

REPORT NUMBER: SNCAP-CAL-11-024

**NEW CAR ASSESSMENT PROGRAM (NCAP)
Moving Deformable Barrier Side Impact Test**

**Toyota Canada
2011 Toyota RAV4
Utility Vehicle**

NHTSA NUMBER: MB5116

**PREPARED BY:
CALSPAN CORPORATION
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December 21, 2010

FINAL REPORT

**PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF CRASHWORTHINESS STANDARDS
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FINAL REPORT ACCEPTANCE BY OCWS:

Division Chief, New Car Assessment Program
NHTSA, Office of Crashworthiness Standards

Date: _____

COTR, New Car Assessment Program
NHTSA, Office of Crashworthiness Standards

Date: _____

Technical Report Documentation Page

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16. Abstract A 55/28 kph 90° Moving Deformable Barrier NCAP Side Impact Test was conducted on the subject 2011 Toyota RAV4 Utility Vehicle in accordance with the specifications of the Office of Crashworthiness Standards Test Procedure for the generation of consumer information on vehicle side crash protection. This test was conducted at the Calspan Corporation Crash Test Facility in Buffalo, New York, on 11/5/2010. The impact velocity of the Moving Deformable Barrier (MDB) was 62.1 km/h, and the ambient temperature at the struck side (driver side) of the vehicle was 22°C. The target vehicle's maximum post-test static crush was 281 mm at level 3. The test vehicle's performance was as follows: <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th colspan="4" style="text-align: center;">Driver ATD (ES-2re)</th> </tr> <tr> <th style="text-align: left;">Measurement Description</th> <th style="text-align: center;">Units</th> <th style="text-align: center;">Threshold</th> <th style="text-align: center;">Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₃₆)</td> <td style="text-align: center;">N/A</td> <td style="text-align: center;">1000</td> <td style="text-align: center;">157.74</td> </tr> <tr> <td>Maximum Chest Deflection</td> <td style="text-align: center;">mm</td> <td style="text-align: center;">44</td> <td style="text-align: center;">19.89</td> </tr> <tr> <td>Total Abdominal Force</td> <td style="text-align: center;">N</td> <td style="text-align: center;">2500</td> <td style="text-align: center;">1079.29</td> </tr> <tr> <td>Pubic Symphysis Force</td> <td style="text-align: center;">N</td> <td style="text-align: center;">6000</td> <td style="text-align: center;">-2022.01</td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th colspan="4" style="text-align: center;">Passenger ATD (SID-IIs)</th> </tr> <tr> <th style="text-align: left;">Measurement Description</th> <th style="text-align: center;">Units</th> <th style="text-align: center;">Threshold</th> <th style="text-align: center;">Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₃₆)</td> <td style="text-align: center;">N/A</td> <td style="text-align: center;">1000</td> <td style="text-align: center;">276.94</td> </tr> <tr> <td>Lower Spine Resultant Acceleration</td> <td style="text-align: center;">G</td> <td style="text-align: center;">82</td> <td style="text-align: center;">75.13</td> </tr> <tr> <td>Total Pelvic Force (sum of acetabular and iliac forces)</td> <td style="text-align: center;">N</td> <td style="text-align: center;">5525</td> <td style="text-align: center;">5130.54</td> </tr> </tbody> </table>				Driver ATD (ES-2re)				Measurement Description	Units	Threshold	Result	Head Injury Criteria (HIC ₃₆)	N/A	1000	157.74	Maximum Chest Deflection	mm	44	19.89	Total Abdominal Force	N	2500	1079.29	Pubic Symphysis Force	N	6000	-2022.01	Passenger ATD (SID-IIs)				Measurement Description	Units	Threshold	Result	Head Injury Criteria (HIC ₃₆)	N/A	1000	276.94	Lower Spine Resultant Acceleration	G	82	75.13	Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	5130.54
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The two doors on the struck side of the vehicle did not separate from the body at the hinges or latches and the opposite doors did not open during the side impact event.																																															
17. Key Words New Car Assessment Program (NCAP) Side Impact MDB ES-2re SID-IIs		18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Adm. Technical Ref. Division, 1200 New Jersey Ave. SE Room W43-410 Washington, D.C. 20590																																													
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PURPOSE

This moving deformable barrier side impact test is part of the MY 2011 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under contract number DTNH22-09-D-00126. The purpose of this test is to generate comparative side impact performance in a 2011 Toyota RAV4 Utility Vehicle. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Laboratory Test Procedure dated January 2010.

SUMMARY

A 2011 Toyota RAV4 Utility Vehicle was impacted on the left (driver's) side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 62.1 km/h (39 mph). The target vehicle was stationary and was positioned at an angle of 63° to the line of forward motion. The side impact test was conducted by the Calspan Corporation Transportation Sciences Center on 11/5/2010. Pretest and post- test photographs of the test vehicle, the MDB and the dummies (ES-2re and SID-IIs) are included in this report.

Dummies were placed in the driver and left rear designated seating positions according to instructions specified in the OCWS Side Impact Laboratory Test Procedure, dated January 2010. The side impact event was documented by 11 high-speed cameras. Camera locations are included in this report.

The Dummies were instrumented in the following manner:

DRIVER ATD (ES-2re)

Head Accelerometers

Thorax Rib 1 to Rib 3 Potentiometers

Abdomen Forward, Middle, and Rear Load Cells

Pubic Load Cell

Lower Spine Accelerometers

PASSENGER ATD (SID-IIs)

Head Accelerometers

Thorax Upper, Middle, and Lower Rib Potentiometers

Abdomen Upper and Lower Rib Potentiometers

Acetabulum Load Cell

Iliac Load Cell

Lower Spine Accelerometers

Dummy injury values were recorded as follows:

	Driver ATD (ES-2re)		
Measurement Description	Units	Threshold	Result
Head Injury Criteria (HIC ₃₆)	N/A	1000	157.74
Maximum Chest Deflection	mm	44	19.89
Total Abdominal Force	N	2500	1079.29
Pubic Symphysis Force	N	6000	-2022.01

	Passenger ATD (SID-IIs)		
Measurement Description	Units	Threshold	Result
Head Injury Criteria (HIC ₃₆)	N/A	1000	276.94
Lower Spine Resultant Acceleration	G	82	75.13
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	5130.54

Supplemental restraint information is given below:

SUPPLEMENTAL RESTRAINT INFORMATION

Restraint Type	Left Front (Driver) Occupant Location 1		Left Rear (Passenger) Occupant Location 4	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	No		
Knee Airbag	No	NA		
Side Curtain Airbag	Yes	Yes	Yes	Yes
Side Torso Airbag	Yes	Yes	No	NA
Seat Belt Pretensioner	Yes	No	No	NA
Seat Belt Load Limiter	Yes	No	No	NA
Other				

GENERAL COMMENTS

SECTION 2
DATA SHEETS

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2011 Toyota RAV4
Test Program: Side MDB NCAP

NHTSA No.: MB5116
Test Date: 11/5/2010

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	MB5116	Anti-Lock Brakes	Yes
Model Year	2011	All-Wheel Drive	No
Make	Toyota	Power Steering	Yes
Model	RAV4	Driver Front Airbag	Yes
Body Style	Utility Vehicle	Driver Curtain Airbag	Yes
VIN	2T3ZF4DV1BW054070	Driver Head/Torso Airbag	No
Body Color	Light gray/silver	Driver Torso Airbag	Yes
Delivery Date	10/18/2010	Driver Torso/Pelvis Airbag	No
Odometer Reading (km/mi)	31/19	Driver Pelvis Airbag	No
Dealer	Basil Toyota	Driver Knee Airbag	No
Transmission	4 Speed Automatic	Rear Pass. Curtain Airbag	Yes
Final Drive	Front Wheel Drive	Rear Pass. Head/Torso Airbag	No
Type/No. Cylinders	V4	Rear Pass. Torso Airbag	No
Engine Displacement (L)	2.5	Rear Pass. Torso/Pelvis Airbag	No
Engine Placement	Transverse	Rear Pass. Pelvis Airbag	No
Roof Rack	Yes	Pretensioners	Yes
Sunroof/T-Top	No	Load Limiters	Yes
Tinted Glass	Yes	Automatic Door Locks	No
Traction Control	Yes	Bucket Seats	Yes
Power Brakes	Yes	Tilt Steering	Yes
Front Disc	Yes	Other	--
Rear Disc	Yes	Other	

Does owner's manual provide instructions to turn off automatic door locks? NA

DATA FROM CERTIFICATION LABEL

Manufactured By	Toyota Canada	GWR (kg)	2035
Date of Manufacture	9/10	GWR Front (kg)	1145
		GWR Rear (kg)	1100

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	2	3		5	
Capacity Weight (VCW) (kg)				375.0	(A)
DSC x 68.04 (kg)				340.2	(B)
Cargo Weight (RCLW) (kg)				35	(A-B)

* Maximum allowable RCLW is 136 kg

VEHICLE SEAT TYPE

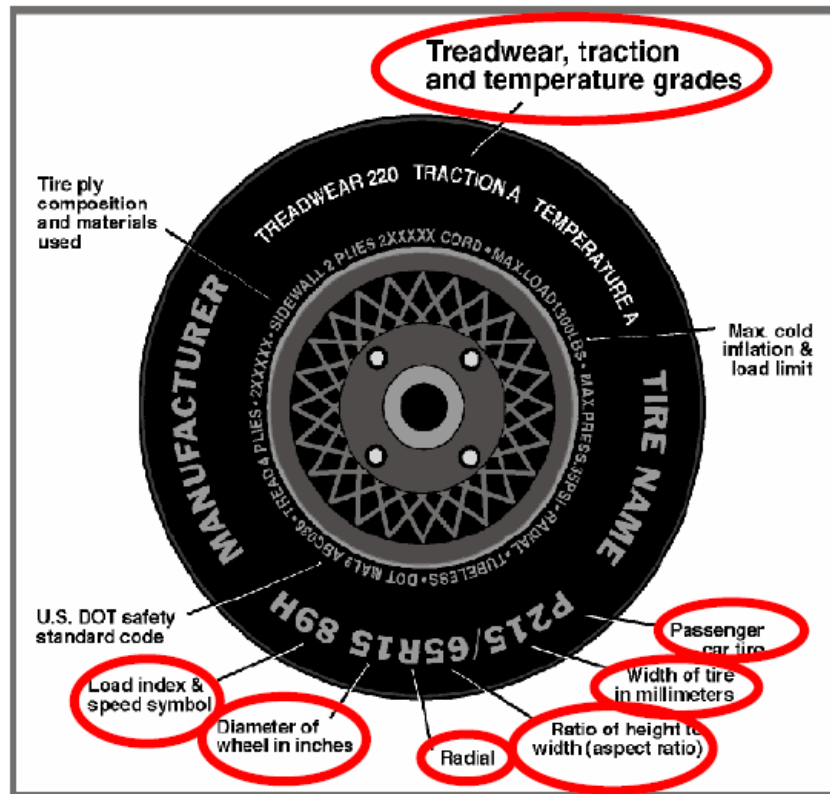
Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						W/ Lever	W/ Knob
Front Seat	X					X	
Rear or Second Row Seat			X			X	
Third row seat							

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

Test Vehicle: 2011 Toyota RAV4
 Test Program: Side MDB NCAP

NHTSA No.: MB5116
 Test Date: 11/5/2010

VEHICLE TIRE INFORMATION



	Front	Rear
Max. Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	220	220
Recommended Tire Size	P225/65R17	P225/65R17
Tire Size on Vehicle	P225/65R17	P225/65R17
Tire Manufacturer	Bridgestone	Bridgestone
Tire Model	Dueler	Dueler
Treadwear	300	300
Traction	B	B
Temperature Grades	A	A
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Steel, 1 Polyester, 1 Nylon	2 Steel, 2 Polyester, 1 Nylon
Load Index/Speed Symbol	101H	101H
Tire Material	Rubber	Rubber
DOT Safety Code Right	EPF5CFK3210	EPF5CFK3210
DOT Safety Code Left	EPF5CFK3210	EPF5CFK3210

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

Test Vehicle: 2011 Toyota RAV4
Test Program: Side MDB NCAP

NHTSA No.: MB5116
Test Date: 11/5/2010

TEST VEHICLE AXLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	468	330	798	505	405	910	514	402	916
Right	kg	431	323	754	432	372	804	437	368	805
Ratio	%	58	42		55	45		55	45	
Totals	kg	899	653	1552	937	777	1714	951	770	1721

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1552	(A)
Sum of Actual Weight of 2 P572 ATDS Used	kg	136.1	(B)
Rated Cargo/Luggage Weight (RCLW)	kg	33.0	(C)
Calculated Target Vehicle Test Weight (TVTW)	kg	1721	(A+B+C)

TEST VEHICLE ATTITUDE AND CG

Measurement Description	Units	LF	RF	RR	LR	CG (aft of front axle)
Fully Loaded	mm	821	805	816	828	
As Tested (Fully Loaded $\pm$ 10 mm at each wheel well)	mm	807	818	824	812	1140

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2659
Total Vehicle Length at Left Side	mm	4453
Total Vehicle Length at Centerline	mm	4617
Total Vehicle Length at Right Side	mm	4452
Weight of Ballast in Cargo Area	kg	0
Weight of Vehicle Components Removed	kg	0
Amount of Stoddard Solvent in Fuel Tank	L	56.4

Vehicle components removed to make Target Vehicle Test Weight:

None

TEST VEHICLE VERTICAL IMPACT LINE DATA

Measured Parameter	Units	Value
Target Impact Point Aft of Front Axle	mm	395
Actual Impact Point Aft of Front Axle	mm	413

DATA SHEET NO. 2
SEAT ADJUSTMENT, FUEL SYSTEMS, AND STEERING WHEEL DATA

Test Vehicle: 2011 Toyota RAV4
 Test Program: Side MDB NCAP

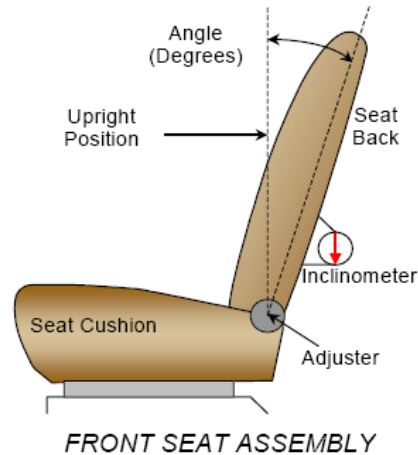
NHTSA No.: MB5116
 Test Date: 11/5/2010

NORMAL DESIGN RIDING POSITION

Driver seat: The driver's seat back was positioned according to Form 1 specifications provided by the manufacturer

Passenger Seat:

The rear passenger's seat was adjusted to the forward most seat back position to create a level plane for the head of the dummy



SEAT BACK ANGLES

	Degrees
Driver w/ Seated Dummy	1
Passenger w/ Seated Dummy	1

SEAT FORE/AFT POSITIONS

The driver's seat was positioned at the mid-point of the fore/aft travel range.

The rear passengers seat was adjusted to the rearmost position of fore/aft travel range

SEAT FORE/AFT POSITIONING

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	240 mm	8
Rear Seat	165 mm	11

SEAT BELT UPPER ANCHORAGES

The Driver's belt upper anchorage was adjusted to the topmost position of 4 possible positions

The Rear passenger's belt anchorage was not adjustable

SEAT BELT UPPER ANCHORAGES

	Total # of Positions	Placed in Position #
Driver Seat	4	0
Rear Seat	NA	NA

DATA SHEET NO. 2 (CONTINUED)
SEAT ADJUSTMENT, FUEL SYSTEMS, AND STEERING WHEEL DATA

Test Vehicle: 2011 Toyota RAV4
 Test Program: Side MDB NCAP

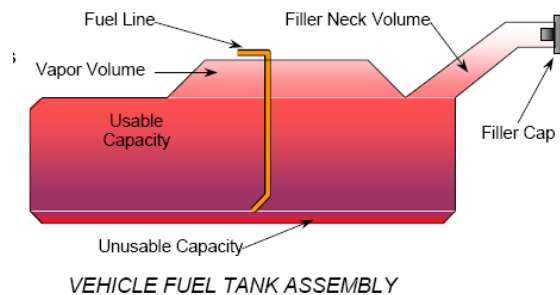
NHTSA No.: MB5116
 Test Date: 11/5/2010

FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	60.0
Usable Capacity of "Optional Tank"	NA
Usable Capacity Used for FMVSS 301	60.0
Actual Amount of Solvent Used	56.4

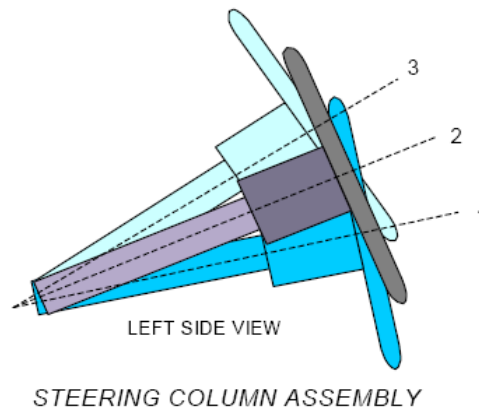
FUEL PUMP

The fuel was evacuated from the fuel tank using the specifications provided by the Manufacturer in FORM 1



STEERING COLUMN ADJUSTMENT

The steering wheel was positioned at the mid-point of the tilt adjustment range and the mid-point of the telescoping travel



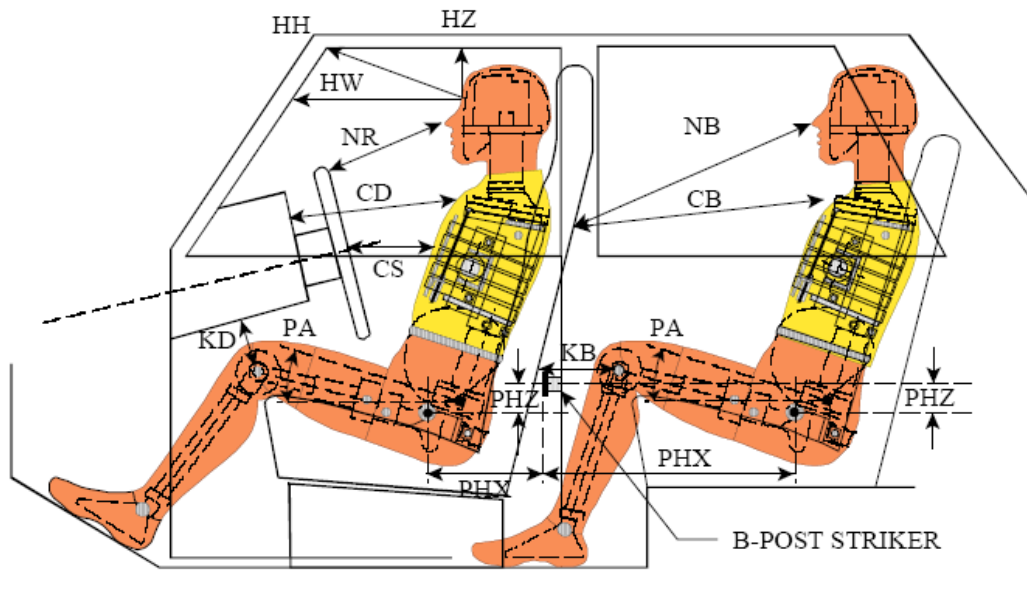
STEERING COLUMN POSITIONING

	Degrees	Fore/Aft Position (mm)
Lowermost - Position 1	60	
Geometric Center – Position 2	62	
Uppermost – Position 3	64	
Telescoping Steering Wheel Travel		37
Test Position	62	19

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2011 Toyota RAV4
 Test Program: Side MDB NCAP

NHTSA No.: MB5116
 Test Date: 11/5/2010



LEFT SIDE VIEW

NOTE: 2-DOOR VEHICLE SHOWN.
 REAR DUMMY PHX & PHZ
 MEASUREMENTS FOR A 4-DOOR
 VEHICLE WOULD USE THE C-POST
 STRIKER AS A REFERENCE POINT

DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

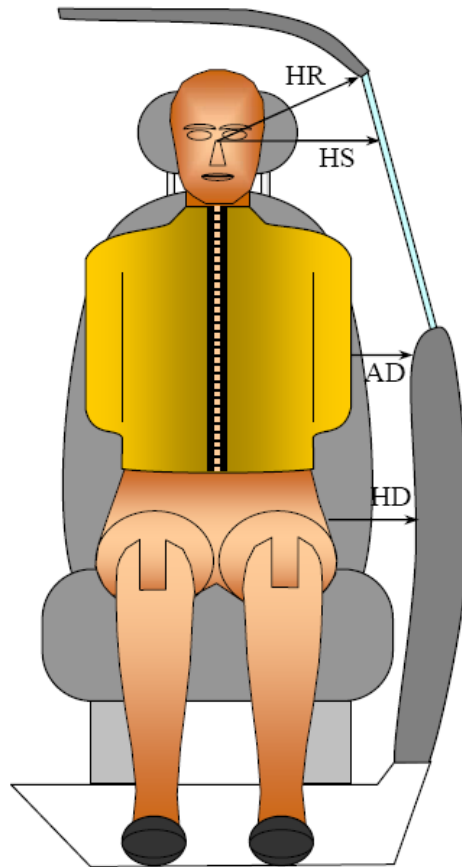
Driver Code	Pass. Code	Measurement Description	Driver S/N 033		Passenger S/N 300	
			Length (mm)	Angle	Length (mm)	Angle
HH		Header to Header	358	22		
HW		Header to Windshield	570	0		
HZ	HZ	Head to Roof	194	90	307	90
NR	NB	Nose to Rim/Seat Back	455	-18	322	-13
CD	CB	Chest to Dash/Seat Back	579	-2	537	13
CS		Chest to Steering Wheel	293	0		
KDL	KBL	Left Knee to Dash/Seat Back	136	22	312	22
KDR	KBR	Right Knee to Dash/Seat Back	123	21	318	27
PA	PA	Pelvic Angle		23		15
PHX	PHX	H-Point to Striker (X-Axis)	234		297	
PHZ	PHZ	H-Point to Striker (Z-Axis)	180		248	
SA	SA	Seat Back Angle		1 *		1*

* Measurement from the head restraint post

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2011 Toyota RAV4
Test Program: Side MDB NCAP

NHTSA No.: MB5116
Test Date: 11/5/2010



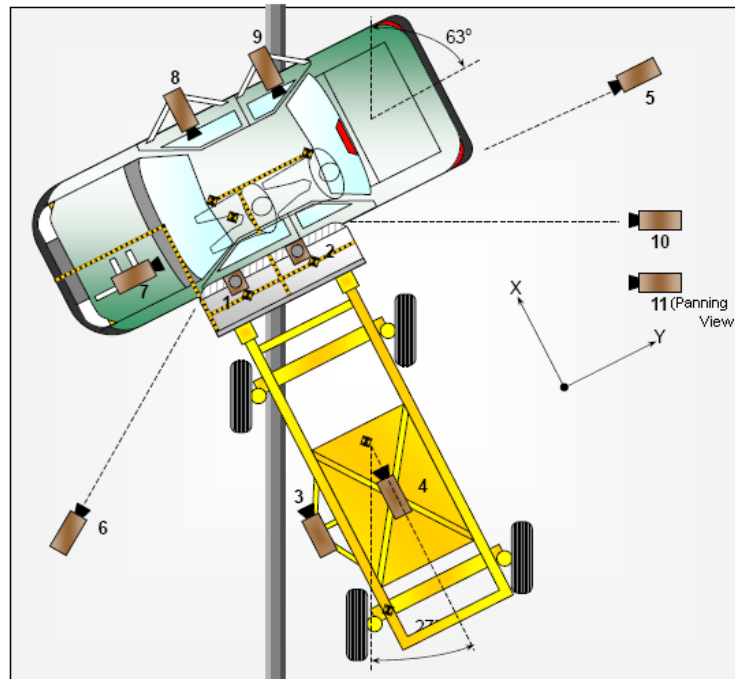
DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Description	Units	Driver S/N 033	Passenger S/N 300
HR	Head to Side Header	mm	214	281
HS	Head to Side Window	mm	333	389
AD	Arm to Door	mm	85	174
HD	H-point to Door	mm	135	177

DATA SHEET NO. 5
CAMERA LOCATIONS AND DATA

Test Vehicle: 2011 Toyota RAV4
Test Program: Side MDB NCAP

NHTSA No.: MB5116
Test Date: 11/5/2010



CAMERA LOCATIONS AND DATA

No.	Camera View	Location			Angle	Lens (mm)	Film Speed (fps)
		X	Y	Z			
1	Overhead Wide View	72	812	-4880	-90	20	1000
2	Overhead Close-up View	195	855	-4880	-90	28	1000
3	Impact Point	-1470	0	-847	0	25	500
4	Struck-Side View at Impact	-1140	838	-1587	-17	12.5	500
5	Rear Impact View of Struck Side	315	11250	905	-1.5	50	1000
6	Front Oblique Impact View of Struck Side	2390	1090	945	-2.6	24	1000
7	Driver Dummy Front View (OB)	260	445	1395	-7	25	500
8	Driver Dummy Side View (OB)	1380	700	1015	-2	12.5	500
9	Rear Passenger Dummy Side View (OB)	1420	1720	1040	-3.5	12.5	500
10	Real-time Rear View of Impact				-	-	24
11	Real-time Pan View of Impact				-	-	24

Reference: Impact Point projected to Ground

+X = To Front of MDB,

+Y = To Right of MDB,

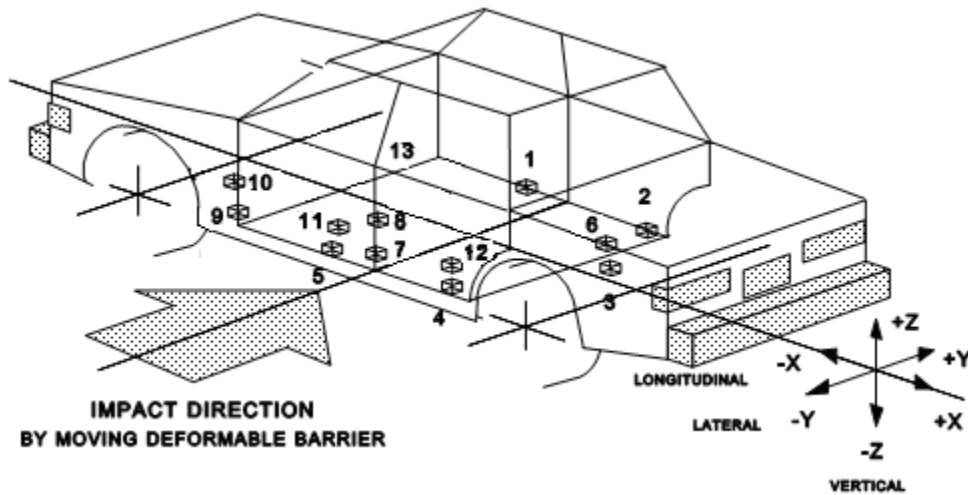
+Z = Down

**All measurements accurate to ± 6 mm.*

DATA SHEET NO. 6
VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2011 Toyota RAV4
Test Program: Side MDB NCAP

NHTSA No.: MB5116
Test Date: 11/5/2010



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

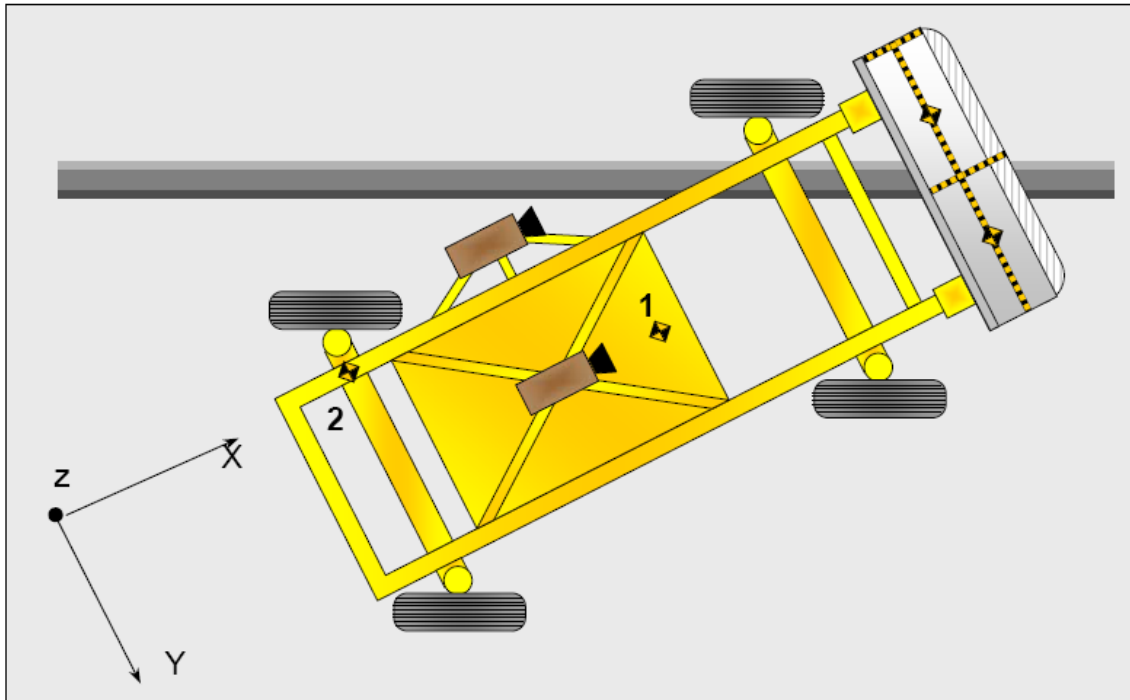
Loc. No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Right Sill at Front Seat	2848	608	386
2	Right Sill at Rear Seat	1924	630	408
3	Rear Floorpan Above Axle	1143	-3	636
4	Left Sill at Rear Door	1895	-656	401
5	Left Sill at Front Door	2812	-646	375
6	Rt. Rear Occ. Compartment	2159	280	401
7	B-Post Lower	2188	-689	485
8	B-Post Middle	2120	-684	1162
9	A-Post Lower	3221	-654	466
10	A-Post Middle	3177	-661	1157
11	Front Seat Track	2298	-566	454
12	Rear Seat Structure	1239	-561	666
13	Vehicle CG	2824	4	696

Reference: X – Rear surface of vehicle (+ forward)
Y – Vehicle centerline (+ to right)
Z – Ground plane (+ down)

DATA SHEET NO. 7
MDB ACCELEROMETER LOCATIONS

Test Vehicle: 2011 Toyota RAV4
 Test Program: Side MDB NCAP

NHTSA No.: MB5116
 Test Date: 11/5/2010



MDB ACCELEROMETER LOCATIONS

Loc No.	Accelerometer Locations	Measurements		
		X	Y	Z
1	MDB CG	1859	0	-330
2	MDB Rear	386	-660	-660

Reference: X – Face of MDB (+ forward)
 Y – MDB centerline (+ to right)
 Z – Ground plane (+ down)

DATA SHEET NO. 8
TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle: 2011 Toyota RAV4
 Test Program: Side MDB NCAP

NHTSA No.: MB5116
 Test Date: 11/5/2010

MAXIMUM EXTERIOR STATIC CRUSH

Level	Measured Parameter	Units	Maximum Crush	Above Ground
1	Sill Top Height	mm	123	340
2	Occupant H-Point	mm	263	680
3	Mid Door	mm	281	774
4	Window Sill	mm	182	1019
5	Window Top	mm	12	1600
	Maximum Penetration	mm	281	774

INSTRUMENTATION

Driver Dummy Channels	16
Passenger Dummy Channels	16
Vehicle Structure Accelerometers	21
MDB Accelerometers	5
Total No. of Contact Switches	0 *
Total	58

* Vehicle manufacturer requested that certain contact switches not be installed on ATDs.

CAMERA COVERAGE

High-Speed Vehicle Onboard	3
High-Speed Offboard	4
High-Speed MDB Onboard	2
Real-Time Panning	2
Total	11

DATA SHEET NO. 9
MOVING DEFORMABLE BARRIER (MDB) SUMMARY OF RESULTS

Test Vehicle: 2011 Toyota RAV4
 Test Program: Side MDB NCAP

NHTSA No.: MB5116
 Test Date: 11/5/2010

MDB SPECIFICATIONS

Measurement Description	Length (mm)
Overall Width of Framework Carriage	1250
Overall Length Including Honeycomb Frame	4120
Wheel Base of Framework Carriage	2590
CG Location of Front Axle	1104

MDB WEIGHTS

	Units	Front Axle	Rear Axle	Total
Left	kg	409.5	281.5	691.0
Right	kg	372.5	299.0	671.5
Ratio	%	57.4	42.6	-
Totals	kg	782.0	580.5	1362.5

SPEED AND IMPACT DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.1 to 62.7	62.1
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	62.1
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	90

MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE

Vertical Location			From Centerline		Maximum Crush
Row	Description	Height	Distance	Direction	
A	Center of Bumper	430	800	Left	129
B	Top of Bumper	542	700	Left	86
C	Mid-Level	682	800	Right	111
D	Top of Stack	811	800	Right	191

MDB INSTRUMENTATION

Accelerometers	5
Contact Switches	2

**DATA SHEET NO. 10
POST TEST OBSERVATIONS**

Test Vehicle: 2011 Toyota RAV4
Test Program: Side MDB NCAP

NHTSA No.: MB5116
Test Date: 11/5/2010

TEST DUMMY INFORMATION AND CONTACT

Description	Front Seat Dummy (ES-2re)	Rear Seat Dummy (SID-IIs)
Dummy Type/Serial No.	033	300
Head Contact	Curtain Airbag	Curtain Airbag
Upper Torso Contact	Curtain Airbag	Door Trim Panel
Lower Torso Contact	Torso Airbag	Door Trim Panel
Left Knee Contact	Door Trim Panel	Door Trim Panel
Right Knee Contact		

POST TEST DOOR OPENING AND SEAT TRACK INFORMATION

Description	Front	Rear
Left Side Doors	Jammed Shut	Jammed Shut
Right Side Doors	Closed & Operational	Closed & Operational
Hatch and Other Doors	-	Closed & Operational
Seat Movement	None	None
Seat Back Failure	None	None

POST TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	Intruded due to side impact
Sill Separation	None
Windshield Damage	None
Window Damage	Driver Glass Shattered
Other Notable Effects	None

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Left Front (Driver) Occupant Location 1		Left Rear (Passenger) Occupant Location 4	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	No		
Knee Airbag	No	NA		
Side Curtain Airbag	Yes	Yes	Yes	Yes
Side Torso Airbag	Yes	Yes	No	NA
Seat Belt Pretensioner	Yes	No	No	NA
Seat Belt Load Limiter	Yes	No	No	NA
Other				

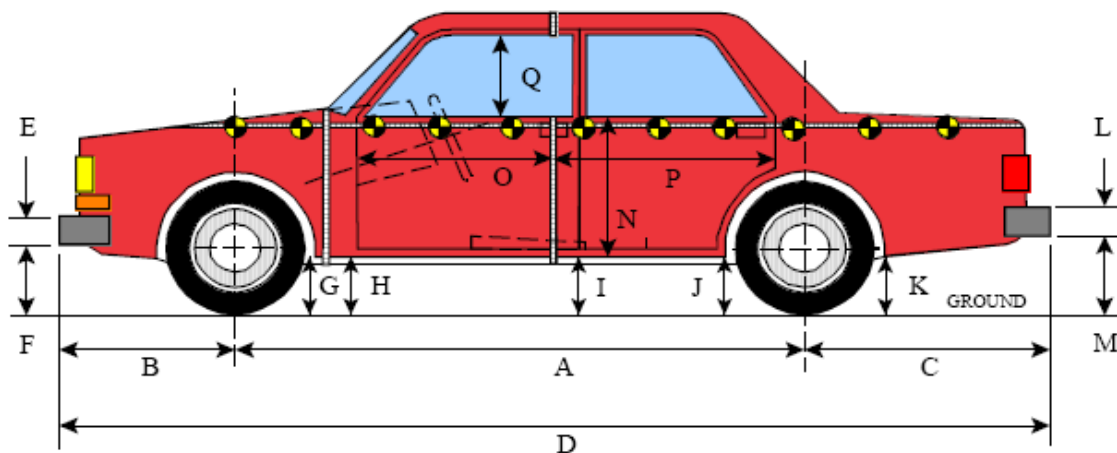
MDB LEFT EDGE IMPACT POINT DATA

Measured Parameter	Units	Requirement	Value
Horizontal Offset	mm	+/- 50	-18
Vertical Offset	mm	+/- 20	8

VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2011 Toyota RAV4
 Test Program: Side MDB NCAP

NHTSA No.: MB5116
 Test Date: 11/5/2010



LEFT SIDE VIEW

All MEASUREMENTS IN (mm) WITH TOLERANCE OF ± 3 mm

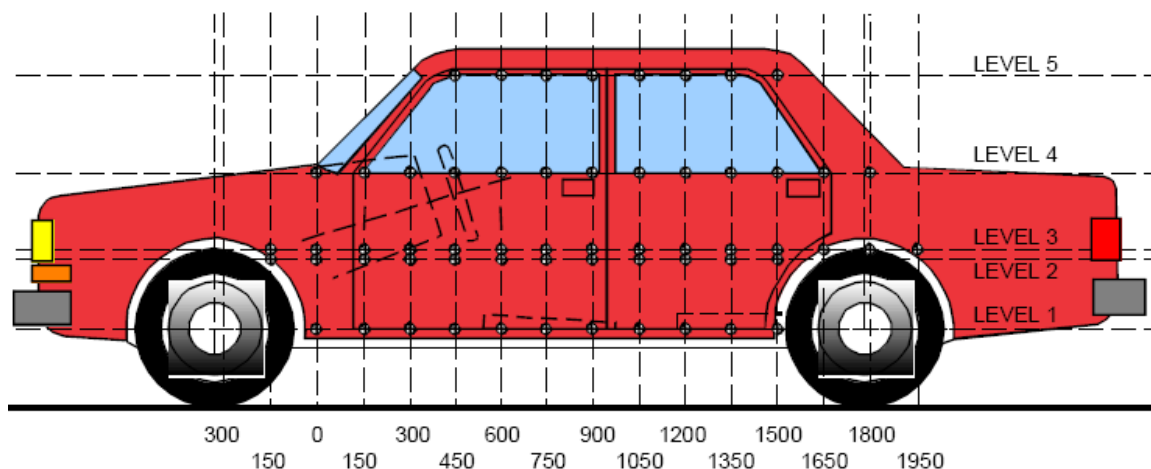
VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2659	2643	-16
B	Front Axle to FSOV	878	932	53
C	Rear Axle to RSOV	1079	1076	-3
D	Total Length at Centerline	4617	4651	34
E	Front Bumper Thickness	408	408	0
F	Front Bumper Bottom to Ground	307	311	4
G	Sill Height at Front Wheel Well	285	298	13
H	Sill Height at Front Door Leading Edge	290	280	-10
I	Sill Height at B Pillar	305	270	-35
J1	Sill Height at Rear Wheel Well	301	270	-31
J2	Pinch Weld Height at Rear Wheel Well	247	242	-5
K	Sill Height Aft of Rear Wheel Well	336	335	-1
L	Rear Bumper Thickness	200	200	0
M	Rear Bumper Bottom to Ground	343	345	2
N	Sill Height to Window Bottom Sill	771	748	-23
O	Front Door Leading Edge to Impact CL	769	738	-31
P	Rear Door Trailing Edge to Impact CL	1164	1088	-76
Q	Front Window Opening	482	510	28
R	Right Side Length	4452	4470	18
S	Left Side Length	4453	4499	46
T	Vehicle Width at B Post	1787	1591	-196

DATA SHEET NO. 12
VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2011 Toyota RAV4
 Test Program: Side MDB NCAP

NHTSA No.: MB5116
 Test Date: 11/5/2010



LEFT SIDE VIEW

Level	Measurement Description	Height Above Ground (mm)
1	Sill Top	340
2	Occupant H-Point	680
3	Mid-Door	774
4	Window Sill	1019
5	Window Top	1600

NOTE: The above measurements should be taken along the vertical impact reference line.
 Vehicle measurements forward of the vertical impact reference line are negative.

DATA SHEET NO. 12 (CONTINUED)
VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2011 Toyota RAV4
 Test Program: Side MDB NCAP

NHTSA No.: MB5116
 Test Date: 11/5/2010

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-900	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
-750	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
-600	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
-450	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
-300	--	--	--	757	--	--	--	--	762	--	--	--	--	-5	--
-150	--	--	913	796	--	--	--	883	796	--	--	--	30	0	--
0	--	908	908	814	--	--	858	863	814	--	--	50	45	0	--
150	836	889	890	823	--	776	717	759	819	--	60	172	131	4	--
300	822	884	888	832	--	705	691	687	804	--	117	193	201	28	--
450	821	884	890	842	--	708	668	667	797	--	113	216	223	45	--
600	822	886	892	853	--	707	656	651	784	--	115	230	241	69	--
750	823	887	894	860	--	704	647	643	772	--	119	240	251	88	--
900	824	888	895	866	598	703	639	639	771	594	121	249	256	95	4
1050	822	890	896	870	611	705	644	662	768	606	117	246	234	102	5
1200	823	889	895	872	617	704	653	645	751	608	119	236	250	121	9
1350	823	888	894	875	619	700	636	622	743	607	123	252	272	132	12
1500	821	887	893	875	618	706	629	612	723	609	115	258	281	152	9
1650	819	886	892	876	616	713	623	617	694	608	106	263	275	182	8
1800	821	895	895	876	611	709	644	634	728	605	112	251	261	148	6
1950	--	905	911	893	604	--	783	752	778	601	--	122	159	115	3
2100	--	--	--	890	597	--	--	--	805	596	--	--	--	85	1
2250	--	--	--	876	588	--	--	--	813	586	--	--	--	63	2
2400	--	--	--	872	573	--	--	--	825	574	--	--	--	47	-1
2550	--	--	--	866	559	--	--	--	835	559	--	--	--	31	0
2700	--	--	--	857	--	--	--	--	836	--	--	--	--	21	--
2850	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

MAXIMUM CRUSH DATA

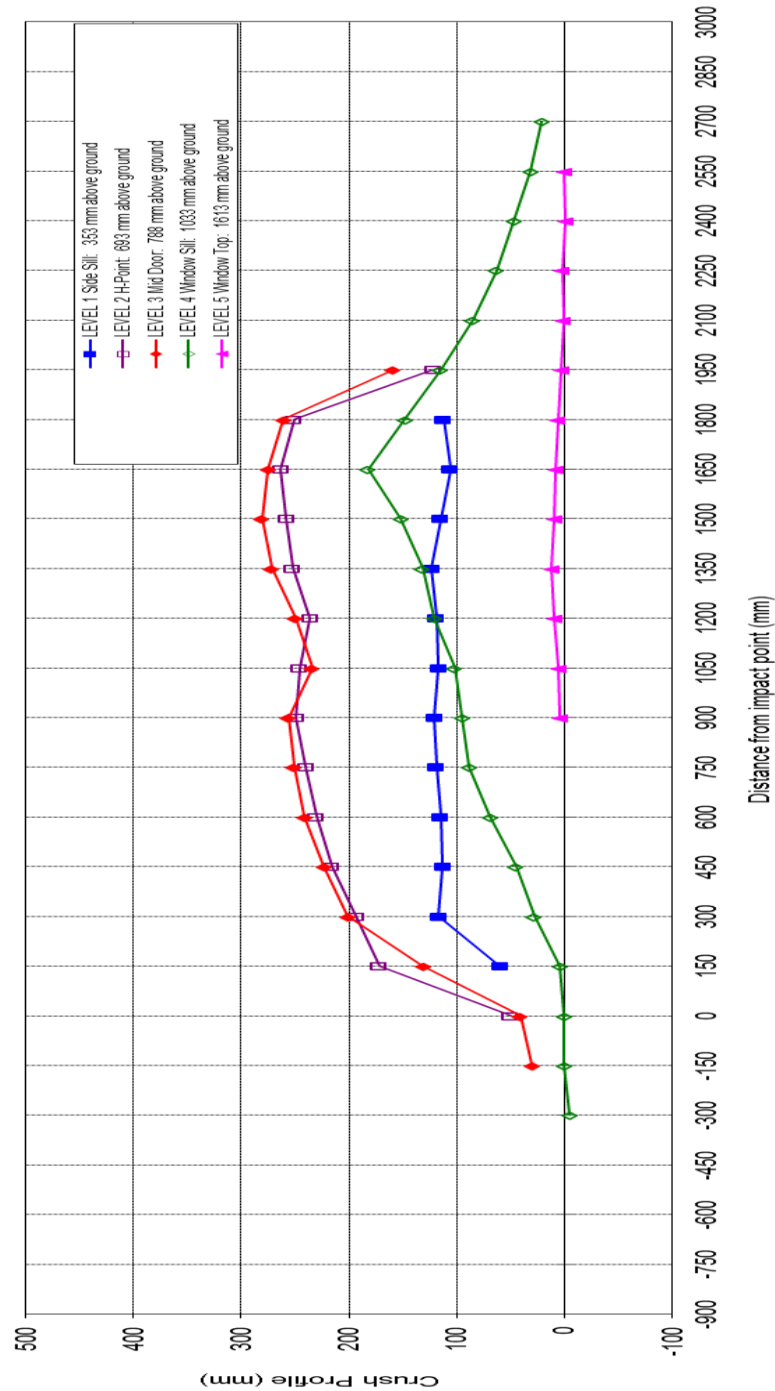
	Level 1	Level 2	Level 3	Level 4	Level 5
Maximum Crush (mm)	123	263	281	182	12
Distance From Impact (mm)	1350	1650	1500	1650	1350

NOTE: Pre-test measurements are taken when the vehicle is in the "As Tested" weight condition. Vehicle measurements forward of the vertical impact reference line are negative. The crush profile grid is established prior to test based on an estimated impact point.

DATA SHEET NO. 12 (CONTINUED)
VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2011 Toyota RAV4
 Test Program: Side MDB NCAP

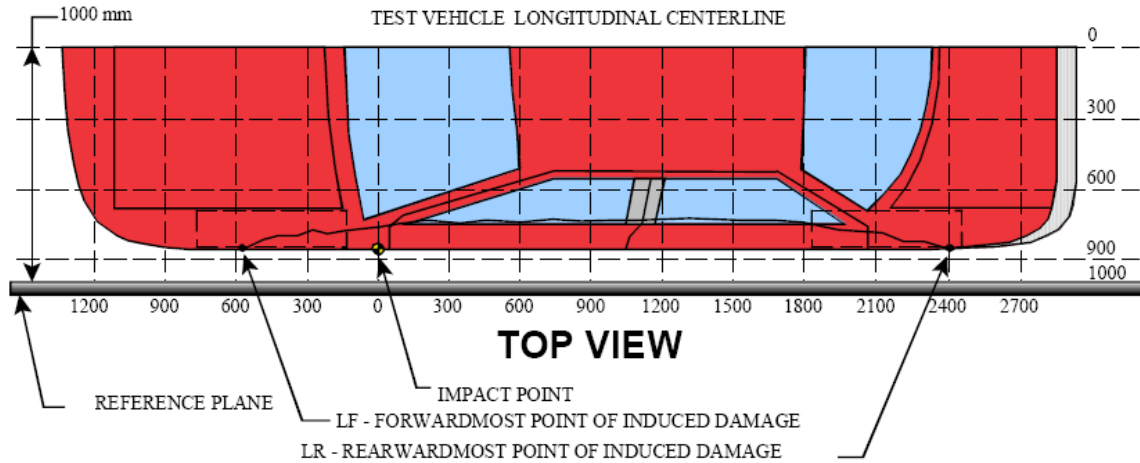
NHTSA No.: MB5116
 Test Date: 11/5/2010



DATA SHEET NO. 13
VEHICLE DAMAGE PROFILE DISTANCES

Test Vehicle: 2011 Toyota RAV4
 Test Program: Side MDB NCAP

NHTSA No.: MB5116
 Test Date: 11/5/2010



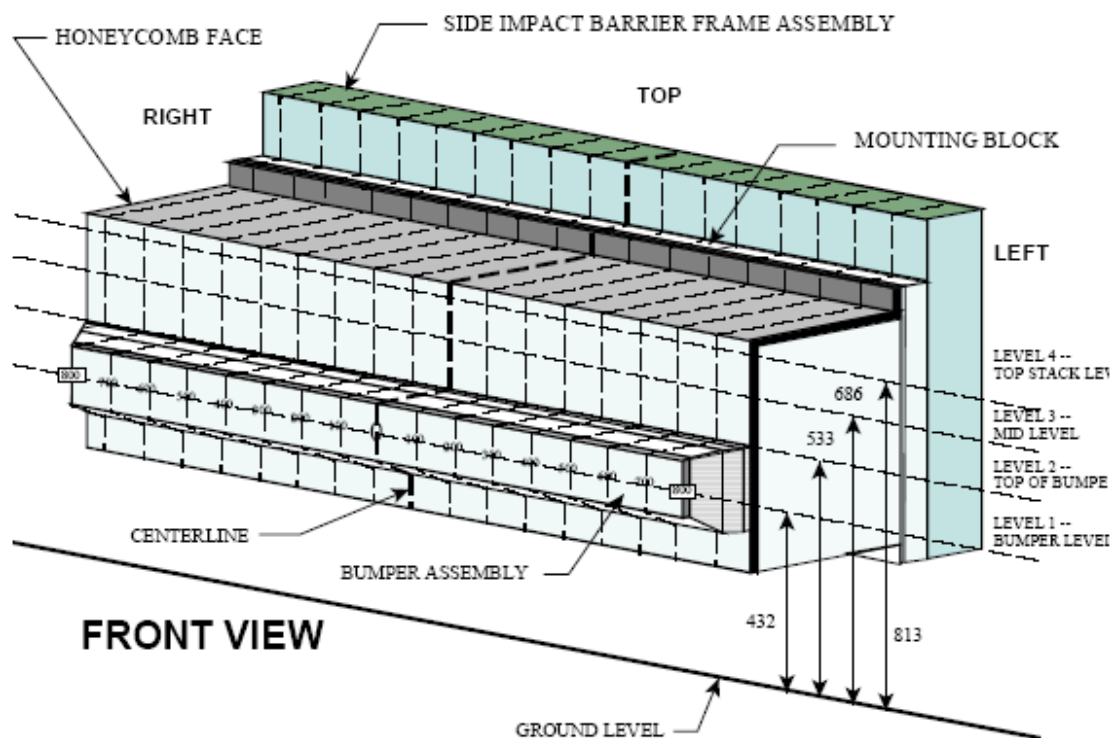
DAMAGE PROFILE DISTANCES

DPD	Distance From Impact Point (mm)	Level	Pre-Test (mm)	Post-Test (mm)	Maximum Static Crush (mm)
1	2550	4	134	165	31
2	2010	4	108	211	103
3	1470	3	107	386	279
4	930	3	105	356	251
5	0	3	111	325	214
6	-150	3	87	117	30

DATA SHEET NO. 14
EXTERIOR STATIC CRUSH FOR IMPACTOR FACE

Test Vehicle: 2011 Toyota RAV4
 Test Program: Side MDB NCAP

NHTSA No.: MB5116
 Test Date: 11/5/2010



NOTE: Dimensions are shown in millimeters, mm

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	191	182	171	163	159	158	156	154	154	149	148	146	145	142	140	142	142
2	111	103	95	89	87	85	75	74	77	75	73	70	69	67	65	64	68
3	55	30	22	25	32	29	43	37	20	17	17	17	19	26	40	62	86
4	88	36	13	6	14	33	54	74	50	33	35	39	48	59	72	86	129

DATA SHEET NO. 15A
FMVSS NO. 301 FUEL SYSTEM INTEGRITY POST-IMPACT DATA

Test Vehicle: 2011 Toyota RAV4
 Test Program: Side MDB NCAP

NHTSA No.: MB5116
 Test Date: 11/5/2010

Test Time: 14:30 Temperature: 5° C

- | | | | |
|----|--|----------|-----|
| A. | From impact until vehicle motion ceases:
(Maximum allowable is 1 oz.) | <u>0</u> | oz. |
| B. | For the 5-minute period after motion ceases:
(Maximum allowable is 5 oz.) | <u>0</u> | oz. |
| C. | For the following 25 minutes:
(Maximum allowable is 1 oz./minute) | <u>0</u> | oz. |
| D. | Spillage Details: _____ | None | |

FMVSS NO. 301 STATIC ROLLOVER DATA



ROLLOVER SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0 to 90	1:14	5:00	6:14
90 to 180	1:03	5:00	6:03
180 to 270	1:04	5:00	6:04
270 to 360	1:09	5:00	6:09

FMVSS NO. 301 ROLLOVER SPILLAGE TABLE

Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0 to 90	None	NA	NA	NA
90 to 180	None	NA	NA	NA
180 to 270	None	NA	NA	NA
270 to 360	None	NA	NA	NA

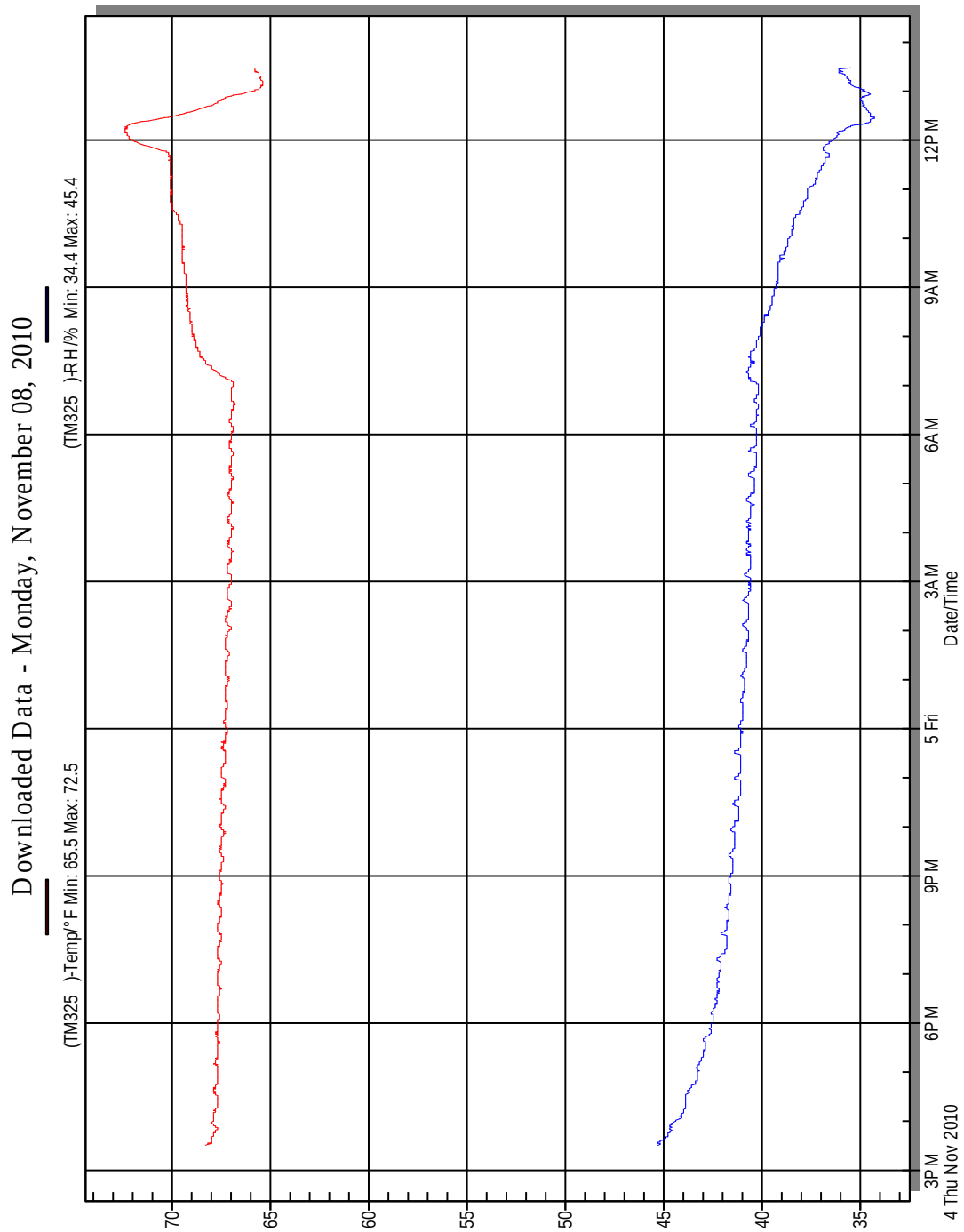
ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

Test Phase	Spillage Location
0 to 90	NA
90 to 180	NA
180 to 270	NA
270 to 360	NA

DATA SHEET NO. 16
DUMMY/VEHICLE TEMPERATURE STABILIZATION

Test Vehicle: 2011 Toyota RAV4
Test Program: Side MDB NCAP

NHTSA No.: MB5116
Test Date: 11/5/2010



APPENDIX A
PHOTOGRAPHS

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Figure A-1: As-Delivered Right Front $\frac{3}{4}$ View of Test Vehicle



Figure A-2: As-Delivered Left Rear $\frac{3}{4}$ View of Test Vehicle



Figure A-3: Pre-Test Frontal View of Test Vehicle



Figure A-4: Post-Test Frontal View of Test Vehicle



Figure A-5: Pre-Test Left Front $\frac{3}{4}$ View of Test Vehicle



Figure A-6: Post-Test Left Front $\frac{3}{4}$ View of Test Vehicle



Figure A-7: Pre-Test Left Side View of Test Vehicle



Figure A-8: Post-Test Left Side View of Test Vehicle



Figure A-9: Pre-Test Left Rear $\frac{3}{4}$ View of Test Vehicle



Figure A-10: Post-Test Left Rear $\frac{3}{4}$ View of Test Vehicle



Figure A-11: Pre-Test Rear View of Test Vehicle



Figure A-12: Post-Test Rear View of Test Vehicle

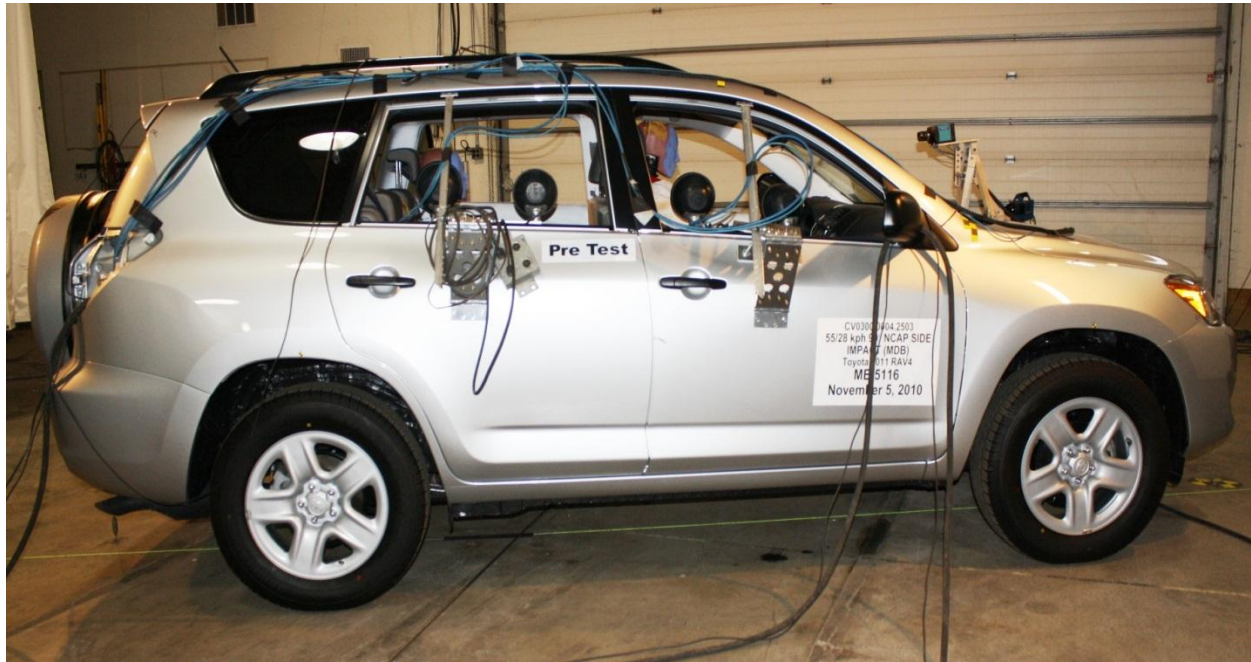


Figure A-13: Pre-Test Right Side View of Test Vehicle



Figure A-14: Post-Test Right Side View of Test Vehicle



Figure A-15: Pre-Test Overhead View of the Test Vehicle and MDB



Figure A-16: Post-Test Overhead View of Test Vehicle and MDB



Figure A-17: Pre-Test Left Side View of MDB Positioned Against Side of Test Vehicle



Figure A-18: Pre-Test Right Side View of MDB Positioned Against Side of Test Vehicle



Figure A-19: Pre-Test Close-up View of Impact Point Target

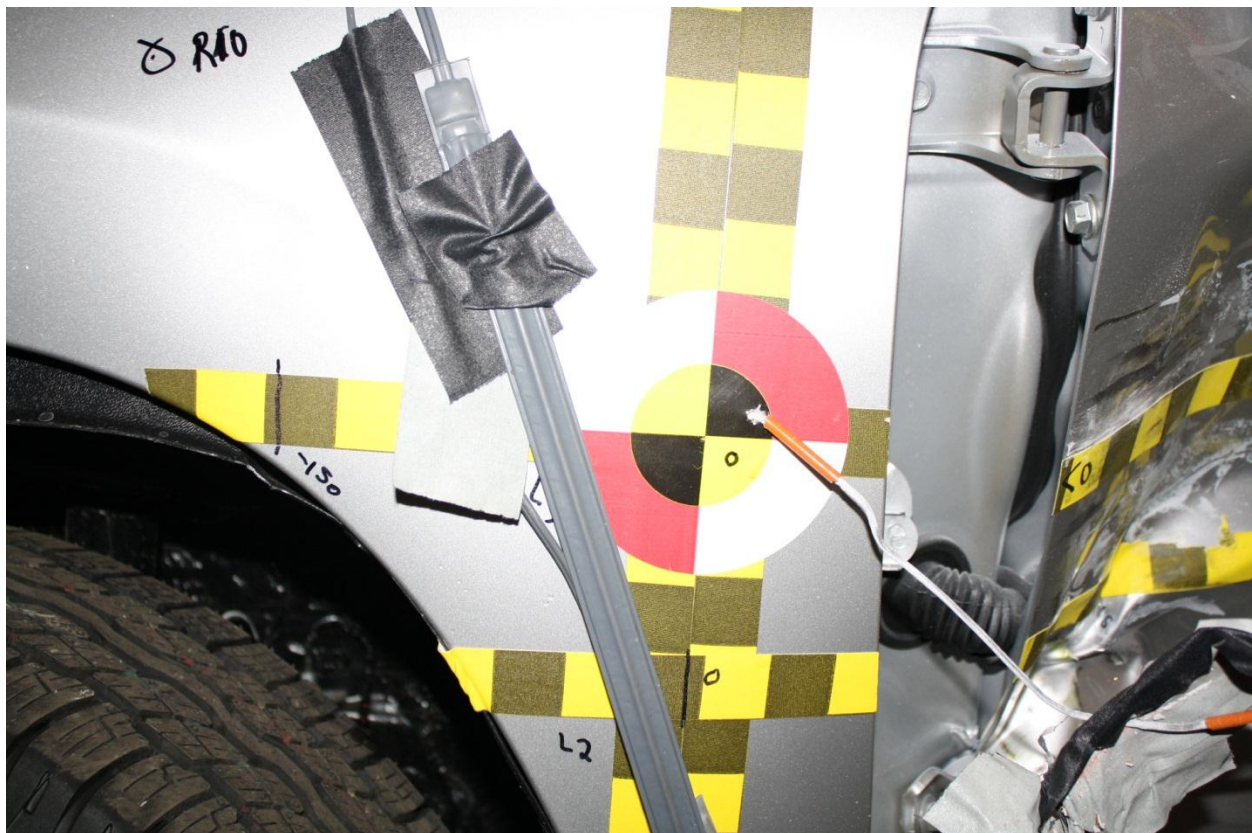


Figure A-20: Post-Test Close-up View of Impact Point Target



Figure A-21: Pre-Test Left Front Door Latch Close-up



Figure A-22: Post-Test Left Front Door Latch Close-up

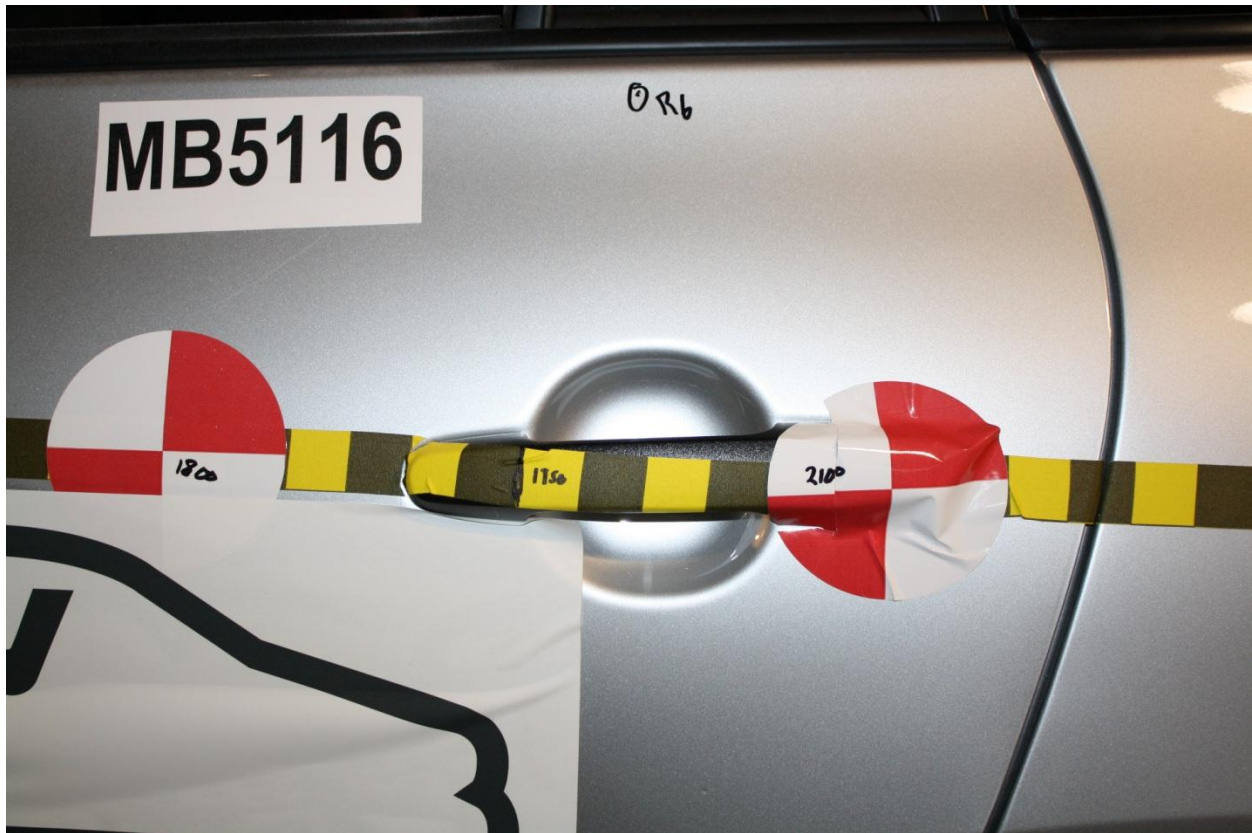


Figure A-23: Pre-Test Left Rear Door Latch Close-up



Figure A-24: Post-Test Left Rear Door Latch Close-up



Figure A-25: Pre-Test Front Close-up View of Driver Dummy



Figure A-26: Post-Test Front Close-up View of Driver Dummy



Figure A-27: Pre-Test Left Side View of Driver Dummy Showing Belt, Chalking, and Contact Switches



Figure A-28: Pre-Test Left Side View of Driver Dummy Shoulder and Door Top View



Figure A-29: Post-test Left Side View of Driver Dummy Shoulder and Door Top View



Figure A-30: Pre-Test Frontal View of Driver Seat Back Prior to Dummy Positioning

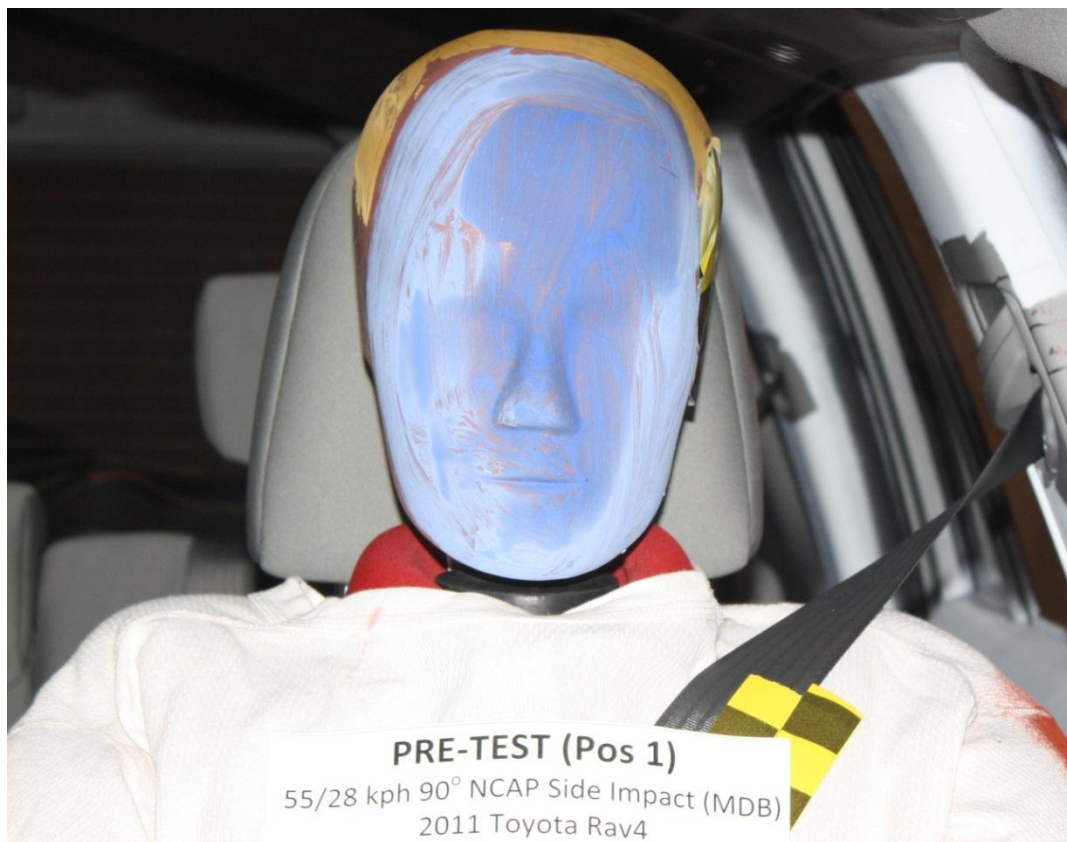


Figure A-31: Pre-Test Frontal View of Driver Dummy Head and Shoulders in Relation to Head Restraint



Figure A-32: Pre-Test Frontal View of Driver Seat Pan Prior to Dummy Positioning

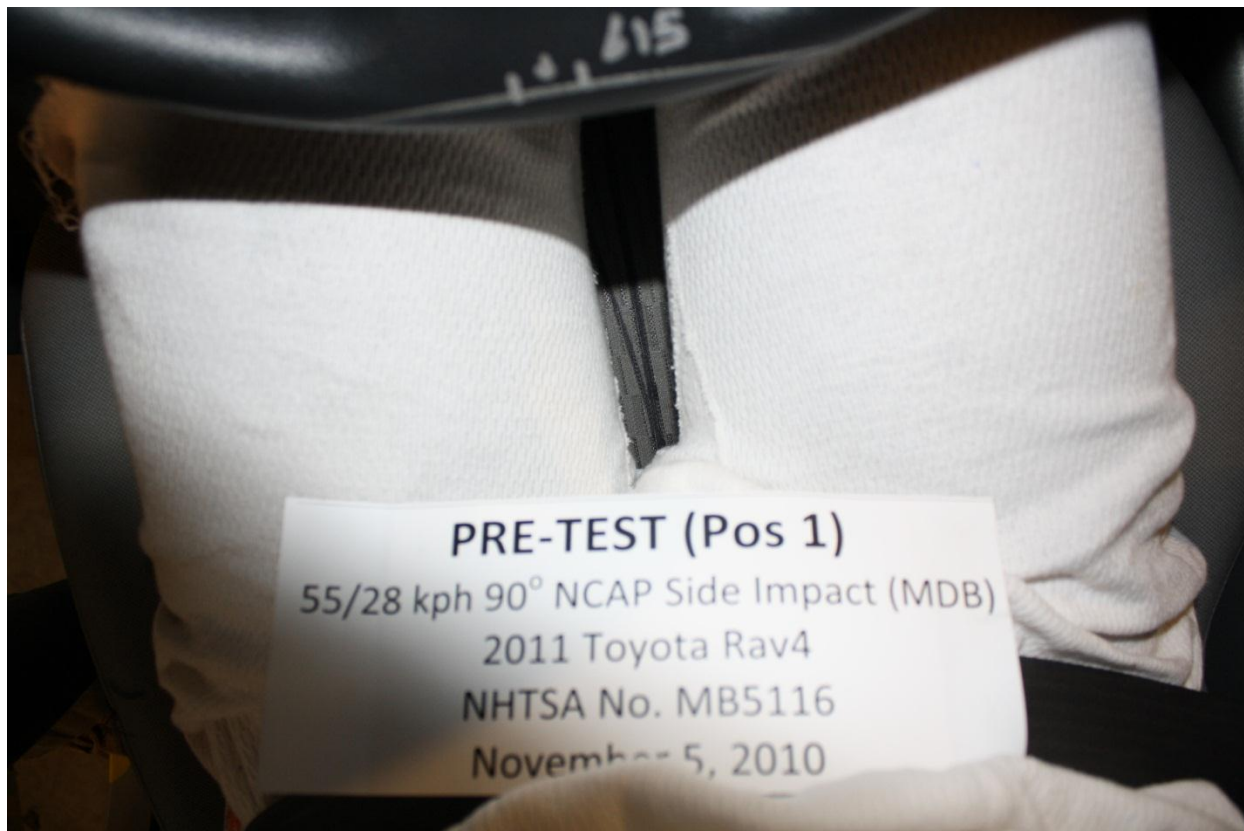


Figure A-33: Pre-Test Overhead View of Driver Dummy Thighs on Seat Pan



Figure A-34: Pre-Test Placement of Driver Dummy's Feet

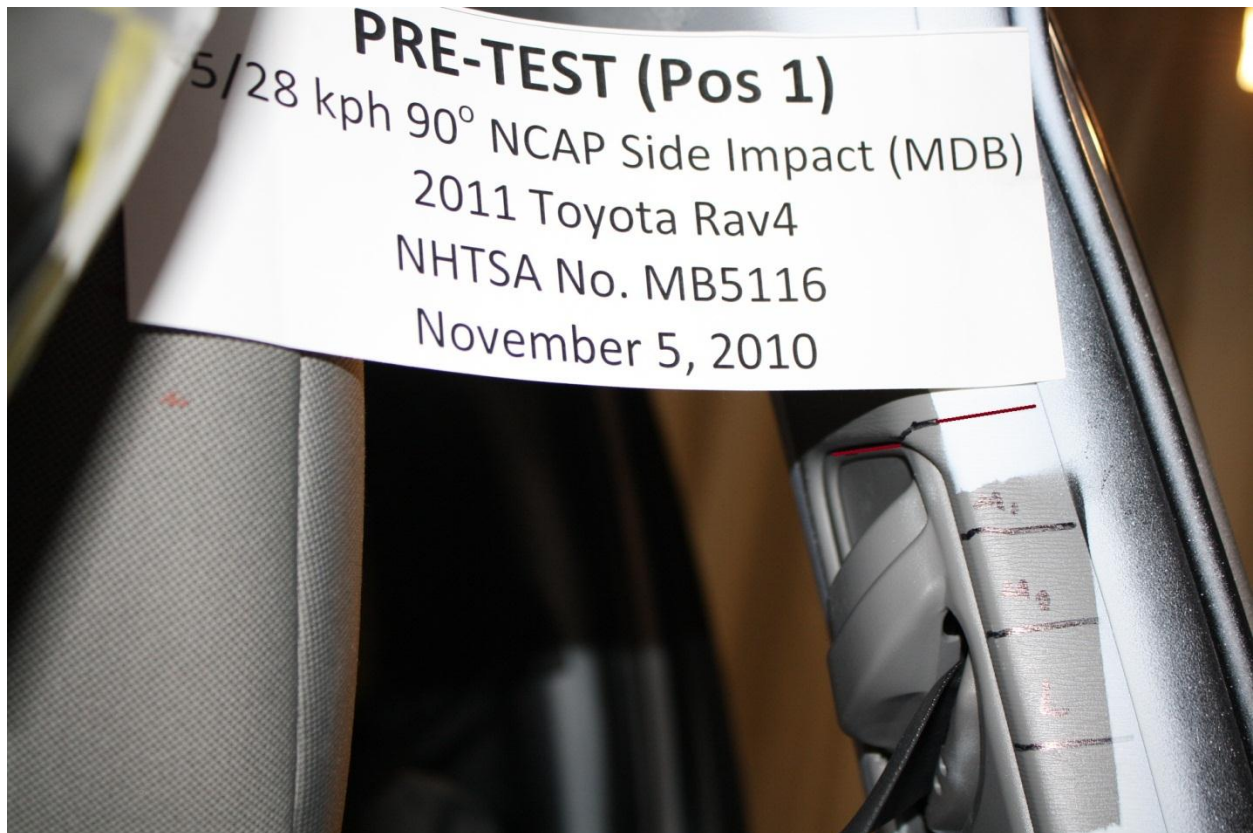


Figure A-35: Pre-Test View of Belt Anchorage for Driver Dummy to Show Position



Figure A-36: Pre-Test Left Side View of Steering Wheel to Show Position



Figure A-37: Pre-Test View of Parking Brake



Figure A-38: Pre-test Close-up Left Side View of Driver Seat Track Showing Seat Positioning



Figure A-39: Pre-test Close-up Left Side View of Driver Seat Back Showing Seat Back Positioning



Figure A-40: Pre-Test Close-Up View of Driver Seat Back or Head Restraint Showing Seat Back Test Position



Figure A-41: Pre-test Driver Dummy and Door Clearance View



Figure A-42: Post-test Driver Dummy and Door Clearance View



Figure A-43: Pre-test Right Side View of Driver Dummy and Front Seat of Occupant Compartment



Figure A-44: Post-test Right Side View of Driver Dummy and Front Seat of Occupant Compartment



Figure A-45: Pre-test Driver Inner Door Panel View

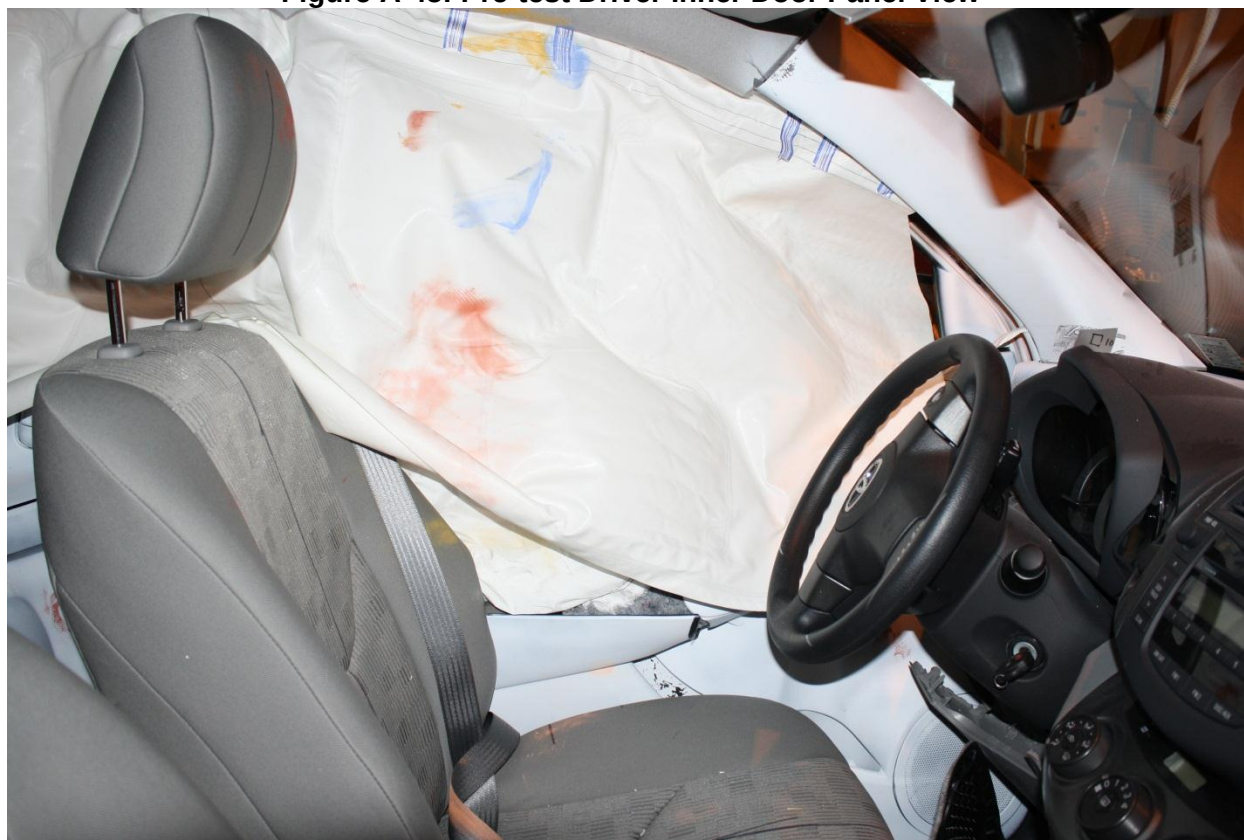


Figure A-46: Post-test Driver Inner Door Panel View Showing Driver Dummy Contact Locations

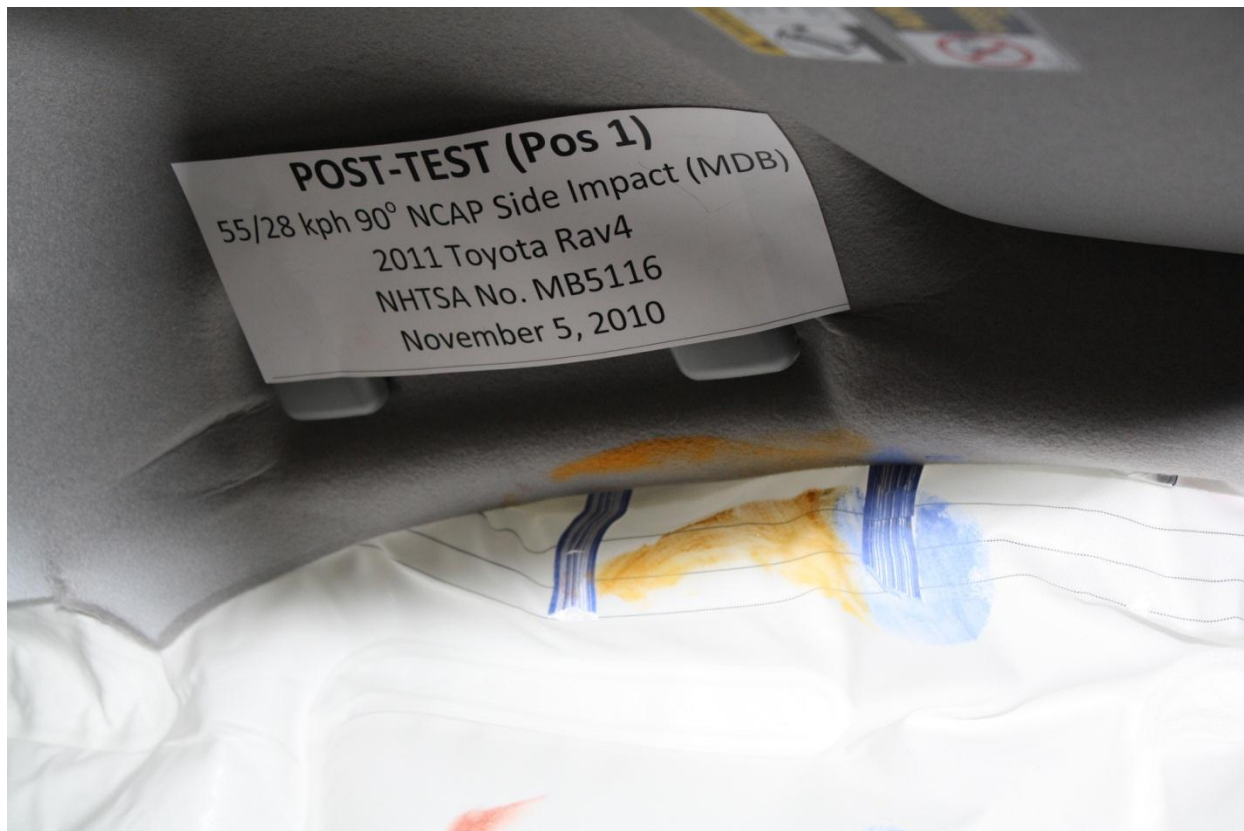


Figure A-47: Post-test Driver Dummy Close-Up Head Contact with Vehicle View



Figure A-48: Post-test Driver Dummy Close-Up Head Contact with Side Airbag View

Photo Not Applicable

Figure A-49: Post-Test Driver Dummy Close-Up Torso Contact with Vehicle Interior View



Figure A-50: Post-Test Driver Dummy Close-Up Torso Contact with Side Airbag View



Figure A-51: Post-Test Driver Dummy Close-Up Pelvis Contact View

Photo Not Applicable

Figure A-52: Post-Test Driver Dummy Close-Up Pelvis Contact with Side Airbag View



Figure A-53: Pre-test Left Side View of Passenger Dummy Showing Belt, Chalking, and Contact Switches



Figure A-54: Pre-test Left Side View of Passenger Dummy Shoulder and Door Top View



Figure A-55: Post-test Left Side View of Passenger Dummy Shoulder and Door Top View



Figure A-56: Pre-Test Frontal View of Rear Passenger Seat Back Prior to Dummy Positioning



Figure A-57: Pre-Test Frontal View of Rear Passenger Dummy Head and Shoulders in Relation to Head Restraint



Figure A-58: Pre-Test Overhead View of Rear Passenger Seat Pan Prior to Dummy Positioning



Figure A-59: Pre-Test Overhead View of Rear Passenger Dummy Thighs on Seat Pan

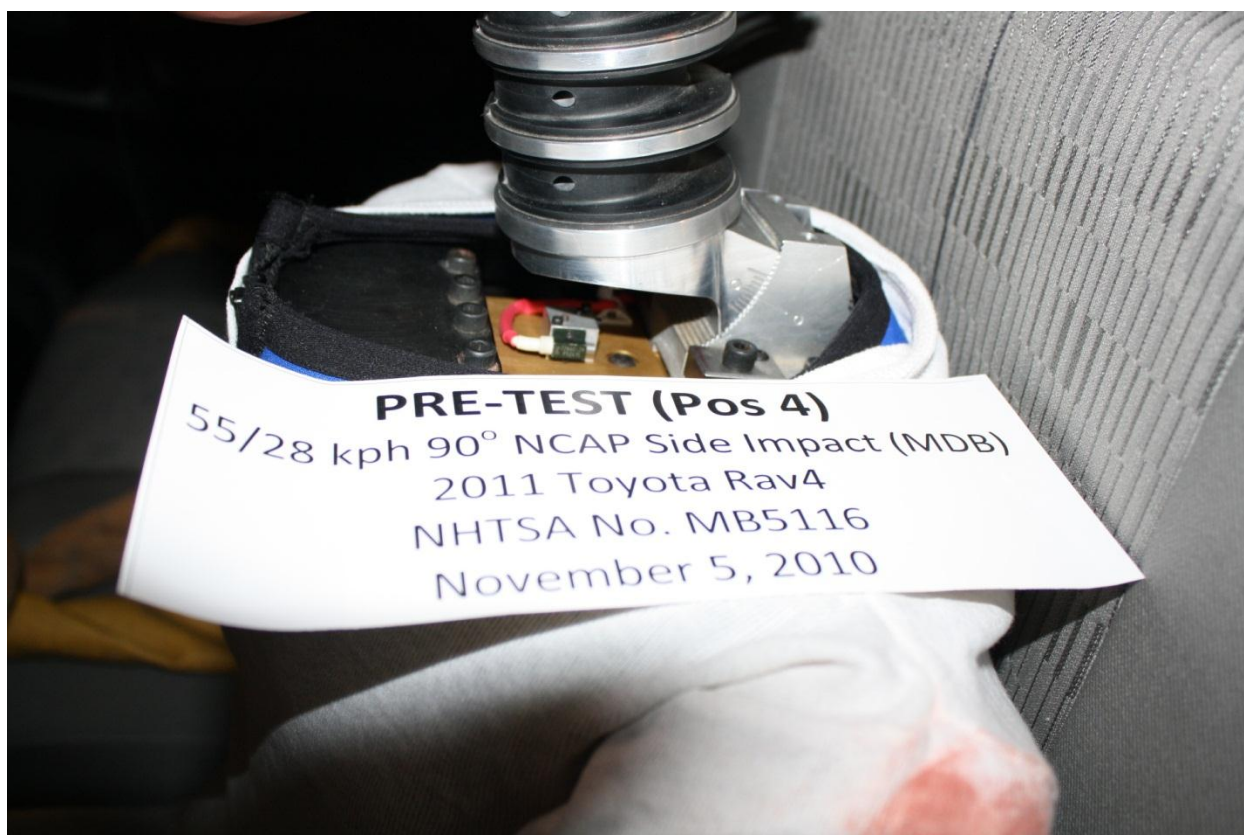


Figure A-60: Pre-Test View of Rear Passenger Dummy's Neck Showing Position of Adjustable Neck Bracket

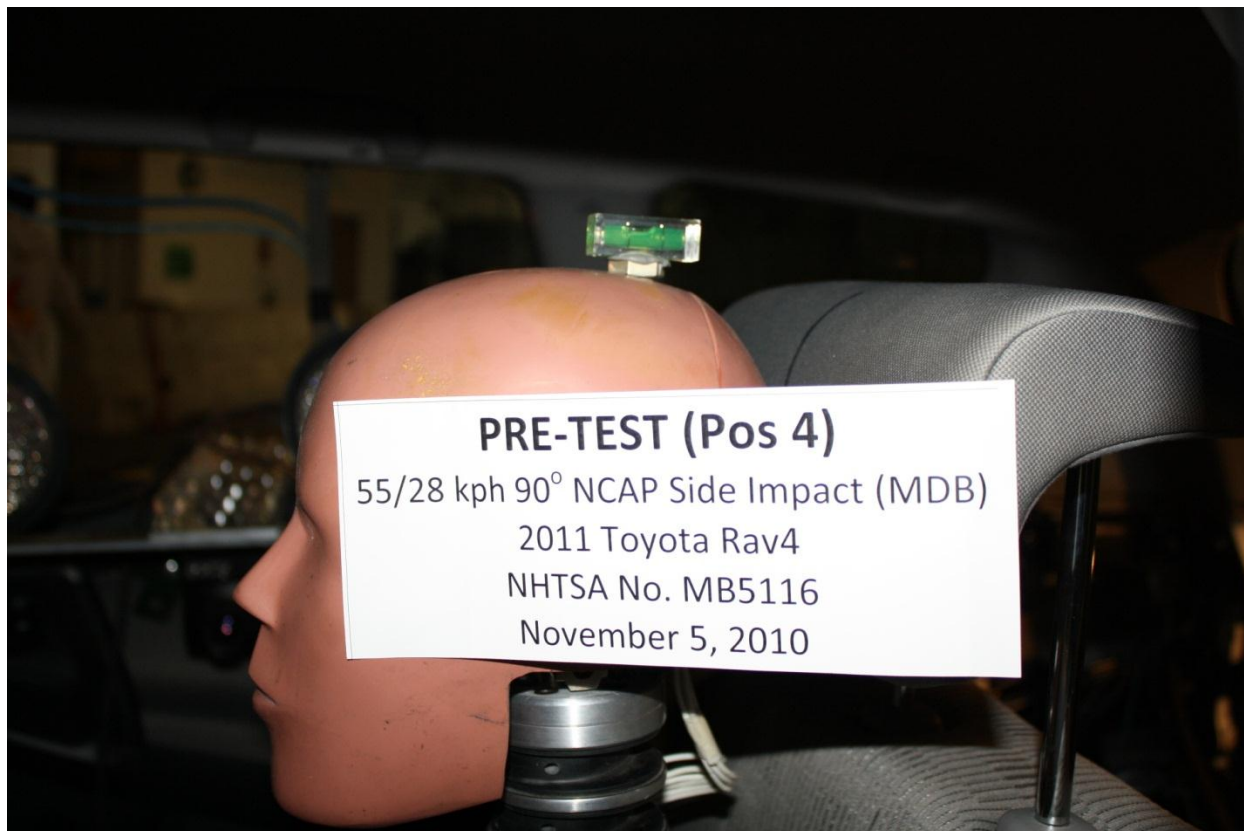


Figure A-61: Pre-Test View of Rear Passenger Dummy's Head Showing Dummy's Head is Level



Figure A-62: Pre-Test Placement of Rear Passenger Dummy's Feet

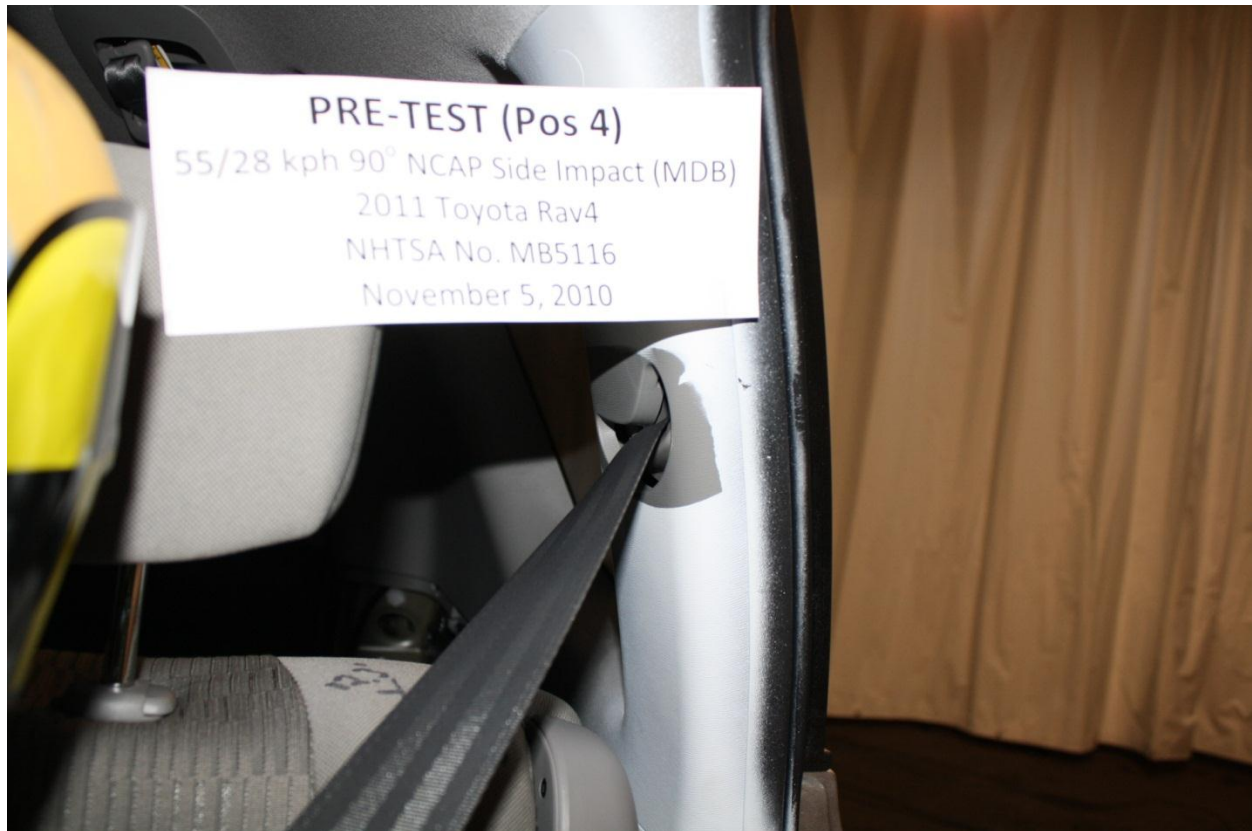


Figure A-63: Pre-Test View of Belt Anchorage for Rear Passenger Dummy to Show Position



Figure A-64: Pre-test Close-Up Left Side View of Rear Passenger Seat Track Showing Test Position



Figure A-65: Pre-test Close-Up Left Side View of Rear Passenger Seat Back Showing Test Position



PRE-TEST (Pos 4)
8 kph 90° NCAP Side Impact (MDB)

Figure A-66: Pre-Test Close-Up View of Rear Passenger Seat Back or Head Restraint Showing Seat Back Test Position



Figure A-67: Pre-Test Passenger Dummy and Door Clearance View



Figure A-68: Post-Test Passenger Dummy and Door Clearance View



Figure A-69: Pre-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment



Figure A-70: Post-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment



Figure A-71: Pre-test Passenger Inner Door Panel View



Figure A-72: Post-test Passenger Inner Door Panel View Showing Rear Passenger Dummy Contact Locations

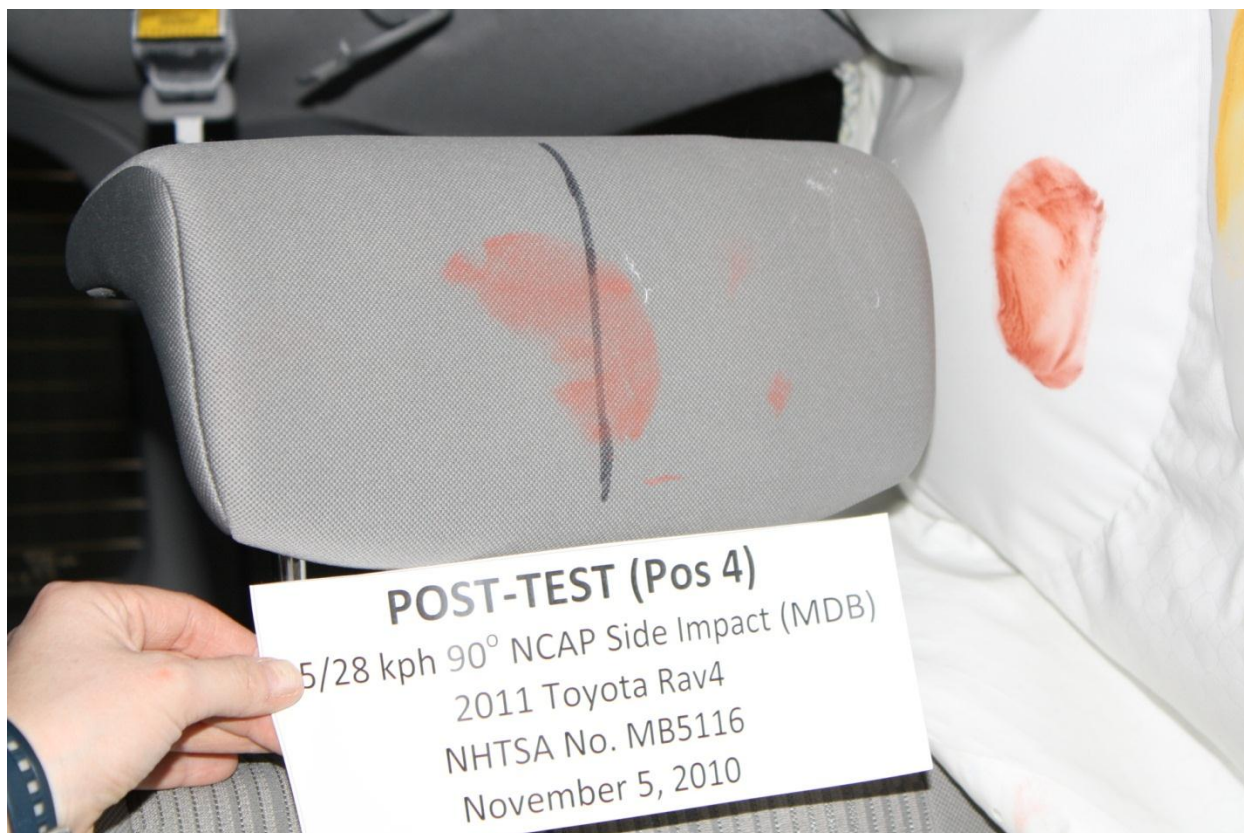


Figure A-73: Post-test Rear Passenger Dummy Close-Up Head Contact with Vehicle View



Figure A-74: Post-test Rear Passenger Dummy Close-Up Head Contact with Side Airbag View



Figure A-75: Post-Test Rear Passenger Dummy Close-Up Torso Contact with Vehicle Interior View

Photo Not Applicable

Figure A-76: Post-Test Rear Passenger Dummy Close-Up Torso Contact with Side Airbag View



Figure A-77: Post-Test Rear Passenger Dummy Close-Up Pelvis Contact View

Photo Not Applicable

Figure A-78: Post-Test Rear Passenger Dummy Close-Up Pelvis Contact with Side Airbag View



Figure A-79: Pre-Test View of Fuel Filler Cap or Fuel Filler Neck

Photo Not Available

fuel door release lever not accessible after the crash

Figure A-80: Post-Test View of Fuel Filler Cap or Fuel Filler Neck



Figure A-81: Pre-Test Front View of MDB Impactor Face

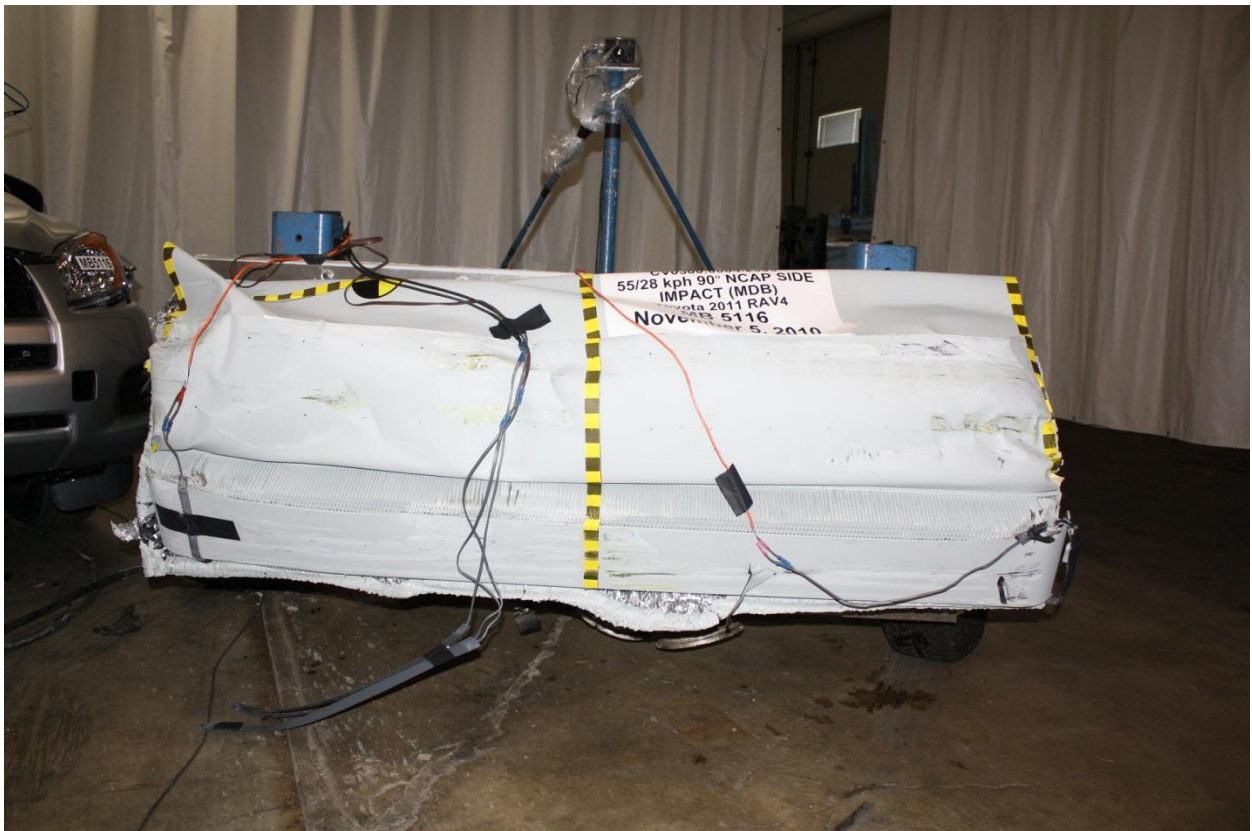


Figure A-82: Post-Test Front View of MDB Impactor Face



Figure A-83: Pre-Test Top View of MDB Impactor Face

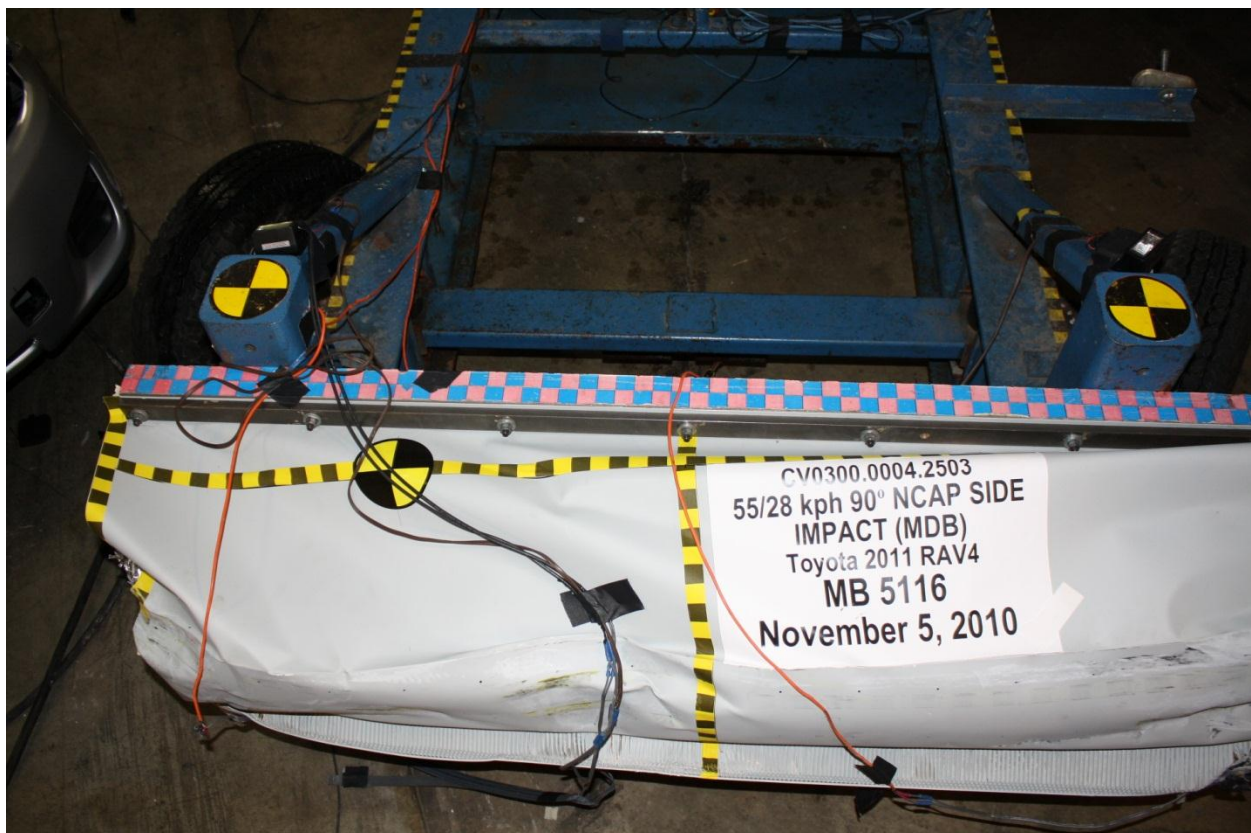


Figure A-84: Post-Test Top View of MDB Impactor Face



Figure A-85: Pre-Test Left Side View of MDB Impactor Face



Figure A-86: Post-Test Left Side View of MDB Impactor Face



Figure A-87: Pre-Test Right Side View of MDB Impactor Face

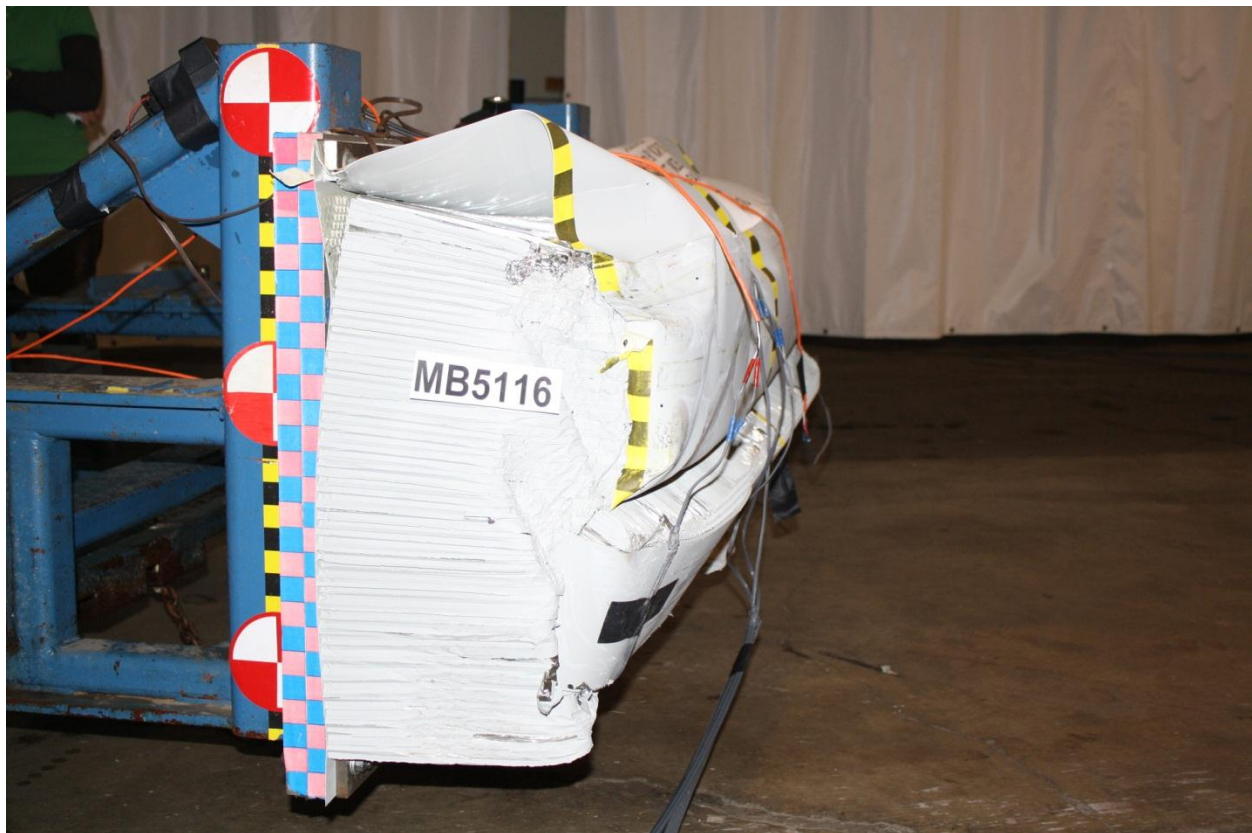


Figure A-88: Post-Test Right Side View of MDB Impactor Face



Figure A-89: Close-Up View of Vehicle's Certification Label



Figure A-90: Close-Up View of Vehicle's Tire Information Placard or Label

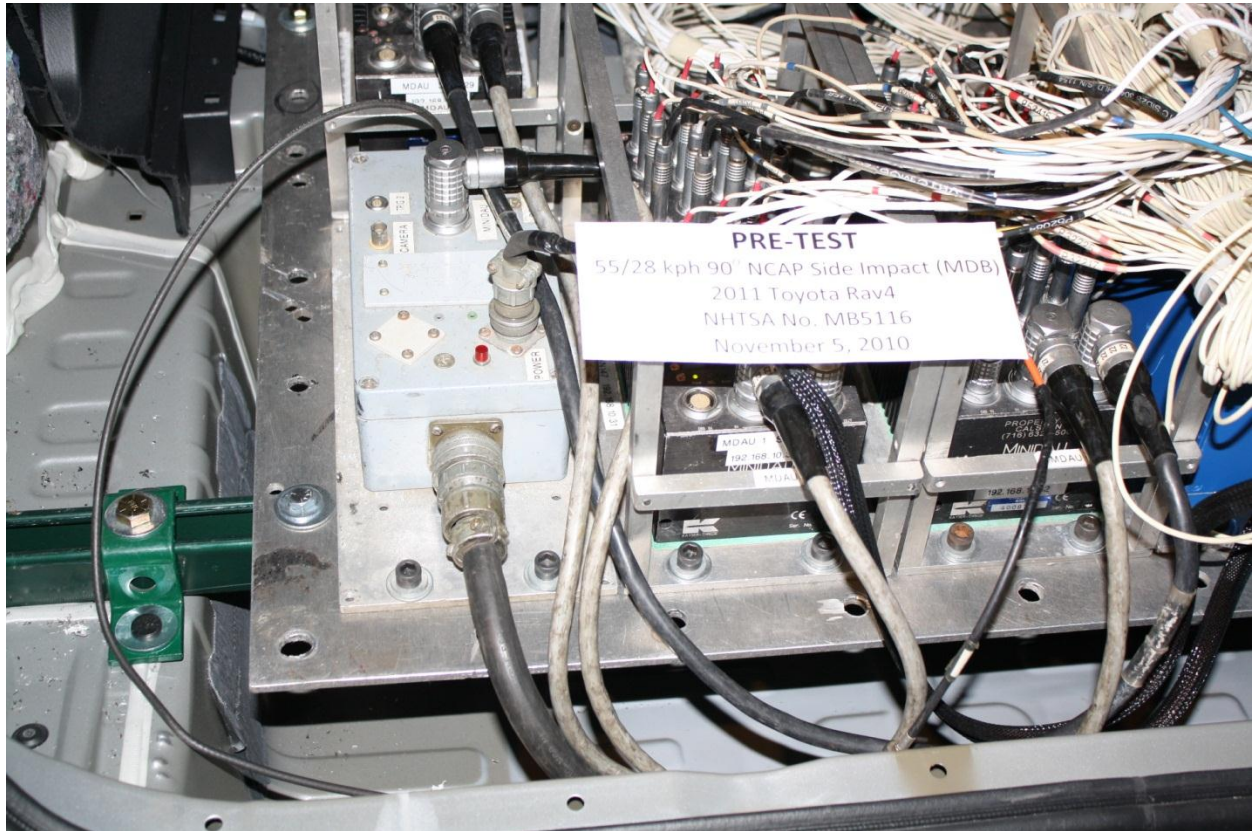


Figure A-91: Pre-Test Ballast View



Figure A-92: Post-Test Primary and Redundant Speed Trap Read-Out



Figure A-93: FMVSS No. 301 Rollover 0°



Figure A-94: FMVSS No. 301 Rollover 90°



Figure A-95: FMVSS No. 301 Rollover 180°



Figure A-96: FMVSS No. 301 Rollover 270°



Figure A-97: FMVSS No. 301 Rollover 360°

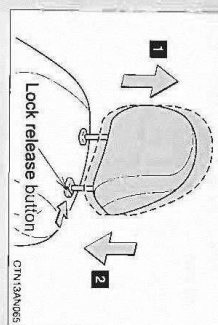


Figure A-98: Impact Event (Impact Side)

1-3. Adjustable components (seats, mirrors, steering wheel) Head restraints

Head restraints are provided for all seats.

► Front seats



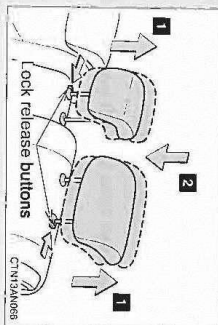
1 Up

Pull the head restraints up.

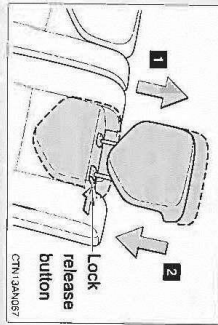
2 Down

Push the head restraint down while pushing the lock release button.

► Second seats



► Third seats (if equipped)



Before driving

Figure A-101: Left Rear Passenger Head Restraint Use and Adjustment Information from Vehicle Owner's Manual

APPENDIX B
DUMMY RESPONSE DATA

The following data plots shall be included in this appendix:

TABLE OF DATA PLOTS
Driver & Passenger Dummy Instrumentation Plots
FILTERED DATA

No.	Description	Page
1	Driver Head Acceleration (X) Primary vs. Time	B-4
2	Driver Head Acceleration (Y) Primary vs. Time	B-4
3	Driver Head Acceleration (Z) Primary vs. Time	B-5
4	Driver Head Resultant Acceleration Primary vs. Time	B-5
5	Driver Upper Thorax Rib Deflection (Y) vs. Time	B-6
6	Driver Middle Thorax Rib Deflection (Y) vs. Time	B-6
7	Driver Lower Thorax Rib Deflection (Y) vs. Time	B-7
8	Driver Thorax Rib Deflection Maximum vs. Time	B-7
9	Driver Anterior Abdominal Force (Y) vs. Time	B-8
10	Driver Middle Abdominal Force (Y) vs. Time	B-8
11	Driver Posterior Abdominal Force (Y) vs. Time	B-9
12	Driver Total Abdominal Force (Y) vs. Time	B-9
13	Driver Pubic Symphysis Force (Y) vs. Time	B-10
14	Passenger Head Acceleration (X) vs. Time Primary	B-10
15	Passenger Head Acceleration (Y) vs. Time Primary	B-11
16	Passenger Head Acceleration (Z) vs. Time Primary	B-11
17	Passenger Head Resultant Acceleration Primary vs. Time	B-12
18	Passenger Lower Spine T12 Acceleration (X) vs. Time	B-12
19	Passenger Lower Spine T12 Acceleration (Y) vs. Time	B-13
20	Passenger Lower Spine T12 Acceleration (Z) vs. Time	B-13
21	Passenger Lower Spine T12 Resultant Acceleration vs. Time	B-14
22	Passenger Iliac Force on Impact Side (Y) vs. Time	B-14
23	Passenger Acetabulum Force on Impact Side (Y) vs. Time	B-15
24	Passenger Total Pelvic Force on Impact Side (Y) vs. Time	B-15

The following additional data for this test can be obtained from the Research and Development section of the NHTSA website. The website can be found at www.NHTSA.dot.gov.

Driver & Passenger Dummy Instrumentation Data

Driver Lower Spine T12 Acceleration (X)
Driver Lower Spine T12 Acceleration (Y)
Driver Lower Spine T12 Acceleration (Z)
Passenger Upper Thorax Rib Deflection (Y)
Passenger Middle Thorax Rib Deflection (Y)
Passenger Lower Thorax Rib Deflection (Y)
Passenger Upper Abdomen Rib Deflection (Y)
Passenger Lower Abdomen Rib Deflection (Y)
Driver Head Acceleration Redundant (X)
Driver Head Acceleration Redundant (Y)
Driver Head Acceleration Redundant (Z)
Driver Shoulder Contact Switch
Driver Torso Contact Switch
Driver Pelvis Contact Switch
Passenger Head Acceleration Redundant (X)
Passenger Head Acceleration Redundant (Y)
Passenger Head Acceleration Redundant (Z)
Passenger Shoulder Contact Switch
Passenger Torso Contact Switch
Passenger Pelvis Contact Switch

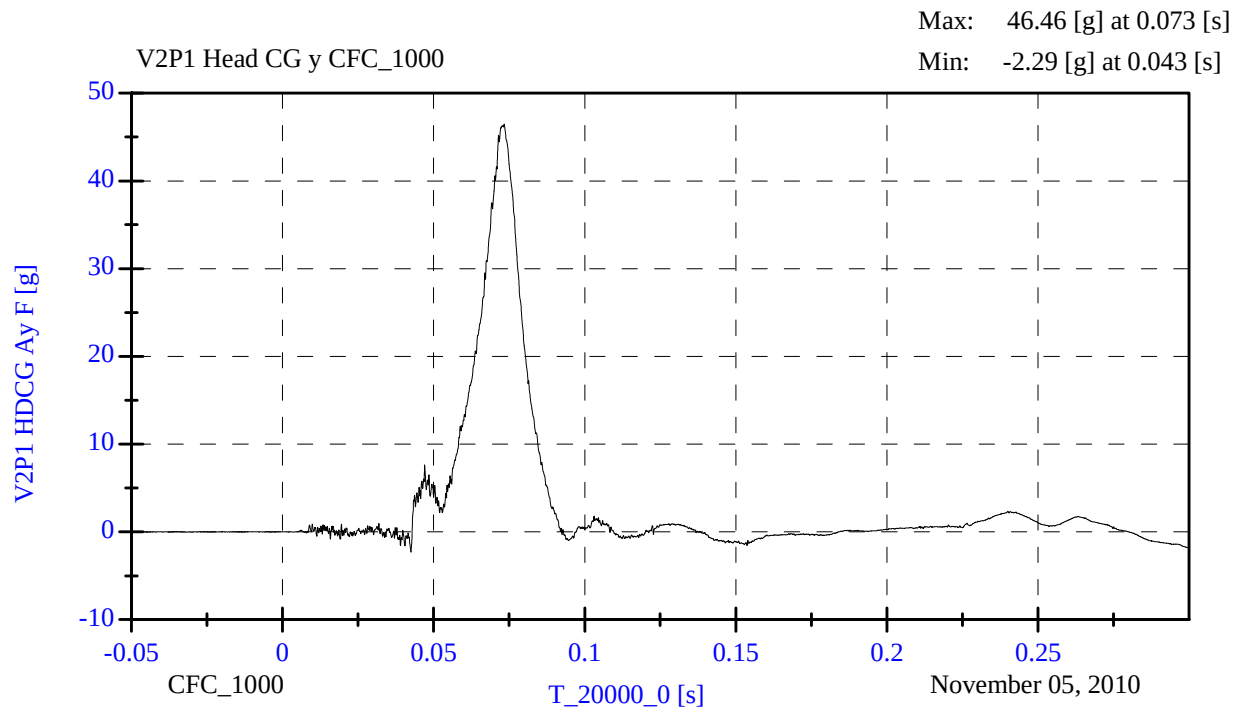
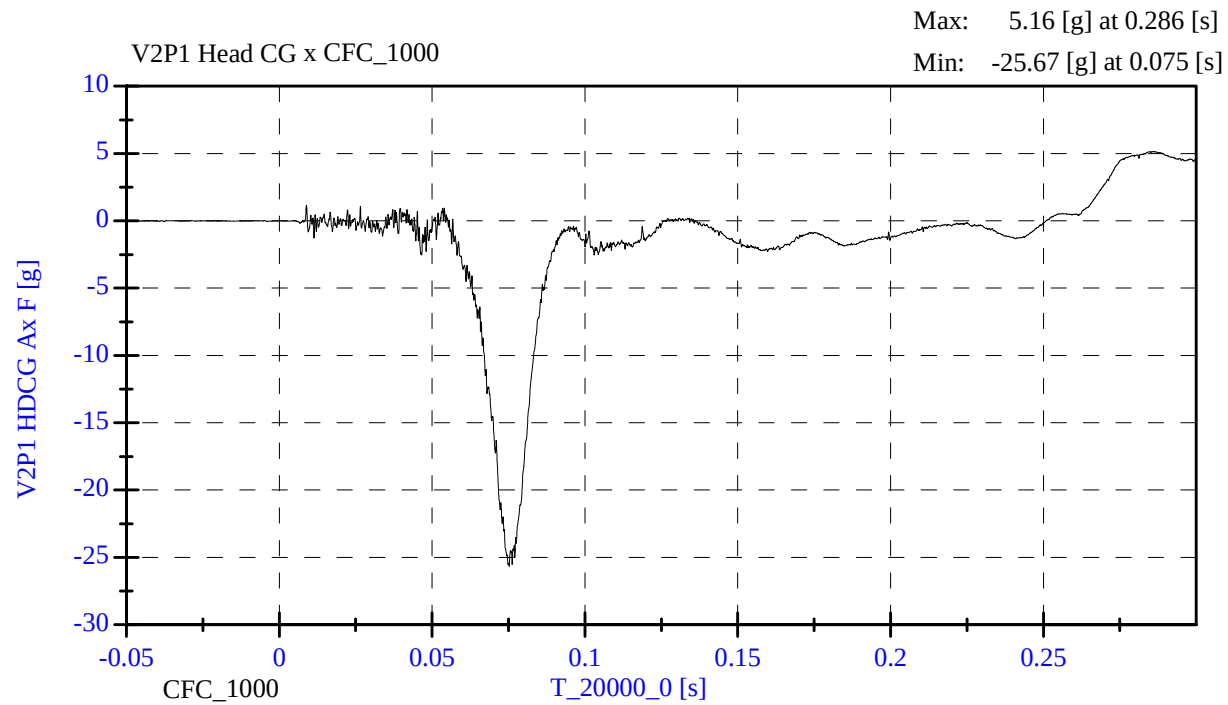
Vehicle Instrumentation Data

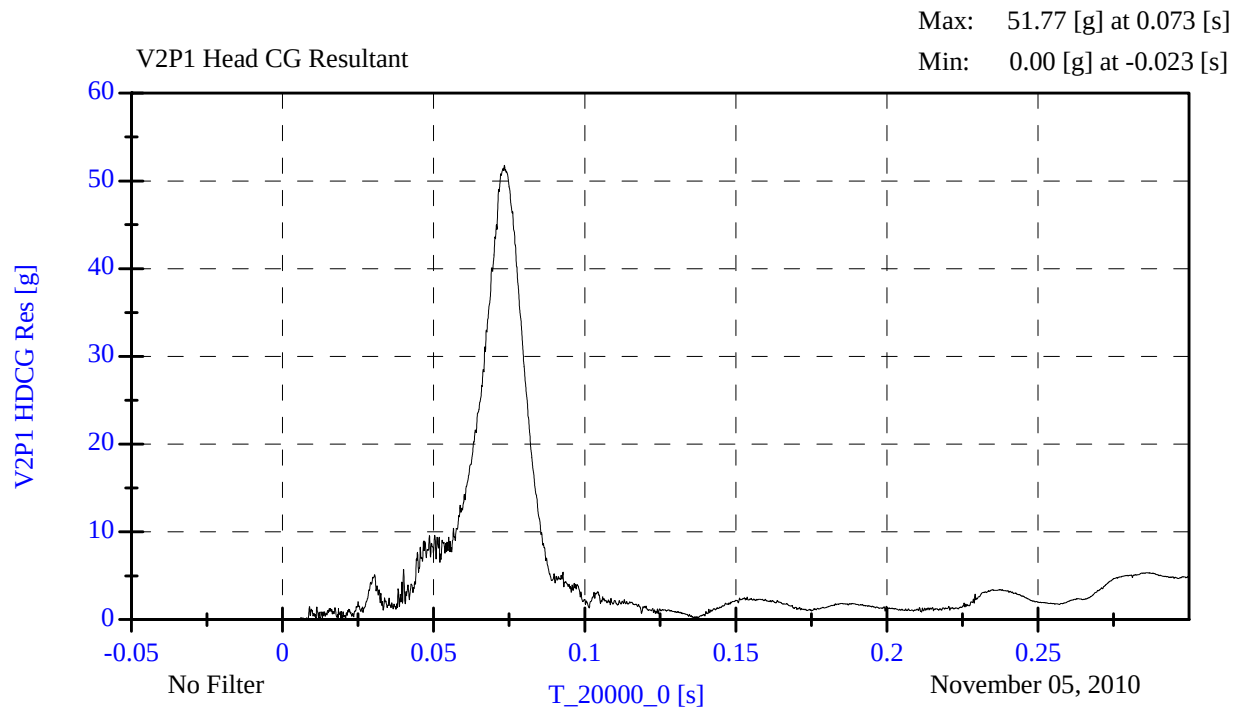
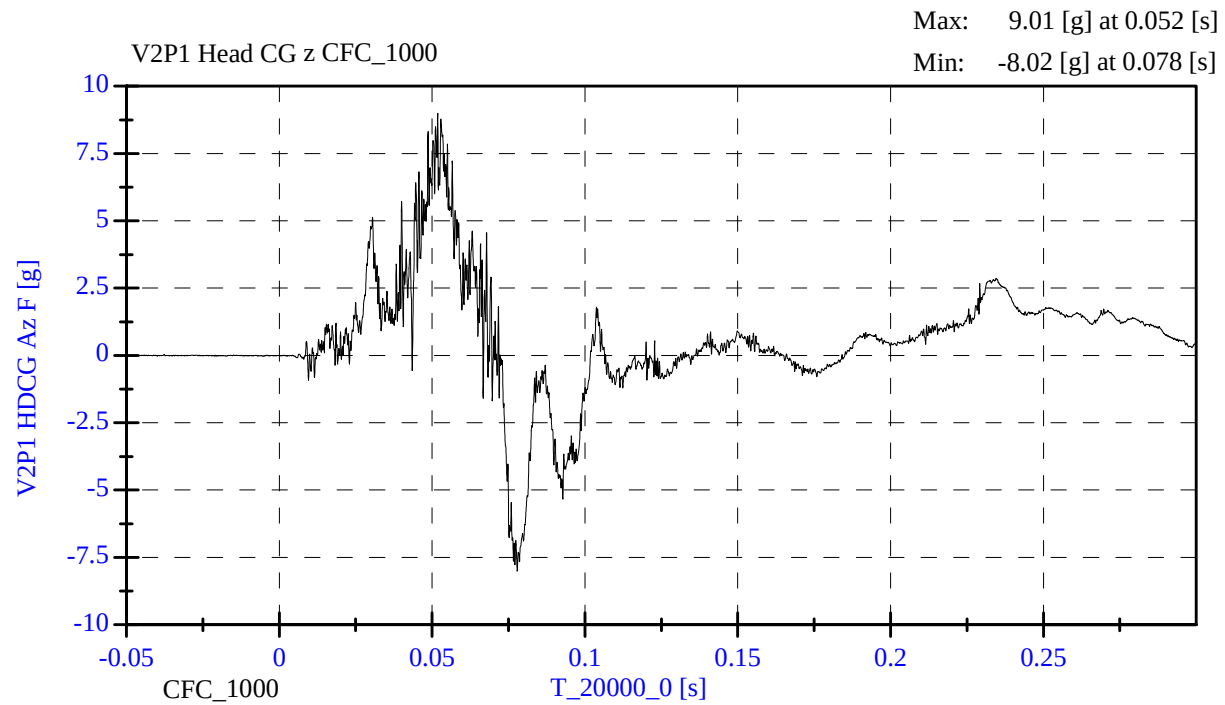
Driver Side Airbag Timing
Driver Side Curtain Airbag Timing
Passenger Side Airbag Timing (if applicable)
Passenger Side Curtain Airbag Timing (if different from Driver)
Right Side Sill at Front Seat Acceleration (X)
Right Side Sill at Front Seat Acceleration (Y)
Right Side Sill at Front Seat Acceleration (Z)
Right Side Sill at Rear Seat Acceleration (X)
Right Side Sill at Rear Seat Acceleration (Y)
Right Side Sill at Rear Seat Acceleration (Z)
Rear Floorpan Above Axle Acceleration (X)
Rear Floorpan Above Axle Acceleration (Y)
Rear Floorpan Above Axle Acceleration (Z)
Left Side Sill at Front Seat Acceleration (Y)
Left Side Sill at Rear Seat Acceleration (Y)
Right Rear Occupant Compartment Acceleration (Y)
Lower A-Post Acceleration (Y)
Upper A-Post Acceleration (Y)
Lower B-Post Acceleration (Y)
Upper B-Post Acceleration (Y)
Front Seat Track Acceleration (Y)

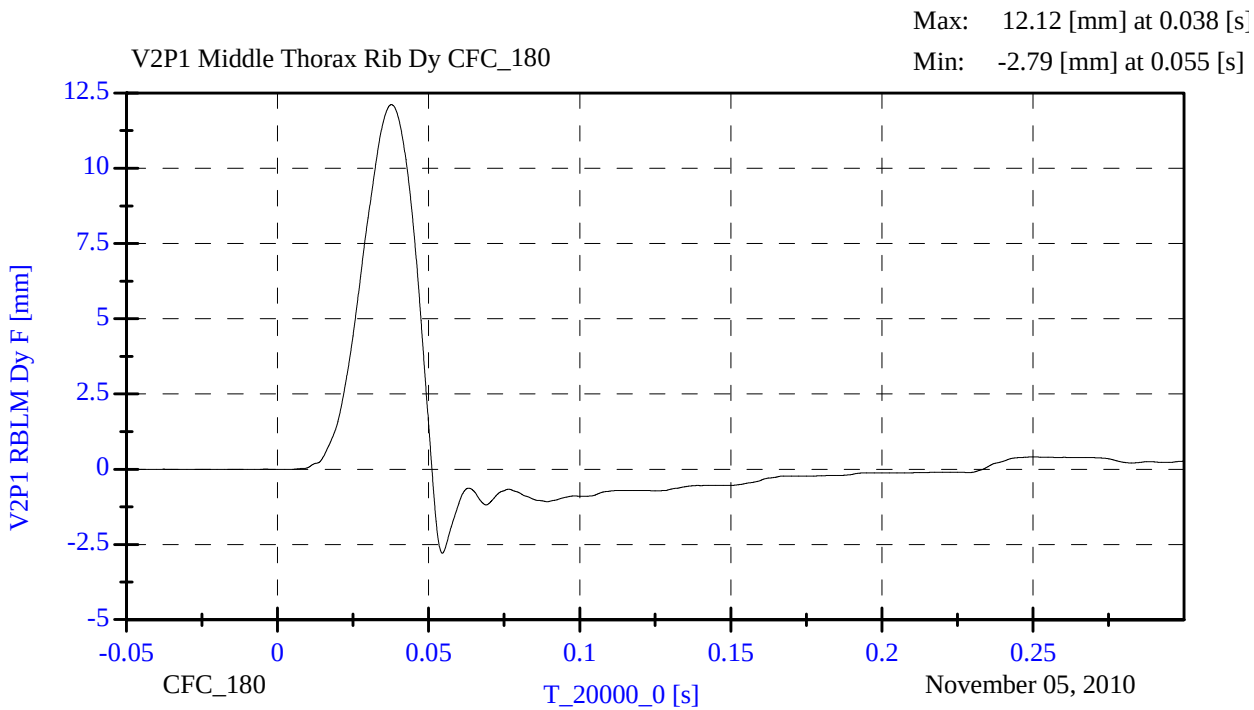
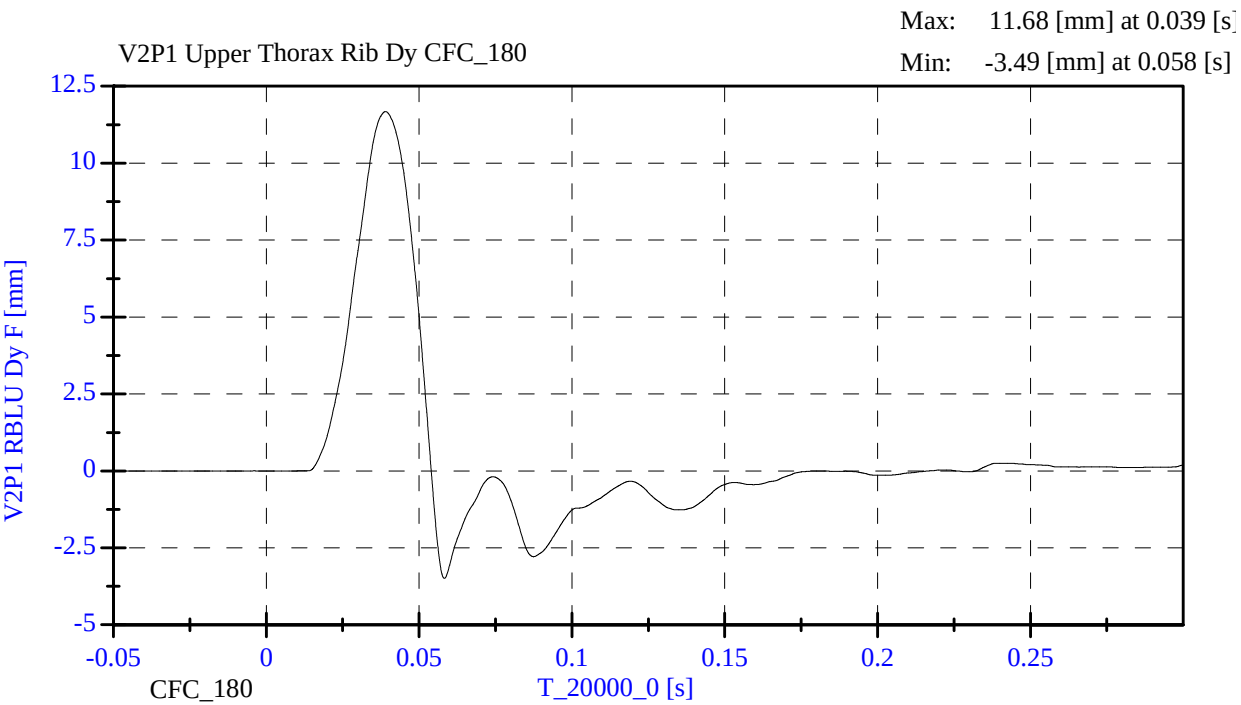
Rear Seat Track Acceleration (Y)
Vehicle Center of Gravity Acceleration (X)
Vehicle Center of Gravity Acceleration (Y)
Vehicle Center of Gravity Acceleration (Z)

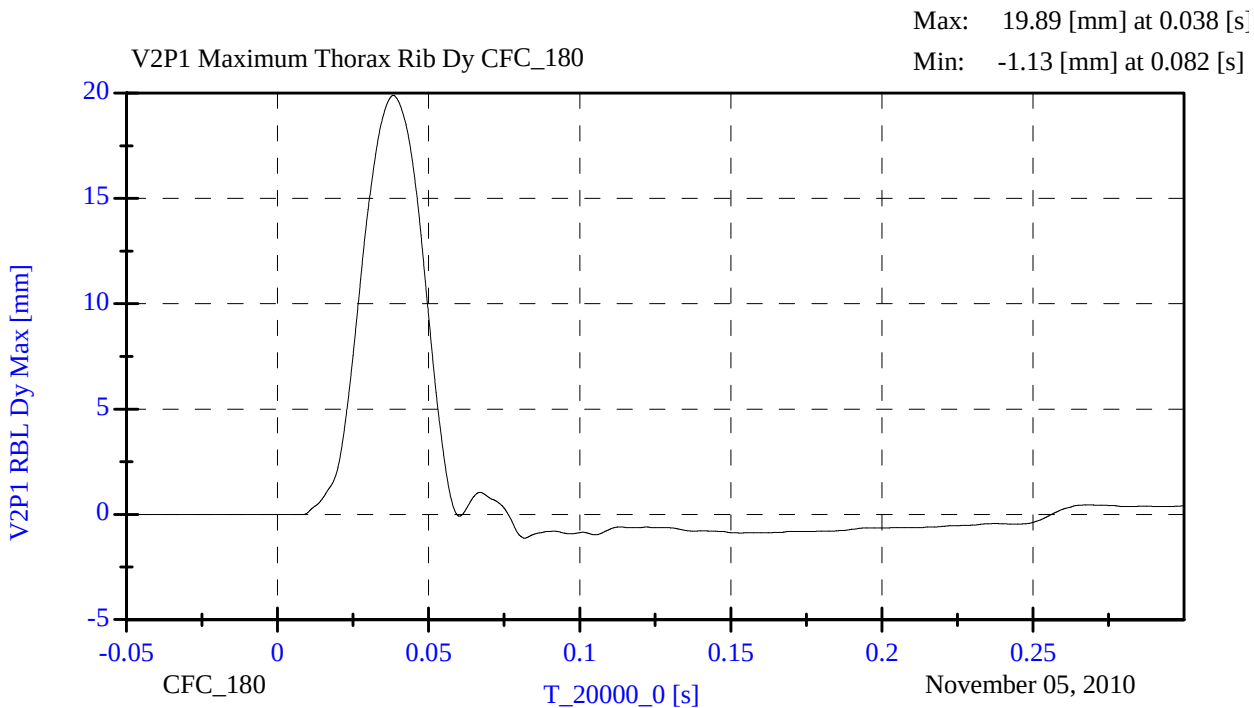
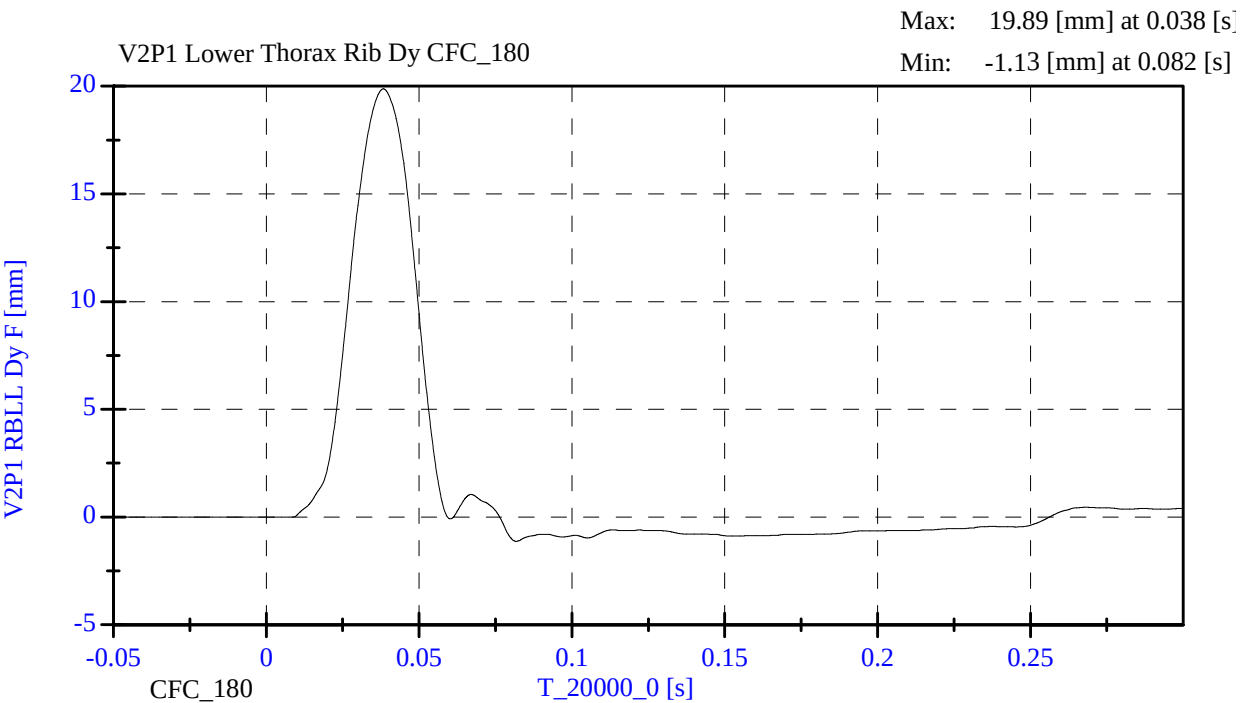
MDB Instrumentation Data

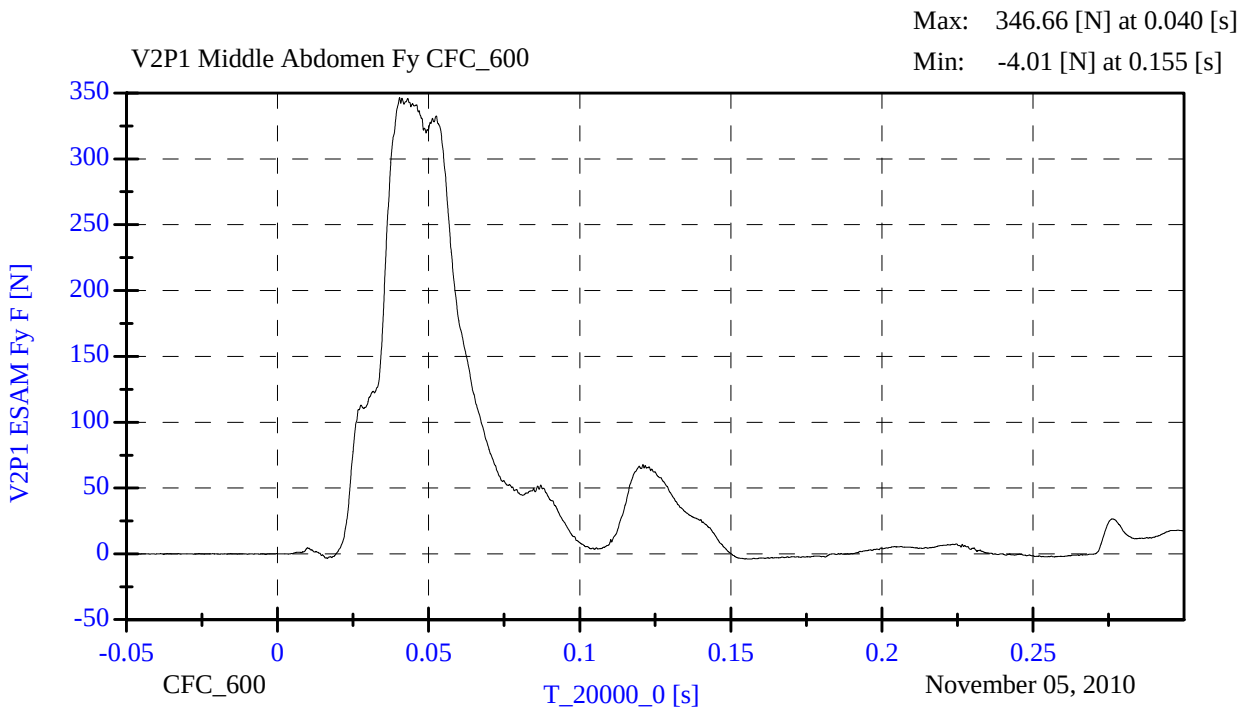
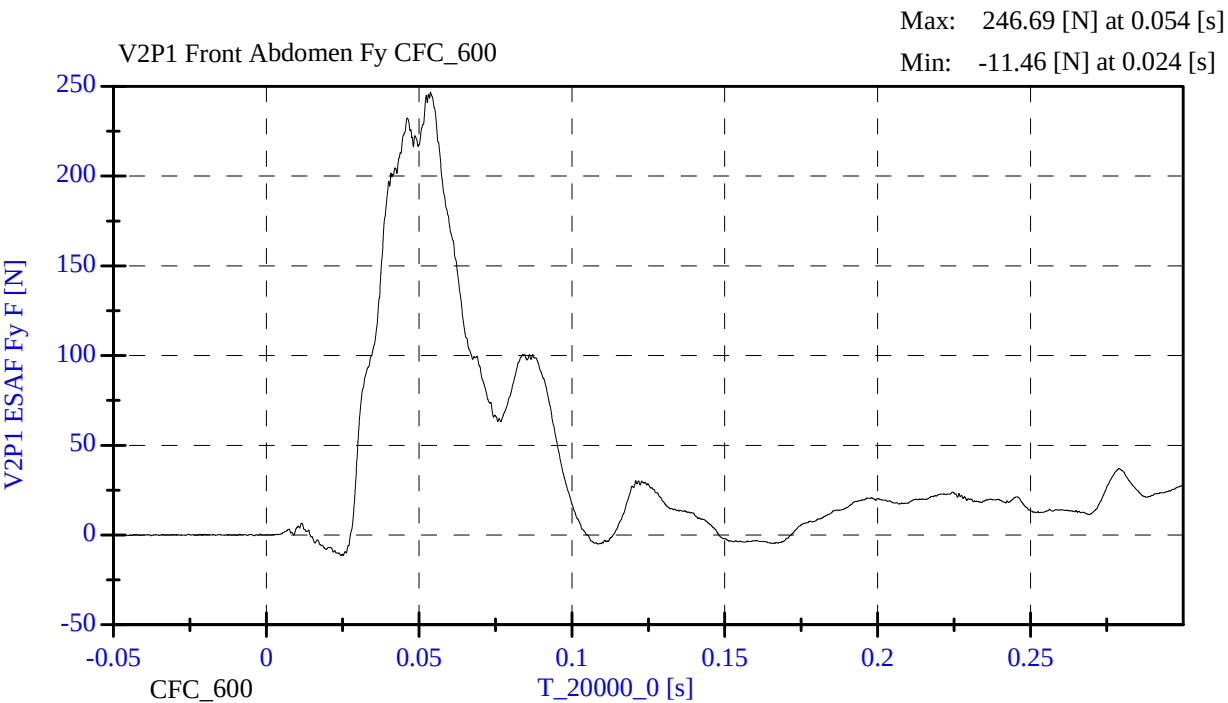
MDB Center of Gravity Acceleration (X)
MDB Center of Gravity Acceleration (Y)
MDB Center of Gravity Acceleration (Z)
MDB Rear Acceleration (X)
MDB Rear Acceleration (Y)
Left MDB Contact Switch
Right MDB Contact Switch

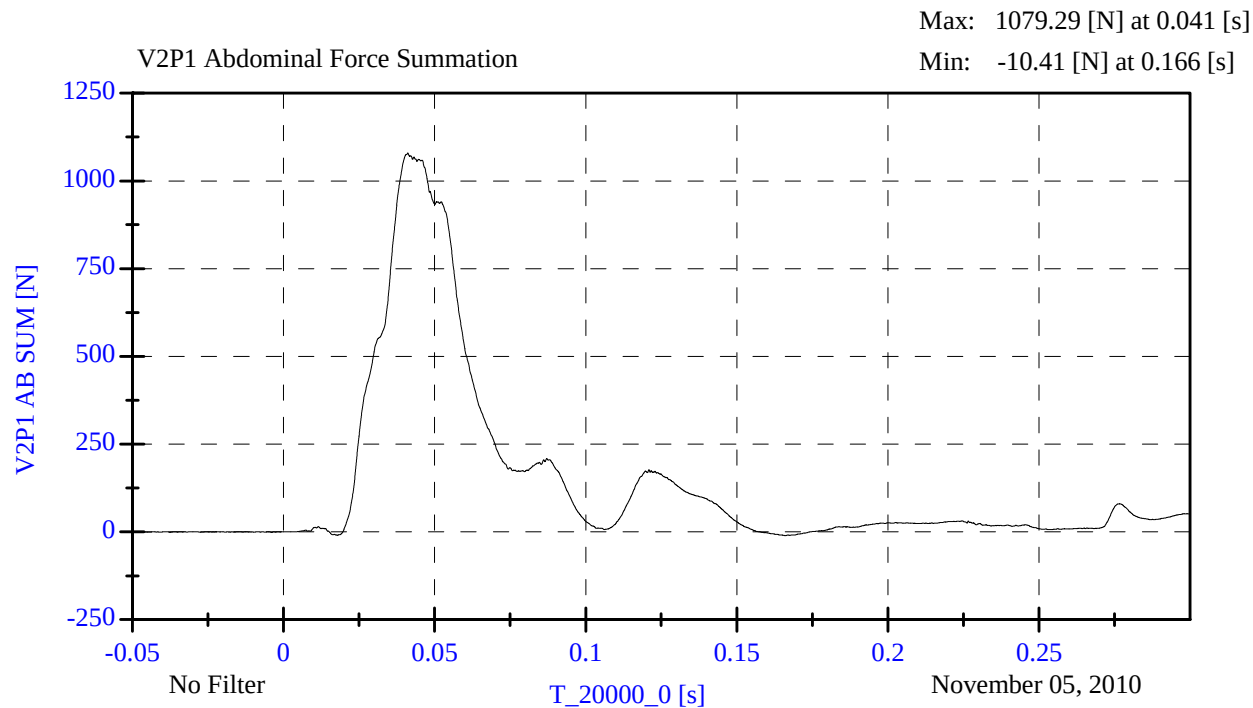
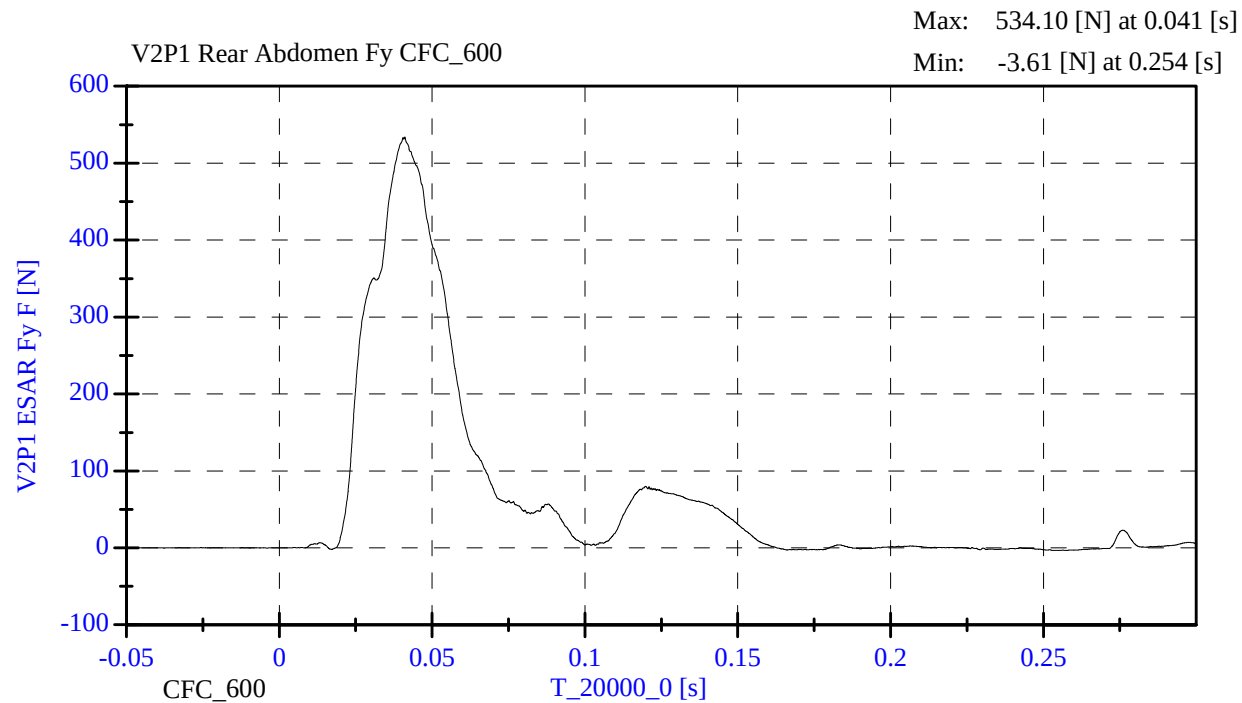


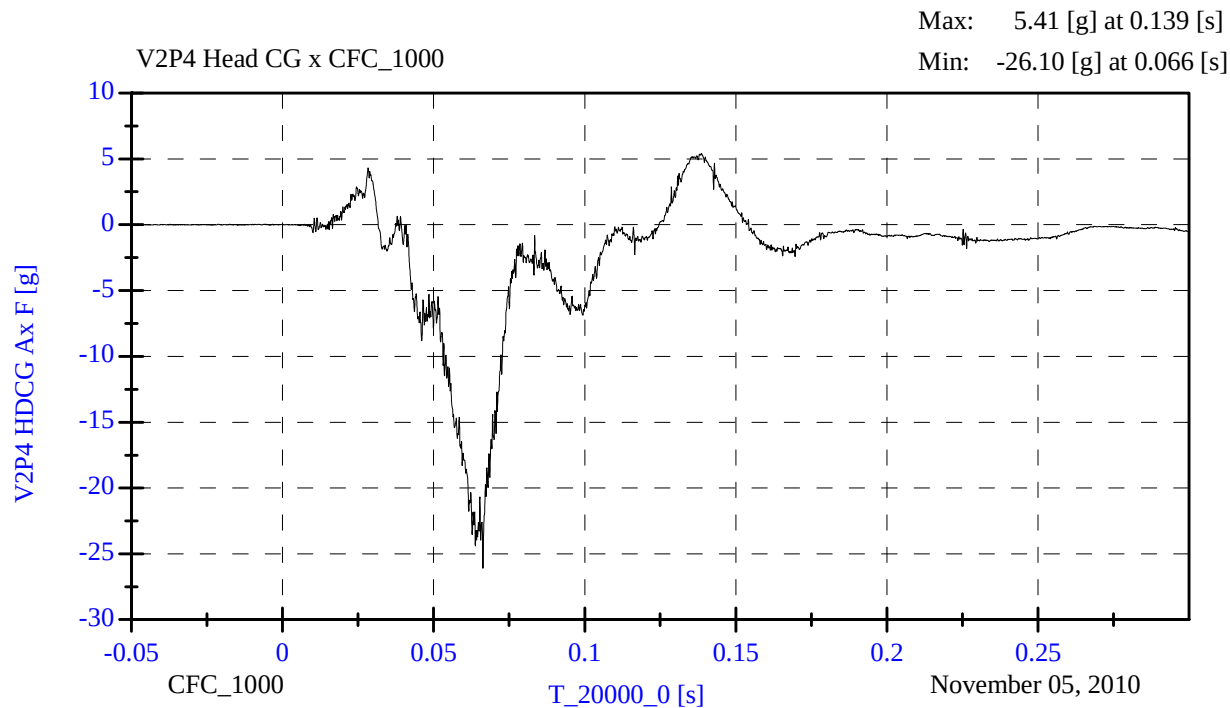
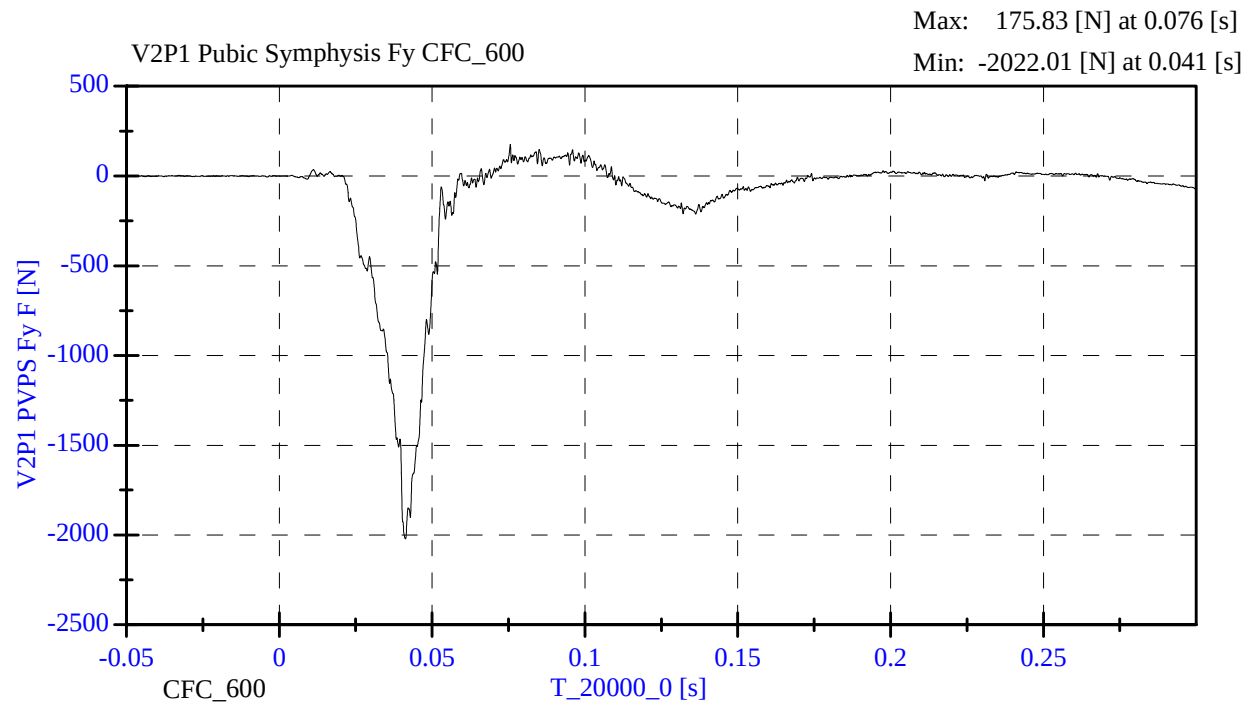


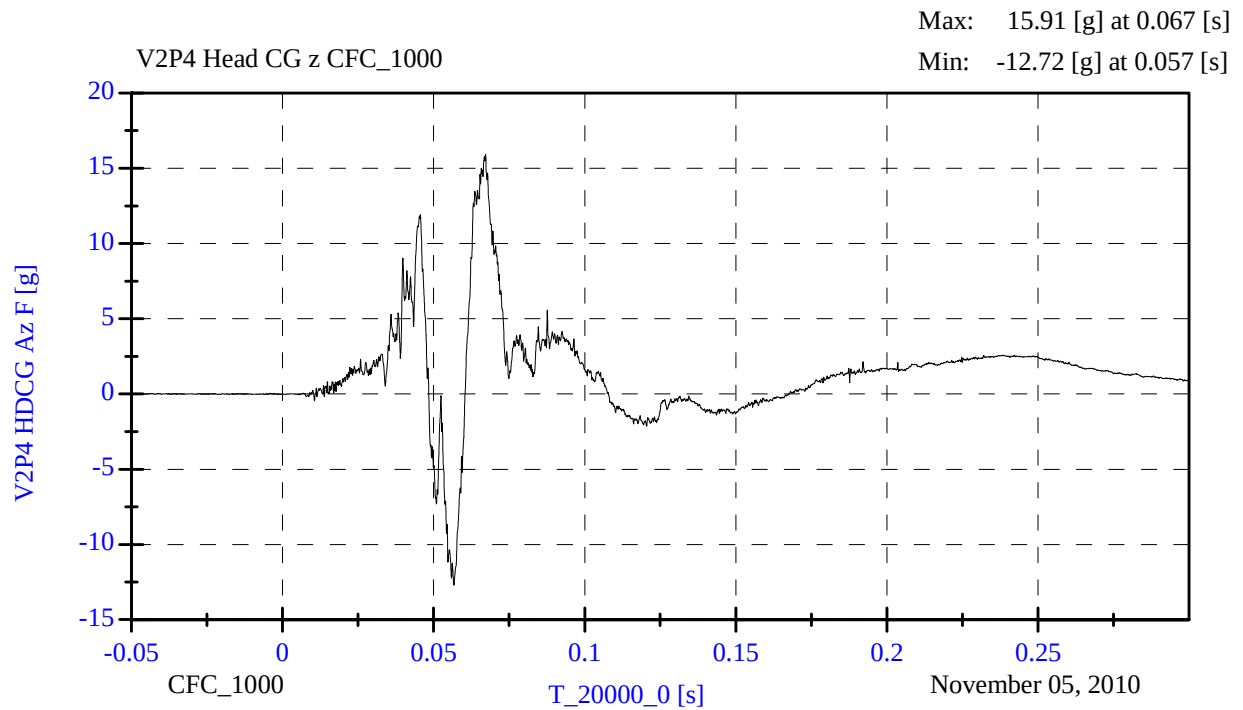
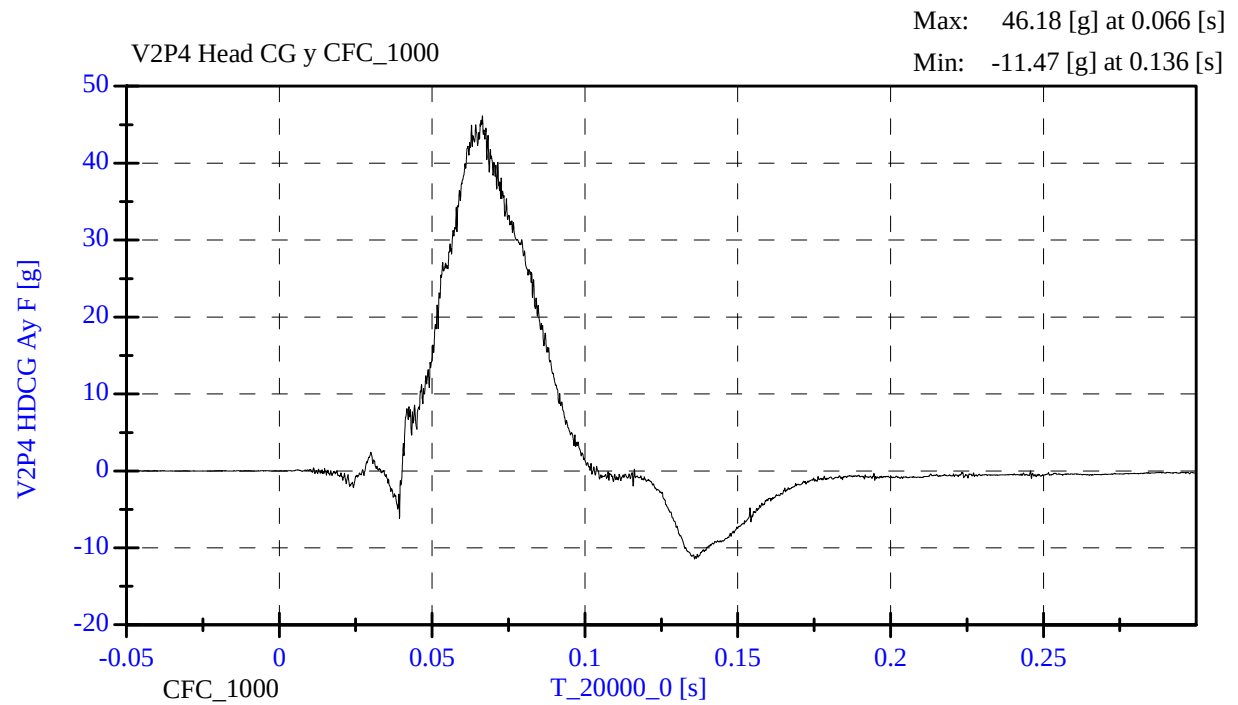


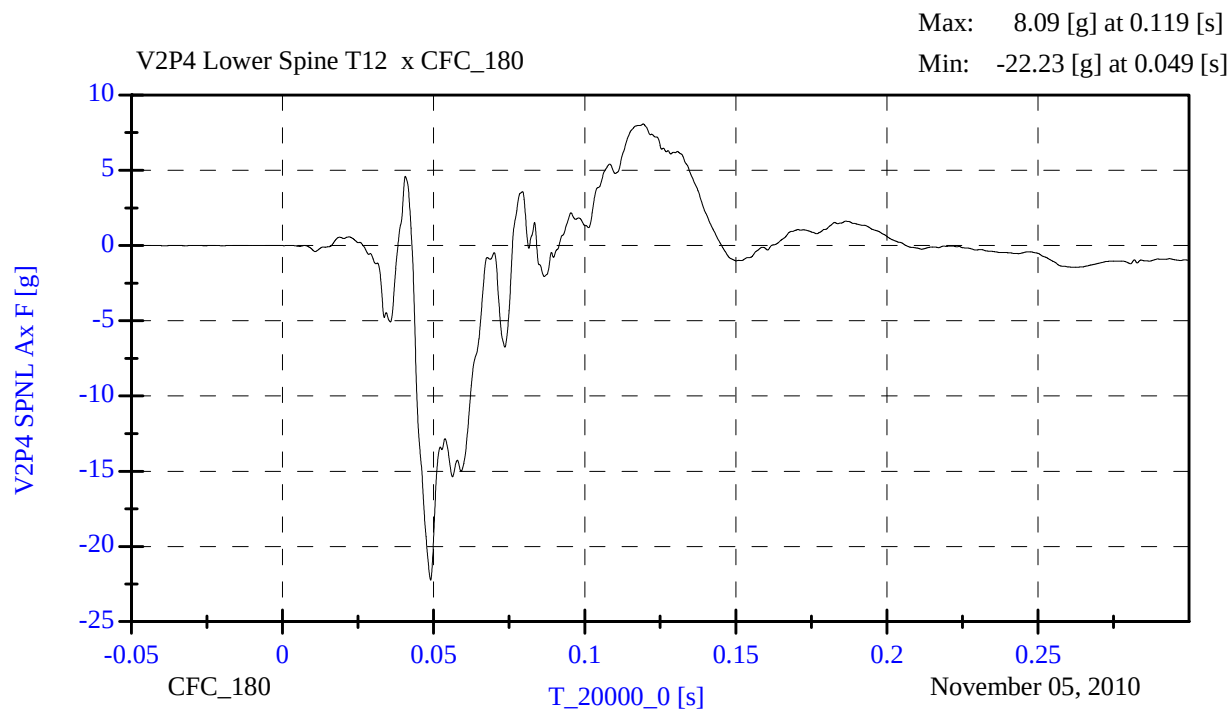
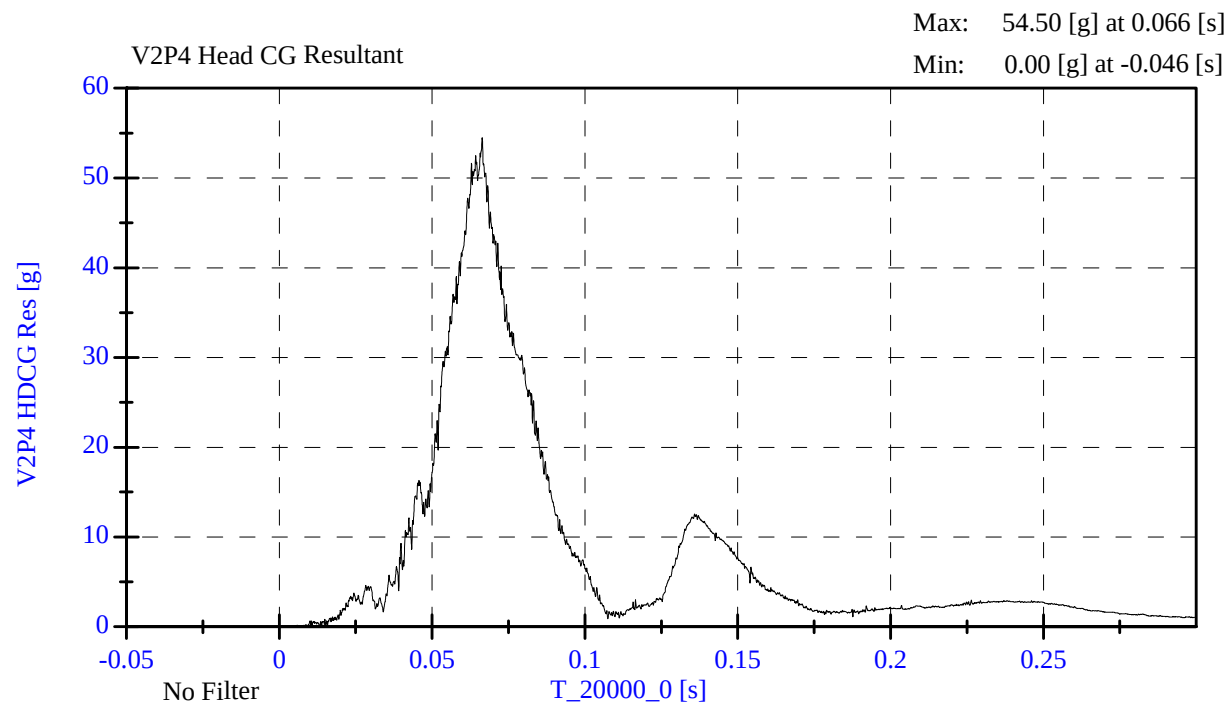


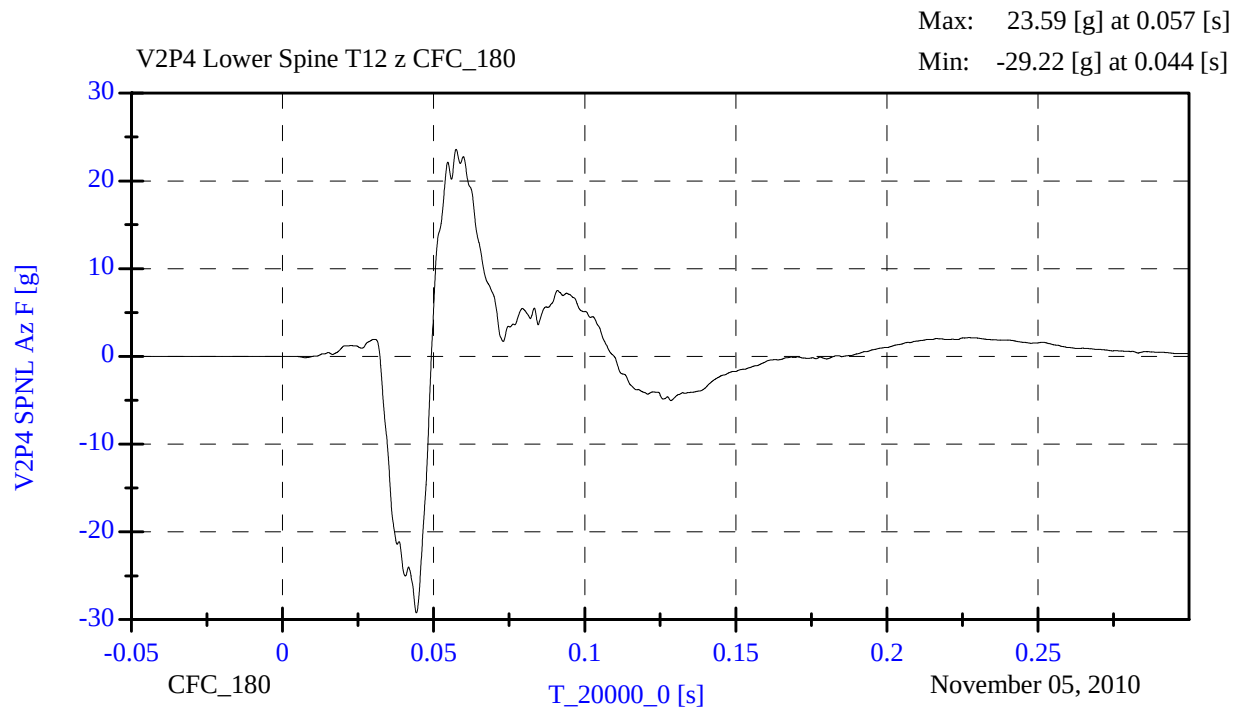
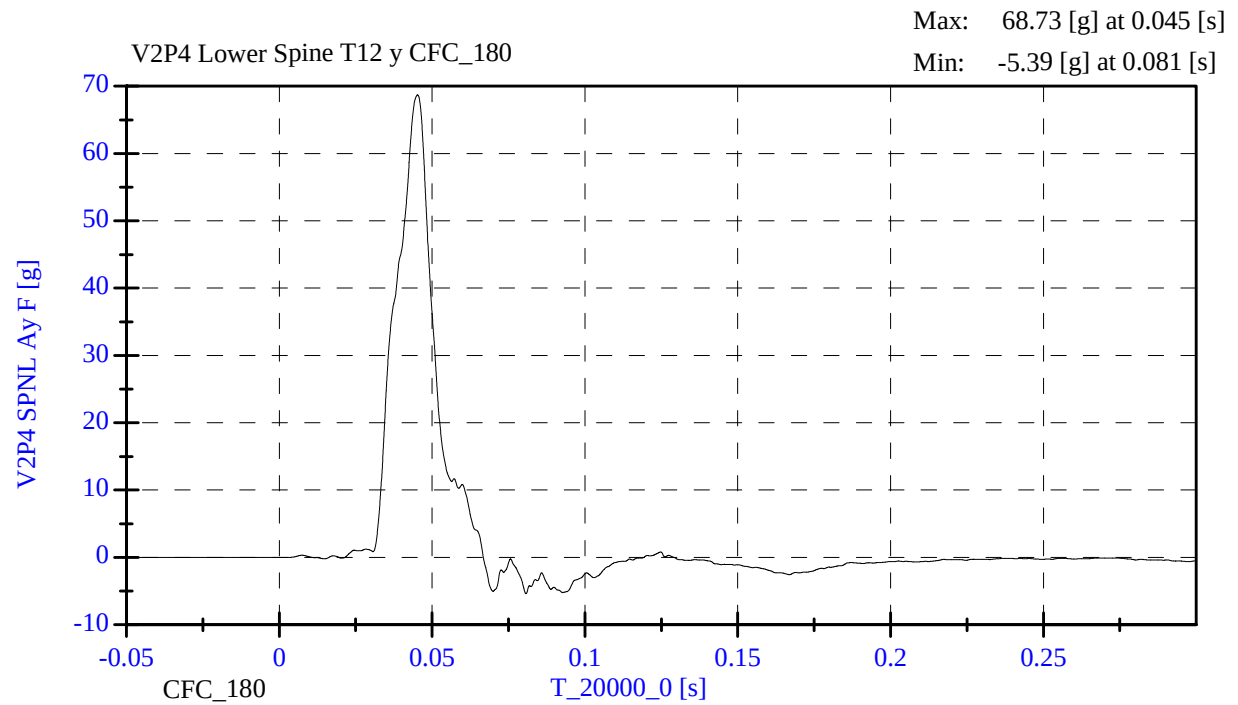


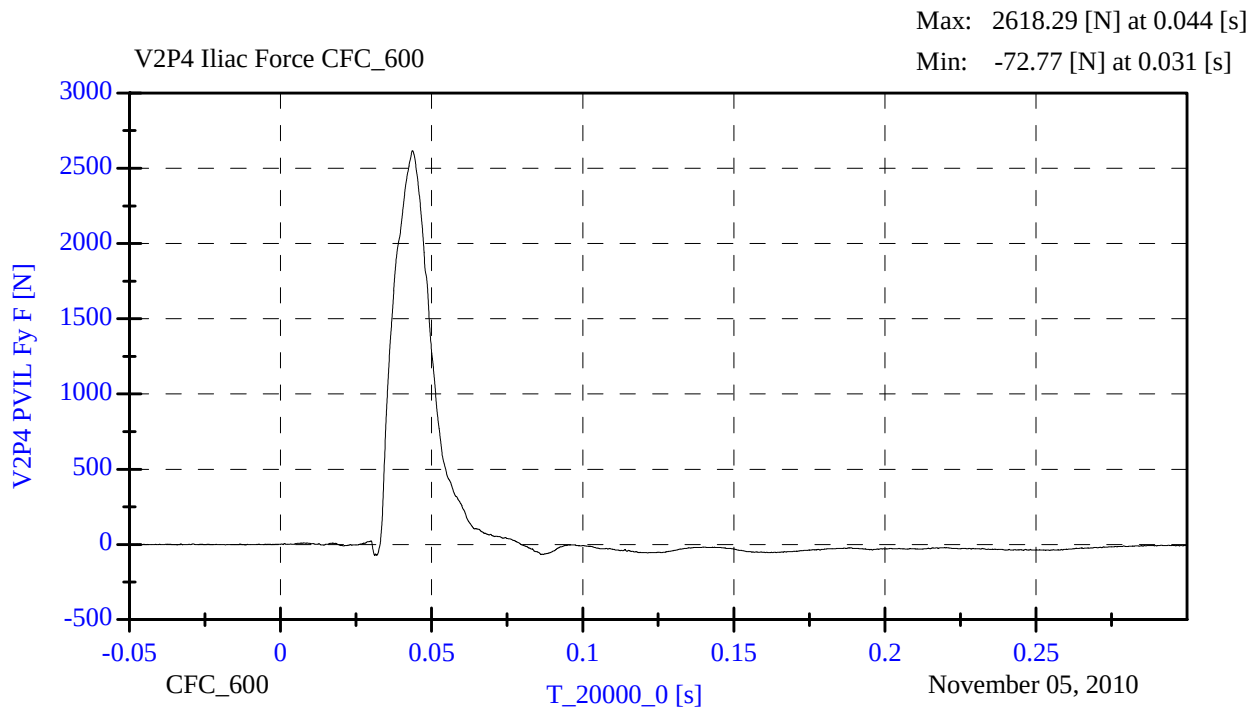
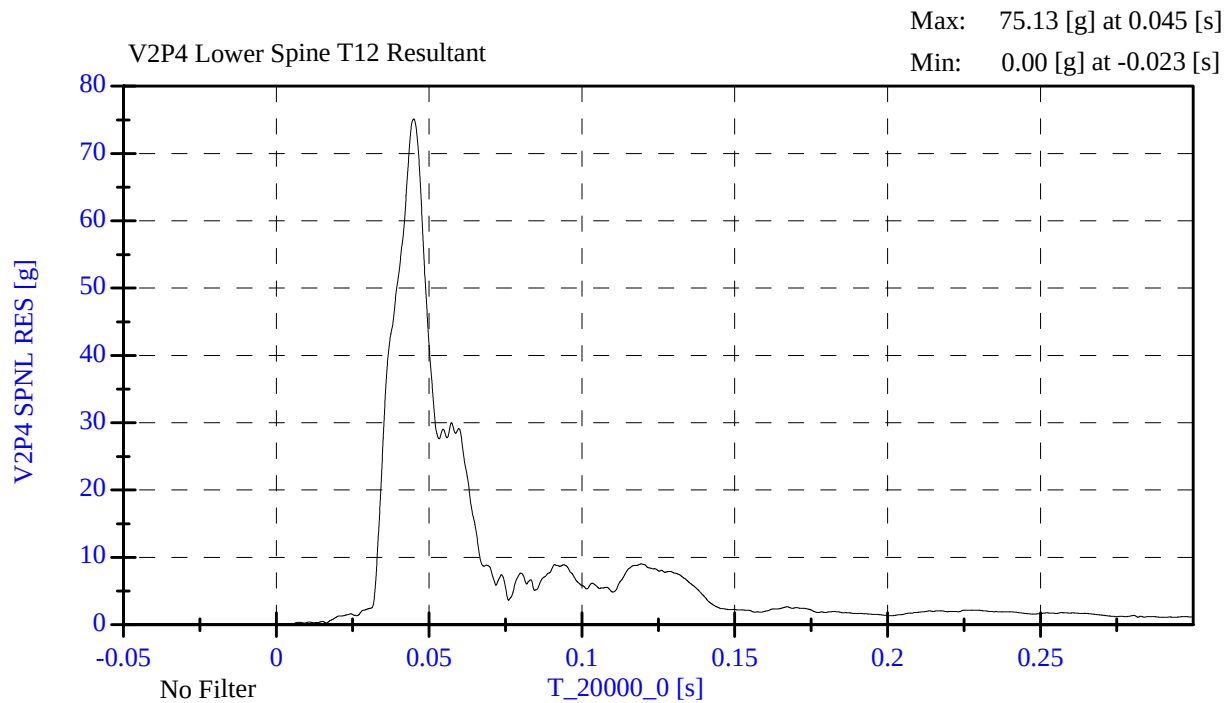


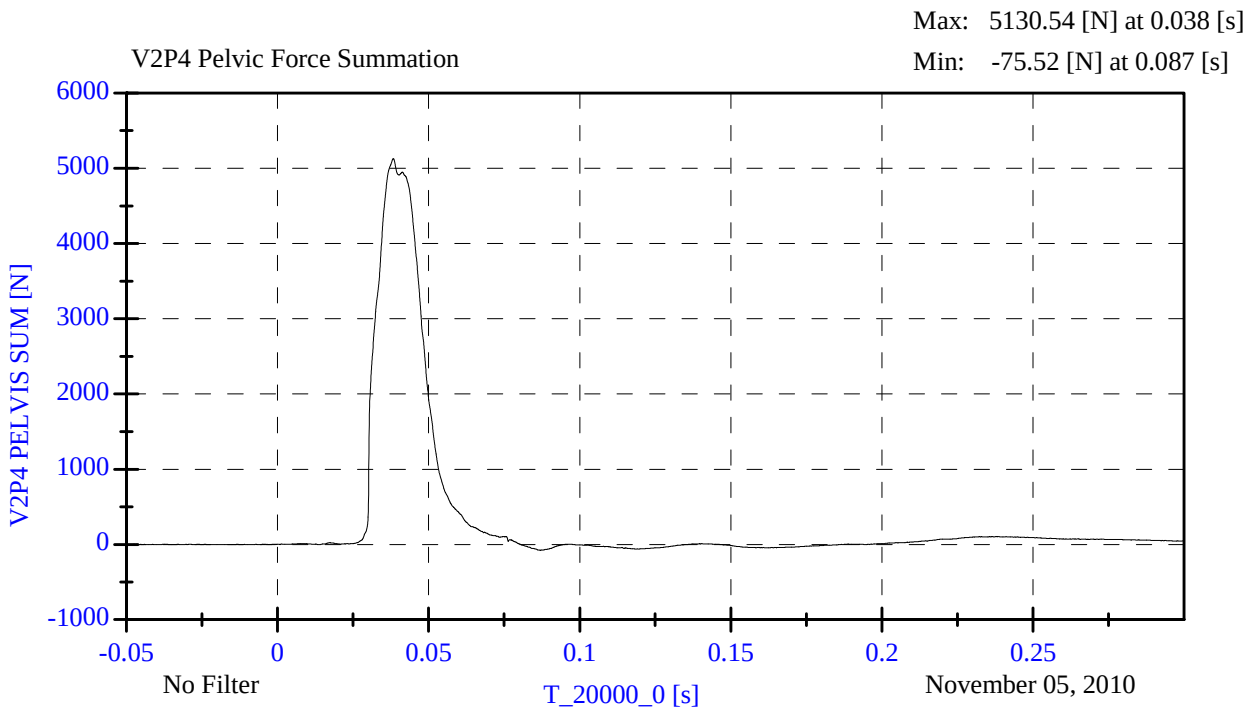
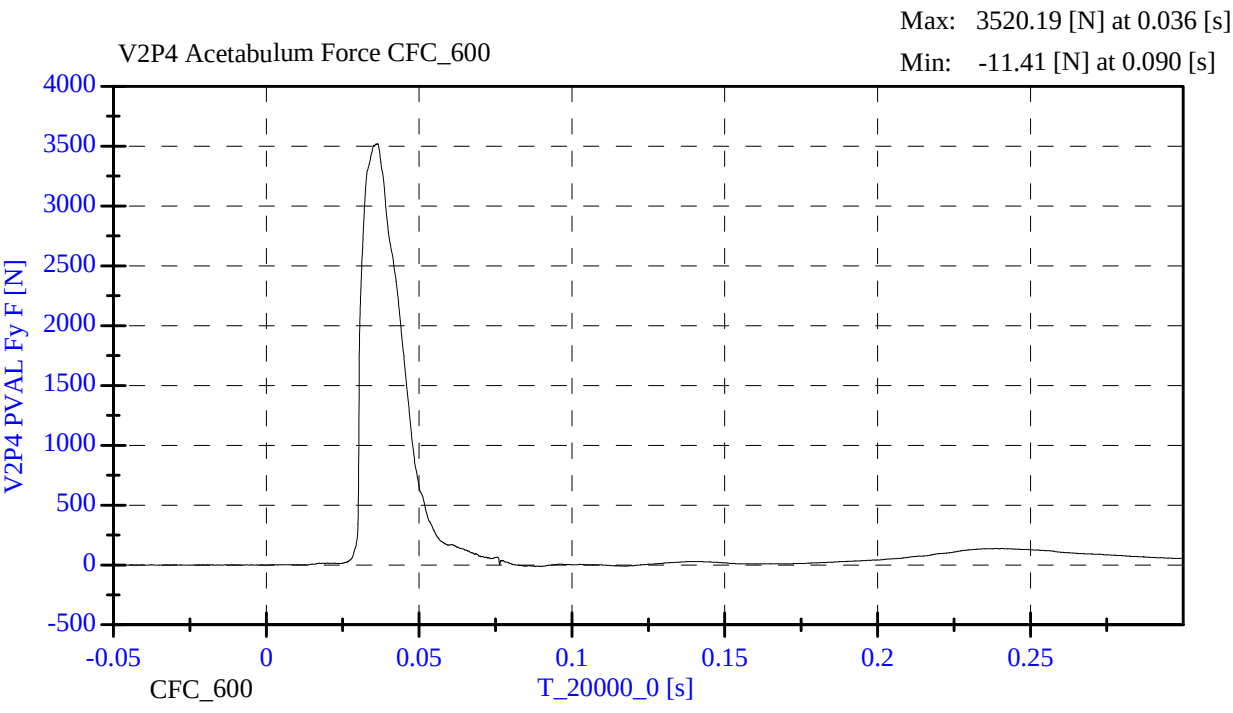












APPENDIX C
DUMMY CALIBRATION DATA

CALIBRATION TEST RESULTS

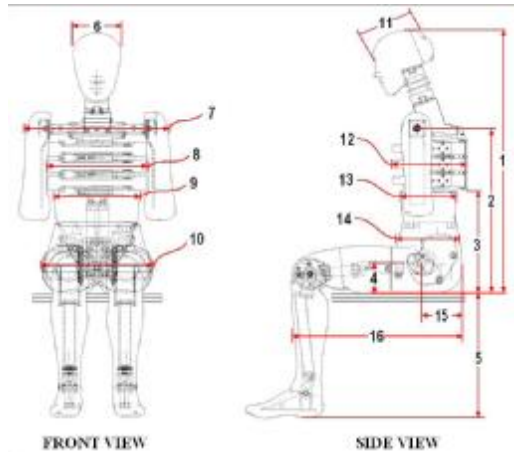
PRE-TEST

Es-2re No: 033

CONFIGURED FOR LEFT SIDE IMPACT

ES-2re External Measurements

NHTSA SN F033



Dim. No.	Description	Specification (mm)	Result (mm)	Pass/Fail
1	Sitting Height	900-918	909	Pass
2	Seat to Shoulder Joint	558-572	565	Pass
3	Seat to Lower Face of Thoracic Spine Box	346-356	354	Pass
4	Seat to Hip Joint (center of bolt)	97-103	100	Pass
5	Sole to Seat, Sitting	433-451	444	Pass
6	Head Width	152-158	158	Pass
7	Shoulder/Arm Width	461-479	470	Pass
8	Thorax Width	322-332	323	Pass
9	Abdomen Width	273-287	282	Pass
10	Pelvis Lap Width	359-373	369	Pass
11	Head Depth	196-206	201	Pass
12	Thorax Depth	262-272	267	Pass
13	Abdomen Depth	194-204	199	Pass
14	Pelvis Depth	235-245	239	Pass
15	Back of Buttocks to Hip Joint (center of bolt)	150-160	157	Pass
16	Back of Buttocks to Front Knee	597-615	603	Pass

Technician: SZ

Date: 11/2/2010



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Calspan - Transportation Research Group

4455 Genesee Street, Buffalo, New York 14225 - Phone (716)632-7500

VERIFICATION REPORT

Test Name:	Head Drop	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Head Drop	Test Date:	11/1/2010
Test Number:	1	Test Time:	2:39:57 PM

Component Part Number	Component Serial Number
455-1007	8473

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.2 deg C P
Humidity	10 -- 70	23 %RH P
Resultant Acceleration	125 -- 155	146 g P
Oscillation	0.0 -- 15.0	8.3 % P
Fore-Aft Acceleration	-15.00 -- 15.00	5.72 g P

All test parameters are within specifications

Technician: **A. Rudniski** Signature: _____
Supervisor: **D. Travale** Signature: _____

Test ID: **Head Drop**

Test Time: **2:39:57 PM**

Test Date: **11/1/2010**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Endevco	7264-2000	P51681	9/20/2010
Endevco	7264-2000	P51949	5/26/2010
Endevco	7264-2000	P51695	9/20/2010

Test ID: **Head Drop**

Test Time: **2:39:57 PM**

Test Date: **11/1/2010**

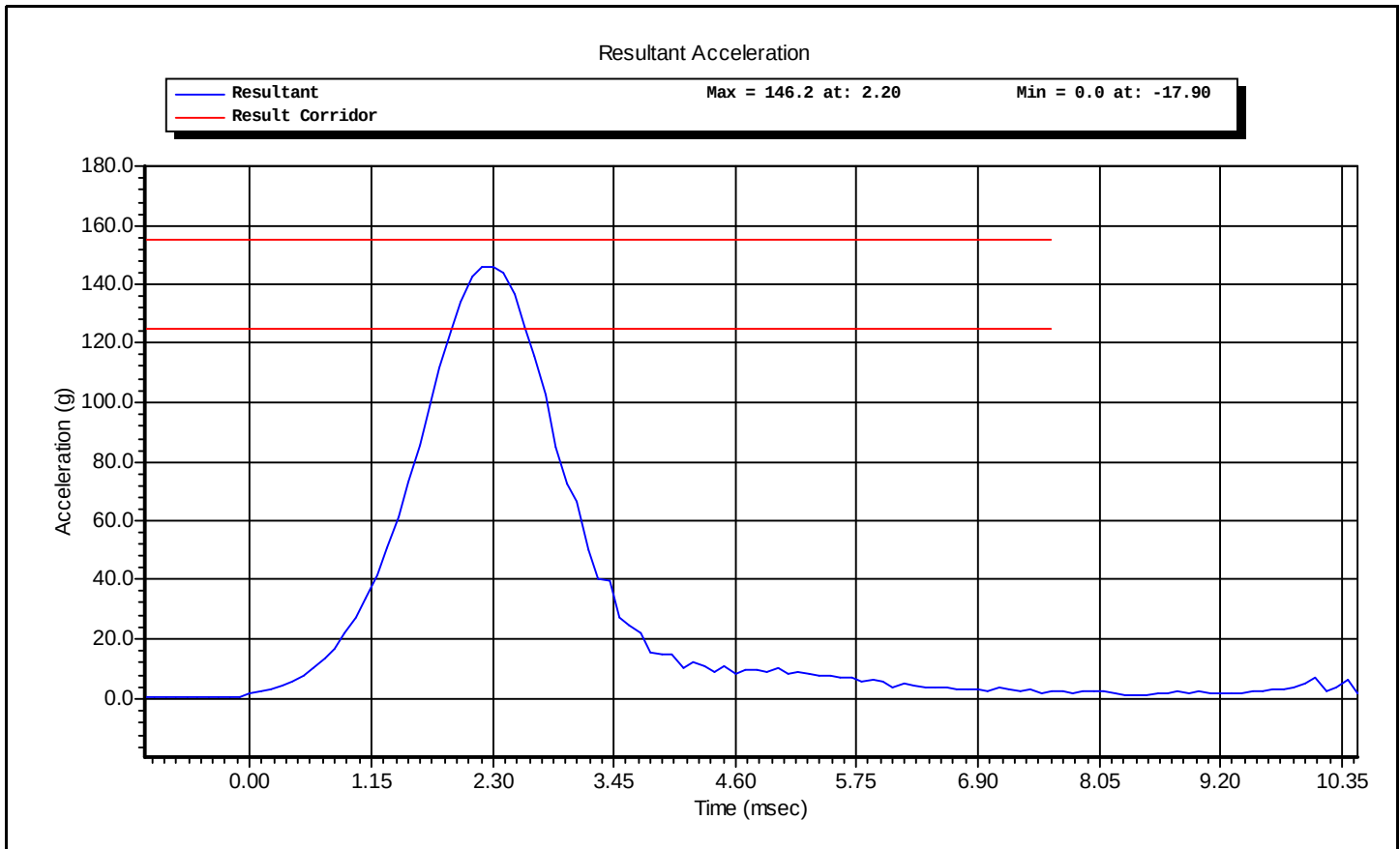


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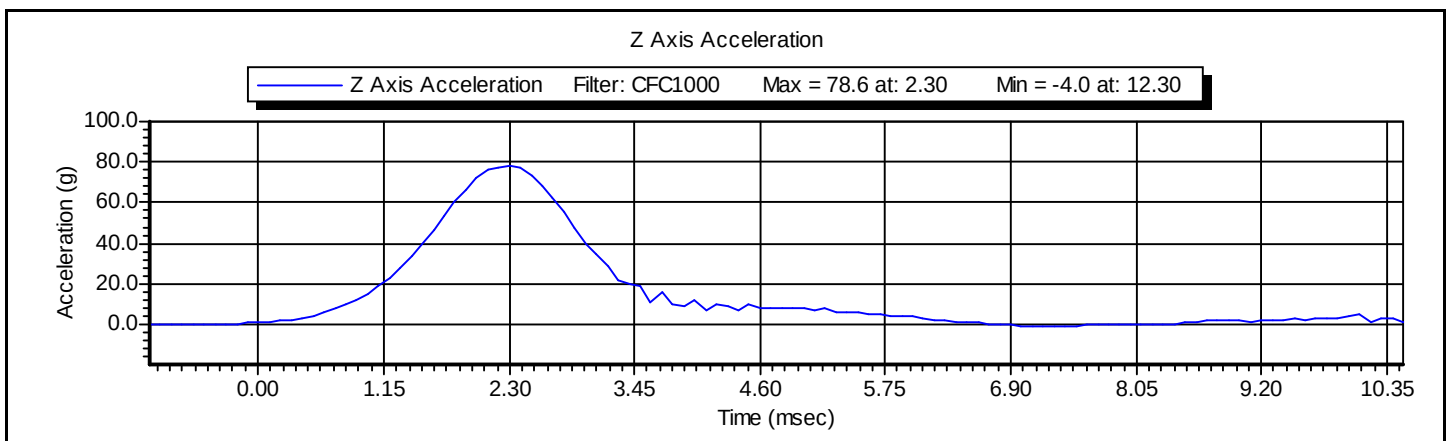
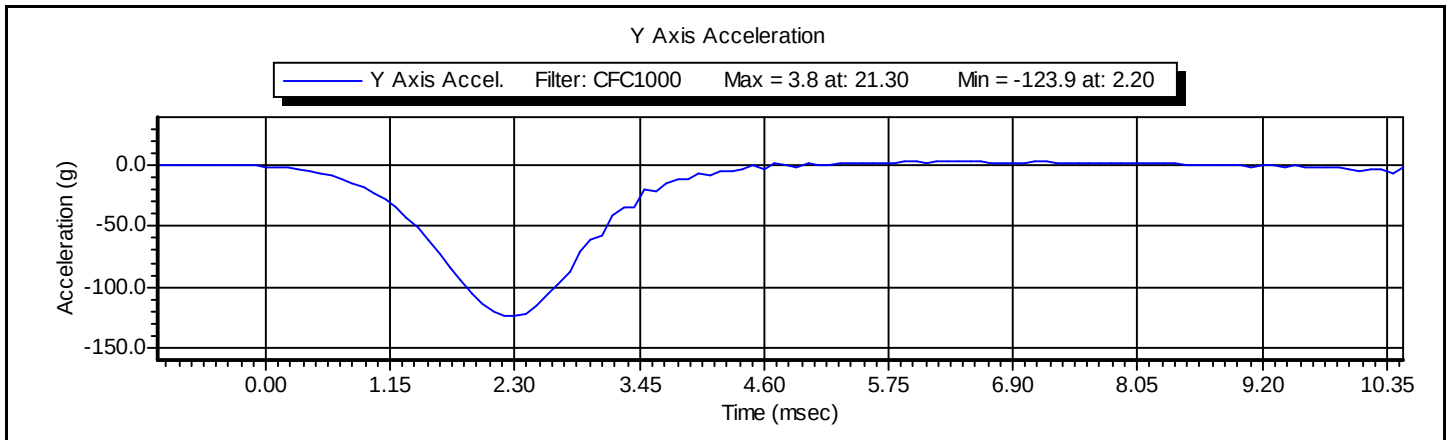
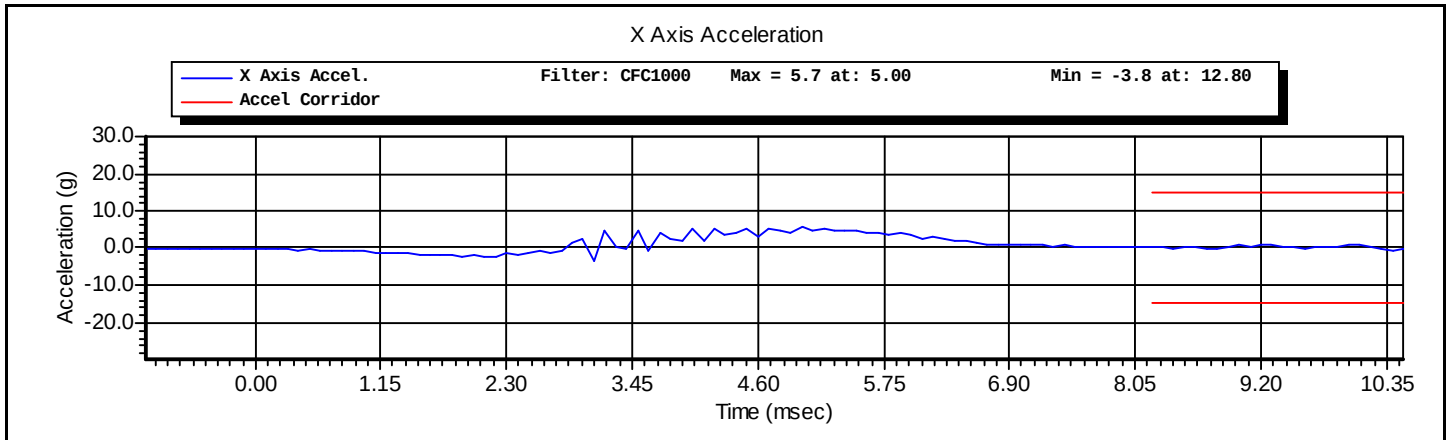
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Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Head Drop	Test Date:	11/1/2010
Test Number:	1	Test Time:	2:39:57 PM



Test ID: **Head Drop**

Test Time: **2:39:57 PM**

Test Date: **11/1/2010**





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VERIFICATION REPORT

Test Name:	Neck Flexion	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	Fo33		
Test ID:	Neck Flexion	Test Date:	11/1/2010
Test Number:	1	Test Time:	3:22:38 PM

Component Part Number	Component Serial Number
455-2002	07085

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.2 deg C P
Humidity	10 -- 70	23 %RH P
Velocity	3.30 -- 3.50	3.43 m/s P
Maximum Neck Flexion Angle	49.0 -- 59.0	51.2 degrees P
Time At Maximum Neck Flexion	54.0 -- 66.0	55.6 ms P
Decay to Zero Degrees	53.0 -- 88.0	61.6 ms P
Velocity Corridor	--	P

All test parameters are within specifications

Technician: **A. Rudniski** Signature: _____

Supervisor: **D. Travale** Signature: _____

Test ID: **Neck Flexion**

Test Time: **3:22:38 PM**

Test Date: **11/1/2010**



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4455 Genesee Street, Buffalo, New York 14225 - Phone (716)632-7500

VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2010
Endevco	7231CT	C16510	5/10/2010
DentonATD	7000428	094	4/27/2010
DentonATD	7000428	095	4/27/2010
DentonATD	7000428	093	4/27/2010

Test ID: **Neck Flexion**

Test Time: **3:22:38 PM**

Test Date: **11/1/2010**



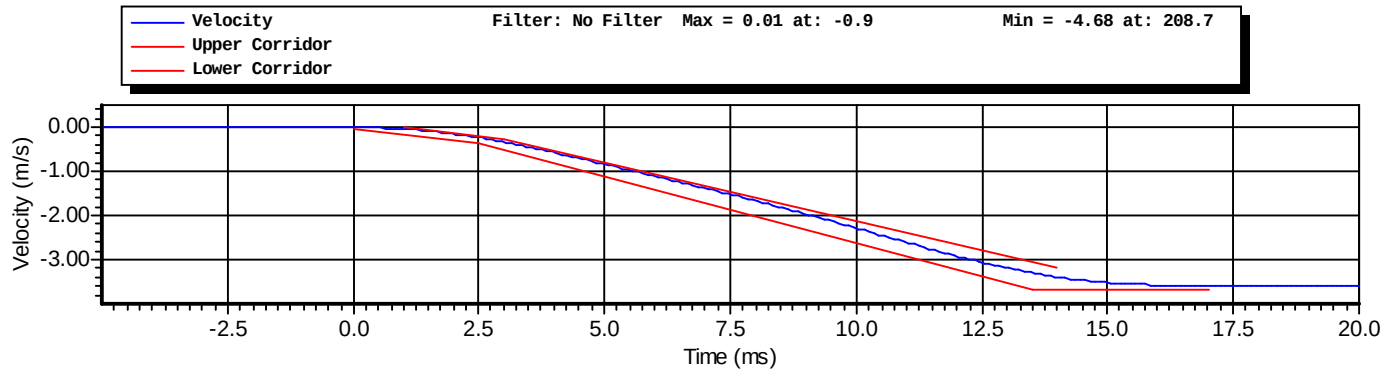
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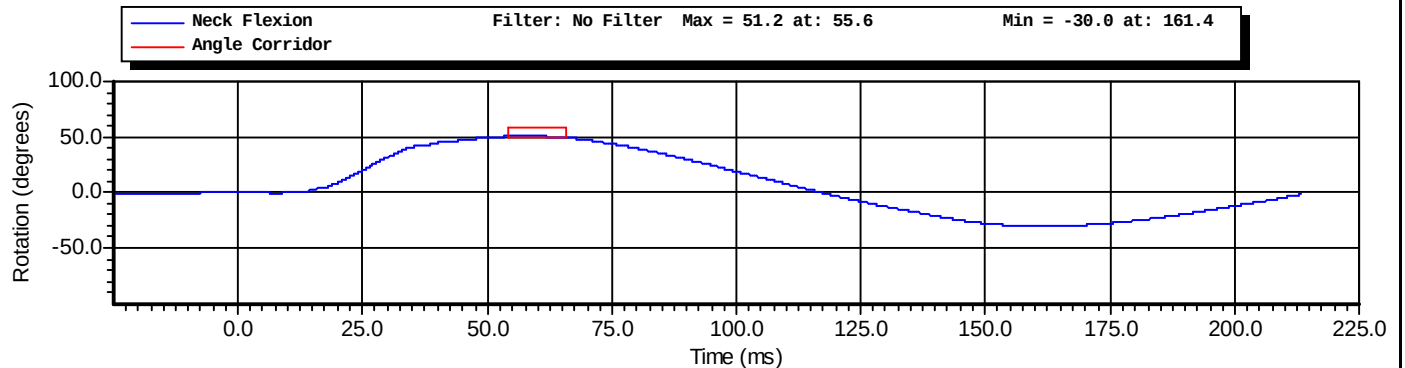
4455 Genesee Street, Buffalo, New York 14225 - Phone (716)632-7500

Test Name:	Neck Flexion	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	Fo33		
Test ID:	Neck Flexion	Test Date:	11/1/2010
Test Number:	1	Test Time:	3:22:38 PM

Pendulum Velocity



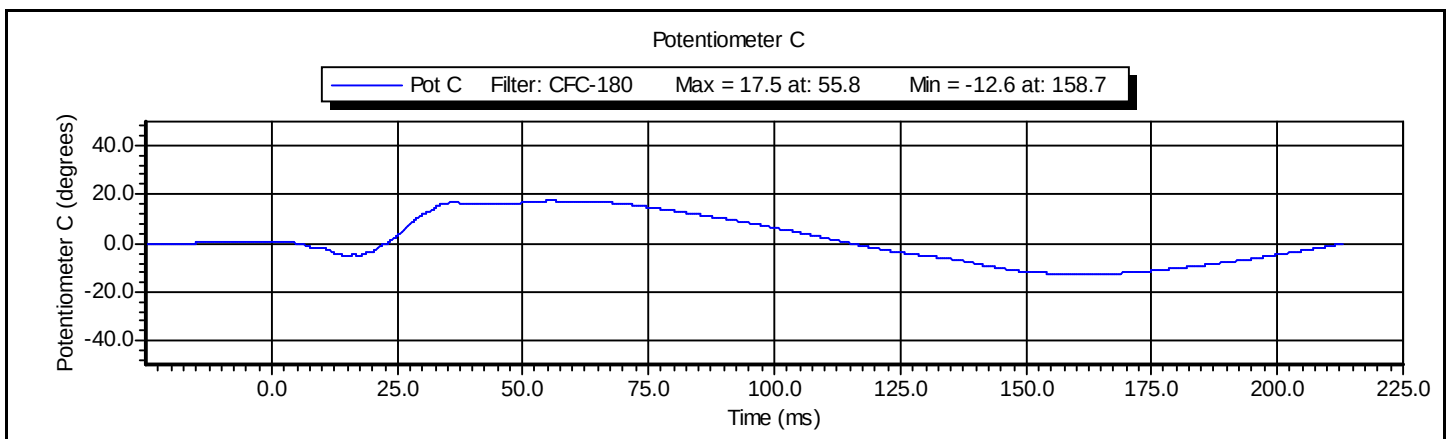
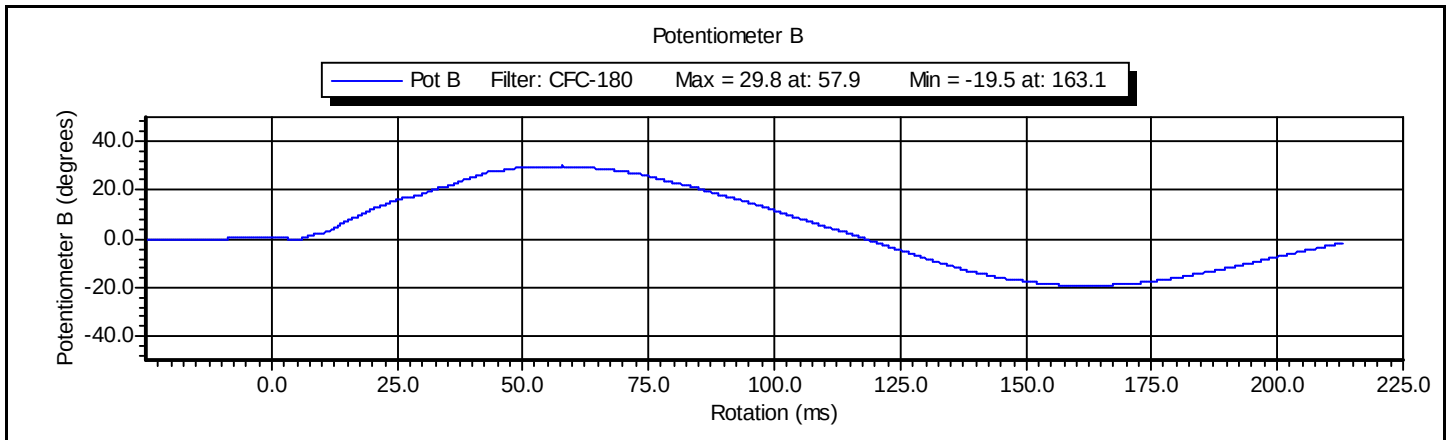
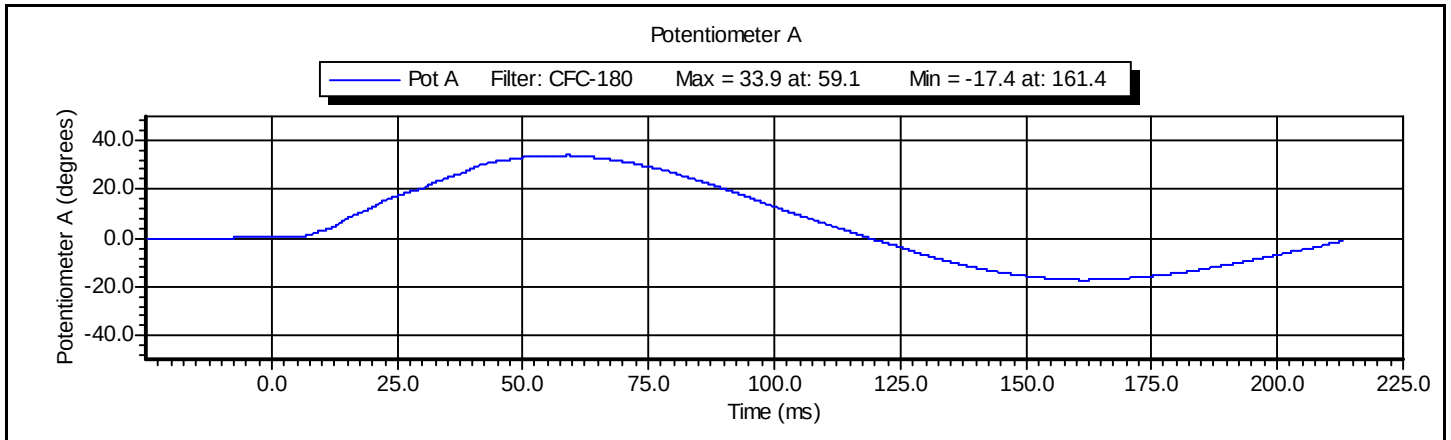
Neck Flexion Angle



Test ID: **Neck Flexion**

Test Time: **3:22:38 PM**

Test Date: **11/1/2010**





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VERIFICATION REPORT

Test Name:	Shoulder Impact	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Shoulder	Test Date:	11/2/2010
Test Number:	1	Test Time:	11:49:13 AM

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.0 deg C P
Humidity	10.0 -- 70.0	25.7 %RH P
Velocity	4.20 -- 4.40	4.33 m/s P
Pendulum Acceleration	-10.50 -- -7.50	-10.07 g P

All test parameters are within specifications

Technician: **A. Rudniski** Signature: _____

Supervisor: **D. Travale** Signature: _____

Test ID: **Shoulder**

Test Time: **11:49:13 AM**

Test Date: **11/2/2010**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2010
Endevco	7264-2000	P66930	10/5/2010

Test ID: **Shoulder**

Test Time: **11:49:13 AM**

Test Date: **11/2/2010**

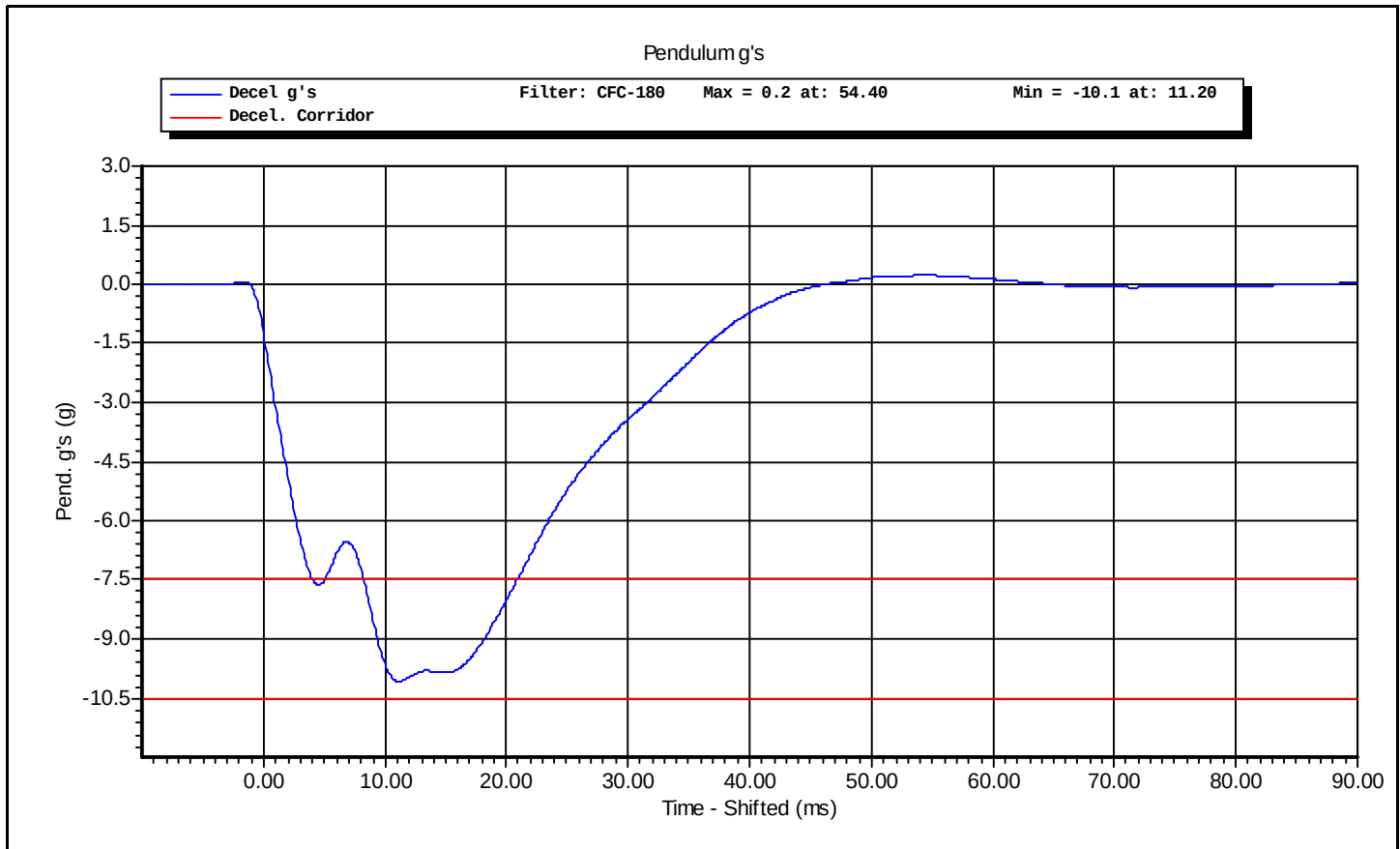


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Test Name:	Shoulder Impact	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Shoulder	Test Date:	11/2/2010
Test Number:	1	Test Time:	11:49:13 AM



Test ID: **Shoulder**

Test Time: **11:49:13 AM**

Test Date: **11/2/2010**



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VERIFICATION REPORT

Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	4.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Upper Rib 4 m/s	Test Date:	11/2/2010
Test Number:	1	Test Time:	8:32:34 AM

Component Part Number	Component Serial Number
455-3100	UPPER

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.1 deg C P
Humidity	10.0 -- 70.0	23.0 %RH P
Velocity	3.90 -- 4.10	3.99 m/s P
Rib Displacement	-51.00 -- -46.00	-48.10 mm P
Drop Height	807.0 -- 823.0	815.0 mm P

All test parameters are within specifications

Technician: **A. Rudniski** Signature: _____
Supervisor: **D. Travale** Signature: _____

Test ID: **Upper Rib 4 m/s**

Test Time: **8:32:34 AM**

Test Date: **11/2/2010**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Honeywell	MLT-38000	DS-179	4/23/2010
DentonATD	Velocity Trap	1	1/11/2010
Endevco	7264-2000	P38216	6/22/2010

Test ID: **Upper Rib 4 m/s**

Test Time: **8:32:34 AM**

Test Date: **11/2/2010**

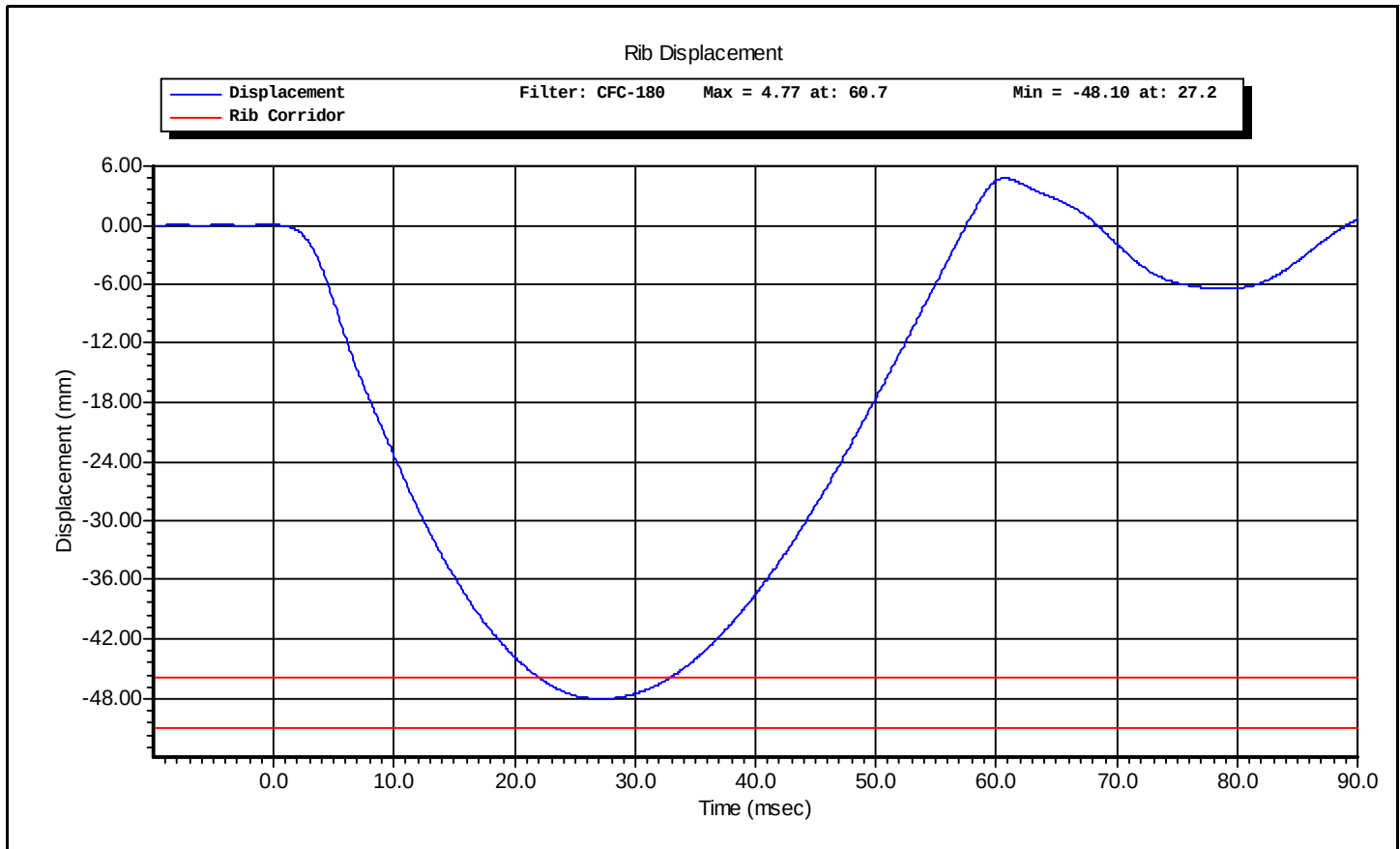


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Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	4.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Upper Rib 4 m/s	Test Date:	11/2/2010
Test Number:	1	Test Time:	8:32:34 AM



Test ID: Upper Rib 4 m/s Test Time: 8:32:34 AM

Test Date: 11/2/2010



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VERIFICATION REPORT

Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	3.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Upper Rib 3 m/s	Test Date:	11/2/2010
Test Number:	1	Test Time:	8:39:25 AM

Component Part Number	Component Serial Number
455-3100	UPPER

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.1 deg C P
Humidity	10.0 -- 70.0	23.0 %RH P
Velocity	2.90 -- 3.10	2.97 m/s P
Rib Displacement	-40.00 -- -36.00	-36.98 mm P
Drop Height	454 -- 464	459 mm P

All test parameters are within specifications

Technician: **A. Rudniski** Signature: _____

Supervisor: **D. Travale** Signature: _____

Test ID: **Upper Rib 3 m/s**

Test Time: **8:39:25 AM**

Test Date: **11/2/2010**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Honeywell	MLT-38000	DS-179	4/23/2010
DentonATD	Velocity Trap	1	1/11/2010
Endevco	7264-2000	P38216	6/22/2010

Test ID: **Upper Rib 3 m/s**

Test Time: **8:39:25 AM**

Test Date: **11/2/2010**

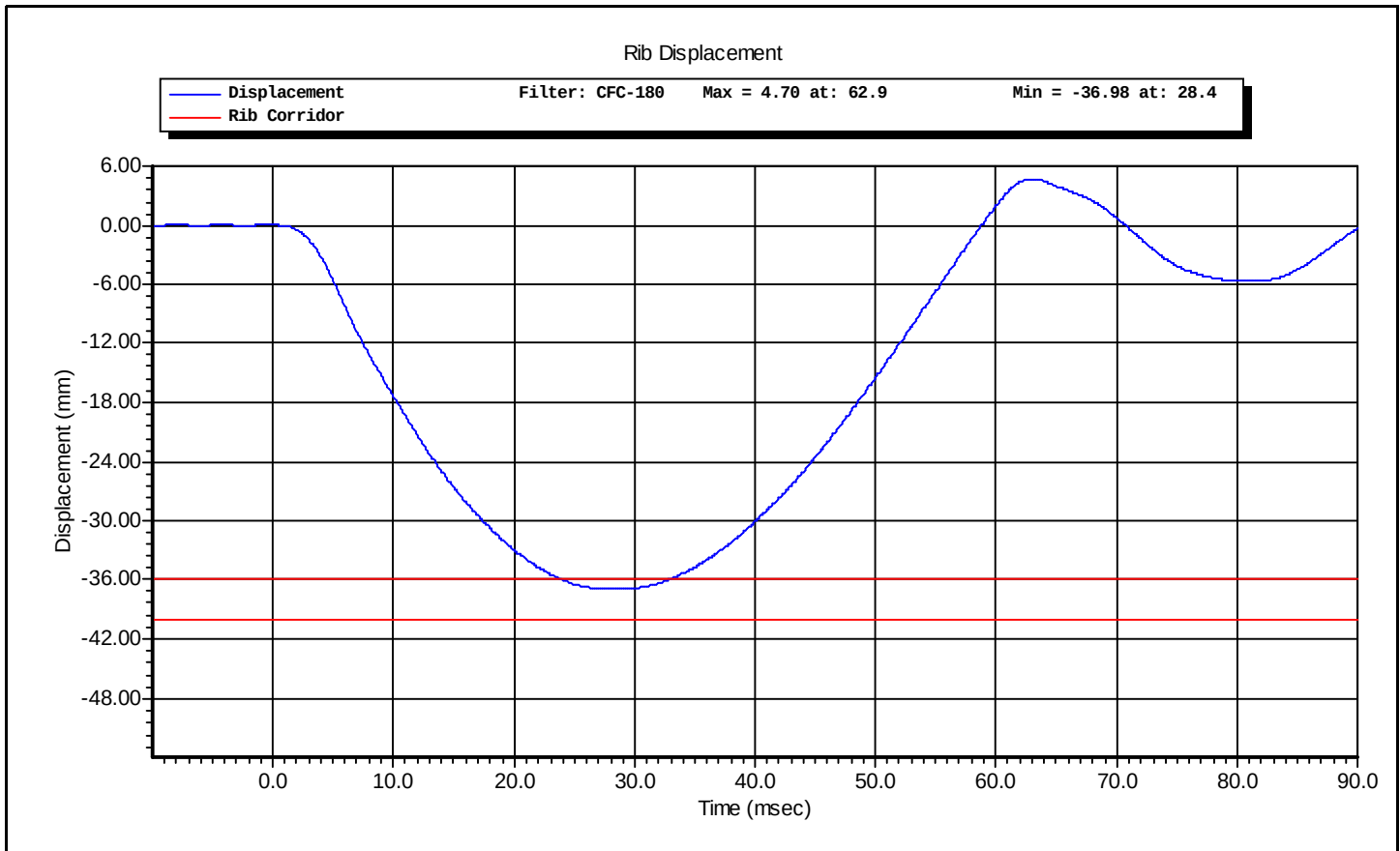


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Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	3.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Upper Rib 3 m/s	Test Date:	11/2/2010
Test Number:	1	Test Time:	8:39:25 AM



Test ID: Upper Rib 3 m/s

Test Time: 8:39:25 AM

Test Date: 11/2/2010



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VERIFICATION REPORT

Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	4.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Middle Rib 4 m/s	Test Date:	11/2/2010
Test Number:	1	Test Time:	8:47:08 AM

Component Part Number	Component Serial Number
455-3100	MIDDLE

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.1 deg C P
Humidity	10.0 -- 70.0	23.0 %RH P
Velocity	3.90 -- 4.10	3.99 m/s P
Rib Displacement	-51.00 -- -46.00	-46.32 mm P
Drop Height	807.0 -- 823.0	815.0 mm P

All test parameters are within specifications

Technician: **A. Rudniski** Signature: _____

Supervisor: **D. Travale** Signature: _____

Test ID: **Middle Rib 4 m/s** Test Time: **8:47:08 AM**

Test Date: **11/2/2010**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Honeywell	MLT-38000	DS-185	4/23/2010
DentonATD	Velocity Trap	1	1/11/2010
Endevco	7264-2000	P38216	6/22/2010

Test ID: **Middle Rib 4 m/s**

Test Time: **8:47:08 AM**

Test Date: **11/2/2010**

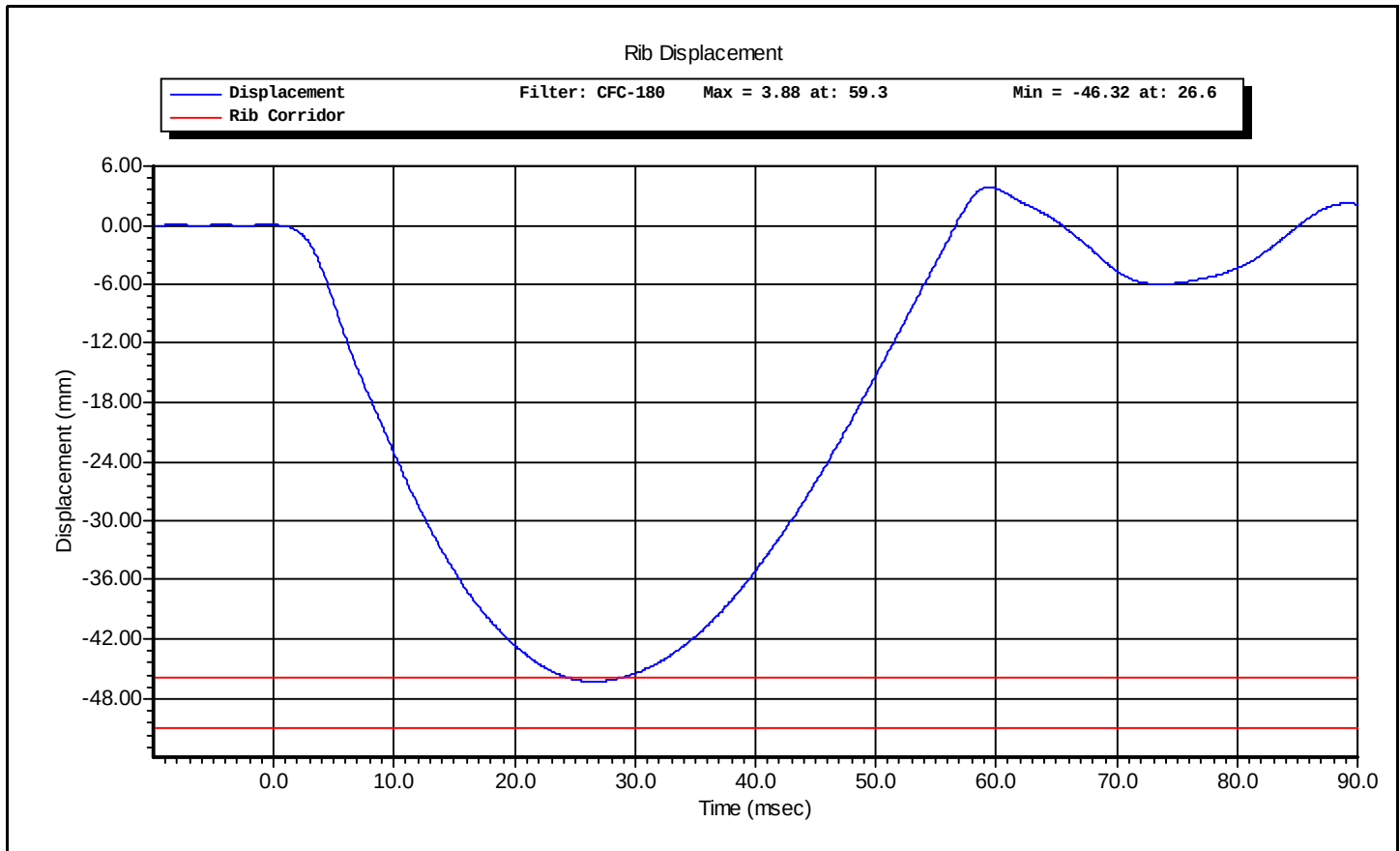


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Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	4.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Middle Rib 4 m/s	Test Date:	11/2/2010
Test Number:	1	Test Time:	8:47:08 AM



Test ID: Middle Rib 4 m/s Test Time: 8:47:08 AM

Test Date: 11/2/2010



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VERIFICATION REPORT

Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	3.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Middle Rib 3 m/s	Test Date:	11/2/2010
Test Number:	1	Test Time:	8:53:33 AM

Component Part Number	Component Serial Number
455-3100	MIDDLE

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.1 deg C P
Humidity	10.0 -- 70.0	23.0 %RH P
Velocity	2.90 -- 3.10	2.98 m/s P
Rib Displacement	-40.00 -- -36.00	-36.73 mm P
Drop Height	454 -- 464	459 mm P

All test parameters are within specifications

Technician: **A. Rudniski** Signature: _____
Supervisor: **D. Travale** Signature: _____

Test ID: **Middle Rib 3 m/s** Test Time: **8:53:33 AM**

Test Date: **11/2/2010**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Honeywell	MLT-38000	DS-185	4/23/2010
DentonATD	Velocity Trap	1	1/11/2010
Endevco	7264-2000	P38216	6/22/2010

Test ID: **Middle Rib 3 m/s**

Test Time: **8:53:33 AM**

Test Date: **11/2/2010**

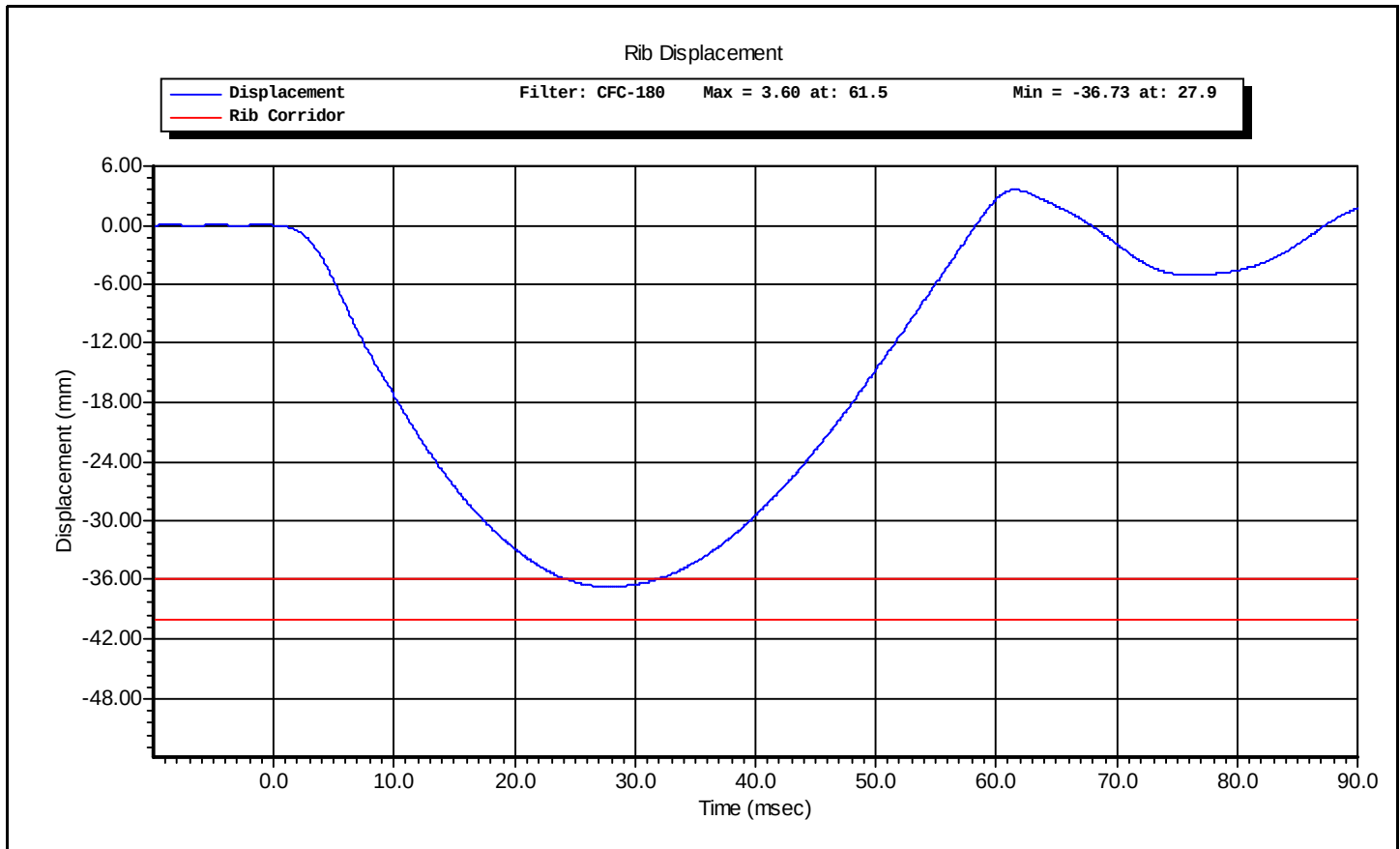


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Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	3.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Middle Rib 3 m/s	Test Date:	11/2/2010
Test Number:	1	Test Time:	8:53:33 AM



Test ID: Middle Rib 3 m/s Test Time: 8:53:33 AM

Test Date: 11/2/2010



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VERIFICATION REPORT

Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	4.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Lower Rib 4 m/s	Test Date:	11/2/2010
Test Number:	1	Test Time:	9:09:05 AM

Component Part Number	Component Serial Number
455-3100	LOWER

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	20.6 deg C P
Humidity	10.0 -- 70.0	24.0 %RH P
Velocity	3.90 -- 4.10	3.97 m/s P
Rib Displacement	-51.00 -- -46.00	-47.55 mm P
Drop Height	807.0 -- 823.0	815.0 mm P

All test parameters are within specifications

Technician: **S. Zito** Signature: _____

Supervisor: **D. Travale** Signature: _____

Test ID: **Lower Rib 4 m/s**

Test Time: **9:09:05 AM**

Test Date: **11/2/2010**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Honeywell	MLT-38000	DS-178	4/23/2010
DentonATD	Velocity Trap	1	1/11/2010
Endevco	7264-2000	P38216	6/22/2010

Test ID: **Lower Rlb 4 m/s**

Test Time: **9:09:05 AM**

Test Date: **11/2/2010**

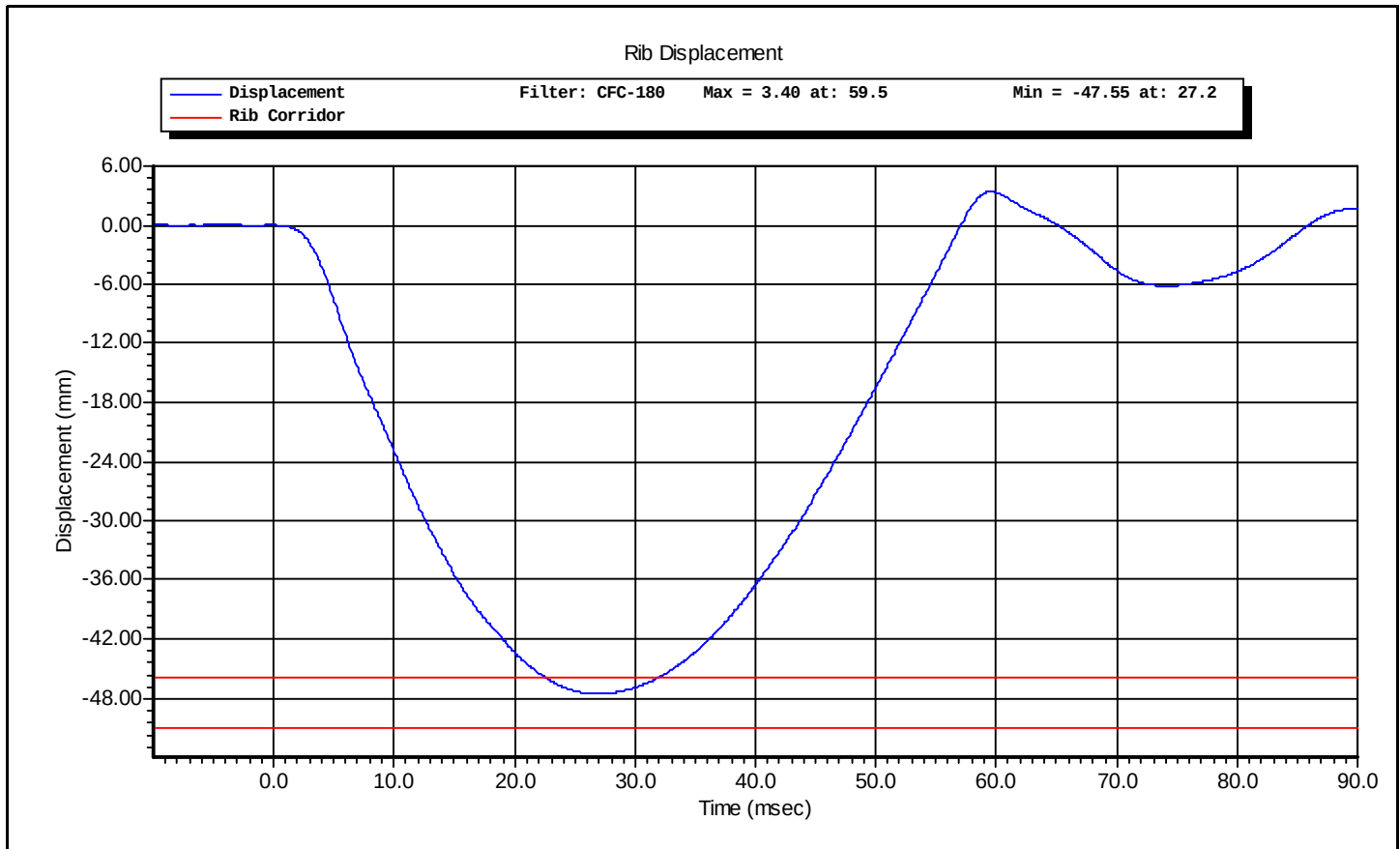


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Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	4.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Lower Rib 4 m/s	Test Date:	11/2/2010
Test Number:	1	Test Time:	9:09:05 AM



Test ID: Lower Rib 4 m/s Test Time: 9:09:05 AM

Test Date: 11/2/2010



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VERIFICATION REPORT

Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	3.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Lower 3 m/s	Test Date:	11/2/2010
Test Number:	1	Test Time:	9:17:19 AM

Component Part Number	Component Serial Number
455-3100	LOWER

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	20.6 deg C P
Humidity	10.0 -- 70.0	24.0 %RH P
Velocity	2.90 -- 3.10	2.98 m/s P
Rib Displacement	-40.00 -- -36.00	-36.84 mm P
Drop Height	454 -- 464	459 mm P

All test parameters are within specifications

Technician: _____ Signature: _____

Supervisor: _____ Signature: _____

Test ID: **Lower 3 m/s**

Test Time: **9:17:19 AM**

Test Date: **11/2/2010**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Honeywell	MLT-38000	DS-178	4/23/2010
DentonATD	Velocity Trap	1	1/11/2010
Endevco	7264-2000	P38216	6/22/2010

Test ID: **Lower 3 m/s**

Test Time: **9:17:19 AM**

Test Date: **11/2/2010**

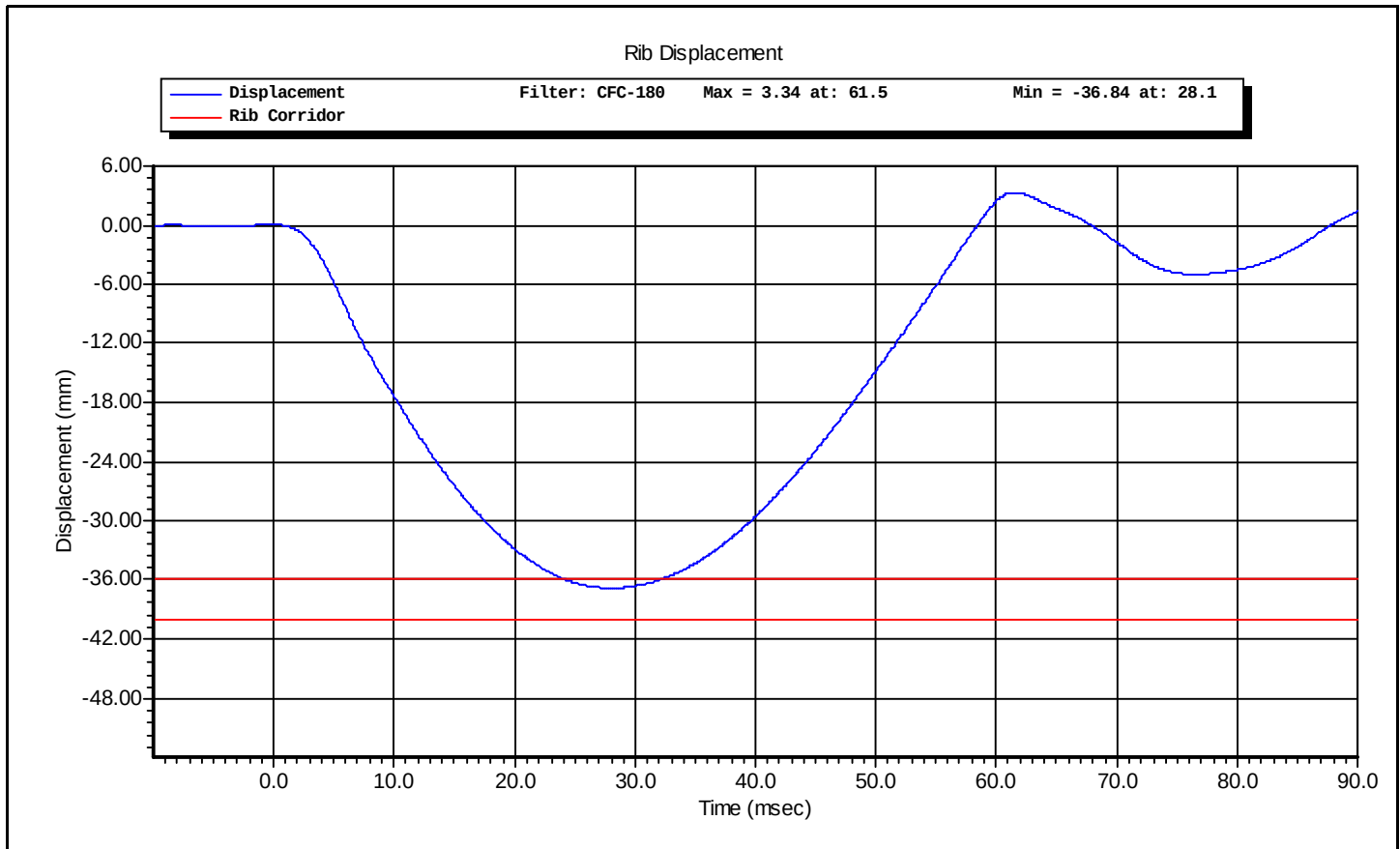


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Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	3.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Lower 3 m/s	Test Date:	11/2/2010
Test Number:	1	Test Time:	9:17:19 AM



Test ID: Lower 3 m/s

Test Time: 9:17:19 AM

Test Date: 11/2/2010



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VERIFICATION REPORT

Test Name:	Thorax Impact	Revision:	8/15/2008
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Thorax	Test Date:	11/2/2010
Test Number:	1	Test Time:	11:28:06 AM

Test Parameters	Test Specifications			Test Results	
Temperature	20.6	--	22.2	20.9 deg C	P
Humidity	10.0	--	70.0	26.0 %RH	P
Velocity	5.40	--	5.60	5.50 m/s	P
Upper Rib Displacement	34.0	--	41.0	36.5 mm	P
Middle Rib Displacement	37.0	--	45.0	41.1 mm	P
Lower Rib Displacement	37.0	--	44.0	41.3 mm	P
Impactor Force	5100	--	6200	5570 N	P

All test parameters are within specifications

Technician: **A. Rudniski** Signature: _____
Supervisor: **D. Travale** Signature: _____

Test ID: **Thorax**

Test Time: **11:28:06 AM**

Test Date: **11/2/2010**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2010
Endevco	7264-2000	P66930	10/5/2010
Honeywell	MLT-38000	DS-179	4/23/2010
Honeywell	MLT-38000	DS-185	4/23/2010
Honeywell	MLT-38000	DS-178	4/23/2010

Test ID: **Thorax**

Test Time: **11:28:06 AM**

Test Date: **11/2/2010**

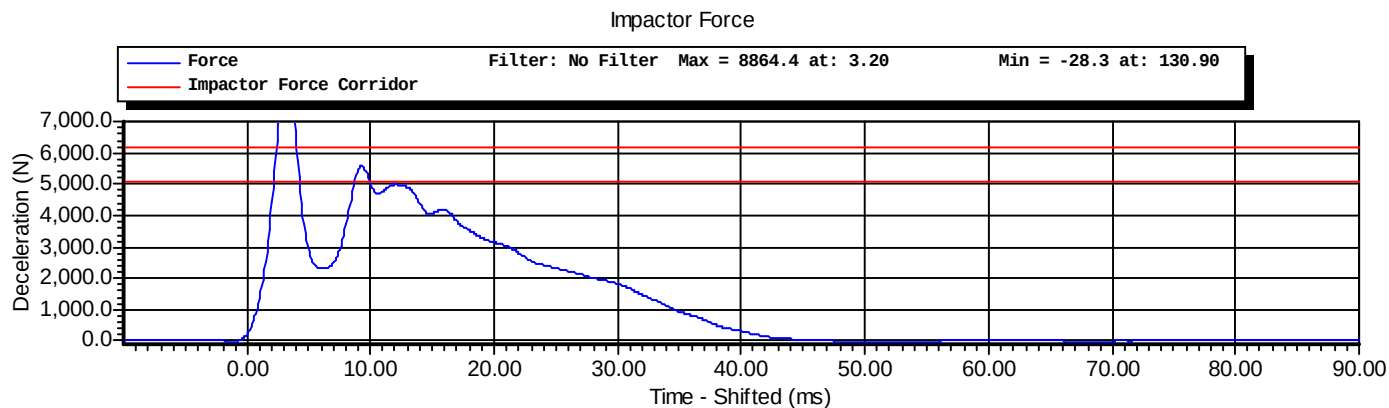
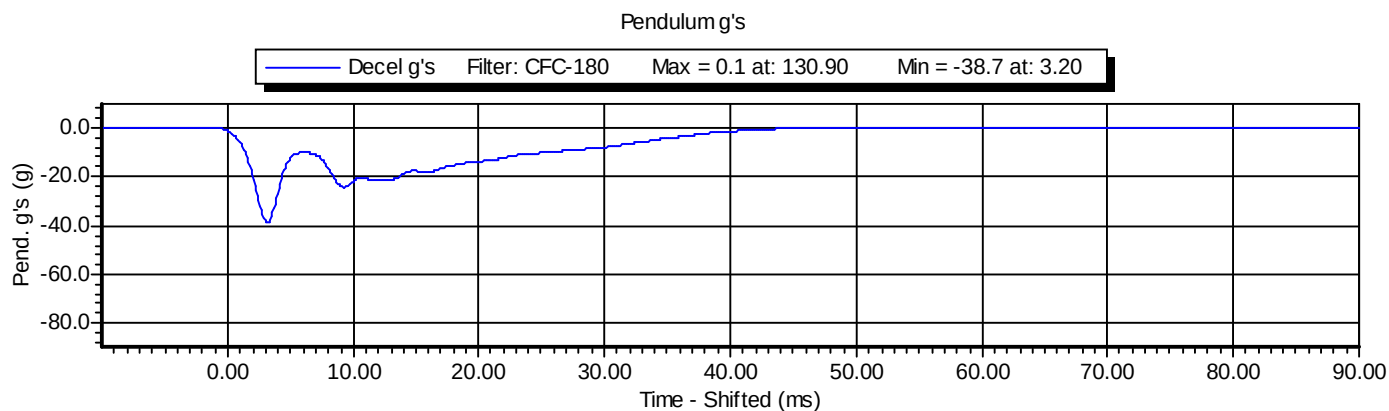


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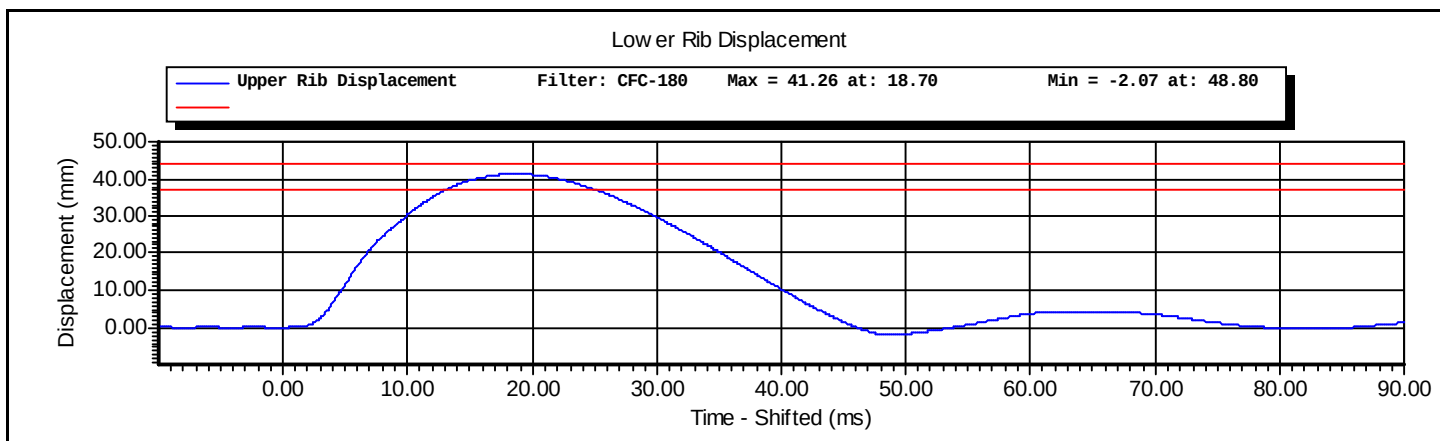
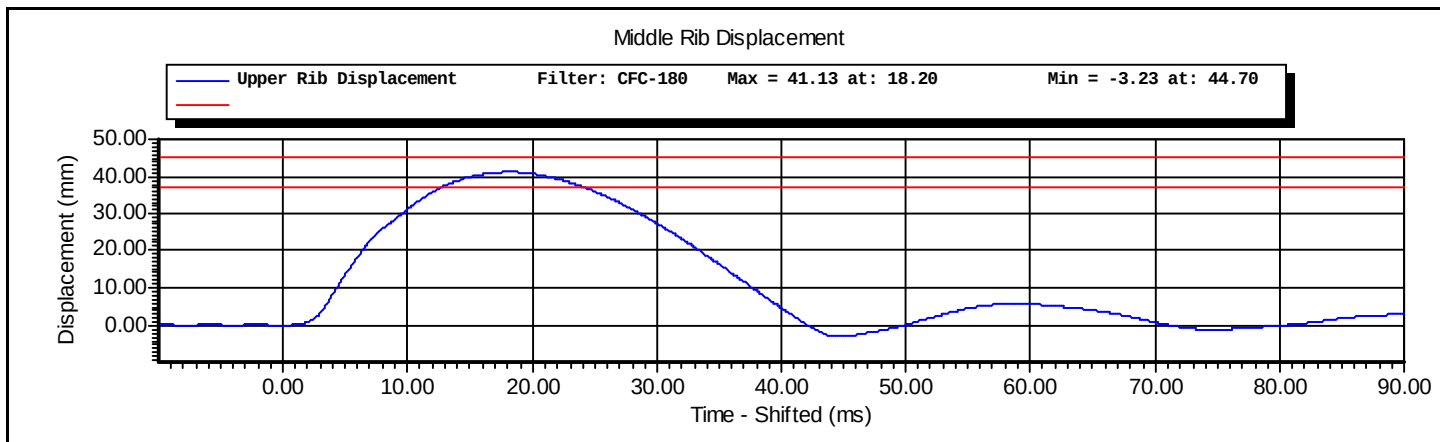
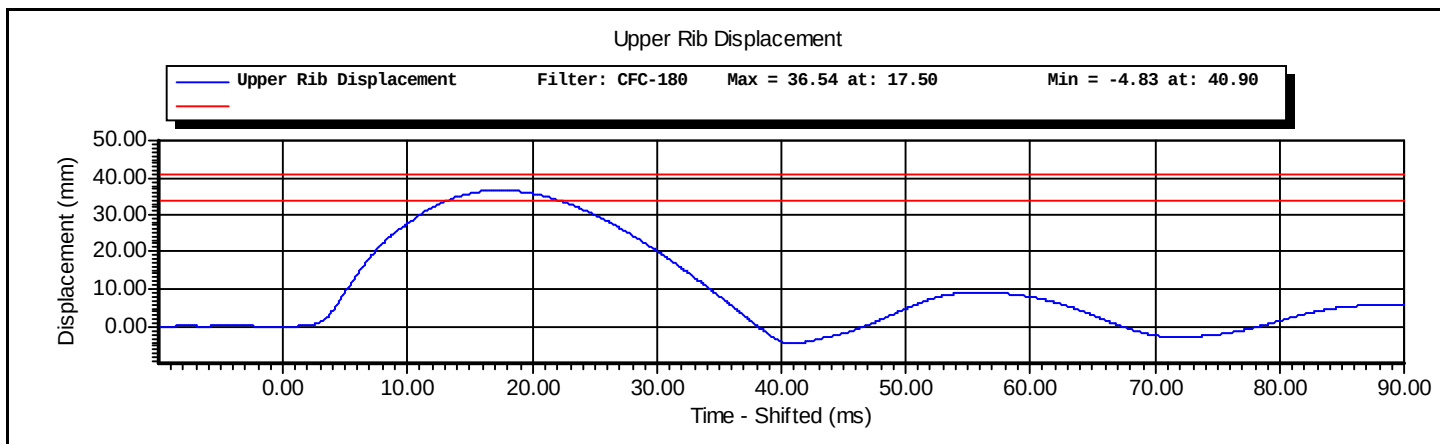
Test Name:	Thorax Impact	Revision:	8/15/2008
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Thorax	Test Date:	11/2/2010
Test Number:	1	Test Time:	11:28:06 AM



Test ID: Thorax

Test Time: 11:28:06 AM

Test Date: 11/2/2010





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VERIFICATION REPORT

Test Name:	Abdominal Impact	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Abdomen	Test Date:	11/2/2010
Test Number:	2	Test Time:	11:01:09 AM

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.1 deg C P
Humidity	10 -- 70	24 %RH P
Velocity	3.90 -- 4.10	4.03 m/s P
Peak Abdominal Force	-2.70 -- -2.20	-2.48 kN P
Time At Peak Abdominal Force	10.0 -- 12.3	10.7 ms P
Maximum Pendulum Force	-4.80 -- -4.00	-4.52 kN P
Time at Peak Pendulum Force	10.6 -- 13.0	10.8 ms P

All test parameters are within specifications

Technician: **A. Rudniski** Signature: _____
Supervisor: **D. Travale** Signature: _____

Test ID: **Abdomen**

Test Time: **11:01:09 AM**

Test Date: **11/2/2010**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2010
Endevco	7264-2000	P66930	10/5/2010
Denton	2631	LC-1524	4/22/2010
Denton	2631	LC-1523	4/22/2010
Denton	2631	LC-1530	4/22/2010

Test ID: **Abdomen**

Test Time: **11:01:09 AM**

Test Date: **11/2/2010**



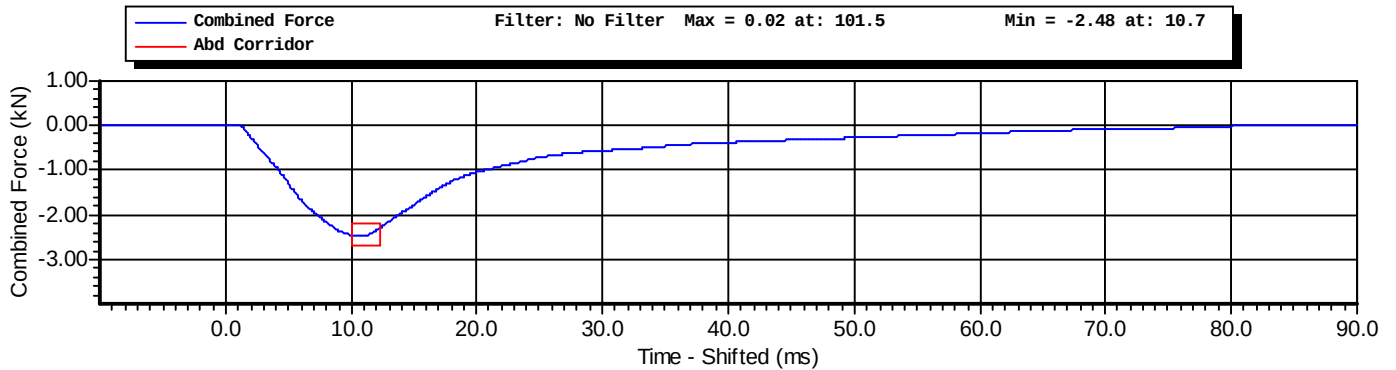
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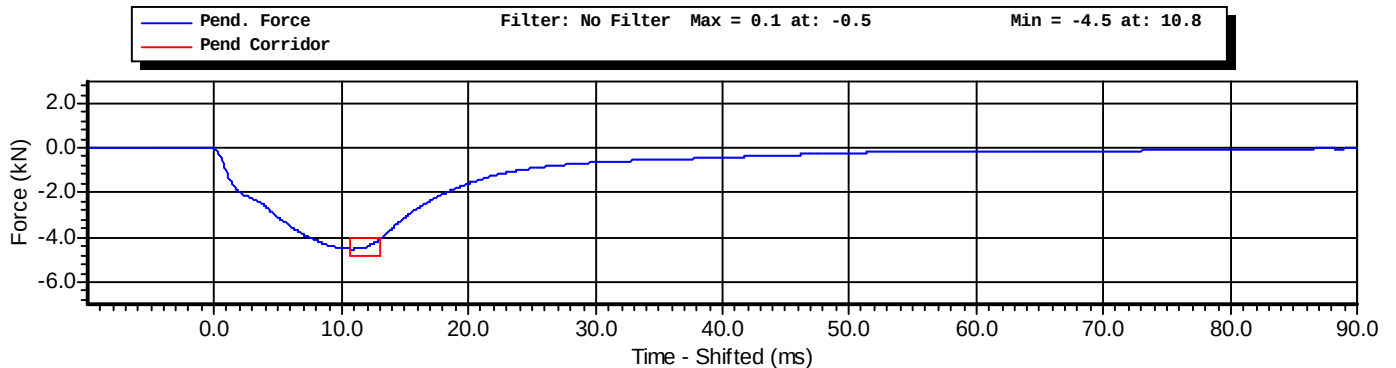
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Test Name:	Abdominal Impact	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Abdomen	Test Date:	11/2/2010
Test Number:	2	Test Time:	11:01:09 AM

Combined Abdominal Force



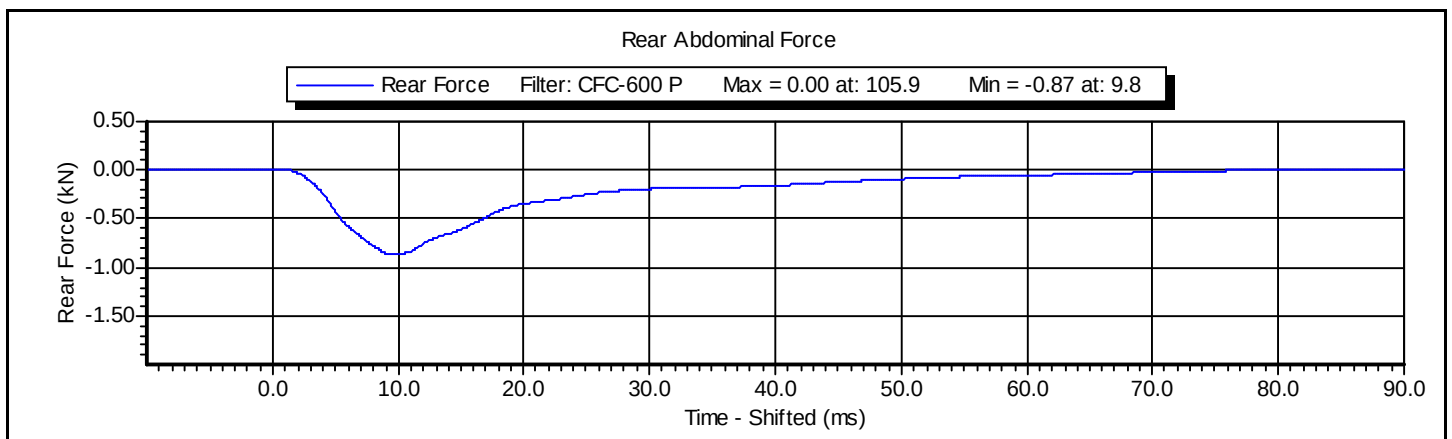
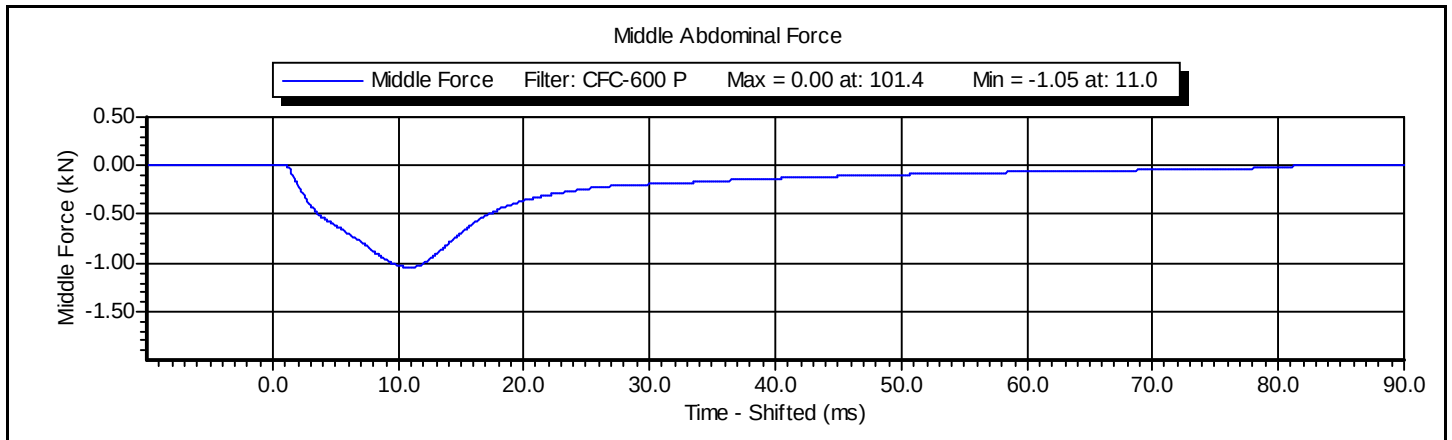
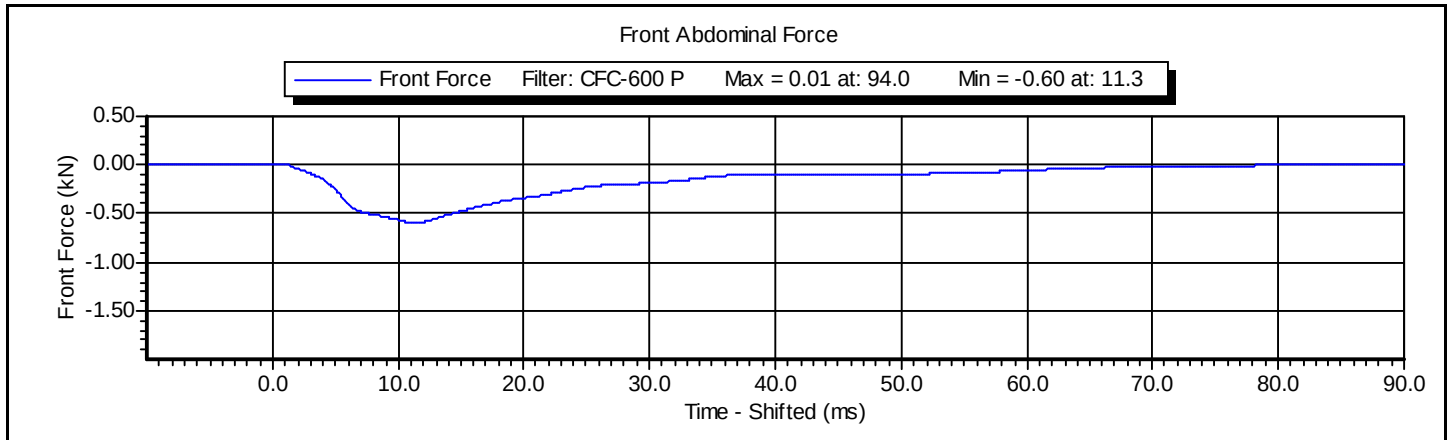
Pendulum Force



Test ID: **Abdomen**

Test Time: **11:01:09 AM**

Test Date: **11/2/2010**





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VERIFICATION REPORT

Test Name:	Lumbar Spine	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Lumbar Spine	Test Date:	11/1/2010
Test Number:	1	Test Time:	4:00:31 PM

Component Part Number	Component Serial Number
175-5501	15-0545

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.2 deg C P
Humidity	10 -- 70	23 %RH P
Velocity	5.95 -- 6.15	6.15 m/s P
Maximum Headform Flexion Angle	45.0 -- 55.0	48.5 degrees P
Time at Maximum Headform Flexion Angle	39.0 -- 53.0	43.8 ms P
Decay to Zero Degrees	37.0 -- 57.0	38.8 ms P
Velocity Corridor	--	P

All test parameters are within specifications

Technician: **A. Rudniski** Signature: _____

Supervisor: **D. Travale** Signature: _____

Test ID: **Lumbar Spine**

Test Time: **4:00:31 PM**

Test Date: **11/1/2010**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2010
Endevco	7231CT	C16510	5/10/2010
DentonATD	7000428	094	4/27/2010
DentonATD	7000428	095	4/27/2010
DentonATD	7000428	093	4/27/2010

Test ID: **Lumbar Spine**

Test Time: **4:00:31 PM**

Test Date: **11/1/2010**



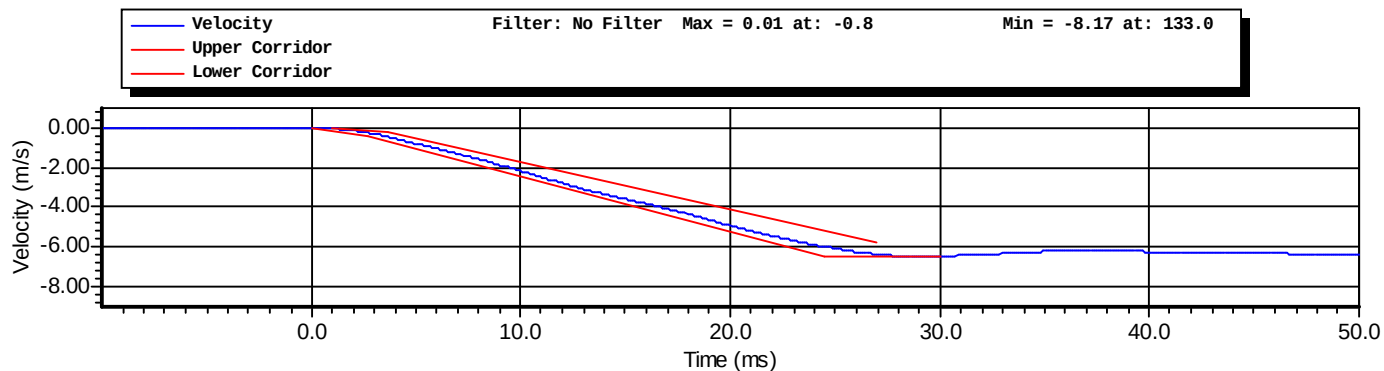
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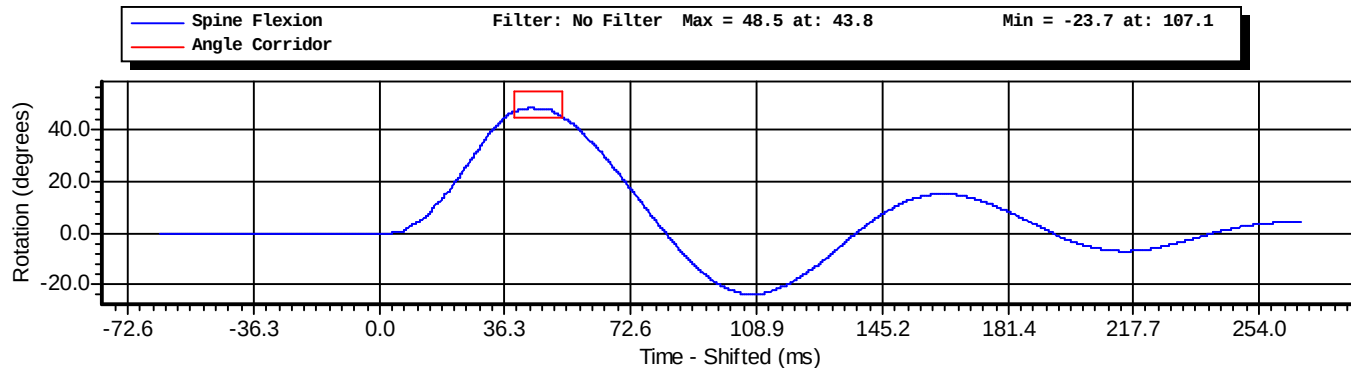
4455 Genesee Street, Buffalo, New York 14225 - Phone (716)632-7500

Test Name:	Lumbar Spine	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Lumbar Spine	Test Date:	11/1/2010
Test Number:	1	Test Time:	4:00:31 PM

Pendulum Velocity



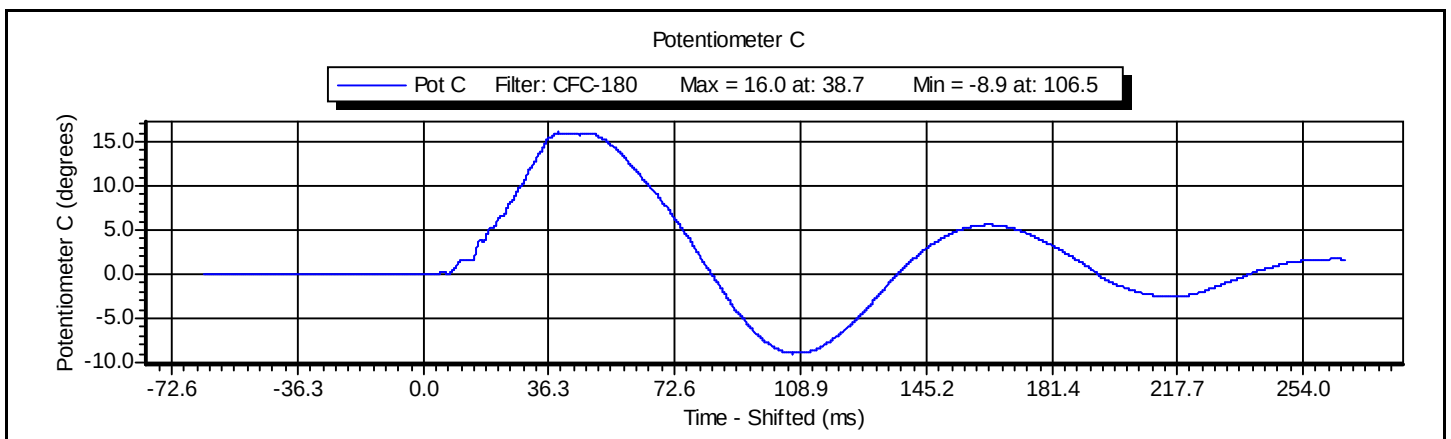
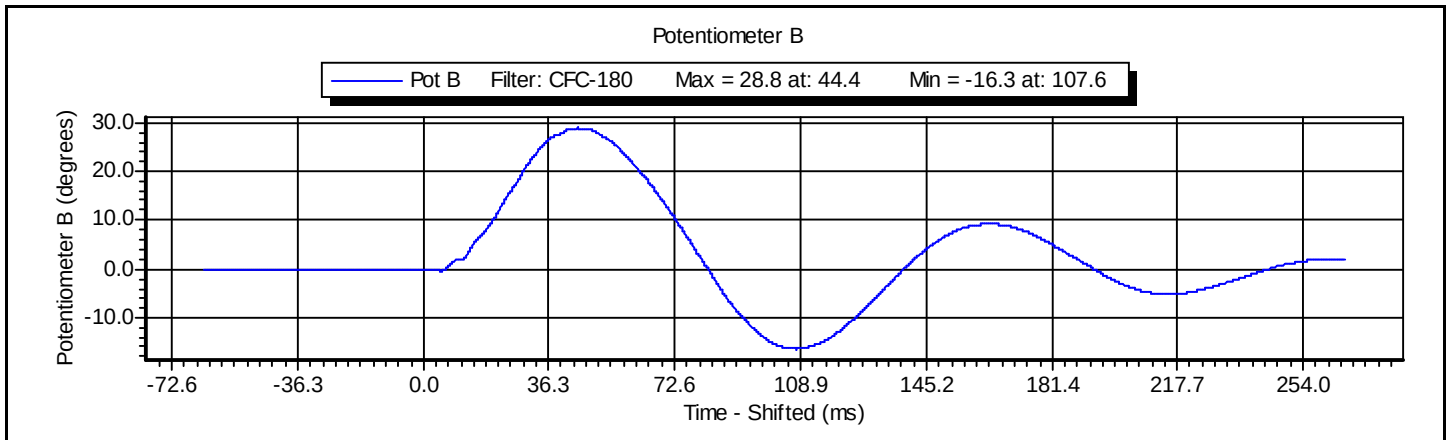
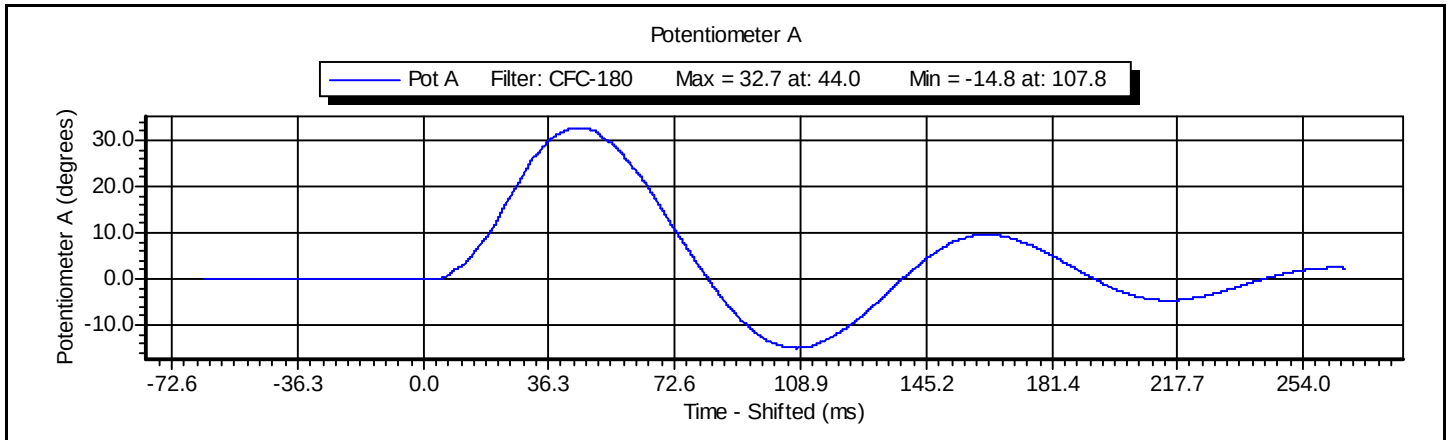
Spine Flexion Angle



Test ID: **Lumbar Spine**

Test Time: **4:00:31 PM**

Test Date: **11/1/2010**





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VERIFICATION REPORT

Test Name:	Pelvis Impact	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Pelvis	Test Date:	11/2/2010
Test Number:	2	Test Time:	10:12:28 AM

Test Parameters	Test Specifications			Test Results	
Temperature	20.6	--	22.2	20.6 deg C	P
Humidity	10	--	70	24 %RH	P
Velocity	4.20	--	4.40	4.32 m/s	P
Peak Pendulum Force	-5.40	--	-4.70	-4.91 kN	P
Time at Peak Pendulum Force	11.80	--	16.10	13.23 ms	P
Peak Pubic Symphysis Force	-1.59	--	-1.23	-1.32 kN	P
Time at Peak Pubic Symphysis Force	12.20	--	17.00	15.33 ms	P

All test parameters are within specifications

Technician: **A. Rudniski** Signature: _____
Supervisor: **D. Travale** Signature: _____

Test ID: **Pelvis**

Test Time: **10:12:28 AM**

Test Date: **11/2/2010**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2010
Endevco	7264-2000	P66930	10/5/2010
Denton	3096	LC-456Fy	4/22/2010

Test ID: **Pelvis**

Test Time: **10:12:28 AM**

Test Date: **11/2/2010**

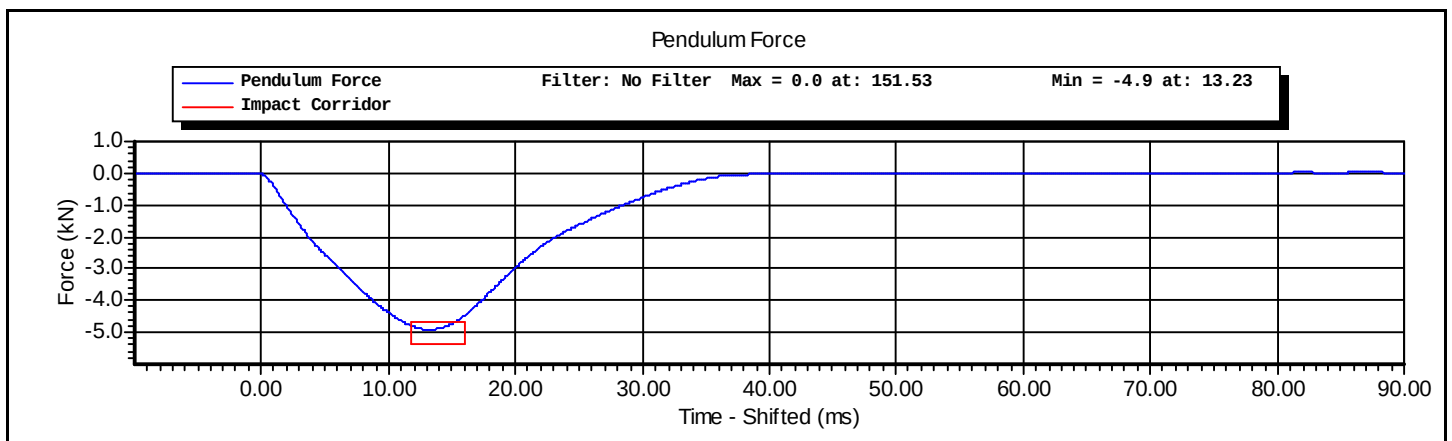
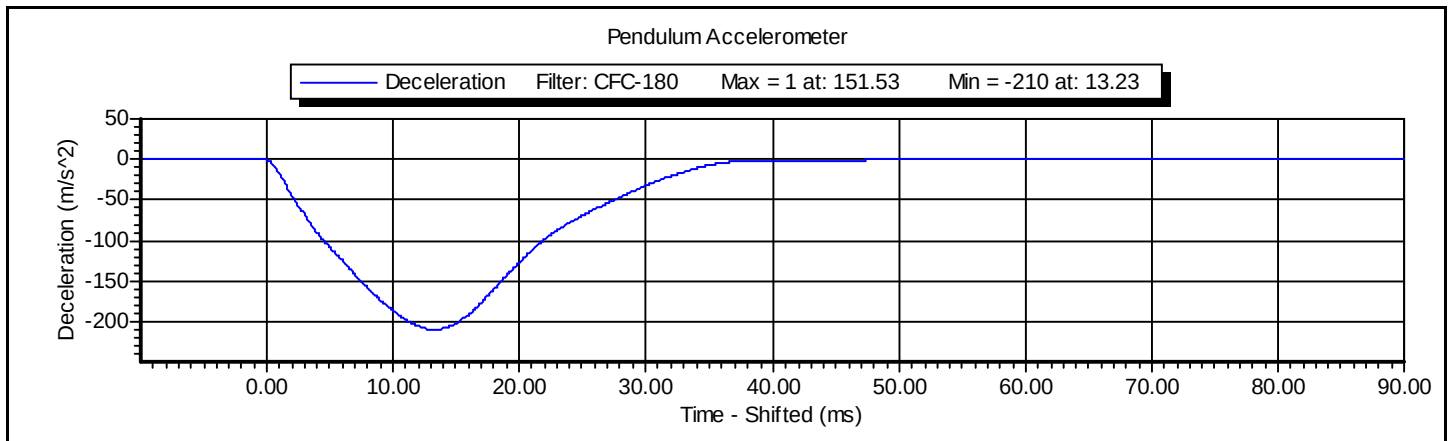


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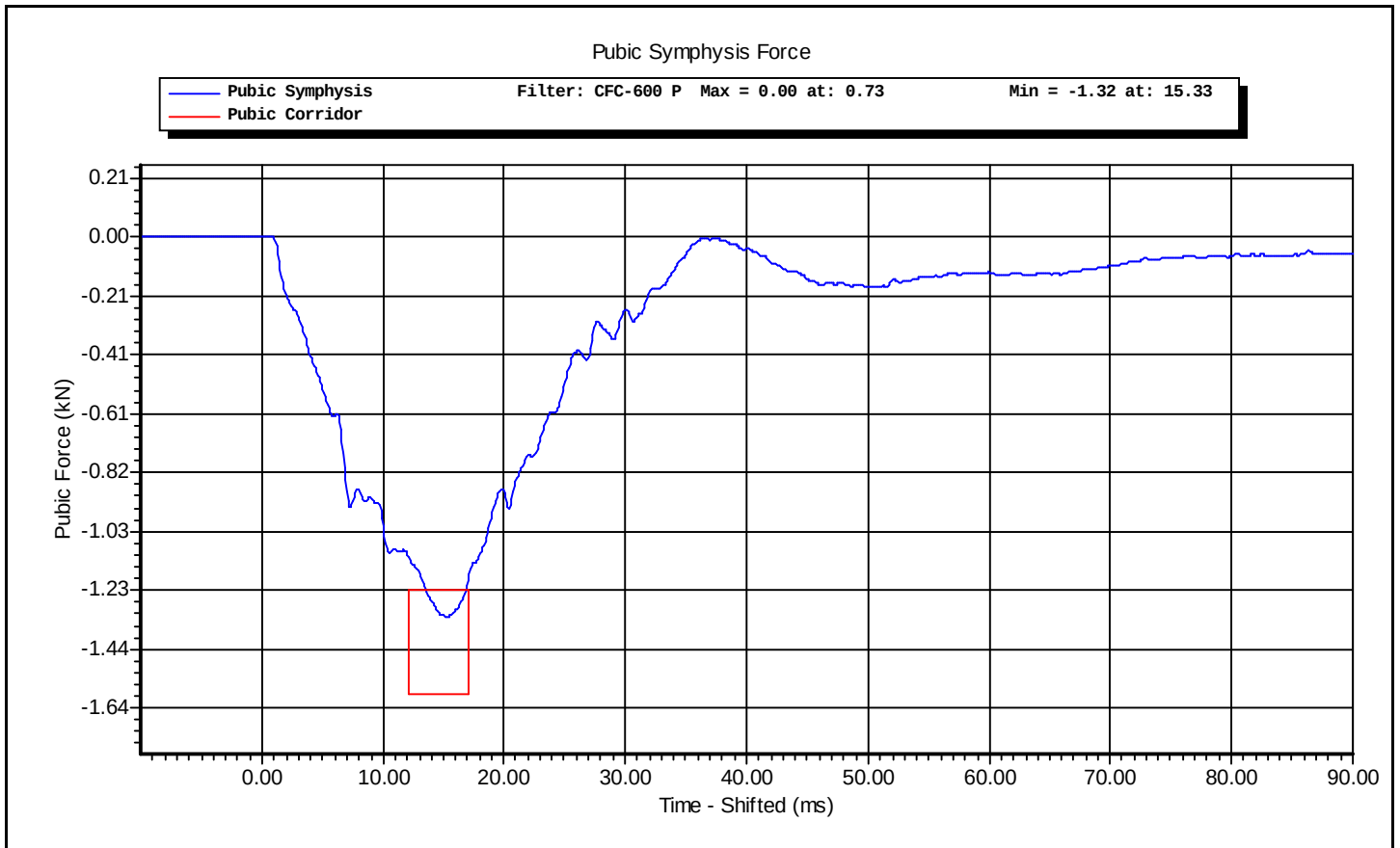
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Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Pelvis	Test Date:	11/2/2010
Test Number:	2	Test Time:	10:12:28 AM



Test ID: **Pelvis**

Test Time: **10:12:28 AM**

Test Date: **11/2/2010**



CALIBRATION TEST RESULTS

PRE-TEST

SID-IIs No: 304

CONFIGURED FOR LEFT SIDE IMPACT

SID-IIsD External Measurements

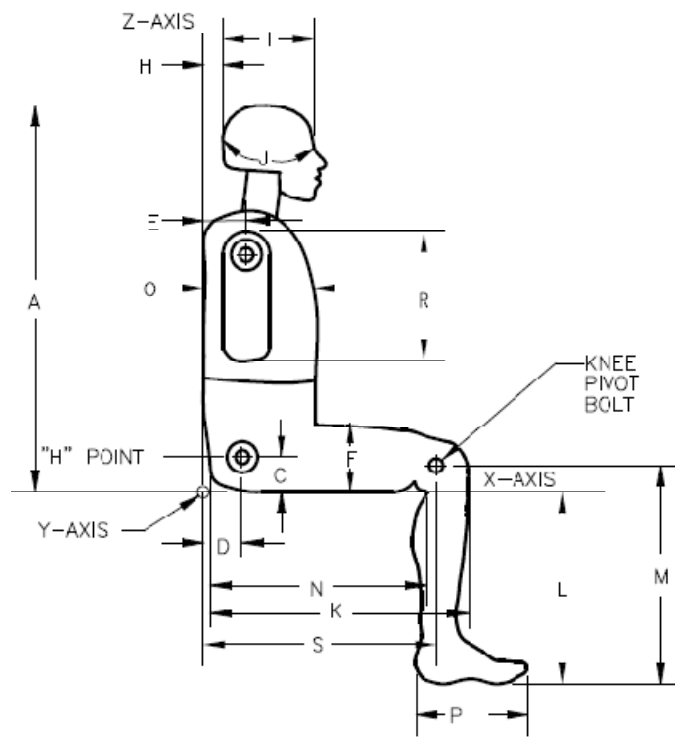
NHTSA ATD S/N 304

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Sitting Height	772.0 - 788.0	778	Yes
B	Shoulder Pivot Height	437.0 - 453.0	439	Yes
C	H-Point Height	79.0 - 89.0	83	Yes
D	H-Point from Seat Back	141.0 - 151.0	146	Yes
E	Shoulder Pivot from Backline	97.0 - 107.0	104	Yes
F	Thigh Clearance	119.0 - 135.0	126	Yes
G	Head Breadth	140.0 - 148.0	145	Yes
H	Head Back from Backline	40.0 - 46.0	43	Yes
I	Head Depth	178.0 - 188.0	182	Yes
J	Head Circumference	541.0 - 551.0	546	Yes
K	Buttock to Knee Length	514.0 - 540.0	528	Yes
L	Popliteal Height	343.0 - 369.0	353	Yes
M	Knee Pivot to Floor Height	393.0 - 409.0	398	Yes
N	Buttock Popliteal Length	416.0 - 442.0	428	Yes
O	Chest Depth without Jacket	195.0 - 211.0	204	Yes
P	Foot Length (right)	216.0 - 232.0	220	Yes
P	Foot Length (left)	216.0 - 232.0	220	Yes
Q	Hip Breadth	313.0 - 323.0	318	Yes
R	Arm Length	249.0 - 259.0	251	Yes
S	Knee Joint to Seat back	478.0 - 493.0	485	Yes
V	Shoulder Width (only one arm installed)	341.0 - 357.0	353	Yes
W	Foot Width (right)	78.0 - 94.0	80	Yes
W	Foot Width (left)	78.0 - 94.0	80	Yes
Y	Chest Circumference with Jacket	851.0 - 881.0	870	Yes
Z	Waist Circumference	761.0 - 791.0	782	Yes

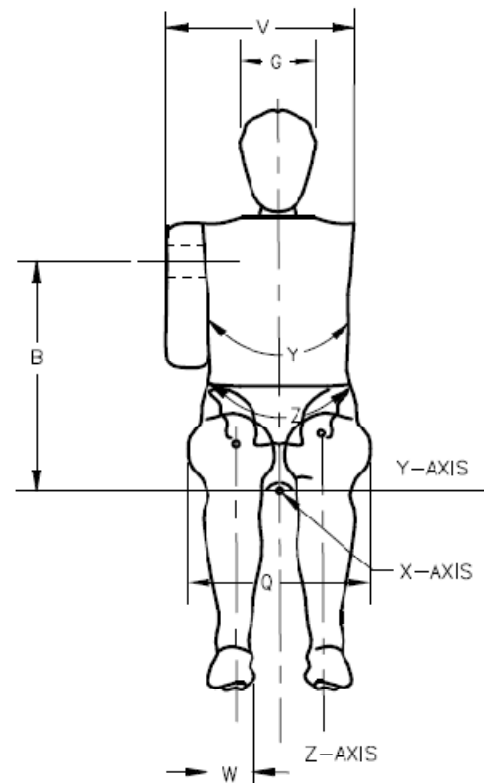
Technician: SZ

Date: 11/04/2010

SID-IIIsD External Dimension Reference Diagram



SIDE VIEW



FRONT VIEW



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VERIFICATION REPORT

Test Name:	Head Drop	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	SID 304		
Test ID:	Head Drop	Test Date:	11/2/2010
Test Number:	1	Test Time:	3:17:08 PM

Component Part Number	Component Serial Number
Head Skin - 180-1002	1371

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.0 deg C P
Humidity	10 -- 70	26 %RH P
Resultant Acceleration	115.0 -- 137.0	121.3 g P
Oscillation	0.0 -- 15.0	11.3 % P
Fore-Aft Acceleration	-15.0 -- 15.0	-5.4 g P

All test parameters are within specifications

Technician: **S. Zito** Signature: _____
Supervisor: **D. Travale** Signature: _____

Test ID: **Head Drop**

Test Time: **3:17:08 PM**

Test Date: **11/2/2010**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Endevco	7264-2000	P66943	10/25/2010
Endevco	7264-2000	P66931	10/25/2010
Endevco	7264-2000	P66926	10/25/2011

Test ID: **Head Drop**

Test Time: **3:17:08 PM**

Test Date: **11/2/2010**

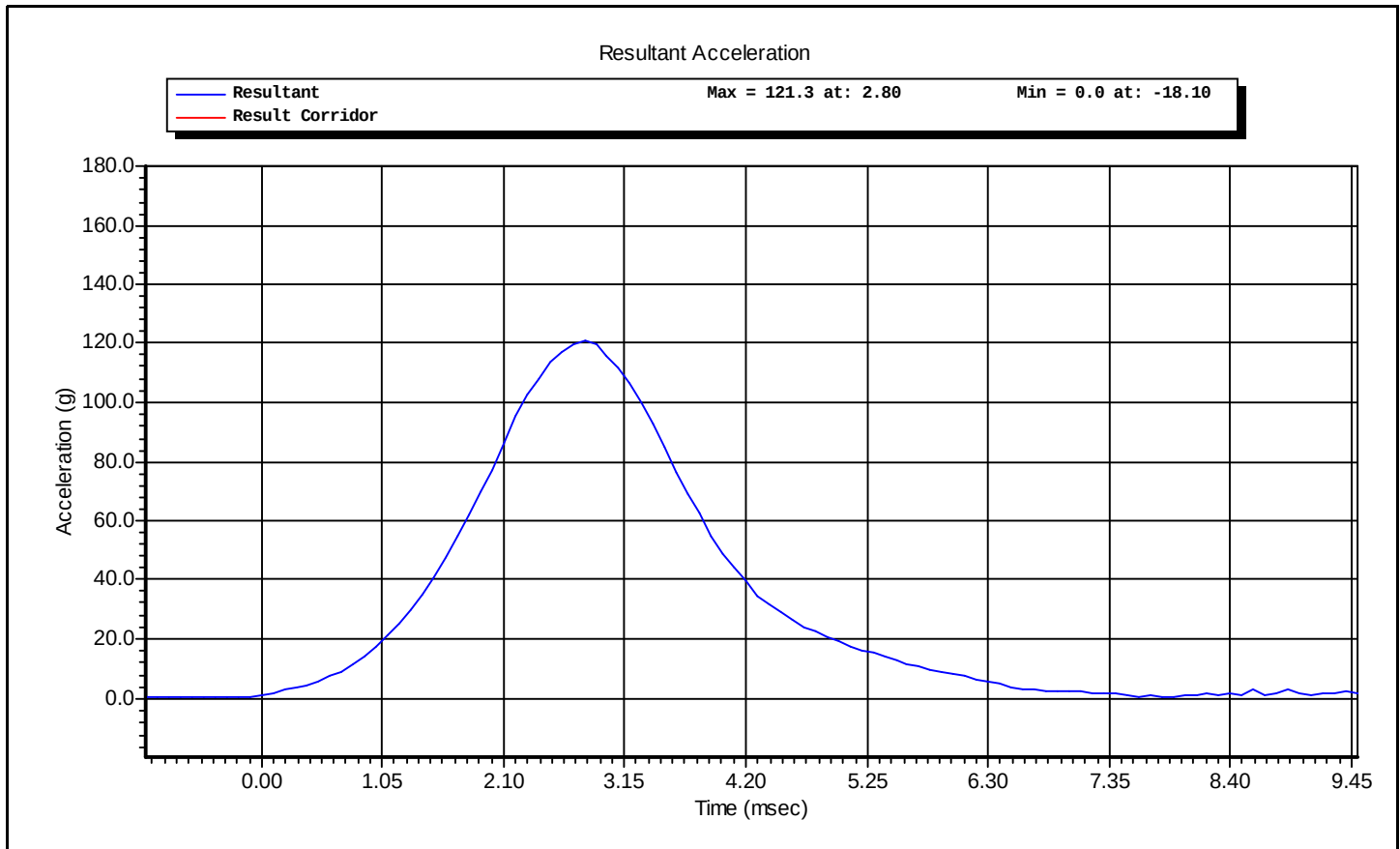


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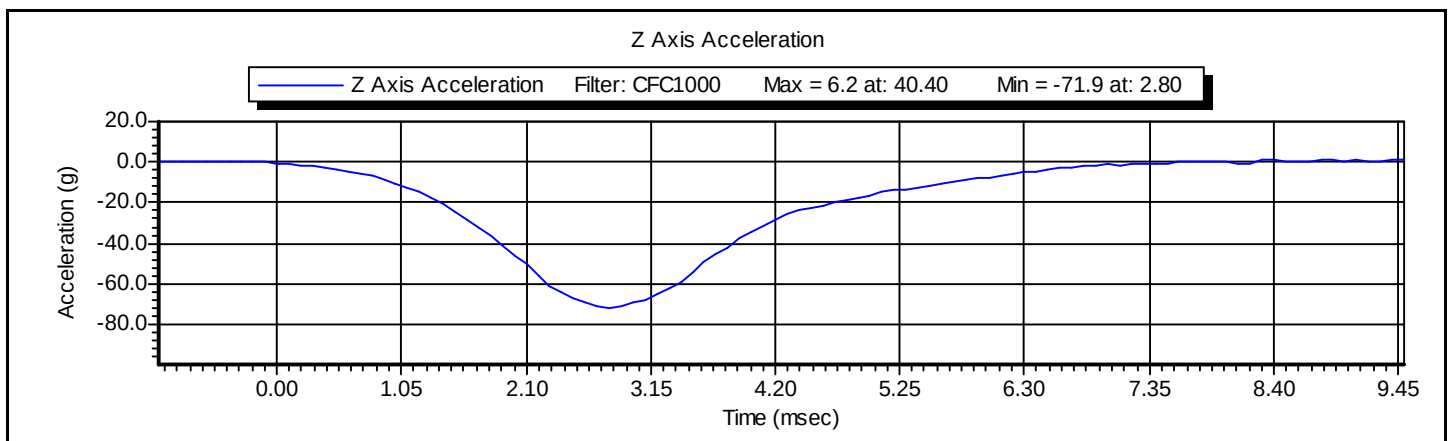
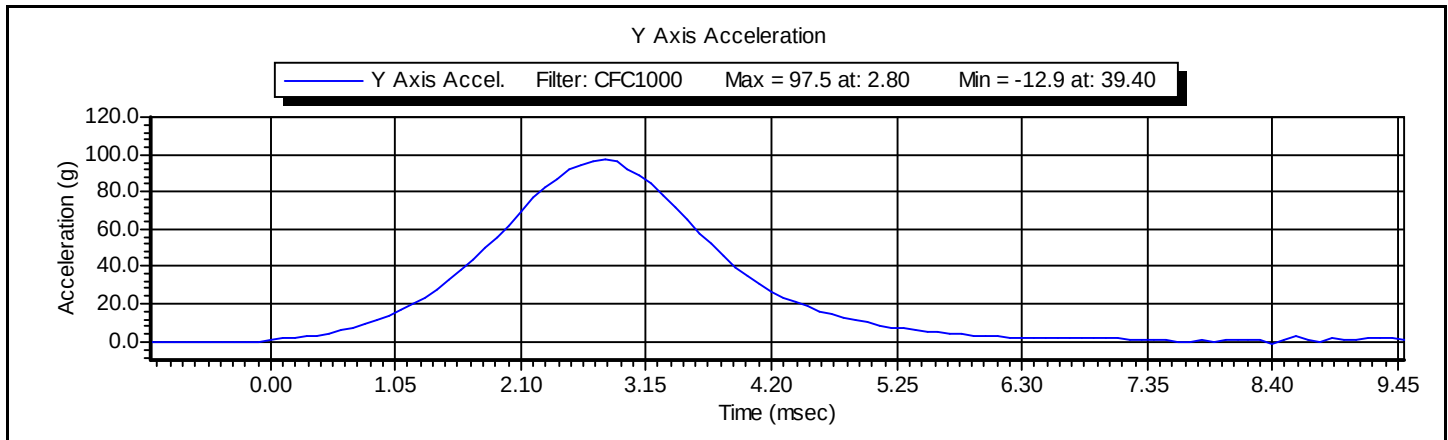
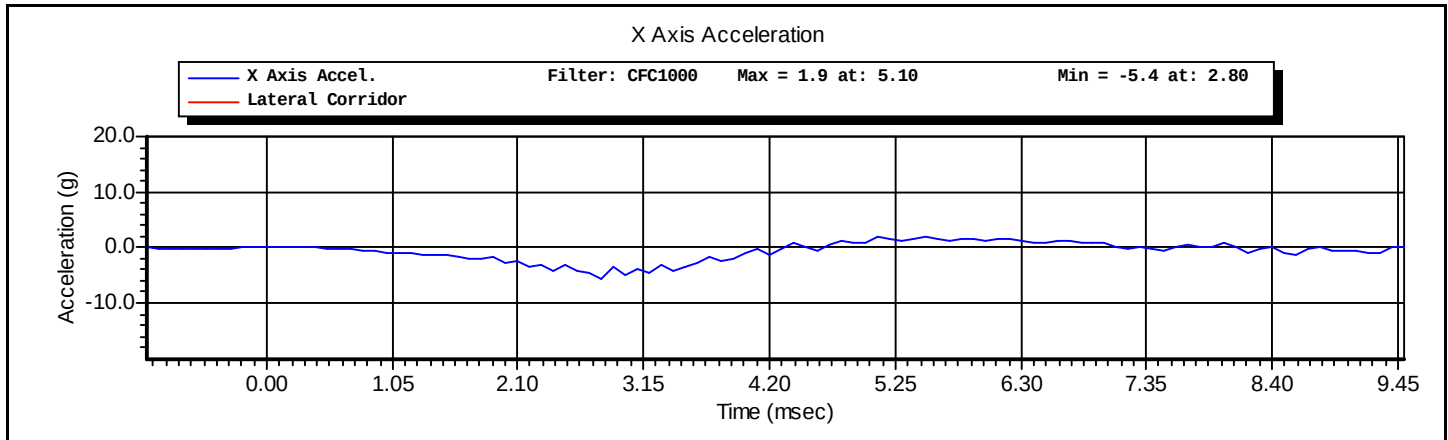
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Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	SID 304		
Test ID:	Head Drop	Test Date:	11/2/2010
Test Number:	1	Test Time:	3:17:08 PM



Test ID: **Head Drop**

Test Time: **3:17:08 PM**

Test Date: **11/2/2010**





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VERIFICATION REPORT

Test Name:	Neck Pendulum	Revision:	8/24/2009
Sub Test Name:	Left Side	Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	SID 304		
Test ID:	Neck Flexion	Test Date:	11/2/2010
Test Number:	1	Test Time:	3:53:26 PM

Component Part Number	Component Serial Number
Neck - 180-2000	AB8239

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.2 deg C P
Humidity	10 -- 70	25 %RH P
Velocity	5.51 -- 5.63	5.56 m/s P
Pendulum Impulse at 10 ms	2.20 -- 2.80	2.26 m/s P
Pendulum Impulse at 15 ms	3.30 -- 4.10	3.33 m/s P
Pendulum Impulse at 20 ms	4.40 -- 5.40	4.56 m/s P
Pendulum Impulse at 25 ms	5.40 -- 6.10	5.44 m/s P
Pendulum Impulse between 25 and 100 ms	5.50 -- 6.20	5.86 m/s P
Max D Plane Rotation	71.0 -- 81.0	71.6 degrees P
Time at Max Rotation	50.0 -- 70.0	61.7 ms P
Moment about OC	-44.0 -- -36.0	-38.1 Nm P
Moment Decay to Zero	102.0 -- 126.0	116.4 ms P

All test parameters are within specifications

Technician: **S. Zito** Signature: _____
Supervisor: **D. Travale** Signature: _____

Test ID: **Neck Flexion**

Test Time: **3:53:26 PM**

Test Date: **11/2/2010**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2010
Endevco	7231CT	C16510	5/10/2010
FTSS	IF-205	LC-283Fy	4/9/2010
FTSS	IF-205	LC-283Mx	4/9/2010
DentonATD	78051-342	184	4/30/2010
DentonATD	78051-342	174	4/30/2010
DentonATD	78051-342	185	4/30/2010

Test ID: **Neck Flexion**

Test Time: **3:53:26 PM**

Test Date: **11/2/2010**



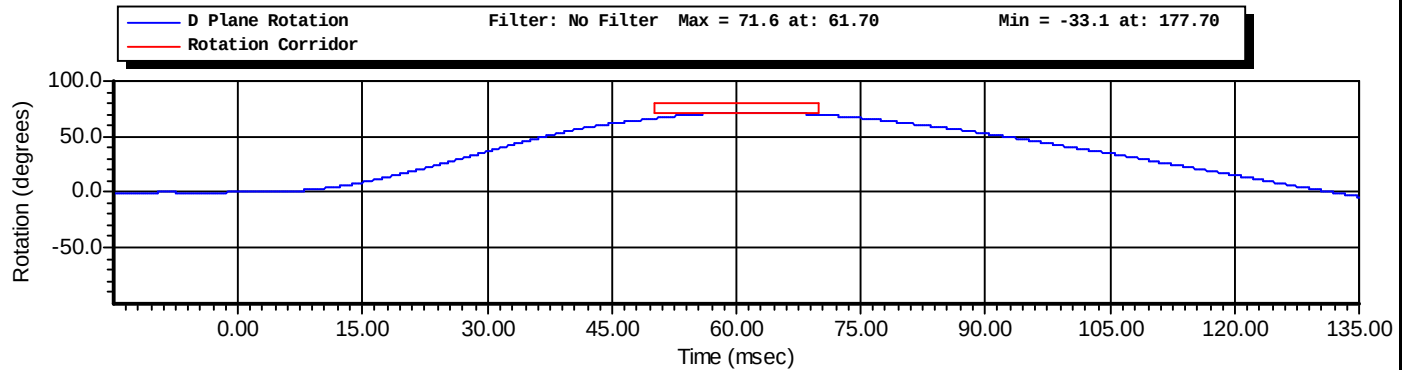
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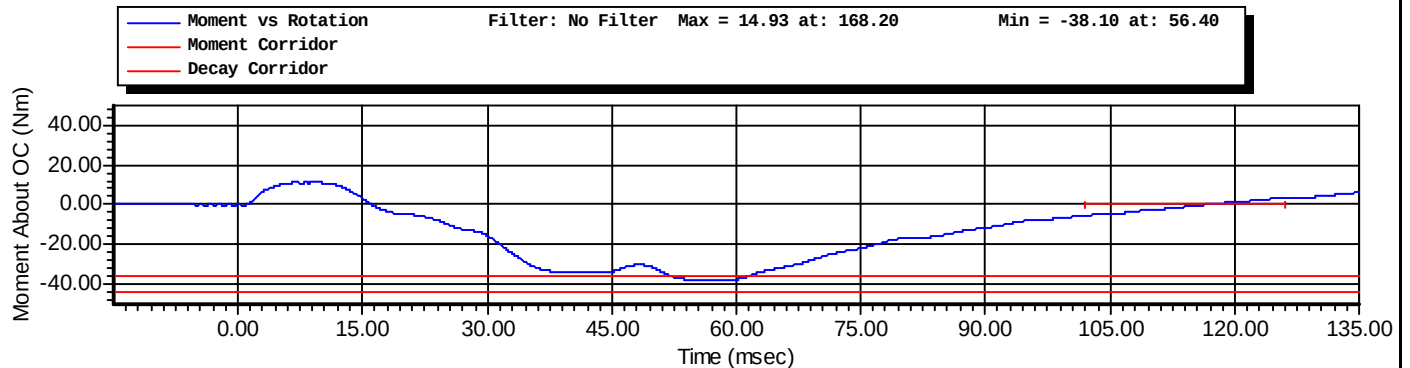
4455 Genesee Street, Buffalo, New York 14225 - Phone (716)632-7500

Test Name:	Neck Pendulum	Revision:	8/24/2009
Sub Test Name:	Left Side	Spec Type:	NHTSA
ATD Type:	SID-IIIs		
ATD Serial Number:	SID 304		
Test ID:	Neck Flexion	Test Date:	11/2/2010
Test Number:	1	Test Time:	3:53:26 PM

D Plane Rotation



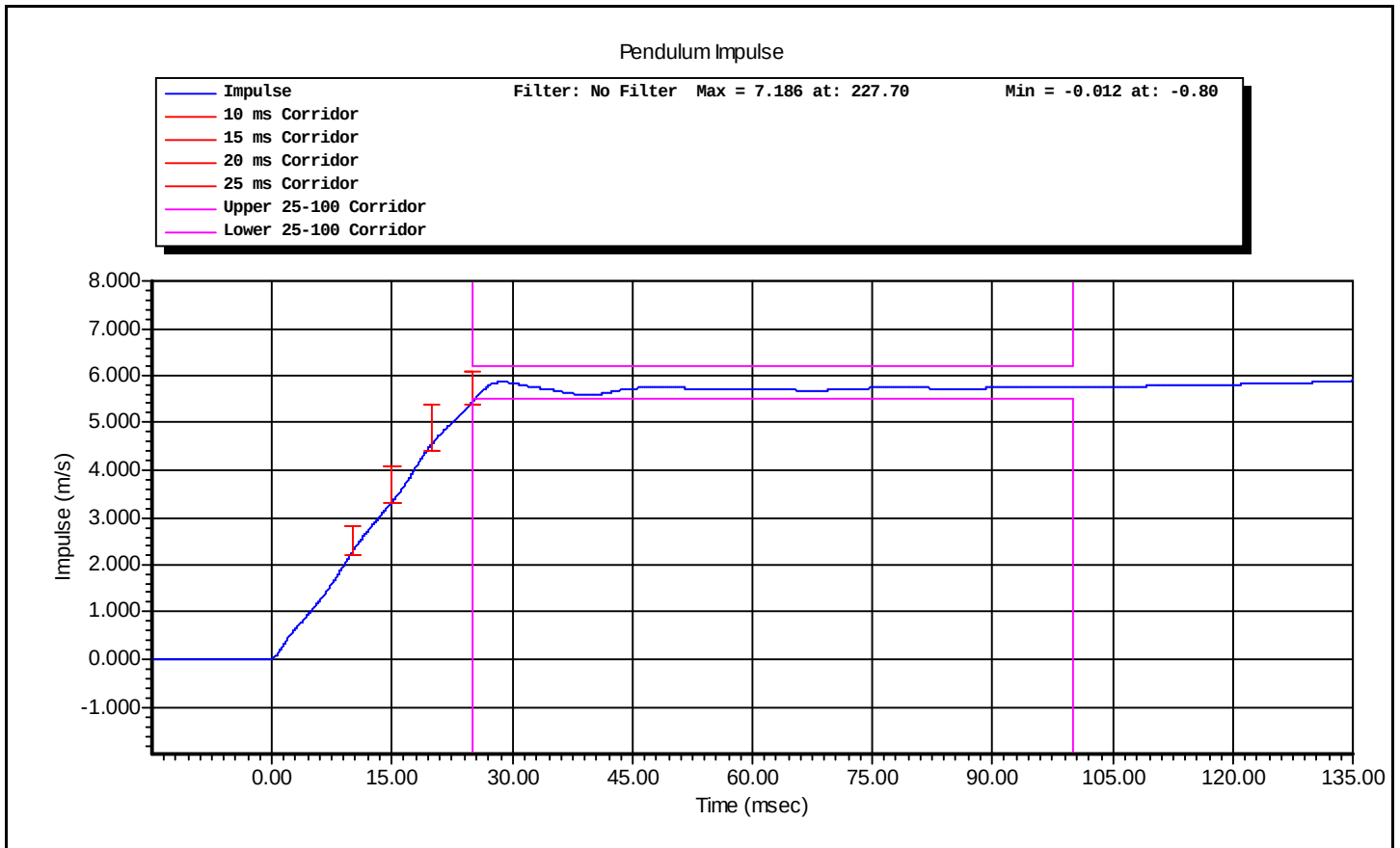
Moment About Occipital Condyle



Test ID: Neck Flexion

Test Time: 3:53:26 PM

Test Date: 11/2/2010





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VERIFICATION REPORT

Test Name:	Shoulder Impact	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	SID 304		
Test ID:	Shoulder	Test Date:	11/3/2010
Test Number:	1	Test Time:	3:17:40 PM

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.20 deg C P
Humidity	10.0 -- 70.0	26.0 %RH P
Velocity	4.20 -- 4.40	4.30 m/s P
Probe Acceleration	13.0 -- 18.0	15.5 g P
Shoulder Deflection	28.0 -- 37.0	28.8 mm P
T1 Acceleration	17.0 -- 22.0	19.7 g P

All test parameters are within specifications

Technician: **S. Zito III** Signature: _____
Supervisor: **D. Travale** Signature: _____

Test ID: **Shoulder**

Test Time: **3:17:40 PM**

Test Date: **11/3/2010**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2010
Endevco	7264-2000	P66930	10/5/2010
Servo	180-3885	DS-1154	3/26/2010
Endevco	7264-2000	P52415	10/12/2010

Test ID: **Shoulder**

Test Time: **3:17:40 PM**

Test Date: **11/3/2010**

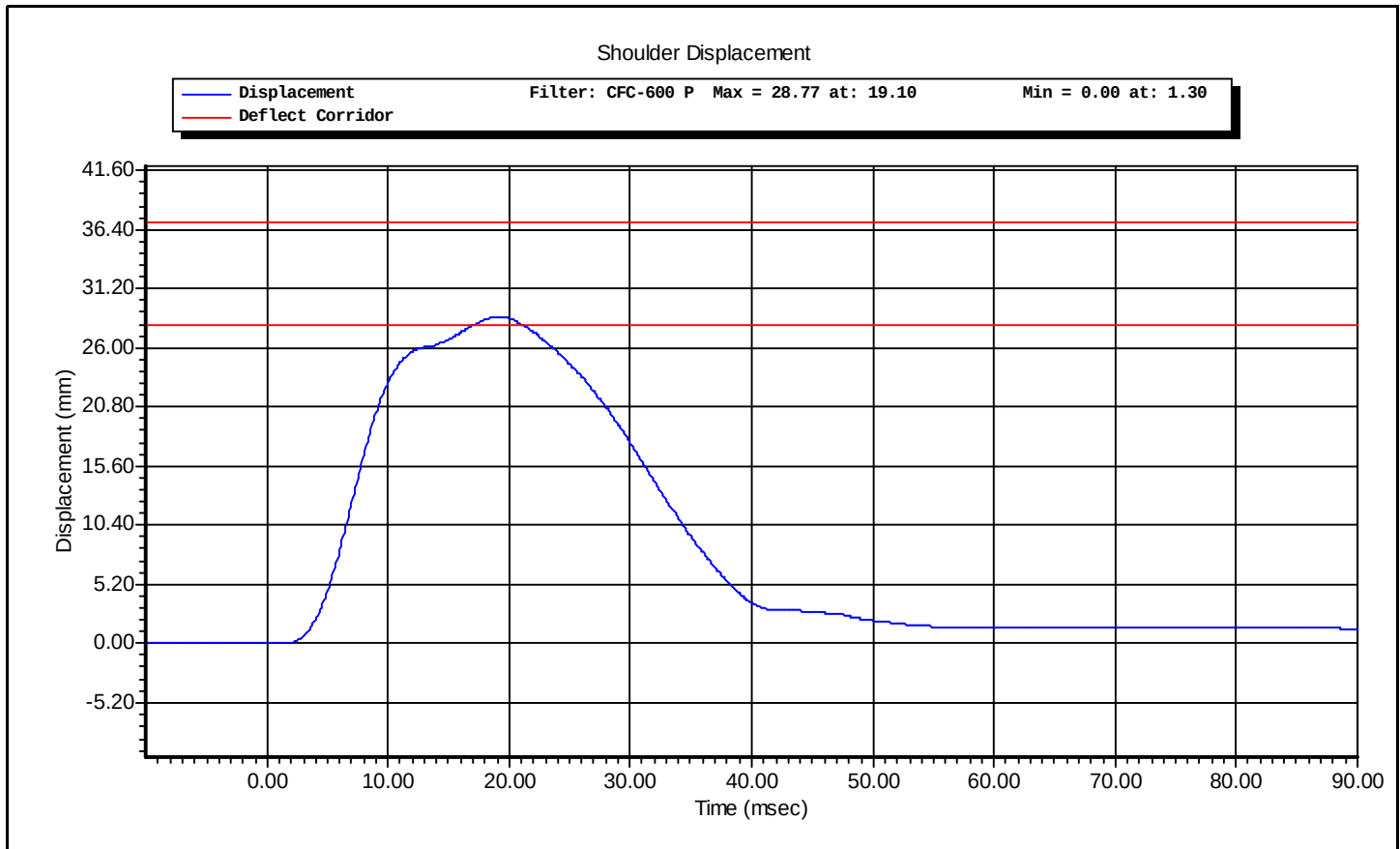


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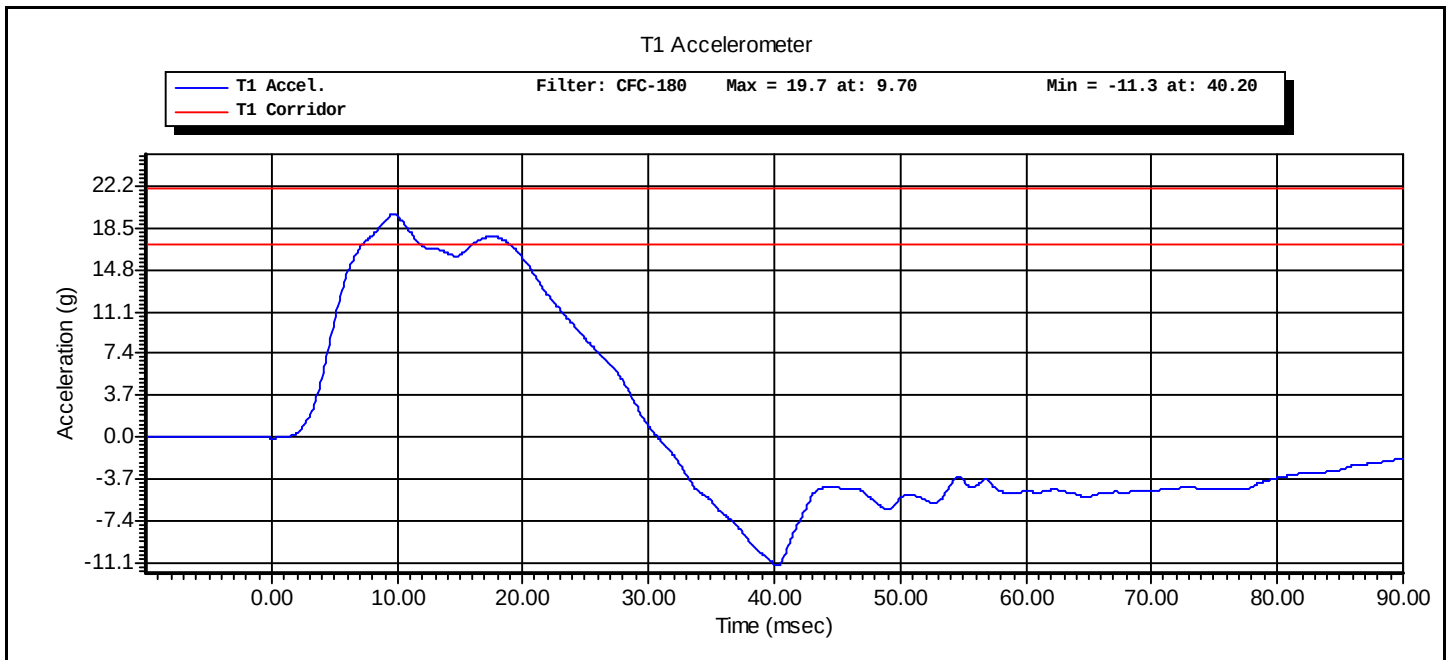
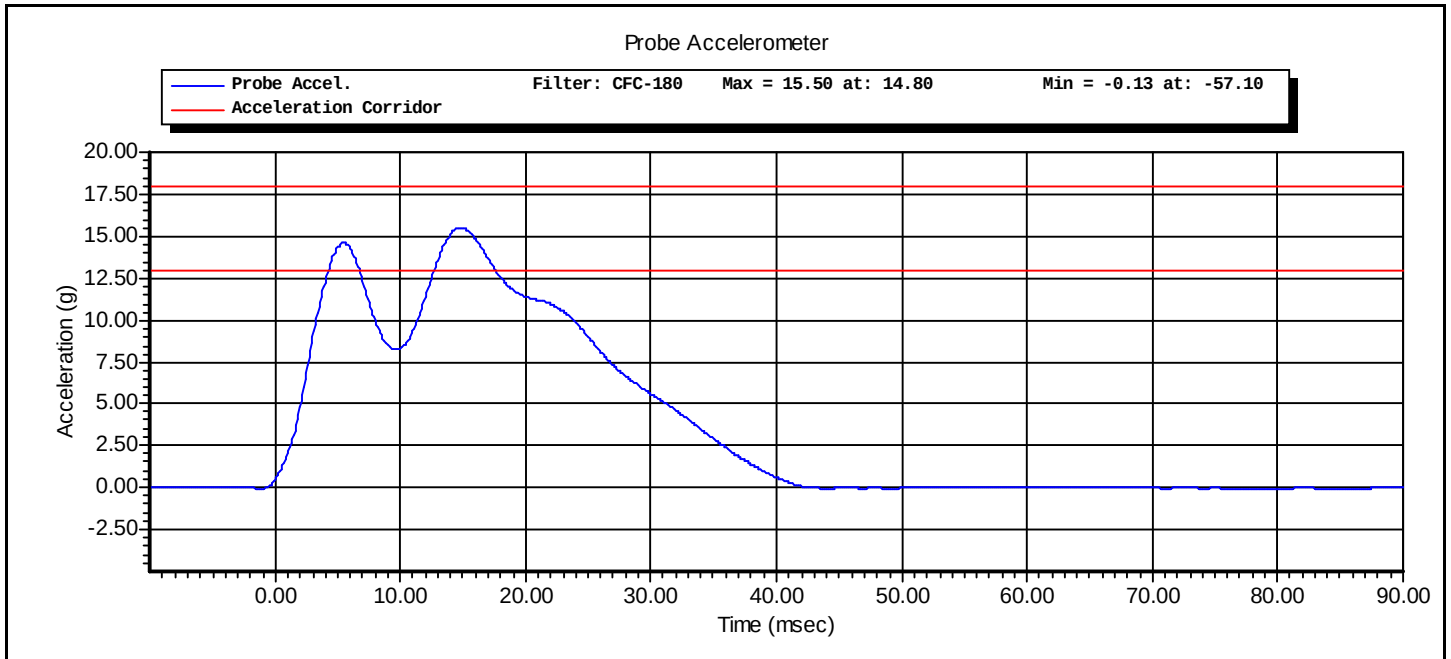
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Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	SID 304		
Test ID:	Shoulder	Test Date:	11/3/2010
Test Number:	1	Test Time:	3:17:40 PM



Test ID: **Shoulder**

Test Time: **3:17:40 PM**

Test Date: **11/3/2010**





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VERIFICATION REPORT

Test Name:	Thorax Impact without Arm	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	SID 304		
Test ID:	Thorax Without Arm	Test Date:	11/3/2010
Test Number:	2	Test Time:	3:02:22 PM

Test Parameters	Test Specifications			Test Results	
Temperature	20.6	--	22.2	22.2 deg C	P
Humidity	10	--	70	26 %RH	P
Velocity	4.20	--	4.40	4.32 m/s	P
Probe Acceleration	14.0	--	18.0	16.7 g	P
Upper Thorax Rib Deflection	32.0	--	40.0	35.5 mm	P
Mid Thorax Rib Deflection	39.0	--	45.0	41.5 mm	P
Lower Thorax Rib Deflection	35.0	--	43.0	38.9 mm	P
Upper Spine Acceleration T1	13.0	--	17.0	16.9 g	P
Lower Spine Acceleration T12	7.0	--	11.0	10.3 g	P

All test parameters are within specifications

Technician: **S. Zito III** Signature: _____
Supervisor: **D. Travale** Signature: _____

Test ID: **Thorax Without Arm** Test Time: **3:02:22 PM**

Test Date: **11/3/2010**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2010
Endevco	7264-2000	P66930	10/5/2010
Servo	180-3885	DS-1188	3/26/2010
Servo	180-3885	DS-1269	3/26/2010
Servo	180-3885	DS-1260	3/26/2010
Endevco	7264-2000	P52415	10/12/2010
Endevco	7264-2000	P58839	10/14/2010

Test ID: **Thorax Without Arm** Test Time: **3:02:22 PM**

Test Date: **11/3/2010**

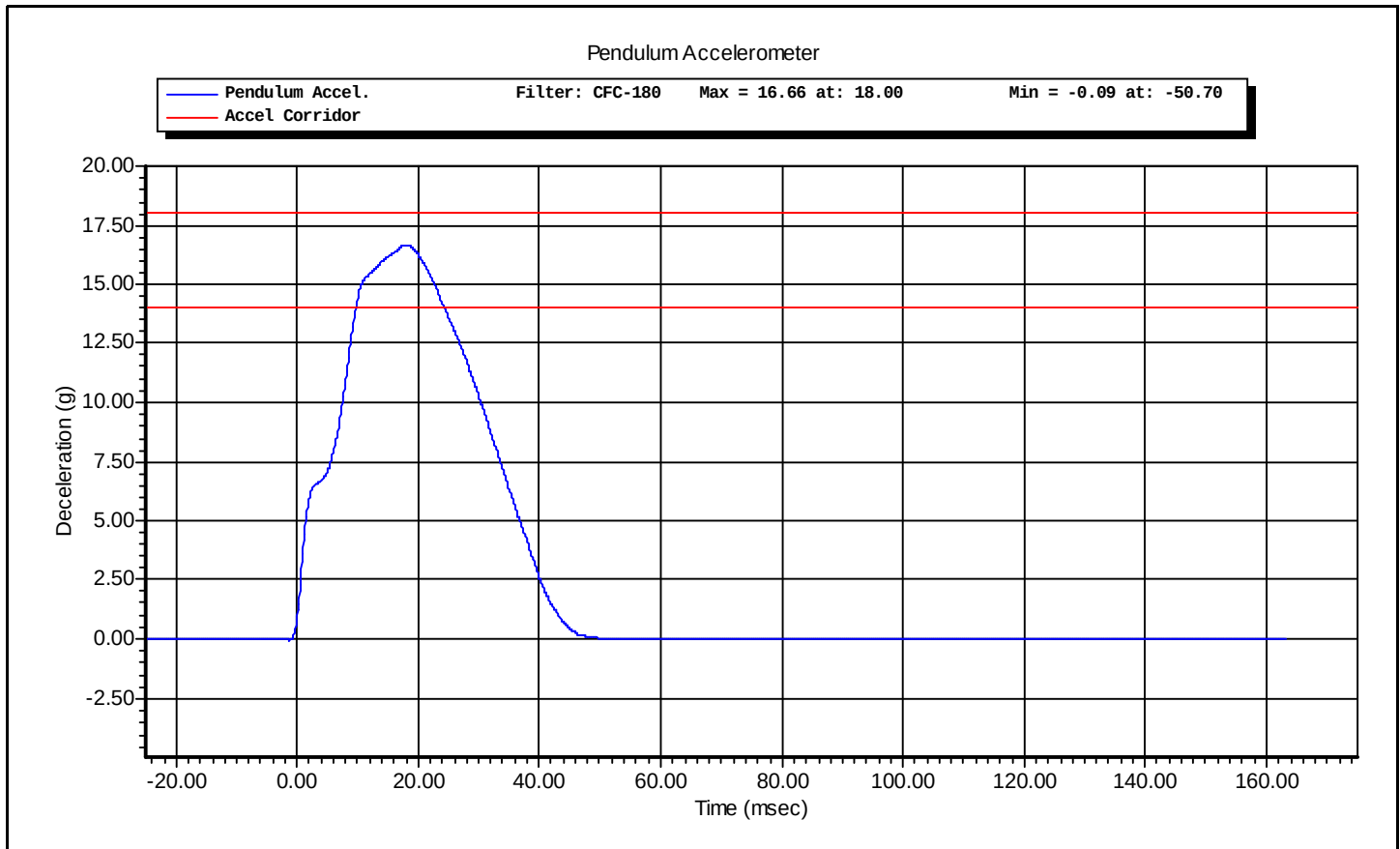


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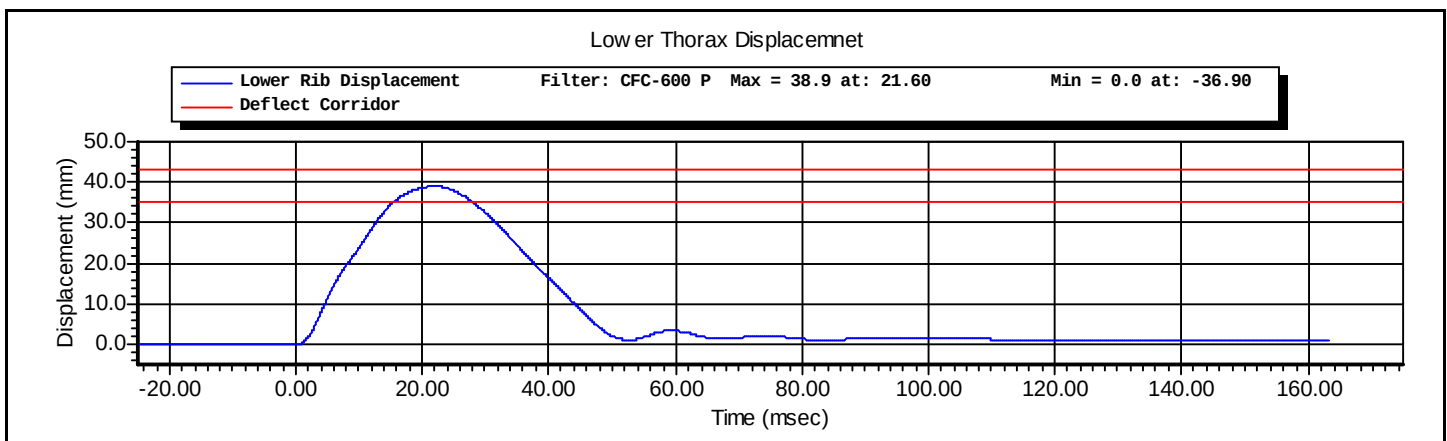
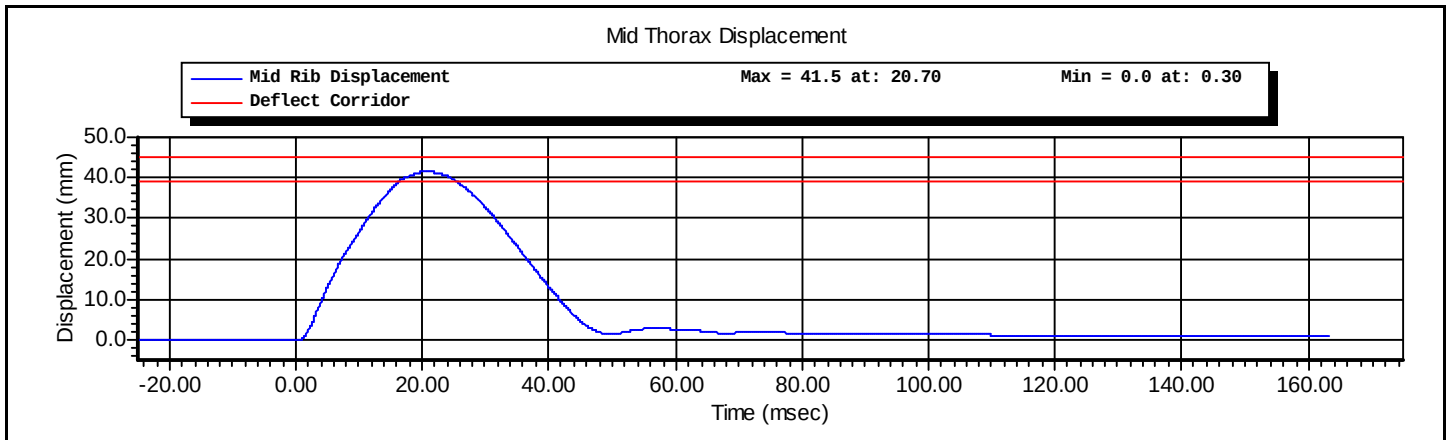
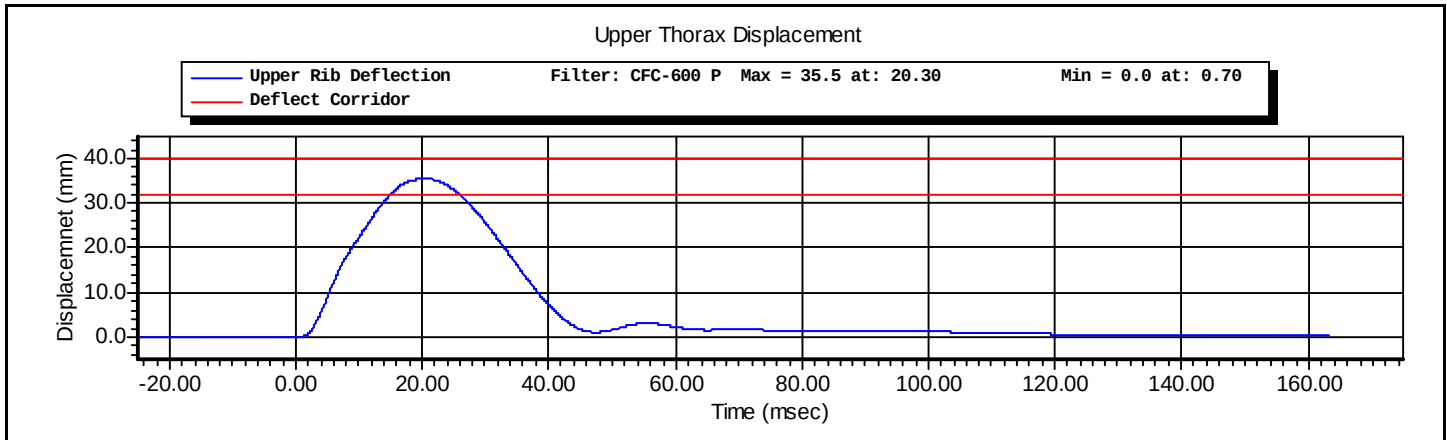
4455 Genesee Street, Buffalo, New York 14225 - Phone (716)632-7500

Test Name:	Thorax Impact without Arm	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	SID 304		
Test ID:	Thorax Without Arm	Test Date:	11/3/2010
Test Number:	2	Test Time:	3:02:22 PM

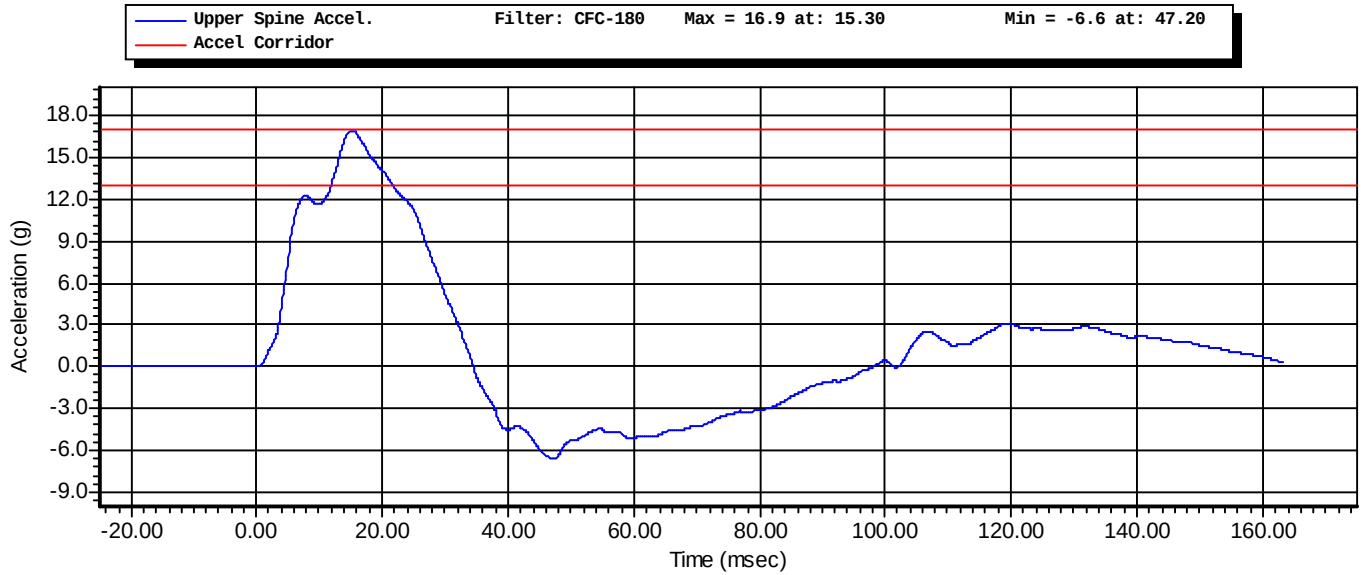


Test ID: Thorax Without Arm Test Time: 3:02:22 PM

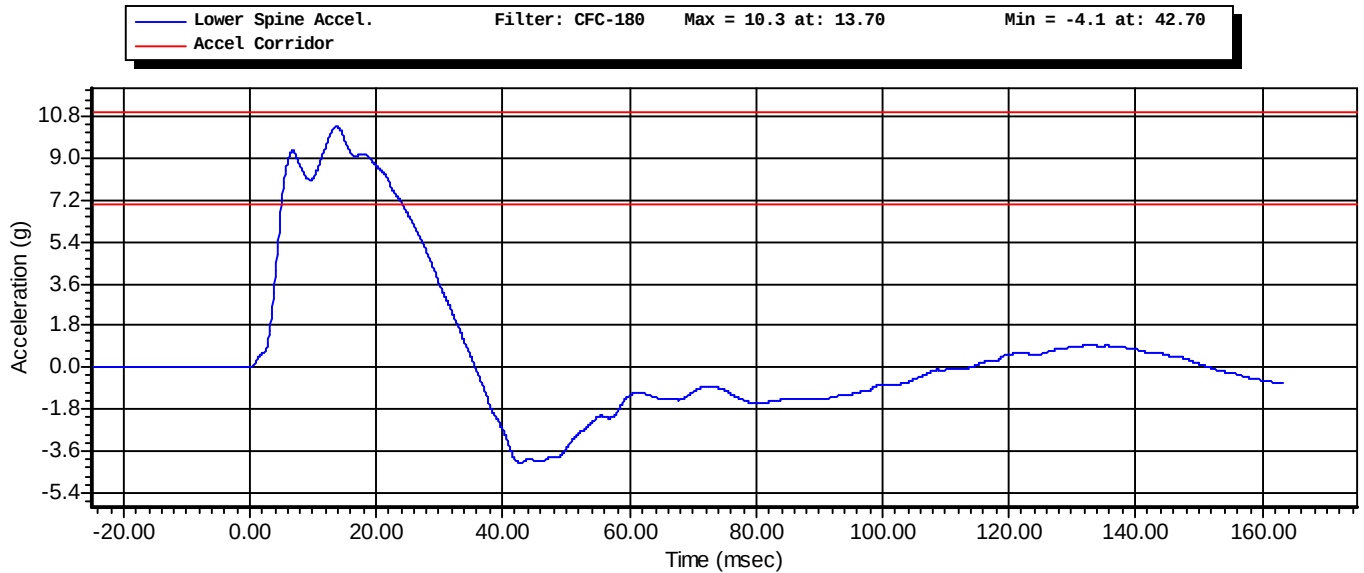
Test Date: 11/3/2010



Upper Spine Acceleration



Lower Spine Acceleration





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VERIFICATION REPORT

Test Name:	Thorax Impact with Arm	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	SID 304		
Test ID:	Thorax With Arm	Test Date:	11/3/2010
Test Number:	1	Test Time:	3:43:01 PM

Test Parameters	Test Specifications			Test Results	
Temperature	20.6	--	22.2	22.2 deg C	P
Humidity	10	--	70	26 %RH	P
Velocity	6.60	--	6.80	6.67 m/s	P
Probe Acceleration after 5ms	30.0	--	36.0	33.9 g	P
Upper Thorax Rib Deflection	25.0	--	32.0	26.9 mm	P
Mid Thorax Rib Deflection	30.0	--	36.0	31.2 mm	P
Lower Thorax Rib Deflection	32.0	--	38.0	33.5 mm	P
Upper Spine Acceleration ("y")	34.0	--	43.0	42.5 g	P
Lower Spine Acceleration ("y")	29.0	--	37.0	34.0 g	P
Shoulder Deflection	31.0	--	40.0	34.6 mm	P

All test parameters are within specifications

Technician: **S.Zito III** Signature: _____
Supervisor: **D. Travale** Signature: _____

Test ID: **Thorax With Arm** Test Time: **3:43:01 PM**

Test Date: **11/3/2010**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2010
Endevco	7264-2000	P66930	10/5/2010
Servo	180-3885	DS-1188	3/26/2010
Servo	180-3885	DS-1269	3/26/2010
Servo	180-3885	DS-1260	3/26/2010
Endevco	7264-2000	P52415	10/12/2010
Endevco	7264-2000	P58839	10/14/2010
Servo	180-3885	DS-1154	3/26/2010

Test ID: **Thorax With Arm** Test Time: **3:43:01 PM**

Test Date: **11/3/2010**

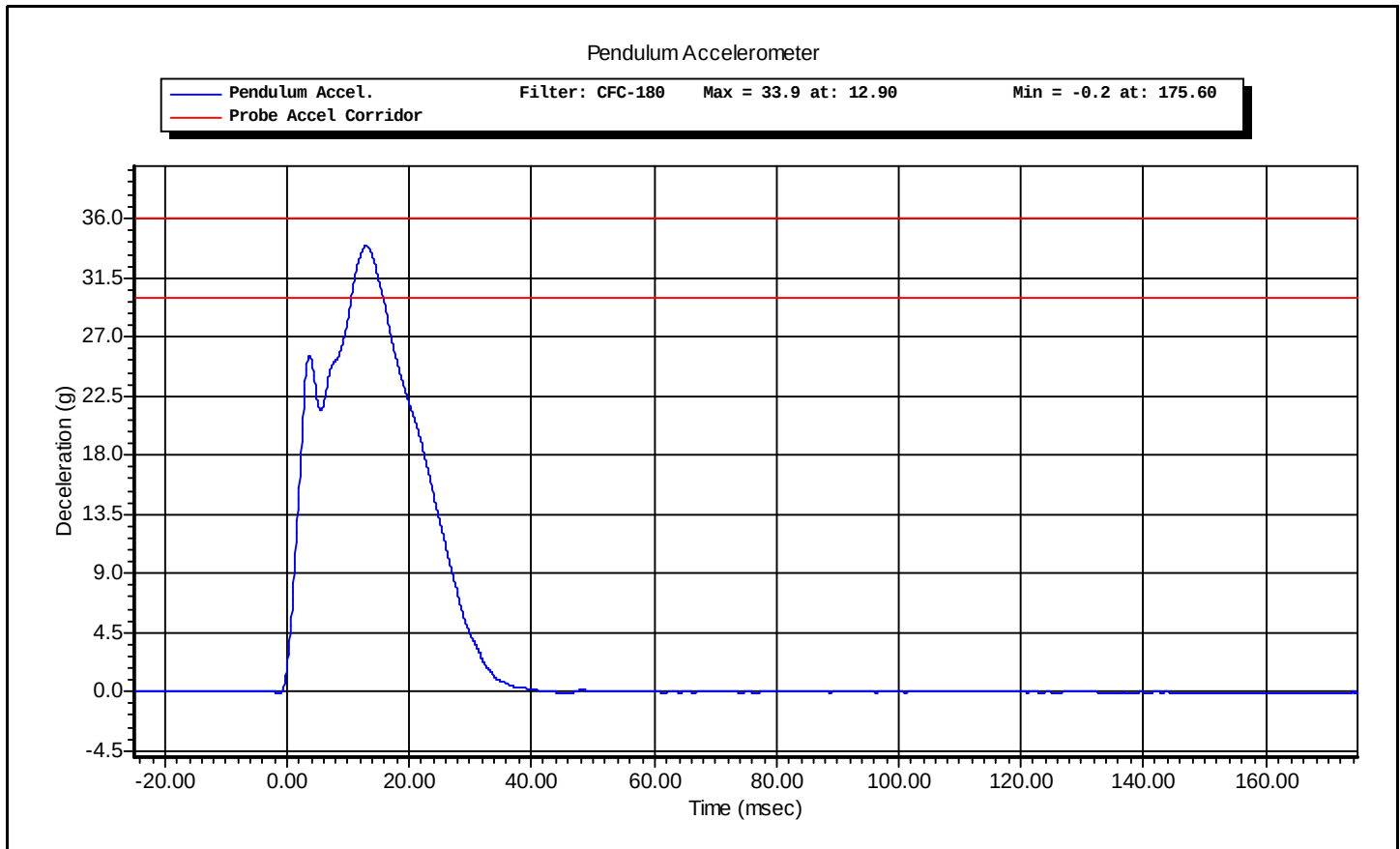


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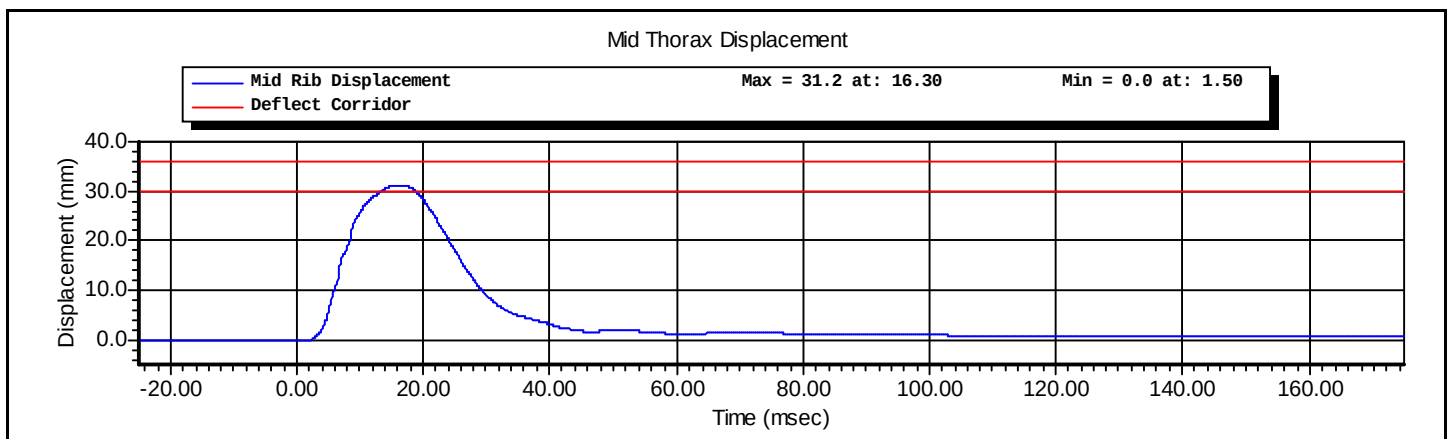
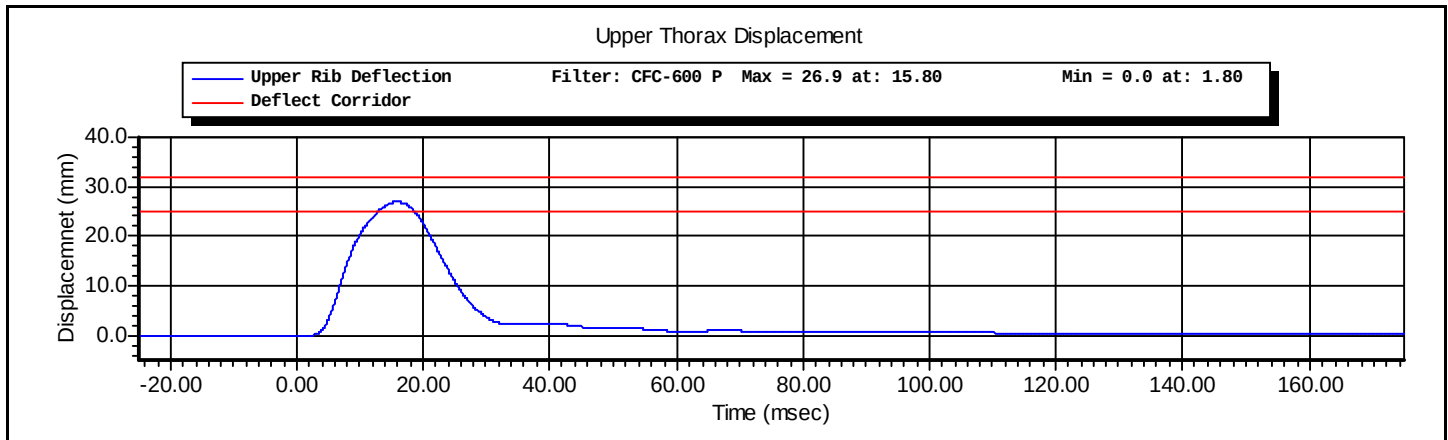
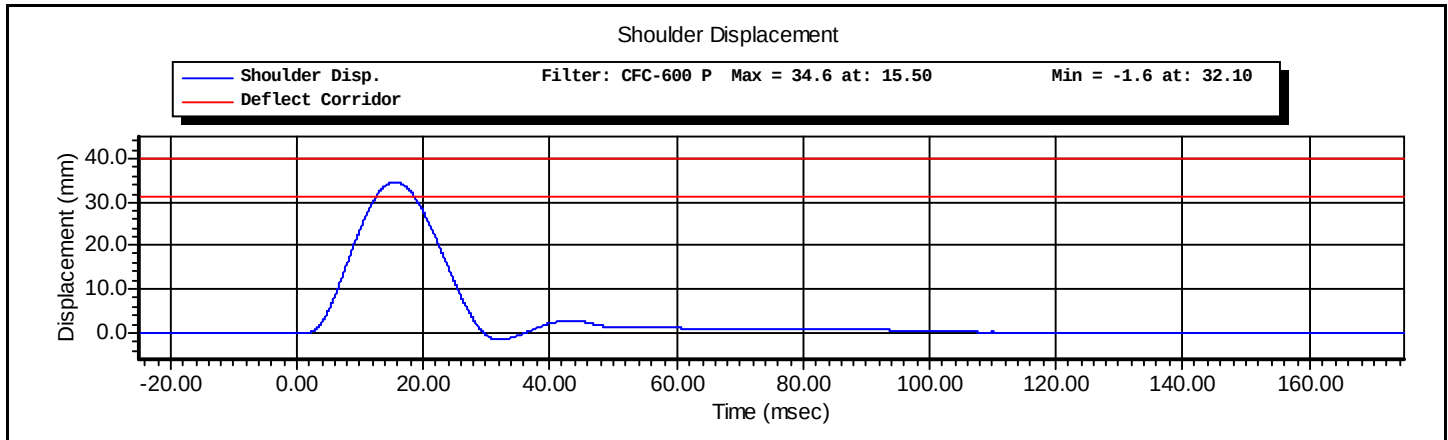
4455 Genesee Street, Buffalo, New York 14225 - Phone (716)632-7500

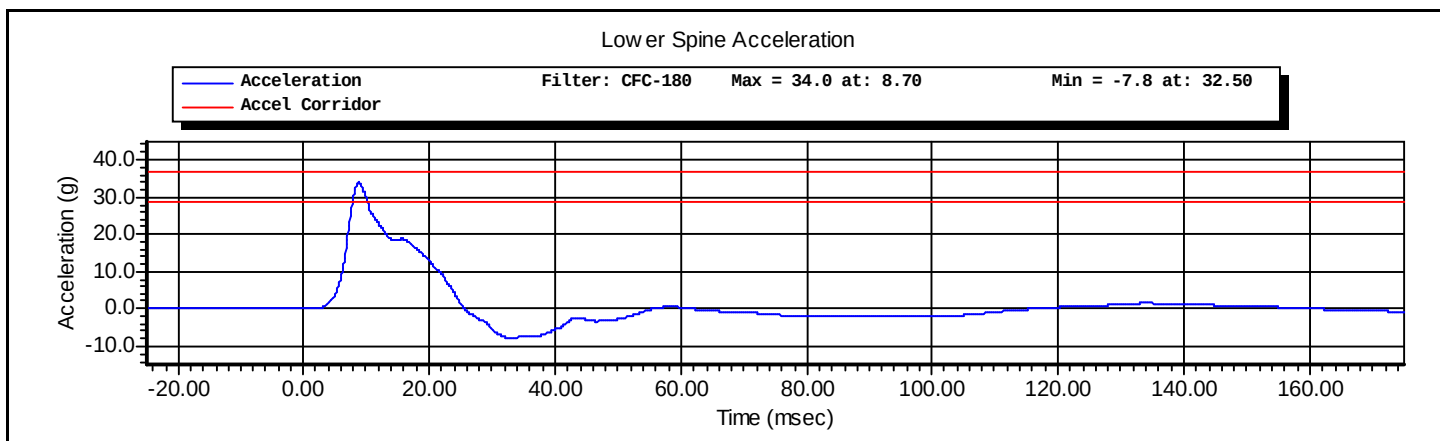
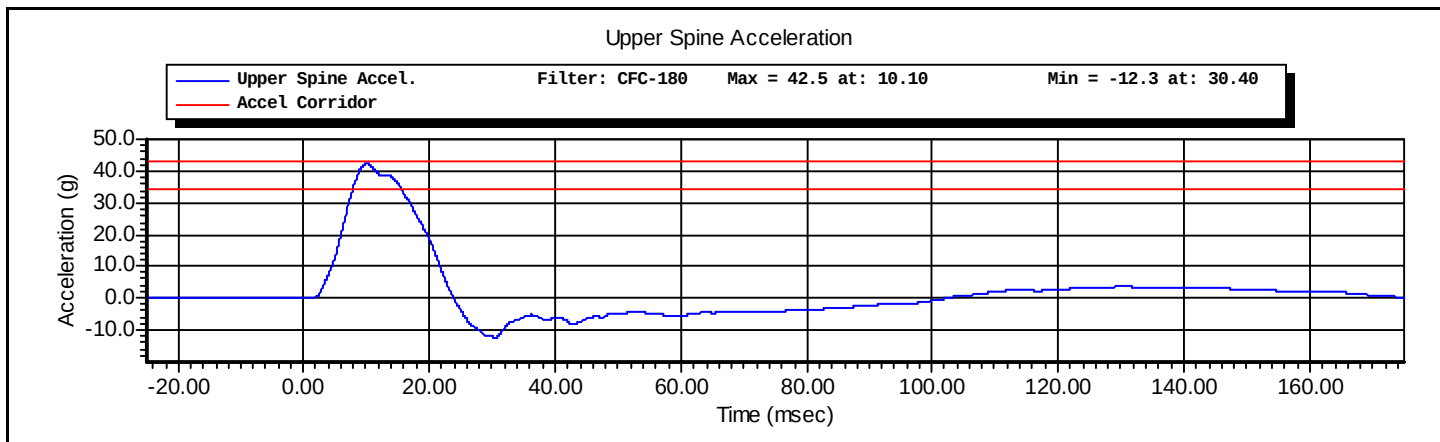
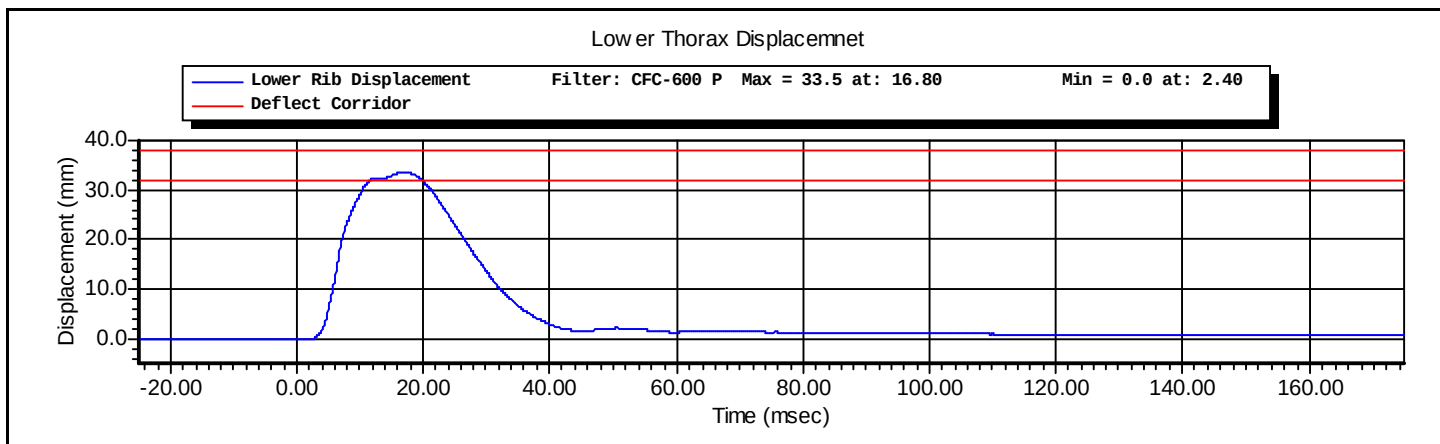
Test Name:	Thorax Impact with Arm	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	SID 304		
Test ID:	Thorax With Arm	Test Date:	11/3/2010
Test Number:	1	Test Time:	3:43:01 PM



Test ID: Thorax With Arm Test Time: 3:43:01 PM

Test Date: 11/3/2010







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VERIFICATION REPORT

Test Name:	Abdominal Impact	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	SID 304		
Test ID:	Abdomen	Test Date:	11/3/2010
Test Number:	1	Test Time:	1:24:14 PM

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.7 deg C P
Humidity	10 -- 70	26 %RH P
Velocity	4.20 -- 4.40	4.34 m/s P
Probe Acceleration	12.0 -- 16.0	15.6 g P
Upper Abdominal Rib Deflection	36.0 -- 47.0	38.8 mm P
Lower Abdominal Rib Deflection	33.0 -- 44.0	38.4 mm P
Lower Spine Acceleration - T12	9.0 -- 14.0	11.7 g P

All test parameters are within specifications

Technician: **S. Zito III** Signature: _____
Supervisor: **D. Travale** Signature: _____

Test ID: **Abdomen**

Test Time: **1:24:14 PM**

Test Date: **11/3/2010**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2010
Endevco	7264-2000	P66930	10/5/2010
Servo	180-3885	DS-1207	3/26/2010
Servo	180-3885	DS-1204	3/26/2010
Endevco	7264-2000	P58839	10/14/2010

Test ID: **Abdomen**

Test Time: **1:24:14 PM**

Test Date: **11/3/2010**



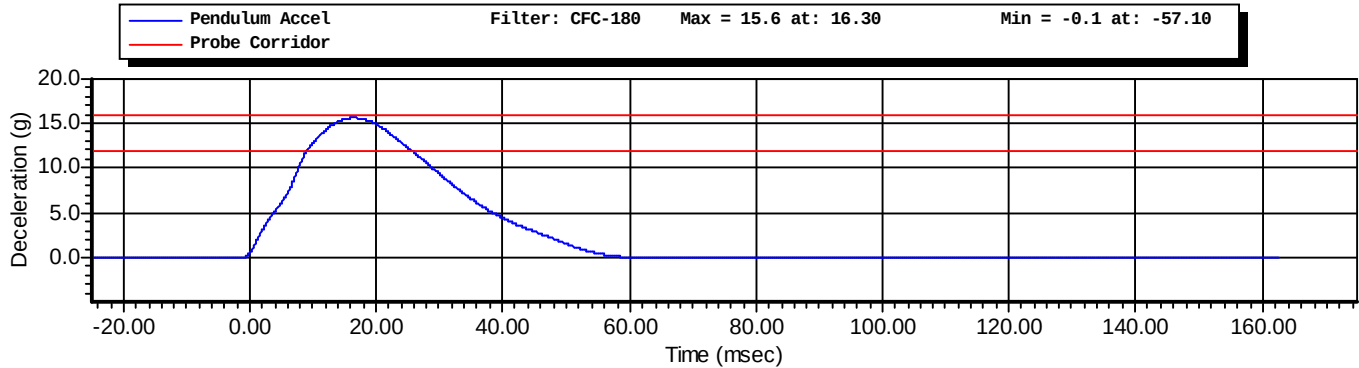
www.calspan.com

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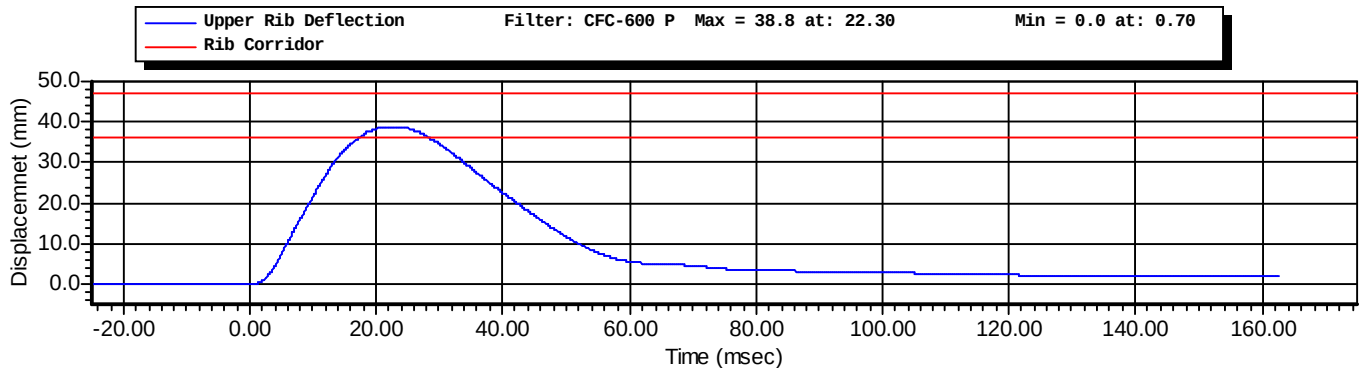
4455 Genesee Street, Buffalo, New York 14225 - Phone (716)632-7500

Test Name:	Abdominal Impact	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	SID 304		
Test ID:	Abdomen	Test Date:	11/3/2010
Test Number:	1	Test Time:	1:24:14 PM

Pendulum Accelerometer



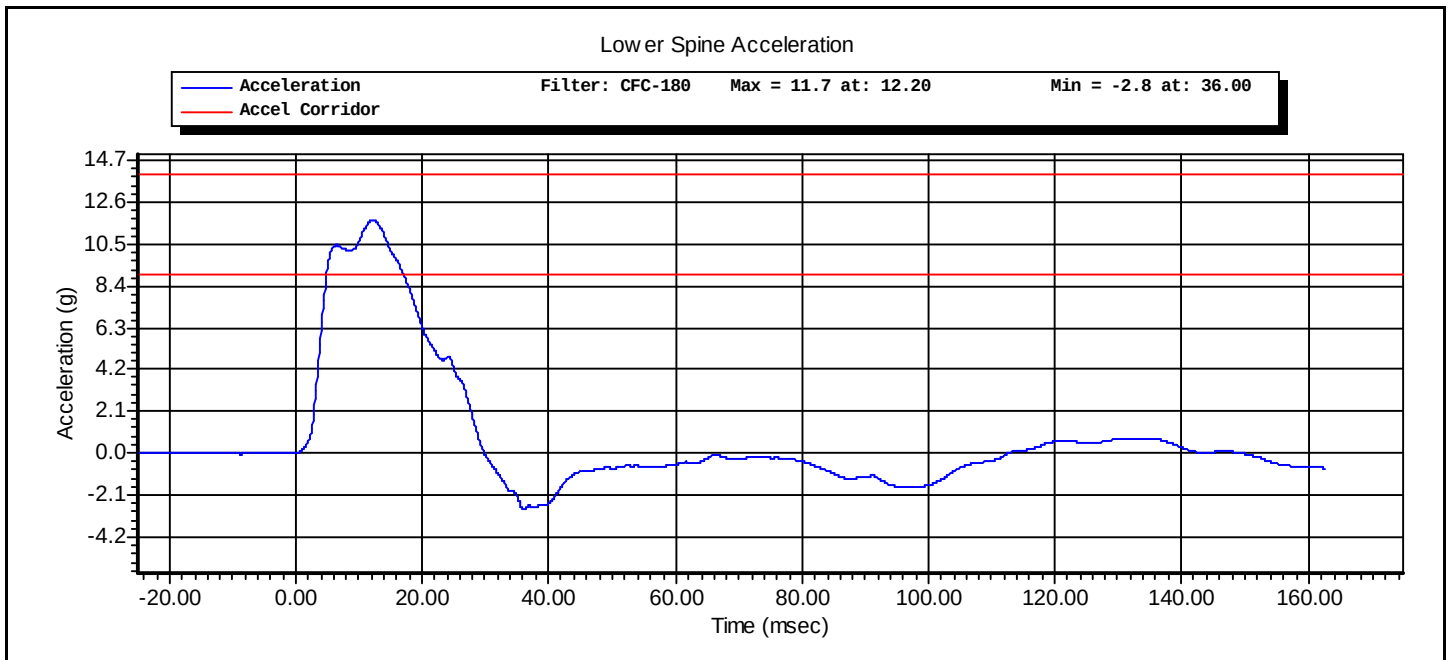
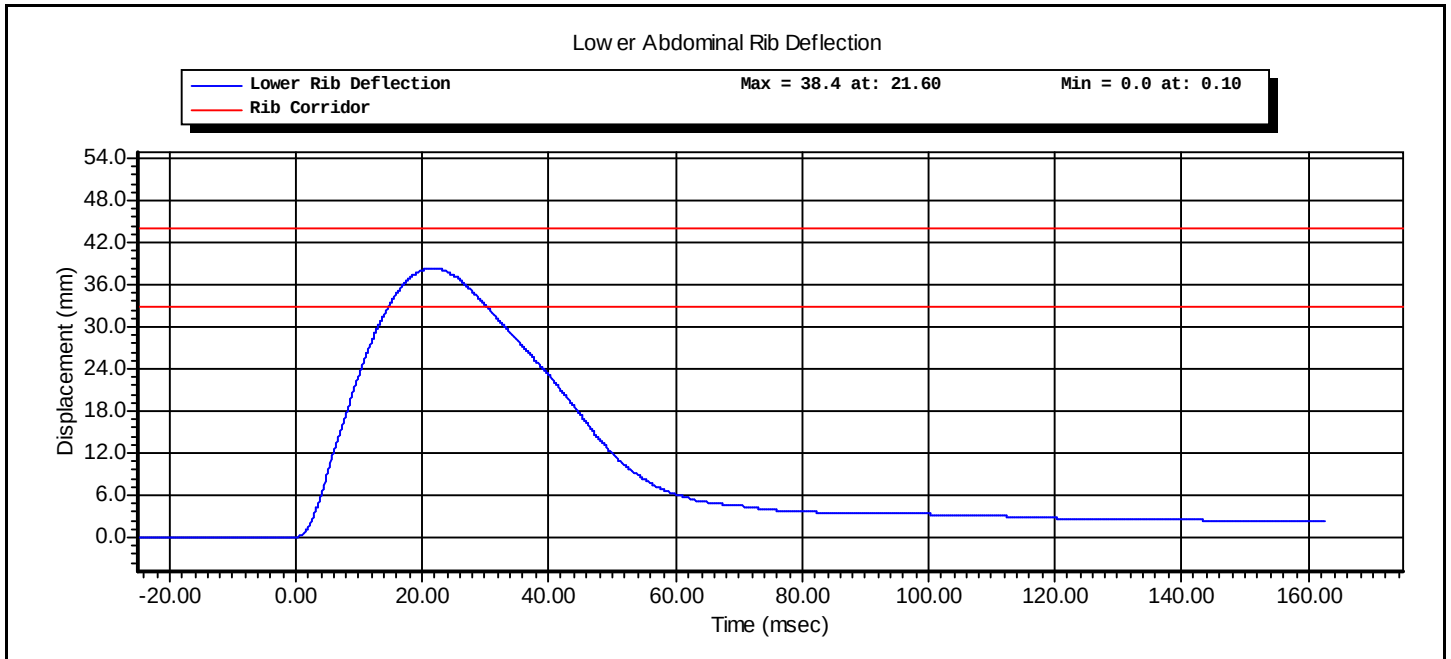
Upper Abdominal Rib Deflection



Test ID: **Abdomen**

Test Time: **1:24:14 PM**

Test Date: **11/3/2010**





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VERIFICATION REPORT

Test Name:	Pelvis	Revision:	8/24/2009
Sub Test Name:	Iliac Impact	Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	SID 304		
Test ID:	Iliac Pelvis	Test Date:	11/3/2010
Test Number:	3	Test Time:	11:40:38 AM

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.3 deg C P
Humidity	10 -- 70	26 %RH P
Velocity	4.20 -- 4.40	4.23 m/s P
Peak Probe Acceleration	36.0 -- 45.0	40.8 g P
Peak Pelvis Acceleration	28.0 -- 39.0	34.3 g P
Peak Iliac Force	4.10 -- 5.10	4.70 kN P

All test parameters are within specifications

Technician: **A. Rudniski** Signature: _____
Supervisor: **D. Travale** Signature: _____

Test ID: **Iliac Pelvis**

Test Time: **11:40:38 AM**

Test Date: **11/3/2010**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2010
Endevco	7264-2000	P66930	10/5/2010
Endevco	7264-2000	P49217	10/12/2010
DentonATD	3228J	LC-281 Fy	4/9/2010

Test ID: **Iliac Pelvis**

Test Time: **11:40:38 AM**

Test Date: **11/3/2010**

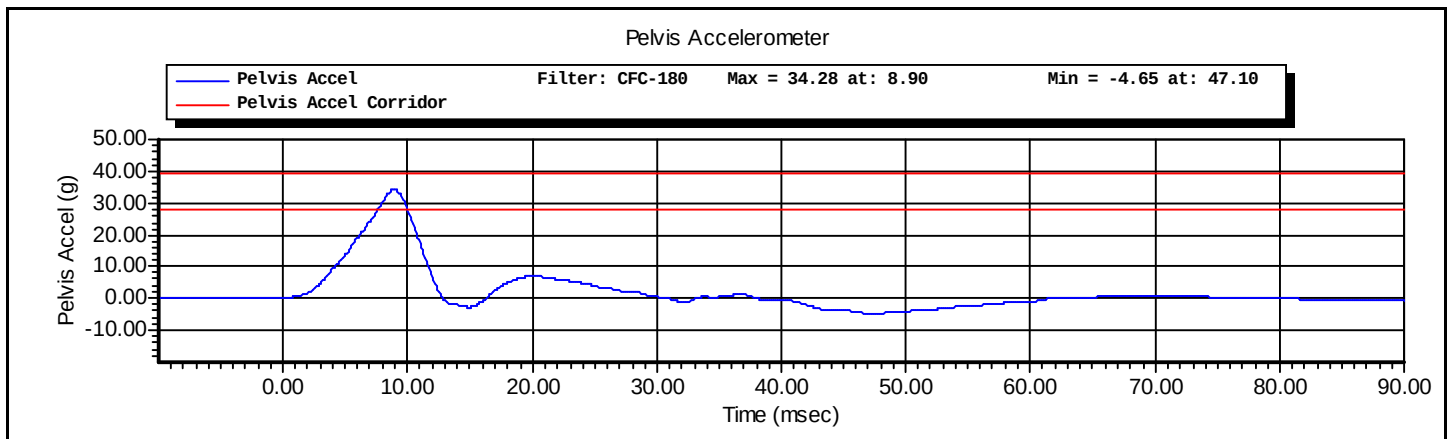
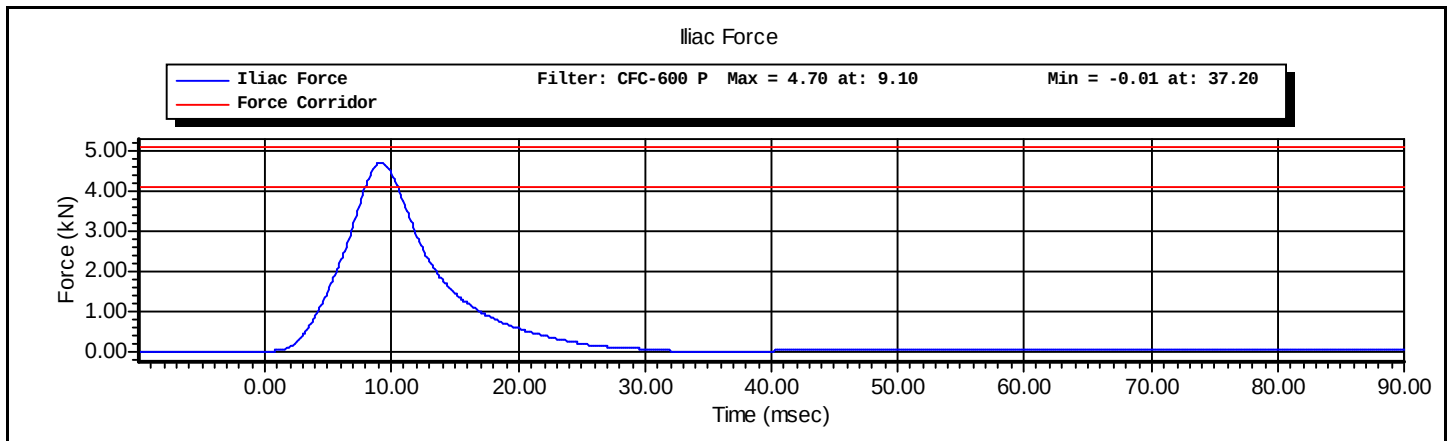


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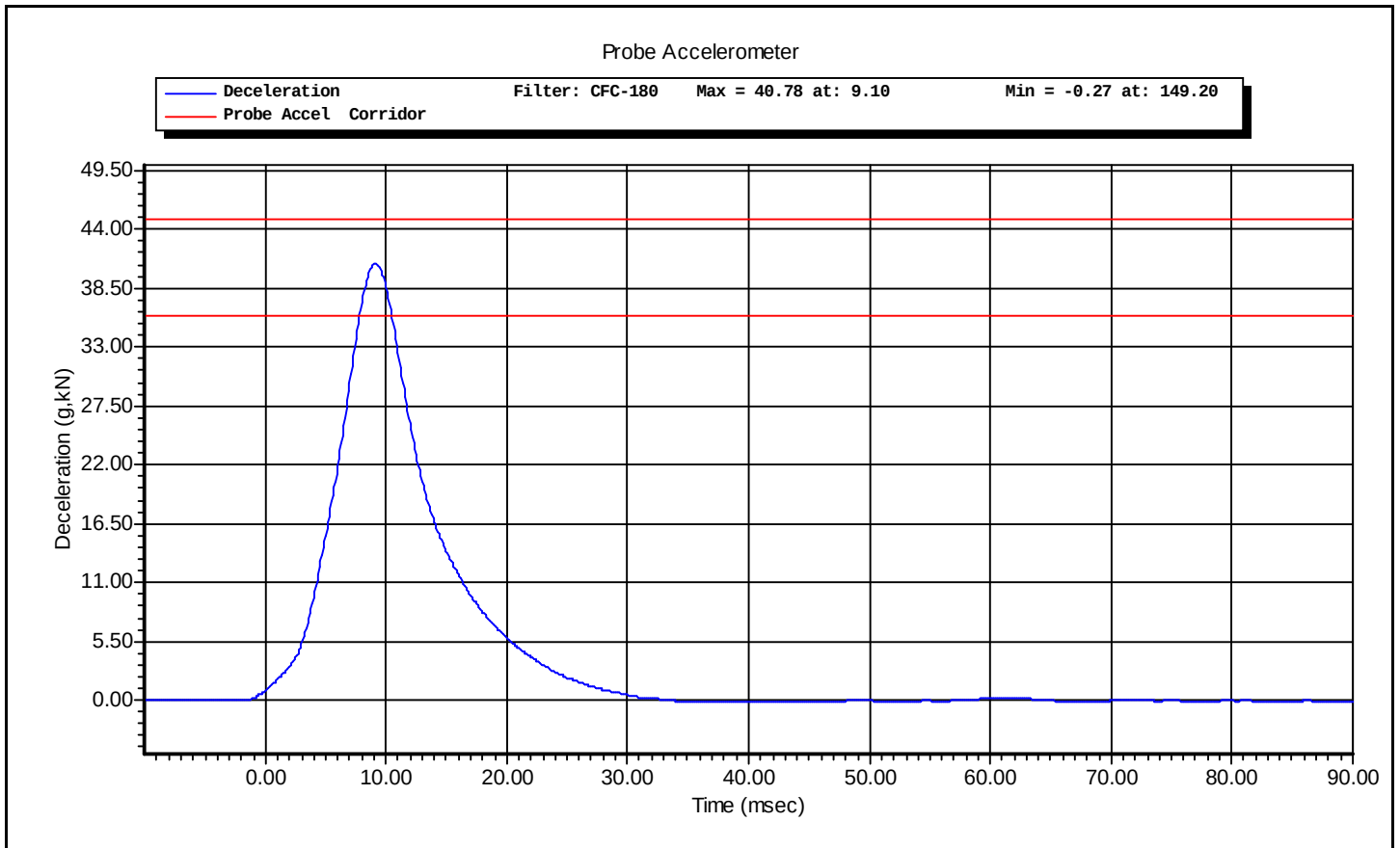
Test Name:	Pelvis	Revision:	8/24/2009
Sub Test Name:	Iliac Impact	Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	SID 304		
Test ID:	Iliac Pelvis	Test Date:	11/3/2010
Test Number:	3	Test Time:	11:40:38 AM



Test ID: **Iliac Pelvis**

Test Time: **11:40:38 AM**

Test Date: **11/3/2010**





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VERIFICATION REPORT

Test Name:	Pelvis	Revision:	8/24/2009
Sub Test Name:	Acetabulum Impact	Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	SID 304		
Test ID:	Acetabulum	Test Date:	11/3/2010
Test Number:	1	Test Time:	12:39:55 PM

Comments:

Pelvis Plug Used for Certification:
FTSS S/N 8142
Force @ 3mm = 1494N

Pelvis Plug Used for Full Scale Test:
FTSS S/N 12754
Force @ 3mm = 1498N

Test Parameters	Test Specifications			Test Results	
Temperature	20.6	--	22.2	21.7 deg C	P
Humidity	10	--	70	26 %RH	P
Velocity	6.60	--	6.80	6.61 m/s	P
Peak Probe Acceleration	38.0	--	47.0	42.9 g	P
Peak Pelvis Acceleration	34.0	--	42.0	39.1 g	P
Peak Acetabulum Force	3.60	--	4.30	3.93 kN	P

All test parameters are within specifications

Technician: **S. Zito** Signature: _____

Supervisor: **D. Travale** Signature: _____

Test ID: **Acetabulum**

Test Time: **12:39:55 PM**

Test Date: **11/3/2010**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2010
Endevco	7264-2000	P66930	10/5/2010
Endevco	7264-2000	P49217	10/12/2010
DentonATD	3249J	LC-267Fy	4/9/2010

Test ID: **Acetabulum**

Test Time: **12:39:55 PM**

Test Date: **11/3/2010**



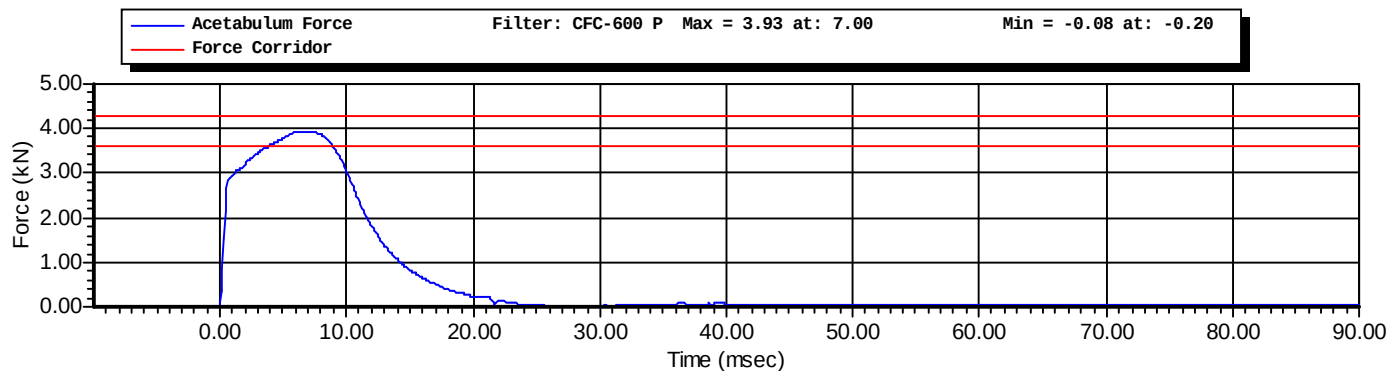
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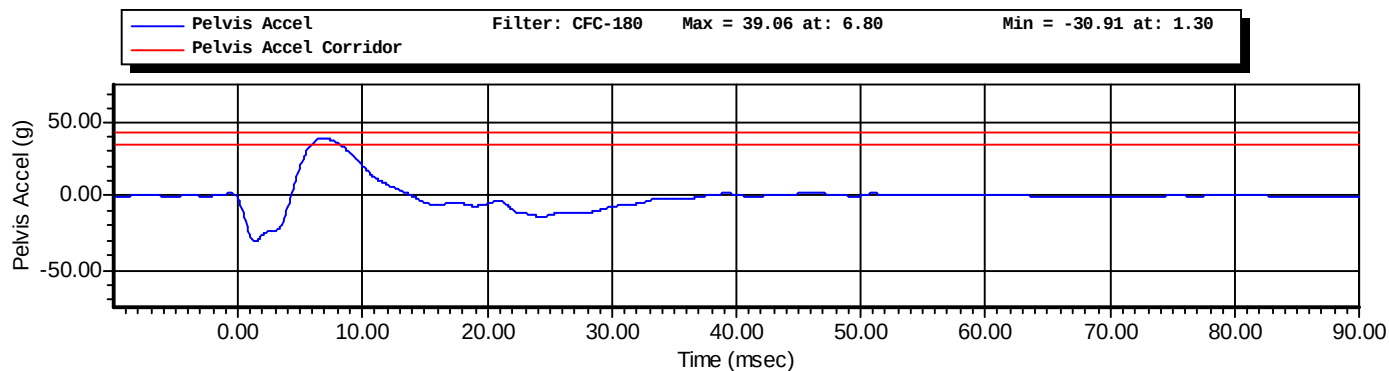
4455 Genesee Street, Buffalo, New York 14225 - Phone (716)632-7500

Test Name:	Pelvis	Revision:	8/24/2009
Sub Test Name:	Acetabulum Impact	Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	SID 304		
Test ID:	Acetabulum	Test Date:	11/3/2010
Test Number:	1	Test Time:	12:39:55 PM

Acetabulum Force



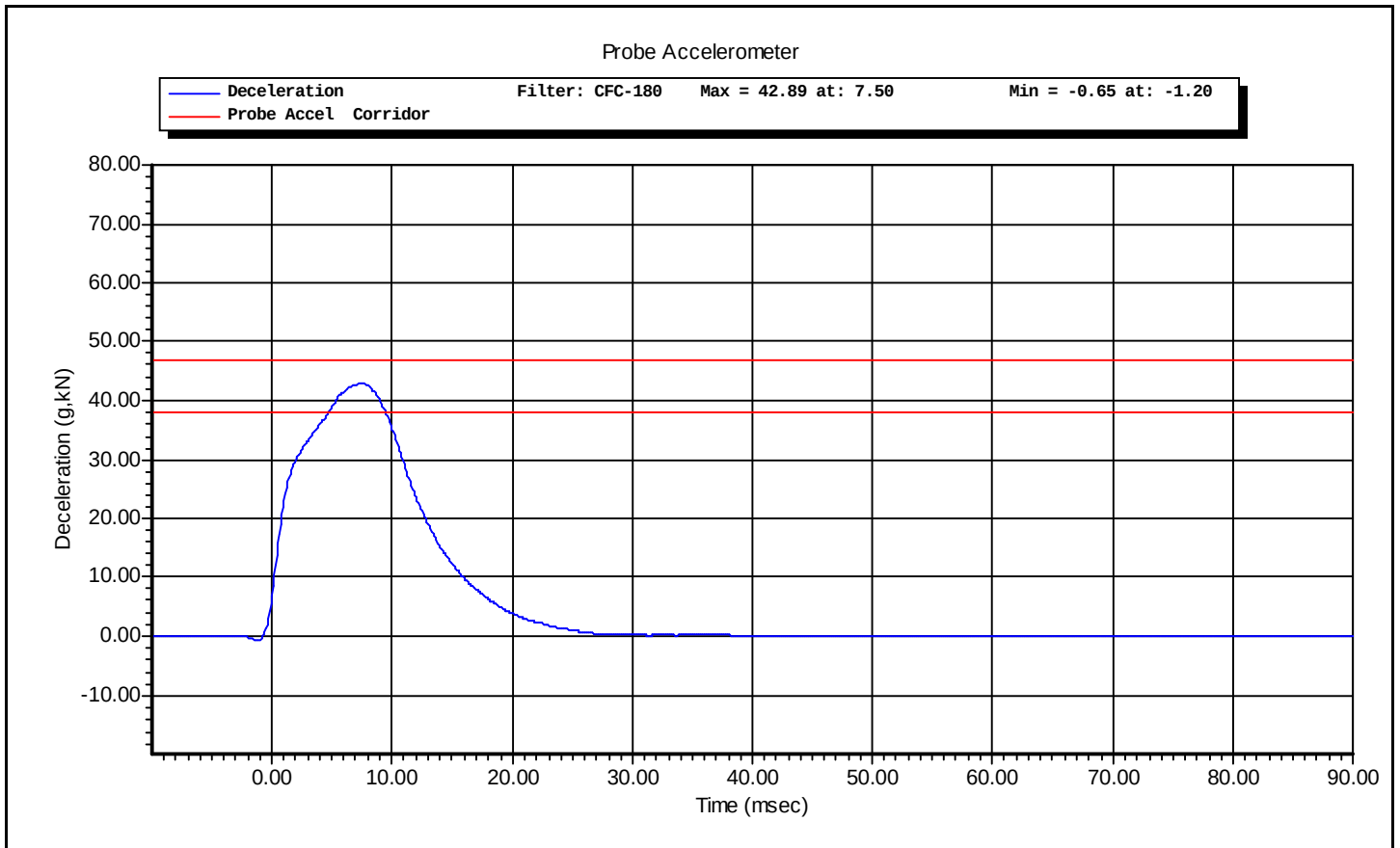
Pelvis Accelerometer



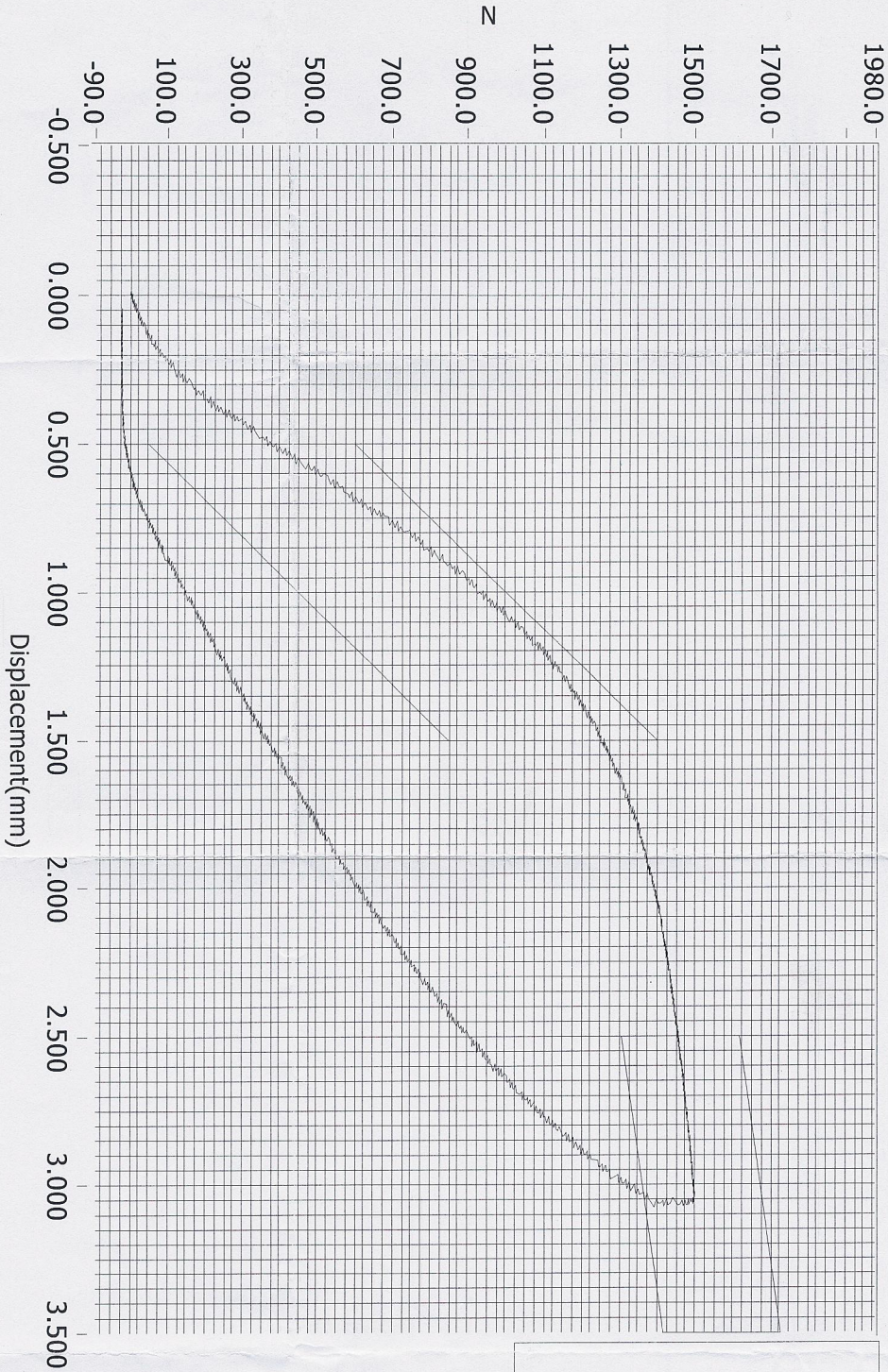
Test ID: **Acetabulum**

Test Time: **12:39:55 PM**

Test Date: **11/3/2010**



Resultant Data - SIDIIs Plug Compression



- Loading Curve
- Boundary Limit Upper
- Boundary Limit Lower
- Peak Load Upper
- Peak Load Lower
- Peak Defl Upper
- Peak Defl Lower

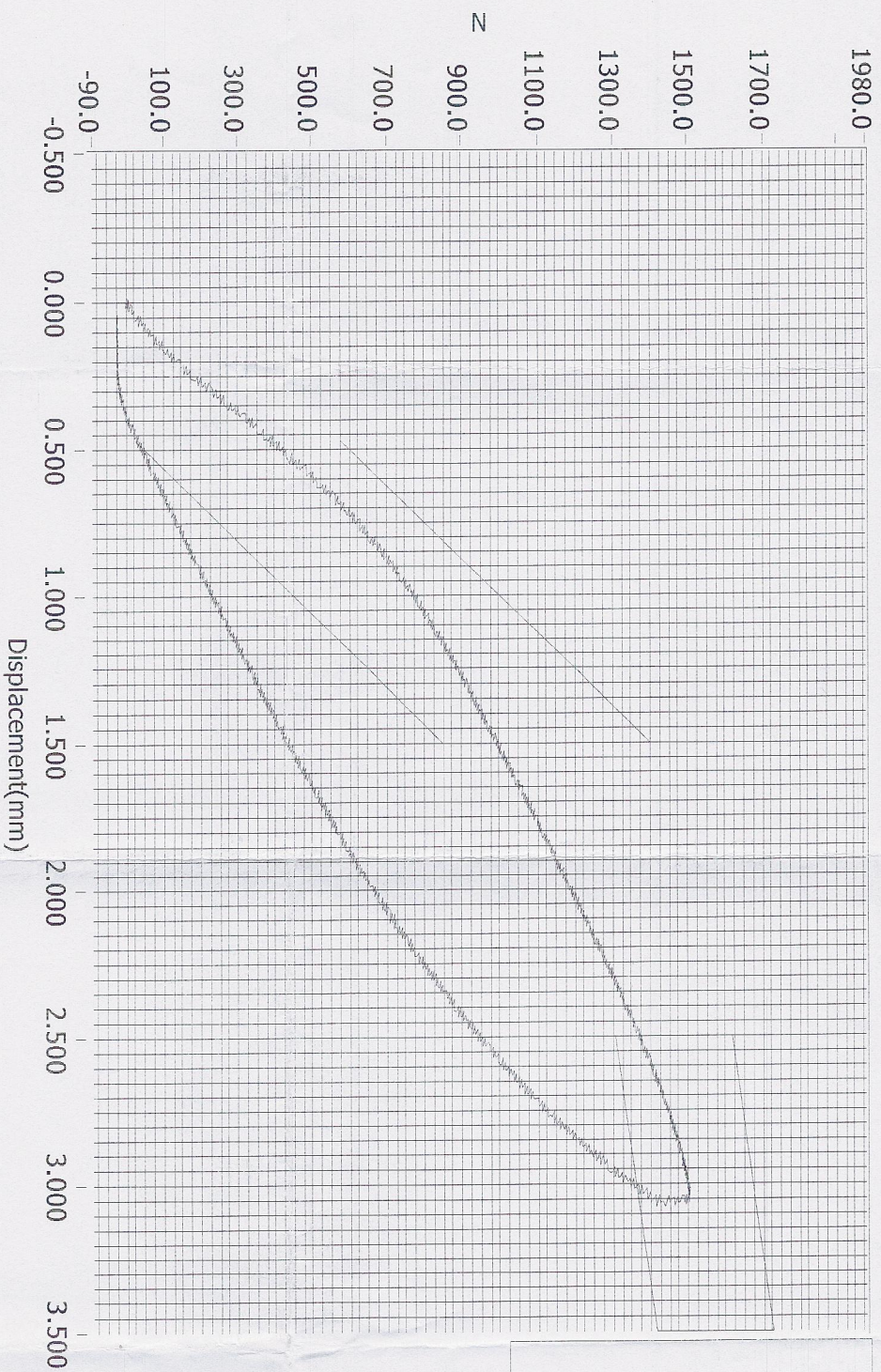
ATD Calibration Lab

Test ID	Part Serial Number	Test Date	Test Time
Cert ID	ATD Serial Number	ATD Type	
	8142	SIDIIs	

Current Date : 2/19/2007

Current Time : 05:42:44

Resultant Data - SIDIIs Plug Compression



Loading Curve	<
Boundary Limit Upper	<
Boundary Limit Lower	<
Peak Load Upper	<
Peak Load Lower	<
Peak Defl Upper	<
Peak Defl Lower	<

ATD Calibration Lab

Test ID

Part Serial Number

Test Date

Test Time

Cert ID

ATD Serial Number

ATD Type

12754

SIDIIs

Current Date : 7/16/2007

Current Time : 14:24:06

CALIBRATION TEST RESULTS

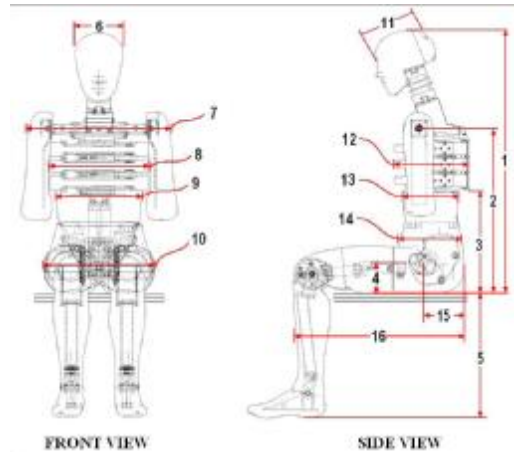
POST-TEST

ES2-re No: 033

CONFIGURED FOR LEFT SIDE IMPACT

ES-2re External Measurements

NHTSA SN F033



Dim. No.	Description	Specification (mm)	Result (mm)	Pass/Fail
1	Sitting Height	900-918	909	Pass
2	Seat to Shoulder Joint	558-572	565	Pass
3	Seat to Lower Face of Thoracic Spine Box	346-356	354	Pass
4	Seat to Hip Joint (center of bolt)	97-103	100	Pass
5	Sole to Seat, Sitting	433-451	444	Pass
6	Head Width	152-158	158	Pass
7	Shoulder/Arm Width	461-479	470	Pass
8	Thorax Width	322-332	323	Pass
9	Abdomen Width	273-287	282	Pass
10	Pelvis Lap Width	359-373	369	Pass
11	Head Depth	196-206	201	Pass
12	Thorax Depth	262-272	267	Pass
13	Abdomen Depth	194-204	199	Pass
14	Pelvis Depth	235-245	239	Pass
15	Back of Buttocks to Hip Joint (center of bolt)	150-160	157	Pass
16	Back of Buttocks to Front Knee	597-615	603	Pass

Technician: SZ

Date: 11/11/2010



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VERIFICATION REPORT

Test Name:	Head Drop	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Head Drop	Test Date:	11/10/2010
Test Number:	1	Test Time:	2:17:07 PM

Component Part Number	Component Serial Number
455-1007	8473

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.2 deg C P
Humidity	10 -- 70	30 %RH P
Resultant Acceleration	125 -- 155	154 g P
Oscillation	0.0 -- 15.0	0.0 % P
Fore-Aft Acceleration	-15.00 -- 15.00	-5.63 g P

All test parameters are within specifications

Technician: **S. Zito** Signature: _____
Supervisor: **D. Travale** Signature: _____

Test ID: **Head Drop**

Test Time: **2:17:07 PM**

Test Date: **11/10/2010**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Endevco	7264-2000	P51681	9/20/2010
Endevco	7264-2000	P51949	5/26/2010
Endevco	7264-2000	P51695	9/20/2010

Test ID: **Head Drop**

Test Time: **2:17:07 PM**

Test Date: **11/10/2010**

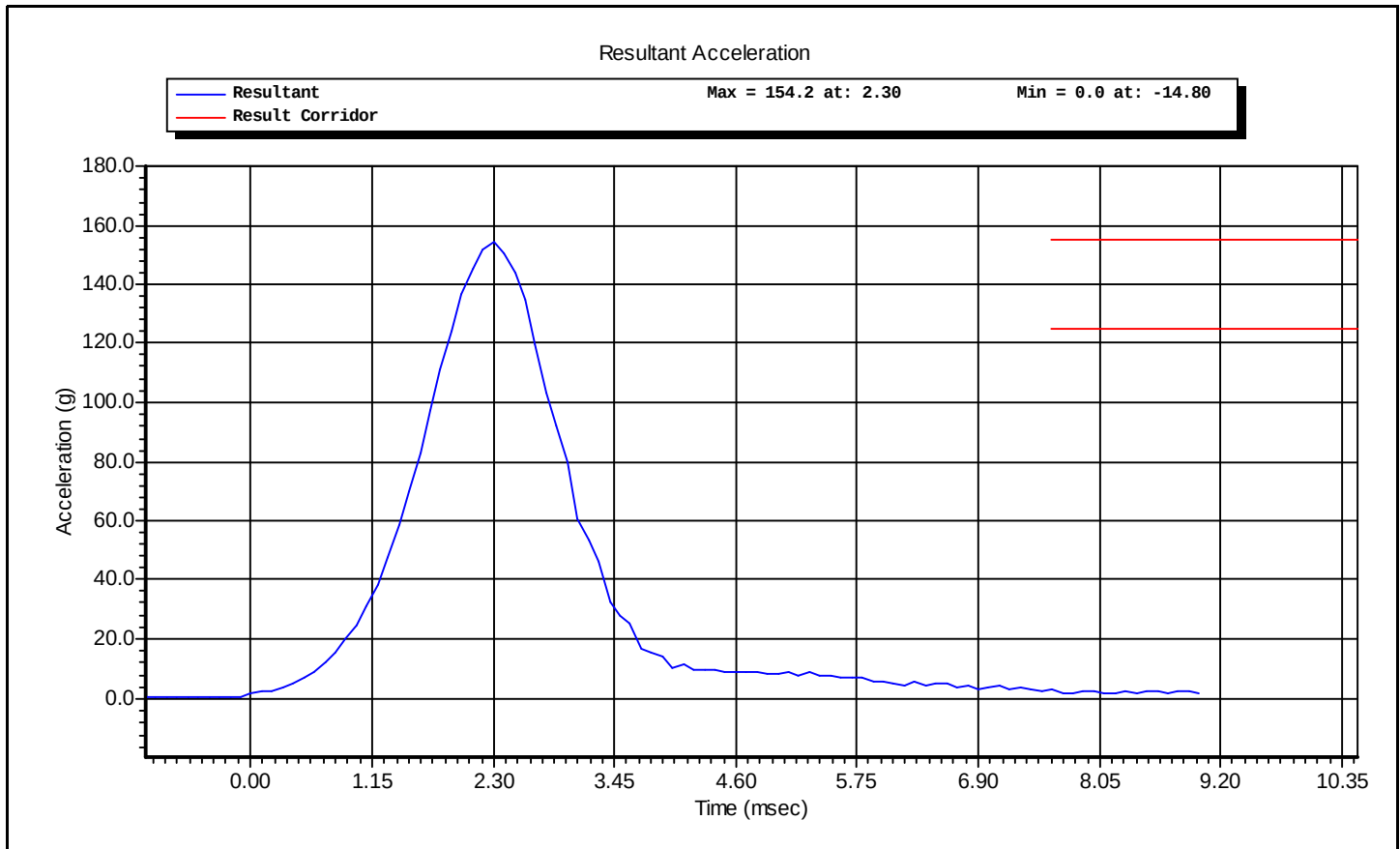


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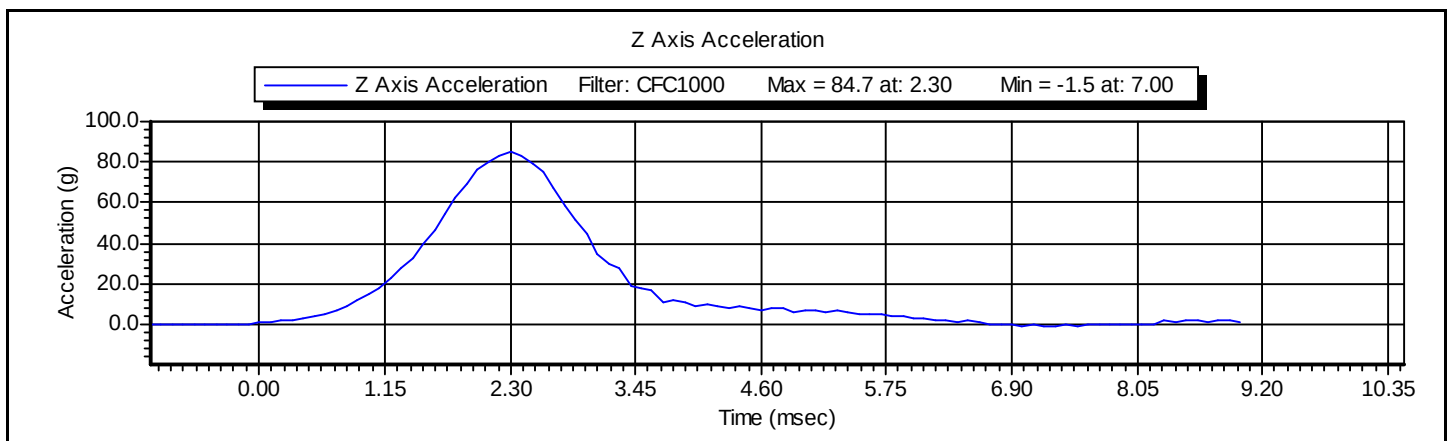
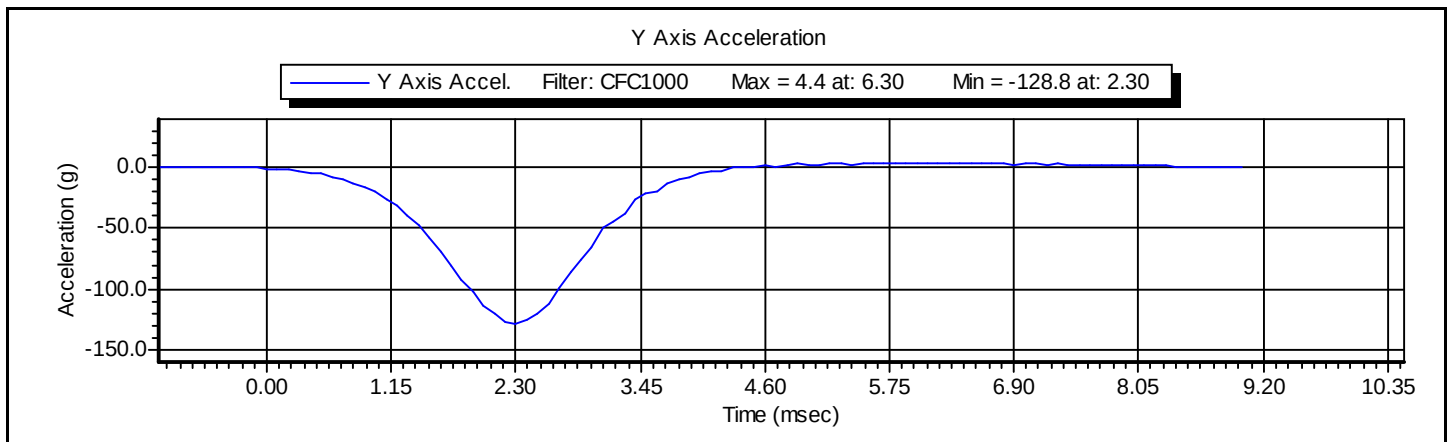
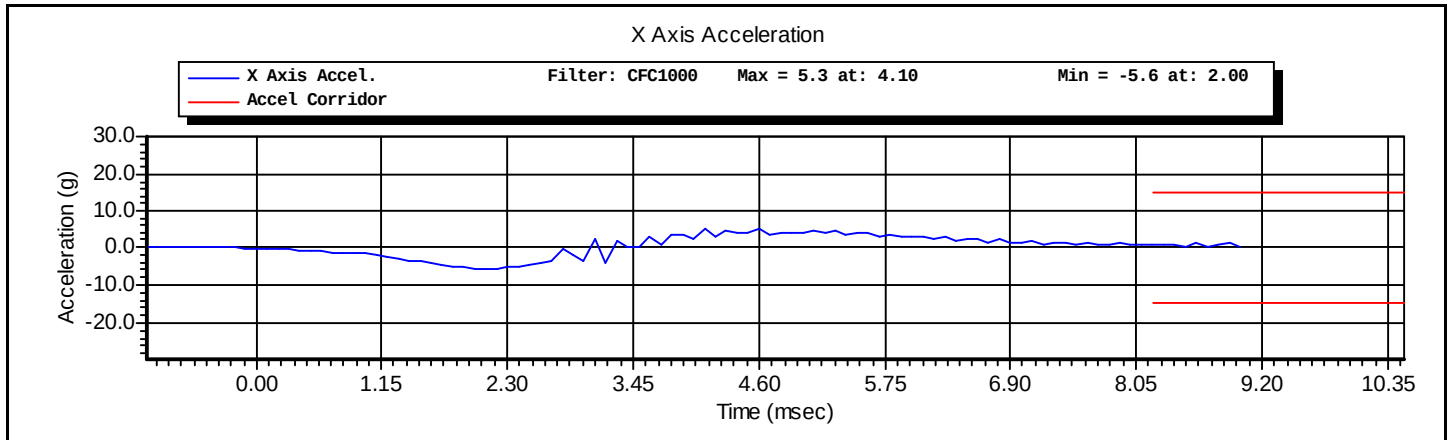
Test Name:	Head Drop	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Head Drop	Test Date:	11/10/2010
Test Number:	1	Test Time:	2:17:07 PM



Test ID: **Head Drop**

Test Time: **2:17:07 PM**

Test Date: **11/10/2010**





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VERIFICATION REPORT

Test Name:	Neck Flexion	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Neck Flexion	Test Date:	11/10/2010
Test Number:	1	Test Time:	4:09:35 PM

Component Part Number	Component Serial Number
455-2002	07085

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.2 deg C P
Humidity	10 -- 70	29 %RH P
Velocity	3.30 -- 3.50	3.43 m/s P
Maximum Neck Flexion Angle	49.0 -- 59.0	52.5 degrees P
Time At Maximum Neck Flexion	54.0 -- 66.0	58.2 ms P
Decay to Zero Degrees	53.0 -- 88.0	59.6 ms P
Velocity Corridor	--	P

All test parameters are within specifications

Technician: **A. Rudniski** Signature: _____

Supervisor: **D. Travale** Signature: _____

Test ID: **Neck Flexion**

Test Time: **4:09:35 PM**

Test Date: **11/10/2010**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2010
Endevco	7231CT	C16510	5/10/2010
DentonATD	7000428	094	4/27/2010
DentonATD	7000428	095	4/27/2010
DentonATD	7000428	093	4/27/2010

Test ID: **Neck Flexion**

Test Time: **4:09:35 PM**

Test Date: **11/10/2010**



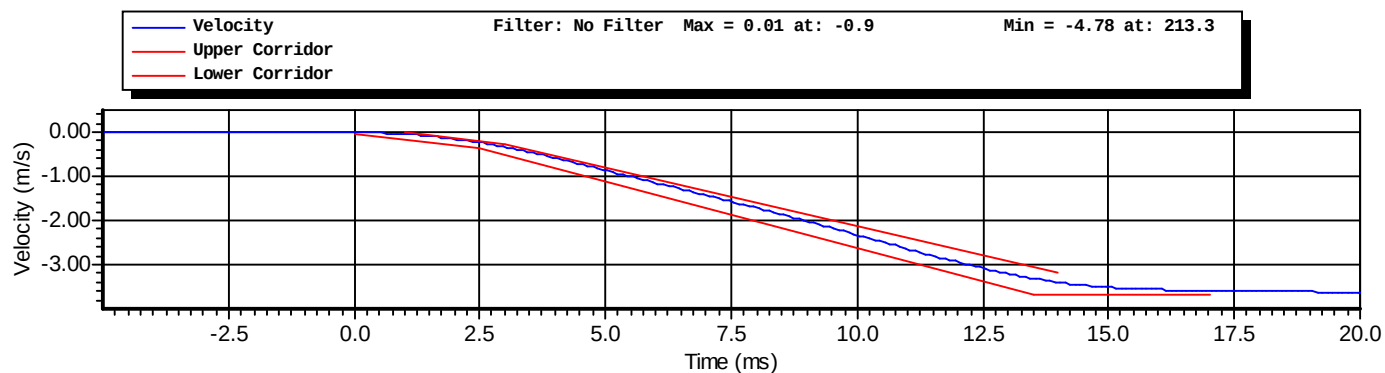
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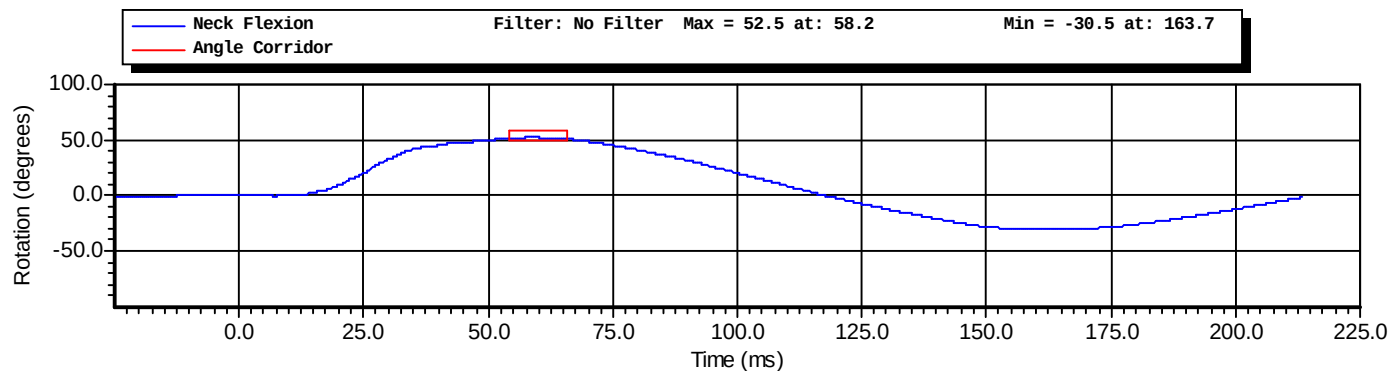
4455 Genesee Street, Buffalo, New York 14225 - Phone (716)632-7500

Test Name:	Neck Flexion	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Neck Flexion	Test Date:	11/10/2010
Test Number:	1	Test Time:	4:09:35 PM

Pendulum Velocity



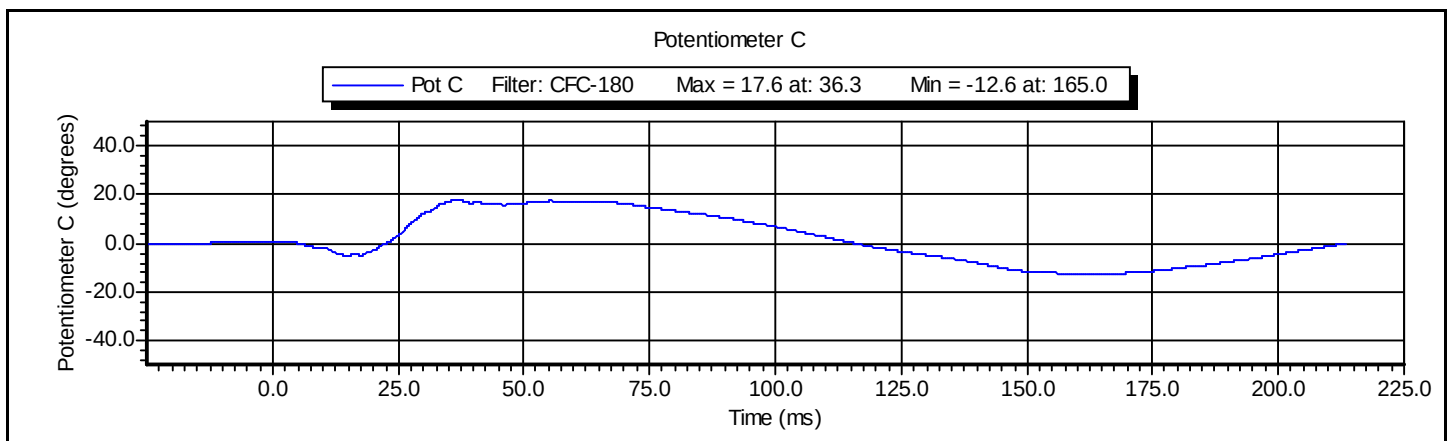
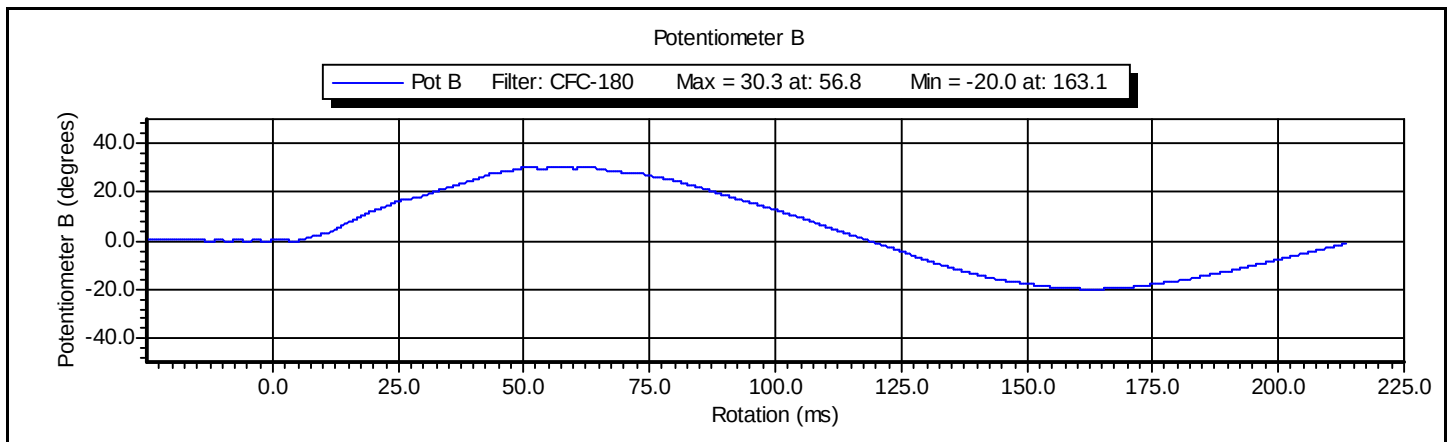
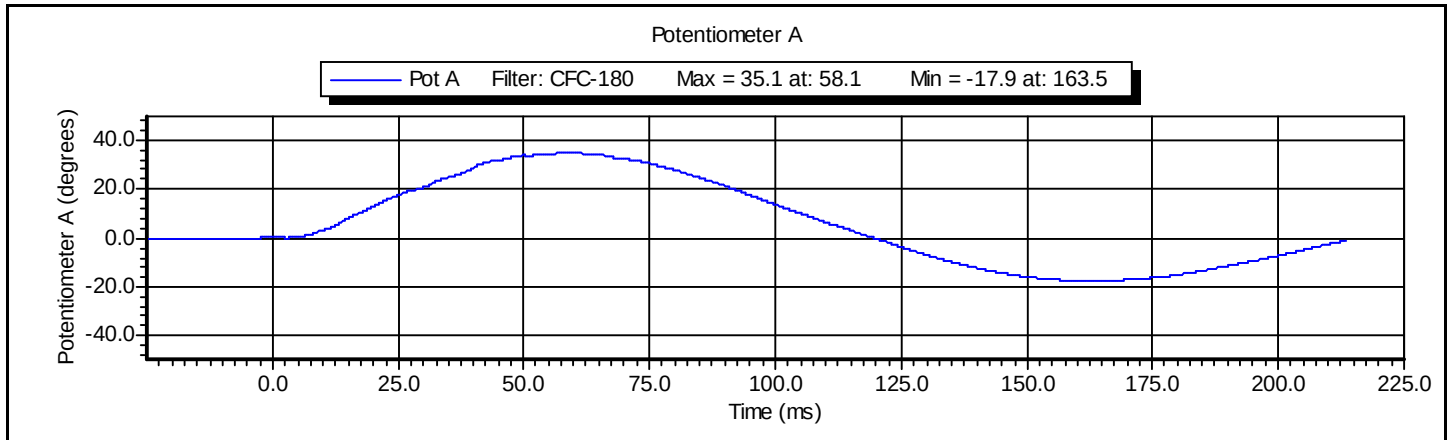
Neck Flexion Angle



Test ID: Neck Flexion

Test Time: 4:09:35 PM

Test Date: 11/10/2010





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VERIFICATION REPORT

Test Name:	Shoulder Impact	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Shoulder	Test Date:	11/11/2010
Test Number:	1	Test Time:	8:40:54 AM

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	20.8 deg C P
Humidity	10.0 -- 70.0	28.0 %RH P
Velocity	4.20 -- 4.40	4.32 m/s P
Pendulum Acceleration	-10.50 -- -7.50	-10.17 g P

All test parameters are within specifications

Technician: **A. Rudniski** Signature: _____
Supervisor: **D. Travale** Signature: _____

Test ID: **Shoulder**

Test Time: **8:40:54 AM**

Test Date: **11/11/2010**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2010
Endevco	7264-2000	P66930	10/5/2010

Test ID: **Shoulder**

Test Time: **8:40:54 AM**

Test Date: **11/11/2010**

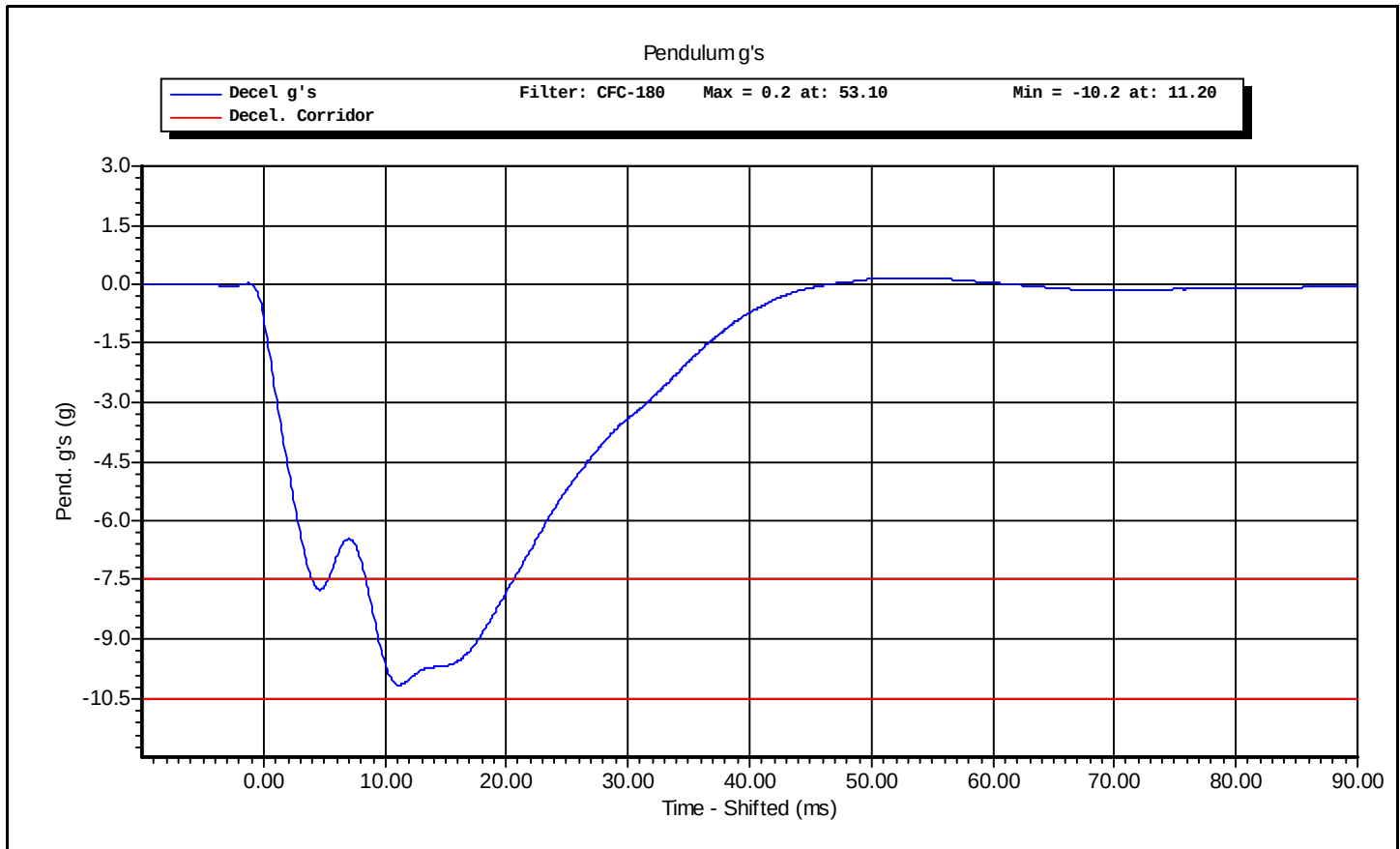


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Test Name:	Shoulder Impact	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Shoulder	Test Date:	11/11/2010
Test Number:	1	Test Time:	8:40:54 AM



Test ID: **Shoulder**

Test Time: **8:40:54 AM**

Test Date: **11/11/2010**



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VERIFICATION REPORT

Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	4.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Upper Rib 4m/s	Test Date:	11/10/2010
Test Number:	1	Test Time:	4:56:53 PM

Component Part Number	Component Serial Number
455-3100	UPPER

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.2 deg C P
Humidity	10.0 -- 70.0	30.0 %RH P
Velocity	3.90 -- 4.10	3.97 m/s P
Rib Displacement	-51.00 -- -46.00	-48.54 mm P
Drop Height	807.0 -- 823.0	815.0 mm P

All test parameters are within specifications

Technician: **A. Rudniski** Signature: _____
Supervisor: **D. Travale** Signature: _____

Test ID: **Upper Rib 4m/s**

Test Time: **4:56:53 PM**

Test Date: **11/10/2010**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Honeywell	MLT-38000	DS-179	4/23/2010
DentonATD	Velocity Trap	1	1/11/2010
Endevco	7264-2000	P38216	6/22/2010

Test ID: **Upper Rib 4m/s**

Test Time: **4:56:53 PM**

Test Date: **11/10/2010**

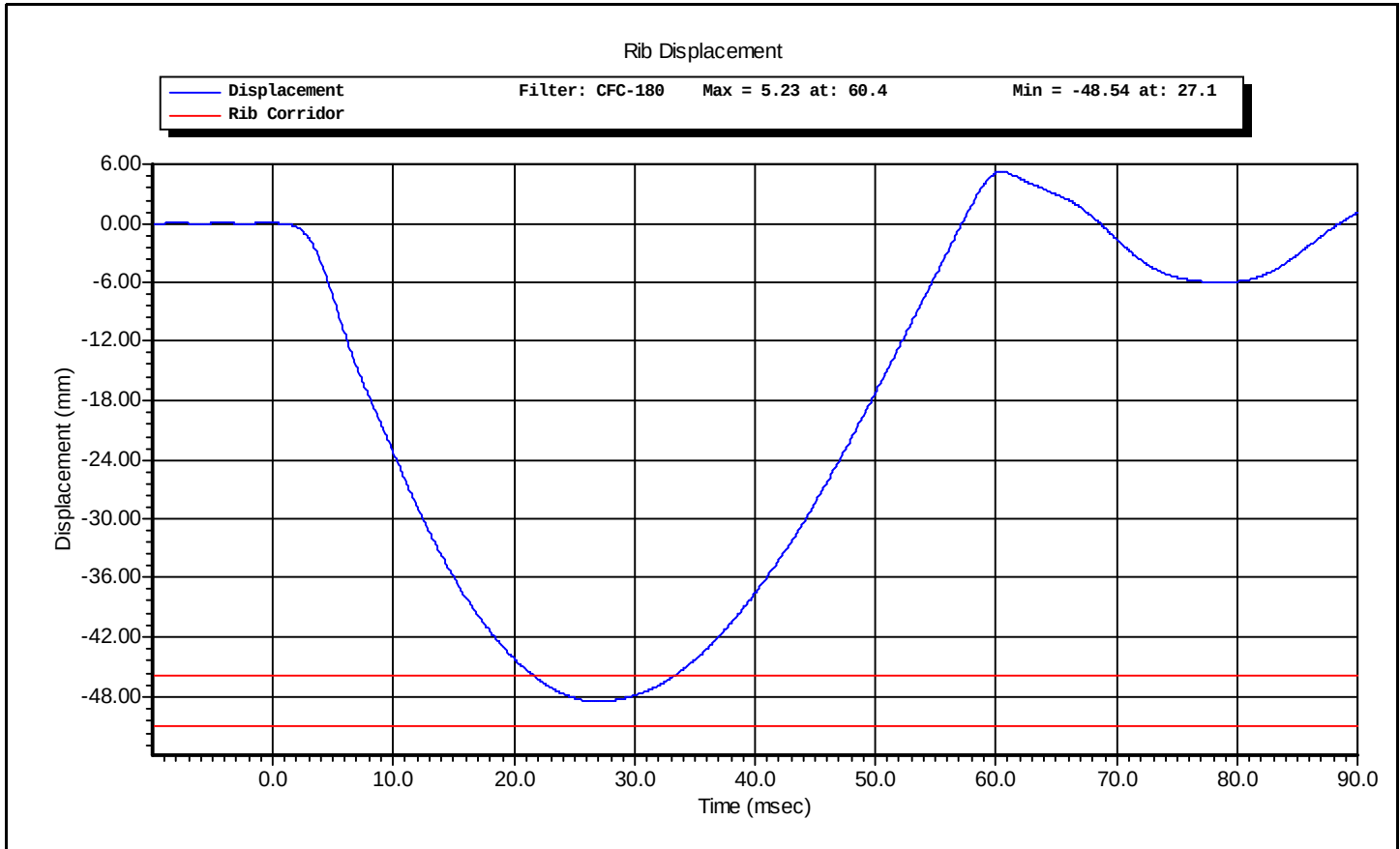


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Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	4.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Upper Rib 4m/s	Test Date:	11/10/2010
Test Number:	1	Test Time:	4:56:53 PM



Test ID: Upper Rib 4m/s

Test Time: 4:56:53 PM

Test Date: 11/10/2010



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VERIFICATION REPORT

Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	3.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Upper Rib 3m/s	Test Date:	11/10/2010
Test Number:	1	Test Time:	5:02:26 PM

Component Part Number	Component Serial Number
455-3100	UPPER

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.2 deg C P
Humidity	10.0 -- 70.0	30.0 %RH P
Velocity	2.90 -- 3.10	2.93 m/s P
Rib Displacement	-40.00 -- -36.00	-37.13 mm P
Drop Height	454 -- 464	459 mm P

All test parameters are within specifications

Technician: **S. Zito** Signature: _____
Supervisor: **D. Travale** Signature: _____

Test ID: **Upper Rib 3m/s**

Test Time: **5:02:26 PM**

Test Date: **11/10/2010**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Honeywell	MLT-38000	DS-179	4/23/2010
DentonATD	Velocity Trap	1	1/11/2010
Endevco	7264-2000	P38216	6/22/2010

Test ID: **Upper Rib 3m/s**

Test Time: **5:02:26 PM**

Test Date: **11/10/2010**

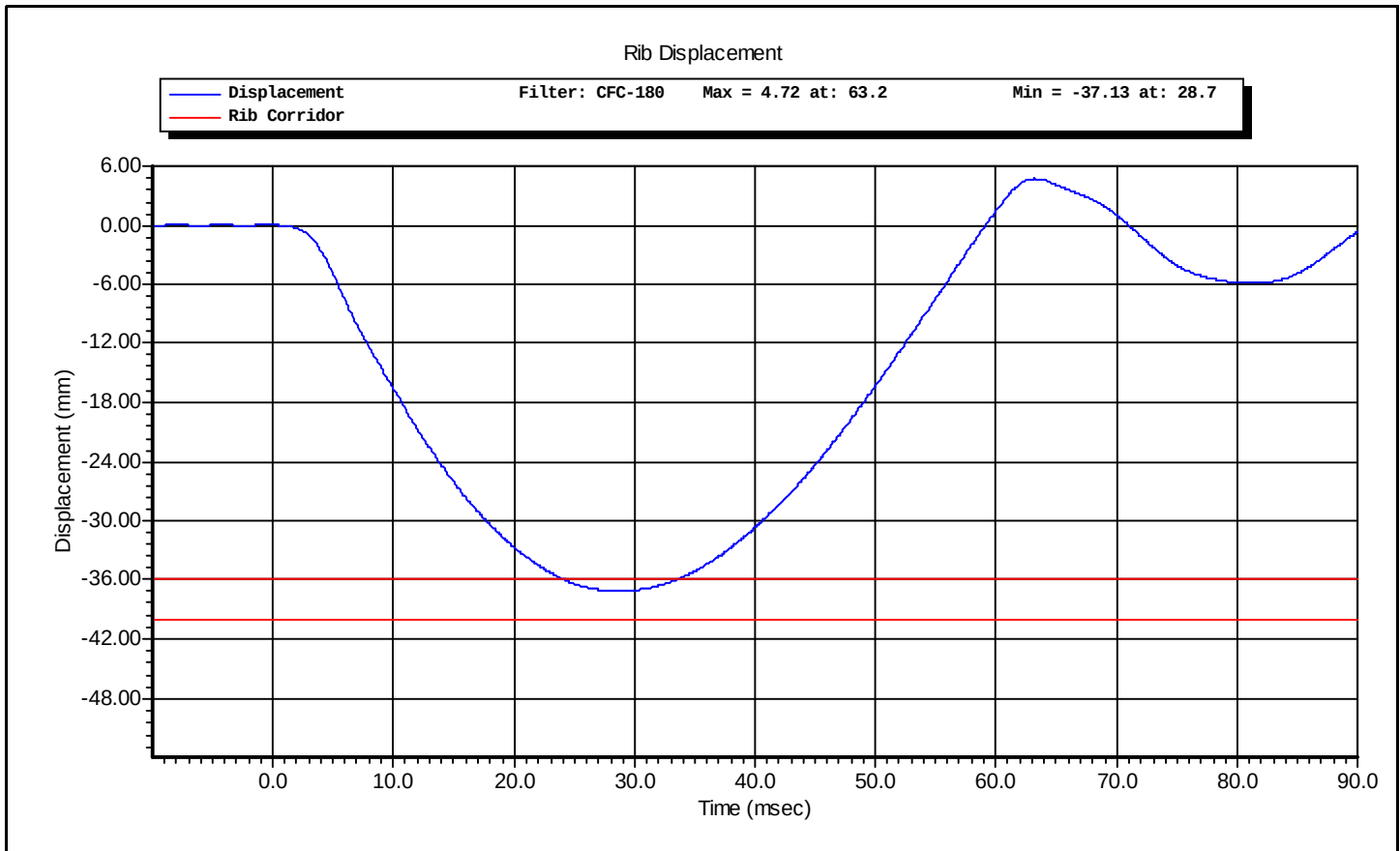


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Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	3.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Upper Rib 3m/s	Test Date:	11/10/2010
Test Number:	1	Test Time:	5:02:26 PM



Test ID: Upper Rib 3m/s

Test Time: 5:02:26 PM

Test Date: 11/10/2010



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VERIFICATION REPORT

Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	4.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Middle 4m/s	Test Date:	11/10/2010
Test Number:	1	Test Time:	5:16:27 PM

Component Part Number	Component Serial Number
455-3100	MIDDLE

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.2 deg C P
Humidity	10.0 -- 70.0	30.0 %RH P
Velocity	3.90 -- 4.10	3.98 m/s P
Rib Displacement	-51.00 -- -46.00	-47.66 mm P
Drop Height	807.0 -- 823.0	815.0 mm P

All test parameters are within specifications

Technician: **S. Zito** Signature: _____
Supervisor: **D. Travale** Signature: _____

Test ID: **Middle 4m/s**

Test Time: **5:16:27 PM**

Test Date: **11/10/2010**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Honeywell	MLT-38000	DS-185	4/23/2010
DentonATD	Velocity Trap	1	1/11/2010
Endevco	7264-2000	P38216	6/22/2010

Test ID: **Middle 4m/s**

Test Time: **5:16:27 PM**

Test Date: **11/10/2010**

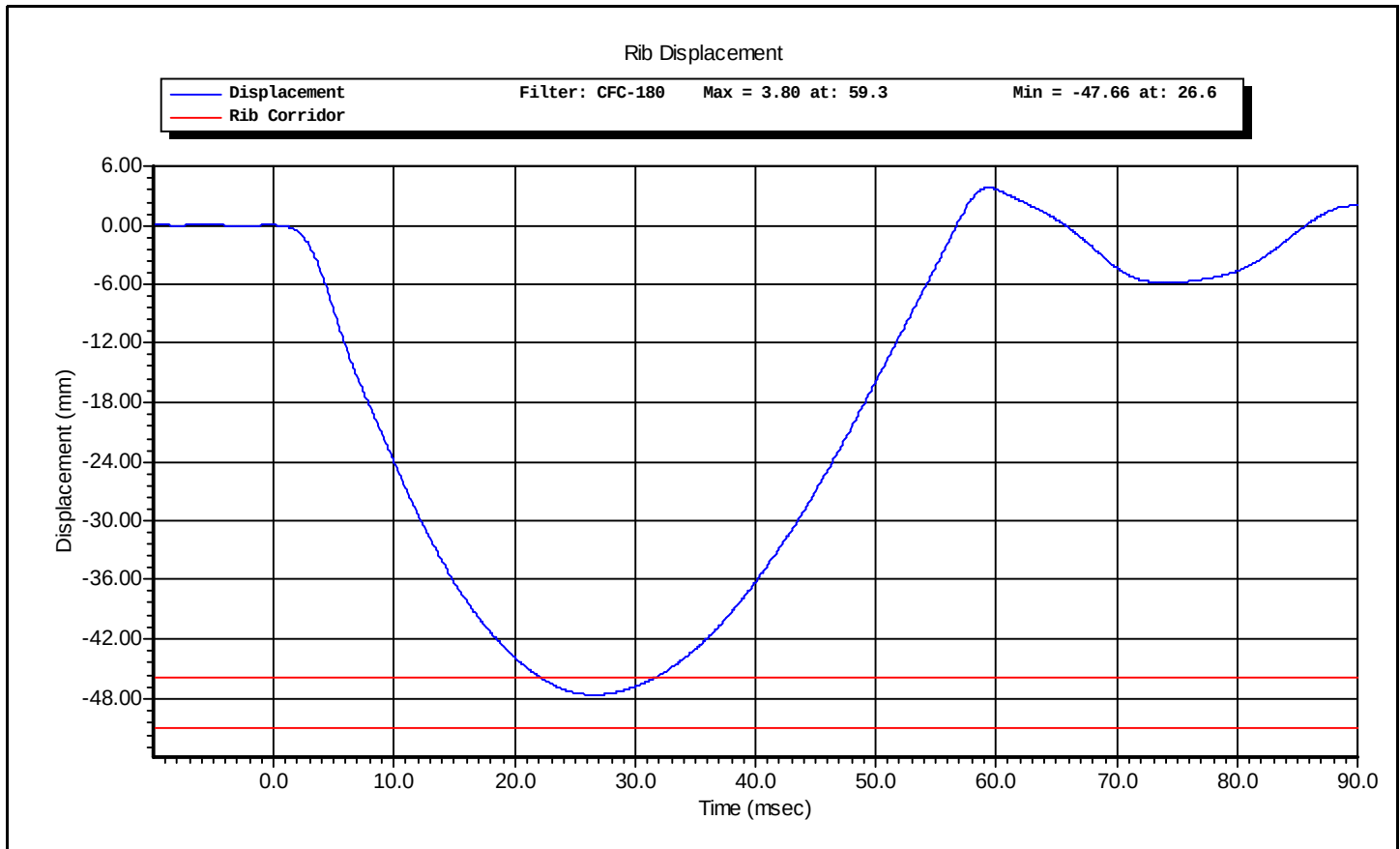


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Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	4.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Middle 4m/s	Test Date:	11/10/2010
Test Number:	1	Test Time:	5:16:27 PM



Test ID: Middle 4m/s

Test Time: 5:16:27 PM

Test Date: 11/10/2010



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VERIFICATION REPORT

Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	3.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Middle 3 m/s	Test Date:	11/10/2010
Test Number:	1	Test Time:	5:21:31 PM

Component Part Number	Component Serial Number
455-3100	MIDDLE

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.2 deg C P
Humidity	10.0 -- 70.0	30.0 %RH P
Velocity	2.90 -- 3.10	2.97 m/s P
Rib Displacement	-40.00 -- -36.00	-36.91 mm P
Drop Height	454 -- 464	459 mm P

All test parameters are within specifications

Technician: **S. Zito III** Signature: _____

Supervisor: **D. Travale** Signature: _____

Test ID: **Middle 3 m/s**

Test Time: **5:21:31 PM**

Test Date: **11/10/2010**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Honeywell	MLT-38000	DS-185	4/23/2010
DentonATD	Velocity Trap	1	1/11/2010
Endevco	7264-2000	P38216	6/22/2010

Test ID: **Middle 3 m/s**

Test Time: **5:21:31 PM**

Test Date: **11/10/2010**

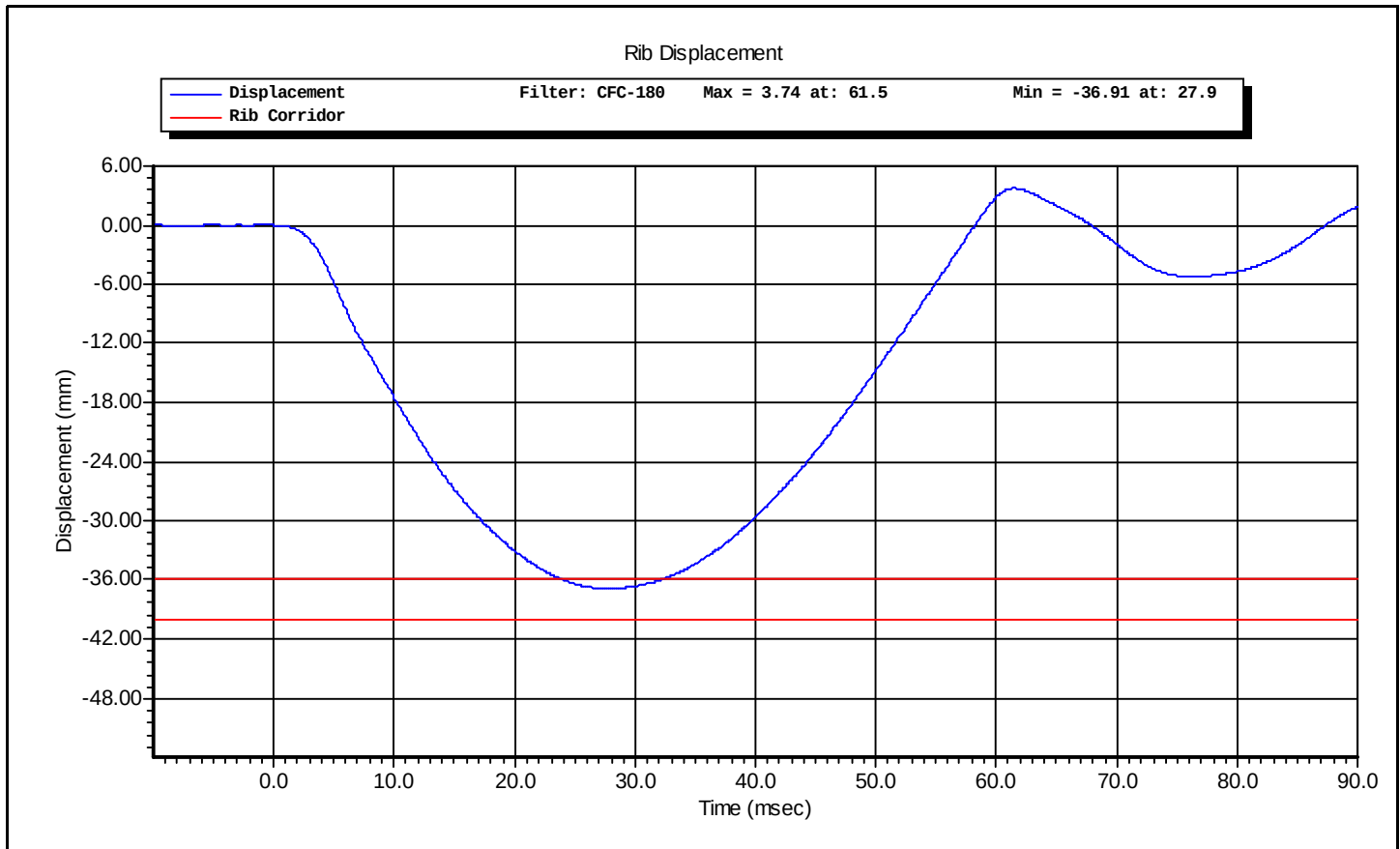


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Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	3.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Middle 3 m/s	Test Date:	11/10/2010
Test Number:	1	Test Time:	5:21:31 PM



Test ID: Middle 3 m/s

Test Time: 5:21:31 PM

Test Date: 11/10/2010



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VERIFICATION REPORT

Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	4.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Lower Rib 4 m/s	Test Date:	11/10/2010
Test Number:	1	Test Time:	5:27:05 PM

Component Part Number	Component Serial Number
455-3100	LOWER

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.2 deg C P
Humidity	10.0 -- 70.0	30.0 %RH P
Velocity	3.90 -- 4.10	3.97 m/s P
Rib Displacement	-51.00 -- -46.00	-47.16 mm P
Drop Height	807.0 -- 823.0	815.0 mm P

All test parameters are within specifications

Technician: **S. Zito** Signature: _____

Supervisor: **D. Travale** Signature: _____

Test ID: **Lower Rib 4 m/s**

Test Time: **5:27:05 PM**

Test Date: **11/10/2010**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Honeywell	MLT-38000	DS-178	4/23/2010
DentonATD	Velocity Trap	1	1/11/2010
Endevco	7264-2000	P38216	6/22/2010

Test ID: **Lower Rib 4 m/s**

Test Time: **5:27:05 PM**

Test Date: **11/10/2010**

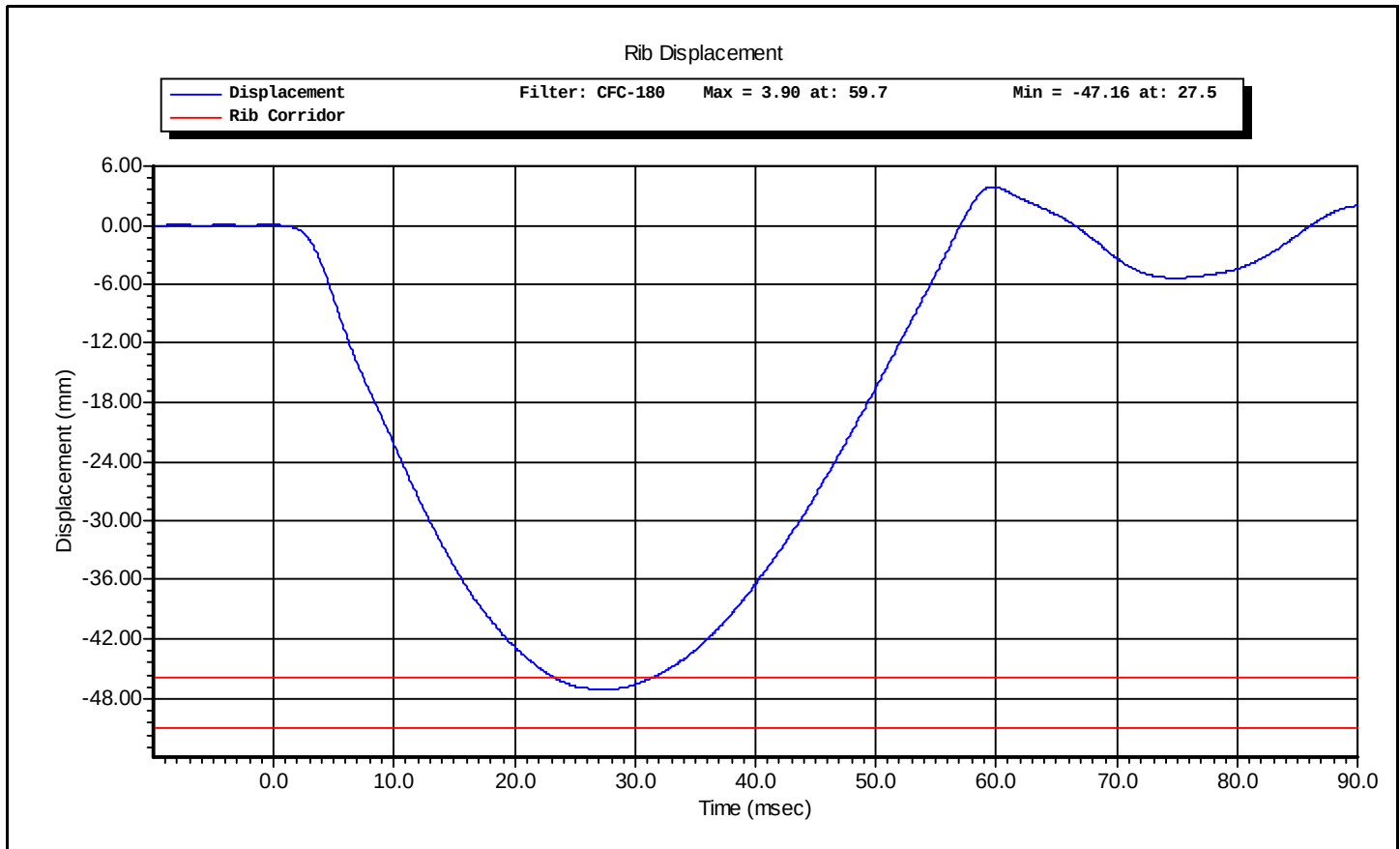


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Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	4.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Lower Rib 4 m/s	Test Date:	11/10/2010
Test Number:	1	Test Time:	5:27:05 PM



Test ID: Lower Rib 4 m/s Test Time: 5:27:05 PM

Test Date: 11/10/2010



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VERIFICATION REPORT

Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	3.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Lower Rib 3 m/s	Test Date:	11/10/2010
Test Number:	1	Test Time:	5:34:07 PM

Component Part Number	Component Serial Number
455-3100	LOWER

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.2 deg C P
Humidity	10.0 -- 70.0	30.0 %RH P
Velocity	2.90 -- 3.10	2.95 m/s P
Rib Displacement	-40.00 -- -36.00	-37.38 mm P
Drop Height	454 -- 464	459 mm P

All test parameters are within specifications

Technician: **S. Zito** Signature: _____
Supervisor: **D. Travale** Signature: _____

Test ID: **Lower Rib 3 m/s**

Test Time: **5:34:07 PM**

Test Date: **11/10/2010**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Honeywell	MLT-38000	DS-178	4/23/2010
DentonATD	Velocity Trap	1	1/11/2010
Endevco	7264-2000	P38216	6/22/2010

Test ID: **Lower Rib 3 m/s**

Test Time: **5:34:07 PM**

Test Date: **11/10/2010**

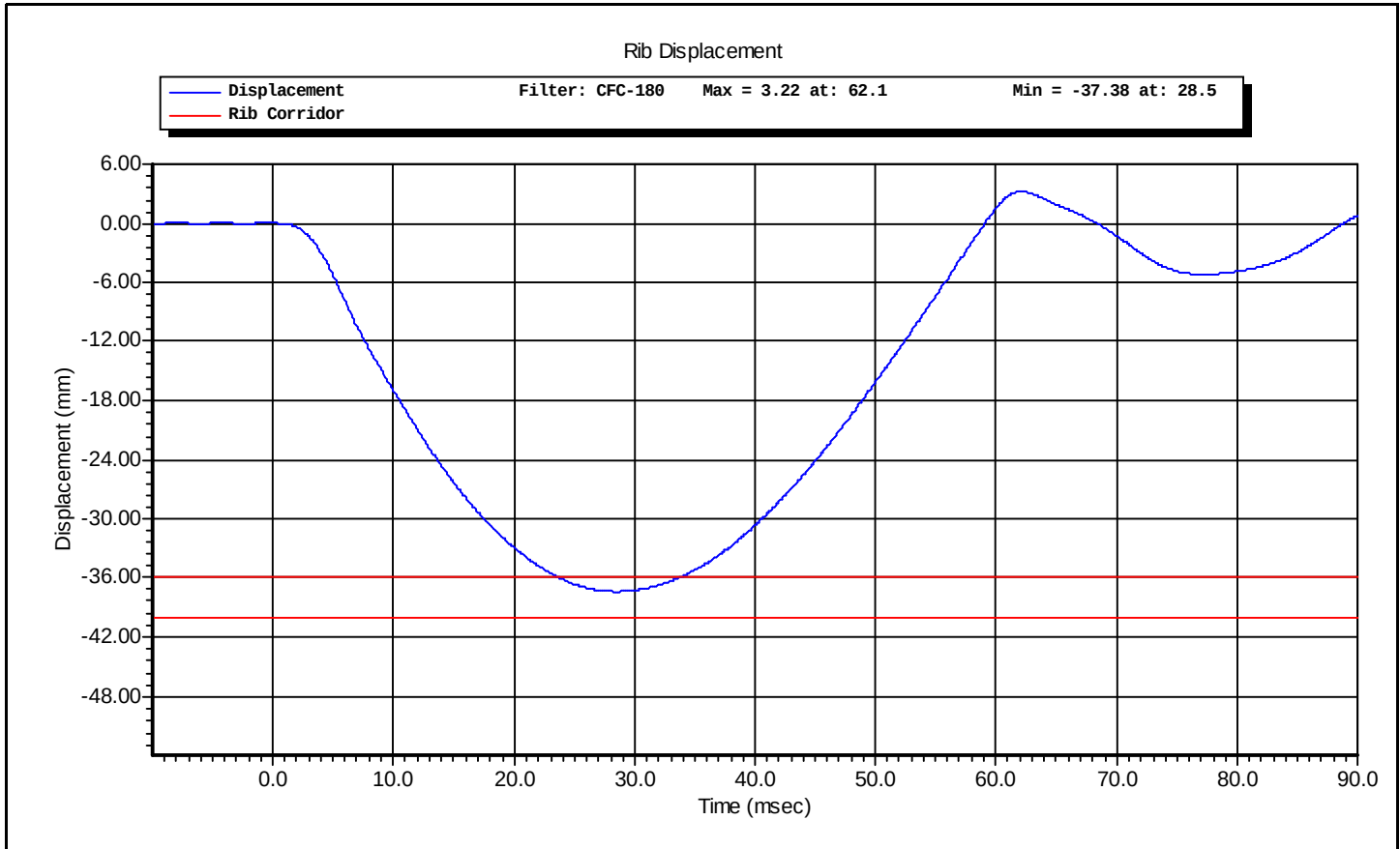


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Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	3.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Lower Rib 3 m/s	Test Date:	11/10/2010
Test Number:	1	Test Time:	5:34:07 PM



Test ID: Lower Rib 3 m/s Test Time: 5:34:07 PM

Test Date: 11/10/2010



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VERIFICATION REPORT

Test Name:	Thorax Impact	Revision:	8/15/2008
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Thorax	Test Date:	11/11/2010
Test Number:	1	Test Time:	8:51:18 AM

Test Parameters	Test Specifications			Test Results	
Temperature	20.6	--	22.2	20.7 deg C	P
Humidity	10.0	--	70.0	28.0 %RH	P
Velocity	5.40	--	5.60	5.50 m/s	P
Upper Rib Displacement	34.0	--	41.0	35.8 mm	P
Middle Rib Displacement	37.0	--	45.0	40.4 mm	P
Lower Rib Displacement	37.0	--	44.0	40.9 mm	P
Impactor Force	5100	--	6200	5670 N	P

All test parameters are within specifications

Technician: **A. Rudniski** Signature: _____
Supervisor: **D. Travale** Signature: _____

Test ID: **Thorax**

Test Time: **8:51:18 AM**

Test Date: **11/11/2010**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2010
Endevco	7264-2000	P66930	10/5/2010
Honeywell	MLT-38000	DS-179	4/23/2010
Honeywell	MLT-38000	DS-185	4/23/2010
Honeywell	MLT-38000	DS-178	4/23/2010

Test ID: **Thorax**

Test Time: **8:51:18 AM**

Test Date: **11/11/2010**

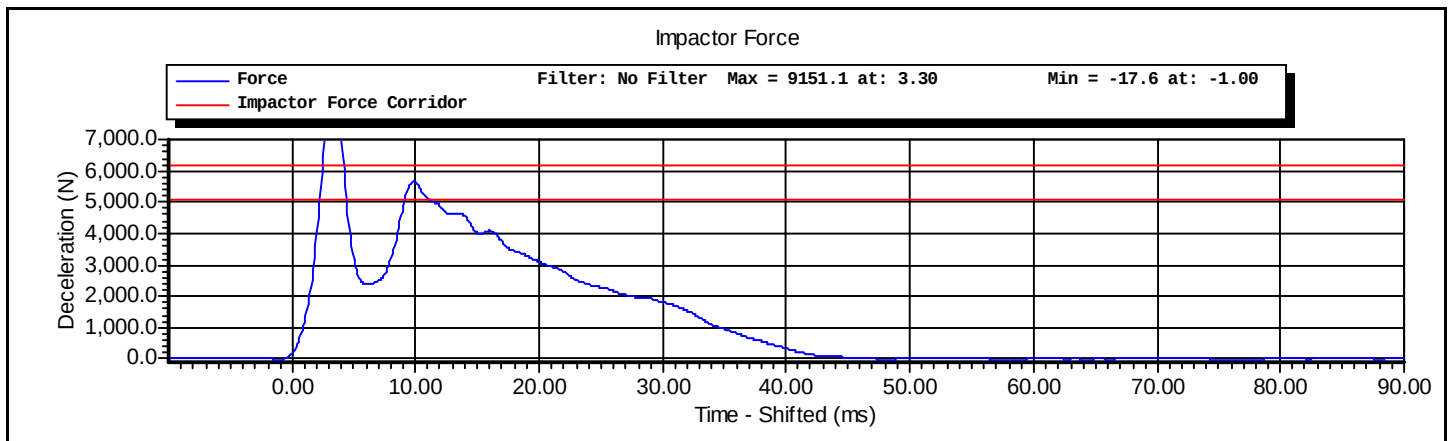
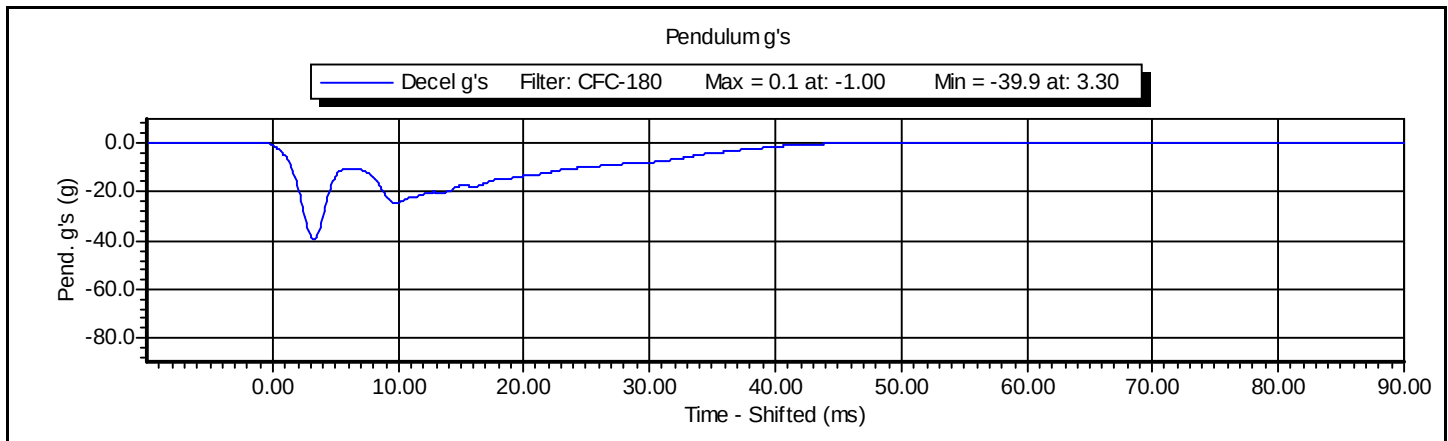


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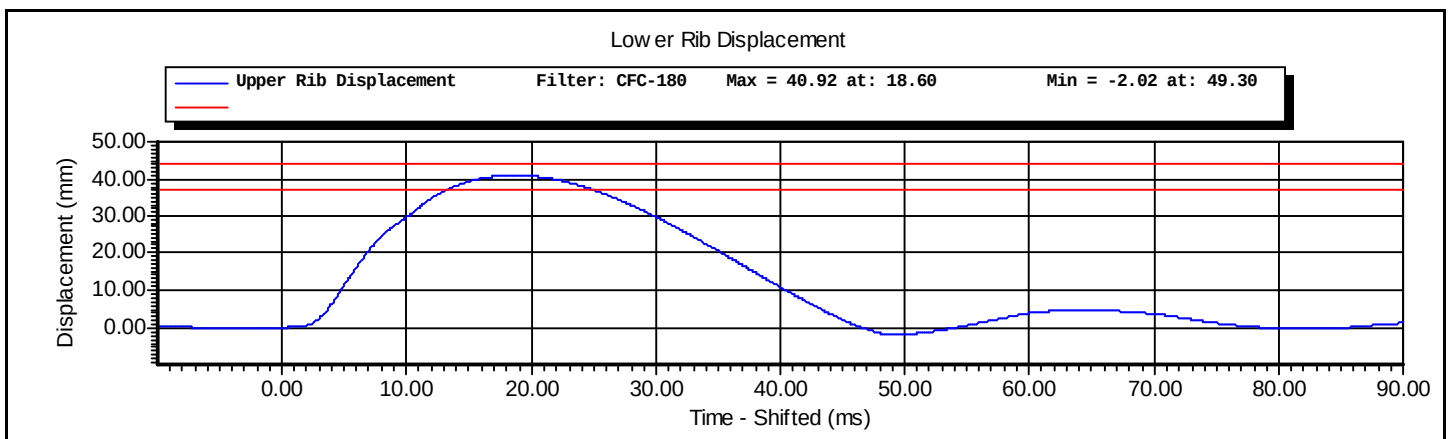
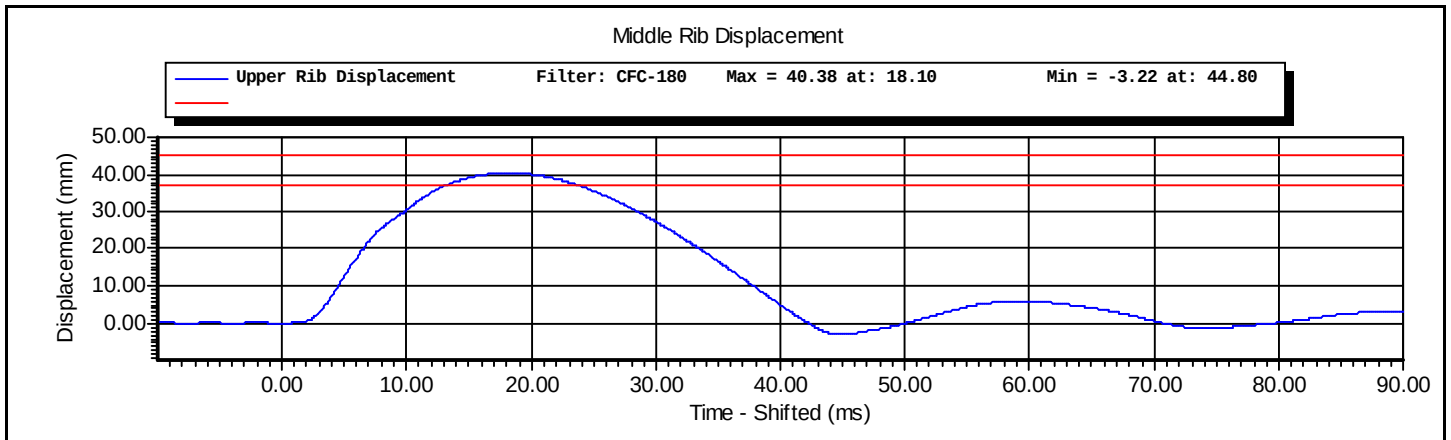
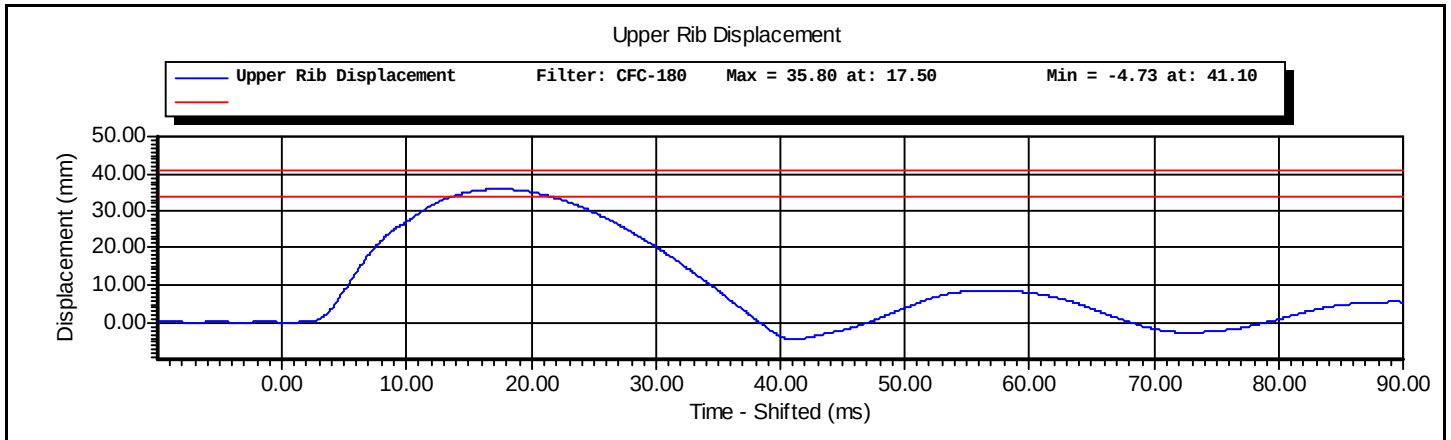
Test Name:	Thorax Impact	Revision:	8/15/2008
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Thorax	Test Date:	11/11/2010
Test Number:	1	Test Time:	8:51:18 AM



Test ID: Thorax

Test Time: 8:51:18 AM

Test Date: 11/11/2010





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VERIFICATION REPORT

Test Name:	Abdominal Impact	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Abdomen	Test Date:	11/11/2010
Test Number:	1	Test Time:	9:30:02 AM

Component Part Number	Component Serial Number
455-4001 Abdomen	07/136

Test Parameters	Test Specifications			Test Results	
Temperature	20.6	--	22.2	21.1 deg C	P
Humidity	10	--	70	28 %RH	P
Velocity	3.90	--	4.10	4.03 m/s	P
Peak Abdominal Force	-2.70	--	-2.20	-2.43 kN	P
Time At Peak Abdominal Force	10.0	--	12.3	10.4 ms	P
Maximum Pendulum Force	-4.80	--	-4.00	-4.49 kN	P
Time at Peak Pendulum Force	10.6	--	13.0	11.0 ms	P

All test parameters are within specifications

Technician: **A. Rudniski** Signature: _____
Supervisor: **D. Travale** Signature: _____

Test ID: **Abdomen**

Test Time: **9:30:02 AM**

Test Date: **11/11/2010**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2010
Endevco	7264-2000	P66930	10/5/2010
Denton	2631	LC-1524	4/22/2010
Denton	2631	LC-1523	4/22/2010
Denton	2631	LC-1530	4/22/2010

Test ID: **Abdomen**

Test Time: **9:30:02 AM**

Test Date: **11/11/2010**



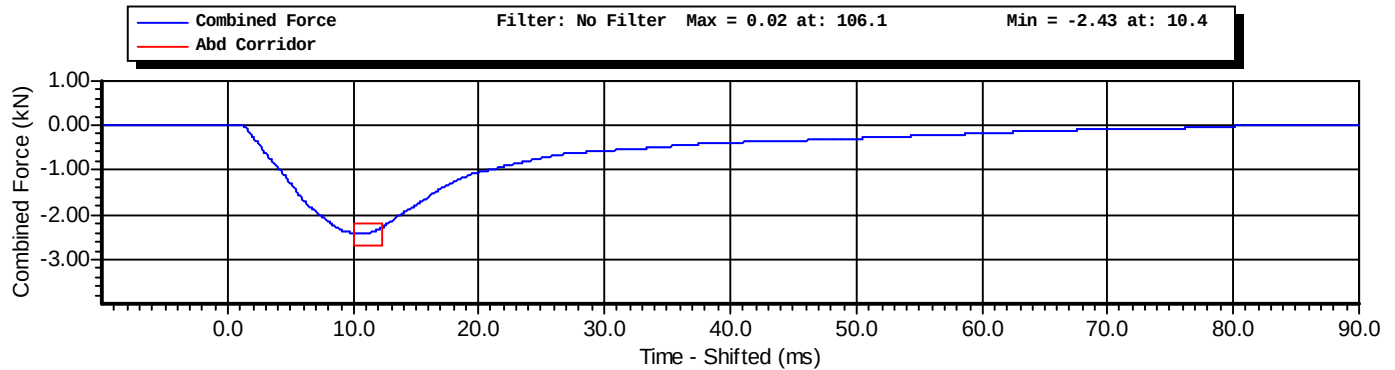
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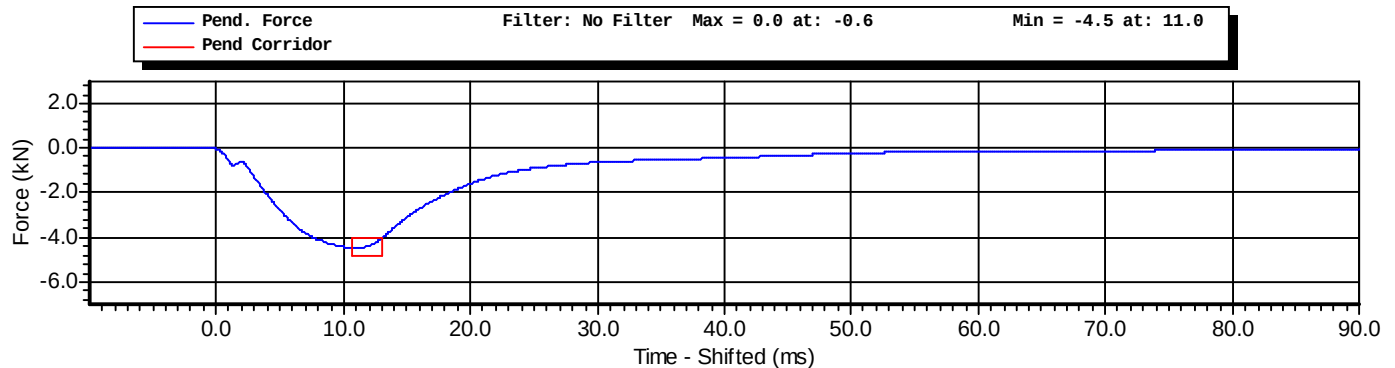
4455 Genesee Street, Buffalo, New York 14225 - Phone (716)632-7500

Test Name:	Abdominal Impact	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Abdomen	Test Date:	11/11/2010
Test Number:	1	Test Time:	9:30:02 AM

Combined Abdominal Force



Pendulum Force

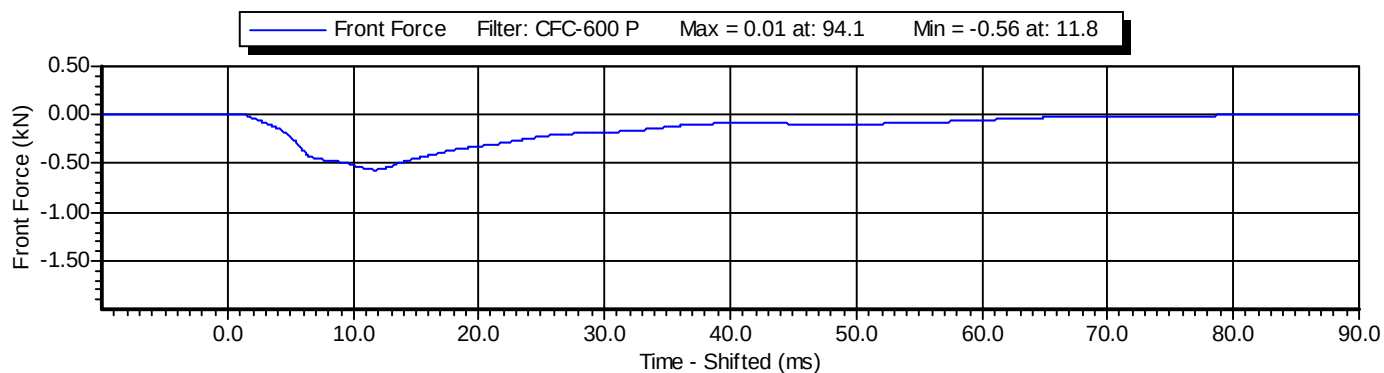


Test ID: **Abdomen**

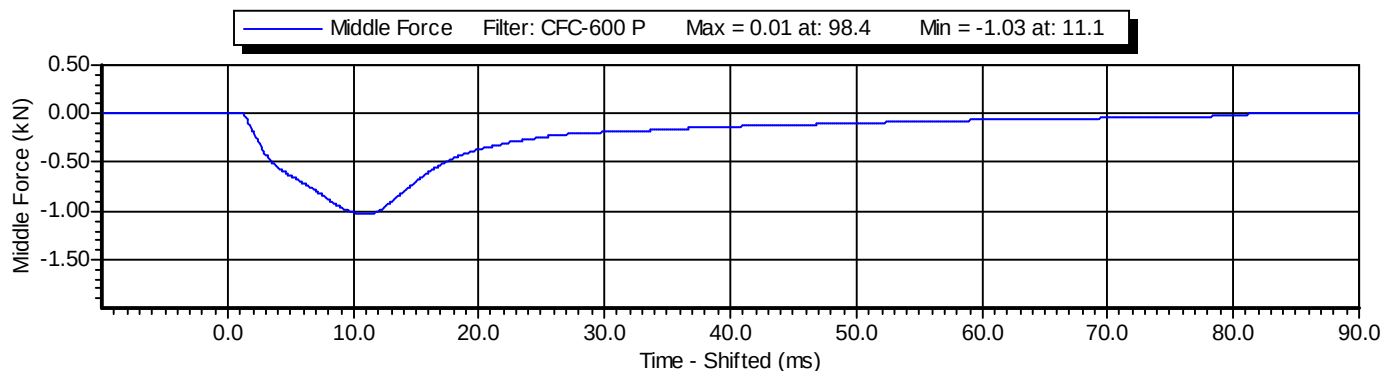
Test Time: **9:30:02 AM**

Test Date: **11/11/2010**

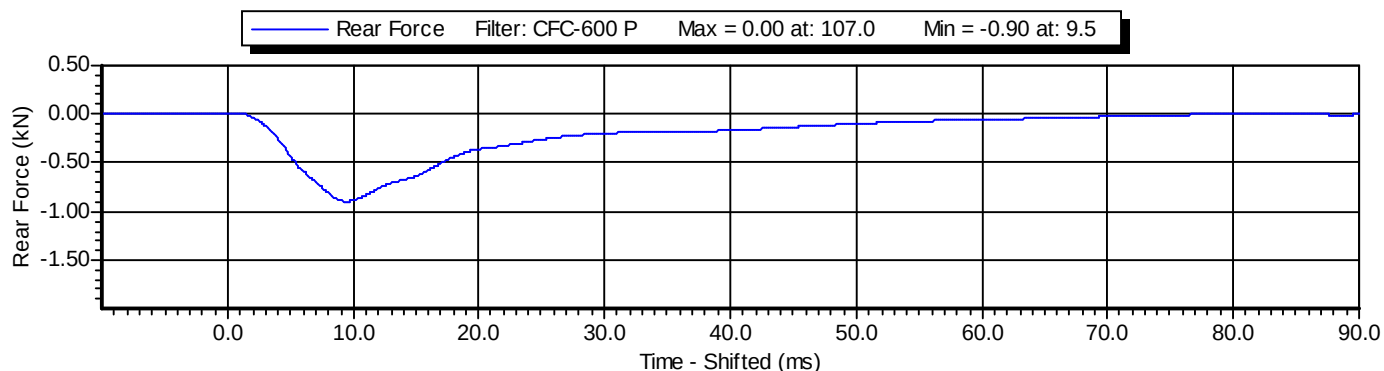
Front Abdominal Force



Middle Abdominal Force



Rear Abdominal Force





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VERIFICATION REPORT

Test Name:	Lumbar Spine	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Lumbar Spine	Test Date:	11/10/2010
Test Number:	1	Test Time:	4:41:32 PM

Component Part Number	Component Serial Number
175-5501	15-0545

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.2 deg C P
Humidity	10 -- 70	29 %RH P
Velocity	5.95 -- 6.15	6.15 m/s P
Maximum Headform Flexion Angle	45.0 -- 55.0	46.4 degrees P
Time at Maximum Headform Flexion Angle	39.0 -- 53.0	44.7 ms P
Decay to Zero Degrees	37.0 -- 57.0	39.0 ms P
Velocity Corridor	--	P

All test parameters are within specifications

Technician: **A. Rudniski** Signature: _____

Supervisor: **D. Travale** Signature: _____

Test ID: **Lumbar Spine**

Test Time: **4:41:32 PM**

Test Date: **11/10/2010**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2010
Endevco	7231CT	C16510	5/10/2010
DentonATD	7000428	094	4/27/2010
DentonATD	7000428	095	4/27/2010
DentonATD	7000428	093	4/27/2010

Test ID: **Lumbar Spine**

Test Time: **4:41:32 PM**

Test Date: **11/10/2010**



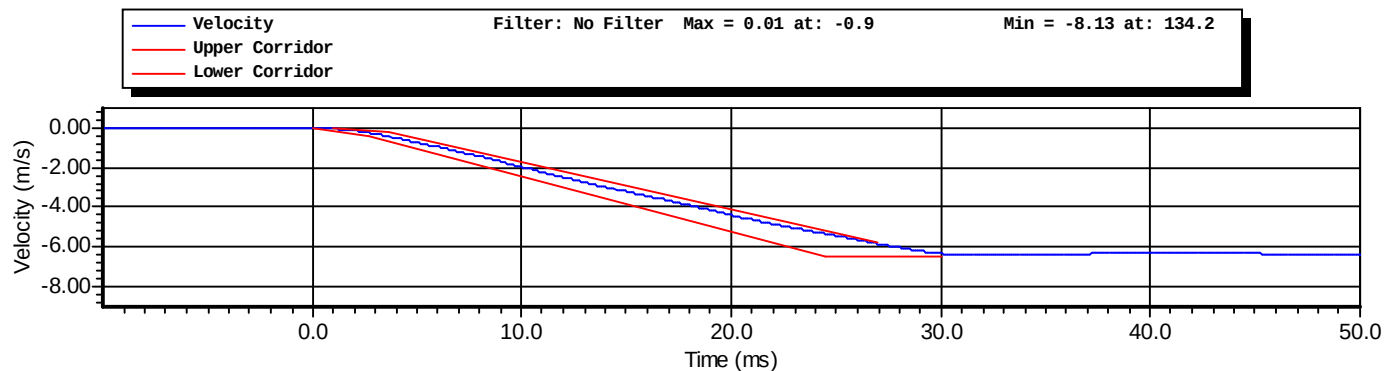
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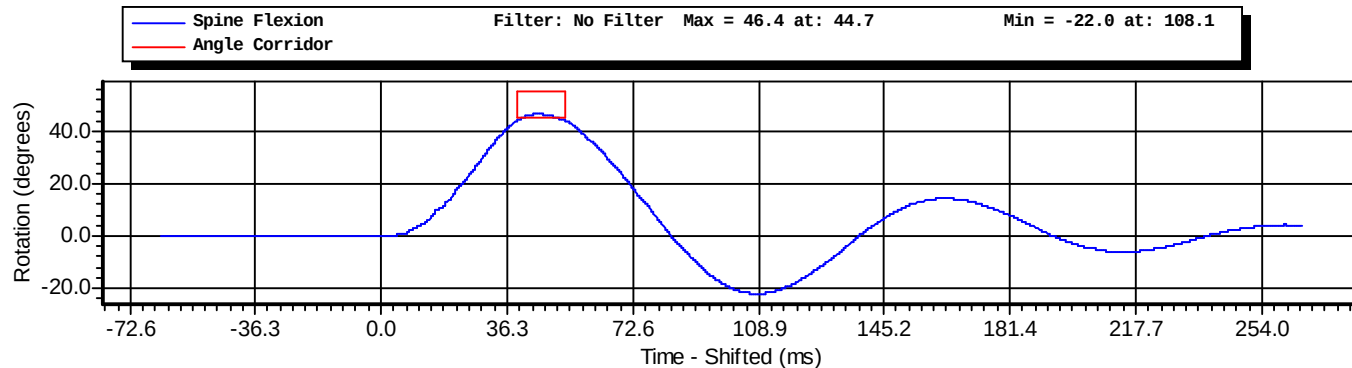
4455 Genesee Street, Buffalo, New York 14225 - Phone (716)632-7500

Test Name:	Lumbar Spine	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Lumbar Spine	Test Date:	11/10/2010
Test Number:	1	Test Time:	4:41:32 PM

Pendulum Velocity

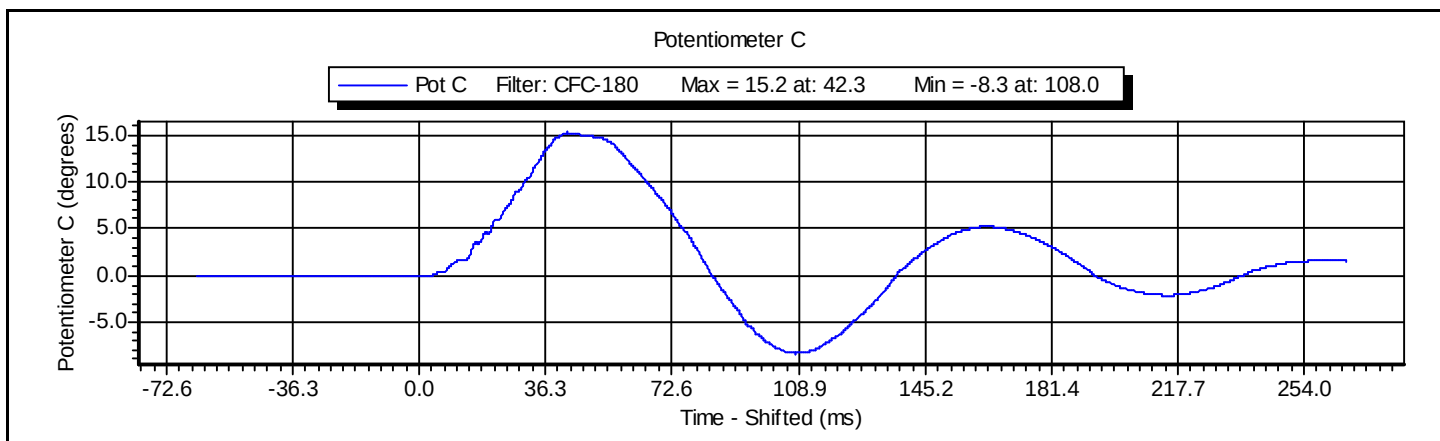
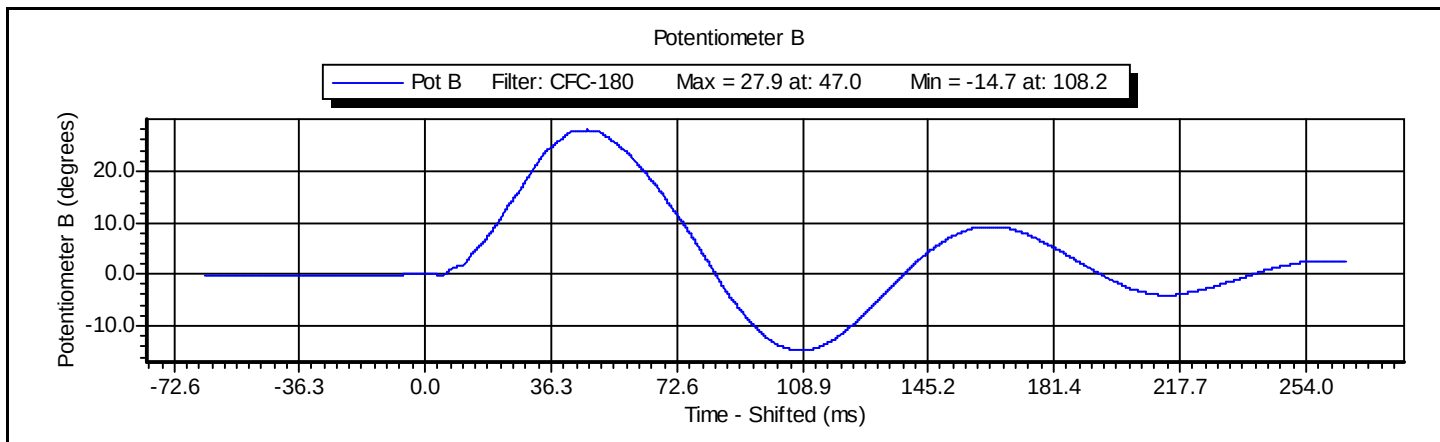
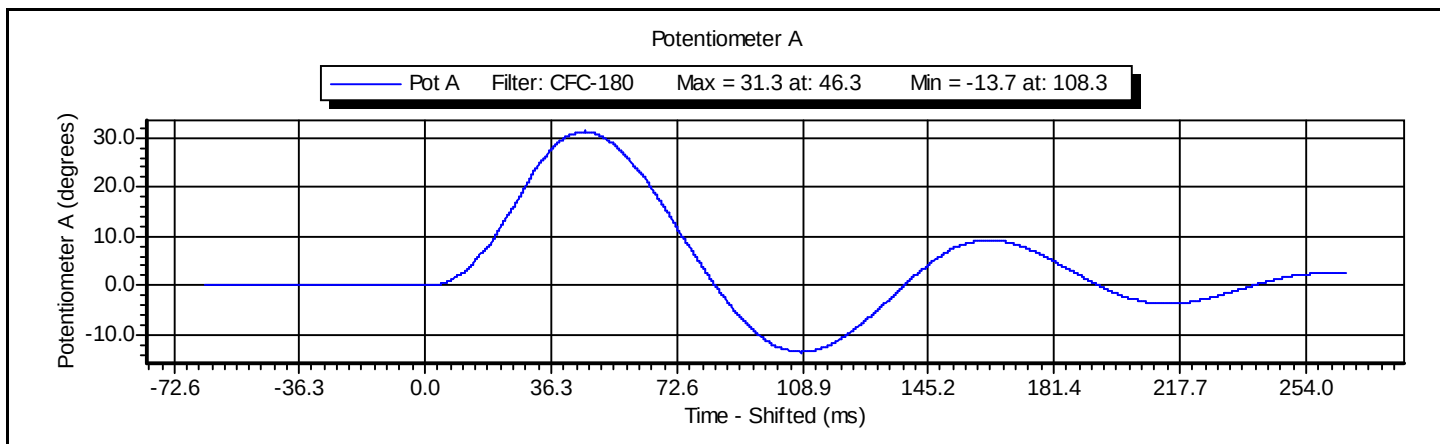


Spine Flexion Angle



Test ID: **Lumbar Spine** Test Time: **4:41:32 PM**

Test Date: **11/10/2010**





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VERIFICATION REPORT

Test Name:	Pelvis Impact	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Pelvis	Test Date:	11/10/2010
Test Number:	1	Test Time:	5:54:09 PM

Test Parameters	Test Specifications			Test Results	
Temperature	20.6	--	22.2	22.2 deg C	P
Humidity	10	--	70	30 %RH	P
Velocity	4.20	--	4.40	4.33 m/s	P
Peak Pendulum Force	-5.40	--	-4.70	-5.00 kN	P
Time at Peak Pendulum Force	11.80	--	16.10	13.62 ms	P
Peak Pubic Symphysis Force	-1.59	--	-1.23	-1.40 kN	P
Time at Peak Pubic Symphysis Force	12.20	--	17.00	15.02 ms	P

All test parameters are within specifications

Technician: **A. Rudniski** Signature: _____
Supervisor: **D. Travale** Signature: _____

Test ID: **Pelvis**

Test Time: **5:54:09 PM**

Test Date: **11/10/2010**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2010
Endevco	7264-2000	P66930	10/5/2010
Denton	3096	LC-456Fy	4/22/2010

Test ID: **Pelvis**

Test Time: **5:54:09 PM**

Test Date: **11/10/2010**



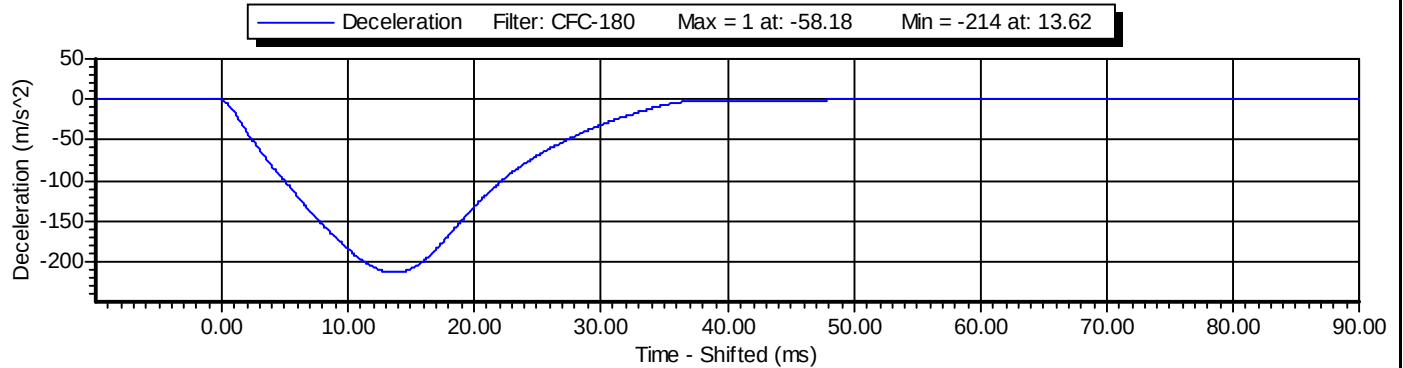
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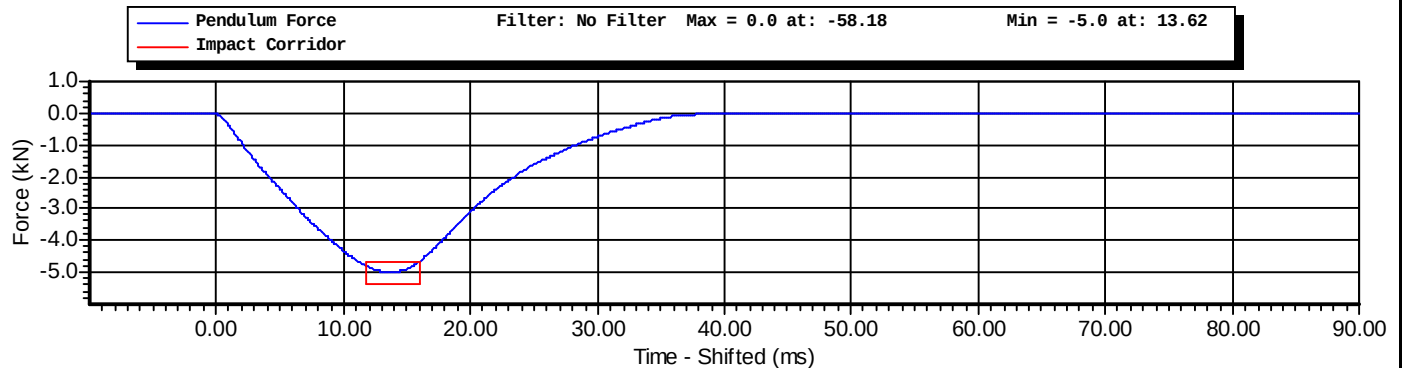
4455 Genesee Street, Buffalo, New York 14225 - Phone (716)632-7500

Test Name:	Pelvis Impact	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Pelvis	Test Date:	11/10/2010
Test Number:	1	Test Time:	5:54:09 PM

Pendulum Accelerometer



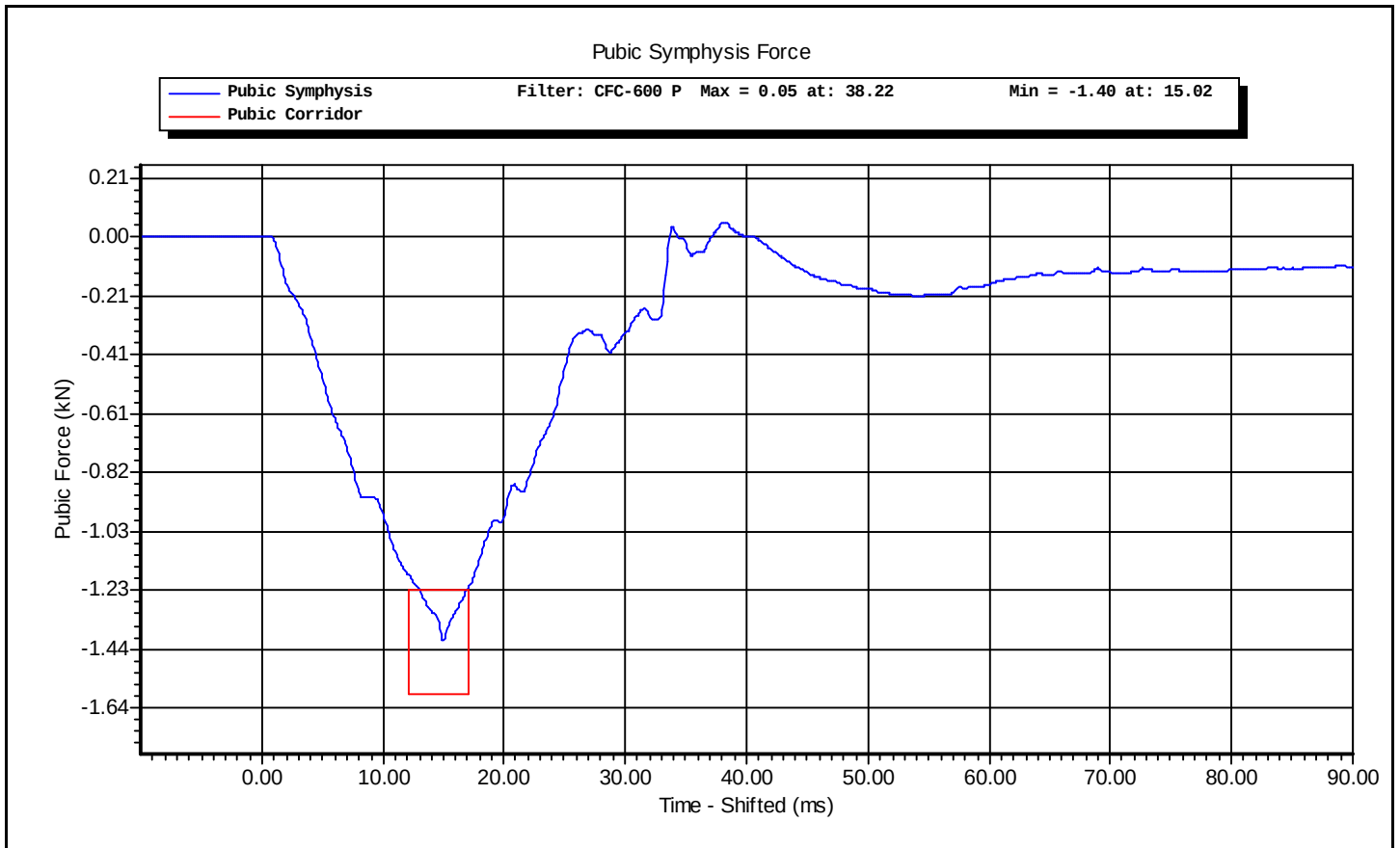
Pendulum Force



Test ID: **Pelvis**

Test Time: **5:54:09 PM**

Test Date: **11/10/2010**



CALIBRATION TEST RESULTS

POST-TEST

SID-IIs No: 304

CONFIGURED FOR LEFT SIDE IMPACT

SID-IIsD External Measurements

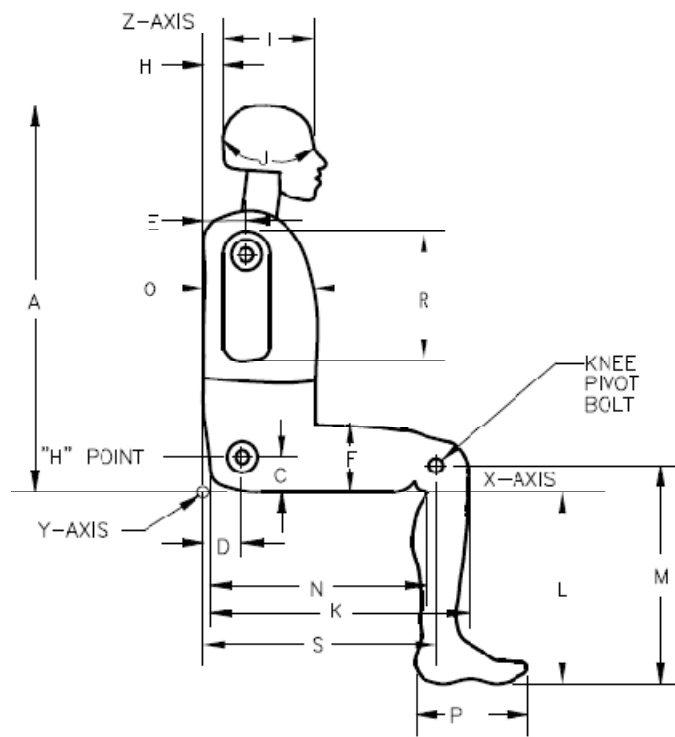
NHTSA ATD S/N 304

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Sitting Height	772.0 - 788.0	778	Yes
B	Shoulder Pivot Height	437.0 - 453.0	439	Yes
C	H-Point Height	79.0 - 89.0	83	Yes
D	H-Point from Seat Back	141.0 - 151.0	146	Yes
E	Shoulder Pivot from Backline	97.0 - 107.0	104	Yes
F	Thigh Clearance	119.0 - 135.0	126	Yes
G	Head Breadth	140.0 - 148.0	145	Yes
H	Head Back from Backline	40.0 - 46.0	43	Yes
I	Head Depth	178.0 - 188.0	182	Yes
J	Head Circumference	541.0 - 551.0	546	Yes
K	Buttock to Knee Length	514.0 - 540.0	528	Yes
L	Popliteal Height	343.0 - 369.0	353	Yes
M	Knee Pivot to Floor Height	393.0 - 409.0	398	Yes
N	Buttock Popliteal Length	416.0 - 442.0	428	Yes
O	Chest Depth without Jacket	195.0 - 211.0	204	Yes
P	Foot Length (right)	216.0 - 232.0	220	Yes
P	Foot Length (left)	216.0 - 232.0	220	Yes
Q	Hip Breadth	313.0 - 323.0	318	Yes
R	Arm Length	249.0 - 259.0	251	Yes
S	Knee Joint to Seat back	478.0 - 493.0	485	Yes
V	Shoulder Width (only one arm installed)	341.0 - 357.0	353	Yes
W	Foot Width (right)	78.0 - 94.0	80	Yes
W	Foot Width (left)	78.0 - 94.0	80	Yes
Y	Chest Circumference with Jacket	851.0 - 881.0	870	Yes
Z	Waist Circumference	761.0 - 791.0	782	Yes

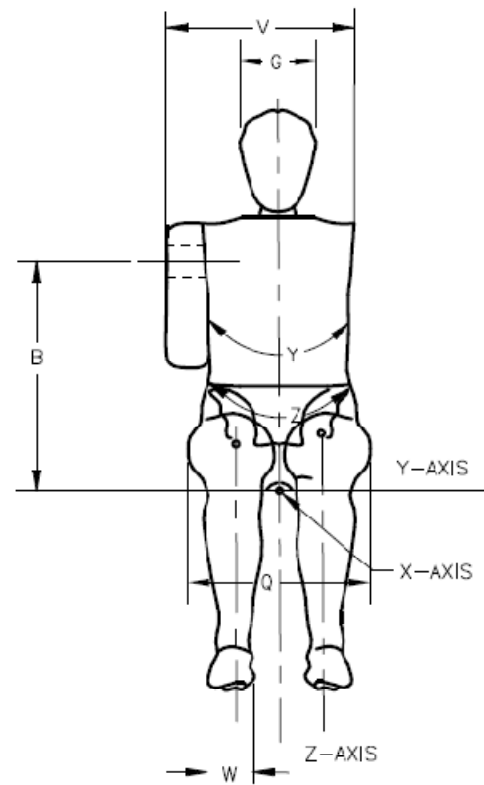
Technician: AR

Date: 11/11/2010

SID-IIIsD External Dimension Reference Diagram



SIDE VIEW



FRONT VIEW



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VERIFICATION REPORT

Test Name:	Head Drop	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	SID 300		
Test ID:	Head Drop	Test Date:	11/11/2010
Test Number:	2	Test Time:	1:00:45 PM

Component Part Number	Component Serial Number
Head Skin - 180-1002	1371

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.2 deg C P
Humidity	10 -- 70	29 %RH P
Resultant Acceleration	115.0 -- 137.0	115.4 g P
Oscillation	0.0 -- 15.0	2.2 % P
Fore-Aft Acceleration	-15.0 -- 15.0	-2.9 g P

All test parameters are within specifications

Technician: **S. Zito III** Signature: _____

Supervisor: **D. Travale** Signature: _____

Test ID: **Head Drop**

Test Time: **1:00:45 PM**

Test Date: **11/11/2010**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Endevco	7264-2000	P66931	10/25/2010
Endevco	7264-2000	P66926	10/25/2011
Endevco	7264-2000	P66943	10/25/2010

Test ID: **Head Drop**

Test Time: **1:00:45 PM**

Test Date: **11/11/2010**

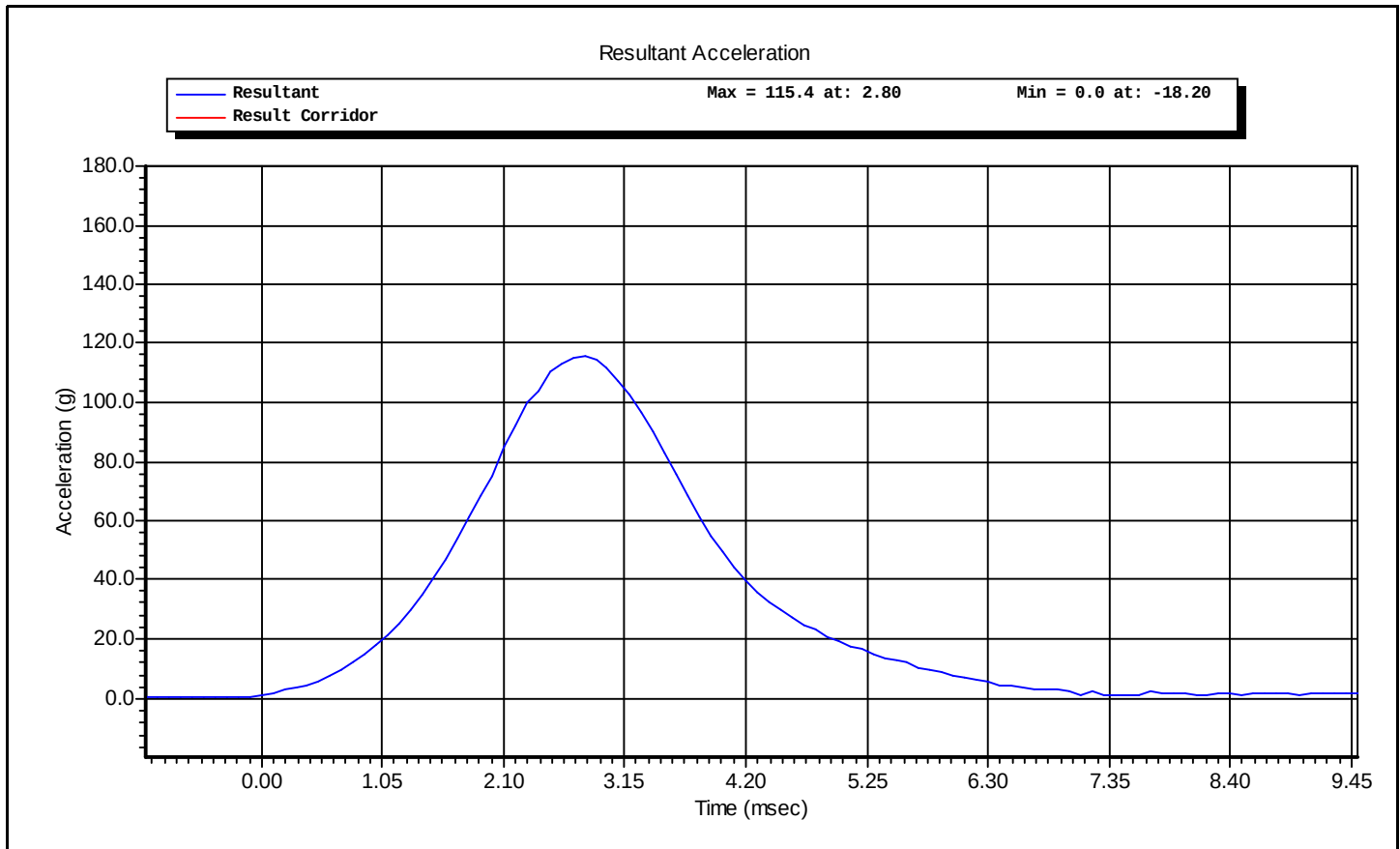


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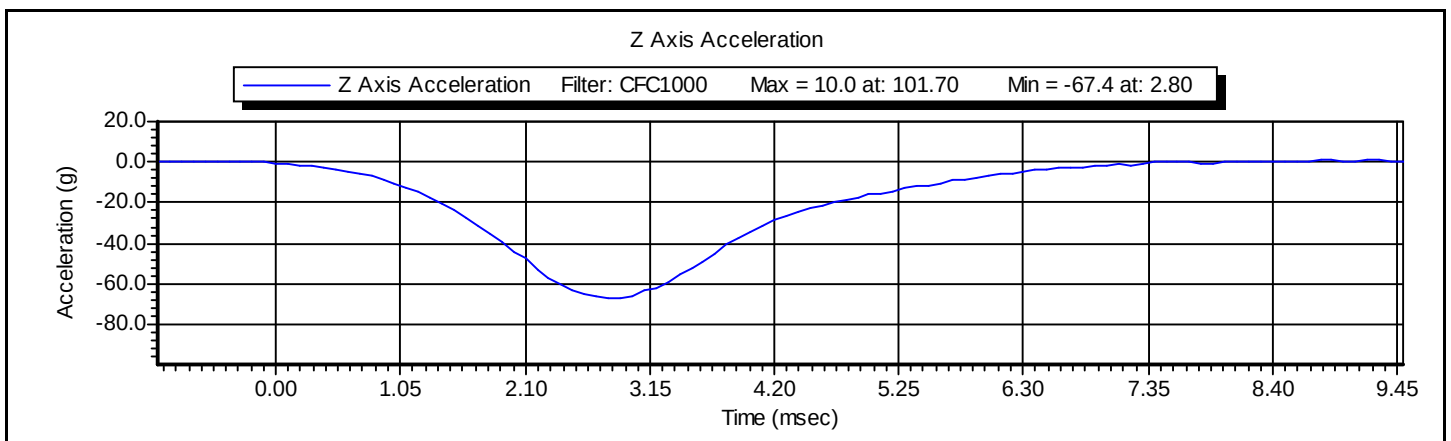
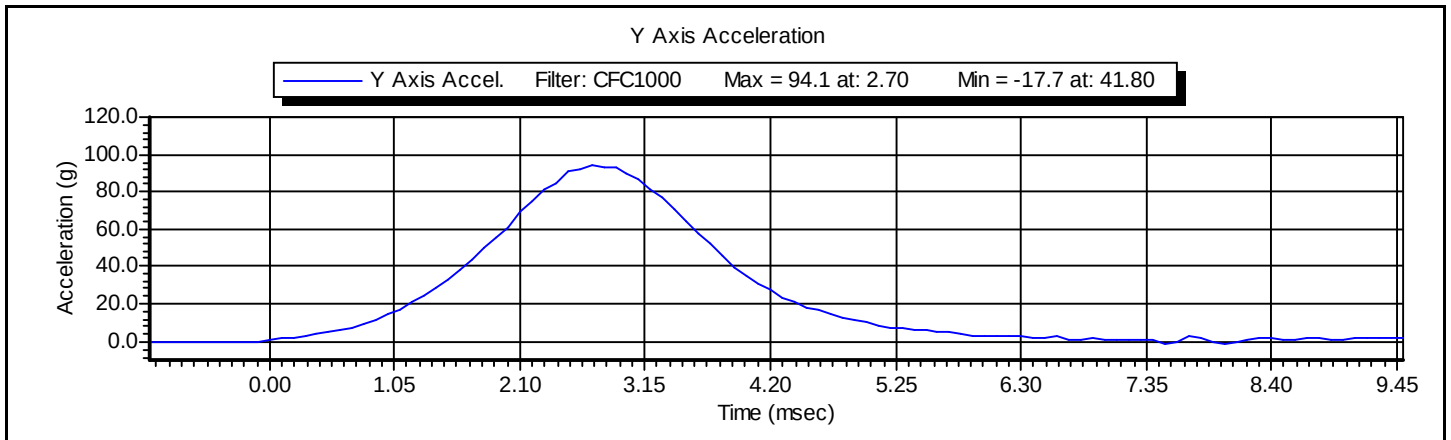
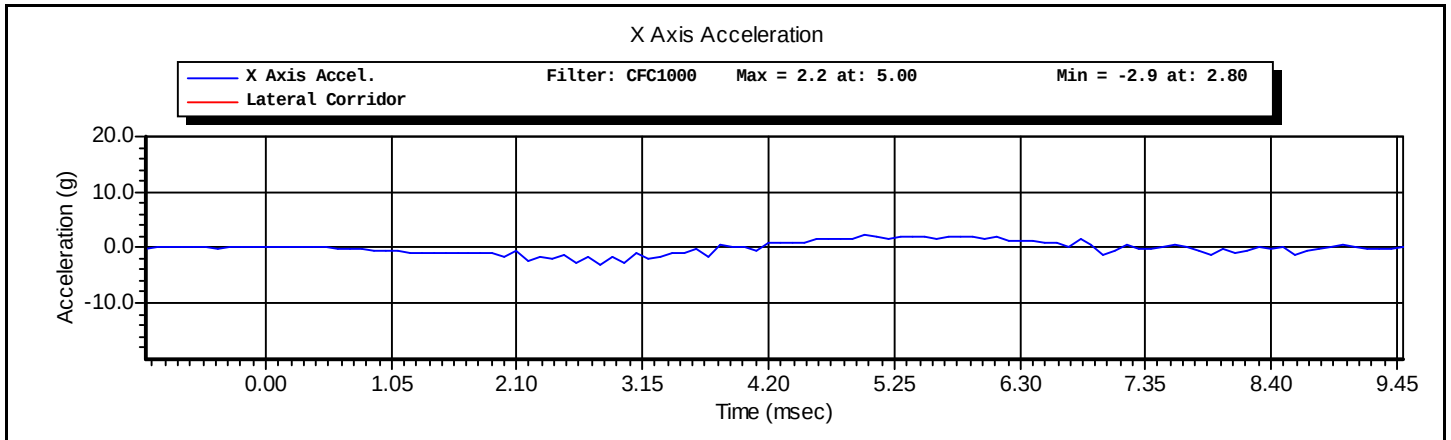
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Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	SID 300		
Test ID:	Head Drop	Test Date:	11/11/2010
Test Number:	2	Test Time:	1:00:45 PM



Test ID: **Head Drop**

Test Time: **1:00:45 PM**

Test Date: **11/11/2010**





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VERIFICATION REPORT

Test Name:	Neck Pendulum	Revision:	8/24/2009
Sub Test Name:	Left Side	Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	SID 304		
Test ID:	Neck Flexion	Test Date:	11/11/2010
Test Number:	1	Test Time:	11:41:59 AM

Component Part Number	Component Serial Number
Neck - 180-2000	AB8239

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.9 deg C P
Humidity	10 -- 70	29 %RH P
Velocity	5.51 -- 5.63	5.56 m/s P
Pendulum Impulse at 10 ms	2.20 -- 2.80	2.39 m/s P
Pendulum Impulse at 15 ms	3.30 -- 4.10	3.47 m/s P
Pendulum Impulse at 20 ms	4.40 -- 5.40	4.76 m/s P
Pendulum Impulse at 25 ms	5.40 -- 6.10	5.73 m/s P
Pendulum Impulse between 25 and 100 ms	5.50 -- 6.20	5.91 m/s P
Max D Plane Rotation	71.0 -- 81.0	74.0 degrees P
Time at Max Rotation	50.0 -- 70.0	62.4 ms P
Moment about OC	-44.0 -- -36.0	-39.8 Nm P
Moment Decay to Zero	102.0 -- 126.0	119.5 ms P

All test parameters are within specifications

Technician: **A. Rudniski** Signature: _____
Supervisor: **D. Travale** Signature: _____

Test ID: **Neck Flexion**

Test Time: **11:41:59 AM**

Test Date: **11/11/2010**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2010
Endevco	7231CT	C16510	10/21/2010
Denton	1716A	LC-576 Fy	2/15/2010
Denton	1716A	LC-576 Mx	2/15/2010
DentonATD	78051-342	184	4/30/2010
DentonATD	78051-342	174	4/30/2010
DentonATD	78051-342	185	4/30/2010

Test ID: **Neck Flexion**

Test Time: **11:41:59 AM**

Test Date: **11/11/2010**



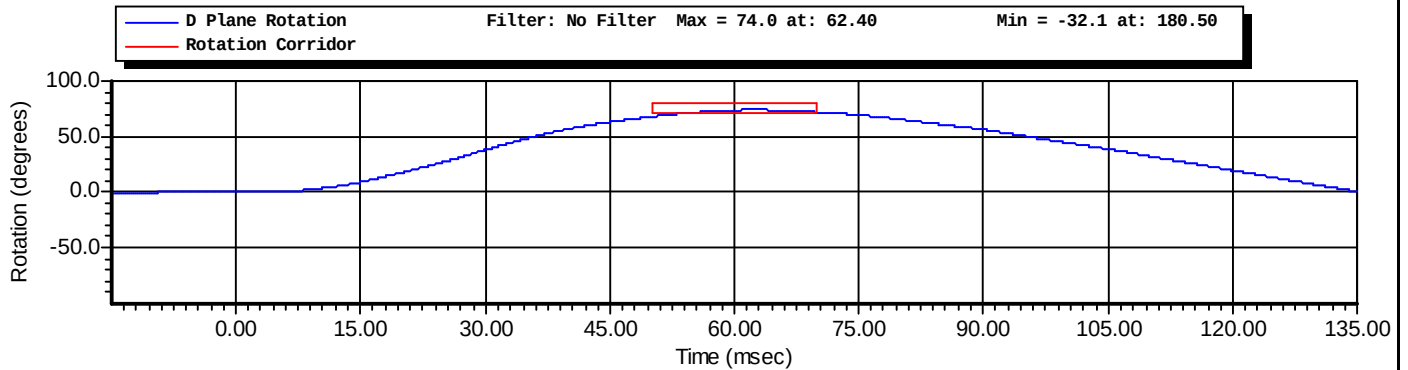
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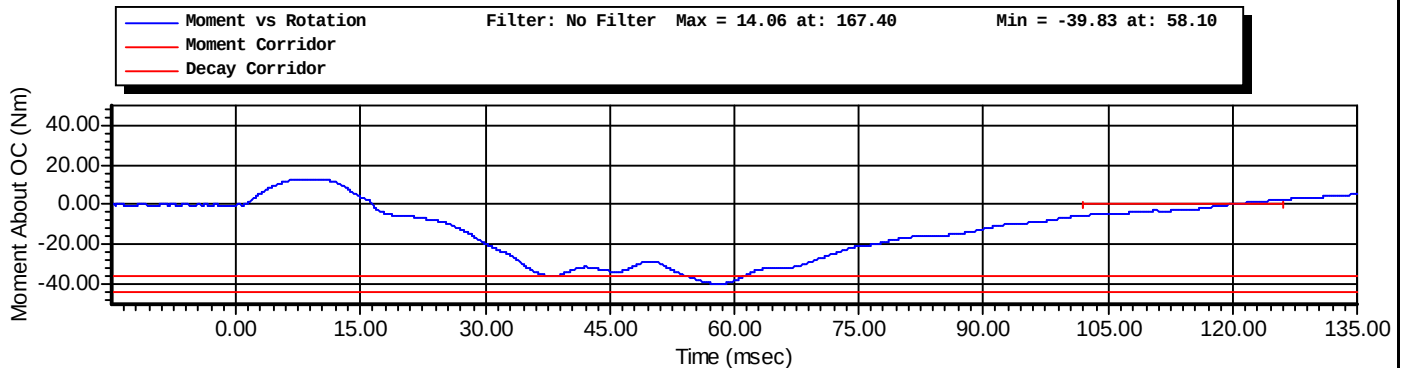
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Test Name:	Neck Pendulum	Revision:	8/24/2009
Sub Test Name:	Left Side	Spec Type:	NHTSA
ATD Type:	SID-IIIs		
ATD Serial Number:	SID 304		
Test ID:	Neck Flexion	Test Date:	11/11/2010
Test Number:	1	Test Time:	11:41:59 AM

D Plane Rotation



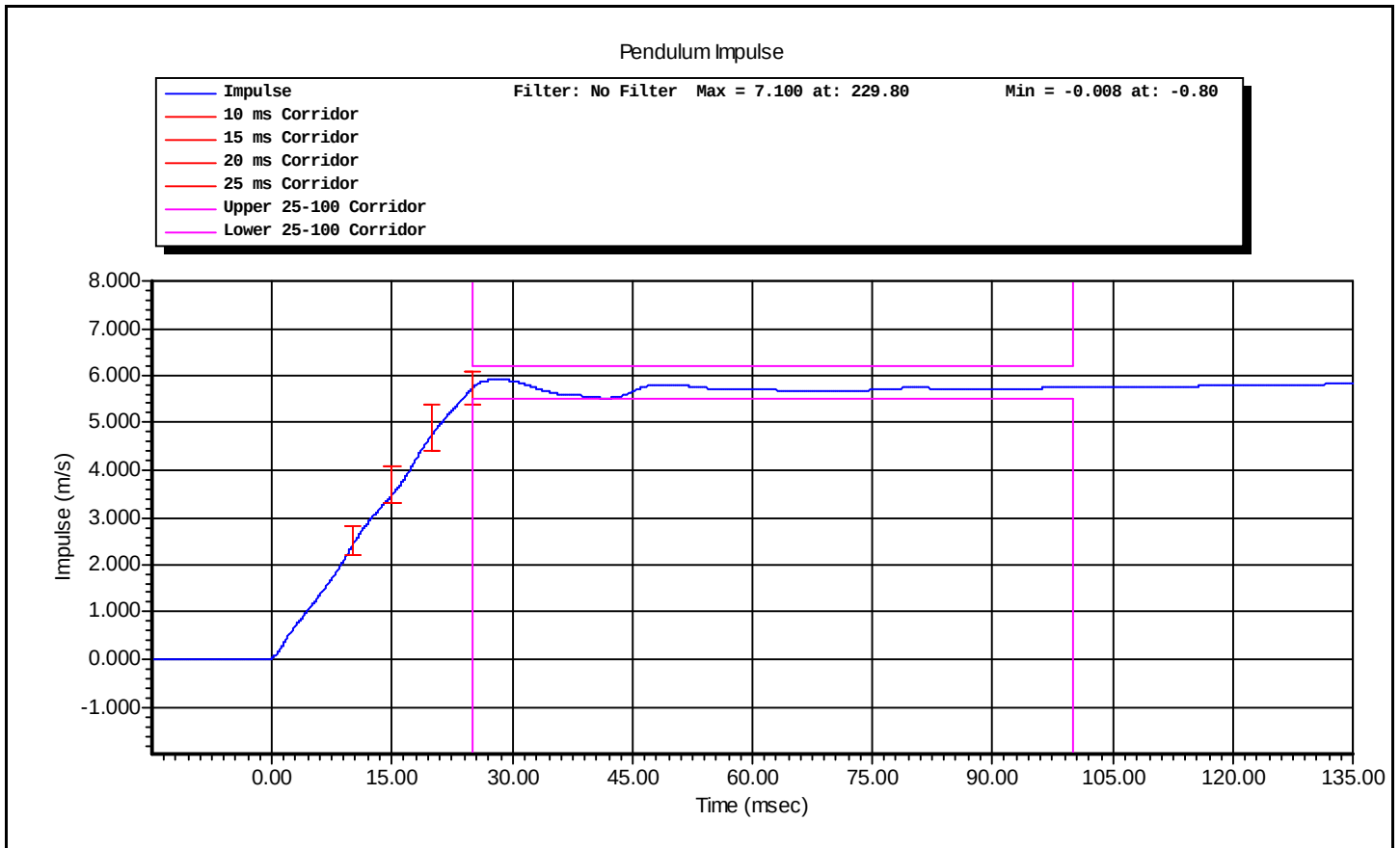
Moment About Occipital Condyle



Test ID: Neck Flexion

Test Time: 11:41:59 AM

Test Date: 11/11/2010





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VERIFICATION REPORT

Test Name:	Shoulder Impact	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	SID 304		
Test ID:	Shoulder	Test Date:	11/15/2010
Test Number:	3	Test Time:	3:00:00 PM

Component Part Number	Component Serial Number
-----------------------	-------------------------

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.20 deg C P
Humidity	10.0 -- 70.0	27.0 %RH P
Velocity	4.20 -- 4.40	4.35 m/s P
Probe Acceleration	13.0 -- 18.0	16.0 g P
Shoulder Deflection	28.0 -- 37.0	31.4 mm P
T1 Acceleration	17.0 -- 22.0	19.9 g P

All test parameters are within specifications

Technician: **S. Zito III** Signature: _____

Supervisor: **D. Travale** Signature: _____

Test ID: **Shoulder**

Test Time: **3:00:00 PM**

Test Date: **11/15/2010**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2010
Endevco	7264-2000	P66930	10/5/2010
Servo	180-3885	DS-1154	3/26/2010
Endevco	7264-2000	P52415	10/12/2010

Test ID: **Shoulder**

Test Time: **3:00:00 PM**

Test Date: **11/15/2010**

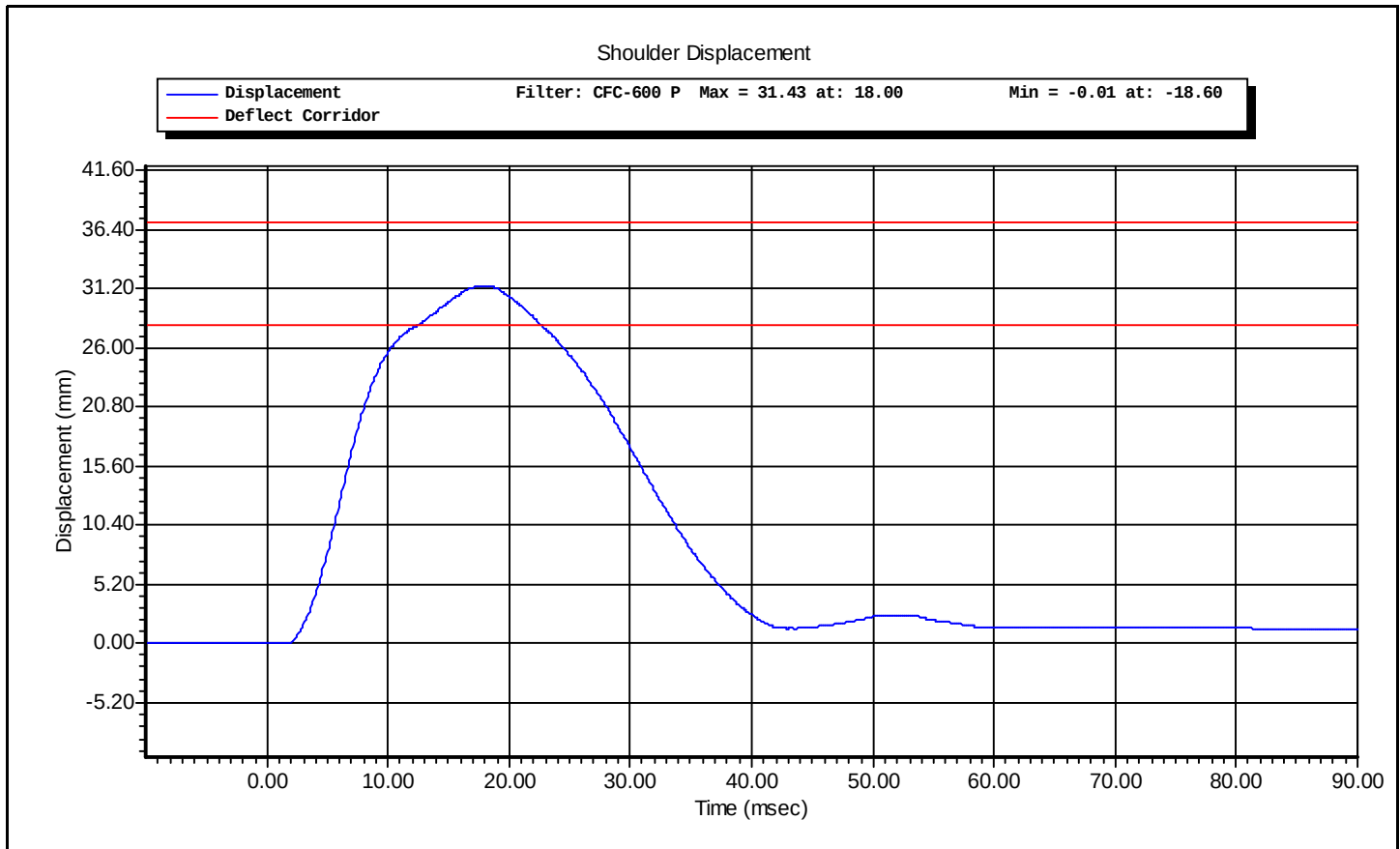


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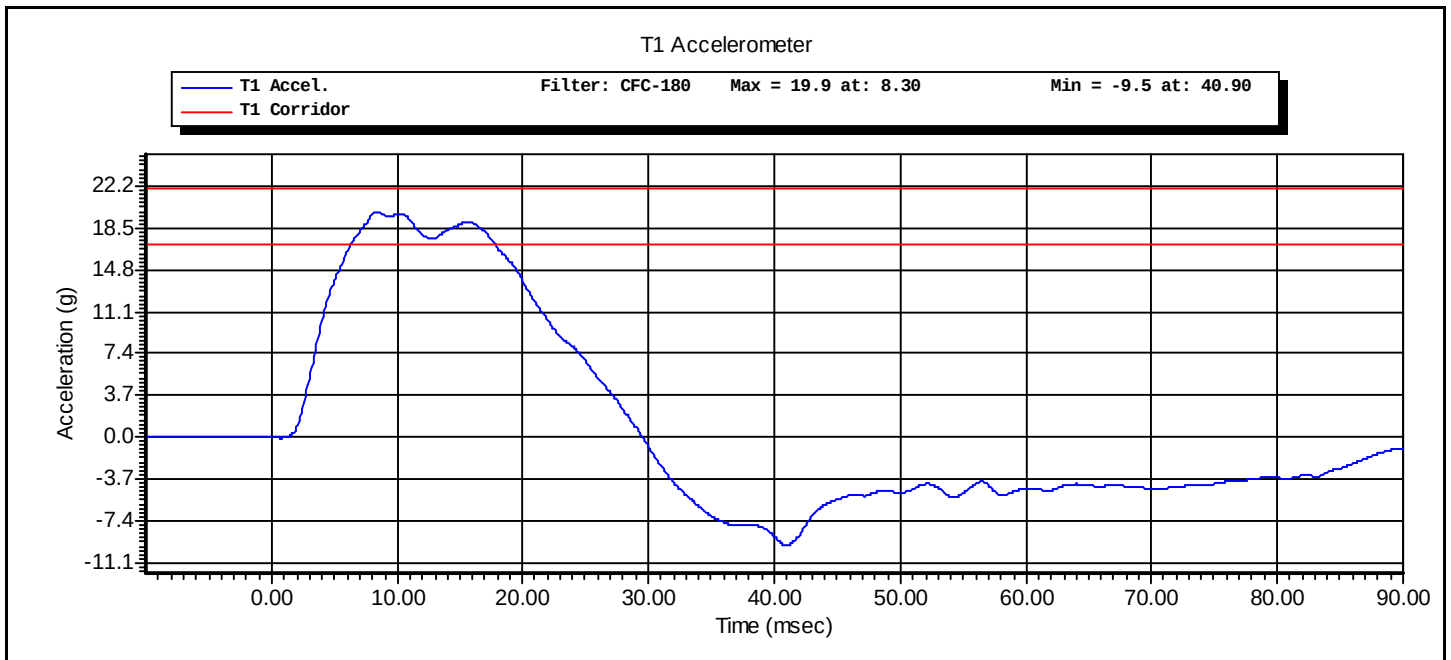
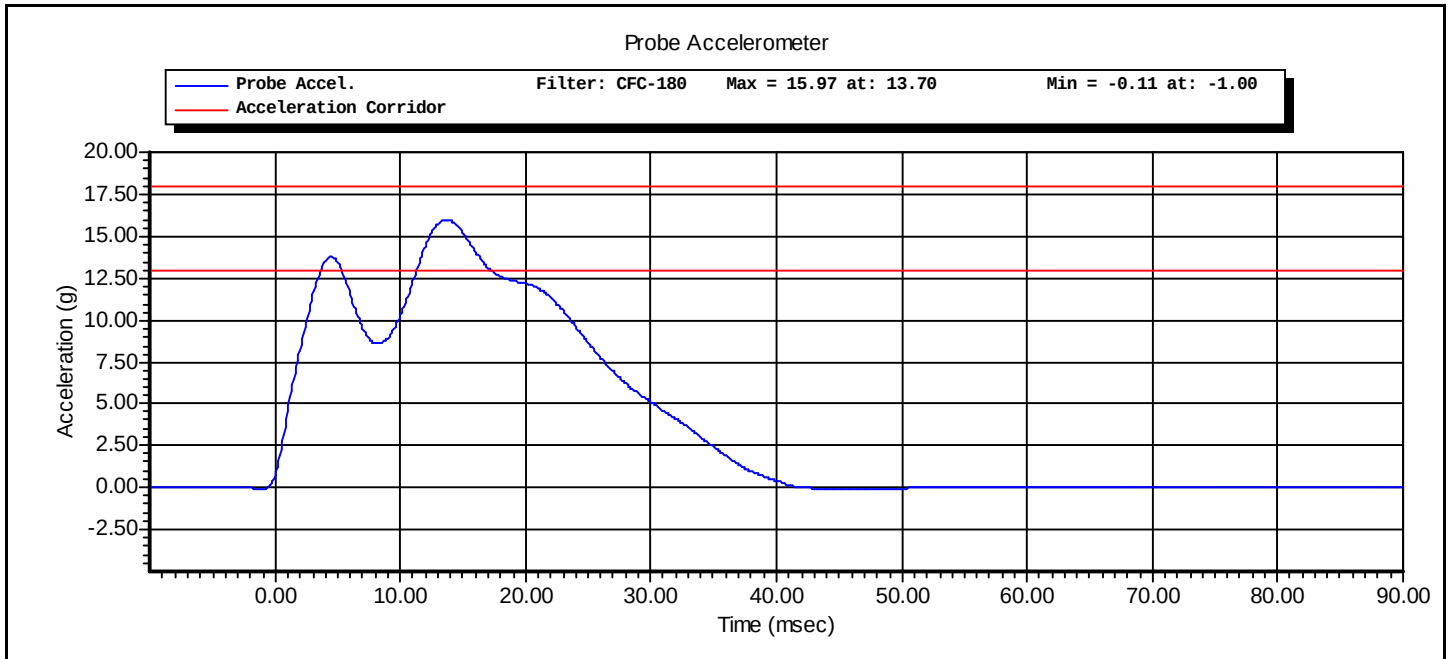
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Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	SID 304		
Test ID:	Shoulder	Test Date:	11/15/2010
Test Number:	3	Test Time:	3:00:00 PM



Test ID: **Shoulder**

Test Time: **3:00:00 PM**

Test Date: **11/15/2010**





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VERIFICATION REPORT

Test Name:	Thorax Impact without Arm	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	SID 304		
Test ID:	Thorax Without Arm	Test Date:	11/15/2010
Test Number:	1	Test Time:	9:52:18 AM

Component Part Number	Component Serial Number
-----------------------	-------------------------

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.2 deg C P
Humidity	10 -- 70	29 %RH P
Velocity	4.20 -- 4.40	4.32 m/s P
Probe Acceleration	14.0 -- 18.0	17.1 g P
Upper Thorax Rib Deflection	32.0 -- 40.0	36.0 mm P
Mid Thorax Rib Deflection	39.0 -- 45.0	41.1 mm P
Lower Thorax Rib Deflection	35.0 -- 43.0	38.1 mm P
Upper Spine Acceleration T1	13.0 -- 17.0	16.8 g P
Lower Spine Acceleration T12	7.0 -- 11.0	10.5 g P

All test parameters are within specifications

Technician: **S. Zito** Signature: _____

Supervisor: **D. Travale** Signature: _____

Test ID: **Thorax Without Arm** Test Time: **9:52:18 AM**

Test Date: **11/15/2010**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2010
Endevco	7264-2000	P66930	10/5/2010
Servo	180-3885	DS-1188	3/26/2010
Servo	180-3885	DS-1269	3/26/2010
Servo	180-3885	DS-1260	3/26/2010
Endevco	7264-2000	P52415	10/12/2010
Endevco	7264-2000	P58839	10/14/2010

Test ID: **Thorax Without Arm** Test Time: **9:52:18 AM**

Test Date: **11/15/2010**

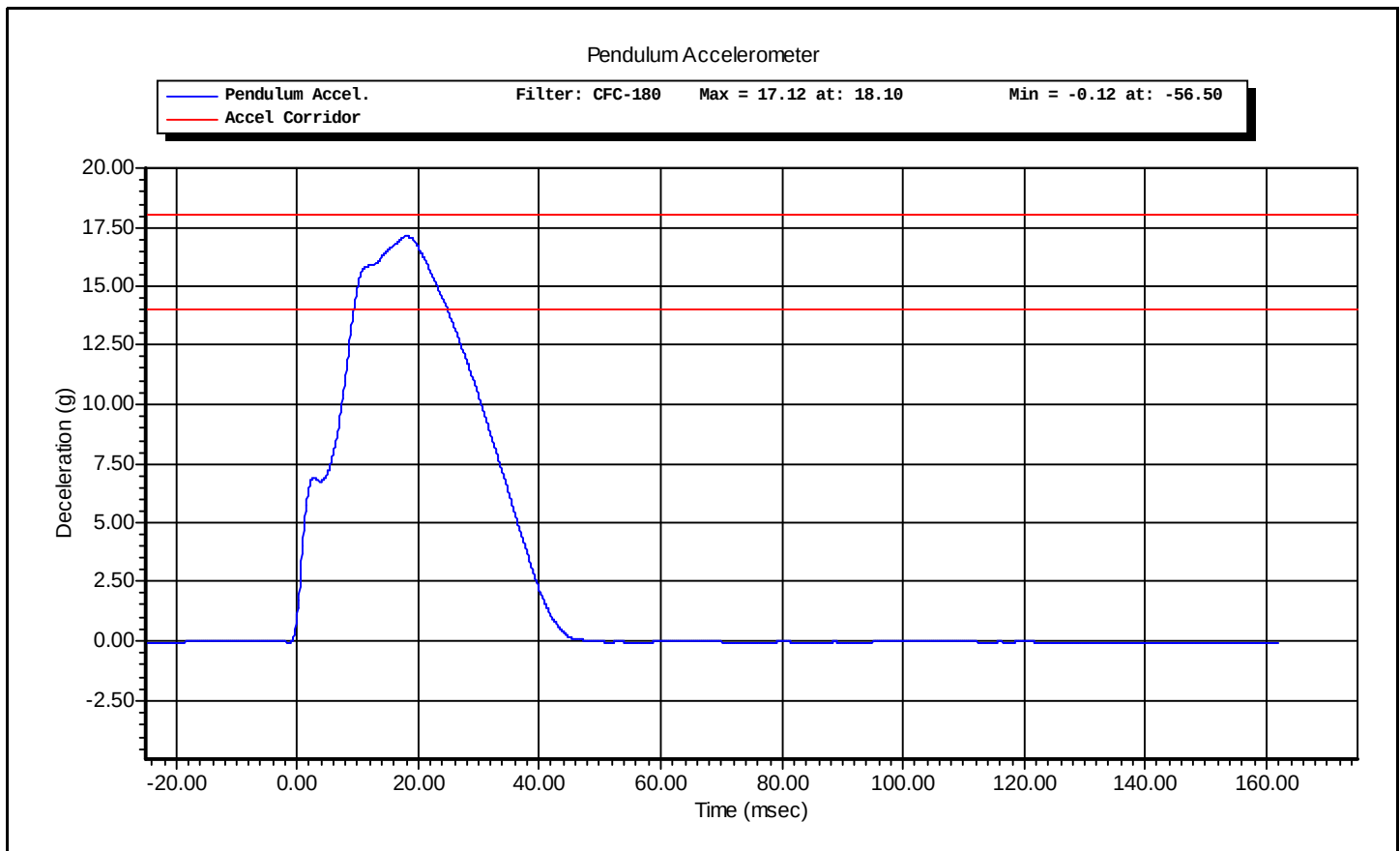


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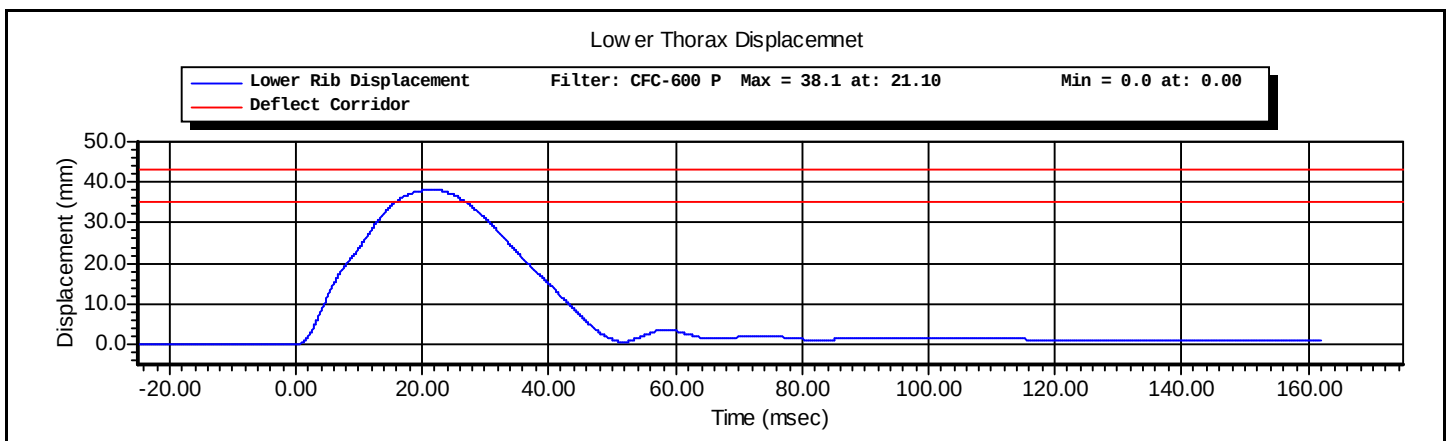
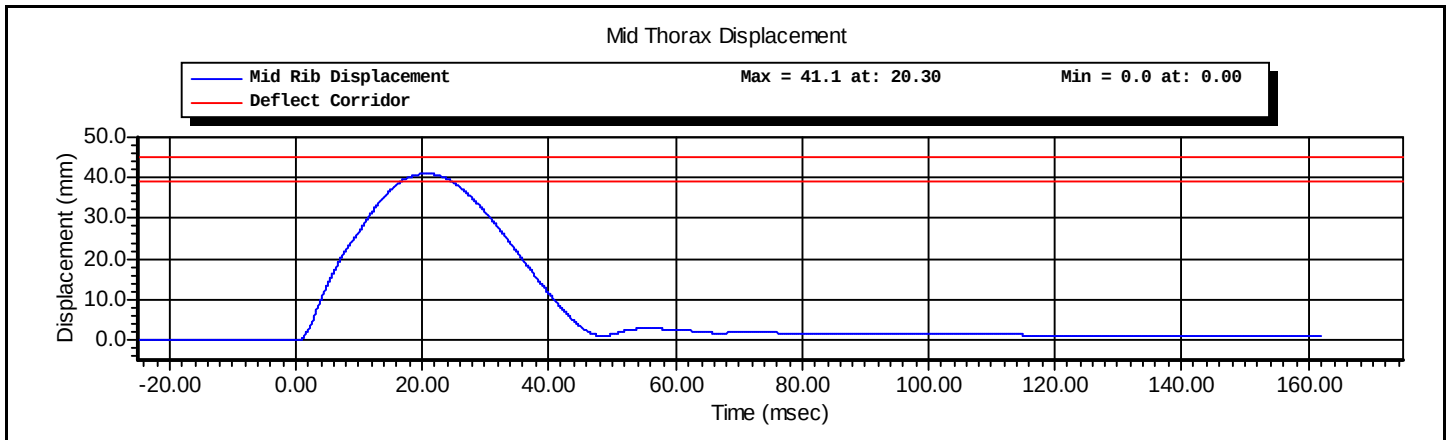
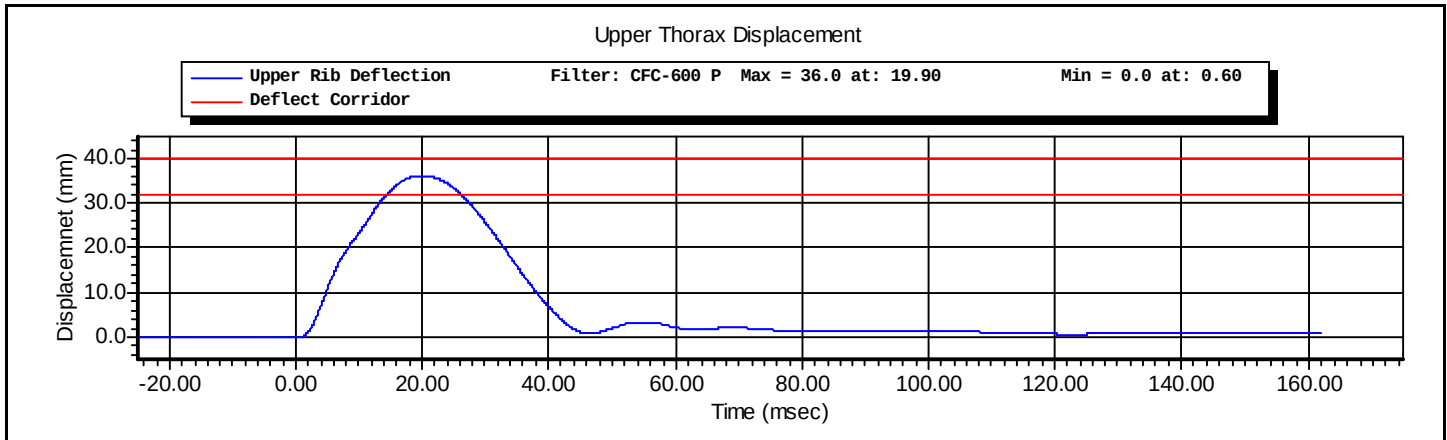
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Test Name:	Thorax Impact without Arm	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	SID 304		
Test ID:	Thorax Without Arm	Test Date:	11/15/2010
Test Number:	1	Test Time:	9:52:18 AM

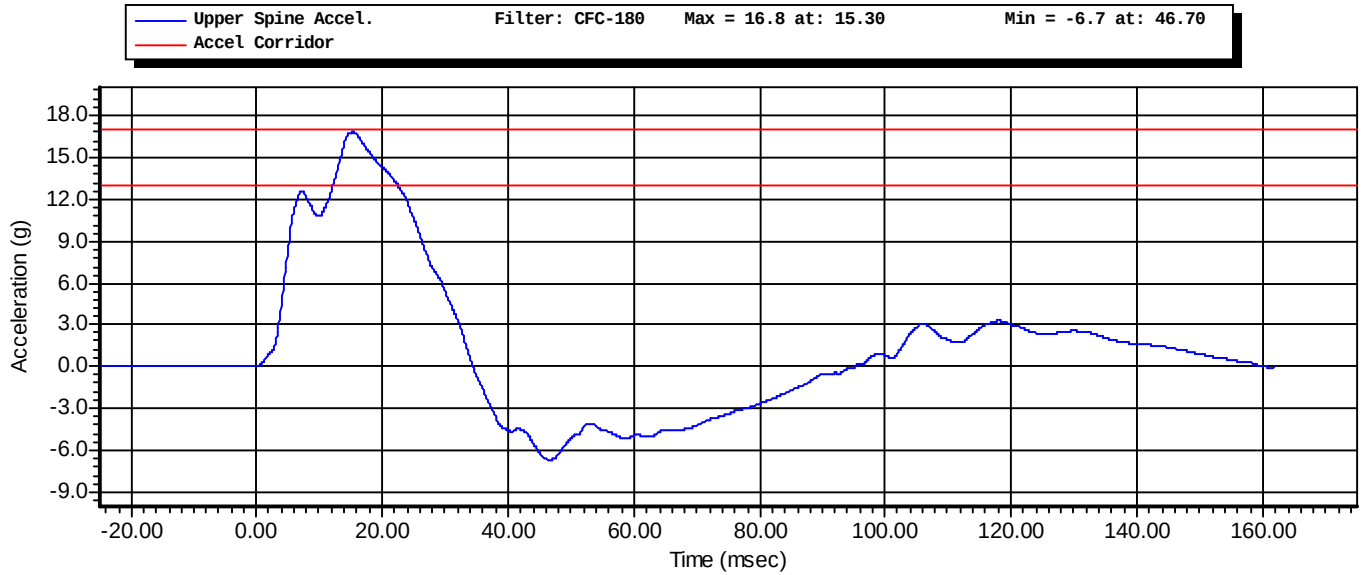


Test ID: Thorax Without Arm Test Time: 9:52:18 AM

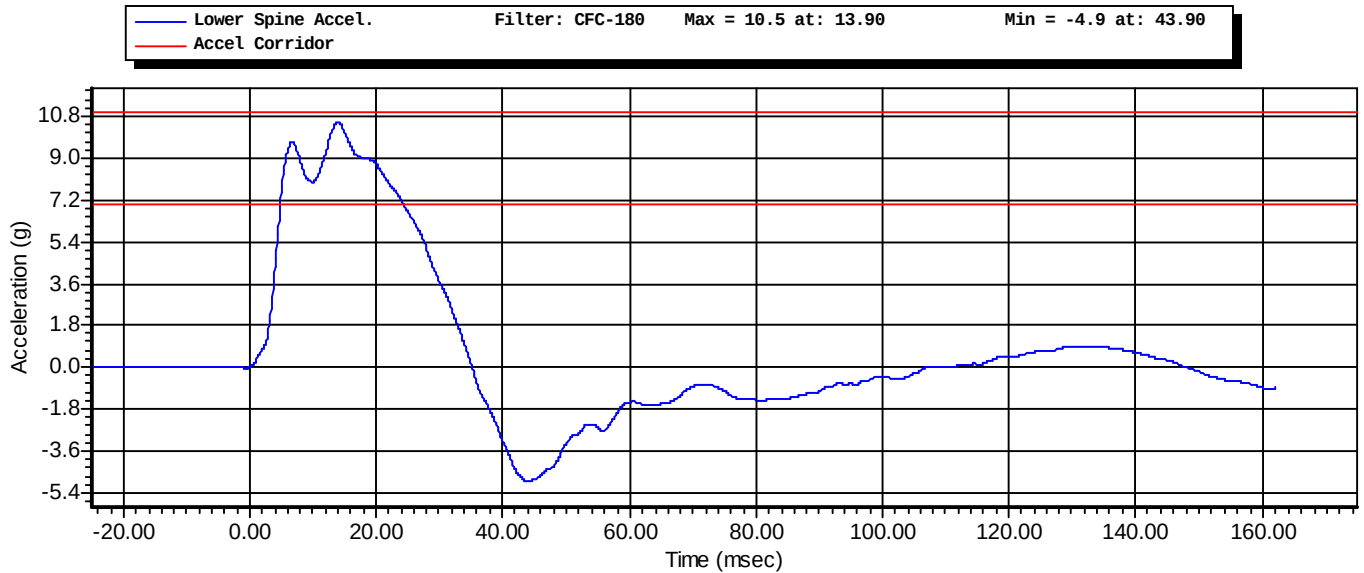
Test Date: 11/15/2010



Upper Spine Acceleration



Lower Spine Acceleration





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VERIFICATION REPORT

Test Name:	Thorax Impact with Arm	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	SID 304		
Test ID:	Thorax With Arm	Test Date:	11/15/2010
Test Number:	1	Test Time:	10:41:33 AM

Component Part Number	Component Serial Number
-----------------------	-------------------------

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.1 deg C P
Humidity	10 -- 70	29 %RH P
Velocity	6.60 -- 6.80	6.60 m/s P
Probe Acceleration after 5ms	30.0 -- 36.0	33.8 g P
Upper Thorax Rib Deflection	25.0 -- 32.0	26.4 mm P
Mid Thorax Rib Deflection	30.0 -- 36.0	30.2 mm P
Lower Thorax Rib Deflection	32.0 -- 38.0	32.2 mm P
Upper Spine Acceleration ("y")	34.0 -- 43.0	41.8 g P
Lower Spine Acceleration ("y")	29.0 -- 37.0	34.4 g P
Shoulder Deflection	31.0 -- 40.0	33.4 mm P

All test parameters are within specifications

Technician: **S. Zito III** Signature: _____

Supervisor: **D. Travale** Signature: _____

Test ID: **Thorax With Arm** Test Time: **10:41:33 AM** Test Date: **11/15/2010**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2010
Endevco	7264-2000	P66930	10/5/2010
Servo	180-3885	DS-1188	3/26/2010
Servo	180-3885	DS-1269	3/26/2010
Servo	180-3885	DS-1260	3/26/2010
Endevco	7264-2000	P52415	10/12/2010
Endevco	7264-2000	P58839	10/14/2010
Servo	180-3885	DS-1154	3/26/2010

Test ID: **Thorax With Arm** Test Time: **10:41:33 AM**

Test Date: **11/15/2010**

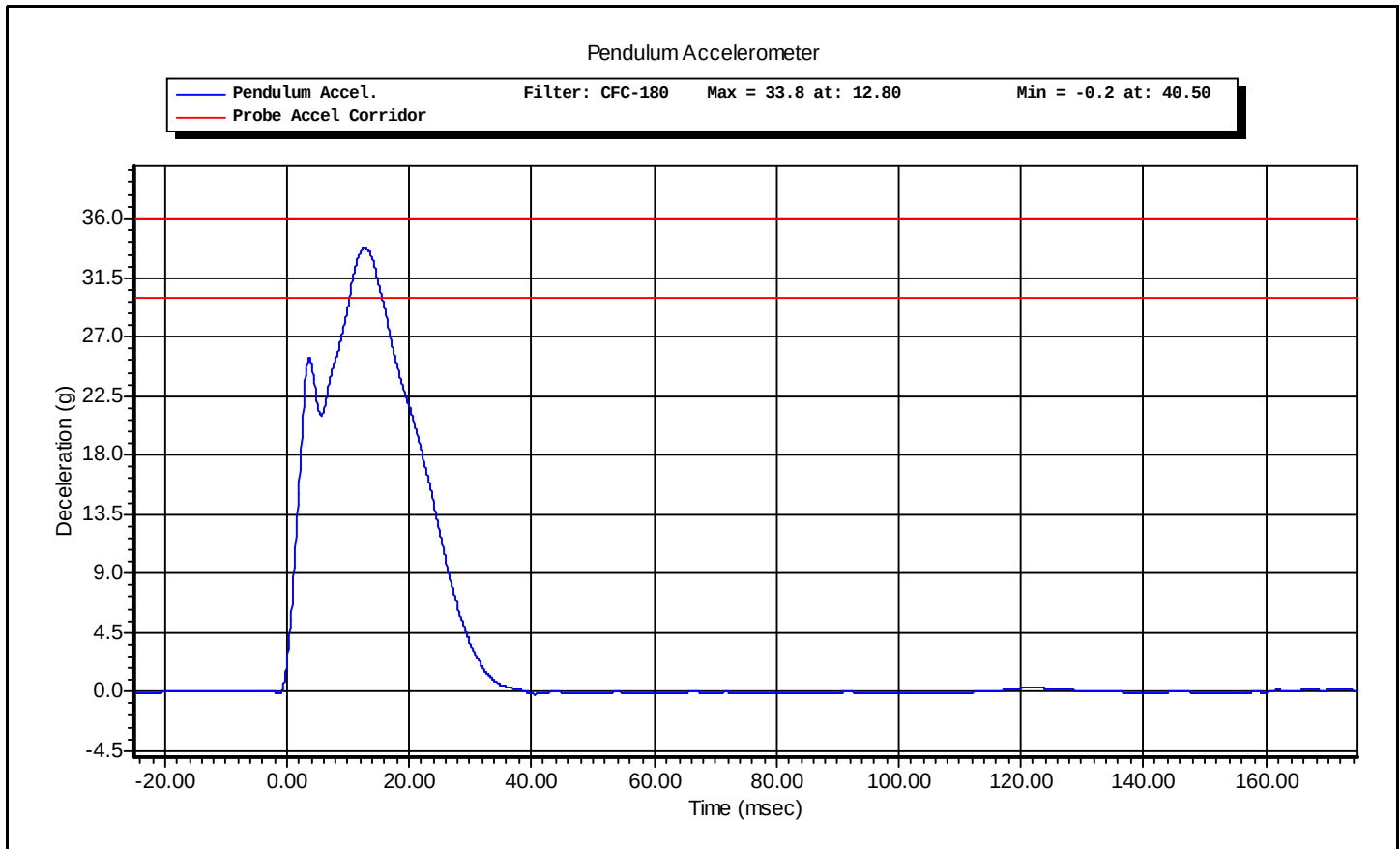


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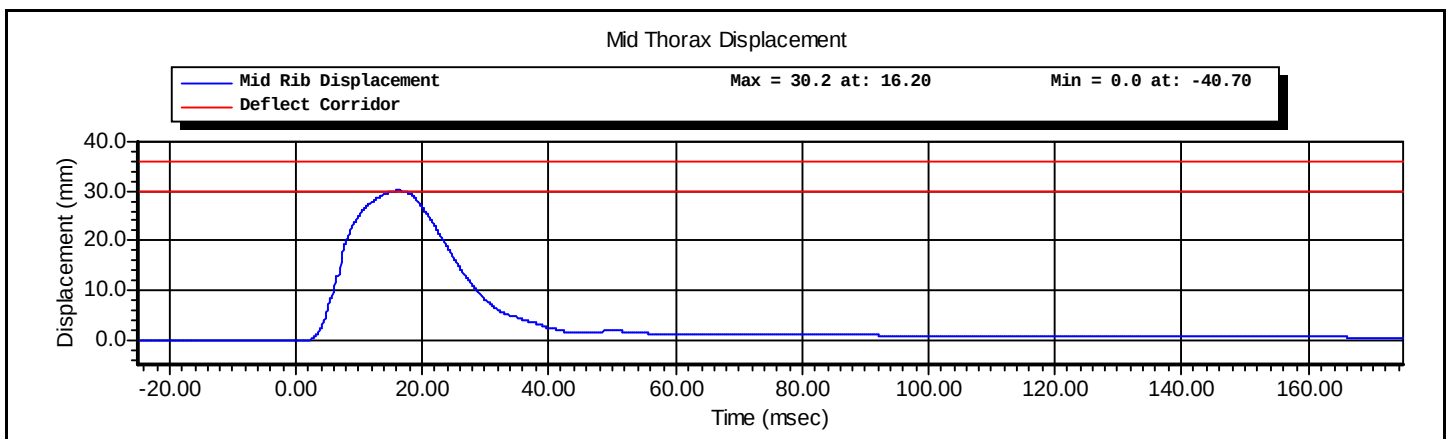
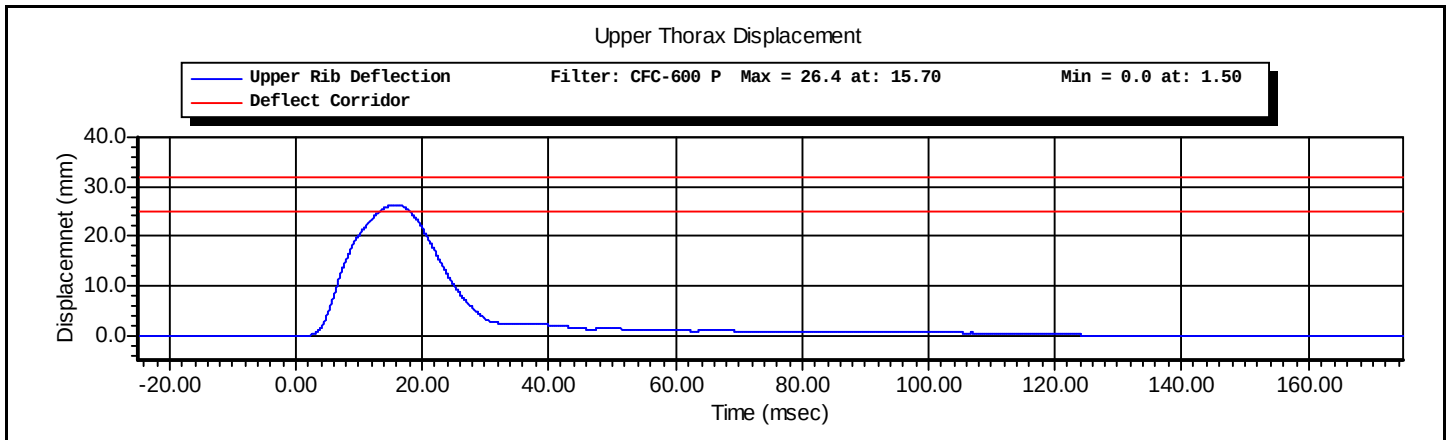
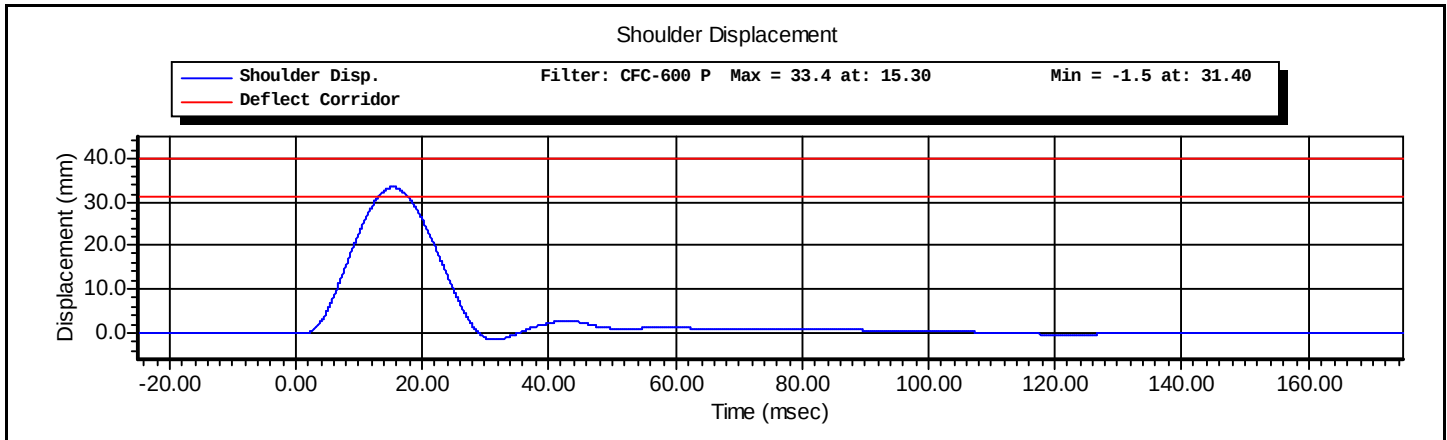
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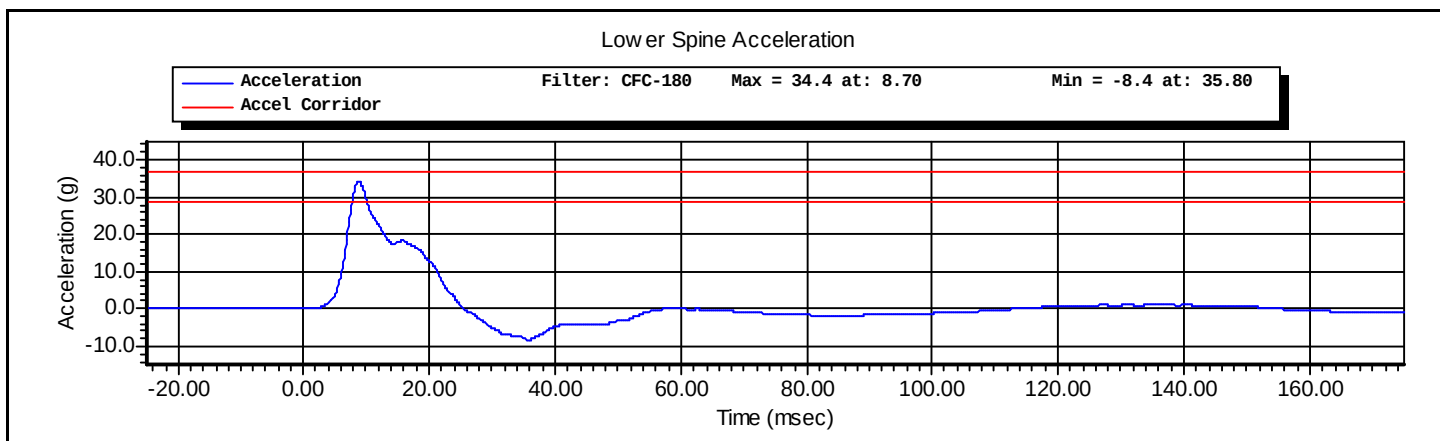
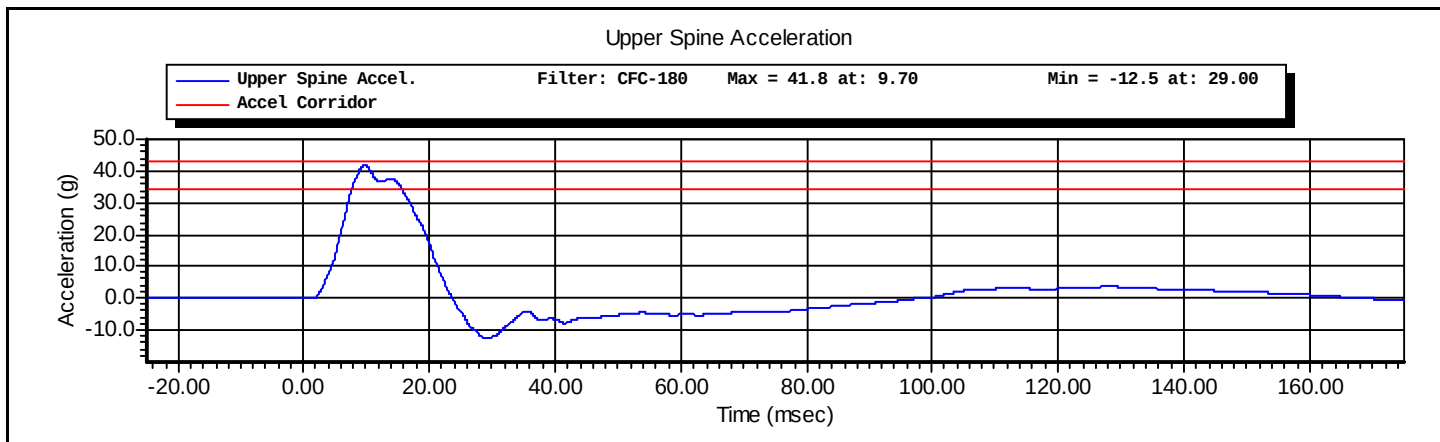
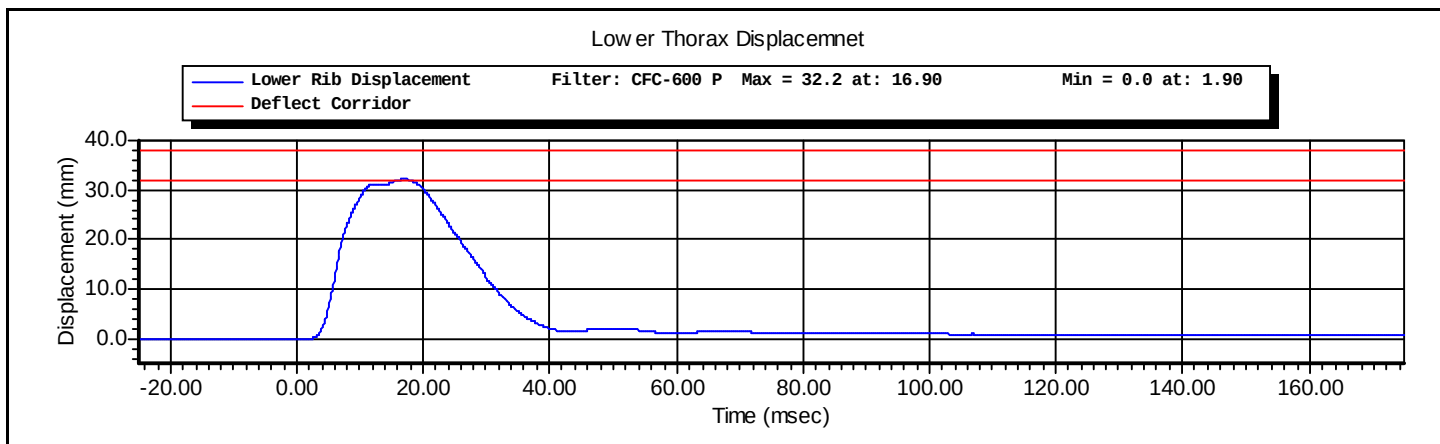
Test Name:	Thorax Impact with Arm	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	SID 304		
Test ID:	Thorax With Arm	Test Date:	11/15/2010
Test Number:	1	Test Time:	10:41:33 AM



Test ID: **Thorax With Arm** Test Time: **10:41:33 AM**

Test Date: **11/15/2010**







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VERIFICATION REPORT

Test Name:	Abdominal Impact	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	SID 304		
Test ID:	Abdomen	Test Date:	11/15/2010
Test Number:	2	Test Time:	9:21:42 AM

Component Part Number	Component Serial Number
-----------------------	-------------------------

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.1 deg C P
Humidity	10 -- 70	29 %RH P
Velocity	4.20 -- 4.40	4.34 m/s P
Probe Acceleration	12.0 -- 16.0	15.9 g P
Upper Abdominal Rib Deflection	36.0 -- 47.0	38.4 mm P
Lower Abdominal Rib Deflection	33.0 -- 44.0	38.5 mm P
Lower Spine Acceleration - T12	9.0 -- 14.0	12.0 g P

All test parameters are within specifications

Technician: **S. Zito** Signature: _____
Supervisor: **D. Travale** Signature: _____

Test ID: **Abdomen**

Test Time: **9:21:42 AM**

Test Date: **11/15/2010**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2010
Endevco	7264-2000	P66930	10/5/2010
Servo	180-3885	DS-1207	3/26/2010
Servo	180-3885	DS-1204	3/26/2010
Endevco	7264-2000	P58839	10/14/2010

Test ID: **Abdomen**

Test Time: **9:21:42 AM**

Test Date: **11/15/2010**



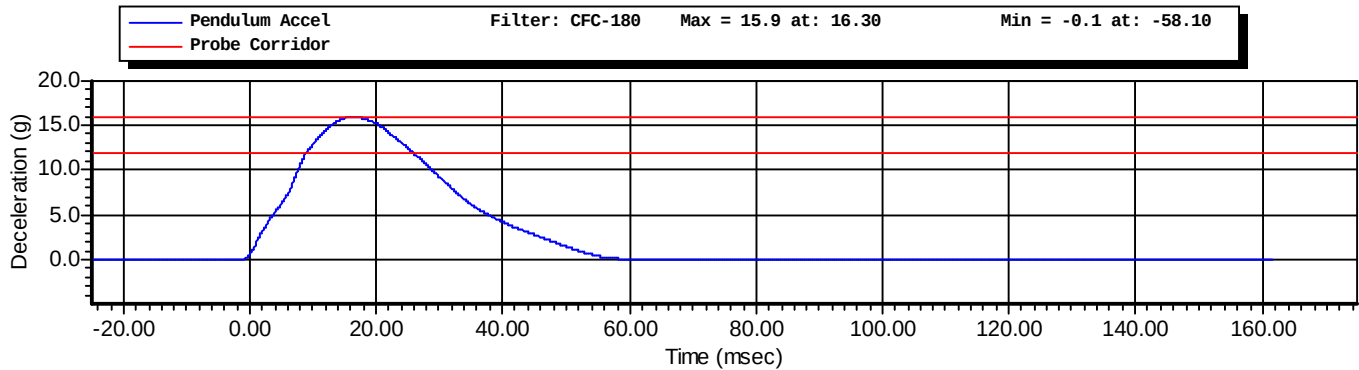
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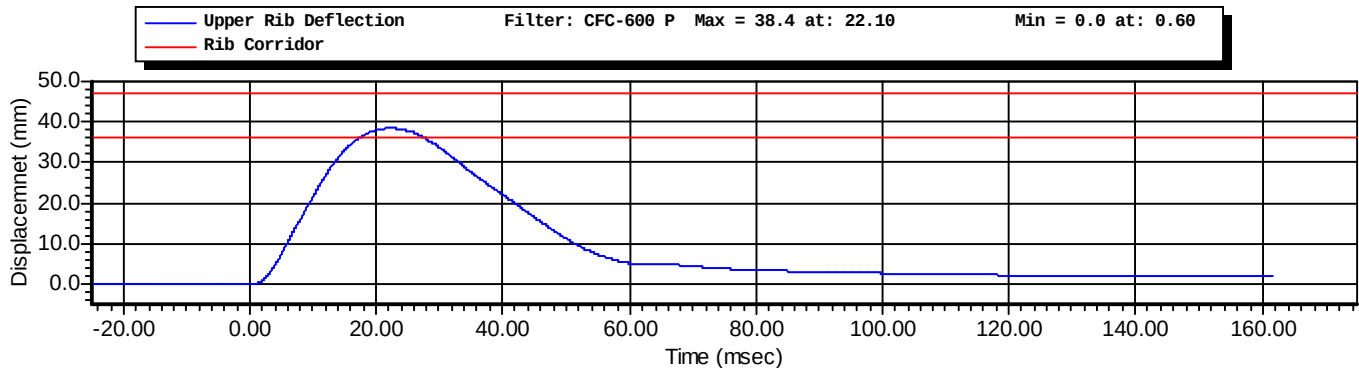
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Test Name:	Abdominal Impact	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	SID 304		
Test ID:	Abdomen	Test Date:	11/15/2010
Test Number:	2	Test Time:	9:21:42 AM

Pendulum Accelerometer



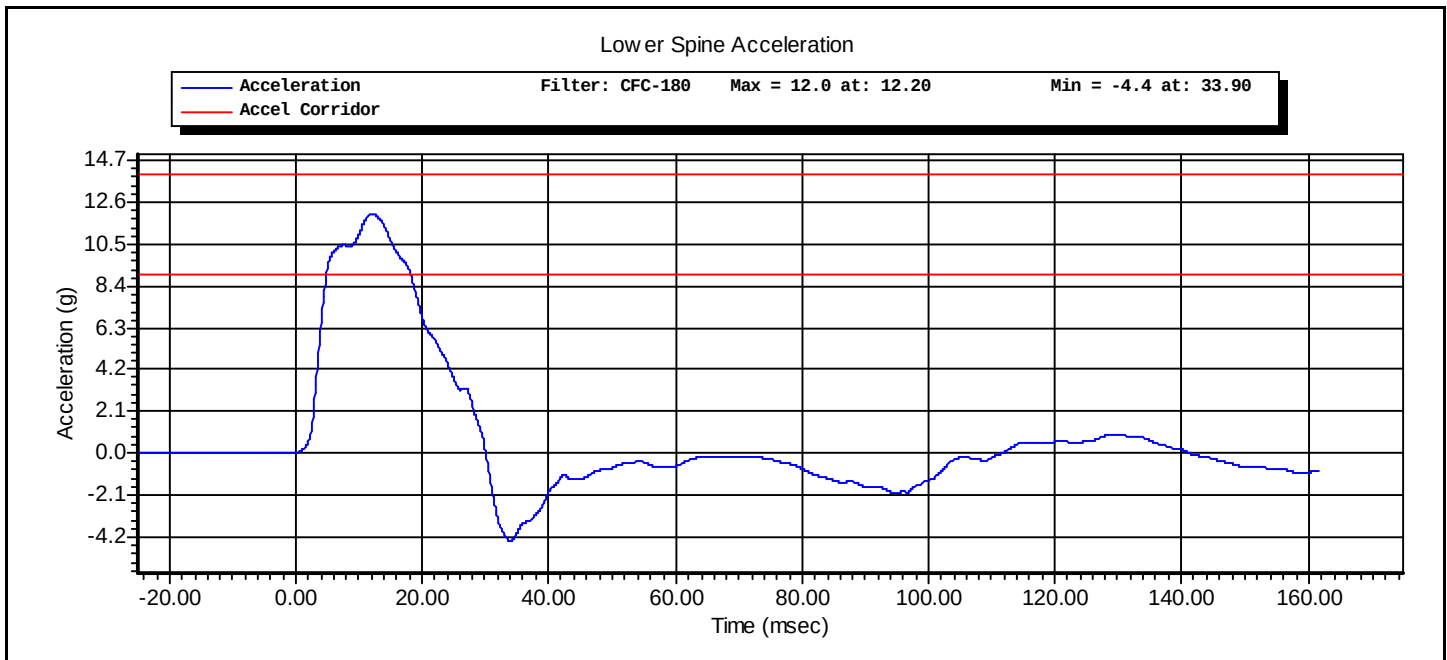
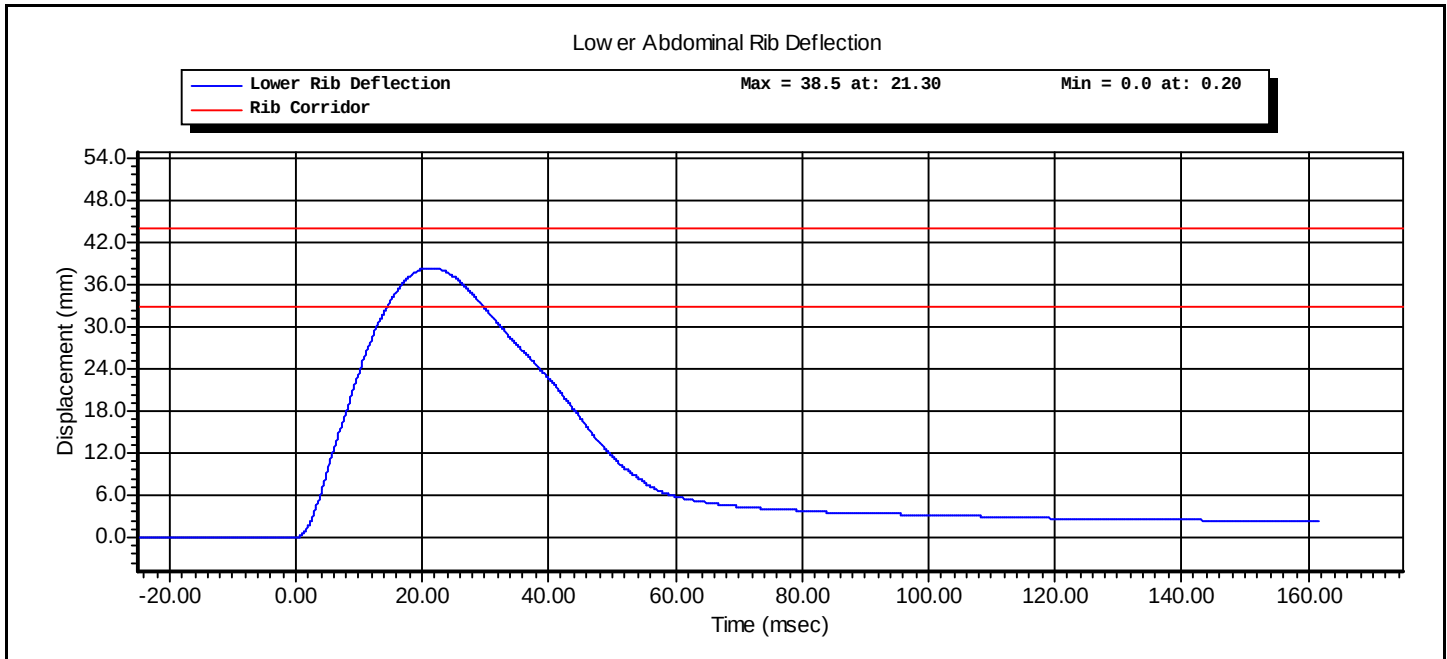
Upper Abdominal Rib Deflection



Test ID: **Abdomen**

Test Time: **9:21:42 AM**

Test Date: **11/15/2010**





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VERIFICATION REPORT

Test Name:	Pelvis	Revision:	8/24/2009
Sub Test Name:	Iliac Impact	Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	SID 304		
Test ID:	Iliac Pelvis	Test Date:	11/16/2010
Test Number:	1	Test Time:	9:29:43 AM

Component Part Number	Component Serial Number
-----------------------	-------------------------

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.4 deg C P
Humidity	10 -- 70	26 %RH P
Velocity	4.20 -- 4.40	4.28 m/s P
Peak Probe Acceleration	36.0 -- 45.0	40.6 g P
Peak Pelvis Acceleration	28.0 -- 39.0	34.3 g P
Peak Iliac Force	4.10 -- 5.10	4.64 kN P

All test parameters are within specifications

Technician: **A. Rudniski** Signature: _____
Supervisor: **D. Travale** Signature: _____

Test ID: **Iliac Pelvis**

Test Time: **9:29:43 AM**

Test Date: **11/16/2010**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2010
Endevco	7264-2000	P66930	10/5/2010
Endevco	7264-2000	P52040	10/12/2010
DentonATD	3228J	LC-281 Fy	4/9/2010

Test ID: **Iliac Pelvis**

Test Time: **9:29:43 AM**

Test Date: **11/16/2010**

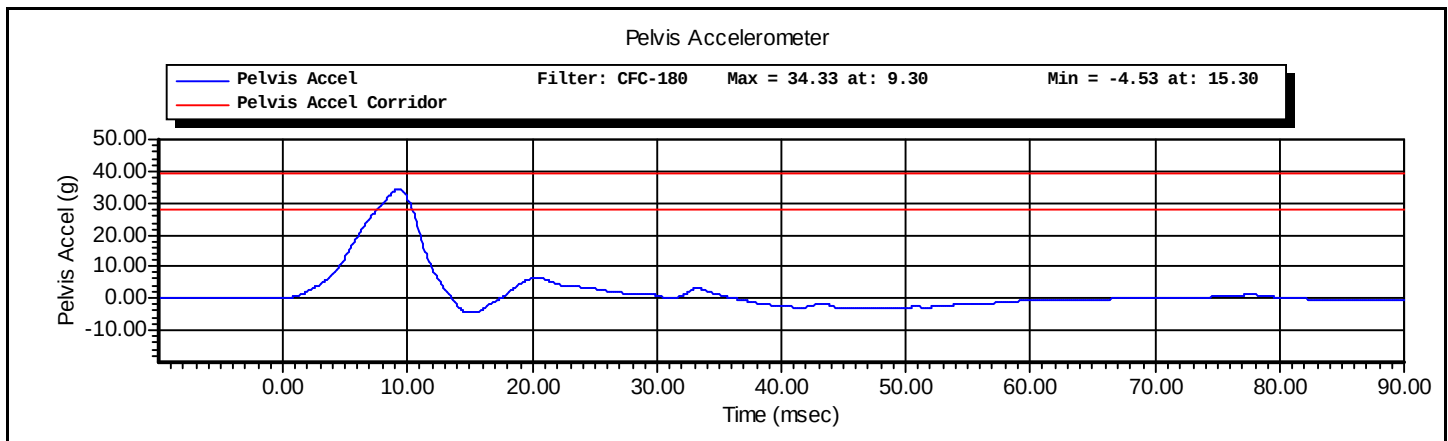
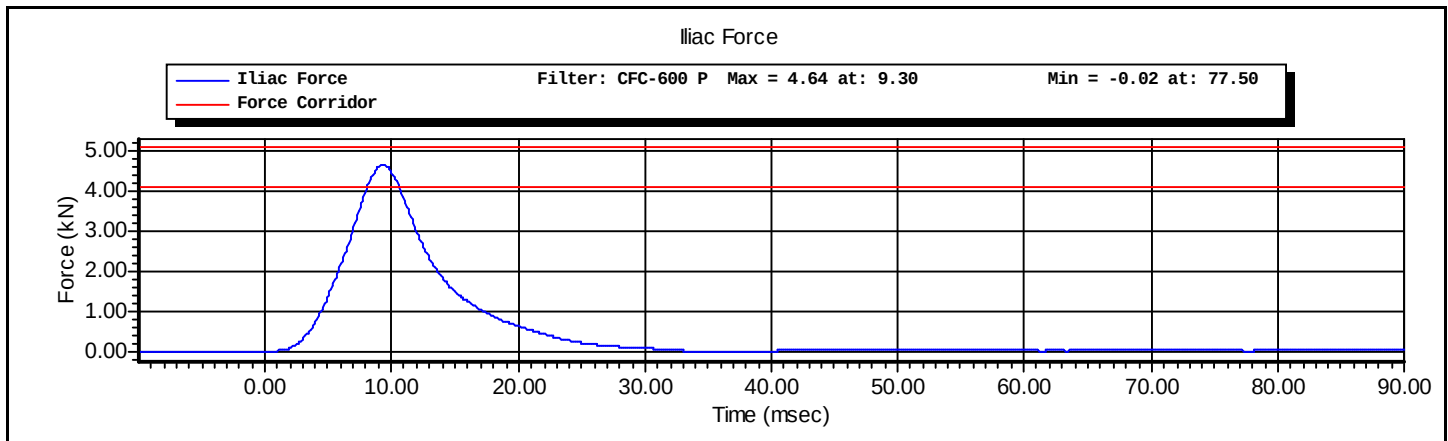


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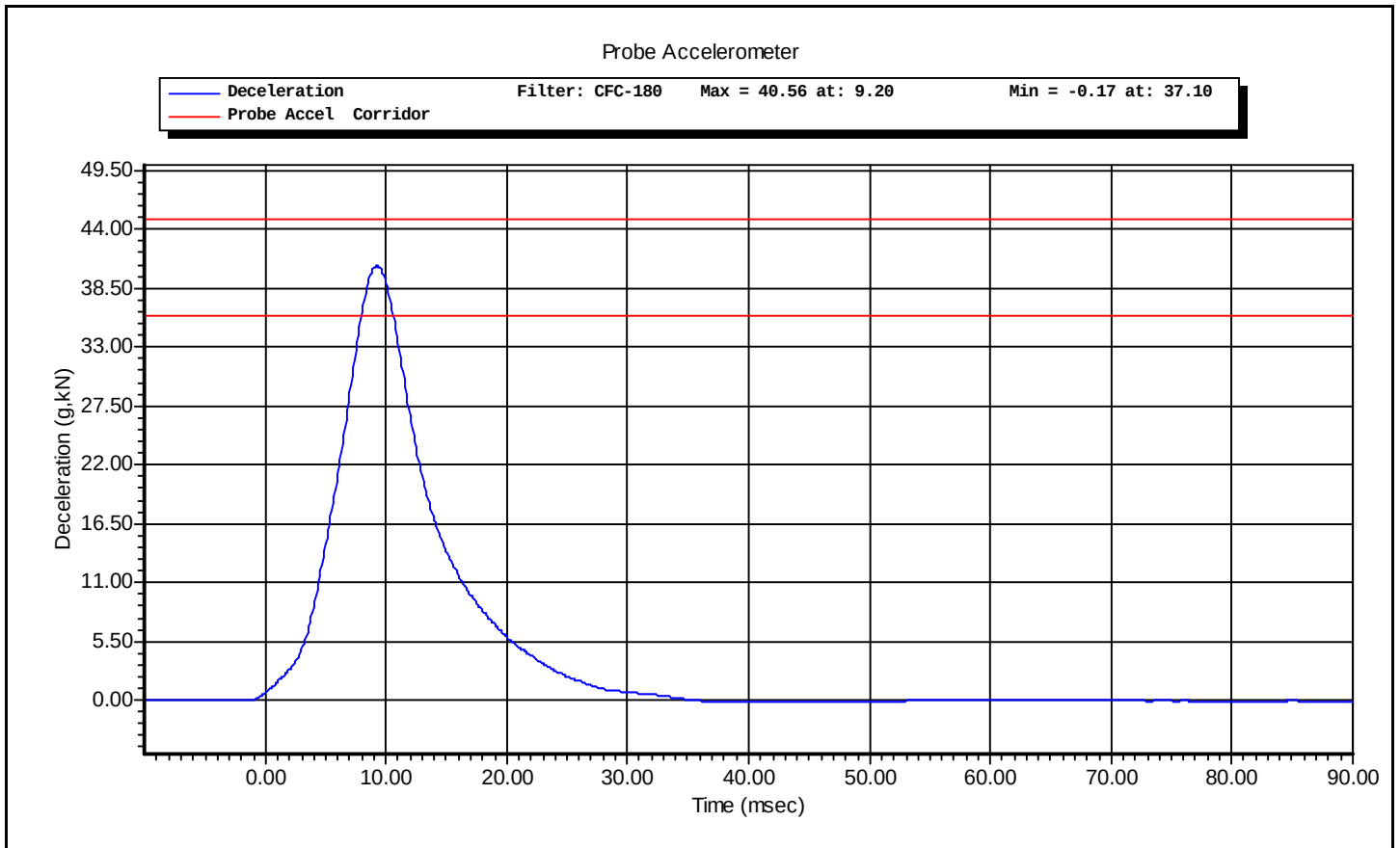
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Sub Test Name:	Iliac Impact	Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	SID 304		
Test ID:	Iliac Pelvis	Test Date:	11/16/2010
Test Number:	1	Test Time:	9:29:43 AM



Test ID: **Iliac Pelvis**

Test Time: **9:29:43 AM**

Test Date: **11/16/2010**





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VERIFICATION REPORT

Test Name:	Pelvis	Revision:	8/24/2009
Sub Test Name:	Acetabulum Impact	Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	SID 304		
Test ID:	Acetabulum	Test Date:	11/16/2010
Test Number:	1	Test Time:	1:27:30 PM

Comments:

Pelvis Plug Used for Certification:
FTSS S/N 14058
Force @ 3mm = 1503N

Pelvis Plug Used for Full Scale Test:
FTSS S/N 8141
Force @ 3mm = 1484N

Test Parameters	Test Specifications			Test Results	
Temperature	20.6	--	22.2	22.0 deg C	P
Humidity	10	--	70	28 %RH	P
Velocity	6.60	--	6.80	6.60 m/s	P
Peak Probe Acceleration	38.0	--	47.0	42.7 g	P
Peak Pelvis Acceleration	34.0	--	42.0	35.0 g	P
Peak Acetabulum Force	3.60	--	4.30	3.70 kN	P

All test parameters are within specifications

Technician: **A. Rudniski** Signature: _____

Supervisor: **D. Travale** Signature: _____

Test ID: **Acetabulum**

Test Time: **1:27:30 PM**

Test Date: **11/16/2010**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2010
Endevco	7264-2000	P66930	10/5/2010
Endevco	7264-2000	P52040	10/12/2010
DentonATD	3249J	LC-267Fy	4/9/2010
Endevco	7264-2000	P51288	6/2/2010

Test ID: **Acetabulum**

Test Time: **1:27:30 PM**

Test Date: **11/16/2010**



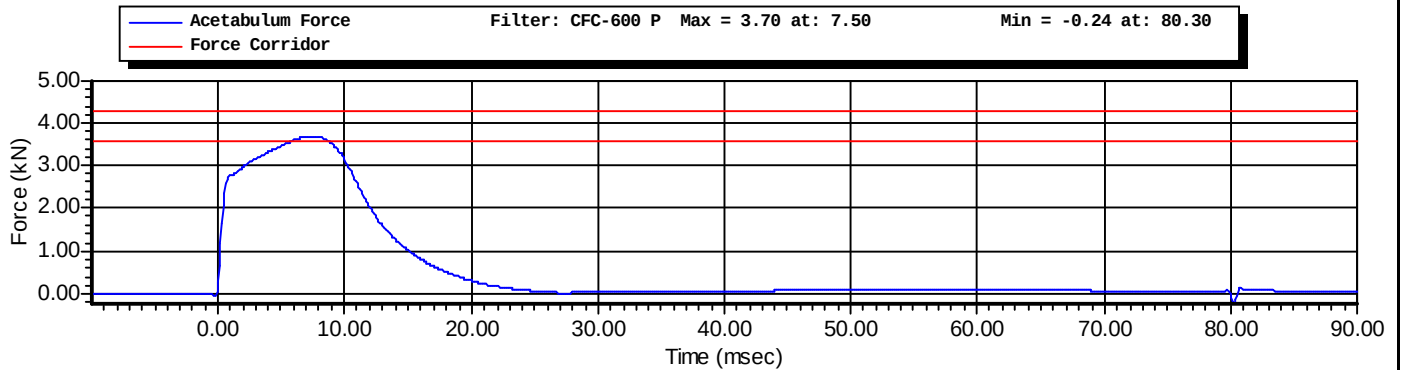
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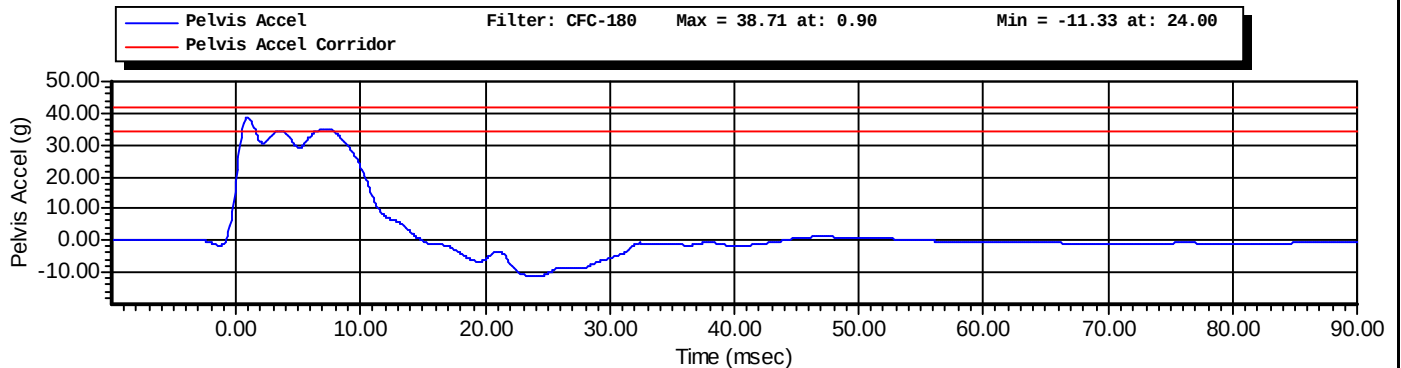
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Test Name:	Pelvis	Revision:	8/24/2009
Sub Test Name:	Acetabulum Impact	Spec Type:	NHTSA
ATD Type:	SID-IIIs		
ATD Serial Number:	SID 304		
Test ID:	Acetabulum	Test Date:	11/16/2010
Test Number:	1	Test Time:	1:27:30 PM

Acetabulum Force



Pelvis Accelerometer



Test ID: **Acetabulum**

Test Time: **1:27:30 PM**

Test Date: **11/16/2010**

