

REPORT NUMBER: NCAPSIDE-MGA-2008-003

**NEW CAR ASSESSMENT PROGRAM
SIDE IMPACT TEST**

**DAIMLERCHRYSLER CORPORATION
2008 DODGE GRAND CARAVAN SE
NHTSA NUMBER: L80300**

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



Test Date: August 31, 2007


Report Date: September 27, 2007

FINAL REPORT

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

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Technical Report Documentation Page

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16. Abstract A 55/28 km/h 90° Moving Deformable Barrier NCAP side impact was conducted on the subject 2008 Dodge Grand Caravan SE 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 August 31, 2007. The impact velocity of the Moving Deformable Barrier (MDB) was 62.4 km/h, and the ambient temperature at the struck side (drivers) of the vehicle was 21°C. The target vehicle's maximum post test static crush was 270 mm at level 2. The test vehicle's occupant performance is as follows: <table style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;"></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;">24.7</td> <td style="text-align: center;">40.0</td> </tr> <tr> <td>Left Lower Rib (LLR) Accel., g</td> <td style="text-align: center;">30.1</td> <td style="text-align: center;">39.7</td> </tr> <tr> <td>Lower Spine (T₁₂) Accel., g</td> <td style="text-align: center;">37.1</td> <td style="text-align: center;">38.7</td> </tr> <tr> <td>Thoracic Trauma Index (TTI)</td> <td style="text-align: center;">34</td> <td style="text-align: center;">39</td> </tr> <tr> <td>Pelvis (PEV) Accel., g</td> <td style="text-align: center;">59.1</td> <td style="text-align: center;">73.9</td> </tr> <tr> <td>HIC</td> <td style="text-align: center;">113</td> <td style="text-align: center;">192</td> </tr> </tbody> </table> <p>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.</p>					<u>DRIVER</u>	<u>PASS.</u>	Left Upper Rib (LUR) Accel., g	24.7	40.0	Left Lower Rib (LLR) Accel., g	30.1	39.7	Lower Spine (T ₁₂) Accel., g	37.1	38.7	Thoracic Trauma Index (TTI)	34	39	Pelvis (PEV) Accel., g	59.1	73.9	HIC	113	192
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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 Dodge Grand Caravan SE manufactured by DaimlerChrysler Corporation.

TEST PROCEDURE

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

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

SECTION 2

SUMMARY OF NCAP SIDE IMPACT TEST

A model year 2008 Dodge Grand Caravan SE was impacted on the left (driver's) side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 62.4 km/h. The specified impact velocity range is from 61.1 to 62.7 km/h. The test (target) vehicle was stationary and positioned 63° to the line of forward motion. The weight of the vehicle as tested was 2207.2 kg and the test weight of the MDB was 1360.8 kg. The test was conducted at MGA Research Corporation in Burlington, Wisconsin, on August 31, 2007.

One (1) real-time motion picture camera and ten (10) high-speed motion picture cameras were used to document the impact event. The pre-test and post-test conditions were recorded by one (1) real-time motion picture camera. Camera locations and pertinent camera information are documented in the data sheets. Pre- and post-test photographs of the vehicle and Side Impact Dummies (SID/HIIIs) can be found in Appendix A. Two 50th percentile adult male SID/HIIIs were placed in the driver and left rear passenger designated seating positions according to instructions specified in the Laboratory Test Procedure for New Car Assessment Program Side Impact Testing dated November 2002. Each SID/HIII was instrumented in the following locations:

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

The test vehicle was instrumented with twenty-one (21) structural accelerometers and the MDB was instrumented with five (5) accelerometers and two (2) contact switches on the bumper to compare left side to right side bumper impact timing. All data channels were recorded with a fully self contained on-board DTS TDAS Pro Data Acquisition System. The data was digitally sampled at 10,000 samples per second and processed per Appendix V of the Test Procedure.

2.2 GENERAL COMMENTS

The test vehicle sustained a maximum static crush of 270 mm at level 2, 1500 mm rearward of the vertical impact point. The driver and passenger SID/HIIIs, Serial Nos. 271 and 272 respectively, were calibrated just prior to this test.

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

The occupant data is summarized below:

ATD position	HIC	T ¹	T ²	TTI (G's)	Peak Pelvis (G's)
Driver	113	54.8	79.9	34	59.1
Passenger	192	58.4	78.8	39	73.9

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

There was no valid data collected for:

- Left Rear Sill Y
- Driver Seat Track Y

DATA SHEET NO. 1

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2008 Dodge Grand Caravan SE
 Test Program: NCAP Side Impact

NHTSA No. L80300
 Test Date: 8/31/2007

TEST VEHICLE INFORMATION

Make	Dodge
Model	Grand Caravan SE
Body Style	MPV
NHTSA No.	L80300
VIN	2D8HN44H68R104815
Color	Stone White
Delivery Date	8/27/2007
Odometer Reading (mile)	126
Dealer	Frank Boucher
Transmission	Automatic
Final Drive	Front
Number of Cylinders	6
Engine Displacement (L)	3.3
Engine Placement	Lateral
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	No
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	DaimlerChrysler Corporation
Date of Manufacture	8-07

GVWR (kg)	2745
GAWR Front (kg)	1339
GAWR Rear (kg)	1407

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bucket	Split Bench	
Number Of Occupants	2	2	3	7
Capacity Wt. (VCW) (kg)				521
Cargo Wt. (RCLW) (kg)				45

DATA SHEET NO. 1 (continued)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2008 Dodge Grand Caravan SE

NHTSA No. L80300

Test Program: NCAP Side Impact

Test Date: 8/31/2007

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	574.7	440.9		643.2	514.8	
Right	kg	546.1	445.9		552.5	496.7	
Ratio	%	55.8	44.2		54.2	45.8	
Totals	kg	1120.8	886.8	2007.6	1195.7	1011.5	2207.2

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	2007.6
Weight of 2 P572M ATDs	kg	161.5
Rated Cargo/Luggage Weight (RCLW)	kg	45
Calculated Vehicle Target Weight (TVTW)	kg	2214.1

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

Weight of Ballast in Cargo Area: None

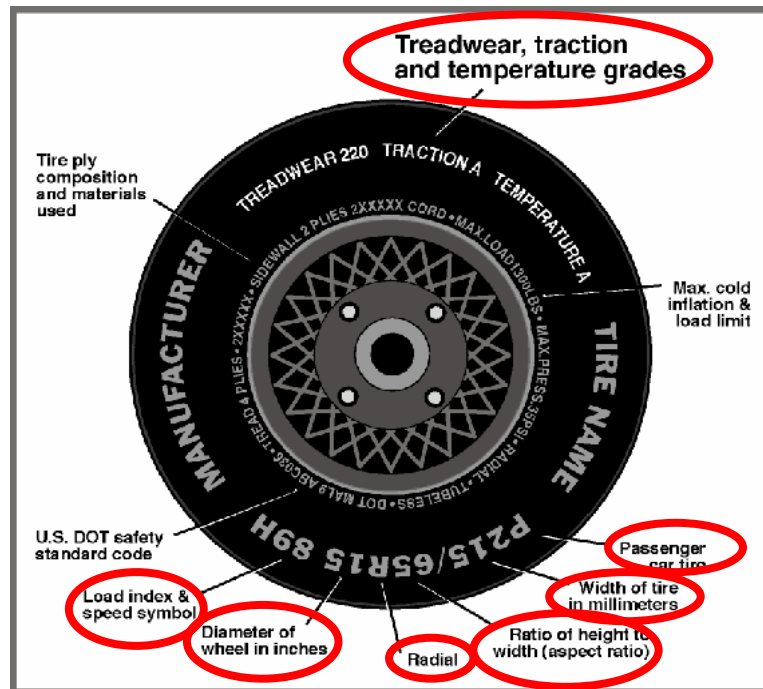
TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	779	772	790	787	1361
As Tested	mm	761	767	768	767	1411
Fully Loaded	mm	760	765	759	765	

TEST VEHICLE VERTICAL IMPACT LINE DATA

Measurement Description	Units	Value
Test Vehicle Wheel Base	mm	3080
Target Impact Point Aft of Front Axle	mm	508
Actual Impact Point Aft of Front Axle	mm	502

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)	250	250
Recommended Tire Size	P225/65R16	P225/65R16
Tire Size on Vehicle	P225/65R16	P225/65R16
Tire Manufacturer	Yokohama	Yokohama
Tire Name	AVID	AVID
Tire Type	Passenger	Passenger
Tire Width (mm)	225	225
Ratio of Height to Width (aspect ratio)	65	65
Radial	R	R
Wheel Diameter	16	16
Load Index & Speed Symbol	100S	100S
Treadwear	450	450
Traction Grade	B	B
Temperature Grade	B	B

DATA SHEET NO. 3
TEST VEHICLE INFORMATION

Test Vehicle: 2008 Dodge Grand Caravan SE
Test Program: NCAP Side Impact

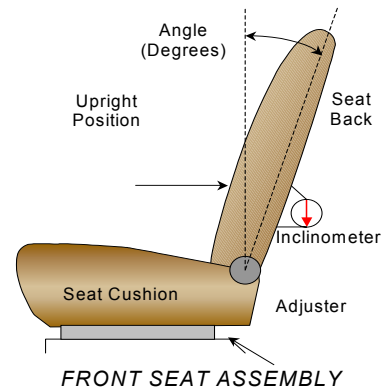
NHTSA No. L80300
Test Date: 8/31/2007

NORMAL DESIGN RIDING POSITION

The driver and passenger seat back is positioned to the manufacturer's designated angle. The procedure is as follows:
15.44 degrees (measured to flat on back of frame)

Driver seat back angle: 15.2 degrees

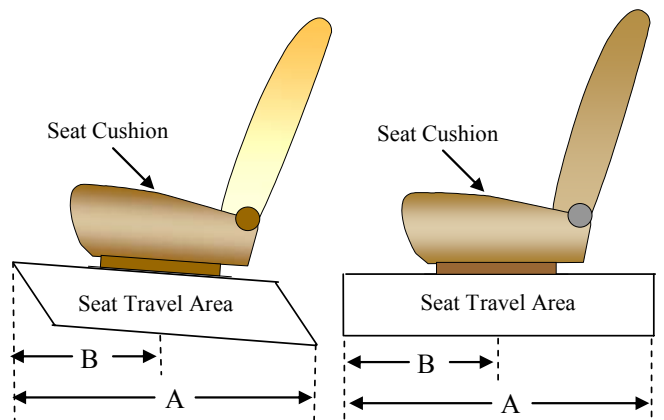
Passenger seat back angle: 15.8 degrees



SEAT FORE/AFT POSITIONS

SEAT FORE/AFT POSITIONS

	Total Fore/Aft Travel	Placed in position #
Driver Seat	33 detents	16 th detent (1 st as 0)
Rear Seat	11 detents	5 th detent (1 st as 0)



DATA SHEET NO. 3 (CONTINUED)

TEST VEHICLE INFORMATION

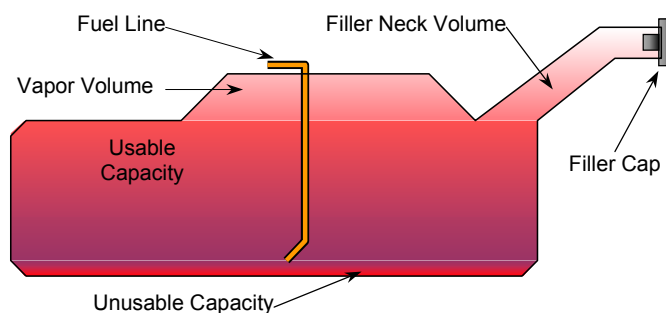
Test Vehicle: 2008 Dodge Grand Caravan SE
 Test Program: NCAP Side Impact

NHTSA No. L80300
 Test Date: 8/31/2007

FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	75.7
Usable Capacity of "Optional" Tank	
92-94% of Usable Capacity	69.6- 71.2
Actual Amount of Solvent used	70.8
1/3 of Usable Capacity	25.2

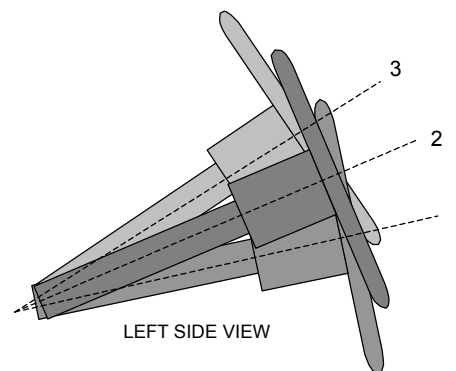
The test vehicle is equipped with an electric fuel pump. For the fuel pump to pump fuel, the engine must be running.



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		21.0
Geometric center position No. 2		24.0
Uppermost position No. 3		27.0

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

Test Vehicle: 2008 Dodge Grand Caravan SE
 Test Program: NCAP Side Impact

NHTSA No. L80300
 Test Date: 8/31/2007

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	62.0
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	90.2

POST TEST OBSERVATIONS
MDB LEFT EDGE IMPACT POINT DATA

Measured Parameter	Units	Requirement	Value
Horizontal Offset	mm	+/- 50	6 forward
Vertical Offset	mm	+/-20	10 up

DATA SHEET NO. 5

POST TEST OBSERVATIONS

Test Vehicle: 2008 Dodge Grand Caravan SE
 Test Program: NCAP Side Impact

NHTSA No. L80300
 Test Date: 8/31/2007

TEST DUMMY INFORMATION AND CONTACT POINTS

Description	Front Seat SID/HIII	Rear Seat SID/HIII
Dummy Type / Serial No.	SID HIII / 271	SID HIII / 272
Head Contact	Curtain Airbag, Side Header	Curtain Airbag, Side Header
Upper Torso Contact	Door Panel	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 front and left rear windows broke
Other Notable Effects	None

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

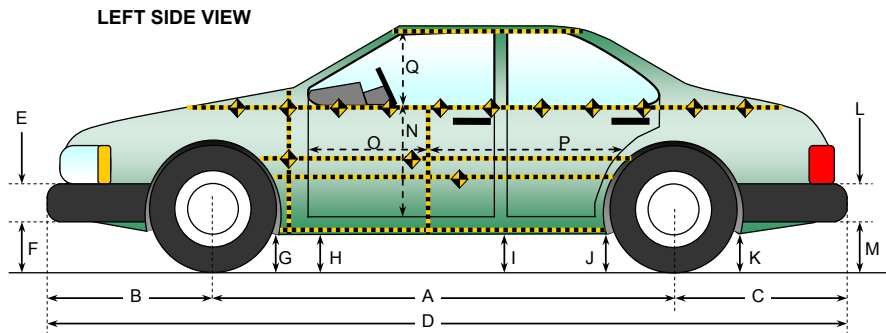
Restraint Type	Occupant Location 01		Occupant Location 04	
	Installed	Operation	Installed	Operation
Front Airbag	Yes	No	No	
Side Torso Airbag	No		No	
Curtain Airbag	Yes	Yes	Yes	Yes

DATA SHEET NO. 6

VEHICLE PRE-TEST AND POST-TEST MEASUREMENTS

Test Vehicle: 2008 Dodge Grand Caravan SE
 Test Program: NCAP Side Impact

NHTSA No. L80300
 Test Date: 8/31/2007



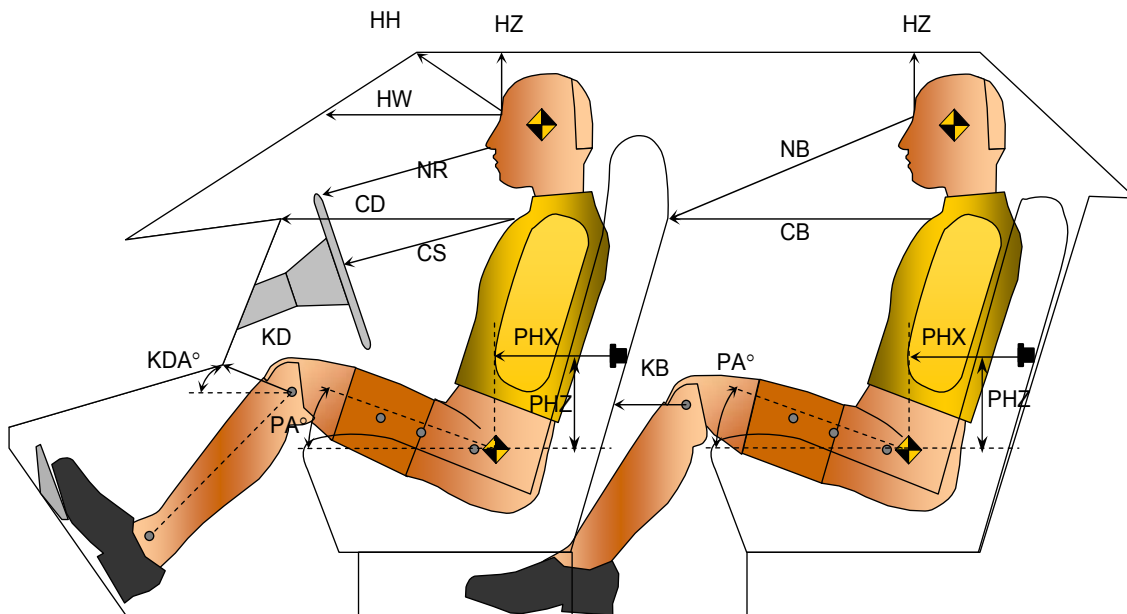
All Measurements in mm

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	3080	3082	-2
B	Front Axle to FSOV	923	931	-8
C	Rear Axle to RSOV	1107	1089	18
D	Total Length at Centerline	5110	5102	8
E	Front Bumper Thickness	168	168	0
F	Front Bumper Bottom to Ground	151	245	-94
G	Sill Height at Front Wheel Well	230	223	7
H	Sill Height at Front Door Leading Edge	229	220	9
I	Sill Height at "B" Pillar	236	220	16
J1	Sill Height at Rear Wheel Well	241	230	11
J2	Pinch Weld Height at Rear Wheel Well	232	229	3
K	Sill Height Aft of Rear Wheel Well	257	253	4
L	Rear Bumper Thickness	126	126	0
M	Rear Bumper Bottom to Ground	211	319	-108
N	Sill Height to Window Bottom Sill	783	586	197
O	Front Door Leading Edge to Impact CL	839	706	133
P	Rear Door Trailing Edge to Impact CL	1382	1310	72
Q	Front Window Opening	470	504	-34
R	Right Side Length	4192	4194	-2
S	Left Side Length	4190	4181	9
T	Vehicle Width at "B" Post	1959	1749	210

DATA SHEET NO. 7
SID/HIII LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2008 Dodge Grand Caravan SE
 Test Program: NCAP Side Impact

NHTSA No. L80300
 Test Date: 8/31/2007

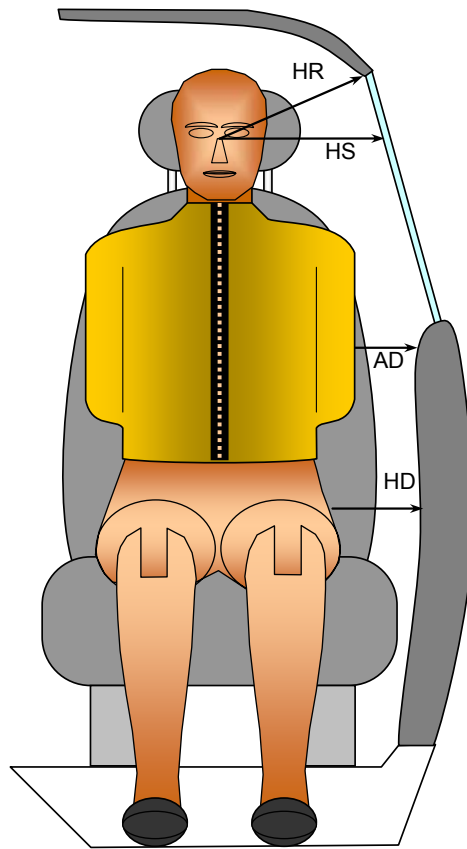


Driver Code	Pass. Code	Measurement Description	Driver S/N 271		Passenger S/N 272	
			Length(mm)	Angle(°)	Length(mm)	Angle(°)
HH		Head to Header	281			
HW		Head to Windshield	616			
HZ	HZ	Head to Roof	156		204	
NR	NB	Nose to Rim/Nose to Seatback	366		718	
CD	CB	Chest to Dash or Seatback	477		616	
CS		Chest to Steering Wheel	275			
KDL	KBL	Left Knee to Dash or Seatback	162	19.7	297	19.7
KDR	KBR	Right Knee to Dash or Seatback	137	24.0	301	20.2
PA	PA	Pelvic Angle		23.8		24.6
PHX	PHX	H-Point to Striker (X-Axis)	197		347	
PHZ	PHZ	H-Point to Striker (Z-Axis)	0		118	

DATA SHEET NO. 8
SID/HIII LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2008 Dodge Grand Caravan SE
 Test Program: NCAP Side Impact

NHTSA No. L80300
 Test Date: 8/31/2007



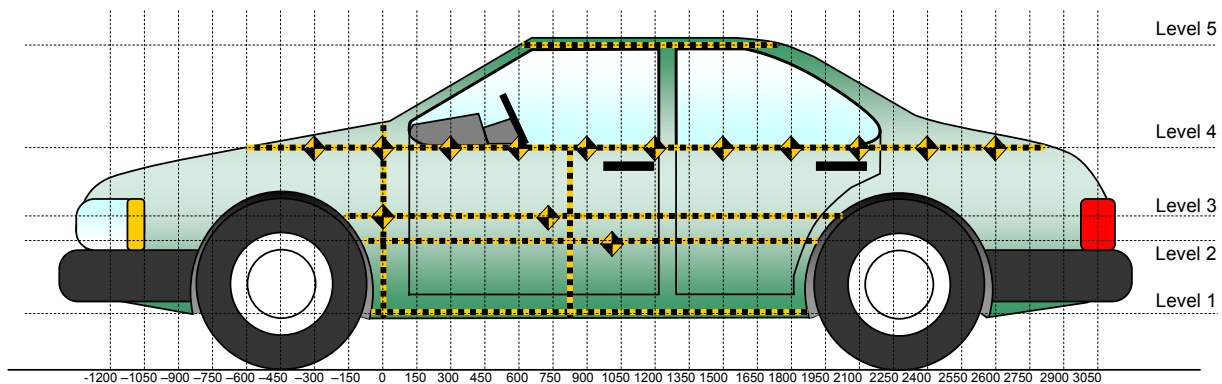
FRONT VIEW OF DUMMY

Code	Measurement Description	Units	Driver S/N 271	Passenger S/N 272
HR	Head to Side Header	mm	249	206
HS	Head to Side Window	mm	387	391
AD	Arm to Door	mm	138	176
HD	H-Point to Door	mm	144	255

DATA SHEET NO. 9
VEHICLE SIDE MEASUREMENTS

Test Vehicle: 2008 Dodge Grand Caravan SE
Test Program: NCAP Side Impact

NHTSA No. L80300
Test Date: 8/31/2007



All Measurements Shown in mm

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	-7	900	1637
4	Window Sill	138	1050	1075
3	Mid Door	264	1350	761
2	Occupant H-Point	270	1500	697
1	Sill Top	81	450	213
	Maximum Penetration	270		

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH PROFILES

Test Vehicle: 2008 Dodge Grand Caravan SE
Test Program: NCAP Side Impact

NHTSA No. L80300
Test Date: 8/31/2007

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-150		165	153	212			161	154	207			-4	1	-5	
0	192	161	162	205		194	165	177	173		2	4	15	-32	
150	189	156	157	197		228	313	319	207		39	157	162	10	
300	183	151	152	193		242	375	364	219		59	224	212	26	
450	178	146	148	189		259	379	361	231		81	233	213	42	
600	175	145	145	186	395	249	369	360	248	379	74	224	215	62	-16
750	173	142	143	185	392	245	365	364	268	378	72	223	221	83	-14
900	171	140	141	183	389	234	364	368	274	382	63	224	227	91	-7
1050	171	140	140	183	391	236	351	362	321	381	65	211	222	138	-10
1200	171	140	141	184	391	236	392	404	316	359	65	252	263	132	-32
1350	173	141	141	185	392	241	403	405	303	336	68	262	264	118	-56
1500	175	143	144	185	394	249	413	405	270	312	74	270	261	85	-82
1650	179	146	147	189	394	258	404	405	245	290	79	258	258	56	-104
1800	183	149	150	193	396	230	379	381	321	267	47	230	231	128	-129
1950	188	154	155	198	298	146	278	276	201	246	-42	124	121	3	-52
2100	194	159	160	204	400	194	188	181	184	226	0	29	21	-20	-174
2250		161	149	211	403		174	154	219	386		13	5	8	-17
2400		147		216	405		151		220	389		4		4	-16
2550		148		227	407		147		227	391		-1		0	-16

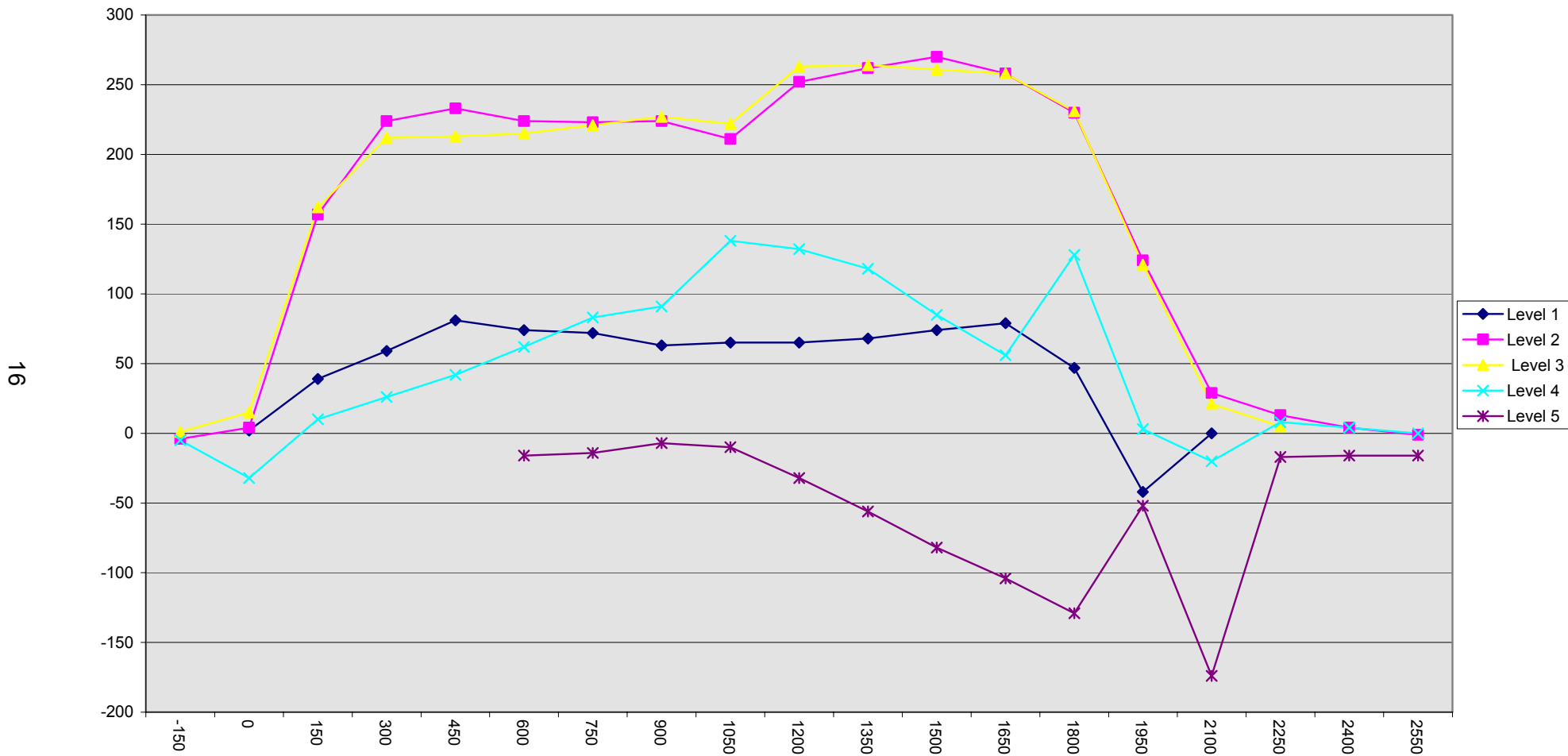
Reference plane is parallel to test vehicle longitudinal centerline.

Given dimensions = Reference plane to car body

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

Test Vehicle: 2008 Dodge Grand Caravan SE
Test Program: NCAP Side Impact

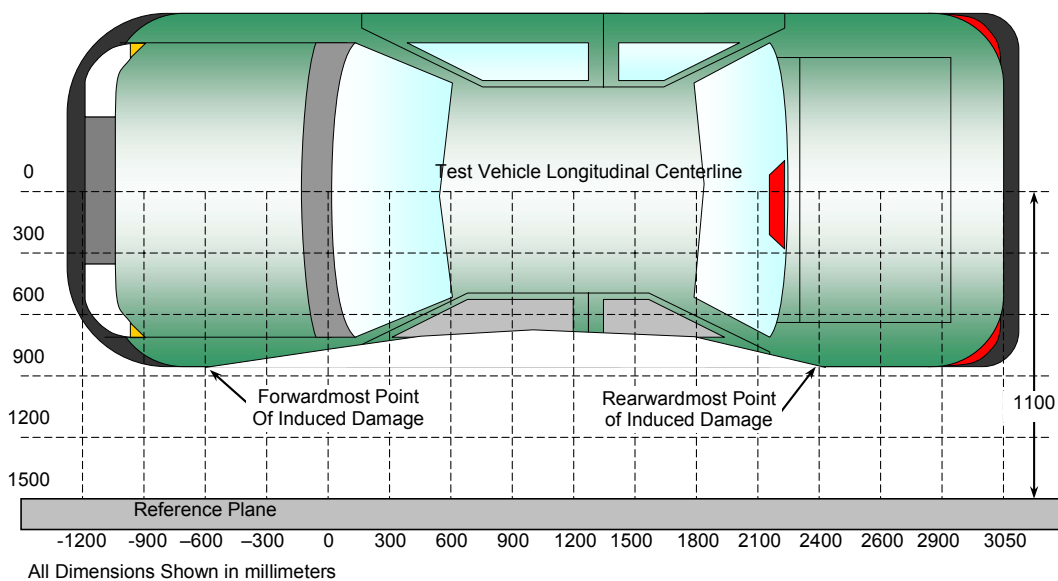
NHTSA No. L80300
Test Date: 8/31/2007



DATA SHEET NO. 11
VEHICLE DAMAGE PROFILE DISTANCES

Test Vehicle: 2008 Dodge Grand Caravan SE
 Test Program: NCAP Side Impact

NHTSA No. L80300
 Test Date: 8/31/2007



TOP VIEW

DAMAGE PROFILE DISTANCES

DPD	Distance from Impact Point in mm	Level	Pre-Test (mm)	Post-Test (mm)	Max Static Crush (mm)
1	2550	4	227	227	0
2	2015	4	200	281	81
3	1468	3	142	418	276
4	902	2	141	400	259
5	357	2	151	391	240
6	-150	4	212	207	-5

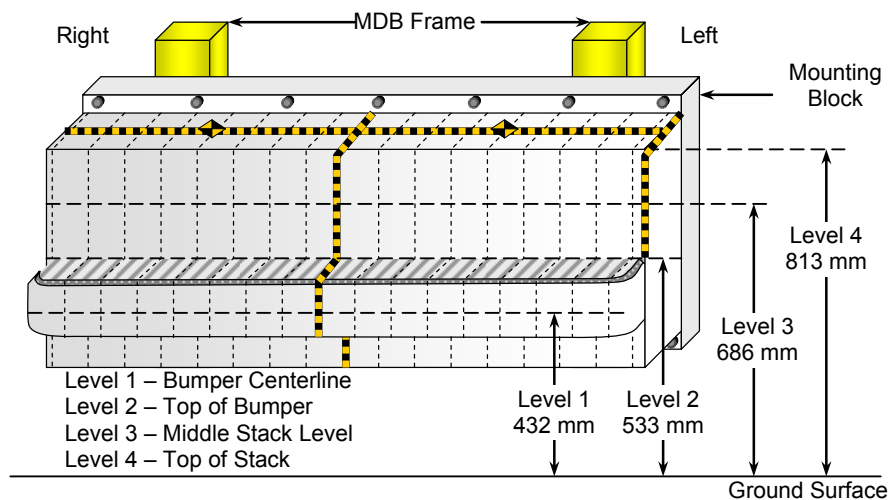
Reference plane is parallel to test vehicle longitudinal centerline.
 Given dimensions = Reference plane to car body.

DATA SHEET NO. 12

DEFORMABLE BARRIER HONEYCOMB FACE STATIC CRUSH

Test Vehicle: 2008 Dodge Grand Caravan SE
 Test Program: NCAP Side Impact

NHTSA No. L80300
 Test Date: 8/31/2007



DEFORMABLE BARRIER STATIC CRUSH

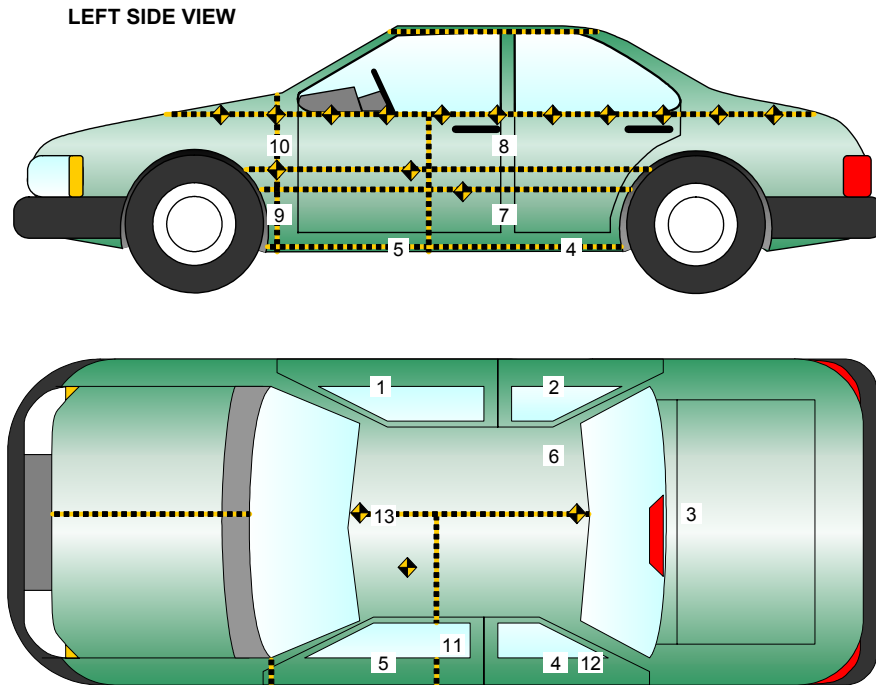
Stack Level	Distance Right of Center								C _L	Distance Left of Center							
	800	700	600	500	400	300	200	100		100	200	300	400	500	600	700	800
1	173	167	162	162	163	170	176	178	165	156	145	133	132	129	136	148	151
2	60	68	65	63	65	73	75	75	72	57	54	54	46	51	56	70	87
3	54	35	24	16	12	15	37	59	61	39	36	26	18	21	24	34	65
4	80	114	48	29	22	20	44	78	84	51	35	31	33	40	48	67	88

All Dimensions in mm

DATA SHEET NO. 13
VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2008 Dodge Grand Caravan SE
 Test Program: NCAP Side Impact

NHTSA No. L80300
 Test Date: 8/31/2007



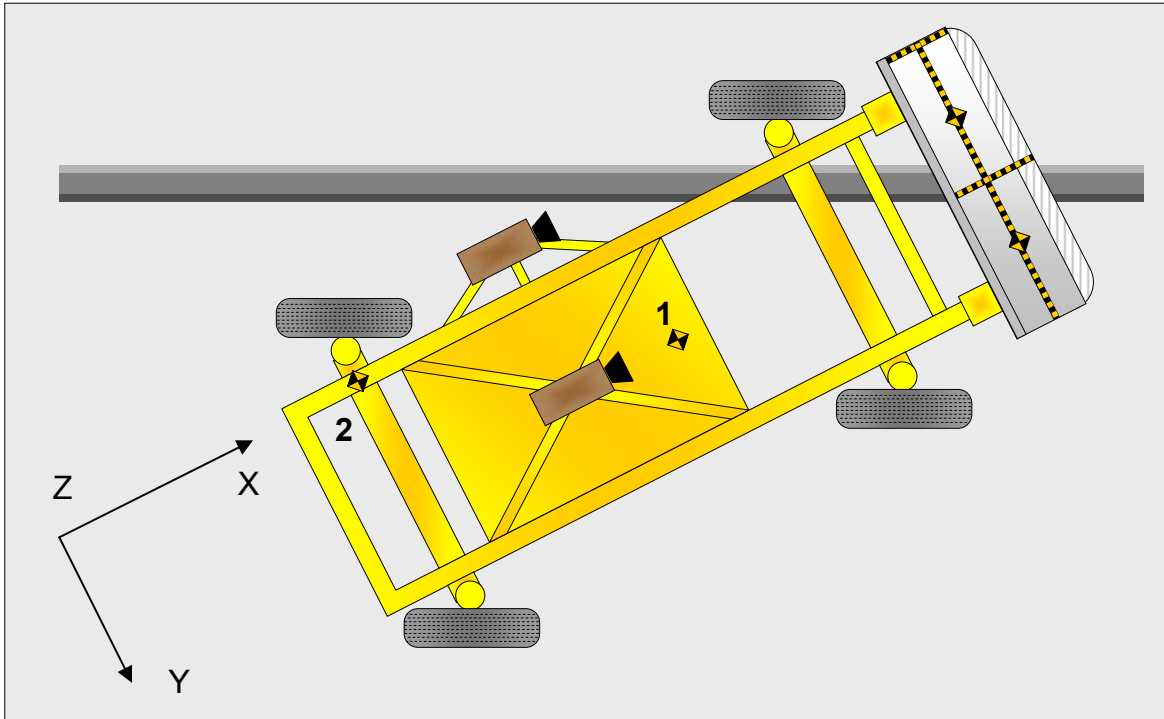
Loc. No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Right Sill at Front Seat	3112	717	260
2	Right Sill at Rear Seat	1573	730	278
3	Rear Floorpan Above Axle	1042	-44	576
4	Left Sill at Rear Door	1544	715	278
5	Left Sill at Front Door	3127	717	262
6	Rear Occupant Compartment	2233	711	491
7	Left Lower B-Post	2654	788	684
8	Left Middle B-Post	2633	784	917
9	Left Lower A-Post	3627	808	549
10	Left Middle A-Post	3643	823	1097
11	Front Seat Track	2743	651	526
12	Rear Seat Track or Structure	1771	621	637
13	Vehicle CG	2738	0	223

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 Dodge Grand Caravan SE
 Test Program: NCAP Side Impact

NHTSA No. L80300
 Test Date: 8/31/2007



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 Dodge Grand Caravan SE
 Test Program: NCAP Side Impact

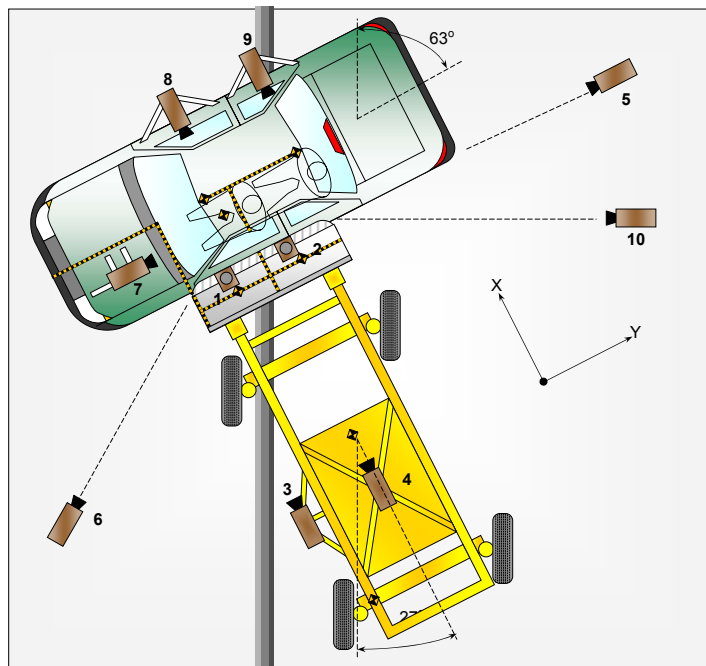
NHTSA No. L80300
 Test Date: 8/31/2007

	Elements	Pre-Test (mm)
1	Total Length	5143
2	Total Width	1959
3	Bumper Top Height	634
4	Bumper Bottom Height	468
5	Longitudinal Member Top Height	605
6	Distance between Longitudinal Members	944
7	Longitudinal Member Width	74
8	Engine Top Height	942
9	Engine Bottom Height	215
10	Engine and gearbox width	890
11	Front bumper-engine distance	562
12	Front shock absorber fixing height	979
13	Bonnet leading edge height	901
14	Front shock absorber fixing width	1319
15	Front bumper – front axle distance	923
16	Front axle – a pillar distance	475
17	A-pillar – B-pillar distance	1080
18	B-Pillar – rear axle distance	1524
19	B-pillar – C-pillar distance	1030
20	Roof sill bottom height	1635
21	Roof sill top height	1687
22	Floor sill bottom height	189
23	Floor sill top height	316

DATA SHEET NO. 16
HIGH SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2008 Dodge Grand Caravan SE
 Test Program: NCAP Side Impact

NHTSA No. L80300
 Test Date: 8/31/2007



No.	Camera View	Location (mm)			Lens (mm)	Film Speed (fps)
		X	Y	Z		
1	Overhead Close-up	120	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	-1130	5040	1230	24	1000
6	Left Side, Ground Level, Overall	1140	-5250	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	Onboard Child Seat				8	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 Dodge Grand Caravan SE
 Test Program: NCAP Side Impact

NHTSA No. L80300
 Test Date: 8/31/2007

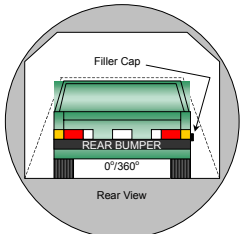
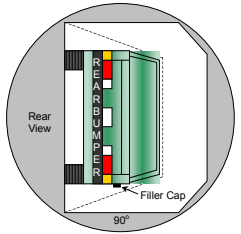
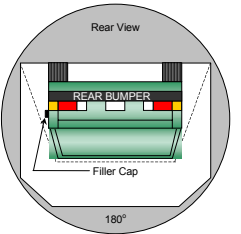
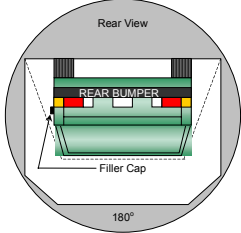
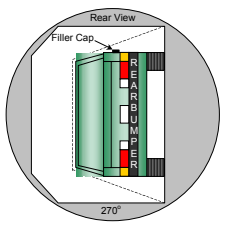
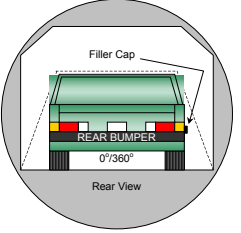
FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 21° C Test Time: 11:18 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

			<p>1. The specified fixture rollover rate for each 90° of rotation is 60 to 180 seconds.</p> <p>2. The position hold time at each position is 300 seconds (minimum).</p> <p>3. Details of Stoddard Solvent spillage locations: None</p>
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°	117	300	First 5	0
180° to 270°	116	300	First 5	0
270° to 360°	118	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 ¾ View



Post-Test Left Front ¾ View



Pre-Test Left Side View



Pre-Test Left Rear 3/4 View



Post-Test Left Rear 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



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



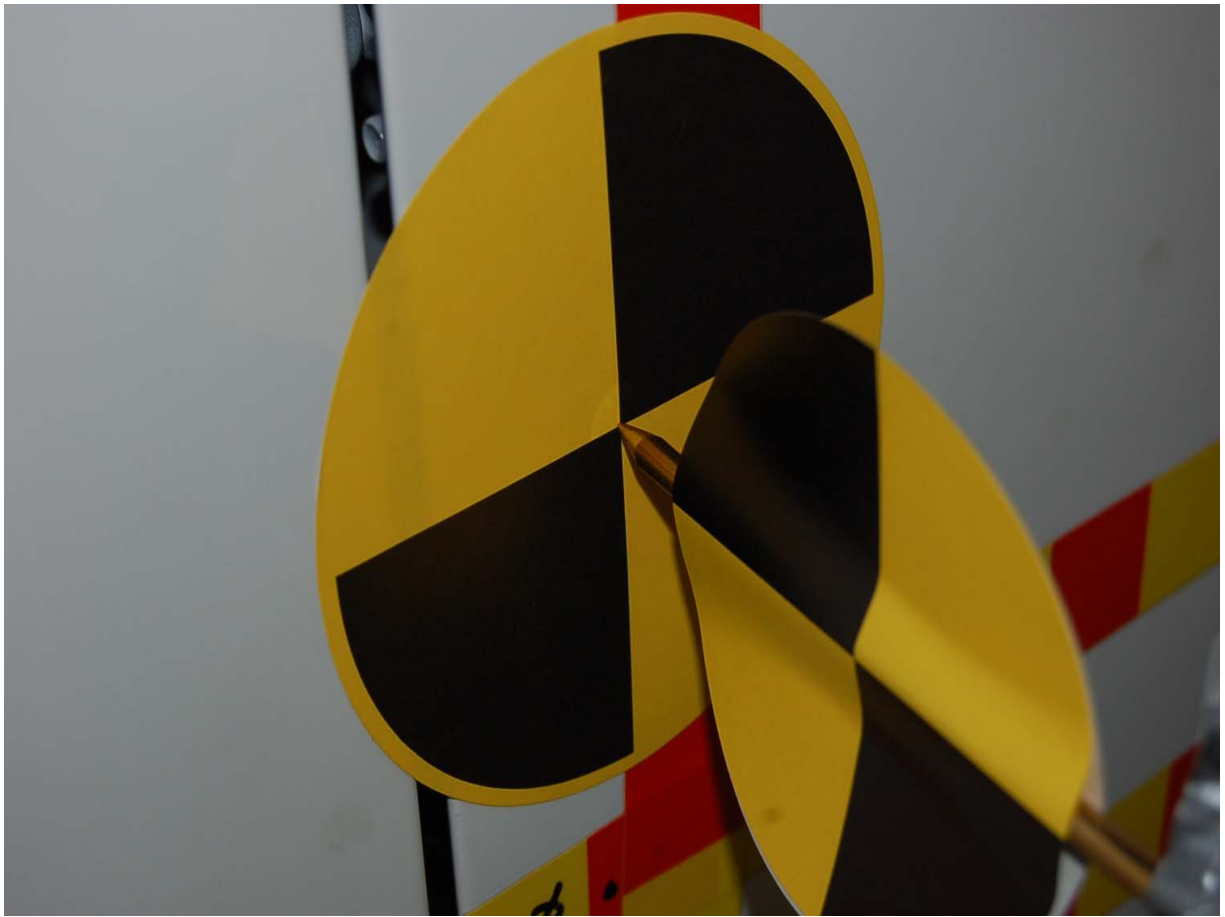
Post-Test Right Front $\frac{3}{4}$ View



Pre-Test Overhead View



Post-Test Overhead View



Pre-Test Left Impact Point



Post-Test Left Impact Point



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



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



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



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



Pre-Test Left Side Impact Close-up



Post-Test Left Side Impact Close-up



Pre-Test Driver Dummy (Door Open)



Pre-Test Driver Dummy Clearance From Door



Post-Test Driver Dummy Clearance From Door



Pre-Test Driver Dummy (Through Window)



Post-Test Driver Dummy (Through Window)



Pre-Test Driver Dummy Right Side View



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)



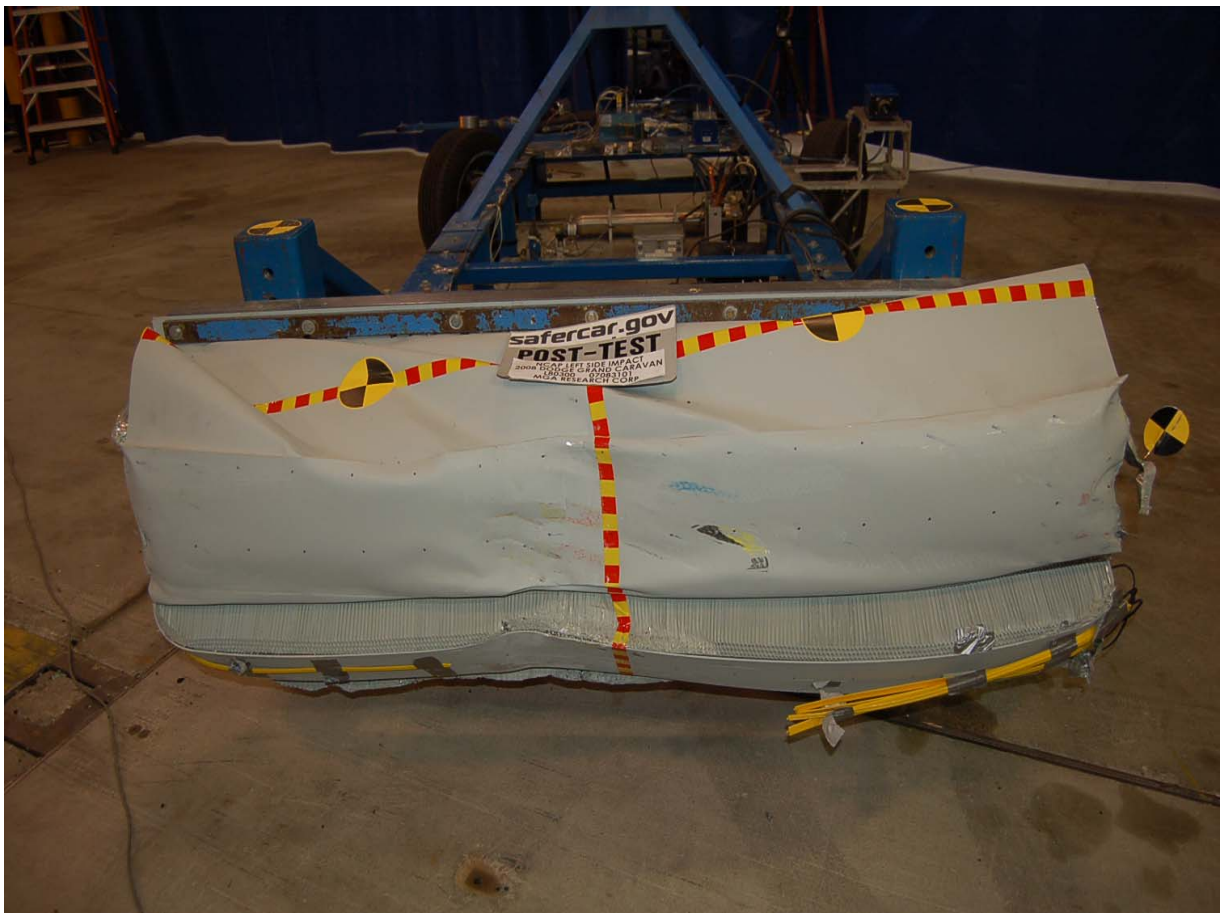
Pre-Test Passenger Dummy Right Side View



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



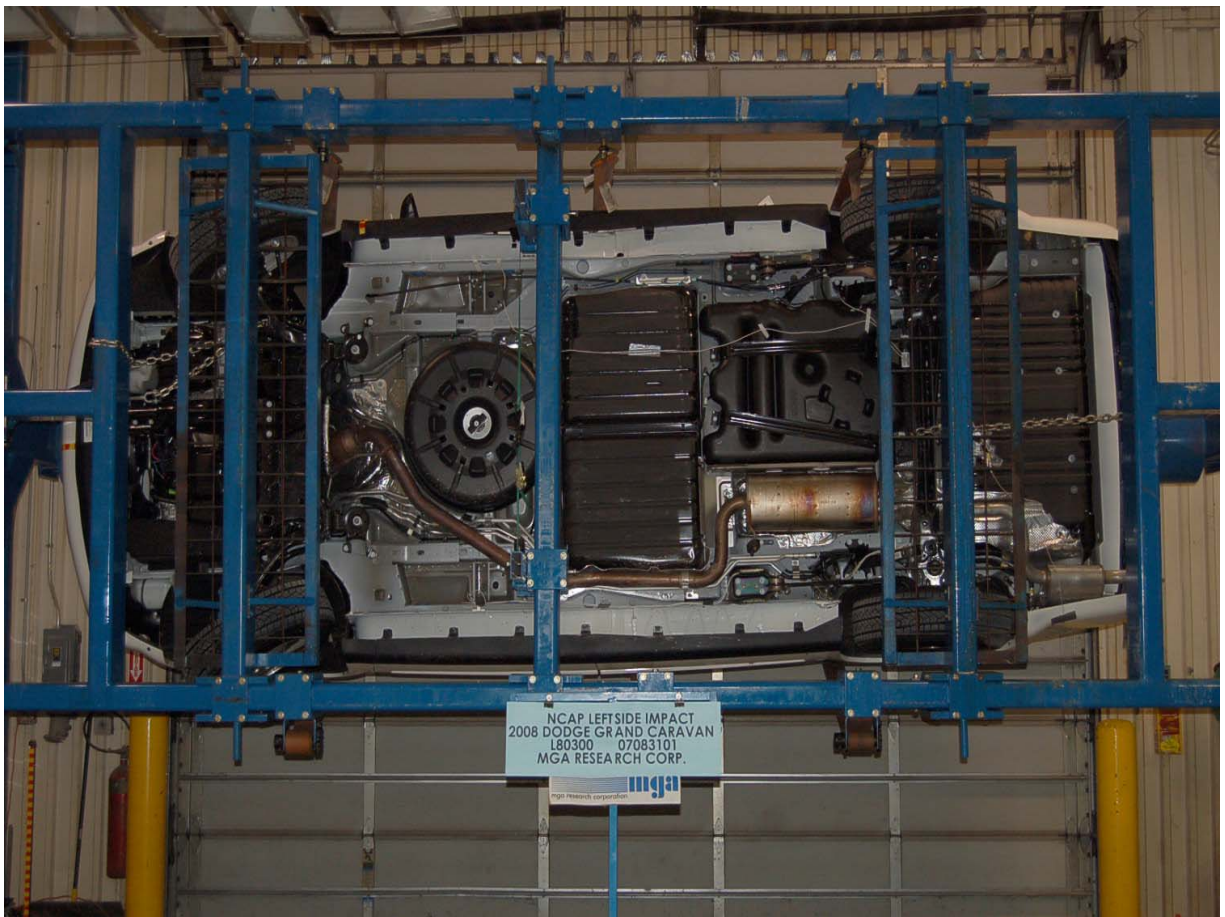
Post-Test Left Side View of Deformable Barrier



Vehicle on Rollover Device (90 Degrees)



Vehicle on Rollover Device (180 Degrees)



Vehicle on Rollover Device (270 Degrees)



Vehicle on Rollover Device (360 Degrees)

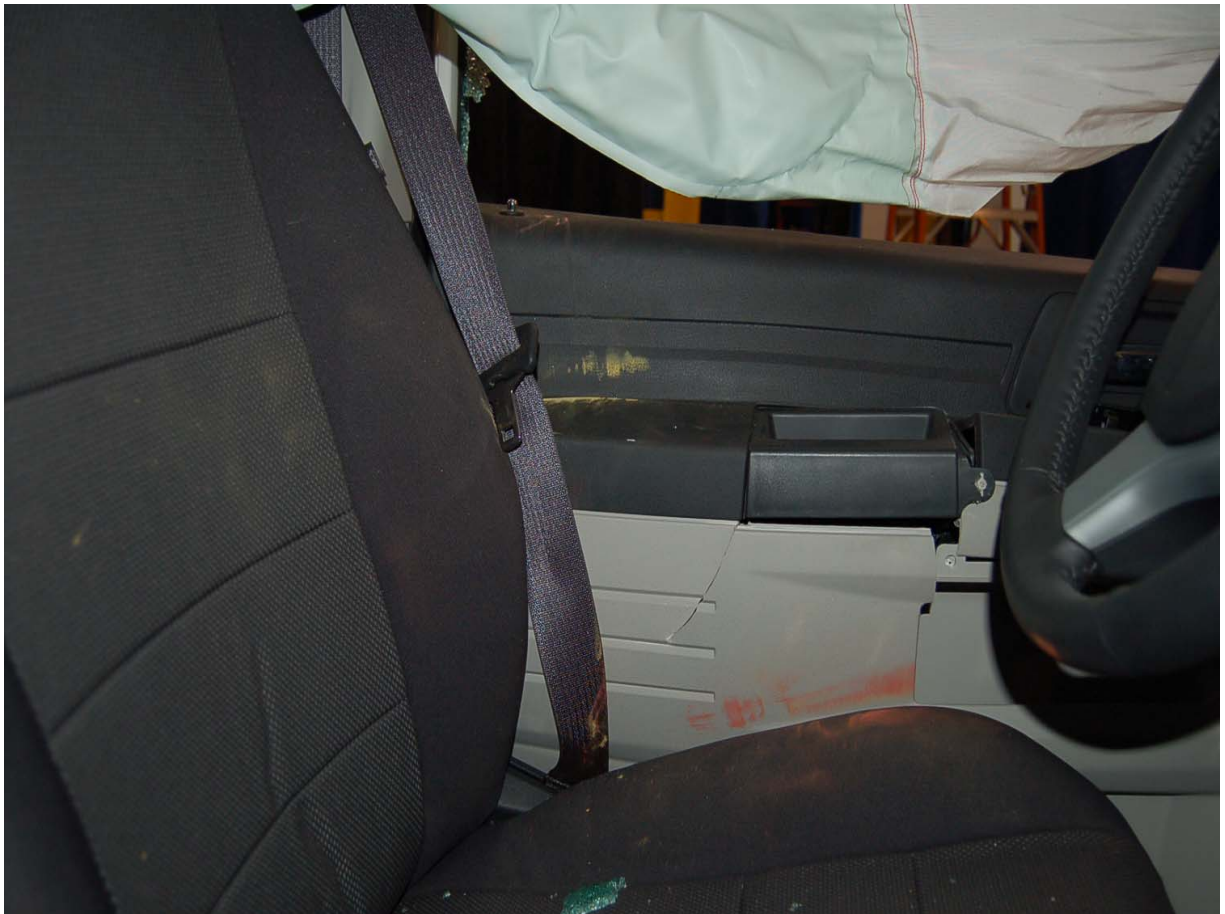


96,00 ms • 31 Aug 2007 11:25 • T0: 21 • 1,000 fps • Frame: 117

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

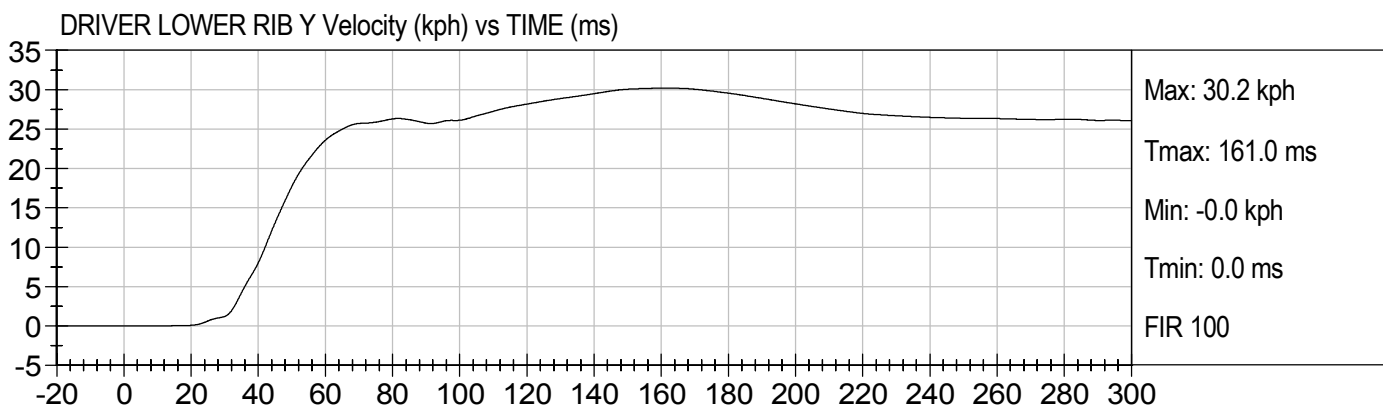
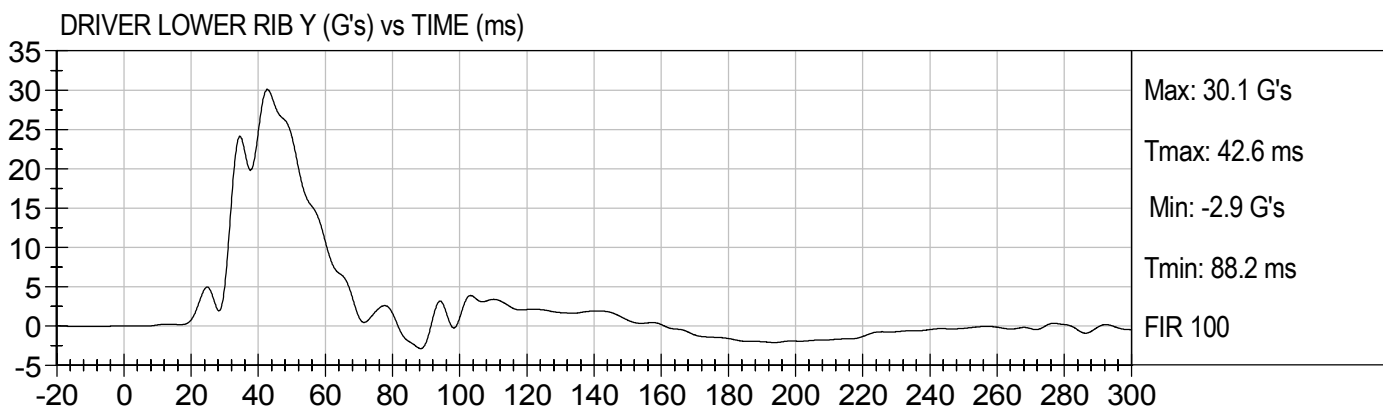
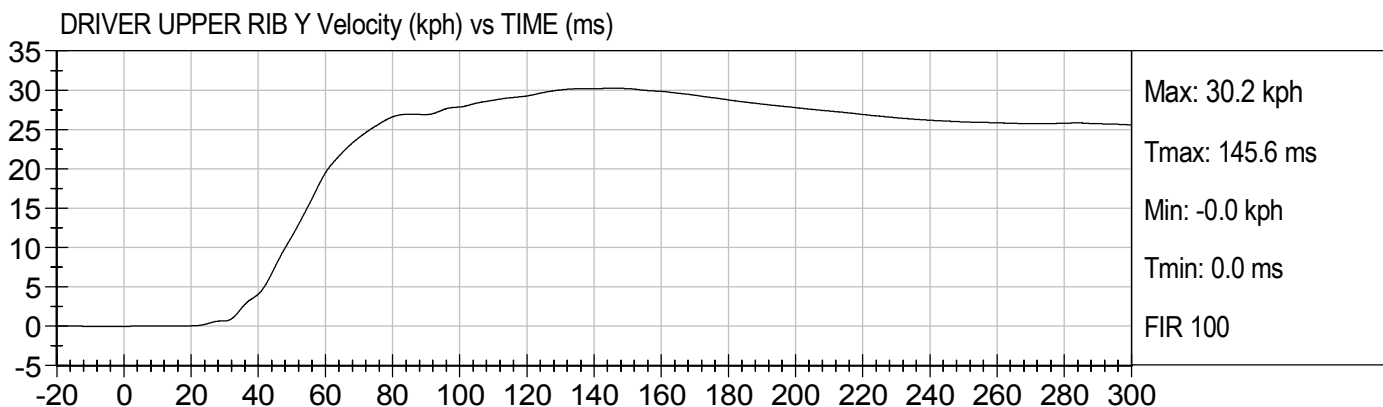
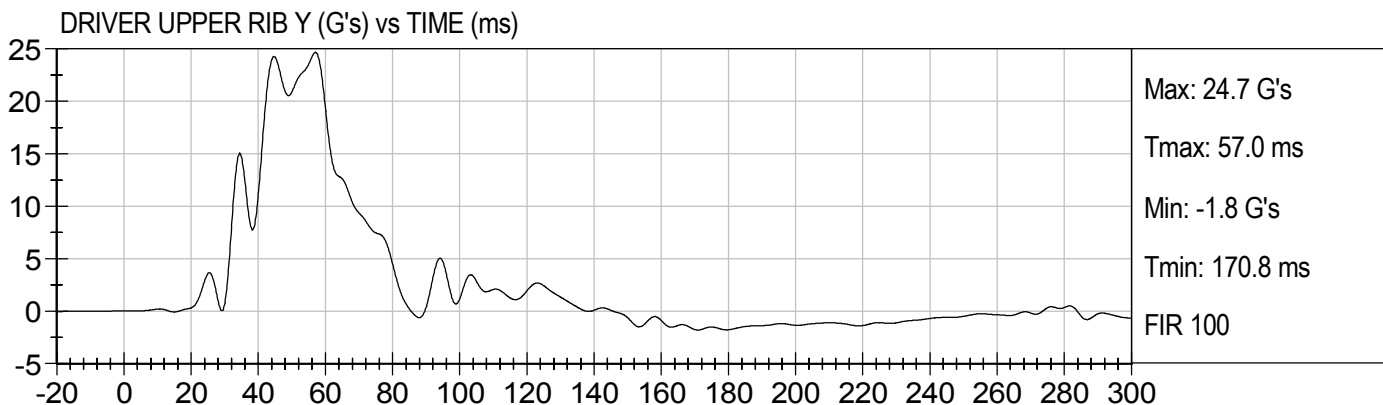
Driver Upper Neck Force Y

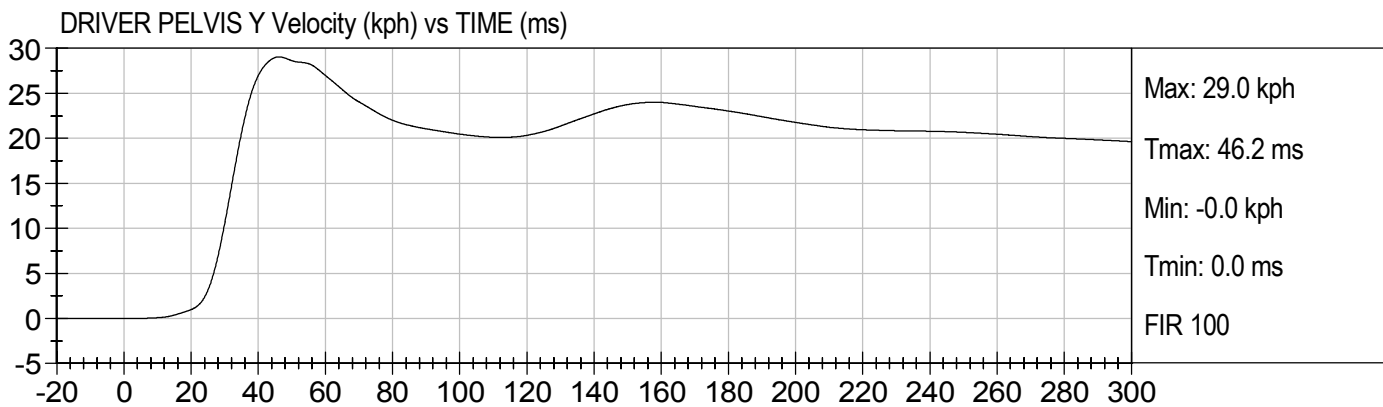
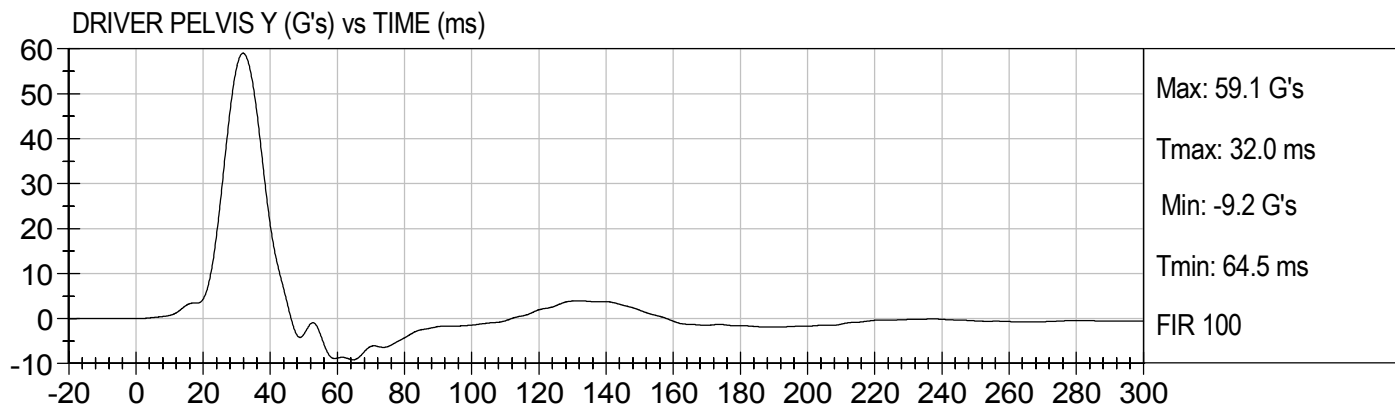
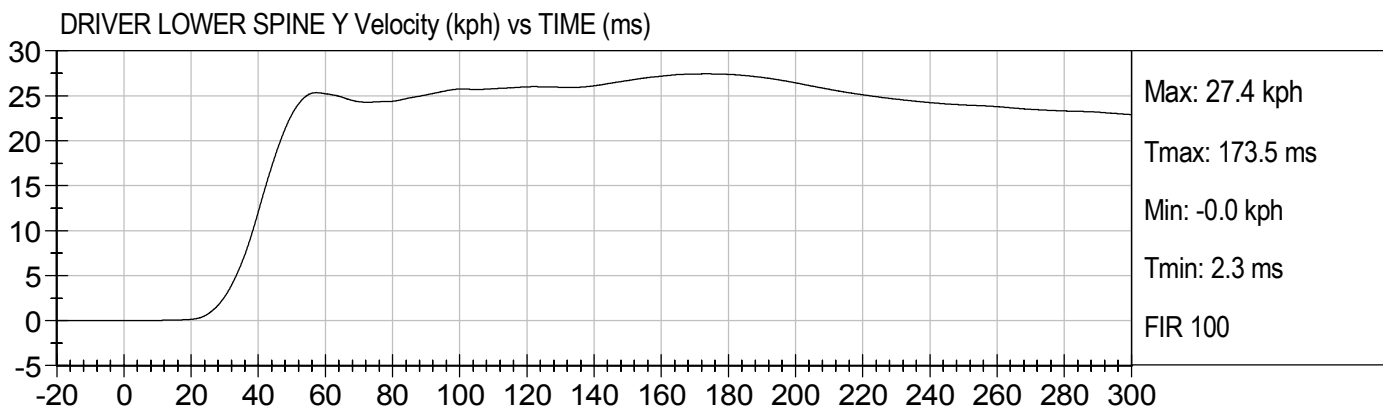
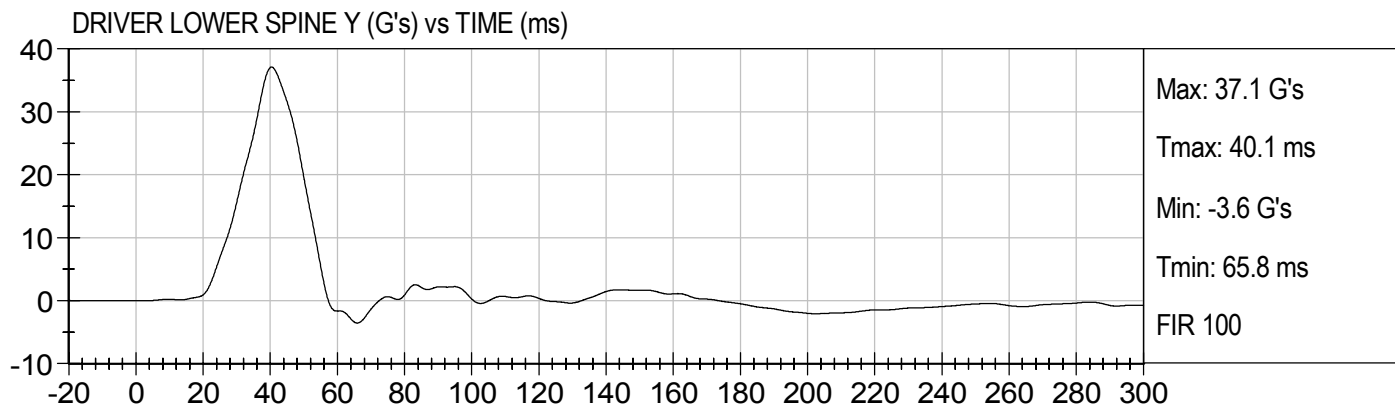
Driver Upper Neck Force Z

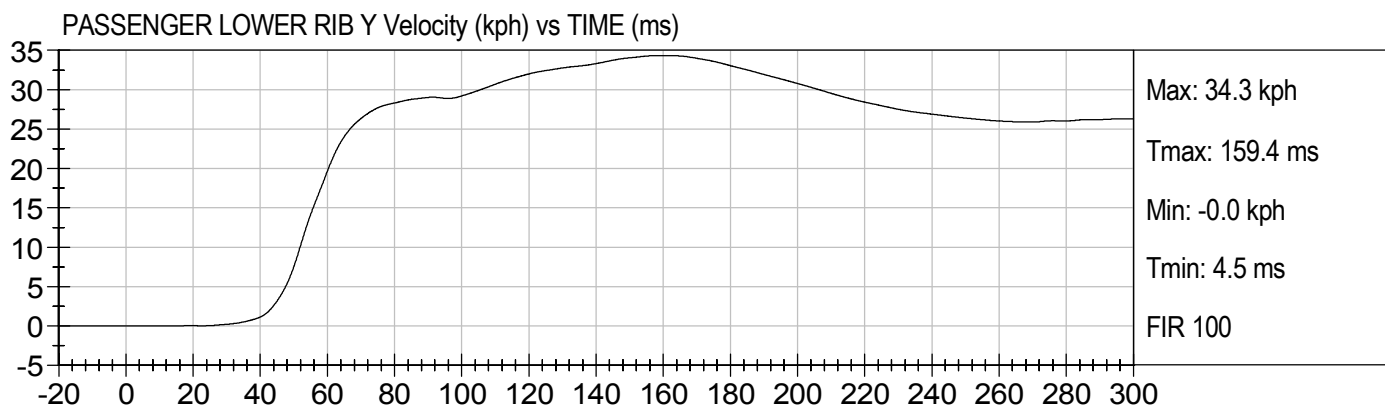
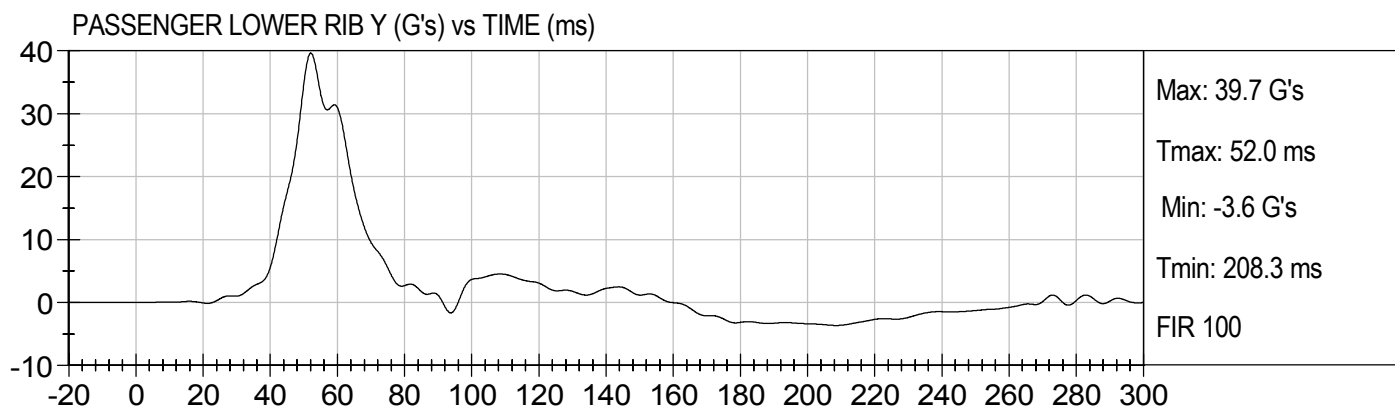
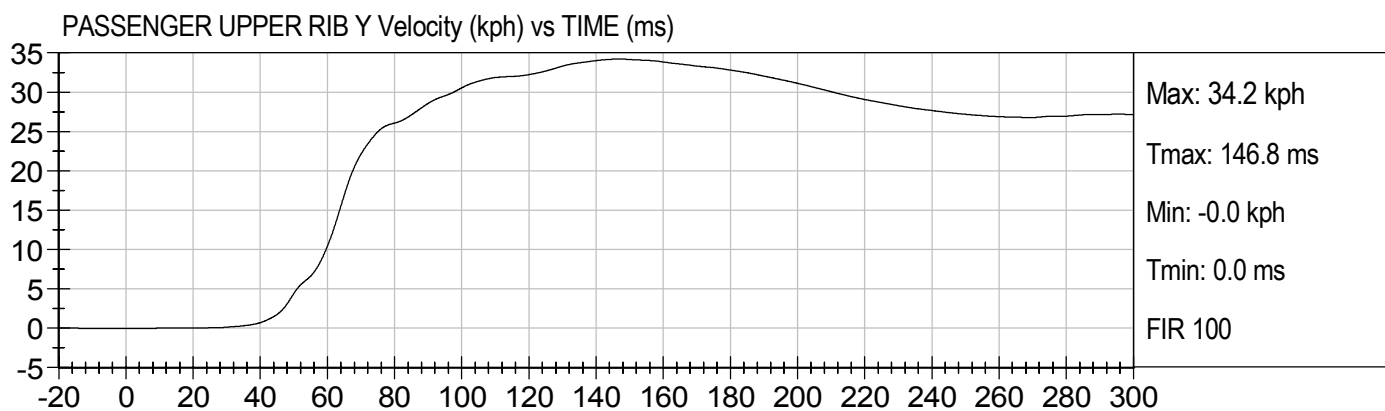
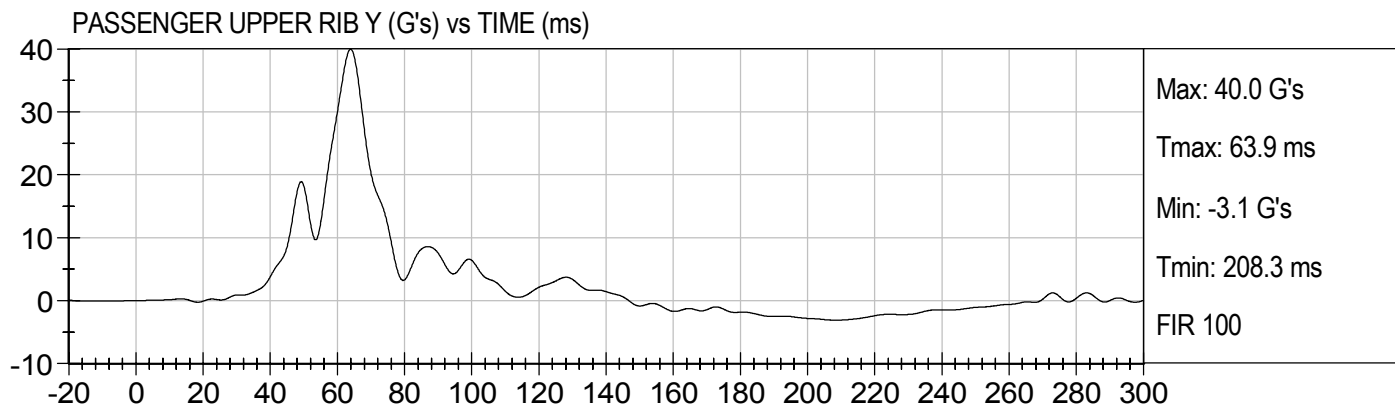
Driver Upper Neck Moment X

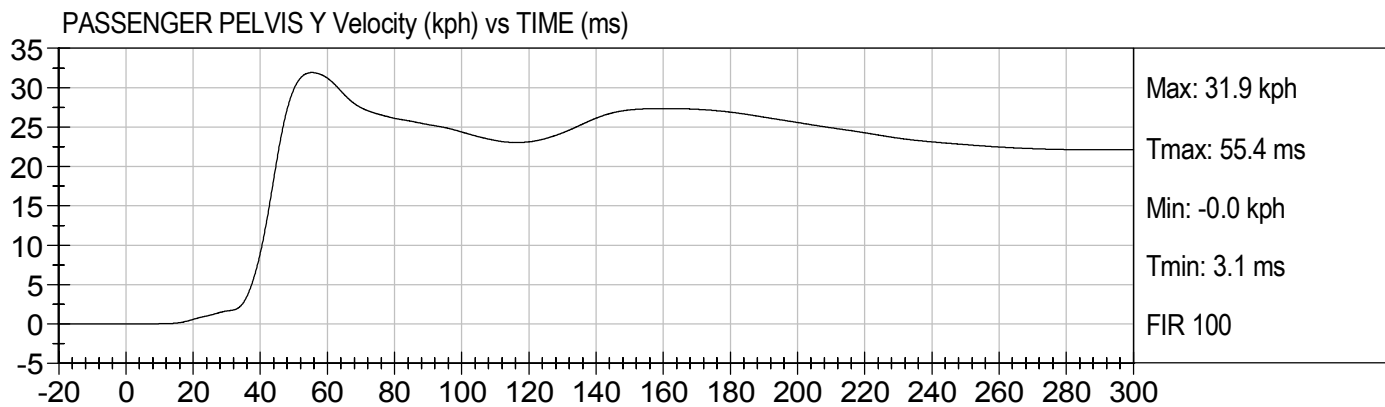
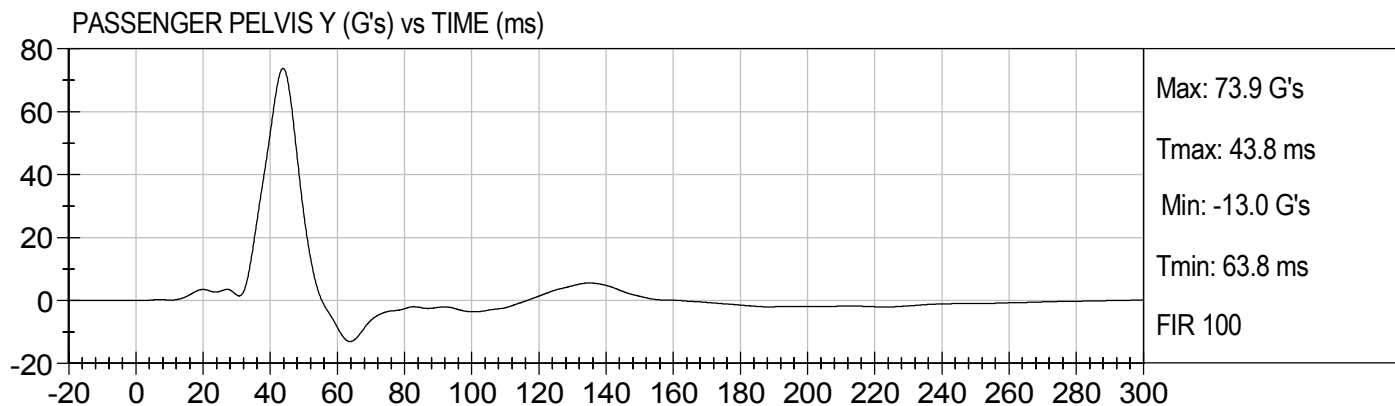
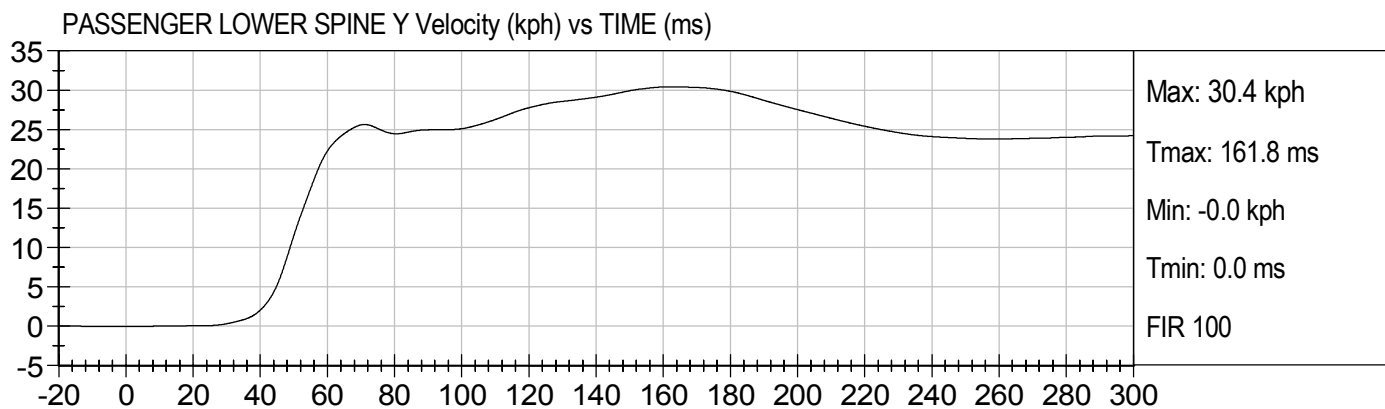
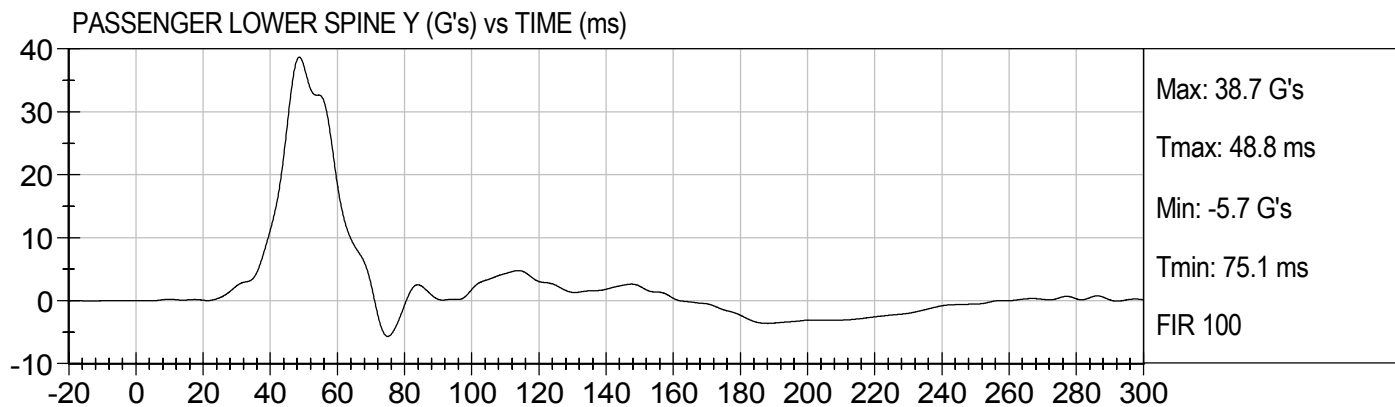
Driver Upper Neck Moment Y
Driver Upper Neck Moment Z
Driver Upper Rib Redundant Y
Driver Lower Rib Redundant Y
Driver Lower Spine Redundant Y
Driver Pelvis Redundant Y
Driver Thorax Contact
Driver Pelvis Contact
Passenger Head X Primary
Passenger Head Y Primary
Passenger Head Z Primary
Passenger Head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









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.: D07267

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

8/30/2007
 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.: D072671

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	38	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	-7.7	Pass
Overall Test Results				Pass

Jessica Gall
 Laboratory Technician

8/30/07
 Test Date

David Winkelbauer
 Approved By



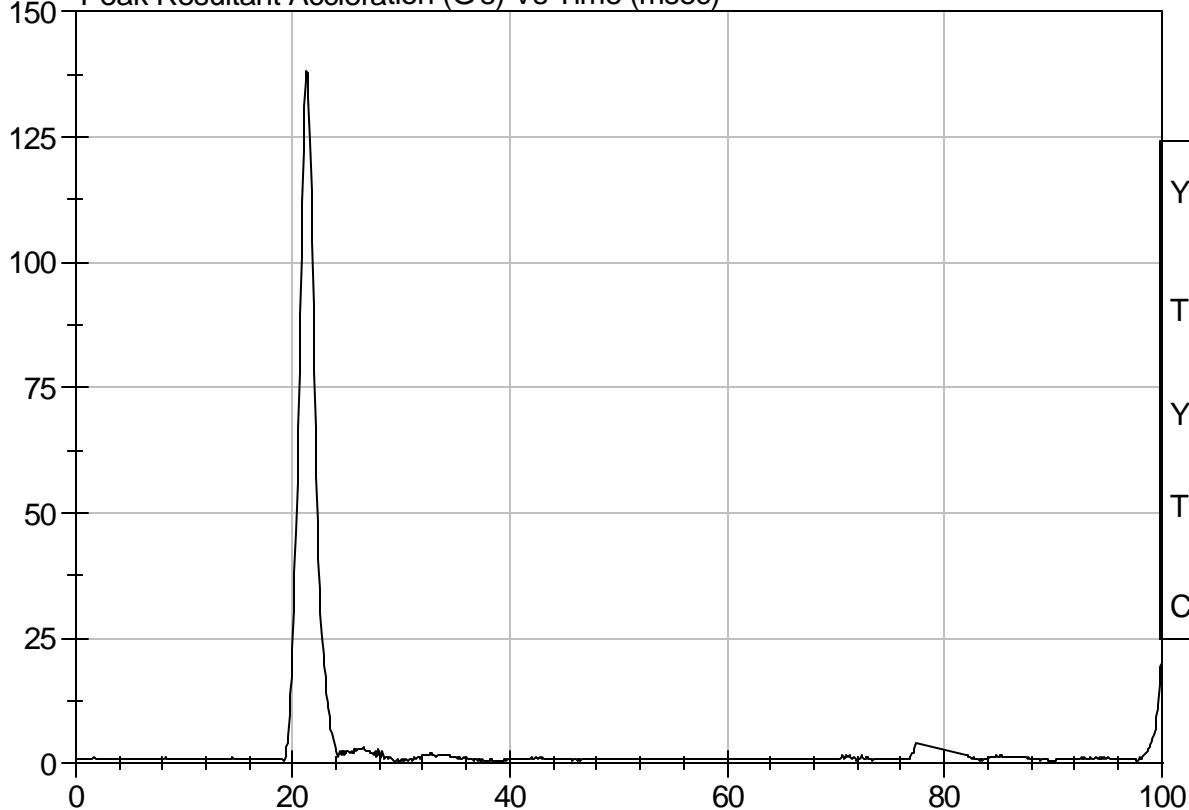
Test Description: Head Drop

Test Date: 8/30/07

Component: D072671

Speed: 0 ft/s, 0 m/s

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



YMax: 138.1 G

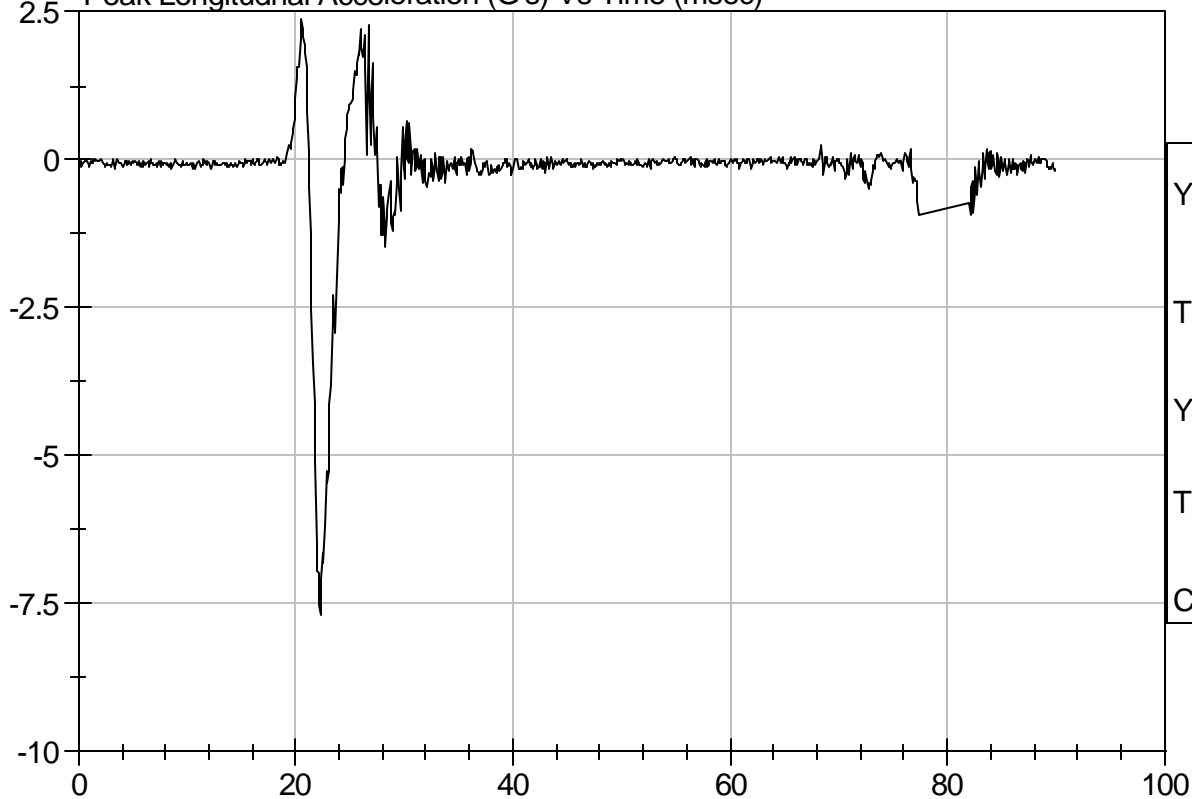
Tmax: 21.3 ms

YMin: 0.3 G

Tmin: 29.4 ms

CFC 1000

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



YMax: 2.4 G

Tmax: 20.5 ms

YMin: -7.7 G

Tmin: 22.3 ms

CFC 1000

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

ATD Serial No: 271

Test I.D.: D072672

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	20.6	Pass
Laboratory Relative Humidity	%	10 to 70	40	Pass
Probe Velocity	m/s	4.22 - 4.31	4.30	Pass
Upper Rib	G's	37 - 46	44	Pass
Lower Rib	G's	37 - 46	43	Pass
Lower Spine	G's	15 - 22	19	Pass
Overall Test Results				Pass

Jessica Gall
 Laboratory Technician

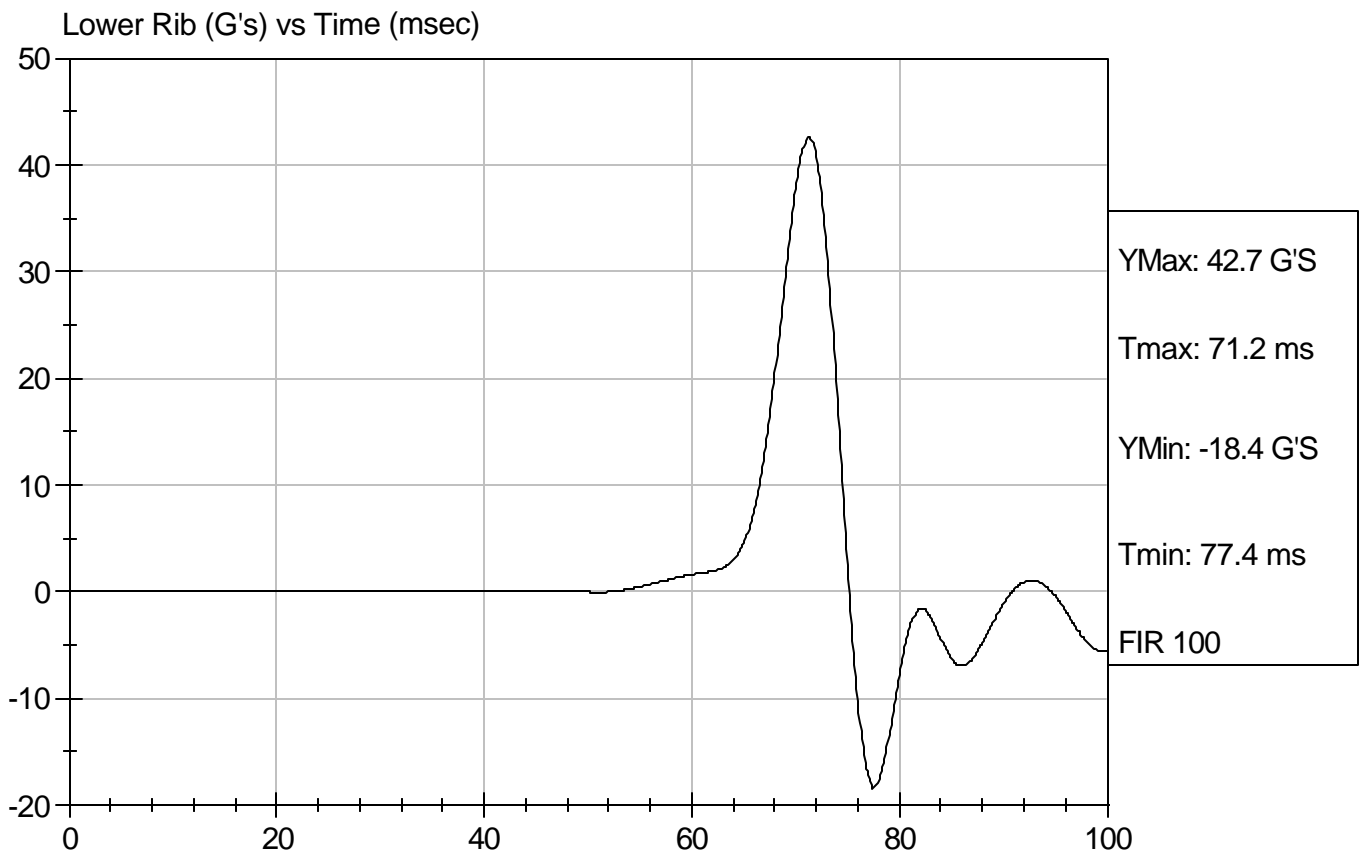
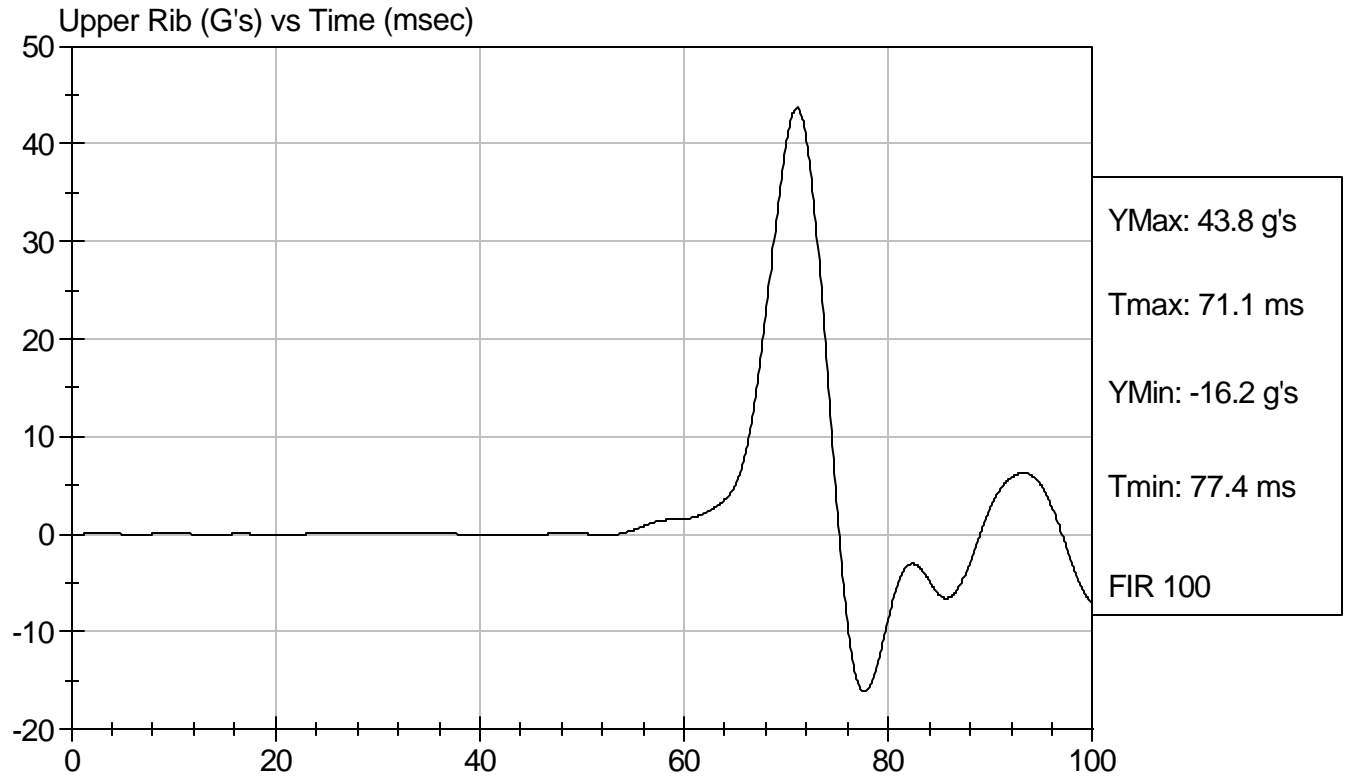
8/30/07
 Test Date

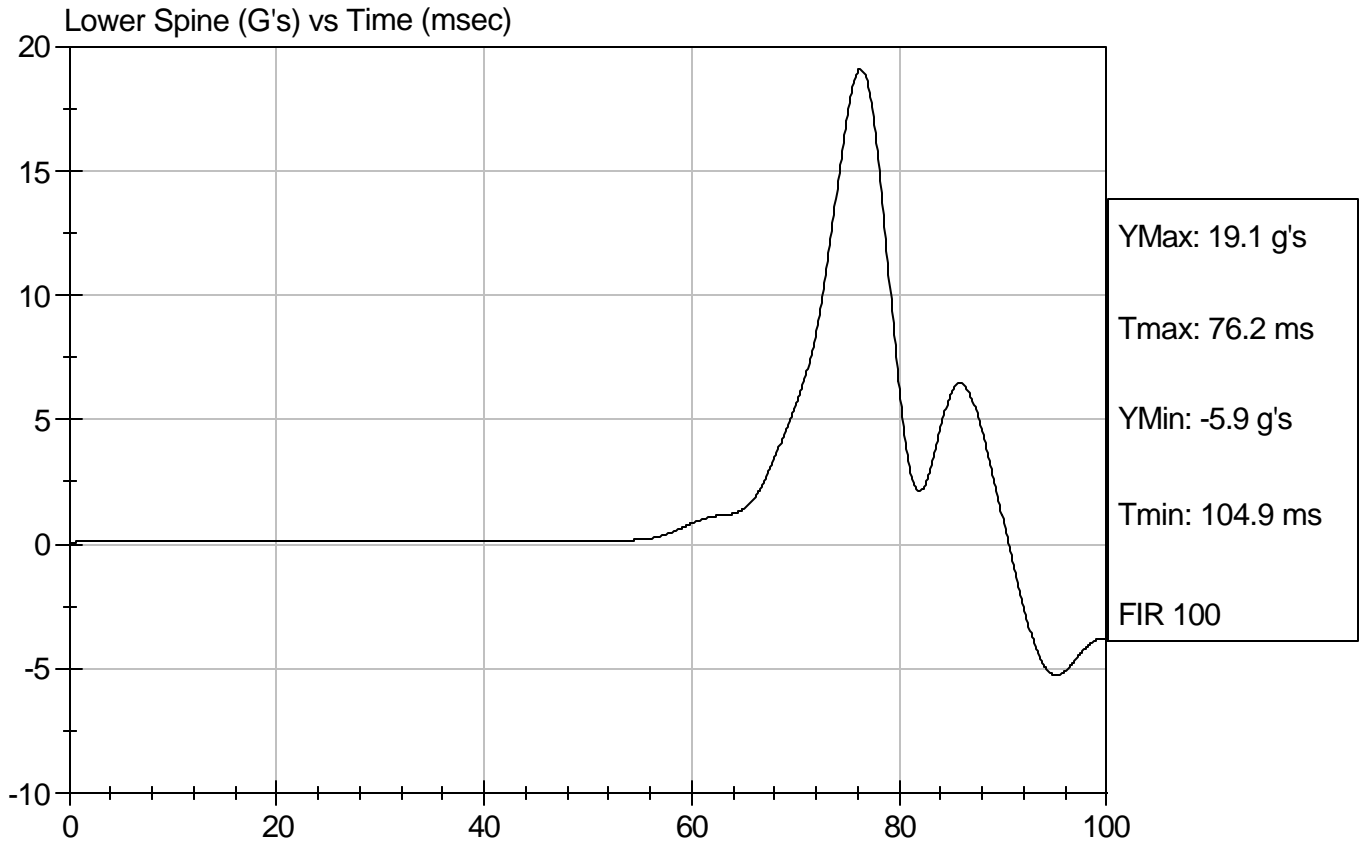
David Winkelbauer
 Approved By



Test Desc: Thorax Impact
Component ID: D072672

Test Date: 8/30/07
Speed: 14.12 ft/sec, 4.30 m/sec





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

ATD Serial No: 271

Test I.D.: D072673

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

Jessica Gall
Laboratory Technician

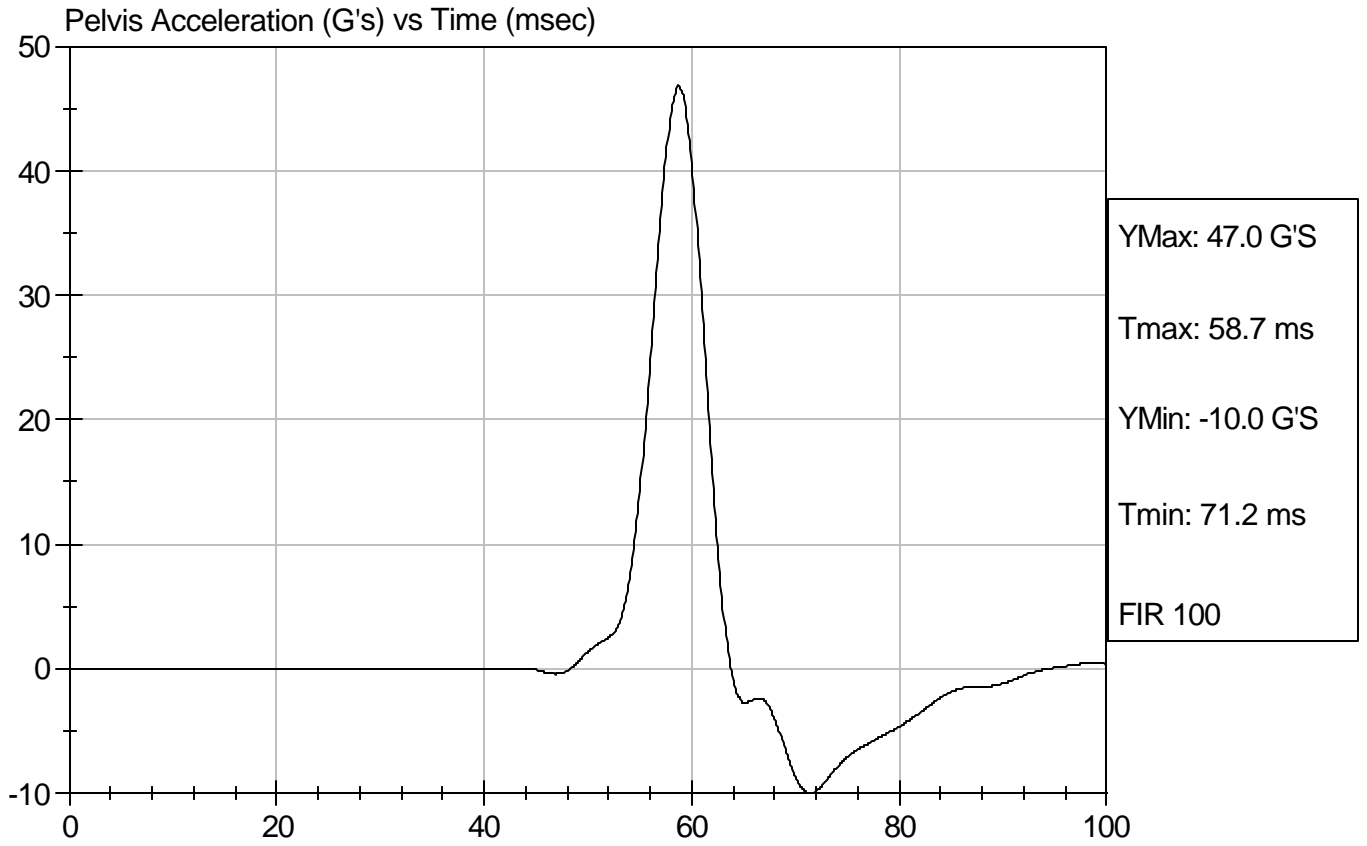
8/30/07
Test Date

David Winkelbauer
Approved By



Test Desc: Pelvis Impact
Component ID: D072673

Test Date: 8/30/07
Speed: 14.00 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.: D072674

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	20.4	Pass
Laboratory Relative Humidity	%	10 to 70	37	Pass
Force At 12.7 mm	N	104 -162	142	Pass
Force At 19 mm	N	163 - 222	195	Pass
Force At 25.4 mm	N	222 - 280	259	Pass
Force At 33 mm	N	325 - 391	349	Pass
Overall Test Results				Pass

Jessica Gall
Laboratory Technician

8/30/07
Test Date

David Winkelbauer
Approved By

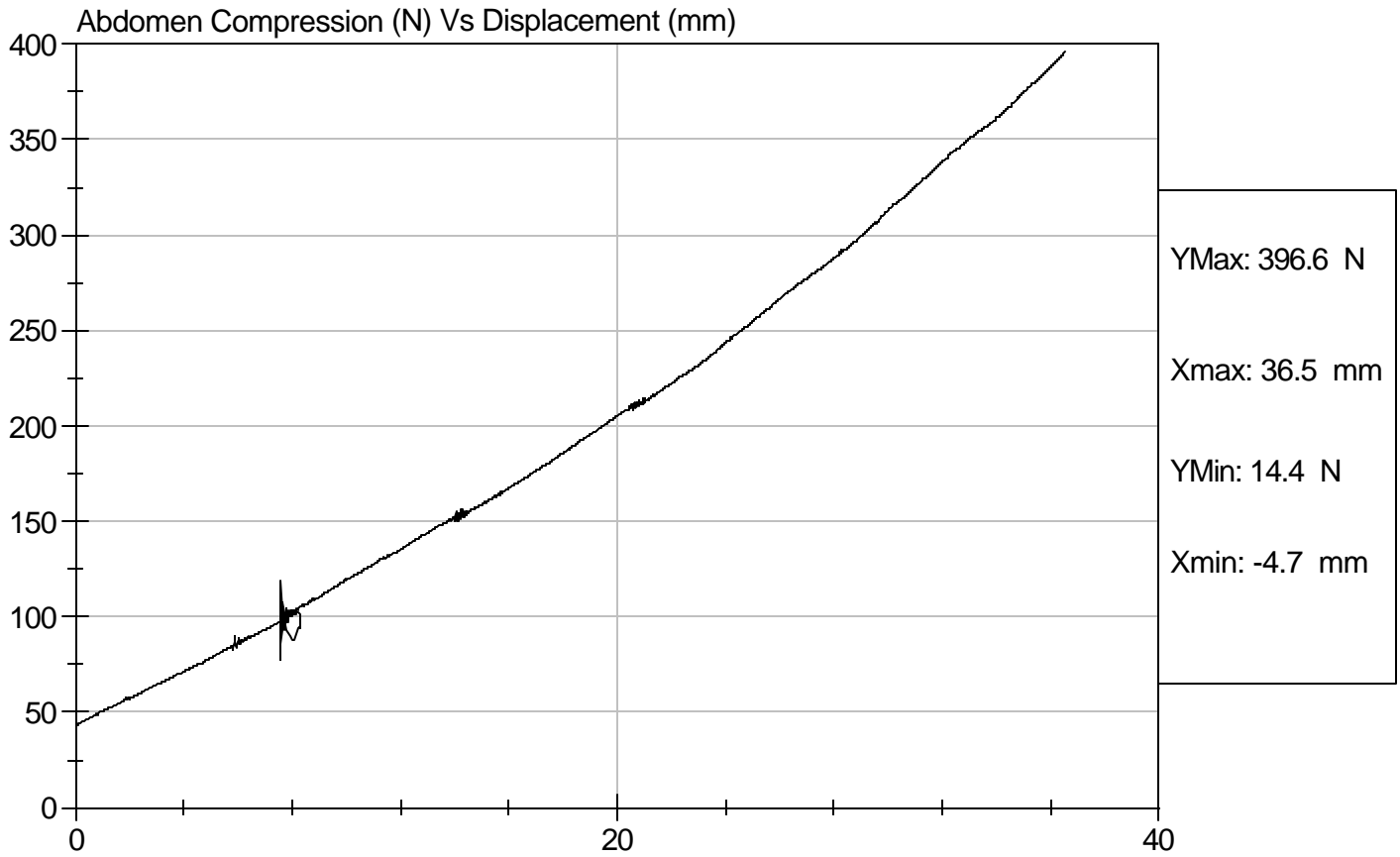


Test Description: Abdomen Compression

Test Date: 8/30/07

Component: D072674

Speed: 0 ft/sec, 0 m/sec



SID Calibration Data Sheet
Side Impact Dummy
Lumbar Flexion Calibration

ATD Serial No: 271

Test I.D.: D072675

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	20.4	Pass
Laboratory Relative Humidity	%	10 to 70	37	Pass
Force At 0 deg	N	0 - 26.7	0	Pass
Force At 20 deg	N	97.9 - 151.2	132.3	Pass
Force At 30 deg	N	151.2 - 204.6	180.8	Pass
Force At 40 deg	N	204.6 - 258.0	233.1	Pass
Return Angle	Deg	12 Maximum	4	Pass
Overall Test Results				Pass

Jessica Gall
 Laboratory Technician

8/30/07
 Test Date

David Winkelbauer
 Approved By

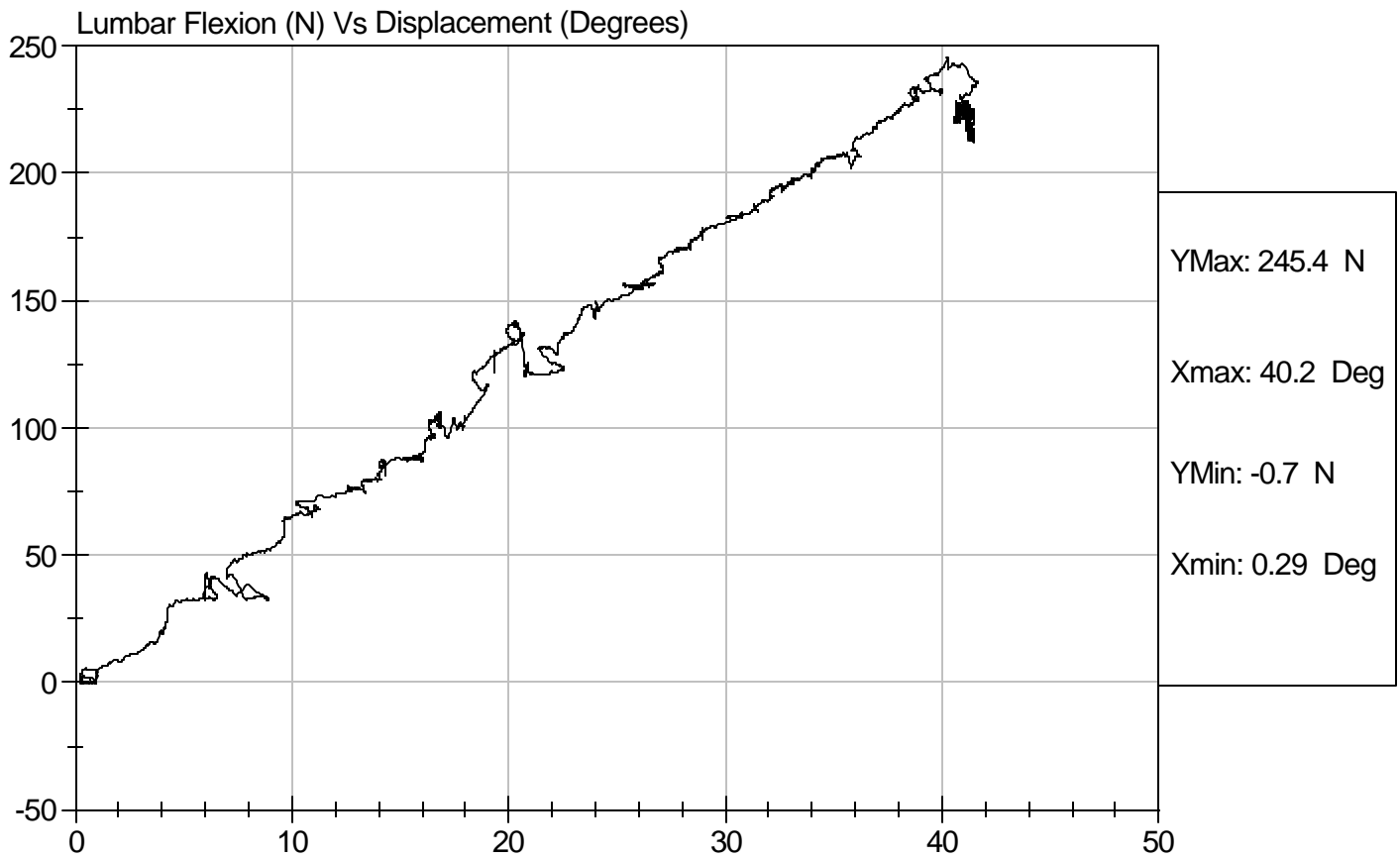


Test Description: Lumbar Flexion

Test Date: 8/30/07

Component: D072675

Speed: 0 ft/sec, 0 m/sec



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

ATD Serial No: 271

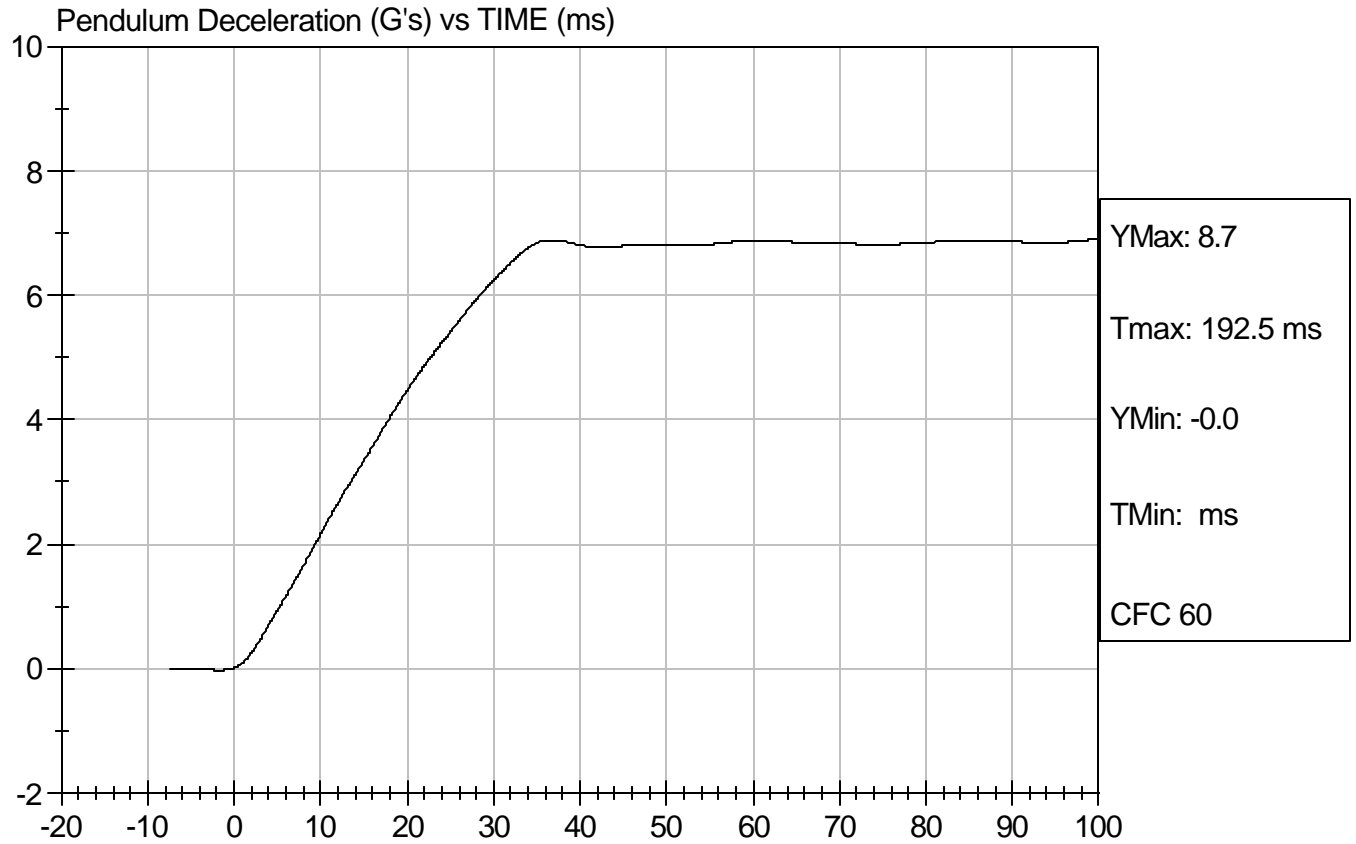
Test I.D.: D072679

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity		%	10 to 70	37	Pass
Impact Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 msec	m/s	1.96 to 2.55	2.17	Pass
	20 msec	m/s	4.12 to 5.10	4.48	Pass
	30 msec	m/s	5.73 to 7.01	6.24	Pass
	40 to 70 msec	m/s	6.27 to 7.64	6.84	Pass
Midsaggital Plane Max Rotation		deg	66 to 82	76	Pass
Head Rotation Peak to Zero - Decay Time		msec	58 to 67	59	Pass
Max. Mx at Occipital Condyles		Nm	73 to 88	73	Pass
Mx Peak To Zero - Decay Time		msec	49 to 64	60	Pass
Mx Peak to Max. Head Rotation		msec	2 to 16	14	Pass

Jessica Gall
Laboratory Technician

8/30/07
Test Date

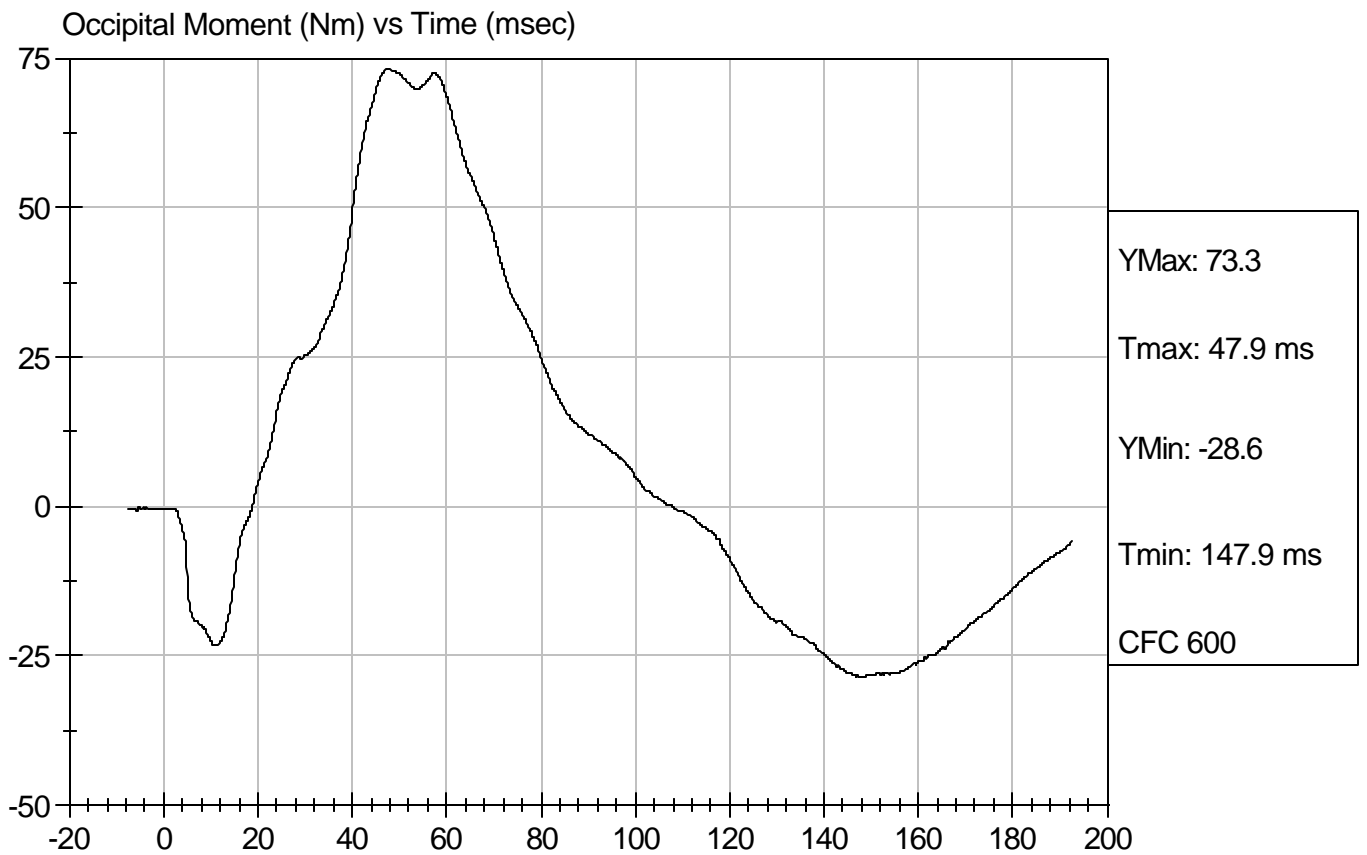
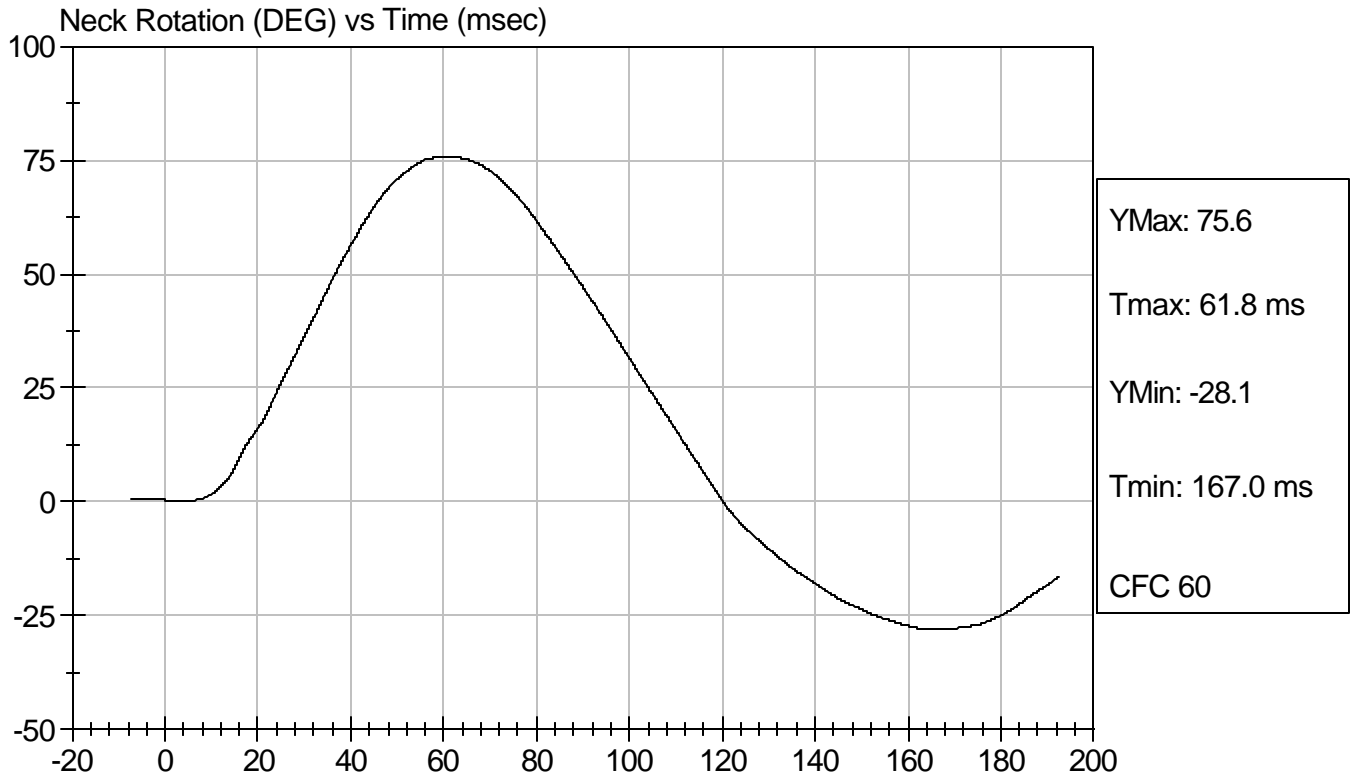
David Winkelbauer
Approved By





Test Desc: Neck Bending
Component ID: D072679

Test Date: 8/30/07
Speed: 23.148 ft/sec, 7.06 m/sec



Calibration Test Results Summary

Dummy Serial Number: 271

Post-Test Calibration

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

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

ATD Serial No: 271

Test I.D.: D072691

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	40	Pass
Peak Resultant Acceleration	G's	120 to 150	134	Pass
Is Resultant Curve Unimodal?	Yes/No	15% of peak	Yes	Pass
Peak Longitudnal Acceleration	G's	+/- 15	-10.2	Pass
Overall Test Results				Pass

Jessica Gall
 Laboratory Technician

9/4/07
 Test Date

David Winkelbauer
 Approved By



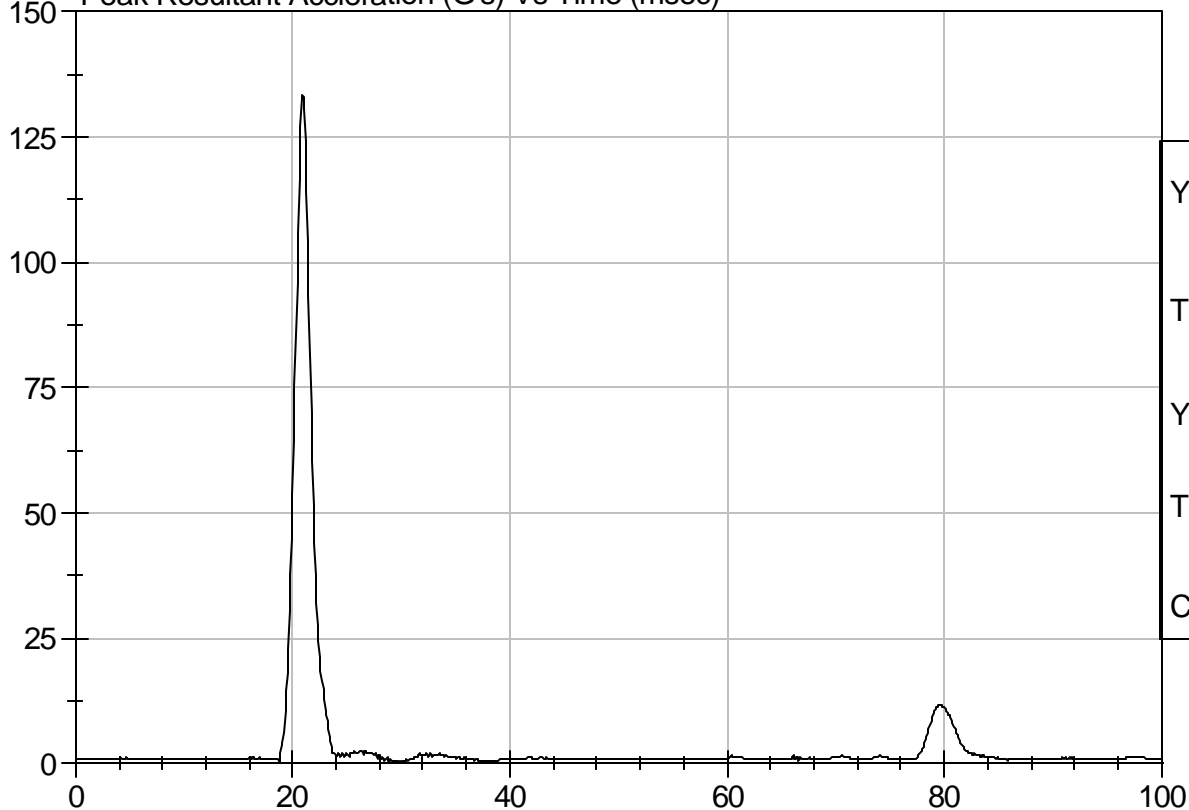
Test Description: Head Drop

Test Date: 9/4/07

Component: D072691

Speed: 0 ft/s, 0 m/s

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



YMax: 133.6 G

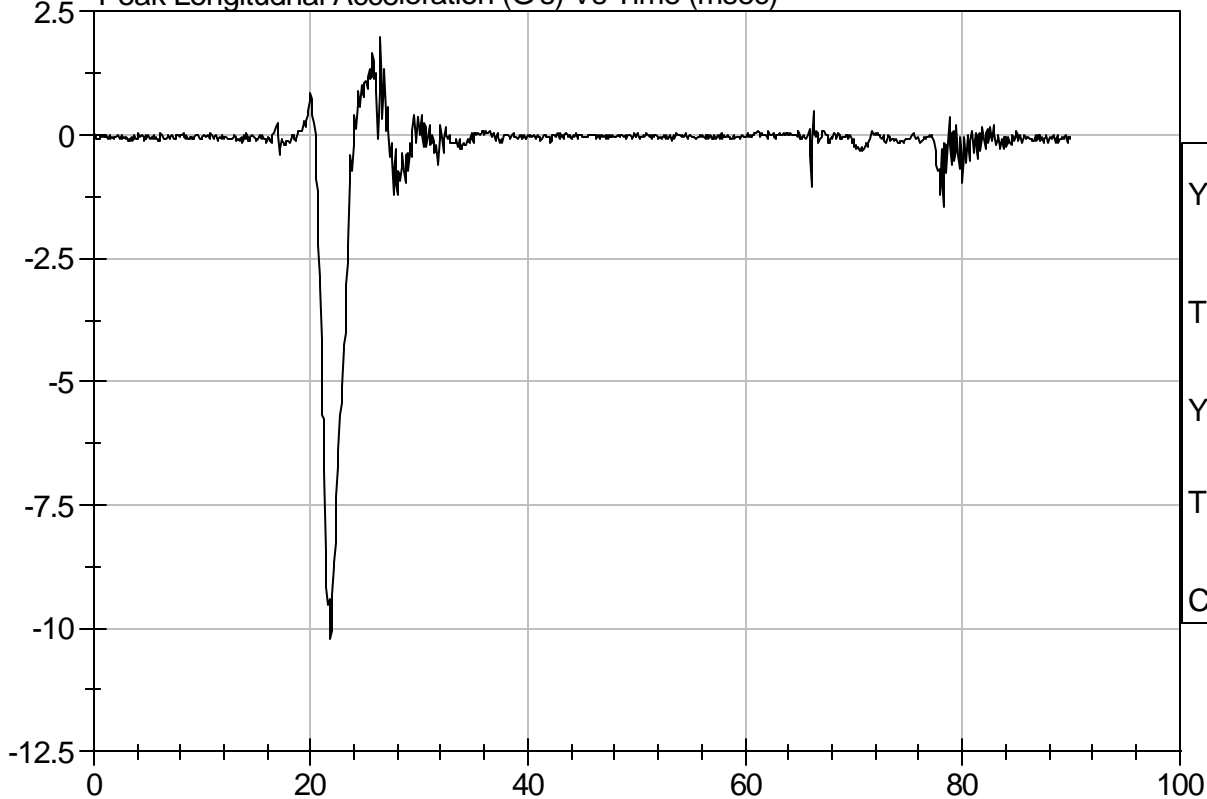
Tmax: 20.9 ms

YMin: 0.2 G

Tmin: 30.0 ms

CFC 1000

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



YMax: 2.0 G

Tmax: 26.4 ms

YMin: -10.2 G

Tmin: 21.8 ms

CFC 1000

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

ATD Serial No: 271

Test I.D.: D072692

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	20.6	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	44	Pass
Lower Rib	G's	37 - 46	44	Pass
Lower Spine	G's	15 - 22	19	Pass
Overall Test Results				Pass

Jessica Gall
 Laboratory Technician

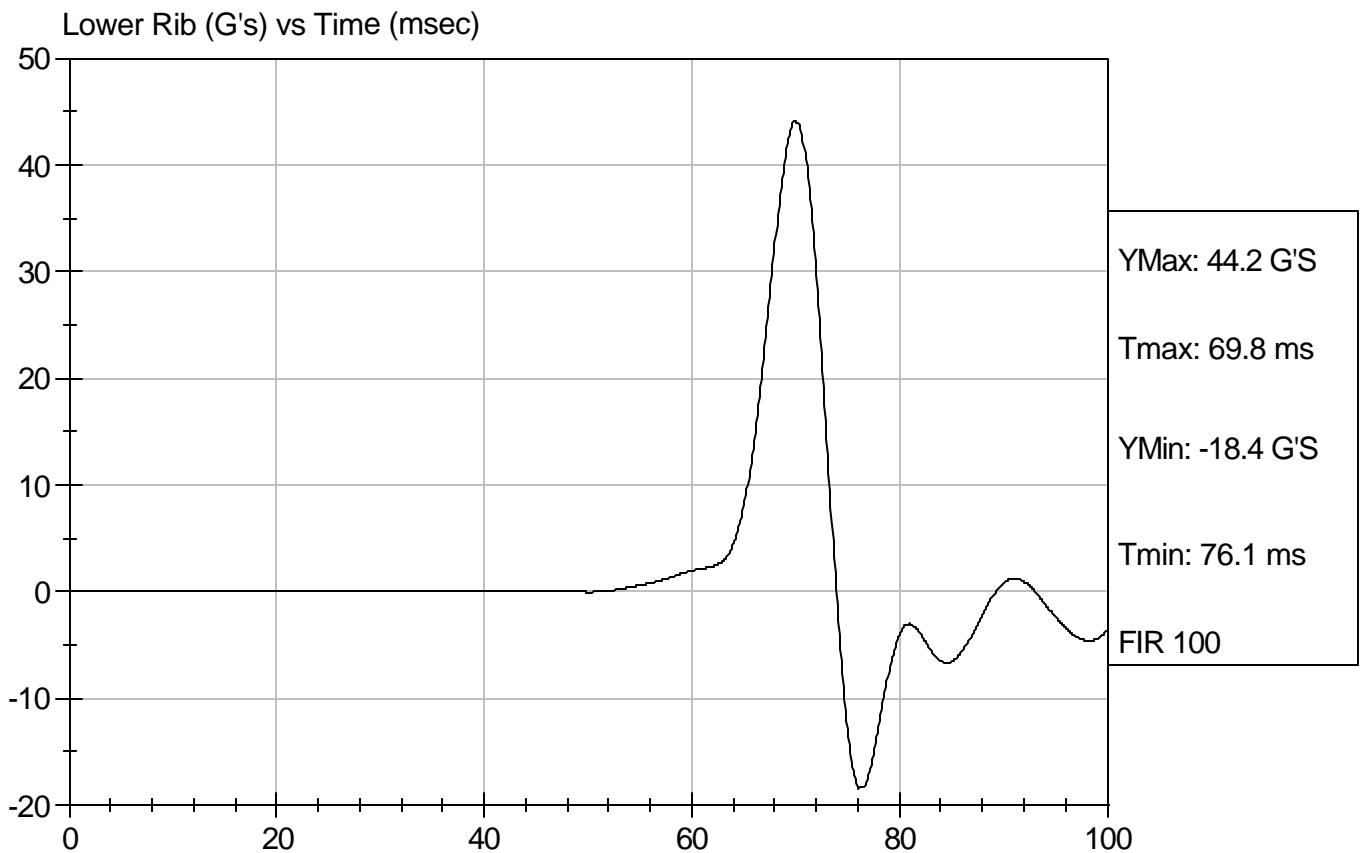
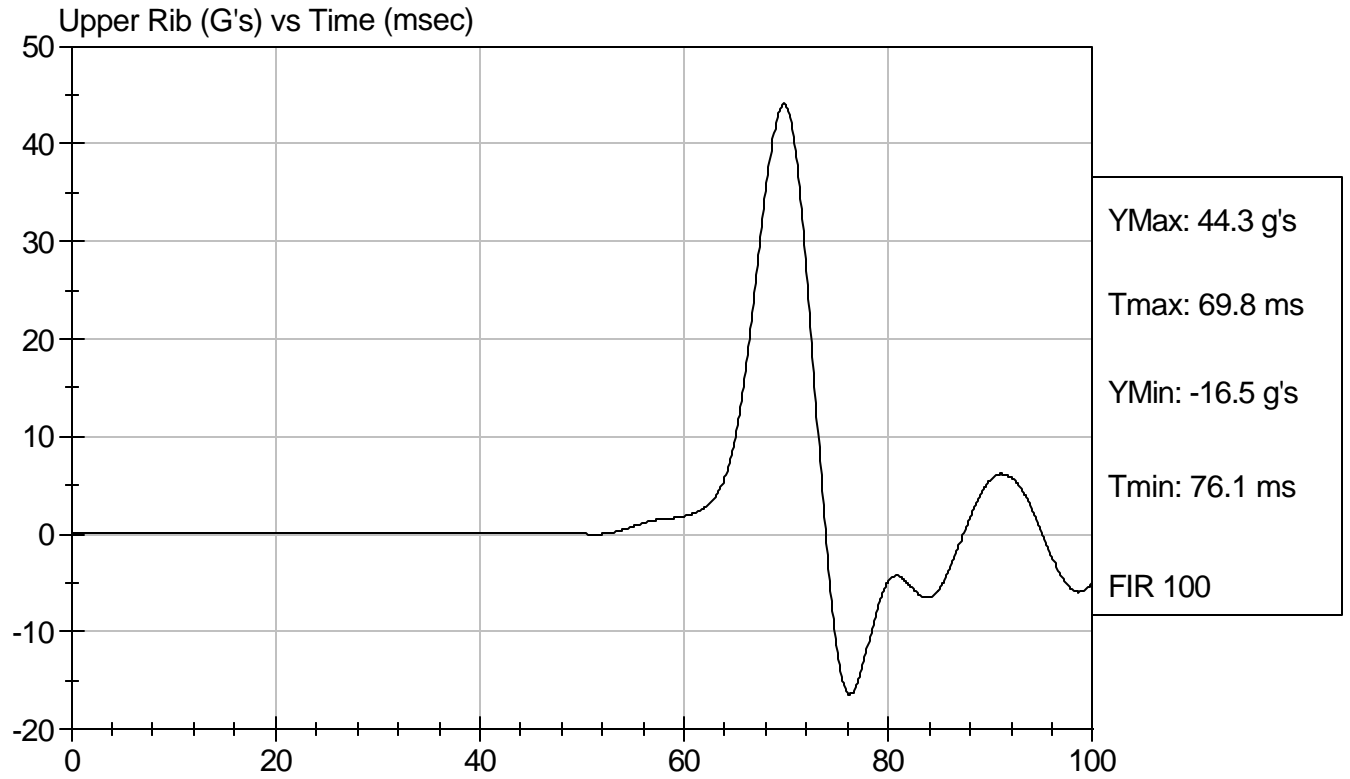
9/4/07
 Test Date

David Winkelbauer
 Approved By



Test Desc: Thorax Impact
Component ID: D072692

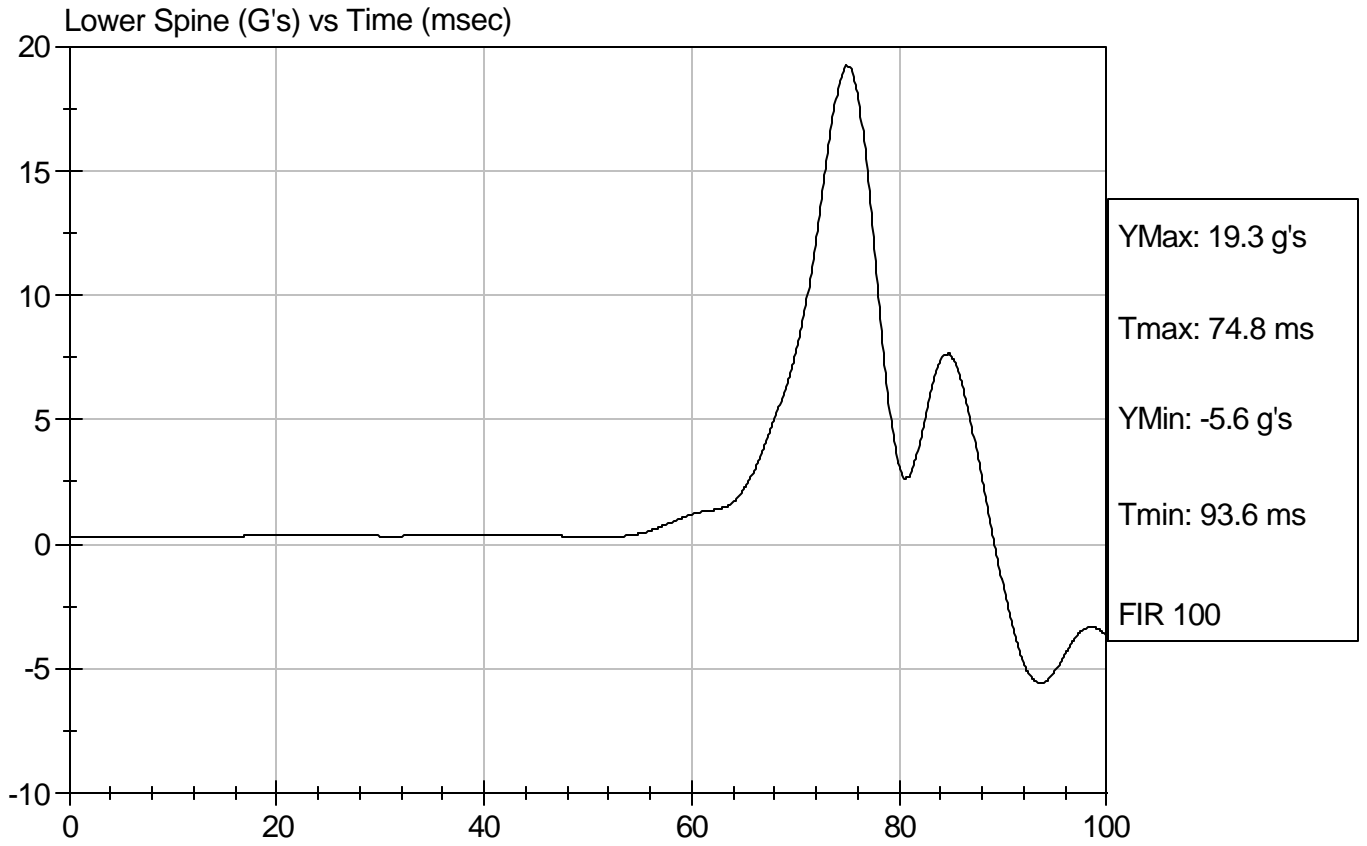
Test Date: 9/4/07
Speed: 14.0 ft/sec, 4.27 m/sec





Test Desc: Thorax Impact
Component ID: D072692

Test Date: 9/4/07
Speed: 14.0 ft/sec, 4.27 m/sec



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

ATD Serial No: 271

Test I.D.: D072693

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	40	Pass
Probe Velocity	m/s	4.27 - 4.33	4.30	Pass
Pelvis Acceleration	G's	40 - 60	46	Pass
Overall Test Results				Pass

Jessica Gall
Laboratory Technician

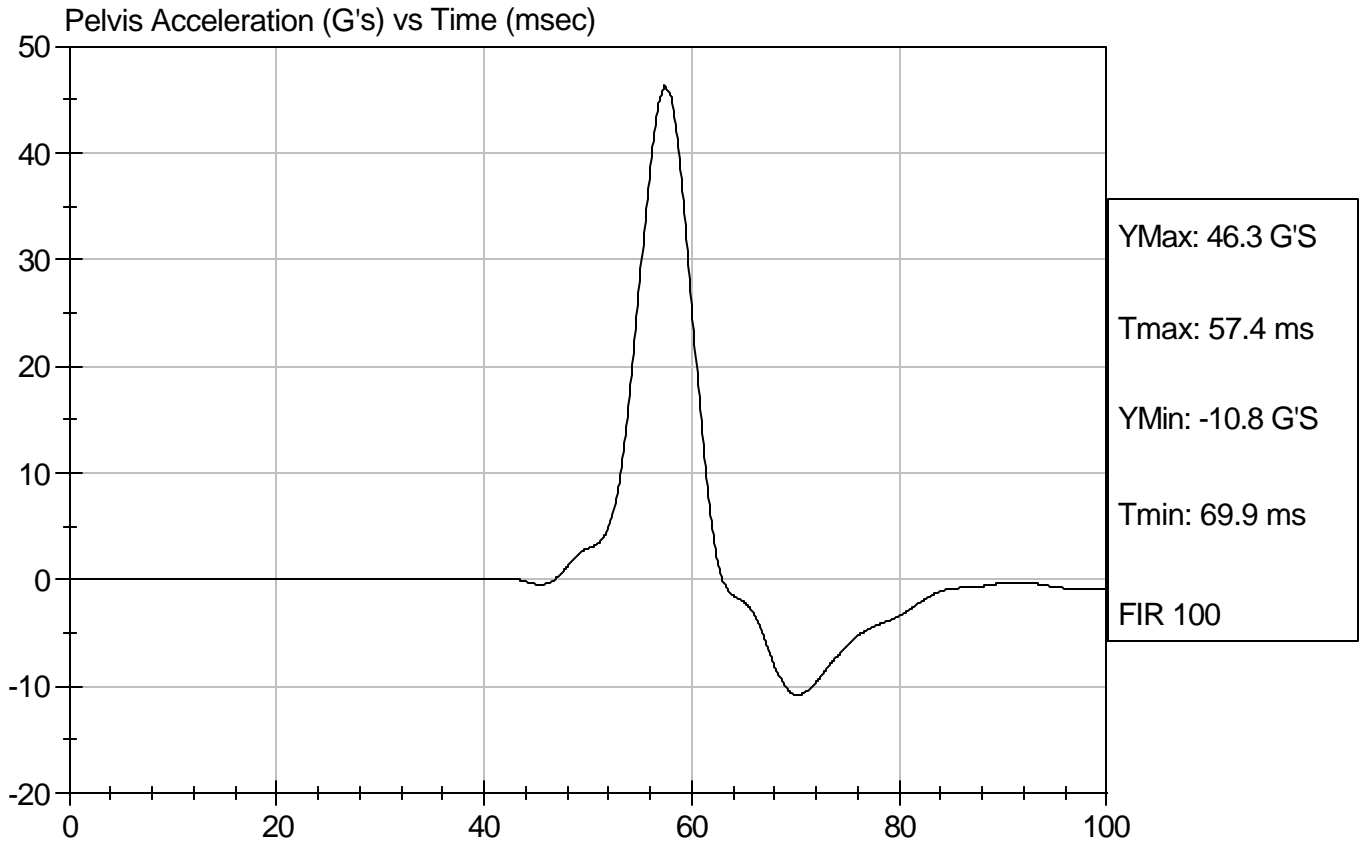
9/4/07
Test Date

David Winkelbauer
Approved By



Test Desc: Pelvis Impact
Component ID: D072693

Test Date: 9/4/07
Speed: 14.1 ft/sec, 4.30 m/sec



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

ATD Serial No: 271

Test I.D.: D072694

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	20.9	Pass
Laboratory Relative Humidity	%	10 to 70	44	Pass
Force At 12.7 mm	N	104 -162	147	Pass
Force At 19 mm	N	163 - 222	207	Pass
Force At 25.4 mm	N	222 - 280	277	Pass
Force At 33 mm	N	325 - 391	375	Pass
Overall Test Results				Pass

Jessica Gall
 Laboratory Technician

9/4/07
 Test Date

David Winkelbauer
 Approved By

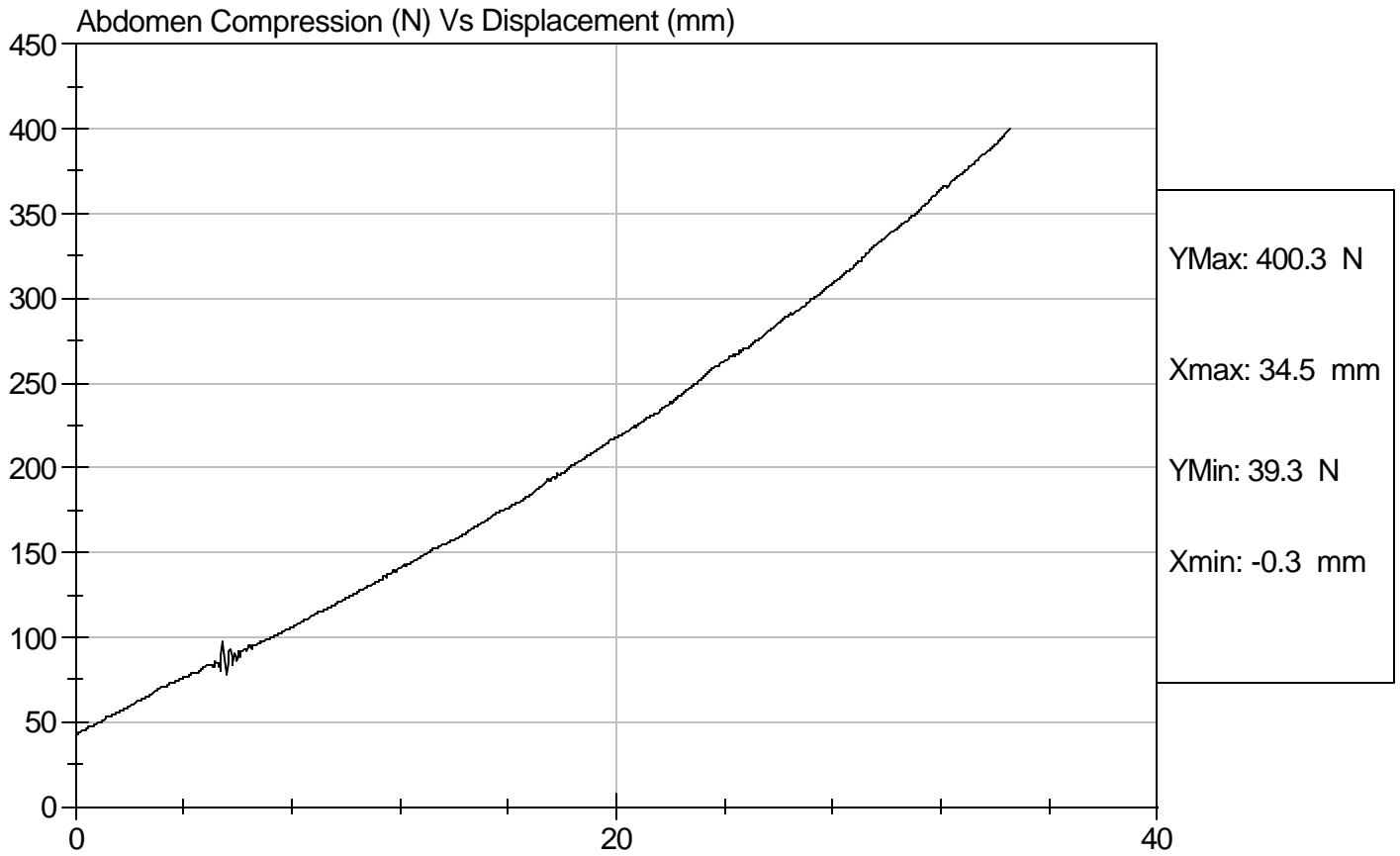


Test Description: Abdomen Compression

Test Date: 9/4/07

Component: D072694

Speed: 0 ft/sec, 0 m/sec



SID Calibration Data Sheet
Side Impact Dummy
Lumbar Flexion Calibration

ATD Serial No: 271

Test I.D.: D072695

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	20.9	Pass
Laboratory Relative Humidity	%	10 to 70	44	Pass
Force At 0 deg	N	0 - 26.7	0	Pass
Force At 20 deg	N	97.9 - 151.2	122.7	Pass
Force At 30 deg	N	151.2 - 204.6	174.3	Pass
Force At 40 deg	N	204.6 - 258.0	231.8	Pass
Return Angle	Deg	12 Maximum	4	Pass
Overall Test Results				Pass

Jessica Gall
 Laboratory Technician

9/4/07
 Test Date

David Winkelbauer
 Approved By

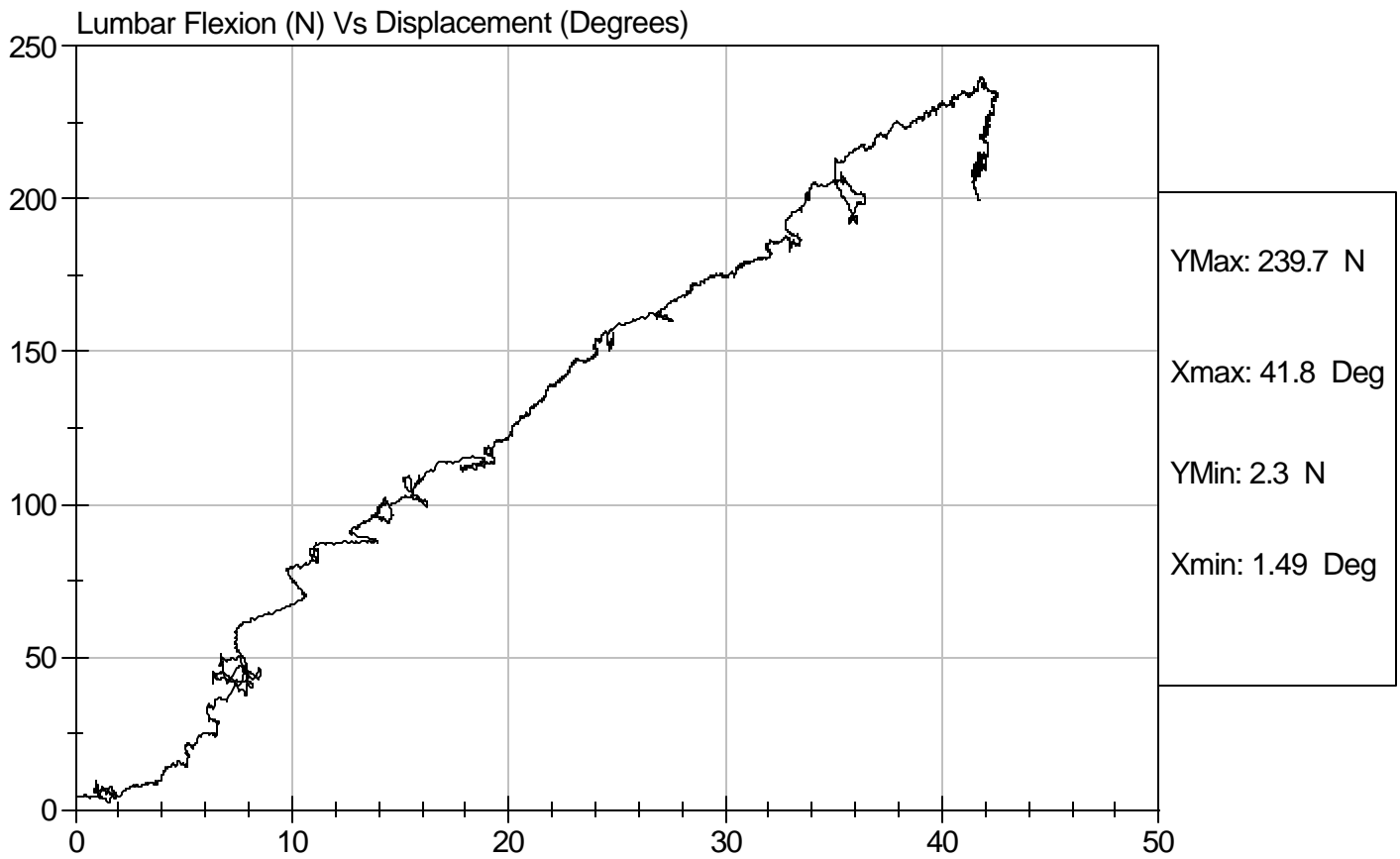


Test Description: Lumbar Flexion

Test Date: 9/4/07

Component: D072695

Speed: 0 ft/sec, 0 m/sec



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

ATD Serial No: 271

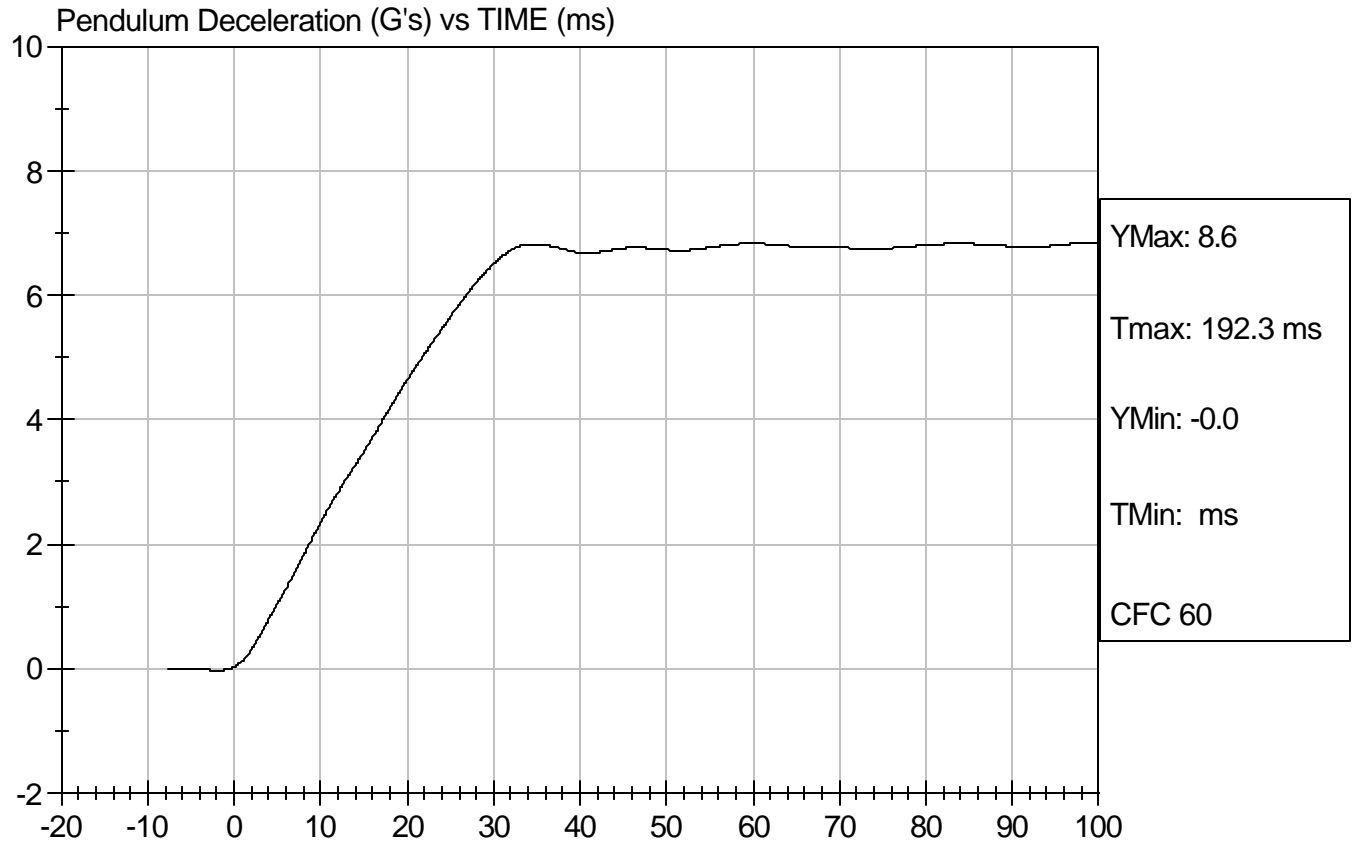
Test I.D.: D072699

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	40	Pass
Impact Velocity		m/s	6.89 to 7.13	6.96	Pass
Pendulum Deceleration	10 msec	m/s	1.96 to 2.55	2.35	Pass
	20 msec	m/s	4.12 to 5.10	4.64	Pass
	30 msec	m/s	5.73 to 7.01	6.51	Pass
	40 to 70 msec	m/s	6.27 to 7.64	6.77	Pass
Midsaggital Plane Max Rotation		deg	66 to 82	73	Pass
Head Rotation Peak to Zero - Decay Time		msec	58 to 67	61	Pass
Max. Mx at Occipital Condyles		Nm	73 to 88	75	Pass
Mx Peak To Zero - Decay Time		msec	49 to 64	61	Pass
Mx Peak to Max. Head Rotation		msec	2 to 16	13	Pass

Jessica Gall
Laboratory Technician

9/4/07
Test Date

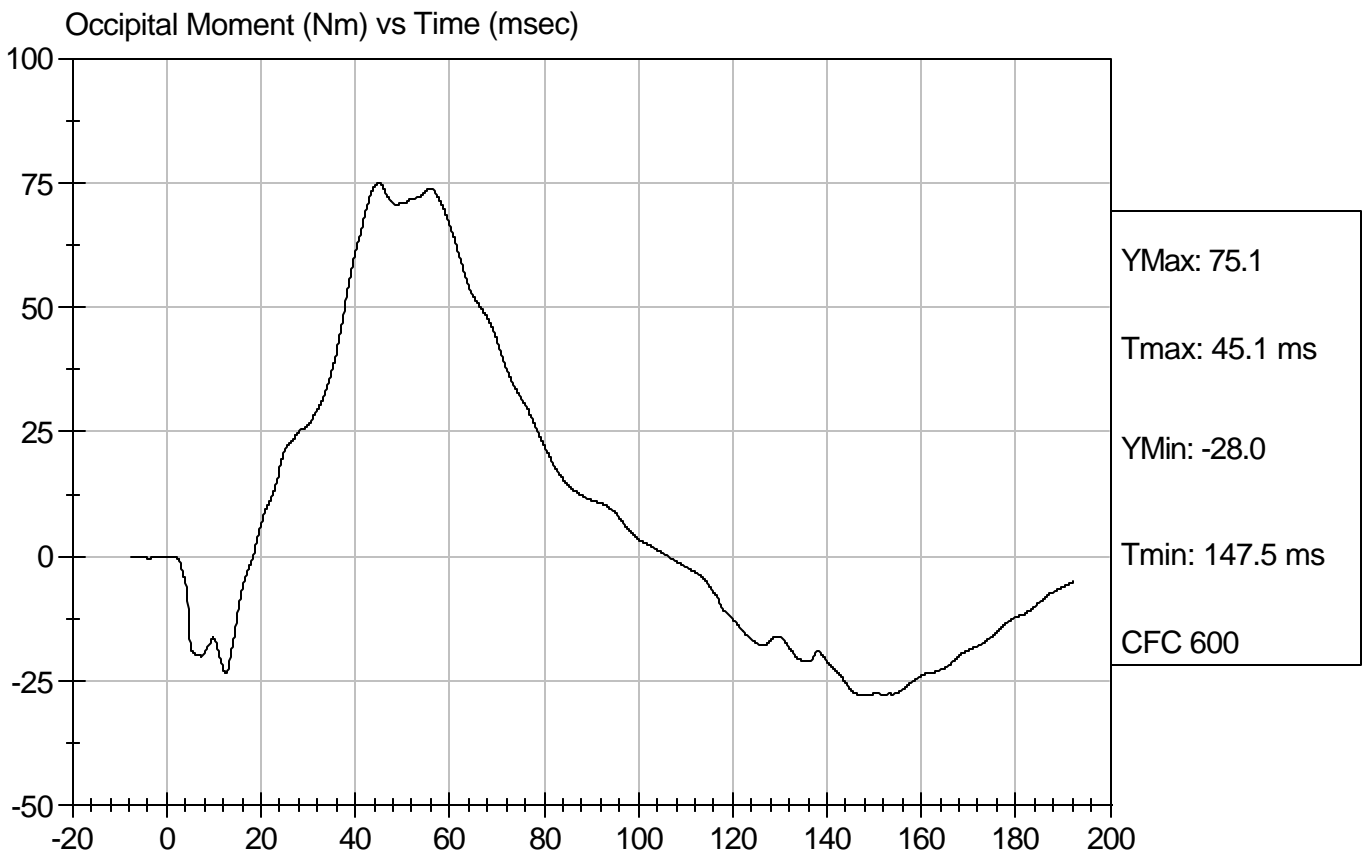
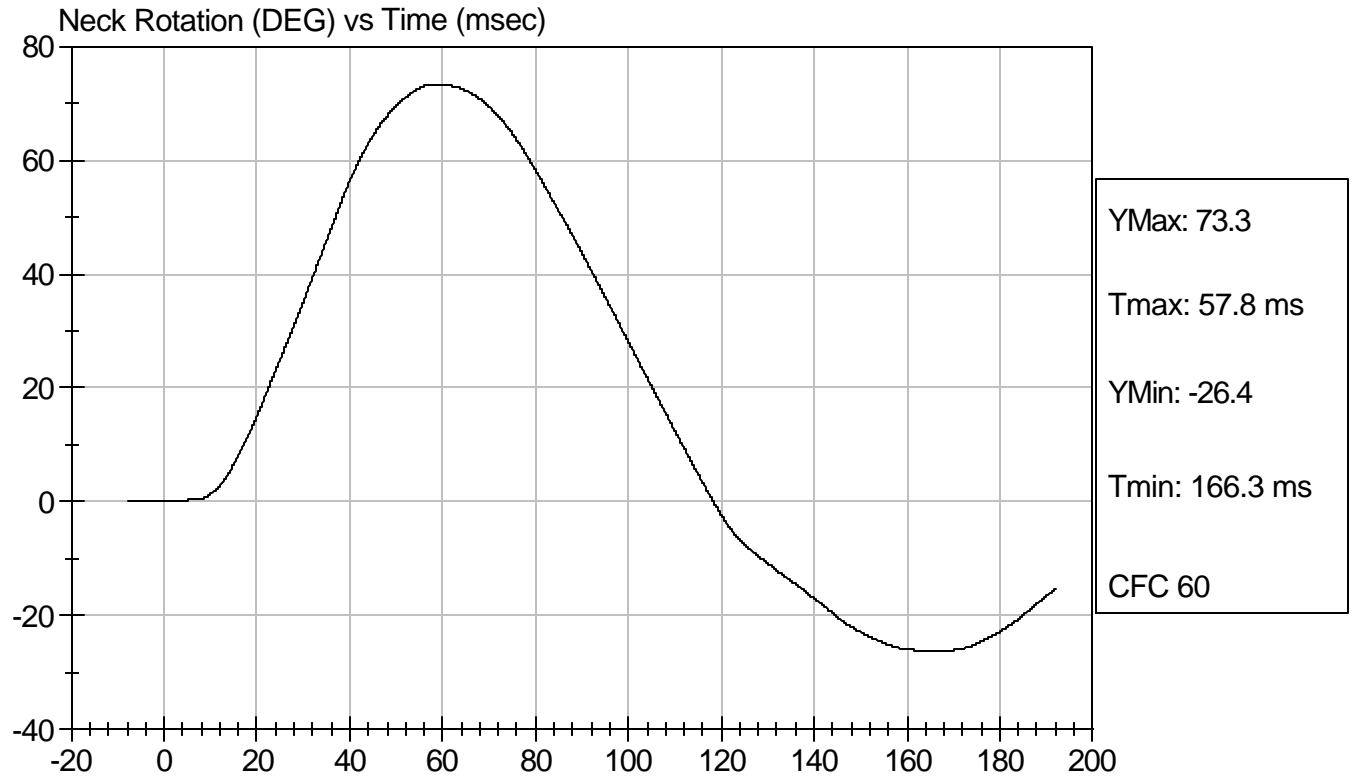
David Winkelbauer
Approved By





Test Desc: Neck Bending
Component ID: D072699

Test Date: 9/4/07
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

9/4/2007
 Test Date

CERTIFICATION DATA

Dummy Serial Number: 272

Calibration Test Results Summary

Dummy Serial Number: 272

Pre-Test Calibration

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

SID Calibration Data Sheet
Side Impact Dummy
External Measurements

ATD Serial No: 272

Test I.D: D07268

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 Gall
Laboratory Technician

8/30/2007
Test Date

David Winkelbauer
Approved By

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

ATD Serial No: 272

Test I.D.: D072681

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	38	Pass
Peak Resultant Acceleration	G's	120 to 150	141	Pass
Is Resultant Curve Unimodal?	Yes/No	15% of peak	Yes	Pass
Peak Longitudnal Acceleration	G's	+/- 15	-11.9	Pass
Overall Test Results				Pass

Jessica Gall
 Laboratory Technician

8/30/07
 Test Date

David Winkelbauer
 Approved By



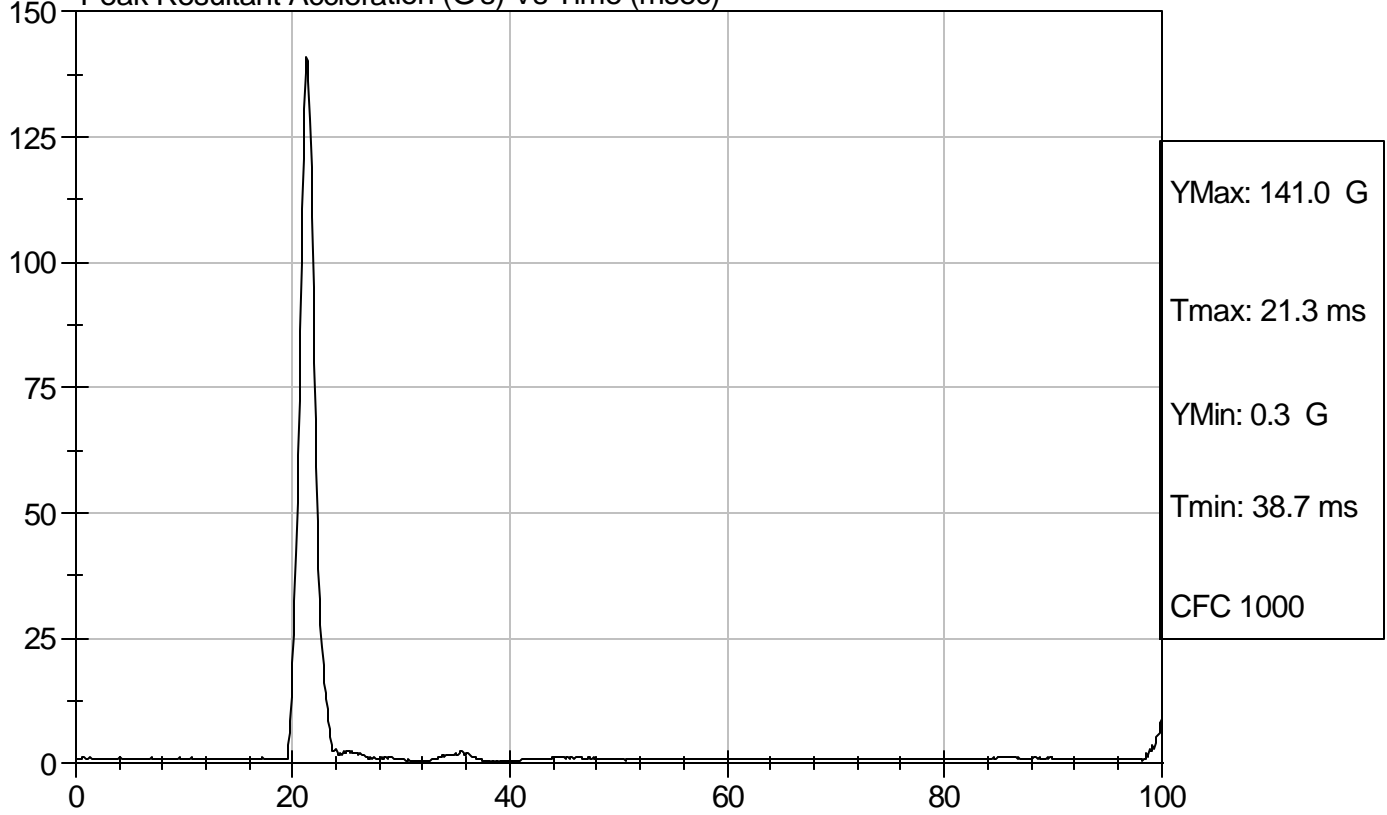
Test Description: Head Drop

Test Date: 8/30/07

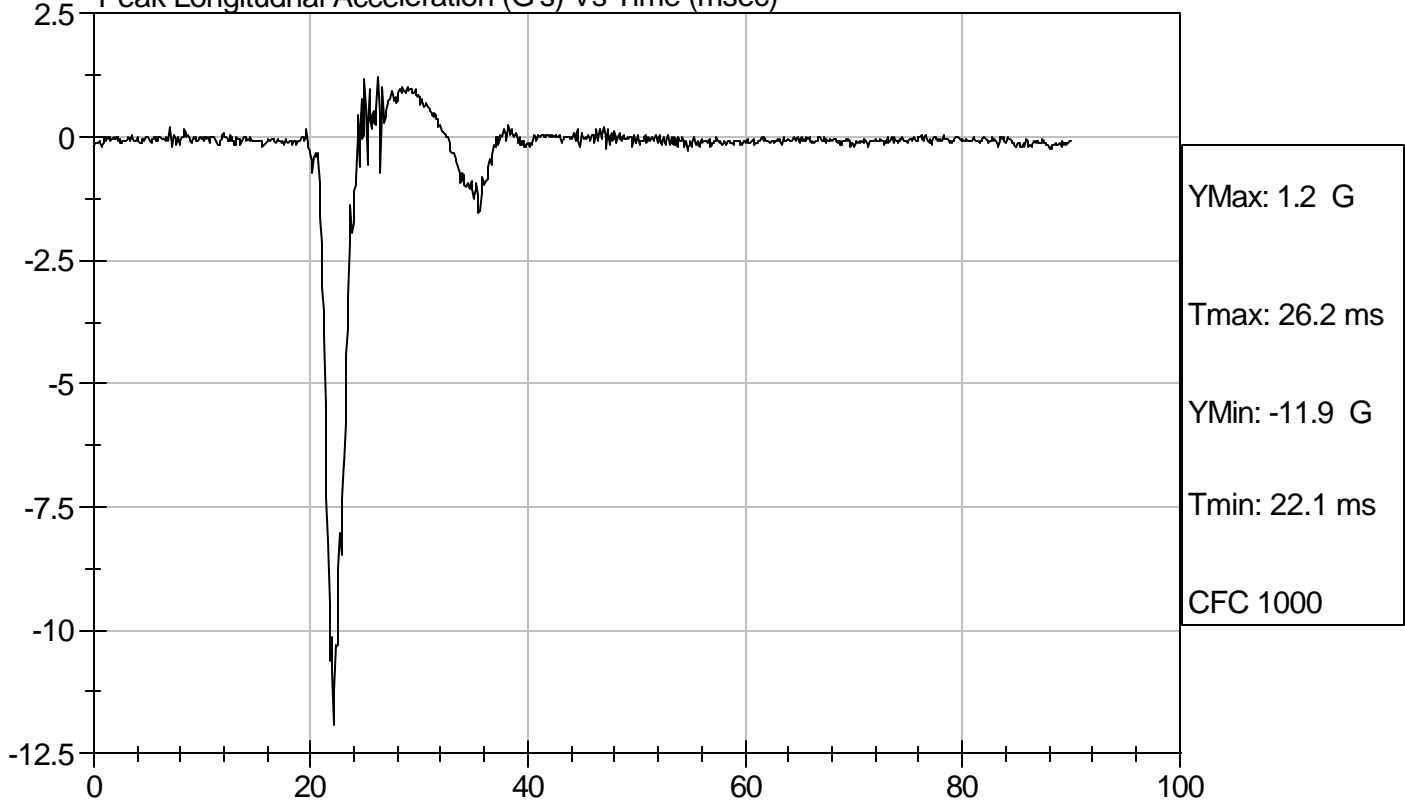
Component: D072681

Speed: 0 ft/s, 0 m/s

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



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



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

ATD Serial No: 272

Test I.D.: D072682

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	20.6	Pass
Laboratory Relative Humidity	%	10 to 70	40	Pass
Probe Velocity	m/s	4.22 - 4.31	4.23	Pass
Upper Rib	G's	37 - 46	41	Pass
Lower Rib	G's	37 - 46	38	Pass
Lower Spine	G's	15 - 22	20	Pass
Overall Test Results				Pass

Jessica Gall
 Laboratory Technician

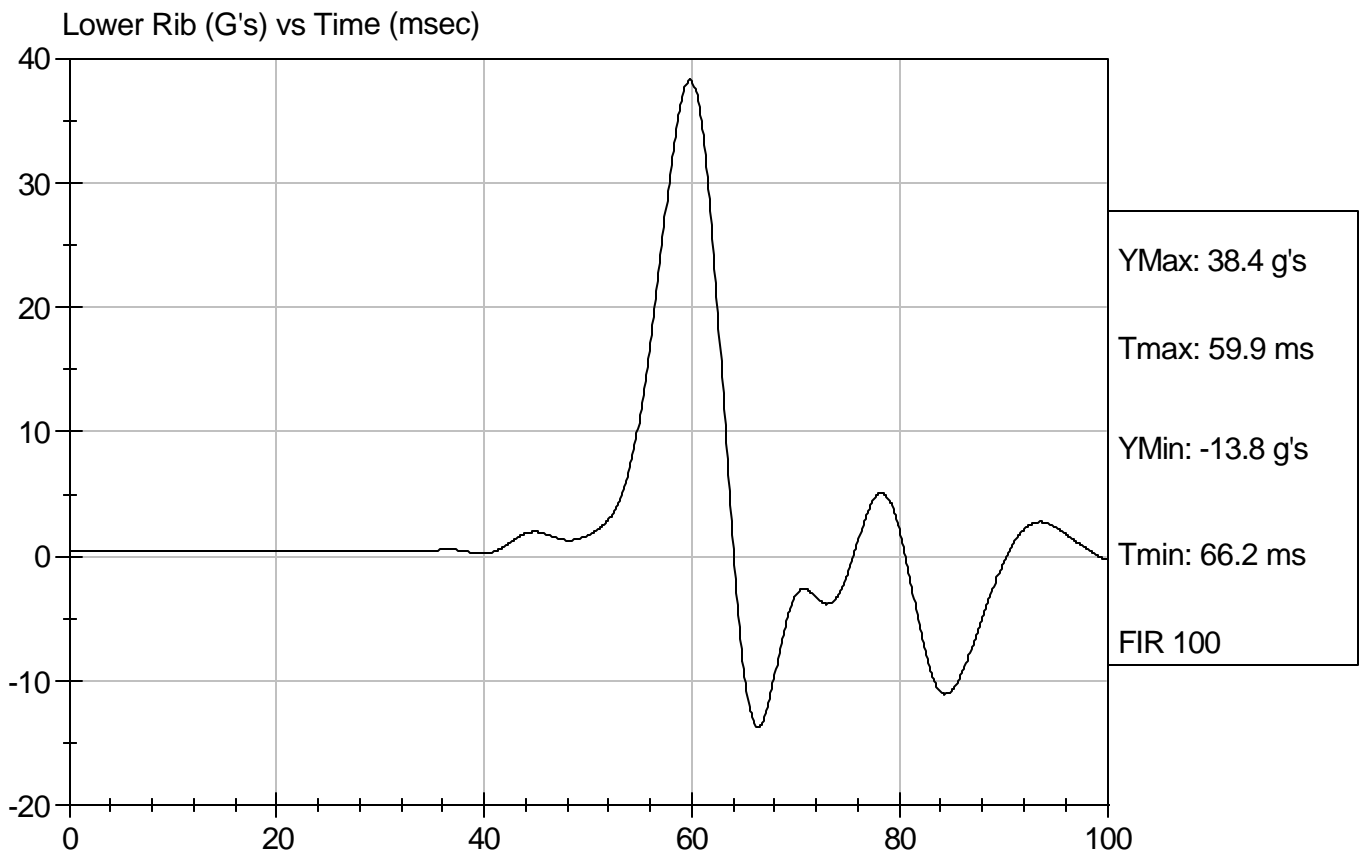
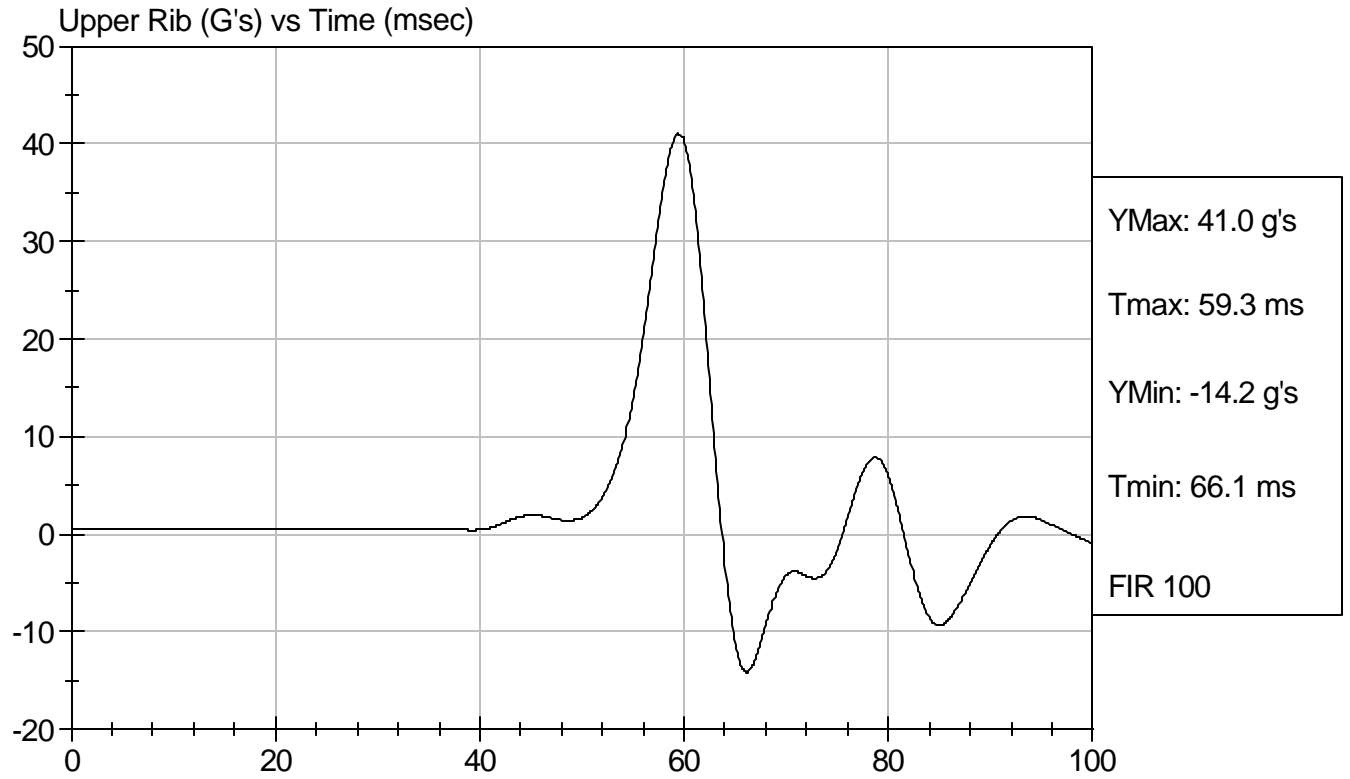
8/30/07
 Test Date

David Winkelbauer
 Approved By



Test Desc: Thorax Impact
Component ID: D072682

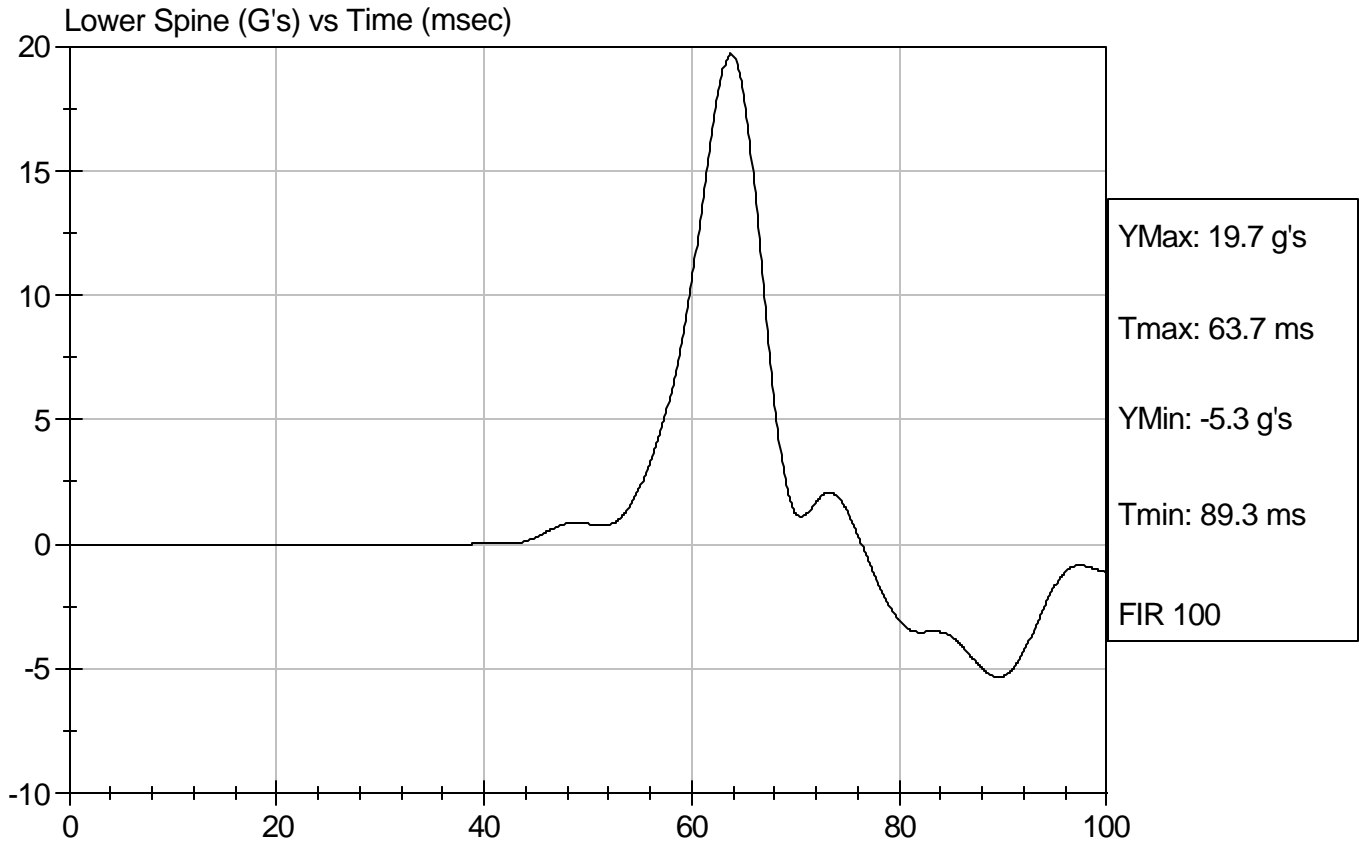
Test Date: 8/30/07
Speed: 13.88 ft/sec, 4.23 m/sec





Test Desc: Thorax Impact
Component ID: D072682

Test Date: 8/30/07
Speed: 13.88 ft/sec, 4.23 m/sec



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

ATD Serial No: 272

Test I.D.: D072683

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	40	Pass
Probe Velocity	m/s	4.27 - 4.33	4.27	Pass
Pelvis Acceleration	G's	40 - 60	41	Pass
Overall Test Results				Pass

Jessica Gall
Laboratory Technician

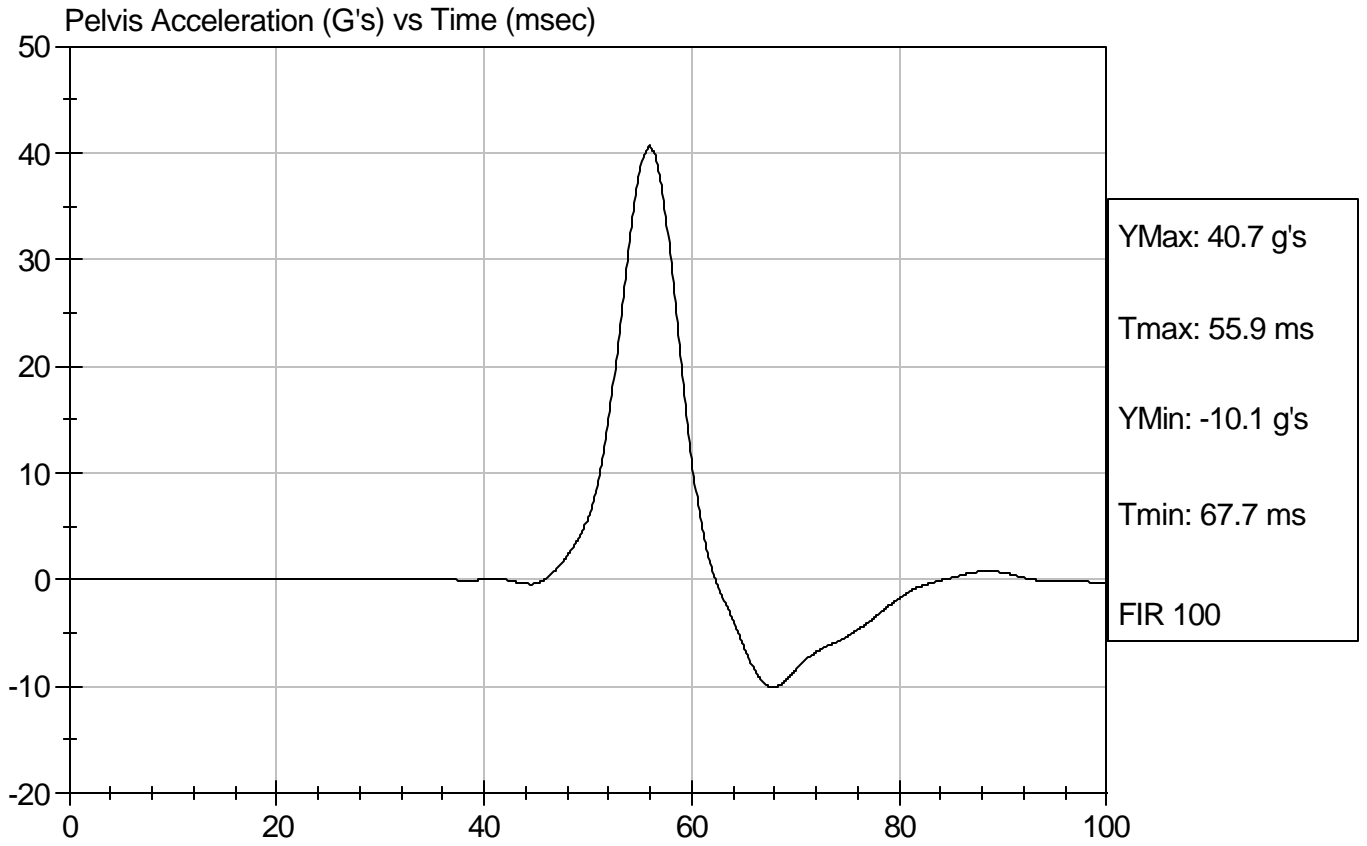
8/30/07
Test Date

David Winkelbauer
Approved By



Test Desc: Pelvis Impact
Component ID: D072683

Test Date: 8/30/07
Speed: 14.00 ft/sec, 4.27 m/sec



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

ATD Serial No: 272

Test I.D.: D072684

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	20.6	Pass
Laboratory Relative Humidity	%	10 to 70	40	Pass
Force At 12.7 mm	N	104 -162	136	Pass
Force At 19 mm	N	163 - 222	184	Pass
Force At 25.4 mm	N	222 - 280	239	Pass
Force At 33 mm	N	325 - 391	339	Pass
Overall Test Results				Pass

Jessica Gall
 Laboratory Technician

8/30/07
 Test Date

David Winkelbauer
 Approved By

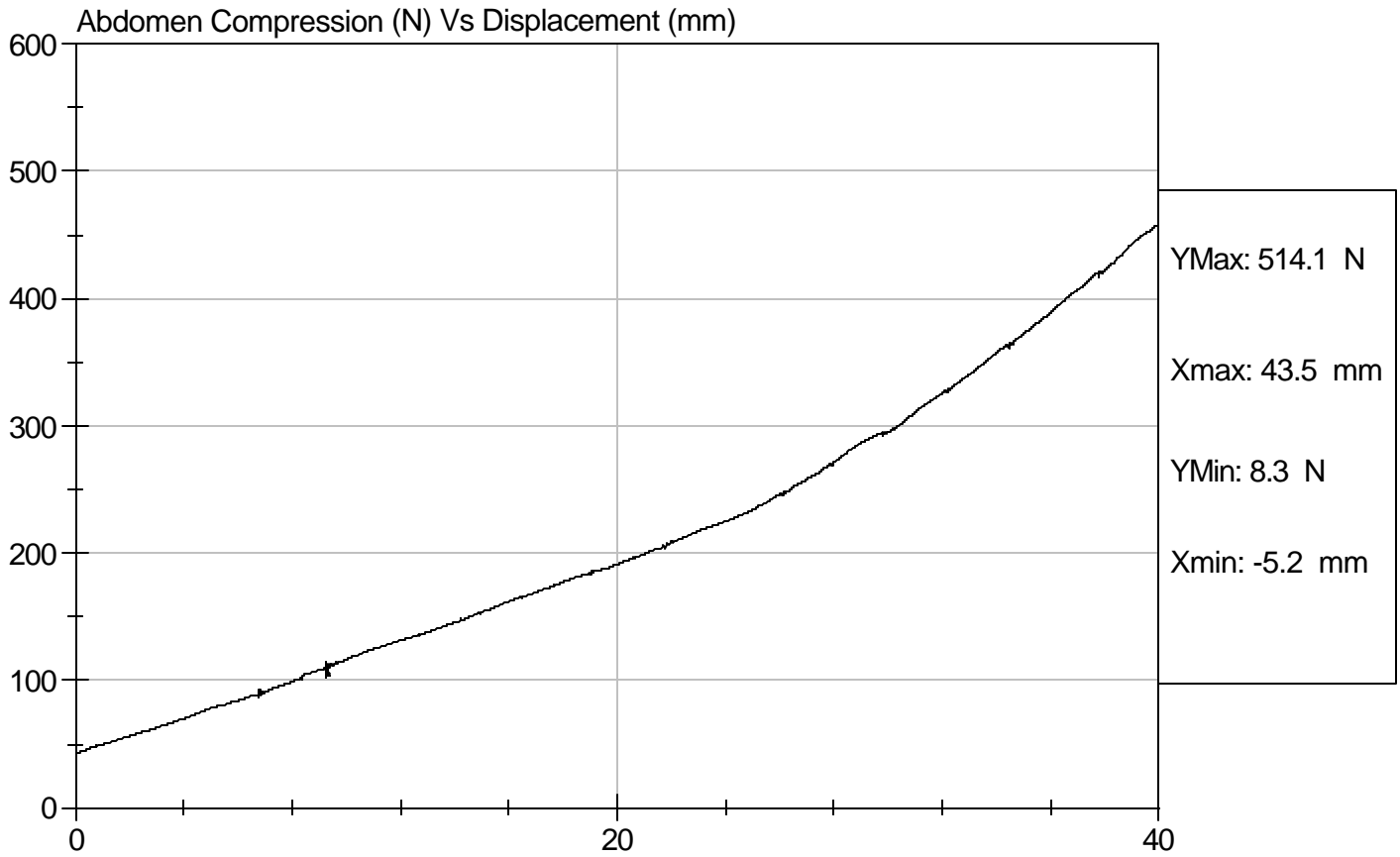


Test Description: Abdomen Compression

Test Date: 8/30/07

Component: D072684

Speed: 0 ft/sec, 0 m/sec



SID Calibration Data Sheet
Side Impact Dummy
Lumbar Flexion Calibration

ATD Serial No: 272

Test I.D.: D072685

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	20.4	Pass
Laboratory Relative Humidity	%	10 to 70	37	Pass
Force At 0 deg	N	0 - 26.7	0	Pass
Force At 20 deg	N	97.9 - 151.2	117.2	Pass
Force At 30 deg	N	151.2 - 204.6	166.0	Pass
Force At 40 deg	N	204.6 - 258.0	210.8	Pass
Return Angle	Deg	12 Maximum	5	Pass
Overall Test Results				Pass

Jessica Gall
 Laboratory Technician

8/30/07
 Test Date

David Winkelbauer
 Approved By

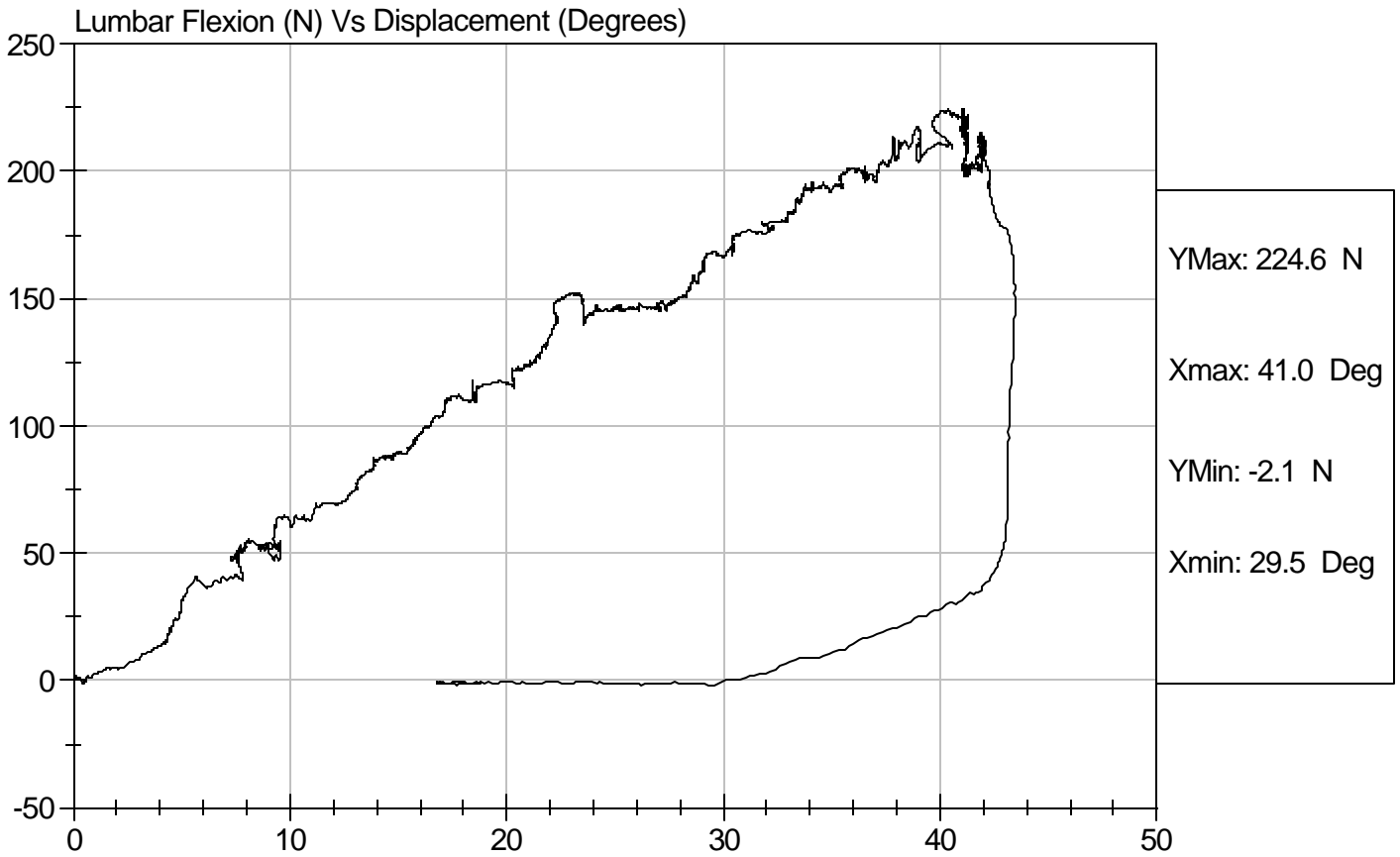


Test Description: Lumbar Flexion

Test Date: 8/30/07

Component: D072685

Speed: 0 ft/sec, 0 m/sec



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

ATD Serial No: 272

Test I.D: D072689

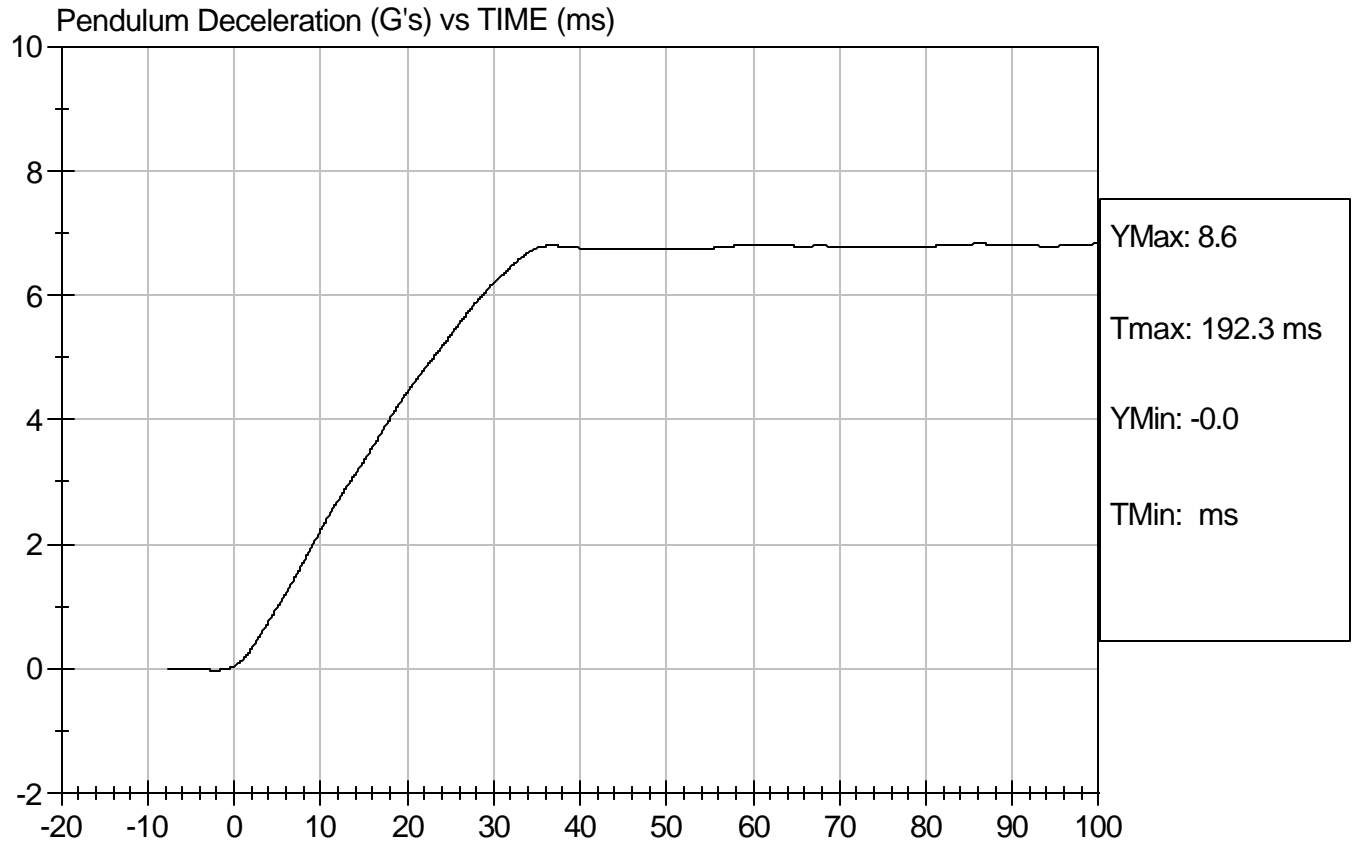
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	20.6	Pass
Laboratory Relative Humidity		%	10 to 70	37	Pass
Impact Velocity		m/s	6.89 to 7.13	6.96	Pass
Pendulum Deceleration	10 msec	m/s	1.96 to 2.55	2.23	Pass
	20 msec	m/s	4.12 to 5.10	4.44	Pass
	30 msec	m/s	5.73 to 7.01	6.19	Pass
	40 to 70 msec	m/s	6.27 to 7.64	6.79	Pass
Midsagittal Plane Max Rotation		deg	66 to 82	70	Pass
Head Rotation Peak to Zero - Decay Time		msec	58 to 67	59	Pass
Max. Mx at Occipital Condyles		Nm	73 to 88	75	Pass
Mx Peak To Zero - Decay Time		msec	49 to 64	59	Pass
Mx Peak to Max. Head Rotation		msec	2 to 16	12	Pass

Jessica Gall
Laboratory Technician

8/30/07

Test Date

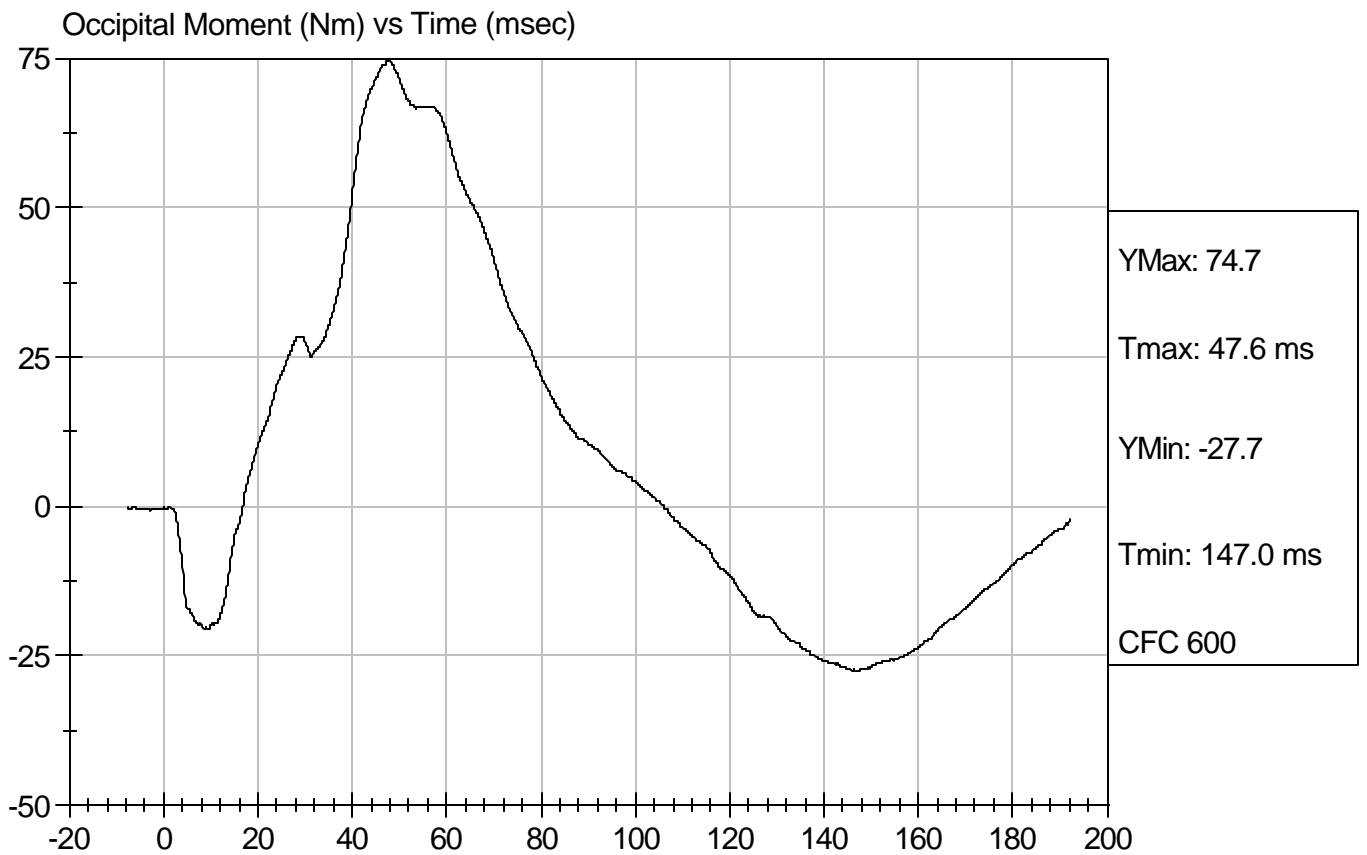
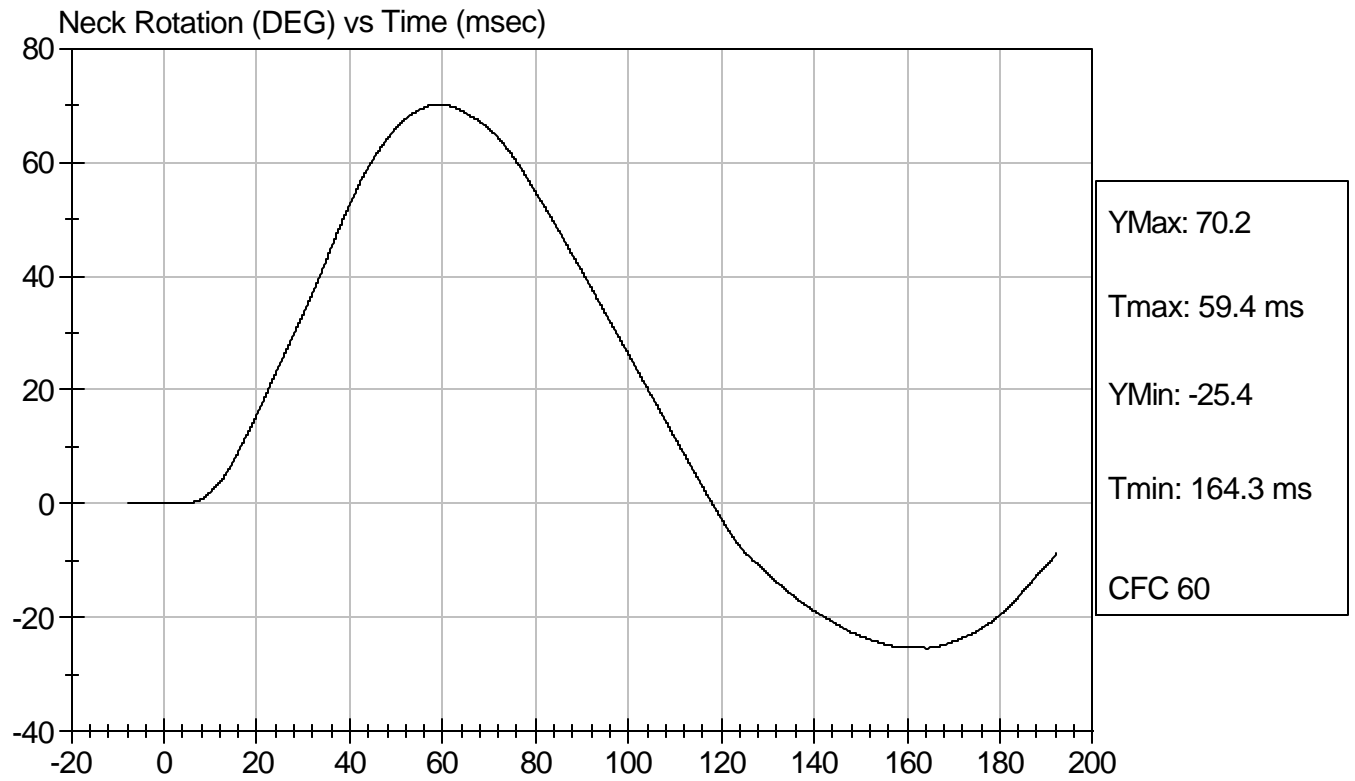
David Winkelbauer
Approved By





Test Desc: Neck Bending
Component ID: D072689

Test Date: 8/30/07
Speed: 22.83 ft/sec, 6.96 m/sec



Calibration Test Results Summary

Dummy Serial Number: 272

Post-Test Calibration

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

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

ATD Serial No: 272

Test I.D.: D072701

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	40	Pass
Peak Resultant Acceleration	G's	120 to 150	143	Pass
Is Resultant Curve Unimodal?	Yes/No	15% of peak	Yes	Pass
Peak Longitudnal Acceleration	G's	+/- 15	-10.5	Pass
Overall Test Results				Pass

Jessica Gall
 Laboratory Technician

9/4/07
 Test Date

David Winkelbauer
 Approved By



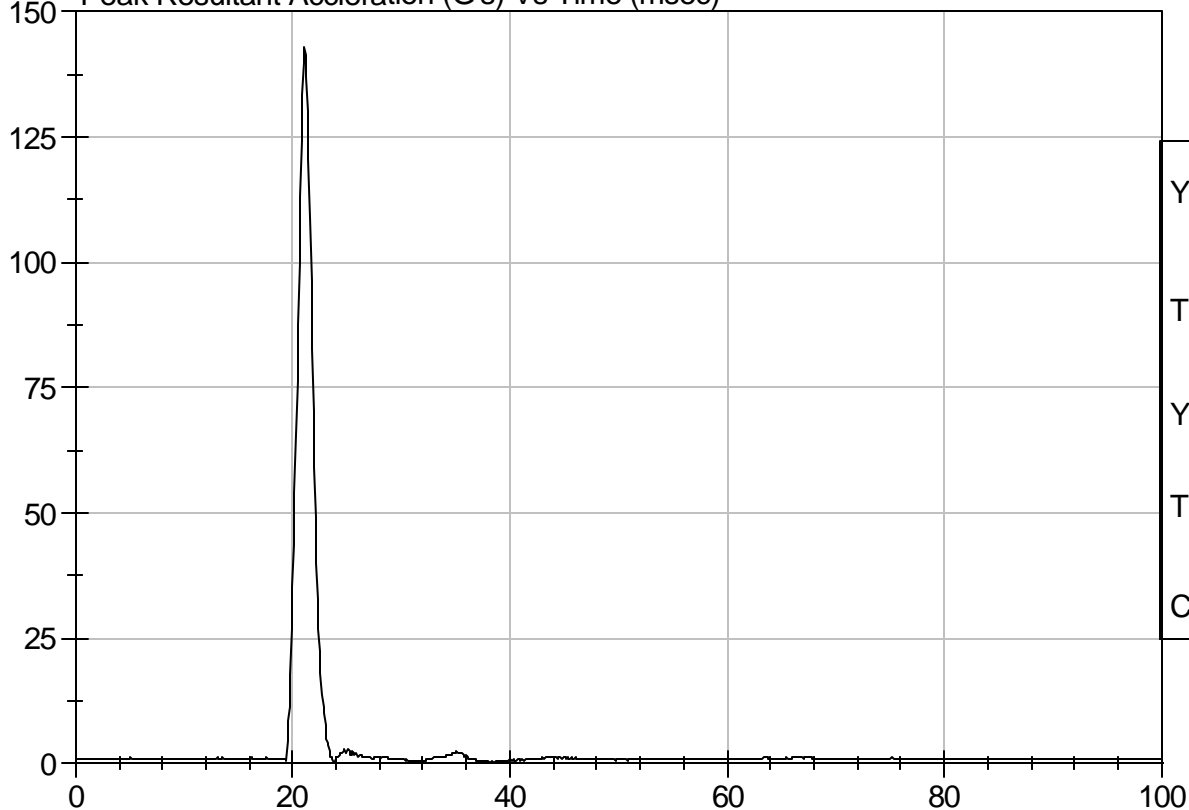
Test Description: Head Drop

Test Date: 9/4/07

Component: D072701

Speed: 0 ft/s, 0 m/s

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



YMax: 143.2 G

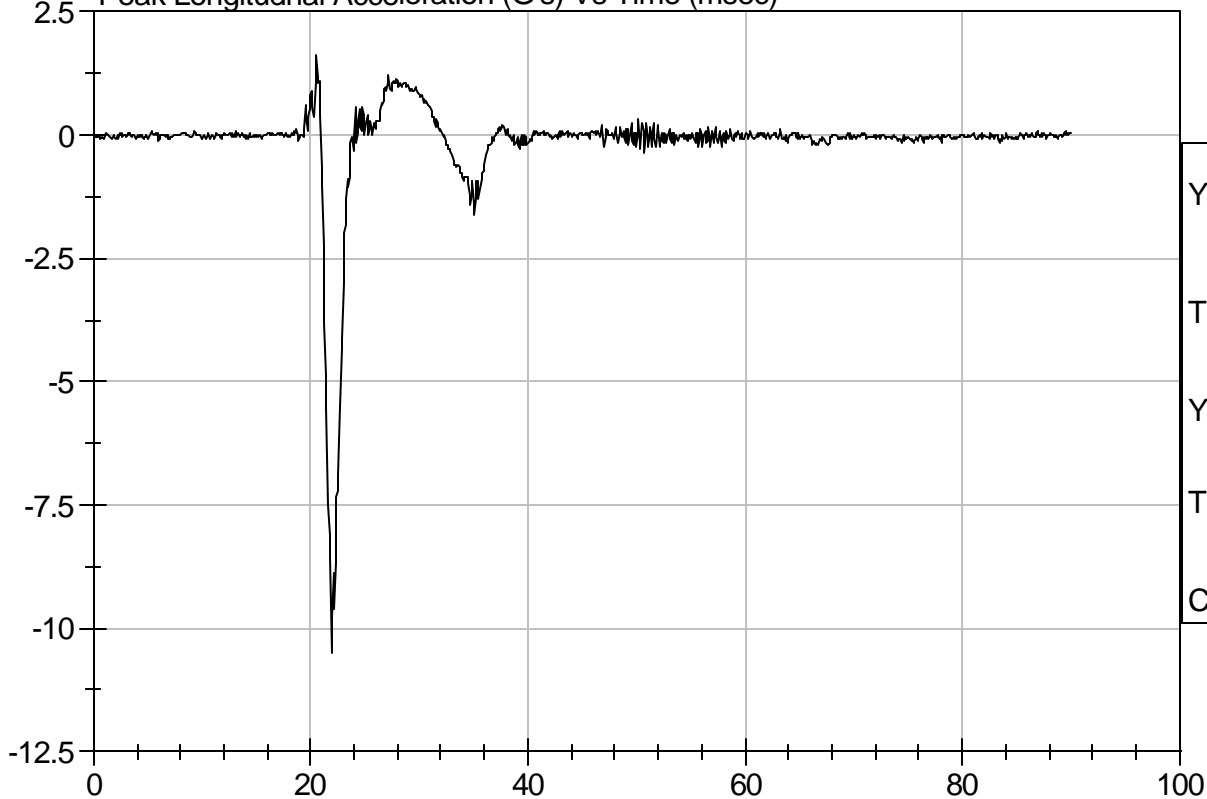
Tmax: 21.1 ms

YMin: 0.2 G

Tmin: 23.8 ms

CFC 1000

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



YMax: 1.6 G

Tmax: 20.5 ms

YMin: -10.5 G

Tmin: 21.9 ms

CFC 1000

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

ATD Serial No: 272

Test I.D.: D072702

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	20.9	Pass
Laboratory Relative Humidity	%	10 to 70	44	Pass
Probe Velocity	m/s	4.22 - 4.31	4.27	Pass
Upper Rib	G's	37 - 46	40	Pass
Lower Rib	G's	37 - 46	42	Pass
Lower Spine	G's	15 - 22	20	Pass
Overall Test Results				Pass

Jessica Gall
 Laboratory Technician

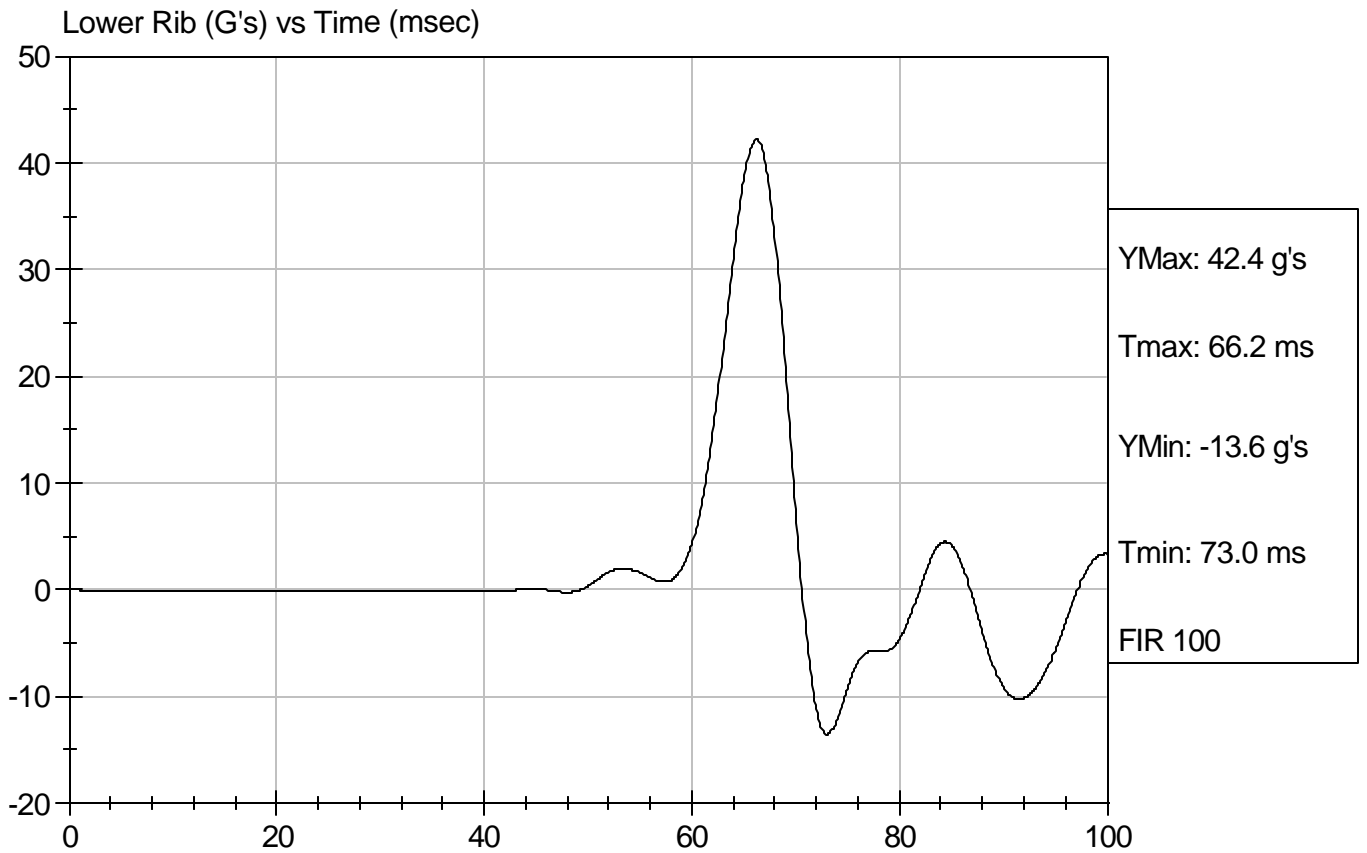
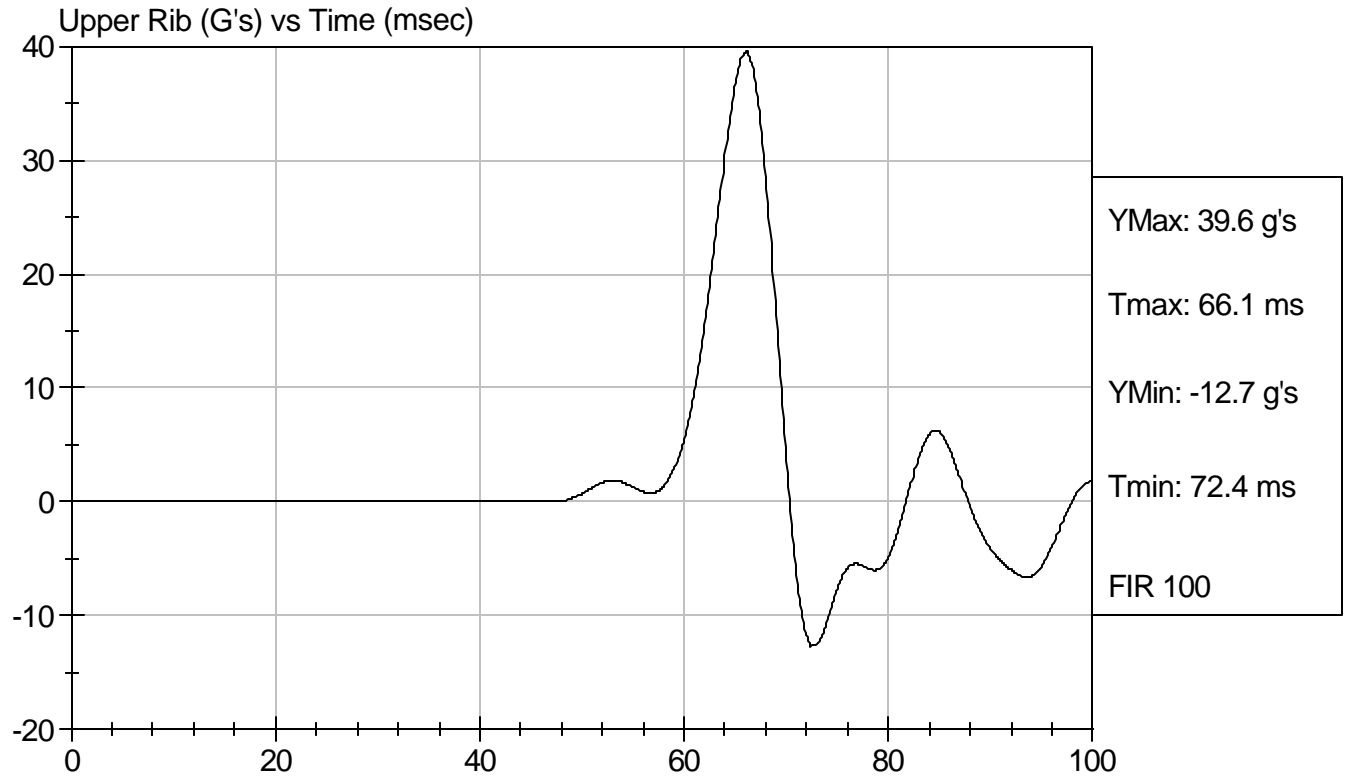
9/4/07
 Test Date

David Winkelbauer
 Approved By



Test Desc: Thorax Impact
Component ID: D072702

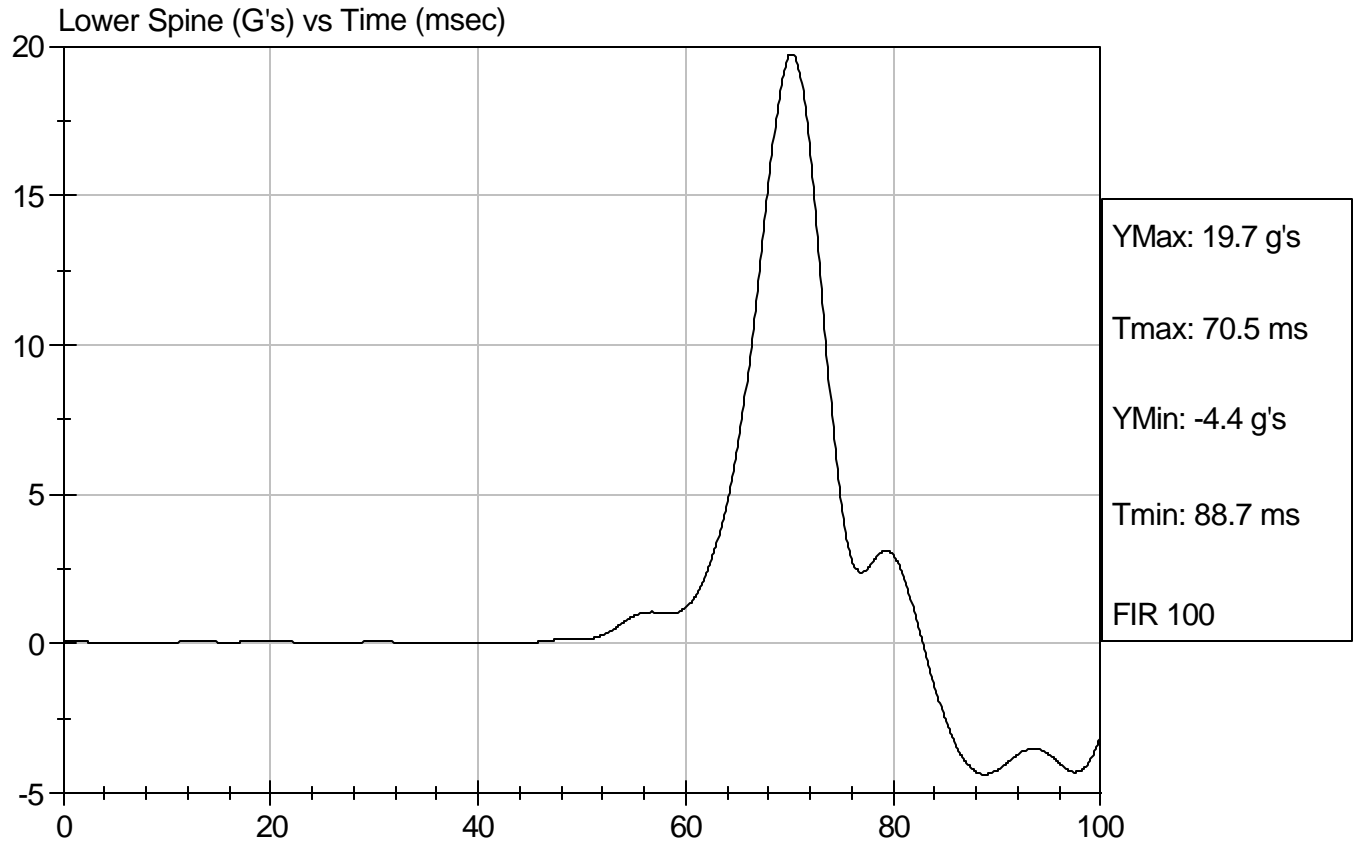
Test Date: 9/4/07
Speed: 14.00 ft/sec, 4.27 m/sec





Test Desc: Thorax Impact
Component ID: D072702

Test Date: 9/4/07
Speed: 14.00 ft/sec, 4.27 m/sec



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

ATD Serial No: 272

Test I.D.: D072703

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	20.8	Pass
Laboratory Relative Humidity	%	10 to 70	44	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 Gall
Laboratory Technician

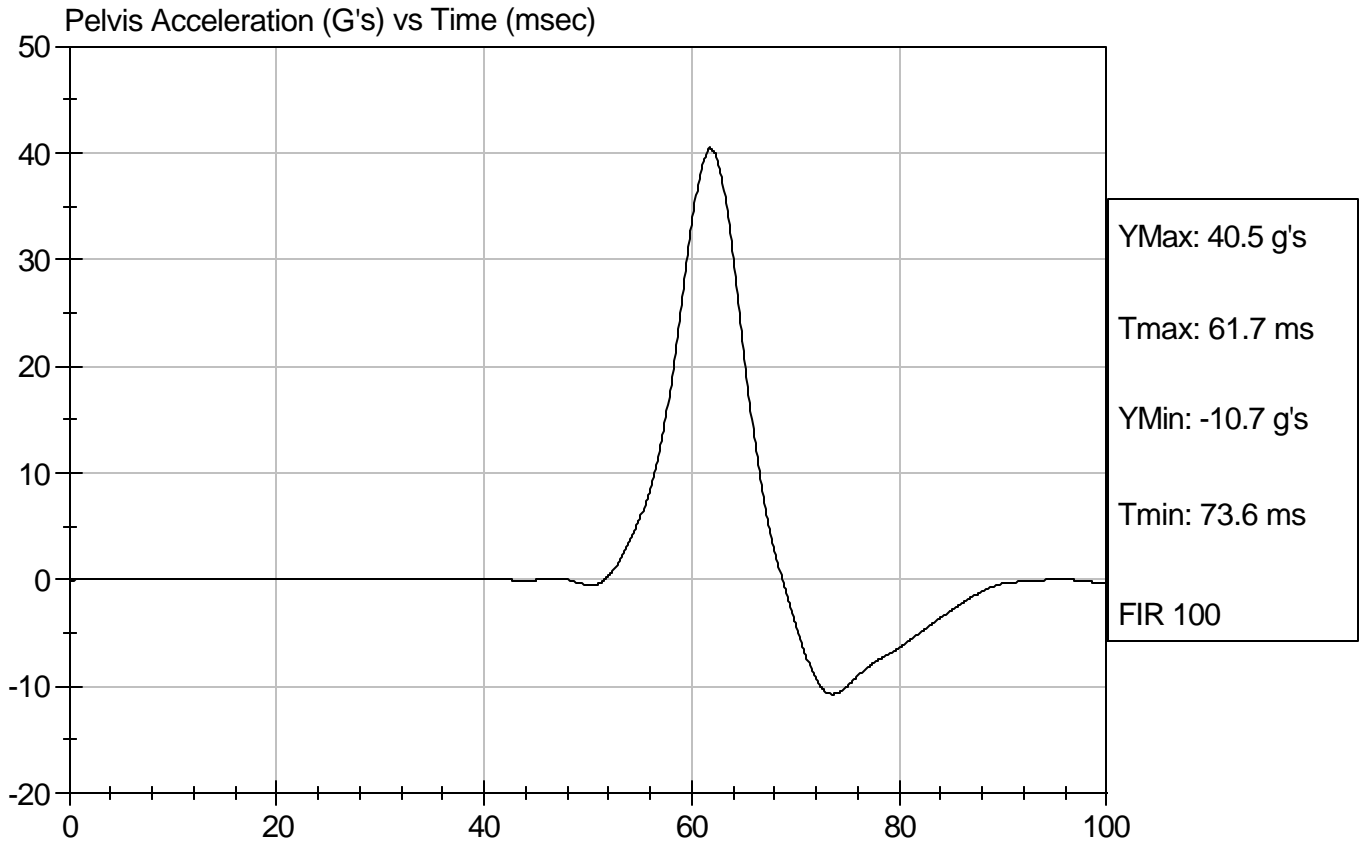
9/4/07
Test Date

David Winkelbauer
Approved By



Test Desc: Pelvis Impact
Component ID: D072703

Test Date: 9/4/07
Speed: 14.12 ft/sec, 4.30 m/sec



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

ATD Serial No: 272

Test I.D.: D072704

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	20.9	Pass
Laboratory Relative Humidity	%	10 to 70	44	Pass
Force At 12.7 mm	N	104 - 162	132	Pass
Force At 19 mm	N	163 - 222	178	Pass
Force At 25.4 mm	N	222 - 280	239	Pass
Force At 33 mm	N	325 - 391	333	Pass
Overall Test Results				Pass

Jessica Gall
 Laboratory Technician

9/4/07
 Test Date

David Winkelbauer
 Approved By

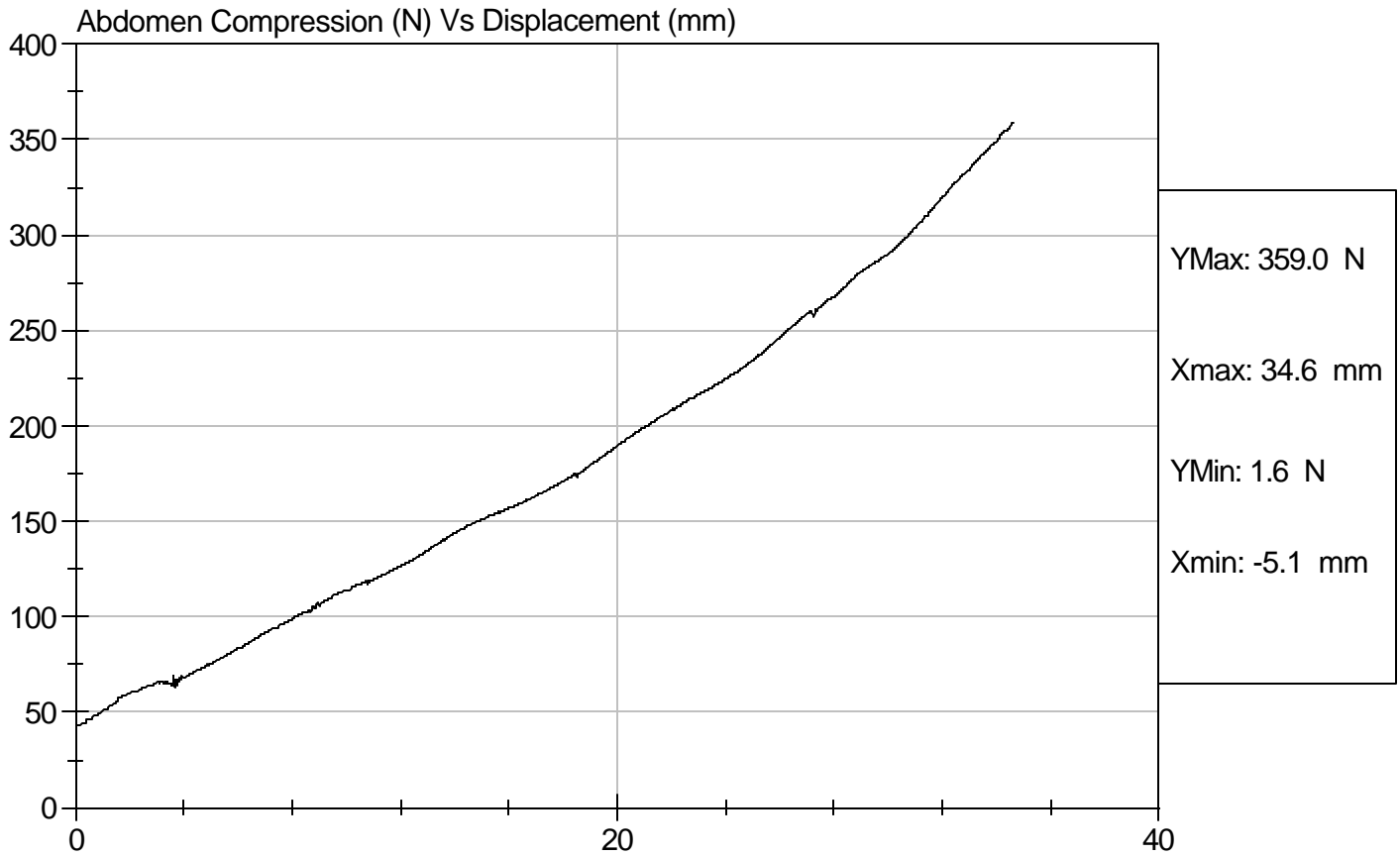


Test Description: Abdomen Compression

Test Date: 9/4/07

Component: D072704

Speed: 0 ft/sec, 0 m/sec



SID Calibration Data Sheet
Side Impact Dummy
Lumbar Flexion Calibration

ATD Serial No: 272

Test I.D.: D072705

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	20.9	Pass
Laboratory Relative Humidity	%	10 to 70	44	Pass
Force At 0 deg	N	0 - 26.7	0	Pass
Force At 20 deg	N	97.9 - 151.2	145.1	Pass
Force At 30 deg	N	151.2 - 204.6	185.6	Pass
Force At 40 deg	N	204.6 - 258.0	254.5	Pass
Return Angle	Deg	12 Maximum	6	Pass
Overall Test Results				Pass

Jessica Gall
 Laboratory Technician

9/4/07
 Test Date

David Winkelbauer
 Approved By

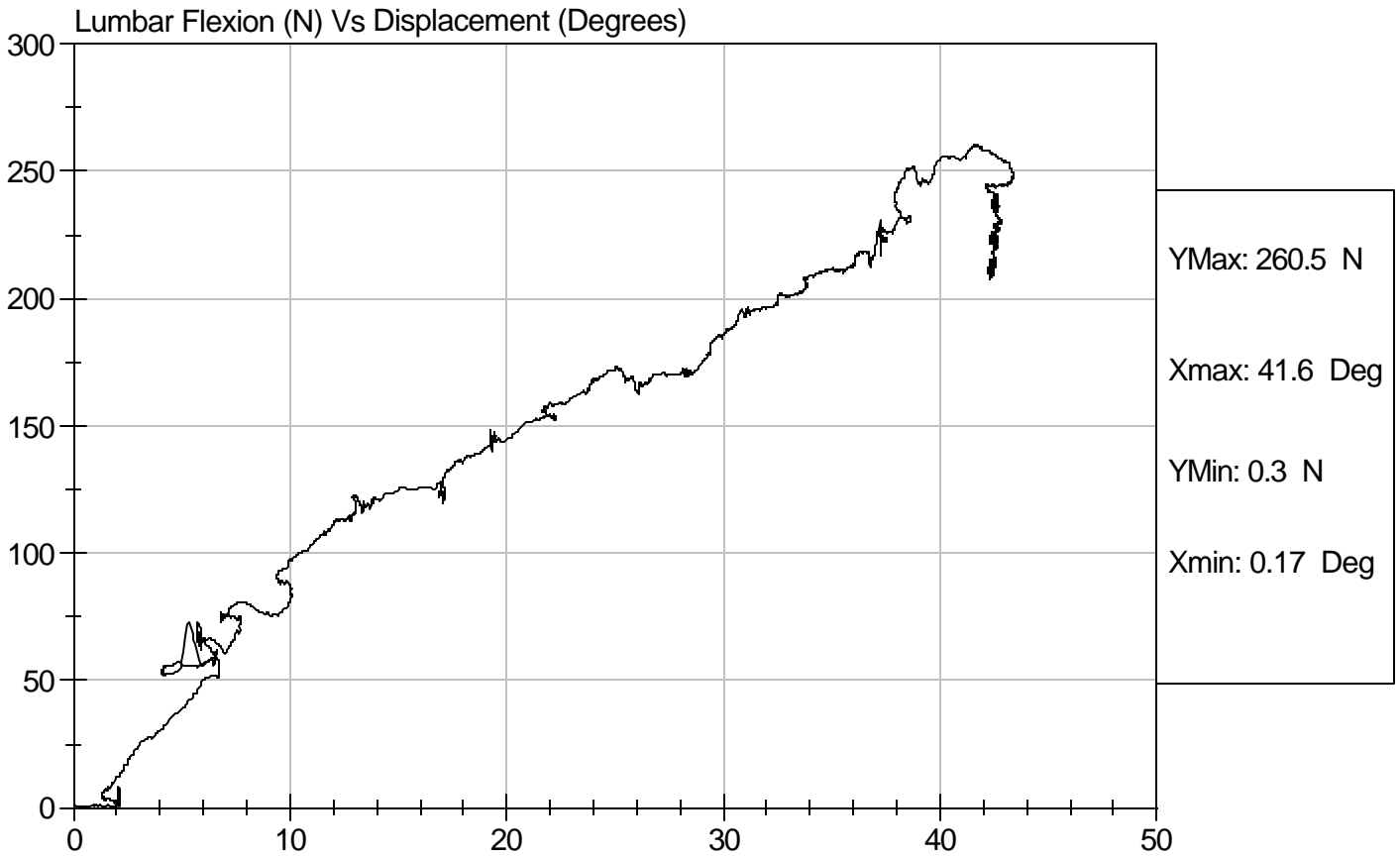


Test Description: Lumbar Flexion

Test Date: 9/4/07

Component: D072705

Speed: 0 ft/sec, 0 m/sec



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

ATD Serial No: 272

Test I.D.: D072709

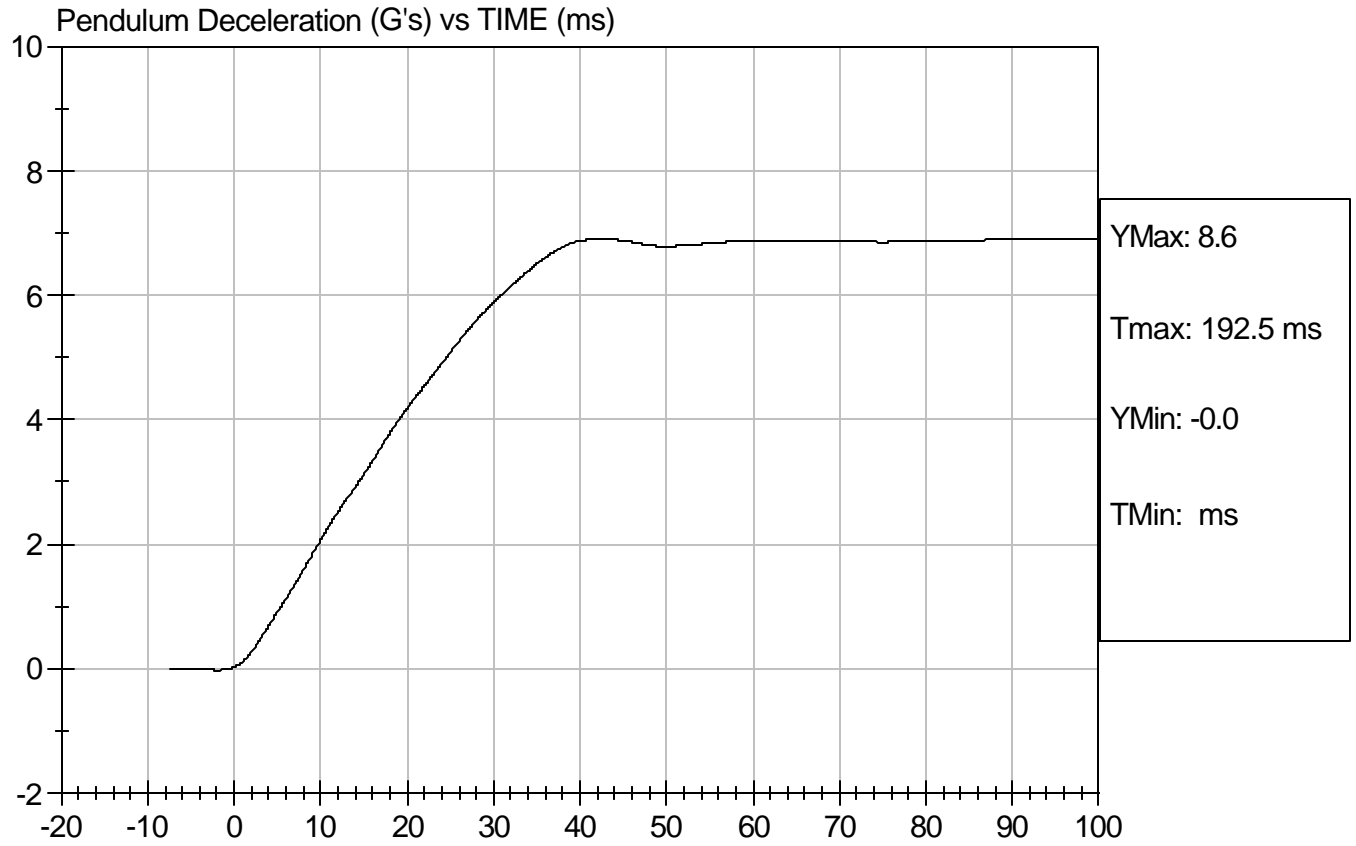
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	20.6	Pass
Laboratory Relative Humidity		%	10 to 70	40	Pass
Impact Velocity		m/s	6.89 to 7.13	7.07	Pass
Pendulum Deceleration	10 msec	m/s	1.96 to 2.55	2.07	Pass
	20 msec	m/s	4.12 to 5.10	4.19	Pass
	30 msec	m/s	5.73 to 7.01	5.88	Pass
	40 to 70 msec	m/s	6.27 to 7.64	6.88	Pass
Midsagittal Plane Max Rotation		deg	66 to 82	70	Pass
Head Rotation Peak to Zero - Decay Time		msec	58 to 67	58	Pass
Max. Mx at Occipital Condyles		Nm	73 to 88	77	Pass
Mx Peak To Zero - Decay Time		msec	49 to 64	57	Pass
Mx Peak to Max. Head Rotation		msec	2 to 16	10	Pass

Jessica Gall
 Laboratory Technician

9/4/07

Test Date

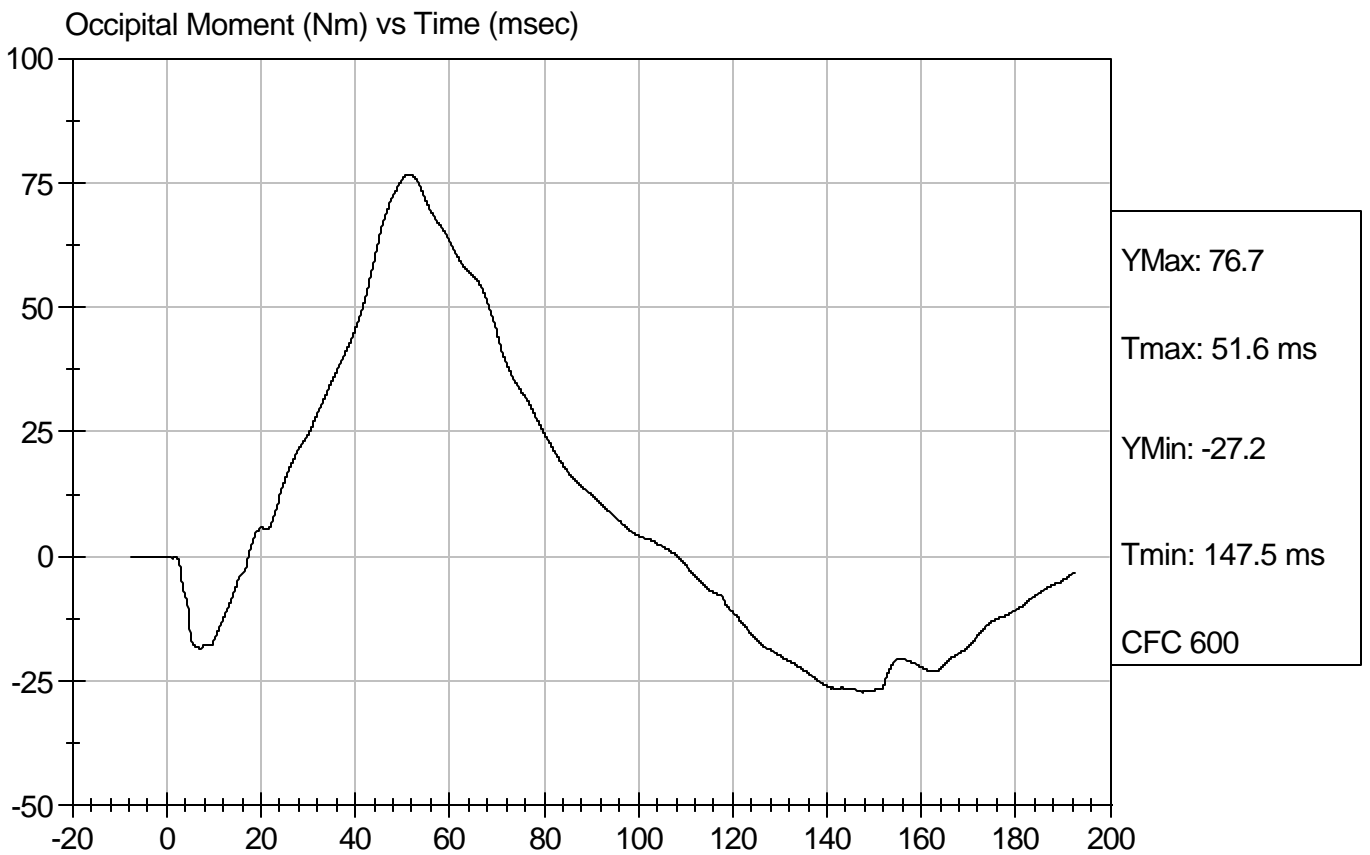
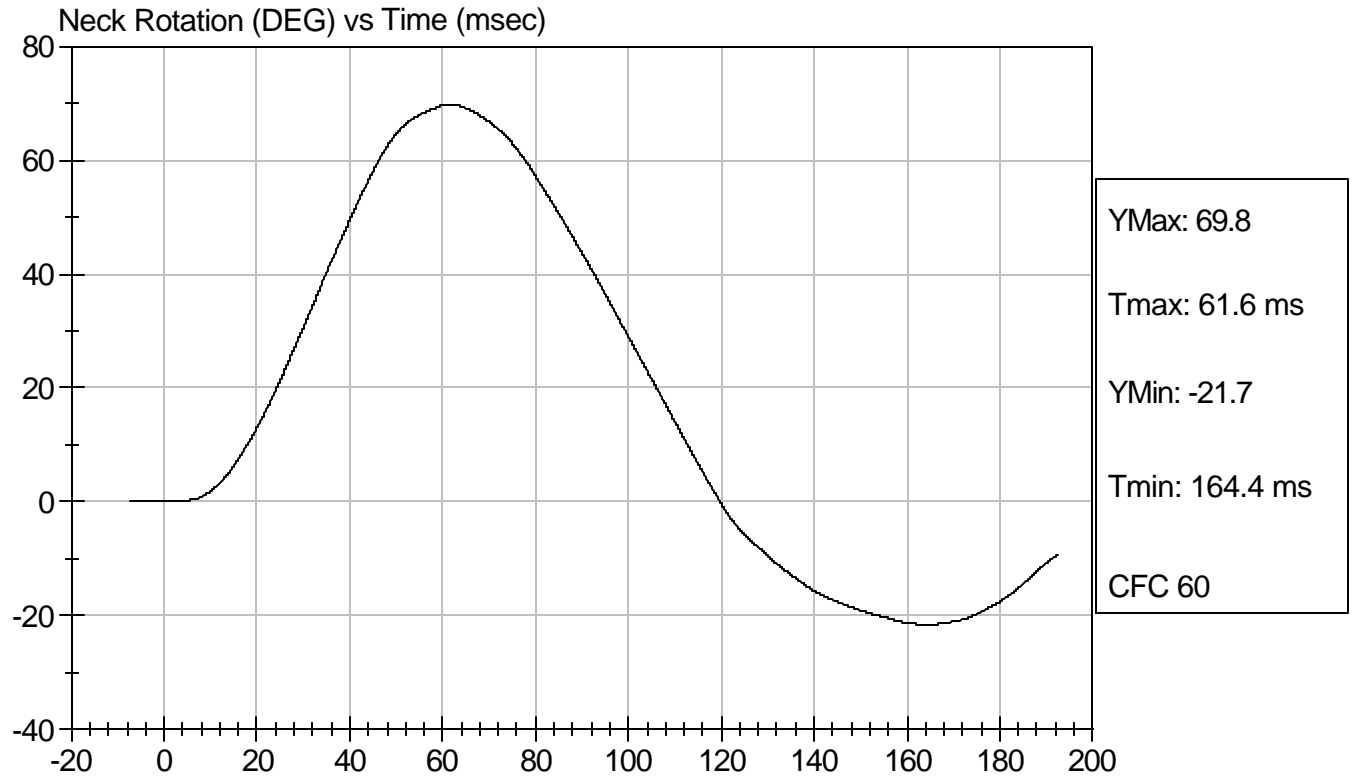
David Winkelbauer
 Approved By





Test Desc: Neck Bending
Component ID: D072709

Test Date: 9/4/07
Speed: 23.21 ft/sec, 7.07 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

Jessica Hall
 Laboratory Technician
David Winkelbauer
 Approved By

9/4/2007
 Test Date

APPENDIX D
CHILD DUMMY DATA

SUMMARY OF TEST

Measurement Description	Units	Threshold	P3 ATD
Head Injury Criteria (HIC36)	N/A	N/A	29
Head Injury Criteria (HIC15)	N/A	390	15
Max. Thorax Accel. (3msec Clip)	G's	50	18

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	643.2	514.8	
Right	kg	552.5	496.7	
Ratio	%	54.2	45.8	
Totals	kg	1195.7	1011.5	2207.2

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

TEST NOTES

The child seat became unattached from its base during impact.

TEST DUMMY INFORMATION

Description	Position 3 CRS
Dummy Type / Serial No.	12 month old CRABI / 093
Number of Data Channels	12
Restraint System	Evenflo Discovery (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

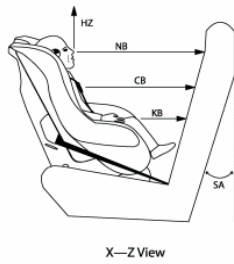
VISIBLE DUMMY CONTACT POINTS

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

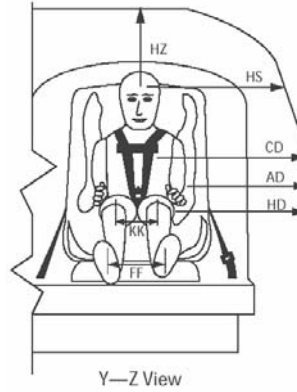
CHILD DUMMY POSITIONING IN VEHICLE

Child Restraint System (Position 3)	Evenflo Discovery (Rear Facing)
NHTSA No.	L80300

Dummy Measurements for Rear-facing CRS Passengers



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



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)	15.8	
HS	457	1142
CD	430	1118
AD	325	903
HD	355	888
HZ	442	1025
NB	535	1132
CB	397	992
KK	100	89
FF	103	69
KB - LEFT	176	777
KB - RIGHT	176	823
TB - LEFT	52	727
TB - RIGHT	55	738

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

CRS PERFORMANCE DATA

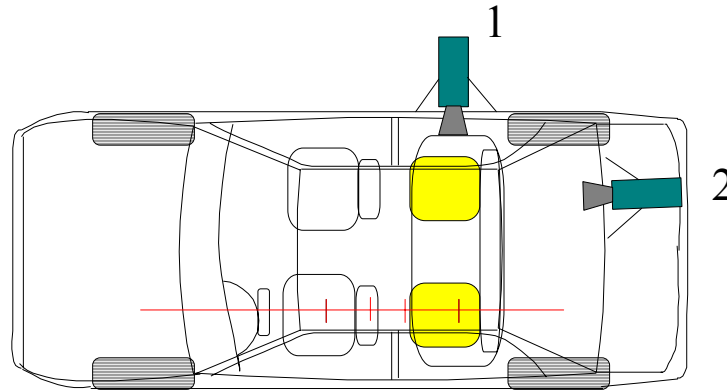
Child Restraint System (Position 3)	Evenflo Discovery (Rear Facing)
NHTSA No.	L80300

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	3 Point
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)	Evenflo Discovery (Rear Facing)
NHTSA No.	L80300



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					8	1000

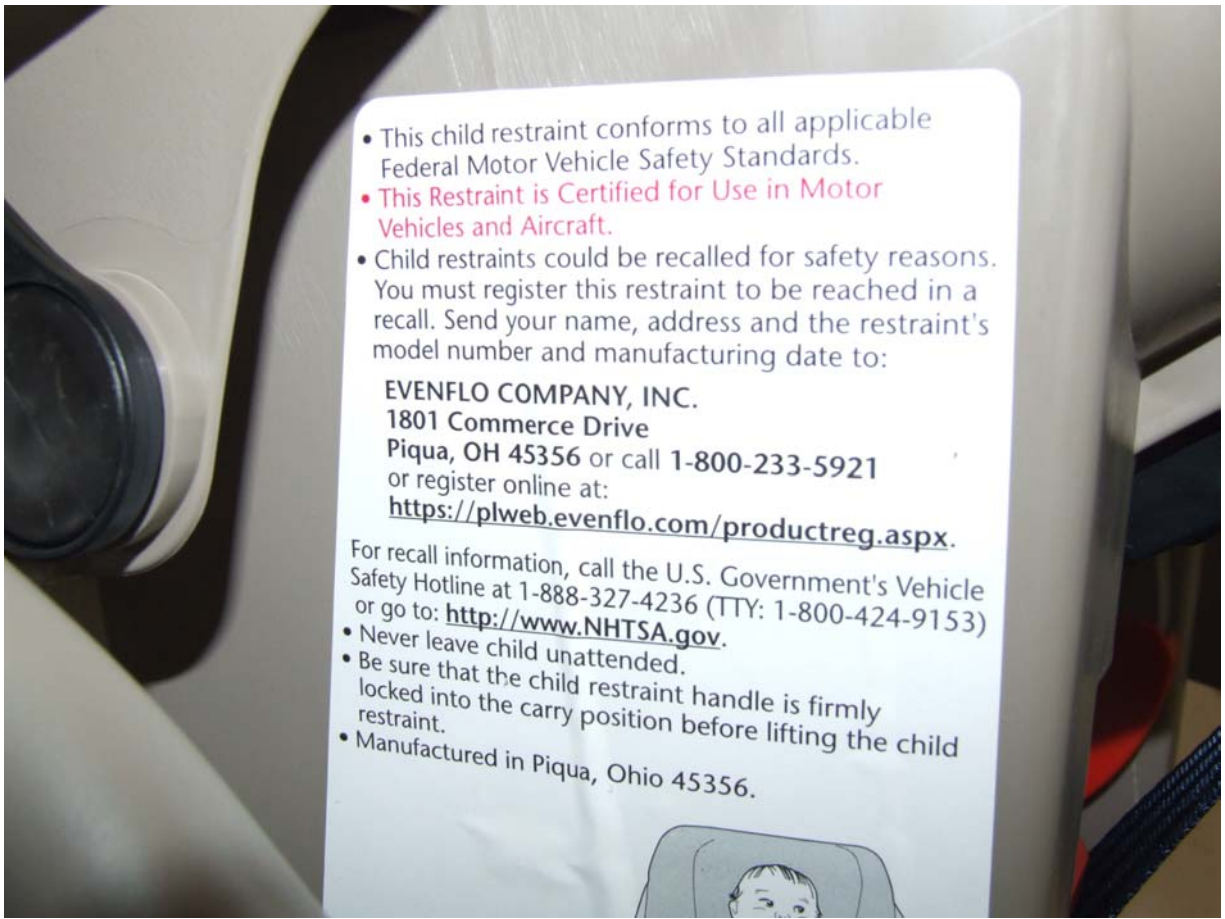
***COORDINATES:**

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

PHOTOGRAPHS

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Close-up View of Position 3 CRS Label



Pre-Test Front View of Position 3 CRS



Post-Test Front View of Position 3 CRS



Pre-Test Rear View of Position 3 CRS



Post-Test Rear View of Position 3 CRS



Pre-Test Left Side View of Position 3 CRS



Post-Test Left Side View of Position 3 CRS



Pre-Test Right Side View of Position 3 CRS



Post-Test Right Side View of Position 3 CRS



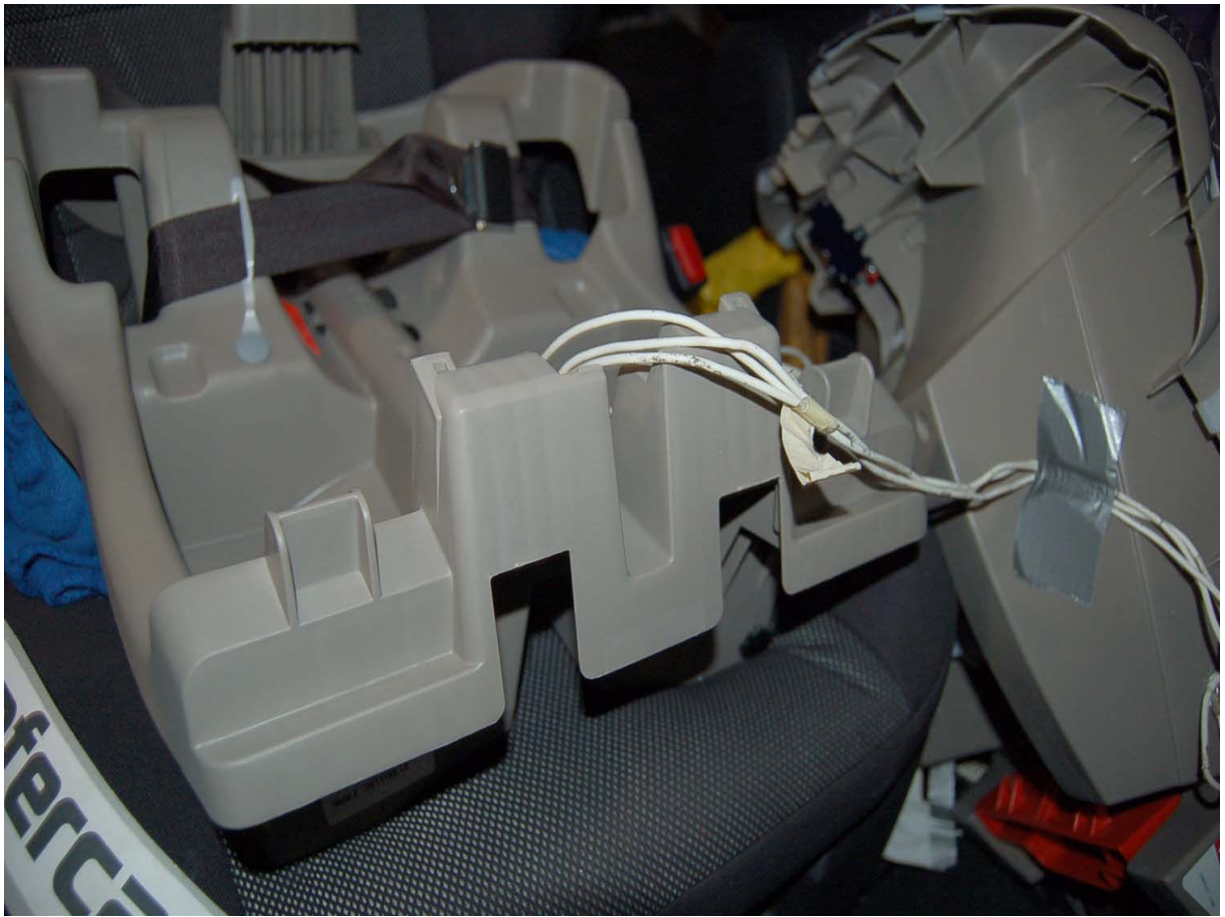
Pre-Test Position 3 Left Side View



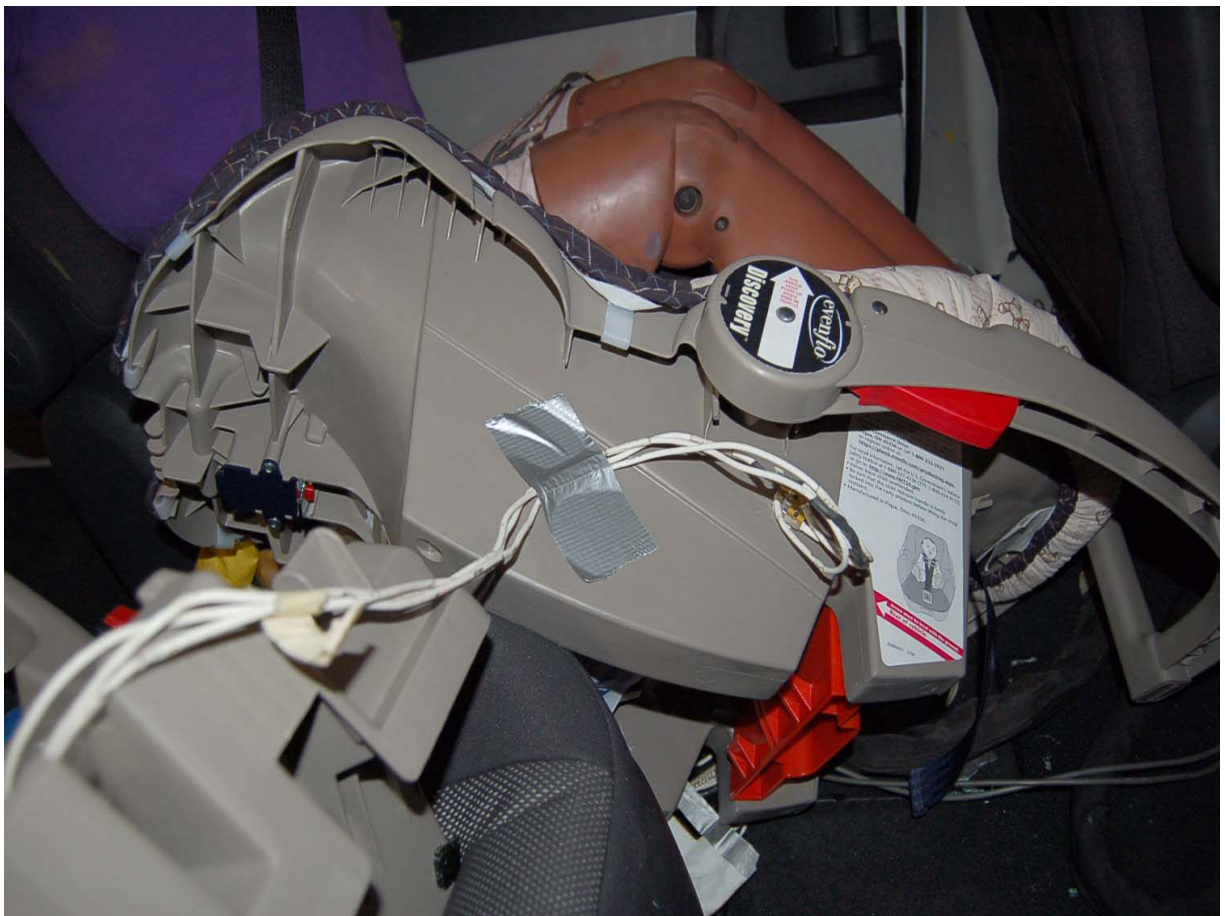
Pre-Test Position 3 Right Side View



Post-Test Position 3 Right Side View



Post-Test CRS Base



Post-Test Child Seat

CHILD DUMMY RESPONSE DATA TRACES

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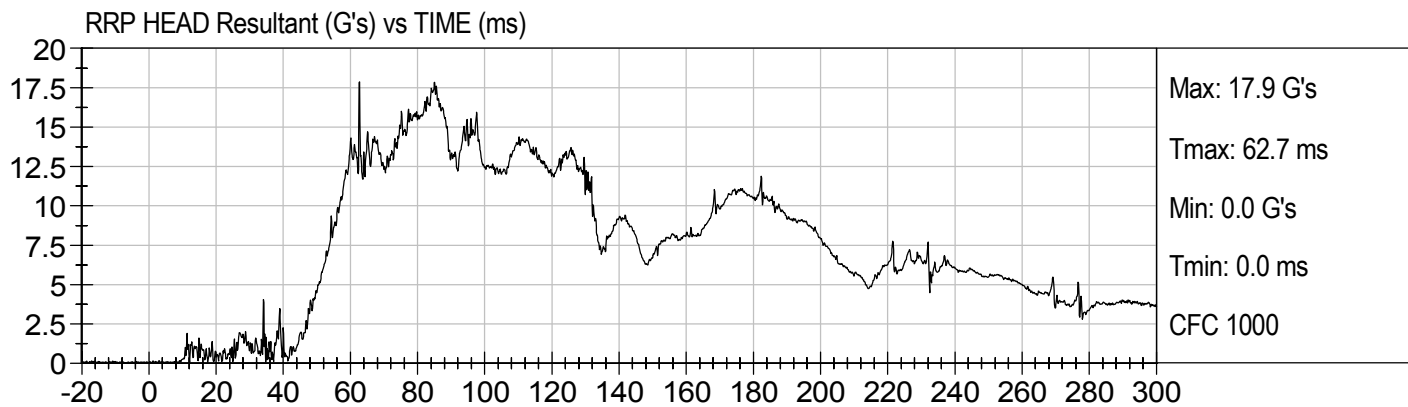
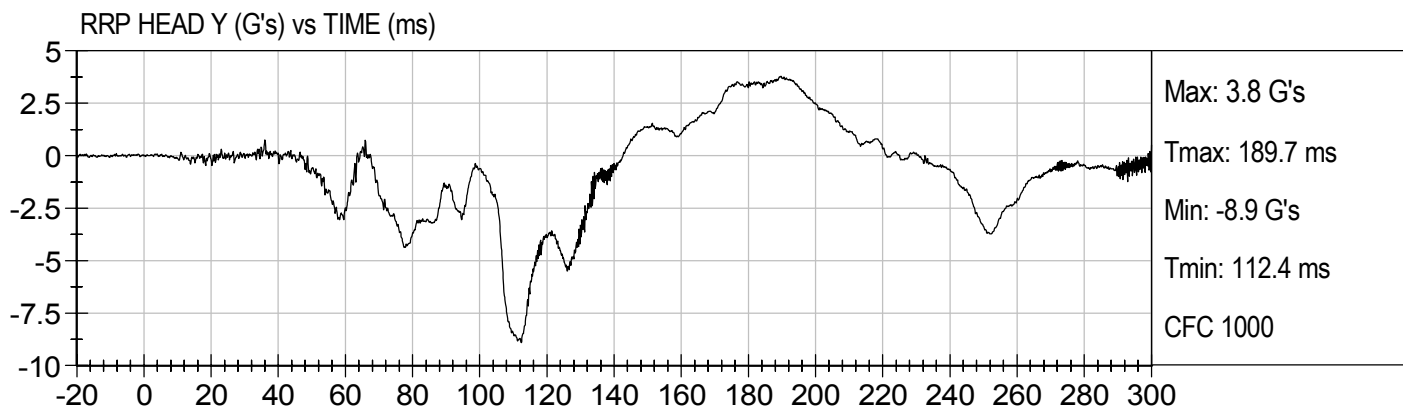
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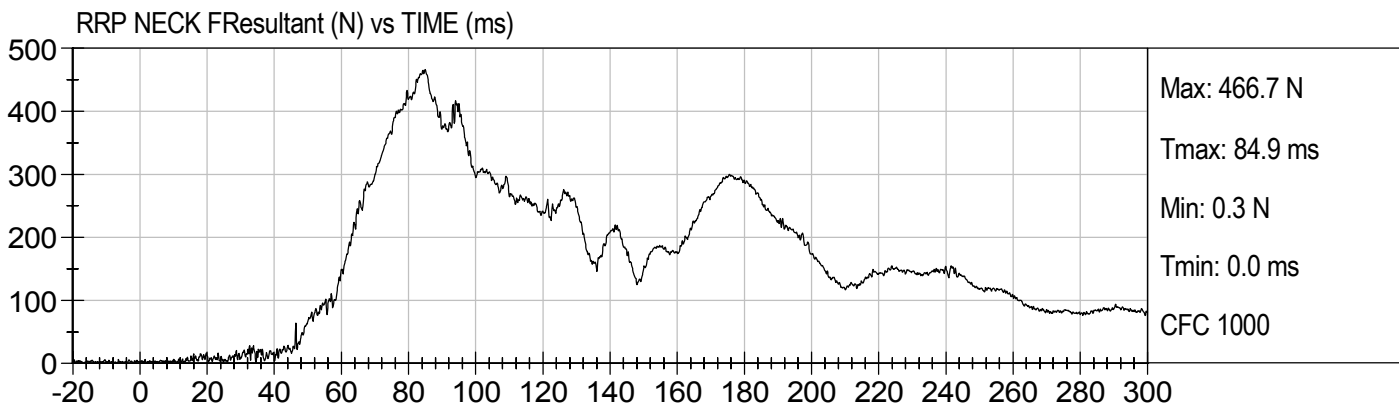
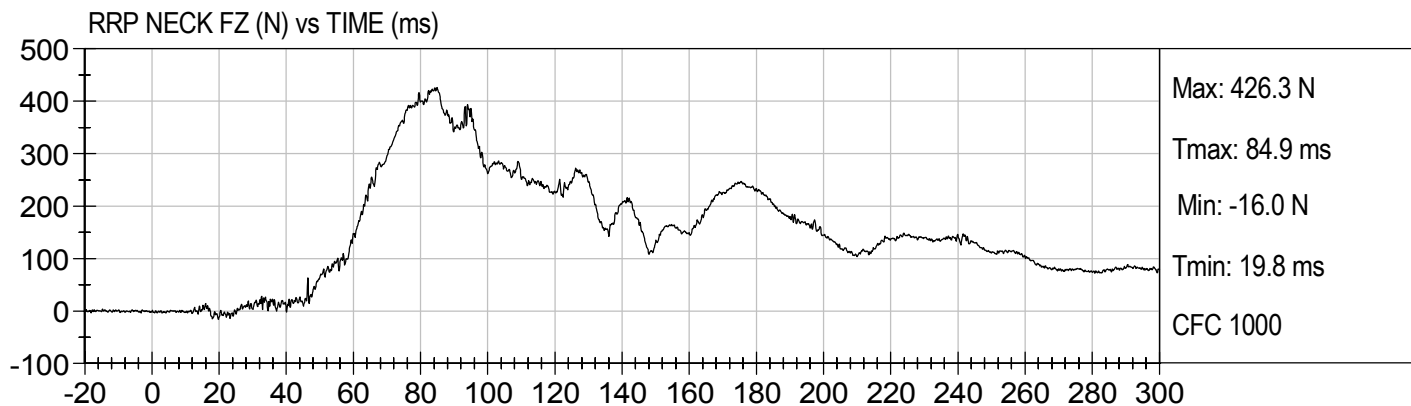
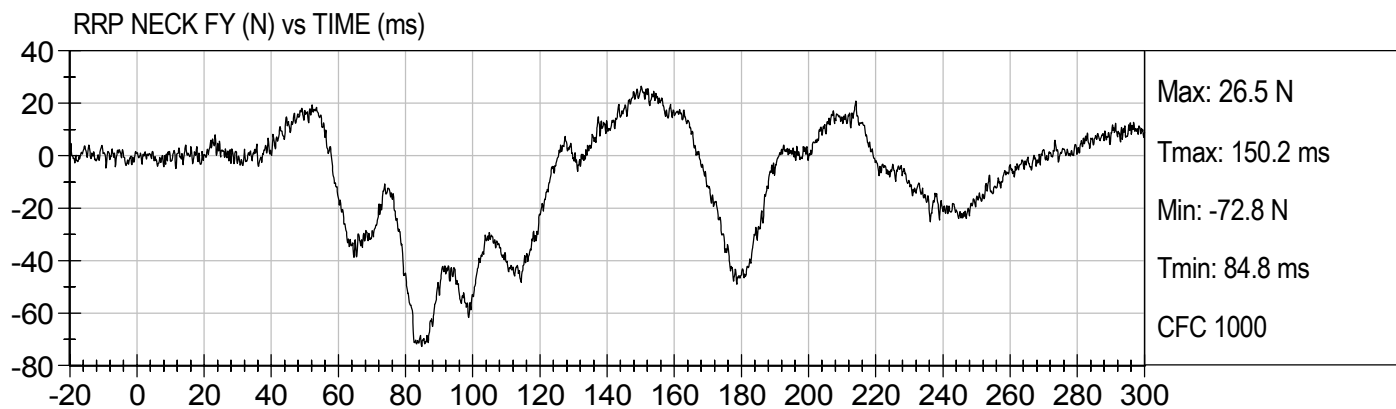
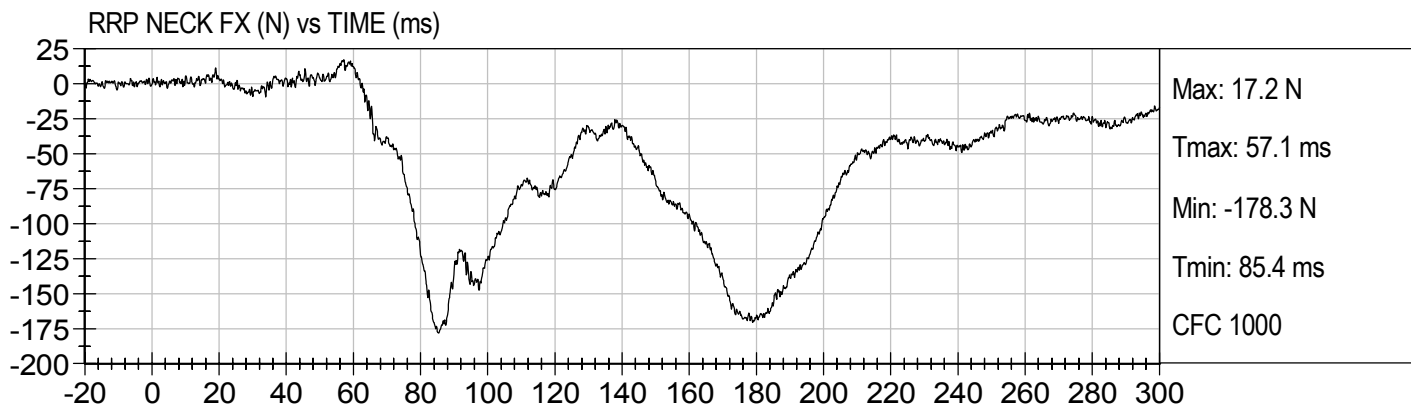
RRP Child Seat X Acceleration vs. Time

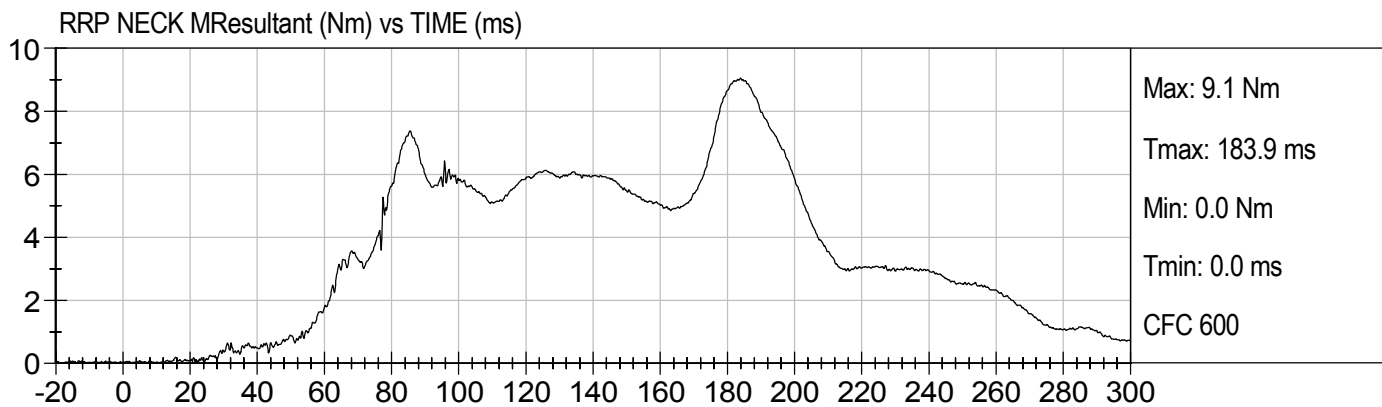
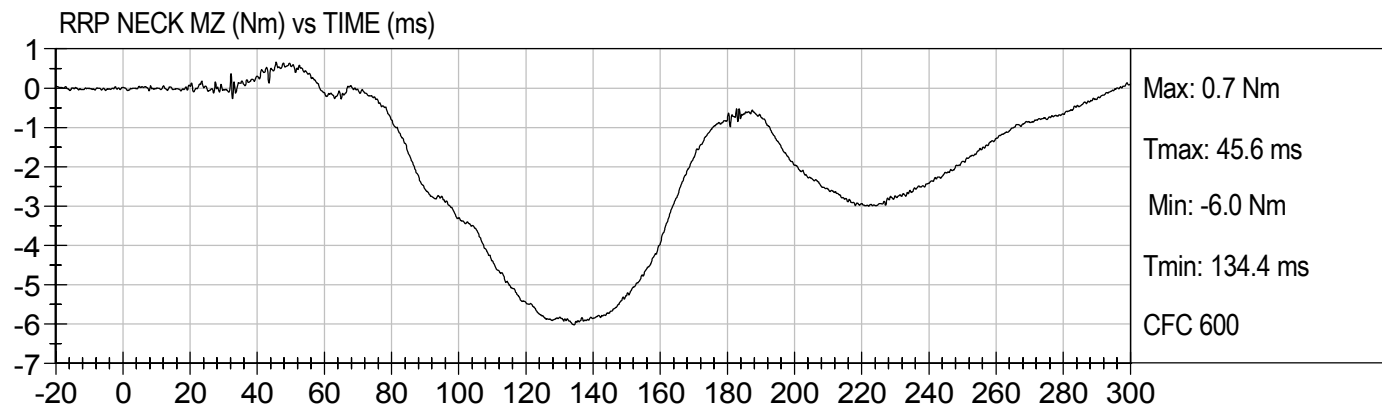
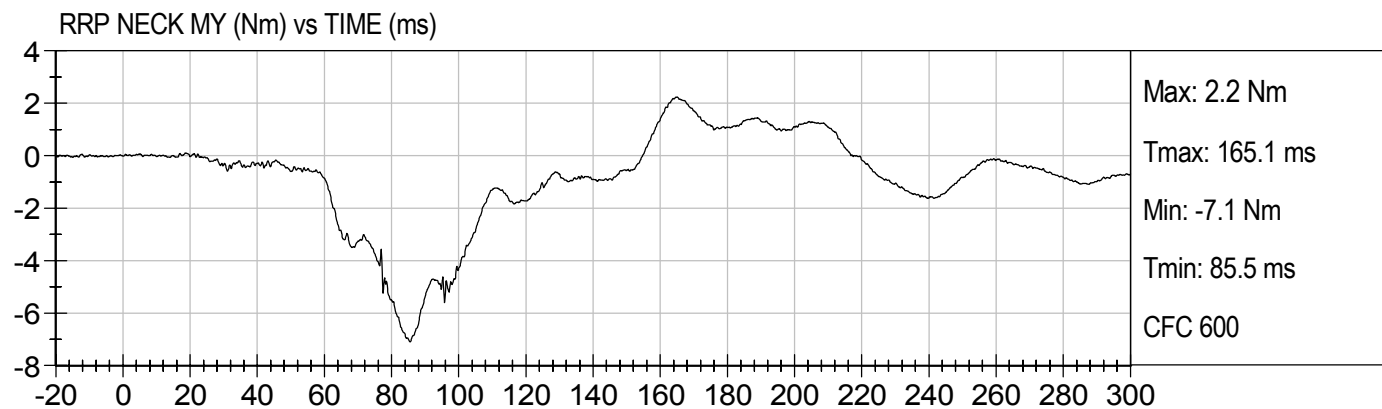
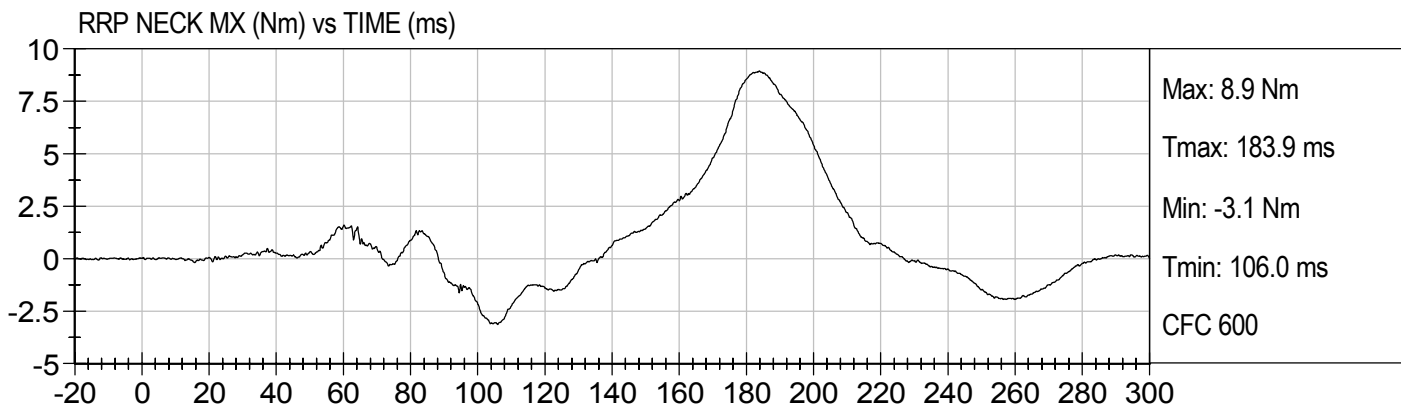
RRP Child Seat Y Acceleration vs. Time

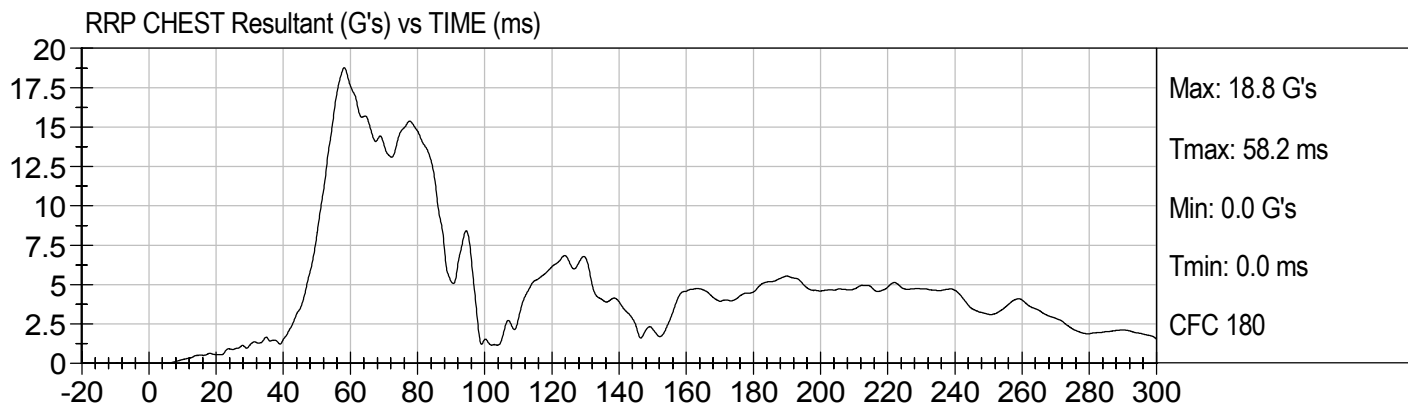
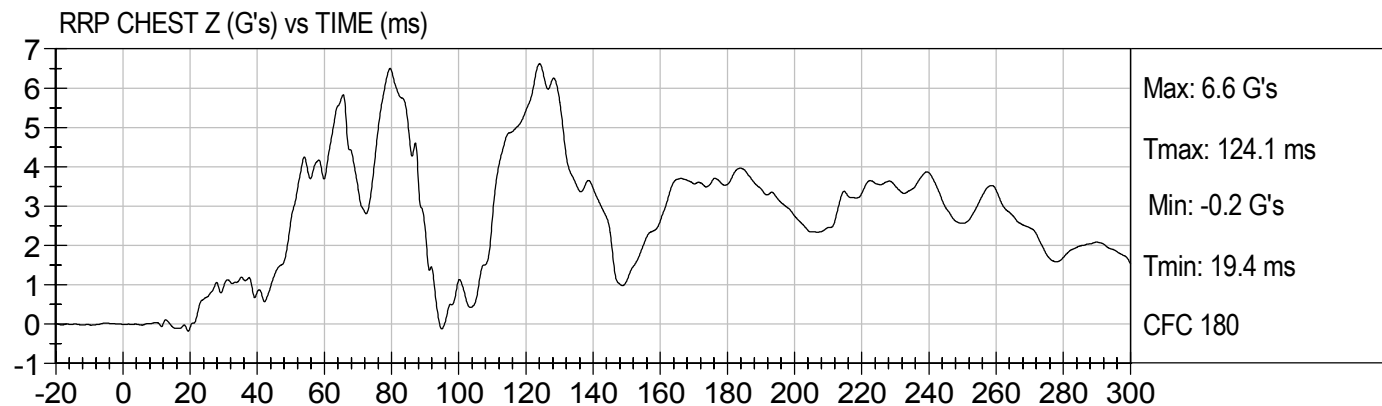
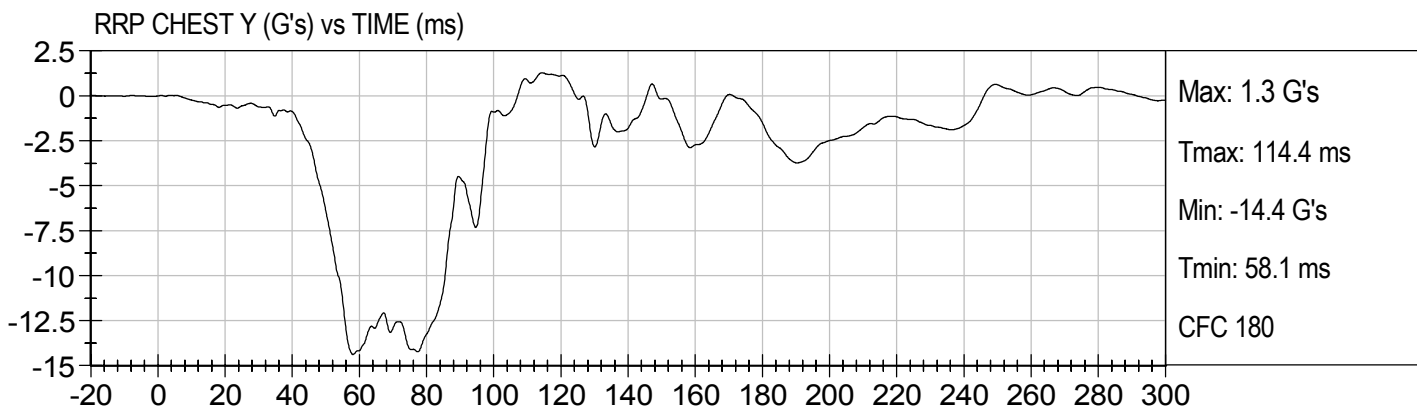
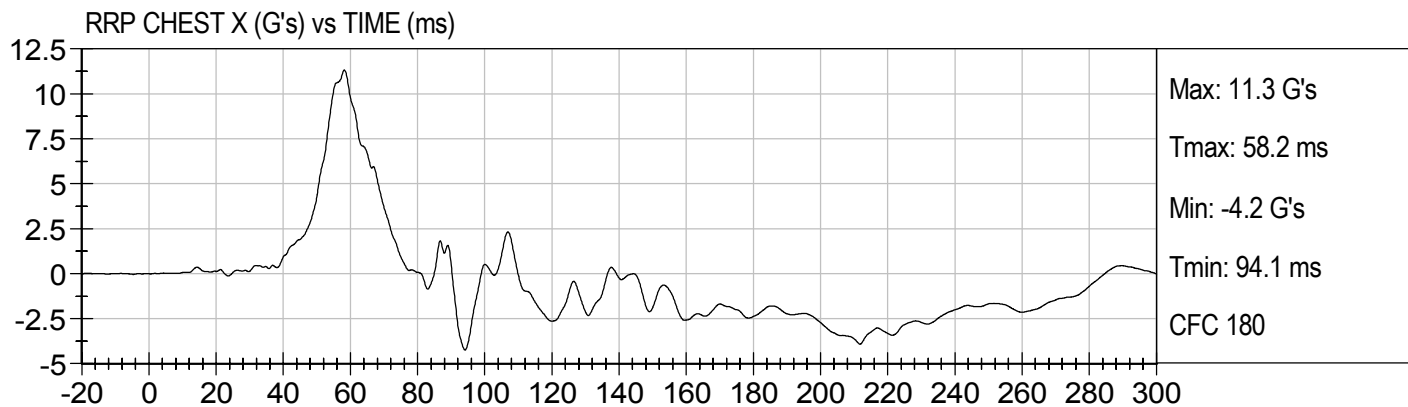
RRP Child Seat Z Acceleration vs. Time

RRP Child Seat Resultant Acceleration vs. Time









CHILD DUMMY CALIBRATION INFORMATION

MGA RESEARCH CORPORATION
FRONT HEAD DROP TEST
CRABI 12 MONTH


ATD Serial No: 093

Test ID: D072541

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

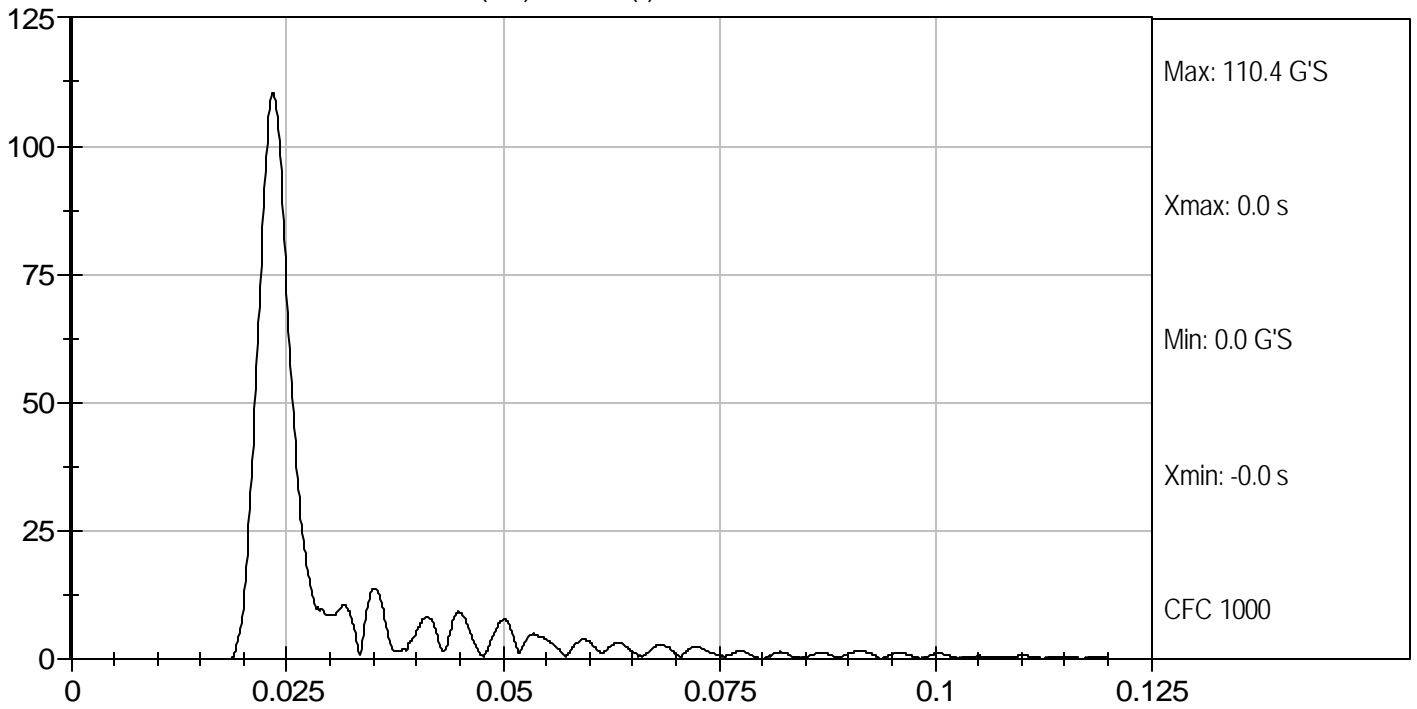

 Laboratory Technician

8/23/07
 Test Date

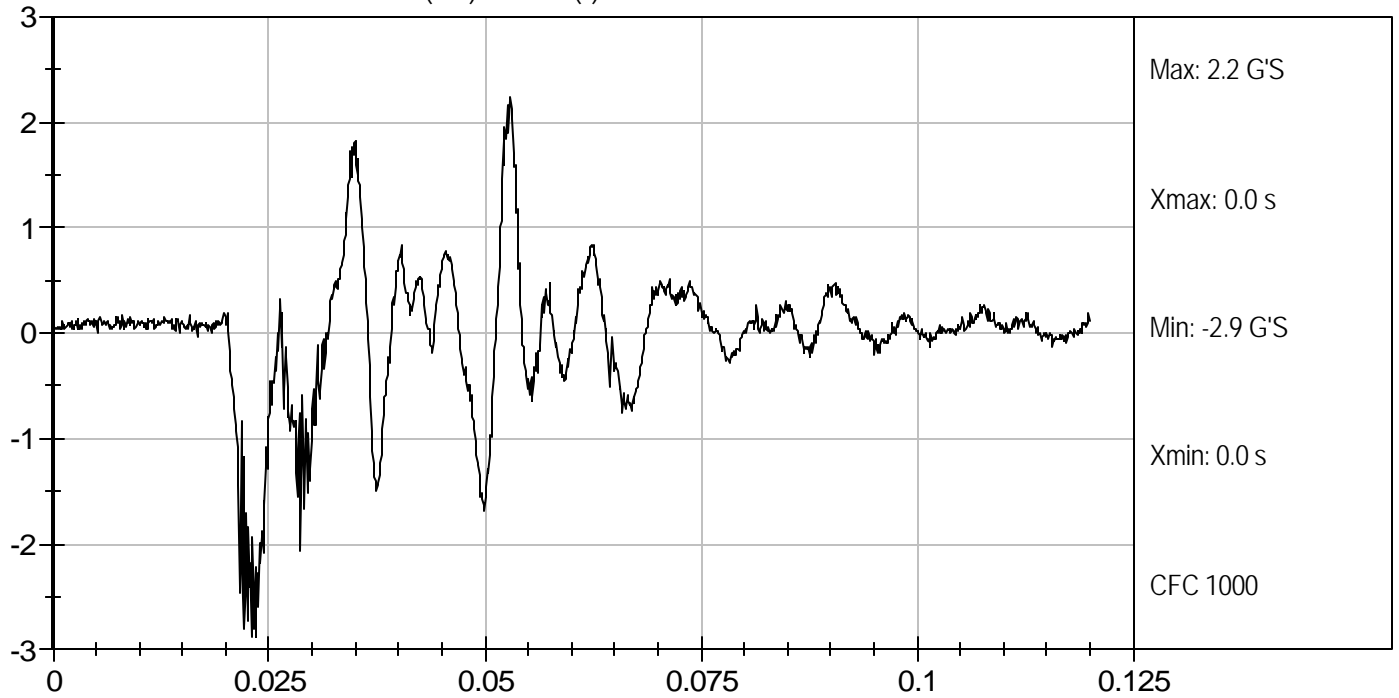

 Approved By



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



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



**MGA RESEARCH CORPORATION
NECK FLEXION TEST
CRABI 12 MONTH**

ATD Serial No: 093

Test I.D.: D072542

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



Laboratory Technician

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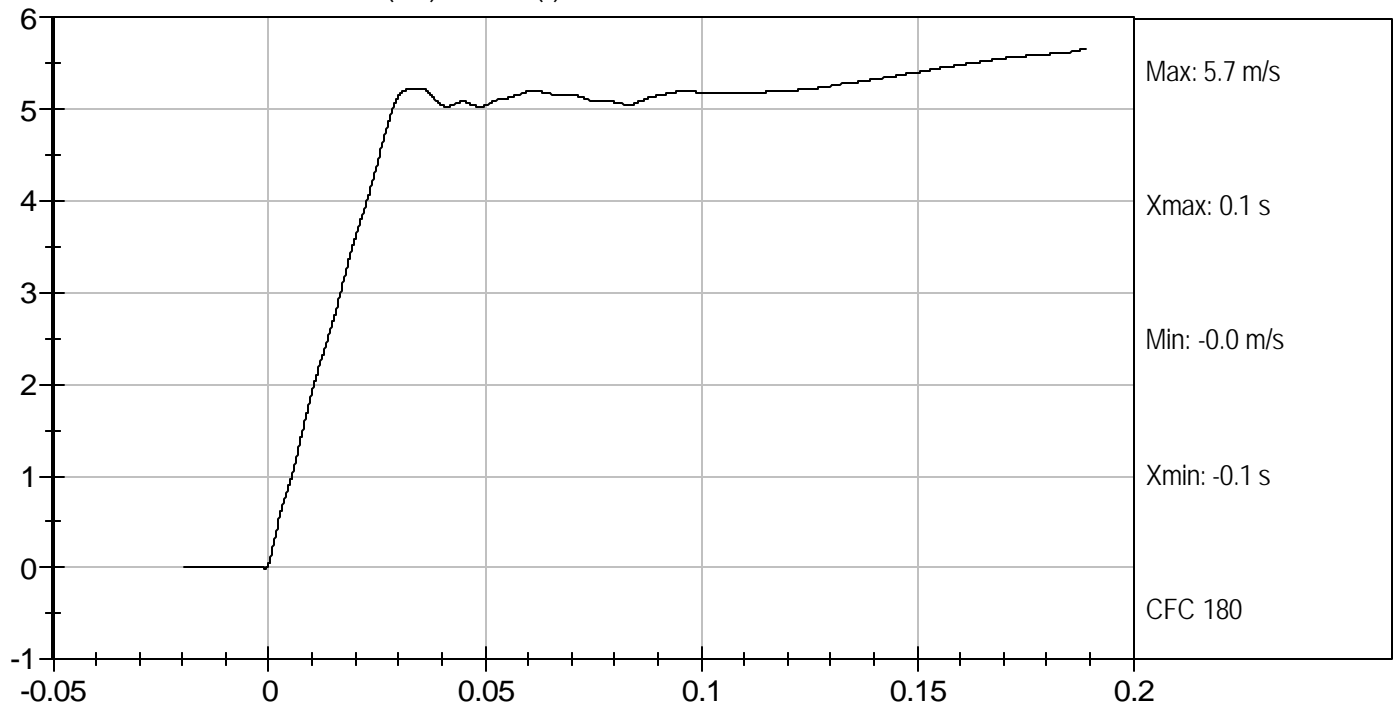
Test Date



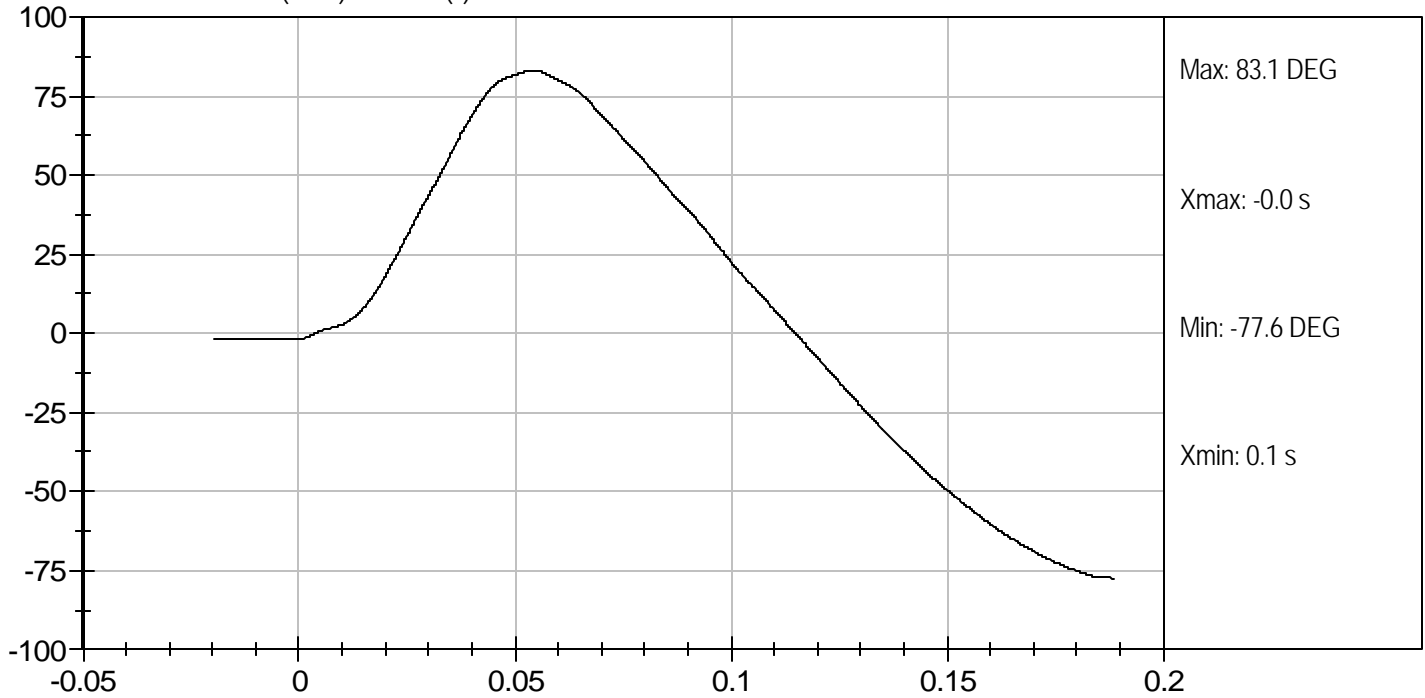
Approved By



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



FLEXION ANGLE (DEG) vs TIME (s)

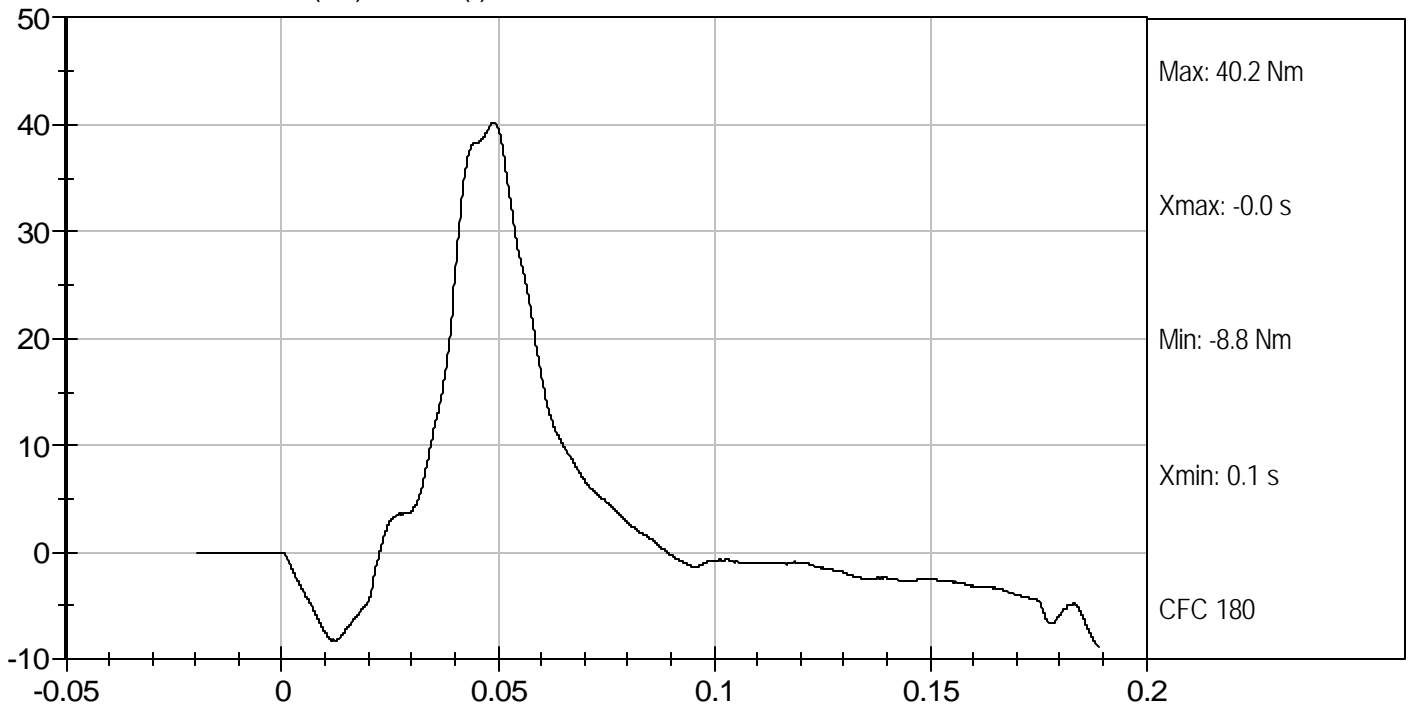




Test Desc: Neck Flexion
Component ID: D072542

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

OCCIPITAL MOMENT (Nm) vs TIME (s)



MGA RESEARCH CORPORATION
NECK EXTENSION TEST
CRABI 12 MONTH

ATD Serial No: 093

Test I.D.: D072543


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



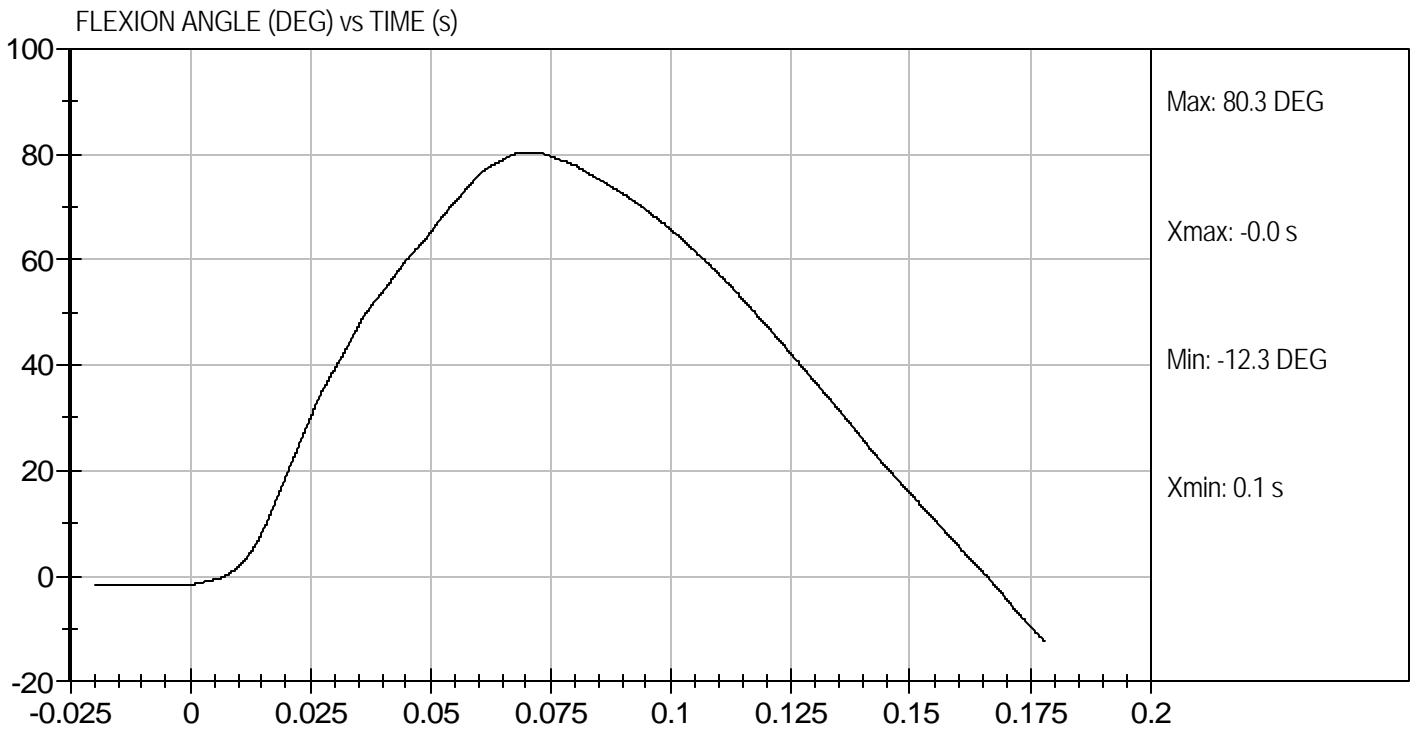
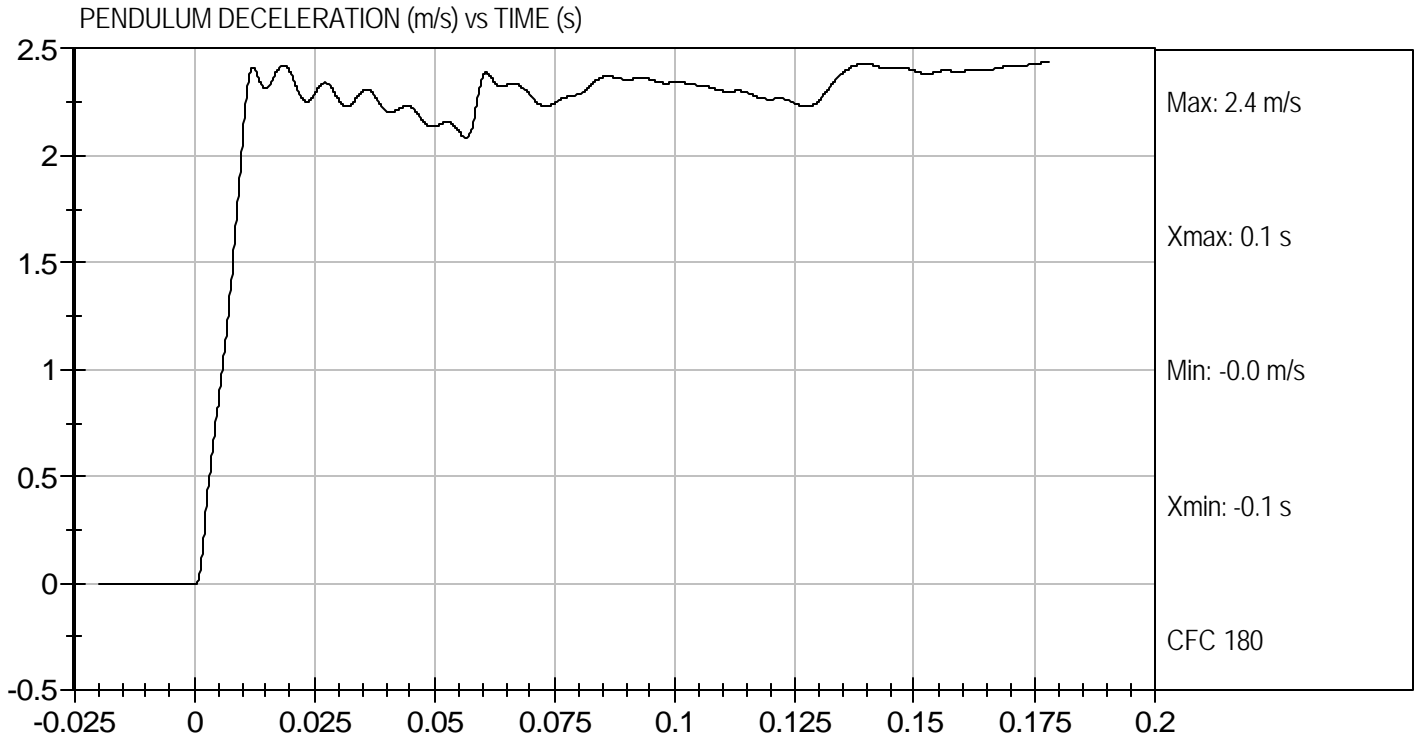
 Laboratory Technician

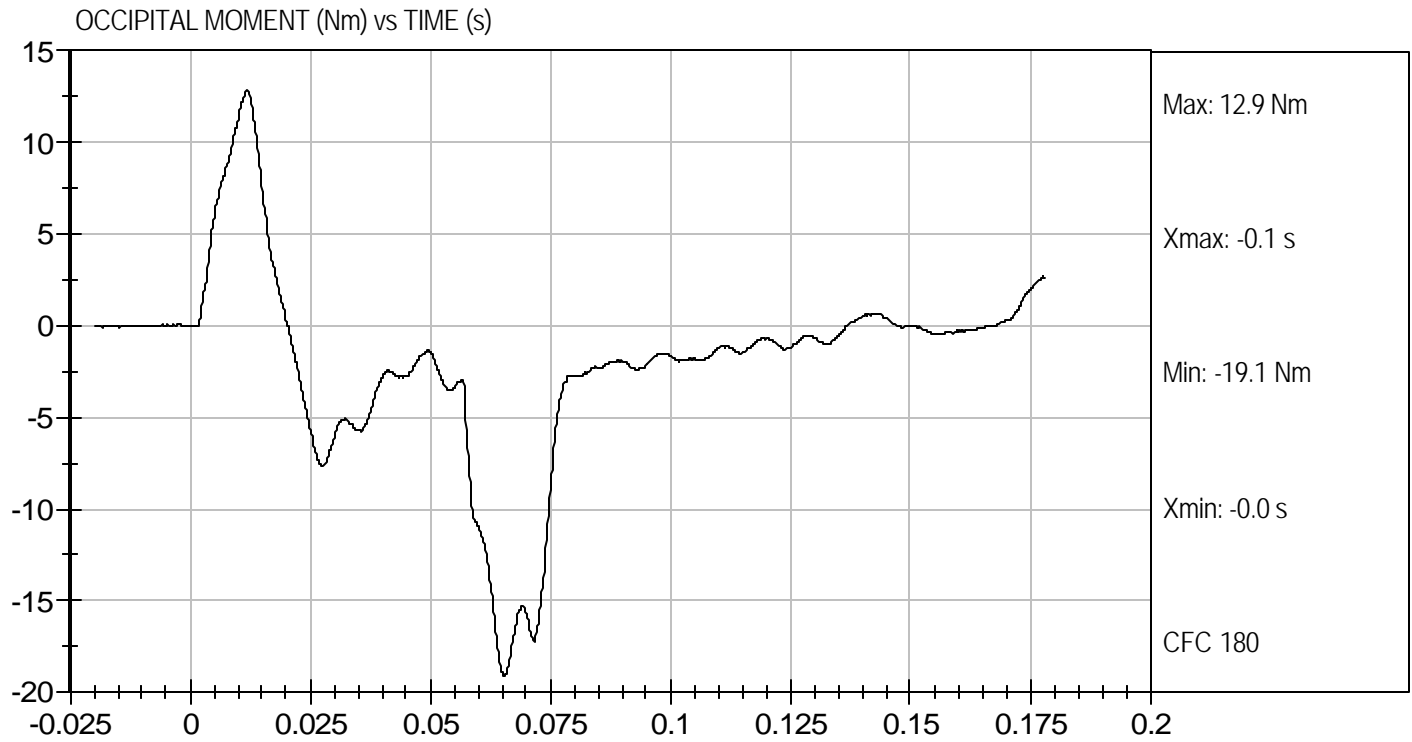
8/23/07

 Test Date



 Approved By





MGA RESEARCH CORPORATION
THORAX IMPACT TEST
CRABI 12 MONTH

ATD Serial No: 093

Test I.D: D072544

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


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8/23/07

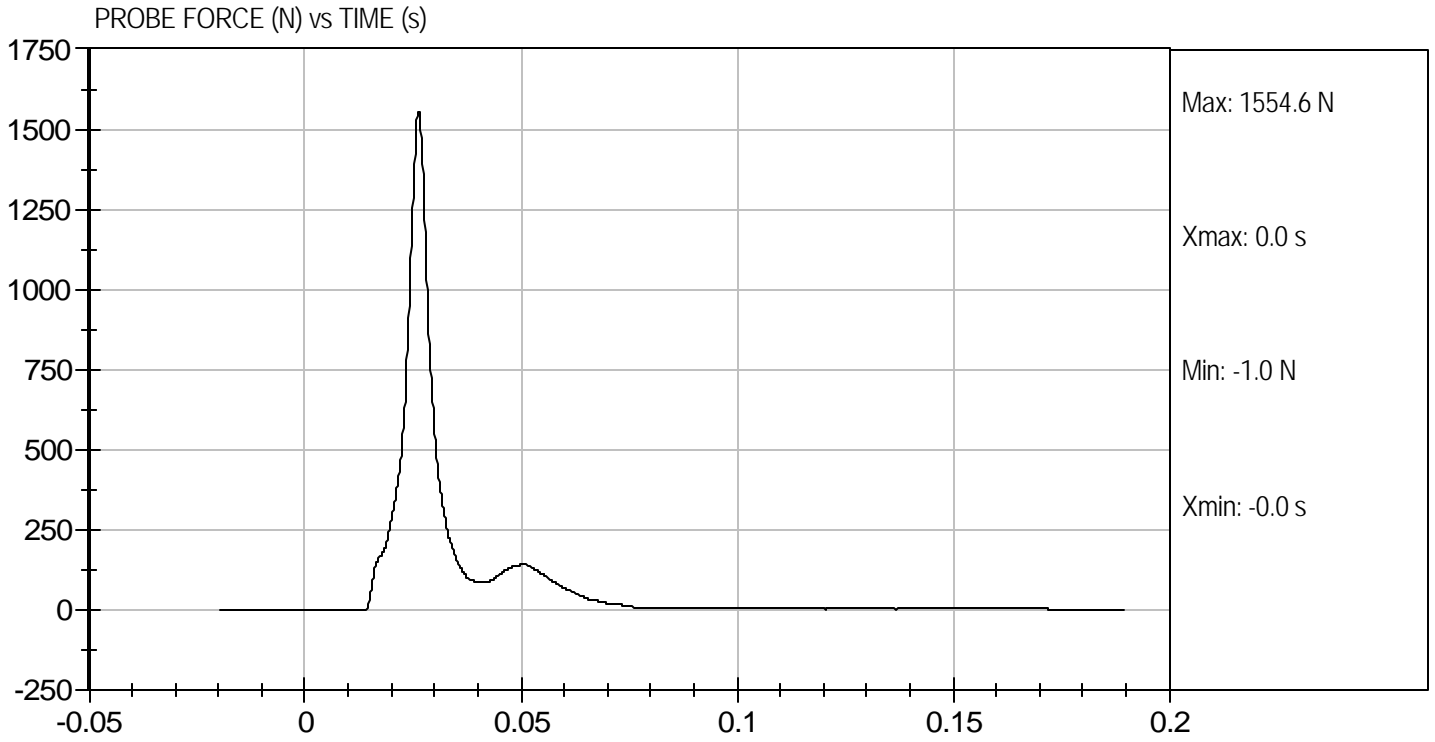
Test Date


 Approved By



Test Desc: Thorax Impact
Component ID: D072544

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



MGA RESEARCH CORPORATION
REAR HEAD DROP TEST
CRABI 12 MONTH

ATD Serial No: 093

Test ID: D072545

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

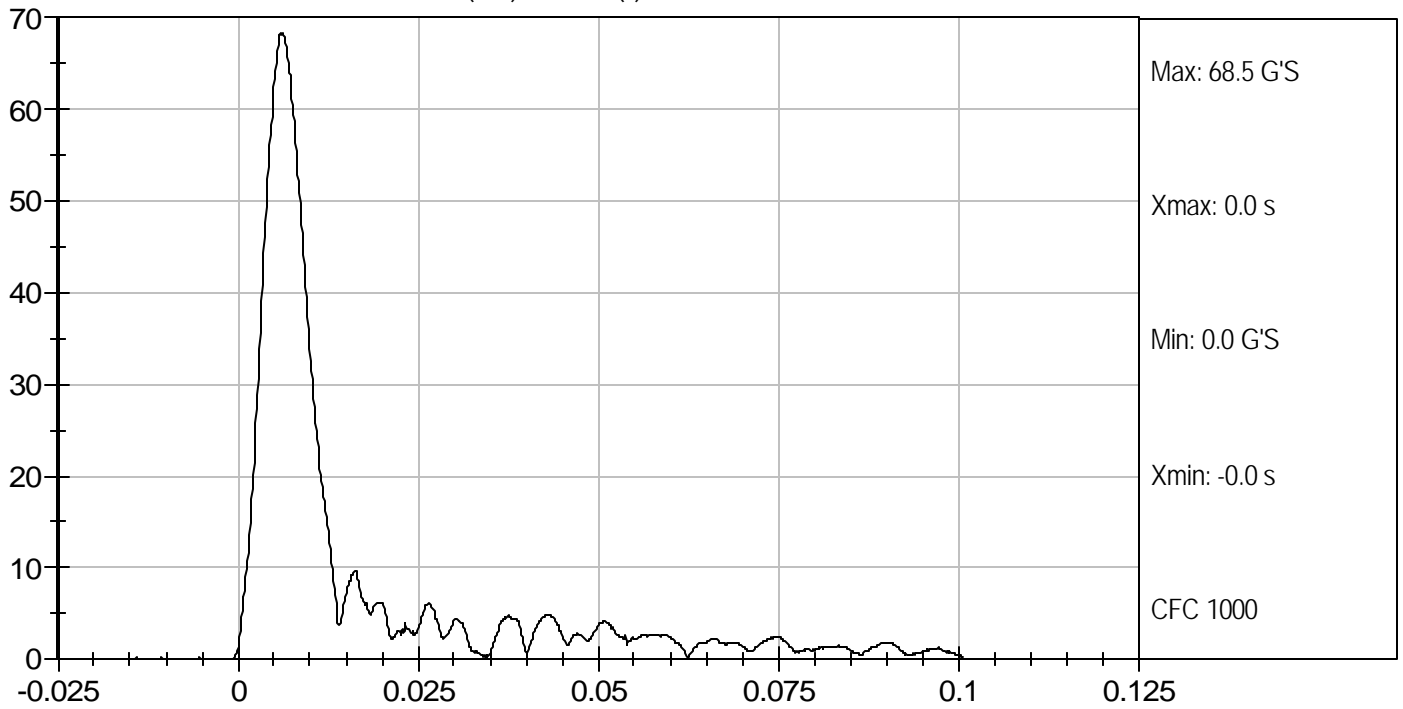

 Laboratory Technician

8/23/07
 Test Date


 Approved By



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



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

