

REPORT NUMBER: SNCAP-CAL-10-03

**VALIDATION
SIDE IMPACT POLE TEST**

**FORD MOTOR COMPANY
2010 FORD MUSTANG
2-DOOR COUPE**

NHTSA NUMBER: MA0204

**PREPARED BY:
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Test Date: May 12, 2009

FINAL REPORT

**PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF CRASHWORTHINESS STANDARDS
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Date: August 5, 2009

Technical Report Documentation Page

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16. Abstract A 31.2 km/h (19.5 mph), 75° oblique impact Validation Side Impact Pole Test was conducted on the subject 2010 Ford Mustang 2-Door in accordance with the specifications of the Office of Crashworthiness Standards Side NCAP Pole Laboratory Test Procedure for the generation of consumer information on vehicle side pole crash protection. This test was conducted at the Calspan Corporation Crash Test Facility in Buffalo, New York, on May 12, 2009. The impact velocity was 31.7 km/h, and the ambient temperature at the struck (driver's) side of the vehicle was 21°C. The test vehicle post-test maximum crush was 425 mm at level 2. The test vehicle's occupant performance is as follows: <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="text-align: left;">Measurement Description</th> <th style="text-align: left;">Units</th> <th style="text-align: left;">Driver ATD (SID-IIs) Threshold</th> <th style="text-align: left;">Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₃₆)</td> <td>N/A</td> <td>1000</td> <td>3682</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td>Gs</td> <td>82</td> <td>65.9</td> </tr> <tr> <td>Combined Ace tabular and Iliac Pelvic Force</td> <td>N</td> <td>5525</td> <td>6046</td> </tr> </tbody> </table> 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.				Measurement Description	Units	Driver ATD (SID-IIs) Threshold	Result	Head Injury Criteria (HIC ₃₆)	N/A	1000	3682	Resultant Lower Spine Acceleration	Gs	82	65.9	Combined Ace tabular and Iliac Pelvic Force	N	5525	6046
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17. Key Words Validation Test Side Impact Pole Part 572V SID-IIs		18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Adm. Technical Ref. Division, 1200 New Jersey Ave. SE Washington, D.C. 20590																	
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SECTION 1

PURPOSE AND TEST PROCEDURE

PURPOSE

This side impact test was conducted as part of the FY 2010 Validation Side Impact Pole Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-03-D-22005. The purpose of this test is to generate comparative side impact performance in a 2010 Ford Mustang 2-Door Coupe manufactured by Ford Motor Company. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Side NCAP Pole Laboratory Test Procedure, dated April 2009.

SECTION 2

SUMMARY OF VALIDATION SIDE IMPACT POLE TEST

A rigid pole side impact test was conducted on a 2010 Ford Mustang 2-Door Coupe . The subject vehicle was towed into the rigid pole at an angle of 75° and a velocity of 31.7 km/h. The test was conducted by Calspan Corporation Transportation Research Group on May 12, 2009. Pre-test and post test photographs of the test vehicle and side impact dummy (SID-IIs) are included in Appendix A of this report.

One Part 572V (SID-IIs) dummy was placed in the driver designated seating position according to instructions specified in the OCWS Side NCAP Pole Laboratory Test Procedure, dated April 2009. Camera locations and other pertinent camera information are included in this report.

The Part 572V (SID-IIs) Dummy was instrumented accordingly:

- Head CG Triaxial Accelerometers
- Upper Neck Load Cells
- Shoulder Load Cell
- Thorax Upper, Middle, and Lower Rib Displacement Transducers
- Abdomen Upper and Lower Rib Displacement Transducers
- Acetabulum Load Cell
- Iliac Load Cell
- Lower Spine Triaxial Accelerometers

Appendix B contains the vehicle and dummy response data. A summary of the side impact configuration and performance verification test data is shown in Appendix C. Dummy and vehicle instrumentation calibration data can be found in Appendix D of this report.

The following table summarizes the results of the test:

Dummy	HIC(36ms)	Resultant Lower Spine Acceleration	Pelvic Force (N)
SID-IIs 5 th percentile female	3682	65.9	Iliac Wing = 3370.3
			Acetabular = 2676.5
			Sum = 6046

SUPPLEMENTAL RESTRAINT INFORMATION

Restraint Type	Left Front (Driver)		Left Rear (Passenger)	
	Mounted	Deployed	Mounted	Deployed
Front Airbag	Yes	No	No	NA
Knee Airbag	No	NA	No	NA
Side Torso Airbag	No	No	No	NA
Combination Head/Torso Side Airbag	Yes	No	No	NA
Curtain/Tube Side Airbag	No	NA	No	NA
Seat Belt Pretensioner	Yes	No	No	NA
Seat Belt Load Limiter	Yes	No	No	NA

SECTION 3
OCCUPANT AND VEHICLE INFORMATION

DATA SHEET NO. 1

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2010 Ford Mustang NHTSA No. MA0204
 Test Program: Validation Side Impact Pole Test Date: May 12, 2009

TEST VEHICLE INFORMATION AND VEHICLE OPTIONS

NHTSA No.	MA0204	Anti-Lock Brakes	Yes
Model Year	2010	All-Wheel Drive	No
Make	Ford	Power Steering	Yes
Model	Mustang	Driver Front Airbag	Yes
Body Style	2-Door Coupe	Driver Side Airbag	No
VIN	1ZVBP8AN5A5101727	Drive Head/Torso Airbag	Yes
Body Color	White	Driver Curtain Airbag	No
Delivery Date	5/5/09	Driver Knee Bag	No
Odometer Reading (km/mi)	74/119	Pass. Front Airbag	Yes
Dealer	Griffin Ford Lincoln Mercury Waukesha, WI	Pass. Head/Torso Airbag	Yes
Transmission	Manual 5-speed	Pass. Side Airbag	No
Final Drive	Rear	Pass. Curtain Airbag	No
Type/No. Cylinders	6	Pass. Knee Bag	No
Engine Displacement (L)	4.0	Pretensioners	Yes
Engine Placement	Longitudinal	Load Limiters	Yes
Roof Rack	No	Air Conditioning	Yes
Sunroof/T-Top	No	AM/FM CD	Yes
Tinted Glass	No	Tilting Steering	Yes
Traction Control	No	Automatic Door Locks	Yes
Power Brakes	Yes	Power Windows	Yes
Front Disc	Yes	Power Seats	No
Rear Disc	Yes	Other	NA

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

Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Ford Motor Company	GVWR (kg)	2059
Date of Manufacture	3/09	GAWR Front (kg)	993
		GAWR Rear (kg)	1070

VEHICLE SEATING AND WEIGHT CAPACITY DATA

	Front	Rear	Third	Total
Designated Seating Capacity (DSC)	2	2	-	4
Vehicle Capacity Weight (VCW) (kg)	326			
DSC X 68.04 kg	272			
Rated Cargo and Luggage Weight (RCLW) (kg)	54			

(A)

(B)

(A-B)

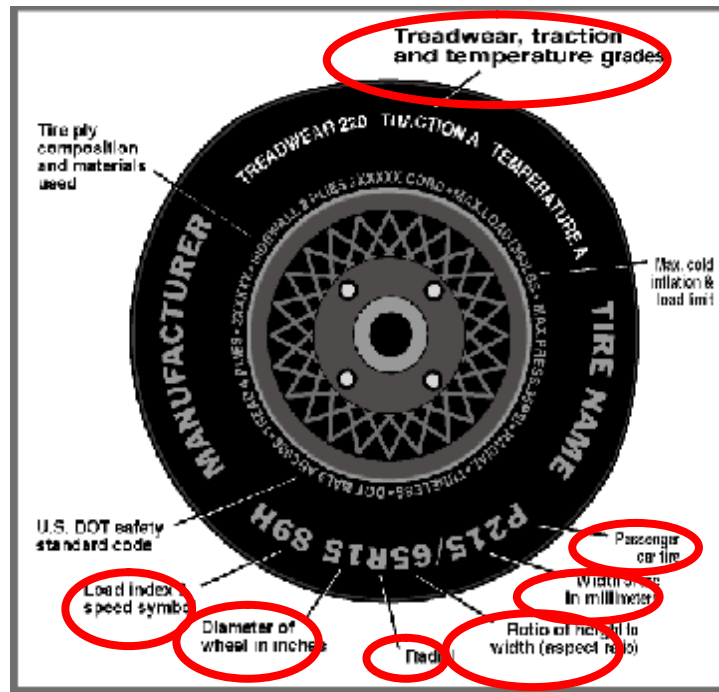
VEHICLE SEAT TYPE

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	X	-	-
Third row seat	-	-	-	-	-	-	-

DATA SHEET NO. 1 (continued)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle:	2010 Ford Mustang	NHTSA No.	MA0204
Test Program:	Validation Side Impact Pole	Test Date:	May 12, 2009



Measured Parameter	Front	Rear
Maximum Tire Pressure	300	300
Cold Pressure (kPa)	220	220
Recommended Tire Size	P215/60R17	P215/60R17
Tire Size on Vehicle	P215/60R17	P215/60R17
Tire Model	Traction T/A	Traction T/A
Tire Manufacturer	BFGoodrich	BFGoodrich
Treadwear	620	620
Traction	A	A
Temperature Grades	B	B
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	1 Polyester + 2 Steel + 1 Nylon	1 Polyester + 2 Steel + 1 Nylon
Load Index/Speed Symbol	95T	95T
Tire Material	Rubber	Rubber
DOT Safety Code Right	APNV H111 0109	APNV H111 0109
DOT Safety Code Left	APNV H111 0109	APNV H111 0109

DATA SHEET NO. 1 (continued)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle:	2010 Ford Mustang	NHTSA No.	MA0204
Test Program:	Validation Side Impact Pole	Test Date:	May 12, 2009

TEST VEHICLE AXLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			Fully Loaded (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	424.5	351.5		443.0	400.5		437.0	398.0	
Right	kg	418.5	357.5		417.5	399.5		416.0	398.0	
Ratio	%	54.3	45.7		51.8	48.2		51.7	48.3	
Totals	kg	843.0	709.0	1552.0	860.5	800.0	1660.5	853.0	796.0	1649.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1552.0	(A)
Actual Weight of 1 P572V ATD (SID-IIs) Dummy Used	kg	51.0	(B)
Rated Cargo/Luggage Weight (RCLW)	kg	54.0	(C)
Calculated Vehicle Target Weight (TVTW)	kg	1657.0	(A+B+C)

TEST VEHICLE ATTITUDES AND CG

	Units	As Delivered	As Tested	Fully Loaded
Driver Door Sill Angle (front-to-rear)*	Deg.	1.5	1.3	1.3
Front Passenger Sill Angle (front-to-rear)*	Deg.	1.5	1.3	1.3
Front Bumper Angle (left-to-right)**	Deg.	-0.2	-0.2	-0.1
Rear Bumper Angle (left-to-right)**	Deg.	-0.2	-0.2	-0.1
Vehicle CG (Aft of Front Axle)	mm	1243	1313	1310
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	0	10	13

* Front up is positive

** Left up is positive

GENERAL VEHICLE TEST DATA

Measurement Description	Units	Value
Weight of Ballast in Cargo Area	kg	11.3
Weight of Vehicle Components Removed	kg	None

Vehicle parts removed to make Target Vehicle Test Weight:

None

TEST VEHICLE VERTICAL IMPACT LINE DATA

Measurement Parameter	Units	Value
Vertical Impact Reference Line (Aft of Front Axle)	mm	1354
Actual Impact Point (Aft of Front Axle)	mm	1342
Impact Point Difference	mm	12

DATA SHEET NO. 2

SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEMS DATA

Test Vehicle: 2010 Ford Mustang

NHTSA No. MA0204

Test Program: Validation Side Impact Pole

Test Date: May 12, 2009

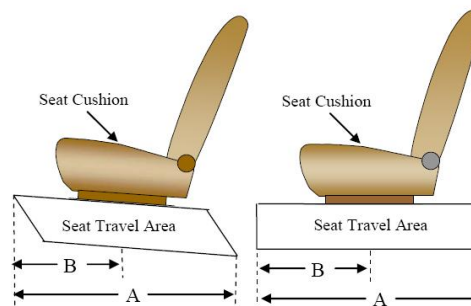
SEAT FORE/AFT POSITIONS

Describe the fore/aft and vertical operation of the driver's seat and explain the method used to determine how the seat was set to the forward-most, mid-height position.

Full forward to full down – placed seat in full forward with seat in mid range height.

Describe the fore/aft and vertical operation of the rear passenger's seat and explain the method used to determine how the seat was set to the rear-most, lowest position.

Not Applicable



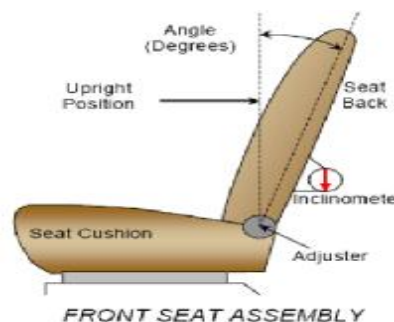
SEAT FORE/AFT POSITION

	Total Fore/Aft Travel (mm)	Placed in Detent # or Position (mm)
Driver Seat	240	0 (full forward)
Front Passenger Seat	240	0 (full forward)
Rear Seat – Struck Side	Fixed	NA
Rear-Seat – Non-Struck Side	Fixed	NA

SEAT BACK ANGLE POSITION

The driver and passenger seat backs are positioned to the manufacturer's designated angle. The procedure is as follows (describe how to position the inclinometer to measure the seat back angle. Include a description of the location of the adjustment latch detent, if applicable):

The inclinometer was positioned approximately 10" up from the seat back pivot point and was placed on the seat outboard frame.



SEAT BACK ANGLE

	Degrees	Detent
Driver Seat Back Angle with Seated Dummy	12.6	Detent unknown **
Front Passenger Seat Back Angle	12.6	Detent unknown **
Struck Side Rear Seat Back Angle	NA	NA
Non-Struck Side Rear Passenger Seat Back Angle	NA	NA

** Seat back was positioned to achieve a level longitudinal head position on the SID-IIs

SEAT BELT UPPER ANCHORAGE POSITIONS

Describe the method of positioning seat belt upper anchorages.

Not Applicable.

SEAT BELT UPPER ANCHORAGE POSITIONING

	Total # of Positions	Placed in Position #
Driver Seat	Not Applicable	Not Applicable
Front Passenger Seat	Not Applicable	Not Applicable

DATA SHEET NO. 2(CONTINUED)

SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEMS DATA

Test Vehicle: 2010 Ford Mustang

NHTSA No. MA0204

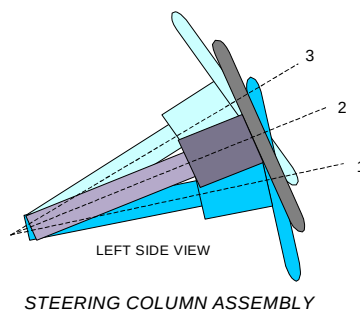
Test Program: Validation Side Impact Pole

Test Date: May 12, 2009

STEERING COLUMN ADJUSTMENTS

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. Describe how this measurement was attained.

A straight edge was placed on the steering wheel to achieve the uppermost and lowermost positions. The steering wheel was placed in the geometric center of these two positions.



STEERING COLUMN POSITIONING

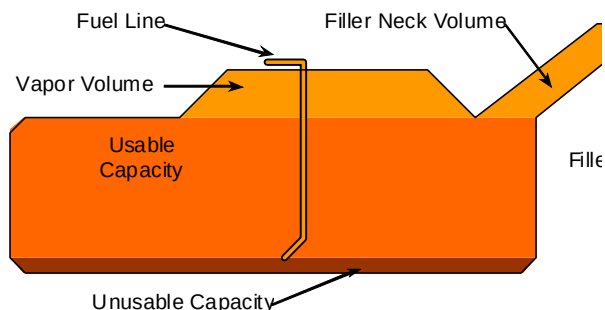
	Degrees	Fore/Aft Position (mm)
Lowermost, Position No. 1	21.1	NA
Geometric Center, Position No. 2	23.3	NA
Uppermost, Position No. 3	25.4	NA
Telescoping Steering Wheel Travel	Not Applicable	NA
Test Position	23.3	NA

FUEL PUMP

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

The fuel pump operates for 2 seconds to pressurize the fuel system following the actuation of the ignition.

The fuel filler neck is located on the rear left side of vehicle



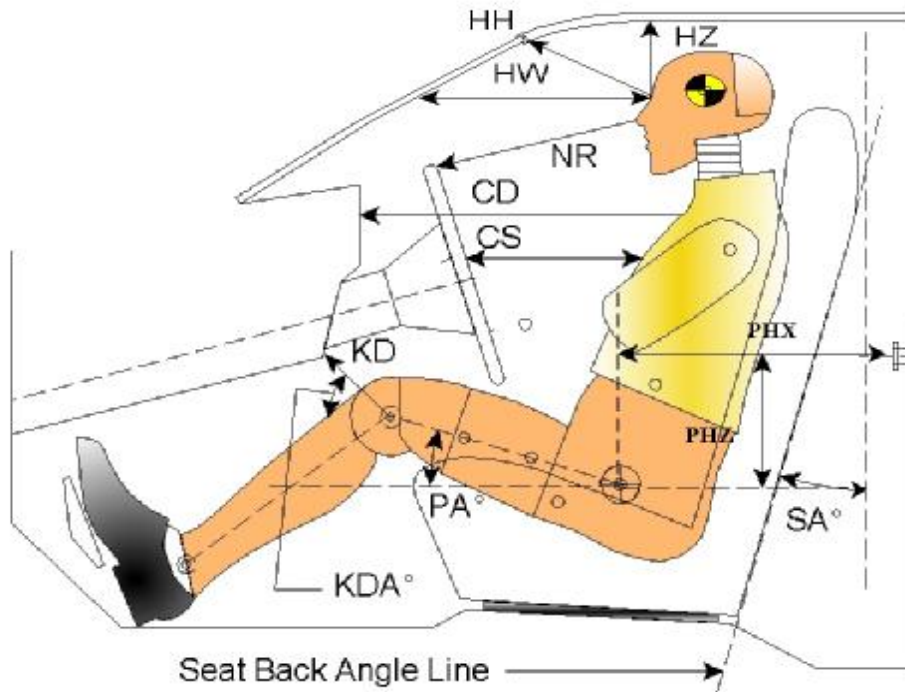
FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	60.6
Usable Capacity of "Optional Tank"	NA
Usable Capacity of Standard Tank as Specified in Owner's Manual	60.6
Usable Capacity of Optional Tank as Specified in Owner's Manual	NA
92-94% of Usable Capacity	55.8 – 57.0
Actual Amount of Solvent Used	56.4
1/3 of Usable Capacity	20.2

DATA SHEET NO. 3

DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle:	2010 Ford Mustang	NHTSA No.	MA0204
Test Program:	Validation Side Impact Pole	Test Date:	May 12, 2009



DUMMY ID# 304

Code	Measurement Description	Driver	
		Length (mm)	Angle (°)
HH	Head to Header	262	
HW	Head to Windshield	520	
HZ	Head to Roof	175	
NR	Nose to Rim	259	
CD	Chest to Dash	439	
CS	Chest to Steering Wheel	198	
KDL/KDAL°	Left Knee to Dash	75	51
KDR/KDAR°	Right Knee to Dash	62	49
PA~	Pelvic Angle		21.4
PHX	H-Point to Striker (X-Axis)	576	
PHZ	H-Point to Striker (Z-Axis)	183	
SA~	Seat Back Angle		12.6

DATA SHEET NO. 4

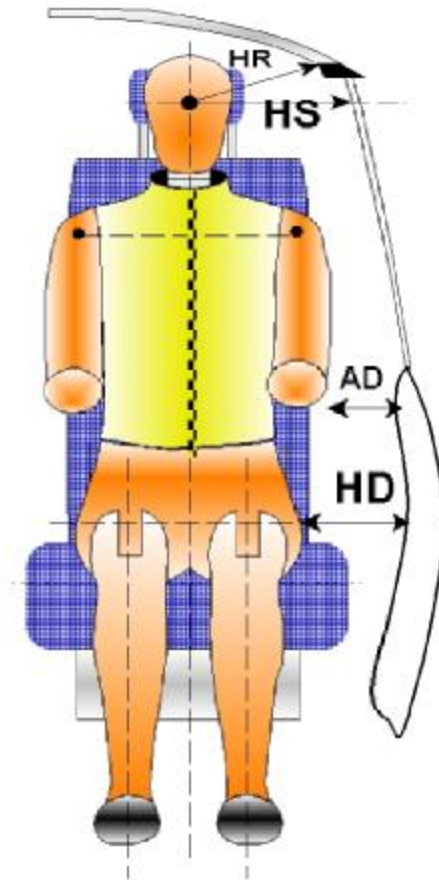
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2010 Ford Mustang

NHTSA No. MA0204

Test Program: Validation Side Impact Pole

Test Date: May 12, 2009



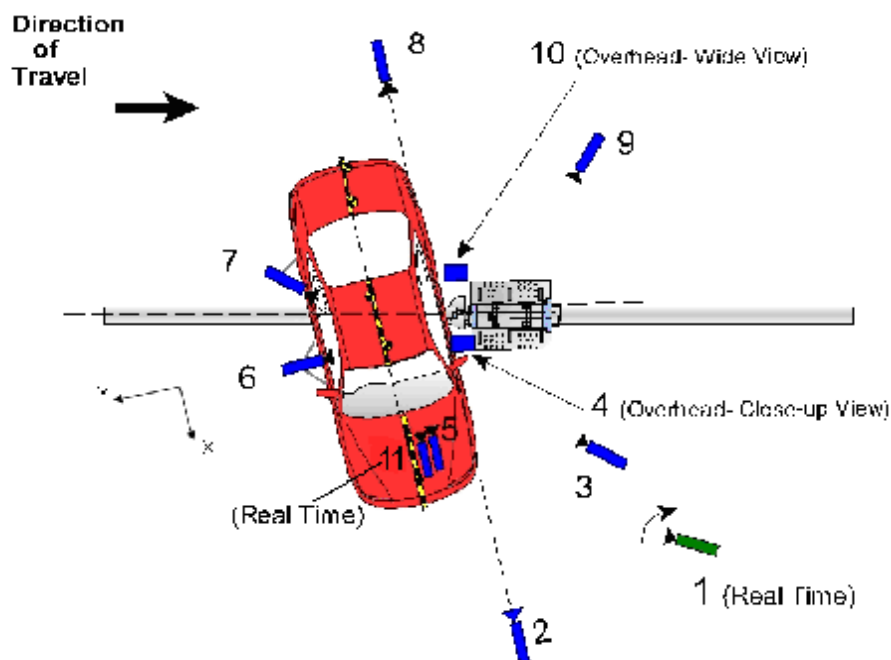
DUMMY ID# 304

Code	Measurement Description	Length (mm)
HR	Head To Side Header	252
HS	Head to Side Window	377
AD	Arm to Door	134
HD	H-Point to Door	155

DATA SHEET NO. 5

CAMERA AND INSTRUMENTATION DATA

Test Vehicle:	2010 Ford Mustang	NHTSA No.	MA0204
Test Program:	Validation Side Impact Pole	Test Date:	May 12, 2009



REFERENCE (from Point of Image for X and Y; ground for Z):
+ X = Forward of vehicle, + Y = Right of vehicle, + Z = Down

Camera No.	View	Coordinates (mm)			Lens (mm)	Film Speed (fps)
		X*	Y*	Z*		
1	Real time (24 fps) film coverage of test	-	-	-	-	24
2	Front ground level - impact view	7121	0	1150	50	1000
3	Impact side 45° - forward pole view	1131	1496	1150	28	1000
4	Overhead Close-up view of impact	180	390	4375	28	1000
5	Onboard – dummy front view	1381	545	1242	24	500
6	Onboard – dummy side view	459	1674	1021	12.5	500
7	Onboard – dummy rear view	-393	1867	1126	12.5	500
8	Rear ground level – impact view	7363	409	953	24	1000
9	Impact side 45° - rearward pole view	2904	3727	1254	24	1000
10	Overhead wide-view of impact	180	970	4375	14	1000

* All measurements accurate to ± 6 mm.

NOTE: Vehicle was at a 15° angle to the rigid pole.

INSTRUMENTATION

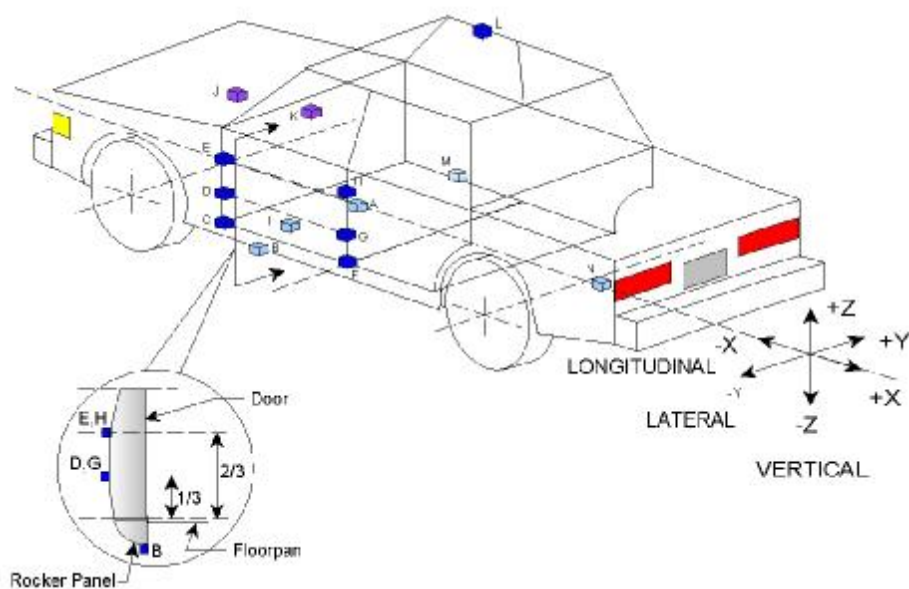
	Number of Channels
Driver Dummy	23
Vehicle Structure	21 #
Pole Load Cells	0
Contact Switches	0
Total No. of Data Channels	44

Includes triaxial angular rate sensor

DATA SHEET NO. 6

VEHICLE ACCELEROMETER DATA

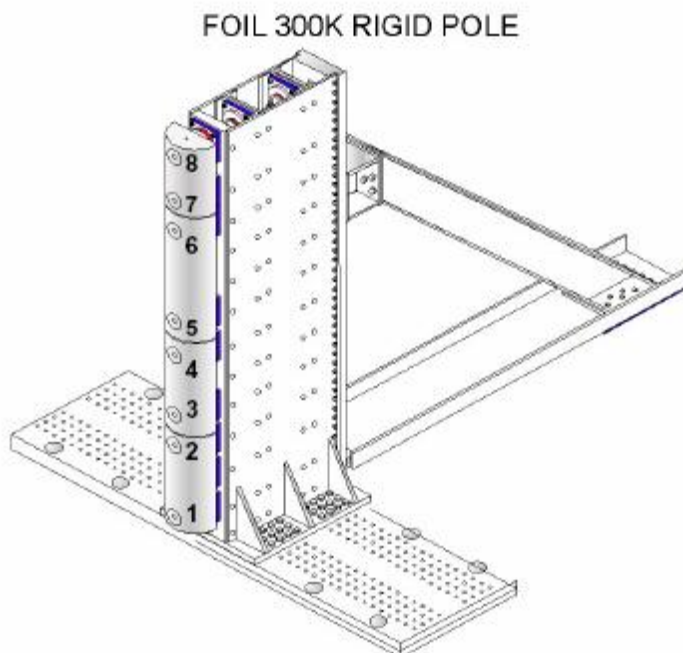
Test Vehicle:	2010 Ford Mustang	NHTSA No.	MA0204
Test Program:	Validation Side Impact Pole	Test Date:	May 12, 2009



Accelerometer Location				
	ID	Coordinates (mm)		
		X	Y	Z
A	Vehicle CG	2399	3	526
B	Left Floor Sill	2720	-666	261
C	A Pillar Sill	3073	-667	406
D	A Pillar Low	3090	-669	546
E	A Pillar Mid	2900	-659	1000
F	B Pillar Sill	1907	-642	378
G	B Pillar Low	1777	-682	707
H	B Pillar Mid	1752	-686	953
I	Driver Seat	2230	-543	275
J	Engine Top	3676	-214	788
K	Firewall	3478	-70	856
L	Right Roof	2061	553	1352
M	Right Floor Sill	2187	670	282
N	Rear Floorpan	1144	1	630

DATA SHEET NO. 7
RIGID POLE LOAD DATA

Test Vehicle:	2010 Ford Mustang	NHTSA No.	MA0204
Test Program:	Validation Side Impact Pole	Test Date:	May 12, 2009



LOAD CELL LOCATIONS

ID	Height from Ground (mm)
1	Not Applicable
2	Not Applicable
3	Not Applicable
4	Not Applicable
5	Not Applicable
6	Not Applicable
7	Not Applicable
8	Not Applicable

DATA SHEET NO. 8
POST TEST OBSERVATIONS

Test Vehicle:	2010 Ford Mustang	NHTSA No.	MA0204
Test Program:	Validation Side Impact Pole	Test Date:	May 12, 2009

TEST DUMMY INFORMATION AND CONTACT

Description	Driver Dummy
Dummy Type/Serial No.	SID-IIs (S/N: 304)
Head Contact	Stationary Impact Pole
Upper Torso Contact	Left Front Door
Lower Torso Contact	Left Front Door
Left Knee Contact	Left Front Door
Right Knee Contact	No Contact

POST TEST DOOR OPENING AND SEAT TRACK INFORMATION

Description	Front	Rear
Left Side Door Opening	Jammed shut	NA
Right Side Door Opening	Closed and operational	NA
Hatch and Other Doors	Closed and operational	
Seat Movement	0	NA
Seat Back Failure	None	NA

POST TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	Satisfactory
Sill Separation	No Separation
Windshield Damage	Significant window damage on left side
Window Damage	Left front window shattered during test
Other Notable Effects	Driver side head/torso airbag did not deploy during impact

SUPPLEMENTAL RESTRAINT INFORMATION

Restraint Type	Left Front (Driver) Occupant Location 1		Left Rear (Passenger) Occupant Location 4	
	Installed	Deployed	Installed	Deployed
Front Airbag	Yes	No	No	NA
Side Torso Airbag	No	NA	No	NA
Head Airbag	No	NA	No	NA
Head/Torso Side Airbag	Yes	No	No	NA
Curtain Airbag	No	NA	No	NA
Seat Belt Pretensioner	Yes	No	No	NA
Seat Belt Load Limiter	Yes	No	No	NA

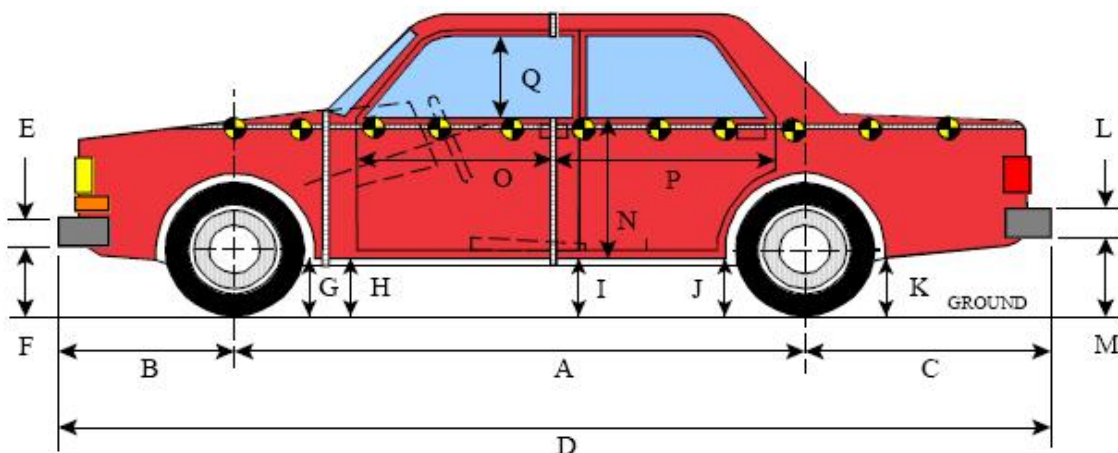
VEHICLE SPEED AND IMPACT DATA

Measured Parameter	Units	Requirement	Value
Horizontal Offset from Vertical Impact Reference Line	mm	+/- 38	+12
Trap No. 1 Velocity (Primary)	km/h	30.4 to 32.0	31.7
Trap No. 2 Velocity (Redundant)	km/h	30.4 to 32.0	31.8

DATA SHEET NO. 9

VEHICLE PROFILE MEASUREMENTS

Test Vehicle:	2010 Ford Mustang	NHTSA No.	MA0204
Test Program:	Validation Side Impact Pole	Test Date:	May 12, 2009



LEFT SIDE VIEW

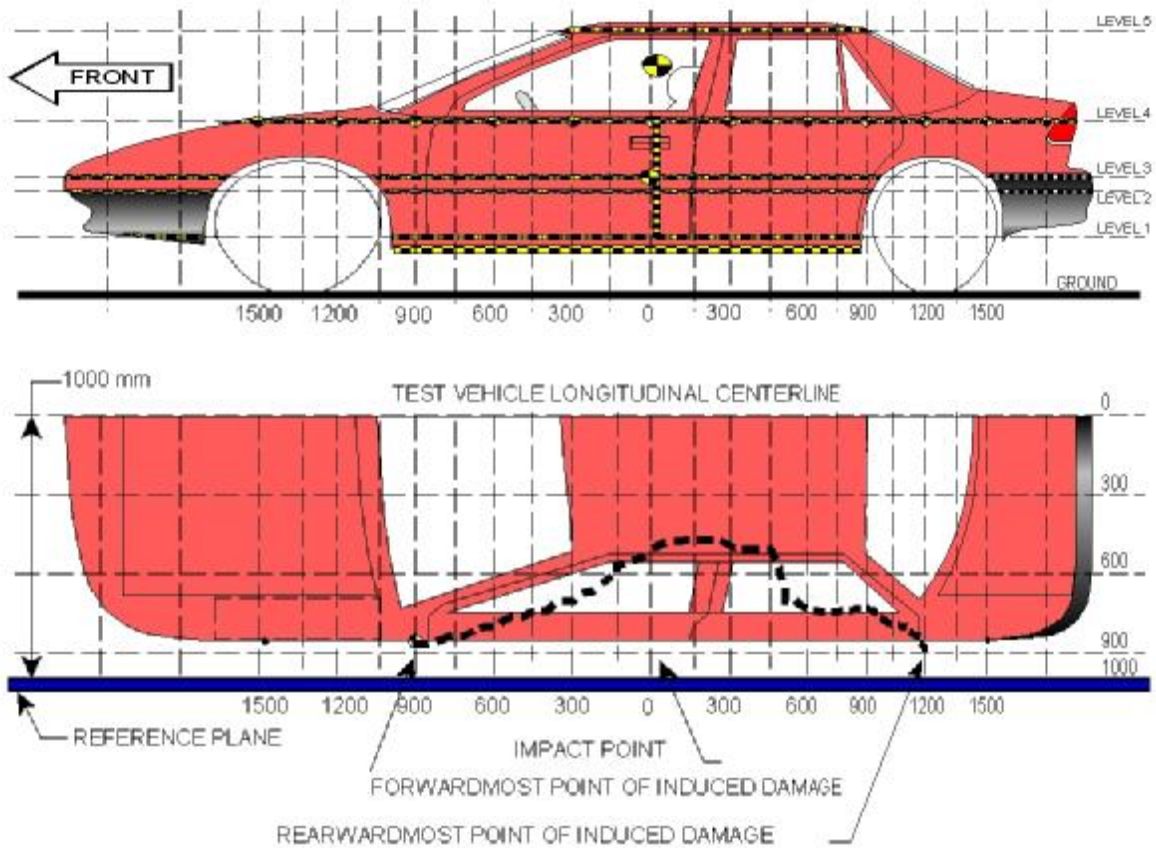
All MEASUREMENTS IN (mm) WITH TOLERANCE OF ± 3 mm

Code	Description	Pre-Test	Post-Test	Difference
A	Vehicle Wheelbase	2720	2624	96
B	Front Axle to FSOV	932	932	0
C	Rear Axle to RSOV	1126	1135	-9
D1	Total Vehicle Length at Left Side	4656	4573	83
D2	Total Vehicle Length at Centerline	4776	4743	33
D3	Total Vehicle Length at Right Side	4658	4658	0
E	Front Bumper Thickness	125	125	0
F	Front Bumper Bottom to Ground	380	450	-70
G	Sill Height at Front Wheel Well	137	131	6
H	Sill Height at Front Door Leading Edge	142	139	3
I	Sill Height at B Pillar	152	115	37
J1	Sill Height at Rear Wheel Well	156	193	-37
J2	Pinch Weld Height at Rear Wheel Well	162	195	-33
K	Sill Height Aft of Rear Wheel Well	229	233	-4
L	Rear Bumper Thickness	335	335	0
M	Rear Bumper Bottom to Ground	359	362	-3
N	Sill Height to Window Bottom Sill	685	708	-23
O	Front Door Leading Edge to Impact CL	634	632	2
P	Rear Door Trailing Edge to Impact CL	670	638	32
Q	Front Window Opening	400	329	71
R	Right Side Length	4658	4658	0
S	Left Side Length	4656	4573	83
T	Vehicle Width at B Post	1841	1814	27

DATA SHEET NO. 10

VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle:	2010 Ford Mustang	NHTSA No.	MA0204
Test Program:	Validation Side Impact Pole	Test Date:	May 12, 2009



Level	Measurement Description	Height Above Ground (mm)
1	Sill Top	273
2	Occupant H-Point	444
3	Mid-Door	630
4	Window Sill	891
5	Window Top	1316

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. 10 (CONTINUED)

VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2010 Ford Mustang NHTSA No. MA0204
 Test Program: Validation Side Impact Pole Test Date: May 12, 2009

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-900	872	915	914	833		874	900	910	868		-2	15	4	-35	
-750	873	914	915	842		826	868	899	866		47	46	16	-24	
-600	873	914	916	848		774	850	868	826		99	64	48	22	
-450	871	919	917	854		715	768	779	770		156	151	138	84	
-300	870	922	918	859		649	682	690	691		221	240	228	168	
-150	869	923	918	864		575	592	593	599		294	331	325	265	
0	869	922	918	868	622	490	497	498	501	459	379	425	420	367	163
150	868	922	918	871	629	537	519	518	517	488	331	403	400	354	141
300	865	921	918	873	632	659	644	634	621	517	206	277	284	252	115
450	862	919	917	874	631	751	754	634	701	543	111	165	283	173	88
600	855	916	915	876	627	768	857	834	788	559	87	59	81	88	68
750	850	913	916	880		842	789	843	828		8	124	73	52	
900	844	912	924	885		904	863	875	828		-60	49	49	57	
1050			935	885				878	845				57	40	
1200				884					854					30	
1350															
1500															
1650															
1800															
1950															
2100															
2250															
2400															
2550															
2700															
2850															

MAXIMUM CRUSH DATA

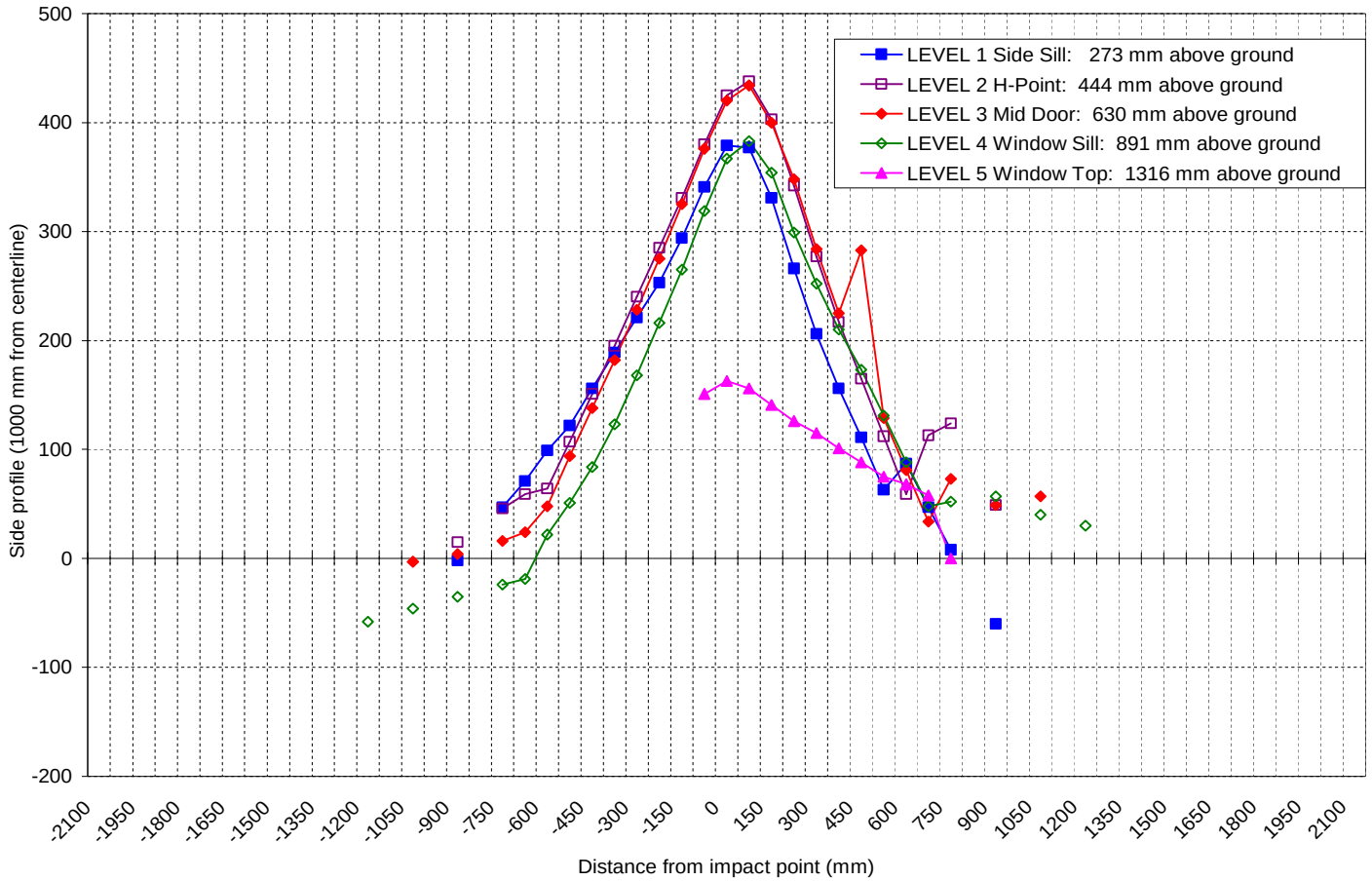
	Level1	Level2	Level3	Level4	Level5
Maximum Crush (mm)	379	425	420	367	163
Distance From Impact (mm)	0	0	0	0	0

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. The final distance to impact is determined after the final dummy positioning and the pole is aligned with the center of gravity of the dummy's head

DATA SHEET NO. 10 (CONTINUED)

VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle:	2010 Ford Mustang	NHTSA No.	MA0204
Test Program:	Validation Side Impact Pole	Test Date:	May 12, 2009



DATA SHEET NO. 11

DUMMY/VEHICLE TEMPERATURE STABILIZATION DATA

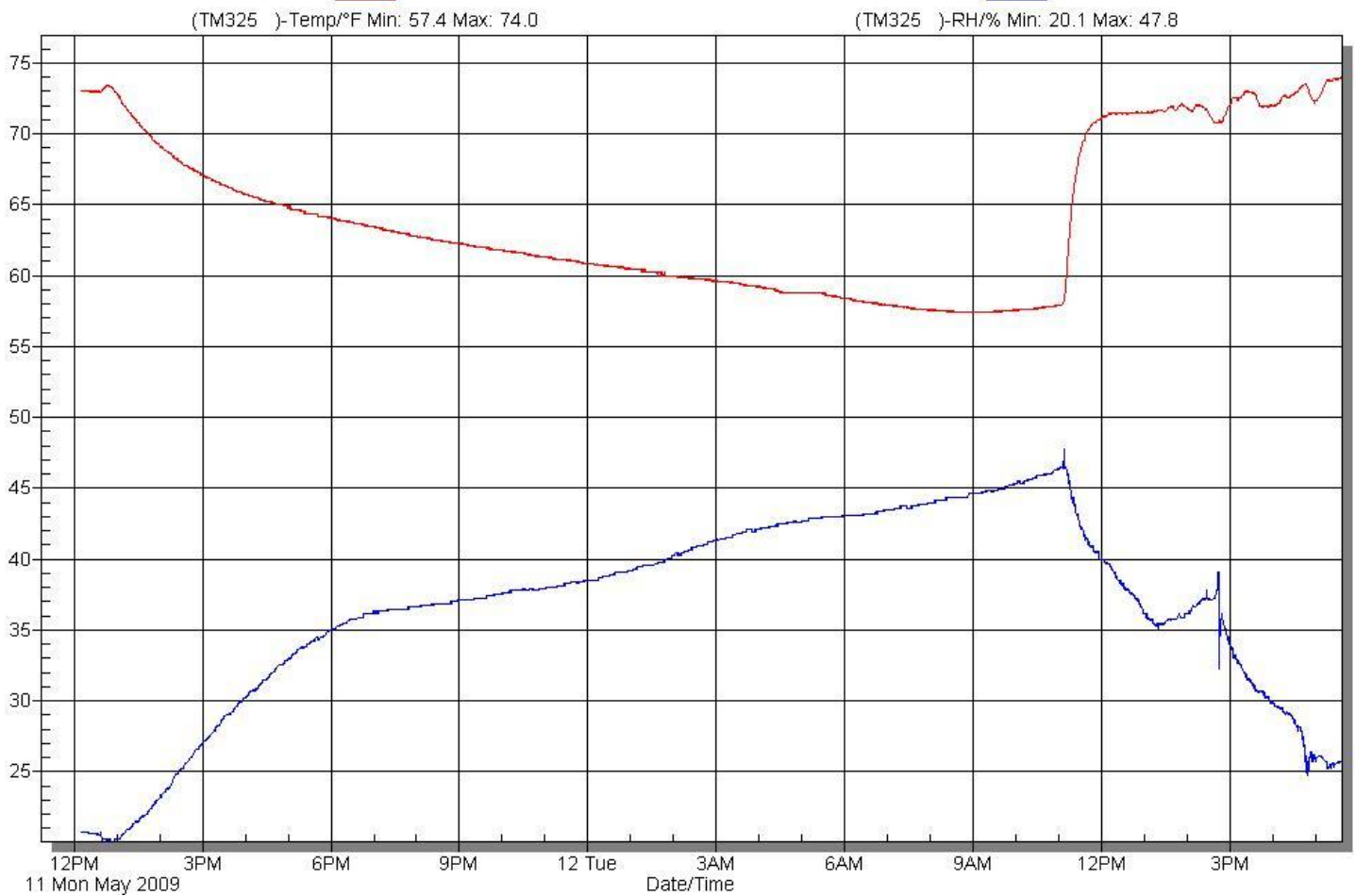
Test Vehicle: 2010 Ford Mustang

NHTSA No. MA0204

Test Program: Validation Side Impact Pole

Test Date: May 12, 2009

Downloaded Data - Wednesday, May 13, 2009



APPENDIX A
PHOTOGRAPHS

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



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



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



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



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



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



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 $\frac{3}{4}$ Rear View of Vehicle with Pole in Position



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



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



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



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



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



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



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

Photograph Not Available

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

Photograph Not Available

Figure A-18: Pre-Test Right Side View of Pole Positioned Against Side of 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 Showing Impact Location



Figure A-21: Pre-Test Front Close-Up View of Dummy



Figure A-22: Post-Test Front Close-Up View of Dummy



Figure A-23: Pre-Test Left Side View of Dummy



Figure A-24: Pre-Test Left Side View of Dummy Shoulder and Door Top View



Figure A-25: Post-Test Left Side View of Dummy Shoulder and Door Top View

Photograph Not Available

Figure A-26: Pre-Test Frontal View of Seat Back

Photograph Not Available

Figure A-27: Pre-Test Frontal View of Dummy Head and Shoulders

Photograph Not Available

Figure A-28: Pre-Test Frontal View of Seat Pan Prior to Dummy Positioning

Photograph Not Available

Figure A-29: Pre-Test Overhead View of Dummy's Thigh on Seat Pan

Photograph Not Available

Figure A-30: Pre-Test View of Dummy's Neck



Figure A-31: Pre-Test View of Dummy's Head (Level)



Figure A-32: Pre-Test Placement of Dummy's Feet

Photograph Not Available

Figure A-33: Pre-Test View of Belt Anchorage

Photograph Not Available

Figure A-34: Pre-Test Left Side View of Steering Wheel

Photograph Not Available

Figure A-35: Pre-Test View of Parking Brake

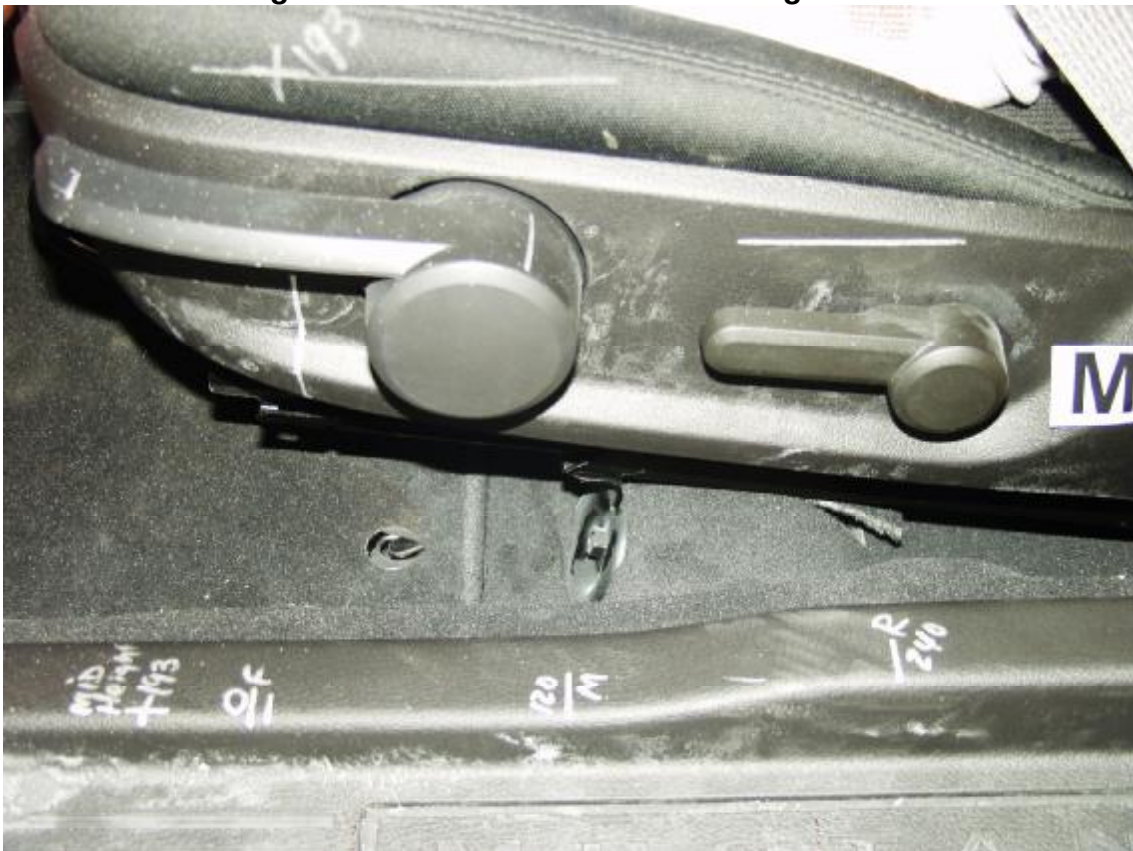


Figure A-36: Pre-Test Close-Up Left Side View of Driver Seat Track



Figure A-37: Pre-Test Close-Up Left Side View of Driver Seat Back

Photograph Not Available

Figure A-38: Pre-Test Close-Up View of Driver Seat Back



Figure A-39: Pre-Test Dummy and Door Clearance View



Figure A-40: Post-Test Dummy and Door Clearance View



Figure A-41: Pre-Test Right Side View of Dummy and Front Seat Occupant



Figure A-42: Post-Test Right Side View of Dummy and Front Seat Occupant



Figure A-43: Pre-Test Inner Door Panel View



Figure A-44: Post-Test Inner Door Panel View



Figure A-45: Post-Test Dummy Close-Up Head Contact with Vehicle View

Not Applicable

Figure A-46: Post-Test Dummy Close-Up Head Contact View with Side Airbag



Figure A-47: Post-Test Dummy Close-Up Torso Contact Vehicle Interior

Not Applicable

Figure A-48: Post-Test Dummy Close-Up Torso Contact with Side Airbag



Figure A-49: Post-Test Dummy Close-Up Pelvis Contact View

Not Applicable

Figure A-50: Post-Test Dummy Close-Up Pelvis Contact with Side Airbag



Figure A-51: Pre-Test View of Fuel Filler Cap/Neck View



Figure A-52: Post-Test View of Fuel Filler Cap/Neck View

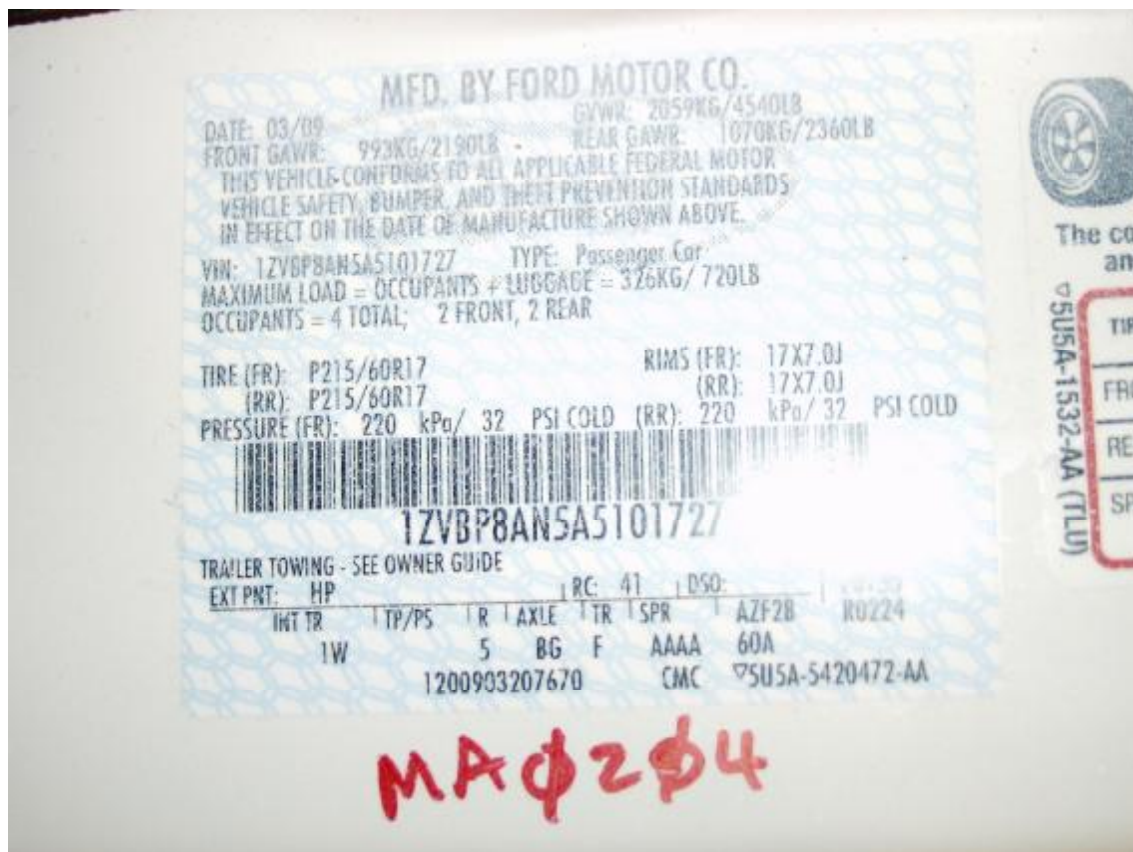


Figure A-53: Close-Up View of Vehicle's Certification Label

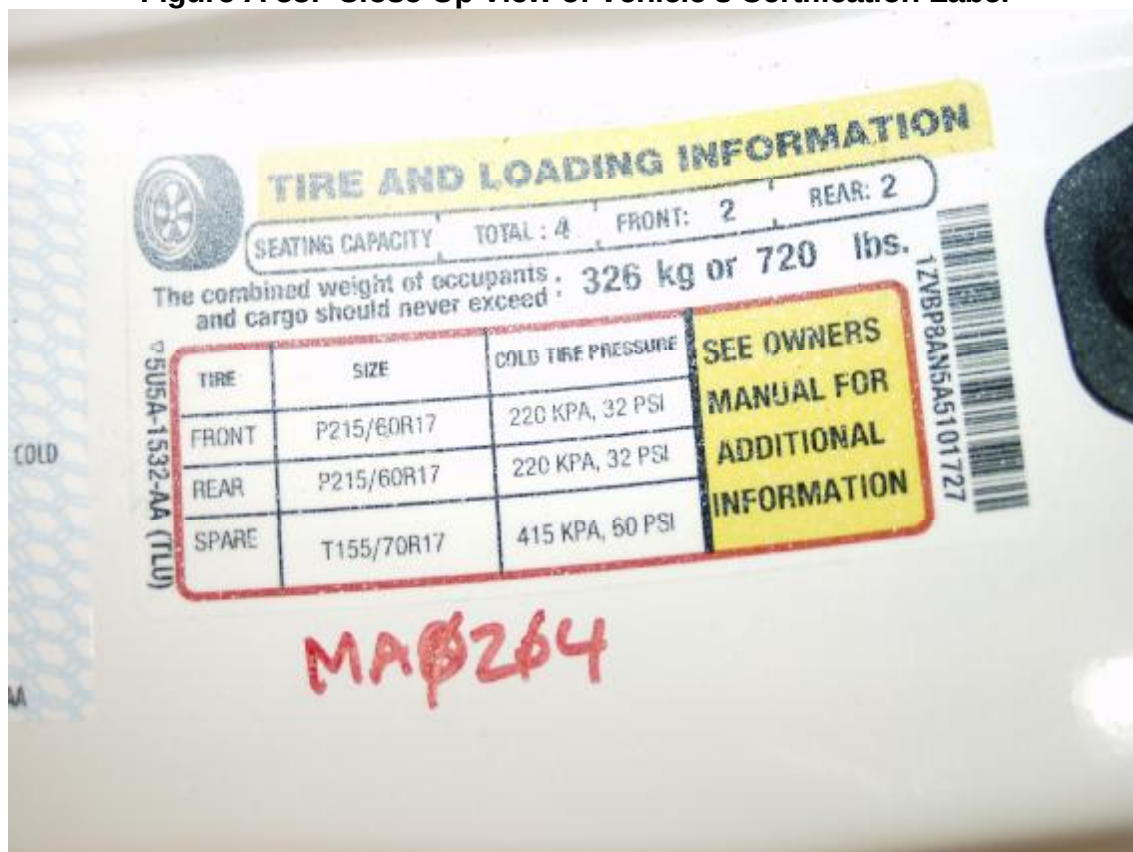


Figure A-54: Close-Up View of Vehicle's Tire Information Placard

Photograph Not Available

Figure A-55: Pre-Test Pole Barrier Front View



Figure A-56: Post-Test Pole Barrier Front View



Figure A-57: Pre-Test Pole Barrier Side View

Photograph Not Available

Figure A-58: Post-Test Pole Barrier Side View



Figure A-59: Pre-Test Ballast View



Figure A-60: Post-Test Primary and Redundant Speed Trap Read-Out



Figure A-61: FMVSS 301/305 Rollover 0°



Figure A-62: FMVSS 301/305 Rollover 90°



Figure A-63: FMVSS 301/305 Rollover 180°



Figure A-64: FMVSS 301/305 Rollover 270°



Figure A-65: FMVSS 301/305 Rollover 360°



Figure A-66: Impact Event

Photograph Not Available

Figure A-67: Monroney Label

Photograph Not Available

Figure A-68: Head Restraint Use/Adjustment from Owner's Manual

APPENDIX B

VEHICLE AND DUMMY RESPONSE DATA PLOTS

The following table and respective vehicle and dummy (filtered) data plots should be included in Appendix B:

TABLE OF DATA PLOTS		
No.	Driver Dummy Instrumentation Plots	Page
1	Driver Head (X) Acceleration vs. Time Primary	B-3
2	Driver Head (Y) Acceleration vs. Time Primary	B-3
3	Driver Head (Z) Acceleration vs. Time Primary	B-3
4	Driver Head Resultant vs. Time Primary	B-3
5	Driver Lower Spine (X) Acceleration vs. Time Primary	B-4
6	Driver Lower Spine (Y) Acceleration vs. Time Primary	B-4
7	Driver Lower Spine (Z) Acceleration vs. Time Primary	B-4
8	Driver Lower Spine Resultant Acceleration vs. Time Primary	B-4
9	Driver Left Iliac Wing (Y) Force vs. Time	B-5
10	Driver Left Acetabulum (Y) Force vs. Time	B-5
11	Driver Pelvis Summation vs. Time	B-6

The following additional data plots 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 Dummy Instrumentation Plots

Driver Head (X) Acceleration
Driver Head (Y) Acceleration
Driver Head (Z) Acceleration
Driver Head (X) Acceleration Redundant
Driver Head (Y) Acceleration Redundant
Driver Head (Z) Acceleration Redundant
Driver Upper Neck (X) Force
Driver Upper Neck (Y) Force
Driver Upper Neck (Z) Force
Driver Upper Neck Moment About X
Driver Upper Neck Moment About Y
Driver Upper Neck Moment About Z
Lower Spine T12 (X) Acceleration
Lower Spine T12 (Y) Acceleration
Lower Spine T12 (Z) Acceleration
Driver Shoulder (Y) Displacement
Driver Left Thorax Rib 1 (Y) Displacement
Driver Left Thorax Rib 2 (Y) Displacement
Driver Left Thorax Rib 3 (Y) Displacement
Driver Left Abdomen Rib 1 (Y) Displacement
Driver Left Abdomen Rib 2 (Y) Displacement
Driver Acetabulum (Y) Force
Driver Left Iliac Wing (Y) Force

Driver Head Contact Switch (Not Available)

Driver Shoulder Contact Switch (Not Available)

Driver Torso Contact Switch Driver Leg Contact Switch (Not Available)

Vehicle Instrumentation Plots

Vehicle Center of Gravity (X) Acceleration
Vehicle Center of Gravity (Y) Acceleration
Vehicle Center of Gravity (Z) Acceleration
Left Floor Sill (Y) Acceleration
Left A-Pillar Sill (Y) Acceleration
Left Lower A-Pillar (Y) Acceleration
Left Mid A-Pillar (Y) Acceleration
Left B-Pillar Sill (Y) Acceleration
Left Lower B-Pillar (Y) Acceleration
Left Mid B-Pillar (Y) Acceleration
Driver Seat Track at Dummy H-Point (Y) Acceleration
Engine Top (X) Acceleration
Engine Top (Y) Acceleration Firewall Center (Y) Acceleration
Right Roof at Vertical Impact Reference Line (Y) Acceleration
Right Sill at Vertical Impact Reference Line (Y) Acceleration
Rear Floorpan Behind Rear Axle at Centerline (X) Acceleration
Rear Floorpan Behind Rear Axle at Centerline (Y) Acceleration

Driver Side Airbag Voltage (Not Available)

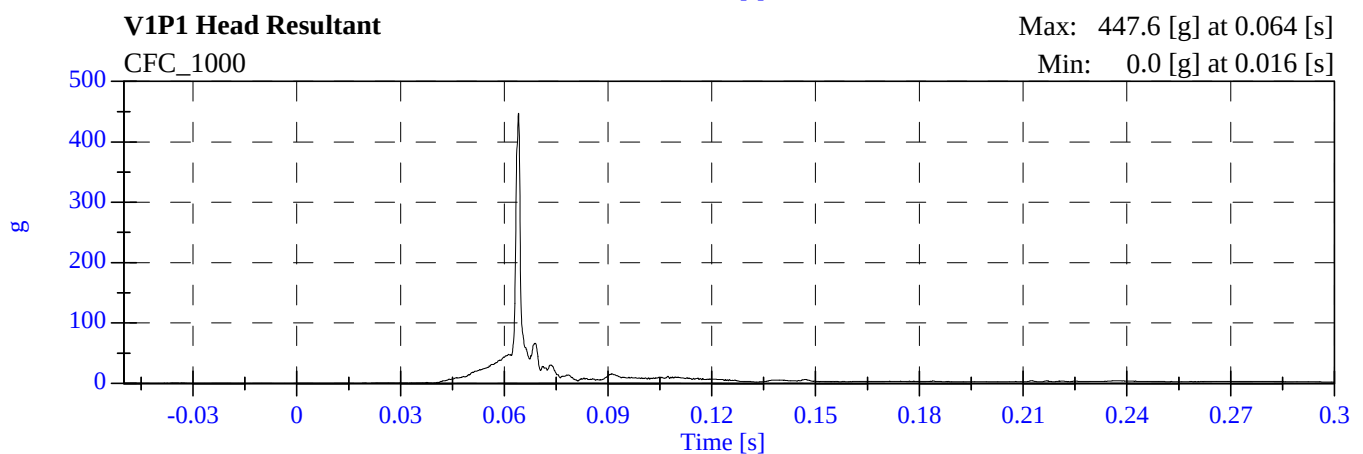
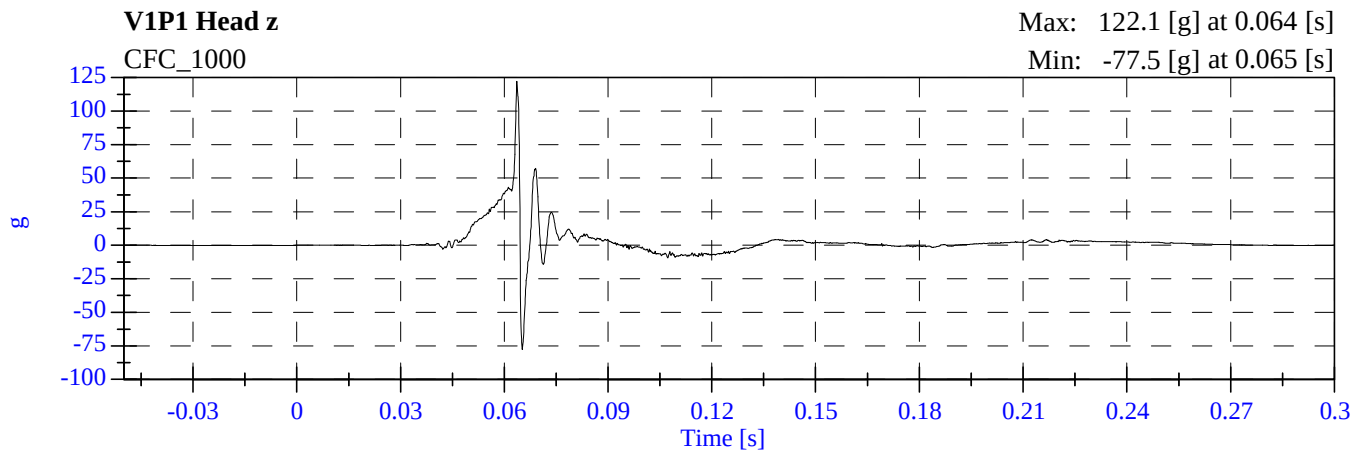
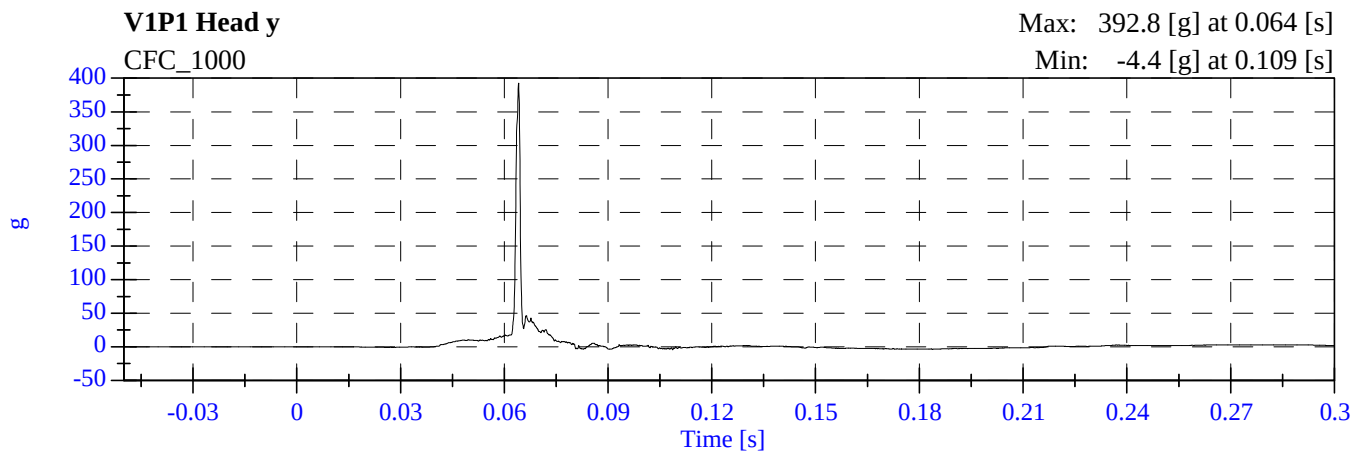
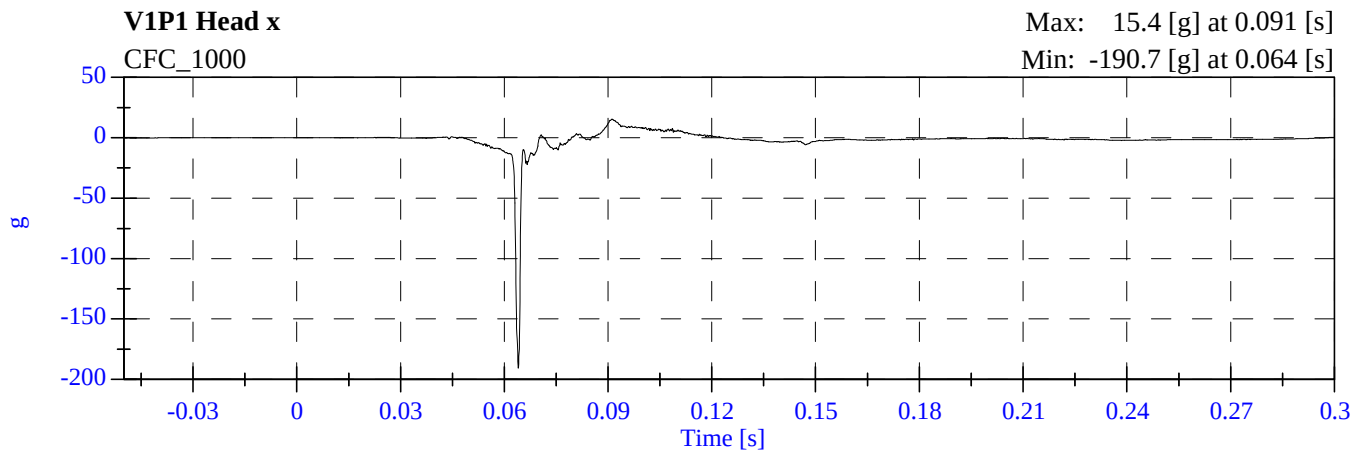
Driver Side Curtain Airbag Voltage (Not Available)

Pole Instrumentation Plots (NOT AVAILABLE)

Load Cell Pole Barrier #1 Force
Load Cell Pole Barrier #2 Force
Load Cell Pole Barrier #3 Force
Load Cell Pole Barrier #4 Force
Load Cell Pole Barrier #5 Force
Load Cell Pole Barrier #6 Force
Load Cell Pole Barrier #7 Force
Load Cell Pole Barrier #8 Force

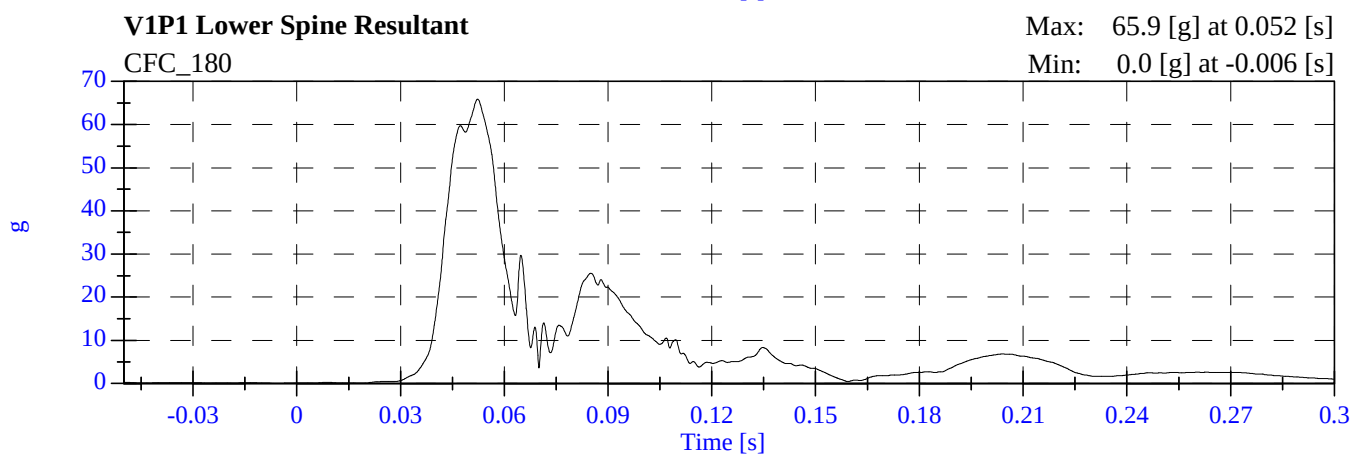
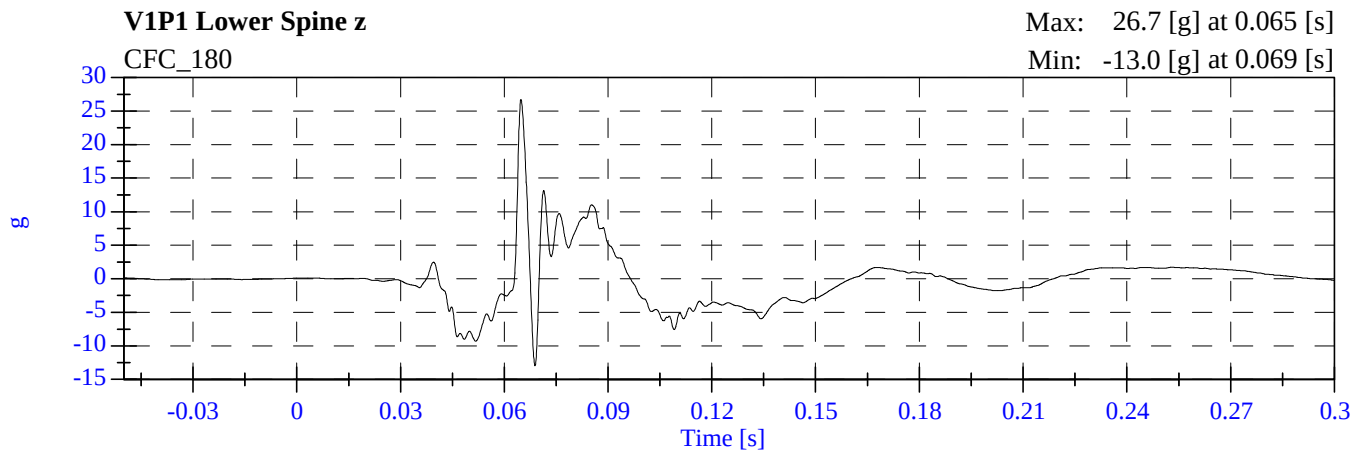
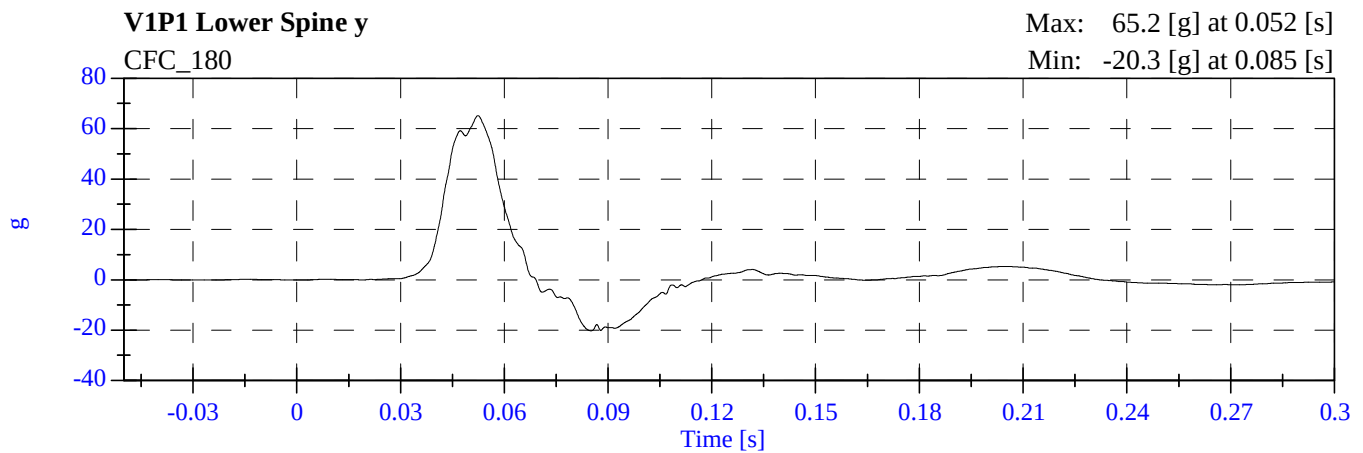
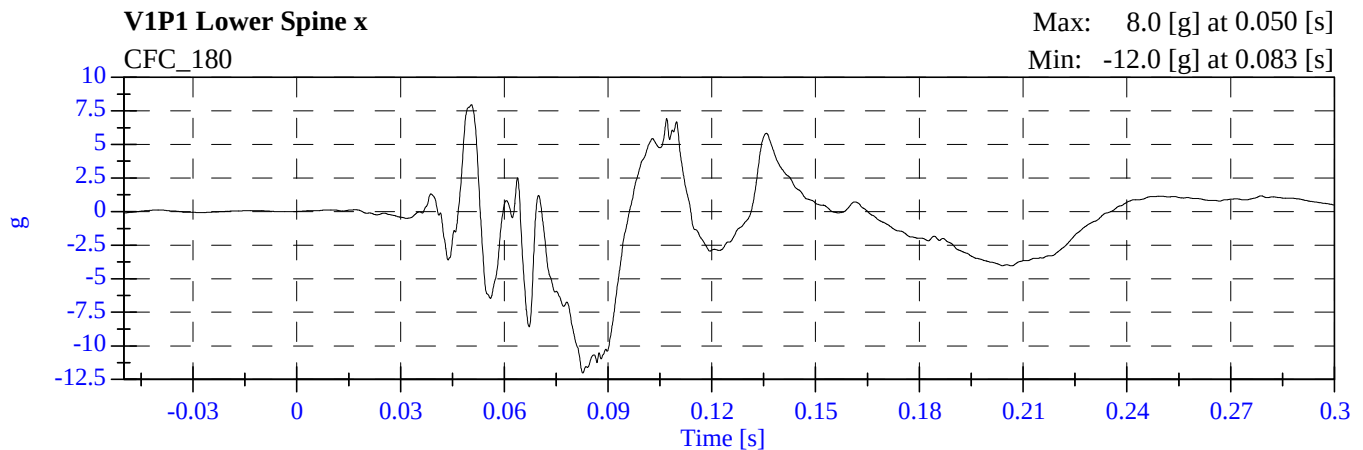
Side NCAP pole 2010 Ford Mustang

MA0204 - May 12, 2009



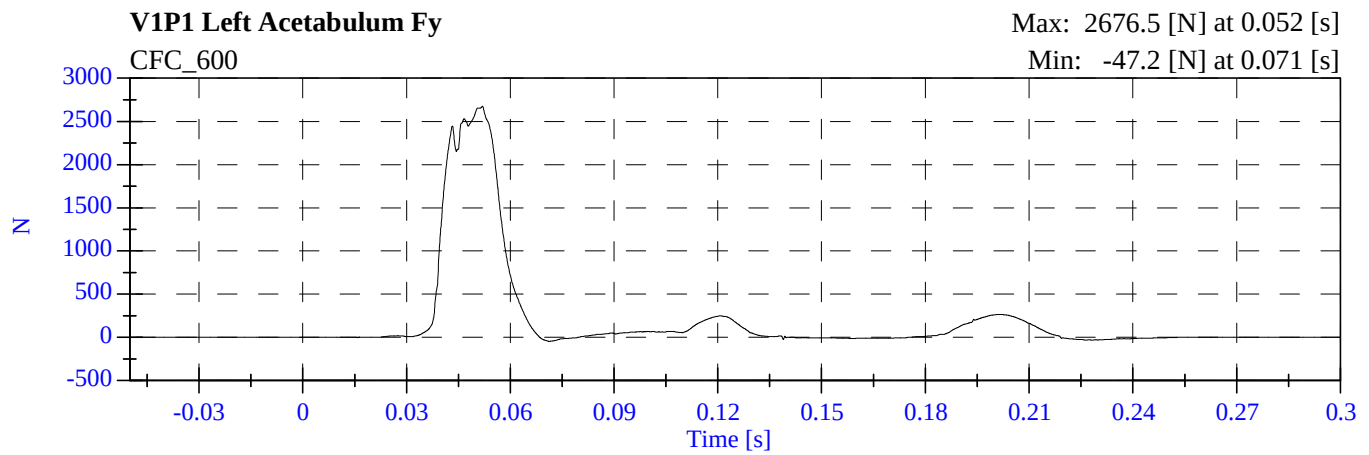
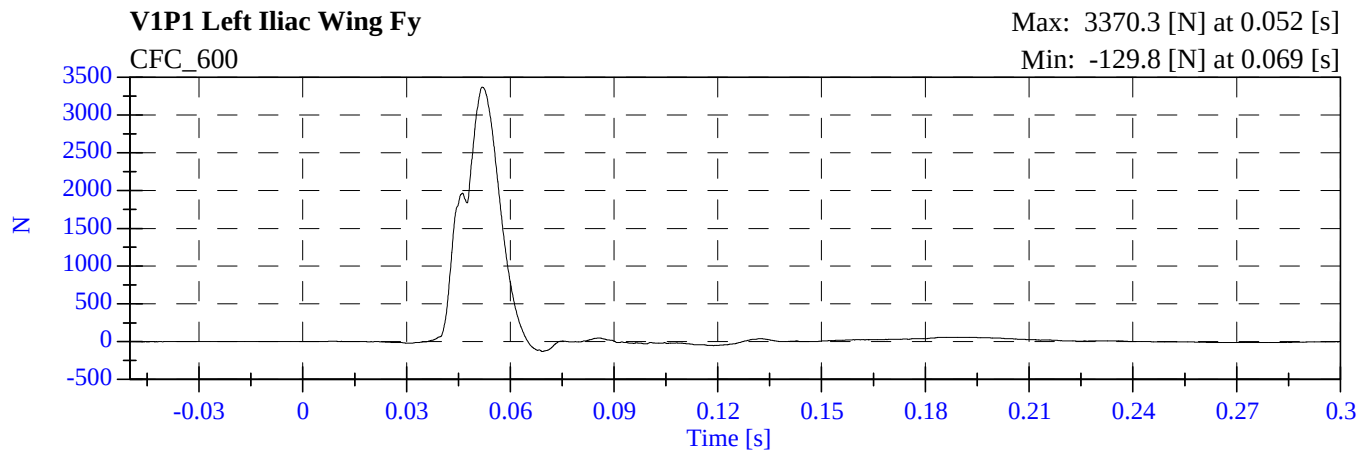
Side NCAP pole 2010 Ford Mustang

MA0204 - May 12, 2009

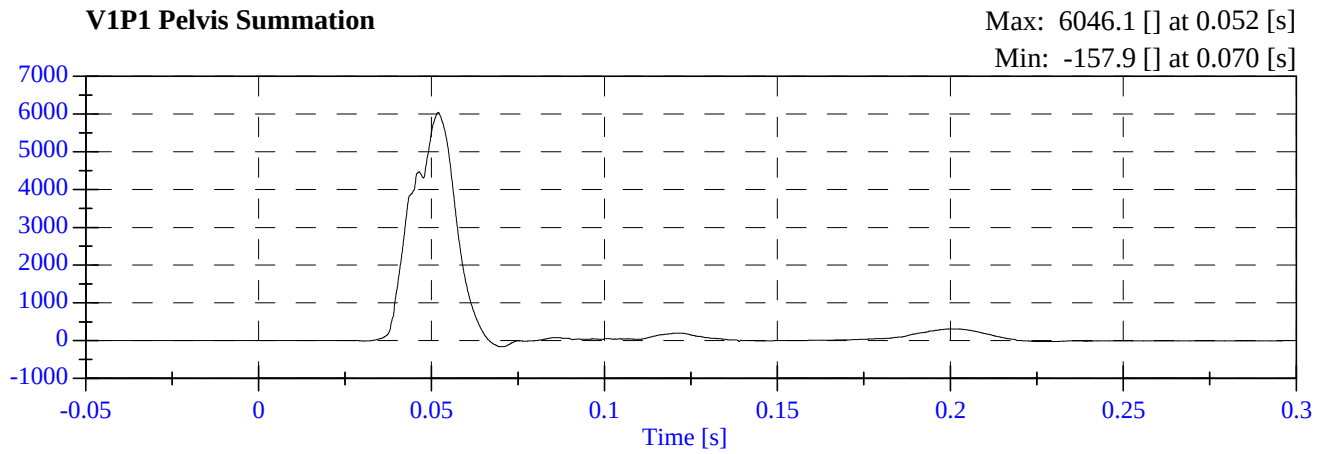


Side NCAP pole 2010 Ford Mustang

MA0204 - May 12, 2009



Side NCAP pole 2010 Ford Mustang MA0204 - May 12, 2009



APPENDIX C

DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

CALIBRATION TEST RESULTS

PRE TEST

SID IIs NO.: 304

CONFIGURED FOR LEFT SIDE IMPACT



Denton Technical Center

1965 Larchwood Troy, Michigan 48083, Phone: (248) 528-9889, Fax: (248) 528-8494

CALSPAN

4455 Genesee Street
Buffalo, New York 14225

SID-IIs ATD Serial No. 0304 Certification Report

Testing Complete on: 04/30/2009

**Per Specifications of the Code of Federal Regulations:
Number 49, Part 572, SID-IIs**

Creating the New Standard in ATD Service

Denton Corporate Offices: 2967 Waterview Dr., Rochester Hills, MI 48309-4600

Tel (248) 852-5100 • Fax (248) 852-6060 • email: info@radenton.com • www.radenton.com



DENTON TECHNICAL CENTER

1965 Larchwood, Troy, Michigan 48083

Tel:(248) 528-9889 Fax:(248) 528-8494

Document Number: DTC-TLF012

Revision Date: 3/10/2009

Revision Level: 5

DTC Form (IAW ISO-17025)

RMA Summary Report

Customer Name: <u>Calspan</u>	☐ In Process <u>4/14/2009</u>
Customer Contact: <u>David Travale</u>	☒ Final Report
Phone: <u>(716) 713-5556</u>	☐ Outgoing Lease
DTC RMA No.: <u>14020</u>	☐ Lease Return
RDI RMA No.: <u>NA</u>	0 Potentiometers / Other
Date Received: <u>4/15/2009</u>	MRT Time (hrs)
Date Started: <u>4/17/2009</u>	
Date Finished: <u>4/30/2009</u>	
Date Shipped: <u>4/30/2009</u>	Priority: Standard

Special Instructions: No Sensor cals.VRTC to supply replacement parts if needed. Replaced Thorax rib set S/N = 366

Type of ATD	QTY	Certification/Service	S/N	Service Time (hrs)
SID-IIs-BLD	1	Calibration	304	

Parts	Billable	Part No.	QTY	Model No.	Serial No.
Thorax Ribs	No	180-3362	1		366

Service Time Explanation:

The Denton Technical Center values all feedback we receive from customers. Please visit our corporate website at <http://www.dentoninc.com> or send emails to webmaster@radenton.com.

Report Date: 4/30/2009 10:27 AM

**DENTON TECHNICAL CENTER****DTC Form (IAW ISO-17025)****RMA Evaluation Report**

1965 Larchwood, Troy, Michigan 48083

Tel: (248) 528-9889 Fax: (248) 528-8494

Document Number: DTC-TLF012

Revision Date: 1/30/09

Revision Level: 5

Customer: Calspan**Certificate No.: 43009304****DTC RMA#: 14020****RDI RMA#: NA****Dummy Type: SID-IIs-BLD****Serial Number: 304****Mechanical Status:****Condition as Received:**☐ In Tolerance ☒ Out of Tolerance**Condition as Returned:**☒ In Tolerance ☐ Out of Tolerance**Electrical Status (MUX):** ☒ Not Applicable**Condition as Received:**☐ In Tolerance ☐ Out of Tolerance**Condition as Returned:**☐ In Tolerance ☐ Out of Tolerance**Testing Requirements IAW: CFR 49, 572, V**

	Test Description	S/N	Status
1	Lateral Head Drop	1371	Passed
2	Lateral Neck Bending	704	Passed
3	Thorax Impact w/ Arm	495	Failed
4	Thorax Impact w/o Arm	366	Passed
5	Shoulder Impact	495	Passed
6	Abdominal Impact	495	Passed
7	Pelvis Impact, Acet.	882	Passed
8	Pelvis Impact, Iliac	882	Passed
9	Thorax Impact w/Arm	366	Passed
10			
11			

Torque Wrench: 1100814903**Comments:**

Left Side Impact

Failed Cert. - Thorax Rib Set -S/N = 495

Installed New Thorax Rib Set - S/N =366 4/29/09

Incoming Appearance:**Head Assembly** ☒ Good ☐ Damaged**Neck Assembly** ☒ Good ☐ Damaged**Upper Torso Assembly** ☐ Good ☒ Damaged**Lower Torso Assembly** ☒ Good ☐ Damaged**Left Arm Assembly** ☒ Good ☐ Damaged**Right Arm Assembly** ☐ Good ☐ Damaged**Left Leg Assembly** ☒ Good ☐ Damaged**Right Leg Assembly** ☒ Good ☐ Damaged**Comments:**

Failed Certification - Thorax Rib Set - S/N = 495

Installed New Rib Set - S/N =366 4/29/09 Cust. Sply

N/A

Comments:

No Sensor calcs.VRTC to supply replacement parts if needed. Replaced Thorax rib set S/N = 366

Action Items

Certificate No.: 43009304

Action #1	
Resolution #1	☐ Complete
Action #2	
Resolution #2	☐ Complete
Action #3	
Resolution #3	☐ Complete
Action #4	
Resolution #4	☐ Complete
Comments	

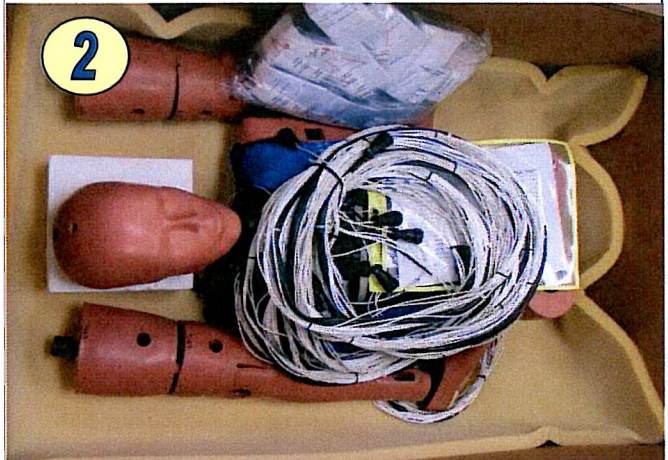
Observations and Recommendations:

Certificate No.: 43009304

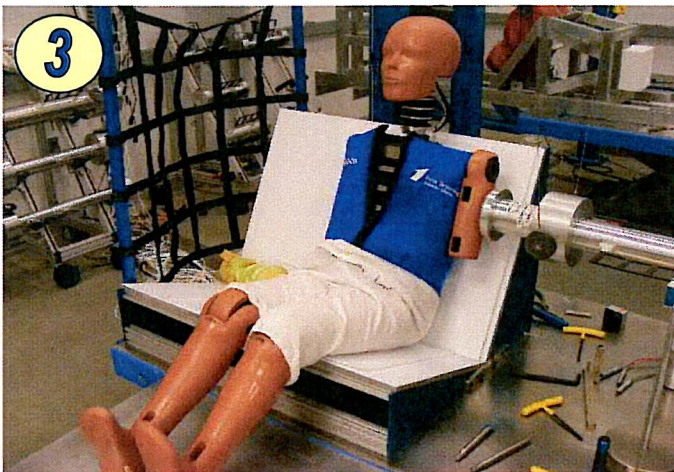
Below are inspection photos and observations of parts that may require repair or replacement.



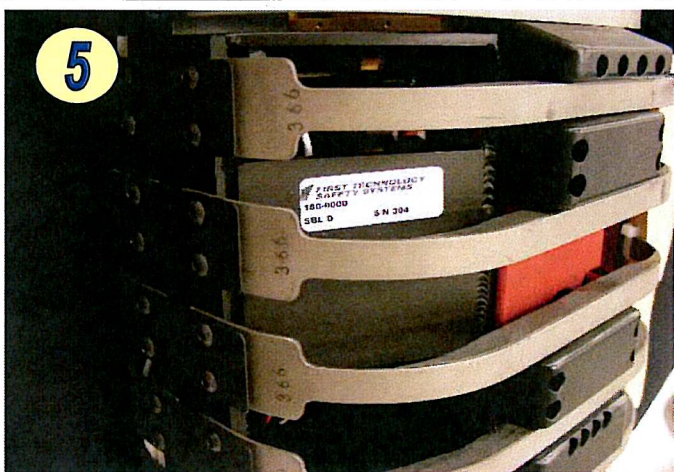
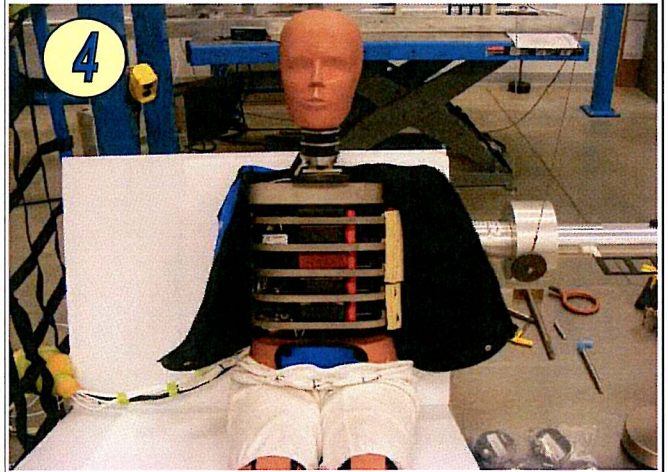
Arrival Photos



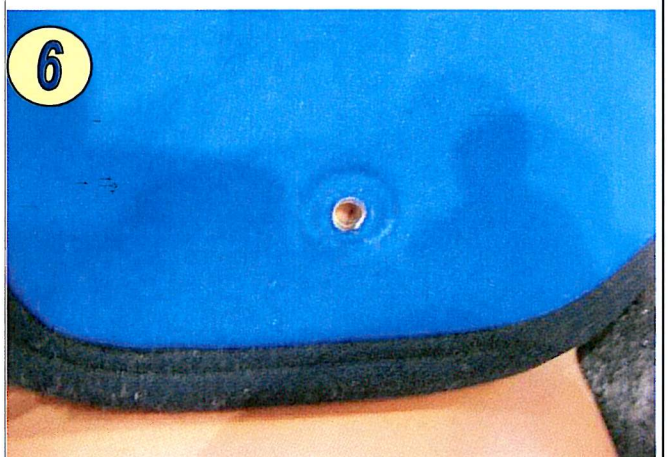
Arrival Photos - S/N = 304



Failed Certification - Thorax Rib Set - S/N = 495



Installed New Thorax Rib Set - S/N = 366



Broken Jacket Snap

Observations and Recommendations:

Certificate No.: 43009304

Below are inspection photos and observations of parts that may require repair or replacement.

--	--

Conclusions (parts needed):**Certificate No.: 43009304**

QTY	Description	Part No.	Reason	Approval
1	Thorax Ribs	180-3362	Failed Cert	Yes

Indicates that parts are required for certification.

Comments:

Final Inspection:

Checked By:

Comments:

Instrumentation Installed



JR

Connectors Checked



N/A

Sensor Function Checked (MUX)



N/A

Neck & Spine Cables Checked



Joints Adjusted 1-2 g's



Fasteners Tightened



Targets Installed



N/A

Clothing



N/A

Shoes



N/A

Cal./Cert. Documents



Denton Technical Center
1965 Larchwood Drive
Troy, Michigan
48083 USA
248-528-9889

Report Finalized By: Mark Smilnak

TESTING CERT #2421.02

This certification report pertains only to the items detailed herein.



Denton Technical Center

1965 Larchwood Troy, Michigan 48063, Phone: (248) 528-9889, Fax: (248) 528-8494

VERIFICATION REPORT

Test Name:	Head Drop	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs Level 'D'		
ATD Serial Number:	304		
Test ID:	RD1371	Test Date:	4/21/2009
Test Number:	1	Test Time:	1:00:17 PM

Condition As Received:	CALSPAN
User Field 2:	
User Field 3:	

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

Comments:
LEFT

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.6 deg C P
Humidity	10 -- 70	43 %RH P
Resultant Acceleration	115.0 -- 137.0	116.6 g P
Oscillation	0.0 -- 15.0	4.3 % P
Lateral Acceleration	-15.0 -- 15.0	5.1 g P

Technician:	JR	Signature:	
Supervisor:	MS	Signature:	

All test parameters are within specifications

Test ID: RD1371

Test Time: 1:00:17 PM

Test Date: 4/21/2009



Denton Technical Center

1965 Larchwood Troy, Michigan 48063, Phone: (248) 528-9889, Fax: (248) 528-8494

VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	12/16/2008
Endevco	7264D-2000	11558	8/12/2008
Endevco	7264D-2000	11553	8/12/2008
Endevco	7264D-2000	11569	8/18/2008

Test ID: **RD1371**

Test Time: **1:00:17 PM**

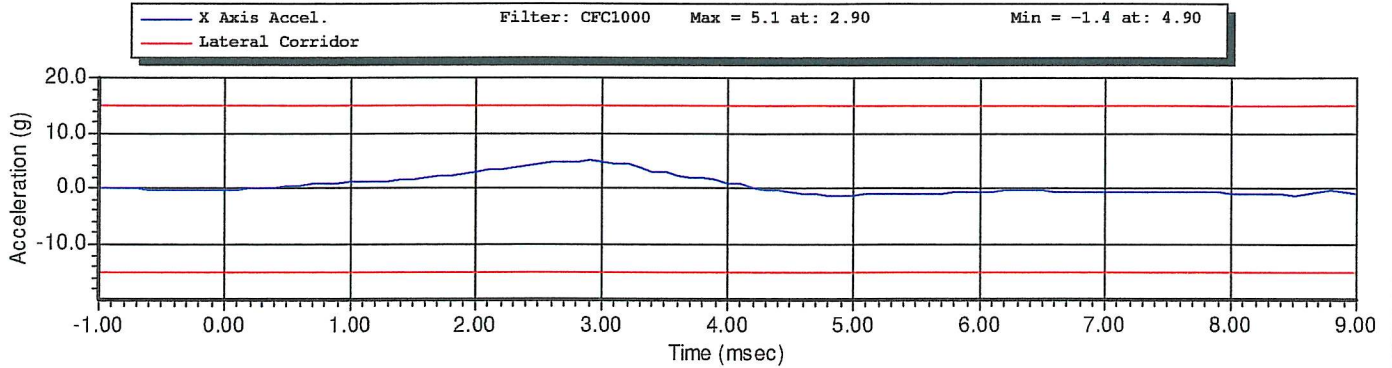
Test Date: **4/21/2009**



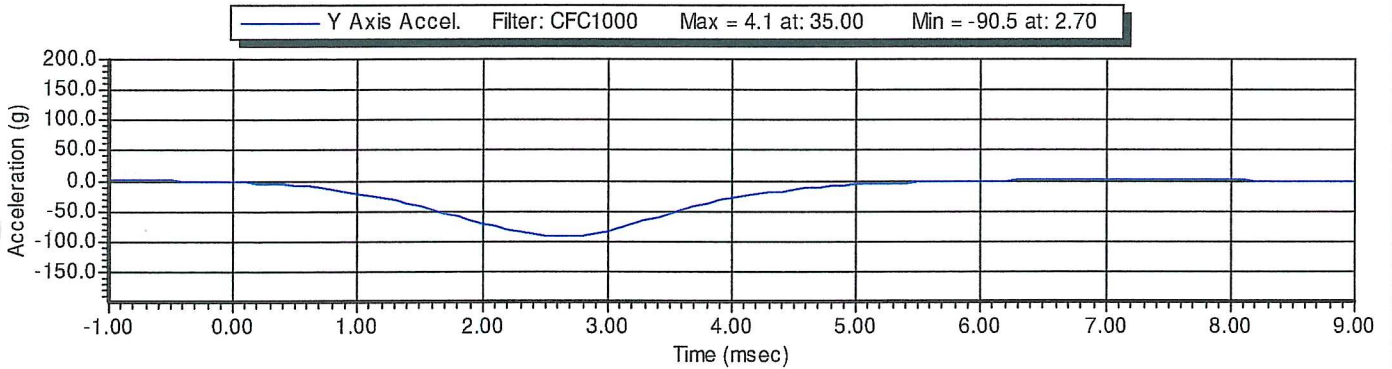
Denton Technical Center

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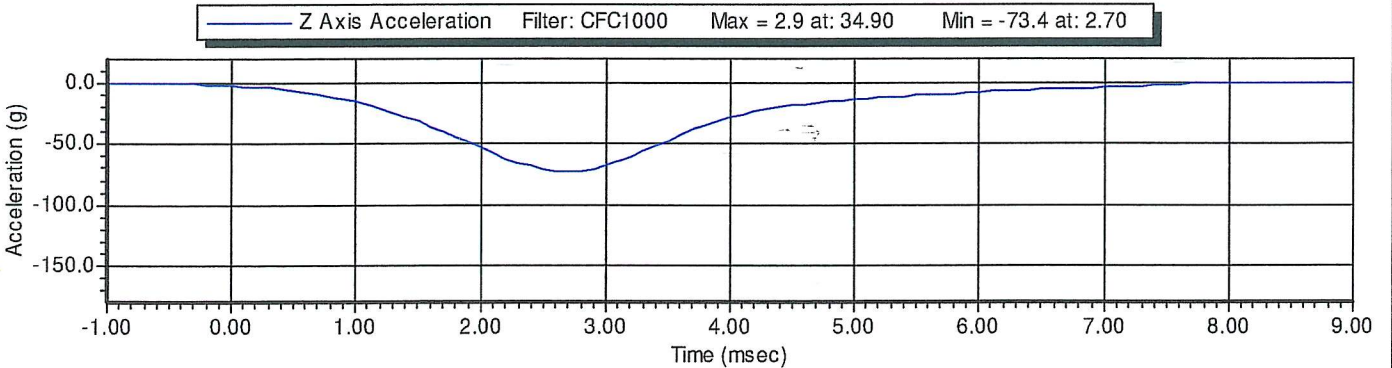
X Axis Acceleration



Y Axis Acceleration



Z Axis Acceleration



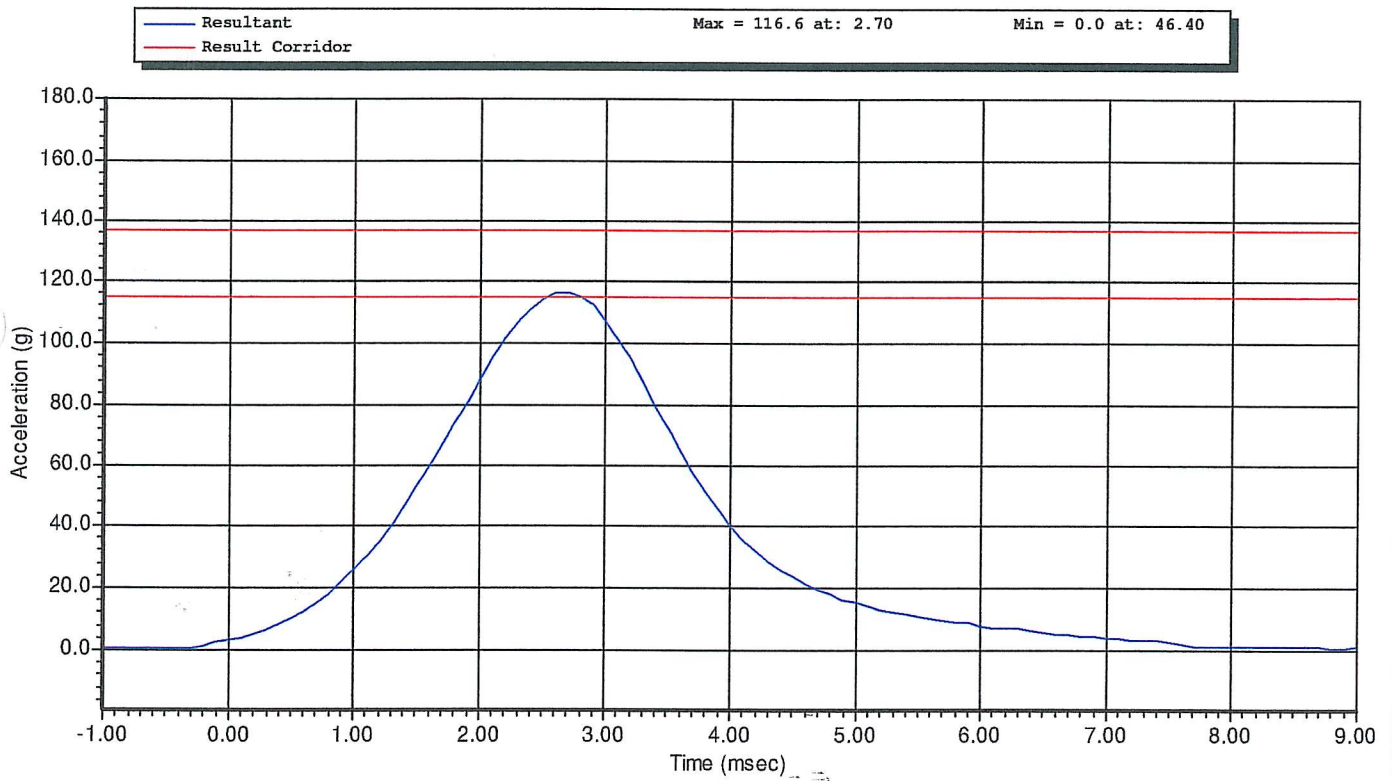


Denton Technical Center

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Test Name:	Head Drop	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs Level 'D'		
ATD Serial Number:	304		
Test Number:	1	Test Date:	4/21/2009
		Test Time:	1:00:17 PM
Component Part Number	Component Serial Number		
Head Skin - 180-1002	1371		

Resultant Acceleration



Test ID: RD1371

Test Time: 1:00:17 PM

Test Date: 4/21/2009



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VERIFICATION REPORT

Test Name:	Neck Pendulum	Revision:	12/14/2006
Sub Test Name:	Left Side	Spec Type:	NHTSA
ATD Type:	SID-IIs Level 'D'		
ATD Serial Number:	304		
Test ID:	RA0704	Test Date:	4/22/2009
Test Number:	3	Test Time:	6:51:50 AM

Condition As Received:	CALSPAN
User Field 2:	
User Field 3:	

Component Part Number	Component Serial Number
Neck - 180-2000	704
Torque Wrench s/n: 0106800459	

Comments:
LEFT
8X7+2 @ 84°

Test Parameters		Test Specifications		Test Results	
Temperature		20.6	-- 22.2	20.8 deg C	P
Humidity		10	-- 70	42 %RH	P
Velocity		5.51	-- 5.63	5.61 m/s	P
Pendulum Impulse at	10 ms	2.20	-- 2.80	2.56 m/s	P
Pendulum Impulse at	15 ms	3.30	-- 4.10	3.85 m/s	P
Pendulum Impulse at	20 ms	4.40	-- 5.40	5.18 m/s	P
Pendulum Impulse at	25 ms	5.40	-- 6.10	5.89 m/s	P
Pendulum Impulse between 25 and	100 ms	5.50	-- 6.20	5.89 m/s	P

Test ID: RA0704

Test Time: 6:51:50 AM

Test Date: 4/22/2009



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VERIFICATION REPORT

Test Parameters	Test Specifications	Test Results
Max D Plane Rotation	71.0 -- 81.0	73.8 degrees P
Time at Max Rotation	50.0 -- 70.0	58.9 ms P
Moment about OC	-44.0 -- -36.0	-36.9 Nm P
Moment Decay to Zero	102.0 -- 126.0	111.2 ms P

All test parameters are within specifications

Technician: **JR** Signature: 
Supervisor: **MS** Signature: 

Test ID: **RA0704**

Test Time: **6:51:50 AM**

Test Date: **4/22/2009**



Denton Technical Center

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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	99999999	12/16/2008
MSI	61A-750-10-360-XY	A021724	10/14/2008
Denton	1716A	1999	11/14/2008
Denton	1716A	1999	11/14/2008
DentonATD	78051-342	114	10/28/2008
DentonATD	78051-342	113	10/28/2008
DentonATD	78051-342	112	10/28/2008

Test ID: **RA0704**

Test Time: **6:51:50 AM**

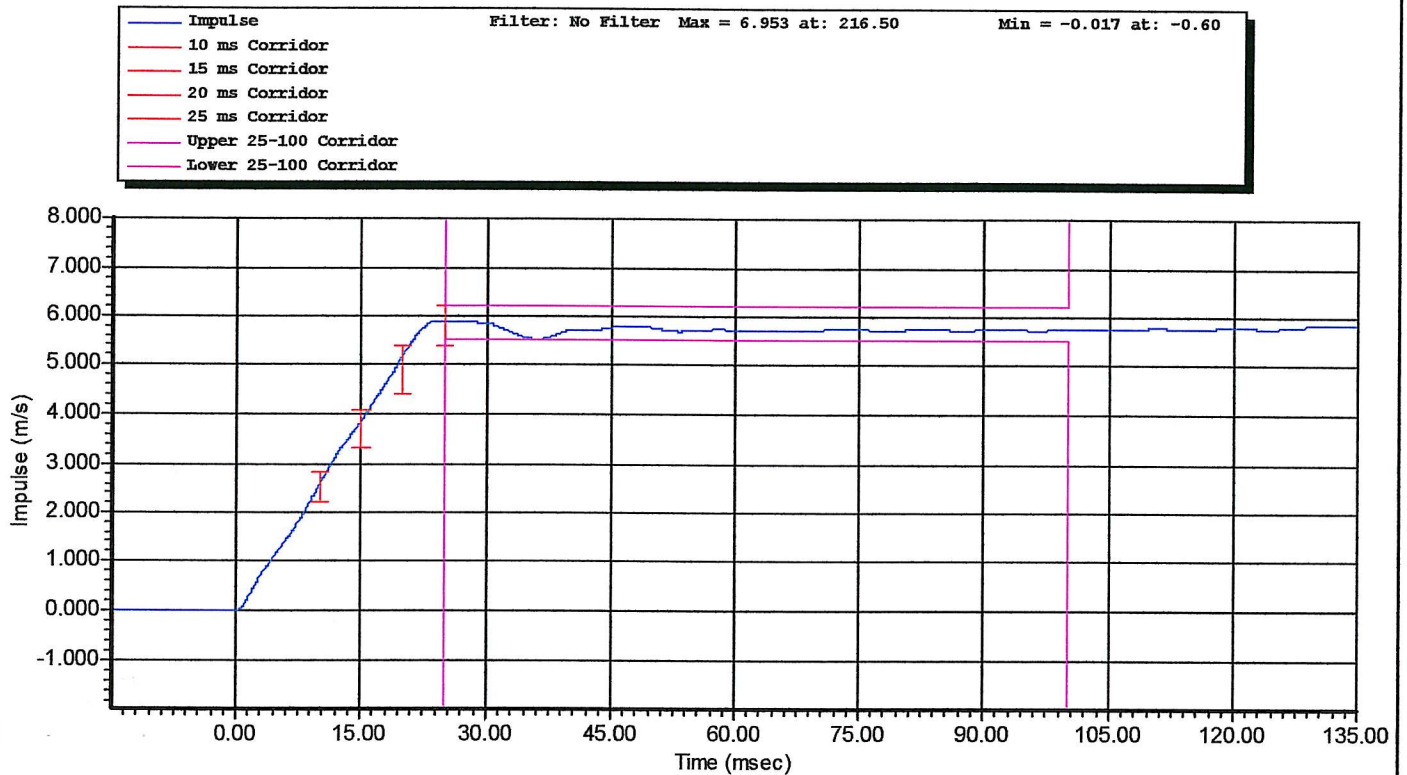
Test Date: **4/22/2009**



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Pendulum Impulse



Test ID: RA0704

Test Time: 6:51:50 AM

Test Date: 4/22/2009

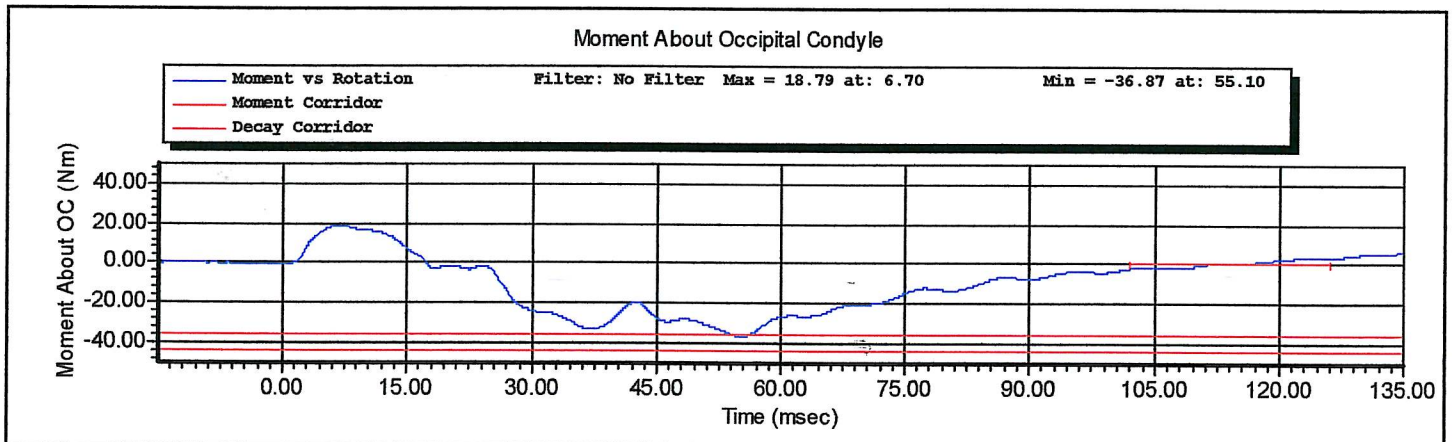
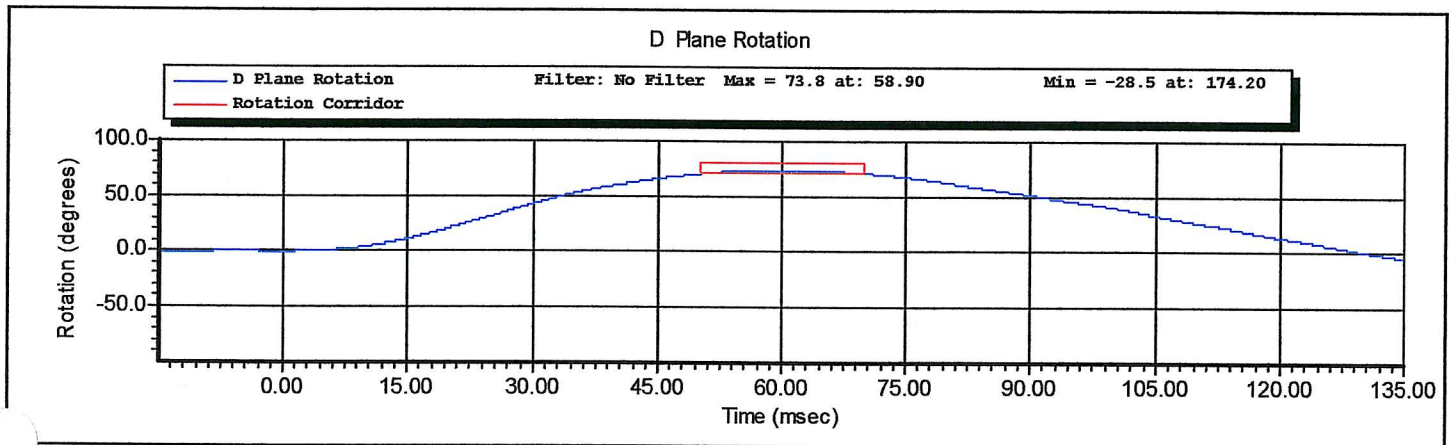


Denton Technical Center

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Test Name:	Neck Pendulum	Revision:	12/14/2006
Sub Test Name:	Left Side	Spec Type:	NHTSA
ATD Type:	SID-IIs Level 'D'		
ATD Serial Number:	304		
Test Number:	3	Test Date:	4/22/2009
		Test Time:	6:51:50 AM

Component Part Number	Component Serial Number
Neck - 180-2000	704



Test ID: RA0704

Test Time: 6:51:50 AM

Test Date: 4/22/2009



Denton Technical Center

1965 Larchwood Troy, Michigan 48063, Phone: (248) 528-9889, Fax: (248) 528-8494

VERIFICATION REPORT

Test Name:	Shoulder Impact	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs Level 'D'		
ATD Serial Number:	304		
Test ID:	RM0495	Test Date:	4/29/2009
Test Number:	1	Test Time:	9:32:52 AM

Condition As Received:	CALSPAN
User Field 2:	
User Field 3:	

Component Part Number	Component Serial Number
Shoulder Rib - 180-3355	281

Comments:
LEFT

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.0 deg C P
Humidity	10.0 -- 70.0	41.7 %RH P
Velocity	4.30 -- 4.50	4.43 m/s P
Probe Acceleration	14.0 -- 18.0	16.6 g P
Shoulder Deflection	30.0 -- 37.0	30.6 mm P
Upper Spine Acceleration	17.0 -- 19.0	19.5 g F
FTSS Proposed Upper Spine Acceleration	17.0 -- 21.0	19.5 g P

-All test parameters are NOT within specifications

Technician:	JR	Signature:	<i>John S Rozell</i>
Supervisor:	MS	Signature:	<i>Mark Smith</i>

Test ID: RM0495

Test Time: 9:32:52 AM

Test Date: 4/29/2009



Denton Technical Center

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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	99999999	12/16/2008
MSI	61A-750-10-360-XY	A021717	4/3/2009
Denton	180-3881	386	12/4/2008
Endevco	7264-2000	P58884	3/9/2009

Test ID: **RM0495**

Test Time: **9:32:52 AM**

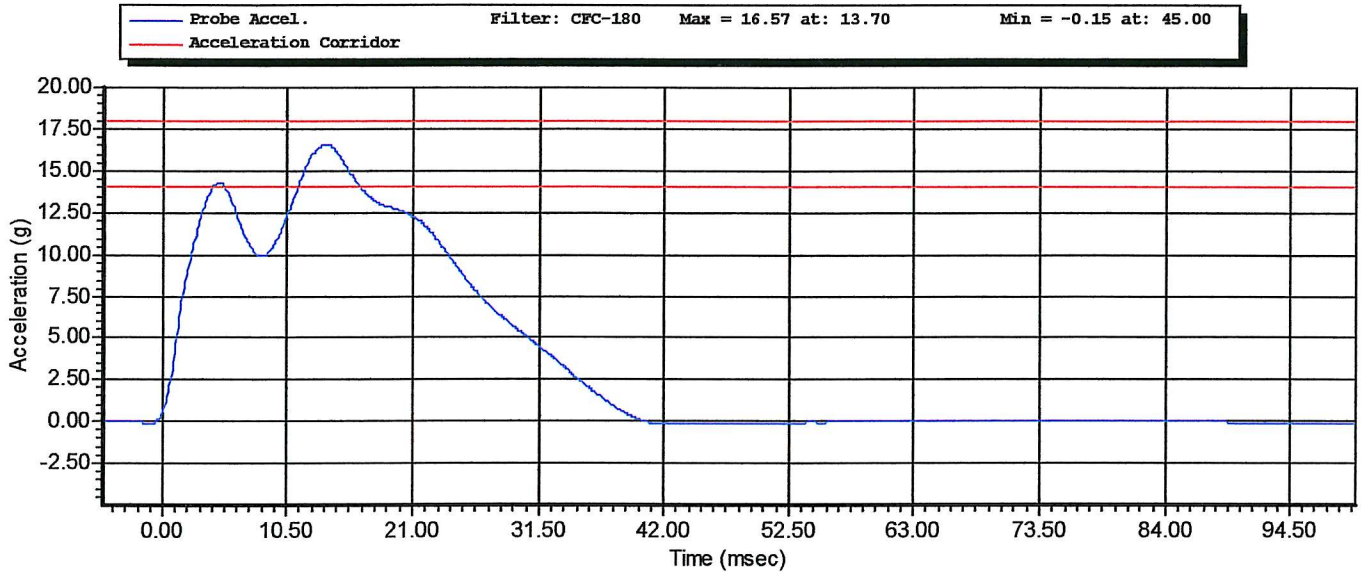
Test Date: **4/29/2009**



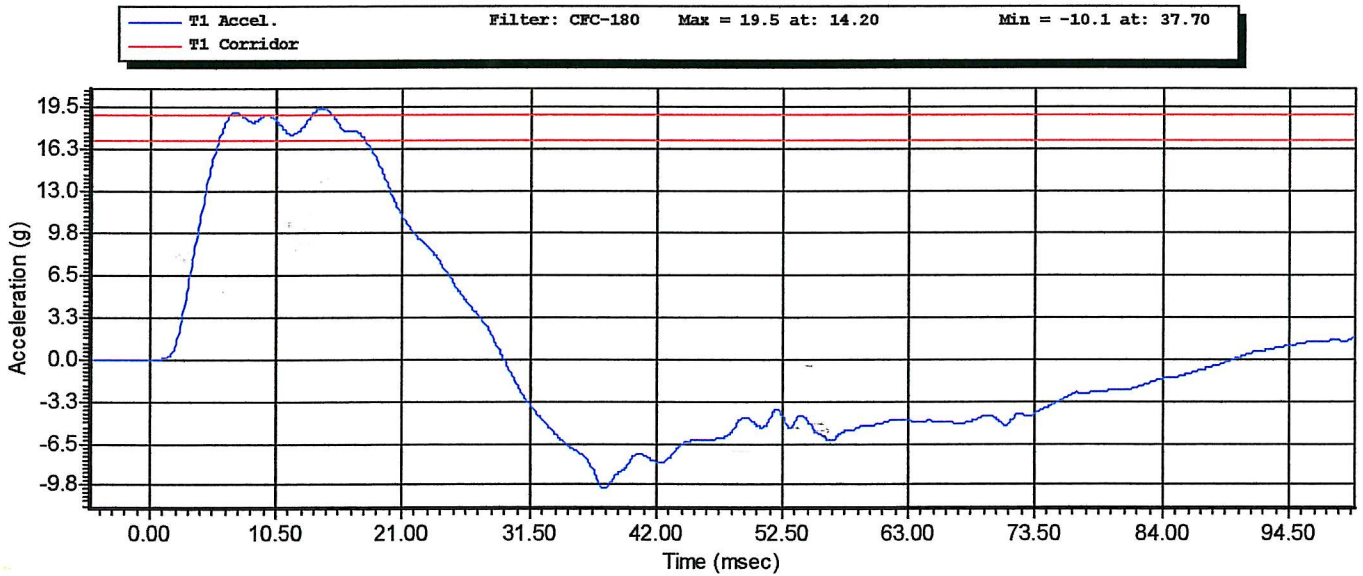
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Probe Accelerometer



T1 Accelerometer

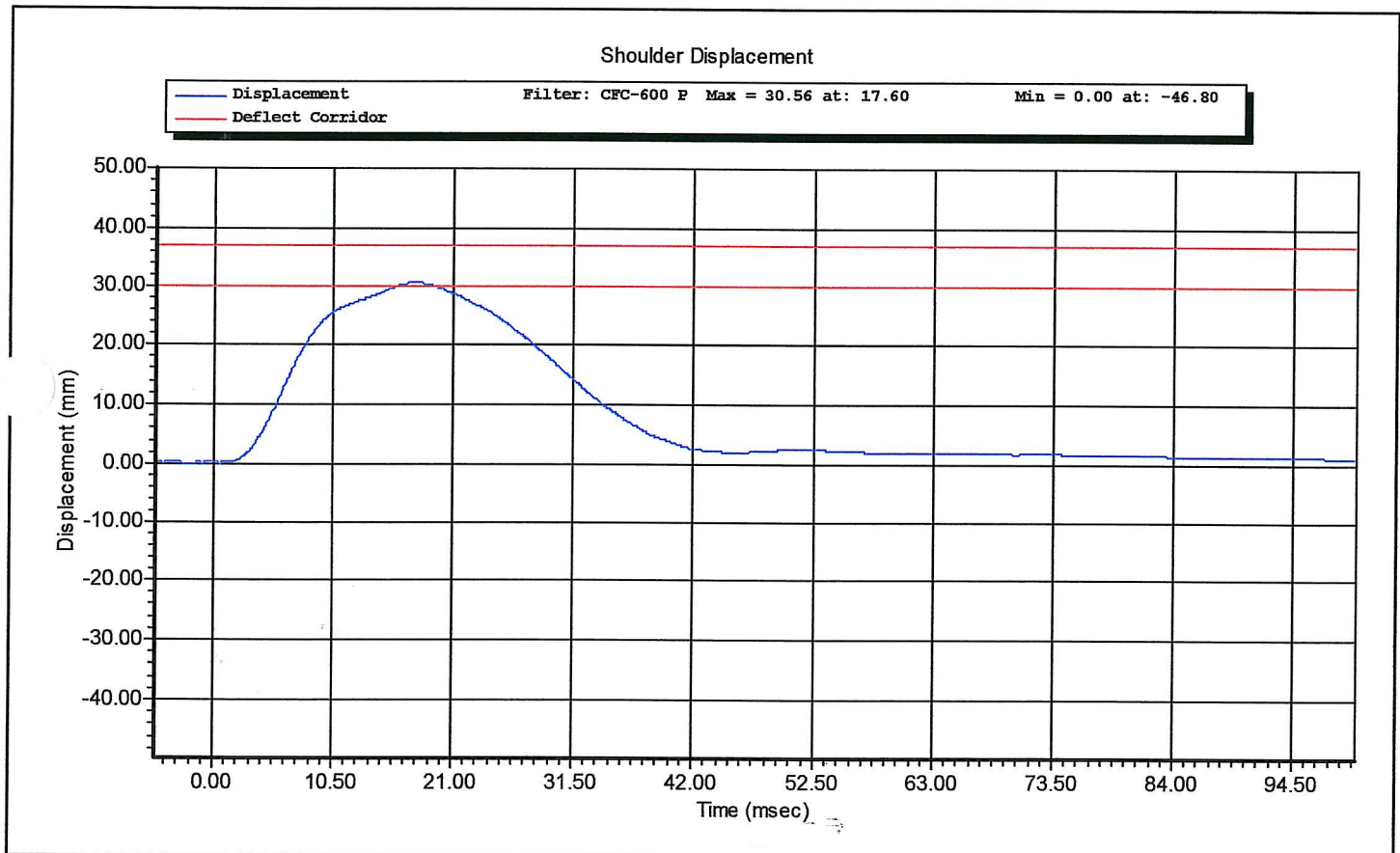




Denton Technical Center

1965 Larchwood Troy, Michigan 48063, Phone: (248) 528-9889, Fax: (248) 528-8494

Test Name:	Shoulder Impact	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs Level 'D'		
ATD Serial Number:	304		
Test Number:	1	Test Date:	4/29/2009
		Test Time:	9:32:52 AM
Component Part Number	Component Serial Number		
Shoulder Rib - 180-3355	281		



Test ID: RM0495

Test Time: 9:32:52 AM

Test Date: 4/29/2009



Denton Technical Center

1965 Larchwood Troy, Michigan 48063, Phone: (248) 528-9889, Fax: (248) 528-8494

VERIFICATION REPORT

Test Name:	Thorax Impact with Arm	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs Level 'D'		
ATD Serial Number:	304		
Test ID:	RN0366	Test Date:	4/29/2009
Test Number:	7	Test Time:	2:30:34 PM

Condition As Received: **CALSPAN**

User Field 2:

User Field 3:

Component Part Number	Component Serial Number
Thorax Rib #1 - 180-3362	1474
Thorax Rib #2 - 180-3362	1496
Thorax Rib #3 - 180-3362	1497
Shoulder Rib - 180-3355	281
Arm - 180-6011	950

Comments:

LEFT
NEW THORACIC RIBS

Test Parameters	Test Specifications			Test Results	
Temperature	20.6	--	22.2	20.9 deg C	P
Humidity	10	--	70	43 %RH	P
Velocity	6.60	--	6.80	6.67 m/s	P
Probe Acceleration	31.0	--	36.0	35.2 g	P
Upper Thorax Rib Deflection	26.0	--	32.0	26.6 mm	P
Mid Thorax Rib Deflection	30.0	--	36.0	31.7 mm	P

Test ID: **RN0366**

Test Time: **2:30:34 PM**

Test Date: **4/29/2009**



Denton Technical Center

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VERIFICATION REPORT

Test Parameters	Test Specifications	Test Results
Lower Thorax Rib Deflection	32.0 -- 38.0	34.6 mm P
Upper Spine Acceleration	34.0 -- 43.0	41.1 g P
Lower Spine Acceleration	28.0 -- 35.0	32.2 g P
Shoulder Deflection	31.0 -- 40.0	32.9 mm P

All test parameters are within specifications

Technician: **JSR**

Signature:

John J. Rozick

Supervisor: **MS**

Signature:

Mark Smith

Test ID: **RN0366**

Test Time: **2:30:34 PM**

Test Date: **4/29/2009**



Denton Technical Center

1965 Larchwood Troy, Michigan 48063, Phone: (248) 528-9889, Fax: (248) 528-8494

VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	99999999	12/16/2008
MSI	61A-750-10-360-XY	A021717	4/3/2009
Denton	180-3885	420	12/5/2008
Denton	180-3885	409	12/5/2008
Denton	180-3885	25	4/15/2009
Endevco	7264-2000	P58884	3/9/2009
Endevco	7264-2000	P58839	3/9/2009
Denton	180-3881	386	12/4/2008

Test ID: **RN0366**

Test Time: **2:30:34 PM**

Test Date: **4/29/2009**

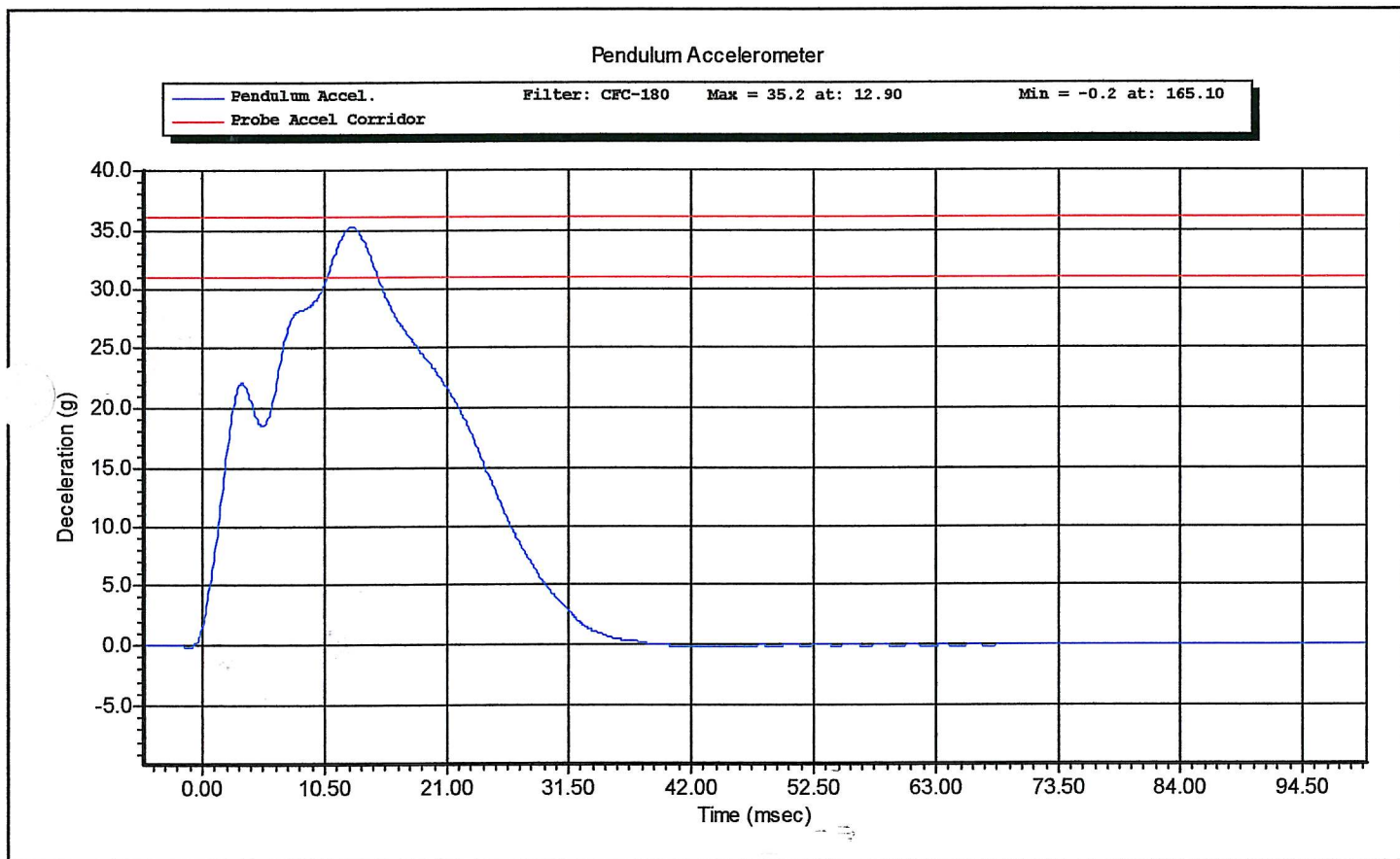


Denton Technical Center

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Test Name:	Thorax Impact with Arm	Revision:	12/14/2006
Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs Level 'D'		
ATD Serial Number:	304		
Test Number:	7	Test Date:	4/29/2009
		Test Time:	2:30:34 PM

Component Part Number	Component Serial Number
Thorax Rib #1 - 180-3362	1474



Test ID: RN0366

Test Time: 2:30:34 PM

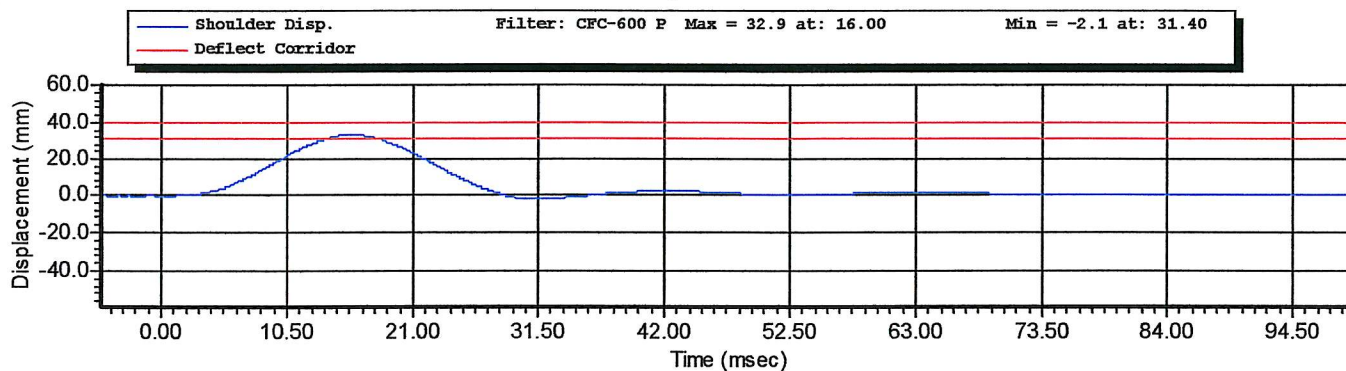
Test Date: 4/29/2009



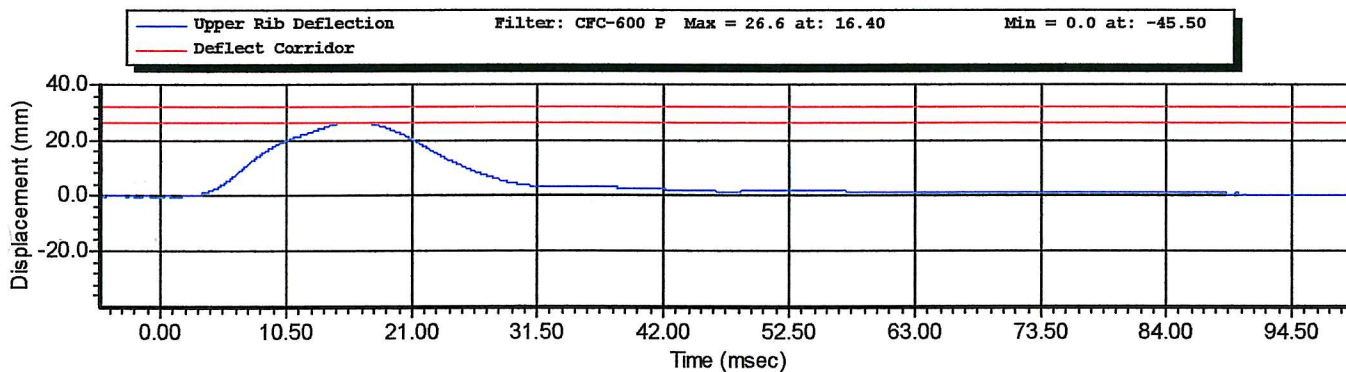
Denton Technical Center

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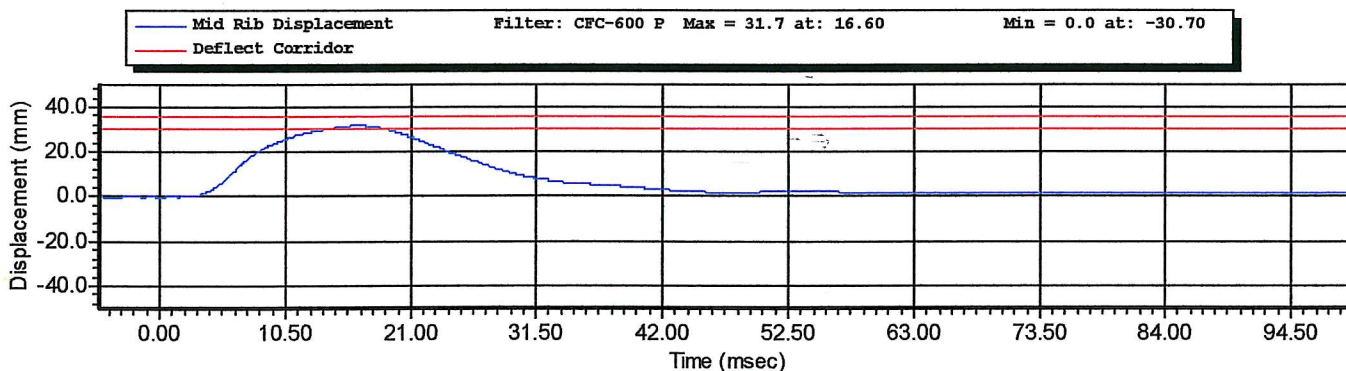
Shoulder Displacement



Upper Thorax Displacement



Mid Thorax Displacement

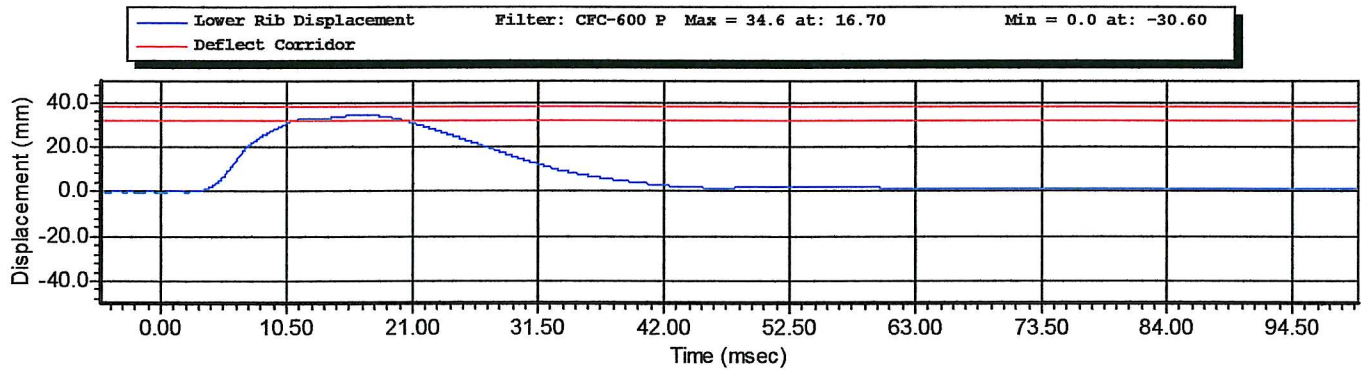




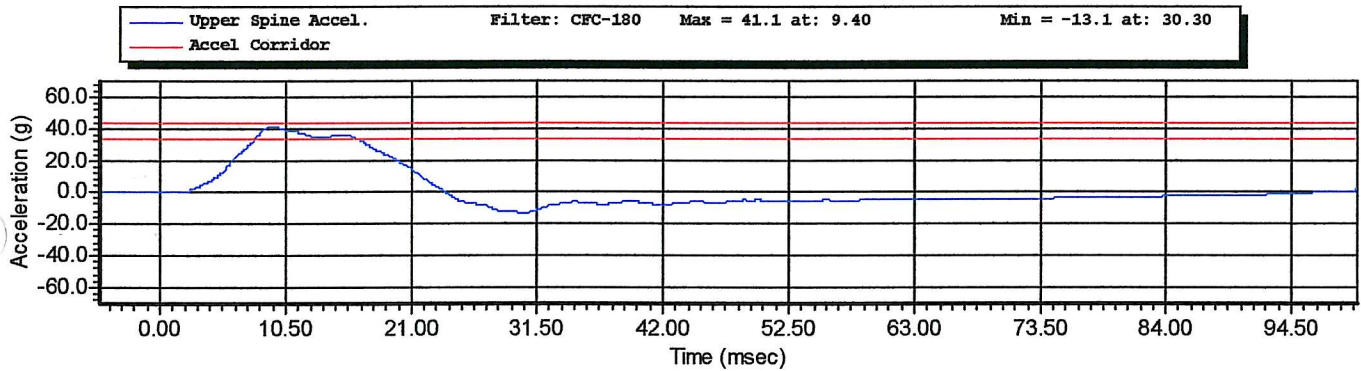
Denton Technical Center

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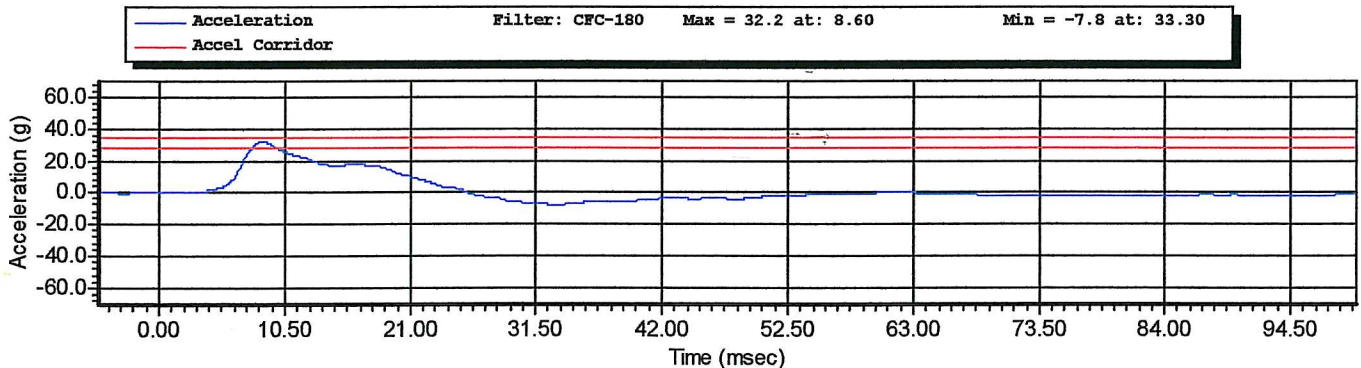
Lower Thorax Displacement



Upper Spine Acceleration



Lower Spine Acceleration





Denton Technical Center

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VERIFICATION REPORT

Test Name:	Thorax Impact without Arm	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs Level 'D'		
ATD Serial Number:	304		
Test ID:	RO0366	Test Date:	4/23/2009
Test Number:	2	Test Time:	3:00:51 PM

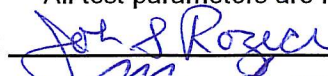
Condition As Received:	CALSPAN
User Field 2:	
User Field 3:	

Component Part Number	Component Serial Number
180-3362	1474, 1496, 1497

Comments:
LEFT

Test Parameters	Test Specifications			Test Results	
Temperature	20.6	--	22.2	21.1 deg C	P
Humidity	10	--	70	43 %RH	P
Velocity	4.20	--	4.40	4.30 m/s	P
Probe Acceleration	14.0	--	18.0	17.7 g	P
Upper Thorax Rib Deflection	33.0	--	40.0	33.7 mm	P
Mid Thorax Rib Deflection	39.0	--	45.0	40.7 mm	P
Lower Thorax Rib Deflection	36.0	--	43.0	38.2 mm	P
Upper Spine Acceleration	14.0	--	17.0	16.8 g	P
Lower Spine Acceleration	7.0	--	10.0	10.4 g	F
FTSS Proposed Lower Spine Acceleration	7.0	--	11.0	10.4 g	P

All test parameters are NOT within specifications

Technician:	JSR	Signature:	
Supervisor:	MS	Signature:	

Test ID: RO0366

Test Time: 3:00:51 PM

Test Date: 4/23/2009



Denton Technical Center

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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	99999999	12/16/2008
MSI	61A-750-10-360-XY	A021717	4/3/2009
Denton	180-3885	420	12/5/2008
Denton	180-3885	409	12/5/2008
Denton	180-3885	25	4/15/2009
Endevco	7264-2000	P58884	3/9/2009
Endevco	7264-2000	P58839	3/9/2009

Test ID: **RO0366**

Test Time: **3:00:51 PM**

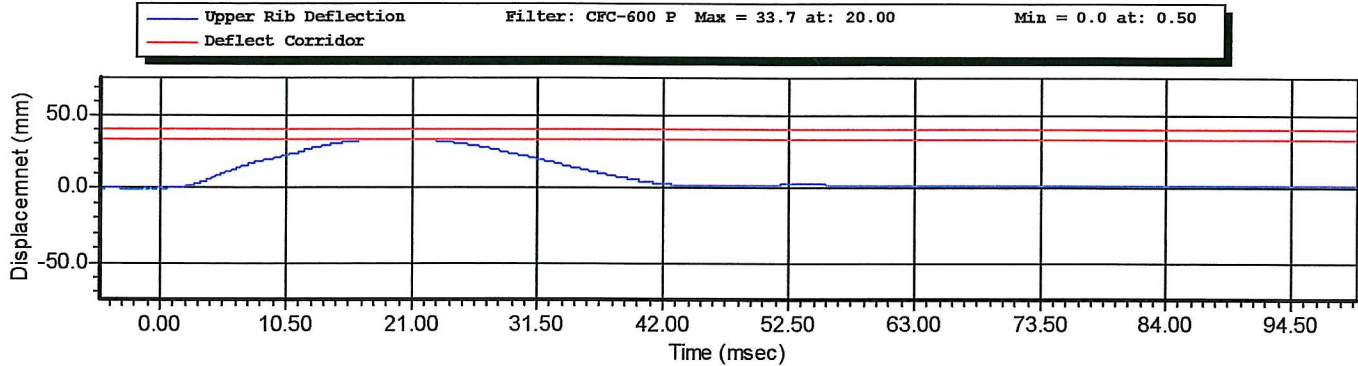
Test Date: **4/23/2009**



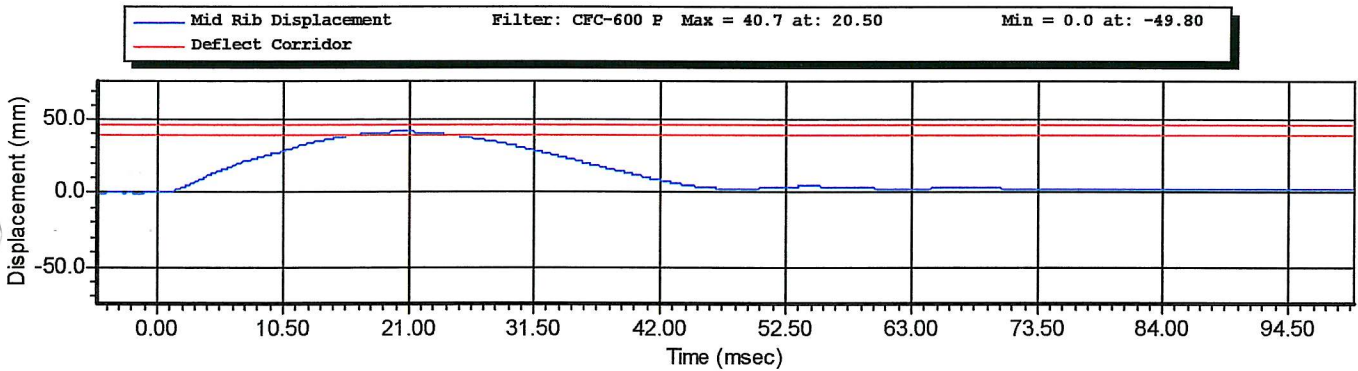
Denton Technical Center

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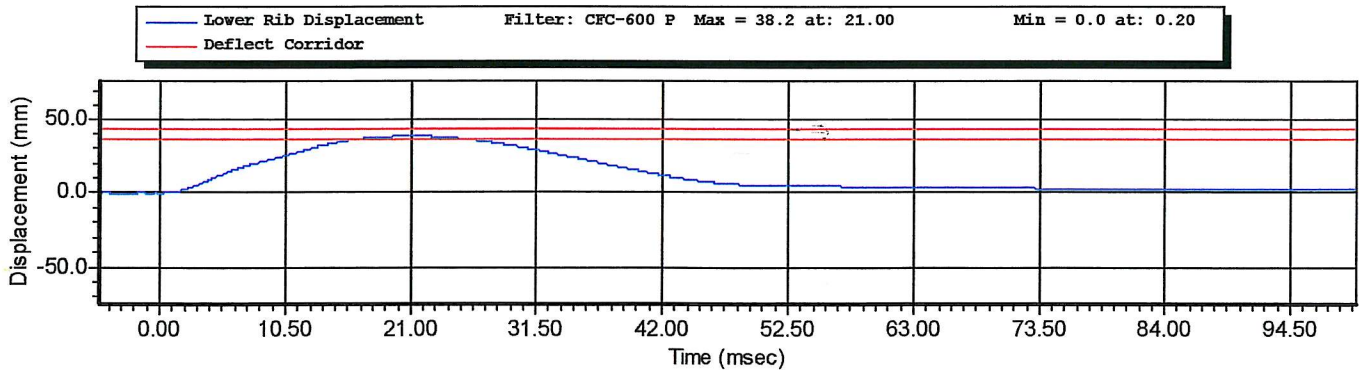
Upper Thorax Displacement



Mid Thorax Displacement



Lower Thorax Displacement

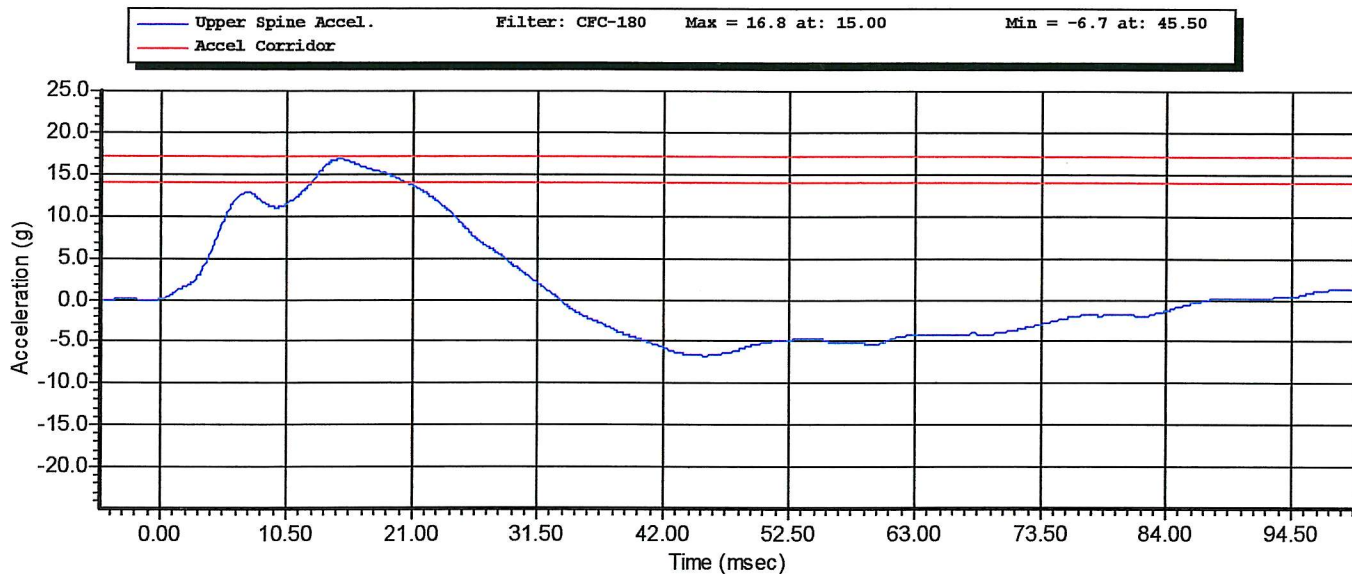




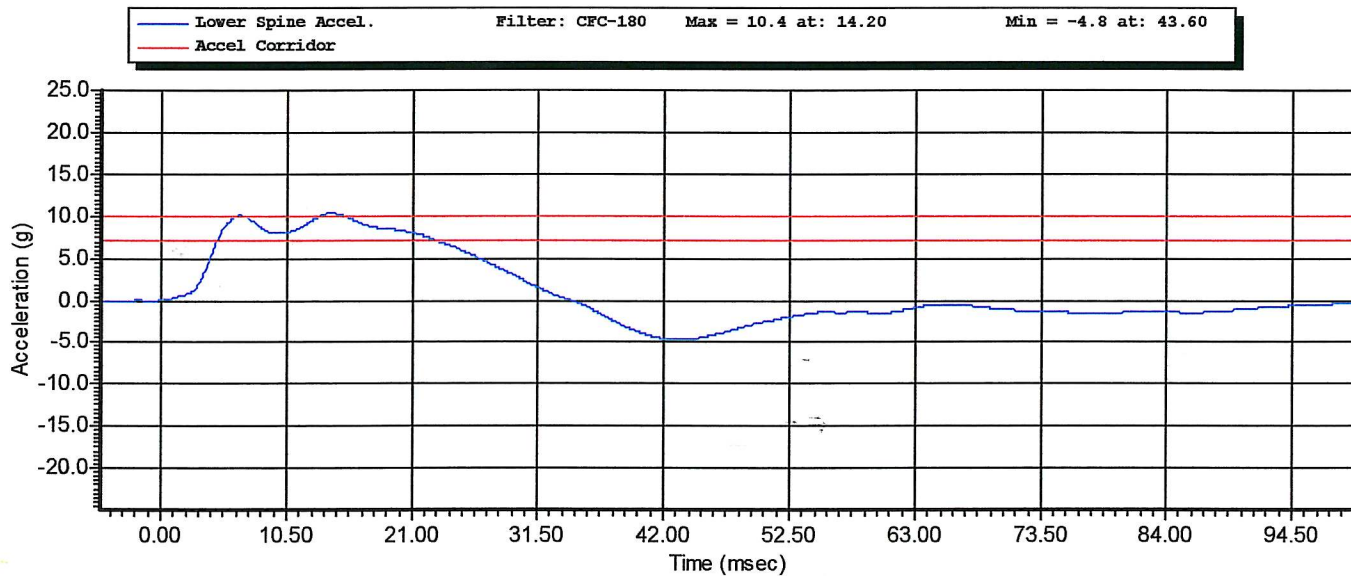
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Upper Spine Acceleration



Lower Spine Acceleration

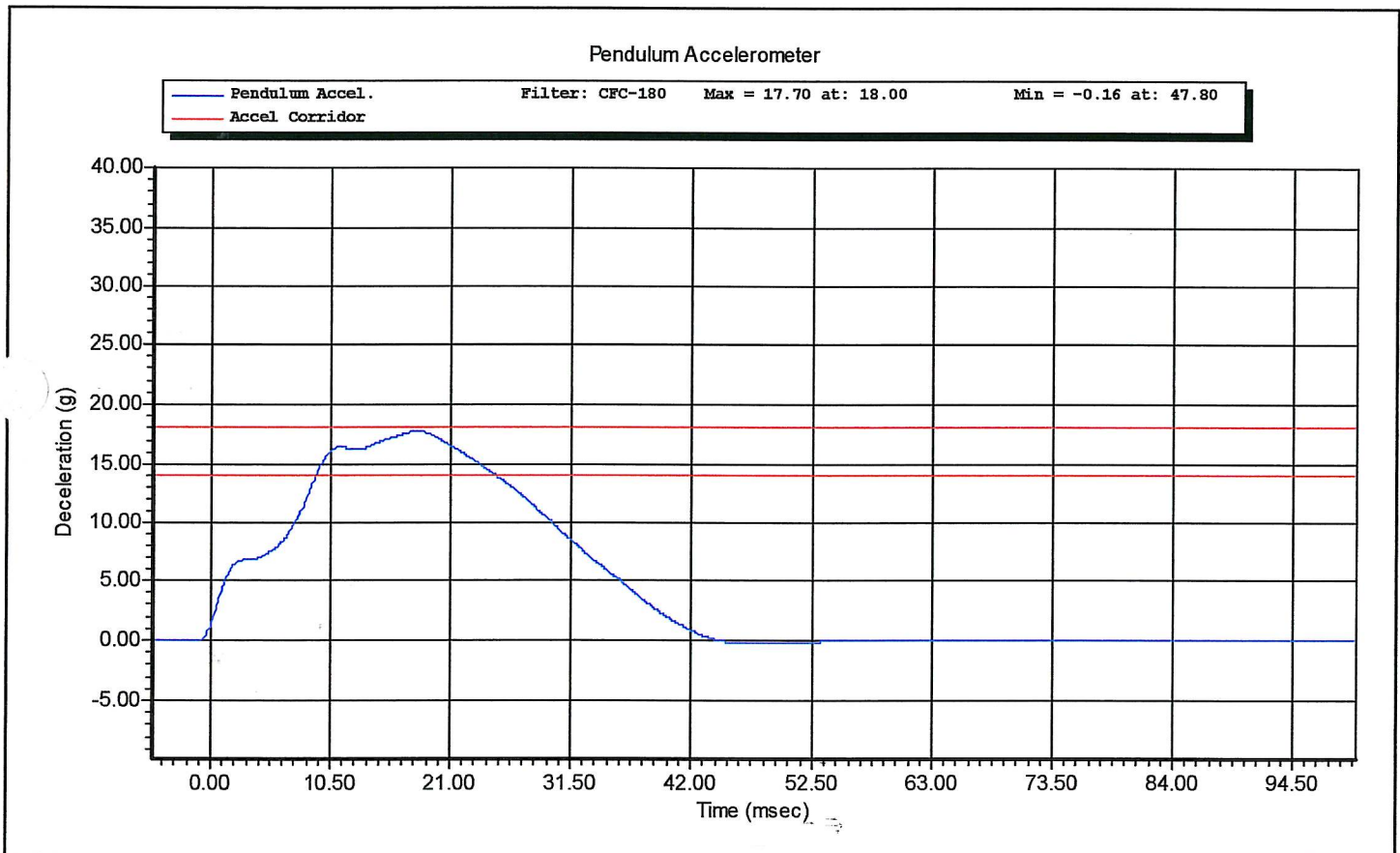




Denton Technical Center

1965 Larchwood Troy, Michigan 48063, Phone: (248) 528-9889, Fax: (248) 528-8494

Test Name:	Thorax Impact without Arm	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs Level 'D'		
ATD Serial Number:	304		
Test Number:	2	Test Date:	4/23/2009
		Test Time:	3:00:51 PM
Component Part Number	Component Serial Number		
180-3362			



Test ID: RO0366

Test Time: 3:00:51 PM

Test Date: 4/23/2009



Denton Technical Center

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VERIFICATION REPORT

Test Name:	Abdominal Impact	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs Level 'D'		
ATD Serial Number:	304		
Test ID:	RF0495	Test Date:	4/23/2009
Test Number:	7	Test Time:	1:32:44 PM

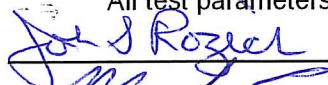
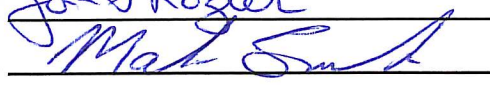
Condition As Received:	CALSPAN
User Field 2:	
User Field 3:	

Component Part Number	Component Serial Number
180-3368	1787, 1788

Comments:
LEFT

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.0 deg C P
Humidity	10 -- 70	43 %RH P
Velocity	4.30 -- 4.50	4.33 m/s P
Probe Acceleration	12.0 -- 16.0	16.0 g P
Upper Abdominal Rib Deflection	39.0 -- 47.0	40.6 mm P
Lower Abdominal Rib Deflection	37.0 -- 46.0	37.4 mm P
Lower Spine Acceleration	11.0 -- 14.0	12.1 g P
FTSS Proposed Lower Spine Acceleration	9.0 -- 14.0	12.1 g P

All test parameters are within specifications

Technician:	JSR	Signature:	
Supervisor:	MS	Signature:	

Test ID: **RF0495**

Test Time: **1:32:44 PM**

Test Date: **4/23/2009**



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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	99999999	12/16/2008
MSI	61A-750-10-360-XY	A021717	4/3/2009
Denton	180-3885	404	12/5/2008
Denton	180-3881	305	10/21/2008
Endevco	7264-2000	P58839	3/9/2009

Test ID: **RF0495**

Test Time: **1:32:44 PM**

Test Date: **4/23/2009**

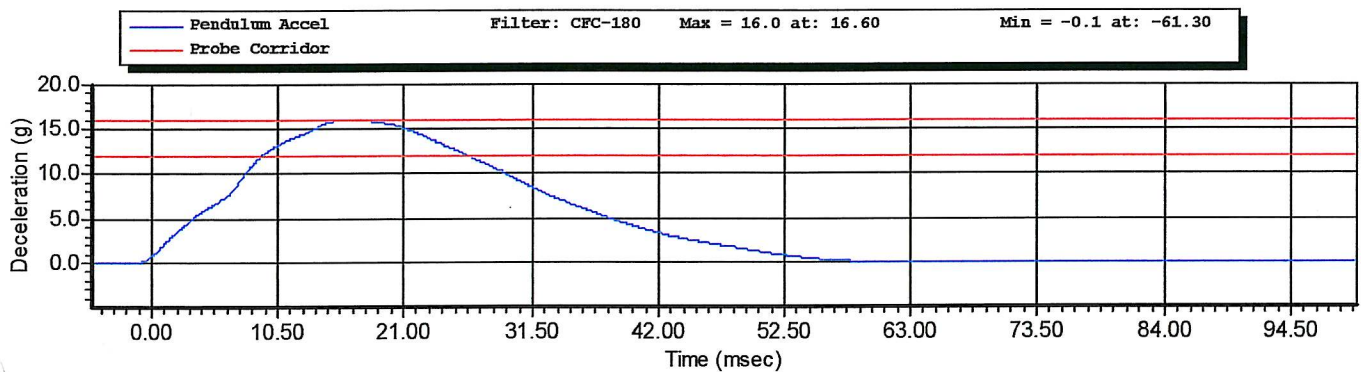


Denton Technical Center

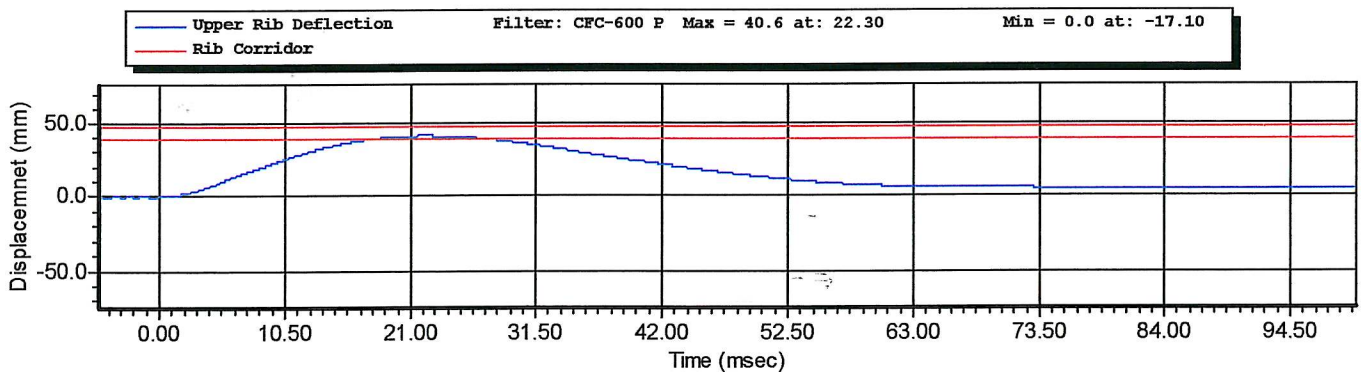
1965 Larchwood Troy, Michigan 48063, Phone: (248) 528-9889, Fax: (248) 528-8494

Test Name:	Abdominal Impact	Revision:	12/14/2006
Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs Level 'D'		
ATD Serial Number:	304		
Test Number:	7	Test Date:	4/23/2009
		Test Time:	1:32:44 PM
Component Part Number	Component Serial Number		
180-3368	1787, 1788		

Pendulum Accelerometer



Upper Abdominal Rib Deflection



Test ID: RF0495

Test Time: 1:32:44 PM

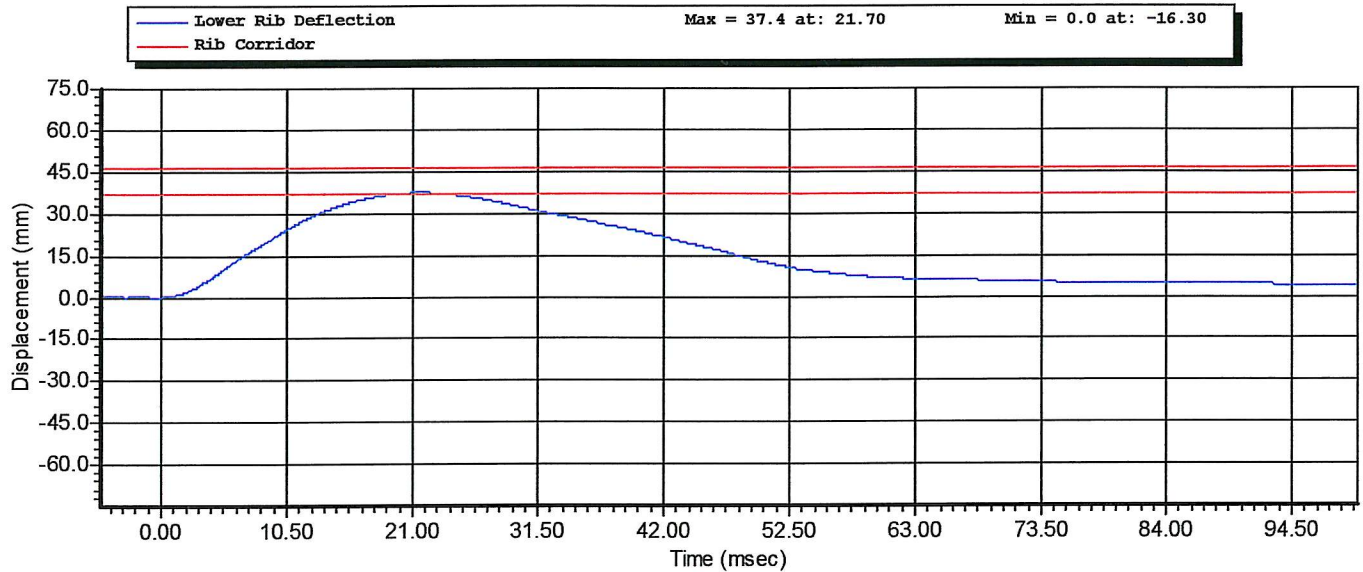
Test Date: 4/23/2009



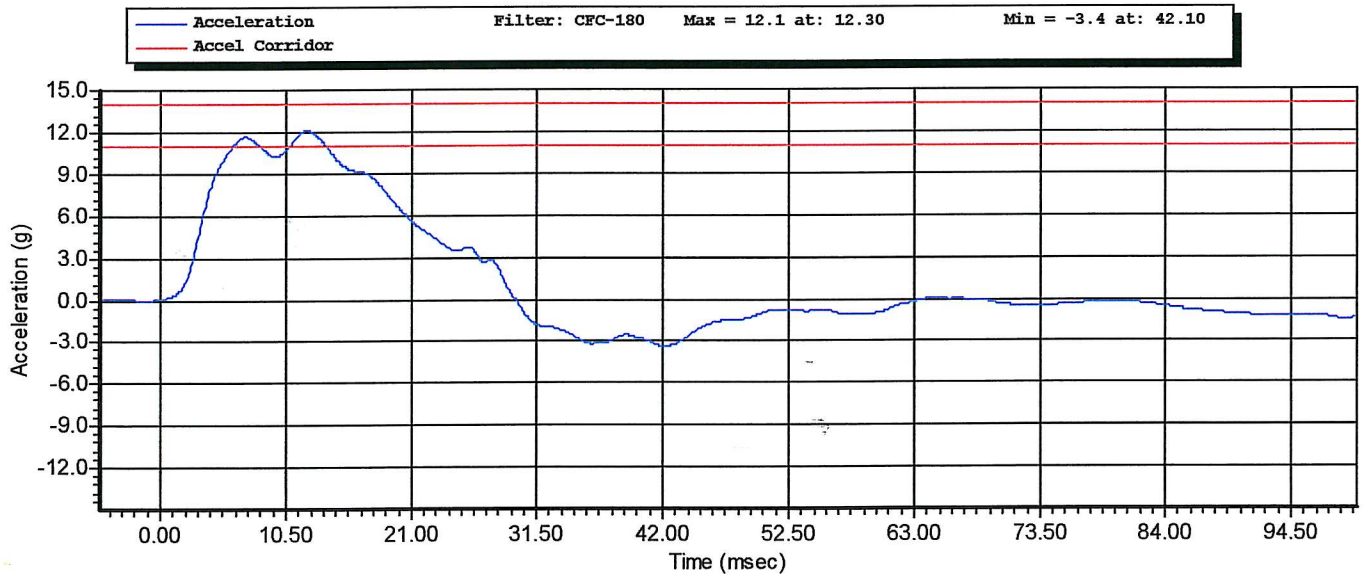
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Lower Abdominal Rib Deflection



Lower Spine Acceleration





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VERIFICATION REPORT

Test Name:	Pelvis	Revision:	12/14/2006
Sub Test Name:	Acetabulum Impact	Spec Type:	NHTSA
ATD Type:	SID-IIs Level 'D'		
ATD Serial Number:	304		
Test ID:	RJ0882	Test Date:	4/17/2009
Test Number:	5	Test Time:	3:10:44 PM

Condition As Received:	CALSPAN
User Field 2:	
User Field 3:	

Component Part Number	Component Serial Number
180-4343	882

Comments:
LEFT

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.1 deg C P
Humidity	10 -- 70	44 %RH P
Velocity	6.60 -- 6.80	6.72 m/s P
Peak Probe Acceleration	38.0 -- 47.0	45.2 g P
Peak Pelvis Acceleration	41.0 -- 50.0	45.8 g P
FTSS Proposed Peak Pelvis Accel after 5	34.0 -- 42.0	38.9 g P
Peak Acetabulum Force	3.80 -- 4.60	4.10 kN P
FTSS Proposed Peak Acetabulum Force	3.60 -- 4.40	4.10 kN P

All test parameters are within specifications

Technician:	JR	Signature:	
Supervisor:	MS	Signature:	

Test ID: **RJ0882**

Test Time: **3:10:44 PM**

Test Date: **4/17/2009**



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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	99999999	12/16/2008
MSI	61A-750-10-360-XY	A022629	10/14/2008
Endevco	7264-2000	P52094	3/9/2009
Denton	3249J	267	3/6/2009

Test ID: **RJ0882**

Test Time: **3:10:44 PM**

Test Date: **4/17/2009**

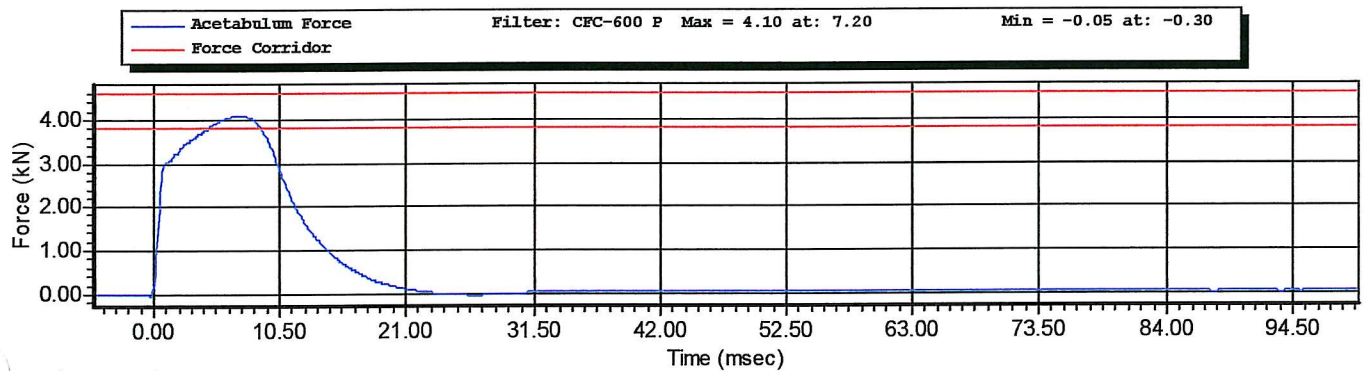


Denton Technical Center

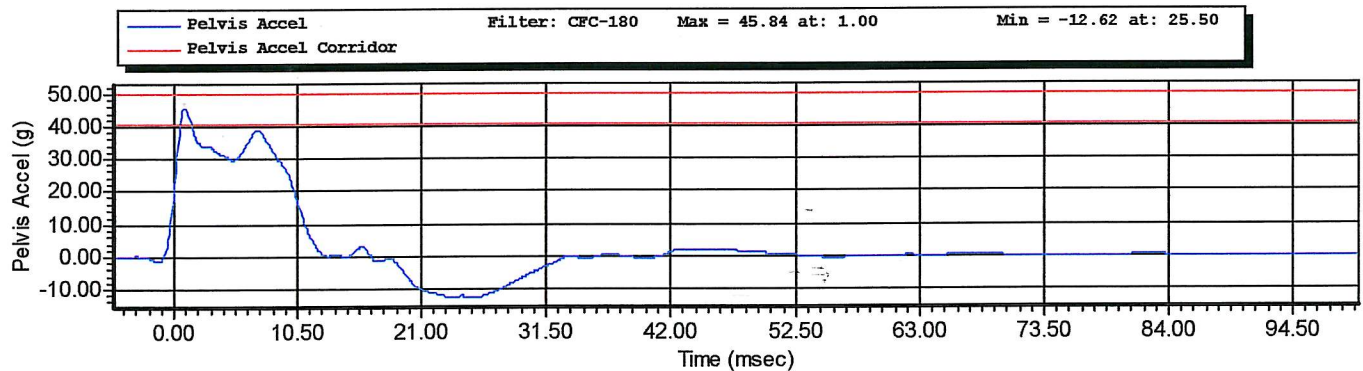
1965 Larchwood Troy, Michigan 48063, Phone: (248) 528-9889, Fax: (248) 528-8494

Test Name:	Pelvis	Revision:	12/14/2006
Test Name:	Acetabulum Impact	Spec Type:	NHTSA
ATD Type:	SID-IIs Level 'D'		
ATD Serial Number:	304		
Test Number:	5	Test Date:	4/17/2009
		Test Time:	3:10:44 PM
Component Part Number	Component Serial Number		
180-4343	882		

Acetabulum Force



Pelvis Accelerometer



Test ID: **RJ0882**

Test Time: **3:10:44 PM**

Test Date: **4/17/2009**

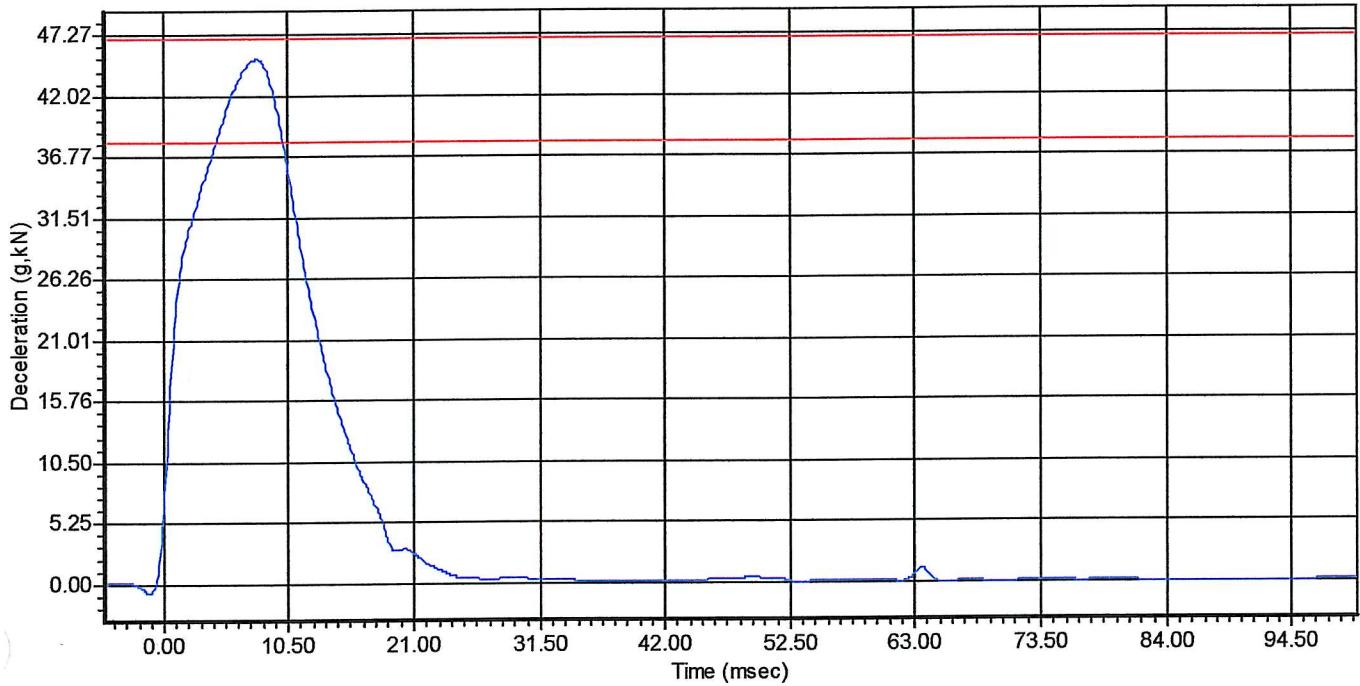


Denton Technical Center

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Probe Accelerometer

Deceleration Filter: CFC-180 Max = 45.18 at: 7.80 Min = -0.75 at: -1.10
Probe Accel Corridor



Test ID: RJ0882

Test Time: 3:10:44 PM

Test Date: 4/17/2009



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VERIFICATION REPORT

Test Name:	Pelvis	Revision:	12/14/2006
Sub Test Name:	Iliac Impact	Spec Type:	NHTSA
ATD Type:	SID-Ils Level 'D'		
ATD Serial Number:	304		
Test ID:	R60882	Test Date:	4/24/2009
Test Number:	4	Test Time:	10:48:10 AM

Condition As Received:	CALSPAN
User Field 2:	
User Field 3:	

Component Part Number	Component Serial Number
Pelvis Flesh - 180-4343	882

Comments:
LEFT

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.0 deg C P
Humidity	10 -- 70	44 %RH P
Velocity	4.20 -- 4.40	4.20 m/s P
Peak Probe Acceleration	34.0 -- 40.0	39.3 g P
Peak Pelvis Acceleration	27.0 -- 33.0	29.9 g P
Peak Iliac Force	3.70 -- 4.50	4.28 kN P
FTSS Proposed Peak Iliac Force	3.60 -- 4.40	4.28 kN P

All test parameters are within specifications

Technician: **JSR** Signature: *Joe S Rozice*
Supervisor: **MS** Signature: *Mark P Smith*

Test ID: **R60882**

Test Time: **10:48:10 AM**

Test Date: **4/24/2009**



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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	99999999	12/16/2008
MSI	61A-750-10-360-XY	A021717	4/3/2009
Endevco	7264-2000	P52094	3/9/2009
Denton	3228J	281	3/6/2009

Test ID: **R60882**

Test Time: **10:48:10 AM**

Test Date: **4/24/2009**

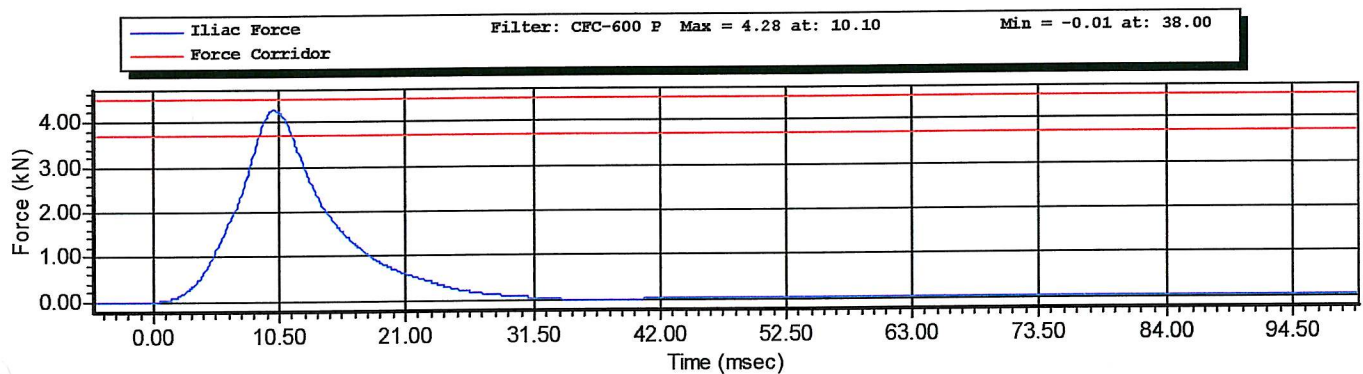


Denton Technical Center

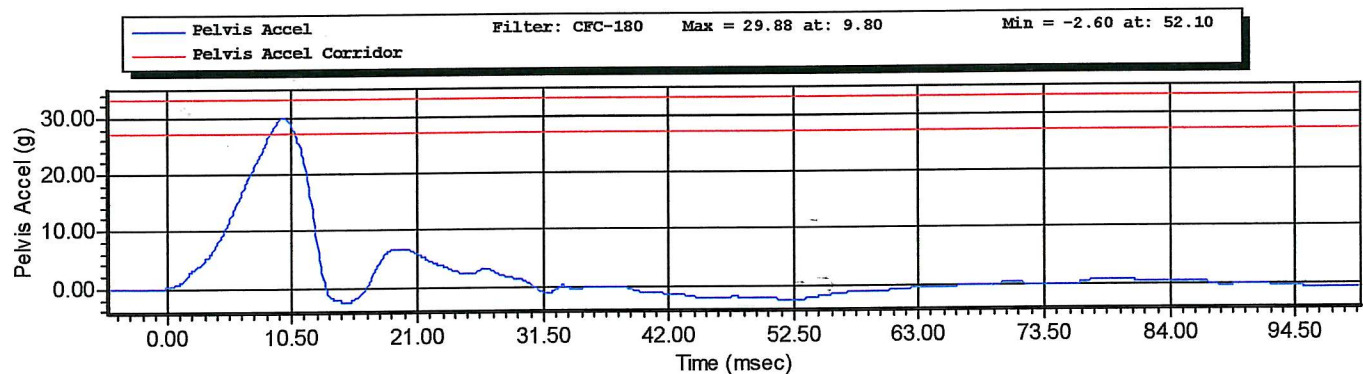
1965 Larchwood Troy, Michigan 48083, Phone: (248) 528-9889, Fax: (248) 528-8494

Test Name:	Pelvis	Revision:	12/14/2006
Test Name:	Iliac Impact	Spec Type:	NHTSA
ATD Type:	SID-IIs Level 'D'		
ATD Serial Number:	304		
Test Number:	4	Test Date:	4/24/2009
		Test Time:	10:48:10 AM
Component Part Number	Component Serial Number		
Pelvis Flesh - 180-4343	882		

Iliac Force



Pelvis Accelerometer



Test ID: R60882

Test Time: 10:48:10 AM

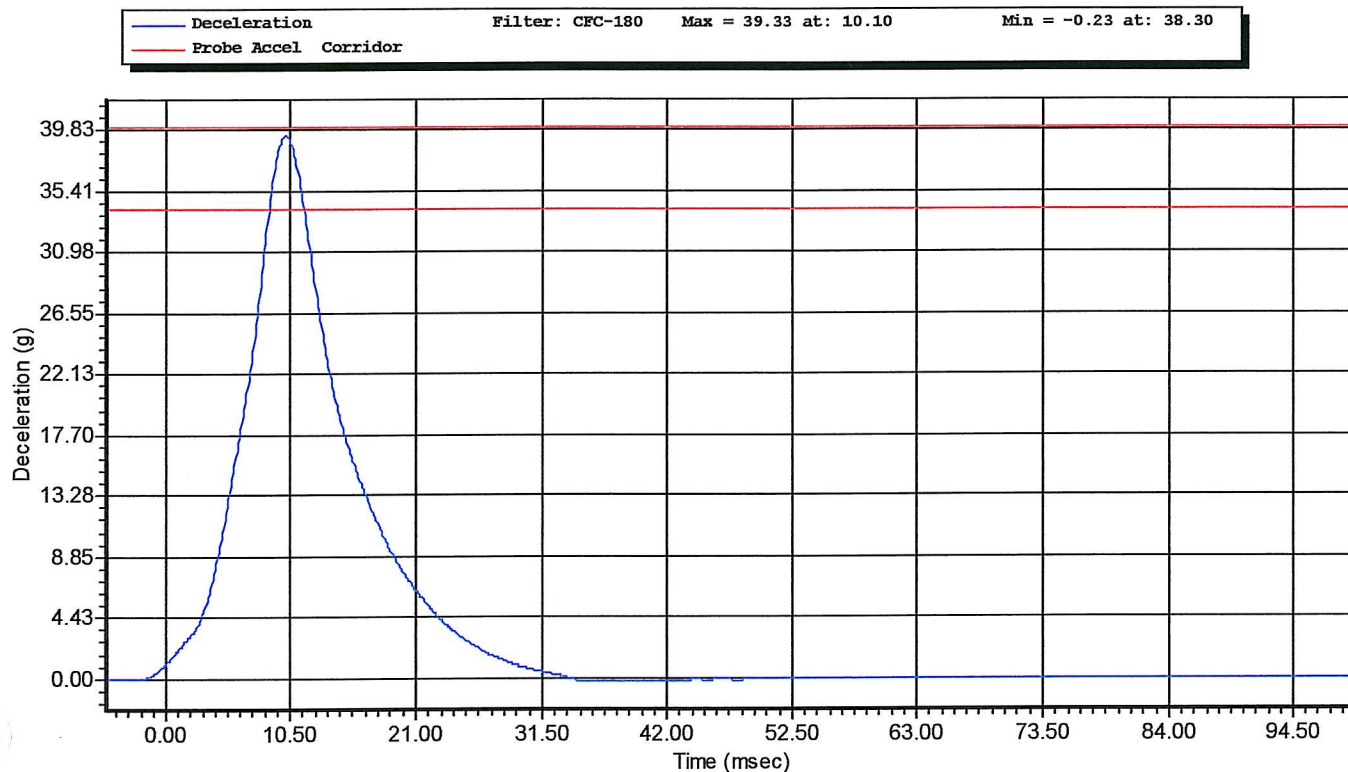
Test Date: 4/24/2009



Denton Technical Center

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Probe Accelerometer



Test ID: **R60882**

Test Time: **10:48:10 AM**

Test Date: **4/24/2009**

CALIBRATION TEST RESULTS

POST TEST

SID IIs NO.: 304

CONFIGURED FOR LEFT SIDE IMPACT



Denton Technical Center

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VERIFICATION REPORT

Test Name:	Head Drop	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs Level 'D'		
ATD Serial Number:	304		
Test ID:	RD1371	Test Date:	6/10/2009
Test Number:	1	Test Time:	7:40:03 AM

Condition As Received: Used	CALSPAN
User Field 2:	
User Field 3:	

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

Comments:
LEFT

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	20.7 deg C P
Humidity	10 -- 70	42 %RH P
Resultant Acceleration	115.0 -- 137.0	116.7 g P
Oscillation	0.0 -- 15.0	4.0 % P
Lateral Acceleration	-15.0 -- 15.0	9.7 g P

All test parameters are within specifications

Technician:	JSR	Signature:	<i>John J. Rozich</i>
Supervisor:	MS	Signature:	<i>Mark Smith</i>

Test ID: RD1371

Test Time: 7:40:03 AM

Test Date: 6/10/2009



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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	12/16/2008
Endevco	7264D-2000	11558	8/12/2008
Endevco	7264D-2000	11553	8/12/2008
Endevco	7264D-2000	11569	8/18/2008

Test ID: RD1371

Test Time: 7:40:03 AM

Test Date: 6/10/2009

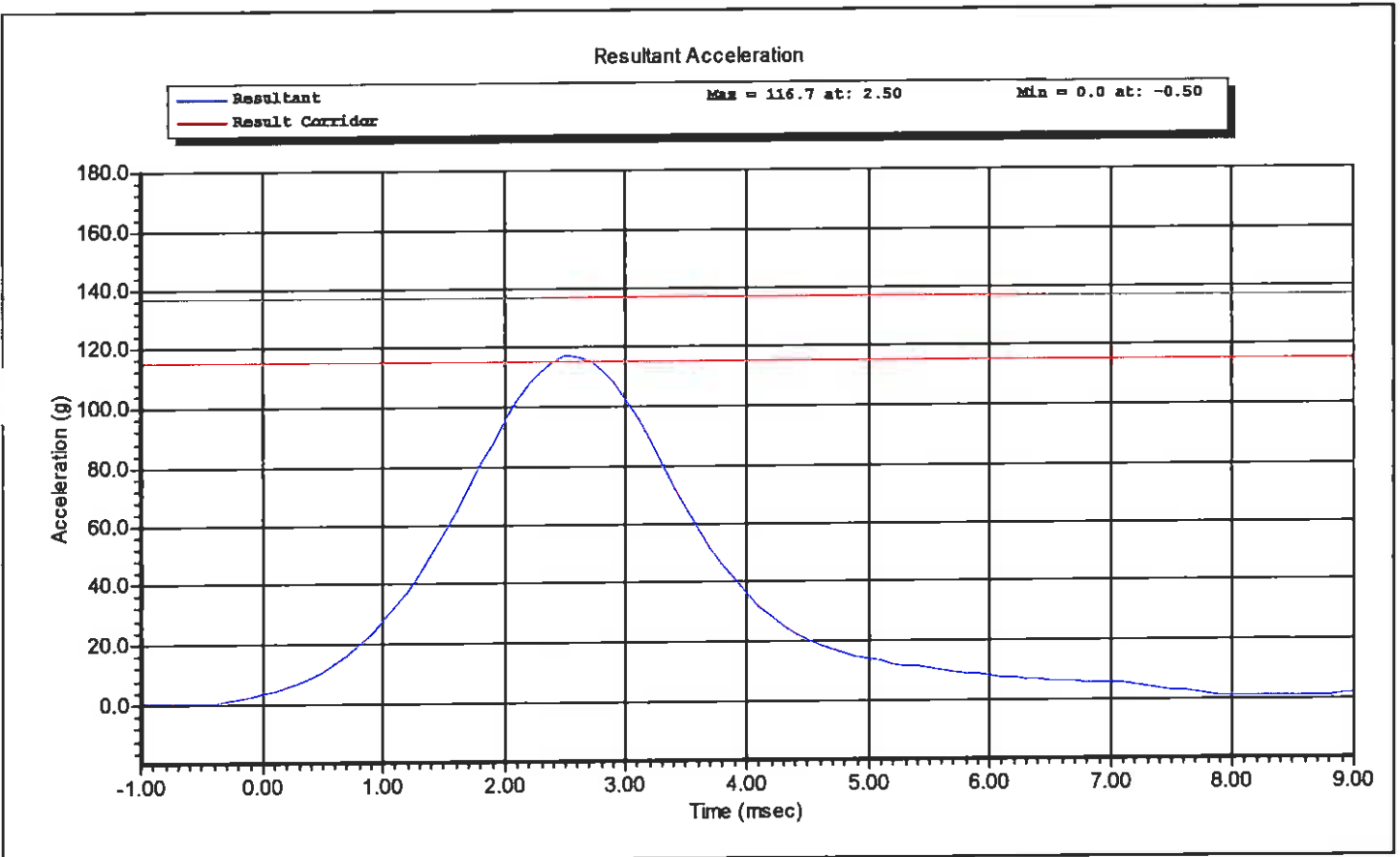


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Test Name:	Head Drop	Revision:	12/14/2006
Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs Level 'D'		
ATD Serial Number:	304		
Test Number:	1	Test Date:	6/10/2009
		Test Time:	7:40:03 AM

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



Test ID: RD1371

Test Time: 7:40:03 AM

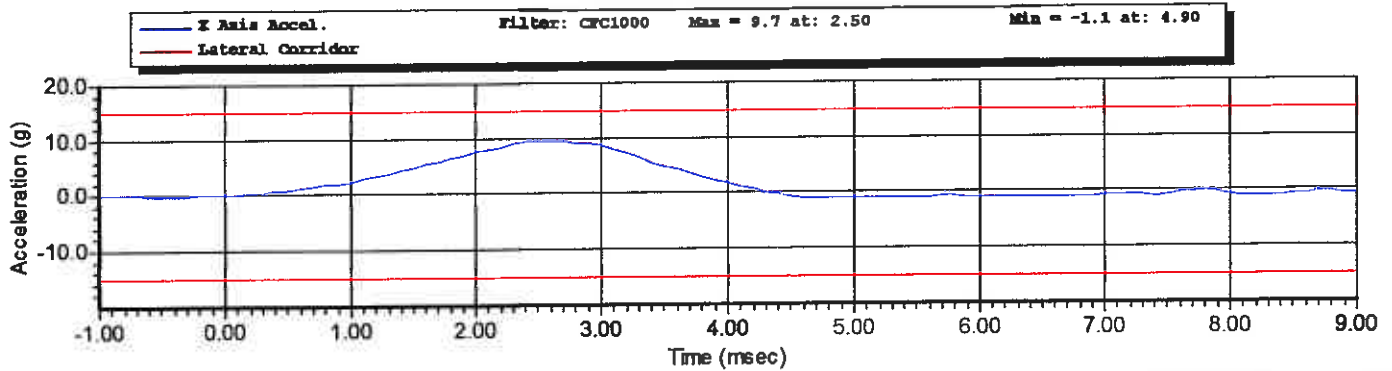
Test Date: 6/10/2009



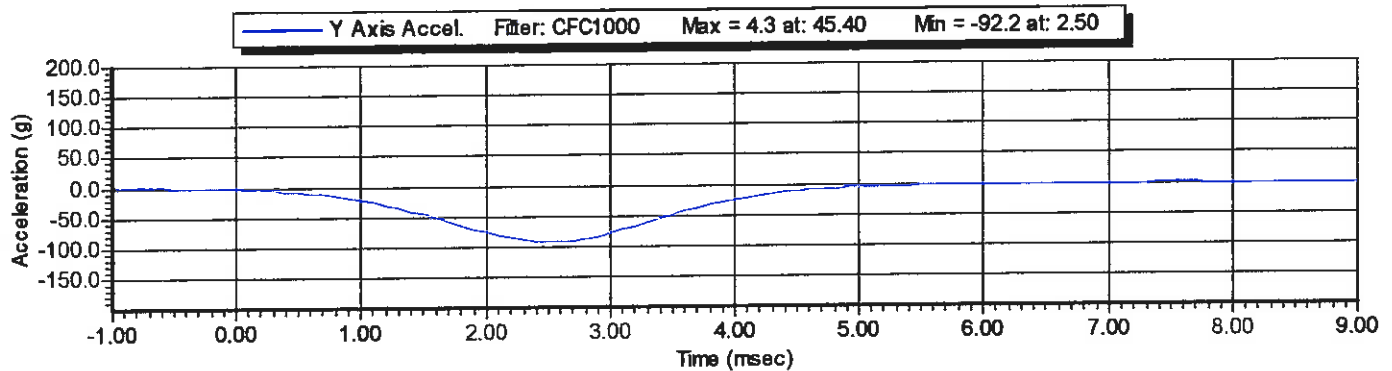
Denton Technical Center

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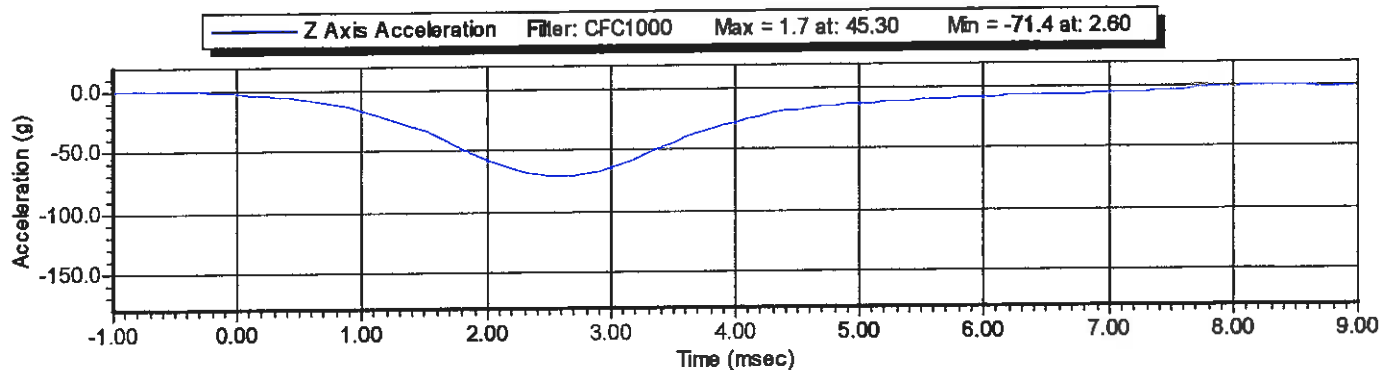
X Axis Acceleration



Y Axis Acceleration



Z Axis Acceleration





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VERIFICATION REPORT

Test Name:	Neck Pendulum	Revision:	12/14/2006
Sub Test Name:	Left Side	Spec Type:	NHTSA
ATD Type:	SID-IIs Level 'D'		
ATD Serial Number:	304		
Test ID:	RA0704	Test Date:	6/10/2009
Test Number:	1	Test Time:	8:50:11 AM

Condition As Received: Used	CALSPAN
User Field 2:	
User Field 3:	

Component Part Number	Component Serial Number
Neck - 180-2000	0704
Torque Wrench s/n: 0106800459	

Comments:
8X6 @ 84°

Test Parameters		Test Specifications		Test Results	
Temperature		20.6	– 22.2	20.8 deg C	P
Humidity		10	– 70	43 %RH	P
Velocity		5.51	– 5.63	5.61 m/s	P
Pendulum Impulse at	10 ms	2.20	– 2.80	2.37 m/s	P
Pendulum Impulse at	15 ms	3.30	– 4.10	3.53 m/s	P
Pendulum Impulse at	20 ms	4.40	– 5.40	4.77 m/s	P
Pendulum Impulse at	25 ms	5.40	– 6.10	5.74 m/s	P

Test ID: RA0704

Test Time: 8:50:11 AM

Test Date: 6/10/2009



Denton Technical Center

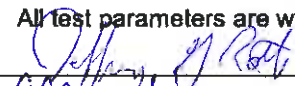
1965 Larchwood Troy, Michigan 48063, Phone: (248) 528-9889, Fax: (248) 528-8494

VERIFICATION REPORT

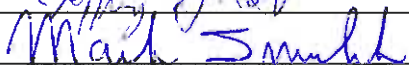
Test Parameters	Test Specifications	Test Results
Pendulum Impulse between 25 and 100 ms	5.50 – 6.20	5.88 m/s P
Max D Plane Rotation	71.0 – 81.0	74.5 degrees P
Time at Max Rotation	50.0 – 70.0	60.0 ms P
Moment about OC	-44.0 – -36.0	-36.0 Nm P
Moment Decay to Zero	102.0 – 126.0	111.9 ms P

All test parameters are within specifications

Technician: **JR**

Signature: 

Supervisor: **MS**

Signature: 

Test ID: **RA0704**

Test Time: **8:50:11 AM**

Test Date: **6/10/2009**



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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	99999999	12/16/2008
MSI	61A-750-10-360-XY	a021723	10/14/2008
Denton	1716A	1998	4/15/2009
Denton	1716A	1998	4/15/2009
DentonATD	78051-342	114	10/28/2008
DentonATD	78051-342	113	10/28/2008
DentonATD	78051-342	112	10/28/2008

Test ID: **RA0704**

Test Time: **8:50:11 AM**

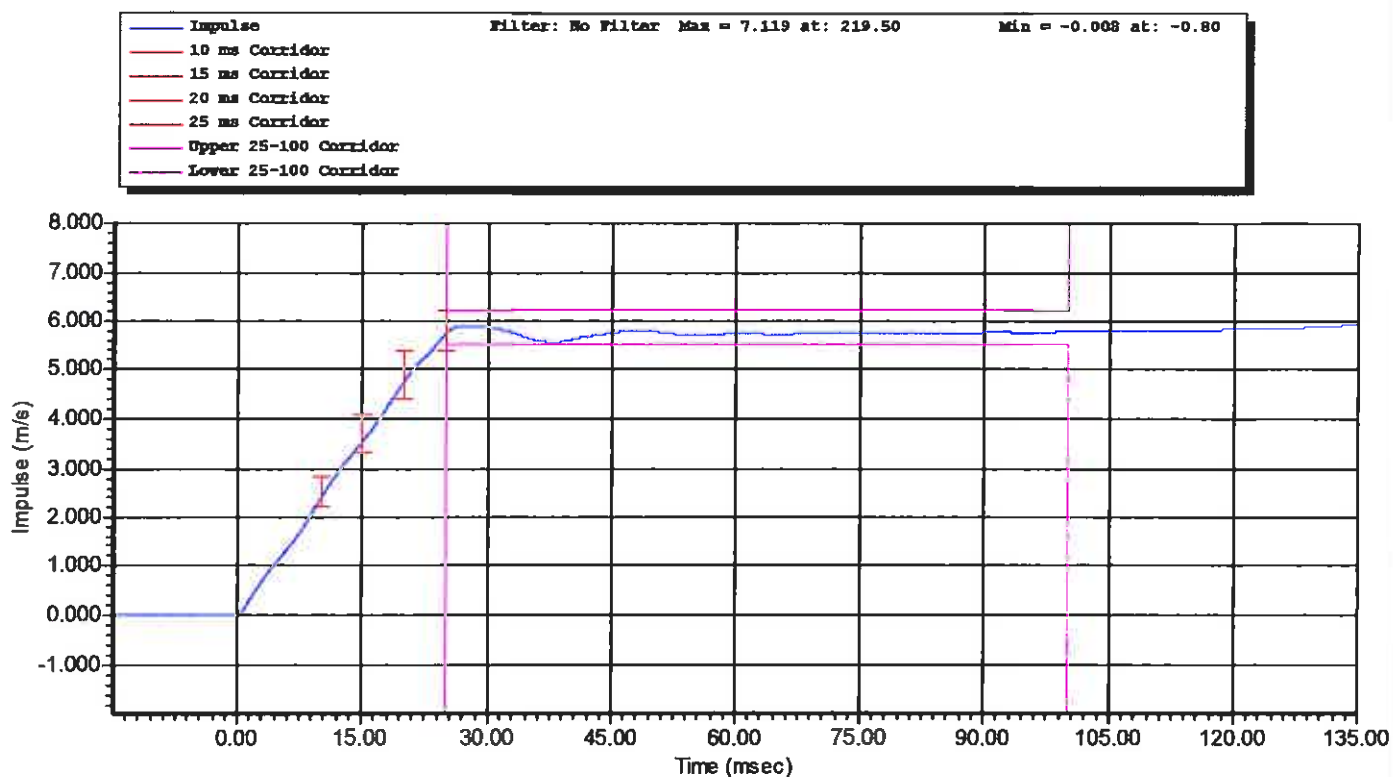
Test Date: **6/10/2009**



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Pendulum Impulse



Test ID: RA0704

Test Time: 8:50:11 AM

Test Date: 6/10/2009



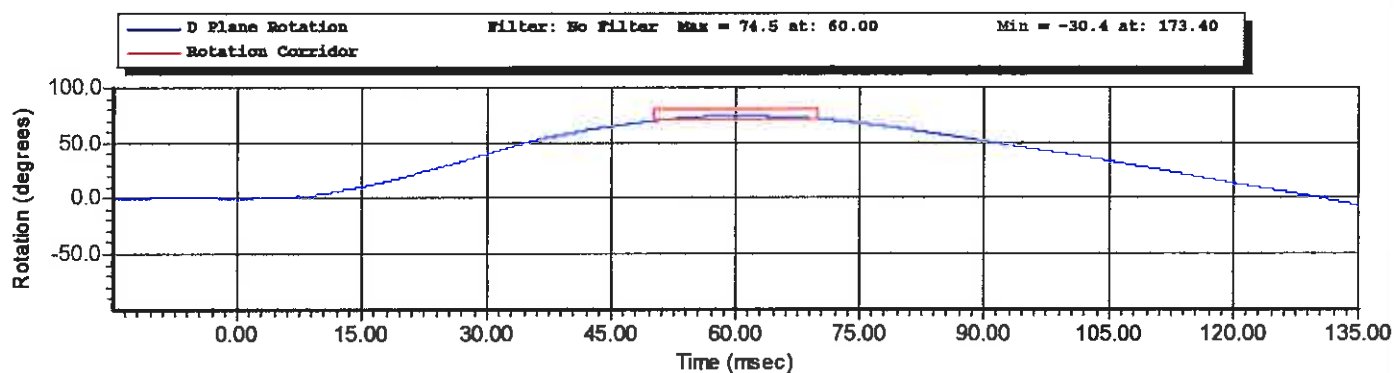
Denton Technical Center

1965 Larchwood Troy, Michigan 48063, Phone: (248) 528-9889, Fax: (248) 528-8494

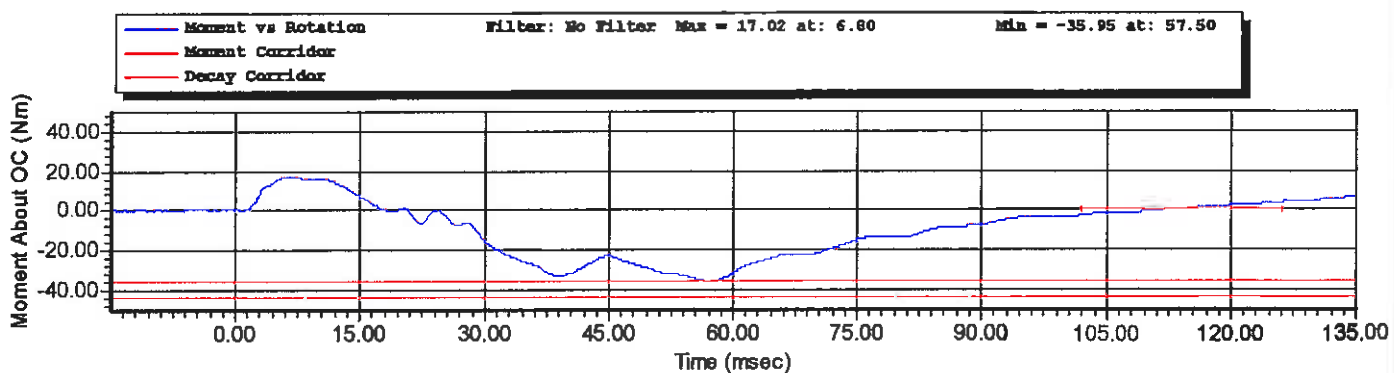
Test Name:	Neck Pendulum	Revision:	12/14/2006
Job Test Name:	Left Side	Spec Type:	NHTSA
ATD Type:	SID-11s Level 'D'		
ATD Serial Number:	304		
Test Number:	1	Test Date:	6/10/2009
		Test Time:	8:50:11 AM

Component Part Number	Component Serial Number
Neck - 180-2000	0704

D Plane Rotation



Moment About Occipital Condyle



Test ID: RA0704

Test Time: 8:50:11 AM

Test Date: 6/10/2009



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VERIFICATION REPORT

Test Name:	Shoulder Impact	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs Level 'D'		
ATD Serial Number:	304		
Test ID:	RM0495	Test Date:	6/6/2009
Test Number:	1	Test Time:	10:09:41 AM

Condition As Received: Used	CALSPAN
User Field 2:	
User Field 3:	

Component Part Number	Component Serial Number
Shoulder Rib - 180-3355	281

Comments:
LEFT

Test Parameters	Test Specifications	Test Results
Temperature	20.6 – 22.2	20.7 deg C P
Humidity	10.0 – 70.0	40.6 %RH P
Velocity	4.30 – 4.50	4.43 m/s P
Probe Acceleration	14.0 – 18.0	16.5 g P
Shoulder Deflection	30.0 – 37.0	30.7 mm P
Upper Spine Acceleration	17.0 – 19.0	19.1 g F
FTSS Proposed Upper Spine Acceleration	17.0 – 21.0	19.1 g P

All test parameters are NOT within specifications

Technician:	JSR	Signature:	<i>John S. Rozick</i>
Supervisor:	MS	Signature:	<i>Mark Smith</i>

Test ID: RM0495

Test Time: 10:09:41 AM

Test Date: 6/6/2009



Denton Technical Center

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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	99999999	12/16/2008
MSI	61A-750-10-360-XY	A021717	4/3/2009
Denton	180-3885	1154	3/6/2009
Endevco	7264-2000	P58884	3/9/2009

Test ID: **RM0495**

Test Time: **10:09:41 AM**

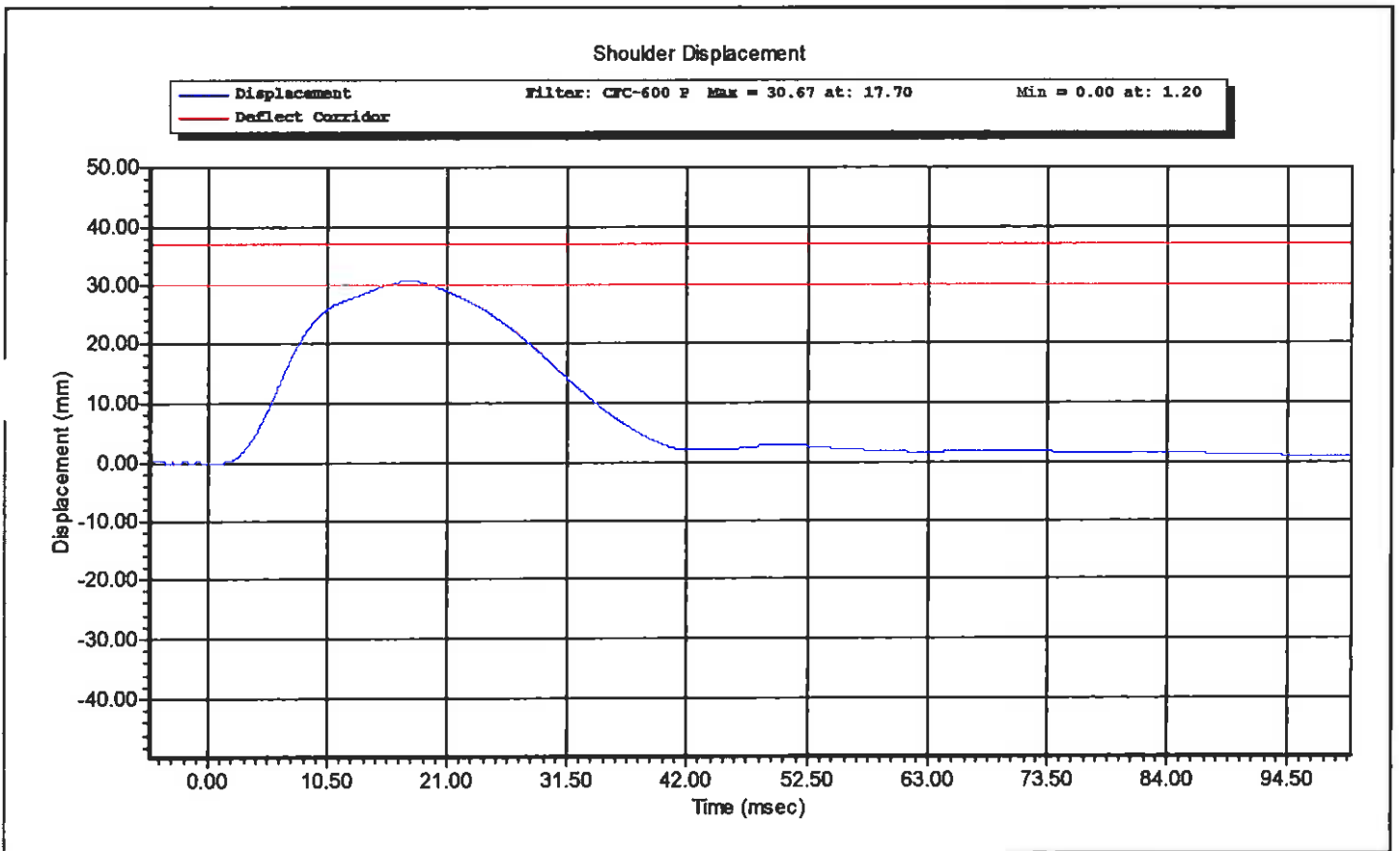
Test Date: **6/6/2009**



Denton Technical Center

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Test Name:	Shoulder Impact	Revision:	12/14/2006
Lab Test Name:		Spec Type:	NHTSA
ATD Type:	SID-11s Level 'D'		
ATD Serial Number:	304		
Test Number:	1	Test Date:	6/6/2009
		Test Time:	10:09:41 AM
Component Part Number	Component Serial Number		
Shoulder Rib - 180-3355	281		



Test ID: RM0495

Test Time: 10:09:41 AM

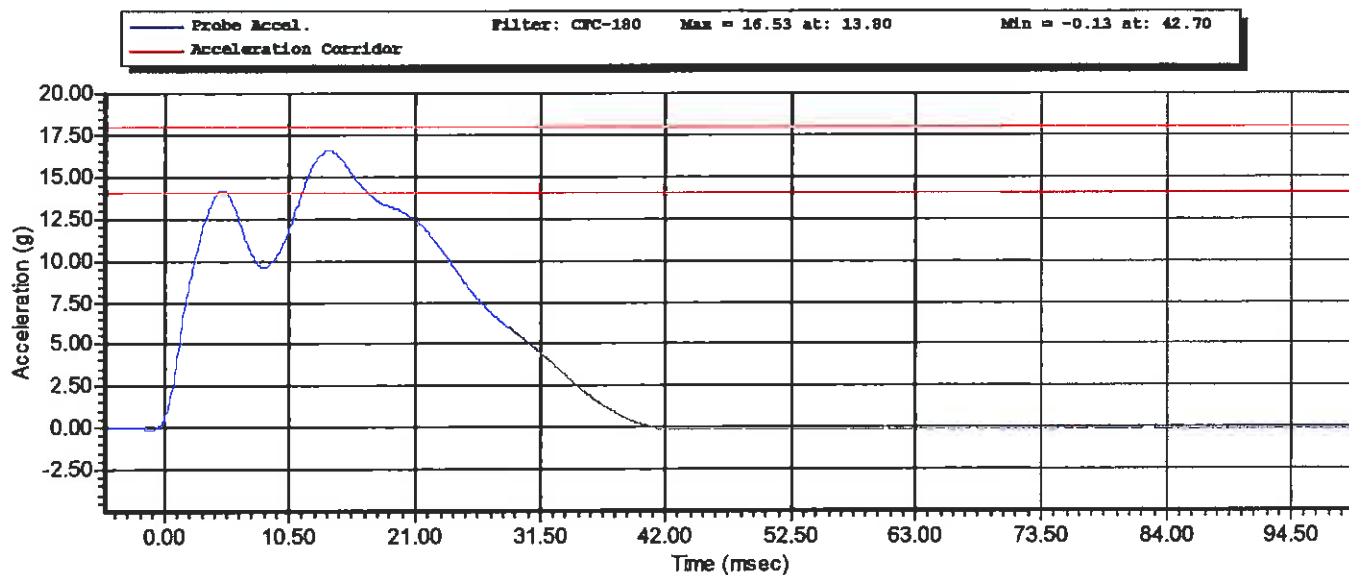
Test Date: 6/6/2009



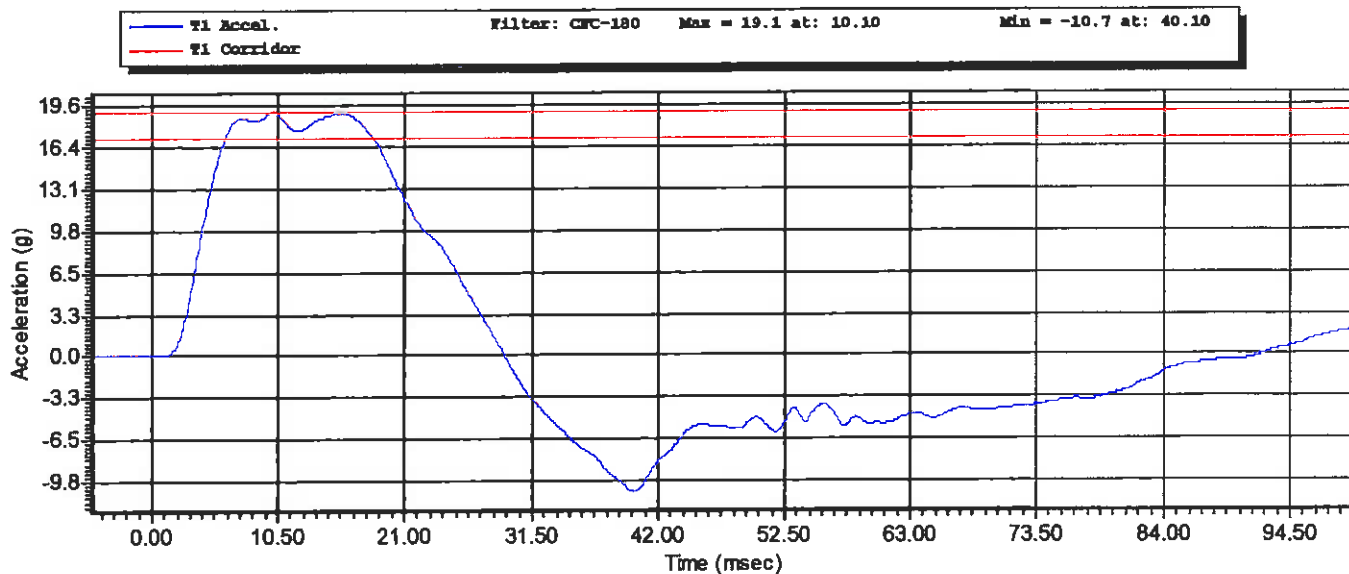
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Probe Accelerometer



T1 Accelerometer





Denton Technical Center

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VERIFICATION REPORT

Test Name:	Thorax Impact with Arm	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs Level 'D'		
ATD Serial Number:	304		
Test ID:	RN0366	Test Date:	6/9/2009
Test Number:	6	Test Time:	1:53:17 PM

Condition As Received: Used	CALSPAN
User Field 2:	
User Field 3:	

Component Part Number	Component Serial Number
Thorax Rib #1 - 180-3362	1474
Thorax Rib #2 - 180-3362	1496
Thorax Rib #3 - 180-3362	1497
Shoulder Rib - 180-3355	281
Arm - 180-6011	950

Comments:
FT

Test Parameters	Test Specifications	Test Results
Temperature	20.6 – 22.2	21.3 deg C P
Humidity	10 – 70	46 %RH P
Velocity	6.60 – 6.80	6.66 m/s P
Probe Acceleration	31.0 – 36.0	36.0 g P
Upper Thorax Rib Deflection	26.0 – 32.0	27.5 mm P
Mid Thorax Rib Deflection	30.0 – 36.0	31.3 mm P

Test ID: RN0366

Test Time: 1:53:17 PM

Test Date: 6/9/2009



Denton Technical Center

1965 Larchwood Troy, Michigan 48063, Phone: (248) 528-9889, Fax: (248) 528-8494

VERIFICATION REPORT

Test Parameters	Test Specifications	Test Results
Lower Thorax Rib Deflection	32.0 -- 38.0	33.1 mm P
Upper Spine Acceleration	34.0 -- 43.0	41.2 g P
Lower Spine Acceleration	28.0 -- 35.0	34.8 g P
Shoulder Deflection	31.0 -- 40.0	36.0 mm P

All test parameters are within specifications

Technician: **JSR**

Signature: 

Supervisor: **MS**

Signature: 

Test ID: **RN0366**

Test Time: **1:53:17 PM**

Test Date: **6/9/2009**



Denton Technical Center

1965 Larchwood Troy, Michigan 48063, Phone: (248) 528-9889, Fax: (248) 528-8494

VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	99999999	12/16/2008
MSI	61A-750-10-360-XY	A021717	4/3/2009
Denton	180-3885	1188	3/6/2009
Denton	180-3885	1269	3/6/2009
Denton	180-3885	1260	3/6/2009
Endevco	7264-2000	P58884	3/9/2009
Endevco	7264-2000	P58839	3/9/2009
Denton	180-3885	1154	3/6/2009

Test ID: RN0366

Test Time: 1:53:17 PM

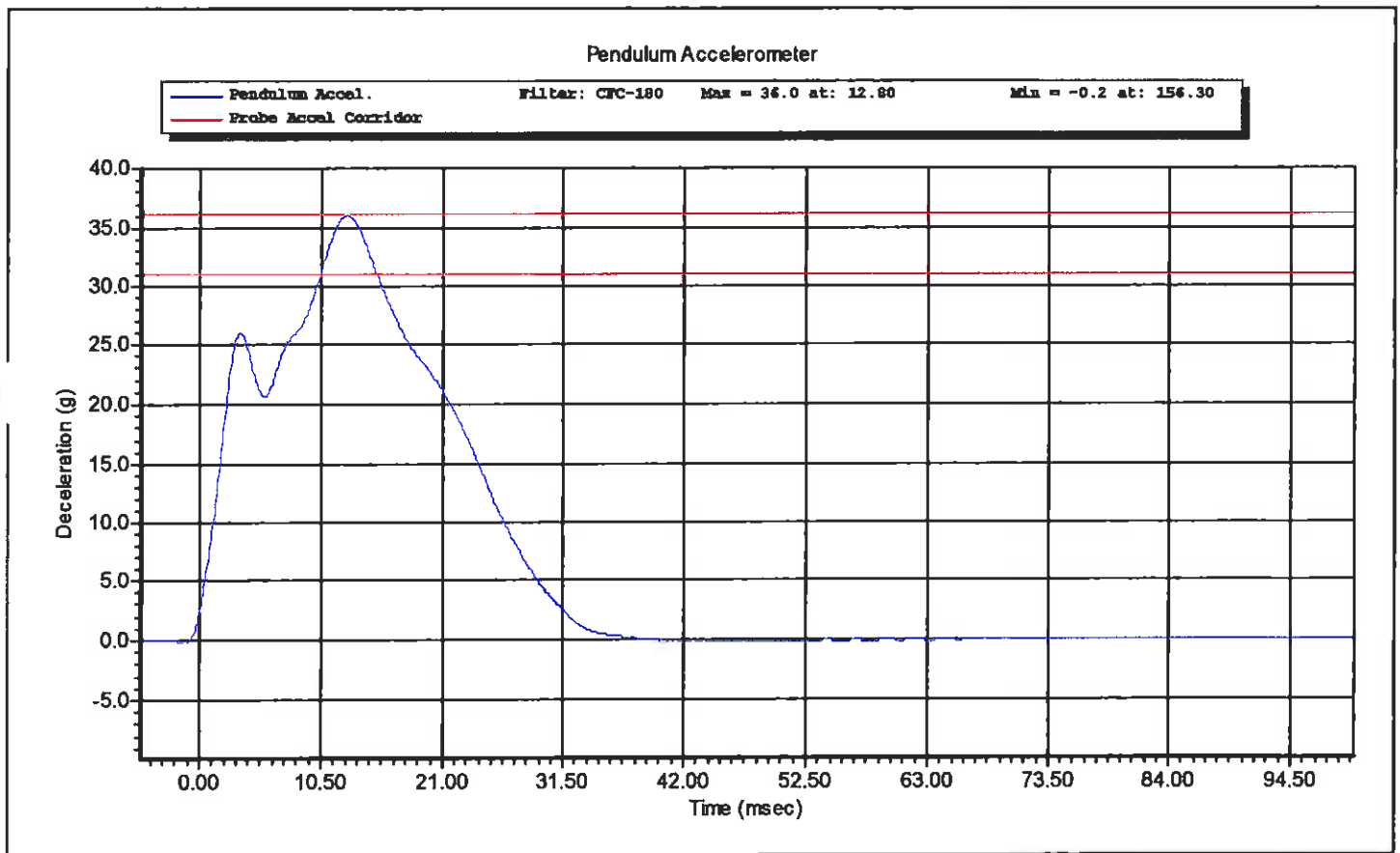
Test Date: 6/9/2009



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Test Name:	Thorax Impact with Arm	Revision:	12/14/2006
.b Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs Level 'D'		
ATD Serial Number:	304		
Test Number:	6	Test Date:	6/9/2009
		Test Time:	1:53:17 PM
Component Part Number	Component Serial Number		
Thorax Rib #1 - 180-3362	1474		



Test ID: RN0366

Test Time: 1:53:17 PM

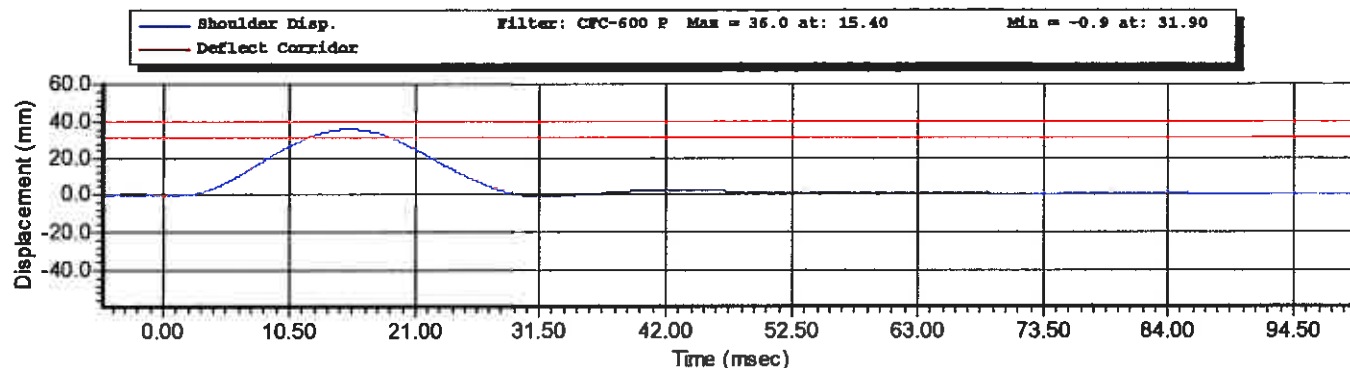
Test Date: 6/9/2009



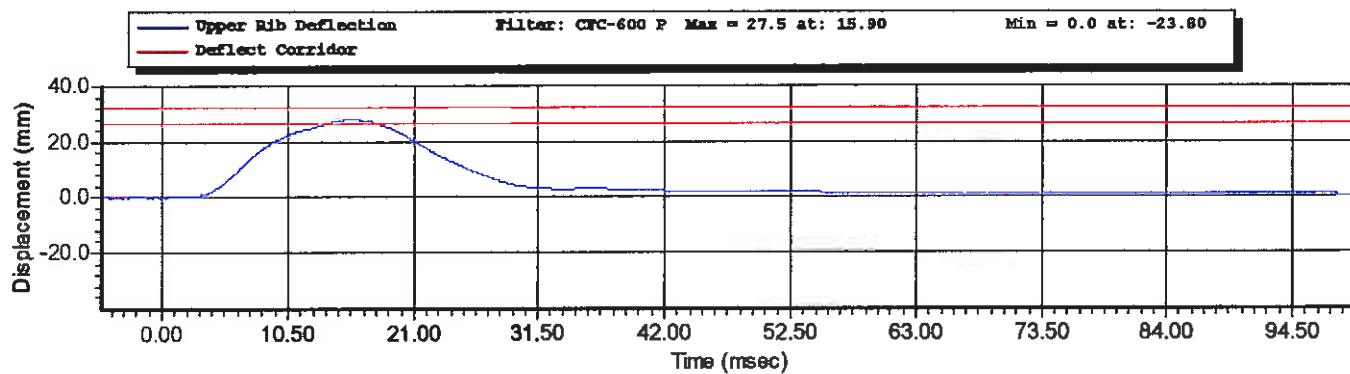
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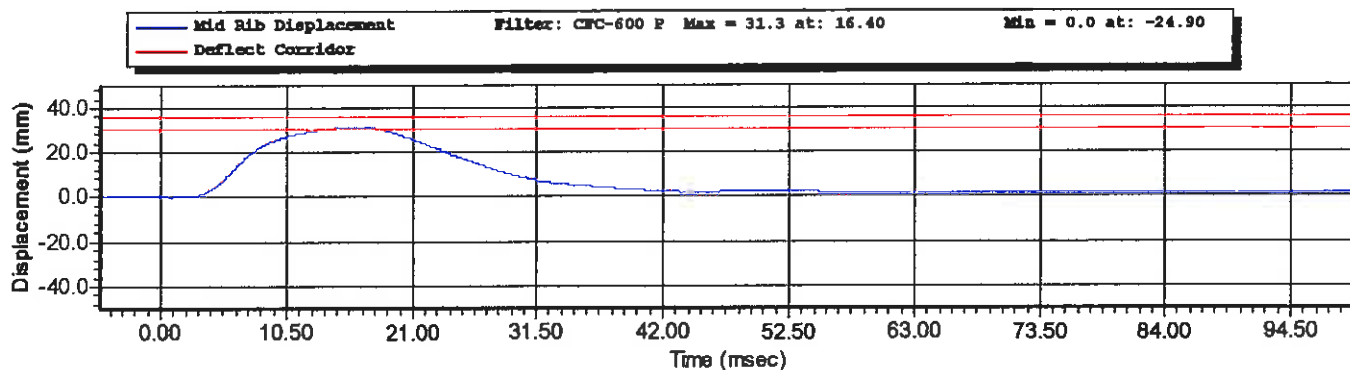
Shoulder Displacement



Upper Thorax Displacement



Mid Thorax Displacement

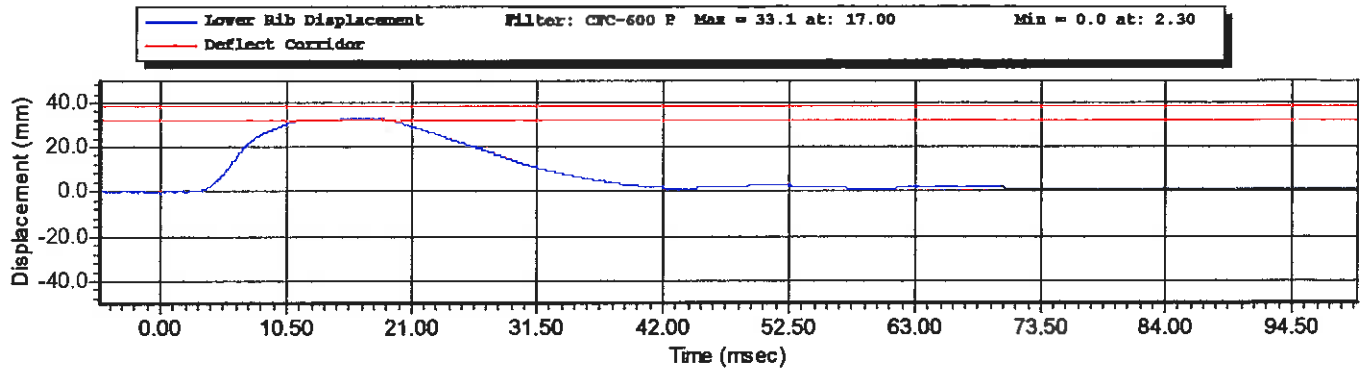




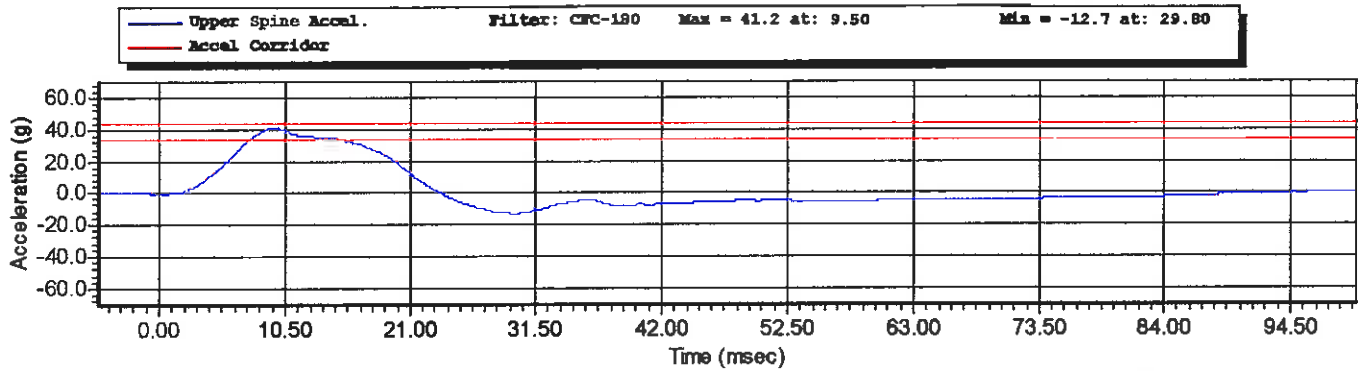
Denton Technical Center

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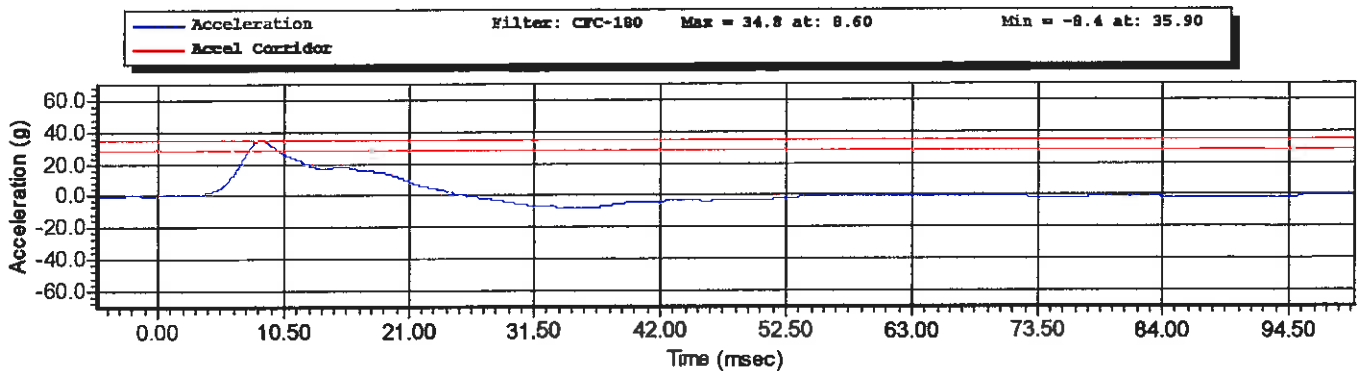
Lower Thorax Displacement



Upper Spine Acceleration



Lower Spine Acceleration





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VERIFICATION REPORT

Test Name:	Thorax Impact without Arm	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs Level 'D'		
ATD Serial Number:	304		
Test ID:	RO0366	Test Date:	6/6/2009
Test Number:	1	Test Time:	10:46:52 AM

Condition As Received: Used	CALSPAN
User Field 2:	
User Field 3:	

Component Part Number	Component Serial Number
Thorax Rib #1 - 180-3362	1474
Thorax Rib #2 - 180-3362	1496
Thorax Rib #3 - 180-3362	1497

Comments:
LEFT

Test Parameters	Test Specifications	Test Results
Temperature	20.6 – 22.2	20.7 deg C P
Humidity	10 – 70	41 %RH P
Velocity	4.20 – 4.40	4.31 m/s P
Probe Acceleration	14.0 – 18.0	17.4 g P
Upper Thorax Rib Deflection	33.0 – 40.0	33.9 mm P
Mid Thorax Rib Deflection	39.0 – 45.0	40.2 mm P
Lower Thorax Rib Deflection	36.0 – 43.0	38.4 mm P

Test ID: RO0366

Test Time: 10:46:52 AM

Test Date: 6/6/2009



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VERIFICATION REPORT

Test Parameters	Test Specifications	Test Results
Upper Spine Acceleration	14.0 – 17.0	16.8 g P
Lower Spine Acceleration	7.0 – 10.0	10.7 g F
FTSS Proposed Lower Spine Acceleration	7.0 – 11.0	10.7 g P

All test parameters are NOT within specifications

Technician: **JSR**

Signature:

Supervisor: **MS**

Signature:

Test ID: **RO0366**

Test Time: **10:46:52 AM**

Test Date: **6/6/2009**



Denton Technical Center

1965 Larchwood Troy, Michigan 48063, Phone: (248) 528-9889, Fax: (248) 528-8494

VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	99999999	12/16/2008
MSI	61A-750-10-360-XY	A021717	4/3/2009
Denton	180-3885	1188	3/6/2009
Denton	180-3885	1269	3/6/2009
Denton	180-3885	1260	3/6/2009
Endevco	7264-2000	P58884	3/9/2009
Endevco	7264-2000	P58839	3/9/2009

Test ID: RO0366

Test Time: 10:46:52 AM

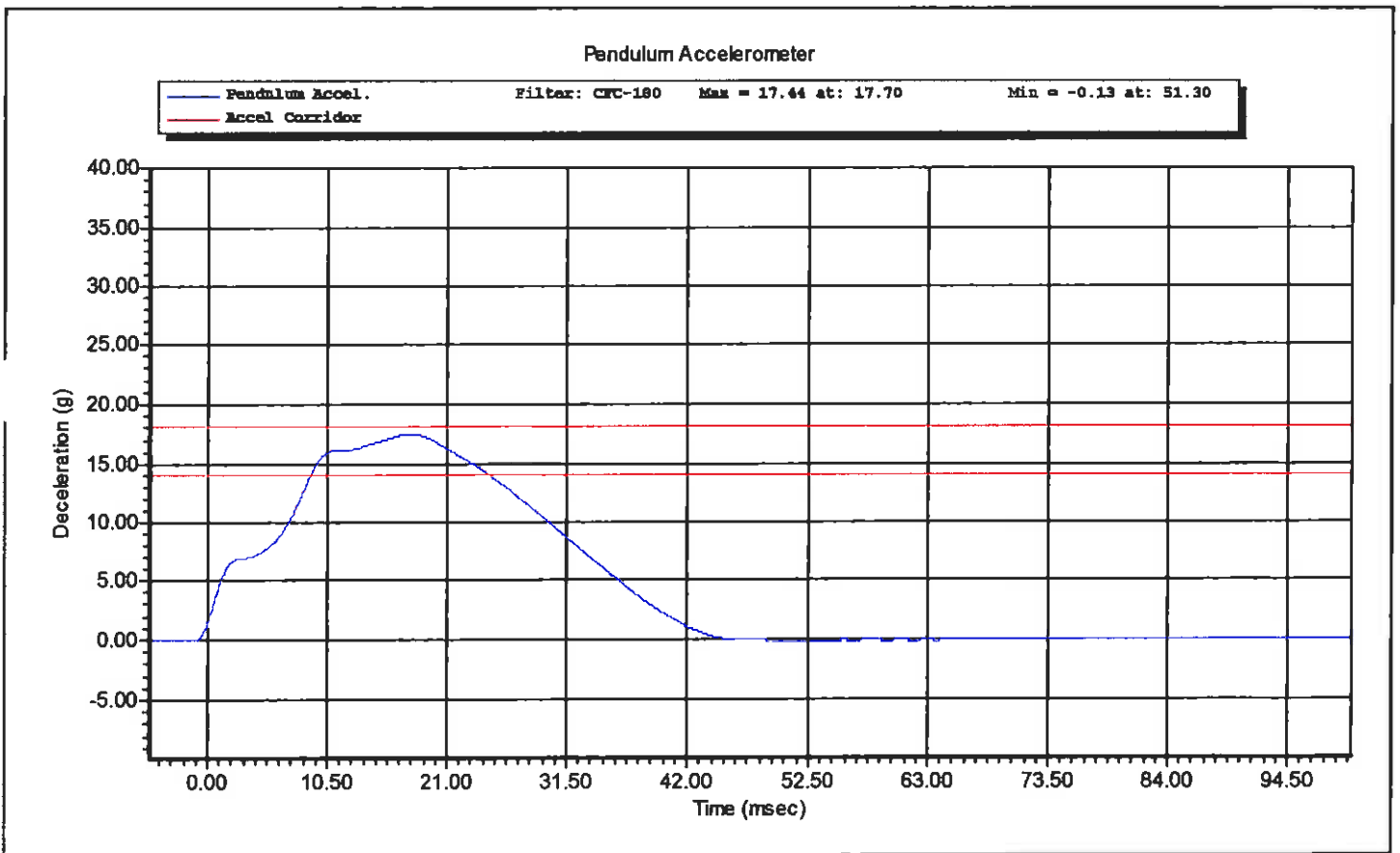
Test Date: 6/6/2009



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Test Name:	Thorax Impact without Arm	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs Level 'D'		
ATD Serial Number:	304		
Test Number:	1	Test Date:	6/6/2009
		Test Time:	10:46:52 AM
Component Part Number	Component Serial Number		
Thorax Rib #1 - 180-3362	1474		

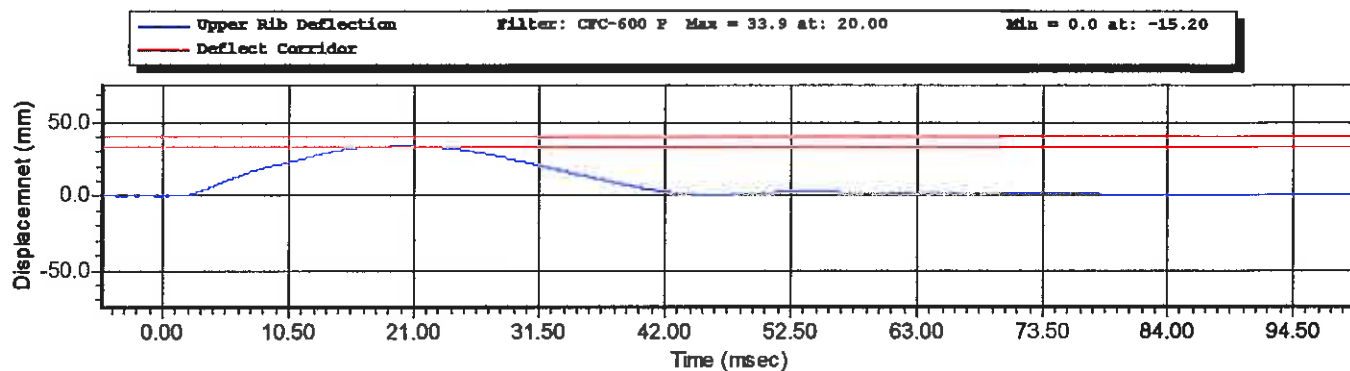




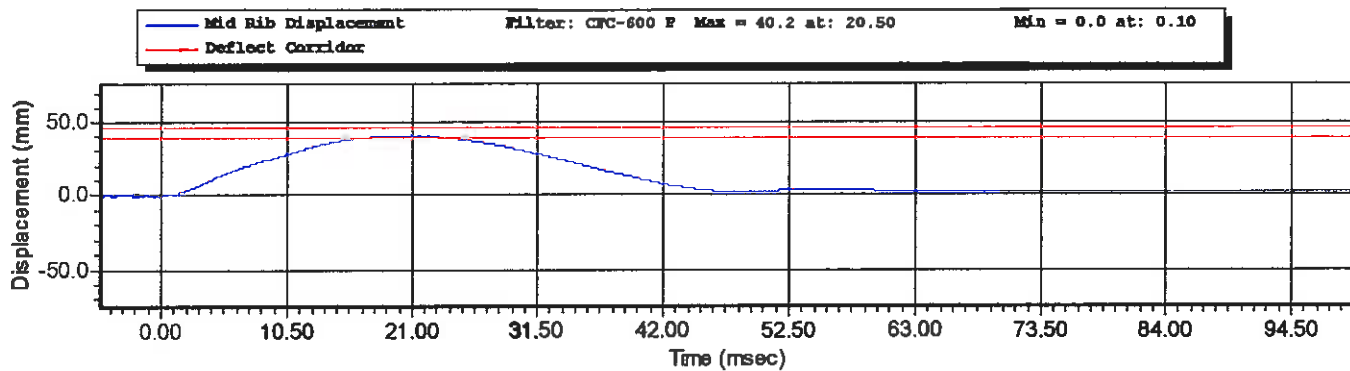
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1965 Larchwood Troy, Michigan 48063, Phone: (248) 528-9889, Fax: (248) 528-8494

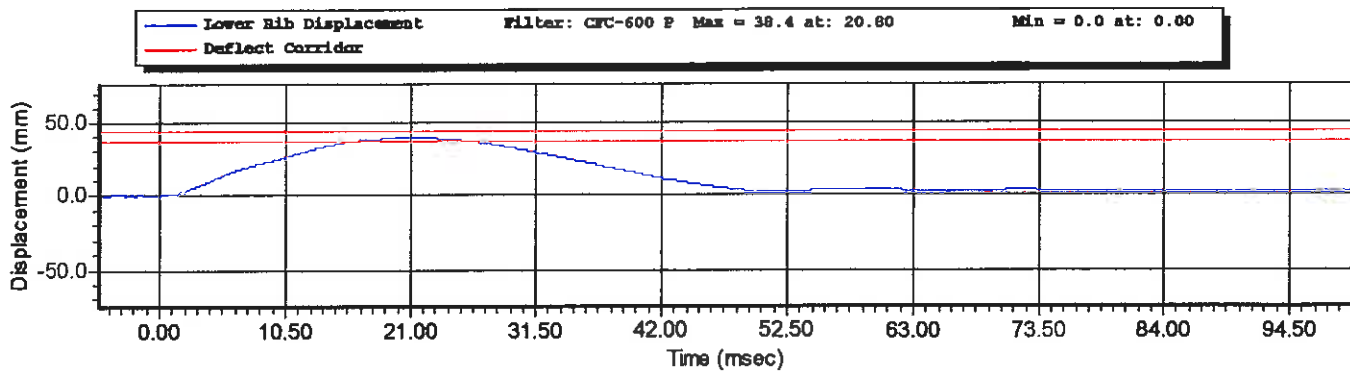
Upper Thorax Displacement



Mid Thorax Displacement



Lower Thorax Displacement

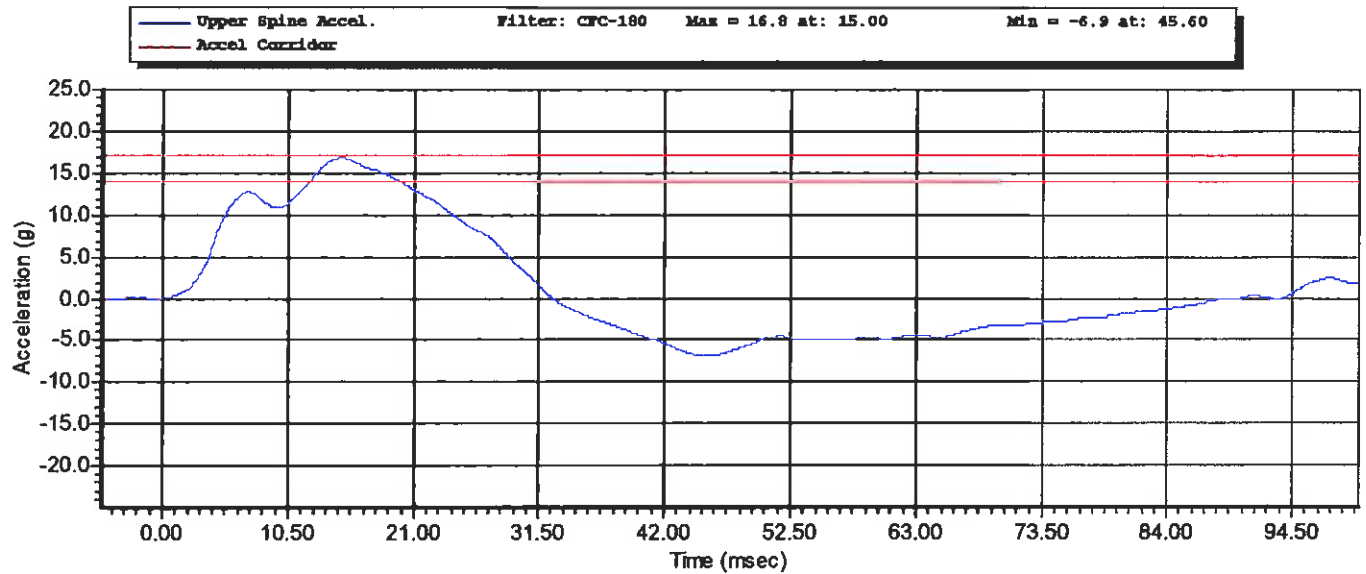




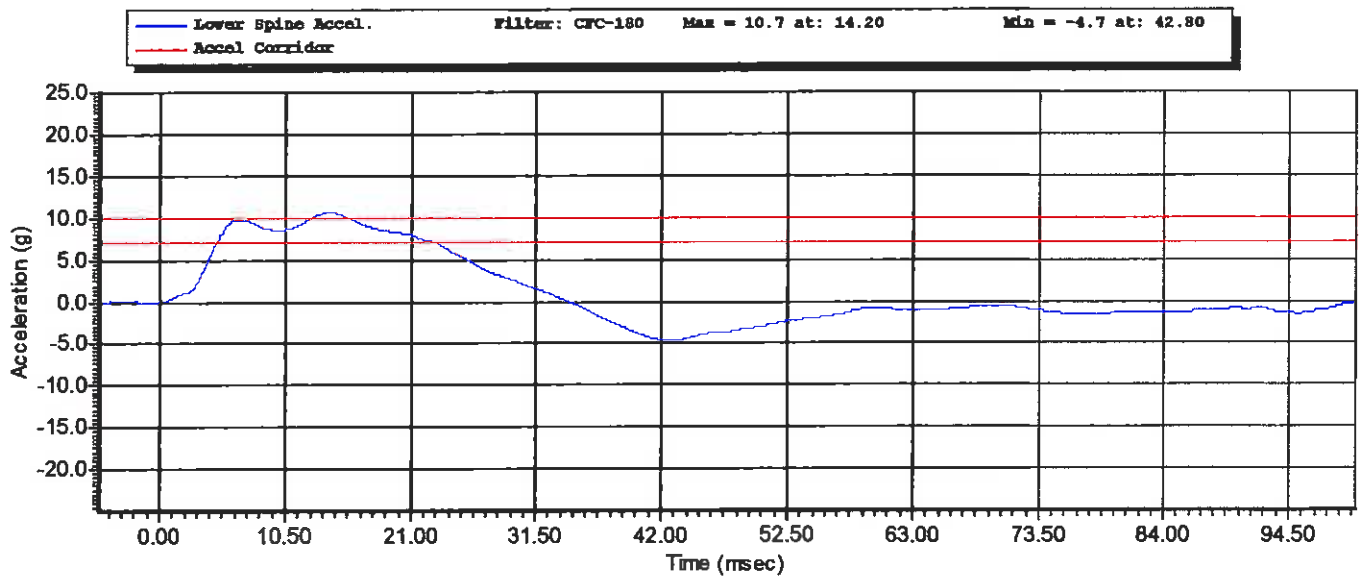
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Upper Spine Acceleration



Lower Spine Acceleration





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VERIFICATION REPORT

Test Name:	Abdominal Impact	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs Level 'D'		
ATD Serial Number:	304		
Test ID:	RF0495	Test Date:	6/6/2009
Test Number:	2	Test Time:	11:51:17 AM

Condition As Received: Used	CALSPAN
User Field 2:	
User Field 3:	

Component Part Number	Component Serial Number
Abdo Rib #1 - 180-3362	1787
Abdo Rib #2 - 180-3362	1788

Comments:
LEFT

Test Parameters	Test Specifications	Test Results
Temperature	20.6 – 22.2	20.7 deg C P
Humidity	10 – 70	45 %RH P
Velocity	4.30 – 4.50	4.35 m/s P
Probe Acceleration	12.0 – 16.0	15.8 g P
Upper Abdominal Rib Deflection	39.0 – 47.0	41.1 mm P
Lower Abdominal Rib Deflection	37.0 – 46.0	39.3 mm P
Lower Spine Acceleration	11.0 – 14.0	11.4 g P

Test ID: RF0495

Test Time: 11:51:17 AM

Test Date: 6/6/2009



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VERIFICATION REPORT

Test Parameters	Test Specifications	Test Results
FTSS Proposed Lower Spine Acceleration	9.0 – 14.0	11.4 g P

All test parameters are within specifications

Technician: **JSR**

Signature: *John S. Rozzel*

Supervisor: **MS**

Signature: *Mark S. Smith*

Test ID: **RF0495**

Test Time: **11:51:17 AM**

Test Date: **6/6/2009**



Denton Technical Center

1965 Larchwood Troy, Michigan 48063, Phone: (248) 528-9889, Fax: (248) 528-8494

VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	99999999	12/16/2008
MSI	61A-750-10-360-XY	A021717	4/3/2009
Denton	180-3885	1207	3/6/2009
Denton	180-3885	1204	3/6/2009
Endevco	7264-2000	P58839	3/9/2009

Test ID: RF0495

Test Time: 11:51:17 AM

Test Date: 6/6/2009

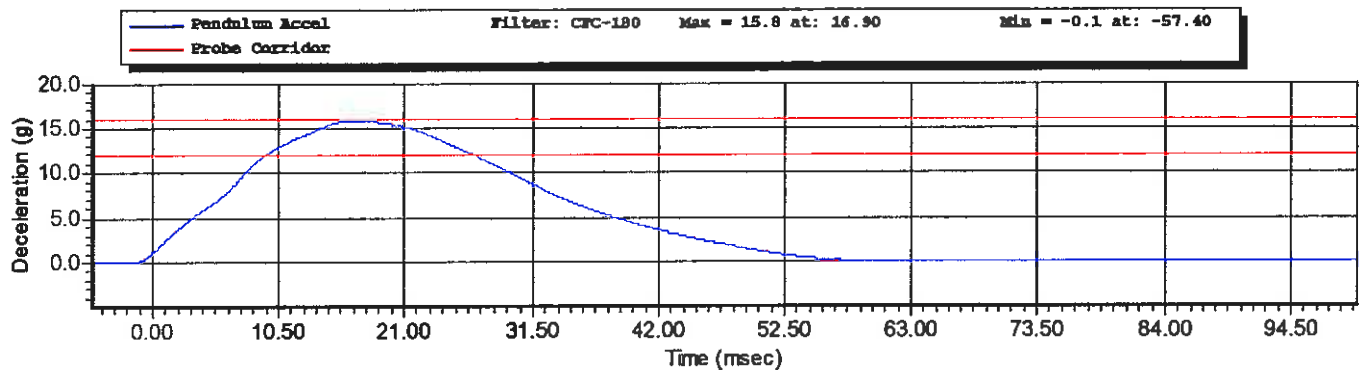


Denton Technical Center

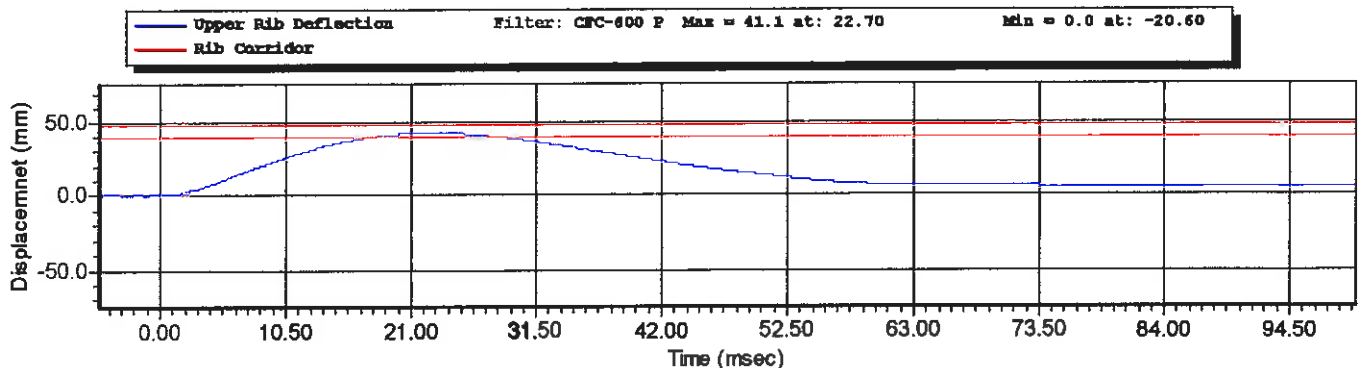
1965 Larchwood Troy, Michigan 48063, Phone: (248) 528-9889, Fax: (248) 528-8494

Test Name:	Abdominal Impact	Revision:	12/14/2006
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	SID-IIs Level 'D'		
ATD Serial Number:	304		
Test Number:	2	Test Date:	6/6/2009
		Test Time:	11:51:17 AM
Component Part Number	Component Serial Number		
Abdo Rib #1 - 180-3362	1787		

Pendulum Accelerometer



Upper Abdominal Rib Deflection



Test ID: RF0495

Test Time: 11:51:17 AM

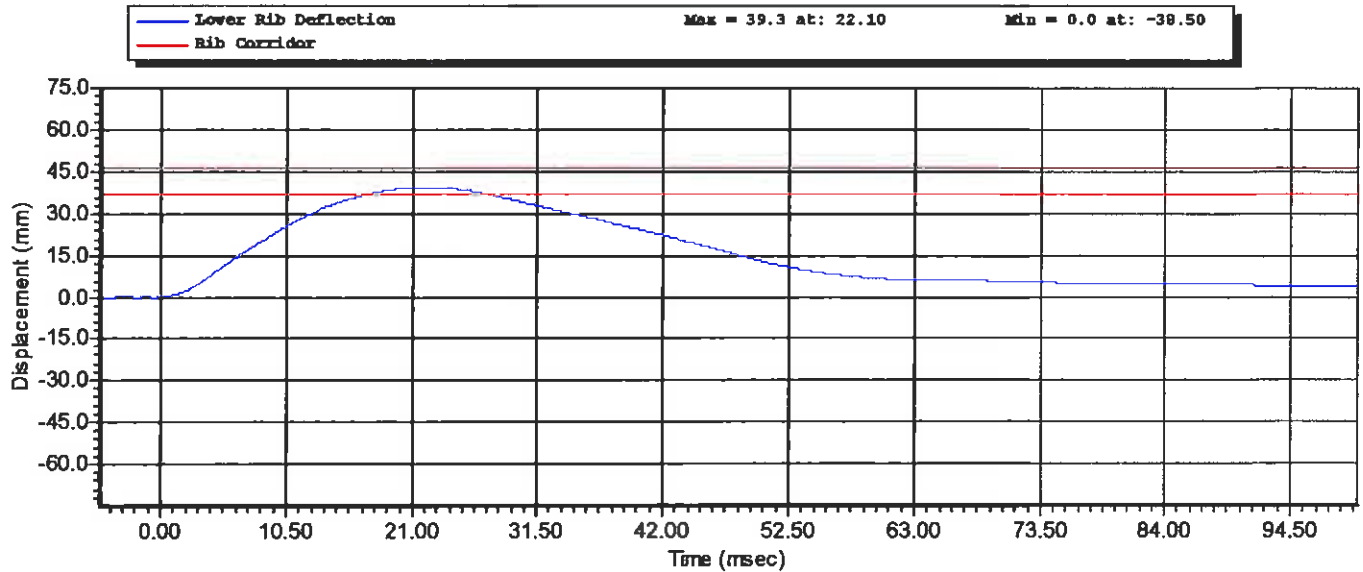
Test Date: 6/6/2009



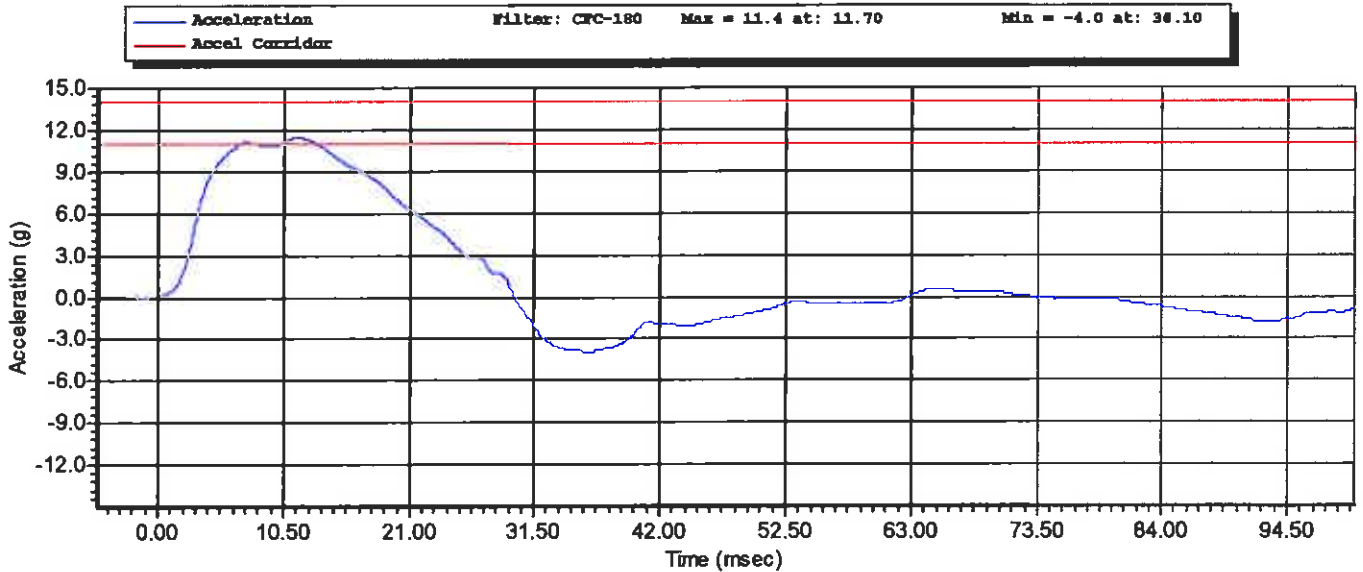
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Lower Abdominal Rib Deflection



Lower Spine Acceleration





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VERIFICATION REPORT

Test Name:	Pelvis	Revision:	12/14/2006
Sub Test Name:	Acetabulum Impact	Spec Type:	NHTSA
ATD Type:	SID-IIs Level 'D'		
ATD Serial Number:	304		
Test ID:	RJ0882	Test Date:	6/9/2009
Test Number:	4	Test Time:	11:45:59 AM

Condition As Received: Used	CALSPAN
User Field 2:	
User Field 3:	

Component Part Number	Component Serial Number
Pelvis Flesh - 180-4343	882
Pelvis Plug - 180-4450	12920

Comments:
LEFT

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.8 deg C P
Humidity	10 -- 70	46 %RH P
Velocity	6.60 -- 6.80	6.65 m/s P
Peak Probe Acceleration	38.0 -- 47.0	44.0 g P
Peak Pelvis Acceleration	41.0 -- 50.0	41.1 g P
FTSS Proposed Peak Pelvis Accel after 5	34.0 -- 42.0	35.7 g P
Peak Acetabulum Force	3.80 -- 4.60	3.95 kN P

Test ID: RJ0882

Test Time: 11:45:59 AM

Test Date: 6/9/2009



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VERIFICATION REPORT

Test Parameters	Test Specifications	Test Results
FTSS Proposed Peak Acetabulum Force	3.60 -- 4.40	3.95 kN P

All test parameters are within specifications

Technician: **JSR**

Signature: *John S. Rozin*

Supervisor: **MS**

Signature: *Mark Smith*

Test ID: **RJ0882**

Test Time: **11:45:59 AM**

Test Date: **6/9/2009**



Denton Technical Center

1985 Larchwood Troy, Michigan 48063, Phone: (248) 528-9889, Fax: (248) 528-8494

VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	99999999	12/16/2008
MSI	61A-750-10-360-XY	A021717	4/3/2009
Endevco	7264-2000	P52094	3/9/2009
Denton	3249J	267	3/6/2009

Test ID: **RJ0882**

Test Time: **11:45:59 AM**

Test Date: **6/9/2009**



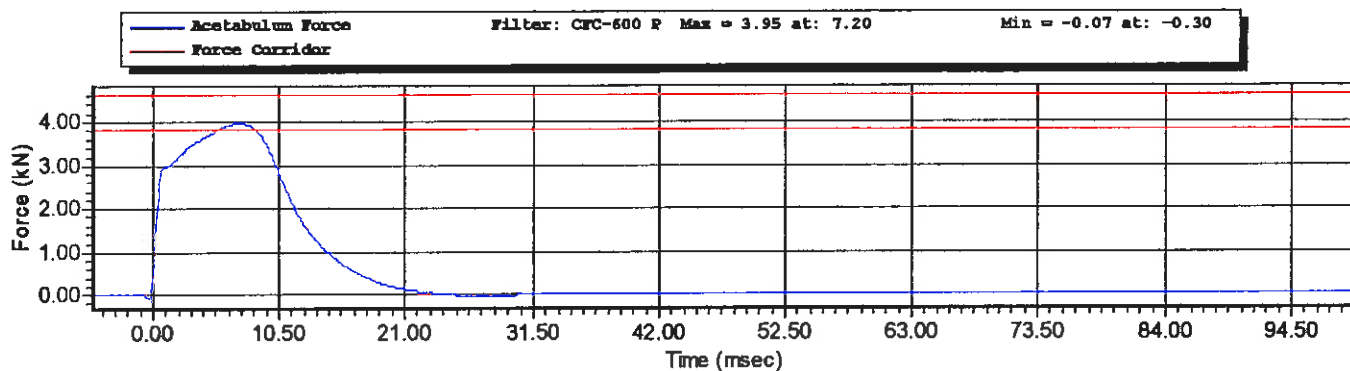
Denton Technical Center

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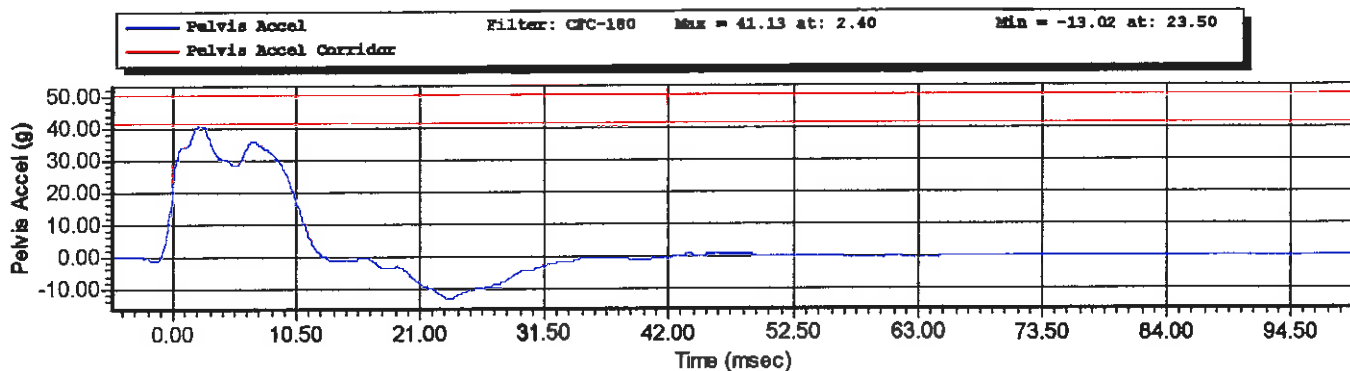
Test Name:	Pelvis	Revision:	12/14/2006
o Test Name:	Acetabulum Impact	Spec Type:	NHTSA
ATD Type:	SID-Ils Level 'D'		
ATD Serial Number:	304		
Test Number:	4	Test Date:	6/9/2009
		Test Time:	11:45:59 AM

Component Part Number	Component Serial Number
Pelvis Flesh - 180-4343	882

Acetabulum Force



Pelvis Accelerometer



Test ID: RJ0882

Test Time: 11:45:59 AM

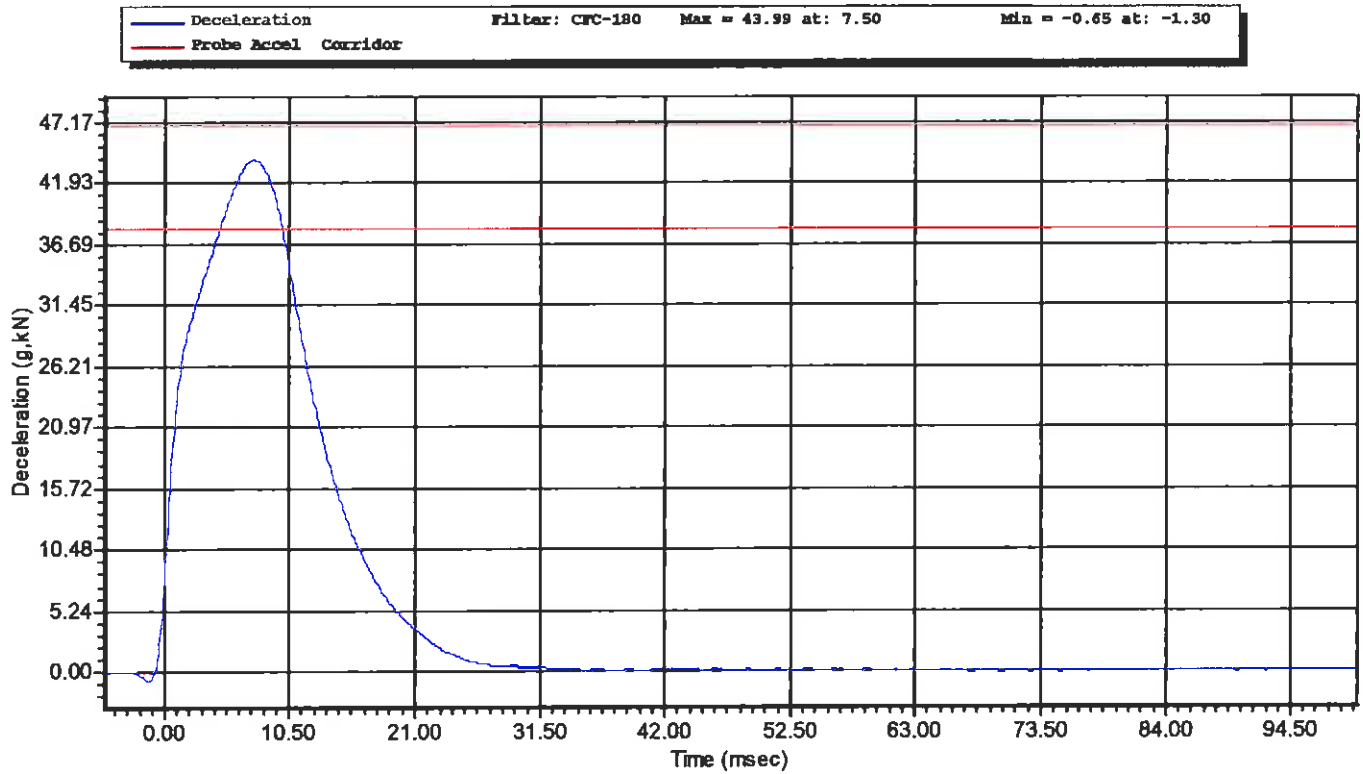
Test Date: 6/9/2009



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Probe Accelerometer



Test ID: RJ0882

Test Time: 11:45:59 AM

Test Date: 6/9/2009



Denton Technical Center

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VERIFICATION REPORT

Test Name:	Pelvis	Revision:	12/14/2006
Sub Test Name:	Iliac Impact	Spec Type:	NHTSA
ATD Type:	SID-Ils Level 'D'		
ATD Serial Number:	304		
Test ID:	R60882	Test Date:	6/9/2009
Test Number:	2	Test Time:	11:06:32 AM

Condition As Received: Used	CALSPAN
User Field 2:	
User Field 3:	

Component Part Number	Component Serial Number
Pelvis Flesh - 180-4343	882

Comments:
LEFT

Test Parameters	Test Specifications	Test Results
Temperature	20.6 – 22.2	21.6 deg C P
Humidity	10 – 70	47 %RH P
Velocity	4.20 -- 4.40	4.20 m/s P
Peak Probe Acceleration	34.0 – 40.0	38.4 g P
Peak Pelvis Acceleration	27.0 – 33.0	28.4 g P
Peak Iliac Force	3.70 – 4.50	4.11 kN P
FTSS Proposed Peak Iliac Force	3.60 -- 4.40	4.11 kN P

All test parameters are within specifications

Technician:	JSR	Signature:	<i>John Rozick</i>
Supervisor:	MS	Signature:	<i>Mark Smith</i>

Test ID: R60882

Test Time: 11:06:32 AM

Test Date: 6/9/2009



Denton Technical Center

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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	99999999	12/16/2008
MSI	61A-750-10-360-XY	A021717	4/3/2009
Endevco	7264-2000	P52094	3/9/2009
Denton	3228J	281	3/6/2009

Test ID: **R60882**

Test Time: **11:06:32 AM**

Test Date: **6/9/2009**

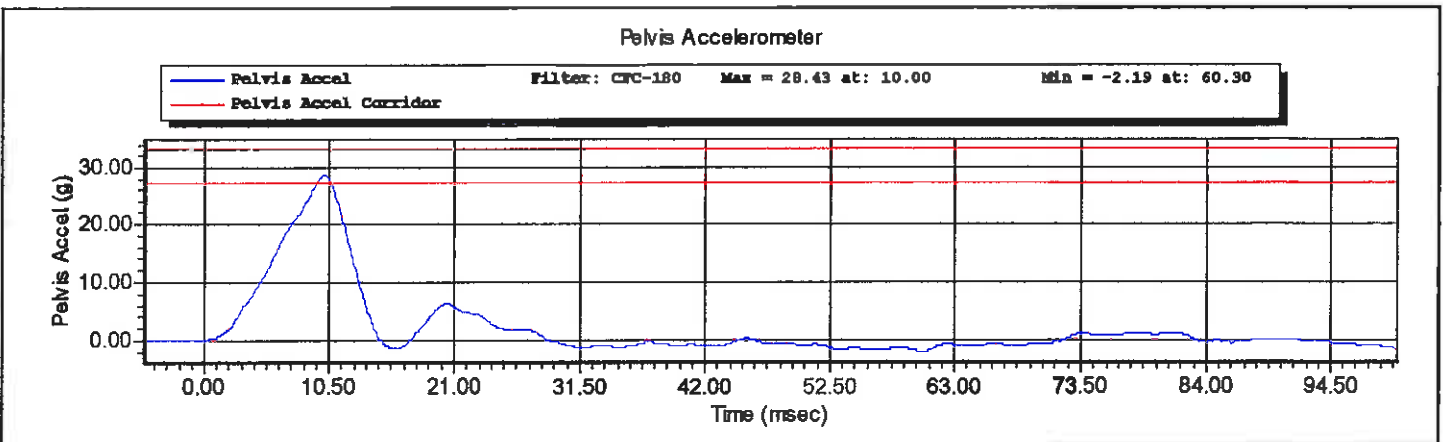
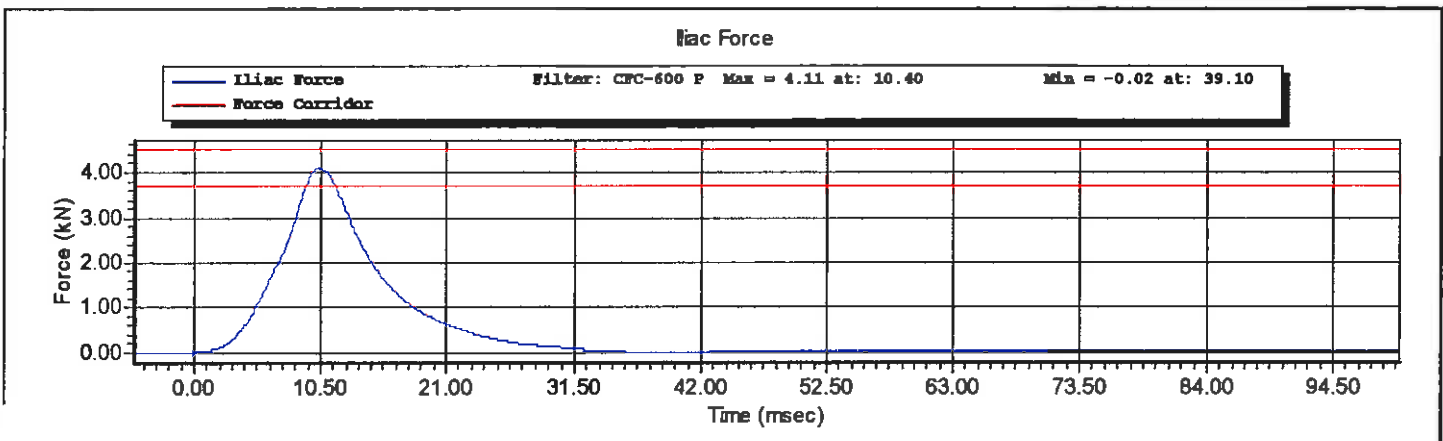


Denton Technical Center

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Test Name:	Pelvis	Revision:	12/14/2006
o Test Name:	Iliac Impact	Spec Type:	NHTSA
ATD Type:	SID-Ils Level 'D'		
ATD Serial Number:	304		
Test Number:	2	Test Date:	6/9/2009
		Test Time:	11:06:32 AM

Component Part Number	Component Serial Number
Pelvis Flesh - 180-4343	882



Test ID: R60882

Test Time: 11:06:32 AM

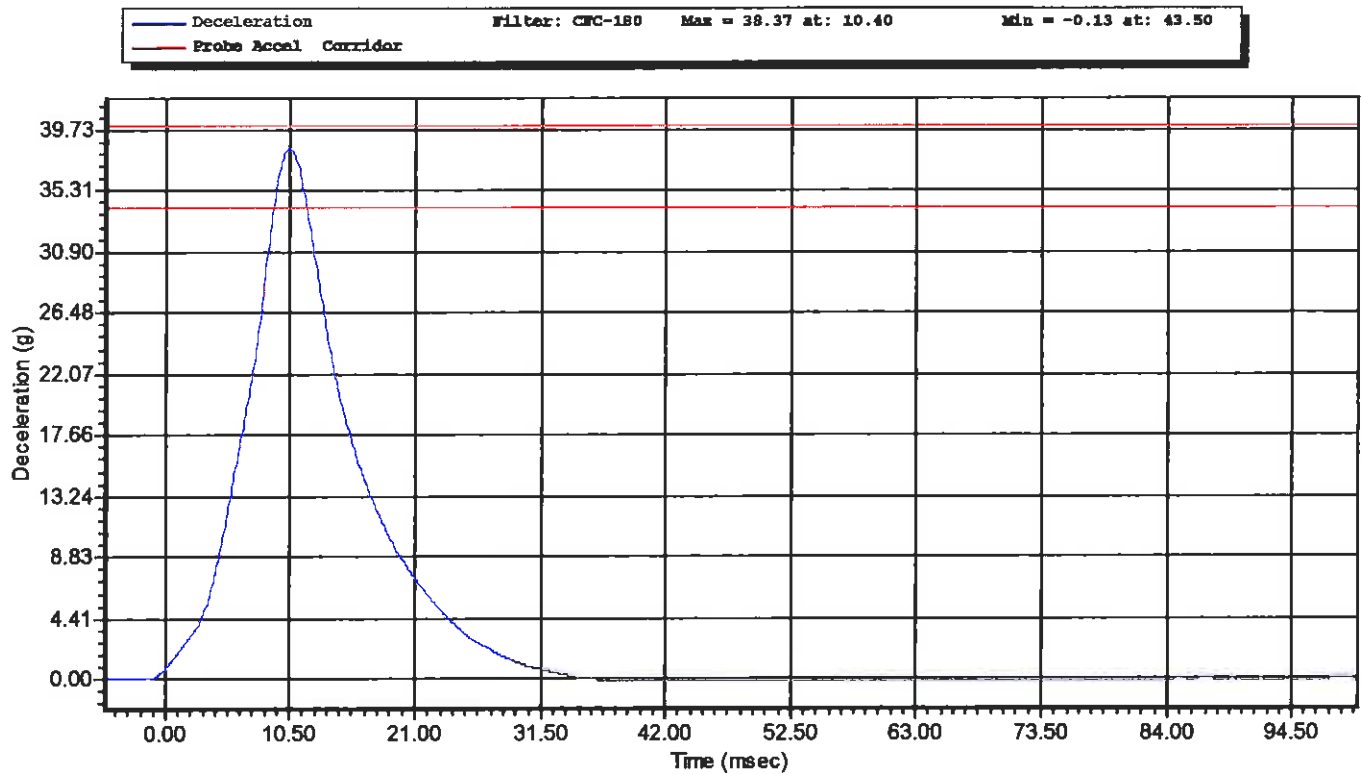
Test Date: 6/9/2009



Denton Technical Center

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Probe Accelerometer



Test ID: R60882

Test Time: 11:06:32 AM

Test Date: 6/9/2009

APPENDIX D

DUMMY AND VEHICLE INSTRUMENTATION CALIBRATION DATA

TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

SID-IIs INSTRUMENTATION

	FRONT SID-IIs NO.: 304		
	SERIAL NUMBER	MANUFACTURER	CALIBRATION DATE
HEAD AX	AC-P58737	ENDEVCO	06-Mar-09
HEAD AY	AC-P52100	ENDEVCO	06-Mar-09
HEAD AZ	AC-P52099	ENDEVCO	06-Mar-09
HEAD AX (REDUNDANT)	AC-P58715	ENDEVCO	06-Mar-09
HEAD AY (REDUNDANT)	AC-P58796	ENDEVCO	06-Mar-09
HEAD AZ (REDUNDANT)	AC-P52084	ENDEVCO	06-Mar-09
UPPER NECK FX	LC-283Fx	DENTON	15-Dec-08
UPPER NECK FY	LC-283Fy	DENTON	15-Dec-08
UPPER NECK FZ	LC-283Fz	DENTON	15-Dec-08
UPPER NECK MX	LC-283Mx	DENTON	15-Dec-08
UPPER NECK MY	LC-283My	DENTON	15-Dec-08
UPPER NECK MZ	LC-283Mz	DENTON	15-Dec-08
SHUOLDER DY	DS-1154	FTSS	06-Mar-09
UPPER THORAX RIB DY	DS-1188	FTSS	06-Mar-09
MIDDLE THORAX RIB DY	DS-1269	FTSS	06-Mar-09
LOWER THORAX RIB DY	DS-1260	FTSS	06-Mar-09
LOWER SPINE T12 AX	AC-P58830	ENDEVCO	06-Mar-09
LOWER SPINE T12 AY	AC-P58839	ENDEVCO	06-Mar-09
LOWER SPINE T12 AZ	AC-P58843	ENDEVCO	06-Mar-09
ABDOMEN UPPER RIB DY	DS-1207	FTSS	06-Mar-09
ABDOMEN LOWER RIB DY	DS-1204	FTSS	06-Mar-09
ACETABULUM FY	LC-281Fy	DENTON	06-Mar-09
ILIAC WING FY	LC-267Fy	DENTON	06-Mar-09

Notes:

Pos1 Neck Moment X: Channel saturated at approximately 63.6 – 70 msec and 103.3 – 118.1 msec

TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

VEHICLE INSTRUMENTATION

	VEHICLE INSTRUMENTS		
	SERIAL NUMBER	MANUFACTURER	CALIBRATION DATE
VEHICLE CG (X)	AC-P23885	ENDEVCO	02-Mar-09
VEHICLE CG (Y)	AC-P16671	ENDEVCO	02-Mar-09
VEHICLE CG (Z)	AC-P32288	ENDEVCO	02-Mar-09
VEHICLE CG (X) ANGULAR RATE	0326	ATA	05-Oct-08
VEHICLE CG (Y) ANGULAR RATE	0331	ATA	05-Oct-08
VEHICLE CG (Z) ANGULAR RATE	0321	ATA	05-Oct-08
LEFT FLOOR SILL (Y)	AC-P19359	ENDEVCO	27-Feb-09
A-PILLAR SILL (Y)	AC-P16576	ENDEVCO	27-Feb-09
A-PILLAR LOW (Y)	AC-P18785	ENDEVCO	27-Feb-09
A-PILLAR MID (Y)	AC-P17242	ENDEVCO	27-Feb-09
B-PILLAR SILL (Y)	AC-P32204	ENDEVCO	02-Mar-09
B-PILLAR LOW (Y)	AC-P23873	ENDEVCO	02-Mar-09
B-PILLAR MID (Y)	AC-APF89	ENDEVCO	27-Feb-09
DRIVER SEAT (Y)	AC-P23139	ENDEVCO	02-Mar-09
ENGINE TOP (X)	AC-P21399	ENDEVCO	03-Mar-09
ENGINE TOP (Y)	AC-P35757	ENDEVCO	02-Mar-09
FIREWAL (Y)	AC-J38127	ENDEVCO	03-Mar-09
RIGHT ROOF (Y)	AC-J37854	ENDEVCO	02-Mar-09
RIGHT ROOF SILL (Y)	AC-P18531	ENDEVCO	03-Mar-09
REAR FLOORPAN (X)	AC-P35803	ENDEVCO	02-Mar-09
REAR FLOORPAN (Y)	AC-P35811	ENDEVCO	02-Mar-09

Notes:

Rear Floorpan (X): Questionable Data after 437 msec

Rear Floorpan (Y): Questionable Data after 437 msec