

REPORT NUMBER: SINCAP-CAL-12-015

**NEW CAR ASSESSMENT PROGRAM (NCAP)
MOVING DEFORMABLE BARRIER SIDE IMPACT TEST**

**FUJI HEAVY INDUSTRIES LTD
2013 Subaru Legacy
Four Door Sedan**

NHTSA No: QD5101

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



February 4, 2013

FINAL REPORT

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

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Prepared by: *Vanessa Walsh*
Vanessa Walsh, Project Engineer

Date: February 4, 2013

Approved by: *David Travale*
David Travale, Technical Director
Transportation Test Operations

Date: February 4, 2013

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

TECHNICAL REPORT DOCUMENTATION PAGE

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16. Abstract A 55/28, (61.90 kph / 38.5 mph), 90° Moving Deformable Barrier NCAP Side Impact Test was conducted on the subject 2013 Subaru Legacy four door sedan 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 Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on November 26, 2012. The impact velocity of the Moving Deformable Barrier (MDB) was 62.36 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle at the time of impact was 1°C. The target vehicle's maximum post-test static crush was 231 mm located at level 3. The test vehicle's occupant performance data is as follows:																														
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<p>* Proposed IARV</p> <p>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.</p>																														
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 Administration Technical Information Services Division, NPO-411 1200 New Jersey Ave. SE Washington, D.C. 20590 e-mail: tis@nhtsa.dot.gov FAX: 202-493-2833																												
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SECTION 1

TEST PURPOSE AND PROCEDURE

This moving deformable barrier side impact test is part of the MY 2013 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 2013 Subaru Legacy four door sedan.

The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Laboratory Test Procedure dated September 2012.

SECTION 2

SUMMARY OF TEST RESULTS

A 2013 Subaru Legacy four door sedan was impacted on the left (driver's) side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 62.36 km/h (38.75 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's Transportation Test Operations Center in Buffalo, New York on November 26, 2012. 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 September 2012. 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	56.07
Maximum Thorax Rib Deflection	mm	44	20.91
Combined Abdominal Force	N	2500	910.15
Pubic Symphysis Force	N	6000	2456.78

Measurement Description	Passenger ATD (SID-IIs)		
	Units	Threshold	Result
Head Injury Criteria (HIC36)		1000	463.73
Lower Spine (T12) Resultant Acceleration	G	82	52.46
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3713.10
Maximum Thoracic Rib Deflection	mm	38*	16.65
Maximum Abdominal Rib Deflection	mm	45*	14.37

*Proposed IARV

SUPPLEMENTAL RESTRAINT INFORMATION

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

GENERAL COMMENTS:

1. P1 serial number - F033
2. P4 serial number - 303

Data Anomalies:

- LEFT REAR SILL AY has a questionable spike at 41 ms.
- LEFT LOWER B-POST AY has a saturated spike at 8 and 10ms.

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: 2013 Subaru Legacy four door sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No.: QD5101
Test Date: 11/26/2012

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	QD5101
Model Year	2013
Make	Subaru
Model	Legacy
Body Style	Four Door Sedan
VIN	4S3BMAA60D1013708
Body Color	Charcoal gray
Odometer Reading (km/mi)	24 / 15
Engine Displacement (L)	2.5
Type/No. Cylinders	I4
Engine Placement	Transverse
Transmission Type	Manual
Transmission Speeds	6-Speed
Overdrive	No
Final Drive	All Wheel Drive
Roof Rack	No
Sunroof/T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	No
Anti-Lock Brakes (ABS)	Yes

Traction Control System (TCS)	Yes
Auto-Leveling System	No
Automatic Door Locks (ADL)	No
Power Window Auto-Reverse	No
Other Optional Feature	--
Driver Front Airbag	Yes
Driver Curtain Airbag	Yes
Driver Head/Torso Airbag	No
Driver Torso Airbag	No
Driver Torso/Pelvis Airbag	Yes
Driver Pelvis Airbag	No
Driver Knee Airbag	No
Rear Pass. Curtain Airbag	Yes
Rear Pass. Head/Torso Airbag	No
Rear Pass. Torso Airbag	No
Rear Pass. Torso/Pelvis Airbag	No
Rear Pass. Pelvis Airbag	No
Driver Seat Belt Pretensioner	Yes
Rear Pass. Seat Belt Pretensioner	No
Driver Load Limiter	Yes
Rear Pass. Load Limiter	No
Other Safety Restraint	--

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

No

DATA FROM CERTIFICATION LABEL

Manufactured By	FUJI HEAVY
Date of Manufacture	09/12
Vehicle Type	Four Door Sedan

GVWR (kg)	2,010
GAWR Front (kg)	1,070
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)				385.0	(A)
DSC X 68.04 kg				340.2	(B)
Cargo Weight (RCLW) (kg)				44.8	(A-B)

VEHICLE SEAT TYPE

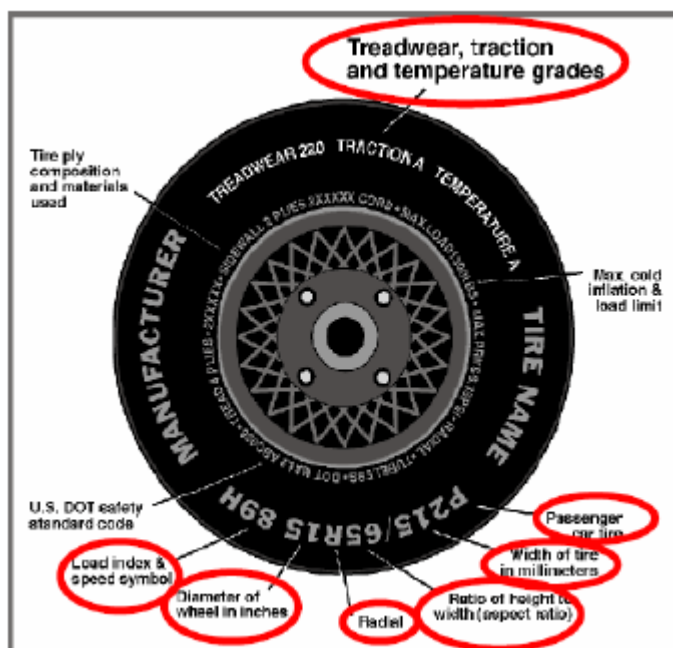
Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						W/ Lever	W/ Knob
Front Seat	X					X	
Rear or Second Row Seat		X			X		
Third Row seat							

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

Test Vehicle: 2013 Subaru Legacy four door sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: QD5101
 Test Date: 11/26/2012

Collected for year, make, model, & VIN, all items circled in red, tire manufacturer and tire name.



VEHICLE TIRE INFORMATION

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	230	220
Recommended Tire Size	P205/60R16	P205/60R16
Tire Size on Vehicle	P205/60R16	P205/60R16
Tire Manufacturer	Bridgestone	Bridgestone
Tire Model	Turanza	Turanza
Treadwear	260	260
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Polyester, 2 Steel, 1 Nylon	2 Polyester, 2 Steel, 1 Nylon
Load Index / Speed Symbol	91V	91V
Tire Material	RUBBER	RUBBER
DOT Safety Code Left	OBXVPM13112	OBXVPM13112
DOT Safety Code Right	OBXVPM13112	OBXVPM13112

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

Test Vehicle: 2013 Subaru Legacy four door sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: QD5101
 Test Date: 11/26/2012

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	230	230	220	220
Tire Placard	kPa	230	230	220	220
Owner's Manual	kPa	230	230	220	220
As Tested	kPa	230	230	220	220

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	207	207	207	207

TEST VEHICLE AXLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	438.5	324.5		479.0	400.0		484.0	403.5	
Right	kg	418.0	311.0		429.0	359.0		428.5	359.0	
Ratio	%	57	43		54	46		54	46	
Totals	kg	856.5	635.5	1,492.0	908.0	759.0	1,667.0	912.5	762.5	1,675.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1,492.0	(A)
Sum of Actual Weight of 2 P572 ATDS Used	kg	136.8	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	44.8	(C)
Calculated Target Vehicle Test Weight (TVTW)	kg	1,673.6	(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

TEST VEHICLE ATTITUDES AND CG

Measurement Description	Units	Fully Loaded	As Tested	Meets Requirement***
LF	mm	710	713	Yes
RF	mm	722	722	Yes
RR	mm	710	704	Yes
LR	mm	700	697	Yes
Vehicle CG (Aft of Front Axle)	mm	1,253	1,253	
Vehicle CG (Left(+)/ Right(-) from Longitudinal Centerline)	mm	-47	-43	

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

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

Test Vehicle: 2013 Subaru Legacy four door sedan NHTSA No.: QD5101
Test Program: NCAP Side MDB Impact Test Test Date: 11/26/2012

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Trunk Carpeting	4.5
Spare Tire	12.0
Jack	3.0
Ballast / Equipment Added	0.0

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

Test Vehicle: 2013 Subaru Legacy four door sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: QD5101
 Test Date: 11/26/2012

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	16.3	12.7	14.5
Front Passenger Seat	-	Not Adjustable	-
Front Center Seat*	N/A	N/A	N/A
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 SCRP Height (mm)	SCRP Height Position	SCRP Height (mm)		
				Rearmost	Mid-Fore/Aft	Forward-Most
Driver Seat	14.5	17	Max	54	67	83
			Mid	18	30	44
			Min	0	13	19
Front Passenger Seat	Not Adjustable	Not Adjustable	Max	-	-	-
			Mid	-	-	-
			Min	-	-	-
Front Center Seat*	N/A	N/A	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: 2013 Subaru Legacy four door sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: QD5101
 Test Date: 11/26/2012

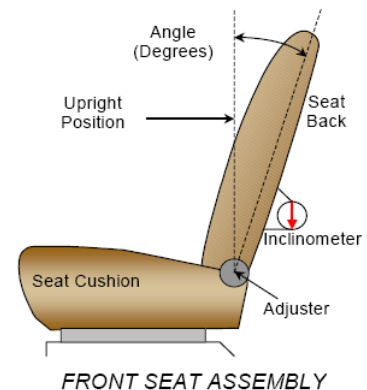
SEAT FORE / AFT POSITION

Seat	Total Fore / Aft Travel		Test Position from Forwardmost Position	
	mm	Detents*	mm	Detent*
Driver Seat	248	26	130	13
Front Passenger Seat	250	26	130	13
Front Center Seat*	N/A	N/A	N/A	N/A
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	-12.3 to 48.5	N/A	4.5	8
Front Passenger Seat	-11.5 to 46.9	N/A	4.4	8
Front Center Seat*	N/A	N/A	N/A	N/A
Struck Side Rear Seat w/ Seated Dummy	Fixed	Fixed	Fixed	Fixed
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: 2013 Subaru Legacy four door sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: QD5101
 Test Date: 11/26/2012

SEAT BELT ANCHORAGE ADJUSTMENT

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

	Total # of Positions	Placed in Position #
Driver Seat	5	1
Rear Seat	Fixed	Fixed

HEAD RESTRAINT ADJUSTMENT

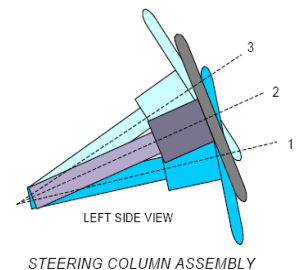
The driver's head restraint is adjusted to the highest and most full forward in-use position. The struck-side rear passenger's head restraint is adjusted to the lowest and most full forward in-use position.

	Total # of Positions	Placed in Position #
Driver Seat	5	4 - Uppermost
Rear Seat	3	0 - Lowermost

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.

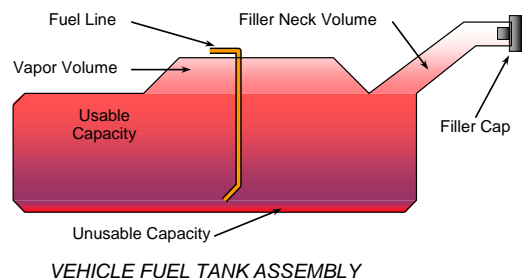
	Degrees	Fore/Aft Position (mm)
Lowermost – Position 1	23.5	0
Geometric Center – Position 2	22.0	19
Uppermost – Position 3	20.5	38
Telescoping Steering Wheel Travel		38
Test Position	22.0	19



FUEL PUMP

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

The vehicle is equipped with an electric fuel pump. The fuel filler neck is on the right side of the vehicle. The pump creates positive pressure in the fuel lines, pushing the gasoline to the engine. See form 1 for more information.



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

Test Vehicle: 2013 Subaru Legacy four door sedan NHTSA No.: QD5101
 Test Program: NCAP Side MDB Impact Test Test Date: 11/26/2012

FUEL TANK CAPACITY

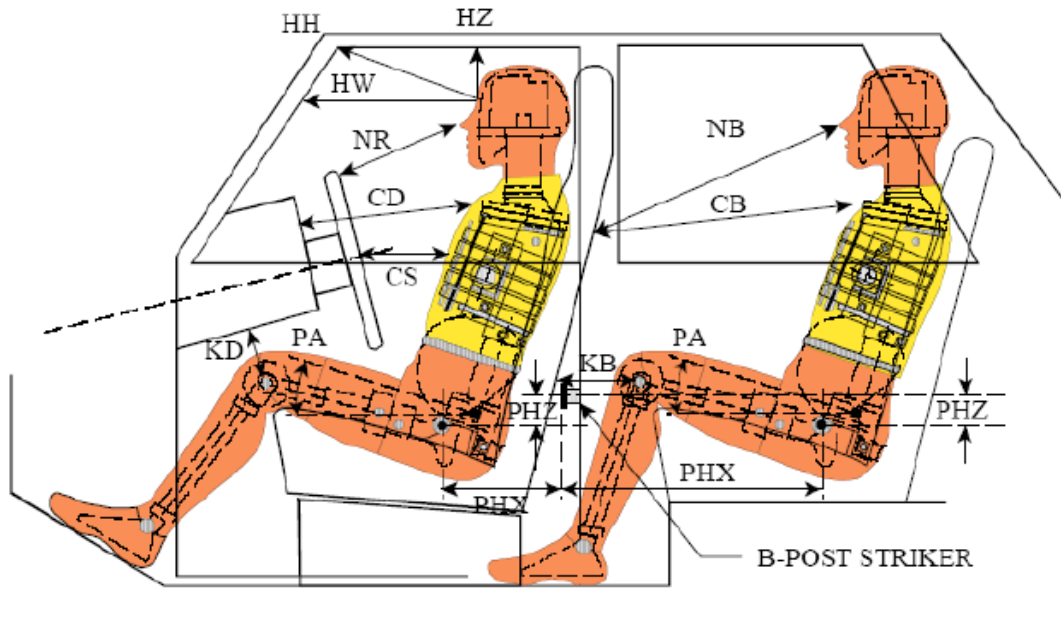
		Liters
Usable Capacity of "Standard Tank"	- see Form No. 1	70.0
Usable Capacity of "Optional Tank"	- see Form No. 1	N/A
Usable Capacity of Standard Tank	- see Owner's Manual	70.0
Usable Capacity of Optional Tank	- see Owner's Manual	N/A
93% of Usable Capacity		65.1
Actual Amount of Solvent Used in Test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

Is the Actual Amount of Solvent Used in the test equal to 93% ± 1% of the Usable Capacity stated in Form No. 1? **Yes** **No**

**DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS**

Test Vehicle: 2013 Subaru Legacy four door sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: QD5101
 Test Date: 11/26/2012



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

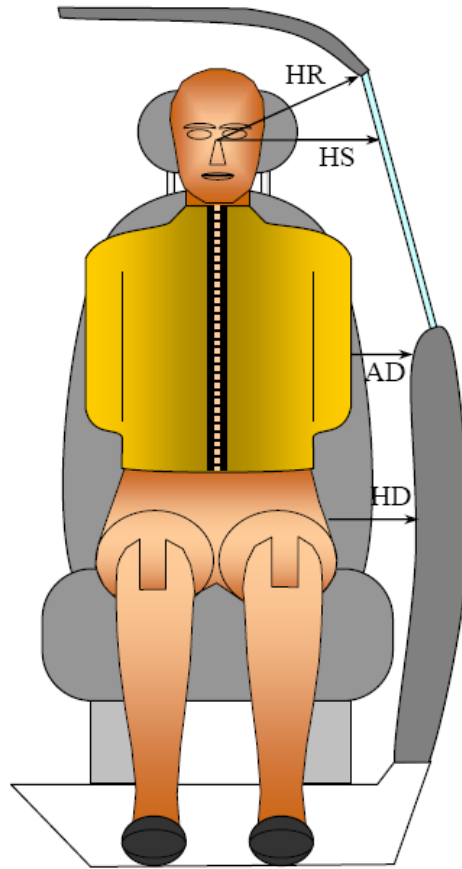
DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Pass. Code	Description	Driver (Serial No. F033)		Passenger (Serial No. 303)	
			Length (mm)	Angle	Length (mm)	Angle
HH		Header to Header	393			
HW		Header to Windshield	682			
HZ	HZ	Head to Roof Liner	177		259	
NR	NB	Nose to Rim/Seat Back	477		587	
CD	CB	Chest to Dash/Seat Back	585		566	
CS		Chest to Steering Wheel	427			
KD(L)/KDA(L)°	KB(L)/KBA(L)°	Left Knee to Dash/Seat Back	187	30.3	328	19.8
KD(R)/KDA(R)°	KB(R)/KBA(R)°	Right Knee to Dash/Seat Back	185	31.0	325	24.3
PAX°	PAX°	Pelvic Tilt Angle X		-24.0		20.8
	PAY°	Pelvic Tilt Angle Y				- 0.3
PHX	PHX	Hip Point to Striker (X-Axis)	213		244	
PHZ	PHZ	Hip Point to Striker (Z-Axis)	155		247	

**DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS**

Test Vehicle: 2013 Subaru Legacy four door sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: QD5101
 Test Date: 11/26/2012



FRONT VIEW OF DUMMY

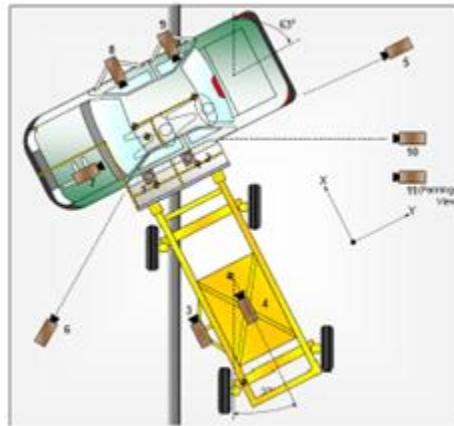
DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver (Serial No. F033)	Passenger (Serial No. 303)
HR	Head to Side Header	mm	206	250
HS	Head to Side Window	mm	345	365
AD	Arm to Door	mm	81	117
HD	Hip Point to Door	mm	152	158

**DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA**

Test Vehicle: 2013 Subaru Legacy four door sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: QD5101
 Test Date: 11/26/2012



CAMERA LOCATIONS AND DATA

No.	Camera View	Coordinates (mm)			Lens Length (mm)	Operating Frame Rate (fps)
		X	Y	Z		
1	Overhead Overall	400	910	4328	14.5	1000
2	Overhead Close-up	0	910	4328	24	1000
3	Left Impact Point (MDB)	-1470	0	-847	12.5	1000
4	Side Overall (MDB)	-1170	0	-847	6.5	1000
5	Rear	494	10857	942	50	1000
6	Left Front	2656	687	961	28	1000
7	Driver Front (OB)				12.5	1000
8	Driver Side (OB)				6.5	1000
9	Passenger Side (OB)				6.5	1000
10	Real-time Left Rear				Zoom	30
11	Real-time Inrun				Zoom	30

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

All cameras operated as intended.

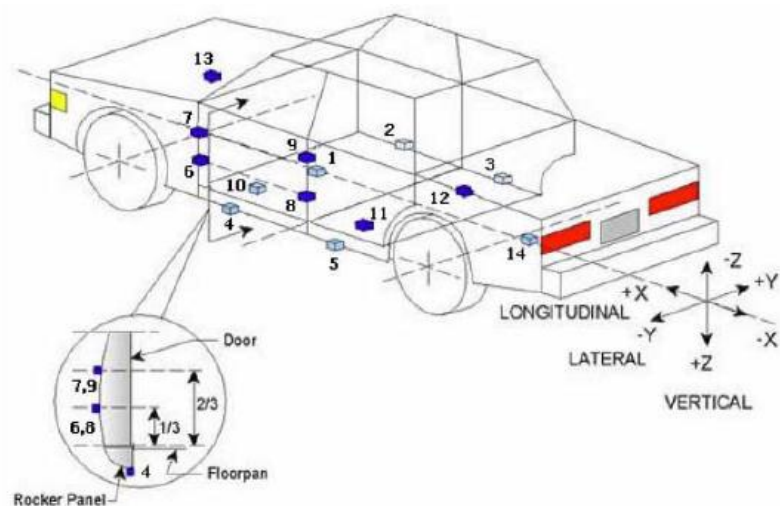
INSTRUMENTATION

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: 2013 Subaru Legacy four door sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No.: QD5101
Test Date: 11/26/2012



TEST VEHICLE ACCELEROMETER LOCATIONS

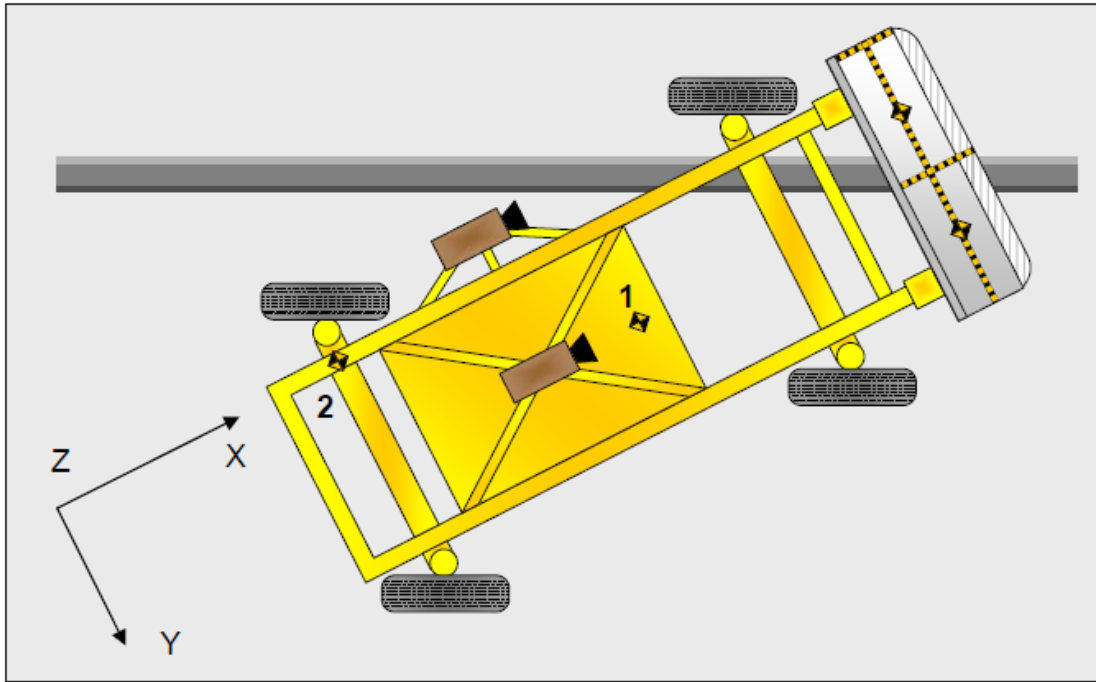
No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2,669	-1	-543
2	Right Sill at Front Seat	2,908	662	-293
3	Right Sill at Rear Seat	2,035	638	-279
4	Left Sill at Front Door	2,958	-659	-287
5	Left Sill at Rear Door	2,042	-634	-258
6	A-Post Lower	3,260	-632	-373
7	A-Post Middle	3,192	-662	-983
8	B-Post Lower	2,209	-680	-488
9	B-Post Middle	2,203	-683	-709
10	Front Seat Track	2,313	-538	-275
11	Rear Seat Structure	1,131	-550	-672
12	Rt. Rear Occ. Compartment	2,131	388	-220
13	Engine Block	4,014	91	-786
14	Rear Above Axle	1,146	-2	-571

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: 2013 Subaru Legacy four door sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No.: QD5101
Test Date: 11/26/2012



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: 2013 Subaru Legacy four door sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: QD5101
 Test Date: 11/26/2012

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 & Side Header	Curtain Airbag & Side Header &
Left Side of Head	Curtain Airbag & Side Header	Curtain Airbag
Back of Head	Curtain Airbag, Side Header &	Center Rear Seat Headrest
Left Shoulder	Curtain Airbag & Torso/Pelvis Airbag	Passenger Door
Upper Torso	Torso/Pelvis Airbag & Seat Back	Passenger Door
Lower Torso	Torso/Pelvis Airbag & Seat Back	Passenger Door & Seat Back
Left Hip	Torso/Pelvis Airbag & Seat Pan	Passenger Door & Seat Pan
Left Knee	Driver's Door	Passenger 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	0	0	0	0	0
Latch or Hinge Systems Pulled Out of Their Anchorages	No	No	No	No	No
Disengaged from Latched Position	No	No	No	No	No
Latch Separated from Striker	No	No	No	No	No
Jammed Shut	Yes	Yes	No	No	No
If Door Opened at Striker, Width of Opening at Striker (mm)	NA	NA	NA	NA	NA

POST-TEST SEAT PERFORMANCE

Description	Struck Side		Non-Struck Side	
	Front	Rear	Front	Rear
Seat Movement Along Seat Track	No	No	No	No
Seat Disengagement from Floor Pan	No	No	No	No
Seat Back Movement from Initial Position	No	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	Bent inwards but remained on vehicle
Windshield Damage	None
Side Window Damage	Rear passenger window shattered during impact
Other Notable Effects	None

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

Test Vehicle: 2013 Subaru Legacy four door sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: QD5101
 Test Date: 11/26/2012

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vehicle Wheel Base	mm		2753
Vertical Impact Reference Line (Aft of Front Axle - Intended Impact Point)	mm		440
Actual Impact Point (Aft of Frontal Axle)	mm		449
Horizontal Offset (+ forward / - rearward)	mm	+/- 50 of Intended Impact Point	-9
Vertical Offset (+ down / - up)	mm	+/- 20 of Intended Impact Point	8

**DATA SHEET NO. 9
MDB SUMMARY OF RESULTS**

Test Vehicle: 2013 Subaru Legacy four door sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: QD5101
 Test Date: 11/26/2012

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	62.36
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	62.32
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

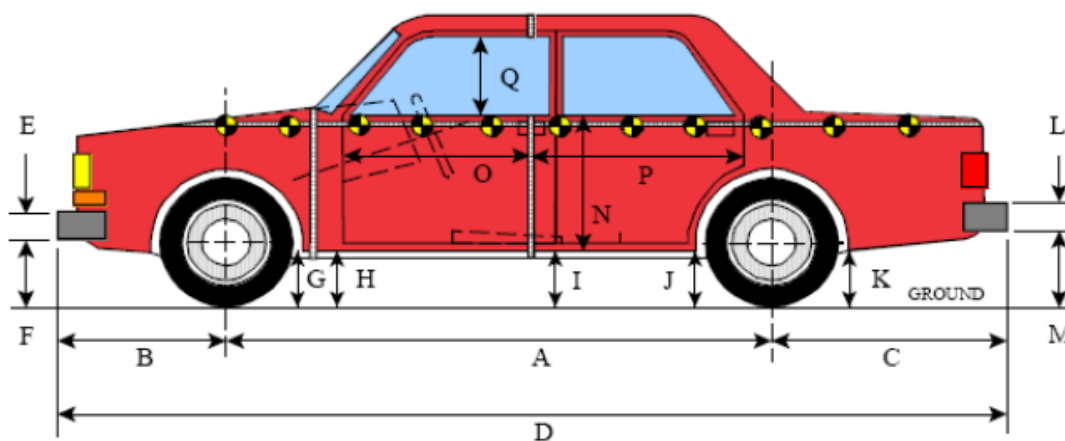
MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE

Vertical Location			From Centerline		Maximum Crush (mm)
Row	Description	Height (mm)	Distance (mm)	Direction	
A	Center of Bumper	432	300	Right	207
B	Top of Bumper	533	200	Right	145
C	Mid-Level	686	800	Left	76
D	Top of Stack	813	800	Left	119

**DATA SHEET NO. 10
TEST VEHICLE PROFILE MEASUREMENTS**

Test Vehicle: 2013 Subaru Legacy four door sedan
Test Program: NCAP Side MDB Impact Test

NHTSA No.: QD5101
Test Date: 11/26/2012



LEFT SIDE VIEW

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

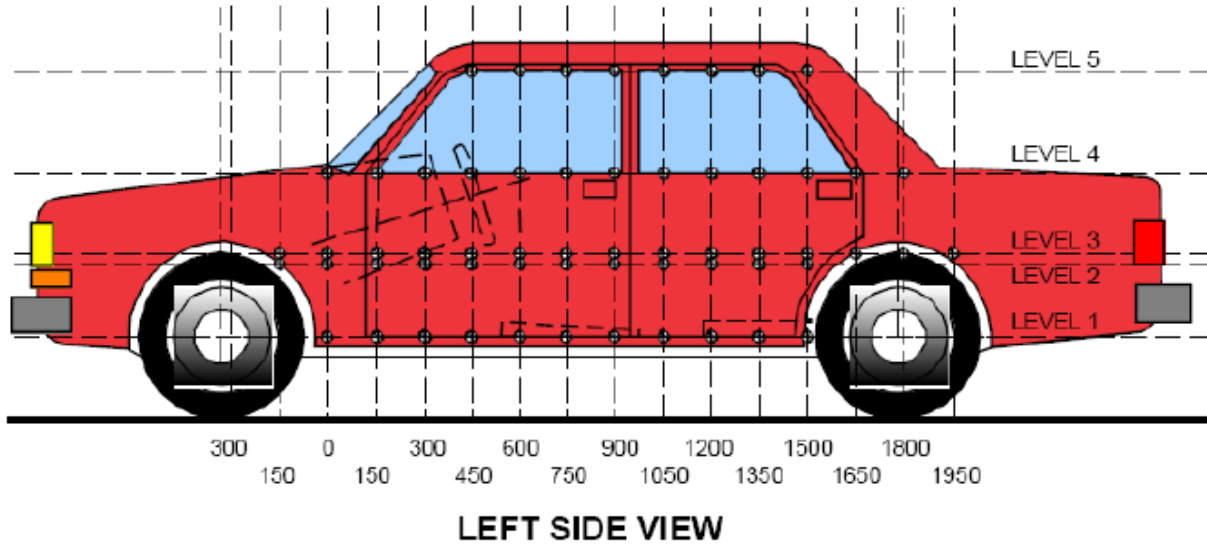
VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2,753	2,734	-19
B	Front Axle to FSOV	978	957	-21
C	Rear Axle to RSOV	1,018	1,029	11
D	Total Length at Centerline	4,754	4,721	-33
E	Front Bumper Thickness	120	120	0
F	Front Bumper Bottom to Ground	401	403	2
G	Sill Height at Front Wheel Well	165	177	12
H	Sill Height at Front Door Leading Edge	169	188	19
I	Sill Height at B Pillar	166	197	31
J1	Sill Height at Rear Wheel Well	159	192	33
J2	Pinch Weld Height at Rear Wheel Well	153	163	10
K	Sill Height Aft of Rear Wheel Well	211	223	12
L	Rear Bumper Thickness	160	160	0
M	Rear Bumper Bottom to Ground	439	457	18
N	Sill Height to Window Bottom of Front Window Sill	713	668	-45
O	Front Door Leading Edge to Impact CL	795	769	-26
P	Rear Door Trailing Edge to Impact CL	1,214	1,183	-31
Q	Front Window Opening	430	490	60
R	Right Side Length	4,665	4,666	1
S	Left Side Length	4,664	4,660	-4
T	Maximum Vehicle Width	1,779	1,659	-120

DATA SHEET NO. 11
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2013 Subaru Legacy four door sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: QD5101
 Test Date: 11/26/2012



MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Units	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	mm	301	81	1650
2	Driver Hip Point	mm	536	200	1650
3	Mid-Door	mm	657	231	1500
4	Window Sill	mm	908	135	1350
5	Window Top	mm	1,424	5	1200

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: 2013 Subaru Legacy four door sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: QD5101
 Test Date: 11/26/2012

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				-761					-769					-8	
-450				-778					-784					-6	
-300				-792					-796					-4	
-150			-904	-801				-907	-803				-3	-2	
0	-887	-892	-881	-809		-885	-893	-882	-806		2	-1	-1	3	
150	-854	-878	-881	-812		-884	-790	-792	-816		-30	88	89	-4	
300	-856	-880	-883	-821		-861	-770	-743	-787		-5	110	140	34	
450	-858	-882	-886	-831		-855	-762	-726	-788		3	120	160	43	
600	-859	-884	-888	-840		-852	-762	-716	-784		7	122	172	56	
750	-858	-886	-889	-848	-372	-855	-777	-714	-781	-372	3	109	175	67	0
900	-857	-887	-890	-855	-591	-859	-795	-719	-783	-593	-2	92	171	72	-2
1050	-856	-886	-890	-859	-610	-866	-810	-742	-793	-609	-10	76	148	66	1
1200	-853	-883	-888	-860	-615	-784	-731	-718	-766	-610	69	152	170	94	5
1350	-852	-883	-888	-862	-617	-781	-723	-671	-727	-616	71	160	217	135	1
1500	-851	-882	-887	-863	-617	-777	-691	-656	-747	-615	74	191	231	116	2
1650	-850	-880	-886	-863	-612	-769	-680	-677	-768	-612	81	200	209	95	0
1800	-862	-881	-883	-862	-596	-792	-691	-710	-789	-598	70	190	173	73	-2
1950		-905	-899	-863	-503		-842	-793	-825	-502		63	106	38	1
2100			-911	-858				-869	-845				42	13	
2250				-853					-824					29	
2400				-848					-831					17	
2550				-843					-834					9	
2700				-834					-832					2	
2850				-824					-825					-1	
3000				-804					-805					-1	

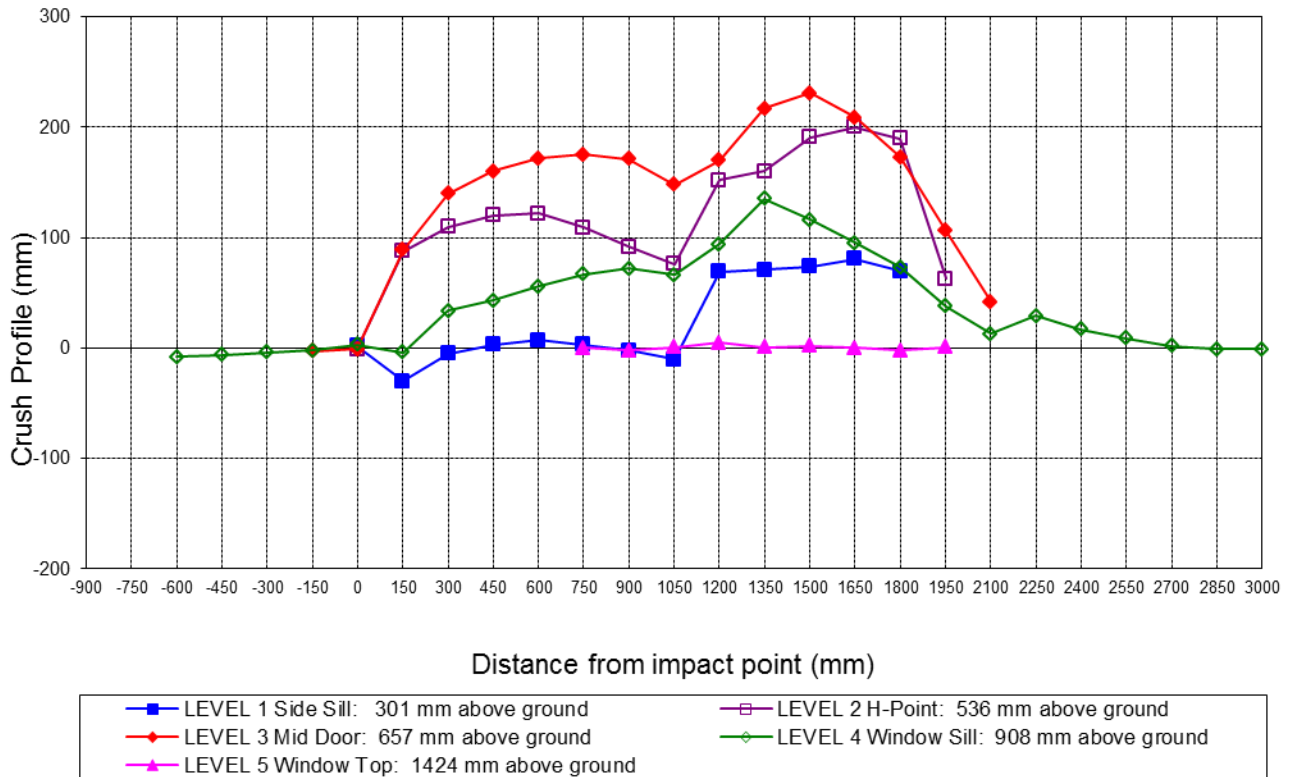
NOTE: Pre-test measurements are taken when the vehicle is in the "As Tested" weight condition.
 Vehicle measurements forward of the vertical impact reference line are negative.
 The crush profile grid is established prior to test based on an estimated impact point.

DATA SHEET NO. 11 (CONTINUED)
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2013 Subaru Legacy four door sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: QD5101
 Test Date: 11/26/2012

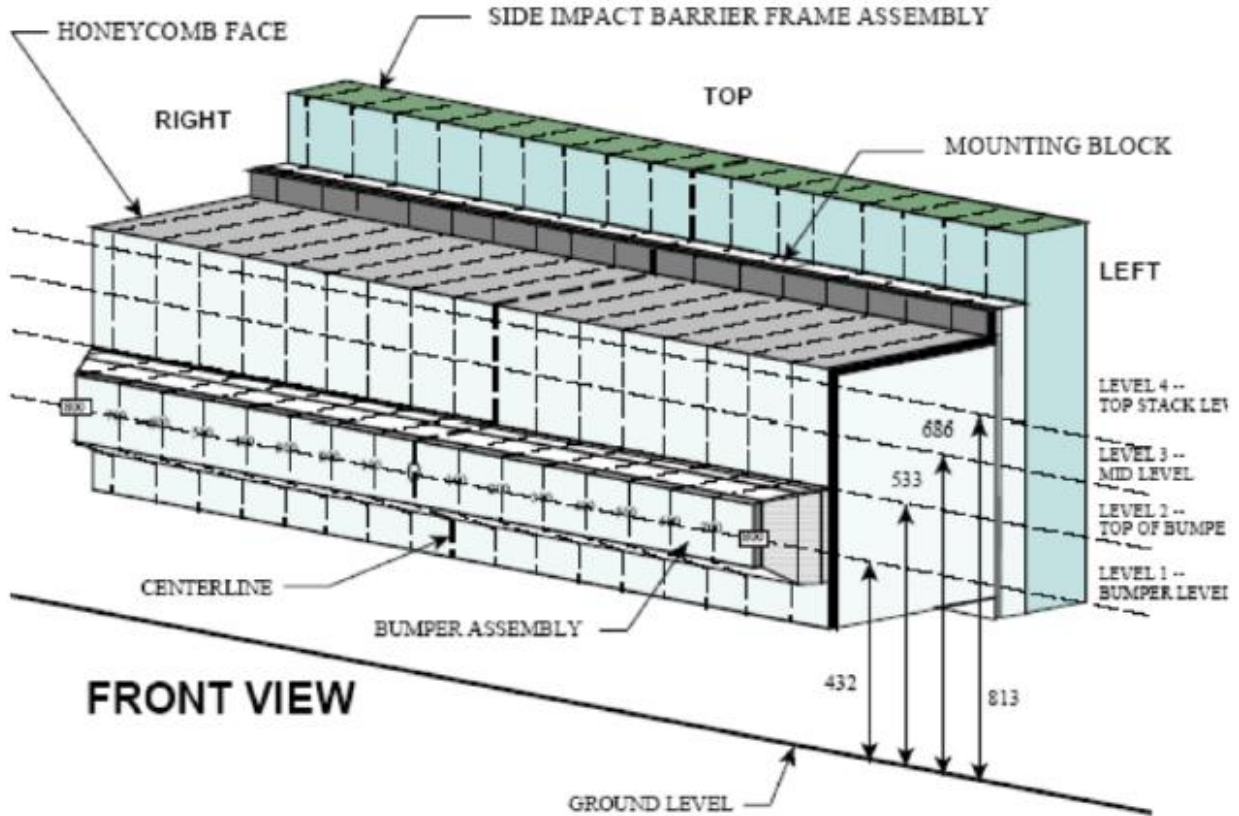
Vehicle Exterior Crush Measurements - Visual Representation



DATA SHEET NO. 12
MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle: 2013 Subaru Legacy Four Door Sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: QD5101
 Test Date: 11/26/2012



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		0	100	200	300	400	500	600	700
1	189	178	176	178	182	207	199	184	170	153	138	131	125	121	117	120	133
2	138	135	123	119	122	145	145	136	109	99	90	81	80	79	79	79	79
3	56	36	27	31	36	50	71	44	19	14	11	10	10	16	24	39	76
4	104	73	50	33	37	71	93	64	46	49	44	42	45	51	57	80	119

**DATA SHEET NO. 13
FMVSS NO. 301 STATIC ROLLOVER RESULTS**

Test Vehicle: 2013 Subaru Legacy four door sedan NHTSA No.: QD5101
 Test Program: NCAP Side MDB Impact Test Test Date: 11/26/2012

Test Time: 12:32 PM Temperature: 1 ° 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: No Spillage Occurred

FMVSS NO. 301 STATIC ROLLOVER DATA



ROLLOVER SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	70	300	370
90° to 180°	64	300	364
180° to 270°	63	300	363
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			
90° to 180°	0			
180° to 270°	0			
270° to 360°	0			

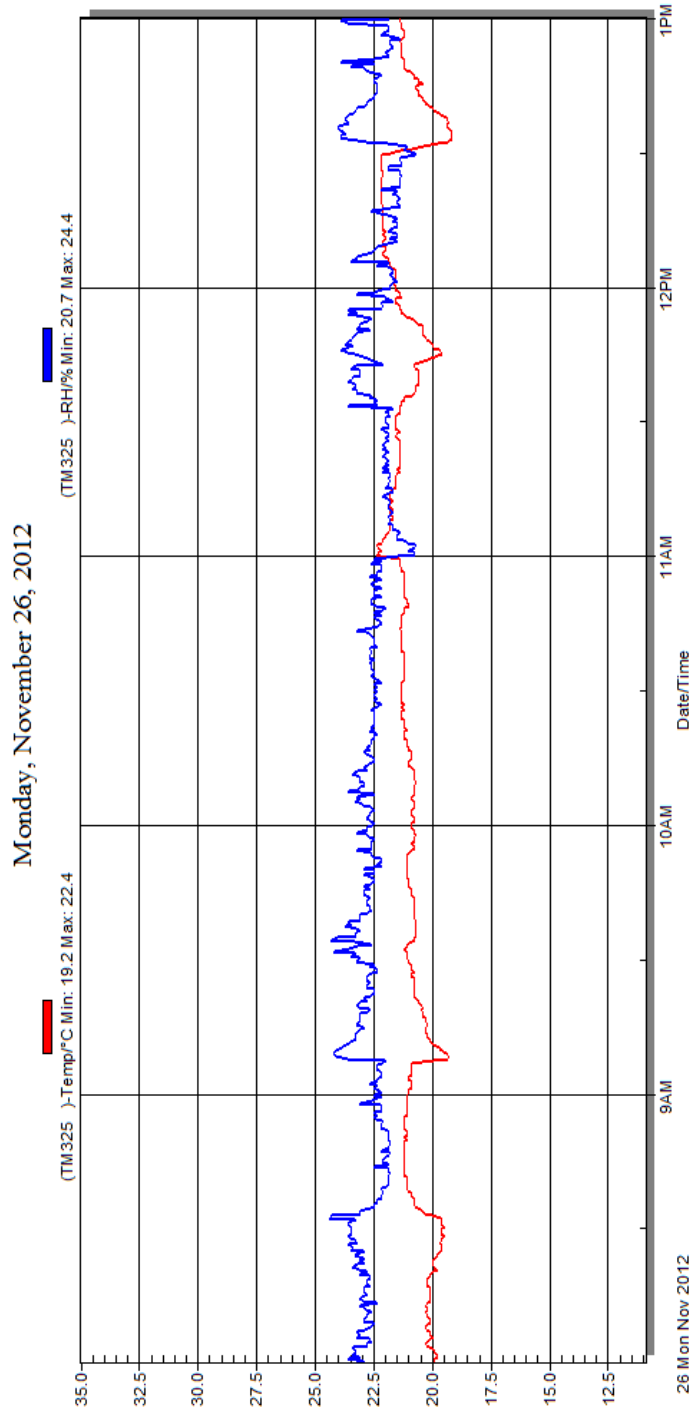
ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

Test Phase	Spillage Location
0° to 90°	N/A
90° to 180°	N/A
180° to 270°	N/A
270° to 360°	N/A

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

Test Vehicle: 2013 Subaru Legacy four door sedan
 Test Program: NCAP Side MDB Impact Test

NHTSA No.: QD5101
 Test Date: 11/26/2012



Temperature and Humidity Stabilization Chart/Data for Dummies and Test Vehicle

APPENDIX A
PHOTOGRAPHS

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Figure A-1: As-Delivered Right Front 3/4 View of Test Vehicle

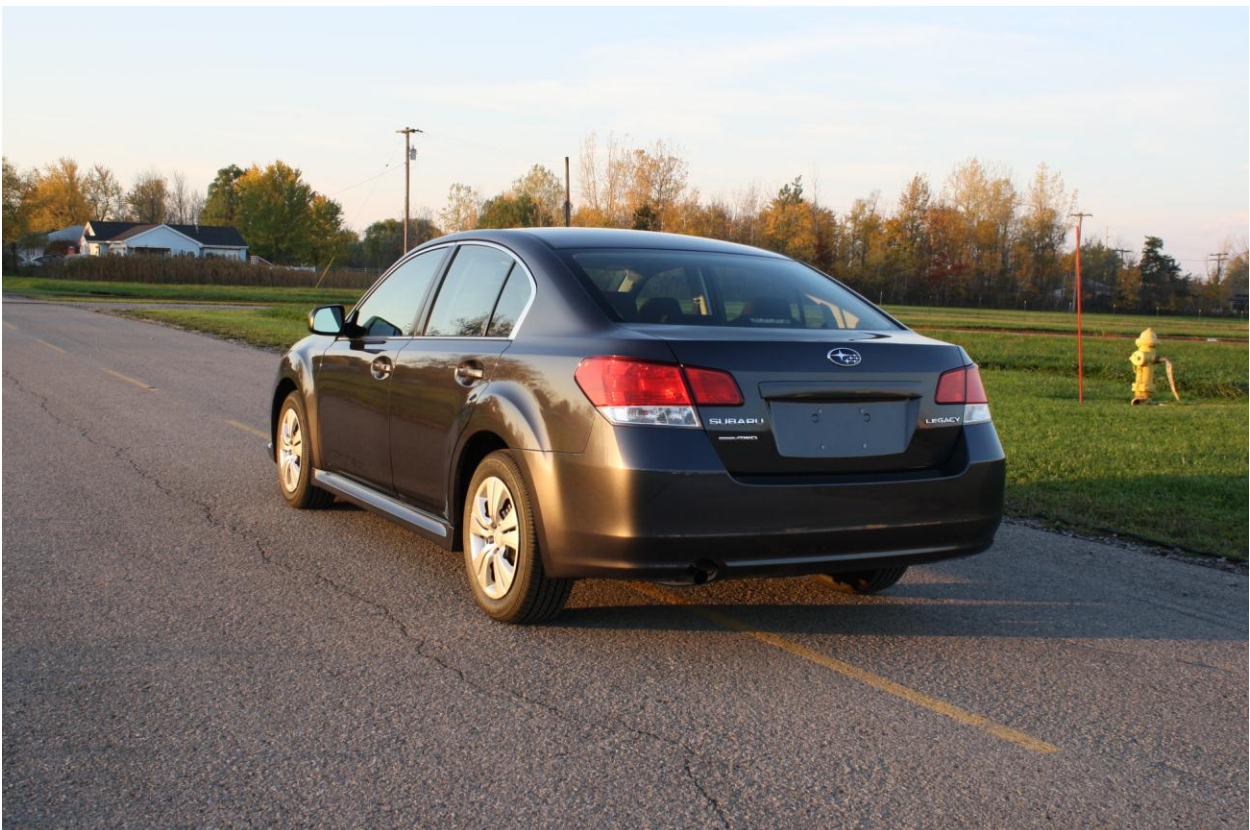


Figure A-2: As-Delivered Left Rear 3/4 View of Test Vehicle



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

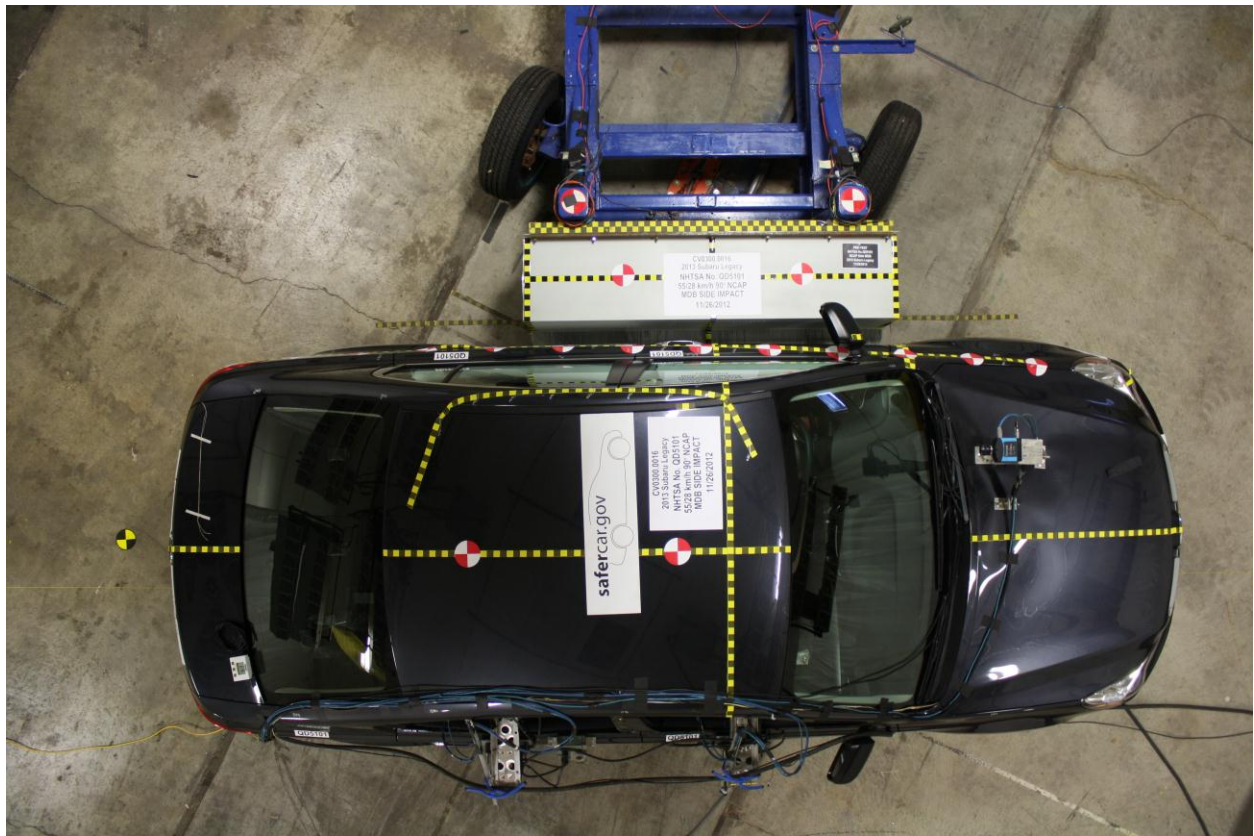


Figure A-15: Pre-Test Overhead View of the Test Area

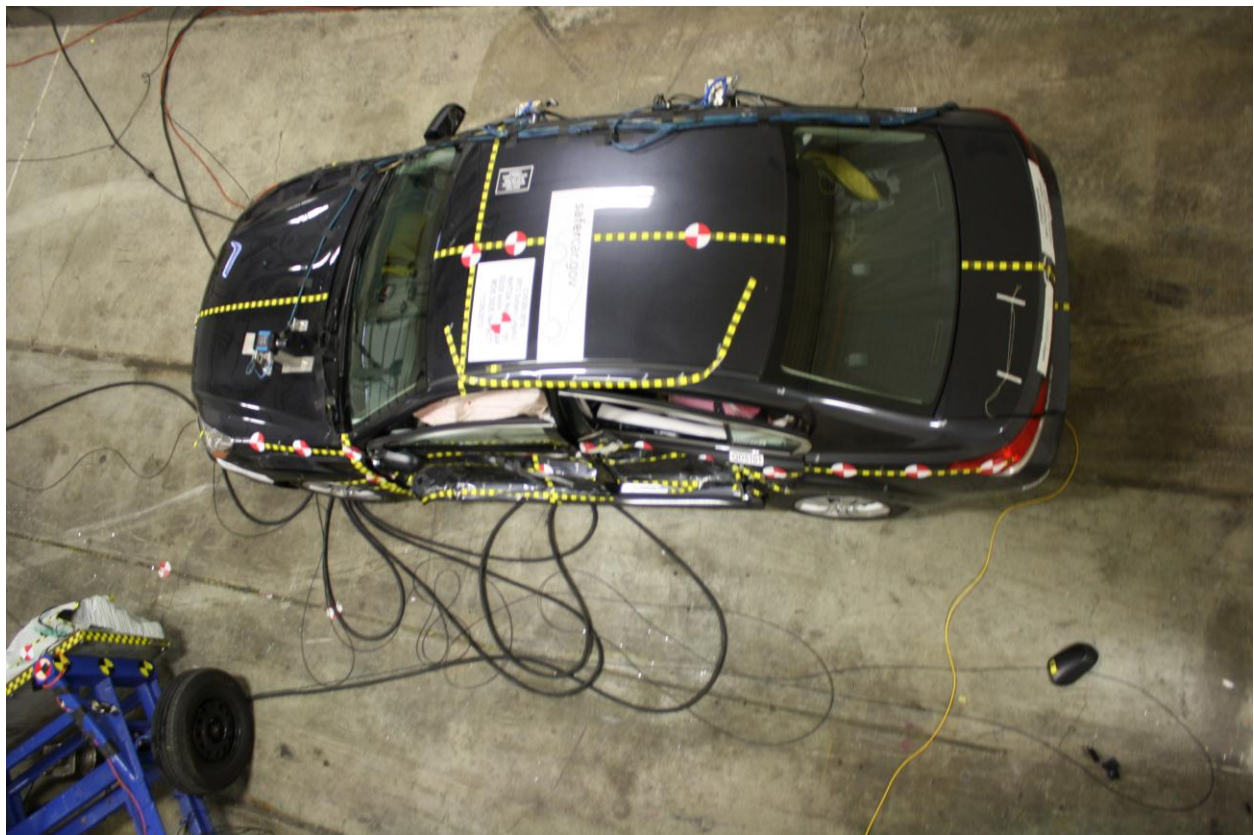


Figure A-16: Post-Test Overhead View of Test Area

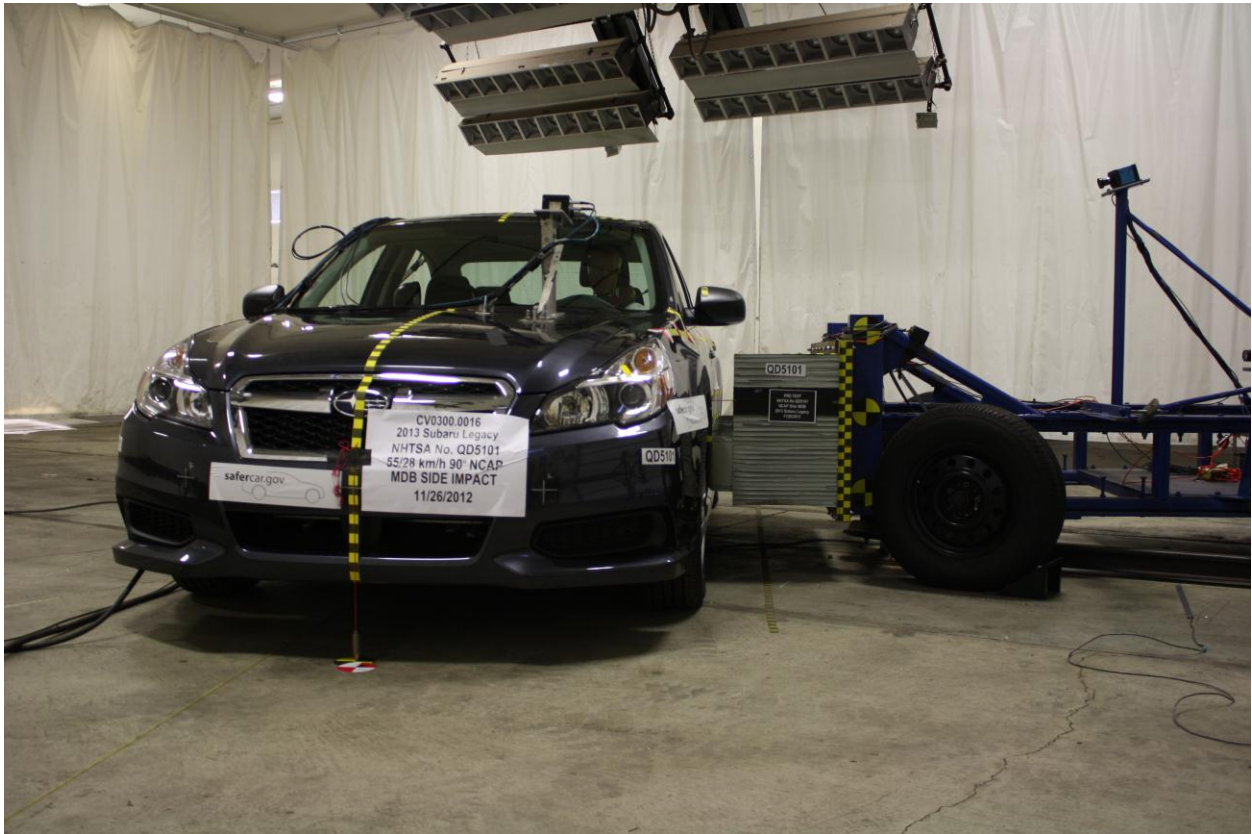


Figure A-17: Pre-Test Left Side View of MDB Positioned Against Side of Test Vehicle



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

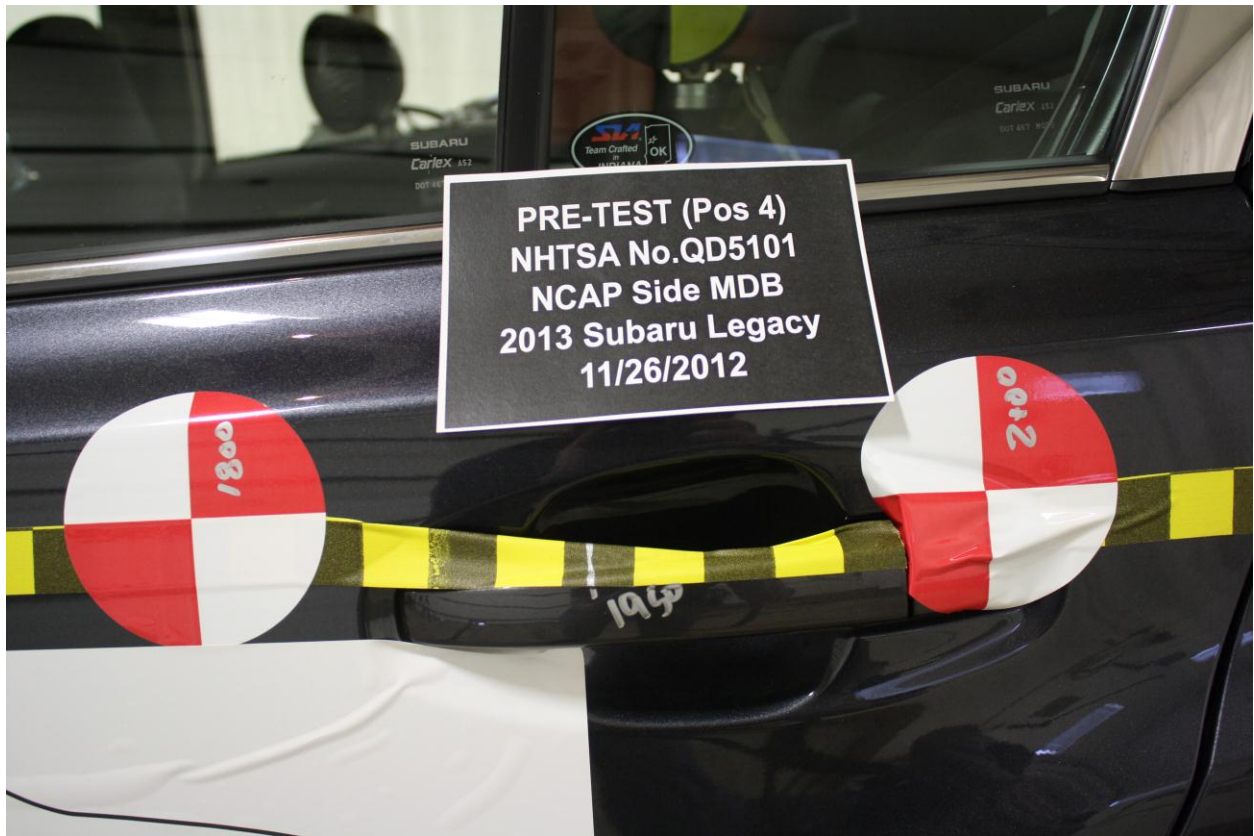


Figure A-23: Pre-Test Left Rear Door Latch Close-Up



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

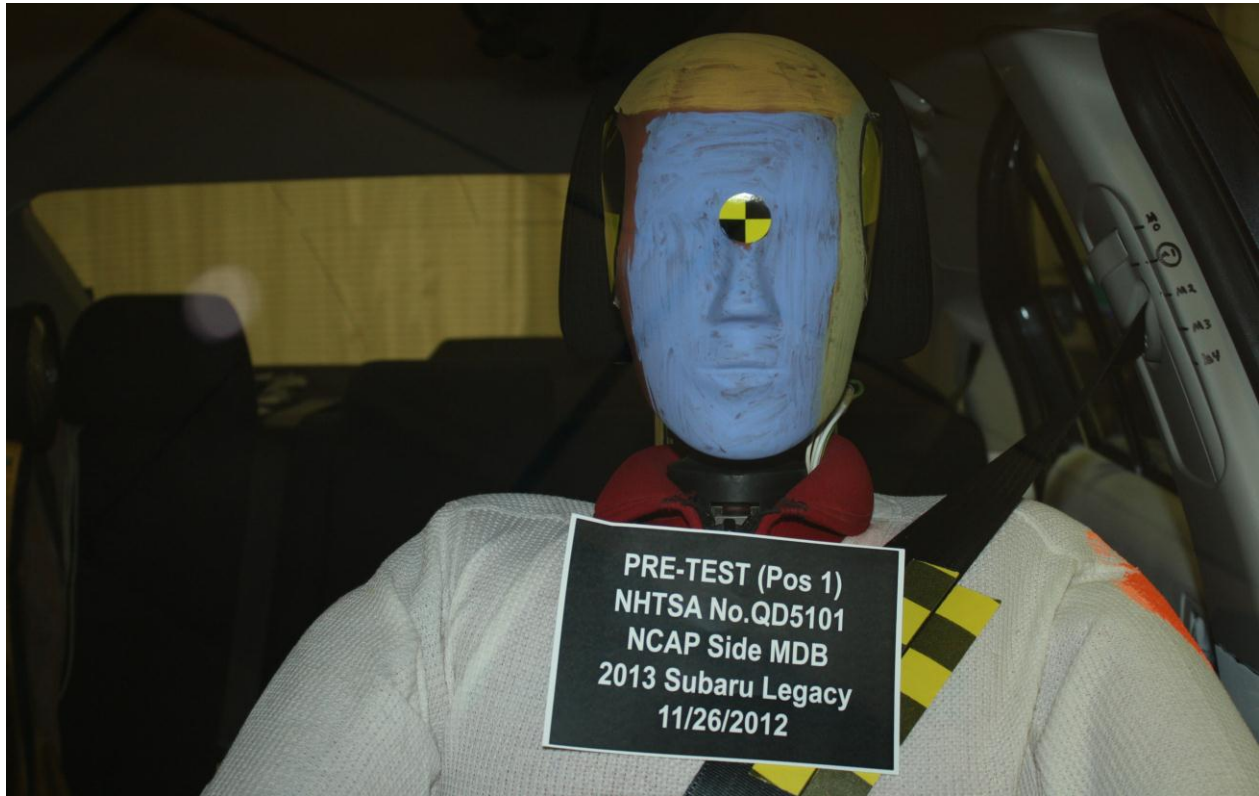


Figure A-31: Pre-Test Frontal View of Driver Dummy Head and Shoulders in Relation to Head Restraint



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

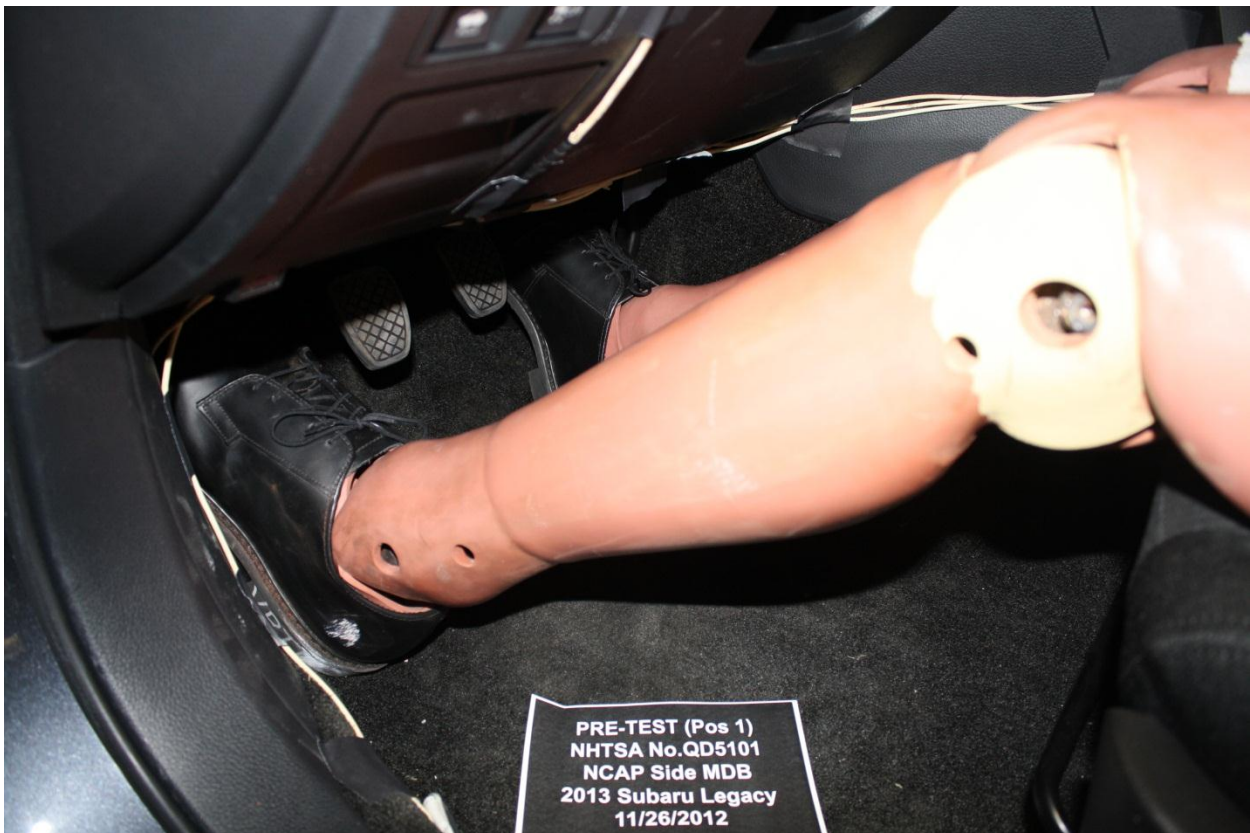


Figure A-34: Pre-Test Placement of Driver Dummy's Feet

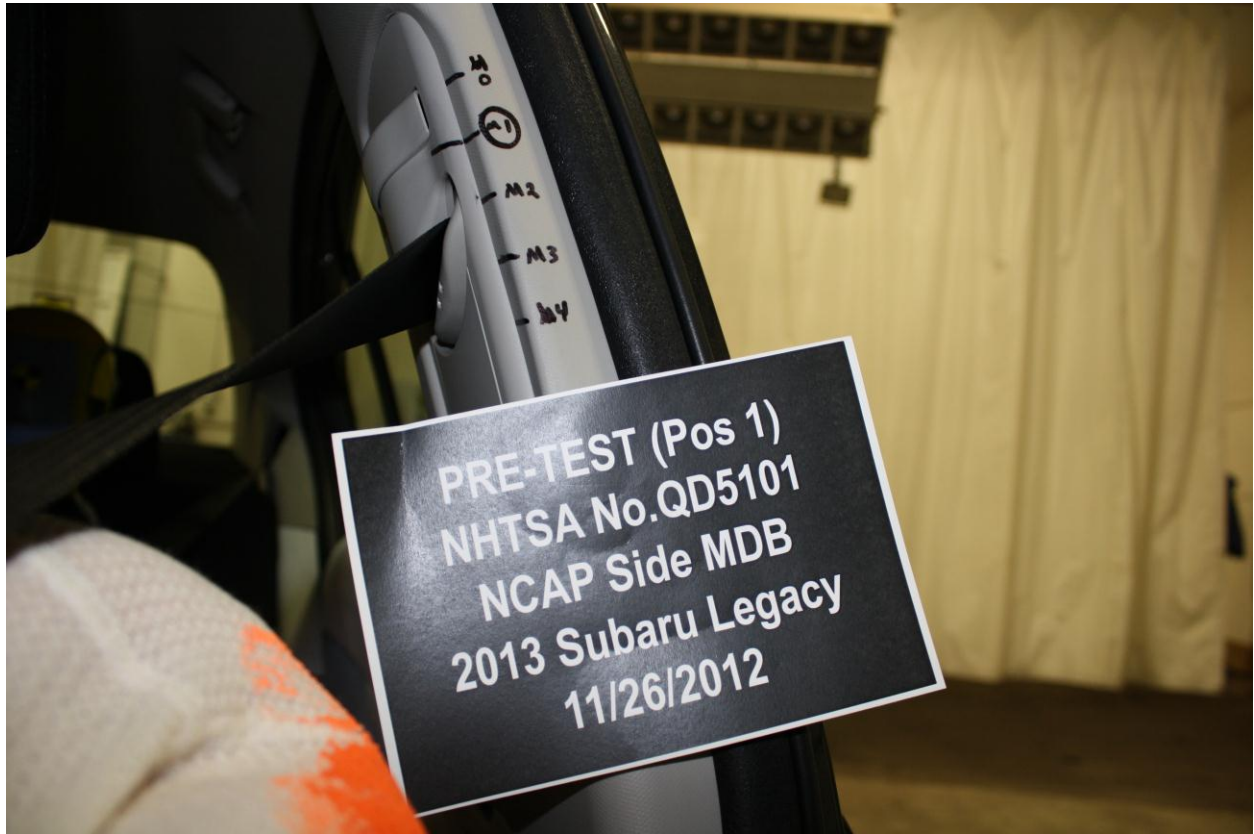


Figure A-35: Pre-Test View of Belt Anchorage for Driver Dummy



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

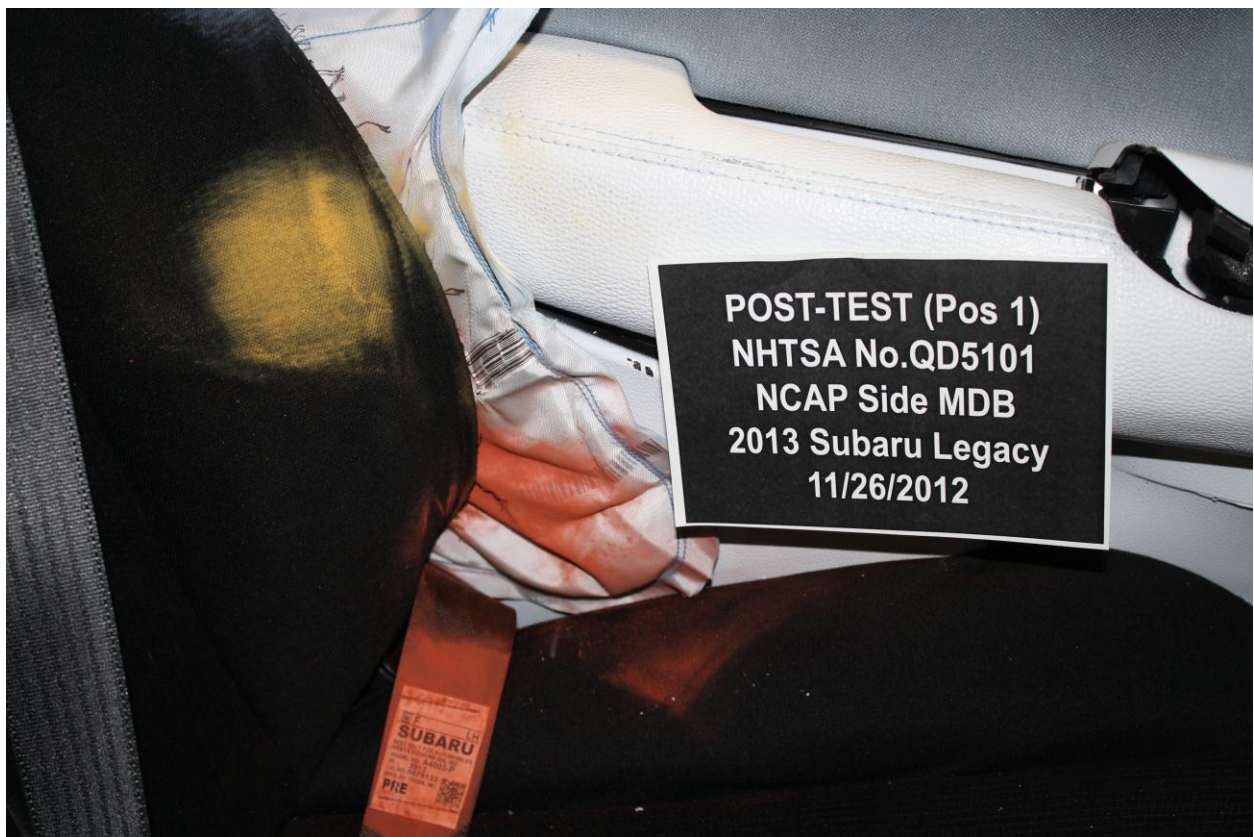


Figure A-52: Post-Test Driver Dummy Close-Up Pelvis Contact View



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



Figure A-54: Post-Test Driver Dummy Close-Up Knee Contact View



Figure A-55: Pre-Test Left Side View of Passenger Dummy Showing Belt and Chalking



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



Figure A-57: Post-Test Left Side View of Passenger Dummy Shoulder and Door Top View



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

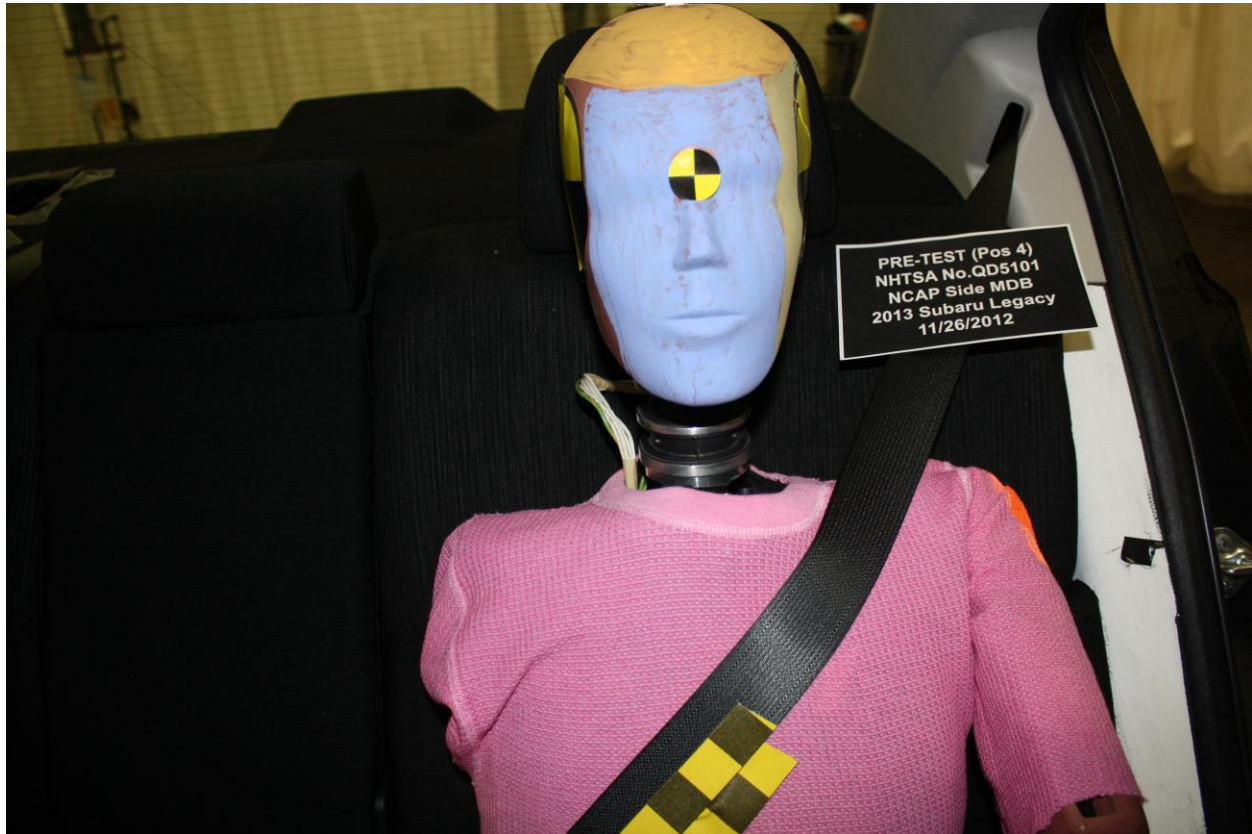


Figure A-59: Pre-Test Frontal View of Rear Passenger Dummy Head and Shoulders in Relation to Head Restraint



Figure A-60: Pre-Test Overhead View of Rear Passenger Seat Pan Prior to Dummy Positioning



Figure A-61: Pre-Test Overhead View of Rear Passenger Dummy Thighs on Seat Pan



Figure A-62: Pre-Test View of Rear Passenger Dummy's Neck Showing Position of Adjustable Neck Bracket

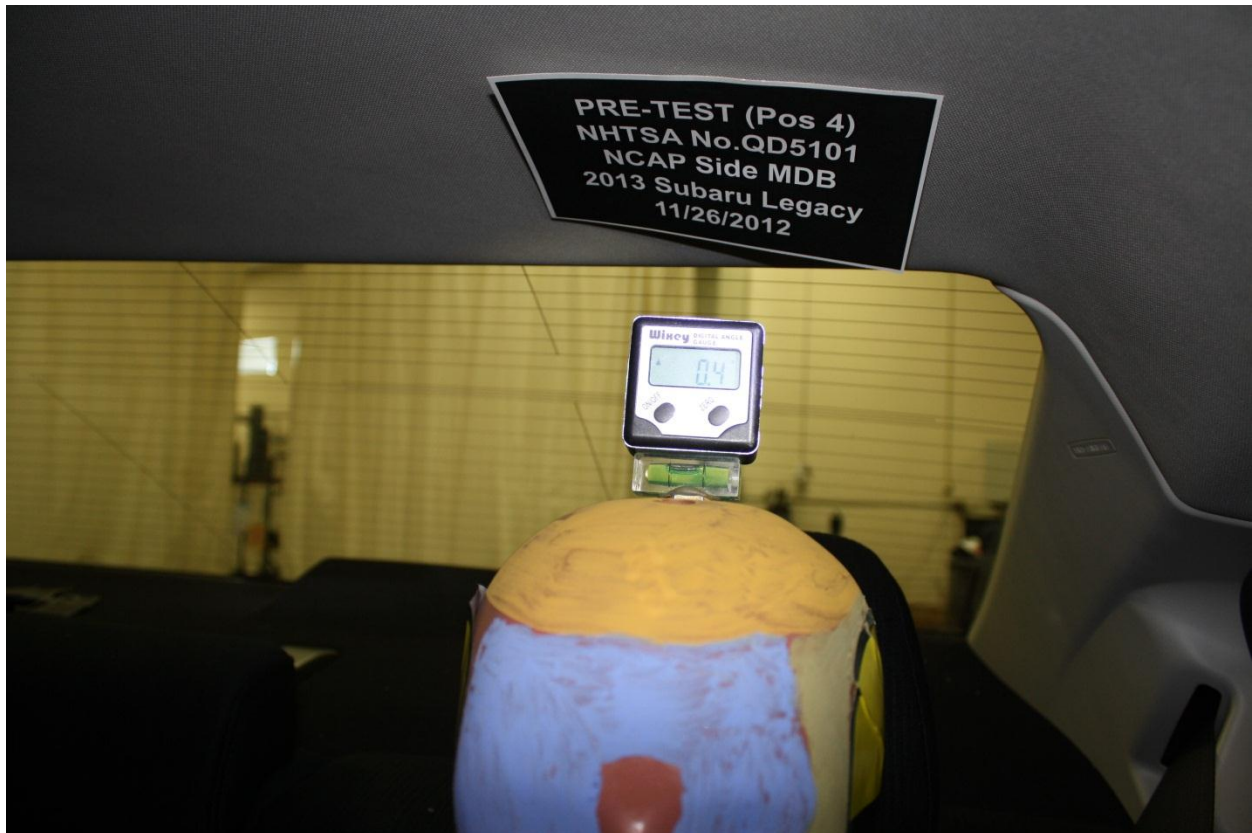


Figure A-63: Pre-Test View of Rear Passenger Dummy's Head Showing Dummy's Head is Level



Figure A-64: Pre-Test Placement of Rear Passenger Dummy's Feet



Figure A-65: Pre-Test View of Belt Anchorage for Rear Passenger Dummy

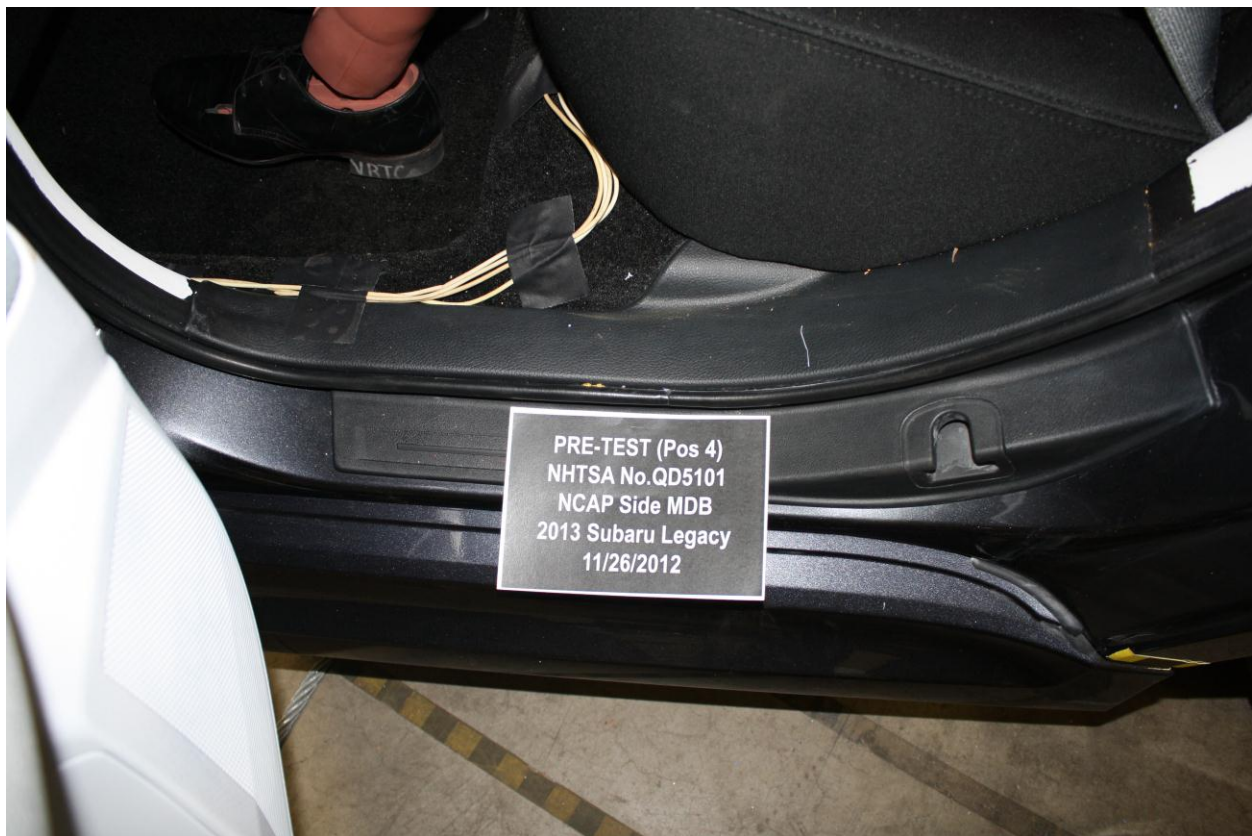


Figure A-66: Pre-Test Close-Up Left Side View of Rear Passenger Seat Track



Figure A-67: Pre-Test Close-Up Left Side View of Rear Passenger Seat Back

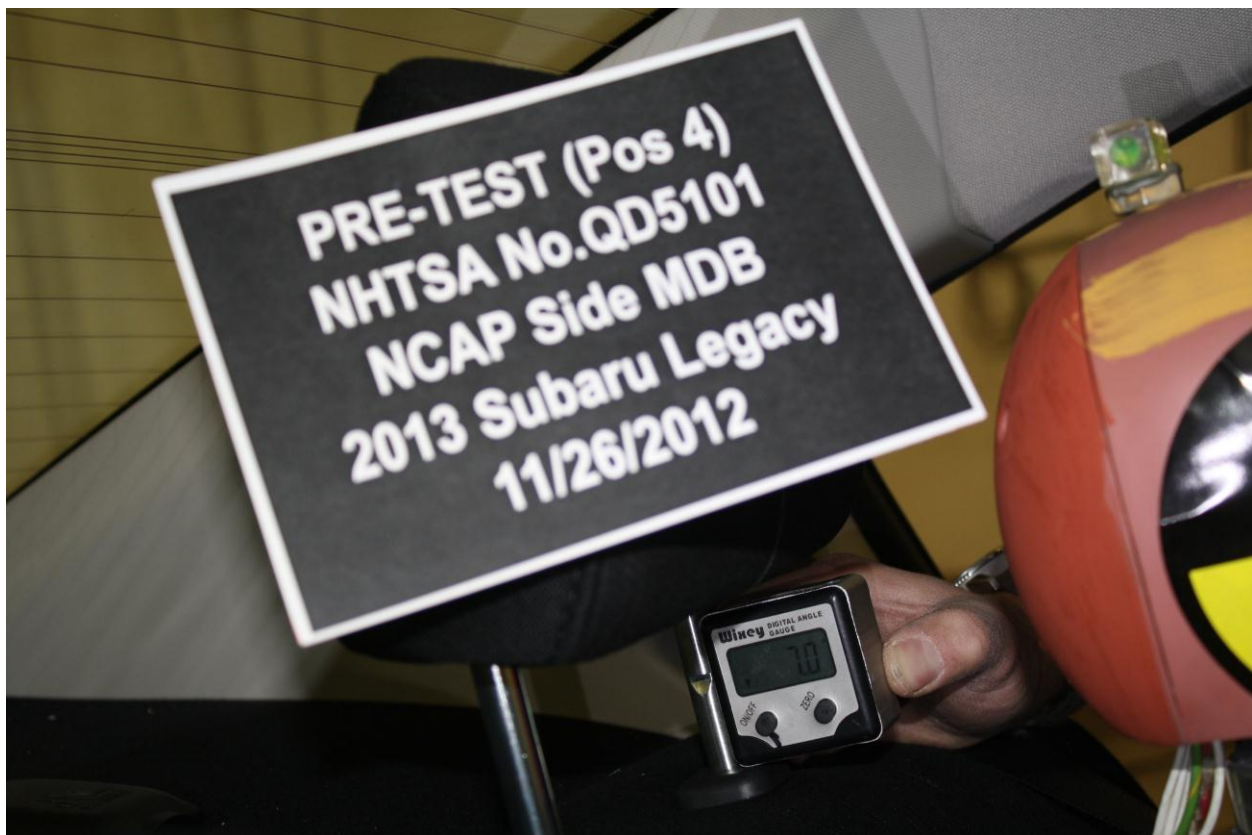


Figure A-68: Pre-Test Close-Up View of Rear Passenger Seat Back or Head Restraint



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



Figure A-70: Post-Test Passenger Dummy and Door Clearance View



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



Figure A-72: Post-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment



Figure A-73: Pre-Test Passenger Inner Door Panel View



Figure A-74: Post-Test Passenger Inner Door Panel View



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



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



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

Photo Not Applicable

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



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

Photo Not Applicable

Figure A-80: Post-Test Rear Passenger Dummy Close-Up Pelvis Contact with Side Airbag View

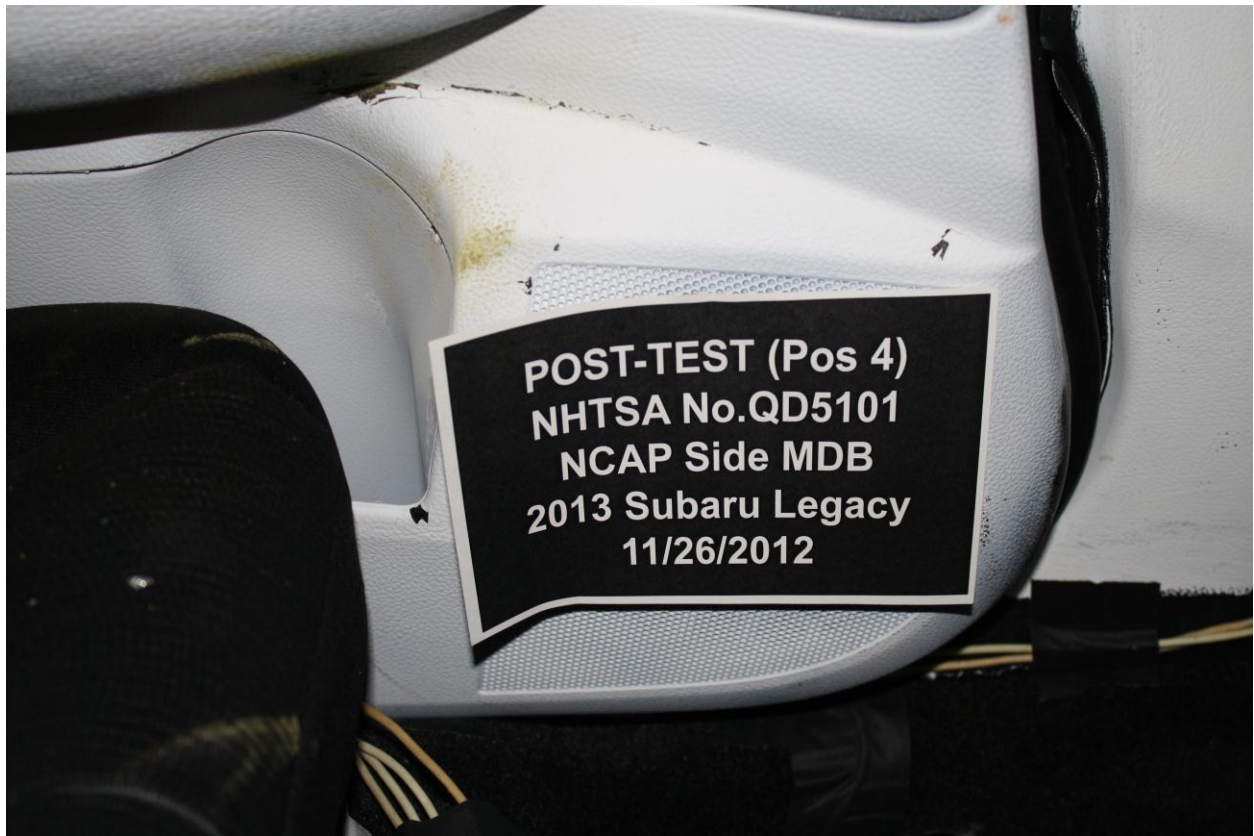


Figure A-81: Post-Test Rear Passenger Dummy Close-Up Knee Contact View



Figure A-82: Pre-Test View of Fuel Filler Cap or Fuel Filler Neck



Figure A-83: Post-Test View of Fuel Filler Cap or Fuel Filler Neck



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



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



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

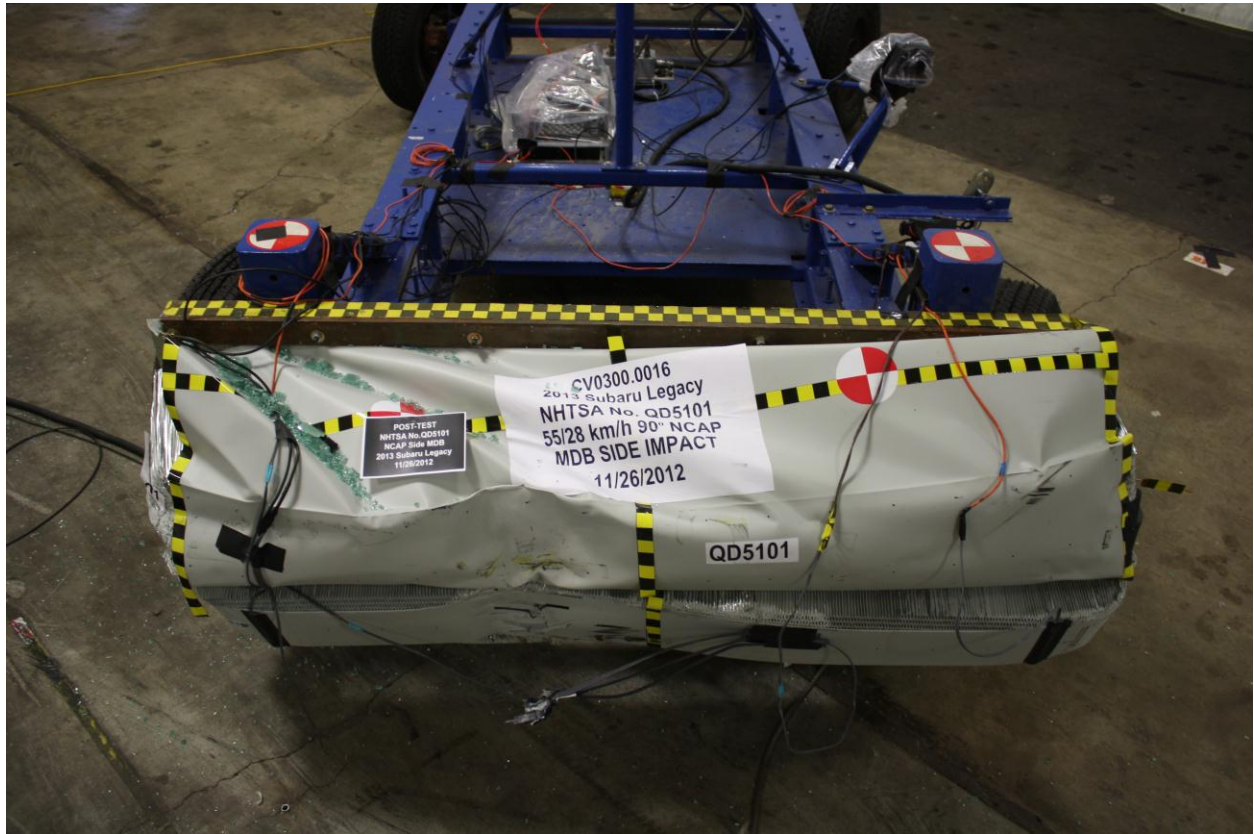


Figure A-87: Post-Test Top View of MDB Impactor Face



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



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



Figure A-90: Pre-Test Right Side View of MDB Impactor Face



Figure A-91: Post-Test Right Side View of MDB Impactor Face

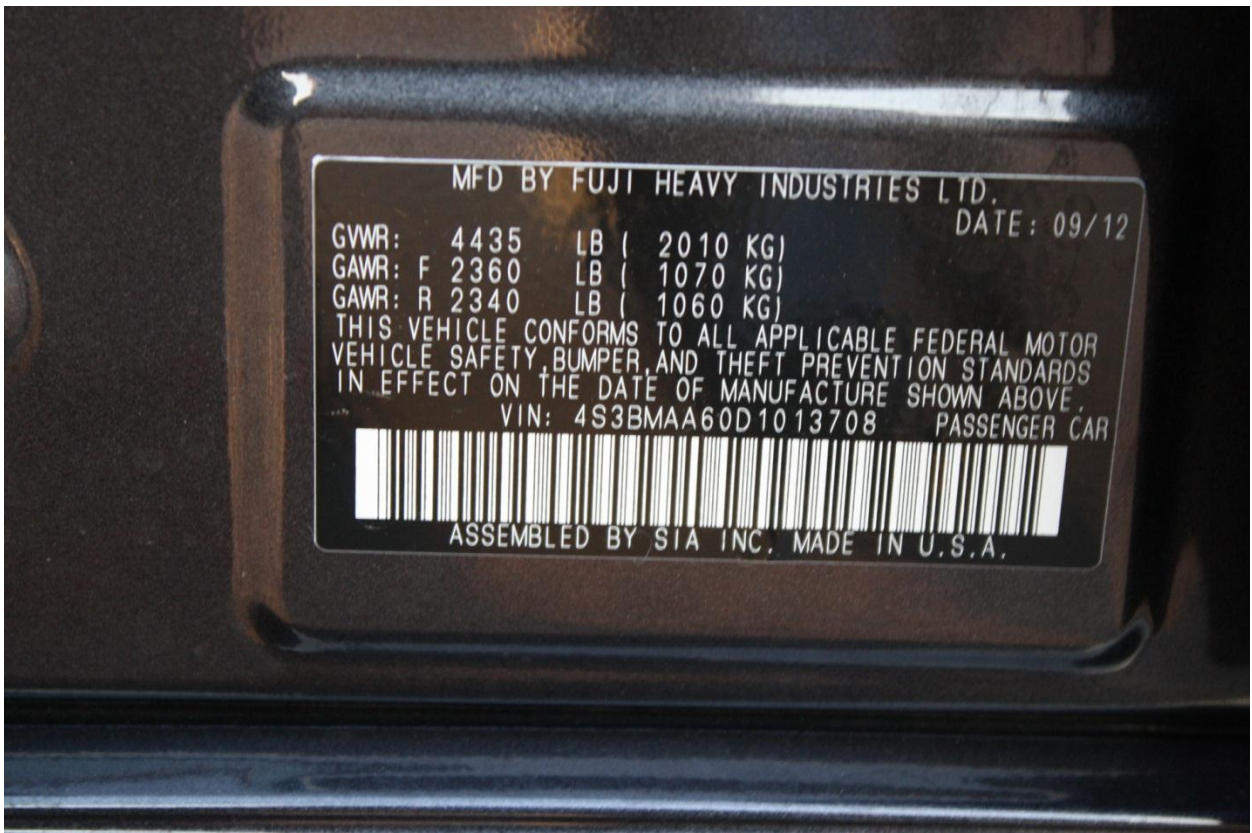


Figure A-92: Close-Up View of Vehicle's Certification Label

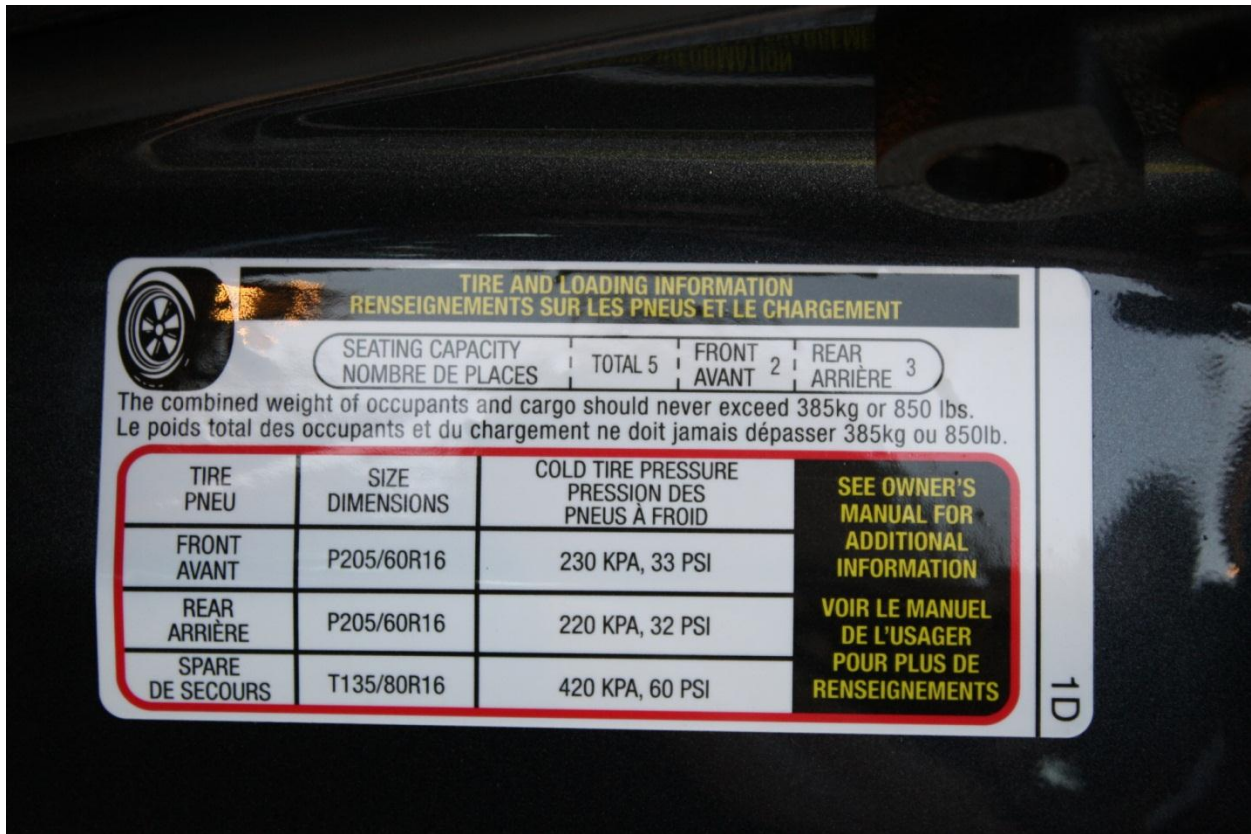


Figure A-93: Close-Up View of Vehicle's Tire Information Placard or Label

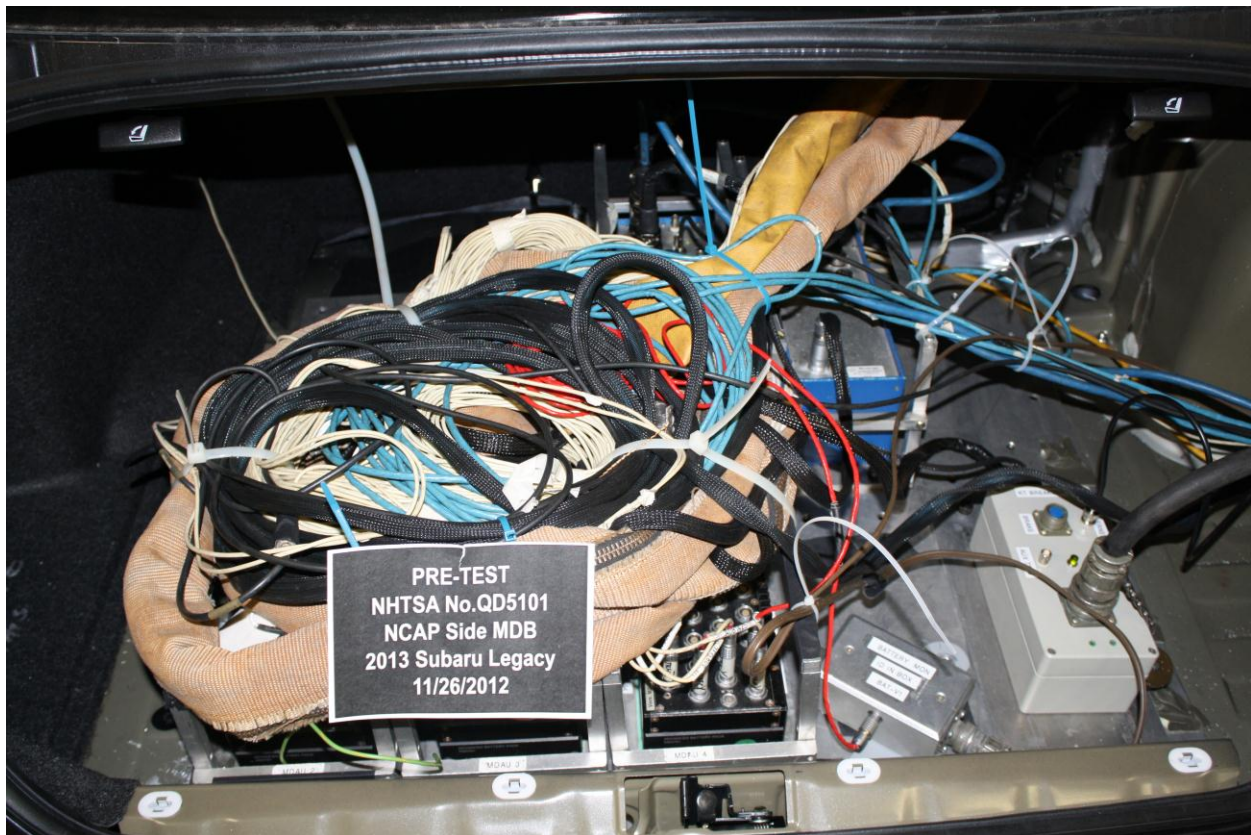


Figure A-94: Pre-Test Ballast View



Figure A-95: Post-Test Primary and Redundant Speed Trap Read-Out



Figure A-96: FMVSS No. 301 Static Rollover 0 Degrees



Figure A-97: FMVSS No. 301 Static Rollover 90 Degrees



Figure A-98: FMVSS No. 301 Static Rollover 180 Degrees

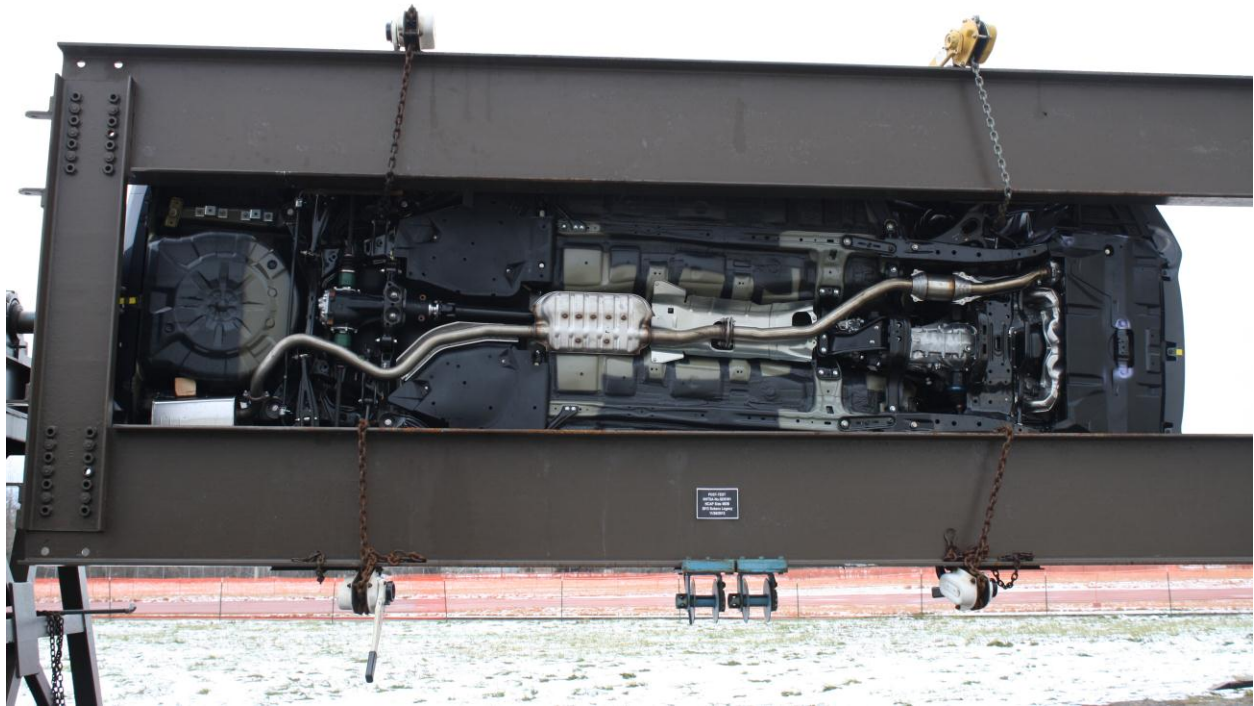


Figure A-99: FMVSS No. 301 Static Rollover 270 Degrees



Figure A-100: FMVSS No. 301 Static Rollover 360 Degrees



Figure A-101: Impact Event

LEGACY.

VIN: 4S3BMAA60D1013708
 Model/Code: 2013 Subaru Legacy 2.5i/DA
 Exterior Color: Graphite Gray Metallic
 Port / Assembly: Boston, MA
 Delivery by / Carrier: Diversified Automotive, Inc

SHIP TO: 020283
 Northtown
 HYUNDAI-SUBARU
 3675 Sheridan Drive
 Amherst, NY 14226

SOLD TO: 020283
 Northtown
 HYUNDAI-SUBARU
 3675 Sheridan Drive
 Amherst, NY 14226

SUBARU.
Confidence in Motion

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)
 Brake Override System

PERFORMANCE AND EXTERIOR
 2.5L Horizontally-Opposed 4-Cyl Engine
 Quick Ratio Power Steering
 Auto Lights w/ Daytime Running Lights
 Traction Control
 Front McPherson Strut Suspension
 Rear Double-Wishbone Suspension
 Intermittent Front Wipers

COMFORT, CONVENIENCE AND INTERIOR
 Air Conditioning w/Air Filtration System
 AM/FM Stereo w/ CD Player

Cruise Control
 Bluetooth Hands-Free Phone & Audio
 Carpeted Floor Mats, Cargo Area Mat
 Dual-Illuminated Visor Vanity Mirrors
 Electronic Parking Brake
 Multi-Function Trip Computer
 Outside Temperature Gauge
 Power Windows, Door Locks and Mirrors
 Remote Keyless Entry System
 60/40 Split Fold-Down Rear Seatback
 Steering Wheel Audio & Cruise Controls
 Tilt / Telescopic Steering Wheel

LIMITED WARRANTY/ROADSIDE ASSISTANCE
 3 Years / 36,000 Miles Basic
 5 Years / 60,000 Miles Powertrain
 5 Yrs / Unlimited Mileage Rust Perforation
 3 Yrs / 36,000 24/7 Roadside Assistance
 See Owner Info Kit & Warranty For Details

OPTIONAL EQUIPMENT
 Manufacturer's Suggested Retail Price
 Full Tank of Gas
 Floor Mats, All Weather

\$20,295.00
INCLD
\$72.00

GOVERNMENT 5-STAR SAFETY RATINGS	
Overall Vehicle Score	NOT RATED
Based on the combined ratings of frontal, side and rollover. Should ONLY be compared to other vehicles of similar size and weight.	
Frontal	NOT RATED
Crash	NOT RATED
Based on the risk of injury in a frontal impact. Should ONLY be compared to other vehicles of similar size and weight.	
Side	NOT RATED
Crash	NOT RATED
Based on the risk of injury in a side impact.	
Rollover	★★★★★
Based on the risk of rollover in a single-vehicle crash.	
Star ratings range from 1 to 5 stars (★★★★★) with 5 being the highest. Source: National Highway Traffic Safety Administration (NHTSA) www.safercar.gov or 1-800-327-4236	

EPA DOT Fuel Economy and Environment		Gasoline Vehicle
<p>Fuel Economy</p> <p style="font-size: 1.5em; font-weight: bold;">24</p> <p style="font-size: 0.8em;">combined city/highway</p>		
<p>21</p> <p>city</p>	<p>28</p> <p>highway</p>	<p>Midsize cars range from 13 to 99 MPG. The best vehicle rates 112 MPG.</p> <p>You save</p> <p style="font-size: 1.5em; font-weight: bold;">\$ 600</p> <p>in fuel costs over 5 years compared to the average new vehicle.</p>
<p>4.2 gallons per 100 miles</p>		
<p>Annual fuel Cost</p> <p style="font-size: 1.5em; font-weight: bold;">\$2,200</p>		
<p>Fuel Economy & Greenhouse Gas Rating (tailpipe only) Smog Rating (tailpipe only)</p> <p style="font-size: 1.5em; font-weight: bold;">6</p> <p style="font-size: 0.7em;">This vehicle emits 351 grams CO₂ per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also creates emissions. Learn more at fuelconomy.gov</p>		
<p>Equal results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 24 MPG and costs \$11,600 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at \$3.15 per gallon. Mileage is miles per gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.</p>		

<p>PARTS CONTENT INFORMATION FOR VEHICLES IN THIS CATEGORY: U.S./CANADIAN PARTS CONTENT: 40% MAJOR SOURCE OF FOREIGN PARTS CONTENT: JAPAN 45%</p>	<p>FOR THIS VEHICLE: FINAL ASSEMBLY POINT: Lafayette, IN COUNTRY OF ORIGIN: JAPAN ENGINE: Japan TRANSMISSION: Japan</p>
<p>Note: Parts content does not include final assembly, distribution, or other non-parts costs.</p>	

<p>Additional protection is available on this vehicle from Subaru</p> <p>ADDED SECURITY*</p> <p>SUBARU</p>	<p>Always Invest in Genuine Subaru Products</p> <ul style="list-style-type: none"> • Added Security* protects your investment • Mechanical and Maintenance plans available • Coverage up to 100,000 miles • Genuine Subaru replacement parts • Towing & Rental car benefits • Trip Interruption and Tire Hazard benefits available • Transferable <p style="font-size: 0.7em; text-align: center;">THE ONLY EXTENDED SERVICE PLAN BACKED AND ENDORSED BY SUBARU FOR OVER 30 YEARS!</p>
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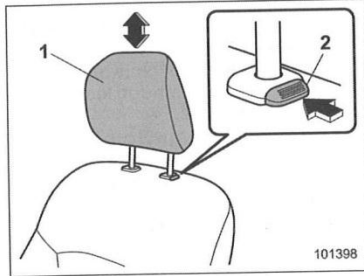
Transportation (Inland Freight Charge & Handling Charge) **\$810.00**

Total Suggested Retail Price \$21,177.00

Figure A-102: Monroney Label

3. The chirp sound sounds, and the registered seat position is cleared.

Head restraint adjustment



- 1) Head restraint
- 2) Release button

Both the driver's seat and the front passenger's seat are equipped with head restraints.

The head restraint should be adjusted so that the center of the head restraint is closest to the top of the occupant's ears.

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.

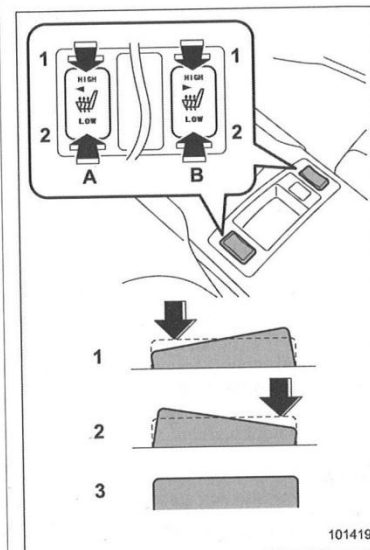
To install:

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

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.

Seat heater (if equipped)



- 1) HIGH – Rapid heating
- 2) LOW – Normal heating
- 3) OFF – Off
- A) Left-hand side
- B) Right-hand side

Figure A-103: Driver Head Restraint Use and Adjustment Information from Vehicle Owner's Manual

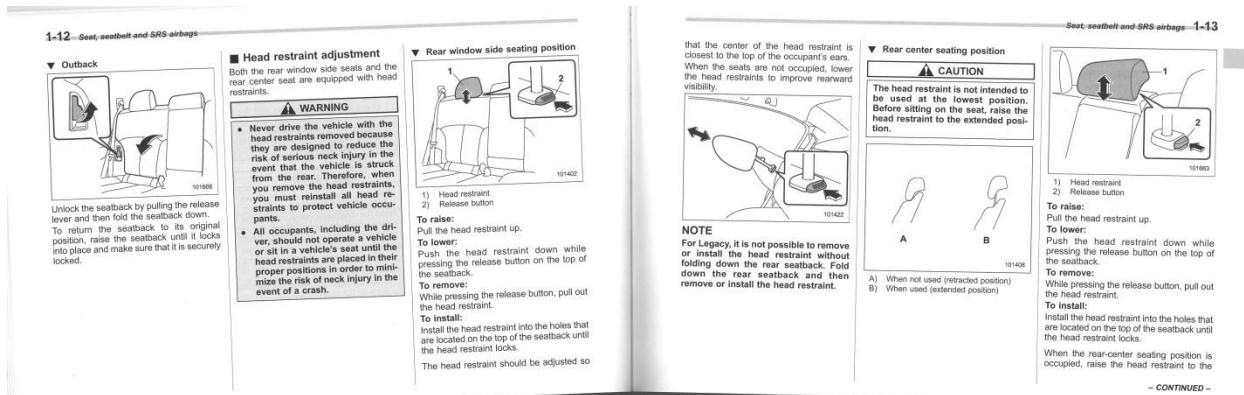


Figure A-104: Left Rear Passenger Head Restraint Use and Adjustment Information from Vehicle Owner's Manual

APPENDIX B

VEHICLE AND DUMMY RESPONSE DATA PLOTS

TABLE OF DATA PLOTS

Driver & Passenger Dummy Instrumentation Plots

Fig.	Description	Page
1	Driver Head Acceleration (X) Primary vs. Time	B-5
2	Driver Head Acceleration (Y) Primary vs. Time	B-5
3	Driver Head Acceleration (Z) Primary vs. Time	B-6
4	Driver Head Resultant Acceleration Primary vs. Time	B-6
5	Driver Upper Thorax Rib Deflection (Y) vs. Time	B-7
6	Driver Middle Thorax Rib Deflection (Y) vs. Time	B-7
7	Driver Lower Thorax Rib Deflection (Y) vs. Time	B-8
8	Driver Thorax Rib Deflection Maximum vs. Time	B-8
9	Driver Anterior Abdominal Force (Y) vs. Time	B-9
10	Driver Middle Abdominal Force (Y) vs. Time	B-9
11	Driver Posterior Abdominal Force (Y) vs. Time	B-10
12	Driver Total Abdominal Force (Y) vs. Time	B-10
13	Driver Pubic Symphysis Force (Y) vs. Time	B-11
14	Passenger Head Acceleration (X) vs. Time Primary	B-11
15	Passenger Head Acceleration (Y) vs. Time Primary	B-12
16	Passenger Head Acceleration (Z) vs. Time Primary	B-12
17	Passenger Head Resultant Acceleration Primary vs. Time	B-13
18	Passenger Lower Spine T12 Acceleration (X) vs. Time	B-13
19	Passenger Lower Spine T12 Acceleration (Y) vs. Time	B-14
20	Passenger Lower Spine T12 Acceleration (Z) vs. Time	B-14
21	Passenger Lower Spine T12 Resultant Acceleration vs. Time	B-15
22	Passenger Iliac Force on Impact Side (Y) vs. Time	B-15
23	Passenger Acetabulum Force on Impact Side (Y) vs. Time	B-16
24	Passenger Total Pelvic Force on Impact Side (Y) vs. Time	B-16

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

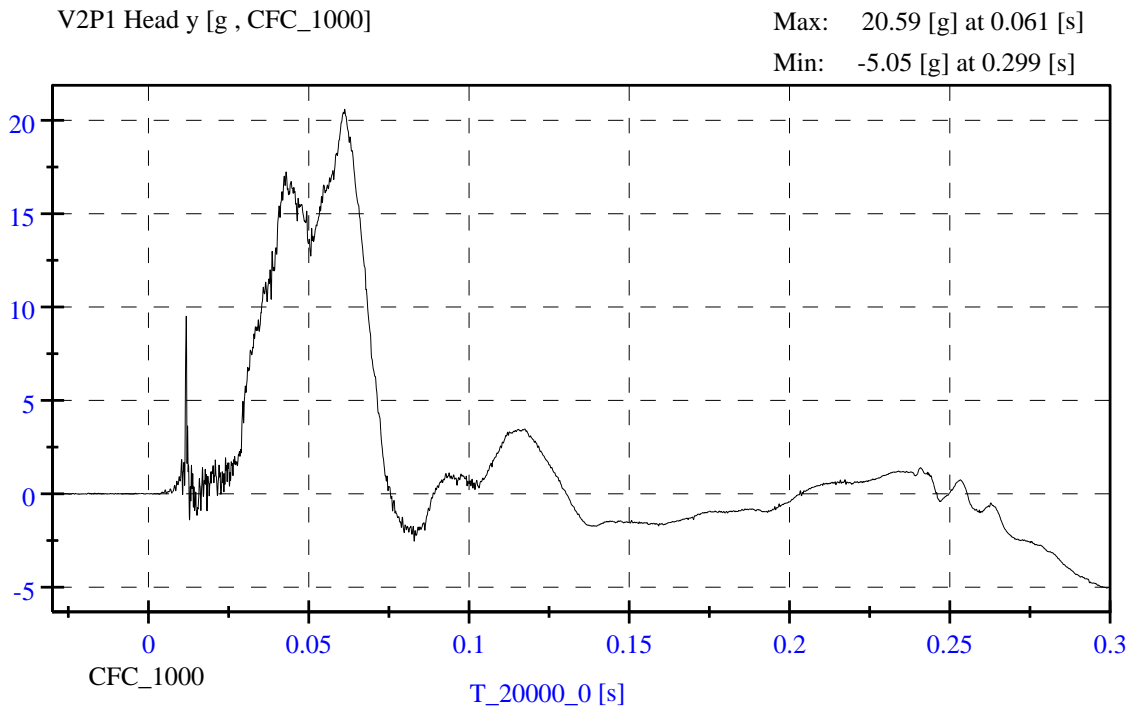
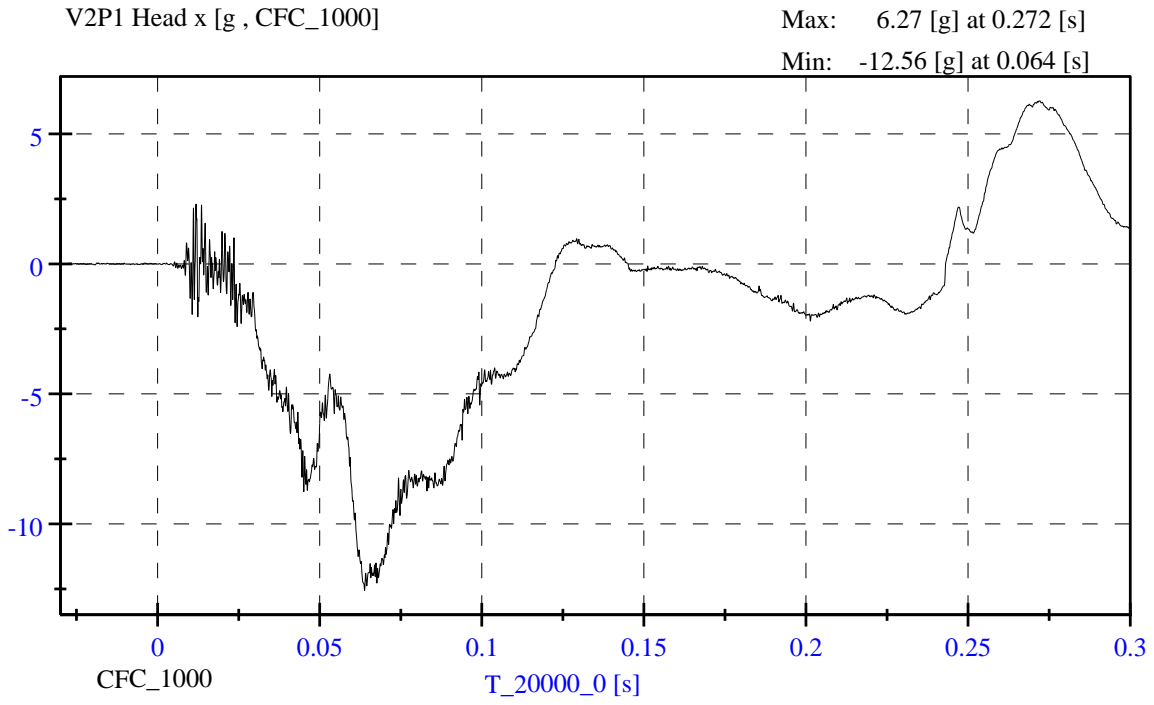
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Driver Lower Spine T12 Acceleration (Y)
Driver Lower Spine T12 Acceleration (Z)
Passenger Upper Thorax Rib Deflection (Y)
Passenger Middle Thorax Rib Deflection (Y)
Passenger Lower Thorax Rib Deflection (Y)
Passenger Upper Abdomen Rib Deflection (Y)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

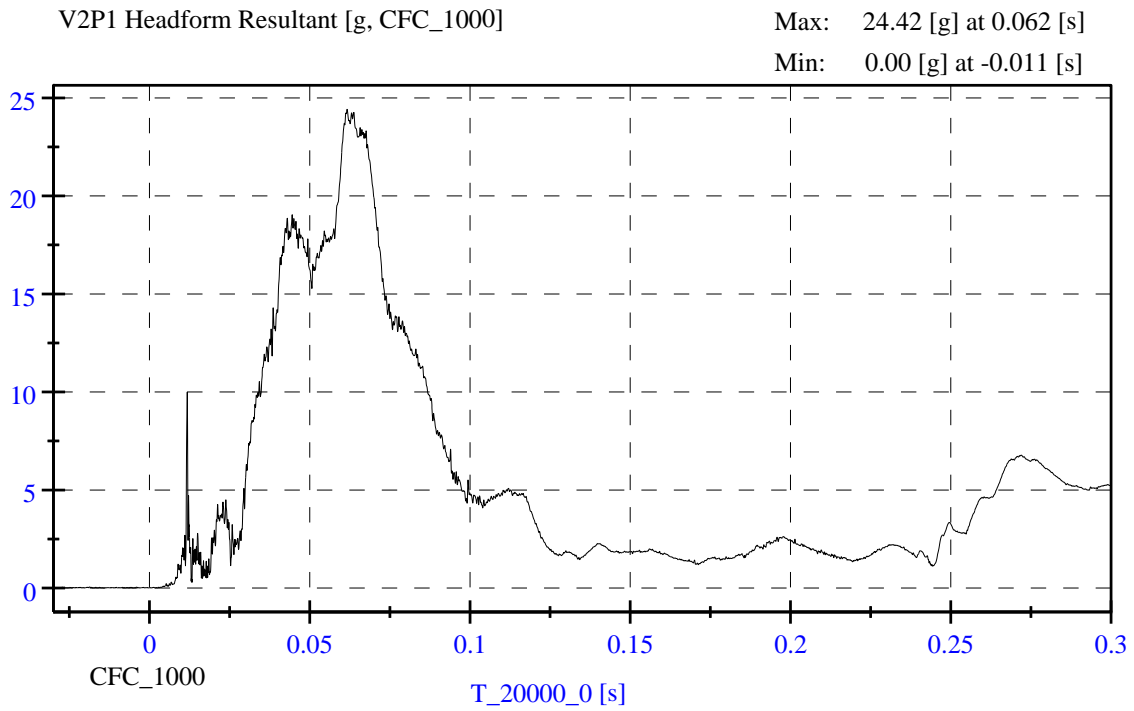
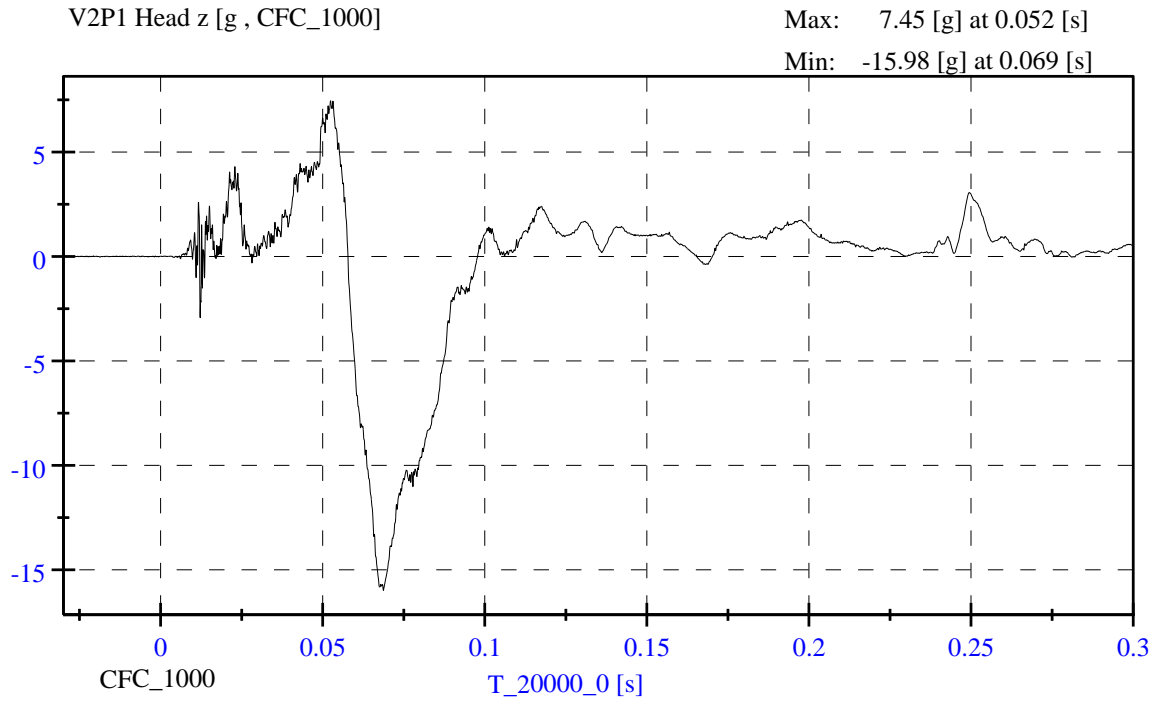
Vehicle Instrumentation Data

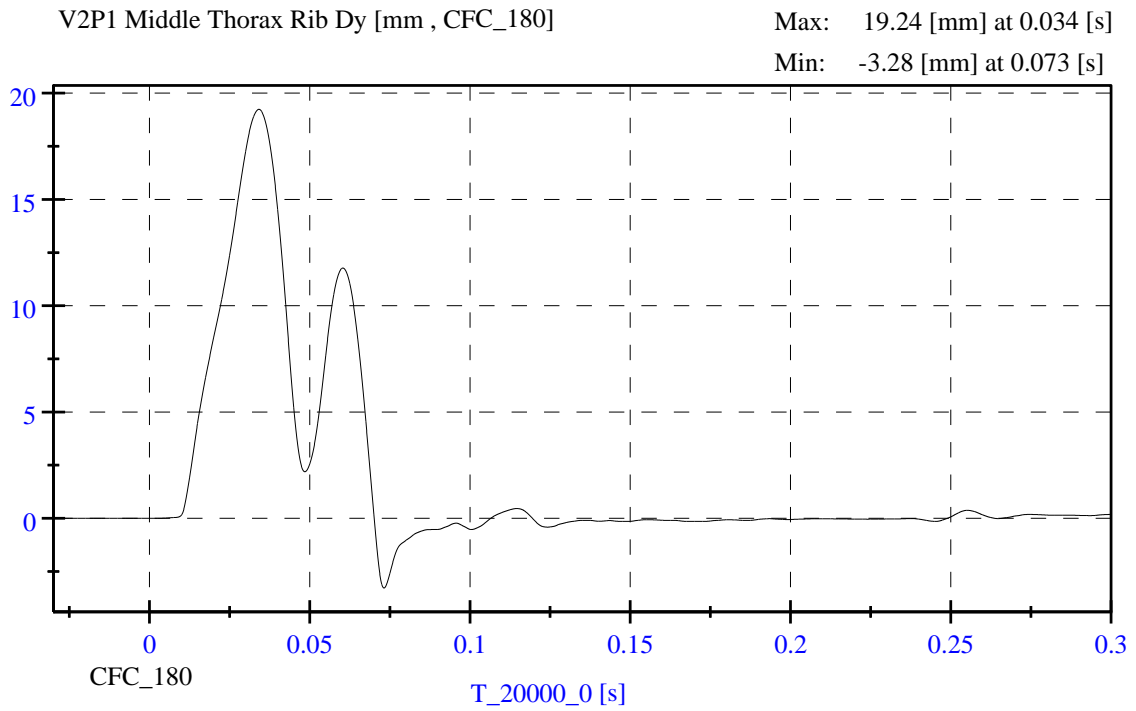
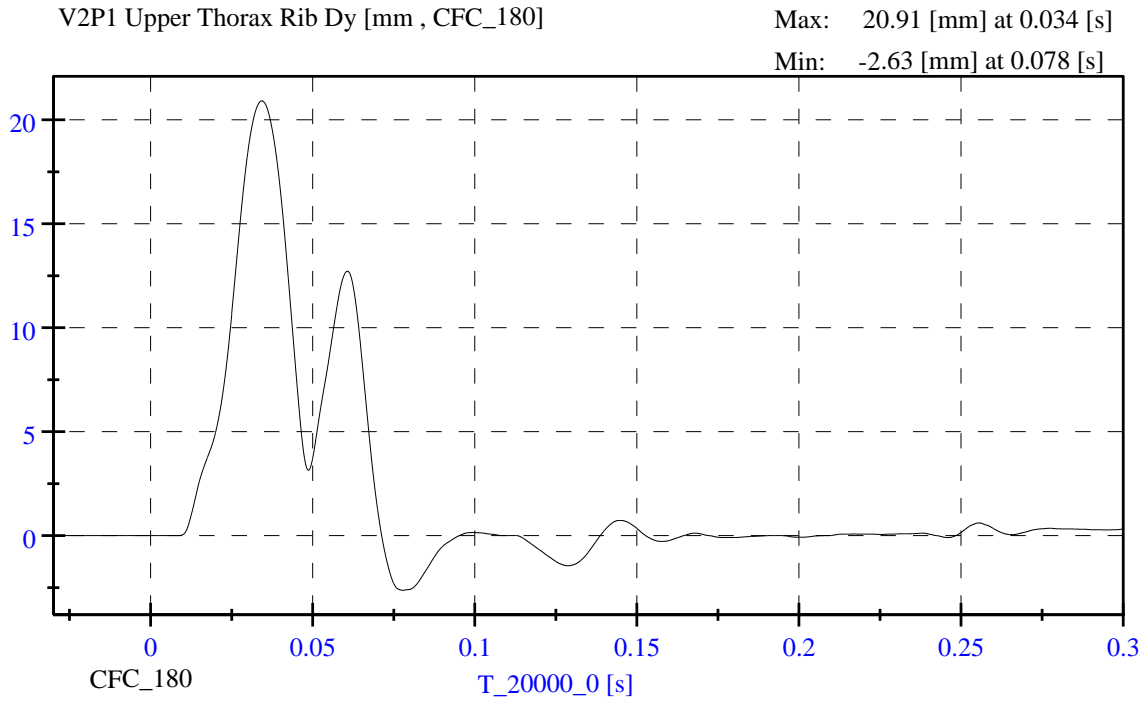
Vehicle Center of Gravity Acceleration (X)
Vehicle Center of Gravity Acceleration (Y)
Vehicle Center of Gravity Acceleration (Z)
Right Side Sill at Front Seat Acceleration (X)
Right Side Sill at Front Seat Acceleration (Y)
Right Side Sill at Front Seat Acceleration (Z)
Right Side Sill at Rear Seat Acceleration (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)
Middle A-Post Acceleration (Y)
Lower B-Post Acceleration (Y)
Middle B-Post Acceleration (Y)
Front Seat Track Acceleration (Y)
Rear Seat Structure 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)

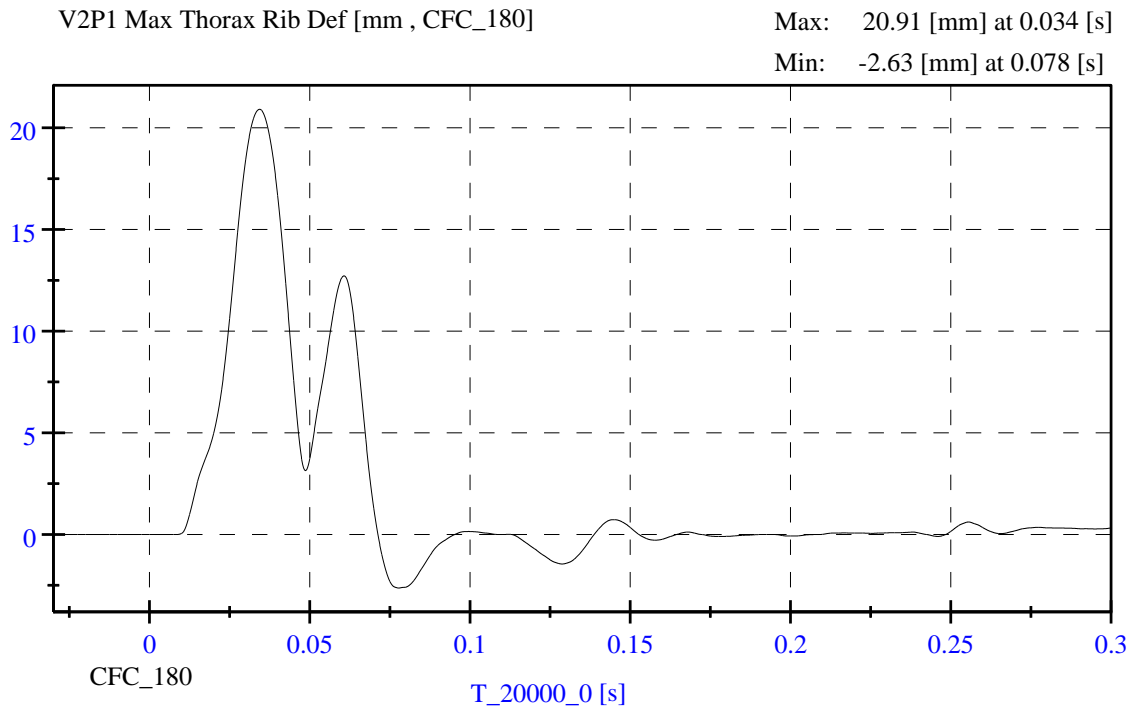
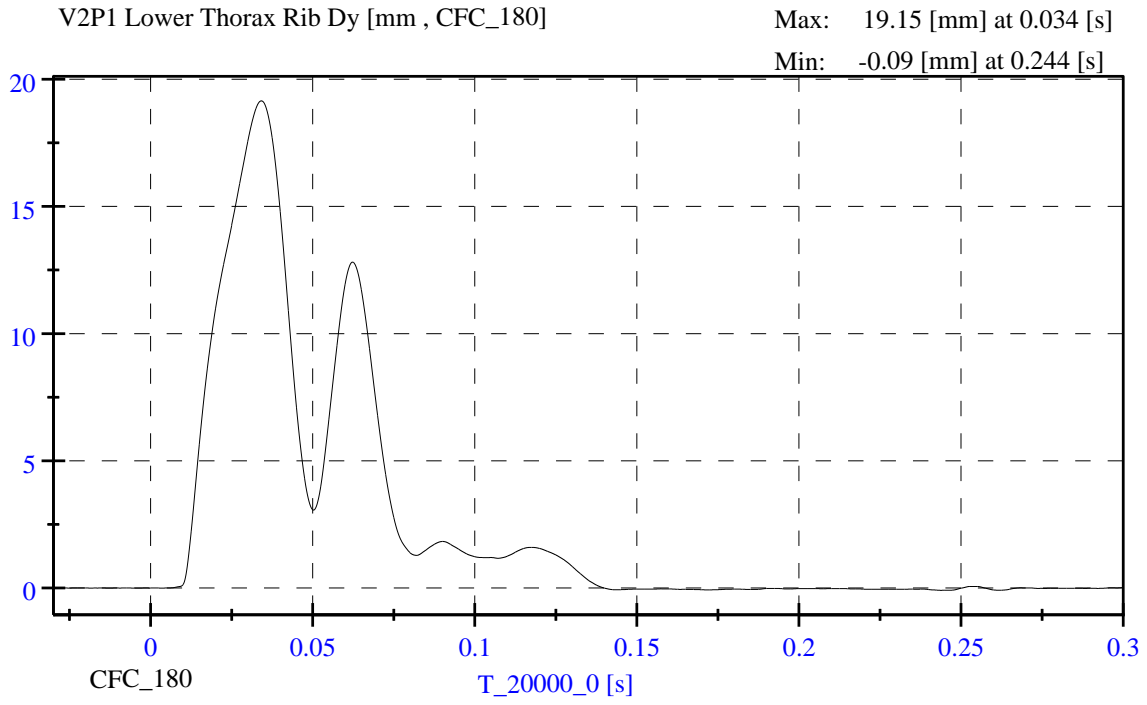
MDB Instrumentation Data

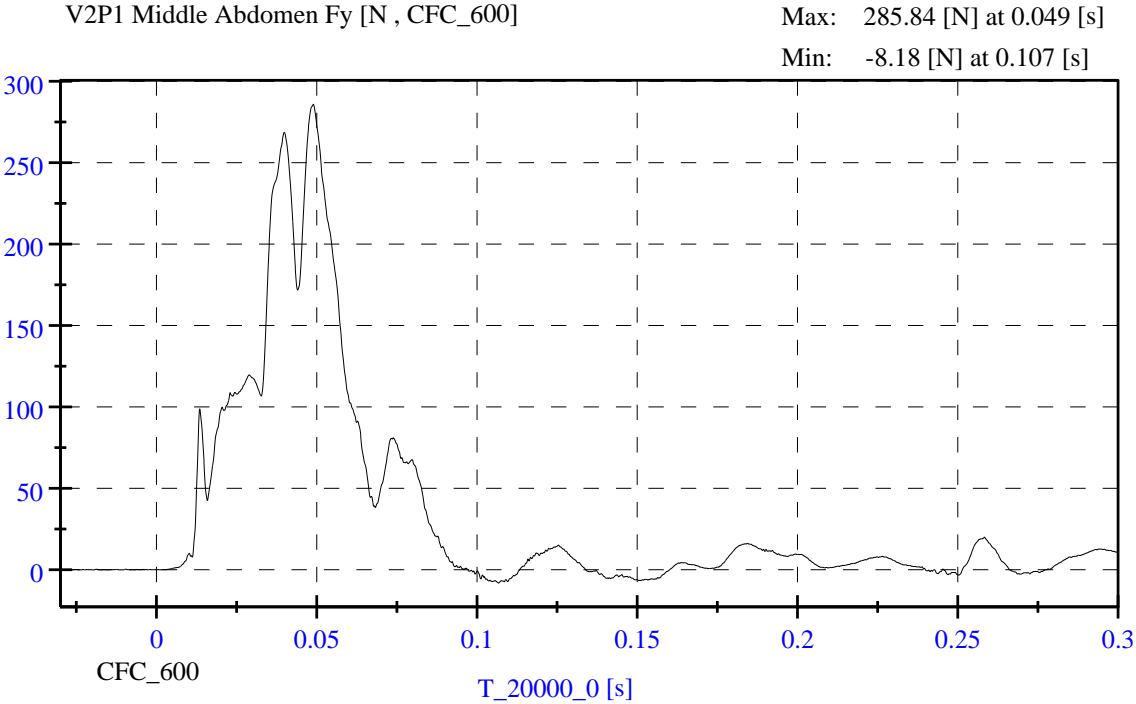
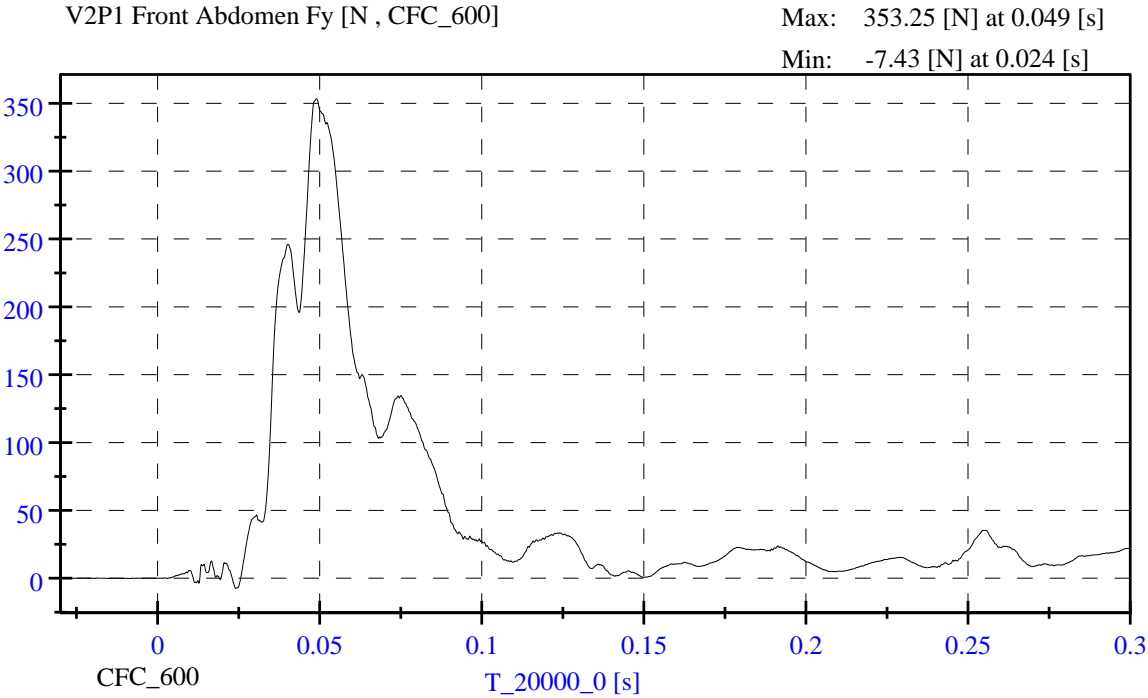
MDB Center of Gravity Acceleration (X)
MDB Center of Gravity Acceleration (Y)
MDB Center of Gravity Acceleration (Z)
MDB Rear Acceleration (X)
MDB Rear Acceleration (Y)
Left MDB Contact Switch
Right MDB Contact Switch

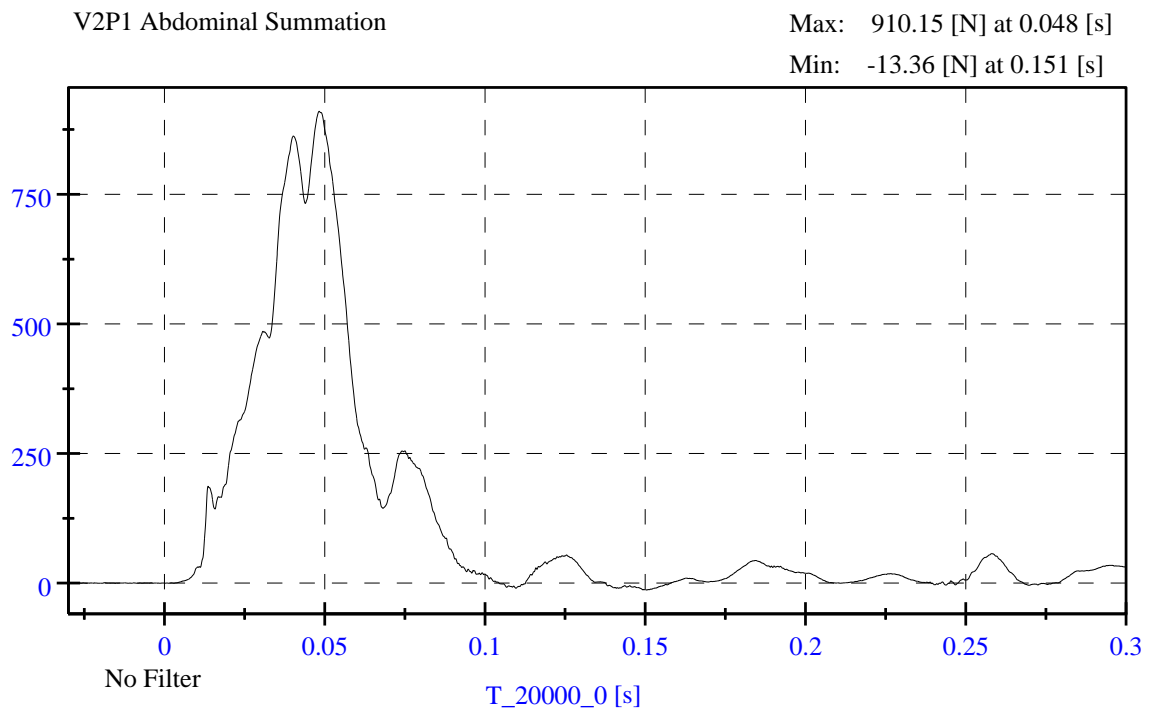
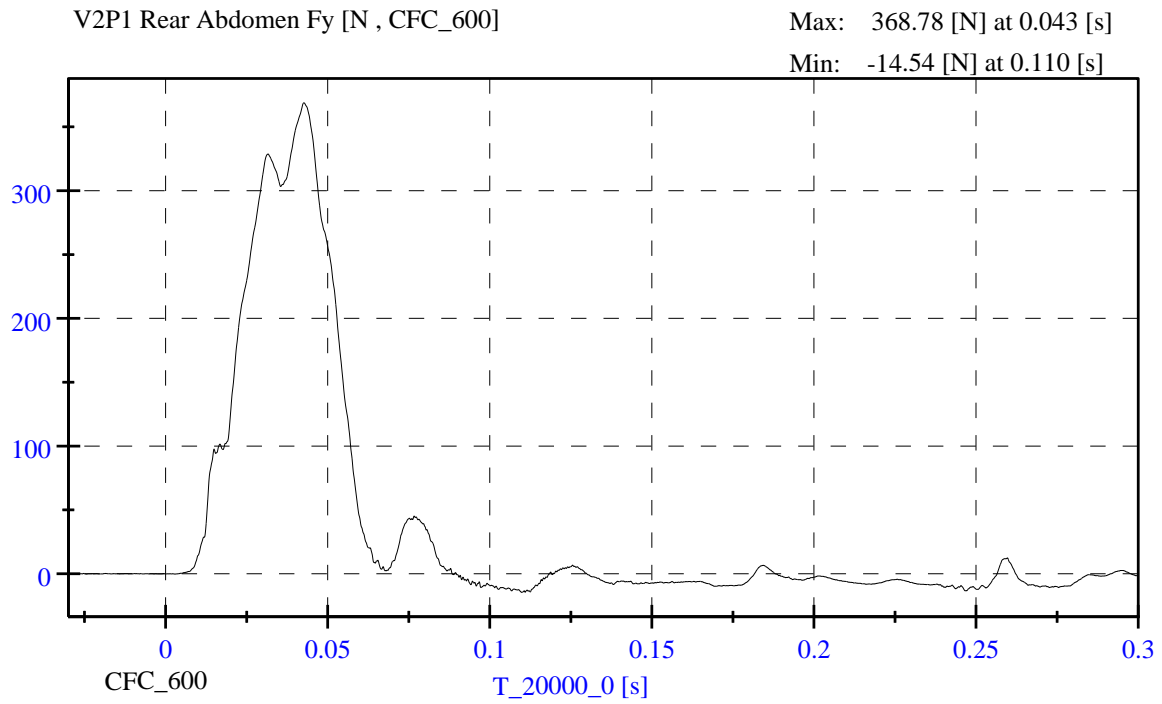


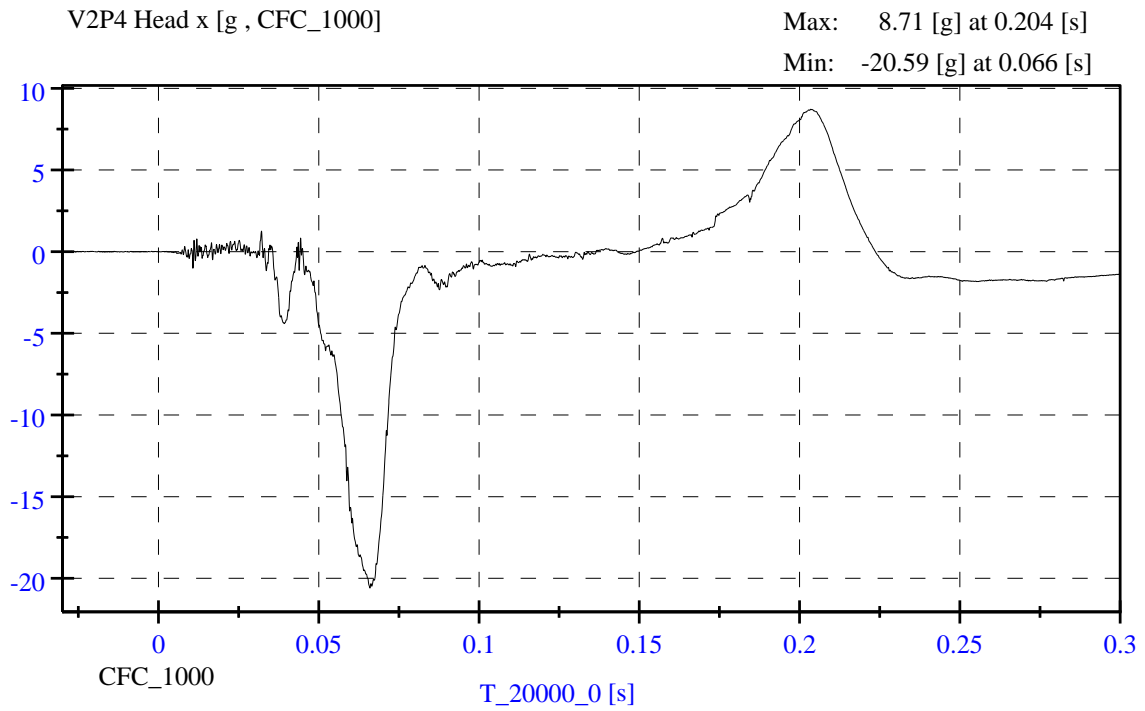
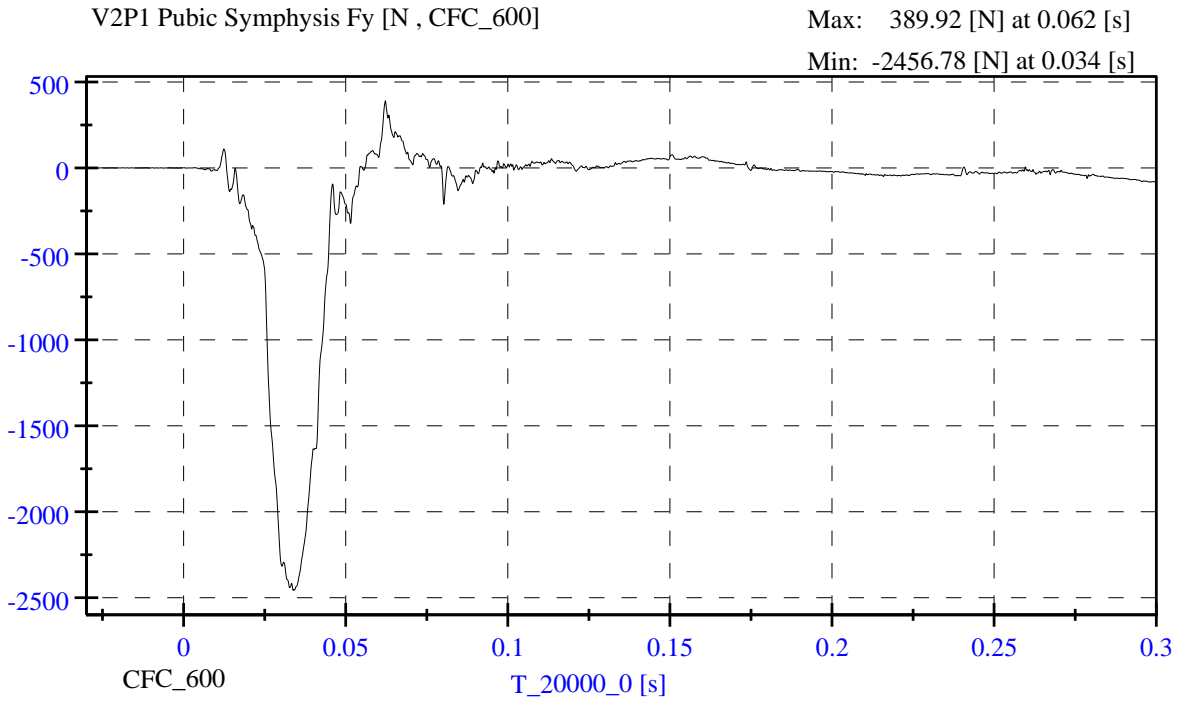


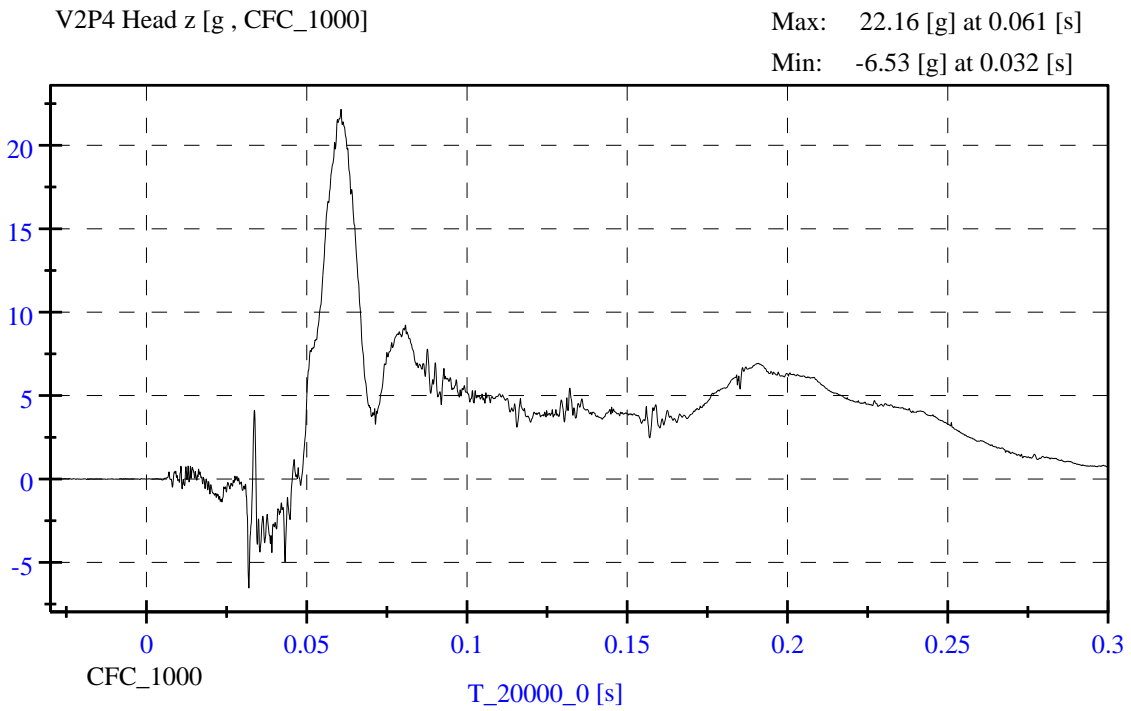
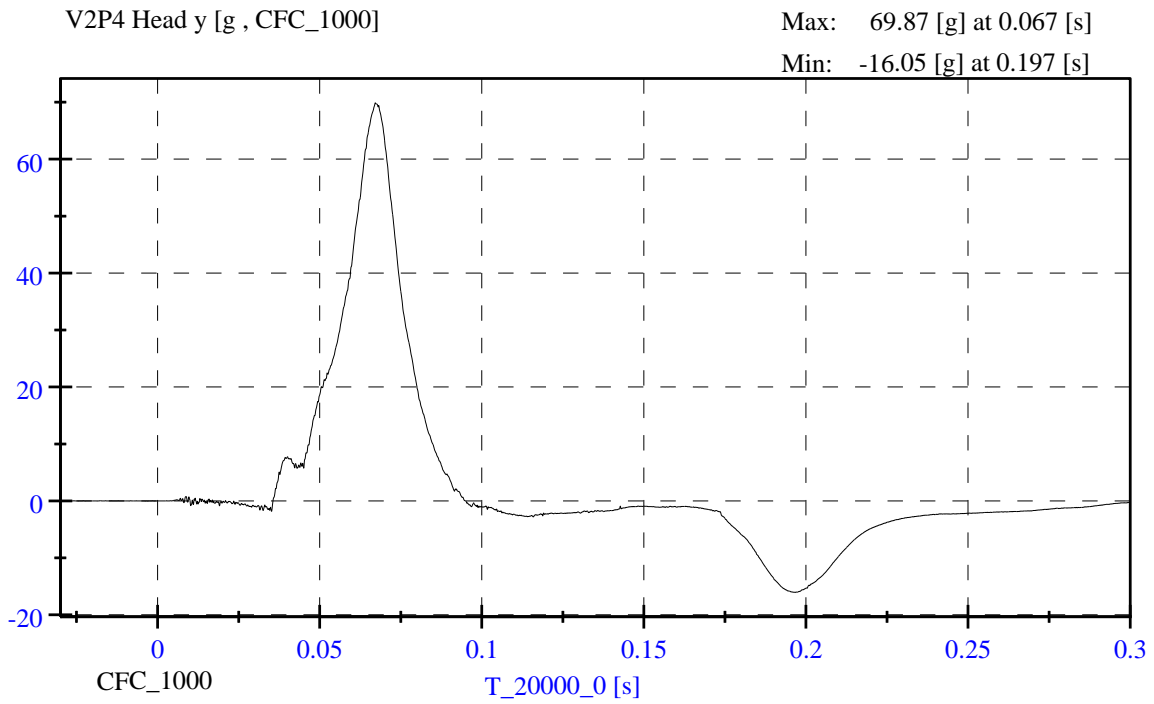


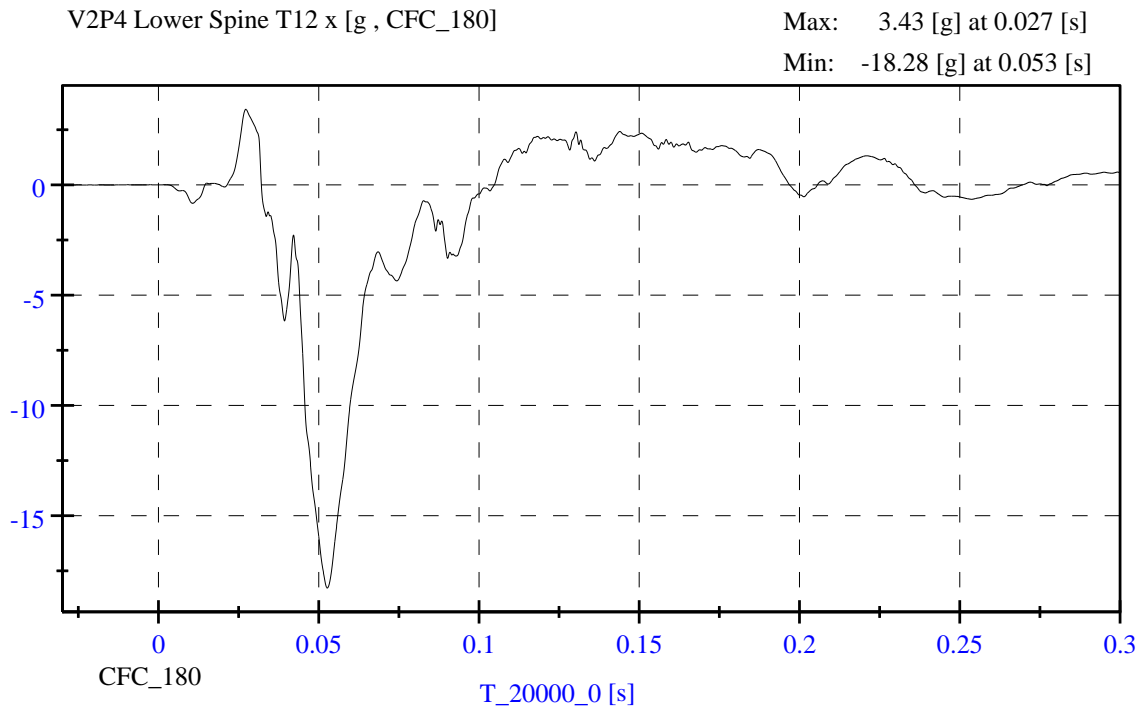
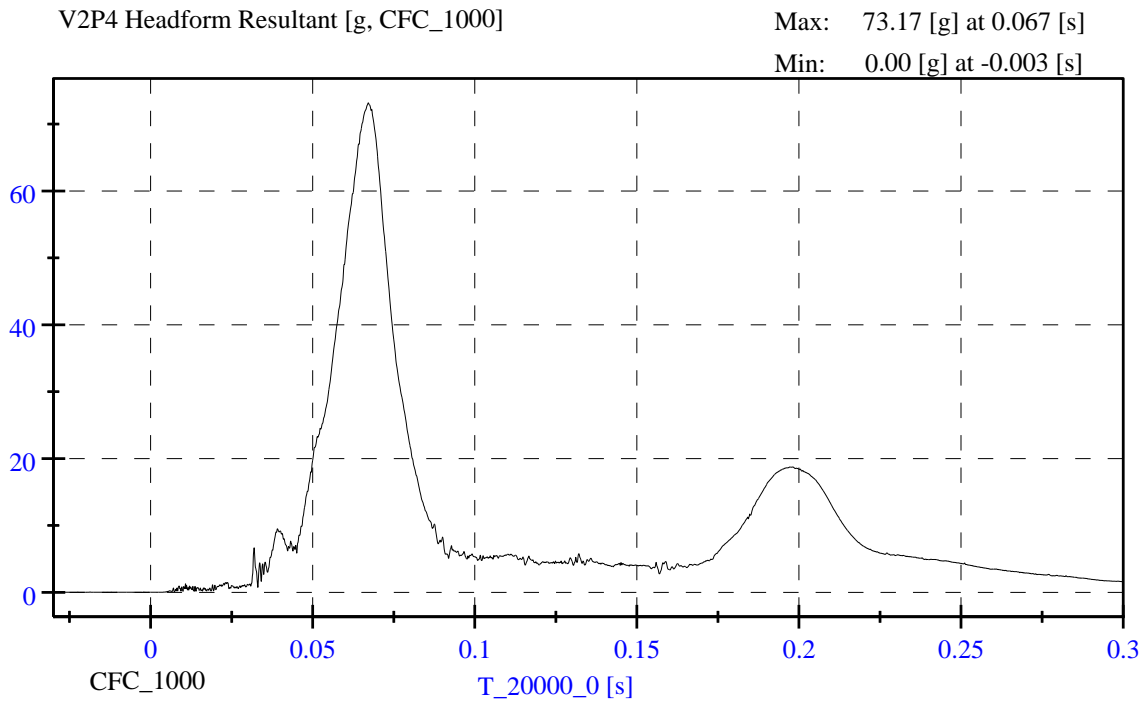


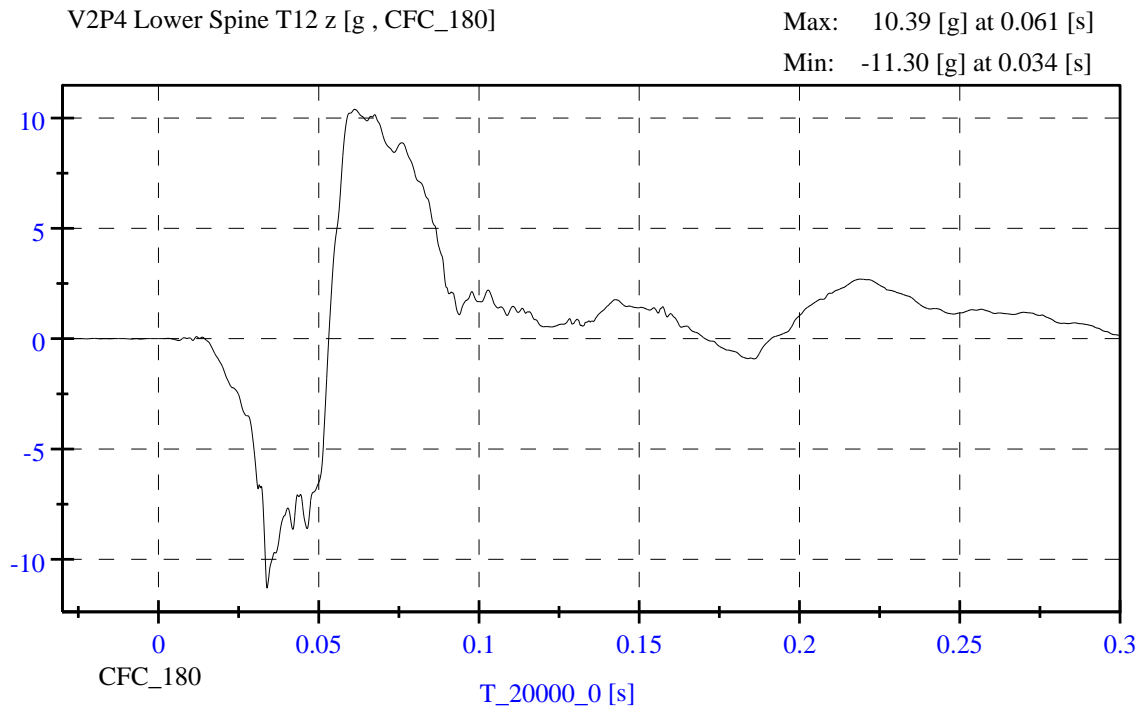
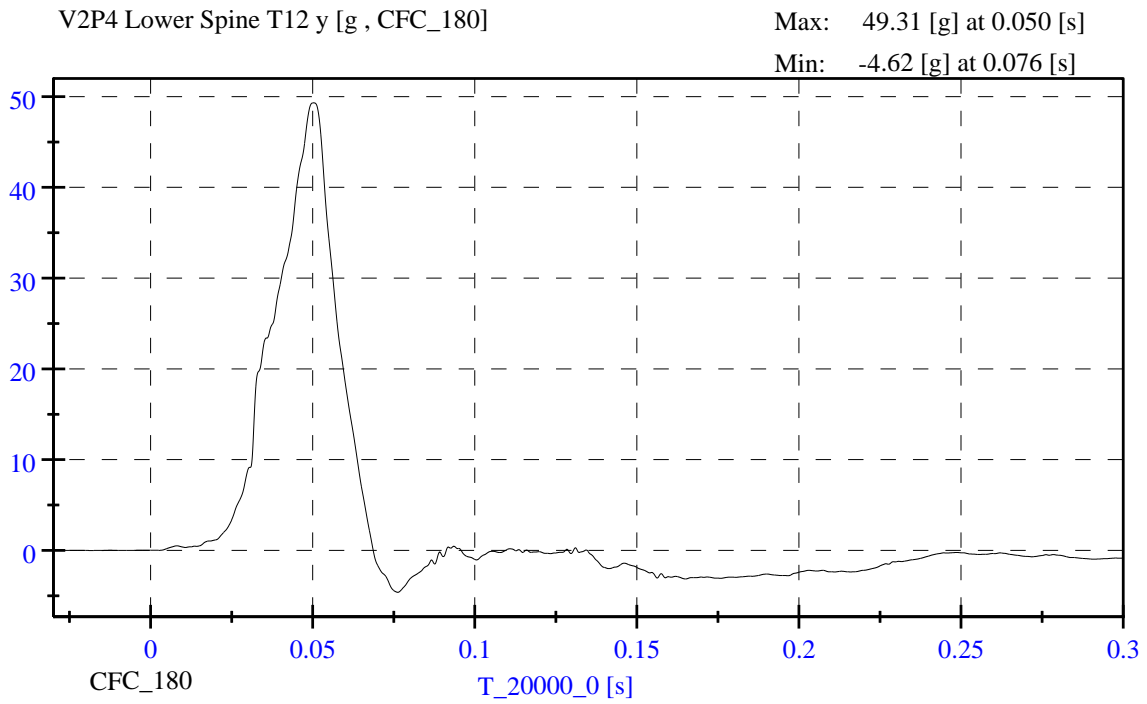


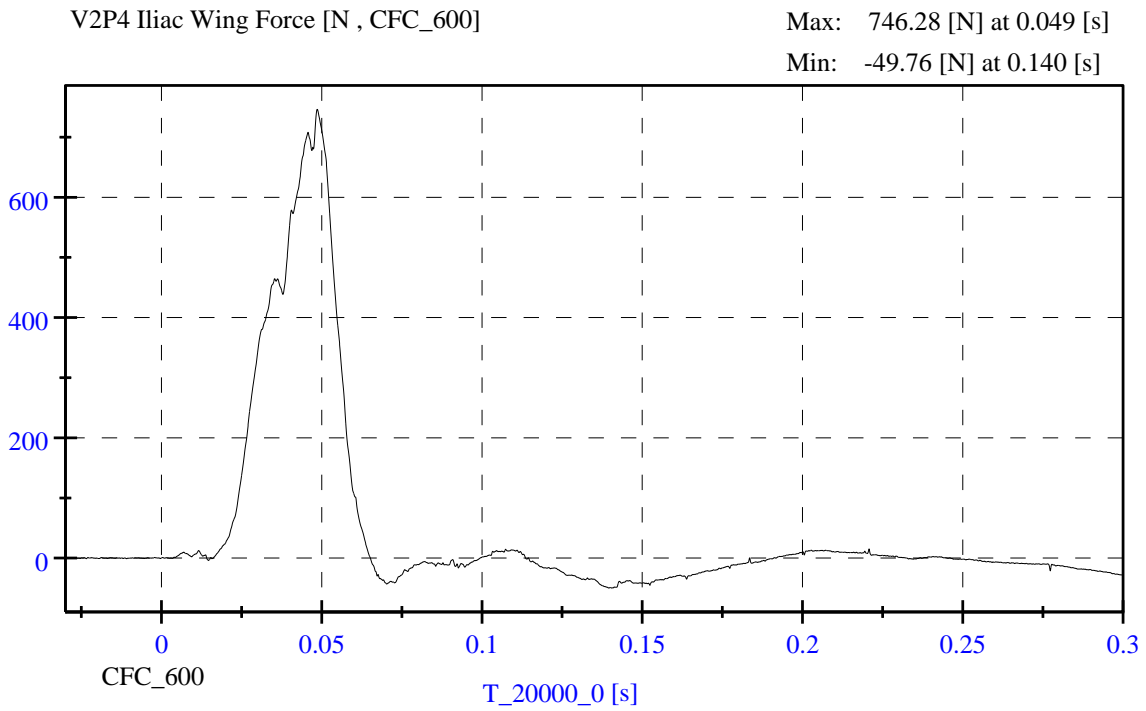
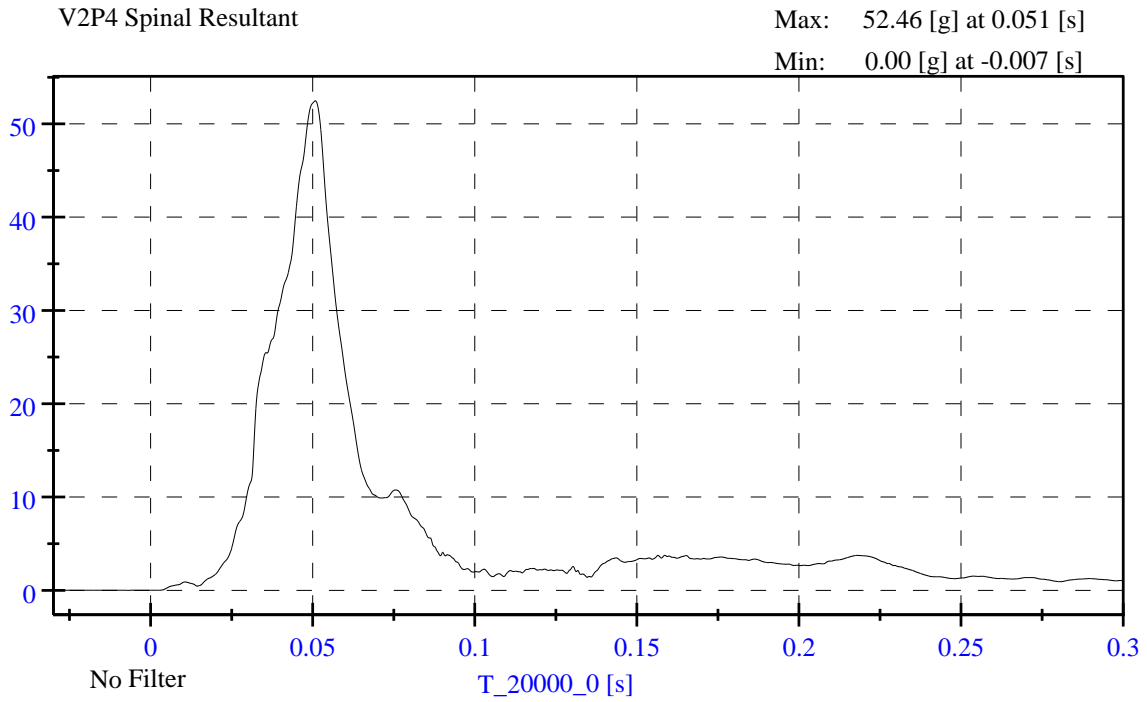


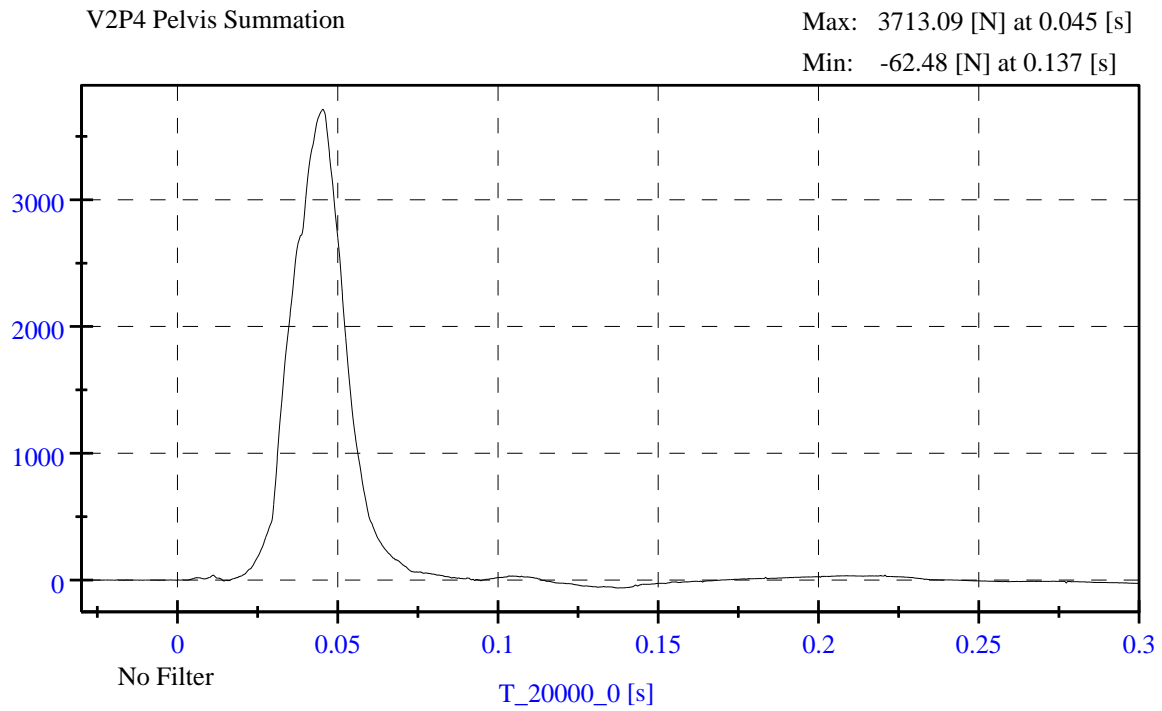
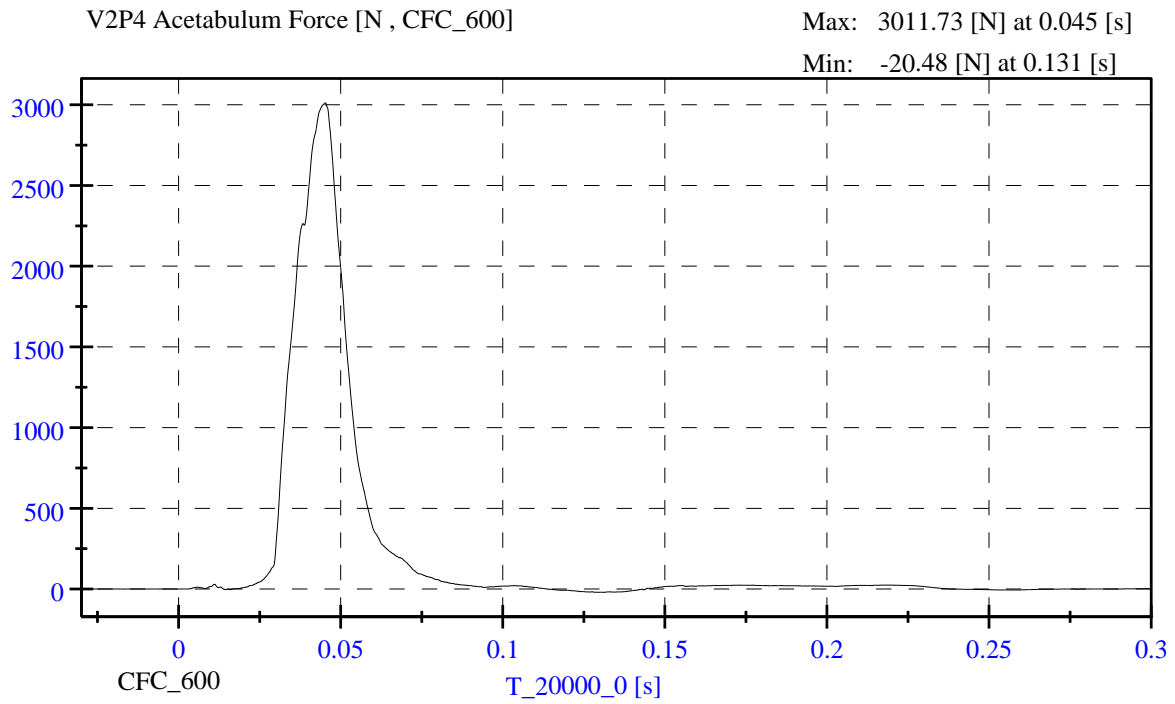












APPENDIX C

DUMMY PERFORMANCE CALIBRATION TEST DATA

CALIBRATION TEST RESULTS

PRE-TEST

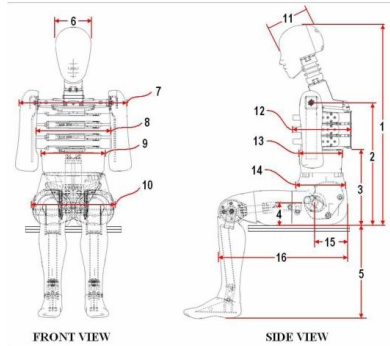
EUROSID 2 (ES-2RE) MALE – DRIVER ATD

SERIAL NO: F033

(CONFIGURED FOR LEFT SIDE IMPACT)

ES-2re External Measurements

NHTSA SN F033



Dim. No.	Description	Specification (mm)	Result (mm)	Pass/Fail
1	Sitting Height	900-918	915	Pass
2	Seat to Shoulder Joint	558-572	564	Pass
3	Seat to Lower Face of Thoracic Spine Box	346-356	354	Pass
4	Seat to Hip Joint (center of bolt)	97-103	100	Pass
5	Sole to Seat, Sitting	433-451	444	Pass
6	Head Width	152-158	155	Pass
7	Shoulder/Arm Width	461-479	465	Pass
8	Thorax Width	322-332	326	Pass
9	Abdomen Width	273-287	284	Pass
10	Pelvis Lap Width	359-373	367	Pass
11	Head Depth	196-206	199	Pass
12	Thorax Depth	262-272	270	Pass
13	Abdomen Depth	194-204	200	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	601	Pass

Technician: M. Goehle

Date: 11/15/12



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VERIFICATION REPORT

Test Name:	Head Drop	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Head Drop	Test Date:	11/15/2012
Test Number:	1	Test Time:	7:43:26 AM

Component Part Number	Component Serial Number
455-1007	1910934

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.0 deg C P
Humidity	10 -- 70	23 %RH P
Resultant Acceleration	125 -- 155	142 g P
Oscillation	0.0 -- 15.0	3.1 % P
Fore-Aft Acceleration	-15.00 -- 15.00	8.09 g P

All test parameters are within specifications

Technician: **M. Goehle**

Supervisor: **D. Travale**

Test Time: **7:43:26 AM**

Test Date: **11/15/2012**

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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	P49204	7/30/2012
Endevco	7264-2000	P63981	5/23/2012
Endevco	7264-2000	P64007	5/23/2012

Test Time: 7:43:26 AM

Test Date: 11/15/2012

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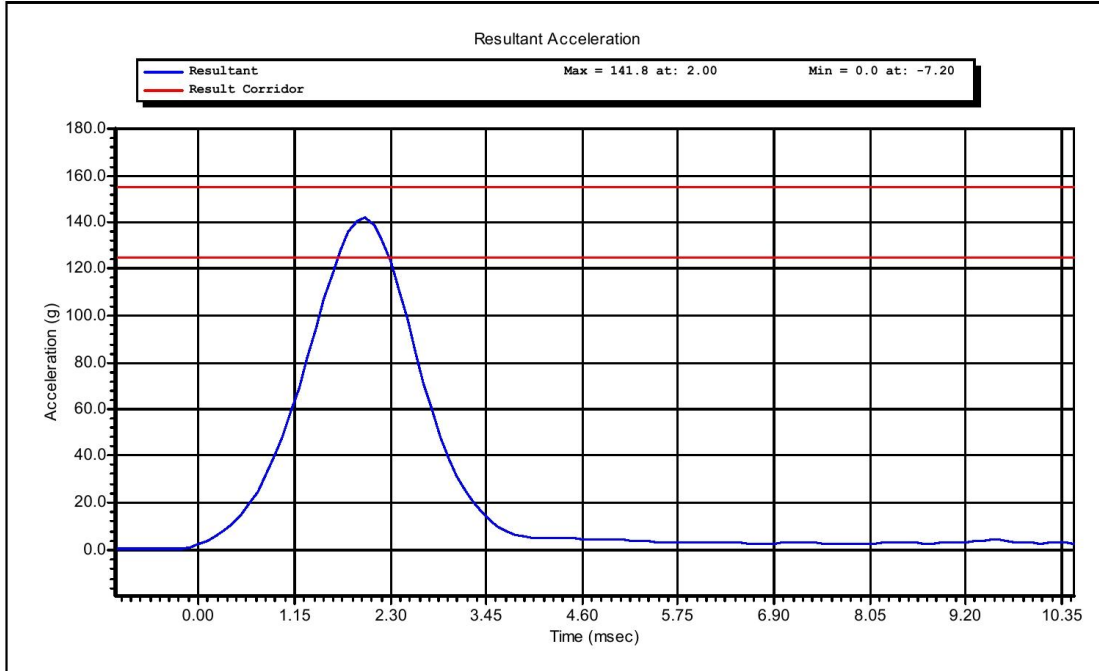


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Test Name:	Head Drop	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Head Drop	Test Date:	11/15/2012
Test Number:	1	Test Time:	7:43:26 AM



Test Time: **7:43:26 AM**

Test Date: **11/15/2012**

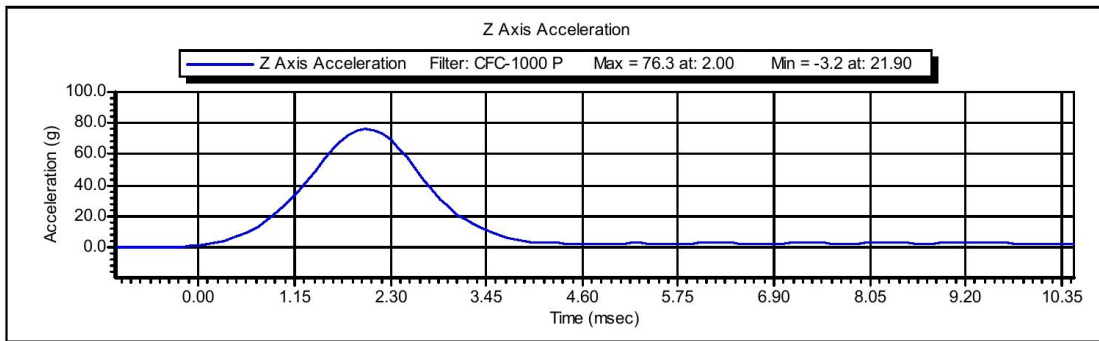
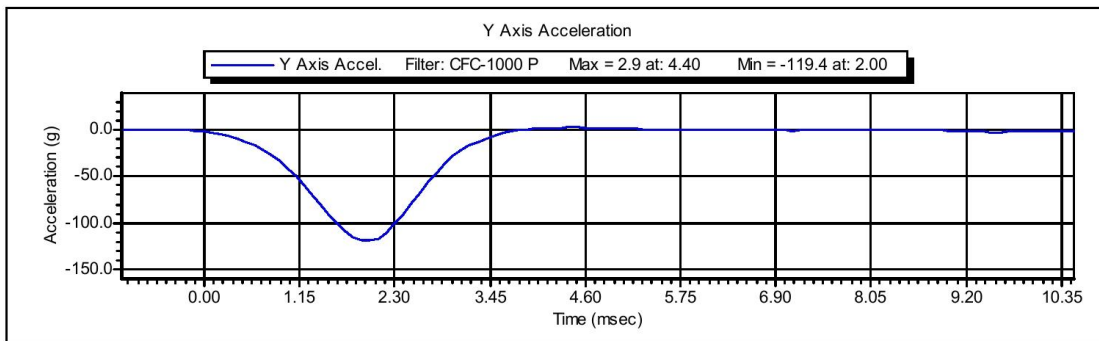
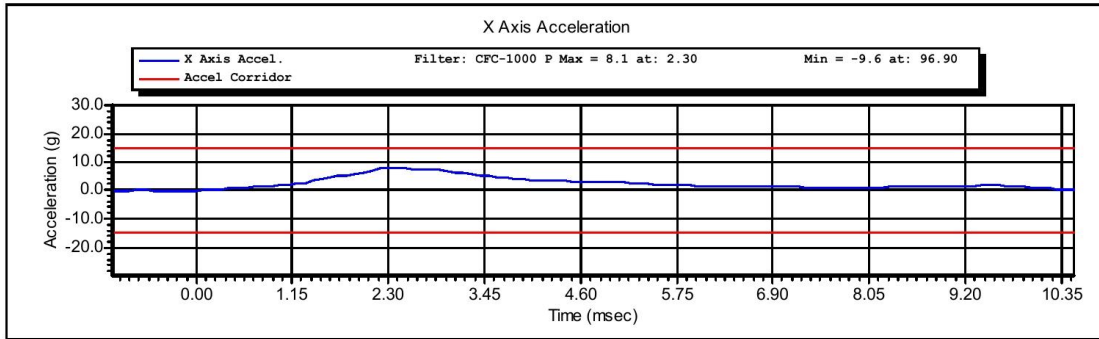
Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0



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Test Time: 7:43:26 AM

Test Date: 11/15/2012

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VERIFICATION REPORT

Test Name:	Neck Flexion	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:		Test Date:	11/14/2012
Test Number:	1	Test Time:	3:30:26 PM

Component Part Number	Component Serial Number
455-2002	175-200107085

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.9 deg C P
Humidity	10 -- 70	25 %RH P
Velocity	3.30 -- 3.50	3.44 m/s P
Maximum Neck Flexion Angle	49.0 -- 59.0	50.4 degrees P
Time At Maximum Neck Flexion	54.0 -- 66.0	59.7 ms P
Decay to Zero Degrees	53.0 -- 88.0	58.8 ms P
Velocity Corridor	--	P

All test parameters are within specifications

Technician: **A. Rudniski**

Supervisor: **D. Travale**

Test Time: **3:30:26 PM**

Test Date: **11/14/2012**

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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	C15016	8/15/2012
DentonATD	7000428	094	5/30/2012
DentonATD	7000428	095	5/30/2012
DentonATD	7000428	093	5/30/2012

Test Time: 3:30:26 PM

Test Date: 11/14/2012

Copyright 2006 Denton ATD, Inc. LabPaq II Version: 1.8.5.0

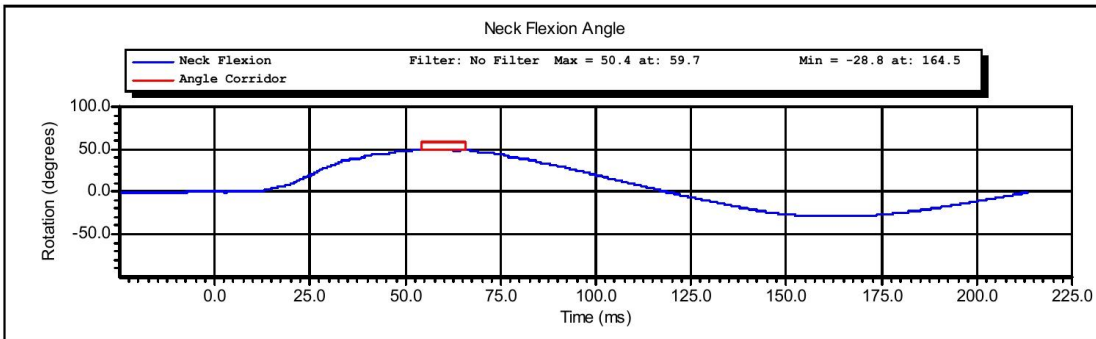
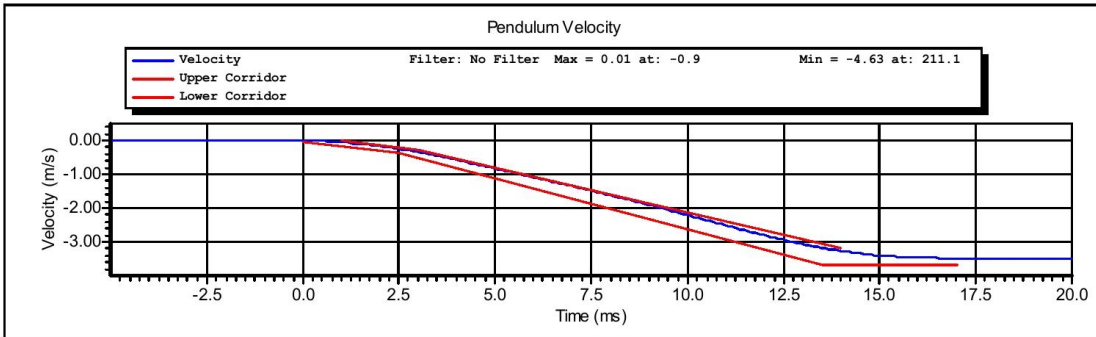


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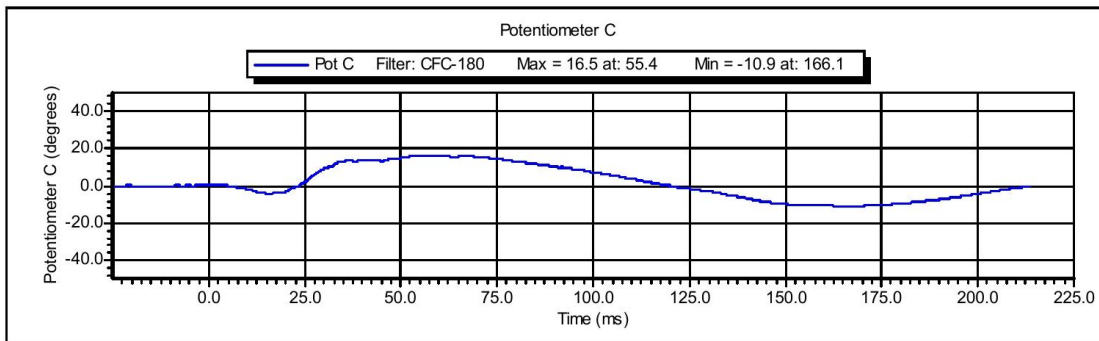
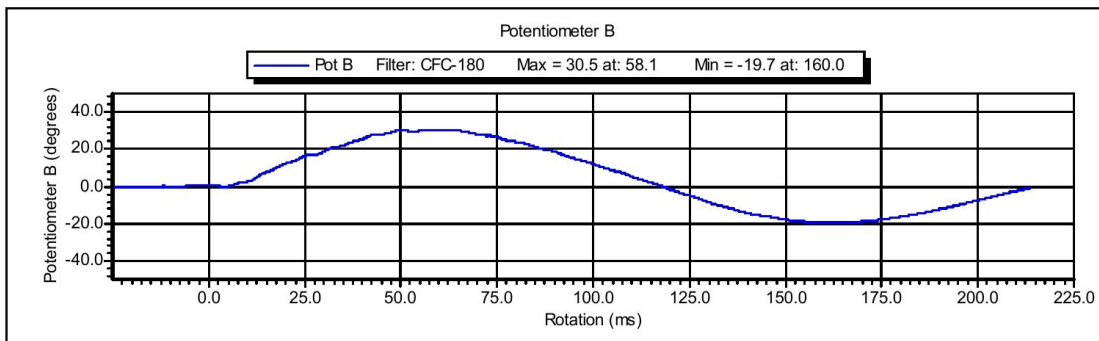
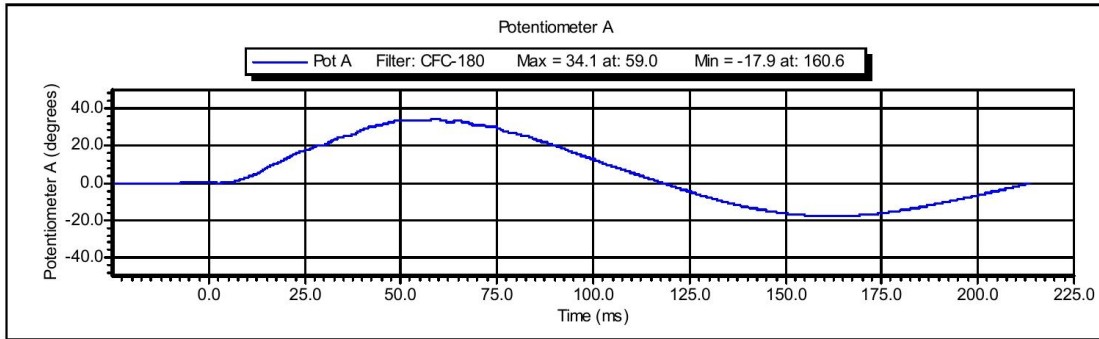
Test Name:	Neck Flexion	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:		Test Date:	11/14/2012
Test Number:	1	Test Time:	3:30:26 PM



Test Time: **3:30:26 PM**

Test Date: **11/14/2012**

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Test Time: 3:30:26 PM

Test Date: 11/14/2012

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VERIFICATION REPORT

Test Name:	Shoulder Impact	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:		Test Date:	11/14/2012
Test Number:	1	Test Time:	2:12:00 PM

Component Part Number	Component Serial Number
960715-313	07021

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.1 deg C P
Humidity	10.0 -- 70.0	24.0 %RH P
Velocity	4.20 -- 4.40	4.25 m/s P
Pendulum Acceleration	-10.50 -- -7.50	-9.27 g P

All test parameters are within specifications

Technician: **A. Rudniski**

Supervisor: **D. Travale**

Test Time: **2:12:00 PM**

Test Date: **11/14/2012**

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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	C14953	5/25/2012

Test Time: 2:12:00 PM

Test Date: 11/14/2012

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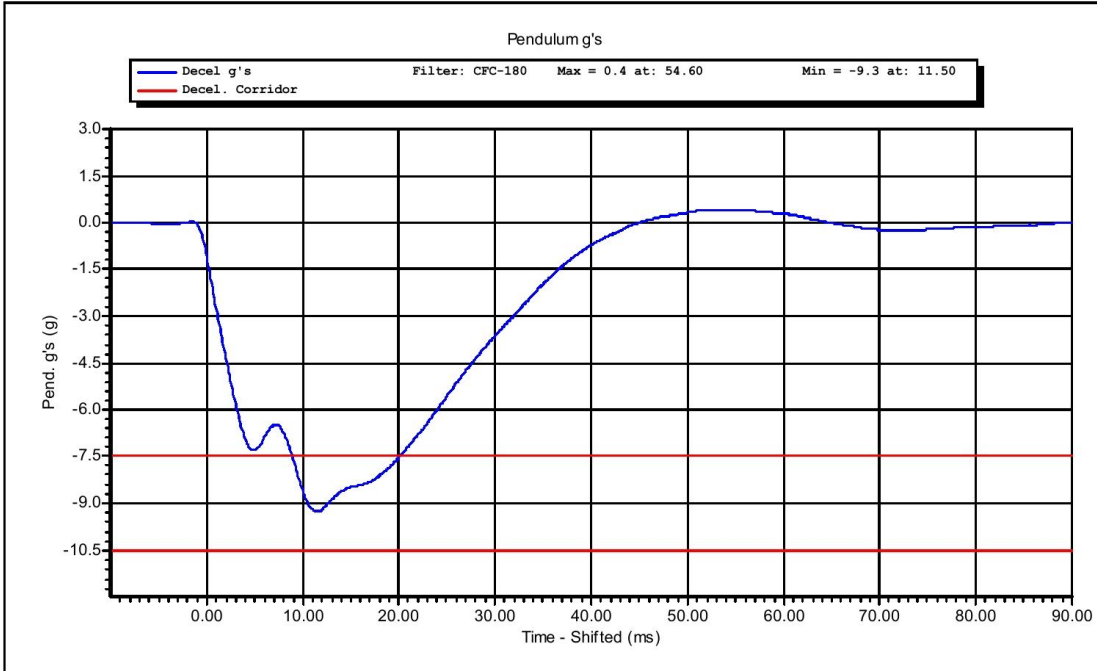


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Test Name:	Shoulder Impact	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:		Test Date:	11/14/2012
Test Number:	1	Test Time:	2:12:00 PM



Test Time: **2:12:00 PM**

Test Date: **11/14/2012**

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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:	F033		
Test ID:	Upper Rib 4 m/s	Test Date:	11/13/2012
Test Number:	1	Test Time:	3:10:29 PM

Component Part Number	Component Serial Number
455-3100	07206

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.5 deg C P
Humidity	10.0 -- 70.0	46.0 %RH P
Velocity	3.90 -- 4.10	3.96 m/s P
Rib Displacement	-51.00 -- -46.00	-48.07 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 Time: **3:10:29 PM**

Test Date: **11/13/2012**

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REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Honeywell	MLT-38000	DS-179	5/17/2012
DentonATD	Velocity Trap	1	1/11/2012
Endevco	7264-2000	P32222	11/13/2012

Test Time: 3:10:29 PM

Test Date: 11/13/2012

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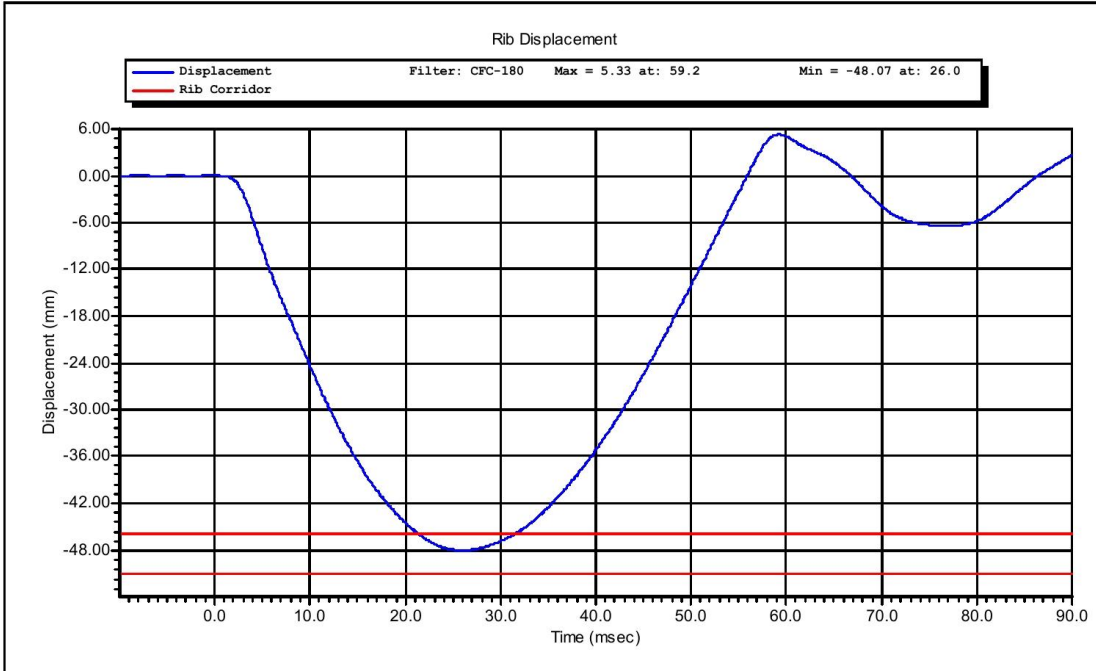


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Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	4.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Upper Rib 4 m/s	Test Date:	11/13/2012
Test Number:	1	Test Time:	3:10:29 PM



Test Time: **3:10:29 PM**

Test Date: **11/13/2012**

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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:			
Test ID:	Upper Rib 3 m/s	Test Date:	11/13/2012
Test Number:	1	Test Time:	3:28:50 PM

Component Part Number	Component Serial Number
455-3100	07206

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.6 deg C P
Humidity	10.0 -- 70.0	46.0 %RH P
Velocity	2.90 -- 3.10	2.98 m/s P
Rib Displacement	-40.00 -- -36.00	-37.57 mm P
Drop Height	454 -- 464	459 mm P

All test parameters are within specifications

Technician: **A. Rudniski**

Supervisor: **D. Travale**

Test Time: **3:28:50 PM**

Test Date: **11/13/2012**

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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-179	5/17/2012
DentonATD	Velocity Trap	1	1/11/2012
Endevco	7264-2000	P32222	11/13/2012

Test Time: 3:28:50 PM

Test Date: 11/13/2012

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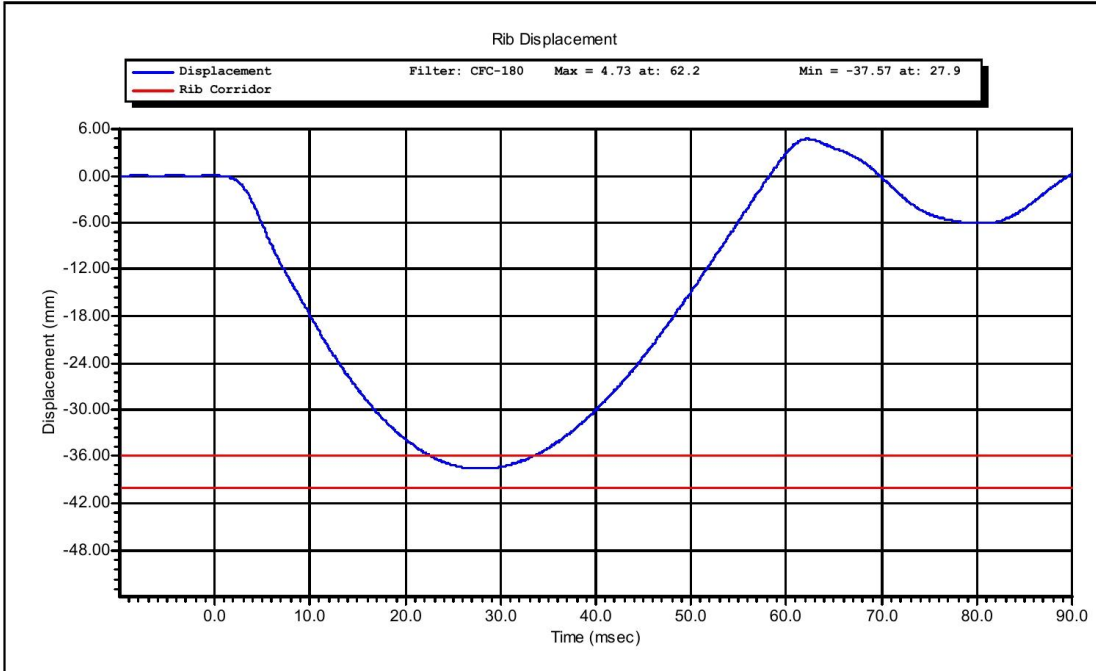


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4455 Genesee Street, Buffalo, New York 14225 - Phone (716)632-7500

Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	3.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:			
Test ID:	Upper Rib 3 m/s	Test Date:	11/13/2012
Test Number:	1	Test Time:	3:28:50 PM



Test Time: **3:28:50 PM**

Test Date: **11/13/2012**

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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:	F033		
Test ID:	Middle Rib 4 m/s	Test Date:	11/13/2012
Test Number:	1	Test Time:	3:35:12 PM

Component Part Number	Component Serial Number
455-3100	07207

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.6 deg C P
Humidity	10.0 -- 70.0	46.0 %RH P
Velocity	3.90 -- 4.10	3.96 m/s P
Rib Displacement	-51.00 -- -46.00	-47.85 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 Time: **3:35:12 PM**

Test Date: **11/13/2012**

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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-185	5/17/2012
DentonATD	Velocity Trap	1	1/11/2012
Endevco	7264-2000	P32222	11/13/2012

Test Time: 3:35:12 PM

Test Date: 11/13/2012

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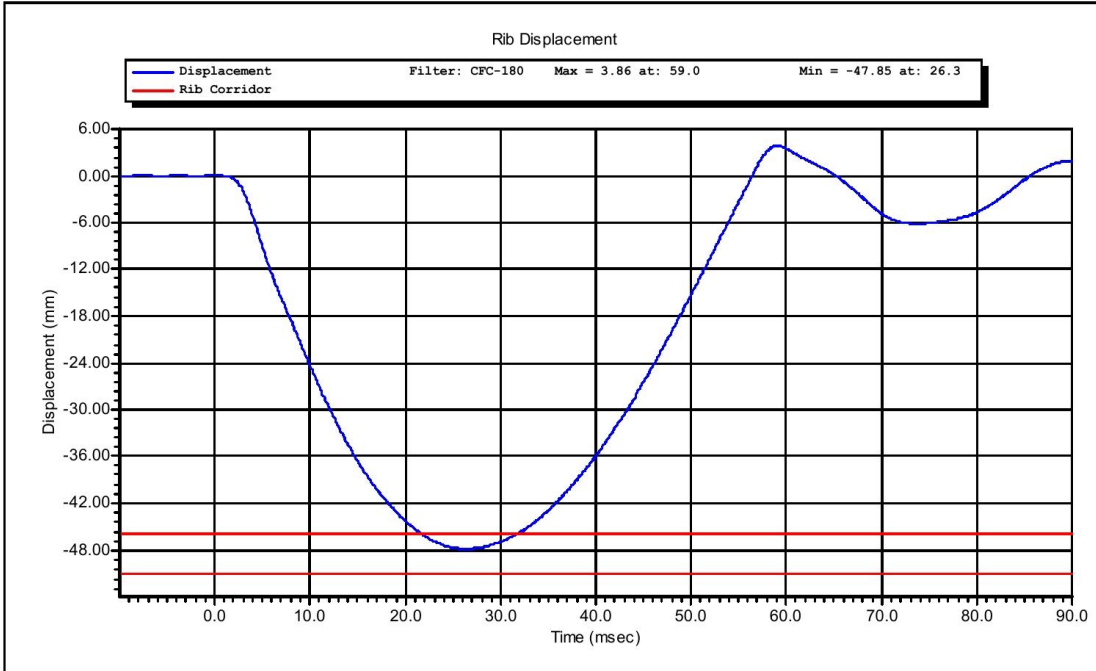


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4455 Genesee Street, Buffalo, New York 14225 - Phone (716)632-7500

Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	4.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Middle Rib 4 m/s	Test Date:	11/13/2012
Test Number:	1	Test Time:	3:35:12 PM



Test Time: **3:35:12 PM**

Test Date: **11/13/2012**

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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:	F033		
Test ID:	Middle Rib 3 m/s	Test Date:	11/13/2012
Test Number:	1	Test Time:	3:44:50 PM

Component Part Number	Component Serial Number
455-3100	07207

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.6 deg C P
Humidity	10.0 -- 70.0	46.0 %RH P
Velocity	2.90 -- 3.10	2.97 m/s P
Rib Displacement	-40.00 -- -36.00	-37.10 mm P
Drop Height	454 -- 464	459 mm P

All test parameters are within specifications

Technician: **A. Rudniski**

Supervisor: **D. Travale**

Test Time: **3:44:50 PM**

Test Date: **11/13/2012**

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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-185	5/17/2012
DentonATD	Velocity Trap	1	1/11/2012
Endevco	7264-2000	P32222	11/13/2012

Test Time: 3:44:50 PM

Test Date: 11/13/2012

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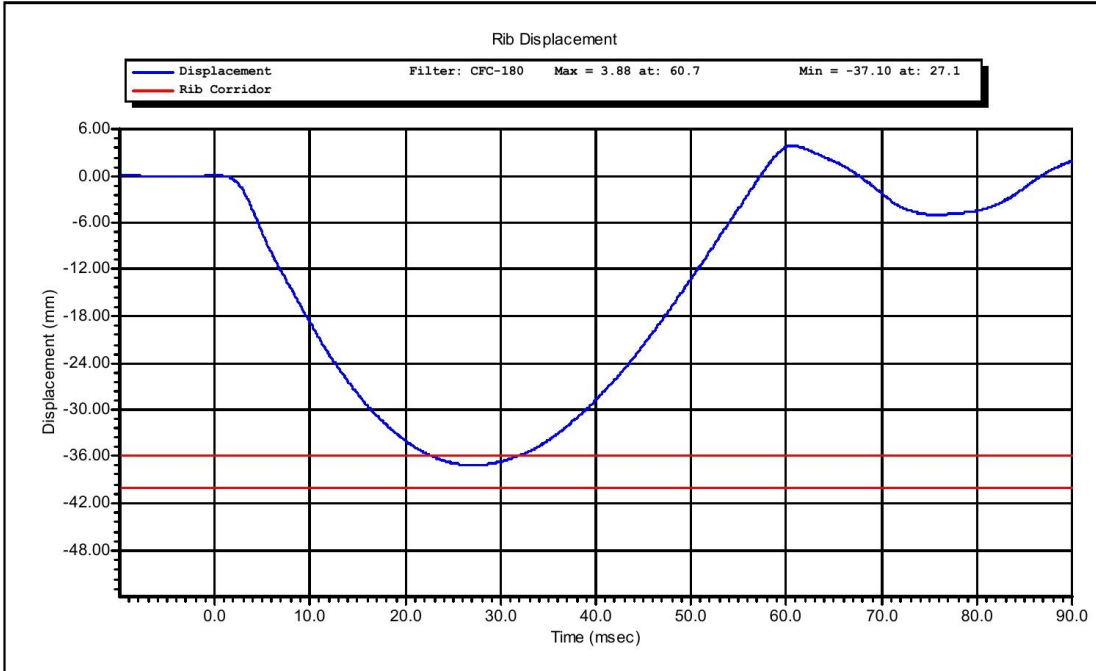


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Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	3.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Middle Rib 3 m/s	Test Date:	11/13/2012
Test Number:	1	Test Time:	3:44:50 PM



Test Time: **3:44:50 PM**

Test Date: **11/13/2012**

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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:	F033		
Test ID:	Lower Rib 4 m/s	Test Date:	11/13/2012
Test Number:	1	Test Time:	3:54:05 PM

Component Part Number	Component Serial Number
455-3100	07208

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.6 deg C P
Humidity	10.0 -- 70.0	46.0 %RH P
Velocity	3.90 -- 4.10	3.96 m/s P
Rib Displacement	-51.00 -- -46.00	-47.63 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 Time: **3:54:05 PM**

Test Date: **11/13/2012**

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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-178	5/17/2012
DentonATD	Velocity Trap	1	1/11/2012
Endevco	7264-2000	P32222	11/13/2012

Test Time: 3:54:05 PM

Test Date: 11/13/2012

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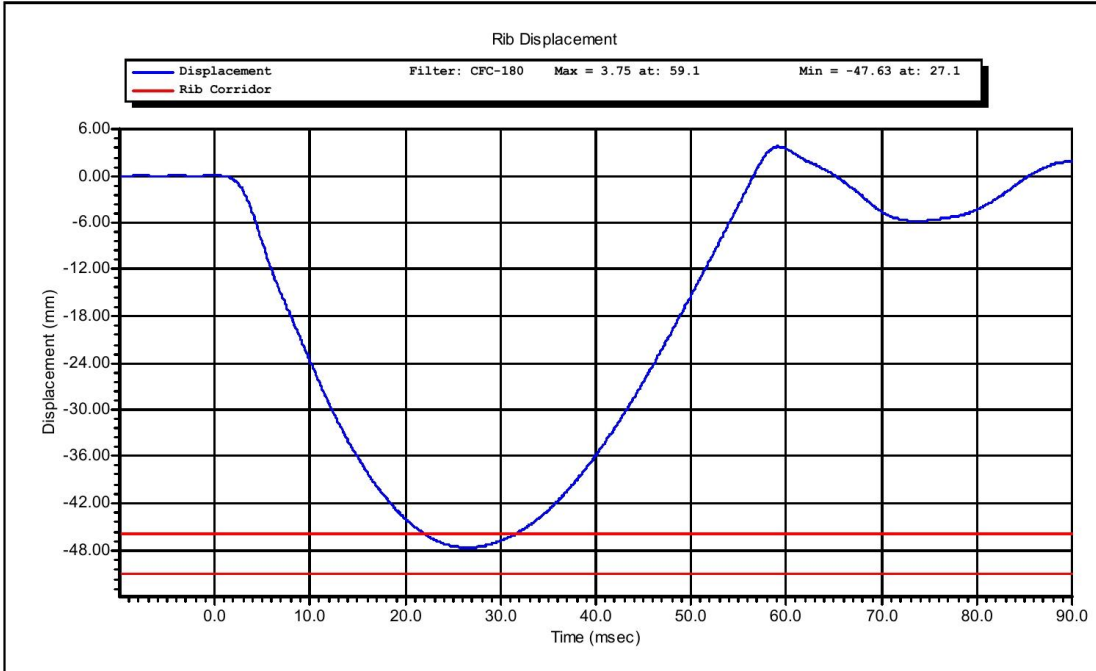


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Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	4.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Lower Rib 4 m/s	Test Date:	11/13/2012
Test Number:	1	Test Time:	3:54:05 PM



Test Time: **3:54:05 PM**

Test Date: **11/13/2012**

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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:	F033		
Test ID:	Lower Rib 3 m/s	Test Date:	11/13/2012
Test Number:	1	Test Time:	4:01:09 PM

Component Part Number	Component Serial Number
455-3100	07208

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.6 deg C P
Humidity	10.0 -- 70.0	46.0 %RH P
Velocity	2.90 -- 3.10	2.98 m/s P
Rib Displacement	-40.00 -- -36.00	-37.13 mm P
Drop Height	454 -- 464	459 mm P

All test parameters are within specifications

Technician: **A. Rudniski**

Supervisor: **D. Travale**

Test Time: **4:01:09 PM**

Test Date: **11/13/2012**

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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-178	5/17/2012
DentonATD	Velocity Trap	1	1/11/2012
Endevco	7264-2000	P32222	11/13/2012

Test Time: 4:01:09 PM

Test Date: 11/13/2012

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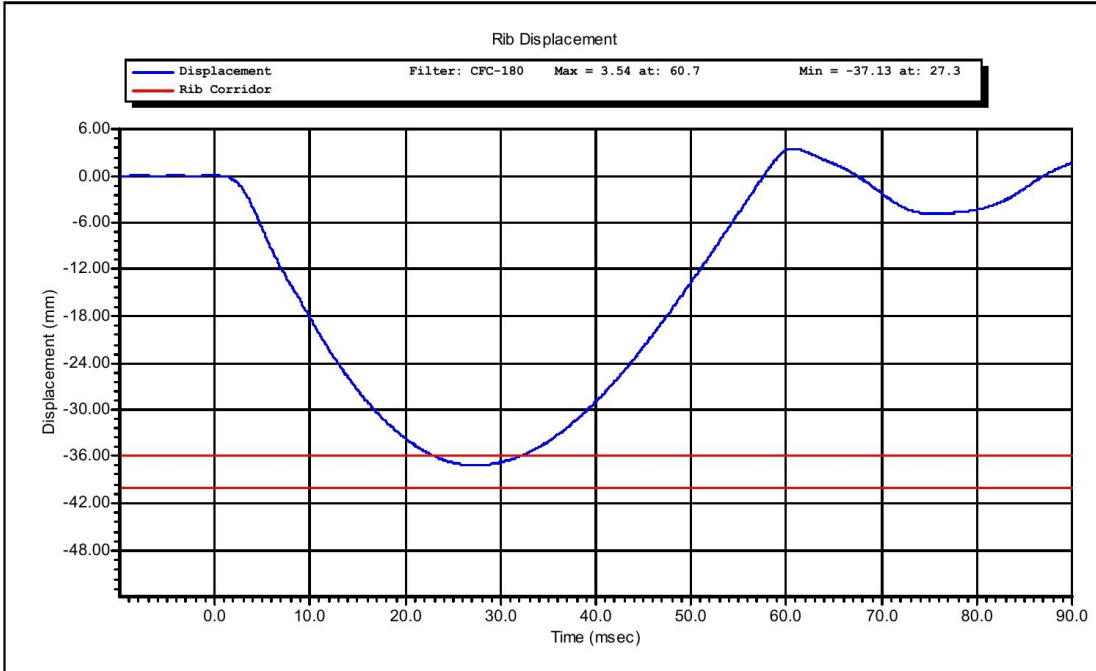


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Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	3.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Lower Rib 3 m/s	Test Date:	11/13/2012
Test Number:	1	Test Time:	4:01:09 PM



Test Time: **4:01:09 PM**

Test Date: **11/13/2012**

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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:	F033		
Test ID:		Test Date:	11/14/2012
Test Number:	1	Test Time:	1:40:00 PM

Component Part Number	Component Serial Number
Upper Rib - 175-4002	07206
Middle Rib - 175-4002	07207
Lower Rib - 175-4002	07208

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.2 deg C P
Humidity	10.0 -- 70.0	24.0 %RH P
Velocity	5.40 -- 5.60	5.52 m/s P
Upper Rib Displacement	34.0 -- 41.0	36.9 mm P
Middle Rib Displacement	37.0 -- 45.0	41.5 mm P
Lower Rib Displacement	37.0 -- 44.0	40.4 mm P
Impactor Force	5100 -- 6200	5759 N P

All test parameters are within specifications

Technician: **A. Rudniski**

Supervisor: **D. Travale**

Test Time: **1:40:00 PM**

Test Date: **11/14/2012**



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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	C14953	5/25/2012
Honeywell	MLT-38000	DS-179	5/17/2012
Honeywell	MLT-38000	DS-185	5/17/2012
Honeywell	MLT-38000	DS-178	5/17/2012

Test Time: 1:40:00 PM

Test Date: 11/14/2012

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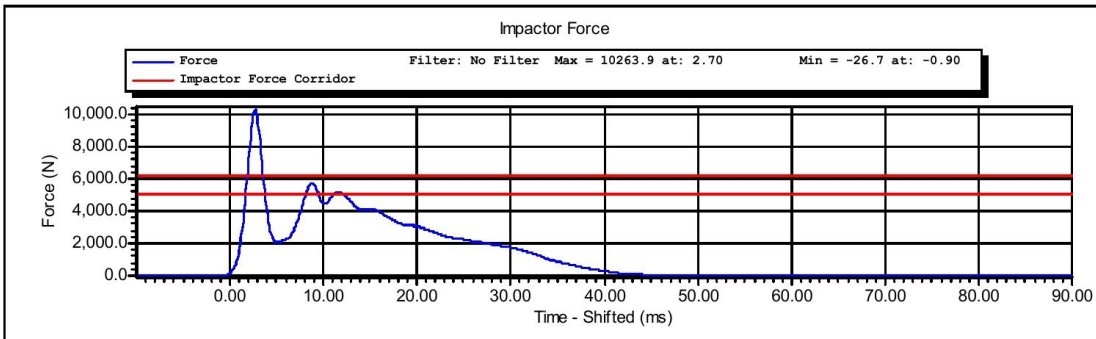
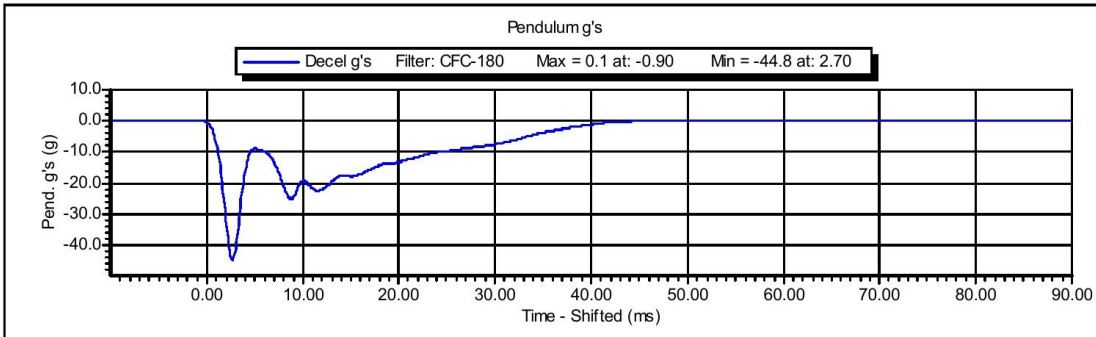


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Test Name:	Thorax Impact	Revision:	8/15/2008
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:		Test Date:	11/14/2012
Test Number:	1	Test Time:	1:40:00 PM



Test Time: **1:40:00 PM**

Test Date: **11/14/2012**

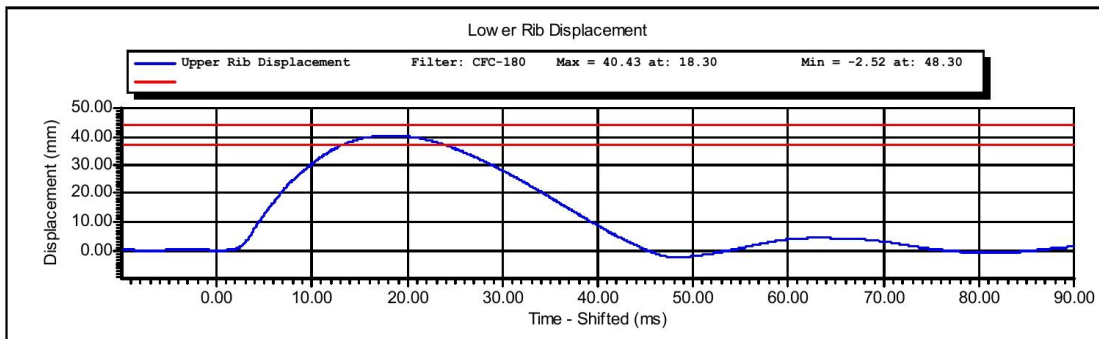
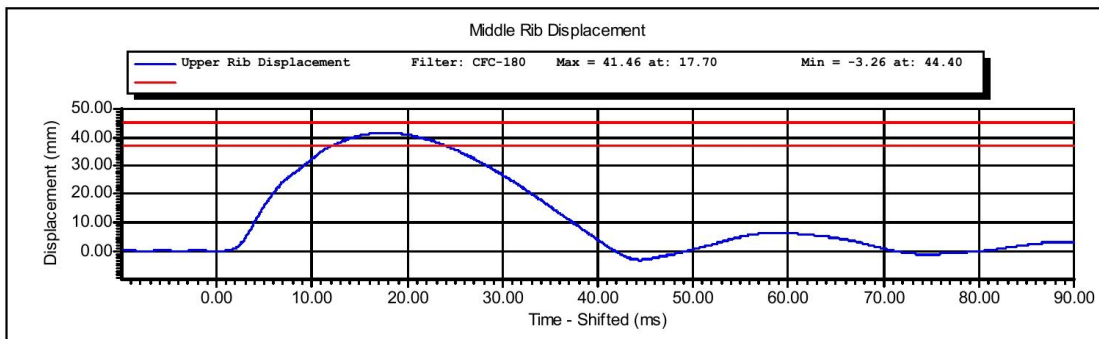
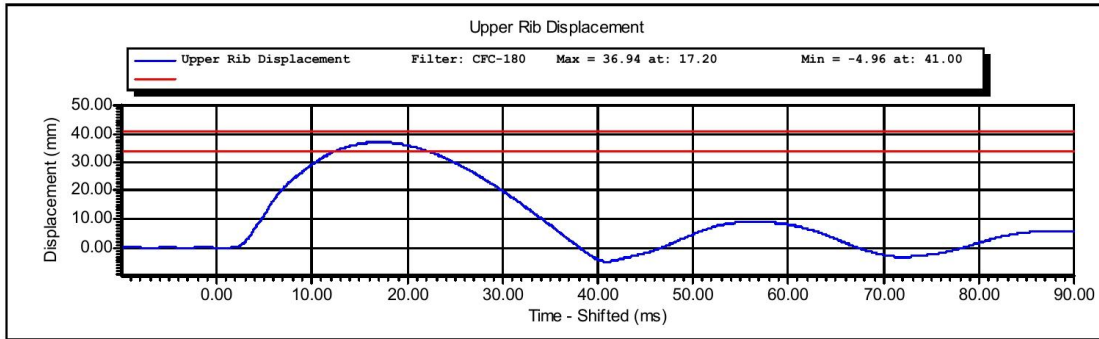
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Test Time: 1:40:00 PM

Test Date: 11/14/2012

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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:	F033		
Test ID:		Test Date:	11/14/2012
Test Number:	1	Test Time:	1:21:22 PM

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

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.2 deg C P
Humidity	10 -- 70	24 %RH P
Velocity	3.90 -- 4.10	4.02 m/s P
Peak Abdominal Force	-2.70 -- -2.20	-2.48 kN P
Time At Peak Abdominal Force	10.0 -- 12.3	11.0 ms P
Maximum Pendulum Force	-4.80 -- -4.00	-4.47 kN P
Time at Peak Pendulum Force	10.6 -- 13.0	11.3 ms P

All test parameters are within specifications

Technician: **A. Rudniski**

Supervisor: **D. Travale**

Test Time: **1:21:22 PM**

Test Date: **11/14/2012**



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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	C14953	5/25/2012
Denton	2631	LC-1524	5/24/2012
Denton	2631	LC-1523	5/24/2012
Denton	2631	LC-1530	5/24/2012

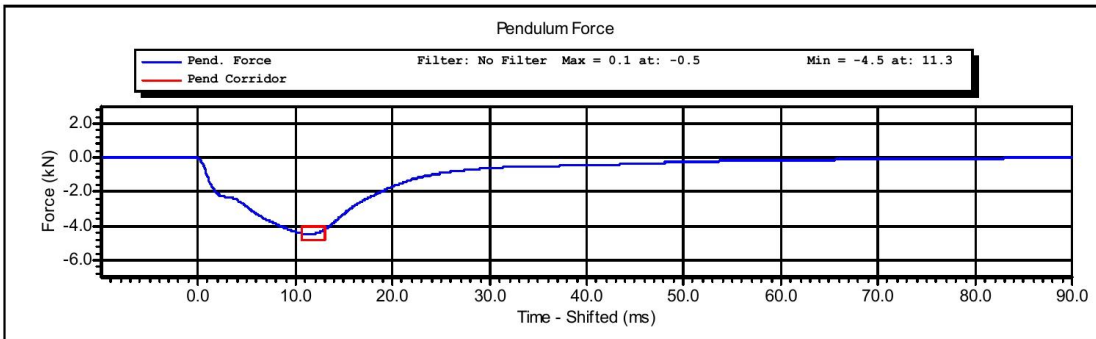
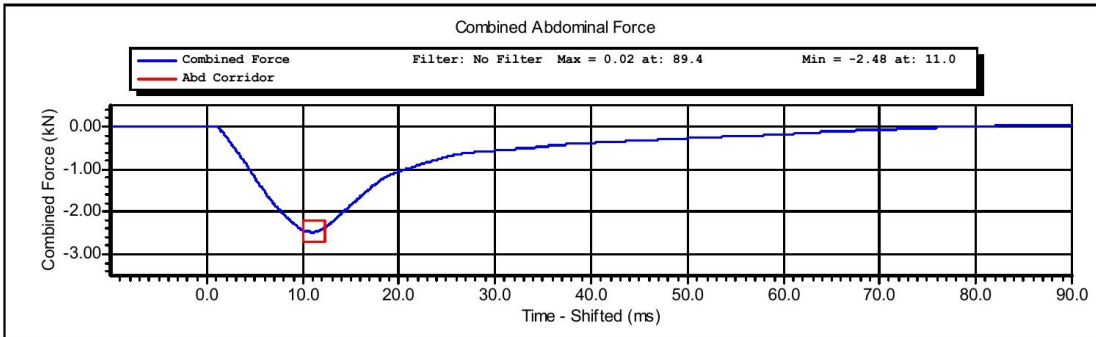
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Test Date: 11/14/2012

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Test Name:	Abdominal Impact	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:		Test Date:	11/14/2012
Test Number:	1	Test Time:	1:21:22 PM



Test Time: 1:21:22 PM

Test Date: 11/14/2012

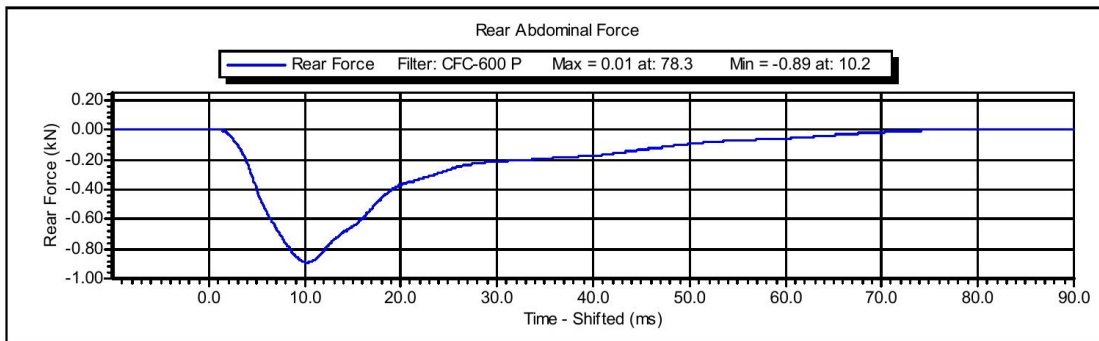
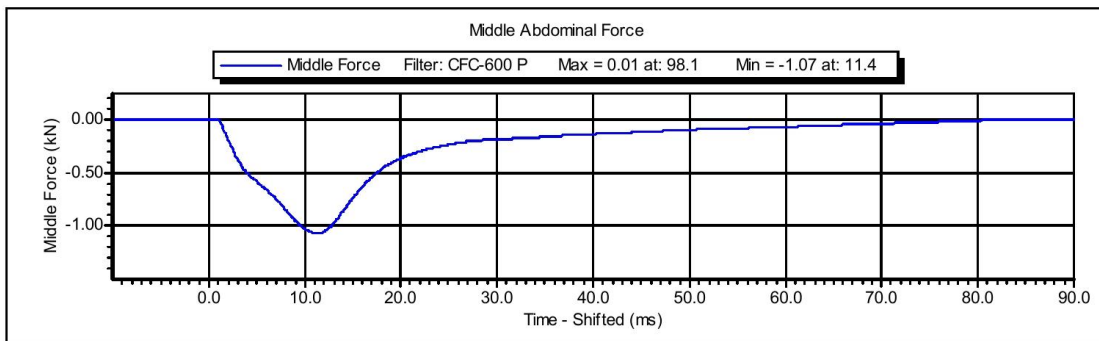
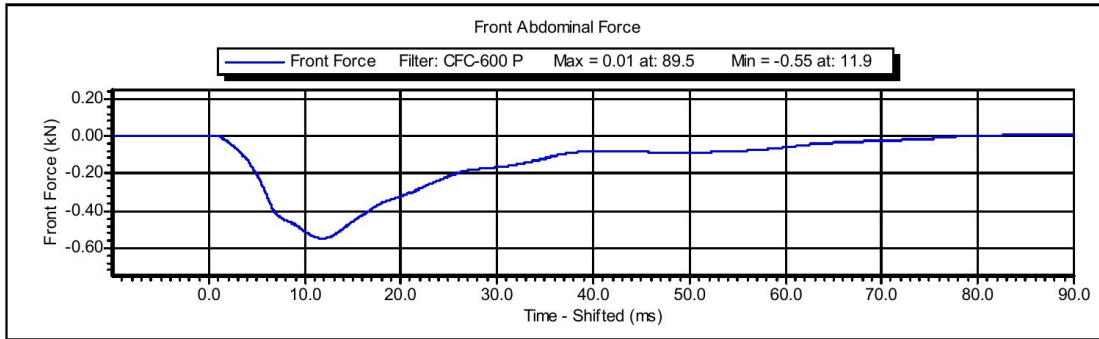
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Test Time: 1:21:22 PM

Test Date: 11/14/2012

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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:	F033		
Test ID:		Test Date:	11/14/2012
Test Number:	1	Test Time:	4:09:22 PM

Component Part Number	Component Serial Number
175-5501	DI8374

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.0 deg C P
Humidity	10 -- 70	25 %RH P
Velocity	5.95 -- 6.15	6.13 m/s P
Maximum Headform Flexion Angle	45.0 -- 55.0	46.0 degrees P
Time at Maximum Headform Flexion Angle	39.0 -- 53.0	43.9 ms P
Decay to Zero Degrees	37.0 -- 57.0	42.1 ms P
Velocity Corridor	--	P

All test parameters are within specifications

Technician: **A. Rudniski**

Supervisor: **D. Travale**

Test Time: **4:09:22 PM**

Test Date: **11/14/2012**

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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	C15016	8/15/2012
DentonATD	7000428	094	5/30/2012
DentonATD	7000428	095	5/30/2012
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Test Time: 4:09:22 PM

Test Date: 11/14/2012

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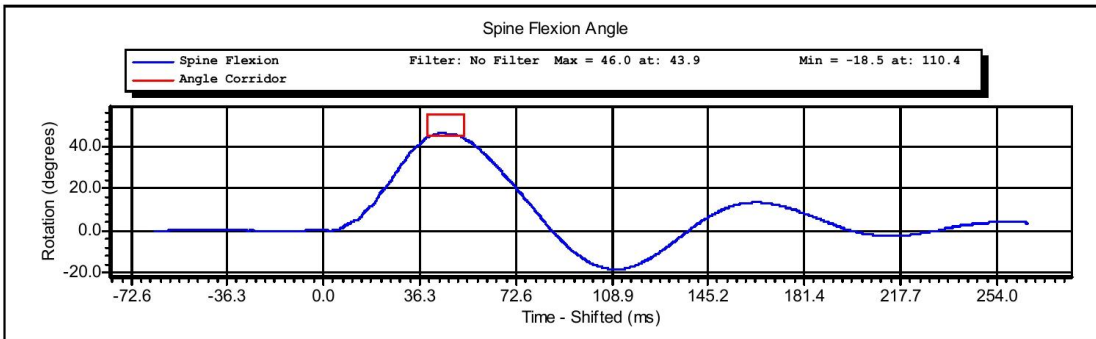
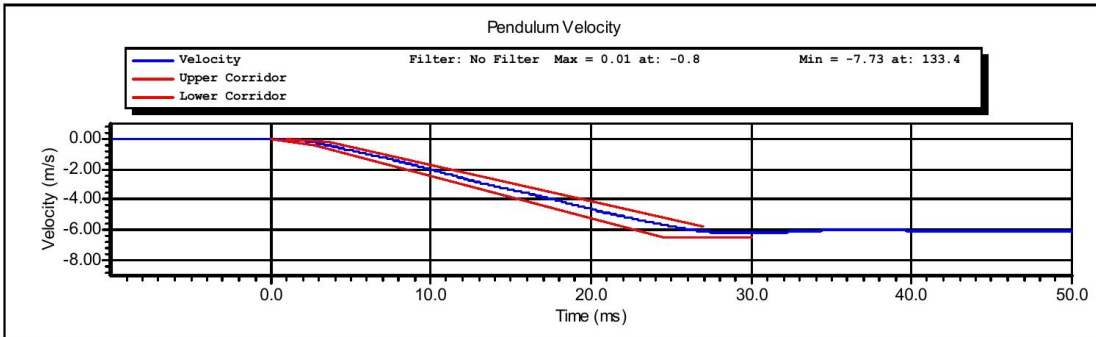


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Test Name:	Lumbar Spine	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:		Test Date:	11/14/2012
Test Number:	1	Test Time:	4:09:22 PM



Test Time: **4:09:22 PM**

Test Date: **11/14/2012**

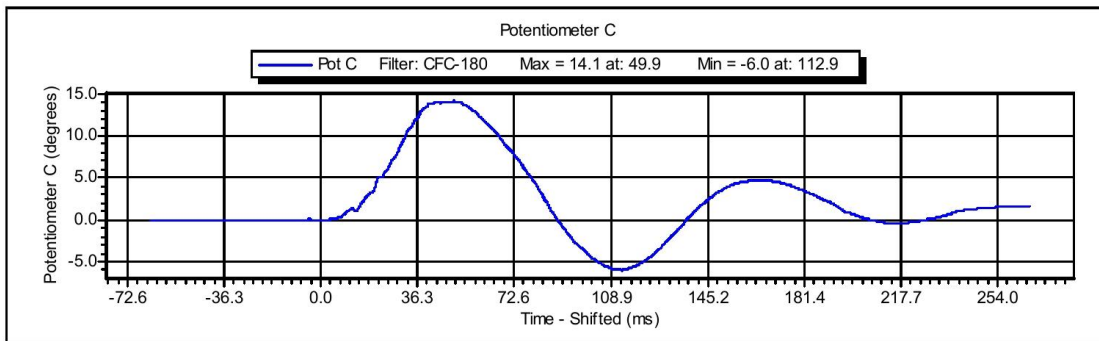
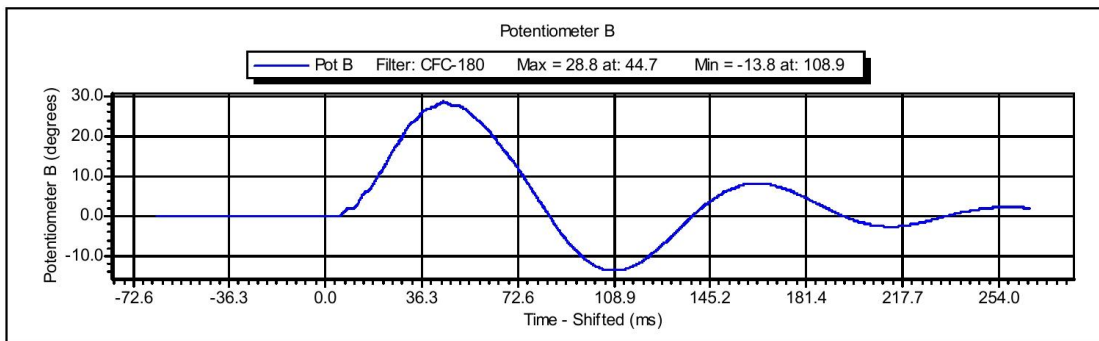
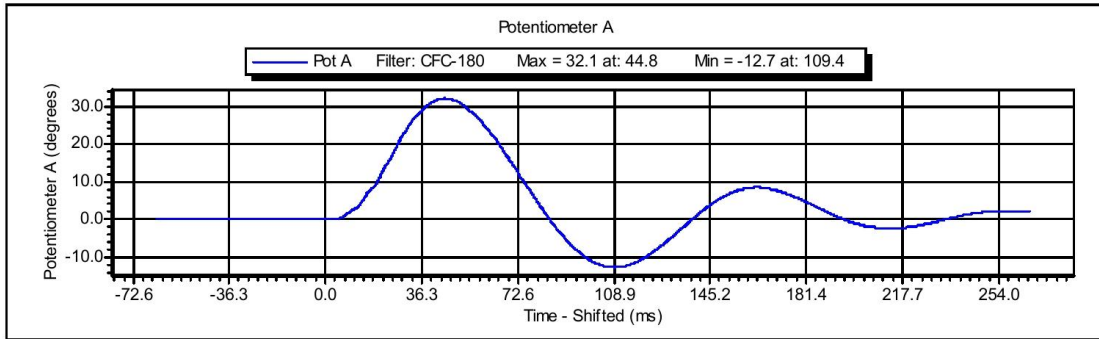
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Test Time: 4:09:22 PM

Test Date: 11/14/2012

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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:	F033		
Test ID:		Test Date:	11/14/2012
Test Number:	1	Test Time:	10:59:55 AM

Component Part Number	Component Serial Number
455-4003	07033

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.2 deg C P
Humidity	10 -- 70	24 %RH P
Velocity	4.20 -- 4.40	4.35 m/s P
Peak Pendulum Force	-5.40 -- -4.70	-5.06 kN P
Time at Peak Pendulum Force	11.80 -- 16.10	13.26 ms P
Peak Pubic Symphysis Force	-1.59 -- -1.23	-1.36 kN P
Time at Peak Pubic Symphysis Force	12.20 -- 17.00	13.56 ms P

All test parameters are within specifications

Technician: **A. Rudniski**

Supervisor: **D. Travale**

Test Time: **10:59:55 AM**

Test Date: **11/14/2012**



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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	C14953	5/25/2012
Denton	3096	LC-456Fy	5/24/2012

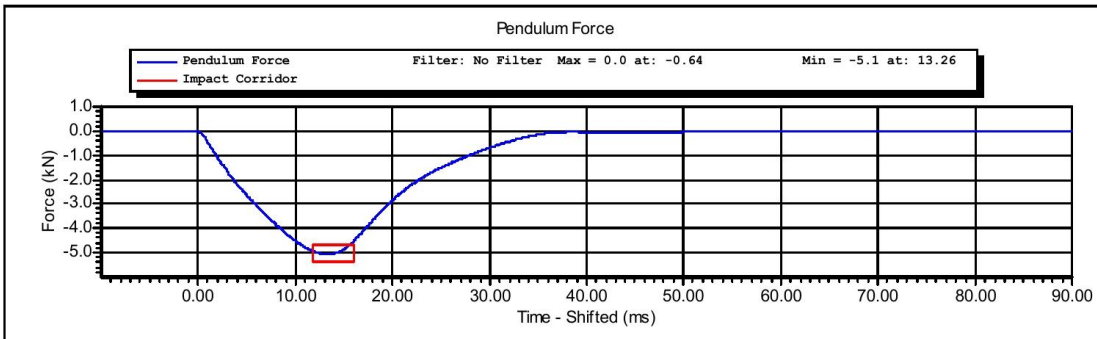
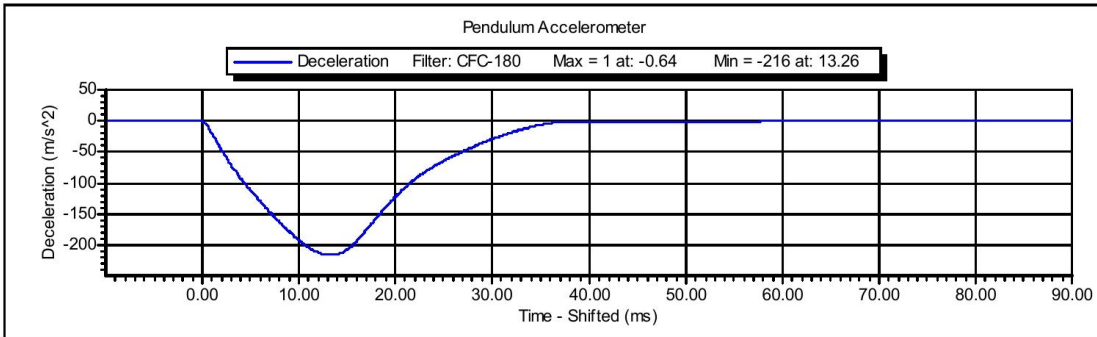
Test Time: 10:59:55 AM

Test Date: 11/14/2012

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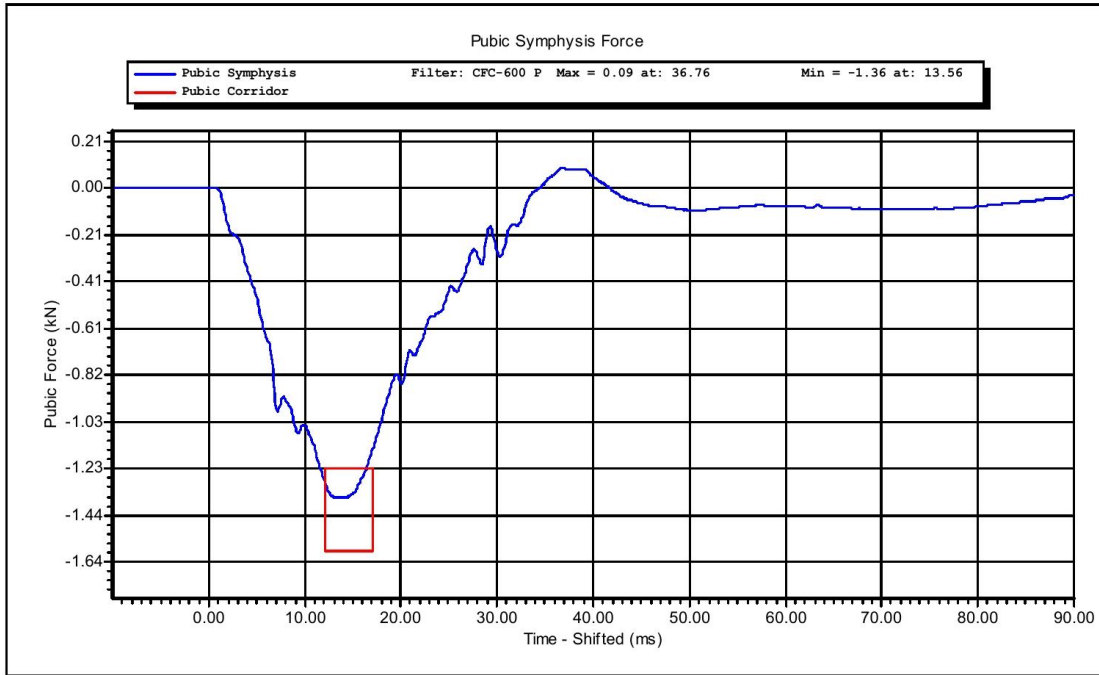
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Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:		Test Date:	11/14/2012
Test Number:	1	Test Time:	10:59:55 AM



Test Time: 10:59:55 AM

Test Date: 11/14/2012

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Test Time: 10:59:55 AM

Test Date: 11/14/2012

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CALIBRATION TEST RESULTS

PRE-TEST

SID-IIS 5TH PERCENTILE FEMALE - PASSENGER ATD

SERIAL No: 303

(CONFIGURED FOR LEFT SIDE IMPACT)



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SID-IIsD External Measurements

ATD S/N 303

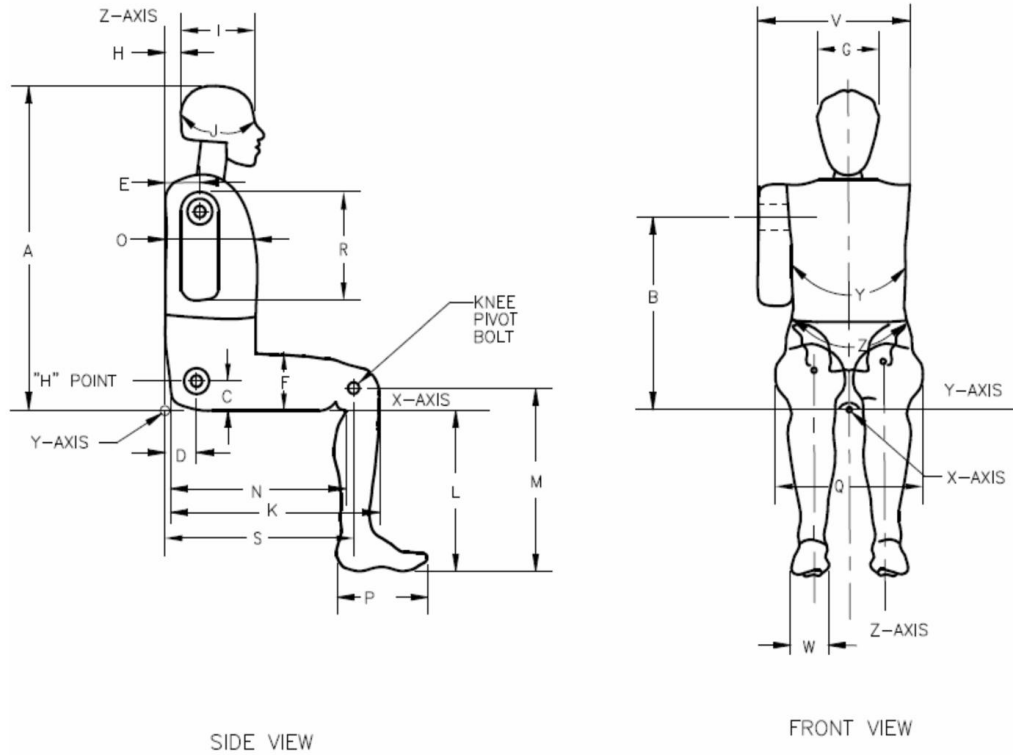
Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Sitting Height	772.0 - 788.0	784	Yes
B	Shoulder Pivot Height	437.0 - 453.0	450	Yes
C	H-Point Height	79.0 - 89.0	85	Yes
D	H-Point from Seat Back	141.0 - 151.0	146	Yes
E	Shoulder Pivot from Backline	97.0 - 107.0	100	Yes
F	Thigh Clearance	119.0 - 135.0	125	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	531	Yes
L	Popliteal Height	343.0 - 369.0	355	Yes
M	Knee Pivot to Floor Height	393.0 - 409.0	402	Yes
N	Buttock Popliteal Length	416.0 - 442.0	435	Yes
O	Chest Depth without Jacket	195.0 - 211.0	200	Yes
P	Foot Length (right)	216.0 - 232.0	222	Yes
P	Foot Length (left)	216.0 - 232.0	223	Yes
Q	Hip Breadth	313.0 - 323.0	317	Yes
R	Arm Length	249.0 - 259.0	252	Yes
S	Knee Joint to Seat back	478.0 - 493.0	482	Yes
V	Shoulder Width (only one arm installed)	341.0 - 357.0	351	Yes
W	Foot Width (right)	78.0 - 94.0	87	Yes
W	Foot Width (left)	78.0 - 94.0	87	Yes
Y	Chest Circumference with Jacket	851.0 - 881.0	874	Yes
Z	Waist Circumference	761.0 - 791.0	782	Yes

Technician: M. Goehle

Date: 11/15/2012

SID-IIIsD External Dimensions

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-IIs		
ATD Serial Number:	303		
Test ID:	Head Drop	Test Date:	11/15/2012
Test Number:	1	Test Time:	10:01:43 AM

Component Part Number	Component Serial Number
Head Skin - 180-1002	368

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.0 deg C P
Humidity	10 -- 70	25 %RH P
Resultant Acceleration	115.0 -- 137.0	122.2 g P
Oscillation	0.0 -- 15.0	2.8 % P
Fore-Aft Acceleration	-15.0 -- 15.0	-1.9 g P

All test parameters are within specifications

Technician: **M. Goehle**

Supervisor: **D. Travale**

Test Time: **10:01:43 AM**

Test Date: **11/15/2012**

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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	P59021	7/24/2012
Endevco	7264-2000	P52088	7/24/2012
Endevco	7264-2000	P58794	7/24/2012

Test Time: 10:01:43 AM

Test Date: 11/15/2012

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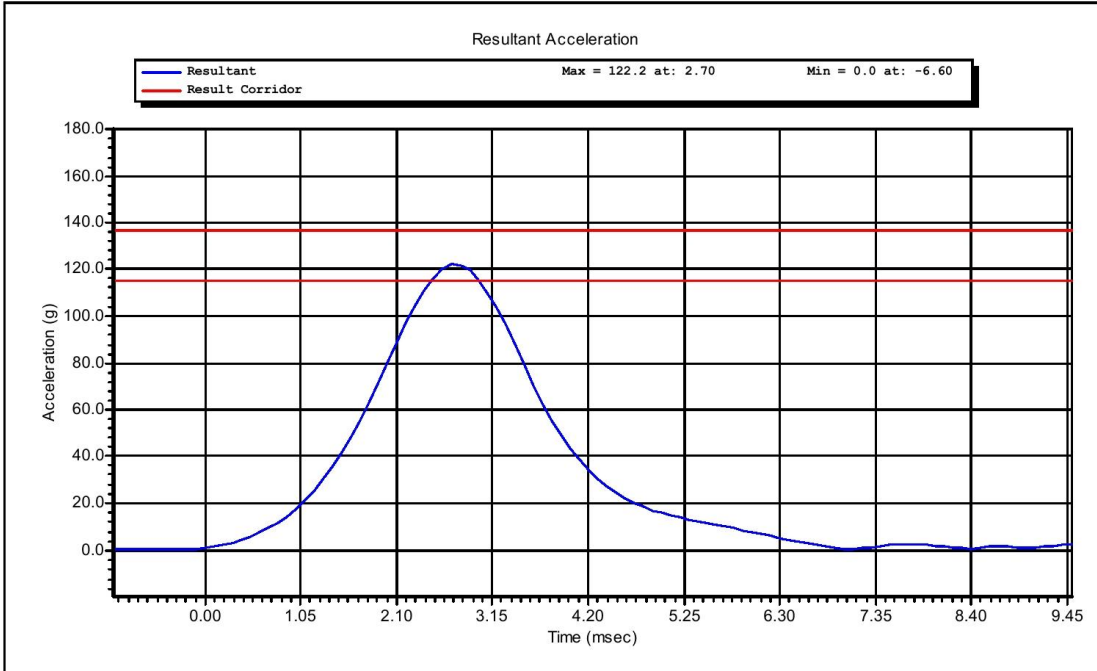


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Test Name:	Head Drop	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	303		
Test ID:	Head Drop	Test Date:	11/15/2012
Test Number:	1	Test Time:	10:01:43 AM



Test Time: **10:01:43 AM**

Test Date: **11/15/2012**

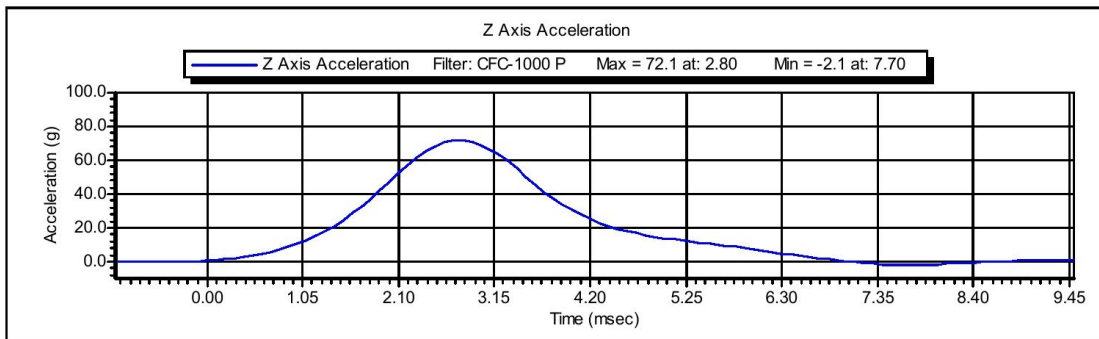
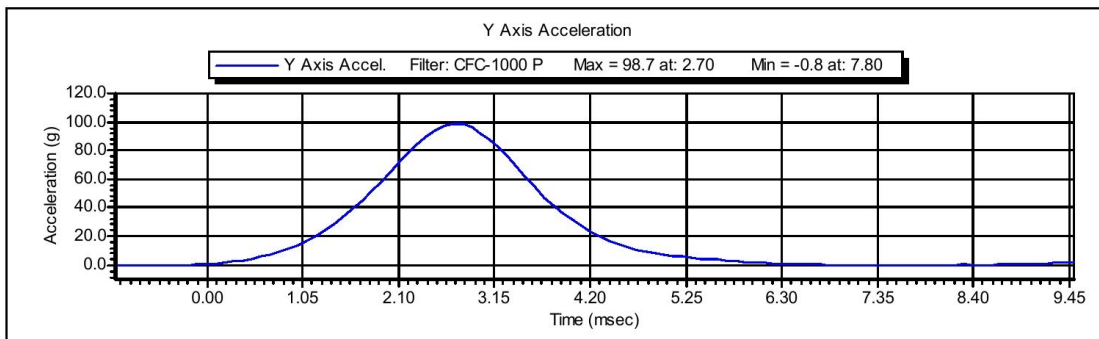
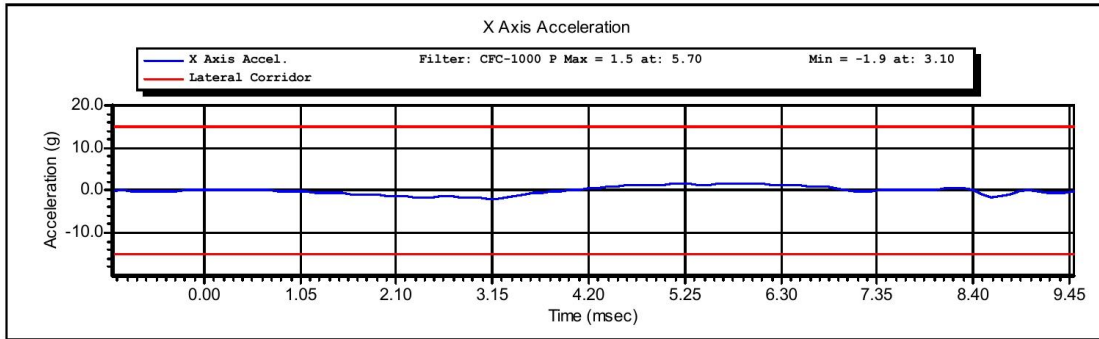
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Test Time: 10:01:43 AM

Test Date: 11/15/2012

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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-IIs		
ATD Serial Number:	303		
Test ID:	Neck Flexion	Test Date:	11/15/2012
Test Number:	3	Test Time:	11:49:07 AM

Component Part Number	Component Serial Number
Neck - 180-2000	777

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.2 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	2.59 m/s P
Pendulum Impulse at 15 ms	3.30 -- 4.10	3.79 m/s P
Pendulum Impulse at 20 ms	4.40 -- 5.40	5.12 m/s P
Pendulum Impulse at 25 ms	5.40 -- 6.10	5.58 m/s P
Pendulum Impulse between 25 and 100 ms	5.50 -- 6.20	5.62 m/s P
Max D Plane Rotation	71.0 -- 81.0	74.5 degrees P
Time at Max Rotation	50.0 -- 70.0	59.2 ms P
Moment about OC	-44.0 -- -36.0	-43.5 Nm P
Moment Decay to Zero	102.0 -- 126.0	115.1 ms P

All test parameters are within specifications

Technician: **M. Goehle**

Supervisor: **D. Travale**

Test Time: **11:49:07 AM**

Test Date: **11/15/2012**



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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	C15016	8/15/2012
Denton	1716A	LC-440 Fy	5/21/2012
Denton	1716A	LC-440 Mx	5/21/2012
DentonATD	78051-342	184	5/30/2012
DentonATD	78051-342	174	5/30/2012
DentonATD	78051-342	185	5/30/2012

Test Time: 11:49:07 AM

Test Date: 11/15/2012

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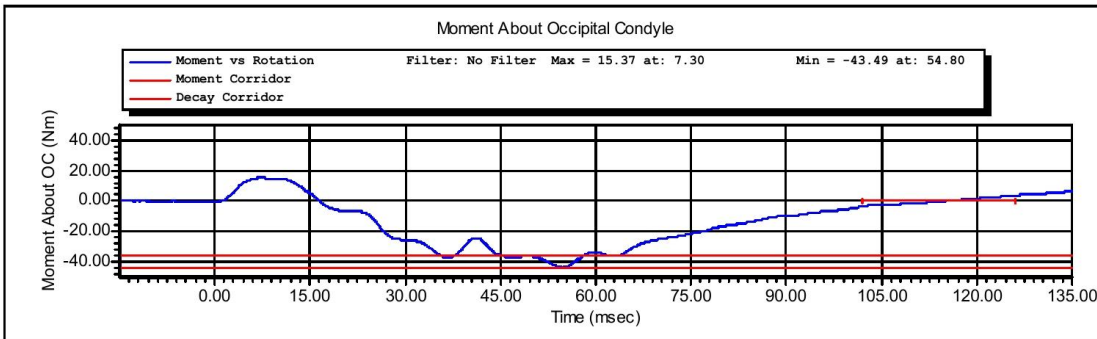
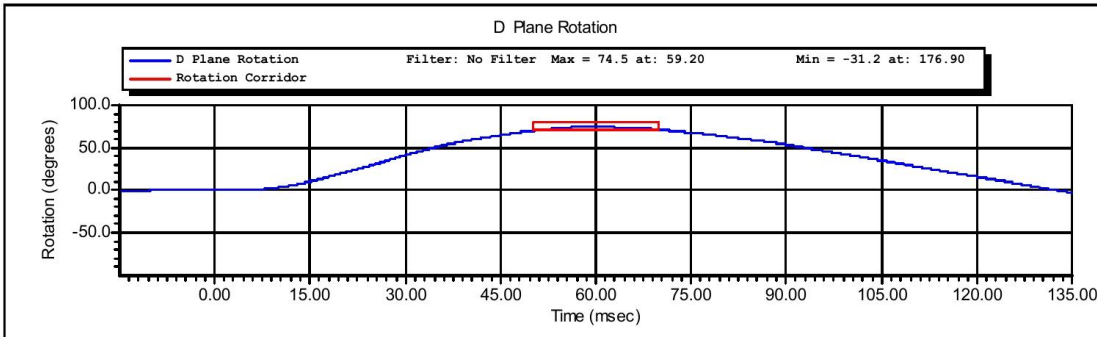


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Test Name:	Neck Pendulum	Revision:	8/24/2009
Sub Test Name:	Left Side	Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	303		
Test ID:	Neck Flexion	Test Date:	11/15/2012
Test Number:	3	Test Time:	11:49:07 AM



Test Time: 11:49:07 AM

Test Date: 11/15/2012

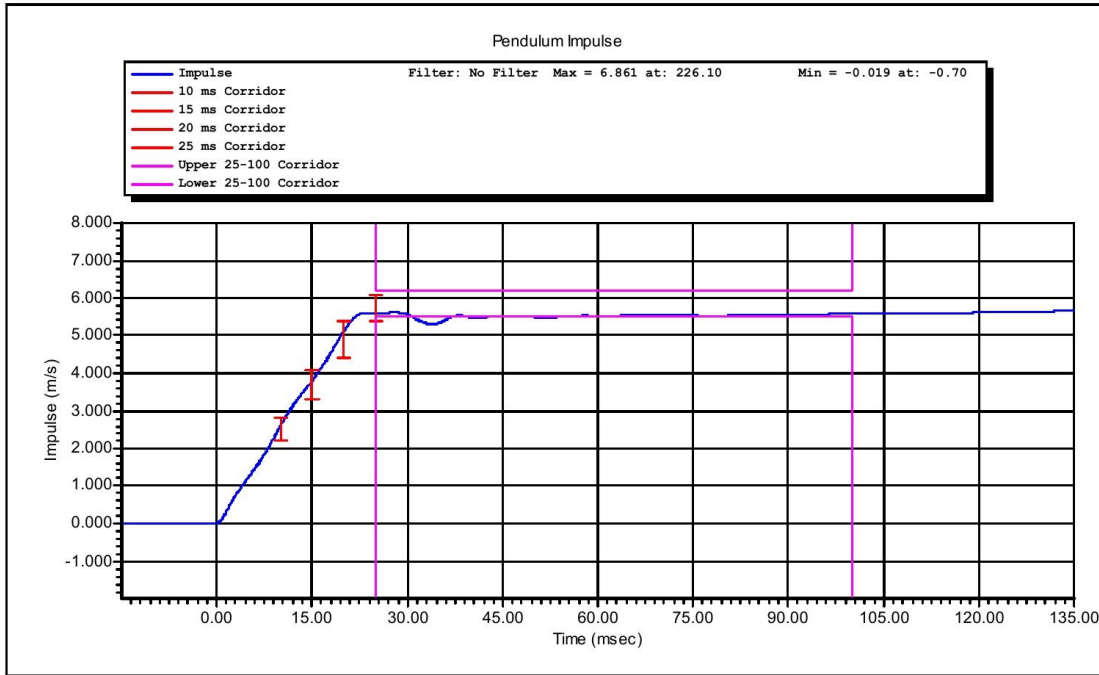
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Test Time: 11:49:07 AM

Test Date: 11/15/2012

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VERIFICATION REPORT

Test Name:	Shoulder Impact	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	303		
Test ID:	Shoulder	Test Date:	11/15/2012
Test Number:	1	Test Time:	8:58:13 AM

Component Part Number	Component Serial Number
Left Arm 180-6011-1	951

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.10 deg C P
Humidity	10.0 -- 70.0	18.9 %RH P
Velocity	4.20 -- 4.40	4.32 m/s P
Probe Acceleration	13.0 -- 18.0	15.7 g P
Shoulder Deflection	28.0 -- 37.0	30.63 mm P
T1 Acceleration	17.0 -- 22.0	20.1 g P

All test parameters are within specifications

Technician: **M. Goehle**

Supervisor: **D. Travale**

Test Time: **8:58:13 AM**

Test Date: **11/15/2012**



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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	C14953	5/25/2012
Servo	180-3885	DS-1179	10/25/2012
Endevco	7264-2000	P63315	10/26/2012

Test Time: 8:58:13 AM

Test Date: 11/15/2012

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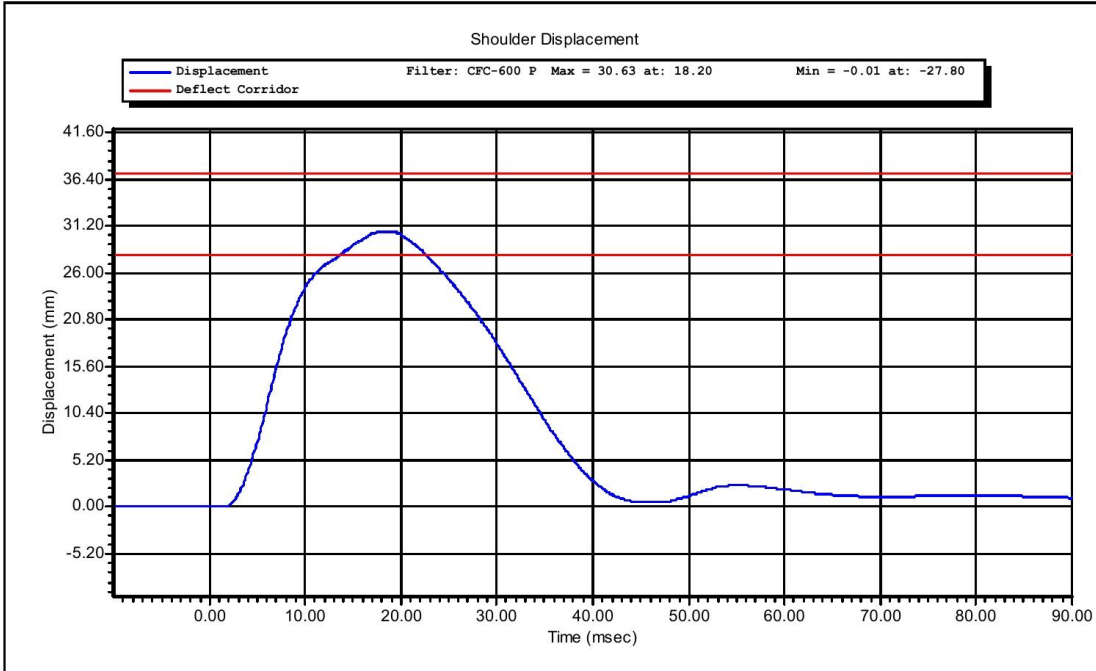


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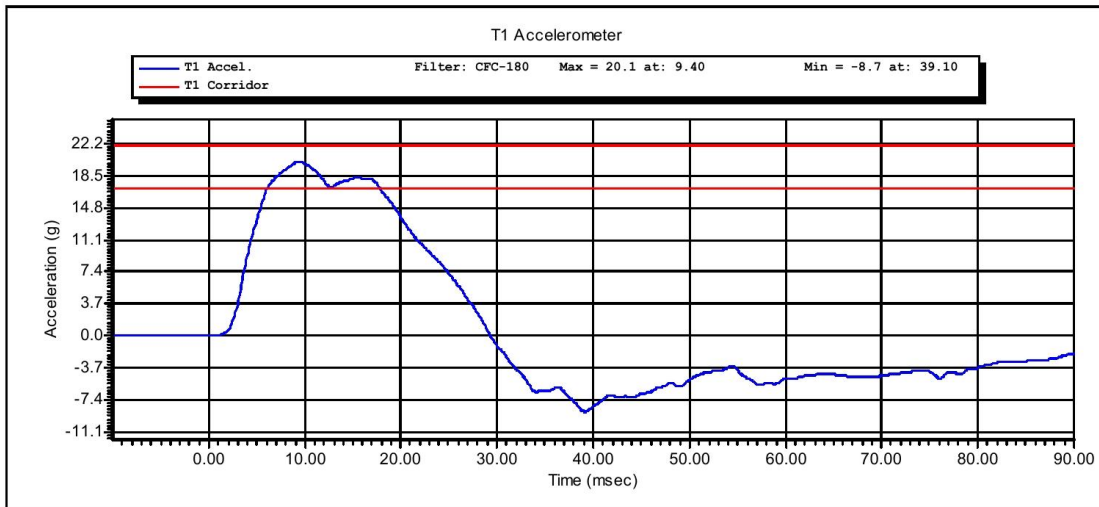
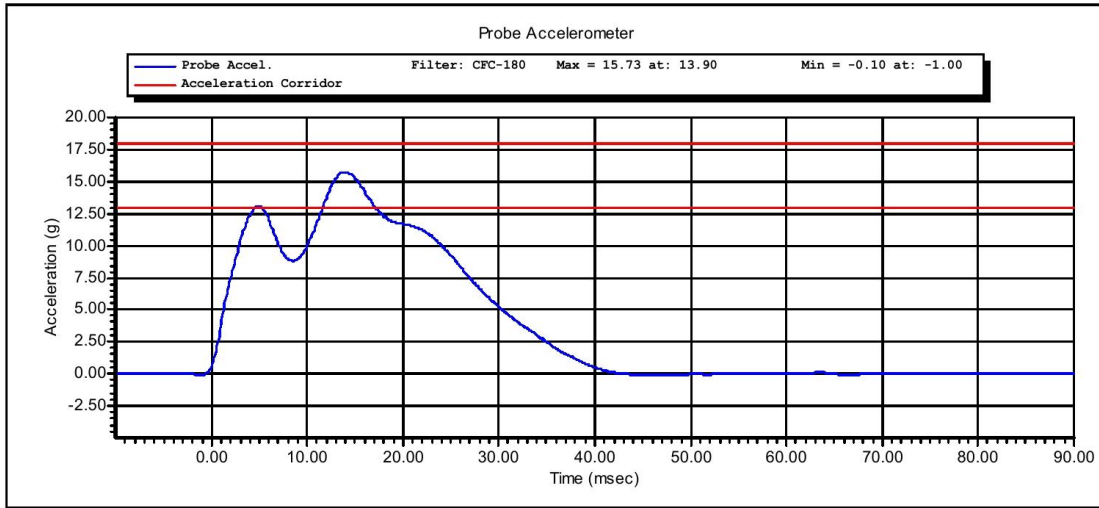
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Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	303		
Test ID:	Shoulder	Test Date:	11/15/2012
Test Number:	1	Test Time:	8:58:13 AM



Test Time: **8:58:13 AM**

Test Date: **11/15/2012**

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Test Time: 8:58:13 AM

Test Date: 11/15/2012

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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-IIs		
ATD Serial Number:	303		
Test ID:	Thorax Without Arm	Test Date:	11/15/2012
Test Number:	1	Test Time:	8:45:43 AM

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

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.1 deg C P
Humidity	10 -- 70	19 %RH P
Velocity	4.20 -- 4.40	4.32 m/s P
Probe Acceleration	14.0 -- 18.0	16.7 g P
Upper Thorax Rib Deflection	32.0 -- 40.0	34.2 mm P
Mid Thorax Rib Deflection	39.0 -- 45.0	41.0 mm P
Lower Thorax Rib Deflection	35.0 -- 43.0	38.6 mm P
Upper Spine Acceleration T1	13.0 -- 17.0	15.2 g P
Lower Spine Acceleration T12	7.0 -- 11.0	10.0 g P

All test parameters are within specifications

Technician: **M. Goehle**

Supervisor: **D. Travale**

Test Time: **8:45:43 AM**

Test Date: **11/15/2012**



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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	C14953	5/25/2012
Servo	180-3885	DS-1199	10/25/2012
Servo	180-3885	DS-1246	10/24/2012
Servo	180-3885	DS-1256	10/25/2012
Endevco	7264-2000	P63315	10/26/2012
Endevco	7264-2000	P63861	10/25/2012

Test Time: 8:45:43 AM

Test Date: 11/15/2012

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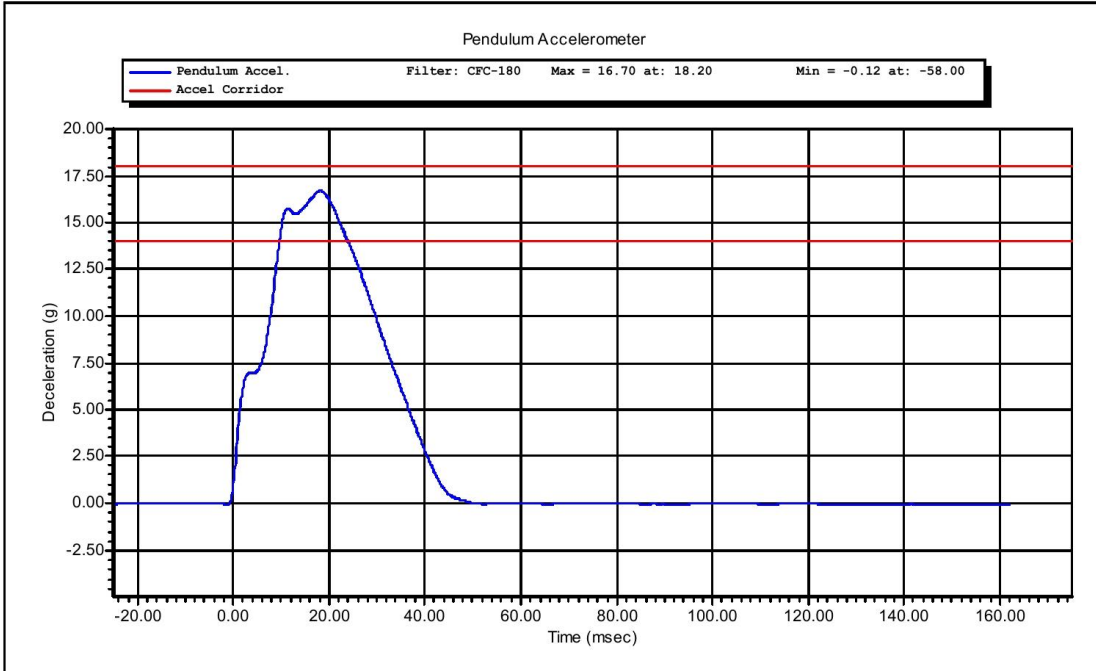


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Test Name:	Thorax Impact without Arm	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	303		
Test ID:	Thorax Without Arm	Test Date:	11/15/2012
Test Number:	1	Test Time:	8:45:43 AM



Test Time: **8:45:43 AM**

Test Date: **11/15/2012**

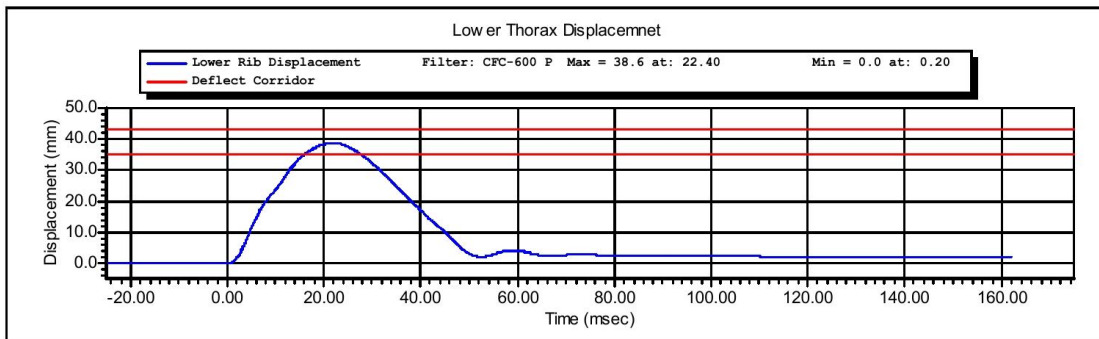
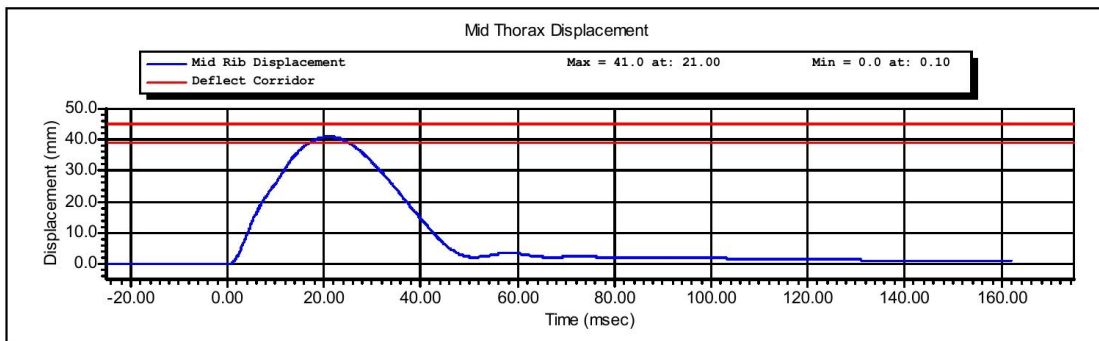
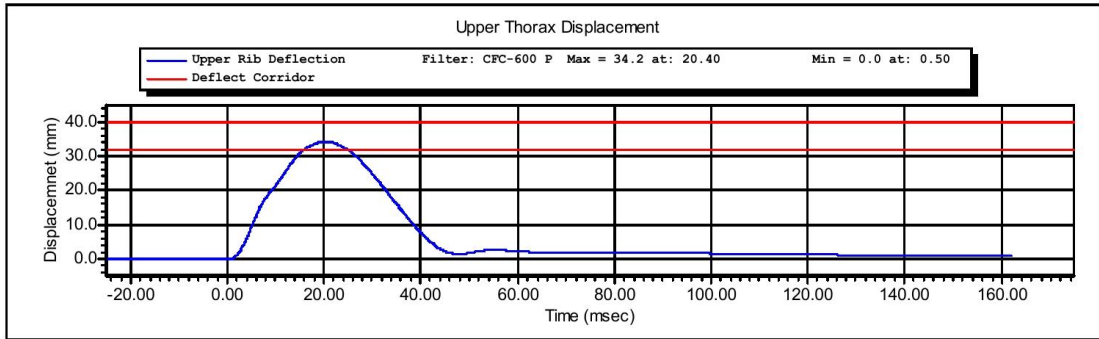
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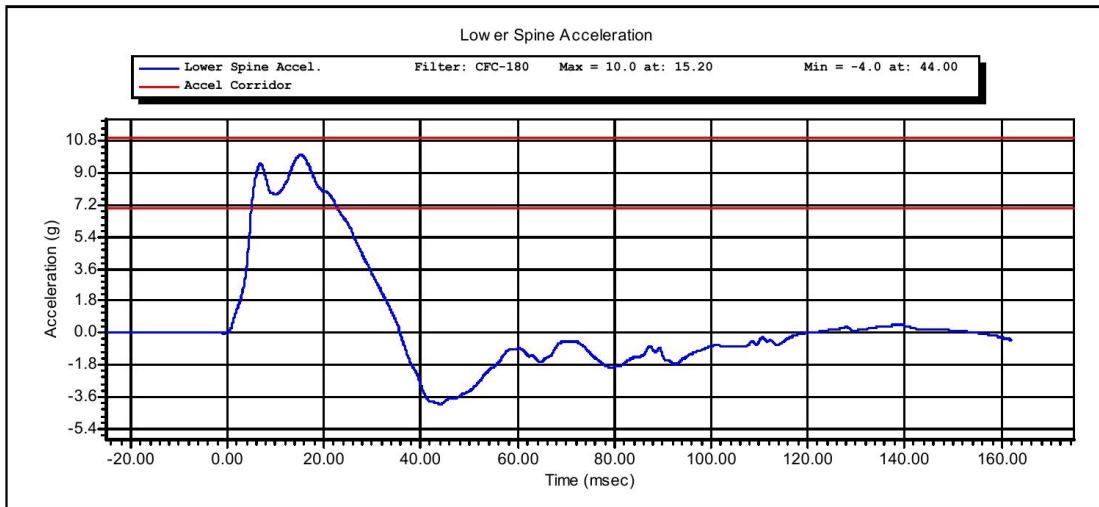
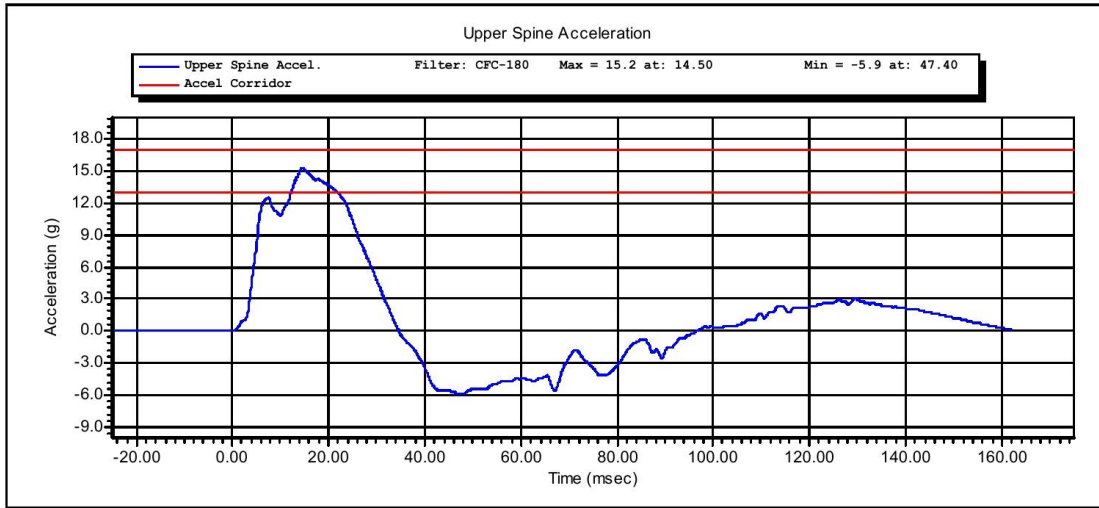
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Test Time: 8:45:43 AM

Test Date: 11/15/2012

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Test Time: 8:45:43 AM

Test Date: 11/15/2012

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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-IIs		
ATD Serial Number:	303		
Test ID:	Thorax With Arm	Test Date:	11/15/2012
Test Number:	1	Test Time:	9:17:02 AM

Component Part Number	Component Serial Number
Left Arm 180-6011-1	951

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.1 deg C P
Humidity	10 -- 70	19 %RH P
Velocity	6.60 -- 6.80	6.71 m/s P
Probe Acceleration after 5ms	30.0 -- 36.0	34.6 g P
Upper Thorax Rib Deflection	25.0 -- 32.0	28.0 mm P
Mid Thorax Rib Deflection	30.0 -- 36.0	32.3 mm P
Lower Thorax Rib Deflection	32.0 -- 38.0	33.0 mm P
Upper Spine Acceleration ("y")	34.0 -- 43.0	38.1 g P
Lower Spine Acceleration ("y")	29.0 -- 37.0	36.6 g P
Shoulder Deflection	31.0 -- 40.0	37.0 mm P

All test parameters are within specifications

Technician: **M. Goehle**

Supervisor: **D. Travale**

Test Time: **9:17:02 AM**

Test Date: **11/15/2012**



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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	C14953	5/25/2012
Servo	180-3885	DS-1199	10/25/2012
Servo	180-3885	DS-1246	10/24/2012
Servo	180-3885	DS-1256	10/25/2012
Endevco	7264-2000	P63315	10/26/2012
Endevco	7264-2000	P63861	10/25/2012
Servo	180-3885	DS-1179	10/25/2012

Test Time: 9:17:02 AM

Test Date: 11/15/2012

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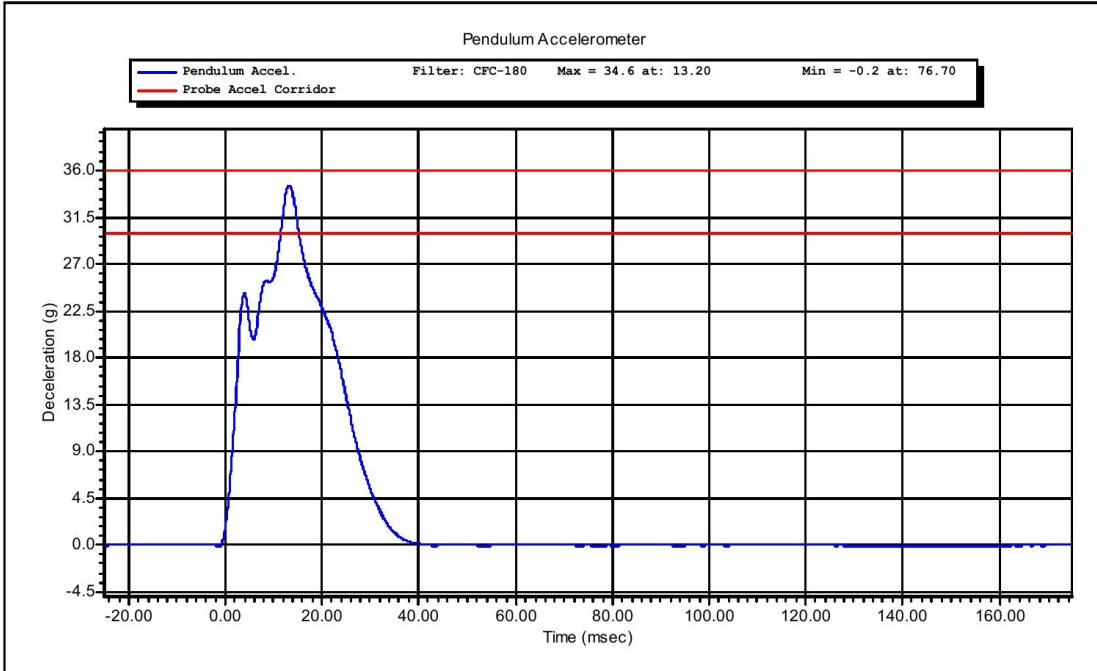


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Test Name:	Thorax Impact with Arm	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	303		
Test ID:	Thorax With Arm	Test Date:	11/15/2012
Test Number:	1	Test Time:	9:17:02 AM



Test Time: **9:17:02 AM**

Test Date: **11/15/2012**

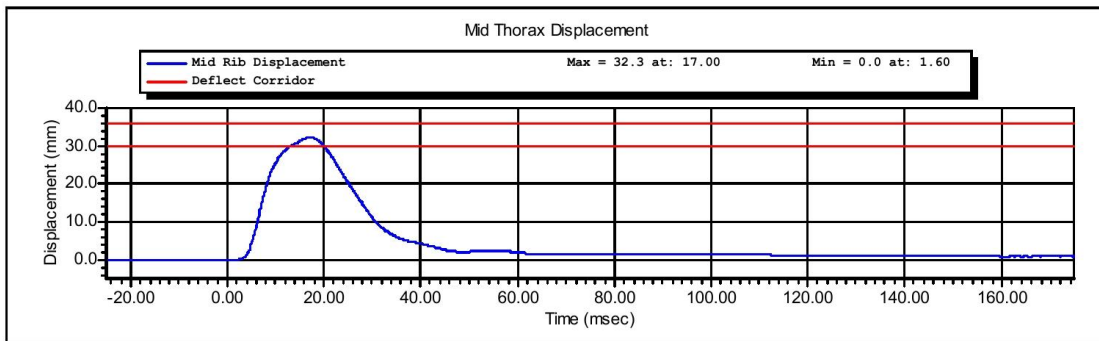
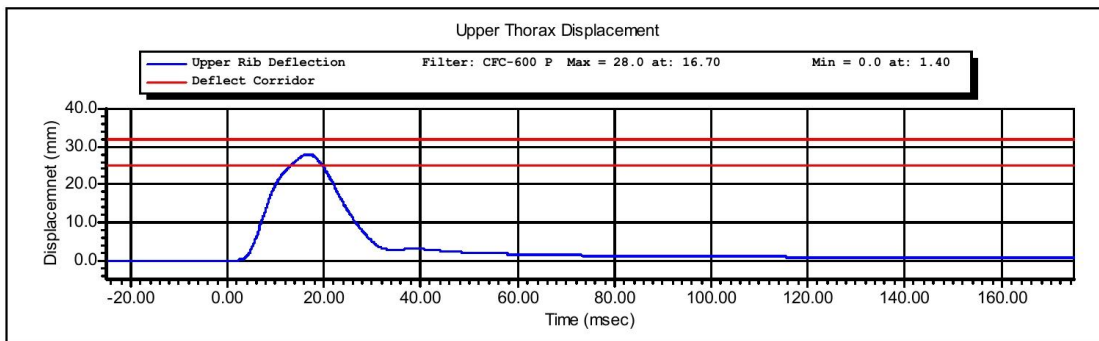
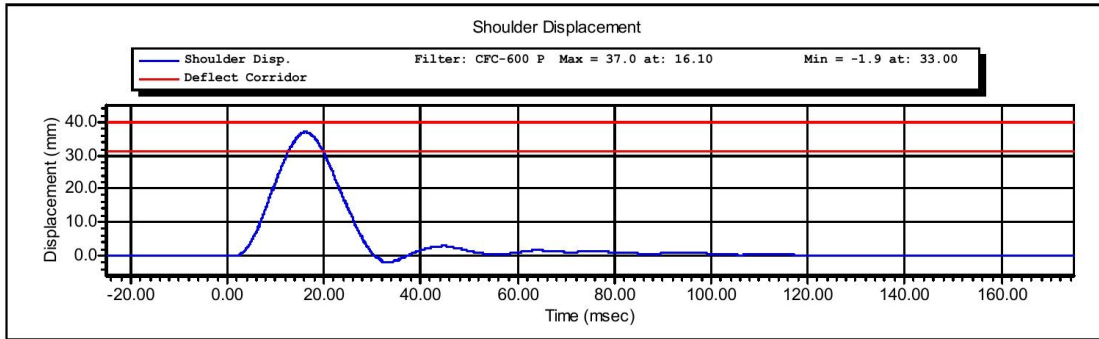
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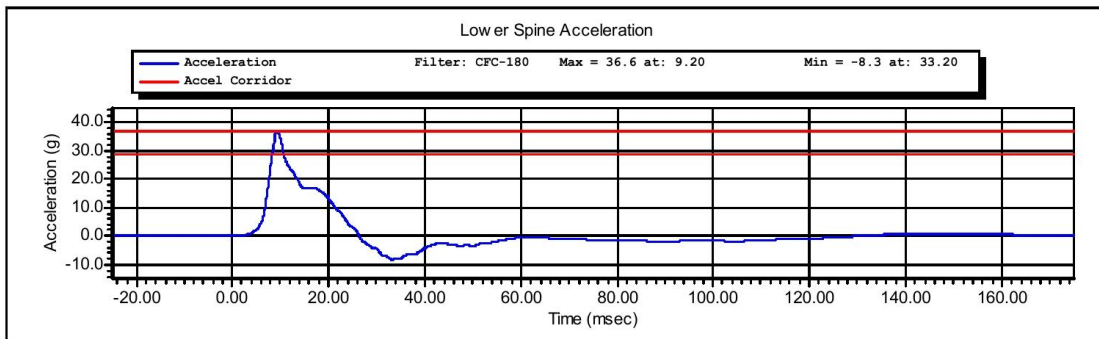
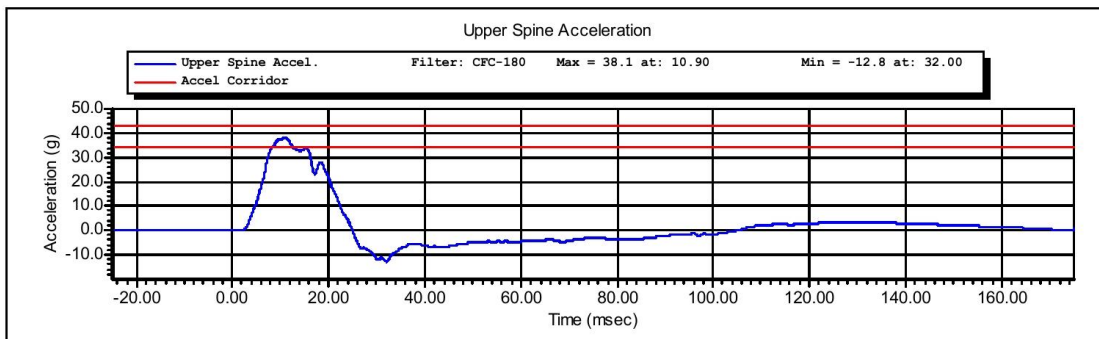
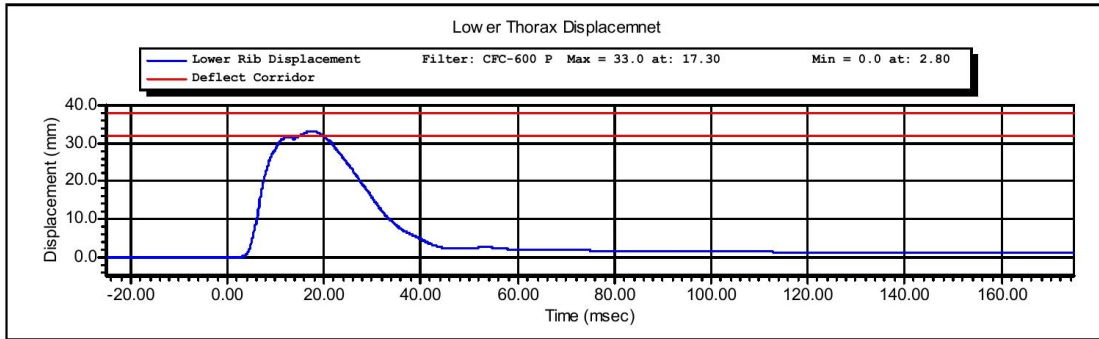
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Test Time: 9:17:02 AM

Test Date: 11/15/2012

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Test Time: 9:17:02 AM

Test Date: 11/15/2012

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VERIFICATION REPORT

Test Name:	Abdominal Impact	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	303		
Test ID:	Abdomen	Test Date:	11/15/2012
Test Number:	1	Test Time:	8:34:26 AM

Component Part Number	Component Serial Number
Upper Abdomen Rib	1789
Lower Abdomen Rib	1790

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.0 deg C P
Humidity	10 -- 70	19 %RH P
Velocity	4.20 -- 4.40	4.32 m/s P
Probe Acceleration	12.0 -- 16.0	15.6 g P
Upper Abdominal Rib Deflection	36.0 -- 47.0	37.2 mm P
Lower Abdominal Rib Deflection	33.0 -- 44.0	38.1 mm P
Lower Spine Acceleration - T12	9.0 -- 14.0	12.1 g P

All test parameters are within specifications

Technician: **M. Goehle**

Supervisor: **D. Travale**

Test Time: **8:34:26 AM**

Test Date: **11/15/2012**



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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	C14953	5/25/2012
Servo	180-3885	DS-1274	10/24/2012
Servo	180-3885	DS-1285	10/25/2012
Endevco	7264-2000	P63861	10/25/2012

Test Time: 8:34:26 AM

Test Date: 11/15/2012

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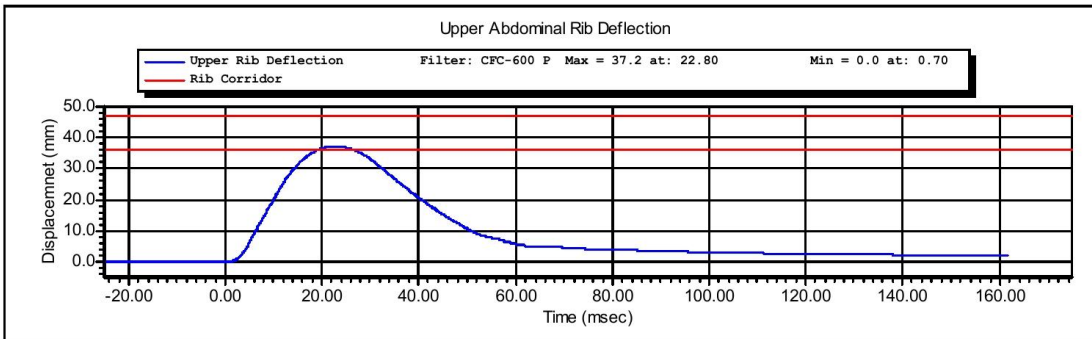
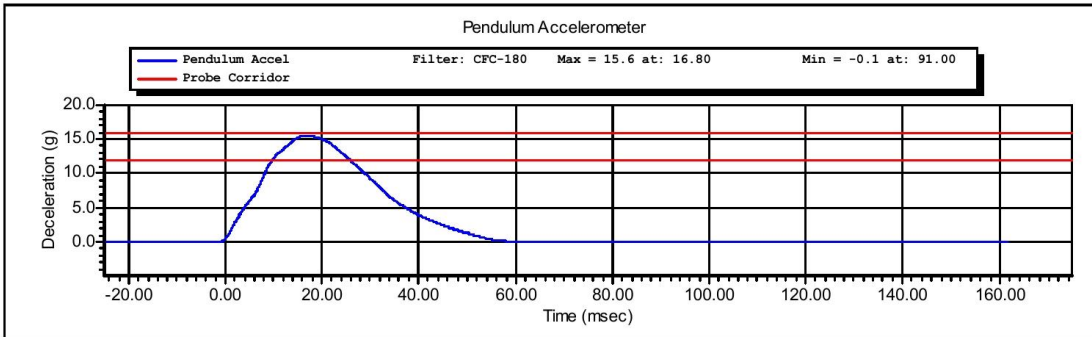


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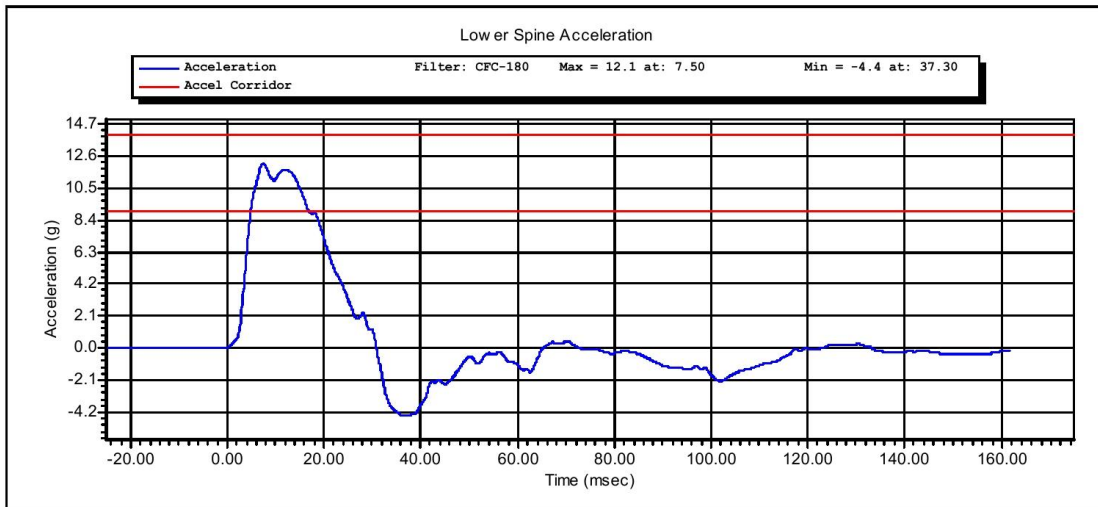
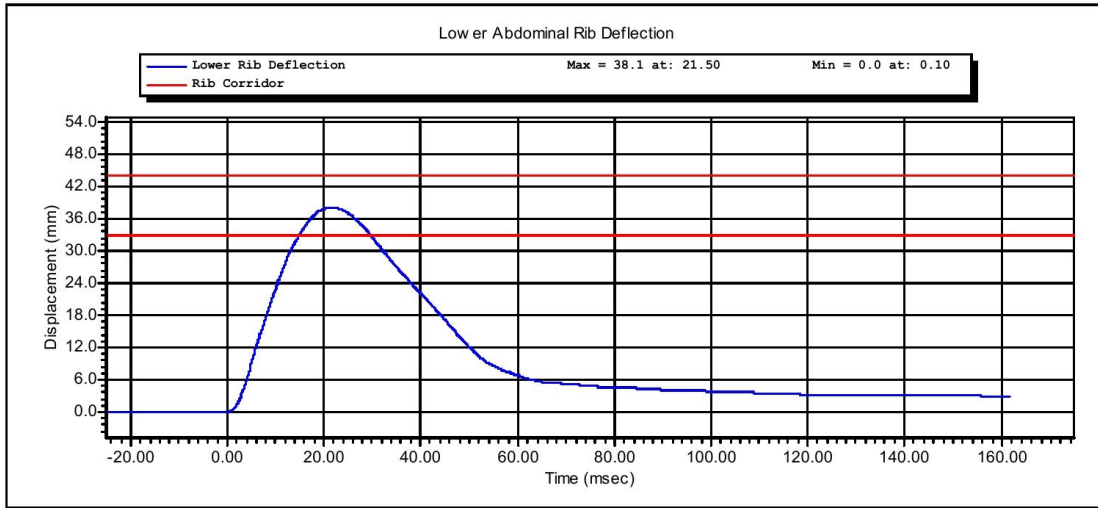
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Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	303		
Test ID:	Abdomen	Test Date:	11/15/2012
Test Number:	1	Test Time:	8:34:26 AM



Test Time: **8:34:26 AM**

Test Date: **11/15/2012**

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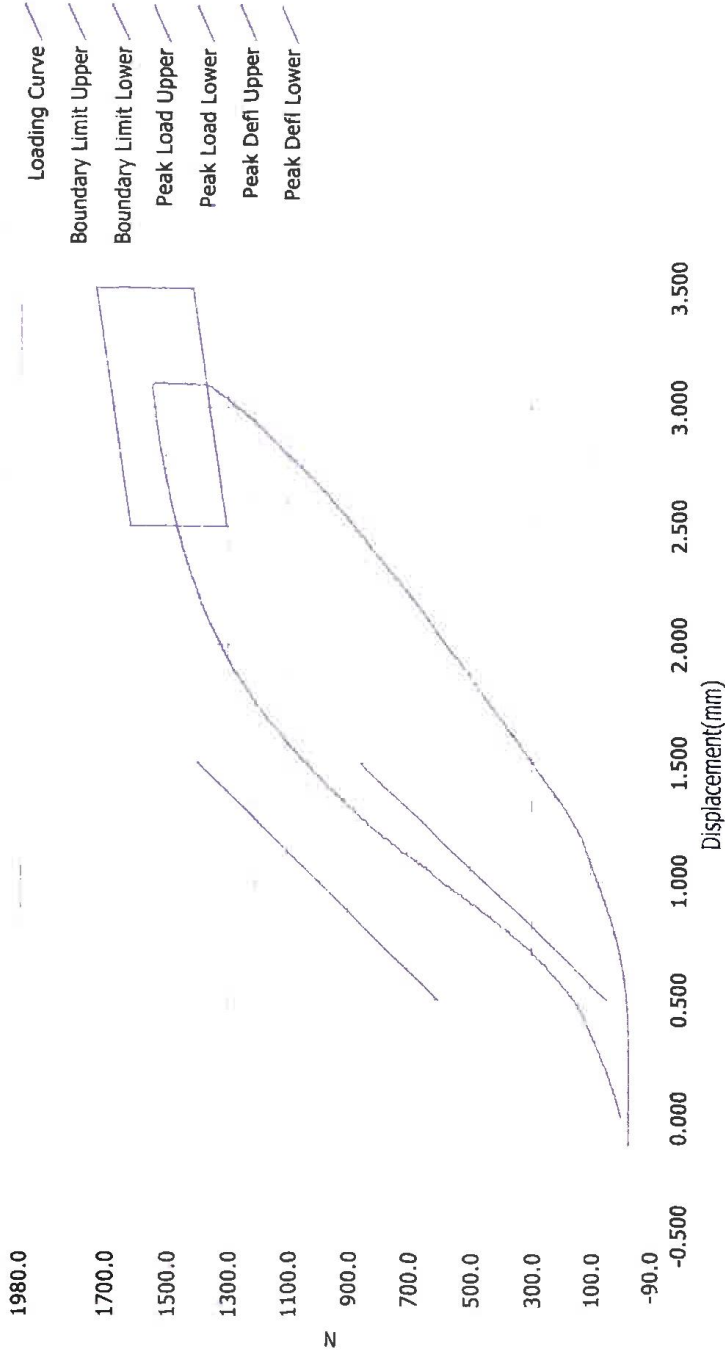


Test Time: 8:34:26 AM

Test Date: 11/15/2012

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Resultant Data - SIDIIs Plug Compression



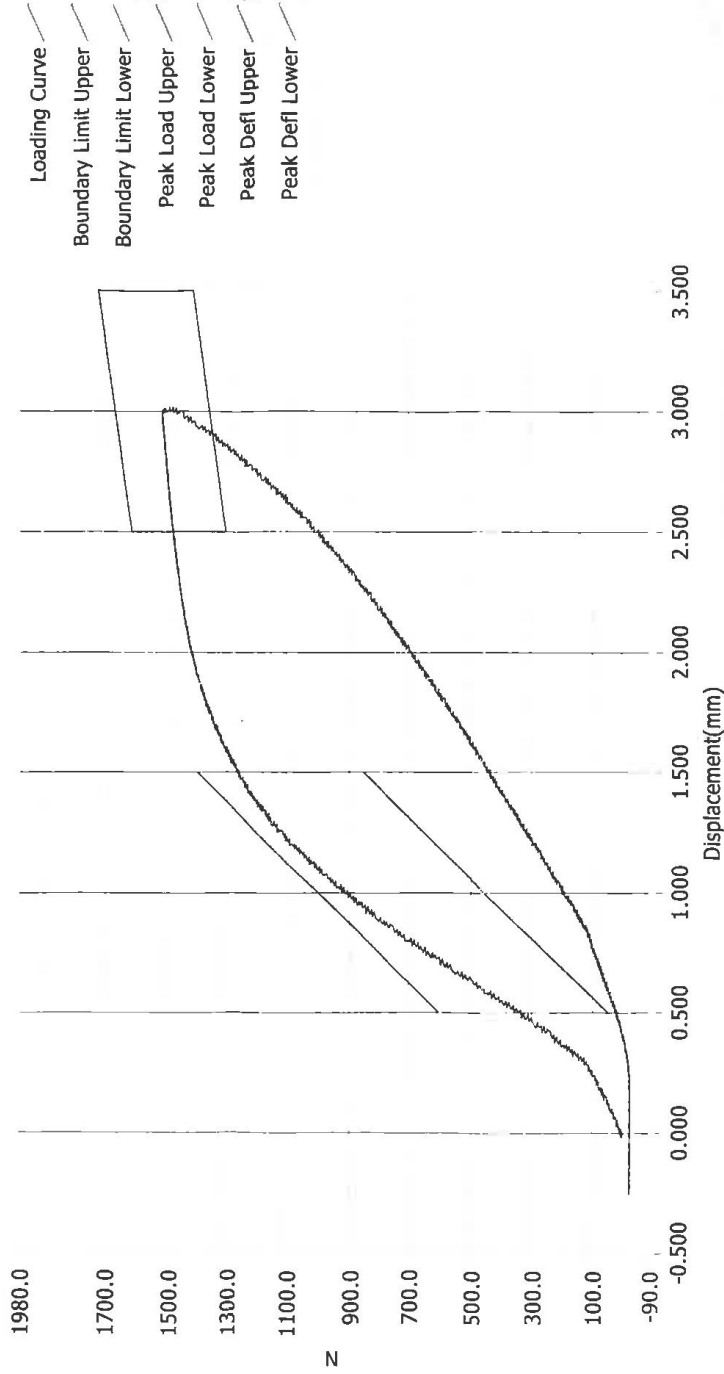
ATD Calibration Lab

303-Crash Plug
11-15-12

Test ID	Part Serial Number	Test Date	Test Time
	46454	9/22/2011	8:23 PM
Cert ID	ATD Serial Number	ATD Type	SIDIIs
	N/A		SIDIIs

Current Date : 9/22/2011 Current Time : 20:23:39

Resultant Data - SIDIIs Plug Compression



ATD Calibration Lab

Test ID Part Serial Number Test Date Test Time
 303-^{PIC} Cert plug 36790 10/5/2010 9:13 PM
Cert ID ATD Serial Number ATD Type
 11-15-12 SIDIIs

Current Date : 10/5/2010 Current Time : 21:14:29



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VERIFICATION REPORT

Test Name:	Pelvis	Revision:	8/24/2009
Sub Test Name:	Acetabulum Impact	Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	303		
Test ID:	Acetabulum	Test Date:	11/15/2012
Test Number:	2	Test Time:	8:03:11 AM

Component Part Number	Component Serial Number
FTSS Cert Plug - 1519N	36790
Humanetics Crash Plug - 1543N	46454

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.0 deg C P
Humidity	10 -- 70	19 %RH P
Velocity	6.60 -- 6.80	6.61 m/s P
Peak Probe Acceleration	38.0 -- 47.0	44.3 g P
Peak Pelvis Acceleration	34.0 -- 42.0	41.8 g P
Peak Acetabulum Force	3.60 -- 4.30	3.90 kN P

All test parameters are within specifications

Technician: **M. Goehle**

Supervisor: **D. Travale**

Test Time: **8:03:11 AM**

Test Date: **11/15/2012**

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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	C14953	5/25/2012
Endevco	7264-2000	P51259	7/30/2012
FTSS	IF-520	LC-236 Fy	10/25/2012

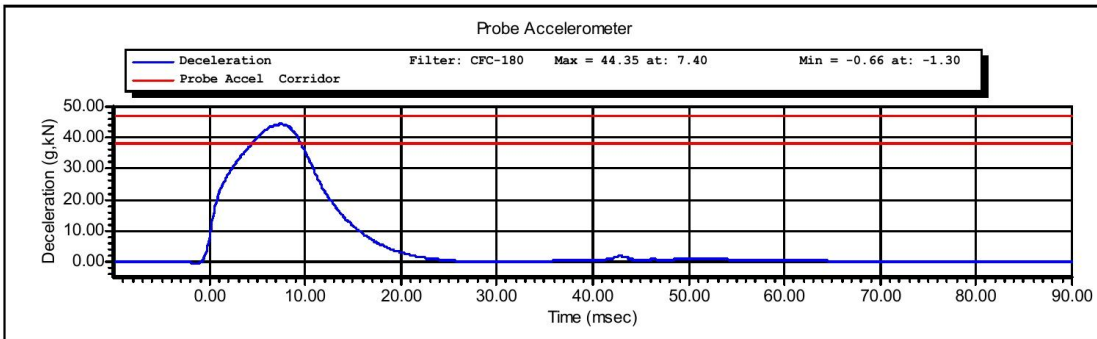
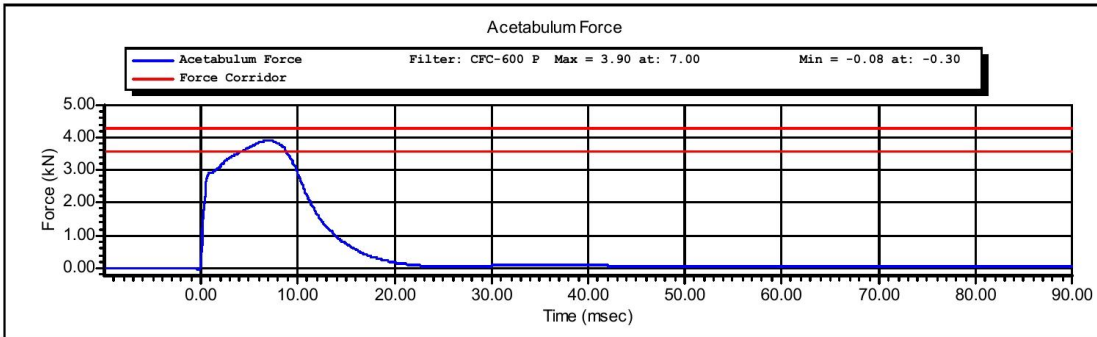
Test Time: 8:03:11 AM

Test Date: 11/15/2012

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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:	303		
Test ID:	Acetabulum	Test Date:	11/15/2012
Test Number:	2	Test Time:	8:03:11 AM



Test Time: 8:03:11 AM

Test Date: 11/15/2012

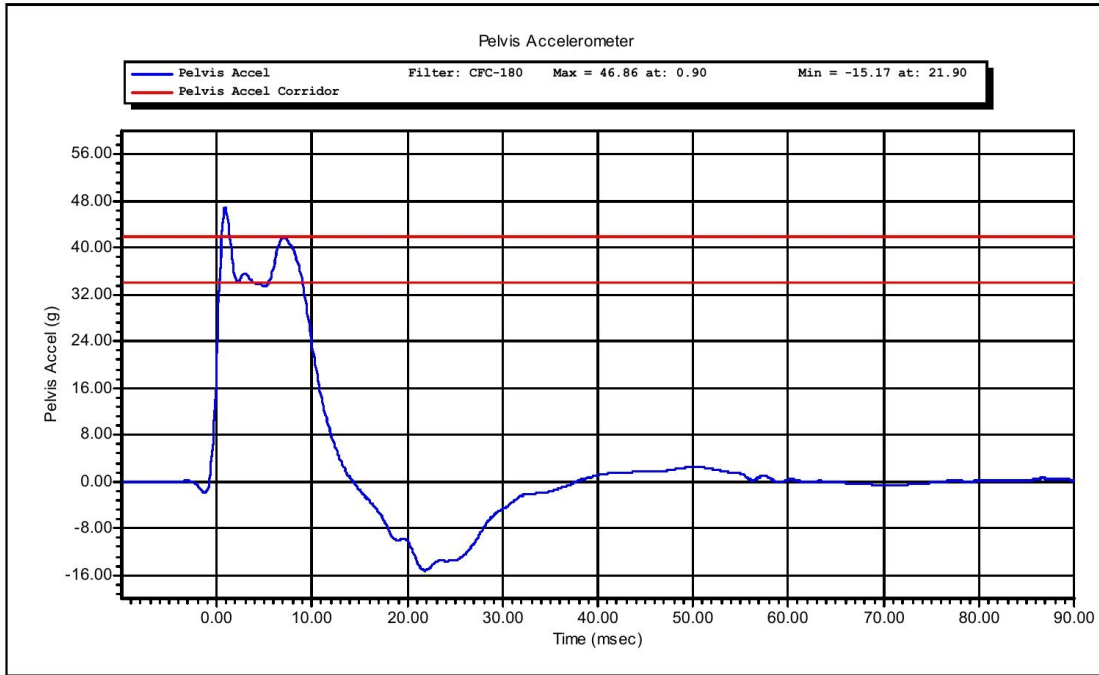
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Test Time: 8:03:11 AM

Test Date: 11/15/2012

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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:	303		
Test ID:		Test Date:	11/14/2012
Test Number:	1	Test Time:	5:33:56 PM

Component Part Number	Component Serial Number
180-4343 Pelvis Flesh	881

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.0 deg C P
Humidity	10 -- 70	25 %RH P
Velocity	4.20 -- 4.40	4.29 m/s P
Peak Probe Acceleration	36.0 -- 45.0	41.5 g P
Peak Pelvis Acceleration	28.0 -- 39.0	36.2 g P
Peak Iliac Force	4.10 -- 5.10	4.66 kN P

All test parameters are within specifications

Technician: **A. Rudniski**

Supervisor: **D. Travale**

Test Time: **5:33:56 PM**

Test Date: **11/14/2012**

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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	C14953	5/25/2012
Endevco	7264-2000	P51259	7/30/2012
DentonATD	3228J	LC-280 Fy	10/24/2012

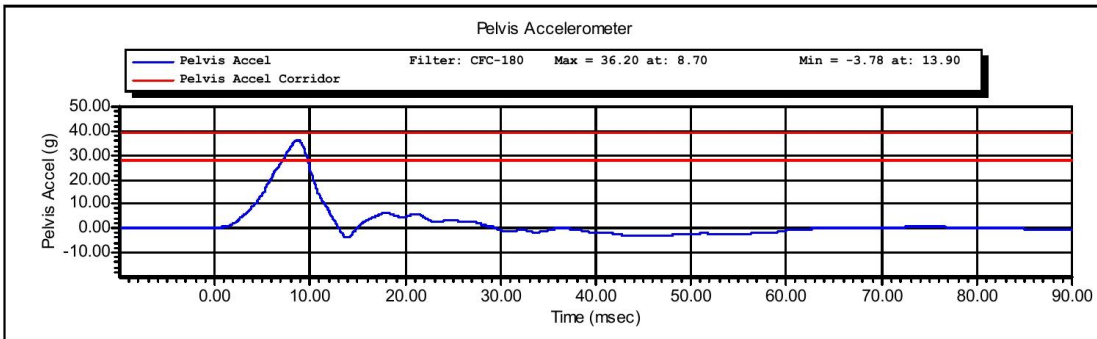
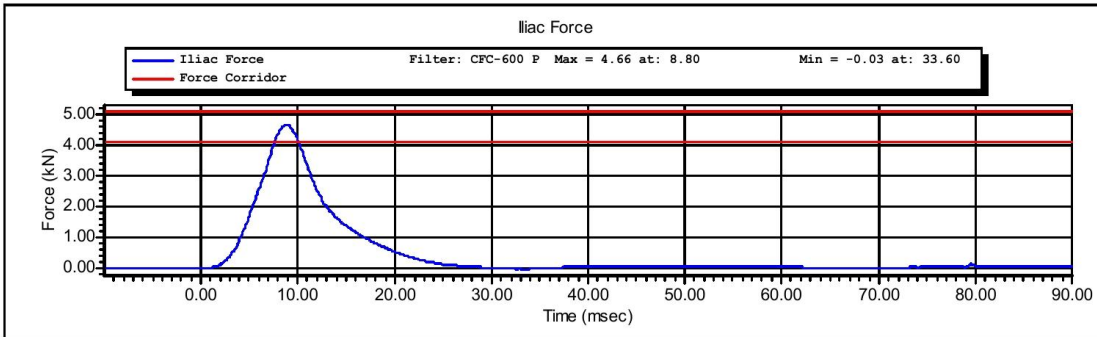
Test Time: 5:33:56 PM

Test Date: 11/14/2012

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Test Name:	Pelvis	Revision:	8/24/2009
Sub Test Name:	Iliac Impact	Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	303		
Test ID:		Test Date:	11/14/2012
Test Number:	1	Test Time:	5:33:56 PM



Test Time: 5:33:56 PM

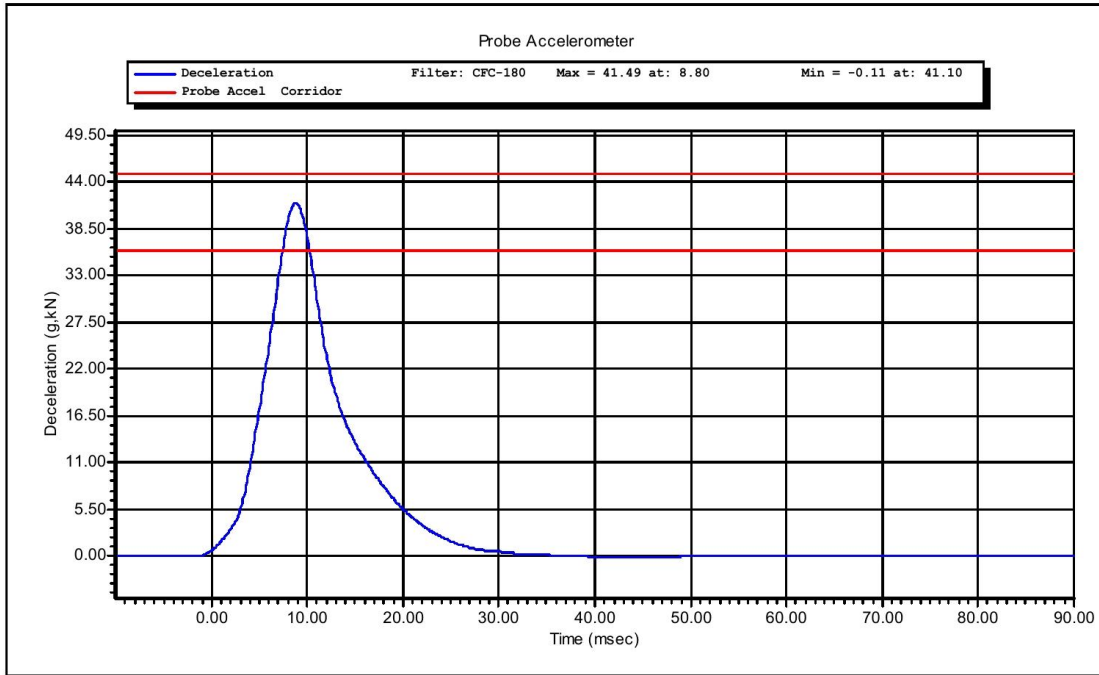
Test Date: 11/14/2012



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Test Time: 5:33:56 PM

Test Date: 11/14/2012

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CALIBRATION TEST RESULTS

POST-TEST

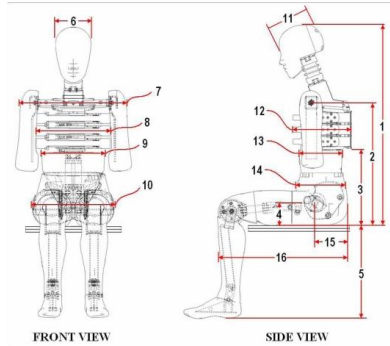
EUROSID 2 (ES-2RE) MALE – DRIVER ATD

SERIAL NO: F033

(CONFIGURED FOR LEFT SIDE IMPACT)

ES-2re External Measurements

NHTSA SN F033



Dim. No.	Description	Specification (mm)	Result (mm)	Pass/Fail
1	Sitting Height	900-918	913	Pass
2	Seat to Shoulder Joint	558-572	563	Pass
3	Seat to Lower Face of Thoracic Spine Box	346-356	354	Pass
4	Seat to Hip Joint (center of bolt)	97-103	100	Pass
5	Sole to Seat, Sitting	433-451	445	Pass
6	Head Width	152-158	155	Pass
7	Shoulder/Arm Width	461-479	465	Pass
8	Thorax Width	322-332	326	Pass
9	Abdomen Width	273-287	284	Pass
10	Pelvis Lap Width	359-373	367	Pass
11	Head Depth	196-206	200	Pass
12	Thorax Depth	262-272	269	Pass
13	Abdomen Depth	194-204	200	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	602	Pass

Technician: M. Goehle

Date: 11/30/12



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VERIFICATION REPORT

Test Name:	Head Drop	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:		Test Date:	11/30/2012
Test Number:	1	Test Time:	11:59:18 AM

Component Part Number	Component Serial Number
455-1007	1910934

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.8 deg C P
Humidity	10 -- 70	23 %RH P
Resultant Acceleration	125 -- 155	131 g P
Oscillation	0.0 -- 15.0	2.8 % P
Fore-Aft Acceleration	-15.00 -- 15.00	4.83 g P

All test parameters are within specifications

Technician: **S. Zito**

Supervisor: **D. Travale**

Test Time: **11:59:18 AM**

Test Date: **11/30/2012**

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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	P49204	11/19/2012
Endevco	7264-2000	P63981	11/19/2012
Endevco	7264-2000	P64007	11/19/2012

Test Time: 11:59:18 AM

Test Date: 11/30/2012

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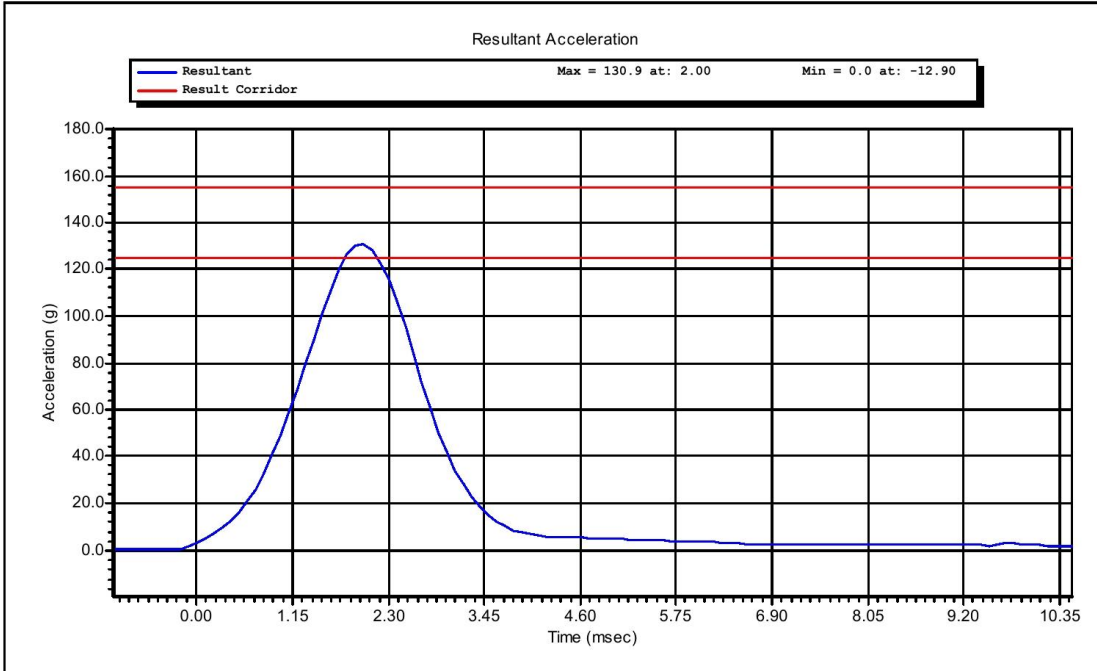


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Test Name:	Head Drop	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:		Test Date:	11/30/2012
Test Number:	1	Test Time:	11:59:18 AM



Test Time: **11:59:18 AM**

Test Date: **11/30/2012**

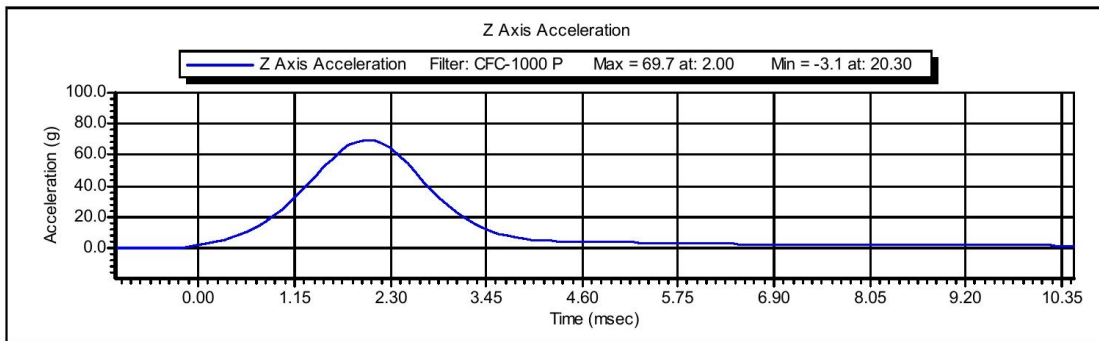
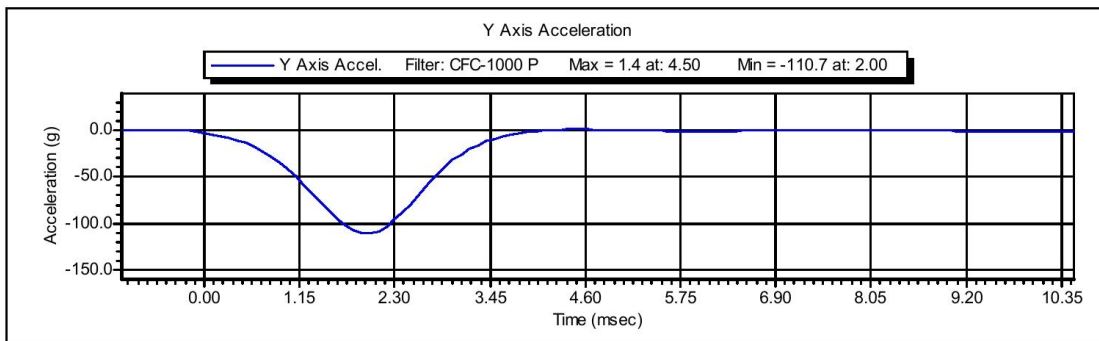
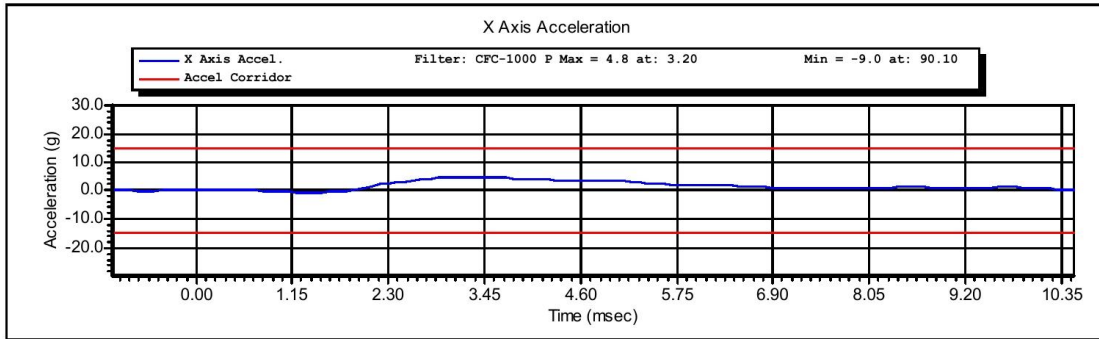
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Test Time: 11:59:18 AM

Test Date: 11/30/2012

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VERIFICATION REPORT

Test Name:	Neck Flexion	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:		Test Date:	11/30/2012
Test Number:	2	Test Time:	2:27:46 PM

Component Part Number	Component Serial Number
455-2002	175-200107085

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.9 deg C P
Humidity	10 -- 70	25 %RH P
Velocity	3.30 -- 3.50	3.45 m/s P
Maximum Neck Flexion Angle	49.0 -- 59.0	51.5 degrees P
Time At Maximum Neck Flexion	54.0 -- 66.0	60.3 ms P
Decay to Zero Degrees	53.0 -- 88.0	63.8 ms P
Velocity Corridor	--	P

All test parameters are within specifications

Technician: **S. Zito**

Supervisor: **D. Travale**

Test Time: **2:27:46 PM**

Test Date: **11/30/2012**

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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	C15016	8/15/2012
DentonATD	7000428	094	5/30/2012
DentonATD	7000428	095	5/30/2012
DentonATD	7000428	093	5/30/2012

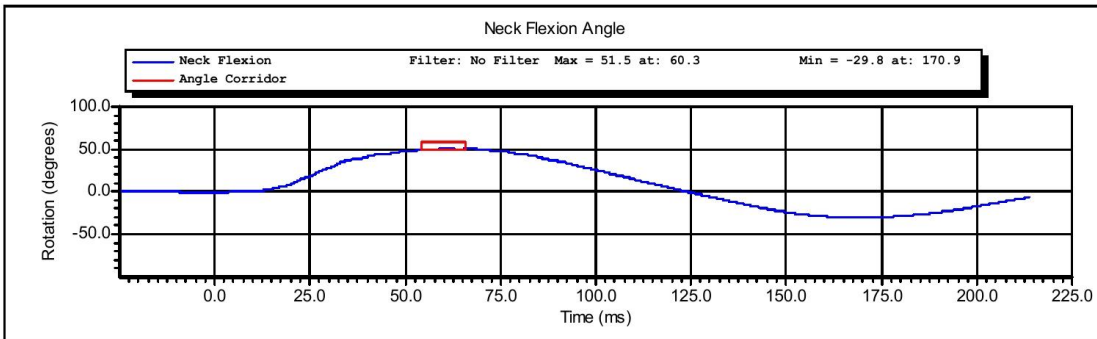
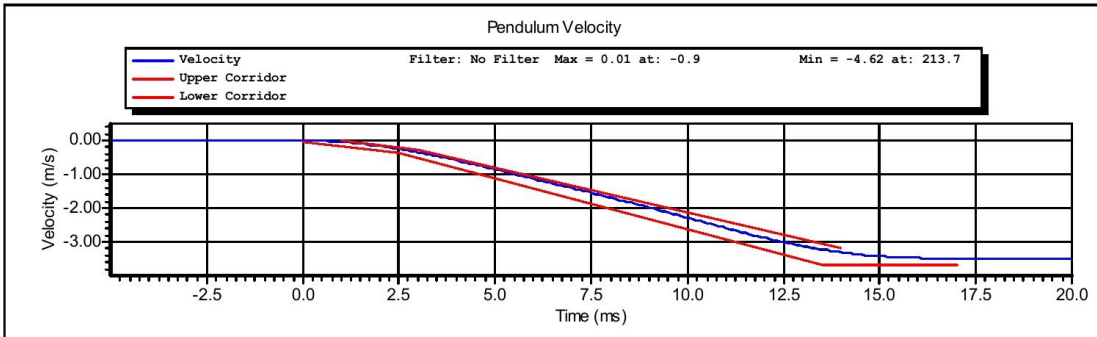
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Test Date: 11/30/2012

Copyright 2006 Denton ATD, Inc. LabPaq II Version: 1.8.5.0



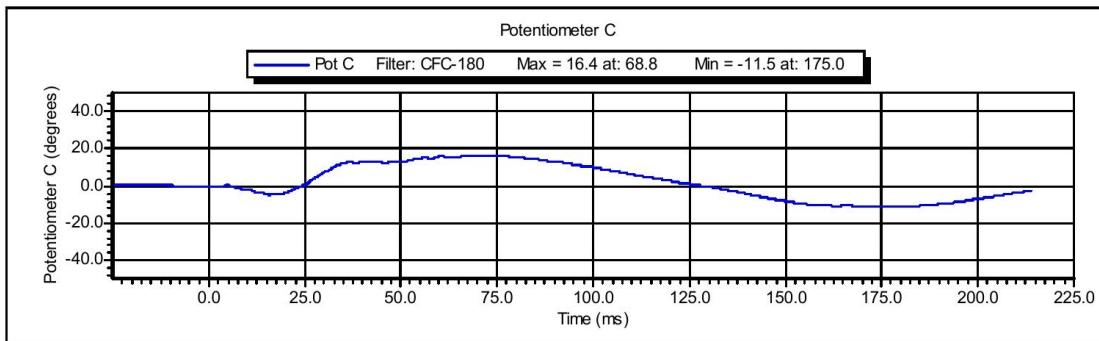
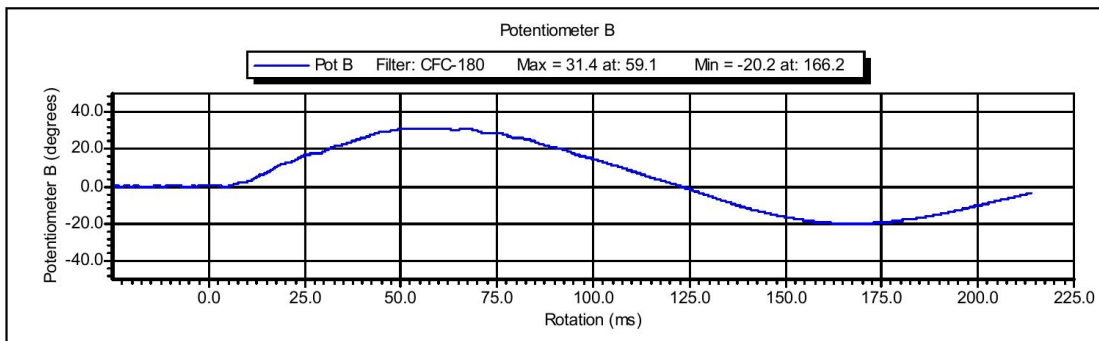
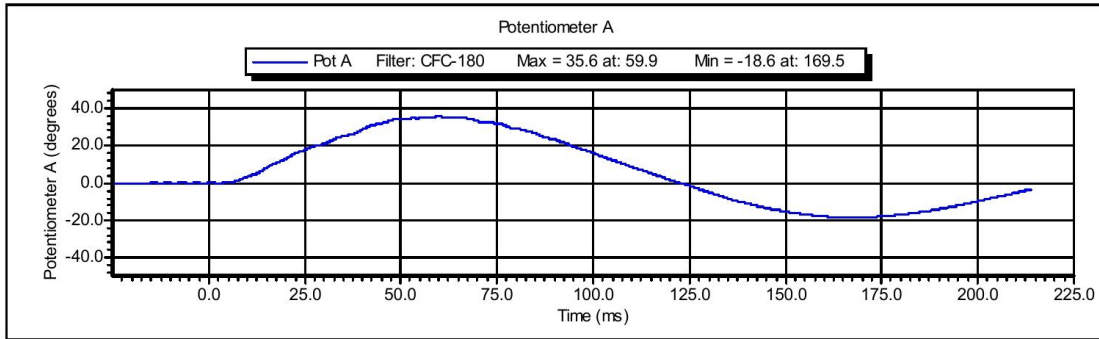
Test Name:	Neck Flexion	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:		Test Date:	11/30/2012
Test Number:	2	Test Time:	2:27:46 PM



Test Time: **2:27:46 PM**

Test Date: **11/30/2012**

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Test Time: 2:27:46 PM

Test Date: 11/30/2012

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VERIFICATION REPORT

Test Name:	Shoulder Impact	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:		Test Date:	11/28/2012
Test Number:	1	Test Time:	1:28:15 PM

Component Part Number	Component Serial Number
960715-313	07021

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	20.9 deg C P
Humidity	10.0 -- 70.0	20.1 %RH P
Velocity	4.20 -- 4.40	4.25 m/s P
Pendulum Acceleration	-10.50 -- -7.50	-9.32 g P

All test parameters are within specifications

Technician: **S. Zito**

Supervisor: **D. Travale**

Test Time: **1:28:15 PM**

Test Date: **11/28/2012**

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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	C14953	11/28/2012

Test Time: 1:28:15 PM

Test Date: 11/28/2012

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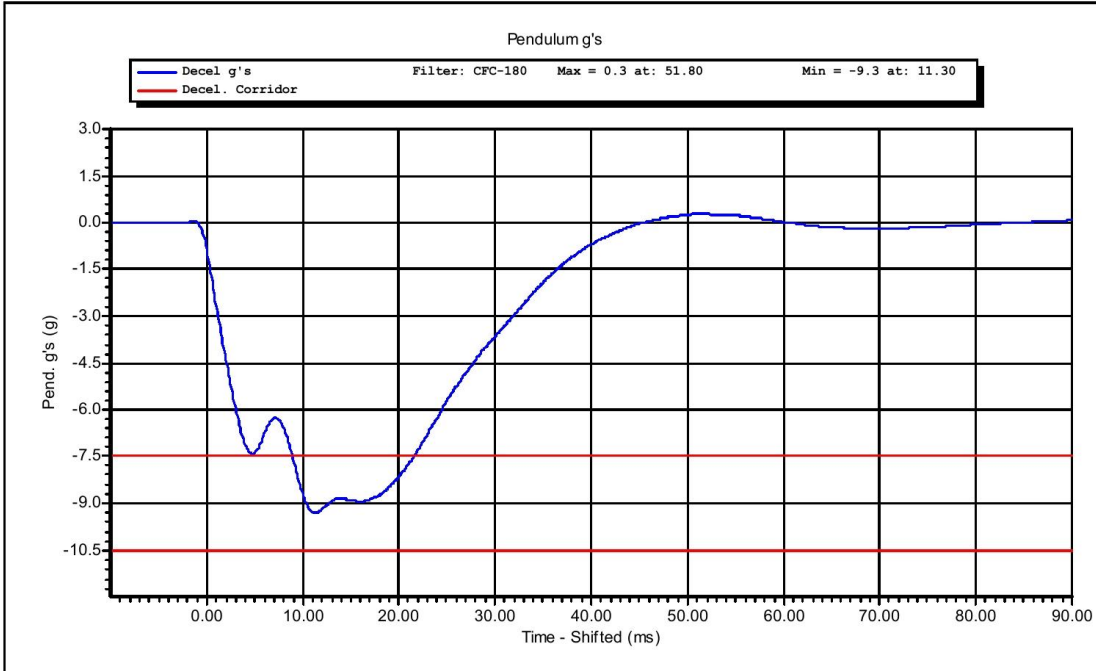


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Test Name:	Shoulder Impact	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:		Test Date:	11/28/2012
Test Number:	1	Test Time:	1:28:15 PM



Test Time: **1:28:15 PM**

Test Date: **11/28/2012**

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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:	F033		
Test ID:	Upper Rib 4.0 m/s	Test Date:	11/30/2012
Test Number:	1	Test Time:	8:32:29 AM

Component Part Number	Component Serial Number
455-3100	07206

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.5 deg C P
Humidity	10.0 -- 70.0	20.4 %RH P
Velocity	3.90 -- 4.10	3.94 m/s P
Rib Displacement	-51.00 -- -46.00	-47.81 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 Time: **8:32:29 AM**

Test Date: **11/30/2012**

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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-179	5/17/2012
DentonATD	Velocity Trap	1	1/11/2012
Endevco	7264-2000	P32222	11/13/2012

Test Time: 8:32:29 AM

Test Date: 11/30/2012

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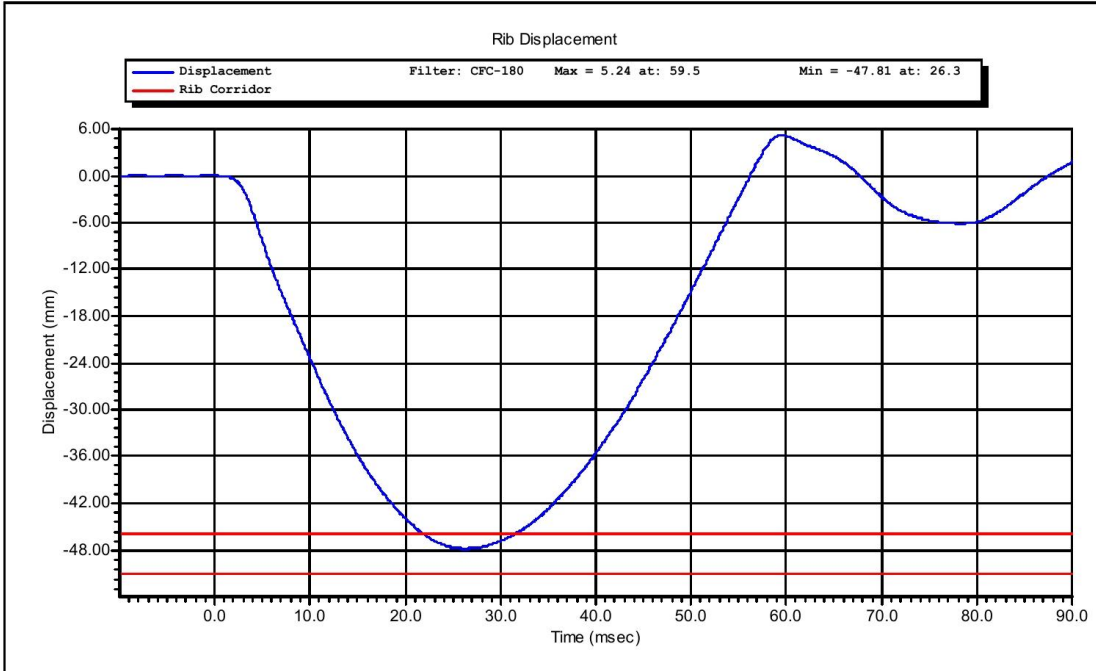


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Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	4.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Upper Rib 4.0 m/s	Test Date:	11/30/2012
Test Number:	1	Test Time:	8:32:29 AM



Test Time: **8:32:29 AM**

Test Date: **11/30/2012**

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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:	F033		
Test ID:	Upper Rib 3.0m/s	Test Date:	11/30/2012
Test Number:	1	Test Time:	8:51:26 AM

Component Part Number	Component Serial Number
455-3100	07206

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.5 deg C P
Humidity	10.0 -- 70.0	20.4 %RH P
Velocity	2.90 -- 3.10	2.98 m/s P
Rib Displacement	-40.00 -- -36.00	-37.44 mm P
Drop Height	454 -- 464	459 mm P

All test parameters are within specifications

Technician: **S. Zito**

Supervisor: **D. Travale**

Test Time: **8:51:26 AM**

Test Date: **11/30/2012**



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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-179	5/17/2012
DentonATD	Velocity Trap	1	1/11/2012
Endevco	7264-2000	P32222	11/13/2012

Test Time: 8:51:26 AM

Test Date: 11/30/2012

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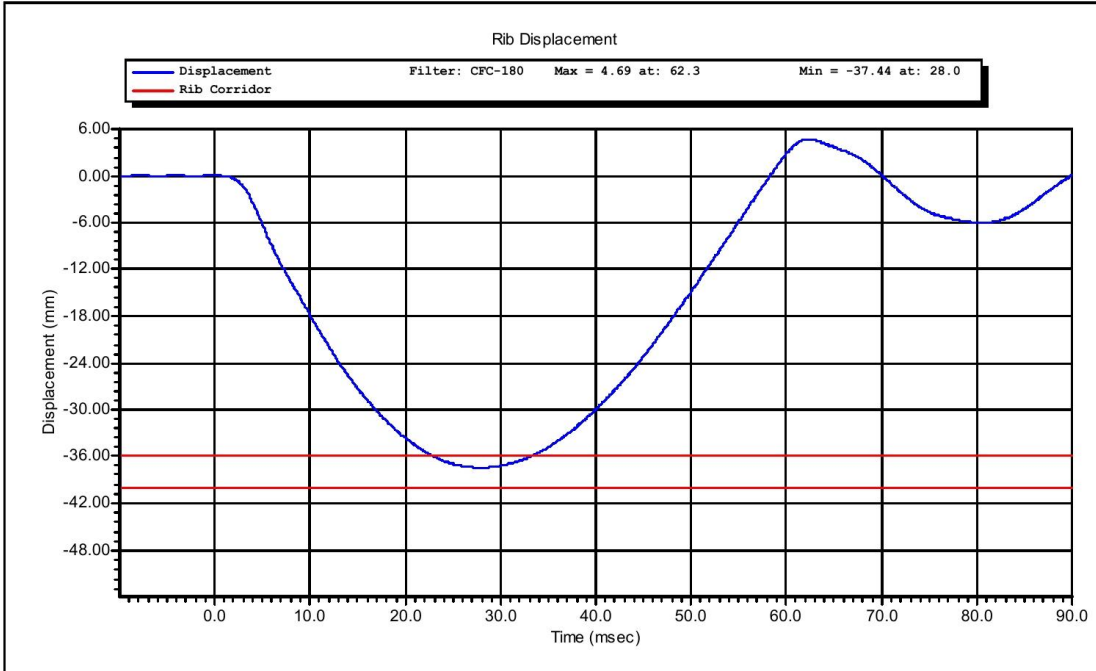


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Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	3.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Upper Rib 3.0m/s	Test Date:	11/30/2012
Test Number:	1	Test Time:	8:51:26 AM



Test Time: **8:51:26 AM**

Test Date: **11/30/2012**

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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:	F033		
Test ID:	Middle Rib 4.0 m/s	Test Date:	11/30/2012
Test Number:	1	Test Time:	9:19:52 AM

Component Part Number	Component Serial Number
455-3100	07207

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.5 deg C P
Humidity	10.0 -- 70.0	19.8 %RH P
Velocity	3.90 -- 4.10	3.90 m/s P
Rib Displacement	-51.00 -- -46.00	-47.69 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 Time: **9:19:52 AM**

Test Date: **11/30/2012**

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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-185	5/17/2012
DentonATD	Velocity Trap	1	1/11/2012
Endevco	7264-2000	P32222	11/13/2012

Test Time: 9:19:52 AM

Test Date: 11/30/2012

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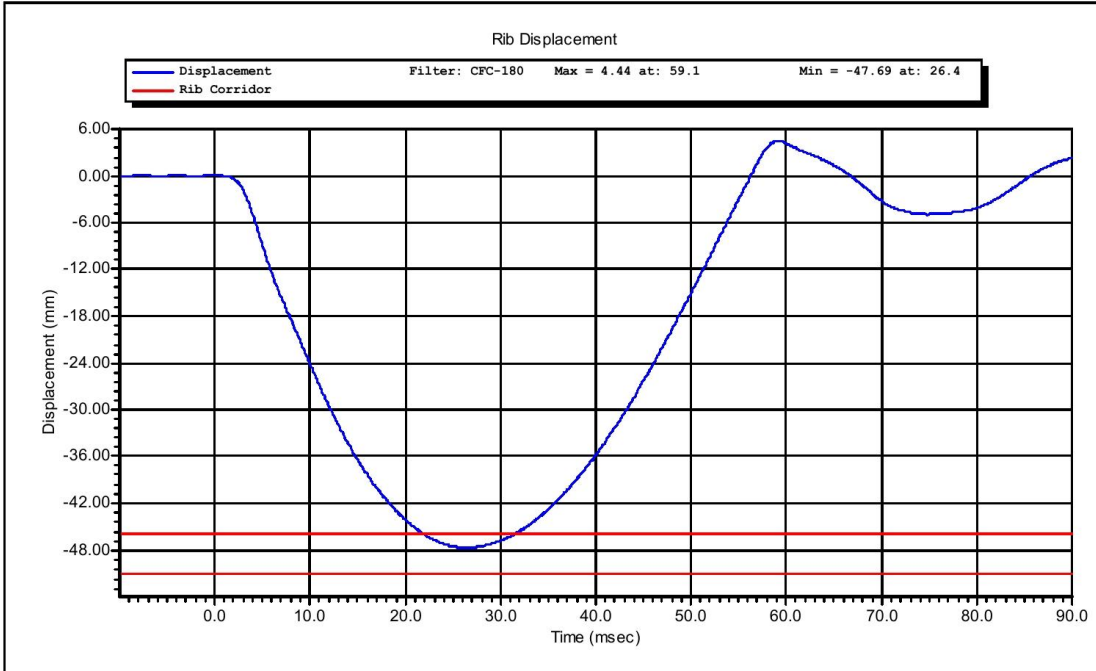


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Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	4.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Middle Rib 4.0 m/s	Test Date:	11/30/2012
Test Number:	1	Test Time:	9:19:52 AM



Test Time: **9:19:52 AM**

Test Date: **11/30/2012**

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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:	F033		
Test ID:	Middle 3.0 m/s	Test Date:	11/30/2012
Test Number:	1	Test Time:	9:41:18 AM

Component Part Number	Component Serial Number
455-3100	07207

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.7 deg C P
Humidity	10.0 -- 70.0	19.6 %RH P
Velocity	2.90 -- 3.10	2.98 m/s P
Rib Displacement	-40.00 -- -36.00	-37.14 mm P
Drop Height	454 -- 464	459 mm P

All test parameters are within specifications

Technician: **S. Zito**

Supervisor: **D. Travale**

Test Time: **9:41:18 AM**

Test Date: **11/30/2012**



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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-185	5/17/2012
DentonATD	Velocity Trap	1	1/11/2012
Endevco	7264-2000	P32222	11/13/2012

Test Time: 9:41:18 AM

Test Date: 11/30/2012

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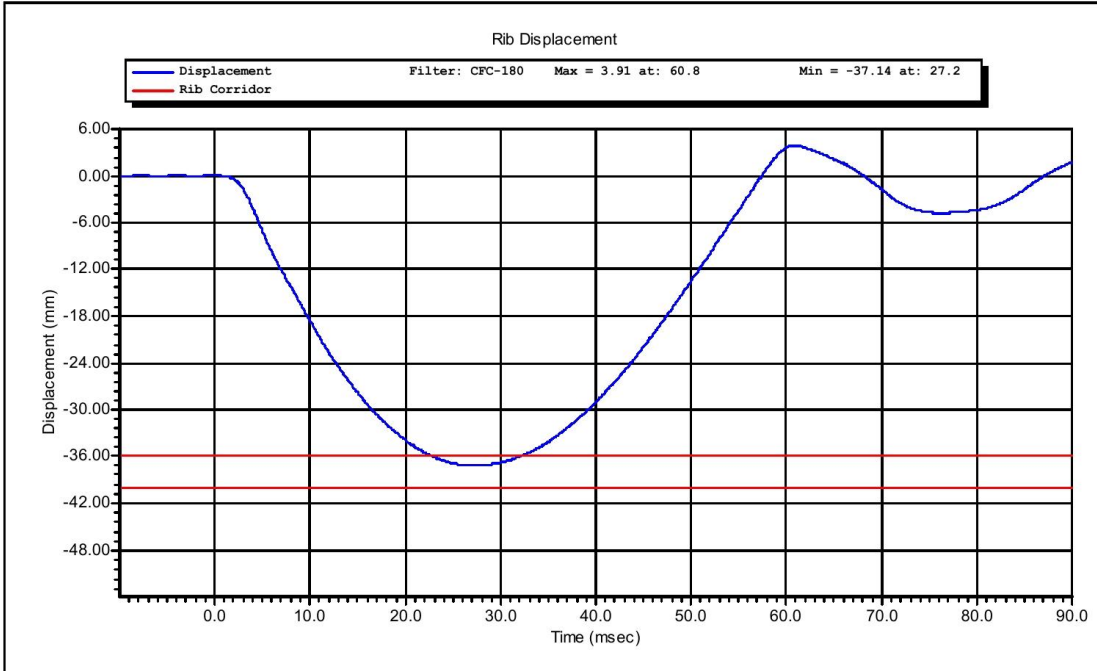


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Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	3.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Middle 3.0 m/s	Test Date:	11/30/2012
Test Number:	1	Test Time:	9:41:18 AM



Test Time: **9:41:18 AM**

Test Date: **11/30/2012**

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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:	F033		
Test ID:	Lower Rib 4.0 m/s	Test Date:	11/30/2012
Test Number:	1	Test Time:	9:58:02 AM

Component Part Number	Component Serial Number
455-3100	07208

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.7 deg C P
Humidity	10.0 -- 70.0	19.3 %RH P
Velocity	3.90 -- 4.10	3.96 m/s P
Rib Displacement	-51.00 -- -46.00	-47.79 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 Time: **9:58:02 AM**

Test Date: **11/30/2012**

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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-178	5/17/2012
DentonATD	Velocity Trap	1	1/11/2012
Endevco	7264-2000	P32222	11/13/2012

Test Time: 9:58:02 AM

Test Date: 11/30/2012

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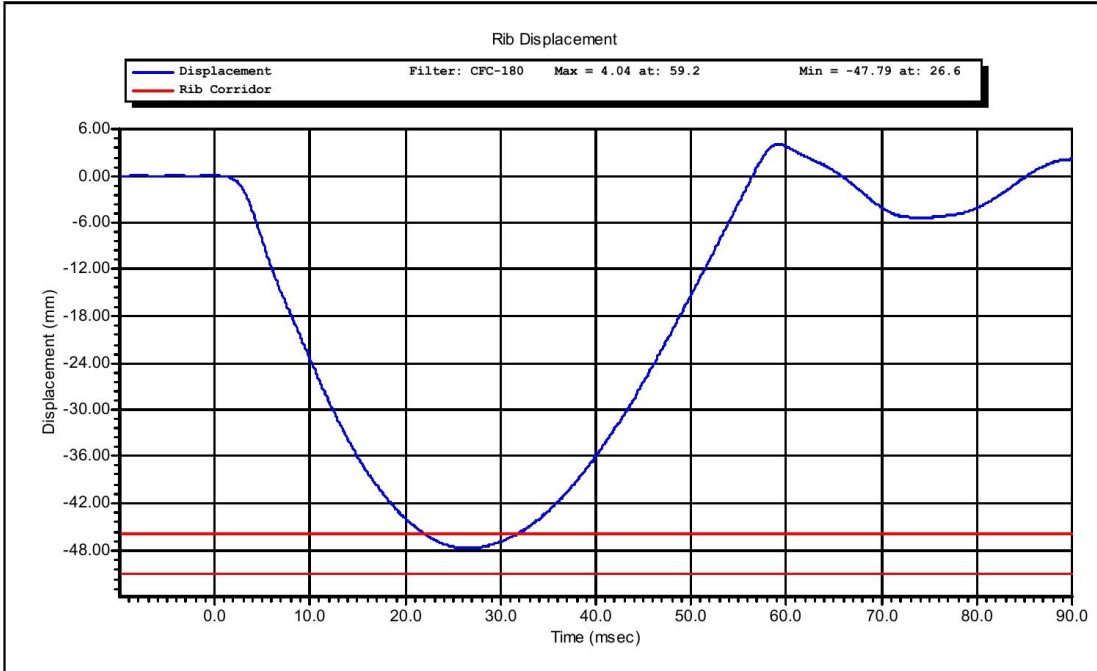


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Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	4.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Lower Rib 4.0 m/s	Test Date:	11/30/2012
Test Number:	1	Test Time:	9:58:02 AM



Test Time: **9:58:02 AM**

Test Date: **11/30/2012**

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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:	F033		
Test ID:	Lower 3.0 m/s	Test Date:	11/30/2012
Test Number:	1	Test Time:	10:15:43 AM

Component Part Number	Component Serial Number
455-3100	07208

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.7 deg C P
Humidity	10.0 -- 70.0	19.2 %RH P
Velocity	2.90 -- 3.10	2.98 m/s P
Rib Displacement	-40.00 -- -36.00	-37.36 mm P
Drop Height	454 -- 464	459 mm P

All test parameters are within specifications

Technician: **S. Zito**

Supervisor: **D. Travale**

Test Time: **10:15:43 AM**

Test Date: **11/30/2012**

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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-178	5/17/2012
DentonATD	Velocity Trap	1	1/11/2012
Endevco	7264-2000	P32222	11/13/2012

Test Time: 10:15:43 AM

Test Date: 11/30/2012

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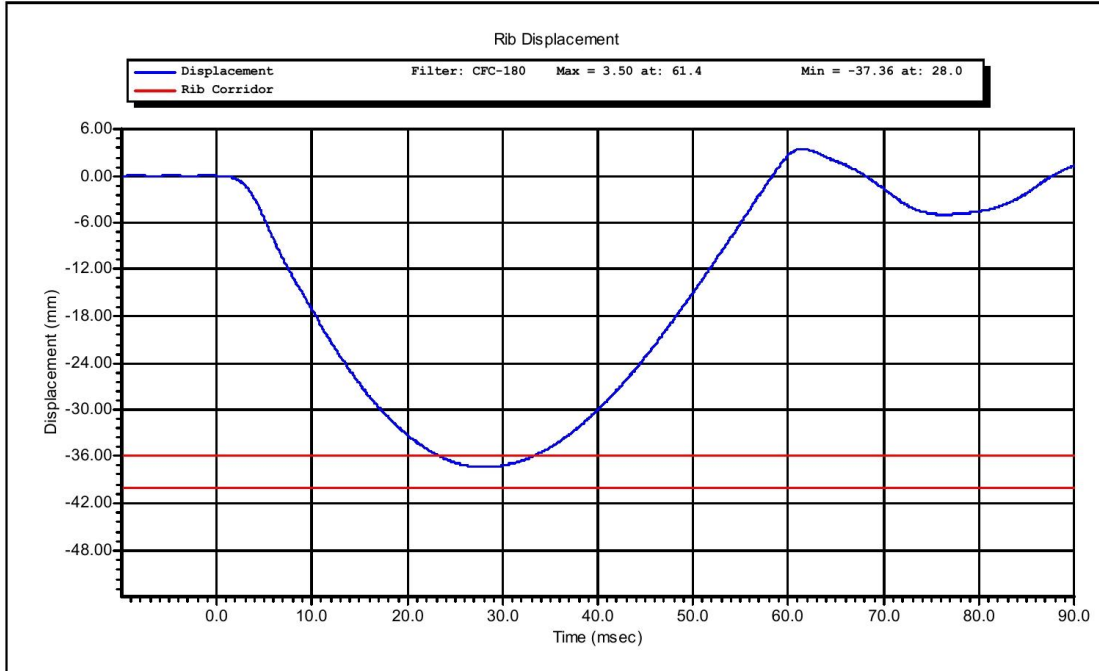


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Test Name:	Full Rib Module Impact	Revision:	12/14/2006
Sub Test Name:	3.0 Meters/Second	Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:	Lower 3.0 m/s	Test Date:	11/30/2012
Test Number:	1	Test Time:	10:15:43 AM



Test Time: **10:15:43 AM**

Test Date: **11/30/2012**

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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:	F033		
Test ID:		Test Date:	11/28/2012
Test Number:	1	Test Time:	11:24:02 AM

Component Part Number	Component Serial Number
Upper Rib - 175-4002	07206
Middle Rib - 175-4002	07207
Lower Rib - 175-4002	07208

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.2 deg C P
Humidity	10.0 -- 70.0	19.9 %RH P
Velocity	5.40 -- 5.60	5.52 m/s P
Upper Rib Displacement	34.0 -- 41.0	37.1 mm P
Middle Rib Displacement	37.0 -- 45.0	41.6 mm P
Lower Rib Displacement	37.0 -- 44.0	40.8 mm P
Impactor Force	5100 -- 6200	5723 N P

All test parameters are within specifications

Technician: **S. Zito**

Supervisor: **D. Travale**

Test Time: **11:24:02 AM**

Test Date: **11/28/2012**



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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	C14953	11/28/2012
Honeywell	MLT-38000	DS-179	5/17/2012
Honeywell	MLT-38000	DS-185	5/17/2012
Honeywell	MLT-38000	DS-178	5/17/2012

Test Time: 11:24:02 AM

Test Date: 11/28/2012

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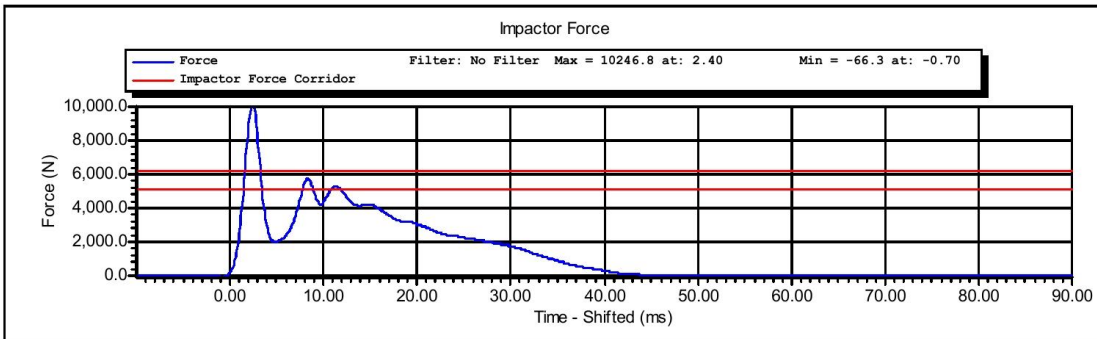
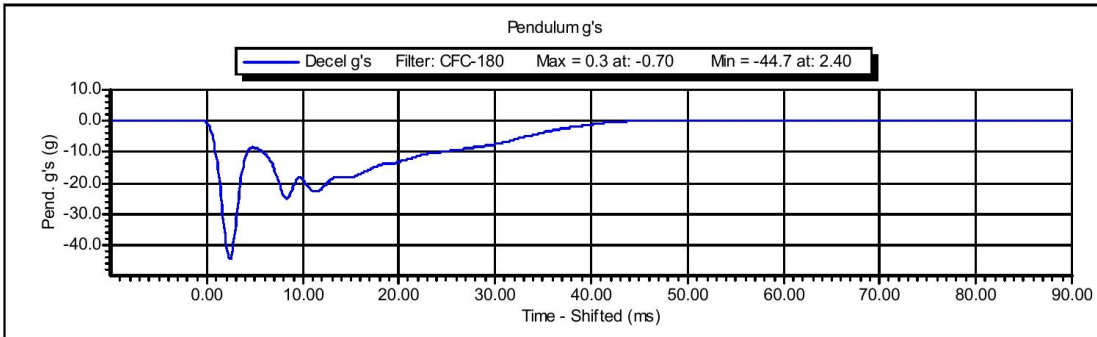


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Test Name:	Thorax Impact	Revision:	8/15/2008
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:		Test Date:	11/28/2012
Test Number:	1	Test Time:	11:24:02 AM



Test Time: **11:24:02 AM**

Test Date: **11/28/2012**

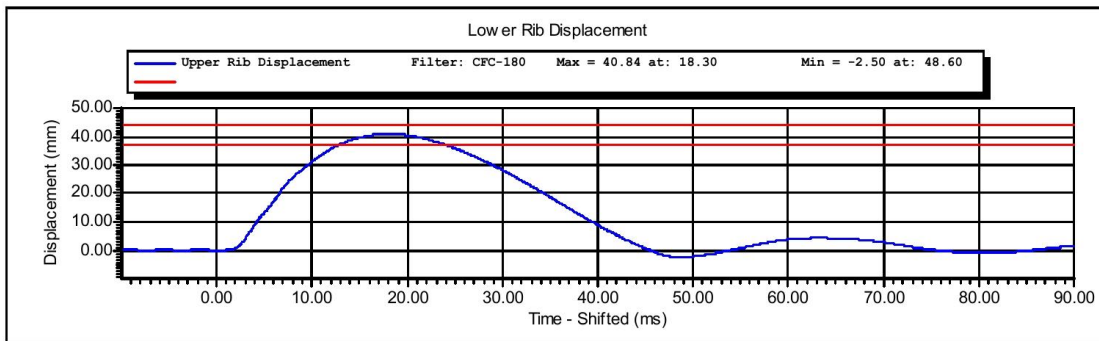
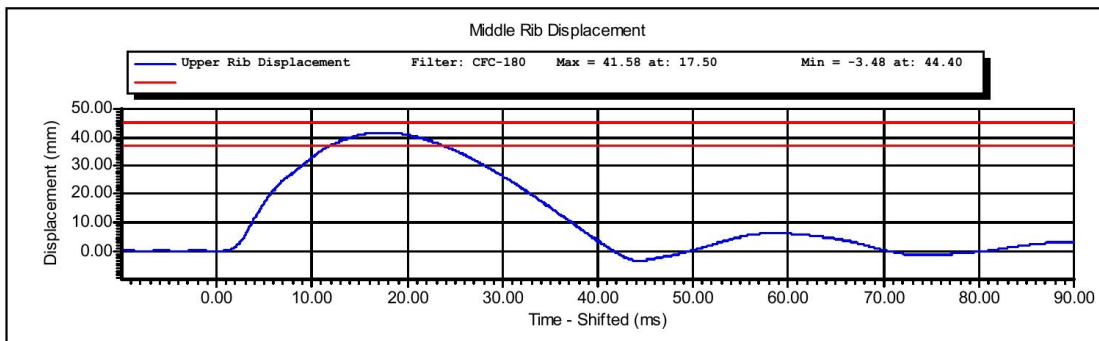
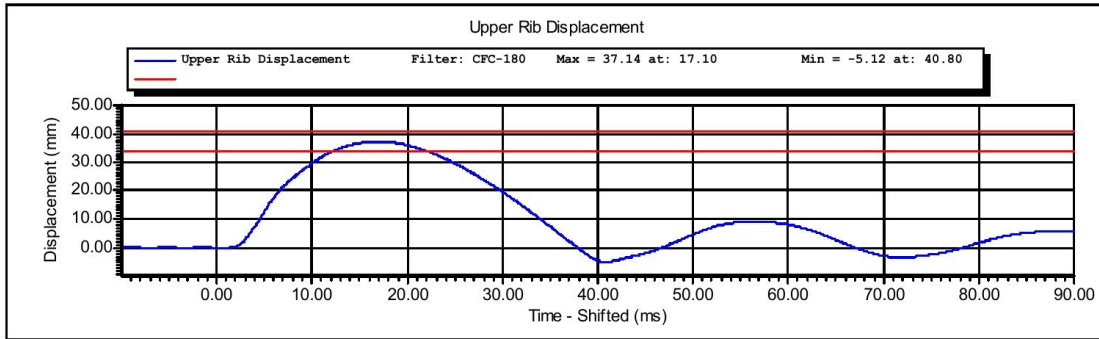
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Test Time: 11:24:02 AM

Test Date: 11/28/2012

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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:	F033		
Test ID:		Test Date:	11/28/2012
Test Number:	1	Test Time:	11:04:15 AM

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

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.0 deg C P
Humidity	10 -- 70	20 %RH P
Velocity	3.90 -- 4.10	4.05 m/s P
Peak Abdominal Force	-2.70 -- -2.20	-2.53 kN P
Time At Peak Abdominal Force	10.0 -- 12.3	10.8 ms P
Maximum Pendulum Force	-4.80 -- -4.00	-4.55 kN P
Time at Peak Pendulum Force	10.6 -- 13.0	10.6 ms P

All test parameters are within specifications

Technician: **S. Zito**

Supervisor: **D. Travale**

Test Time: **11:04:15 AM**

Test Date: **11/28/2012**

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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	C14953	11/28/2012
Denton	2631	LC-1524	5/24/2012
Denton	2631	LC-1523	5/24/2012
Denton	2631	LC-1530	5/24/2012

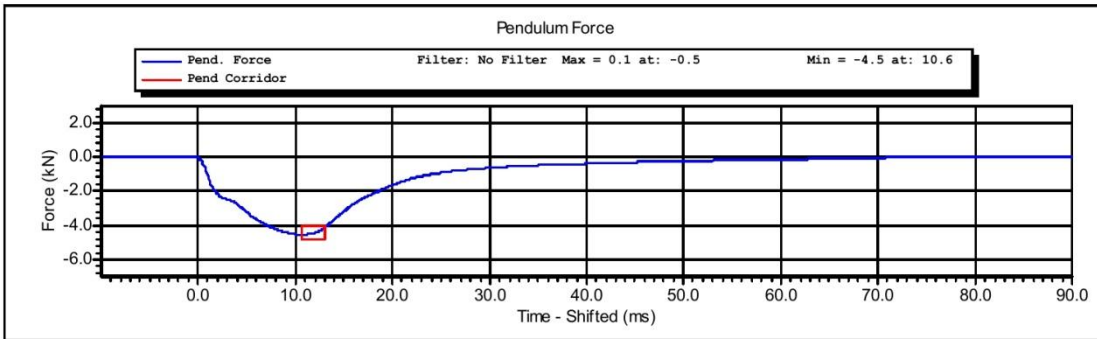
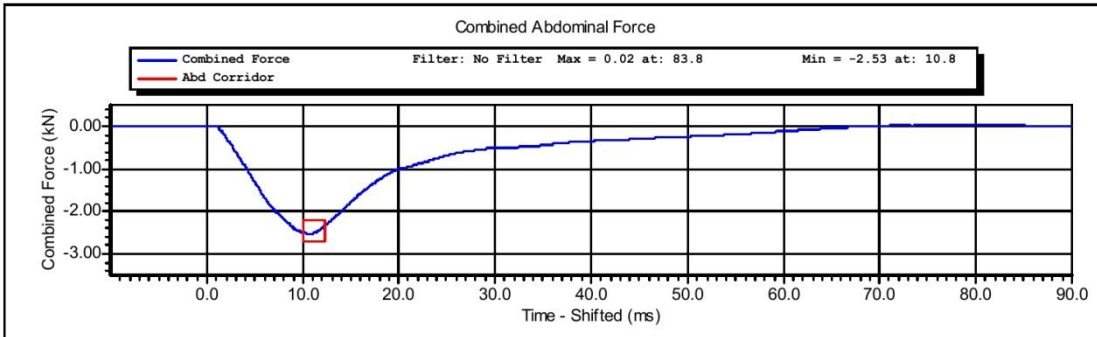
Test Time: 11:04:15 AM

Test Date: 11/28/2012

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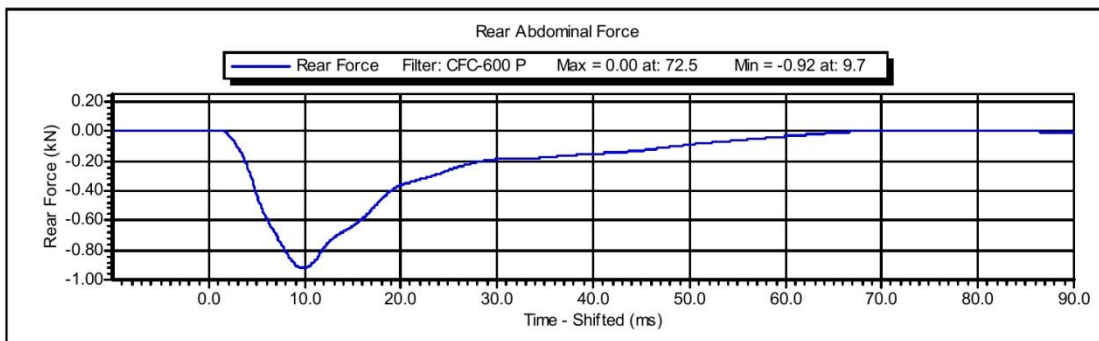
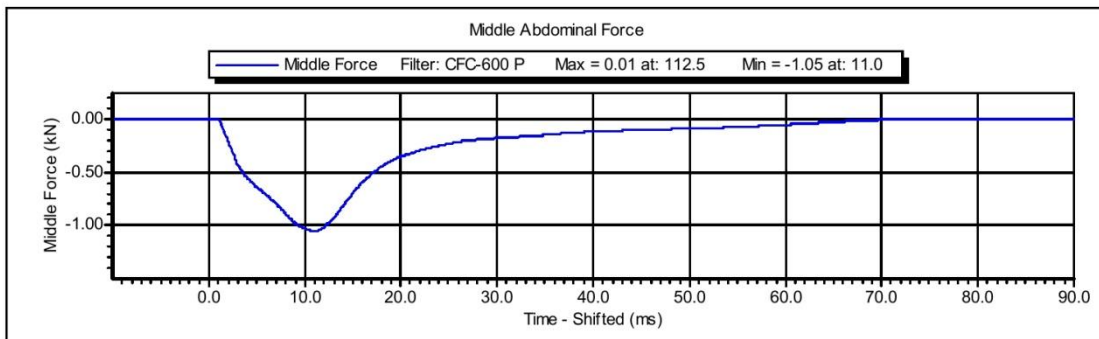
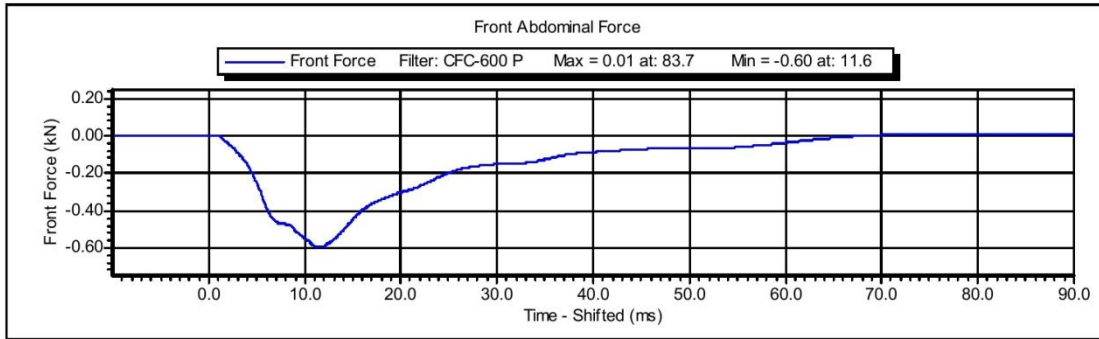
Test Name:	Abdominal Impact	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:		Test Date:	11/28/2012
Test Number:	1	Test Time:	11:04:15 AM



Test Time: 11:04:15 AM

Test Date: 11/28/2012

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Test Time: 11:04:15 AM

Test Date: 11/28/2012

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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:	F033		
Test ID:		Test Date:	11/30/2012
Test Number:	2	Test Time:	3:43:54 PM

Component Part Number	Component Serial Number
175-5501	DI8374

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.9 deg C P
Humidity	10 -- 70	25 %RH P
Velocity	5.95 -- 6.15	6.14 m/s P
Maximum Headform Flexion Angle	45.0 -- 55.0	46.4 degrees P
Time at Maximum Headform Flexion Angle	39.0 -- 53.0	47.1 ms P
Decay to Zero Degrees	37.0 -- 57.0	38.6 ms P
Velocity Corridor	--	P

All test parameters are within specifications

Technician: **S. Zito**

Supervisor: **D. Travale**

Test Time: **3:43:54 PM**

Test Date: **11/30/2012**



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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	C15016	8/15/2012
DentonATD	7000428	094	5/30/2012
DentonATD	7000428	095	5/30/2012
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Test Time: 3:43:54 PM

Test Date: 11/30/2012

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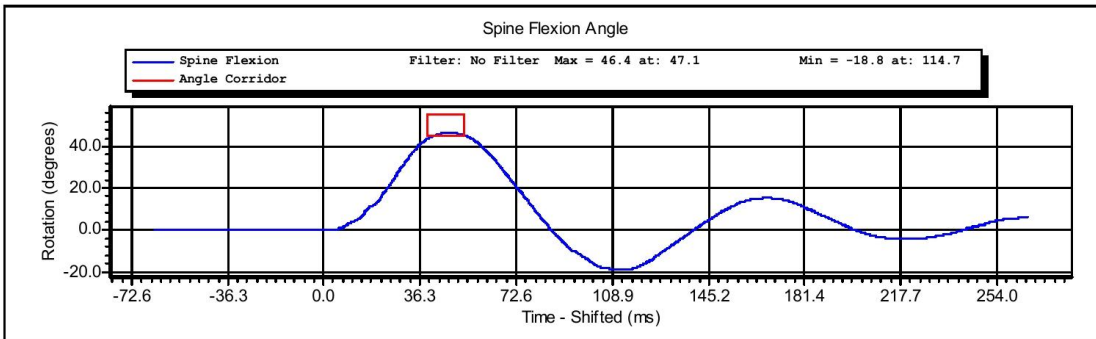
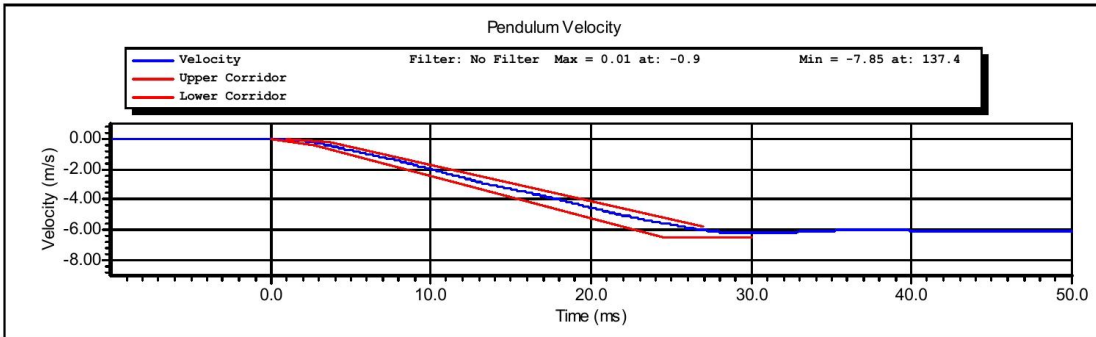


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Test Name:	Lumbar Spine	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:		Test Date:	11/30/2012
Test Number:	2	Test Time:	3:43:54 PM



Test Time: **3:43:54 PM**

Test Date: **11/30/2012**

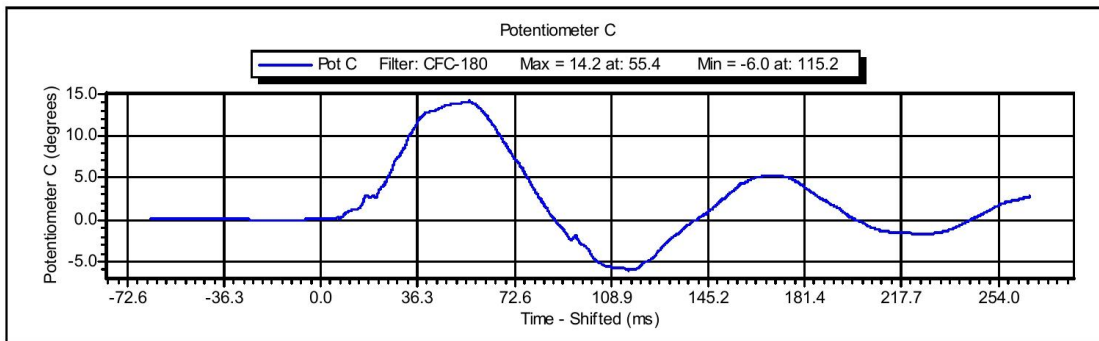
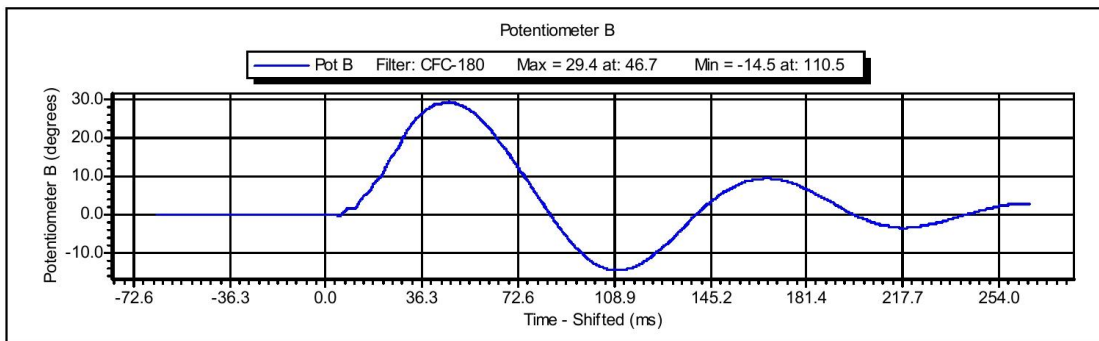
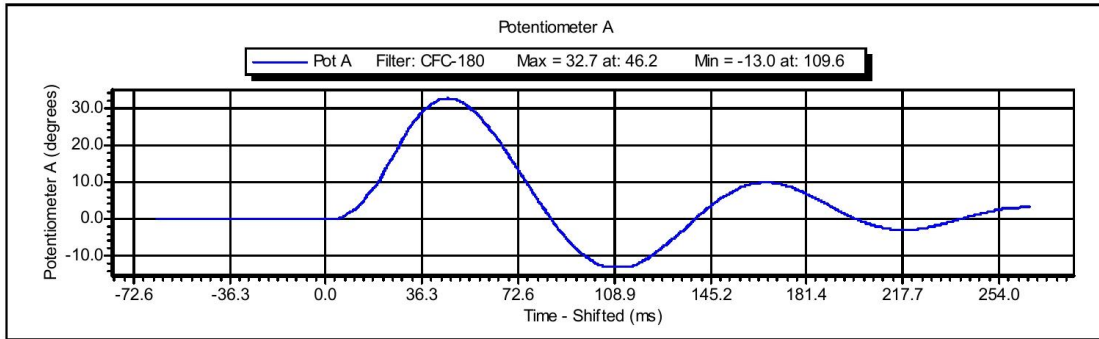
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Test Time: 3:43:54 PM

Test Date: 11/30/2012

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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:	F033		
Test ID:		Test Date:	11/28/2012
Test Number:	1	Test Time:	10:09:02 AM

Component Part Number	Component Serial Number
455-4003	07033

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	20.9 deg C P
Humidity	10 -- 70	21 %RH P
Velocity	4.20 -- 4.40	4.36 m/s P
Peak Pendulum Force	-5.40 -- -4.70	-5.11 kN P
Time at Peak Pendulum Force	11.80 -- 16.10	13.10 ms P
Peak Pubic Symphysis Force	-1.59 -- -1.23	-1.35 kN P
Time at Peak Pubic Symphysis Force	12.20 -- 17.00	13.60 ms P

All test parameters are within specifications

Technician: **S. Zito**

Supervisor: **D. Travale**

Test Time: **10:09:02 AM**

Test Date: **11/28/2012**



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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	C14953	11/28/2012
Denton	3096	LC-456Fy	5/24/2012

Test Time: 10:09:02 AM

Test Date: 11/28/2012

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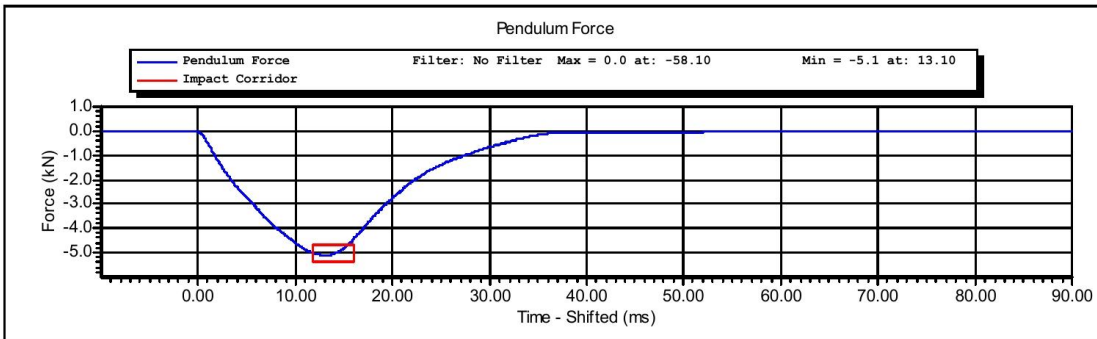
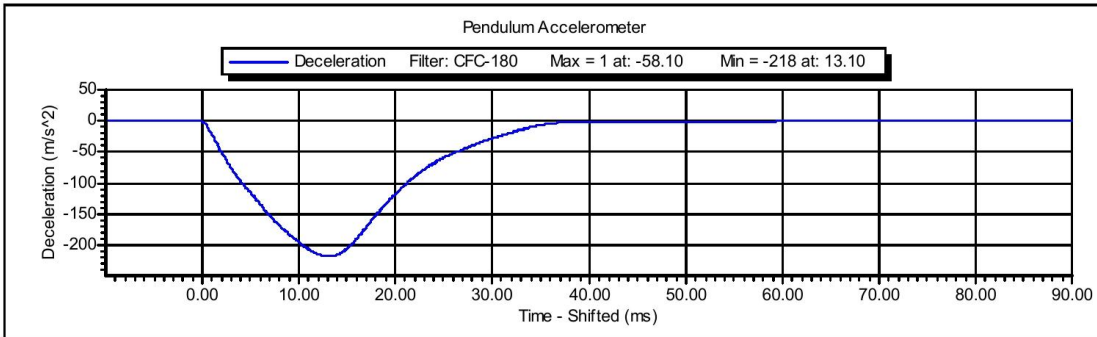


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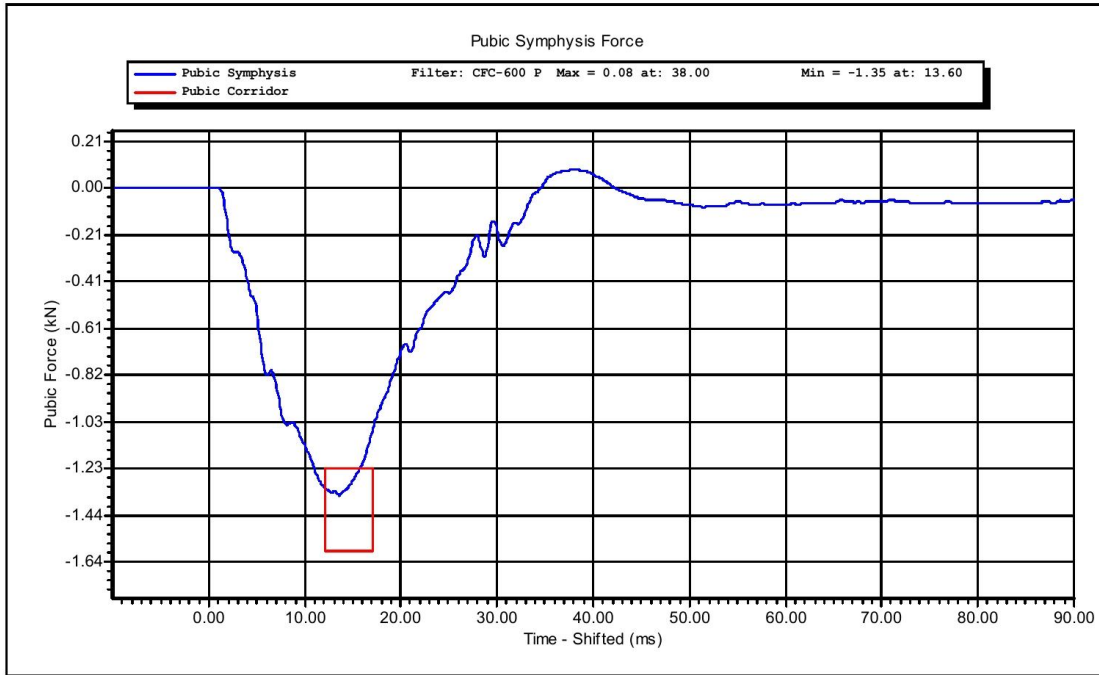
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Sub Test Name:		Spec Type:	NHTSA
ATD Type:	ES-2re		
ATD Serial Number:	F033		
Test ID:		Test Date:	11/28/2012
Test Number:	1	Test Time:	10:09:02 AM



Test Time: **10:09:02 AM**

Test Date: **11/28/2012**

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Test Time: 10:09:02 AM

Test Date: 11/28/2012

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CALIBRATION TEST RESULTS

POST-TEST

SID-IIS 5TH PERCENTILE FEMALE - PASSENGER ATD

SERIAL No: 303

(CONFIGURED FOR LEFT SIDE IMPACT)



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SID-IIsD External Measurements

ATD S/N 303

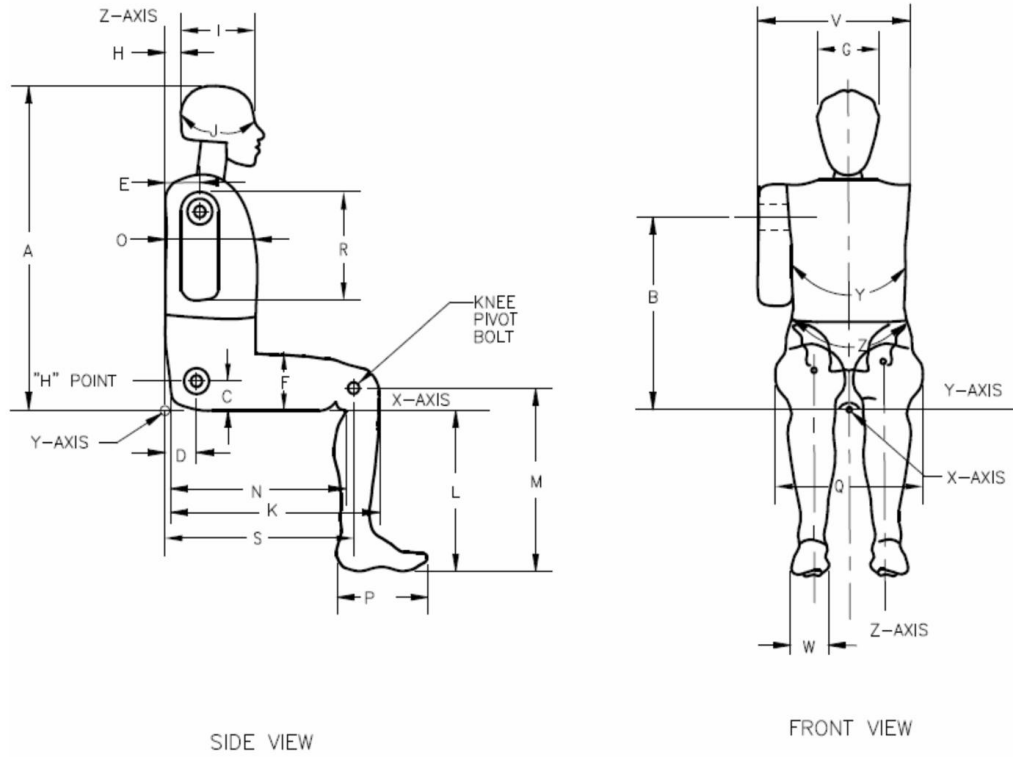
Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Sitting Height	772.0 - 788.0	785	Yes
B	Shoulder Pivot Height	437.0 - 453.0	450	Yes
C	H-Point Height	79.0 - 89.0	85	Yes
D	H-Point from Seat Back	141.0 - 151.0	146	Yes
E	Shoulder Pivot from Backline	97.0 - 107.0	100	Yes
F	Thigh Clearance	119.0 - 135.0	124	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	546	Yes
K	Buttock to Knee Length	514.0 - 540.0	528	Yes
L	Popliteal Height	343.0 - 369.0	355	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	201	Yes
P	Foot Length (right)	216.0 - 232.0	222	Yes
P	Foot Length (left)	216.0 - 232.0	222	Yes
Q	Hip Breadth	313.0 - 323.0	317	Yes
R	Arm Length	249.0 - 259.0	252	Yes
S	Knee Joint to Seat back	478.0 - 493.0	481	Yes
V	Shoulder Width (only one arm installed)	341.0 - 357.0	351	Yes
W	Foot Width (right)	78.0 - 94.0	87	Yes
W	Foot Width (left)	78.0 - 94.0	87	Yes
Y	Chest Circumference with Jacket	851.0 - 881.0	874	Yes
Z	Waist Circumference	761.0 - 791.0	782	Yes

Technician: M. Goehle

Date: 11/30/2012

SID-IIIsD External Dimensions

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-IIs		
ATD Serial Number:	303		
Test ID:	Head Drop	Test Date:	11/27/2012
Test Number:	1	Test Time:	1:25:20 PM

Component Part Number	Component Serial Number
Head Skin - 180-1002	368

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.8 deg C P
Humidity	10 -- 70	22 %RH P
Resultant Acceleration	115.0 -- 137.0	128.5 g P
Oscillation	0.0 -- 15.0	2.5 % P
Fore-Aft Acceleration	-15.0 -- 15.0	-2.7 g P

All test parameters are within specifications

Technician: **M. Goehle**

Supervisor: **D. Travale**

Test Time: **1:25:20 PM**

Test Date: **11/27/2012**

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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	P59021	7/24/2012
Endevco	7264-2000	P52088	7/24/2012
Endevco	7264-2000	P58794	7/24/2012

Test Time: 1:25:20 PM

Test Date: 11/27/2012

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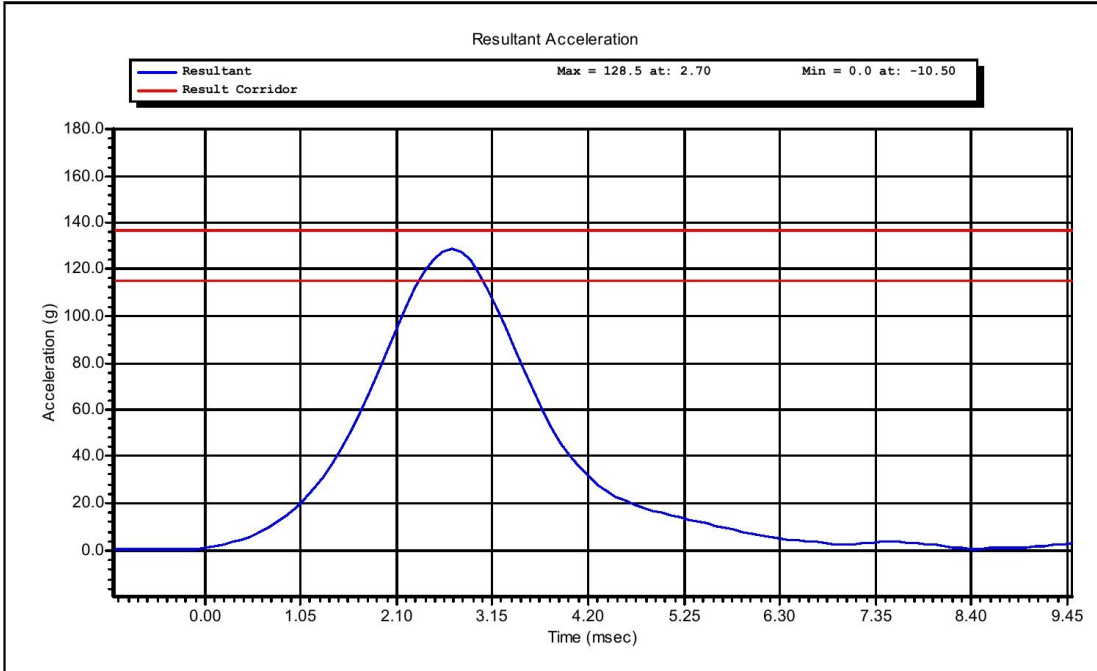


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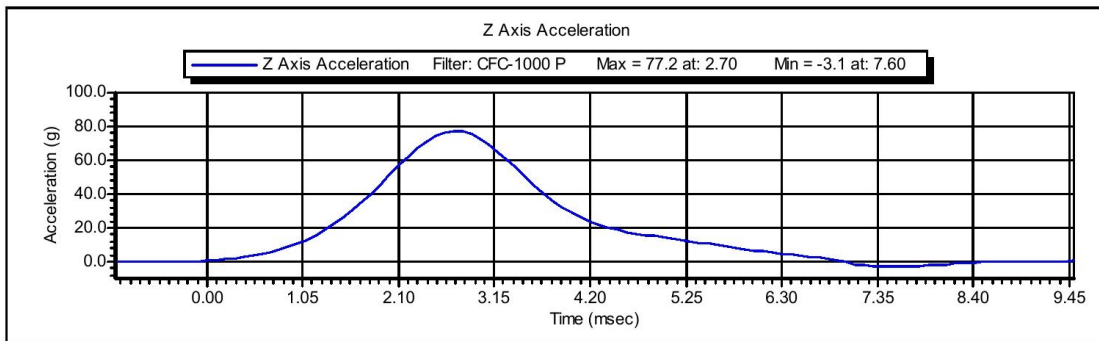
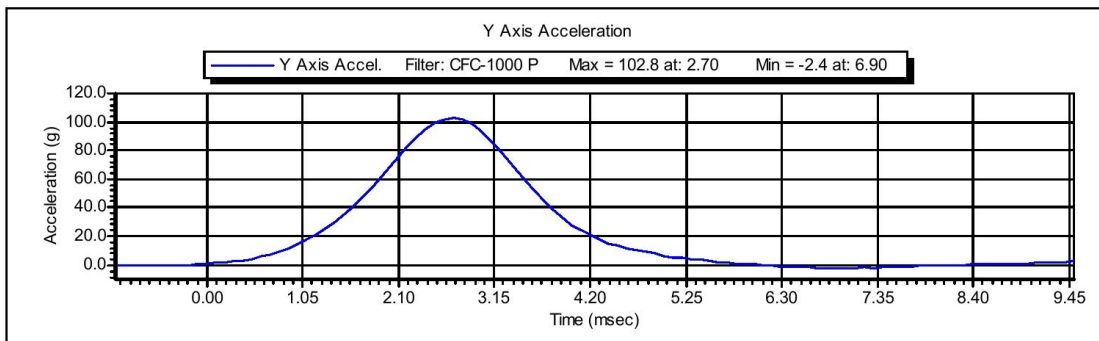
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Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	303		
Test ID:	Head Drop	Test Date:	11/27/2012
Test Number:	1	Test Time:	1:25:20 PM



Test Time: **1:25:20 PM**

Test Date: **11/27/2012**

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Test Time: 1:25:20 PM

Test Date: 11/27/2012

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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-IIs		
ATD Serial Number:	303		
Test ID:	Neck Flexion	Test Date:	11/27/2012
Test Number:	1	Test Time:	3:07:16 PM

Component Part Number	Component Serial Number
Neck - 180-2000	777

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.8 deg C P
Humidity	10 -- 70	22 %RH P
Velocity	5.51 -- 5.63	5.60 m/s P
Pendulum Impulse at 10 ms	2.20 -- 2.80	2.40 m/s P
Pendulum Impulse at 15 ms	3.30 -- 4.10	3.56 m/s P
Pendulum Impulse at 20 ms	4.40 -- 5.40	4.92 m/s P
Pendulum Impulse at 25 ms	5.40 -- 6.10	5.61 m/s P
Pendulum Impulse between 25 and 100 ms	5.50 -- 6.20	5.61 m/s P
Max D Plane Rotation	71.0 -- 81.0	72.3 degrees P
Time at Max Rotation	50.0 -- 70.0	59.4 ms P
Moment about OC	-44.0 -- -36.0	-43.0 Nm P
Moment Decay to Zero	102.0 -- 126.0	115.4 ms P

All test parameters are within specifications

Technician: **M. Goehle**

Supervisor: **D. Travale**

Test Time: **3:07:16 PM**

Test Date: **11/27/2012**



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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	C15016	8/15/2012
Denton	1716A	LC-440 Fy	5/21/2012
Denton	1716A	LC-440 Mx	5/21/2012
DentonATD	78051-342	184	5/30/2012
DentonATD	78051-342	174	5/30/2012
DentonATD	78051-342	185	5/30/2012

Test Time: 3:07:16 PM

Test Date: 11/27/2012

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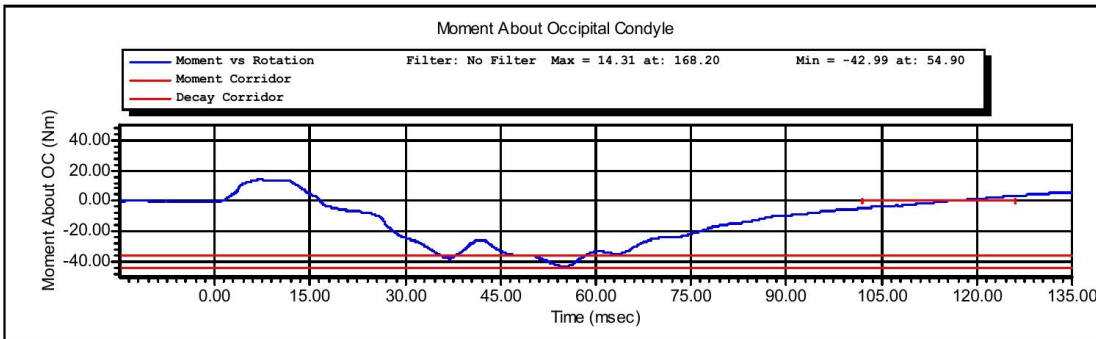
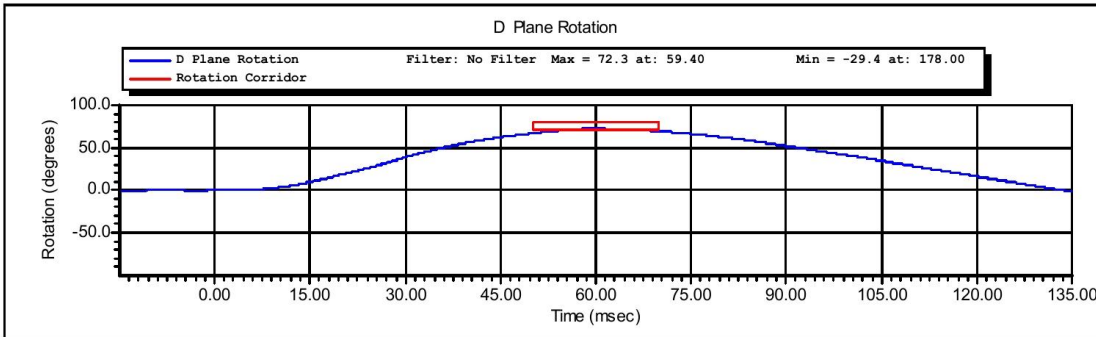


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Test Name:	Neck Pendulum	Revision:	8/24/2009
Sub Test Name:	Left Side	Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	303		
Test ID:	Neck Flexion	Test Date:	11/27/2012
Test Number:	1	Test Time:	3:07:16 PM



Test Time: **3:07:16 PM**

Test Date: **11/27/2012**

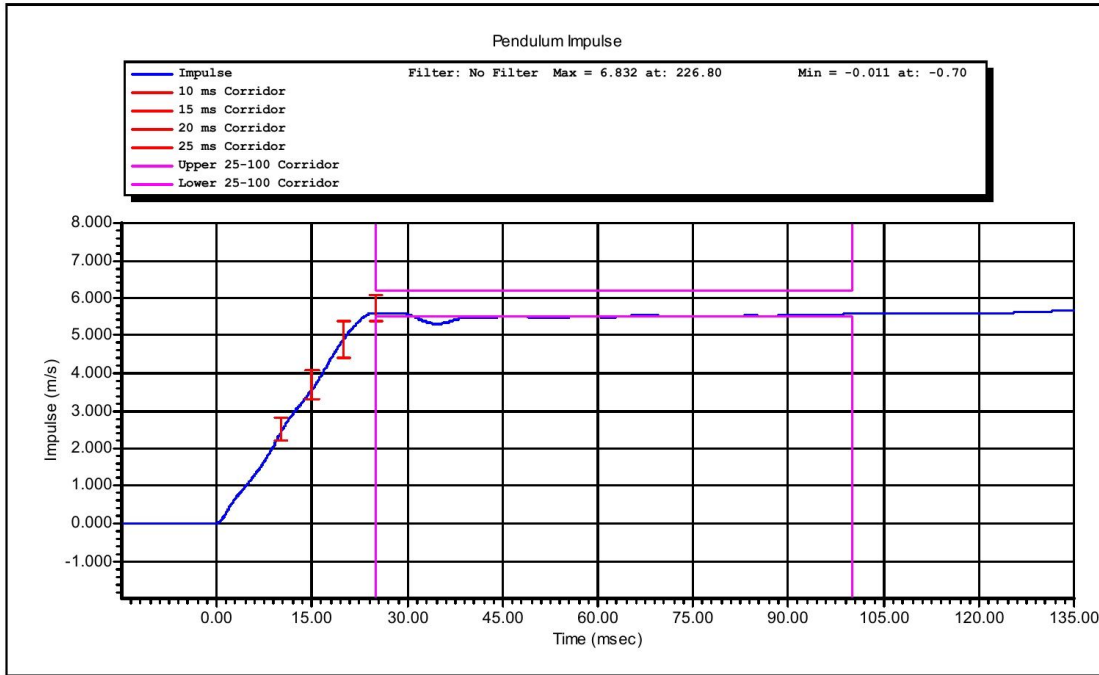
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Test Time: 3:07:16 PM

Test Date: 11/27/2012

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Test Name:	Shoulder Impact	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	303		
Test ID:	Shoulder	Test Date:	11/30/2012
Test Number:	1	Test Time:	9:48:02 AM

Component Part Number	Component Serial Number
Left Arm 180-6011-1	951

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.70 deg C P
Humidity	10.0 -- 70.0	19.5 %RH P
Velocity	4.20 -- 4.40	4.34 m/s P
Probe Acceleration	13.0 -- 18.0	15.9 g P
Shoulder Deflection	28.0 -- 37.0	30.8 mm P
T1 Acceleration	17.0 -- 22.0	20.0 g P

All test parameters are within specifications

Technician: **M. Goehle**

Supervisor: **D. Travale**

Test Time: **9:48:02 AM**

Test Date: **11/30/2012**



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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	C14953	11/28/2012
Servo	180-3885	DS-1179	10/25/2012
Endevco	7264-2000	P63315	10/26/2012

Test Time: 9:48:02 AM

Test Date: 11/30/2012

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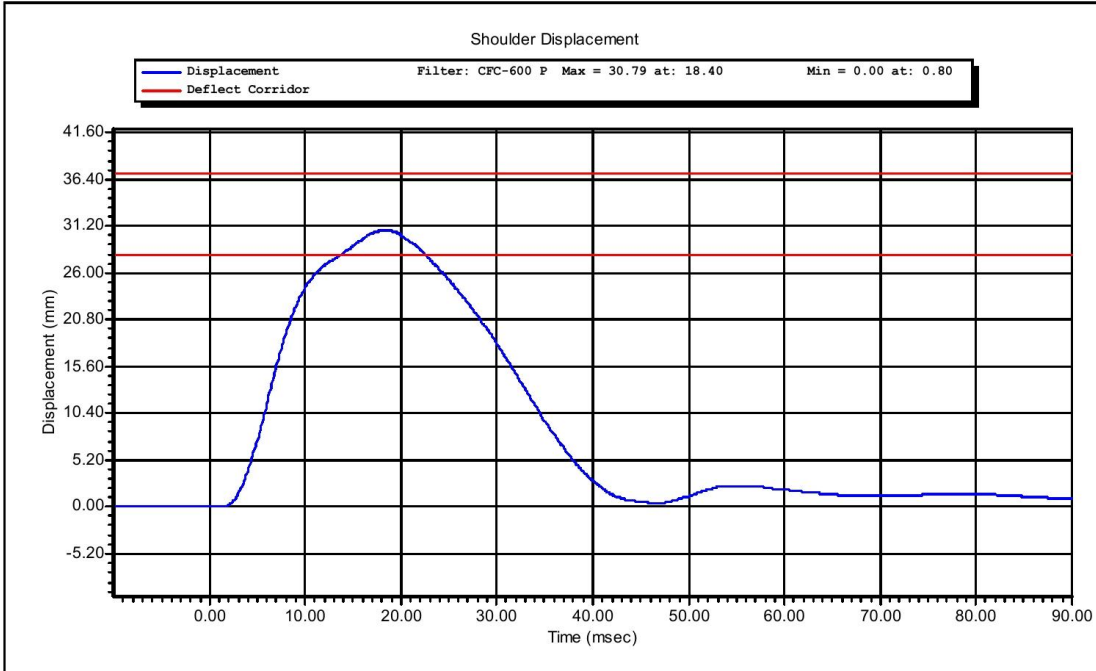


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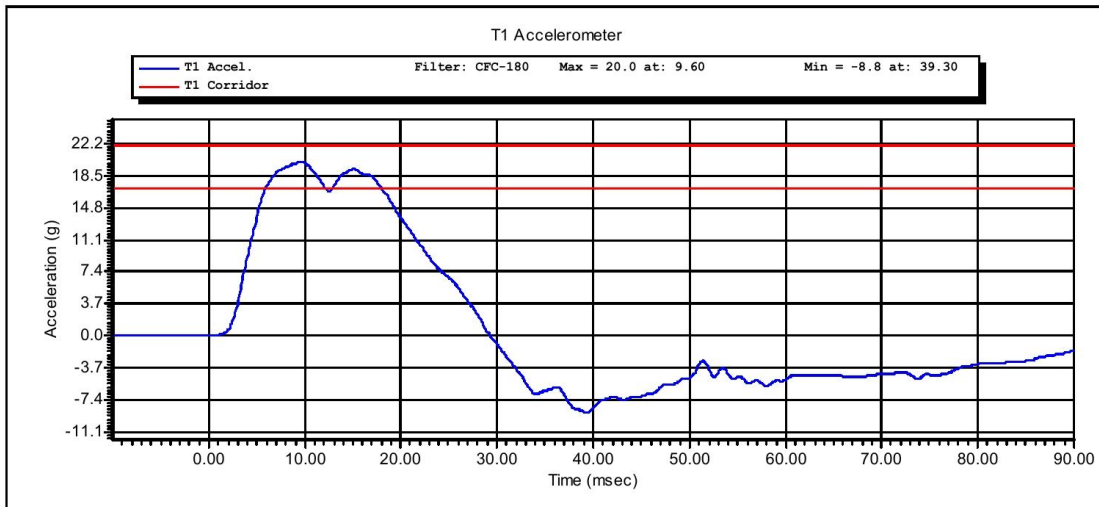
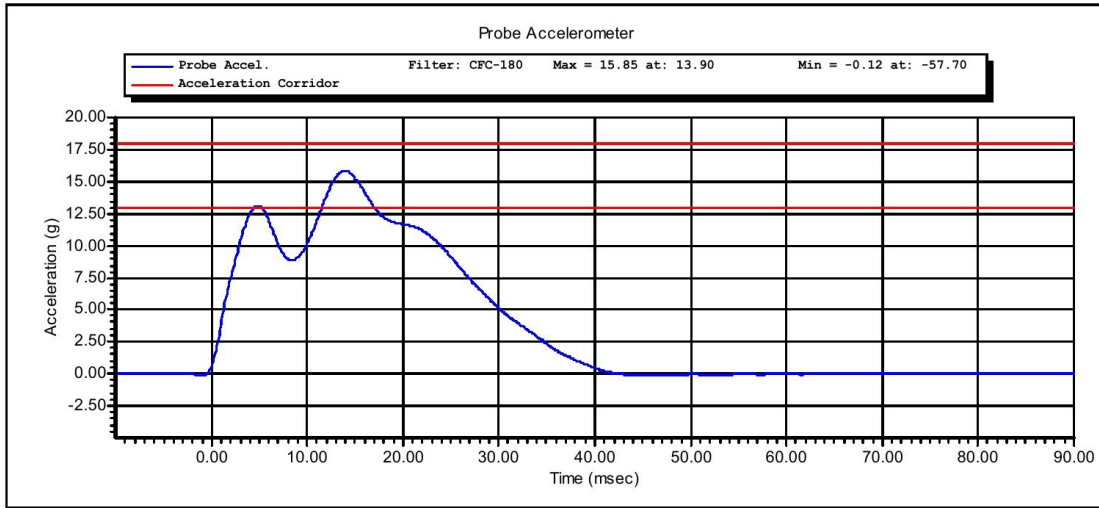
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Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	303		
Test ID:	Shoulder	Test Date:	11/30/2012
Test Number:	1	Test Time:	9:48:02 AM



Test Time: **9:48:02 AM**

Test Date: **11/30/2012**

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Test Time: 9:48:02 AM

Test Date: 11/30/2012

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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-IIs		
ATD Serial Number:	303		
Test ID:	Thorax without Arm	Test Date:	11/30/2012
Test Number:	1	Test Time:	9:33:02 AM

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

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.6 deg C P
Humidity	10 -- 70	20 %RH P
Velocity	4.20 -- 4.40	4.34 m/s P
Probe Acceleration	14.0 -- 18.0	16.7 g P
Upper Thorax Rib Deflection	32.0 -- 40.0	34.1 mm P
Mid Thorax Rib Deflection	39.0 -- 45.0	40.8 mm P
Lower Thorax Rib Deflection	35.0 -- 43.0	38.2 mm P
Upper Spine Acceleration T1	13.0 -- 17.0	15.6 g P
Lower Spine Acceleration T12	7.0 -- 11.0	10.2 g P

All test parameters are within specifications

Technician: **M. Goehle**

Supervisor: **D. Travale**

Test Time: **9:33:02 AM**

Test Date: **11/30/2012**



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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	C14953	11/28/2012
Servo	180-3885	DS-1199	10/25/2012
Servo	180-3885	DS-1246	10/24/2012
Servo	180-3885	DS-1256	10/25/2012
Endevco	7264-2000	P63315	10/26/2012
Endevco	7264-2000	P63861	10/25/2012

Test Time: 9:33:02 AM

Test Date: 11/30/2012

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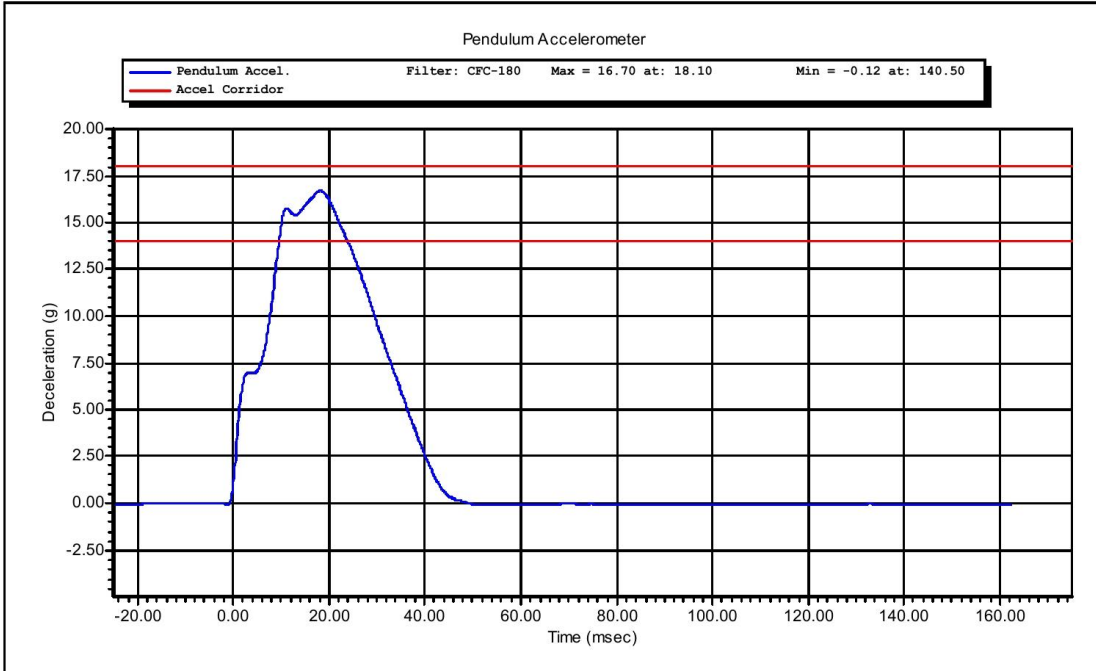


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Test Name:	Thorax Impact without Arm	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	303		
Test ID:	Thorax without Arm	Test Date:	11/30/2012
Test Number:	1	Test Time:	9:33:02 AM



Test Time: **9:33:02 AM**

Test Date: **11/30/2012**

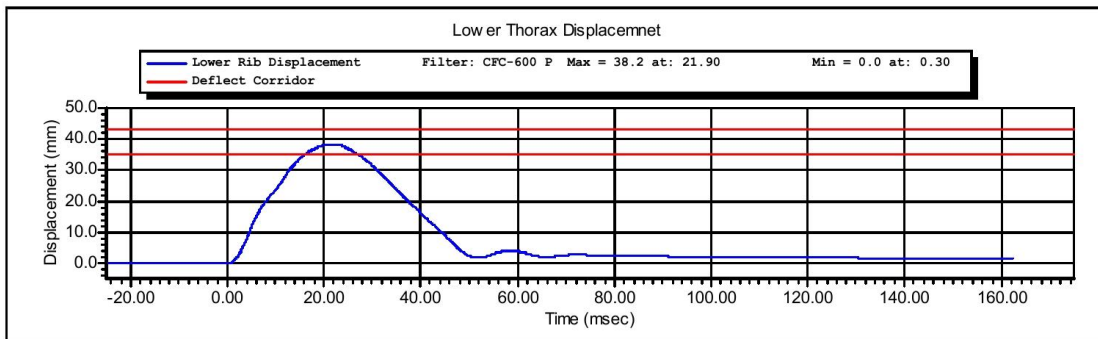
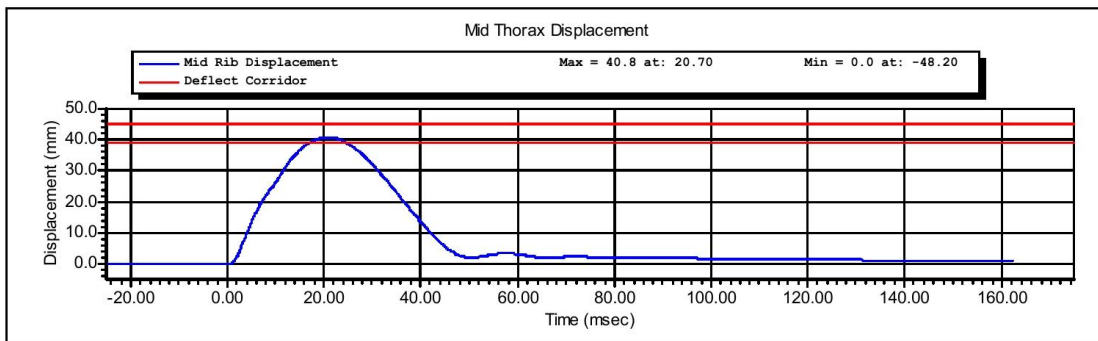
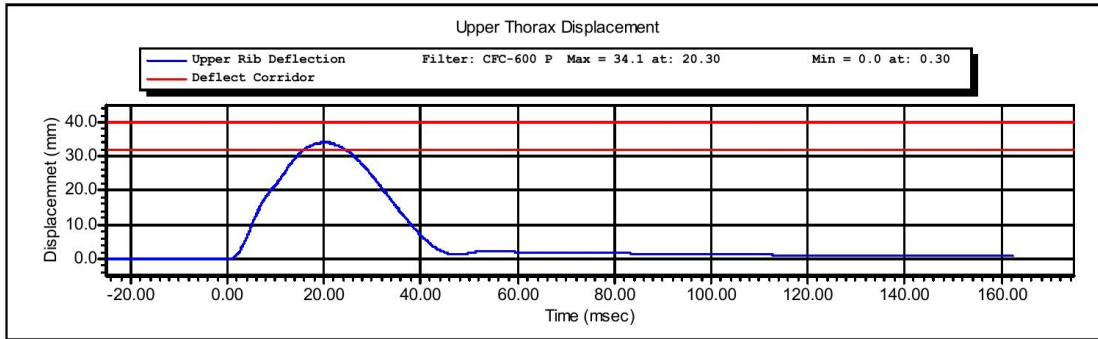
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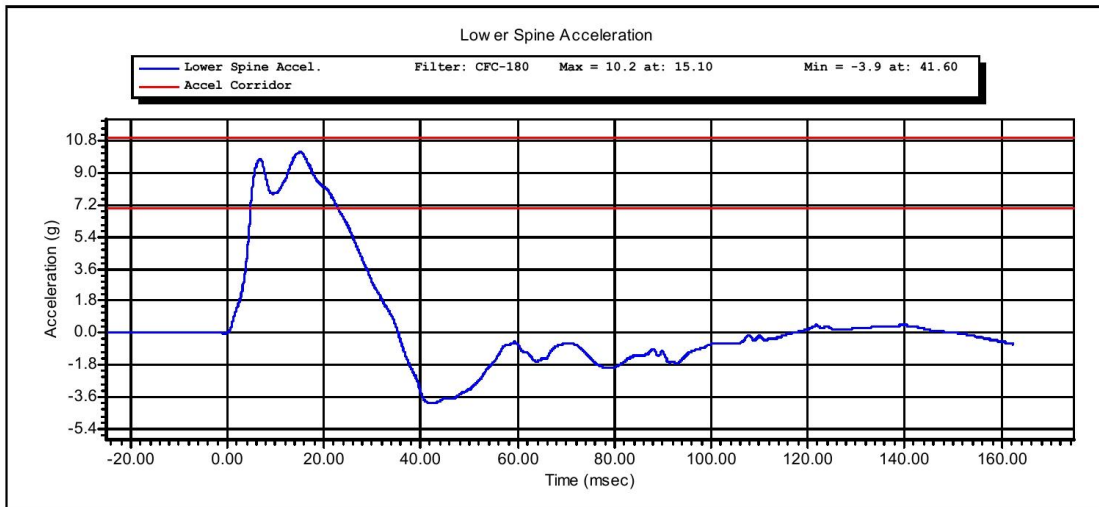
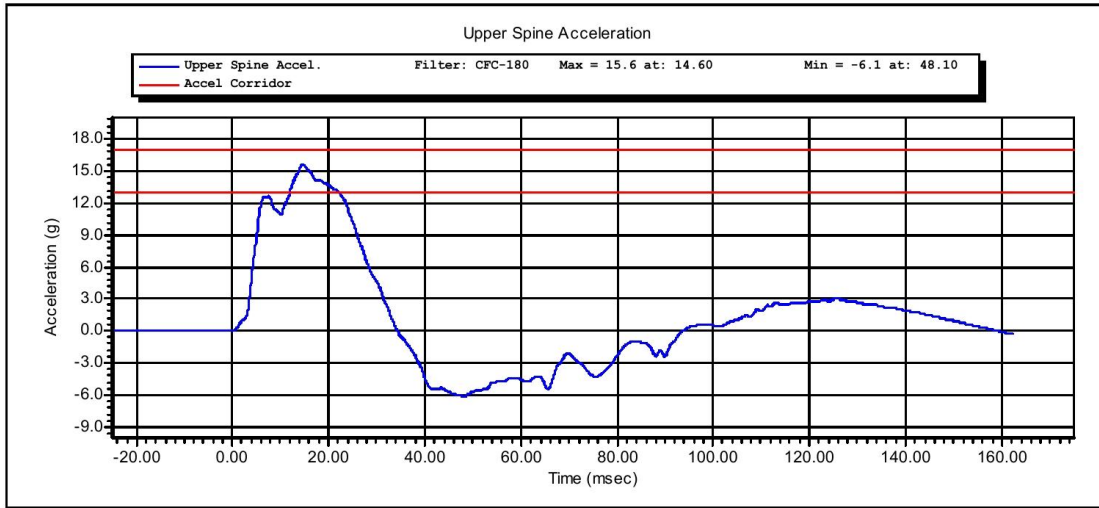
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Test Time: 9:33:02 AM

Test Date: 11/30/2012

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Test Time: 9:33:02 AM

Test Date: 11/30/2012

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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-IIs		
ATD Serial Number:	303		
Test ID:	Thorax With Arm	Test Date:	11/30/2012
Test Number:	1	Test Time:	10:59:38 AM

Component Part Number	Component Serial Number
Left Arm 180-6011-1	951

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.8 deg C P
Humidity	10 -- 70	19 %RH P
Velocity	6.60 -- 6.80	6.71 m/s P
Probe Acceleration after 5ms	30.0 -- 36.0	33.2 g P
Upper Thorax Rib Deflection	25.0 -- 32.0	28.9 mm P
Mid Thorax Rib Deflection	30.0 -- 36.0	33.0 mm P
Lower Thorax Rib Deflection	32.0 -- 38.0	33.9 mm P
Upper Spine Acceleration ("y")	34.0 -- 43.0	37.6 g P
Lower Spine Acceleration ("y")	29.0 -- 37.0	36.0 g P
Shoulder Deflection	31.0 -- 40.0	38.7 mm P

All test parameters are within specifications

Technician: **M. Goehle**

Supervisor: **D. Travale**

Test Time: **10:59:38 AM**

Test Date: **11/30/2012**



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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	C14953	11/28/2012
Servo	180-3885	DS-1199	10/25/2012
Servo	180-3885	DS-1246	10/24/2012
Servo	180-3885	DS-1256	10/25/2012
Endevco	7264-2000	P63315	10/26/2012
Endevco	7264-2000	P63861	10/25/2012
Servo	180-3885	DS-1179	10/25/2012

Test Time: 10:59:38 AM

Test Date: 11/30/2012

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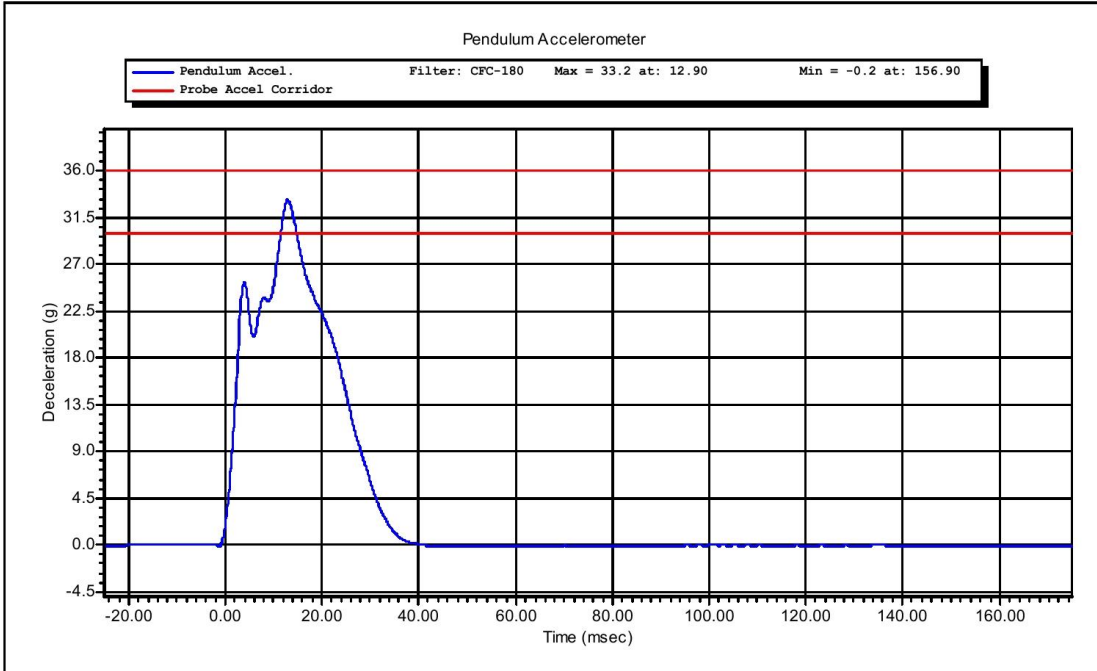


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Test Name:	Thorax Impact with Arm	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	303		
Test ID:	Thorax With Arm	Test Date:	11/30/2012
Test Number:	1	Test Time:	10:59:38 AM



Test Time: **10:59:38 AM**

Test Date: **11/30/2012**

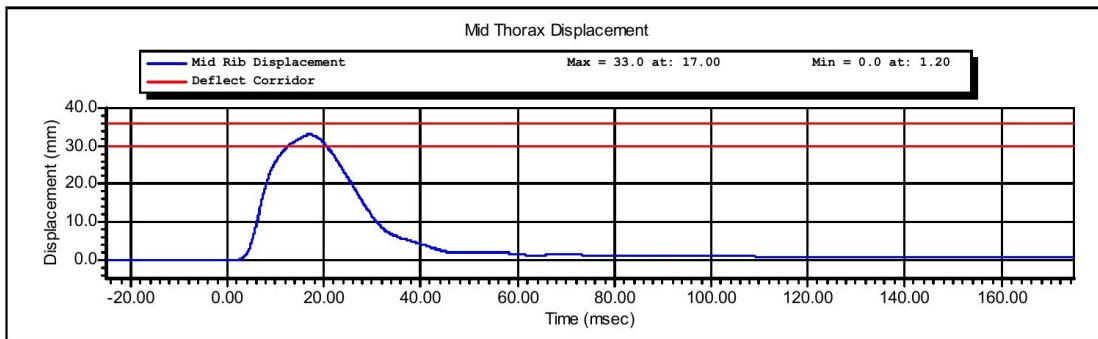
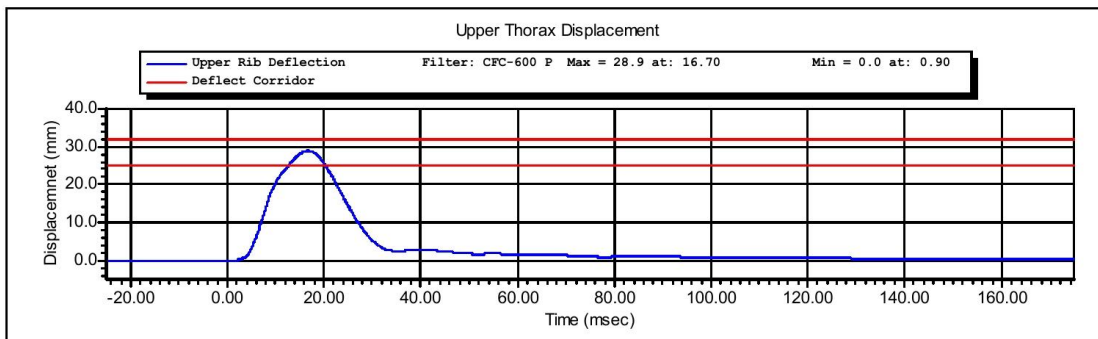
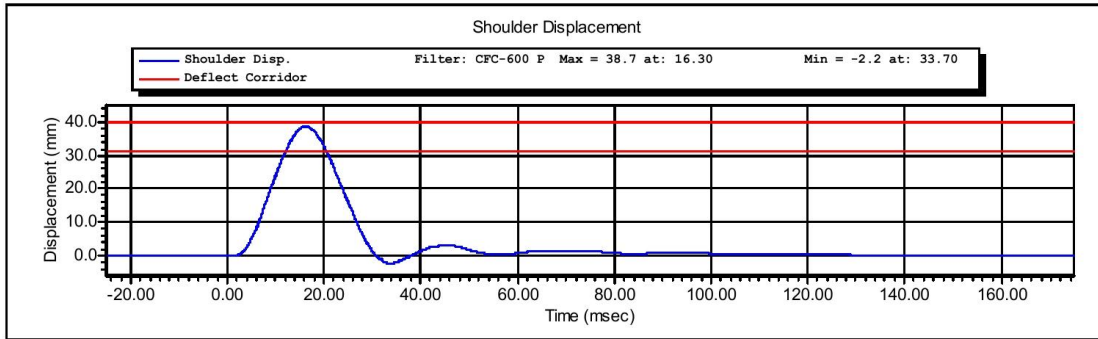
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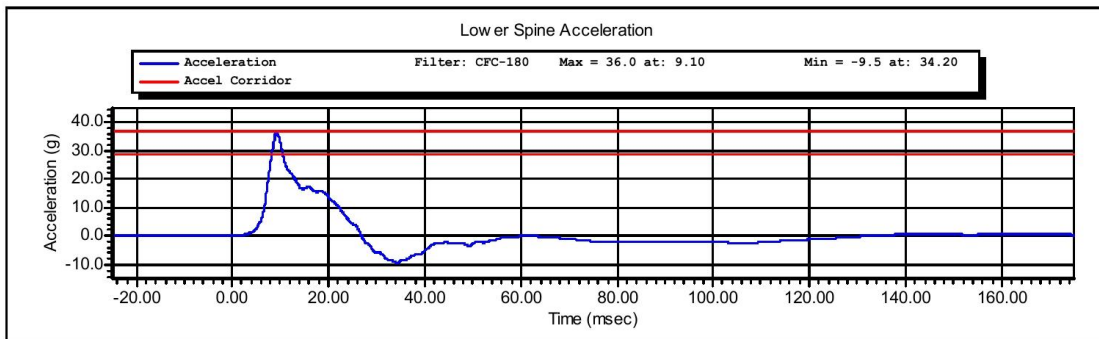
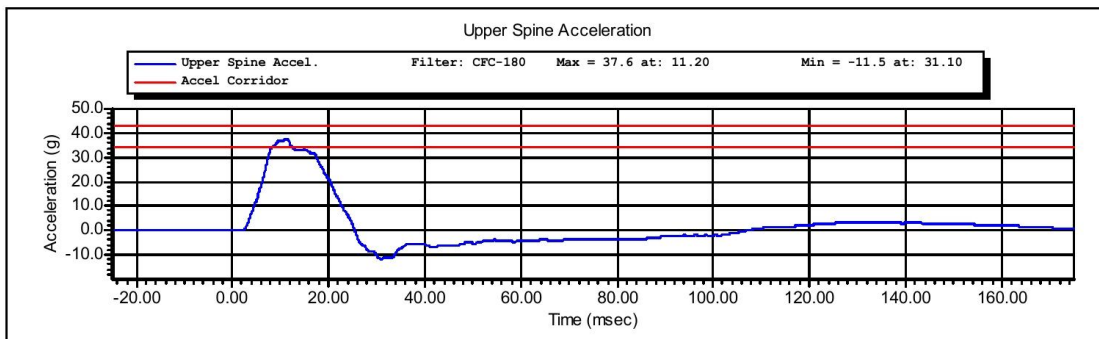
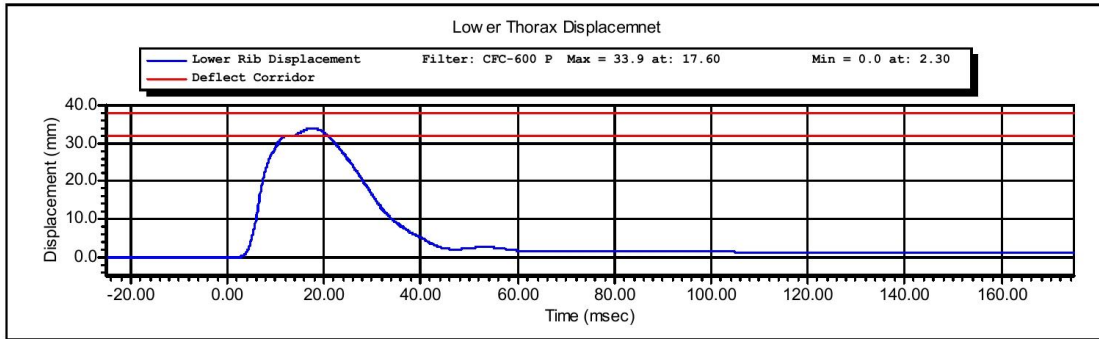
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Test Time: 10:59:38 AM

Test Date: 11/30/2012

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Test Time: 10:59:38 AM

Test Date: 11/30/2012

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VERIFICATION REPORT

Test Name:	Abdominal Impact	Revision:	8/24/2009
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	303		
Test ID:	Abdomen	Test Date:	11/30/2012
Test Number:	1	Test Time:	9:10:23 AM

Component Part Number	Component Serial Number
Upper Abdomen Rib	1789
Lower Abdomen Rib	1790

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.6 deg C P
Humidity	10 -- 70	20 %RH P
Velocity	4.20 -- 4.40	4.33 m/s P
Probe Acceleration	12.0 -- 16.0	15.5 g P
Upper Abdominal Rib Deflection	36.0 -- 47.0	38.4 mm P
Lower Abdominal Rib Deflection	33.0 -- 44.0	35.5 mm P
Lower Spine Acceleration - T12	9.0 -- 14.0	12.5 g P

All test parameters are within specifications

Technician: **M. Goehle**

Supervisor: **D. Travale**

Test Time: **9:10:23 AM**

Test Date: **11/30/2012**



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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	C14953	11/28/2012
Servo	180-3885	DS-1274	10/24/2012
Servo	180-3885	DS-1285	10/25/2012
Endevco	7264-2000	P63861	10/25/2012

Test Time: 9:10:23 AM

Test Date: 11/30/2012

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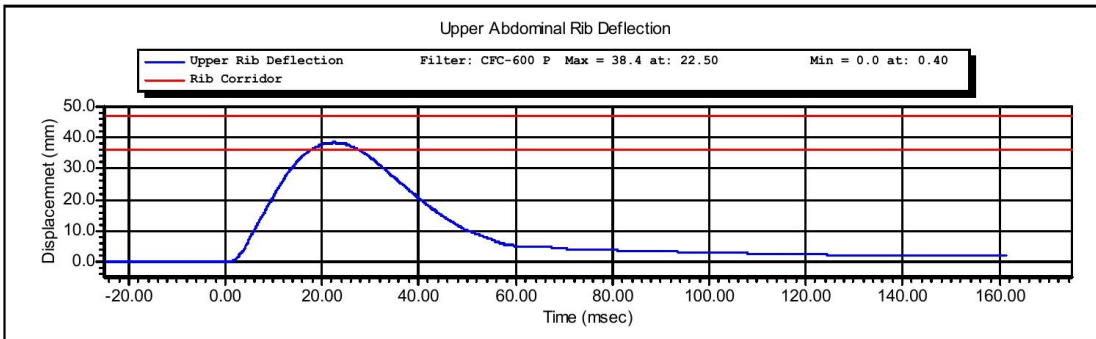
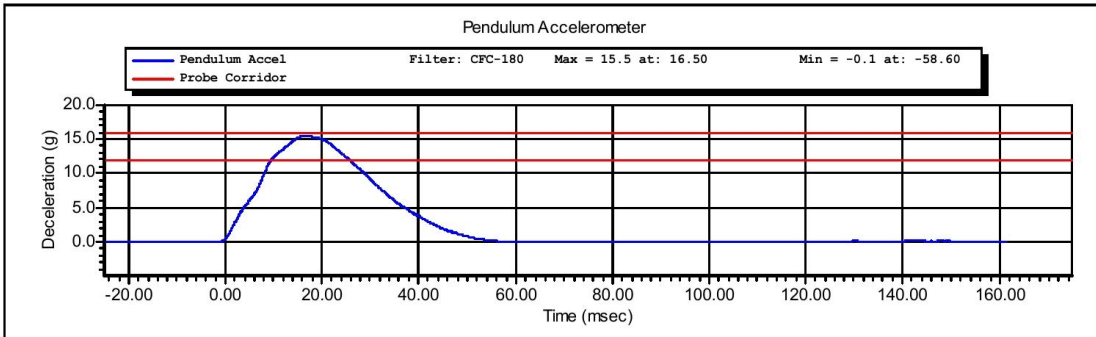


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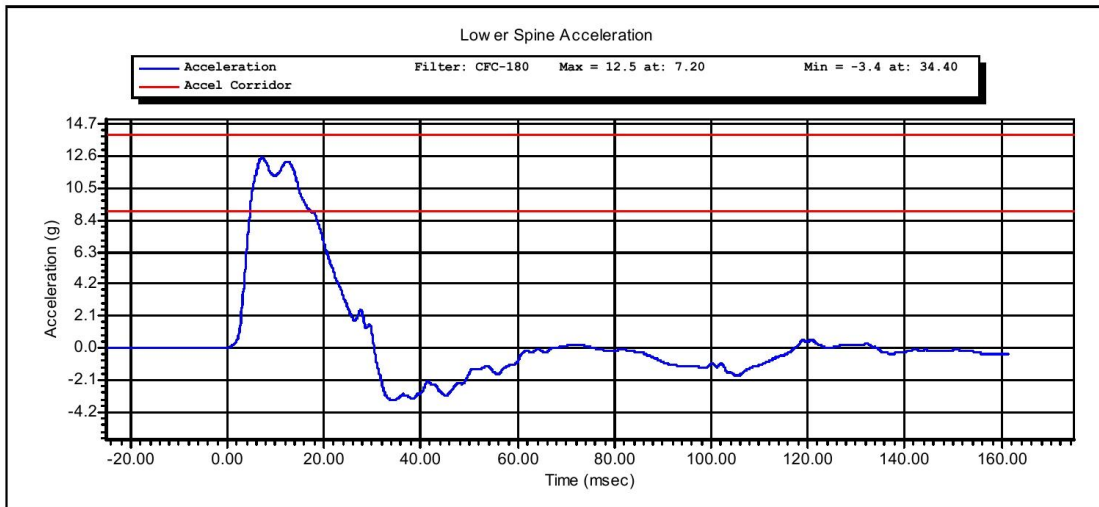
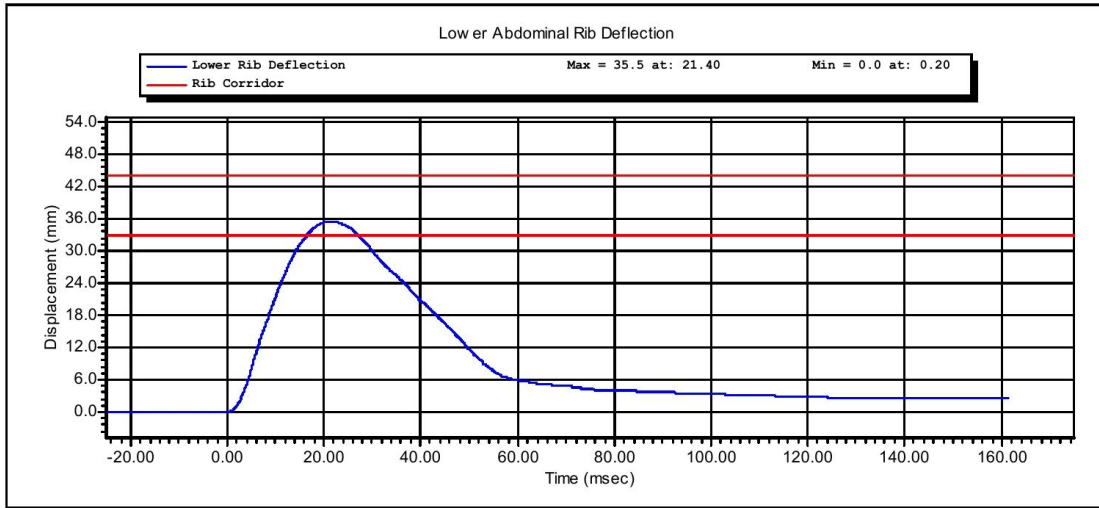
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Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	303		
Test ID:	Abdomen	Test Date:	11/30/2012
Test Number:	1	Test Time:	9:10:23 AM



Test Time: 9:10:23 AM

Test Date: 11/30/2012

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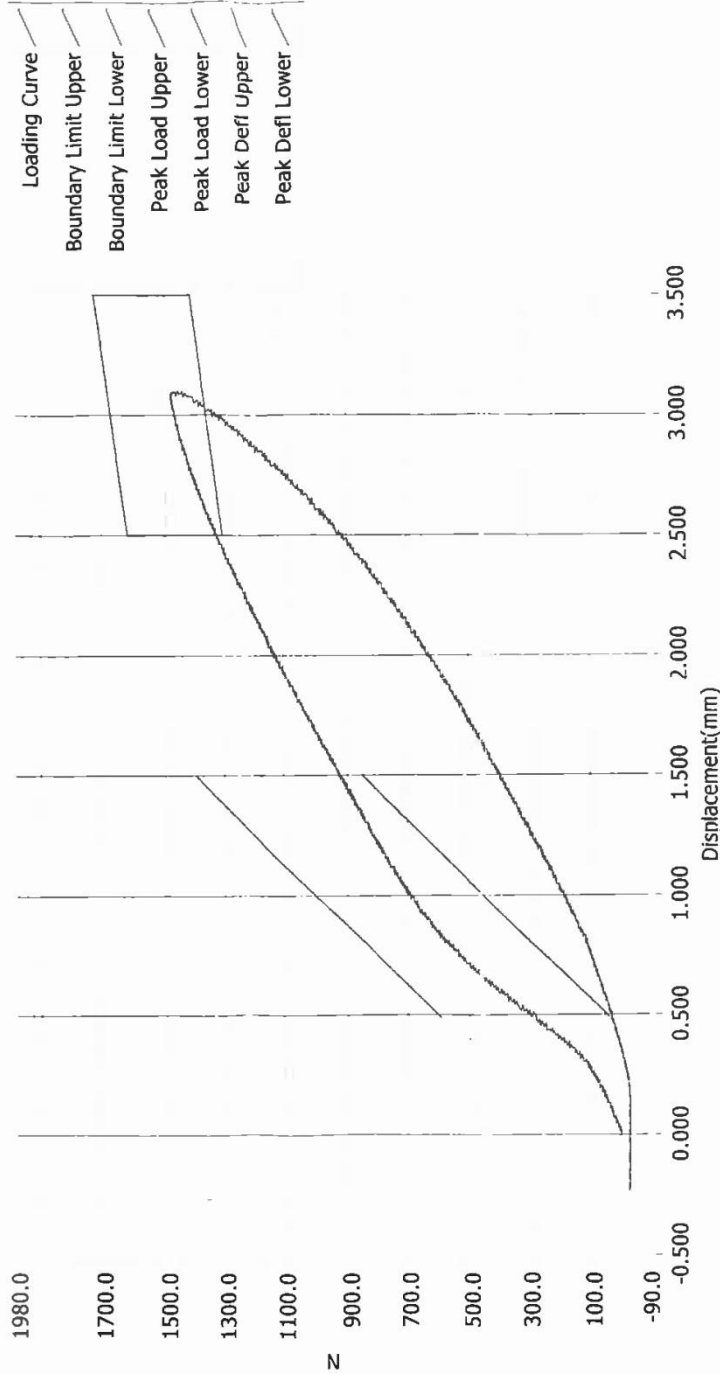


Test Time: 9:10:23 AM

Test Date: 11/30/2012

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

Resultant Data - SIDIIs Plug Compression



ATD Calibration Lab Test ID Part Serial Number Test Date Test Time
 303 Certification 37066 10/8/2010 9:44 PM
 (1/30/12) N/A ATD Serial Number SIDIIs

Current Date : 10/8/2010 Current Time : 21:45:19



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VERIFICATION REPORT

Test Name:	Pelvis	Revision:	8/24/2009
Sub Test Name:	Acetabulum Impact	Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	303		
Test ID:	Acetabulum	Test Date:	11/30/2012
Test Number:	3	Test Time:	2:36:10 PM

Component Part Number	Component Serial Number
FTSS Cert Plug - 1468N	37066

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.9 deg C P
Humidity	10 -- 70	23 %RH P
Velocity	6.60 -- 6.80	6.60 m/s P
Peak Probe Acceleration	38.0 -- 47.0	41.8 g P
Peak Pelvis Acceleration	34.0 -- 42.0	39.8 g P
Peak Acetabulum Force	3.60 -- 4.30	3.70 kN P

All test parameters are within specifications

Technician: **M. Goehle**

Supervisor: **D. Travale**

Test Time: **2:36:10 PM**

Test Date: **11/30/2012**



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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	C14953	11/28/2012
Endevco	7264-2000	P51259	7/30/2012
FTSS	IF-520	LC-236 Fy	10/25/2012

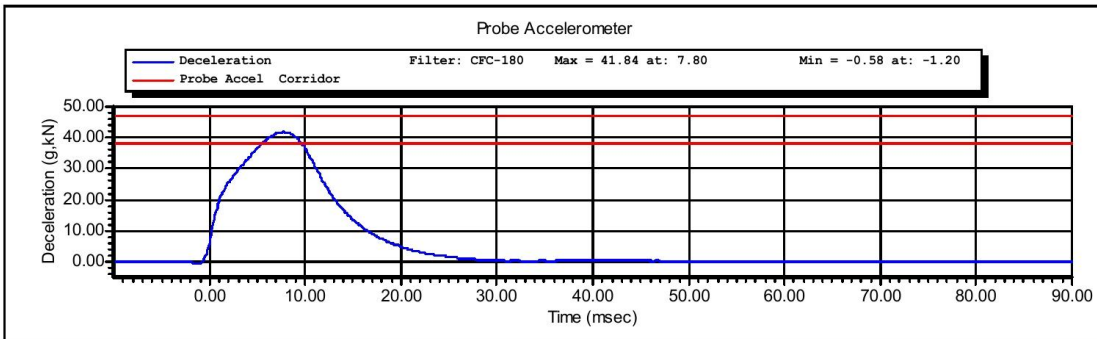
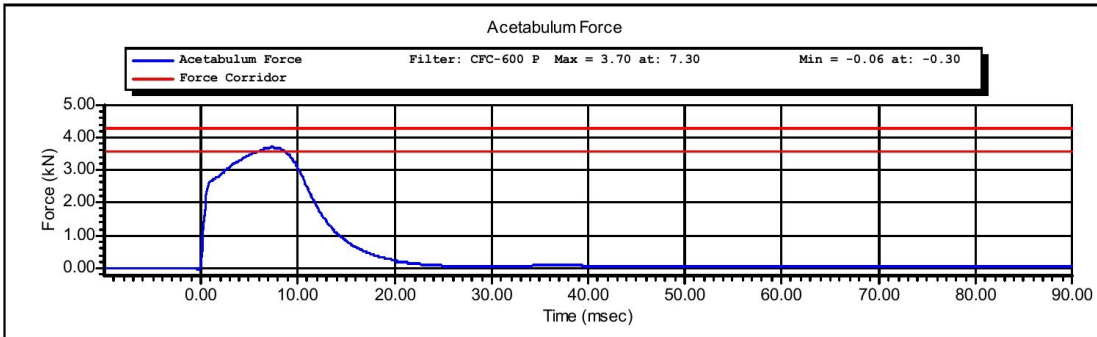
Test Time: 2:36:10 PM

Test Date: 11/30/2012

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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:	303		
Test ID:	Acetabulum	Test Date:	11/30/2012
Test Number:	3	Test Time:	2:36:10 PM



Test Time: 2:36:10 PM

Test Date: 11/30/2012

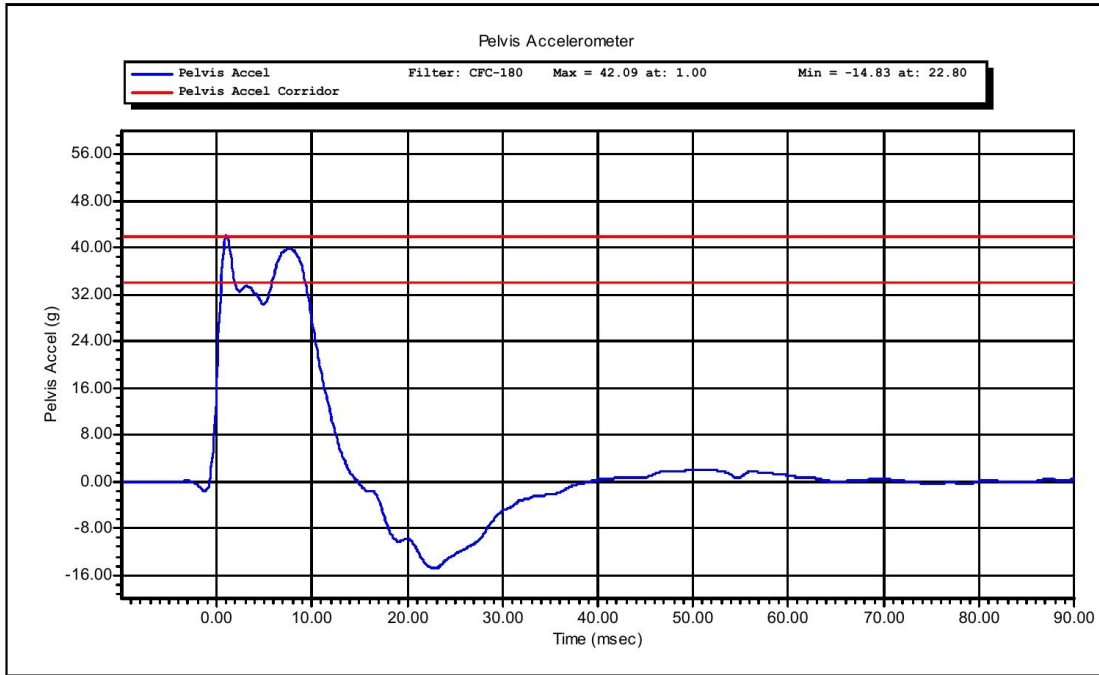
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Test Time: 2:36:10 PM

Test Date: 11/30/2012

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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:	303		
Test ID:	Iliac	Test Date:	11/30/2012
Test Number:	1	Test Time:	7:53:58 AM

Component Part Number	Component Serial Number
180-4343 Pelvis Flesh	881

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.3 deg C P
Humidity	10 -- 70	21 %RH P
Velocity	4.20 -- 4.40	4.33 m/s P
Peak Probe Acceleration	36.0 -- 45.0	40.7 g P
Peak Pelvis Acceleration	28.0 -- 39.0	35.5 g P
Peak Iliac Force	4.10 -- 5.10	4.50 kN P

All test parameters are within specifications

Technician: **M. Goehle**

Supervisor: **D. Travale**

Test Time: **7:53:58 AM**

Test Date: **11/30/2012**

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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	C14953	11/28/2012
Endevco	7264-2000	P51259	7/30/2012
DentonATD	3228J	LC-280 Fy	10/24/2012

Test Time: 7:53:58 AM

Test Date: 11/30/2012

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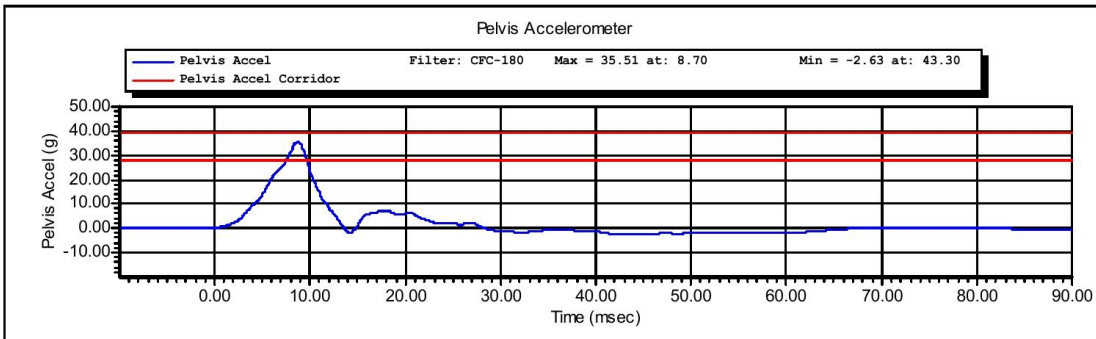
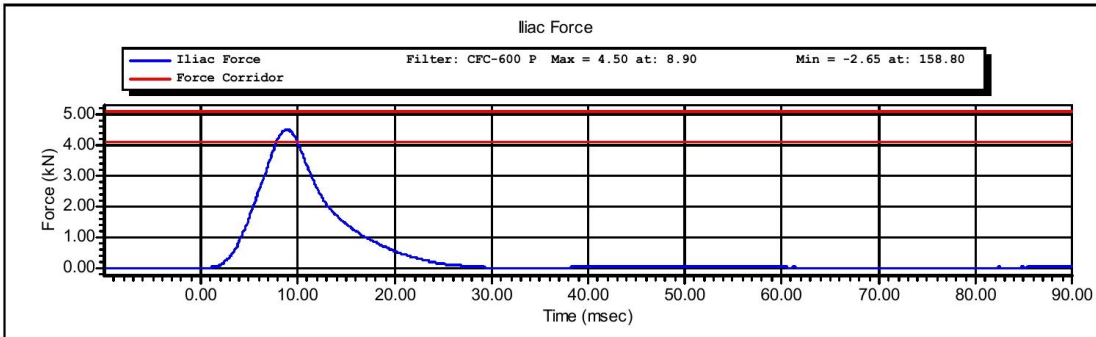


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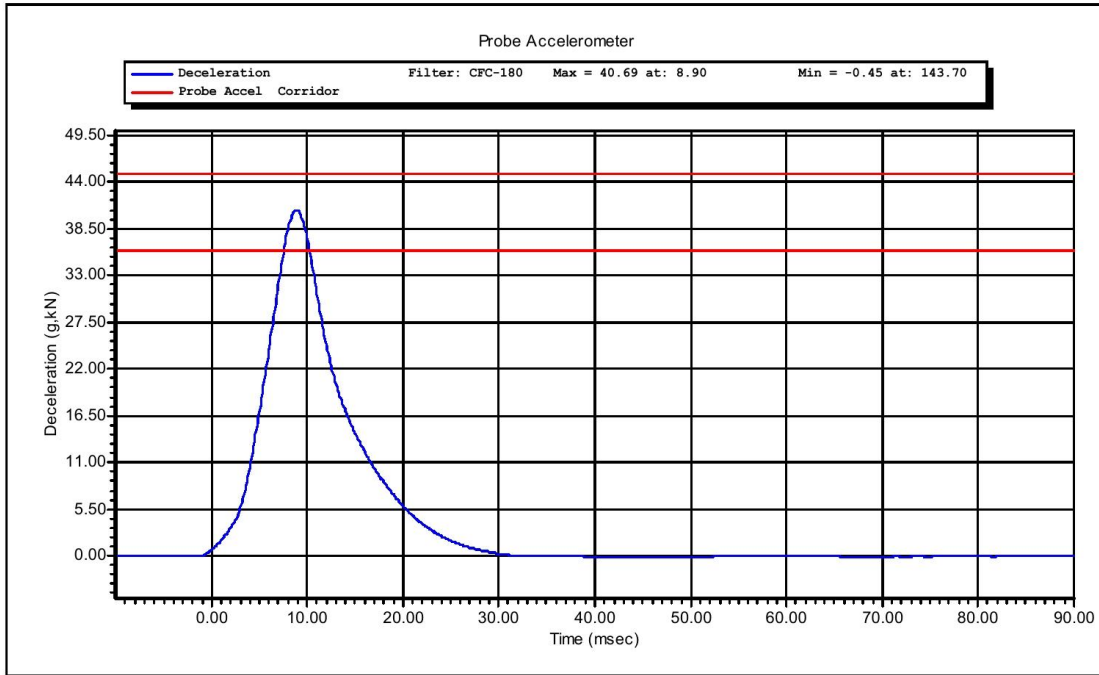
Test Name:	Pelvis	Revision:	8/24/2009
Sub Test Name:	Iliac Impact	Spec Type:	NHTSA
ATD Type:	SID-IIs		
ATD Serial Number:	303		
Test ID:	Iliac	Test Date:	11/30/2012
Test Number:	1	Test Time:	7:53:58 AM



Test Time: **7:53:58 AM**

Test Date: **11/30/2012**

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Test Time: 7:53:58 AM

Test Date: 11/30/2012

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APPENDIX D

TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

Table 1 – Dummy Instrumentation (ES-2re)

			ES-2re S/N: F033		
			Serial Number	Manufacturer	Calibration Date
Head Accelerometers	X		P49204	ENDEVCO	11/19/2012
	Y		P63981	ENDEVCO	11/19/2012
	Z		P64007	ENDEVCO	11/19/2012
Thorax Rib Displacement Potentiometers	Upper	Y	179	HONEYWELL	5/17/2012
	Middle	Y	185	HONEYWELL	5/17/2012
	Lower	Y	178	HONEYWELL	5/17/2012
Abdomen Load Cells	Forward	Y	1524	DENTON	5/24/2012
	Middle	Y	1523	DENTON	5/24/2012
	Rear	Y	1530	DENTON	5/24/2012
Lower Spine Accelerometers (T12)	X		AAMD5	ENDEVCO	11/19/2012
	Y		J27457	ENDEVCO	11/19/2012
	Z		P52099	ENDEVCO	11/19/2012
Pubic Symphysis Load Cell	Y		456	DENTON	5/24/2012

Table 2 – Dummy Instrumentation (SID-IIs)

				SID-IIs S/N: 303		
				Serial Number	Manufacturer	Calibration Date
Head Accelerometers	X		P59021	ENDEVCO	7/24/2012	
	Y		P52088	ENDEVCO	7/24/2012	
	Z		P58794	ENDEVCO	7/24/2012	
Displacement Potentiometers	Shoulder		Y			
	Thoracic Rib	Upper	Y	1199	FTSS	10/25/2012
		Middle	Y	1246	FTSS	10/24/2012
		Lower	Y	1256	FTSS	10/25/2012
	Abdominal Rib	Upper	Y	1274	FTSS	10/24/2012
		Lower	Y	1285	FTSS	10/25/2012
Lower Spine Accelerometers (T12)	X		P52023	ENDEVCO	10/26/2012	
	Y		P63861	ENDEVCO	10/25/2012	
	Z		P49213	ENDEVCO	10/24/2012	
Acetabulum Load Cell	Y		236	DENTON	10/25/2012	
Iliac Wing Load Cell	Y		280	DENTON	10/24/2012	
Pelvis Plug (struck side)			46454	HUMANETICS	9/22/2011	
Pelvis Plug (non-struck side)						

Table 3 – Vehicle Instrumentation

Vehicle Instrumentation			Serial Number	Manufacturer	Calibration Date
1	Vehicle Center of Gravity	X	A081429	MS	9/26/2012
	Vehicle Center of Gravity	Y	A081447	MS	8/10/2012
	Vehicle Center of Gravity	Z	A081463	MS	8/10/2012
2	Right Sill at Front Seat	X	A081413	MS	8/10/2012
	Right Sill at Front Seat	Y	A081417	MS	8/10/2012
	Right Sill at Front Seat	Z	A081443	MS	8/10/2012
3	Right Sill at Rear Seat	X	A081436	MS	8/10/2012
	Right Sill at Rear Seat	Y	A081453	MS	8/10/2012
	Right Sill at Rear Seat	Z	A081456	MS	8/10/2012
4	Left Sill at Front Door	Y	A081421	MS	9/5/2012
5	Left Sill at Rear Door	Y	A081418	MS	9/4/2012
6	Left A-Post Lower	Y	A081455	MS	9/4/2012
7	Left A-Post Middle	Y	A070861	MS	9/5/2012
8	Left B-Post Lower	Y	A005901	MS	9/5/2012
9	Left B-Post Middle	Y	A081419	MS	9/5/2012
10	Front Seat Track	Y	A005899	MS	9/4/2012
11	Rear Seat Track or Structure	Y	A081437	MS	9/4/2012
12	Right Rear Occ. Compartment	Y	A005903	MS	9/5/2012
13	Engine Block	X	A081461	MS	8/10/2012
	Engine Block	Y	A081425	MS	8/10/2012
14	Rear Floorpan Above Axle	X	A081445	MS	8/10/2012
	Rear Floorpan Above Axle	Y	A005869	MS	8/10/2012
	Rear Floorpan Above Axle	Z	A081433	MS	8/10/2012

TABLE 4 – MDB Instrumentation

MDB Instrumentation		Serial Number	Manufacturer	Calibration Date
MDB Center of Gravity	X	C14901	ENDEVCO	9/14/2012
MDB Center of Gravity	Y	C16680	ENDEVCO	9/14/2012
MDB Center of Gravity	Z	CP30	ENDEVCO	9/14/2012
Left Frame at Rear Axle Centerline	X	C16507	ENDEVCO	9/14/2012
Left Frame at Rear Axle Centerline	Y	C16499	ENDEVCO	9/14/2012