

REPORT NUMBER: SNCAP-CAL-11-015

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

**General Motors Corporation
2011 Chevrolet Silverado
1500 Crew Cab**

NHTSA NUMBER: MB0113

**PREPARED BY:
CALSPAN CORPORATION
P.O. BOX 400
BUFFALO, NEW YORK 14225**



11/16/2010

FINAL REPORT

**PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF CRASHWORTHINESS STANDARDS
MAIL CODE: NVS-111
1200 NEW JERSEY AVE SE, ROOM W43-410
WASHINGTON, D.C. 20590**

This publication is distributed by the U.S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration. The United States Government assumes no liability for its contents or use thereof. If trade or manufacturers' names or products are mentioned it is only because they are considered essential to the object of the publication and should not be construed as an endorsement. The United States Government does not endorse products or manufacturers.

Prepared by: _____
Bethany Koetje, Project Engineer

Date: _____

Approved by: _____
David Travale, Program Manager
Transportation Sciences Center

Date: _____

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

1. Report No. SNCAP-CAL-11-015	2. Government Accession No.	3. Recipient's Catalog No.																																													
4. Title and Subtitle Final Report of New Car Assessment Program Side Impact Testing of 2011 Chevrolet Silverado 1500 Crew Cab NHTSA No.: MB0113		5. Report Date 11/16/2010																																													
		6. Performing Organization Code CAL																																													
7. Author(s) Bethany Koetje, Project Engineer		8. Performing Organization Report No. tr2492																																													
9. Performing Organization Name and Address Calspan Corporation Transportation Sciences Center P.O. Box 400 Buffalo, New York 14225		10. Work Unit No.																																													
		11. Contract or Grant No. DTNH22-06-D-00024																																													
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards 1200 New Jersey Ave., SE, Room W43-410 Washington, D.C. 20590		13. Type of Report and Period Covered: Final Report 11/16/2010																																													
		14. Sponsoring Agency Code NVS-111																																													
15. Supplementary Notes																																															
16. Abstract A 55/28 kph 90° Moving Deformable Barrier NCAP Side Impact Test was conducted on the subject 2011 Chevrolet Silverado 1500 Crew Cab 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 9/30/2010. The impact velocity of the Moving Deformable Barrier (MDB) was 62.2 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 241 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;">54.9</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;">21.9</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;">647.7</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;">1426.6</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;">46.8</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;">30</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;">838.2</td> </tr> </tbody> </table>				Driver ATD (ES-2re)				Measurement Description	Units	Threshold	Result	Head Injury Criteria (HIC ₃₆)	N/A	1000	54.9	Maximum Chest Deflection	mm	44	21.9	Total Abdominal Force	N	2500	647.7	Pubic Symphysis Force	N	6000	1426.6	Passenger ATD (SID-IIs)				Measurement Description	Units	Threshold	Result	Head Injury Criteria (HIC ₃₆)	N/A	1000	46.8	Lower Spine Resultant Acceleration	G	82	30	Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	838.2
Driver ATD (ES-2re)																																															
Measurement Description	Units	Threshold	Result																																												
Head Injury Criteria (HIC ₃₆)	N/A	1000	54.9																																												
Maximum Chest Deflection	mm	44	21.9																																												
Total Abdominal Force	N	2500	647.7																																												
Pubic Symphysis Force	N	6000	1426.6																																												
Passenger ATD (SID-IIs)																																															
Measurement Description	Units	Threshold	Result																																												
Head Injury Criteria (HIC ₃₆)	N/A	1000	46.8																																												
Lower Spine Resultant Acceleration	G	82	30																																												
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	838.2																																												
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																																													
19. Security Class. (of this report) Unclassified	20. Security Class. (of this page) Unclassified	21. No. of Pages 271	22. Price																																												

TABLE OF CONTENTS

<u>Section</u>		<u>Page No.</u>
1	Purpose and Summary of the Test	1-1
2	Occupant and Vehicle Information/Data Sheets	2-1
<u>Data Sheet No.</u>		<u>Page No.</u>
1	General Test and Vehicle Parameter Data	2-2
2	Seat Adjustment, Fuel Systems, and Steering Wheel Data	2-5
3	Dummy Longitudinal Clearance Dimensions	2-7
4	Dummy Lateral Clearance Dimensions	2-8
5	Camera Locations and Data	2-9
6	Vehicle Accelerometer Locations	2-10
7	Moving Deformable Barrier Accelerometer Locations	2-11
8	Test Vehicle Summary of Results	2-12
9	Moving Deformable Barrier Summary of Results	2-13
10	Post Test Observations	2-14
11	Vehicle Profile Measurements	2-15
12	Vehicle Exterior Crush Measurements	2-16
13	Vehicle Damage Profile Distances	2-19
14	Exterior Static Crush for Impactor Face	2-20
15A	FMVSS No. 301 Fuel System Integrity Post-Impact Data	2-21
16	Dummy/Vehicle Temperature Stabilization	2-22
<u>Appendix</u>		<u>Page No.</u>
A	Photographs	A-1
B	Dummy Response Data	B-1
C	Dummy Calibration Data	C-1

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 DTNH22-06-D-00024. The purpose of this test is to generate comparative side impact performance in a 2011 Chevrolet Silverado 1500 Crew Cab. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Laboratory Test Procedure dated January 2010.

SUMMARY

A 2011 Chevrolet Silverado 1500 Crew Cab 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 62.2 km/h (38.64 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 9/30/2010. 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 nine 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	54.906
Maximum Chest Deflection	mm	44	21.948
Total Abdominal Force	N	2500	647.656
Pubic Symphysis Force	N	6000	1426.641

	Passenger ATD (SID-IIs)		
Measurement Description	Units	Threshold	Result
Head Injury Criteria (HIC ₃₆)	N/A	1000	46.891
Lower Spine Resultant Acceleration	G	82	30.045
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	838.244

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		No		
Knee Airbag	No	NA		
Side Airbag 1 (Curtain)	Yes	Yes	Yes	Yes
Side Airbag 2 (Torso/Pelvis.)	Yes	Yes	No	NA
Seat Belt Pretensioner	Yes	No	No	NA
Seat Belt Load Limiter	Yes	No	No	NA
Other	NA	NA	NA	NA

GENERAL COMMENTS

None

SECTION 2
DATA SHEETS

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2011 Chevrolet Silverado Crew Cab **NHTSA No.:** MB0113
Test Program: Side MDB NCAP **Test Date:** 9/30/2010

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	MB0113	Anti-Lock Brakes	Yes
Model Year	2011	All-Wheel Drive	No
Make	Chevrolet	Power Steering	Yes
Model	Silverado	Driver Front Airbag	Yes
Body Style	1500 Crew Cab	Driver Curtain Airbag	Yes
VIN	3GCPCPEA2BG100650	Driver Head/Torso Airbag	No
Body Color	Silver	Driver Torso Airbag	No
Delivery Date	08/19/2010	Driver Torso/Pelvis Airbag	Yes
Odometer Reading (km/mi)		Driver Pelvis Airbag	No
Dealer	Keller Chevrolet, Inc.	Driver Knee Airbag	No
Transmission	4 speed automatic	Rear Pass. Curtain Airbag	Yes
Final Drive	Rear Wheel	Rear Pass. Head/Torso Airbag	No
Type/No. Cylinders	V8	Rear Pass. Torso Airbag	No
Engine Displacement (L)	4.8	Rear Pass. Torso/Pelvis Airbag	No
Engine Placement	Transverse	Rear Pass. Pelvis Airbag	No
Roof Rack	No	Pretensioners	Yes
Sunroof/T-Top	No	Load Limiters	Yes
Tinted Glass	Yes	Automatic Door Locks	No
Traction Control	Yes	Bucket Seats	No
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? Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	General Motors	GVWR (kg)	3085
Date of Manufacture	7/10/2010	GAWR Front (kg)	1656
		GAWR Rear (kg)	1792

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	3	3		6	
Capacity Weight (VCW) (kg)				765	(A)
DSC x 68.04 (kg)				408.24	(B)
Cargo Weight (RCLW) (kg)				356.76	(A-B)

* Maximum allowable RCLW is 136 kg

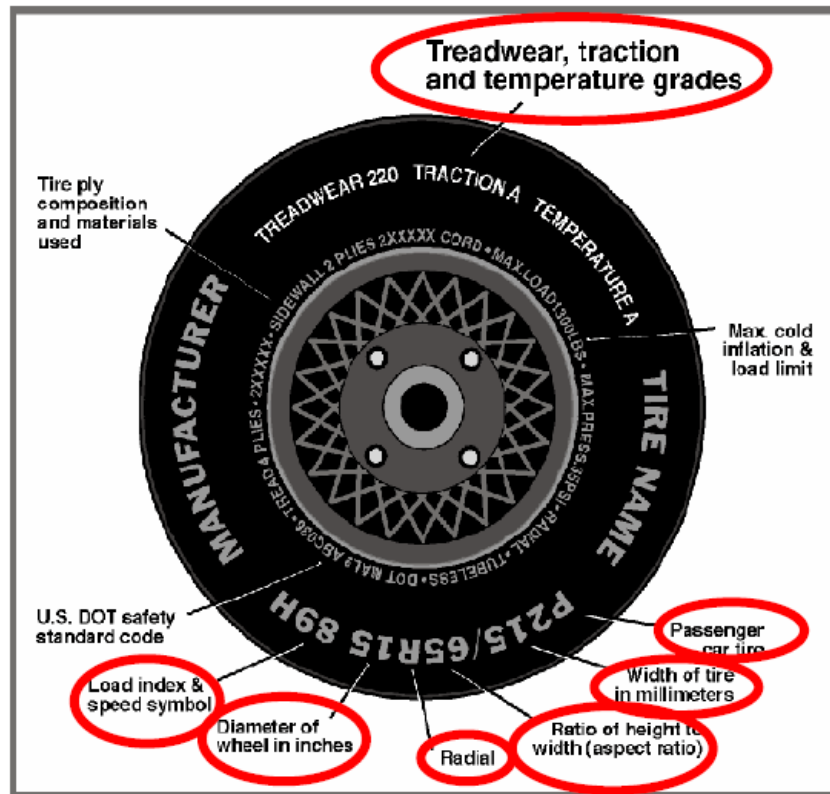
VEHICLE SEAT TYPE

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: <u>2011 Chevrolet Silverado Crew Cab</u>	NHTSA No.: <u>MB0113</u>
Test Program: <u>Side MDB NCAP</u>	Test Date: <u>9/30/2010</u>

VEHICLE TIRE INFORMATION



	Front	Rear
Max. Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	240	240
Recommended Tire Size	245/70R17	245/70R17
Tire Size on Vehicle	245/70R17	245/70R17
Tire Manufacturer	General	General
Tire Model	Grabber #TS	Grabber #TS
Treadwear	640	640
Traction	A	A
Temperature Grades	B	B
Tire Plies Sidewall	2 Ply Polyester	2 Ply Polyester
Tire Plies Body	2 Ply Polyester, 2 Steel, 1 Polyamide	2 Ply Polyester, 2 Steel, 1 Polyamide
Load Index/Speed Symbol	108T	108T
Tire Material		
DOT Safety Code Right	A383 BN1 2110	A383 BN1 2110
DOT Safety Code Left	A383 BN1 2110	A383 BN1 2110

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

Test Vehicle: 2011 Chevrolet Silverado Crew Cab NHTSA No.: MB0113
 Test Program: Side MDB NCAP Test Date: 9/30/2010

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	682.0	482.0	1164	730.0	585.5	1315.5	729.5	583.5	1313
Right	kg	665.5	470.0	1135.5	682.5	566.0	1248.5	669.0	564.0	1233
Ratio	%	58.6	41.4		55.1	44.9		55.0	45.0	
Totals	kg	1347.5	952.0	2299.5	1412.5	1151.5	2564	1398	1147.5	2545.5

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	2299.5	(A)
Sum of Actual Weight of 2 P572 ATDS Used	kg	138	(B)
Rated Cargo/Luggage Weight (RCLW)	kg	136	(C)
Calculated Target Vehicle Test Weight (TVTW)	kg	2574	(A+B+C)

TEST VEHICLE ATTITUDE AND CG

Measurement Description	Units	LF	RF	RR	LR	CG (aft of front axle)
Fully Loaded	mm	907	916	970	954	
As Tested (Fully Loaded $\pm$ 10 mm at each wheel well)	mm	908	922	969	960	1282

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2853
Total Vehicle Length at Left Side	mm	4762
Total Vehicle Length at Centerline	mm	4869
Total Vehicle Length at Right Side	mm	4762
Weight of Ballast in Cargo Area	kg	154
Weight of Vehicle Components Removed	kg	0
Amount of Stoddard Solvent in Fuel Tank	L	90.5

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	487
Actual Impact Point Aft of Front Axle	mm	512

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

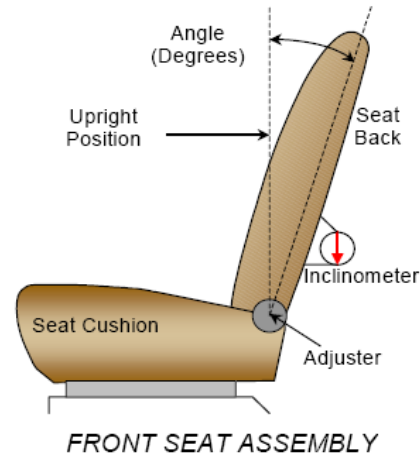
Test Vehicle: 2011 Chevrolet Silverado Crew Cab
Test Program: Side MDB NCAP

NHTSA No.: MB0113
Test Date: 9/30/2010

NORMAL DESIGN RIDING POSITION

Driver seat: Manual Adjustment Seat Back, and Seat Pan Fore/aft adjustment

Passenger Seat: Fixed



SEAT BACK ANGLES

	Degrees
Driver w/ Seated Dummy	7.1
Passenger w/ Seated Dummy	NA

SEAT FORE/AFT POSITIONS

Driver seat positioned at the midpoint of fore/aft travel. Rear passenger seat is fixed.

SEAT FORE/AFT POSITIONING

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	25 detents	12
Rear Seat	Fixed	NA

SEAT BELT UPPER ANCHORAGES

Rear Seat Fixed,

Driver Seat 5 detents in adjustable belt anchorage, placed at uppermost position

SEAT BELT UPPER ANCHORAGES

	Total # of Positions	Placed in Position #
Driver Seat	5	H
Rear Seat	Fixed	

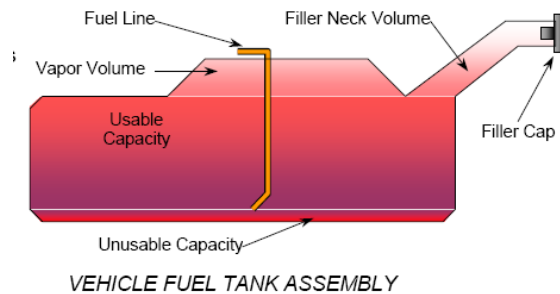
DATA SHEET NO. 2 (CONTINUED)
SEAT ADJUSTMENT, FUEL SYSTEMS, AND STEERING WHEEL DATA

Test Vehicle: 2011 Chevrolet Silverado Crew Cab NHTSA No.: MB0113
 Test Program: Side MDB NCAP Test Date: 9/30/2010

FUEL TANK CAPACITY

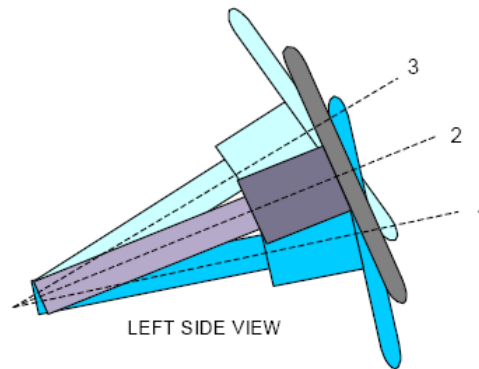
	Liters
Usable Capacity of "Standard Tank"	97.5
Usable Capacity of "Optional Tank"	NA
Usable Capacity Used for FMVSS 301	97.5
Actual Amount of Solvent Used	90.5

Fuel evacuated according to the specifications provided in FORM 1 provided by the manufacturer



STEERING COLUMN ADJUSTMENT

Steering column has 5 tilt detents. Nominal design position is the 2nd detent (with topmost equal to zero)



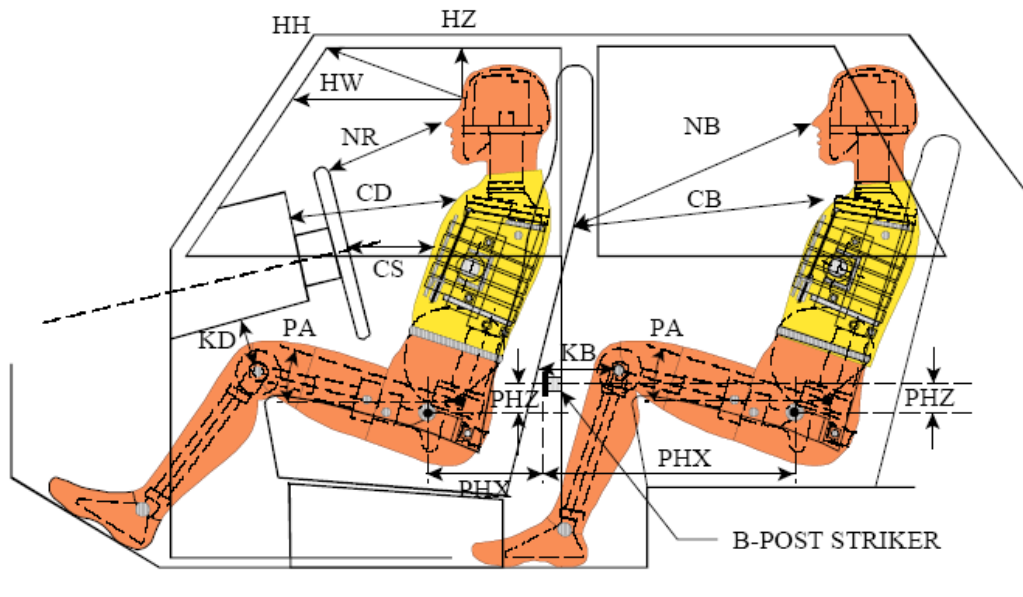
STEERING COLUMN POSITIONING

	Degrees	Fore/Aft Position (mm)
Lowermost - Position 1		
Geometric Center – Position 2	20	
Uppermost – Position 3		
Telescoping Steering Wheel Travel		NA
Test Position	20	NA

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2011 Chevrolet Silverado Crew Cab
 Test Program: Side MDB NCAP

NHTSA No.: MB0113
 Test Date: 9/30/2010



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

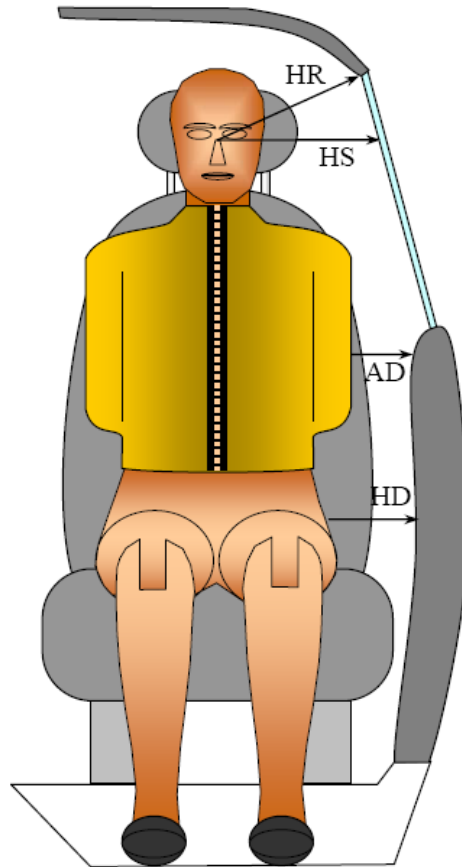
DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Pass. Code	Measurement Description	Driver S/N 33		Passenger S/N 300	
			Length (mm)	Angle	Length (mm)	Angle
HH		Header to Header	456	16		
HW		Header to Windshield	719	0		
HZ	HZ	Head to Roof	224	-	343	90
NR	NB	Nose to Rim/Seat Back	424	13	537	7.5
CD	CB	Chest to Dash/Seat Back	556	3	569	3.5
CS		Chest to Steering Wheel	302	0		
KDL	KBL	Left Knee to Dash/Seat Back	164	27	299	22
KDR	KBR	Right Knee to Dash/Seat Back	147	-	297	18
PA	PA	Pelvic Angle		21.6		19.8
PHX	PHX	H-Point to Striker (X-Axis)	317		310	
PHZ	PHZ	H-Point to Striker (Z-Axis)	46		26	
SA	SA	Seat Back Angle		7.1 *		-

* Measurement from the head restraint post

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2011 Chevrolet Silverado Crew Cab	NHTSA No.: MB0113
Test Program: Side MDB NCAP	Test Date: 9/30/2010



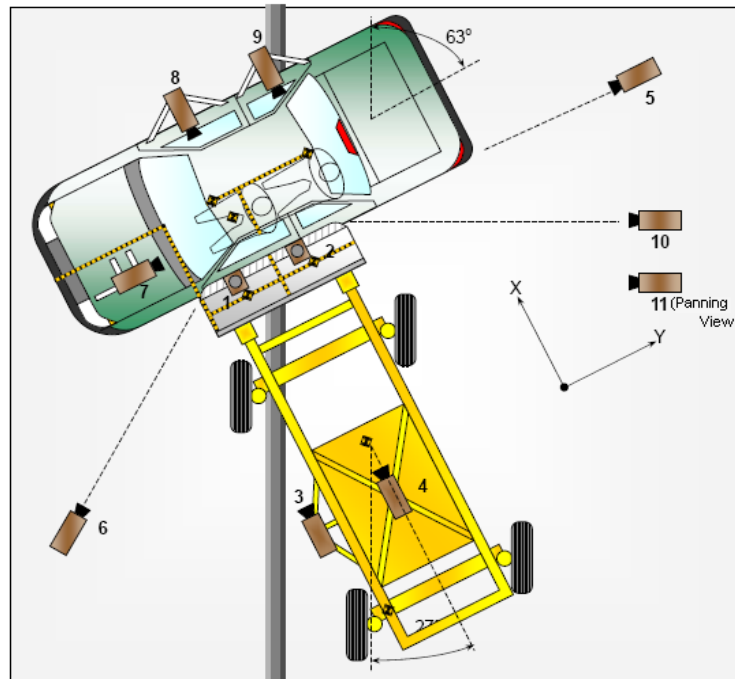
DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Description	Units	Driver S/N 33	Passenger S/N 300
HR	Head to Side Header	mm	202	263
HS	Head to Side Window	mm	338	371
AD	Arm to Door	mm	125	174
HD	H-point to Door	mm	145	229

DATA SHEET NO. 5
CAMERA LOCATIONS AND DATA

Test Vehicle: 2011 Chevrolet Silverado Crew Cab
Test Program: Side MDB NCAP

NHTSA No.: MB0113
Test Date: 9/30/2010



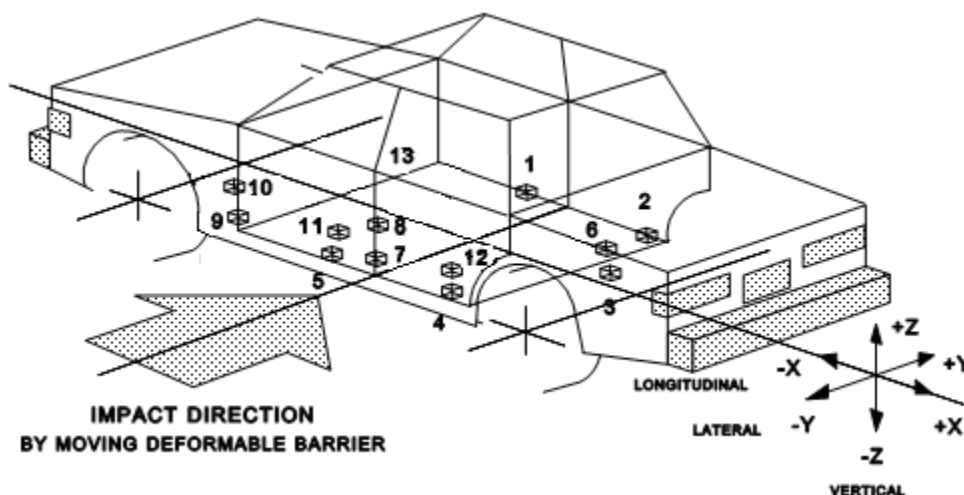
CAMERA LOCATIONS AND DATA

No.	Camera View	Location			Angle	Lens (mm)	Film Speed (fps)
		X	Y	Z			
1	Overhead Overall	72	812	-4880	-90	20	1000
2	Overhead Close-up	195	855	-4880	-90	28	1000
3	Left Impact Point (MDB)	-1470	0	-847	0	25	500
4	Side Overall (MDB)	-1140	838	-1586	-17	12.5	500
5	Rear	3860	310	940	-3	50	1000
6	Left Front	2801	295	930	-2	28	1000
7	Driver Front (OB)	515	490	1610	-12	25	500
8	Driver Side (OB)	1645	785	1120	-4	12.5	500
9	Passenger Side (OB)	1660	1590	1120	-1	12.5	500
10	Real-time Left Rear				-	-	24
11	Real-time Inrun				-	-	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: <u>2011 Chevrolet Silverado Crew Cab</u>	NHTSA No.: <u>MB0113</u>
Test Program: <u>Side MDB NCAP</u>	Test Date: <u>9/30/2010</u>



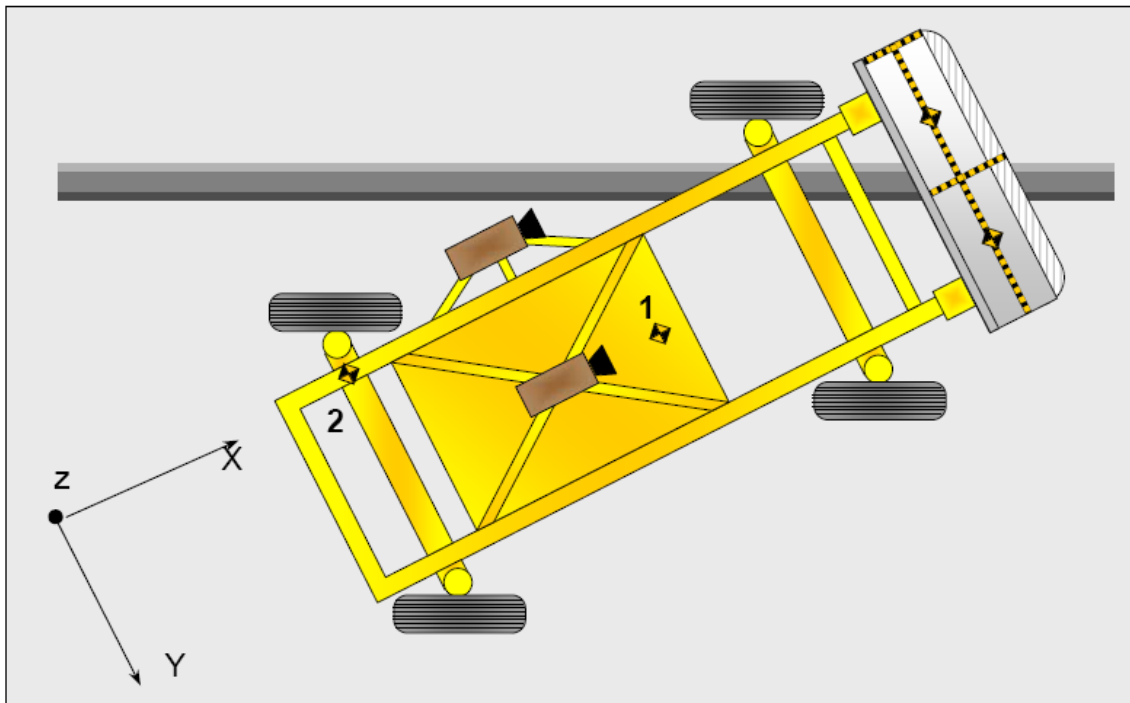
VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

Loc. No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Right Sill at Front Seat	3121	677	363
2	Right Sill at Rear Seat	2200	21	366
3	Rear Floorpan Above Axle	1109	-667	666
4	Left Sill at Rear Door	2192	-677	362
5	Left Sill at Front Door	3071	679	389
6	Rt. Rear Occ. Compartment	2199	-674	368
7	B-Post Lower	2360	-675	541
8	B-Post Middle	2292	-646	971
9	A-Post Lower	3298	-660	445
10	A-Post Middle	3340	-568	609
11	Front Seat Track	2464	-590	402
12	Rear Seat Structure	1246	-23	726
13	Vehicle CG	2660	485	563

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

DATA SHEET NO. 7
MDB ACCELEROMETER LOCATIONS

Test Vehicle: <u>2011 Chevrolet Silverado Crew Cab</u>	NHTSA No.: <u>MB0113</u>
Test Program: <u>Side MDB NCAP</u>	Test Date: <u>9/30/2010</u>



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: <u>2011 Chevrolet Silverado Crew Cab</u> Test Program: <u>Side MDB NCAP</u>	NHTSA No.: <u>MB0113</u> Test Date: <u>9/30/2010</u>
--	---

MAXIMUM EXTERIOR STATIC CRUSH

Level	Measured Parameter	Units	Maximum Crush	Above Ground
1	Sill Top Height	mm	124	415
2	Occupant H-Point	mm	214	632
3	Mid Door	mm	241	738
4	Window Sill	mm	222	984
5	Window Top	mm	9	1473
	Maximum Penetration	mm	241	738

INSTRUMENTATION

Driver Dummy Channels	16
Passenger Dummy Channels	16
Vehicle Structure Accelerometers	21
MDB Accelerometers	5
Total No. of Contact Switches	5 *
Total	63

* 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 Chevrolet Silverado Crew Cab	NHTSA No.: MB0113
Test Program: Side MDB NCAP	Test Date: 9/30/2010

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	1140

MDB WEIGHTS

	Units	Front Axle	Rear Axle	Total
Left	kg	406.5	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	62.2
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	89.2

MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE

Vertical Location			From Centerline		Maximum Crush
Row	Description	Height	Distance	Direction	
A	Center of Bumper	432	800	Right	192
B	Top of Bumper	533	800	Right	140
C	Mid-Level	686	800	Left	109
D	Top of Stack	813	800	Left	134

MDB INSTRUMENTATION

Accelerometers	5
Contact Switches	2

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

Test Vehicle: 2011 Chevrolet Silverado Crew Cab **NHTSA No.:** MB0113
Test Program: Side MDB NCAP **Test Date:** 9/30/2010

TEST DUMMY INFORMATION AND CONTACT

Description	Front Seat Dummy (ES-2re)	Rear Seat Dummy (SID-IIs)
Dummy Type/Serial No.	33	300
Head Contact	Side Curtain Airbag	Side Curtain Airbag
Upper Torso Contact	Side torso/ pelvis airbag	Side door trim panel
Lower Torso Contact	Side torso/pelvis airbag	Side door trim panel
Left Knee Contact	Side door trim panel	Side 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 and operational	Closed and Operational
Hatch and Other Doors	Closed and 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 with barrier
Sill Separation	None
Windshield Damage	None
Window Damage	Side windows broken during crash
Other Notable Effects	None

SUPPLEMENTAL RESTRAINT INFORMATION

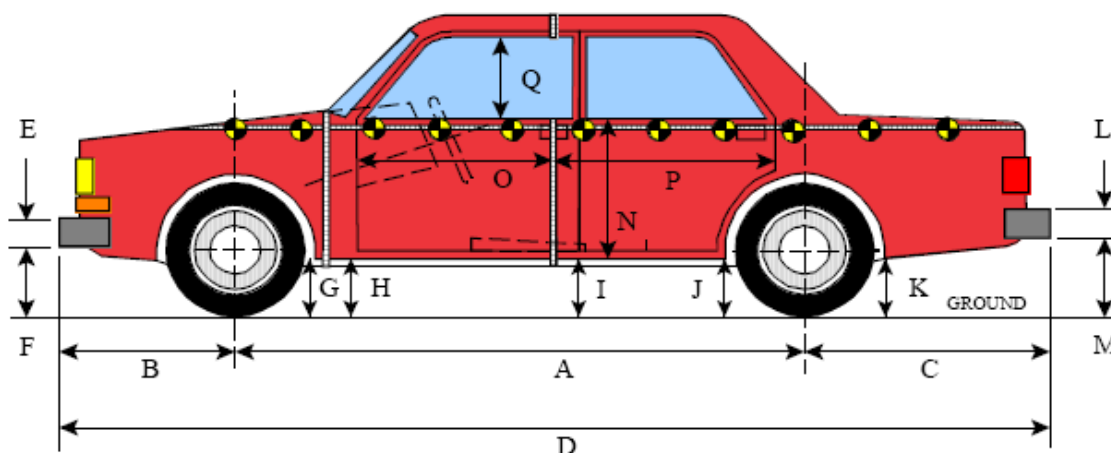
Restraint Type	Left Front (Driver) Occupant Location 1		Left Rear (Passenger) Occupant Location 4	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag		No		
Knee Airbag	NA	NA		
Side Airbag 1 (Curtain)	Yes	Yes	Yes	Yes
Side Airbag 2 (Torso/Pelvis.)	Yes	Yes	No	NA
Seat Belt Pretensioner	Yes	No	No	NA
Seat Belt Load Limiter	Yes	No	No	NA
Other	NA	NA	NA	NA

MDB LEFT EDGE IMPACT POINT DATA

Measured Parameter	Units	Requirement	Value
Horizontal Offset	mm	+/- 50	-25
Vertical Offset	mm	+/- 20	-2

DATA SHEET NO. 11
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2011 Chevrolet Silverado Crew Cab	NHTSA No.: MB0113
Test Program: Side MDB NCAP	Test Date: 9/30/2010



LEFT SIDE VIEW

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

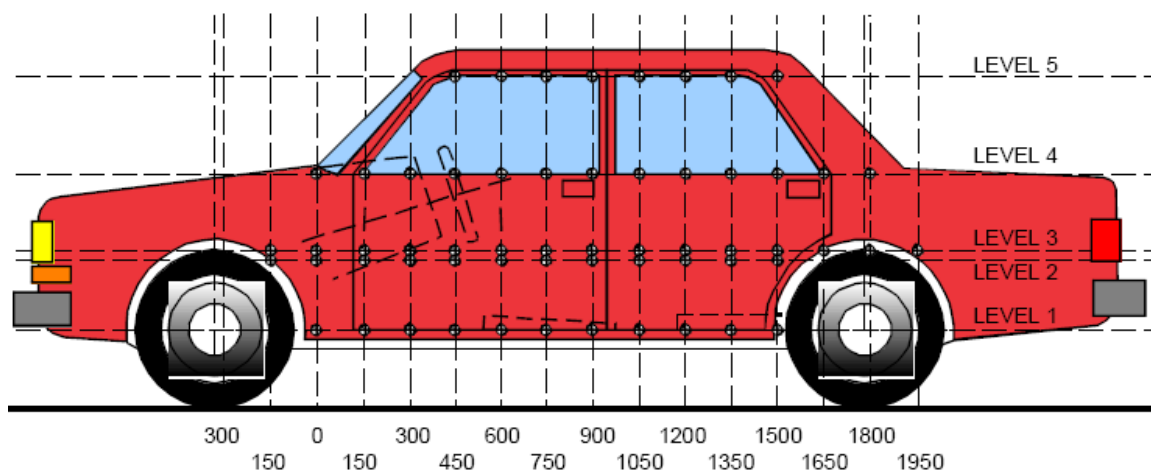
VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2853	2846	-7
B	Front Axle to FSOV	983	988	5
C	Rear Axle to RSOV	1032	1031	-2
D	Total Length at Centerline	4869	4864	-4
E	Front Bumper Thickness	350	350	0
F	Front Bumper Bottom to Ground	281	214	-67
G	Sill Height at Front Wheel Well	345	332	-13
H	Sill Height at Front Door Leading Edge	348	354	6
I	Sill Height at B Pillar	360	382	22
J1	Sill Height at Rear Wheel Well	365	430	65
J2	Pinch Weld Height at Rear Wheel Well	270	350	80
K	Sill Height Aft of Rear Wheel Well	411	510	99
L	Rear Bumper Thickness	239	239	0
M	Rear Bumper Bottom to Ground	486	520	34
N	Sill Height to Window Bottom Sill	698	620	-78
O	Front Door Leading Edge to Impact CL	885	836	-49
P	Rear Door Trailing Edge to Impact CL	1205	1157	-48
Q	Front Window Opening	425	430	5
R	Right Side Length	4762	4761	-1
S	Left Side Length	4762	4753	-9
T	Vehicle Width at B Post	1774	1558	-216

DATA SHEET NO. 12
VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2011 Chevrolet Silverado Crew Cab
 Test Program: Side MDB NCAP

NHTSA No.: MB0113
 Test Date: 9/30/2010



LEFT SIDE VIEW

Level	Measurement Description	Height Above Ground (mm)
1	Sill Top	415
2	Occupant H-Point	632
3	Mid-Door	738
4	Window Sill	984
5	Window Top	1473

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 Chevrolet Silverado Crew Cab
 Test Program: Side MDB NCAP

NHTSA No.: MB0113
 Test Date: 9/30/2010

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-900	--	854	840	--	--	--	858	845	--	--	--	-4	-5	--	--
-750	--	--	882	657	--	--	--	883	664	--	--	--	-1	-7	--
-600	--	--	--	723	--	--	--	--	727	--	--	--	--	-4	--
-450	--	--	--	780	--	--	--	--	782	--	--	--	--	-2	--
-300	--	--	--	819	--	--	--	--	819	--	--	--	--	0	--
-150	--	891	890	832	--	--	881	875	828	--	--	10	15	4	--
0	865	882	882	838	--	865	810	857	878	--	0	72	25	-40	--
150	864	882	886	845	--	758	699	772	809	--	106	183	114	36	--
300	864	882	886	852	--	747	679	737	775	--	117	203	149	77	--
450	864	882	886	858	--	740	675	708	751	--	124	207	178	107	--
600	864	882	887	862	--	744	675	699	741	--	120	207	188	121	--
750	864	881	887	865	580	752	680	677	731	579	112	201	210	134	1
900	864	881	887	853	589	766	667	681	718	585	98	214	206	135	4
1050	863	880	887	869	590	776	678	674	711	581	87	202	213	158	9
1200	861	880	886	869	589	780	682	660	701	582	81	198	226	168	7
1350	861	879	885	869	588	776	672	656	647	580	85	207	229	222	8
1500	861	877	883	868	586	770	675	648	672	580	91	202	235	196	6
1650	861	876	881	865	583	765	673	640	682	579	96	203	241	183	4
1800	860	874	878	861	575	809	713	667	691	575	51	161	211	170	0
1950	861	881	877	878	555	850	800	771	786	555	11	81	106	92	0
2100	--	--	888	854	383	--	--	863	825	383	--	--	25	29	0
2250	--	--	--	841	--	--	--	--	822	--	--	--	--	19	--
2400	--	--	--	832	--	--	--	--	819	--	--	--	--	13	--
2550	--	--	--	819	--	--	--	--	816	--	--	--	--	3	--
2700	--	875	864	806	--	--	870	862	809	--	--	5	2	-3	--
2850	--	826	818	789	--	--	826	820	797	--	--	0	-2	-8	--

MAXIMUM CRUSH DATA

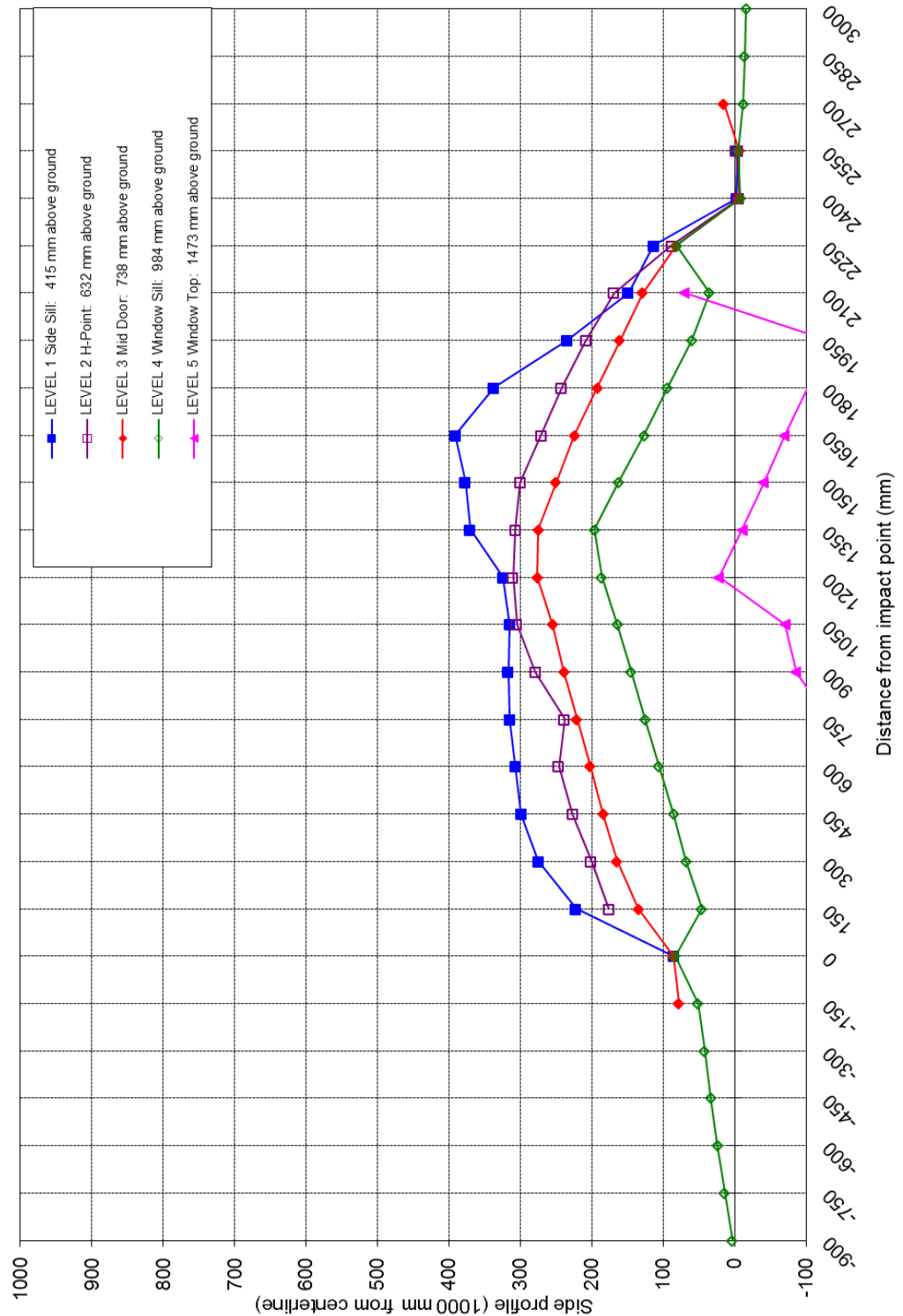
	Level 1	Level 2	Level 3	Level 4	Level 5
Maximum Crush (mm)	124	214	241	222	9
Distance From Impact (mm)	450	900	1650	1350	1050

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

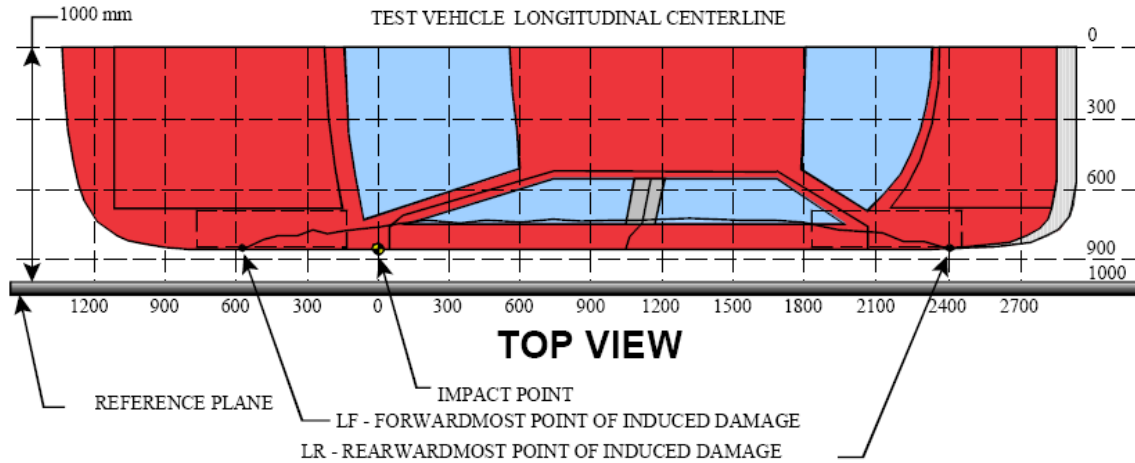
Test Vehicle: 2011 Chevrolet Silverado Crew Cab
 Test Program: Side MDB NCAP

NHTSA No.: MB0113
 Test Date: 9/30/2010



DATA SHEET NO. 13
VEHICLE DAMAGE PROFILE DISTANCES

Test Vehicle: 2011 Chevrolet Silverado Crew Cab NHTSA No.: MB0113
 Test Program: Side MDB NCAP Test Date: 9/30/2010



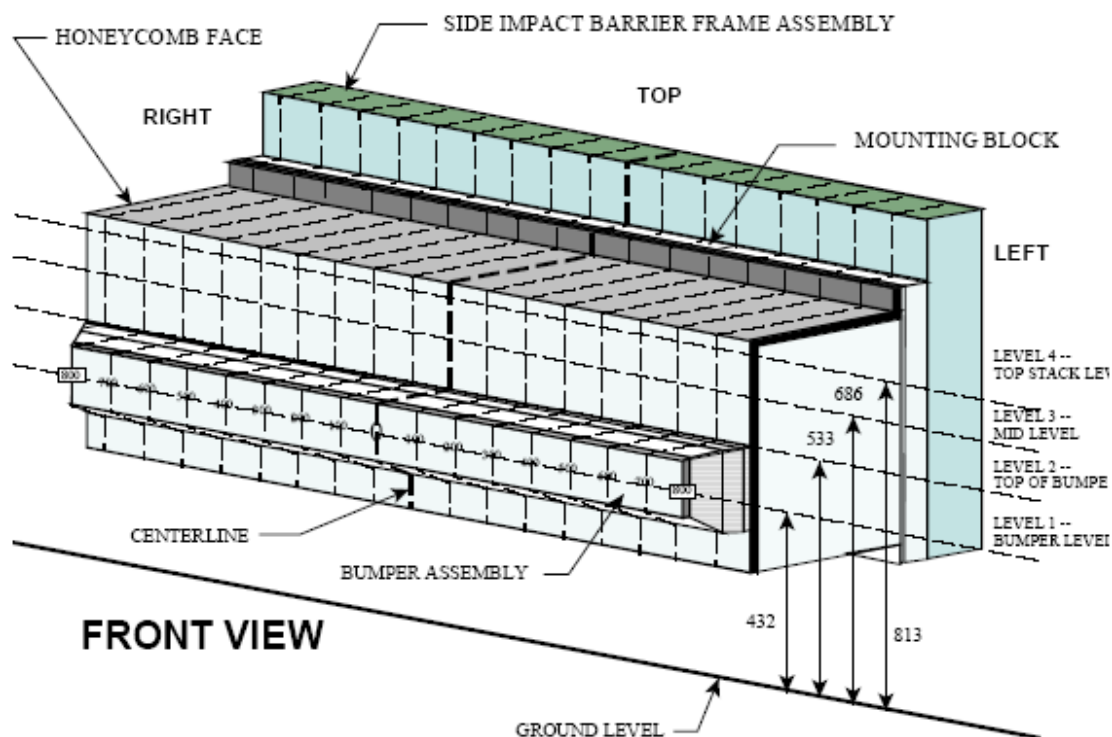
DAMAGE PROFILE DISTANCES

DPD	Distance From Impact Point (mm)	Level	Pre-Test (mm)	Post-Test (mm)	Maximum Static Crush (mm)
1	2550	4	30	25	-5
2	2010	1	82	282	200
3	1470	1	71	447	376
4	930	1	64	381	317
5	0	1	61	350	289
6	-150	3	-8	70	78

DATA SHEET NO. 14
EXTERIOR STATIC CRUSH FOR IMPACTOR FACE

Test Vehicle: 2011 Chevrolet Silverado Crew Cab
 Test Program: Side MDB NCAP

NHTSA No.: MB0113
 Test Date: 9/30/2010



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	192	187	180	178	179	184	192	176	168	160	152	146	140	135	132	130	135
2	140	137	130	128	126	124	120	115	112	105	100	95	89	87	86	90	98
3	46	26	23	23	25	28	44	31	27	25	24	26	31	41	54	75	109
4	56	30	14	22	21	33	64	40	33	35	38	40	49	60	77	99	134

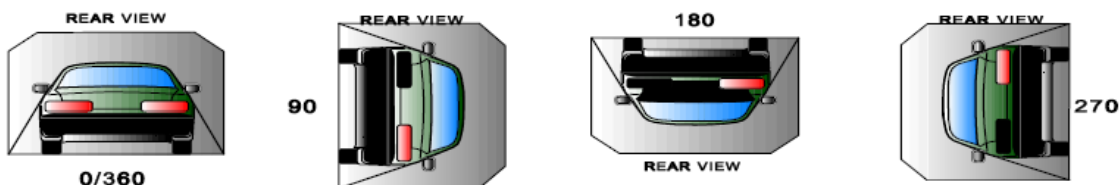
DATA SHEET NO. 15A
FMVSS NO. 301 FUEL SYSTEM INTEGRITY POST-IMPACT DATA

Test Vehicle: 2011 Chevrolet Silverado Crew Cab NHTSA No.: MB0113
 Test Program: Side MDB NCAP Test Date: 9/30/2010

Test Time: _____ Temperature: _____ °C

- A. From impact until vehicle motion ceases: _____ 0 oz.
 (Maximum allowable is 1 oz.)
- B. For the 5-minute period after motion ceases: _____ 0 oz.
 (Maximum allowable is 5 oz.)
- C. For the following 25 minutes: _____ 0 oz.
 (Maximum allowable is 1 oz./minute)
- 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	1:03	5:00	6:03
90 to 180	1:05	5:00	6:05
180 to 270	1:10	5:00	6:10
270 to 360	1:05	5:00	6:05

FMVSS NO. 301 ROLLOVER SPILLAGE TABLE

Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0 to 90	0			
90 to 180	0			
180 to 270	0			
270 to 360	0			

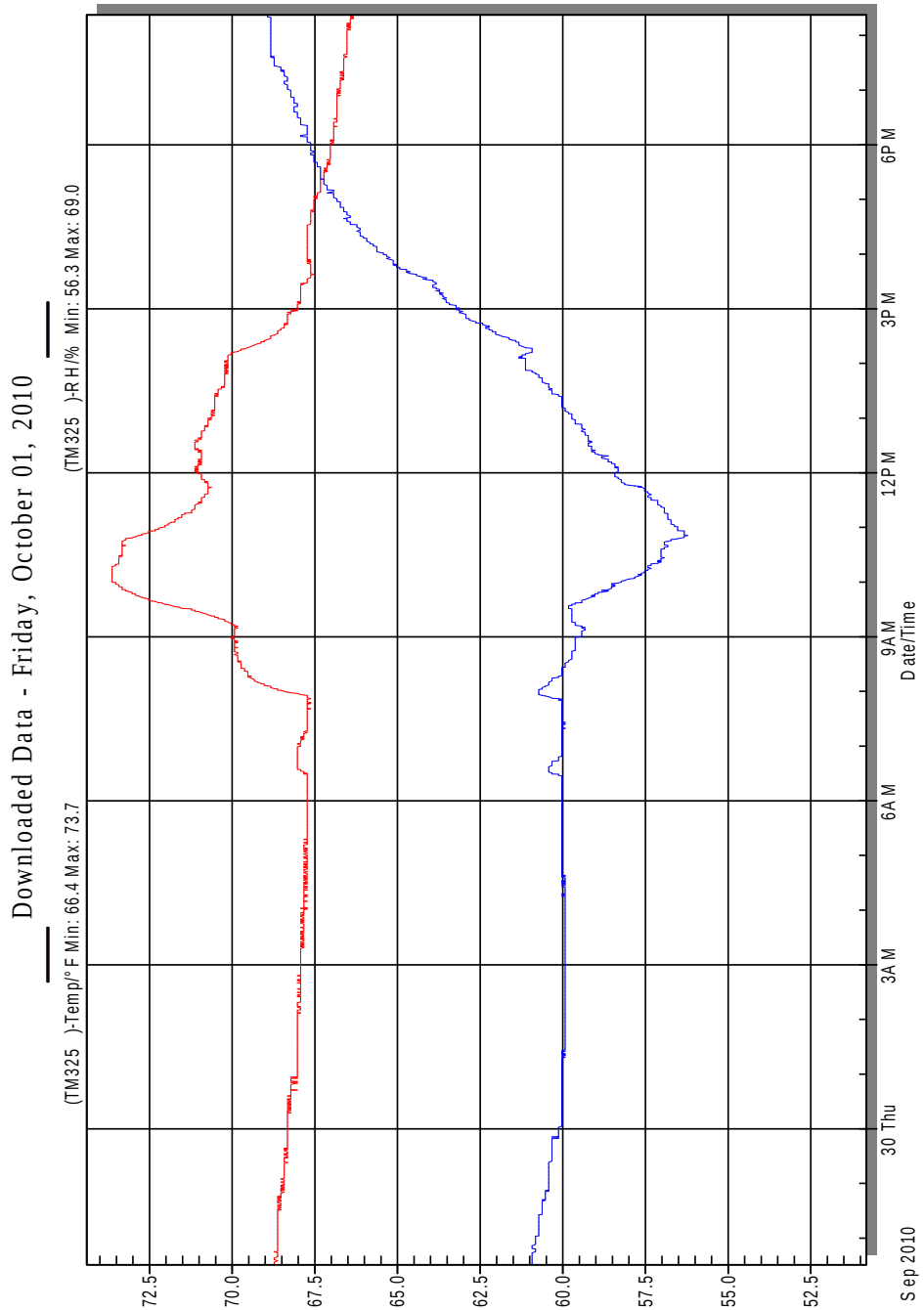
ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

Test Phase	Spillage Location
0 to 90	None
90 to 180	None
180 to 270	None
270 to 360	None

DATA SHEET NO. 16
DUMMY/VEHICLE TEMPERATURE STABILIZATION

Test Vehicle: 2011 Chevrolet Silverado Crew Cab
Test Program: Side MDB NCAP

NHTSA No.: MB0113
Test Date: 9/30/2010



APPENDIX A
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

No.	Description	Page
001	As-Delivered Right Front $\frac{3}{4}$ View of Test Vehicle	A-5
002	As-Delivered Left Rear $\frac{3}{4}$ View of Test Vehicle	A-5
003	Pre-test Frontal View of the Test Vehicle	A-6
004	Post-test Frontal View of Test Vehicle	A-6
005	Pre-test Left Front $\frac{3}{4}$ View of Test Vehicle	A-7
006	Post-test Left Front $\frac{3}{4}$ View of Test Vehicle	A-7
007	Pre-test Left Side View of Test Vehicle	A-8
008	Post-test Left Side View of Test Vehicle	A-8
009	Pre-test Left Rear $\frac{3}{4}$ View of Test Vehicle	A-9
010	Post-test Left Rear $\frac{3}{4}$ View of Test Vehicle	A-9
011	Pre-test Rear View of Test Vehicle	A-10
012	Post-test Rear Side View of Test Vehicle	A-10
013	Pre-test Right Side View of Test Vehicle	A-11
014	Post-test Right Side View of Test Vehicle	A-11
015	Pre-test Overhead View of the Test Vehicle with MDB Positioned Against the Side of the Test Vehicle at Ideal Impact Point	A-12
016	Post-test Overhead View of Test Vehicle and MDB	A-12
017	Pre-test Left Side View of MDB Positioned Against Side of Test Vehicle at Ideal Impact Point	A-13
018	Pre-test Right Side View of MDB Positioned Against Side of Test Vehicle at Ideal Impact Point	A-13
019	Pre-test Close-up View of Impact Point Target	A-14
020	Post-test Close-up View of Impact Point Target Showing Impact Point Location	A-14
021	Pre-test Left Front Door Latch Close-up	A-15
022	Post-test Left Front Door Latch Close-up	A-15
023	Pre-test Left Rear Door Latch Close-up	A-16
024	Post-test Left Rear Door Latch Close-up	A-16
025	Pre-test Front Close-up View of Driver Dummy	A-17
026	Post-test Front Close-up View of Driver Dummy	A-17
027	Pre-test Left Side View of Driver Dummy Showing Belt, Chalking, and Contact Switches	A-18
028	Pre-test Left Side View of Driver Dummy Shoulder and Door Top View	A-18
029	Post-test Left Side View of Driver Dummy Shoulder and Door Top View	A-19
030	Pre-Test Frontal View of Driver Seat Back (Including Head Restraint) Prior to Dummy Positioning	A-19
031	Pre-Test Frontal View of Driver Dummy Head and Shoulders in Relation to Head Restraint	A-20
032	Pre-Test Frontal View of Driver Seat Pan Prior to Dummy Positioning	A-20
033	Pre-Test Overhead View of Driver Dummy Thighs on Seat Pan	A-21
034	Pre-Test Placement of Driver Dummy's Feet	A-21
035	Pre-Test View of Belt Anchorage for Driver Dummy to Show Position	A-22
036	Pre-Test Left Side View of Steering Wheel to Show Position	A-22
037	Pre-Test View of Parking Brake	A-23
038	Pre-test Close-up Left Side View of Driver Seat Track Showing Seat Positioning	A-23
039	Pre-test Close-up Left Side View of Driver Seat Back Showing Seat Back Positioning	A-24
040	Pre-Test Close-Up View of Driver Seat Back or Head Restraint Showing Seat Back Test Position	A-24
041	Pre-test Driver Dummy and Door Clearance View	A-25

042	Post-test Driver Dummy and Door Clearance View	A-25
043	Pre-test Right Side View of Driver Dummy and Front Seat of Occupant Compartment	A-26
044	Post-test Right Side View of Driver Dummy and Front Seat of Occupant Compartment	A-26
045	Pre-test Driver Inner Door Panel View	A-27
046	Post-test Driver Inner Door Panel View Showing Driver Dummy Contact Locations	A-27
047	Post-test Driver Dummy Close-Up Head Contact with Vehicle View, If Applicable	A-28
048	Post-test Driver Dummy Close-Up Head Contact with Side Airbag View, If Applicable	A-28
049	Post-Test Driver Dummy Close-Up Torso Contact with Vehicle Interior View, If Applicable	A-29
050	Post-Test Driver Dummy Close-Up Torso Contact with Side Airbag View, If Applicable	A-29
051	Post-Test Driver Dummy Close-Up Pelvis Contact View, If Applicable	A-30
052	Post-Test Driver Dummy Close-Up Pelvis Contact with Side Airbag View, If Applicable	A-30
053	Pre-test Left Side View of Passenger Dummy Showing Belt, Chalking, and Contact Switches	A-31
054	Pre-test Left Side View of Passenger Dummy Shoulder and Door Top View	A-31
055	Post-test Left Side View of Passenger Dummy Shoulder and Door Top View	A-32
056	Pre-Test Frontal View of Rear Passenger Seat Back Prior to Dummy Positioning	A-32
057	Pre-Test Frontal View of Rear Passenger Dummy Head and Shoulders in Relation to Head Restraint	A-33
058	Pre-Test Overhead View of Rear Passenger Seat Pan Prior to Dummy Positioning	A-33
059	Pre-Test Overhead View of Rear Passenger Dummy Thighs on Seat Pan	A-34
060	Pre-Test View of Rear Passenger Dummy's Neck Showing Position of Adjustable Neck Bracket	A-34
061	Pre-Test View of Rear Passenger Dummy's Head Showing Dummy's Head is Level	A-35
062	Pre-Test Placement of Rear Passenger Dummy's Feet	A-35
063	Pre-Test View of Belt Anchorage for Rear Passenger Dummy to Show Position	A-36
064	Pre-test Close-Up Left Side View of Rear Passenger Seat Track Showing Test Position	A-36
065	Pre-test Close-Up Left Side View of Rear Passenger Seat Back Showing Test Position	A-37
066	Pre-Test Close-Up View of Rear Passenger Seat Back or Head Restraint Showing Seat Back Test Position	A-37
067	Pre-Test Passenger Dummy and Door Clearance View	A-38
068	Post-Test Passenger Dummy and Door Clearance View	A-38
069	Pre-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment	A-39
070	Post-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment	A-39
071	Pre-test Passenger Inner Door Panel View	A-40
072	Post-test Passenger Inner Door Panel View Showing Rear Passenger Dummy Contact Locations	A-40
073	Post-test Rear Passenger Dummy Close-Up Head Contact with Vehicle View	A-41
074	Post-test Rear Passenger Dummy Close-Up Head Contact with Side Airbag View	A-41
075	Post-Test Rear Passenger Dummy Close-Up Torso Contact with Vehicle Interior View	A-42
076	Post-Test Rear Passenger Dummy Close-Up Torso Contact with Side Airbag View	A-42
077	Post-Test Rear Passenger Dummy Close-Up Pelvis Contact View	A-43
078	Post-Test Rear Passenger Dummy Close-Up Pelvis Contact with Side Airbag View	A-43
079	Pre-Test View of Fuel Filler Cap or Fuel Filler Neck	A-44
080	Post-Test View of Fuel Filler Cap or Fuel Filler Neck	A-44
081	Pre-Test Front View of MDB Impactor Face	A-45
082	Post-Test Front View of MDB Impactor Face	A-45
083	Pre-Test Top View of MDB Impactor Face	A-46
084	Post-Test Top View of MDB Impactor Face	A-46

085	Pre-Test Left Side View of MDB Impactor Face	A-47
086	Post-Test Left Side View of MDB Impactor Face	A-47
087	Pre-Test Right Side View of MDB Impactor Face	A-48
088	Post-Test Right Side View of MDB Impactor Face	A-48
089	Close-Up View of Vehicle's Certification Label	A-49
090	Close-Up View of Vehicle's Tire Information Placard or Label	A-49
091	Pre-Test Ballast View	A-50
092	Post-Test Primary and Redundant Speed Trap Read-Out	A-50
093	FMVSS No. 301/305 Rollover 0°	A-51
094	FMVSS No. 301/305 Rollover 90°	A-51
095	FMVSS No. 301/305 Rollover 180°	A-52
096	FMVSS No. 301/305 Rollover 270°	A-52
097	FMVSS No. 301/305 Rollover 360 °	A-53
098	Impact Event (Impact Side)	A-53
099	Monroney Label	A-54
100	Driver Head Restraint Use and Adjustment Information from Vehicle Owner's Manual	A-54
101	Left Rear Passenger Head Restraint Use and Adjustment Information from Vehicle Owner's Manual	A-55



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 ¾ View of Test Vehicle



Figure A-6: Post-Test Left Front ¾ 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

Photo Not Available

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

Photo Not Available

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

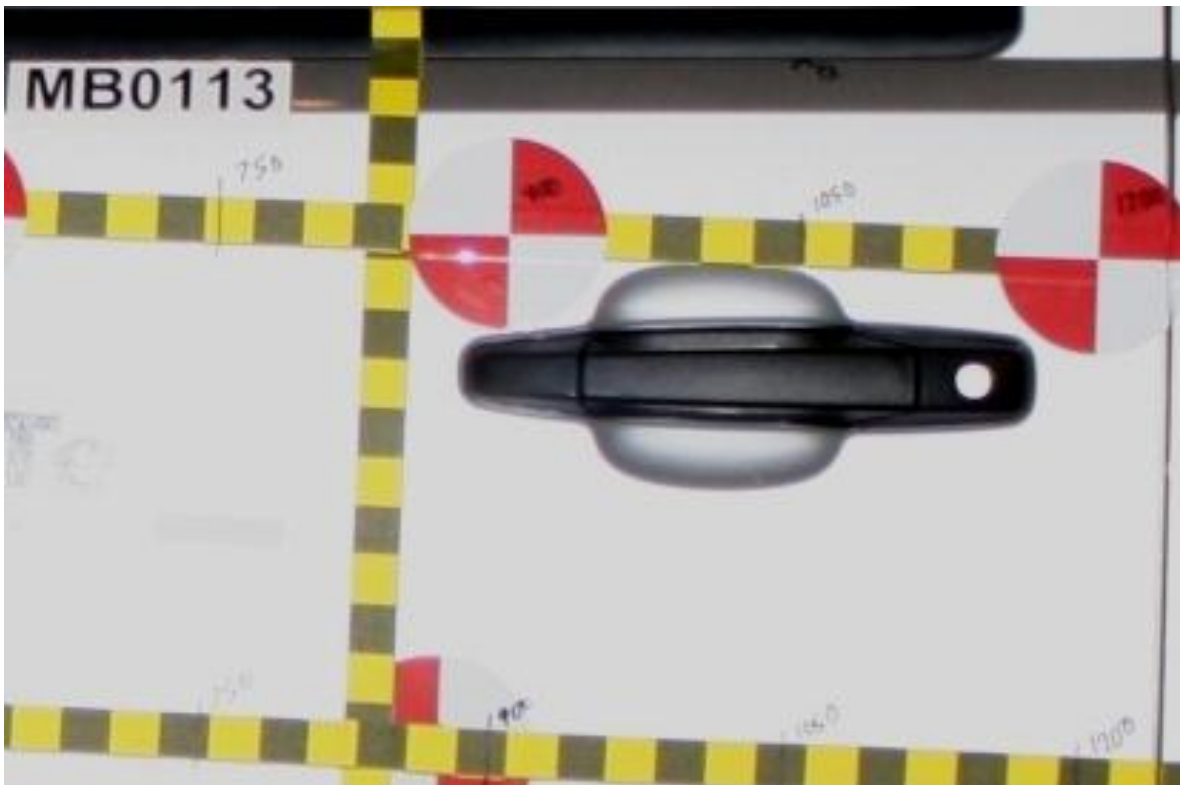


Figure A-21: Pre-Test Left Front Door Latch Close-up



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

Photo Not Available

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

Photo Not Available

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

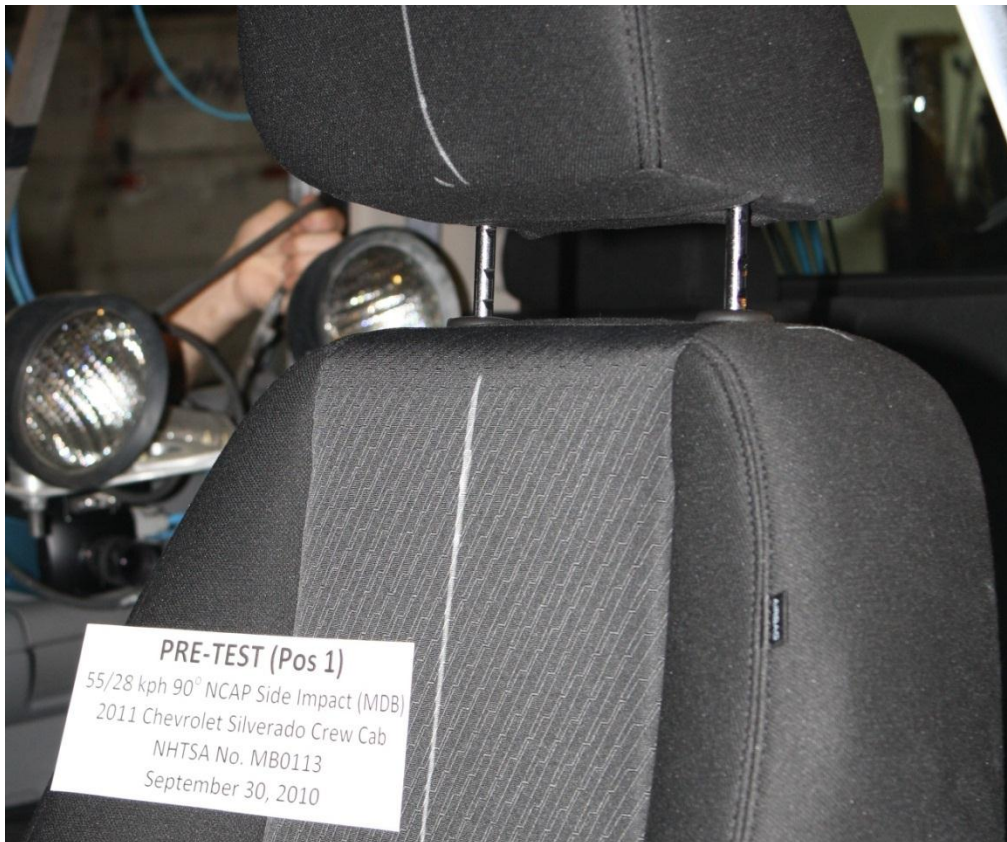


Figure A-30: Pre-Test Frontal View of Driver Seat Back Prior to Dummy Positioning



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

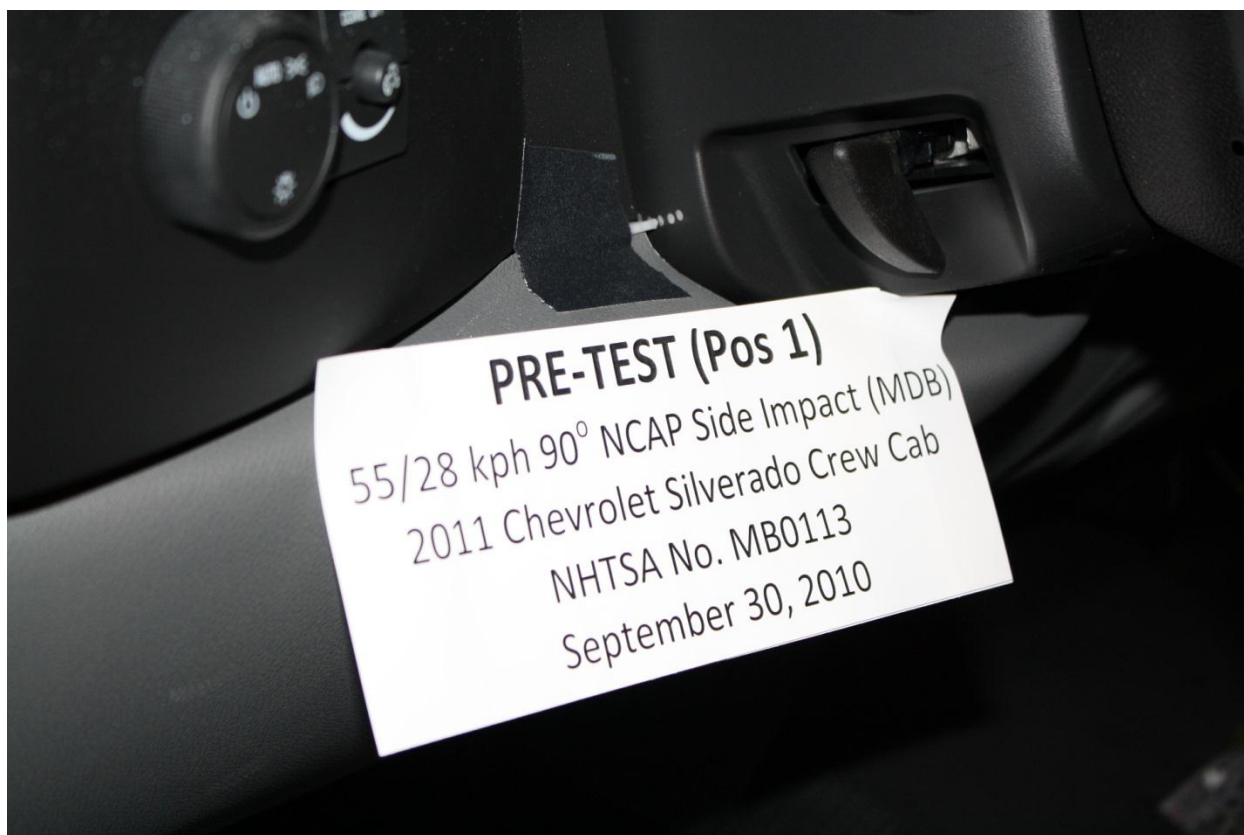


Figure A-36: Pre-Test Left Side View of Steering Wheel to Show Position



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

Photo Not Available

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

Photo Not Available

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

Photo Not Available

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

Photo Not Applicable

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

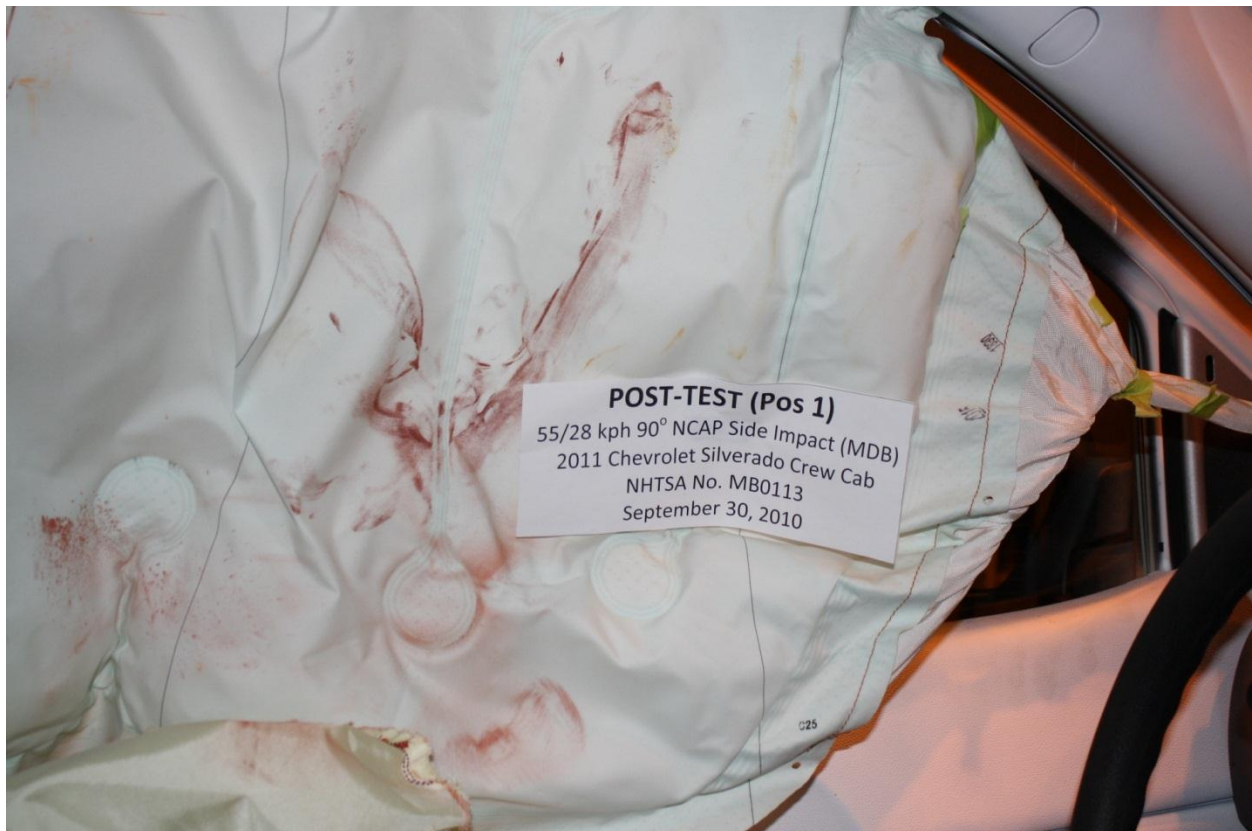


Figure A-48: Post-test Driver Dummy Close-Up Head Contact with Side Airbag View

Photo Not Applicable

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

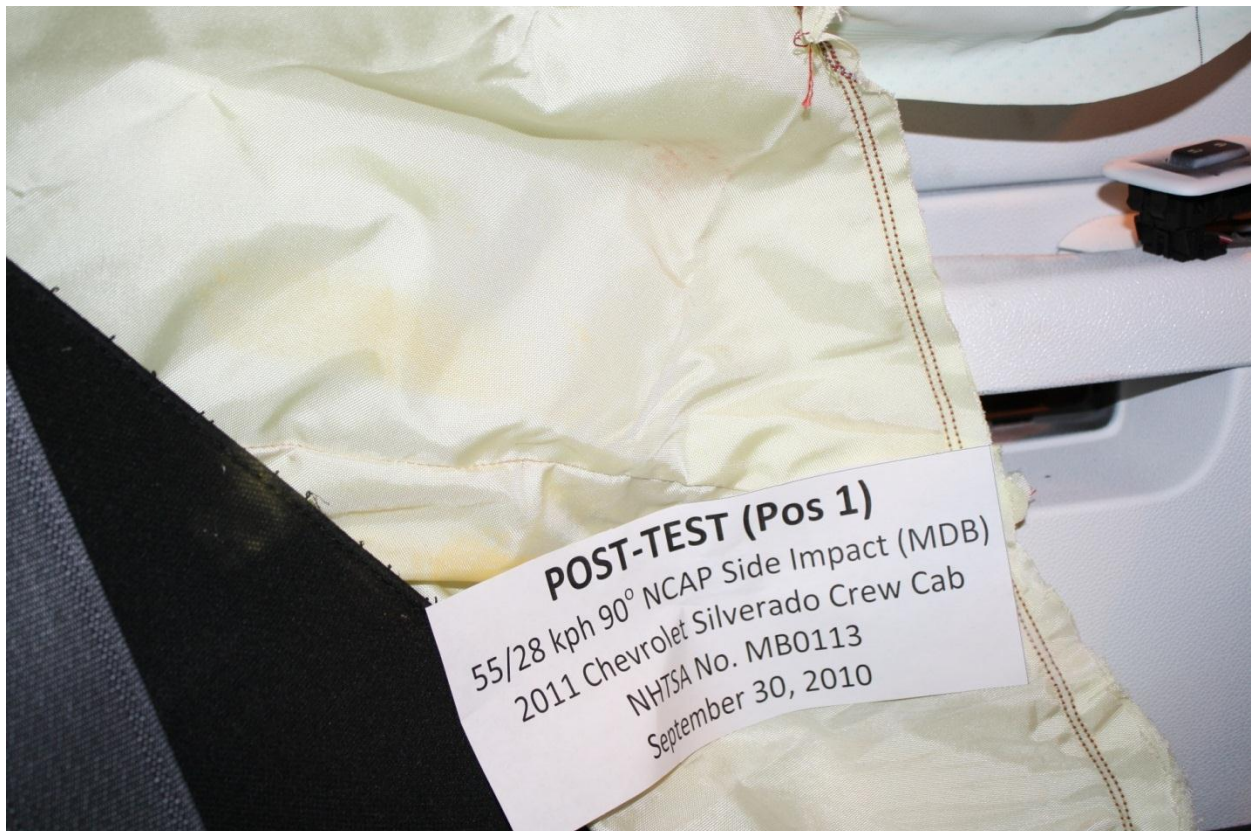


Figure A-50: Post-Test Driver Dummy Close-Up Torso Contact with Side Airbag View

Photo Not Applicable

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

Photo Not Available

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

Photo Not Available

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

Photo Not Available

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

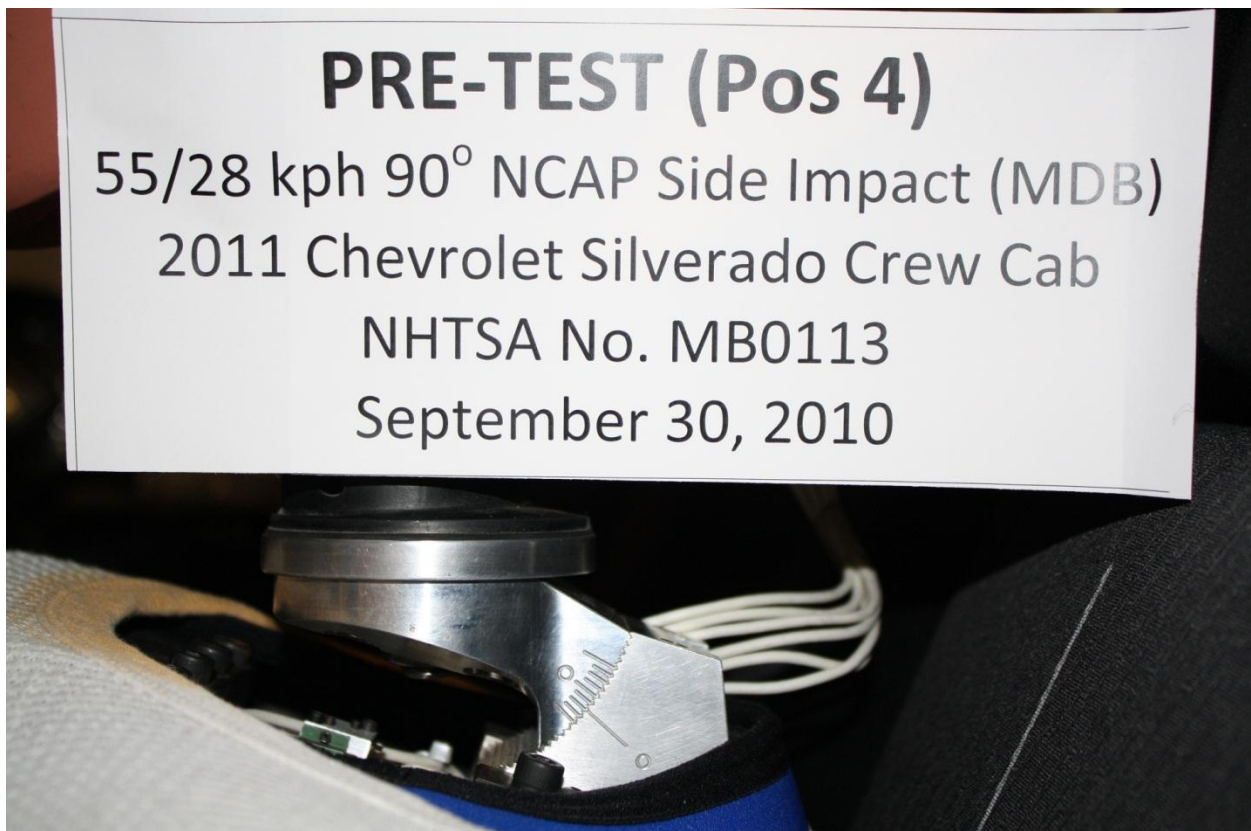


Figure A-60: Pre-Test View of Rear Passenger Dummy's Neck Showing Position of Adjustable Neck Bracket

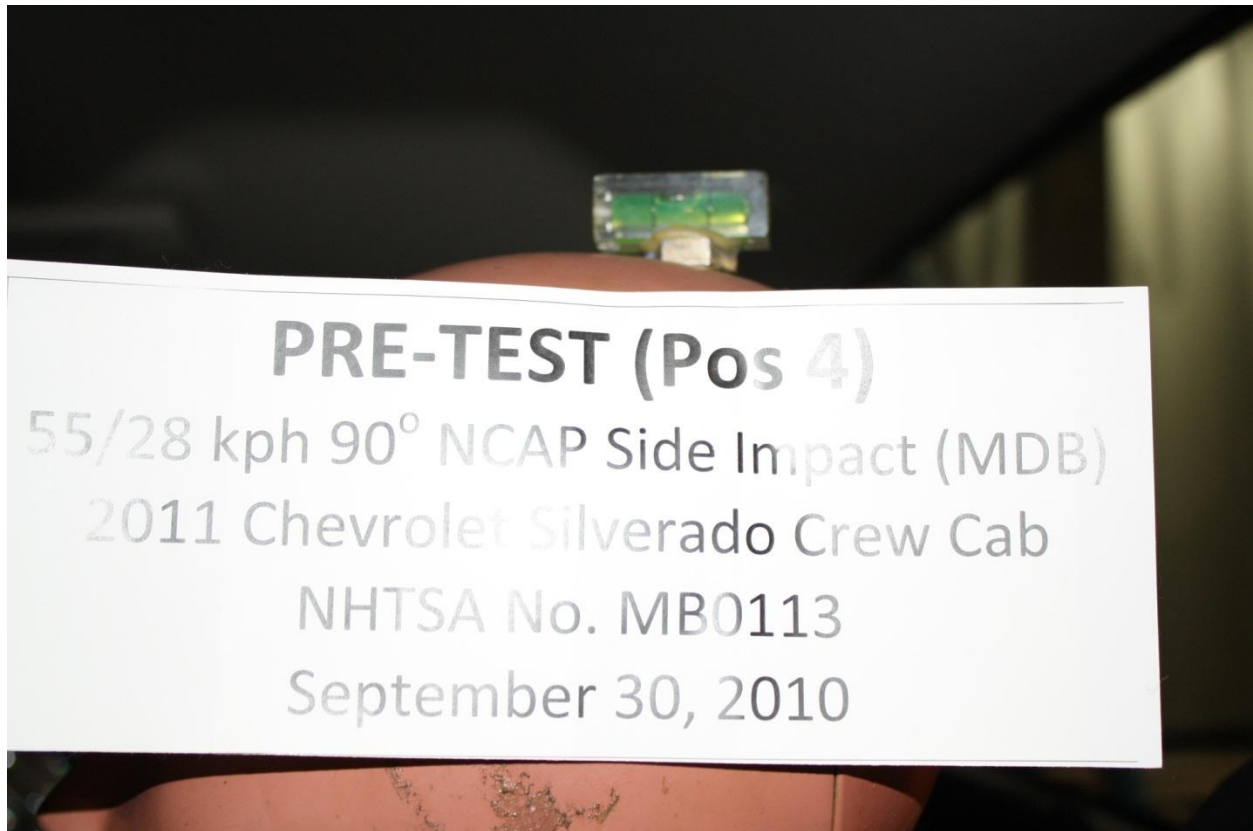


Figure A-61: Pre-Test View of Rear Passenger Dummy's Head Showing Dummy's Head is Level



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

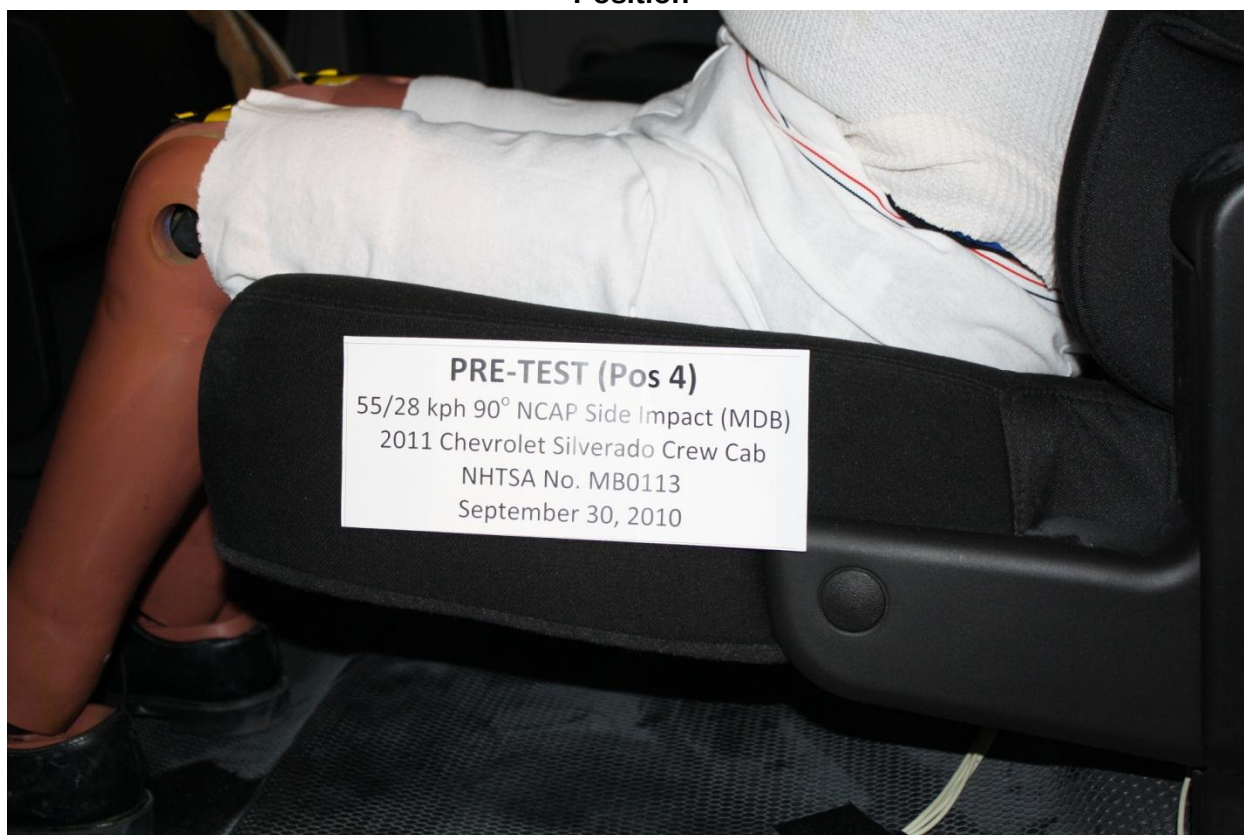


Figure A-64: Pre-test Close-Up Left Side View of Rear Passenger Seat Track Showing Test Position



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

Photo Not Available

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

Photo Not Available

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

Photo Not Available

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

Photo Not Applicable

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

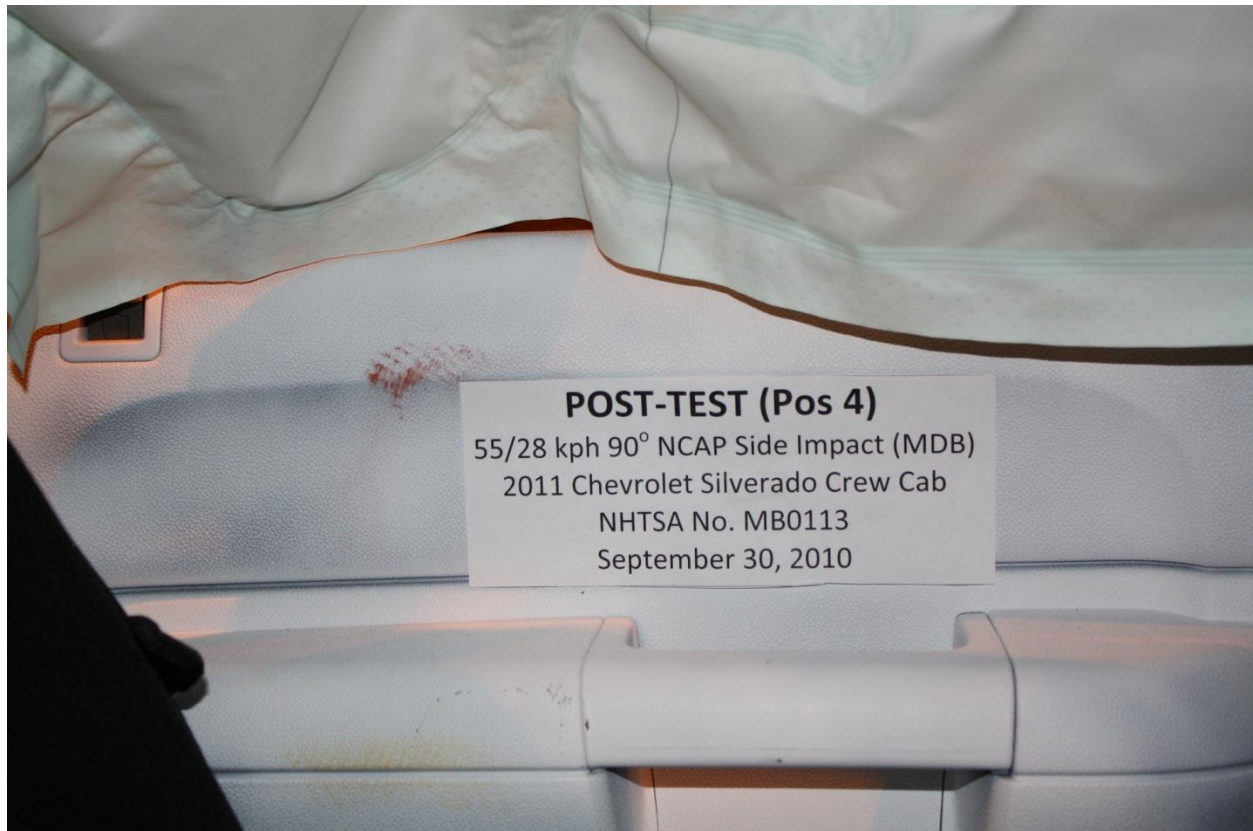


Figure A-75: Post-Test Rear Passenger Dummy Close-Up Torso Contact with Vehicle Interior View

Photo Not Applicable

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

Photo Not Available

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



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

Photo Not Available

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

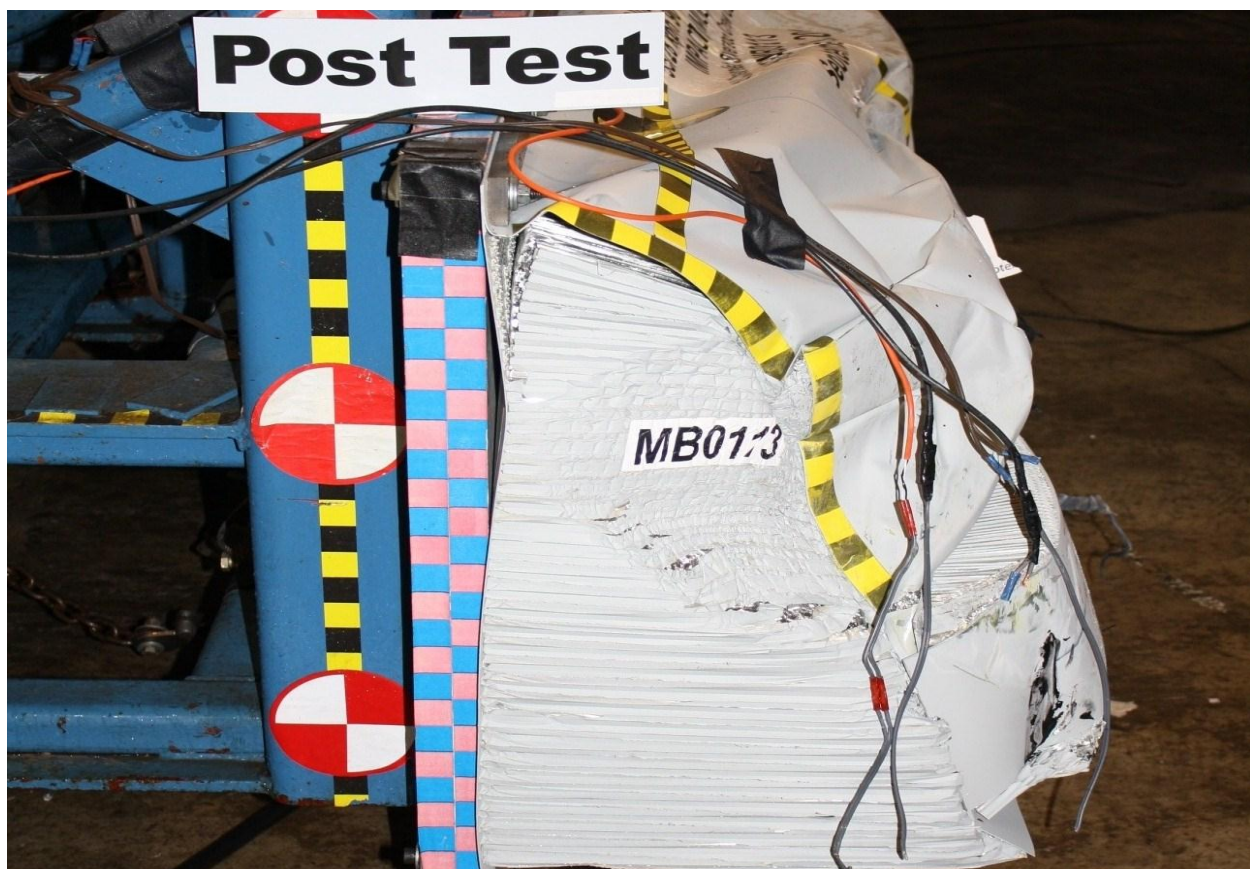


Figure A-88: Post-Test Right Side View of MDB Impactor Face



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

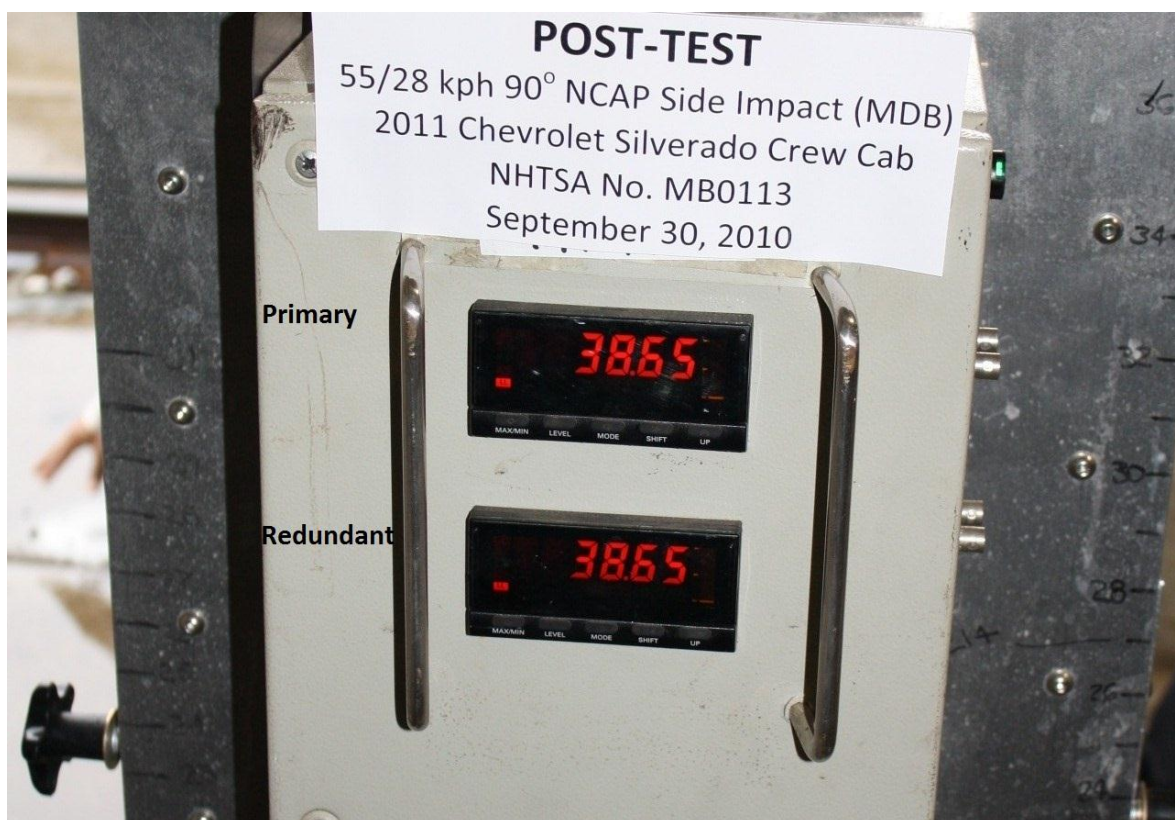


Figure A-92: Post-Test Primary and Redundant Speed Trap Read-Out



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

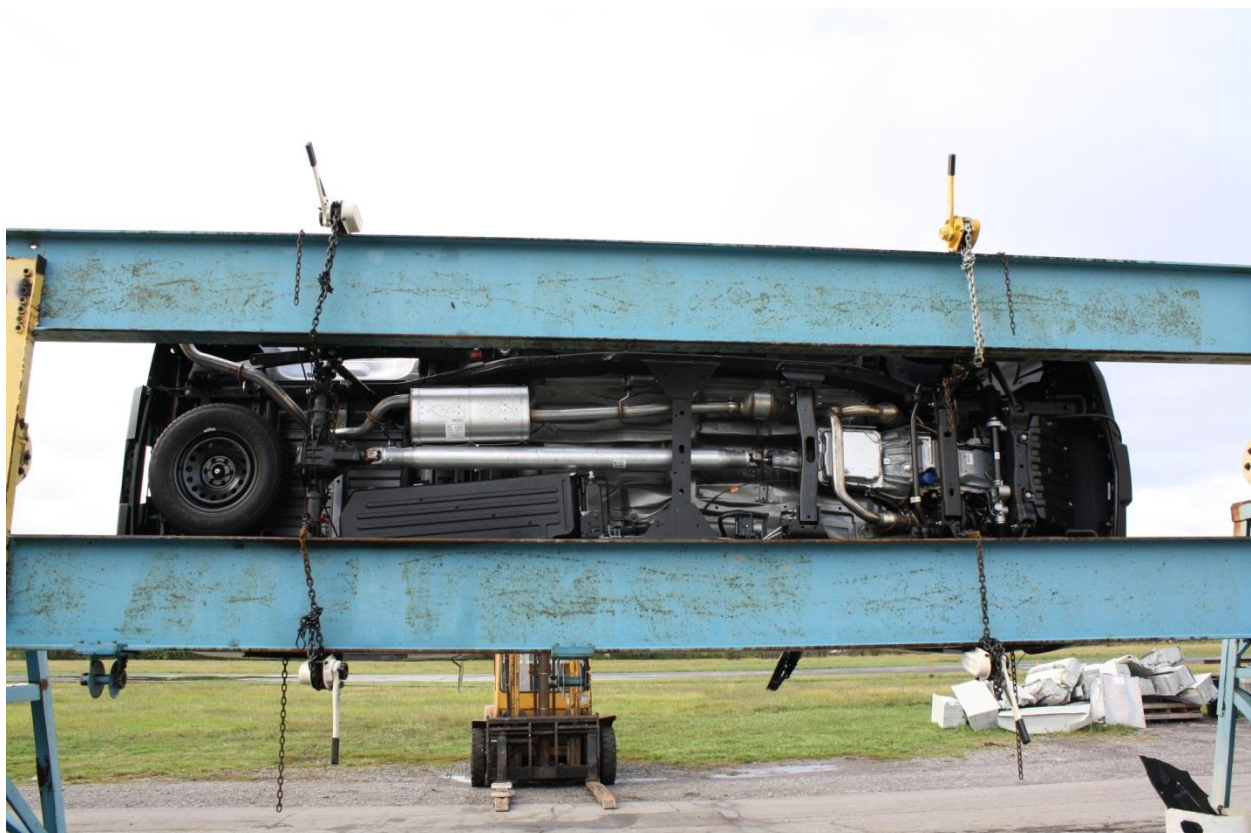


Figure A-94: FMVSS No. 301 Rollover 90°



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)



Figure A-99: Monroney Label

Photo Not Available

Figure A-100: Driver Head Restraint Use and Adjustment Information from Vehicle Owner's Manual

Photo Not Available

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

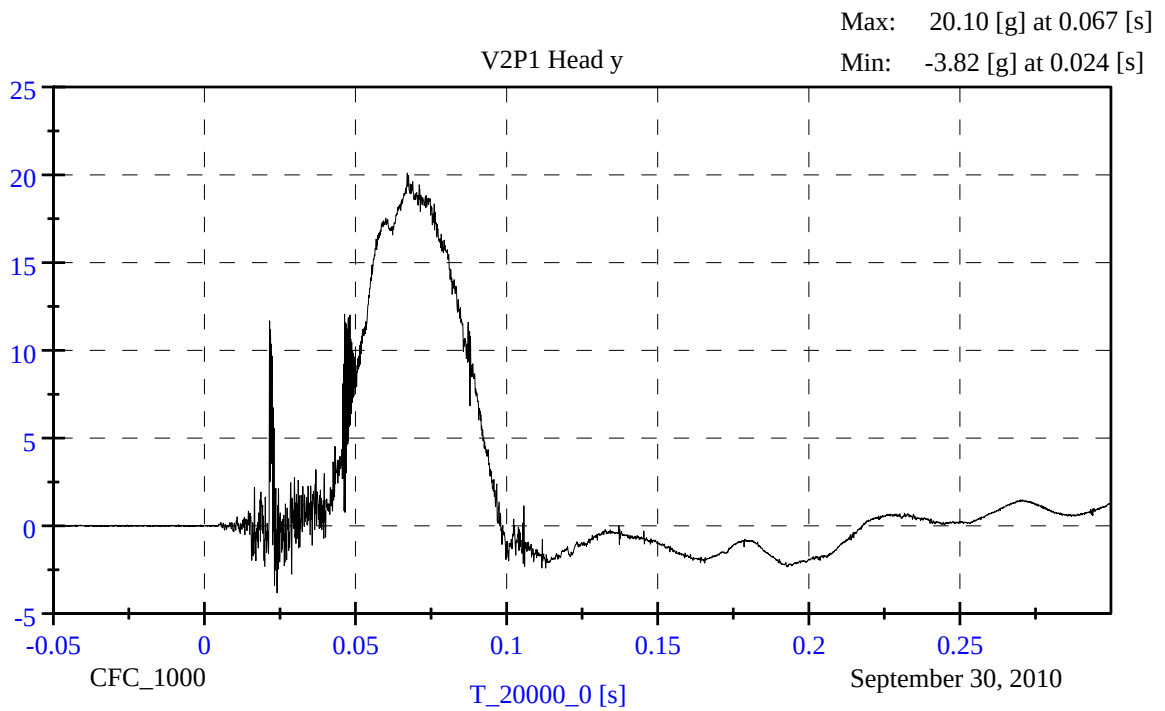
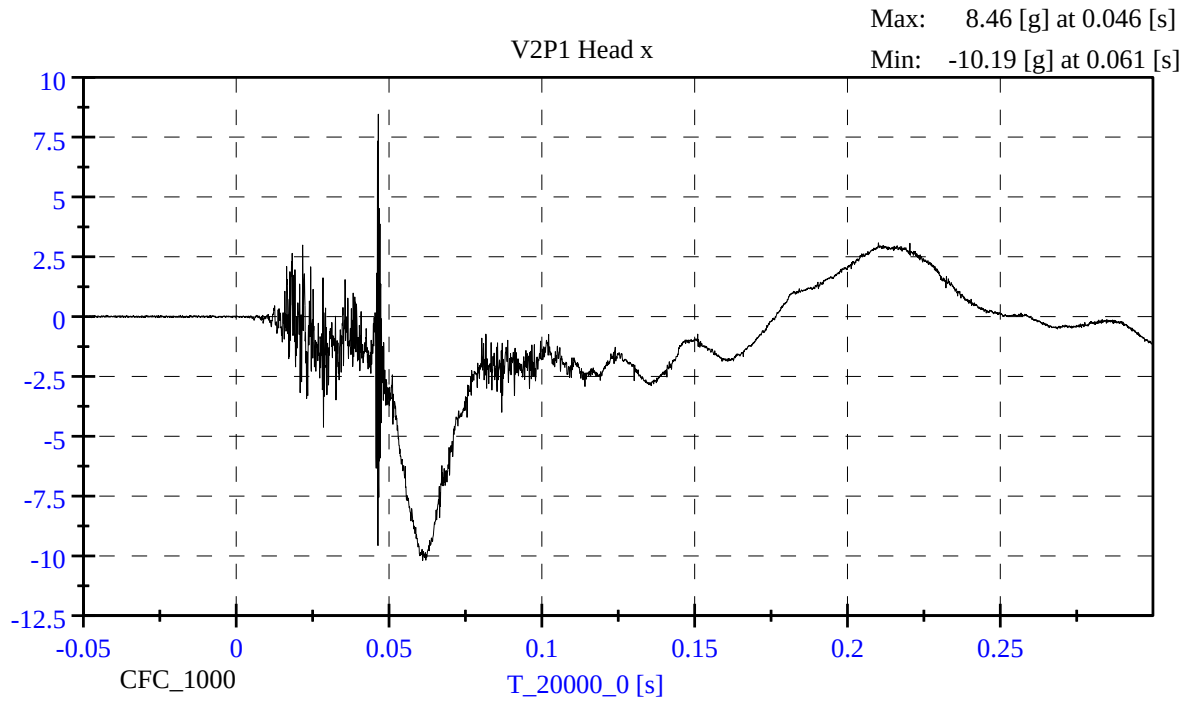
Vehicle Instrumentation Data

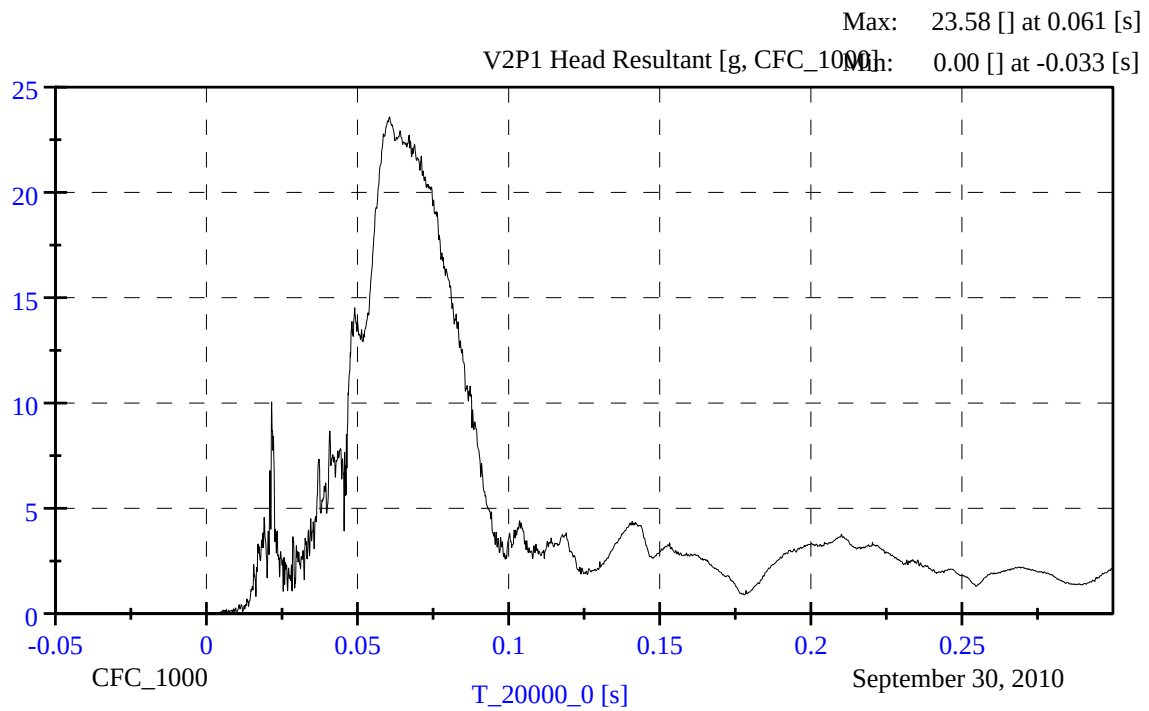
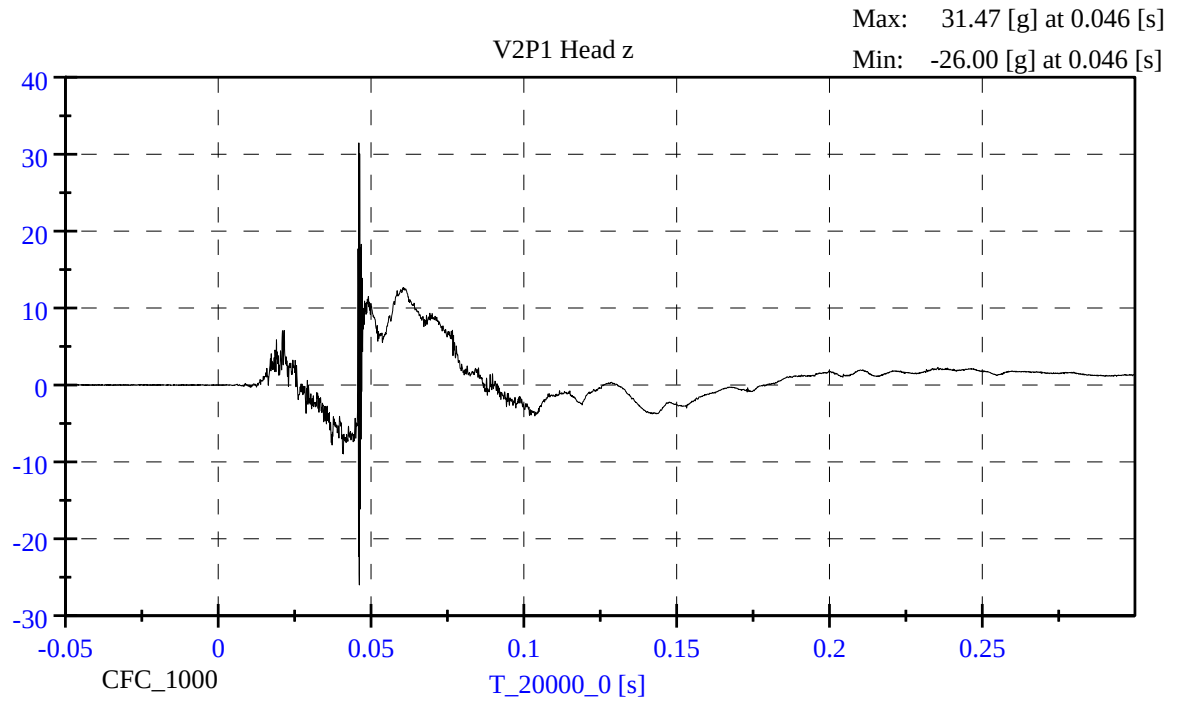
Driver Side Airbag Timing
Driver Side Curtain Airbag Timing
Passenger Side Airbag Timing (if applicable)
Passenger Side Curtain Airbag Timing (if different from Driver)
Right Side Sill at Front Seat Acceleration (X)
Right Side Sill at Front Seat Acceleration (Y)
Right Side Sill at Front Seat Acceleration (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)

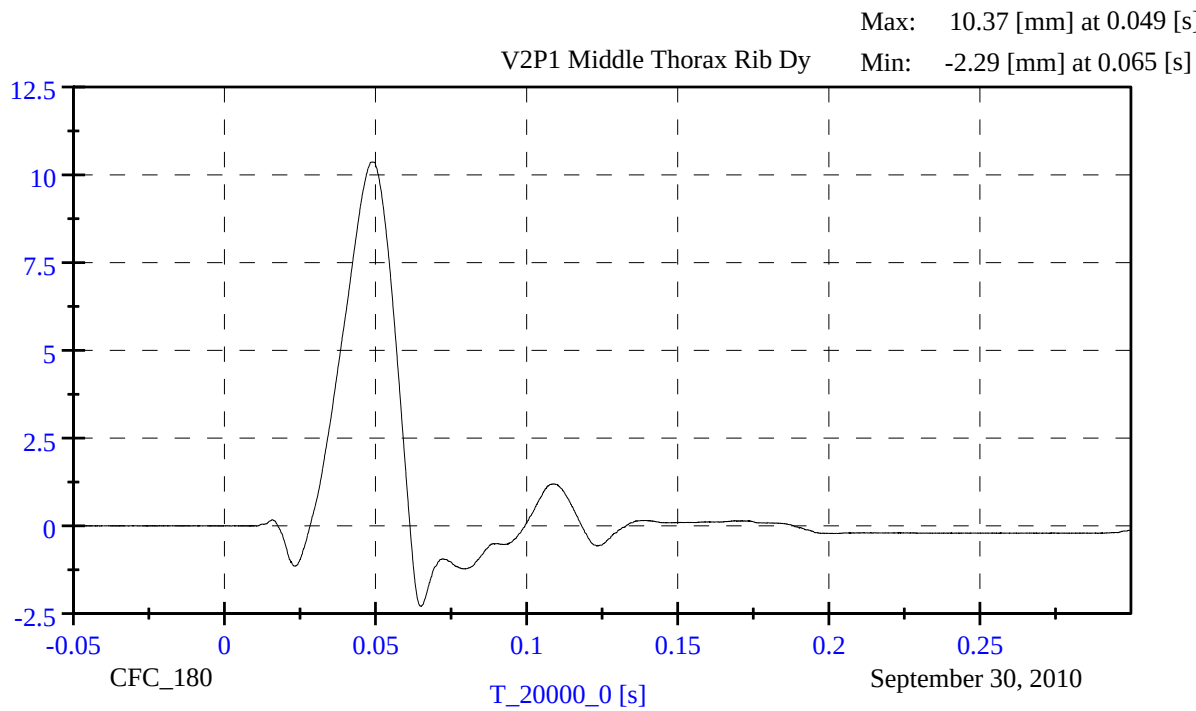
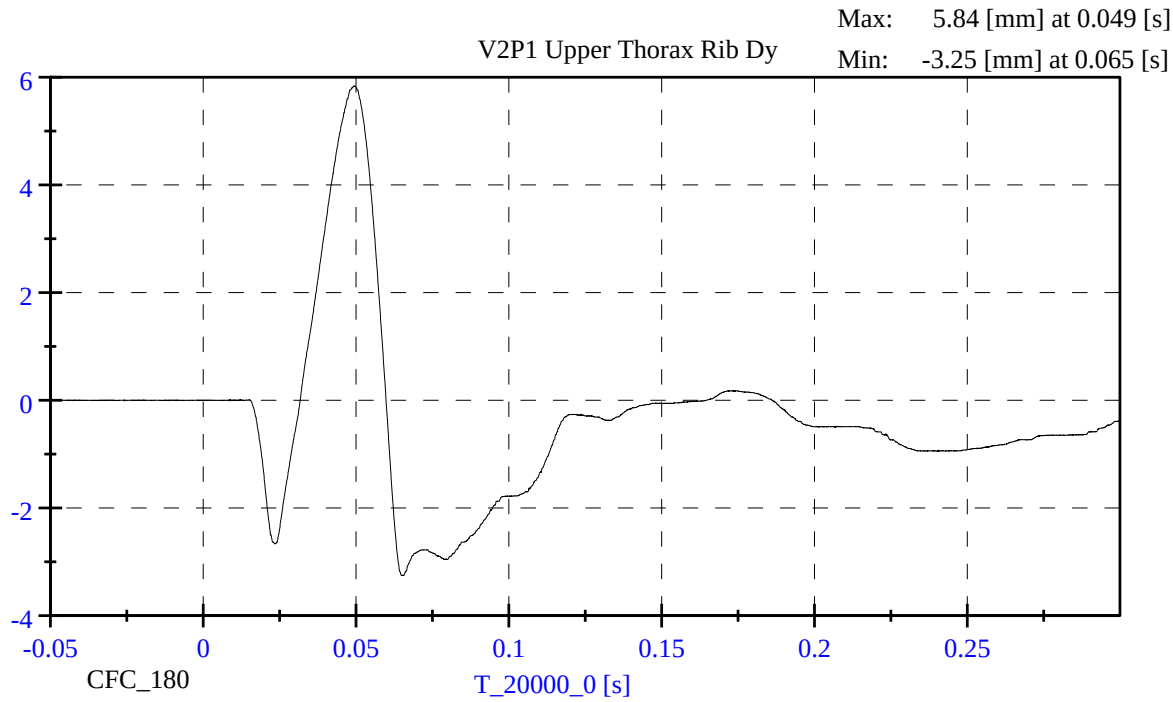
Rear Seat Track Acceleration (Y)
Vehicle Center of Gravity Acceleration (X)
Vehicle Center of Gravity Acceleration (Y)
Vehicle Center of Gravity Acceleration (Z)

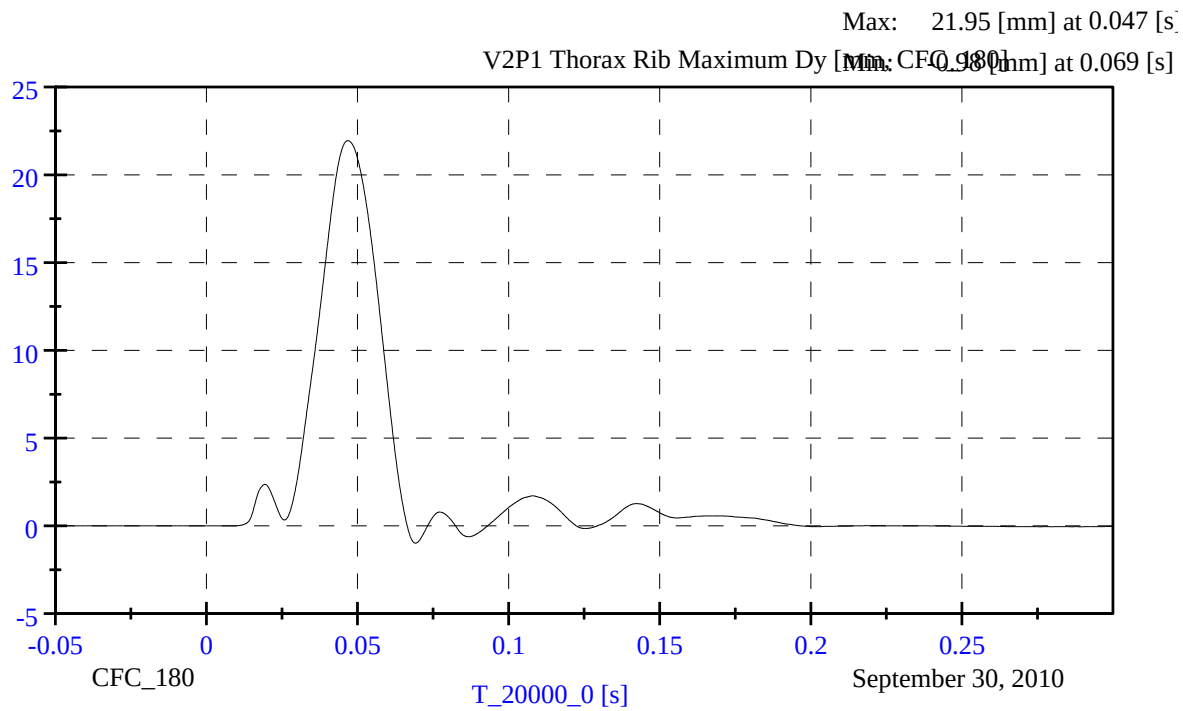
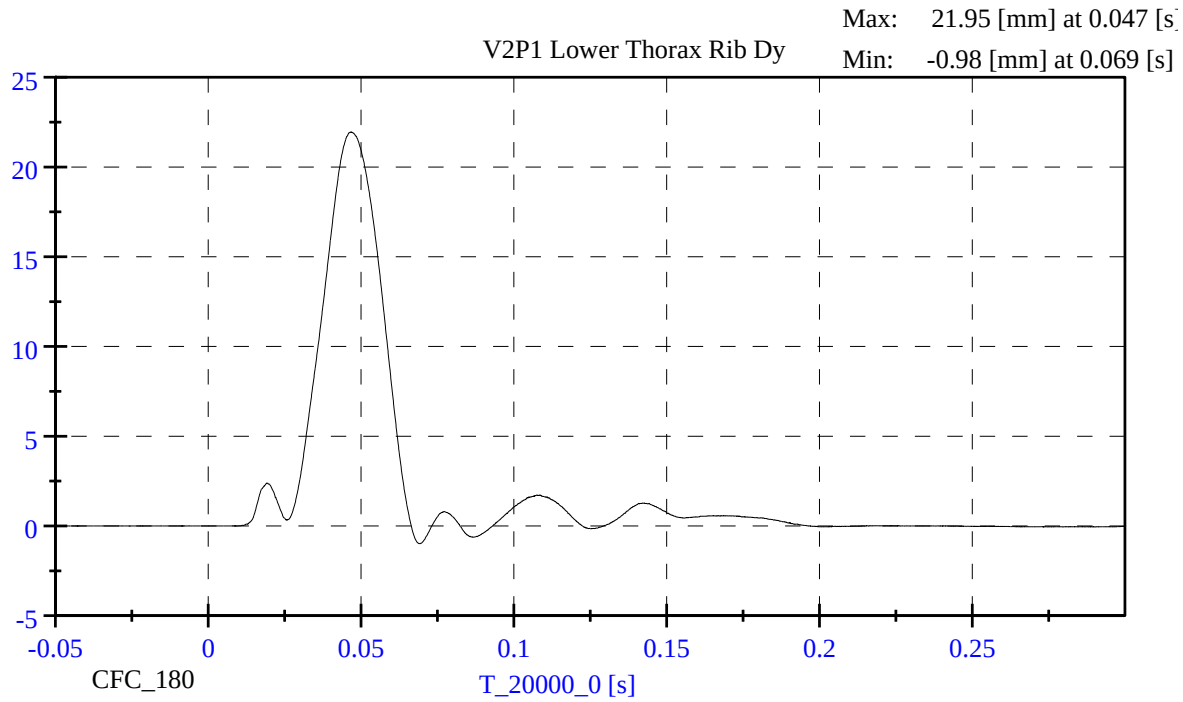
MDB Instrumentation Data

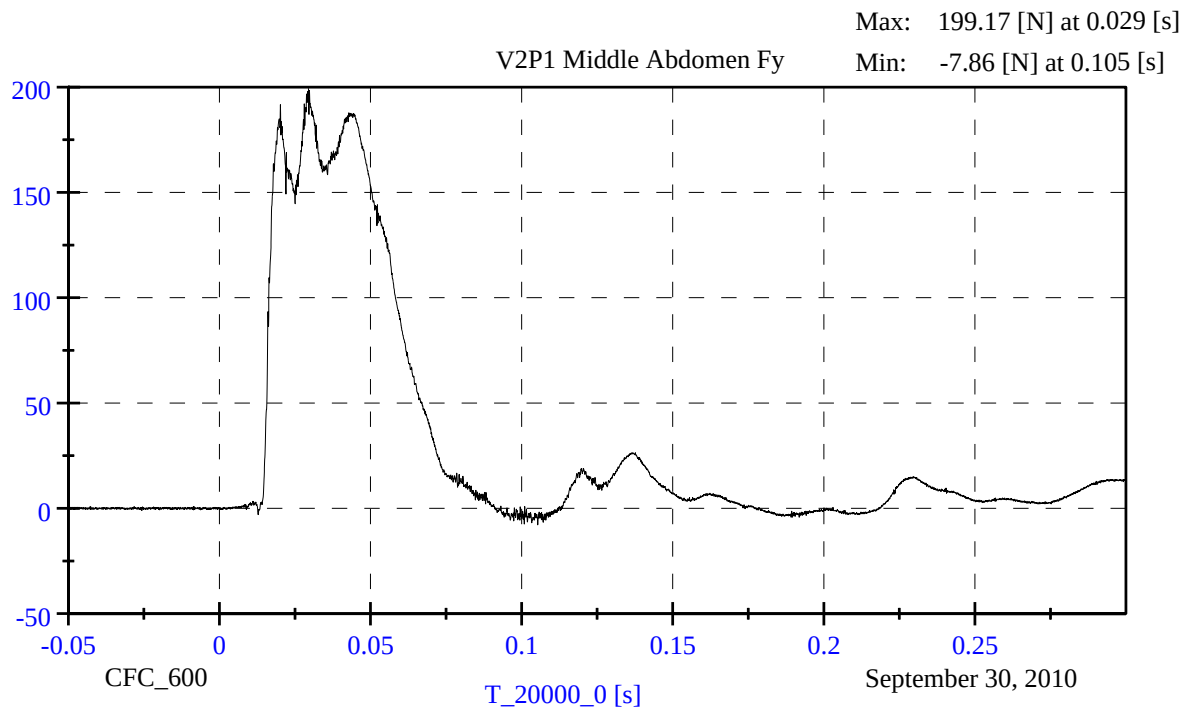
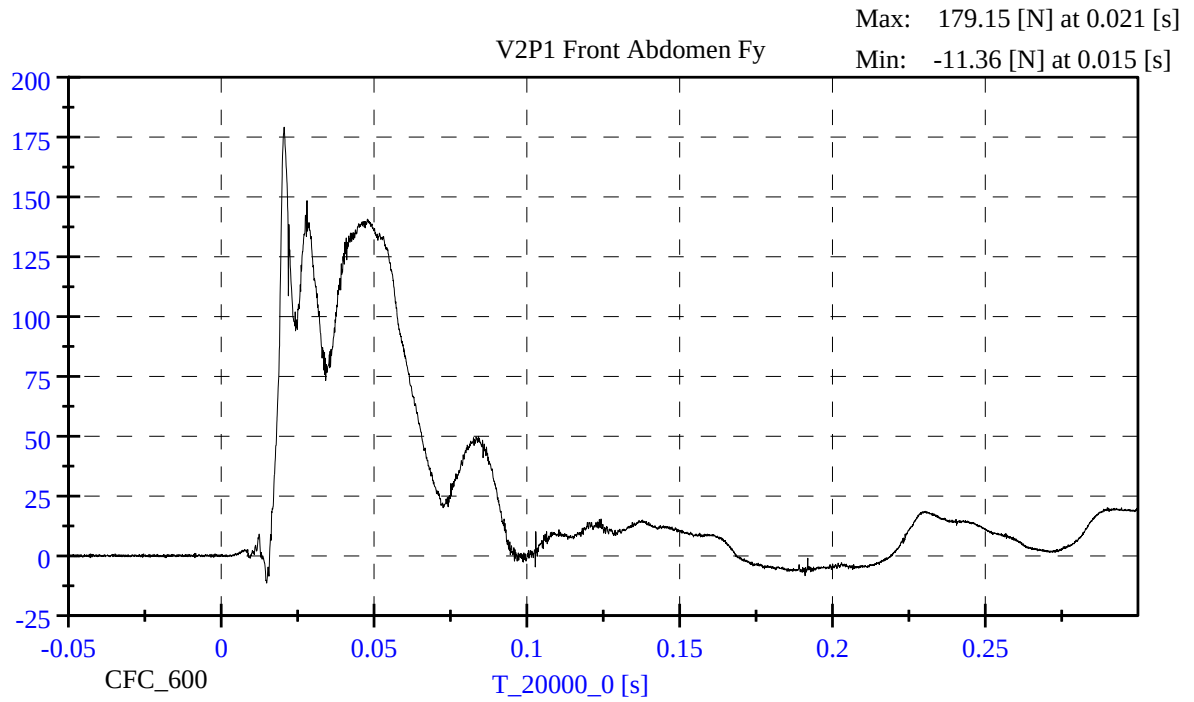
MDB Center of Gravity Acceleration (X)
MDB Center of Gravity Acceleration (Y)
MDB Center of Gravity Acceleration (Z)
MDB Rear Acceleration (X)
MDB Rear Acceleration (Y)
Left MDB Contact Switch
Right MDB Contact Switch

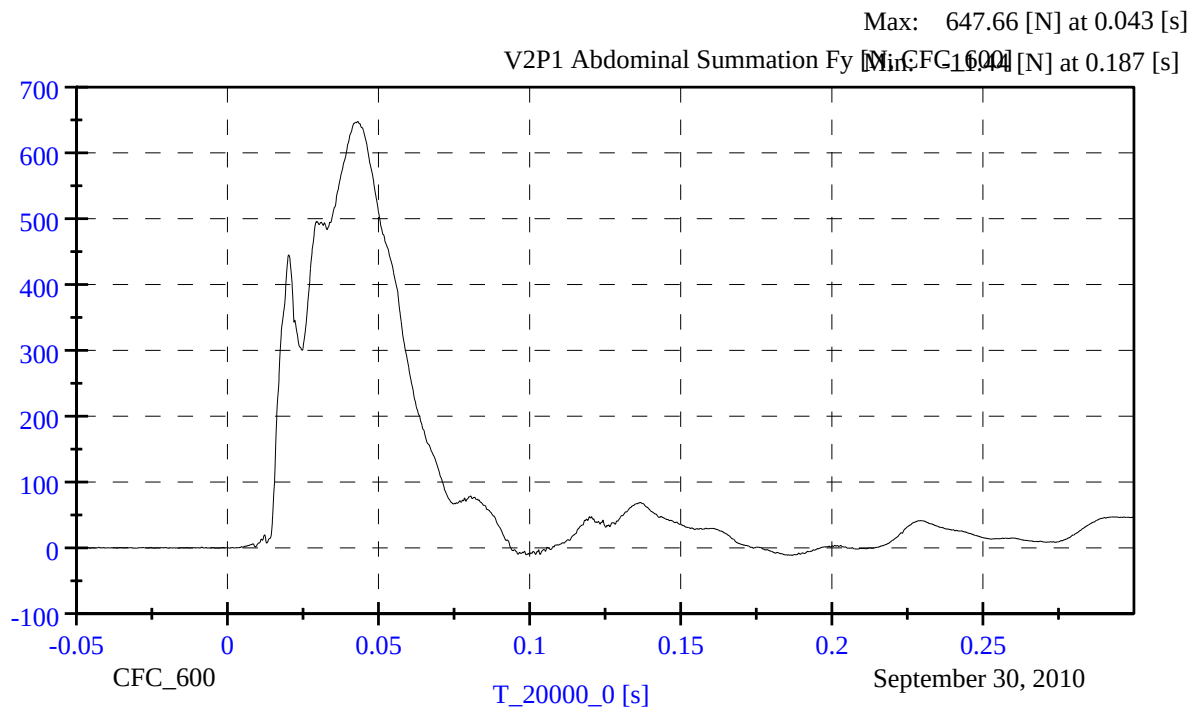
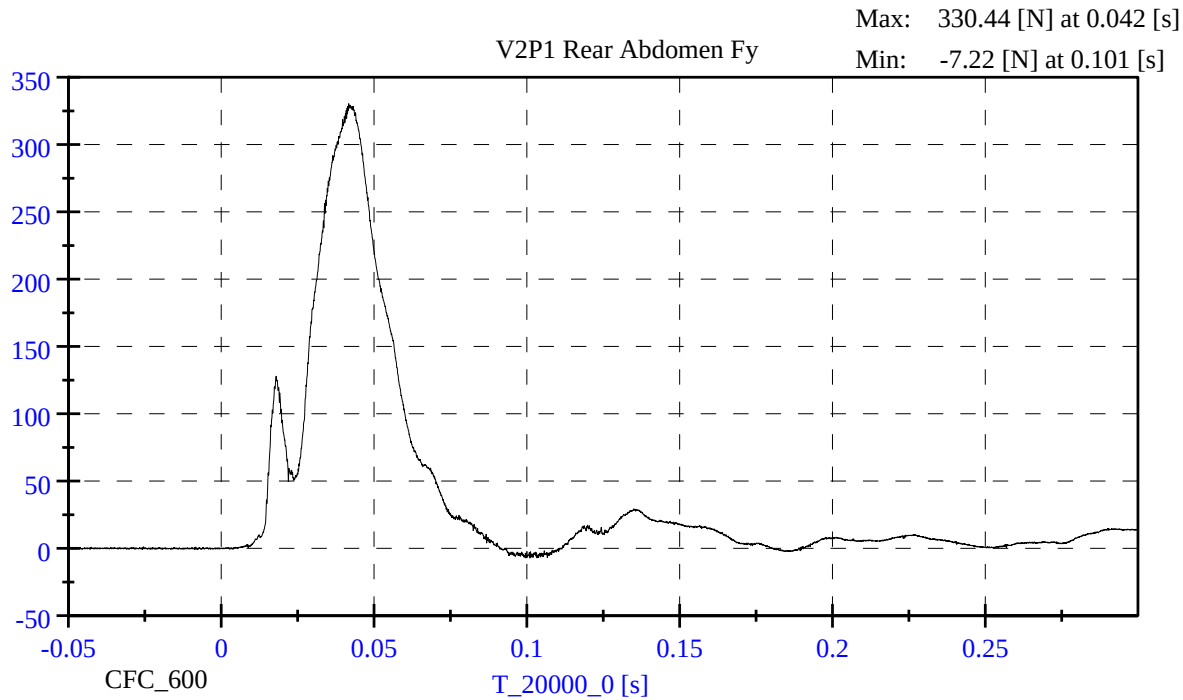


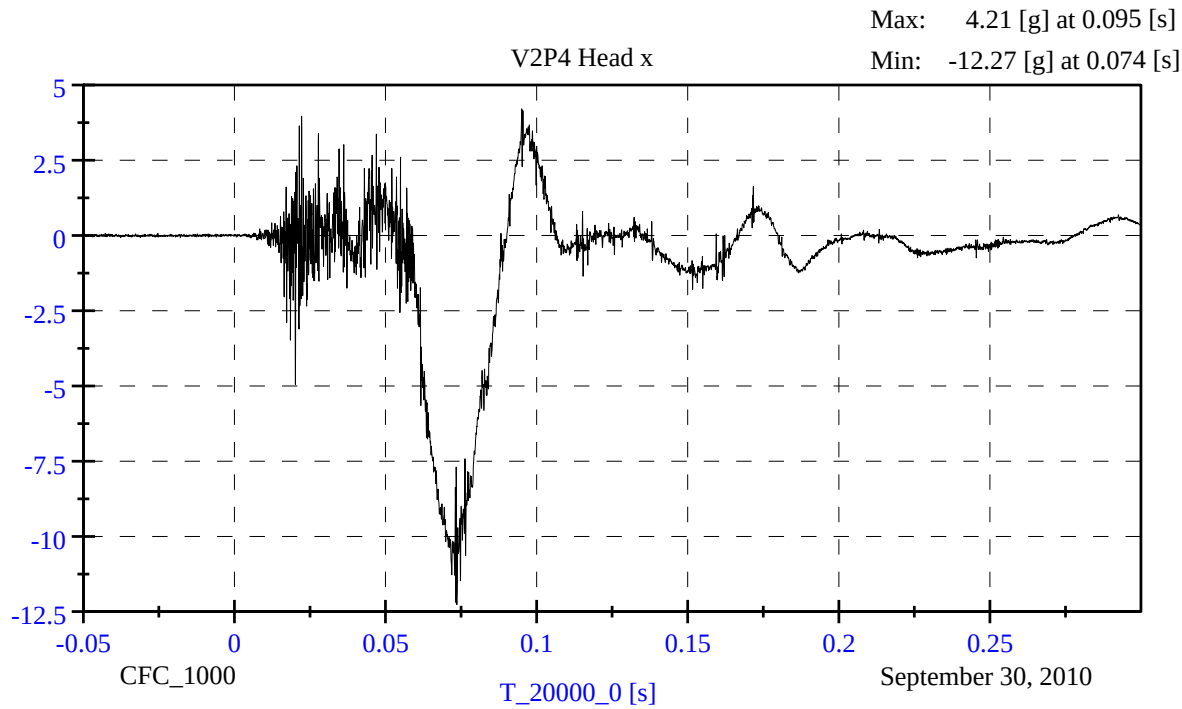
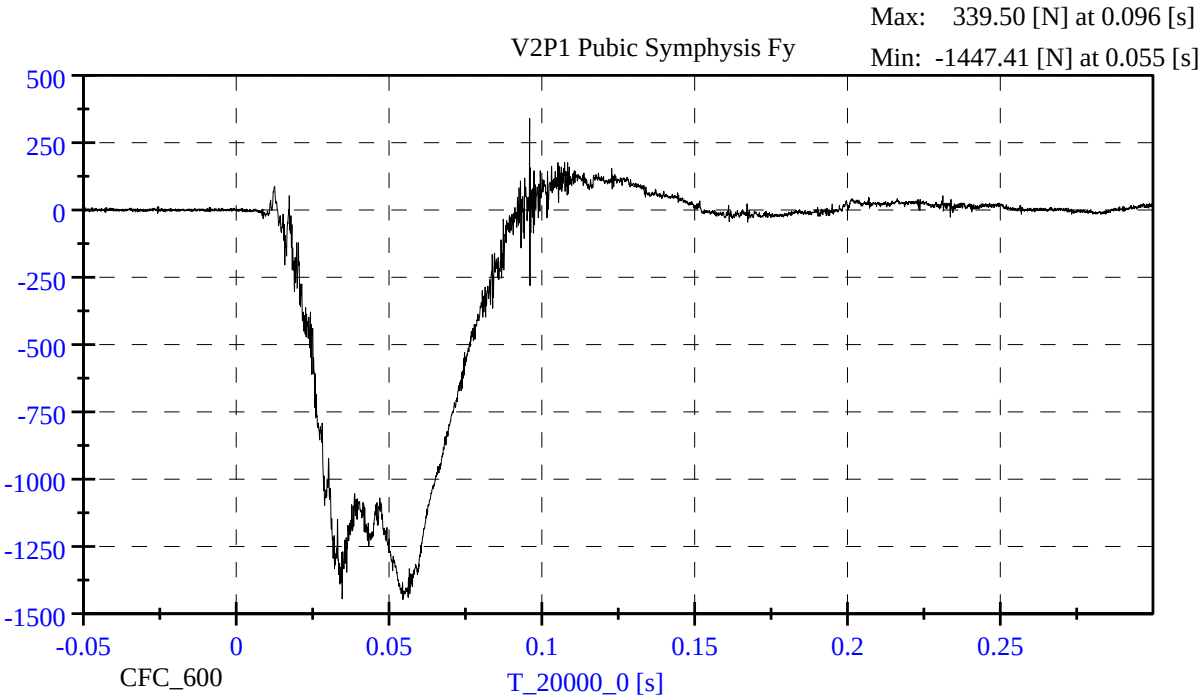


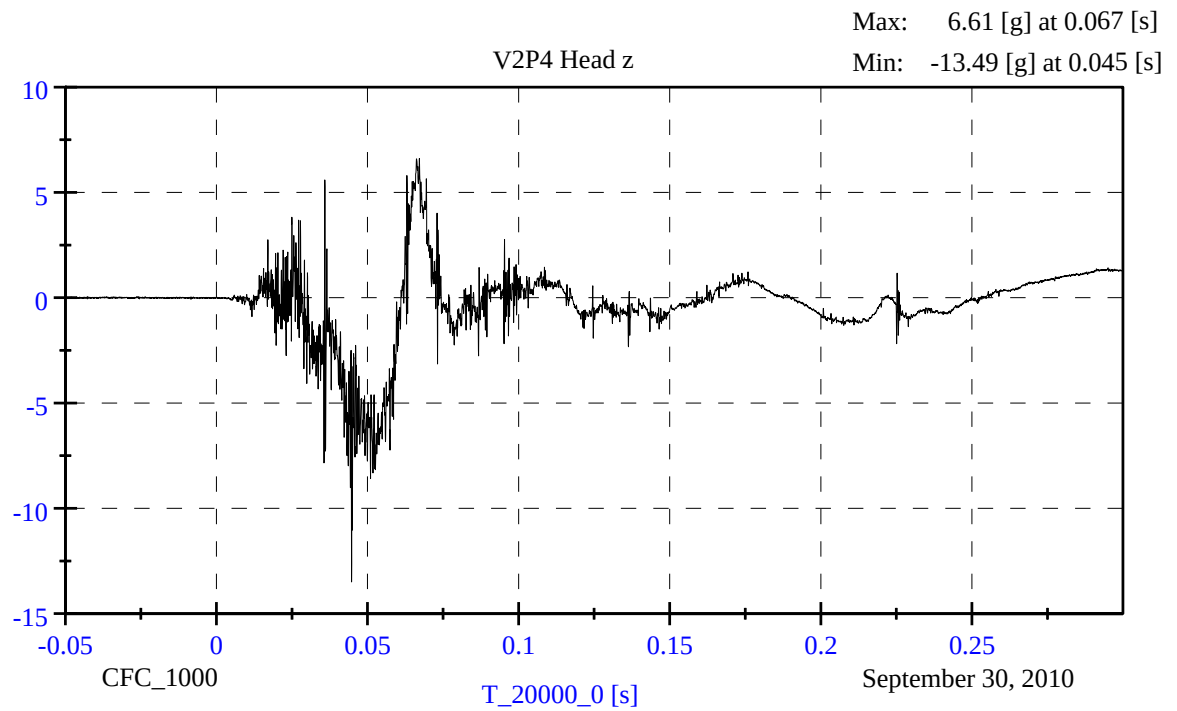
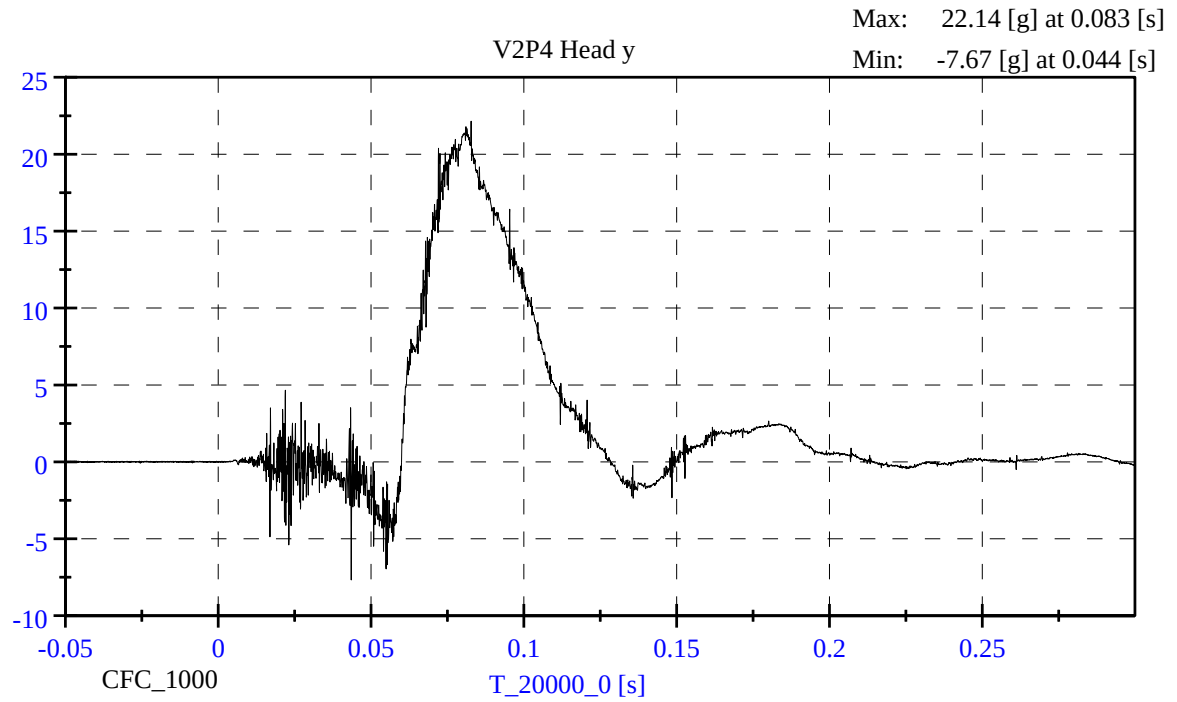


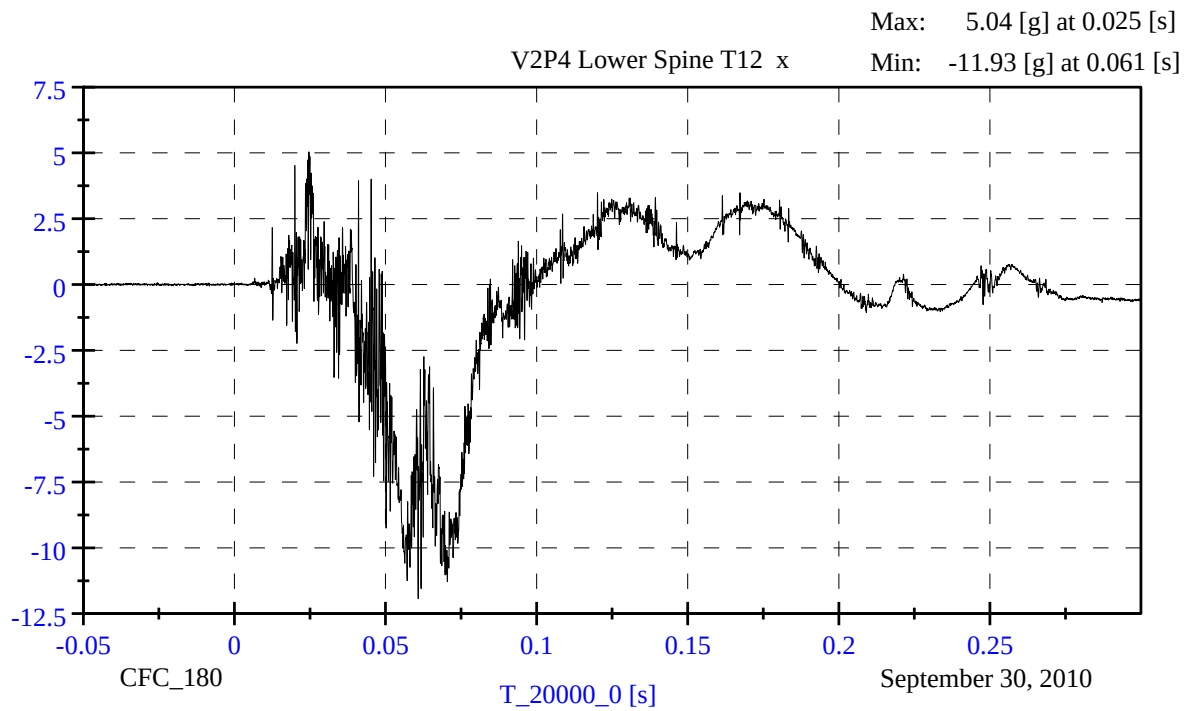
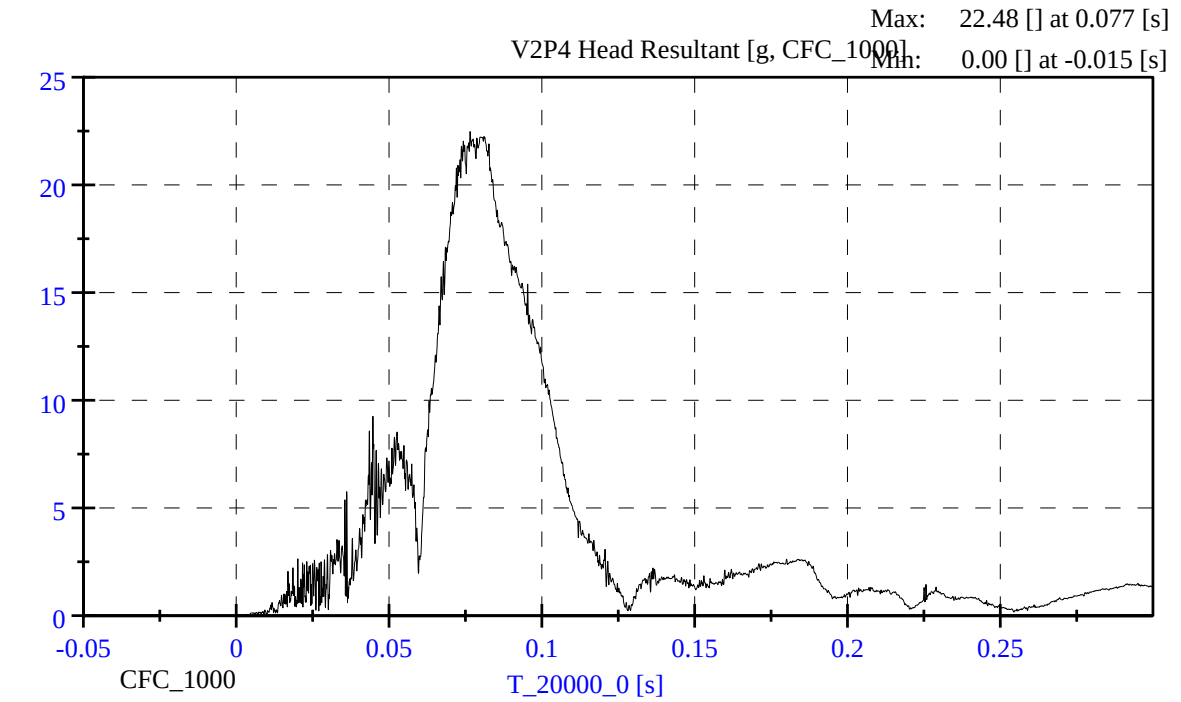


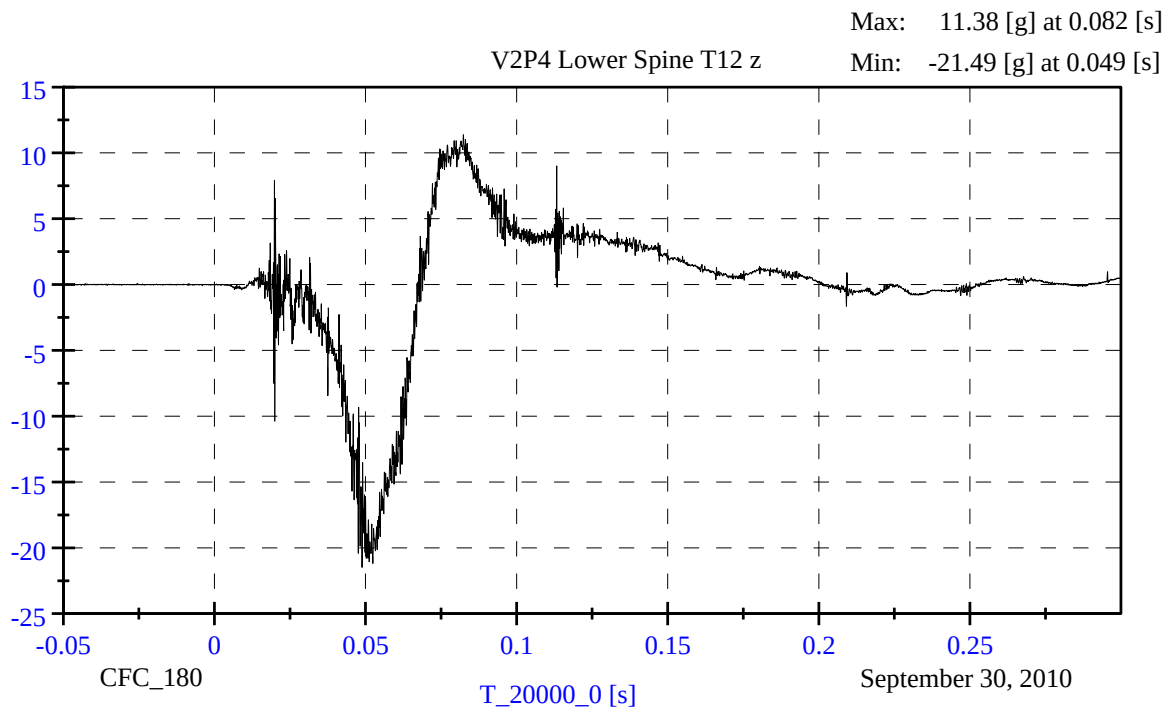
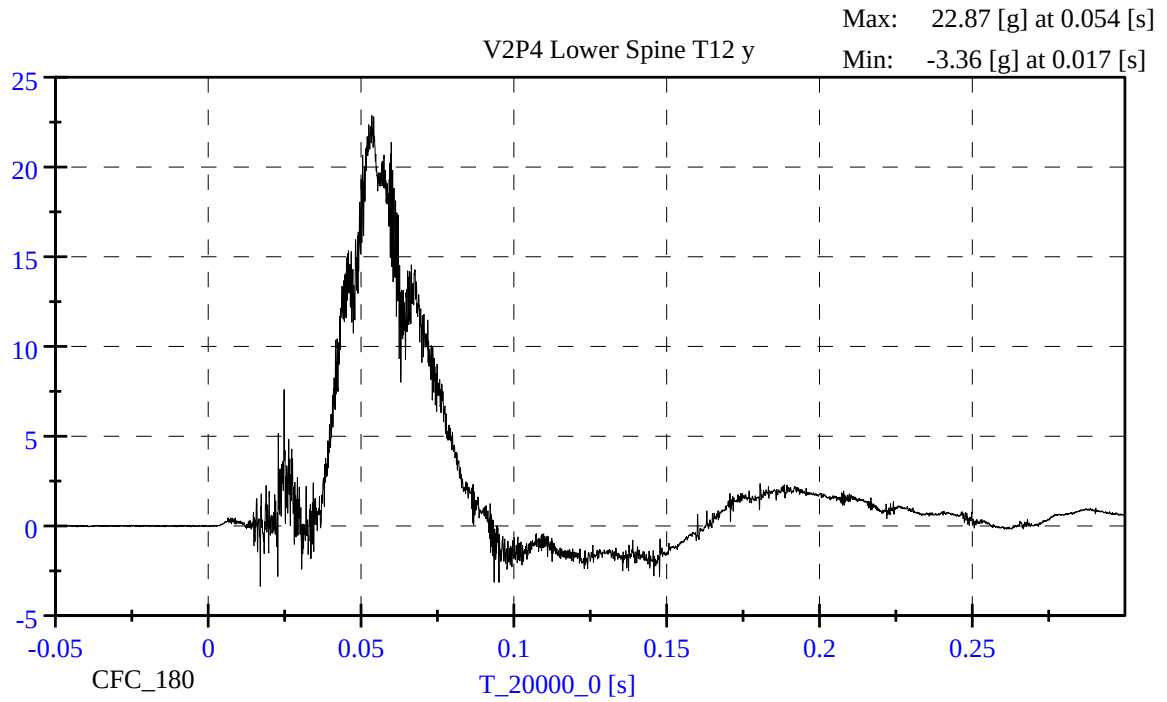


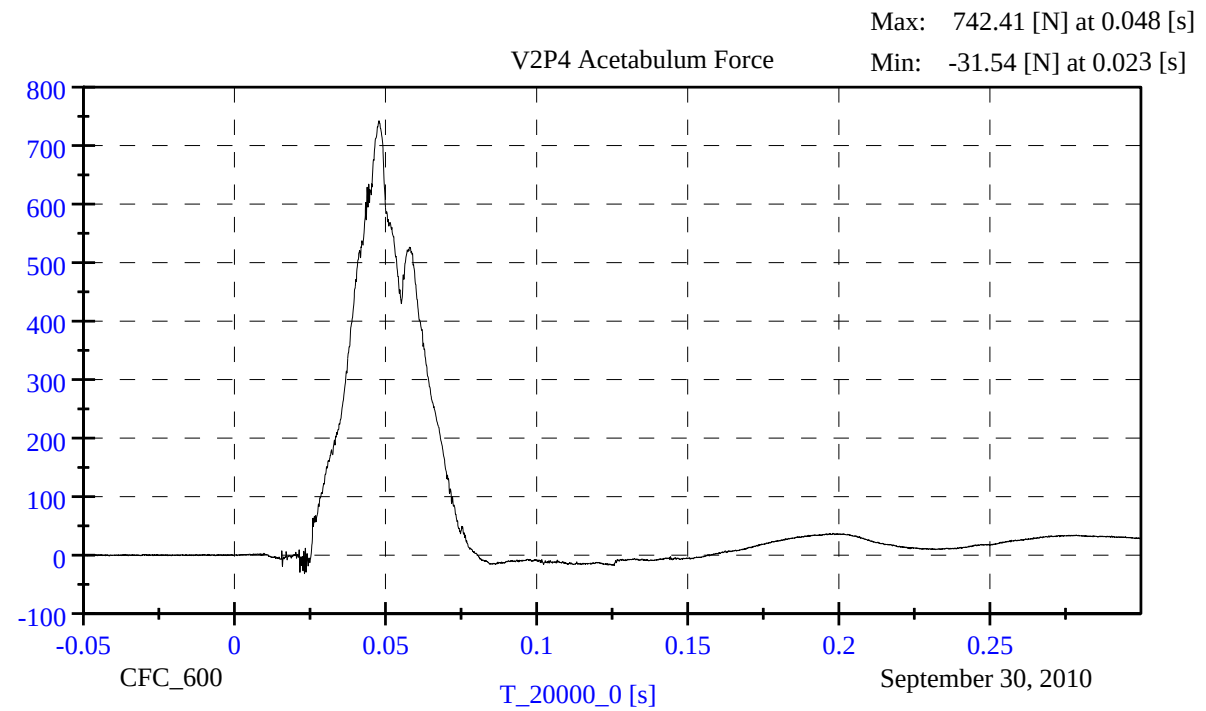
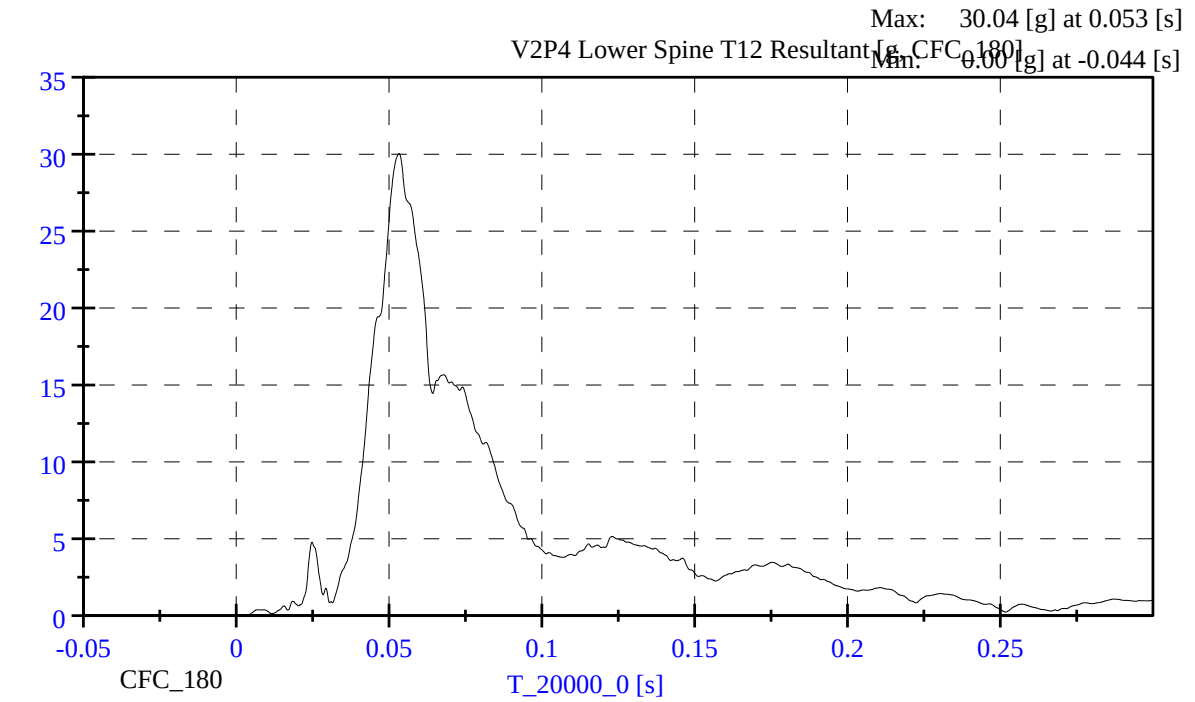


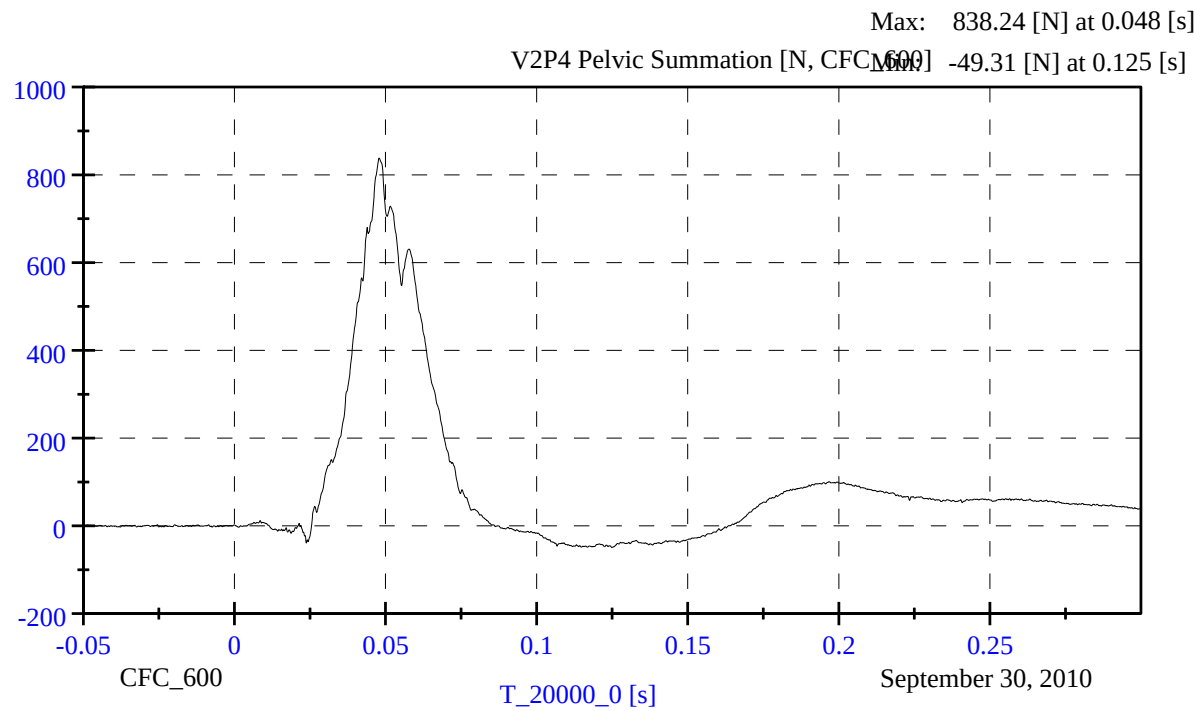
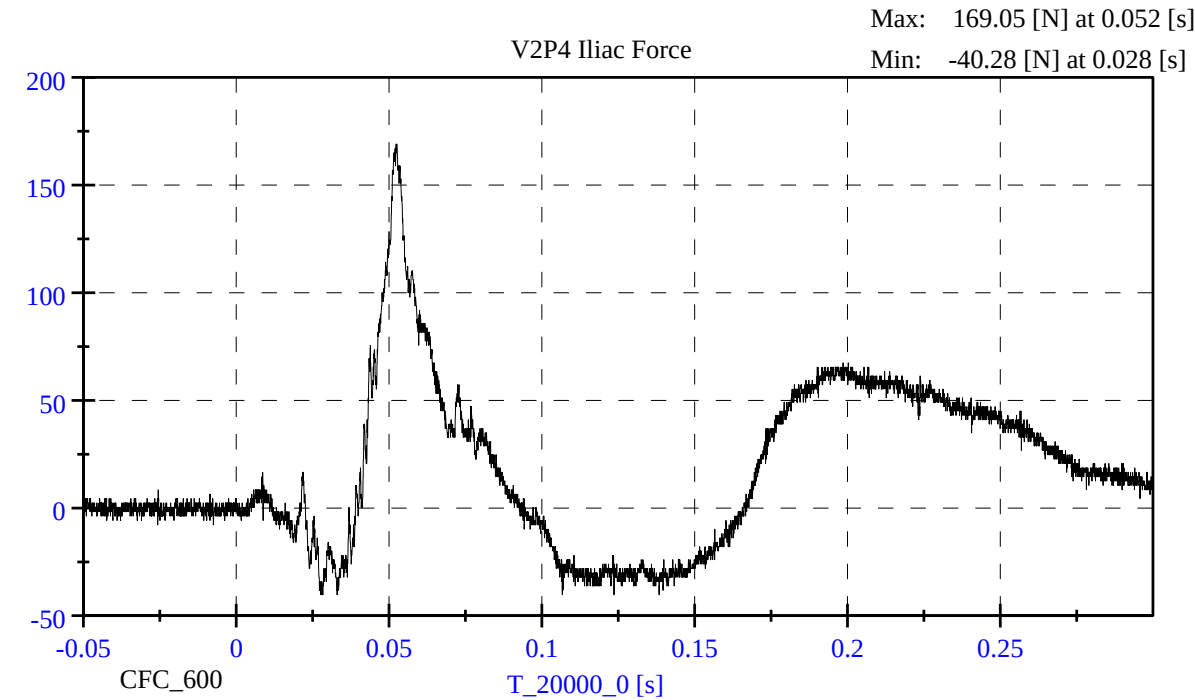












APPENDIX C
DUMMY CALIBRATION DATA

CALIBRATION TEST RESULTS

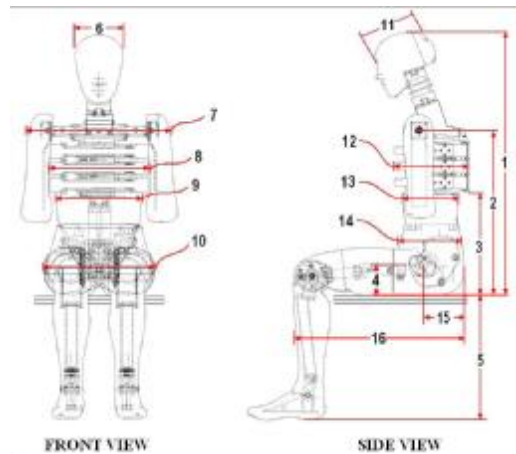
PRE-TEST

Es-2re No: 33

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	564	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	159	Pass
7	Shoulder/Arm Width	461-479	470	Pass
8	Thorax Width	322-332	323	Pass
9	Abdomen Width	273-287	281	Pass
10	Pelvis Lap Width	359-373	370	Pass
11	Head Depth	196-206	201	Pass
12	Thorax Depth	262-272	269	Pass
13	Abdomen Depth	194-204	201	Pass
14	Pelvis Depth	235-245	238	Pass
15	Back of Buttocks to Hip Joint (center of bolt)	150-160	154	Pass
16	Back of Buttocks to Front Knee	597-615	603	Pass

Technician: SZ

Date: 09/29/2010



www.calspan.com

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:	9/29/2010
Test Number:	1	Test Time:	10:13:39 AM

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	54 %RH P
Resultant Acceleration	125 -- 155	153 g P
Oscillation	0.0 -- 15.0	5.9 % P
Fore-Aft Acceleration	-15.00 -- 15.00	5.99 g P

All test parameters are within specifications

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

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

Test ID: **Head Drop**

Test Time: **10:13:39 AM**

Test Date: **9/29/2010**



www.calspan.com

Calspan - Transportation Research Group

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>
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: **10:13:39 AM**

Test Date: **9/29/2010**

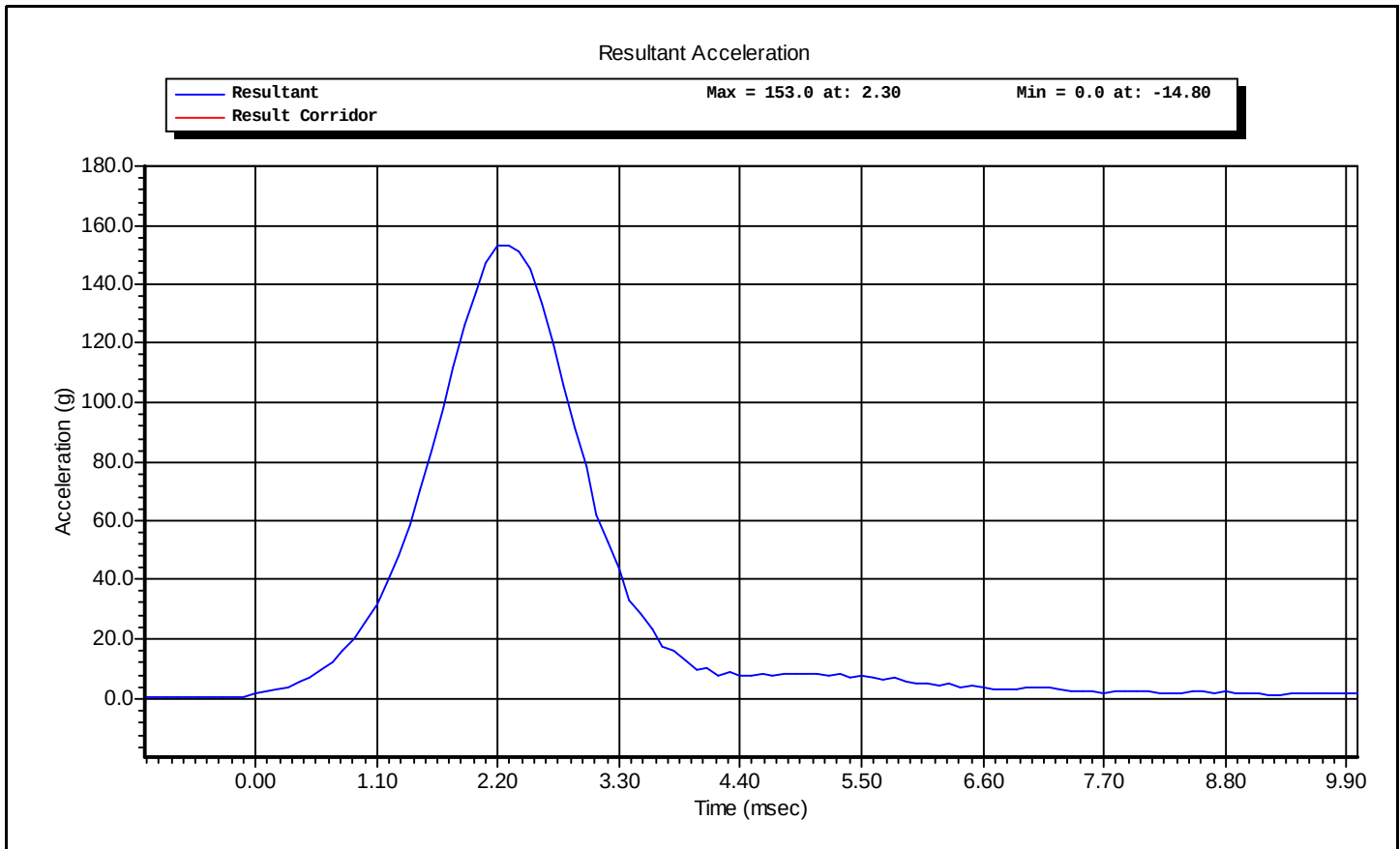


www.calspan.com

Calspan - Transportation Research Group

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

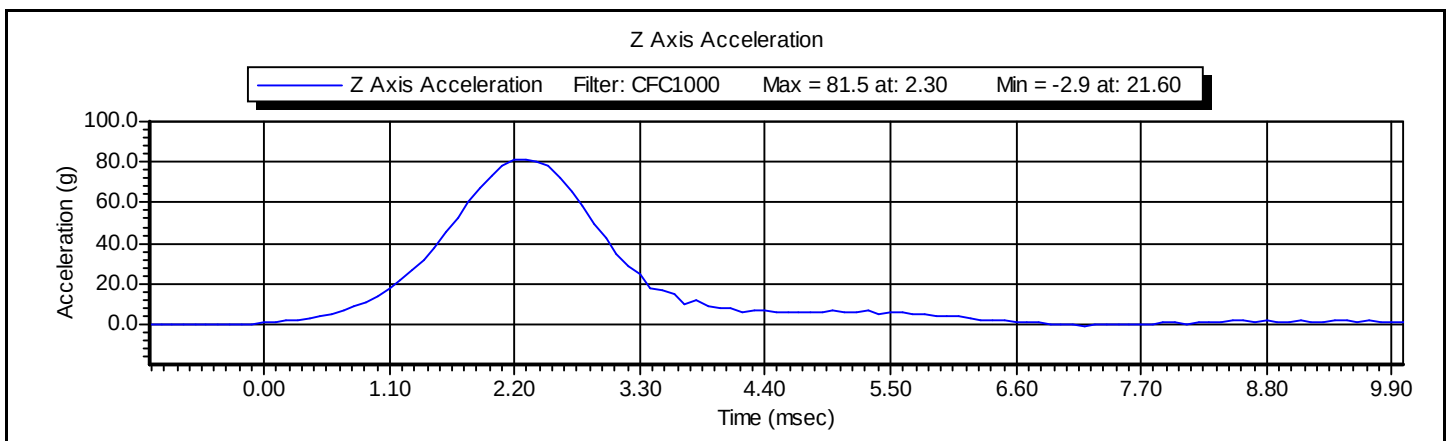
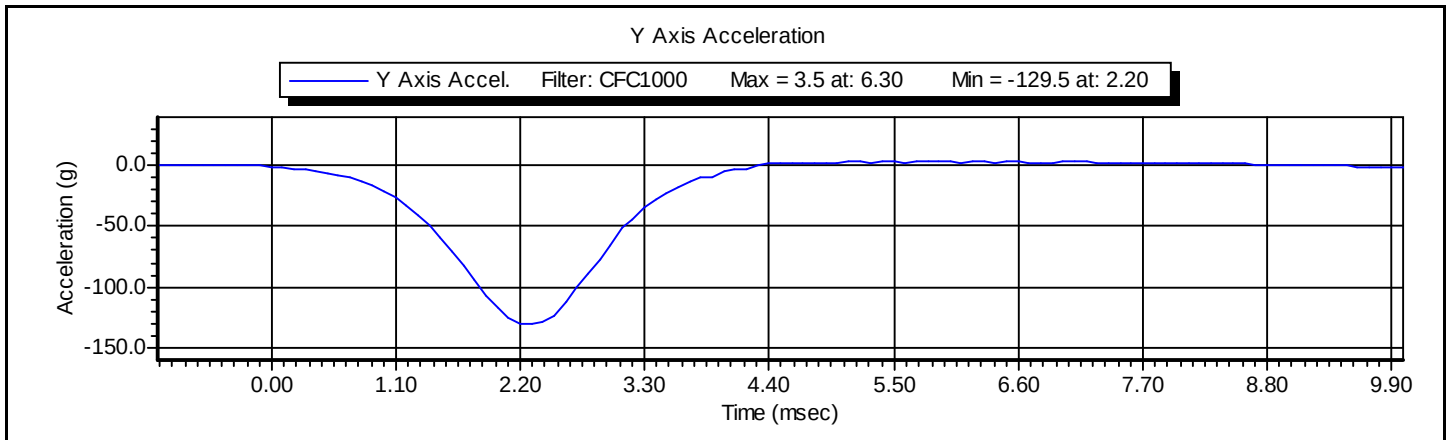
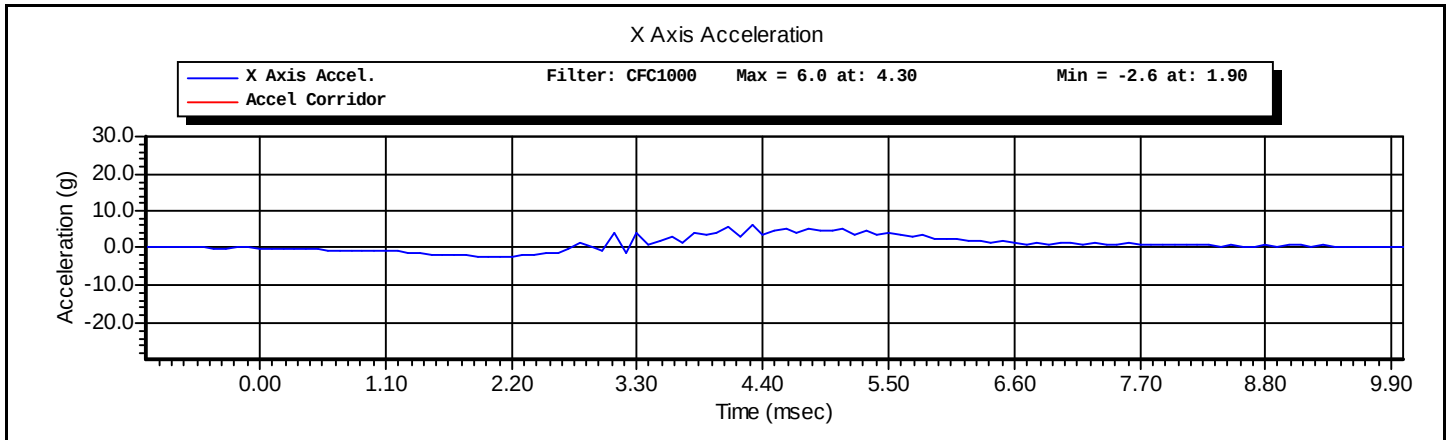
Test Name:	Head Drop	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Head Drop	Test Date:	9/29/2010
Test Number:	1	Test Time:	10:13:39 AM



Test ID: **Head Drop**

Test Time: **10:13:39 AM**

Test Date: **9/29/2010**





www.calspan.com

Calspan - Transportation Research Group

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

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:	9/29/2010
Test Number:	1	Test Time:	10:50:50 AM

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	53 %RH P
Velocity	3.30 -- 3.50	3.42 m/s P
Maximum Neck Flexion Angle	49.0 -- 59.0	52.6 degrees P
Time At Maximum Neck Flexion	54.0 -- 66.0	59.6 ms P
Decay to Zero Degrees	53.0 -- 88.0	58.5 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: **10:50:50 AM**

Test Date: **9/29/2010**



www.calspan.com

Calspan - Transportation Research Group

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: **10:50:50 AM**

Test Date: **9/29/2010**



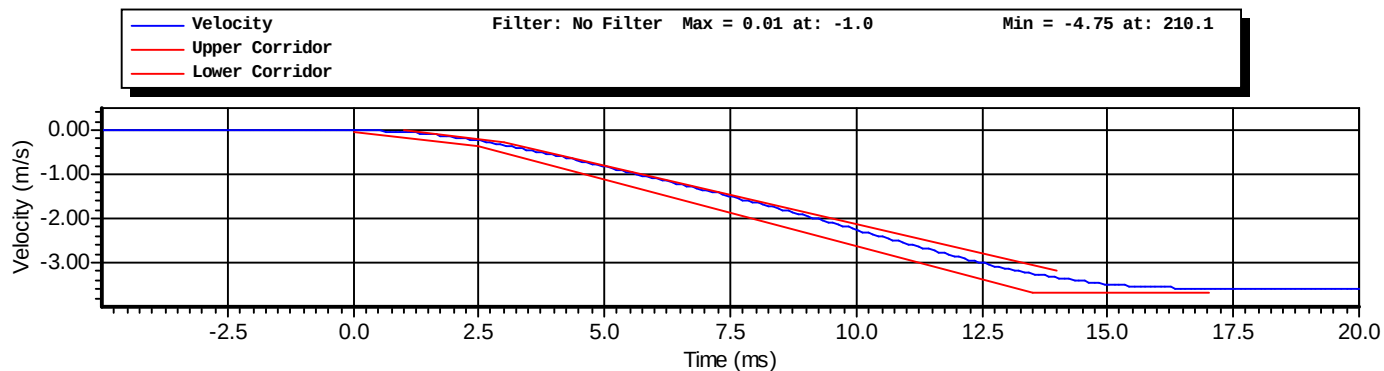
www.calspan.com

Calspan - Transportation Research Group

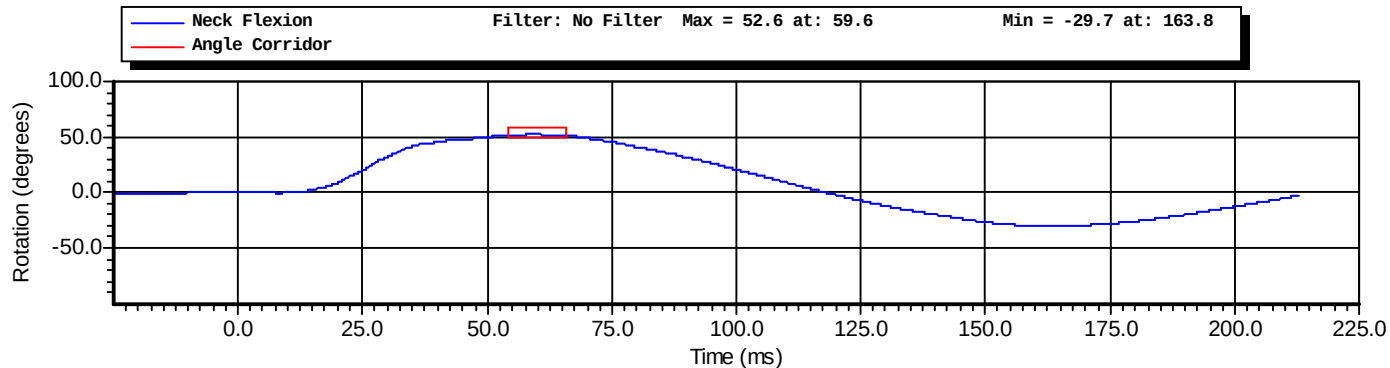
4455 Genesee Street, Buffalo, New York 14225 - Phone (716)632-7500

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:	9/29/2010
Test Number:	1	Test Time:	10:50:50 AM

Pendulum Velocity



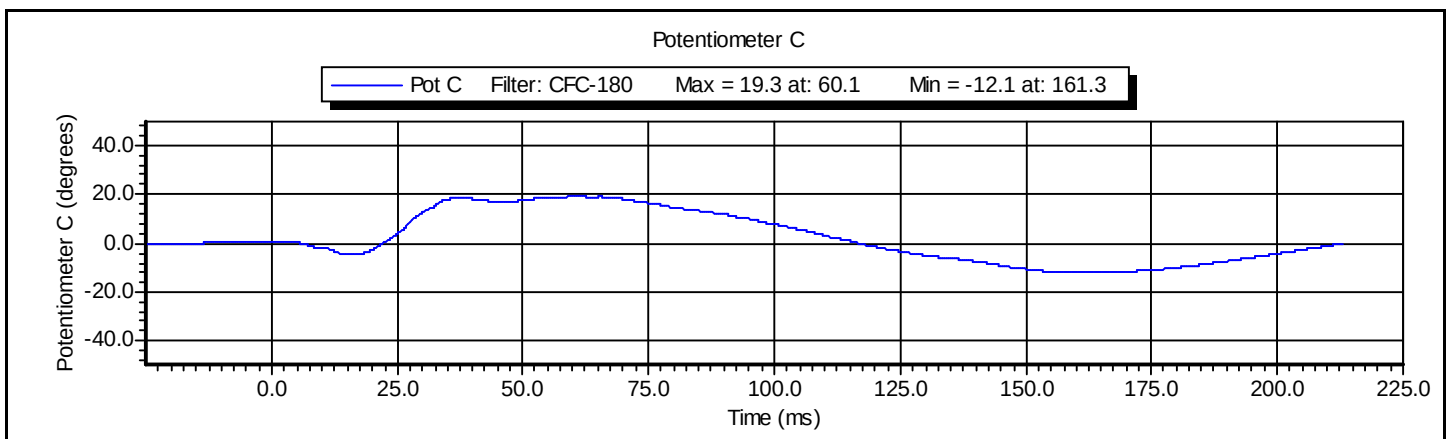
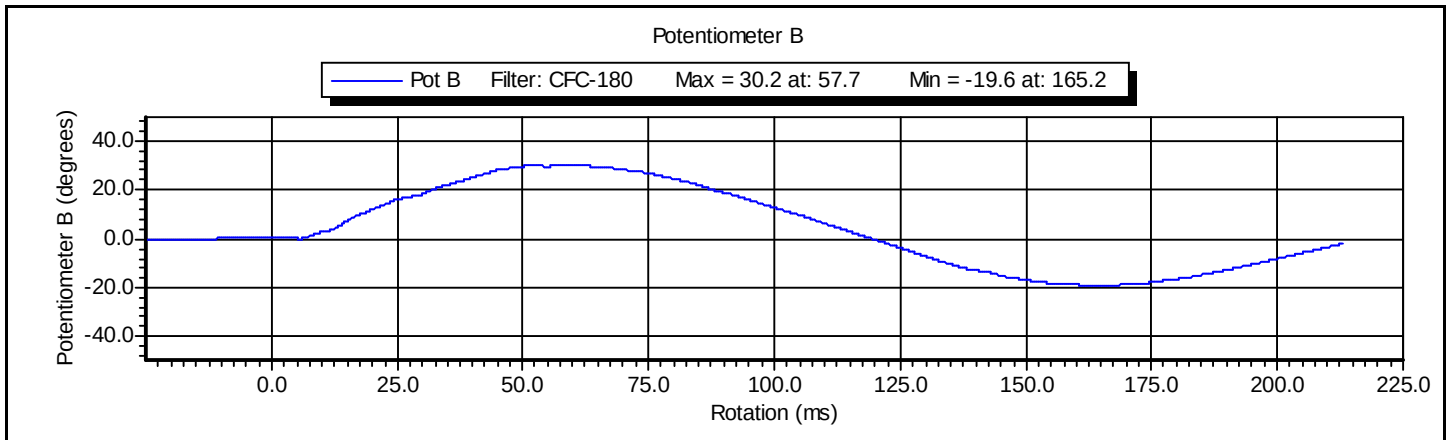
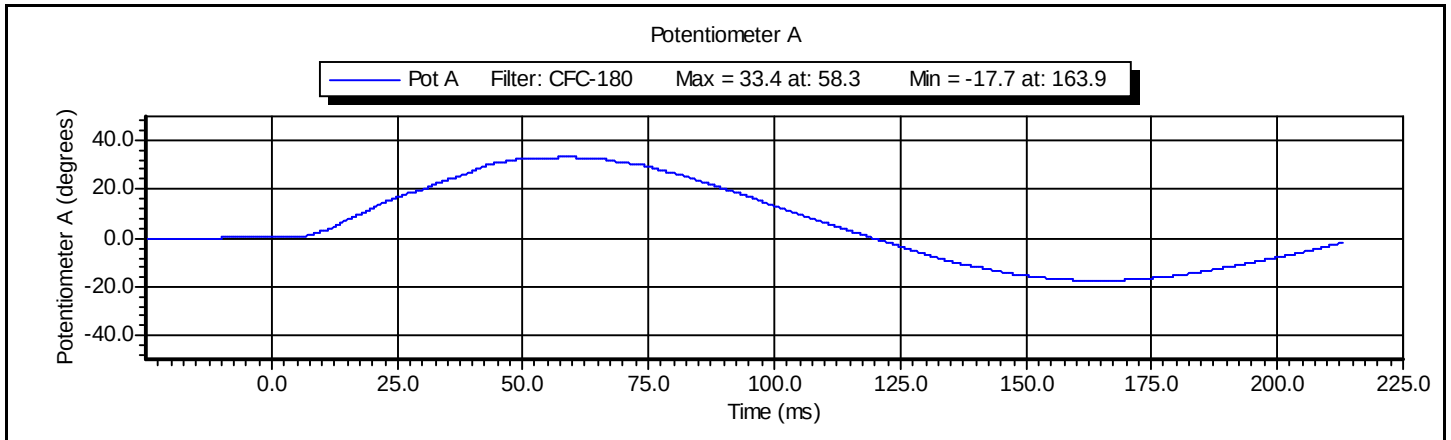
Neck Flexion Angle



Test ID: Neck Flexion

Test Time: 10:50:50 AM

Test Date: 9/29/2010





www.calspan.com

Calspan - Transportation Research Group

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

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:	9/29/2010
Test Number:	1	Test Time:	3:28:09 PM

Test Parameters	Test Specifications			Test Results	
Temperature	20.6	--	22.2	22.2 deg C	P
Humidity	10.0	--	70.0	51.0 %RH	P
Velocity	4.20	--	4.40	4.33 m/s	P
Pendulum Acceleration	-10.50	--	-7.50	-9.59 g	P

All test parameters are within specifications

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

Test ID: **Shoulder**

Test Time: **3:28:09 PM**

Test Date: **9/29/2010**



www.calspan.com

Calspan - Transportation Research Group

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	7264-2000	P66927	4/20/2010

Test ID: **Shoulder**

Test Time: **3:28:09 PM**

Test Date: **9/29/2010**

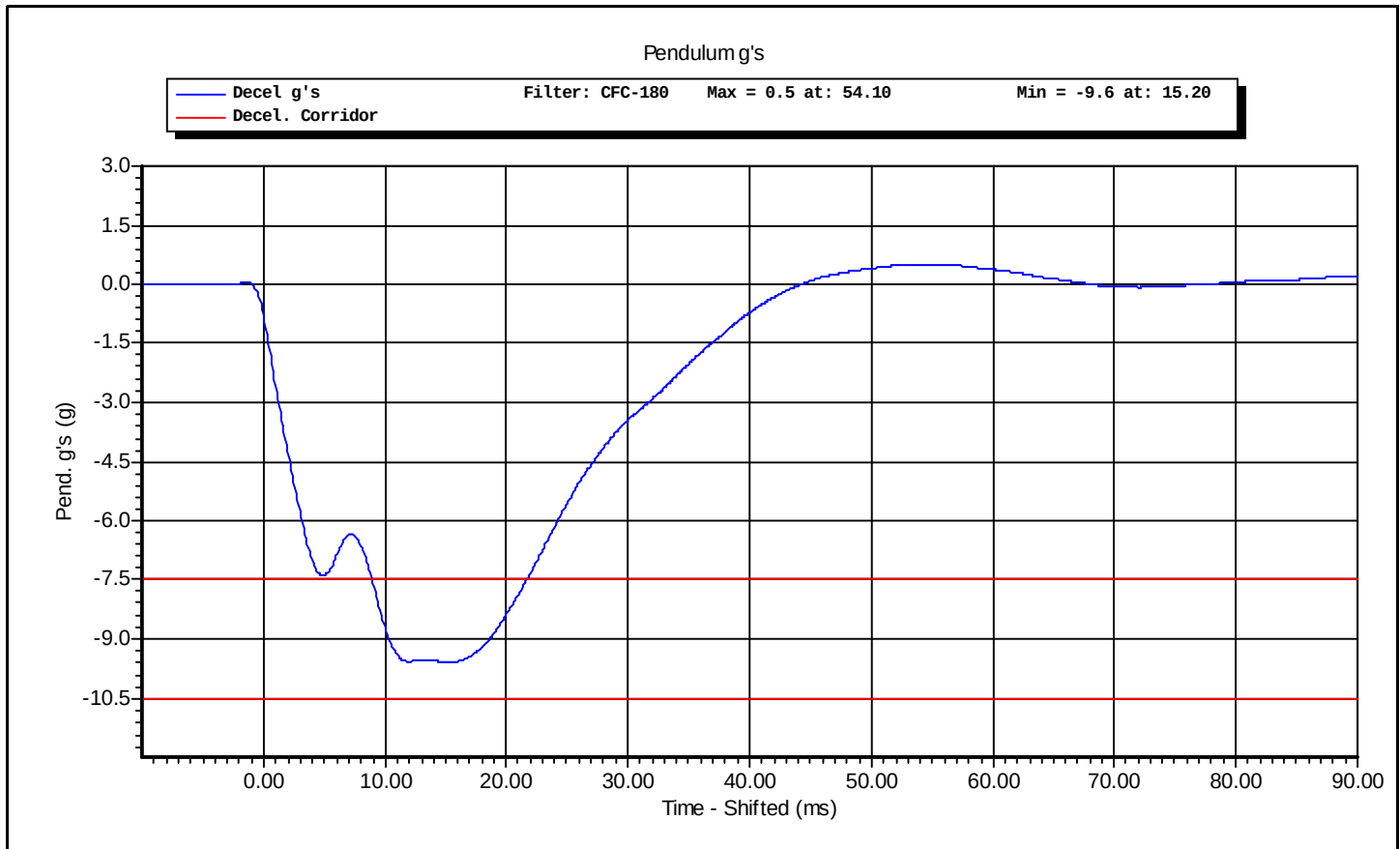


www.calspan.com

Calspan - Transportation Research Group

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

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:	9/29/2010
Test Number:	1	Test Time:	3:28:09 PM



Test ID: **Shoulder**

Test Time: **3:28:09 PM**

Test Date: **9/29/2010**



www.calspan.com

Calspan - Transportation Research Group

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

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:	9/29/2010
Test Number:	1	Test Time:	1:26:14 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	52.0 %RH P
Velocity	3.90 -- 4.10	3.97 m/s P
Rib Displacement	-51.00 -- -46.00	-48.63 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: **Lower Rib 4 m/s**

Test Time: **1:26:14 PM**

Test Date: **9/29/2010**



www.calspan.com

Calspan - Transportation Research Group

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>
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: **1:26:14 PM**

Test Date: **9/29/2010**

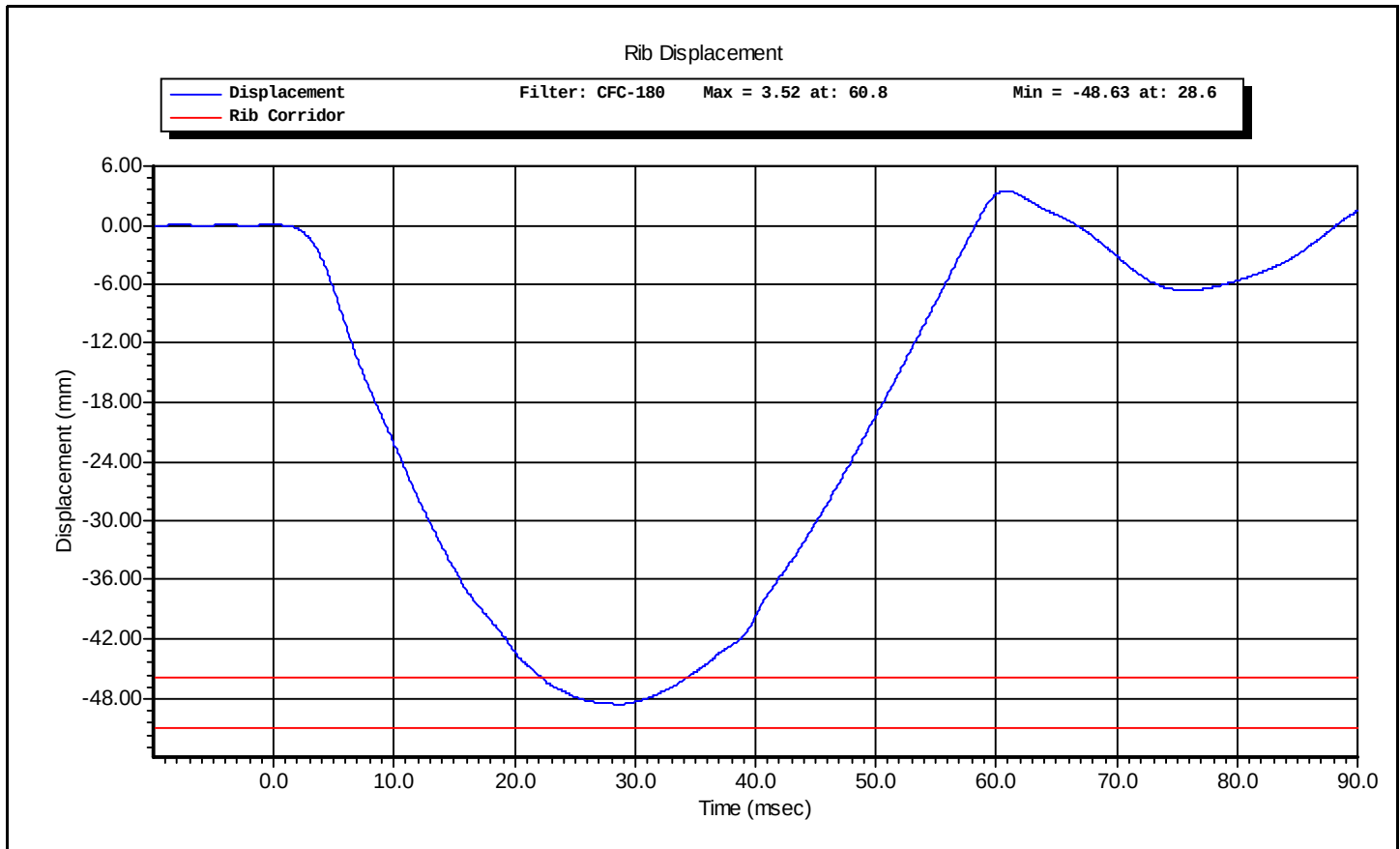


www.calspan.com

Calspan - Transportation Research Group

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

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:	9/29/2010
Test Number:	1	Test Time:	1:26:14 PM



Test ID: Lower Rib 4 m/s Test Time: 1:26:14 PM

Test Date: 9/29/2010



www.calspan.com

Calspan - Transportation Research Group

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

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:	9/29/2010
Test Number:	1	Test Time:	1:33:55 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	52.0 %RH P
Velocity	2.90 -- 3.10	2.96 m/s P
Rib Displacement	-40.00 -- -36.00	-38.08 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: **Lower Rib 3 m/s**

Test Time: **1:33:55 PM**

Test Date: **9/29/2010**



www.calspan.com

Calspan - Transportation Research Group

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>
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: **1:33:55 PM**

Test Date: **9/29/2010**

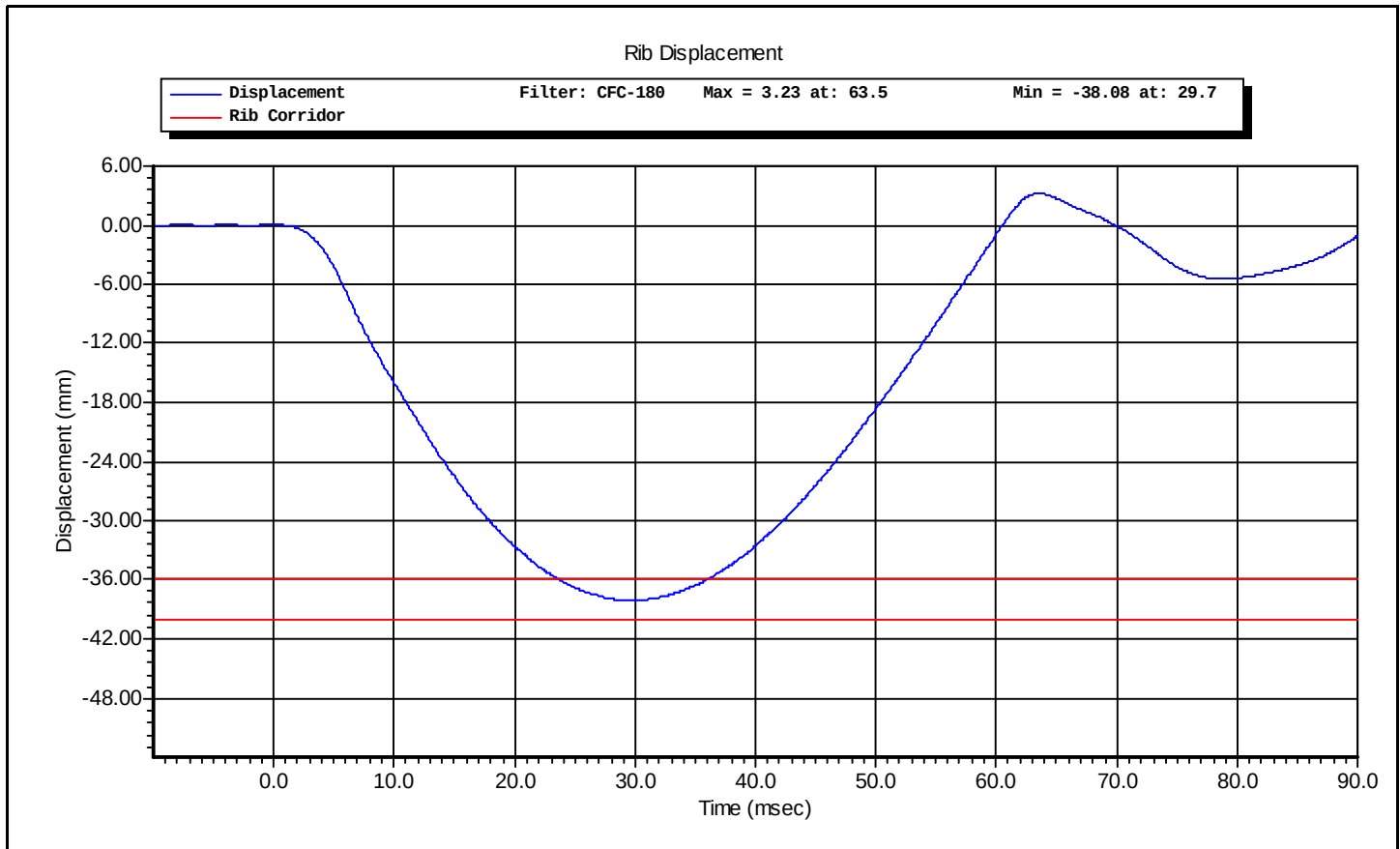


www.calspan.com

Calspan - Transportation Research Group

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

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:	9/29/2010
Test Number:	1	Test Time:	1:33:55 PM



Test ID: Lower Rib 3 m/s Test Time: 1:33:55 PM

Test Date: 9/29/2010



www.calspan.com

Calspan - Transportation Research Group

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

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:	9/29/2010
Test Number:	1	Test Time:	12:54:26 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	50.0 %RH P
Velocity	3.90 -- 4.10	3.99 m/s P
Rib Displacement	-51.00 -- -46.00	-47.96 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: **12:54:26 PM**

Test Date: **9/29/2010**



www.calspan.com

Calspan - Transportation Research Group

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>
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: **12:54:26 PM**

Test Date: **9/29/2010**

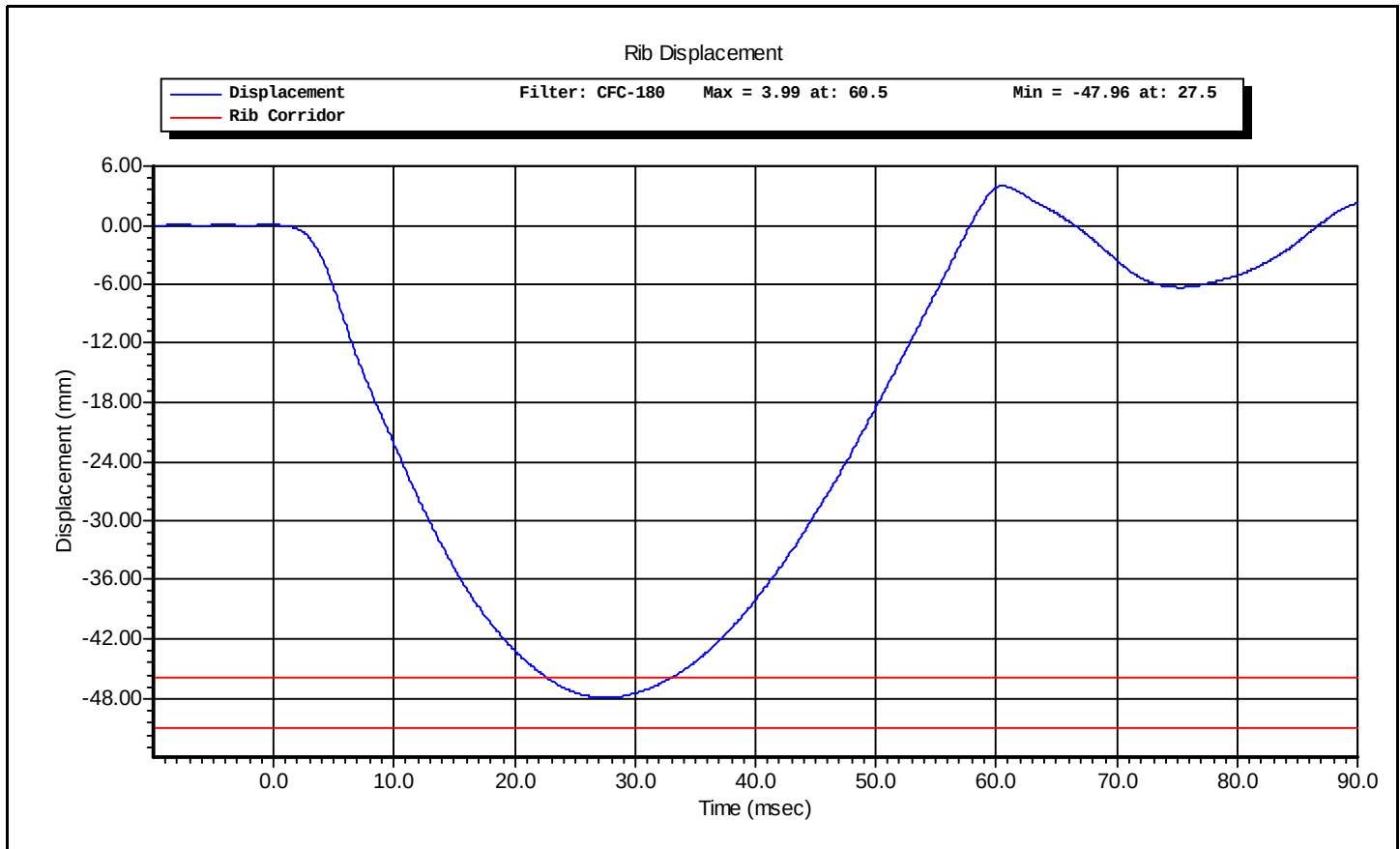


www.calspan.com

Calspan - Transportation Research Group

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

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:	9/29/2010
Test Number:	1	Test Time:	12:54:26 PM



Test ID: Middle Rib 4 m/s Test Time: 12:54:26 PM

Test Date: 9/29/2010



www.calspan.com

Calspan - Transportation Research Group

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

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:	9/29/2010
Test Number:	1	Test Time:	1:12:19 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	52.0 %RH P
Velocity	2.90 -- 3.10	2.97 m/s P
Rib Displacement	-40.00 -- -36.00	-37.57 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: **1:12:19 PM**

Test Date: **9/29/2010**



www.calspan.com

Calspan - Transportation Research Group

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>
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: **1:12:19 PM**

Test Date: **9/29/2010**

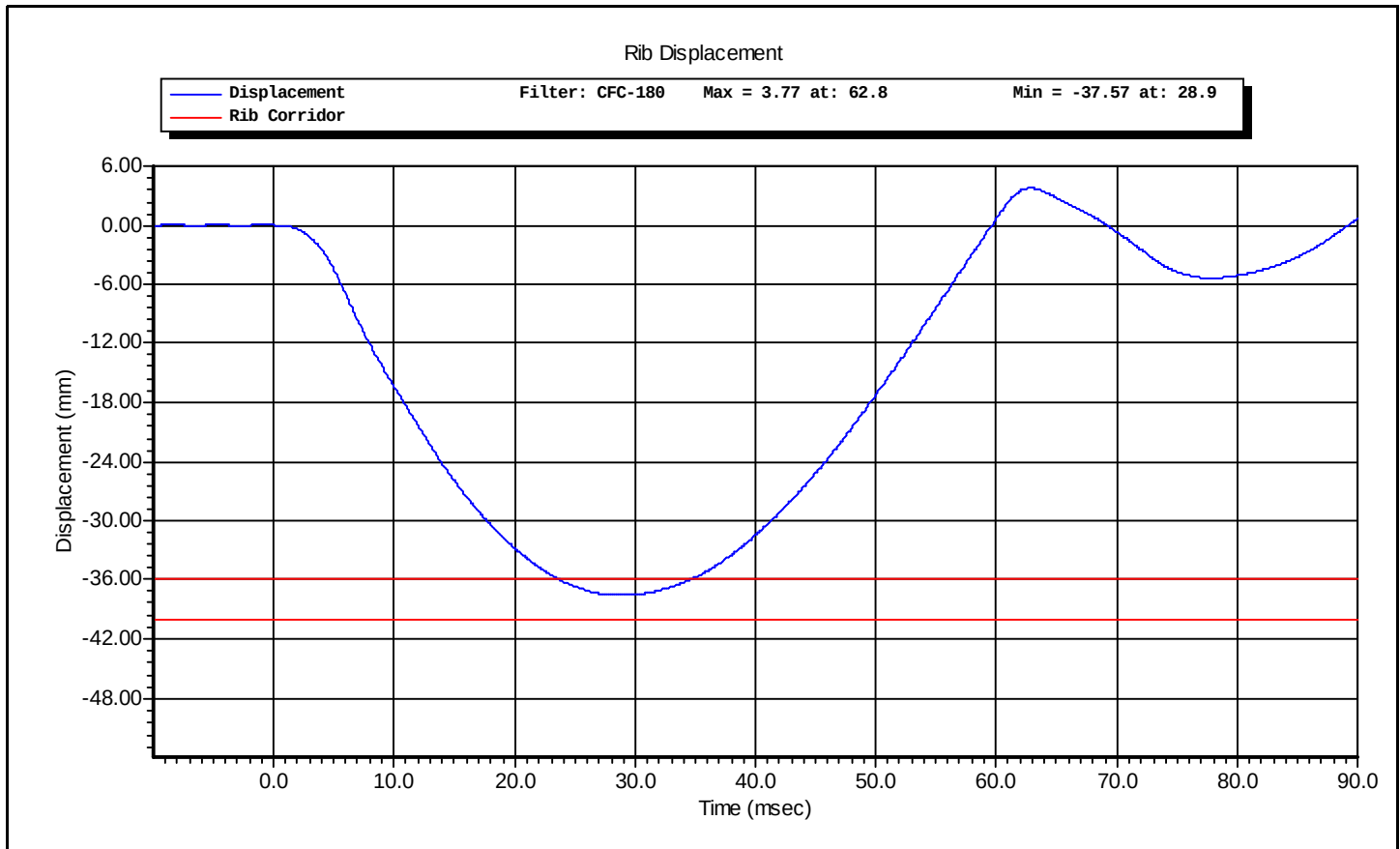


www.calspan.com

Calspan - Transportation Research Group

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

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:	9/29/2010
Test Number:	1	Test Time:	1:12:19 PM



Test ID: **Middle Rib 3 m/s** Test Time: **1:12:19 PM**

Test Date: **9/29/2010**



www.calspan.com

Calspan - Transportation Research Group

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

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:	9/29/2010
Test Number:	1	Test Time:	11:57:15 AM

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	52.0 %RH P
Velocity	3.90 -- 4.10	3.96 m/s P
Rib Displacement	-51.00 -- -46.00	-48.96 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: **Upper Rib 4 m/s**

Test Time: **11:57:15 AM**

Test Date: **9/29/2010**



www.calspan.com

Calspan - Transportation Research Group

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>
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: **11:57:15 AM**

Test Date: **9/29/2010**

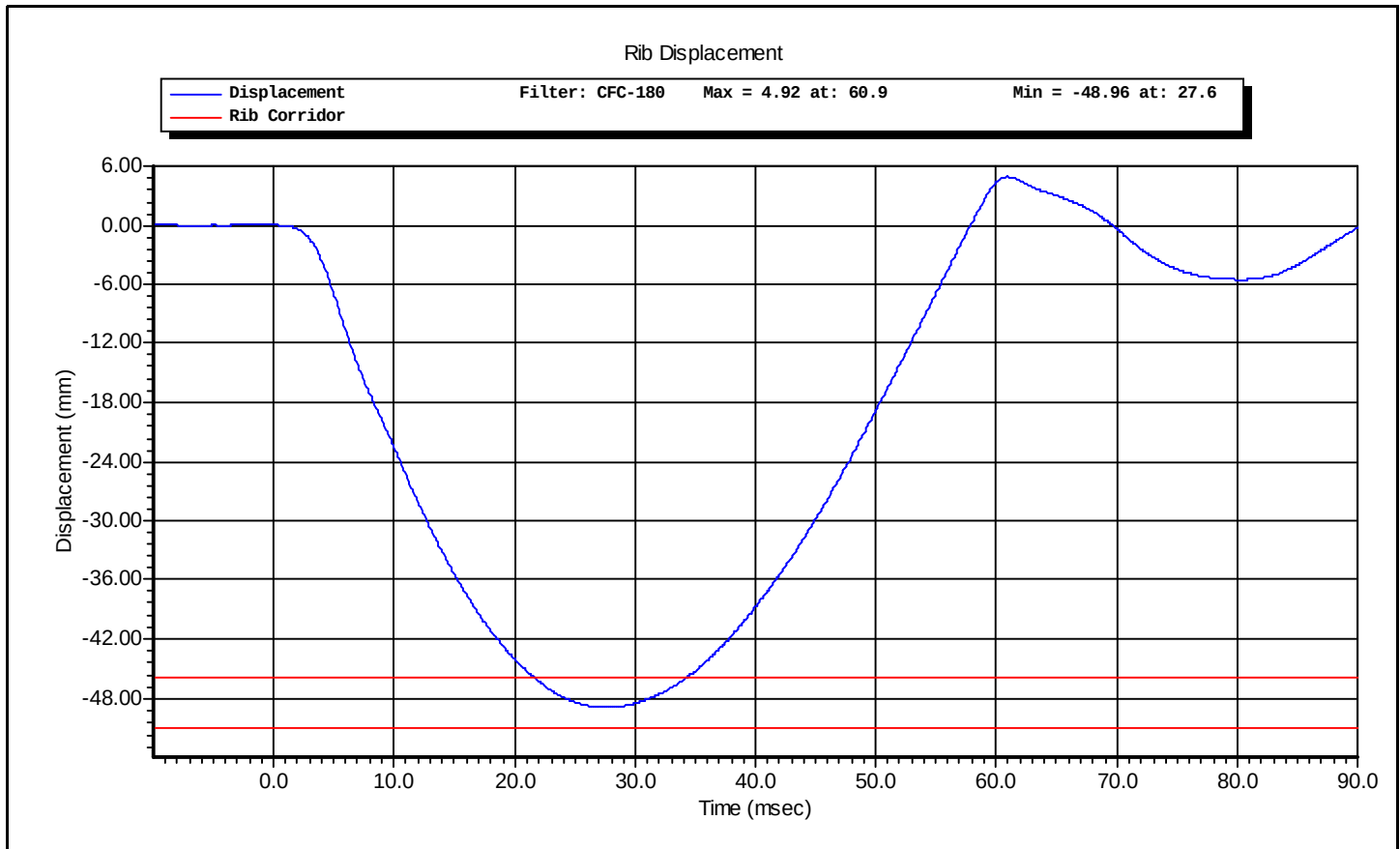


www.calspan.com

Calspan - Transportation Research Group

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

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:	9/29/2010
Test Number:	1	Test Time:	11:57:15 AM



Test ID: Upper Rib 4 m/s Test Time: 11:57:15 AM

Test Date: 9/29/2010



www.calspan.com

Calspan - Transportation Research Group

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

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 3.0 m/s	Test Date:	9/29/2010
Test Number:	1	Test Time:	12:03:45 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	53.0 %RH P
Velocity	2.90 -- 3.10	2.98 m/s P
Rib Displacement	-40.00 -- -36.00	-37.82 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 3.0 m/s** Test Time: **12:03:45 PM**

Test Date: **9/29/2010**



www.calspan.com

Calspan - Transportation Research Group

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>
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 3.0 m/s** Test Time: **12:03:45 PM**

Test Date: **9/29/2010**

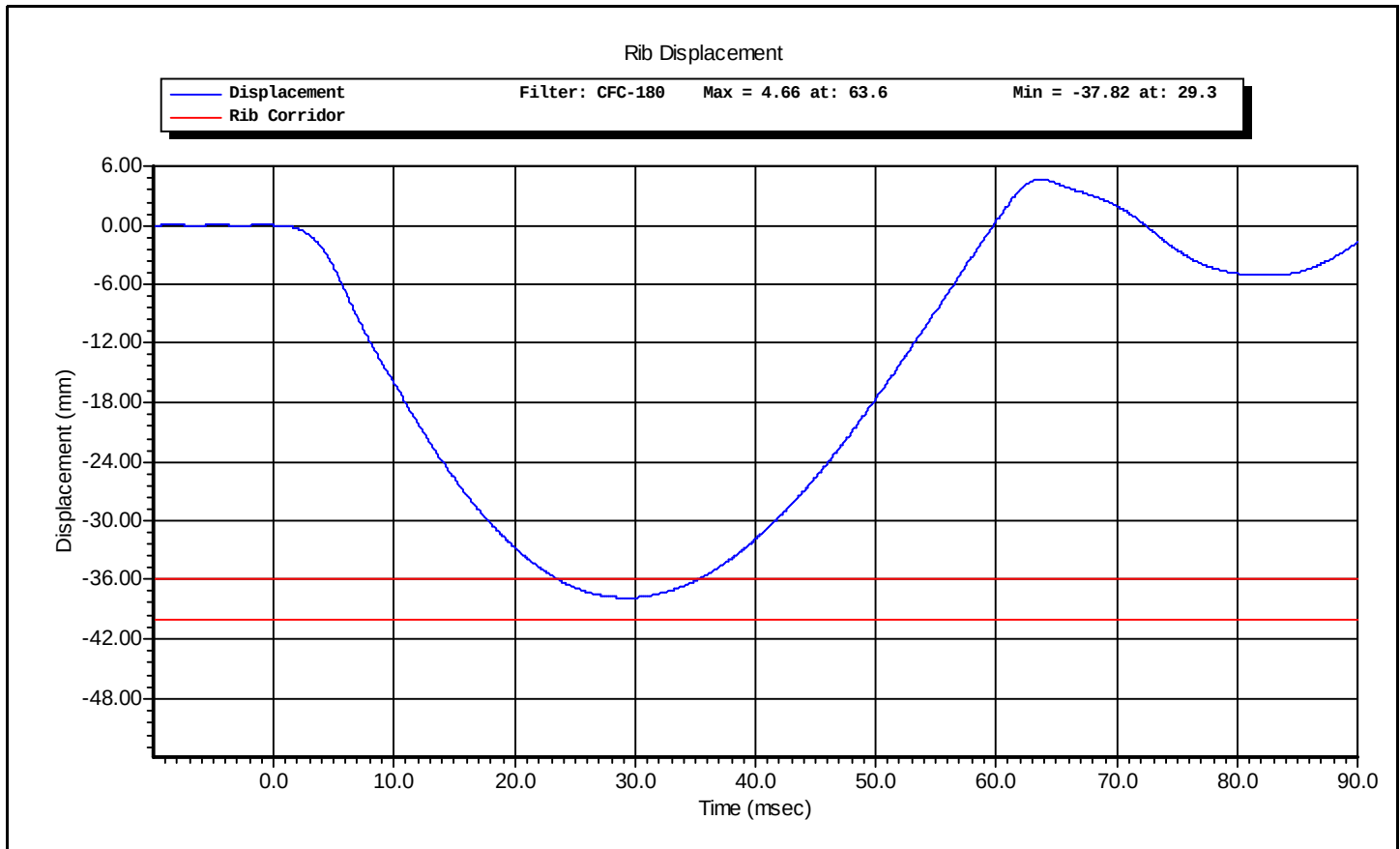


www.calspan.com

Calspan - Transportation Research Group

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

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 3.0 m/s	Test Date:	9/29/2010
Test Number:	1	Test Time:	12:03:45 PM



Test ID: Upper Rib 3.0 m/s Test Time: 12:03:45 PM

Test Date: 9/29/2010



www.calspan.com

Calspan - Transportation Research Group

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

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:	9/29/2010
Test Number:	1	Test Time:	2:48:50 PM

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.2 deg C P
Humidity	10.0 -- 70.0	52.0 %RH P
Velocity	5.40 -- 5.60	5.49 m/s P
Upper Rib Displacement	34.0 -- 41.0	37.1 mm P
Middle Rib Displacement	37.0 -- 45.0	41.0 mm P
Lower Rib Displacement	37.0 -- 44.0	41.0 mm P
Impactor Force	5100 -- 6200	5216 N P

All test parameters are within specifications

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

Test ID: **Thorax**

Test Time: **2:48:50 PM**

Test Date: **9/29/2010**



www.calspan.com

Calspan - Transportation Research Group

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	7264-2000	P66927	4/20/2010
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: **2:48:50 PM**

Test Date: **9/29/2010**

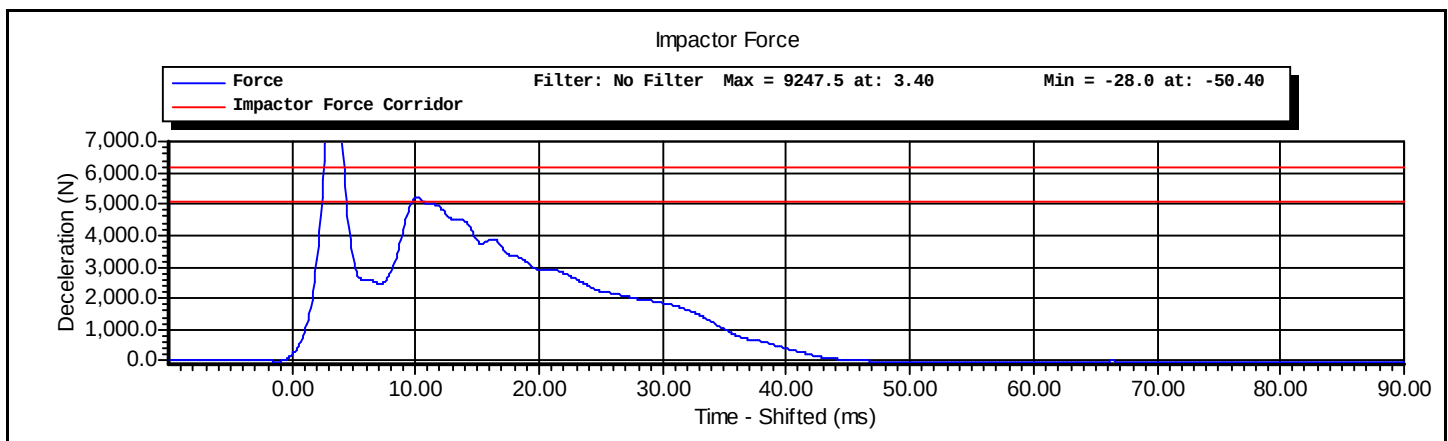
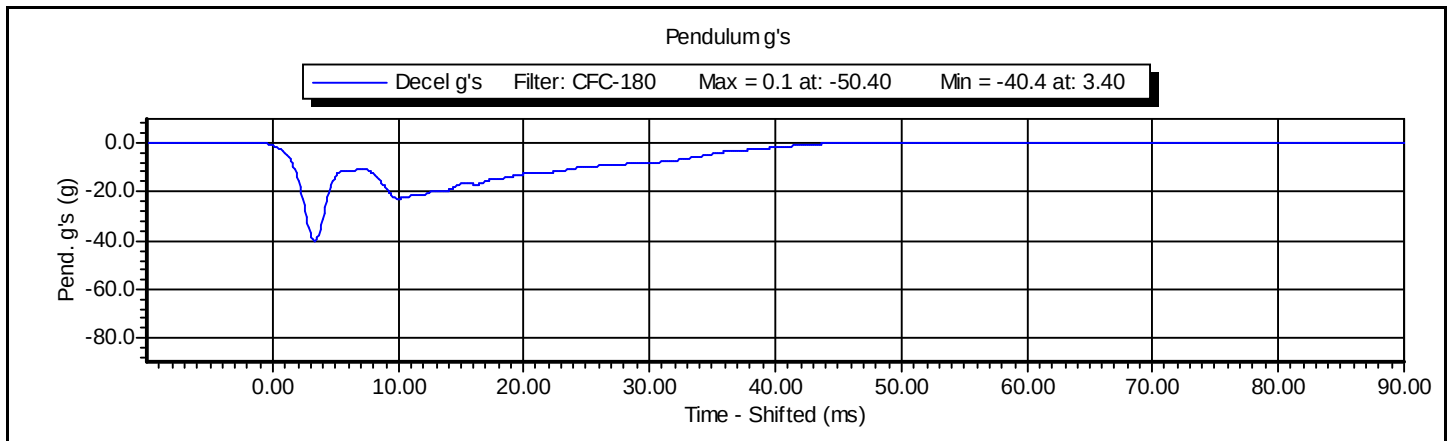


www.calspan.com

Calspan - Transportation Research Group

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

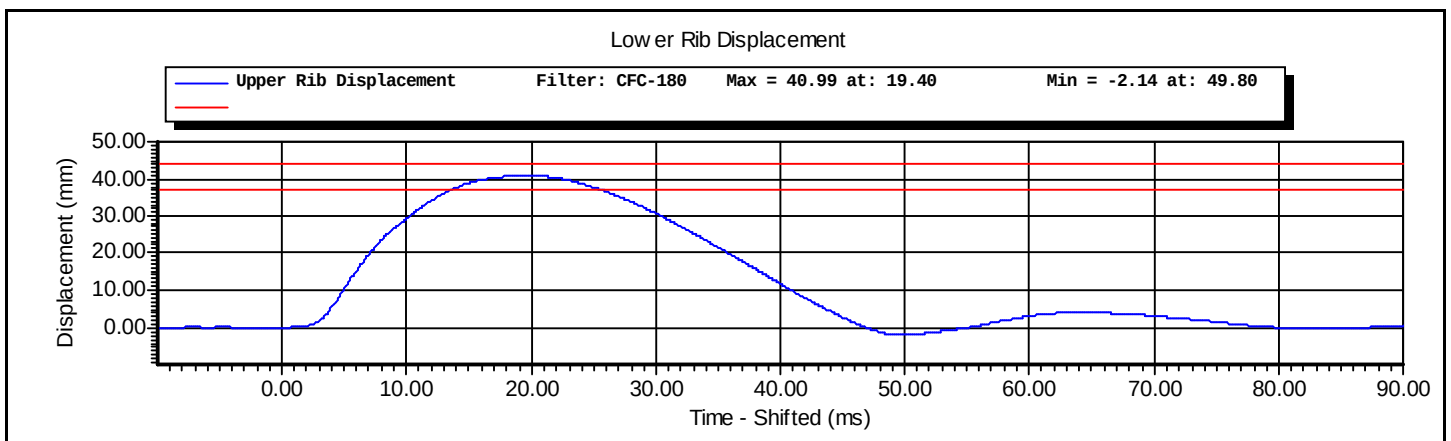
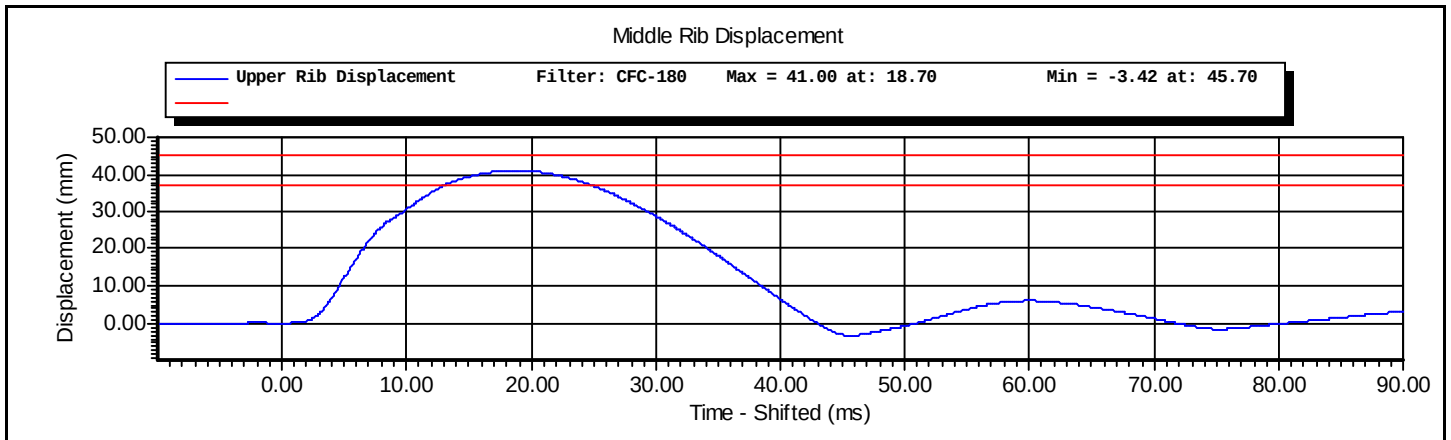
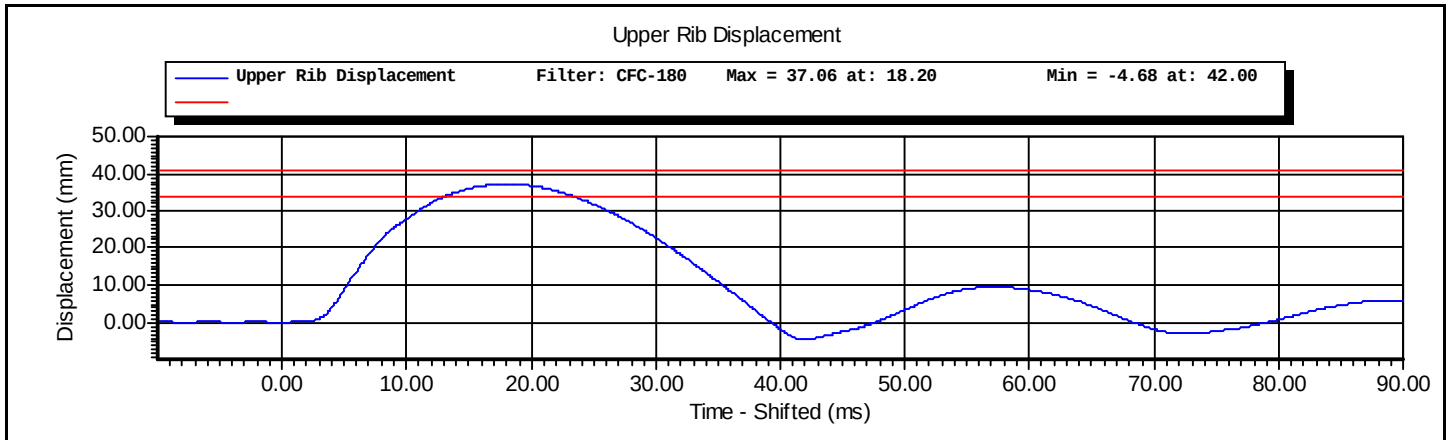
Test Name:	Thorax Impact	Revision:	8/15/2008
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Thorax	Test Date:	9/29/2010
Test Number:	1	Test Time:	2:48:50 PM



Test ID: **Thorax**

Test Time: **2:48:50 PM**

Test Date: **9/29/2010**





www.calspan.com

Calspan - Transportation Research Group

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

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:	9/29/2010
Test Number:	1	Test Time:	2:24:10 PM

Test Parameters	Test Specifications			Test Results	
Temperature	20.6	--	22.2	22.2 deg C	P
Humidity	10	--	70	50 %RH	P
Velocity	3.90	--	4.10	4.02 m/s	P
Peak Abdominal Force	-2.70	--	-2.20	-2.46 kN	P
Time At Peak Abdominal Force	10.0	--	12.3	11.7 ms	P
Maximum Pendulum Force	-4.80	--	-4.00	-4.22 kN	P
Time at Peak Pendulum Force	10.6	--	13.0	12.0 ms	P

All test parameters are within specifications

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

Test ID: **Abdomen**

Test Time: **2:24:10 PM**

Test Date: **9/29/2010**



www.calspan.com

Calspan - Transportation Research Group

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	7264-2000	P66927	4/20/2010
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: **2:24:10 PM**

Test Date: **9/29/2010**

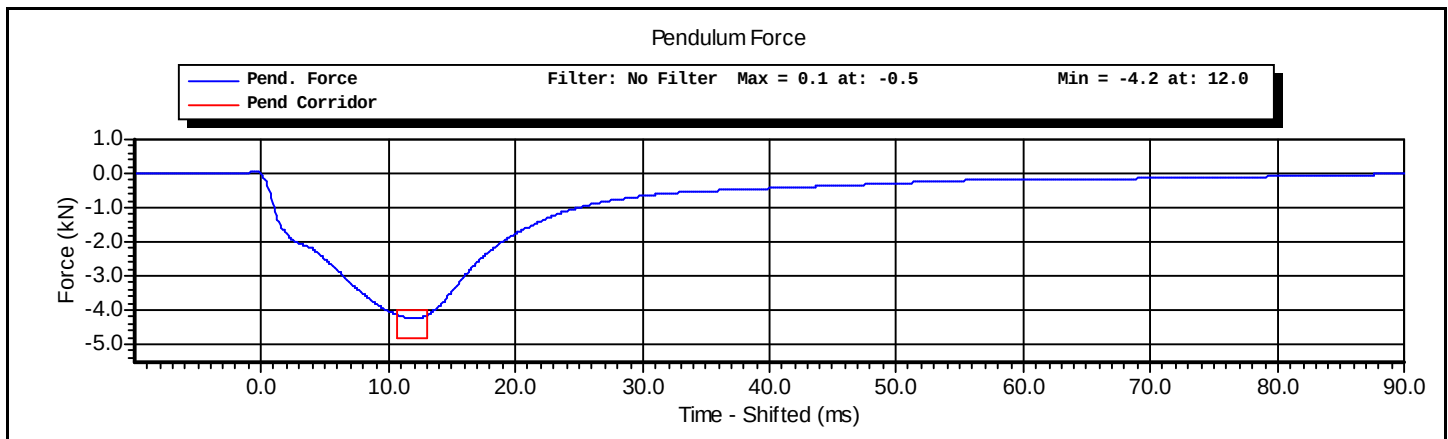
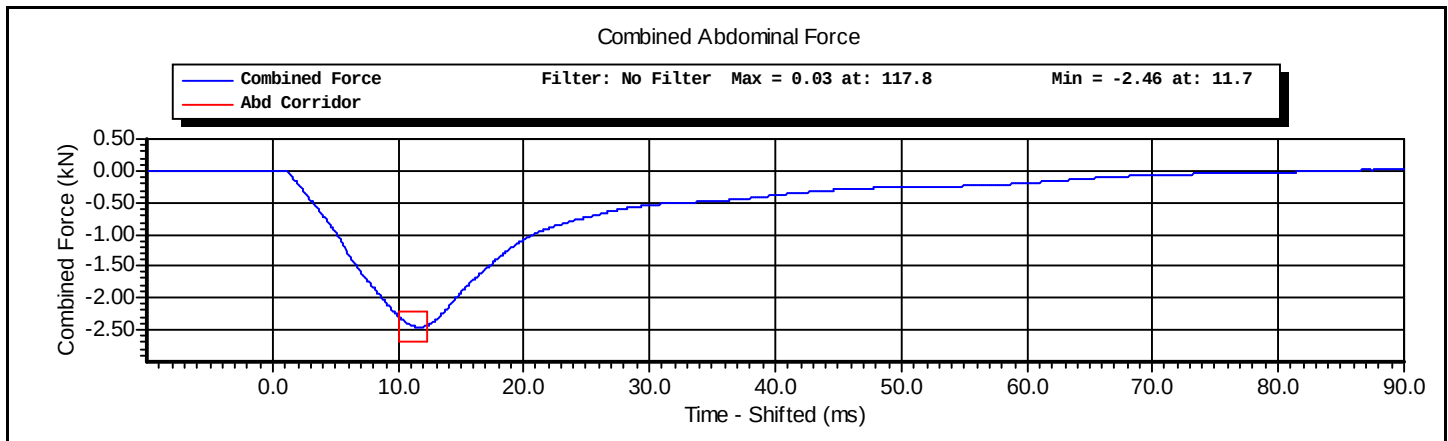


www.calspan.com

Calspan - Transportation Research Group

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

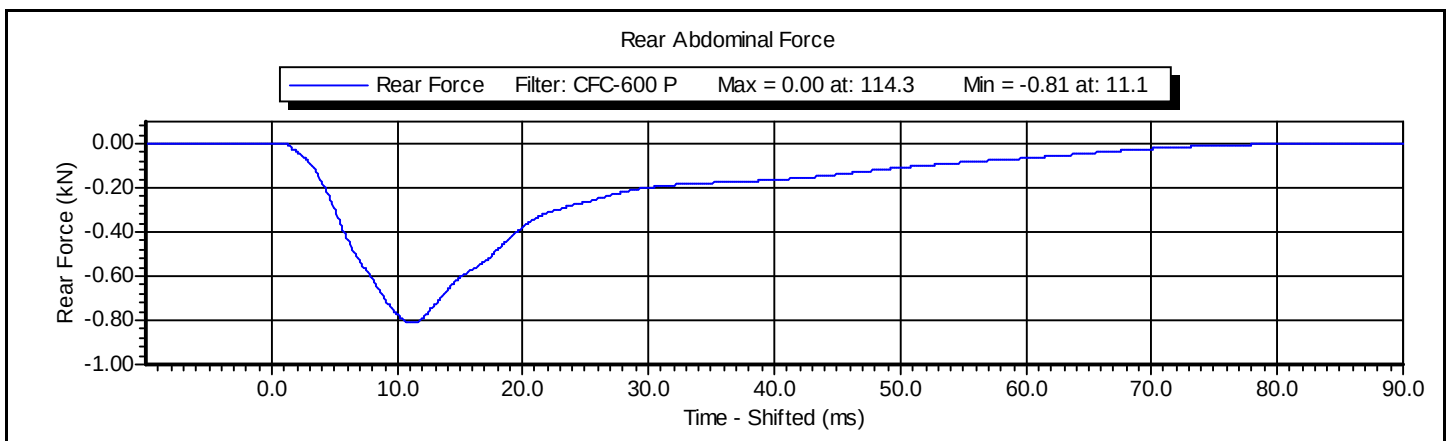
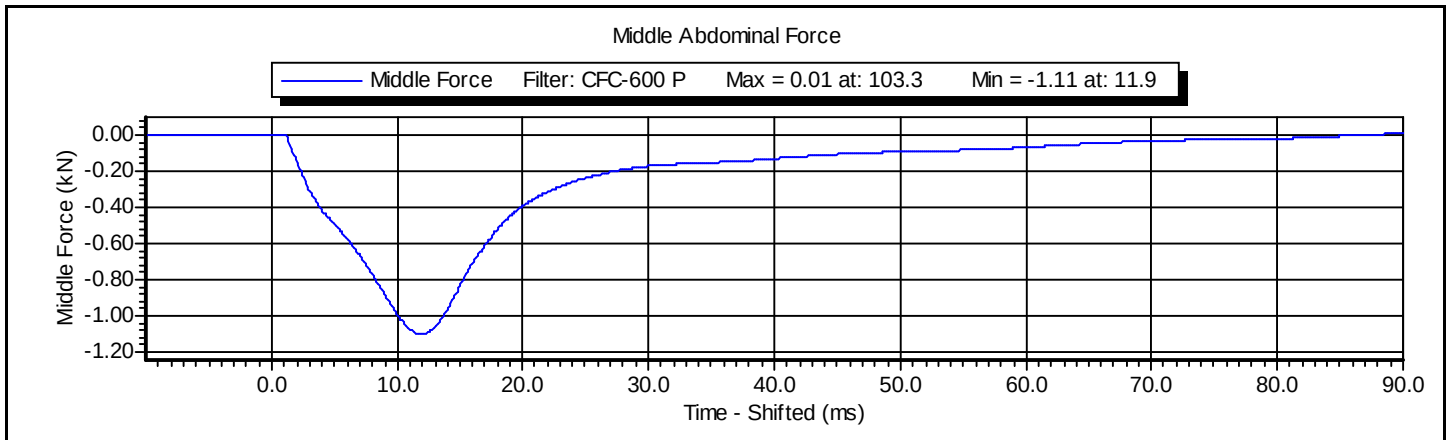
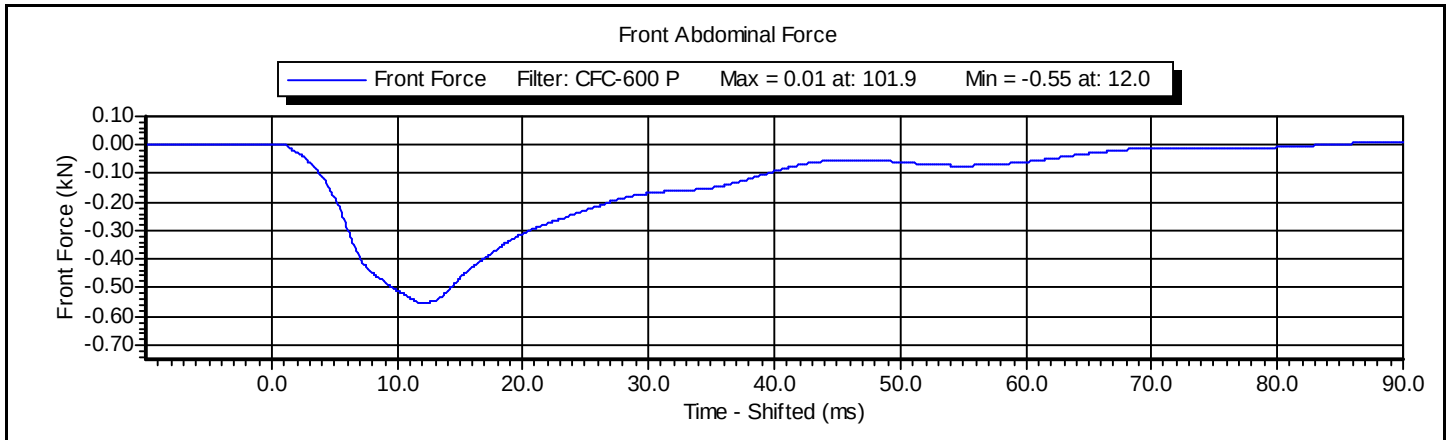
Test Name:	Abdominal Impact	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Abdomen	Test Date:	9/29/2010
Test Number:	1	Test Time:	2:24:10 PM



Test ID: **Abdomen**

Test Time: **2:24:10 PM**

Test Date: **9/29/2010**





www.calspan.com

Calspan - Transportation Research Group

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

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:	9/29/2010
Test Number:	1	Test Time:	11:21:23 AM

Component Part Number	Component Serial Number
175-5501	19-0545

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.2 deg C P
Humidity	10 -- 70	52 %RH P
Velocity	5.95 -- 6.15	6.14 m/s P
Maximum Headform Flexion Angle	45.0 -- 55.0	46.3 degrees P
Time at Maximum Headform Flexion Angle	39.0 -- 53.0	41.9 ms P
Decay to Zero Degrees	37.0 -- 57.0	39.2 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: **11:21:23 AM**

Test Date: **9/29/2010**



www.calspan.com

Calspan - Transportation Research Group

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: **Lumbar Spine**

Test Time: **11:21:23 AM**

Test Date: **9/29/2010**



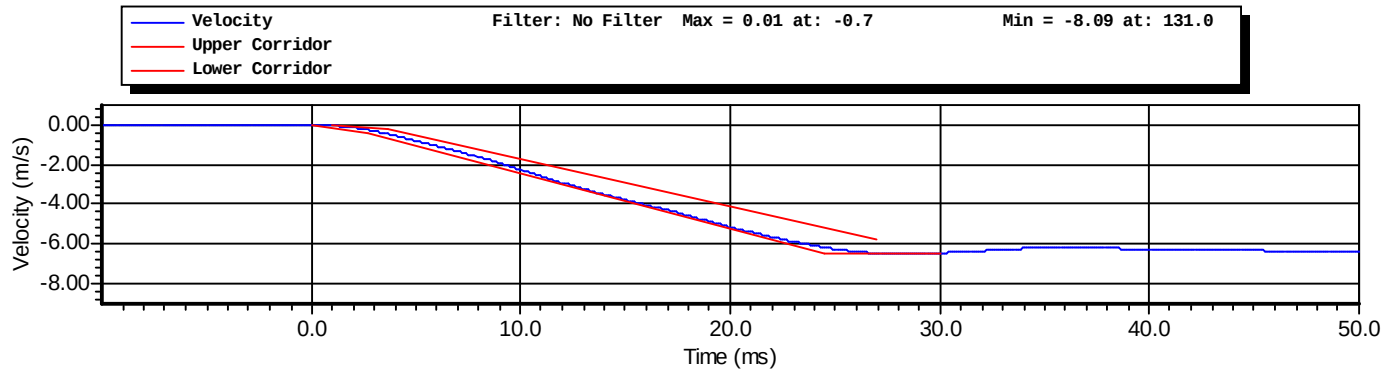
www.calspan.com

Calspan - Transportation Research Group

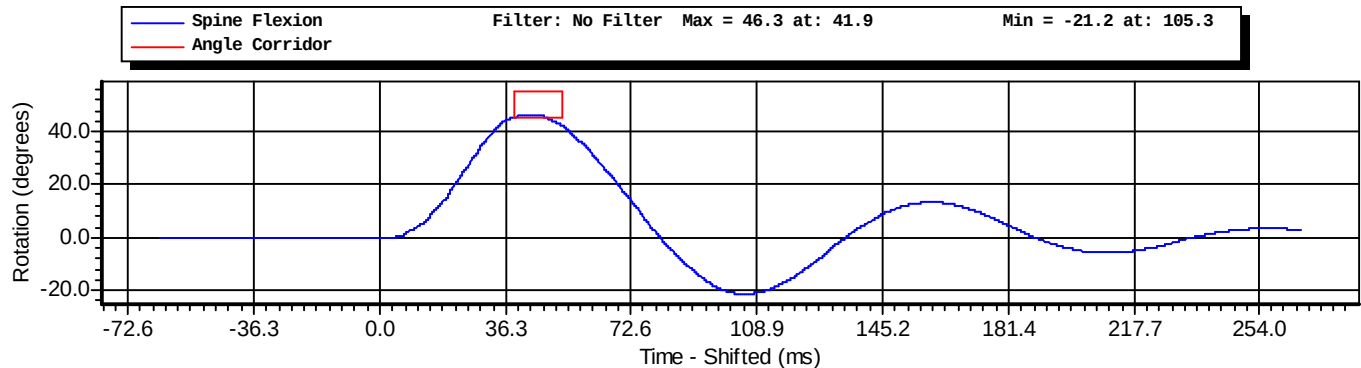
4455 Genesee Street, Buffalo, New York 14225 - Phone (716)632-7500

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:	9/29/2010
Test Number:	1	Test Time:	11:21:23 AM

Pendulum Velocity



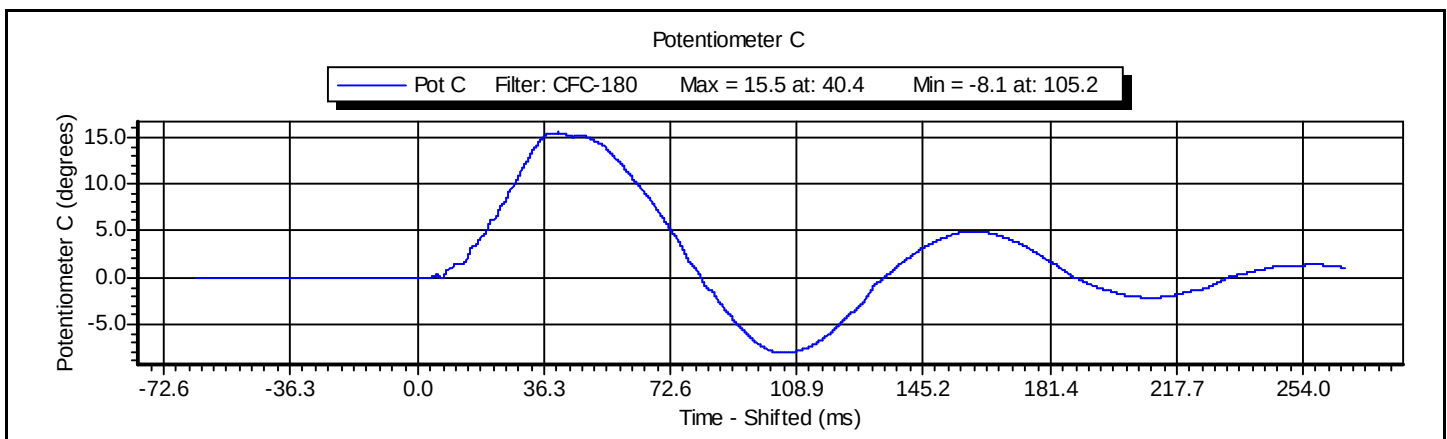
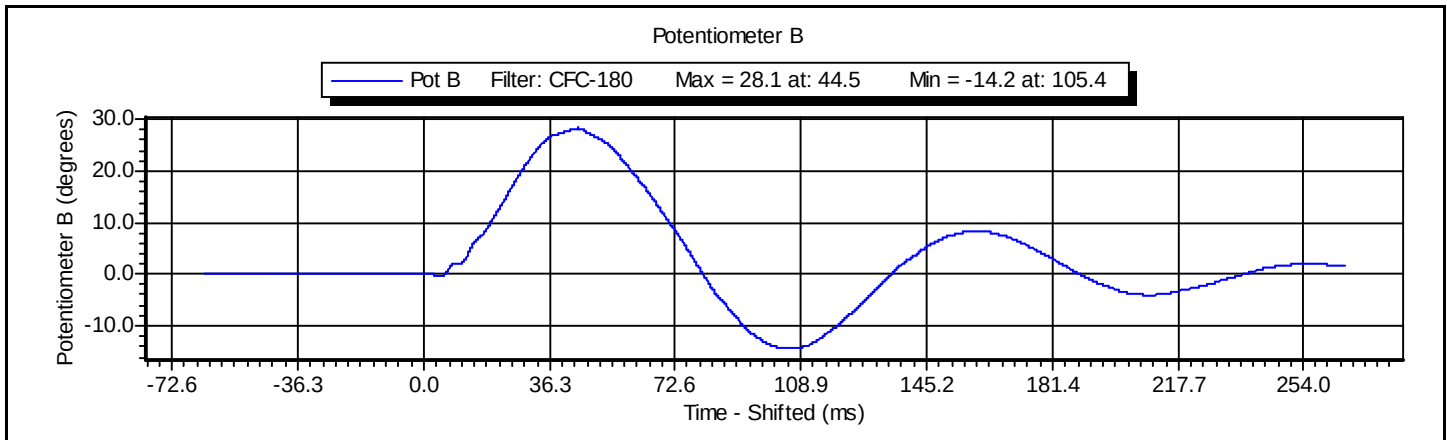
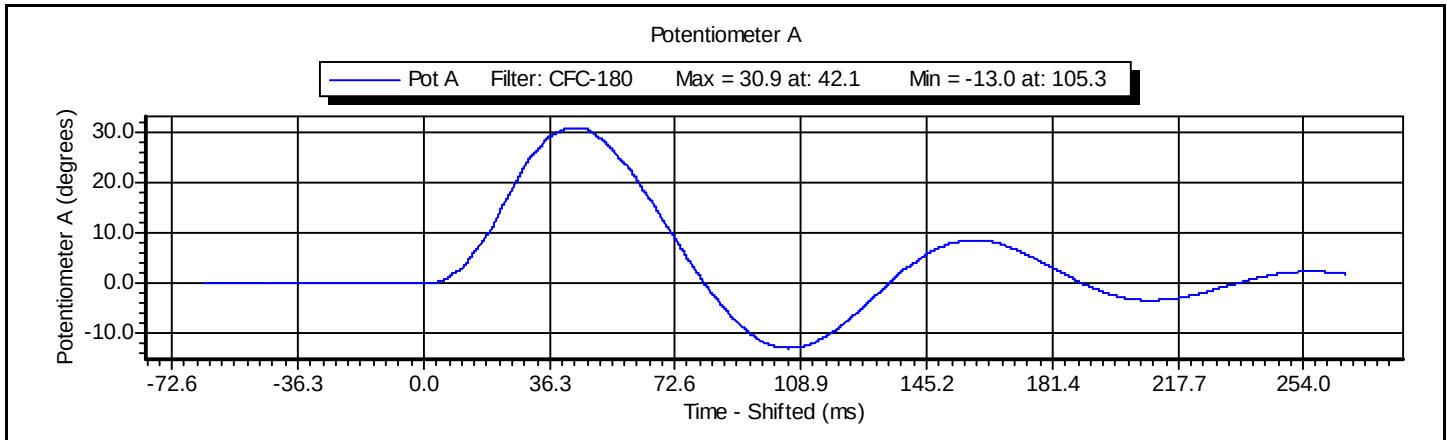
Spine Flexion Angle



Test ID: Lumbar Spine

Test Time: 11:21:23 AM

Test Date: 9/29/2010





www.calspan.com

Calspan - Transportation Research Group

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

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:	9/29/2010
Test Number:	1	Test Time:	2:01:04 PM

Test Parameters	Test Specifications			Test Results	
Temperature	20.6	--	22.2	22.2 deg C	P
Humidity	10	--	70	53 %RH	P
Velocity	4.20	--	4.40	4.32 m/s	P
Peak Pendulum Force	-5.40	--	-4.70	-4.93 kN	P
Time at Peak Pendulum Force	11.80	--	16.10	14.67 ms	P
Peak Pubic Symphysis Force	-1.59	--	-1.23	-1.39 kN	P
Time at Peak Pubic Symphysis Force	12.20	--	17.00	16.17 ms	P

All test parameters are within specifications

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

Test ID: **Pelvis**

Test Time: **2:01:04 PM**

Test Date: **9/29/2010**



www.calspan.com

Calspan - Transportation Research Group

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	7264-2000	P66927	4/20/2010
Denton	3096	LC-456Fy	4/22/2010

Test ID: **Pelvis**

Test Time: **2:01:04 PM**

Test Date: **9/29/2010**



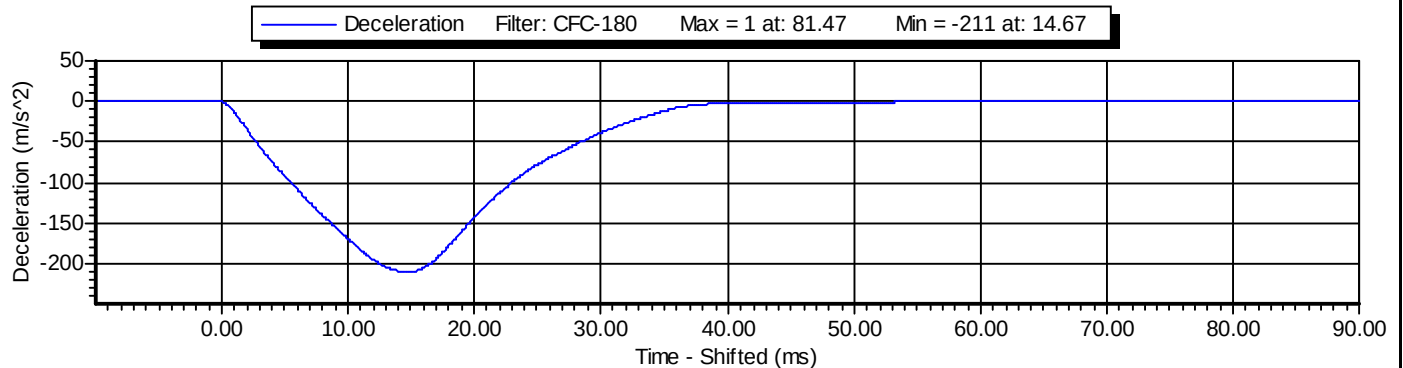
www.calspan.com

Calspan - Transportation Research Group

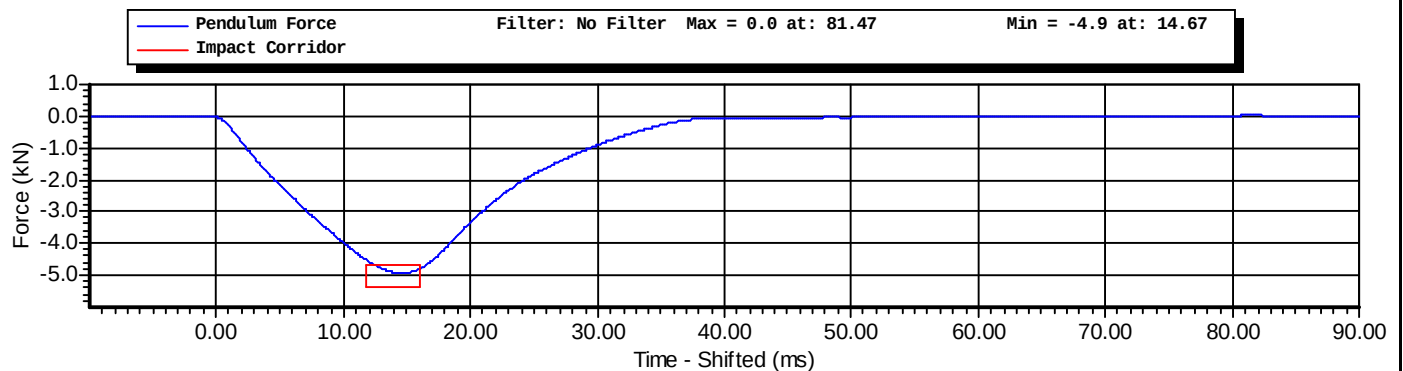
4455 Genesee Street, Buffalo, New York 14225 - Phone (716)632-7500

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:	9/29/2010
Test Number:	1	Test Time:	2:01:04 PM

Pendulum Accelerometer



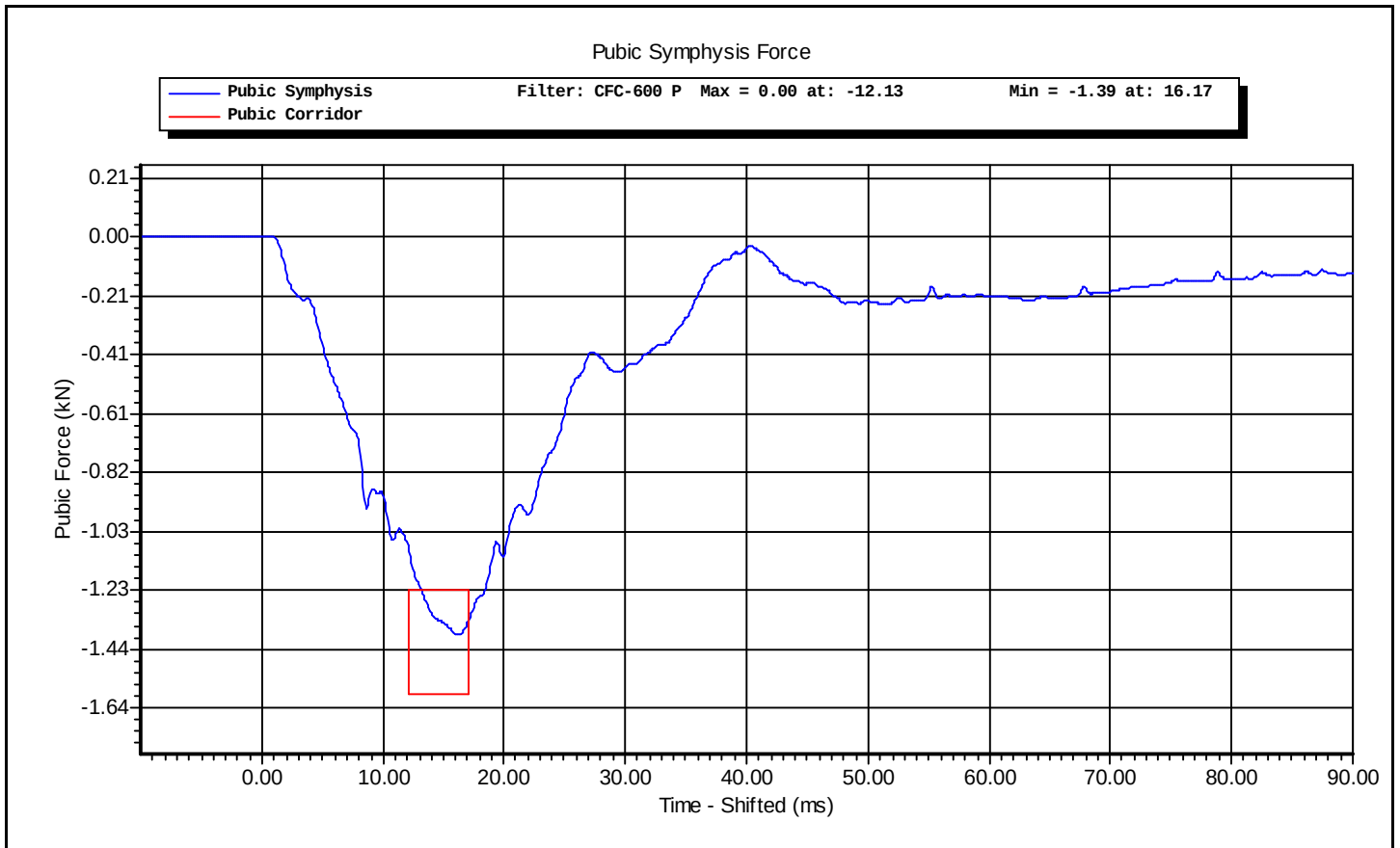
Pendulum Force



Test ID: **Pelvis**

Test Time: **2:01:04 PM**

Test Date: **9/29/2010**



CALIBRATION TEST RESULTS

PRE-TEST

SID-IIs No: 300

CONFIGURED FOR LEFT SIDE IMPACT

SID-IIsD External Measurements

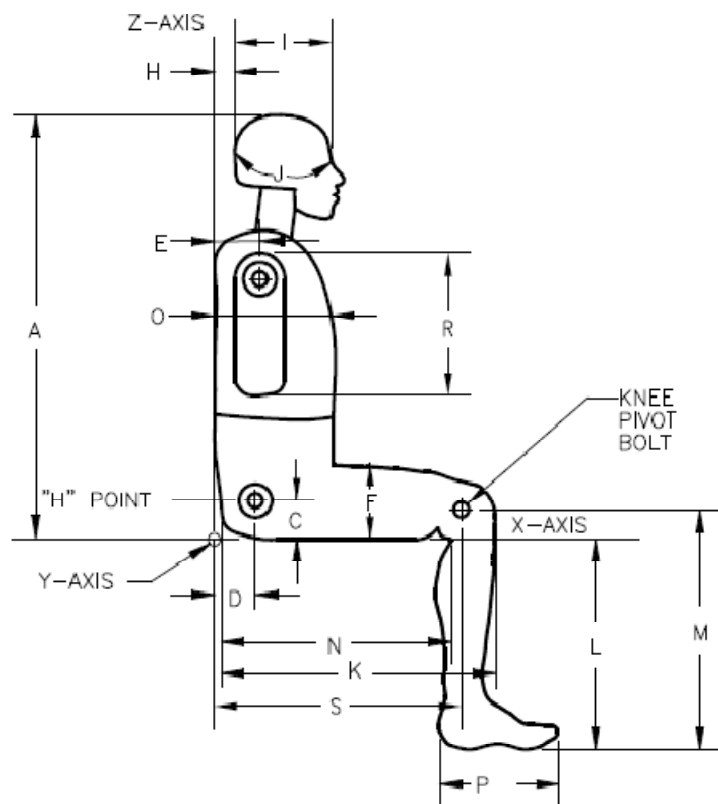
NHTSA ATD S/N 300

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Sitting Height	772.0 - 788.0	785	Yes
B	Shoulder Pivot Height	437.0 - 453.0	450	Yes
C	H-Point Height	79.0 - 89.0	87	Yes
D	H-Point from Seat Back	141.0 - 151.0	145	Yes
E	Shoulder Pivot from Backline	97.0 - 107.0	98	Yes
F	Thigh Clearance	119.0 - 135.0	125	Yes
G	Head Breadth	140.0 - 148.0	143	Yes
H	Head Back from Backline	40.0 - 46.0	42	Yes
I	Head Depth	178.0 - 188.0	181	Yes
J	Head Circumference	541.0 - 551.0	545	Yes
K	Buttock to Knee Length	514.0 - 540.0	523	Yes
L	Popliteal Height	343.0 - 369.0	365	Yes
M	Knee Pivot to Floor Height	393.0 - 409.0	395	Yes
N	Buttock Popliteal Length	416.0 - 442.0	430	Yes
O	Chest Depth without Jacket	195.0 - 211.0	205	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	315	Yes
R	Arm Length	249.0 - 259.0	253	Yes
S	Knee Joint to Seat back	478.0 - 493.0	475	Yes
V	Shoulder Width (only one arm installed)	341.0 - 357.0	353	Yes
W	Foot Width (right)	78.0 - 94.0	85	Yes
W	Foot Width (left)	78.0 - 94.0	85	Yes
Y	Chest Circumference with Jacket	851.0 - 881.0	870	Yes
Z	Waist Circumference	761.0 - 791.0	773	Yes

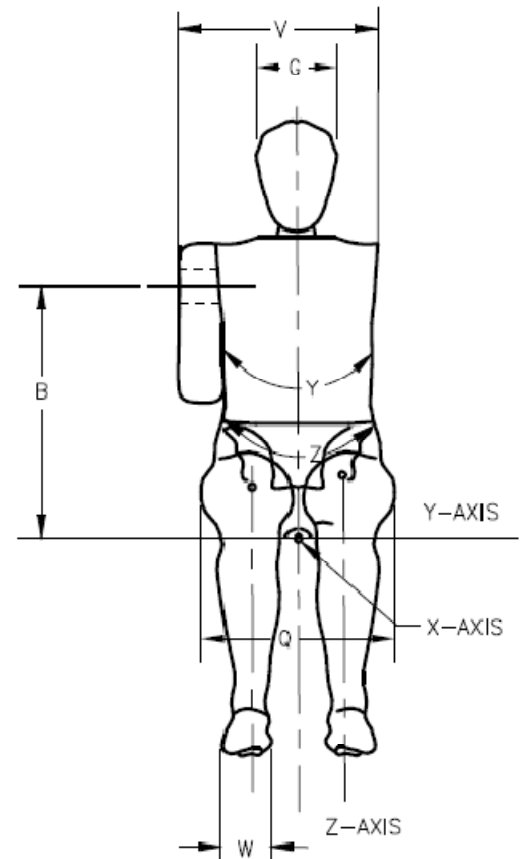
Technician: AR

Date: 10/4/2010

SID-IIsD External Dimension Reference Diagram



SIDE VIEW



FRONT VIEW



www.calspan.com

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:	SID-IIs		
ATD Serial Number:	SID 300		
Test ID:	Head Drop	Test Date:	9/28/2010
Test Number:	1	Test Time:	4:26:36 PM

Component Part Number	Component Serial Number
Head Skin - 180-1002	1355

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.2 deg C P
Humidity	10 -- 70	60 %RH P
Resultant Acceleration	115.0 -- 137.0	132.0 g P
Oscillation	0.0 -- 15.0	2.5 % P
Fore-Aft Acceleration	-15.0 -- 15.0	7.5 g P

All test parameters are within specifications

Technician: A. Rudniski Signature: _____

Supervisor: D. Travale Signature: _____

Test ID: **Head Drop**

Test Time: **4:26:36 PM**

Test Date: **9/28/2010**



www.calspan.com

Calspan - Transportation Research Group

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>
Endevco	7264-2000	P51685	4/7/2010
Endevco	7264-2000	P51682	4/7/2010
Endevco	7264-2000	P51699	4/7/2010

Test ID: **Head Drop**

Test Time: **4:26:36 PM**

Test Date: **9/28/2010**

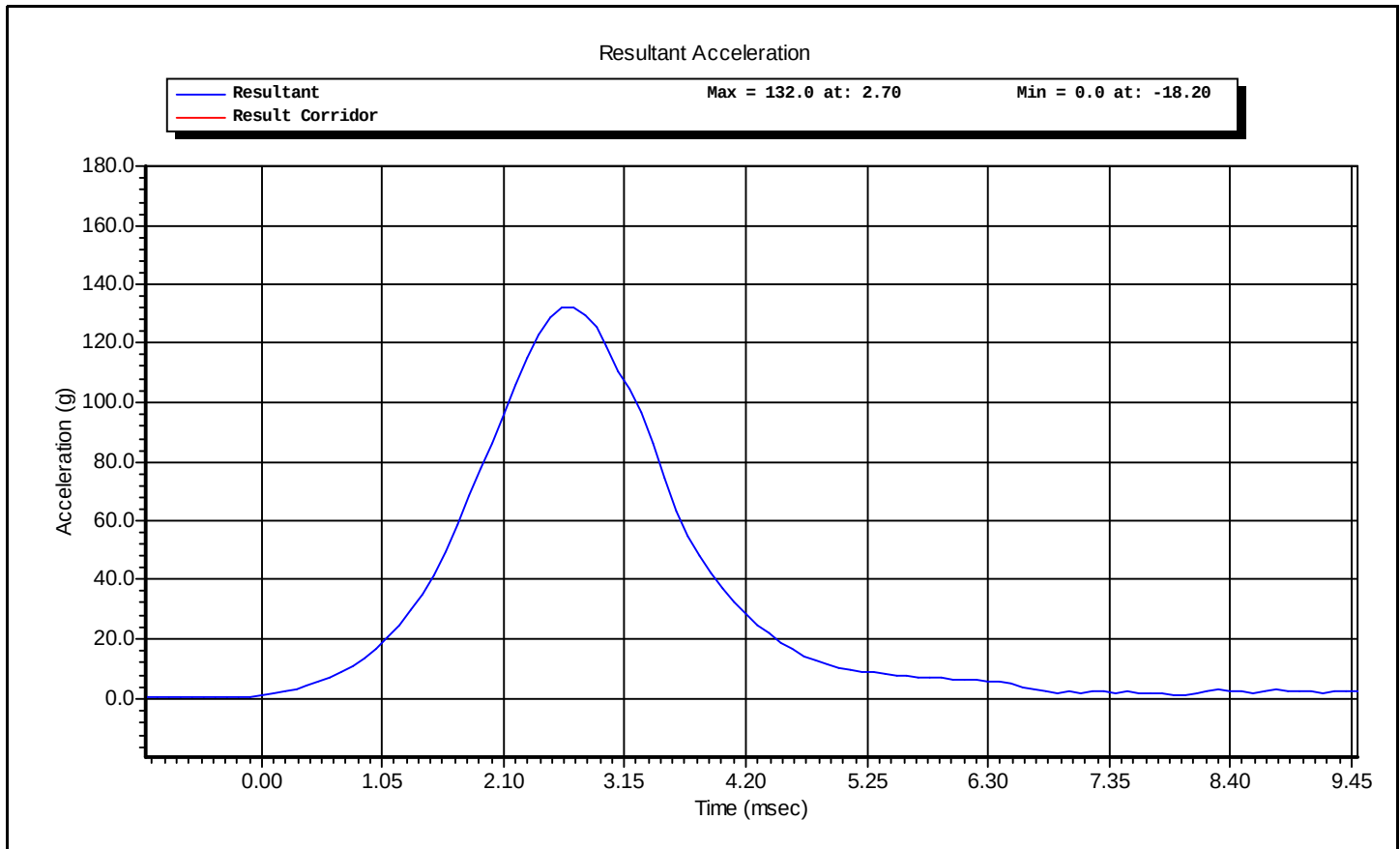


www.calspan.com

Calspan - Transportation Research Group

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

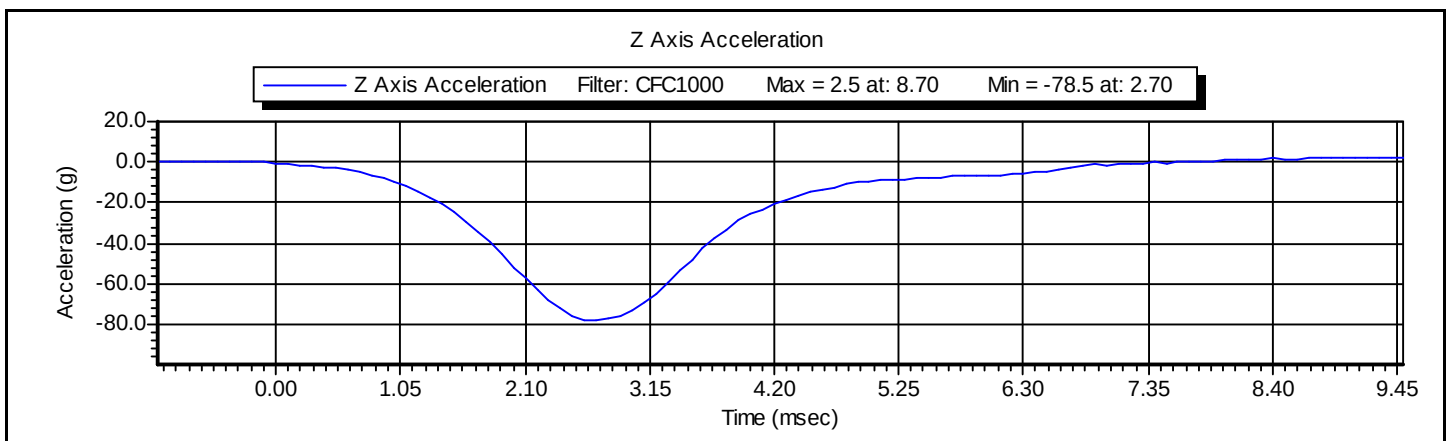
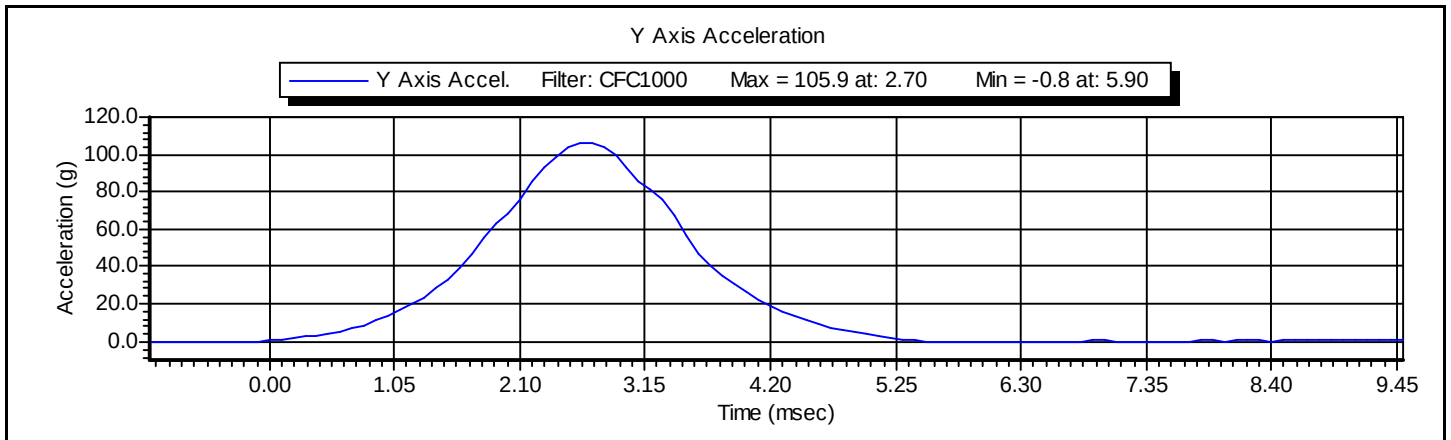
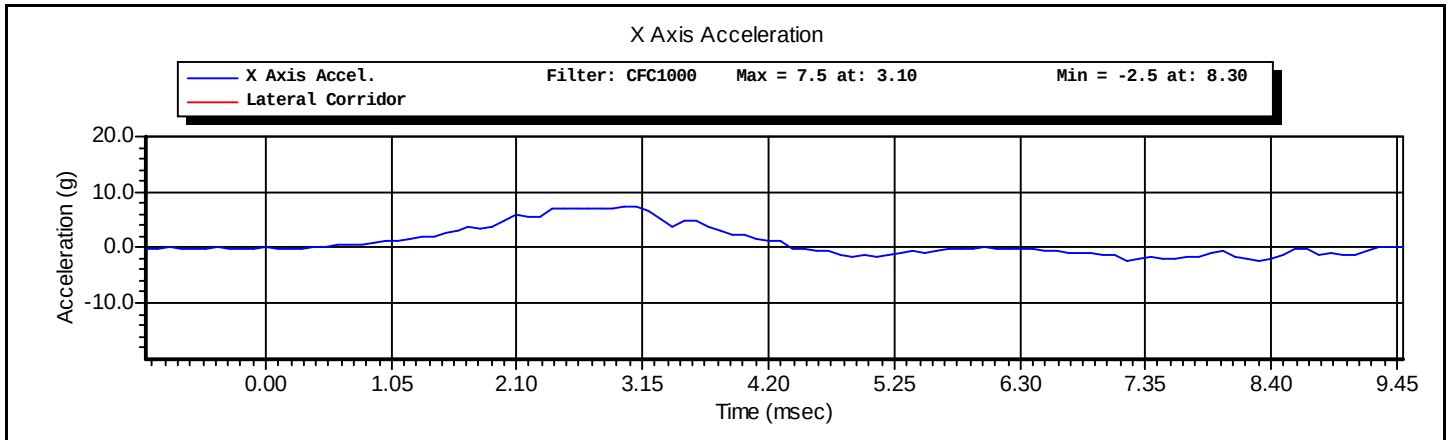
Test Name:	Head Drop	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	SID 300		
Test ID:	Head Drop	Test Date:	9/28/2010
Test Number:	1	Test Time:	4:26:36 PM



Test ID: **Head Drop**

Test Time: **4:26:36 PM**

Test Date: **9/28/2010**





www.calspan.com

Calspan - Transportation Research Group

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

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 300		
Test ID:	Neck Flexion	Test Date:	9/28/2010
Test Number:	1	Test Time:	3:21:13 PM

Component Part Number	Component Serial Number
Neck - 180-2000	787

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.2 deg C P
Humidity	10 -- 70	60 %RH P
Velocity	5.51 -- 5.63	5.55 m/s P
Pendulum Impulse at 10 ms	2.20 -- 2.80	2.57 m/s P
Pendulum Impulse at 15 ms	3.30 -- 4.10	3.80 m/s P
Pendulum Impulse at 20 ms	4.40 -- 5.40	5.24 m/s P
Pendulum Impulse at 25 ms	5.40 -- 6.10	5.86 m/s P
Pendulum Impulse between 25 and 100 ms	5.50 -- 6.20	5.90 m/s P
Max D Plane Rotation	71.0 -- 81.0	74.2 degrees P
Time at Max Rotation	50.0 -- 70.0	60.3 ms P
Moment about OC	-44.0 -- -36.0	-43.5 Nm P
Moment Decay to Zero	102.0 -- 126.0	114.5 ms P

All test parameters are within specifications

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

Test ID: **Neck Flexion**

Test Time: **3:21:13 PM**

Test Date: **9/28/2010**



www.calspan.com

Calspan - Transportation Research Group

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
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: **3:21:13 PM**

Test Date: **9/28/2010**



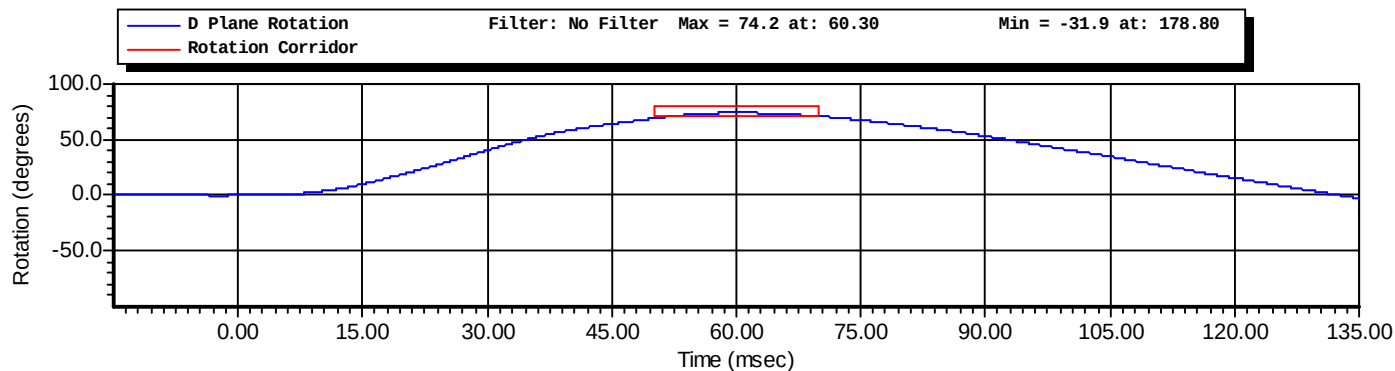
www.calspan.com

Calspan - Transportation Research Group

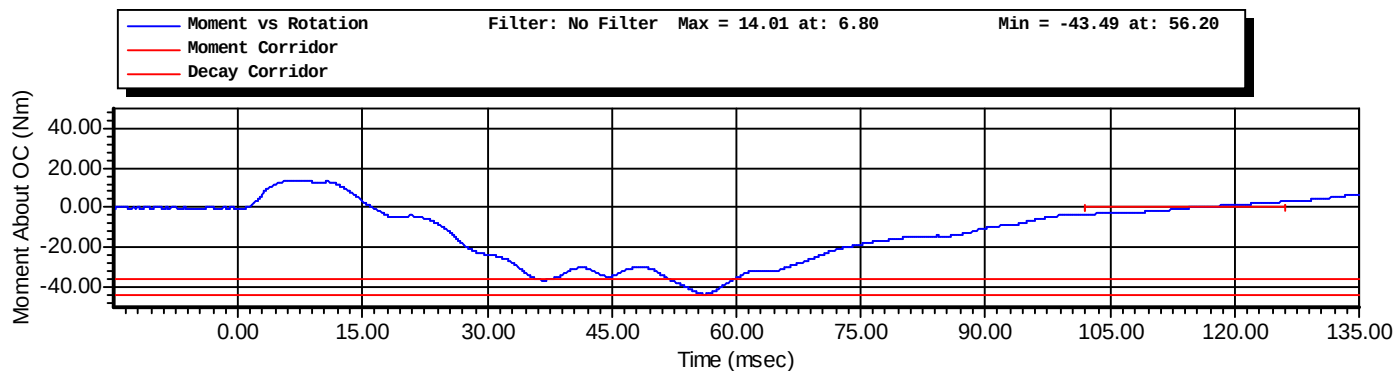
4455 Genesee Street, Buffalo, New York 14225 - Phone (716)632-7500

Test Name:	Neck Pendulum	Revision:	8/24/2009
Sub Test Name:	Left Side	Spec Type:	NHTSA
ATD Type:	SID-IIIs		
ATD Serial Number:	SID 300		
Test ID:	Neck Flexion	Test Date:	9/28/2010
Test Number:	1	Test Time:	3:21:13 PM

D Plane Rotation



Moment About Occipital Condyle

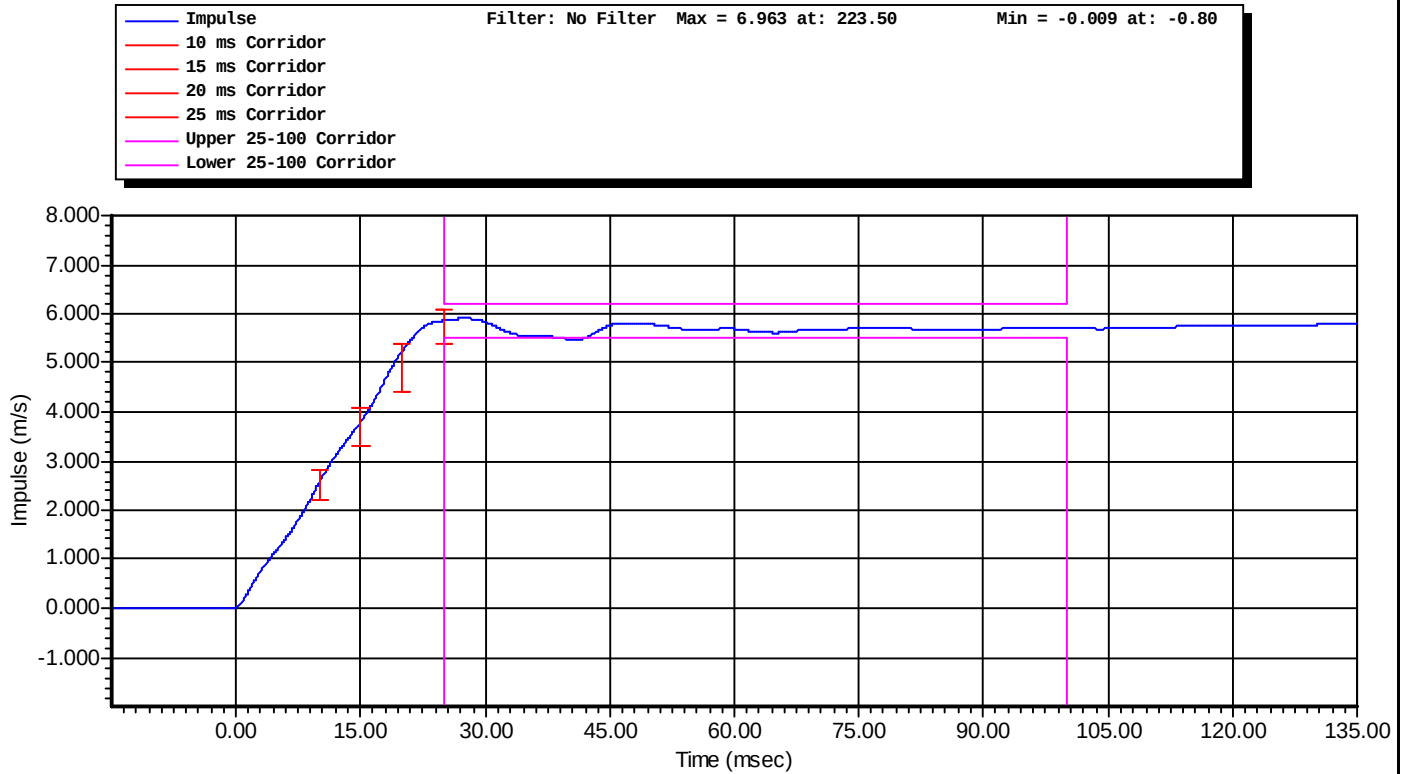


Test ID: Neck Flexion

Test Time: 3:21:13 PM

Test Date: 9/28/2010

Pendulum Impulse





www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

Test Name:	Shoulder Impact	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	SID 300		
Test ID:	Shoulder	Test Date:	10/4/2010
Test Number:	1	Test Time:	2:13:19 PM

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.20 deg C P
Humidity	10.0 -- 70.0	41.0 %RH P
Velocity	4.20 -- 4.40	4.33 m/s P
Probe Acceleration	13.0 -- 18.0	16.4 g P
Shoulder Deflection	28.0 -- 37.0	31.8 mm P
T1 Acceleration	17.0 -- 22.0	20.1 g P

All test parameters are within specifications

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

Test ID: **Shoulder**

Test Time: **2:13:19 PM**

Test Date: **10/4/2010**



www.calspan.com

Calspan - Transportation Research Group

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	7264-2000	P66927	4/20/2010
Servo	180-3885	DS-1063	4/7/2010
Endevco	7264-2000	P26269	10/1/2010

Test ID: **Shoulder**

Test Time: **2:13:19 PM**

Test Date: **10/4/2010**

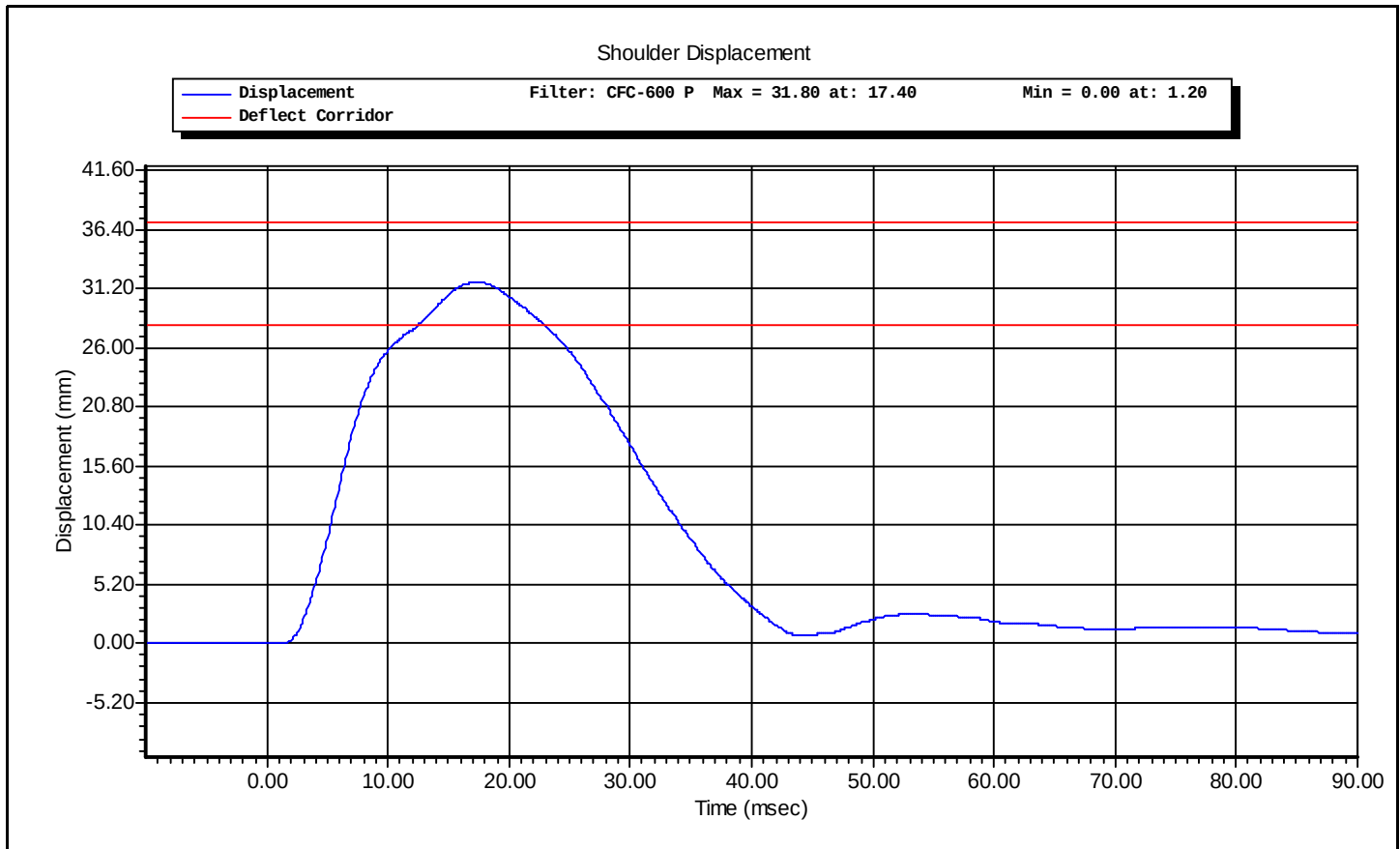


www.calspan.com

Calspan - Transportation Research Group

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

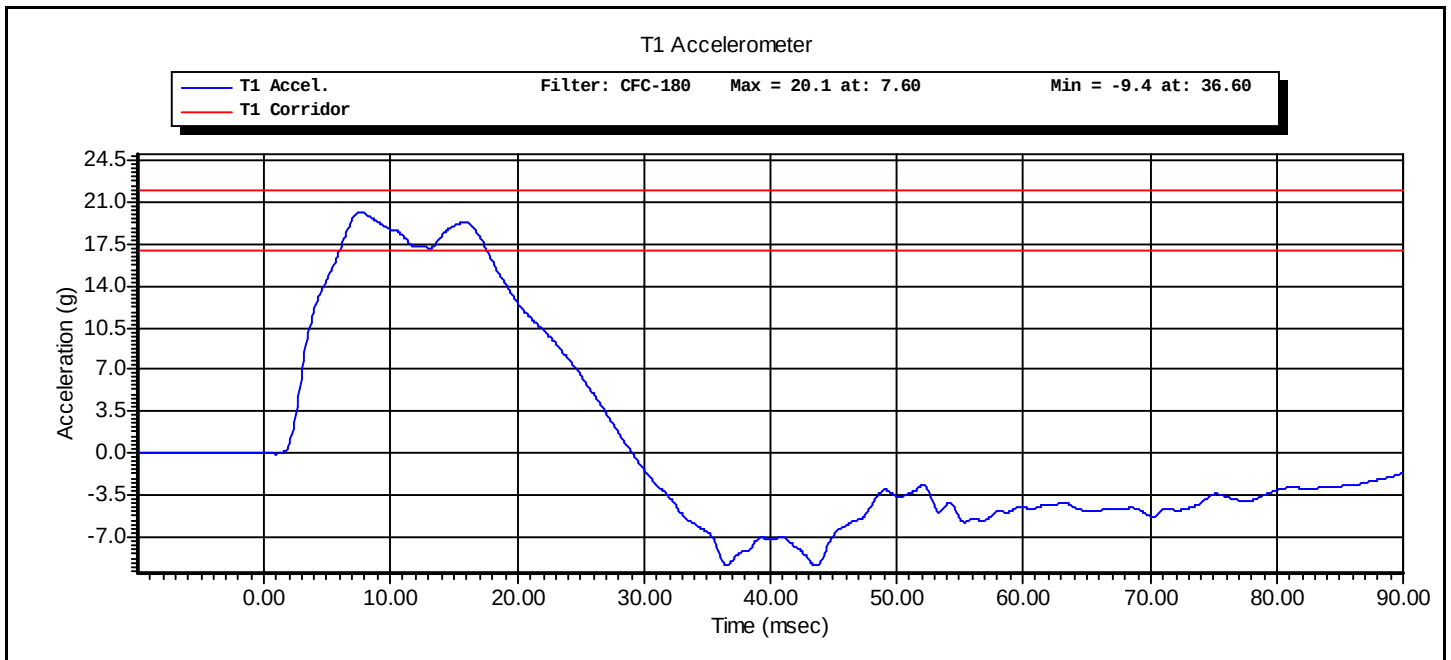
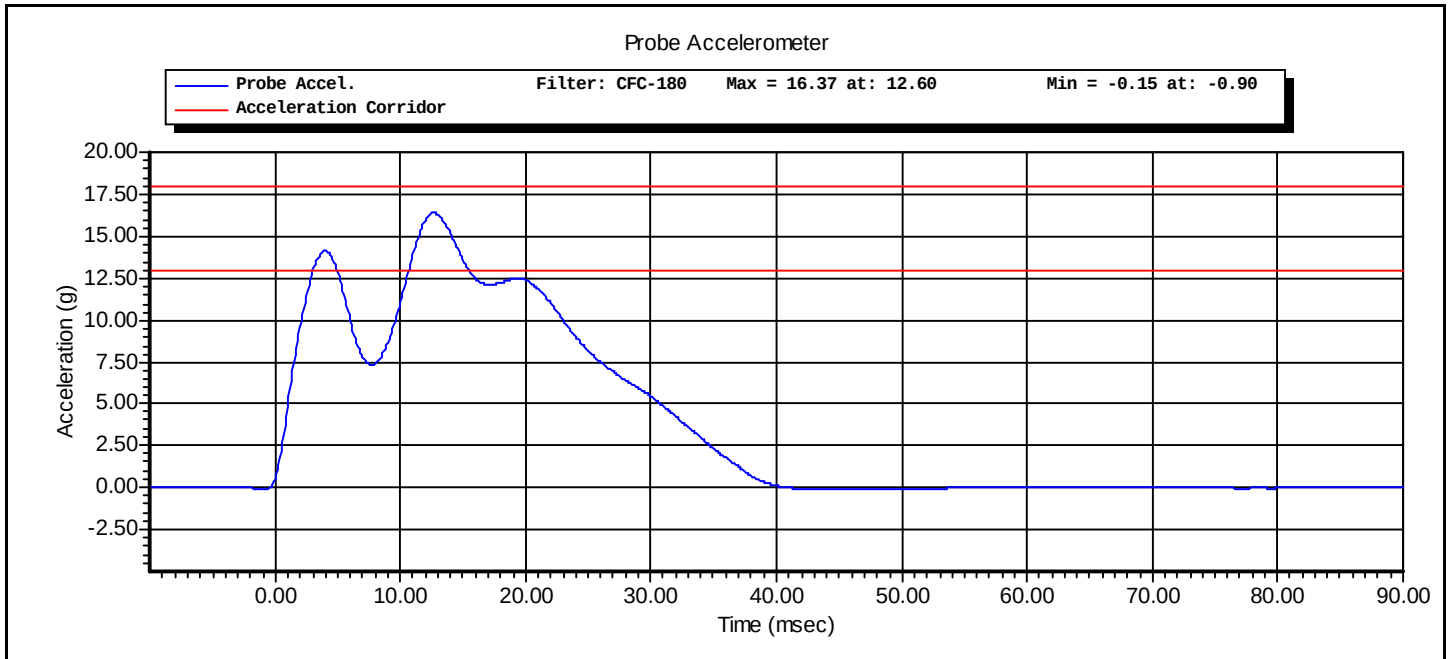
Test Name:	Shoulder Impact	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	SID 300		
Test ID:	Shoulder	Test Date:	10/4/2010
Test Number:	1	Test Time:	2:13:19 PM



Test ID: **Shoulder**

Test Time: **2:13:19 PM**

Test Date: **10/4/2010**





www.calspan.com

Calspan - Transportation Research Group

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

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 300		
Test ID:	Thorax With Arm	Test Date:	10/4/2010
Test Number:	1	Test Time:	2:56:40 PM

Test Parameters	Test Specifications			Test Results	
Temperature	20.6	--	22.2	22.2 deg C	P
Humidity	10	--	70	41 %RH	P
Velocity	6.60	--	6.80	6.70 m/s	P
Probe Acceleration after 5ms	30.0	--	36.0	34.0 g	P
Upper Thorax Rib Deflection	25.0	--	32.0	26.7 mm	P
Mid Thorax Rib Deflection	30.0	--	36.0	31.3 mm	P
Lower Thorax Rib Deflection	32.0	--	38.0	36.5 mm	P
Upper Spine Acceleration ("y")	34.0	--	43.0	40.6 g	P
Lower Spine Acceleration ("y")	29.0	--	37.0	35.6 g	P
Shoulder Deflection	31.0	--	40.0	36.7 mm	P

All test parameters are within specifications

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

Test ID: **Thorax With Arm** Test Time: **2:56:40 PM**

Test Date: **10/4/2010**



www.calspan.com

Calspan - Transportation Research Group

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	7264-2000	P66927	4/20/2010
Servo	180-3885	DS-1121	4/7/2010
Servo	180-3885	DS-1151	4/7/2010
Servo	180-3885	DS-1156	4/7/2010
Endevco	7264-2000	P26269	10/1/2010
Endevco	7264-2000	P64147	9/20/2010
Servo	180-3885	DS-1063	4/7/2010

Test ID: **Thorax With Arm** Test Time: **2:56:40 PM**

Test Date: **10/4/2010**

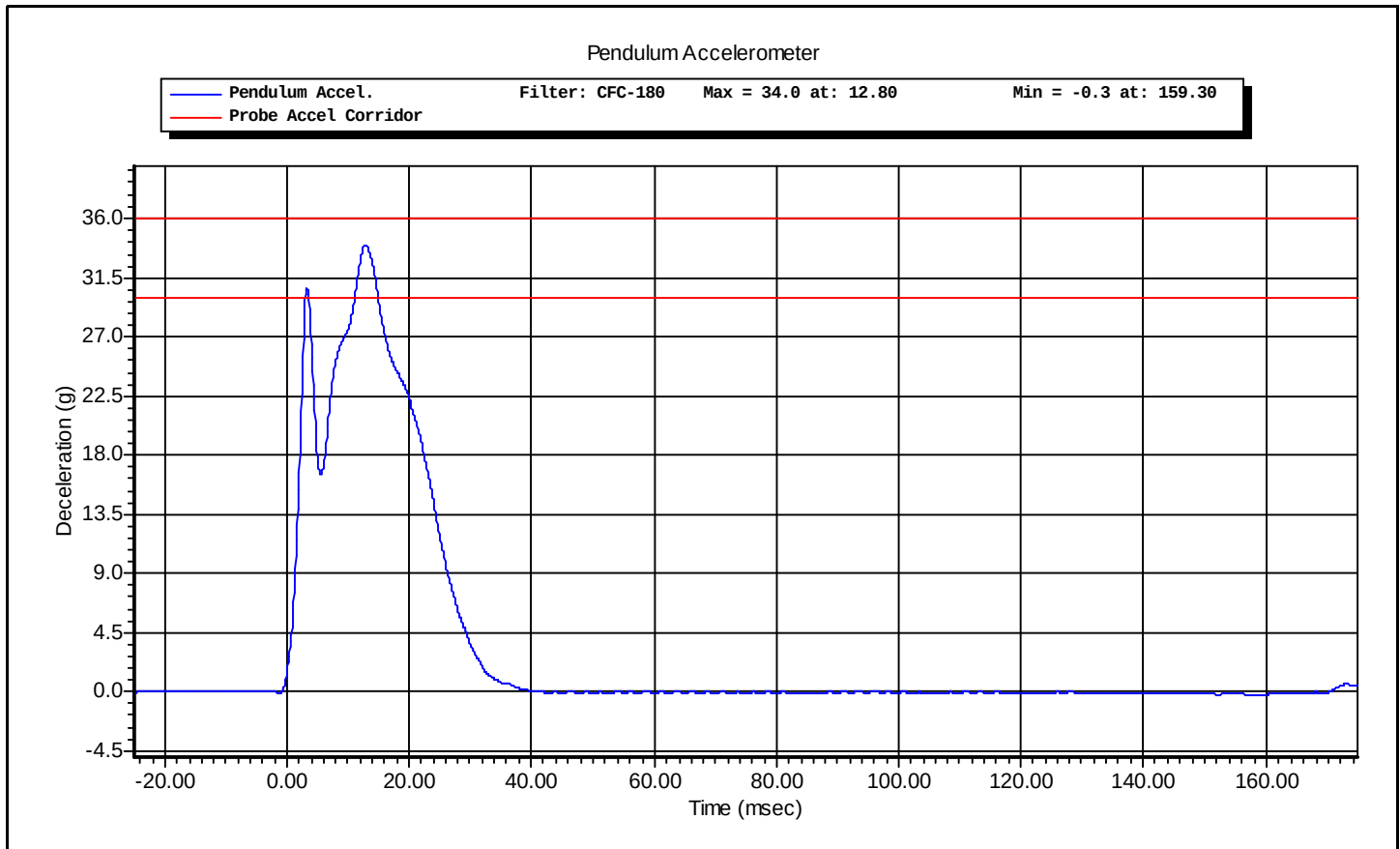


www.calspan.com

Calspan - Transportation Research Group

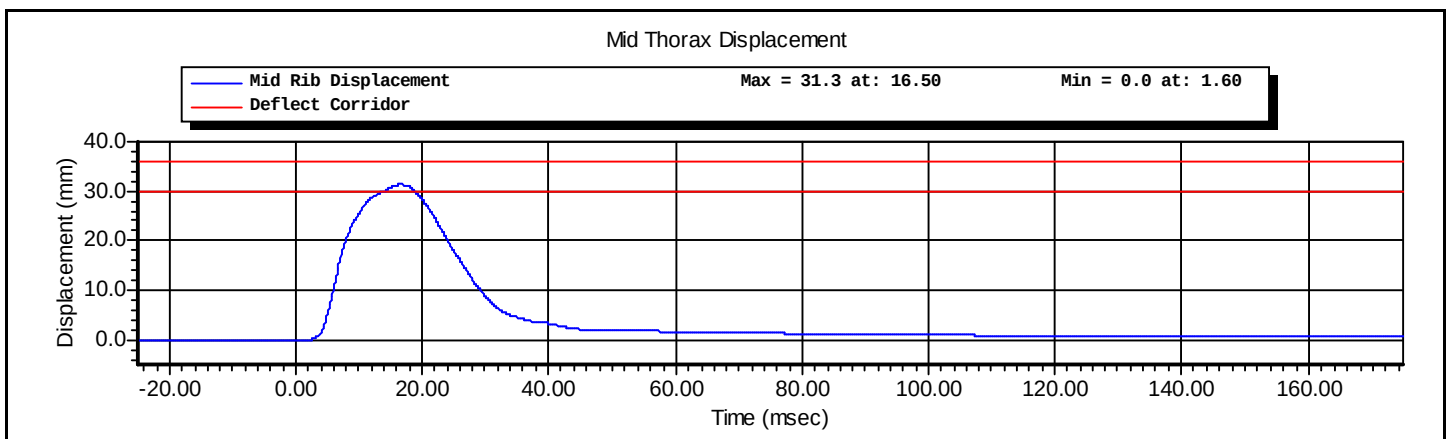
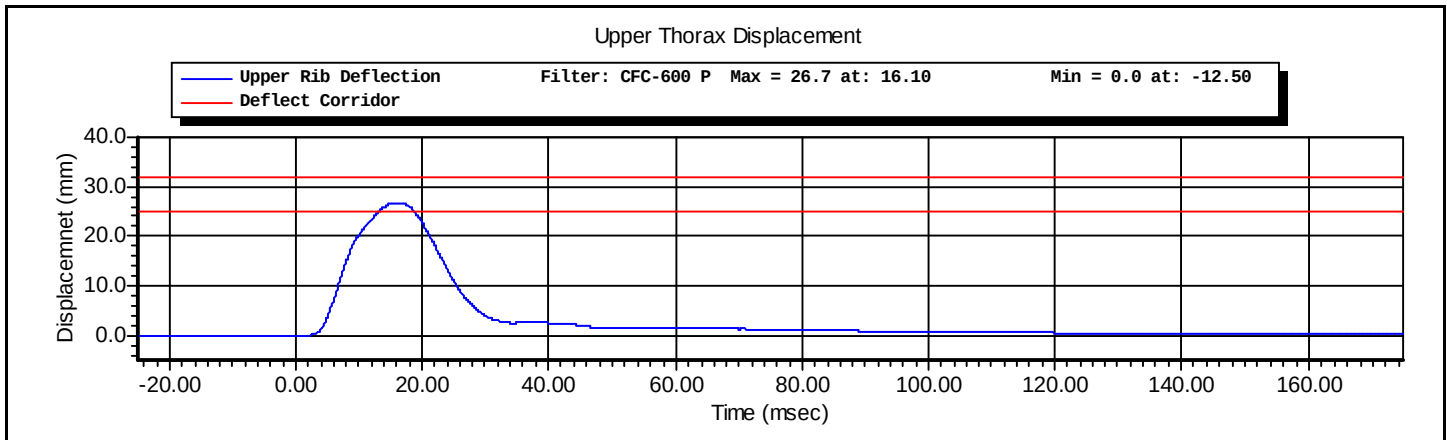
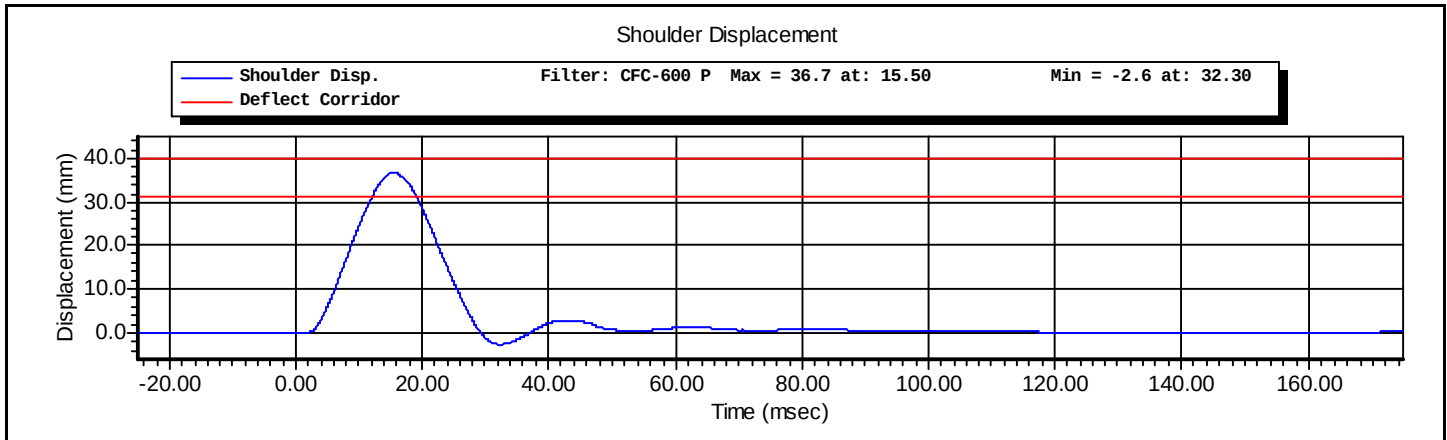
4455 Genesee Street, Buffalo, New York 14225 - Phone (716)632-7500

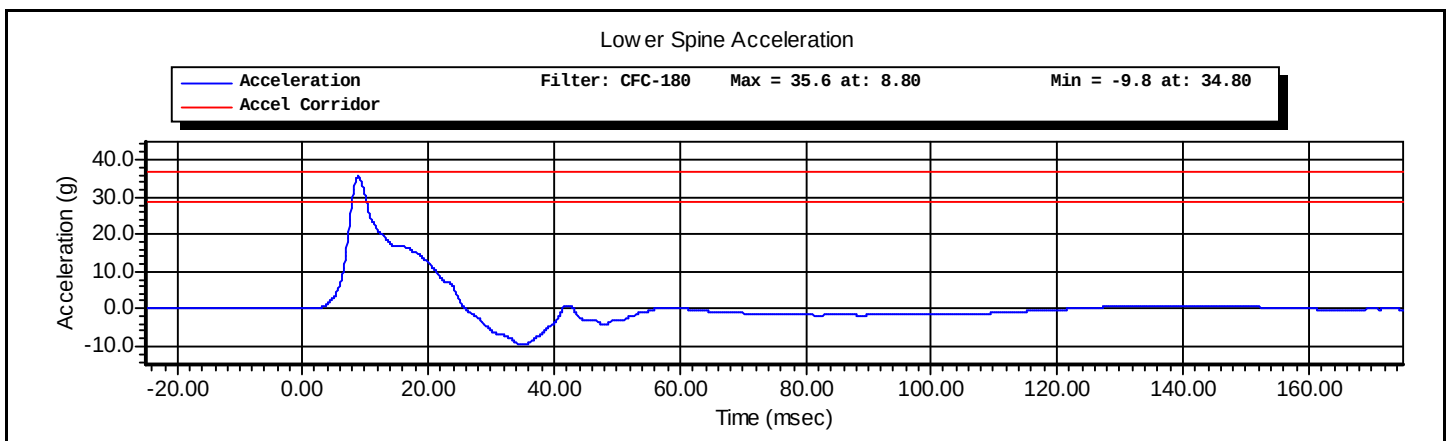
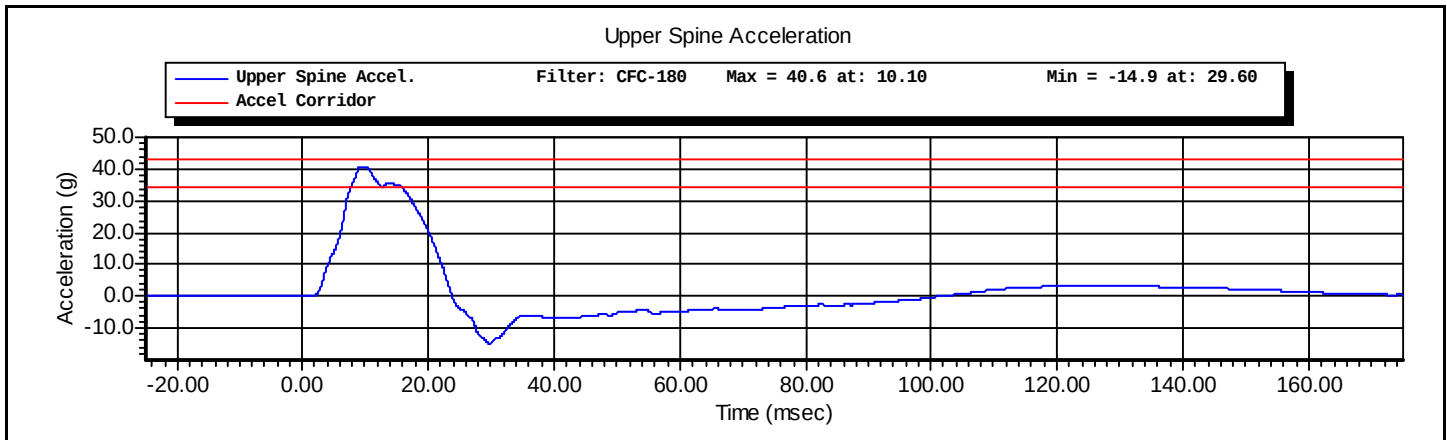
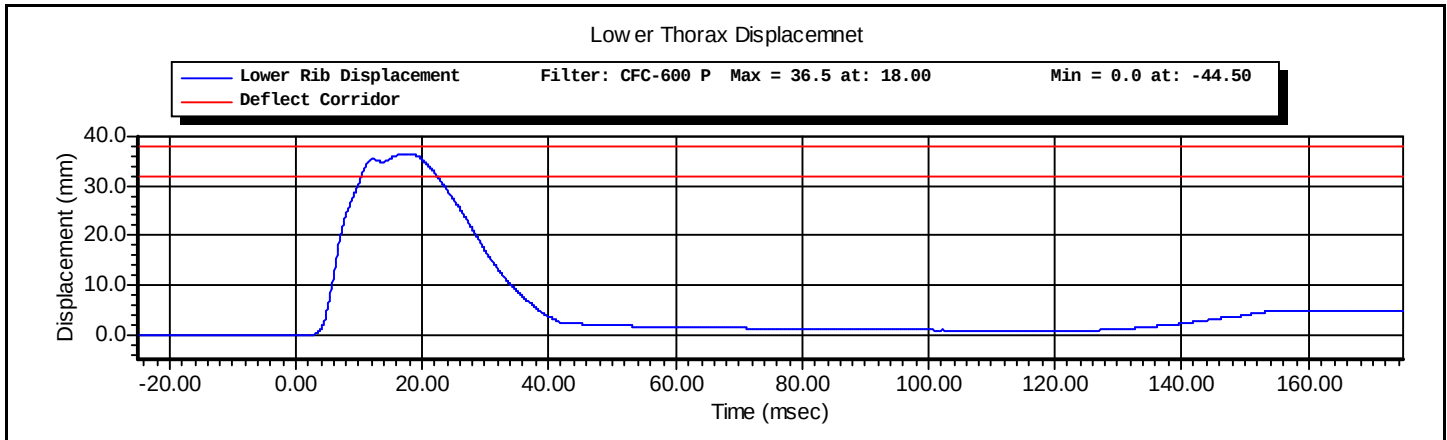
Test Name:	Thorax Impact with Arm	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	SID 300		
Test ID:	Thorax With Arm	Test Date:	10/4/2010
Test Number:	1	Test Time:	2:56:40 PM



Test ID: Thorax With Arm Test Time: 2:56:40 PM

Test Date: 10/4/2010







www.calspan.com

Calspan - Transportation Research Group

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

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 300		
Test ID:	Thorax Without Arm	Test Date:	10/4/2010
Test Number:	1	Test Time:	2:01:13 PM

Test Parameters	Test Specifications			Test Results	
Temperature	20.6	--	22.2	22.2 deg C	P
Humidity	10	--	70	40 %RH	P
Velocity	4.20	--	4.40	4.35 m/s	P
Probe Acceleration	14.0	--	18.0	16.0 g	P
Upper Thorax Rib Deflection	32.0	--	40.0	35.8 mm	P
Mid Thorax Rib Deflection	39.0	--	45.0	41.2 mm	P
Lower Thorax Rib Deflection	35.0	--	43.0	40.9 mm	P
Upper Spine Acceleration T1	13.0	--	17.0	16.1 g	P
Lower Spine Acceleration T12	7.0	--	11.0	10.3 g	P

All test parameters are within specifications

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

Test ID: **Thorax Without Arm** Test Time: **2:01:13 PM**

Test Date: **10/4/2010**



www.calspan.com

Calspan - Transportation Research Group

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	7264-2000	P66927	4/20/2010
Servo	180-3885	DS-1121	4/7/2010
Servo	180-3885	DS-1151	4/7/2010
Servo	180-3885	DS-1156	4/7/2010
Endevco	7264-2000	P26269	10/1/2010
Endevco	7264-2000	P64147	9/20/2010

Test ID: **Thorax Without Arm** Test Time: **2:01:13 PM**

Test Date: **10/4/2010**

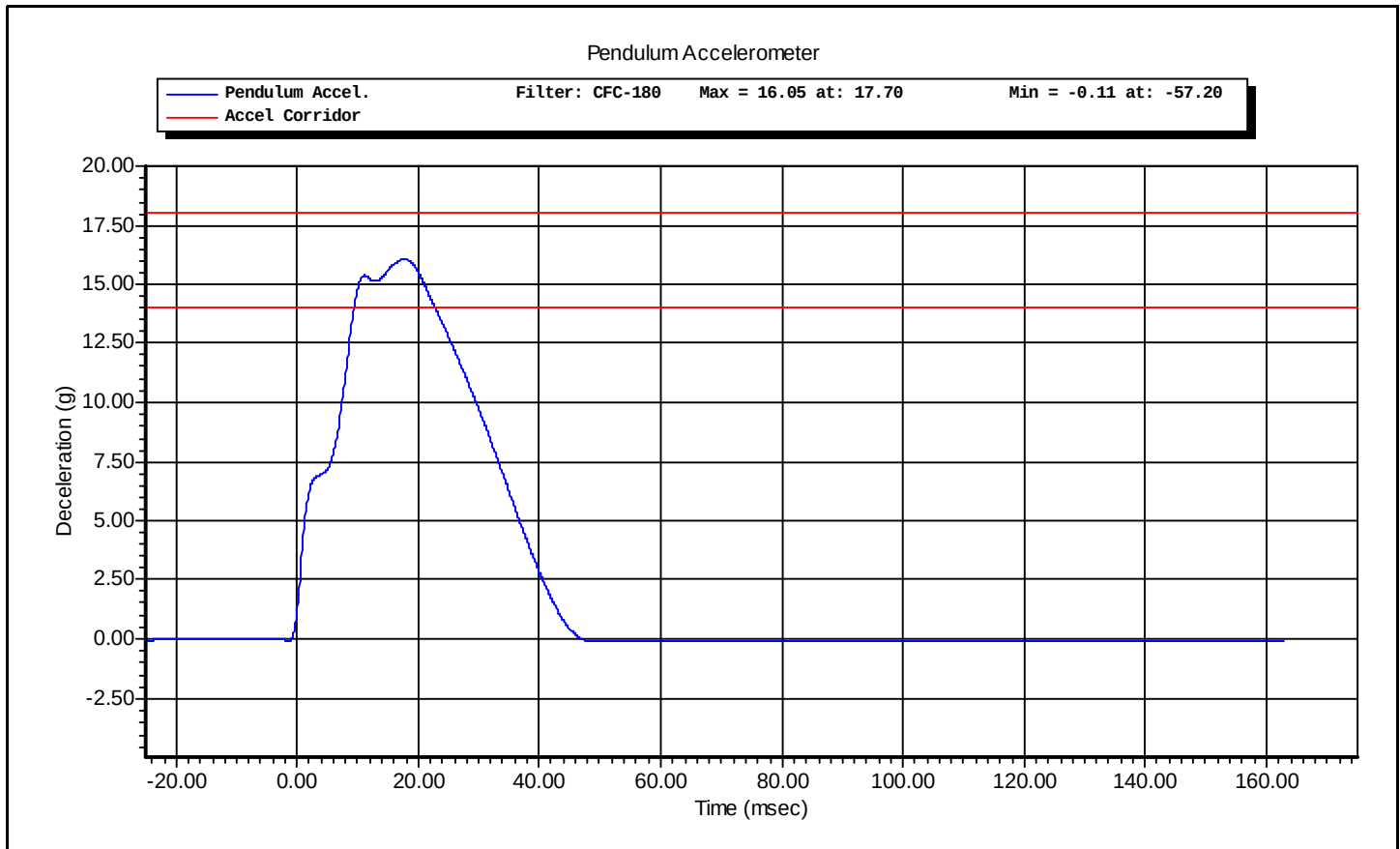


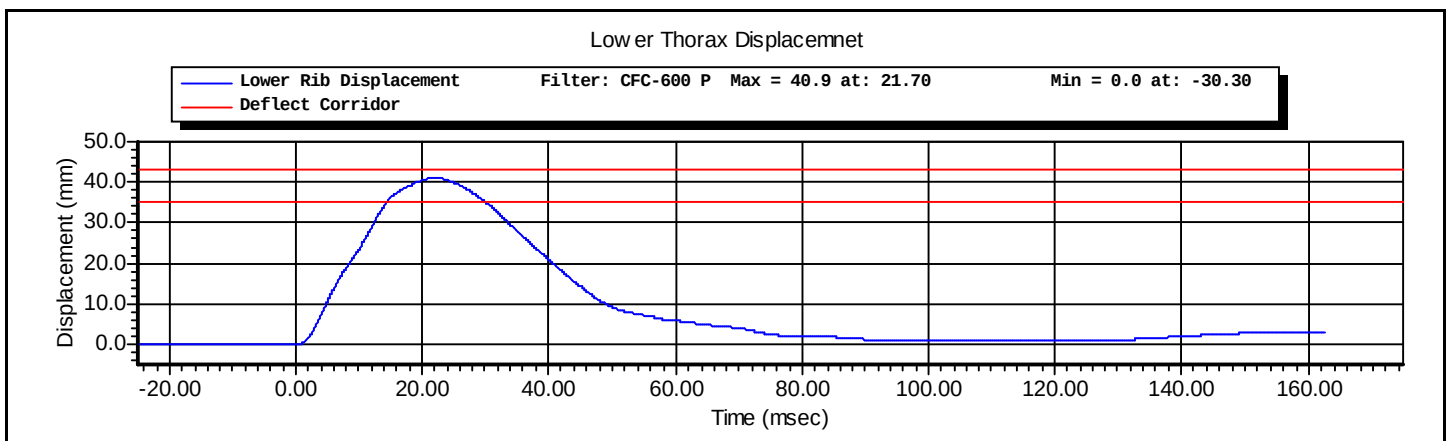
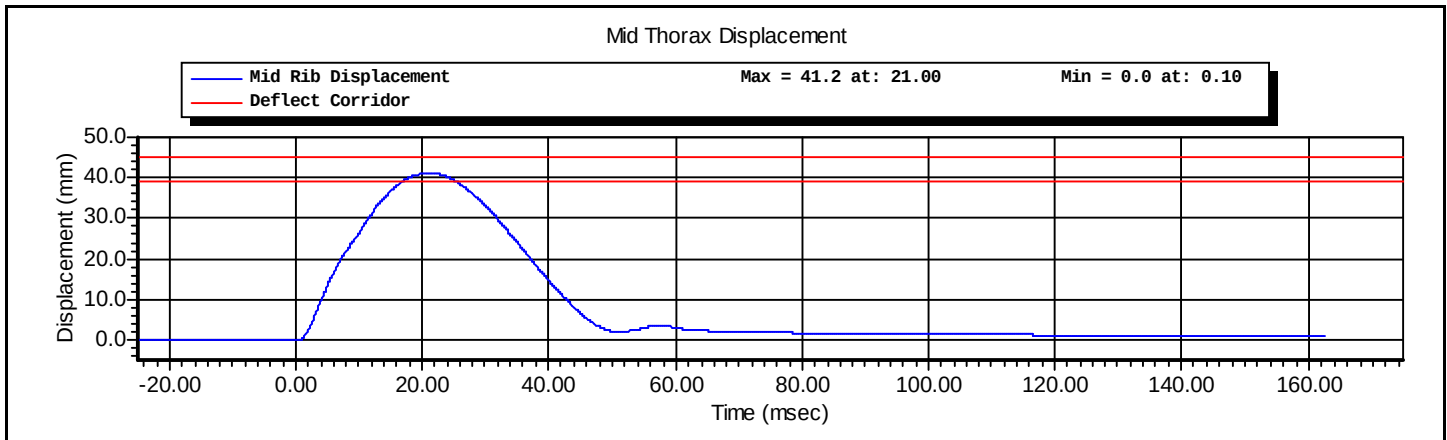
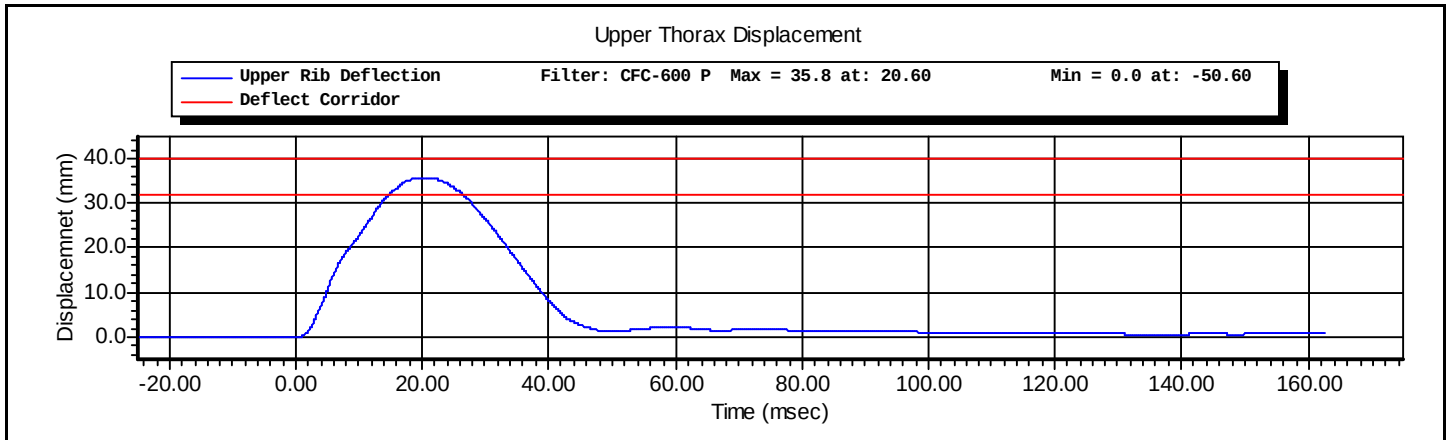
www.calspan.com

Calspan - Transportation Research Group

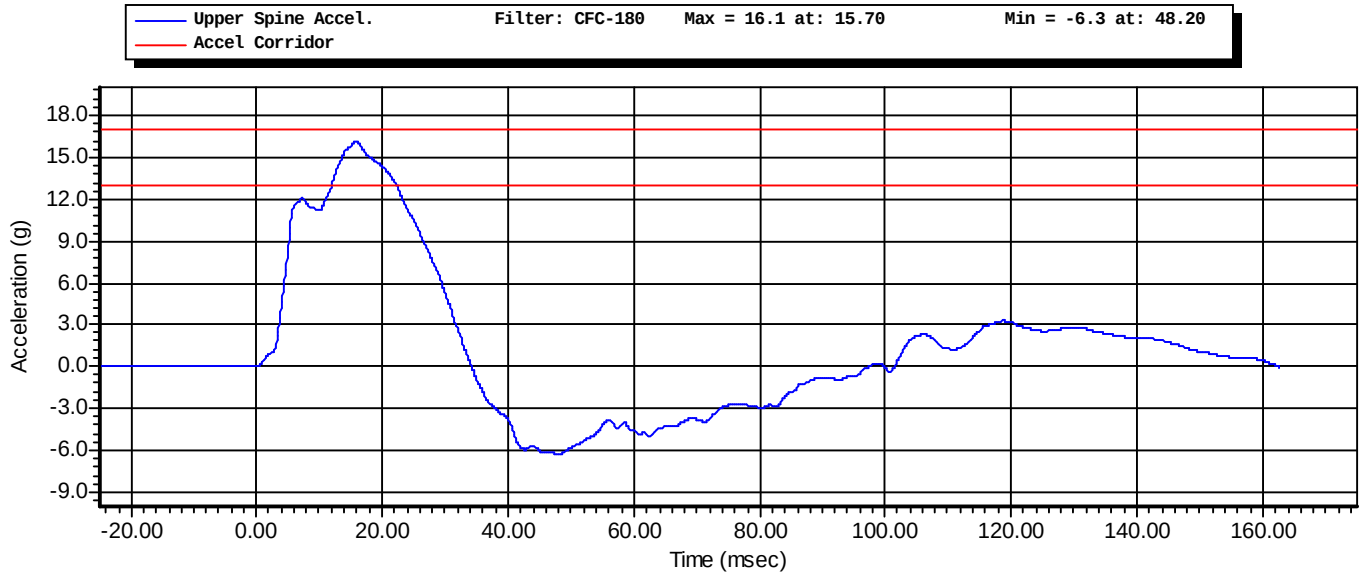
4455 Genesee Street, Buffalo, New York 14225 - Phone (716)632-7500

Test Name:	Thorax Impact without Arm	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	SID 300		
Test ID:	Thorax Without Arm	Test Date:	10/4/2010
Test Number:	1	Test Time:	2:01:13 PM

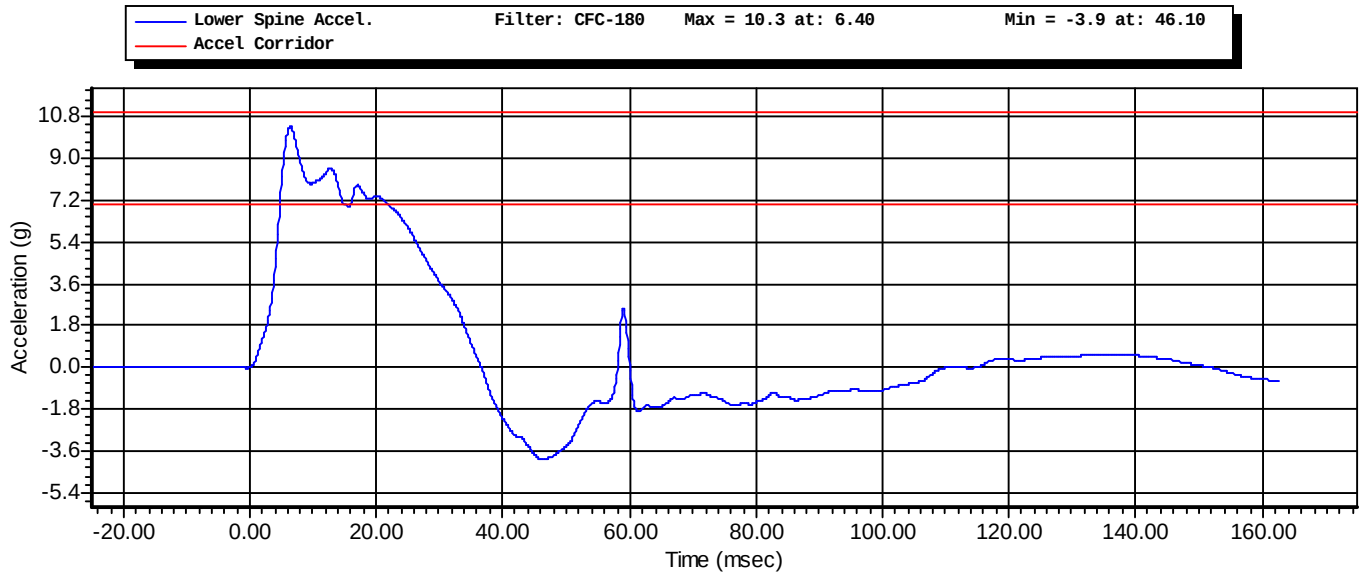




Upper Spine Acceleration



Lower Spine Acceleration





www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

Test Name:	Abdominal Impact	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	SID 300		
Test ID:	Abdomen	Test Date:	10/4/2010
Test Number:	1	Test Time:	2:37:39 PM

Test Parameters	Test Specifications			Test Results	
Temperature	20.6	--	22.2	22.2 deg C	P
Humidity	10	--	70	42 %RH	P
Velocity	4.20	--	4.40	4.35 m/s	P
Probe Acceleration	12.0	--	16.0	15.5 g	P
Upper Abdominal Rib Deflection	36.0	--	47.0	39.6 mm	P
Lower Abdominal Rib Deflection	33.0	--	44.0	34.4 mm	P
Lower Spine Acceleration - T12	9.0	--	14.0	12.7 g	P

All test parameters are within specifications

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

Test ID: **Abdomen**

Test Time: **2:37:39 PM**

Test Date: **10/4/2010**



www.calspan.com

Calspan - Transportation Research Group

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	7264-2000	P66927	4/20/2010
Servo	180-3885	DS-1162	4/7/2010
Servo	180-3885	DS-1232	4/7/2010
Endevco	7264-2000	P64147	9/20/2010

Test ID: **Abdomen**

Test Time: **2:37:39 PM**

Test Date: **10/4/2010**



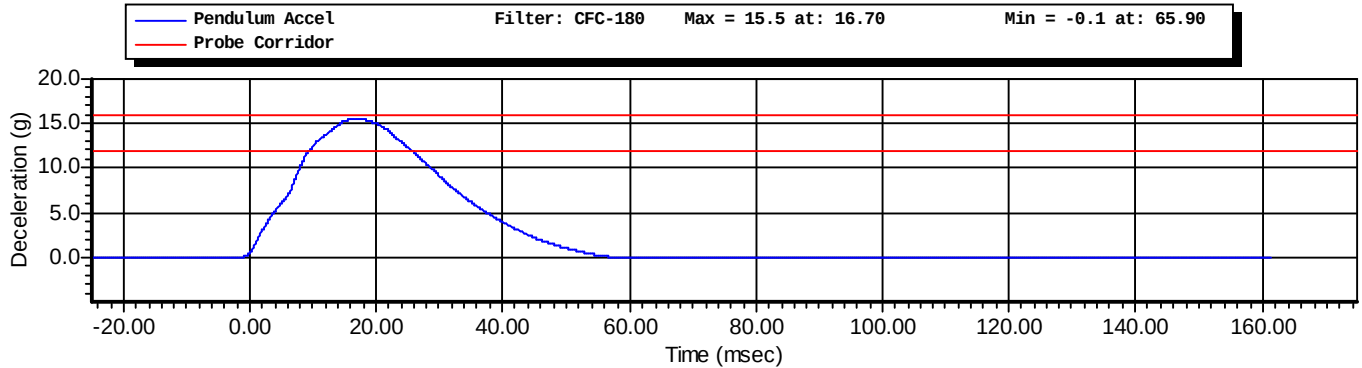
www.calspan.com

Calspan - Transportation Research Group

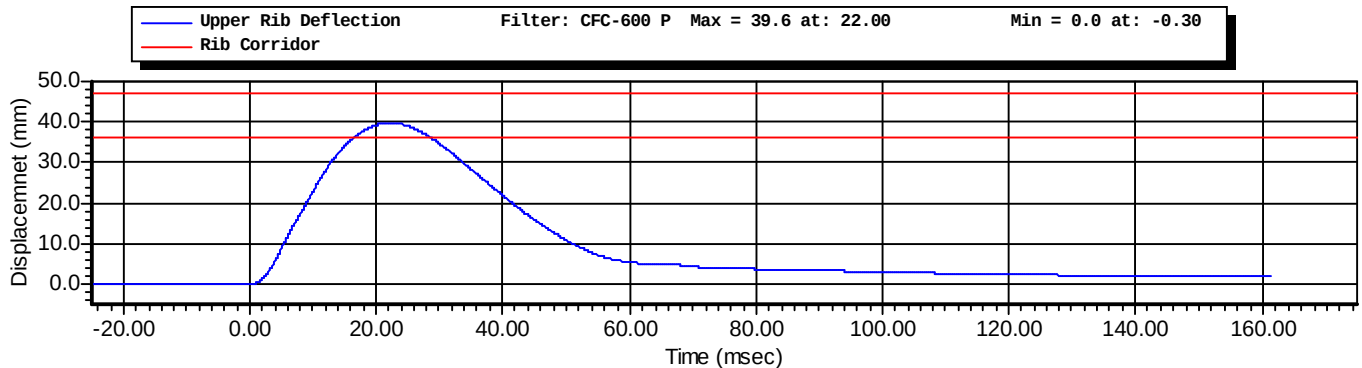
4455 Genesee Street, Buffalo, New York 14225 - Phone (716)632-7500

Test Name:	Abdominal Impact	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	SID 300		
Test ID:	Abdomen	Test Date:	10/4/2010
Test Number:	1	Test Time:	2:37:39 PM

Pendulum Accelerometer



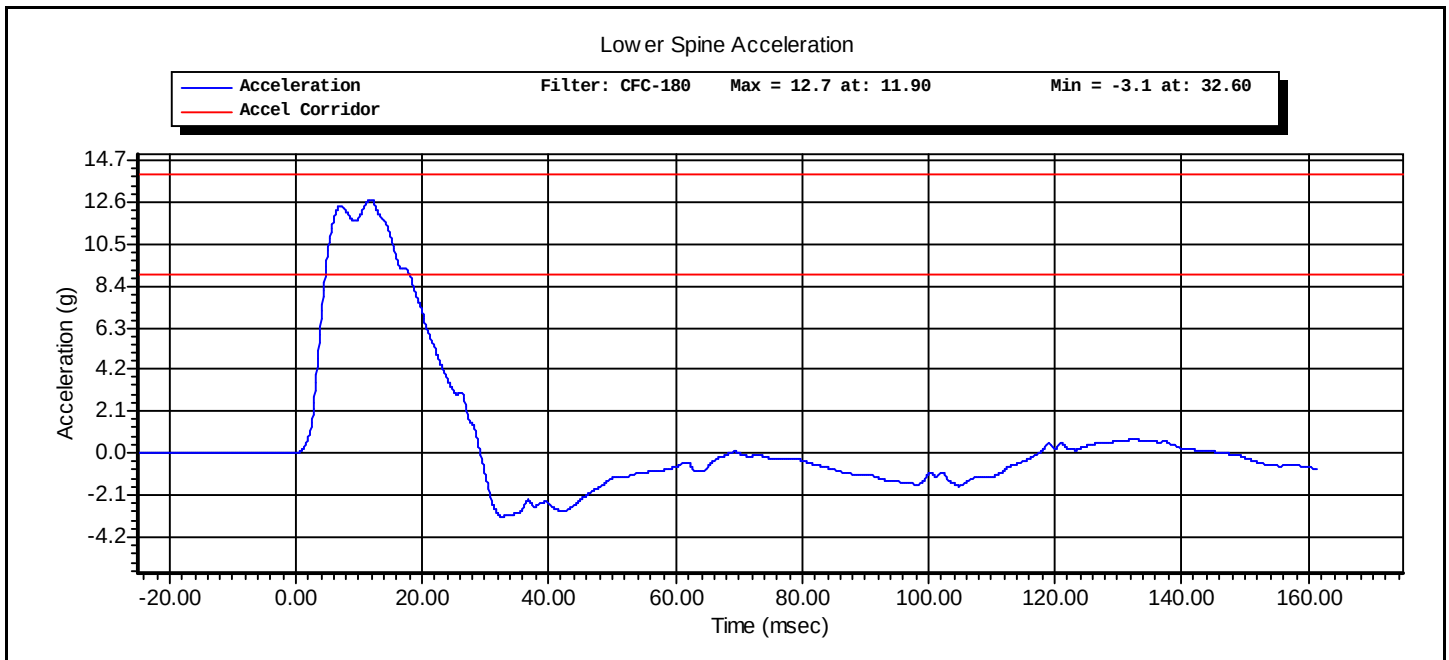
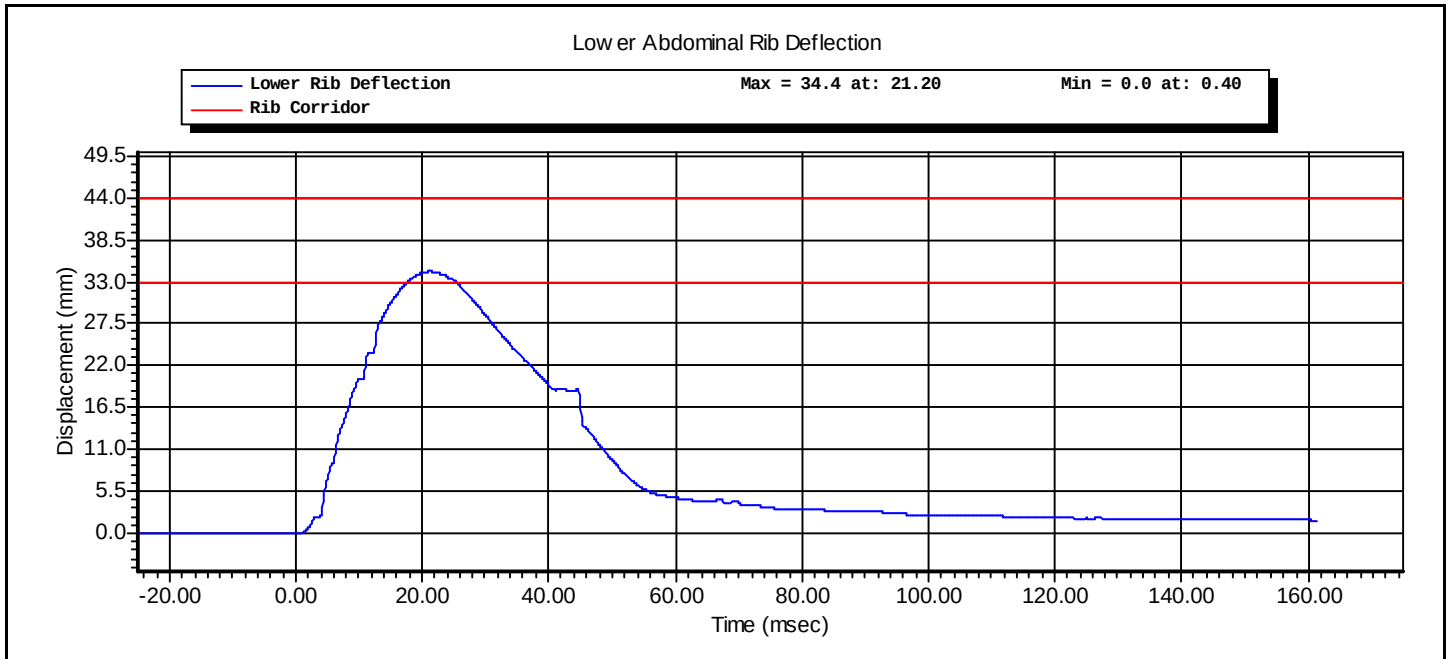
Upper Abdominal Rib Deflection



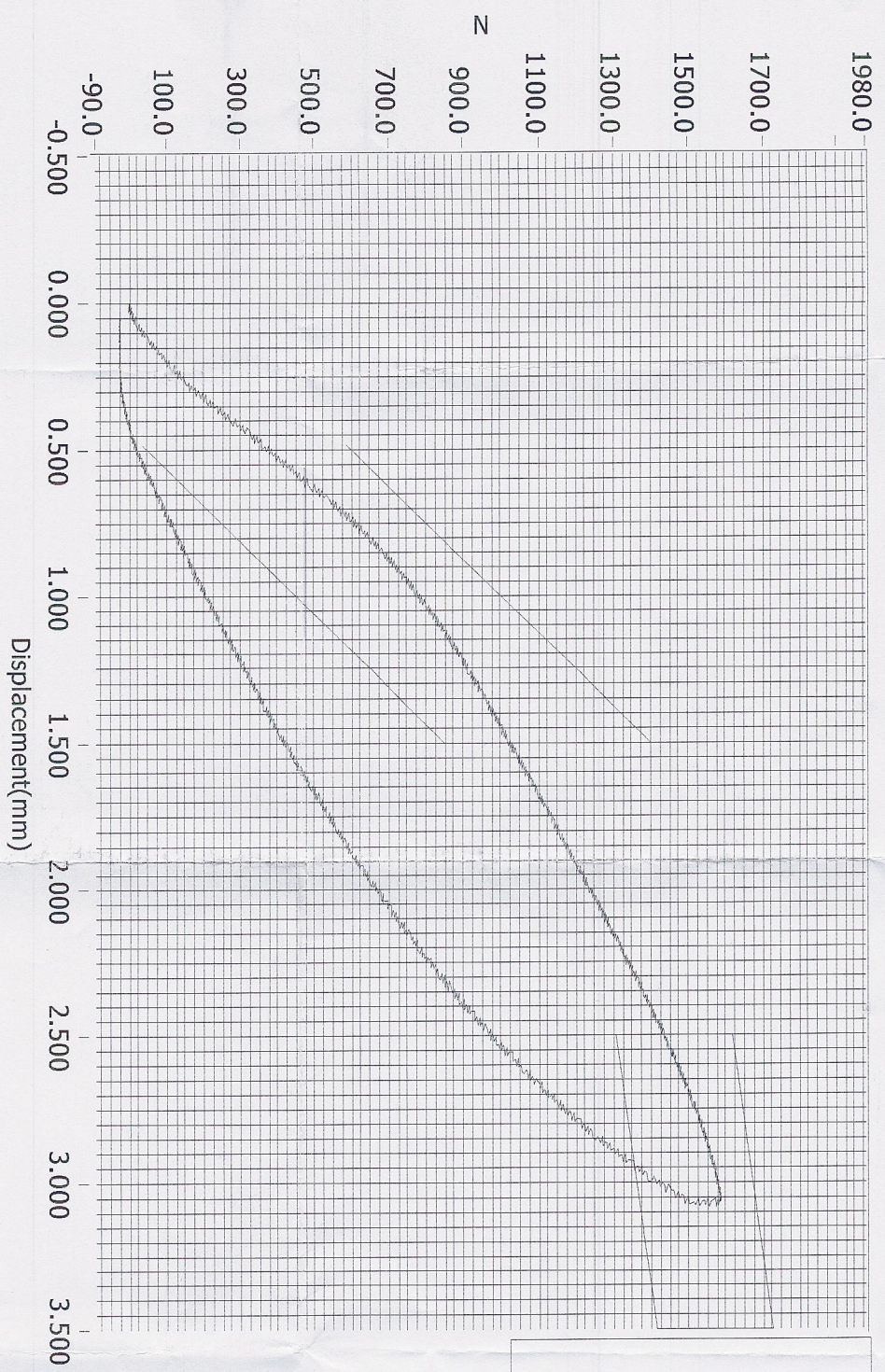
Test ID: **Abdomen**

Test Time: **2:37:39 PM**

Test Date: **10/4/2010**



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	<

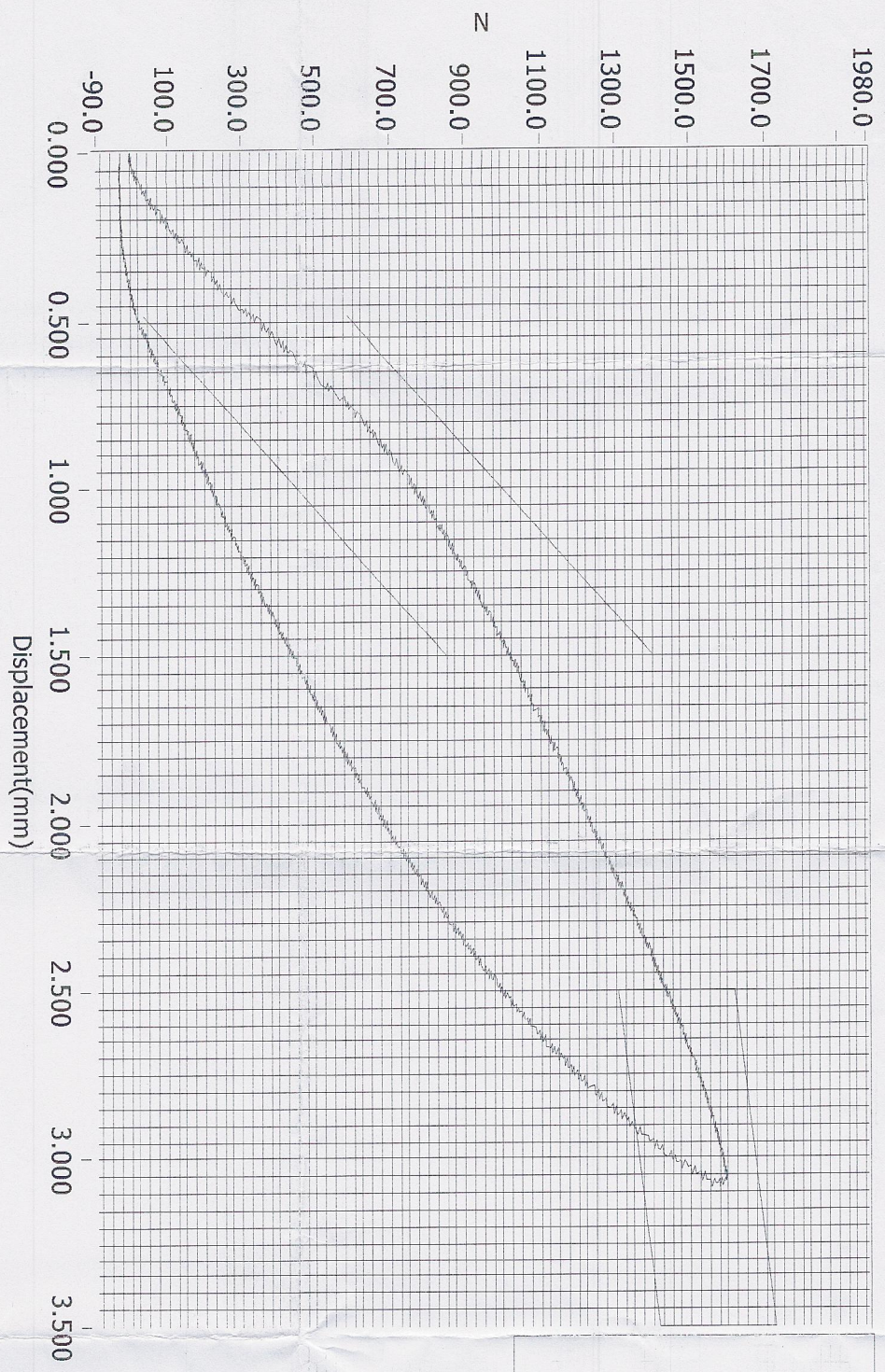
ATD Calibration Lab

Test ID	Part Serial Number	Test Date	Test Time
Cert ID	ATD Serial Number	ATD Type	
	11997	SIDIIs	

Current Date : 6/26/2007

Current Time : 16:15:40

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

<u>Test ID</u>	<u>Part Serial Number</u>	<u>Test Date</u>	<u>Test Time</u>
<u>Cert ID</u>	<u>ATD Serial Number</u>	<u>ATD Type</u>	
	11858	SIDIIs	

Current Date : 6/22/2007

Current Time : 13:51:58

FS



www.calspan.com

Calspan - Transportation Research Group

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

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 300		
Test ID:	Acetabulum	Test Date:	10/4/2010
Test Number:	1	Test Time:	11:44:25 AM

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.2 deg C P
Humidity	10 -- 70	39 %RH P
Velocity	6.60 -- 6.80	6.62 m/s P
Peak Probe Acceleration	38.0 -- 47.0	45.7 g P
Peak Pelvis Acceleration	34.0 -- 42.0	41.4 g P
Peak Acetabulum Force	3.60 -- 4.30	4.22 kN P

All test parameters are within specifications

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

Test ID: **Acetabulum**

Test Time: **11:44:25 AM**

Test Date: **10/4/2010**



www.calspan.com

Calspan - Transportation Research Group

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	7264-2000	P66927	4/20/2010
Endevco	7264-2000	P51671	4/12/2010
DentonATD	3249J	LC-275a	4/12/2010

Test ID: **Acetabulum**

Test Time: **11:44:25 AM**

Test Date: **10/4/2010**



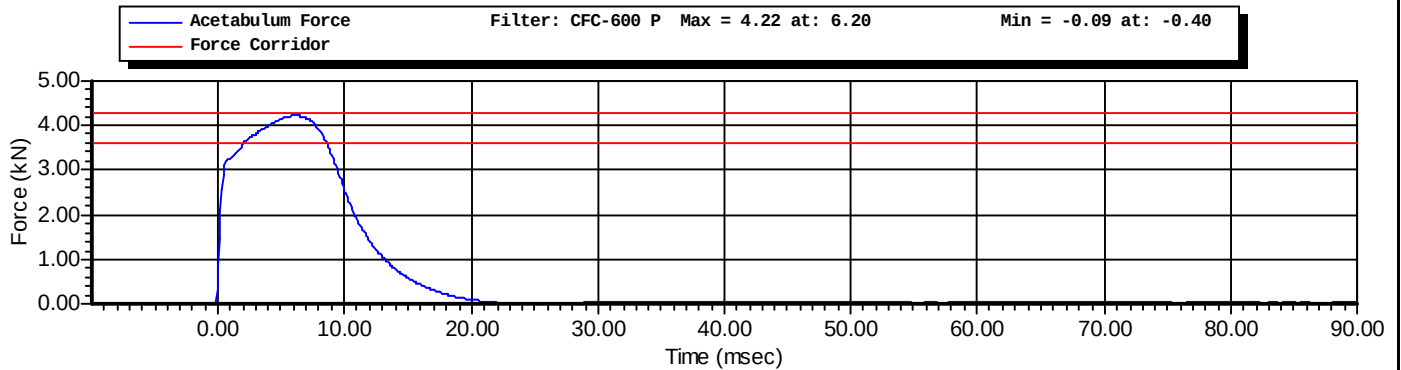
www.calspan.com

Calspan - Transportation Research Group

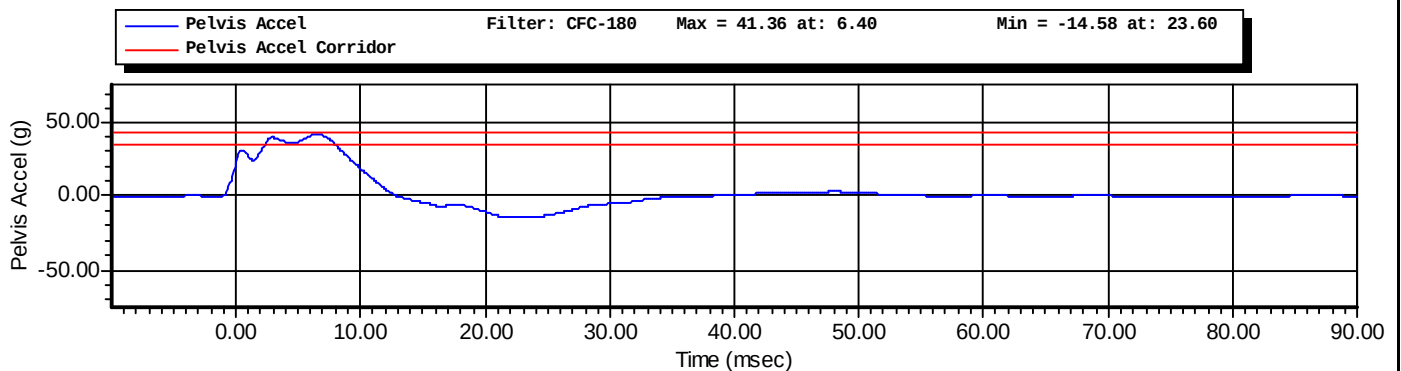
4455 Genesee Street, Buffalo, New York 14225 - Phone (716)632-7500

Test Name:	Pelvis	Revision:	8/24/2009
Sub Test Name:	Acetabulum Impact	Spec Type:	NHTSA
ATD Type:	SID-IIIs		
ATD Serial Number:	SID 300		
Test ID:	Acetabulum	Test Date:	10/4/2010
Test Number:	1	Test Time:	11:44:25 AM

Acetabulum Force



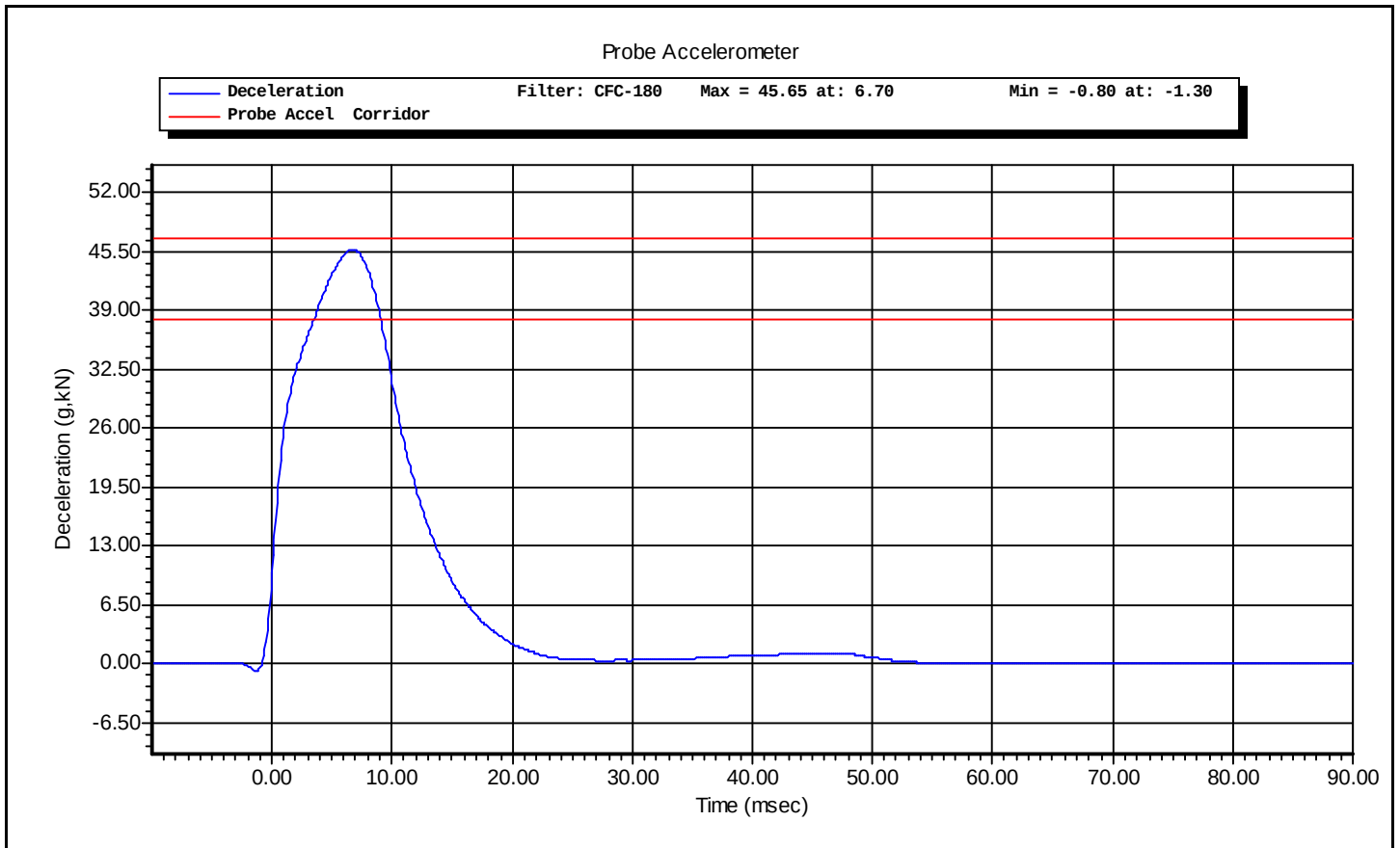
Pelvis Accelerometer



Test ID: **Acetabulum**

Test Time: **11:44:25 AM**

Test Date: **10/4/2010**





www.calspan.com

Calspan - Transportation Research Group

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

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-300		
Test ID:	Pelvis Iliac	Test Date:	10/4/2010
Test Number:	2	Test Time:	11:12:17 AM

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.2 deg C P
Humidity	10 -- 70	39 %RH P
Velocity	4.20 -- 4.40	4.27 m/s P
Peak Probe Acceleration	36.0 -- 45.0	42.1 g P
Peak Pelvis Acceleration	28.0 -- 39.0	38.2 g P
Peak Iliac Force	4.10 -- 5.10	4.81 kN P

All test parameters are within specifications

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

Test ID: **Pelvis Iliac**

Test Time: **11:12:17 AM**

Test Date: **10/4/2010**



www.calspan.com

Calspan - Transportation Research Group

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	7264-2000	P66927	4/20/2010
Endevco	7264-2000	P51671	4/12/2010
DentonATD	3228J	LC-279 Fy	4/12/2010

Test ID: **Pelvis Illiac**

Test Time: **11:12:17 AM**

Test Date: **10/4/2010**

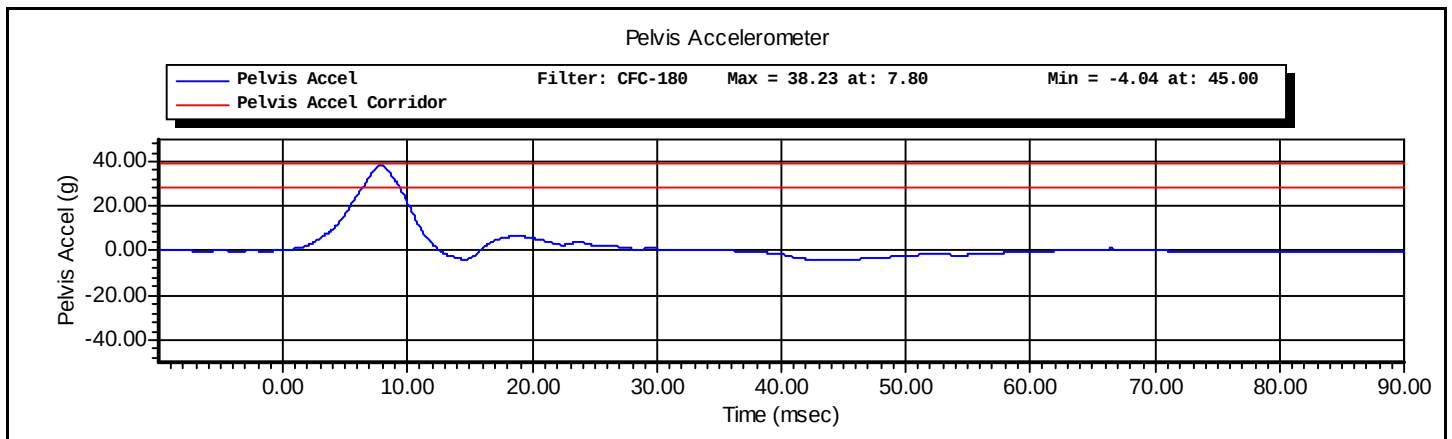
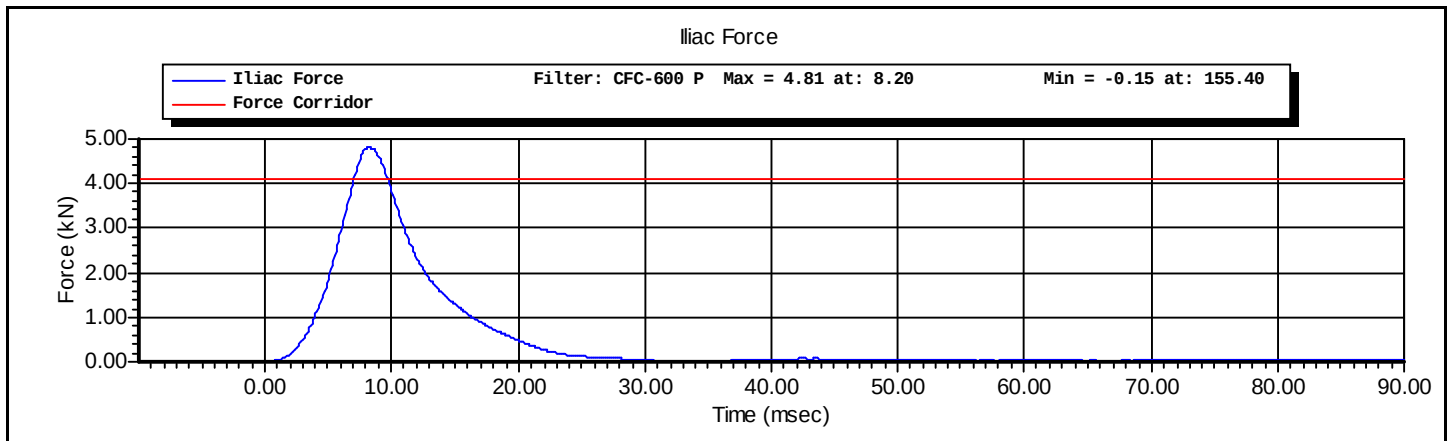


www.calspan.com

Calspan - Transportation Research Group

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

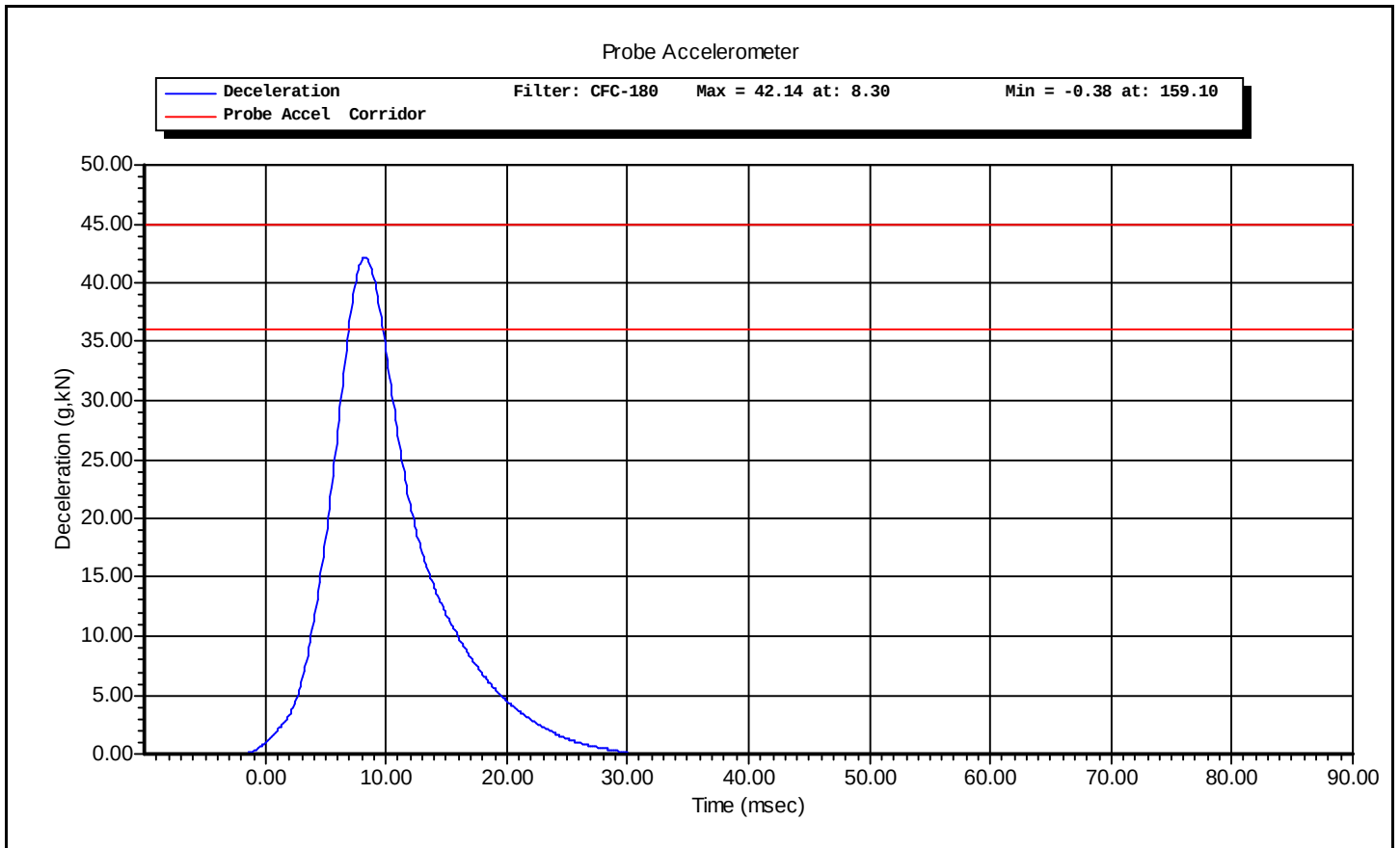
Test Name:	Pelvis	Revision:	8/24/2009
Sub Test Name:	Iliac Impact	Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	SID-300		
Test ID:	Pelvis Iliac	Test Date:	10/4/2010
Test Number:	2	Test Time:	11:12:17 AM



Test ID: **Pelvis Iliac**

Test Time: **11:12:17 AM**

Test Date: **10/4/2010**



CALIBRATION TEST RESULTS

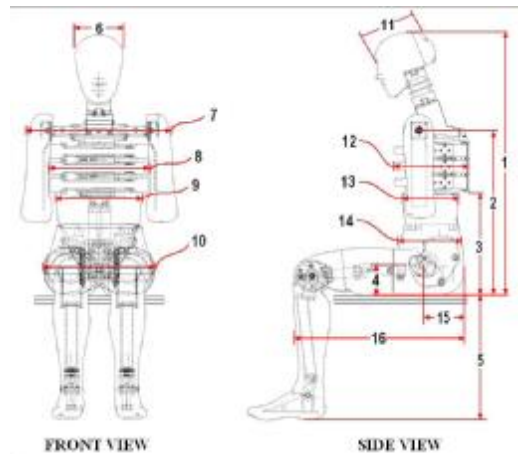
POST-TEST

ES2-re No: 33

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	564	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	159	Pass
7	Shoulder/Arm Width	461-479	470	Pass
8	Thorax Width	322-332	323	Pass
9	Abdomen Width	273-287	281	Pass
10	Pelvis Lap Width	359-373	370	Pass
11	Head Depth	196-206	201	Pass
12	Thorax Depth	262-272	269	Pass
13	Abdomen Depth	194-204	201	Pass
14	Pelvis Depth	235-245	238	Pass
15	Back of Buttocks to Hip Joint (center of bolt)	150-160	154	Pass
16	Back of Buttocks to Front Knee	597-615	603	Pass

Technician: SZ

Date: 09/29/2010



www.calspan.com

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:	9/29/2010
Test Number:	1	Test Time:	10:13:39 AM

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	54 %RH P
Resultant Acceleration	125 -- 155	153 g P
Oscillation	0.0 -- 15.0	5.9 % P
Fore-Aft Acceleration	-15.00 -- 15.00	5.99 g P

All test parameters are within specifications

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

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

Test ID: **Head Drop**

Test Time: **10:13:39 AM**

Test Date: **9/29/2010**



www.calspan.com

Calspan - Transportation Research Group

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>
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: **10:13:39 AM**

Test Date: **9/29/2010**

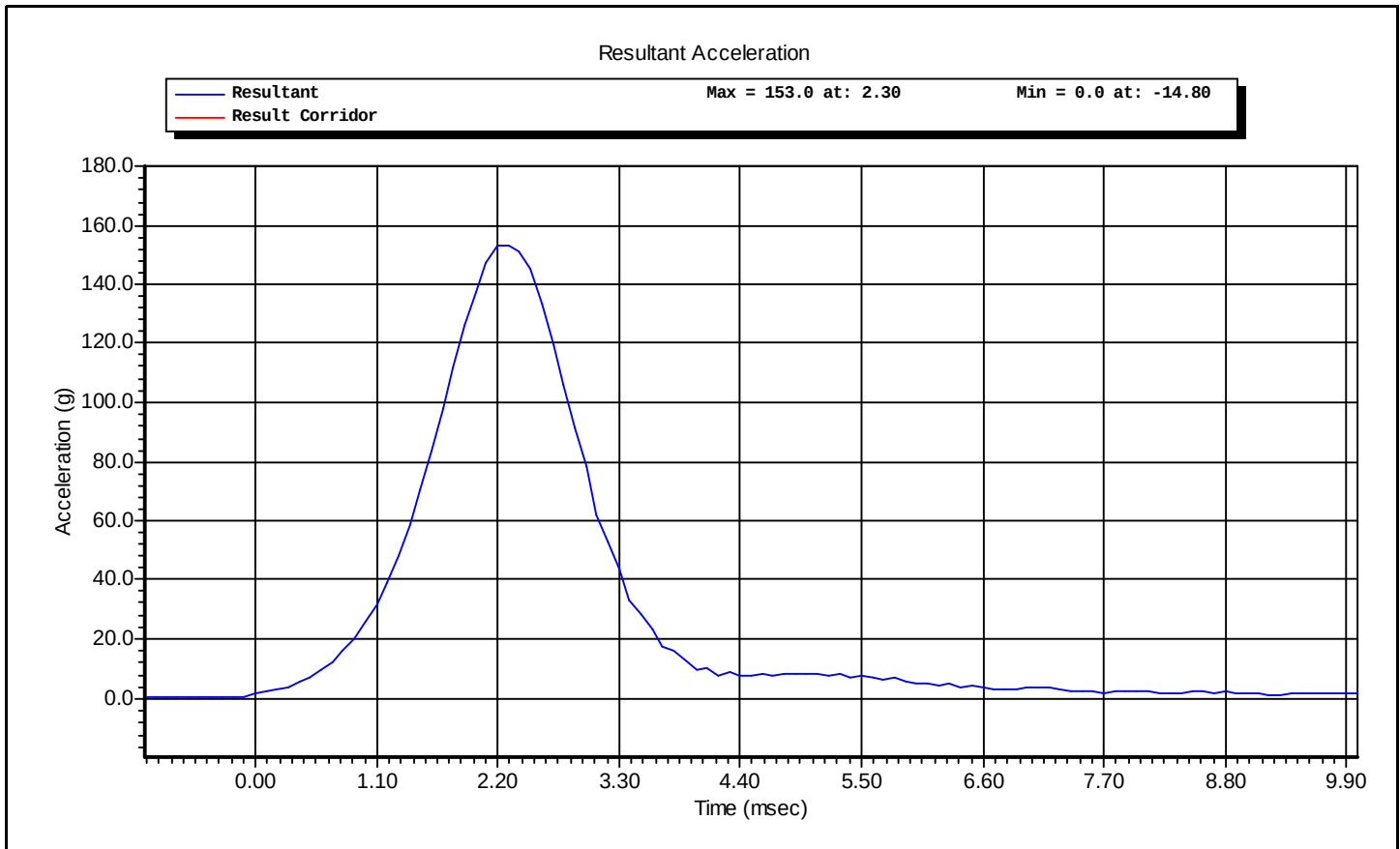


www.calspan.com

Calspan - Transportation Research Group

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

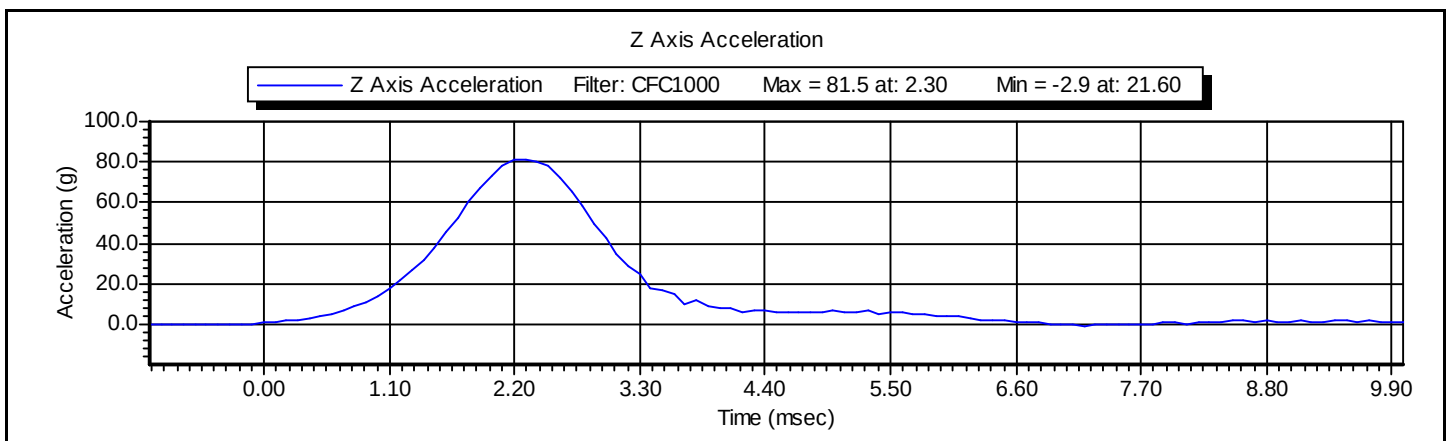
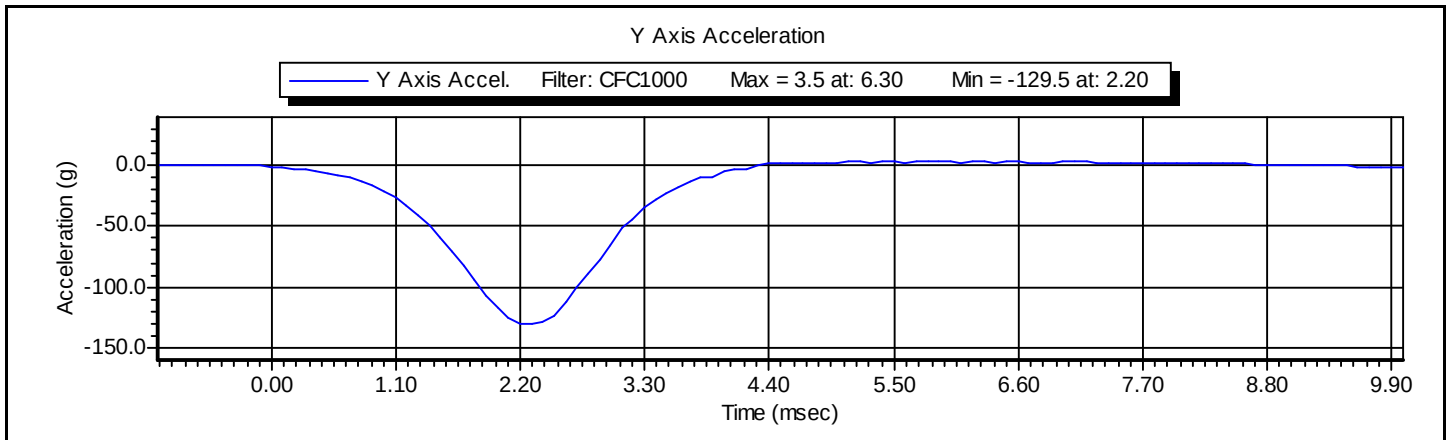
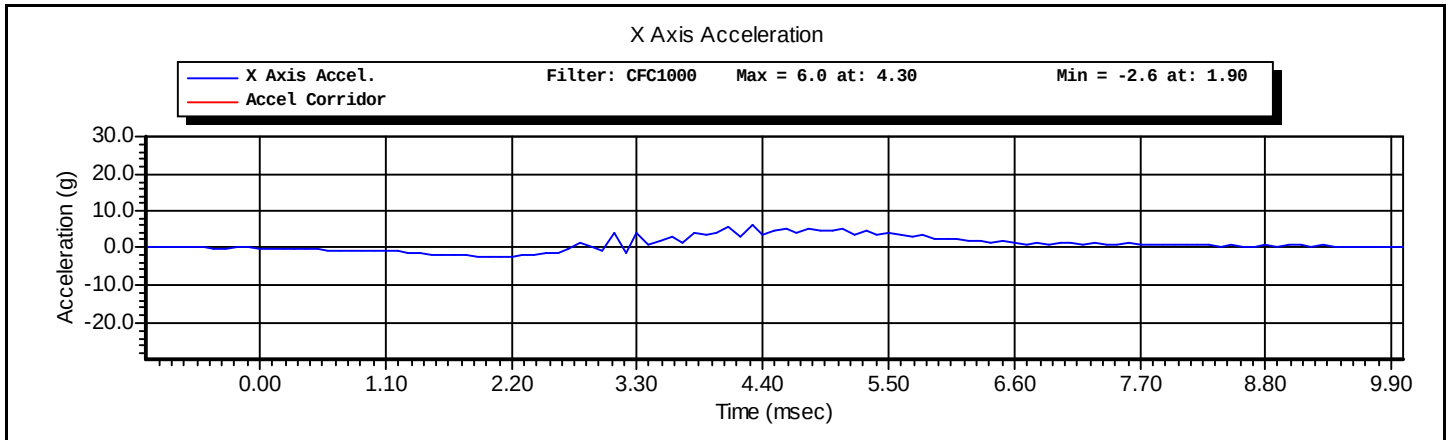
Test Name:	Head Drop	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Head Drop	Test Date:	9/29/2010
Test Number:	1	Test Time:	10:13:39 AM



Test ID: **Head Drop**

Test Time: **10:13:39 AM**

Test Date: **9/29/2010**





www.calspan.com

Calspan - Transportation Research Group

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

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:	9/29/2010
Test Number:	1	Test Time:	10:50:50 AM

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	53 %RH P
Velocity	3.30 -- 3.50	3.42 m/s P
Maximum Neck Flexion Angle	49.0 -- 59.0	52.6 degrees P
Time At Maximum Neck Flexion	54.0 -- 66.0	59.6 ms P
Decay to Zero Degrees	53.0 -- 88.0	58.5 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: **10:50:50 AM**

Test Date: **9/29/2010**



www.calspan.com

Calspan - Transportation Research Group

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: **10:50:50 AM**

Test Date: **9/29/2010**



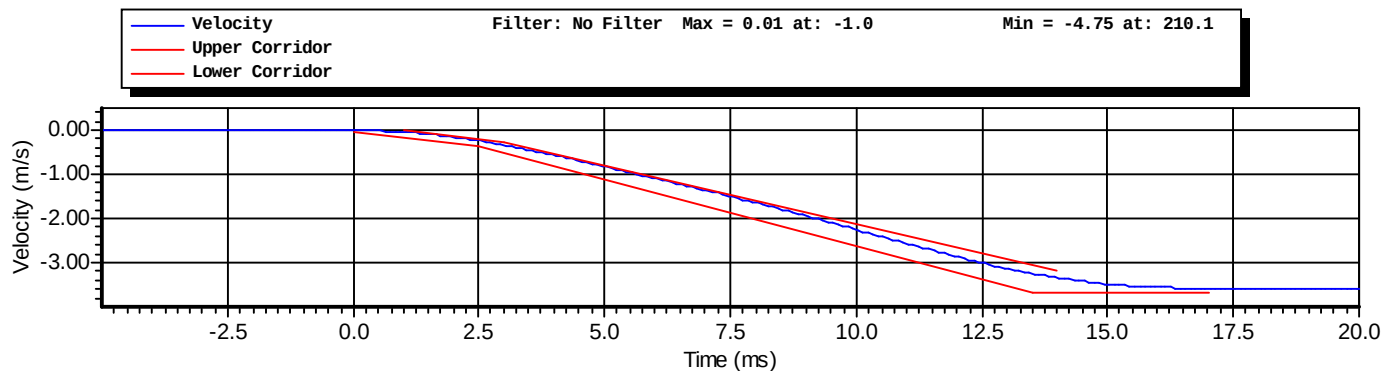
www.calspan.com

Calspan - Transportation Research Group

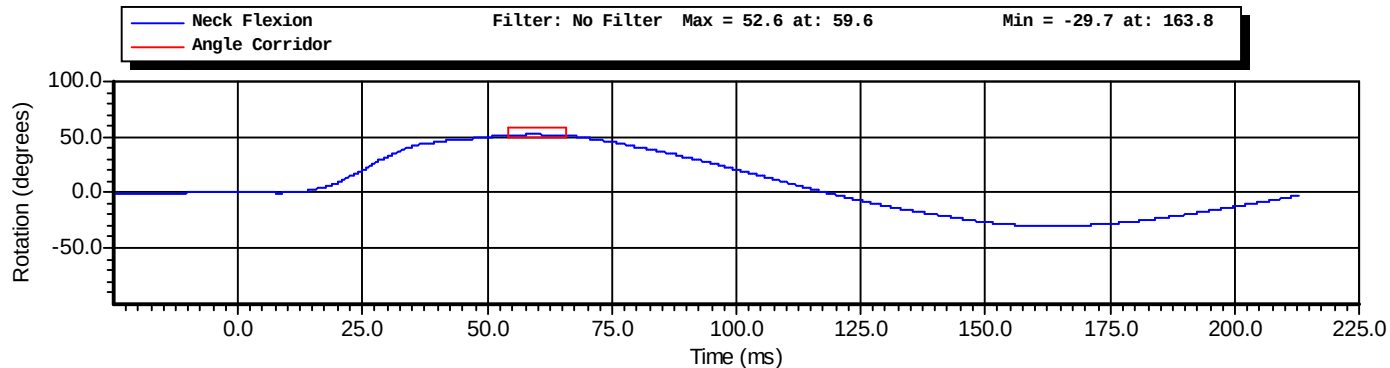
4455 Genesee Street, Buffalo, New York 14225 - Phone (716)632-7500

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:	9/29/2010
Test Number:	1	Test Time:	10:50:50 AM

Pendulum Velocity



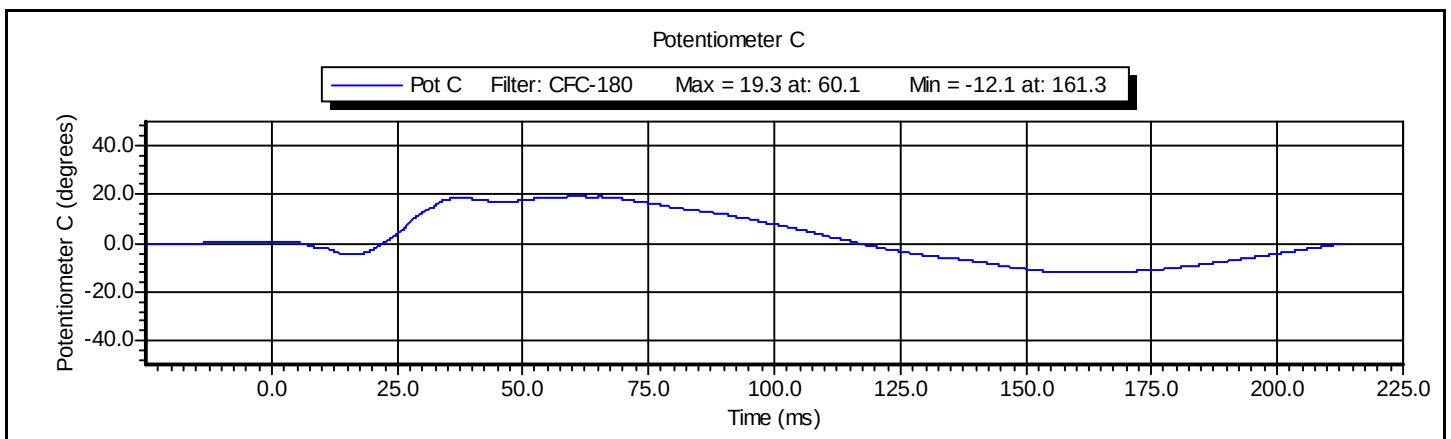
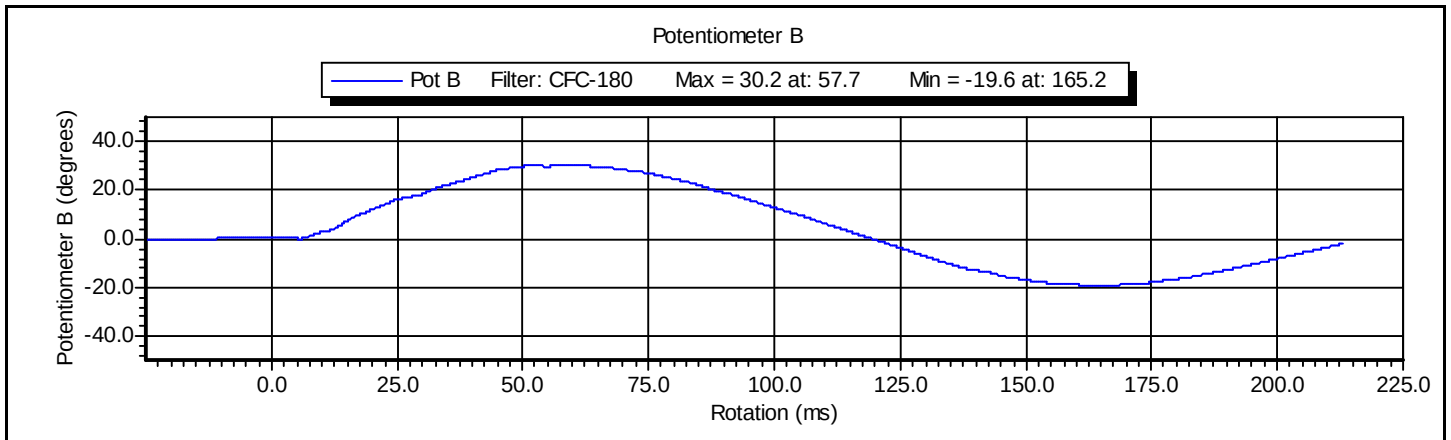
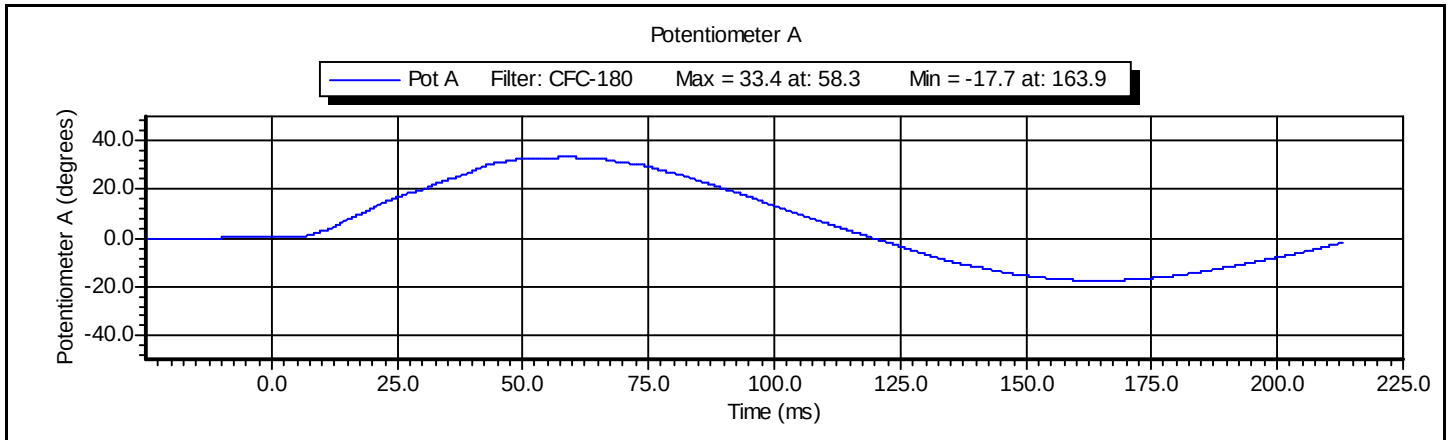
Neck Flexion Angle



Test ID: Neck Flexion

Test Time: 10:50:50 AM

Test Date: 9/29/2010





www.calspan.com

Calspan - Transportation Research Group

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

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:	9/29/2010
Test Number:	1	Test Time:	3:28:09 PM

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.2 deg C P
Humidity	10.0 -- 70.0	51.0 %RH P
Velocity	4.20 -- 4.40	4.33 m/s P
Pendulum Acceleration	-10.50 -- -7.50	-9.59 g P

All test parameters are within specifications

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

Test ID: **Shoulder**

Test Time: **3:28:09 PM**

Test Date: **9/29/2010**



www.calspan.com

Calspan - Transportation Research Group

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	7264-2000	P66927	4/20/2010

Test ID: **Shoulder**

Test Time: **3:28:09 PM**

Test Date: **9/29/2010**

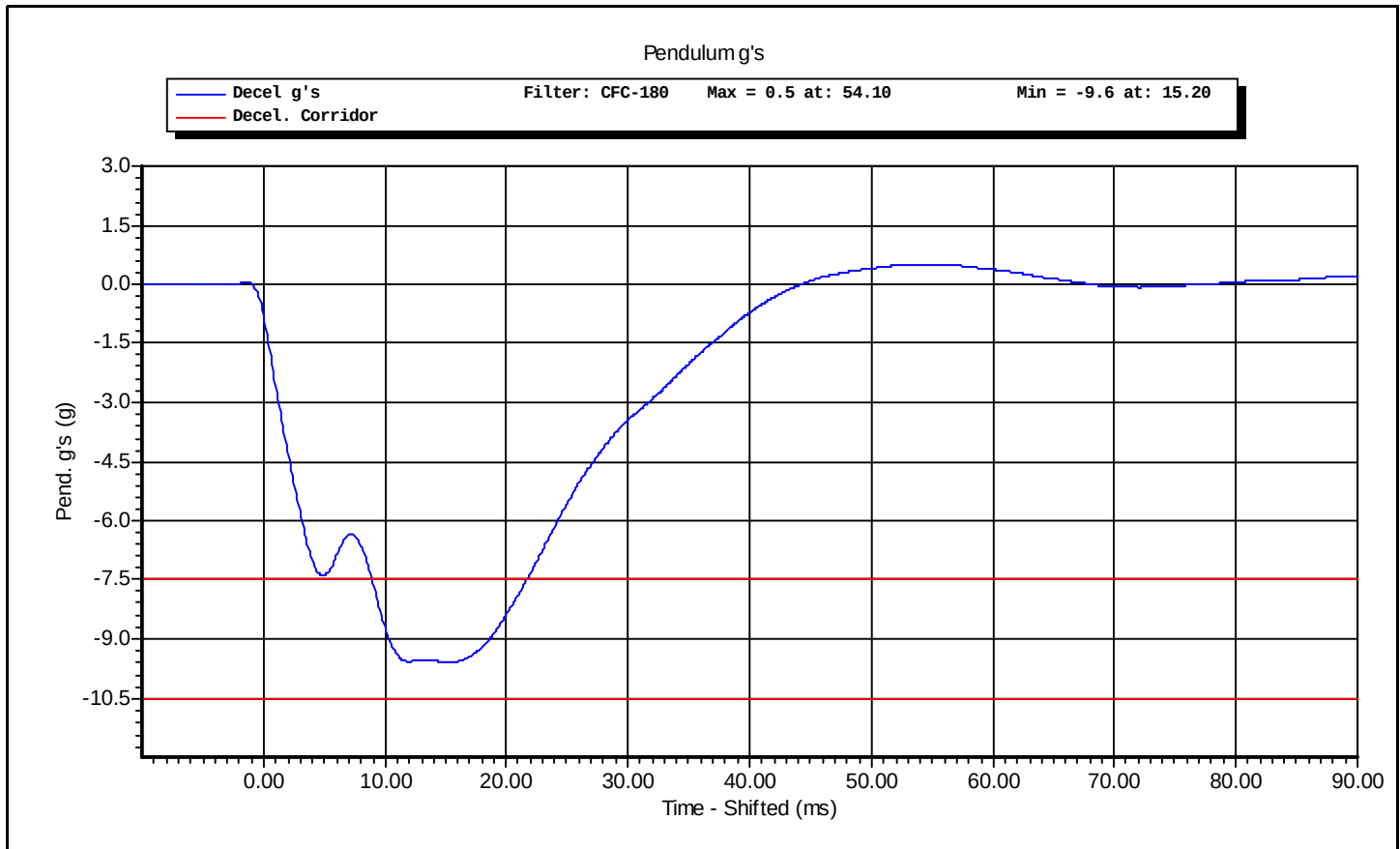


www.calspan.com

Calspan - Transportation Research Group

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

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:	9/29/2010
Test Number:	1	Test Time:	3:28:09 PM



Test ID: **Shoulder**

Test Time: **3:28:09 PM**

Test Date: **9/29/2010**



www.calspan.com

Calspan - Transportation Research Group

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

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:	9/29/2010
Test Number:	1	Test Time:	1:26:14 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	52.0 %RH P
Velocity	3.90 -- 4.10	3.97 m/s P
Rib Displacement	-51.00 -- -46.00	-48.63 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: **Lower Rib 4 m/s**

Test Time: **1:26:14 PM**

Test Date: **9/29/2010**



www.calspan.com

Calspan - Transportation Research Group

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>
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: **1:26:14 PM**

Test Date: **9/29/2010**

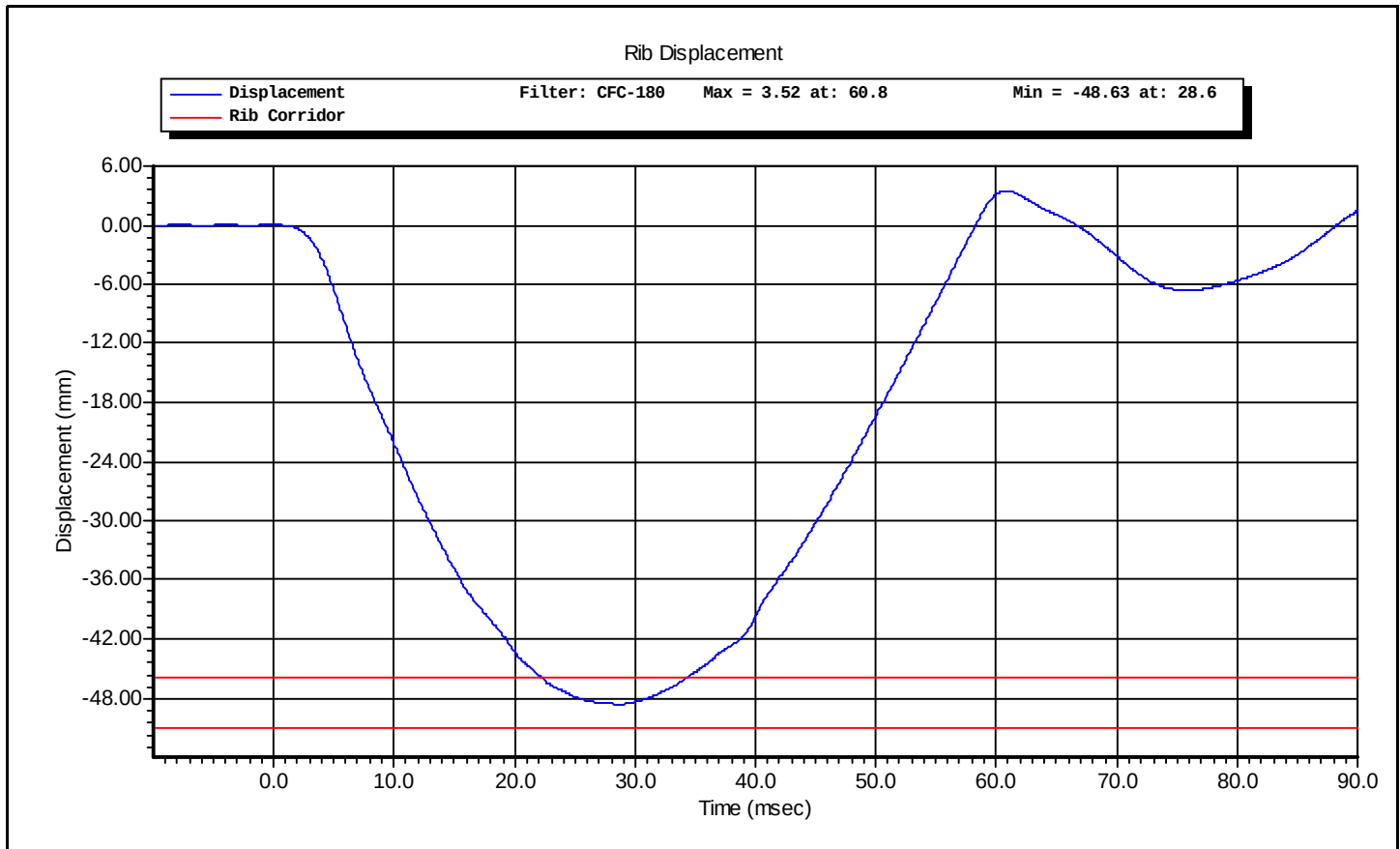


www.calspan.com

Calspan - Transportation Research Group

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

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:	9/29/2010
Test Number:	1	Test Time:	1:26:14 PM



Test ID: Lower Rib 4 m/s Test Time: 1:26:14 PM

Test Date: 9/29/2010



www.calspan.com

Calspan - Transportation Research Group

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

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:	9/29/2010
Test Number:	1	Test Time:	1:33:55 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	52.0 %RH P
Velocity	2.90 -- 3.10	2.96 m/s P
Rib Displacement	-40.00 -- -36.00	-38.08 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: **Lower Rib 3 m/s**

Test Time: **1:33:55 PM**

Test Date: **9/29/2010**



www.calspan.com

Calspan - Transportation Research Group

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>
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: **1:33:55 PM**

Test Date: **9/29/2010**

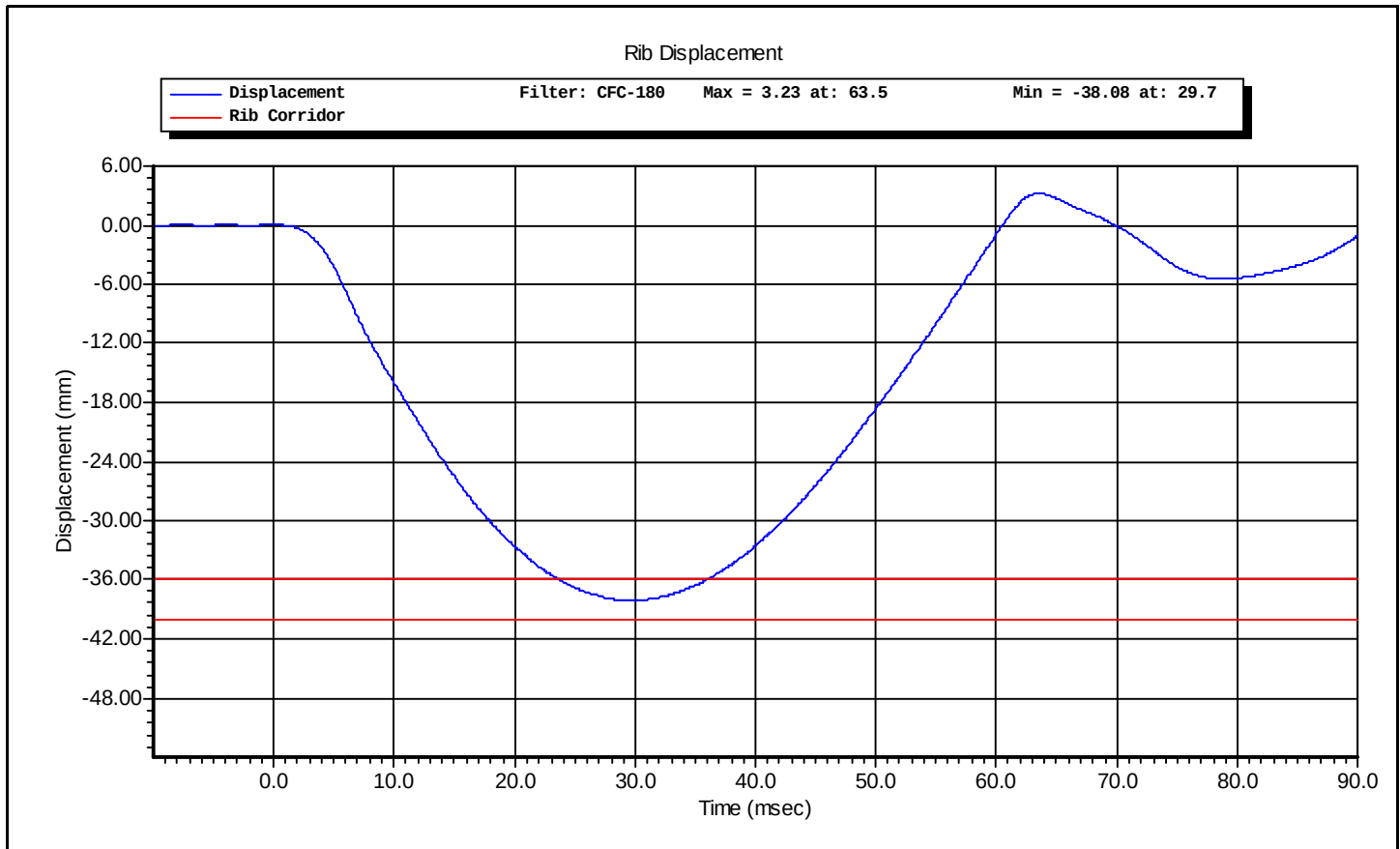


www.calspan.com

Calspan - Transportation Research Group

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

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:	9/29/2010
Test Number:	1	Test Time:	1:33:55 PM



Test ID: Lower Rib 3 m/s Test Time: 1:33:55 PM

Test Date: 9/29/2010



www.calspan.com

Calspan - Transportation Research Group

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

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:	9/29/2010
Test Number:	1	Test Time:	12:54:26 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	50.0 %RH P
Velocity	3.90 -- 4.10	3.99 m/s P
Rib Displacement	-51.00 -- -46.00	-47.96 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: **12:54:26 PM**

Test Date: **9/29/2010**



www.calspan.com

Calspan - Transportation Research Group

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>
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: **12:54:26 PM**

Test Date: **9/29/2010**

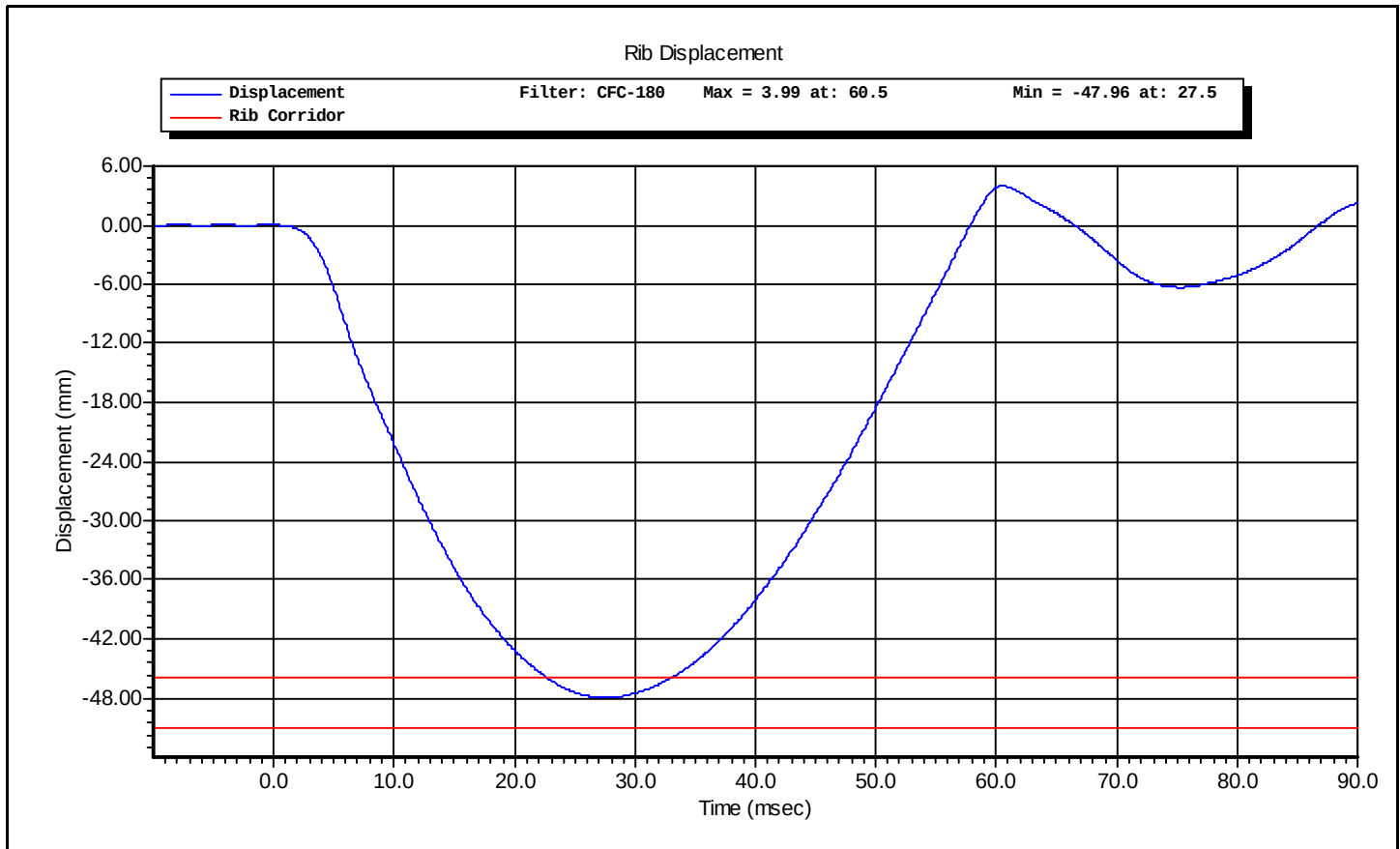


www.calspan.com

Calspan - Transportation Research Group

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

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:	9/29/2010
Test Number:	1	Test Time:	12:54:26 PM



Test ID: Middle Rib 4 m/s Test Time: 12:54:26 PM

Test Date: 9/29/2010



www.calspan.com

Calspan - Transportation Research Group

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

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:	9/29/2010
Test Number:	1	Test Time:	1:12:19 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	52.0 %RH P
Velocity	2.90 -- 3.10	2.97 m/s P
Rib Displacement	-40.00 -- -36.00	-37.57 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: **1:12:19 PM**

Test Date: **9/29/2010**



www.calspan.com

Calspan - Transportation Research Group

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>
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: **1:12:19 PM**

Test Date: **9/29/2010**

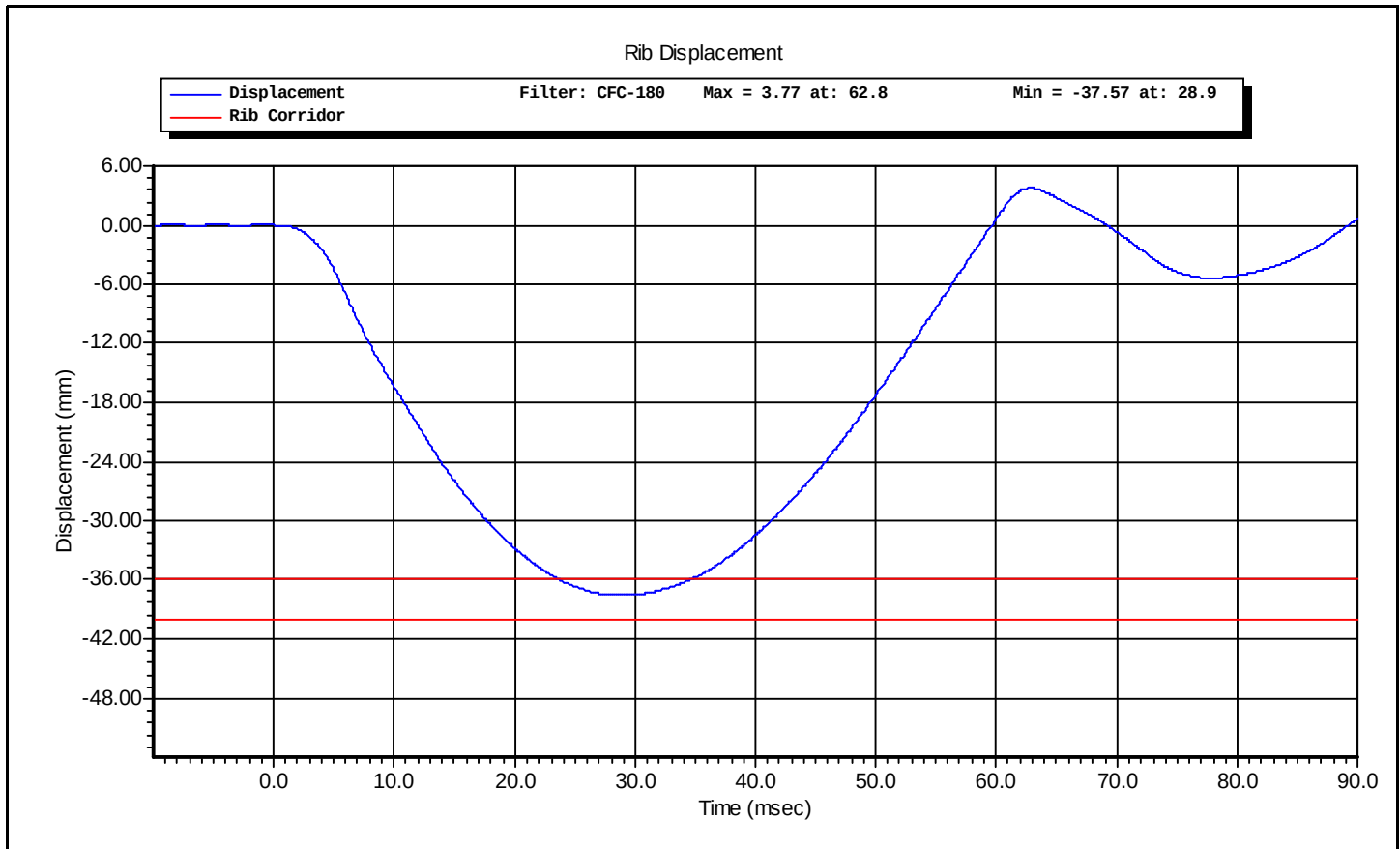


www.calspan.com

Calspan - Transportation Research Group

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

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:	9/29/2010
Test Number:	1	Test Time:	1:12:19 PM



Test ID: Middle Rib 3 m/s Test Time: 1:12:19 PM

Test Date: 9/29/2010



www.calspan.com

Calspan - Transportation Research Group

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

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:	9/29/2010
Test Number:	1	Test Time:	11:57:15 AM

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	52.0 %RH P
Velocity	3.90 -- 4.10	3.96 m/s P
Rib Displacement	-51.00 -- -46.00	-48.96 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: **Upper Rib 4 m/s**

Test Time: **11:57:15 AM**

Test Date: **9/29/2010**



www.calspan.com

Calspan - Transportation Research Group

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>
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: **11:57:15 AM**

Test Date: **9/29/2010**

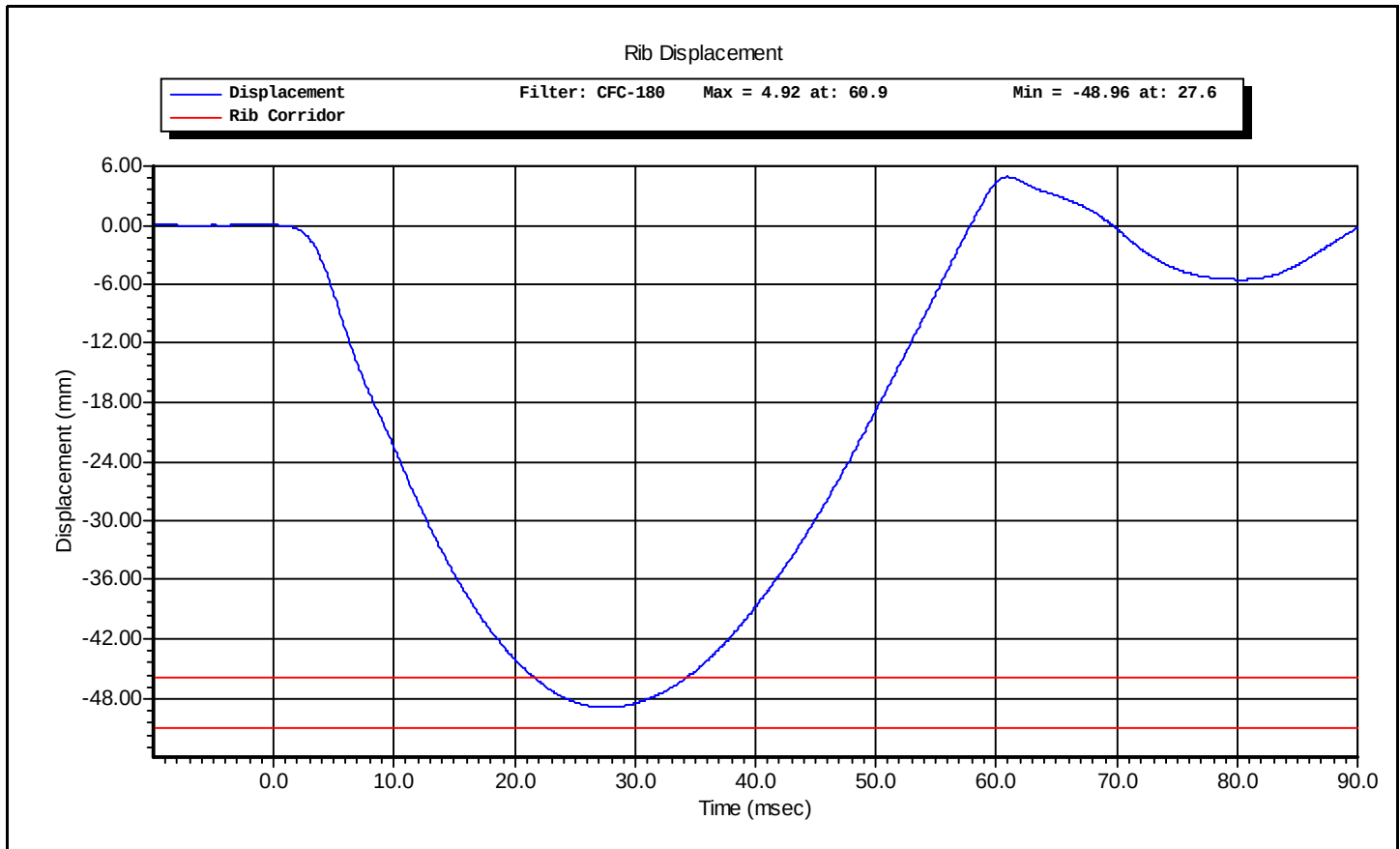


www.calspan.com

Calspan - Transportation Research Group

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

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:	9/29/2010
Test Number:	1	Test Time:	11:57:15 AM



Test ID: Upper Rib 4 m/s

Test Time: 11:57:15 AM

Test Date: 9/29/2010



www.calspan.com

Calspan - Transportation Research Group

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

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 3.0 m/s	Test Date:	9/29/2010
Test Number:	1	Test Time:	12:03:45 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	53.0 %RH P
Velocity	2.90 -- 3.10	2.98 m/s P
Rib Displacement	-40.00 -- -36.00	-37.82 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 3.0 m/s** Test Time: **12:03:45 PM**

Test Date: **9/29/2010**



www.calspan.com

Calspan - Transportation Research Group

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>
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 3.0 m/s** Test Time: **12:03:45 PM**

Test Date: **9/29/2010**

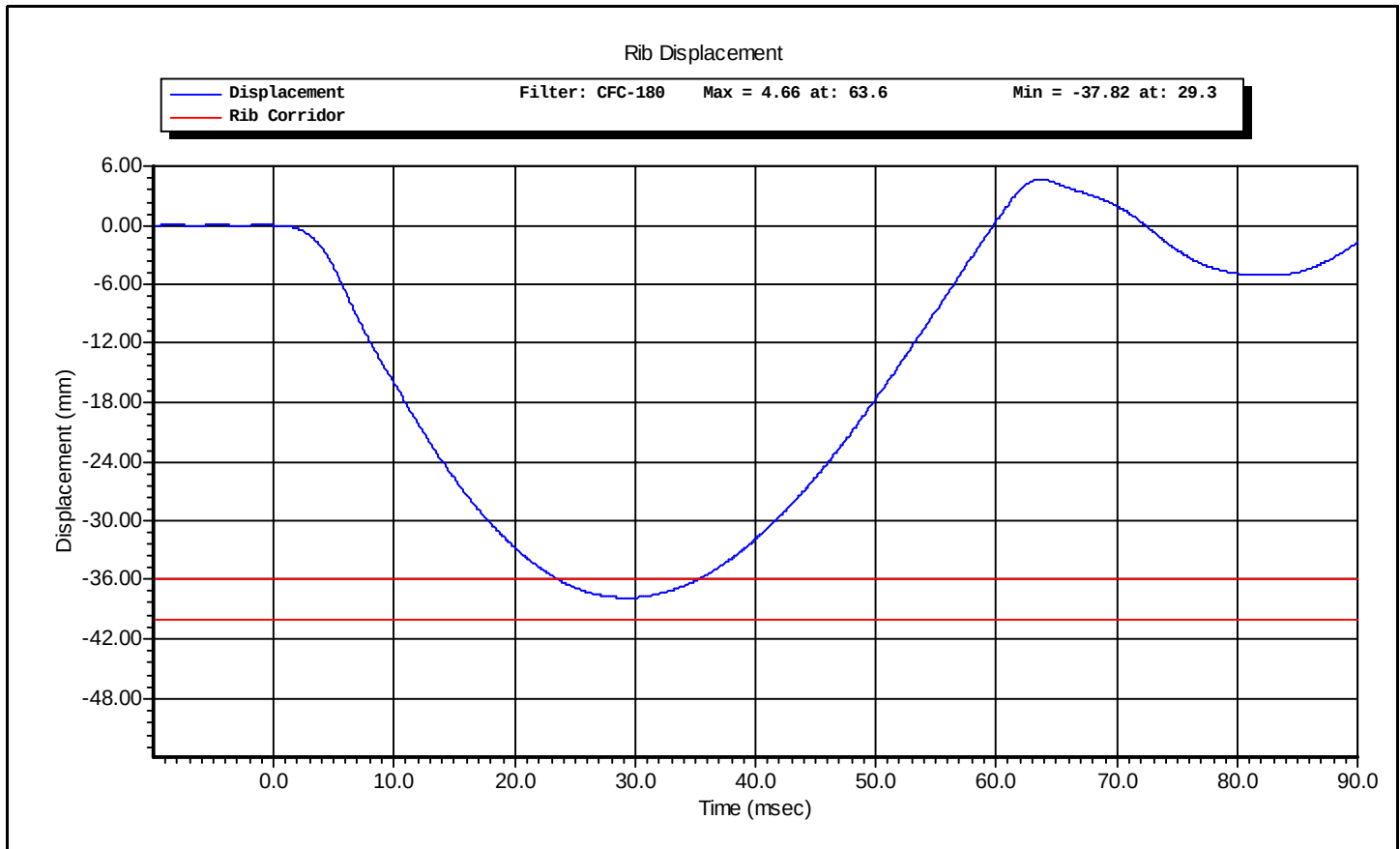


www.calspan.com

Calspan - Transportation Research Group

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

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 3.0 m/s	Test Date:	9/29/2010
Test Number:	1	Test Time:	12:03:45 PM



Test ID: Upper Rib 3.0 m/s Test Time: 12:03:45 PM

Test Date: 9/29/2010



www.calspan.com

Calspan - Transportation Research Group

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

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:	9/29/2010
Test Number:	1	Test Time:	2:48:50 PM

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.2 deg C P
Humidity	10.0 -- 70.0	52.0 %RH P
Velocity	5.40 -- 5.60	5.49 m/s P
Upper Rib Displacement	34.0 -- 41.0	37.1 mm P
Middle Rib Displacement	37.0 -- 45.0	41.0 mm P
Lower Rib Displacement	37.0 -- 44.0	41.0 mm P
Impactor Force	5100 -- 6200	5216 N P

All test parameters are within specifications

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

Test ID: **Thorax**

Test Time: **2:48:50 PM**

Test Date: **9/29/2010**



www.calspan.com

Calspan - Transportation Research Group

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	7264-2000	P66927	4/20/2010
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: **2:48:50 PM**

Test Date: **9/29/2010**

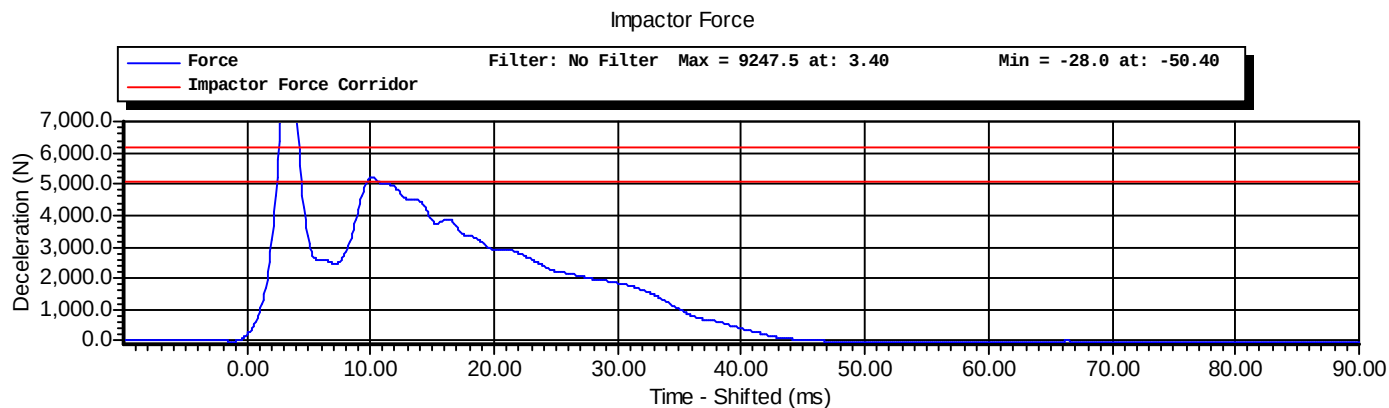
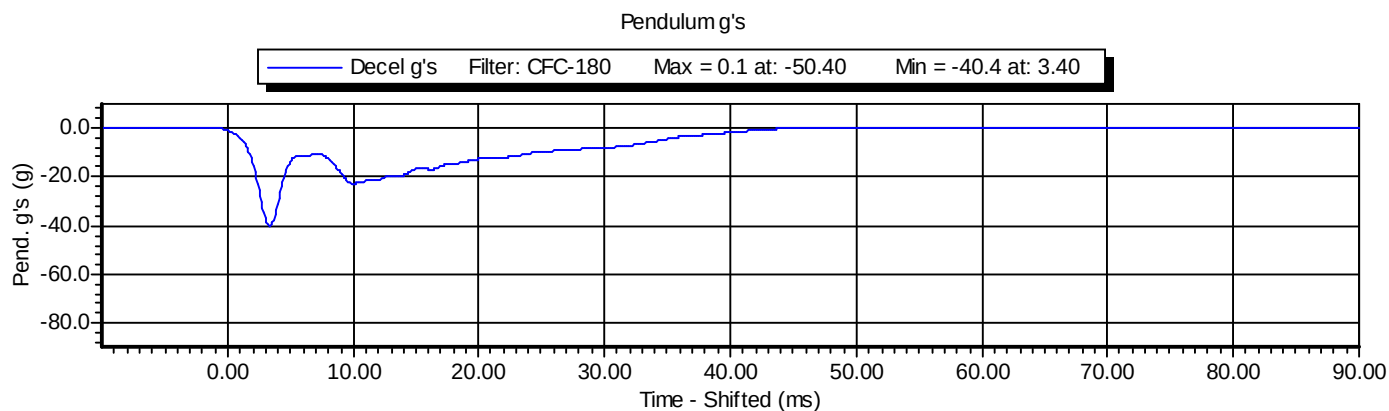


www.calspan.com

Calspan - Transportation Research Group

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

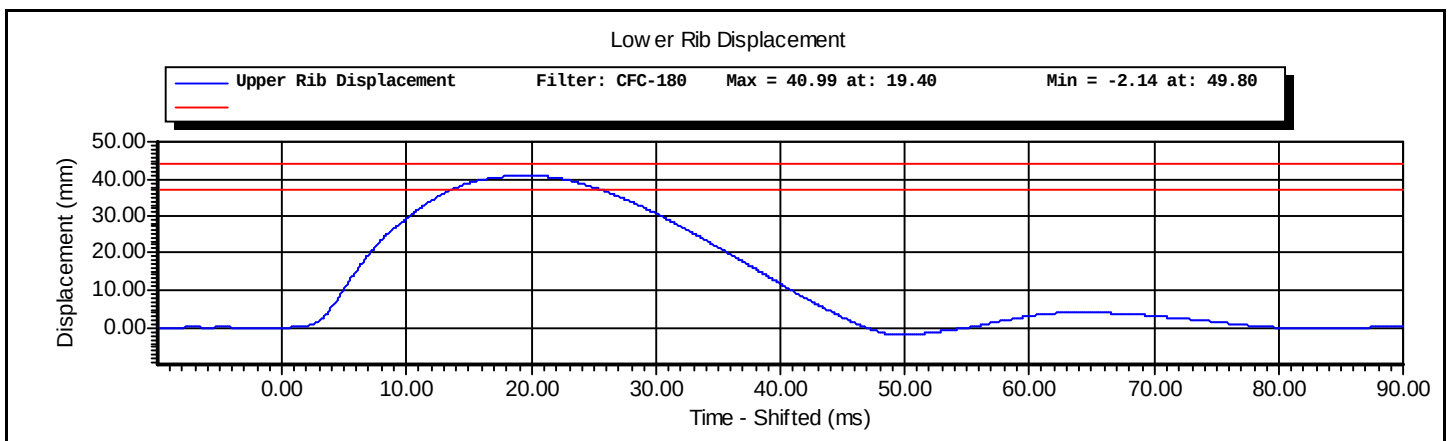
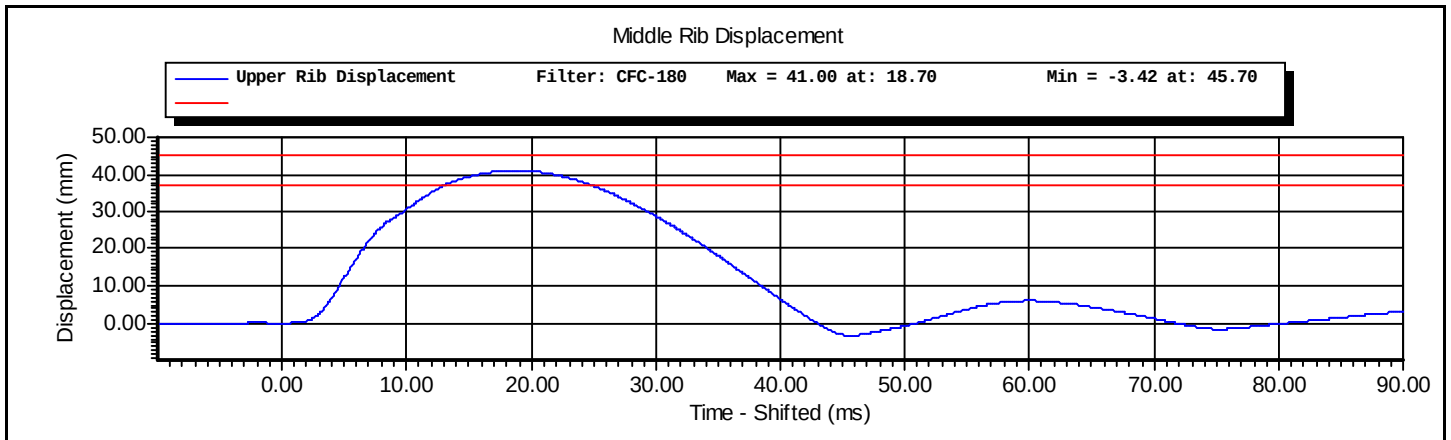
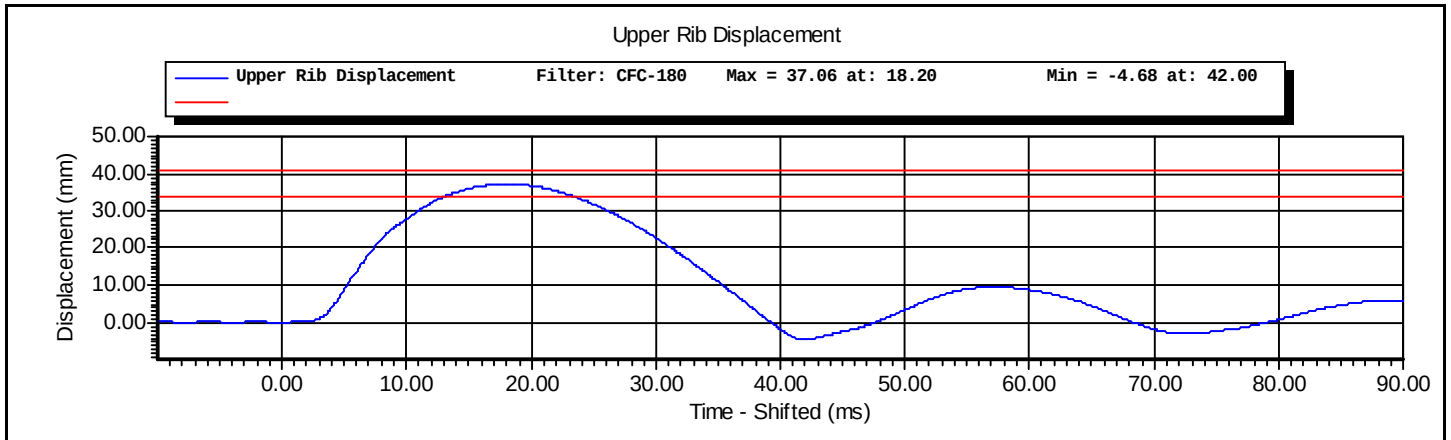
Test Name:	Thorax Impact	Revision:	8/15/2008
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Thorax	Test Date:	9/29/2010
Test Number:	1	Test Time:	2:48:50 PM



Test ID: Thorax

Test Time: 2:48:50 PM

Test Date: 9/29/2010





www.calspan.com

Calspan - Transportation Research Group

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

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:	9/29/2010
Test Number:	1	Test Time:	2:24:10 PM

Test Parameters	Test Specifications			Test Results	
Temperature	20.6	--	22.2	22.2 deg C	P
Humidity	10	--	70	50 %RH	P
Velocity	3.90	--	4.10	4.02 m/s	P
Peak Abdominal Force	-2.70	--	-2.20	-2.46 kN	P
Time At Peak Abdominal Force	10.0	--	12.3	11.7 ms	P
Maximum Pendulum Force	-4.80	--	-4.00	-4.22 kN	P
Time at Peak Pendulum Force	10.6	--	13.0	12.0 ms	P

All test parameters are within specifications

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

Test ID: **Abdomen**

Test Time: **2:24:10 PM**

Test Date: **9/29/2010**



www.calspan.com

Calspan - Transportation Research Group

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	7264-2000	P66927	4/20/2010
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: **2:24:10 PM**

Test Date: **9/29/2010**

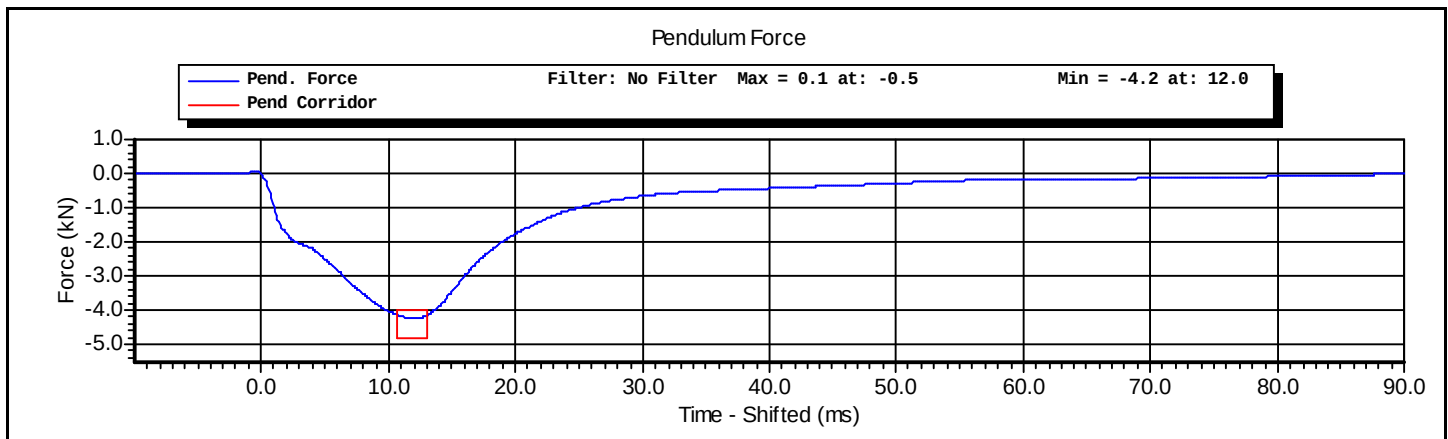
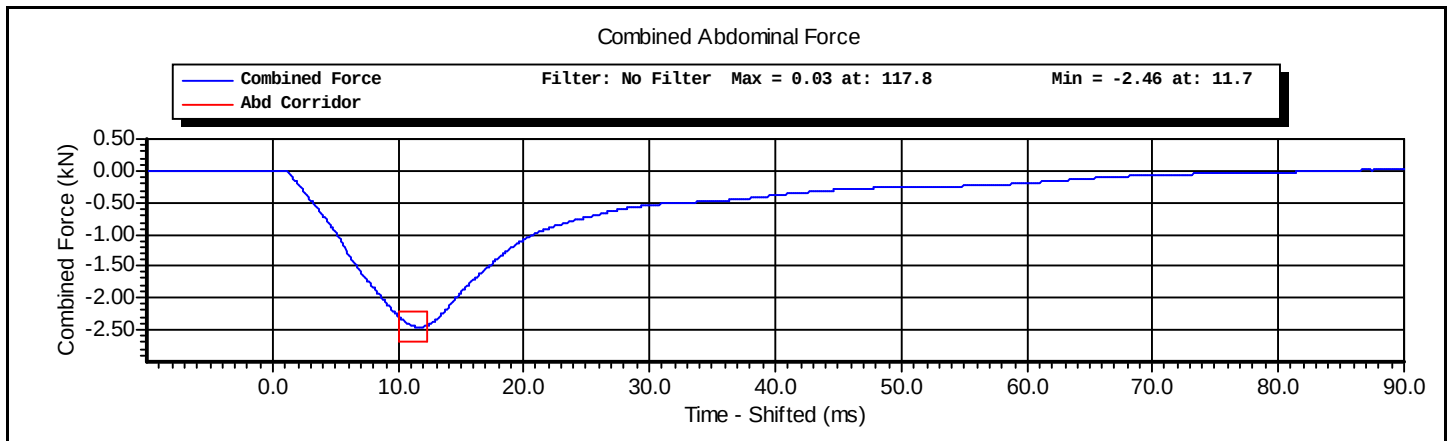


www.calspan.com

Calspan - Transportation Research Group

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

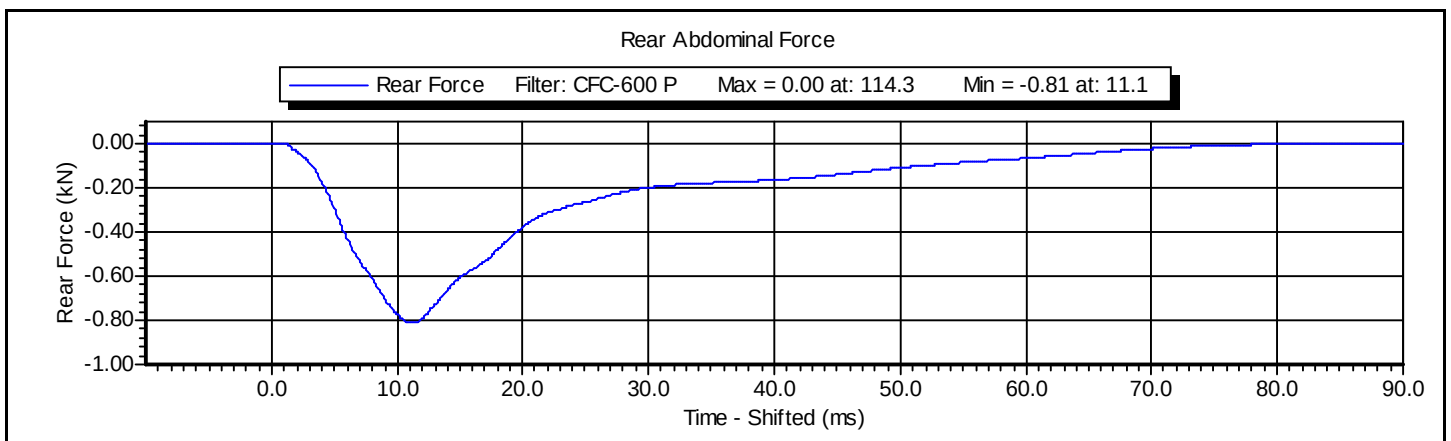
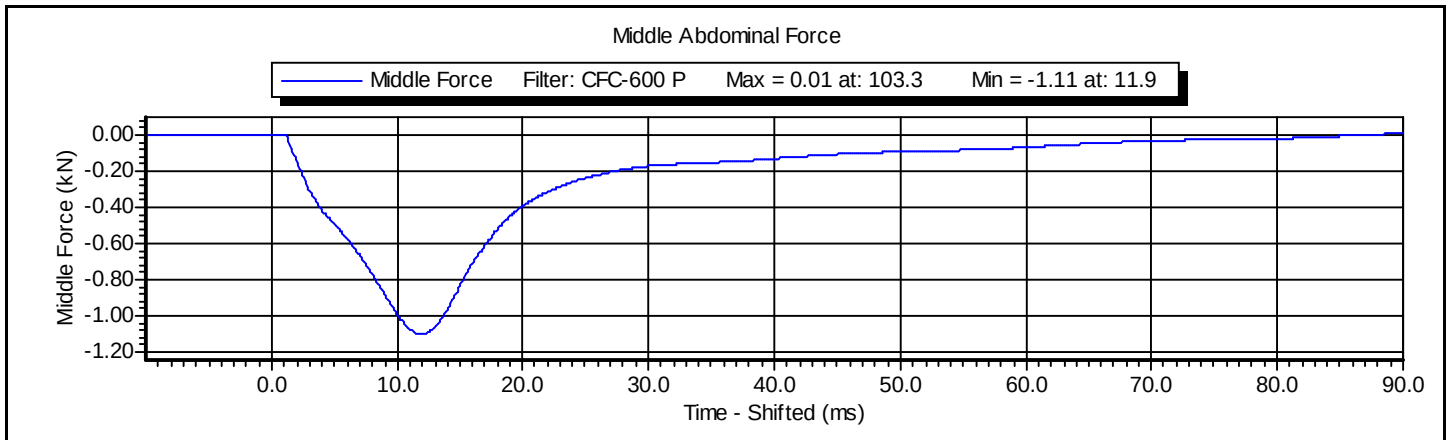
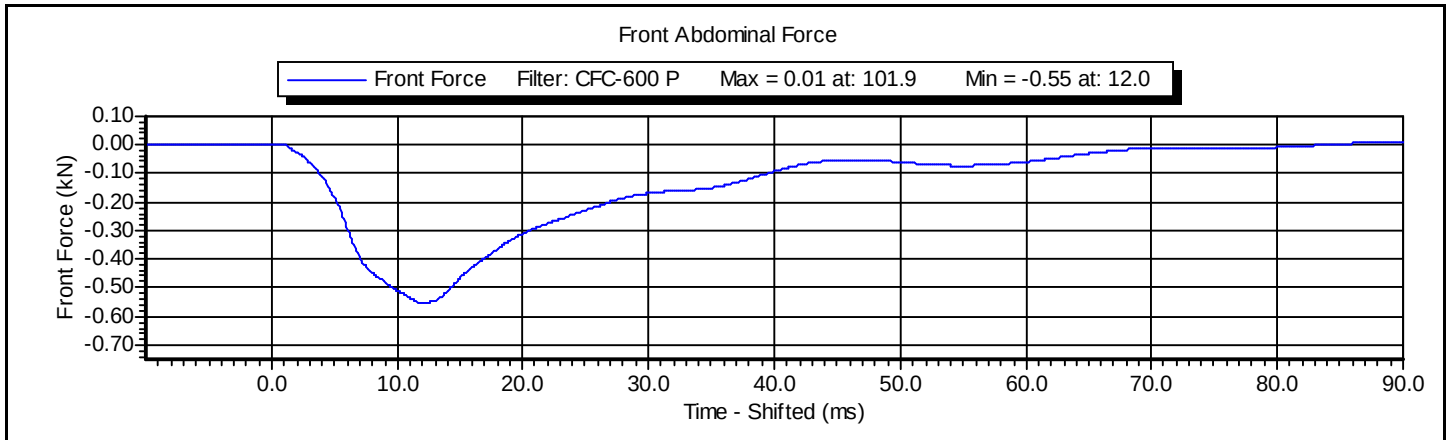
Test Name:	Abdominal Impact	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Abdomen	Test Date:	9/29/2010
Test Number:	1	Test Time:	2:24:10 PM



Test ID: **Abdomen**

Test Time: **2:24:10 PM**

Test Date: **9/29/2010**





www.calspan.com

Calspan - Transportation Research Group

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

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:	9/29/2010
Test Number:	1	Test Time:	11:21:23 AM

Component Part Number	Component Serial Number
175-5501	19-0545

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.2 deg C P
Humidity	10 -- 70	52 %RH P
Velocity	5.95 -- 6.15	6.14 m/s P
Maximum Headform Flexion Angle	45.0 -- 55.0	46.3 degrees P
Time at Maximum Headform Flexion Angle	39.0 -- 53.0	41.9 ms P
Decay to Zero Degrees	37.0 -- 57.0	39.2 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: **11:21:23 AM**

Test Date: **9/29/2010**



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

REFERENCE EQUIPMENT

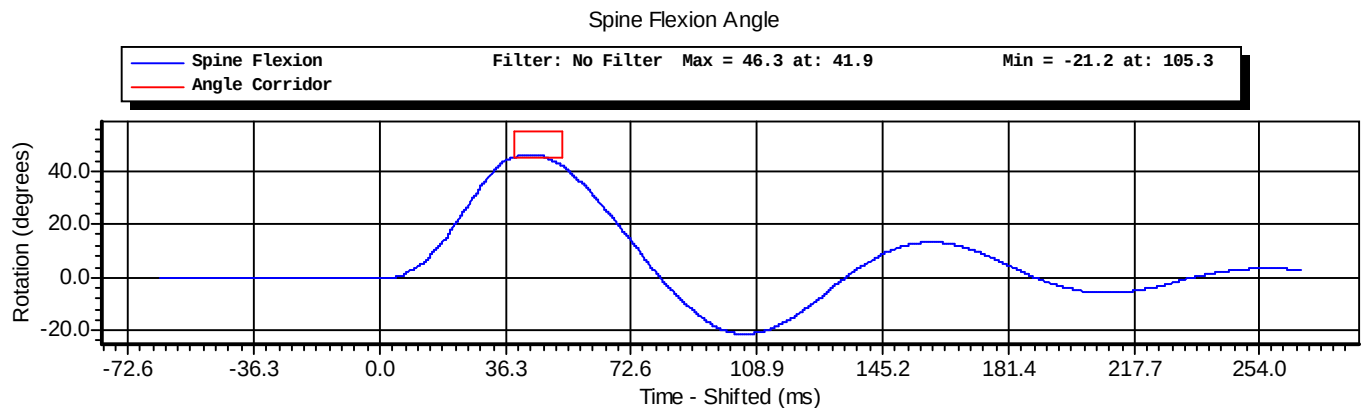
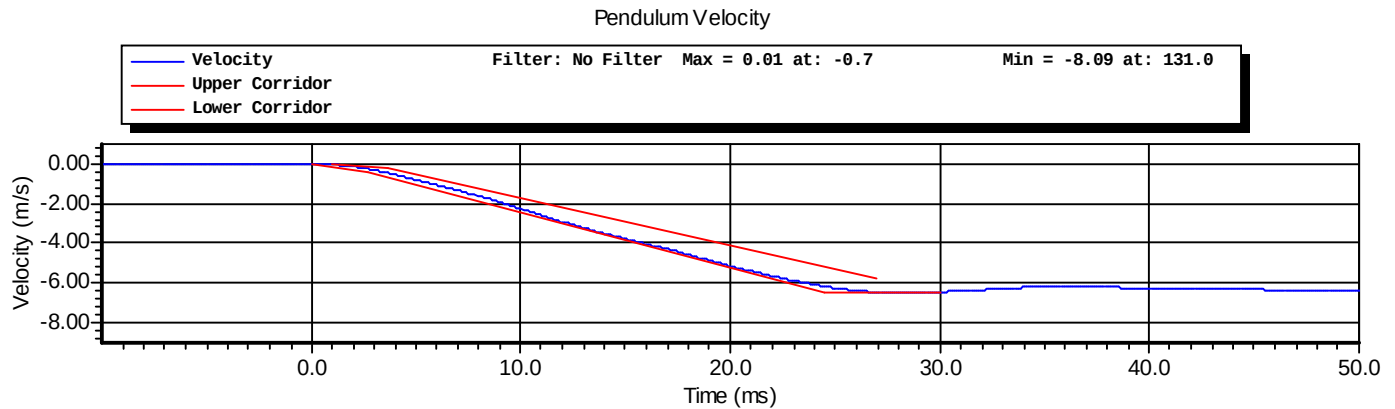
<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2010
Endevco	7231CT	C16510	5/10/2010
DentonATD	7000428	094	4/27/2010
DentonATD	7000428	095	4/27/2010
DentonATD	7000428	093	4/27/2010

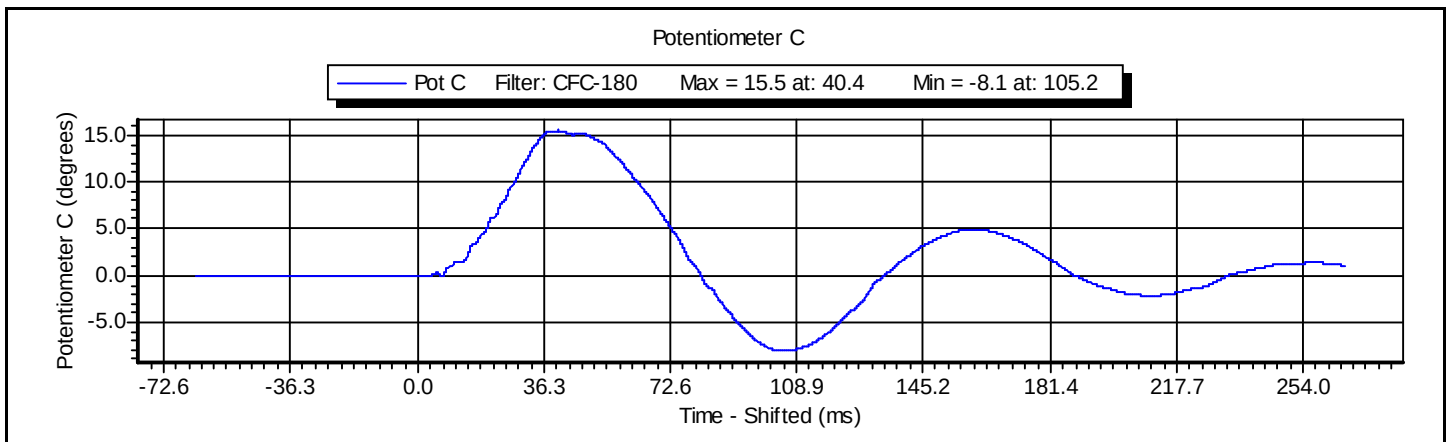
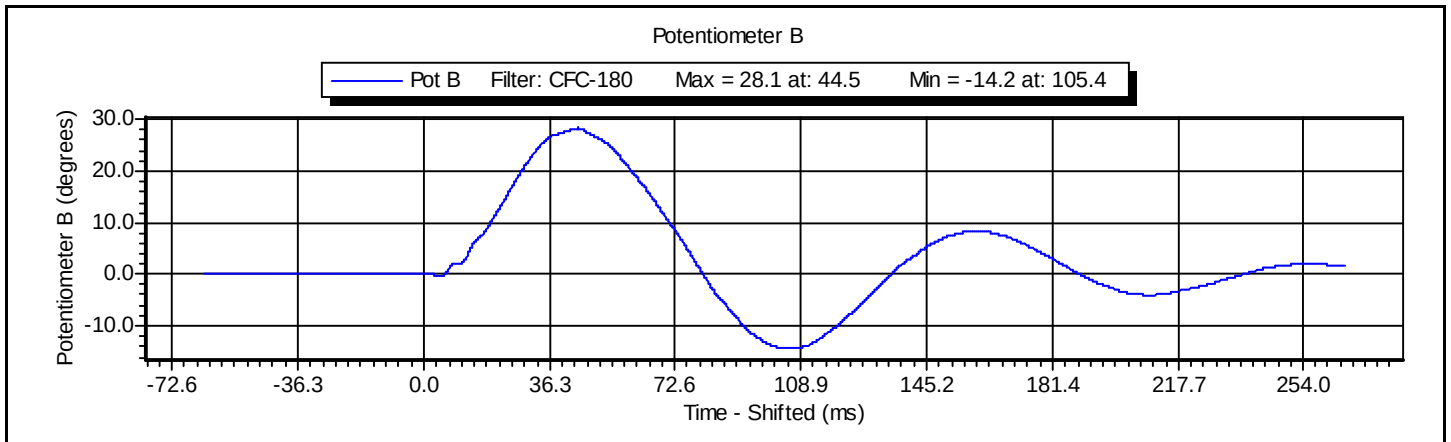
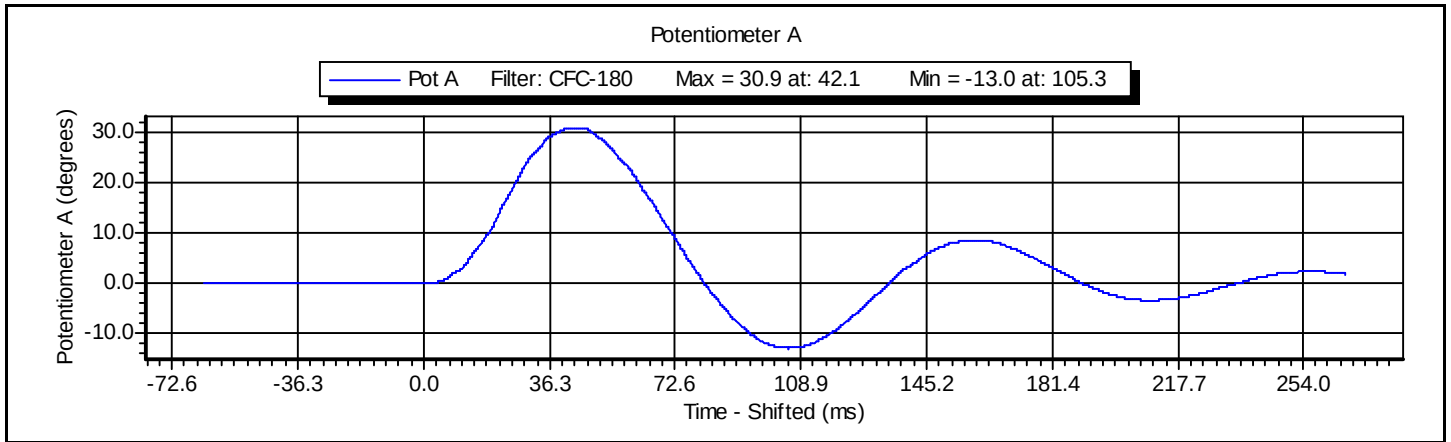
Test ID: **Lumbar Spine**

Test Time: **11:21:23 AM**

Test Date: **9/29/2010**

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:	9/29/2010
Test Number:	1	Test Time:	11:21:23 AM







www.calspan.com

Calspan - Transportation Research Group

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

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:	9/29/2010
Test Number:	1	Test Time:	2:01:04 PM

Test Parameters	Test Specifications			Test Results	
Temperature	20.6	--	22.2	22.2 deg C	P
Humidity	10	--	70	53 %RH	P
Velocity	4.20	--	4.40	4.32 m/s	P
Peak Pendulum Force	-5.40	--	-4.70	-4.93 kN	P
Time at Peak Pendulum Force	11.80	--	16.10	14.67 ms	P
Peak Pubic Symphysis Force	-1.59	--	-1.23	-1.39 kN	P
Time at Peak Pubic Symphysis Force	12.20	--	17.00	16.17 ms	P

All test parameters are within specifications

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

Test ID: **Pelvis**

Test Time: **2:01:04 PM**

Test Date: **9/29/2010**



www.calspan.com

Calspan - Transportation Research Group

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	7264-2000	P66927	4/20/2010
Denton	3096	LC-456Fy	4/22/2010

Test ID: **Pelvis**

Test Time: **2:01:04 PM**

Test Date: **9/29/2010**



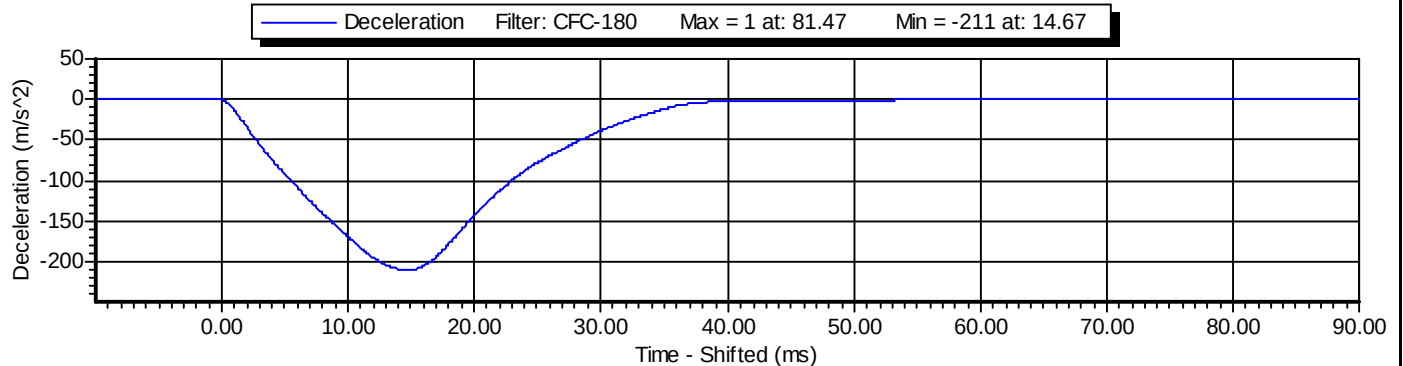
www.calspan.com

Calspan - Transportation Research Group

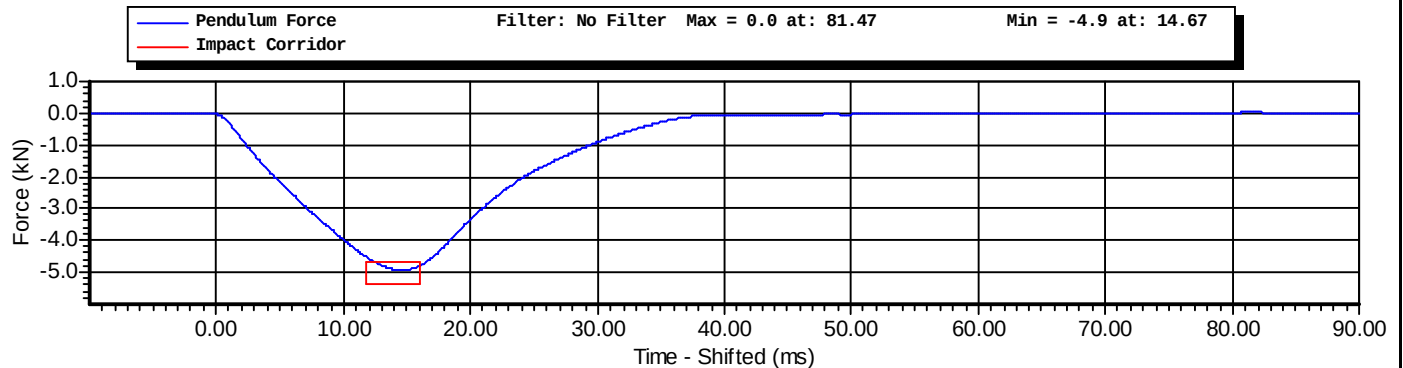
4455 Genesee Street, Buffalo, New York 14225 - Phone (716)632-7500

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:	9/29/2010
Test Number:	1	Test Time:	2:01:04 PM

Pendulum Accelerometer



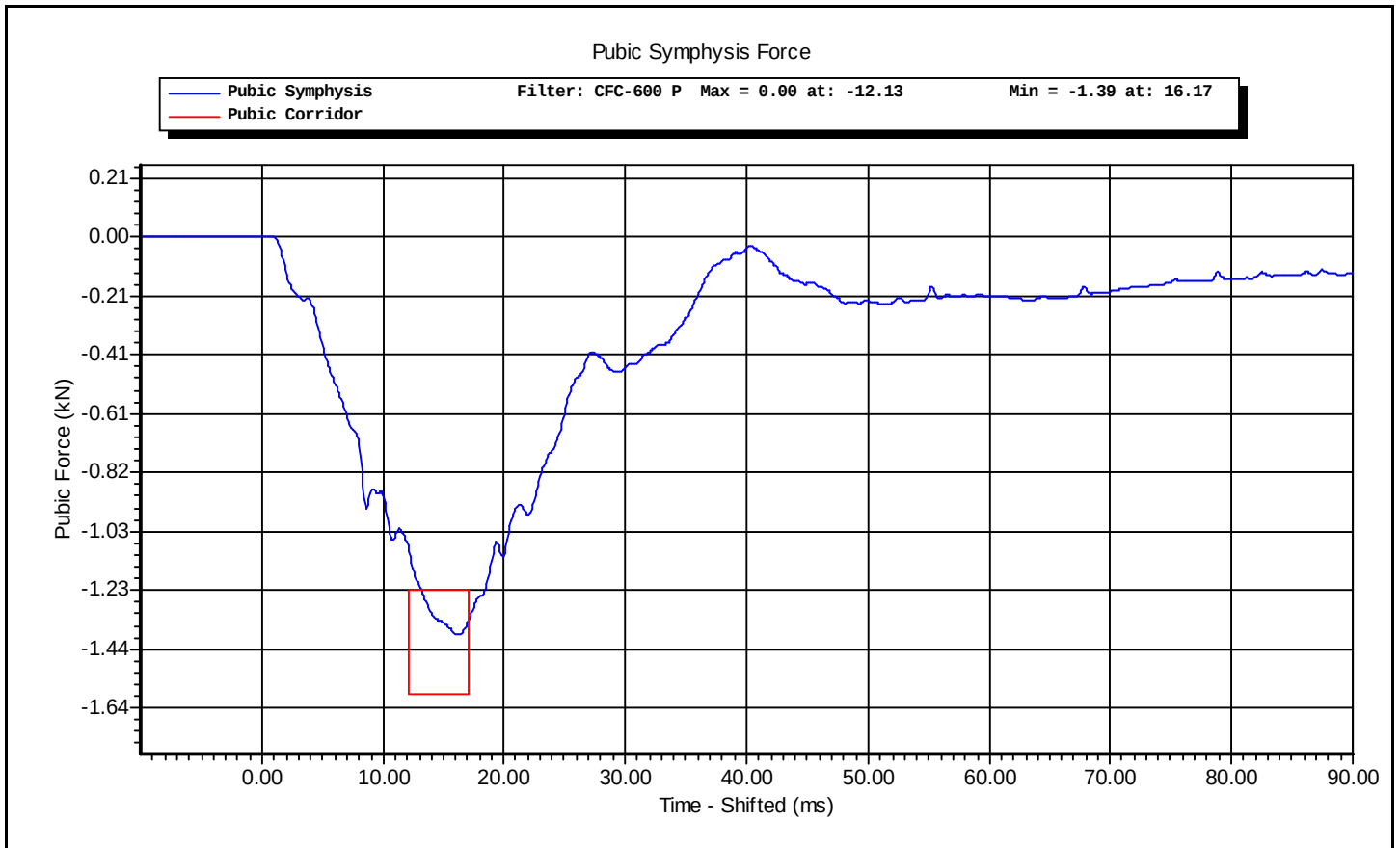
Pendulum Force



Test ID: **Pelvis**

Test Time: **2:01:04 PM**

Test Date: **9/29/2010**



CALIBRATION TEST RESULTS

POST-TEST

SID-IIs No: 300

CONFIGURED FOR LEFT SIDE IMPACT

SID-IIsD External Measurements

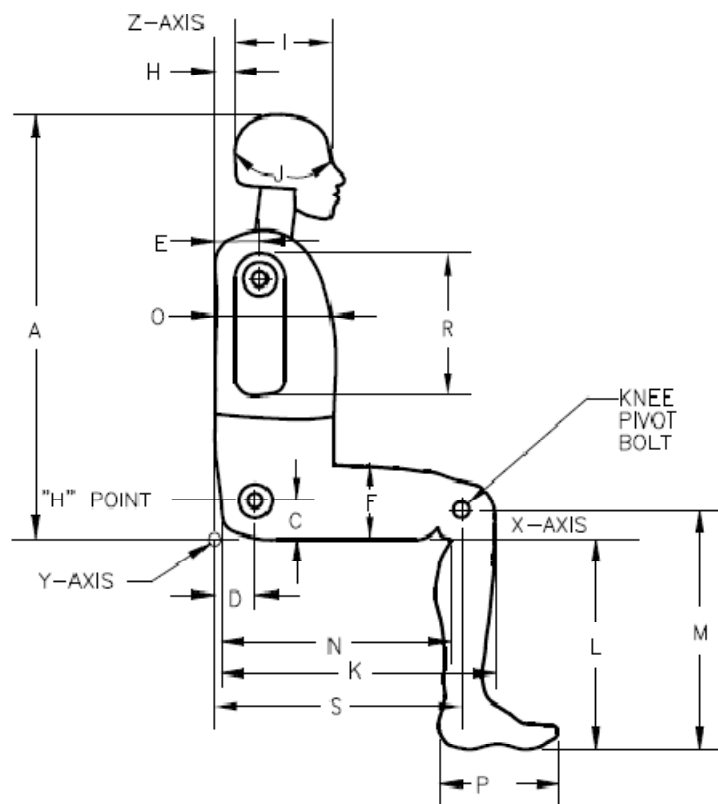
NHTSA ATD S/N 300

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Sitting Height	772.0 - 788.0	785	Yes
B	Shoulder Pivot Height	437.0 - 453.0	450	Yes
C	H-Point Height	79.0 - 89.0	87	Yes
D	H-Point from Seat Back	141.0 - 151.0	145	Yes
E	Shoulder Pivot from Backline	97.0 - 107.0	98	Yes
F	Thigh Clearance	119.0 - 135.0	125	Yes
G	Head Breadth	140.0 - 148.0	143	Yes
H	Head Back from Backline	40.0 - 46.0	42	Yes
I	Head Depth	178.0 - 188.0	181	Yes
J	Head Circumference	541.0 - 551.0	545	Yes
K	Buttock to Knee Length	514.0 - 540.0	523	Yes
L	Popliteal Height	343.0 - 369.0	365	Yes
M	Knee Pivot to Floor Height	393.0 - 409.0	395	Yes
N	Buttock Popliteal Length	416.0 - 442.0	430	Yes
O	Chest Depth without Jacket	195.0 - 211.0	205	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	315	Yes
R	Arm Length	249.0 - 259.0	253	Yes
S	Knee Joint to Seat back	478.0 - 493.0	475	Yes
V	Shoulder Width (only one arm installed)	341.0 - 357.0	353	Yes
W	Foot Width (right)	78.0 - 94.0	85	Yes
W	Foot Width (left)	78.0 - 94.0	85	Yes
Y	Chest Circumference with Jacket	851.0 - 881.0	870	Yes
Z	Waist Circumference	761.0 - 791.0	773	Yes

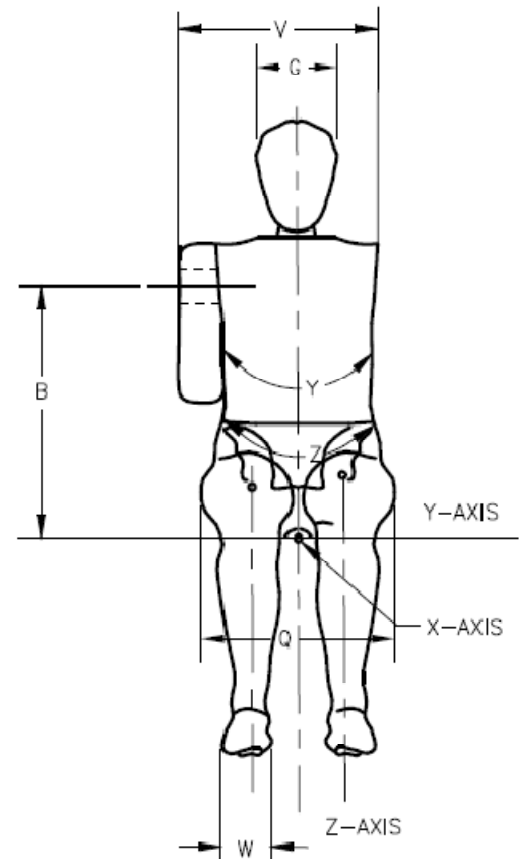
Technician: S. Zito

Date: 10/20/2010

SID-IIIsD External Dimension Reference Diagram



SIDE VIEW



FRONT VIEW



www.calspan.com

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:	SID-IIs		
ATD Serial Number:	SID 300		
Test ID:	Head Drop	Test Date:	10/21/2010
Test Number:	1	Test Time:	9:01:45 AM

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	20.6 deg C P
Humidity	10 -- 70	39 %RH P
Resultant Acceleration	115.0 -- 137.0	131.8 g P
Oscillation	0.0 -- 15.0	2.8 % P
Fore-Aft Acceleration	-15.0 -- 15.0	8.5 g P

All test parameters are within specifications

Technician: S. Zito Signature: _____

Supervisor: D. Travale Signature: _____

Test ID: **Head Drop**

Test Time: **9:01:45 AM**

Test Date: **10/21/2010**



www.calspan.com

Calspan - Transportation Research Group

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>
Endevco	7264-2000	P51685	10/8/2010
Endevco	7264-2000	P51682	10/8/2010
Endevco	7264-2000	P51699	10/8/2010

Test ID: **Head Drop**

Test Time: **9:01:45 AM**

Test Date: **10/21/2010**

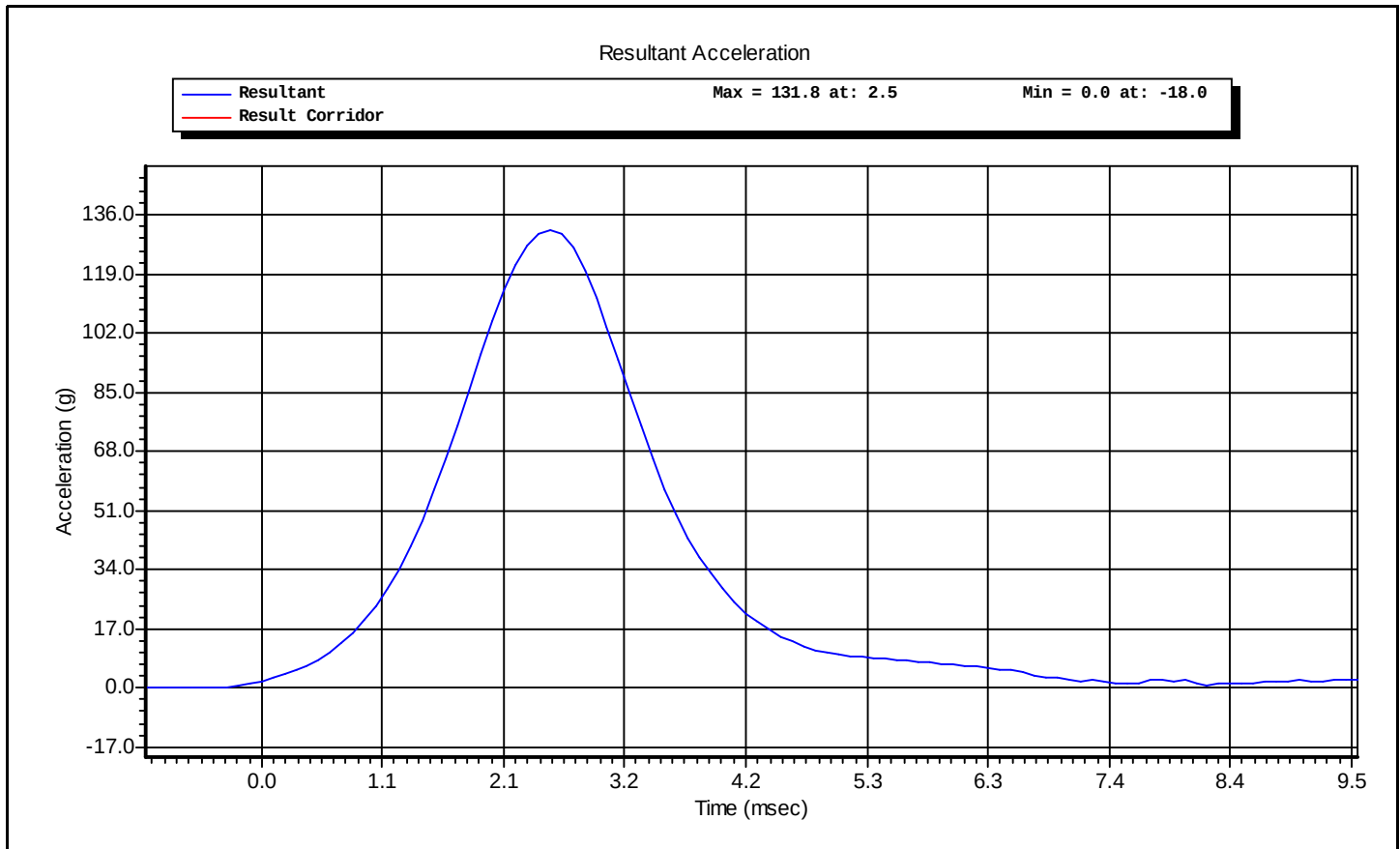


www.calspan.com

Calspan - Transportation Research Group

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

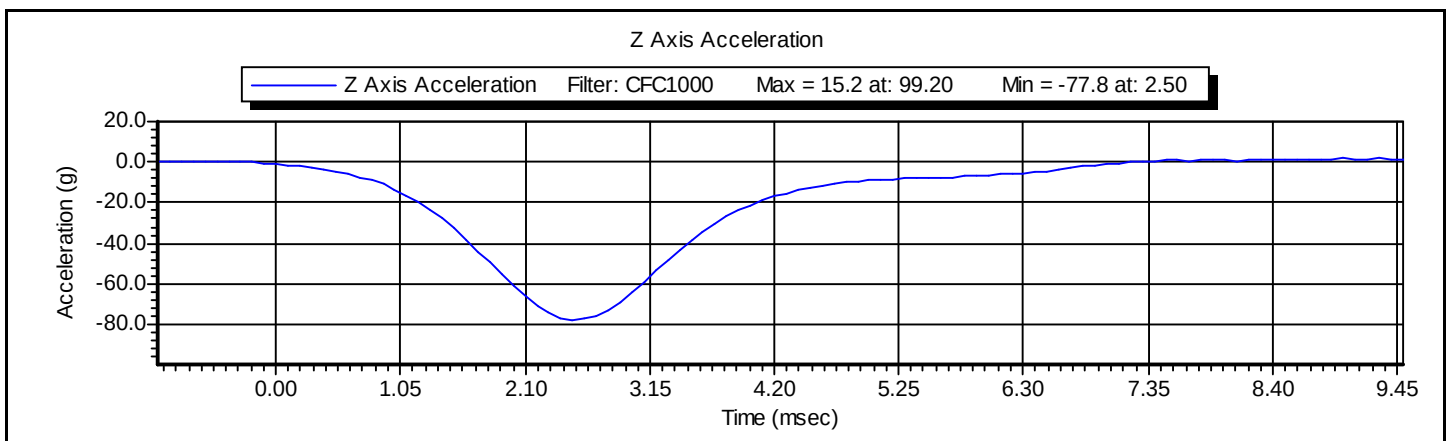
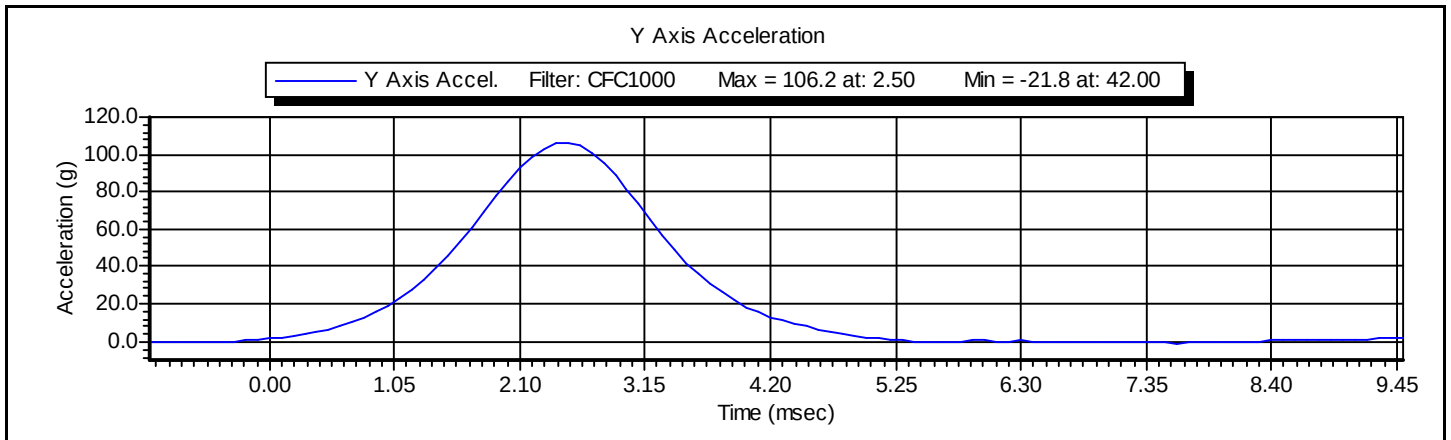
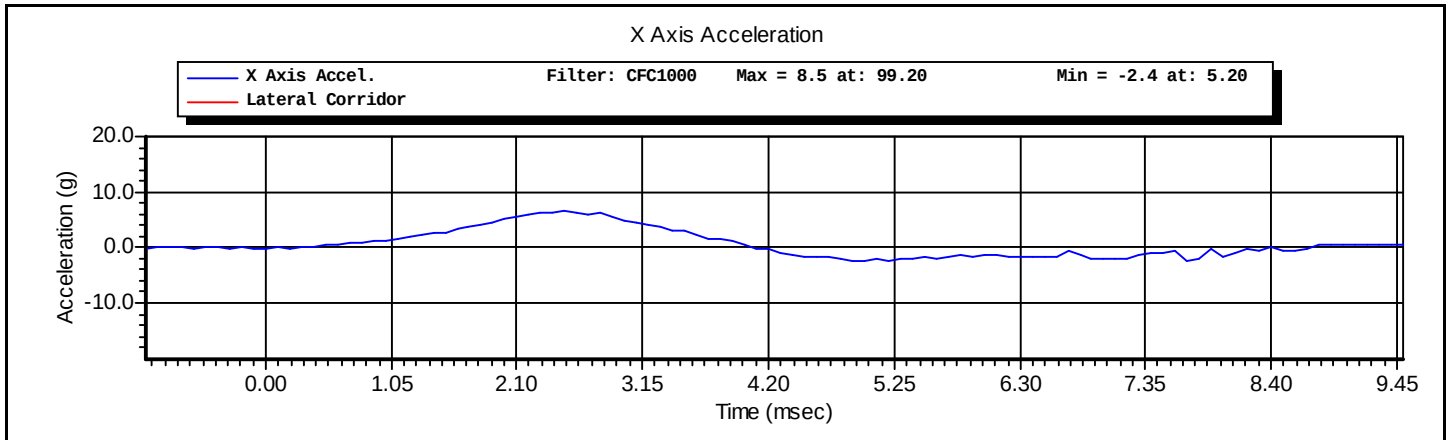
Test Name:	Head Drop	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	SID 300		
Test ID:	Head Drop	Test Date:	10/21/2010
Test Number:	1	Test Time:	9:01:45 AM



Test ID: **Head Drop**

Test Time: **9:01:45 AM**

Test Date: **10/21/2010**





www.calspan.com

Calspan - Transportation Research Group

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

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 300		
Test ID:	Neck Flexion	Test Date:	10/21/2010
Test Number:	1	Test Time:	11:29:14 AM

Component Part Number	Component Serial Number
Neck - 180-2000	787

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.7 deg C P
Humidity	10 -- 70	35 %RH P
Velocity	5.51 -- 5.63	5.56 m/s P
Pendulum Impulse at 10 ms	2.20 -- 2.80	2.49 m/s P
Pendulum Impulse at 15 ms	3.30 -- 4.10	3.59 m/s P
Pendulum Impulse at 20 ms	4.40 -- 5.40	4.90 m/s P
Pendulum Impulse at 25 ms	5.40 -- 6.10	5.79 m/s P
Pendulum Impulse between 25 and 100 ms	5.50 -- 6.20	5.89 m/s P
Max D Plane Rotation	71.0 -- 81.0	73.8 degrees P
Time at Max Rotation	50.0 -- 70.0	61.4 ms P
Moment about OC	-44.0 -- -36.0	-40.5 Nm P
Moment Decay to Zero	102.0 -- 126.0	115.3 ms P

All test parameters are within specifications

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

Test ID: **Neck Flexion**

Test Time: **11:29:14 AM**

Test Date: **10/21/2010**



www.calspan.com

Calspan - Transportation Research Group

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
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: **11:29:14 AM**

Test Date: **10/21/2010**



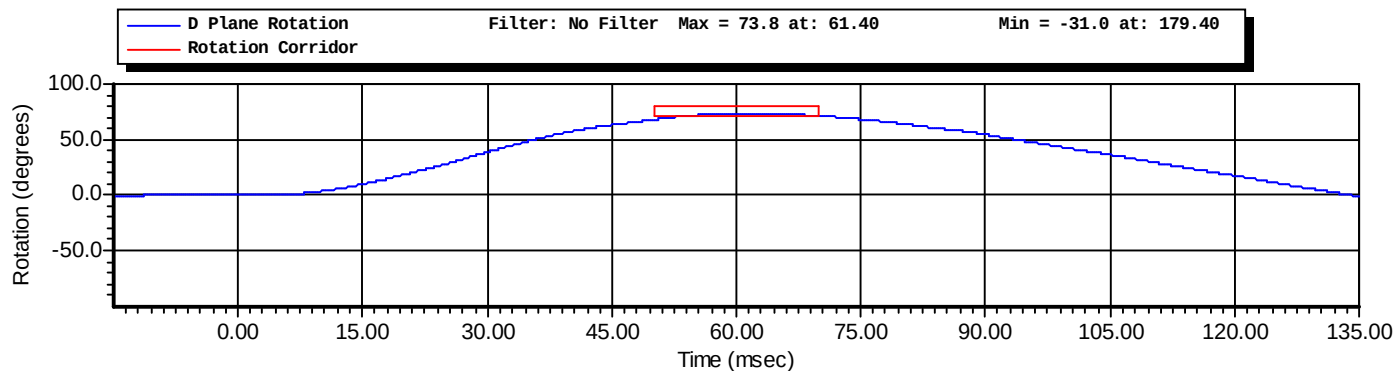
www.calspan.com

Calspan - Transportation Research Group

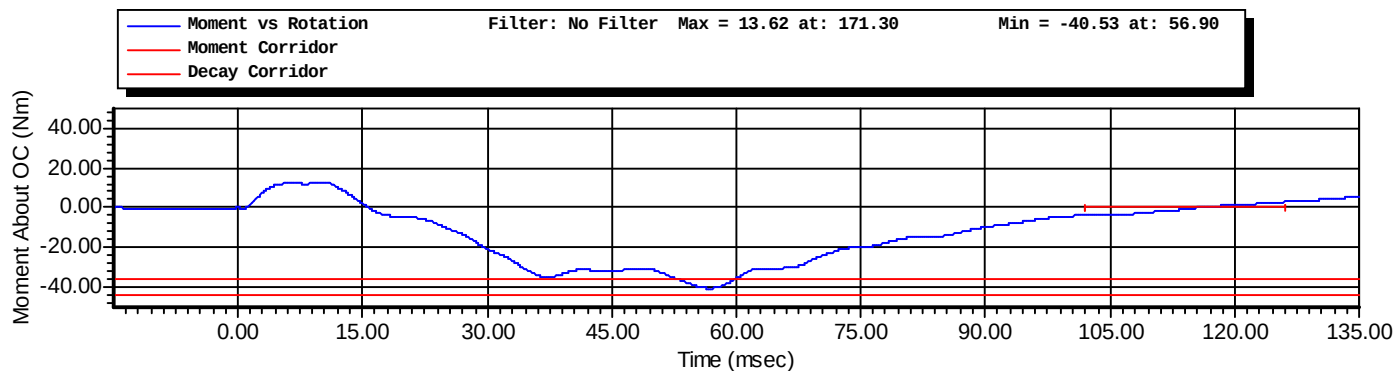
4455 Genesee Street, Buffalo, New York 14225 - Phone (716)632-7500

Test Name:	Neck Pendulum	Revision:	8/24/2009
Sub Test Name:	Left Side	Spec Type:	NHTSA
ATD Type:	SID-IIIs		
ATD Serial Number:	SID 300		
Test ID:	Neck Flexion	Test Date:	10/21/2010
Test Number:	1	Test Time:	11:29:14 AM

D Plane Rotation



Moment About Occipital Condyle

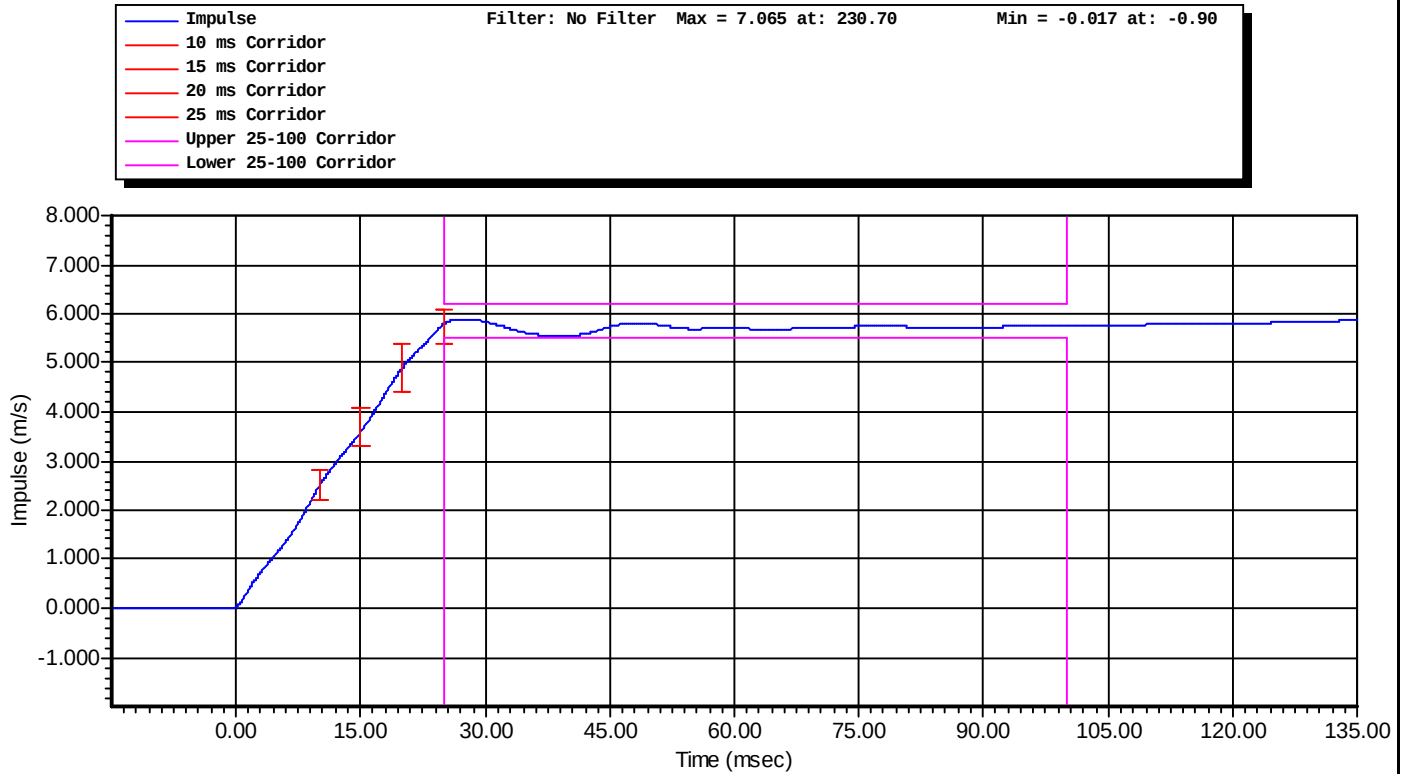


Test ID: Neck Flexion

Test Time: 11:29:14 AM

Test Date: 10/21/2010

Pendulum Impulse





www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

Test Name:	Shoulder Impact	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	300		
Test ID:	Shoulder	Test Date:	10/20/2010
Test Number:	1	Test Time:	1:28:24 PM

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.20 deg C P
Humidity	10.0 -- 70.0	32.0 %RH P
Velocity	4.20 -- 4.40	4.33 m/s P
Probe Acceleration	13.0 -- 18.0	16.6 g P
Shoulder Deflection	28.0 -- 37.0	32.3 mm P
T1 Acceleration	17.0 -- 22.0	20.0 g P

All test parameters are within specifications

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

Test ID: **Shoulder**

Test Time: **1:28:24 PM**

Test Date: **10/20/2010**



www.calspan.com

Calspan - Transportation Research Group

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	7264-2000	P66930	10/5/2010
Servo	180-3885	DS-1063	4/7/2010
Endevco	7264-2000	P51927	10/8/2010

Test ID: **Shoulder**

Test Time: **1:28:24 PM**

Test Date: **10/20/2010**

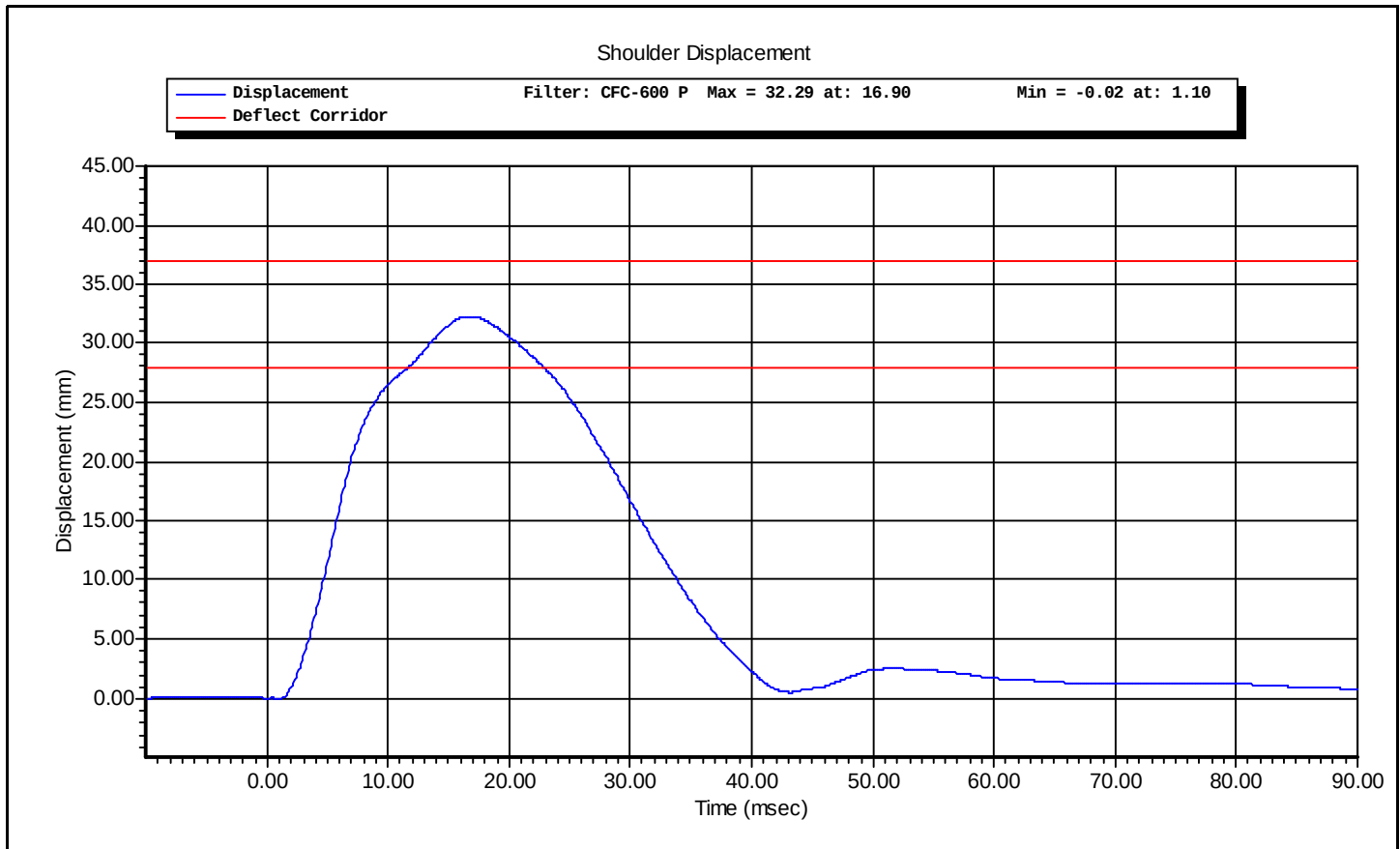


www.calspan.com

Calspan - Transportation Research Group

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

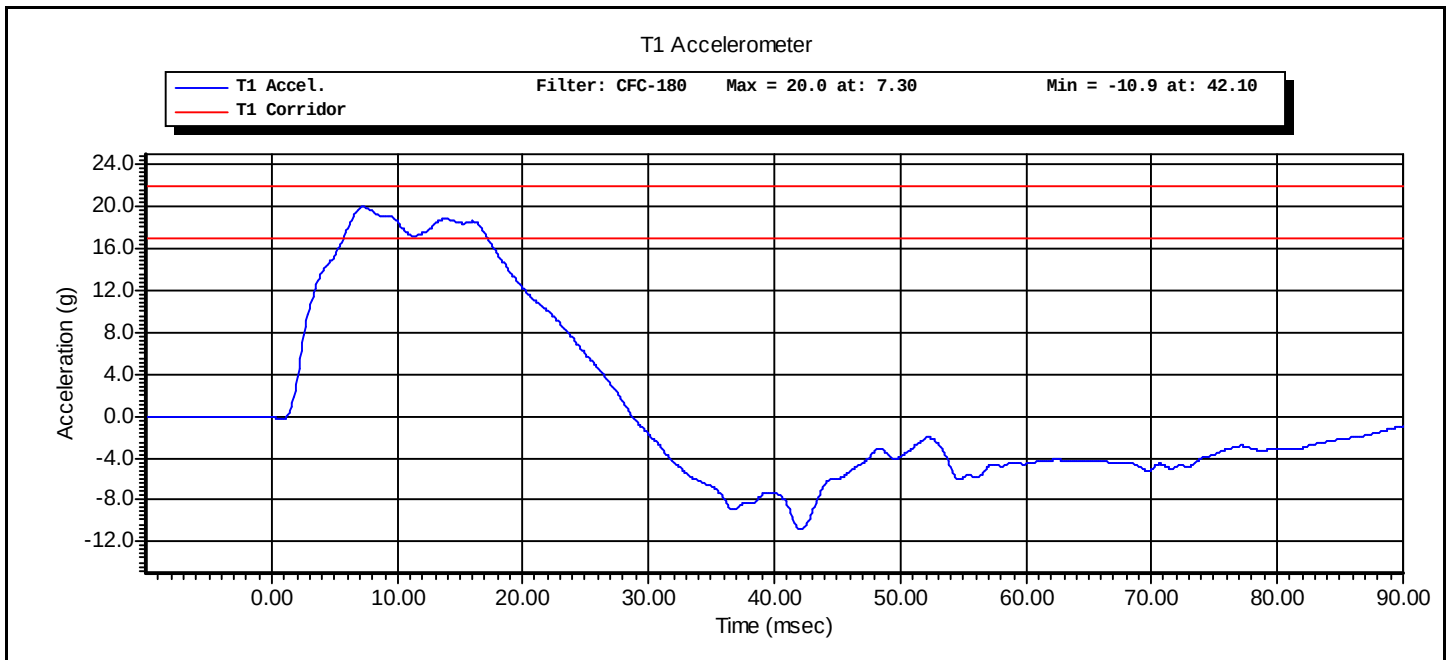
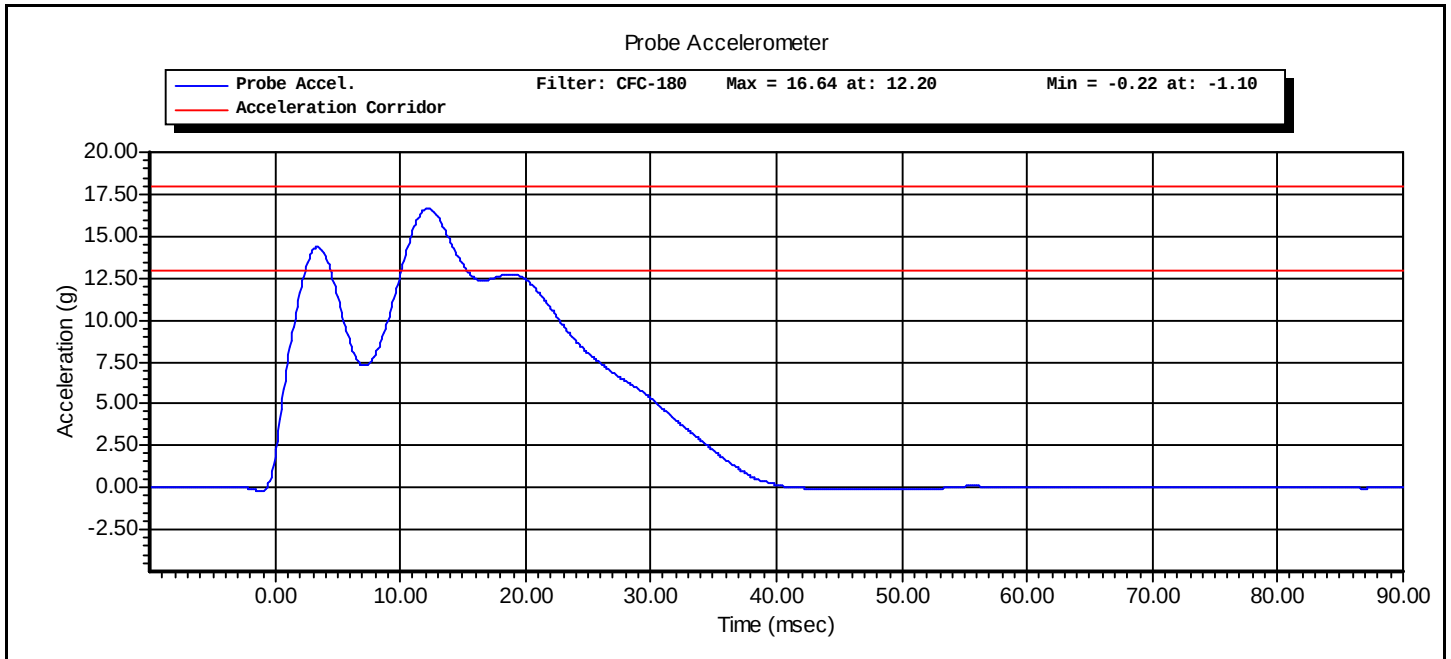
Test Name:	Shoulder Impact	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	300		
Test ID:	Shoulder	Test Date:	10/20/2010
Test Number:	1	Test Time:	1:28:24 PM



Test ID: **Shoulder**

Test Time: **1:28:24 PM**

Test Date: **10/20/2010**





www.calspan.com

Calspan - Transportation Research Group

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

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:	300		
Test ID:	Thorax With Arm	Test Date:	10/20/2010
Test Number:	1	Test Time:	3:17:17 PM

Test Parameters	Test Specifications			Test Results	
Temperature	20.6	--	22.2	22.2 deg C	P
Humidity	10	--	70	32 %RH	P
Velocity	6.60	--	6.80	6.69 m/s	P
Probe Acceleration after 5ms	30.0	--	36.0	34.4 g	P
Upper Thorax Rib Deflection	25.0	--	32.0	27.0 mm	P
Mid Thorax Rib Deflection	30.0	--	36.0	32.0 mm	P
Lower Thorax Rib Deflection	32.0	--	38.0	36.8 mm	P
Upper Spine Acceleration ("y")	34.0	--	43.0	39.4 g	P
Lower Spine Acceleration ("y")	29.0	--	37.0	35.8 g	P
Shoulder Deflection	31.0	--	40.0	37.0 mm	P

All test parameters are within specifications

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

Test ID: **Thorax With Arm** Test Time: **3:17:17 PM**

Test Date: **10/20/2010**



www.calspan.com

Calspan - Transportation Research Group

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	7264-2000	P66930	10/5/2010
Servo	180-3885	DS-1121	4/7/2010
Servo	180-3885	DS-1151	4/7/2010
Servo	180-3885	DS-1156	4/7/2010
Endevco	7264-2000	P51927	10/8/2010
Endevco	7264-2000	P64147	9/20/2010
Servo	180-3885	DS-1063	4/7/2010

Test ID: **Thorax With Arm** Test Time: **3:17:17 PM**

Test Date: **10/20/2010**

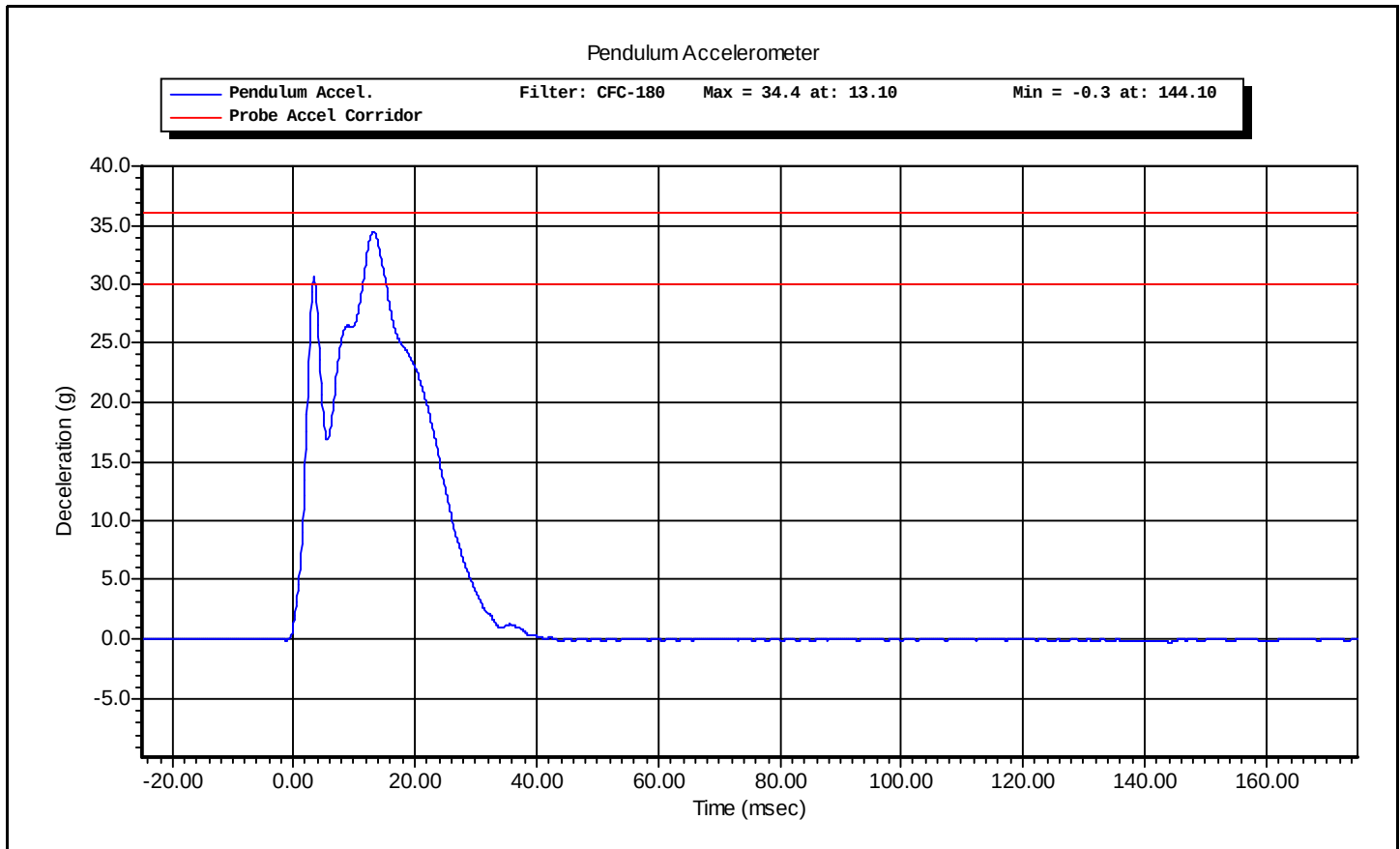


www.calspan.com

Calspan - Transportation Research Group

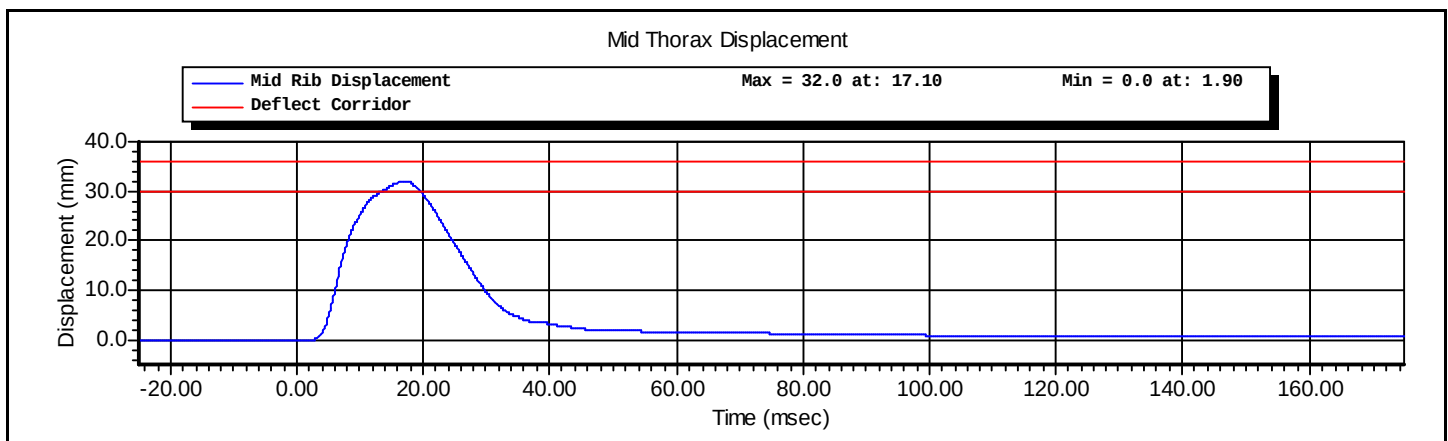
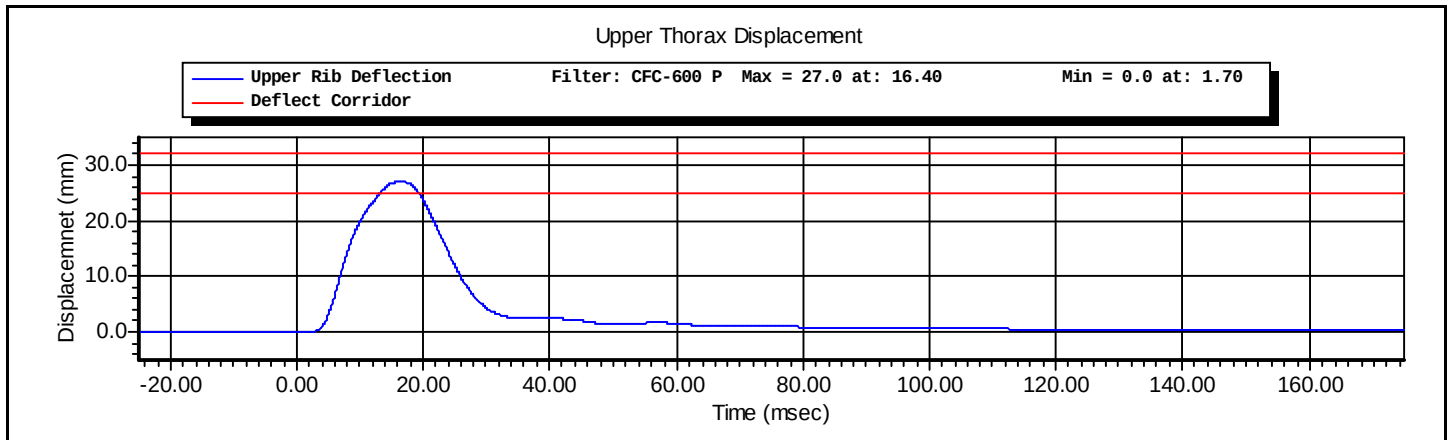
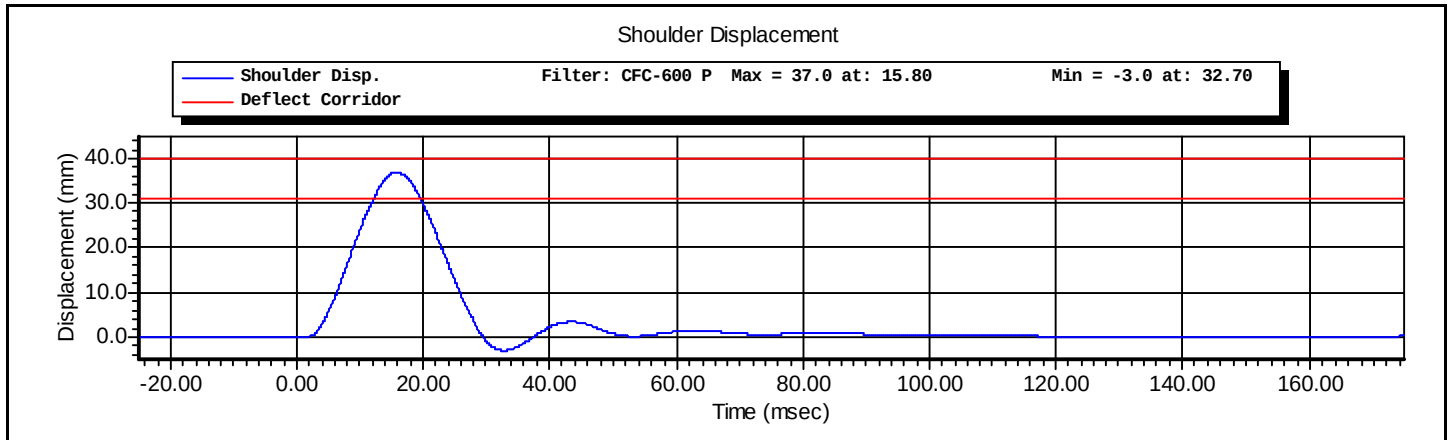
4455 Genesee Street, Buffalo, New York 14225 - Phone (716)632-7500

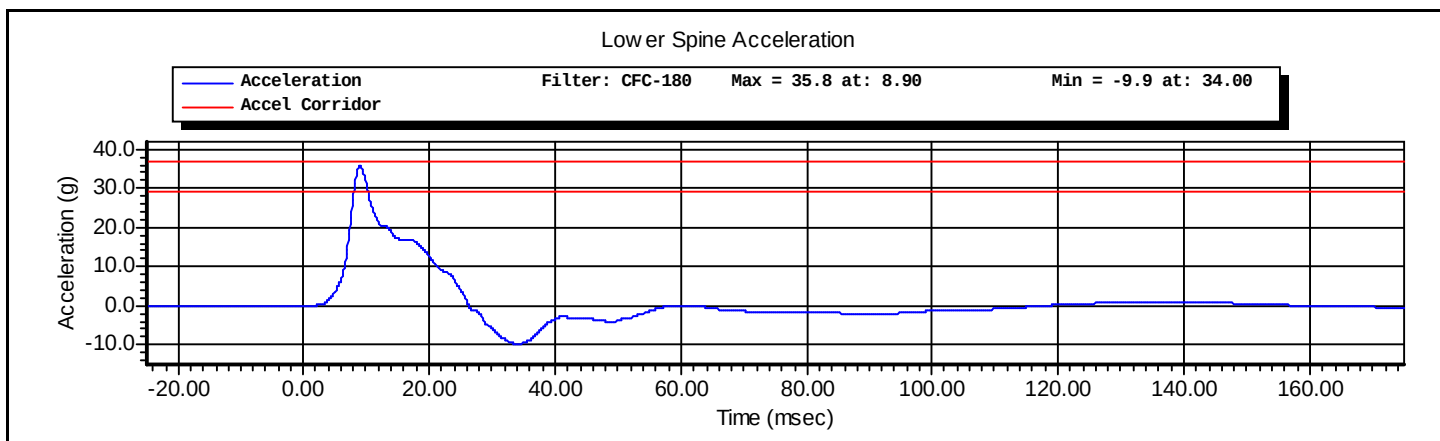
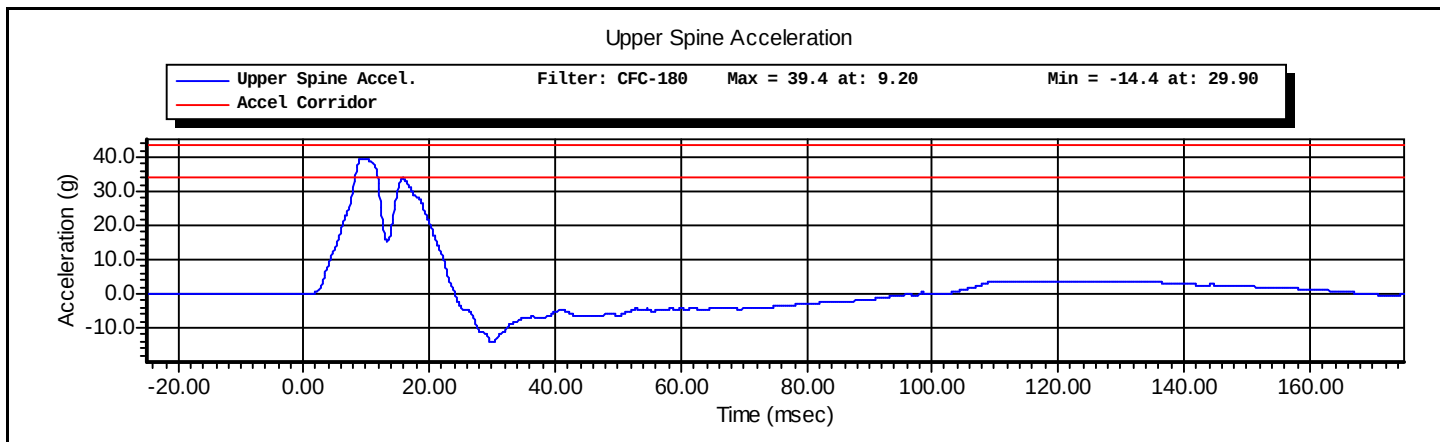
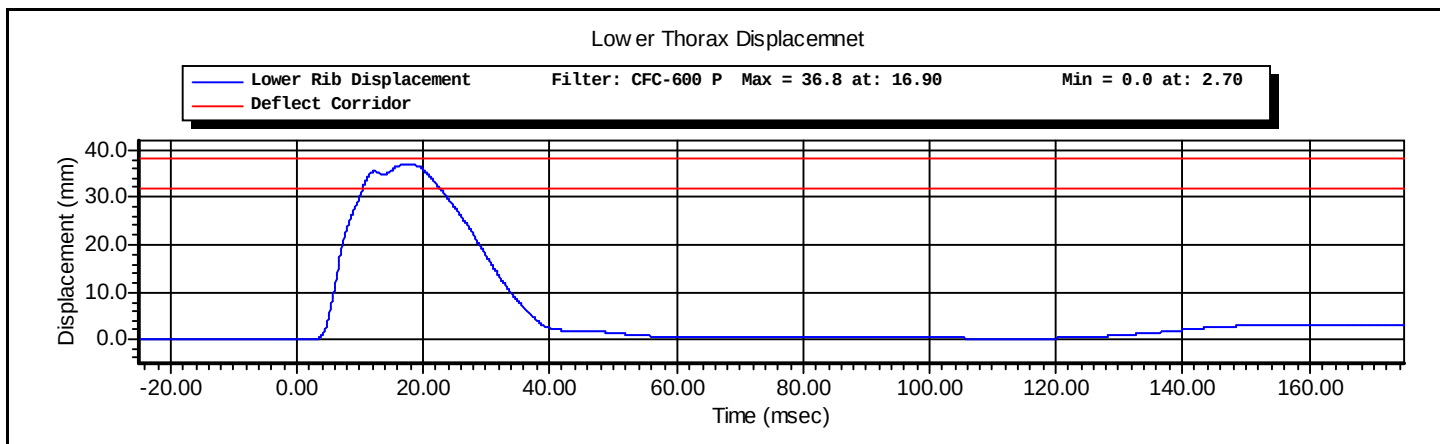
Test Name:	Thorax Impact with Arm	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	300		
Test ID:	Thorax With Arm	Test Date:	10/20/2010
Test Number:	1	Test Time:	3:17:17 PM



Test ID: **Thorax With Arm** Test Time: **3:17:17 PM**

Test Date: **10/20/2010**







www.calspan.com

Calspan - Transportation Research Group

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

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:	300		
Test ID:	Thorax Without Arm	Test Date:	10/20/2010
Test Number:	1	Test Time:	2:29:29 PM

Test Parameters	Test Specifications			Test Results	
Temperature	20.6	--	22.2	22.2 deg C	P
Humidity	10	--	70	32 %RH	P
Velocity	4.20	--	4.40	4.34 m/s	P
Probe Acceleration	14.0	--	18.0	16.3 g	P
Upper Thorax Rib Deflection	32.0	--	40.0	35.6 mm	P
Mid Thorax Rib Deflection	39.0	--	45.0	41.6 mm	P
Lower Thorax Rib Deflection	35.0	--	43.0	41.3 mm	P
Upper Spine Acceleration T1	13.0	--	17.0	15.8 g	P
Lower Spine Acceleration T12	7.0	--	11.0	10.1 g	P

All test parameters are within specifications

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

Test ID: **Thorax Without Arm** Test Time: **2:29:29 PM**

Test Date: **10/20/2010**



www.calspan.com

Calspan - Transportation Research Group

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	7264-2000	P66930	10/5/2010
Servo	180-3885	DS-1121	4/7/2010
Servo	180-3885	DS-1151	4/7/2010
Servo	180-3885	DS-1156	4/7/2010
Endevco	7264-2000	P51927	10/8/2010
Endevco	7264-2000	P64147	9/20/2010

Test ID: **Thorax Without Arm** Test Time: **2:29:29 PM**

Test Date: **10/20/2010**

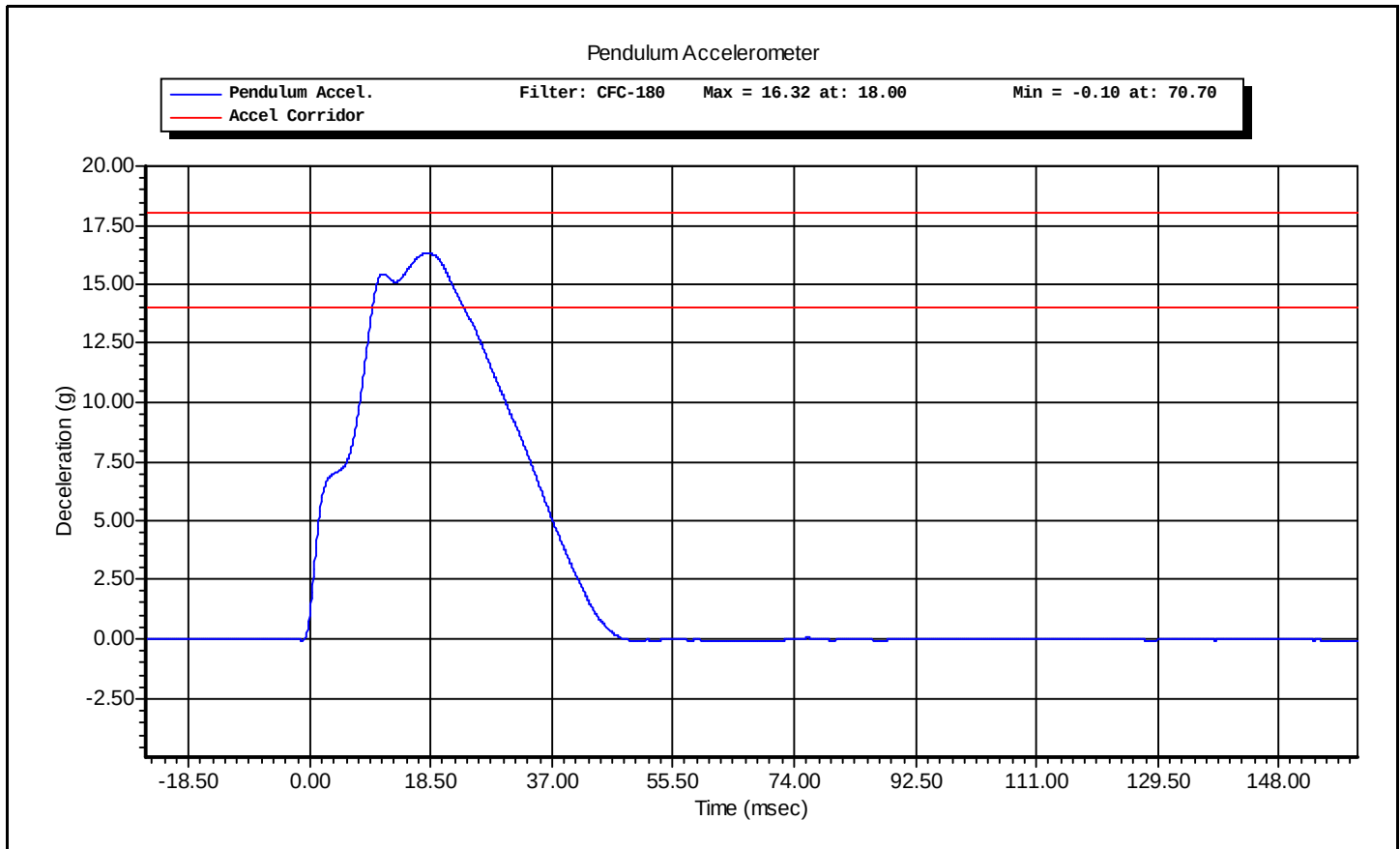


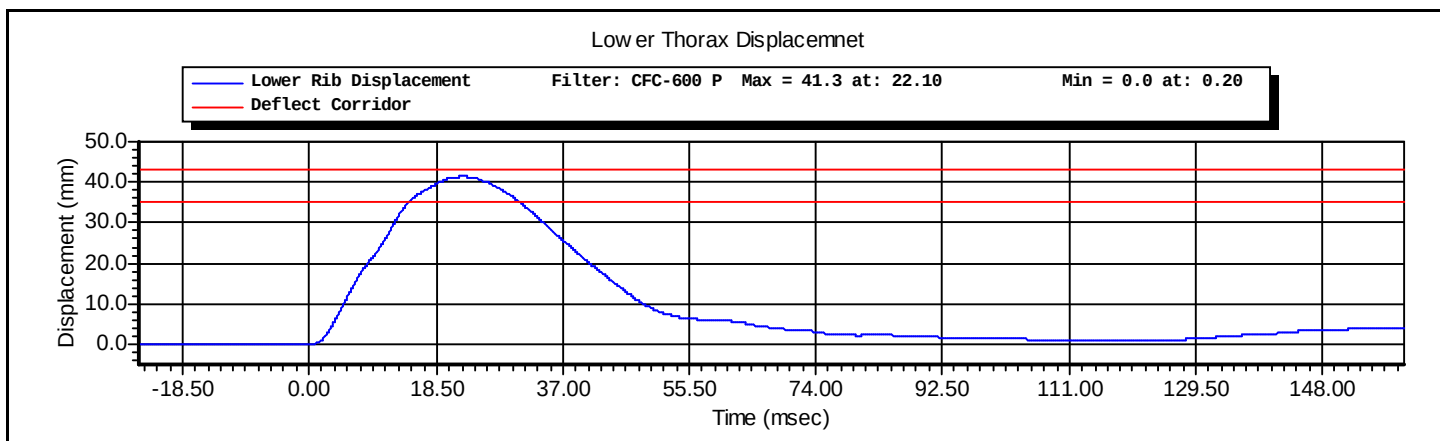
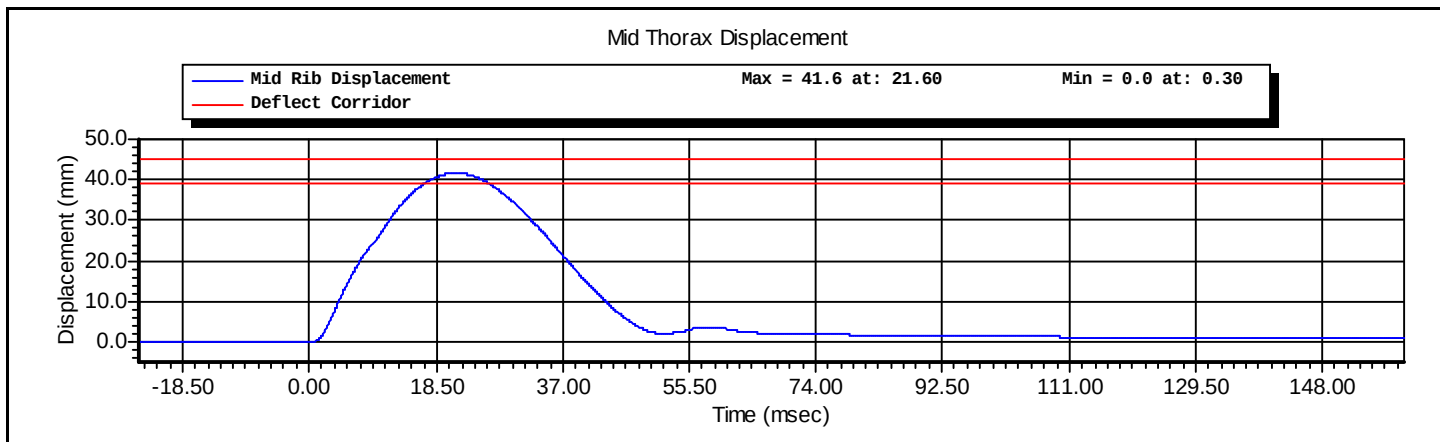
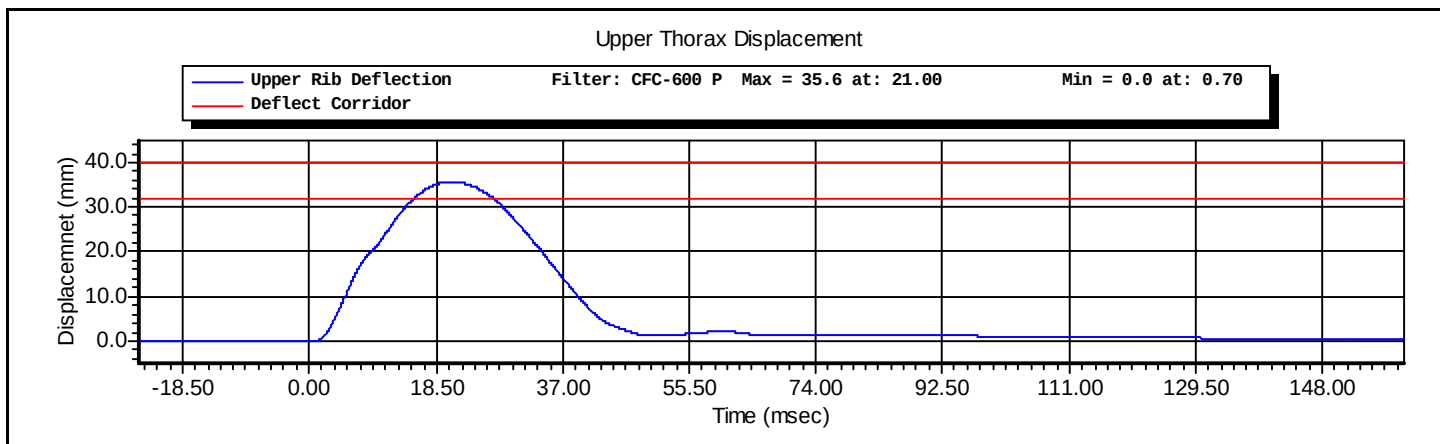
www.calspan.com

Calspan - Transportation Research Group

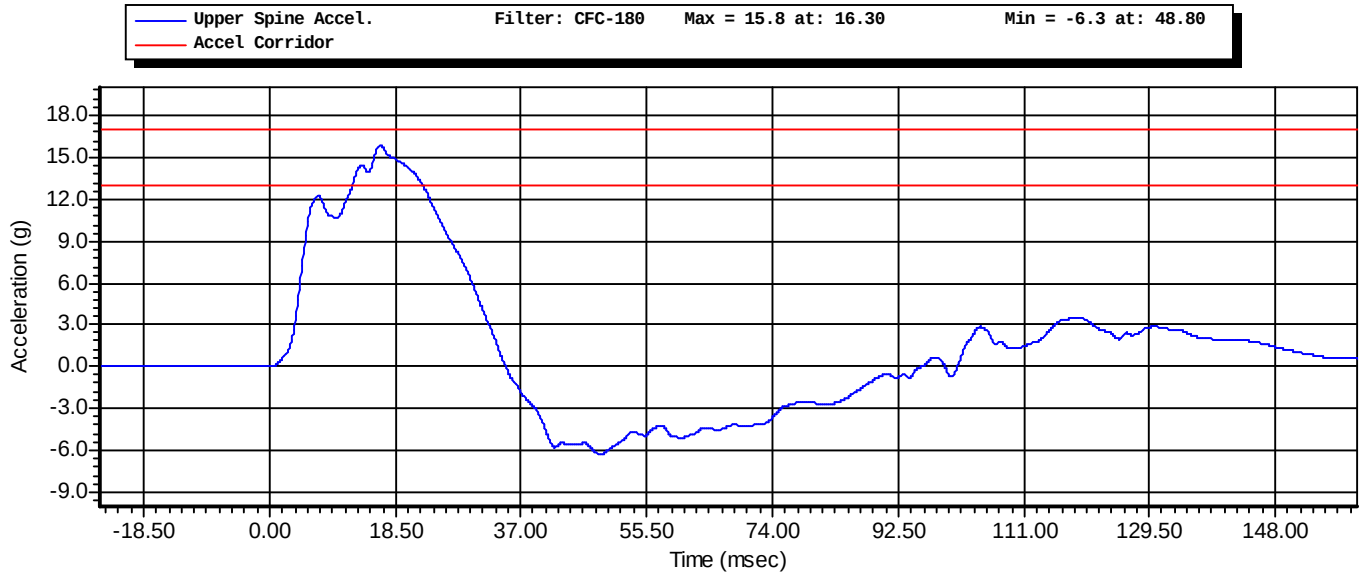
4455 Genesee Street, Buffalo, New York 14225 - Phone (716)632-7500

Test Name:	Thorax Impact without Arm	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	300		
Test ID:	Thorax Without Arm	Test Date:	10/20/2010
Test Number:	1	Test Time:	2:29:29 PM

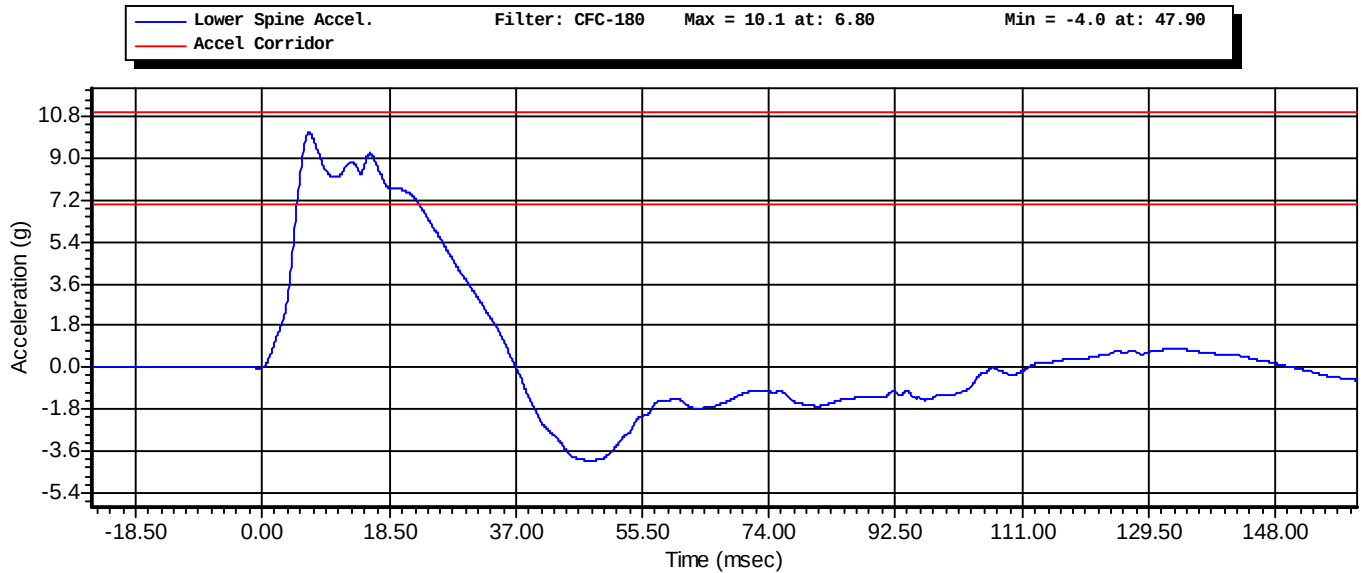




Upper Spine Acceleration



Lower Spine Acceleration





www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

Test Name:	Abdominal Impact	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	300		
Test ID:	Abdomen	Test Date:	10/20/2010
Test Number:	1	Test Time:	2:02:37 PM

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.2 deg C P
Humidity	10 -- 70	32 %RH P
Velocity	4.20 -- 4.40	4.35 m/s P
Probe Acceleration	12.0 -- 16.0	15.5 g P
Upper Abdominal Rib Deflection	36.0 -- 47.0	39.3 mm P
Lower Abdominal Rib Deflection	33.0 -- 44.0	36.0 mm P
Lower Spine Acceleration - T12	9.0 -- 14.0	12.2 g P

All test parameters are within specifications

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

Test ID: **Abdomen**

Test Time: **2:02:37 PM**

Test Date: **10/20/2010**



www.calspan.com

Calspan - Transportation Research Group

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	7264-2000	P66930	10/5/2010
Servo	180-3885	DS-1162	4/7/2010
Servo	180-3885	DS-1232	4/7/2010
Endevco	7264-2000	P64147	9/20/2010

Test ID: **Abdomen**

Test Time: **2:02:37 PM**

Test Date: **10/20/2010**



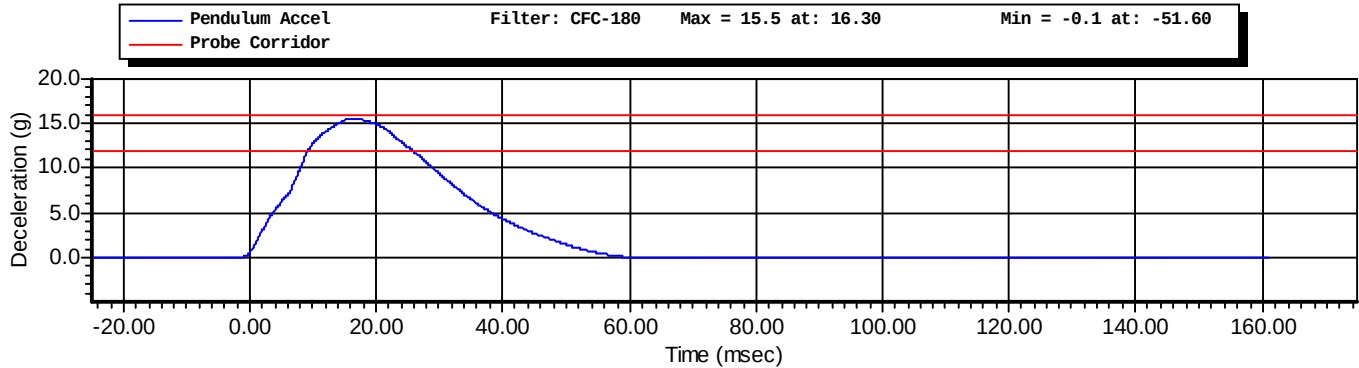
www.calspan.com

Calspan - Transportation Research Group

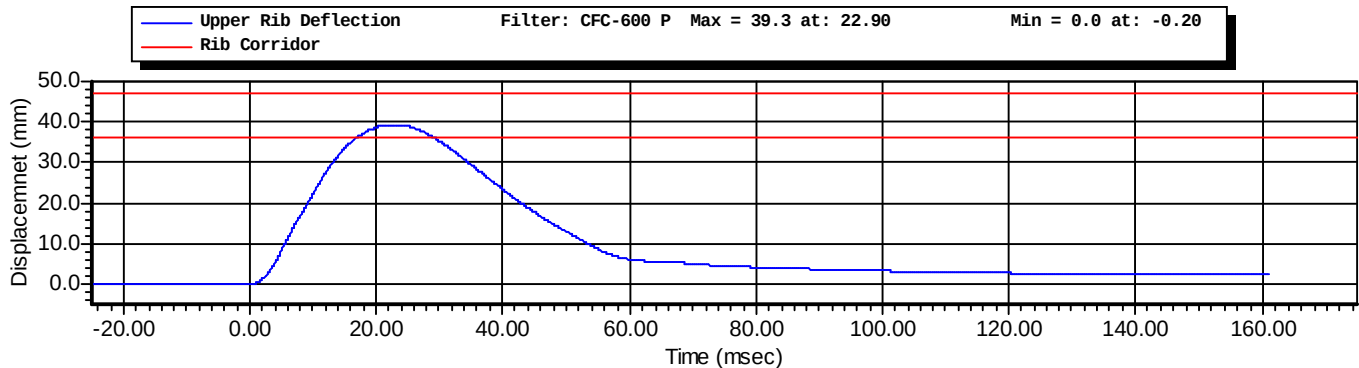
4455 Genesee Street, Buffalo, New York 14225 - Phone (716)632-7500

Test Name:	Abdominal Impact	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	300		
Test ID:	Abdomen	Test Date:	10/20/2010
Test Number:	1	Test Time:	2:02:37 PM

Pendulum Accelerometer



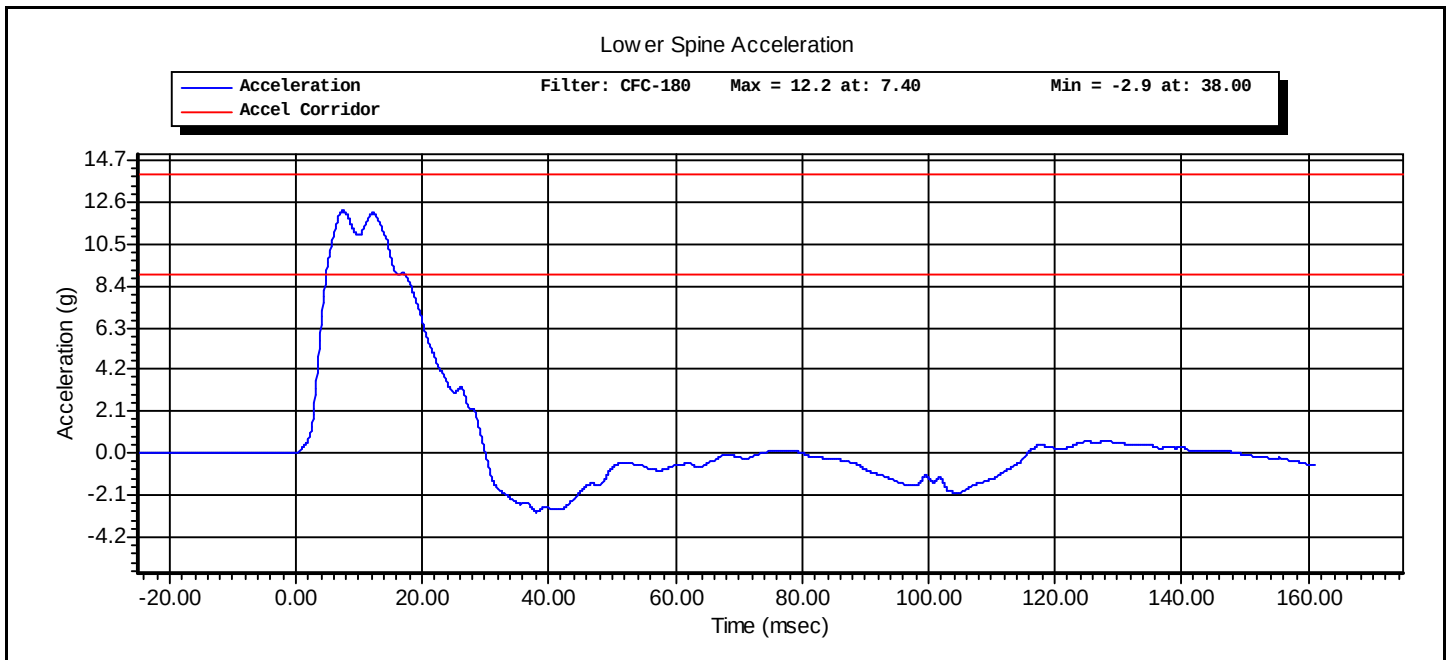
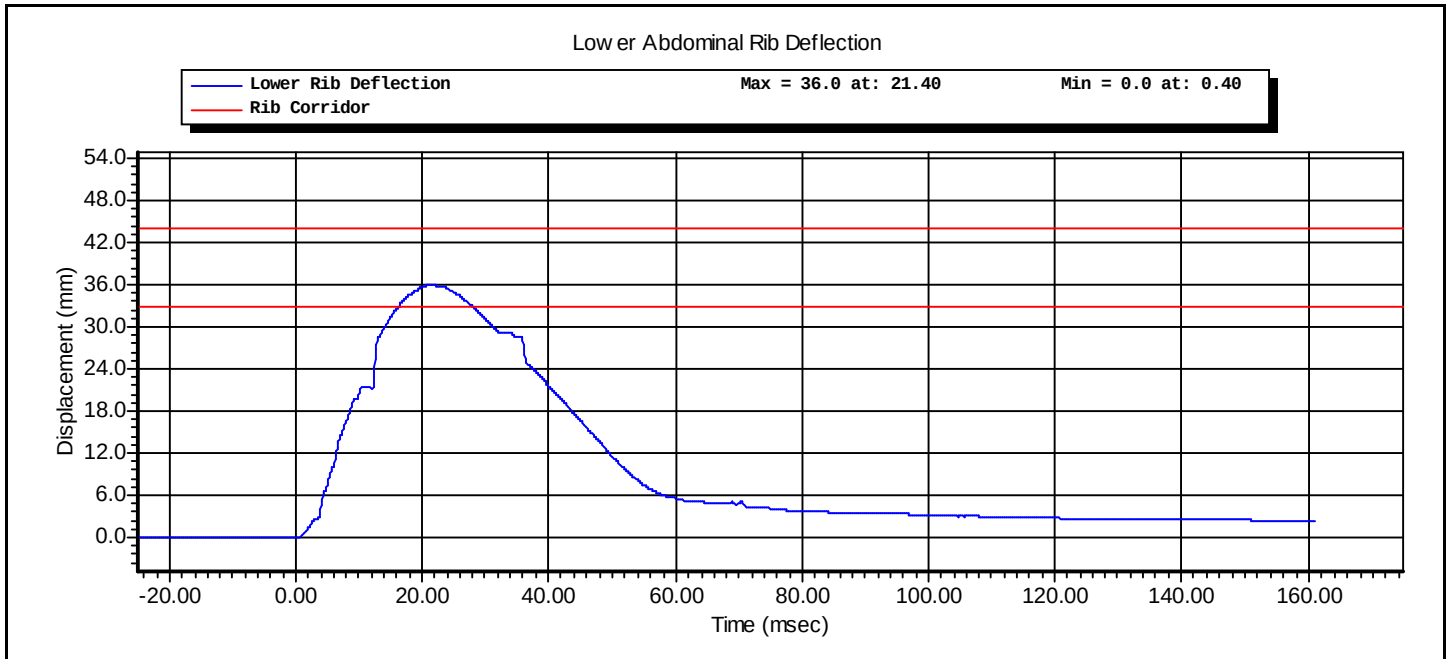
Upper Abdominal Rib Deflection



Test ID: **Abdomen**

Test Time: **2:02:37 PM**

Test Date: **10/20/2010**





www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

Test Name:	Pelvis	Revision:	8/24/2009
Sub Test Name:	Acetabulum Impact	Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	300		
Test ID:	Pelvis Acetabulum	Test Date:	10/20/2010
Test Number:	1	Test Time:	11:49:44 AM

Comments:

Pelvis Plug Used for Certification:
FTSS S/N 12761
Force @ 3mm = 1499N

Pelvis Plug Used for Full Scale Test:
FTSS S/N 12574
Force @ 3mm = 1509N

Test Parameters	Test Specifications			Test Results	
Temperature	20.6	--	22.2	21.8 deg C	P
Humidity	10	--	70	33 %RH	P
Velocity	6.60	--	6.80	6.64 m/s	P
Peak Probe Acceleration	38.0	--	47.0	45.6 g	P
Peak Pelvis Acceleration	34.0	--	42.0	41.5 g	P
Peak Acetabulum Force	3.60	--	4.30	3.94 kN	P

All test parameters are within specifications

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

Test ID: **Pelvis Acetabulum** Test Time: **11:49:44 AM**

Test Date: **10/20/2010**



www.calspan.com

Calspan - Transportation Research Group

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	7264-2000	P66930	10/5/2010
Endevco	7264-2000	P51671	10/12/2010
DentonATD	3249J	LC-275a	4/12/2010

Test ID: **Pelvis Acetabulum** Test Time: **11:49:44 AM**

Test Date: **10/20/2010**



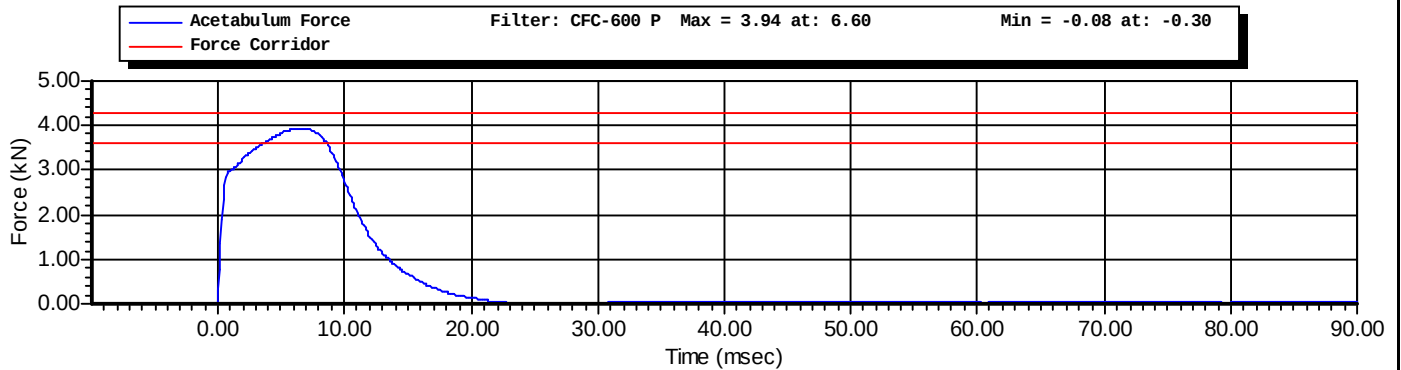
www.calspan.com

Calspan - Transportation Research Group

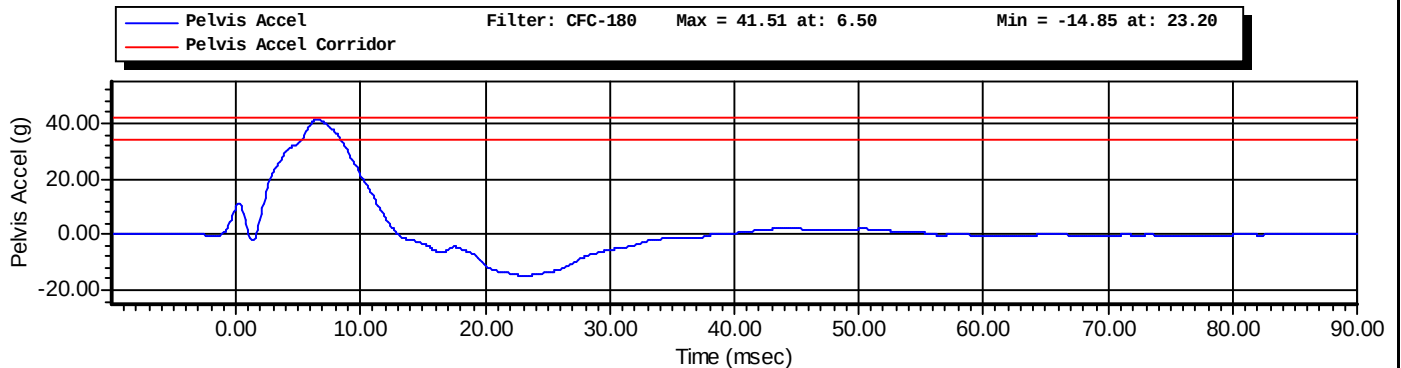
4455 Genesee Street, Buffalo, New York 14225 - Phone (716)632-7500

Test Name:	Pelvis	Revision:	8/24/2009
Sub Test Name:	Acetabulum Impact	Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	300		
Test ID:	Pelvis Acetabulum	Test Date:	10/20/2010
Test Number:	1	Test Time:	11:49:44 AM

Acetabulum Force

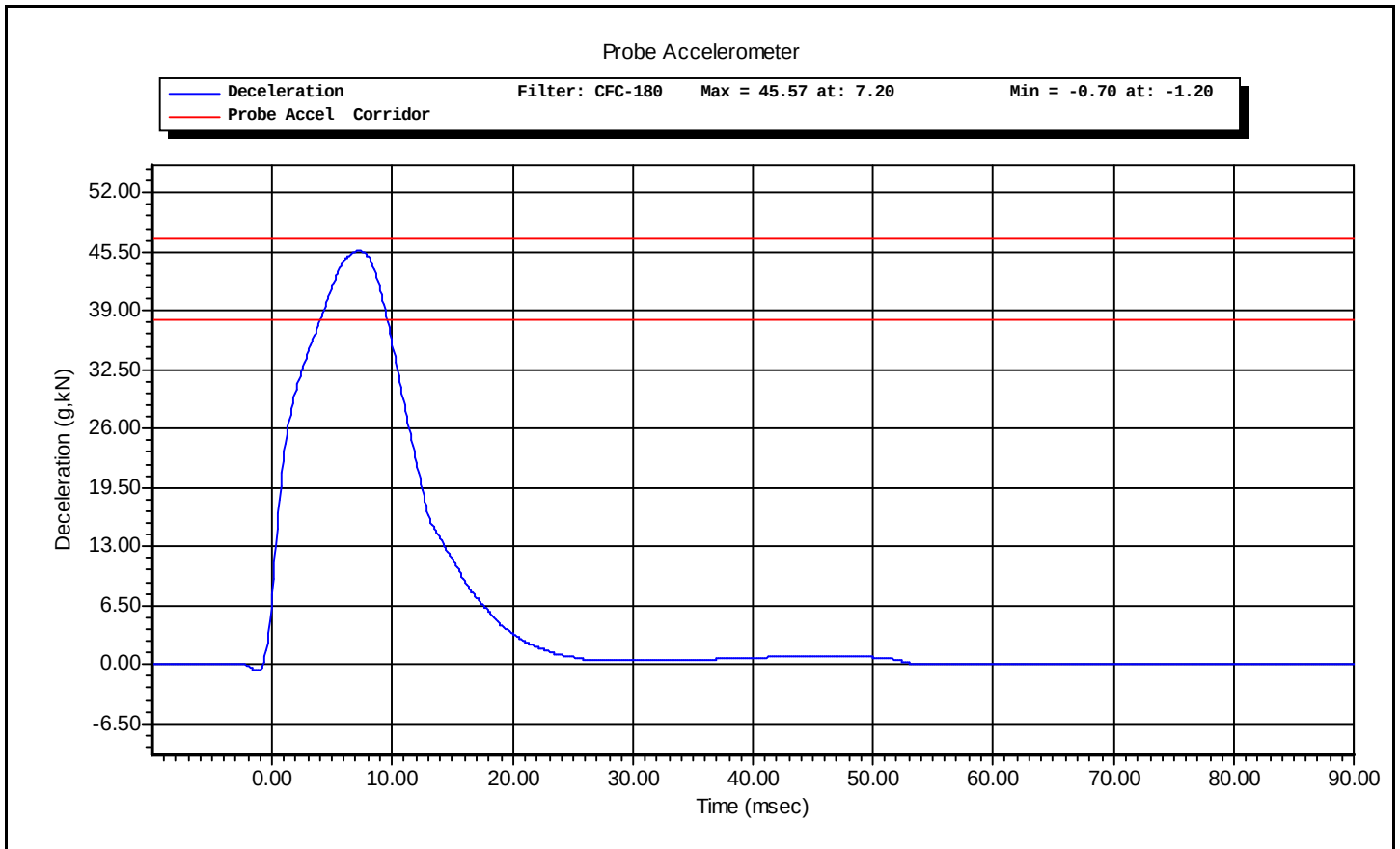


Pelvis Accelerometer



Test ID: **Pelvis Acetabulum** Test Time: **11:49:44 AM**

Test Date: **10/20/2010**





www.calspan.com

Calspan - Transportation Research Group

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

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 300		
Test ID:	Pelvis Iliac	Test Date:	10/20/2010
Test Number:	2	Test Time:	10:31:18 AM

Comments:

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.2 deg C P
Humidity	10 -- 70	32 %RH P
Velocity	4.20 -- 4.40	4.28 m/s P
Peak Probe Acceleration	36.0 -- 45.0	43.6 g P
Peak Pelvis Acceleration	28.0 -- 39.0	38.1 g P
Peak Iliac Force	4.10 -- 5.10	4.93 kN P

All test parameters are within specifications

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

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

Test ID: **Pelvis Iliac**

Test Time: **10:31:18 AM**

Test Date: **10/20/2010**



www.calspan.com

Calspan - Transportation Research Group

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	7264-2000	P66930	10/5/2010
Endevco	7264-2000	P51671	10/12/2010
DentonATD	3228J	LC-279 Fy	4/12/2010

Test ID: **Pelvis Iliac**

Test Time: **10:31:18 AM**

Test Date: **10/20/2010**

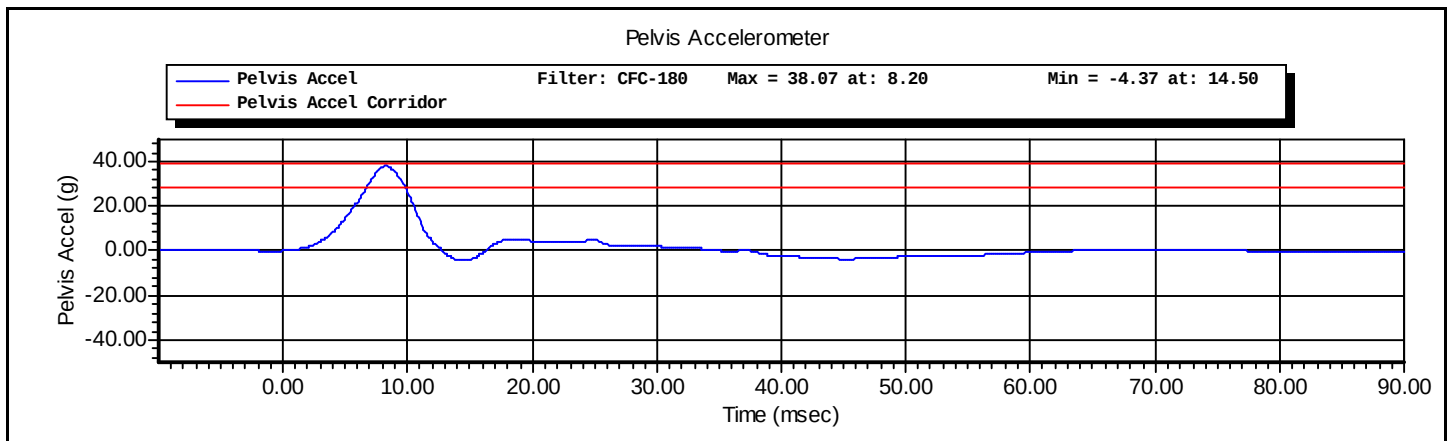
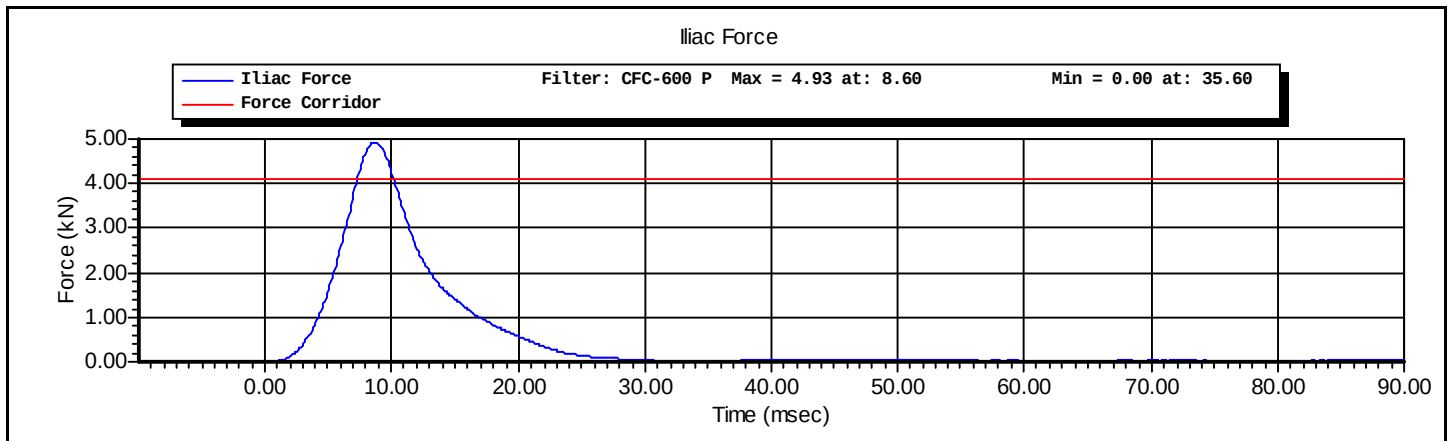


www.calspan.com

Calspan - Transportation Research Group

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

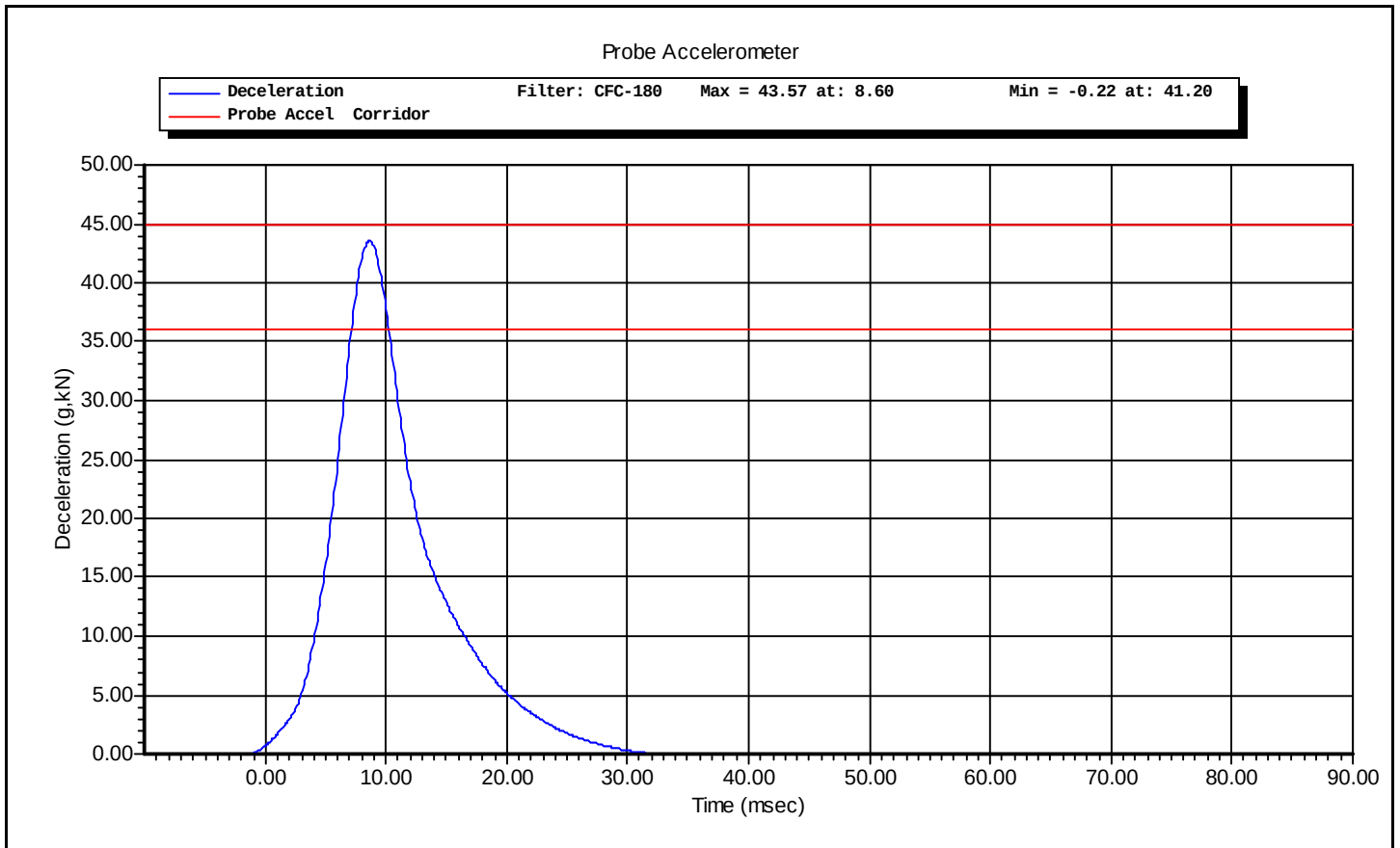
Test Name:	Pelvis	Revision:	8/24/2009
Sub Test Name:	Iliac Impact	Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	SID 300		
Test ID:	Pelvis Iliac	Test Date:	10/20/2010
Test Number:	2	Test Time:	10:31:18 AM



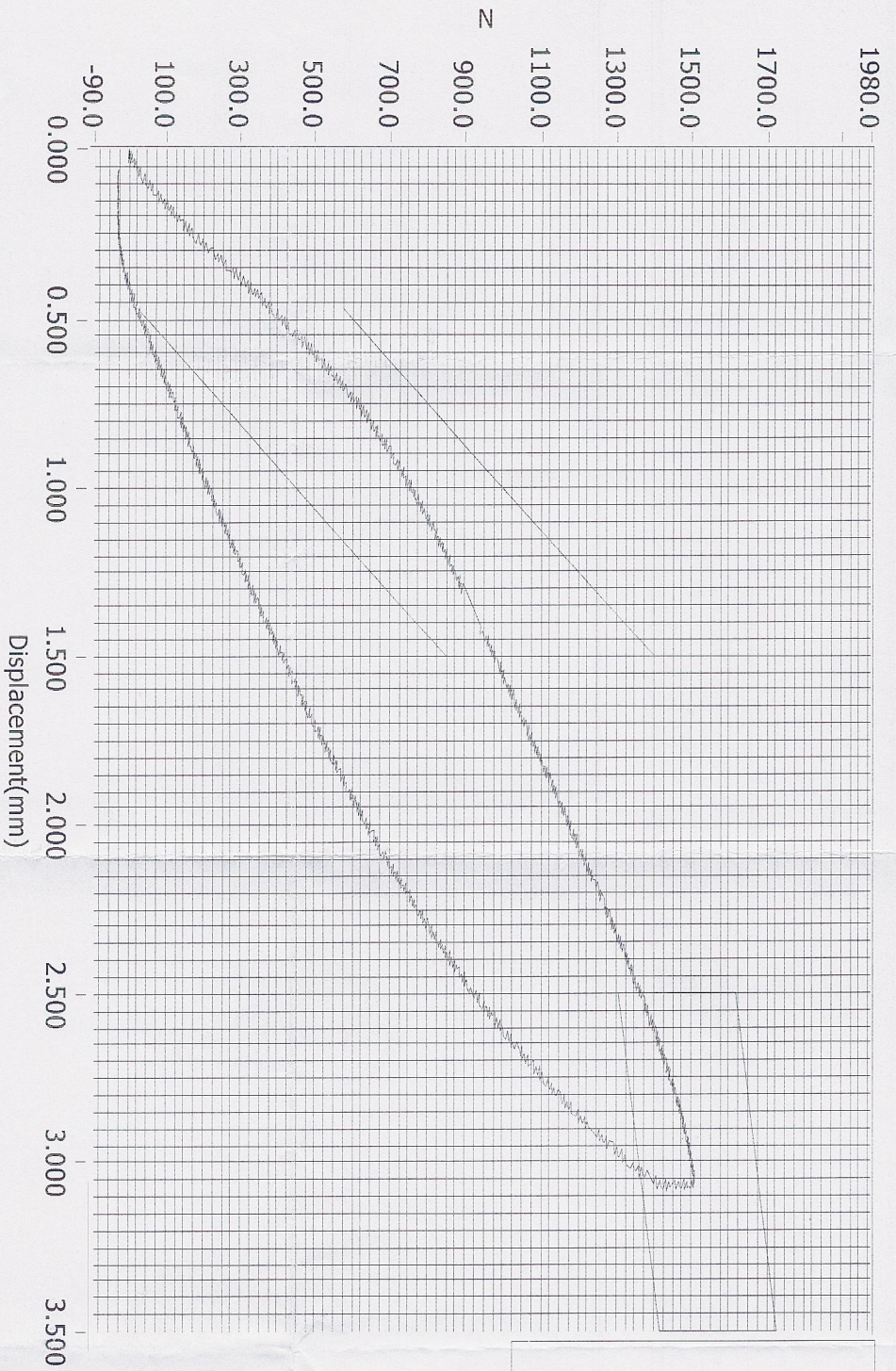
Test ID: **Pelvis Iliac**

Test Time: **10:31:18 AM**

Test Date: **10/20/2010**



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

12761

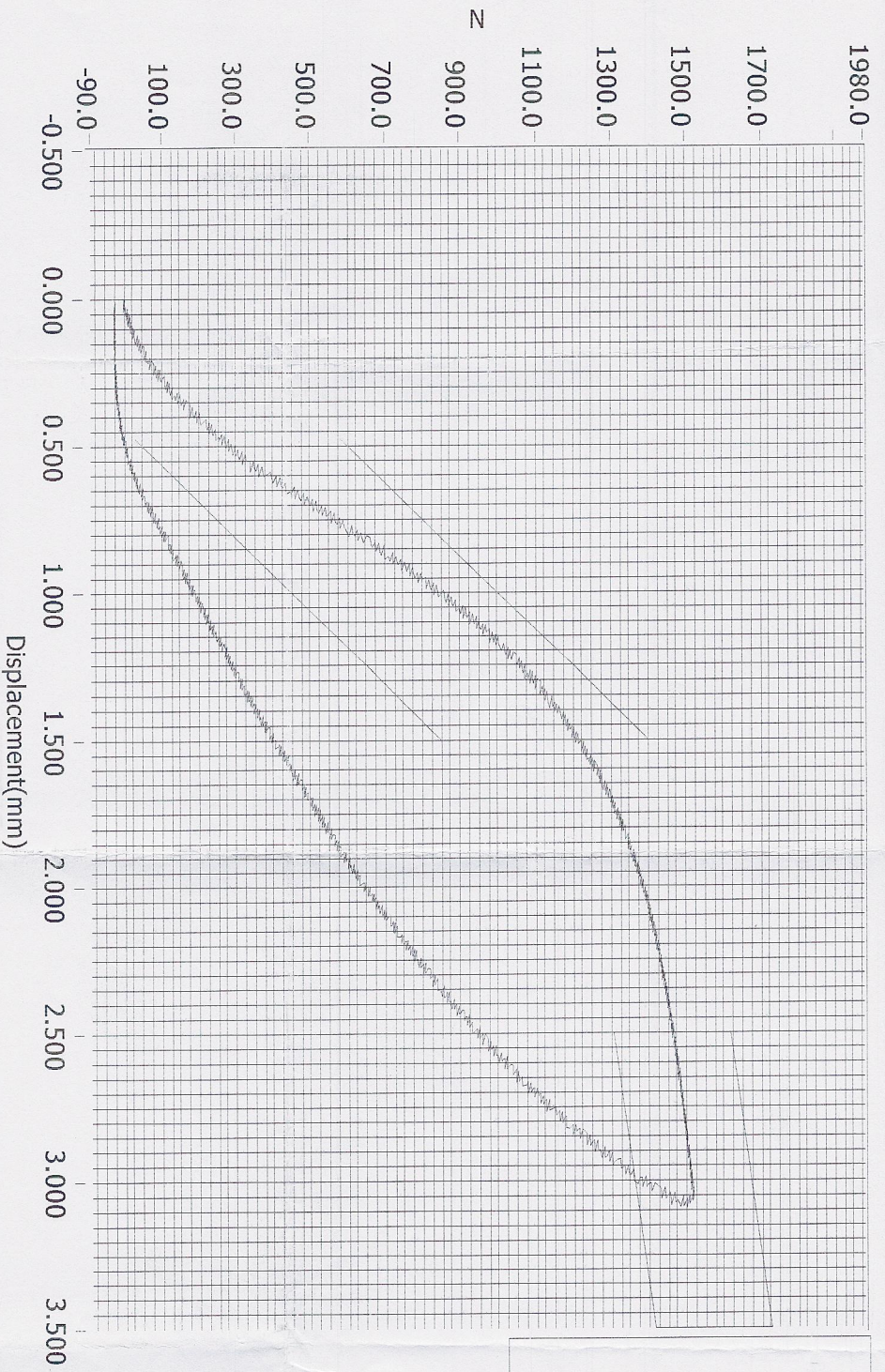
SIDIIs

Current Date : 7/16/2007

Current Time : 14:40:02

C

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

12574

SIDIIs

Current Date : 7/10/2007

Current Time : 14:44:09

FS