

REPORT NUMBER: 214-CAL-07-02

**SAFETY COMPLIANCE TESTING FOR FMVSS 214
SIDE IMPACT PROTECTION
INDICANT**

**GENERAL MOTOR CORPORATION
2007 SATURN AURA
4-DOOR SEDAN**

NHTSA NUMBER: C70103

**PREPARED BY:
CALSPAN CORPORATION
P.O. BOX 400
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Test Date: September 13, 2006

FINAL REPORT

**PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
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Date: _____

Technical Report Documentation Page

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16. Abstract <p>A 55/28 km/h 90° Moving Deformable Barrier FMVSS 214 Indicant side impact was conducted on the subject 2007 Saturn Aura 4-door Sedan to obtain new car assessment and research data indicant of FMVSS No. 214D performance. The test was conducted at the Calspan Corporation Transportation Sciences Center in Buffalo, New York, on September 13, 2006. The impact velocity of the Moving Deformable Barrier (MDB) was 62.76 km/h, and the ambient temperature at the struck side (driver side) of the vehicle was 21°C. The target vehicle's maximum post test static crush was 272 mm at level 4. The test vehicle's occupant performance is as follows:</p> <table style="margin-left: auto; margin-right: auto; border: none;"> <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;">44.66</td> <td style="text-align: center;">40.97</td> </tr> <tr> <td>Left Lower Rib (LLR) Accel., g</td> <td style="text-align: center;">43.84</td> <td style="text-align: center;">41.24</td> </tr> <tr> <td>Lower Spine (T₁₂) Accel., g</td> <td style="text-align: center;">54.64</td> <td style="text-align: center;">60.44</td> </tr> <tr> <td>Thoracic Trauma Index (TTI)</td> <td style="text-align: center;">50</td> <td style="text-align: center;">51</td> </tr> <tr> <td>Pelvis (PEV) Accel., g</td> <td style="text-align: center;">62</td> <td style="text-align: center;">59</td> </tr> <tr> <td>HIC</td> <td style="text-align: center;">72.4</td> <td style="text-align: center;">495.4</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	44.66	40.97	Left Lower Rib (LLR) Accel., g	43.84	41.24	Lower Spine (T ₁₂) Accel., g	54.64	60.44	Thoracic Trauma Index (TTI)	50	51	Pelvis (PEV) Accel., g	62	59	HIC	72.4	495.4
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SECTION 1
PURPOSE AND TEST PROCEDURE

PURPOSE

This side impact test is part of the FMVSS 214 Side Impact Protection Compliance Test Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-02-D-01114. The purpose of this indicant test was to evaluate side impact protection in a 2007 Saturn Aura 4-door Sedan when tested at the New Car Assessment Program (NCAP) target test velocity of 62.0 kph, which is 8 kph faster than the target velocity required by the Office of Vehicle Safety Compliance's Laboratory Test Procedure (TP-214D-06, dated July 26, 2001).

SECTION 2

SUMMARY OF FMVSS 214 INDICANT SIDE IMPACT TEST

This Side Impact Protection Indicant Test was performed at the New Car Assessment Program (NCAP) target test velocity of 62.0 kph, which is 8 kph faster than the target velocity required by the Office of Vehicle Safety Compliance's Laboratory Test Procedure (TP-214D-06, dated July 26, 2001).

A model year 2007 Saturn Aura 4-door Sedan 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 62.76 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 1832 kg and the test weight of the MDB was 1362.5 kg. The test was conducted at the Calspan Corporation Transportation Sciences Center on September 13, 2006.

One (1) real-time motion picture camera and nine (9) high-speed motion picture cameras were used to document the impact event. The pre-test and post-test conditions were recorded by one (1) real-time motion picture camera. Camera locations and pertinent camera information are documented in the data sheets. Pre- and post-test photographs of the vehicle and Side Impact Dummies (SID/HIII's) can be found in Appendix A.

Two 50th percentile adult male SID/HIII's were placed in the driver (P1) and left rear passenger (P4) designated seating positions according to instructions specified in the Laboratory Test Procedure for New Car Assessment Program Side Impact Testing dated July 1997. 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.

2.2 GENERAL COMMENTS

The test vehicle sustained a maximum static crush of 272 mm at level 4, 1350 mm rearward of the left vertical impact point. The driver and passenger SID/HIII's, Serial Nos. 270 and 269 respectively, were calibrated just prior to this test.

Test data and observations are presented in this section of the report. Appendix A contains the still photograph prints. Appendix B contains the driver and passenger SID/HIII's, vehicle, and MDB response data traces. Appendix C contains the SID/HIII's configuration and performance verification data. Appendix D contains the test equipment information.

The occupant data is summarized below:

ATD position	HIC(36)	T ₁	T ₂	TTI (G's)	Peak Pelvis (G's)
Driver	72.4	25.1	61.1	50	62
Passenger	495.4	53.4	65.0	51	59

SUPPLEMENTAL RESTRAINT INFORMATION

Restraint Type	Left Front (Driver)		Left Rear (Passenger)	
	Installed	Deployed	Installed	Deployed
Front Airbag	Yes	No	NA	NA
Side Torso Airbag	Yes	Yes	NA	NA
Side Head/Torso Combination Airbag	NA	NA	NA	NA
Curtain Airbag	Yes	Yes	Yes	Yes

The test instrumentation data listed in Appendix B can be found on the NHTSA website:
www.nhtsa.dot.gov.

DATA SHEET NO. 1

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle:	2007 Saturn Aura	NHTSA No.	C70103
Test Program:	FMVSS 214 Indicant Side Impact	Test Date:	September 13, 2006

TEST VEHICLE INFORMATION AND VEHICLE OPTIONS

Make	General Motor Corporation	Driver Front Airbag	Yes
Model	Aura	Driver Side Curtain Airbag	Yes
Body Style	4-door Sedan	Driver Side Torso Airbag	Yes
NHTSA No.	C70103	Driver Pretensioners	Yes
VIN	1G8ZS57N57F131832	Driver Load Limiters	Yes
Color	GOLD	Driver Power Seats	Yes
Engine Disp.(L)	3.5	Rear Pass. Side Curtain Airbag	Yes
Engine Cylinders	6	Rear Pass. Side Torso Airbag	No
Engine Placement	Lateral	Rear Pass. Pretensioners	No
Transmission Type	Automatic	Rear Pass. Load Limiters	No
Transmission Speeds	4	Rear Pass. Power Seats	NA
Final Drive	Front/	Tilt Wheel	Yes
Air Conditioning	Yes	Anti-lock Brakes	Yes
Power Steering	Yes	Traction Control	Yes
Power Brakes	Yes	Power Windows	Yes
Delivery Date	09/08/06	Power Door Locks	Yes
Odometer Reading (km)	68	Automatic Door Locks (ADL)	Yes
Dealer	SATURN OF CLARENCE	Owner's Manual Details Instructions on Disabling ADLs	Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	General Motor Corporation	GVWR (kg)	2047
		GAWR Front (kg)	1092
Date of Manufacture	08/06	GAWR Rear (kg)	955

VEHICLE CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket/	Bench		
Number Of Occupants	2	3		5
Capacity Wt. (VCW) (kg)				412
Cargo Wt. (RCLW) (kg)				71.8

DATA SHEET NO. 1 (continued)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2007 Saturn Aura NHTSA No. C70103
 Test Program: FMVSS 214 Indicant Side Impact Test Date: September 13, 2006

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			Fully Loaded (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	490.5	313.5		542.0	420.0		538	410	
Right	kg	498.0	302.0		505.5	373.0		508	376	
Ratio	%	61.6	38.4		56.9	43.1		57.1	42.9	
Totals	kg	988.5	615.5	1604.0	1047.5	793.0	1840.5	1046.0	786.0	1832.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1604
Weight of 2 P572E ATDs (81.2 kg each)	kg	162.4
Rated Cargo/Luggage Weight (RCLW)	kg	71.8
Calculated Vehicle Target Weight (TVTW)	kg	1838.2

* Actual As Tested Weight (ATW) will be TVTW -4.5/-9.1 kg

Weight of Ballast (including instrumentation package and cameras): 65.6 kg

TEST VEHICLE ATTITUDES

	Units	LF	RF	LR	RR
As Delivered	mm	720	731	716	741
Fully Loaded	mm	700	690	710	708
As Tested	mm	708	697	711	708

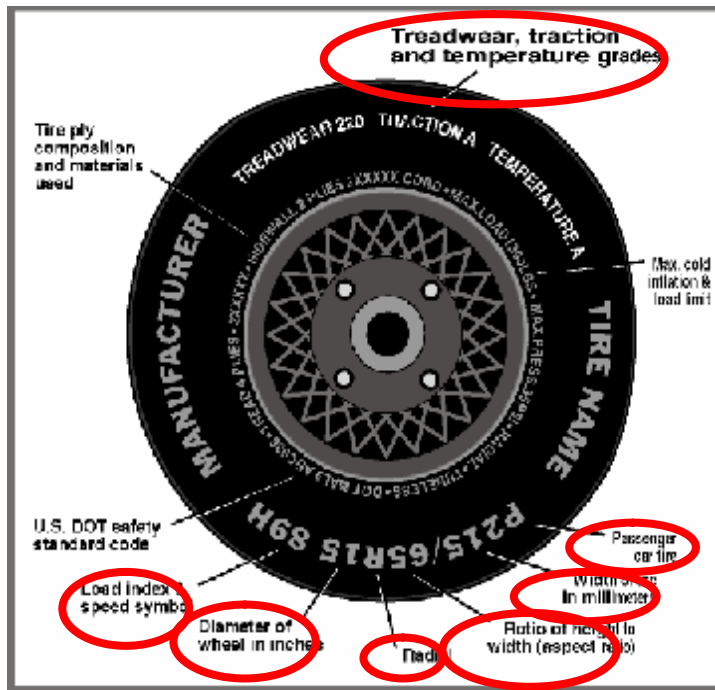
TEST VEHICLE VERTICAL IMPACT LINE AND CG

Measurement Description	Units	Value
Test Vehicle Wheel Base	mm	2860
Target Impact Point Aft of Front Axle	mm	490
Actual Impact Point Aft of Front Axle	mm	490
As Tested CG (aft of front axle)	mm	1227.05

DATA SHEET NO. 2

TEST VEHICLE TIRE INFORMATION

Test Vehicle:	2007 Saturn Aura	NHTSA No.	C70103
Test Program:	FMVSS 214 Indicant Side Impact	Test Date:	September 13, 2006



DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold / Test Pressure (kPa)	210	210
Recommended Tire Size	P225/50R17S	P225/50R17S
Tire Size on Vehicle	P225/50R17	P225/50R17
Tire Manufacturer	HANKOOK	HANKOOK
Tire Name	OPTIMO H725A	OPTIMO H725A
Tire Type	P	P
Tire Width (mm)	225	225
Ratio of Height to Width (aspect ratio)	50	50
Radial	YES	YES
Wheel Diameter	17	17
Load Index & Speed Symbol	93S	93S
Treadwear	340	340
Traction Grade	A	A
Temperature Grade	A	A

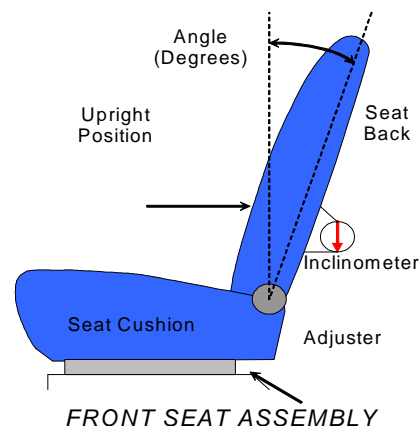
DATA SHEET NO. 3

TEST VEHICLE INFORMATION

Test Vehicle: 2007 Saturn Aura	NHTSA No. C70103
Test Program: FMVSS 214 Indicant Side Impact	Test Date: September 13, 2006

NORMAL DESIGN RIDING POSITION

The driver and passenger seat back is positioned to the manufacturer's designated angle.

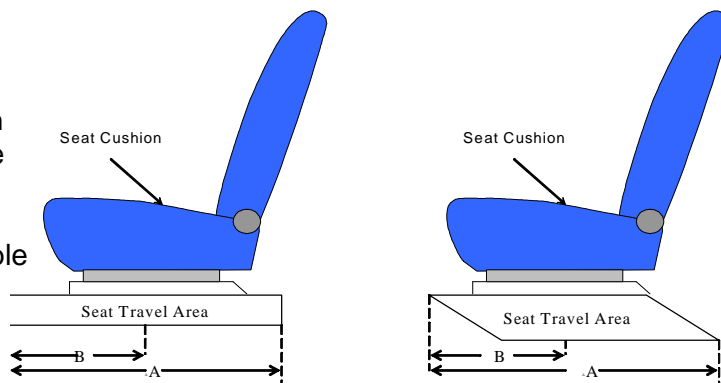


SEAT BACK POSITION

	Driver Seat	Rear Seat
Test Detent (forward-most detent defined as 0)	Detent 6	Not Adjustable
Angle (deg. from forward-most locking position)	19	Not Adjustable
Alternative Measurements to Verify Test Position	NA	NA

SEAT FORE/AFT POSITIONS

The total seat travel was measured from forward most position to rearmost position irrespective of vertical seat height in those positions. The seat was set at the longitudinal mid position with vertical adjustment at the lowest position obtainable for both the driver and passenger.



SEAT FORE/AFT POSITION

	Driver Seat	Rear Seat
Total Fore/Aft Travel (A) (mm)	270	Not Adjustable
Test Position (B) (mm)	135	Not Adjustable
Test Detent (forward-most detent defined as 0)	10	Not Adjustable
Total Number of Detents (including 0)	20	Not Adjustable

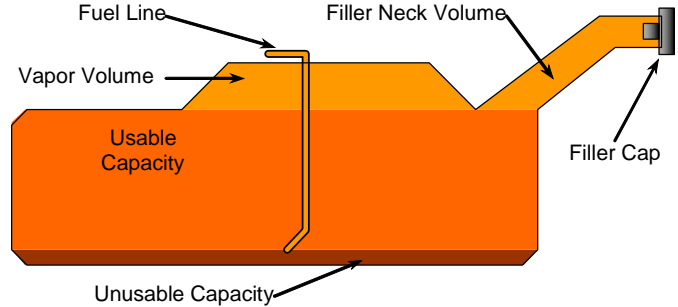
DATA SHEET NO. 3 (CONTINUED)

TEST VEHICLE INFORMATION

Test Vehicle: 2007 Saturn Aura NHTSA No. C70103
 Test Program: FMVSS 214 Indicant Side Impact Test Date: September 13, 2006

FUEL SYSTEM INFORMATION

The test vehicle is equipped with an electric fuel pump. The fuel pump operates for approximately two seconds after the ignition is placed in the "ON" position, after which the fuel pump automatically shuts off. The fuel filler door is located on the left rear fender. The standard fuel tank occupies the area under the rear seat.



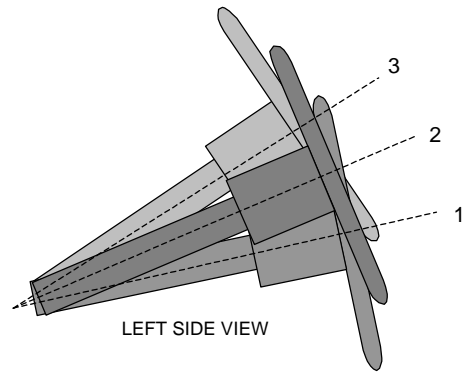
VEHICLE FUEL TANK ASSEMBLY

FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard" Fuel Tank	61.3
Usable Capacity of "Optional" Fuel Tank	-
Stoddard Used For Test (92%-94% of Fuel Tank Usable Capacity)	57.38

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 Position (mm)	Tilt (degrees)	Tilt (detent)
Lowermost Position No. 1	NA	67.4	NA
Geometric Center Position No. 2 *	NA	69.4	NA
Uppermost Position No. 3	NA	71.4	NA

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

Test Vehicle:	2007 Saturn Aura	NHTSA No.	C70103
Test Program:	FMVSS 214 Indicant Side Impact	Test Date:	September 13, 2006

MDB SPECIFICATIONS

Measurement Description	Length (mm)
Overall Width of Framework Carriage	1250
Overall Length Including Honeycomb Face	4120
Wheel base of Framework Carriage	2590
Tread of Framework Carriage (front & rear)	1875
C.G. Location aft of Front Axle	1104

MDB WEIGHTS

	Units	Front Axle	Rear Axle	Total
Left	kg	409.5	281.5	
Right	kg	372.5	299.0	
Ratio	%	57.4	42.6	
Totals	kg	782.0	580.5	1362.5

MDB SPEED AND IMPACT ANGLE DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.1 to 62.7	62.7
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	62.7

POST TEST OBSERVATIONS**MDB LEFT EDGE IMPACT POINT DATA**

Measured Parameter	Units	Requirement	Value
Horizontal Offset	mm	+/- 50	0 mm
Vertical Offset	mm	+/-20	2 mm below

DATA SHEET NO. 5

POST TEST OBSERVATIONS

Test Vehicle: 2007 Saturn Aura NHTSA No. C70103
 Test Program: FMVSS 214 Indicant Side Impact Test Date: September 13, 2006

TEST DUMMY INFORMATION AND CONTACT POINTS

Description	Front Seat SID/HIII	Rear Seat SID/HIII
Dummy Type / Serial No.	SID/HIII / 270	SID/HIII / 269
Head Contact	SIDE CURTAIN	SIDE CURTAIN
Upper Torso Contact	TORSO AIRBAG	UPPER DOOR TRIM
Lower Torso Contact	TORSO BAG/ ARM REST	LOWER DOOR TRIM / ARM REST
Left Knee Contact	DOOR TRIM	DOOR TRIM
Right Knee Contact	LEFT KNEE	LEFT KNEE

POST TEST DOOR OPENING AND SEAT TRACK INFORMATION

Description	Front	Rear
Locked/Unlocked Doors	Doors were locked	Doors were locked
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 Passenger Window Broke
Other Notable Effects	None

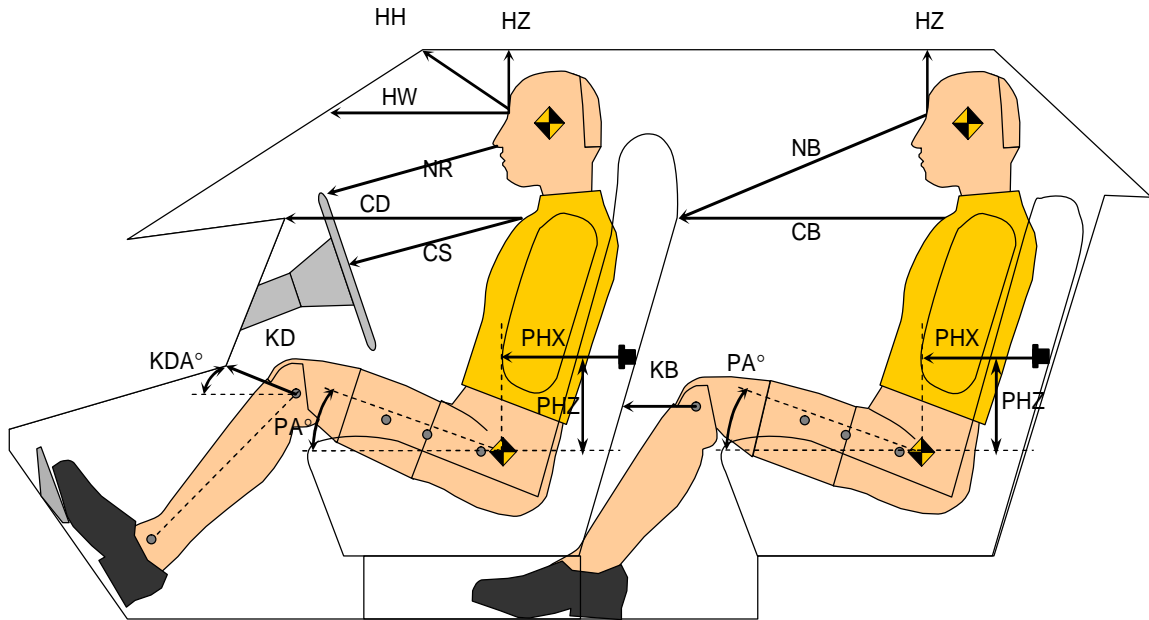
SUPPLEMENTAL RESTRAINT INFORMATION

Restraint Type	Left Front (Driver)		Left Rear (Passenger)	
	Installed	Deployed	Installed	Deployed
Front Airbag	Yes	No	NA	NA
Side Torso Airbag	Yes	Yes	NA	NA
Side Head/Torso Combination Airbag	NA	NA	NA	NA
Curtain Airbag	Yes	Yes	Yes	Yes

DATA SHEET NO. 7

SID/HIII LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle:	2007 Saturn Aura	NHTSA No.:	C70103
Test Program:	FMVSS 214 Indicant Side Impact	Test Date:	September 13, 2006

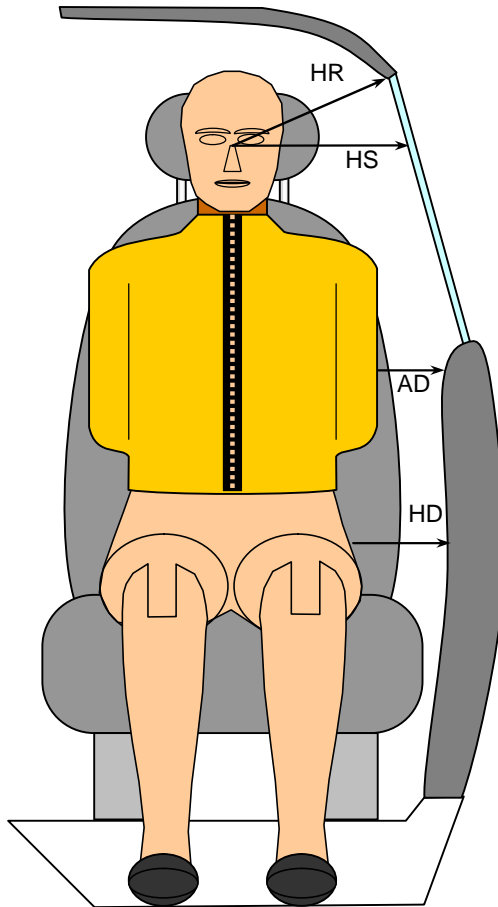


Driver Code	Pass. Code	Measurement Description	Driver S/N 270		Passenger S/N 269	
			Length(mm)	Angle(°)	Length(mm)	Angle(°)
HH		Head to Header	412			
HW		Head to Windshield	711			
HZ	HZ	Head to Roof	173		143	
NR	NB	Nose to Rim/Nose to Seatback	476		649	
CD	CB	Chest to Dash or Seatback	590		576	
CS		Chest to Steering Wheel	404			
KDL	KBL	Left Knee to Dash or Seatback	193	38	213	21
KDR	KBR	Right Knee to Dash or Seatback	172	43	219	14
PA	PA	Pelvic Angle		23.2		24.5
PHX	PHX	H-Point to Striker (X-Axis)	185		286	
PHZ	PHZ	H-Point to Striker (Z-Axis)	153		292	

DATA SHEET NO. 8

SID/HIII LATERAL CLEARANCE DIMENSIONS

Test Vehicle:	2007 Saturn Aura	NHTSA No.	C70103
Test Program:	FMVSS 214 Indicant Side Impact	Test Date:	September 13, 2006



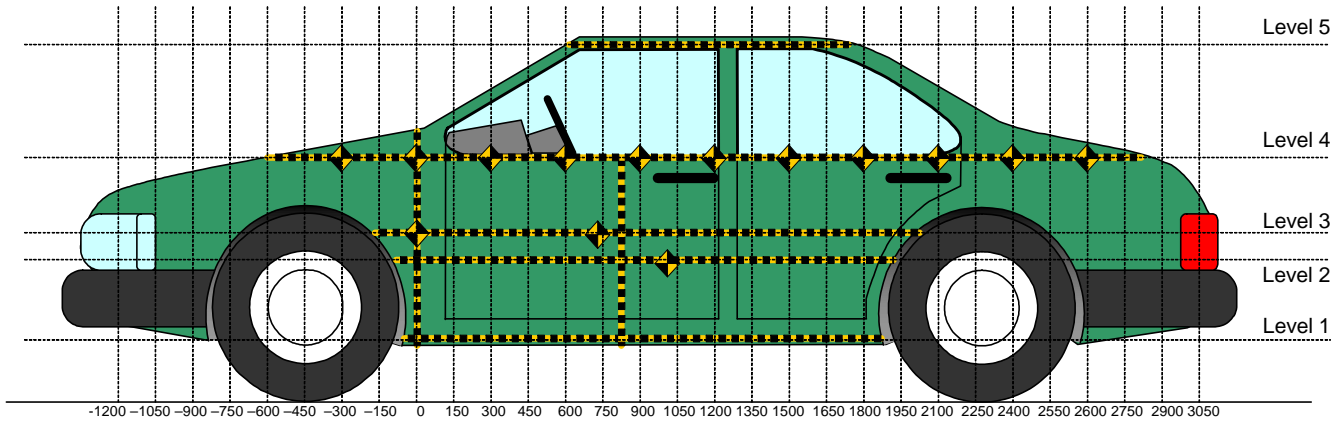
FRONT VIEW OF DUMMY

Code	Measurement Description	Units	Driver S/N 270	Passenger S/N 269
HR	Head to Side Header	mm	191	246
HS	Head to Side Window	mm	316	356
AD ₁	Arm to Door (at upper rib level)	mm	123	121
AD ₂	Arm to Door (at lower rib level)	mm	111	117
HD	H-Point to Door	mm	139	165

DATA SHEET NO. 9

VEHICLE SIDE MEASUREMENTS

Test Vehicle: 2007 Saturn Aura NHTSA No. C70103
 Test Program: FMVSS 214 Indicant Side Impact Test Date: September 13, 2006



All Measurements Shown in mm

LEFT SIDE VIEW

Measurements are taken with vehicle in the as tested condition.
 Measurements along the vertical 750 mm.
 All measurements below in mm.

Level	Measurement Description	Maximum Exterior Static Crush	Height Above Ground	Distance From Impact
1	Sill Top	32	224	150
2	Occupant H-Point	244	471	900
3	Mid Door	245	607	1500
4	Window Sill	272	833	1350
5	Window	39	1345	1050
	Maximum Penetration	272		

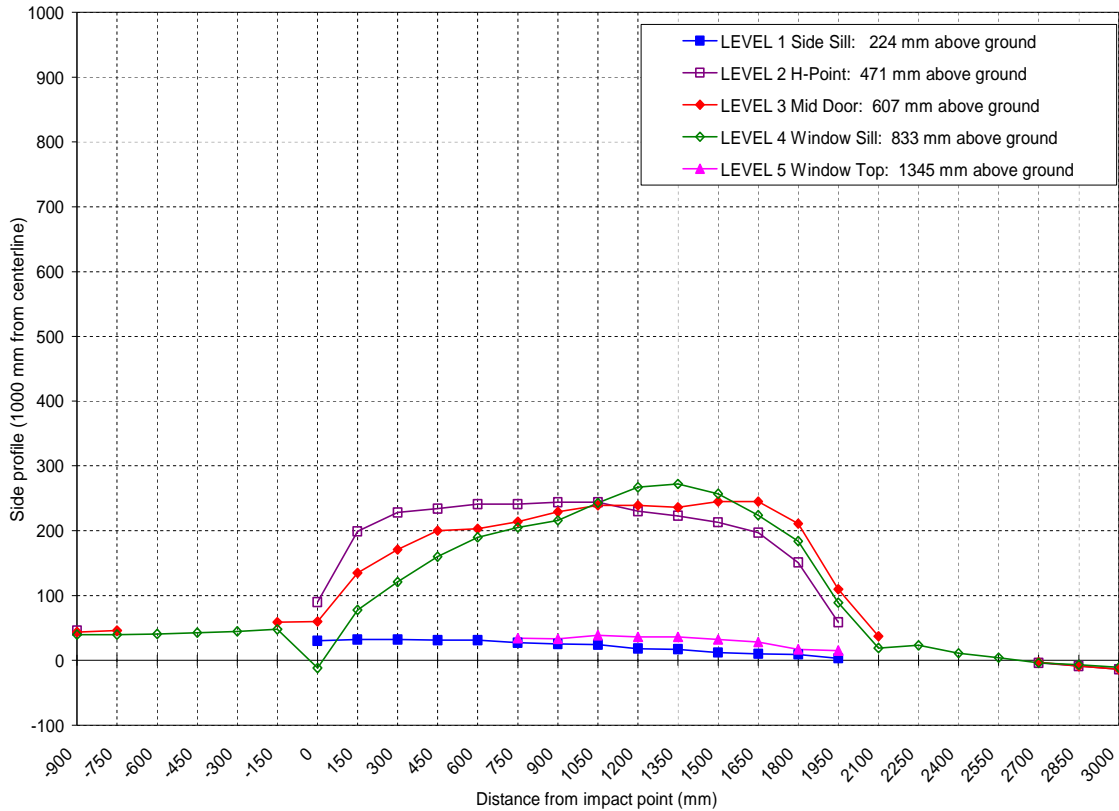
DATA SHEET NO. 10

VEHICLE EXTERIOR CRUSH PROFILES

Test Vehicle: 2007 Saturn Aura NHTSA No. C70103
 Test Program: FMVSS 214 Indicant Side Impact Test Date: September 13, 2006

NOTE: All dimensions are in millimeters with a tolerance of ±3 mm

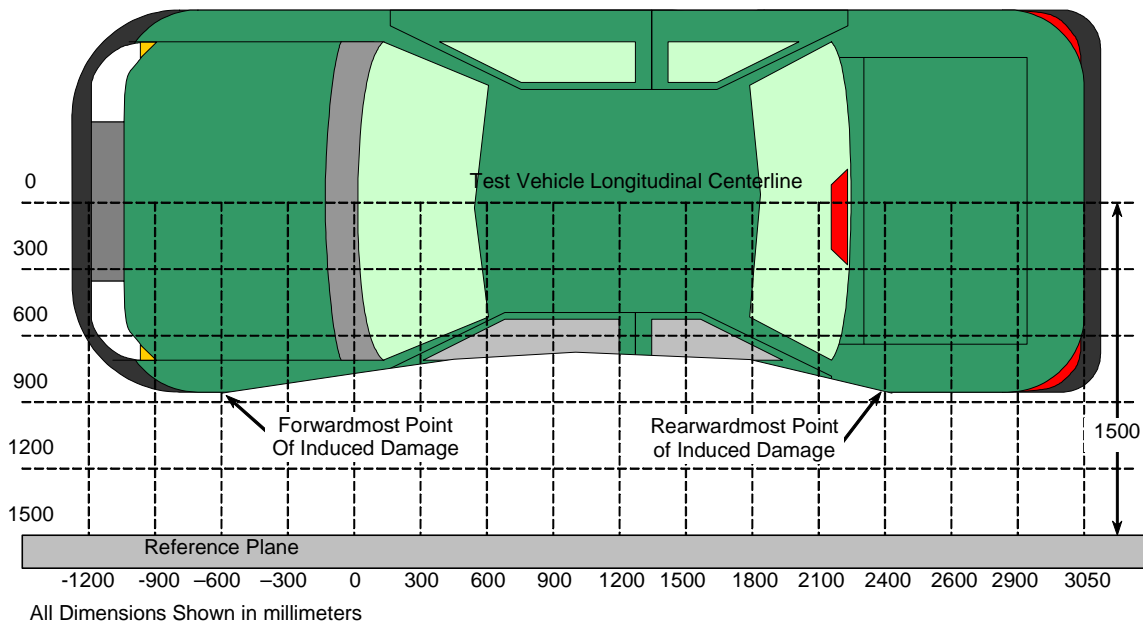
LEVEL	HEIGHT (mm)		DISTANCE IN MILLIMETERS (mm) FROM IMPACT POINT																											
			-900	-750	-600	-450	-300	-150	0	150	300	450	600	750	900	1050	1200	1350	1500	1650	1800	1950	2100	2250	2400	2550	2700	2850	3000	
LEVEL 1 SIDE SILL	224	PRE	-	-	-	-	-	-	150	150	150	149	148	149	149	149	151	151	155	154	151	151	-	-	-	-	-	-	-	-
		POST	-	-	-	-	-	-	180	182	182	180	179	176	174	173	169	168	167	164	160	154	-	-	-	-	-	-	-	-
		CRUSH	N/A	N/A	N/A	N/A	N/A	N/A	30	32	32	31	31	27	25	24	18	17	12	10	9	3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LEVEL 2 H POINT	471	PRE	162	-	-	-	-	-	120	120	120	120	120	120	120	121	122	123	124	126	128	127	-	-	-	-	-	147	184	209
		POST	208	-	-	-	-	-	210	319	348	354	361	361	364	365	352	346	337	323	279	186	-	-	-	-	143	175	195	
		CRUSH	46	N/A	N/A	N/A	N/A	N/A	90	199	228	234	241	241	244	244	230	223	213	197	151	59	N/A	N/A	N/A	N/A	-4	-9	-14	
LEVEL 3 MID DOOR	607	PRE	164	125	-	-	-	110	111	111	111	111	111	111	111	113	114	116	118	117	125	116	-	-	-	154	181	205		
		POST	208	171	-	-	-	169	171	246	282	311	314	325	340	350	352	350	361	363	328	235	153	-	-	-	151	172	191	
		CRUSH	44	46	N/A	N/A	N/A	59	60	135	171	200	203	214	229	239	239	236	245	245	211	110	37	N/A	N/A	N/A	-3	-9	-14	
LEVEL 4 WINDOW SILL	833	PRE	273	221	194	174	161	151	144	138	135	131	128	126	97	123	124	125	126	128	131	136	139	146	154	164	178	196	220	
		POST	313	261	235	217	206	199	132	216	256	291	318	331	313	366	391	397	383	352	315	225	158	169	165	168	174	189	209	
		CRUSH	40	40	41	43	45	48	-12	78	121	160	190	205	216	243	267	272	257	224	184	89	19	23	11	4	-4	-7	-11	
LEVEL 5 WINDOW TOP	1345	PRE	-	-	-	-	-	-	-	-	-	-	-	-	403	399	400	400	401	404	406	418	442	-	-	-	-	-	-	
		POST	-	-	-	-	-	-	-	-	-	-	-	-	-	437	432	439	436	437	436	434	435	457	-	-	-	-	-	-
		CRUSH	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	34	33	39	36	36	32	28	17	15	N/A	N/A	N/A	N/A	N/A	N/A



DATA SHEET NO. 11

VEHICLE DAMAGE PROFILE DISTANCES

Test Vehicle:	2007 Saturn Aura	NHTSA No.:	C70103
Test Program:	FMVSS 214 Indicant Side Impact	Test Date:	September 13, 2006



TOP VIEW

DAMAGE PROFILE DISTANCES

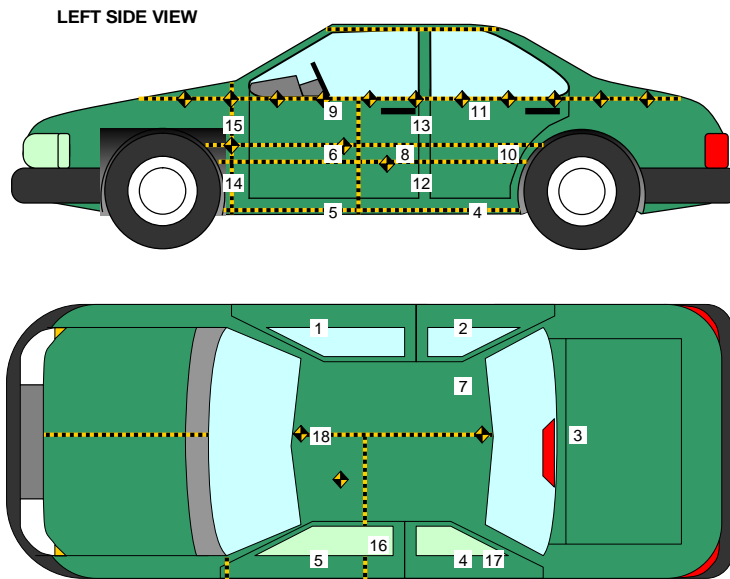
DPD	Distance from Impact Point in mm	Level	Pre-Test (mm)	Post-Test (mm)	Max Static Crush (mm)
1 (LR)	2200	833	144	165	21
2	1730	607	117	344	227
3	1260	833	124	393	269
4	790	471	120	362	242
5	320	471	120	349	229
6 (LF)	-150	607	110	169	59

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

DATA SHEET NO. 13

VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle:	2007 Saturn Aura	NHTSA No.:	C70103
Test Program:	FMVSS 214 Indicant Side Impact	Test Date:	September 13, 2006



Loc. No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Right Sill at Front Seat	3199	676	-526
2	Right Sill at Rear Seat	2248	673	-542
3	Rear Floorpan Above Axle	903	-161	-238
4	Left Sill at Rear Door	2234	-671	-558
5	Left Sill at Front Door	3225	-672	-541
6	Left Front Door C/L**	-	-	-
7	Rear Occupant Compartment	2107	-460	-608
8	Left Front Door Mid-Rear**	-	-	-
9	Left Front Door Upper C/L**	-	-	-
10	Left Rear Door Mid-Rear**	-	-	-
11	Left Rear Door Upper C/L**	-	-	-
12	Left Lower B-Post	2243	-679	-422
13	Left Middle B-Post	2212	-681	-194
14	Left Lower A-Post	3290	-644	-466
15	Left Middle A-Post	3315	-672	158
16	Front Seat Track	2404	-571	-523
17	Rear Seat Track or Structure	1224	-587	-215
18	Vehicle CG	2642	-9	-387

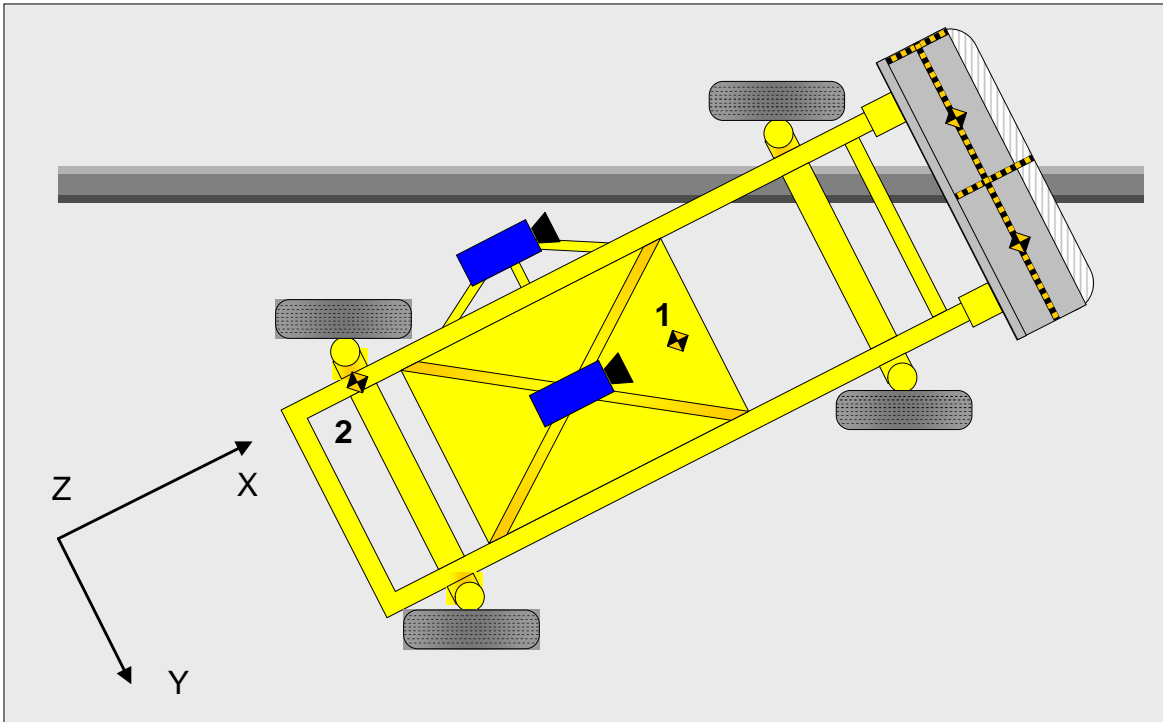
Reference Points X - Test Vehicle Rear Bumper (+ forward)
 Y - Test Vehicle Centerline (+ to right)
 Z - Ground Plane (+ down)

** Accelerometer was not requested by the COTR.

DATA SHEET NO. 14

MDB ACCELEROMETER LOCATIONS

Test Vehicle: 2007 Saturn Aura NHTSA No. C70103
 Test Program: FMVSS 214 Indicant Side Impact Test Date: September 13, 2006



Loc. No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	MDB CG	1859	0	-330
2	MDB Rear	386	-660	-660

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

DATA SHEET NO. 15

VEHICLE STRUCTURAL MEASUREMENTS

Test Vehicle: 2007 Saturn Aura NHTSA No. C70103
 Test Program: FMVSS 214 Indicant Side Impact Test Date: September 13, 2006

	Elements	Pre-Test (mm)
1	Total Length	4838
2	Total Width	1754
3	Bumper Top Height	510
4	Bumper Bottom Height	381
5	Longitudinal Member Top Height	565
6	Distance between Longitudinal Members	1058
7	Longitudinal Member Width	95
8	Engine Top Height	880
9	Engine Bottom Height	211
10	Engine and gearbox width	675
11	Front bumper-engine distance	529
12	Front shock absorber fixing height	863
13	Bonnet leading edge height	728
14	Front shock absorber fixing width	1136
15	Front bumper – front axle distance	971
16	Front axle – a pillar distance	491
17	A-pillar – B-pillar distance	1087
18	B-Pillar – rear axle distance	1275
19	B-pillar – C-pillar distance	1154
20	Roof sill bottom height	1310
21	Roof sill top height	1407
22	Floor sill bottom height	258
23	Floor sill top height	354

APPENDIX A
PHOTOGRAPHS

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A-47	Pre-Test Left Front $\frac{3}{4}$ View of Left Side Doors	A-27
A-48	Post-Test Left Front $\frac{3}{4}$ View of Left Side Doors	A-27
A-49	Pre-Test Left Rear $\frac{3}{4}$ View of Left Side Doors	A-28
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Figure A-1: As Received Left Front $\frac{3}{4}$ View



Figure A-2: As Received Right Rear $\frac{3}{4}$ View



Figure A-3: Vehicle Certification Label



Figure A-4: Vehicle Tire Placard Label



Figure A-5: Pre-Test Front View



Figure A-6: Post-Test Front View



Figure A-7: Pre-Test Left Front $\frac{3}{4}$ View



Figure A-8: Post-Test Left Front $\frac{3}{4}$ View



Figure A-9: Pre-Test Left Side View



Figure A-10: Post-Test Left Side View



Figure A-11: Pre-Test Left Rear $\frac{3}{4}$ View



Figure A-12: Post-Test Left Rear $\frac{3}{4}$ View



Figure A-13: Pre-Test Rear View



Figure A-14: Post-Test Rear View



Figure A-15: Pre-Test Right Rear 3/4 View



Figure A-16: Post-Test Right Rear 3/4 View



Figure A-17: Pre-Test Right Side View



Figure A-18: Post-Test Right Side View



Figure A-19: Pre-Test Right Front 3/4 View



Figure A-20: Post-Test Right Front 3/4 View



Figure A-21: Pre-Test Frontal View of MDB Impactor Face



Figure A-22: Post-Test Frontal View of MDB Impactor Face



Figure A-23: Pre-Test Left Side View of MDB Impactor Face



Figure A-24: Post-Test Left Side View of MDB Impactor Face



Figure A-25: Pre-Test Right Side View of MDB Impactor Face



Figure A-26: Post-Test Right Side View of MDB Impactor Face



Figure A-27: Pre-Test Top View of MDB Impactor Face



Figure A-28: Post-Test Top View of MDB Impactor Face



Figure A-29: Pre-Test Left Side View of Aligned MDB and Vehicle



Figure A-30: Pre-Test Right Side View of Aligned MDB and Vehicle



Figure A-31: Pre-Test Overhead View of Aligned MDB and Vehicle



Figure A-32: Post-Test Overhead View of MDB and Vehicle



Figure A-33: Pre-Test Close-Up View of Impact Point Target



Figure A-34: Post-Test Close-Up View of Impact Point Target



Figure A-35: Pre-Test Right Occupant Compartment View of Driver



Figure A-36: Post-Test Right Occupant Compartment View of Driver



Figure A-37: Pre-Test Right Occupant Compartment View of Passenger



Figure A-38: Post-Test Right Occupant Compartment View of Passenger



Figure A-39: Pre-Test Left Occupant Compartment View of Driver



Figure A-40: Post-Test Left Occupant Compartment View of Driver



Figure A-41: Pre-Test Left Occupant Compartment View of Passenger



Figure A-42: Post-Test Left Occupant Compartment View of Passenger



Figure A-43: Pre-Test Left Front Interior Trim



Figure A-44: Post-Test Left Front Interior Trim



Figure A-45: Pre-Test Left Rear Interior Trim



Figure A-46: Post-Test Left Rear Interior Trim



Figure A-47: Pre-Test Left Front $\frac{3}{4}$ View of Left Side Doors



Figure A-48: Post-Test Left Front $\frac{3}{4}$ View of Left Side Doors



Figure A-49: Pre-Test Left Rear $\frac{3}{4}$ View of Left Side Doors



Figure A-50: Post-Test Left Rear $\frac{3}{4}$ View of Left Side Doors



Figure A-51: Rollover 90 Degrees



Figure A-52: Rollover 180 Degrees



Figure A-53: Rollover 270 Degrees



Figure A-54: Rollover 360 Degrees



Figure A-55: Impact Photo

APPENDIX B
SID/HIII, VEHICLE AND MDB RESPONSE DATA
(SAE sign convention)

DATA CHANNEL FILTER CLASS SUMMARY

Data Type	SAE Filter Class
Dummy Head Accelerations	CFC 1000
Rib Accelerations	FIR 100
Spine Accelerations	FIR 100
Pelvis Accelerations	FIR 100

DATA CHANNEL TITLE KEY

Prefix	Suffix
V1 = Vehicle 1 (Moving Barrier)	Ax = Acceleration, X-direction
V2 = Vehicle 2 (Test Vehicle)	Ay = Acceleration, Y-direction
P1 = Left Front Seating Position (Driver)	Az = Acceleration, Z-direction
P4 = Left Second Row Seating Position (Passenger)	Fx = Force, X-direction
A1-A18 = Accelerometer Location Number	Fy = Force, Y-direction
	Fz = Force, Z-direction
	Mx = Moment about X
	My = Moment about Y
	Mz = Moment about Z

TABLE OF DATA PLOTS

PLOT	PLOT NAME[UNITS, CHANNEL FILTER CLASS]	PAGE
1	V2P1 Head Ax [g, CFC_1000]	B-5
2	V2P1 Head Ay [g, CFC_1000]	B-5
3	V2P1 Head Az [g, CFC_1000]	B-5
4	V2P1 Head Ar [g, CFC_1000]	B-5
5	V1P1 Upper Rib Ay [g, FIR_100]	B-6
6	V1P1 Lower Rib Ay [g, FIR_100]	B-6
7	V1P1 Lower Spine Ay [g, FIR_100]	B-6
8	V1P1 Pelvic Ay [g, FIR_100]	B-6
9	V2P4 Head Ax [g, CFC_1000]	B-7
10	V2P4 Head Ay [g, CFC_1000]	B-7
11	V2P4 Head Az [g, CFC_1000]	B-7
12	V2P4 Head Ar [g, CFC_1000]	B-7
13	V1P4 Upper Rib Ay [g, FIR_100]	B-8
14	V1P4 Lower Rib Ay [g, FIR_100]	B-8
15	V1P4 Lower Spine Ay [g, FIR_100]	B-8
16	V1P4 Pelvic Ay [g, FIR_100]	B-8

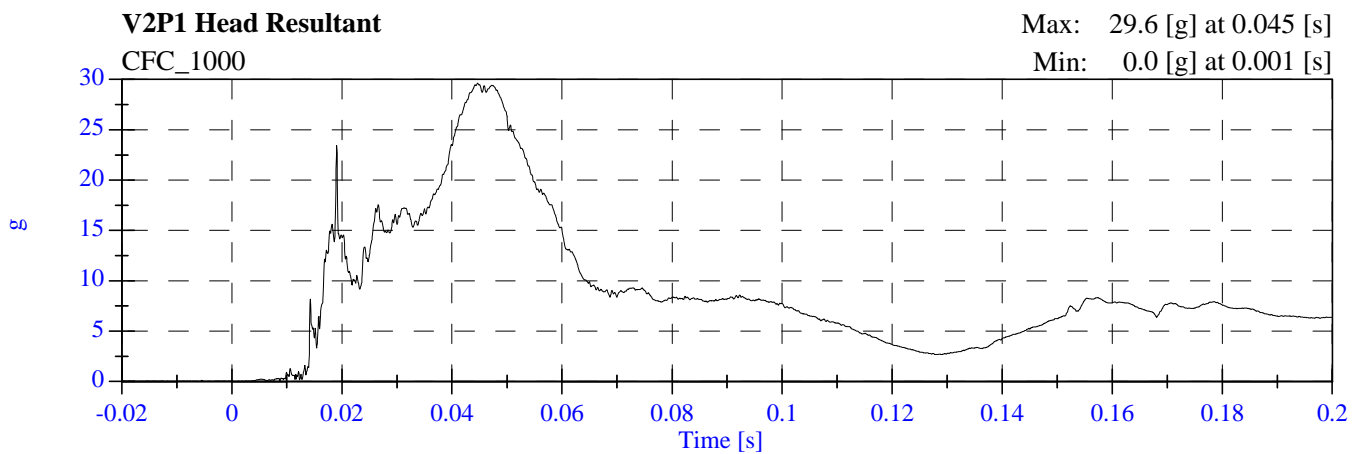
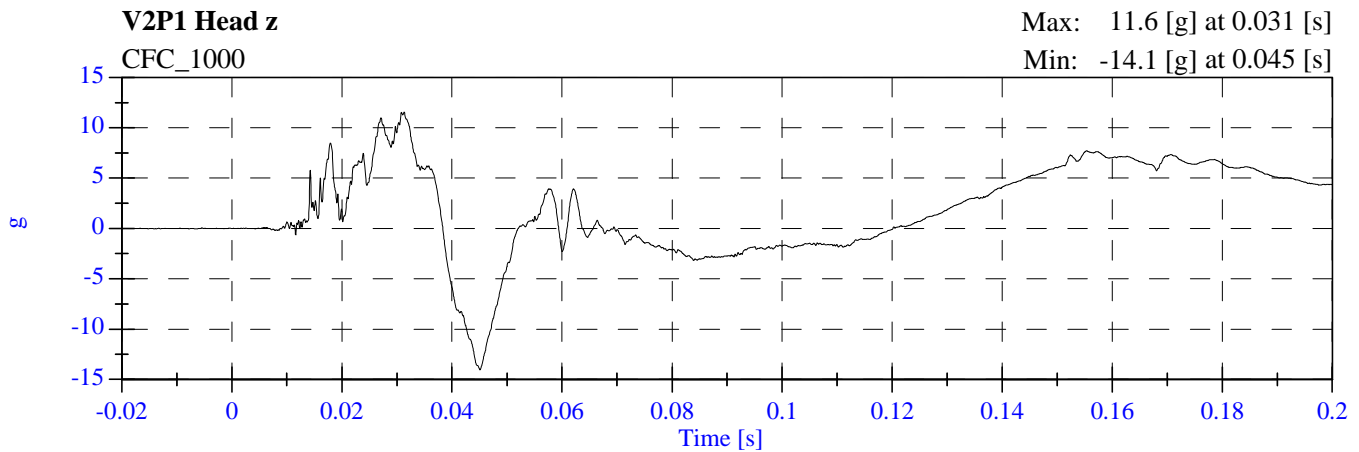
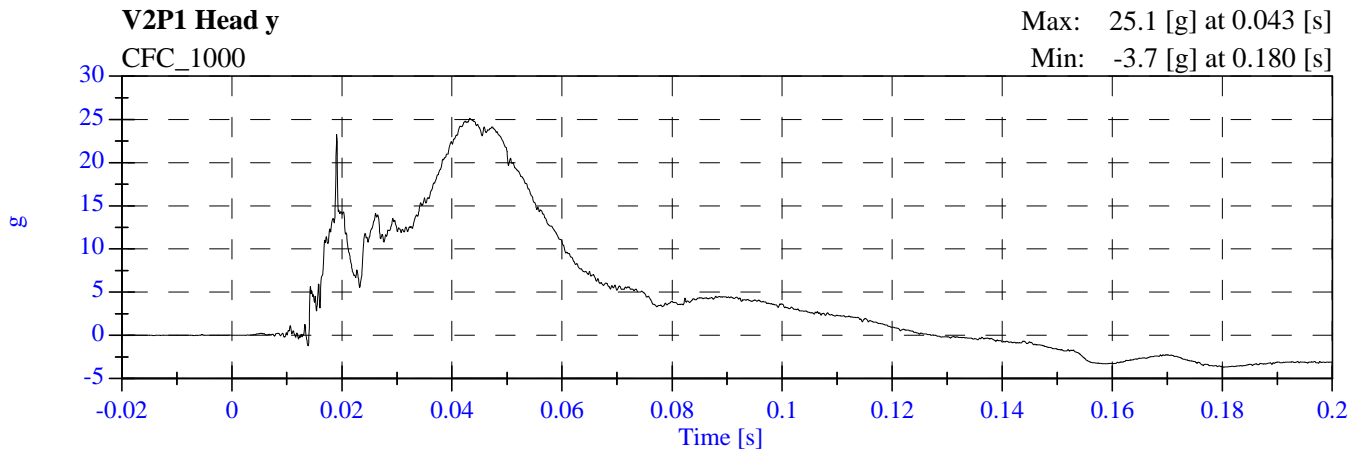
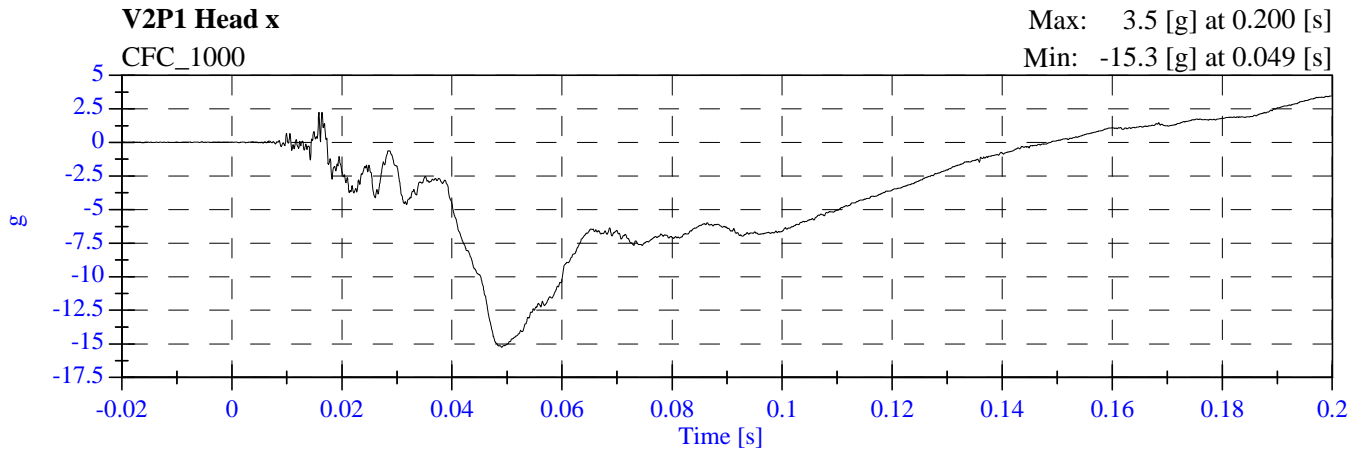
The following dummy, vehicle and load cell response data can be found in the research and development section of the NHTSA website at: www.nhtsa.dot.gov

V2P1 Head Ax	V2A1 Right Front Sill Ax
V2P1 Head Ay	V2A1 Right Front Sill Ay
V2P1 Head Az	V2A1 Right Front Sill Az
V2P1 Upper Neck Fx	V2A2 Right Rear Sill Ax
V2P1 Upper Neck Fy	V2A2 Right Rear Sill Ay
V2P1 Upper Neck Fz	V2A2 Right Rear Sill Az
V2P1 Upper Neck Mx	V2A3 Rear Floorpan Ax
V2P1 Upper Neck My	V2A3 Rear Floorpan Ay
V2P1 Upper Neck Mz	V2A3 Rear Floorpan Az
V2P1 Upper Rib Ay	V2A4 Left Rear Sill Ay
V2P1 Upper Rib Redundant Ay	V2A5 Left Front Sill Ay
V2P1 Lower Rib Ay	V2A6 Left Front Door C/L Ay
V2P1 Lower Rib Redundant Ay	V2A7 Right Rear Compartment Ay
V2P1 Lower Spine Ay	V2A8 Left Front Door Midrear Ay
V2P1 Lower Spine Redundant Ay	V2A9 Left Front Door Upper C/L Ay
V2P1 Pelvic Ay	V2A10 Left Rear Door Midrear Ay
V2P1 Pelvic Redundant Ay	V2A11 Left Rear Door Upper C/L Ay
V2P4 Head Ax	V2A12 Left Lower B Post Ay
V2P4 Head Ay	V2A13 Left Mid B Post Ay
V2P4 Head Az	V2A14 Left Lower A Post Ay
V2P4 Upper Neck Fx	V2A15 Left Mid A Post Ay
V2P4 Upper Neck Fy	V2A16 Front Seat Track Ay
V2P4 Upper Neck Fz	V2A17 Rear Seat Track Ay
V2P4 Upper Neck Mx	V2A18 Target CG Ax
V2P4 Upper Neck My	V2A18 Target CG Ay
V2P4 Upper Neck Mz	V2A18 Target CG Az
V2P4 Upper Rib Ay	V1 Moving Barrier CG Ax
V2P4 Upper Rib Redundant Ay	V1 Moving Barrier CG Ay
V2P4 Lower Rib Ay	V1 Moving Barrier CG Az
V2P4 Lower Rib Redundant Ay	V1 Moving Barrier Left Rail Ax
V2P4 Lower Spine Ay	V1 Moving Barrier Left Rail Ay
V2P4 Lower Spine Redundant Ay	
V2P4 Pelvic Ay	
V2P4 Pelvic Redundant Ay	

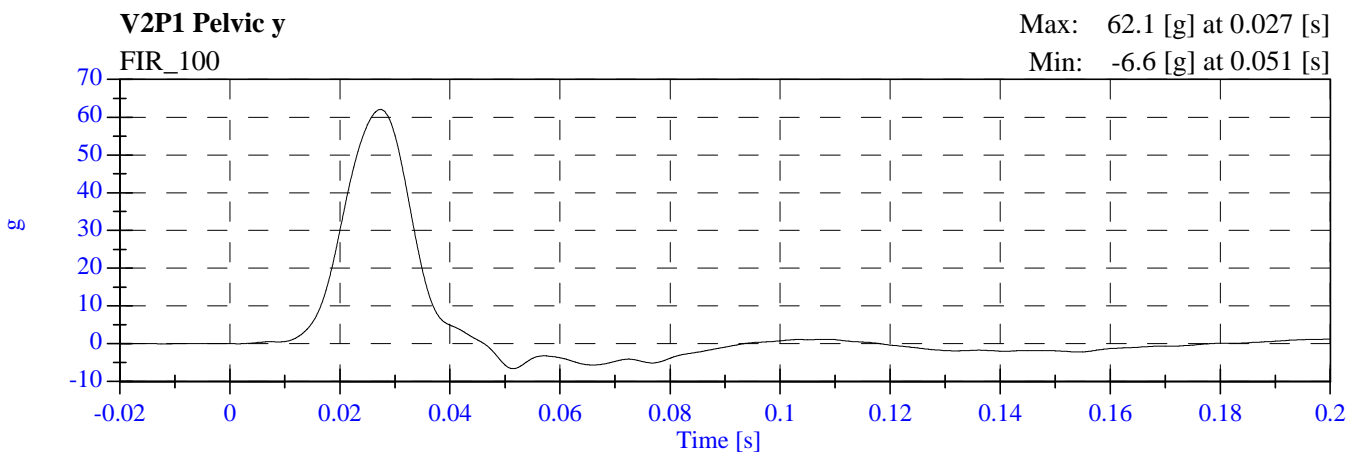
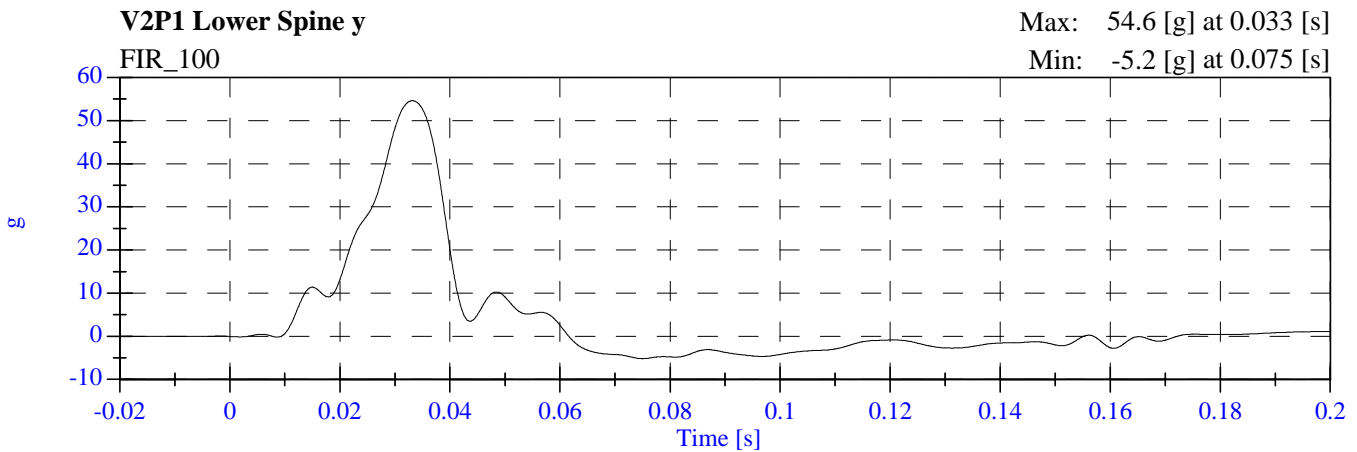
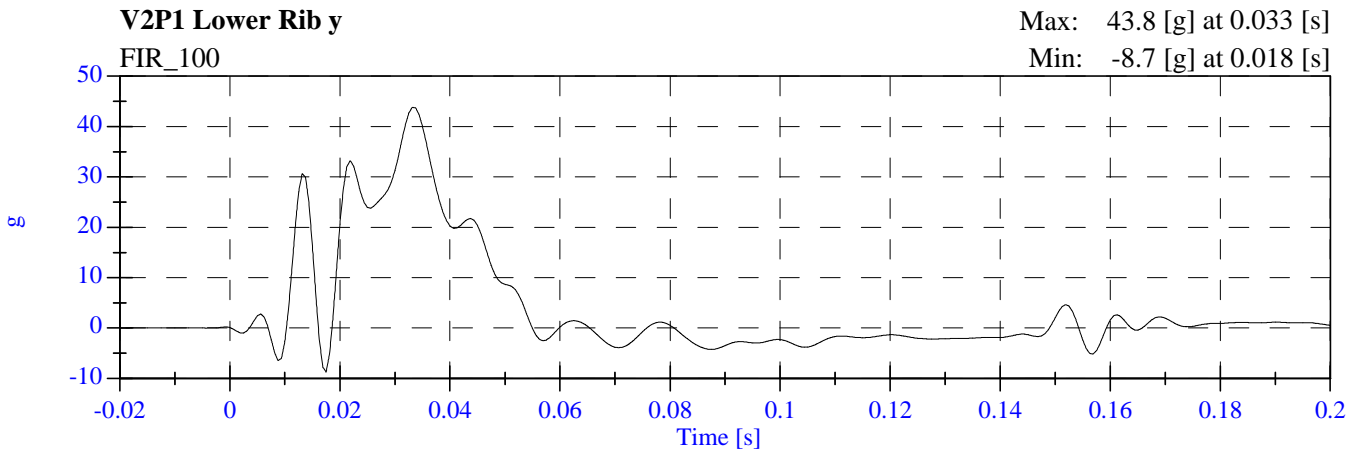
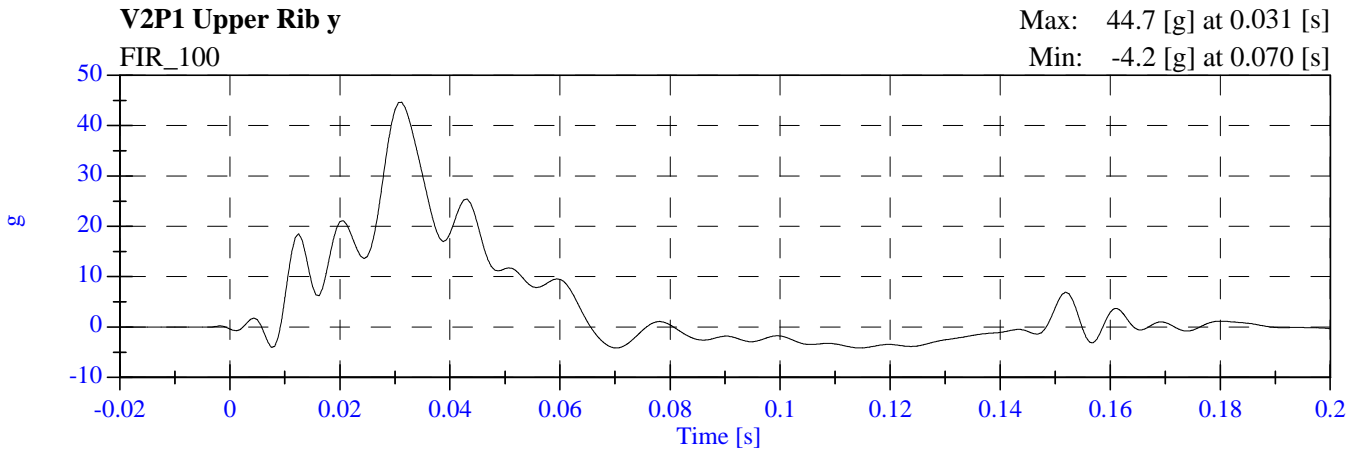
TEST NOTES

The following channel anomalies occurred:
NONE

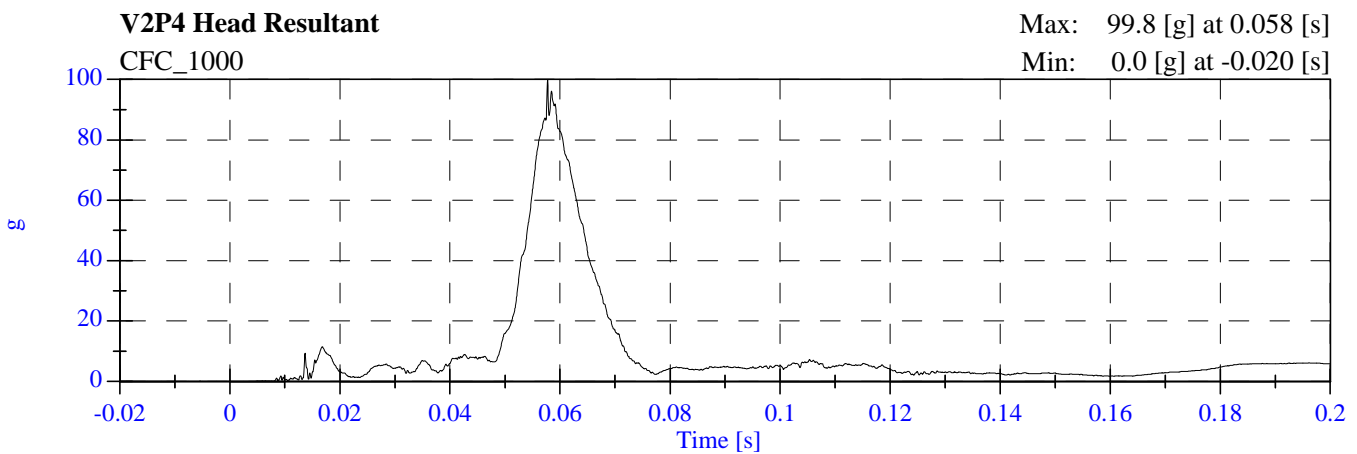
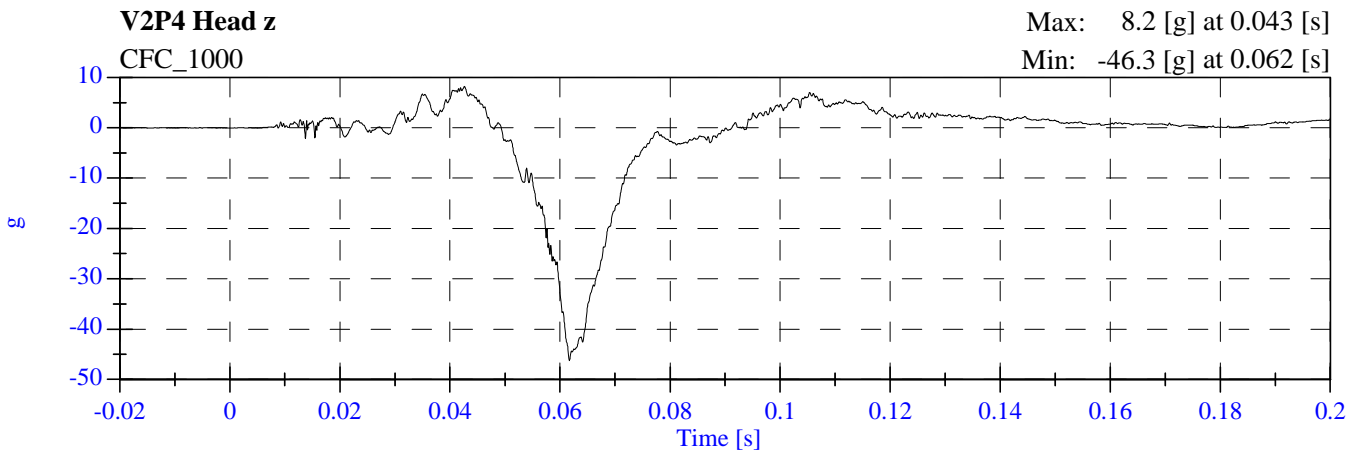
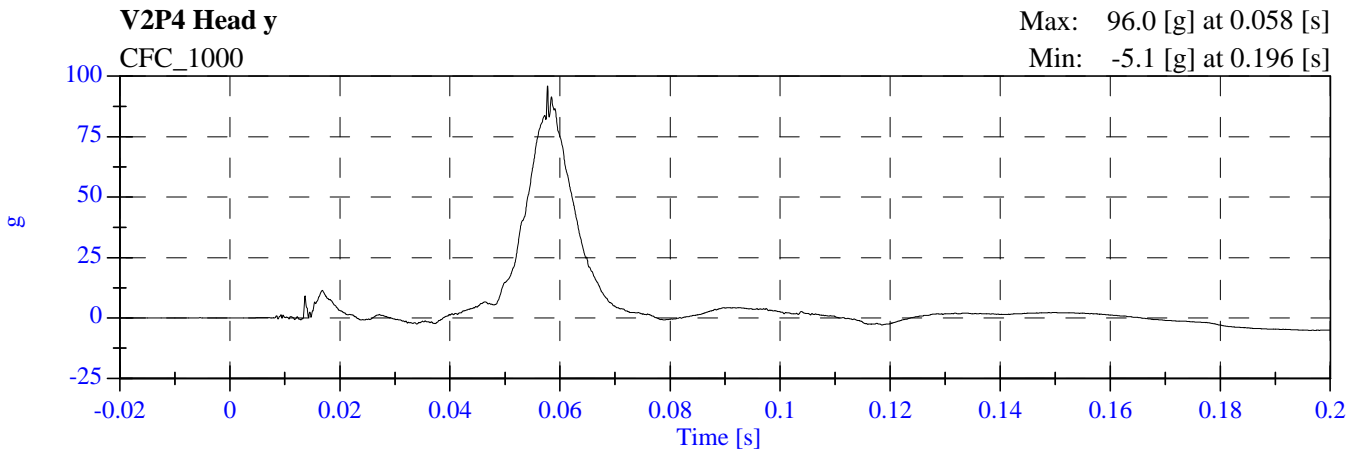
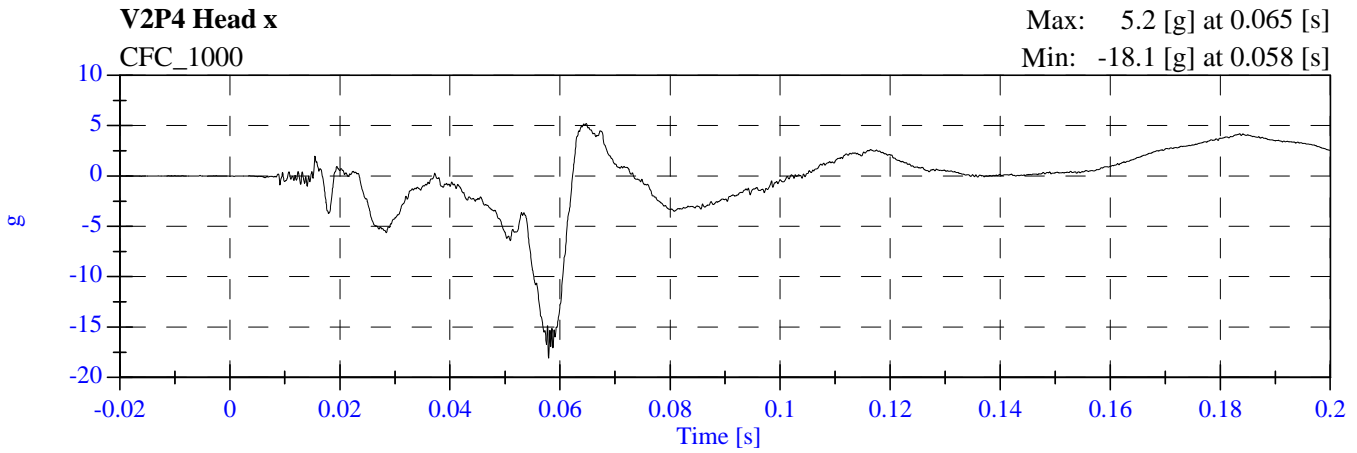
2007 NHTSA 214D Indicant Test - 2007 Saturn Aura C70103 - September 13, 2006



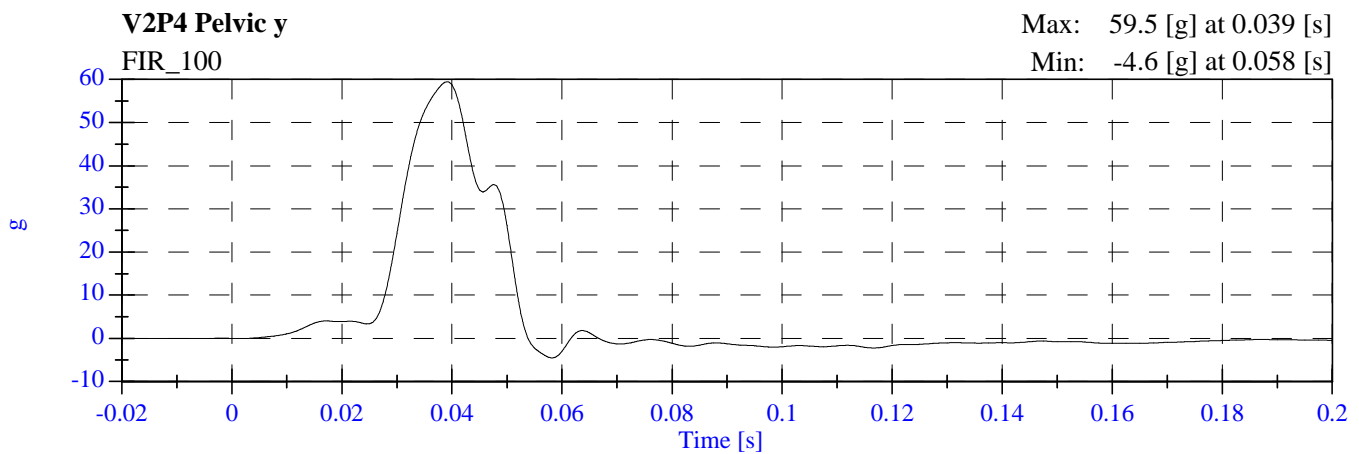
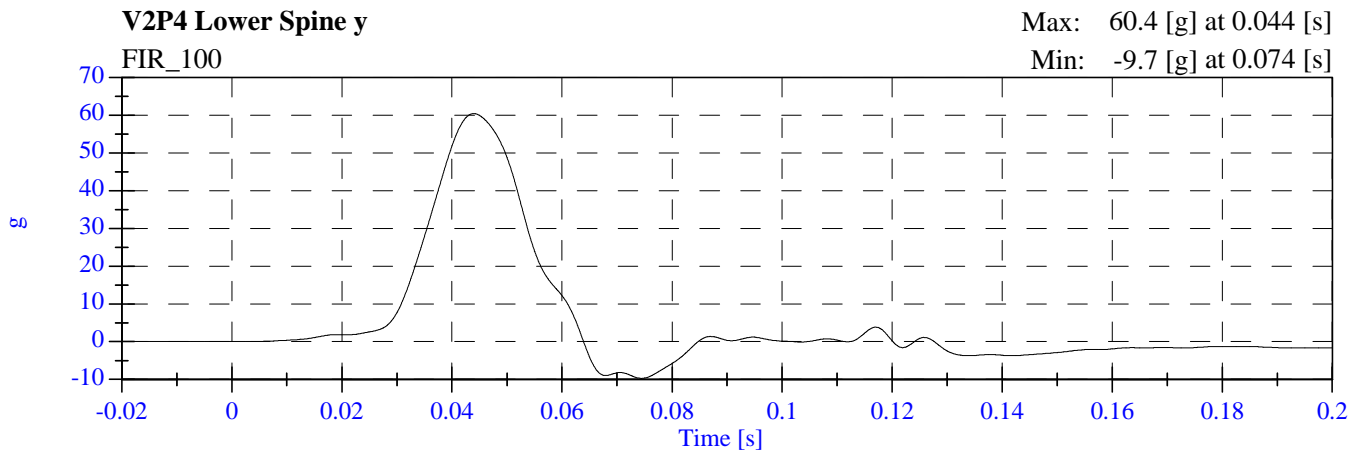
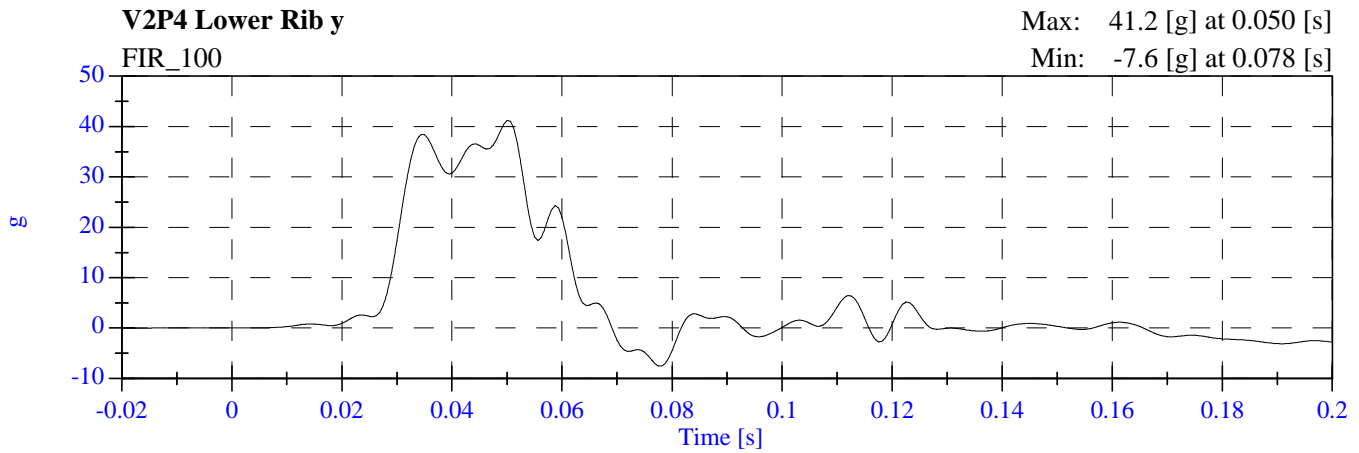
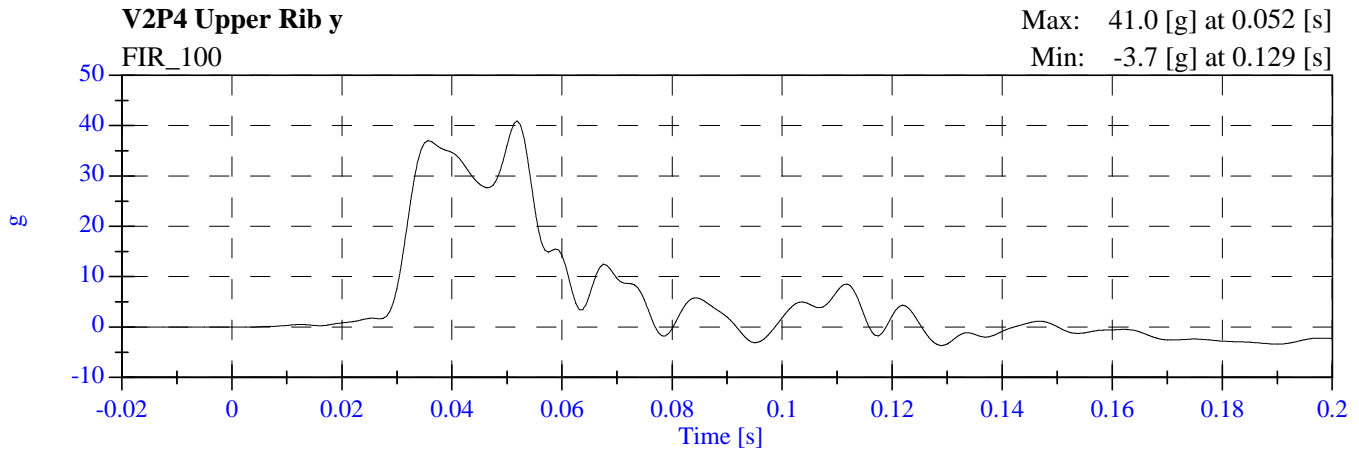
2007 NHTSA 214D Indicant Test - 2007 Saturn Aura C70103 - September 13, 2006



2007 NHTSA 214D Indicant Test - 2007 Saturn Aura C70103 - September 13, 2006



2007 NHTSA 214D Indicant Test - 2007 Saturn Aura C70103 - September 13, 2006



APPENDIX C

DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

SUMMARY
SID H3 PRE & POST TEST CALIBRATION
CONFIGURED FOR LEFT SIDE IMPACT

Date: JULY 2006 / SEPTEMBER 2006

Sequential Test Number: 2

Laboratory Technician: B. Swiecicki

TEST PARAMETER	SPECIFICATION	SID H3 NO.: 270		SID H3 NO.: 269	
		PRE TEST	POST TEST	PRE TEST	POST TEST
SH- Seated Height (mm)	889 - 909	899	904	899	909
RH- Rib Height (mm)	501 - 521	505	510	508	513
HP- Hip Pivot Height (mm)	99 ref.	99	99	99	99
RD- Rib from Back Line (mm)	229 - 241	234	236	234	241
KV- Knee Pivot from Back Line (mm)	511 - 526	516	513	516	521
SW- Knee Pivot to Floor (mm)	490 - 505	495	499	495	493
HW- Hip Width (mm)	356 - 391	381	358	378	363
THORAX IMPACTS					
TEMPERATURE (• C)	18.9 - 25.5	21.1	21.7	21.1	21.1
RELATIVE HUMIDITY (%)	10 - 70	50.0	44.0	50.0	50.0
PROBE SPEED (m/s)	4.27 - 4.33	4.27	4.30	4.33	4.33
UPPER RIB (g's)	37 - 46	42.57	38.67	45.62	41.22
LOWER RIB (g's)	37 - 46	42.28	37.55	45.12	40.58
LOWER SPINE (g's)	15 - 22	21.24	19.81	21.55	18.77
PELVIS IMPACT					
TEMPERATURE (• C)	18.9 - 25.5	21.1	21.1	21.1	21.1
RELATIVE HUMIDITY (%)	10 - 70	50.0	50.0	50.0	50.0
PROBE SPEED (m/s)	4.27 - 4.33	4.30	4.32	4.30	4.27
PELVIS (g's)	40 - 60	42.97	48.49	41.41	54.47

REMARKS: None

CALIBRATION TEST RESULTS

PRE-TEST

SID H3 NO.: 270

CONFIGURED FOR LEFT SIDE IMPACT

**CALIBRATION TEST RESULTS SUMMARY
PRE-TEST**

CONFIGURED FOR LEFT SIDE IMPACT

SID H3 Serial No.: 270 Sequential Test Number: 1
Date: JULY 2006 Laboratory Technician: B. Swiecicki

TEST	COMMENTS
EXTERNAL DIMENSIONS	Passed all requirements.
THORACIC SHOCK ABSORBER TEST	Passed all requirements.
LATERAL THORAX IMPACT TEST	Passed all requirements.
LATERAL PELVIS IMPACT TEST	Passed all requirements.
HEAD DROP TEST*	Passed all requirements.
LATERAL NECK BEND TEST*	Passed all requirements.
ABDOMINAL COMPRESSION TEST*	Passed all requirements.
LUMBAR FLEXION TEST*	Passed all requirements.

* Test not required for SID certification.

REMARKS: None

**EXTERNAL DIMENSIONS
PRE-TEST**

CONFIGURED FOR LEFT SIDE IMPACT

SID H3 Serial No.: 270 Sequential Test Number: 1
Date: JULY 2006 Laboratory Technician: B. Swiecicki

TEST PARAMETER	SPECIFICATION	TEST RESULTS
SH- Seated Height (mm)	889 – 909	899
RH- Rib Height (mm)	502 – 520	505
HP- Hip Pivot Height (mm)	99 ref.	99
RD- Rib from Back Line (mm)	229 – 241	234
KH- Knee Pivot from Back Line (mm)	511 – 526	516
KV- Knee Pivot to Floor (mm)	490 – 505	495
HW- Hip Width (mm)	356 - 391	381

REMARKS: None

Shock Impact - Low (3.05 m/s)

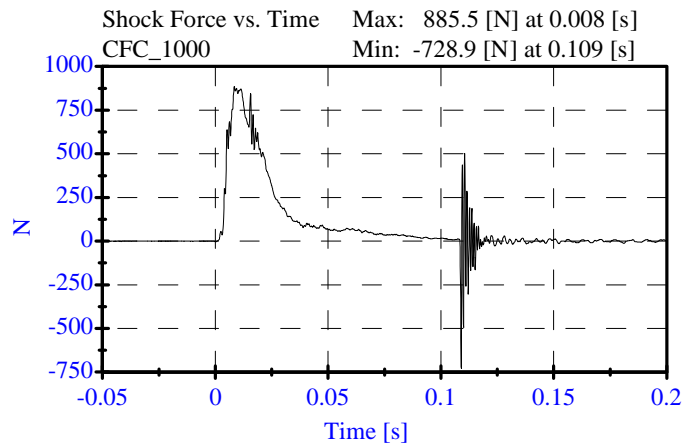
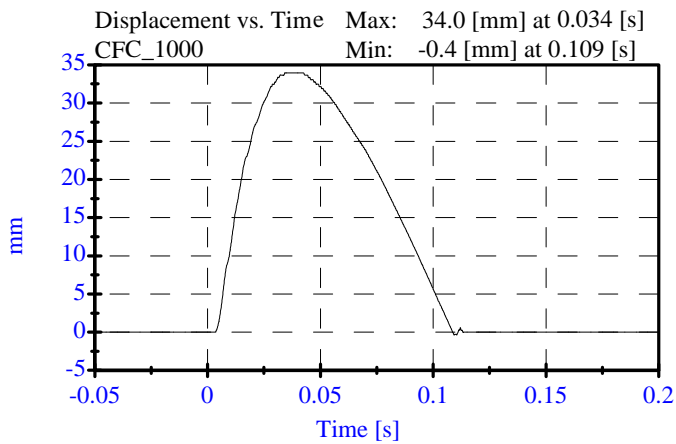
PRE TEST

CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 270
Date: 09-29-05

Sequential Test Number: 1 File: 270SL1 09-29-05
Laboratory Technician: B. Swiecicki

<u>TEST PARAMETER</u>	<u>SPECIFICATION</u>	<u>TEST RESULTS</u>	<u>STATUS</u>
Lab Temperature:	18.9-25.5 C	21.1 C	Passed
Lab Humidity:	10-70 %	37.00 %	Passed
Displacement:	30.00-35.00 mm	34.00 mm	Passed
Maximum Force:	836.00-1125.00 N	885.47 N	Passed
Impact Test Velocity:	3.05 m/s		
Damper Identification:	270		
Damper Setting:	5		



Shock - Med (4.27 m/s)

PRE TEST

CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 270

Date: 09-29-05

Sequential Test Number: 1 File: 270SM1 09-29-05

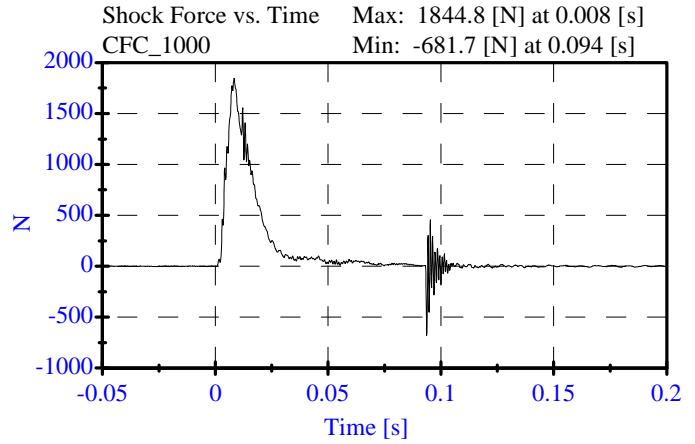
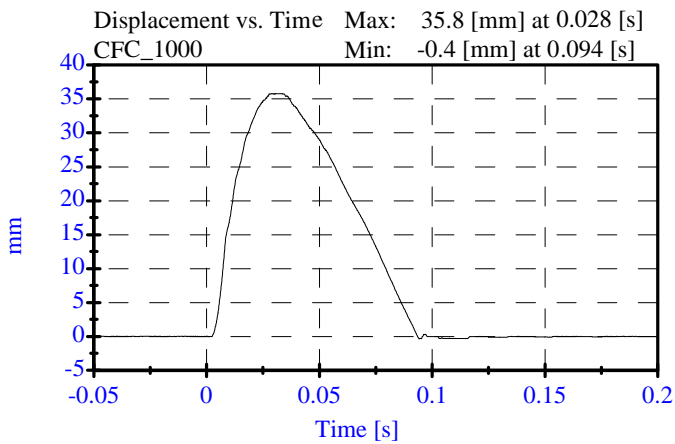
Laboratory Technician: B. Swiecicki

<u>TEST PARAMETER</u>	<u>SPECIFICATION</u>	<u>TEST RESULTS</u>	<u>STATUS</u>
Lab Temperature:	18.9-25.5 C	21.1 C	Passed
Lab Humidity:	10-70 %	37.00 %	Passed
Displacement:	32.00-37.00 mm	35.76 mm	Passed
Maximum Force:	1730.00-2099.00 N	1844.81 N	Passed

Impact Test Velocity: 4.27 m/s

Damper Identification: 270

Damper Setting: 5



Shock Impact - high (6.10 m/s)

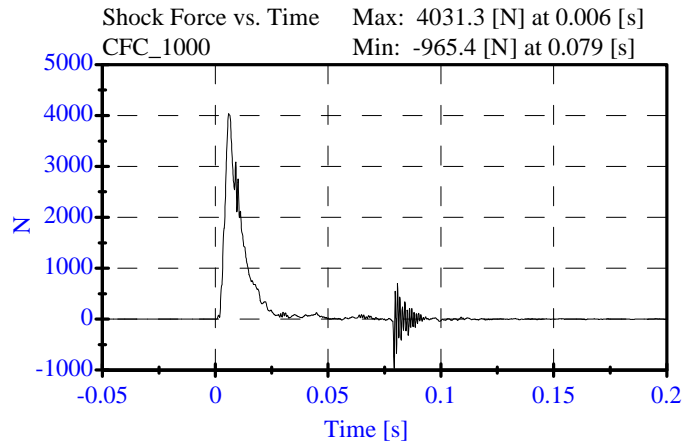
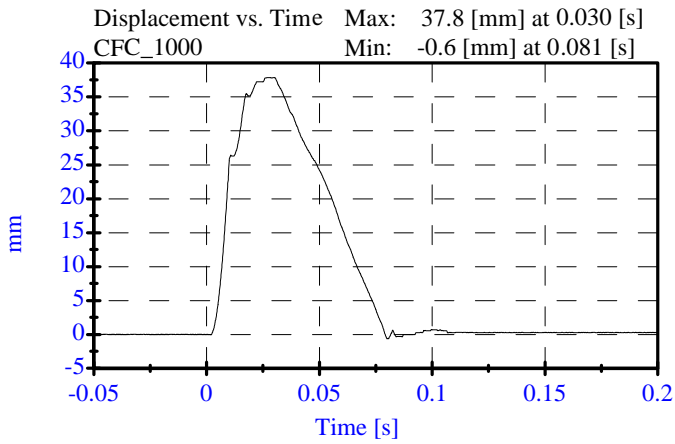
PRE TEST

CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 270
Date: 09-29-05

Sequential Test Number: 1 File: 270SH 09-29-05
Laboratory Technician: B. Swiecicki

<u>TEST PARAMETER</u>	<u>SPECIFICATION</u>	<u>TEST RESULTS</u>	<u>STATUS</u>
Lab Temperature:	18.9-25.5 C	21.1 C	Passed
Lab Humidity:	10-70 %	37.00 %	Passed
Displacement:	33.00-40.00 mm	37.82 mm	Passed
Maximum Force:	3741.00-4448.00 N	4031.26 N	Passed
Impact Test Velocity:	6.10 m/s		
Damper Identification:	270		
Damper Setting:	5		

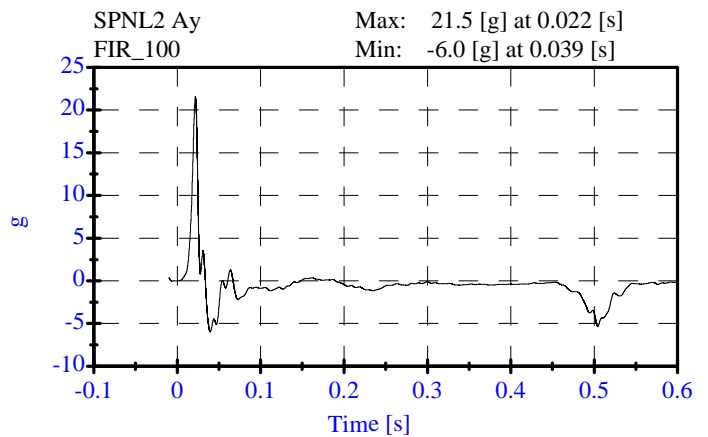
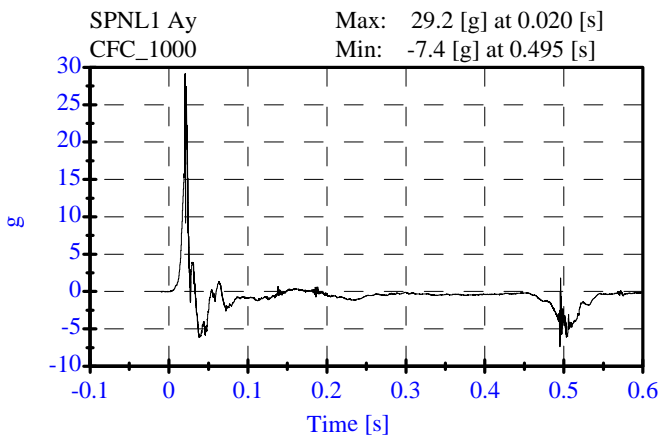
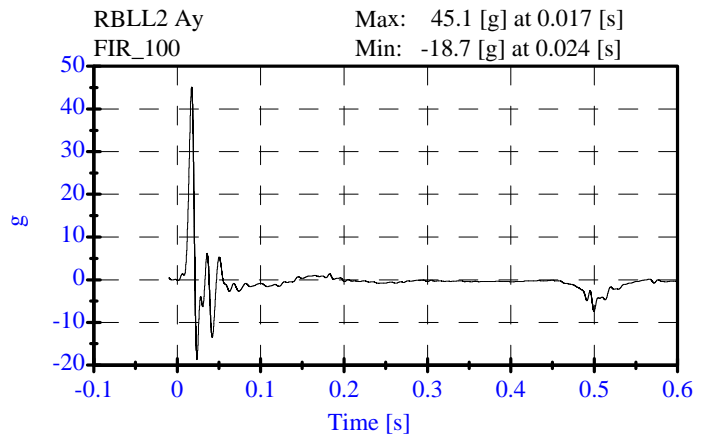
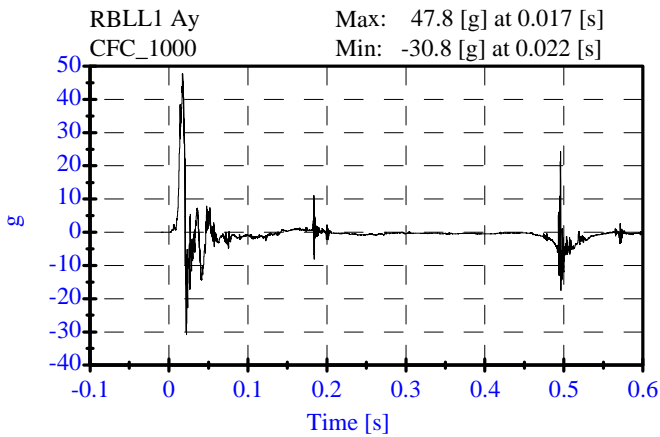
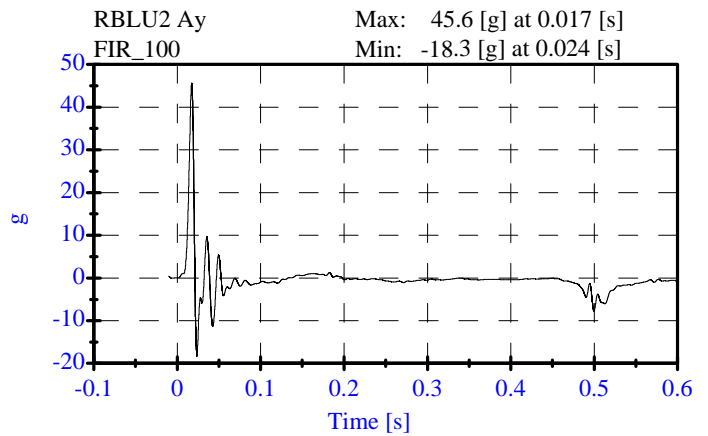
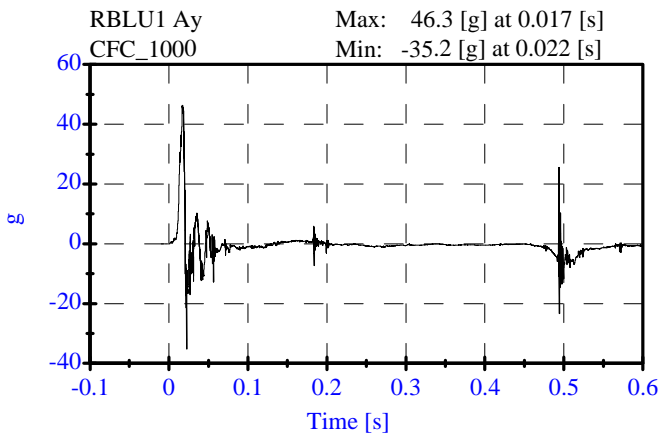


SID Thorax Test Test S/N:270
Pre-Test
CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 270
 Date: July 21, 2006

Sequential Test Number: 1 File: test1
 Laboratory Technician: B. Swiecicki

<u>TEST PARAMETER</u>	<u>SPECIFICATION</u>	<u>TEST RESULTS</u>	<u>STATUS</u>
Lab Temperature:	18.9-25.5 C	21.1 C	Passed
Lab Humidity:	10-70 %	50.00 %	Passed
Probe Velocity:	4.27- 4.33 m/s	4.33 m/s	Passed
Upper Rib Acceleration:	37.00-46.00 g	45.62 g	Passed
Lower Rib Acceleration:	37.00-46.00 g	45.12 g	Passed
Lower Spine Acceleration:	15.00-22.00 g	21.55 g	Passed



SID Pelvic Test S/N:270

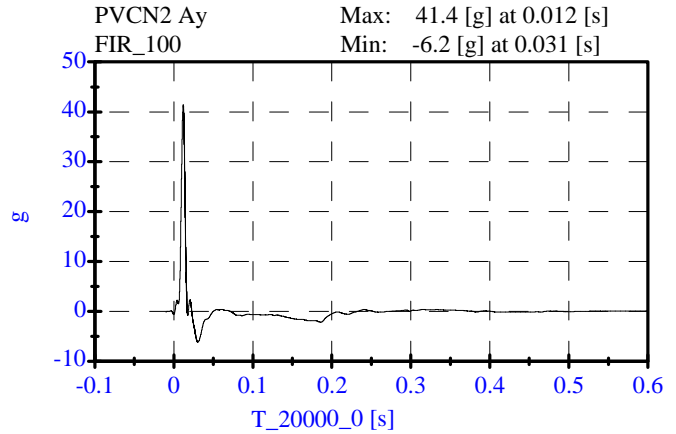
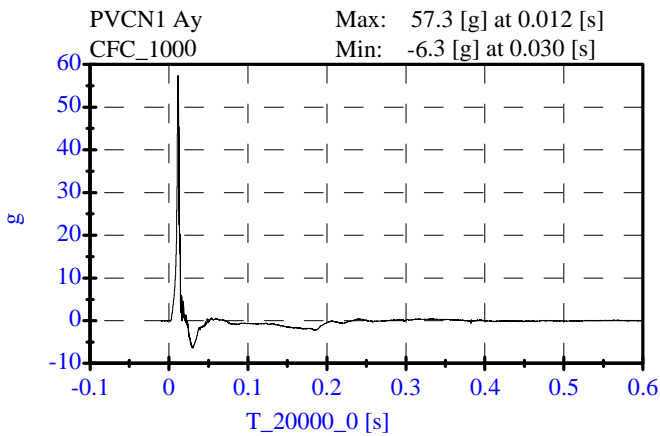
Pre-Test

CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 270
Date: July 21, 2006

Sequential Test Number: 1 File: test1
Laboratory Technician: B. Swiecicki

<u>TEST PARAMETER</u>	<u>SPECIFICATION</u>	<u>TEST RESULTS</u>	<u>STATUS</u>
Lab Temperature:	18.9-25.5 C	21.1 C	Passed
Lab Humidity:	10-70 %	30.00 %	Passed
Probe Velocity:	4.27- 4.33 m/s	4.30 m/s	Passed
Pelvis Y Acceleration:	40.00-60.00 g	41.41 g	Passed
Time Above 20 Gs	3.0-7.0 ms	5.3 ms	Passed

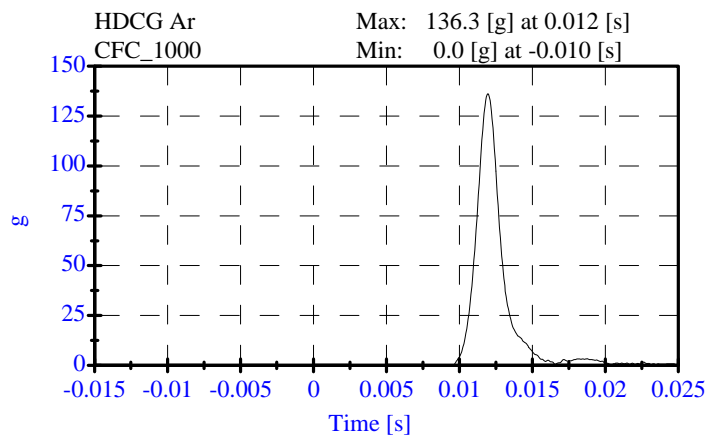
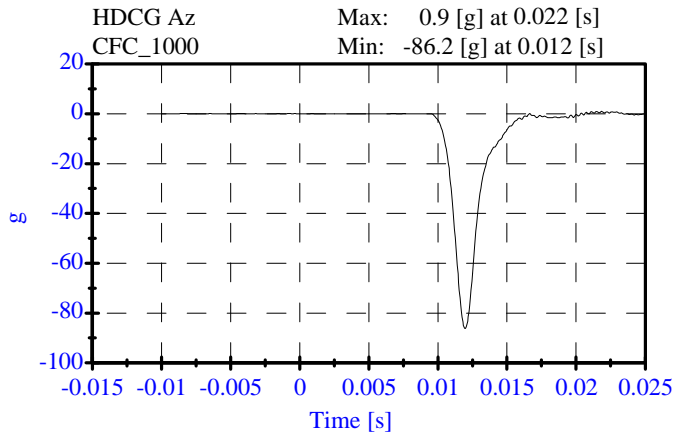
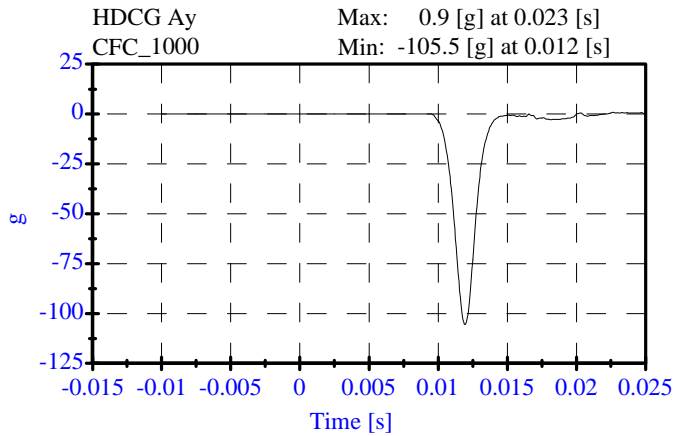
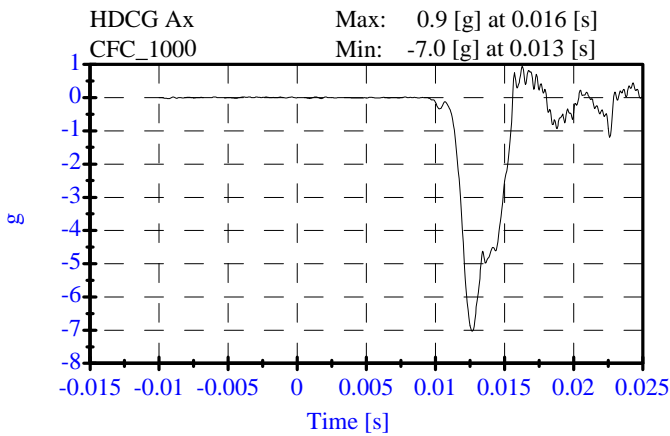


SID HYIII Head Drop Test S/N:270
Pre-Test
CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 270
 Date: July 18, 2006

Sequential Test Number: 1 File: 1001
 Laboratory Technician: B. Swiecicki

<u>TEST PARAMETER</u>	<u>SPECIFICATION</u>	<u>TEST RESULTS</u>	<u>STATUS</u>
Lab Temperature:	18.9-25.6 C	21.1 C	Passed
Lab Humidity:	10-70 %	50.00 %	Passed
Peak Resultant Accel.:	120-150 Gs	136.29 Gs	Passed
Peak Lateral Accel.:	15 Gs Max	0.94 Gs	Passed
Curve PerCent NonModal:	< 15%	2.42 %	Passed



SID Head Neck Test 1 S/N:270

Pre-Test

CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 270

Date: July 21, 2006

Sequential Test Number: 1 File: tst1

Laboratory Technician: B. Swiecicki

<u>TEST PARAMETER</u>	<u>SPECIFICATION</u>	<u>TEST RESULTS</u>	<u>STATUS</u>
Lab Temperature:	20.6-22.2 C	21.1 C	Passed
Lab Humidity:	10-70 %	50.00 %	Passed
Impact Velocity:	6.89- 7.13 m/s	7.01 m/s	Passed
PENDULUM DELTA V			
Delta V at 10 ms:	1.96- 2.55 m/s	2.32 m/s	Passed
Delta V at 20 ms:	4.12- 5.10 m/s	4.73 m/s	Passed
Delta V at 30 ms:	5.73- 7.01 m/s	6.84 m/s	Passed
Delta V between 40-70 ms:	6.27- 7.64 m/s	7.62 m/s	Passed
D PLANE ROTATION			
Maximum Rotation:	66.0-82.0 Deg	67.68 Deg	Passed
Rotation Angle Decay:	58.0-67.0 ms	60.05 ms	Passed
MOMENT ABOUT THE OCCIPITAL CONDYLE			
Max Occipital Moment:	73.00- 88.00 N-m	86.02 N-m	Passed
Occipital Moment Decay:	49.0-64.0 ms	55.05 ms	Passed
HEAD ROTATION TIME WITH RESPECT TO THE OCCIPITAL CONDYLE MOMENT			
Moment to Rotation Peak:	2.0-16.0 ms	10.30 ms	Passed

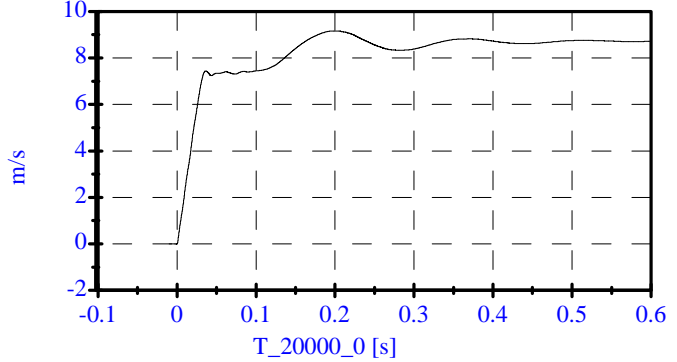
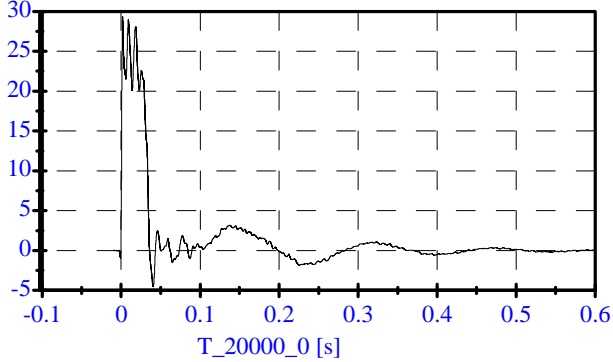
SID Head Neck Test 1 S/N:270
Pre-Test
CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 270
 Date: July 21, 2006

Sequential Test Number: 1 File: tst1
 Laboratory Technician: B. Swiecicki

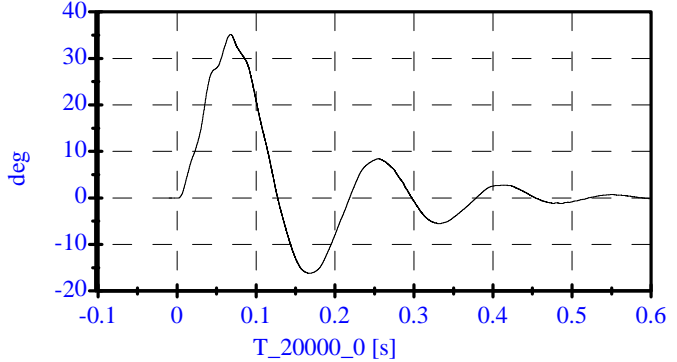
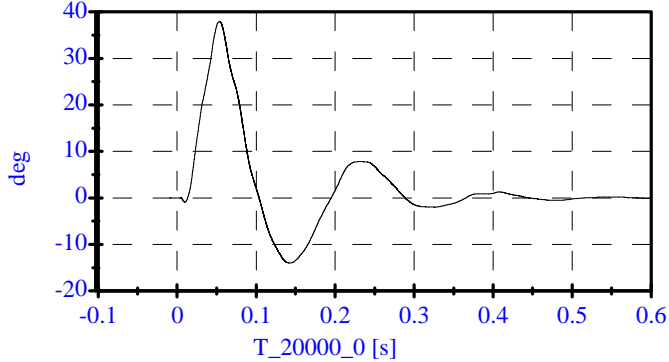
Pend Ax CFC_180 Max: 29.3 [] at 0.002 [s]
 Min: -4.5 [] at 0.041 [s]

Pend Vx CFC_180 Max: 9.2 [m/s] at 0.199 [s]
 Min: -0.0 [m/s] at -0.000 [s]



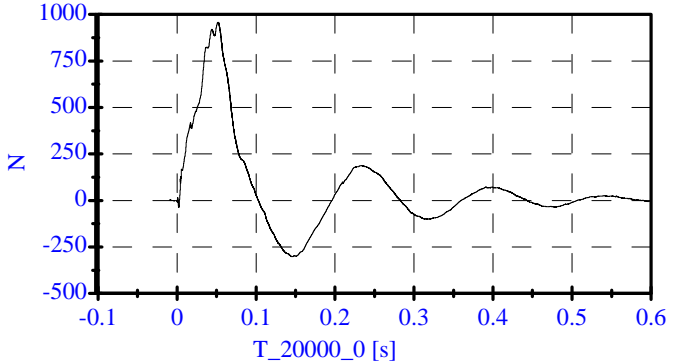
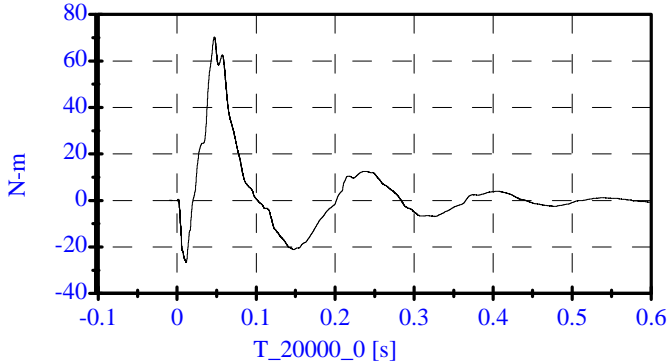
Head Rot CFC_180 Max: 38.0 [deg] at 0.054 [s]
 Min: -14.0 [deg] at 0.143 [s]

Arm Rot CFC_180 Max: 35.2 [deg] at 0.068 [s]
 Min: -16.2 [deg] at 0.168 [s]



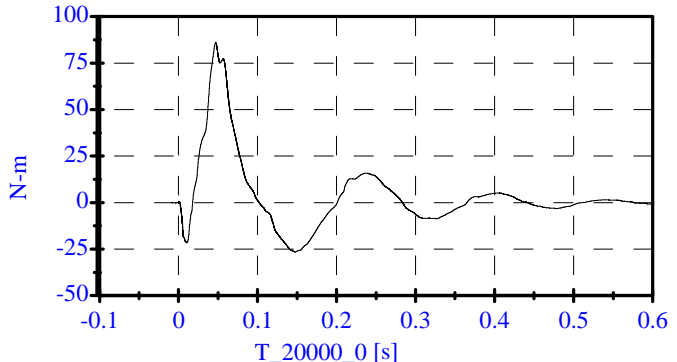
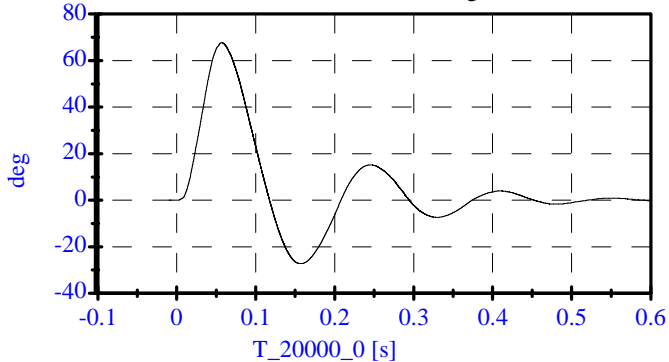
Neck Mx CFC_600 Max: 70.3 [N-m] at 0.047 [s]
 Min: -26.6 [N-m] at 0.011 [s]

Neck Fy CFC_1000 Max: 957.0 [N] at 0.052 [s]
 Min: -302.2 [N] at 0.145 [s]



Tot Rot CFC_180 Max: 67.7 [deg] at 0.057 [s]
 Min: -27.3 [deg] at 0.157 [s]

MOCX Max: 86.0 [N-m] at 0.047 [s]
 Min: -26.5 [N-m] at 0.148 [s]



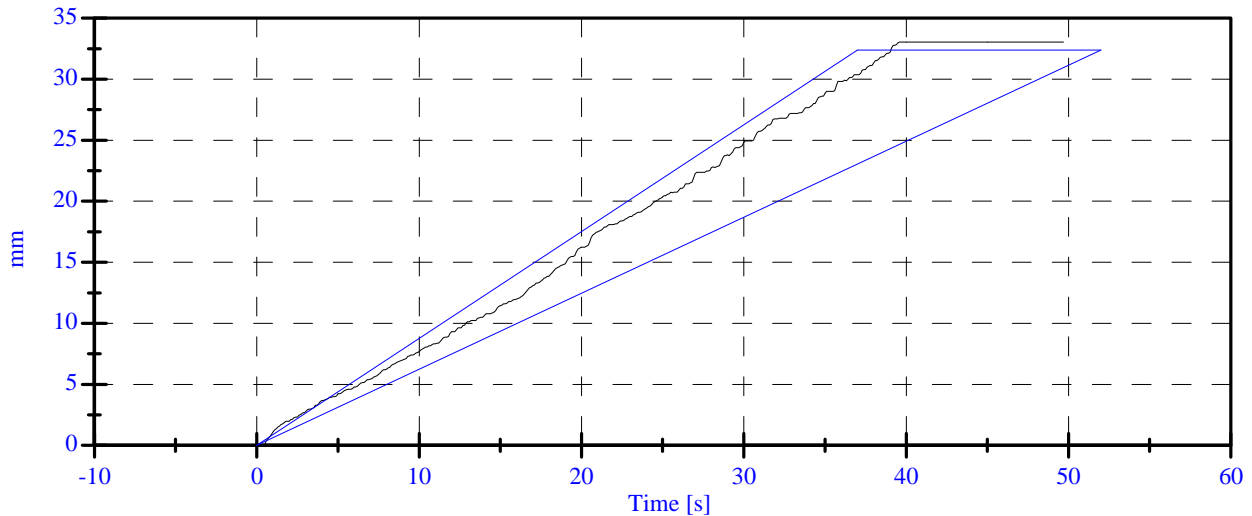
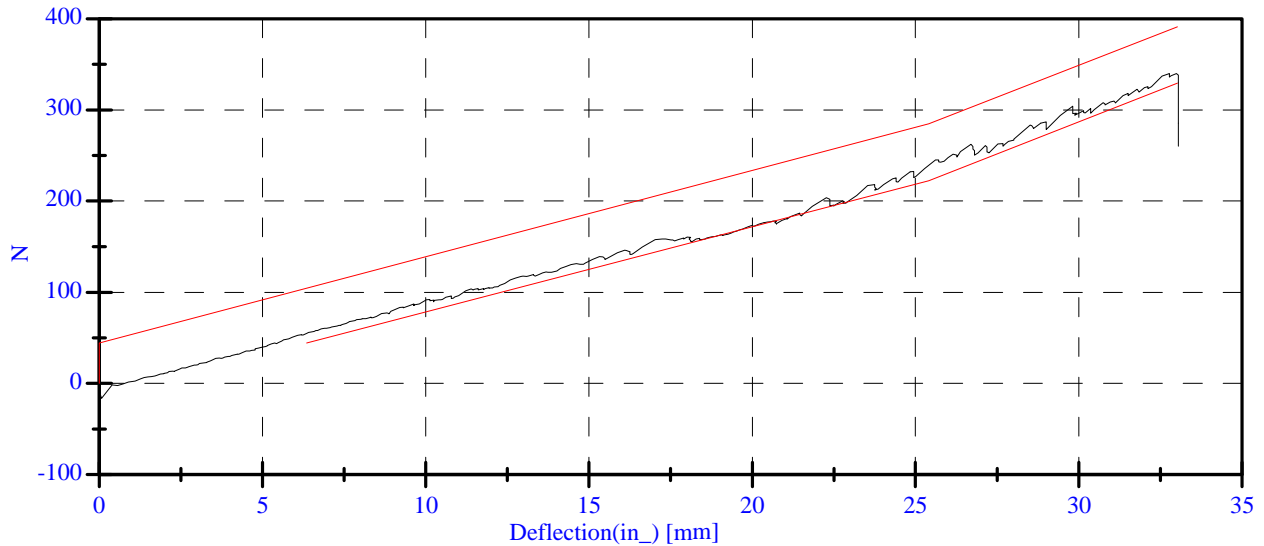
**SID Abdominal
Pre-Test
CONFIGURED FOR LEFT SIDE IMPACT**

ATD Serial No: 270
Date: July 24, 2006

Sequential Test Number: 1 File: abdominal test 3 270test6
Laboratory Technician: B. Swiecicki

<u>TEST PARAMETER</u>	<u>SPECIFICATION</u>	<u>TEST RESULTS</u>	<u>STATUS</u>
Lab Temperature:	18.9-25.5 C	21.1 C	Passed
Lab Humidity:	10-70 %	50.00 %	Passed
Force at 12.95 mm :	104.00-162.00 N	117.90 N	Passed
Force at 19.05 mm :	162.98-220.99 N	162.99 N	Passed
Force at 25.40 mm :	221.97-280.02 N	235.73 N	Passed
Force at 33.02 mm :	324.99-391.00 N	338.28 N	Passed

ABDOMINAL COMPRESSION TEST



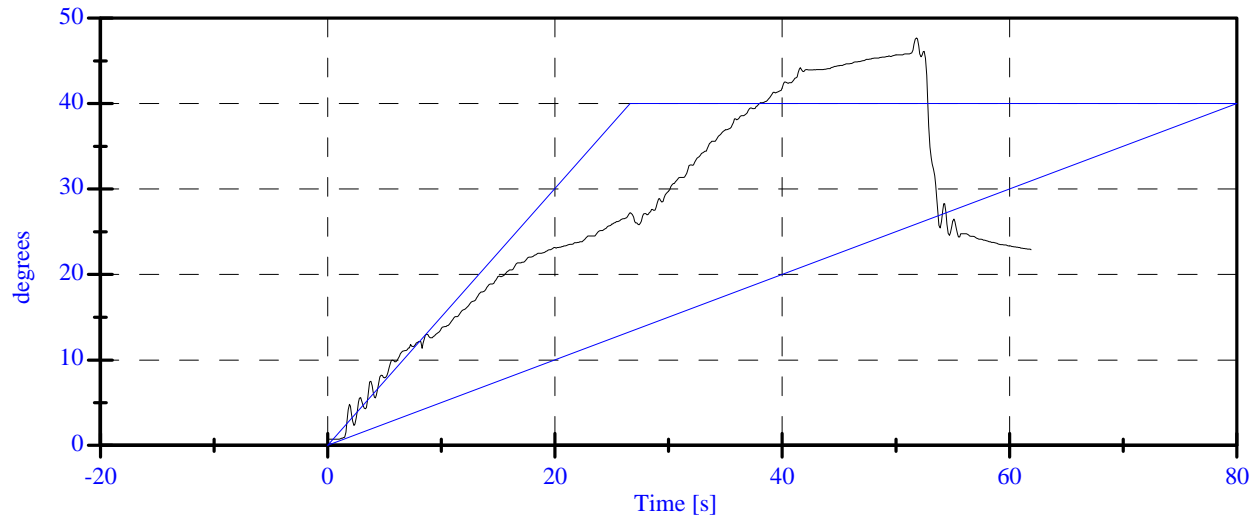
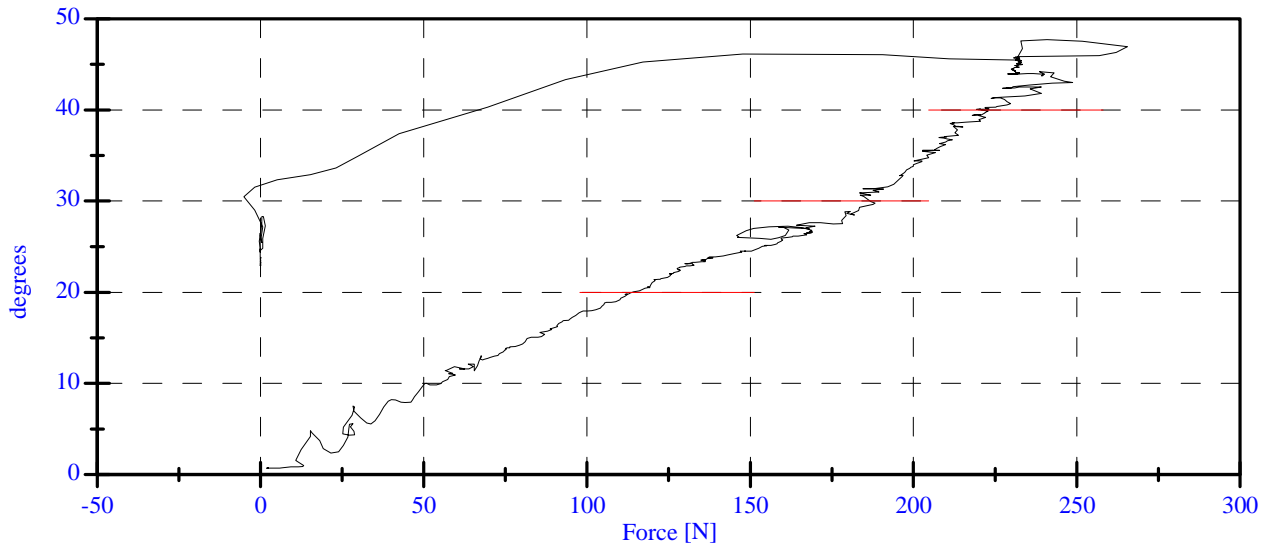
SID 270 LUMBAR SPINE BEND TEST
Pre-Test
CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 270
 Date: Julyu 24, 2006

Sequential Test Number: 1 File: spine bend 270test1
 Laboratory Technician: B. Swiecicki

<u>TEST PARAMETER</u>	<u>SPECIFICATION</u>	<u>TEST RESULTS</u>	<u>STATUS</u>
Lab Temperature:	18.9-25.5 C	21.1 C	Passed
Lab Humidity:	10-70 %	50.00 %	Passed
Force at 0 Deg:	0.00-26.69 N	1.96 N	Passed
Force at 20 Deg:	97.86-151.24 N	114.26 N	Passed
Force at 30 Deg:	151.24-204.62 N	186.86 N	Passed
Force at 40 Deg:	204.62-258.00 N	219.77 N	Passed
Return Angle	12 Deg Max	8.53 deg	Passed

LUMBAR SPINE FLEXION TEST



PRE-TEST DUMMY INSPECTION LIST
CONFIGURED FOR LEFT SIDE IMPACT

SID H3 Serial No.: 270 Sequential Test Number: 1
 Date: JULY 2006 Laboratory Technician: B. Swiecicki

PART	ITEMS CHECKED	COMMENTS
SKIN	VISUAL INSPECTION	OK
HEAD	VISUAL, BALLAST, ACCELEROMETER MOUNT	OK
NECK	VISUAL, CABLE TORQUE	OK
SPINE BOX	VISUAL, BALLAST, WELDMENT, ACCELEROMETER MOUNT	OK
RIB CAGE	VISUAL, MEASURE, STIFFENERS	OK
STERNUM	VISUAL	OK
LUMBAR SPINE	VISUAL	OK
ABDOMEN	VISUAL	OK
PELVIS	VISUAL, PALPATE, ACCELEROMETER MOUNT	OK
UPPER LEGS	VISUAL	OK
KNEES	VISUAL, STOPS, INSERTS	OK
LOWER LEGS	VISUAL, RANGE OF MOTION	OK
ANKLES	VISUAL, RANGE OF MOTION	OK
FEET	VISUAL, RANGE OF MOTION	OK
JOINTS	1 TO 2 g RANGE	OK
OTHER	NONE	-

REMARKS: None

CALIBRATION TEST RESULTS

PRE-TEST

SID H3 NO.: 269

CONFIGURED FOR LEFT SIDE IMPACT

**CALIBRATION TEST RESULTS SUMMARY
PRE-TEST**

CONFIGURED FOR LEFT SIDE IMPACT

SID H3 Serial No.: 269 Sequential Test Number: 1
Date: JULY 2006 Laboratory Technician: B. Swiecicki

TEST	COMMENTS
EXTERNAL DIMENSIONS	Passed all requirements.
THORACIC SHOCK ABSORBER TEST	Passed all requirements.
LATERAL THORAX IMPACT TEST	Passed all requirements.
LATERAL PELVIS IMPACT TEST	Passed all requirements.
HEAD DROP TEST*	Passed all requirements.
LATERAL NECK BEND TEST*	Passed all requirements.
ABDOMINAL COMPRESSION TEST*	Passed all requirements.
LUMBAR FLEXION TEST*	Passed all requirements.

* Test not required for SID certification.

REMARKS: None

**EXTERNAL DIMENSIONS
PRE-TEST**

CONFIGURED FOR LEFT SIDE IMPACT

SID H3 Serial No.: 269 Sequential Test Number: 1
Date: JULY 2006 Laboratory Technician: B. Swiecicki

TEST PARAMETER	SPECIFICATION	TEST RESULTS
SH- Seated Height (mm)	889 - 909	899
RH- Rib Height (mm)	502 - 520	508
HP- Hip Pivot Height (mm)	99 ref.	99
RD- Rib from Back Line (mm)	229 - 241	234
KH- Knee Pivot from Back Line (mm)	511 - 526	516
KV- Knee Pivot to Floor (mm)	490 - 505	495
HW- Hip Width (mm)	356 - 391	378

REMARKS: None

Shock Impact - low (3.05 m/s)

PRE TEST

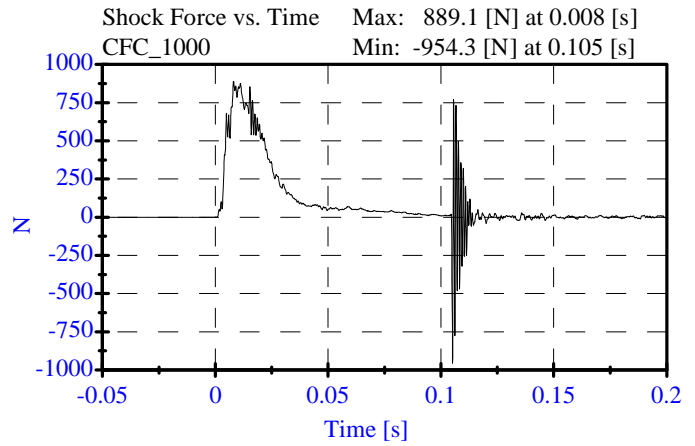
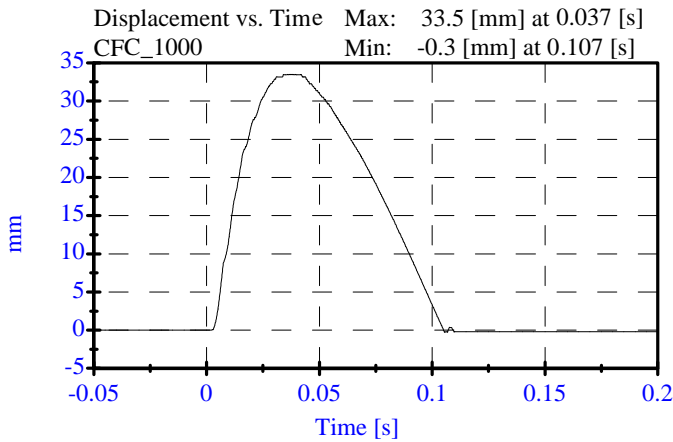
CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 269
Date: 09-29-05

Sequential Test Number: 1 File: 269SL6 09-29-05
Laboratory Technician: B. Swiecicki

<u>TEST PARAMETER</u>	<u>SPECIFICATION</u>	<u>TEST RESULTS</u>	<u>STATUS</u>
Lab Temperature:	18.9-25.5 C	21.1 C	Passed
Lab Humidity:	10-70 %	37.00 %	Passed
Displacement:	30.00-35.00 mm	33.51 mm	Passed
Maximum Force:	836.00-1125.00 N	889.08 N	Passed

Impact Test Velocity: 3.05 m/s
Damper Identification: 269
Damper Setting: 5



Shock Impact - med (4.27 m/s)

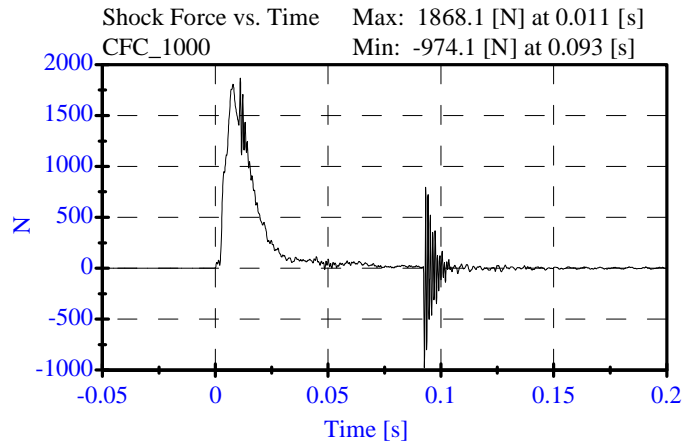
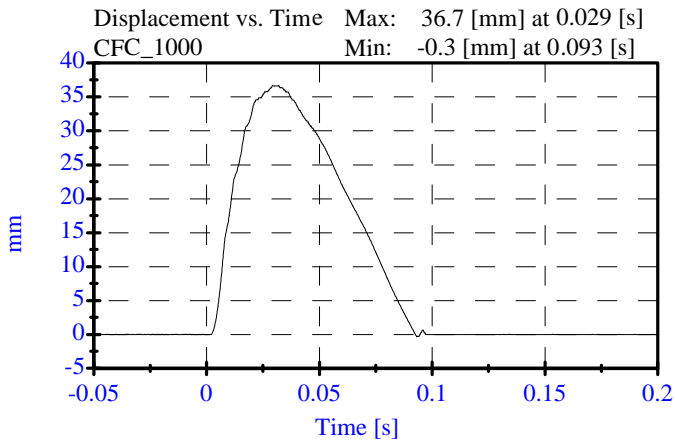
PRE TEST

CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 269
Date: 09-29-05

Sequential Test Number: 1 File: 269SM 09-29-05
Laboratory Technician: B. Swiecicki

<u>TEST PARAMETER</u>	<u>SPECIFICATION</u>	<u>TEST RESULTS</u>	<u>STATUS</u>
Lab Temperature:	18.9-25.5 C	21.1 C	Passed
Lab Humidity:	10-70 %	37.00 %	Passed
Displacement:	32.00-37.00 mm	36.68 mm	Passed
Maximum Force:	1730.00-2099.00 N	1868.14 N	Passed
Impact Test Velocity:	4.27 m/s		
Damper Identification:	269		
Damper Setting:	5		



Shock Impact - high (6.10 m/s)

PRE TEST

CONFIGURED FOR LEFT SIDE IMPACT

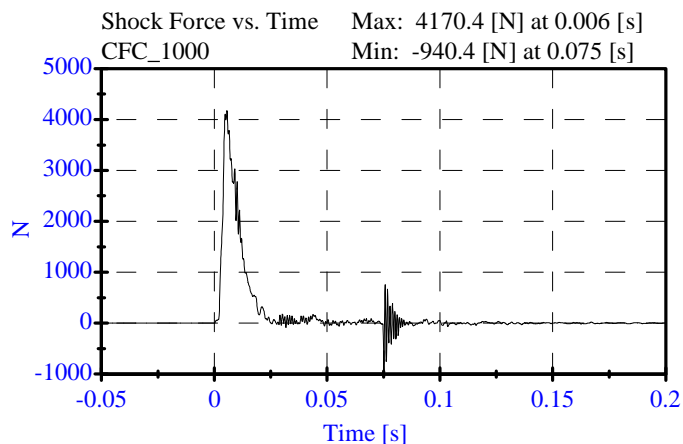
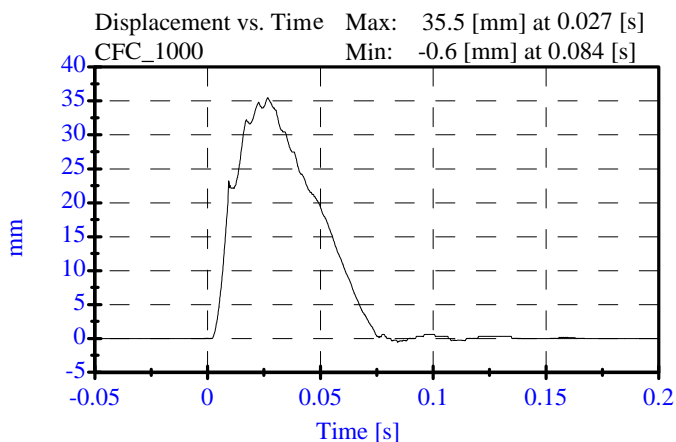
ATD Serial No: 269

Date: 09-29-05

Sequential Test Number: 1 File: 269SH2 09-29-05

Laboratory Technician: B. Swiecicki

<u>TEST PARAMETER</u>	<u>SPECIFICATION</u>	<u>TEST RESULTS</u>	<u>STATUS</u>
Lab Temperature:	18.9-25.5 C	21.1 C	Passed
Lab Humidity:	10-70 %	36.00 %	Passed
Displacement:	33.00-40.00 mm	35.46 mm	Passed
Maximum Force:	3741.00-4448.00 N	4170.44 N	Passed
Impact Test Velocity:	6.10 m/s		
Damper Identification:	269		
Damper Setting:	5		

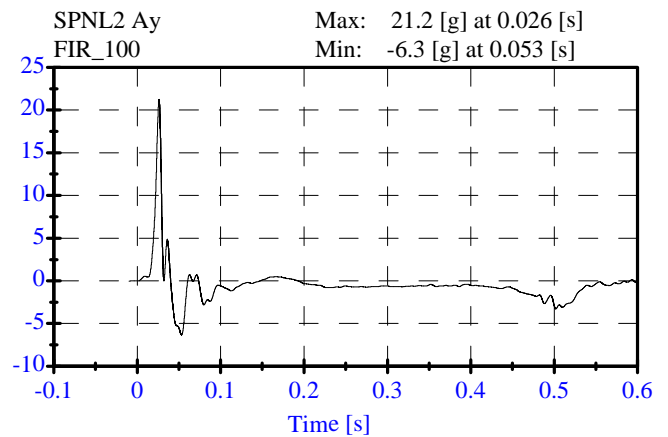
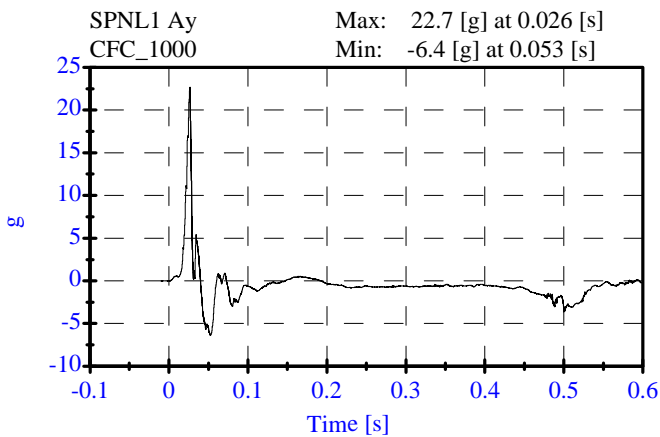
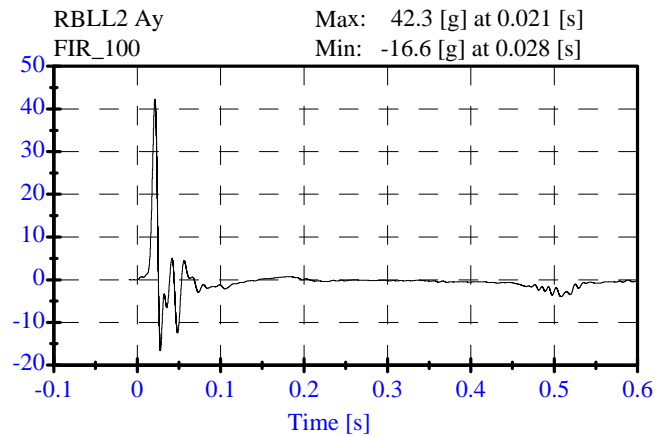
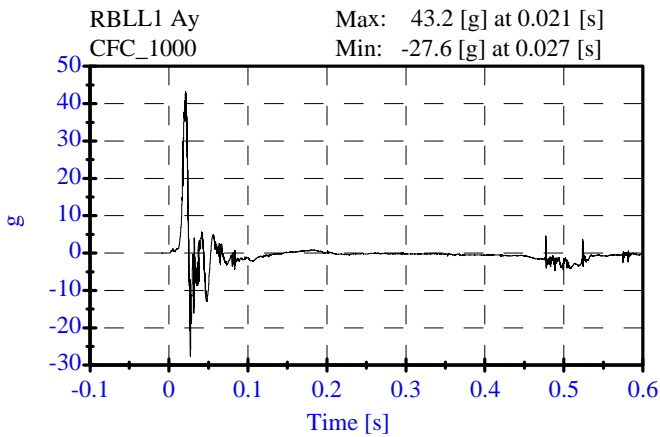
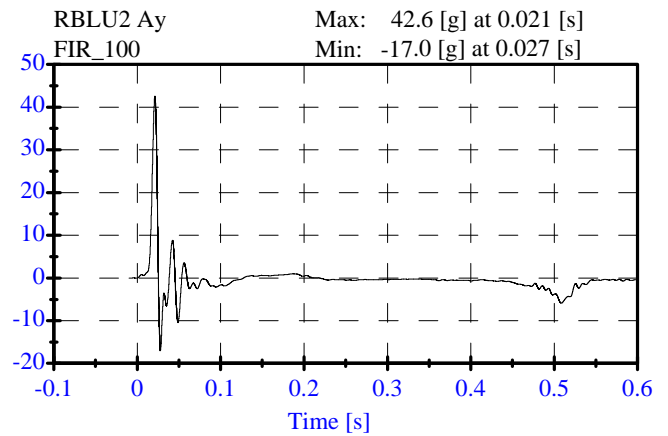
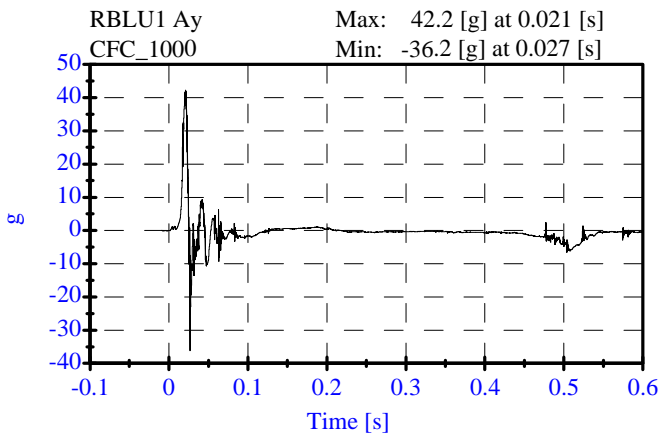


SID Thorax Test S/N:269
Pre-Test
CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 269
 Date: July 24, 2006

Sequential Test Number: 1 File: test1
 Laboratory Technician: B. Swiecicki

<u>TEST PARAMETER</u>	<u>SPECIFICATION</u>	<u>TEST RESULTS</u>	<u>STATUS</u>
Lab Temperature:	18.9-25.5 C	21.1 C	Passed
Lab Humidity:	10-70 %	50.00 %	Passed
Probe Velocity:	4.27- 4.33 m/s	4.27 m/s	Passed
Upper Rib Acceleration:	37.00-46.00 g	42.57 g	Passed
Lower Rib Acceleration:	37.00-46.00 g	42.28 g	Passed
Lower Spine Acceleration:	15.00-22.00 g	21.24 g	Passed



SID Pelvic Test S/N:269

Pre-Test

CONFIGURED FOR LEFT SIDE IMPACT

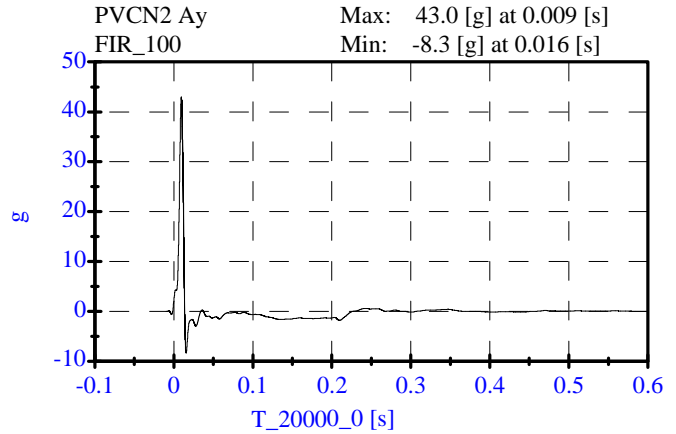
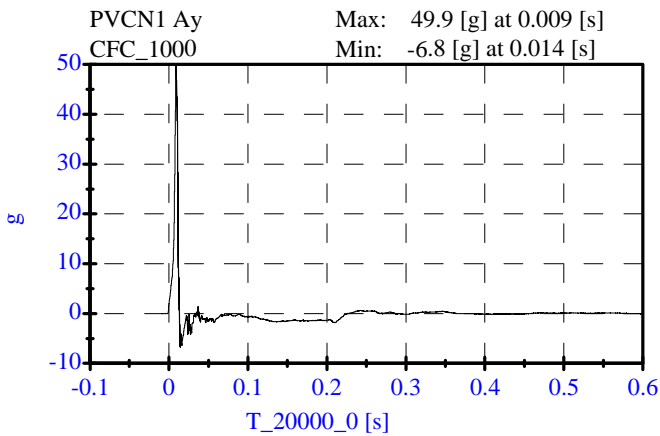
ATD Serial No: 269

Date: July 24, 2006

Sequential Test Number: 1 File: test1

Laboratory Technician: B. Swiecicki

<u>TEST PARAMETER</u>	<u>SPECIFICATION</u>	<u>TEST RESULTS</u>	<u>STATUS</u>
Lab Temperature:	18.9-25.5 C	21.1 C	Passed
Lab Humidity:	10-70 %	50.00 %	Passed
Probe Velocity:	4.27- 4.33 m/s	4.30 m/s	Passed
Pelvis Y Acceleration:	40.00-60.00 g	42.97 g	Passed
Time Above 20 Gs	3.0-7.0 ms	5.5 ms	Passed

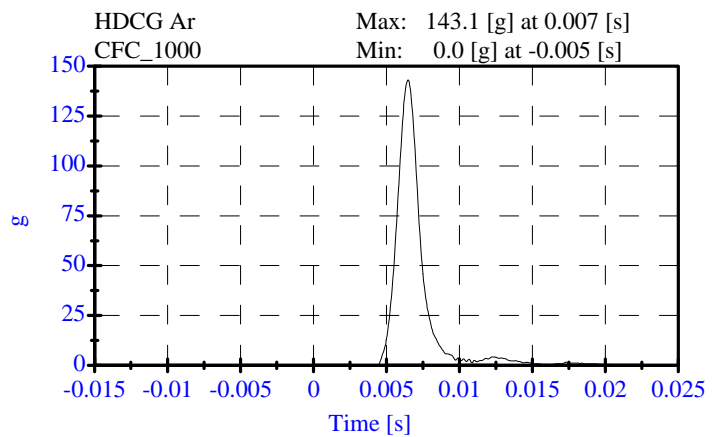
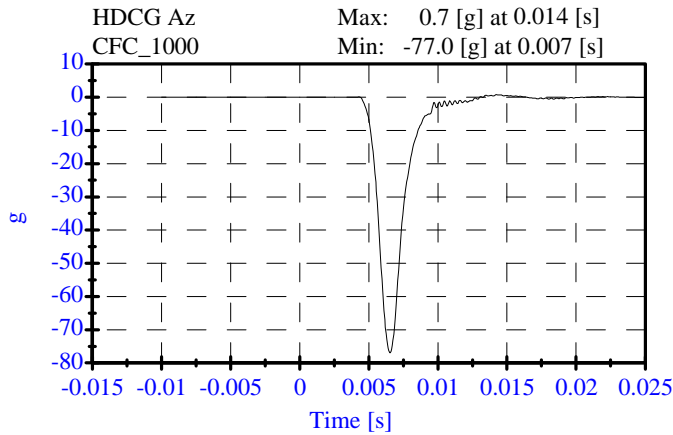
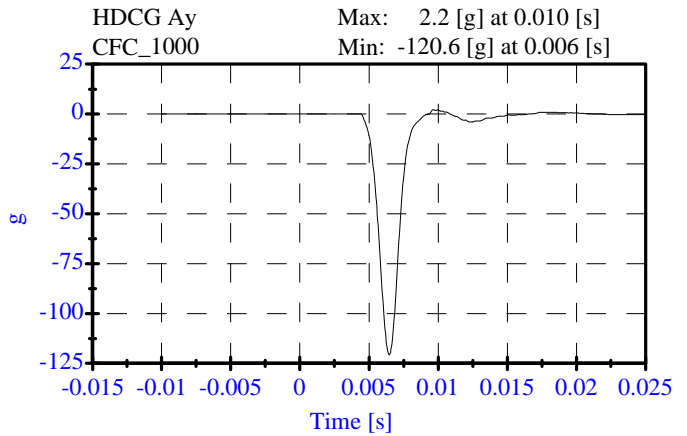
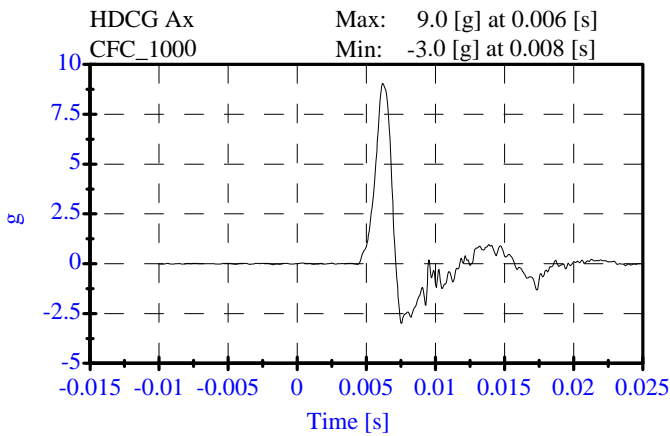


SID HYIII Head Drop Test S/N:269
Pre-Test
CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 269
 Date: July 19, 2006

Sequential Test Number: 1 File: 1001
 Laboratory Technician: B. Swiecicki

<u>TEST PARAMETER</u>	<u>SPECIFICATION</u>	<u>TEST RESULTS</u>	<u>STATUS</u>
Lab Temperature:	18.9-25.6 C	21.1 C	Passed
Lab Humidity:	10-70 %	50.00 %	Passed
Peak Resultant Accel.:	120-150 Gs	143.11 Gs	Passed
Peak Lateral Accel.:	15 Gs Max	9.04 Gs	Passed
Curve PerCent NonModal:	< 15%	2.91 %	Passed



SID Head Neck Test 1 S/N:269

Pre-Test

CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 269

Date: July 19, 2006

Sequential Test Number: 1 File: tst1

Laboratory Technician: B. Swiecicki

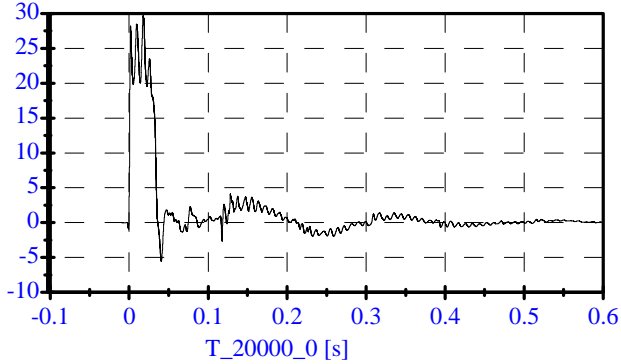
<u>TEST PARAMETER</u>	<u>SPECIFICATION</u>	<u>TEST RESULTS</u>	<u>STATUS</u>
Lab Temperature:	20.6-22.2 C	21.1 C	Passed
Lab Humidity:	10-70 %	50.00 %	Passed
Impact Velocity:	6.89- 7.13 m/s	6.92 m/s	Passed
PENDULUM DELTA V			
Delta V at 10 ms:	1.96- 2.55 m/s	2.20 m/s	Passed
Delta V at 20 ms:	4.12- 5.10 m/s	4.64 m/s	Passed
Delta V at 30 ms:	5.73- 7.01 m/s	6.68 m/s	Passed
Delta V between 40-70 ms:	6.27- 7.64 m/s	7.41 m/s	Passed
D PLANE ROTATION			
Maximum Rotation:	66.0-82.0 Deg	66.35 Deg	Passed
Rotation Angle Decay:	58.0-67.0 ms	62.65 ms	Passed
MOMENT ABOUT THE OCCIPITAL CONDYLE			
Max Occipital Moment:	73.00- 88.00 N-m	77.71 N-m	Passed
Occipital Moment Decay:	49.0-64.0 ms	58.35 ms	Passed
HEAD ROTATION TIME WITH RESPECT TO THE OCCIPITAL CONDYLE MOMENT			
Moment to Rotation Peak:	2.0-16.0 ms	12.55 ms	Passed

SID Head Neck Test 1 S/N:269
Pre-Test
CONFIGURED FOR LEFT SIDE IMPACT

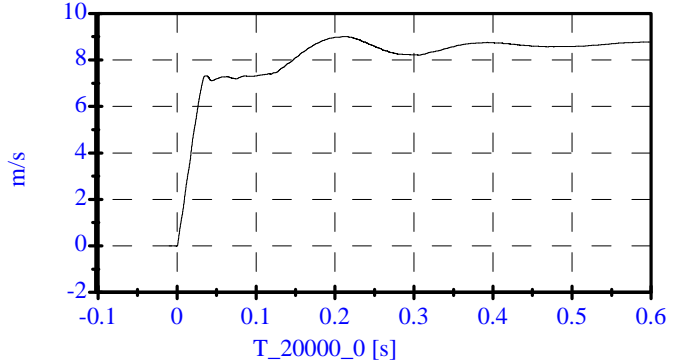
ATD Serial No: 269
 Date: July 19, 2006

Sequential Test Number: 1 File: tst1
 Laboratory Technician: B. Swiecicki

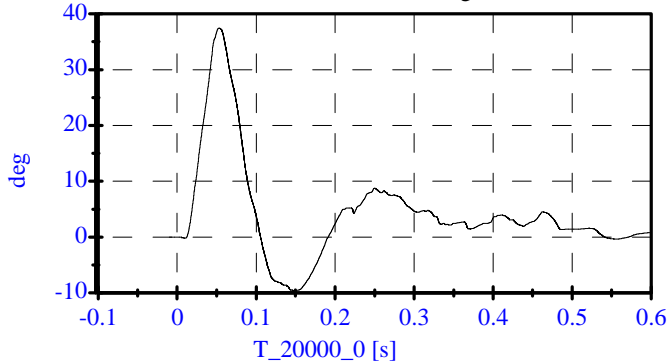
Pend Ax CFC_180 Max: 29.7 [] at 0.018 [s]
 Min: -5.5 [] at 0.041 [s]



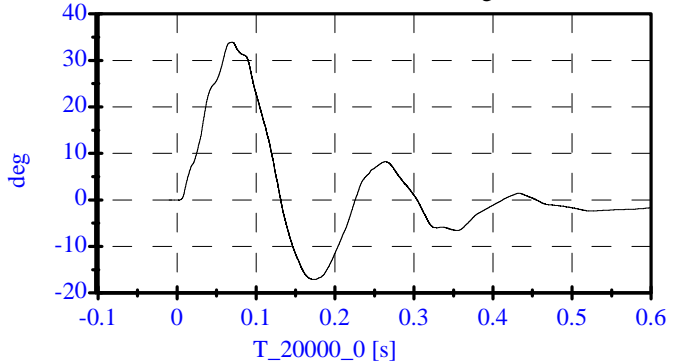
Pend Vx CFC_180 Max: 9.0 [m/s] at 0.212 [s]
 Min: -0.0 [m/s] at -0.000 [s]



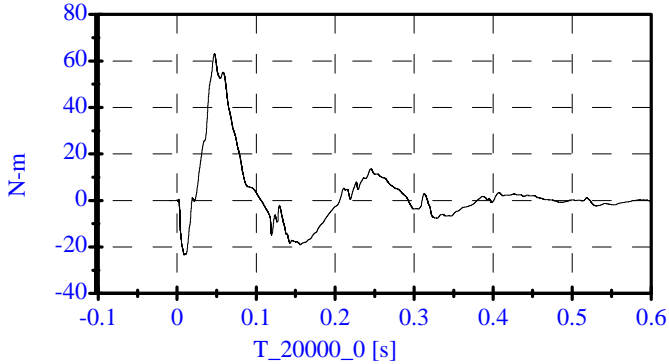
Head Rot CFC_180 Max: 37.5 [deg] at 0.053 [s]
 Min: -9.6 [deg] at 0.148 [s]



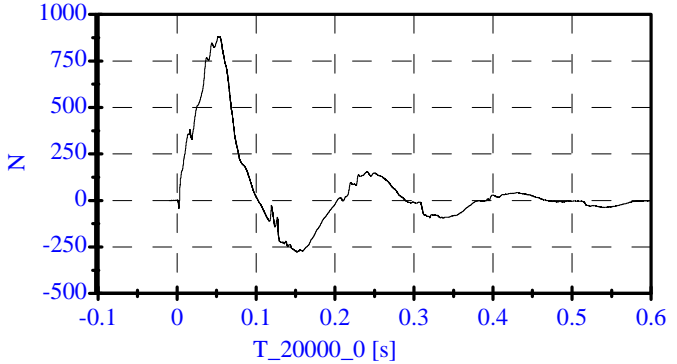
Arm Rot CFC_180 Max: 33.9 [deg] at 0.070 [s]
 Min: -17.1 [deg] at 0.172 [s]



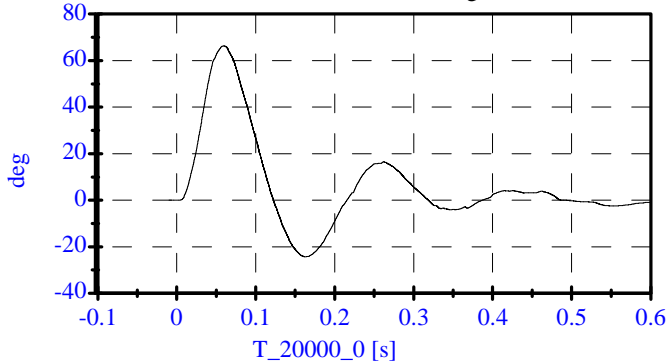
Neck Mx CFC_600 Max: 63.1 [N-m] at 0.047 [s]
 Min: -23.4 [N-m] at 0.009 [s]



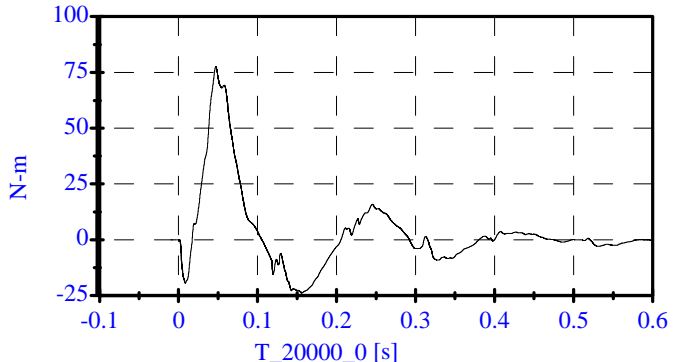
Neck Fy CFC_1000 Max: 882.0 [N] at 0.052 [s]
 Min: -279.0 [N] at 0.152 [s]



Tot Rot CFC_180 Max: 66.3 [deg] at 0.060 [s]
 Min: -24.3 [deg] at 0.162 [s]



MOCX Max: 77.7 [N-m] at 0.047 [s]
 Min: -23.9 [N-m] at 0.156 [s]



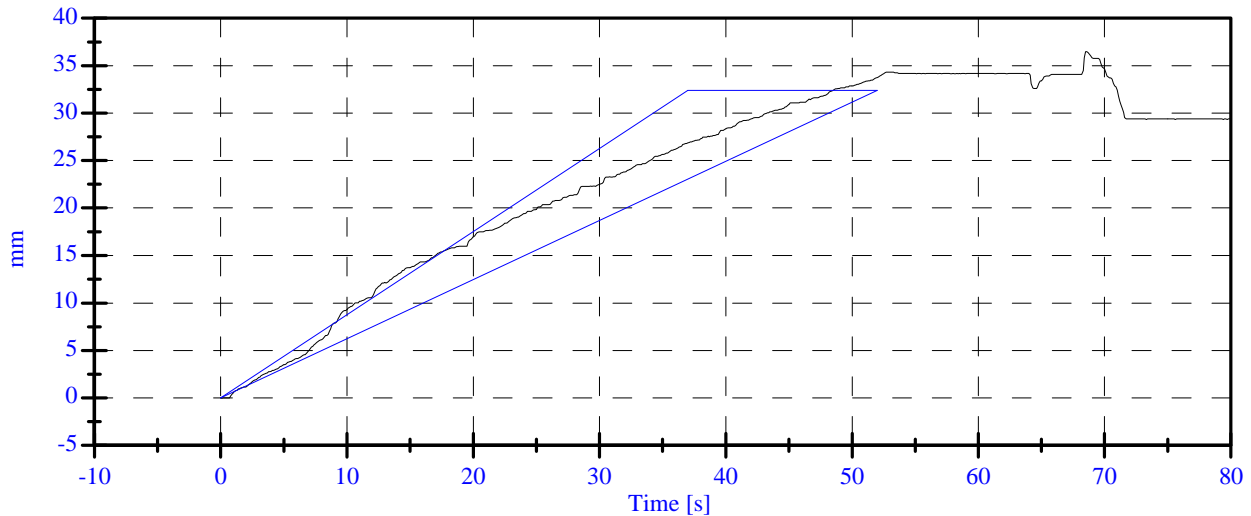
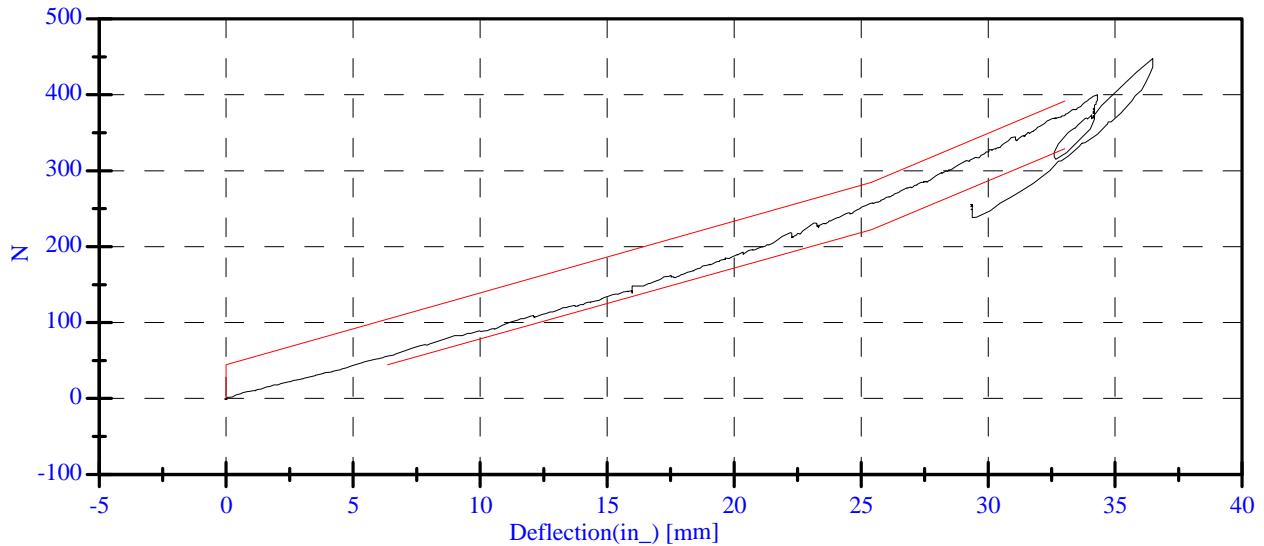
SID Abdominal Test
Pre-Test
CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 269
 Date: July 24, 2006

Sequential Test Number: 1 File: abdominal test 2 269test6
 Laboratory Technician: B. Swiecicki

<u>TEST PARAMETER</u>	<u>SPECIFICATION</u>	<u>TEST RESULTS</u>	<u>STATUS</u>
Lab Temperature:	18.9-25.5 C	21.1 C	Passed
Lab Humidity:	10-70 %	50.00 %	Passed
Force at 12.95 mm :	104.00-162.00 N	115.34 N	Passed
Force at 19.05 mm :	162.98-220.99 N	176.60 N	Passed
Force at 25.40 mm :	221.97-280.02 N	257.80 N	Passed
Force at 33.02 mm :	324.99-391.00 N	373.43 N	Passed

ABDOMINAL COMPRESSION TEST



Sid Lumbar Test

Pre-Test

CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 269

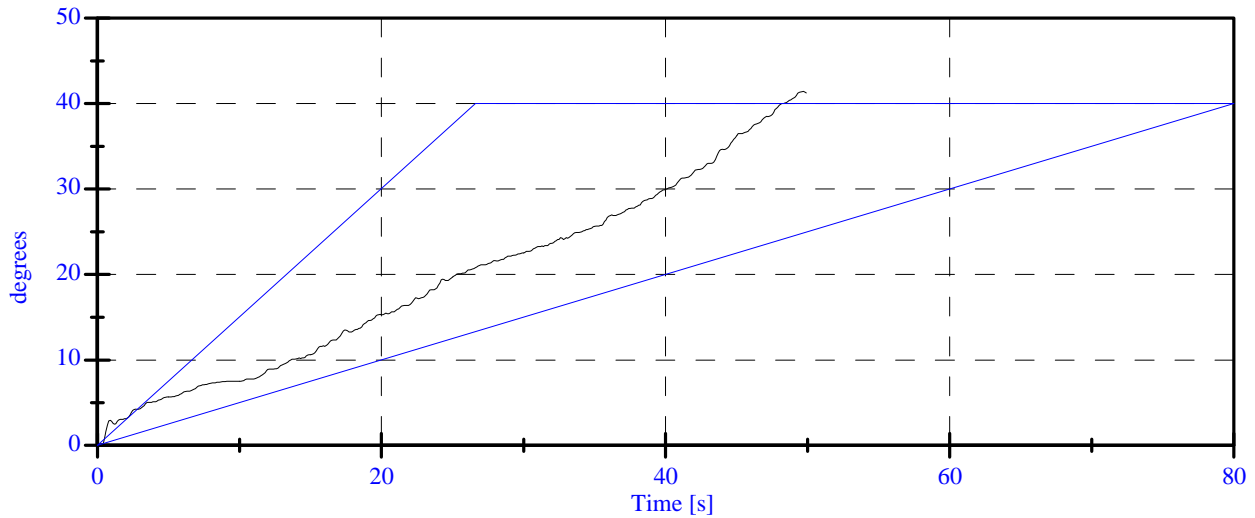
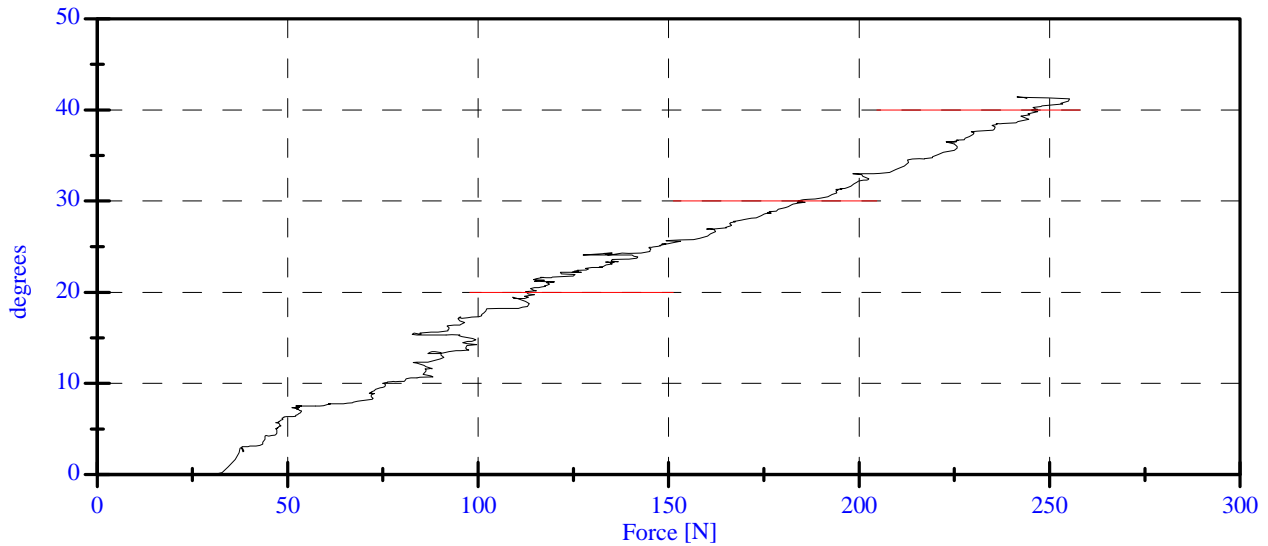
Date: 7-28-2006

Sequential Test Number: 1 File: SID 269 Lumbar test

Laboratory Technician: B. Swiecicki

<u>TEST PARAMETER</u>	<u>SPECIFICATION</u>	<u>TEST RESULTS</u>	<u>STATUS</u>
Lab Temperature:	18.9-25.5 C	21.1 C	Passed
Lab Humidity:	10-70 %	50.00 %	Passed
Force at 0 Deg:	0.00-26.69 N	20.24 N	Passed
Force at 20 Deg:	97.86-151.24 N	112.43 N	Passed
Force at 30 Deg:	151.24-204.62 N	185.29 N	Passed
Force at 40 Deg:	204.62-258.00 N	245.36 N	Passed
Return Angle	12 Deg Max	6.13 deg	Passed

LUMBAR SPINE FLEXION TEST



PRE-TEST DUMMY INSPECTION LIST
CONFIGURED FOR LEFT SIDE IMPACT

SID H3 Serial No.: 269 Sequential Test Number: 1
 Date: JULY 2006 Laboratory Technician: B. Swiecicki

PART	ITEMS CHECKED	COMMENTS
SKIN	VISUAL INSPECTION	OK
HEAD	VISUAL, BALLAST, ACCELEROMETER MOUNT	OK
NECK	VISUAL, CABLE TORQUE	OK
SPINE BOX	VISUAL, BALLAST, WELDMENT, ACCELEROMETER MOUNT	OK
RIB CAGE	VISUAL, MEASURE, STIFFENERS	OK
STERNUM	VISUAL	OK
LUMBAR SPINE	VISUAL	OK
ABDOMEN	VISUAL	OK
PELVIS	VISUAL, PALPATE, ACCELEROMETER MOUNT	OK
UPPER LEGS	VISUAL	OK
KNEES	VISUAL, STOPS, INSERTS	OK
LOWER LEGS	VISUAL, RANGE OF MOTION	OK
ANKLES	VISUAL, RANGE OF MOTION	OK
FEET	VISUAL, RANGE OF MOTION	OK
JOINTS	1 TO 2 g RANGE	OK
OTHER	NONE	-

REMARKS: None

CALIBRATION TEST RESULTS

POST TEST

SID H3 NO.: 270

CONFIGURED FOR LEFT SIDE IMPACT

**CALIBRATION TEST RESULTS SUMMARY
POST TEST**

CONFIGURED FOR LEFT SIDE IMPACT

SID H3 Serial No.: 270 Sequential Test Number: 2
Date: SEPTEMBER 2006 Laboratory Technician: B. Swiecicki

TEST	COMMENTS
EXTERNAL DIMENSIONS	Passed all requirements.
LATERAL THORAX IMPACT TEST	Passed all requirements.
LATERAL PELVIS IMPACT TEST	Passed all requirements.
HEAD DROP TEST*	Passed all requirements.
LATERAL NECK BEND TEST*	Passed all requirements.
ABDOMINAL COMPRESSION TEST*	Passed all requirements.
LUMBAR FLEXION TEST*	Passed all requirements.

* Test not required for SID certification.

REMARKS: None

**EXTERNAL DIMENSIONS
POST TEST**

CONFIGURED FOR LEFT SIDE IMPACT

SID H3 Serial No.: 270 Sequential Test Number: 2
Date: SEPTEMBER 2006 Laboratory Technician: B. Swiecicki

TEST PARAMETER	SPECIFICATION	TEST RESULTS
SH- Seated Height (mm)	889 - 909	904
RH- Rib Height (mm)	502 - 520	510
HP- Hip Pivot Height (mm)	99 ref.	99
RD- Rib from Back Line (mm)	229 - 241	236
KH- Knee Pivot from Back Line (mm)	511 - 526	513
KV- Knee Pivot to Floor (mm)	490 - 505	499
HW- Hip Width (mm)	356 - 391	358

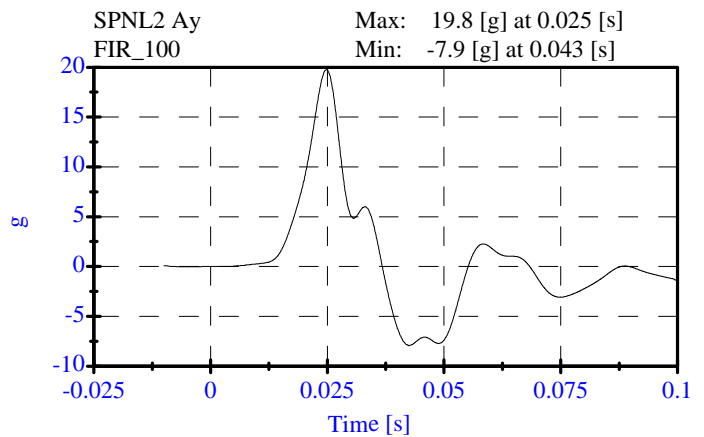
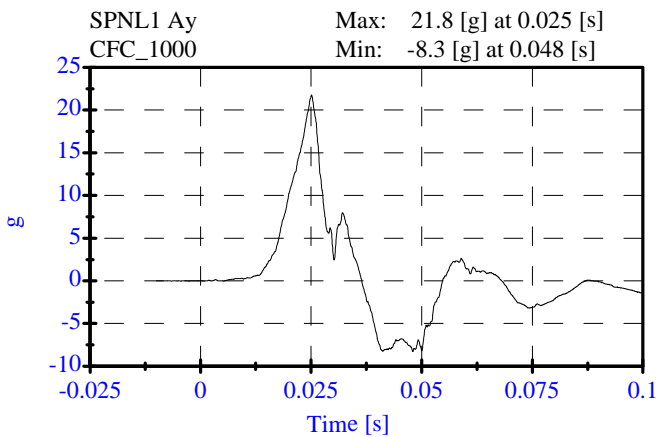
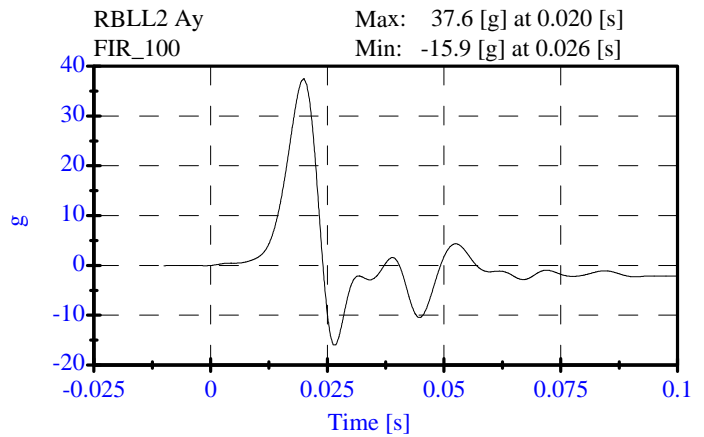
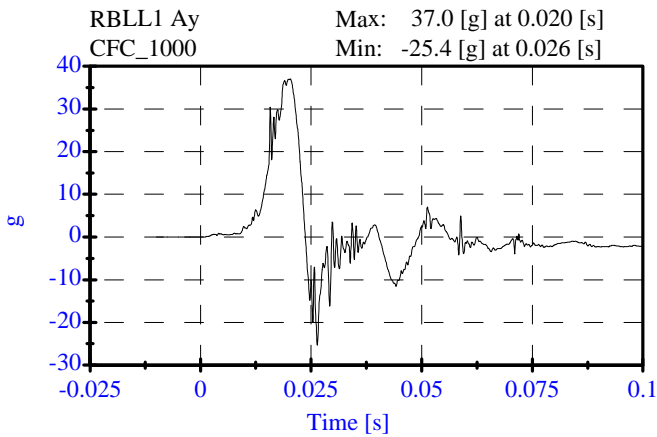
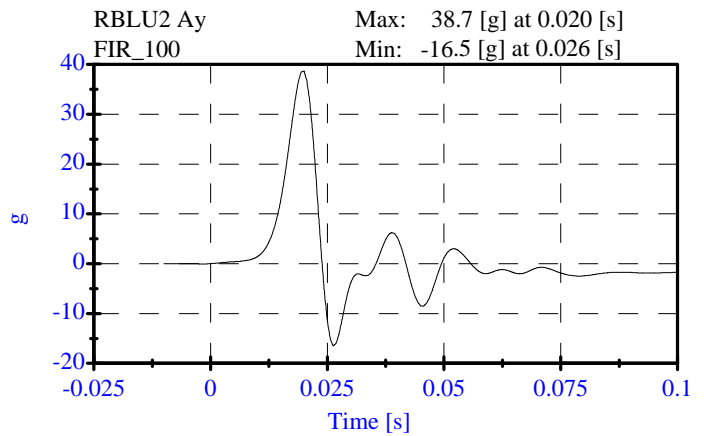
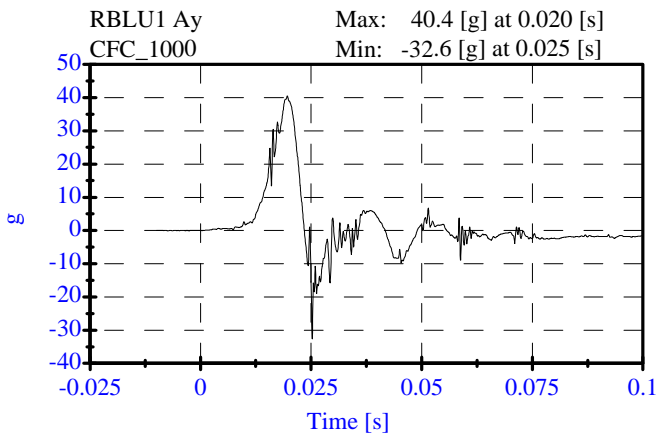
REMARKS: None

SID Thorax Test S/N:270
Post-Test
CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 270
 Date: September 20, 2006

Sequential Test Number: 1 File: 270T
 Laboratory Technician: B. Swiecicki

<u>TEST PARAMETER</u>	<u>SPECIFICATION</u>	<u>TEST RESULTS</u>	<u>STATUS</u>
Lab Temperature:	18.9-25.5 C	21.7 C	Passed
Lab Humidity:	10-70 %	44.00 %	Passed
Probe Velocity:	4.27- 4.33 m/s	4.30 m/s	Passed
Upper Rib Acceleration:	37.00-46.00 g	38.67 g	Passed
Lower Rib Acceleration:	37.00-46.00 g	37.55 g	Passed
Lower Spine Acceleration:	15.00-22.00 g	19.81 g	Passed



SID Pelvis Test S/N:270

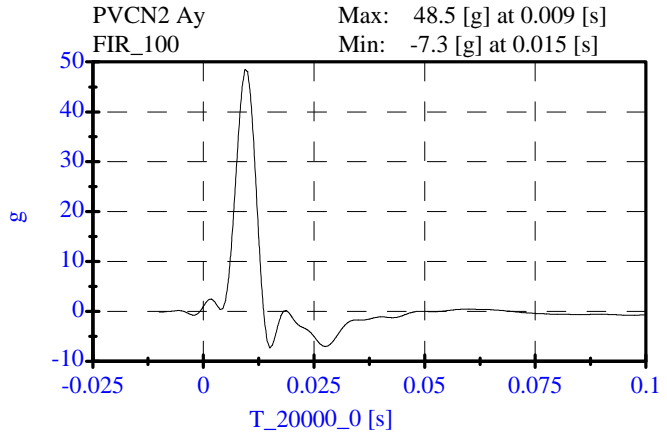
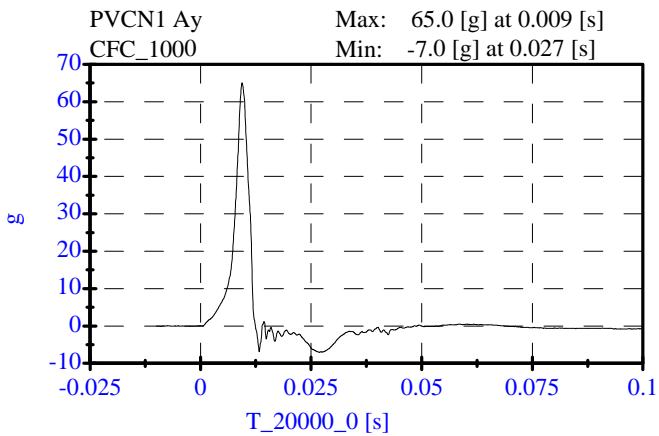
Post-Test

CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 270
Date: September 19, 2006

Sequential Test Number: 1 File: 270T
Laboratory Technician: B. Swiecicki

<u>TEST PARAMETER</u>	<u>SPECIFICATION</u>	<u>TEST RESULTS</u>	<u>STATUS</u>
Lab Temperature:	18.9-25.5 C	21.1 C	Passed
Lab Humidity:	10-70 %	50.00 %	Passed
Probe Velocity:	4.27- 4.33 m/s	4.32 m/s	Passed
Pelvis Y Acceleration:	40.00-60.00 g	48.49 g	Passed
Time Above 20 Gs	3.0-7.0 ms	5.3 ms	Passed

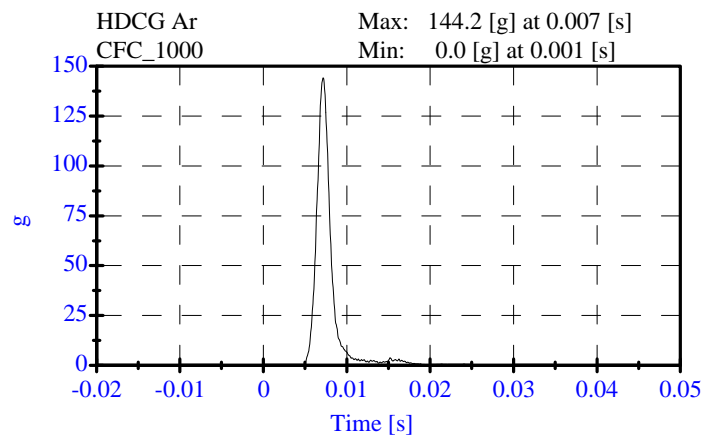
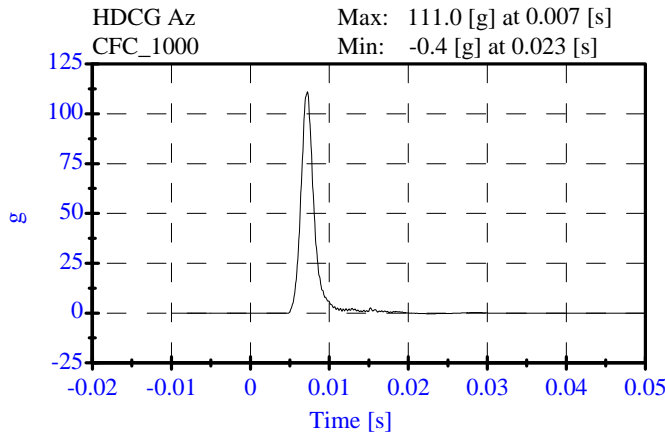
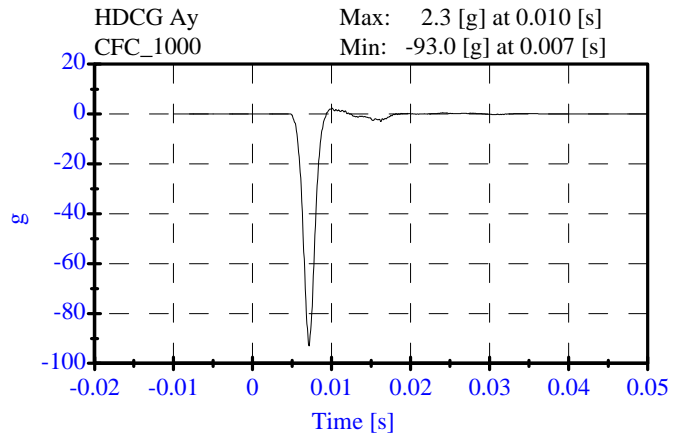
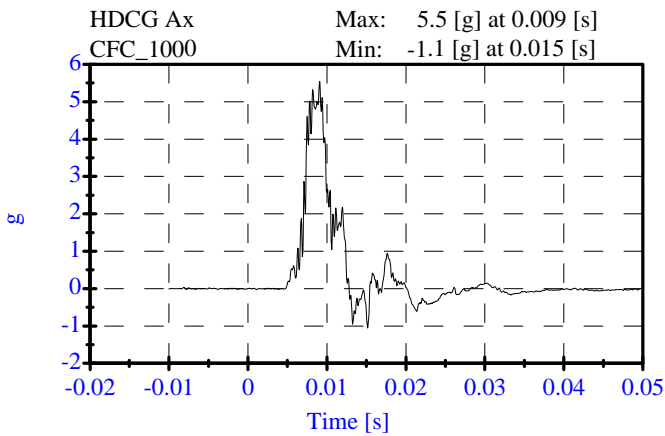


SID HYIII Head Drop Test S/N:270
Post-Test
CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 270
 Date: September 15, 2006

Sequential Test Number: 1 File: 270H
 Laboratory Technician: B. Swiecicki

<u>TEST PARAMETER</u>	<u>SPECIFICATION</u>	<u>TEST RESULTS</u>	<u>STATUS</u>
Lab Temperature:	18.9-25.6 C	21.1 C	Passed
Lab Humidity:	10-70 %	33.00 %	Passed
Peak Resultant Accel.:	120-150 Gs	144.16 Gs	Passed
Peak Lateral Accel.:	15 Gs Max	5.55 Gs	Passed
Curve PerCent NonModal:	< 15%	2.64 %	Passed



SID Head Neck Test S/N:270**Post-Test****CONFIGURED FOR LEFT SIDE IMPACT**

ATD Serial No: 270
 Date: September 18, 2006

Sequential Test Number: 1 File: 270N
 Laboratory Technician: B. Swiecicki

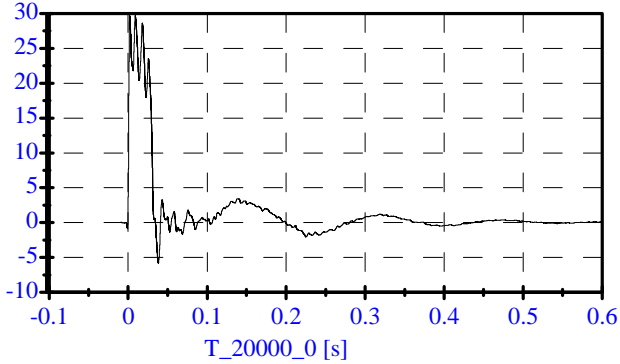
<u>TEST PARAMETER</u>	<u>SPECIFICATION</u>	<u>TEST RESULTS</u>	<u>STATUS</u>
Lab Temperature:	20.6-22.2 C	21.1 C	Passed
Lab Humidity:	10-70 %	50.00 %	Passed
Impact Velocity:	6.89- 7.13 m/s	6.92 m/s	Passed
PENDULUM DELTA V			
Delta V at 10 ms:	1.96- 2.55 m/s	2.37 m/s	Passed
Delta V at 20 ms:	4.12- 5.10 m/s	4.80 m/s	Passed
Delta V at 30 ms:	5.73- 7.01 m/s	6.76 m/s	Passed
Delta V between 40-70 ms:	6.27- 7.64 m/s	6.99 m/s	Passed
D PLANE ROTATION			
Maximum Rotation:	66.0-82.0 Deg	71.96 Deg	Passed
Rotation Angle Decay:	58.0-67.0 ms	60.40 ms	Passed
MOMENT ABOUT THE OCCIPITAL CONDYLE			
Max Occipital Moment:	73.00- 88.00 N-m	80.31 N-m	Passed
Occipital Moment Decay:	49.0-64.0 ms	56.95 ms	Passed
HEAD ROTATION TIME WITH RESPECT TO THE OCCIPITAL CONDYLE MOMENT			
Moment to Rotation Peak:	2.0-16.0 ms	12.90 ms	Passed

SID Head Neck Test S/N:270
Post-Test
CONFIGURED FOR LEFT SIDE IMPACT

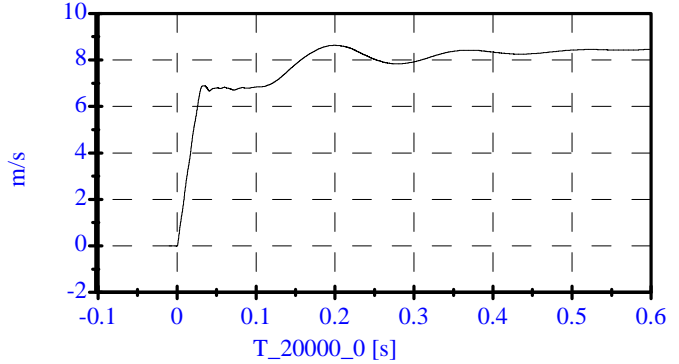
ATD Serial No: 270
 Date: September 18, 2006

Sequential Test Number: 1 File: 270N
 Laboratory Technician: B. Swiecicki

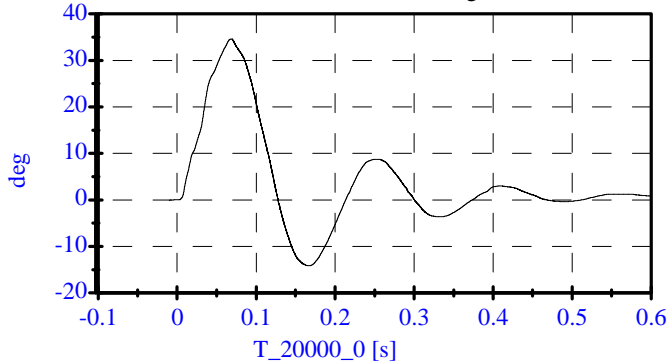
Pend Ax CFC_180 Max: 29.7 [] at 0.002 [s]
 Min: -5.8 [] at 0.038 [s]



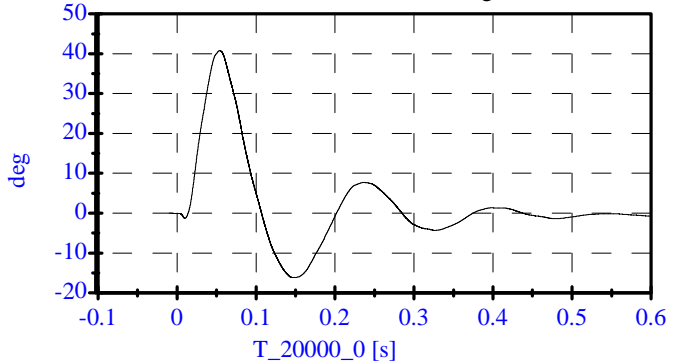
Pend Vx CFC_180 Max: 8.6 [m/s] at 0.200 [s]
 Min: -0.0 [m/s] at -0.000 [s]



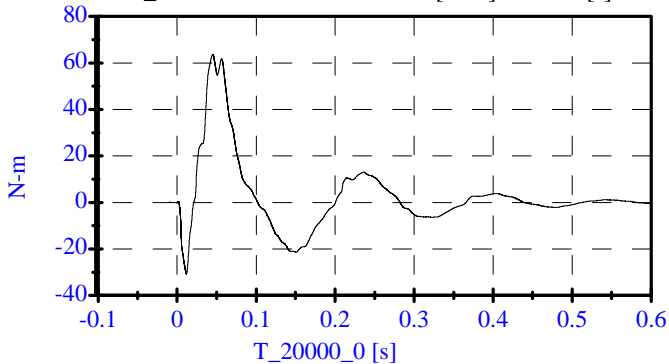
Head Rot CFC_180 Max: 34.6 [deg] at 0.069 [s]
 Min: -14.1 [deg] at 0.167 [s]



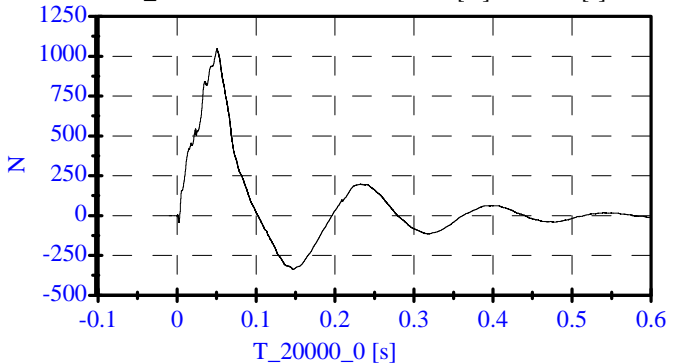
Arm Rot CFC_180 Max: 40.8 [deg] at 0.054 [s]
 Min: -16.1 [deg] at 0.147 [s]



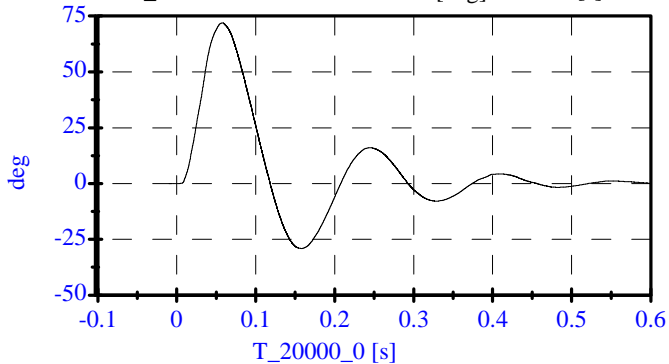
Neck Mx CFC_600 Max: 63.6 [N-m] at 0.045 [s]
 Min: -30.8 [N-m] at 0.012 [s]



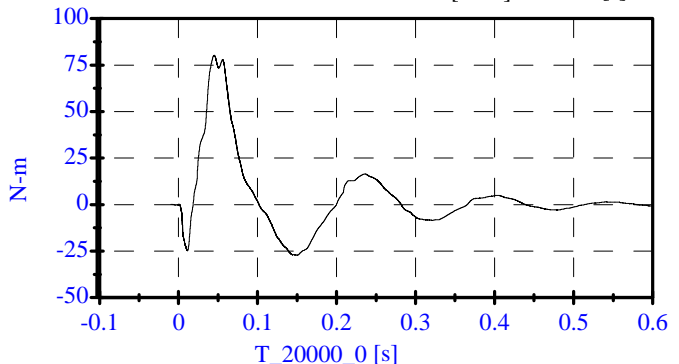
Neck Fy CFC_1000 Max: 1046.3 [N] at 0.050 [s]
 Min: -336.9 [N] at 0.147 [s]



Tot Rot CFC_180 Max: 72.0 [deg] at 0.058 [s]
 Min: -29.1 [deg] at 0.158 [s]



MOCX Max: 80.3 [N-m] at 0.045 [s]
 Min: -27.2 [N-m] at 0.151 [s]



Abdomen Test

Pre-Test

CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 270

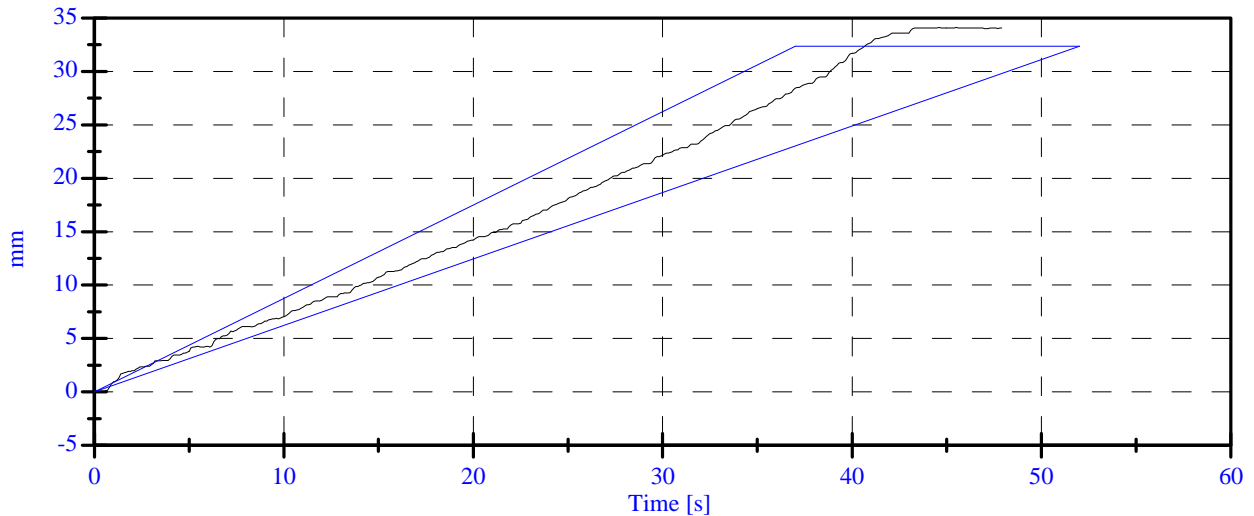
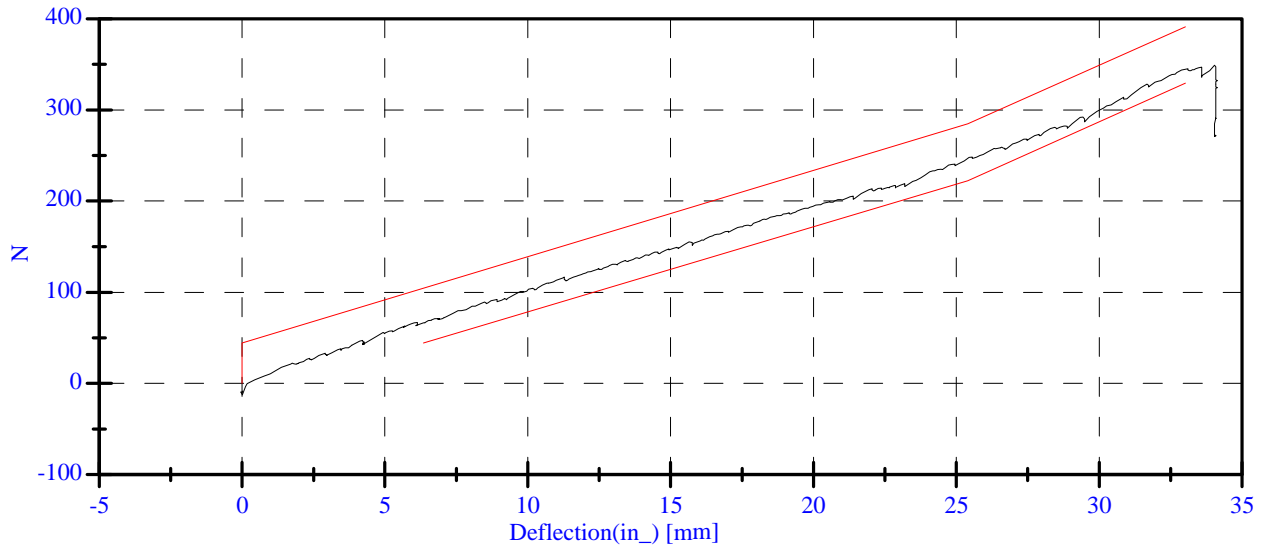
Date: 09-18-06

Sequential Test Number: 1 File: 270 AB 09-18-06 test1

Laboratory Technician: B. Swiecicki

<u>TEST PARAMETER</u>	<u>SPECIFICATION</u>	<u>TEST RESULTS</u>	<u>STATUS</u>
Lab Temperature:	18.9-25.5 C	22.2 C	Passed
Lab Humidity:	10-70 %	54.00 %	Passed
Force at 12.95 mm :	104.00-162.00 N	130.57 N	Passed
Force at 19.05 mm :	162.98-220.99 N	186.39 N	Passed
Force at 25.40 mm :	221.97-280.02 N	248.01 N	Passed
Force at 33.02 mm :	324.99-391.00 N	344.79 N	Passed

ABDOMINAL COMPRESSION TEST



**Spine Test
Post-Test**

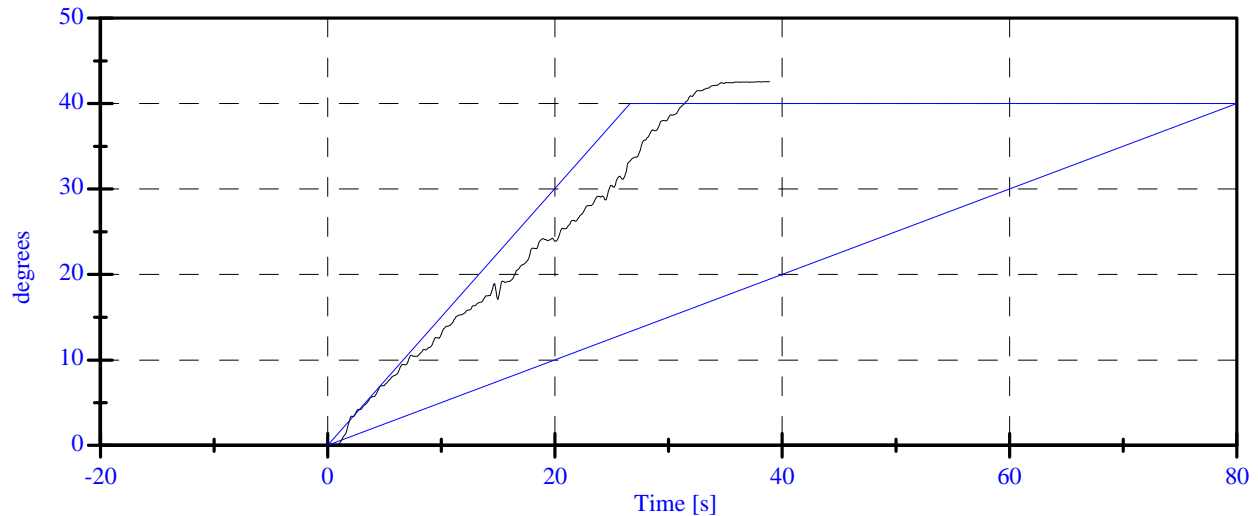
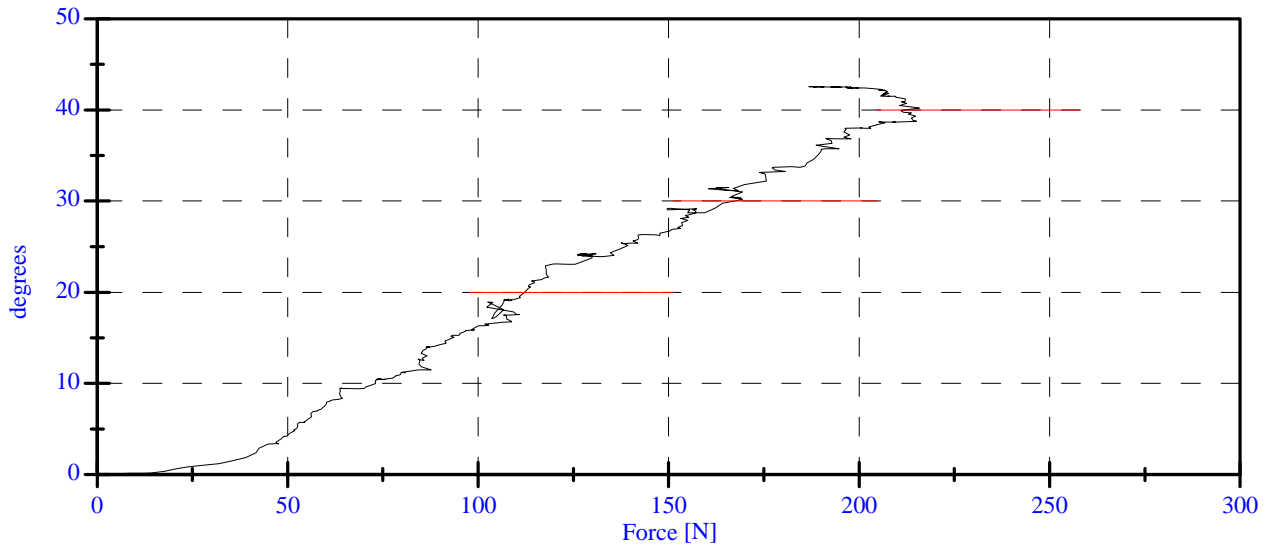
CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 270
Date: 09-18-06

Sequential Test Number: 1 File: 270 spine 09-18-06 test1
Laboratory Technician: B. Swiecicki

<u>TEST PARAMETER</u>	<u>SPECIFICATION</u>	<u>TEST RESULTS</u>	<u>STATUS</u>
Lab Temperature:	18.9-25.5 C	22.8 C	Passed
Lab Humidity:	10-70 %	54.00 %	Passed
Force at 0 Deg:	0.00-26.69 N	1.96 N	Passed
Force at 20 Deg:	97.86-151.24 N	112.43 N	Passed
Force at 30 Deg:	151.24-204.62 N	169.36 N	Passed
Force at 40 Deg:	204.62-258.00 N	211.67 N	Passed
Return Angle	12 Deg Max	2.75 deg	Passed

LUMBAR SPINE FLEXION TEST



POST TEST DUMMY INSPECTION LIST
CONFIGURED FOR LEFT SIDE IMPACT

SID H3 Serial No.: 270 Sequential Test Number: 2
 Date: SEPTEMBER 2006 Laboratory Technician: B. Swiecicki

PART	ITEMS CHECKED	COMMENTS
SKIN	VISUAL INSPECTION	OK
HEAD	VISUAL, BALLAST, ACCELEROMETER MOUNT	OK
NECK	VISUAL, CABLE TORQUE	OK
SPINE BOX	VISUAL, BALLAST, WELDMENT, ACCELEROMETER MOUNT	OK
RIB CAGE	VISUAL, MEASURE, STIFFENERS	OK
STERNUM	VISUAL	OK
LUMBAR SPINE	VISUAL	OK
ABDOMEN	VISUAL	OK
PELVIS	VISUAL, PALPATE, ACCELEROMETER MOUNT	OK
UPPER LEGS	VISUAL	OK
KNEES	VISUAL, STOPS, INSERTS	OK
LOWER LEGS	VISUAL, RANGE OF MOTION	OK
ANKLES	VISUAL, RANGE OF MOTION	OK
FEET	VISUAL, RANGE OF MOTION	OK
JOINTS	1 TO 2 g RANGE	OK
OTHER	NONE	-

REMARKS: None

CALIBRATION TEST RESULTS

POST TEST

SID H3 NO.: 269

CONFIGURED FOR LEFT SIDE IMPACT

**CALIBRATION TEST RESULTS SUMMARY
POST TEST**

CONFIGURED FOR LEFT SIDE IMPACT

SID H3 Serial No.: 269 Sequential Test Number: 2
Date: SEPTEMBER 2006 Laboratory Technician: B. Swiecicki

TEST	COMMENTS
EXTERNAL DIMENSIONS	Passed all requirements.
LATERAL THORAX IMPACT TEST	Passed all requirements.
LATERAL PELVIS IMPACT TEST	Passed all requirements.
HEAD DROP TEST*	Passed all requirements.
LATERAL NECK BEND TEST*	Passed all requirements.
ABDOMINAL COMPRESSION TEST*	Passed all requirements.
LUMBAR FLEXION TEST*	Passed all requirements.

* Test not required for SID certification.

REMARKS: None

**EXTERNAL DIMENSIONS
POST TEST**

CONFIGURED FOR LEFT SIDE IMPACT

SID H3 Serial No.: 269 Sequential Test Number: 2
Date: SEPTEMBER 2006 Laboratory Technician: B. Swiecicki

TEST PARAMETER	SPECIFICATION	TEST RESULTS
SH- Seated Height (mm)	889 - 909	909
RH- Rib Height (mm)	502 - 520	513
HP- Hip Pivot Height (mm)	99 ref.	99
RD- Rib from Back Line (mm)	229 - 241	241
KH- Knee Pivot from Back Line (mm)	511 - 526	521
KV- Knee Pivot to Floor (mm)	490 - 505	493
HW- Hip Width (mm)	356 - 391	363

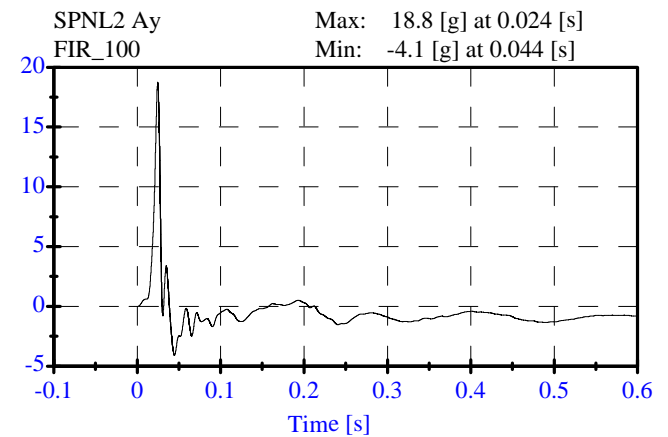
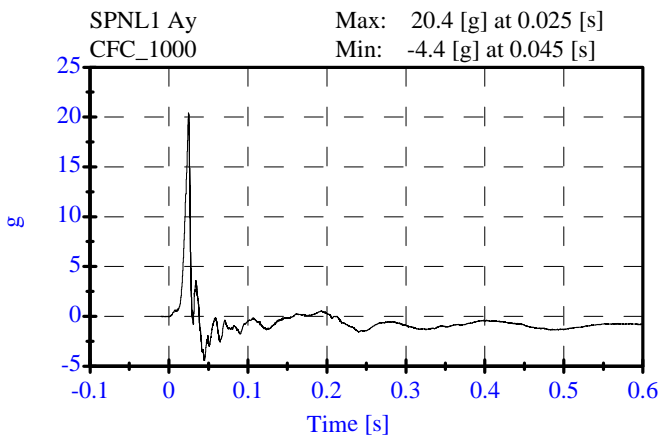
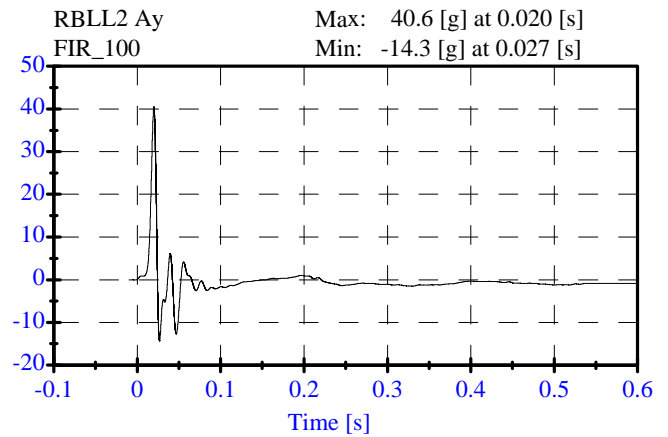
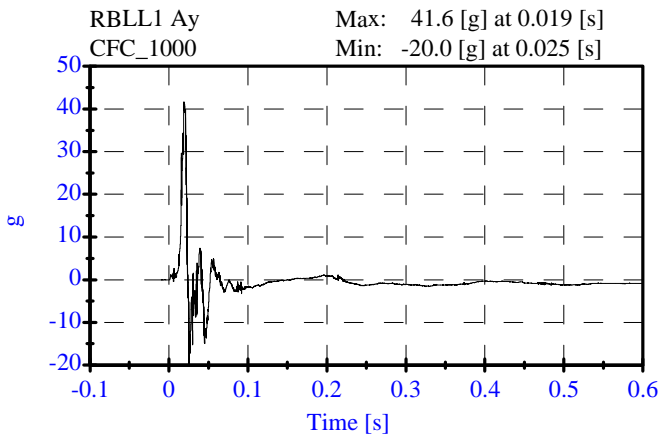
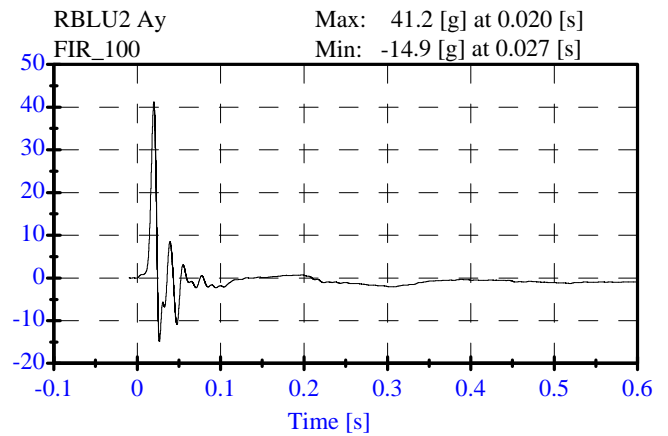
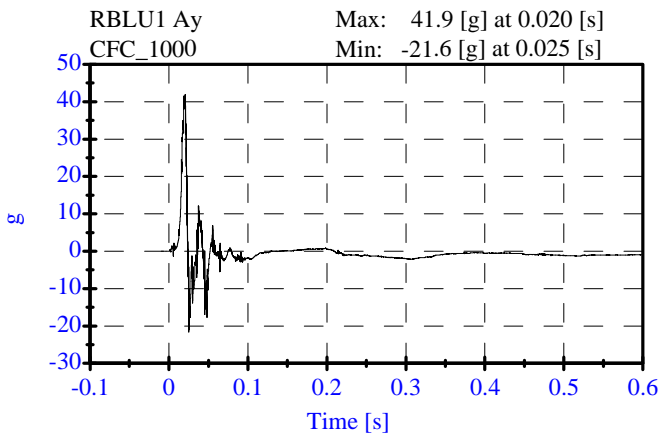
REMARKS: None

SID Thorax Test S/N:269
Post-Test
CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 269
 Date: September 19, 2006

Sequential Test Number: 1 File: test1
 Laboratory Technician: B. Swiecicki

<u>TEST PARAMETER</u>	<u>SPECIFICATION</u>	<u>TEST RESULTS</u>	<u>STATUS</u>
Lab Temperature:	18.9-25.5 C	21.1 C	Passed
Lab Humidity:	10-70 %	50.00 %	Passed
Probe Velocity:	4.27- 4.33 m/s	4.33 m/s	Passed
Upper Rib Acceleration:	37.00-46.00 g	41.22 g	Passed
Lower Rib Acceleration:	37.00-46.00 g	40.58 g	Passed
Lower Spine Acceleration:	15.00-22.00 g	18.77 g	Passed



SID Pelvis Test S/N:269

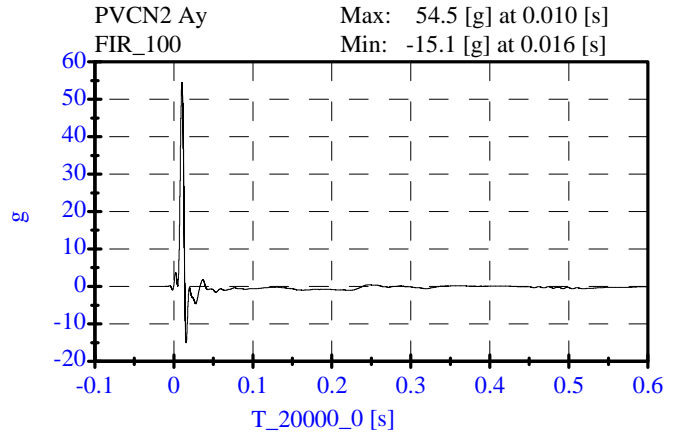
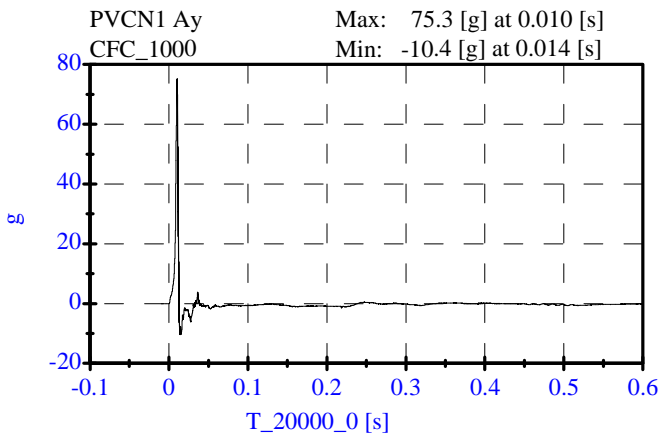
Post-Test

CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 269
Date: September 19, 2006

Sequential Test Number: 1 File: 905T
Laboratory Technician: B. Swiecicki

<u>TEST PARAMETER</u>	<u>SPECIFICATION</u>	<u>TEST RESULTS</u>	<u>STATUS</u>
Lab Temperature:	18.9-25.5 C	21.1 C	Passed
Lab Humidity:	10-70 %	50.00 %	Passed
Probe Velocity:	4.27- 4.33 m/s	4.27 m/s	Passed
Pelvis Y Acceleration:	40.00-60.00 g	54.47 g	Passed
Time Above 20 Gs	3.0-7.0 ms	5.4 ms	Passed

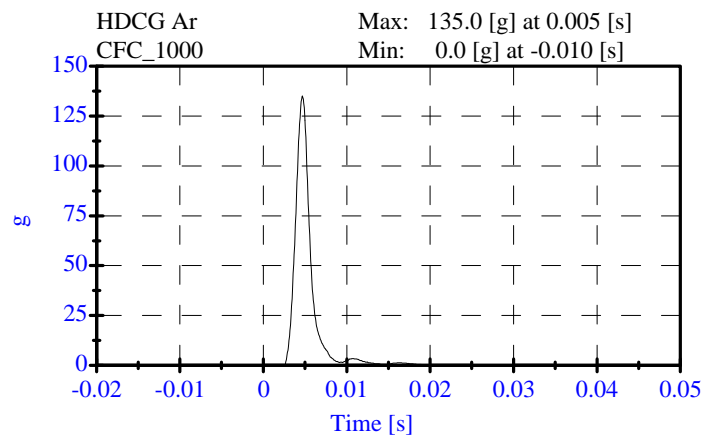
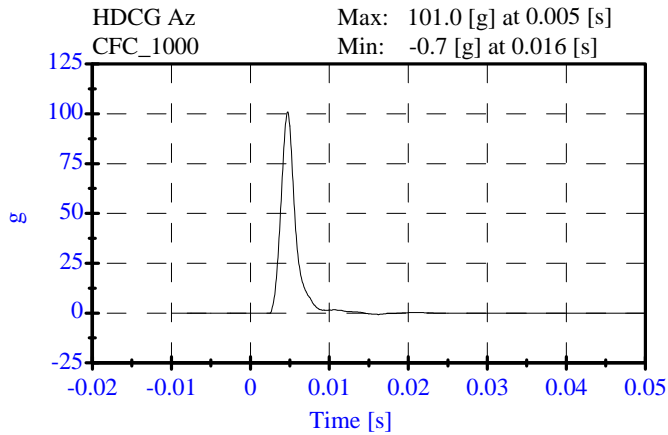
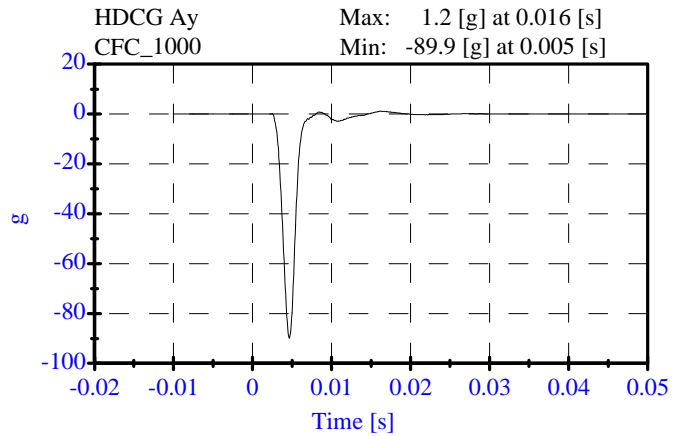
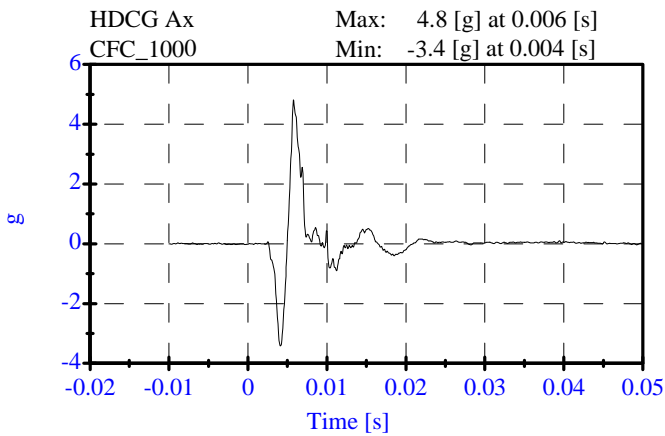


SID HYIII Head Drop Test S/N:269
Post-Test
CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 269
 Date: September 15, 2006

Sequential Test Number: 1 File: 269H
 Laboratory Technician: B. Swiecicki

<u>TEST PARAMETER</u>	<u>SPECIFICATION</u>	<u>TEST RESULTS</u>	<u>STATUS</u>
Lab Temperature:	18.9-25.6 C	21.1 C	Passed
Lab Humidity:	10-70 %	50.00 %	Passed
Peak Resultant Accel.:	120-150 Gs	135.02 Gs	Passed
Peak Lateral Accel.:	15 Gs Max	4.82 Gs	Passed
Curve PerCent NonModal:	< 15%	2.54 %	Passed



SID Head Neck Test S/N:269

Post-Test

CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 269
Date: September 15, 2006

Sequential Test Number: 1 File: 905N
Laboratory Technician: B. Swiecicki

<u>TEST PARAMETER</u>	<u>SPECIFICATION</u>	<u>TEST RESULTS</u>	<u>STATUS</u>
Lab Temperature:	20.6-22.2 C	21.1 C	Passed
Lab Humidity:	10-70 %	50.00 %	Passed
Impact Velocity:	6.89- 7.13 m/s	7.00 m/s	Passed
PENDULUM DELTA V			
Delta V at 10 ms:	1.96- 2.55 m/s	2.12 m/s	Passed
Delta V at 20 ms:	4.12- 5.10 m/s	4.38 m/s	Passed
Delta V at 30 ms:	5.73- 7.01 m/s	6.30 m/s	Passed
Delta V between 40-70 ms:	6.27- 7.64 m/s	7.14 m/s	Passed
D PLANE ROTATION			
Maximum Rotation:	66.0-82.0 Deg	73.13 Deg	Passed
Rotation Angle Decay:	58.0-67.0 ms	62.90 ms	Passed
MOMENT ABOUT THE OCCIPITAL CONDYLE			
Max Occipital Moment:	73.00- 88.00 N-m	78.96 N-m	Passed
Occipital Moment Decay:	49.0-64.0 ms	59.65 ms	Passed
HEAD ROTATION TIME WITH RESPECT TO THE OCCIPITAL CONDYLE MOMENT			
Moment to Rotation Peak:	2.0-16.0 ms	9.55 ms	Passed

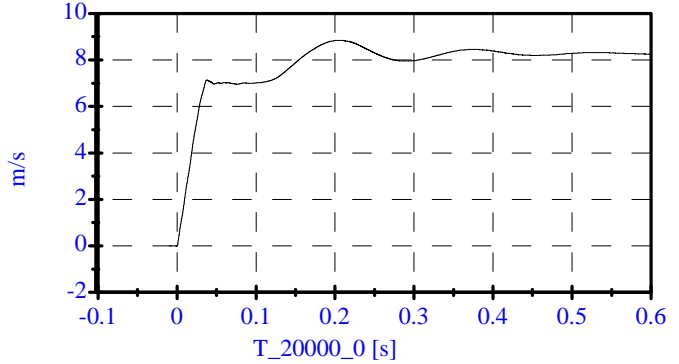
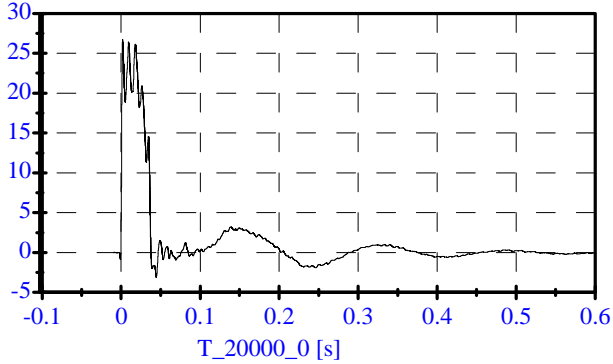
SID Head Neck Test S/N:269
Post-Test
CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 269
 Date: September 15, 2006

Sequential Test Number: 1 File: 905N
 Laboratory Technician: B. Swiecicki

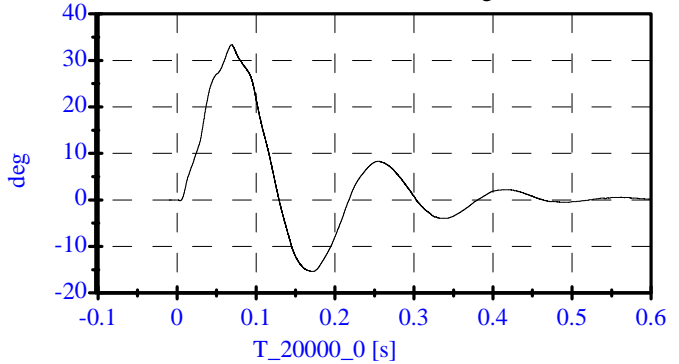
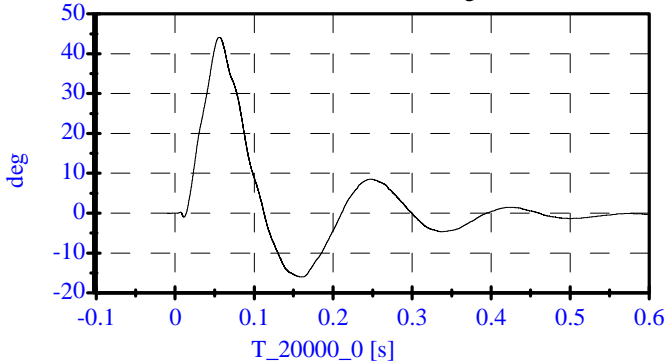
Pend Ax CFC_180 Max: 26.8 [] at 0.002 [s]
 Min: -3.1 [] at 0.045 [s]

Pend Vx CFC_180 Max: 8.8 [m/s] at 0.207 [s]
 Min: -0.0 [m/s] at -0.000 [s]



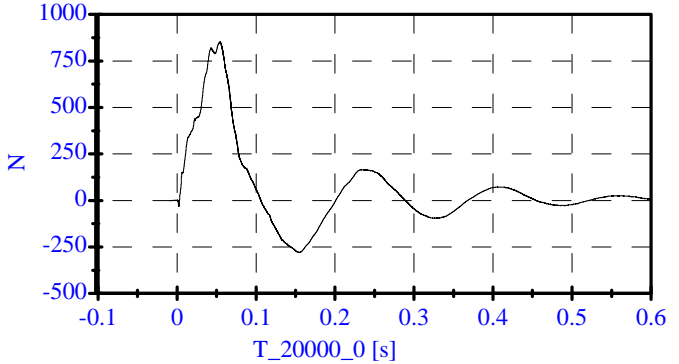
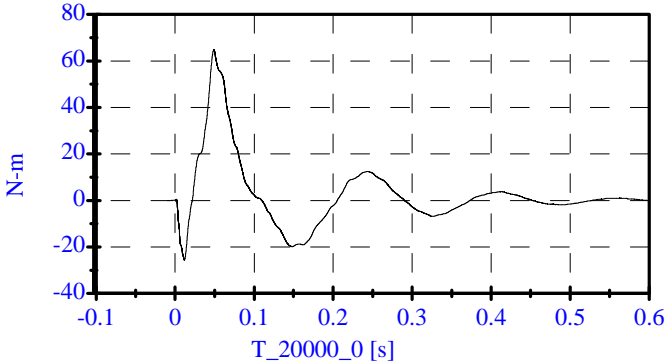
Head Rot CFC_180 Max: 44.1 [deg] at 0.056 [s]
 Min: -16.0 [deg] at 0.159 [s]

Arm Rot CFC_180 Max: 33.4 [deg] at 0.069 [s]
 Min: -15.4 [deg] at 0.171 [s]



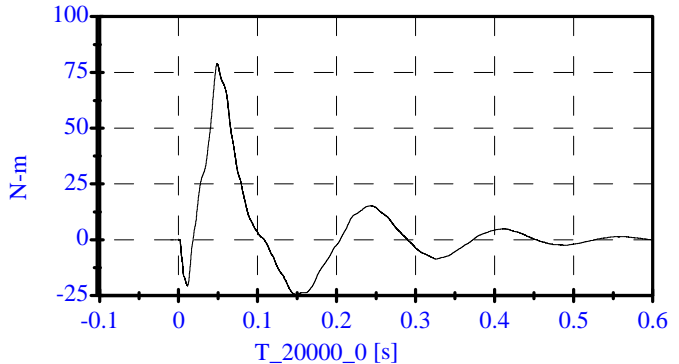
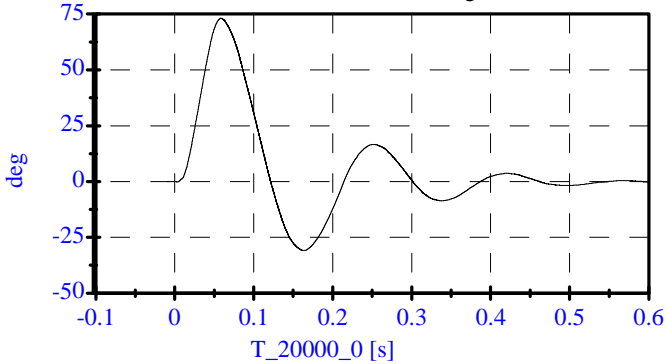
Neck Mx CFC_600 Max: 64.9 [N-m] at 0.049 [s]
 Min: -25.6 [N-m] at 0.012 [s]

Neck Fy CFC_1000 Max: 852.3 [N] at 0.055 [s]
 Min: -280.0 [N] at 0.154 [s]



Tot Rot CFC_180 Max: 73.1 [deg] at 0.058 [s]
 Min: -30.9 [deg] at 0.164 [s]

MOCX Max: 79.0 [N-m] at 0.049 [s]
 Min: -24.6 [N-m] at 0.148 [s]



Abdomen Test

Post-Test

CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 269

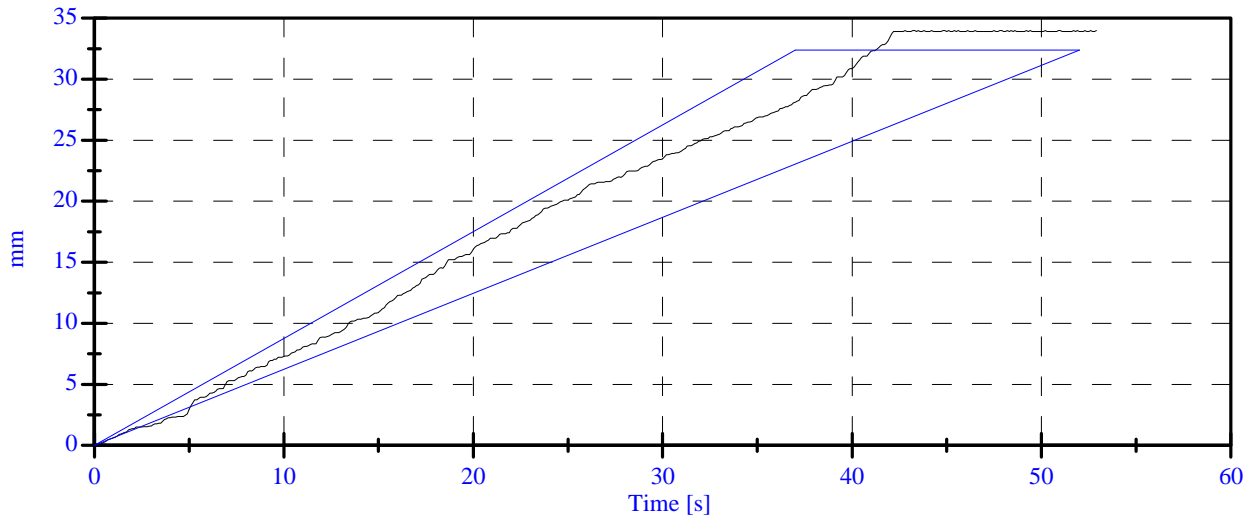
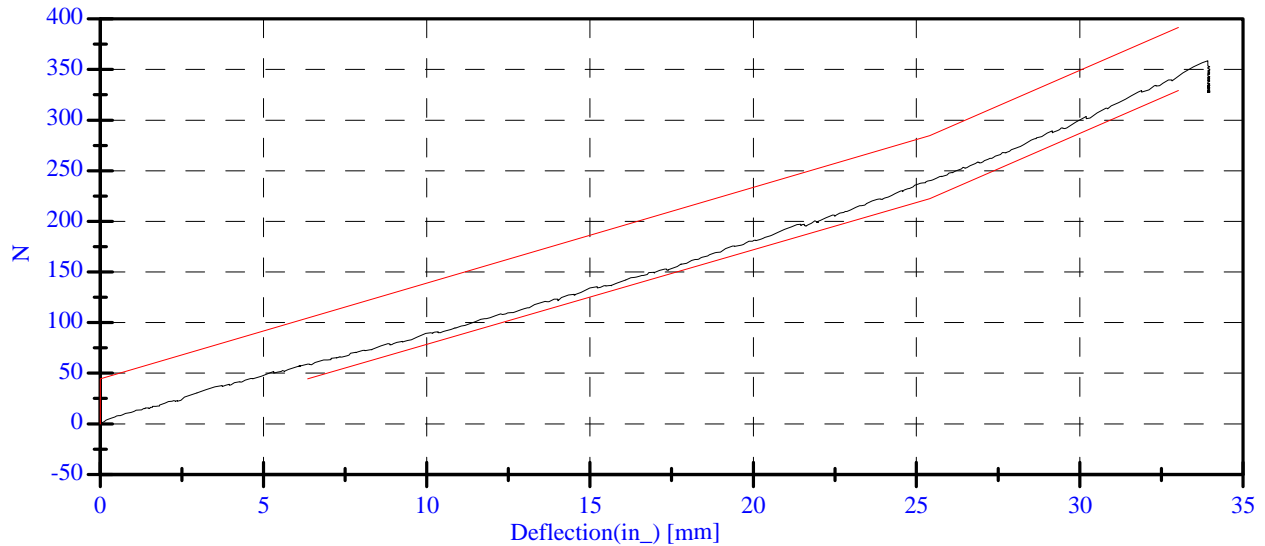
Date: 09-18-06

Sequential Test Number: 1 File: 269 AB 09-18-06 test1

Laboratory Technician: B. Swiecicki

<u>TEST PARAMETER</u>	<u>SPECIFICATION</u>	<u>TEST RESULTS</u>	<u>STATUS</u>
Lab Temperature:	18.9-25.5 C	22.2 C	Passed
Lab Humidity:	10-70 %	54.00 %	Passed
Force at 12.95 mm :	104.00-162.00 N	113.89 N	Passed
Force at 19.05 mm :	162.98-220.99 N	169.71 N	Passed
Force at 25.40 mm :	221.97-280.02 N	240.04 N	Passed
Force at 33.02 mm :	324.99-391.00 N	341.17 N	Passed

ABDOMINAL COMPRESSION TEST



**Spine Test
Post-Test**

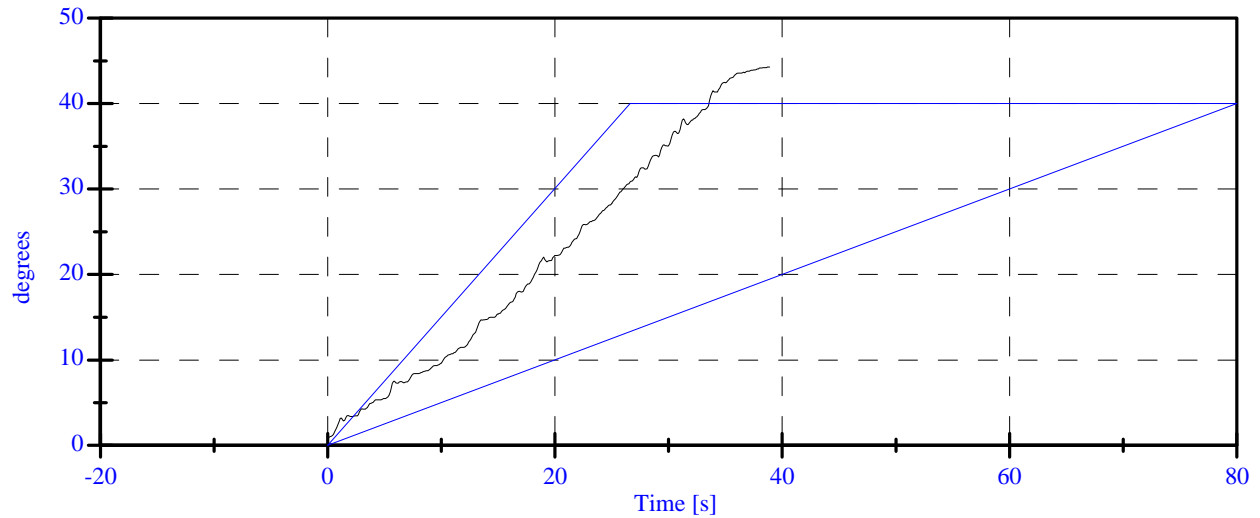
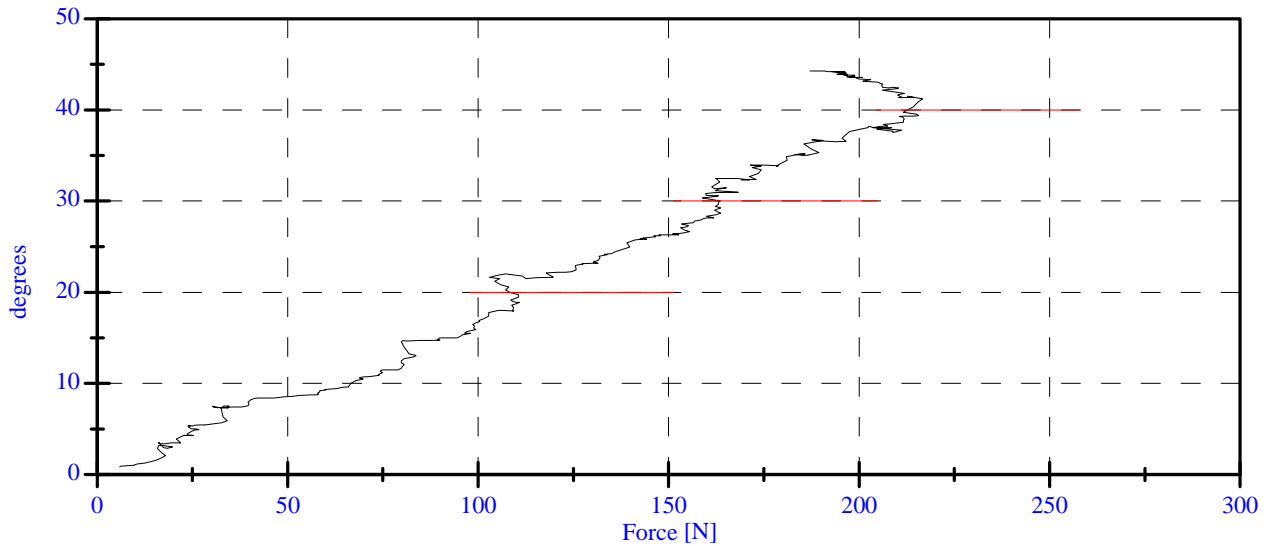
CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 269
Date: 09-18-06

Sequential Test Number: 1 File: 269 spine 09-18-06 test1
Laboratory Technician: B. Swiecicki

<u>TEST PARAMETER</u>	<u>SPECIFICATION</u>	<u>TEST RESULTS</u>	<u>STATUS</u>
Lab Temperature:	18.9-25.5 C	22.2 C	Passed
Lab Humidity:	10-70 %	55.00 %	Passed
Force at 0 Deg:	0.00-26.69 N	5.88 N	Passed
Force at 20 Deg:	97.86-151.24 N	108.25 N	Passed
Force at 30 Deg:	151.24-204.62 N	163.36 N	Passed
Force at 40 Deg:	204.62-258.00 N	211.67 N	Passed
Return Angle	12 Deg Max	2.71 deg	Passed

LUMBAR SPINE FLEXION TEST



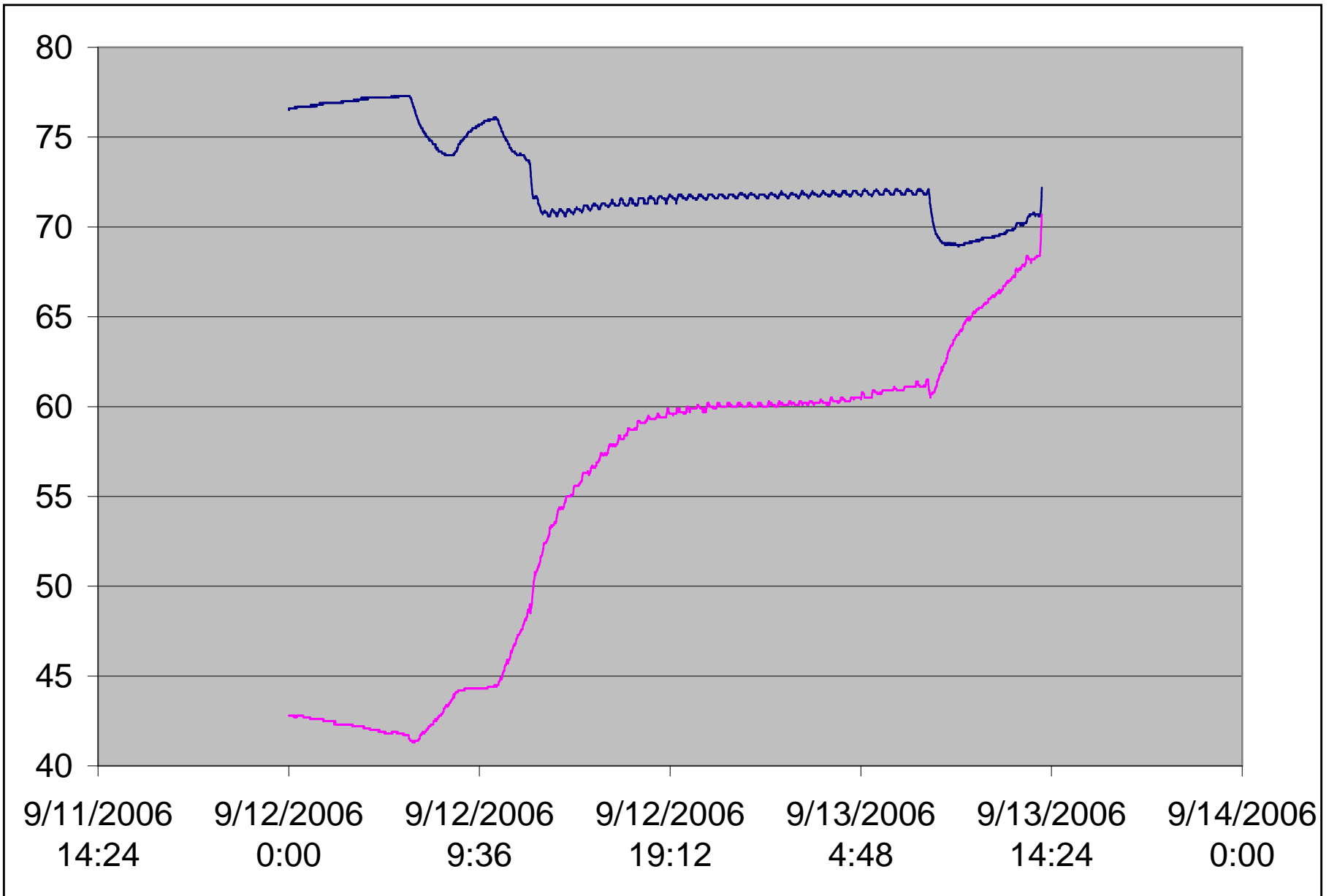
POST TEST DUMMY INSPECTION LIST
CONFIGURED FOR LEFT SIDE IMPACT

SID H3 Serial No.: 269 Sequential Test Number: 2
 Date: SEPTEMBER 2006 Laboratory Technician: B. Swiecicki

PART	ITEMS CHECKED	COMMENTS
SKIN	VISUAL INSPECTION	OK
HEAD	VISUAL, BALLAST, ACCELEROMETER MOUNT	OK
NECK	VISUAL, CABLE TORQUE	OK
SPINE BOX	VISUAL, BALLAST, WELDMENT, ACCELEROMETER MOUNT	OK
RIB CAGE	VISUAL, MEASURE, STIFFENERS	OK
STERNUM	VISUAL	OK
LUMBAR SPINE	VISUAL	OK
ABDOMEN	VISUAL	OK
PELVIS	VISUAL, PALPATE, ACCELEROMETER MOUNT	OK
UPPER LEGS	VISUAL	OK
KNEES	VISUAL, STOPS, INSERTS	OK
LOWER LEGS	VISUAL, RANGE OF MOTION	OK
ANKLES	VISUAL, RANGE OF MOTION	OK
FEET	VISUAL, RANGE OF MOTION	OK
JOINTS	1 TO 2 g RANGE	OK
OTHER	NONE	-

REMARKS: None

TEMPERATURE TRACE



APPENDIX D
TEST EQUIPMENT AND CALIBRATION INFORMATION

TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

SID/HIII INSTRUMENTATION

FRONT SID/HIII NO.: 270			
	SERIAL NUMBER	MANUFACTURER	CALIBRATION DATE
HEAD AX	AC-P35812	ENDEVCO	8/28/2006
HEAD AY	AC-P18739	ENDEVCO	8/28/2006
HEAD AZ	AC-P19212	ENDEVCO	8/28/2006
UPPER NECK FX	LC-1629Fx	DENTON	8/28/2006
UPPER NECK FY	LC-1629Fy	DENTON	8/28/2006
UPPER NECK FZ	LC-1629Fz	DENTON	8/28/2006
UPPER NECK MX	LC-1629Mx	DENTON	8/28/2006
UPPER NECK MY	LC-1629My	DENTON	8/28/2006
UPPER NECK MZ	LC-1629Mz	DENTON	8/28/2006
UPPER RIB	AC-P18558	ENDEVCO	8/28/2006
LOWER RIB	AC-P18537	ENDEVCO	8/28/2006
LOWER SPINE	AC-P18639	ENDEVCO	9/8/2006
PELVIS	AC-P21171	ENDEVCO	9/8/2006
UPPER RIB REDUNDANT	AC-P18516	ENDEVCO	9/8/2006
LOWER RIB REDUNDANT	AC-P19222	ENDEVCO	9/8/2006
LOWER SPINE REDUNDANT	AC-P18663	ENDEVCO	9/8/2006
PELVIS REDUNDANT	AC-P22639	ENDEVCO	9/8/2006

REAR SID/HIII NO.: 269			
	SERIAL NUMBER	MANUFACTURER	CALIBRATION DATE
HEAD AX	AC-P22943	ENDEVCO	8/30/2006
HEAD AY	AC-P17236	ENDEVCO	8/30/2006
HEAD AZ	AC-P23164	ENDEVCO	8/30/2006
UPPER NECK FX	LC-442Fx	DENTON	8/30/2006
UPPER NECK FY	LC-442Fy	DENTON	8/30/2006
UPPER NECK FZ	LC-442Fz	DENTON	8/30/2006
UPPER NECK MX	LC-442Mx	DENTON	8/30/2006
UPPER NECK MY	LC-442My	DENTON	8/30/2006
UPPER NECK MZ	LC-442Mz	DENTON	8/30/2006
UPPER RIB	AC-P39731	ENDEVCO	8/30/2006
LOWER RIB	AC-P38896	ENDEVCO	8/30/2006
LOWER SPINE	AC-P38188	ENDEVCO	9/8/2006
PELVIS	AC-P38132	ENDEVCO	9/8/2006
UPPER RIB REDUNDANT	AC-P39740	ENDEVCO	9/8/2006
LOWER RIB REDUNDANT	AC-P35786	ENDEVCO	9/8/2006
LOWER SPINE REDUNDANT	AC-P38216	ENDEVCO	9/8/2006
PELVIS REDUNDANT	AC-P35757	ENDEVCO	9/8/2006

REMARKS: None

TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

VEHICLE AND MDB INSTRUMENTATION

	VEHICLE AND MDB INSTRUMENTS		
	SERIAL NUMBER	MANUFACTURER	CALIBRATION DATE
RIGHT FRONT SILL (X)	AC-P17242	ENDEVCO	7/18/2006
RIGHT FRONT SILL (Y)	AC-J31059	ENDEVCO	7/5/2006
RIGHT FRONT SILL (Z)	AC-P23174	ENDEVCO	6/28/2006
RIGHT REAR SILL (X)	AC-P23993	ENDEVCO	7/19/2006
RIGHT REAR SILL (Y)	AC-P23999	ENDEVCO	7/19/2006
RIGHT REAR SILL (Z)	AC-P23939	ENDEVCO	7/19/2006
REAR FLOORPAN ABOVE AXLE (X)	AC-P19111	ENDEVCO	7/7/2006
REAR FLOORPAN ABOVE AXLE (Y)	AC-P23161	ENDEVCO	7/19/2006
REAR FLOORPAN ABOVE AXLE (Z)	AC-P24011	ENDEVCO	7/7/2006
LEFT REAR SILL (Y)	AC-P26266	ENDEVCO	8/7/2006
LEFT FRONT SILL (Y)	AC-P18743	ENDEVCO	6/28/2006
LEFT FRONT DOOR CENTERLINE (Y)	-	-	-
RIGHT REAR SEAT OCCUPANT COMP. (Y)	AC-X33	ICS	4/5/2006
MID REAR OF LEFT FRONT DOOR (Y)	-	-	-
LEFT FRONT DOOR UPPER C/L (Y)	-	-	-
MID REAR OF LEFT REAR DOOR (Y)	-	-	-
LEFT REAR DOOR UPPER C/L (Y)	-	-	-
LOWER LEFT B- PILLAR (Y)	AC-J33071	ENDEVCO	7/22/2006
MIDDLE LEFT B-PILLAR (Y)	AC-P16616	ENDEVCO	7/5/2006
LOWER LEFT A-PILLAR (Y)	AC-P35789	ENDEVCO	7/18/2006
UPPER LEFT A-PILLAR (Y)	AC-P16591	ENDEVCO	7/18/2006
FRONT SEAT TRACK (Y)	AC-P35803	ENDEVCO	7/18/2006
REAR SEAT TRACK (Y)	AC-P17141	ENDEVCO	7/18/2006
VEHICLE CG (X)	AC-P18628	ENDEVCO	7/6/2006
VEHICLE CG (Y)	AC-P18718	ENDEVCO	7/6/2006
VEHICLE CG (Z)	AC-P23976	ENDEVCO	7/5/2006
MDB CG (X)	AC-C16433	ENDEVCO	27-Jun-06
MDB CG (Y)	AC-C16416	ENDEVCO	27-Jun-06
MDB CG (Z)	AC-C16499	ENDEVCO	27-Jun-06
MDB REAR FRAME MEMBER (X)	AC-C14948	ENDEVCO	27-Jun-06
MDB REAR FRAME MEMBER (Y)	AC-C16680	ENDEVCO	27-Jun-06

REMARKS: None