

REPORT NUMBER: SINCAP-CAL-12-019

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

**FUJI HEAVY INDUSTRIES LTD
2012 Subaru Outback
Utility Vehicle**

NHTSA No: MC5501

**PREPARED BY:
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February 14, 2012

FINAL REPORT

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

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

Date: _____

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

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Technical Report Documentation Page

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15. Supplementary Notes

16. Abstract

A 55/28 kph 90° Moving Deformable Barrier NCAP Side Impact Test was conducted on the subject 2012 Subaru Outback Utility Vehicle in accordance with the specifications of the Office of Crashworthiness Standards Test Procedure for the generation of consumer information on vehicle side crash protection. This test was conducted at the Calspan Corporation Crash Test Facility in Buffalo, New York, on 12/15/2011.

The impact velocity of the Moving Deformable Barrier (MDB) was 62.56 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle at the time of impact was 11°C. The target vehicle post-test maximum crush was 245 mm at level 3. The test vehicle's performance was as follows:

Measurement Description	Driver ATD (ES-2re)		
	Units	IARV	Result
Head Injury Criteria (HIC ₃₆)	N/A	1000	46.21
Maximum Thoracic Rib Deflection	mm	44	24.92
Total Abdominal Force	N	2500	850.53
Pubic Symphysis Force	N	6000	-2338.26

Measurement Description	Passenger ATD (SID-IIs)		
	Units	IARV	Result
Head Injury Criteria (HIC ₃₆)	N/A	1000	195.40
Lower Spine Resultant Acceleration	G	82	45.84
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	4553.90
Maximum Thoracic Rib Deflection	mm	38*	19.45
Maximum Abdominal Rib Deflection	mm	45*	18.30

* Proposed IARV

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 Information Services Division, NPO-411 1200 New Jersey Ave. SE Room E12-100 Washington, D.C. 20590 e-mail: tis@nhtsa.dot.gov FAX: 202-493-2833	
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SECTION 1

TEST PURPOSE AND PROCEDURE

PURPOSE

This moving deformable barrier side impact test is part of the MY 2012 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under contract number DTNH22-09-D-00126. The purpose of this test is to generate comparative side impact performance in a 2012 Subaru Outback Utility Vehicle.

The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Laboratory Test Procedure dated August 2011.

SECTION 2

SUMMARY OF TEST RESULTS

SUMMARY

A 2012 Subaru Outback Utility Vehicle was impacted on the left (driver's) side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 62.56 km/h (38.87 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 in Buffalo, New York on December 15, 2011. 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 August 2011. The side impact event was documented by 9 high-speed and 2 real-time cameras. Camera locations are included in this report.

The Dummies were instrumented in the following manner:

DRIVER ATD (ES-2re)

- Primary and redundant head CG tri-axial accelerometers
- Chest upper rib, middle rib, and lower rib y-axis displacement potentiometers
- Abdomen forward, middle, and rear y-axis load cells
- Lower spine (T12) tri-axial accelerometers
- Public symphysis y-axis load cell

PASSENGER ATD (SID-IIs)

- Primary and redundant head CG tri-axial accelerometers
- Chest upper rib, middle rib, and lower rib y-axis displacement potentiometers
- Abdomen upper rib and lower rib y-axis displacement potentiometers
- Lower spine (T12) tri-axial accelerometers
- Acetabulum and iliac wing y-axis load cells

Appendix B contains the vehicle and dummy response data. Dummy configuration and performance verification data can be found in APPENDIX C of this report.

DUMMY INJURY VALUES

Measurement Description	Driver ATD (ES-2re)		
	Units	Threshold	Result
Head Injury Criteria (HIC36)		1000	46.21
Maximum Thorax Rib Deflection	mm	44	24.92
Combined Abdominal Force	N	2500	850.53
Pubic Symphysis Force	N	6000	-2338.26

Measurement Description	Passenger ATD (SID-IIs)		
	Units	Threshold	Result
Head Injury Criteria (HIC36)		1000	195.40
Lower Spine (T12) Resultant Acceleration	G	82	45.84
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	4553.90
Maximum Thoracic Rib Deflection	mm	38*	19.45
Maximum Abdominal Rib Deflection	mm	45*	18.30

*Proposed IARV

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

GENERAL COMMENTS:

1. P1 serial number - F034
2. P2 serial number - DG8012

DATA ANOMALIES:

- Passenger Lower Abdominal Rib DY is questionable data after 48-55 ms
- Right Front Sill AX is questionable after 43 ms
- Right Rear Sill AX is questionable after 40 ms
- Top of Engine AX is questionable after 89 ms
- Floorpan at Rear Axle AX is questionable after 47 ms

Note: An internal short occurred within the data acquisition system which caused the time zero event to occur too early. The following channels were not collected:

- ❖ MDB Data Channel Failure
 - MDB Ax, Ay, Az
 - MDB Rear Ax, Ay
 - MDB Left and Right Contact

SECTION 3

Occupant and Vehicle Information

This section contains information reporting for the following Data Sheets:

Data Sheet No. 1 - General Test and Vehicle Parameter Data

Data Sheet No. 2 – Seat, Seat Belt, Steering Wheel Adjustment and Fuel System Data

Data Sheet No. 3 – Dummy Longitudinal Clearance Dimensions

Data Sheet No. 4 – Dummy Lateral Clearance Dimensions

Data Sheet No. 5 – Camera and Instrumentation Data

Data Sheet No. 6 – Test Vehicle Accelerometer Locations

Data Sheet No. 7 – MDB Accelerometer Locations

Data Sheet No. 8 – Post-Test Observations

Data Sheet No. 9 – MDB Summary of Results

Data Sheet No. 10 – Test Vehicle Profile Measurements

Data Sheet No. 11 – Test Vehicle Exterior Crush Measurements

Data Sheet No. 12 – MDB Exterior Static Crush Measurements

Data Sheet No. 13 – FMVSS No. 301 Static Rollover Results

Data Sheet No. 14 – Dummy/Vehicle Temperature and Humidity Stabilization Data

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2012 Subaru Outback
Test Program: NCAP Side MDB Impact Test

NHTSA No.: MC5501
Test Date: 12/15/2011

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	MC5501	Traction Control System (TCS)	Yes
Model Year	2012	Auto-Leveling System	No
Make	Subaru	Automatic Door Locks (ADL)	No
Model	Outback	Power Window Auto-Reverse	No
Body Style	Utility Vehicle	Other Optional Feature	--
VIN	4S4BRBAC8C1201965	Driver Front Airbag	Yes
Body Color	Light gray/silver	Driver Curtain Airbag	Yes
Odometer Reading (km/mi)	142 / 88	Driver Head/Torso Airbag	No
Engine Displacement (L)	2.5	Driver Torso Airbag	No
Type/No. Cylinders	I4	Driver Torso/Pelvis Airbag	Yes
Engine Placement	Lateral	Driver Pelvis Airbag	No
Transmission Type	Manual	Driver Knee Airbag	No
Transmission Speeds	6-Speed	Rear Pass. Curtain Airbag	Yes
Overdrive	Yes	Rear Pass. Head/Torso Airbag	No
Final Drive	All Wheel Drive	Rear Pass. Torso Airbag	No
Roof Rack	Yes	Rear Pass. Torso/Pelvis Airbag	No
Sunroof/T-Top	No	Rear Pass. Pelvis Airbag	No
Running Boards	No	Driver Seat Belt Pretensioners	Yes
Tilt Steering Wheel	Yes	Rear Pass. Seat Belt Pretensioners	No
Power Seats	No	Driver Load Limiter	Yes
Anti-Lock Brakes (ABS)	Yes	Rear Pass. Load Limiter	No
All-Wheel Drive (AWD)	Yes	Other Safety Restraint	--
Does owner's manual provide instructions to turn off automatic door locks?			No

DATA FROM CERTIFICATION LABEL

Manufactured By	FUJI Heavy Industries LTD	GVWR (kg)	2,080
Date of Manufacture	9/11	GAWR Front (kg)	1,070
Vehicle Type	Utility Vehicle	GAWR Rear (kg)	1,060

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	2	3		5	
Capacity Weight (VCW) (kg)				408.0	(A)
DSC X 68.04 kg				340.2	(B)
Cargo Weight (RCLW) (kg)				67.8	(A-B)

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							

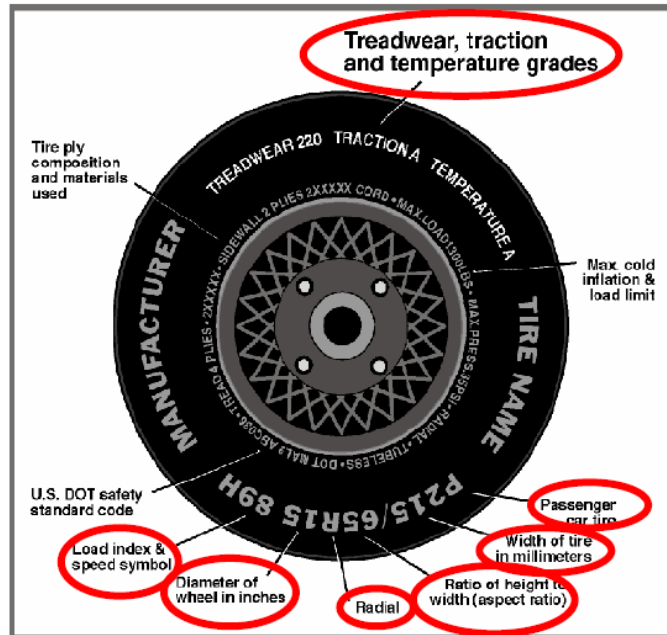
DATA SHEET NO. 1 ... (CONTINUED)
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2012 Subaru Outback
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: MC5501
 Test Date: 12/15/2011

VEHICLE TIRE INFORMATION

Collect year, make, model, VIN, items circled in red, and tire manufacturer and tire name.



TIRE PLACARD INFORMATION

Measured Parameter	Front	Rear
Recommended Cold Tire Pressure (kPa)	220	210
Recommended Tire Size	P215/70R16	P215/70R16

TIRE SIDEWALL INFORMATION

Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	300	300
Tire Size on Vehicle	P215/70R16	P215/70R16
Tire Manufacturer	Continental	Continental
Tire Name	ContiPro Contact	ContiPro Contact
Tire Type	Passenger	Passenger
Tire Width (mm)	215	215
Aspect Ratio	70	70
Radial	Yes	Yes
Wheel Diameter (mm)	709	709
Load Index/Speed	99S	99S
Treadwear	540	540
Traction Grade	A	A
Temperature Grade	A	A
Tire Material	Rubber	Rubber

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

Test Vehicle: 2012 Subaru Outback
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: MC5501
 Test Date: 12/15/2011

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	220	220	210	210
Tire Placard	kPa	220	220	210	210
Owner's Manual	kPa	220	220	210	210
As Tested	kPa	220	220	210	210

MDB TIRE SPECIFICATIONS

	Units	Requirement	LF	RF	LR	RR
Tire Size		P205/75R15	P205/75R15	P205/75R15	P205/75R15	P205/75R15
Tire Pressure	kPa	200 ± 21	214	200	207	207

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	431	358		467	447		475.5	450	
Right	kg	416	329		415.5	400.5		428	387	
Ratio	%	55	45		51	49		52	48	
Totals	kg	847	687	1,534	882.5	847.5	1,730	903.5	837	1,740.5

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1,534.0	(A)
Sum of Actual Weight of 2 P572 ATDS Used	kg	136.8	(B)
Rated Cargo/Luggage Weight (RCLW)	kg	67.8	(C)
Calculated Target Vehicle Test Weight (TVTW)	kg	1,738.6	(A+B+C)

Does the measured As Test Vehicle Weight lie within the required weight range (i.e. Calculated Test Vehicle Target Weight – 4.5 kg to – 9 kg)? ☒ Yes ☐ No

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
None	0.0
Ballast / Equipment Added	0.0

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

Test Vehicle: 2012 Subaru Outback
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: MC5501
 Test Date: 12/15/2011

TEST VEHICLE ATTITUDE AND CG

Measurement Description	Units	Fully Loaded	As Tested	Meets Requirement**
LF	mm	800	802	Yes
RF	mm	807	813	Yes
RR	mm	815	809	Yes
LR	mm	793	790	Yes
Vehicle CG (Aft of Front Axle)	mm	1,320	1,345	
Vehicle CG (Left+)/Right(-) from Longitudinal Centerline)	mm	50	45	

*** The "As Tested" vehicle attitude measurements must be equal to or within ± 10 mm of the "Fully Loaded" vehicle attitude measurements at each wheel well. Indicate "Yes" or "No" for "Meets Requirements".

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

Test Vehicle: 2012 Subaru Outback
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: MC5501
 Test Date: 12/15/2011

SEAT POSITIONING

The driver's seat, front center seat (if applicable), and right front passenger's seat should be set to the mid-track, lowest, mid-angle position. The struck-side rear passenger's seat, rear center seat, and non-struck side rear passengers' seats should be set to the rear-most, lowest, mid-angle position.

SCRL ANGLE RANGE

Seat	SCRL (°)		
	Max	Min	Mid
Driver Seat	16.5	12.7	14.6
Front Passenger Seat	-	No Angle Adjustment	-
Front Center Seat*			
Struck Side Rear Seat	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed
Rear Center Seat*	Fixed	Fixed	Fixed

**if applicable*

SEAT HEIGHT AND ANGLE

Seat	As Tested SCRL Angle (Mid) (°)	As Tested SCRП Height (mm)	SCRП Height Position	SCRП Height (mm)		
				Rearmost	Mid- Fore/Aft	Forward- Most
Driver Seat	14.6	29	Max	54	67	80
			Mid	27	40	52
			Min	50	13	25
Front Passenger Seat	No Height or Angle Adjustment		Max			
			Mid			
			Min			
Front Center Seat*			Max			
			Mid			
			Min			
Struck Side Rear Seat	Fixed	Fixed	Max			
			Mid			
			Min			
Non-Struck Side Rear Seat	Fixed	Fixed	Max			
			Mid			
			Min			
Rear Center Seat*	Fixed	Fixed	Max			
			Mid			
			Min			

**if applicable*

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

Test Vehicle: 2012 Subaru Outback
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: MC5501
 Test Date: 12/15/2011

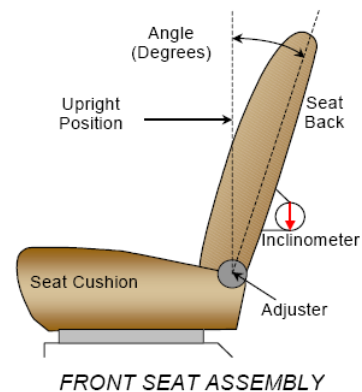
SEAT FORE / AFT POSITION

Seat	Total Fore / Aft Travel		Test Position from Forwardmost Position	
	mm	Detents*	mm	Detent*
Driver Seat	250	26	130	13
Front Passenger Seat	250	26	130	13
Front Center Seat*				
Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Rear Center Seat*	Fixed	Fixed	Fixed	Fixed

**if applicable*

SEAT BACK ANGLE ADJUSTMENT

The driver's seat back is positioned to the manufacturer's designated design angle. The front center and front passenger's seat backs are positioned in a similar manner as the driver's seat back. The struck side rear seat back is positioned such that the dummy's head is level. The rear center and non-struck side rear outboard seat backs are positioned in a similar manner as the struck-side rear seat back.



Seat	Total Seat Back Angle Range		Test Position from Most Upright	
	Degrees	Detents*	Degrees	Detents*
Driver Seat w/ Seated Dummy	-10 to 55.8	-	6.2	8
Front Passenger Seat	-10 to 55.8	-	6.2	8
Front Center Seat*				
Struck Side Rear Seat w/ Seated Dummy	-0.6 to 17.3	-	-0.5	0
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Rear Center Seat*	Fixed	Fixed	Fixed	Fixed

**if applicable*

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

Test Vehicle: 2012 Subaru Outback
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: MC5501
 Test Date: 12/15/2011

SEAT BELT ANCHORAGE ADJUSTMENT

Seat belt anchorages are adjusted in accordance with the information provided by the manufacturer on Form No. 1.

	Total No. of Positions	Placed in Position
Driver Seat	5	1
Rear Seat	Fixed	Fixed

HEAD RESTRAINT ADJUSTMENT

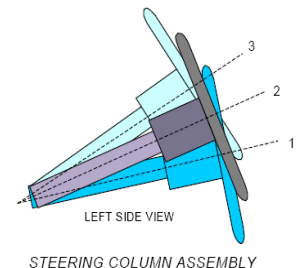
The driver's head restraint is adjusted to the highest and most full forward in-use position. The struck-side rear passenger's head restraint is adjusted to the lowest and most full forward in-use position. For this test zero is defined as the uppermost position

	Total No. of Positions	Placed in Position
Driver Seat	5	0
Rear Seat	3	2

STEERING COLUMN ADJUSTMENT

Steering wheel and column adjustments are made so that the steering wheel hub is at the center of its geometric locus it describes when it moves through its full range of motion.

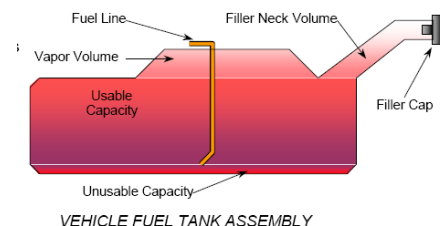
	Degrees	Fore/Aft Position (mm)
Lowermost - Position 1	68.7	
Geometric Center – Position 2	67.2	
Uppermost – Position 3	65.7	
Telescoping Steering Wheel Travel		40
Test Position	67.2	20



FUEL PUMP

Describe the fuel pump type, details about how it operates, and the location of the fuel filler neck.

The electric fuel pump operates when the ignition is in the 'on' position and the engine is running. The fuel filler neck is located above the right rear wheel.



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

Test Vehicle: 2012 Subaru Outback
Test Program: NCAP Side MDB Impact Test

NHTSA No.: MC5501
Test Date: 12/15/2011

FUEL TANK CAPACITY

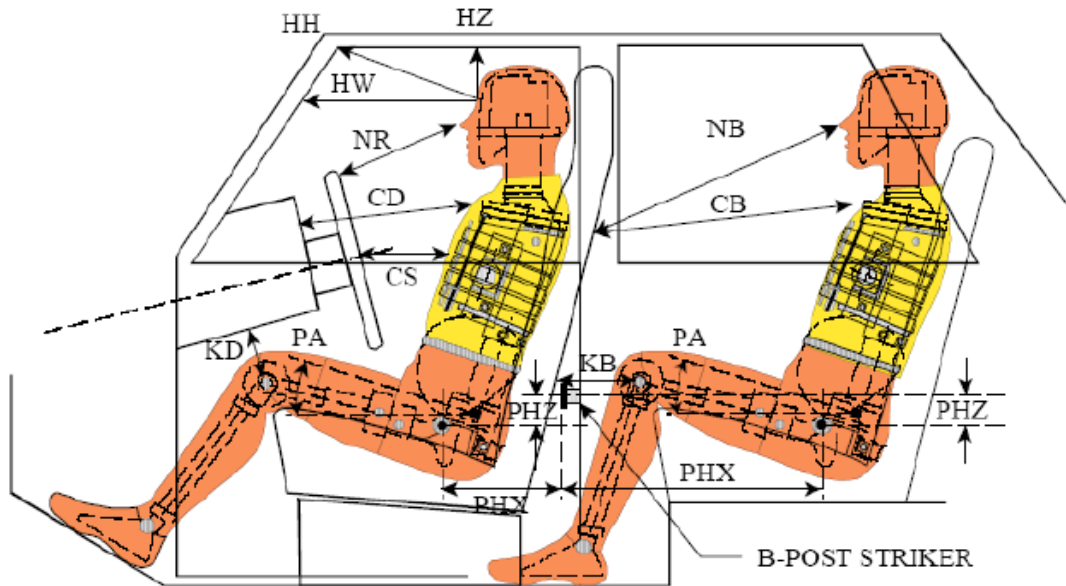
	Liters
Usable Capacity of "Standard Tank" (see Form No. 1)	70.0
Usable Capacity of "Optional Tank" (see Form No. 1)	
Usable Capacity of Standard Tank (see Owner's Manual)	
Usable Capacity of Optional Tank (see Owner's Manual)	
93% of Usable Capacity	65.1
Actual Amount of Solvent Used in Test	65.1
1/3 of Usable Capacity	23.3

Is the Actual Amount of Solvent Used in the test equal to 93% $\pm$ 1% of the Usable Capacity stated in Form No. 1? ☒ Yes ☐ No

DATA SHEET NO. 3 DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2012 Subaru Outback
Test Program: NCAP Side MDB Impact Test

NHTSA No.: MC5501
Test Date: 12/15/2011



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

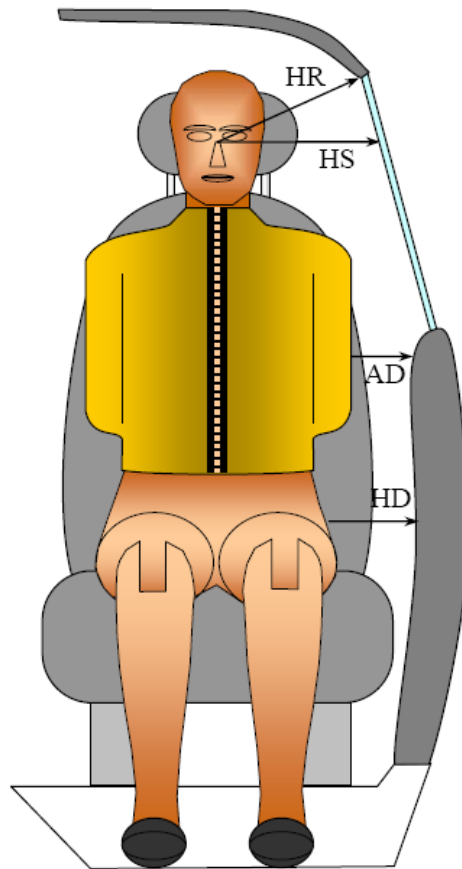
DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Pass. Code	Measurement Description	Driver (Serial No. F034)		Passenger (Serial No. 8012)	
			Length (mm)	Angle	Length (mm)	Angle
HH		Header to Header	417			
HW		Header to Windshield	693			
HZ	HZ	Head to Roof Liner	194		312	
NR	NB	Nose to Rim/Seat Back	489		531	
CD	CB	Chest to Dash/Seat Back	606		528	
CS		Chest to Steering Wheel	429			
KD(L)/KDA(L)°	KB(L)/KBA(L)°	Left Knee to Dash/Seat Back	188	24.2	314	14.6
KD(R)/KDA(R)°	KB(R)/KBA(R)°	Right Knee to Dash/Seat Back	177	23.6	311	130.0
PAX°	PAX°	Pelvic Tilt Angle X		25.4		21.2
	PAY°	Pelvic Tilt Angle Y				0.4
PHX	PHX	Hip Point to Striker (X-Axis)	226		260	
PHZ	PHZ	Hip Point to Striker (Z-Axis)	159		250	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2012 Subaru Outback
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: MC5501
 Test Date: 12/15/2011



FRONT VIEW OF DUMMY

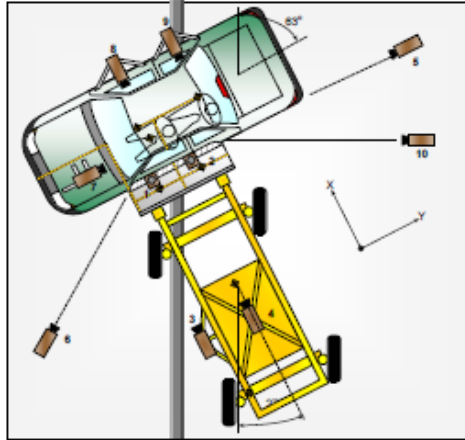
DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver (Serial No. F034)	Passenger (Serial No. 8012)
HR	Head to Side Header	Mm	217	275
HS	Head to Side Window	Mm	344	365
AD	Arm to Door	Mm	80	142
HD	Hip Point to Door	Mm	151	164

DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2012 Subaru Outback
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: MC5501
 Test Date: 12/15/2011



CAMERA LOCATIONS AND DATA

No.	Camera View	Coordinates (mm)			Lens Length (mm)	Operating Frame Rate (fps)
		X	Y	Z		
1	Overhead Overall	305	0	5150	14	1000
2	Overhead Close-up	0	0	5150	28	1000
3	Left Impact Point (MDB)	-1470	0	-847	25	1000
4	Side Overall (MDB)	-1140	838	-1587	12.5	1000
5	Rear	4917	9060	953	50	1000
6	Left Front	2390	1436	910	24	1000
7	Driver Front (OB)				25	500
8	Driver Side (OB)				12.5	500
9	Passenger Side (OB)				12.5	500
10	Real-time Left Rear				-	30
11	Real-time Inrun				-	30

Reference: Impact Point projected to Ground
 +X = To Front of MDB, +Y = To Right of MDB, +Z = Down
 *All measurements accurate to ± 6 mm.

If applicable, explain why camera(s) did not operate as intended: Camera No.2 does not have a time Stamp due to an internal malfunction and needs to be sent back to the manufacturer for repair.

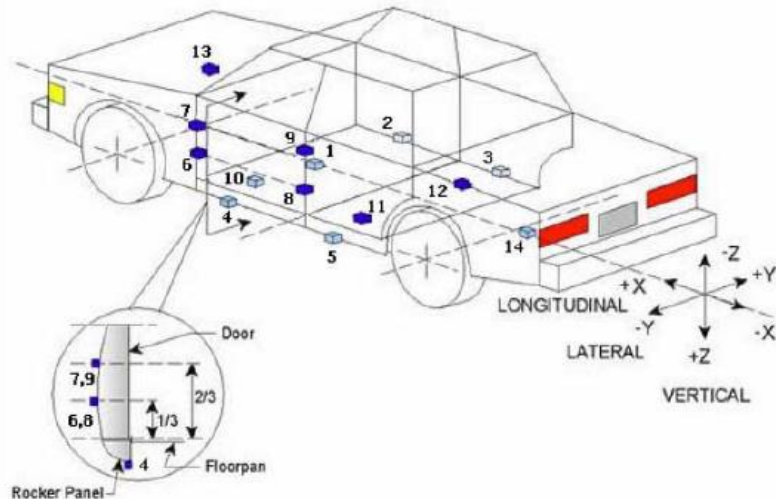
INSTRUMENTATION

Driver Dummy Channels	16
Passenger Dummy Channels	16
Vehicle Structure Accelerometers	23
MDB Accelerometers	7
Total	62

DATA SHEET NO. 6 **TEST VEHICLE ACCELEROMETER LOCATIONS**

Test Vehicle: 2012 Subaru Outback
Test Program: NCAP Side MDB Impact Test

NHTSA No.: MC5501
Test Date: 12/15/2011



TEST VEHICLE ACCELEROMETER LOCATIONS

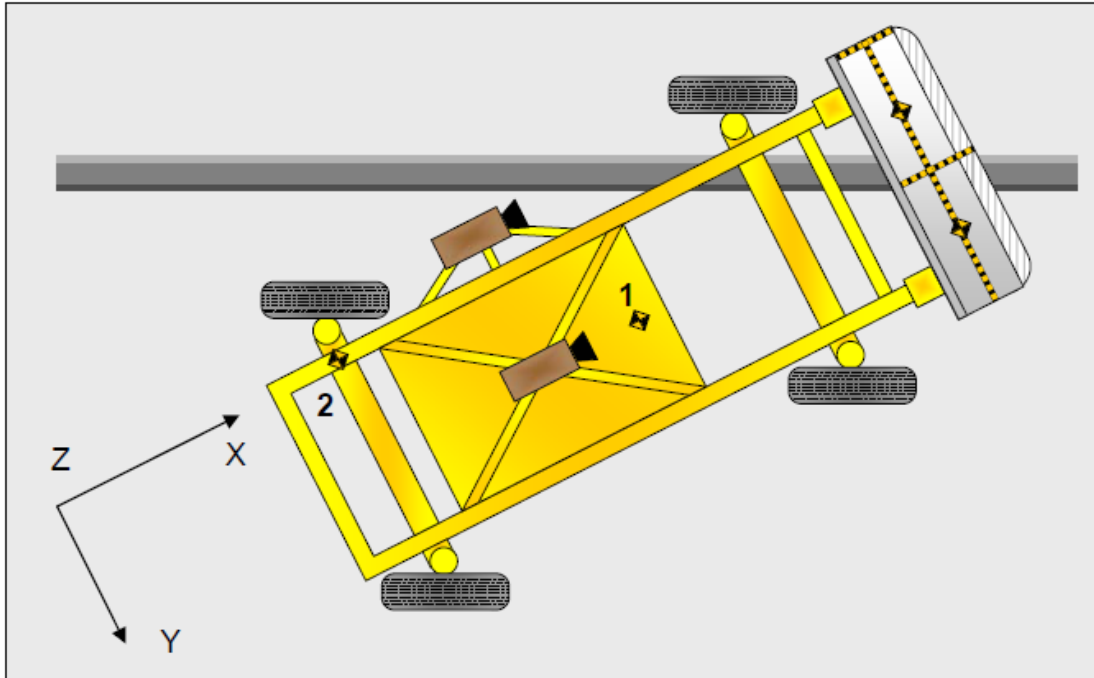
No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2,194	-9	-707
2	Right Sill at Front Seat	2,988	667	-398
3	Right Sill at Rear Seat	1,978	620	-381
4	Left Sill at Front Door	2,969	-662	-394
5	Left Sill at Rear Door	2,067	-635	-388
6	A-Post Lower	3,315	-630	-446
7	A-Post Middle	3,229	-663	-1,098
8	B-Post Lower	2,188	-685	-506
9	B-Post Middle	2,158	-691	-962
10	Front Seat Track	2,388	-531	-372
11	Rear Seat Structure	1,050	-656	-1,090
12	Rt. Rear Occ. Compartment	2,178	343	-313
13	Engine Block	4,073	2	-883
14	Rear Above Axle	876	1	-706

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

DATA SHEET NO. 7 **MDB ACCELEROMETER LOCATIONS**

Test Vehicle: 2012 Subaru Outback
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: MC5501
 Test Date: 12/15/2011



MDB ACCELEROMETER LOCATIONS

No.	Accelerometer Location	Coordinates (mm)		
		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
POST-TEST OBSERVATIONS**

Test Vehicle: 2012 Subaru Outback
Test Program: NCAP Side MDB Impact Test

NHTSA No.: MC5501
Test Date: 12/15/2011

TEST DUMMY INFORMATION AND CONTACT POINTS

Dummy Body Part	Front Seat Dummy (ES-2re)	Rear Seat Dummy (SID-IIs)
Face	Curtain Airbag	Curtain Airbag
Top of Head	Curtain Airbag	Curtain Airbag
Left Side of Head	Curtain Airbag	Curtain Airbag
Back of Head	HeadRest	HeadRest
Left Shoulder	Torso/Pelvis Airbag and Seat	Passenger's Side Door
Upper Torso	Torso/Pelvis Airbag and Seat	Passenger's Side Door
Lower Torso	Driver's Seat Back	Passenger's Side Door
Left Hip	Torso/Pelvis Airbag	Passenger's Side Door
Left Knee	Driver's Side Door	Passenger's Side Door

POST-TEST DOOR PERFORMANCE

Description	Struck Side		Non-Struck Side		Rear Hatch/ Other
	Front	Rear	Front	Rear	
Remained Closed and Operational	No	No	Yes	Yes	Yes
Total Separation from Vehicle at Hinges or Latches	No	No	N/A	N/A	
Latch or Hinge Systems Pulled Out of Their Anchorages	No	No	No	No	
Disengaged from Latched Position	No	No	No	No	
Latch Separated from Striker	No	No	No	No	
Jammed Shut	Yes	Yes	No	No	
If Door Opened at Striker, Width of Opening at Striker (mm)	N/A	N/A	N/A	N/A	

POST-TEST SEAT PERFORMANCE

Description	Struck Side		Non-Struck Side	
	Front	Rear	Front	Rear
Seat Movement Along Seat Track	Un-Recoverable	N/A	No	N/A
Seat Disengagement from Floor pan	No	No	No	No
Seat Back Movement from Initial Position	Un-Recoverable	No	No	No
Seat Back Collapse	No	No	No	No

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	Remained in good condition
Sill Separation	None
Windshield Damage	None
Side Window Damage	None
Other Notable Effects	None

DATA SHEET NO. 8 ... (CONTINUED)
POST-TEST OBSERVATIONS

Test Vehicle: 2012 Subaru Outback
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: MC5501
 Test Date: 12/15/2011

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Struck Side Driver		Struck Side Rear Passenger	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	No		
Knee Airbag	N/A	N/A		
Curtain Airbag	Yes	Yes	Yes	Yes
Torso/Pelvis Airbag	Yes	Yes	N/A	N/A
Seat Belt Pretensioner	Yes	Yes	No	No
Seat Belt Load Limiter	Yes	Yes	No	No
Other				

IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vehicle Wheel Base	mm		2745
Vertical Impact Reference Line (Aft of Front Axle - Intended Impact Point)	mm		432
Actual Impact Point (Aft of Frontal Axle)	mm		447
Horizontal Offset (+ forward / - rearward)	mm	+/- 50 of Intended Impact Point	-15
Vertical Offset (+ down / - up)	mm	+/- 20 of Intended Impact Point	11

DATA SHEET NO. 9
MDB SUMMARY OF RESULTS

Test Vehicle: 2012 Subaru Outback
Test Program: NCAP Side MDB Impact Test

NHTSA No.: MC5501
Test Date: 12/15/2011

MDB SPECIFICATIONS

Measurement Description	Length (mm)
Overall Width of Framework Carriage	1,250
Overall Length Including Honeycomb Frame	4,120
Wheelbase of Framework Carriage	2,600
CG Location of Front Axle	1,120

MDB WEIGHTS

	Units	Front Axle	Rear Axle	Total
Left	kg	392.5	297.5	690.0
Right	kg	386.0	291.5	677.5
Ratio	%	57.4%	42.6%	100.0%
Totals	kg	778.5	589.0	1367.5

SPEED AND ANGLE AT IMPACT DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.1 to 62.7	62.6
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	62.4
MDB CL to Target Vehicle CL	Degrees	88.5 to 91.5	89.5
MDB Forward Line of Motion to Target Vehicle CL	Degrees	62.5 to 63.5	63.0
MDB Crabbed angle to MDB Forward Line of Motion	Degrees	26.0 to 28.0	27.0

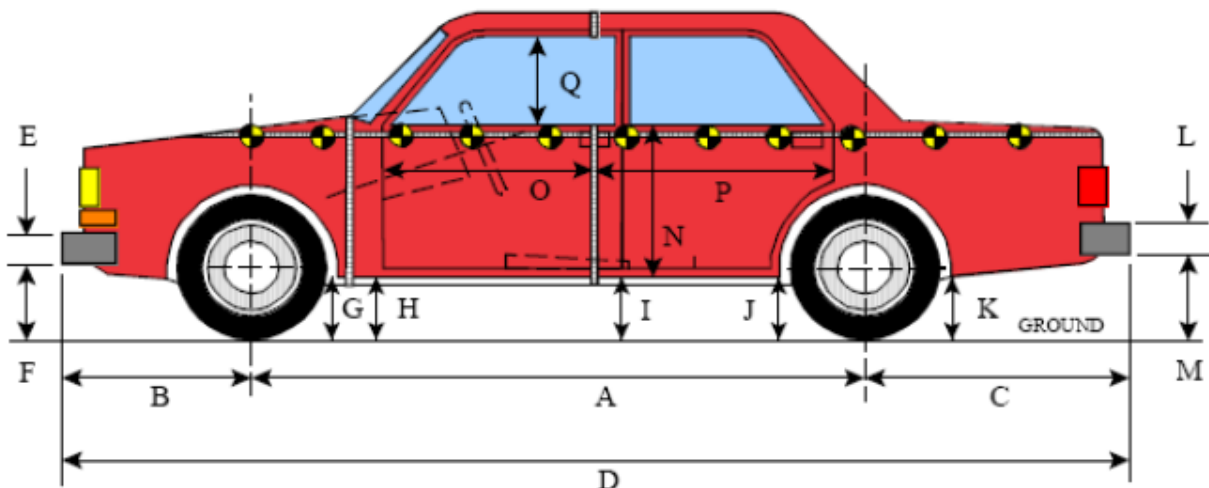
MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE

Vertical Location			From Centerline		Maximum Crush (mm)
Row	Description	Height (mm)	Distance (mm)	Direction	
A	Center of Bumper	432	800	Right	199
B	Top of Bumper	533	700	Right	127
C	Mid-Level	686	800	Left	76
D	Top of Stack	813	800	Right	118

DATA SHEET NO. 10
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2012 Subaru Outback
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: MC5501
 Test Date: 12/15/2011



LEFT SIDE VIEW

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

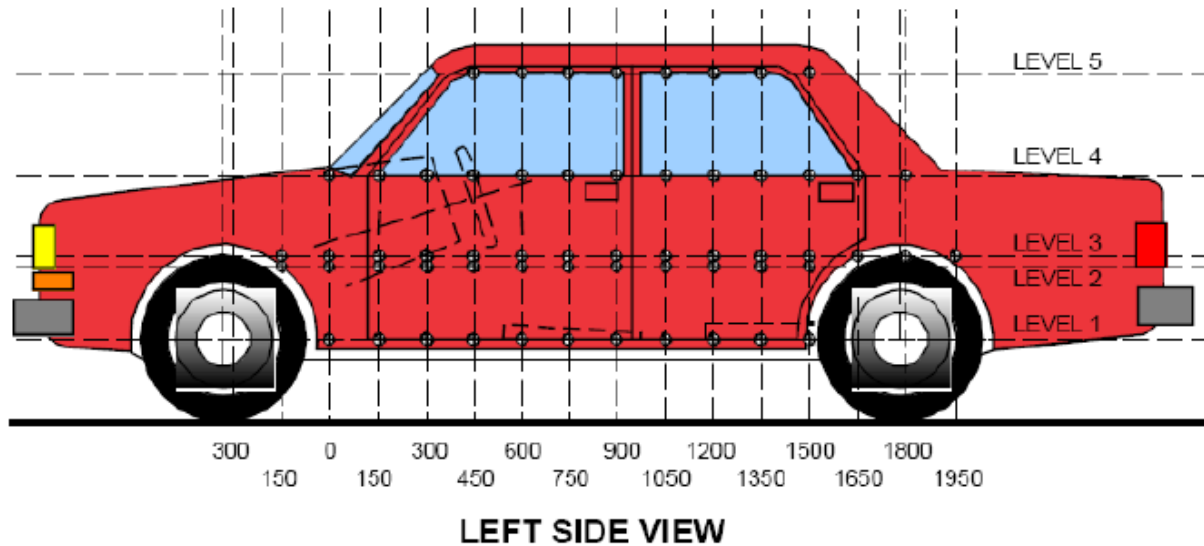
VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2,745	2,744	-1
B	Front Axle to FSOV	962	972	10
C	Rear Axle to RSOV	1,073	1,070	-3
D	Total Length at Centerline	4,780	4,785	5
E	Front Bumper Thickness	140	140	0
F	Front Bumper Bottom to Ground	467	499	32
G	Sill Height at Front Wheel Well	203	222	19
H	Sill Height at Front Door Leading Edge	267	260	-7
I	Sill Height at B Pillar	267	261	-6
J1	Sill Height at Rear Wheel Well	264	272	8
J2	Pinch Weld Height at Rear Wheel Well	248	242	-6
K	Sill Height Aft of Rear Wheel Well	238	316	78
L	Rear Bumper Thickness	240	240	0
M	Rear Bumper Bottom to Ground	381	378	-3
N	Sill Height to Window Bottom of Front Window Sill	716	680	-36
O	Front Door Leading Edge to Impact CL	662	540	-122
P	Rear Door Trailing Edge to Impact CL	1,305	1,250	-55
Q	Front Window Opening	440	477	37
R	Right Side Length	4,704	4,704	0
S	Left Side Length	4,706	4,724	18
T	Vehicle Width at B-Pillar	1,778	1,639	-139

DATA SHEET NO. 11
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2012 Subaru Outback
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: MC5501
 Test Date: 12/15/2011



MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Height Above Ground (mm)	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	318	62	1650
2	Driver Hip Point	616	220	1650
3	Mid-Door	711	245	1500
4	Window Sill	981	122	1350
5	Window Top	1,513	4	1350

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. 11 ... (CONTINUED)
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2012 Subaru Outback
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: MC5501
 Test Date: 12/15/2011

EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

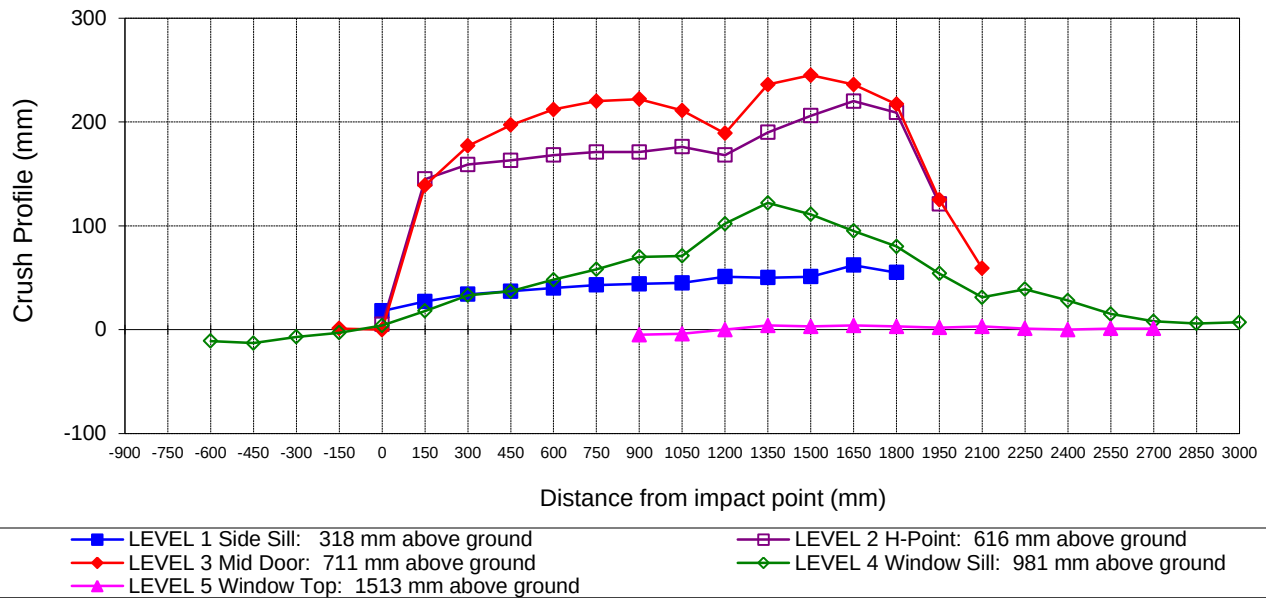
	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-900															
-750															
-600				-766					-777					-11	
-450				-787					-800					-13	
-300				-804					-811					-7	
-150			-910	-811				-909	-814				1	-3	
0	-893	-896	-887	-818		-875	-891	-887	-814		18	5	0	4	
150	-856	-880	-884	-824		-829	-735	-745	-806		27	145	139	18	
300	-852	-882	-886	-833		-818	-723	-709	-800		34	159	177	33	
450	-852	-884	-888	-840		-815	-721	-691	-803		37	163	197	37	
600	-852	-885	-889	-850		-812	-717	-677	-802		40	168	212	48	
750	-851	-886	-890	-860		-808	-715	-670	-802		43	171	220	58	
900	-852	-887	-890	-866	-612	-808	-716	-668	-796	-617	44	171	222	70	-5
1050	-851	-886	-890	-867	-622	-806	-710	-679	-796	-626	45	176	211	71	-4
1200	-850	-884	-889	-869	-626	-799	-716	-700	-767	-626	51	168	189	102	0
1350	-852	-883	-888	-869	-629	-802	-693	-652	-747	-625	50	190	236	122	4
1500	-852	-882	-887	-870	-626	-801	-676	-642	-759	-623	51	206	245	111	3
1650	-854	-880	-885	-870	-627	-792	-660	-649	-775	-623	62	220	236	95	4
1800	-860	-880	-883	-868	-625	-805	-671	-666	-788	-622	55	209	217	80	3
1950		-903	-899	-858	-622		-782	-774	-804	-620		121	125	54	2
2100			-909	-868	-617			-850	-837	-614			59	31	3
2250				-858	-608				-819	-607				39	1
2400				-854	-597				-826	-597				28	0
2550				-848	-578				-833	-577				15	1
2700				-841	-536				-833	-535				8	1
2850				-832					-826					6	
3000				-821					-814					7	

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. 11 (CONTINUED)
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2012 Subaru Outback
 Test Program: NCAP Side MDB Impact Test

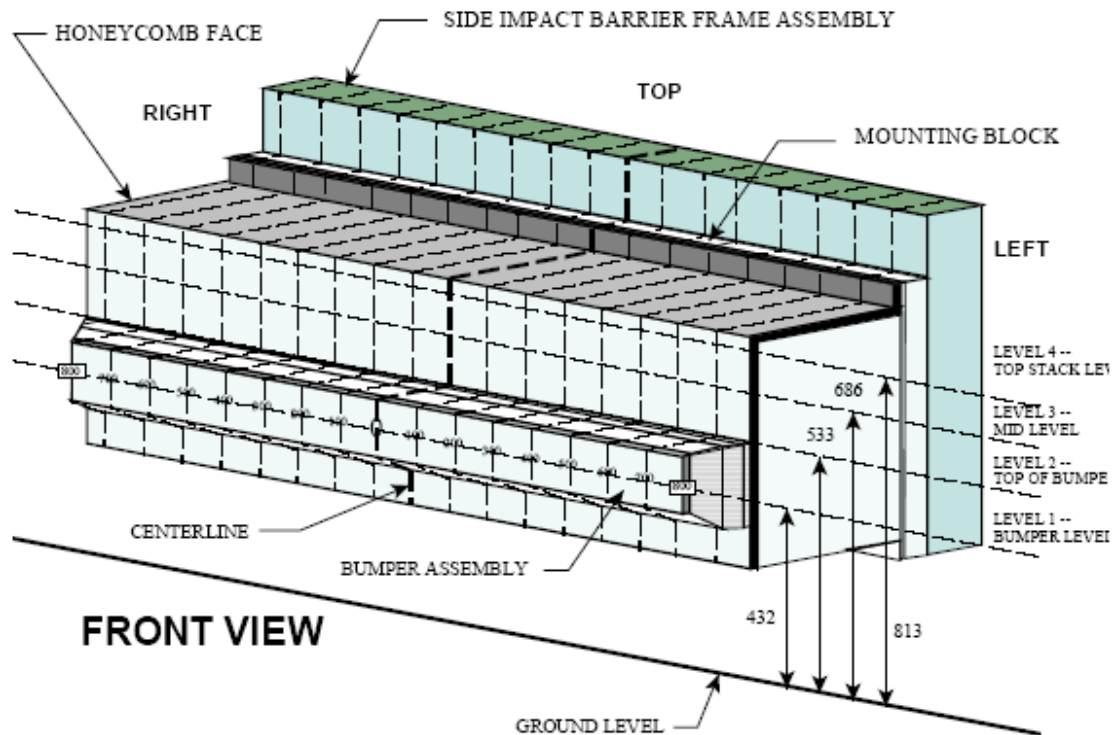
NHTSA No.: MC5501
 Test Date: 12/15/2011



Vehicle Exterior Crush Measurements - Visual Representation

DATA SHEET NO. 12
EXTERIOR STATIC CRUSH FOR IMPACTOR FACE

Test Vehicle:	<u>2012 Subaru Outback</u>	NHTSA No.:	<u>MC5501</u>
Test Program:	<u>Side MDB NCAP</u>	Test Date:	<u>12/15/2011</u>



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	199	192	189	189	189	187	186	184	178	180	176	178	175	174	172	172	177
2	124	127	125	124	116	112	111	108	103	102	109	106	105	102	100	98	103
3	53	39	29	38	44	67	58	45	49	39	36	34	34	38	45	56	76
4	118	63	36	28	34	61	84	67	47	44	48	55	58	63	69	82	108

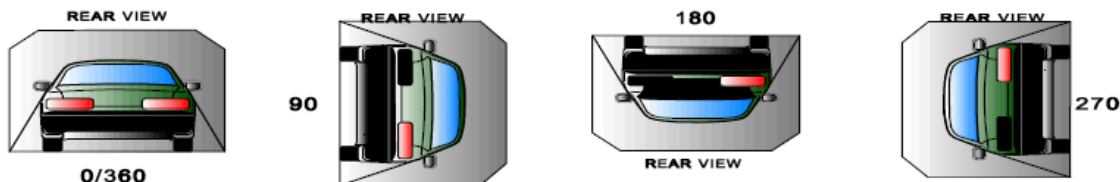
FMVSS NO. 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2012 Subaru Outback NHTSA No.: MC5501
 Test Program: Side MDB NCAP Test Date: 12/15/2011

Test Time: 5:30 PM Temperature: 11°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	69	300	369
90 to 180	66	300	366
180 to 270	65	300	365
270 to 360	69	300	369

FMVSS NO. 301 ROLLOVER SPILLAGE TABLE

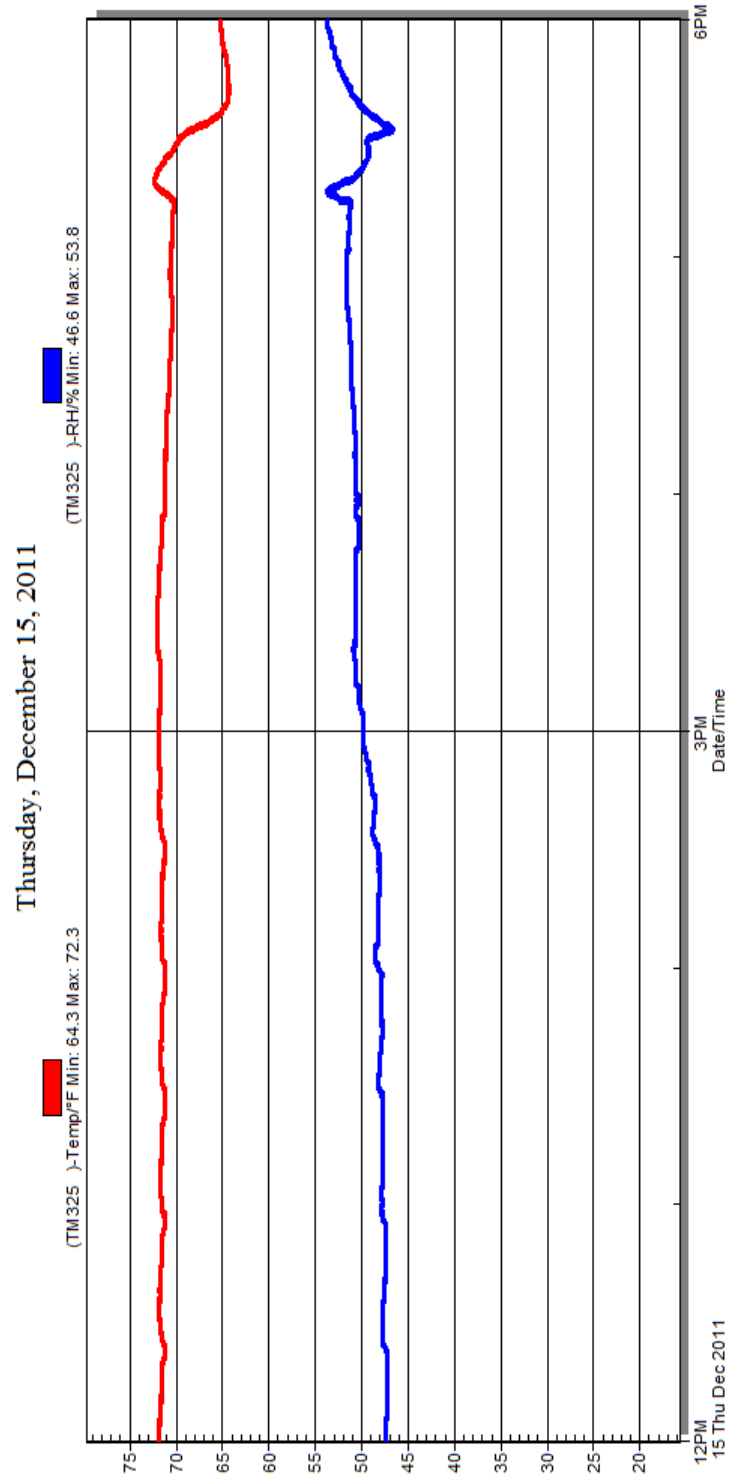
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0 to 90	0	0		
90 to 180	0	0		
180 to 270	0	0		
270 to 360	0	0		

ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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

DATA SHEET NO. 14
DUMMY/VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION DATA

Test Vehicle:	2012 Subaru Outback	NHTSA No.:	MC5501
Test Program:	Side MDB NCAP	Test Date:	12/15/2011



APPENDIX A
PHOTOGRAPHS

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



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



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



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



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



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



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



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



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



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



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



Figure A-12: Post-Test Rear Side 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

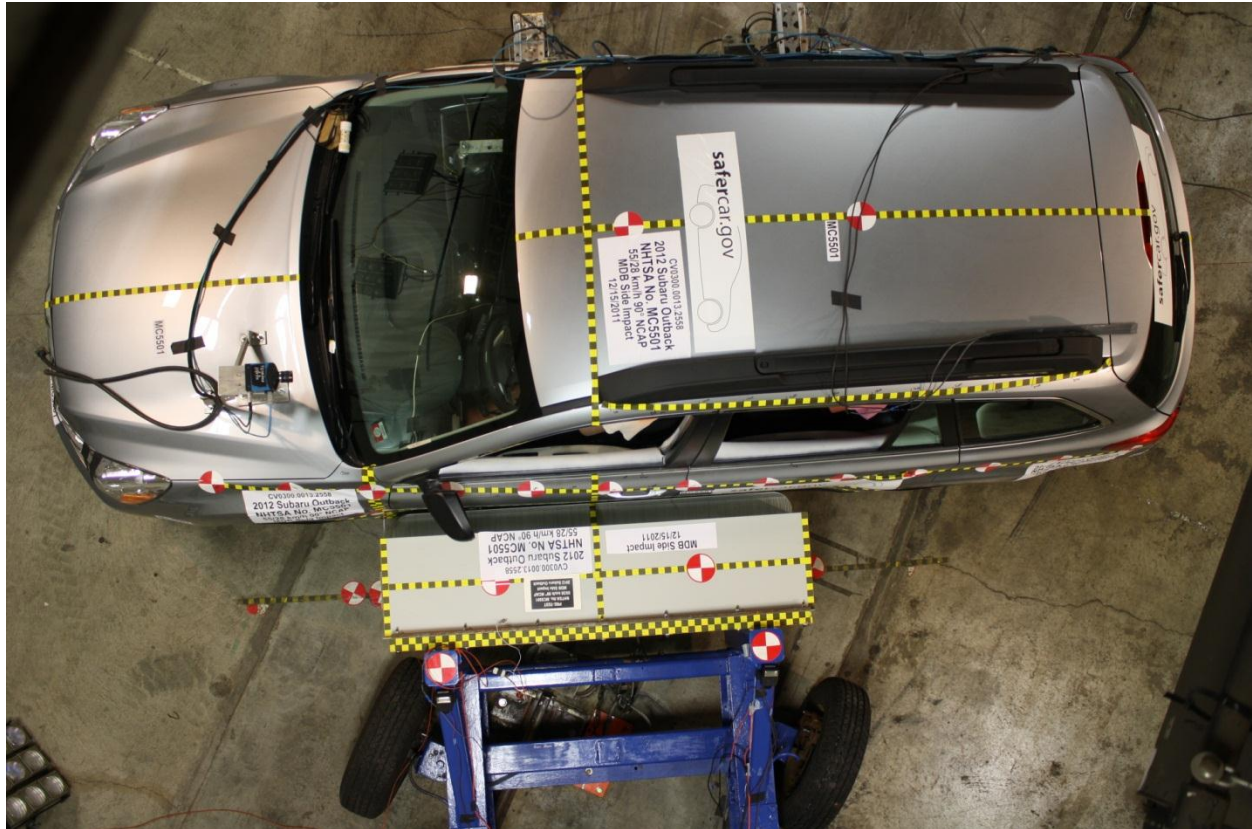


Figure A-15: Pre-Test Overhead View of the Test Area



Figure A-16: Post-Test Overhead View of Test Area



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



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



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

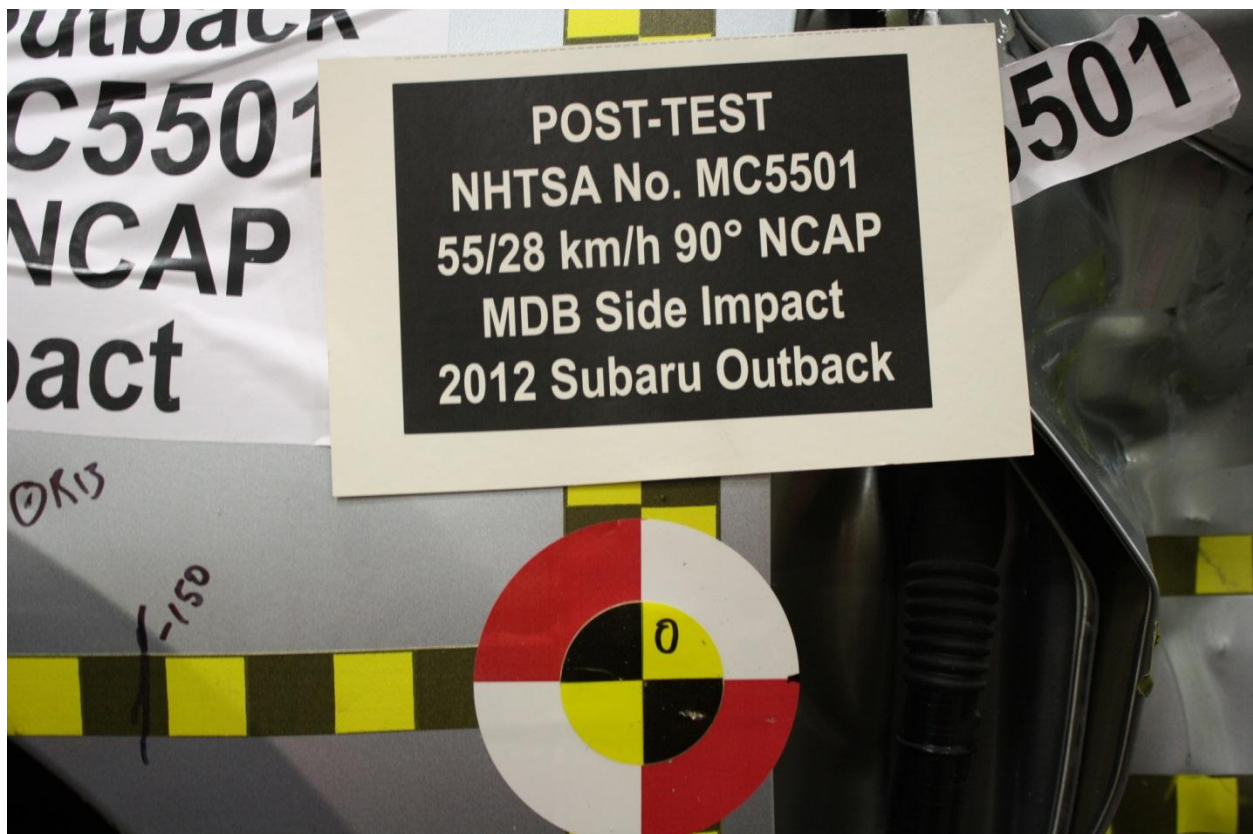


Figure A-20: Post-Test Close-Up View of Impact Point Target



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

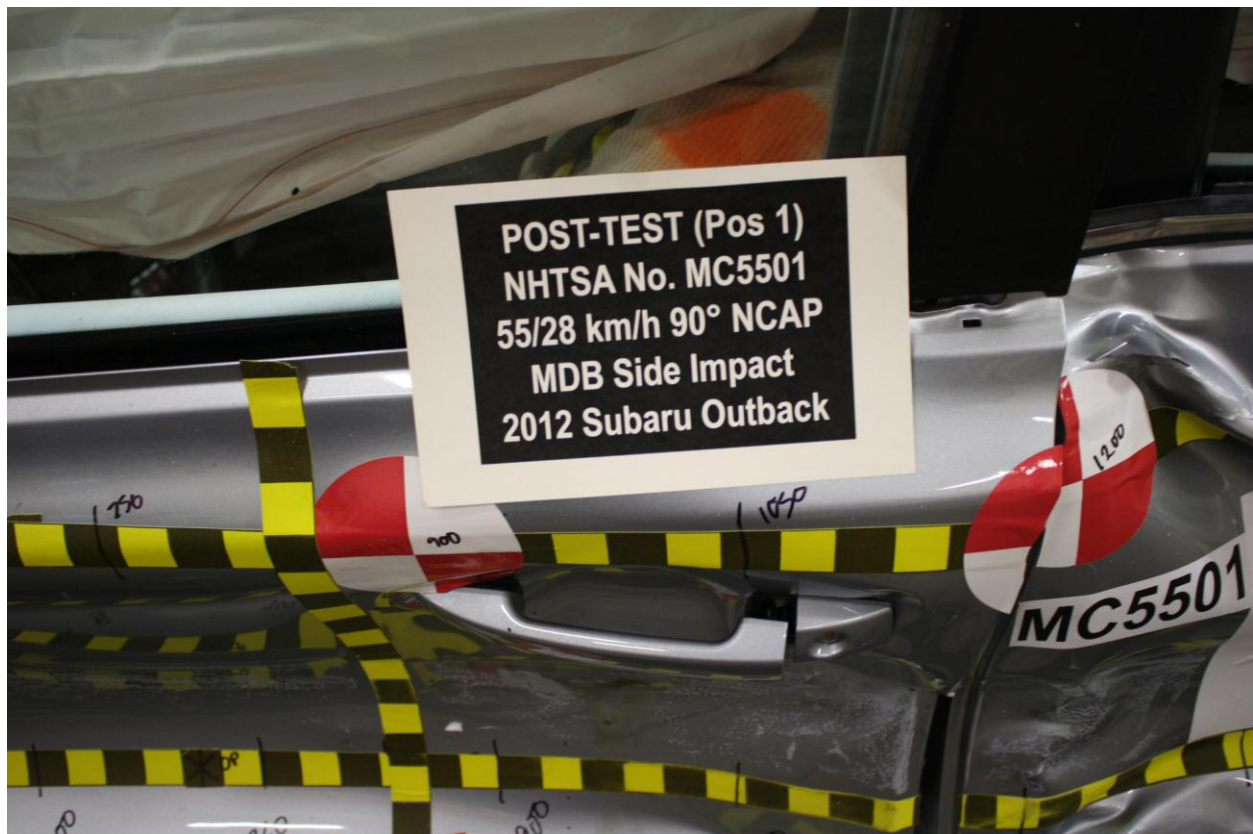


Figure A-22: Post-Test Left Front Door Latch Close-Up



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

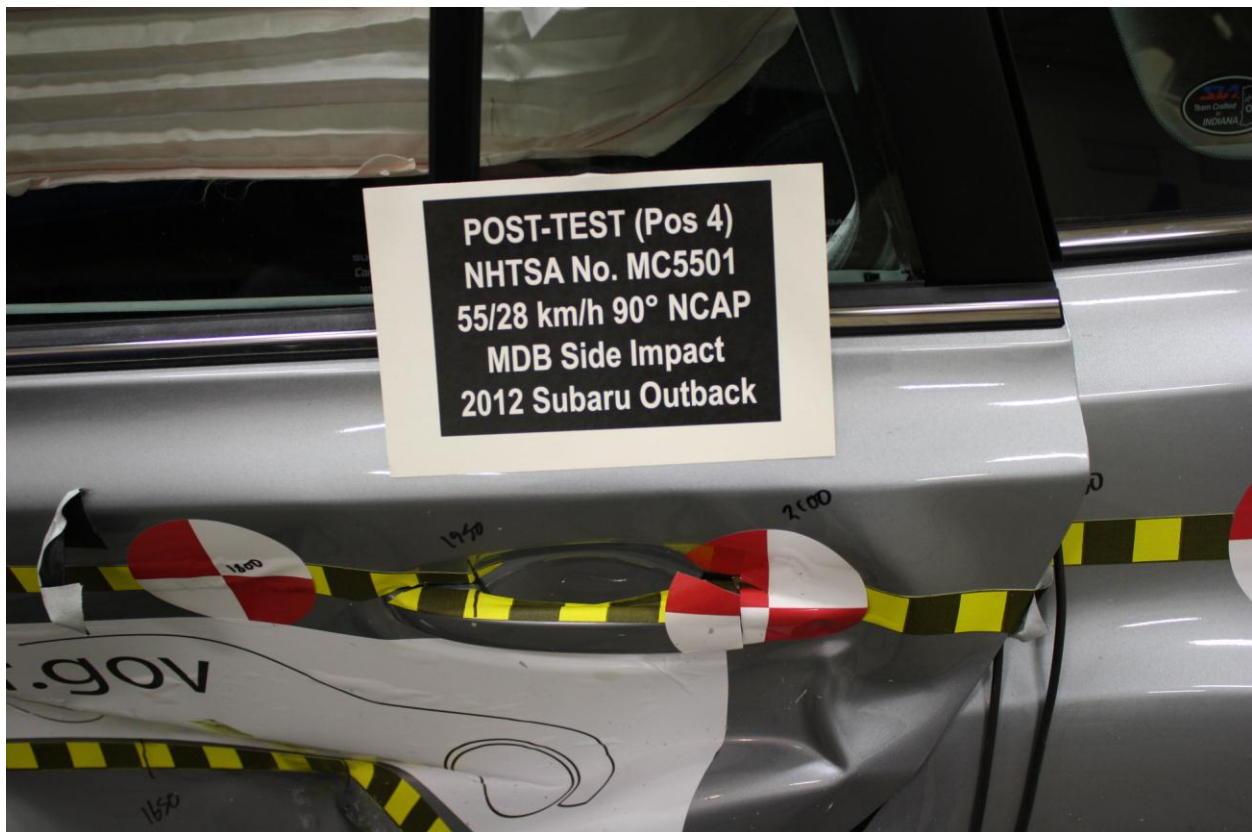


Figure A-24: Post-Test Left Rear Door Latch Close-Up



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



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



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



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



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



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



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



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



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

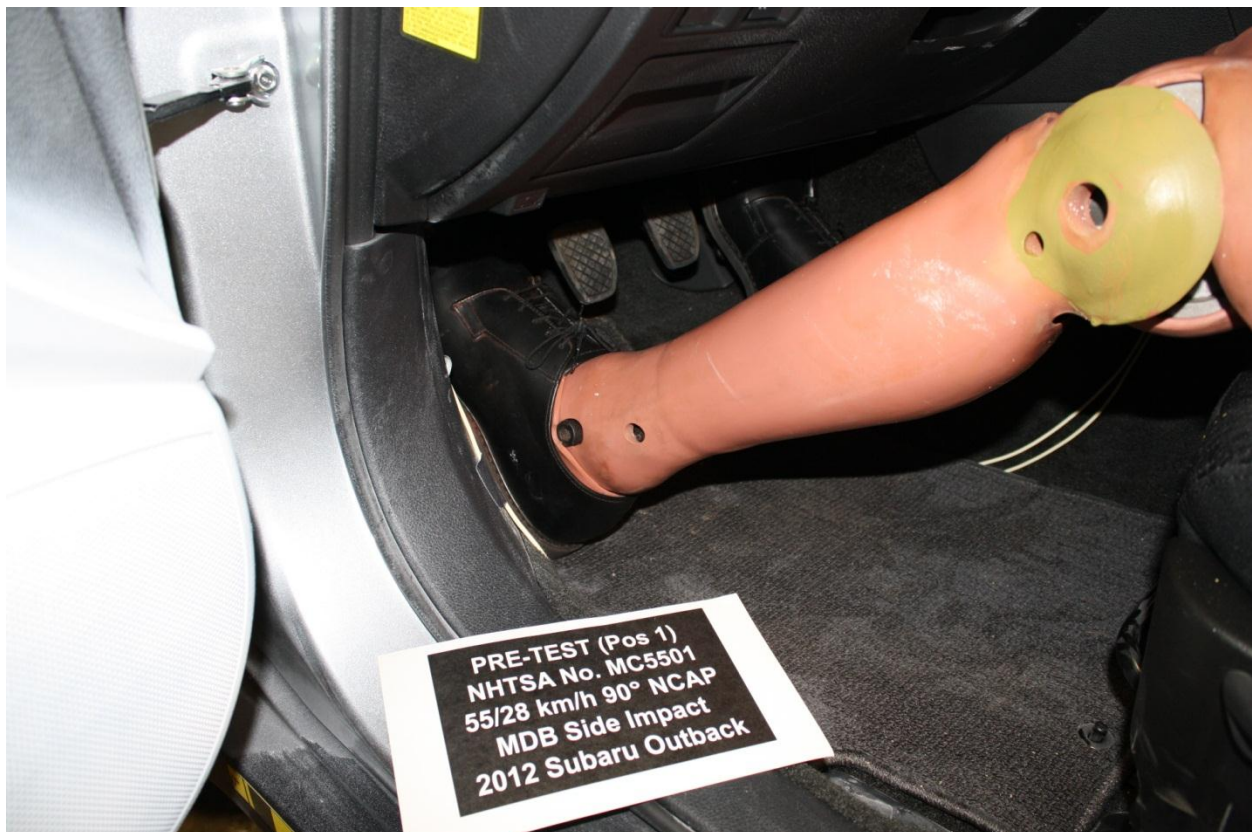


Figure A-34: Pre-Test Placement of Driver Dummy's Feet

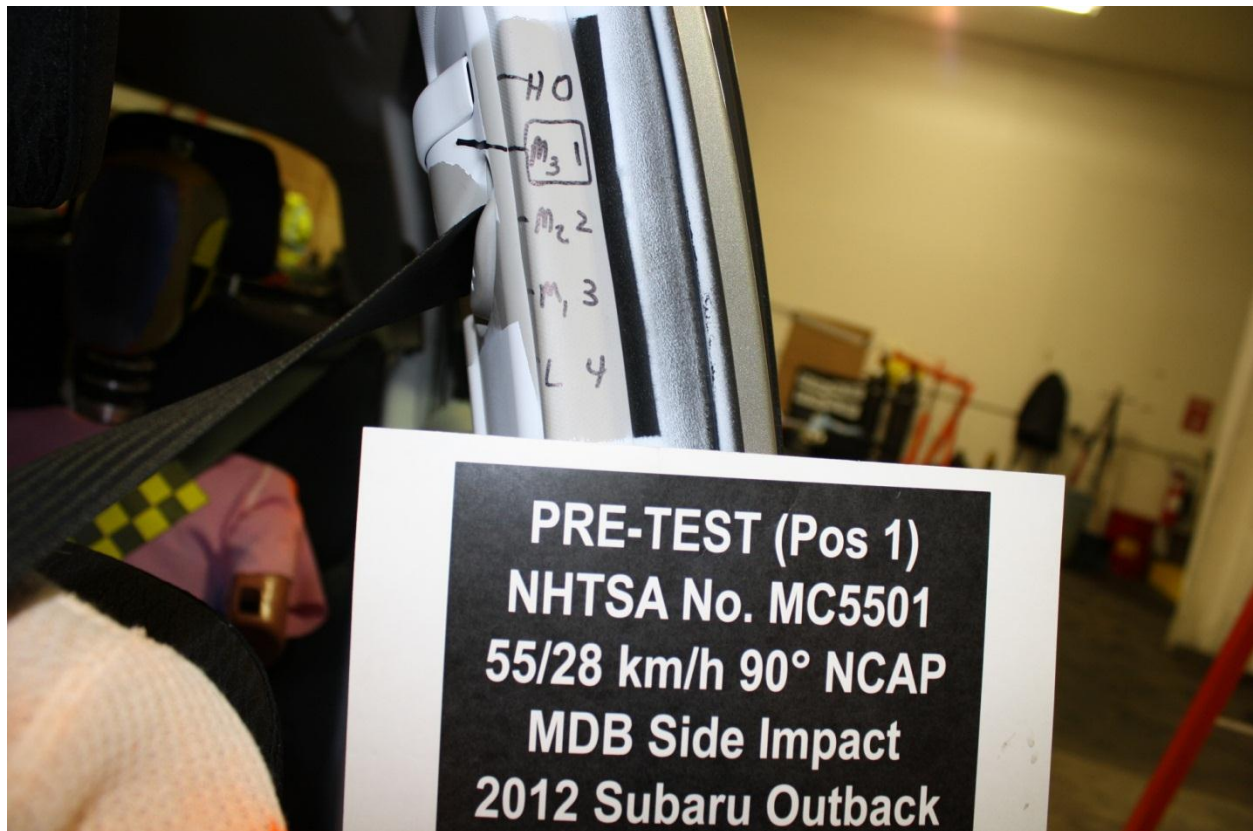


Figure A-35: Pre-Test View of Belt Anchorage for Driver Dummy



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

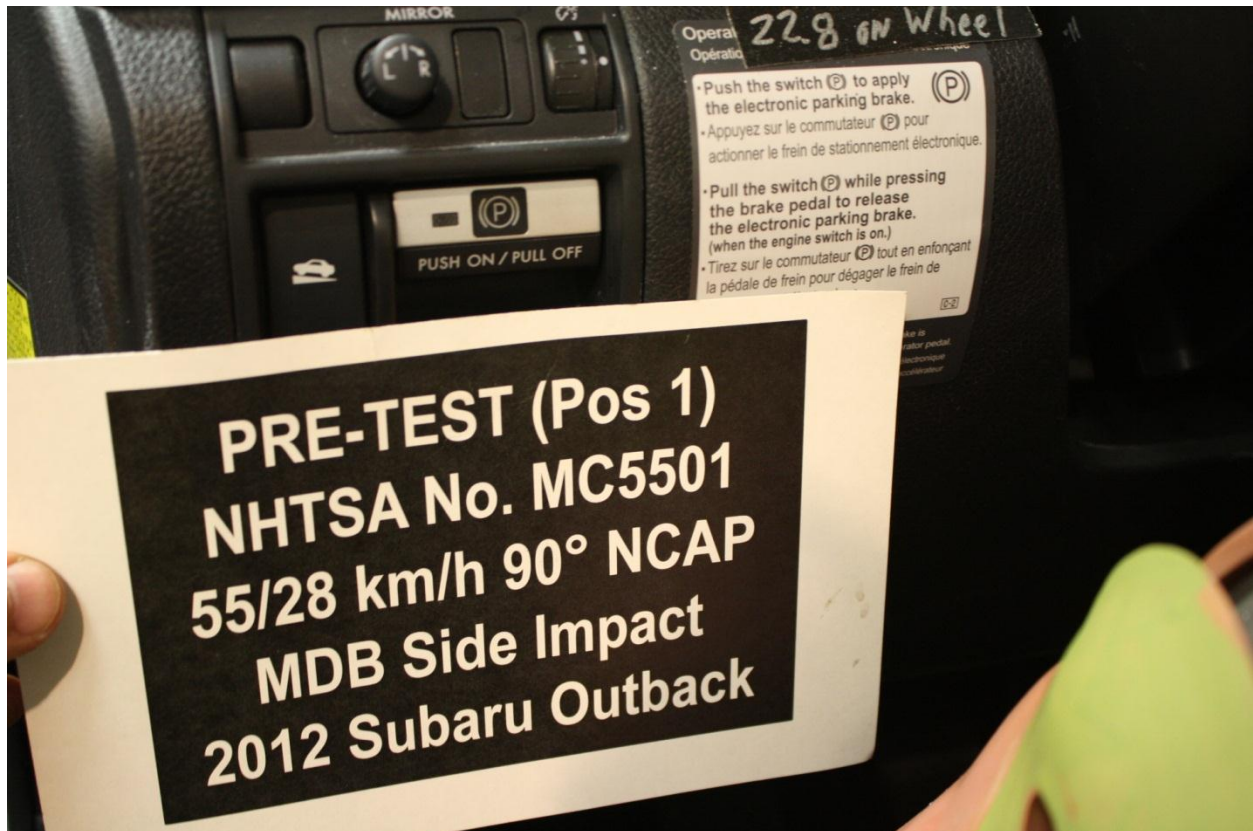


Figure A-37: View of Disengaged Parking Brake

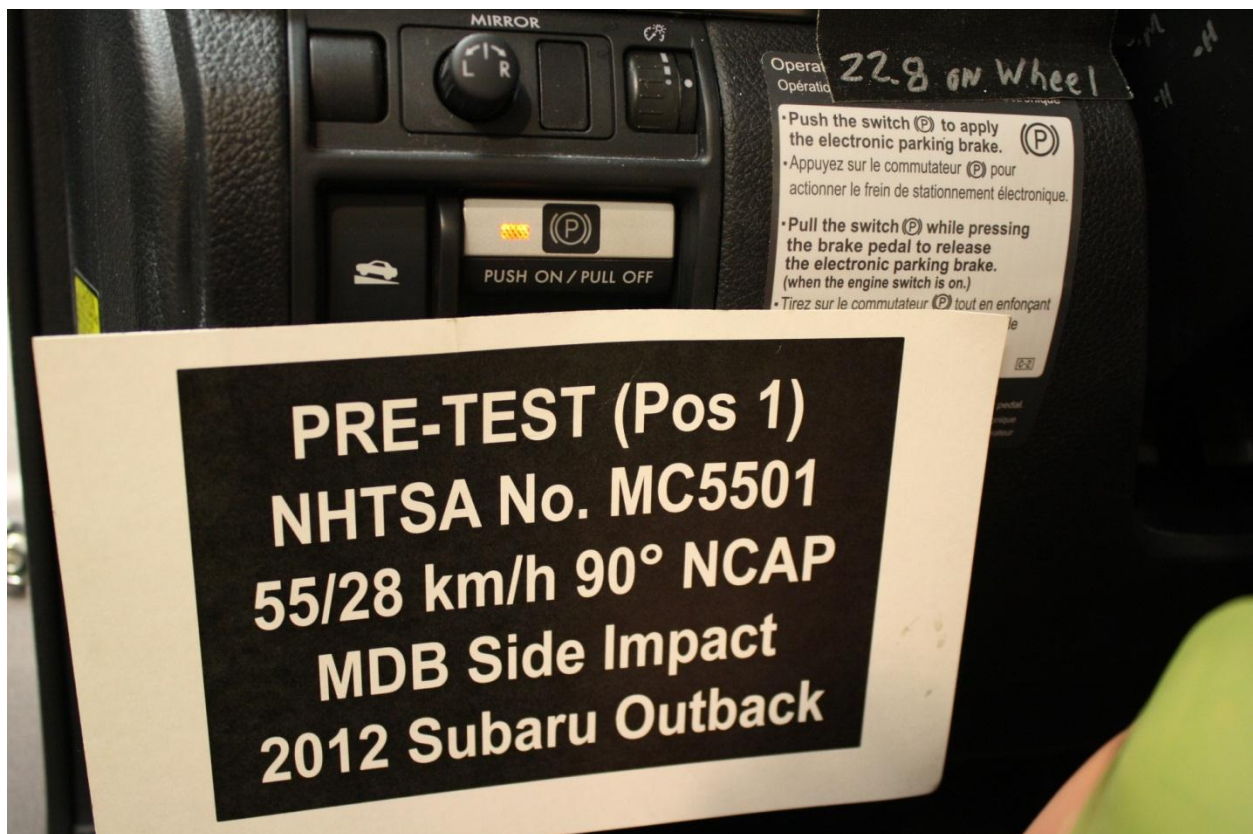


Figure A-38: Pre-Test View of Parking Brake



Figure A-39: Pre-test Close-Up Left Side View of Driver Seat Track



Figure A-40: Pre-Test Close-Up Left Side View of Driver Seat Back

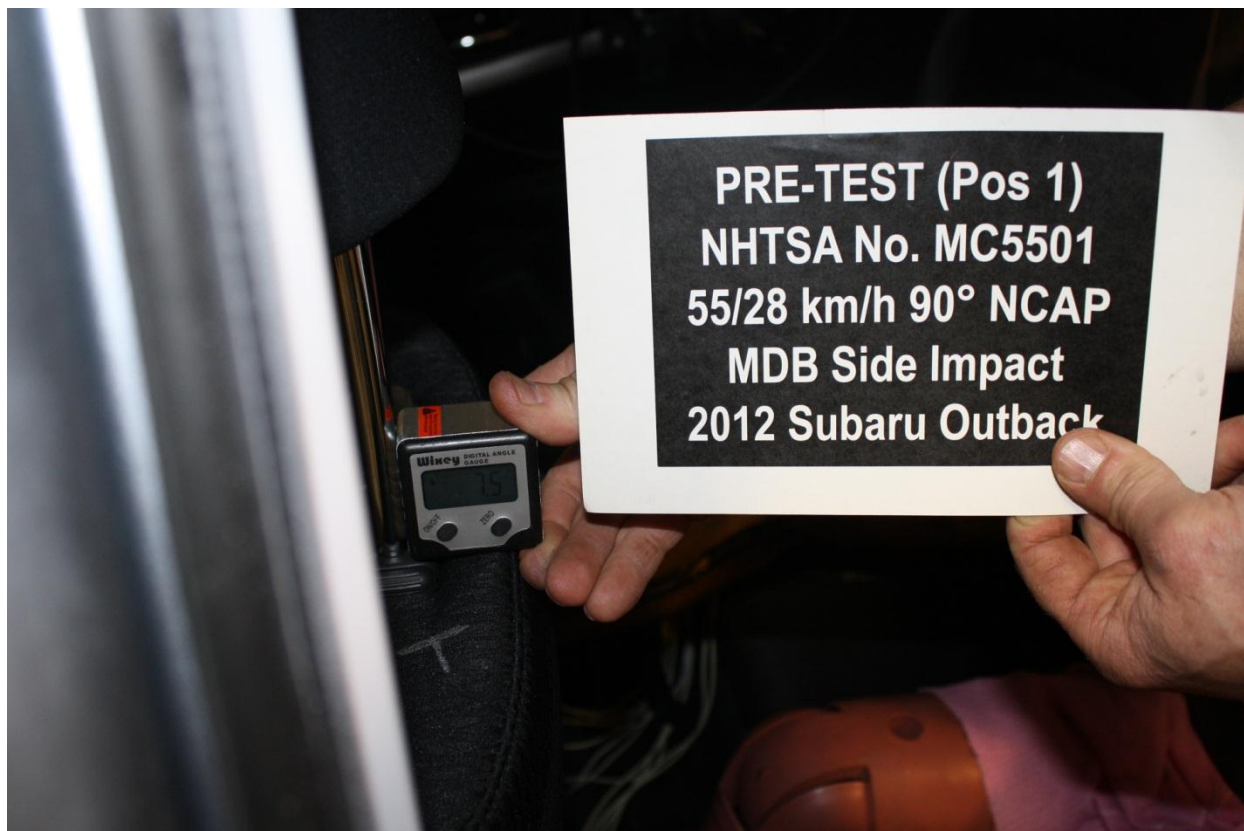


Figure A-41: Pre-Test Close-Up View of Driver Seat Back or Head Restraint



Figure A-42: Pre-Test Driver Dummy and Door Clearance View



Figure A-43: Post-Test Driver Dummy and Door Clearance View



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



Figure A-45: Post-Test Right Side View of Driver Dummy and Front Seat of Occupant Compartment



Figure A-46: Pre-Test Driver Inner Door Panel View



Figure A-47: Post-Test Driver Inner Door Panel View



Figure A-48: Post-Test Driver Dummy Close-Up Head Contact with Vehicle View

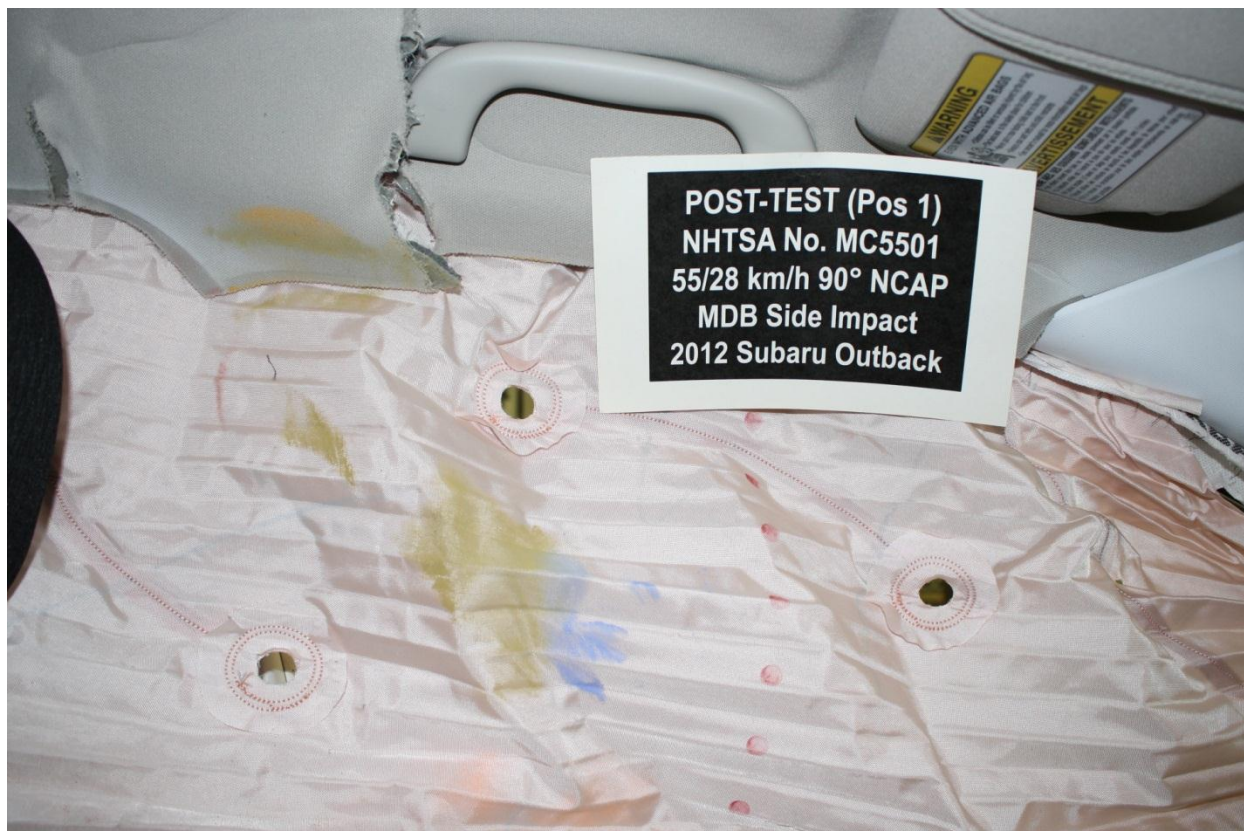


Figure A-49: Post-Test Driver Dummy Close-Up Head Contact with Side Airbag View



Figure A-50: Post-Test Driver Dummy Close-Up Torso Contact with Vehicle Interior View



Figure A-51: Post-Test Driver Dummy Close-Up Torso Contact with Side Airbag View

Photo Not Applicable

No Contact with Vehicle

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

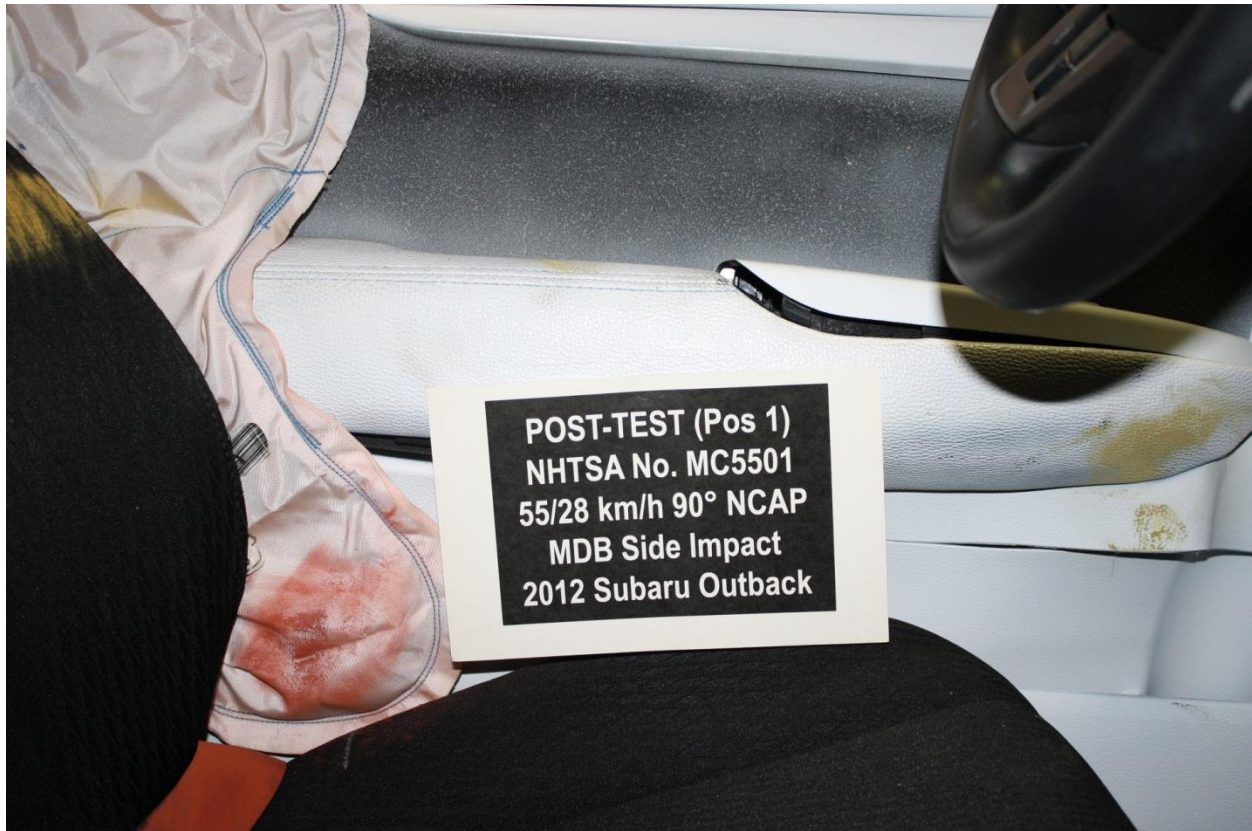


Figure A-53: Post-Test Driver Dummy Close-Up Pelvis Contact with Side Airbag View



Figure A-54: Pre-Test Left Side View of Passenger Dummy Showing Belt and Chalking



Figure A-55: Pre-Test Left Side View of Passenger Dummy Shoulder and Door Top View



Figure A-56: Post-Test Left Side View of Passenger Dummy Shoulder and Door Top View



Figure A-57: Pre-Test Frontal View of Rear Passenger Seat Back Prior to Dummy Positioning



Figure A-58: Pre-Test Frontal View of Rear Passenger Dummy Head and Shoulders in Relation to Head Restraint



Figure A-59: Pre-Test Overhead View of Rear Passenger Seat Pan Prior to Dummy Positioning



Figure A-60: Pre-Test Overhead View of Rear Passenger Dummy Thighs on Seat Pan



Figure A-61: Pre-Test View of Rear Passenger Dummy's Neck Showing Position of Adjustable Neck Bracket

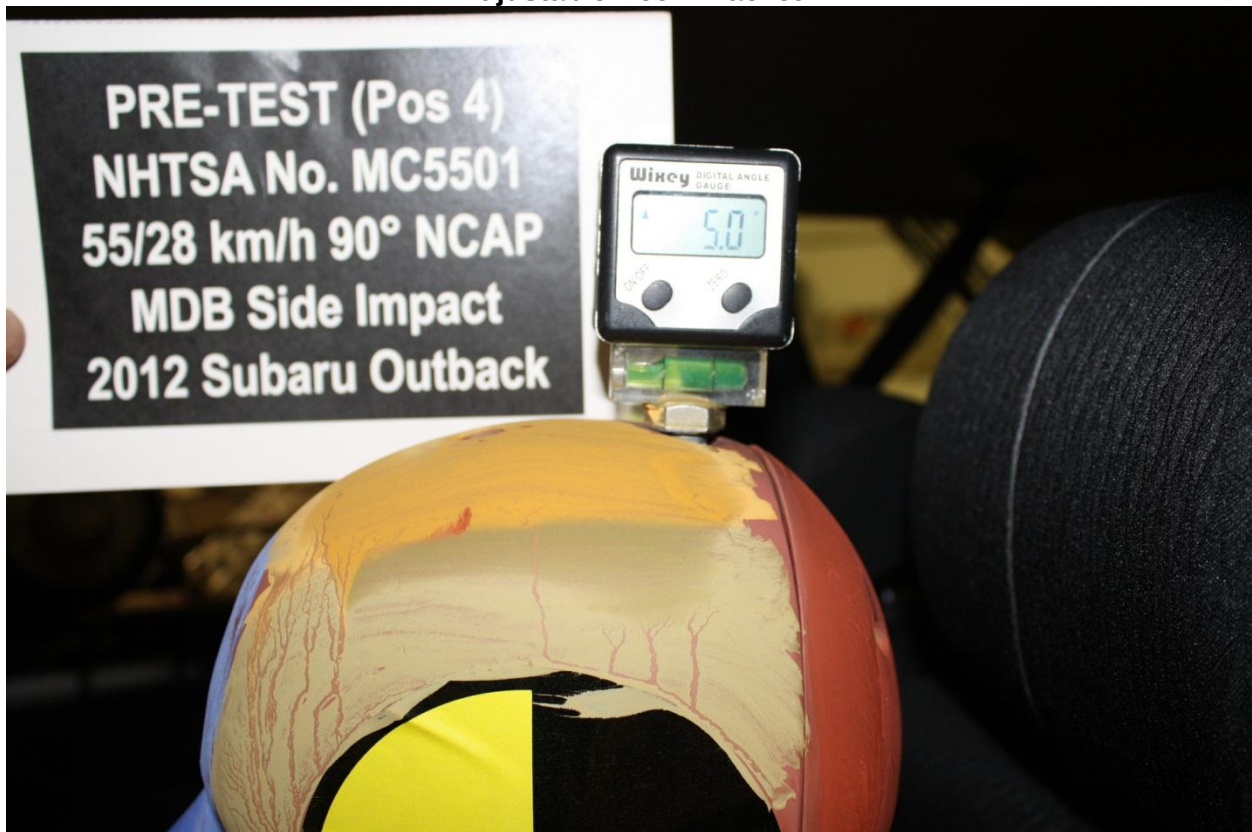


Figure A-62: Pre-Test View of Rear Passenger Dummy's Head Showing Dummy's Head is Level

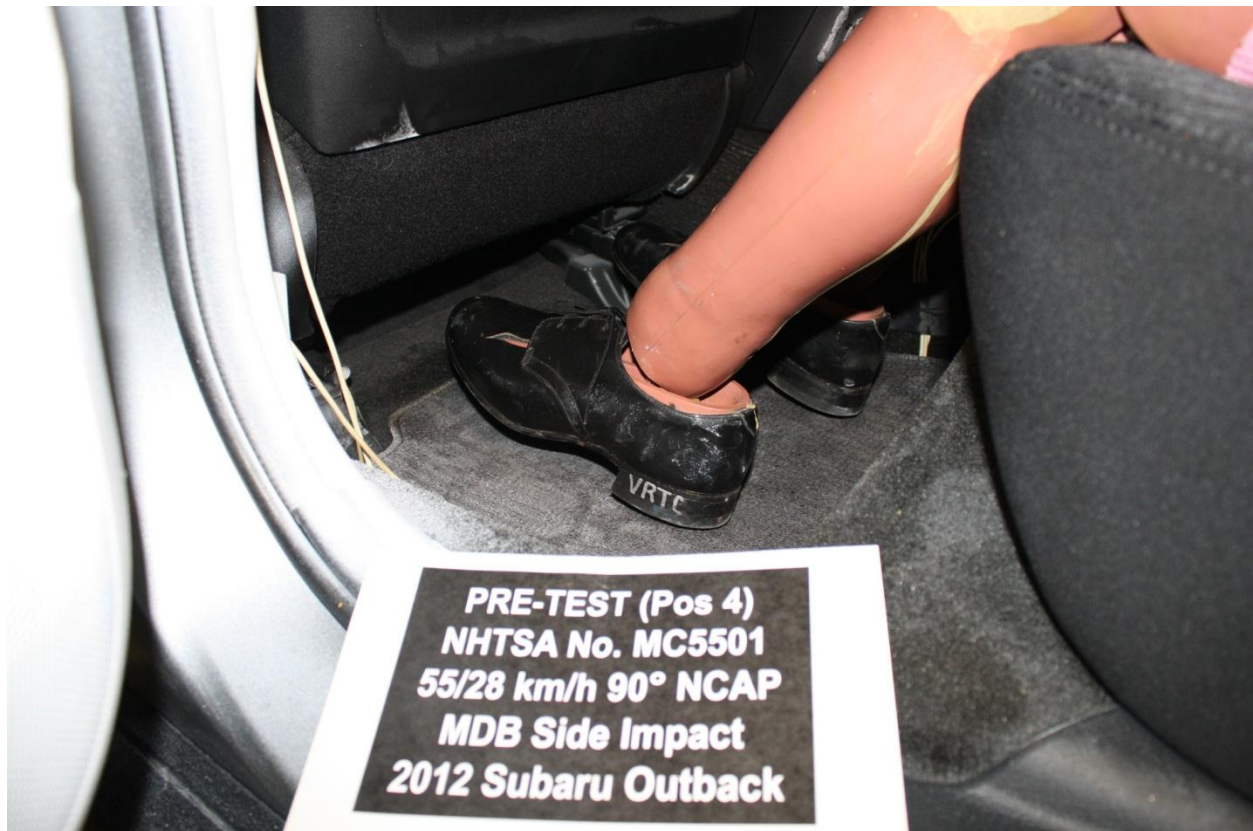


Figure A-63: Pre-Test Placement of Rear Passenger Dummy's Feet



Figure A-64: Pre-Test View of Belt Anchorage for Rear Passenger Dummy



Figure A-65: Pre-Test Close-Up Left Side View of Rear Passenger Seat Track



Figure A-66: Pre-Test Close-Up Left Side View of Rear Passenger Seat Back



Figure A-67: Pre-Test Close-Up View of Rear Passenger Seat Back or Head Restraint



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



Figure A-69: Post-Test Passenger Dummy and Door Clearance View



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



Figure A-71: Post-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment



Figure A-72: Pre-Test Passenger Inner Door Panel View



Figure A-73: Post-test Passenger Inner Door Panel View



Figure A-74: Post-Test Rear Passenger Dummy Close-Up Head Contact with Vehicle View

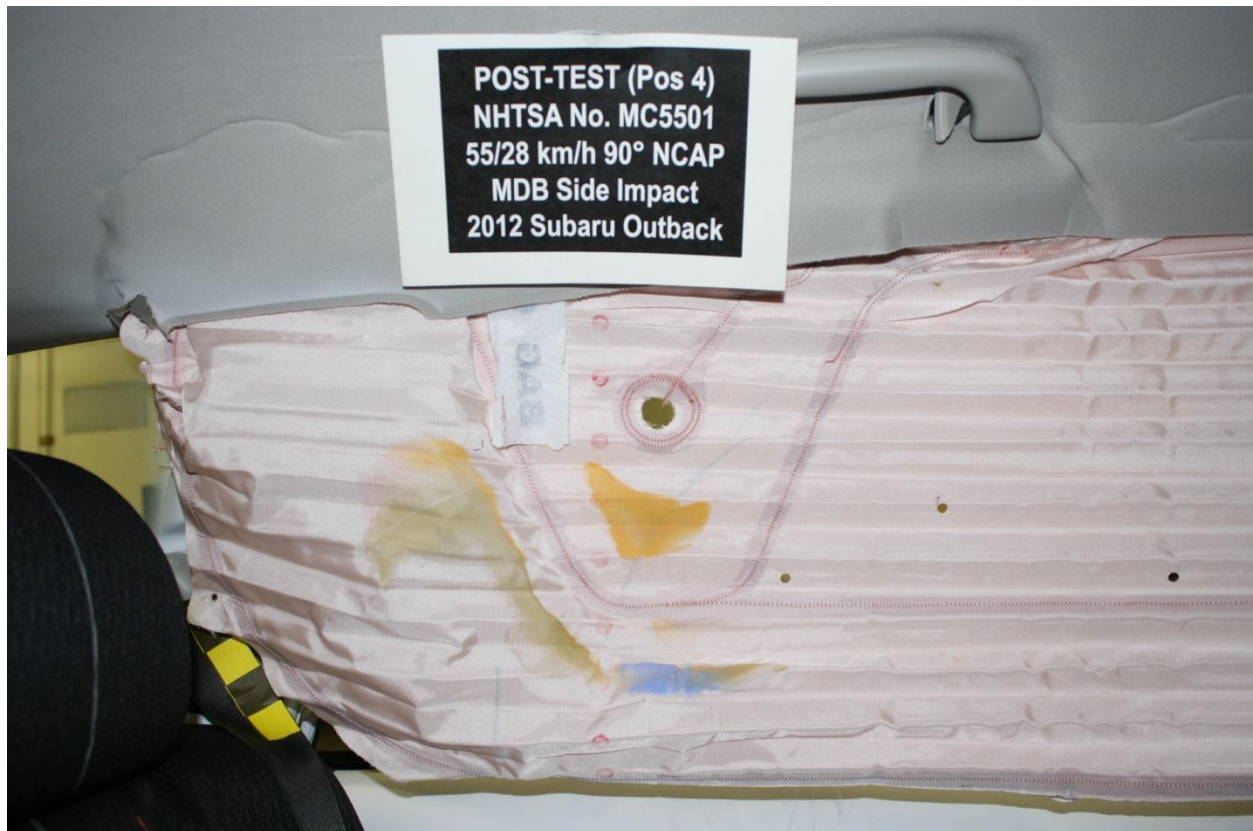


Figure A-75: Post-Test Rear Passenger Dummy Close-Up Head Contact with Side Airbag View



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

Photo Not Applicable

No Side Airbag

Figure A-77: Post-Test Rear Passenger Dummy Close-Up Torso Contact with Side Airbag View



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

Photo Not Applicable

No Side Airbag

Figure A-79: Post-Test Rear Passenger Dummy Close-Up Pelvis Contact with Side Airbag View

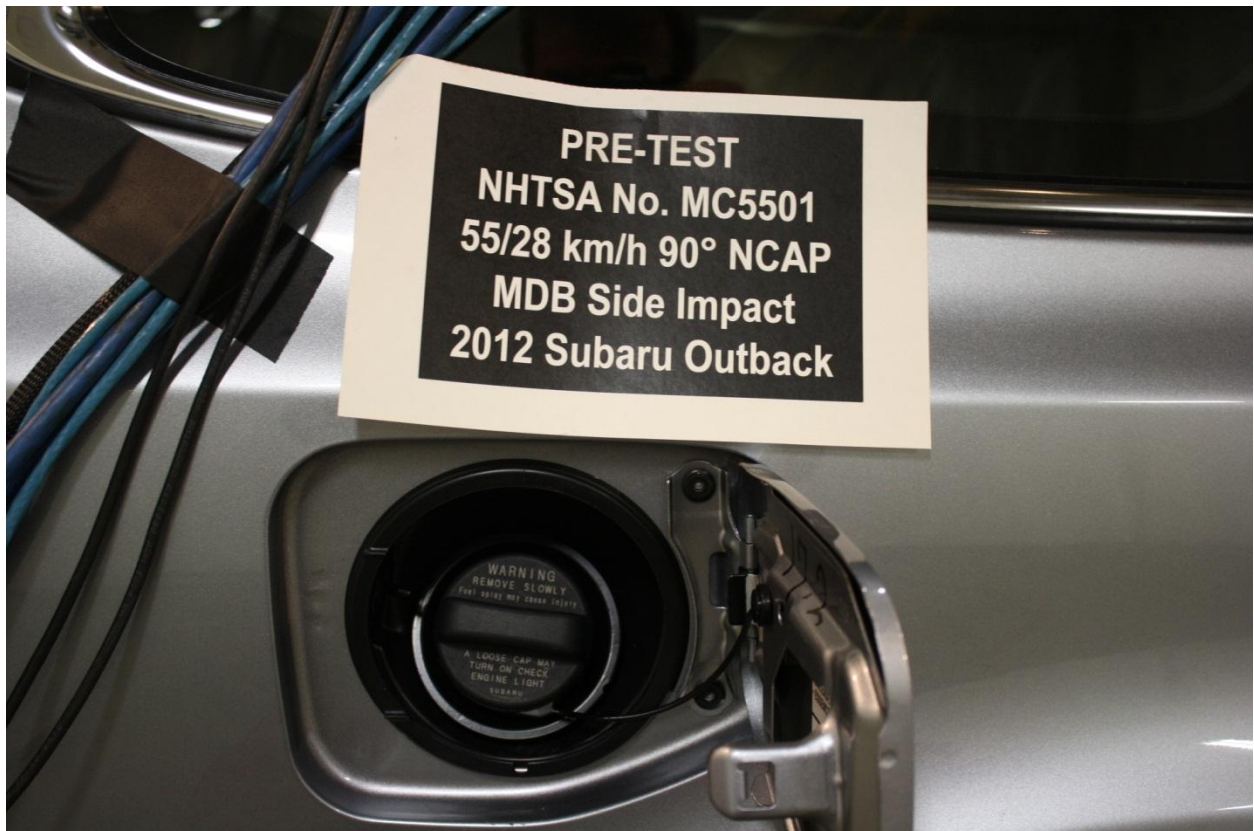


Figure A-80: Pre-Test View of Fuel Filler Cap or Fuel Filler Neck



Figure A-81: Post-Test View of Fuel Filler Cap or Fuel Filler Neck



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



Figure A-83: Post-Test Front View of MDB Impactor Face

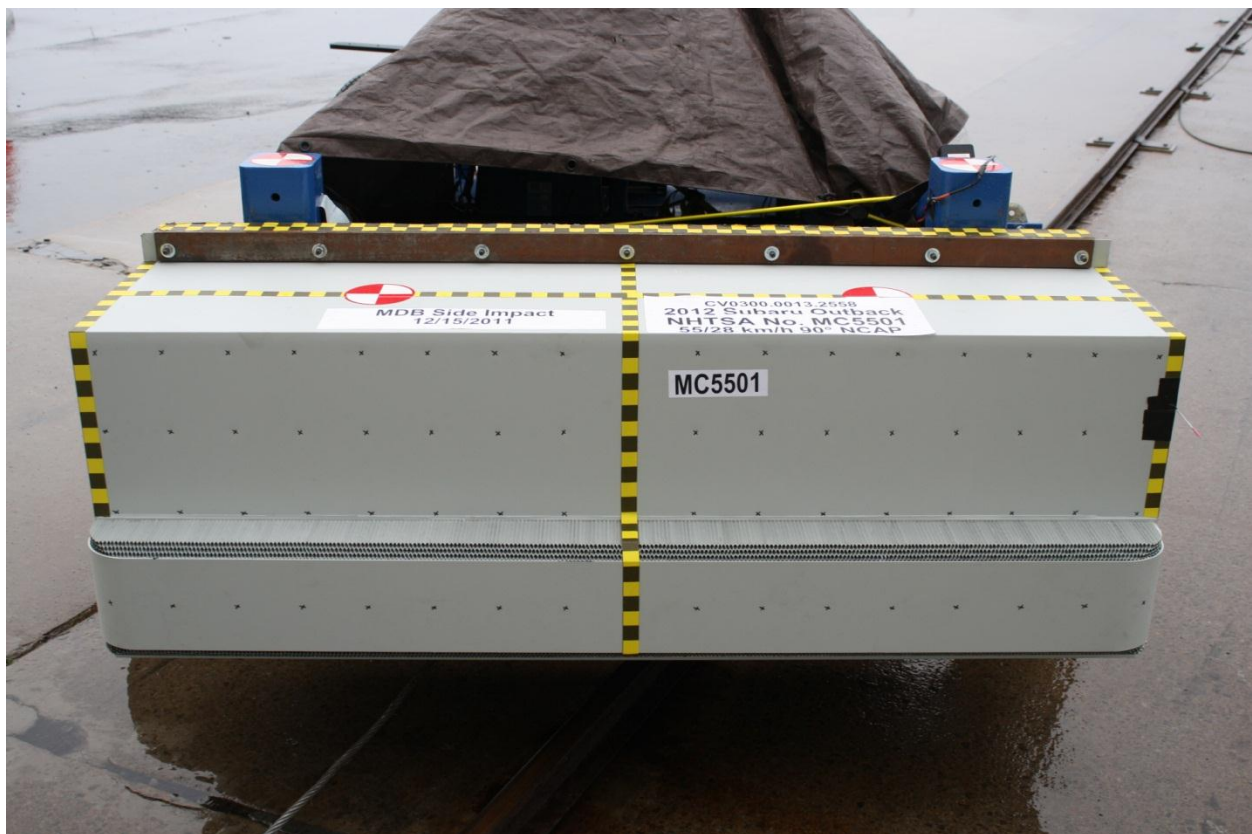


Figure A-84: Pre-Test Top View of MDB Impactor Face



Figure A-85: Post-Test Top View of MDB Impactor Face



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



Figure A-87: Post-Test Left Side View of MDB Impactor Face



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



Figure A-89: Post-Test Right Side View of MDB Impactor Face



Figure A-90: Close-Up View of Vehicle's Certification Label

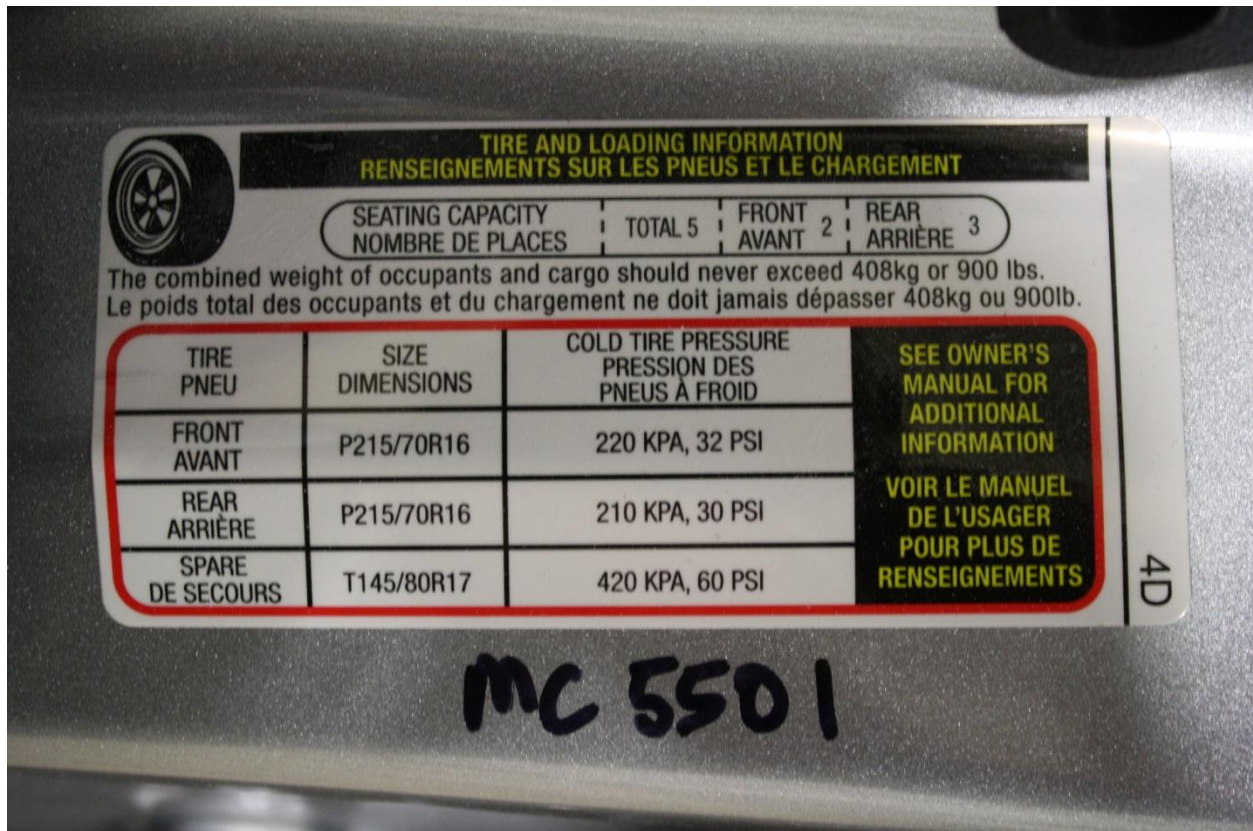


Figure A-91: Close-Up View of Vehicle's Tire Information Placard or Label





Figure A-93: Post-Test Primary and Redundant Speed Trap Read-Out



Figure A-94: FMVSS No. 301 Static Rollover 0 Degrees



Figure A-95: FMVSS No. 301 Static Rollover 90 Degrees



Figure A-96: FMVSS No. 301 Static Rollover 180 Degrees

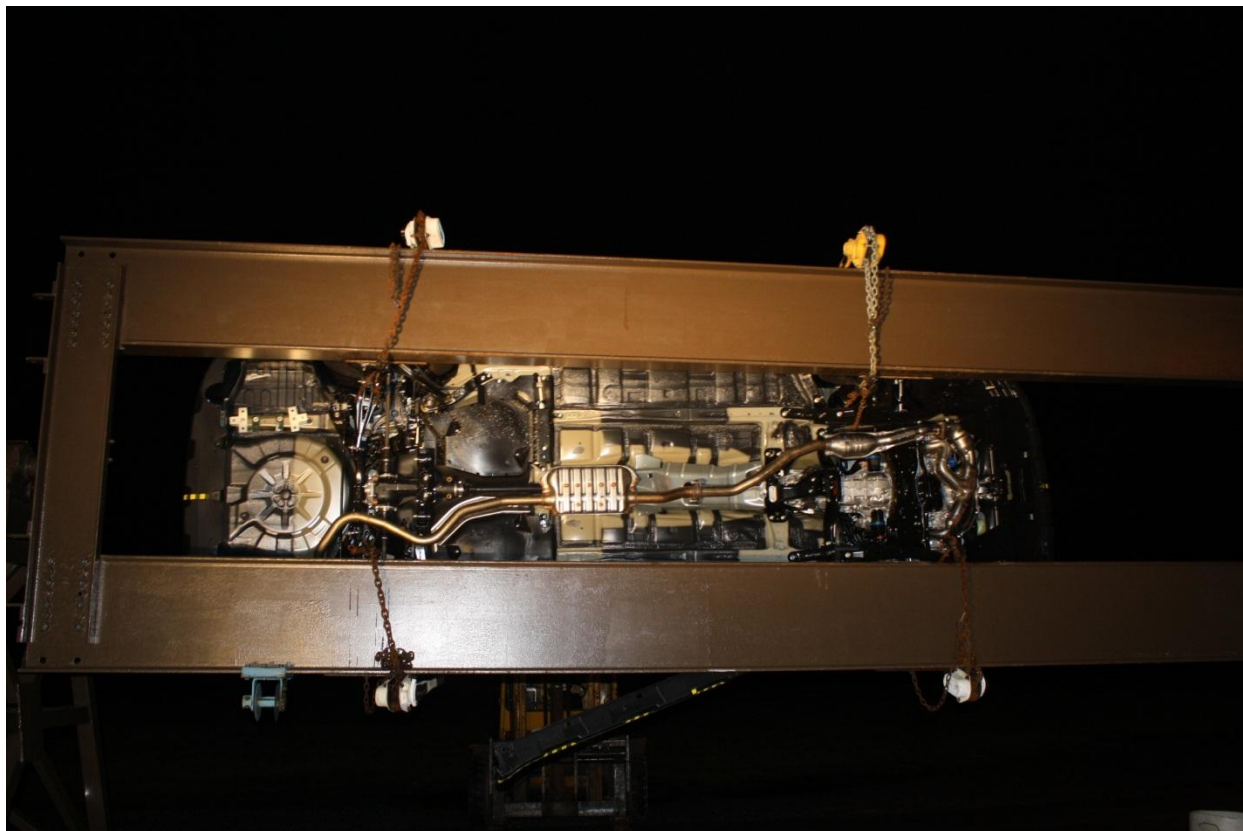


Figure A-97: FMVSS No. 301 Static Rollover 270 Degrees

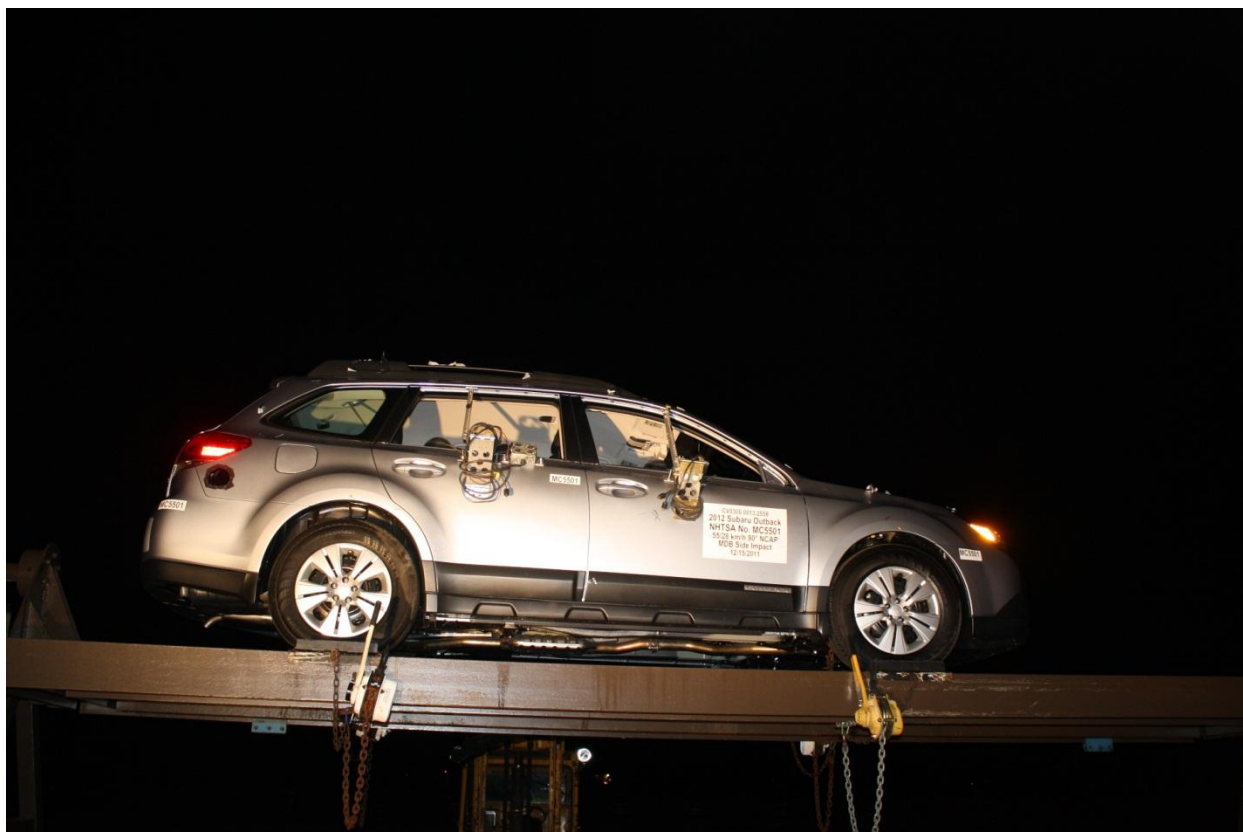


Figure A-98: FMVSS No. 301 Static Rollover 360 Degrees



Figure A-99: Impact Event

OUTBACK

VIN: 4S4BRBAC8C1201965
Model/Code: 2012 Subaru Outback 2.5iCDA
Exterior Color: Ice Silver Metallic
Port / Assembly: Boston, MA

SHIP TO: 020128 Van Bortel Motorcar, Inc.
 6327 Route 99
 Victor, NY 14564

SOLD TO: 020128 Van Bortel Motorcar, Inc.
 6327 Route 99
 Victor, NY 14564

STANDARD EQUIPMENT

SAFETY
 Symmetrical All-Wheel Drive (AWD)
 Vehicle Dynamics Control (VDC)
 Anti-Lock Brakes - 4-Wheel Disc
 Subaru Advanced Frontal Air Bag System
 Side-Curtain Air Bags
 Front Seat Side-Impact Air Bags
 3-Point Seatbelts, All Seating Positions
 LATCH System for Child Safety Seats
 Anti-Theft Alarm & Immobilizer System
 Tire Pressure Monitoring System (TPMS)
 Rollover Sensor
 Brake Assist

PERFORMANCE AND EXTERIOR
 2.5L Horizontally-Opposed 4-Cyl Engine
 Auto Lights w/ Daytime Running Lights
 Intermittent Front/Rear Wipers
 Fully Independent Raised Suspension
 Roof Rails w/ Integrated Cross Bars
 Traction Control

COMFORT, CONVENIENCE AND INTERIOR
 & Cupholders

AM/FM Stereo w/ CD Player
 Auxiliary Audio Jack
 Air Conditioning w/ Air Filtration System
 Carpeted Floor Mats, Cargo Area Mat
 Cruise Control
 Electronic Parking Brake
 Multi-Function Trip Computer
 Outside Temperature Gauge
 Power Windows, Door Locks and Mirrors
 Remote Keyless Entry System
 Steering Wheel Audio & Cruise Controls
 60/40 Fold-Down/Recline Rear Seatback
 Tilt / Telescopic Steering Wheel

OPTIONAL EQUIPMENT

Manufacturer's Suggested Retail Price	
Full Tank of Gas	\$23,595.00
Partial Zero Emission (Pzev)	INCLD
Super-Ultra Low Emission Veh	
Pzev Certified Where Required	
Pzev Warranty State Specific	
Floor Mats, All Weather	\$69.00
Rear Bumper Cover	\$80.00
Splash Guards - Outback	\$129.00

GOVERNMENT SAFETY RATINGS

Crash	Driver	Passenger	NOT RATED
Frontal	Driver	Passenger	NOT RATED
Side	Front Seat	NOT RATED	
Crash	Rear Seat	NOT RATED	
Rollover	★★★★		

Star ratings based on the risk of injury in a frontal impact.

Star ratings based on the risk of injury in a side impact.

Star ratings based on the risk of rollover in a single vehicle crash.

Visit www.safercar.gov or 1-888-327-4226

EPA Fuel Economy Estimates

CITY MPG	Estimated Annual Fuel Cost	HIGHWAY MPG
19	\$2,525	27

Expected Range for most drivers: 15 to 23 MPG

Expected Range for most drivers: 22 to 32 MPG

Combined Fuel Economy This Vehicle: 22

All SUV - 4WD

Calif. Emission Control Syst.

Environmental Performance

Protect the environment, choose vehicles with higher scores:

Global Warming Score

Smog Score

Vehicle emissions are a primary contributor to global warming and smog. Scores are determined by the California Air Resources Board based on this vehicle's measured emissions. Please visit www.DriveClean.ca for more information. AIR RESOURCES BOARD

PARTS CONTENT INFORMATION
 FOR VEHICLES IN THIS CARLINE:
 U.S./CANADIAN PARTS CONTENT: 40%
 MAJOR SOURCE OF FOREIGN PARTS CONTENT: JAPAN 35%
 Note: Parts content does not include final assembly, distribution, or other non-parts costs.

FOR THIS VEHICLE:
 FINAL ASSEMBLY POINT: Lafayette, IN
 COUNTRY OF ORIGIN: Japan
 ENGINE: Japan
 TRANSMISSION: Japan

THE ONLY EXTENDED SERVICE CONTRACT BACKED BY SUBARU

It could be the most important option you choose.

After-warranty mechanical repair protection up to 100,000 miles.

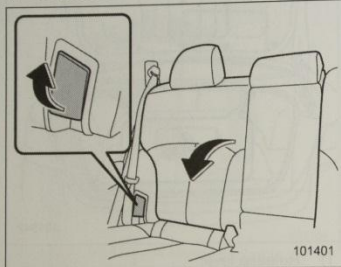
Nobody protects your Subaru like Subaru.

4S4BRBAC8C1201965

Delivery by / Carrier: Diversified Automotive, Inc.

Figure A-100: Monroney Label

▼ Outback



Unlock the seatback by pulling the release lever and then fold the seatback down. To return the seatback to its original position, raise the seatback until it locks into place and make sure that it is securely locked.

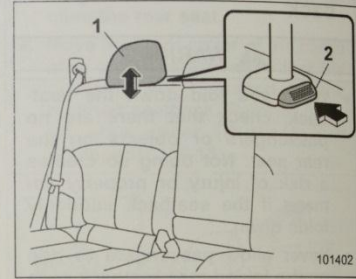
■ Head restraint adjustment

Both the rear window side seats and the rear center seat are equipped with head restraints.

⚠ WARNING

- Never drive the vehicle with the head restraints removed because they are designed to reduce the risk of serious neck injury in the event that the vehicle is struck from the rear. Therefore, when you remove the head restraints, you must reinstall all head restraints to protect vehicle occupants.
- All occupants, including the driver, should not operate a vehicle or sit in a vehicle's seat until the head restraints are placed in their proper positions in order to minimize the risk of neck injury in the event of a crash.

▼ Rear window side seating position



- 1) Head restraint
- 2) Release button

To raise:

Pull the head restraint up.

To lower:

Push the head restraint down while pressing the release button on the top of the seatback.

To remove:

While pressing the release button, pull out the head restraint.

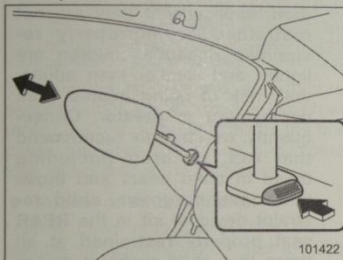
To install:

Install the head restraint into the holes that are located on the top of the seatback until the head restraint locks.

The head restraint should be adjusted so

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

that the center of the head restraint is closest to the top of the occupant's ears. When the seats are not occupied, lower the head restraints to improve rearward visibility.

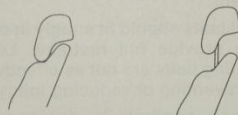

NOTE

For Legacy, it is not possible to remove or install the head restraint without folding down the rear seatback. Fold down the rear seatback and then remove or install the head restraint.

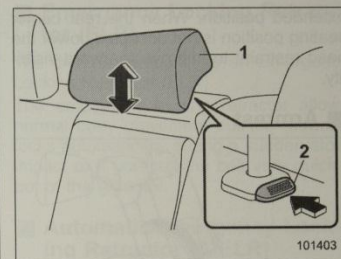
▼ Rear center seating position

⚠ CAUTION

The head restraint is not intended to be used at the lowest position. Before sitting on the seat, raise the head restraint to the extended position.



- A) When not used (retracted position)
- B) When used (extended position)



- 1) Head restraint
- 2) Release button

To raise:

Pull the head restraint up.

To lower:

Push the head restraint down while pressing the release button on the top of the seatback.

To remove:

While pressing the release button, pull out the head restraint.

To install:

Install the head restraint into the holes that are located on the top of the seatback until the head restraint locks.

Figure A-102: Left Rear Passenger Head Restraint Use and Adjustment Information from Vehicle Owner's Manual

APPENDIX B
VEHICLE AND DUMMY RESPONSE DATA PLOTS

The following table and respective vehicle and dummy (filtered) data plots shall be included in this appendix:

TABLE OF DATA PLOTS

Driver & Passenger Dummy Instrumentation Plots

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.

Additional Driver & Passenger Dummy Instrumentation Data

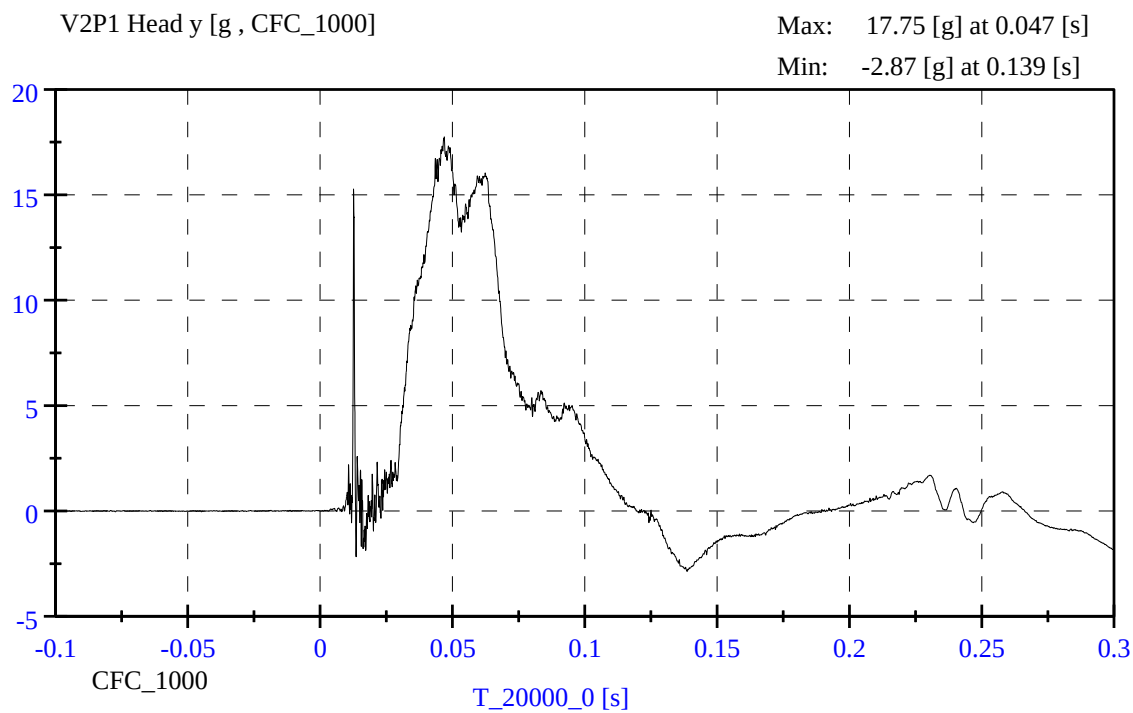
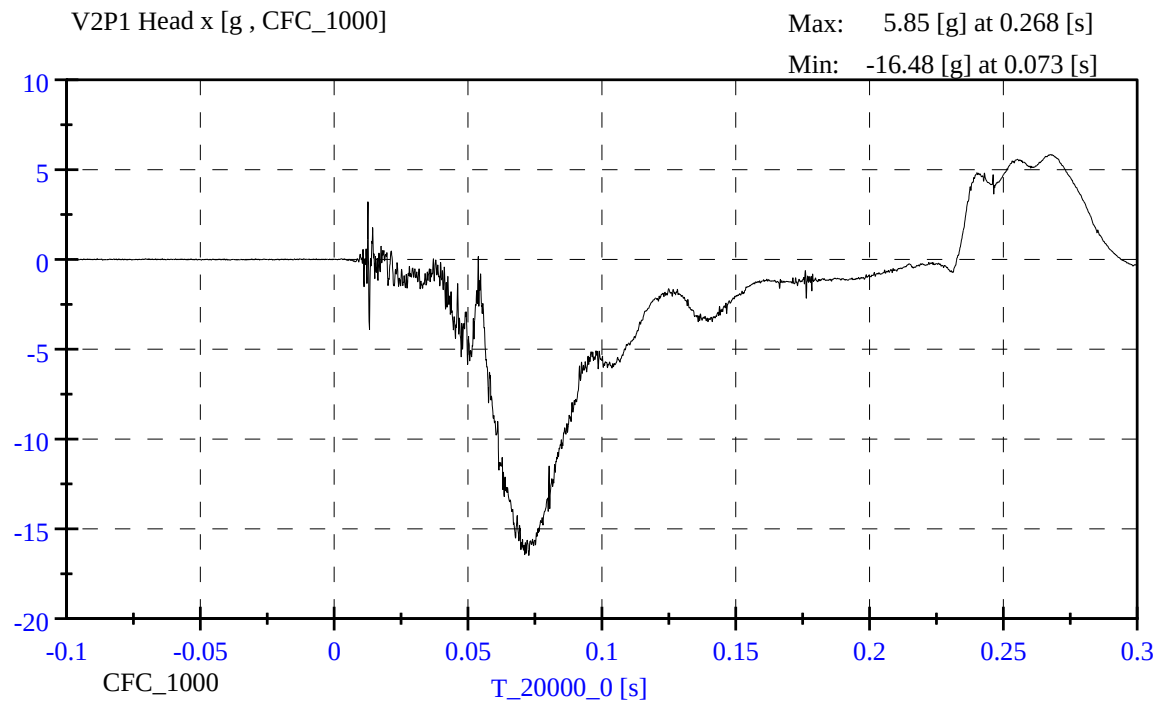
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Driver Lower Spine T12 Acceleration (Y)
Driver Lower Spine T12 Acceleration (Z)
Passenger Upper Thorax Rib Deflection (Y)
Passenger Middle Thorax Rib Deflection (Y)
Passenger Lower Thorax Rib Deflection (Y)
Passenger Upper Abdomen Rib Deflection (Y)
Passenger Lower Abdomen Rib Deflection (Y)
Driver Head Acceleration Redundant (X)
Driver Head Acceleration Redundant (Y)
Driver Head Acceleration Redundant (Z)
Passenger Head Acceleration Redundant (X)
Passenger Head Acceleration Redundant (Y)
Passenger Head Acceleration Redundant (Z)

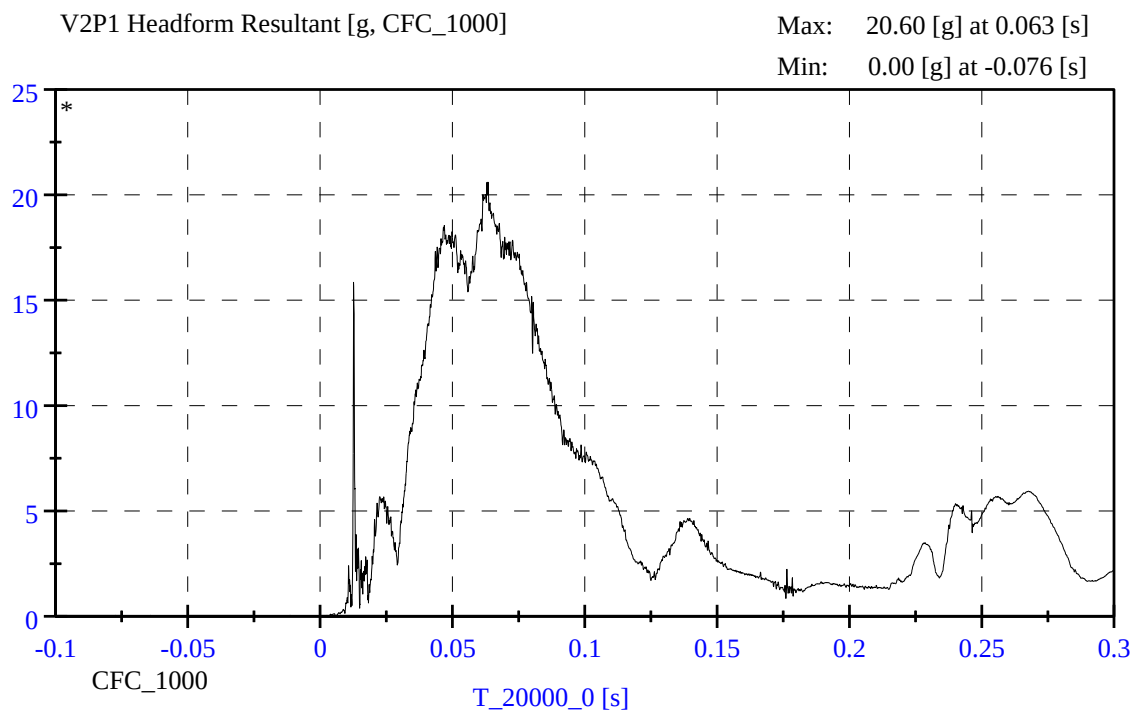
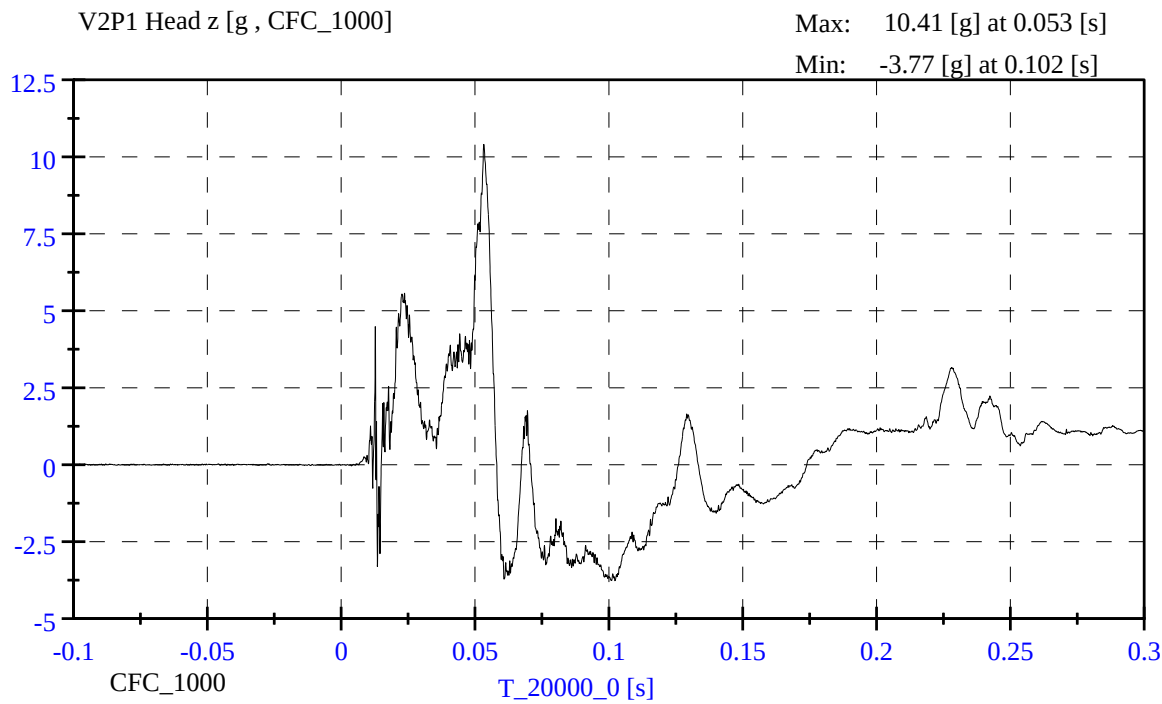
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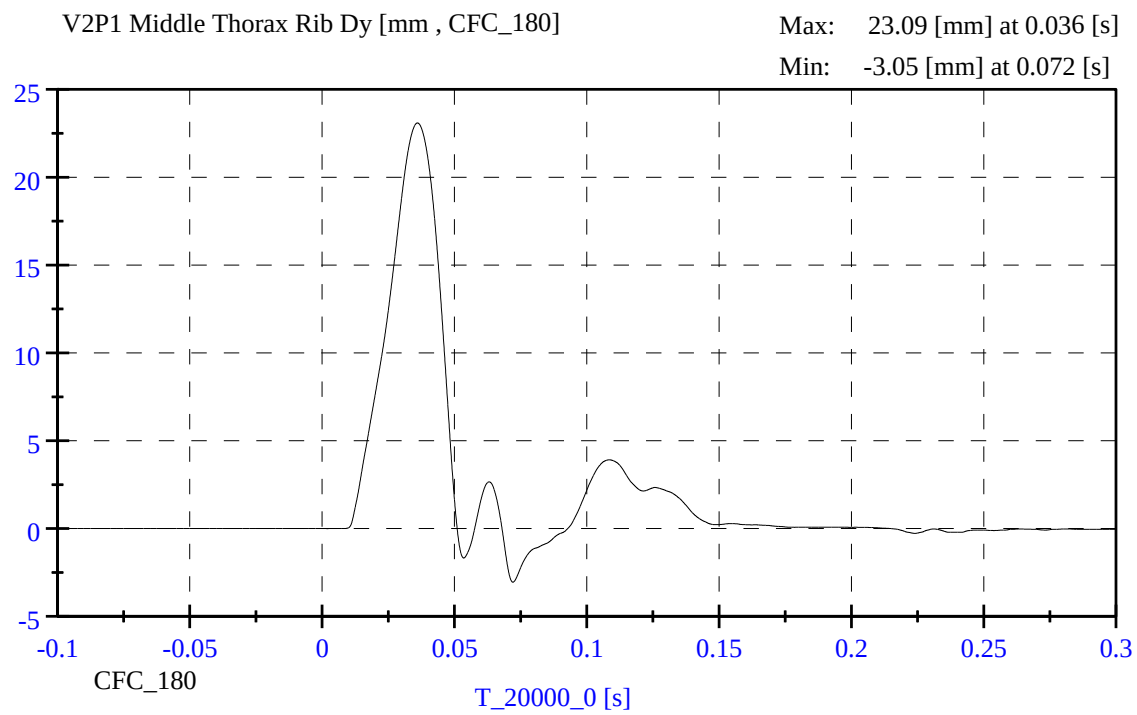
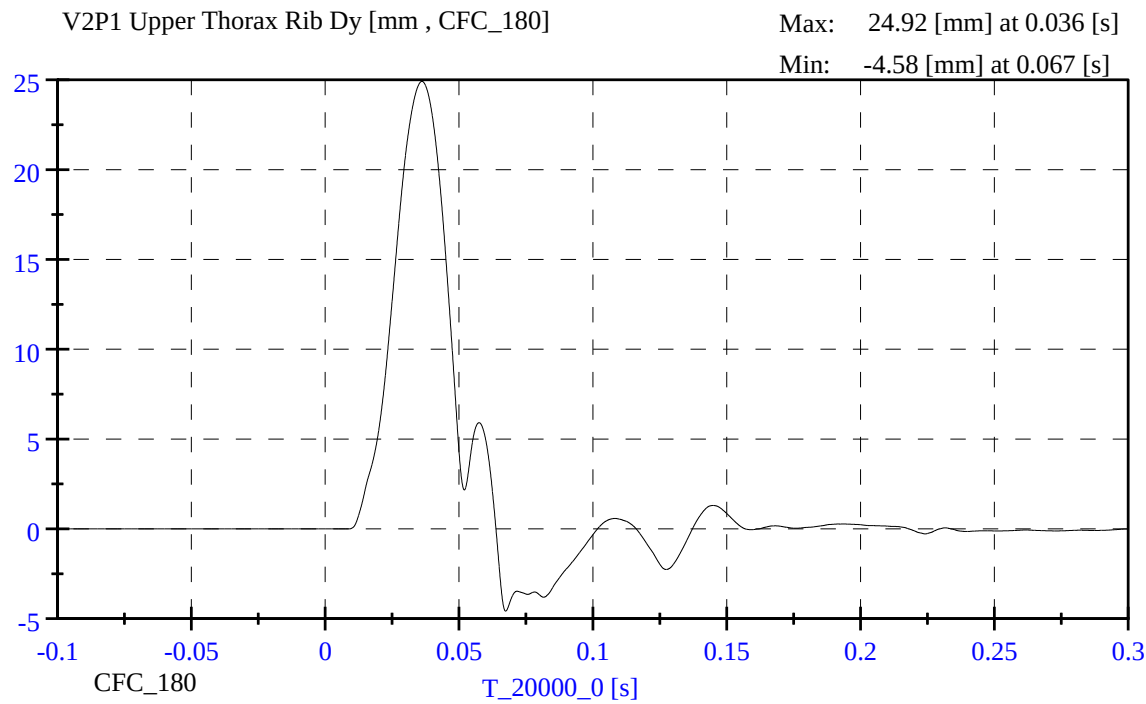
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Vehicle Center of Gravity Acceleration (Y)
Vehicle Center of Gravity Acceleration (Z)
Right Side Sill at Front Seat Acceleration (X)
Right Side Sill at Front Seat Acceleration (Y)
Right Side Sill at Front Seat Acceleration (Z)
Right Side Sill at Rear Seat Acceleration (X)
Right Side Sill at Rear Seat Acceleration (Y)
Right Side Sill at Rear Seat Acceleration (Z)
Left Side Sill at Front Seat Acceleration (Y)
Left Side Sill at Rear Seat 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)
Right Rear Occupant Compartment Acceleration (Y)
Engine Block (X)
Engine Block (Y)
Rear Floorpan Above Axle Acceleration (X)
Rear Floorpan Above Axle Acceleration (Y)
Rear Floorpan Above Axle Acceleration (Z)

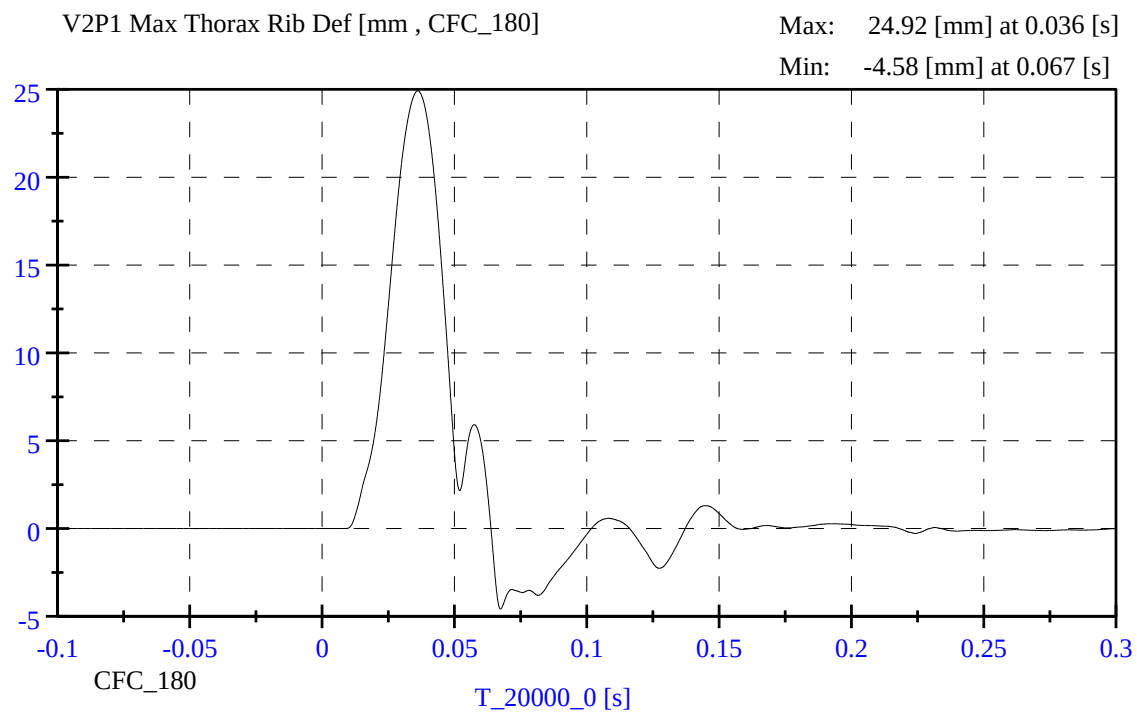
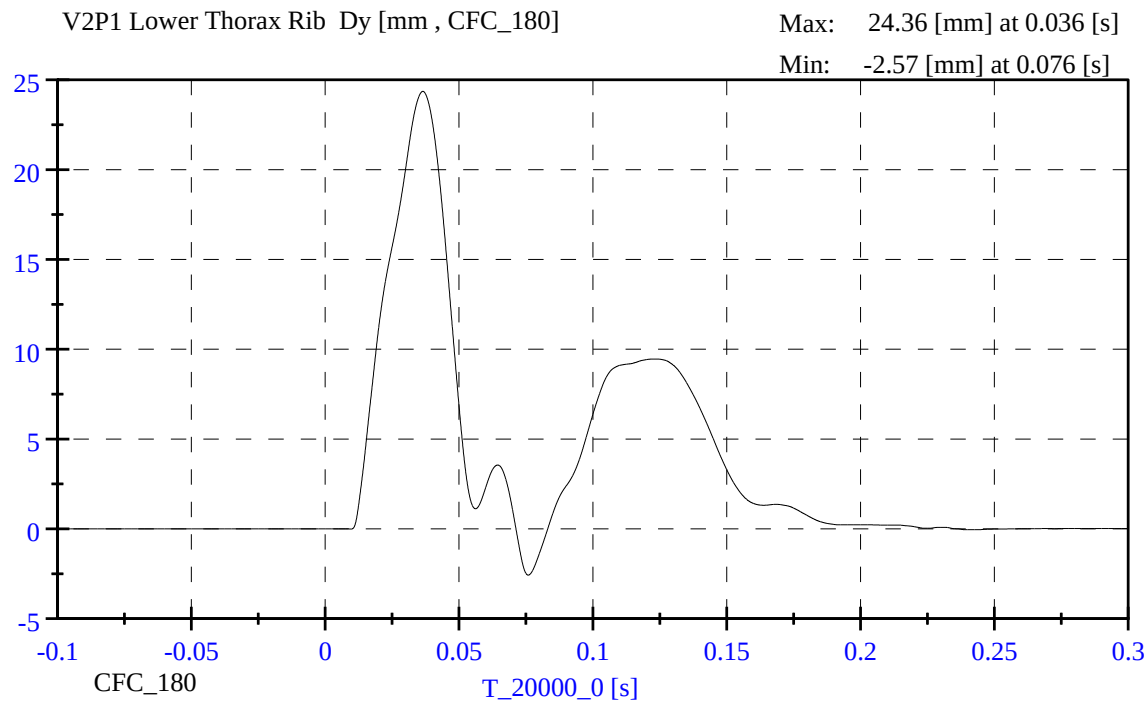
MDB Instrumentation Data

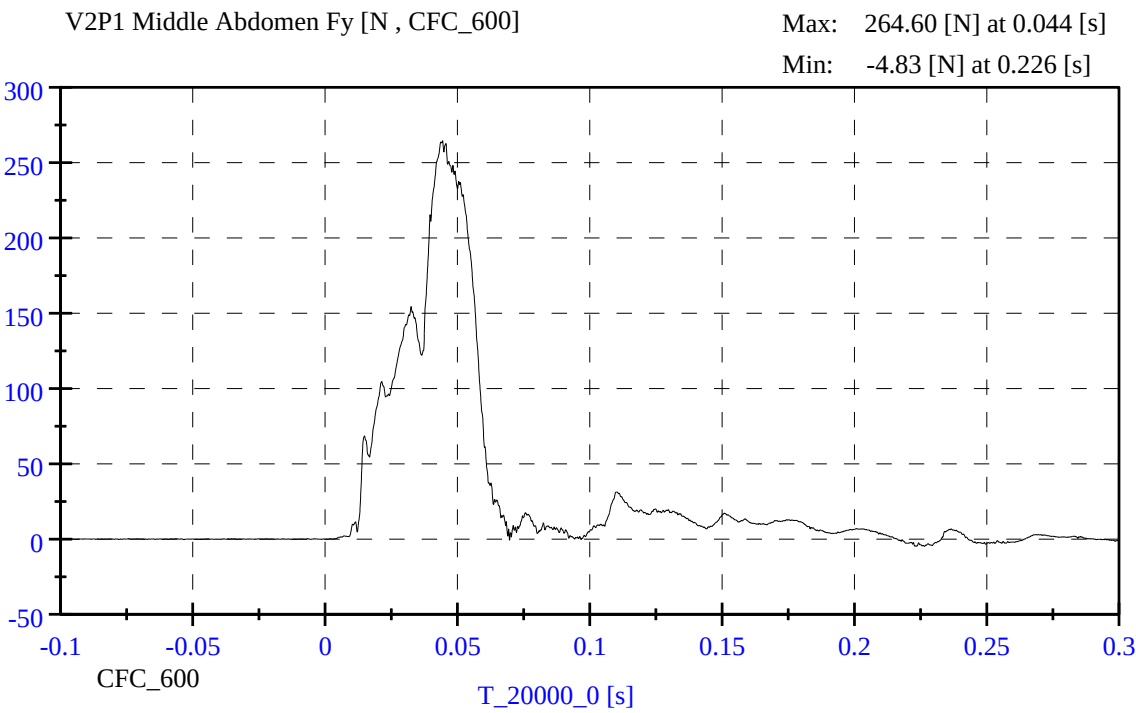
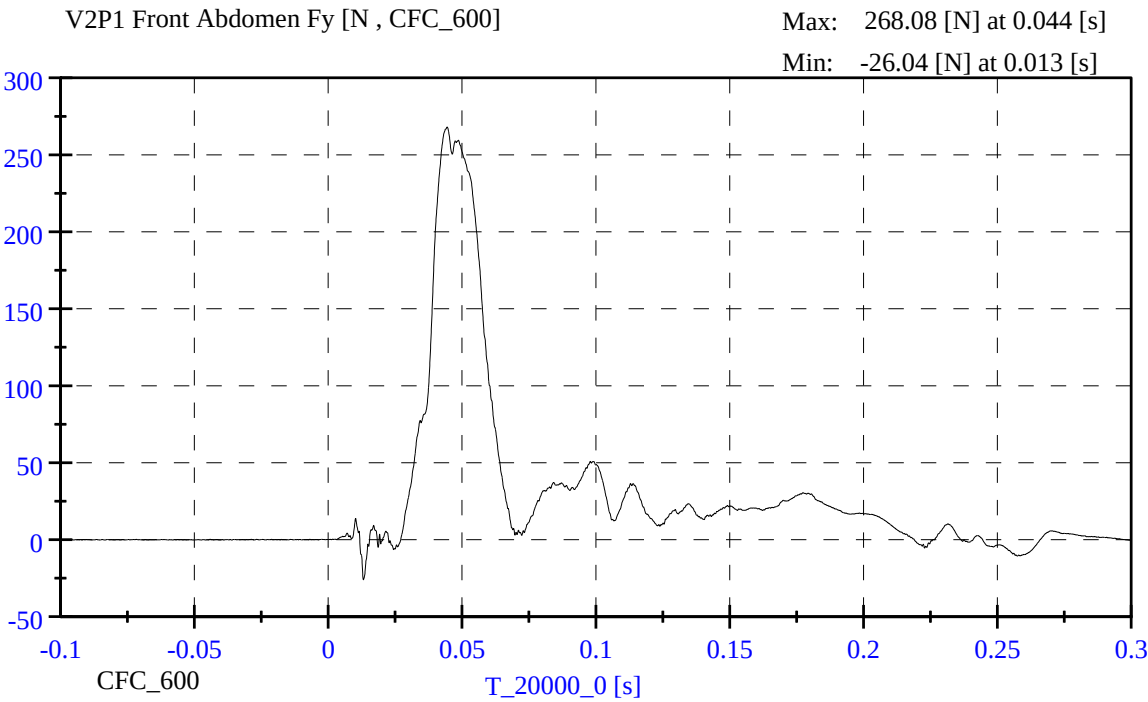
MDB Center of Gravity Acceleration (X)
MDB Center of Gravity Acceleration (Y)
MDB Center of Gravity Acceleration (Z)
MDB Rear Acceleration (X)
MDB Rear Acceleration (Y)
Left MDB Contact Switch
Right MDB Contact Switch

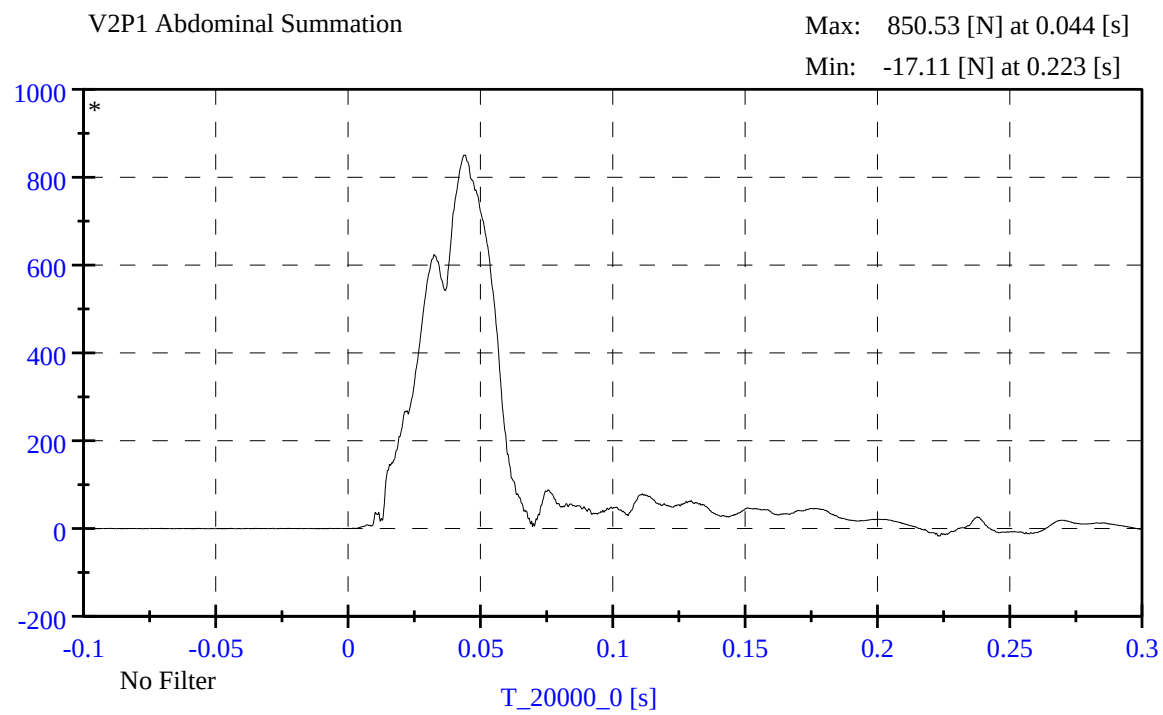
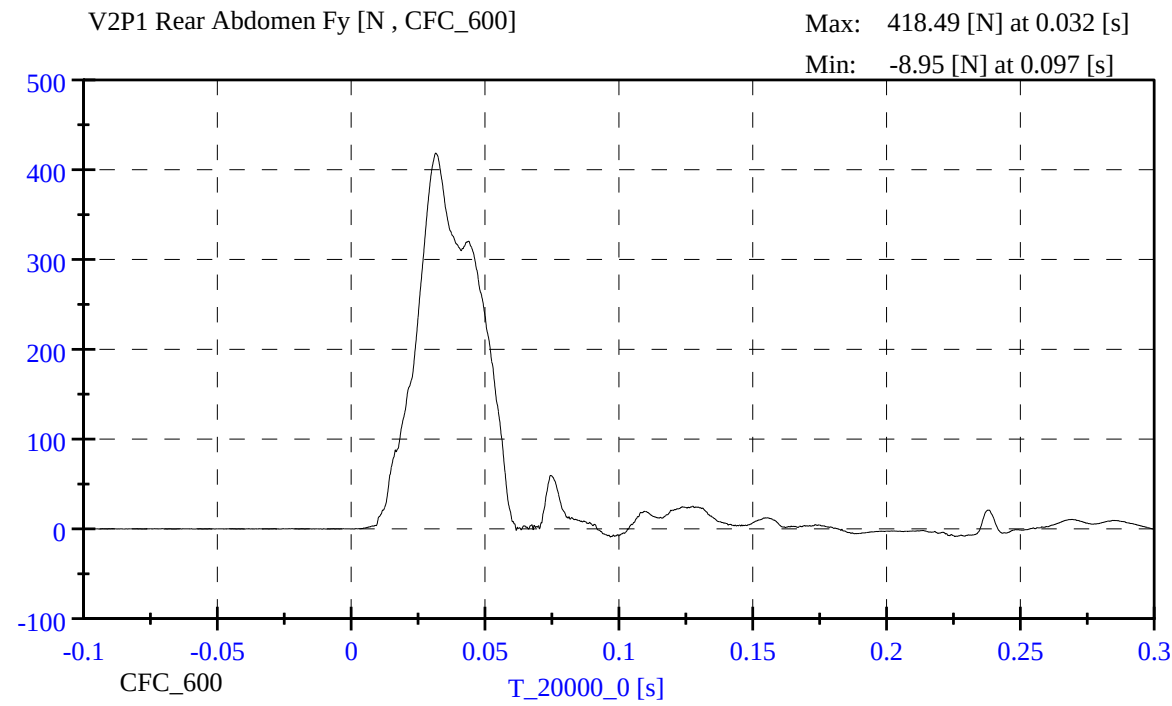


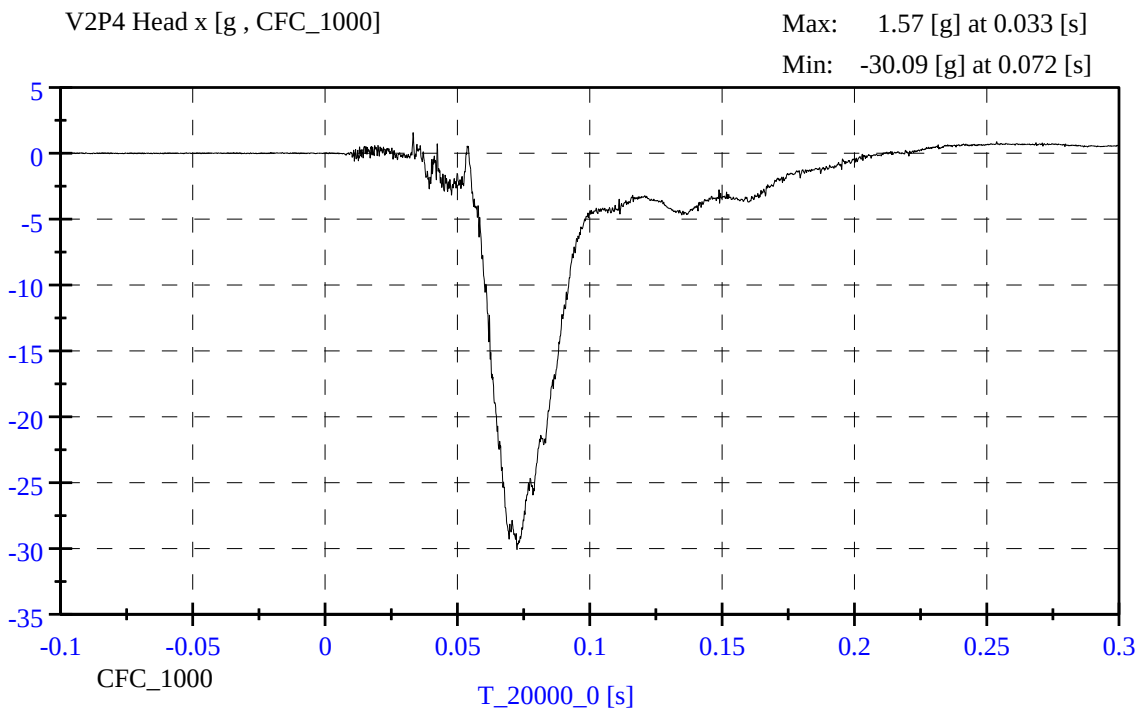
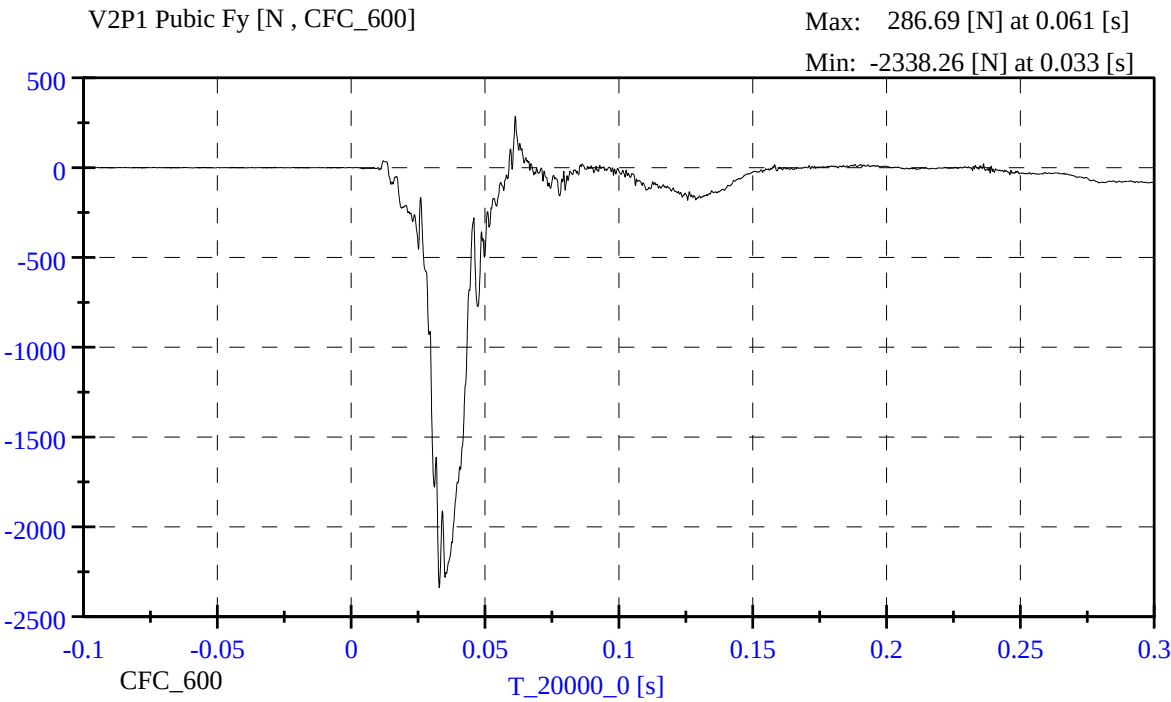


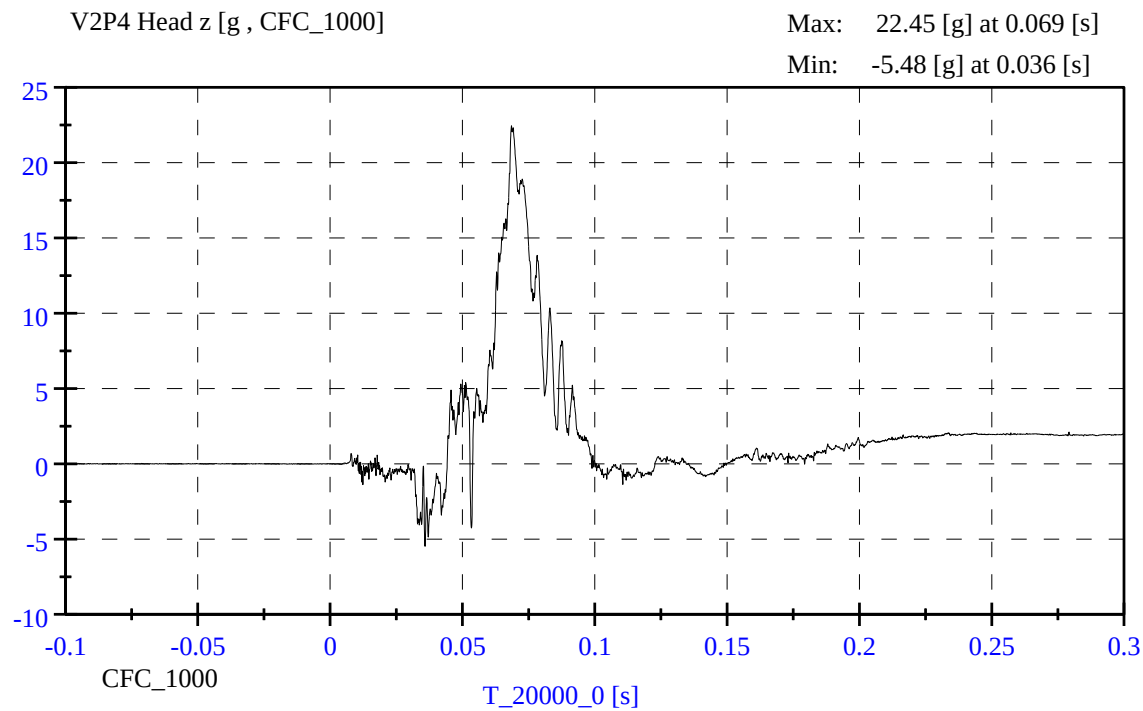
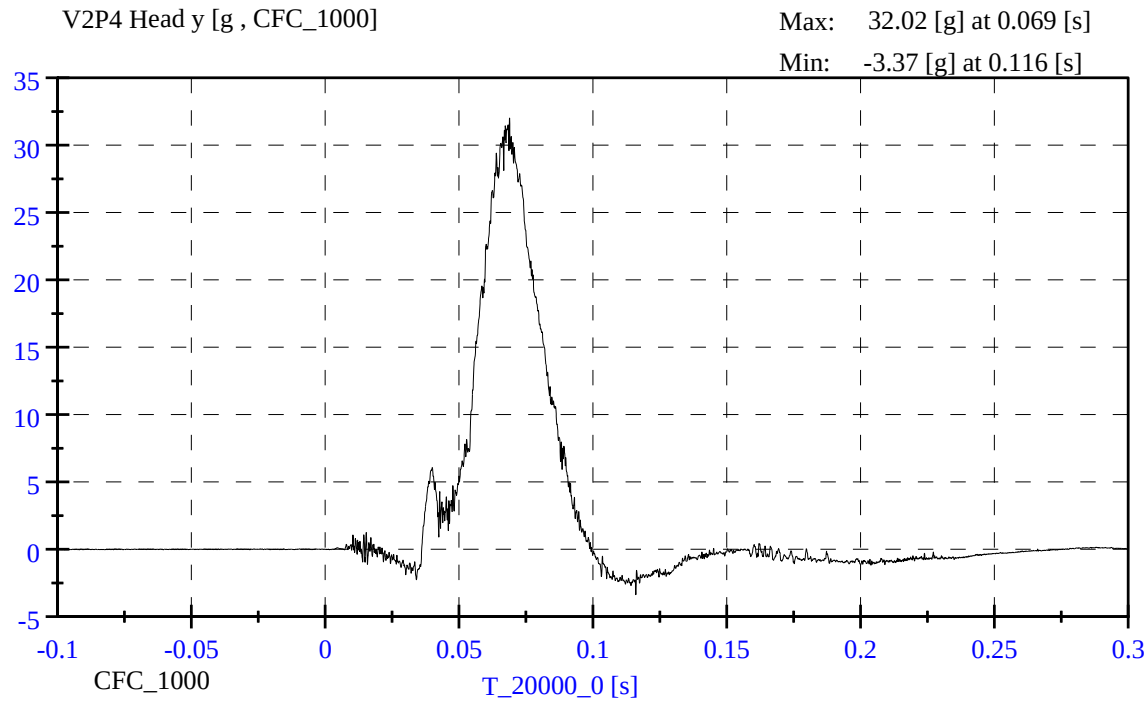


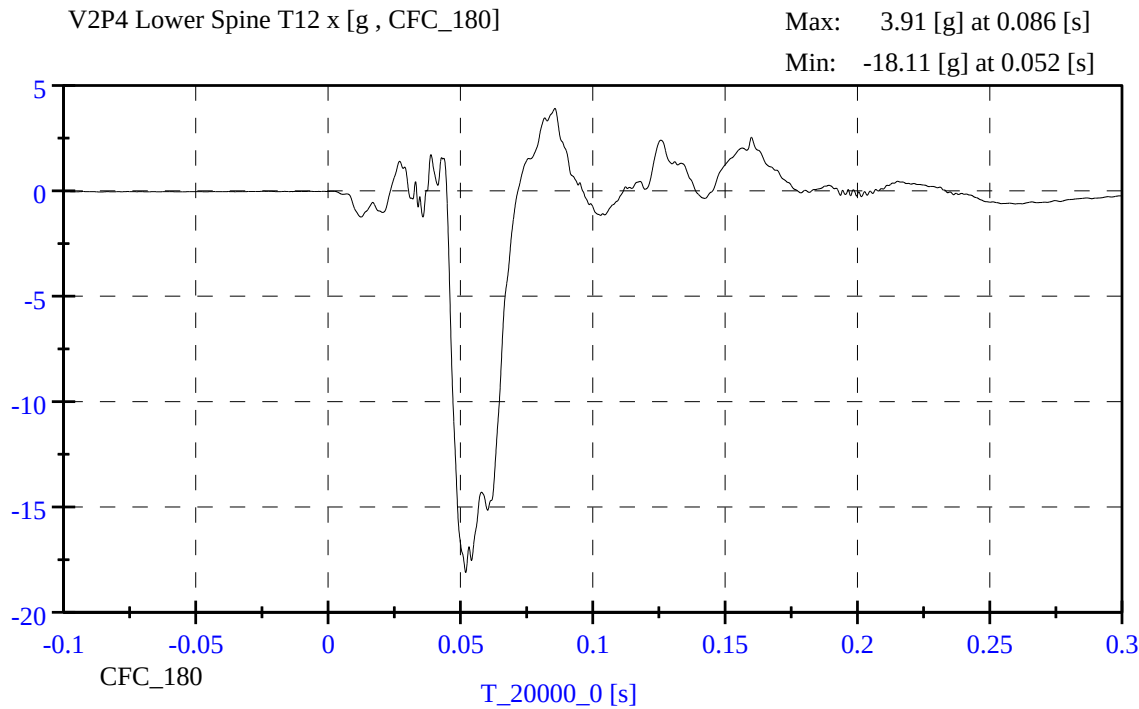
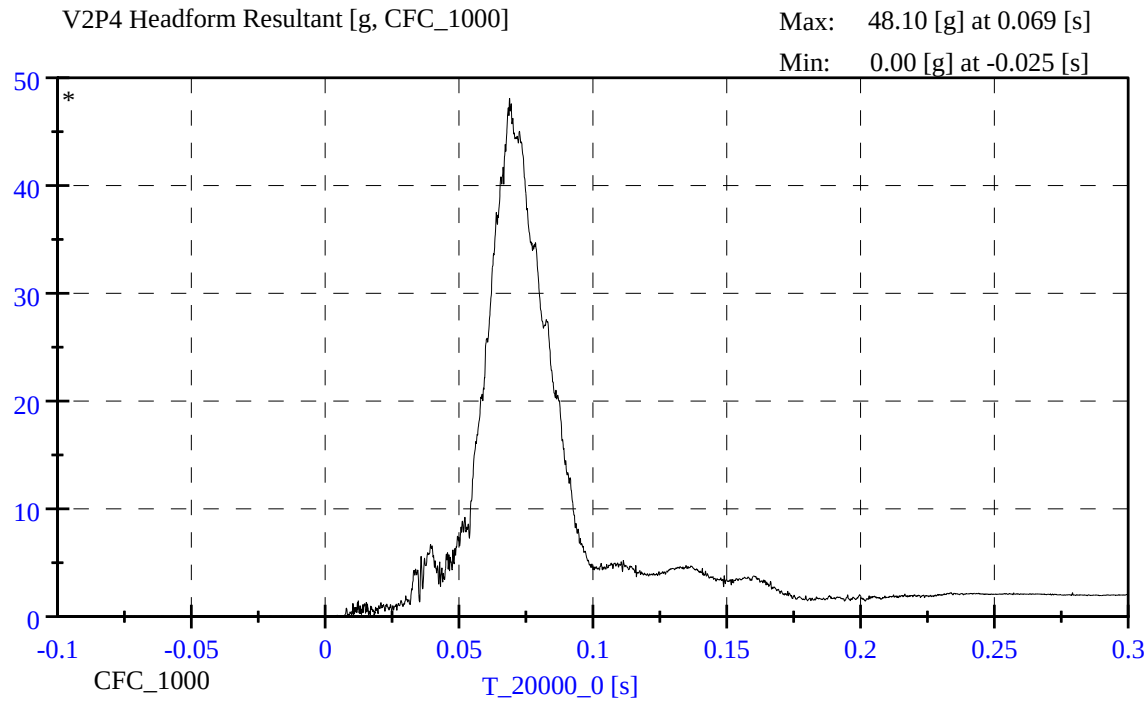


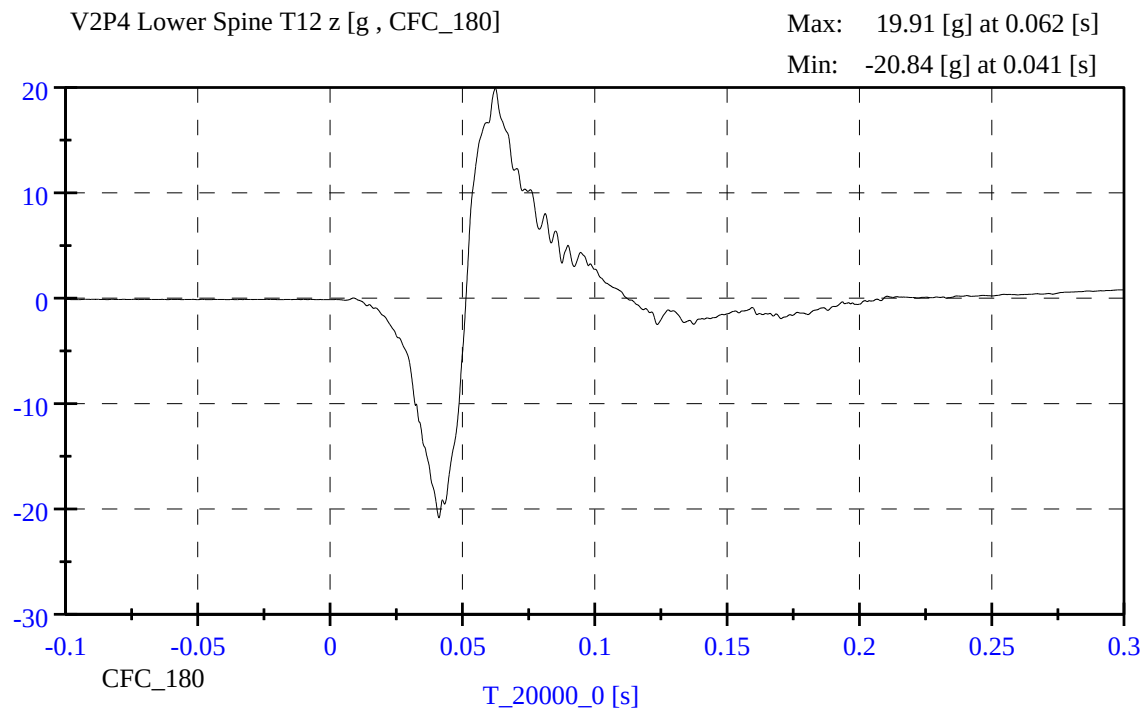
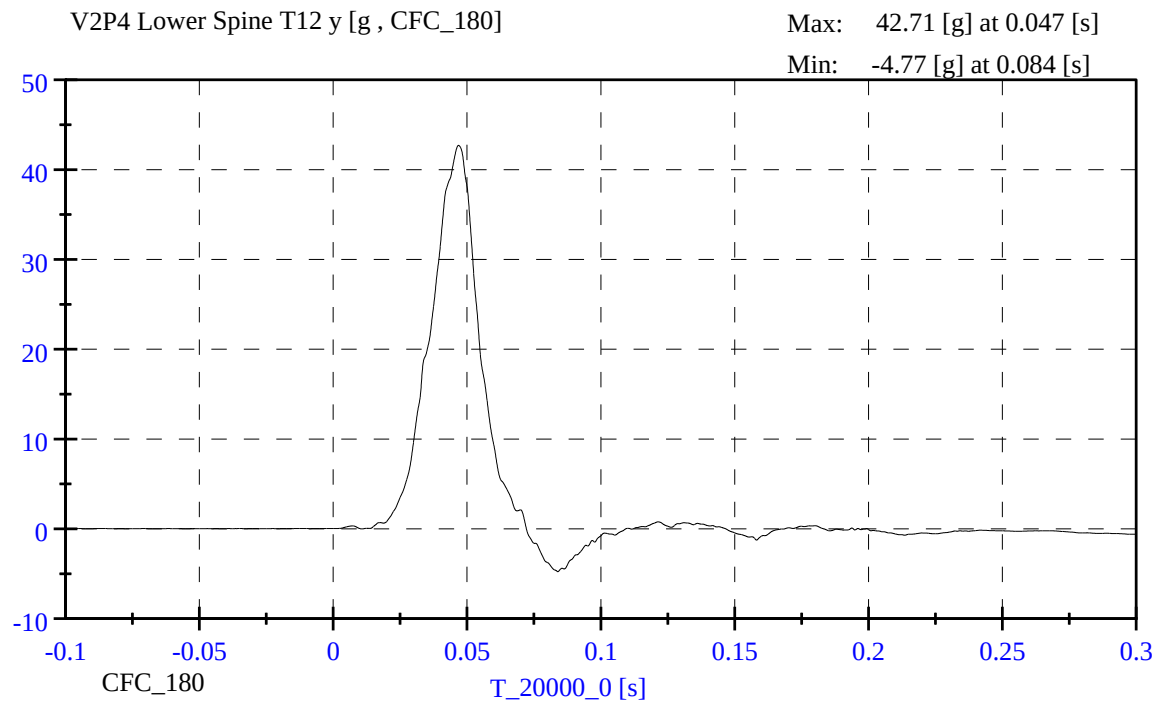


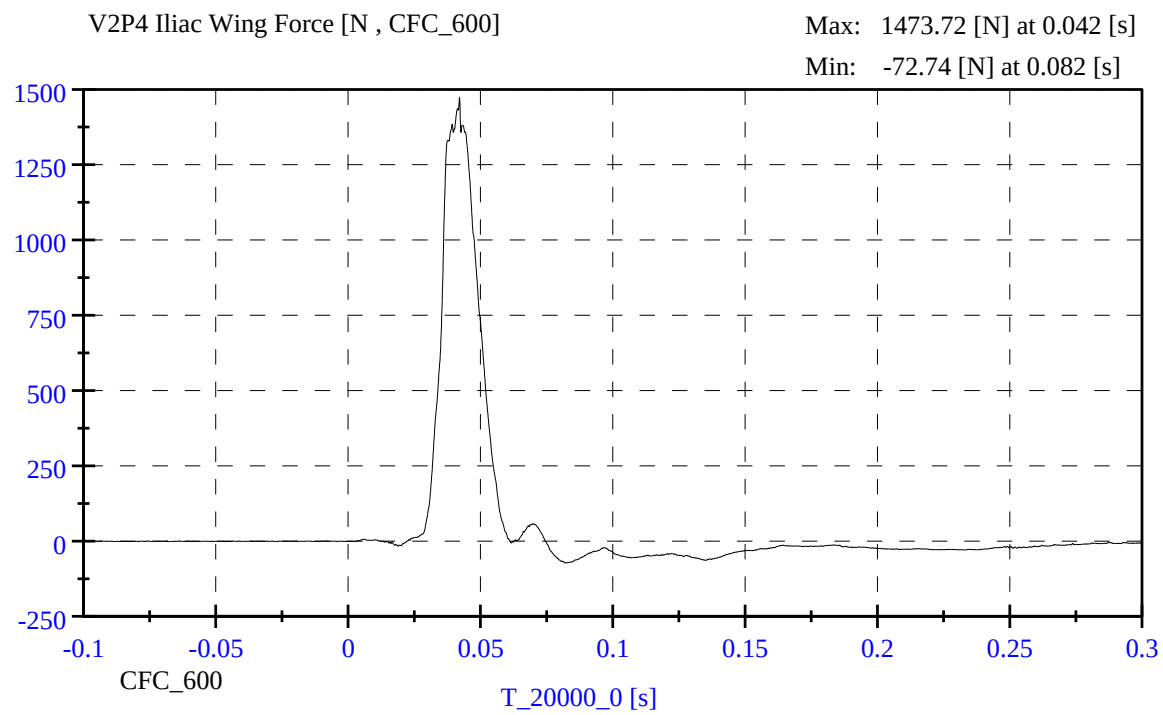
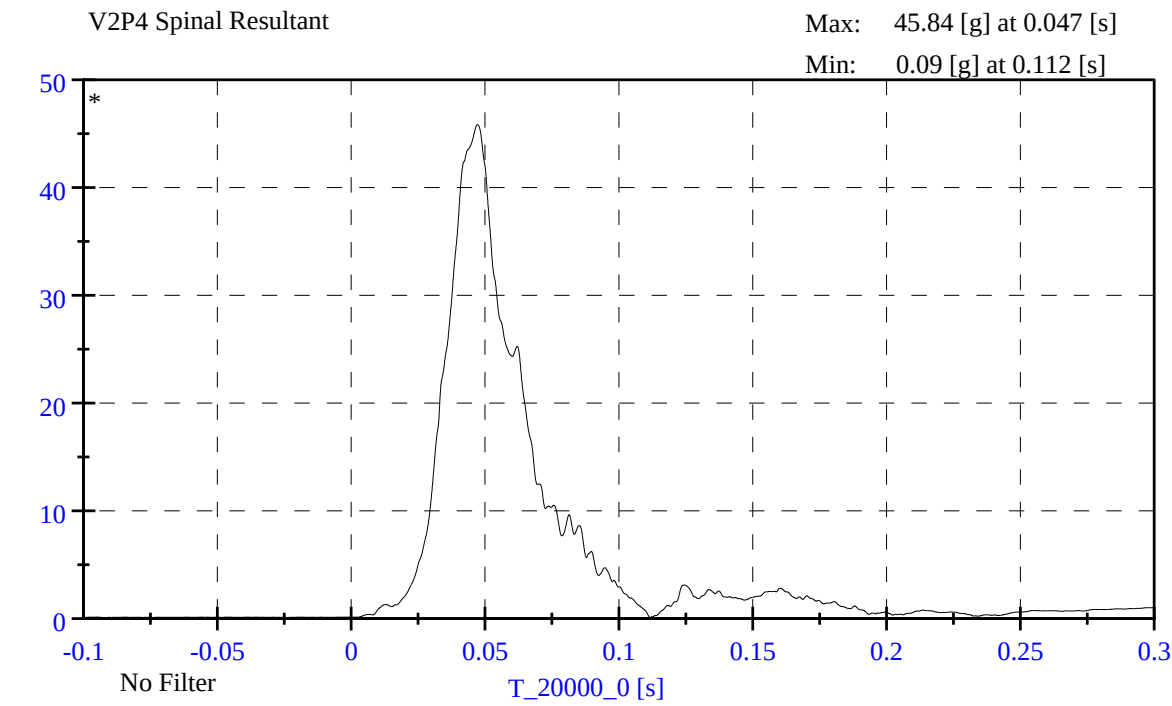


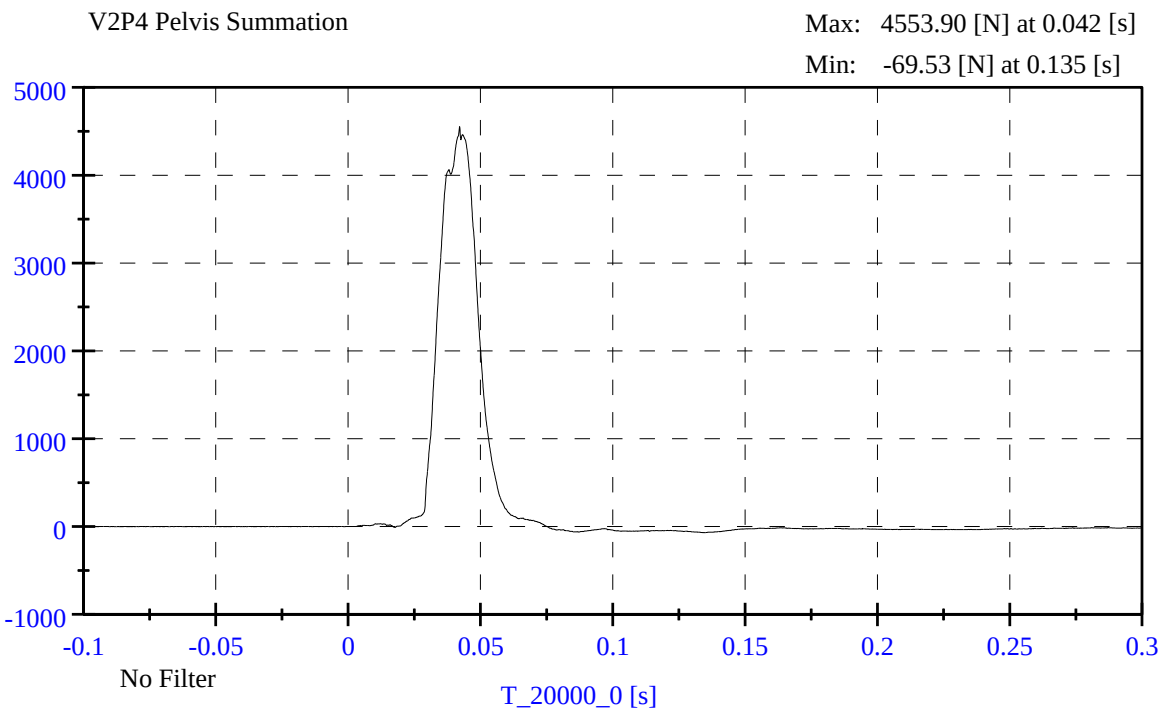
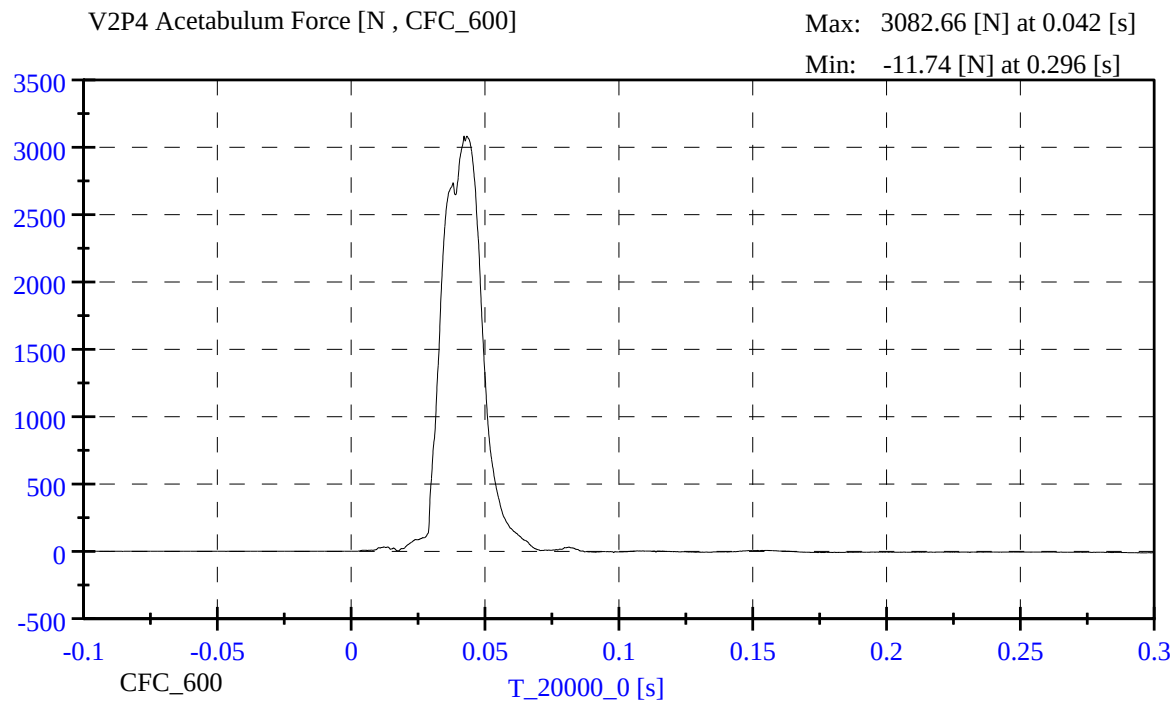












APPENDIX C

DUMMY PERFORMANCE CALIBRATION TEST DATA

TABLE OF CALIBRATION TEST RESULTS

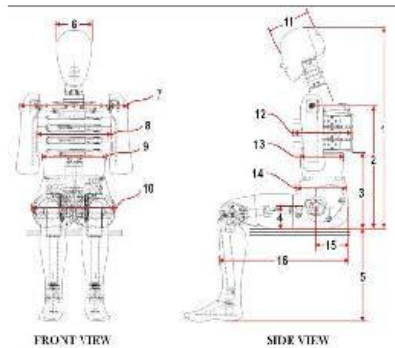
PRE-TEST

Es-2re No: F034

CONFIGURED FOR LEFT SIDE IMPACT

ES-2re External Measurements

NHTSA S/N F034



Dim. No.	Description	Specification (mm)	Result (mm)	Pass/Fail
1	Sitting Height	900-918	914	Pass
2	Seat to Shoulder Joint	558-572	565	Pass
3	Seat to Lower Face of Thoracic Spine Box	346-356	354	Pass
4	Seat to Hip Joint (center of bolt)	97-103	101	Pass
5	Sole to Seat, Sitting	433-451	445	Pass
6	Head Width	152-158	155	Pass
7	Shoulder/Arm Width	461-479	464	Pass
8	Thorax Width	322-332	324	Pass
9	Abdomen Width	273-287	283	Pass
10	Pelvis/Lap Width	359-373	370	Pass
11	Head Depth	196-206	201	Pass
12	Thorax Depth	262-272	268	Pass
13	Abdomen Depth	194-204	199	Pass
14	Pelvis Depth	235-245	237	Pass
15	Back of Buttocks to Hip Joint (center of bolt)	150-160	155	Pass
16	Back of Buttocks to Front Knee	597-615	604	Pass

Technician: AR

Date: 12/13/2011



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VERIFICATION REPORT

Test Name:	Head Drop	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:		Test Date:	12/14/2011
Test Number:	1	Test Time:	10:14:32 AM

Component Part Number	Component Serial Number
455-1007	1916409

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.6 deg C P
Humidity	10 -- 70	26 %RH P
Resultant Acceleration	125 -- 155	145 g P
Oscillation	0.0 -- 15.0	2.7 % P
Fore-Aft Acceleration	-15.00 -- 15.00	3.78 g P

All test parameters are within specifications

Technician: **S. Zito**

Supervisor: **D. Travale**

Test ID:

Test Time: **10:14:32 AM**

Test Date: **12/14/2011**

VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Endevco	7264-2000	P51681	11/5/2011
Endevco	7264-2000	P51949	11/5/2011
Endevco	7264-2000	P51695	11/5/2011

Test ID:

Test Time: **10:14:32 AM**Test Date: **12/14/2011**

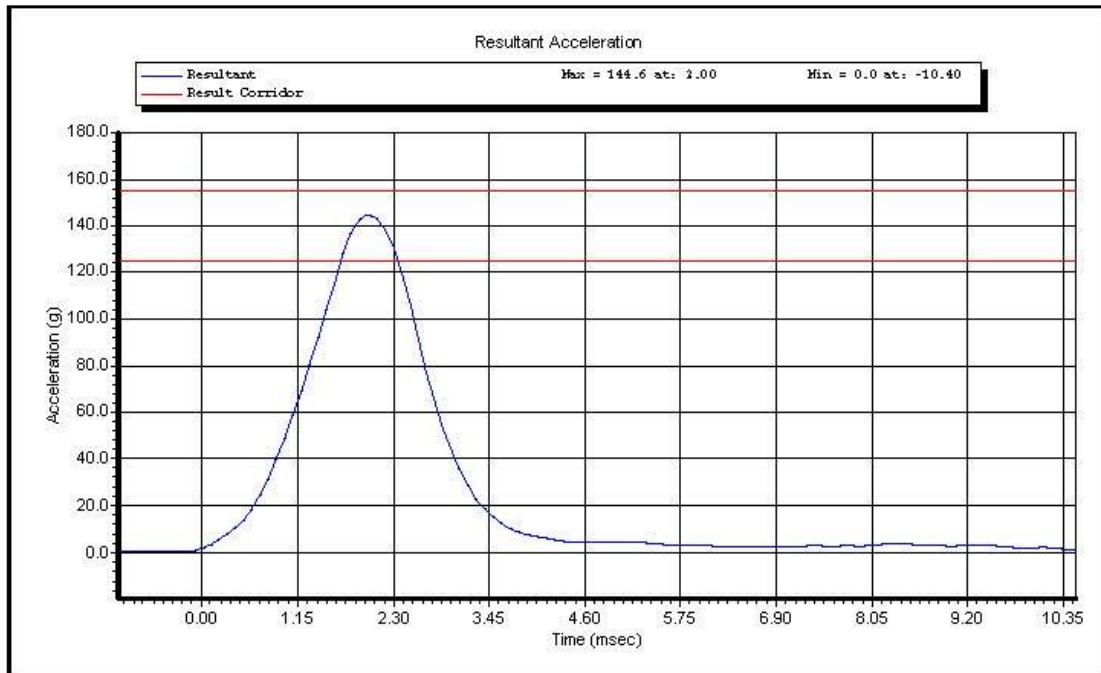


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Test Name:	Head Drop	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:		Test Date:	12/14/2011
Test Number:	1	Test Time:	10:14:32 AM



Test ID:

Test Time: 10:14:32 AM

Test Date: 12/14/2011

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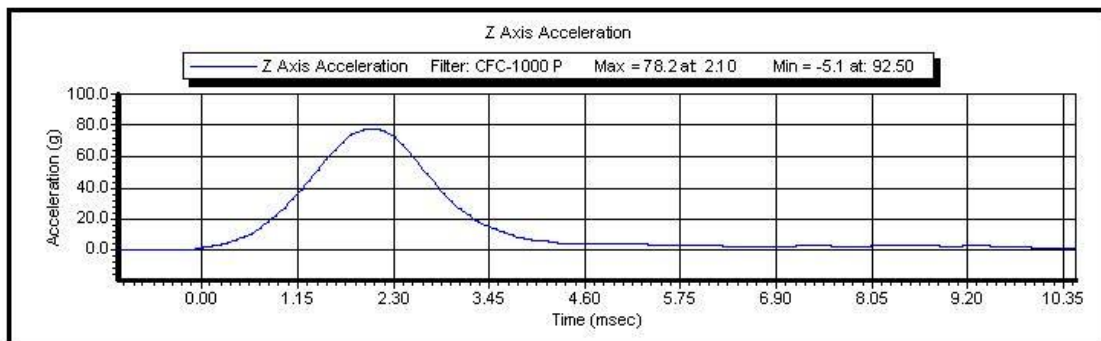
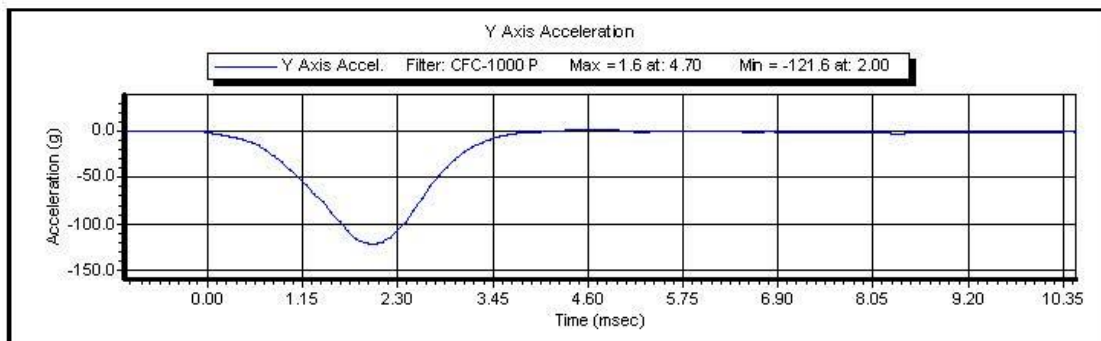
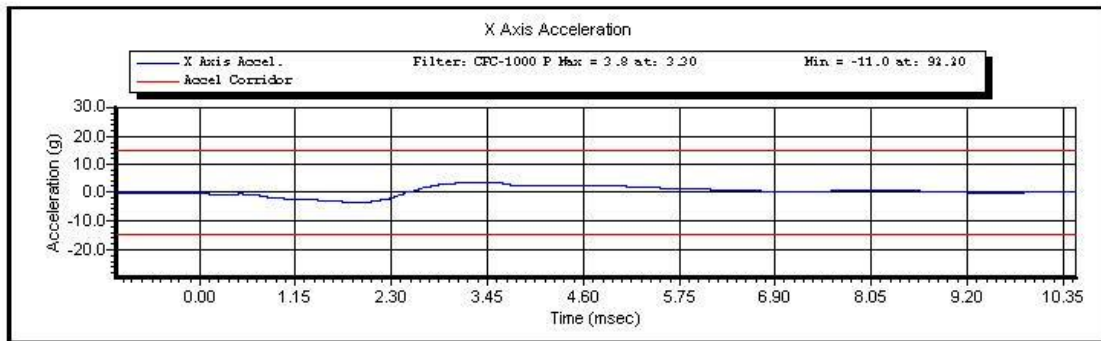
1 of 2



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Test ID:

Test Time: 10:14:32 AM

Test Date: 12/14/2011

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2 of 2

VERIFICATION REPORT

Test Name:	Neck Flexion	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:		Test Date:	12/14/2011
Test Number:	2	Test Time:	12:03:31 PM

Component Part Number	Component Serial Number
455-2002	07066

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.8 deg C P
Humidity	10 -- 70	25 %RH P
Velocity	3.30 -- 3.50	3.47 m/s P
Maximum Neck Flexion Angle	49.0 -- 59.0	49.4 degrees P
Time At Maximum Neck Flexion	54.0 -- 66.0	59.7 ms P
Decay to Zero Degrees	53.0 -- 88.0	61.2 ms P
Velocity Corridor	--	P

All test parameters are within specifications

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

Test ID:

Test Time: **12:03:31 PM**Test Date: **12/14/2011**

VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7231CT	C16510	10/3/2011
DentonATD	7000428	094	4/25/2011
DentonATD	7000428	095	4/25/2011
DentonATD	7000428	093	4/25/2011

Test ID:

Test Time: **12:03:31 PM**Test Date: **12/14/2011**

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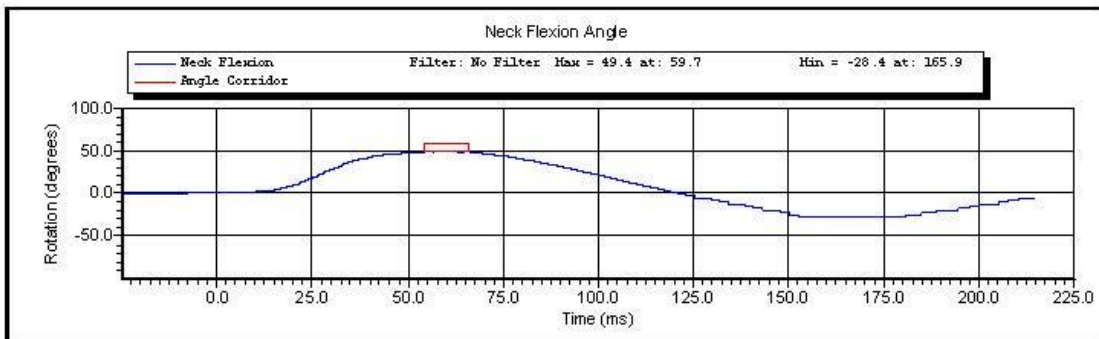
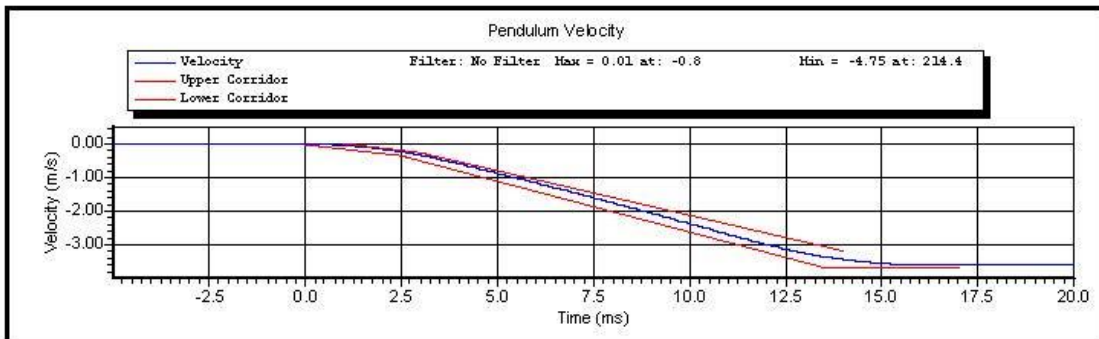


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Test Name:	Neck Flexion	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:		Test Date:	12/14/2011
Test Number:	2	Test Time:	12:03:31 PM



Test ID:

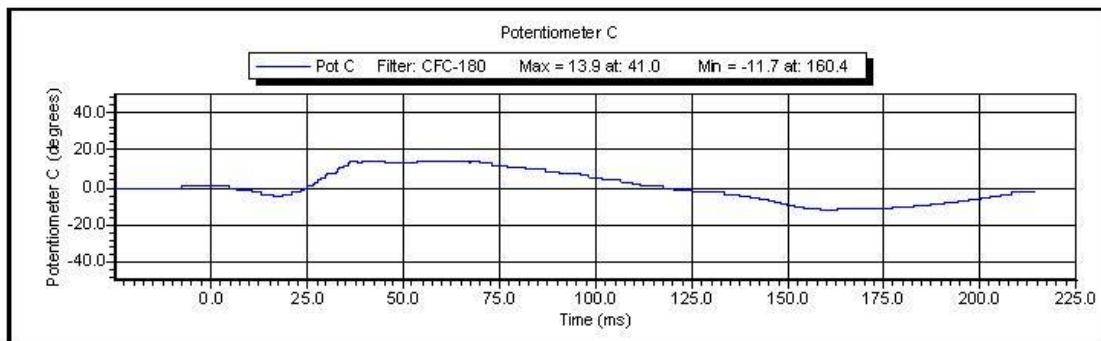
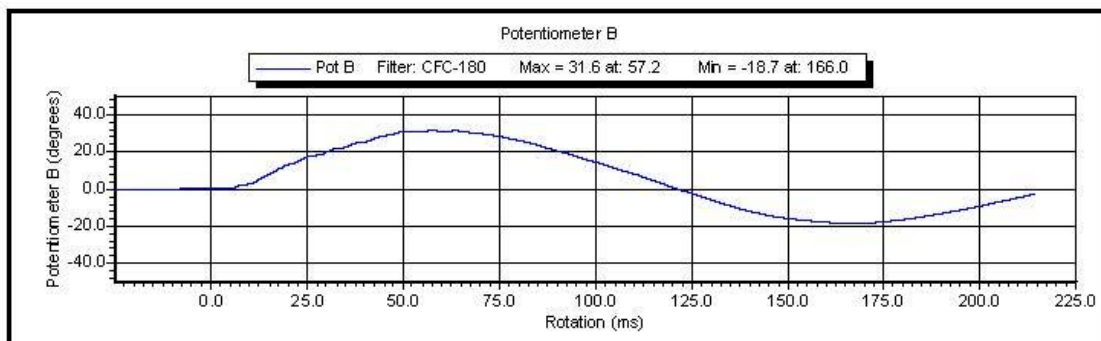
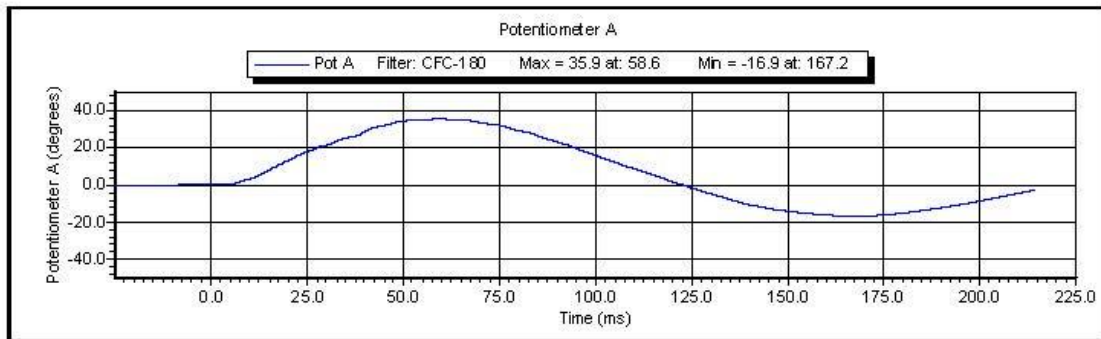
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Test Date: 12/14/2011

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Test ID:

Test Time: **12:03:31 PM**

Test Date: **12/14/2011**

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VERIFICATION REPORT

Test Name:	Shoulder Impact	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:		Test Date:	12/14/2011
Test Number:	2	Test Time:	5:13:37 PM

Component Part Number	Component Serial Number
960715-313	

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.4 deg C P
Humidity	10.0 -- 70.0	30.0 %RH P
Velocity	4.20 -- 4.40	4.24 m/s P
Pendulum Acceleration	-10.50 -- -7.50	-10.44 g P

All test parameters are within specifications

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

Test ID:

Test Time: **5:13:37 PM**

Test Date: **12/14/2011**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7264-2000	P66927	12/10/2011

Test ID:

Test Time: 5:13:37 PM

Test Date: 12/14/2011

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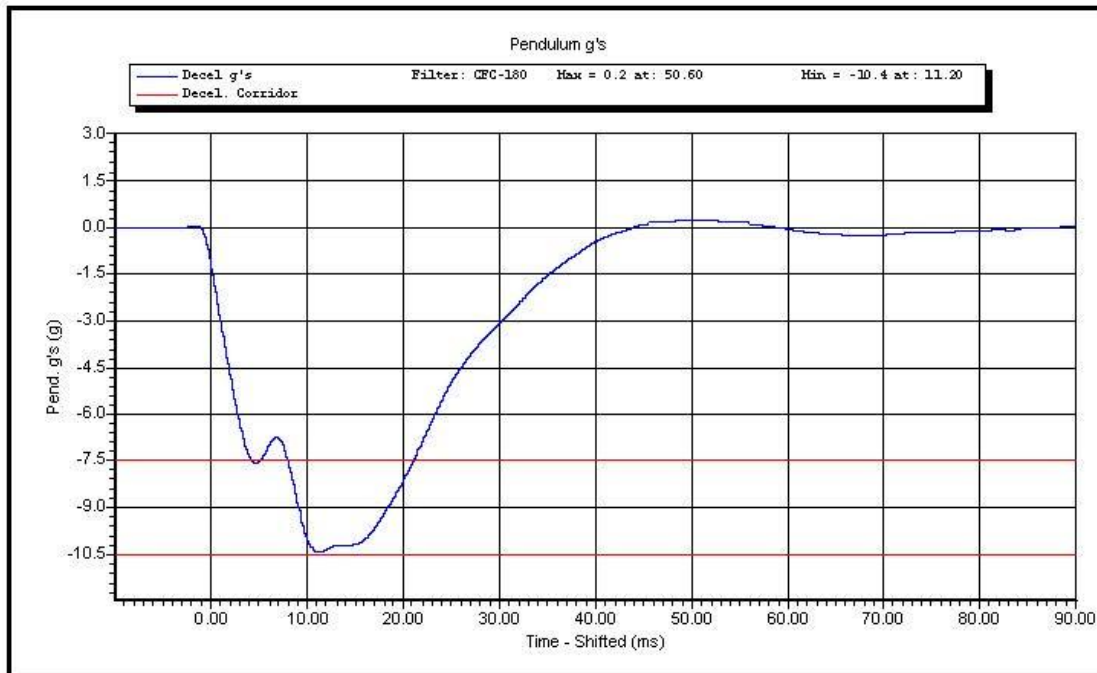


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Test Name:	Shoulder Impact	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:		Test Date:	12/14/2011
Test Number:	2	Test Time:	5:13:37 PM



Test ID:

Test Time: 5:13:37 PM

Test Date: 12/14/2011

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VERIFICATION REPORT

Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	4.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:	Upper 4 m/s	Test Date:	12/14/2011
Test Number:	1	Test Time:	11:24:58 AM

Component Part Number	Component Serial Number
455-3100	07203

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.3 deg C P
Humidity	10.0 -- 70.0	26.0 %RH P
Velocity	3.90 -- 4.10	3.96 m/s P
Rib Displacement	-51.00 -- -46.00	-48.50 mm P
Drop Height	807.0 -- 823.0	815.0 mm P

All test parameters are within specifications

Technician: **S. Zito**

Supervisor: **D. Travale**

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

Test Time: **11:24:58 AM**

Test Date: **12/14/2011**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Honeywell	MLT-38000	DS-183	8/31/2011
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7264-2000	P32222	10/14/2011

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

Test Time: **11:24:58 AM**

Test Date: **12/14/2011**

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2 of 2

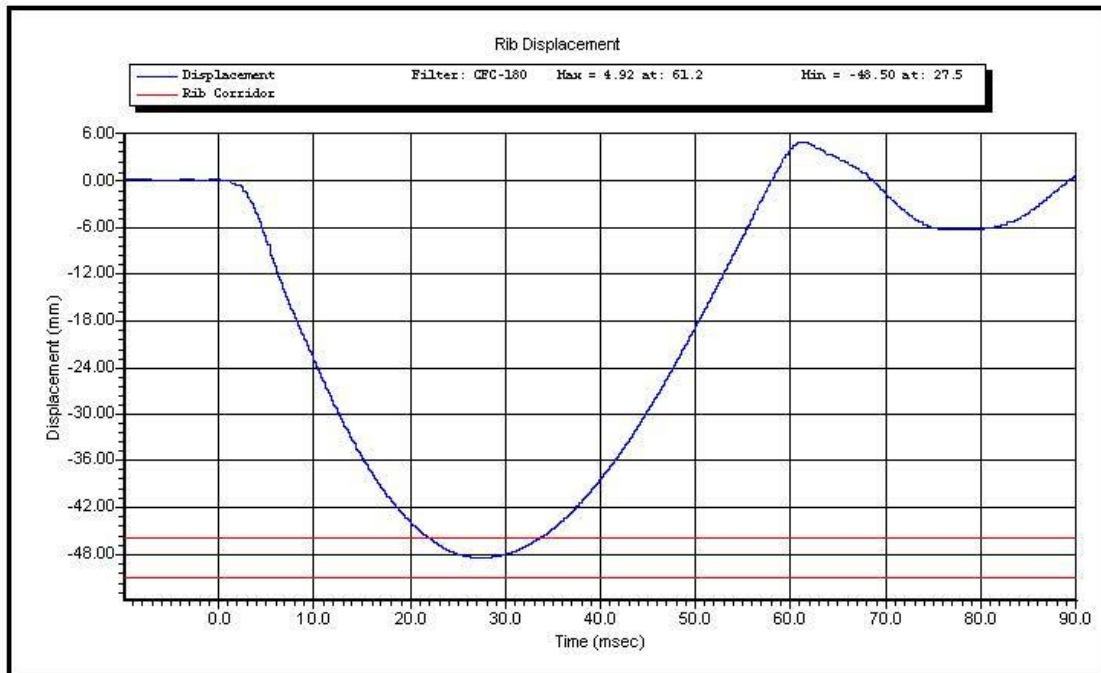


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Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	4.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:	Upper 4 m/s	Test Date:	12/14/2011
Test Number:	1	Test Time:	11:24:58 AM



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

Test Time: **11:24:58 AM**

Test Date: **12/14/2011**

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VERIFICATION REPORT

Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	3.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:	Upper 3 m/s	Test Date:	12/14/2011
Test Number:	1	Test Time:	11:34:19 AM

Component Part Number	Component Serial Number
455-3100	07203

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.4 deg C P
Humidity	10.0 -- 70.0	26.0 %RH P
Velocity	2.90 -- 3.10	2.94 m/s P
Rib Displacement	-40.00 -- -36.00	-37.56 mm P
Drop Height	454 -- 464	459 mm P

All test parameters are within specifications

Technician: **S. Zito**

Supervisor: **D. Travale**

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

Test Time: **11:34:19 AM**

Test Date: **12/14/2011**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Honeywell	MLT-38000	DS-183	8/31/2011
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7264-2000	P32222	10/14/2011

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

Test Time: **11:34:19 AM**

Test Date: **12/14/2011**

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2 of 2

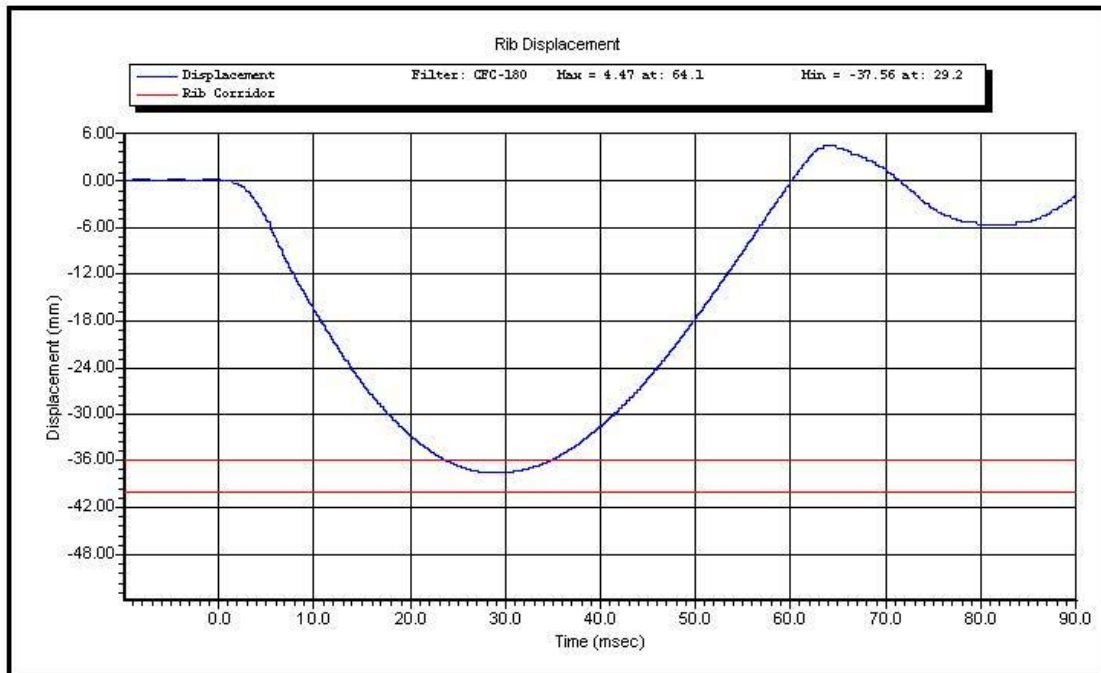


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Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	3.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:	Upper 3 m/s	Test Date:	12/14/2011
Test Number:	1	Test Time:	11:34:19 AM



Test ID: Upper 3 m/s

Test Time: 11:34:19 AM

Test Date: 12/14/2011

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VERIFICATION REPORT

Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	4.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:	Middle Rib 4 m/s	Test Date:	12/14/2011
Test Number:	1	Test Time:	11:40:42 AM

Component Part Number	Component Serial Number
455-3100	07205

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.4 deg C P
Humidity	10.0 -- 70.0	26.0 %RH P
Velocity	3.90 -- 4.10	3.95 m/s P
Rib Displacement	-51.00 -- -46.00	-48.09 mm P
Drop Height	807.0 -- 823.0	815.0 mm P

All test parameters are within specifications

Technician: **S. Zito**

Supervisor: **D. Travale**

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

Test Time: **11:40:42 AM**

Test Date: **12/14/2011**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Honeywell	MLT-38000	DS-184	8/31/2011
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7264-2000	P32222	10/14/2011

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

Test Time: **11:40:42 AM**

Test Date: **12/14/2011**

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2 of 2

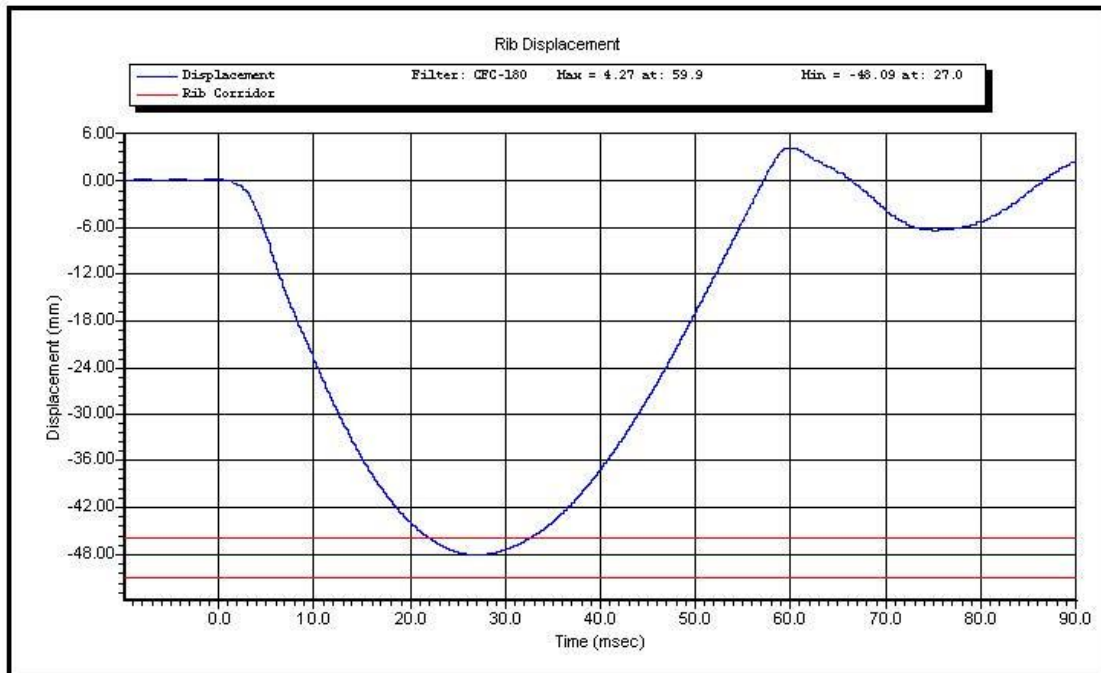


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Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	4.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:	Middle Rib 4 m/s	Test Date:	12/14/2011
Test Number:	1	Test Time:	11:40:42 AM



Test ID: Middle Rib 4 m/s Test Time: 11:40:42 AM

Test Date: 12/14/2011

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VERIFICATION REPORT

Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	3.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:	Middle Rib 3 m/s	Test Date:	12/14/2011
Test Number:	1	Test Time:	11:46:29 AM

Component Part Number	Component Serial Number
455-3100	07205

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.4 deg C P
Humidity	10.0 -- 70.0	26.0 %RH P
Velocity	2.90 -- 3.10	2.98 m/s P
Rib Displacement	-40.00 -- -36.00	-37.76 mm P
Drop Height	454 -- 464	459 mm P

All test parameters are within specifications

Technician: **S. Zito**

Supervisor: **D. Travale**

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

Test Time: **11:46:29 AM**

Test Date: **12/14/2011**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Honeywell	MLT-38000	DS-184	8/31/2011
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7264-2000	P32222	10/14/2011

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

Test Time: **11:46:29 AM**

Test Date: **12/14/2011**

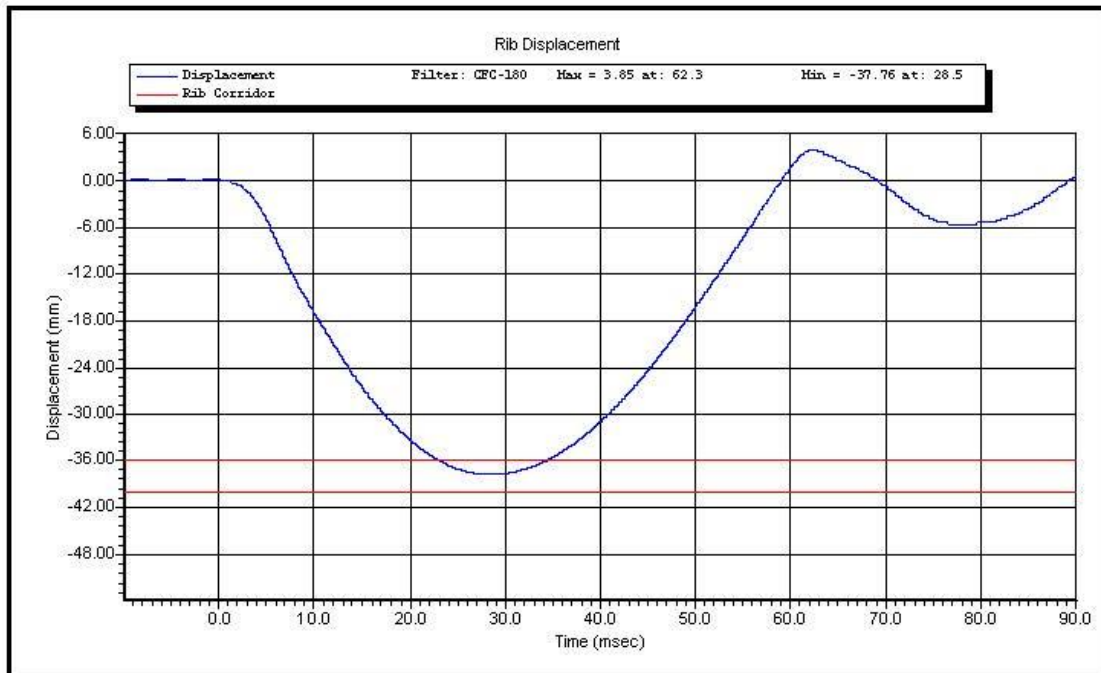


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Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	3.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:	Middle Rib 3 m/s	Test Date:	12/14/2011
Test Number:	1	Test Time:	11:46:29 AM



Test ID: **Middle Rib 3 m/s** Test Time: **11:46:29 AM**

Test Date: **12/14/2011**

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VERIFICATION REPORT

Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	4.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:	Lower 4 m/s	Test Date:	12/14/2011
Test Number:	1	Test Time:	11:52:40 AM

Component Part Number	Component Serial Number
455-3100	07209

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.4 deg C P
Humidity	10.0 -- 70.0	25.9 %RH P
Velocity	3.90 -- 4.10	3.96 m/s P
Rib Displacement	-51.00 -- -46.00	-48.79 mm P
Drop Height	807.0 -- 823.0	815.0 mm P

All test parameters are within specifications

Technician: **S. Zito**

Supervisor: **D. Travale**

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

Test Time: **11:52:40 AM**

Test Date: **12/14/2011**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Honeywell	MLT-38000	DS-182	8/31/2011
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7264-2000	P32222	10/14/2011

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

Test Time: **11:52:40 AM**

Test Date: **12/14/2011**

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2 of 2

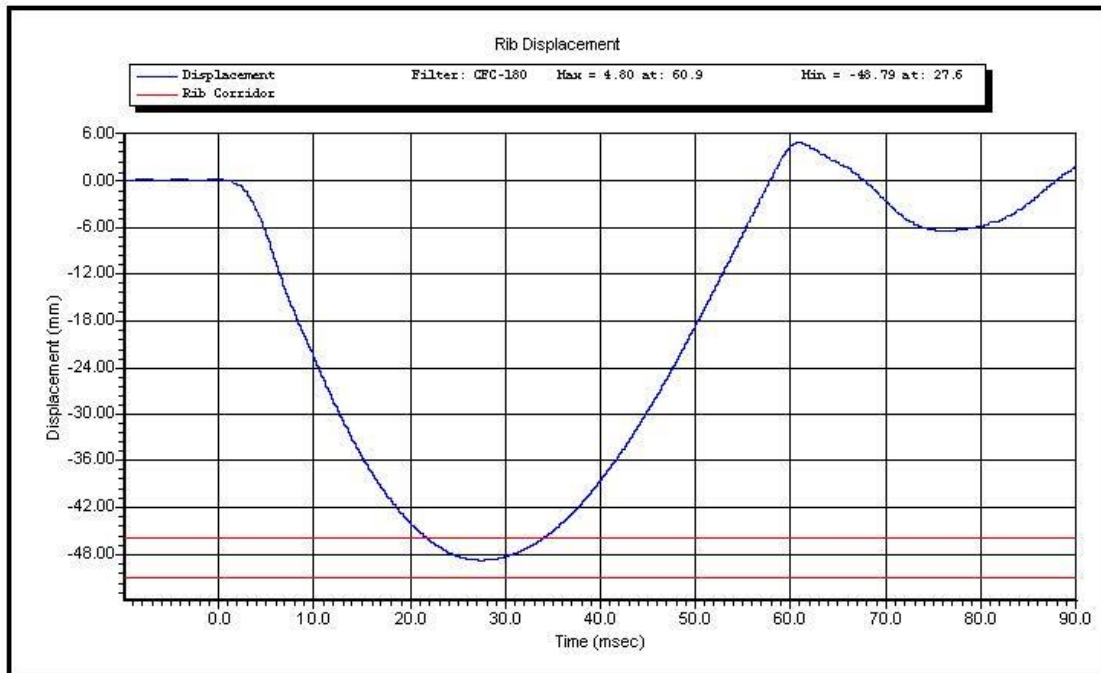


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Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	4.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:	Lower 4 m/s	Test Date:	12/14/2011
Test Number:	1	Test Time:	11:52:40 AM



Test ID: Lower 4 m/s

Test Time: 11:52:40 AM

Test Date: 12/14/2011

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1 of 1



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VERIFICATION REPORT

Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	3.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:	Lower 3 m/s	Test Date:	12/14/2011
Test Number:	1	Test Time:	11:57:52 AM

Component Part Number	Component Serial Number
455-3100	07209

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.4 deg C P
Humidity	10.0 -- 70.0	25.9 %RH P
Velocity	2.90 -- 3.10	2.91 m/s P
Rib Displacement	-40.00 -- -36.00	-37.99 mm P
Drop Height	454 -- 464	459 mm P

All test parameters are within specifications

Technician: **S. Zito**

Supervisor: **D. Travale**

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

Test Time: **11:57:52 AM**

Test Date: **12/14/2011**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Honeywell	MLT-38000	DS-183	8/31/2011
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7264-2000	P32222	10/14/2011

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

Test Time: **11:57:52 AM**

Test Date: **12/14/2011**

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2 of 2

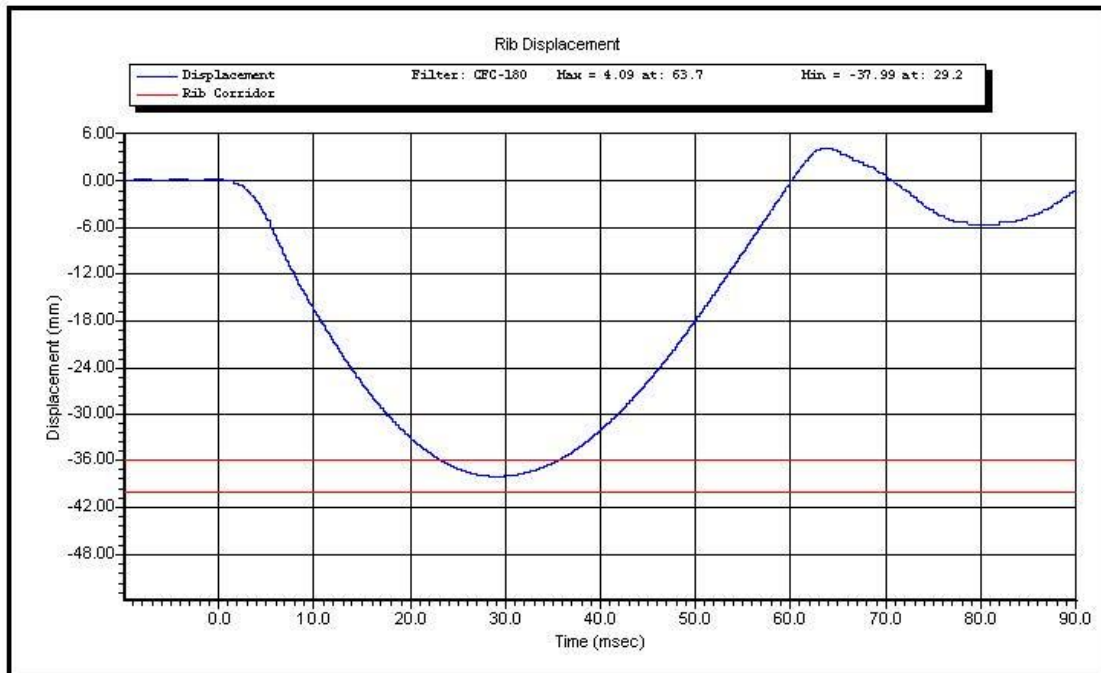


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Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	3.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:	Lower 3 m/s	Test Date:	12/14/2011
Test Number:	1	Test Time:	11:57:52 AM



Test ID: Lower 3 m/s

Test Time: 11:57:52 AM

Test Date: 12/14/2011

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VERIFICATION REPORT

Test Name:	Thorax Impact	Revision:	8/15/2008
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:		Test Date:	12/14/2011
Test Number:	1	Test Time:	4:28:06 PM

Component Part Number	Component Serial Number
Upper Rib - 175-4002	7203
Middle Rib - 175-4002	7205
Lower Rib - 175-4002	7209

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.2 deg C P
Humidity	10.0 -- 70.0	29.0 %RH P
Velocity	5.40 -- 5.60	5.49 m/s P
Upper Rib Displacement	34.0 -- 41.0	38.0 mm P
Middle Rib Displacement	37.0 -- 45.0	41.7 mm P
Lower Rib Displacement	37.0 -- 44.0	40.9 mm P
Impactor Force	5100 -- 6200	5631 N P

All test parameters are within specifications

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

Test ID:

Test Time: **4:28:06 PM**

Test Date: **12/14/2011**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7264-2000	P66927	12/10/2011
Honeywell	MLT 38000	DS-183	8/31/2011
Honeywell	MLT 38000	DS-184	8/31/2011
Honeywell	MLT 38000	DS-182	8/31/2011

Test ID:

Test Time: 4:28:06 PM

Test Date: 12/14/2011

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2 of 2

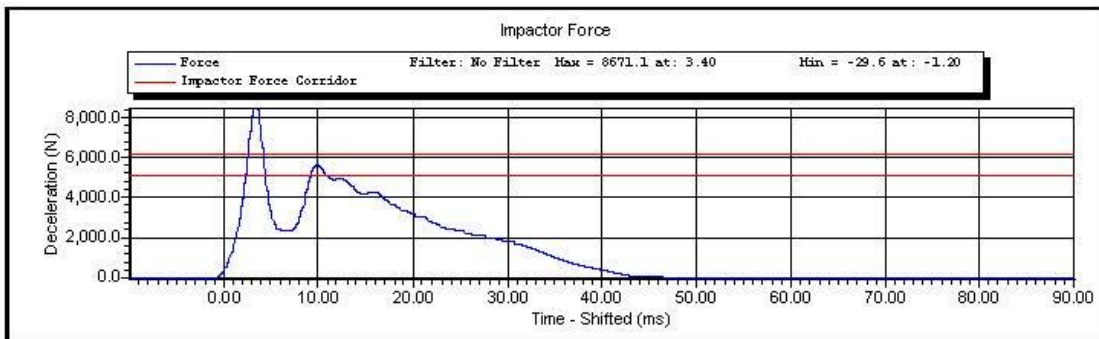
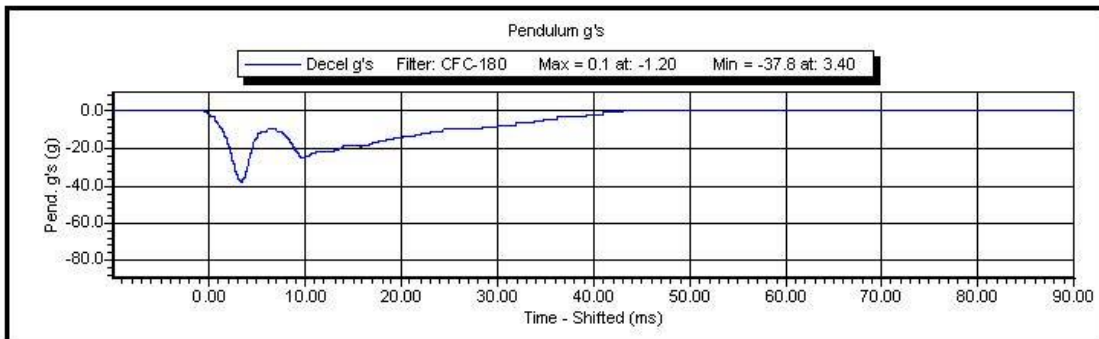


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Test Name:	Thorax Impact	Revision:	8/15/2008
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:		Test Date:	12/14/2011
Test Number:	1	Test Time:	4:28:06 PM



Test ID:

Test Time: 4:28:06 PM

Test Date: 12/14/2011

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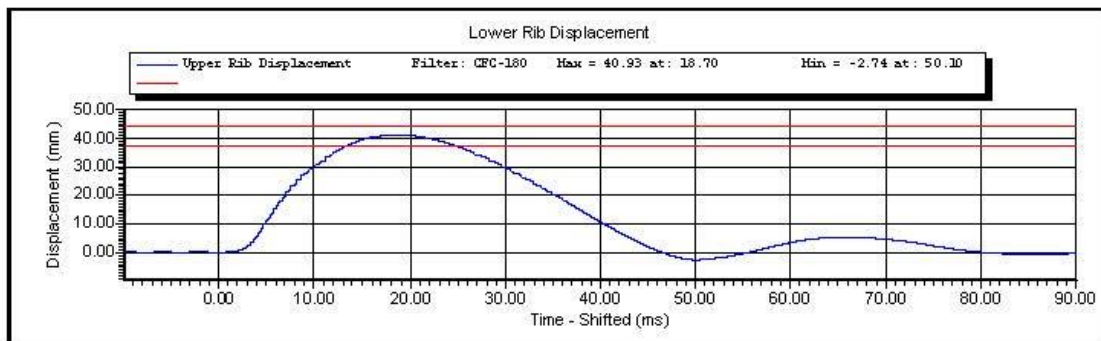
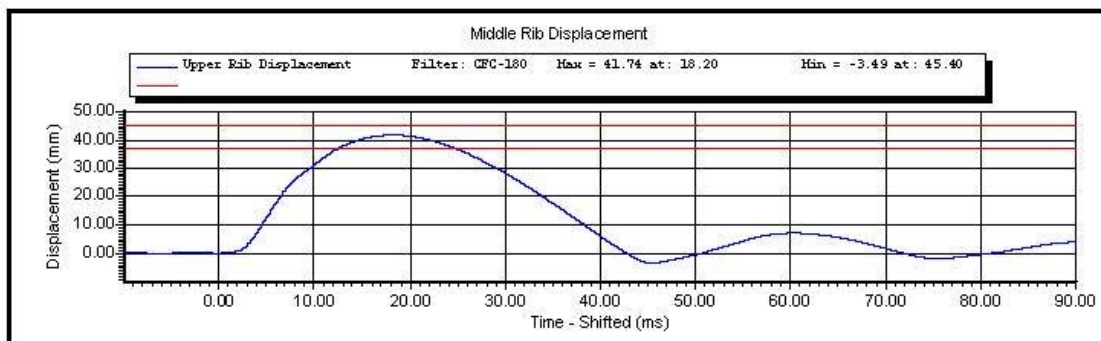
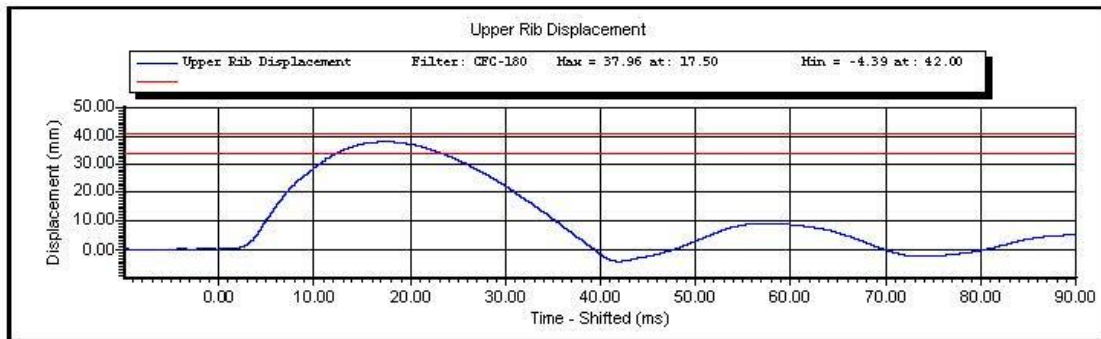
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Test ID:

Test Time: 4:28:06 PM

Test Date: 12/14/2011

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VERIFICATION REPORT

Test Name:	Abdominal Impact	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:		Test Date:	12/14/2011
Test Number:	3	Test Time:	6:54:34 PM

Component Part Number	Component Serial Number
455-4001	0791

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.8 deg C P
Humidity	10 -- 70	32 %RH P
Velocity	3.90 -- 4.10	4.09 m/s P
Peak Abdominal Force	-2.70 -- -2.20	-2.55 kN P
Time At Peak Abdominal Force	10.0 -- 12.3	10.2 ms P
Maximum Pendulum Force	-4.80 -- -4.00	-4.63 kN P
Time at Peak Pendulum Force	10.6 -- 13.0	10.7 ms P

All test parameters are within specifications

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

Test ID:

Test Time: **6:54:34 PM**

Test Date: **12/14/2011**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7231CT	AGHF5	12/14/2011
Denton	2631	LC-1512	3/25/2011
Denton	2631	LC-1526	3/25/2011
Denton	2631	LC-1516	3/25/2011

Test ID:

Test Time: 6:54:34 PM

Test Date: 12/14/2011

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2 of 2

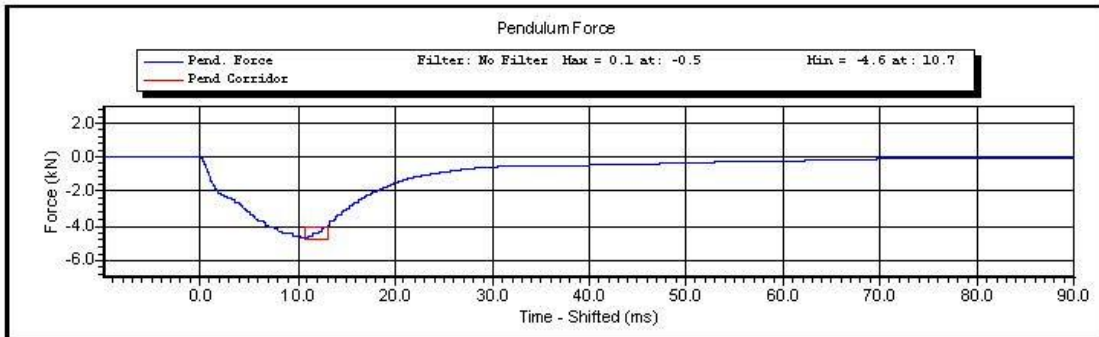
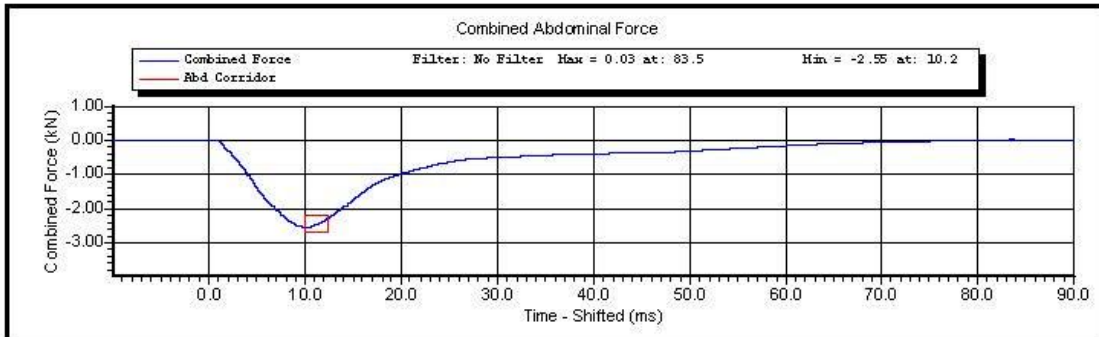


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Test Name:	Abdominal Impact	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:		Test Date:	12/14/2011
Test Number:	3	Test Time:	6:54:34 PM



Test ID:

Test Time: **6:54:34 PM**

Test Date: **12/14/2011**

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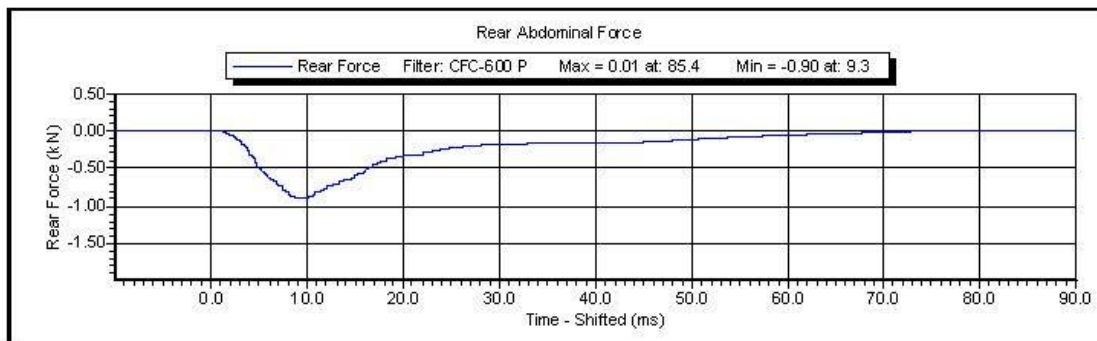
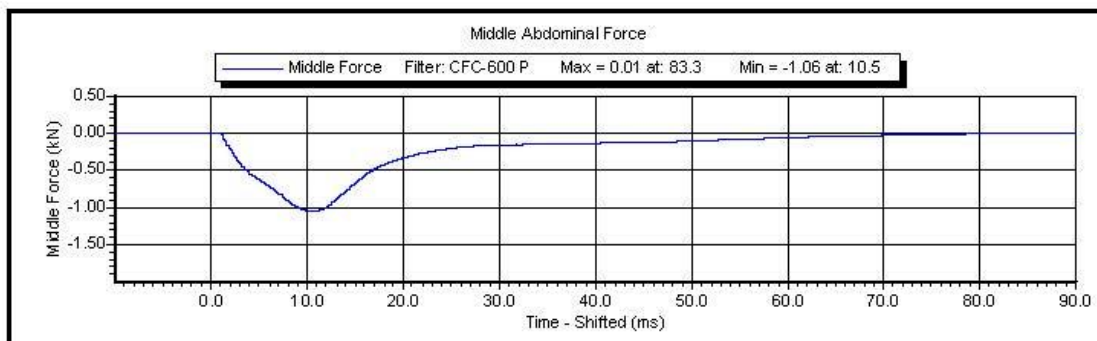
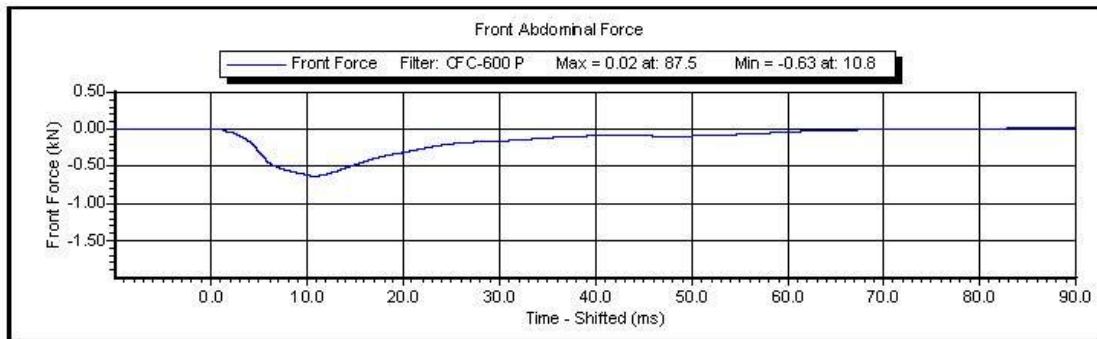
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Test ID:

Test Time: 6:54:34 PM

Test Date: 12/14/2011

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VERIFICATION REPORT

Test Name:	Lumbar Spine	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:		Test Date:	12/15/2011
Test Number:	1	Test Time:	12:06:59 PM

Component Part Number	Component Serial Number
175-5501	15050329A

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.5 deg C P
Humidity	10 -- 70	49 %RH P
Velocity	5.95 -- 6.15	6.15 m/s P
Maximum Headform Flexion Angle	45.0 -- 55.0	45.2 degrees P
Time at Maximum Headform Flexion Angle	39.0 -- 53.0	44.2 ms P
Decay to Zero Degrees	37.0 -- 57.0	40.5 ms P
Velocity Corridor	--	P

All test parameters are within specifications

Technician: **A. Rudniski**

Supervisor: **D. Travale**

Test ID:

Test Time: **12:06:59 PM**

Test Date: **12/15/2011**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7231CT	C16510	10/3/2011
DentonATD	7000428	094	4/25/2011
DentonATD	7000428	095	4/25/2011
DentonATD	7000428	093	4/25/2011

Test ID:

Test Time: 12:06:59 PM

Test Date: 12/15/2011

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2 of 2

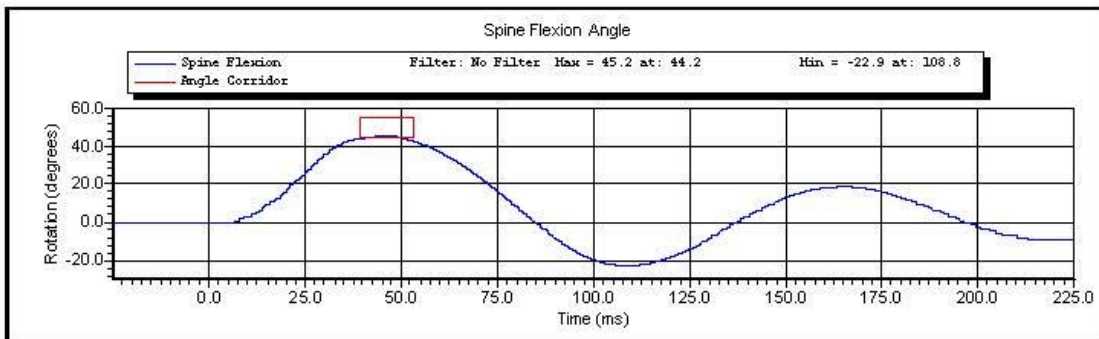
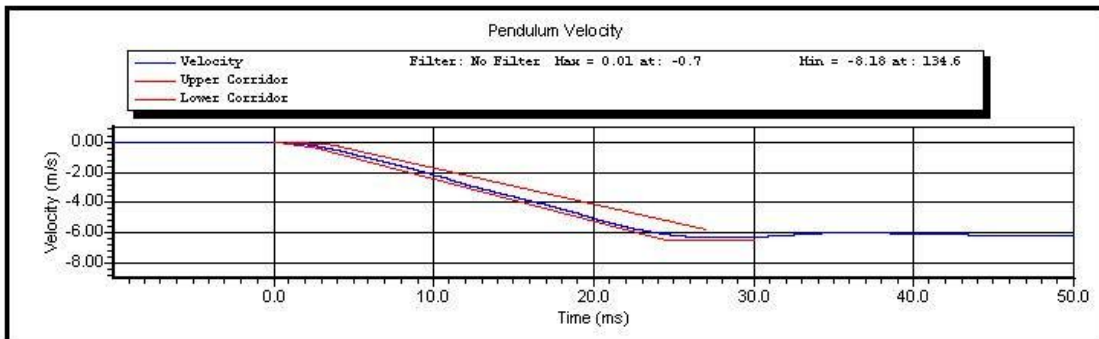


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Test Name:	Lumbar Spine	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:		Test Date:	12/15/2011
Test Number:	1	Test Time:	12:06:59 PM



Test ID:

Test Time: **12:06:59 PM**

Test Date: **12/15/2011**

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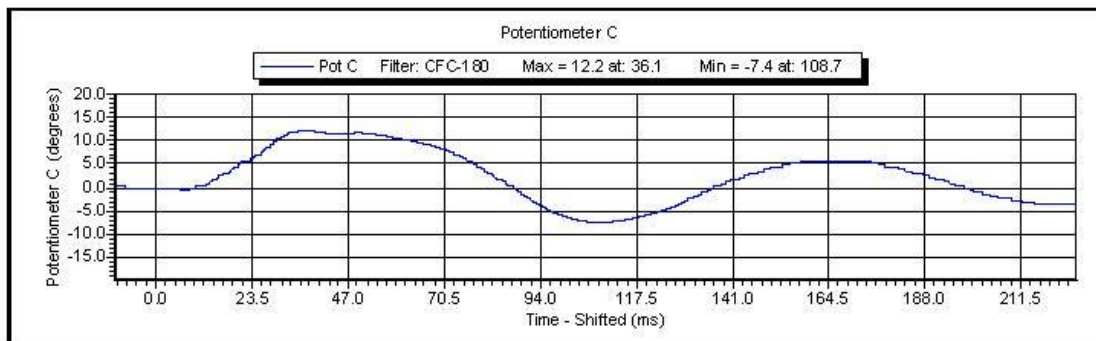
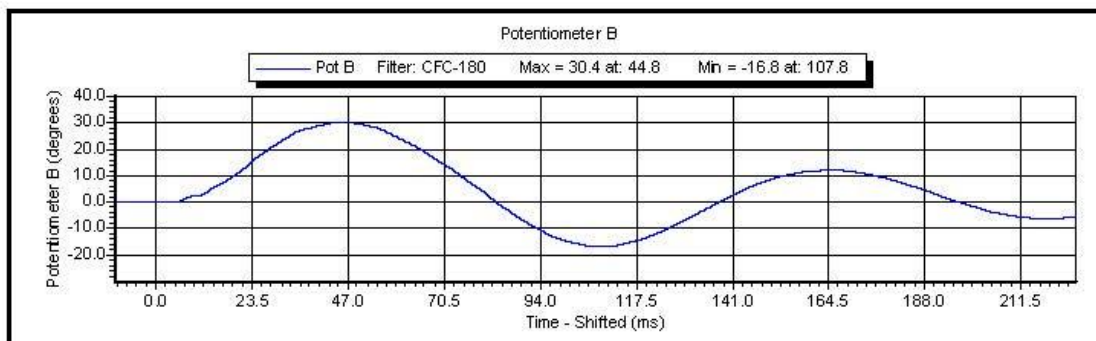
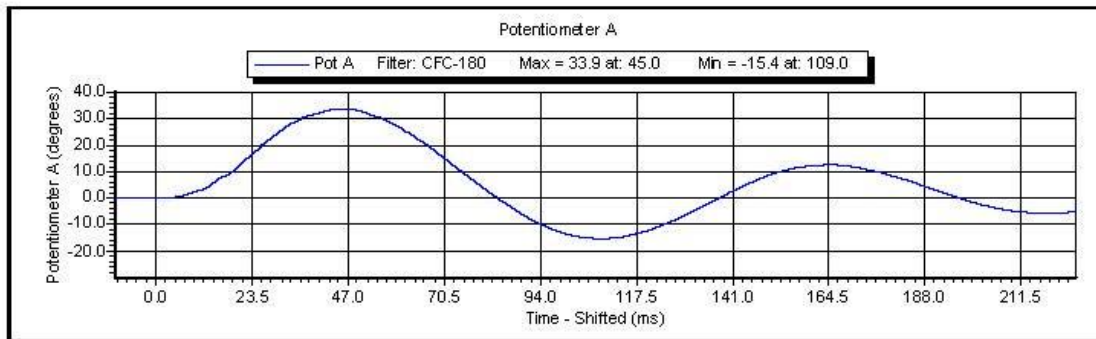
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Test ID:

Test Time: 12:06:59 PM

Test Date: 12/15/2011

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VERIFICATION REPORT

Test Name:	Pelvis Impact	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:		Test Date:	12/14/2011
Test Number:	1	Test Time:	3:46:09 PM

Component Part Number	Component Serial Number
455-4003	

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.2 deg C P
Humidity	10 -- 70	29 %RH P
Velocity	4.20 -- 4.40	4.40 m/s P
Peak Pendulum Force	-5.40 -- -4.70	-5.16 kN P
Time at Peak Pendulum Force	11.80 -- 16.10	13.35 ms P
Peak Pubic Symphysis Force	-1.59 -- -1.23	-1.41 kN P
Time at Peak Pubic Symphysis Force	12.20 -- 17.00	13.85 ms P

All test parameters are within specifications

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

Test ID:

Test Time: **3:46:09 PM**

Test Date: **12/14/2011**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7264-2000	P66927	12/10/2011
Denton	3096	LC 465Fy	8/31/2011

Test ID:

Test Time: 3:46:09 PM

Test Date: 12/14/2011

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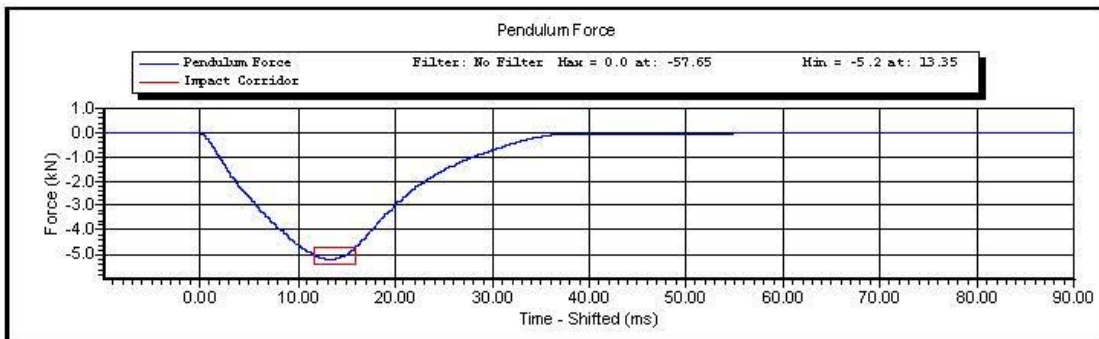
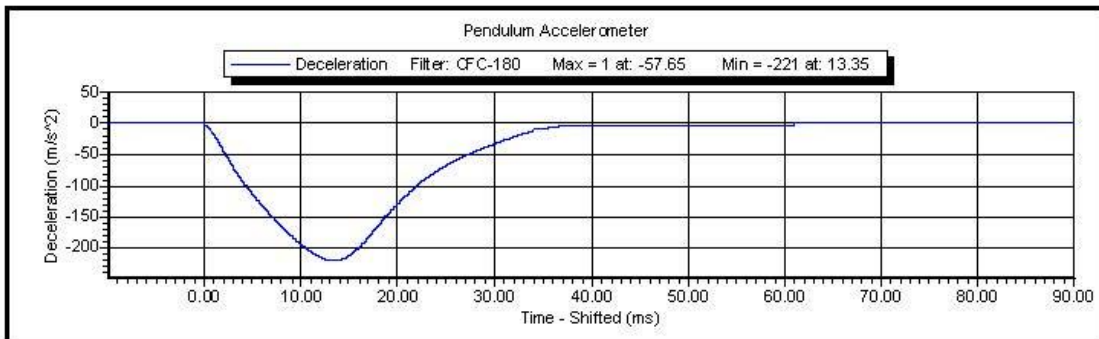


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Test Name:	Pelvis Impact	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:		Test Date:	12/14/2011
Test Number:	1	Test Time:	3:46:09 PM



Test ID:

Test Time: **3:46:09 PM**

Test Date: **12/14/2011**

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1 of 2



Test ID:

Test Time: 3:46:09 PM

Test Date: 12/14/2011

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CALIBRATION TEST RESULTS

PRE-TEST

SID-IIs No: 8012

CONFIGURED FOR LEFT SIDE IMPACT



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SID-IIsD External Measurements

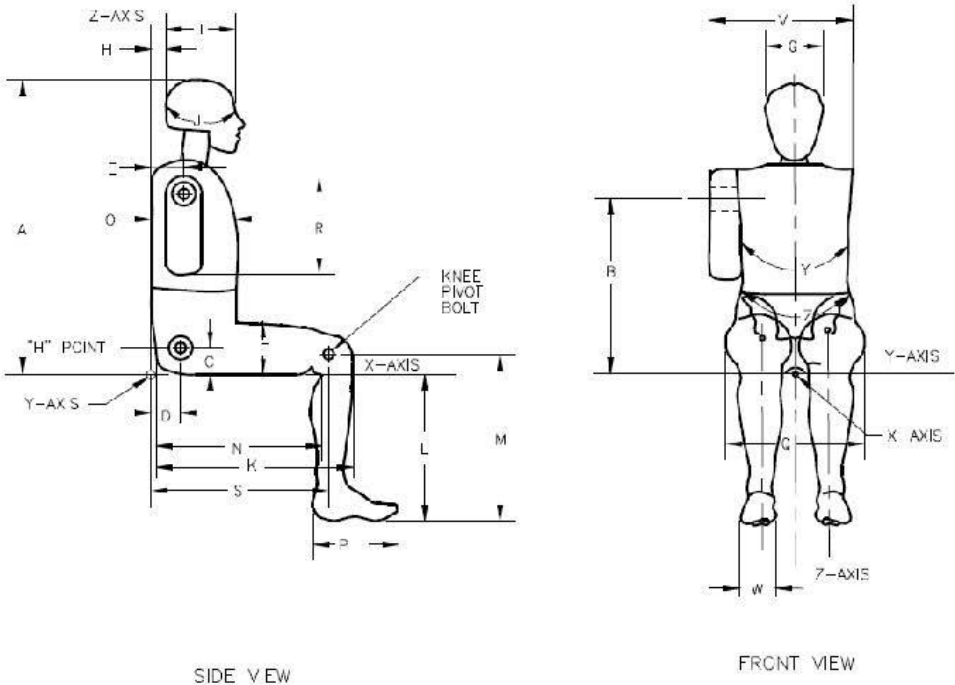
NHTSA ATD S/N DG8012

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Sitting Height	772.0 - 788.0	782	Yes
B	Shoulder Pivot Height	437.0 - 453.0	444	Yes
C	H-Point Height	79.0 - 89.0	85	Yes
D	H-Point from Seat Back	141.0 - 151.0	148	Yes
E	Shoulder Pivot from Backline	97.0 - 107.0	98	Yes
F	Thigh Clearance	119.0 - 135.0	132	Yes
G	Head Breadth	140.0 - 148.0	145	Yes
H	Head Back from Backline	40.0 - 46.0	43	Yes
I	Head Depth	178.0 - 188.0	187	Yes
J	Head Circumference	541.0 - 551.0	548	Yes
K	Buttock to Knee Length	514.0 - 540.0	530	Yes
L	Popliteal Height	343.0 - 369.0	359	Yes
M	Knee Pivot to Floor Height	393.0 - 409.0	402	Yes
N	Buttock Popliteal Length	416.0 - 442.0	434	Yes
O	Chest Depth without Jacket	195.0 - 211.0	204	Yes
P	Foot Length (right)	216.0 - 232.0	223	Yes
Q	Hip Breadth	313.0 - 323.0	315	Yes
R	Arm Length	249.0 - 259.0	257	Yes
S	Knee Joint to Seat back	478.0 - 493.0	490	Yes
V	Shoulder Width (only one arm installed)	341.0 - 357.0	351	Yes
W	Foot Width (right)	78.0 - 94.0	84	Yes
Y	Chest Circumference with Jacket	851.0 - 881.0	872	Yes
Z	Waist Circumference	761.0 - 791.0	782	Yes

Technician : AR

Date: 12/12/2011

SID-IIIsD External Dimension Reference Diagram





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VERIFICATION REPORT

Test Name:	Head Drop	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	12/12/2011
Test Number:	1	Test Time:	11:15:30 AM

Component Part Number	Component Serial Number
Head Skin - 180-1002	1362

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.2 deg C P
Humidity	10 -- 70	17 %RH P
Resultant Acceleration	115.0 -- 137.0	124.7 g P
Oscillation	0.0 -- 15.0	8.3 % P
Fore-Aft Acceleration	-15.0 -- 15.0	-6.2 g P

All test parameters are within specifications

Technician: S. Zito

Supervisor: D. Travale

Test ID:

Test Time: **11:15:30 AM**

Test Date: **12/12/2011**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Endevco	7264-2000	P71271	8/12/2011
Endevco	7264-2000	P71281	8/12/2011
Endevco	7264-2000	P71298	8/12/2011

Test ID:

Test Time: **11:15:30 AM**

Test Date: **12/12/2011**

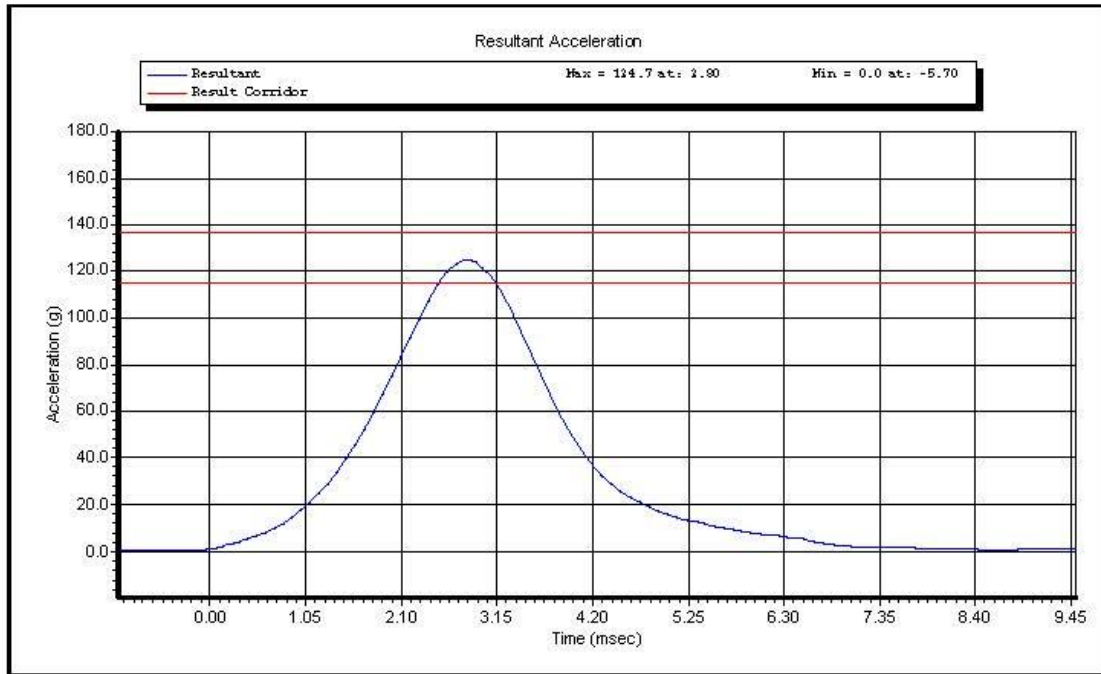


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Test Name:	Head Drop	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	12/12/2011
Test Number:	1	Test Time:	11:15:30 AM



Test ID:

Test Time: 11:15:30 AM

Test Date: 12/12/2011

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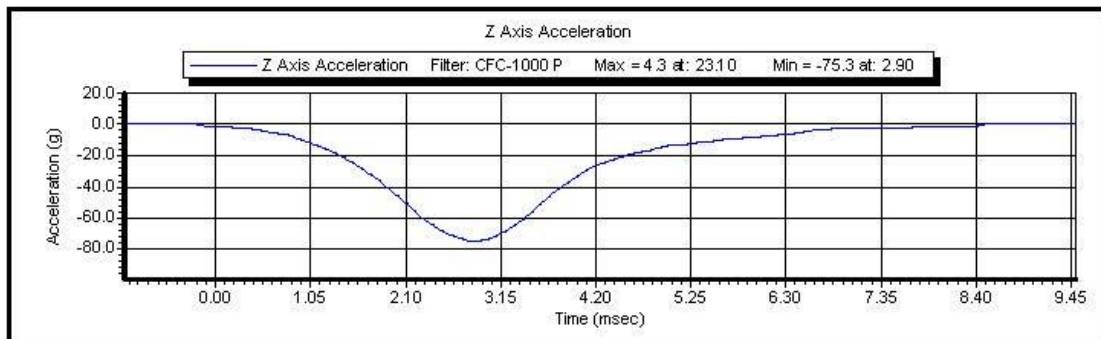
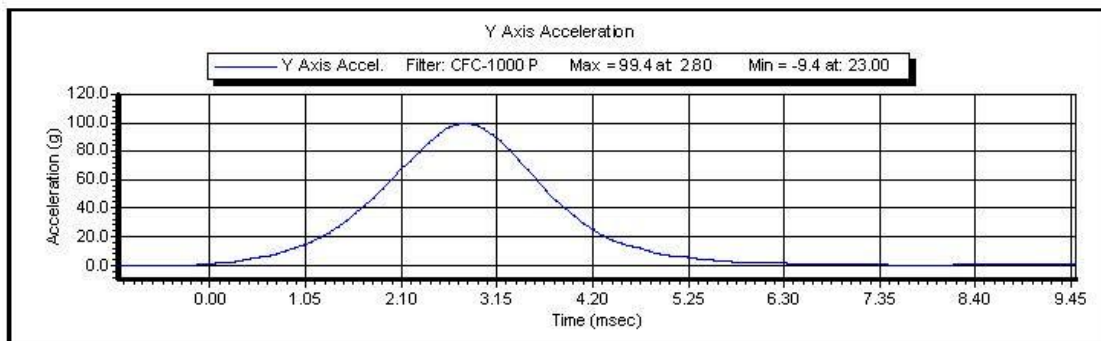
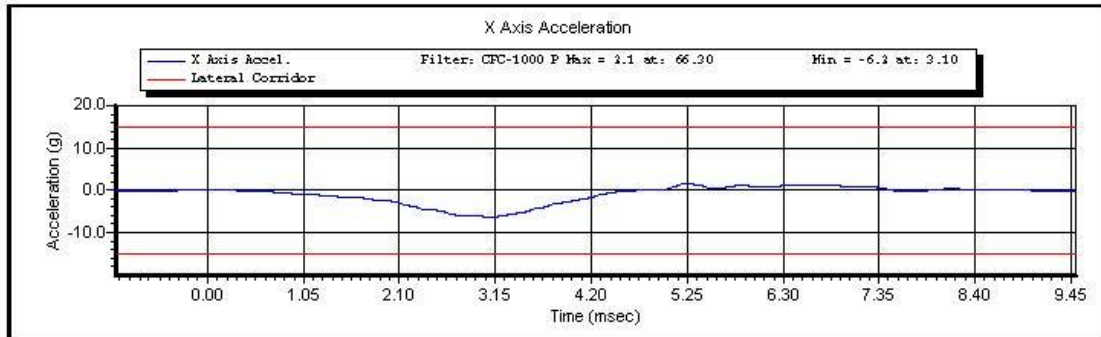
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Test ID:

Test Time: 11:15:30 AM

Test Date: 12/12/2011

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VERIFICATION REPORT

Test Name:	Neck Pendulum	Revision:	8/24/2009
Sub Test Name:	Left Side	Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	12/13/2011
Test Number:	2	Test Time:	11:23:20 AM

Component Part Number	Component Serial Number
Neck - 180-2000	DG7061

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.7 deg C P
Humidity	10 -- 70	22 %RH P
Velocity	5.51 -- 5.63	5.59 m/s P
Pendulum Impulse at 10 ms	2.20 -- 2.80	2.33 m/s P
Pendulum Impulse at 15 ms	3.30 -- 4.10	3.48 m/s P
Pendulum Impulse at 20 ms	4.40 -- 5.40	4.80 m/s P
Pendulum Impulse at 25 ms	5.40 -- 6.10	5.60 m/s P
Pendulum Impulse between 25 and 100 ms	5.50 -- 6.20	5.77 m/s P
Max D Plane Rotation	71.0 -- 81.0	74.1 degrees P
Time at Max Rotation	50.0 -- 70.0	61.7 ms P
Moment about OC	-44.0 -- -36.0	-41.6 Nm P
Moment Decay to Zero	102.0 -- 126.0	113.2 ms P

All test parameters are within specifications

Technician: S. Zito
Supervisor: D. Travale

Test ID:

Test Time: **11:23:20 AM**

Test Date: **12/13/2011**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7231CT	C16510	10/3/2011
Denton	1716A	LC-2192Fy	8/31/2011
Denton	1716A	LC-2192Mx	8/31/2011
DentonATD	78051-342	184	5/8/2011
DentonATD	78051-342	174	5/8/2011
DentonATD	78051-342	185	5/8/2011

Test ID:

Test Time: 11:23:20 AM

Test Date: 12/13/2011

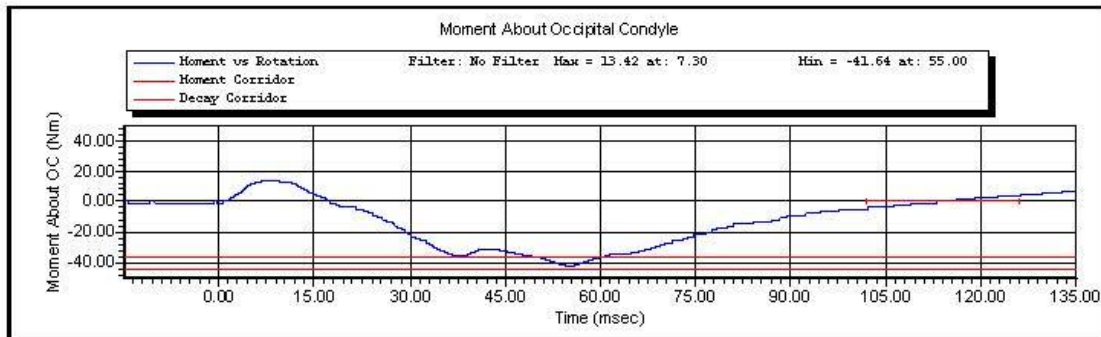
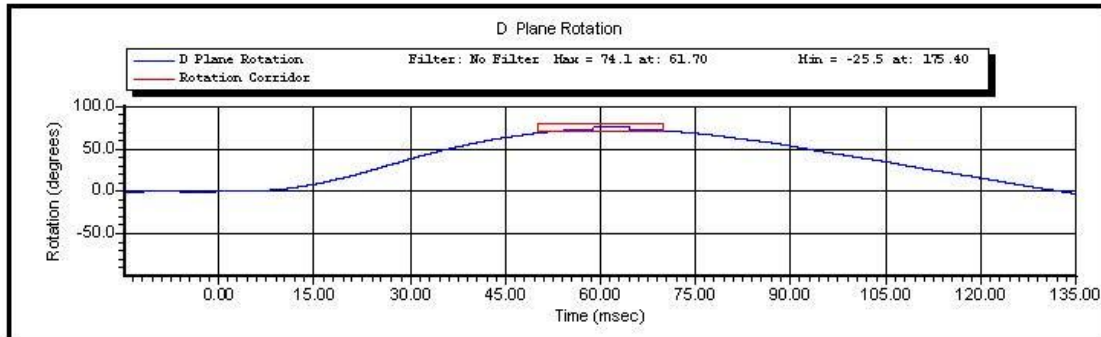


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Test Name:	Neck Pendulum	Revision:	8/24/2009
Sub Test Name:	Left Side	Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	12/13/2011
Test Number:	2	Test Time:	11:23:20 AM



Test ID:

Test Time: 11:23:20 AM

Test Date: 12/13/2011

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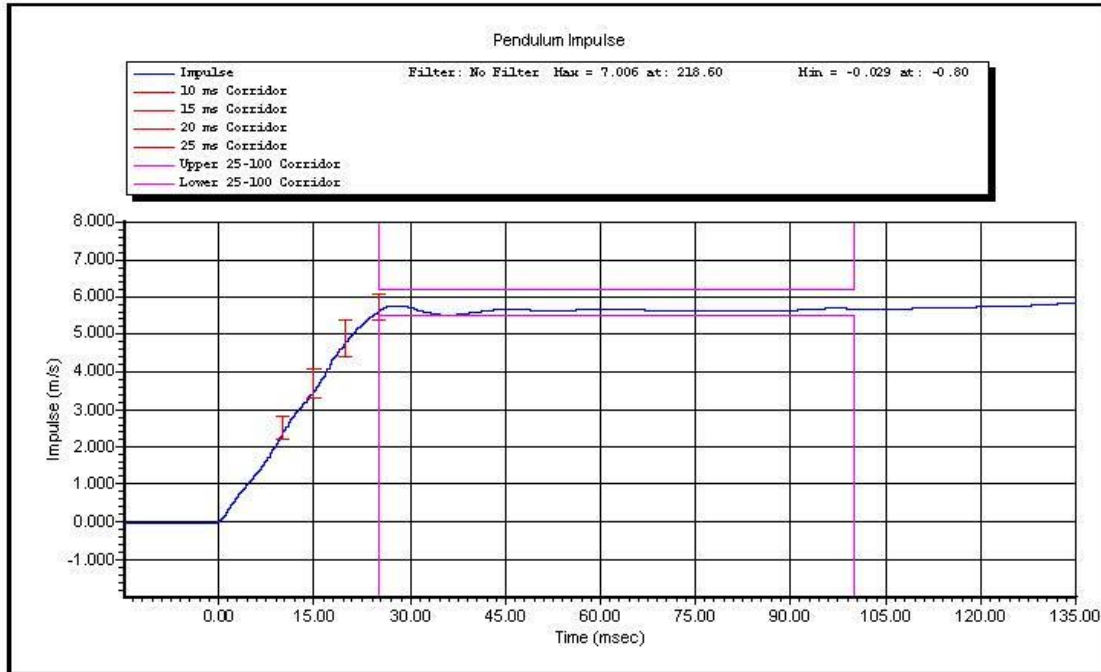
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Test ID:

Test Time: 11:23:20 AM

Test Date: 12/13/2011

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VERIFICATION REPORT

Test Name:	Shoulder Impact	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	12/13/2011
Test Number:	1	Test Time:	3:05:57 PM

Component Part Number	Component Serial Number
Left Arm 180-6011-1	DG3210
Shoulder Rib 180-3355	DG6997

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.70 deg C P
Humidity	10.0 -- 70.0	27.2 %RH P
Velocity	4.20 -- 4.40	4.39 m/s P
Probe Acceleration	13.0 -- 18.0	15.7 g P
Shoulder Deflection	28.0 -- 37.0	29.0 mm P
T1 Acceleration	17.0 -- 22.0	19.3 g P

All test parameters are within specifications

Technician: **S. Zito**

Supervisor: **D. Travale**

Test ID:

Test Time: **3:05:57 PM**

Test Date: **12/13/2011**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7264-2000	P66927	12/10/2011
FTSS	180-3881-1	DS-1845	9/1/2011
Endevco	7264-2000	P63561	10/3/2011

Test ID:

Test Time: 3:05:57 PM

Test Date: 12/13/2011

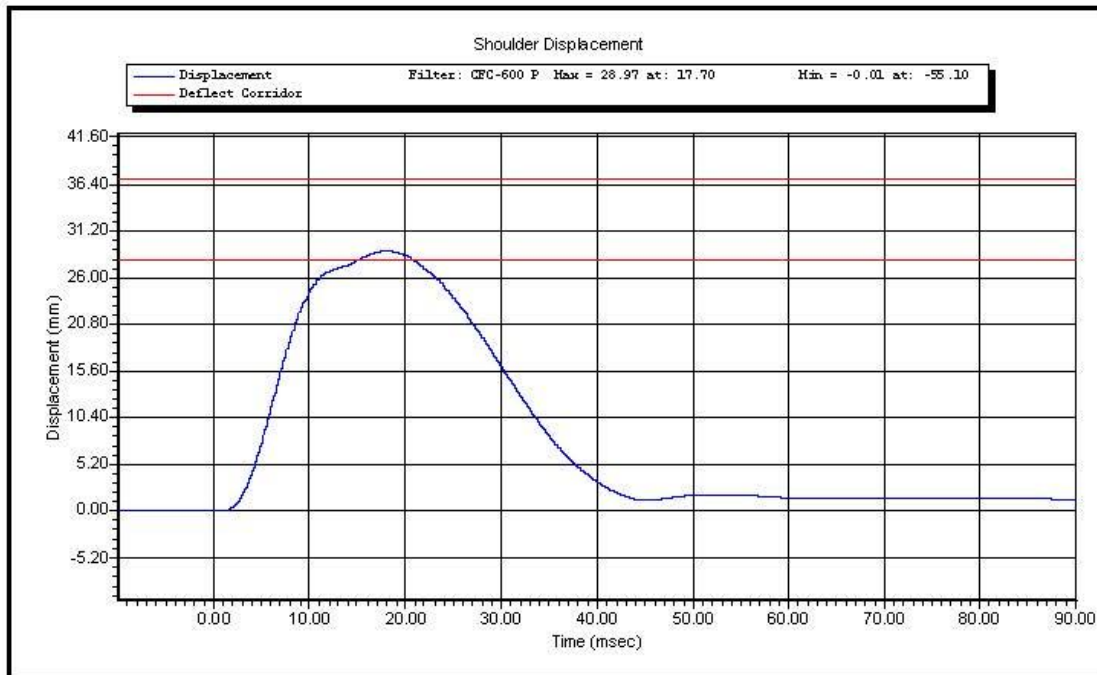


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Test Name:	Shoulder Impact	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	12/13/2011
Test Number:	1	Test Time:	3:05:57 PM



Test ID:

Test Time: 3:05:57 PM

Test Date: 12/13/2011

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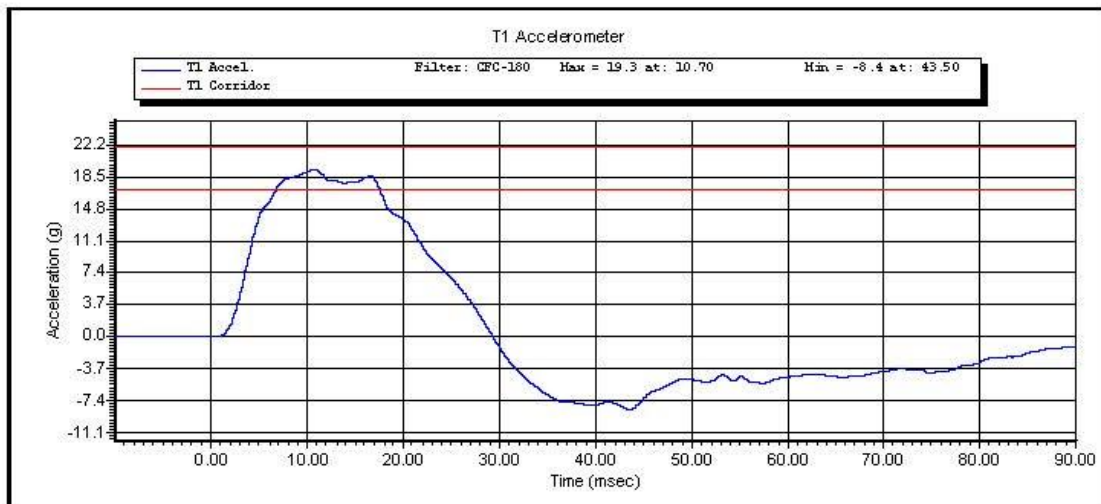
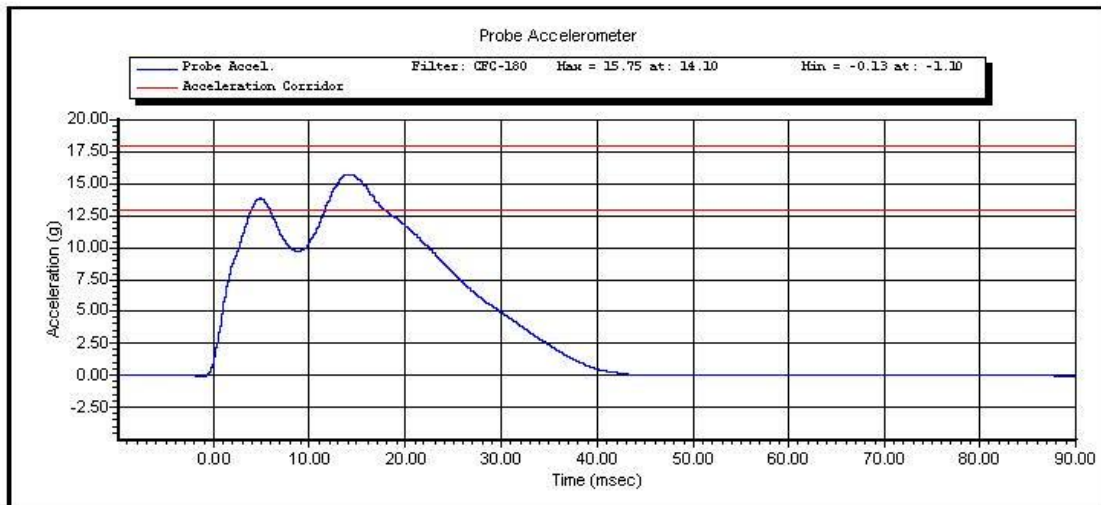
1 of 2



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Test ID:

Test Time: 3:05:57 PM

Test Date: 12/13/2011

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VERIFICATION REPORT

Test Name:	Thorax Impact with Arm	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	12/14/2011
Test Number:	1	Test Time:	8:16:58 PM

Component Part Number	Component Serial Number
Thorax Ribs 1, 2, 3 180-3362	DG6080, DG6081, DG7543
Shoulder Rib 180-3355	DG6997
Left Arm 180-6011-1	DG3210

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.9 deg C P
Humidity	10 -- 70	33 %RH P
Velocity	6.60 -- 6.80	6.72 m/s P
Probe Acceleration after 5ms	30.0 -- 36.0	32.7 g P
Upper Thorax Rib Deflection	25.0 -- 32.0	28.2 mm P
Mid Thorax Rib Deflection	30.0 -- 36.0	32.9 mm P
Lower Thorax Rib Deflection	32.0 -- 38.0	35.6 mm P
Upper Spine Acceleration ("y")	34.0 -- 43.0	40.1 g P
Lower Spine Acceleration ("y")	29.0 -- 37.0	32.4 g P
Shoulder Deflection	31.0 -- 40.0	34.5 mm P

All test parameters are within specifications

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

Test ID:

Test Time: **8:16:58 PM**

Test Date: **12/14/2011**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7231CT	AGHF5	12/14/2011
FTSS	180-3881-1	DS-1849	9/1/2011
Servo	180-3885	DS-1063	10/31/2011
FTSS	180-3881-1	DS-1859	9/1/2011
Endevco	7264-2000	P63561	10/3/2011
Endevco	7264-2000	P58796	10/5/2011
FTSS	180-3881-1	DS-1845	9/1/2011

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Test Date: 12/14/2011

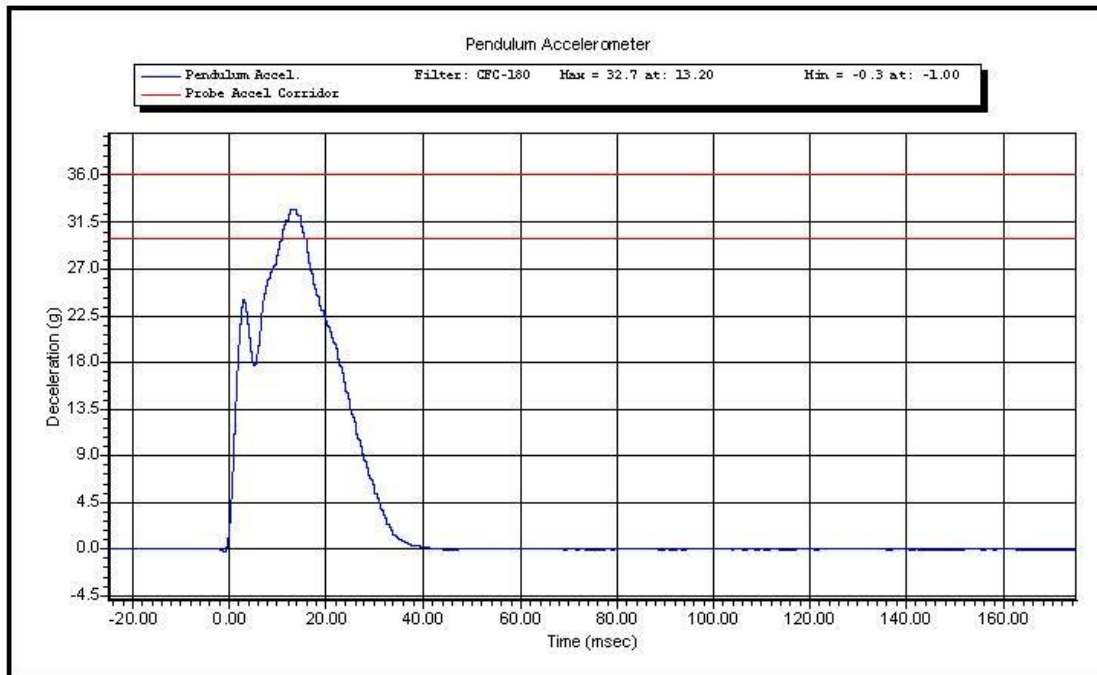


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Test Name:	Thorax Impact with Arm	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	12/14/2011
Test Number:	1	Test Time:	8:16:58 PM



Test ID:

Test Time: 8:16:58 PM

Test Date: 12/14/2011

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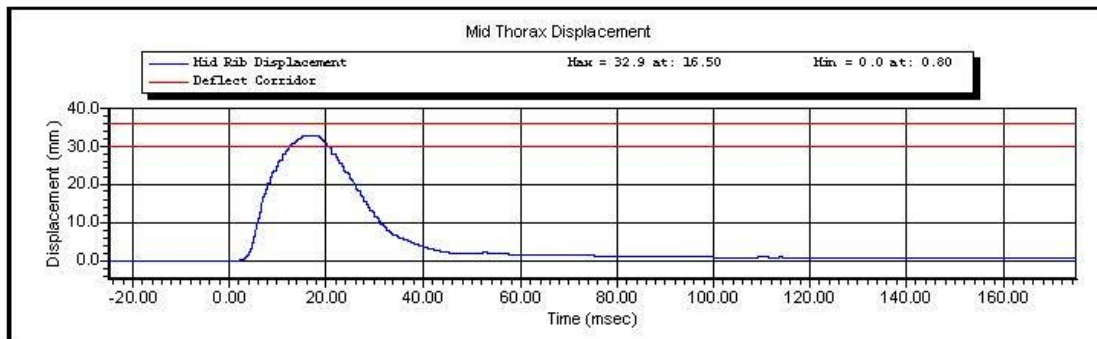
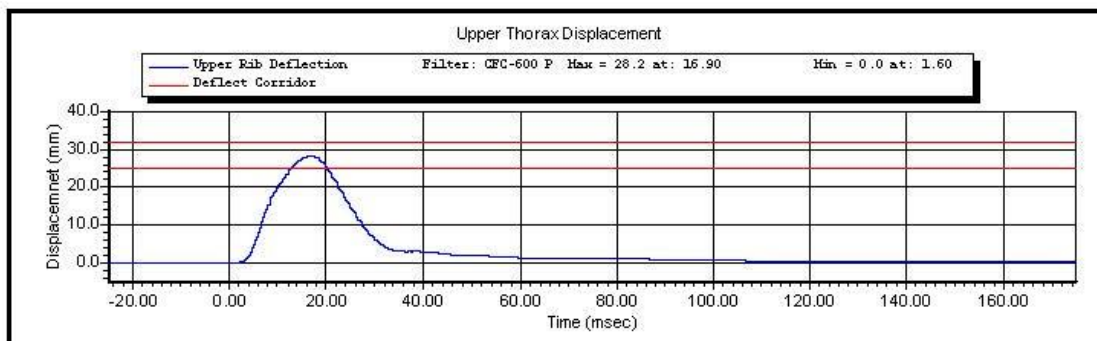
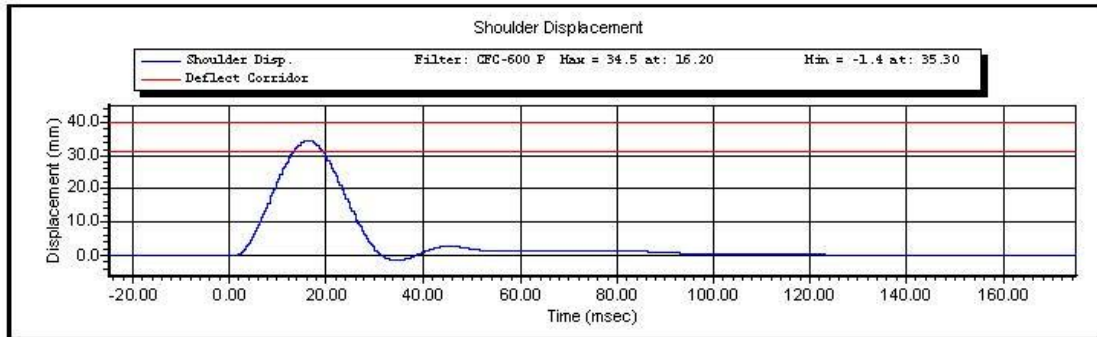
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Test Time: 8:16:58 PM

Test Date: 12/14/2011

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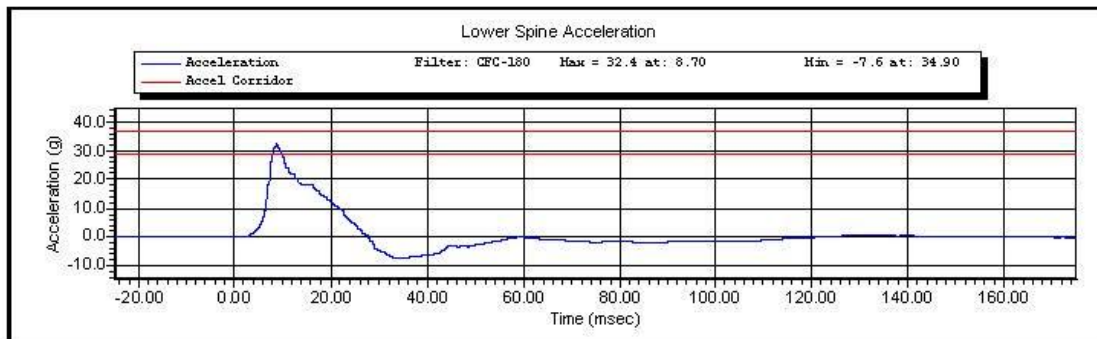
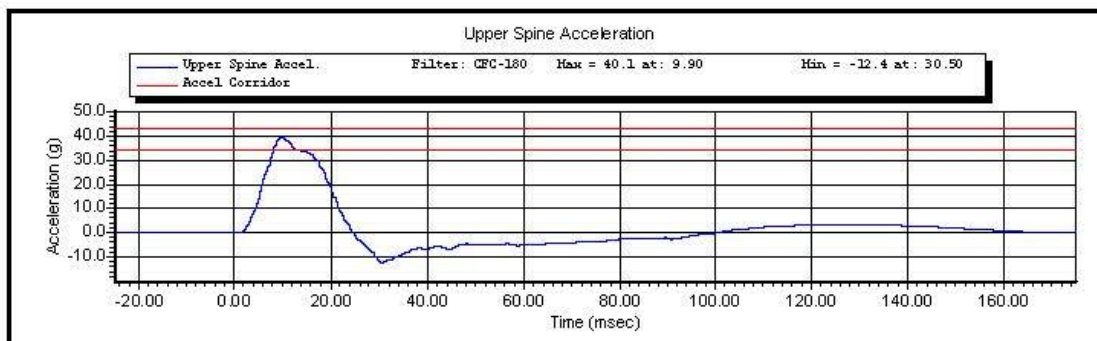
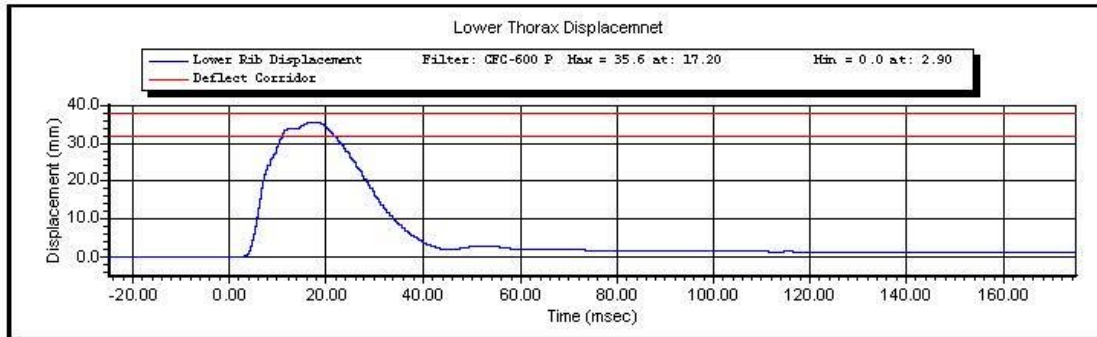
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Test ID:

Test Time: 8:16:58 PM

Test Date: 12/14/2011

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VERIFICATION REPORT

Test Name:	Thorax Impact without Arm	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	12/14/2011
Test Number:	1	Test Time:	7:39:51 PM

Component Part Number	Component Serial Number
Thorax Ribs 1, 2, 3 180-3362	DG6080, DG6081, DG7543

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.9 deg C P
Humidity	10 -- 70	32 %RH P
Velocity	4.20 -- 4.40	4.29 m/s P
Probe Acceleration	14.0 -- 18.0	16.5 g P
Upper Thorax Rib Deflection	32.0 -- 40.0	36.5 mm P
Mid Thorax Rib Deflection	39.0 -- 45.0	41.6 mm P
Lower Thorax Rib Deflection	35.0 -- 43.0	39.2 mm P
Upper Spine Acceleration T1	13.0 -- 17.0	15.3 g P
Lower Spine Acceleration T12	7.0 -- 11.0	10.3 g P

All test parameters are within specifications

Technician: **A. Rudniski**

Supervisor: **D. Travale**

Test ID:

Test Time: **7:39:51 PM**

Test Date: **12/14/2011**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7231CT	AGHF5	12/14/2011
FTSS	180-3881-1	DS-1849	9/1/2011
Servo	180-3885	DS-1063	10/31/2011
FTSS	180-3881-1	DS-1859	9/1/2011
Endevco	7264-2000	P63561	10/3/2011
Endevco	7264-2000	P58796	10/5/2011

Test ID:

Test Time: 7:39:51 PM

Test Date: 12/14/2011

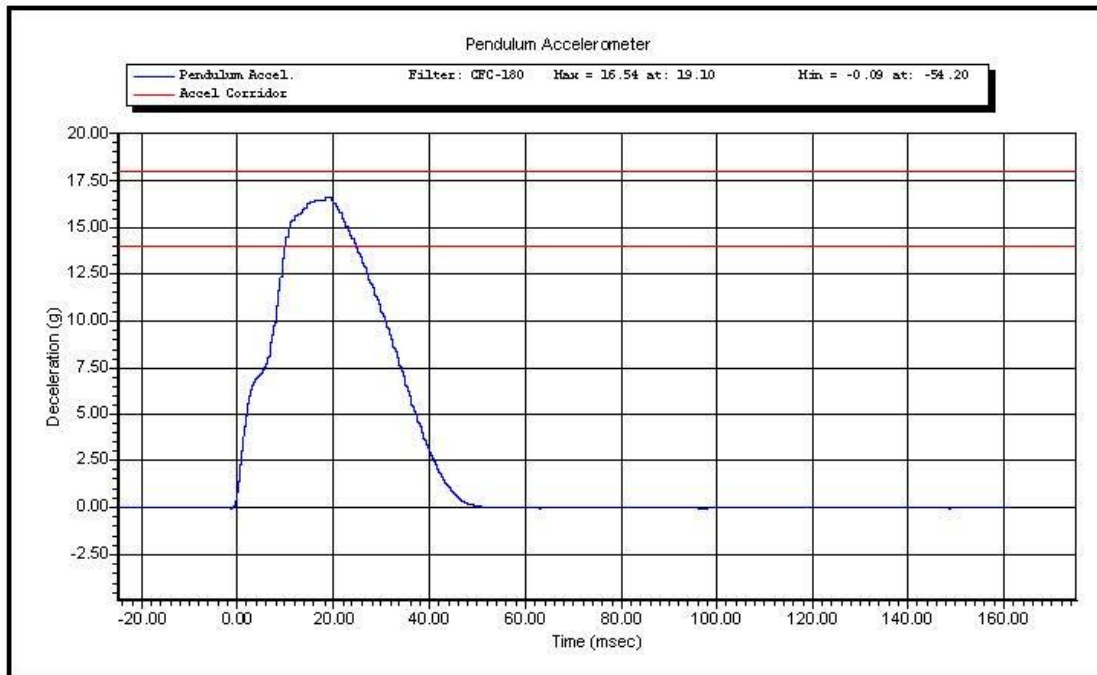


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Test Name:	Thorax Impact without Arm	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	12/14/2011
Test Number:	1	Test Time:	7:39:51 PM



Test ID:

Test Time: 7:39:51 PM

Test Date: 12/14/2011

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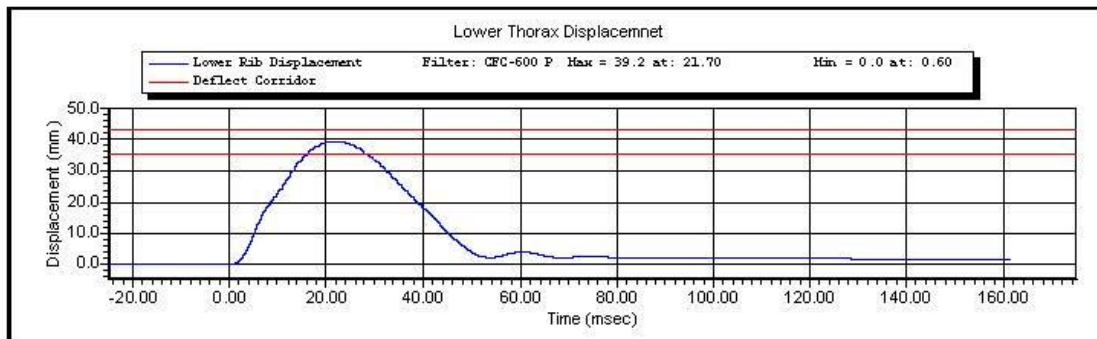
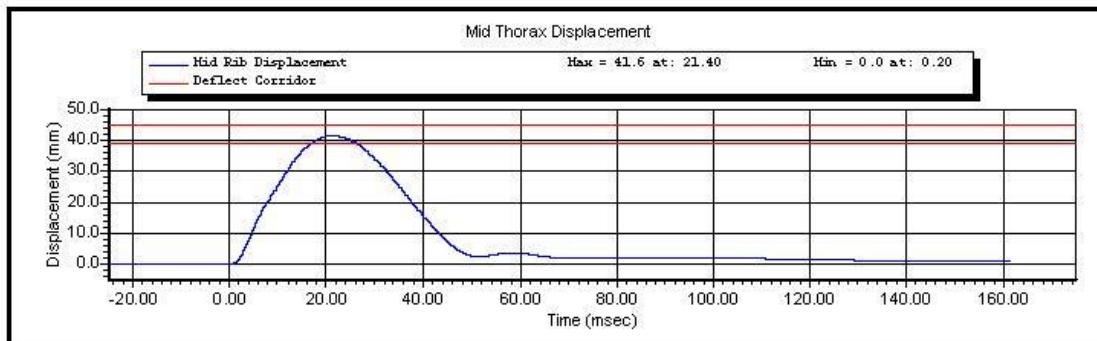
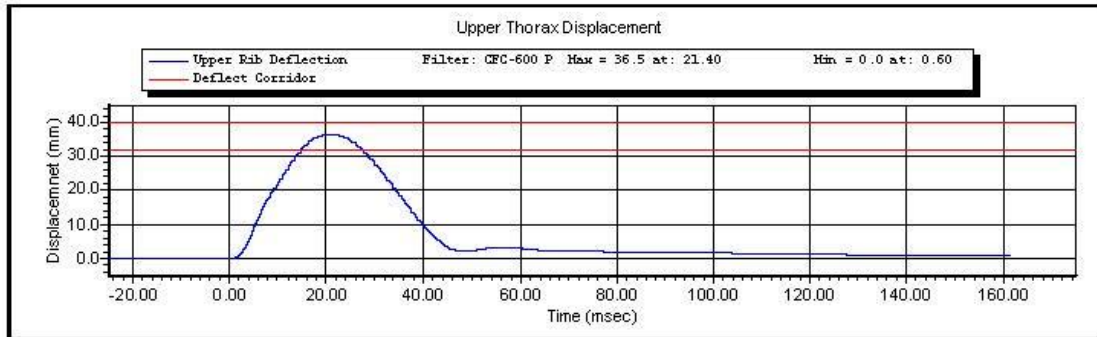
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Test Time: 7:39:51 PM

Test Date: 12/14/2011

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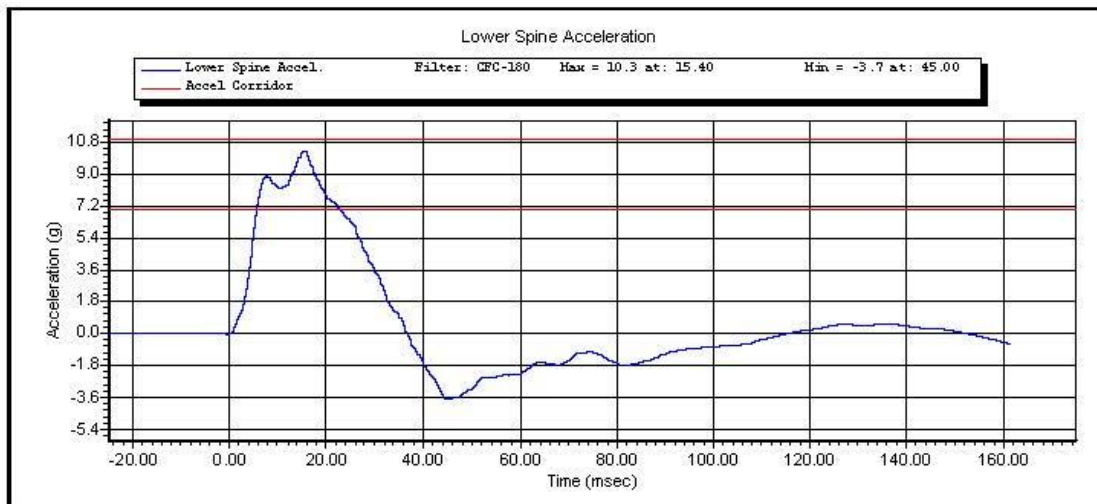
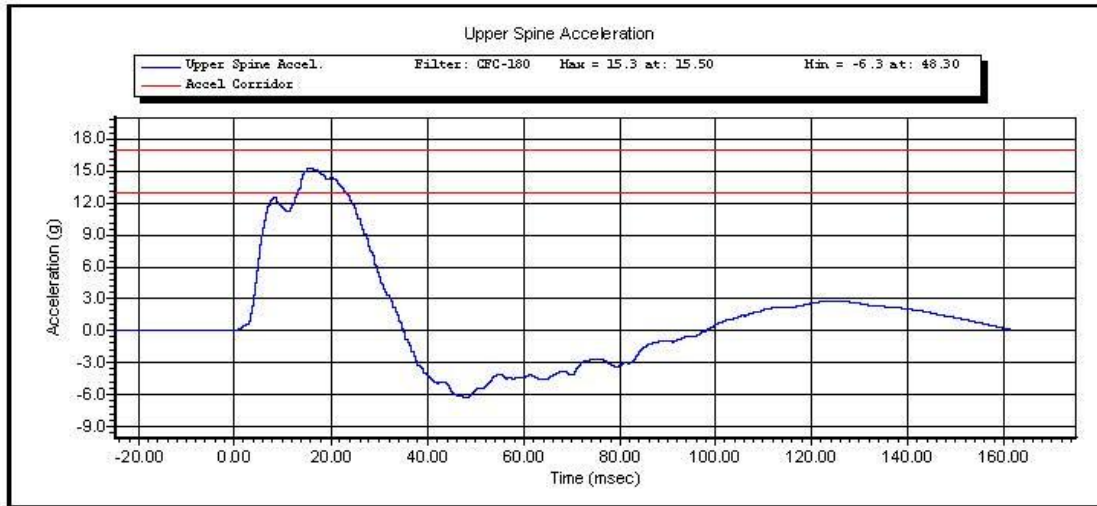
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Test ID:

Test Time: 7:39:51 PM

Test Date: 12/14/2011

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VERIFICATION REPORT

Test Name:	Abdominal Impact	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	12/14/2011
Test Number:	1	Test Time:	9:02:40 AM

Component Part Number	Component Serial Number
Thorax Ribs 4, 5	1761, DG7012

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.4 deg C P
Humidity	10 -- 70	26 %RH P
Velocity	4.20 -- 4.40	4.37 m/s P
Probe Acceleration	12.0 -- 16.0	14.2 g P
Upper Abdominal Rib Deflection	36.0 -- 47.0	44.2 mm P
Lower Abdominal Rib Deflection	33.0 -- 44.0	42.4 mm P
Lower Spine Acceleration - T12	9.0 -- 14.0	10.7 g P

All test parameters are within specifications

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

Test ID:

Test Time: **9:02:40 AM**

Test Date: **12/14/2011**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7264-2000	P66927	12/10/2011
FTSS	180-3881-1	DS-1860	9/1/2011
FTSS	180-3881-1	DS-1861	9/1/2011
Endevco	7264-2000	P58796	10/5/2011

Test ID:

Test Time: 9:02:40 AM

Test Date: 12/14/2011

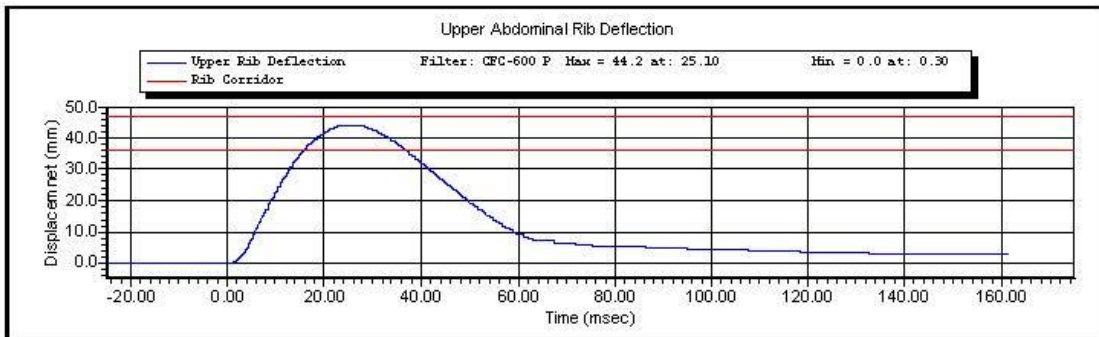
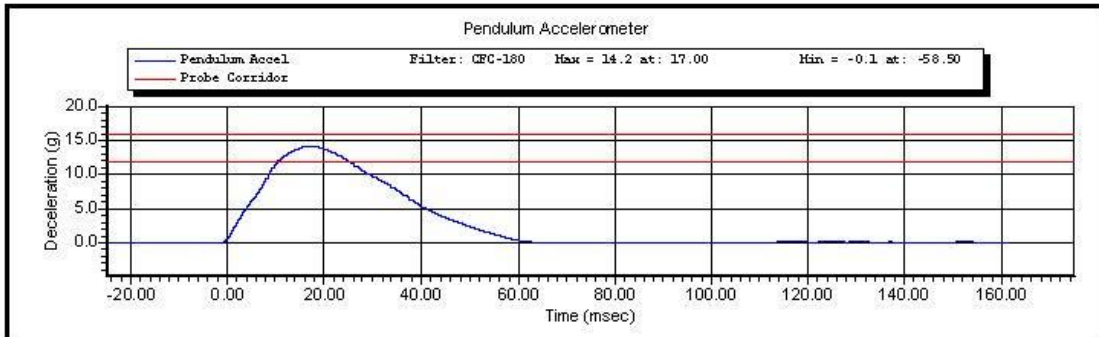


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Test Name:	Abdominal Impact	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	12/14/2011
Test Number:	1	Test Time:	9:02:40 AM



Test ID:

Test Time: 9:02:40 AM

Test Date: 12/14/2011

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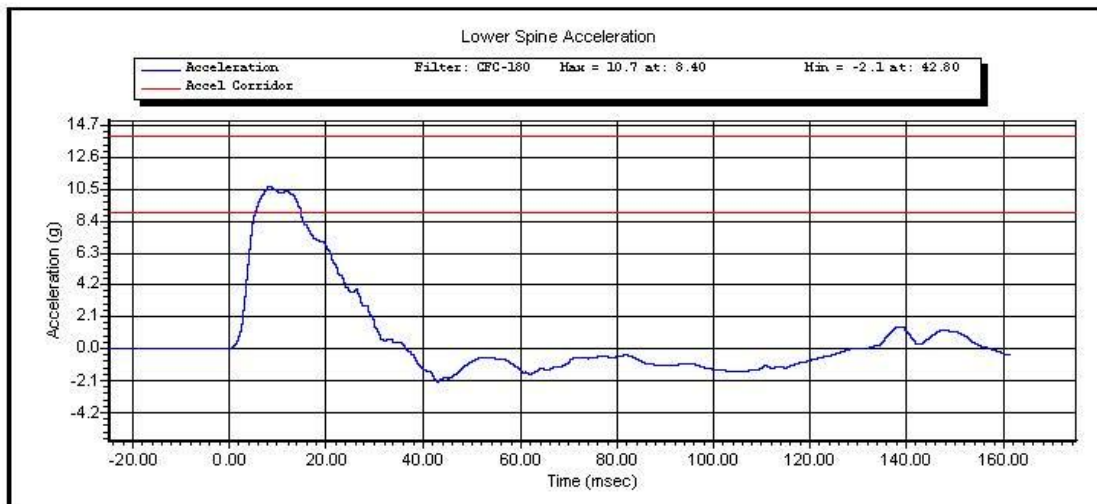
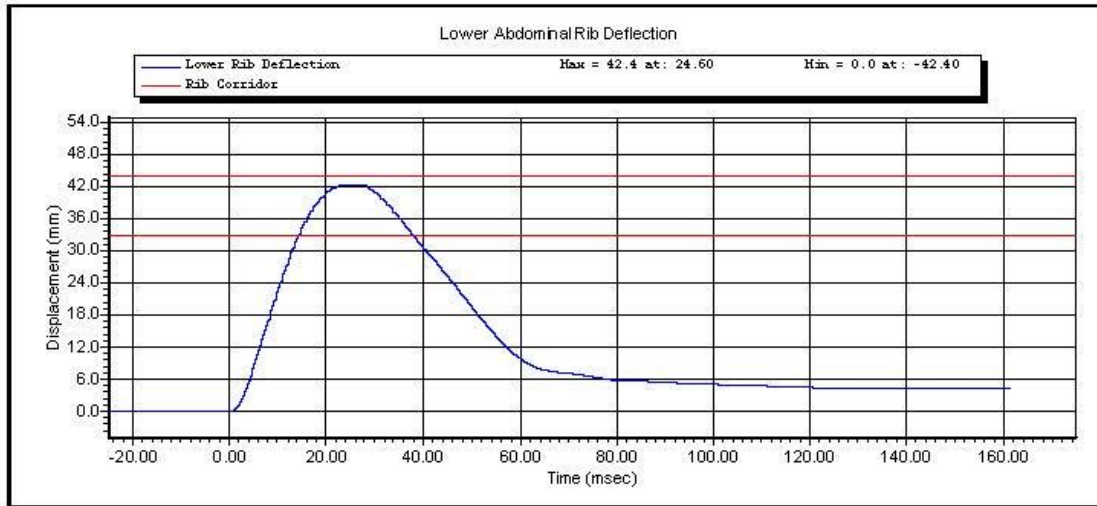
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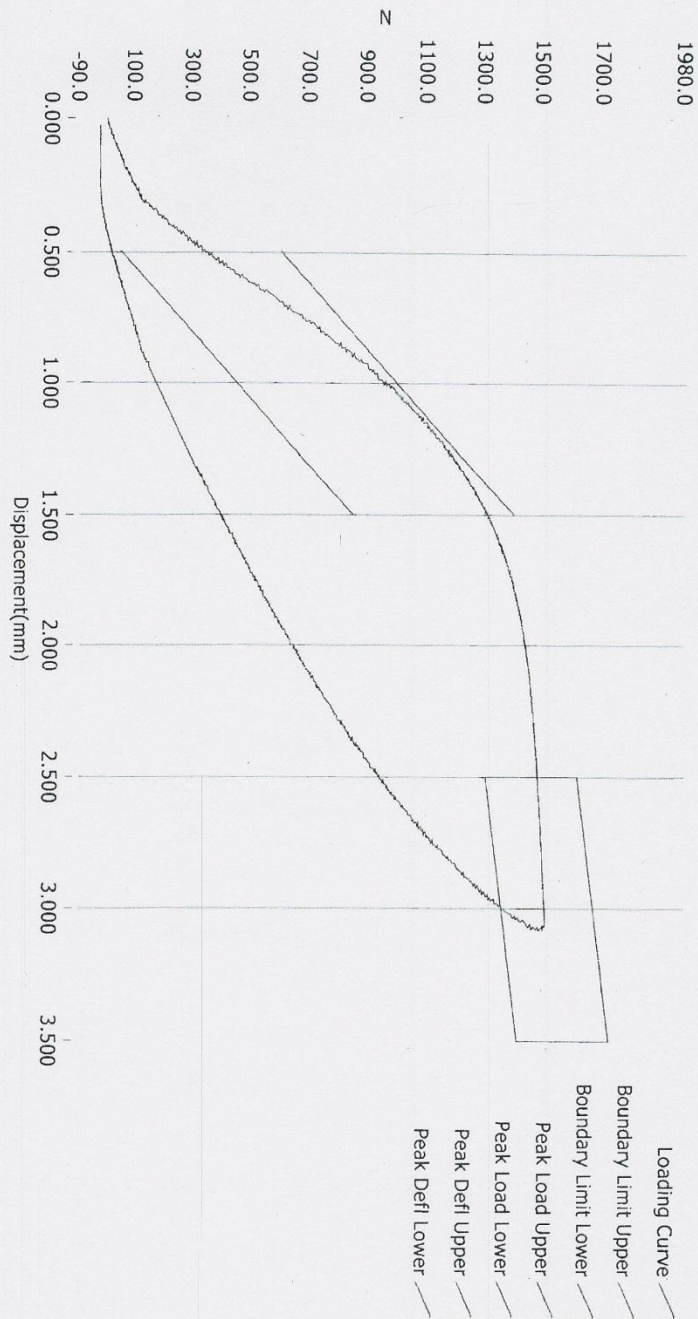
Test Time: 9:02:40 AM

Test Date: 12/14/2011

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2 of 2

Resultant Data - SIDIIs Plug Compression



ATD Calibration Lab

Test ID

Part Serial Number

Test Date

Test Time

Cert ID

ATD Serial Number

ATD Type

36285

SIDIIs

9/22/2010

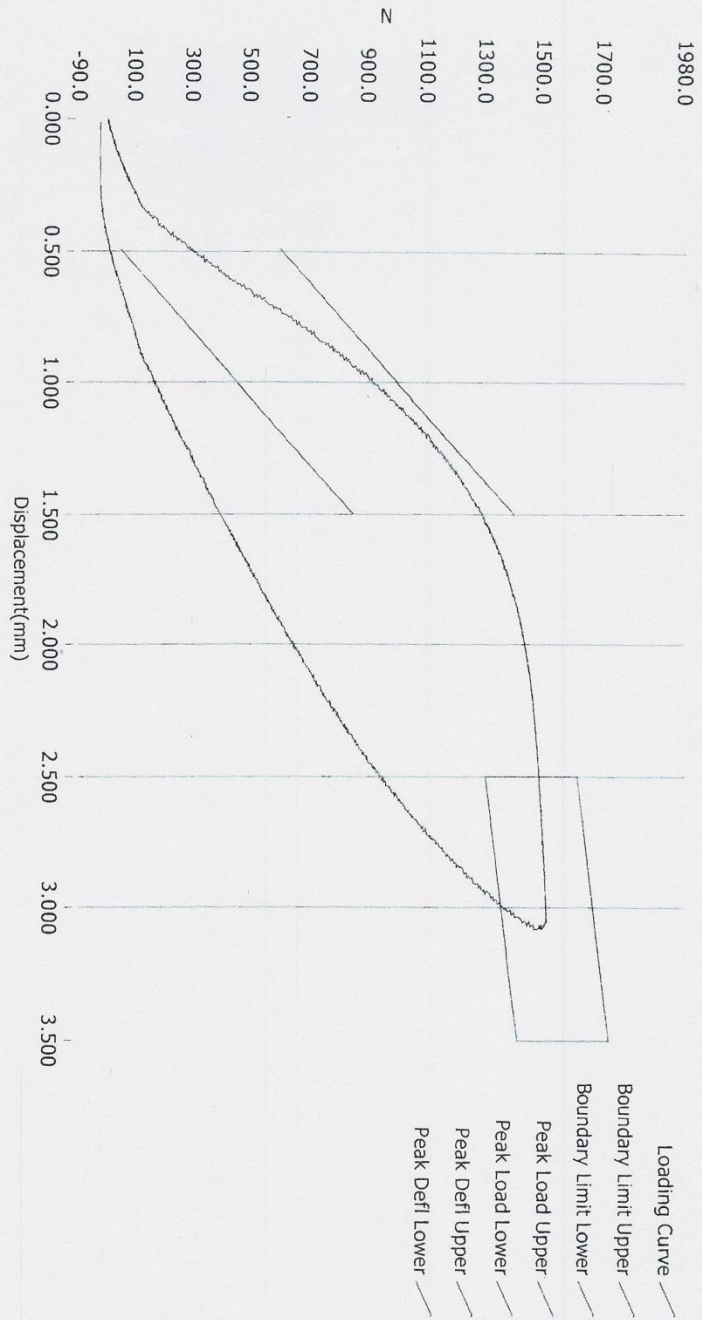
11:13 AM

Current Date : 9/22/2010

Current Time : 11:15:08

CERT

Resultant Data - SIDIIS Plug Compression



ATD Calibration Lab

Test ID	Part Serial Number	Test Date	Test Time
Cert ID	ATD Serial Number	ATD Type	
	36326	SIDIIS	

Current Date : 9/22/2010

Current Time : 14:01:08



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VERIFICATION REPORT

Test Name:	Pelvis	Revision:	8/24/2009
Sub Test Name:	Acetabulum Impact	Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	12/14/2011
Test Number:	1	Test Time:	9:31:09 AM

Component Part Number	Component Serial Number
180-4343 Pelvis Flesh	DG3207
Humanetics Cert Plug	36326
Humanetics Test Plug	36285

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.2 deg C P
Humidity	10 -- 70	27 %RH P
Velocity	6.60 -- 6.80	6.61 m/s P
Peak Probe Acceleration	38.0 -- 47.0	45.1 g P
Peak Pelvis Acceleration	34.0 -- 42.0	41.3 g P
Peak Acetabulum Force	3.60 -- 4.30	3.77 kN P

All test parameters are within specifications

Technician: **S. Zito**

Supervisor: **D. Travale**

Test ID:

Test Time: **9:31:09 AM**

Test Date: **12/14/2011**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7264-2000	P66927	12/10/2011
Endevco	7264-2000	P51875	9/29/2011
DentonATD	3249J	LC-267Fy	10/30/2011

Test ID:

Test Time: **9:31:09 AM**

Test Date: **12/14/2011**

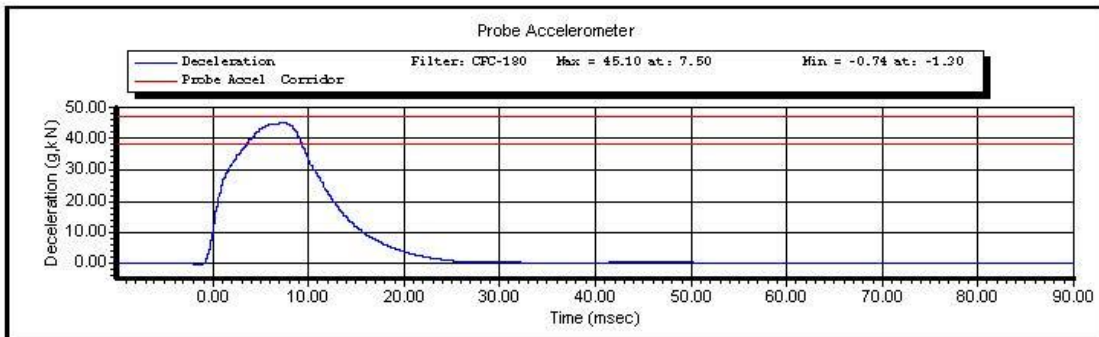
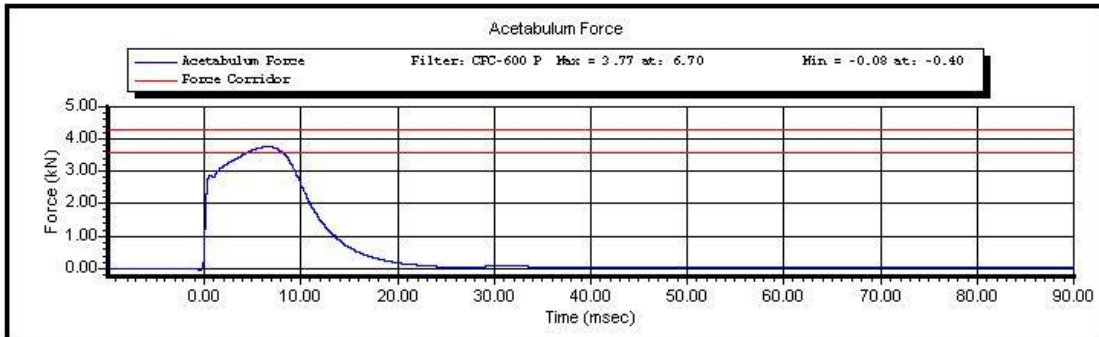


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Test Name:	Pelvis	Revision:	8/24/2009
Sub Test Name:	Acetabulum Impact	Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	12/14/2011
Test Number:	1	Test Time:	9:31:09 AM



Test ID:

Test Time: **9:31:09 AM**

Test Date: **12/14/2011**

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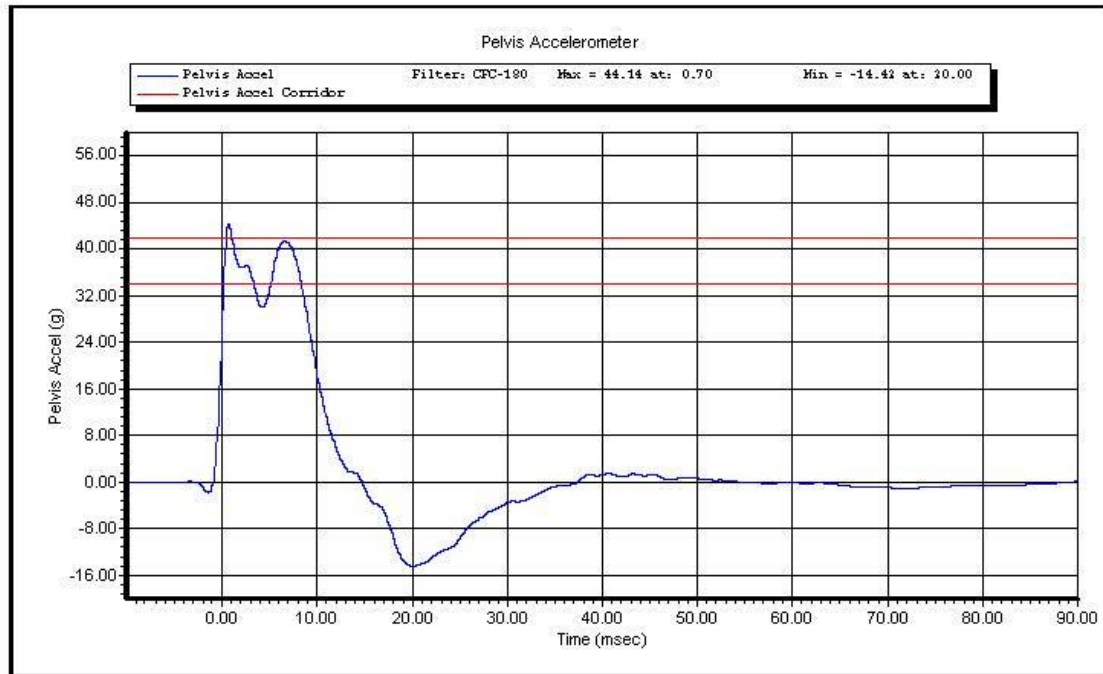
1 of 2



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Test ID:

Test Time: **9:31:09 AM**

Test Date: **12/14/2011**

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VERIFICATION REPORT

Test Name:	Pelvis	Revision:	8/24/2009
Sub Test Name:	Iliac Impact	Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	12/13/2011
Test Number:	1	Test Time:	2:22:21 PM

Component Part Number	Component Serial Number
180-4343 Pelvis Flesh	DG3207

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.8 deg C P
Humidity	10 -- 70	31 %RH P
Velocity	4.20 -- 4.40	4.33 m/s P
Peak Probe Acceleration	36.0 -- 45.0	44.6 g P
Peak Pelvis Acceleration	28.0 -- 39.0	35.1 g P
Peak Iliac Force	4.10 -- 5.10	5.04 kN P

All test parameters are within specifications

Technician: **S. Zito**

Supervisor: **D. Travale**

Test ID:

Test Time: **2:22:21 PM**

Test Date: **12/13/2011**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7264-2000	P66927	12/10/2011
Endevco	7264-2000	P51875	9/29/2011
DentonATD	3228J	LC-281Fy	8/31/2011

Test ID:

Test Time: 2:22:21 PM

Test Date: 12/13/2011

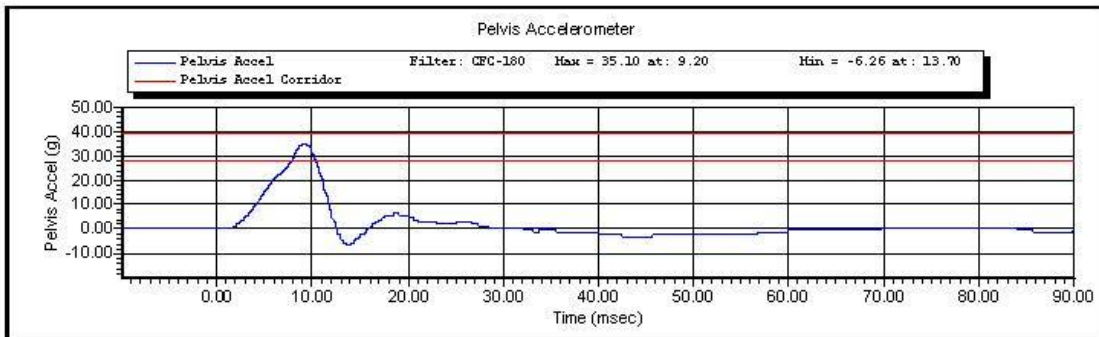
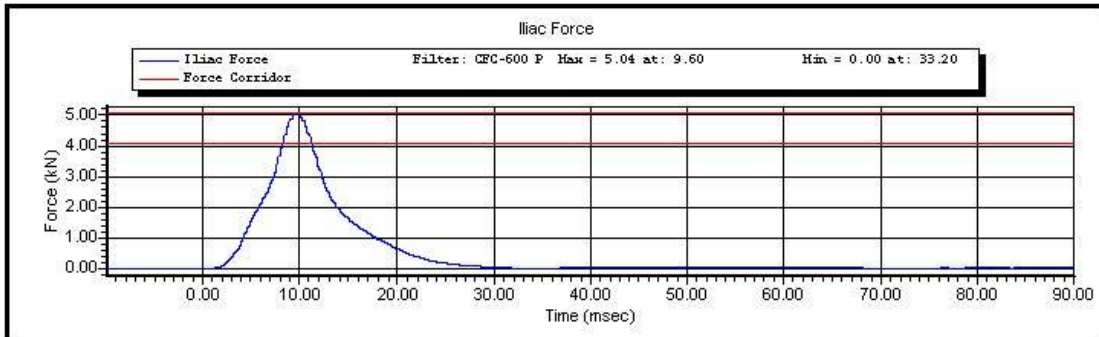


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Test Name:	Pelvis	Revision:	8/24/2009
Sub Test Name:	Iliac Impact	Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	12/13/2011
Test Number:	1	Test Time:	2:22:21 PM



Test ID:

Test Time: **2:22:21 PM**

Test Date: **12/13/2011**

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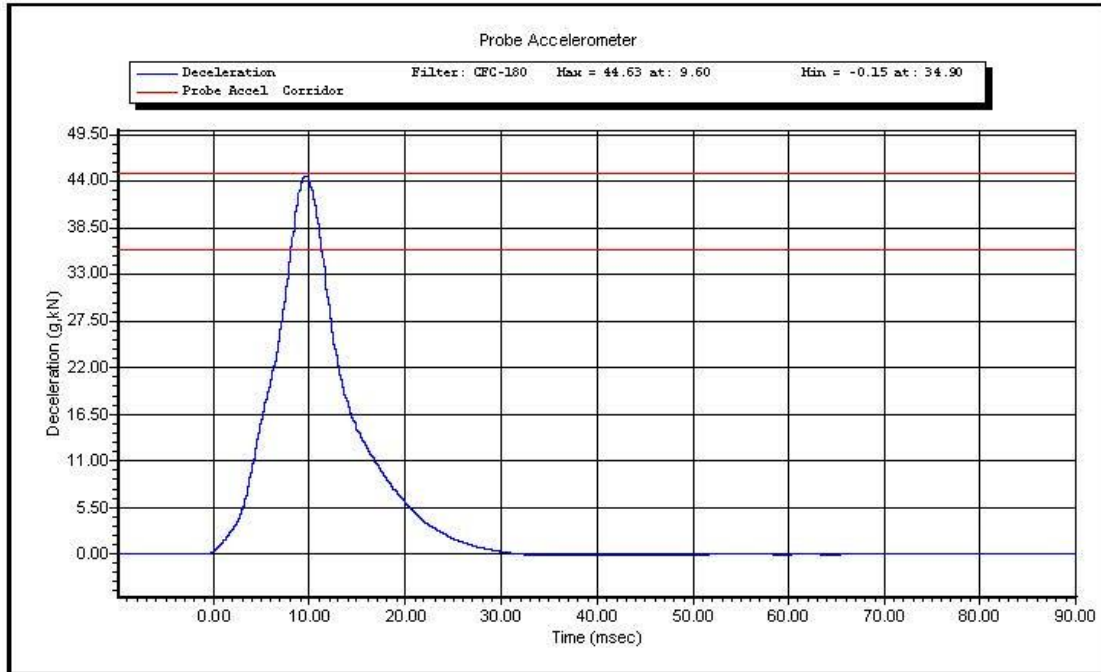
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Test ID:

Test Time: 2:22:21 PM

Test Date: 12/13/2011

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2 of 2

CALIBRATION TEST RESULTS

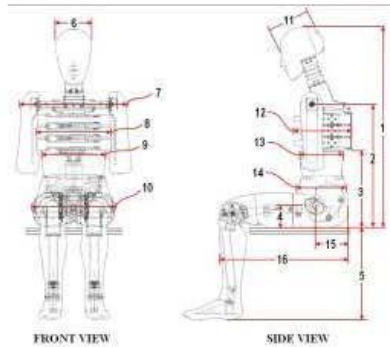
POST-TEST

ES2-re No: F034

CONFIGURED FOR LEFT SIDE IMPACT

ES-2re External Measurements

NHTSA S/N F034



Dim. No.	Description	Specification (mm)	Result (mm)	Pass/Fail
1	Sitting Height	900-918	912	Pass
2	Seat to Shoulder Joint	558-572	565	Pass
3	Seat to Lower Face of Thoracic Spine Box	346-356	354	Pass
4	Seat to Hip Joint (center of bolt)	97-103	101	Pass
5	Sole to Seat, Sitting	433-451	445	Pass
6	Head Width	152-158	155	Pass
7	Shoulder/Arm Width	461-479	464	Pass
8	Thorax Width	322-332	324	Pass
9	Abdomen Width	273-287	285	Pass
10	Pelvis/Lap Width	359-373	370	Pass
11	Head Depth	196-206	201	Pass
12	Thorax Depth	262-272	268	Pass
13	Abdomen Depth	194-204	202	Pass
14	Pelvis Depth	235-245	237	Pass
15	Back of Buttocks to Hip Joint (center of bolt)	150-160	155	Pass
16	Back of Buttocks to Front Knee	597-615	604	Pass

Technician: AR

Date: 12/22/2011



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VERIFICATION REPORT

Test Name:	Head Drop	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:		Test Date:	12/21/2011
Test Number:	1	Test Time:	3:13:06 PM

Component Part Number	Component Serial Number
455-1007	1916409

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.0 deg C P
Humidity	10 -- 70	44 %RH P
Resultant Acceleration	125 -- 155	136 g P
Oscillation	0.0 -- 15.0	0.0 % P
Fore-Aft Acceleration	-15.00 -- 15.00	5.86 g P

All test parameters are within specifications

Technician: S. Zito

Supervisor: D. Travale

Test ID:

Test Time: **3:13:06 PM**

Test Date: **12/21/2011**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Endevco	7264-2000	P71271	8/12/2011
Endevco	7264-2000	P71281	8/12/2011
Endevco	7264-2000	P71298	8/12/2011

Test ID:

Test Time: **3:13:06 PM**

Test Date: **12/21/2011**

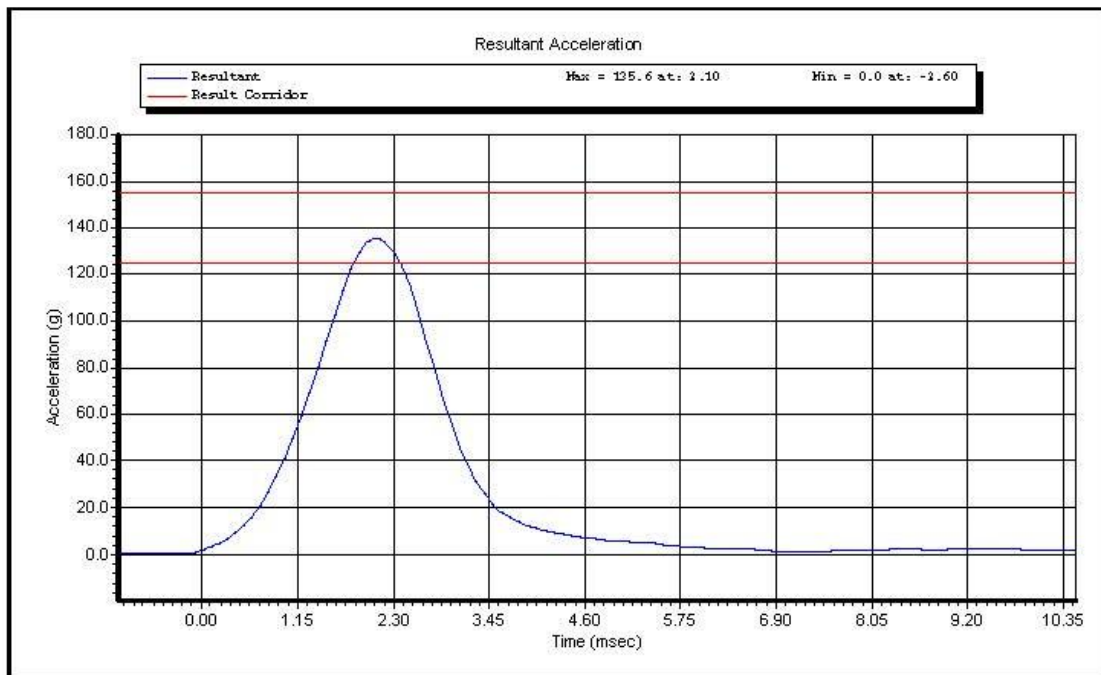


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Test Name:	Head Drop	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:		Test Date:	12/21/2011
Test Number:	1	Test Time:	3:13:06 PM



Test ID:

Test Time: 3:13:06 PM

Test Date: 12/21/2011

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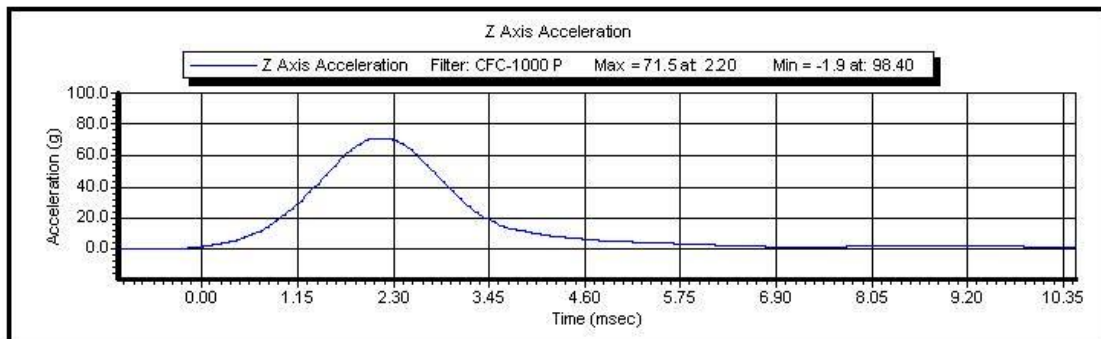
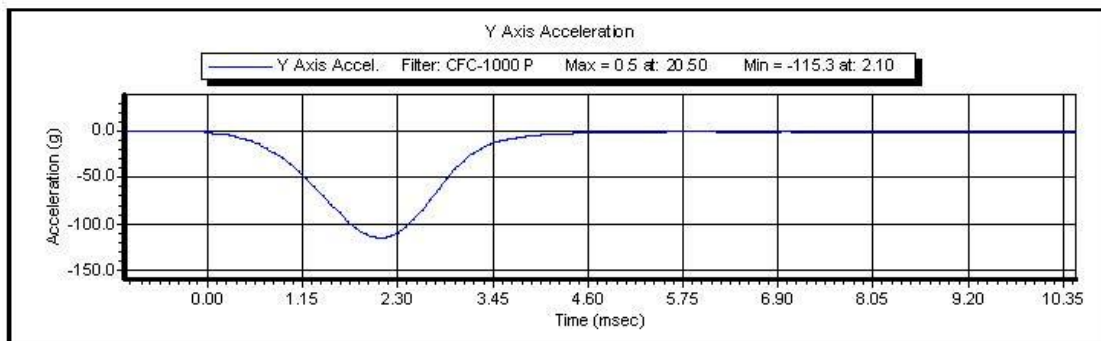
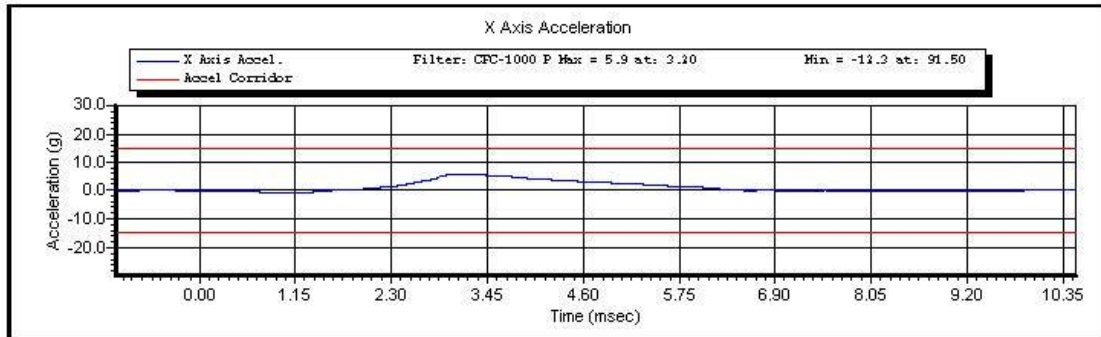
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Test ID:

Test Time: 3:13:06 PM

Test Date: 12/21/2011

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VERIFICATION REPORT

Test Name:	Neck Flexion	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:		Test Date:	12/22/2011
Test Number:	3	Test Time:	10:59:08 AM

Component Part Number	Component Serial Number
455-2002	07066

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.8 deg C P
Humidity	10 -- 70	34 %RH P
Velocity	3.30 -- 3.50	3.46 m/s P
Maximum Neck Flexion Angle	49.0 -- 59.0	50.9 degrees P
Time At Maximum Neck Flexion	54.0 -- 66.0	61.2 ms P
Decay to Zero Degrees	53.0 -- 88.0	63.0 ms P
Velocity Corridor	--	P

All test parameters are within specifications

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

Test ID:

Test Time: **10:59:08 AM**

Test Date: **12/22/2011**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7231CT	C16510	10/3/2011
DentonATD	7000428	094	4/25/2011
DentonATD	7000428	095	4/25/2011
DentonATD	7000428	093	4/25/2011

Test ID:

Test Time: 10:59:08 AM

Test Date: 12/22/2011

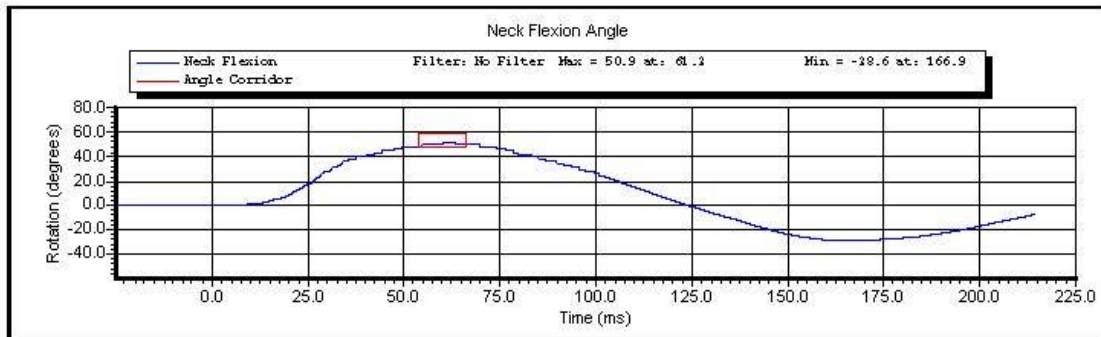
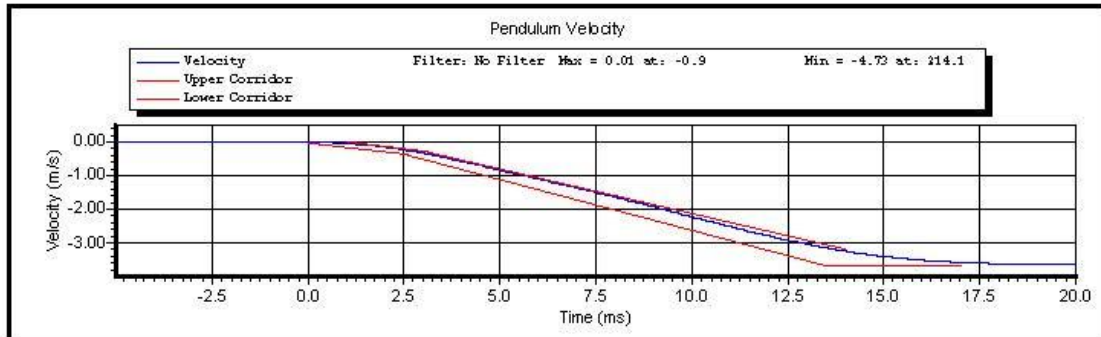


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Test Name:	Neck Flexion	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:		Test Date:	12/22/2011
Test Number:	3	Test Time:	10:59:08 AM



Test ID:

Test Time: 10:59:08 AM

Test Date: 12/22/2011

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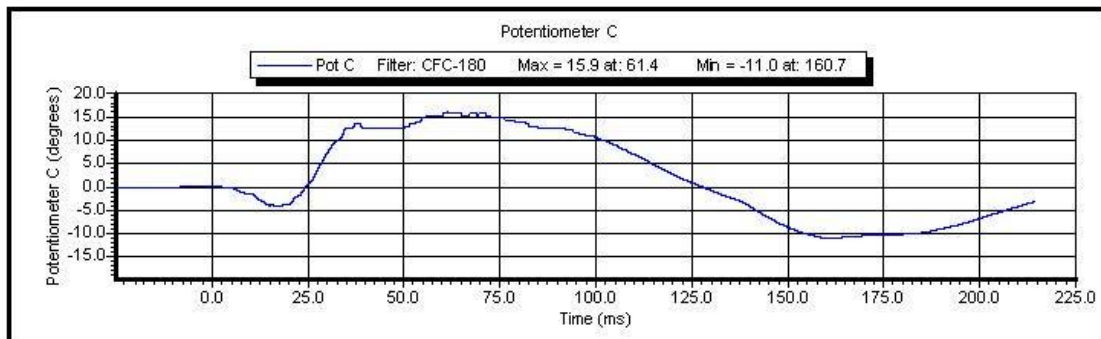
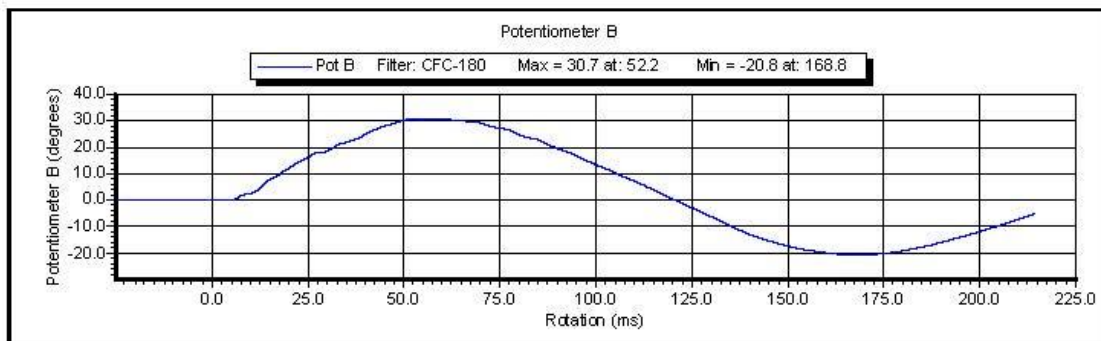
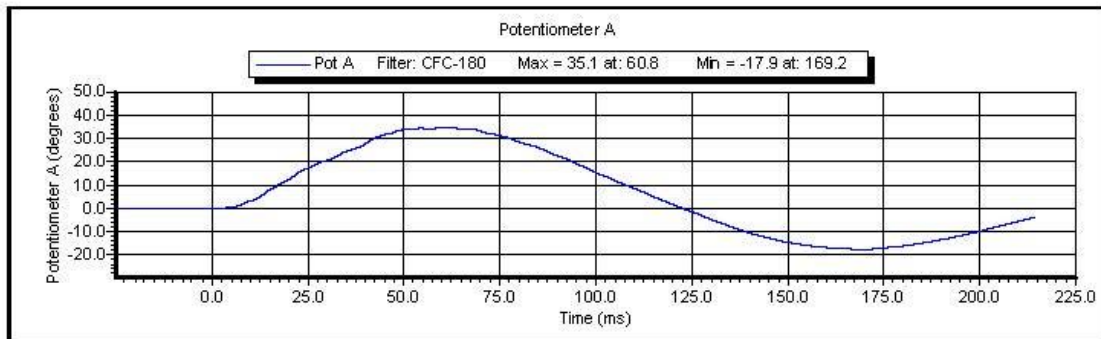
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Test ID:

Test Time: 10:59:08 AM

Test Date: 12/22/2011

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VERIFICATION REPORT

Test Name:	Shoulder Impact	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:		Test Date:	1/4/2012
Test Number:	1	Test Time:	11:18:44 AM

Component Part Number	Component Serial Number
960715-313	

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.2 deg C P
Humidity	10.0 -- 70.0	17.0 %RH P
Velocity	4.20 -- 4.40	4.22 m/s P
Pendulum Acceleration	-10.50 -- -7.50	-10.30 g P

All test parameters are within specifications

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

Test ID:

Test Time: **11:18:44 AM**

Test Date: **1/4/2012**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7231CT	AGHF5	1/3/2012

Test ID:

Test Time: 11:18:44 AM

Test Date: 1/4/2012

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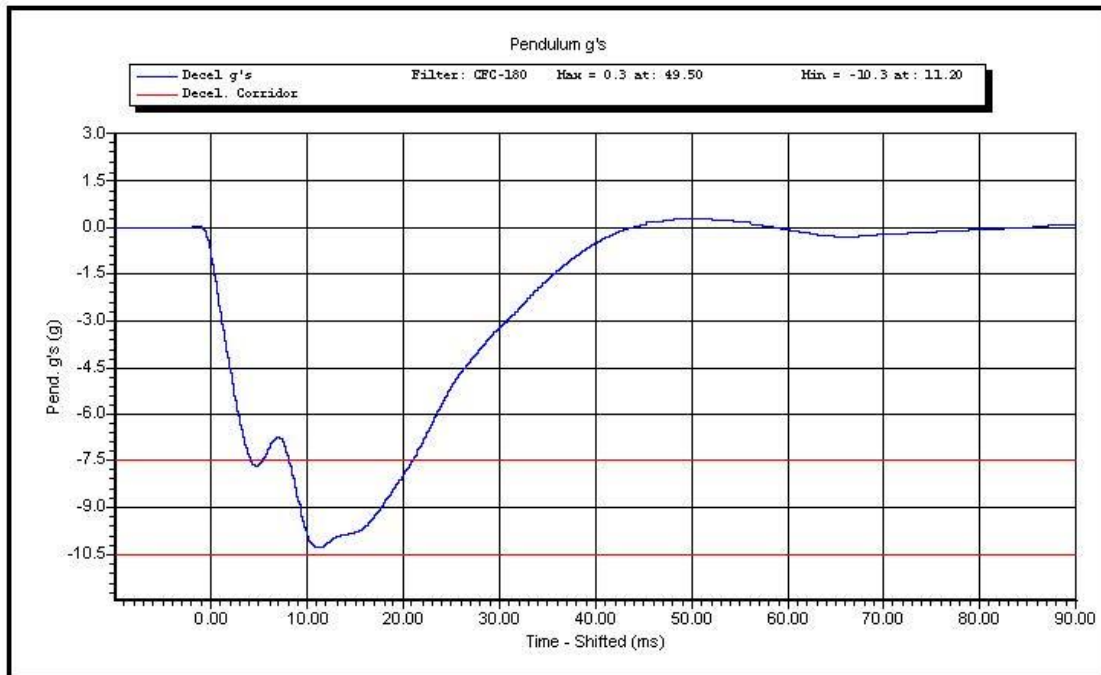


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Test Name:	Shoulder Impact	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:		Test Date:	1/4/2012
Test Number:	1	Test Time:	11:18:44 AM



Test ID:

Test Time: 11:18:44 AM

Test Date: 1/4/2012

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VERIFICATION REPORT

Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	4.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:	Upper Rib 4 m/s	Test Date:	1/3/2012
Test Number:	1	Test Time:	10:56:37 AM

Component Part Number	Component Serial Number
455-3100	07203

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.5 deg C P
Humidity	10.0 -- 70.0	17.0 %RH P
Velocity	3.90 -- 4.10	3.96 m/s P
Rib Displacement	-51.00 -- -46.00	-48.24 mm P
Drop Height	807.0 -- 823.0	815.0 mm P

All test parameters are within specifications

Technician: **A. Rudniski**

Supervisor: **D. Travale**

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

Test Time: **10:56:37 AM**

Test Date: **1/3/2012**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Honeywell	MLT-38000	DS-183	8/31/2011
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7264-2000	P32222	10/14/2011

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

Test Time: **10:56:37 AM**

Test Date: **1/3/2012**

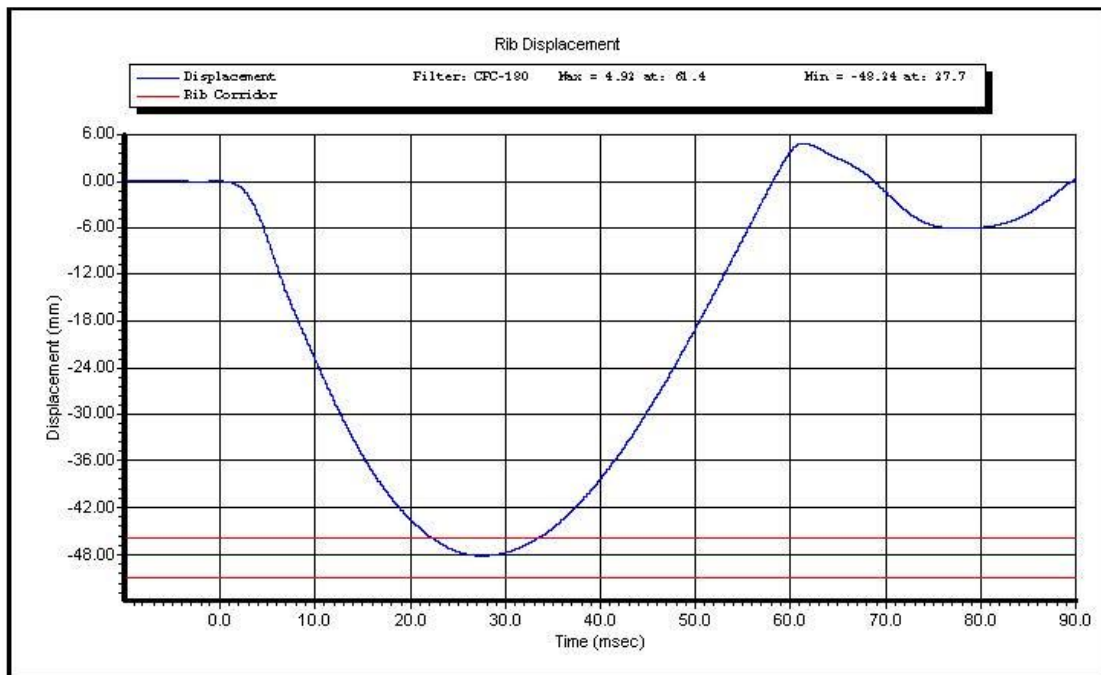


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Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	4.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:	Upper Rib 4 m/s	Test Date:	1/3/2012
Test Number:	1	Test Time:	10:56:37 AM



Test ID: Upper Rib 4 m/s Test Time: 10:56:37 AM

Test Date: 1/3/2012

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VERIFICATION REPORT

Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	3.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:	Upper Rib 3 m/s	Test Date:	1/3/2012
Test Number:	1	Test Time:	11:06:55 AM

Component Part Number	Component Serial Number
455-3100	07203

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.5 deg C P
Humidity	10.0 -- 70.0	17.0 %RH P
Velocity	2.90 -- 3.10	2.97 m/s P
Rib Displacement	-40.00 -- -36.00	-37.62 mm P
Drop Height	454 -- 464	459 mm P

All test parameters are within specifications

Technician: **A. Rudniski**

Supervisor: **D. Travale**

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

Test Time: **11:06:55 AM**

Test Date: **1/3/2012**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Honeywell	MLT-38000	DS-183	8/31/2011
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7264-2000	P32222	10/14/2011

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

Test Time: **11:06:55 AM**

Test Date: **1/3/2012**

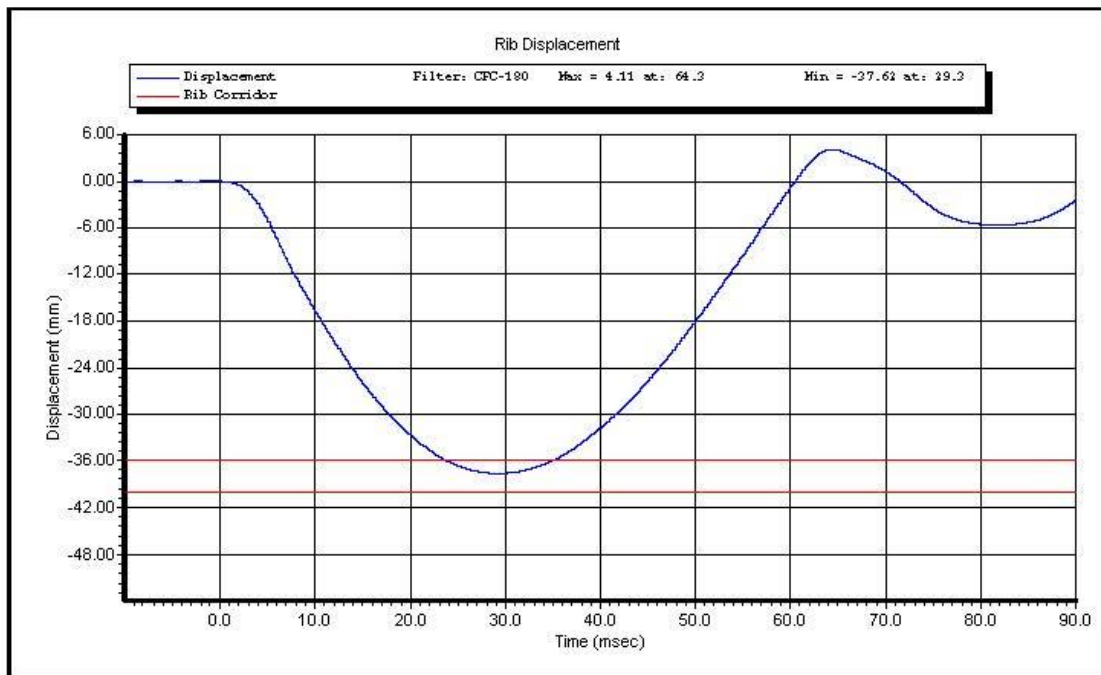


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Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	3.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:	Upper Rib 3 m/s	Test Date:	1/3/2012
Test Number:	1	Test Time:	11:06:55 AM



Test ID: Upper Rib 3 m/s Test Time: 11:06:55 AM

Test Date: 1/3/2012

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VERIFICATION REPORT

Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	4.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:	Middle Rib 4 m/s	Test Date:	1/3/2012
Test Number:	1	Test Time:	11:17:54 AM

Component Part Number	Component Serial Number
455-3100	07205

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.5 deg C P
Humidity	10.0 -- 70.0	17.0 %RH P
Velocity	3.90 -- 4.10	3.97 m/s P
Rib Displacement	-51.00 -- -46.00	-48.09 mm P
Drop Height	807.0 -- 823.0	815.0 mm P

All test parameters are within specifications

Technician: **A. Rudniski**

Supervisor: **D. Travale**

Test ID: **Middle Rib 4 m/s** Test Time: **11:17:54 AM**

Test Date: **1/3/2012**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Honeywell	MLT-38000	DS-184	8/31/2011
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7264-2000	P32222	10/14/2011

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

Test Time: **11:17:54 AM**

Test Date: **1/3/2012**

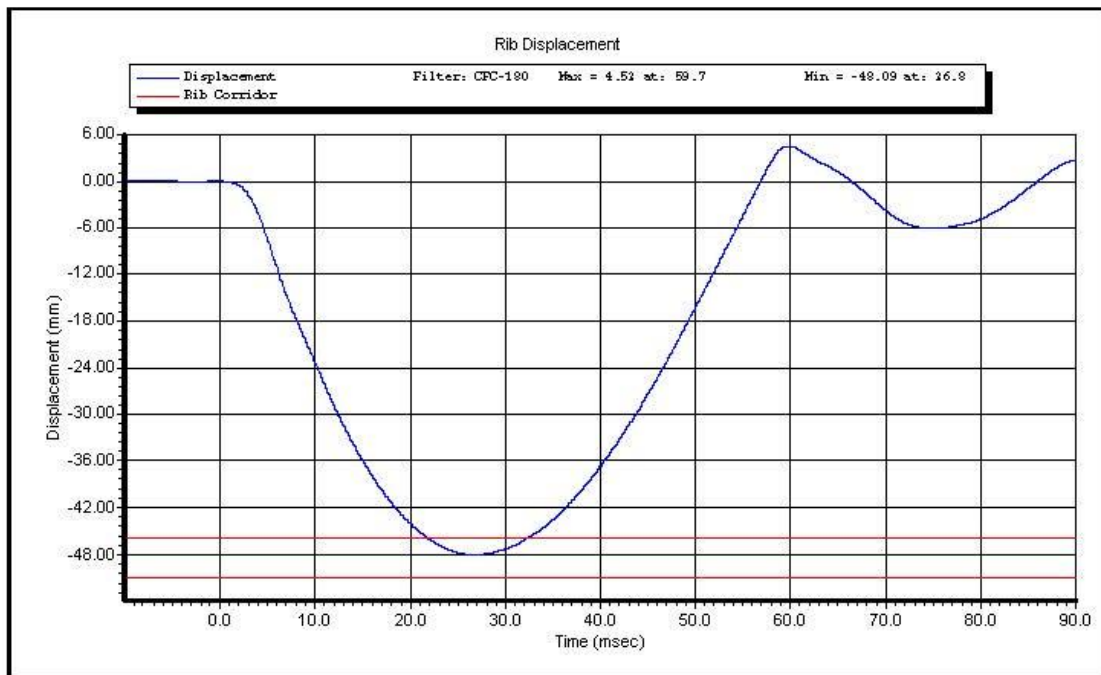


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Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	4.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:	Middle Rib 4 m/s	Test Date:	1/3/2012
Test Number:	1	Test Time:	11:17:54 AM



Test ID: Middle Rib 4 m/s Test Time: 11:17:54 AM

Test Date: 1/3/2012

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VERIFICATION REPORT

Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	3.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:	Middle Rib 3 m/s	Test Date:	1/3/2012
Test Number:	1	Test Time:	11:29:37 AM

Component Part Number	Component Serial Number
455-3100	07205

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.5 deg C P
Humidity	10.0 -- 70.0	17.0 %RH P
Velocity	2.90 -- 3.10	2.98 m/s P
Rib Displacement	-40.00 -- -36.00	-37.61 mm P
Drop Height	454 -- 464	459 mm P

All test parameters are within specifications

Technician: **A. Rudniski**

Supervisor: **D. Travale**

Test ID: **Middle Rib 3 m/s** Test Time: **11:29:37 AM**

Test Date: **1/3/2012**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Honeywell	MLT-38000	DS-184	8/31/2011
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7264-2000	P32222	10/14/2011

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

Test Time: **11:29:37 AM**

Test Date: **1/3/2012**

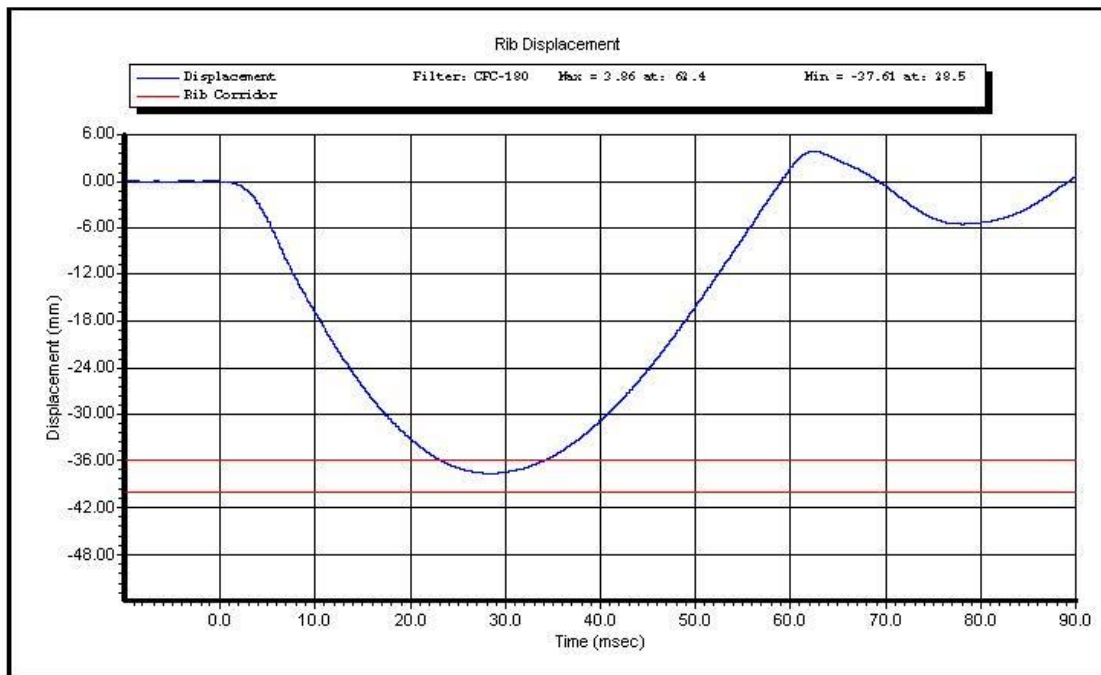


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Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	3.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:	Middle Rib 3 m/s	Test Date:	1/3/2012
Test Number:	1	Test Time:	11:29:37 AM



Test ID: Middle Rib 3 m/s Test Time: 11:29:37 AM

Test Date: 1/3/2012

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1 of 1



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VERIFICATION REPORT

Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	4.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:	Lower Rib 4 m/s	Test Date:	1/3/2012
Test Number:	1	Test Time:	11:44:40 AM

Component Part Number	Component Serial Number
455-3100	07209

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.5 deg C P
Humidity	10.0 -- 70.0	17.0 %RH P
Velocity	3.90 -- 4.10	3.96 m/s P
Rib Displacement	-51.00 -- -46.00	-48.77 mm P
Drop Height	807.0 -- 823.0	815.0 mm P

All test parameters are within specifications

Technician: **A. Rudniski**

Supervisor: **D. Travale**

Test ID: **Lower Rib 4 m/s** Test Time: **11:44:40 AM**

Test Date: **1/3/2012**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Honeywell	MLT-38000	DS-182	8/31/2011
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7264-2000	P32222	10/14/2011

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

Test Time: **11:44:40 AM**

Test Date: **1/3/2012**

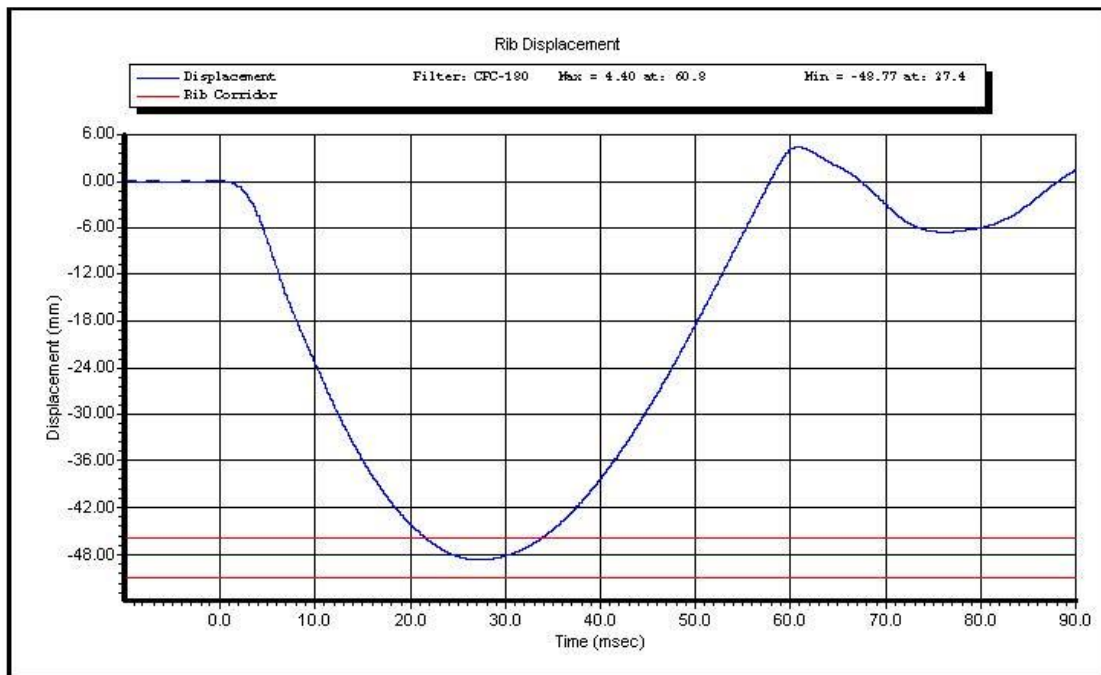


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Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	4.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:	Lower Rib 4 m/s	Test Date:	1/3/2012
Test Number:	1	Test Time:	11:44:40 AM



Test ID: Lower Rib 4 m/s Test Time: 11:44:40 AM

Test Date: 1/3/2012

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VERIFICATION REPORT

Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	3.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:	Lower Rib 3 m/s	Test Date:	1/3/2012
Test Number:	1	Test Time:	11:59:14 AM

Component Part Number	Component Serial Number
455-3100	07209

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.5 deg C P
Humidity	10.0 -- 70.0	17.0 %RH P
Velocity	2.90 -- 3.10	2.96 m/s P
Rib Displacement	-40.00 -- -36.00	-37.92 mm P
Drop Height	454 -- 464	459 mm P

All test parameters are within specifications

Technician: **A. Rudniski**

Supervisor: **D. Travale**

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

Test Time: **11:59:14 AM**

Test Date: **1/3/2012**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Honeywell	MLT-38000	DS-182	8/31/2011
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7264-2000	P32222	10/14/2011

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

Test Time: **11:59:14 AM**

Test Date: **1/3/2012**

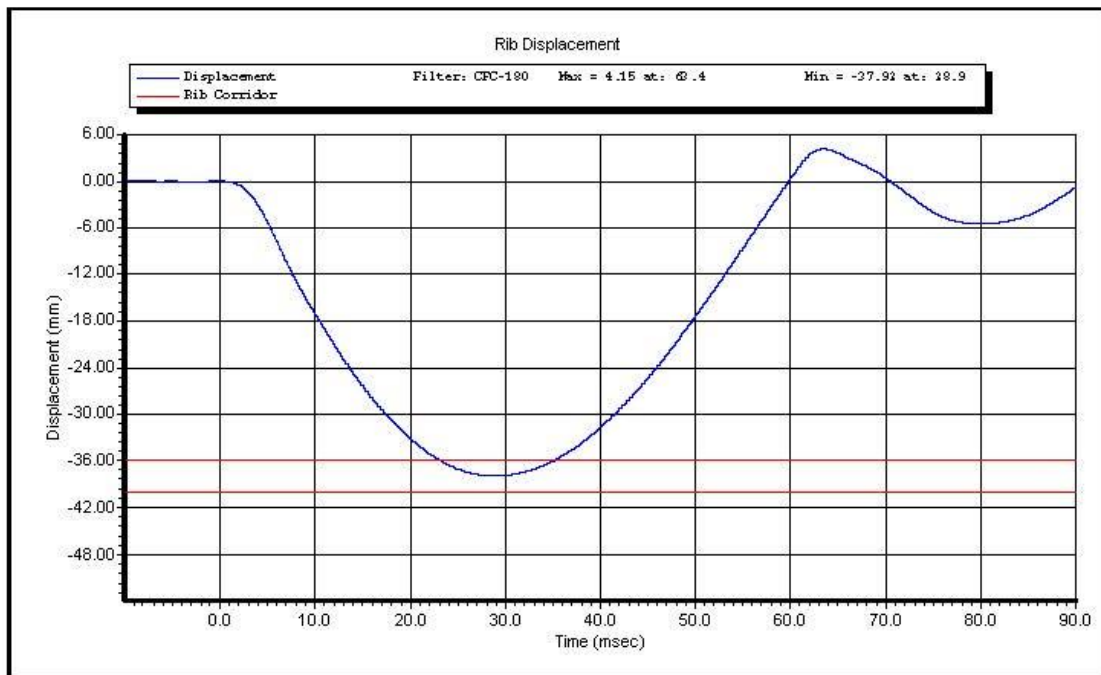


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Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	3.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:	Lower Rib 3 m/s	Test Date:	1/3/2012
Test Number:	1	Test Time:	11:59:14 AM



Test ID: Lower Rib 3 m/s Test Time: 11:59:14 AM

Test Date: 1/3/2012

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VERIFICATION REPORT

Test Name:	Thorax Impact	Revision:	8/15/2008
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:		Test Date:	1/3/2012
Test Number:	1	Test Time:	4:24:52 PM

Component Part Number	Component Serial Number
Upper Rib - 175-4002	7203
Middle Rib - 175-4002	7205
Lower Rib - 175-4002	7209

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.4 deg C P
Humidity	10.0 -- 70.0	16.4 %RH P
Velocity	5.40 -- 5.60	5.48 m/s P
Upper Rib Displacement	34.0 -- 41.0	37.6 mm P
Middle Rib Displacement	37.0 -- 45.0	41.9 mm P
Lower Rib Displacement	37.0 -- 44.0	41.6 mm P
Impactor Force	5100 -- 6200	5694 N P

All test parameters are within specifications

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

Test ID:

Test Time: **4:24:52 PM**

Test Date: **1/3/2012**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7231CT	AGHF5	1/3/2012
Honeywell	MLT 38000	DS-183	8/31/2011
Honeywell	MLT 38000	DS-184	8/31/2011
Honeywell	MLT 38000	DS-182	8/31/2011

Test ID:

Test Time: 4:24:52 PM

Test Date: 1/3/2012

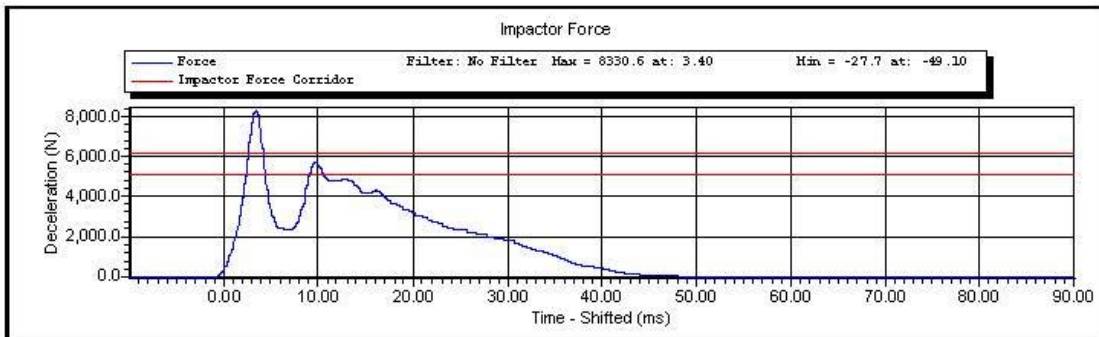
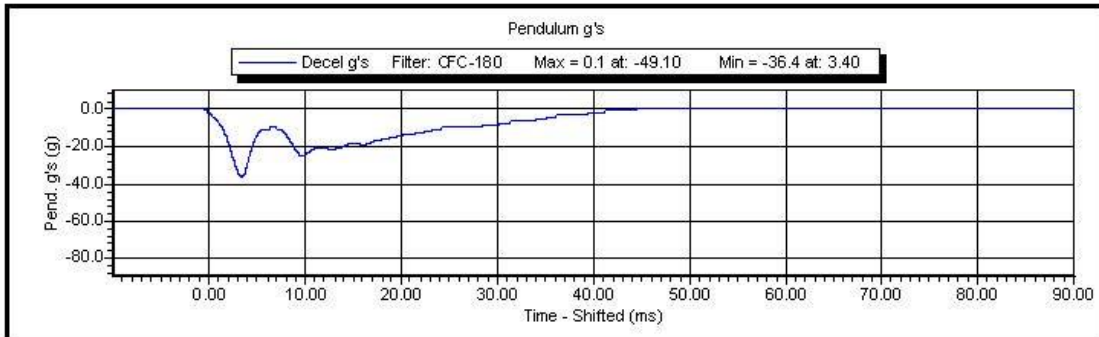


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Test Name:	Thorax Impact	Revision:	8/15/2008
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:		Test Date:	1/3/2012
Test Number:	1	Test Time:	4:24:52 PM



Test ID:

Test Time: 4:24:52 PM

Test Date: 1/3/2012

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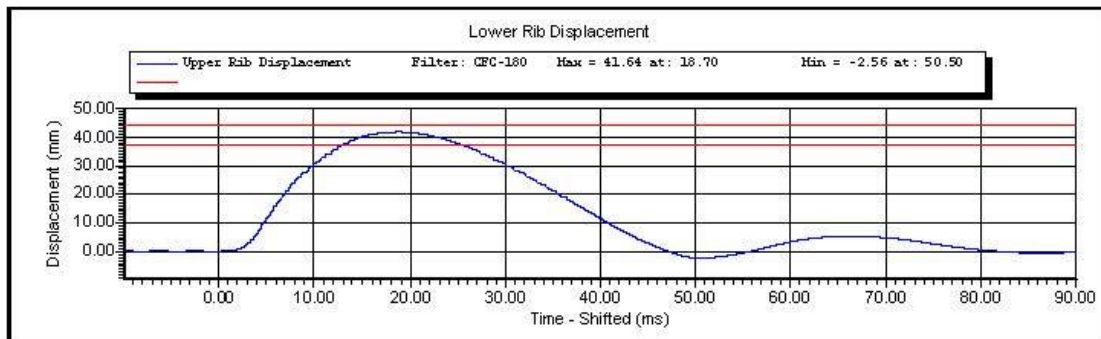
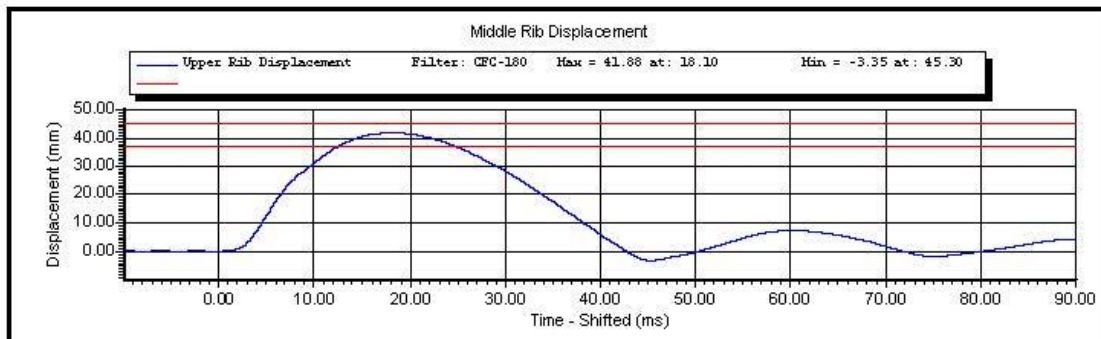
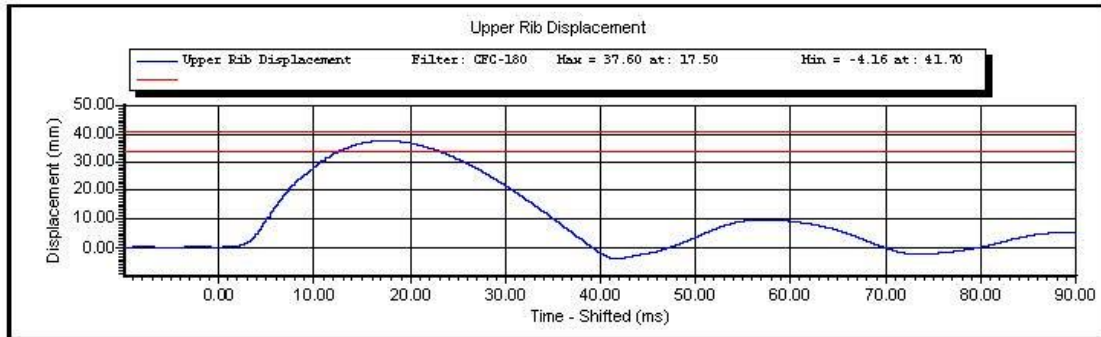
1 of 2



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Test ID:

Test Time: 4:24:52 PM

Test Date: 1/3/2012

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VERIFICATION REPORT

Test Name:	Abdominal Impact	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:		Test Date:	1/5/2012
Test Number:	2	Test Time:	1:17:51 PM

Component Part Number	Component Serial Number
455-4001	0483

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.7 deg C P
Humidity	10 -- 70	23 %RH P
Velocity	3.90 -- 4.10	4.02 m/s P
Peak Abdominal Force	-2.70 -- -2.20	-2.57 kN P
Time At Peak Abdominal Force	10.0 -- 12.3	10.5 ms P
Maximum Pendulum Force	-4.80 -- -4.00	-4.75 kN P
Time at Peak Pendulum Force	10.6 -- 13.0	10.7 ms P

All test parameters are within specifications

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

Test ID:

Test Time: **1:17:51 PM**

Test Date: **1/5/2012**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7231CT	AGHF5	1/3/2012
Denton	2631	LC-1512	3/25/2011
Denton	2631	LC-1526	3/25/2011
Denton	2631	LC-1516	3/25/2011

Test ID:

Test Time: **1:17:51 PM**

Test Date: **1/5/2012**

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2 of 2

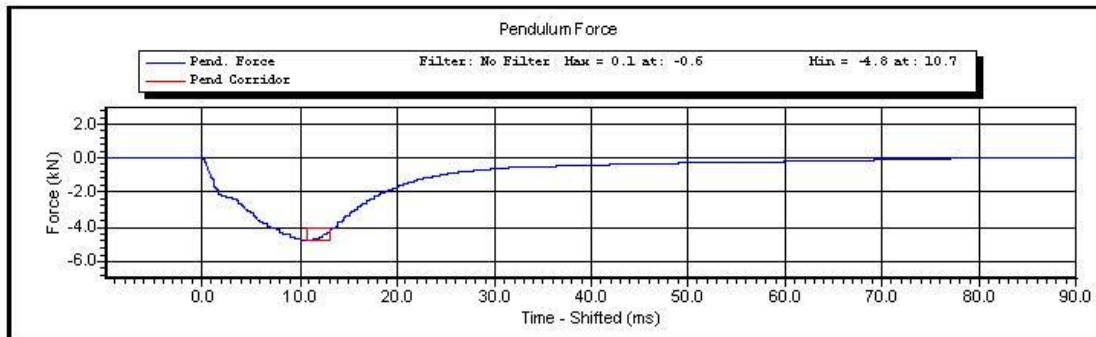
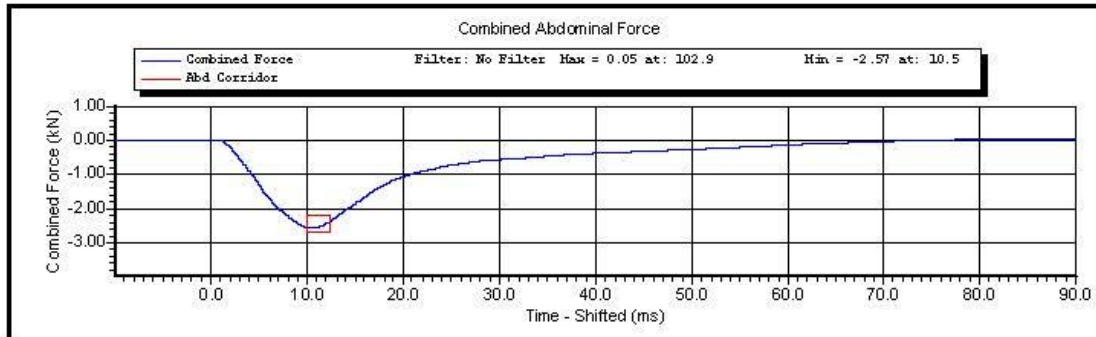


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Test Name:	Abdominal Impact	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:		Test Date:	1/5/2012
Test Number:	2	Test Time:	1:17:51 PM



Test ID:

Test Time: 1:17:51 PM

Test Date: 1/5/2012

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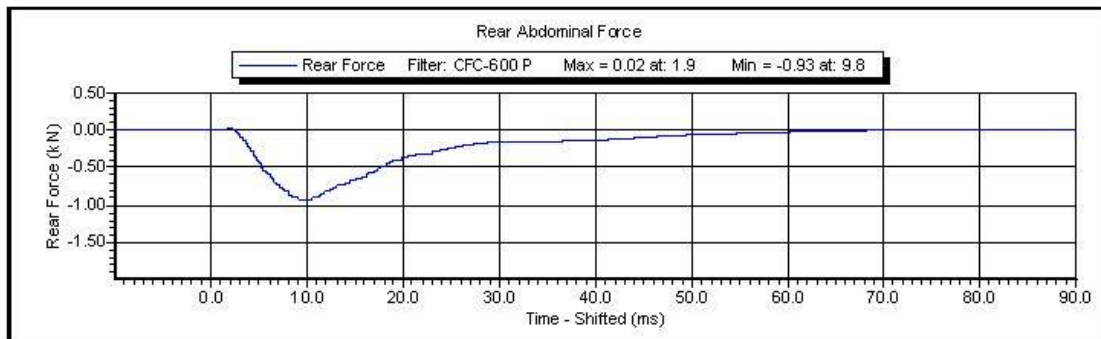
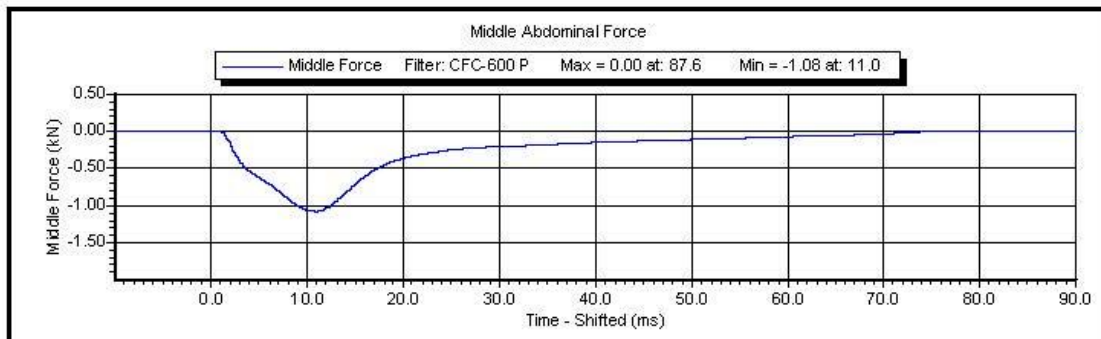
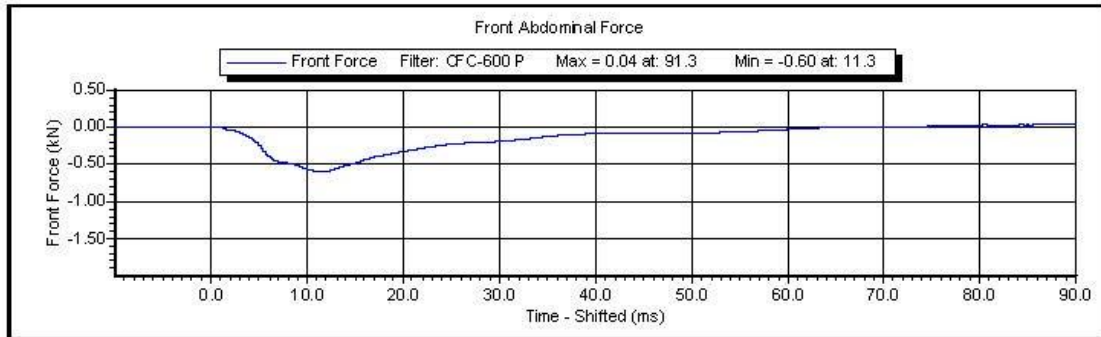
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Test ID:

Test Time: 1:17:51 PM

Test Date: 1/5/2012

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VERIFICATION REPORT

Test Name:	Lumbar Spine	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:		Test Date:	1/3/2012
Test Number:	1	Test Time:	9:19:48 AM

Component Part Number	Component Serial Number
175-5501	15050329A

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.0 deg C P
Humidity	10 -- 70	17 %RH P
Velocity	5.95 -- 6.15	6.15 m/s P
Maximum Headform Flexion Angle	45.0 -- 55.0	45.5 degrees P
Time at Maximum Headform Flexion Angle	39.0 -- 53.0	42.2 ms P
Decay to Zero Degrees	37.0 -- 57.0	40.3 ms P
Velocity Corridor	--	P

All test parameters are within specifications

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

Test ID:

Test Time: **9:19:48 AM**

Test Date: **1/3/2012**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7231CT	C16510	10/3/2011
DentonATD	7000428	094	4/25/2011
DentonATD	7000428	095	4/25/2011
DentonATD	7000428	093	4/25/2011

Test ID:

Test Time: 9:19:48 AM

Test Date: 1/3/2012

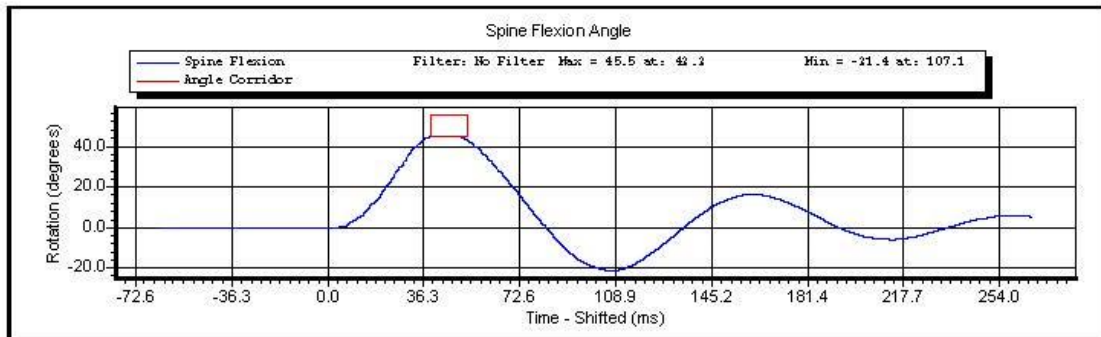
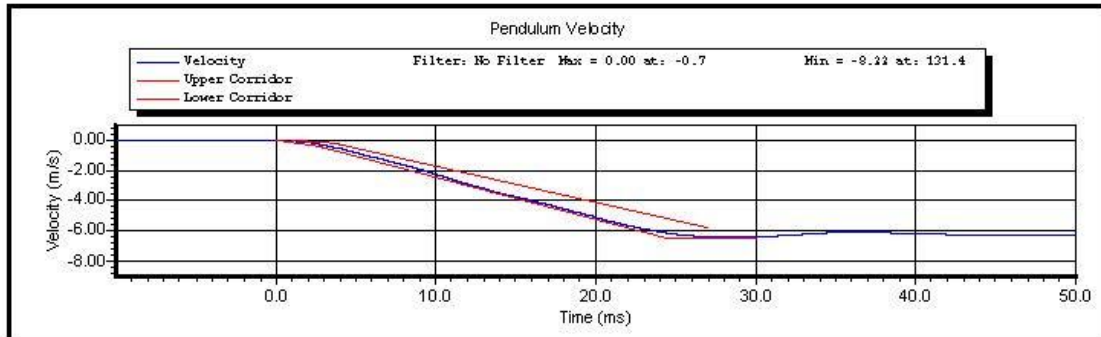


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Test Name:	Lumbar Spine	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:		Test Date:	1/3/2012
Test Number:	1	Test Time:	9:19:48 AM



Test ID:

Test Time: **9:19:48 AM**

Test Date: **1/3/2012**

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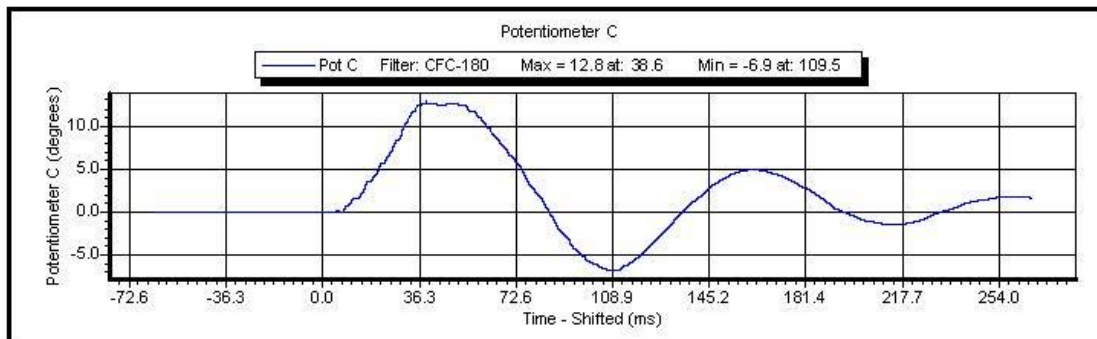
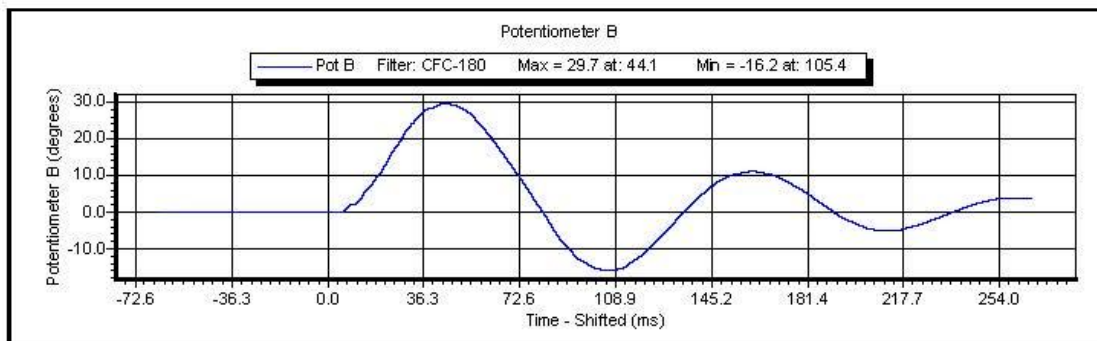
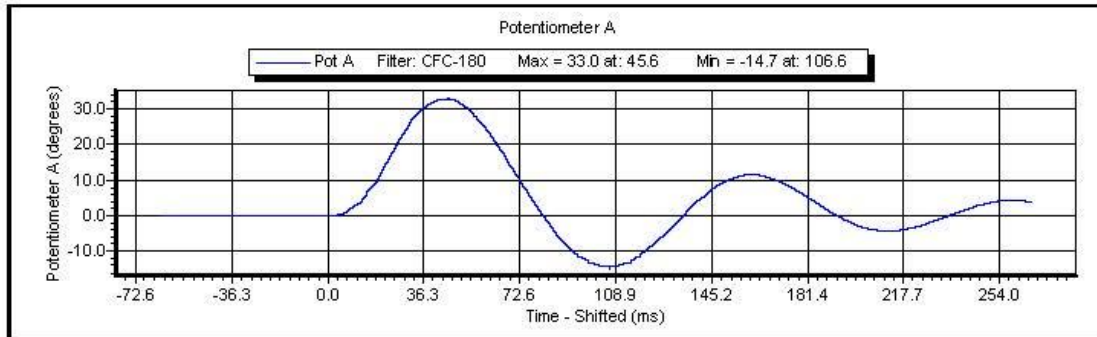
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Test ID:

Test Time: 9:19:48 AM

Test Date: 1/3/2012

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VERIFICATION REPORT

Test Name:	Pelvis Impact	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:		Test Date:	1/4/2012
Test Number:	2	Test Time:	11:52:25 AM

Component Part Number	Component Serial Number
455-4003	

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.3 deg C P
Humidity	10 -- 70	17 %RH P
Velocity	4.20 -- 4.40	4.31 m/s P
Peak Pendulum Force	-5.40 -- -4.70	-5.01 kN P
Time at Peak Pendulum Force	11.80 -- 16.10	13.39 ms P
Peak Pubic Symphysis Force	-1.59 -- -1.23	-1.36 kN P
Time at Peak Pubic Symphysis Force	12.20 -- 17.00	15.09 ms P

All test parameters are within specifications

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

Test ID:

Test Time: **11:52:25 AM**

Test Date: **1/4/2012**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7231CT	AGHF5	1/3/2012
Denton	3096	LC-465Fy	8/31/2011

Test ID:

Test Time: 11:52:25 AM

Test Date: 1/4/2012

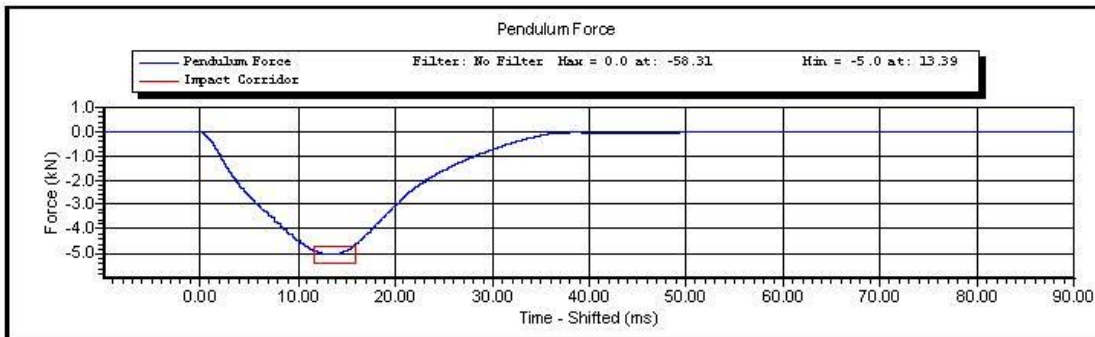
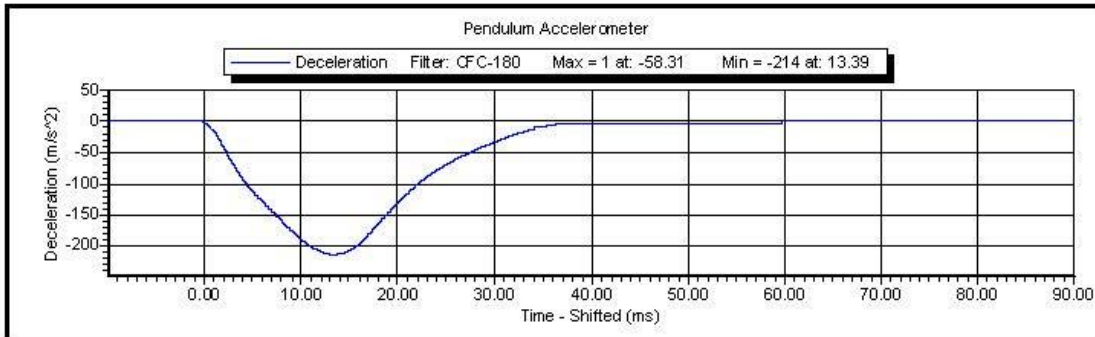


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Test Name:	Pelvis Impact	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F034		
Test ID:		Test Date:	1/4/2012
Test Number:	2	Test Time:	11:52:25 AM



Test ID:

Test Time: **11:52:25 AM**

Test Date: **1/4/2012**

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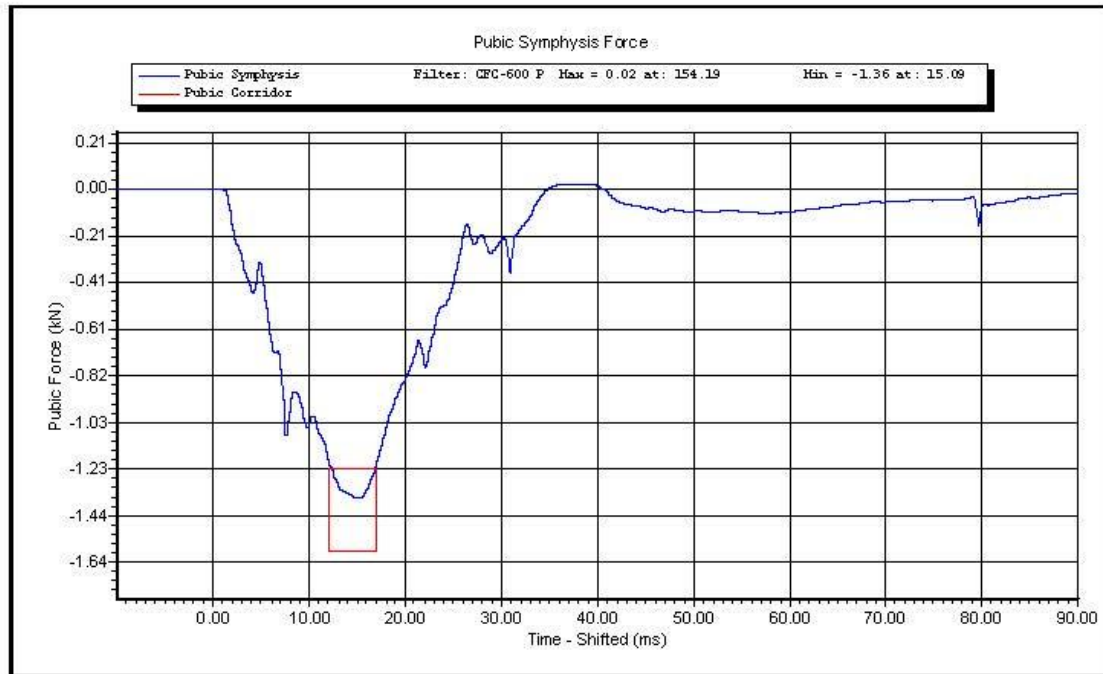
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Test ID:

Test Time: 11:52:25 AM

Test Date: 1/4/2012

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CALIBRATION TEST RESULTS

POST-TEST

SID-IIs No: 8012

CONFIGURED FOR LEFT SIDE IMPACT



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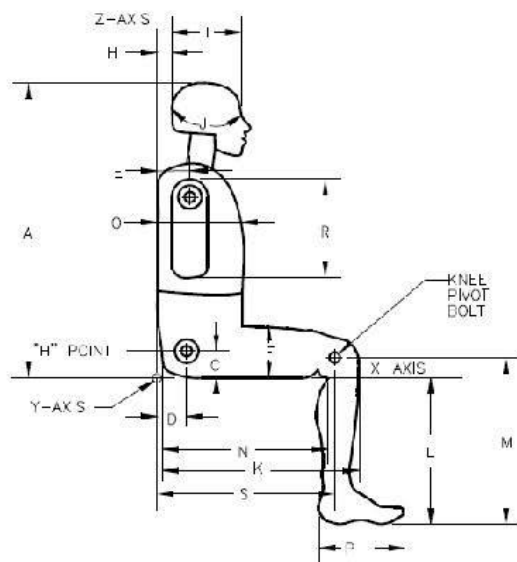
SID-IIsD External Measurements

NHTSA ATD S/N DG8012

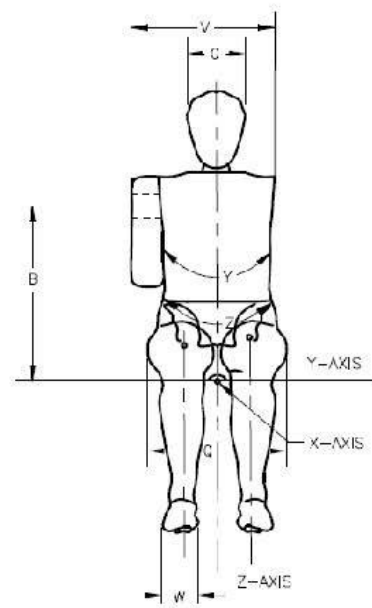
Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Sitting Height	772.0 - 788.0	777	Yes
B	Shoulder Pivot Height	437.0 - 453.0	444	Yes
C	H-Point Height	79.0 - 89.0	86	Yes
D	H-Point from Seat Back	141.0 - 151.0	146	Yes
E	Shoulder Pivot from Backline	97.0 - 107.0	100	Yes
F	Thigh Clearance	119.0 - 135.0	131	Yes
G	Head Breadth	140.0 - 148.0	145	Yes
H	Head Back from Backline	40.0 - 46.0	43	Yes
I	Head Depth	178.0 - 188.0	183	Yes
J	Head Circumference	541.0 - 551.0	547	Yes
K	Buttock to Knee Length	514.0 - 540.0	535	Yes
L	Popliteal Height	343.0 - 369.0	345	Yes
M	Knee Pivot to Floor Height	393.0 - 409.0	397	Yes
N	Buttock Popliteal Length	416.0 - 442.0	441	Yes
O	Chest Depth without Jacket	195.0 - 211.0	203	Yes
P	Foot Length (right)	216.0 - 232.0	221	Yes
Q	Hip Breadth	313.0 - 323.0	318	Yes
R	Arm Length	249.0 - 259.0	253	Yes
S	Knee Joint to Seat back	478.0 - 493.0	486	Yes
V	Shoulder Width (only one arm installed)	341.0 - 357.0	346	Yes
W	Foot Width (right)	78.0 - 94.0	87	Yes
Y	Chest Circumference with Jacket	851.0 - 881.0	864	Yes
Z	Waist Circumference	761.0 - 791.0	769	Yes

Technician : MG

SID-IIsD External Dimension Reference Diagram



SIDE VIEW



FRONT VIEW



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VERIFICATION REPORT

Test Name:	Head Drop	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	1/20/2012
Test Number:	1	Test Time:	9:50:03 AM

Component Part Number	Component Serial Number
Head Skin - 180-1002	1362

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.7 deg C P
Humidity	10 -- 70	15 %RH P
Resultant Acceleration	115.0 -- 137.0	124.6 g P
Oscillation	0.0 -- 15.0	0.0 % P
Fore-Aft Acceleration	-15.0 -- 15.0	-2.6 g P

All test parameters are within specifications

Technician: **A. Rudniski**

Supervisor: **D. Travale**

Test ID:

Test Time: **9:50:03 AM**

Test Date: **1/20/2012**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Endevco	7264-2000	P49185	11/3/2011
Endevco	7264-2000	P58839	10/17/2011
Endevco	7264-2000	P51991	10/17/2011

Test ID:

Test Time: **9:50:03 AM**

Test Date: **1/20/2012**

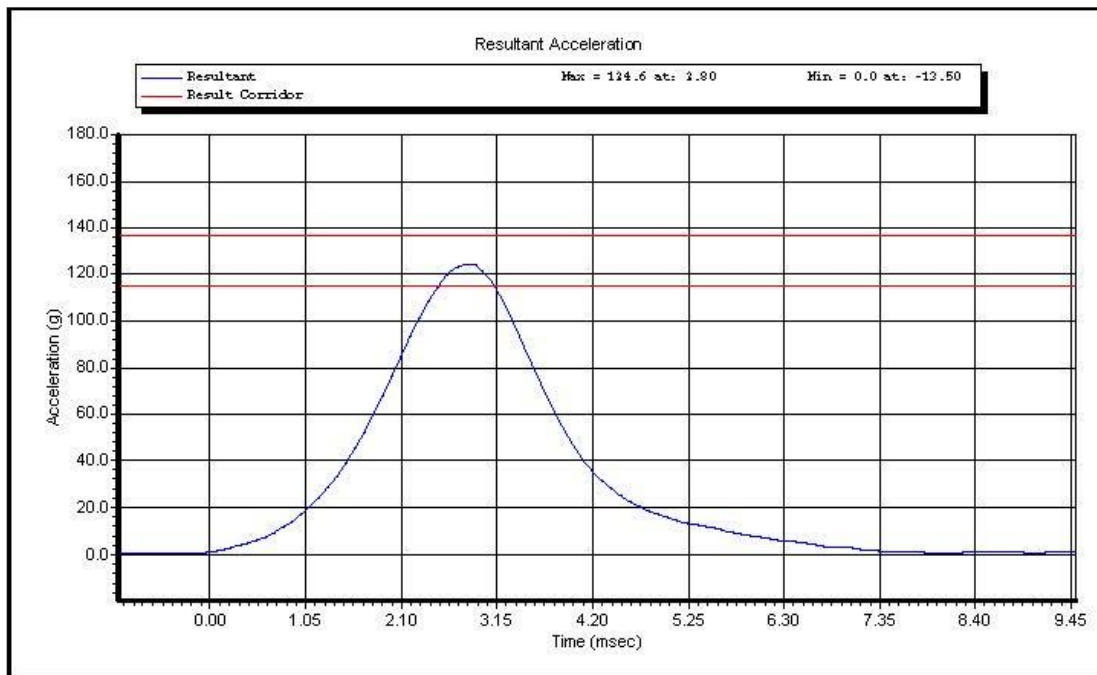


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Test Name:	Head Drop	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	1/20/2012
Test Number:	1	Test Time:	9:50:03 AM



Test ID:

Test Time: 9:50:03 AM

Test Date: 1/20/2012

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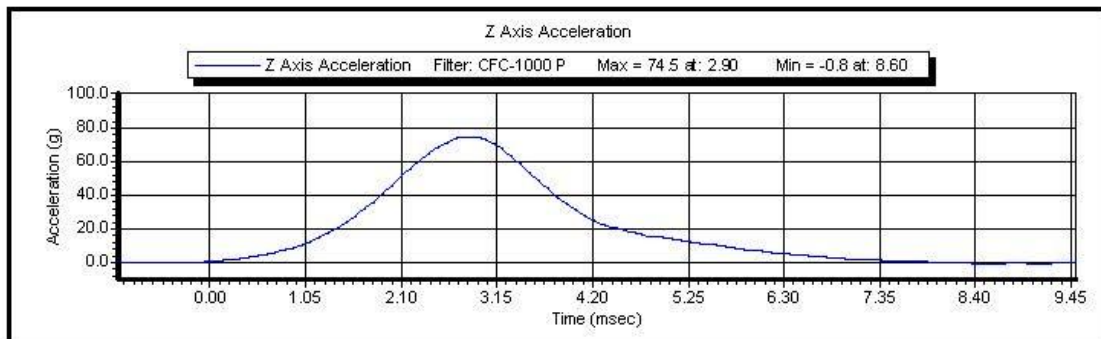
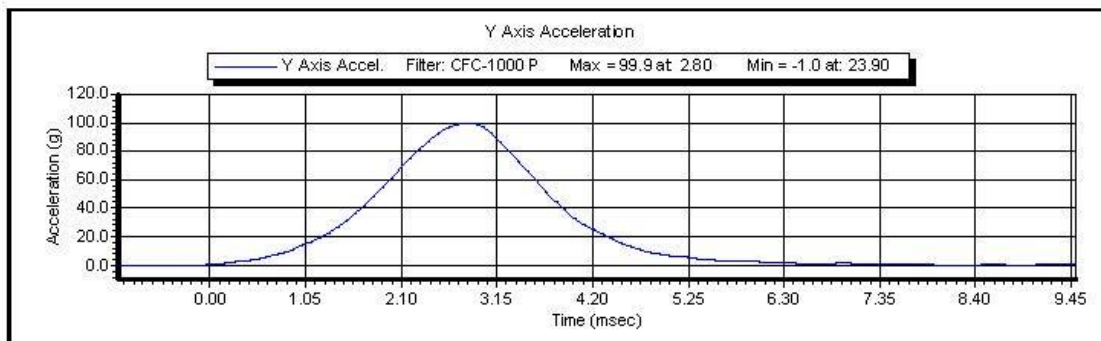
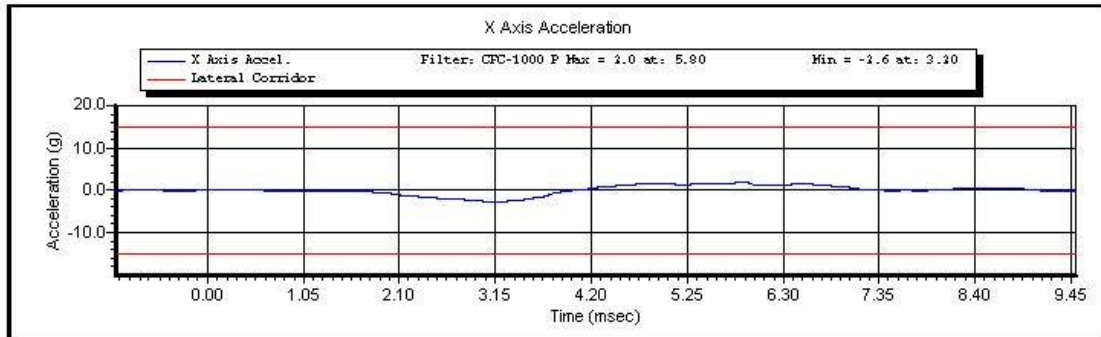
1 of 2



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Test ID:

Test Time: 9:50:03 AM

Test Date: 1/20/2012

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VERIFICATION REPORT

Test Name:	Neck Pendulum	Revision:	8/24/2009
Sub Test Name:	Left Side	Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	1/20/2012
Test Number:	2	Test Time:	1:30:39 PM

Component Part Number	Component Serial Number
Neck - 180-2000	DG7061

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.2 deg C P
Humidity	10 -- 70	15 %RH P
Velocity	5.51 -- 5.63	5.57 m/s P
Pendulum Impulse at 10 ms	2.20 -- 2.80	2.59 m/s P
Pendulum Impulse at 15 ms	3.30 -- 4.10	3.70 m/s P
Pendulum Impulse at 20 ms	4.40 -- 5.40	4.97 m/s P
Pendulum Impulse at 25 ms	5.40 -- 6.10	5.75 m/s P
Pendulum Impulse between 25 and 100 ms	5.50 -- 6.20	5.75 m/s P
Max D Plane Rotation	71.0 -- 81.0	75.1 degrees P
Time at Max Rotation	50.0 -- 70.0	60.5 ms P
Moment about OC	-44.0 -- -36.0	-41.5 Nm P
Moment Decay to Zero	102.0 -- 126.0	112.1 ms P

All test parameters are within specifications

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

Test ID:

Test Time: **1:30:39 PM**

Test Date: **1/20/2012**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2012
Endevco	7231CT	C16510	10/3/2011
Denton	1716A	LC-2192Fy	8/31/2011
Denton	1716A	LC-2192Mx	8/31/2011
DentonATD	78051-342	184	5/8/2011
DentonATD	78051-342	174	5/8/2011
DentonATD	78051-342	185	5/8/2011

Test ID:

Test Time: 1:30:39 PM

Test Date: 1/20/2012

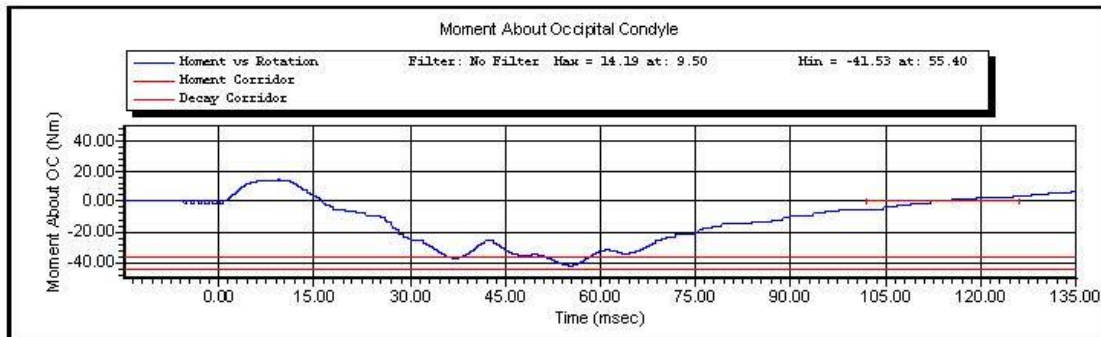
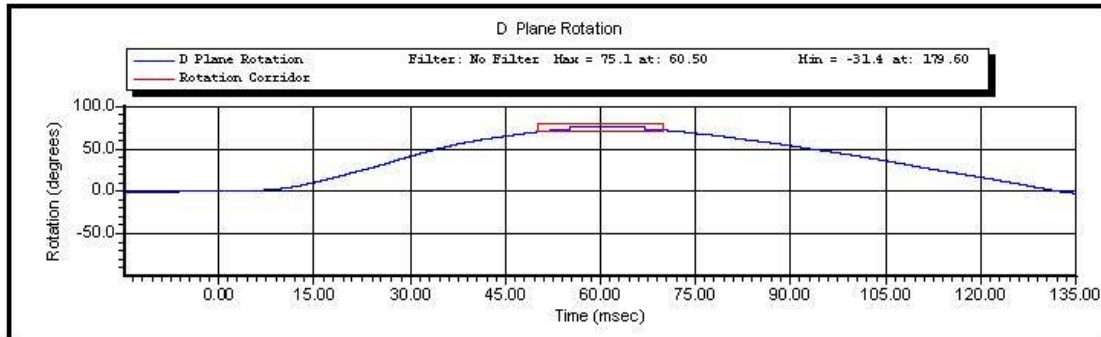


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Test Name:	Neck Pendulum	Revision:	8/24/2009
Sub Test Name:	Left Side	Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	1/20/2012
Test Number:	2	Test Time:	1:30:39 PM



Test ID:

Test Time: 1:30:39 PM

Test Date: 1/20/2012

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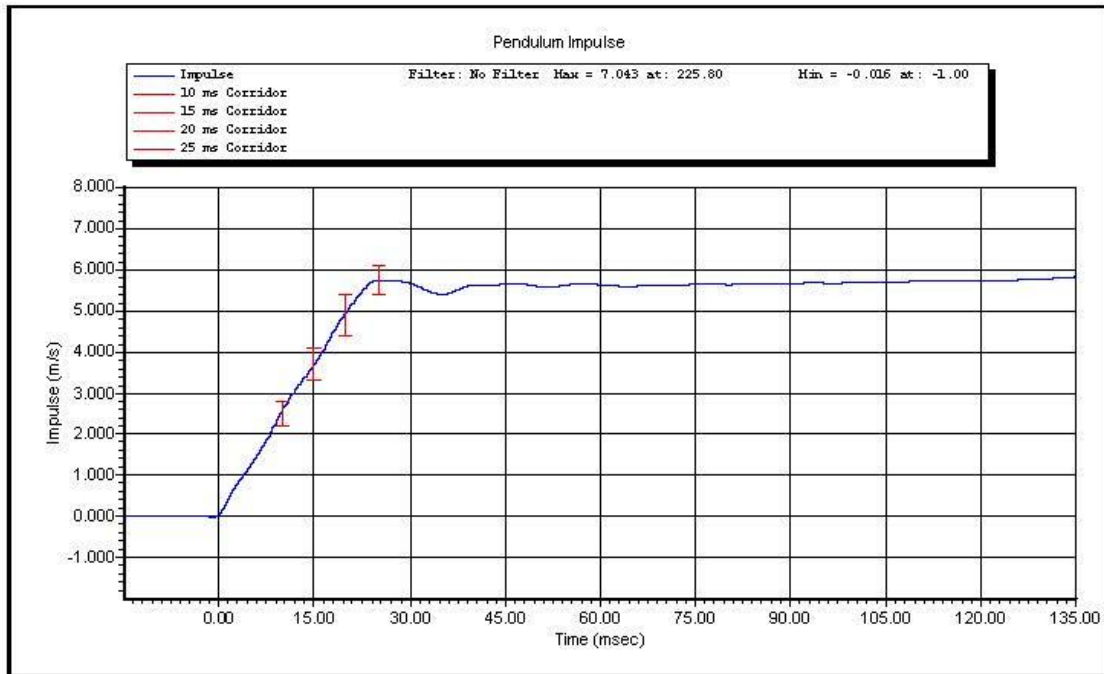
1 of 2



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Test ID:

Test Time: 1:30:39 PM

Test Date: 1/20/2012

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VERIFICATION REPORT

Test Name:	Shoulder Impact	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	1/25/2012
Test Number:	2	Test Time:	10:40:01 AM

Component Part Number	Component Serial Number
Left Arm 180-6011-1	DG3210
Shoulder Rib 180-3355	DG6997

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.00 deg C P
Humidity	10.0 -- 70.0	21.0 %RH P
Velocity	4.20 -- 4.40	4.39 m/s P
Probe Acceleration	13.0 -- 18.0	15.0 g P
Shoulder Deflection	28.0 -- 37.0	30.5 mm P
T1 Acceleration	17.0 -- 22.0	19.3 g P

All test parameters are within specifications

Technician: **A. Rudniski**

Supervisor: **D. Travale**

Test ID:

Test Time: **10:40:01 AM**

Test Date: **1/25/2012**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2012
Endevco	7231CT	AGHF5	1/24/2012
FTSS	180-3881-1	DS-1845	9/1/2011
Endevco	7264-2000	P63561	10/3/2011

Test ID:

Test Time: 10:40:01 AM

Test Date: 1/25/2012

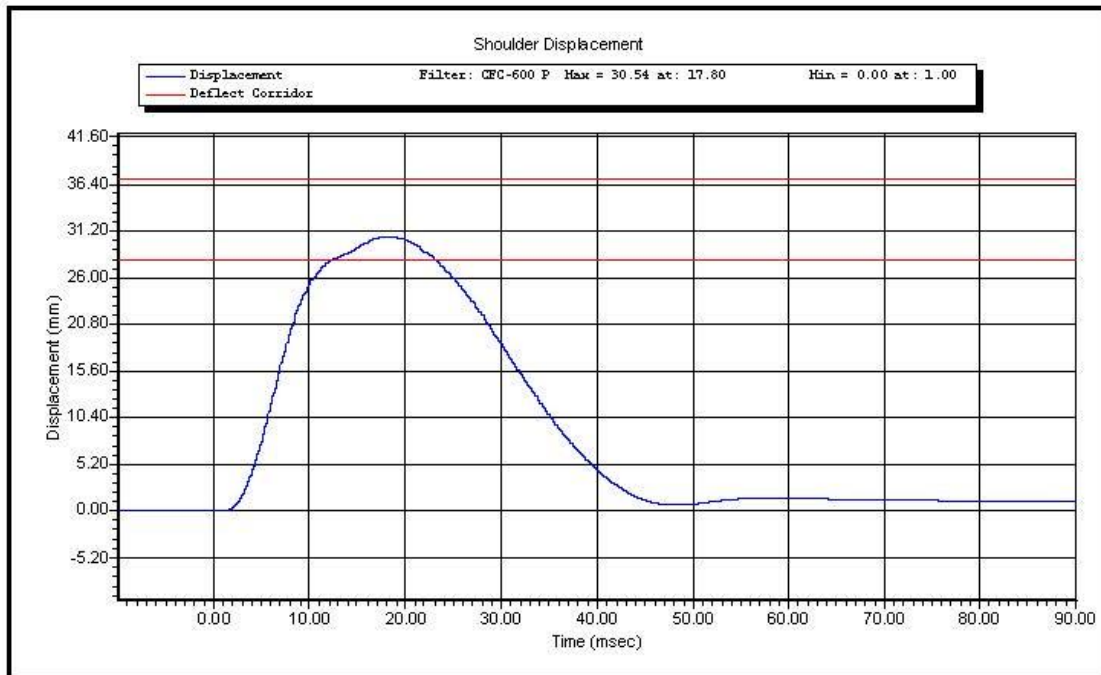


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Test Name:	Shoulder Impact	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	1/25/2012
Test Number:	2	Test Time:	10:40:01 AM



Test ID:

Test Time: 10:40:01 AM

Test Date: 1/25/2012

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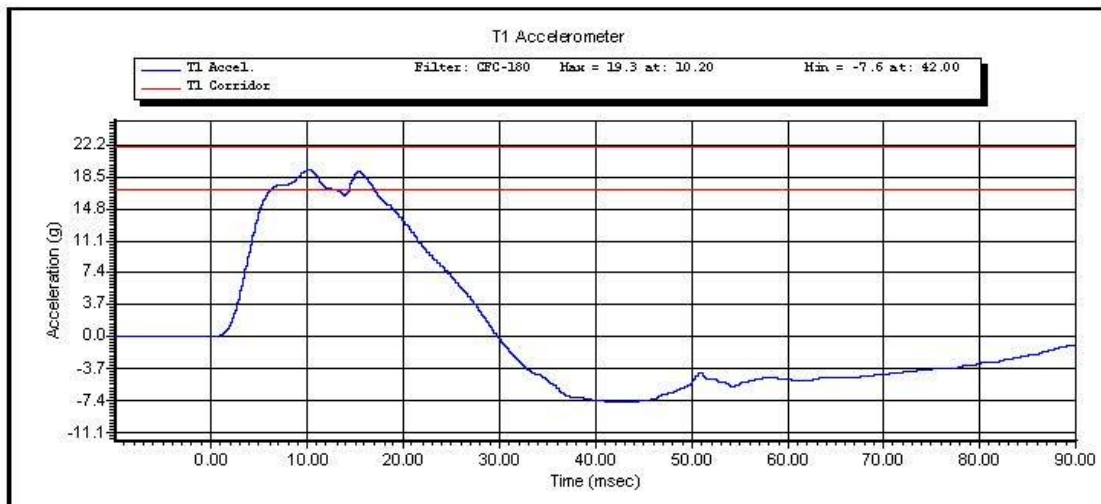
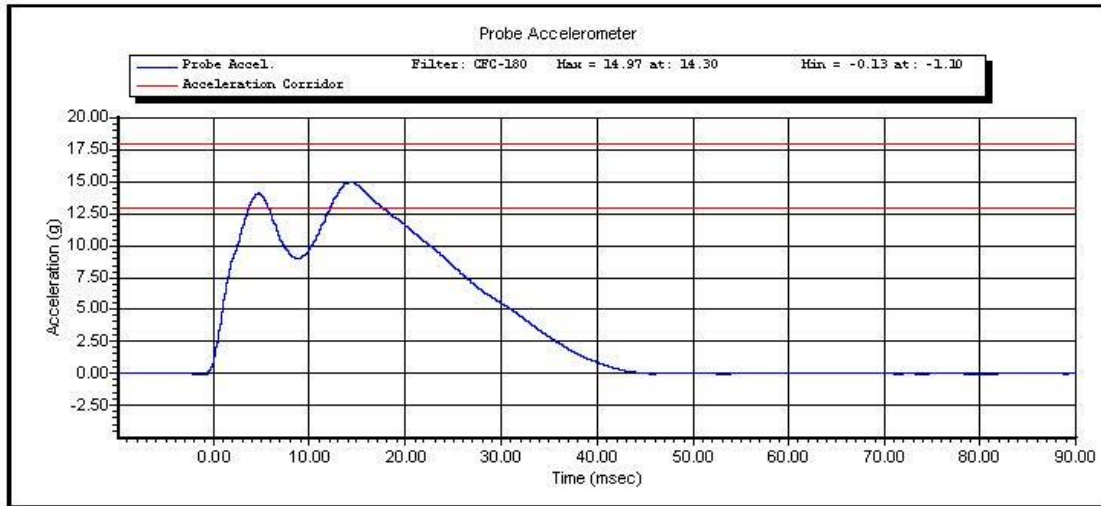
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Test ID:

Test Time: 10:40:01 AM

Test Date: 1/25/2012

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VERIFICATION REPORT

Test Name:	Thorax Impact with Arm	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	1/25/2012
Test Number:	1	Test Time:	9:24:32 AM

Component Part Number	Component Serial Number
Thorax Ribs 1, 2, 3 180-3362	DG6080, DG6081, DG7543
Shoulder Rib 180-3355	DG6997
Left Arm 180-6011-1	DG3210

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.2 deg C P
Humidity	10 -- 70	21 %RH P
Velocity	6.60 -- 6.80	6.70 m/s P
Probe Acceleration after 5ms	30.0 -- 36.0	32.0 g P
Upper Thorax Rib Deflection	25.0 -- 32.0	28.2 mm P
Mid Thorax Rib Deflection	30.0 -- 36.0	33.0 mm P
Lower Thorax Rib Deflection	32.0 -- 38.0	35.2 mm P
Upper Spine Acceleration ("y")	34.0 -- 43.0	38.3 g P
Lower Spine Acceleration ("y")	29.0 -- 37.0	33.6 g P
Shoulder Deflection	31.0 -- 40.0	34.4 mm P

All test parameters are within specifications

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

Test ID:

Test Time: **9:24:32 AM**

Test Date: **1/25/2012**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2012
Endevco	7231CT	AGHF5	1/24/2012
FTSS	180-3881-1	DS-1849	9/1/2011
Servo	180-3881-1	DS-1514	12/15/2011
FTSS	180-3881-1	DS-1859	9/1/2011
Endevco	7264-2000	P63561	10/3/2011
Endevco	7264-2000	P58796	10/5/2011
FTSS	180-3881-1	DS-1845	9/1/2011

Test ID:

Test Time: 9:24:32 AM

Test Date: 1/25/2012

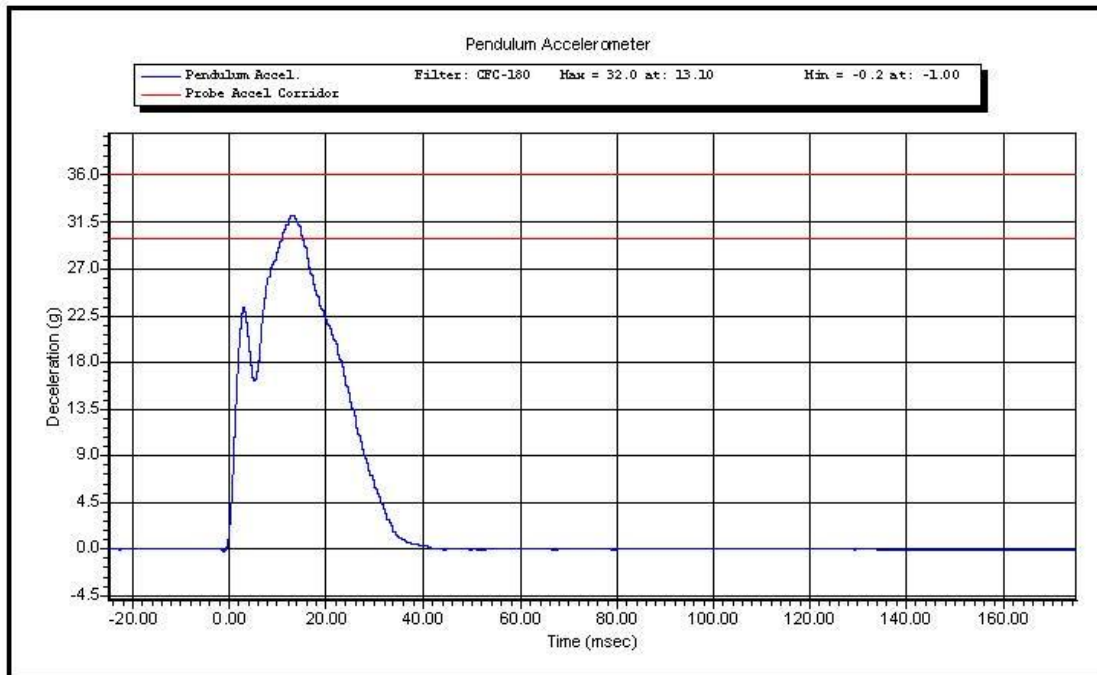


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Test Name:	Thorax Impact with Arm	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	1/25/2012
Test Number:	1	Test Time:	9:24:32 AM



Test ID:

Test Time: 9:24:32 AM

Test Date: 1/25/2012

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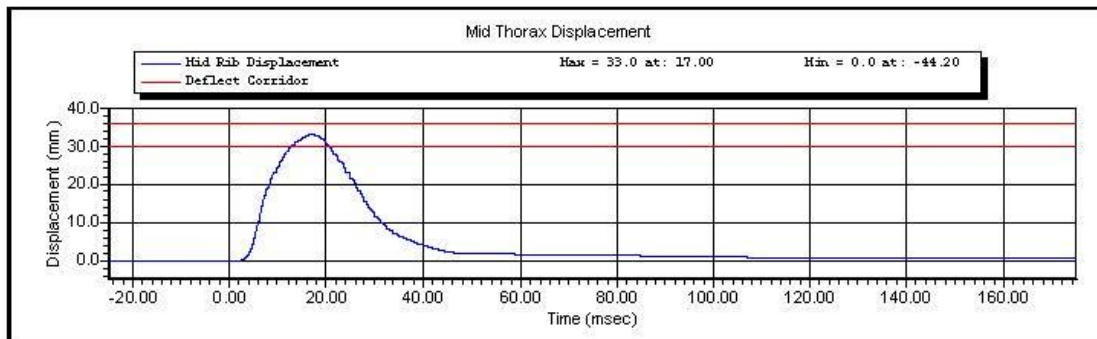
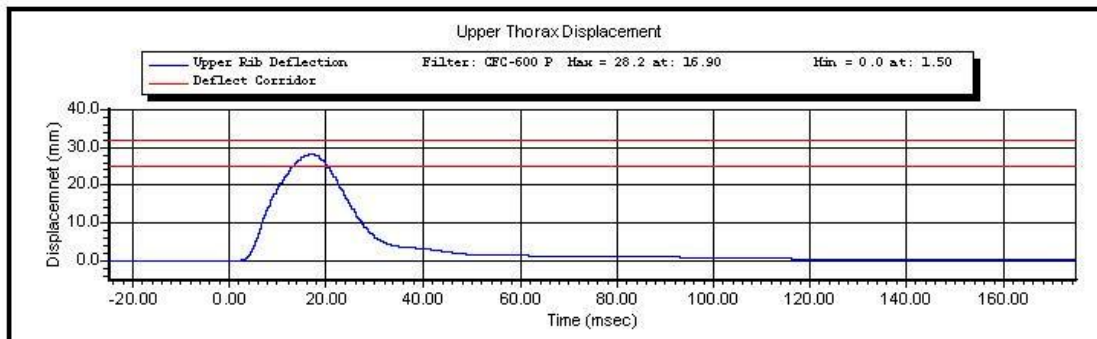
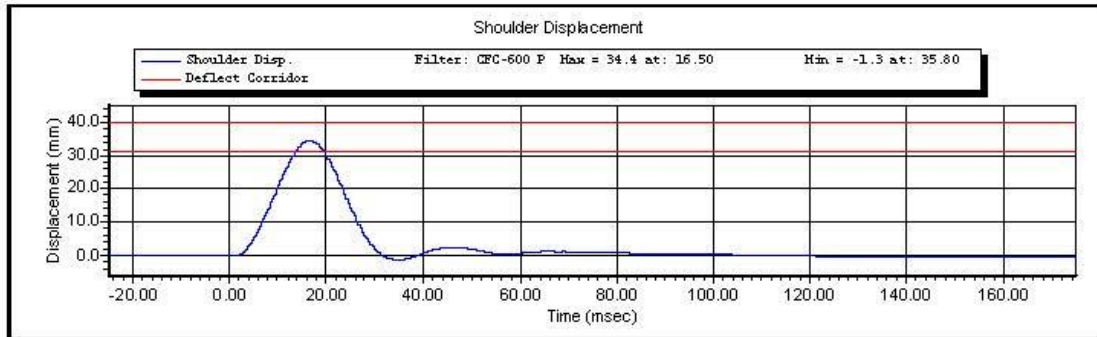
1 of 3



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Test ID:

Test Time: 9:24:32 AM

Test Date: 1/25/2012

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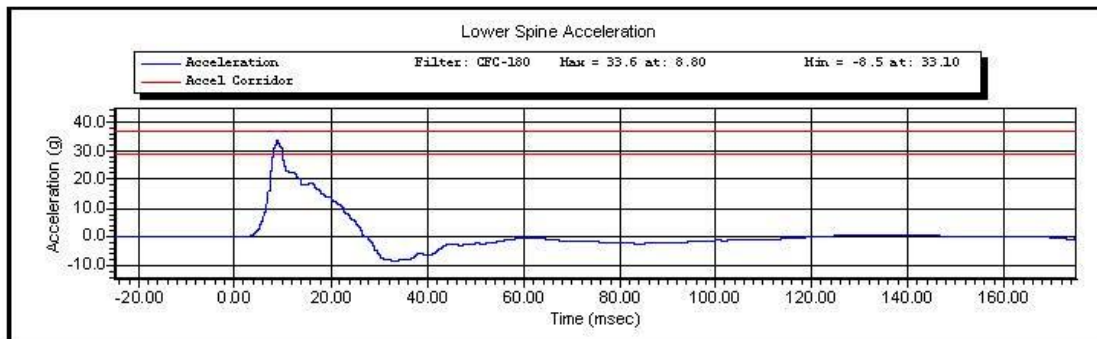
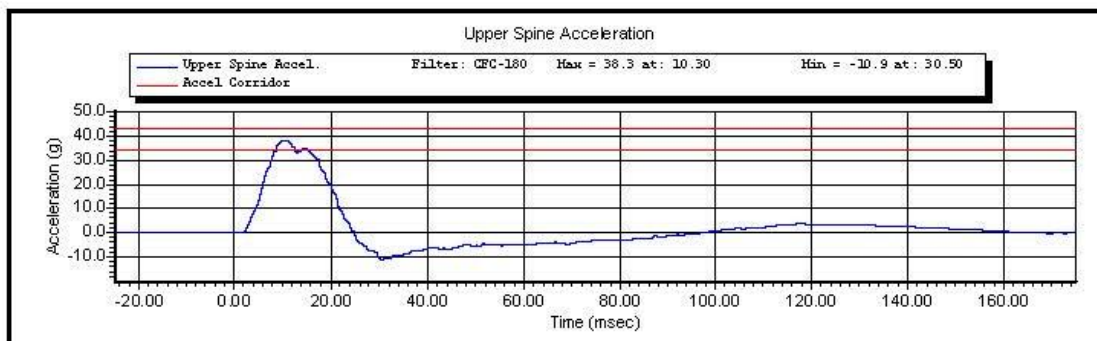
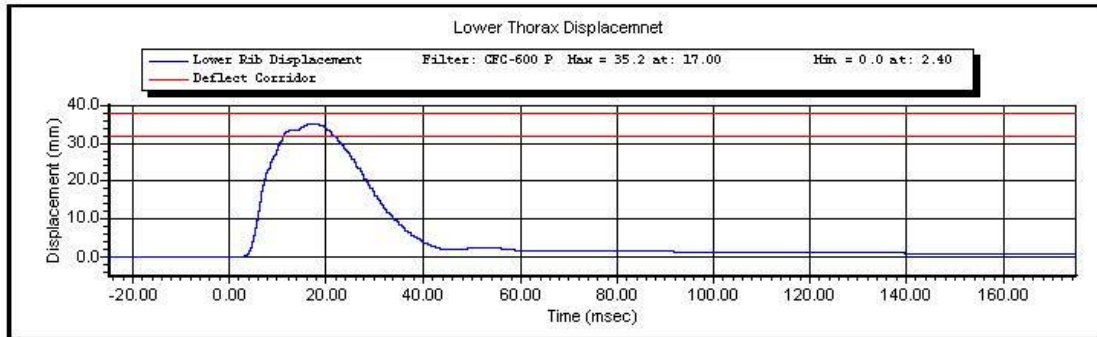
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Test ID:

Test Time: 9:24:32 AM

Test Date: 1/25/2012

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VERIFICATION REPORT

Test Name:	Thorax Impact without Arm	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	1/25/2012
Test Number:	1	Test Time:	8:42:31 AM

Component Part Number	Component Serial Number
Thorax Ribs 1, 2, 3 180-3362	DG6080, DG6081, DG7543

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.0 deg C P
Humidity	10 -- 70	21 %RH P
Velocity	4.20 -- 4.40	4.33 m/s P
Probe Acceleration	14.0 -- 18.0	16.5 g P
Upper Thorax Rib Deflection	32.0 -- 40.0	37.5 mm P
Mid Thorax Rib Deflection	39.0 -- 45.0	42.1 mm P
Lower Thorax Rib Deflection	35.0 -- 43.0	38.6 mm P
Upper Spine Acceleration T1	13.0 -- 17.0	16.0 g P
Lower Spine Acceleration T12	7.0 -- 11.0	10.2 g P

All test parameters are within specifications

Technician: **A. Rudniski**

Supervisor: **D. Travale**

Test ID:

Test Time: **8:42:31 AM**

Test Date: **1/25/2012**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2012
Endevco	7231CT	AGHF5	1/24/2012
FTSS	180-3881-1	DS-1849	9/1/2011
Servo	180-3881-1	DS-1514	12/15/2011
FTSS	180-3881-1	DS-1859	9/1/2011
Endevco	7264-2000	P63561	10/3/2011
Endevco	7264-2000	P58796	10/5/2011

Test ID:

Test Time: **8:42:31 AM**

Test Date: **1/25/2012**

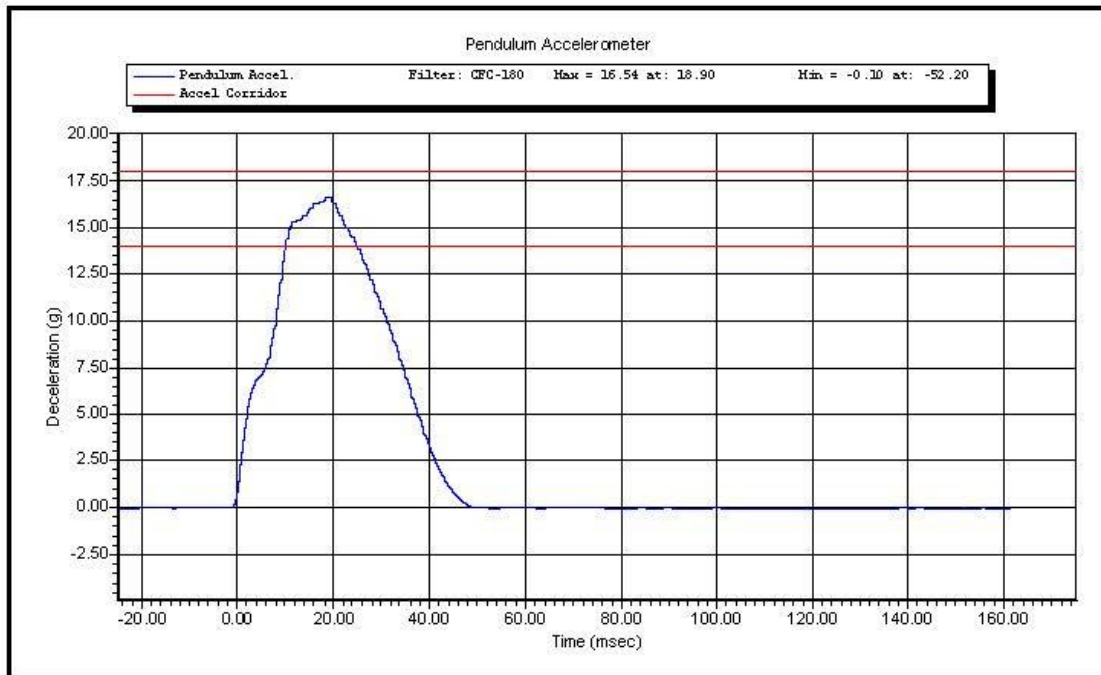


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Test Name:	Thorax Impact without Arm	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	1/25/2012
Test Number:	1	Test Time:	8:42:31 AM



Test ID:

Test Time: 8:42:31 AM

Test Date: 1/25/2012

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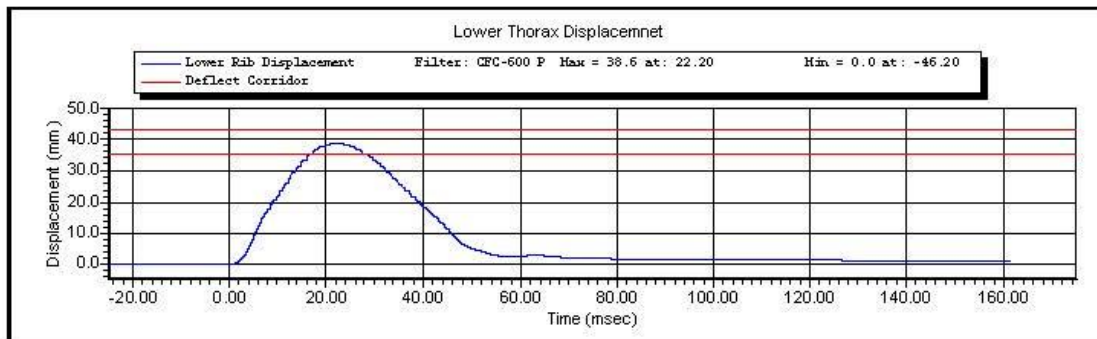
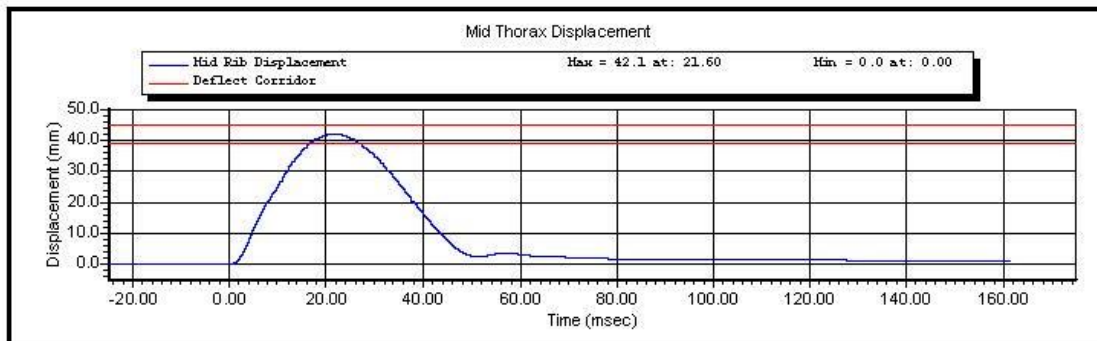
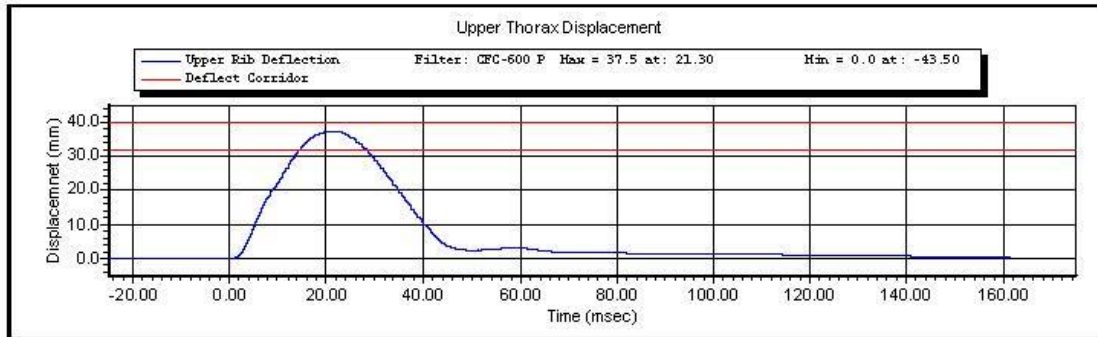
1 of 3



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Test ID:

Test Time: 8:42:31 AM

Test Date: 1/25/2012

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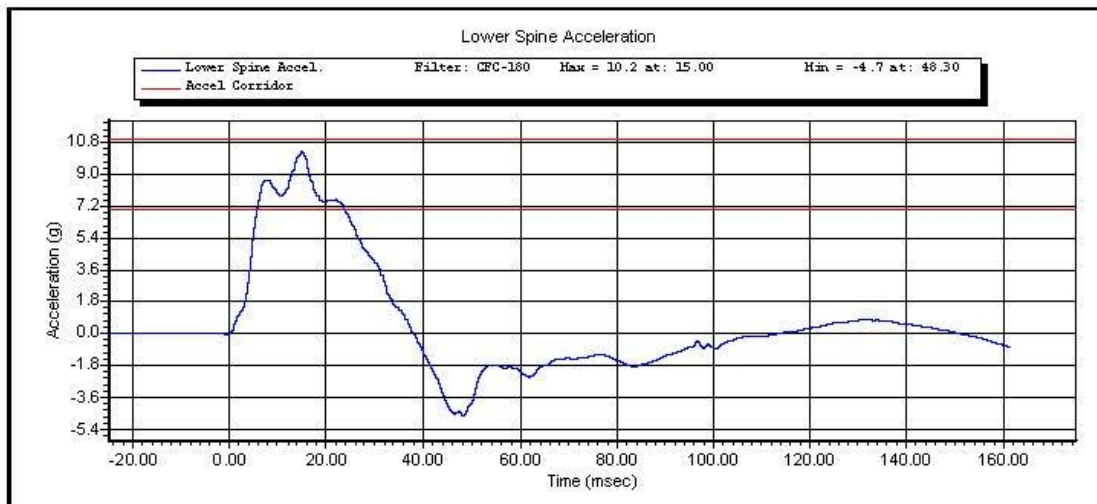
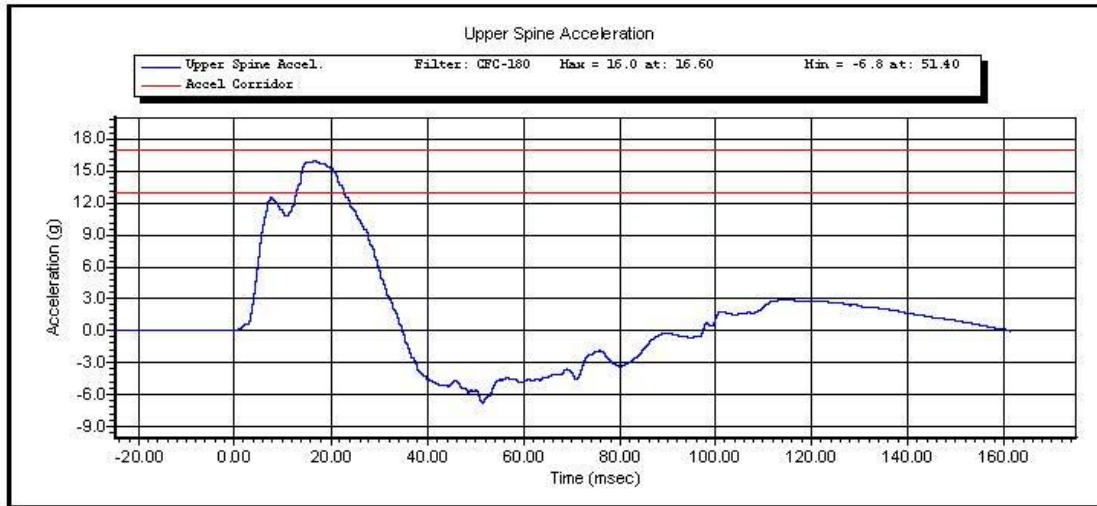
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Test ID:

Test Time: 8:42:31 AM

Test Date: 1/25/2012

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VERIFICATION REPORT

Test Name:	Abdominal Impact	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	1/24/2012
Test Number:	1	Test Time:	3:34:27 PM

Component Part Number	Component Serial Number
Abdomen Ribs 4, 5	1761, DG7012

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.2 deg C P
Humidity	10 -- 70	25 %RH P
Velocity	4.20 -- 4.40	4.34 m/s P
Probe Acceleration	12.0 -- 16.0	14.3 g P
Upper Abdominal Rib Deflection	36.0 -- 47.0	44.5 mm P
Lower Abdominal Rib Deflection	33.0 -- 44.0	42.4 mm P
Lower Spine Acceleration - T12	9.0 -- 14.0	10.8 g P

All test parameters are within specifications

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

Test ID:

Test Time: **3:34:27 PM**

Test Date: **1/24/2012**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2012
Endevco	7231CT	AGHF5	1/24/2012
FTSS	180-3881-1	DS-1860	9/1/2011
FTSS	180-3881-1	DS-1861	9/1/2011
Endevco	7264-2000	P58796	10/5/2011

Test ID:

Test Time: 3:34:27 PM

Test Date: 1/24/2012

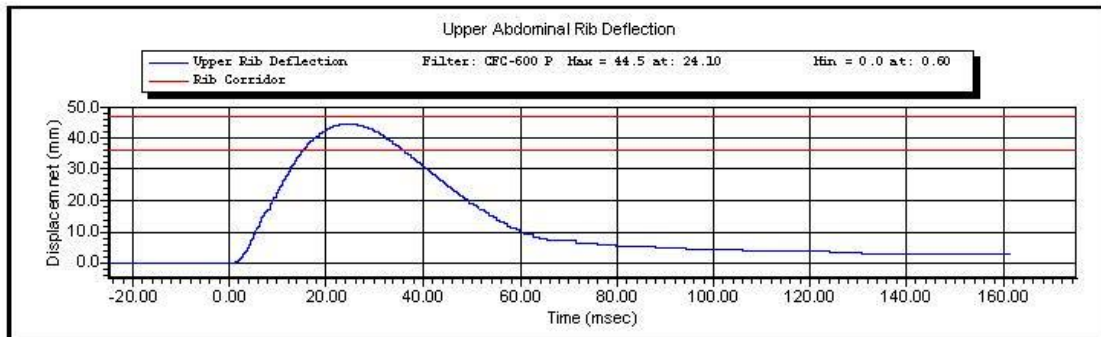
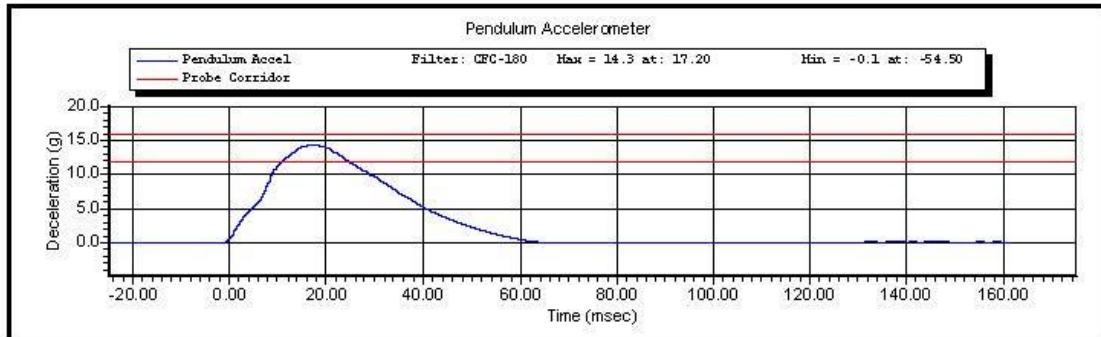


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Test Name:	Abdominal Impact	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	1/24/2012
Test Number:	1	Test Time:	3:34:27 PM



Test ID:

Test Time: 3:34:27 PM

Test Date: 1/24/2012

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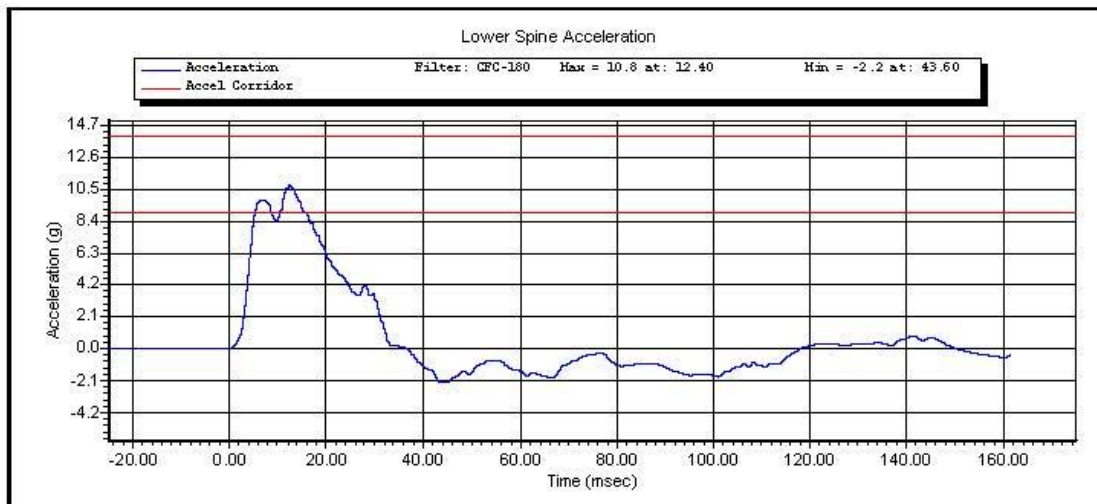
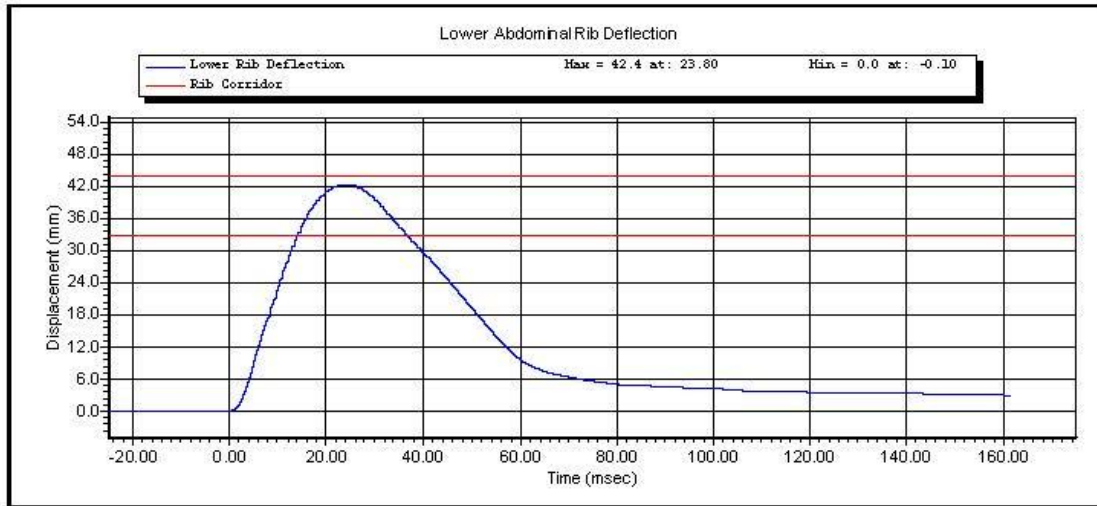
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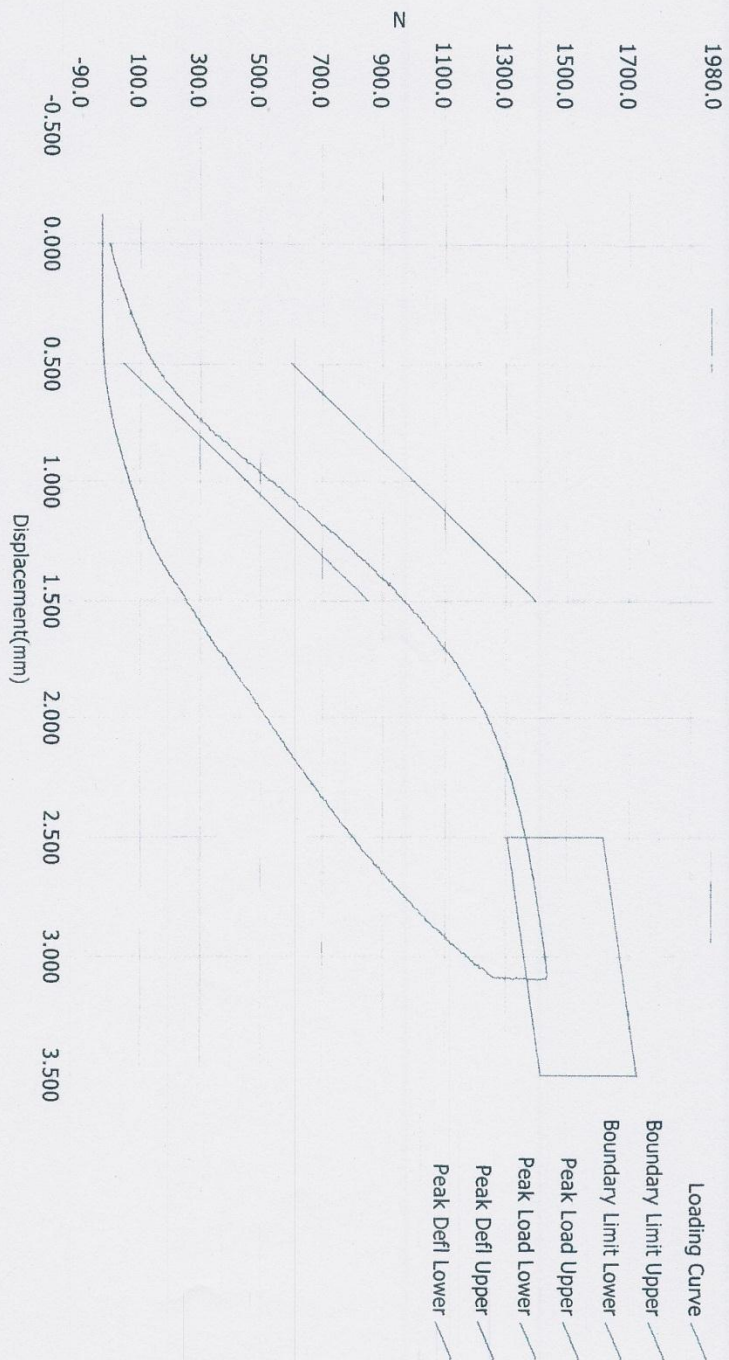
Test Time: 3:34:27 PM

Test Date: 1/24/2012

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2 of 2

Resultant Data - SIDIIS Plug Compression



ATD Calibration Lab

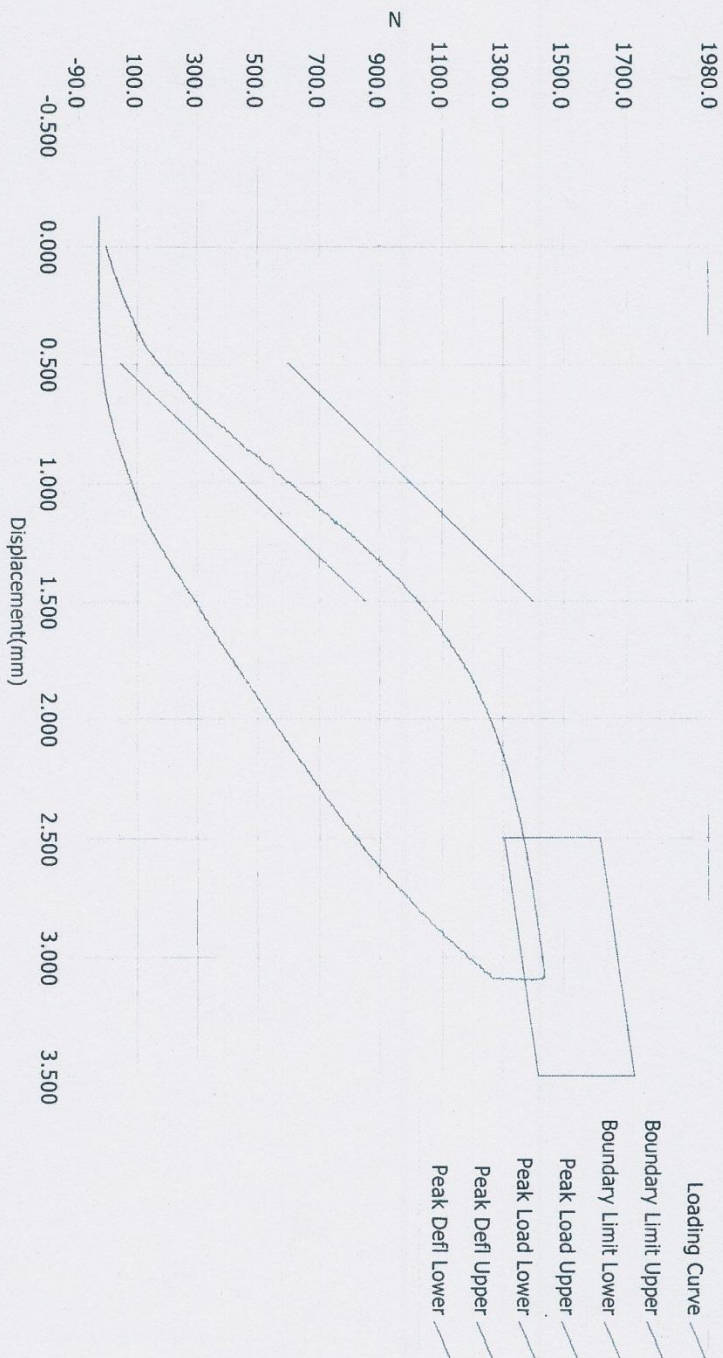
DG8012
(1431 N)
Cet

Test ID	Part Serial Number	Test Date	Test Time
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Cert ID	ATD Serial Number	ATD Type	
N/A	SIDIIS		

Current Date : 9/22/2011

Current Time : 20:29:35

Resultant Data - SIDIIs Plug Compression



ATD Calibration Lab

DG8012
(1489 N)
FS

Test ID	Part Serial Number	Test Date	Test Time
46470	9/22/2011	9:01 PM	
Cert ID	ATD Serial Number	ATD Type	
N/A	SIDIIs		

Current Date : 9/22/2011 Current Time : 21:01:50



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VERIFICATION REPORT

Test Name:	Pelvis	Revision:	8/24/2009
Sub Test Name:	Acetabulum Impact	Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	1/24/2012
Test Number:	2	Test Time:	11:38:59 AM

Component Part Number	Component Serial Number
180-4343 Pelvis Flesh	DG3207
Humanetics Cert Plug - 1431N	46458
Humanetics Test Plug - 1429N	46470

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.8 deg C P
Humidity	10 -- 70	26 %RH P
Velocity	6.60 -- 6.80	6.61 m/s P
Peak Probe Acceleration	38.0 -- 47.0	46.7 g P
Peak Pelvis Acceleration	34.0 -- 42.0	41.3 g P
Peak Acetabulum Force	3.60 -- 4.30	3.81 kN P

All test parameters are within specifications

Technician: **A. Rudniski**

Supervisor: **D. Travale**

Test ID:

Test Time: **11:38:59 AM**

Test Date: **1/24/2012**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2012
Endevco	7231CT	AGHF5	1/24/2012
Endevco	7264-2000	P51875	9/29/2011
DentonATD	3249J	LC-267Fy	10/30/2011

Test ID:

Test Time: 11:38:59 AM

Test Date: 1/24/2012

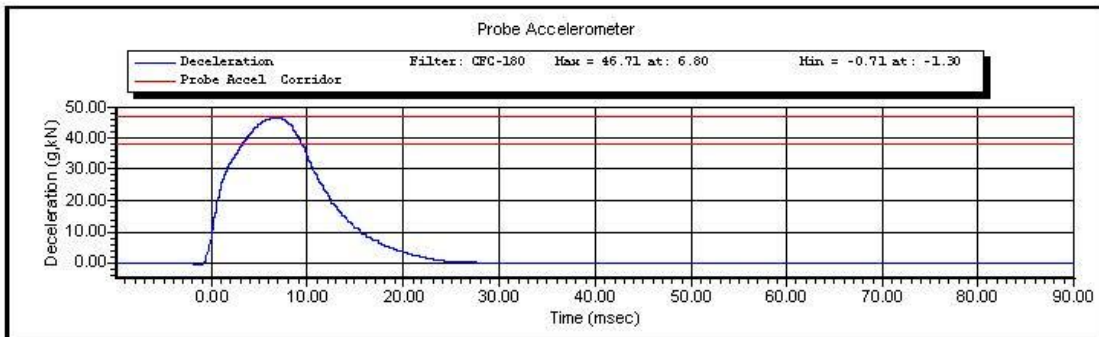
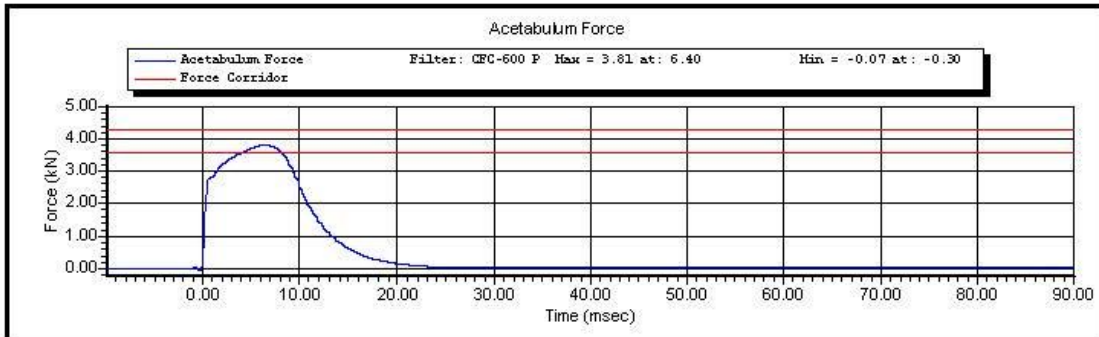


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Test Name:	Pelvis	Revision:	8/24/2009
Sub Test Name:	Acetabulum Impact	Spec Type:	NHTSA
ATD Type:	SID-11s		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	1/24/2012
Test Number:	2	Test Time:	11:38:59 AM



Test ID:

Test Time: **11:38:59 AM**

Test Date: **1/24/2012**

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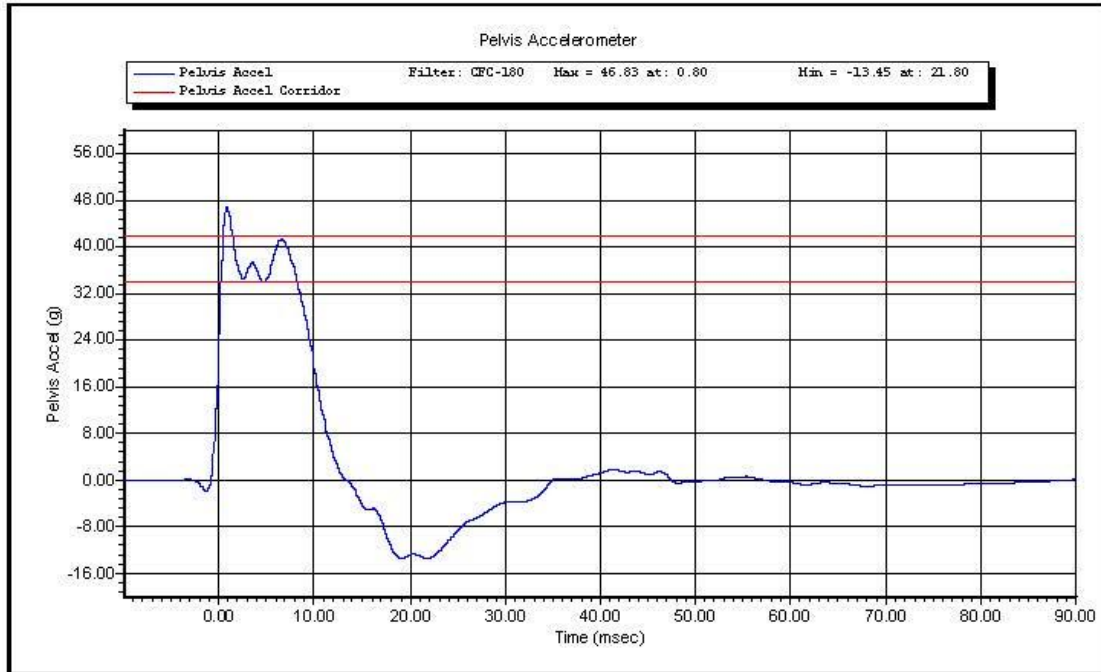
1 of 2



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Test ID:

Test Time: 11:38:59 AM

Test Date: 1/24/2012

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2 of 2



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VERIFICATION REPORT

Test Name:	Pelvis	Revision:	8/24/2009
Sub Test Name:	Iliac Impact	Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	1/20/2012
Test Number:	1	Test Time:	3:59:27 PM

Component Part Number	Component Serial Number
180-4343 Pelvis Flesh	DG3207

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.2 deg C P
Humidity	10 -- 70	15 %RH P
Velocity	4.20 -- 4.40	4.32 m/s P
Peak Probe Acceleration	36.0 -- 45.0	43.7 g P
Peak Pelvis Acceleration	28.0 -- 39.0	34.8 g P
Peak Iliac Force	4.10 -- 5.10	4.94 kN P

All test parameters are within specifications

Technician: **A. Rudniski**

Supervisor: **D. Travale**

Test ID:

Test Time: **3:59:27 PM**

Test Date: **1/20/2012**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2012
Endevco	7231CT	AGHF5	1/3/2012
Endevco	7264-2000	P51875	9/29/2011
DentonATD	3228J	LC-281Fy	8/31/2011

Test ID:

Test Time: **3:59:27 PM**

Test Date: **1/20/2012**

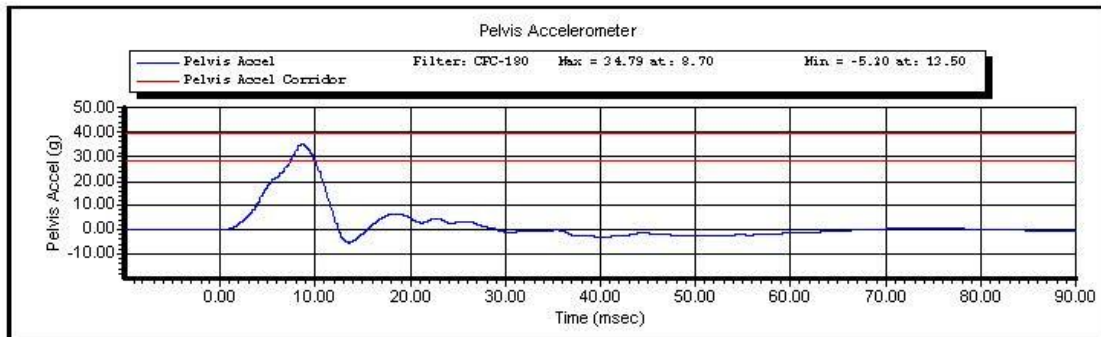
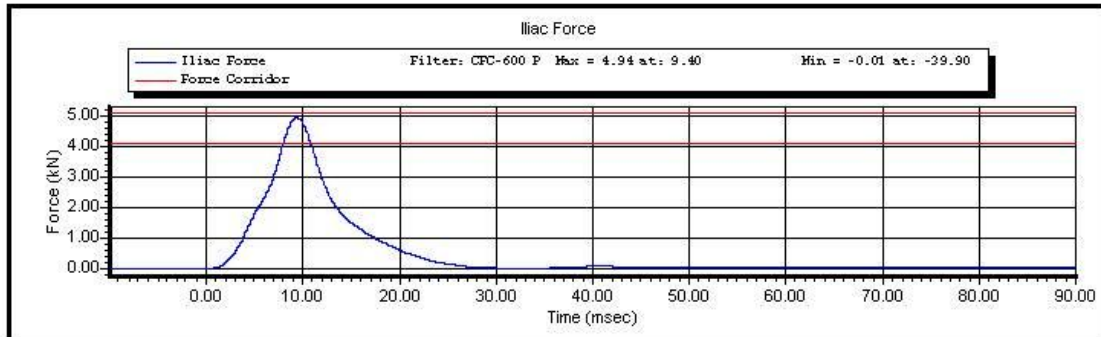


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Test Name:	Pelvis	Revision:	8/24/2009
Sub Test Name:	Iliac Impact	Spec Type:	NHTSA
ATD Type:	SID-Ils		
ATD Serial Number:	DG8012		
Test ID:		Test Date:	1/20/2012
Test Number:	1	Test Time:	3:59:27 PM



Test ID:

Test Time: **3:59:27 PM**

Test Date: **1/20/2012**

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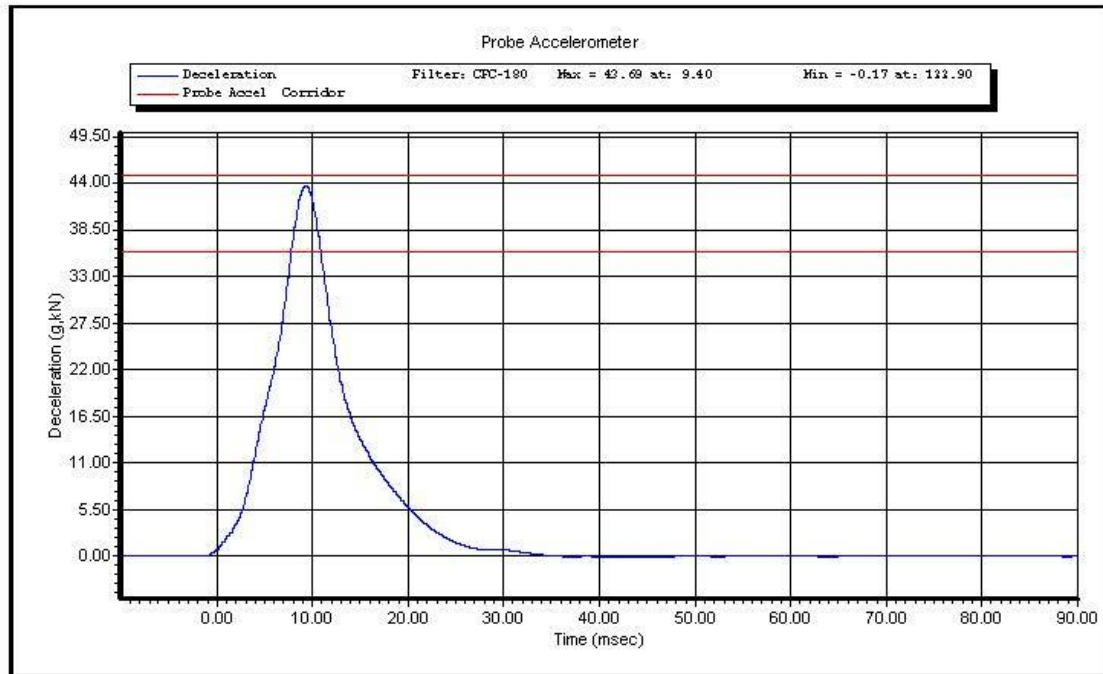
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Test ID:

Test Time: 3:59:27 PM

Test Date: 1/20/2012

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Appendix D
Test Equipment and Instrumentation Calibration Data

Table 1 – Dummy Instrumentation (ES-2re)

			ES-2re S/N: 034		
			Serial Number	Manufacturer	Calibration Date
Head Accelerometers		X	P58737	Endevco	9/29/11
		Y	P52022	Endevco	9/29/11
		Z	P52040	Endevco	9/29/11
Head Accelerometers Redundant		RX	P58843	Endevco	9/29/11
		RY	P51668	Endevco	9/29/11
		RZ	P51327	Endevco	9/29/11
Thorax Rib Displacement Potentiometers	Upper	Y	183	Honeywell	8/31/11
	Middle	Y	184	Honeywell	8/31/11
	Lower	Y	182	Honeywell	8/31/11
Abdominal Load Cells	Upper	Y	1512	Denton	6/3/11
	Middle	Y	1526	Denton	6/3/11
	Lower	Y	1516	Denton	6/3/11
Lower Spine Accelerometers (T12)		X	P58987	Endevco	8/17/11
		Y	P51873	Endevco	8/17/11
		Z	P52152	Endevco	8/17/11
Public Symphysis Load Cell		Y	465	Denton	8/31/11

Table 2 – Dummy Instrumentation (SID-IIs)

				SID-IIs S/N: 8012			
				Serial Number	Manufacturer	Calibration Date	
Head Accelerometers				X	P49185	Endevco	11/3/11
				Y	P58839	Endevco	10/17/11
				Z	P51991	Endevco	10/17/11
Head Accelerometers Redundant				RX	P68058	Endevco	10/17/11
				RY	P51885	Endevco	10/17/11
				RZ	P68059	Endevco	10/17/11
Displacement Potentiometer	Thoracic Rib	Upper	Y	1849	Denton	9/1/11	
		Middle	Y	1063	FTSS	10/31/11	
		Lower	Y	1859	Denton	9/1/11	
	Abdominal Rib	Upper	Y	1860	Denton	9/1/11	
		Lower	Y	1861	Denton	9/1/11	
Lower Spine Accelerometers (T12)				X	P52100	Endevco	10/5/11
				Y	P58796	Endevco	10/5/11
				Z	P50098	Endevco	10/5/11
Acetabulum Load Cell				Y	267Fy	Denton	9/1/11
Lilac Wing Load Cell				Y	281Fy	Denton	9/1/11

Table 3 – Vehicle Instrumentation

Vehicle Instrumentation			Serial Number	Manufacturer	Calibration Date
1	Vehicle Center of Gravity	X	P35786	Endevco	10/4/11
	Vehicle Center of Gravity	Y	P16289	Endevco	9/15/11
	Vehicle Center of Gravity	Z	P32219	Endevco	10/4/11
2	Right Side Sill at Front Seat	X	P69809	Endevco	8/10/11
	Right Side Sill at Front Seat	Y	P69798	Endevco	8/10/11
	Right Side Sill at Front Seat	Z	P71294	Endevco	10/4/11
3	Right Side Sill at Rear Seat	X	P39743	Endevco	10/4/11
	Right Side Sill at Rear Seat	Y	P23303	Endevco	10/4/11
	Right Side Sill at Rear Seat	Z	P18532	Endevco	10/4/11
4	Left Side Sill at Front Door	Y	A081410	MS	10/4/11
5	Left Side Sill at Rear Door	Y	A081447	MS	10/4/11
6	Left A-Post Lower	Y	A081412	MS	10/4/11
7	Left A-Post Middle	Y	A081413	MS	10/4/11
8	Left B-Post Lower	Y	A081424	MS	10/4/11
9	Left B-Post Middle	X	A081414	MS	10/4/11
10	Front Seat Track	Y	A081443	MS	10/4/11
11	Rear Seat Track or Structure	Y	A081457	MS	10/4/11
12	Right Rear Occ. Compartment	Y	A081431	MS	10/4/11
13	Engine Block	X	A034971	MS	10/4/11
	Engine Block	Y	A027662	MS	10/4/11
14	Rear Floorpan Above Axle	X	A081456	MS	10/4/11
	Rear Floorpan Above Axle	Y	A081436	MS	10/4/11
	Rear Floorpan Above Axle	Z	A081453	MS	10/4/11

TABLE 4 – MDB Instrumentation

MDB Instrumentation		Serial Number	Manufacturer	Calibration Date
MDB Center of Gravity	X	C14901	Endevco	10/4/11
MDB Center of Gravity	Y	C16680	Endevco	10/4/11
MDB Center of Gravity	Z	CP30	Endevco	10/4/11
Left Frame at Rear Axle Centerline	X	C16507	Endevco	10/4/11
Left Frame at Rear Axle Centerline	Y	C16499	Endevco	10/4/11