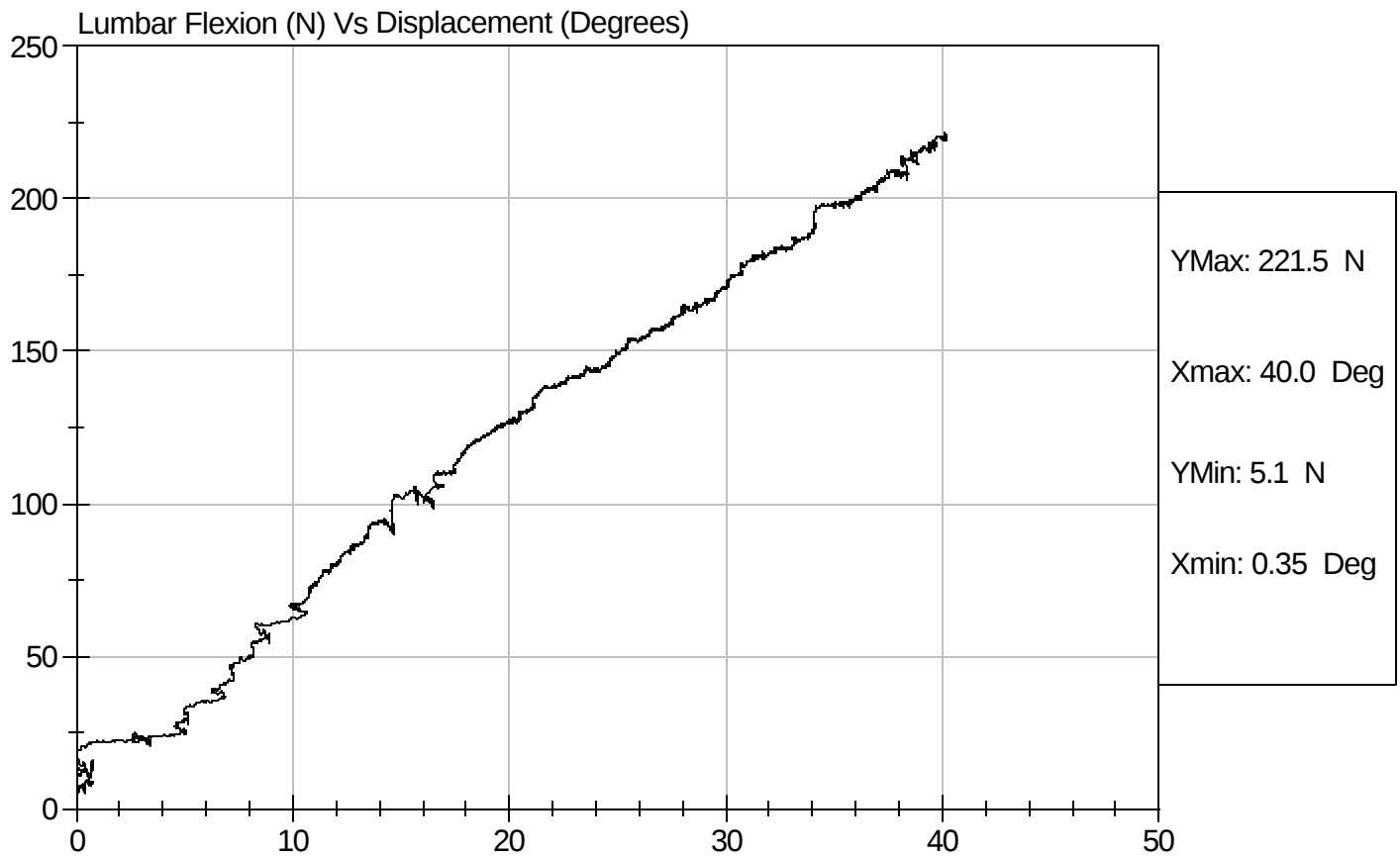


Test Description: Lumbar Flexion

Test Date: 12/21/07

Component: D073645

Speed: 0 ft/sec, 0 m/sec



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

ATD Serial No: 271

Test I.D: D073649

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity		%	10 to 70	29	Pass
Impact Velocity		m/s	6.89 to 7.13	6.96	Pass
Pendulum Deceleration	10 msec	m/s	1.96 to 2.55	2.33	Pass
	20 msec	m/s	4.12 to 5.10	4.71	Pass
	30 msec	m/s	5.73 to 7.01	6.57	Pass
	40 to 70 msec	m/s	6.27 to 7.64	6.65	Pass
Midsagittal Plane Max Rotation		deg	66 to 82	73	Pass
Head Rotation Peak to Zero - Decay Time		msec	58 to 67	62	Pass
Max. Mx at Occipital Condyles		Nm	73 to 88	74	Pass
Mx Peak To Zero - Decay Time		msec	49 to 64	50	Pass
Mx Peak to Max. Head Rotation		msec	2 to 16	3	Pass


 Laboratory Technician

12/21/07

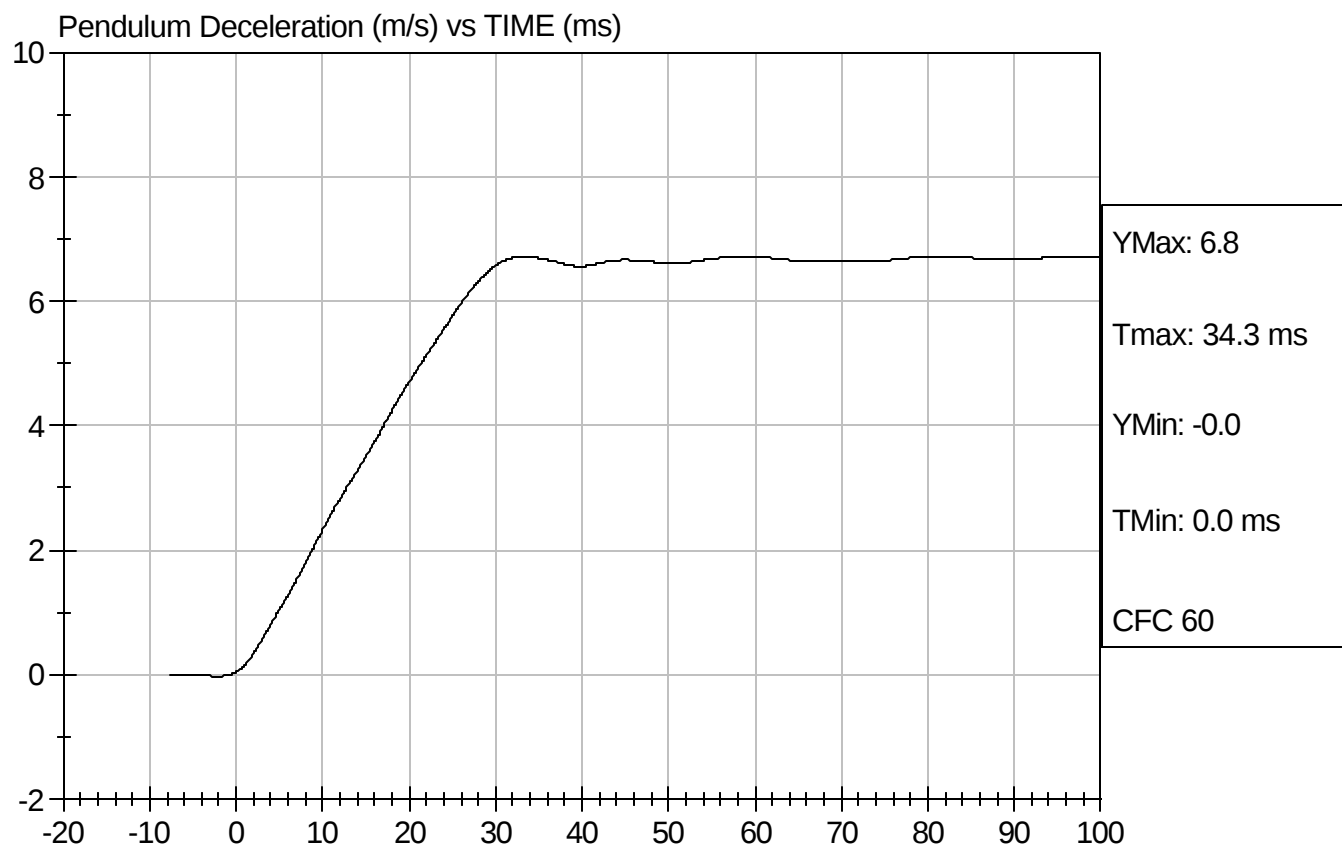
Test Date


 Approved By



Test Desc: Neck Bending
Component ID: D073649

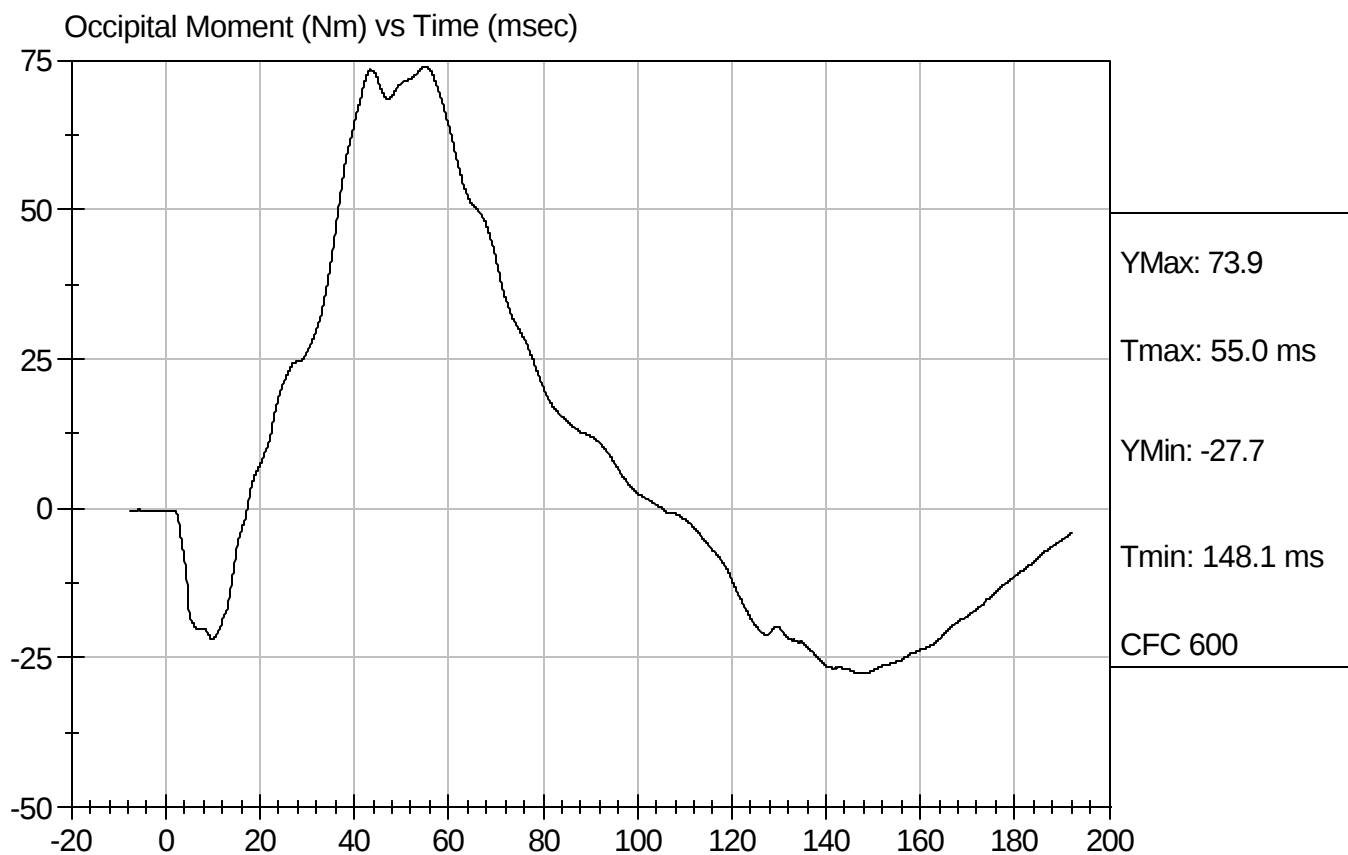
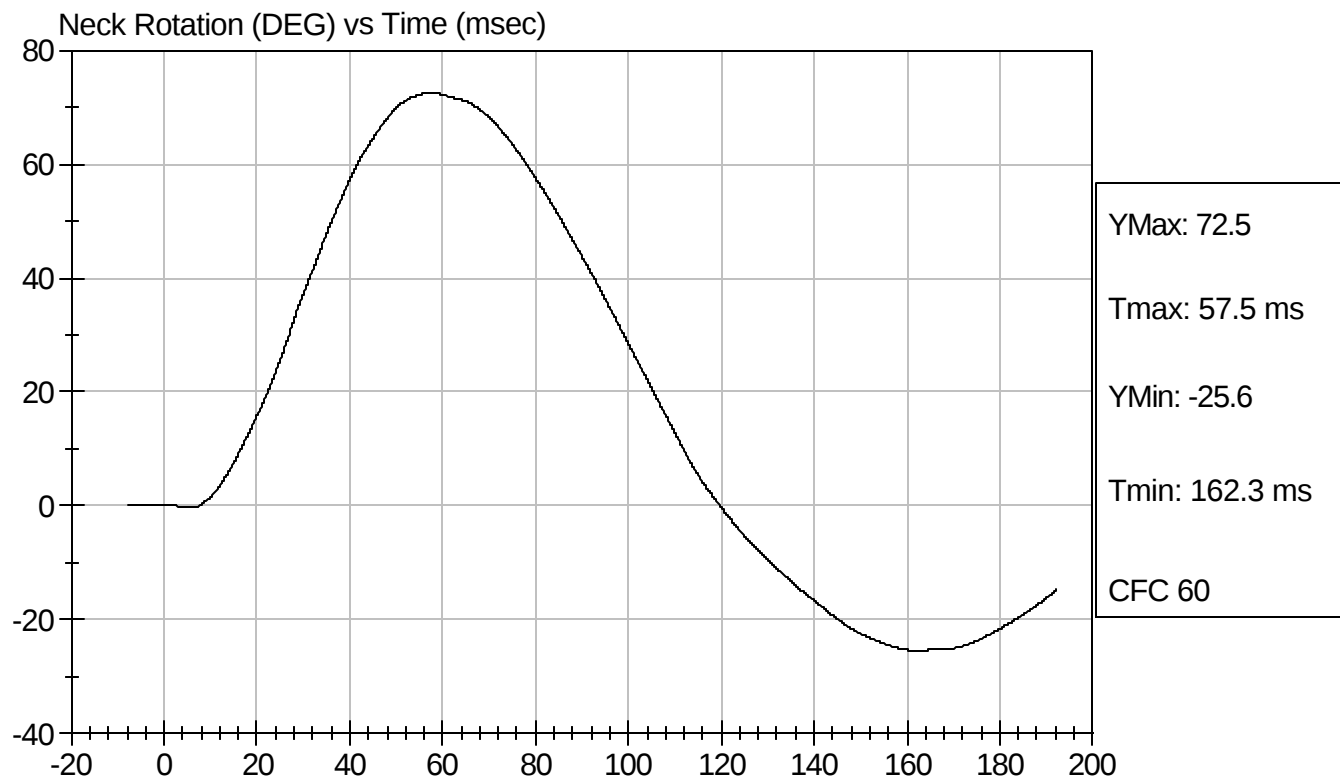
Test Date: 12/21/07
Speed: 22.83 ft/sec, 6.96 m/sec





Test Desc: Neck Bending
Component ID: D073649

Test Date: 12/21/07
Speed: 22.83 ft/sec, 6.96 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

Jessica Hall
Laboratory Technician
David Winkelbauer
Approved By

12/21/2007
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: D07361

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	


Laboratory Technician


Approved By

12/17/2007

Test Date

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

ATD Serial No: 904

Test I.D: D073611

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	20.6	Pass
Laboratory Relative Humidity	%	10 to 70	18	Pass
Peak Resultant Acceleration	G's	120 to 150	146	Pass
Is Resultant Curve Unimodal?	N/A	15% of peak	Yes	Pass
Peak Longitudnal Acceleration	G's	+/- 15	-8.4	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

12/17/07
Test Date

David Winkelbauer
Approved By



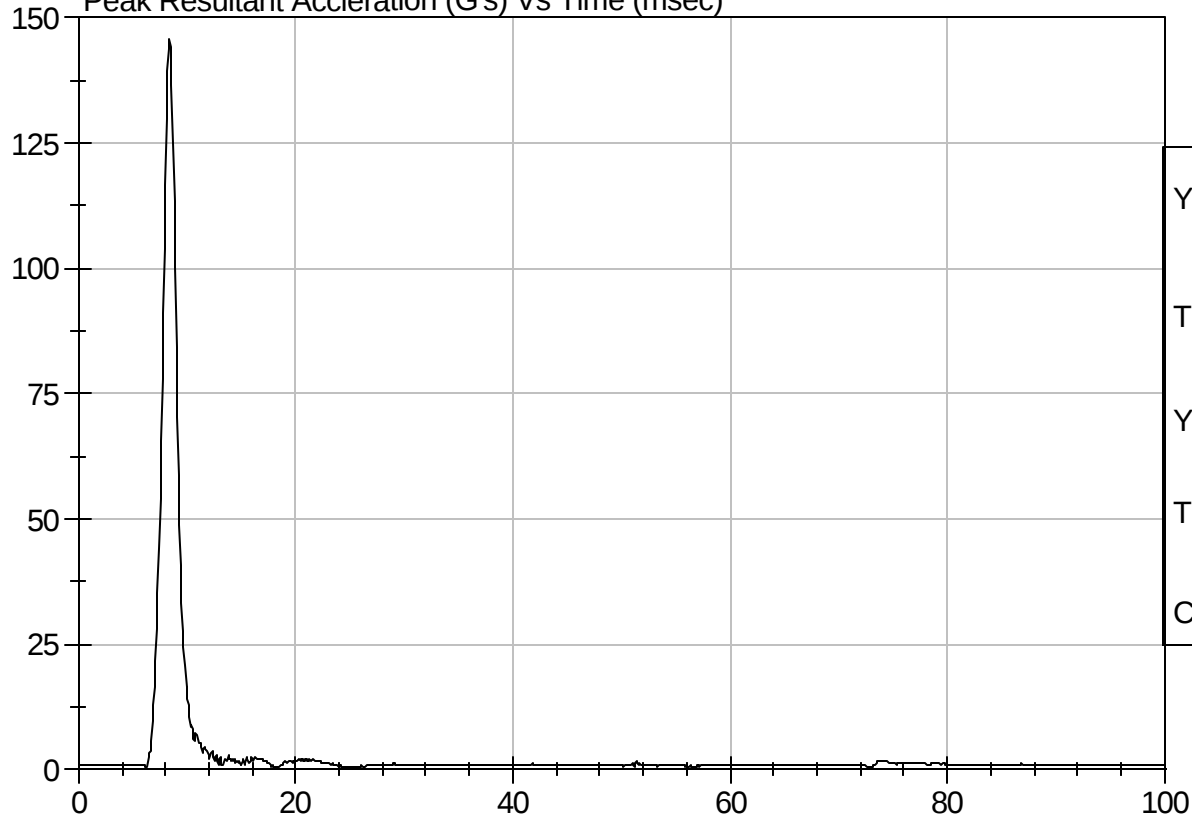
Test Description: Head Drop

Test Date: 12/17/07

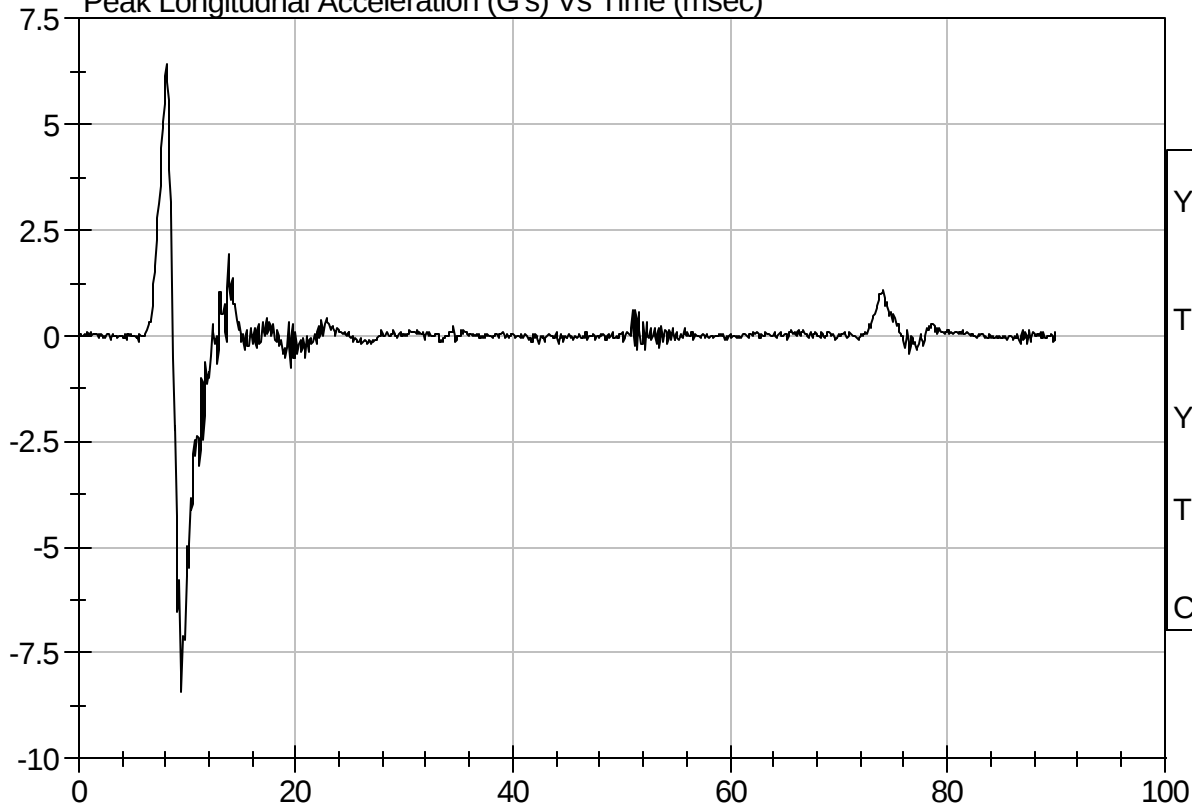
Component: D073611

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: 904

Test I.D: D073612

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	20.6	Pass
Laboratory Relative Humidity	%	10 to 70	18	Pass
Probe Velocity	m/s	4.22 - 4.31	4.27	Pass
Upper Rib	G's	37 - 46	40	Pass
Lower Rib	G's	37 - 46	38	Pass
Lower Spine	G's	15 - 22	21	Pass
Overall Test Results				Pass


Laboratory Technician

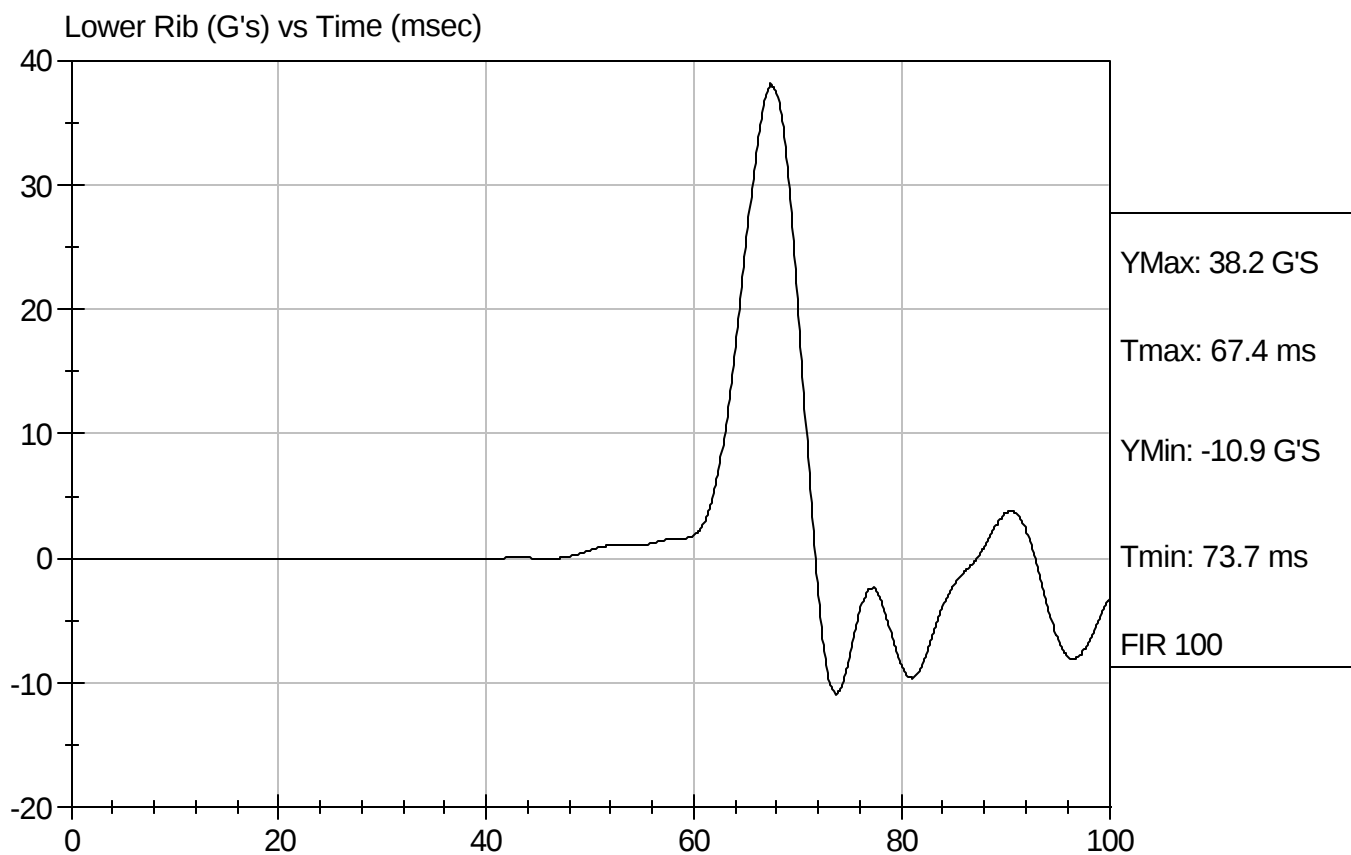
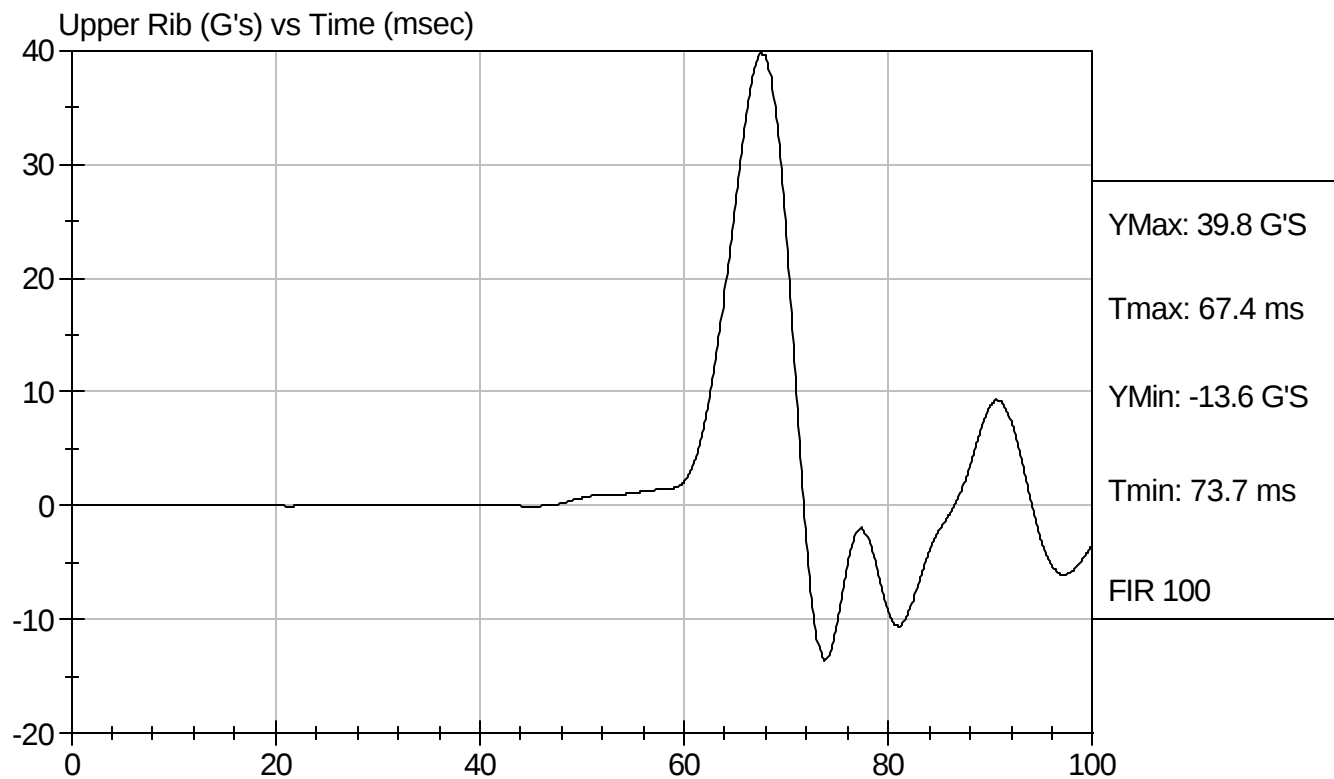
12/17/07
Test Date


Approved By



Test Desc: Thorax Impact
Component ID: D073612

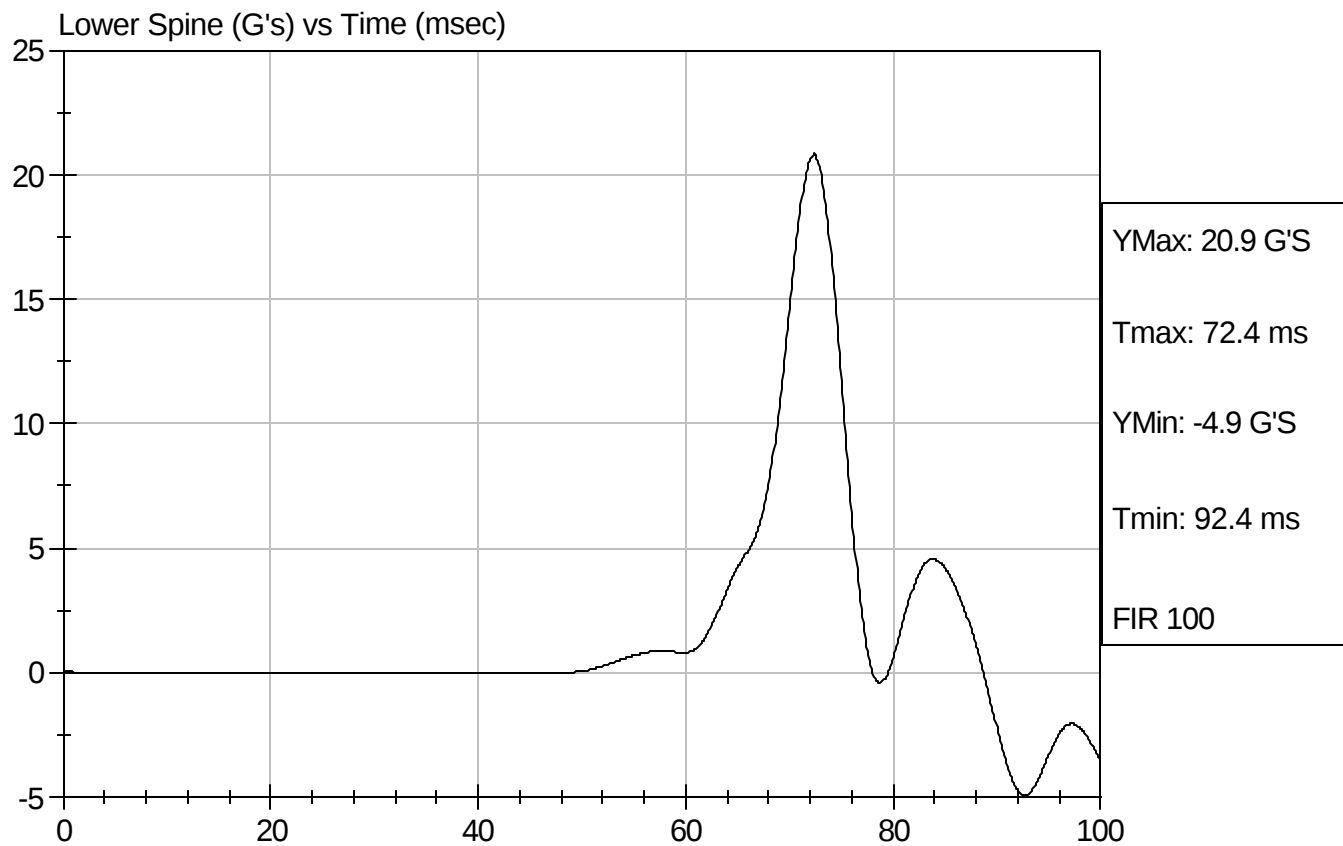
Test Date: 12/17/07
Speed: 14.01 ft/sec, 4.27 m/sec





Test Desc: Thorax Impact
Component ID: D073612

Test Date: 12/17/07
Speed: 14.01 ft/sec, 4.27 m/sec



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

ATD Serial No: 904

Test I.D: D073613

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	17	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

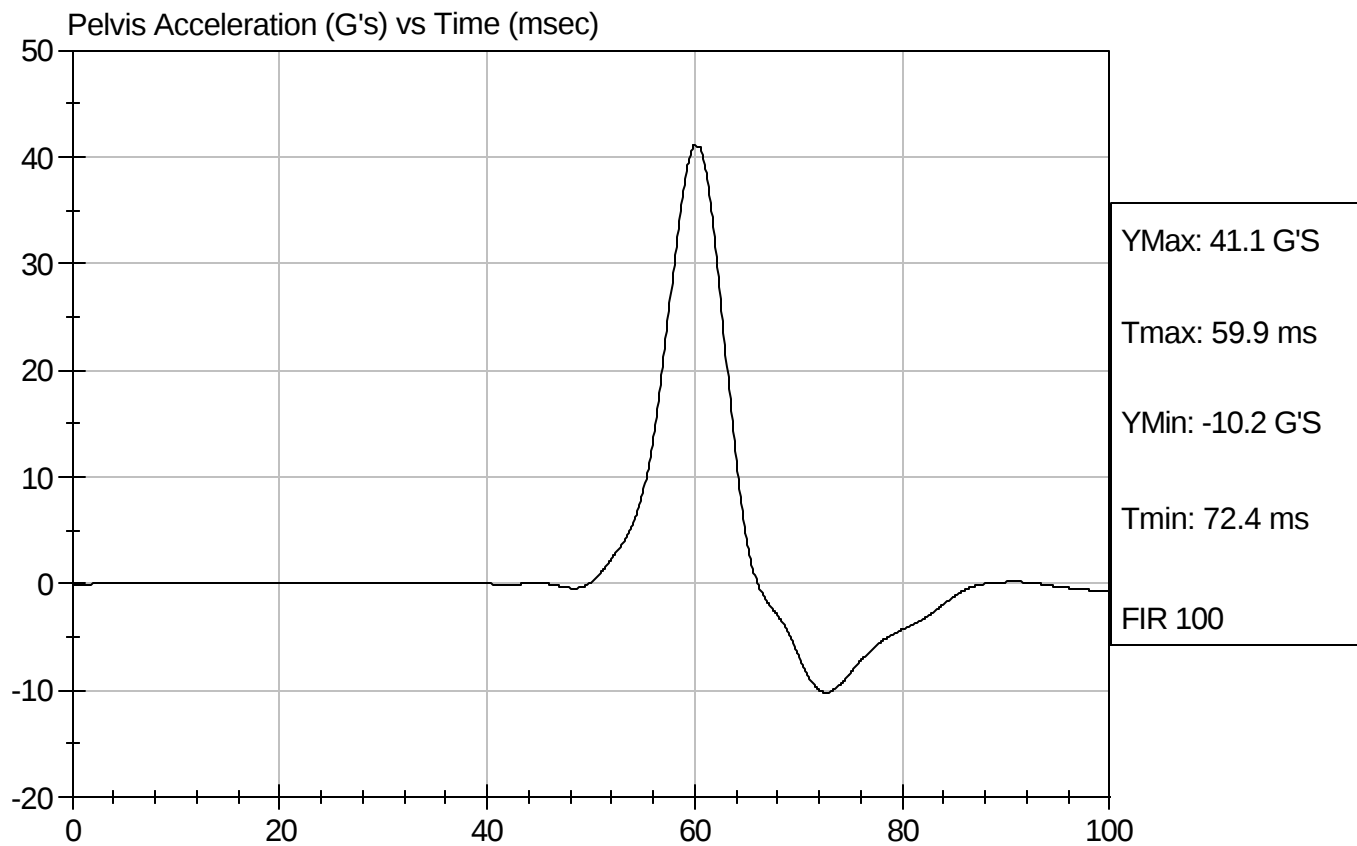
12/17/07
Test Date

David Winkelbauer
Approved By



Test Desc: Pelvis Impact
Component ID: D073613

Test Date: 12/17/07
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: 904

Test I.D: D073614

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	20.6	Pass
Laboratory Relative Humidity	%	10 to 70	18	Pass
Force At 12.7 mm	N	104 -162	131	Pass
Force At 19 mm	N	163 - 222	185	Pass
Force At 25.4 mm	N	222 - 280	256	Pass
Force At 33 mm	N	325 - 391	348	Pass
Overall Test Results				Pass

Jessica Hall
Laboratory Technician

12/17/07
Test Date

David Winkelbauer
Approved By

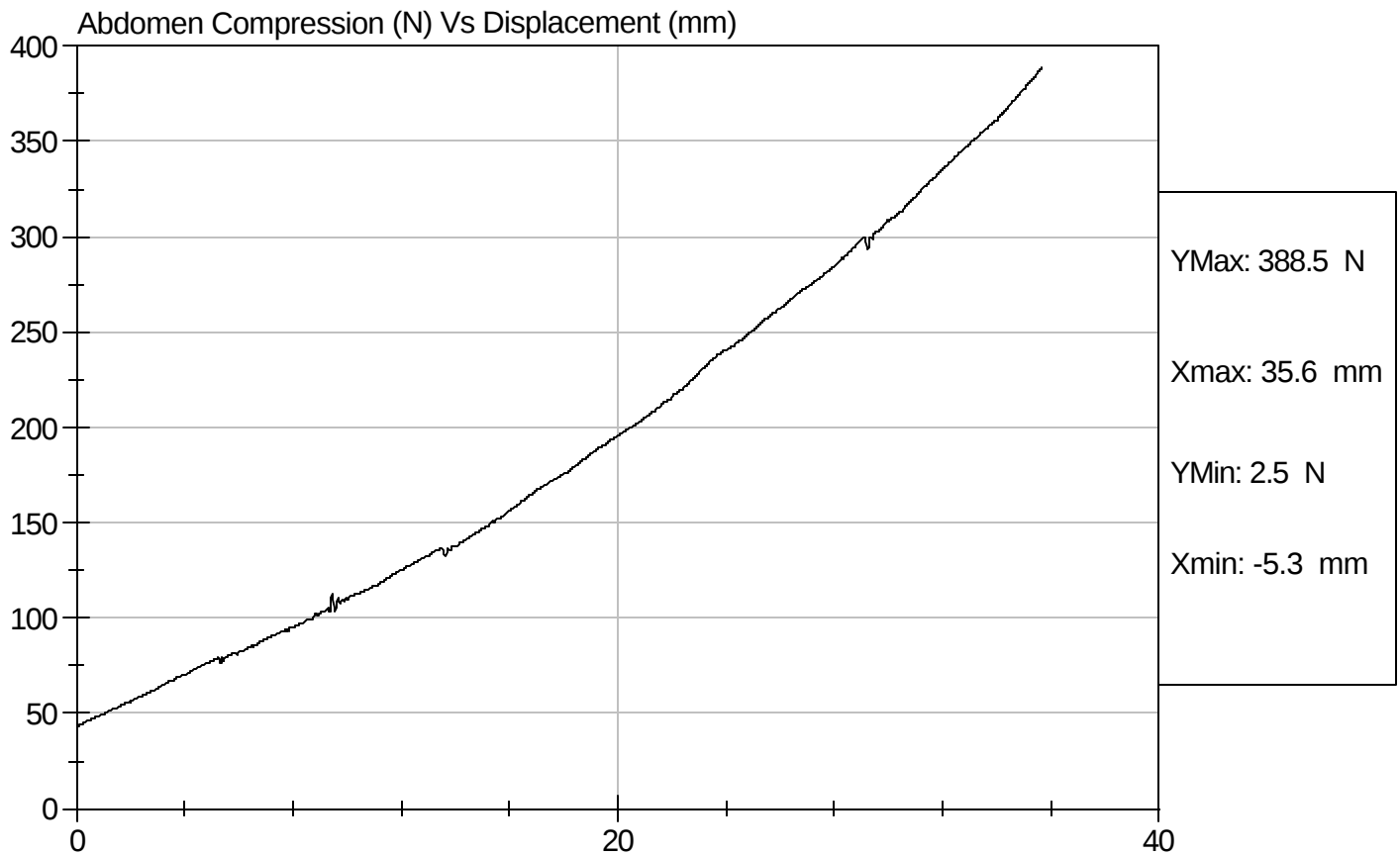


Test Description: Abdomen Compression

Test Date: 12/17/07

Component: D073614

Speed: 0 ft/sec, 0 m/sec



SID Calibration Data Sheet
Side Impact Dummy
Lumbar Flexion Calibration

ATD Serial No: 904

Test I.D.: D073615

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	18	Pass
Force At 0 deg	N	0 - 26.7	0	Pass
Force At 20 deg	N	97.9 - 151.2	138.8	Pass
Force At 30 deg	N	151.2 - 204.6	187.9	Pass
Force At 40 deg	N	204.6 - 258.0	237.7	Pass
Return Angle	Deg	12 Maximum	4	Pass
Overall Test Results			Pass	

Jessica Hall
Laboratory Technician

12/21/07
Test Date

David Winkelbauer
Approved By

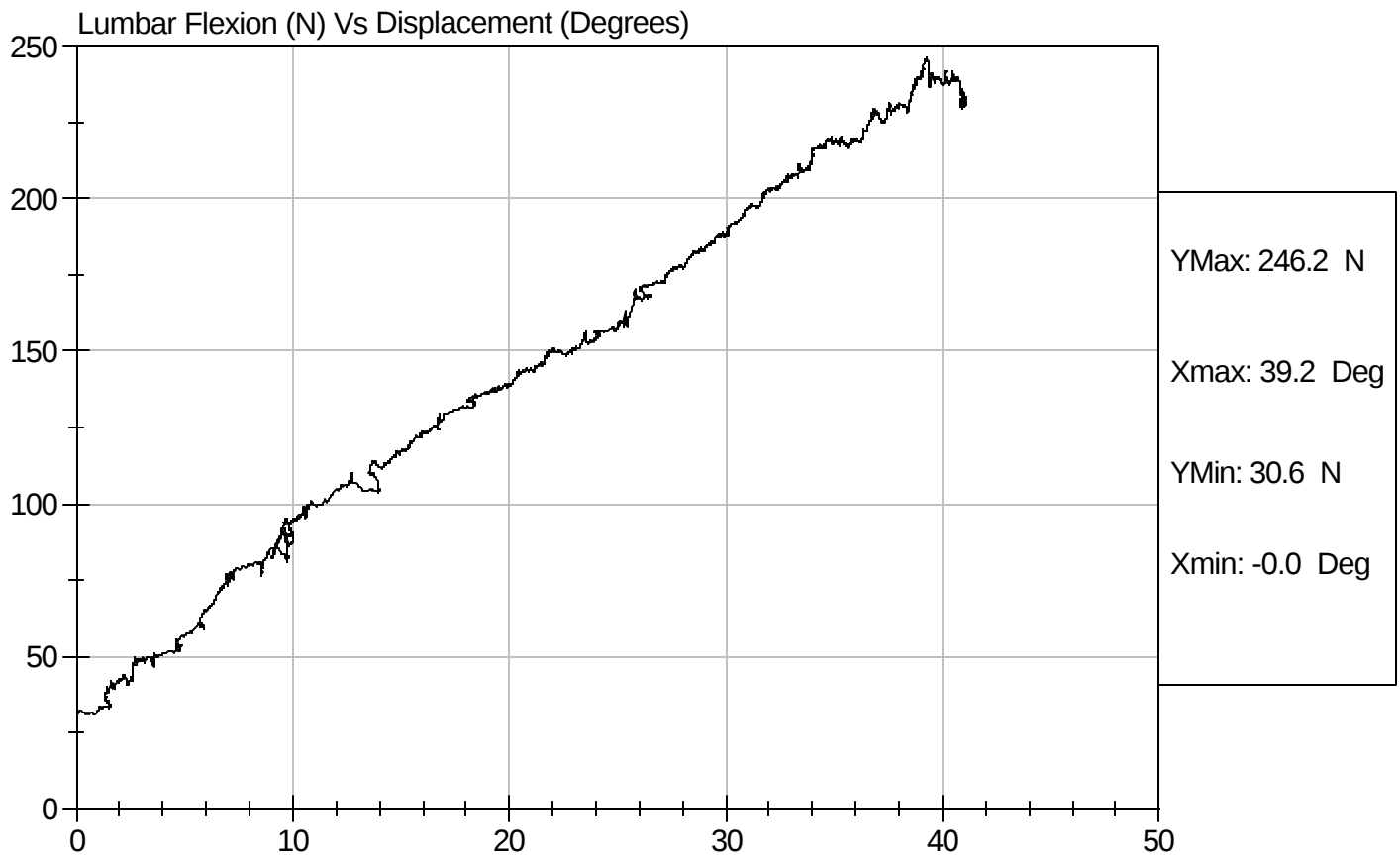


Test Description: Lumbar Flexion

Test Date: 12/21/07

Component: D073615

Speed: 0 ft/sec, 0 m/sec

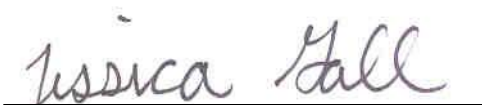


SID/HIII Calibration Data Sheet
Side Impact Dummy
Neck Pendulum Test

ATD Serial No: 904

Test I.D: D073619

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	17	Pass
Impact Velocity		m/s	6.89 to 7.13	6.96	Pass
Pendulum Deceleration	10 msec	m/s	1.96 to 2.55	2.51	Pass
	20 msec	m/s	4.12 to 5.10	4.78	Pass
	30 msec	m/s	5.73 to 7.01	6.51	Pass
	40 to 70 msec	m/s	6.27 to 7.64	6.56	Pass
Midsagittal Plane Max Rotation		deg	66 to 82	74	Pass
Head Rotation Peak to Zero - Decay Time		msec	58 to 67	58	Pass
Max. Mx at Occipital Condyles		Nm	73 to 88	74	Pass
Mx Peak To Zero - Decay Time		msec	49 to 64	52	Pass
Mx Peak to Max. Head Rotation		msec	2 to 16	7	Pass


 Laboratory Technician

12/17/07

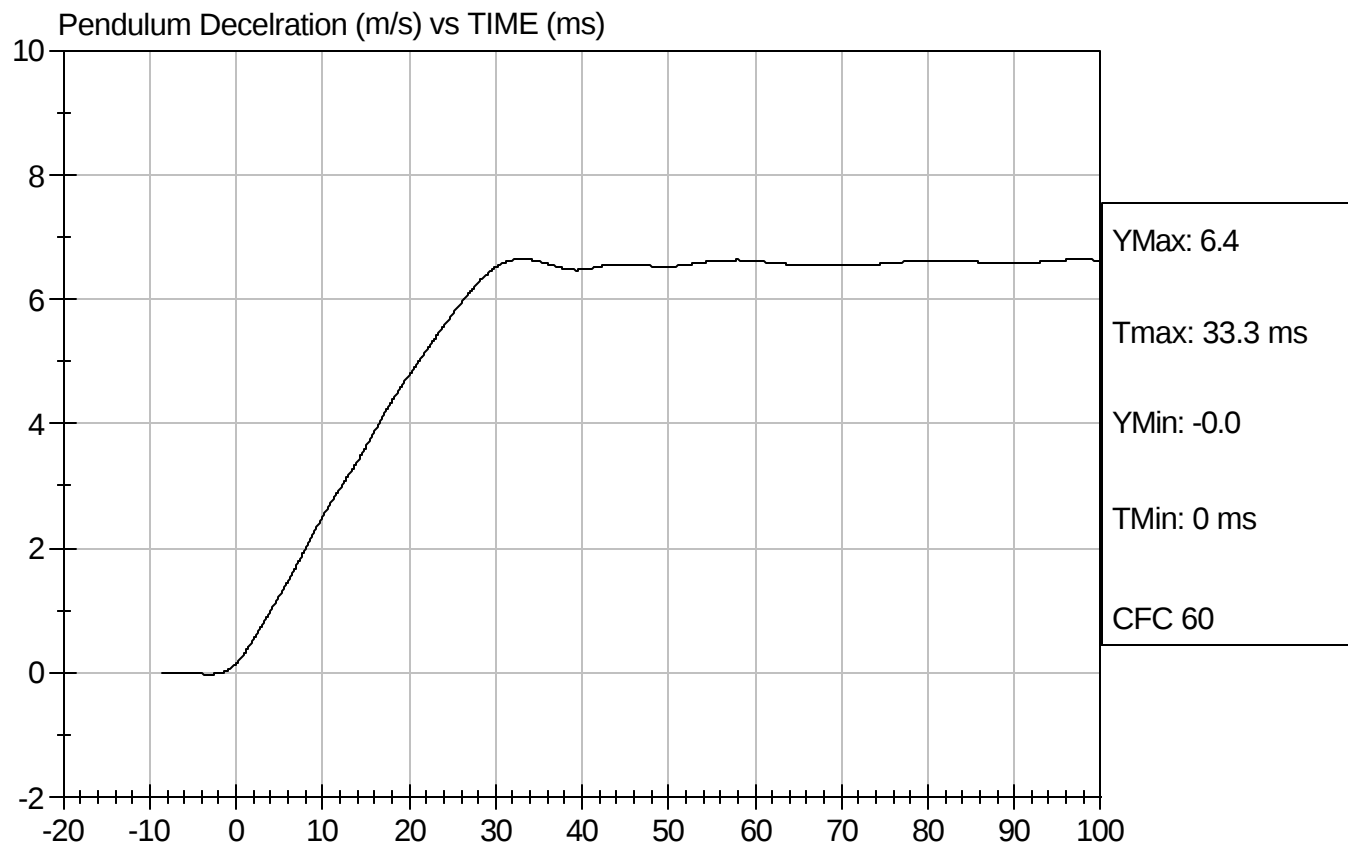
Test Date


 Approved By



Test Desc: Neck Bending
Component ID: D073619

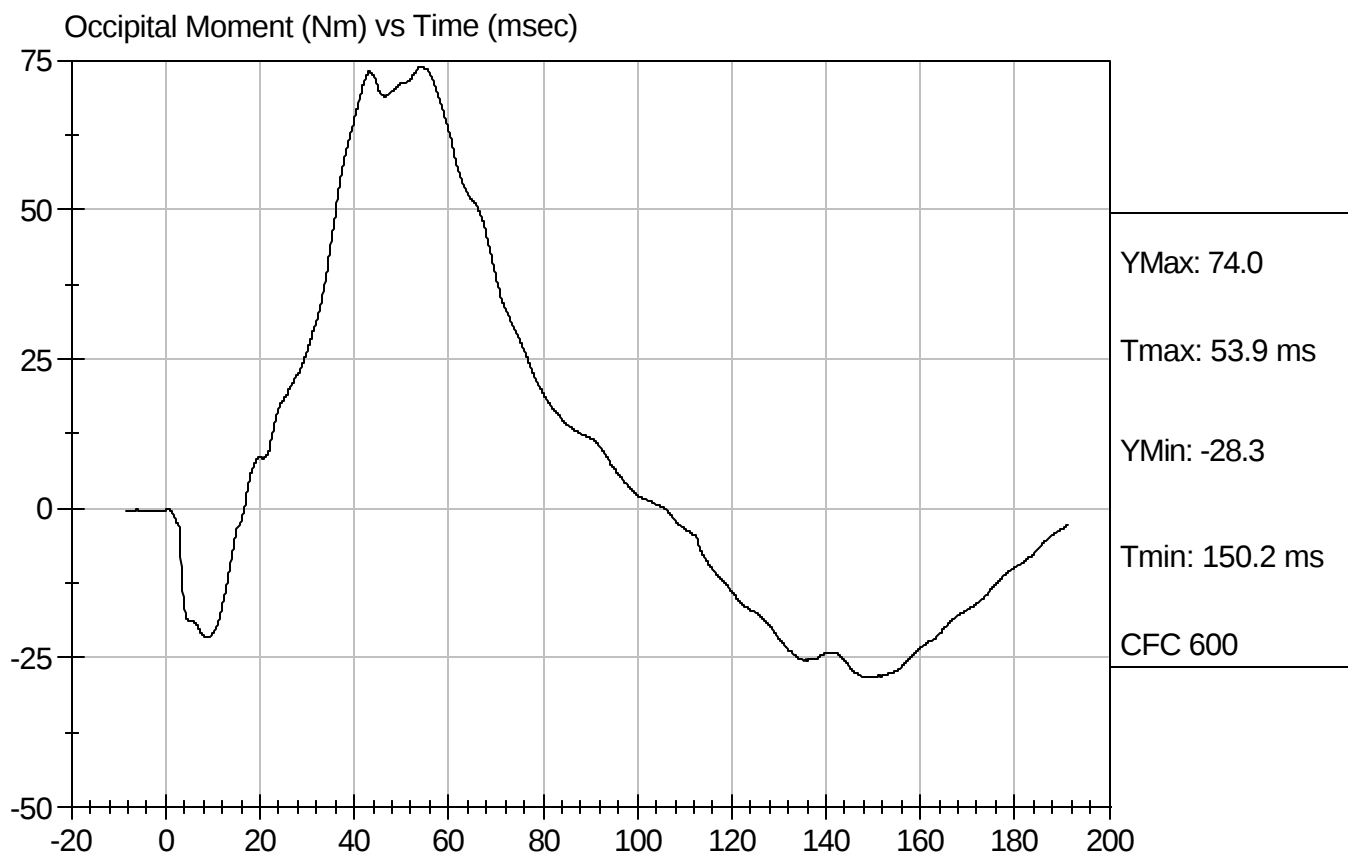
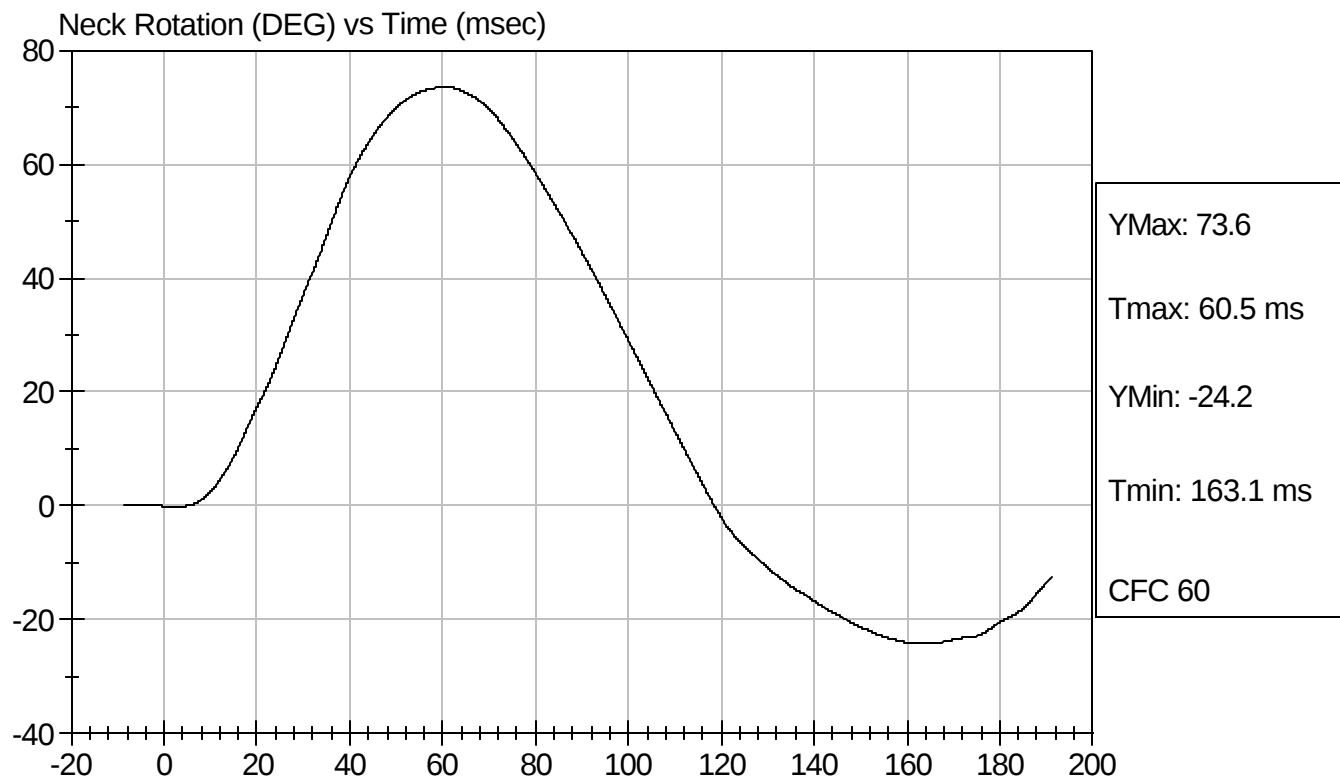
Test Date: 12/17/07
Speed: 22.83 ft/sec, 6.96 m/sec





Test Desc: Neck Bending
Component ID: D073619

Test Date: 12/17/07
Speed: 22.83 ft/sec, 6.96 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/HIII Calibration Data Sheet
Side Impact Dummy
Head Drop Calibration (Lateral)

ATD Serial No: 904

Test I.D: D073651

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	28	Pass
Peak Resultant Acceleration	G's	120 to 150	135	Pass
Is Resultant Curve Unimodal?	N/A	15% of peak	Yes	Pass
Peak Longitudnal Acceleration	G's	+/- 15	-9.2	Pass
Overall Test Results				Pass

Jessica Gall
Laboratory Technician

David Winkelbauer
Approved By

12/21/07

Test Date



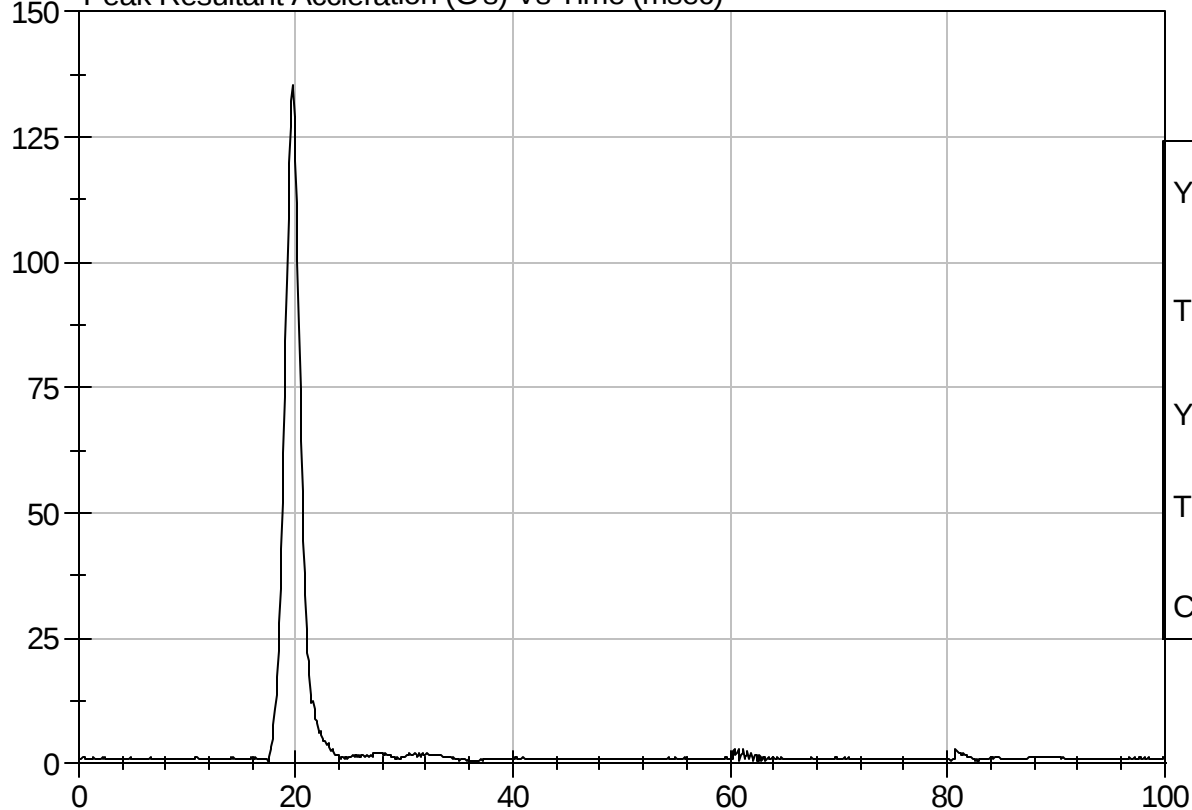
Test Description: Head Drop

Test Date: 12/21/07

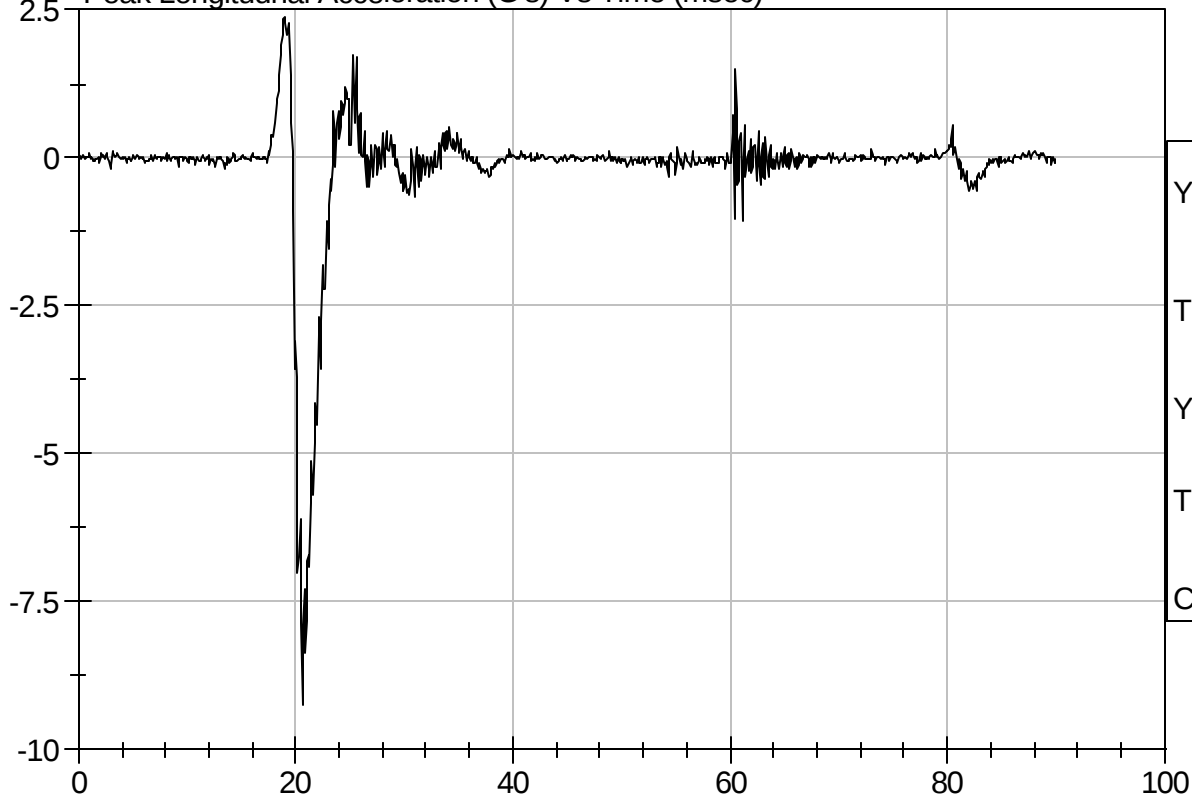
Component: D073651

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: 904

Test I.D: D073652

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Probe Velocity	m/s	4.22 - 4.31	4.27	Pass
Upper Rib	G's	37 - 46	40	Pass
Lower Rib	G's	37 - 46	39	Pass
Lower Spine	G's	15 - 22	21	Pass
Overall Test Results				Pass


Laboratory Technician

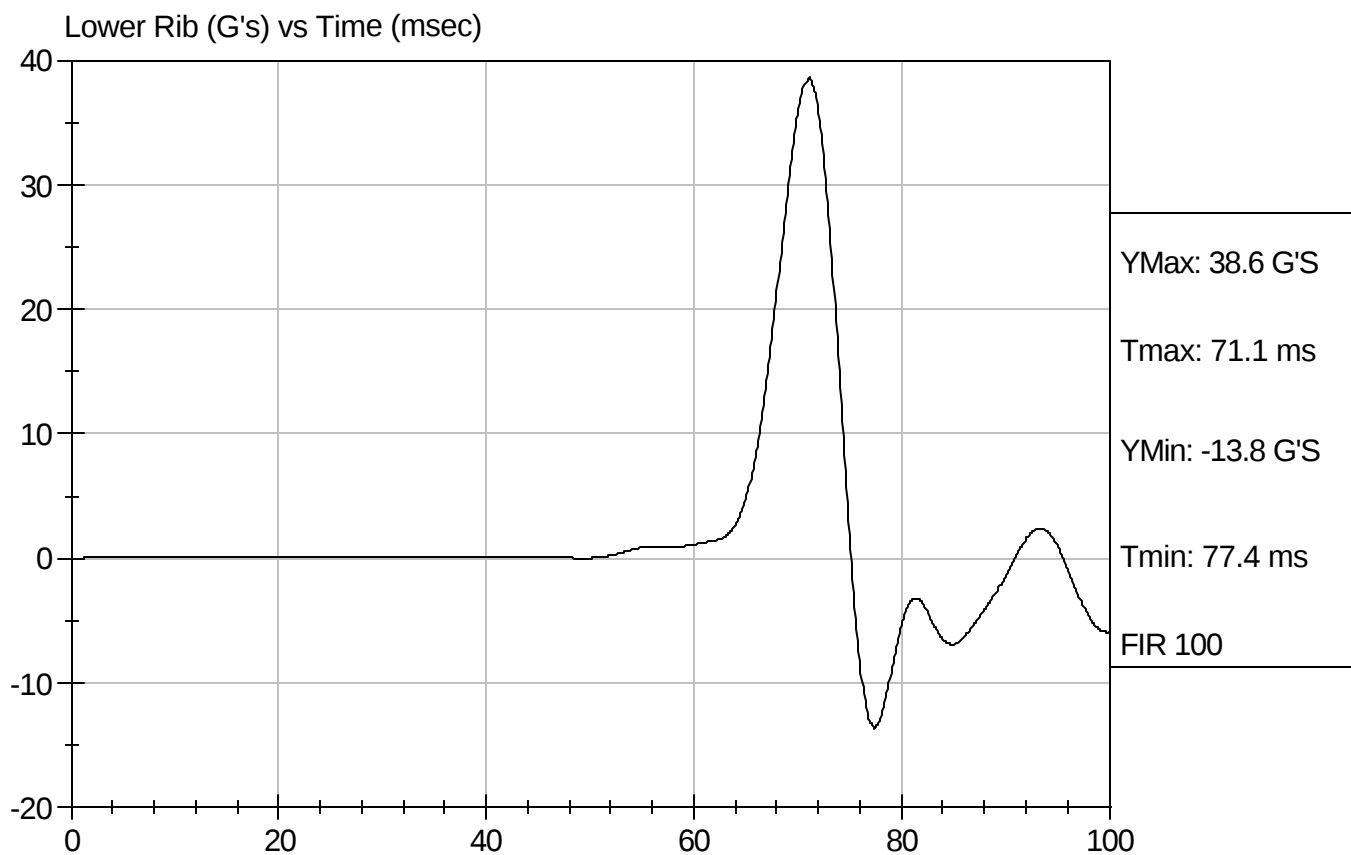
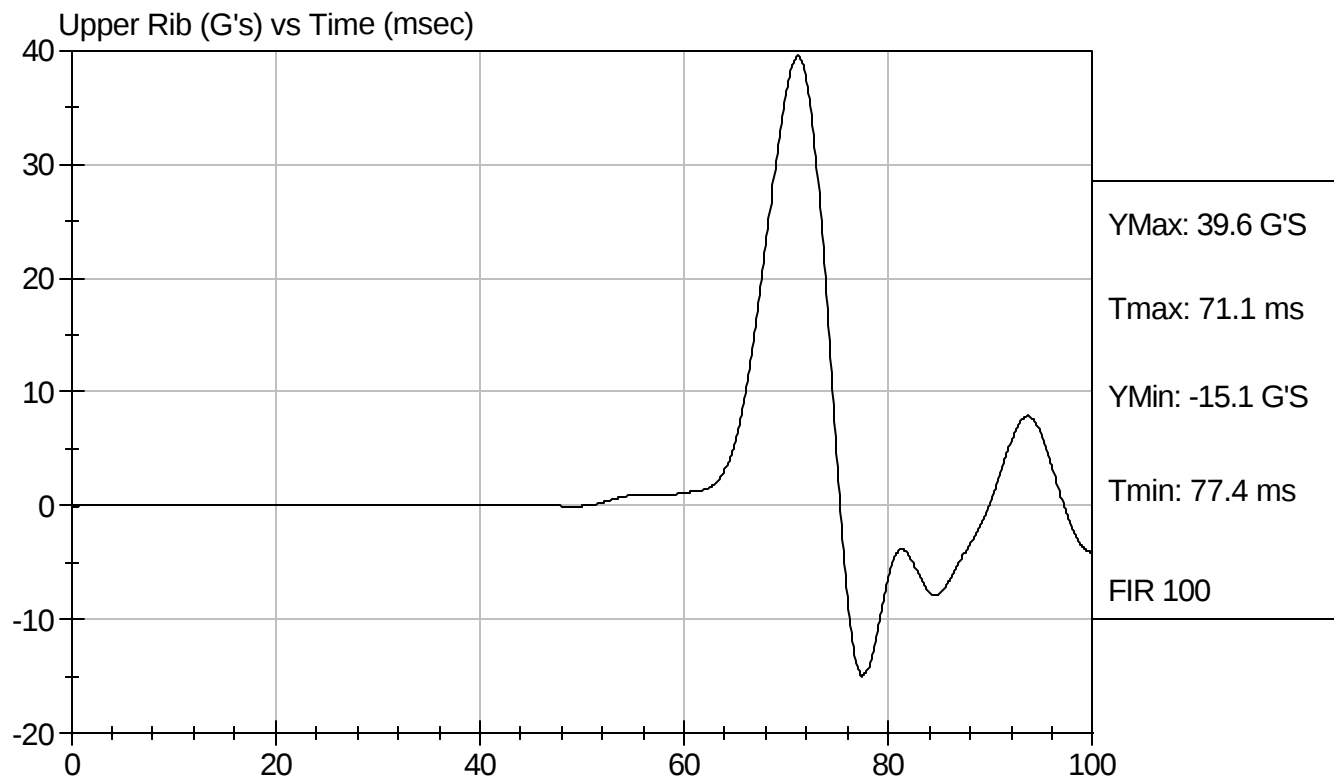

Approved By

12/21/07
Test Date



Test Desc: Thorax Impact
Component ID: D073652

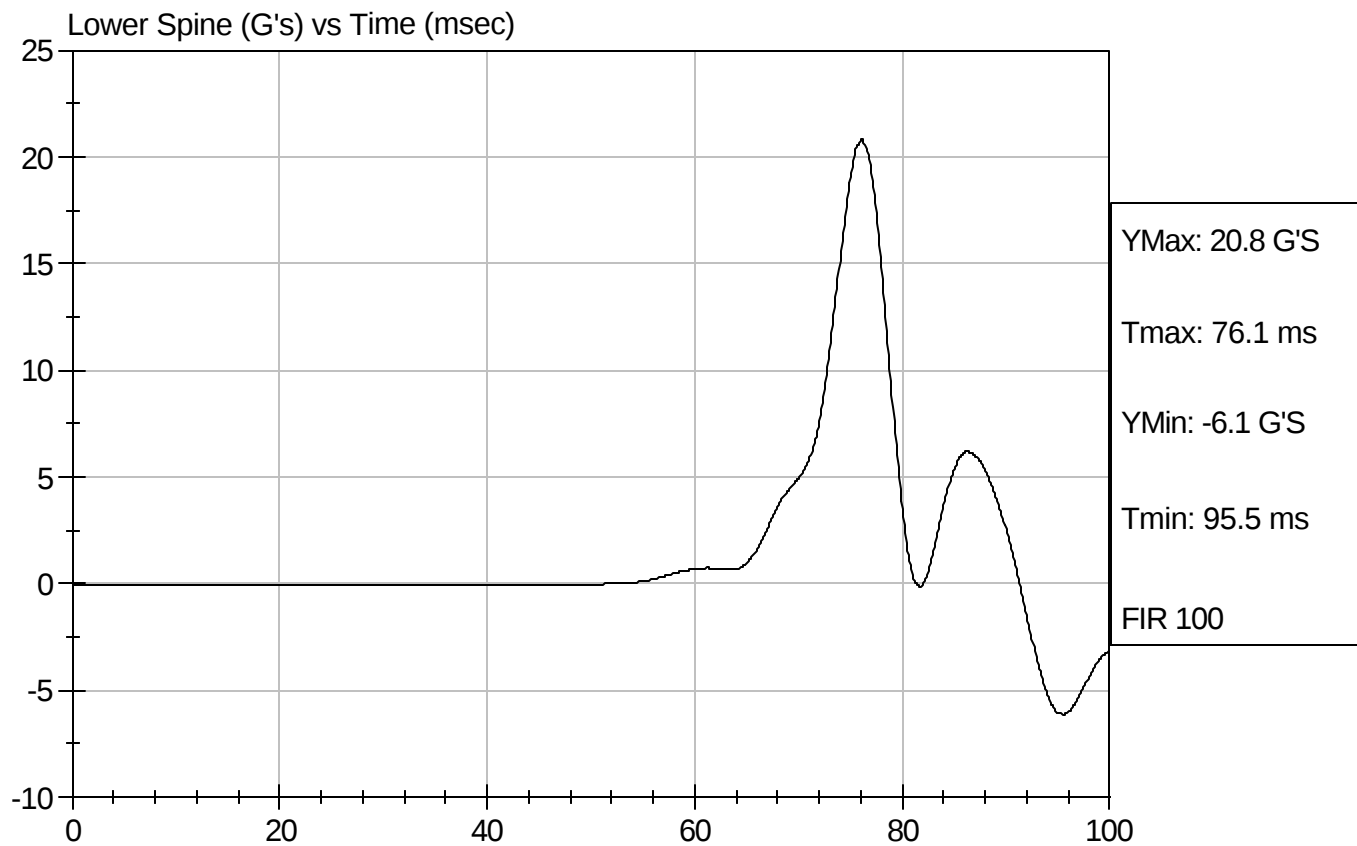
Test Date: 12/21/07
Speed: 14.00 ft/sec, 4.27 m/sec





Test Desc: Thorax Impact
Component ID: D073652

Test Date: 12/21/07
Speed: 14.00 ft/sec, 4.27 m/sec



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

ATD Serial No: 904

Test I.D: D073653

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Probe Velocity	m/s	4.27 - 4.33	4.30	Pass
Pelvis Acceleration	G's	40 - 60	42	Pass
Overall Test Results			Pass	

Jessica Gall
Laboratory Technician

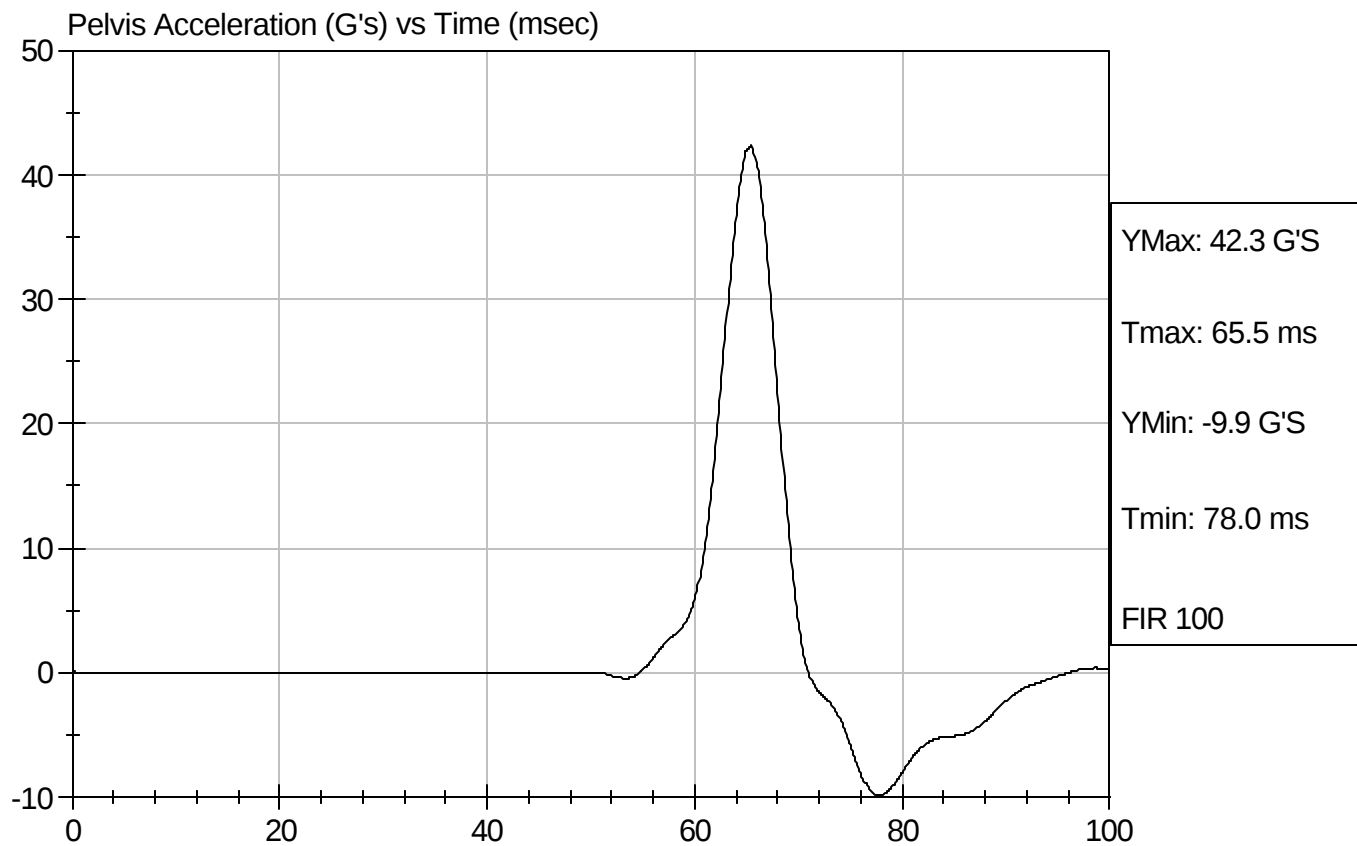
David Winkelbauer
Approved By

12/21/07
Test Date



Test Desc: Pelvis Impact
Component ID: D073653

Test Date: 12/21/07
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: 904

Test I.D: D073654

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	28	Pass
Force At 12.7 mm	N	104 -162	145	Pass
Force At 19 mm	N	163 - 222	205	Pass
Force At 25.4 mm	N	222 - 280	275	Pass
Force At 33 mm	N	325 - 391	367	Pass
Overall Test Results				Pass

Jessica Gall
Laboratory Technician

David Winkelbauer
Approved By

12/21/07

Test Date

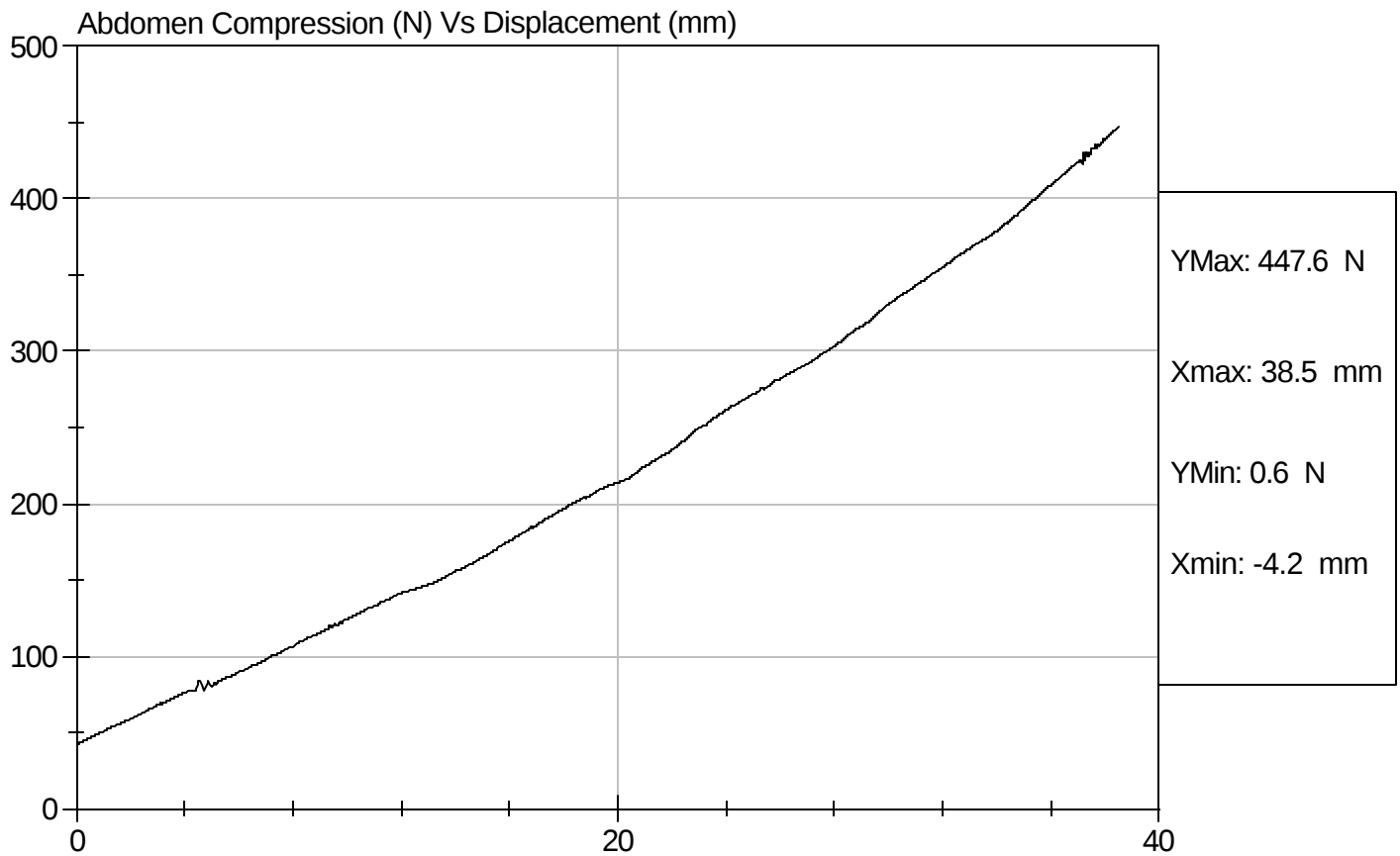


Test Description: Abdomen Compression

Test Date: 12/21/07

Component: D073654

Speed: 0 ft/sec, 0 m/sec



SID Calibration Data Sheet
Side Impact Dummy
Lumbar Flexion Calibration

ATD Serial No: 904

Test I.D: D073655

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	28	Pass
Force At 0 deg	N	0 - 26.7	0	Pass
Force At 20 deg	N	97.9 - 151.2	120.3	Pass
Force At 30 deg	N	151.2 - 204.6	173.6	Pass
Force At 40 deg	N	204.6 - 258.0	210.7	Pass
Return Angle	Deg	12 Maximum	7	Pass
Overall Test Results			Pass	


Laboratory Technician


Approved By

12/21/07

Test Date

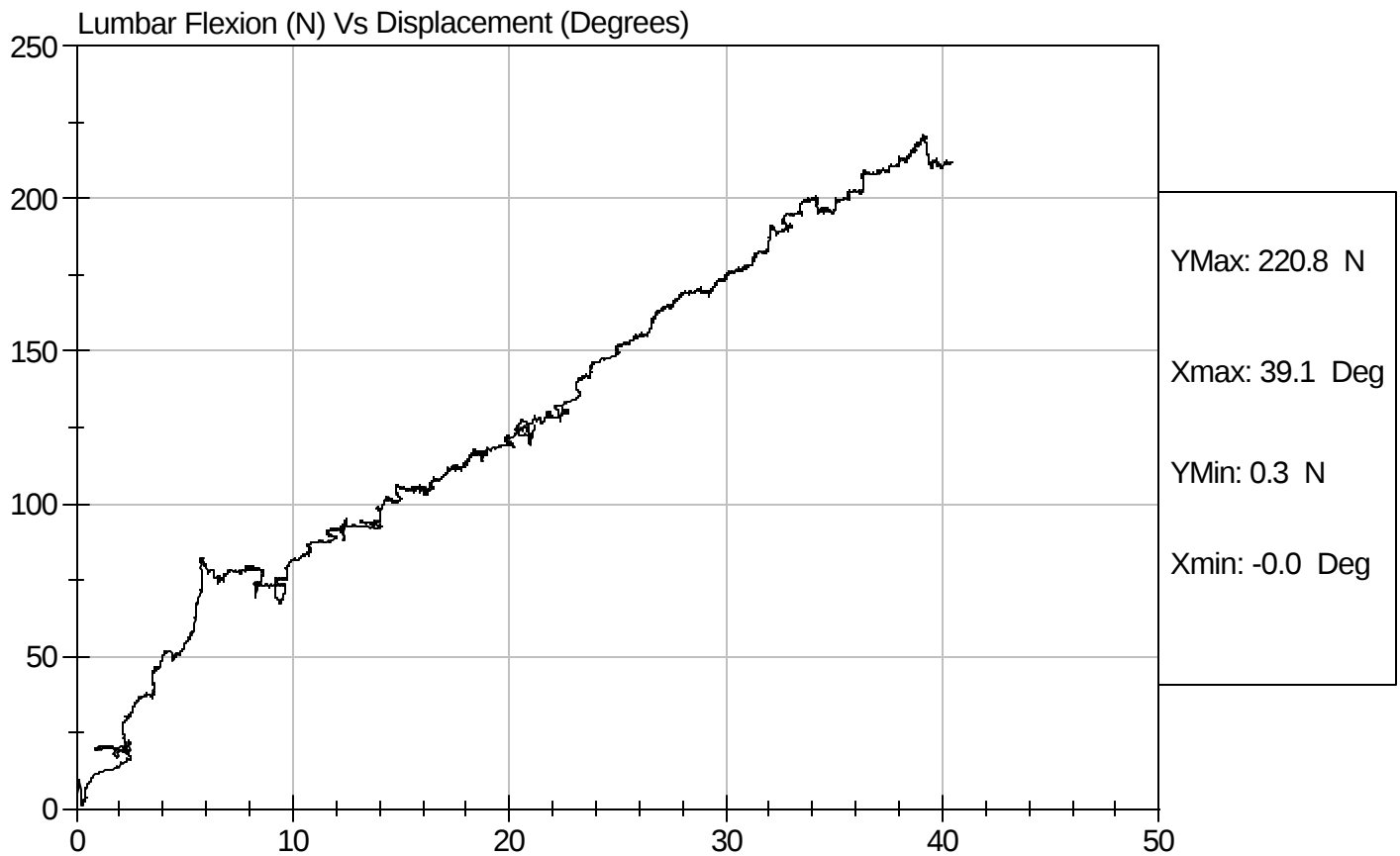


Test Description: Lumbar Flexion

Test Date: 12/21/07

Component: D073655

Speed: 0 ft/sec, 0 m/sec



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

ATD Serial No: 904

Test I.D: D073659

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity		%	10 to 70	29	Pass
Impact Velocity		m/s	6.89 to 7.13	6.96	Pass
Pendulum Deceleration	10 msec	m/s	1.96 to 2.55	2.50	Pass
	20 msec	m/s	4.12 to 5.10	4.79	Pass
	30 msec	m/s	5.73 to 7.01	6.52	Pass
	40 to 70 msec	m/s	6.27 to 7.64	6.53	Pass
Midsagittal Plane Max Rotation		deg	66 to 82	75	Pass
Head Rotation Peak to Zero - Decay Time		msec	58 to 67	59	Pass
Max. Mx at Occipital Condyles		Nm	73 to 88	78	Pass
Mx Peak To Zero - Decay Time		msec	49 to 64	51	Pass
Mx Peak to Max. Head Rotation		msec	2 to 16	7	Pass


 Laboratory Technician

12/21/07

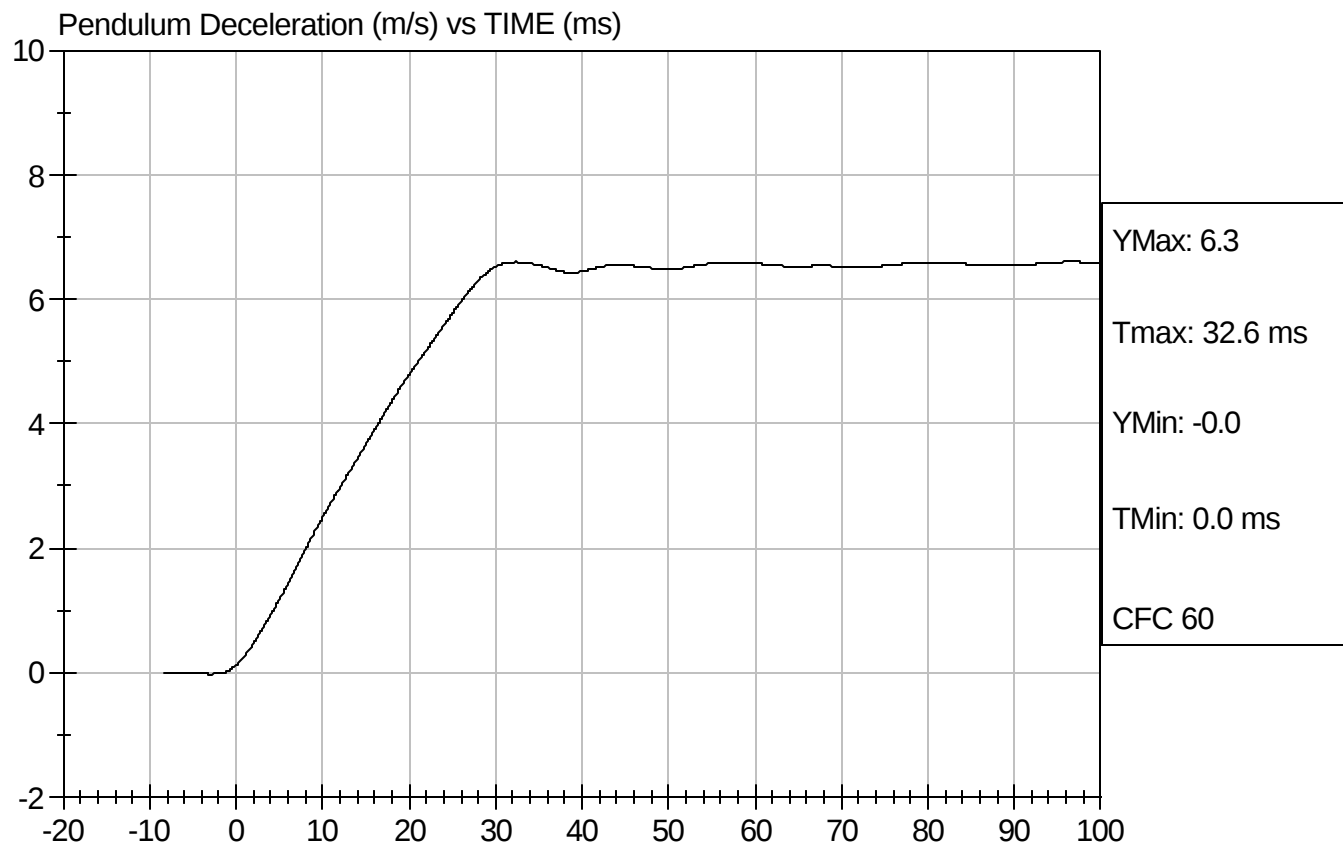
Test Date


 Approved By



Test Desc: Neck Bending
Component ID: D073659

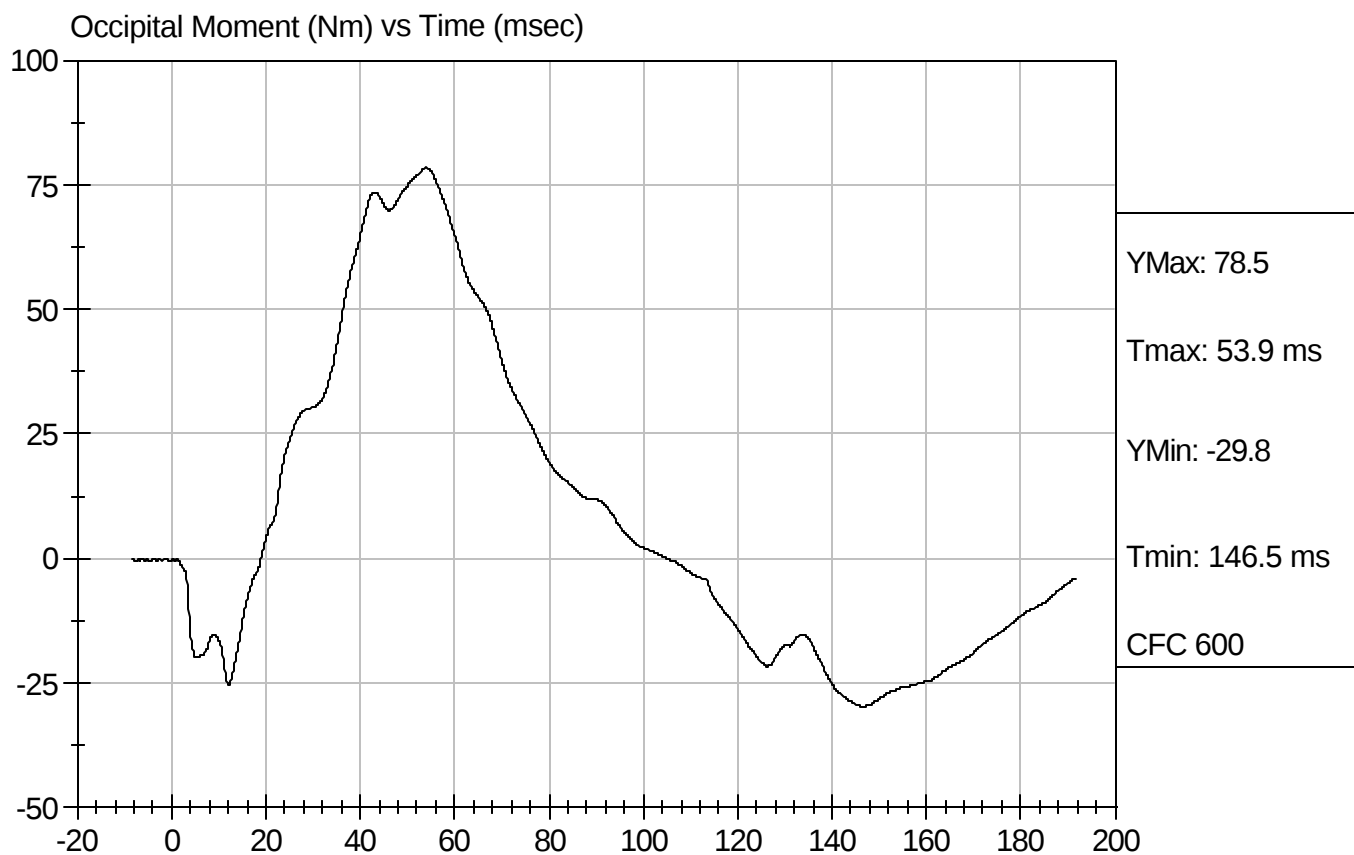
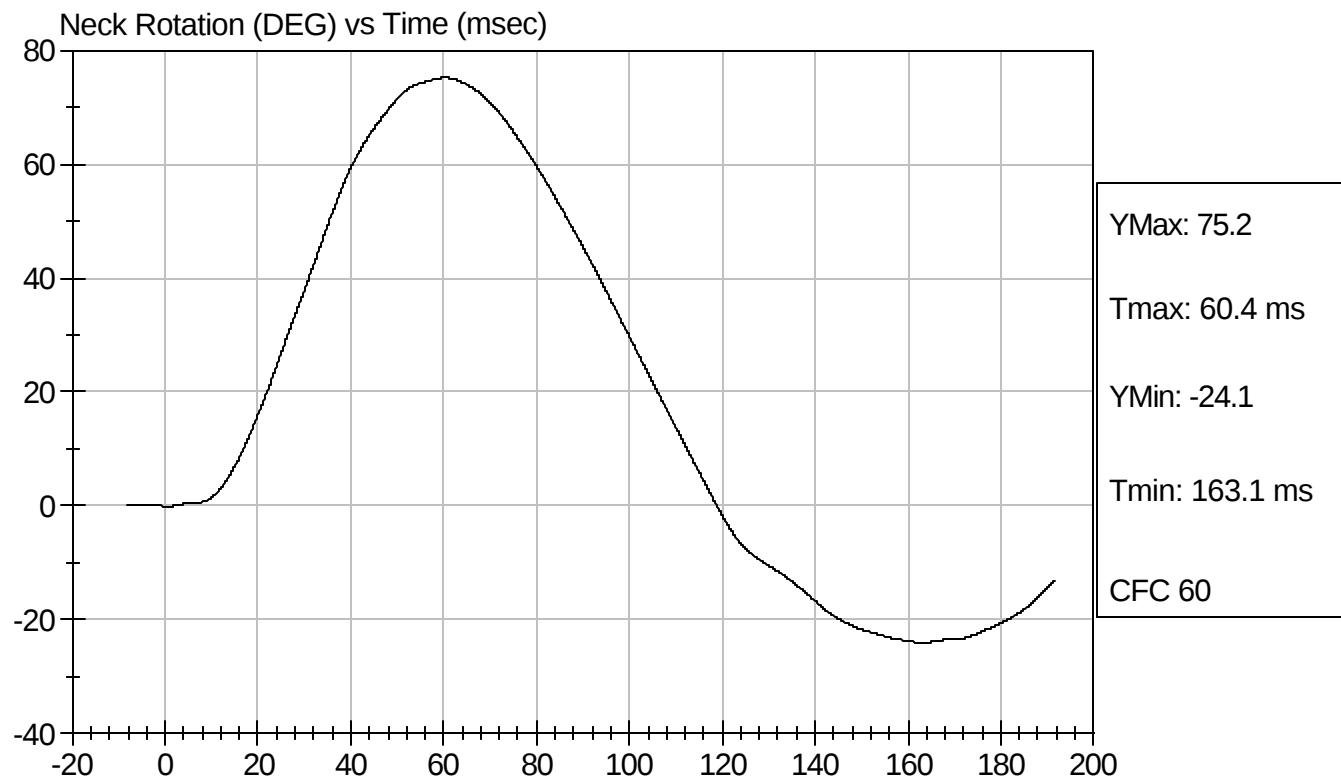
Test Date: 12/21/07
Speed: 22.83 ft/sec, 6.96 m/sec





Test Desc: Neck Bending
Component ID: D073659

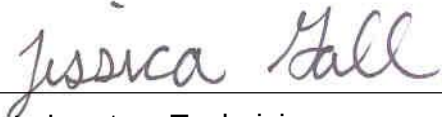
Test Date: 12/21/07
Speed: 22.83 ft/sec, 6.96 m/sec



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

12/21/2007
Test Date

APPENDIX D
CHILD DUMMY DATA

SUMMARY OF TEST

Measurement Description	Units	Threshold	P3 ATD
Head Injury Criteria (HIC36)	N/A	N/A	35
Head Injury Criteria (HIC15)	N/A	390	16
Max. Thorax Accel. (3msec Clip)	G's	50	12

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	550.7	682.7	
Right	kg	541.6	679.0	
Ratio	%	44.5	55.5	
Totals	kg	1092.3	1361.7	2454.0

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

TEST NOTES

None

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

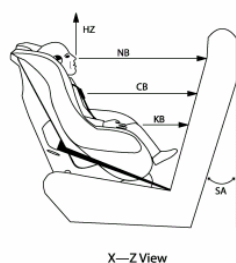
VISIBLE DUMMY CONTACT POINTS

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

CHILD DUMMY POSITIONING IN VEHICLE

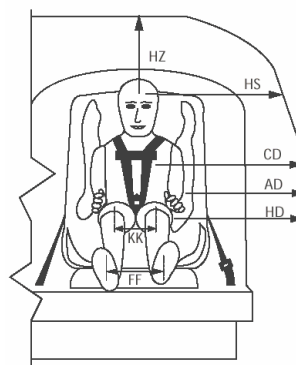
Child Restraint System (Position 3)	Graco Snugride (Rear Facing)
NHTSA No.	M80505

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)	1.8	1.8
HS	375	425
CD	361	366
AD	248	257
HD	293	306
HZ	403	426
NB	565	563
CB	464	480
KK	102	112
FF	93	136
KB - LEFT	164	194
KB - RIGHT	167	197
TB - LEFT	35	51
TB - RIGHT	51	152

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

CRS PERFORMANCE DATA

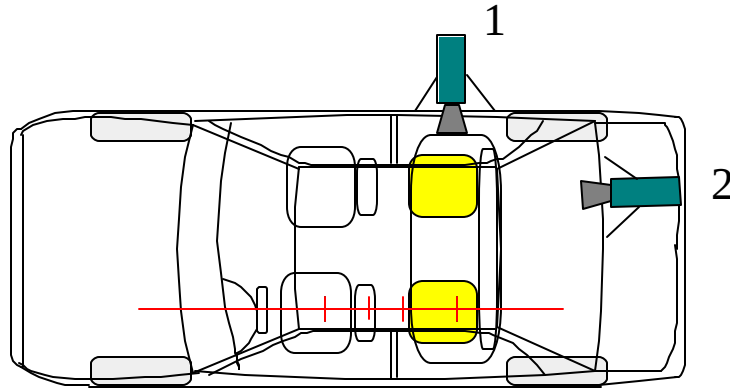
Child Restraint System (Position 3)	Graco Snugride (Rear Facing)
NHTSA No.	M80505

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.	M80505



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					10	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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Figure No. 11.	Post-Test Position 3 Feet Contact	D-13



Pre-Test Front View of Position 3 CRS



Post-Test Front View of Position 3 CRS



Pre-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



Post-Test Position 3 Feet Contact

CHILD DUMMY RESPONSE DATA TRACES

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Figure No. 15.	RRP Child Head Resultant Acceleration vs. Time	D-15
Figure No. 16.	RRP Child Neck X Force vs. Time	D-16
Figure No. 17.	RRP Child Neck Y Force vs. Time	D-16
Figure No. 18.	RRP Child Neck Z Force vs. Time	D-16
Figure No. 19.	RRP Child Neck Resultant Force vs. Time	D-16
Figure No. 20.	RRP Child Neck X Moment vs. Time	D-17
Figure No. 21.	RRP Child Neck Y Moment vs. Time	D-17
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Figure No. 24.	RRP Child Chest X Acceleration vs. Time	D-18
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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

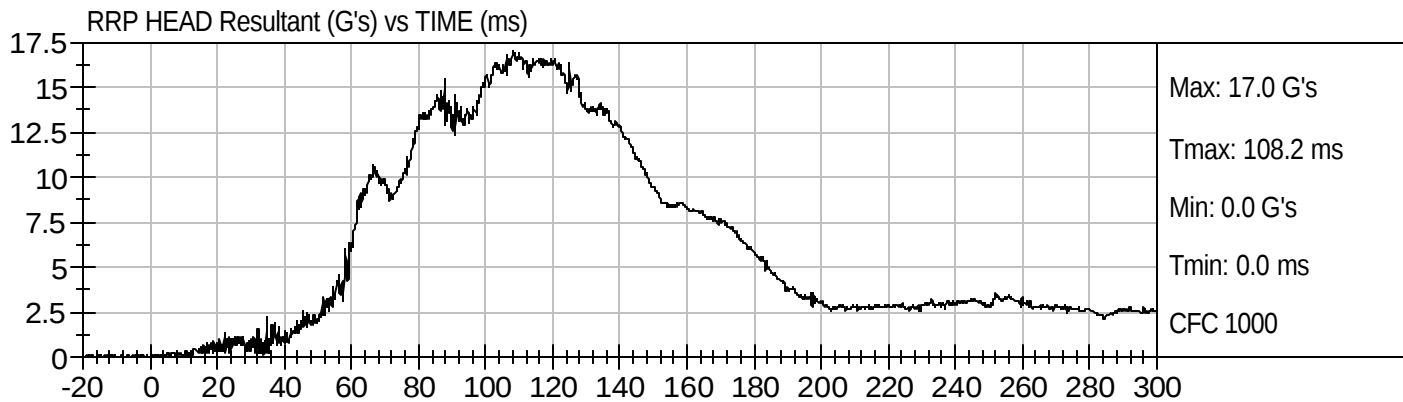
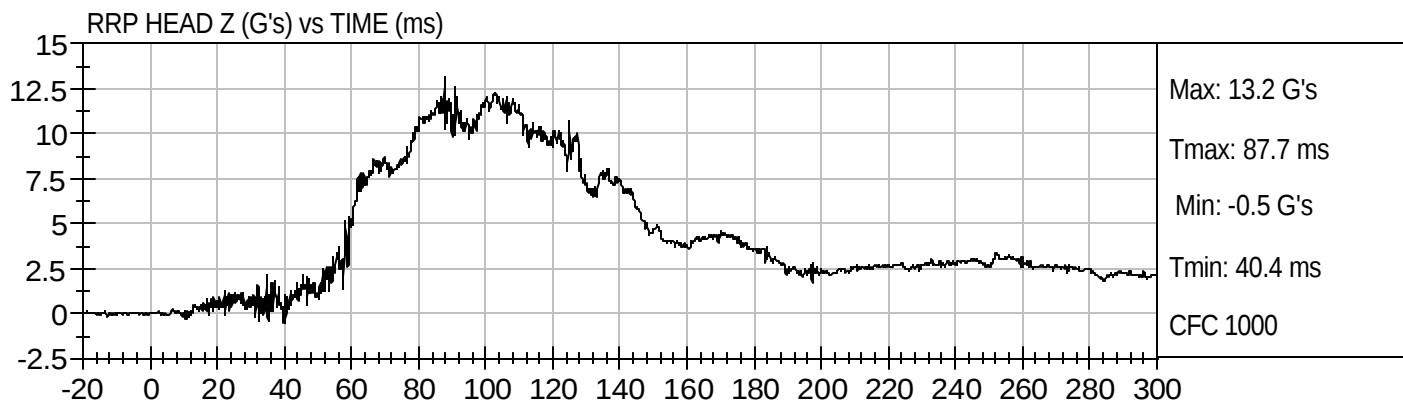
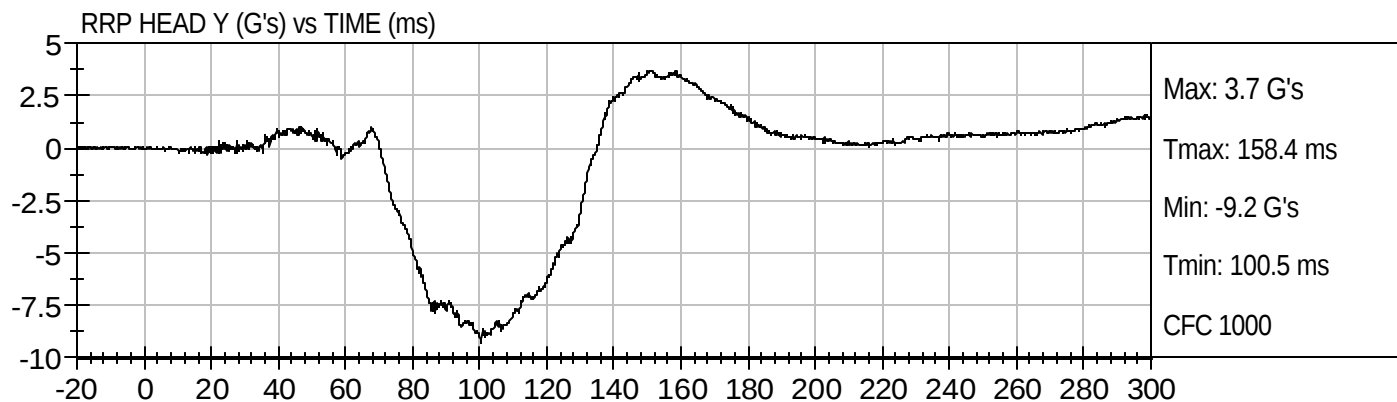
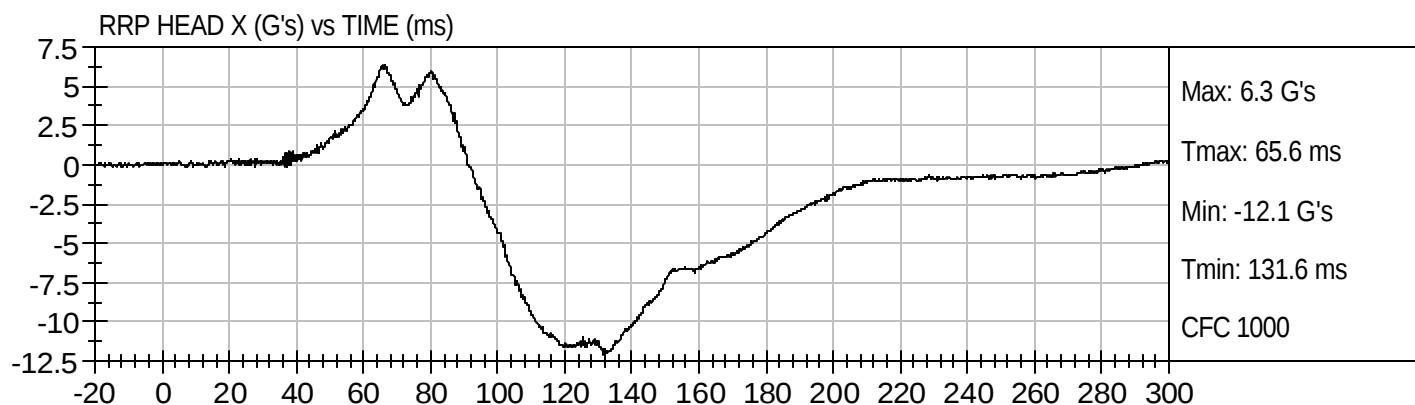
RRP Child Seat Z Acceleration vs. Time

RRP Child Seat Resultant Acceleration vs. Time



NCAP LEFT SIDE
2008 BMW X5 M80505

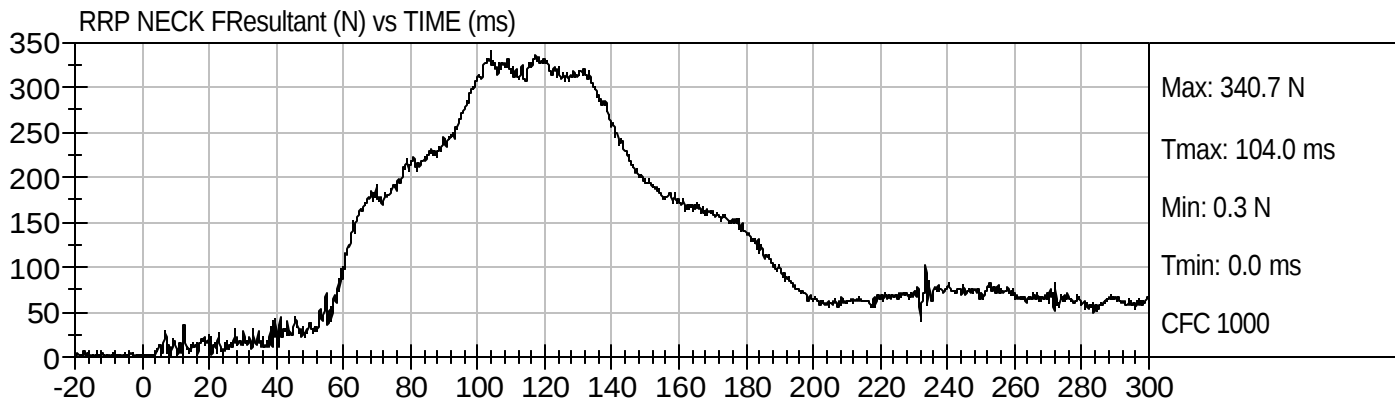
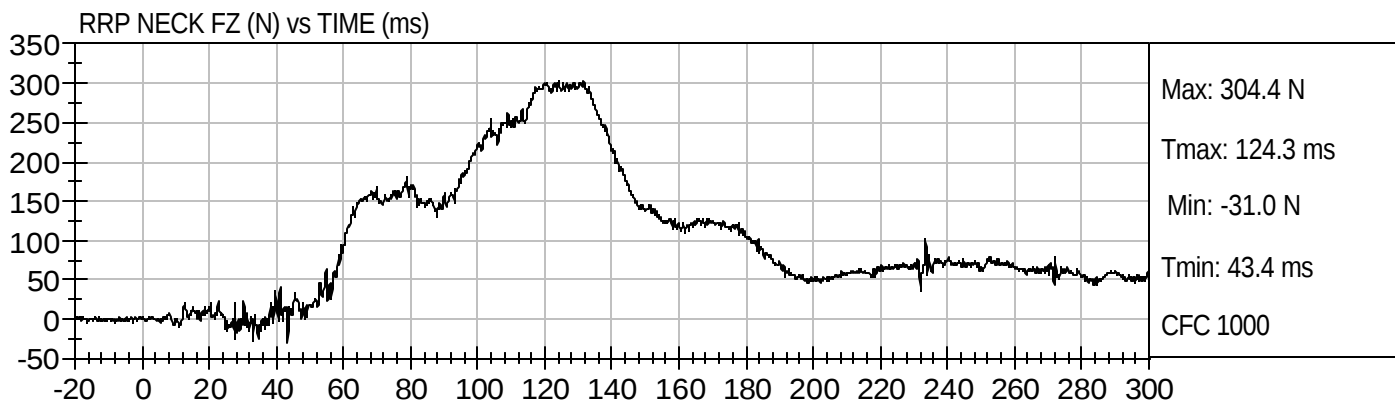
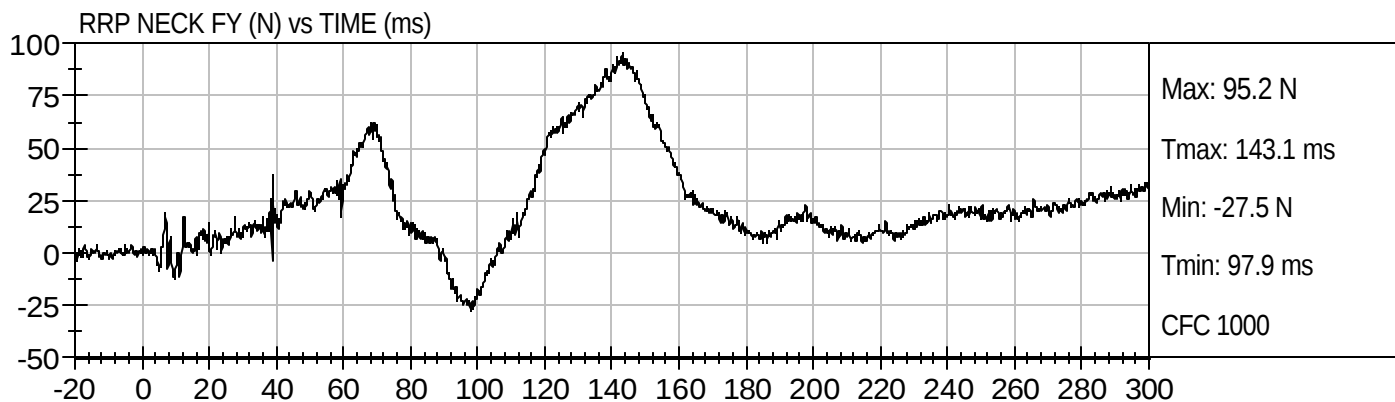
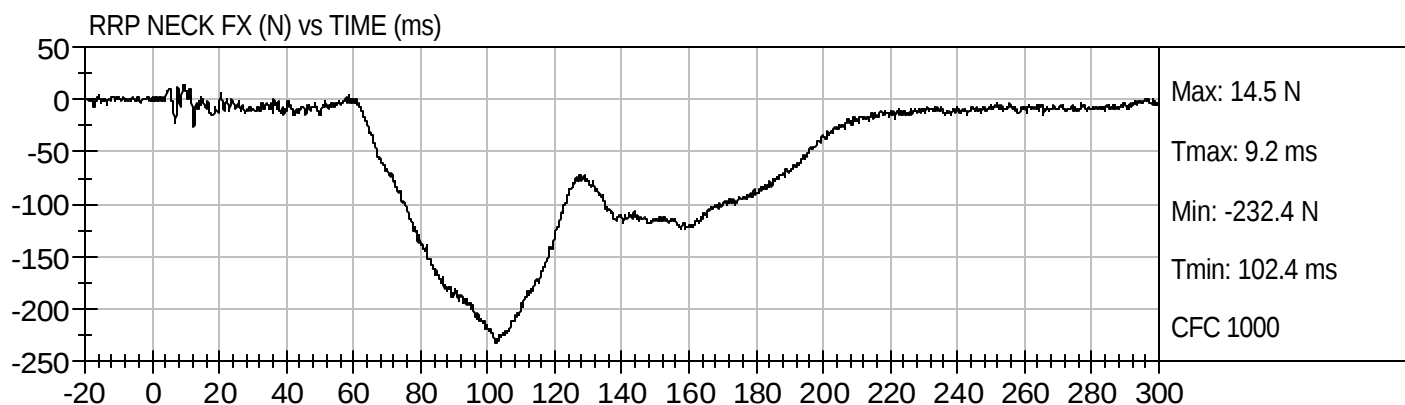
Test Date: 12/20/2007
Speed: 38.6 mph (62.1 km/h)





NCAP LEFT SIDE
2008 BMW X5 M80505

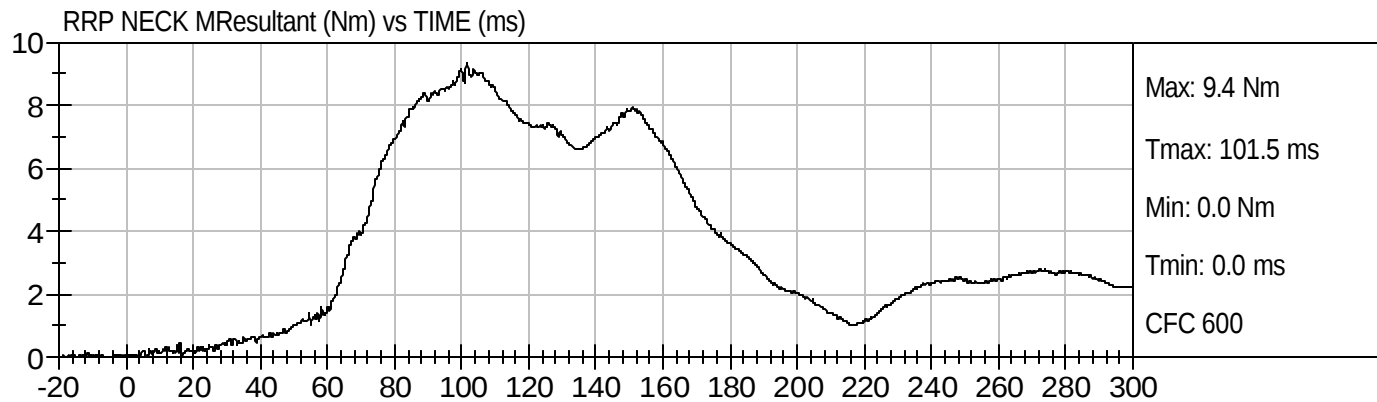
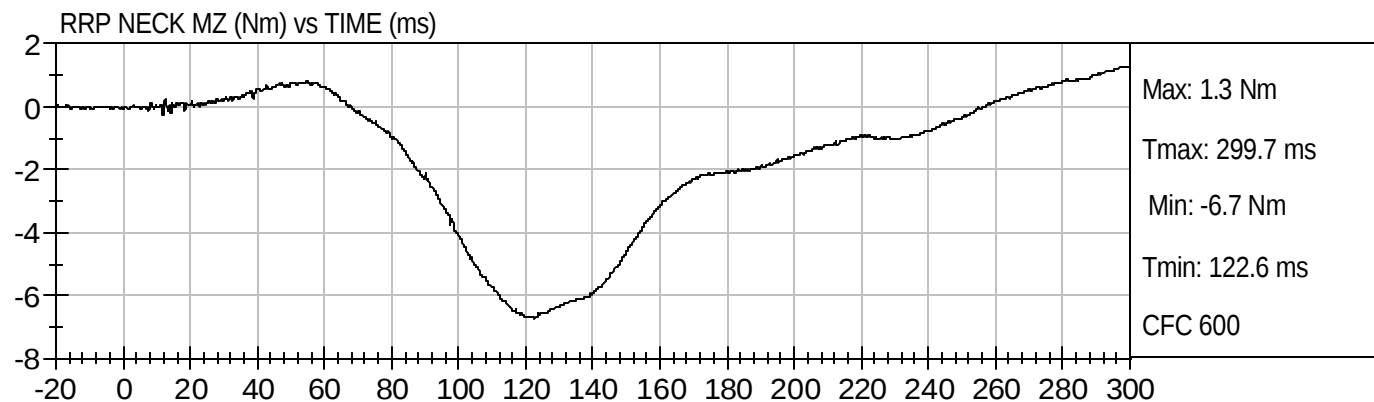
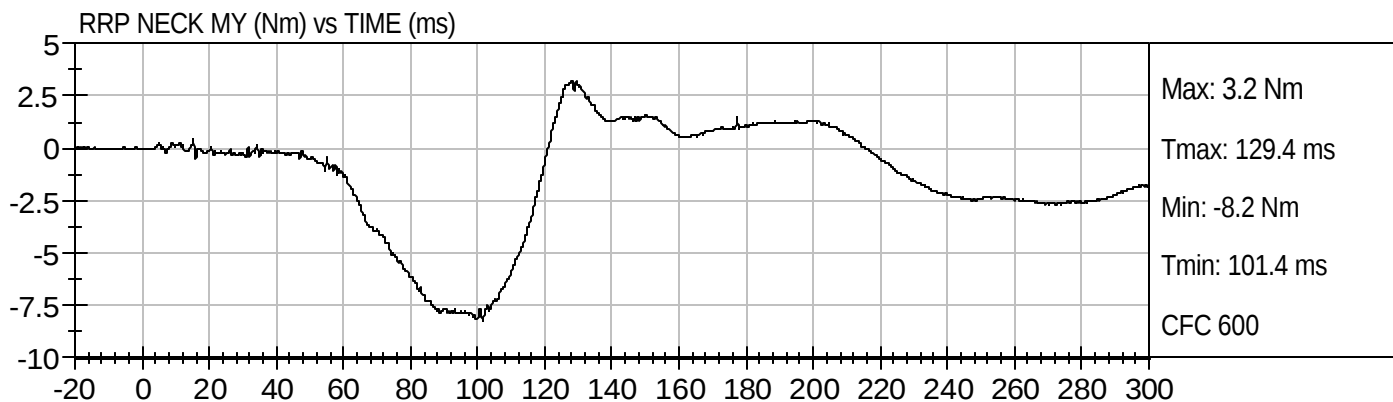
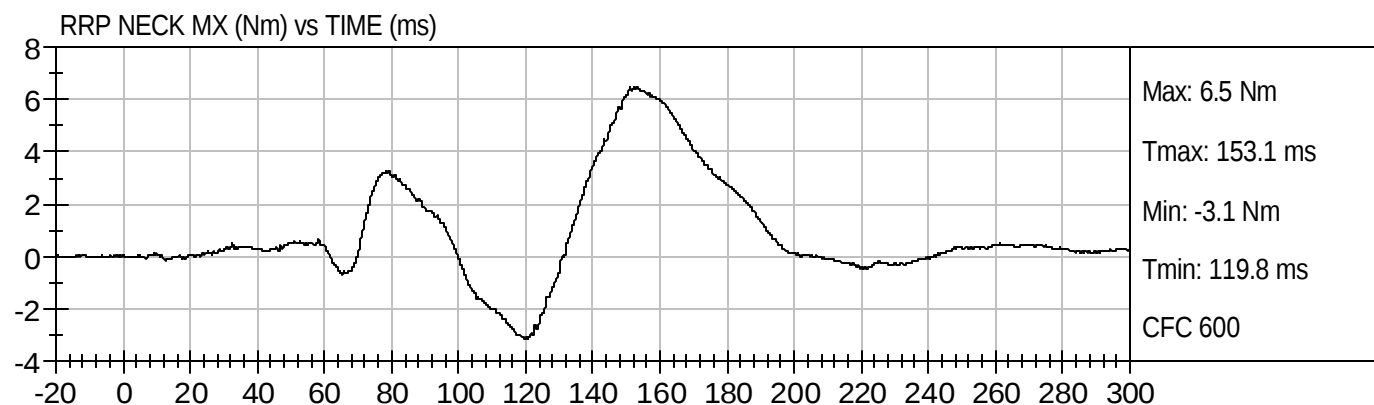
Test Date: 12/20/2007
Speed: 38.6 mph (62.1 km/h)





NCAP LEFT SIDE
2008 BMW X5 M80505

Test Date: 12/20/2007
Speed: 38.6 mph (62.1 km/h)

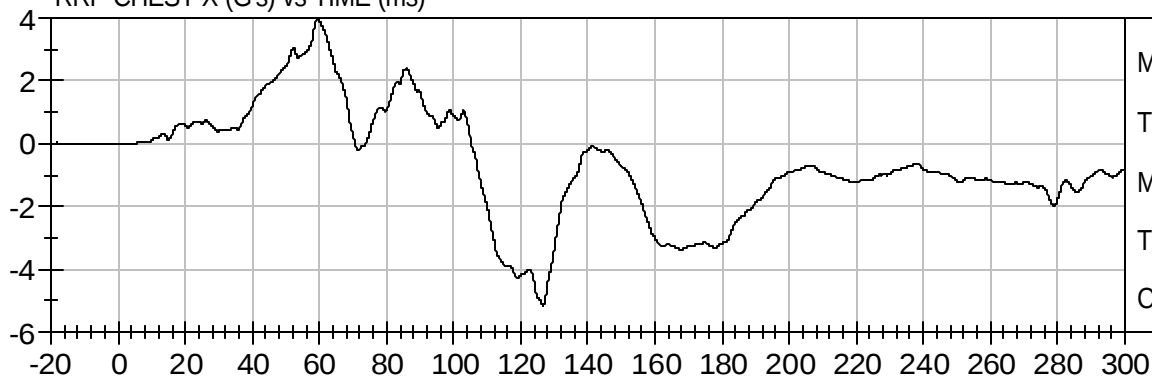




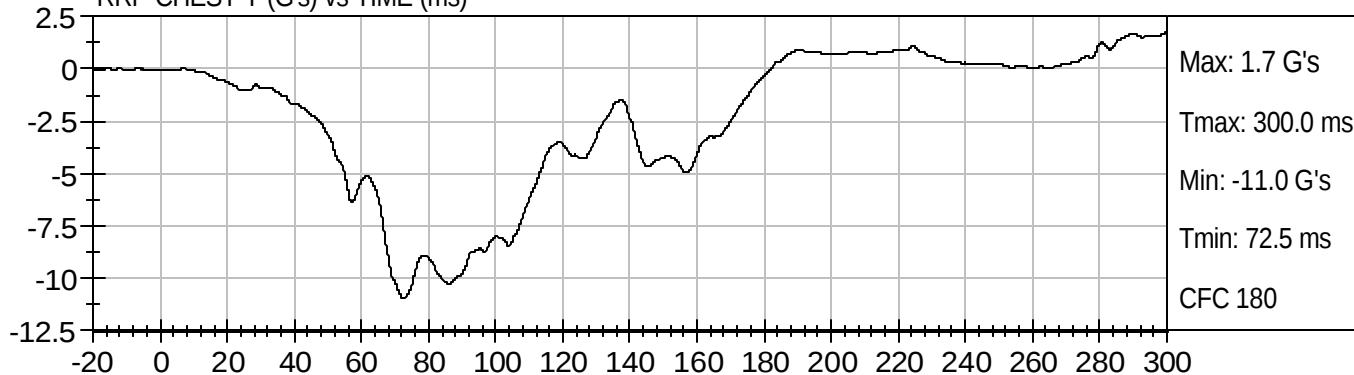
NCAP LEFT SIDE
2008 BMW X5 M80505

Test Date: 12/20/2007
Speed: 38.6 mph (62.1 km/h)

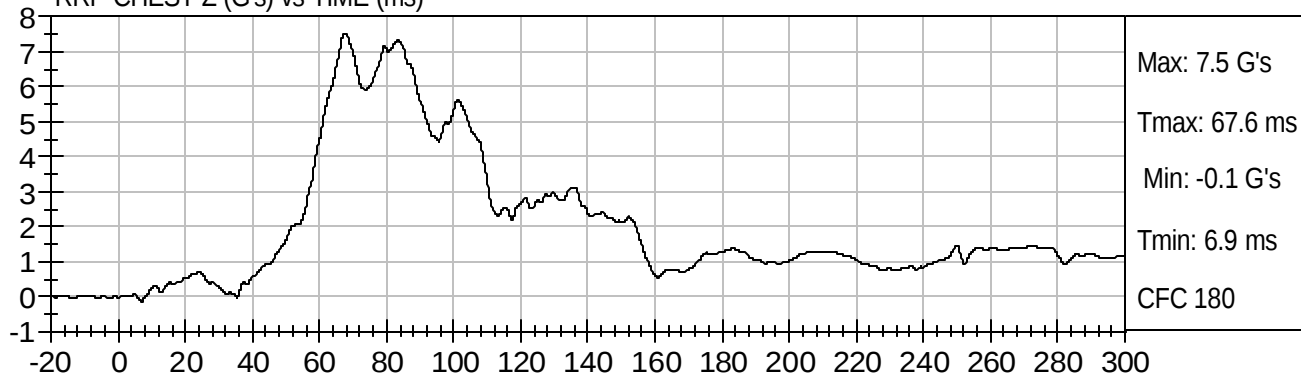
RRP CHEST X (G's) vs TIME (ms)



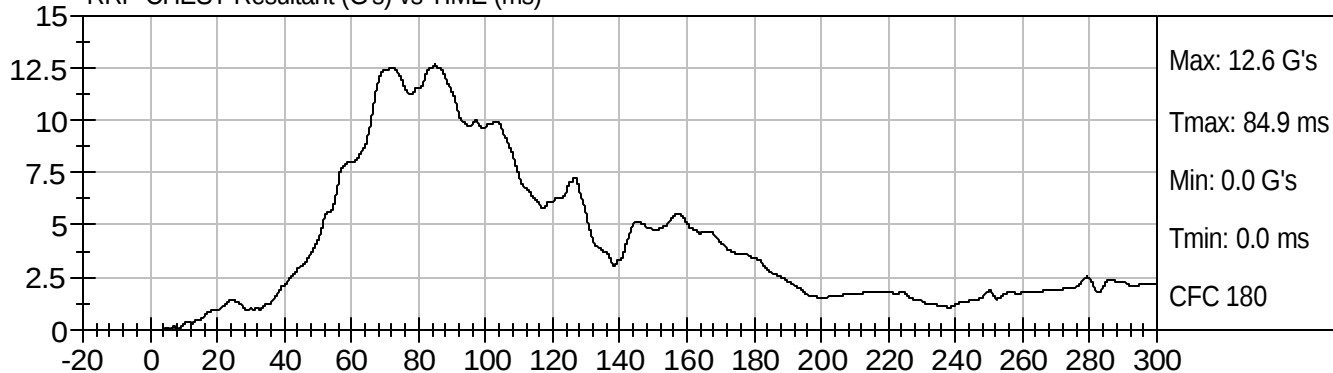
RRP CHEST Y (G's) vs TIME (ms)



RRP CHEST Z (G's) vs TIME (ms)



RRP CHEST Resultant (G's) vs TIME (ms)



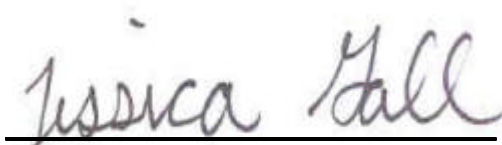
CHILD DUMMY CALIBRATION INFORMATION

MGA RESEARCH CORPORATION
FRONT HEAD DROP TEST
CRABI 12 MONTH

ATD Serial No: 093

Test ID: D073561

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	25	Pass
Peak Resultant Acceleration	G's	100 to 120	106	Pass
Peak Lateral Acceleration	G's	+/- 15	-2	Pass
Unimodal	N/A	within 17% of peak	Yes	Pass
Overall Test Results				Pass


Laboratory Technician

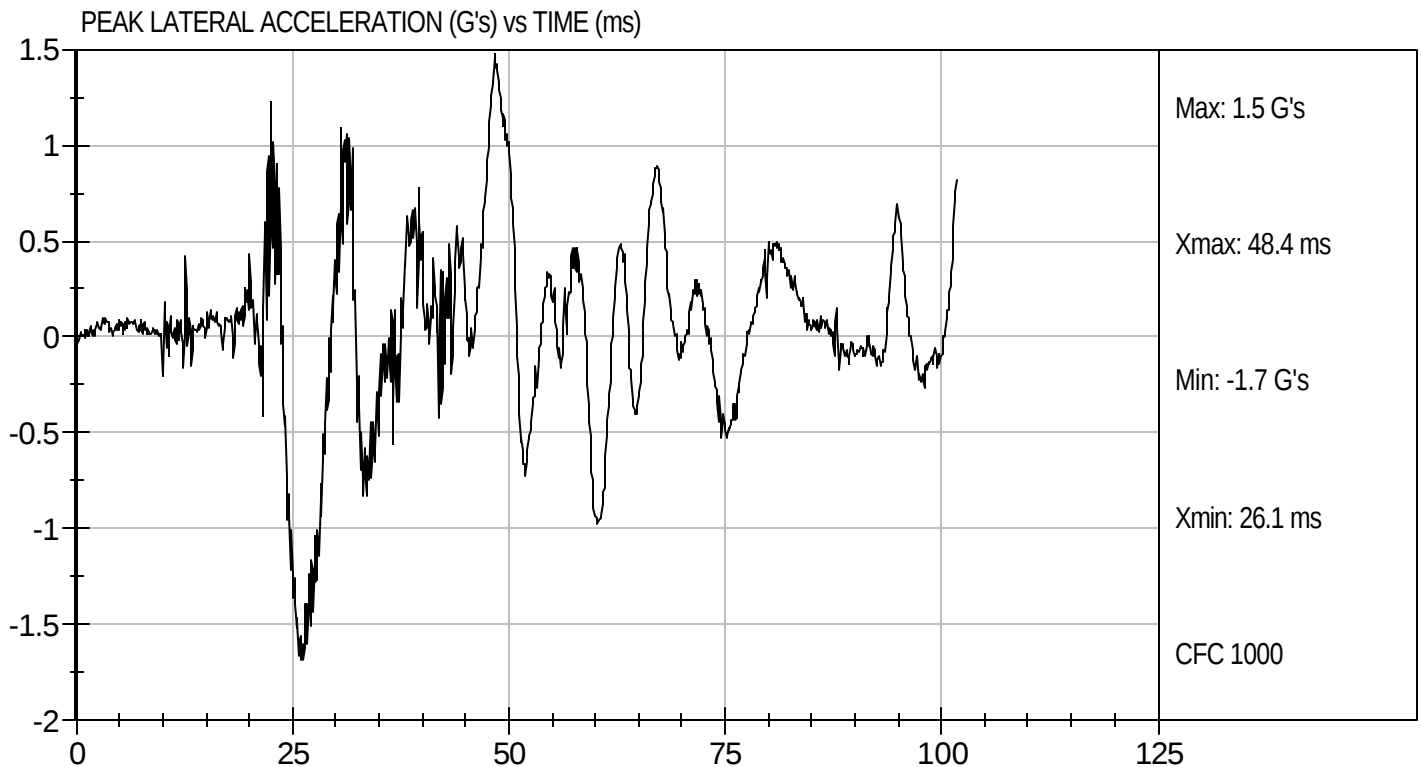
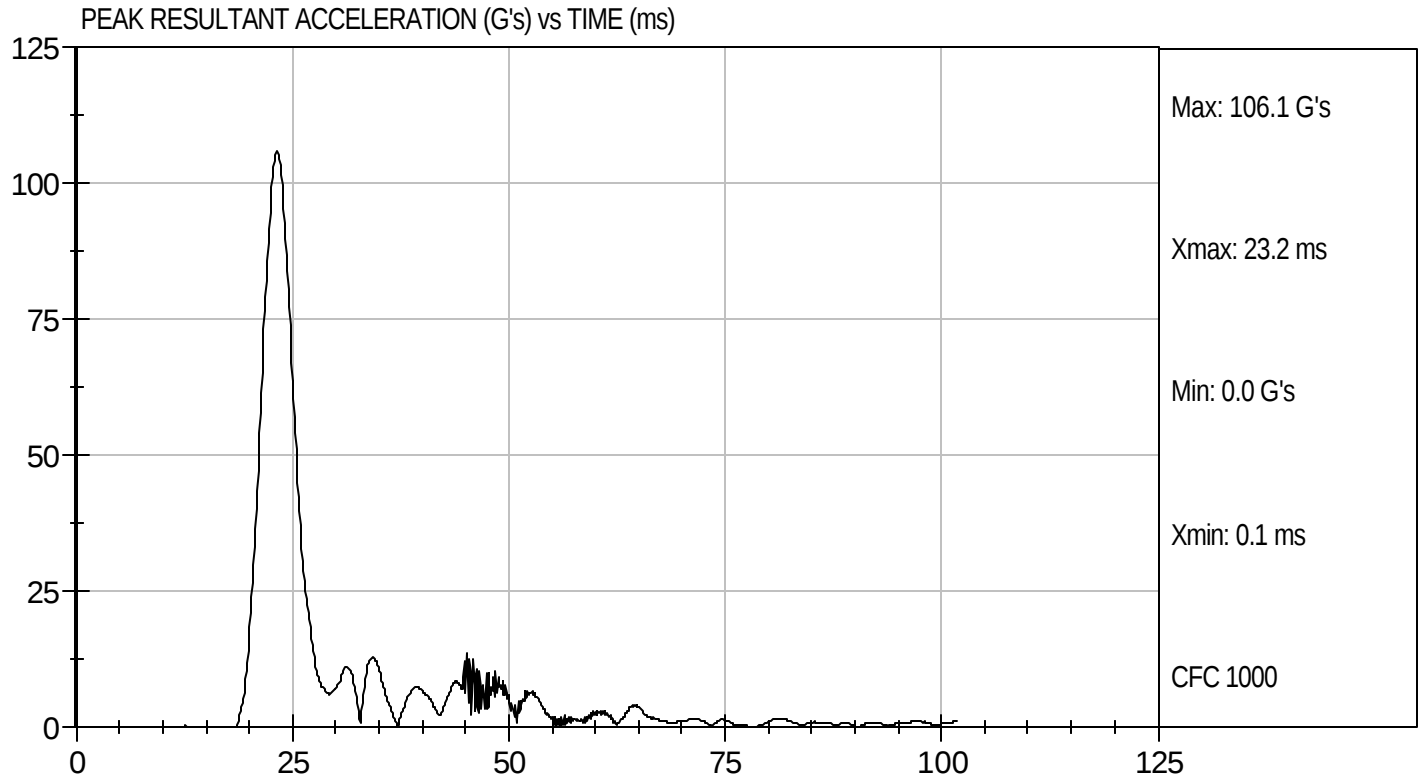
12/12/07
Test Date


Approved By



Test Desc: Head Drop
Component ID: D073561

Test Date: 12/12/07
Velocity: 0 ft/s, 0 m/s



MGA RESEARCH CORPORATION
NECK FLEXION TEST
CRABI 12 MONTH

ATD Serial No: 093

Test I.D: D073562

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	20.7	Pass
Humidity		%	10 to 70	25	Pass
Impact Velocity		m/s	5.1 to 5.3	5.3	Pass
Pendulum Deceleration	10 msec	m/s	1.6 to 2.3	2.1	Pass
	20 msec	m/s	3.4 to 4.2	3.8	Pass
	25 msec	m/s	4.3 to 5.2	4.5	Pass
D Plane Rotation		deg	75.0 to 86.0	80.6	Pass
Moment About Occipital Condyle		Nm	36.0 to 45.0	43.3	Pass
Positive Moment - Time Curve Decay to 5 Nm		msec	60 to 80	69	Pass
Overall Test Results					Pass


 Laboratory Technician


 Approved By

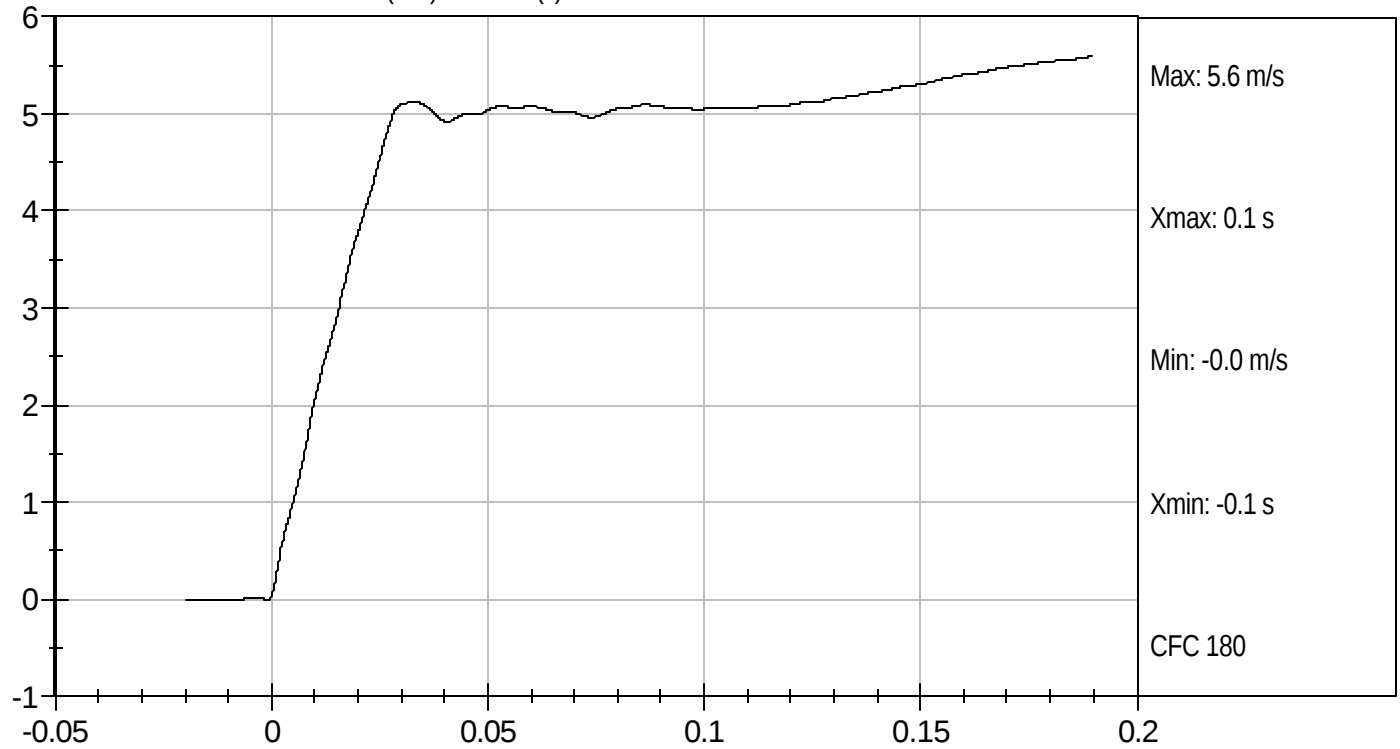
12/12/07
 Test Date



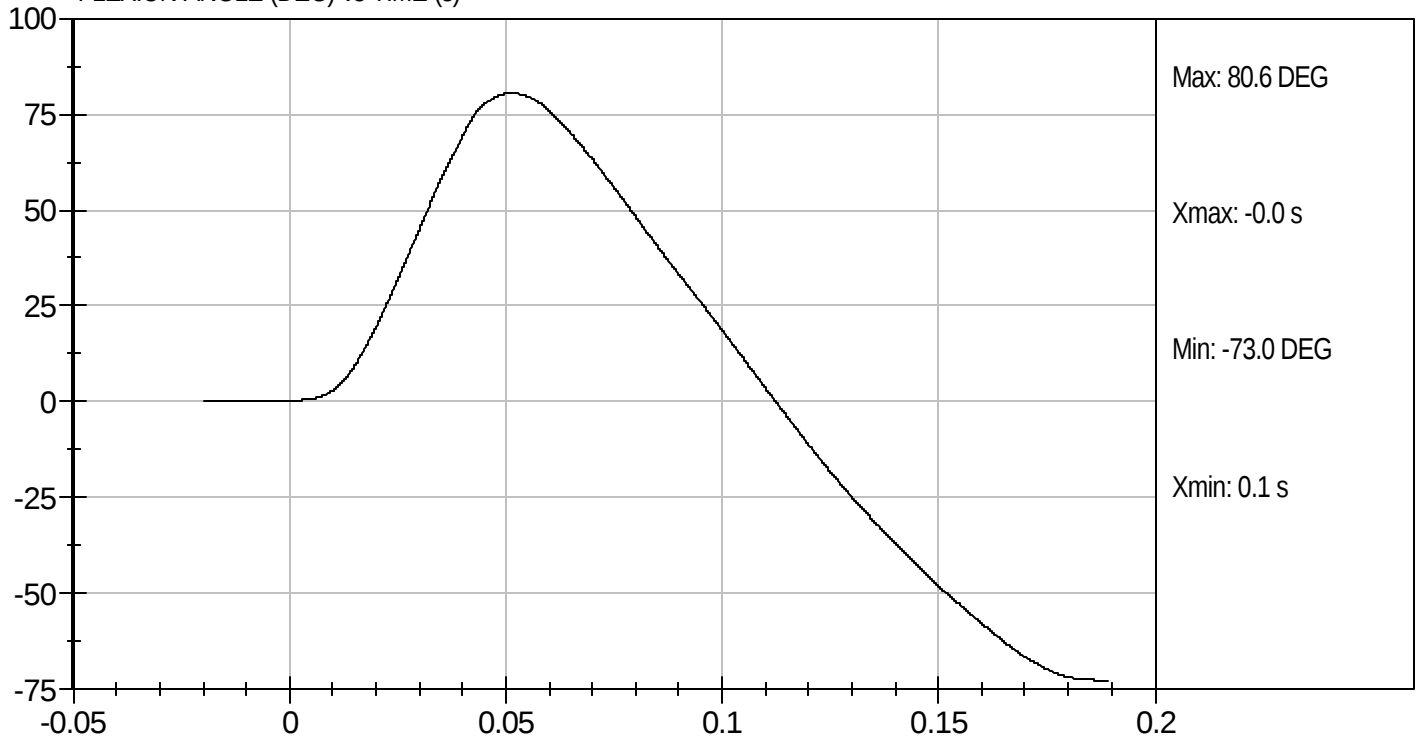
Test Desc: Neck Flexion
Component ID: D073562

Test Date: 12/12/07
Velocity: 17.36 ft/s, 5.3 m/s

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



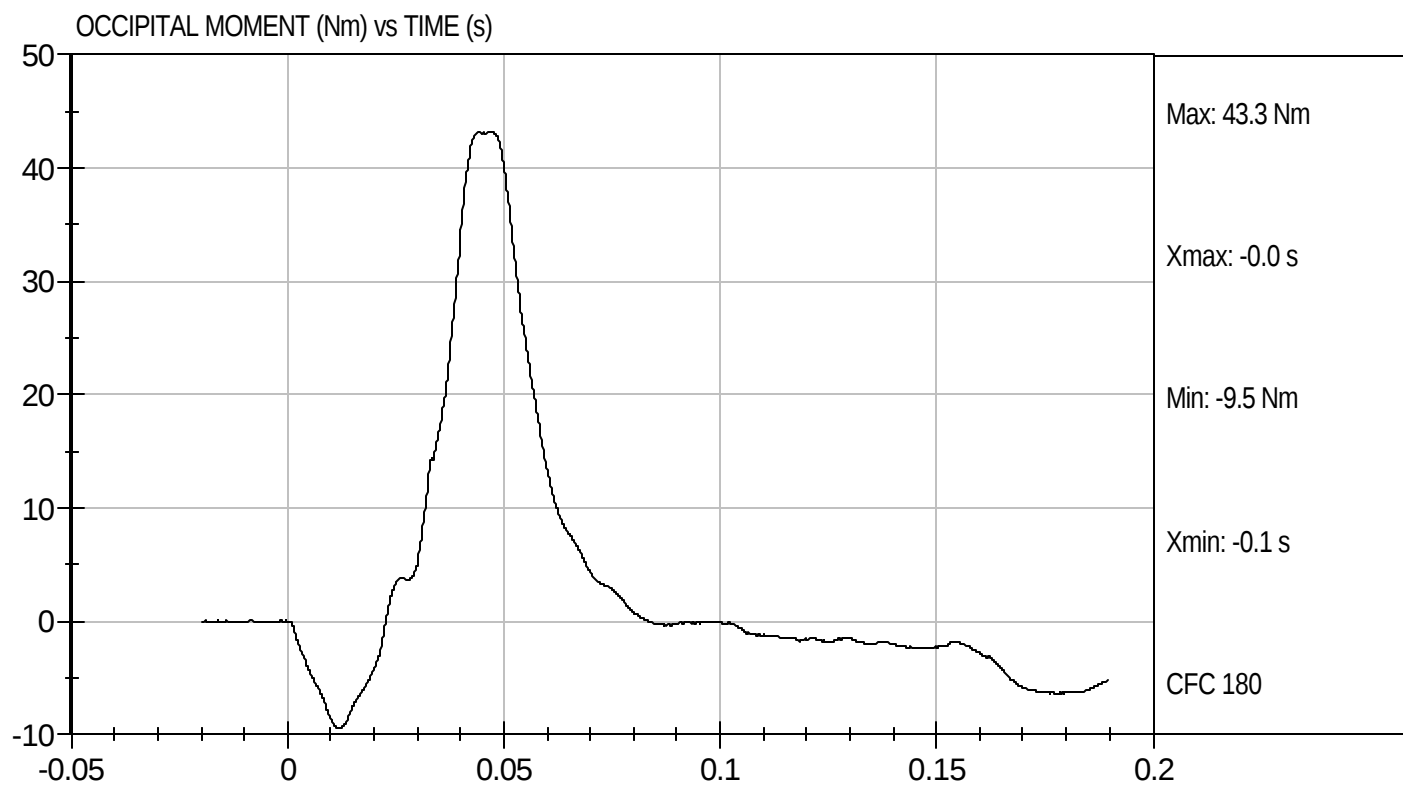
FLEXION ANGLE (DEG) vs TIME (s)





Test Desc: Neck Flexion
Component ID: D073562

Test Date: 12/12/07
Velocity: 17.36 ft/s, 5.3 m/s



MGA RESEARCH CORPORATION
NECK EXTENSION TEST
CRABI 12 MONTH

ATD Serial No: 093

Test I.D: D073563

Tested Parameter		Units	Specification	Result	Pass/Fail
Temperature		deg C	20.6 to 22.2	20.8	Pass
Humidity		%	10 to 70	25	Pass
Pendulum Speed		m/s	2.4 to 2.6	2.6	Pass
Pendulum Deceleration	6 msec	m/s	0.8 to 1.2	0.9	Pass
	10 msec	m/s	1.5 to 2.1	1.9	Pass
	14 msec	m/s	2.2 to 2.9	2.6	Pass
D Plane Rotation		deg	80.0 to 92.0	80.6	Pass
Moment About Occipital Condyle		Nm	-23.0 to -12.0	-19.0	Pass
Negative Moment - Time Curve Decay to -5 Nm		msec	76 to 90	85	Pass
Overall Test Results					Pass


 Laboratory Technician

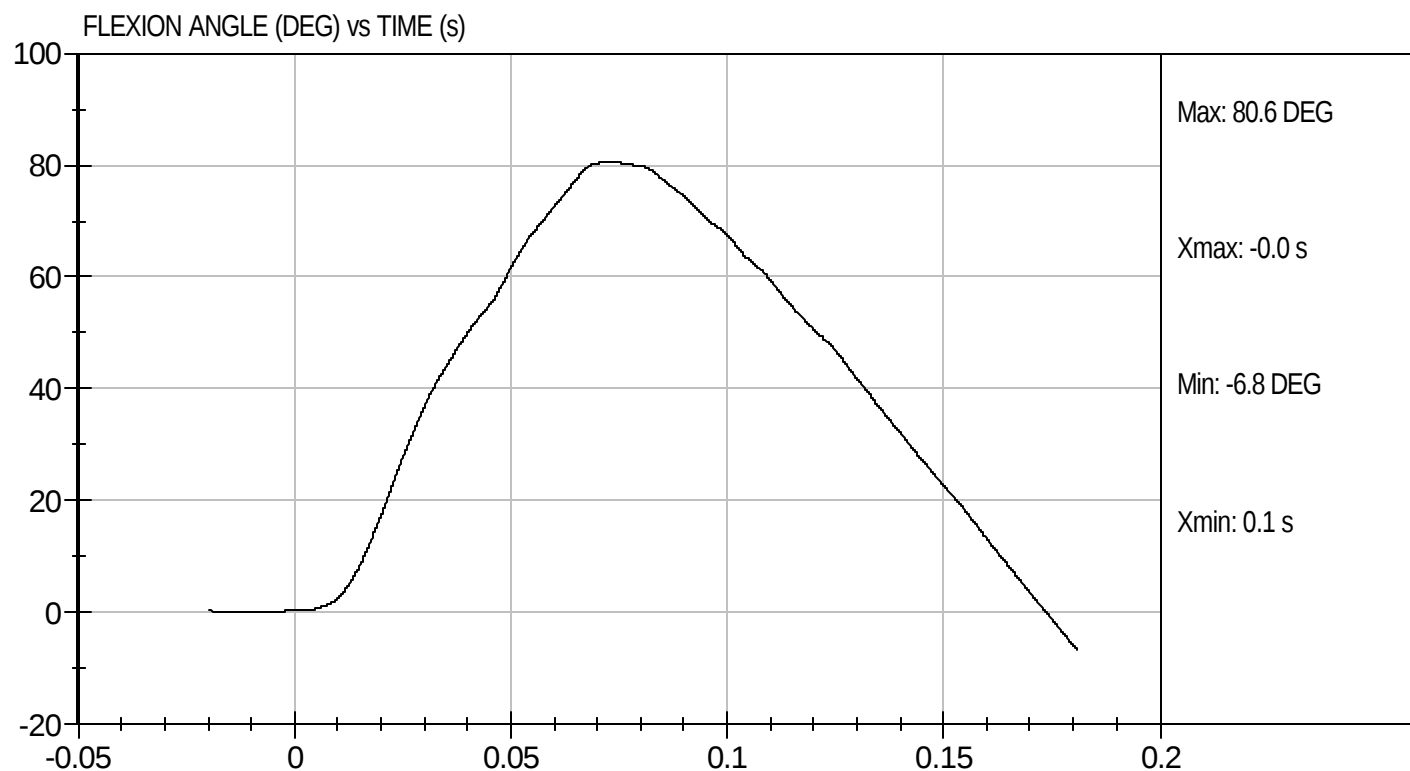
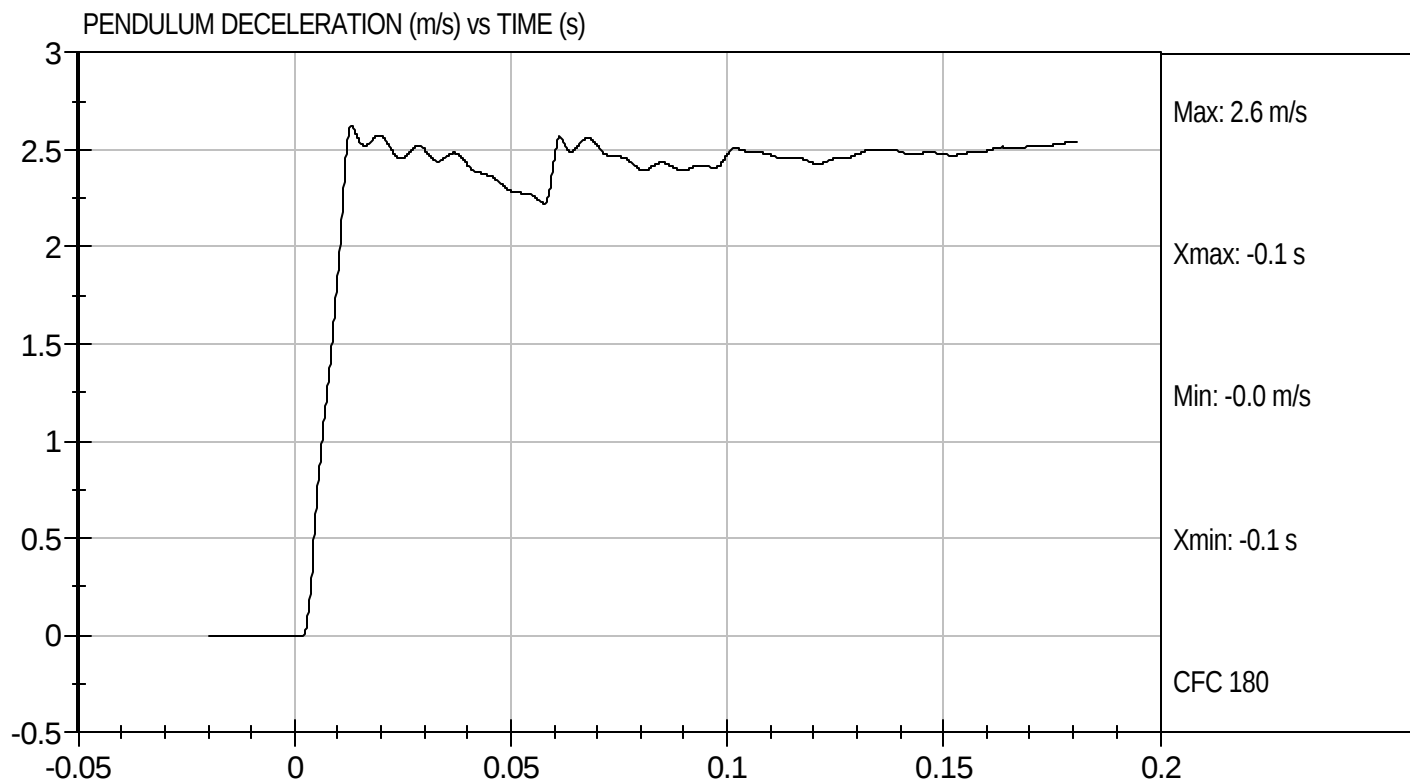

 Approved By

12/12/07
 Test Date



Test Desc: Neck Extension
Component ID: D073563

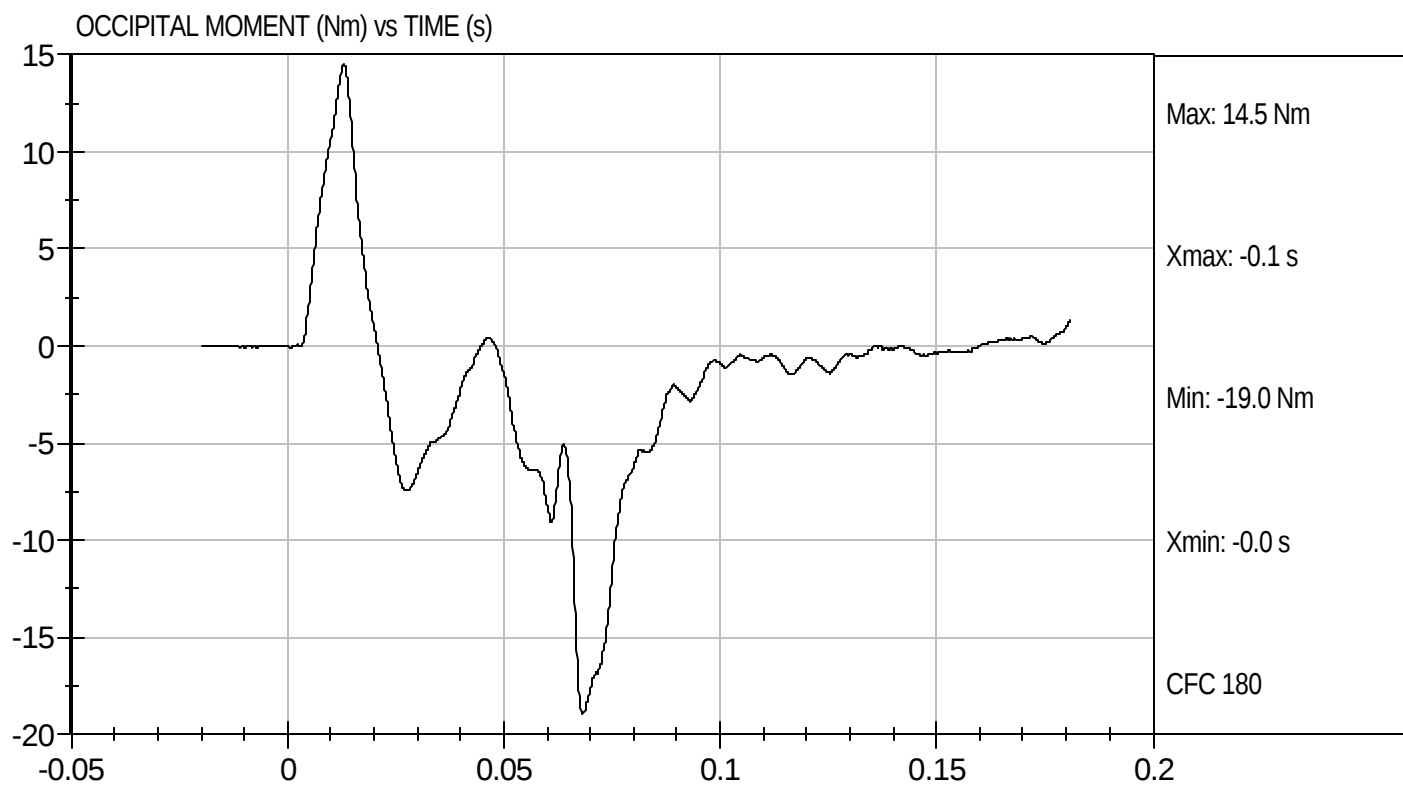
Test Date: 12/12/07
Velocity: 8.41 ft/s, 2.6 m/s





Test Desc: Neck Extension
Component ID: D073563

Test Date: 12/12/07
Velocity: 8.41 ft/s, 2.6 m/s

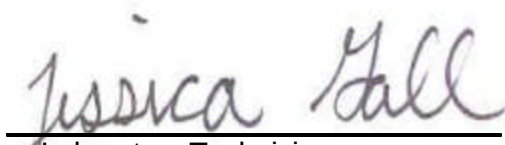


MGA RESEARCH CORPORATION
THORAX IMPACT TEST
CRABI 12 MONTH

ATD Serial No: 093

Test I.D: D073564

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	26	Pass
Probe Speed	m/sec	4.9 to 5.1	5.08	Pass
Probe Force	kN	1.51 to 1.80	1.54	Pass
Overall Test Results				Pass


Laboratory Technician

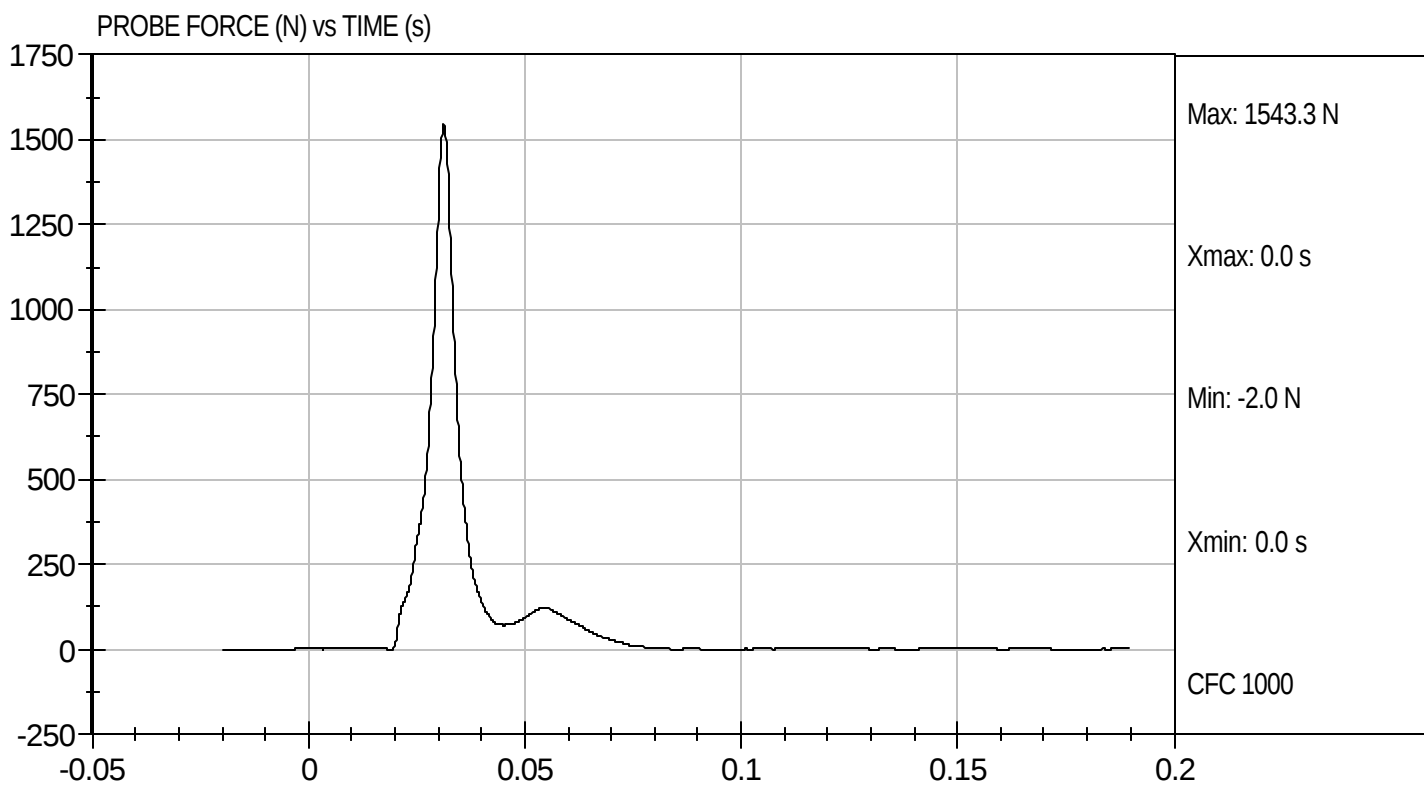

Approved By

12/12/07
Test Date



Test Desc: Thorax Impact
Component ID: D073564

Test Date: 12/12/07
Velocity: 16.67 ft/s, 5.08 m/s

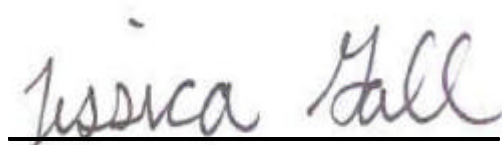


MGA RESEARCH CORPORATION
REAR HEAD DROP TEST
CRABI 12 MONTH

ATD Serial No: 093

Test ID: D073565

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	25	Pass
Peak Resultant Acceleration	G's	55 to 71	64	Pass
Peak Lateral Acceleration	G's	+/- 15	-2	Pass
Unimodal	N/A	within 17% of peak	Yes	Pass
Overall Test Results				Pass


 Laboratory Technician

12/12/07
 Test Date

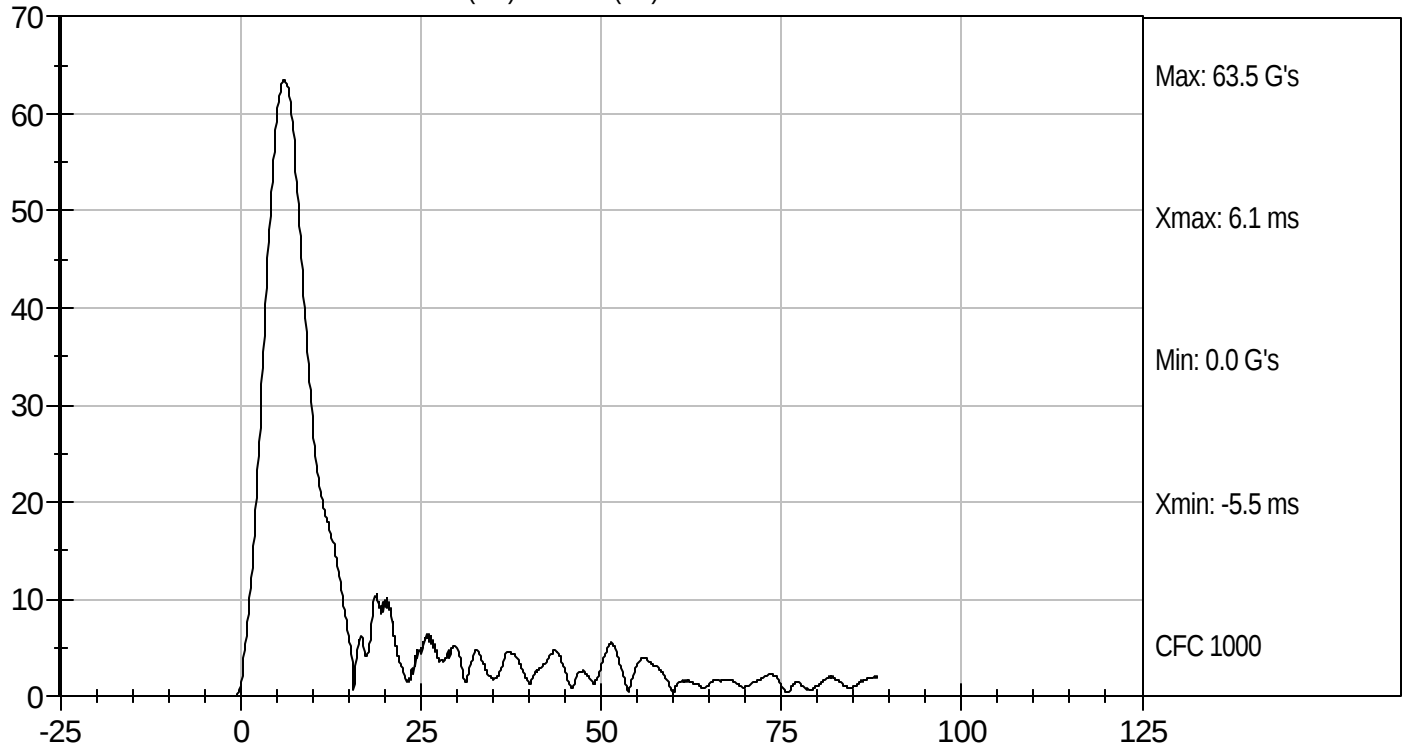

 Approved By



Test Desc: Head Drop
Component ID: D073565

Test Date: 12/12/07
Velocity: 0 ft/s, 0 m/s

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



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

