

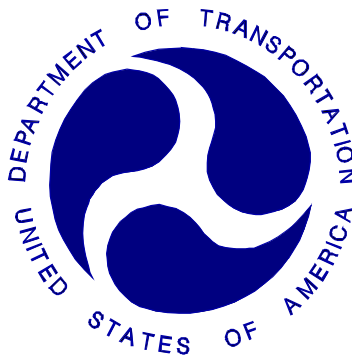
REPORT NUMBER: NCAP-CAL-12-023

**NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST**

**Toyota Motor Manufacturing, Indiana, Inc
2012 Toyota Sienna
Minivan**

NHTSA No: QC5100

**CALSPAN CORPORATION
TRANSPORTATION SCIENCES CENTER
P.O. BOX 400
BUFFALO, NEW YORK 14225**



3/7/2012

FINAL REPORT

PREPARED FOR:

**U. S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Rulemaking
Office of Crashworthiness Standards
1200 New Jersey Ave SE, Room W43-410
Washington, DC 20590**

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Date: _____

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

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15. Supplementary Notes																																																								
16. Abstract A 56.3 km/h NCAP Frontal Impact Test was conducted on a 2012 Toyota Sienna Minivan in accordance with the specifications of the Office of Crashworthiness Standards Frontal NCAP Laboratory Test Procedure. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and foot well intrusion performance. The test was conducted at the Calspan Corporation's crash test facility in Buffalo, New York on 1/11/2012. The impact velocity of the vehicle was 56.18 km/h, and the ambient temperature at the barrier face at the time of impact was 9°C. The target vehicle post-test maximum crush was 547 mm of Vehicle. The test vehicle's performance is as follows: <table border="1"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th rowspan="2">Units</th> <th colspan="2">Driver ATD</th> <th colspan="2">Pass. ATD</th> </tr> <tr> <th>Threshold</th> <th>Result</th> <th>Threshold</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₁₅)</td> <td>N/A</td> <td>700</td> <td>304.07</td> <td>700</td> <td>410.62</td> </tr> <tr> <td>Maximum Chest Compression</td> <td>mm</td> <td>63</td> <td>-16.91</td> <td>52</td> <td>-17.20</td> </tr> <tr> <td>Nij</td> <td>N/A</td> <td>1</td> <td>0.30</td> <td>1</td> <td>0.56</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>4,170</td> <td>1,197.87</td> <td>2,620</td> <td>850.97</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>4,000</td> <td>-91.13</td> <td>2,520</td> <td>-452.99</td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>10,008</td> <td>-1,175.12</td> <td>6,805</td> <td>-2,973.51</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>10,008</td> <td>-2014.33</td> <td>6,805</td> <td>-1262.26</td> </tr> </tbody> </table>					Measurement Description	Units	Driver ATD		Pass. ATD		Threshold	Result	Threshold	Result	Head Injury Criteria (HIC ₁₅)	N/A	700	304.07	700	410.62	Maximum Chest Compression	mm	63	-16.91	52	-17.20	Nij	N/A	1	0.30	1	0.56	Neck Tension	N	4,170	1,197.87	2,620	850.97	Neck Compression	N	4,000	-91.13	2,520	-452.99	Left Femur Force	N	10,008	-1,175.12	6,805	-2,973.51	Right Femur Force	N	10,008	-2014.33	6,805	-1262.26
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SECTION 1

PURPOSE AND SUMMARY OF TEST

1.1 PURPOSE

This 56.3 kph frontal barrier impact test is part of the Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-06-D-00024. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for consumer information purposes.

The 56.3 kph frontal barrier impact test was conducted in accordance with the Office of Crashworthiness Standard Frontal NCAP Laboratory Test procedure.

1.2 TEST PROCEDURE

A load cell barrier consisting of 36 load cells was impacted by a 2012 Toyota Sienna Minivan at a velocity of 56.18 kph. The test was performed at Calspan on 1/11/2012. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

One real-time camera and 14 high-speed cameras were used to document the frontal barrier impact event. Camera locations and other pertinent camera information can be found in this report.

One Part 572E, 50th percentile male anthropomorphic test device (ATDs), was placed in the driver seating position and one Part 572O 5th percentile female ATD was placed in the right-front passenger according to dummy placement instructions specified in the Frontal NCAP Laboratory Test Procedure.

Both ATDs were fully instrumented with head, chest and pelvis tri-axial accelerometers, chest displacement potentiometers, upper neck transducers, right/left femur load cells, and lower leg instrumentation. Seat belt load cells were also on the driver's and passenger's lap and shoulder belts to measure dummy torso and pelvic section loading. The driver (position 1) ATD (Serial No. 64) and the right-front passenger (position 2) ATD (Serial No. 143) were calibrated previous to this test. Certification details, along with instrumentation calibration data, are found in Appendix C of this report.

The 129 channels of data were recorded on an on-board data acquisition system. Appendix B contains the dummy response data traces.

There was 100 percent windshield retention and no intrusion into the protected zone of the windshield during the event. There was no Stoddard solvent leakage after the event or during any phase of the static rollover.

The maximum static crush of the vehicle was 547 mm and both the driver and passenger side doors remained closed during the impact event and were operable after the impact.

The driver's visible contact points were as follows: Face and Upper Torso with Frontal airbag, the head restraint became disconnected from the seat back and hit the back of head; both knees contacted the knee airbag.

The passenger's visible contact points were as follows: Face and Upper Torso with Frontal airbag with the back of head with the head restraint; both knees contacted the lower glovebox door.

The occupant data is summarized below.

ATD Position	HIC ₁₅	Nij	Neck Tension (N)	Neck Compression (N)	3ms Chest Clip (Gs)	Chest Disp. (mm)	Left Femur (N)	Right Femur (N)
Driver (50th)	304.07	0.30	1,197.87	-91.13	49.46	-16.91	-1,175.12	-2,014.33
Passenger (5 th)	410.62	0.56	850.97	-452.99	43.20	-17.195	-2,973.51	-1,262.26

General Comments:

1. P1 Serial Number 064
2. P2 Serial Number 143
3. Camera No. 11 does not have a time stamp due to an internal malfunctions and needs to be sent back to the manufacturer for repair.
4. Driver's head restraint disconnected from the seat back during the impact event.

Data Anomalies:

- V1P1 Pelvic X is questionable after 151ms
- V1P1 Pelvic Y is questionable after 134ms
- V1P1 Shoulder Belt Force Sensor was removed at request of Mfg
- V1P2 Upper Neck Fy has a spike at 61ms
- V1P2 Left Upper Tibia Fz is questionable after 60ms
- V1P2 Shoulder Belt Force Sensor was removed at request of Mfg
- V1 Bottom of Engine Ax is questionable after 213ms
- V1 Right Front Brake Caliper is questionable after 45ms

SECTION 2 DATA SHEETS

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DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2012 Toyota Sienna NHTSA No: QC5100
 Test Program: NCAP Frontal Barrier Impact Test Test Date: 1/11/2012

NHTSA No.	QC5100
Model Year	2012
Make	Toyota
Model	Sienna
Body Style	Minivan
VIN	5TDJK3DC6CS032568
Body Color	Light gray/silver
Odometer Reading (km/mi)	162.5/101
Engine Displacement. (L)	3.5
Type/No. Cylinders	V6
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	6-Speed
Overdrive	Yes
Final Drive	All Wheel Drive
Roof Rack	Yes
Sunroof/T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	Yes
Anti-Lock Brakes (ABS)	Yes
All-Wheel Drive (AWD)	Yes
Traction Control System (TCS)	Yes

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

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

Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Toyota Motor Manufacturing, Indiana, Inc
Date of Manufacture	10/11

GVWR (kg)	2,715
GAWR Front (kg)	1,405
GAWR Rear (kg)	1,405

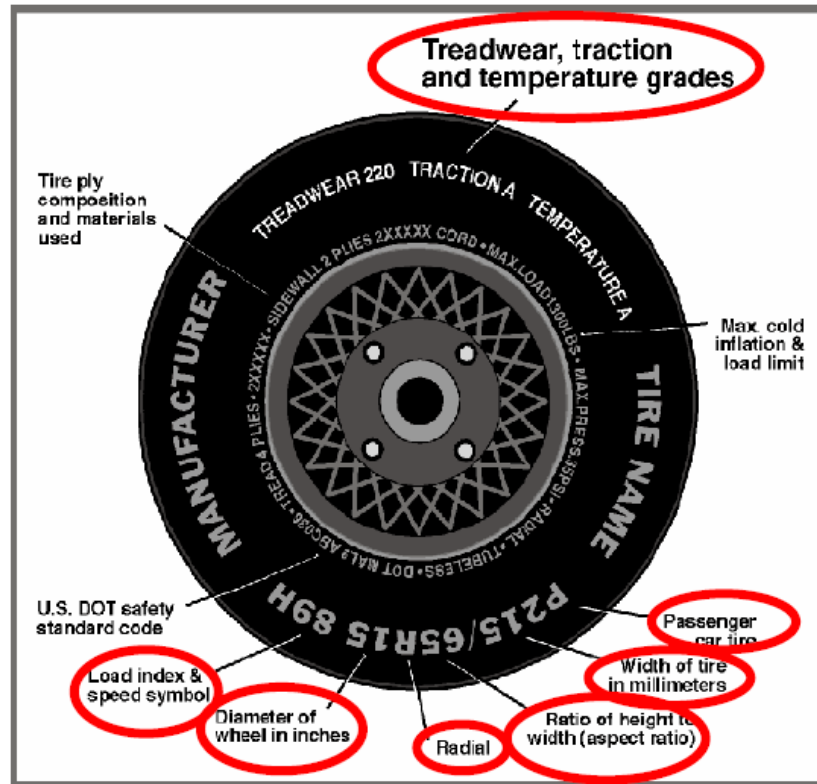
VEHICLE SEATING AND WEIGHT CAPACITY

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bucket	Bench	
Number of Occupants	2	2	3	7
Capacity Wt. (VCW) (kg)				620.0
Cargo Wt. (RCLW) (kg)				143.7

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

Test Vehicle: 2012 Toyota Sienna NHTSA No: QC5100
 Test Program: NCAP Frontal Barrier Impact Test Test Date: 1/11/2012

Collect items circled in red, tire manufacturer, and tire name.



Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	240	240
Recommended Tire Size	P235/55R18	P235/55R18
Tire Size on Vehicle	P235/55R18	P235/55R18
Tire Manufacturer	Bridgestone	Bridgestone
Tire Model	Turanza EL400	Turanza EL400
Treadwear	400	400
Traction	B	B
Temperature Grades	B	B
Tire Plies Sidewall	2 Rayon	2 Rayon
Tire Plies Body	1 Polyester, 2 Steel, 1 Nylon	1 Polyester, 2 Steel, 1 Nylon
Load Index/Speed Symbol	99T	99T
Tire Material	Rubber	Rubber
DOT Safety Code Right	EL7CCCB1811	EL7CCCB1811
DOT Safety Code Left	EL7CCCB1811	EL7CCCB1811

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

Test Vehicle:	2012 Toyota Sienna	NHTSA No:	QC5100
Test Program:	NCAP Frontal Barrier Impact Test	Test Date	1/11/2012

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	591.5	454.5		621.5	574	
Right	kg	579	441.5		595	545.5	
Ratio	%	57	43		52	48	
Totals	kg	1,170.5	896	2,066.5	1,216.5	1,119.5	2,336

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	2,066.5
Weight of 1 P572E ATD & 1 P572O ATD	kg	140.6
Rated Cargo/Luggage Weight (RCLW)	kg	136.1
Calculated Vehicle Target Weight (TVTW)	kg	2,343.2

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	793	799	811	820	1312
As Tested	mm	798	800	782	783	1450
Post Test	mm	821	844	797	788	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	3,026
Total Vehicle Length at Left Side	mm	5,030
Total Vehicle Length at Centerline	mm	5,083
Total Vehicle Length at Right Side	mm	5,031
Weight of Ballast in Cargo Area	kg	143.0
Weight of Vehicle Components Removed	kg	0.0
Amount of Stoddard Solvent in Fuel Tank	L	72.7

LIST OF COMPONENTS REMOVED TO MEET TEST WEIGHT:

No components were removed to meet the required test weight

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

Test Vehicle:	2012 Toyota Sienna	NHTSA No:	QC5100
Test Program:	NCAP Frontal Barrier Impact Test	Test Date	1/11/2012

TARGET VEHICLE STRUCTURAL MEASUREMENT

	Elements	Pre-Test (mm)
1	Total Length	5,083
2	Total Width	1,985
3	Bumper Top Height	-669
4	Bumper Bottom Height	433
5	Longitudinal Member Top Height	-576
6	Distance Between Longitudinal Members	1,111
7	Longitudinal Member Width	88
8	Engine Top Height	-804
9	Engine Bottom Height	-191
10	Engine and Gearbox Width	509
11	Front Bumper-Engine Distance	494
12	Front Shock Absorber Fixing Height	-987
13	Bonnet Leading Edge Height	-830
14	Front Shock Absorber Fixing Width	1,409
15	Front Bumper – Front Axle Distance	952
16	Front Axle – A Pillar Distance	401
17	A-Pillar – B-Pillar Distance	1,156
18	B-Pillar – Rear Axle Distance	1,472
19	B-Pillar – C-Pillar Distance	1,189
20	Roof Sill Bottom Height	-1,631
21	Roof Sill Top Height	-1,683
22	Floor Sill Bottom Height	-408
23	Floor Sill Top Height	-443

DATA SHEET NO. 2

SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL

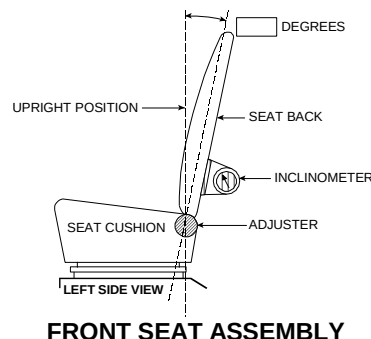
Test Vehicle: 2012 Toyota Sienna NHTSA No: QC5100
 Test Program: NCAP Frontal Barrier Impact Test Test Date: 1/11/2012

NORMAL DESIGN RIDING POSITION

For adjustable driver and passenger seat backs. Please describe how to position the inclinometer to measure the seat back angle. Include description of the location of the adjustment latch detent, if applicable.

Driver seat: The driver seat back was positioned according to the Nominal Design Riding position listed in FORM 1

Passenger Seat: The passenger seat back as positioned to allow for a zero head angle of the passenger HIII 5th dummy



	Deg.
Driver Seat Back Angle	3.0
Passenger Seat Back Angle	1.8

SEAT FORE/AFT POSITIONS

Describe the method used of determining seat fore/aft positions.

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

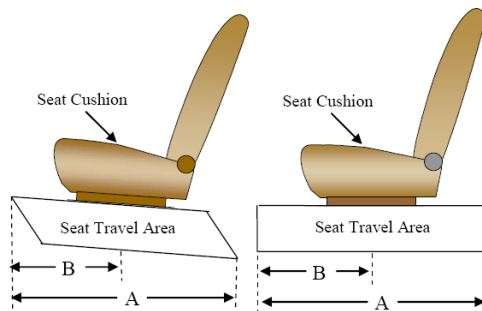
The passenger's seat was positioned at the most forward position of fore/aft travel.

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	286	145
Passenger Seat	240	0

SEAT BELT UPPER ANCHORAGES

Describe the method of positioning seat belt upper anchorages. Seat belt anchorages are adjusted in Accordance with the information provided by the manufacturer on Form No. 1. The uppermost position for this test is defined as zero.

	Total # of Positions	Placed in Position #
Driver Seat	4	1
Passenger Seat	4	3



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

Test Vehicle:	2012 Toyota Sienna	NHTSA No:	QC5100
Test Program:	NCAP Frontal Barrier Impact Test	Test Date	1/11/2012

FUEL TANK CAPACITY

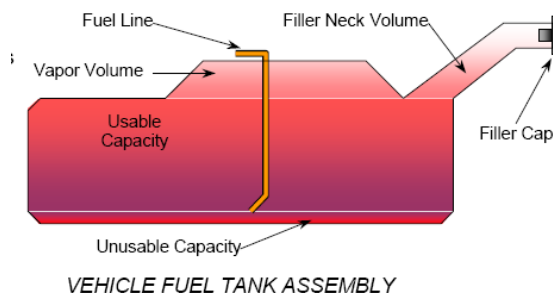
	Liters
Usable Capacity of "Standard Tank"	78.0
Usable Capacity of "Optional Tank"	
92%-94% of Usable Capacity	71.7 - 73.3
Actual Amount of Solvent Used	72.7
1/3 of Usable Capacity	26.0

FUEL PUMP

Describe the fuel system - what type of fuel pump, details about how it operates, etc.

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

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

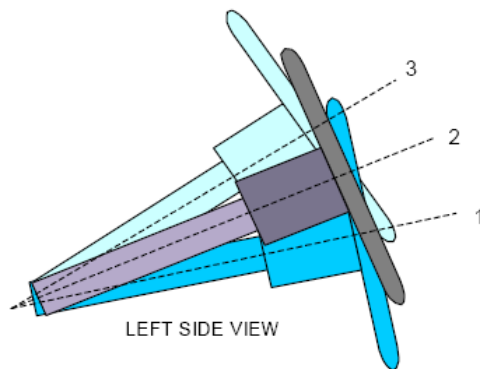


STEERING COLUMN ADJUSTMENT

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

Describe how this measurement was taken.

The steering wheel was adjusted to the midpoint of Tilt angle range and the midpoint of the telescoping Travel (if applicable)



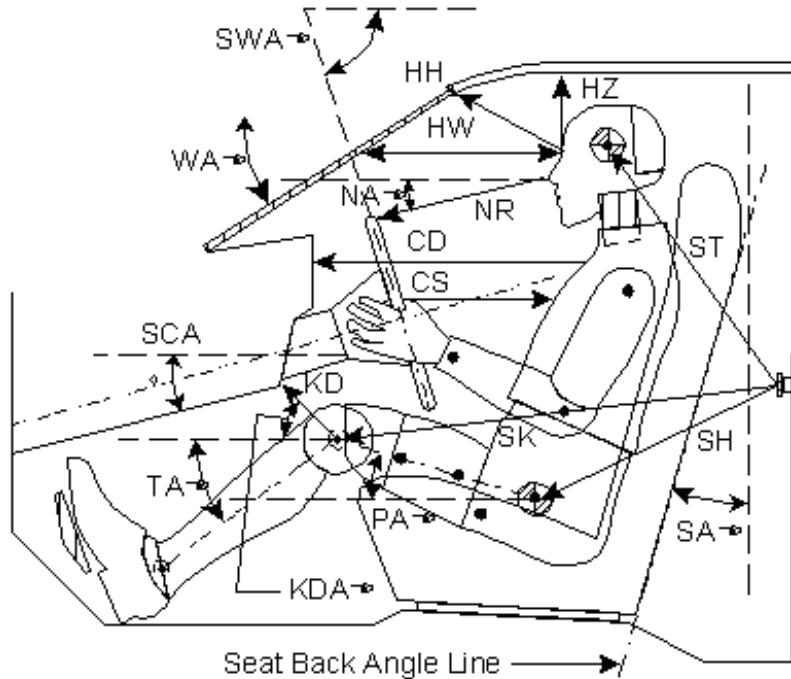
STEERING COLUMN ASSEMBLY

STEERING COLUMN POSITIONS

	Degrees	Fore/Aft Position (mm)
Lowermost position No. 1	65.9	
Geometric center position No. 2	63.8	
Uppermost position No. 3	61.7	
Telescoping Steering Wheel Travel		40
Test Position	63.8	20

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

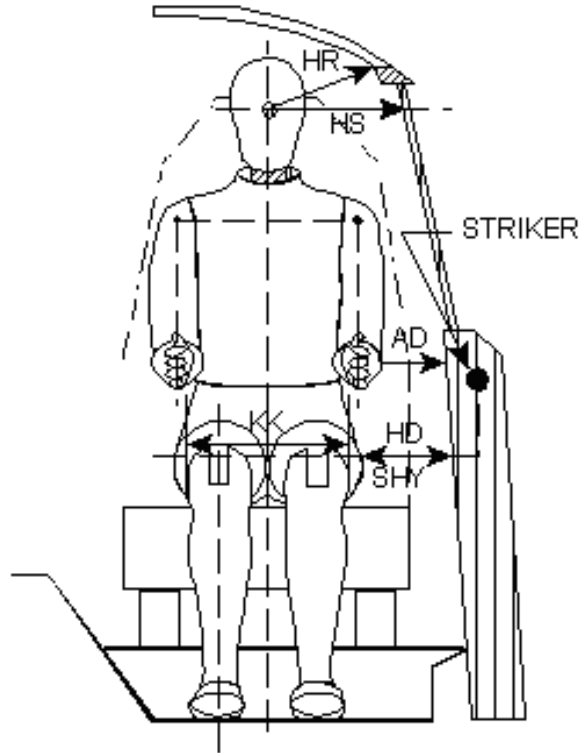
Test Vehicle:	2012 Toyota Sienna	NHTSA No:	QC5100
Test Program:	NCAP Frontal Barrier Impact Test	Test Date	1/11/2012



Code	Measurement Description	Driver (S/N: 064)		Passenger (S/N: 143)	
		Length (mm)	Angle(°)	Length (mm)	Angle (°)
WA°	Windshield Angle		-3.0		
SWA°	Steering Wheel Angle		26.3		
SCA°	Steering Column Angle		63.7		
SA°	Seat Back Angle (on headrest post)		43.6		-1.8
HZ	Head to Roof (Z)	277	90.0	282	90.0
HH	Head to Header	468	27.4	392	40.5
HW	Head to Windshield	827	0.4	748	0.0
NR	Nose to Rim	432	-8.2		
CD	Chest to Dash	544		412	
CS	Chest to Steering Hub	342	-2.2		
RA	Rim to Abdomen	214	0.0		
KDL	Left Knee to Dash	187	20.7	71	25.4
KDR	Right Knee to Dash	189	21.2	84	26.1
PA°	Pelvic Angle		23.4		20.9
TA°	Tibia Angle		-39.8		-54.9
SK	Striker to Knee	630	-8.9	737	-8.1
ST	Striker to Head	502	79.1	495	53.4
SH	Striker to H-Point	298	-41.0	419	-26.9

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle:	2012 Toyota Sienna	NHTSA No:	QC5100
Test Program:	NCAP Frontal Barrier Impact Test	Test Date	1/11/2012

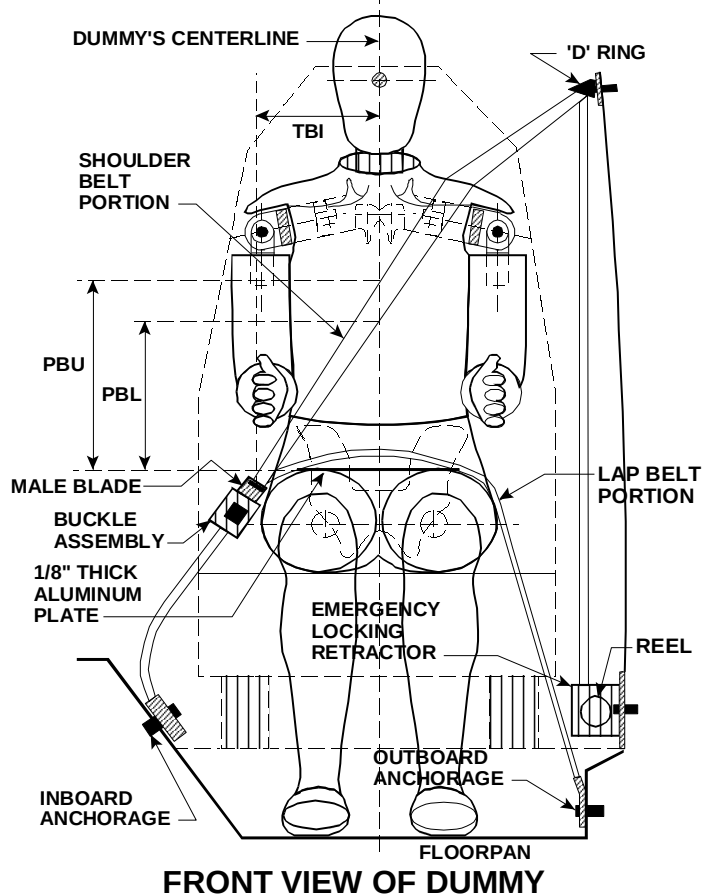


Code	Description	Driver	Passenger
AD	Arm to Door	141	90
HD	H-Point to Door	138	179
HR	Head to Side Header	274	300
HS	Head to Side Window	390	409
KK	Knee to Knee	270	165
SHY	Striker to H-Point (Y Direction)	272	320
AA	Ankle to Ankle	335	162

DATA SHEET NO. 5 SEAT BELT POSITIONING DATA

Test Vehicle:	2012 Toyota Sienna	NHTSA No:	QC5100
Test Program:	NCAP Frontal Barrier Impact Test	Test Date	1/11/2012

SEAT BELT POSITIONING DATA



SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU — Top surface of reference to belt upper edge	mm	380	315
PBL — Top surface of reference to belt lower edge	mm	315	230

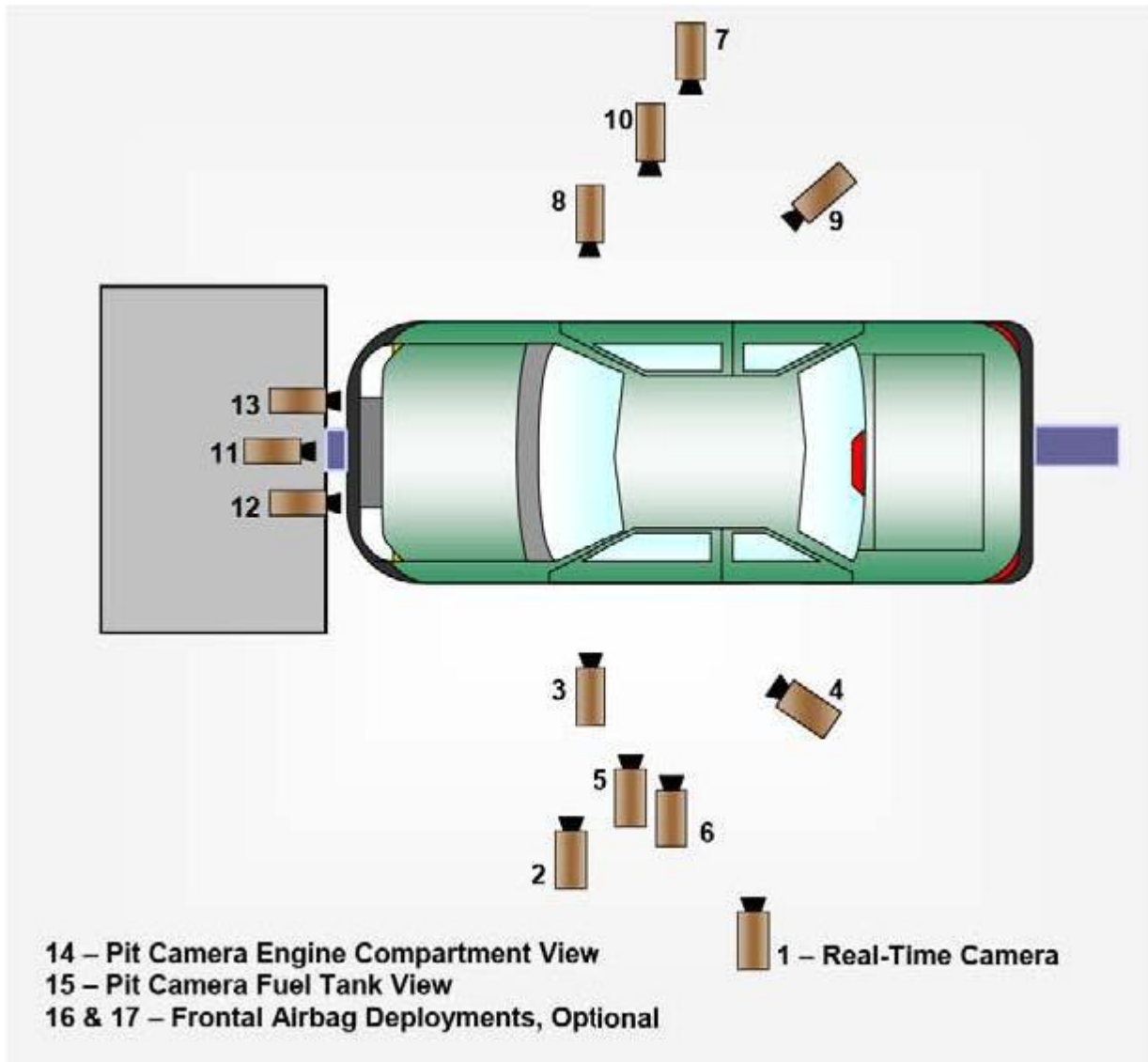
BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Shoulder belt length as measured on ATD	mm	885	945
Lap Belt Length as measured on ATD	mm	760	863
Remainder of belt on reel	mm	955	842
Total belt length for continuous webbing systems	mm	2,600	2,650

DATA SHEET NO. 6
HIGH-SPEED CAMERA LOCATIONS AND DATA

Test Vehicle:	2012 Toyota Sienna	NHTSA No:	QC5100
Test Program:	NCAP Frontal Barrier Impact Test	Test Date	1/11/2012

CAMERA POSITIONS FOR FRONTAL IMPACTS



DATA SHEET NO. 6 (CONTINUED)
HIGH-SPEED CAMERA LOCATIONS AND DATA

Test Vehicle:	2012 Toyota Sienna	NHTSA No:	QC5100
Test Program:	NCAP Frontal Barrier Impact Test	Test Date	1/11/2012

CAMERA LOCATIONS

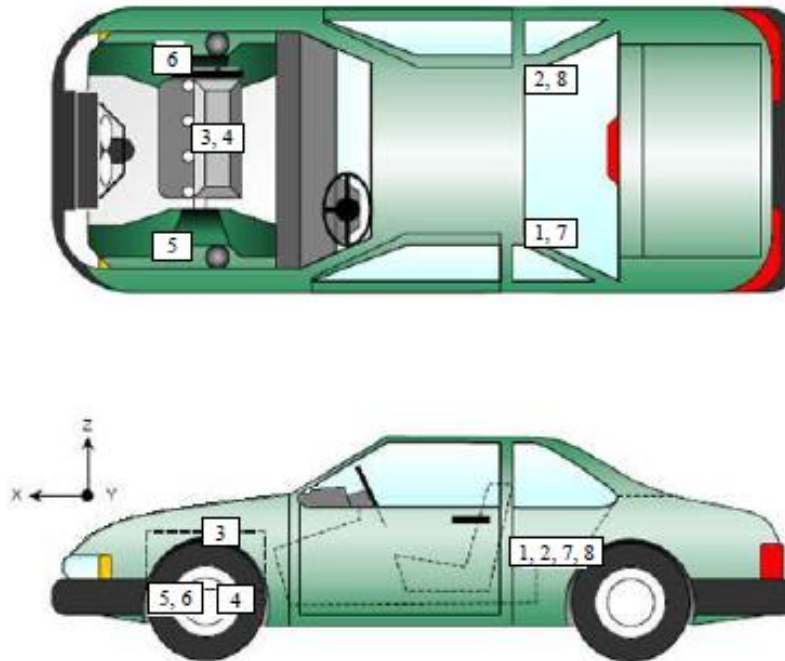
No.	Camera View	Location (mm)			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Overall	-	-	-	Zoom	24
2	Driver Close-Up	1600	7898	1215	50	1000
3	Left Front Half	1080	5500	930	50	1000
4	Left Angle	3063	2690	2136	24	1000
5	Steering Column - Top	1876	9630	1790	50	500
6	Steering Column - Bottom	1876	9630	1180	50	500
7	Right Overall	1912	7443	930	28	1000
8	Passenger Close-Up	1620	8160	1213	50	1000
9	Right Front Half	1080	9530	975	50	1000
10	Right Angle	3075	2740	2130	28	1000
11	Windshield	-670	0	2930	28	500
12	Driver Windshield	0	500	1950	24	500
13	Passenger Windshield	0	500	1950	24	500
14	Pit Front	730	0	-3200	12.5	1000
15	Pit Rear	2200	0	-3200	12.5	1000
16	Onboard Driver Airbag (Optional)					
17	Onboard Passenger Airbag (Optional)					

* COORDINATES:

+X = forward of impact plane
+Y = right of monorail center
+Z = into ground

DATA SHEET NO. 7
VEHICLE ACCELEROMETER DATA

Test Vehicle:	2012 Toyota Sienna	NHTSA No:	QC5100
Test Program:	NCAP Frontal Barrier Impact Test	Test Date	1/11/2012



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear Accelerometer – X Direction	1,569	-769	-867
2	Right Rear Accelerometer – X Direction	1,581	774	-858
3	Engine Top X	4,199	220	-896
4	Engine Bottom X	4,685	231	-180
5	Left Brake Caliper X	3,969	-837	351
6	Right Brake Caliper X	3,986	826	404
7	Left Rear Accelerometer – Z Direction	1,569	-769	-867
8	Right Rear Accelerometer – Z Direction	1,581	774	-858

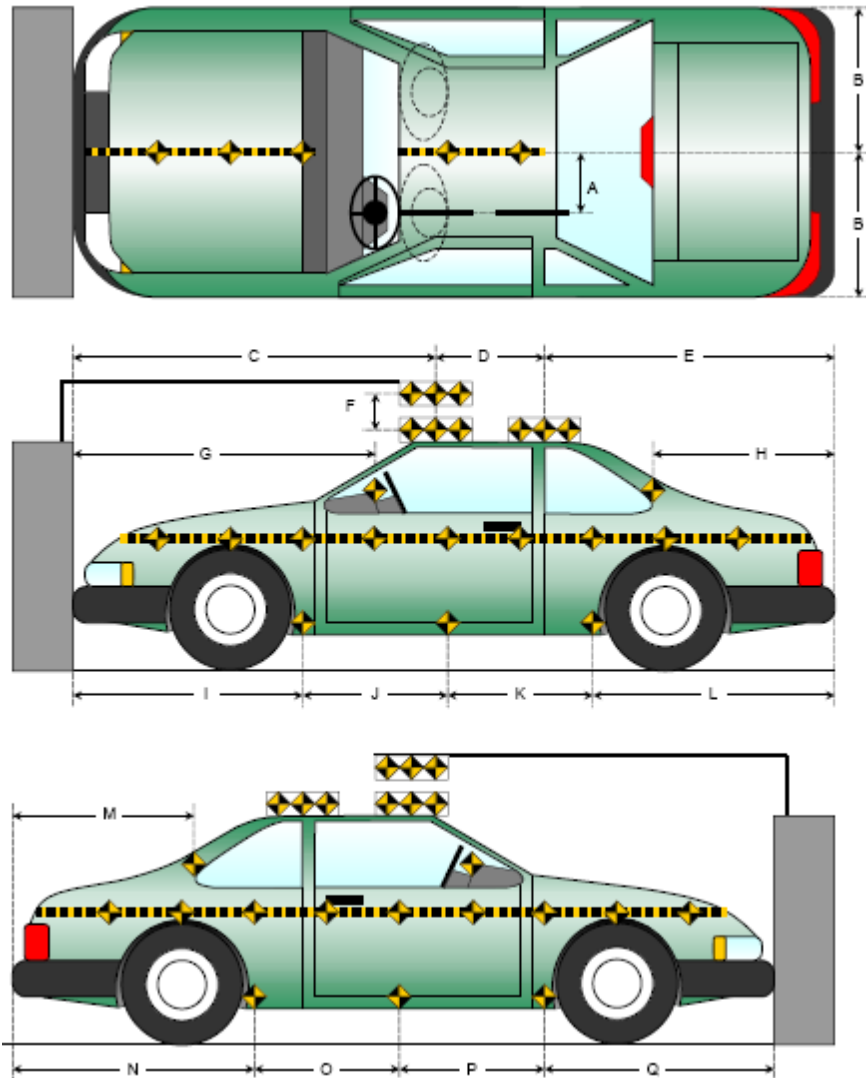
Reference Points: X – Rear Surface of Vehicle (+ forward)
 Y – Vehicle Centerline (+ to right)
 Z – Ground Plane (+ down)

DATA SHEET NO. 8 **PHOTOGRAPHIC REFERENCE TARGET LOCATIONS**

Test Vehicle: 2012 Toyota Sienna NHTSA No: QC5100
 Test Program: NCAP Frontal Barrier Impact Test Test Date 1/11/2012

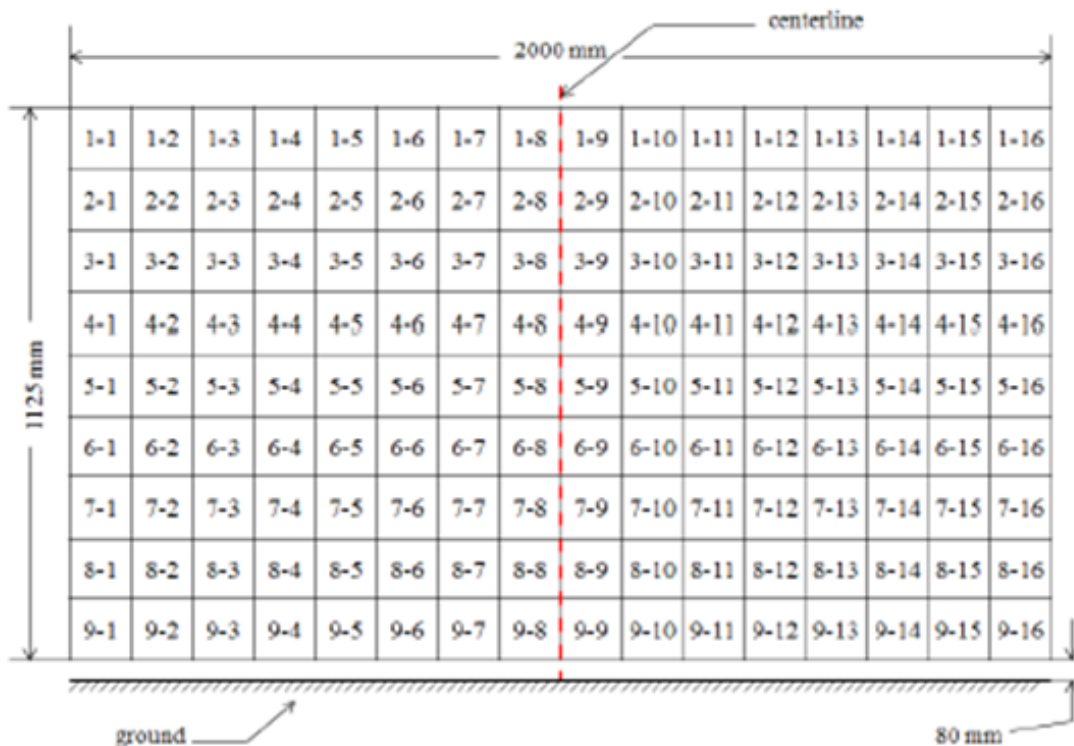
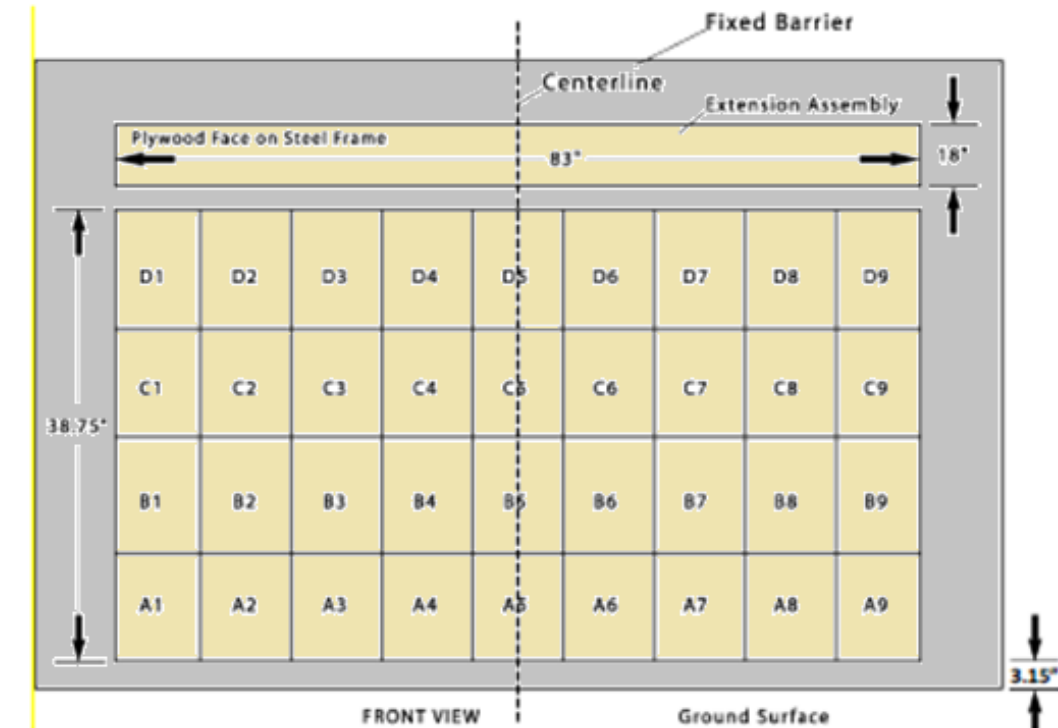
Item	Value
A	451
B	992
C	2,408
D	1,217
E	1,458
F	--
G	1,674
H	1,411
I	1,427
J	1,114
K	969
L	1,573
M	1,412
N	1,575
O	971
P	1,107
Q	1,429

All units in millimeters



DATA SHEET NO. 9 **LOAD CELL LOCATIONS ON FIXED BARRIER**

Test Vehicle:	2012 Toyota Sienna	NHTSA No:	QC5100
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	1/11/2012



DATA SHEET NO. 10
TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle:	2012 Toyota Sienna	NHTSA No:	QC5100
Test Program:	NCAP Frontal Barrier Impact Test	Test Date	1/11/2012

INSTRUMENTATION

Instrumentation	Number of Channels Collected
Driver Dummy Accelerometers	42
Passenger Dummy Accelerometers	42
Vehicle Structure Accelerometers	8
Total	132

CAMERA COVERAGE

Type of Camera	Number Used in this Test
High-Speed Vehicle Onboard	0
High-Speed Offboard	14
Real-Time Panning	1
Total	15

DATA SHEET NO. 11 - POST TEST OBSERVATIONS

Test Vehicle: 2012 Toyota Sienna NHTSA No: QC5100
 Test Program: NCAP Frontal Barrier Impact Test Test Date: 1/11/2012

TEST DUMMY INFORMATION AND CONTACT LOCATIONS

Description	Driver	Passenger
Dummy Type/Serial No.	064	143
Head Contact	Front Airbag and headrest	Front Airbag and Headrest
Upper Torso Contact	Front Airbag	Front Airbag
Lower Torso Contact	None	None
Left Knee Contact	Knee Airbag and Bolster	Glove Box
Right Knee Contact	Knee Airbag and Bolster	Glove Box

DOOR OPENING AND SEAT TRACK INFORMATION

Description	Driver	Passenger
Locked/Unlocked Doors	Unlocked	Unlocked
Front Door Opening	Closed & Operational	Closed & Operational
Rear Door Opening	Closed & Operational	Closed & Operational
Seat Track Shift (mm)	No Shift	No Shift
Seat Back Failure	No Failure	No Failure
Glazing Damage	None	None

POST TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Windshield Damage	Minor cracks along bottom of the Passenger's side A-Pillar
Window Damage	None
Other Notable Effects	None

VEHICLE REBOUND FROM BARRIER

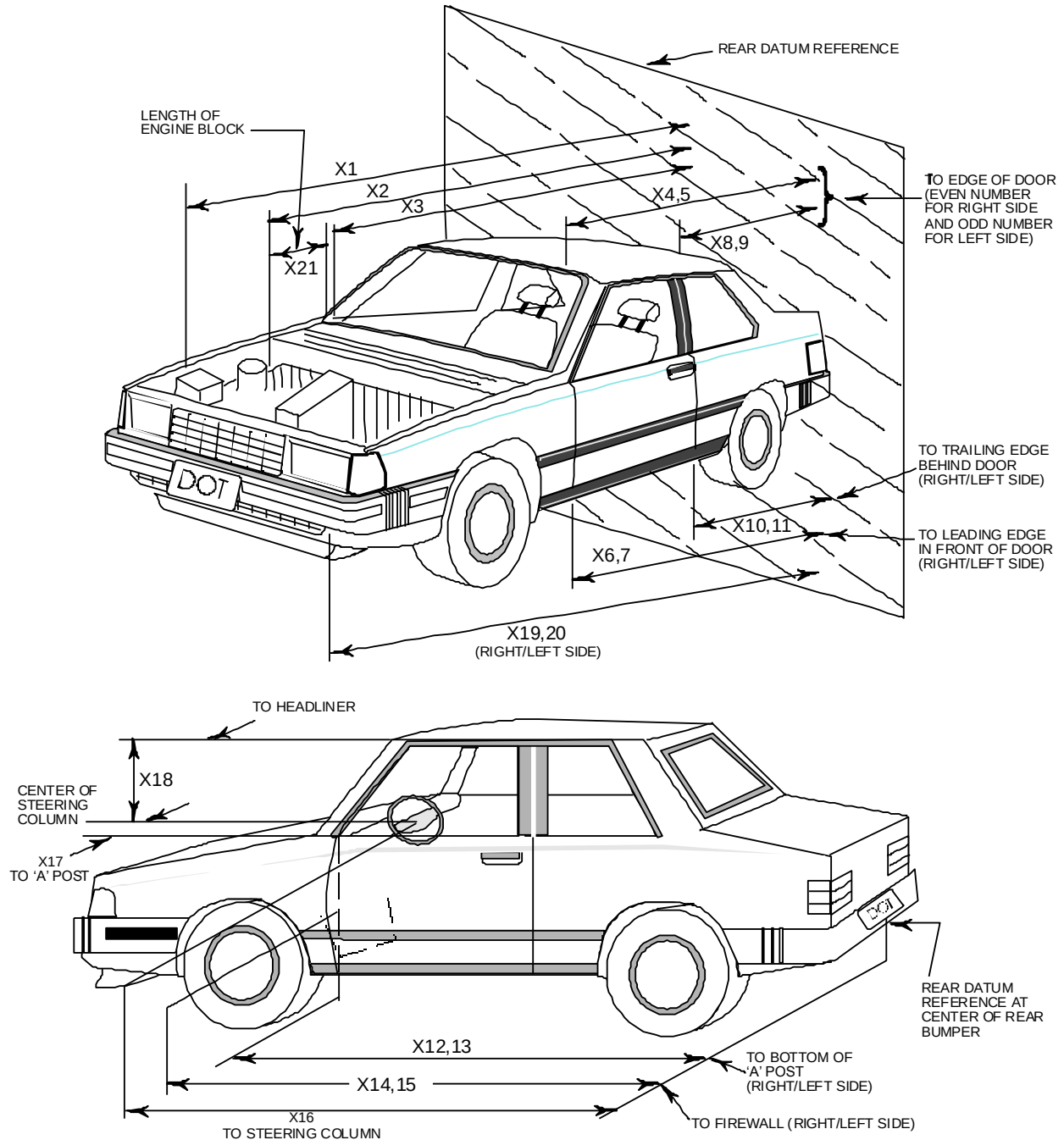
Measured Parameter	Units	Value
Left Side	mm	1,108
Center	mm	1,072
Right Side	mm	1,151
Average	mm	1,110

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Driver (Occupant 1)		Passenger (Occupant 2)	
	Installed	Deployed	Installed	Deployed
Front Airbag	Yes	Yes	Yes	Yes
Curtain Airbag	Yes	No	Yes	No
Torso Airbag	Yes	No	Yes	No
Knee Airbag	Yes	Yes	No	No
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load Limiter	Yes	Yes	Yes	Yes
Other				

DATA SHEET NO. 12 **VEHICLE PROFILE MEASUREMENTS**

Test Vehicle:	2012 Toyota Sienna	NHTSA No:	QC5100
Test Program:	NCAP Frontal Barrier Impact Test	Test Date	1/11/2012



DATA SHEET NO. 12 (CONTINUED)
VEHICLE PROFILE MEASUREMENTS

Test Vehicle:	2012 Toyota Sienna	NHTSA No:	QC5100
Test Program:	NCAP Frontal Barrier Impact Test	Test Date	1/11/2012

No.	Measurement Description	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	5,083	4,581	-502
2	Rear Surface of Vehicle (RSOV) to Front of Engine	4,589	4,276	-313
3	RSOV to Firewall	4,269	4,246	-23
4	RSOV to Upper Leading Edge of Right Door	3,706	3,707	1
5	RSOV to Upper Leading Edge of Left Door	3,707	3,708	1
6	RSOV to Lower Leading Edge of Right Door	3,633	3,636	3
7	RSOV to Lower Leading Edge of Left Door	3,633	3,640	7
8	RSOV to Upper Trailing Edge of Right Door	2,595	2,597	2
9	RSOV to Upper Trailing Edge of Left Door	2,597	2,600	3
10	RSOV to Lower Trailing Edge of Right Door	2,602	2,605	3
11	RSOV to Lower Trailing Edge of Left Door	2,604	2,609	5
12	RSOV to Bottom of "A" Post of Right Side	3,875	3,760	-115
13	RSOV to Bottom of "A" Post of Left Side	3,877	3,870	-7
14	RSOV to Firewall, Right Side	4,246	4,162	-84
15	RSOV to Firewall, Left Side	4,236	4,212	-24
16	RSOV to Steering Column illiterate	3,255	3,305	50
17	Center of Steering Column to "A" Post	324	315	9
18	Center of Steering Column to Headliner	450	466	16
19	RSOV to Right Side of Front Bumper	5,031	4,478	553
20	RSOV to Left Side of Front Bumper	5,030	4,582	448
21	Length of Engine Block	379	379	0
RD	RSOV to Right Side of Dash Panel	3,449	3,450	1
CD	RSOV to Center of Dash Panel	3,478	3,480	2
LD	RSOV to Left Side of Dash Panel	3,452	3,456	4

All Dimensions in mm

DATA SHEET NO. 13
ACCIDENT INVESTIGATION DIVISION DATA

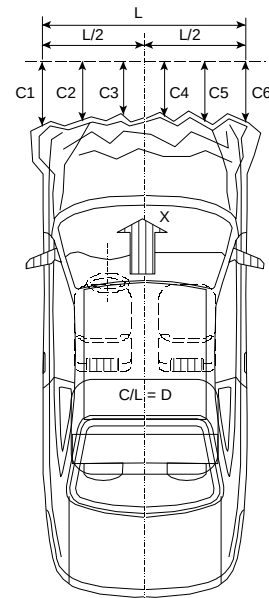
Test Vehicle:	2012 Toyota Sienna	NHTSA No:	QC5100
Test Program:	NCAP Frontal Barrier Impact Test	Test Date	1/11/2012

VEHICLE INFORMATION

VIN	5TDJK3DC6CS032568	Wheelbase (mm)	3,026
Vehicle Size Category	Passenger Mini Van	Test Weight (kg)	2,336

ACCELEROMETER DATA

Accelerometer Locations:	As Described in Data Sheet No. 7
Cal. Procedure/Interval:	Calspan Procedure / 6 months
Integration Algorithm:	Trapezoidal
Linearity:	> 99%
Impact Velocity (km/h):	56.2
Velocity Change (km/h):	56.2
Time of Separation (ms):	132



CRUSH PROFILE

Collision Deformation Classification:	12FDEW4
Midpoint of Damage:	Vehicle Centerline
Damage Region Length (mm):	1,455
Impact Mode:	Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	4,930	4,557	-373
C2	Crush zone 2 at left side	mm	5,042	4,590	-452
C3	Crush zone 3 at left side	mm	5,078	4,595	-483
C4	Crush zone 4 at right side	mm	5,078	4,567	-511
C5	Crush zone 5 at right side	mm	5,042	4,495	-547
C6	Crush zone 6 at right side	mm	4,933	4,537	-396
L	C1 to C6	mm	1,455	1,473	18

DATA SHEET NO. 14
VEHICLE INTRUSION MEASUREMENTS

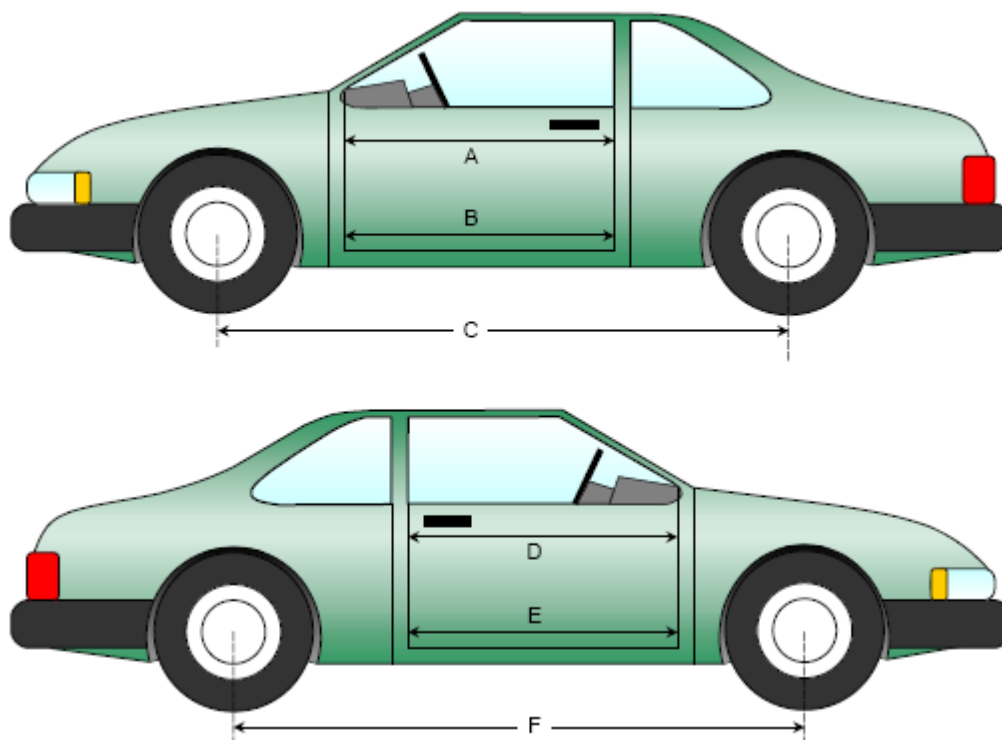
Test Vehicle: 2012 Toyota Sienna NHTSA No: QC5100
Test Program: NCAP Frontal Barrier Impact Test Test Date: 1/11/2012

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	1,006	1,005	-1
B	Left Side Lower	mm	878	878	0
D	Right Side Upper	mm	1,006	1,005	-1
E	Right Side Lower	mm	871	871	0

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	3,026	2,941	-85
F	Right Side Wheelbase	mm	3,026	2,936	-90



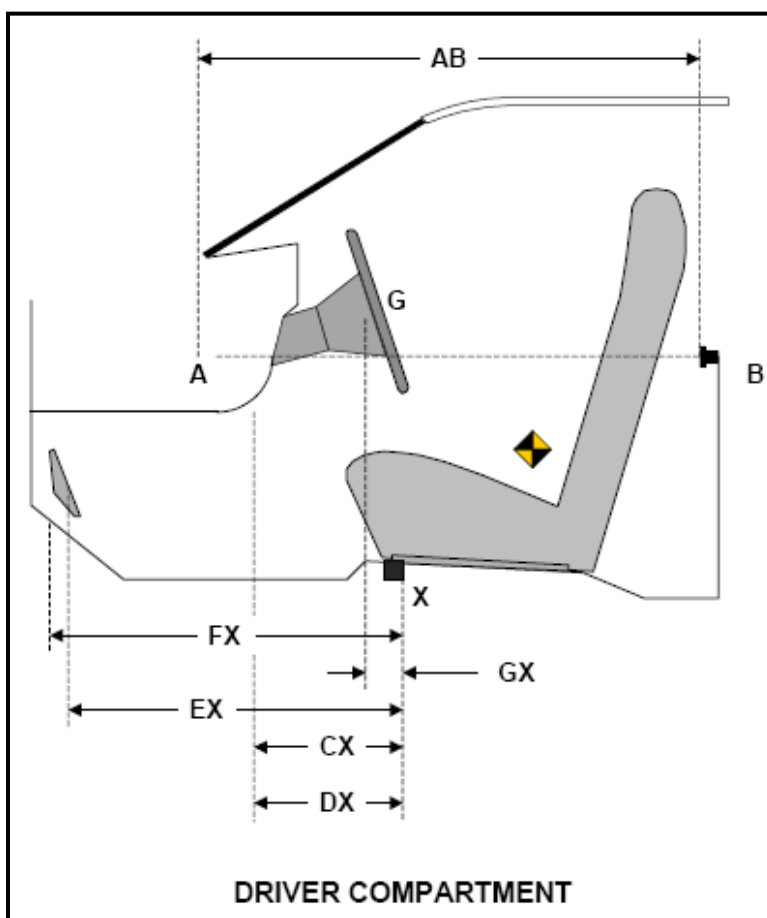
DATA SHEET NO.14 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2012 Toyota Sienna NHTSA No: QC5100
 Test Program: NCAP Frontal Barrier Impact Test Test Date: 1/11/2012

DRIVER COMPARTMENT INTRUSION

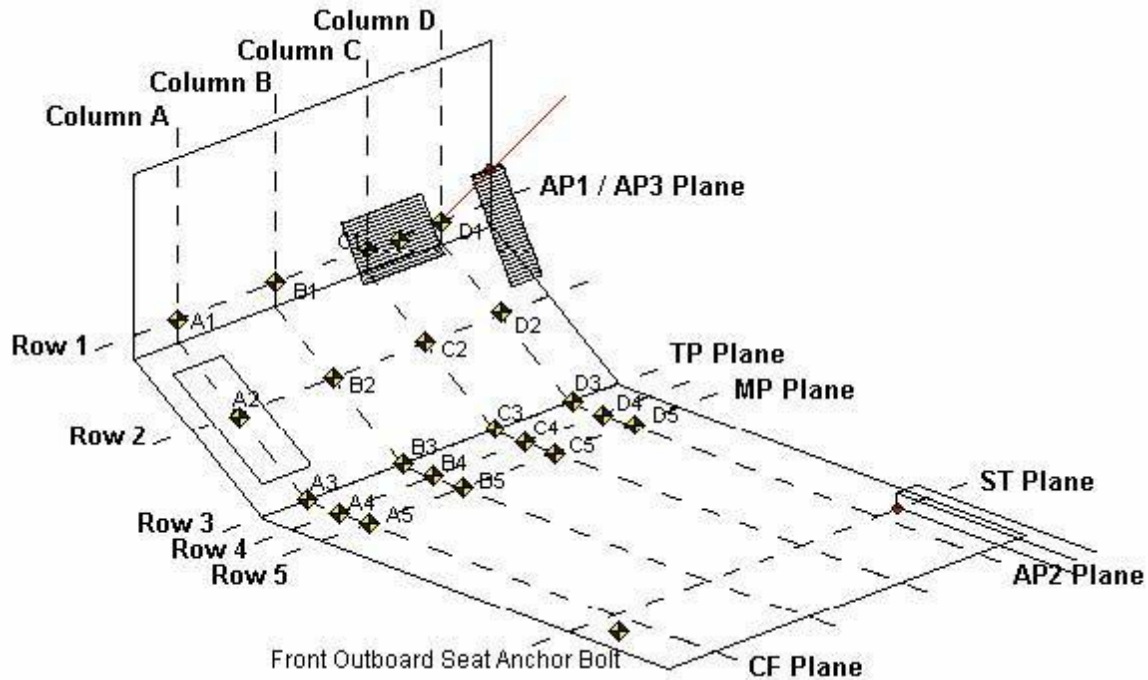
Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	841	840	-1
CX	Left Knee Bolster to X	mm	324	323	-1
DX	Right Knee Bolster to X	mm	318	305	-13
EX	Brake Pedal to X	mm	543	542	-1
FX	Foot Rest to X	mm	515	504	-11
GX	Center of Steering Column Wheel Hub to X	mm	74	124	50

X = Front of Seat Track (Stationary)



DATA SHEET NO.14 (CONTINUED) **VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle:	2012 Toyota Sienna	NHTSA No:	QC5100
Test Program:	NCAP Frontal Barrier Impact Test	Test Date	1/11/2012



- AP1: Y-Z plane passing through D1
- AP2: X-Z plane passing through D1
- AP3: X-Y plane passing through D1
- MP: Y-Z plane, halfway between the ST plane and AP1 plane
- CF Plane: X-Z plane passes through center of footrest.
- BP Plane: X-Z plane passes through center of brake pedal
- TP Plane: Y-Z plane, intersection of BP Plane and the intersection of the toe pan and floorboard
- Column A: intersection of vehicle and CF plane
- Column D: Intersection of vehicle and AP2 plane
- Row 1: intersection of the vehicle and the AP3 Plane
- Row 3: intersection of the vehicle and TP plane
- Row 5: intersection of the vehicle and MP plane
- Row 2: evenly spaced between row 1 and 3
- Row 4: evenly spaced between row 3 and 5

DATA SHEET NO. 15
SUMMARY OF FMVSS 212, 219 (PARTIAL), AND 301 DATA

Test Vehicle: 2012 Toyota Sienna NHTSA No: QC5100
 Test Program: NCAP Frontal Barrier Impact Test Test Date: 1/11/2012

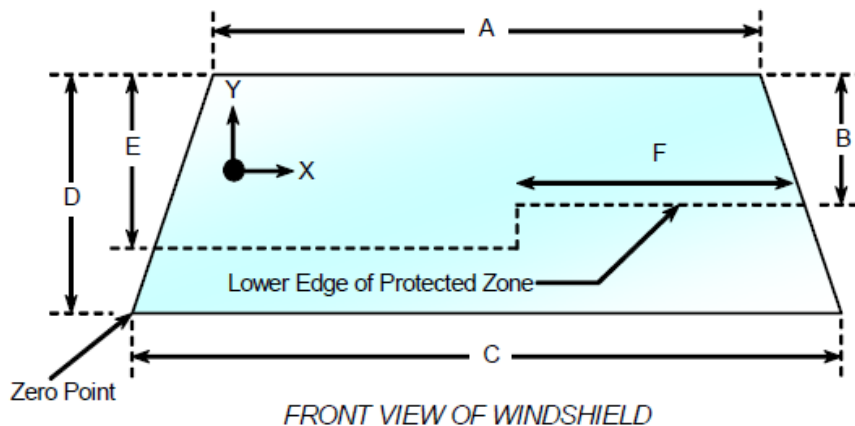
Please provide windshield mounting details. A 0.8 mm trim surrounds the top and side of windshield while a plastic shroud is on the bottom.

The standard requires that the post-test retention measurement be a minimum of 75% of the pre-test total periphery measurement for vehicles not equipped with occupant passive restraints and 50% for each side of the windshield for vehicles which are equipped with occupant passive restraints.

Temperature of windshield molding during test: 21.3°C

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% Retention
Left Side	2,335	2,335	100%
Right Side	2,335	2,335	100%
Total	4,670	4,670	100%



Item	Units	Value
A	mm	1,300
B	mm	605
C	mm	1,650
D	mm	860
E	mm	612
F	mm	580

AREAS OF PROTECTED ZONE FAILURES

A. Provide coordinates of the area that the protected zone was penetrated more than .25 inches by a vehicle component other than one that is normally in contact with the windshield.

X	Y

B. Provide coordinates of the area beneath the protected zone that the inner surface of the windshield was penetrated by a vehicle component.

X	Y

DATA SHEET NO. 15 (CONTINUED)
SUMMARY OF FMVSS 212, 219 (PARTIAL), AND 301 DATA

Test Vehicle:	<u>2012 Toyota Sienna</u>	NHTSA No:	<u>QC5100</u>
Test Program:	<u>NCAP Frontal Barrier Impact Test</u>	Test Date	<u>1/11/2012</u>

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

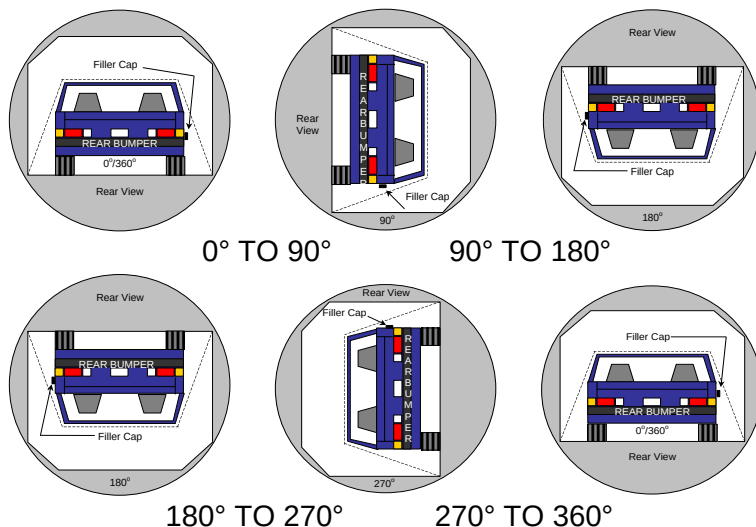
Temperature at Time of Impact: 9° C Test Time: 4:00PM

Stoddard Solvent Spillage Measurements

A.	From impact until vehicle motion ceases: (Maximum allowable = 1 oz.)	<u>0</u>	oz
B.	For the 5-minute period after motion ceases: (Maximum allowable = 5 oz.)	<u>0</u>	oz
C.	For the following 25 minutes: (Maximum allowable = 1 oz./minute)	<u>0</u>	oz
D.	Spillage	<u>0</u>	oz

DATA SHEET NO. 16
FMVSS 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2012 Toyota Sienna NHTSA No: QC5100
 Test Program: NCAP Frontal Barrier Impact Test Test Date: 1/11/2012



1. The specified fixture rollover rate for each 90° of rotation is 60 to 180 seconds.
2. The position hold time at each position is 300 seconds (minimum).
3. Details of Stoddard Solvent spillage: None

SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	66	300	366
90° to 180°	66	300	366
180° to 270°	63	300	363
270° to 360°	69	300	369

FMVSS 301 SPILLAGE TABLE

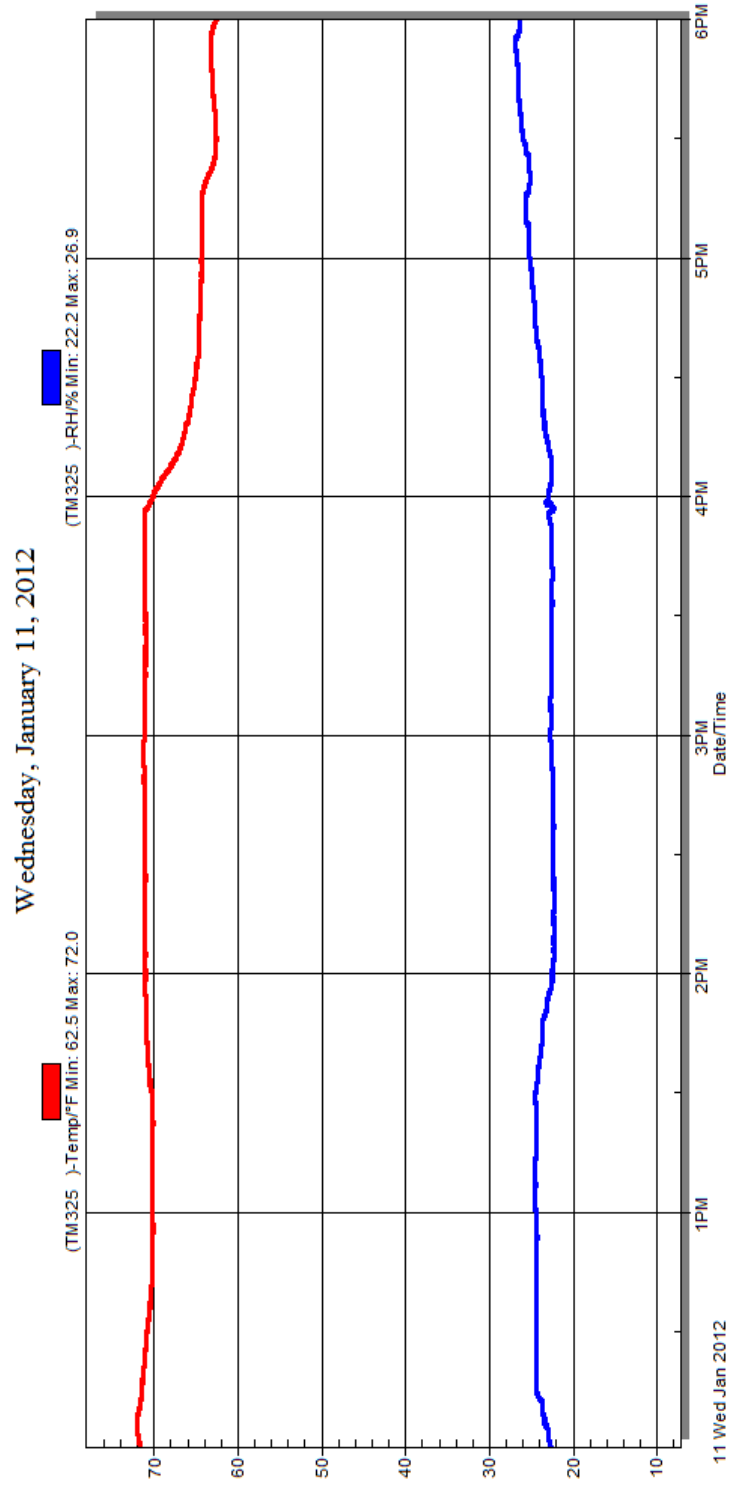
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0° to 90°	0	0		
90° to 180°	0	0		
180° to 270°	0	0		
270° to 360°	0	0		

SOLVENT SPILLAGE LOCATION TABLE

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

**DATA SHEET NO. 17
DUMMY/VEHICLE TEMPERATURE STABILIZATION**

Test Vehicle:	2012 Toyota Sienna	NHTSA No:	QC5100
Test Program:	NCAP Frontal Barrier Impact Test	Test Date	1/11/2012



Temperature Stabilization Chart/Data

APPENDIX A
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS		
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2	Load Cell Wall	A-5
3	Manufacturer's Label	A-6
4	Tire Placard	A-6
5	Right Front 3-4 View, as Received	A-7
6	Left Rear 3-4 View, as Received	A-7
7	Pre-test Front View of Test Vehicle	A-8
8	Post-test Front View of Test Vehicle	A-8
9	Pre-test Left View of Test Vehicle	A-9
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11	Pre-test Right View of Test Vehicle	A-10
12	Post-test Right View of Test Vehicle	A-10
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21	Pre-test Fuel Filler Cap View	A-15
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29	Pre-test Driver Dummy Front View	A-19

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33	Pre-test Driver Dummy and Vehicle Interior View	A-21
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35	Pre-test Driver's Seat Fore-Aft Markings	A-22
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37	Pre-test Driver Dummy Feet	A-23
38	Post-test Driver Dummy Feet	A-23
39	Pre-test Driver's Side Knee Bolster	A-24
40	Post-test Driver's Side Knee Bolster	A-24
41	Pre-test Driver's Side Floorpan	A-25
42	Post-test Driver's Side Floorpan	A-25
43	Post-Test Driver Dummy Face	A-26
44	Post-test Driver Dummy Contact With Airbag	A-26
45	Post-test Driver Dummy Contact With Headrest	A-27
46	Pre-test View of the Steering Wheel	A-27
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48	Pre-test Passenger Dummy Front View	A-28
49	Post-test Passenger Dummy Front View	A-29
50	Pre-test Passenger Dummy Window View	A-29
51	Post-test Passenger Dummy Window View	A-30
52	Pre-test Passenger Dummy and Vehicle Interior View	A-30
53	Post-test Passenger Dummy and Vehicle Interior View	A-31
54	Pre-test Passenger's Seat Fore-Aft Markings	A-31
55	Post-test Passenger's Seat Fore-Aft Markings	A-32
56	Pre-test Passenger Dummy Feet	A-32
57	Post-test Passenger Dummy Feet	A-33
58	Pre-test Passenger's Side Knee Bolster	A-33
59	Post-test Passenger's Side Knee Bolster	A-34
60	Pre-test Passenger's Side Floorpan	A-34
61	Post-test Passenger's Side Floorpan	A-35

62	Post-test Passenger Dummy Contact With Airbag	A-35
62a	Post-test Passenger Dummy Contact With Headrest	A-36
63	Photograph of ballast installed in vehicle	A-36
64	Post-test Stoddard solvent spillage location view, if required	A-37
65	Post-test Speed Trap Read-out	A-37
66	Vehicle at 0° on Static Rollover Device	A-38
67	Vehicle at 90° on Static Rollover Device	A-38
68	Vehicle at 180° on Static Rollover Device	A-39
69	Vehicle at 270° on Static Rollover Device	A-39
70	Vehicle at 360° on Static Rollover Device	A-40
71	2012 Toyota Sienna Frontal Impact Event	A-40
72	Monroney Label Photograph	A-41

¹**NOTE:** *The underbody views should include the following vehicle components: fuel pump, fuel lines, sender unit, fuel tank filler pipe and any other visible system components.*

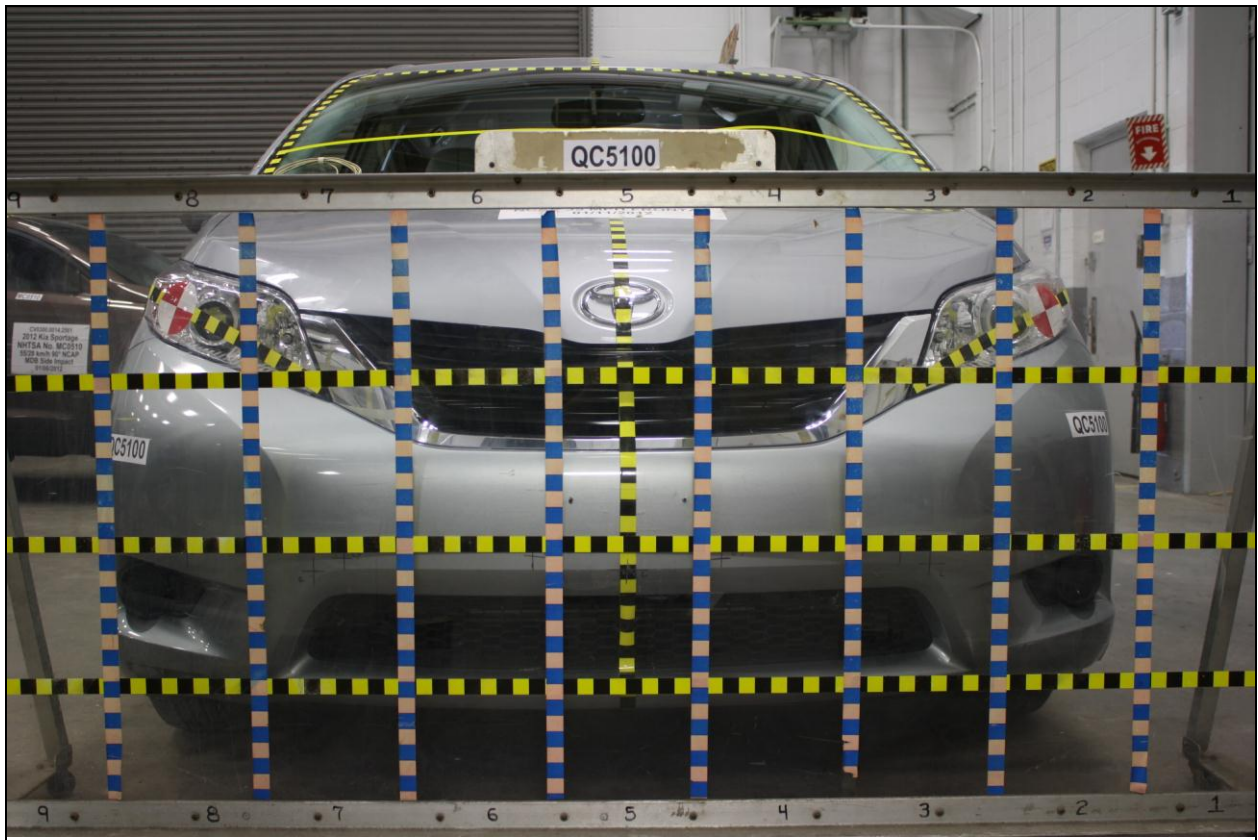


Figure A-1: Load Cell Location



Figure A-2: Load Cell Wall

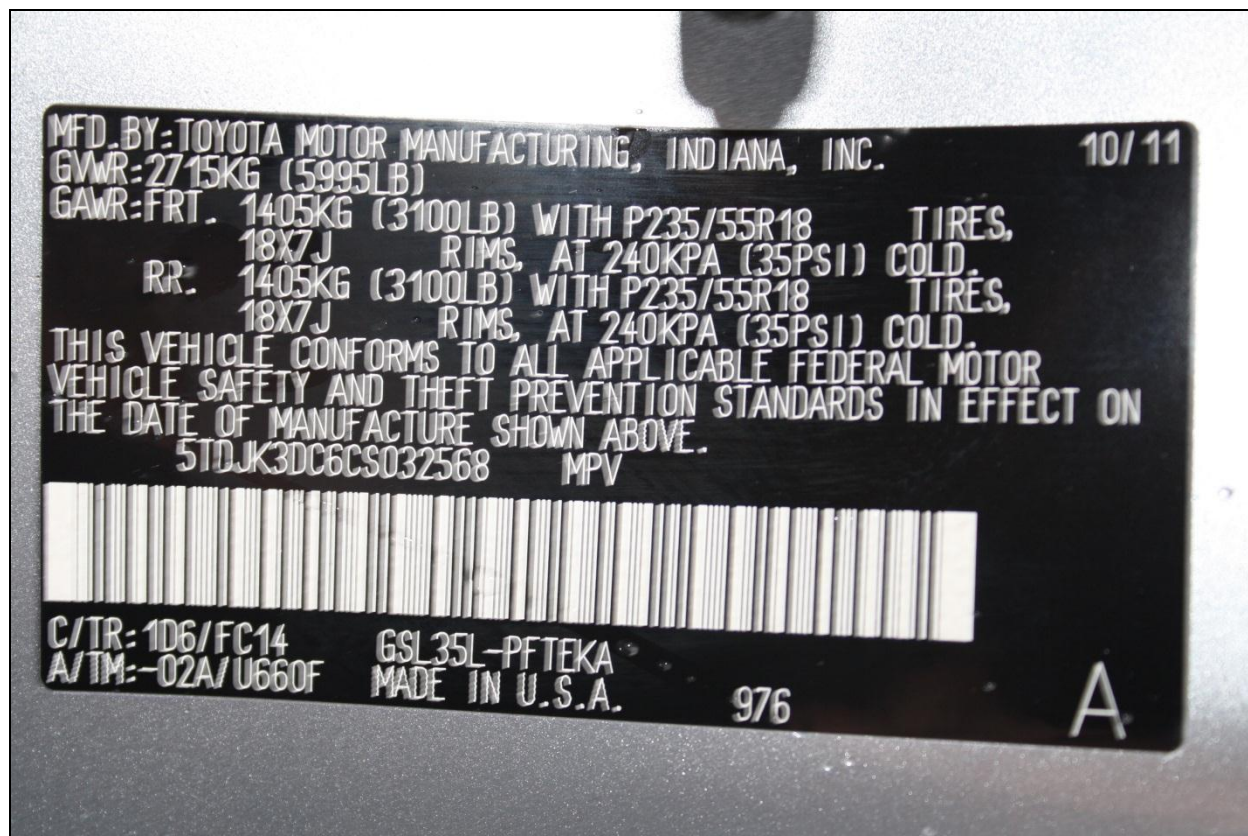


Figure A-3: Manufacturer's Label



Figure A-4: Tire Placard



Figure A-5: Right Front 3-4 View, as Received



Figure A-6: Left Rear 3-4 View, as Received



Figure A-7: Pre-Test Front View of Test Vehicle

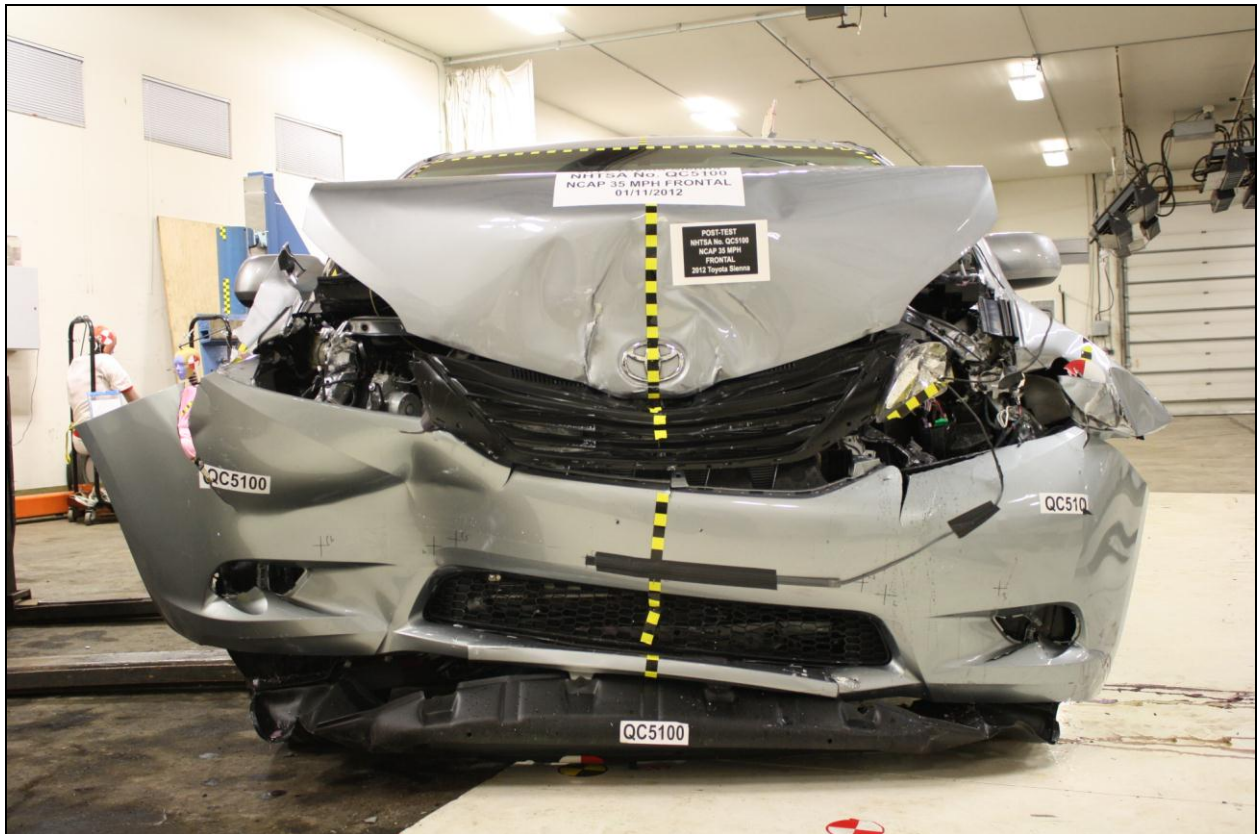


Figure A-8: Post-Test Front View of Test Vehicle



Figure A-9: Pre-Test Left View of Test Vehicle



Figure A-10: Post-Test Left View of Test Vehicle



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



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



Figure A-13: Pre-Test Right Front 3-4 View

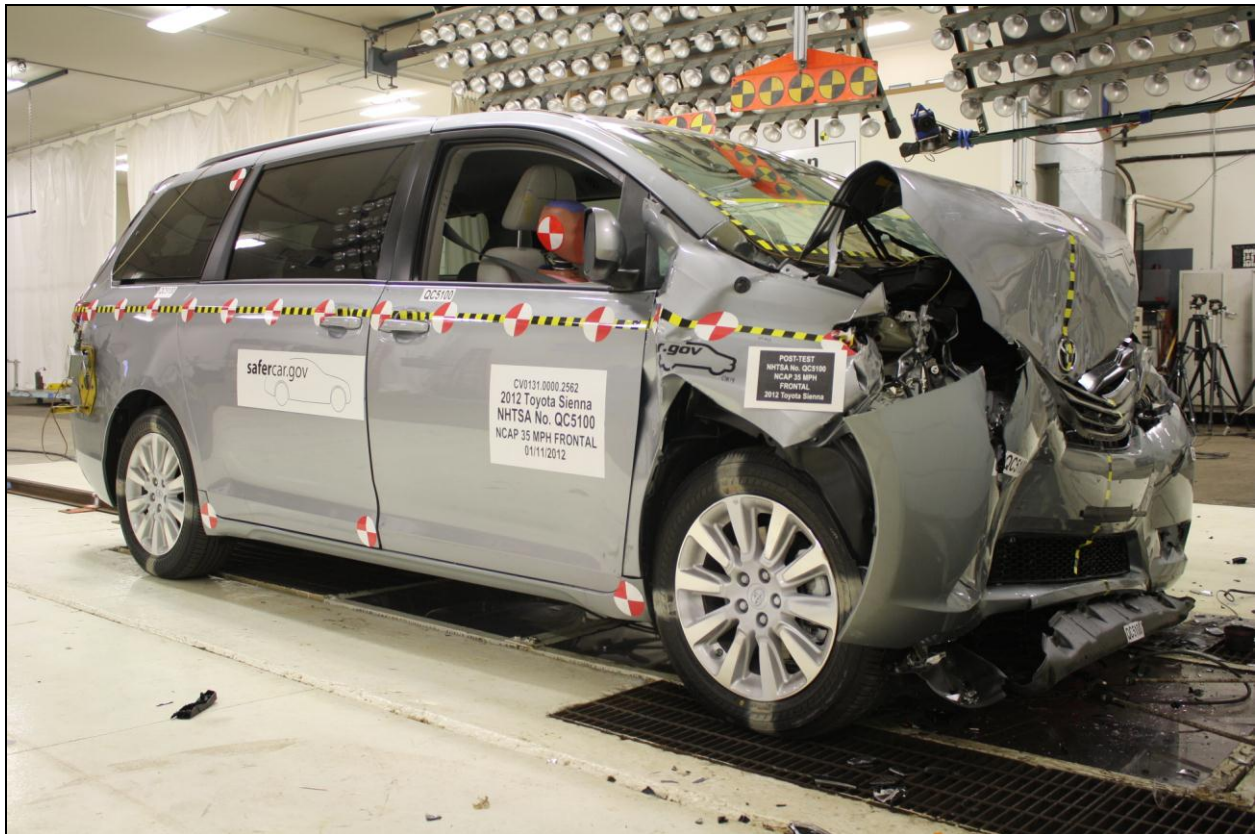


Figure A-14: Post-Test Right Front 3-4 View



Figure A-15: Pre-Test Left Rear 3/4 View



Figure A-16: Post-Test Left Rear 3/4 View



Figure A-17: Pre-Test Windshield View

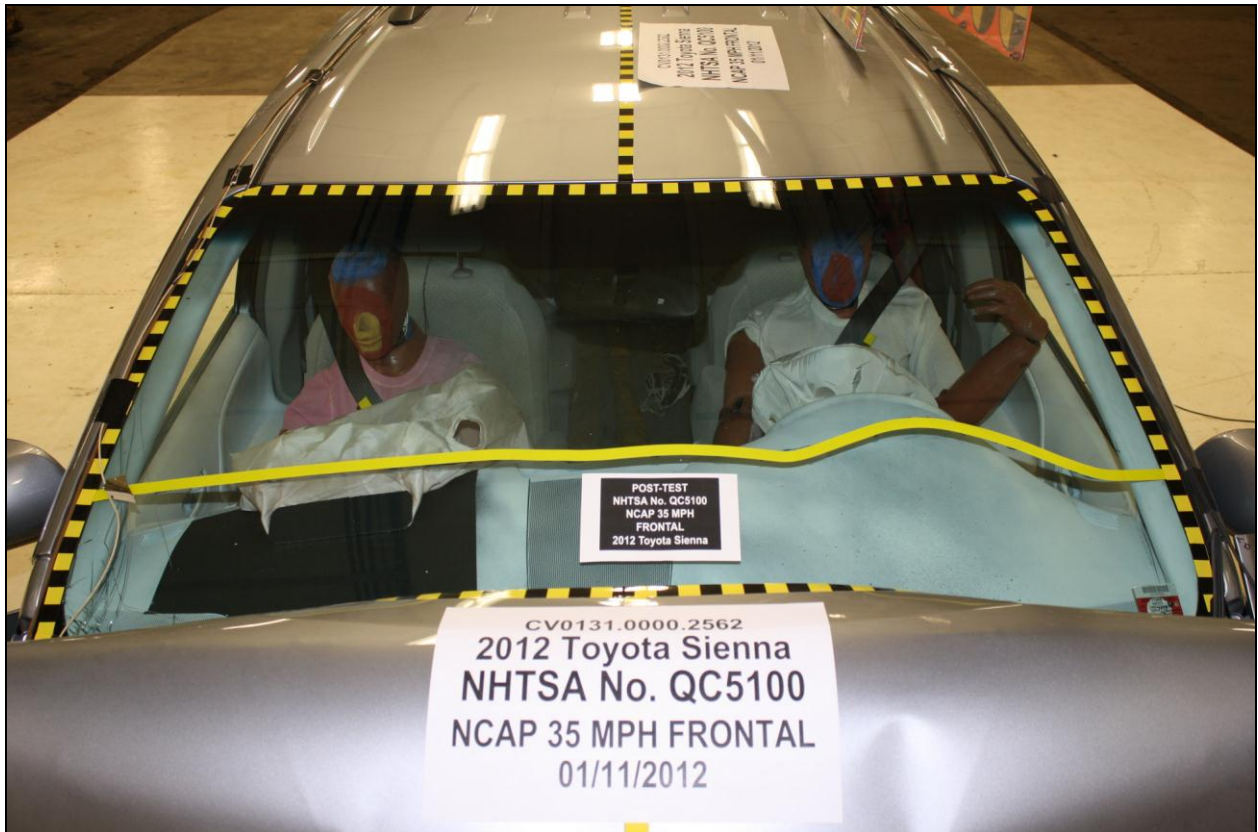


Figure A-18: Post-Test Windshield View

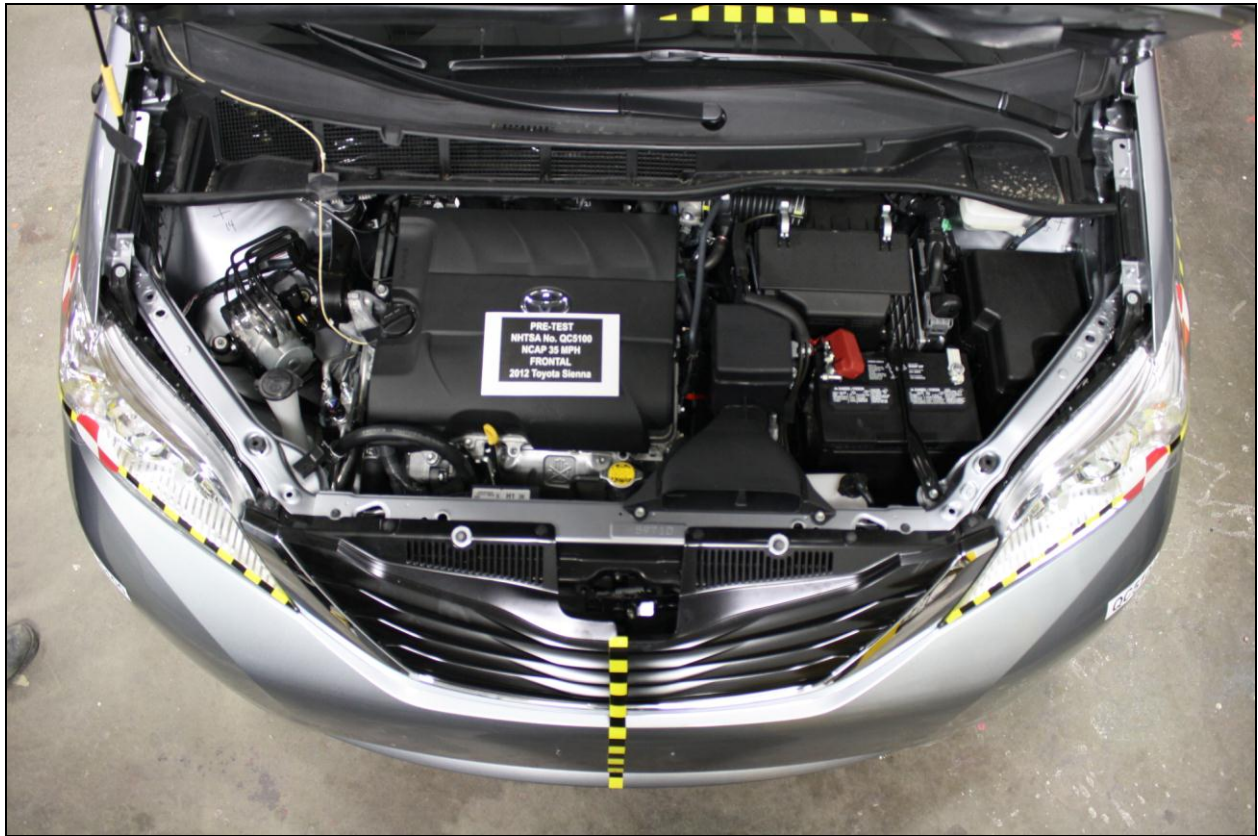


Figure A-19: Pre-Test Engine Compartment View

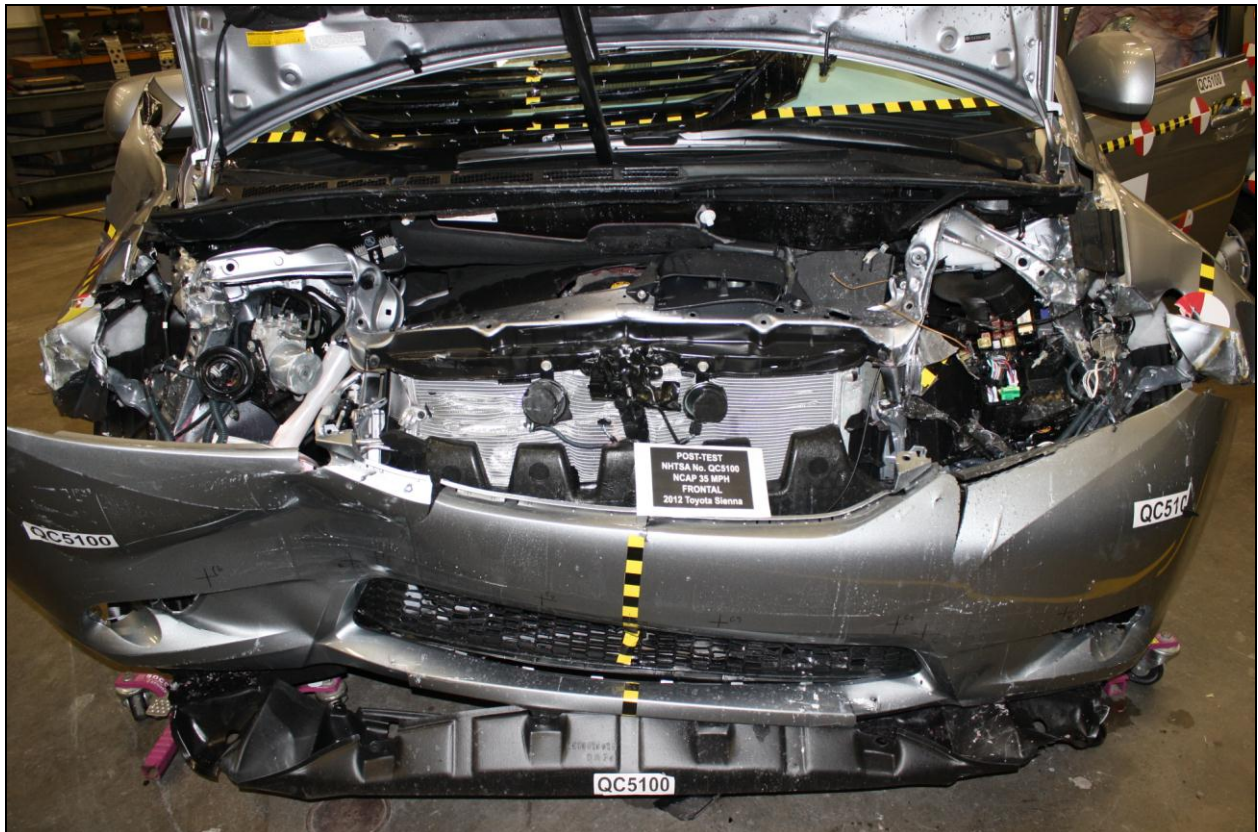


Figure A-20: Post-Test Engine Compartment View



Figure A-21: Pre-Test Fuel Filler Cap View



Figure A-22: Post-Test Fuel Filler Cap View

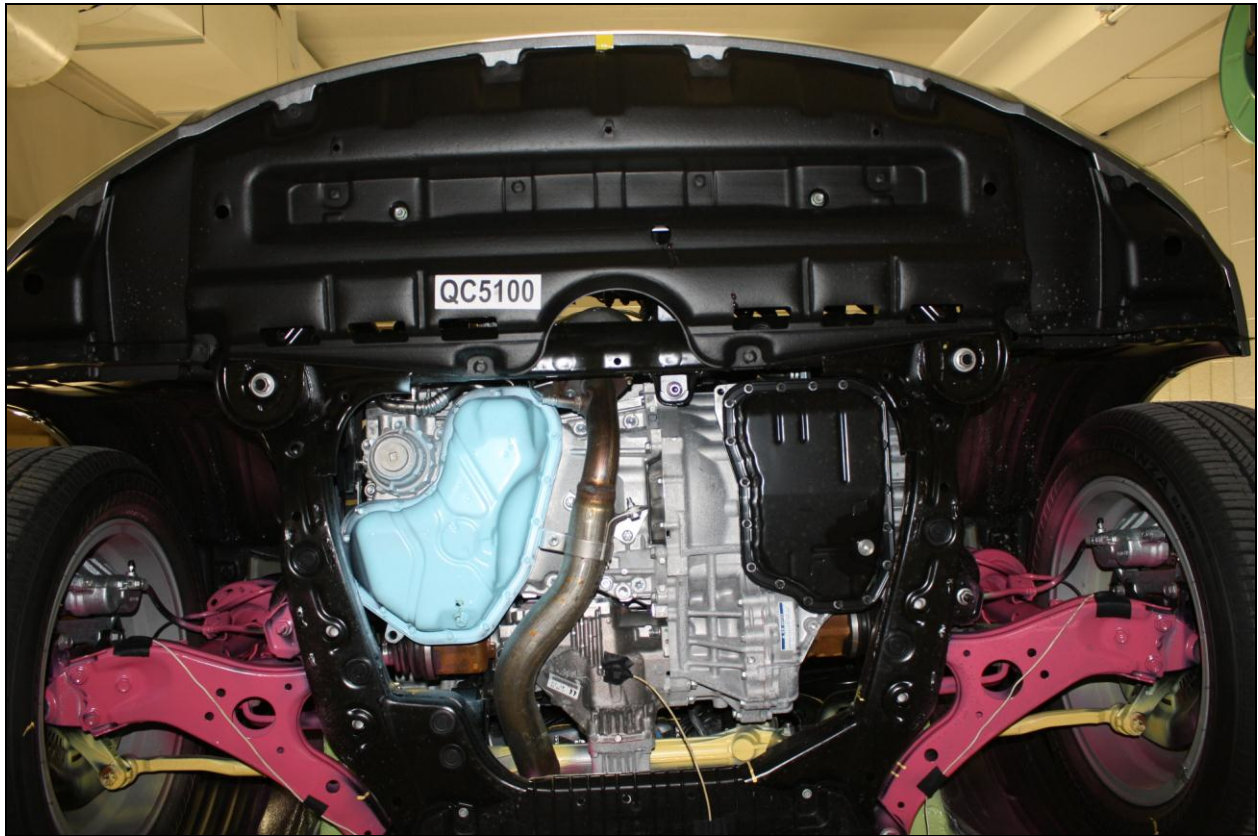


Figure A-23: Pre-Test Front Underbody View



Figure A-24: Post-Test Front Underbody View



Figure A-25: Pre-Test Rear Underbody View



Figure A-26: Post-Test Rear Underbody View



Figure A-27: Pre-Test Dummy Cable Routing



Figure A-28: Post-Test Dummy Cable Routing

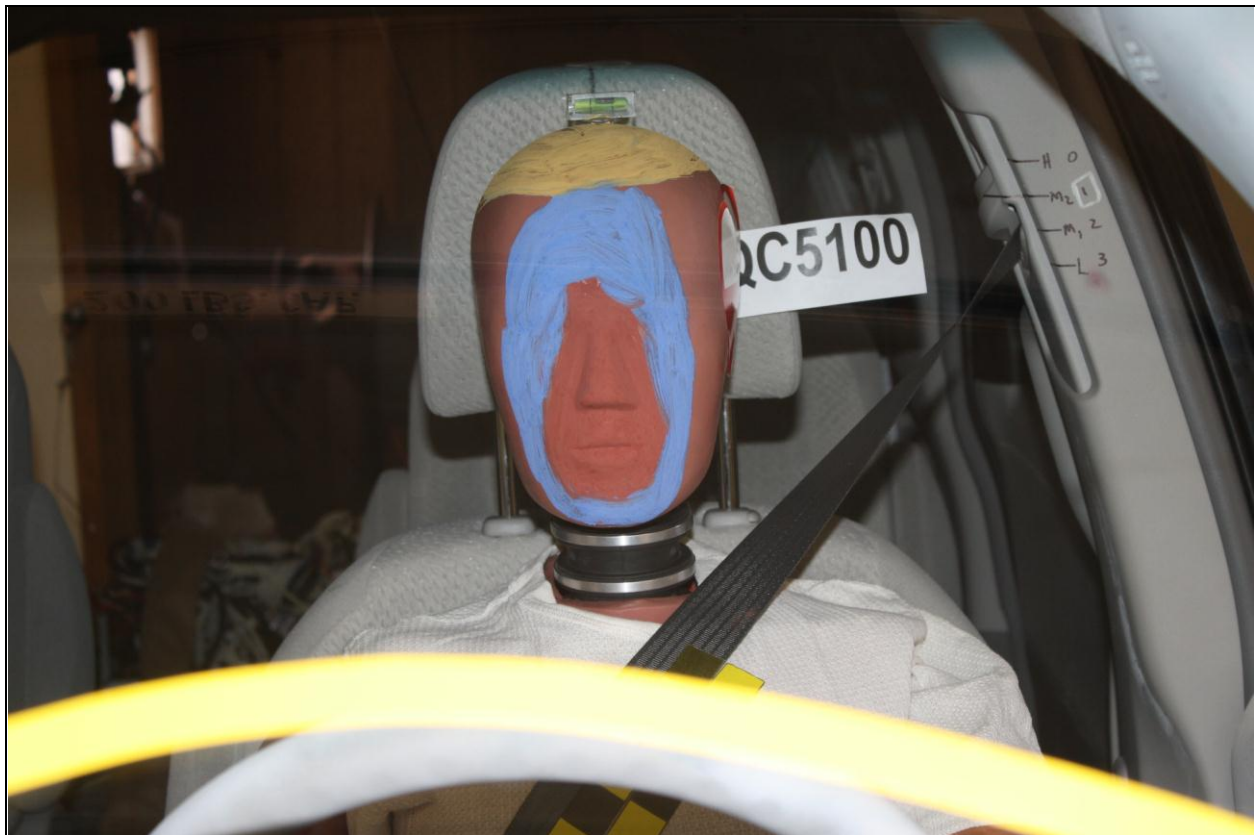


Figure A-29: Pre-Test Driver Dummy Front View

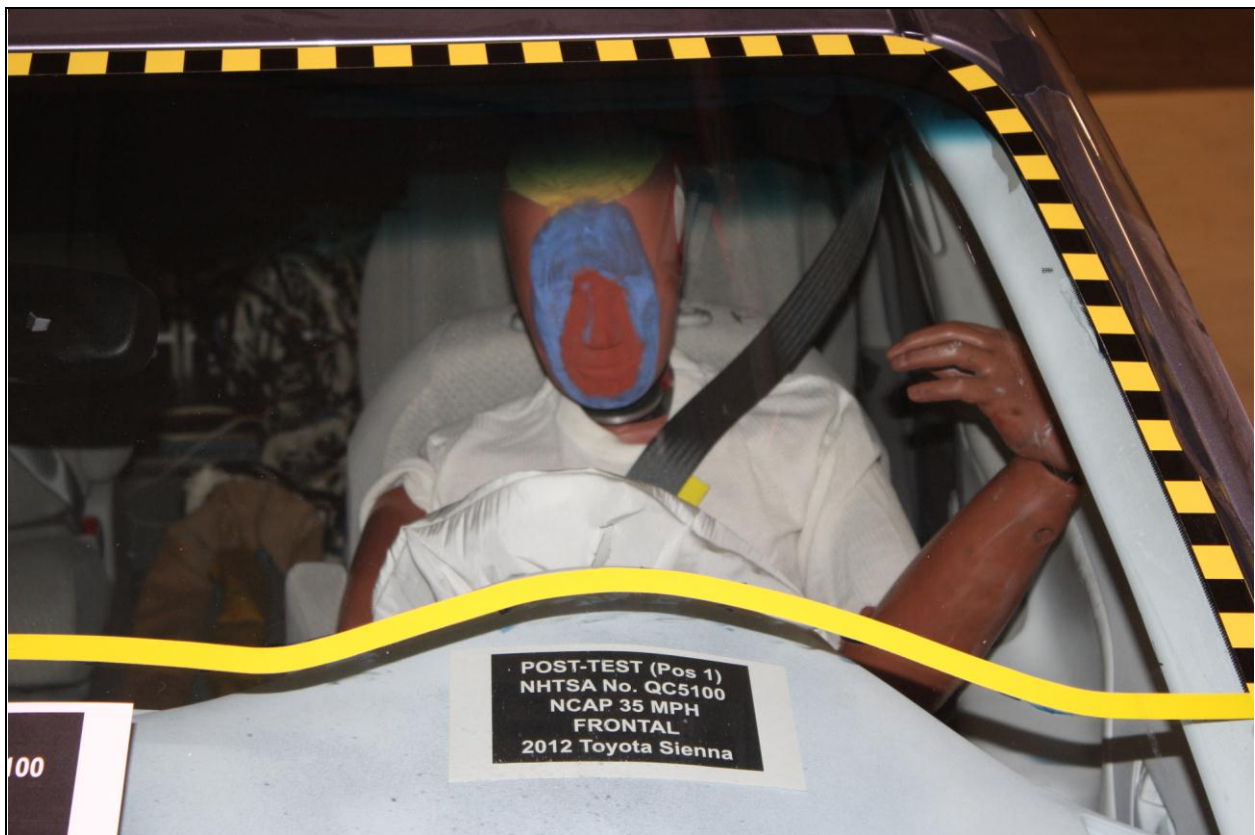


Figure A-30: Post-Test Driver Dummy Front View



Figure A-31: Pre-Test Driver Dummy Window View



Figure A-32: Post-Test Driver Dummy Window View



Figure A-33: Pre-Test Driver Dummy and Vehicle Interior View



Figure A-34: Post-Test Driver Dummy and Vehicle Interior View



Figure A-35: Pre-Test Driver's Seat Fore-Aft Markings



Figure A-36: Post-Test Driver's Seat Fore-Aft Markings



Figure A-37: Pre-Test Driver Dummy Feet



Figure A-38: Post-Test Driver Dummy Feet



Figure A-39: Pre-Test Driver's Side Knee Bolster



Figure A-40: Post-Test Driver's Side Knee Bolster



Figure A-41: Pre-Test Driver's Side Floorpan



Figure A-42: Post-Test Driver's Side Floorpan



Figure A-43: Post-Test Driver Dummy Face

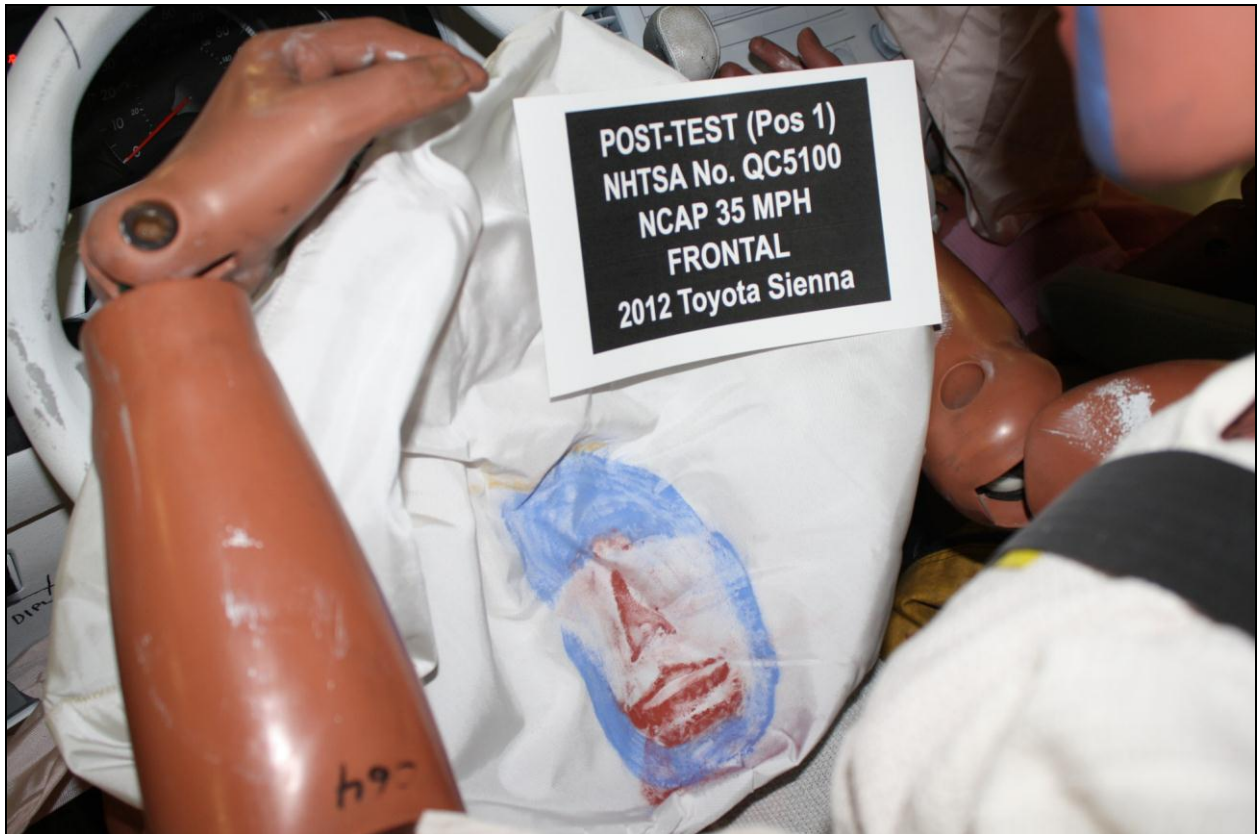


Figure A-44: Post-Test Driver Dummy Contact With Airbag



**Figure A-45: Post-Test Driver Dummy Contact with Headrest
(Headrest disconnected from seatback during the event, Head hit the back of headrest)**



Figure A-46: Pre-Test View of the Steering Wheel



Figure A-47: Post-Test View of the Steering Wheel



Figure A-48: Pre-Test Passenger Dummy Front View



Figure A-49: Post-Test Passenger Dummy Front View



Figure A-50: Pre-Test Passenger Dummy Window View



Figure A-51: Post-Test Passenger Dummy Window View



Figure A-52: Pre-Test Passenger Dummy and Vehicle Interior View



Figure A-53: Post-Test Passenger Dummy and Vehicle Interior View

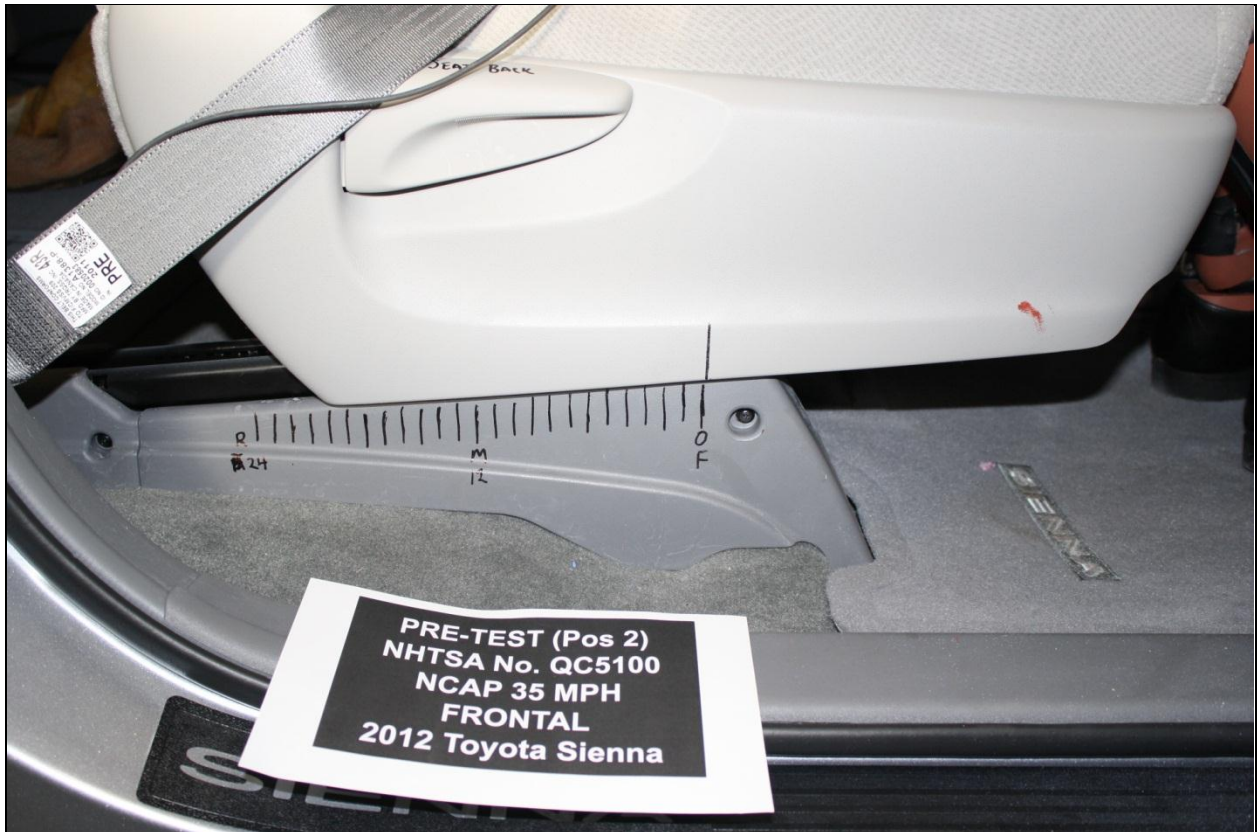


Figure A-54: Pre-Test Passenger's Seat Fore-Aft Markings

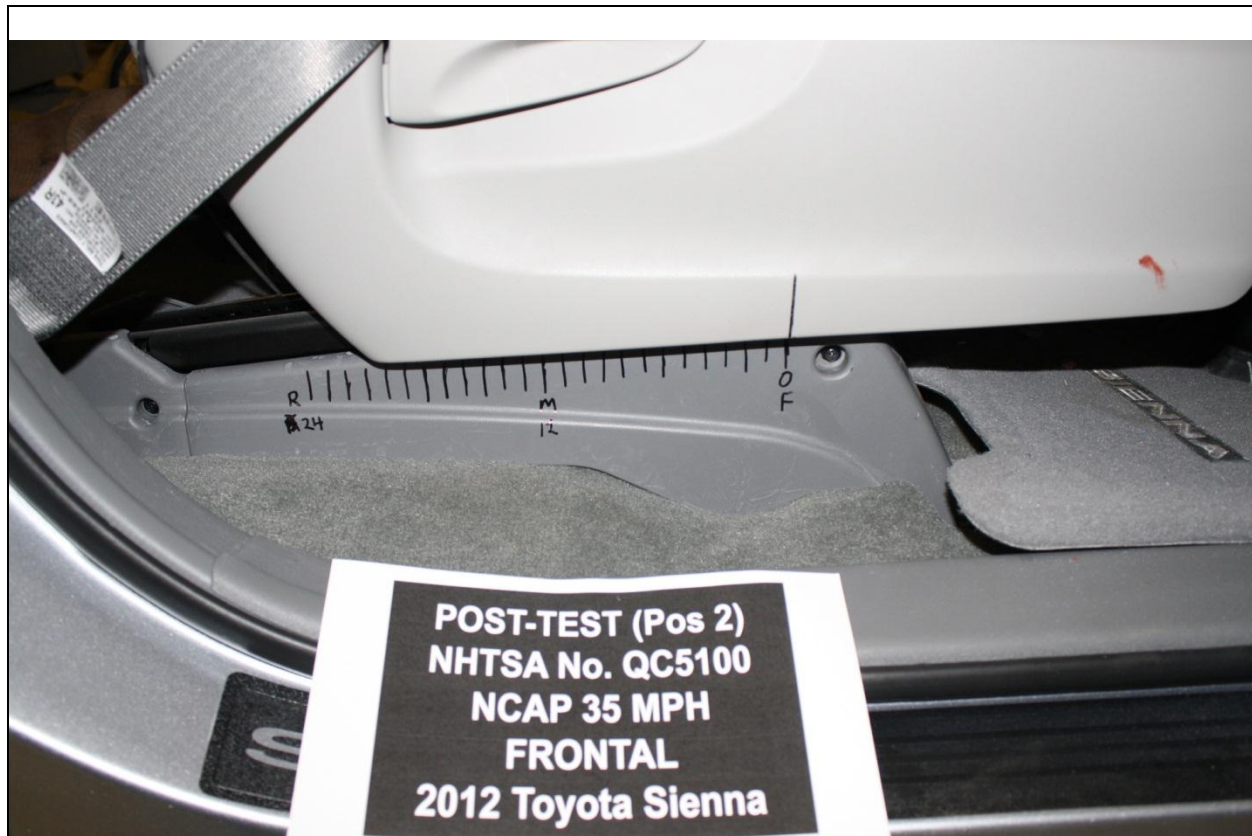


Figure A-55: Post-Test Passenger's Seat Fore-Aft Markings

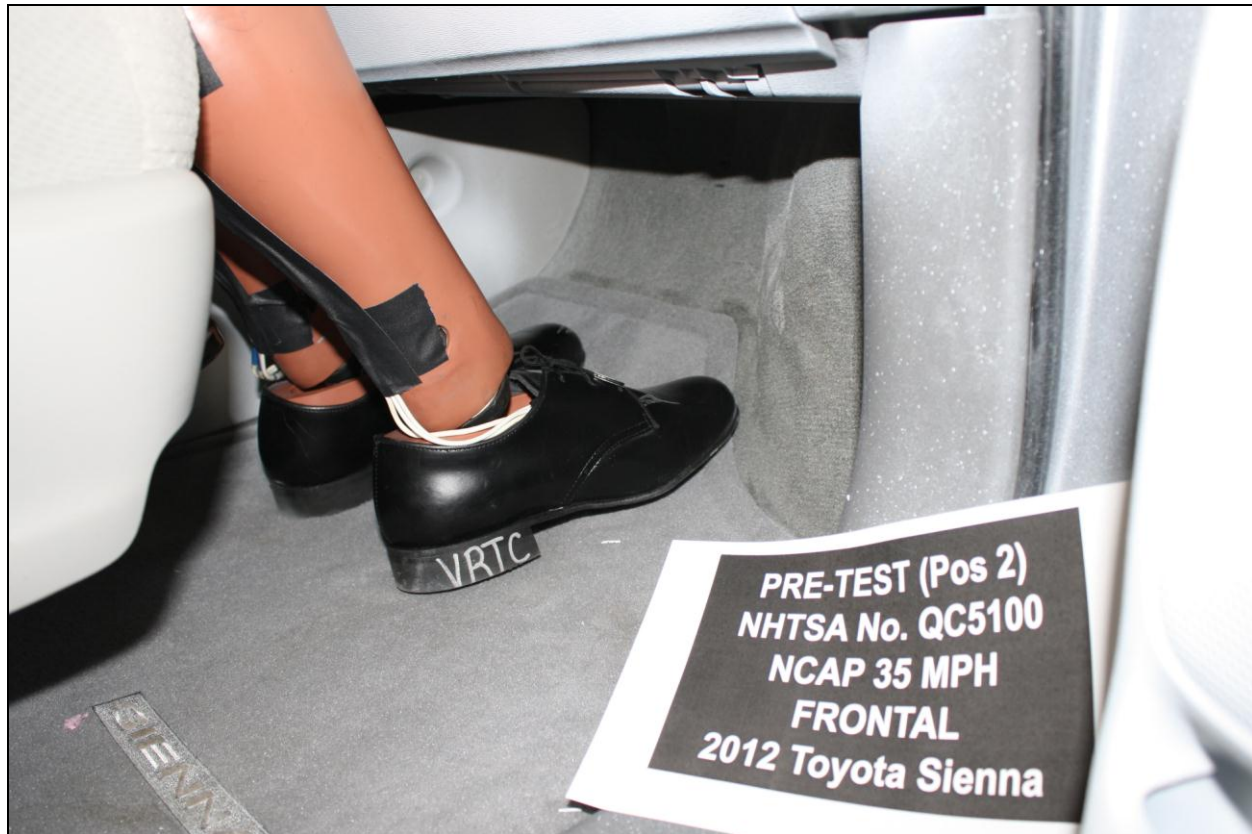


Figure A-56: Pre-Test Passenger Dummy Feet



Figure A-57: Post-Test Passenger Dummy Feet



Figure A-58: Pre-Test Passenger's Side Knee Bolster



Figure A-59: Post-Test Passenger's Side Knee Bolster



Figure A-60: Pre-Test Passenger's Side Floorpan



Figure A-61: Post-Test Passenger's Side Floorpan



Figure A-62: Post-Test Passenger Dummy Contact with Airbag



Figure A-62a: Post-Test Passenger Dummy Contact with Headrest



Figure A-63: Photograph of Ballast Installed in Vehicle

Photo Not Applicable

Figure A-64: Post-Test Stoddard Solvent Spillage Location View, if required



Figure A-65: Post-Test Speed Trap Read-Out

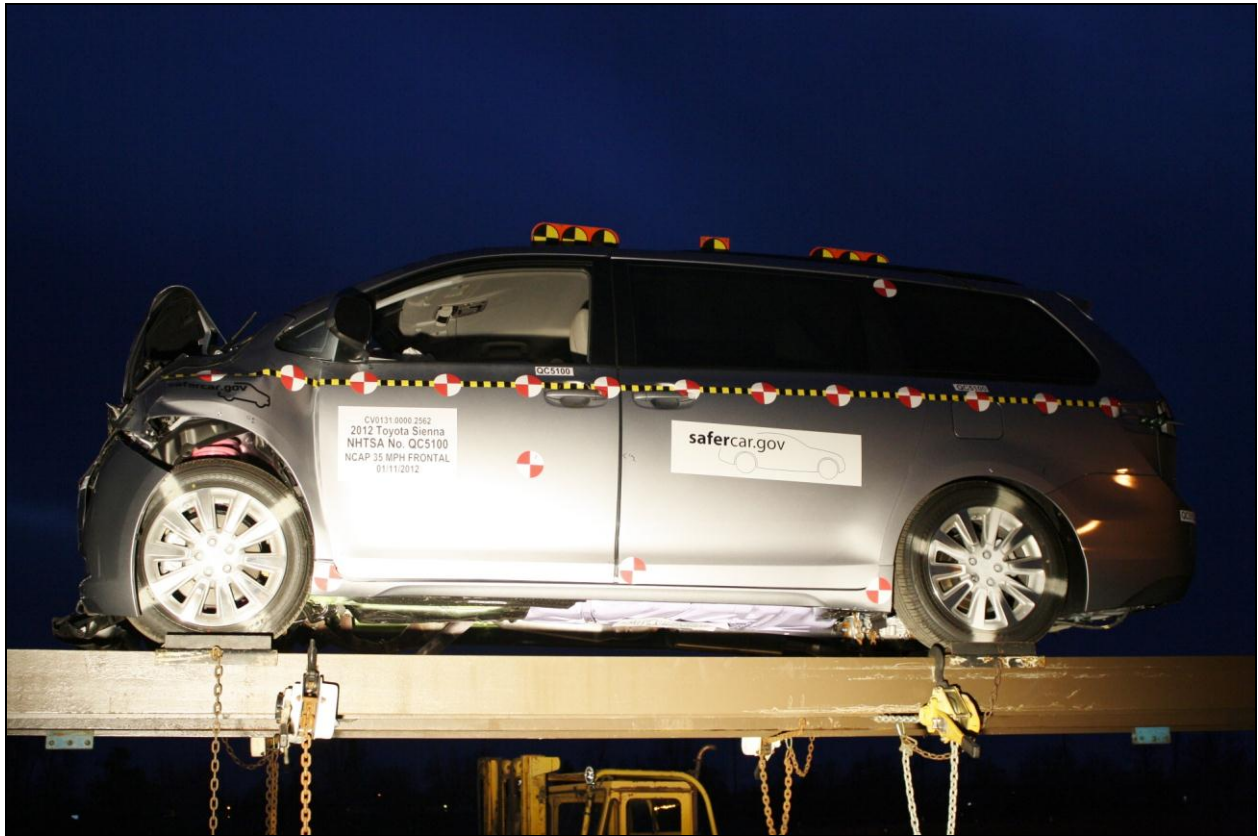


Figure A-66: Vehicle at 0° on Static Rollover Device



Figure A-67: Vehicle at 90° on Static Rollover Device



Figure A-68: Vehicle at 180° on Static Rollover Device



Figure A-69: Vehicle at 270° on Static Rollover Device



Figure A-70: Vehicle at 360° on Static Rollover Device



Figure A-71: 2012 Toyota Sienna Frontal Impact Event

APPENDIX B

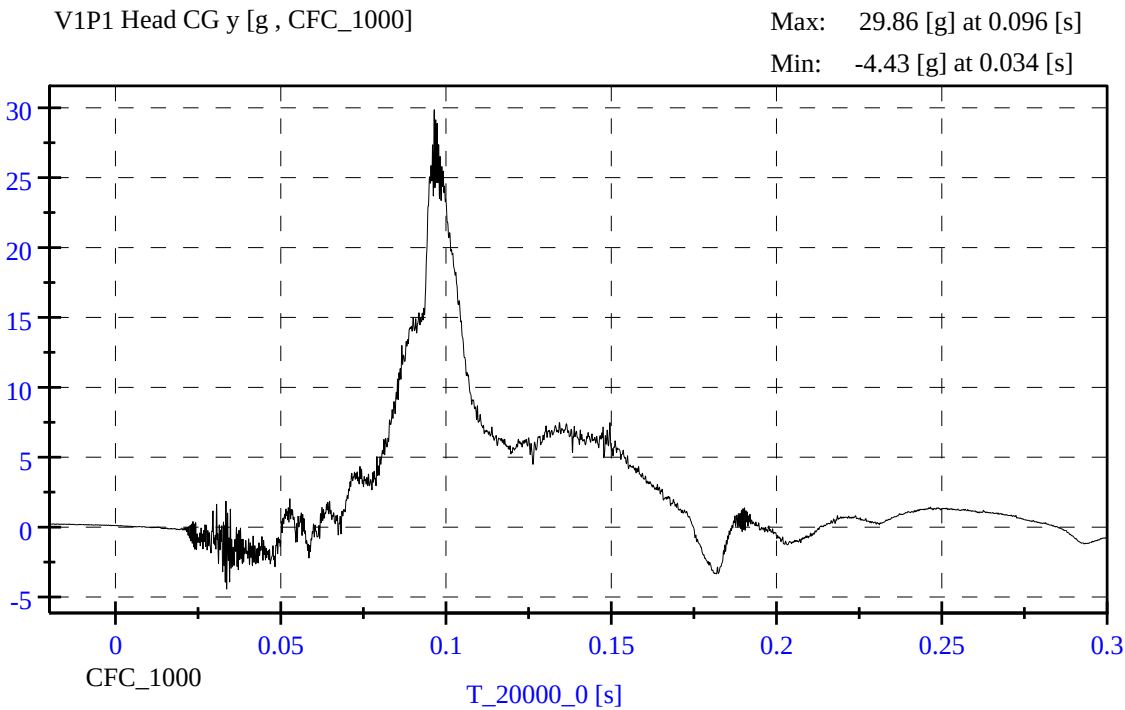
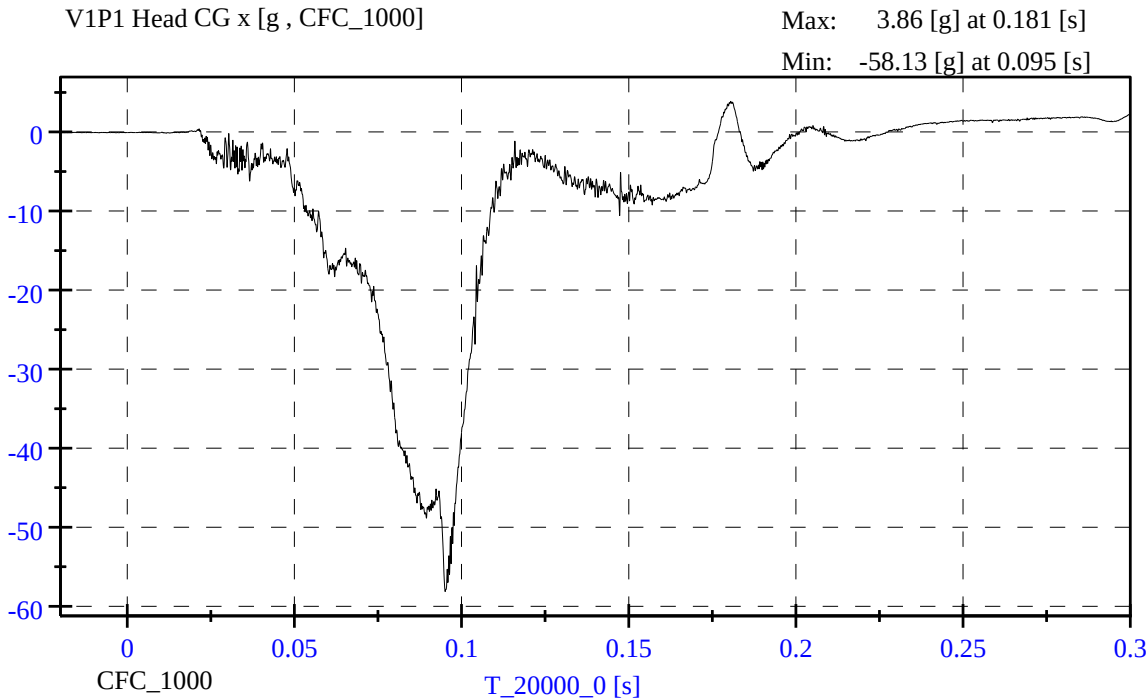
DUMMY RESPONSE DATA TRACES

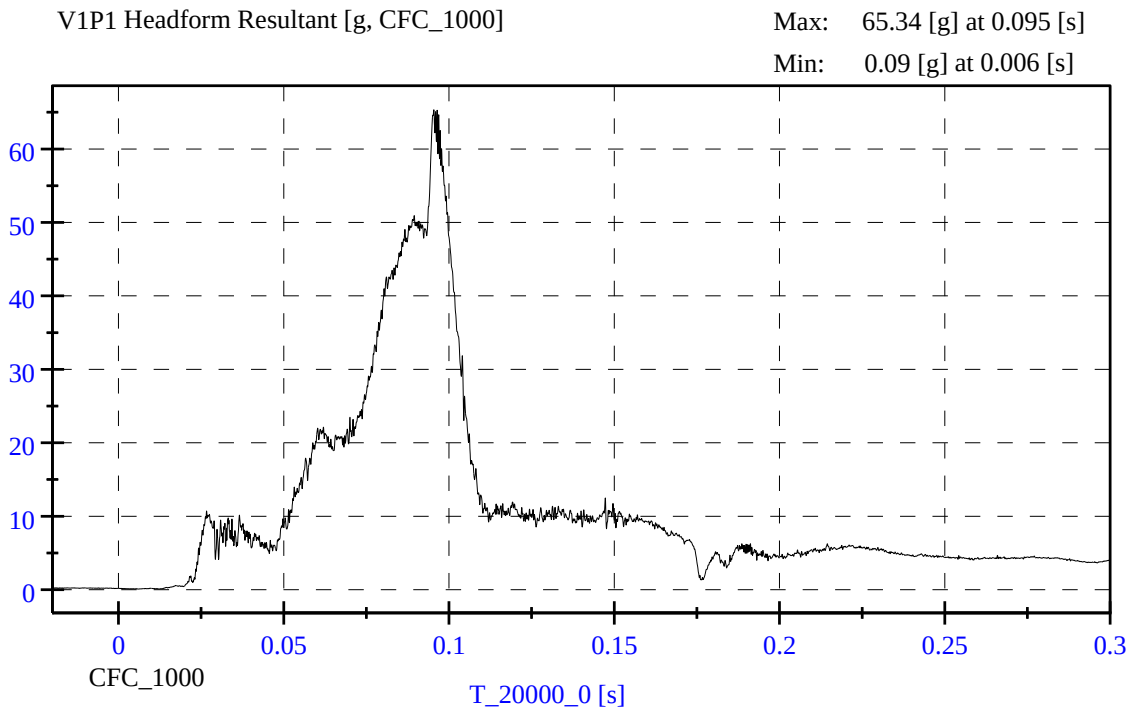
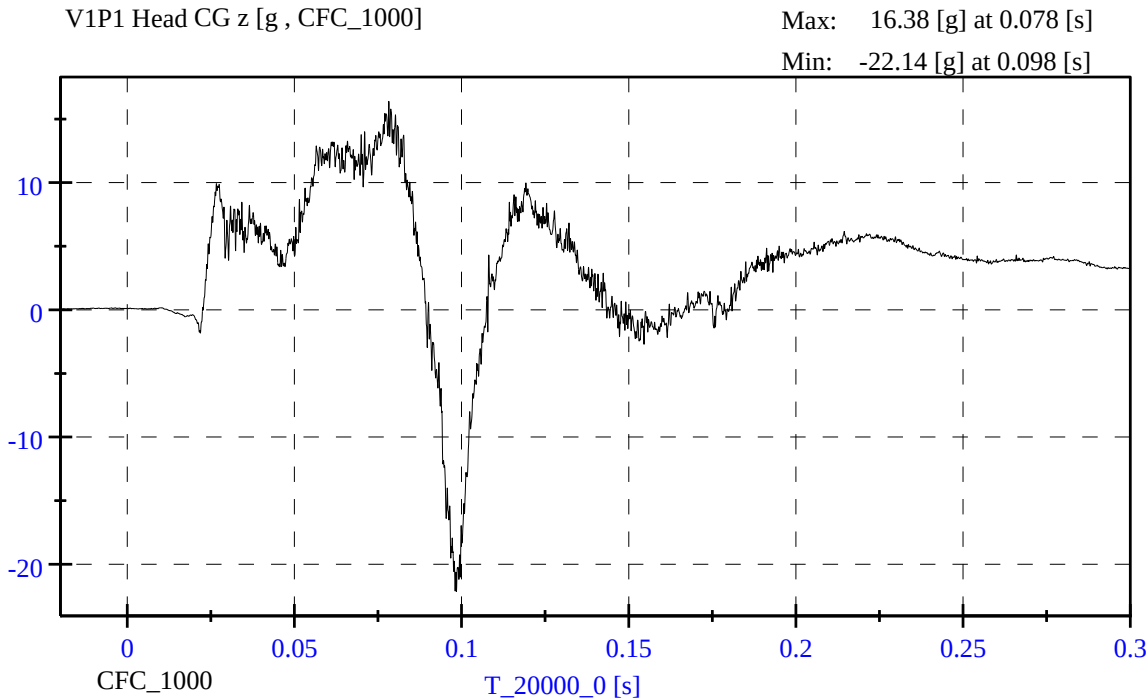
Fig. No.	List of Data Plots Provided In The Test Report	Page No.
1	Driver Head X Acceleration vs. Time Primary	B-5
2	Driver Head Y Acceleration vs. Time Primary	B-5
3	Driver Head Z Acceleration vs. Time Primary	B-6
4	Driver Head Resultant Acceleration vs. Time Primary	B-6
5	Driver Chest X Deflection vs. Time	B-7
6	Driver Chest X Acceleration vs. Time Primary	B-7
7	Driver Chest Y Acceleration vs. Time Primary	B-8
8	Driver Chest Z Acceleration vs. Time Primary	B-8
9	Driver Chest Resultant Acceleration vs. Time Primary	B-9
10	Driver Upper Neck Force X vs. Time Primary	B-9
11	Driver Upper Neck Force Z vs. Time Primary	B-10
12	Driver Upper Neck Moment Y vs. Time Primary	B-10
13	Driver Nij vs. Time Primary	B-11
14	Driver Left Femur Force vs. Time	B-11
15	Driver Right Femur Force vs. Time	B-12
16	Passenger Head X Acceleration vs. Time Primary	B-12
17	Passenger Head Y Acceleration vs. Time Primary	B-13
18	Passenger Head Z Acceleration vs. Time Primary	B-13
19	Passenger Head Resultant Acceleration vs. Time Primary	B-14
20	Passenger Chest X Deflection vs. Time	B-14
21	Passenger Chest X Acceleration vs. Time Primary	B-15
22	Passenger Chest Y Acceleration vs. Time Primary	B-15
23	Passenger Chest Z Acceleration vs. Time Primary	B-16
24	Passenger Chest Resultant Acceleration vs. Time Primary	B-16
25	Passenger Upper Neck Force X vs. Time Primary	B-17
26	Passenger Upper Neck Force Z vs. Time Primary	B-17
27	Passenger Upper Neck Moment Y vs. Time Primary	B-18
28	Passenger Nij vs. Time Primary	B-18
29	Passenger Left Femur Force vs. Time	B-19
30	Passenger Right Femur Force vs. Time	B-19

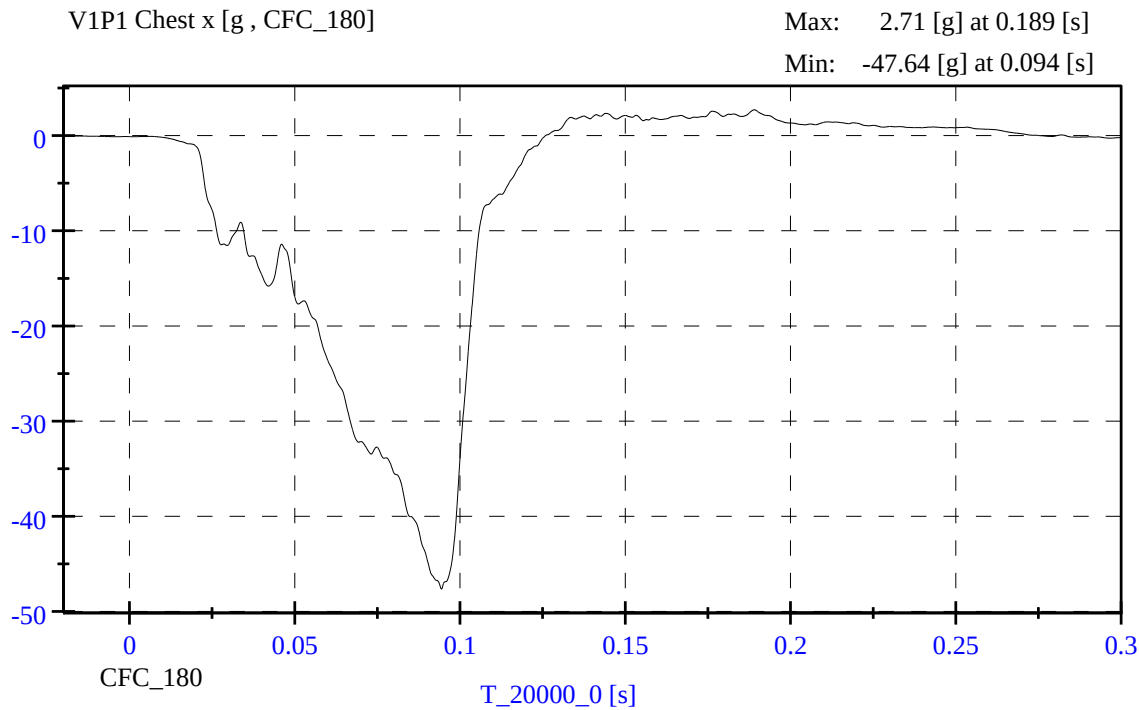
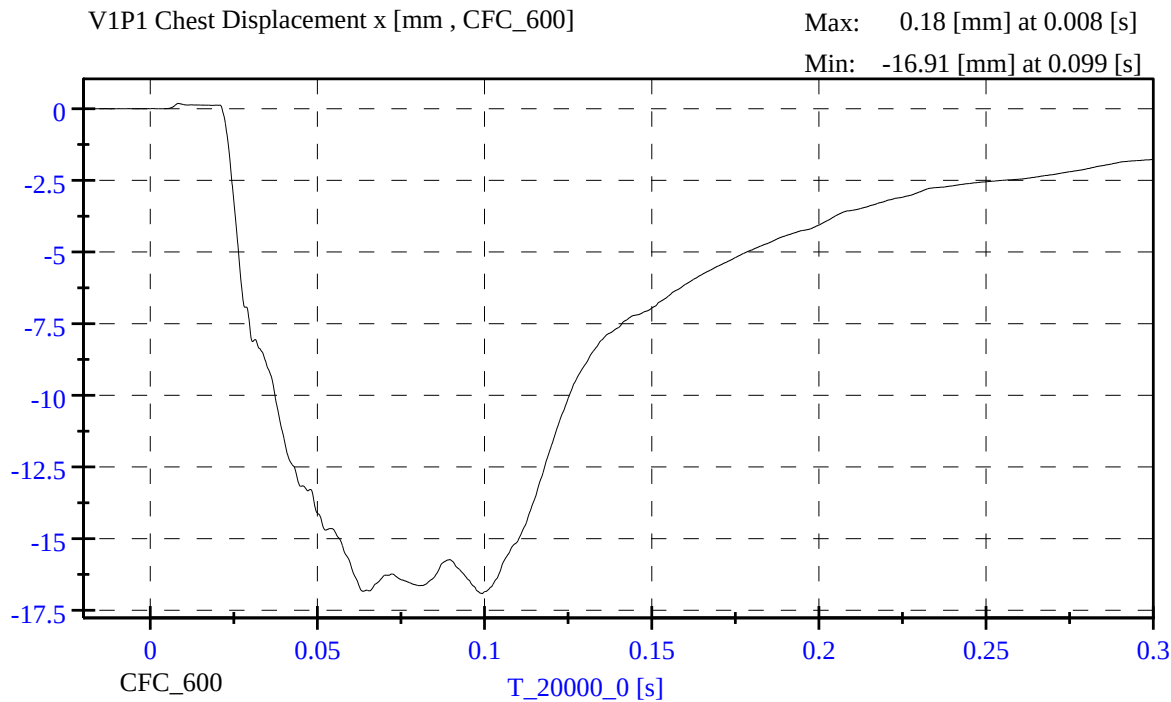
The following additional dummy and vehicle response data can be found in the R&D section of the NHTSA website at www.nhtsa.dot.gov

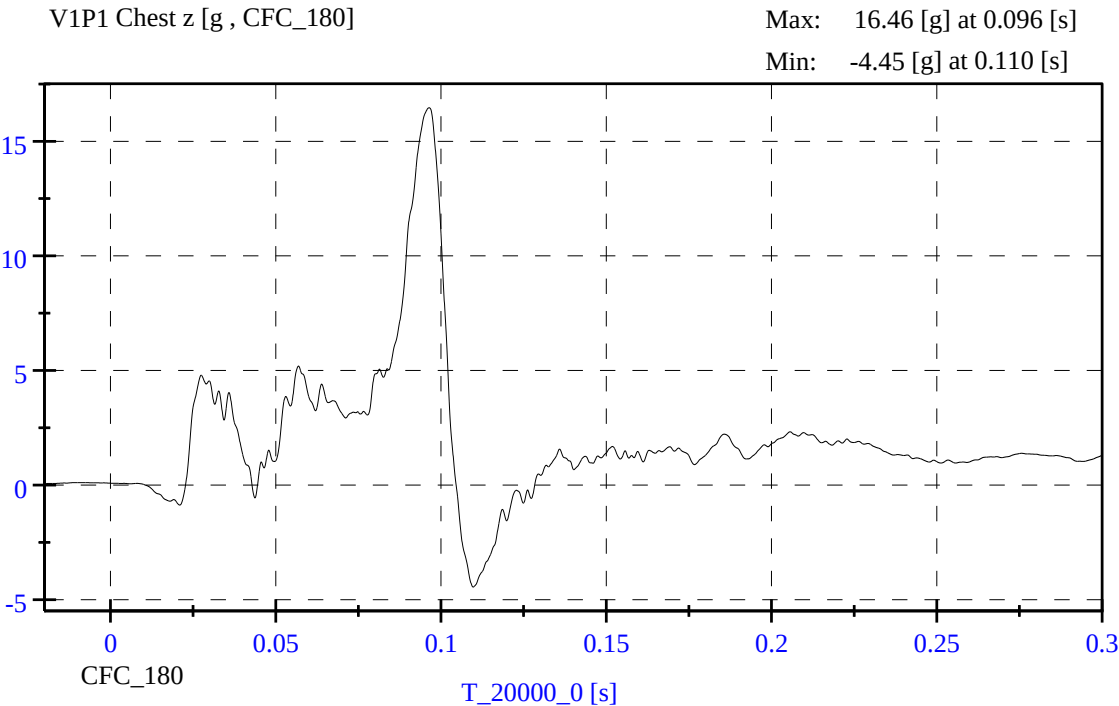
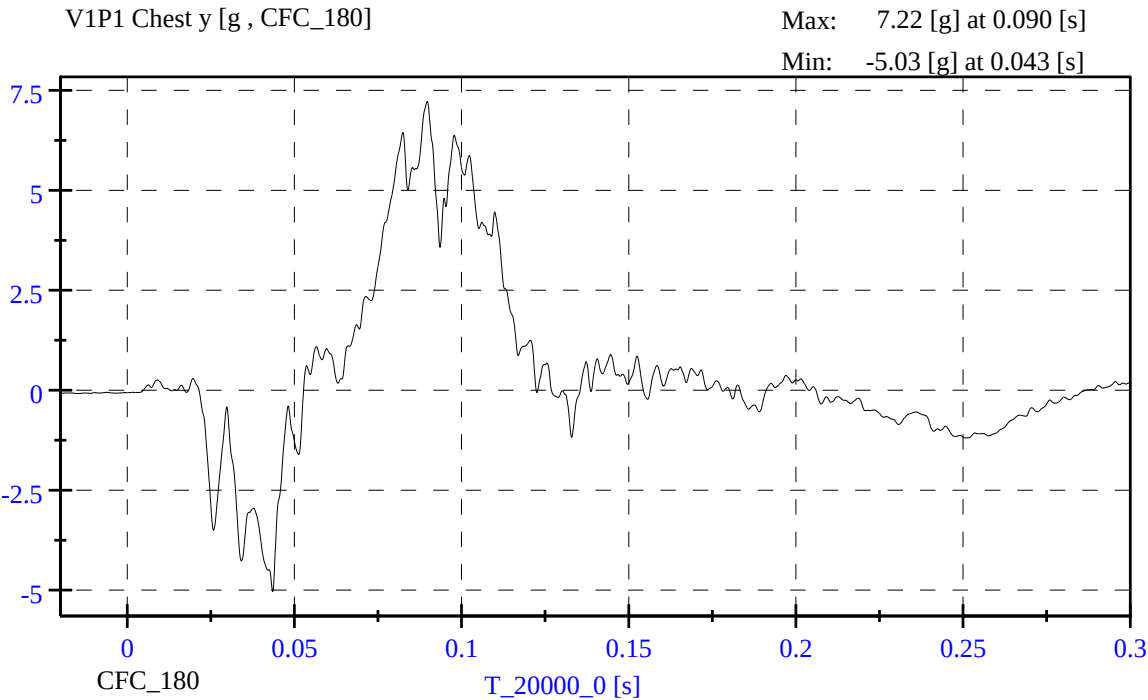
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Driver Head Y Acceleration Redundant
Driver Head Z Acceleration Redundant
Driver Upper Neck Force Y
Driver Upper Neck Moment X
Driver Upper Neck Moment Z
Driver Chest X Acceleration Redundant
Driver Chest Y Acceleration Redundant
Driver Chest Z Acceleration Redundant
Driver Pelvis X
Driver Pelvis Y
Driver Pelvis Z
Driver Left Femur Redundant
Driver Right Femur Redundant
Driver Left Upper Tibia Moment X
Driver Left Upper Tibia Moment Y
Driver Left Upper Tibia Force Z
Driver Left Lower Tibia Moment X
Driver Left Lower Tibia Moment Y
Driver Left Lower Tibia Force Z
Driver Right Upper Tibia Moment X
Driver Right Upper Tibia Moment Y
Driver Right Upper Tibia Force Z
Driver Right Lower Tibia Moment X
Driver Right Lower Tibia Moment Y
Driver Right Lower Tibia Force Z
Driver Left Foot Fore Z
Driver Left Foot Aft X
Driver Left Foot Aft Z
Driver Right Foot Fore Z
Driver Right Foot Aft X
Driver Right Foot Aft Z
Driver Shoulder Belt Force
Driver Lap Belt Force
Passenger Head X Acceleration Redundant
Passenger Head Y Acceleration Redundant
Passenger Head Z Acceleration Redundant
Passenger Upper Neck Force X
Passenger Upper Neck Force Z
Passenger Upper Neck Moment Y
Passenger Chest X Acceleration Redundant
Passenger Chest Y Acceleration Redundant
Passenger Chest Z Acceleration Redundant
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Passenger Right Femur Redundant
Passenger Left Upper Tibia Moment X
Passenger Left Upper Tibia Moment Y

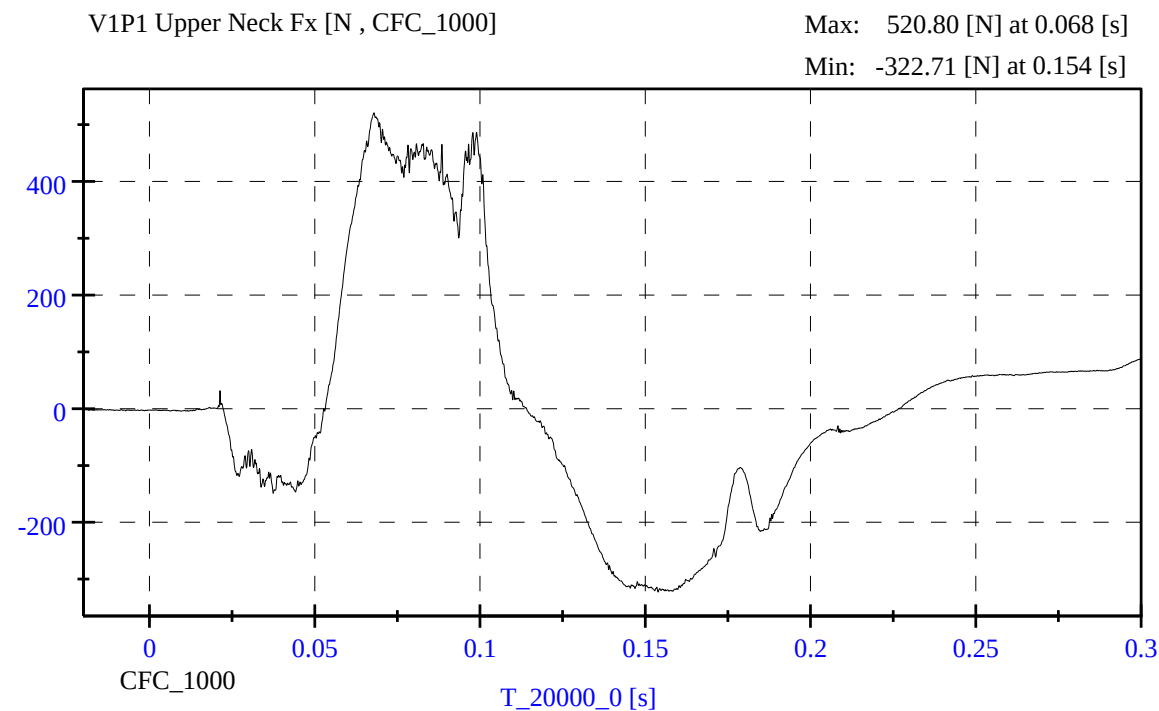
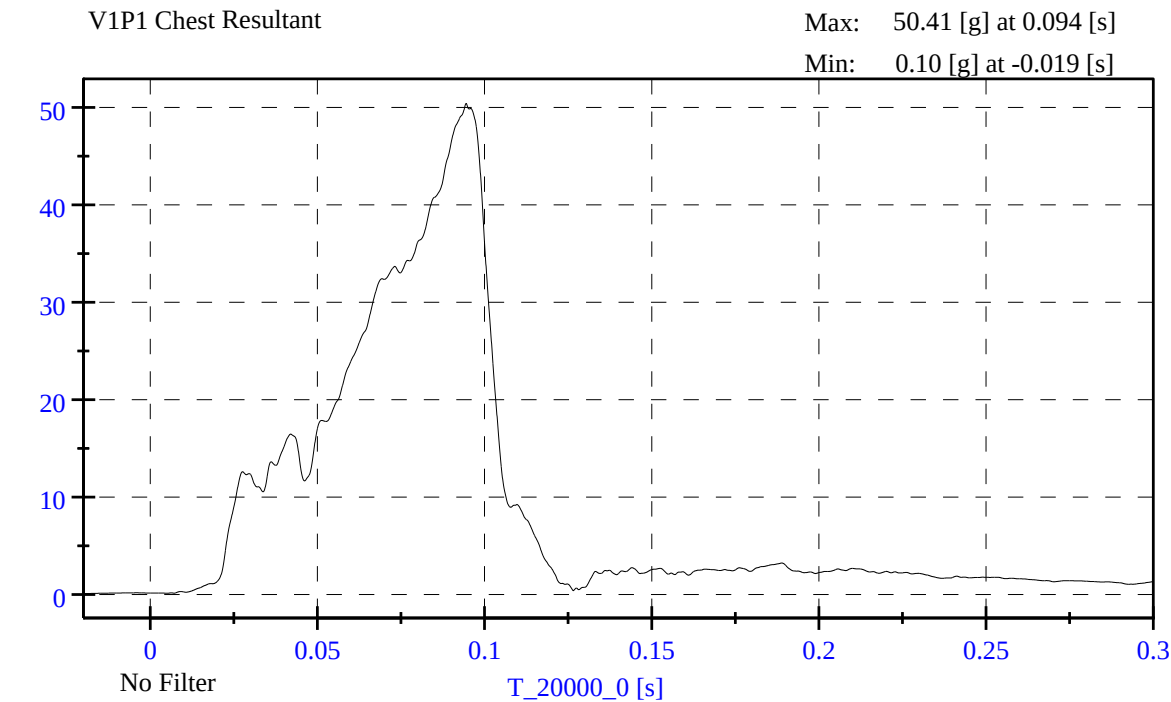
Passenger Left Upper Tibia Force Z
Passenger Left Lower Tibia Moment X
Passenger Left Lower Tibia Moment Y
Passenger Left Lower Tibia Force Z
Passenger Right Upper Tibia Moment X
Passenger Right Upper Tibia Moment Y
Passenger Right Upper Tibia Force Z
Passenger Right Lower Tibia Moment X
Passenger Right Lower Tibia Moment Y
Passenger Right Lower Tibia Force Z
Passenger Left Foot Fore Z
Passenger Left Foot Aft X
Passenger Left Foot Aft Z
Passenger Right Foot Fore Z
Passenger Right Foot Aft X
Passenger Right Foot Aft Z
Passenger Shoulder Belt Force
Passenger Lap Belt Force
Left Rear Seat Crossmember X
Left Rear Seat Crossmember Z
Right Rear Seat Crossmember X
Right Rear Seat Crossmember Z
Vehicle Engine Top X
Vehicle Engine Bottom X
Vehicle Left Brake Caliper X
Vehicle Right Brake Caliper X
Load Cell Barrier A1-A9
Load Cell Barrier B1-A9
Load Cell Barrier C1-A9
Load Cell Barrier D1-A9

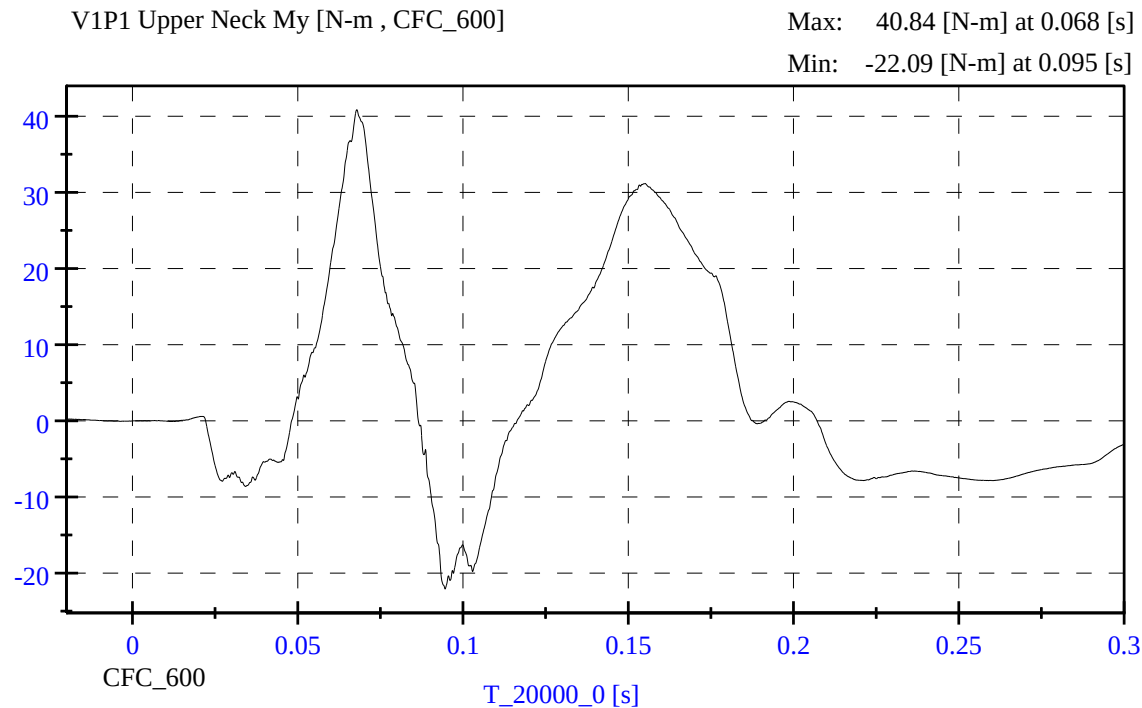
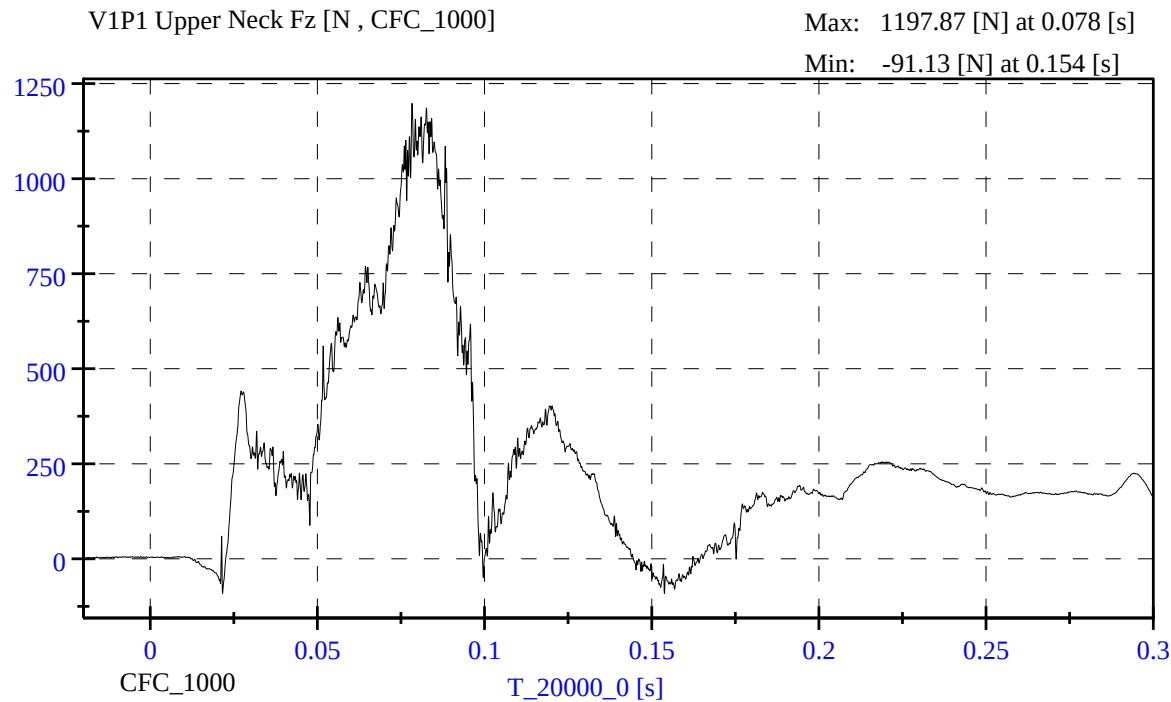


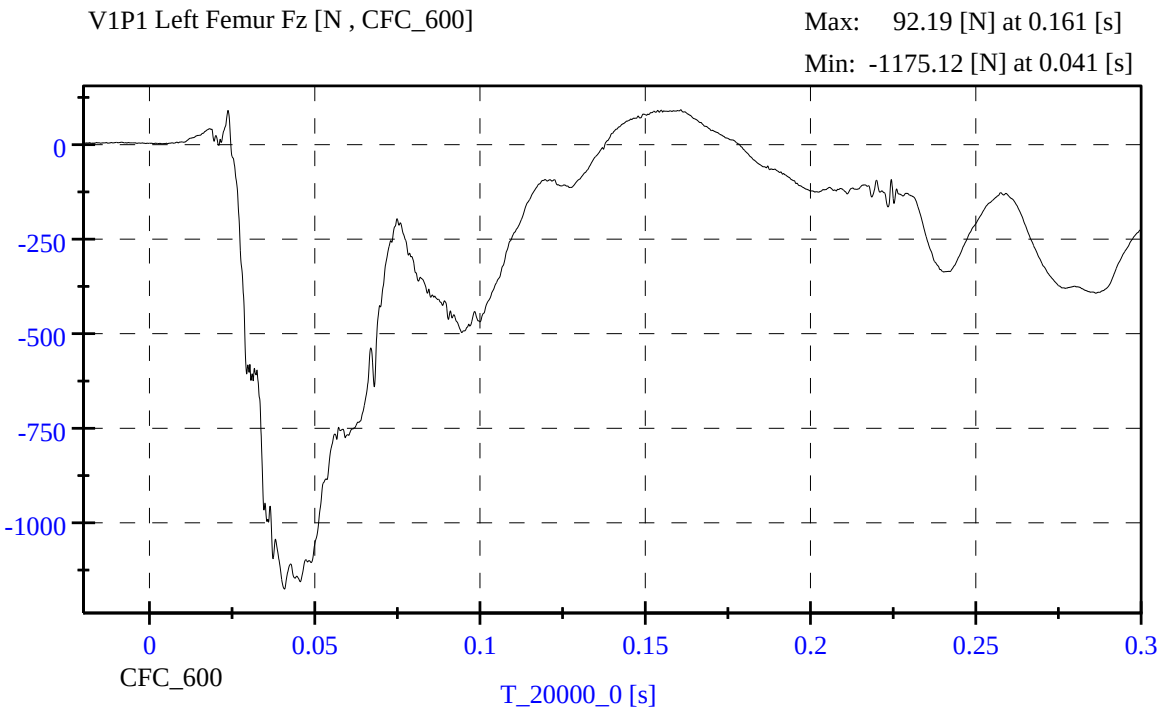
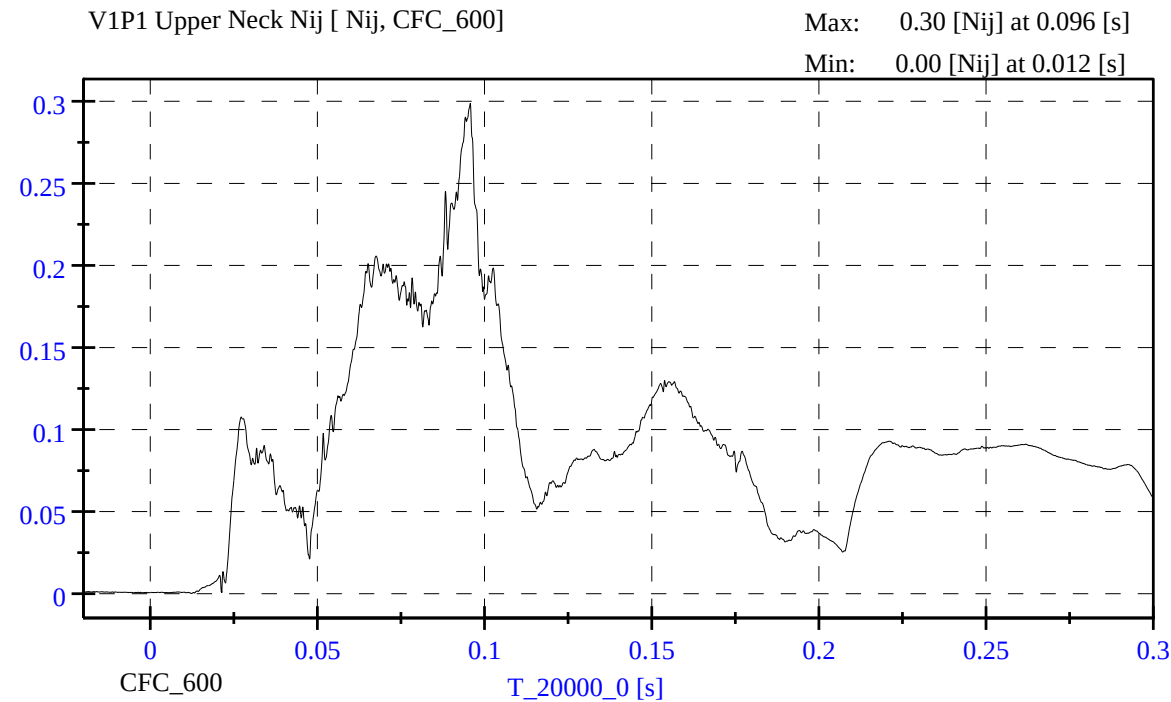


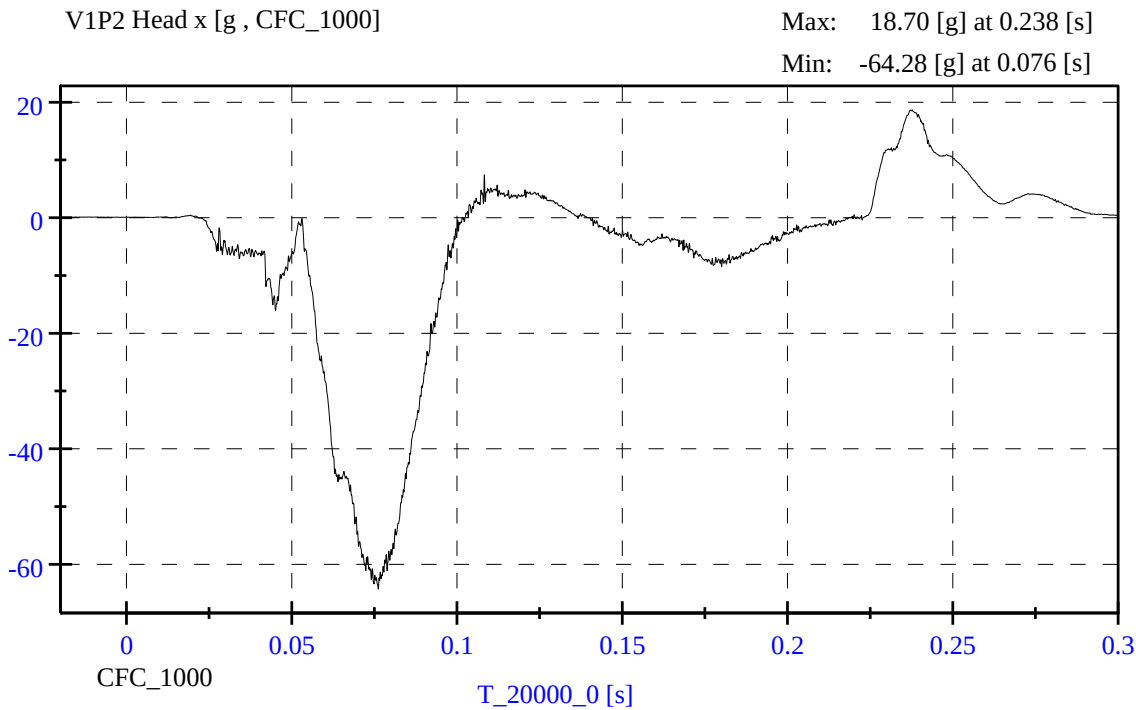
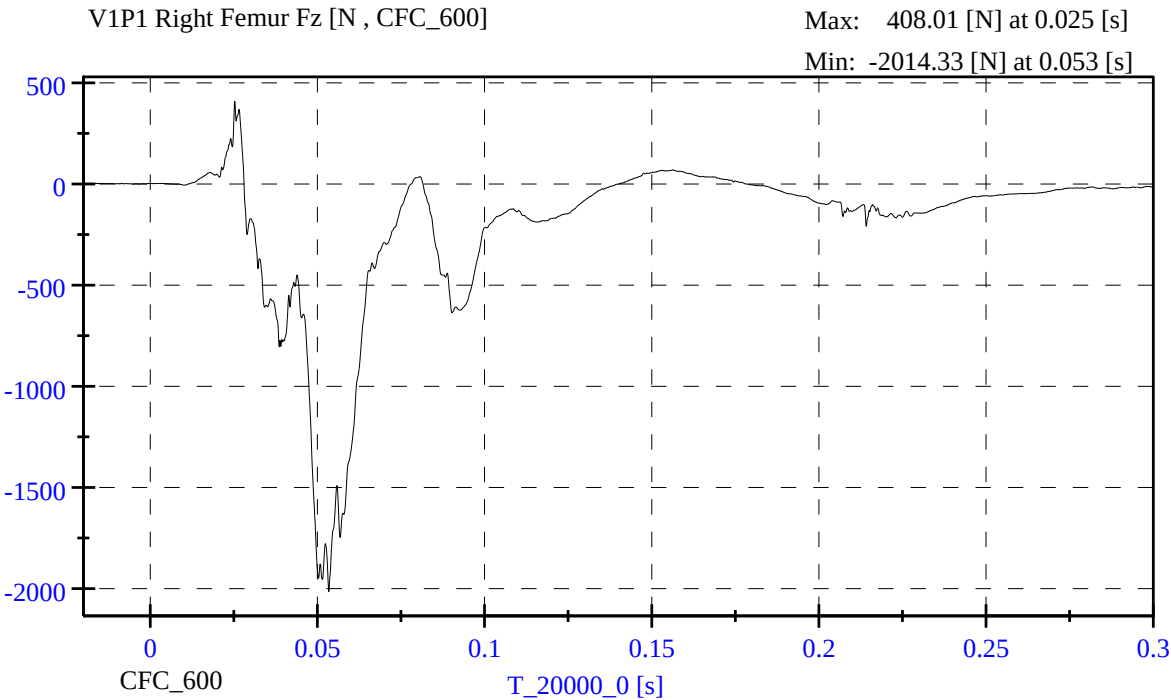


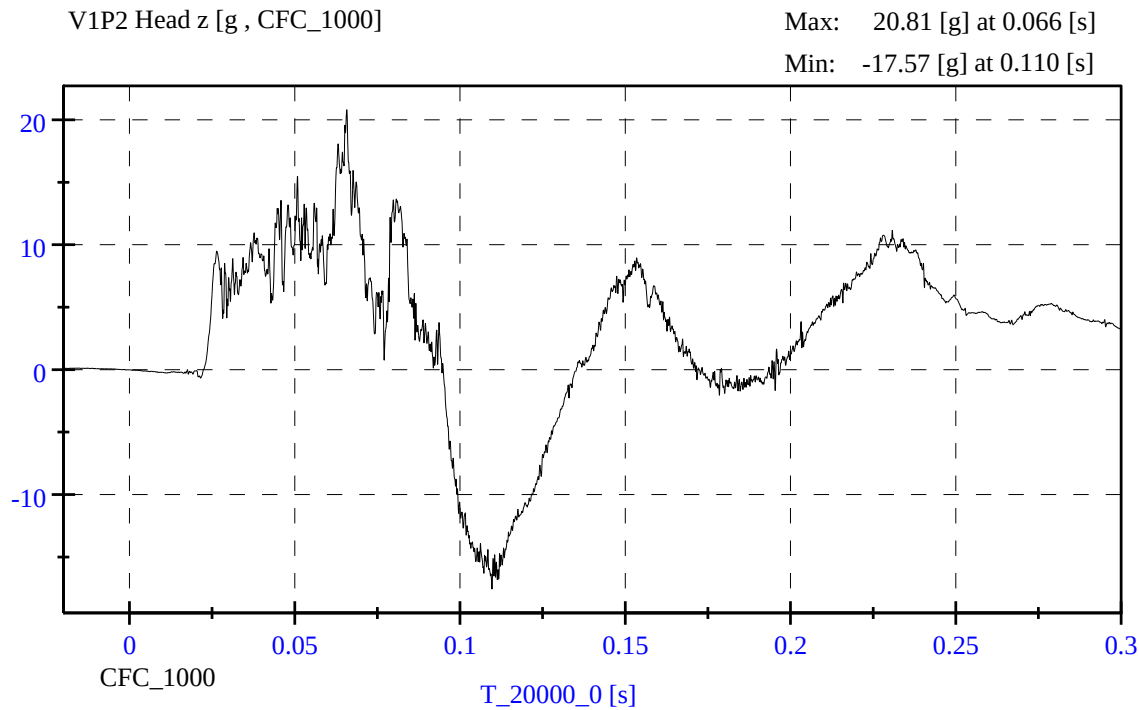
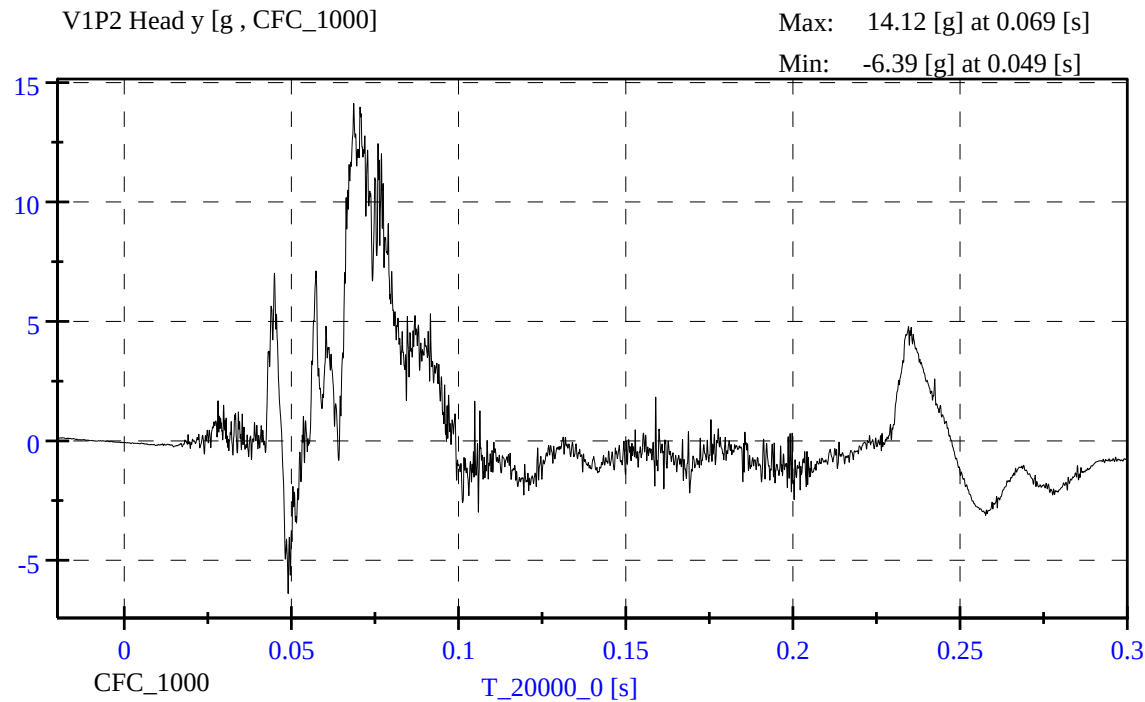


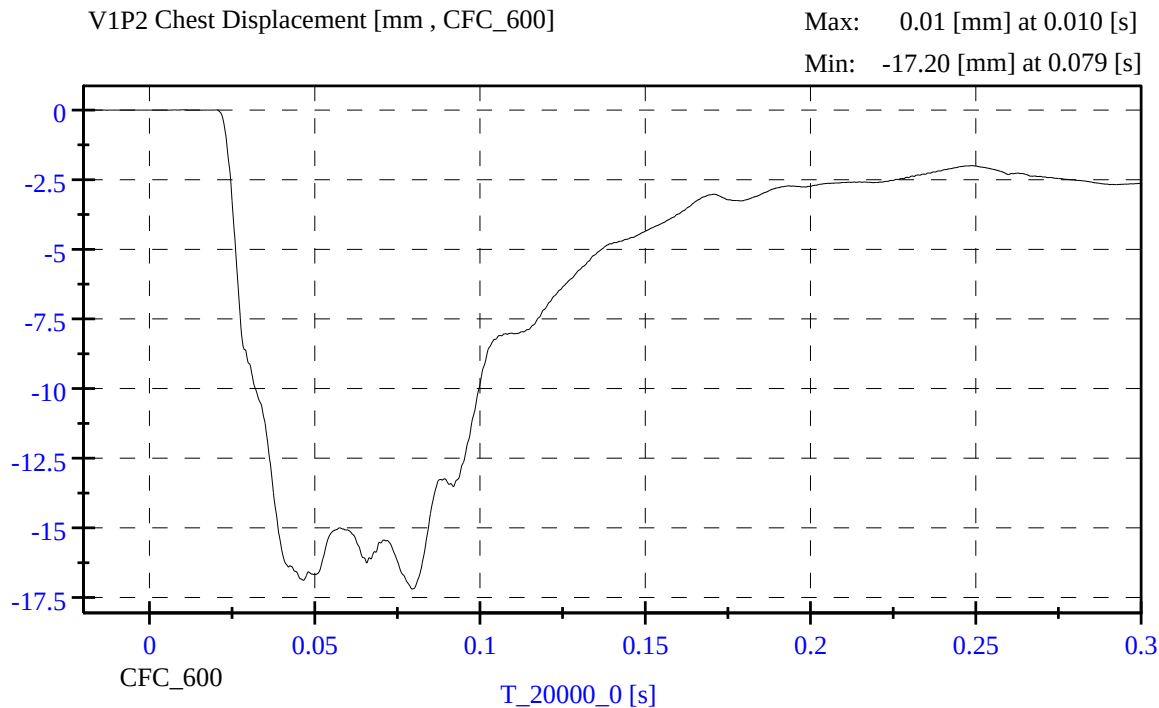
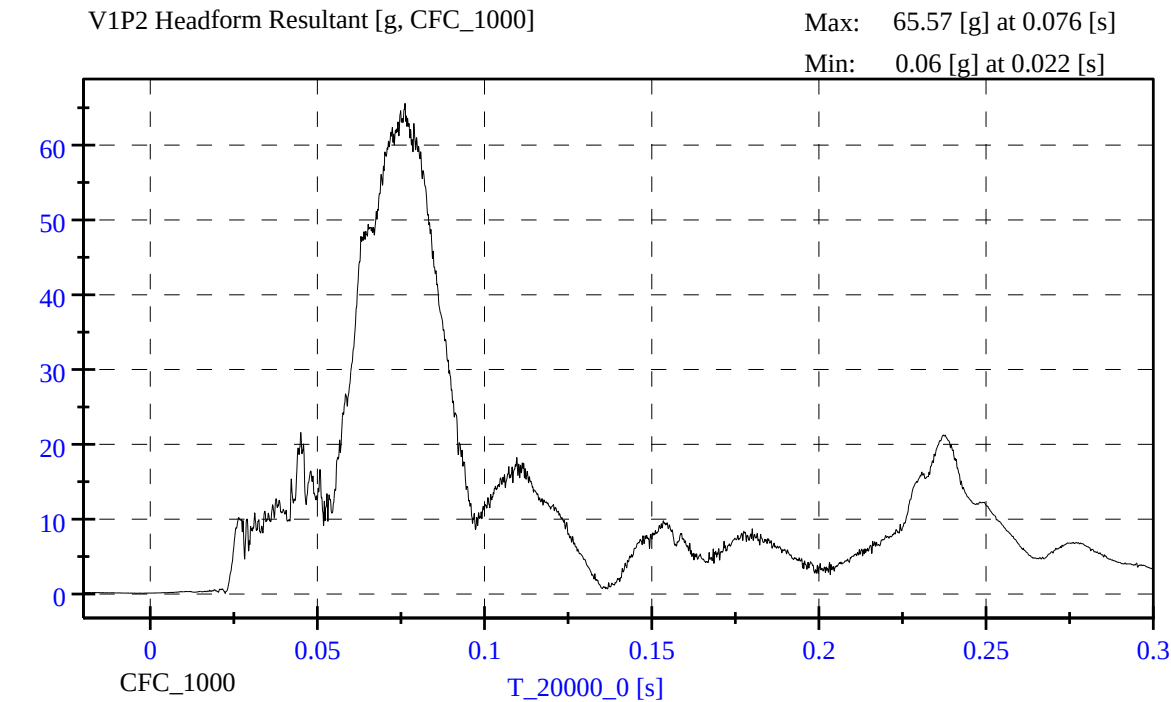


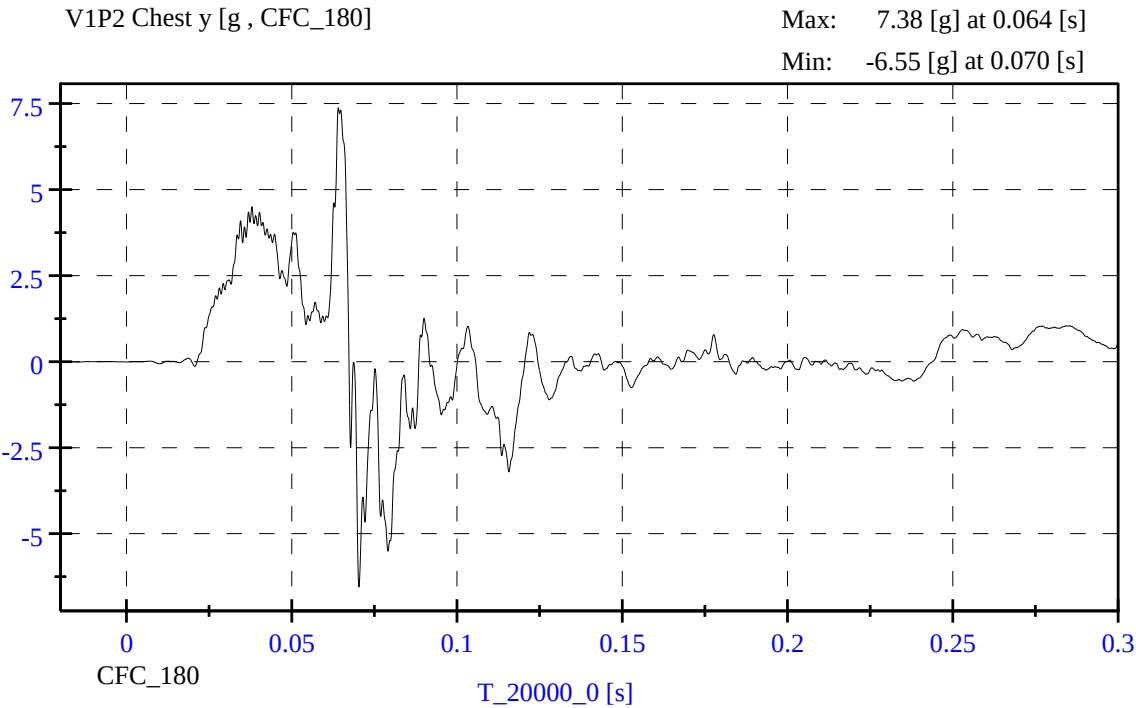
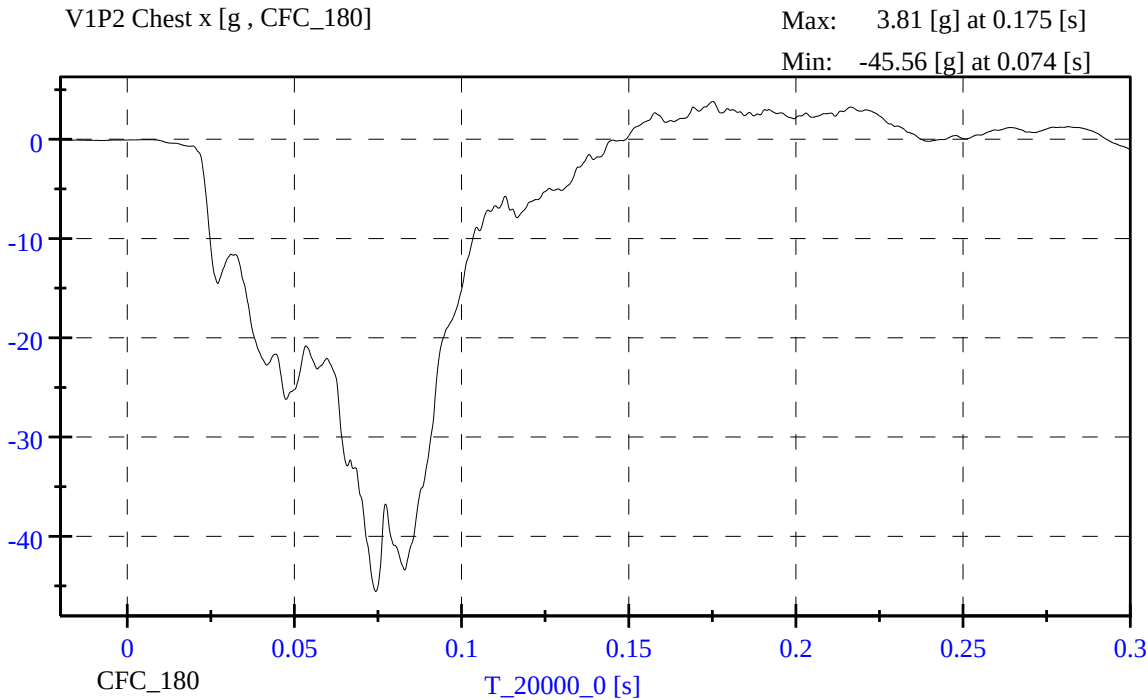


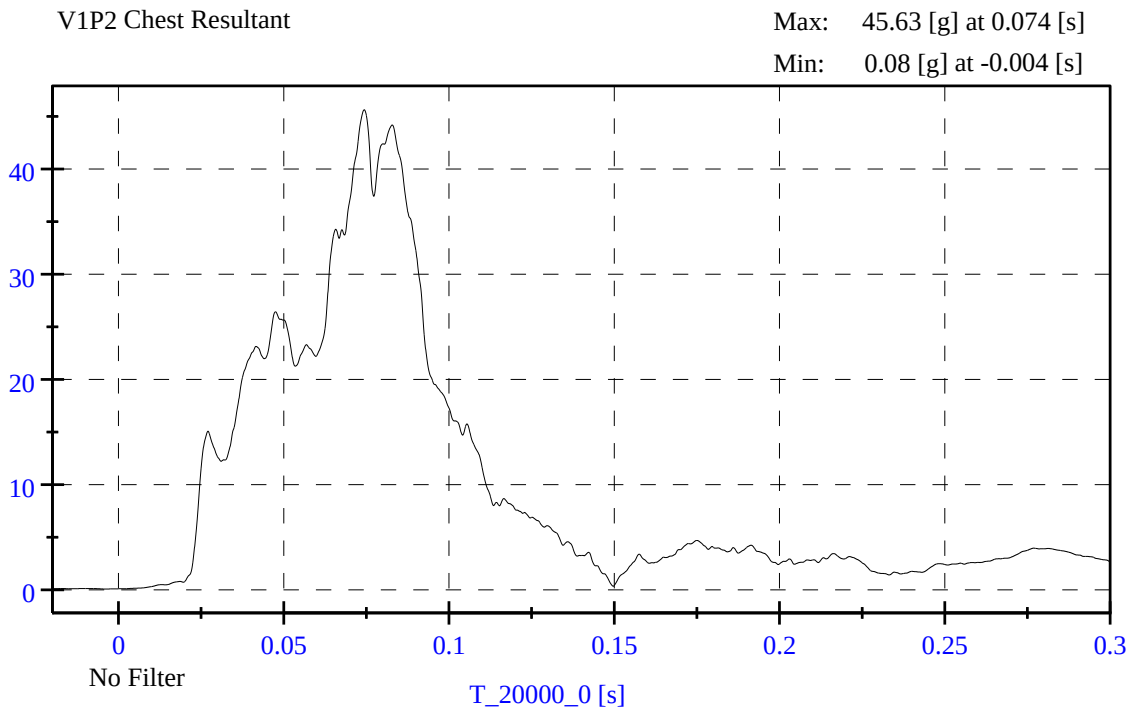
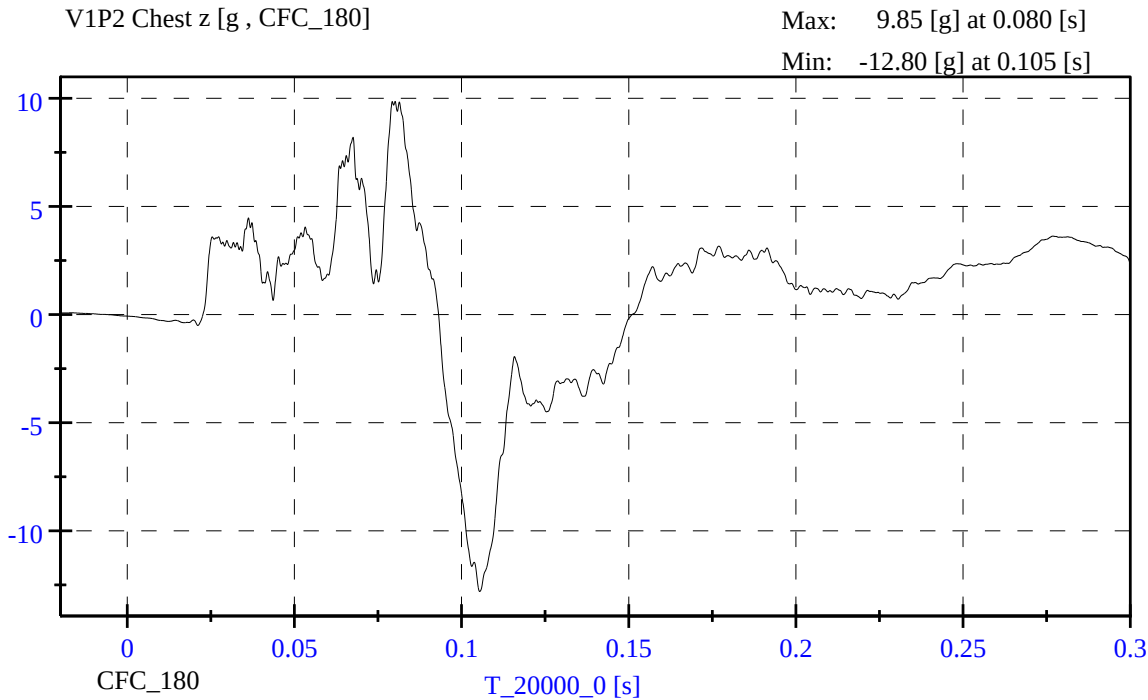


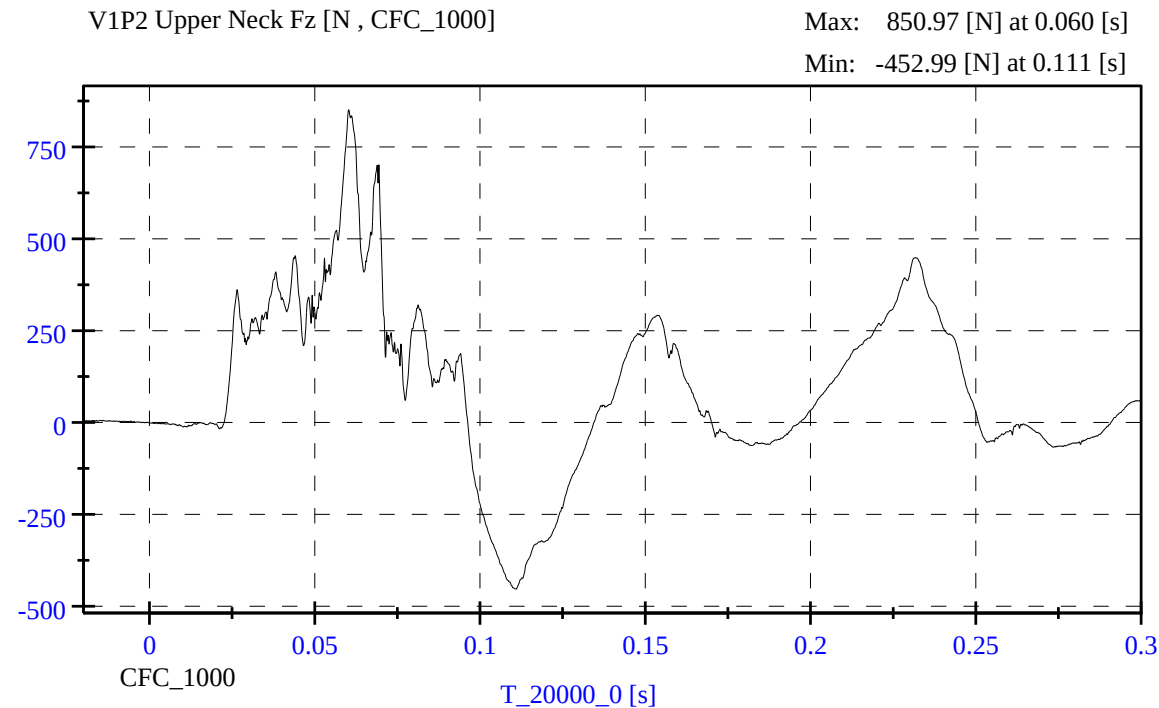
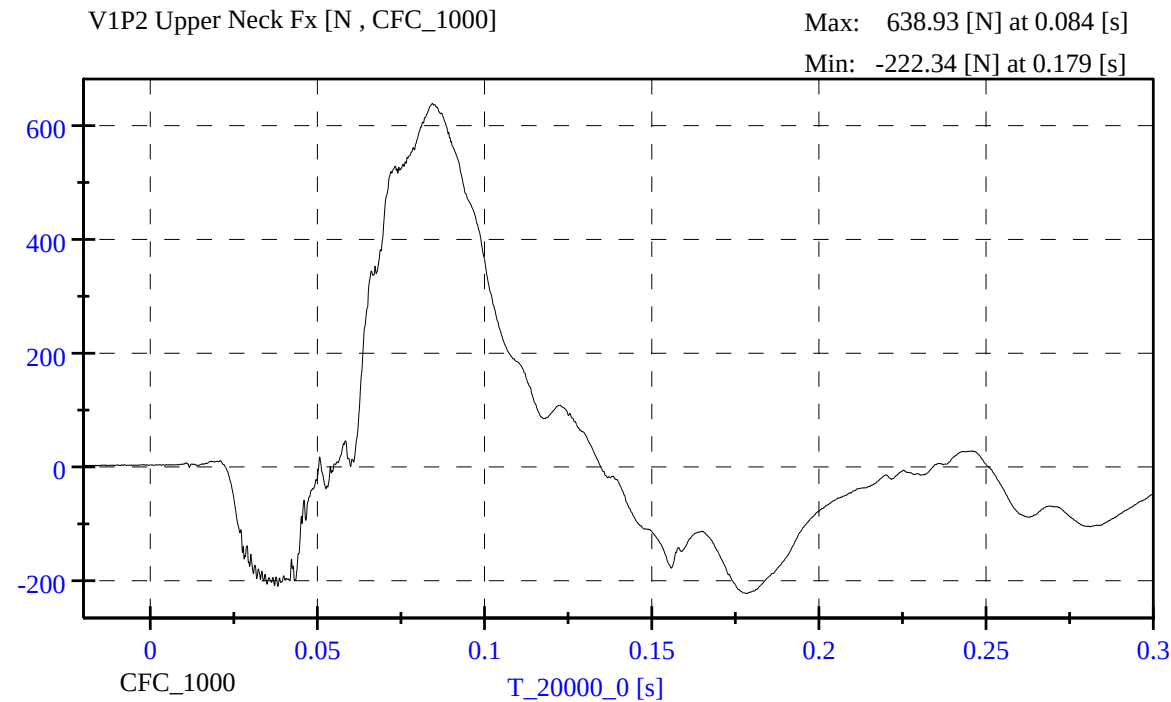


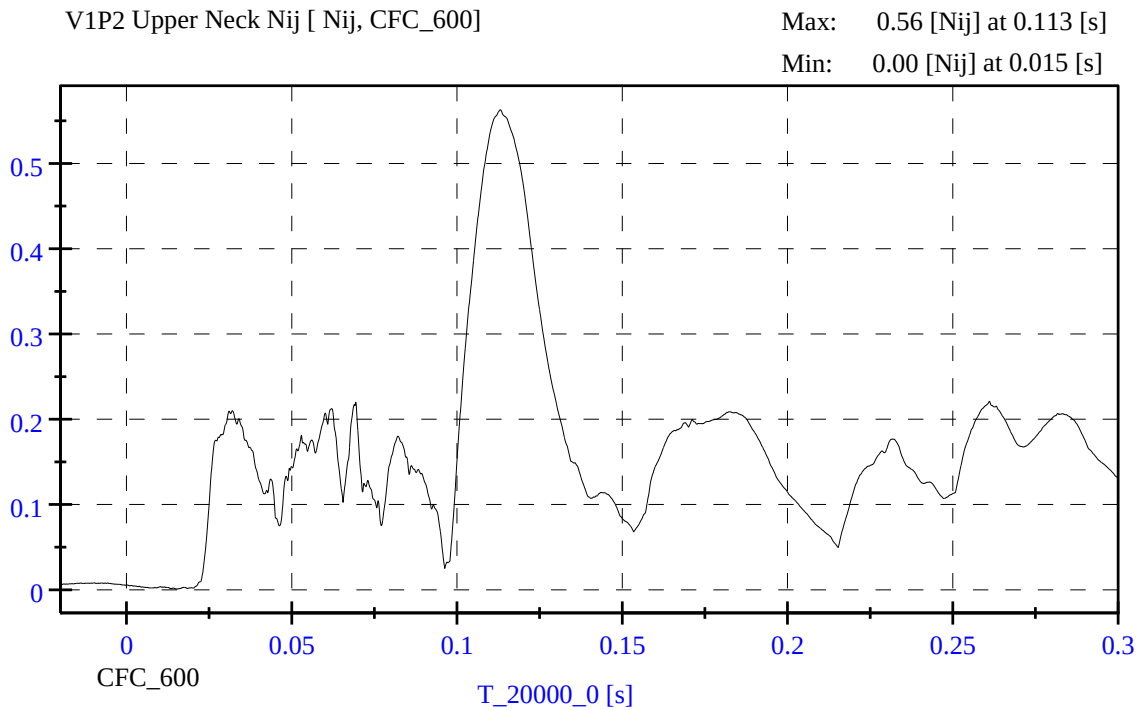
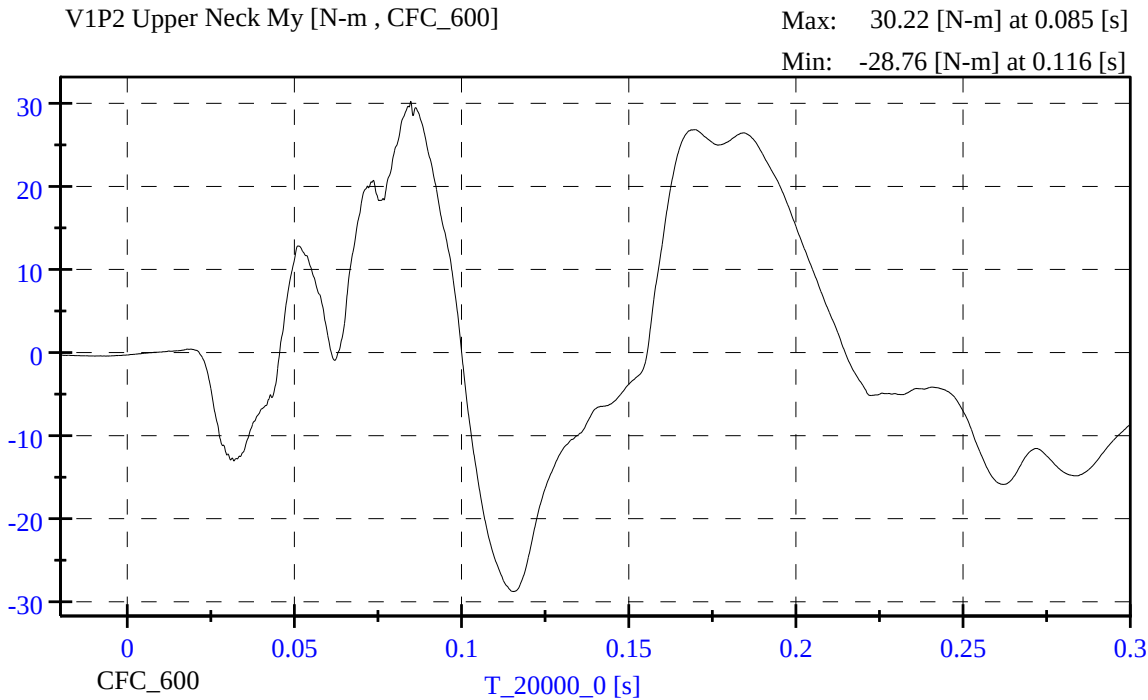


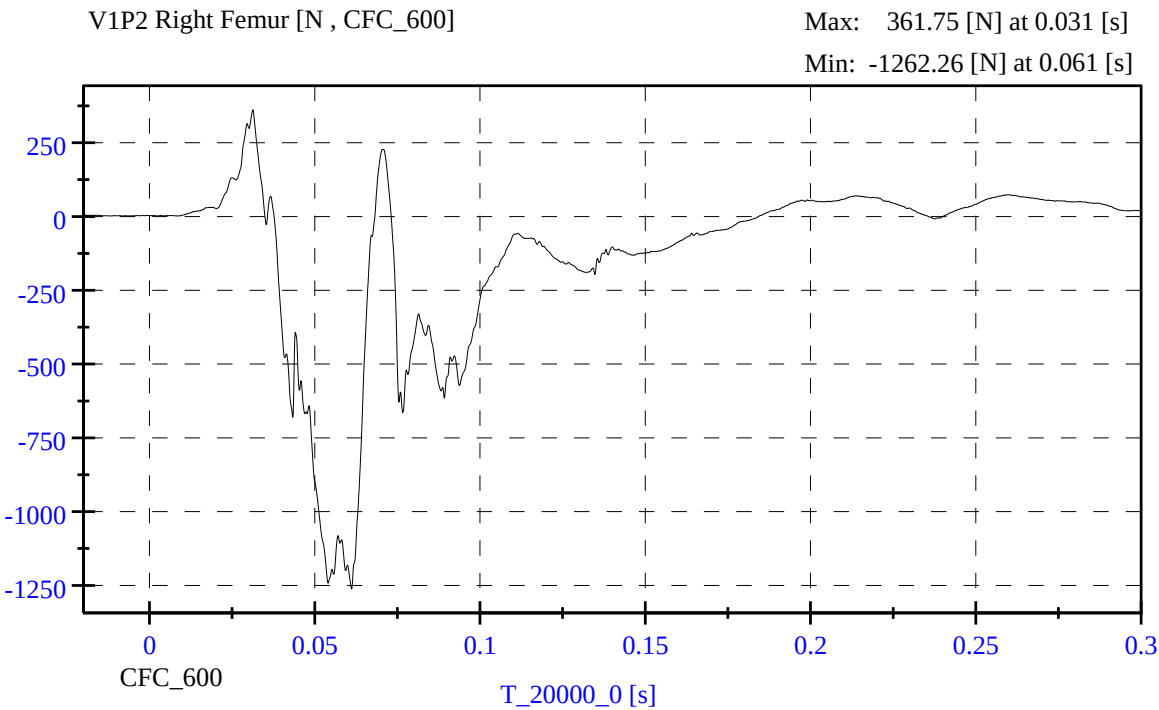
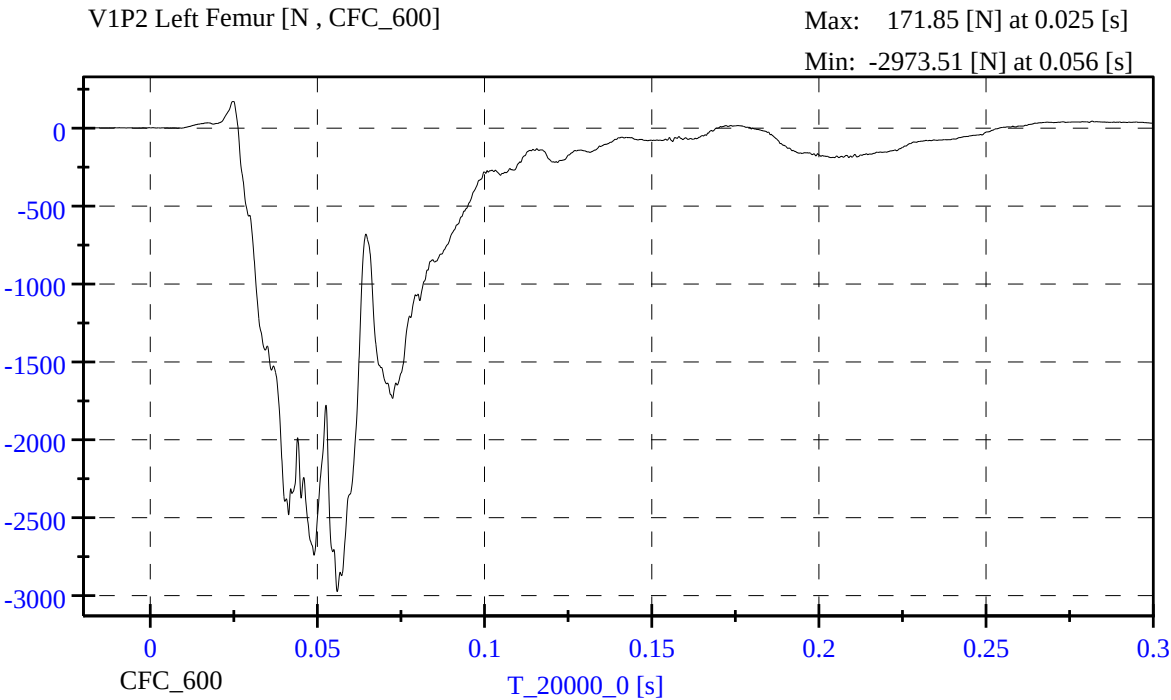












APPENDIX C

PART 572 E/O DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA SHEETS

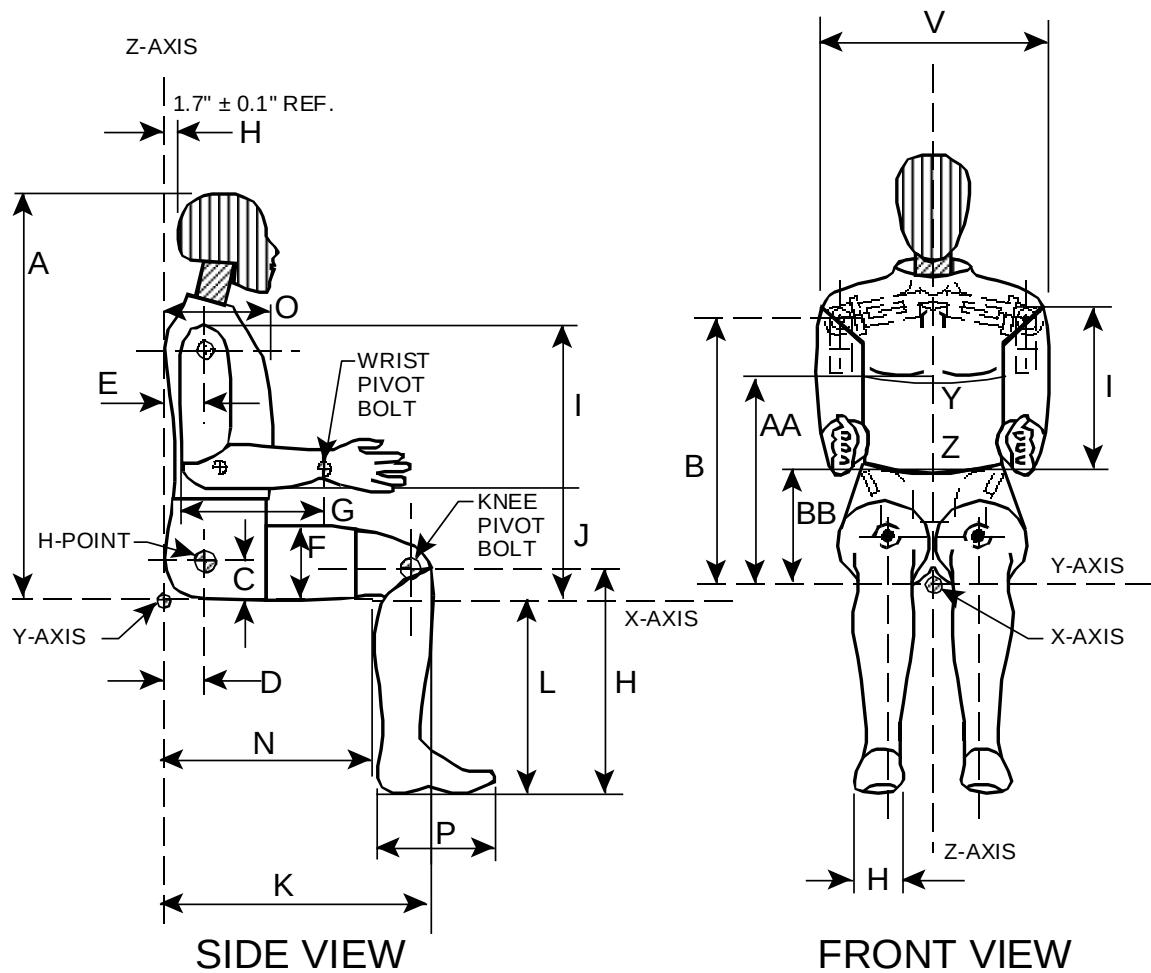
The tests were conducted at the Dummy Certification Test Facility of Calspan. A summary of the test results, and Part 572 specifications are included in this Appendix.

Dummy serial numbers and certification dates are:

<u>Position No./Location</u>	<u>Serial No.</u>	<u>Completion Date</u>
#1/Driver	064	
#2/Right Front Passenger	139	

DUMMY CONFIGURATION DIMENSIONS

EXTERNAL DIMENSIONS SPECIFICATIONS



NOTE: Figure is referenced to the erect seated position. The curved lumbar does not allow the Hybrid III to be positioned in a perfect erect attitude.
(REF: S572.31(A)(6))

CALIBRATION TEST RESULTS

PRE-TEST

DRIVER DUMMY

S/N: 064



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50th Male External Measurements

S/N 064

Symbol	Description	Specification	Results	Pass
		in	in	
A	Sitting Height	34.6 – 35.0	35.0	Yes
B	Shoulder Pivot Height	19.9 – 20.5	20.4	Yes
C	H-Point Height	3.3 – 3.5	3.5	Yes
D	H-Point from Backline	5.3 – 5.5	5.5	Yes
E	Shoulder Pivot from Backline	3.3 – 3.7	3.5	Yes
F	Thigh Clearance	5.5 – 6.1	6.0	Yes
G	Back of Elbow to Wrist Pivot	11.4 – 12.0	11.5	Yes
H	Head Back to Backline	1.6 – 1.8	1.7	Yes
I	Shoulder to Elbow Length	13.0 – 13.6	13.3	Yes
J	Elbow Rest Height	7.5 – 8.3	7.9	Yes
K	Buttock to Knee Length	22.8 – 23.8	23.5	Yes
L	Popliteal Height	16.9 – 17.9	17.2	Yes
M	Knee Pivot Height	19.1 – 19.7	19.1	Yes
N	Buttock Popliteal Length	17.8 – 18.8	18.5	Yes
O	Chest Depth without Jacket	8.4 – 9.0	8.5	Yes
P	Foot Length (right)	9.9 – 10.5	10.2	Yes
V	Shoulder Breadth	16.3 – 17.2	16.7	Yes
W	Foot Breadth	3.6 – 4.2	3.9	Yes
Y	Chest Circumference with Jacket	38.2 – 39.4	38.8	Yes
Z	Waist Circumference	32.9 – 34.1	33.4	Yes
AA	Reference Location (Chest Circumference)	16.9 – 17.1	17.0	Yes
BB	Reference Location (Waist Circumference)	8.9 – 9.1	9.0	Yes

Technician: AR

Date: 1/4/2012



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VERIFICATION REPORT

Test Name:	Head Drop	Revision:	10/1/2001
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 50'th		
ATD Serial Number:	064		
Test ID:		Test Date:	1/4/2012
Test Number:	1	Test Time:	1:47:08 PM

Component Part Number	Component Serial Number
Head Skin - 78051-228	7997

Test Parameters	Test Specifications	Test Results
Temperature	18.9 -- 25.6	21.4 deg C P
Humidity	10 -- 70	16 %RH P
Resultant Acceleration	225 -- 275	257 g P
Oscillation	0.0 -- 10.0	1.7 % P
Lateral Acceleration	-15.00 -- 15.00	-2.08 g P

All test parameters are within specifications

Technician: S. Zito

Supervisor: D. Travale

Test ID:

Test Time: **1:47:08 PM**

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



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VERIFICATION REPORT

REFERENCE EQUIPMENT

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

Test ID:

Test Time: **1:47:08 PM**

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

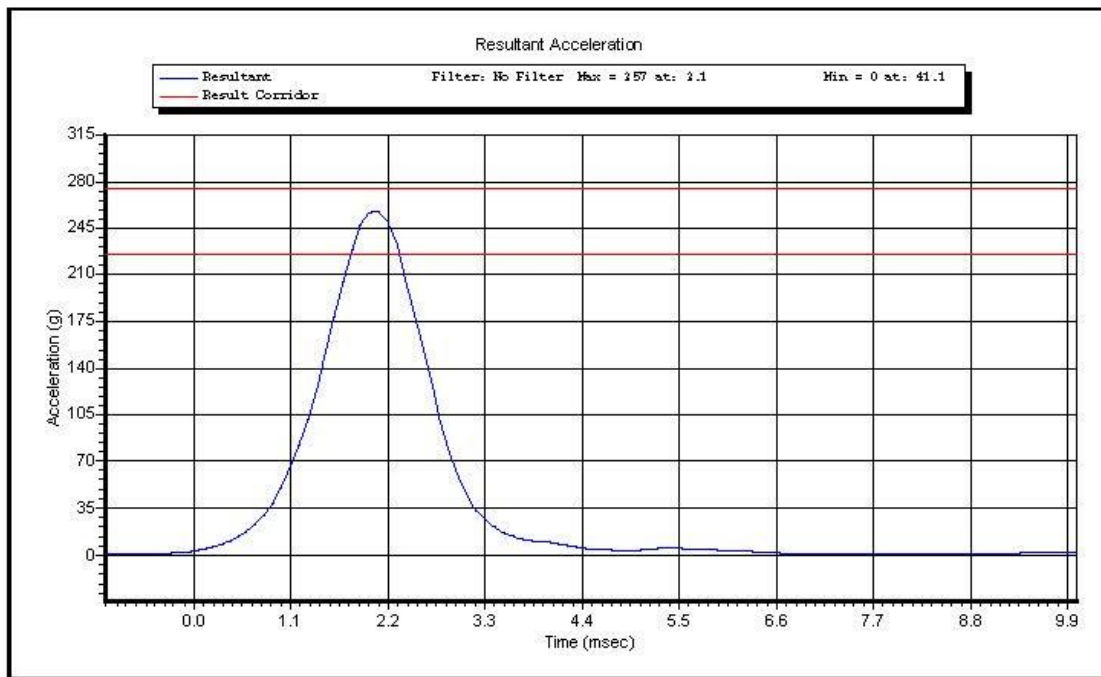


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Test Name:	Head Drop	Revision:	10/1/2001
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 50th		
ATD Serial Number:	064		
Test ID:		Test Date:	1/4/2012
Test Number:	1	Test Time:	1:47:08 PM



Test ID:

Test Time: 1:47:08 PM

Test Date: 1/4/2012

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

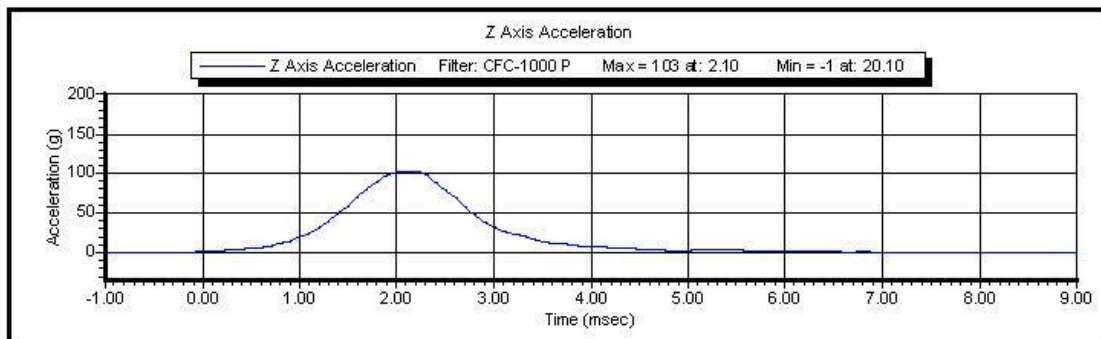
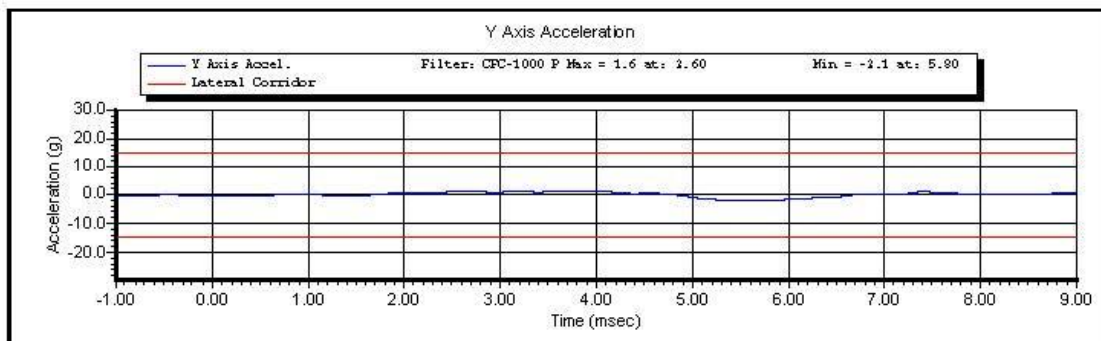
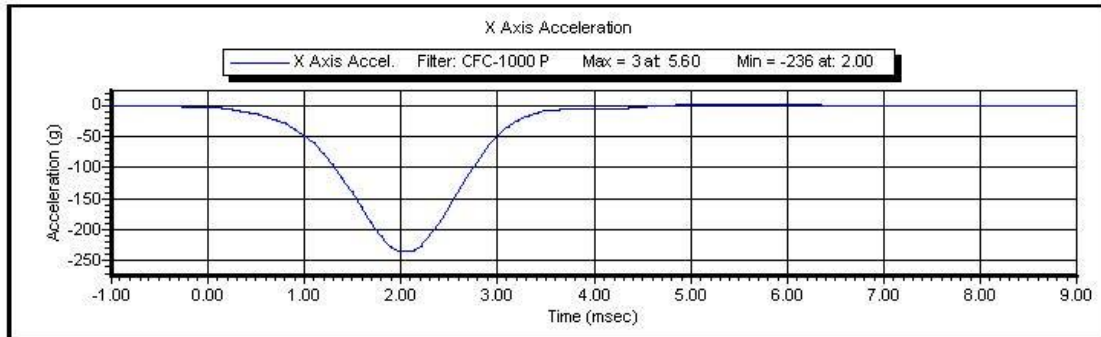
1 of 2



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Test ID:

Test Time: 1:47:08 PM

Test Date: 1/4/2012

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2 of 2



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VERIFICATION REPORT

Test Name:	Neck Extension	Revision:	10/1/2001
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 50'th		
ATD Serial Number:	064		
Test ID:		Test Date:	1/5/2012
Test Number:	2	Test Time:	7:54:58 AM

Component Part Number	Component Serial Number
Neck - 78051-336	02-1692

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.9 deg C P
Humidity	10 -- 70	20 %RH P
Velocity	5.94 -- 6.19	6.13 m/s P
Pendulum Deceleration at 10 ms	17.2 -- 21.2	19.7 g P
Pendulum Deceleration at 20 ms	14.0 -- 19.0	16.6 g P
Pendulum Deceleration at 30 ms	11.0 -- 16.0	12.4 g P
Max Pendulum Deceleration after 30 ms	0.0 -- 22.0	12.4 g P
Decel Time to 5 g	38.0 -- 46.0	42.6 ms P
D Plane Rotation	81.0 -- 106.0	96.2 degrees P
Time at Max Rotation	72.0 -- 82.0	77.4 ms P
Rotation Decay to Zero	147.0 -- 174.0	156.0 ms P
Moment About Occipital Condyle	-80.0 -- -52.9	-62.7 Nm P
Time at Max Moment	65.0 -- 79.0	73.2 ms P
Moment Decay to Zero	120.0 -- 148.0	144.0 ms P

All test parameters are within specifications

Technician: **S. Zito**

Supervisor: **D. Travale**

Test ID:

Test Time: **7:54:58 AM**

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



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7231CT	C16510	10/3/2011
DentonATD	78051-342	PENDULUM POT	2/7/2011
DentonATD	78051-342	CONDYLE POT	2/7/2011
Denton	1716A	LC-2186 My	6/3/2011
Denton	1716A	LC-2186 Fx	6/3/2011

Test ID:

Test Time: **7:54:58 AM**

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

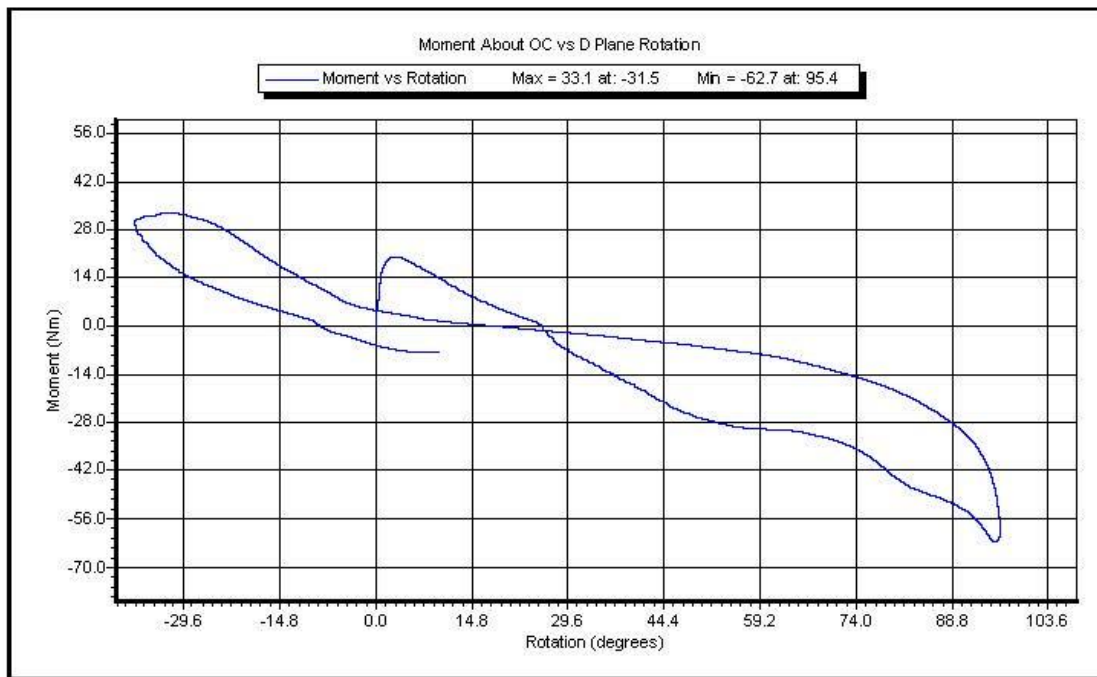


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Name of Test:	Neck Extension	REVISION:	10/1/2001
Name of Sub Test:		Type of Spec:	NHTSA
Type of ATD:	Hybrid III 50'th		
ATD Serial Number:	064		
ID of Test:		Date:	1/5/2012
Number of Test:	2	Time of Test:	7:54:58 AM



ID of Test:

Time of Test: 7:54:58 AM

Date of Test: 1/5/2012

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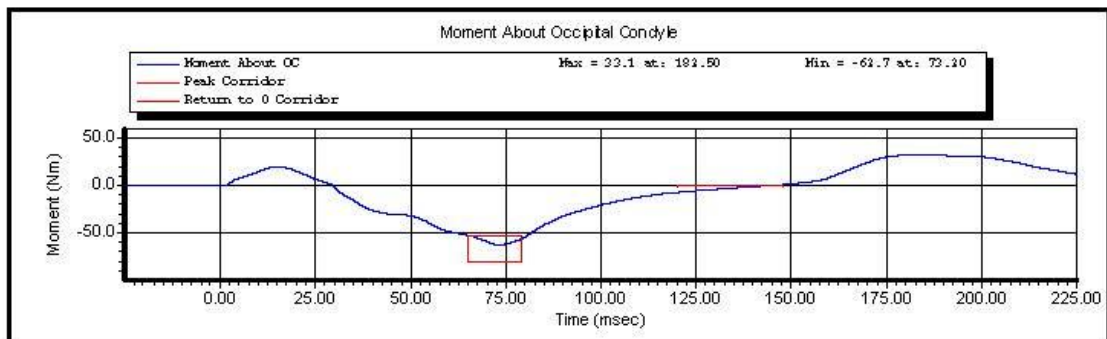
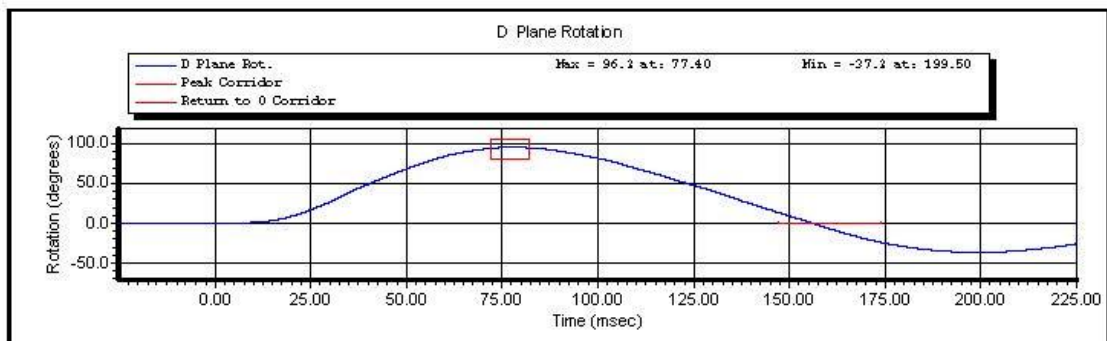
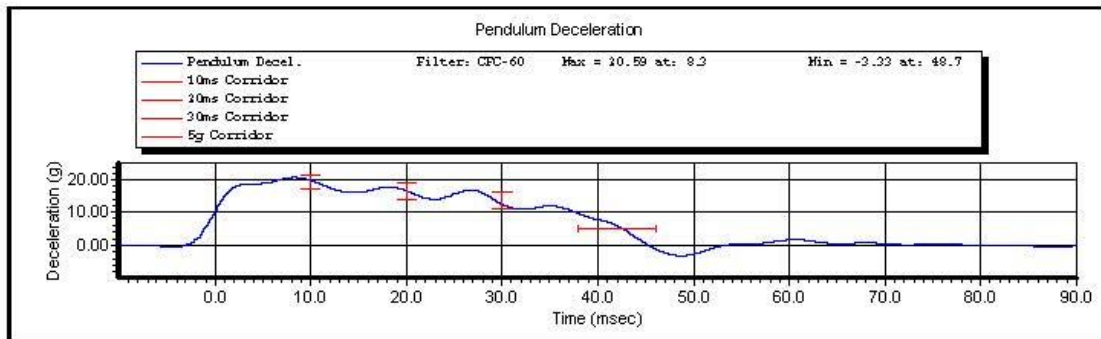
1 of 2



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ID of Test:

Time of Test: **7:54:58 AM**

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

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2 of 2



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VERIFICATION REPORT

Test Name:	Neck Flexion	Revision:	10/1/2001
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 50'th		
ATD Serial Number:	064		
Test ID:		Test Date:	1/4/2012
Test Number:	1	Test Time:	4:26:38 PM

Component Part Number	Component Serial Number
Neck - 78051-336	02-1692

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.9 deg C P
Humidity	10 -- 70	18 %RH P
Velocity	6.89 -- 7.13	7.10 m/s P
Pendulum Deceleration at 10 ms	22.5 -- 27.5	24.7 g P
Pendulum Deceleration at 20 ms	17.6 -- 22.6	19.5 g P
Pendulum Deceleration at 30 ms	12.5 -- 18.5	15.8 g P
Max Pendulum Deceleration After 30 ms	0.0 -- 29.0	15.8 g P
Deceleration time to 5 g	34.0 -- 42.0	38.5 ms P
D Plane Rotation	-78.0 -- -64.0	-70.6 degrees P
Time at max rotation	57.0 -- 64.0	58.1 ms P
Rotation Decay to Zero	113.0 -- 128.0	120.5 ms P
Moment about OC	88.1 -- 108.4	92.2 Nm P
Time at Max Moment	47.0 -- 58.0	52.7 ms P
Moment Decay to Zero	97.0 -- 107.0	101.4 ms P

All test parameters are within specifications

Technician: **S. Zito**

Supervisor: **D. Travale**

Test ID:

Test Time: **4:26:38 PM**

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



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7231CT	C16510	10/3/2011
DentonATD	78051-342	PENDULUM POT	2/7/2011
DentonATD	78051-342	CONDYLE POT	2/7/2011
Denton	1716A	LC-2186 My	6/3/2011
Denton	1716A	LC-2186 Fx	6/3/2011

Test ID:

Test Time: 4:26:38 PM

Test Date: 1/4/2012

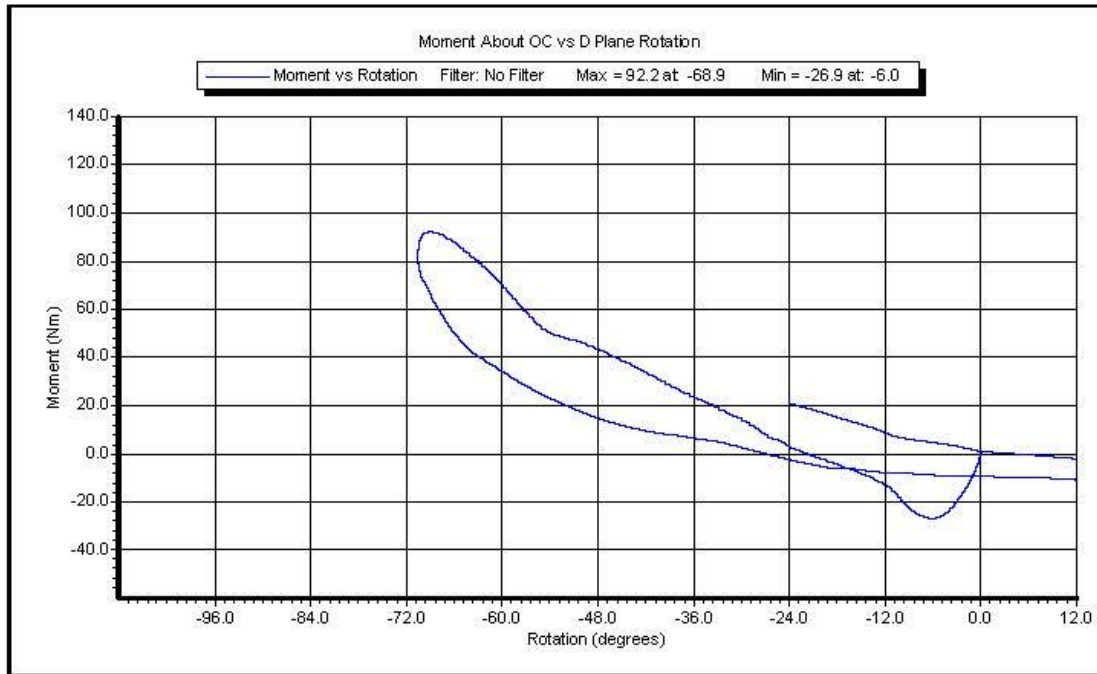


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Name of Test:	Neck Flexion	REVISION:	10/1/2001
Name of Sub Test:		Type of Spec:	NHTSA
Type of ATD:	Hybrid III 50 th		
ATD Serial Number:	064		
ID of Test:		Date:	1/4/2012
Number of Test:	1	Time of Test:	4:26:38 PM



ID of Test:

Time of Test: 4:26:38 PM

Date of Test: 1/4/2012

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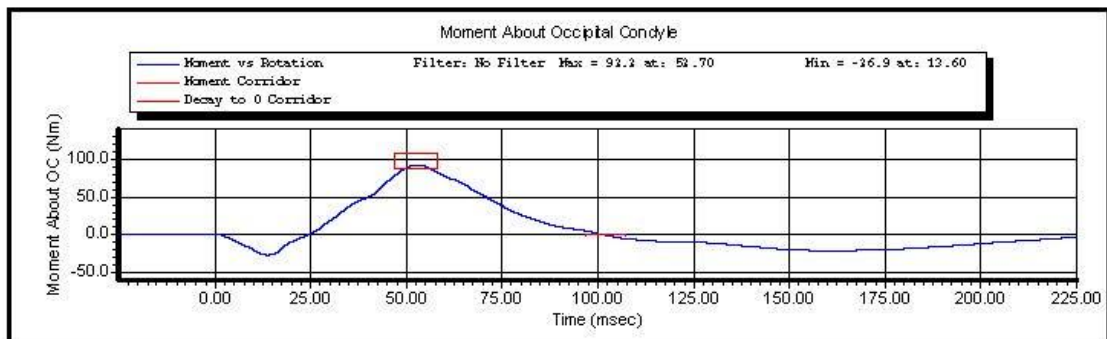
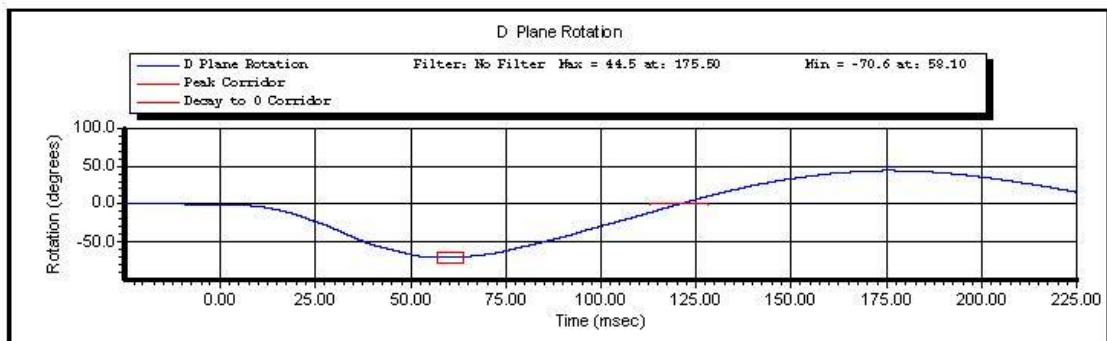
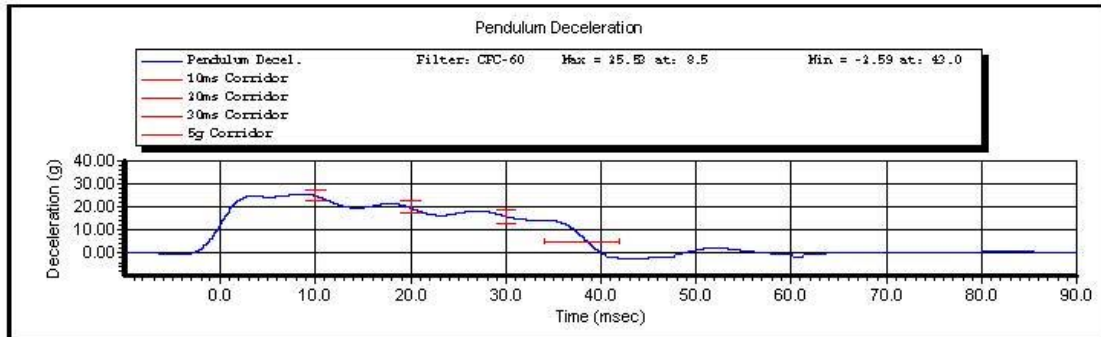
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ID of Test:

Time of Test: 4:26:38 PM

Date of Test: 1/4/2012

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VERIFICATION REPORT

Test Name:	Thorax Impact	Revision:	10/1/2001
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 50'th		
ATD Serial Number:	064		
Test ID:		Test Date:	1/6/2012
Test Number:	2	Test Time:	9:19:42 AM

Component Part Number	Component Serial Number
Ribs 78051-RS	3964
Chest Jacket - 78051-169	2814

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.1 deg C P
Humidity	10.0 -- 70.0	27.1 %RH P
Velocity	6.59 -- 6.83	6.76 m/s P
Resistive Force	-5.894 -- -5.160	-5.760 kN P
Sternum Displacement	-72.6 -- -63.5	-65.0 mm P
Hysteresis	69 -- 85	75 % P

All test parameters are within specifications

Technician: **A. Rudniski**

Supervisor: **D. Travale**

Test ID:

Test Time: **9:19:42 AM**

Test Date: **1/6/2012**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7231CT	AGHF5	1/3/2012
DentonATD	78051-342	DS-064	10/13/2011

Test ID:

Test Time: 9:19:42 AM

Test Date: 1/6/2012

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2 of 2

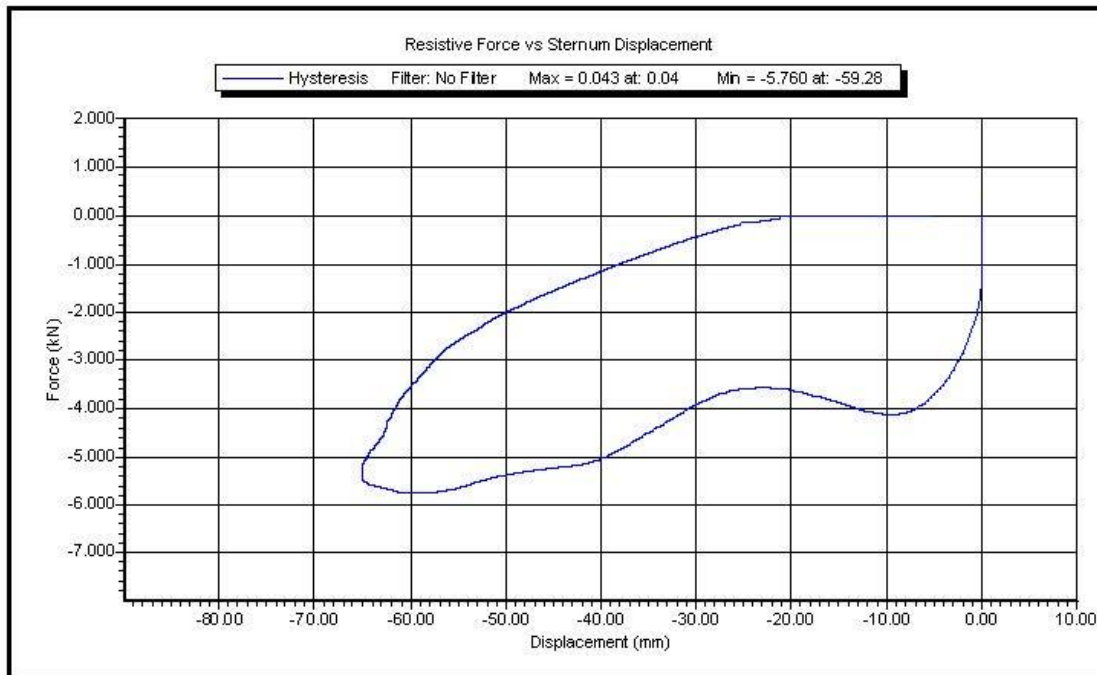


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Test Name:	Thorax Impact	Revision:	10/1/2001
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 50th		
ATD Serial Number:	064		
Test ID:		Test Date:	1/6/2012
Test Number:	2	Test Time:	9:19:42 AM



Test ID:

Test Time: 9:19:42 AM

Test Date: 1/6/2012

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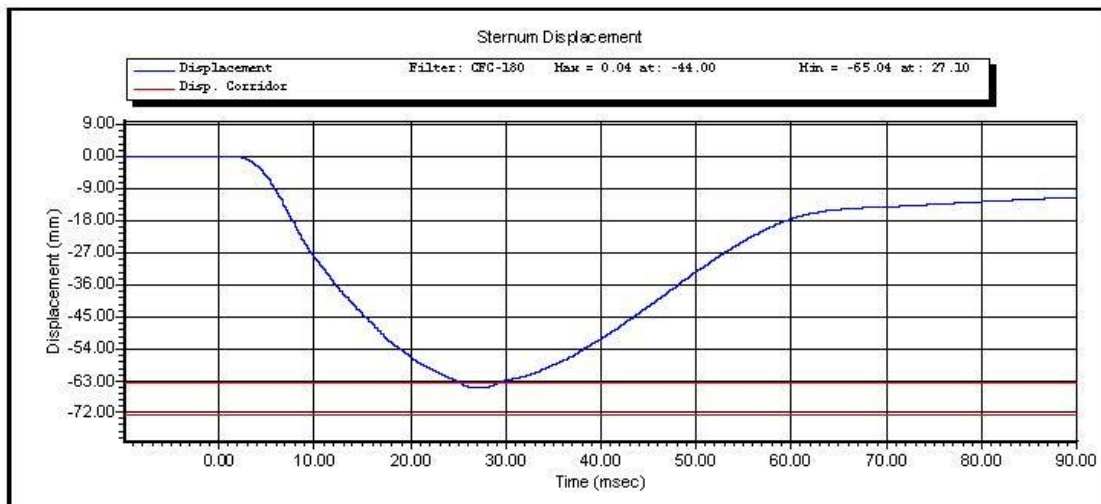
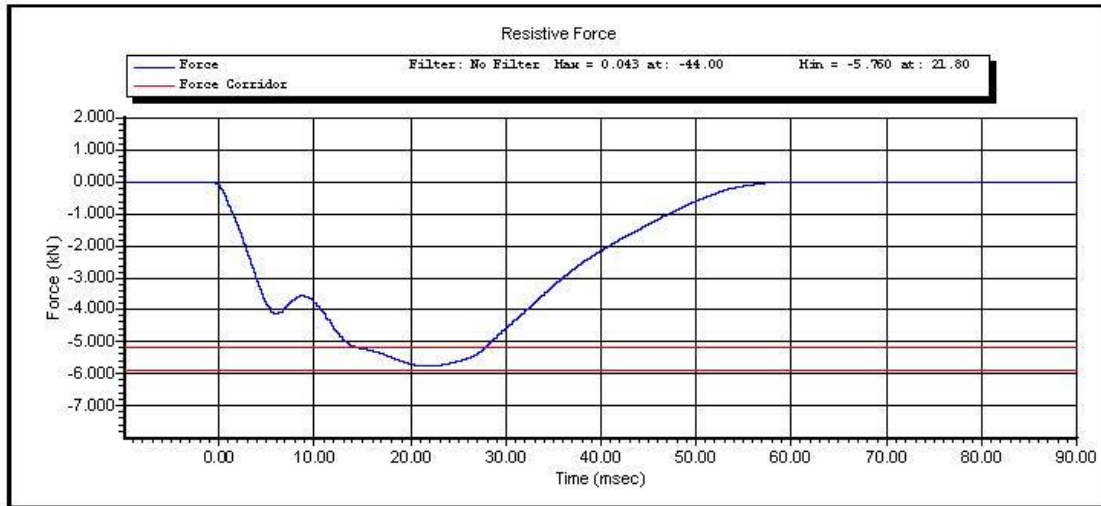
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Test ID:

Test Time: 9:19:42 AM

Test Date: 1/6/2012

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2 of 2

CALSPAN

Hybrid III Hip Range of Motion: Hybrid III 50th Male

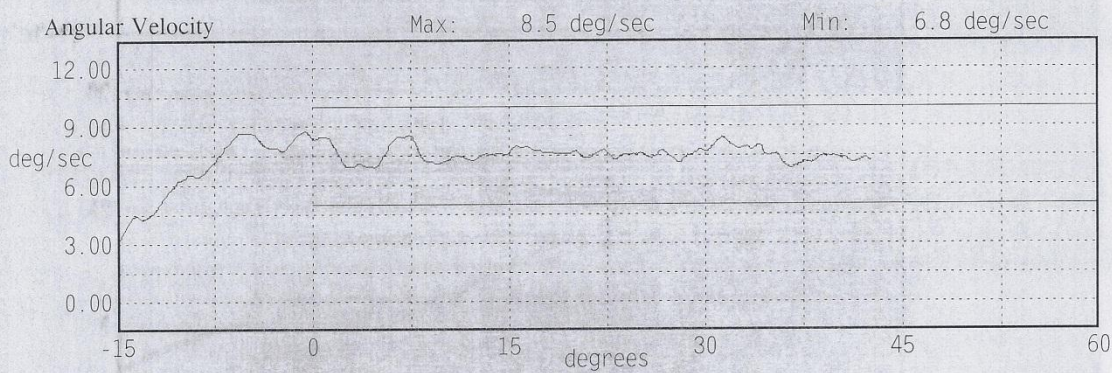
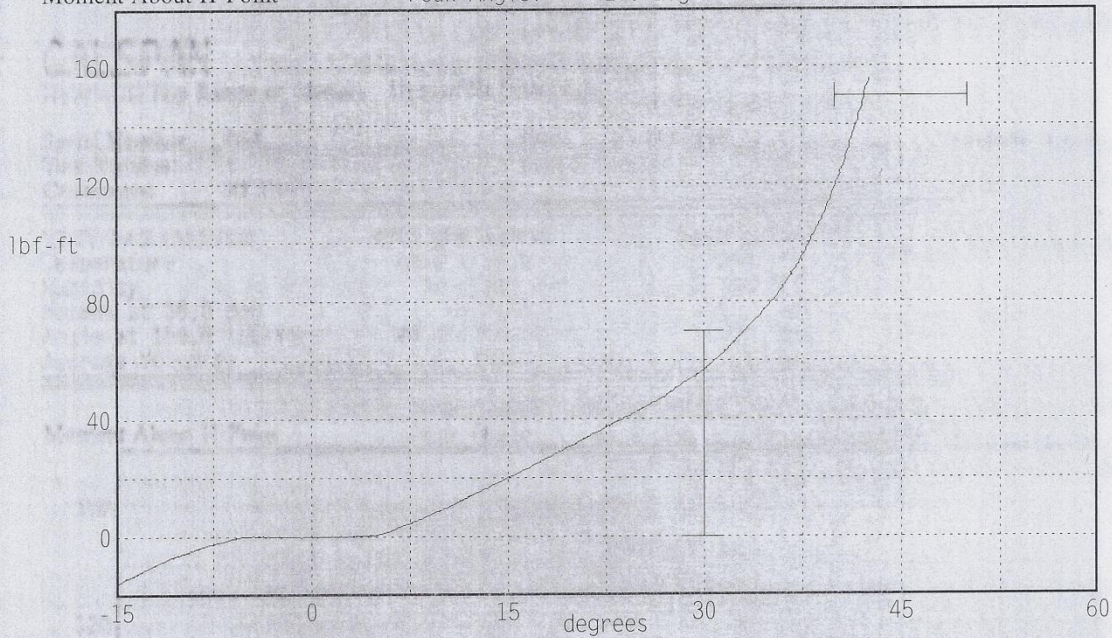
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Test Number: 1
Comments: RIGHT

Date: 01/09/2012
Time: 08:26

Version: 1.6.3

TEST PARAMETER	SPECIFICATION	TEST RESULTS	
Temperature	66.0 - 78.0	70.2 °F	Pass
Humidity	10 - 70	20 %	Pass
Moment at 30.0 deg	<= 70.0	56.7 lbf-ft	Pass
Angle at 150.0 lbf-ft	40.0 - 50.0	42.2 deg	Pass
Average Velocity	5.0 - 10.0	7.6 deg/sec	Pass

Moment About H-Point
Peak Moment: 155.6 lbf-ft at 42.6 deg
Peak Angle: 42.6 deg at 155.6 lbf-ft



CALSPAN

Hybrid III Hip Range of Motion: Hybrid III 50th Male

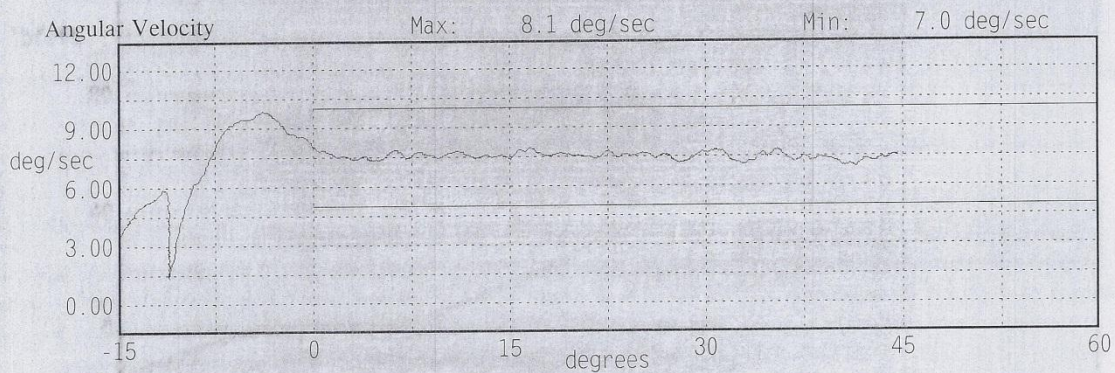
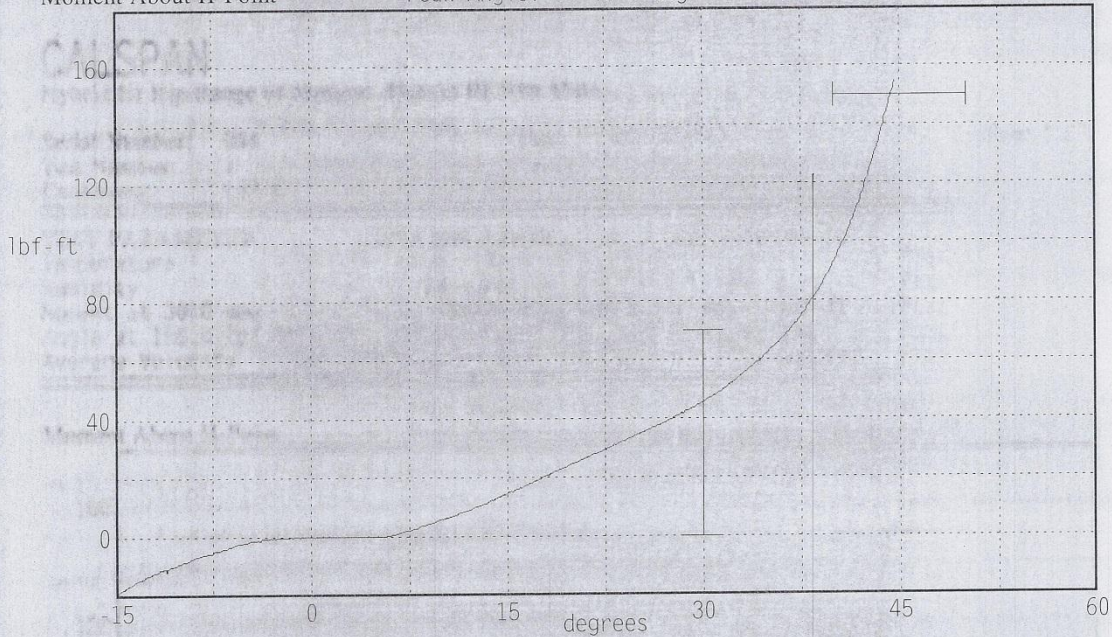
Serial Number: 064
Test Number: 1
Comments: LEFT

Date: 01/09/2012
Time: 08:38

Version: 1.6.3

TEST PARAMETER	SPECIFICATION	TEST RESULTS	
Temperature	66.0 - 78.0	70.2 °F	Pass
Humidity	10 - 70	20 %	Pass
Moment at 30.0 deg	<= 70.0	45.7 lbf-ft	Pass
Angle at 150.0 lbf-ft	40.0 - 50.0	44.4 deg	Pass
Average Velocity	5.0 - 10.0	7.5 deg/sec	Pass

Moment About H-Point
Peak Moment: 154.8 lbf-ft at 44.6 deg
Peak Angle: 44.6 deg at 154.8 lbf-ft





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VERIFICATION REPORT

Test Name:	Knee Impact PENDULUM	Revision:	10/1/2001
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 50'th		
ATD Serial Number:	064		
Test ID:	Left Knee	Test Date:	1/9/2012
Test Number:	1	Test Time:	1:23:49 PM

Component Part Number	Component Serial Number
Knee Skin - 78051	2792

Test Parameters	Test Specifications	Test Results
Temperature	18.9 -- 25.6	21.8 deg C P
Humidity	10.0 -- 70.0	20.0 %RH P
Velocity	2.07 -- 2.13	2.11 m/s P
Resistive Force	-5.78 -- -4.72	-5.03 kN P

All test parameters are within specifications

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

Test ID: **Left Knee**

Test Time: **1:23:49 PM**

Test Date: **1/9/2012**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

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

Test ID: **Left Knee**

Test Time: **1:23:49 PM**

Test Date: **1/9/2012**

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2 of 2

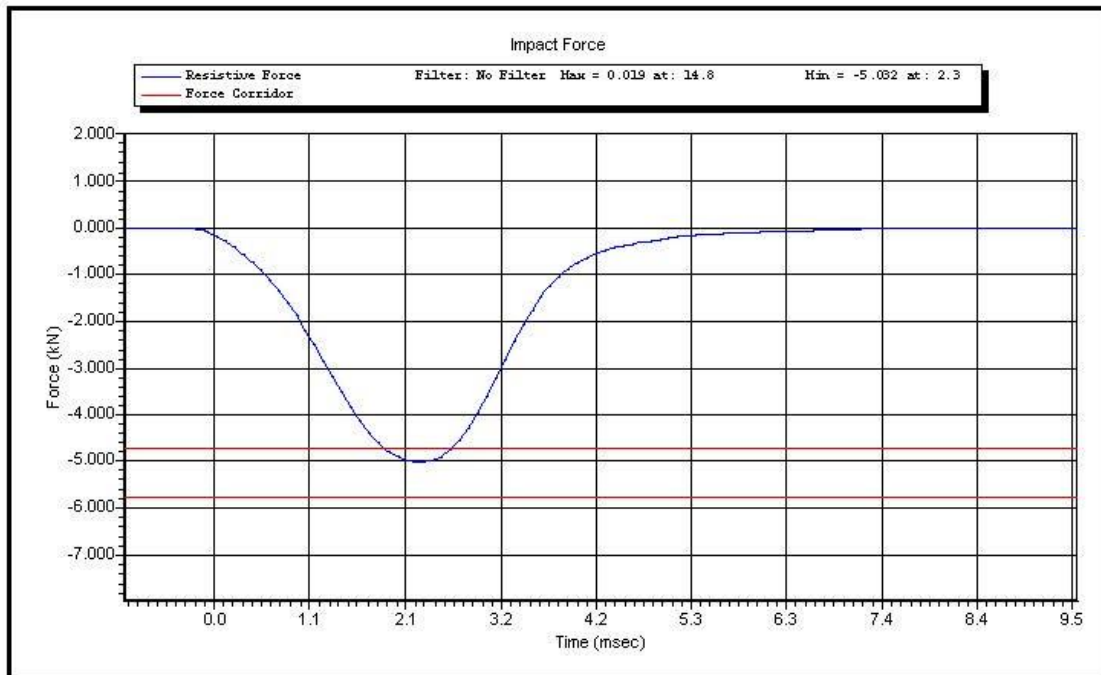


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Test Name:	Knee Impact PENDULUM	Revision:	10/1/2001
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 50th		
ATD Serial Number:	064		
Test ID:	Left Knee	Test Date:	1/9/2012
Test Number:	1	Test Time:	1:23:49 PM



Test ID: **Left Knee**

Test Time: **1:23:49 PM**

Test Date: **1/9/2012**

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VERIFICATION REPORT

Test Name:	Knee Impact PENDULUM	Revision:	10/1/2001
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 50'th		
ATD Serial Number:	064		
Test ID:	Right Knee	Test Date:	1/9/2012
Test Number:	1	Test Time:	11:47:07 AM

Component Part Number	Component Serial Number
Knee Skin - 78051	2880

Test Parameters	Test Specifications	Test Results
Temperature	18.9 -- 25.6	21.9 deg C P
Humidity	10.0 -- 70.0	21.1 %RH P
Velocity	2.07 -- 2.13	2.12 m/s P
Resistive Force	-5.78 -- -4.72	-5.12 kN P

All test parameters are within specifications

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

Test ID: **Right Knee**

Test Time: **11:47:07 AM**

Test Date: **1/9/2012**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

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

Test ID: **Right Knee**

Test Time: **11:47:07 AM**

Test Date: **1/9/2012**

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2 of 2

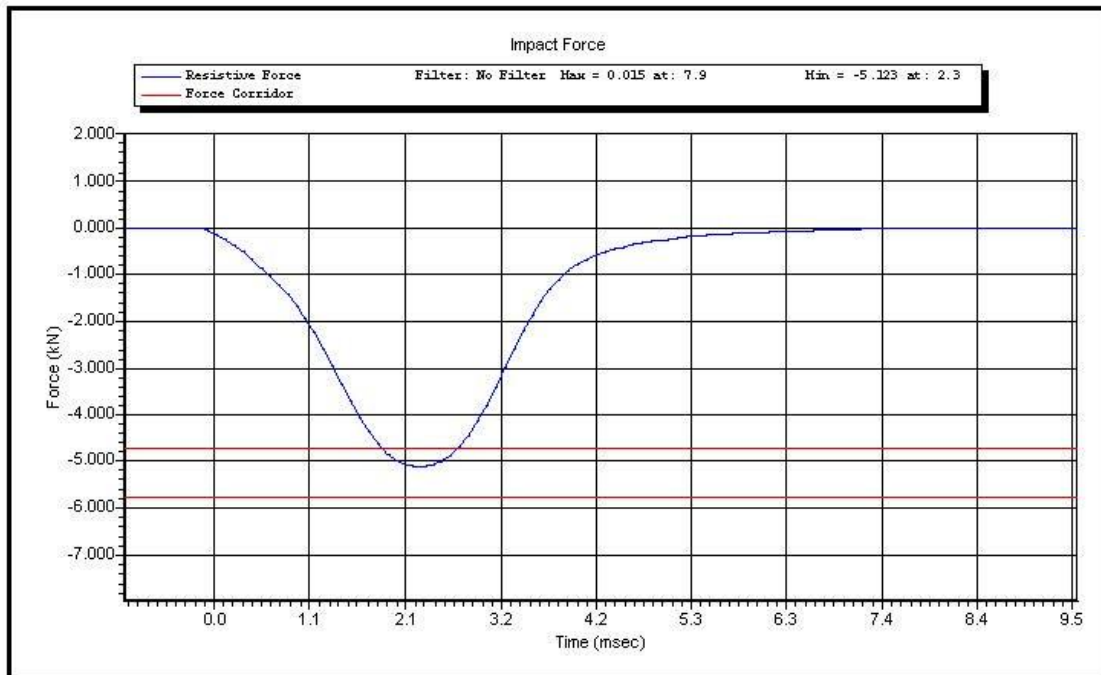


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Test Name:	Knee Impact PENDULUM	Revision:	10/1/2001
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 50th		
ATD Serial Number:	064		
Test ID:	Right Knee	Test Date:	1/9/2012
Test Number:	1	Test Time:	11:47:07 AM



Test ID: **Right Knee**

Test Time: **11:47:07 AM**

Test Date: **1/9/2012**

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1 of 1

CALIBRATION TEST RESULTS

PRE-TEST

RIGHT-FRONT PASSENGER DUMMY

S/N: 143

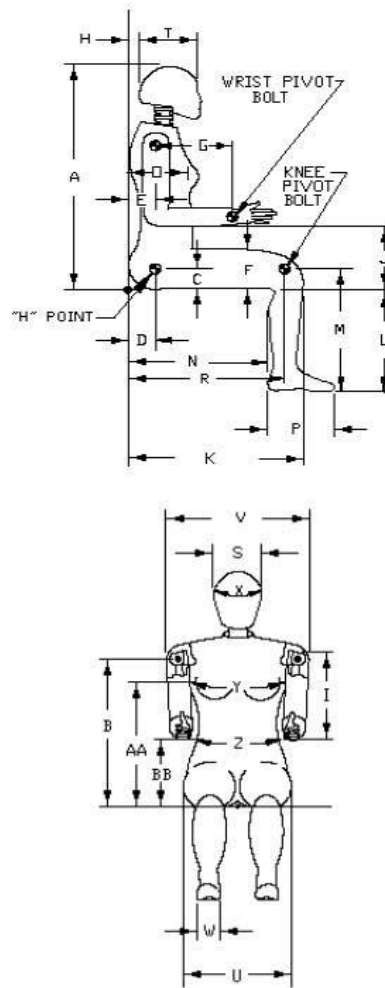
External Measurements - 5th Female

SN 143

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Sitting Height	774.7 – 800.1	785	Yes
B	Shoulder Pivot Height	431.8 – 457.2	447	Yes
C	H-Point Height	81.3 – 86.3	84	Yes
D	H-Point from Backline	144.8 – 149.8	147	Yes
E	Shoulder Pivot from Backline	68.6 – 83.8	77	Yes
F	Thigh Clearance	119.4 – 134.6	128	Yes
G	Back of Elbow to Wrist Pivot	243.9 – 259.1	248	Yes
H	Head Back to Backline	43.2 – 48.2	47	Yes
I	Shoulder to Elbow Length	276.8 – 297.2	288	Yes
J	Elbow Rest Height	182.8 – 203.2	195	Yes
K	Buttock to Knee Length	520.7 – 546.1	543	Yes
L	Popliteal Height	355.6 – 376	360	Yes
M	Knee Pivot Height	393.7 – 419.1	402	Yes
N	Buttock Popliteal Length	414 – 439.4	431	Yes
O	Chest Depth without Jacket	175.3 – 190.5	183	Yes
P	Foot Length (right)	218.5 – 233.7	220	Yes
R	Buttock To Knee Pivot Length	457.2 – 482.6	474	Yes
S	Head Breadth	137.1 – 147.3	143	Yes
T	Head Depth	177.8 – 188	184	Yes
U	Hip Breadth	299.7 – 314.9	305	Yes
V	Shoulder Breadth	350.5 – 365.7	361	Yes
W	Foot Breadth	78.8 – 94	86	Yes
X	Head Circumference	528.3 – 548.7	544	Yes
Y	Chest Circumference with Jacket	850.9 – 881.3	869	Yes
Z	Waist Circumference	759.5 – 789.9	775	Yes
AA	Reference Location (Chest Circumference)	332.7 – 358.1	338	Yes
BB	Reference Location (Waist Circumference)	160.1 – 170.2	165	Yes

Hybrid 3 5th Female External Measurements

Reference Diagram





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VERIFICATION REPORT

Test Name:	Head Drop	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	143		
Test ID:		Test Date:	1/4/2012
Test Number:	1	Test Time:	3:12:29 PM

Component Part Number	Component Serial Number
Head Skin - 78051-228	05733

Test Parameters	Test Specifications	Test Results
Temperature	18.9 -- 25.6	21.6 deg C P
Humidity	10 -- 70	17 %RH P
Resultant Acceleration	250 -- 300	266 g P
Oscillation	0.0 -- 10.0	1.6 % P
Lateral Acceleration	-15.00 -- 15.00	9.36 g P

All test parameters are within specifications

Technician: S. Zito

Supervisor: D. Travale

Test ID:

Test Time: **3:12:29 PM**

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



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VERIFICATION REPORT

REFERENCE EQUIPMENT

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

Test ID:

Test Time: **3:12:29 PM**

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

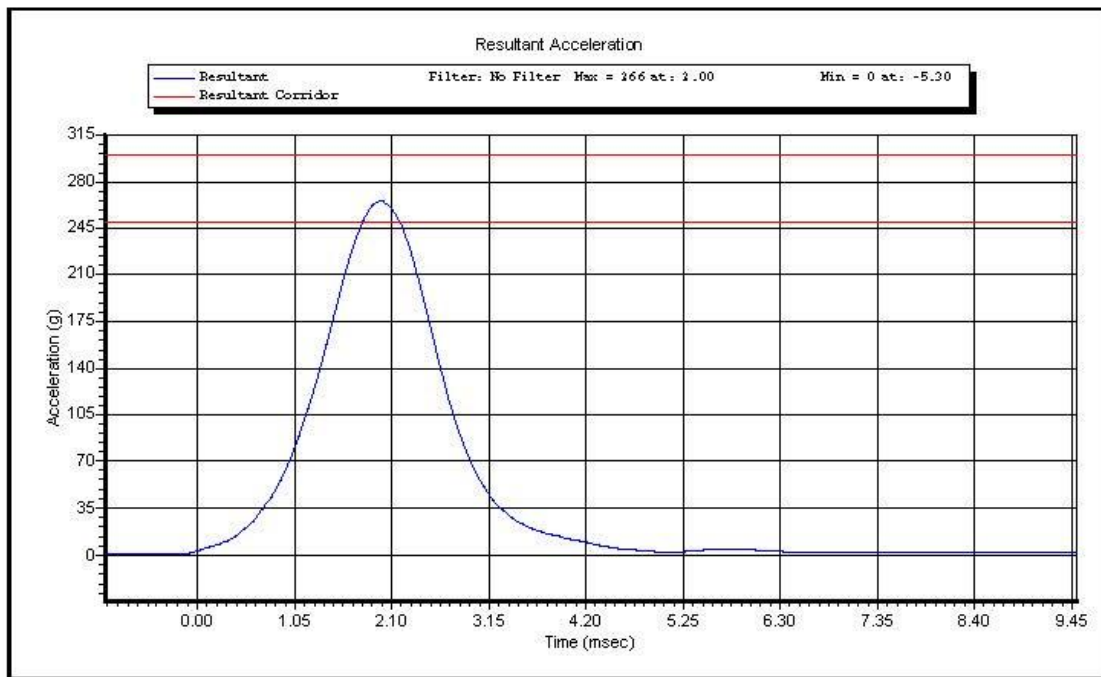


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Test Name:	Head Drop	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	143		
Test ID:		Test Date:	1/4/2012
Test Number:	1	Test Time:	3:12:29 PM



Test ID:

Test Time: 3:12:29 PM

Test Date: 1/4/2012

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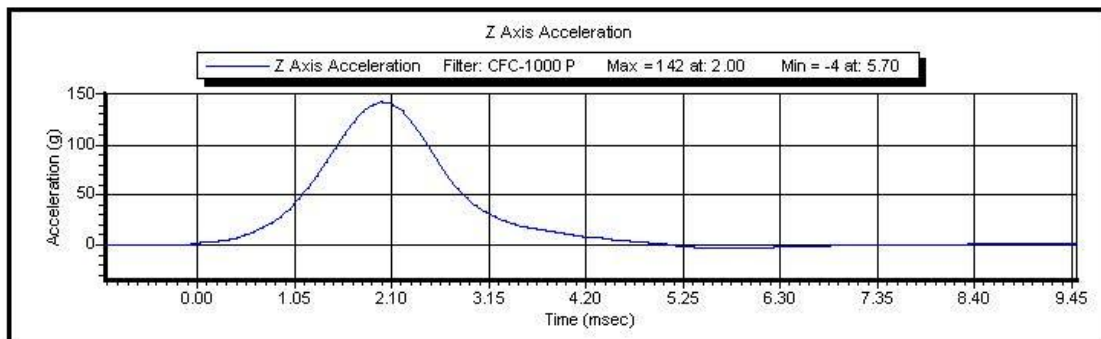
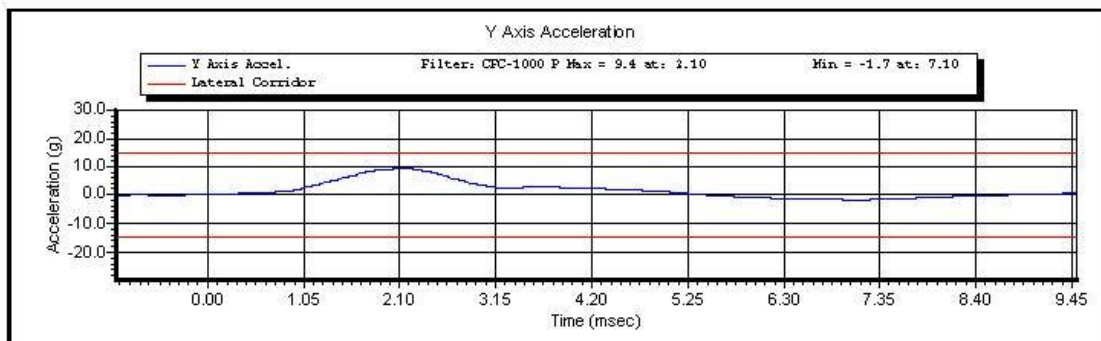
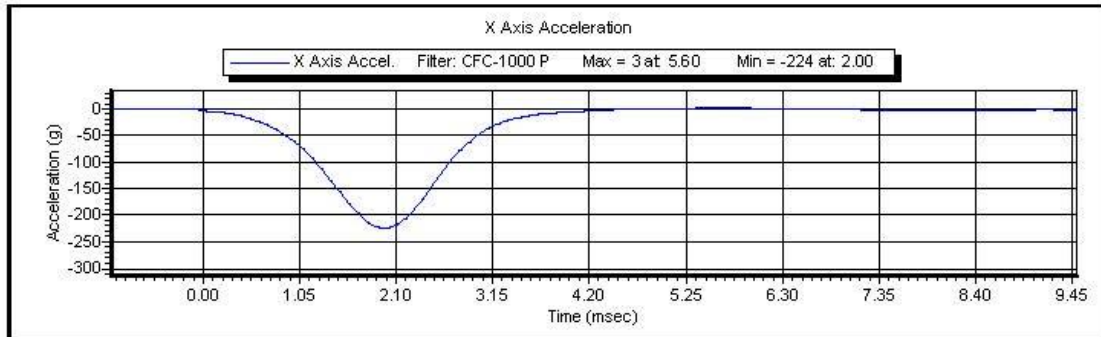
1 of 2



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Test ID:

Test Time: 3:12:29 PM

Test Date: 1/4/2012

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VERIFICATION REPORT

Test Name:	Neck Extension	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	143		
Test ID:		Test Date:	1/5/2012
Test Number:	2	Test Time:	12:57:25 PM

Component Part Number	Component Serial Number
Neck - 880105-255	050512

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.1 deg C P
Humidity	10 -- 70	22 %RH P
Velocity	5.95 -- 6.19	6.10 m/s P
Pendulum Impulse at 10 ms	1.50 -- 1.90	1.82 m/s P
Pendulum Impulse at 20 ms	3.10 -- 3.90	3.61 m/s P
Pendulum Impulse at 30 ms	4.60 -- 5.60	5.27 m/s P
D Plane Rotation	99.0 -- 114.0	102.9 degrees P
Moment During Rotation Interval	-65.0 -- -53.0	-56.1 Nm P
Moment Decay to -10.0 Nm	94.0 -- 114.0	102.1 ms P

All test parameters are within specifications

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

Test ID:

Test Time: **12:57:25 PM**

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



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7231CT	C16510	10/3/2011
DentonATD	78051-342	PENDULUM POT	2/7/2011
DentonATD	78051-342	CONDYLE POT	2/7/2011
Denton	1716A	LC-2206My	8/31/2011
Denton	1716A	LC-2206Fx	8/31/2011

Test ID:

Test Time: 12:57:25 PM

Test Date: 1/5/2012

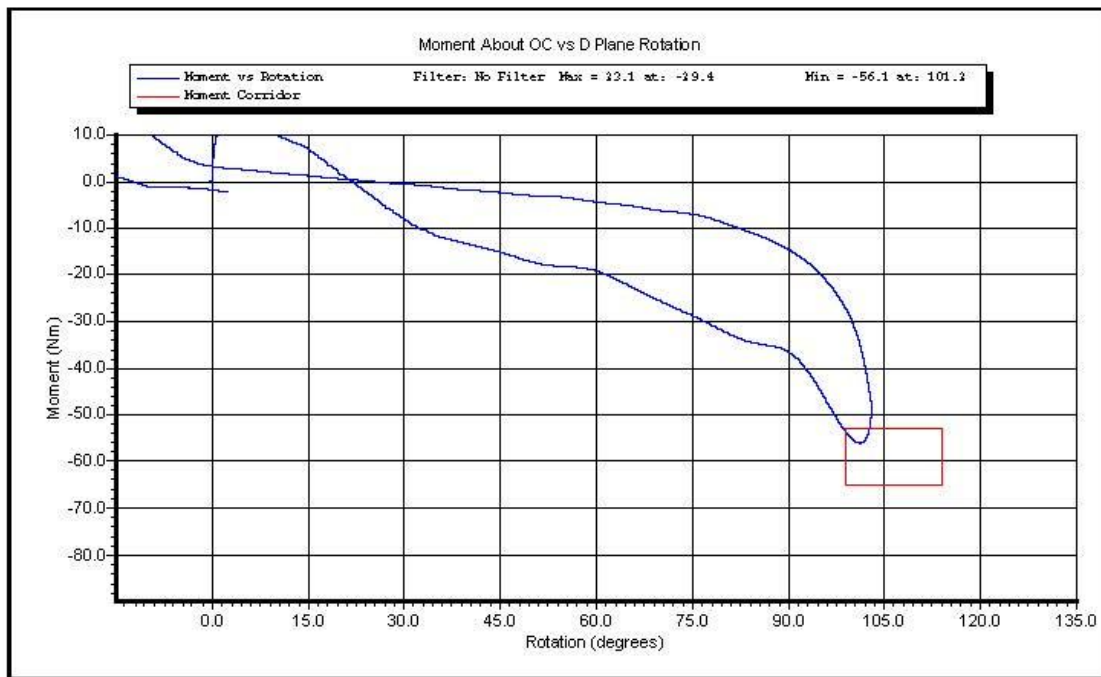


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Test Name:	Neck Extension	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	143		
Test ID:		Test Date:	1/5/2012
Test Number:	2	Test Time:	12:57:25 PM



Test ID:

Test Time: 12:57:25 PM

Test Date: 1/5/2012

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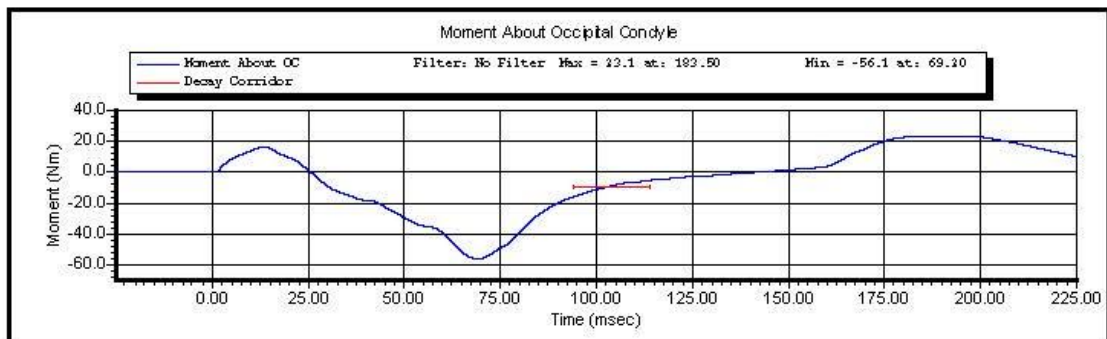
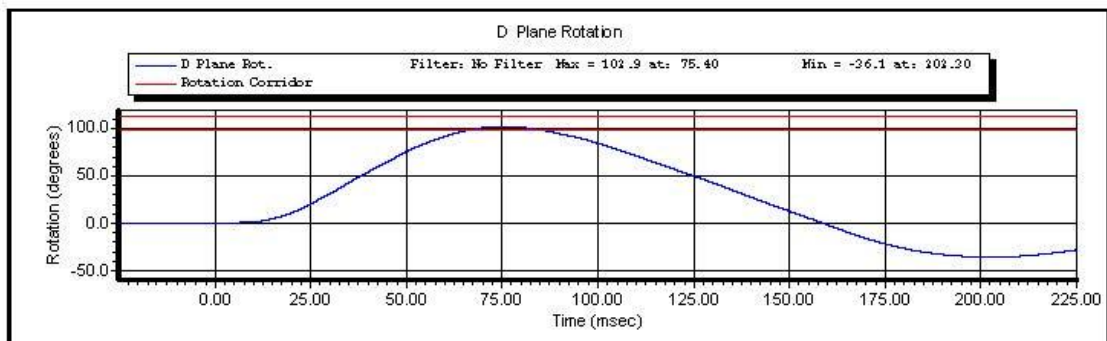
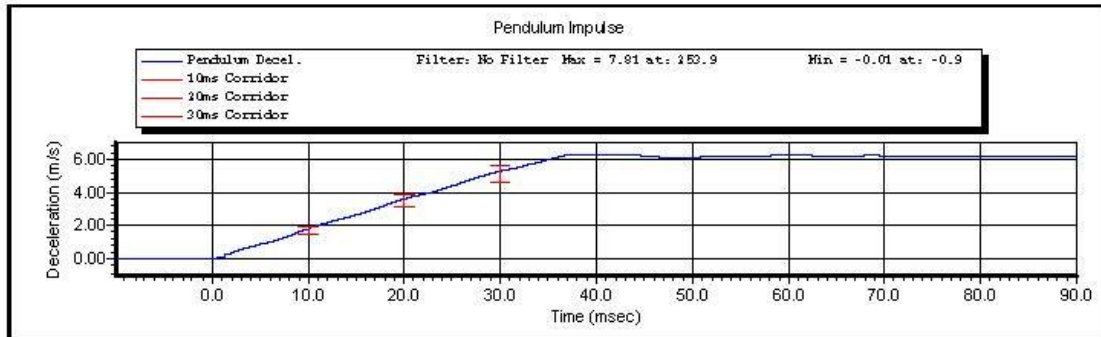
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Test ID:

Test Time: 12:57:25 PM

Test Date: 1/5/2012

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VERIFICATION REPORT

Test Name:	Neck Flexion	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	143		
Test ID:		Test Date:	1/5/2012
Test Number:	1	Test Time:	10:45:58 AM

Component Part Number	Component Serial Number
Neck - 880105-255	05-0512

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.1 deg C P
Humidity	10 -- 70	22 %RH P
Velocity	6.89 -- 7.13	7.09 m/s P
Pendulum Impulse at 10 ms	2.10 -- 2.50	2.50 m/s P
Pendulum Impulse at 20 ms	4.00 -- 5.00	4.69 m/s P
Pendulum Impulse at 30 ms	5.80 -- 7.00	6.59 m/s P
D Plane Rotation	-91.0 -- -77.0	-78.3 degrees P
Moment During Rotation Interval	69.0 -- 83.0	72.4 Nm P
Moment Decay to 10.0 Nm	80.0 -- 100.0	85.3 ms P

All test parameters are within specifications

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

Test ID:

Test Time: **10:45:58 AM**

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



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7231CT	C16510	10/3/2011
DentonATD	78051-342	PENDULUM POT	2/7/2011
DentonATD	78051-342	CONDYLE POT	2/7/2011
Denton	1716A	LC-2206My	8/31/2011
Denton	1716A	LC-2206Fx	8/31/2011

Test ID:

Test Time: 10:45:58 AM

Test Date: 1/5/2012

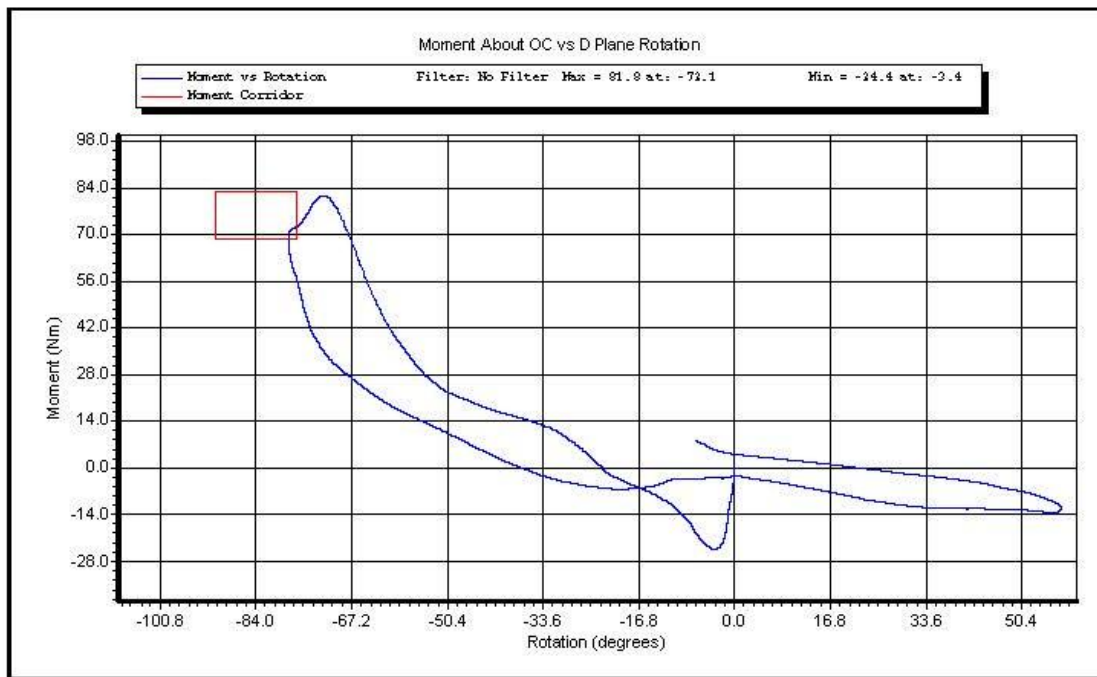


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Test Name:	Neck Flexion	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	143		
Test ID:		Test Date:	1/5/2012
Test Number:	1	Test Time:	10:45:58 AM



Test ID:

Test Time: 10:45:58 AM

Test Date: 1/5/2012

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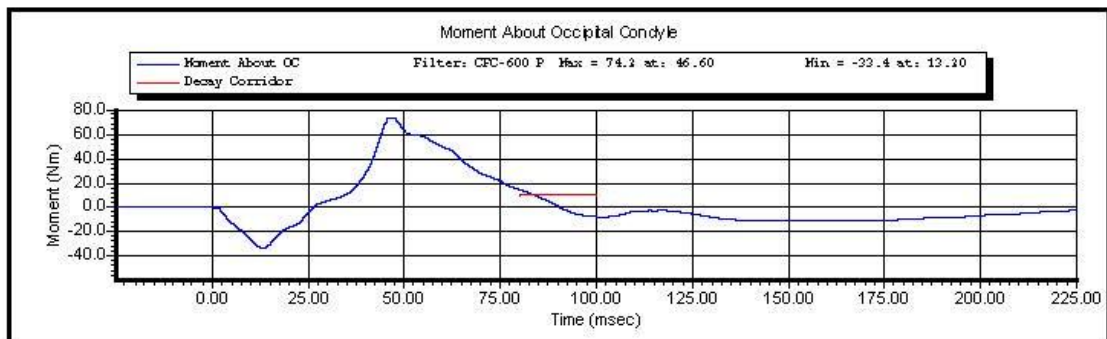
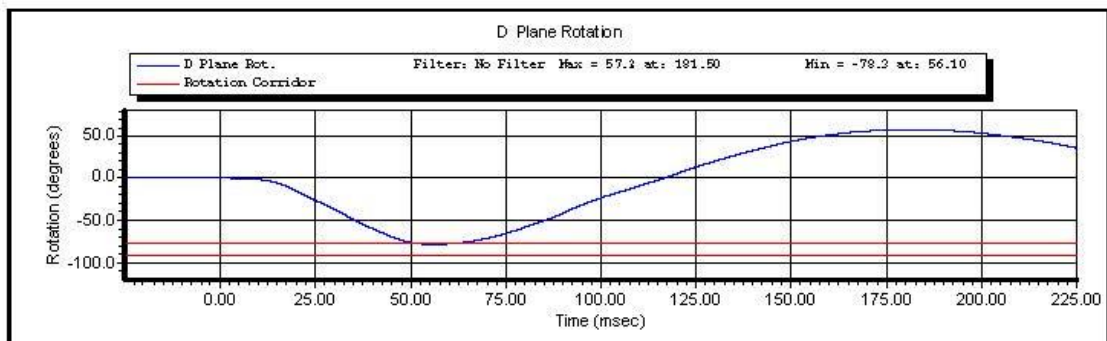
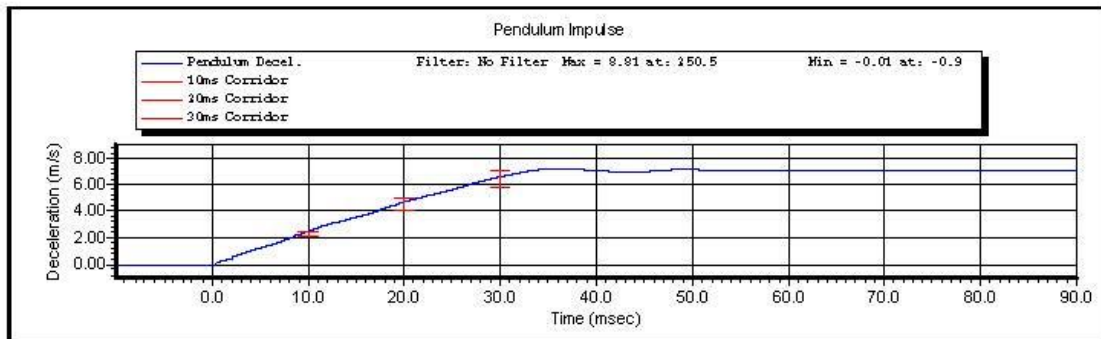
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Test ID:

Test Time: 10:45:58 AM

Test Date: 1/5/2012

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VERIFICATION REPORT

Test Name:	Thorax Impact	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	143		
Test ID:		Test Date:	1/9/2012
Test Number:	2	Test Time:	9:13:17 AM

Component Part Number	Component Serial Number
Ribs 880105-RS	05032021A
Chest Jacket - 880105-355-E	05855
Lumbar Spine - 880105-1095	050330

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.5 deg C P
Humidity	10.0 -- 70.0	22.0 %RH P
Velocity	6.59 -- 6.83	6.69 m/s P
Sternum Displacement	-58.0 -- -50.0	-54.7 mm P
Force During Displacement Interval	-4400 -- -3900	-4388 N P
Force -18.0 to -50.0 Displacement	-4600 -- 0	-4319 N P
Hysteresis	69 -- 85	71 % P

All test parameters are within specifications

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

Test ID:

Test Time: **9:13:17 AM**

Test Date: **1/9/2012**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7231CT	AGHF5	1/3/2012
DentonATD	H3CD	DS-143	12/10/2011
Endevco	7264-2000	P58884	10/31/2011

Test ID:

Test Time: 9:13:17 AM

Test Date: 1/9/2012

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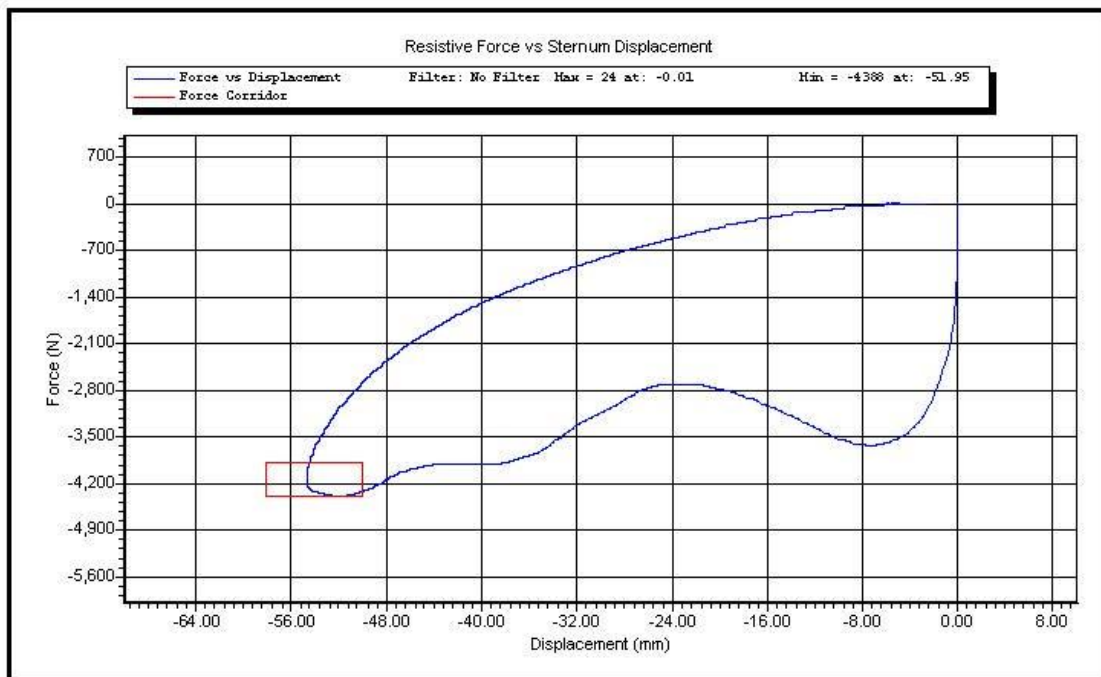


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Test Name:	Thorax Impact	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	143		
Test ID:		Test Date:	1/9/2012
Test Number:	2	Test Time:	9:13:17 AM



Test ID:

Test Time: 9:13:17 AM

Test Date: 1/9/2012

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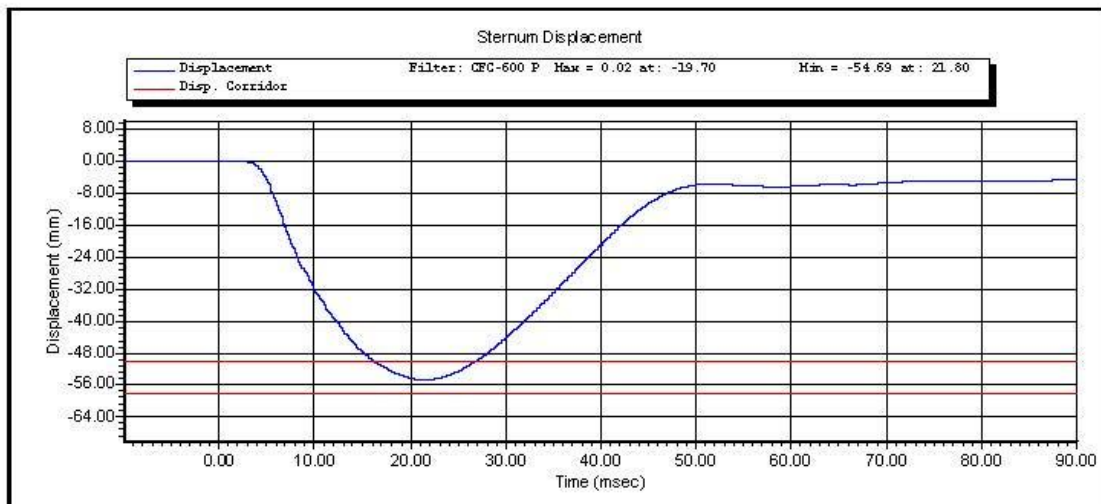
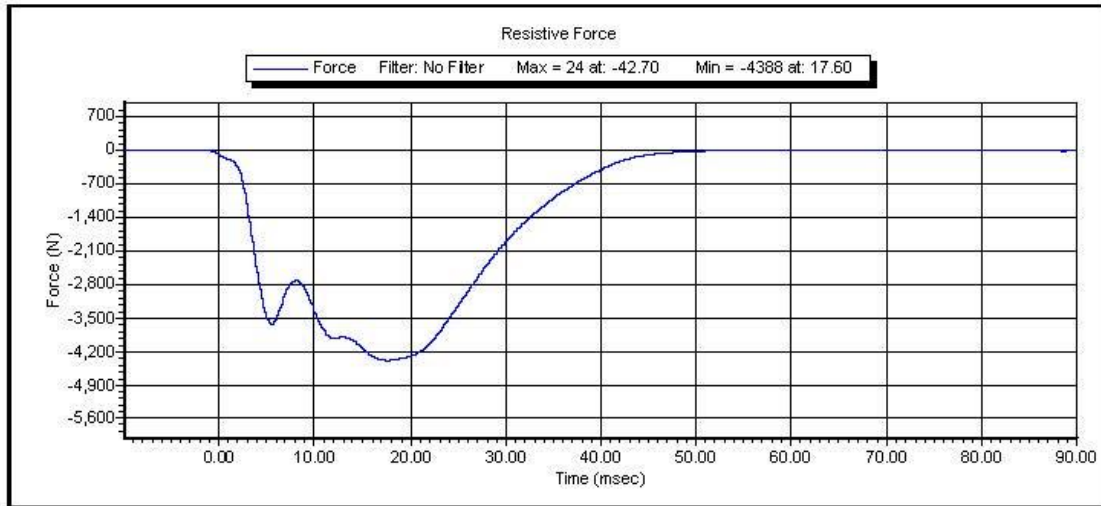
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Test ID:

Test Time: 9:13:17 AM

Test Date: 1/9/2012

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Torso Flexion Test

Technician: AR
Calibration Date: 1/10/2012
ATD Serial Number: NHTSA 5th Female 143

Test Results			
Test Condition	Parameters	Results	Status
Temperature	18.9-25.6° C	21.3° C	Pass
Lab Humidity: 38%	10-70%	25%	Pass
Max Force @ 45 deg	320 – 390N	371N	Pass
Torso rotation rate	0.5 °/s ≤ rate ≤ 1.5 °/s	1.0 °/s	Pass
Initial reference angle	≤20 deg	10°	Pass
Final ref plane angle	Initial ref plane ± 8 deg	17°	Pass



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VERIFICATION REPORT

Test Name:	Knee Impact PENDULUM	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	143		
Test ID:	Left Knee	Test Date:	12/12/2011
Test Number:	1	Test Time:	2:22:24 PM

Component Part Number	Component Serial Number
Knee Skin - 880105-508	1687
Knee Insert - 880105-511	2189

Test Parameters	Test Specifications	Test Results
Temperature	18.9 -- 25.6	22.2 deg C P
Humidity	10.0 -- 70.0	19.0 %RH P
Velocity	2.07 -- 2.13	2.07 m/s P
Resistive Force	-4060 -- -3450	-3765 N P

All test parameters are within specifications

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

Test ID: **Left Knee**

Test Time: **2:22:24 PM**

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



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VERIFICATION REPORT

REFERENCE EQUIPMENT

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

Test ID: **Left Knee**

Test Time: **2:22:24 PM**

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

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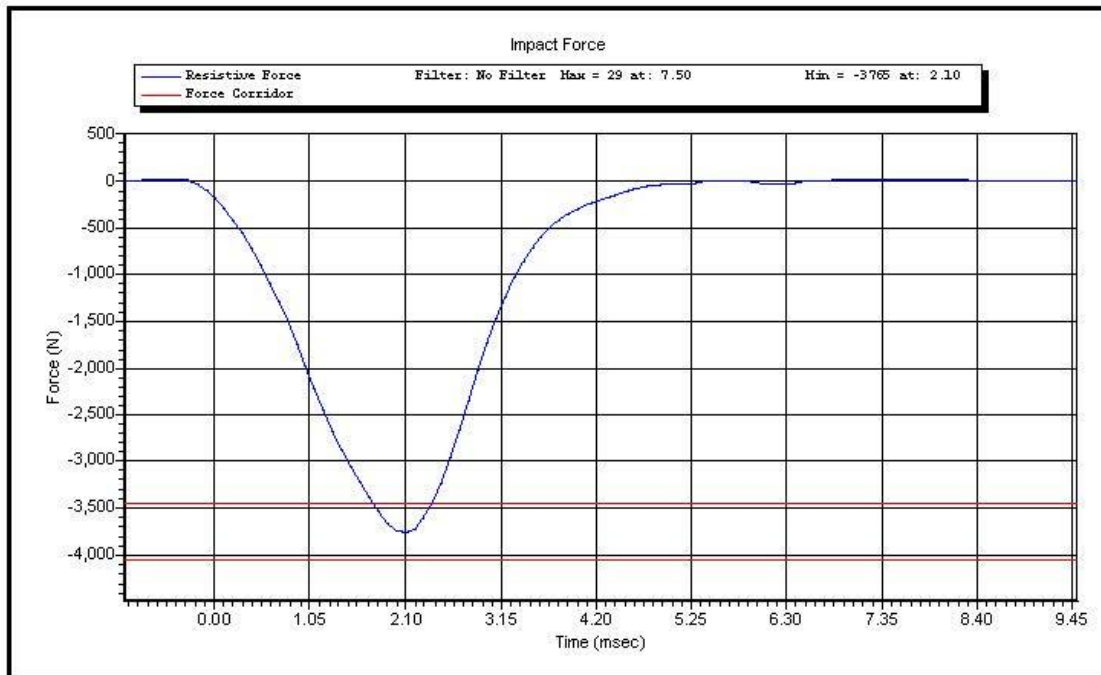


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Test Name:	Knee Impact PENDULUM	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	143		
Test ID:	Left Knee	Test Date:	12/12/2011
Test Number:	1	Test Time:	2:22:24 PM



Test ID: **Left Knee**

Test Time: **2:22:24 PM**

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

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VERIFICATION REPORT

Test Name:	Knee Impact PENDULUM	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	143		
Test ID:	Right Knee	Test Date:	12/12/2011
Test Number:	1	Test Time:	3:04:11 PM

Component Part Number	Component Serial Number
Knee Skin - 880105-508	1028
Knee Insert - 880105-511	2192

Test Parameters	Test Specifications	Test Results
Temperature	18.9 -- 25.6	22.2 deg C P
Humidity	10.0 -- 70.0	19.0 %RH P
Velocity	2.07 -- 2.13	2.08 m/s P
Resistive Force	-4060 -- -3450	-3933 N P

All test parameters are within specifications

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

Test ID: **Right Knee**

Test Time: **3:04:11 PM**

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



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VERIFICATION REPORT

REFERENCE EQUIPMENT

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

Test ID: **Right Knee**

Test Time: **3:04:11 PM**

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

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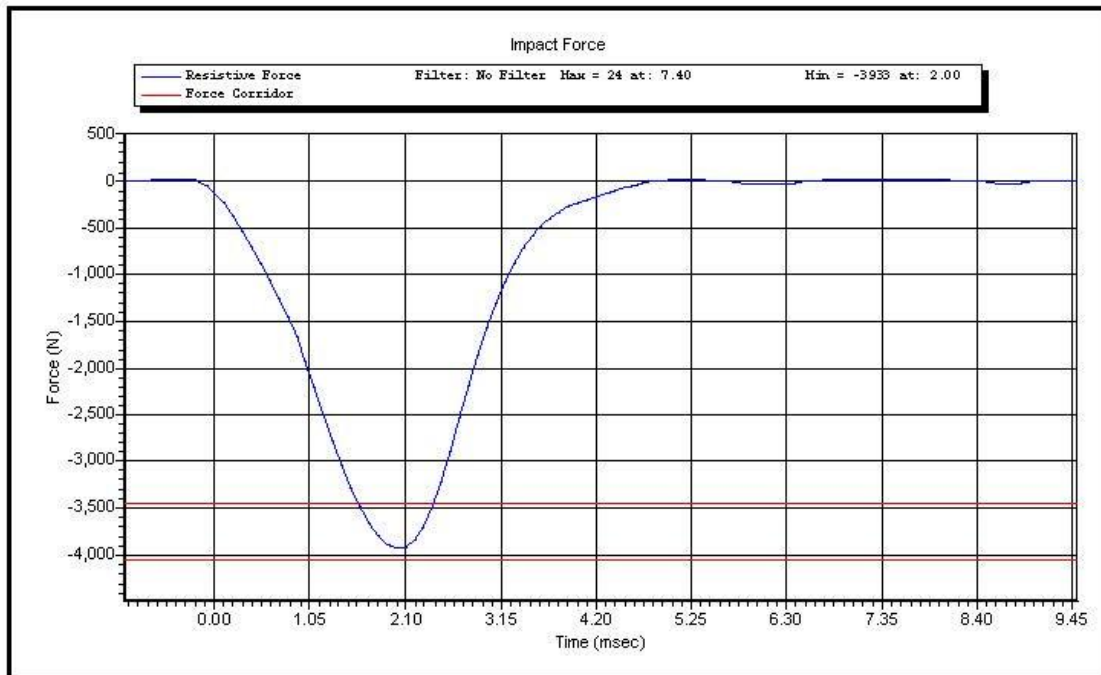


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Test Name:	Knee Impact PENDULUM	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	143		
Test ID:	Right Knee	Test Date:	12/12/2011
Test Number:	1	Test Time:	3:04:11 PM



Test ID: **Right Knee**

Test Time: **3:04:11 PM**

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

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CALIBRATION TEST RESULTS

POST-TEST

DRIVER DUMMY

S/N: 064



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50th Male External Measurements

S/N 064

Symbol	Description	Specification	Results	Pass
		in	in	
A	Sitting Height	34.6 – 35.0	35.0	Yes
B	Shoulder Pivot Height	19.9 – 20.5	20.4	Yes
C	H-Point Height	3.3 – 3.5	3.5	Yes
D	H-Point from Backline	5.3 – 5.5	5.5	Yes
E	Shoulder Pivot from Backline	3.3 – 3.7	3.5	Yes
F	Thigh Clearance	5.5 – 6.1	6.0	Yes
G	Back of Elbow to Wrist Pivot	11.4 – 12.0	11.5	Yes
H	Head Back to Backline	1.6 – 1.8	1.7	Yes
I	Shoulder to Elbow Length	13.0 – 13.6	13.3	Yes
J	Elbow Rest Height	7.5 – 8.3	7.9	Yes
K	Buttock to Knee Length	22.8 – 23.8	23.5	Yes
L	Popliteal Height	16.9 – 17.9	17.2	Yes
M	Knee Pivot Height	19.1 – 19.7	19.1	Yes
N	Buttock Popliteal Length	17.8 – 18.8	18.5	Yes
O	Chest Depth without Jacket	8.4 – 9.0	8.5	Yes
P	Foot Length (right)	9.9 – 10.5	10.2	Yes
V	Shoulder Breadth	16.3 – 17.2	16.7	Yes
W	Foot Breadth	3.6 – 4.2	3.9	Yes
Y	Chest Circumference with Jacket	38.2 – 39.4	38.8	Yes
Z	Waist Circumference	32.9 – 34.1	33.4	Yes
AA	Reference Location (Chest Circumference)	16.9 – 17.1	17.0	Yes
BB	Reference Location (Waist Circumference)	8.9 – 9.1	9.0	Yes

Technician: AR

Date: 1/13/2012



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VERIFICATION REPORT

Test Name:	Head Drop	Revision:	10/1/2001
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 50'th		
ATD Serial Number:	064		
Test ID:		Test Date:	1/13/2012
Test Number:	1	Test Time:	10:53:02 AM

Component Part Number	Component Serial Number
Head Skin - 78051-228	7997

Test Parameters	Test Specifications	Test Results
Temperature	18.9 -- 25.6	21.4 deg C P
Humidity	10 -- 70	26 %RH P
Resultant Acceleration	225 -- 275	234 g P
Oscillation	0.0 -- 10.0	3.0 % P
Lateral Acceleration	-15.00 -- 15.00	-2.76 g P

All test parameters are within specifications

Technician: **A. Rudniski**

Supervisor: **D. Travale**

Test ID:

Test Time: **10:53:02 AM**

Test Date: **1/13/2012**



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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	P71271	8/12/2011
Endevco	7264-2000	P71281	8/12/2011
Endevco	7264-2000	P71298	8/12/2011

Test ID:

Test Time: 10:53:02 AM

Test Date: 1/13/2012

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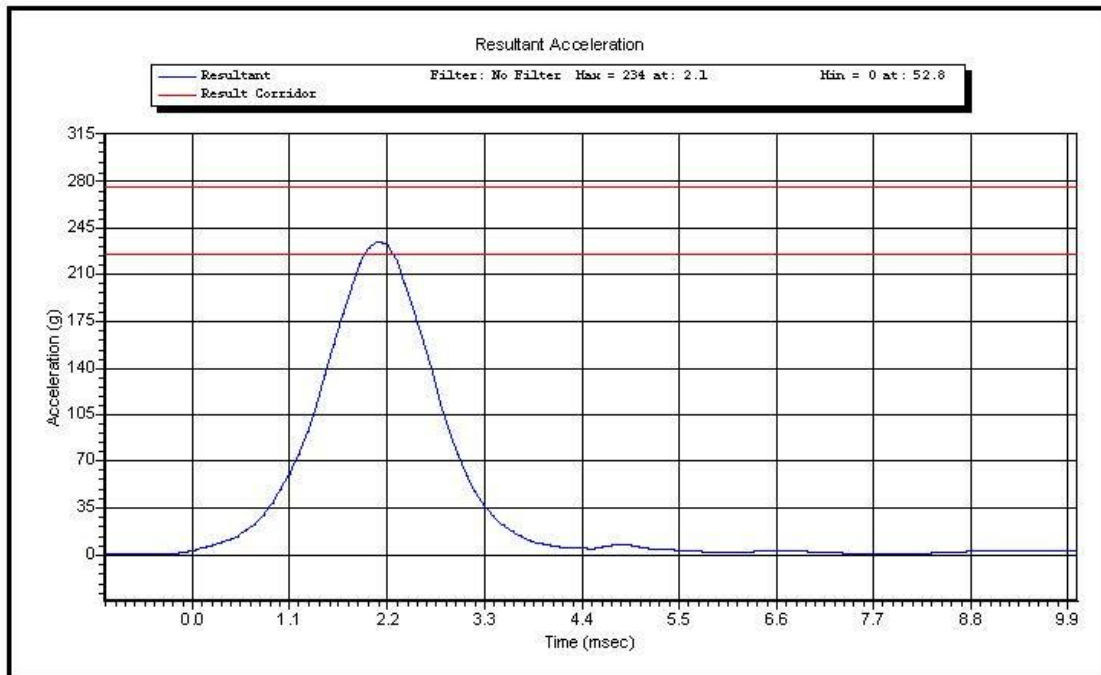


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Test Name:	Head Drop	Revision:	10/1/2001
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 50th		
ATD Serial Number:	064		
Test ID:		Test Date:	1/13/2012
Test Number:	1	Test Time:	10:53:02 AM



Test ID:

Test Time: 10:53:02 AM

Test Date: 1/13/2012

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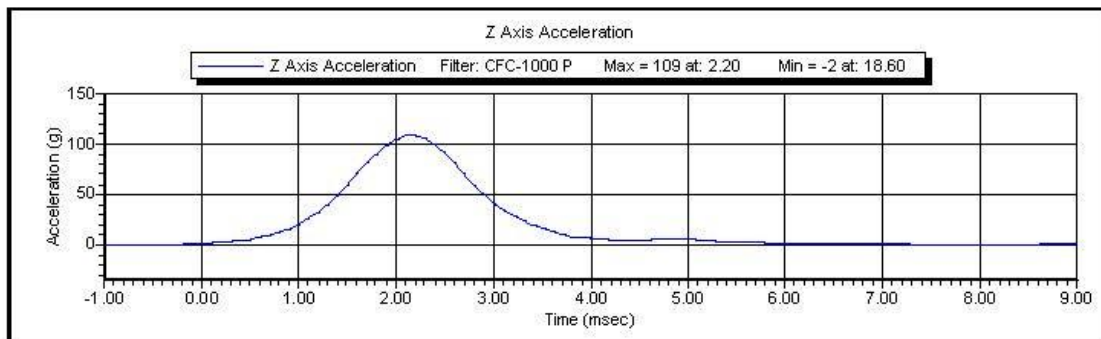
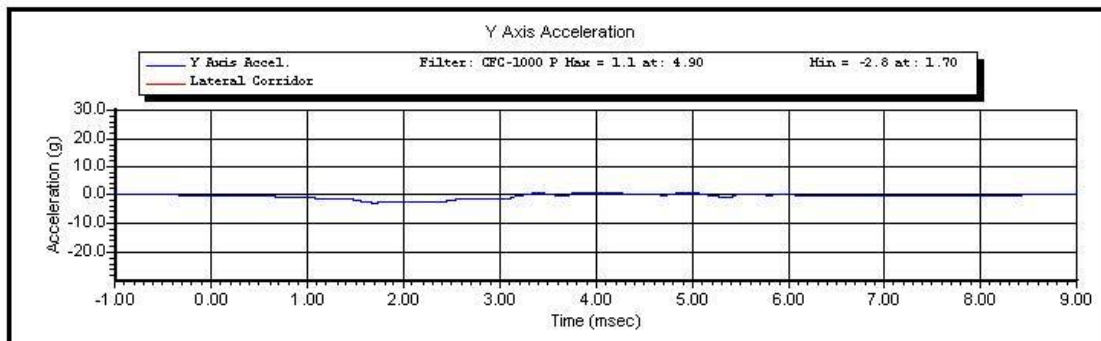
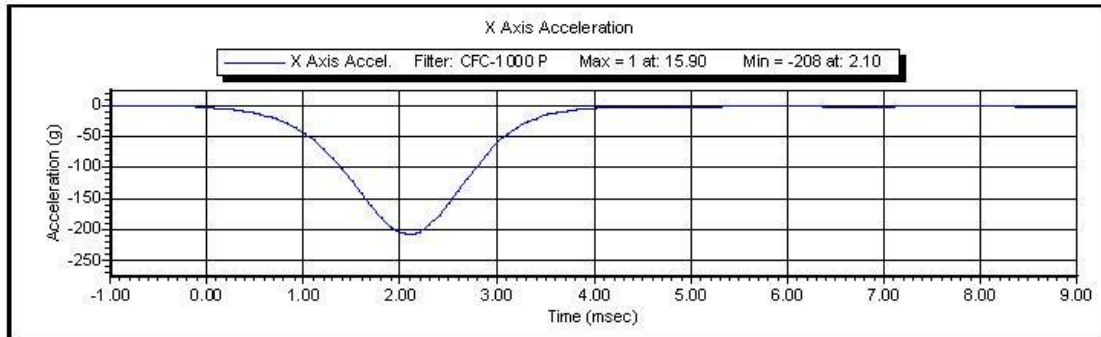
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Test ID:

Test Time: 10:53:02 AM

Test Date: 1/13/2012

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VERIFICATION REPORT

Test Name:	Neck Extension	Revision:	10/1/2001
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 50th		
ATD Serial Number:	064		
Test ID:		Test Date:	1/16/2012
Test Number:	1	Test Time:	1:20:41 PM

Component Part Number	Component Serial Number
Neck - 78051-336	02-1692

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.2 deg C P
Humidity	10 -- 70	17 %RH P
Velocity	5.94 -- 6.19	6.12 m/s P
Pendulum Deceleration at 10 ms	17.2 -- 21.2	19.7 g P
Pendulum Deceleration at 20 ms	14.0 -- 19.0	16.2 g P
Pendulum Deceleration at 30 ms	11.0 -- 16.0	12.7 g P
Max Pendulum Deceleration after 30 ms	0.0 -- 22.0	14.5 g P
Decel Time to 5 g	38.0 -- 46.0	40.5 ms P
D Plane Rotation	81.0 -- 106.0	96.6 degrees P
Time at Max Rotation	72.0 -- 82.0	76.9 ms P
Rotation Decay to Zero	147.0 -- 174.0	154.6 ms P
Moment About Occipital Condyle	-80.0 -- -52.9	-68.1 Nm P
Time at Max Moment	65.0 -- 79.0	73.0 ms P
Moment Decay to Zero	120.0 -- 148.0	141.2 ms P

All test parameters are within specifications

Technician: **S. Zito**

Supervisor: **D. Travale**

Test ID:

Test Time: **1:20:41 PM**

Test Date: **1/16/2012**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2012
Endevco	7231CT	C16510	10/3/2011
DentonATD	78051-342	PENDULUM POT	2/7/2011
DentonATD	78051-342	CONDYLE POT	2/7/2011
Denton	1716A	LC-2186 My	6/3/2011
Denton	1716A	LC-2186 Fx	6/3/2011

Test ID:

Test Time: 1:20:41 PM

Test Date: 1/16/2012

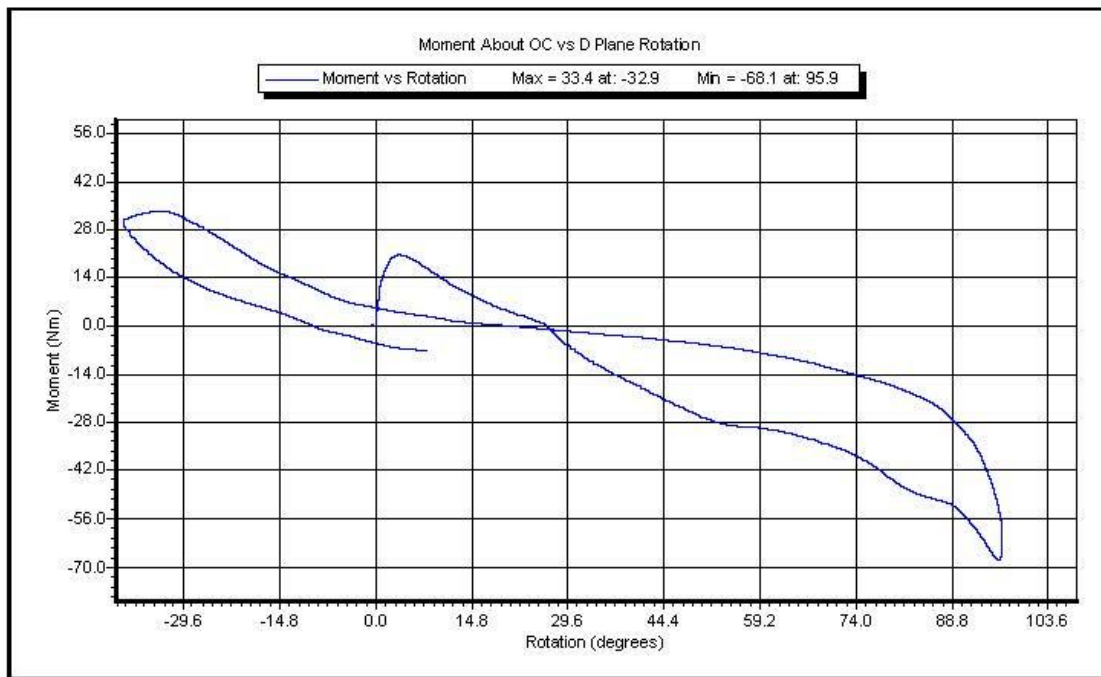


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Name of Test:	Neck Extension	REVISION:	10/1/2001
Name of Sub Test:		Type of Spec:	NHTSA
Type of ATD:	Hybrid III 50th		
ATD Serial Number:	064		
ID of Test:		Date:	1/16/2012
Number of Test:	1	Time of Test:	1:20:41 PM



ID of Test:

Time of Test: 1:20:41 PM

Date of Test: 1/16/2012

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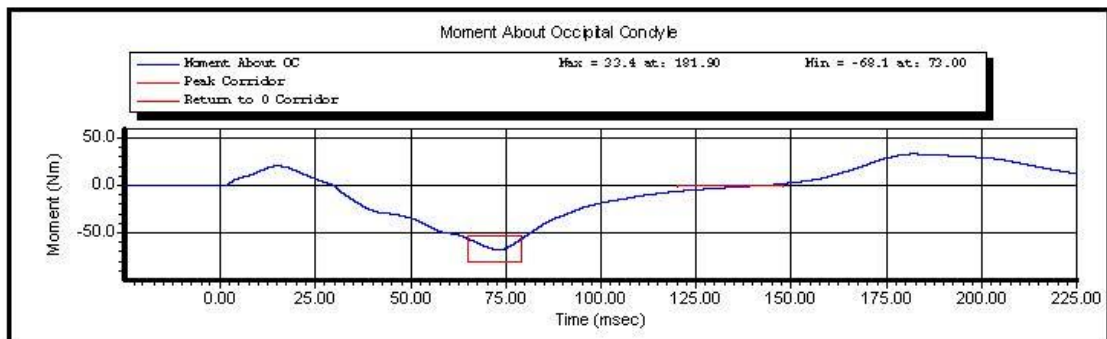
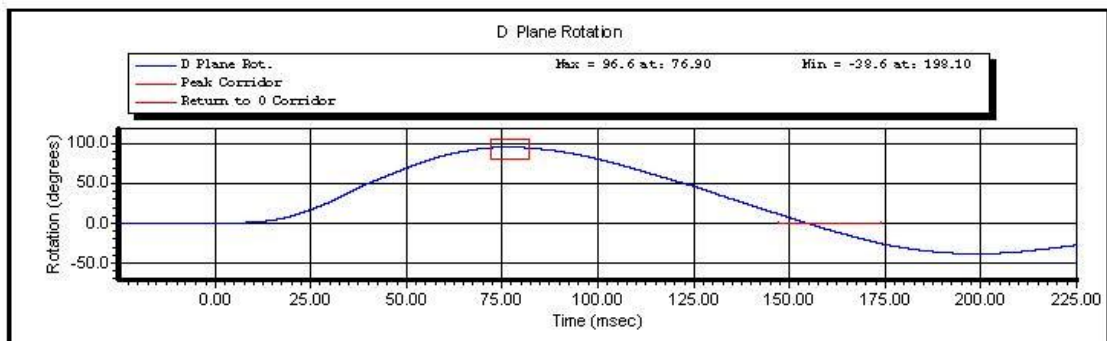
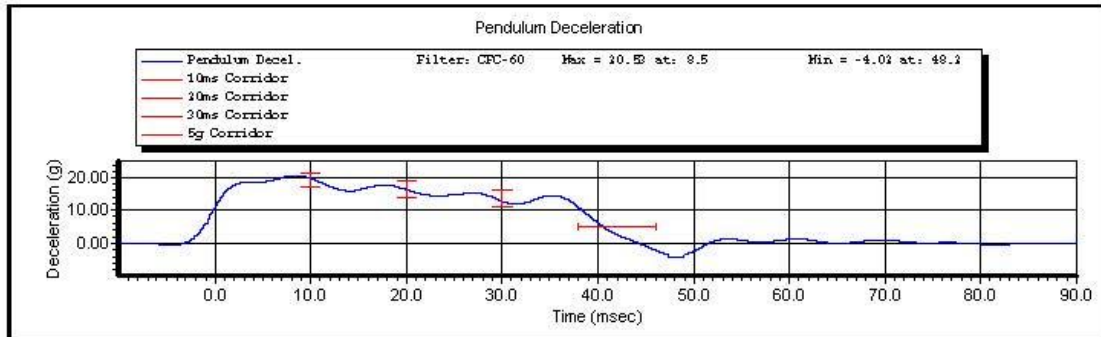
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ID of Test:

Time of Test: 1:20:41 PM

Date of Test: 1/16/2012

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VERIFICATION REPORT

Test Name:	Neck Flexion	Revision:	10/1/2001
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 50th		
ATD Serial Number:	064		
Test ID:		Test Date:	1/16/2012
Test Number:	2	Test Time:	10:33:25 AM

Component Part Number	Component Serial Number
Neck - 78051-336	02-1692

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.8 deg C P
Humidity	10 -- 70	16 %RH P
Velocity	6.89 -- 7.13	7.04 m/s P
Pendulum Deceleration at 10 ms	22.5 -- 27.5	24.2 g P
Pendulum Deceleration at 20 ms	17.6 -- 22.6	20.7 g P
Pendulum Deceleration at 30 ms	12.5 -- 18.5	15.2 g P
Max Pendulum Deceleration After 30 ms	0.0 -- 29.0	15.2 g P
Deceleration time to 5 g	34.0 -- 42.0	38.2 ms P
D Plane Rotation	-78.0 -- -64.0	-73.0 degrees P
Time at max rotation	57.0 -- 64.0	58.9 ms P
Rotation Decay to Zero	113.0 -- 128.0	115.5 ms P
Moment about OC	88.1 -- 108.4	93.2 Nm P
Time at Max Moment	47.0 -- 58.0	51.5 ms P
Moment Decay to Zero	97.0 -- 107.0	103.5 ms P

All test parameters are within specifications

Technician: **S. Zito**

Supervisor: **D. Travale**

Test ID:

Test Time: **10:33:25 AM**

Test Date: **1/16/2012**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2012
Endevco	7231CT	C16510	10/3/2011
DentonATD	78051-342	PENDULUM POT	2/7/2011
DentonATD	78051-342	CONDYLE POT	2/7/2011
Denton	1716A	LC-2186 My	6/3/2011
Denton	1716A	LC-2186 Fx	6/3/2011

Test ID:

Test Time: 10:33:25 AM

Test Date: 1/16/2012

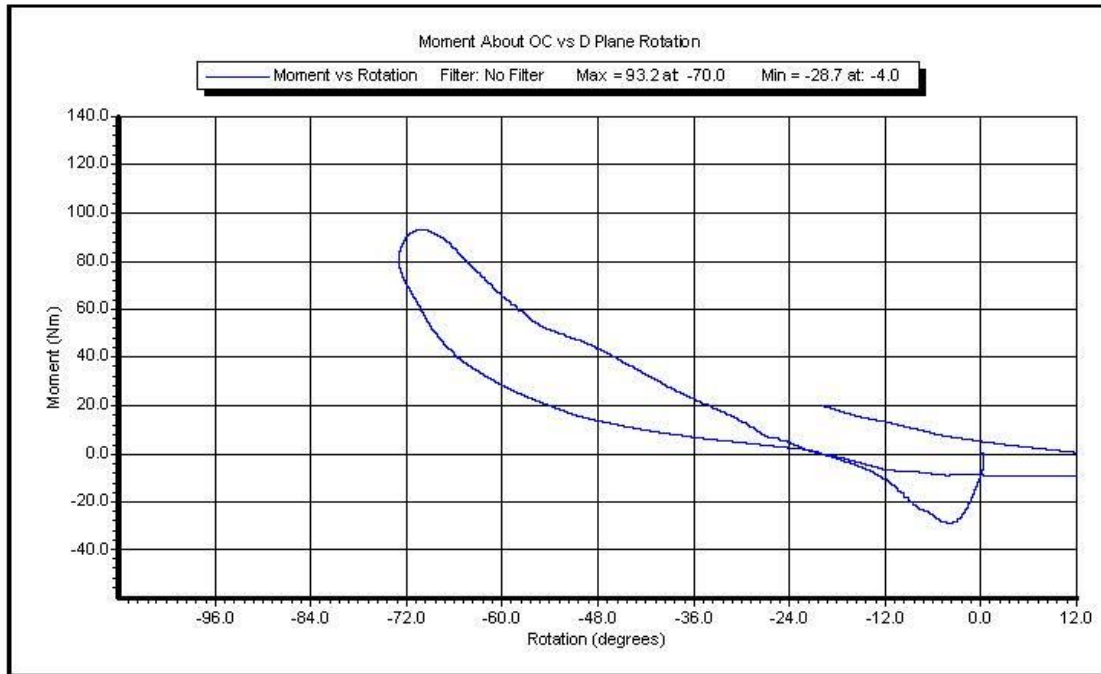


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Name of Test:	Neck Flexion	REVISION:	10/1/2001
Name of Sub Test:		Type of Spec:	NHTSA
Type of ATD:	Hybrid III 50 th		
ATD Serial Number:	064		
ID of Test:		Date:	1/16/2012
Number of Test:	2	Time of Test:	10:33:25 AM



ID of Test:

Time of Test: 10:33:25 AM

Date of Test: 1/16/2012

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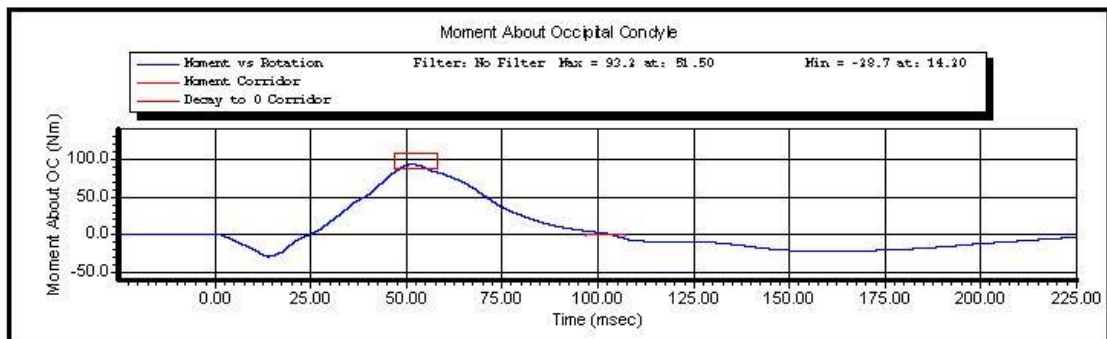
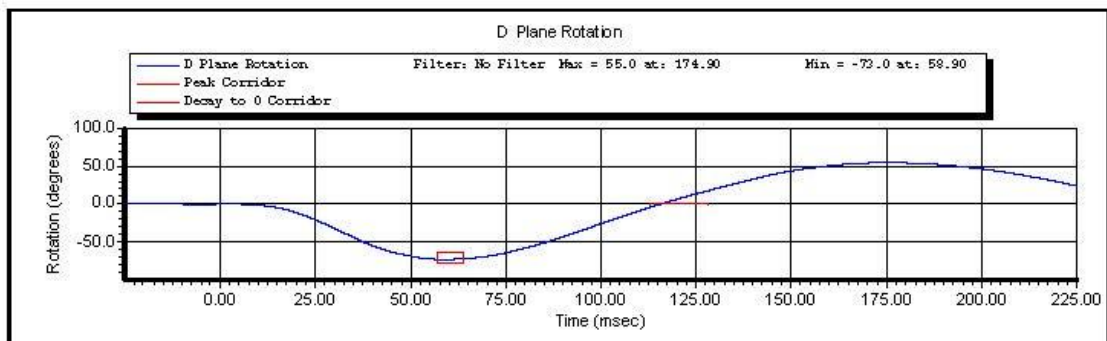
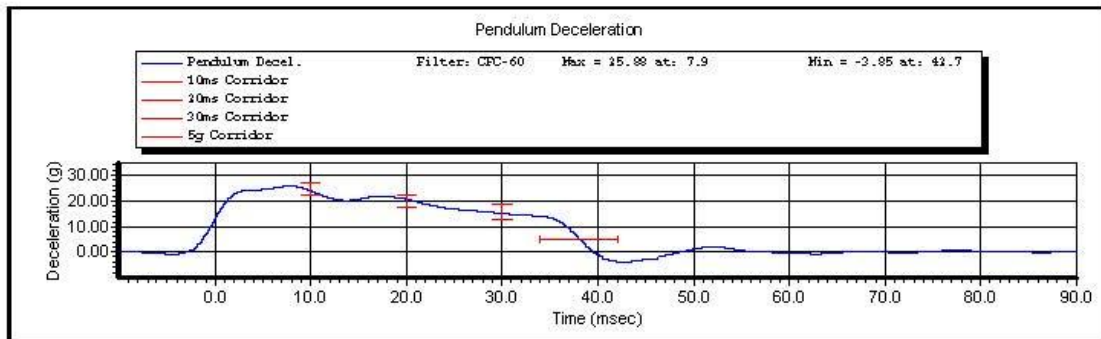
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ID of Test:

Time of Test: 10:33:25 AM

Date of Test: 1/16/2012

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VERIFICATION REPORT

Test Name:	Thorax Impact	Revision:	10/1/2001
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 50th		
ATD Serial Number:	064		
Test ID:		Test Date:	1/17/2012
Test Number:	2	Test Time:	10:08:44 AM

Component Part Number	Component Serial Number
Ribs 78051-RS	3964
Chest Jacket - 78051-169	2814

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.2 deg C P
Humidity	10.0 -- 70.0	34.1 %RH P
Velocity	6.59 -- 6.83	6.75 m/s P
Resistive Force	-5.894 -- -5.160	-5.712 kN P
Sternum Displacement	-72.6 -- -63.5	-63.9 mm P
Hysteresis	69 -- 85	77 % P

All test parameters are within specifications

Technician: **A. Rudniski**

Supervisor: **D. Travale**

Test ID:

Test Time: **10:08:44 AM**

Test Date: **1/17/2012**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2012
Endevco	7231CT	AGHF5	1/3/2012
DentonATD	78051-342	DS-064	10/13/2011

Test ID:

Test Time: 10:08:44 AM

Test Date: 1/17/2012

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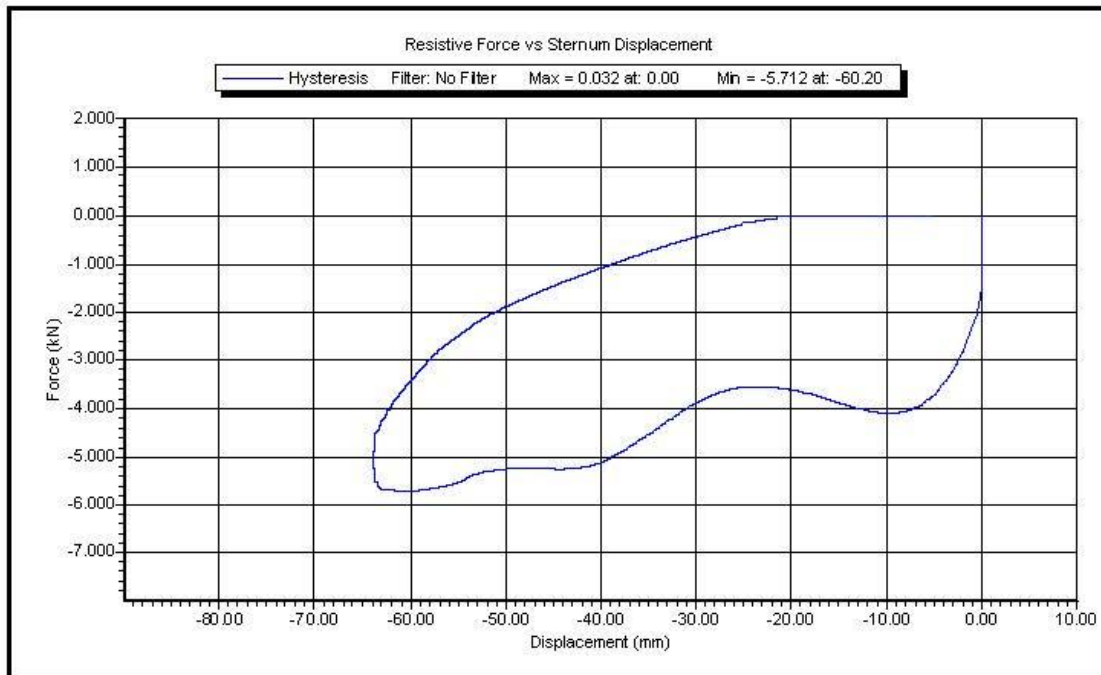


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Test Name:	Thorax Impact	Revision:	10/1/2001
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 50th		
ATD Serial Number:	064		
Test ID:		Test Date:	1/17/2012
Test Number:	2	Test Time:	10:08:44 AM



Test ID:

Test Time: 10:08:44 AM

Test Date: 1/17/2012

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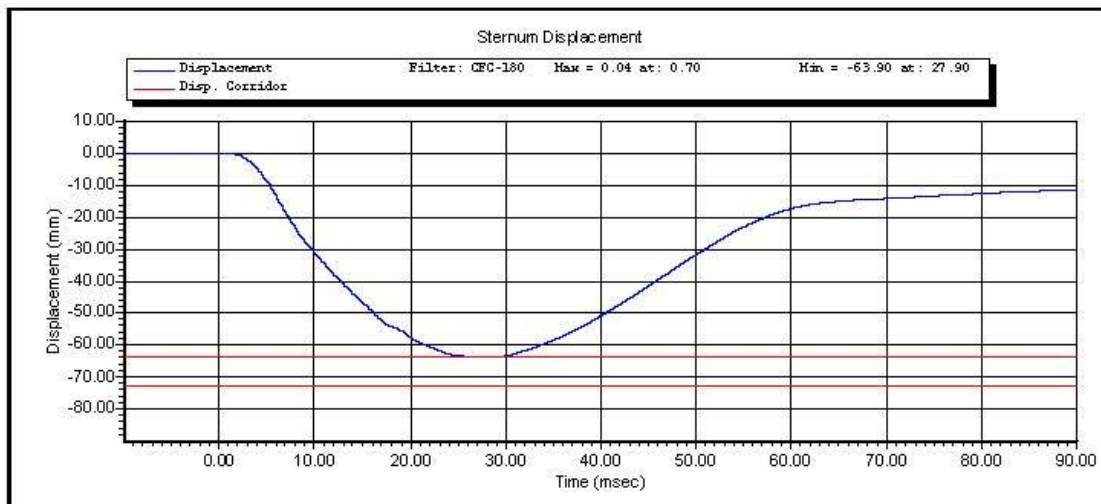
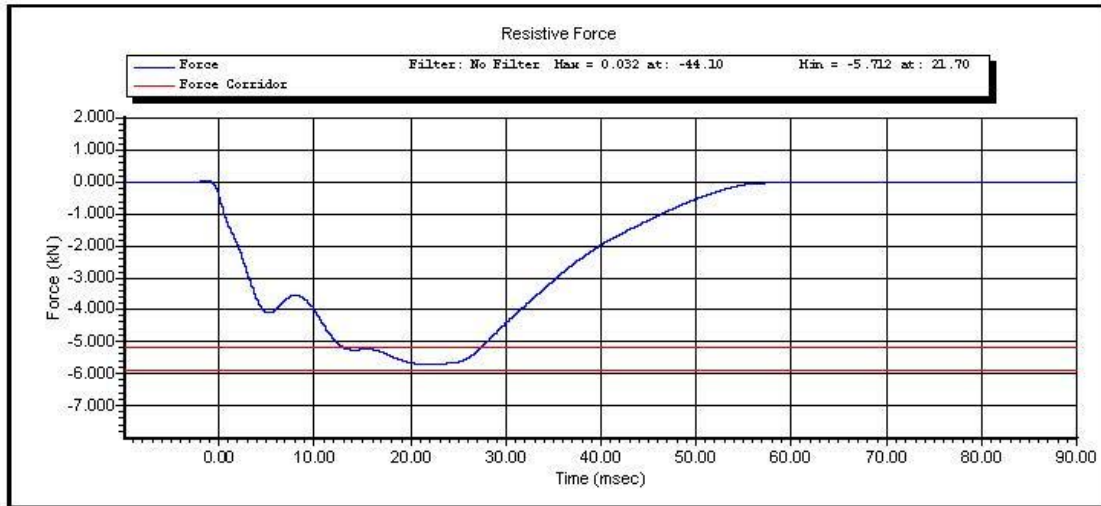
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Test ID:

Test Time: 10:08:44 AM

Test Date: 1/17/2012

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2 of 2

CALSPAN

Hybrid III Hip Range of Motion: Hybrid III 50th Male

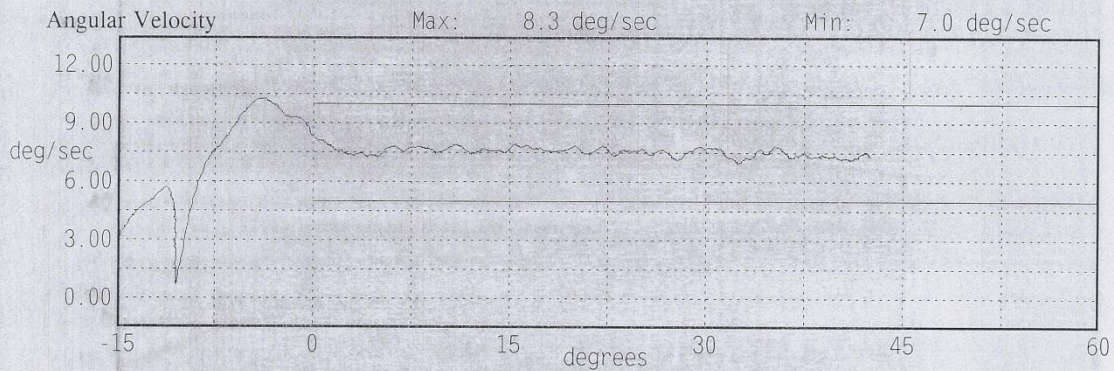
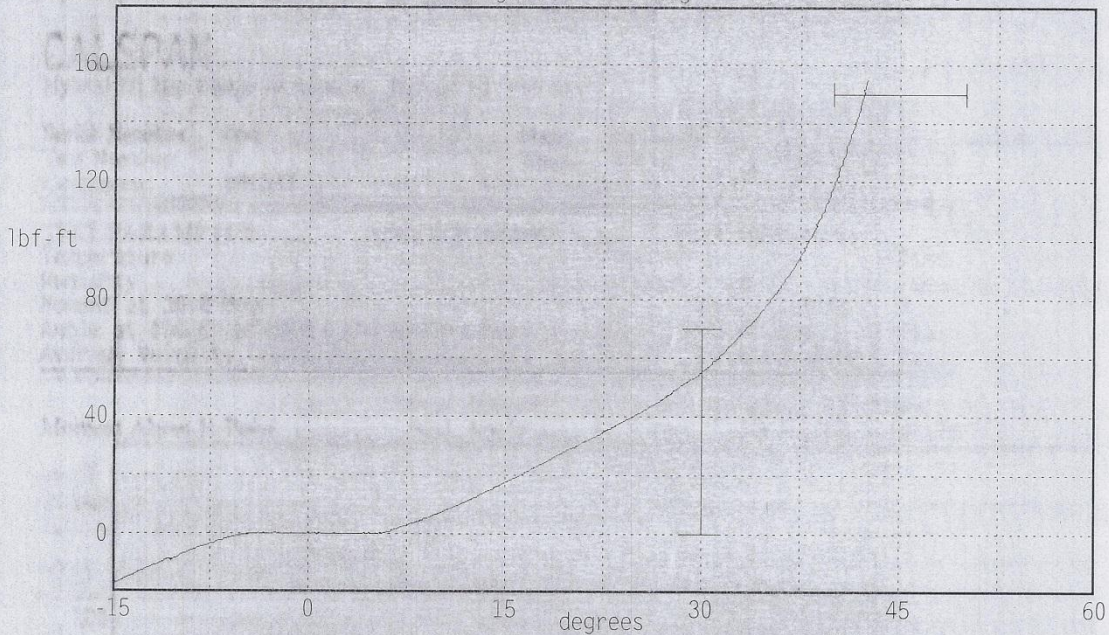
Serial Number: 064
Test Number: 1
Comments: RIGHT

Date: 01/16/2012
Time: 09:11

Version: 1.6.3

TEST PARAMETER	SPECIFICATION	TEST RESULTS	
Temperature	66.0 - 78.0	71.1 °F	Pass
Humidity	10 - 70	16 %	Pass
Moment at 30.0 deg	<= 70.0	55.2 lbf-ft	Pass
Angle at 150.0 lbf-ft	40.0 - 50.0	42.4 deg	Pass
Average Velocity	5.0 - 10.0	7.5 deg/sec	Pass

Moment About H-Point
Peak Moment: 155.0 lbf-ft at 42.5 deg
Peak Angle: 42.5 deg at 155.0 lbf-ft



CALSPAN

Hybrid III Hip Range of Motion: Hybrid III 50th Male

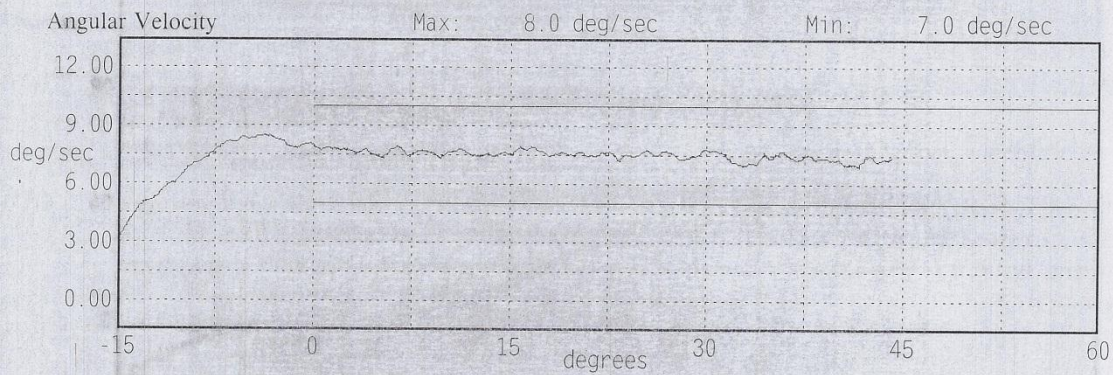
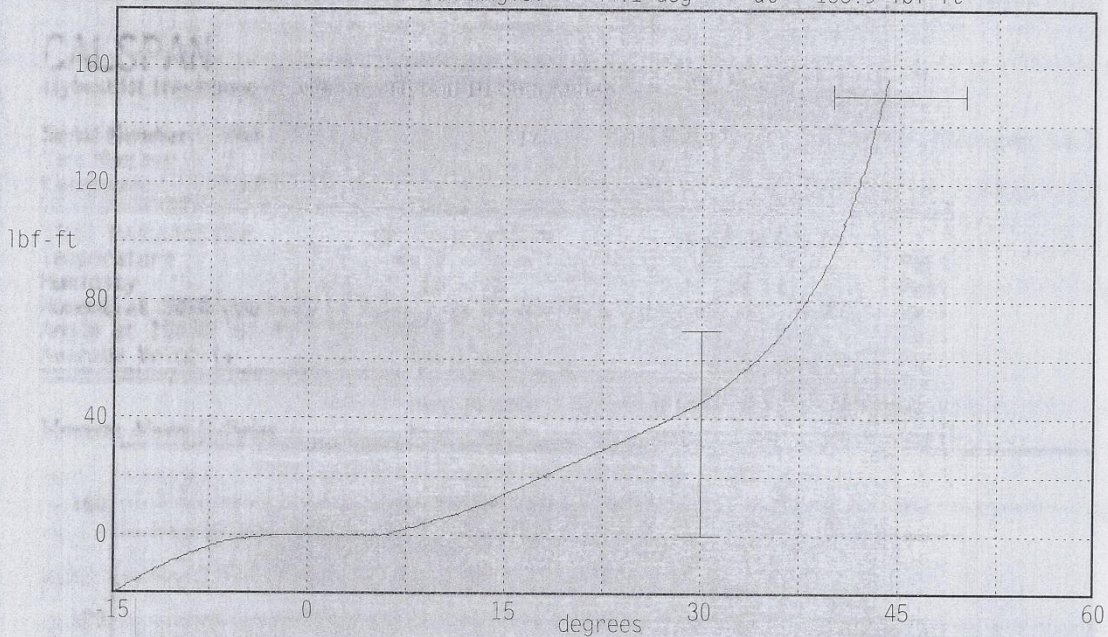
Serial Number: 064
Test Number: 2
Comments: LEFT

Date: 01/16/2012
Time: 09:34

Version: 1.6.3

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	66.0 - 78.0	71.1 °F Pass
Humidity	10 - 70	16 % Pass
Moment at 30.0 deg	<= 70.0	45.6 lbf-ft Pass
Angle at 150.0 lbf-ft	40.0 - 50.0	43.8 deg Pass
Average Velocity	5.0 - 10.0	7.5 deg/sec Pass

Moment About H-Point
Peak Moment: 155.9 lbf-ft at 44.1 deg
Peak Angle: 44.1 deg at 155.9 lbf-ft





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VERIFICATION REPORT

Test Name:	Knee Impact PENDULUM	Revision:	10/1/2001
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 50'th		
ATD Serial Number:	064		
Test ID:	Left Knee	Test Date:	1/17/2012
Test Number:	1	Test Time:	11:22:24 AM

Component Part Number	Component Serial Number
Knee Skin - 78051(L)	2792

Test Parameters	Test Specifications	Test Results
Temperature	18.9 -- 25.6	22.1 deg C P
Humidity	10.0 -- 70.0	35.1 %RH P
Velocity	2.07 -- 2.13	2.13 m/s P
Resistive Force	-5.78 -- -4.72	-4.81 kN P

All test parameters are within specifications

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

Test ID: **Left Knee**

Test Time: **11:22:24 AM**

Test Date: **1/17/2012**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD Endevco	Velocity Trap 7264-2000	1 P66927	1/11/2012 12/10/2011

Test ID: **Left Knee**

Test Time: **11:22:24 AM**

Test Date: **1/17/2012**

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2 of 2

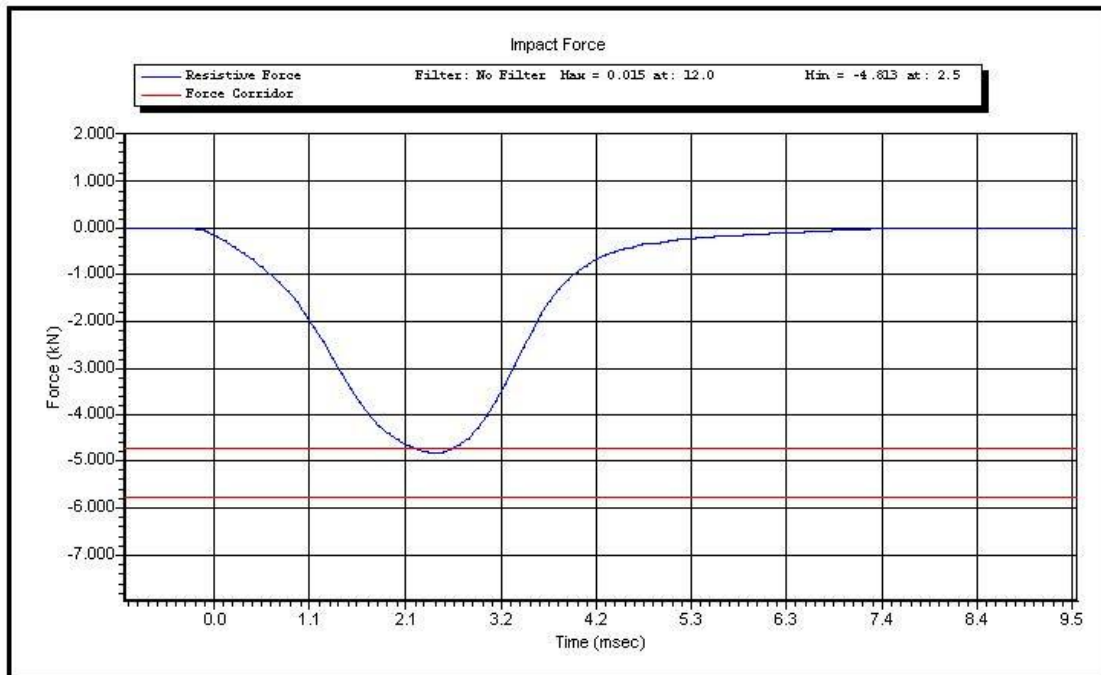


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Test Name:	Knee Impact PENDULUM	Revision:	10/1/2001
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 50th		
ATD Serial Number:	064		
Test ID:	Left Knee	Test Date:	1/17/2012
Test Number:	1	Test Time:	11:22:24 AM



Test ID: **Left Knee**

Test Time: **11:22:24 AM**

Test Date: **1/17/2012**

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VERIFICATION REPORT

Test Name:	Knee Impact PENDULUM	Revision:	10/1/2001
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 50'th		
ATD Serial Number:	064		
Test ID:	Right Knee	Test Date:	1/17/2012
Test Number:	1	Test Time:	11:09:22 AM

Component Part Number	Component Serial Number
Knee Skin - 780516(R)	2880

Test Parameters	Test Specifications	Test Results
Temperature	18.9 -- 25.6	22.1 deg C P
Humidity	10.0 -- 70.0	35.1 %RH P
Velocity	2.07 -- 2.13	2.12 m/s P
Resistive Force	-5.78 -- -4.72	-5.10 kN P

All test parameters are within specifications

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

Test ID: **Right Knee**

Test Time: **11:09:22 AM**

Test Date: **1/17/2012**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD Endevco	Velocity Trap 7264-2000	1 P66927	1/11/2012 12/10/2011

Test ID: **Right Knee**

Test Time: **11:09:22 AM**

Test Date: **1/17/2012**

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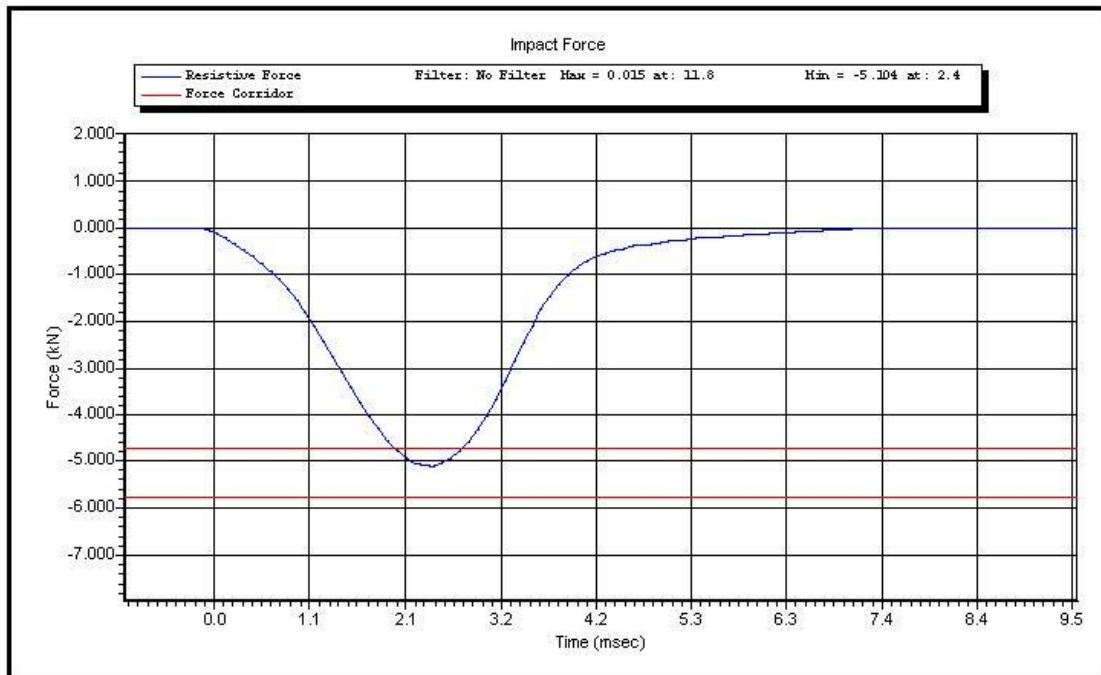


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Test Name:	Knee Impact PENDULUM	Revision:	10/1/2001
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 50th		
ATD Serial Number:	064		
Test ID:	Right Knee	Test Date:	1/17/2012
Test Number:	1	Test Time:	11:09:22 AM



Test ID: **Right Knee**

Test Time: **11:09:22 AM**

Test Date: **1/17/2012**

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CALIBRATION TEST RESULTS

POST-TEST

RIGHT-FRONT PASSENGER DUMMY

S/N: 143



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External Measurements

5th Female SN 143

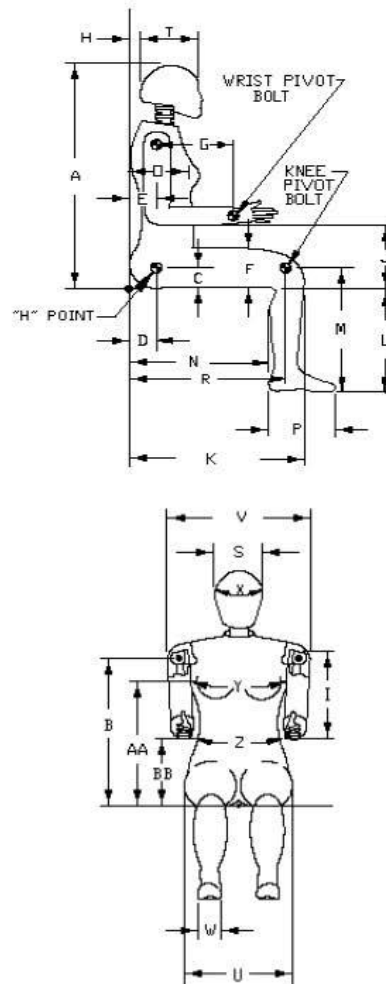
Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Sitting Height	774.7 – 800.1	785	Yes
B	Shoulder Pivot Height	431.8 – 457.2	447	Yes
C	H-Point Height	81.3 – 86.3	84	Yes
D	H-Point from Backline	144.8 – 149.8	147	Yes
E	Shoulder Pivot from Backline	68.6 – 83.8	77	Yes
F	Thigh Clearance	119.4 – 134.6	128	Yes
G	Back of Elbow to Wrist Pivot	243.9 – 259.1	248	Yes
H	Head Back to Backline	43.2 – 48.2	47	Yes
I	Shoulder to Elbow Length	276.8 – 297.2	288	Yes
J	Elbow Rest Height	182.8 – 203.2	195	Yes
K	Buttock to Knee Length	520.7 – 546.1	543	Yes
L	Popliteal Height	355.6 – 376	360	Yes
M	Knee Pivot Height	393.7 – 419.1	402	Yes
N	Buttock Popliteal Length	414 – 439.4	431	Yes
O	Chest Depth without Jacket	175.3 – 190.5	183	Yes
P	Foot Length (right)	218.5 – 233.7	220	Yes
R	Buttock To Knee Pivot Length	457.2 – 482.6	474	Yes
S	Head Breadth	137.1 – 147.3	143	Yes
T	Head Depth	177.8 – 188	184	Yes
U	Hip Breadth	299.7 – 314.9	305	Yes
V	Shoulder Breadth	350.5 – 365.7	361	Yes
W	Foot Breadth	78.8 – 94	86	Yes
X	Head Circumference	528.3 – 548.7	544	Yes
Y	Chest Circumference with Jacket	850.9 – 881.3	869	Yes
Z	Waist Circumference	759.5 – 789.9	775	Yes
AA	Reference Location (Chest Circumference)	332.7 – 358.1	338	Yes
BB	Reference Location (Waist Circumference)	160.1 – 170.2	165	Yes

Technician: AR

Date: 1/24/2012

Hybrid 3 5th Female External Measurements

Reference Diagram





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VERIFICATION REPORT

Test Name:	Head Drop	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	143		
Test ID:		Test Date:	1/25/2012
Test Number:	1	Test Time:	3:00:59 PM

Component Part Number	Component Serial Number
Head Skin - 78051-228	05-0512

Test Parameters	Test Specifications	Test Results
Temperature	18.9 -- 25.6	21.8 deg C P
Humidity	10 -- 70	21 %RH P
Resultant Acceleration	250 -- 300	266 g P
Oscillation	0.0 -- 10.0	0.0 % P
Lateral Acceleration	-15.00 -- 15.00	-1.79 g P

All test parameters are within specifications

Technician: S. Zito

Supervisor: D. Travale

Test ID:

Test Time: **3:00:59 PM**

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



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Endevco	7264-2000	P58998	1/12/2012
Endevco	7264-2000	P58912	1/12/2012
Endevco	7264-2000	P58997	1/12/2012

Test ID:

Test Time: 3:00:59 PM

Test Date: 1/25/2012

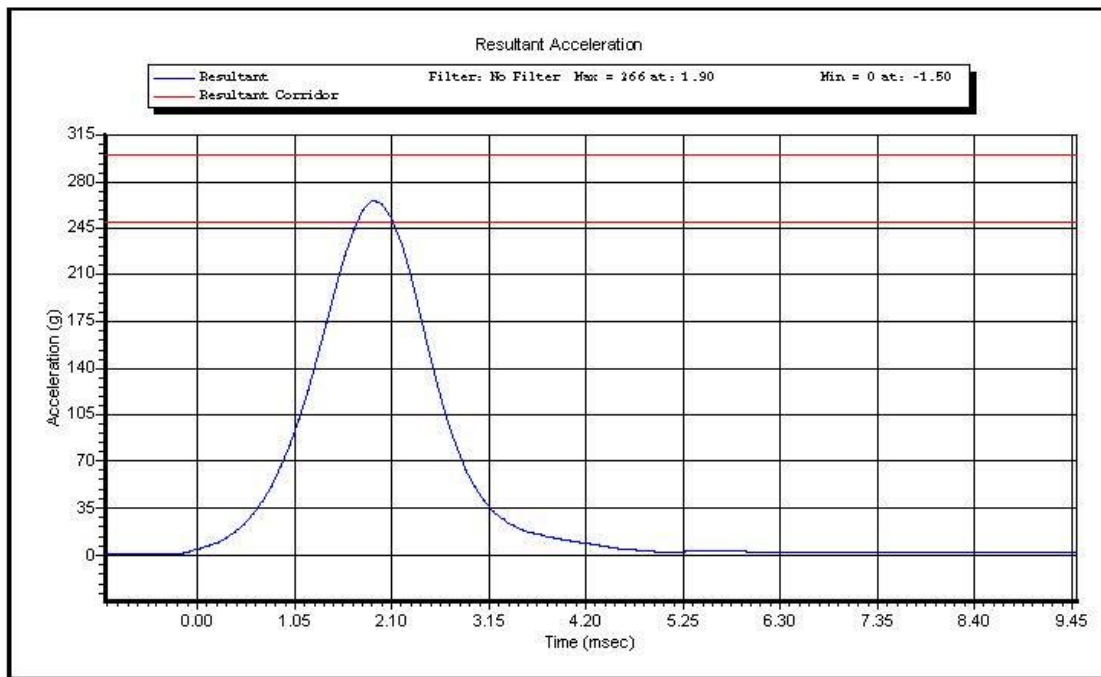


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Test Name:	Head Drop	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	143		
Test ID:		Test Date:	1/25/2012
Test Number:	1	Test Time:	3:00:59 PM



Test ID:

Test Time: 3:00:59 PM

Test Date: 1/25/2012

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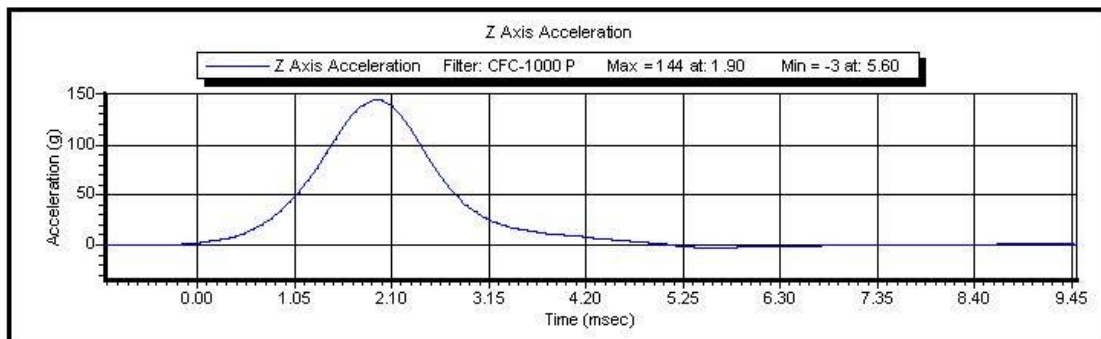
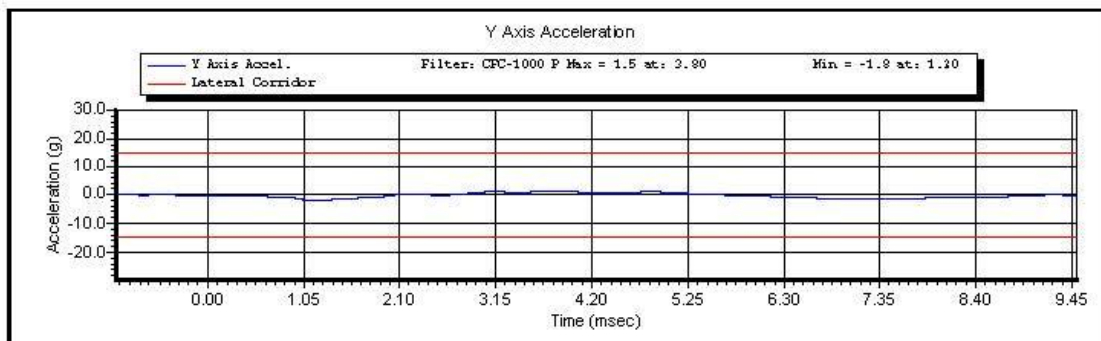
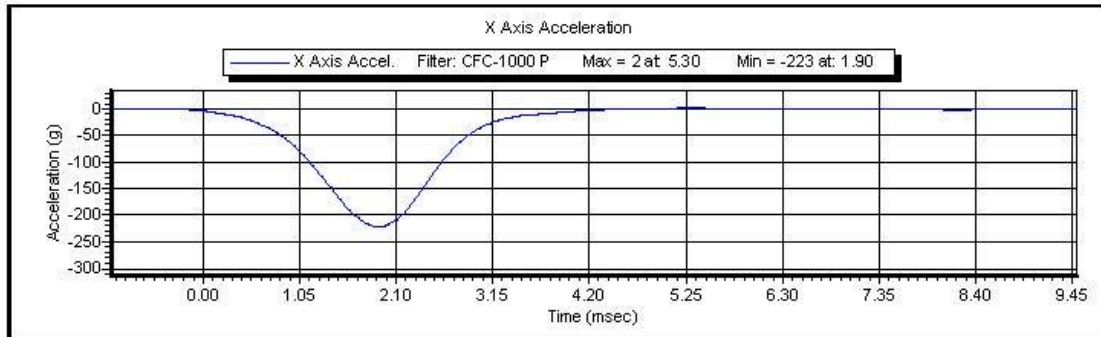
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Test ID:

Test Time: 3:00:59 PM

Test Date: 1/25/2012

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VERIFICATION REPORT

Test Name:	Neck Extension	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	143		
Test ID:		Test Date:	2/1/2012
Test Number:	1	Test Time:	9:37:22 AM

Component Part Number	Component Serial Number
Neck - 880105-255	050512

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.5 deg C P
Humidity	10 -- 70	37 %RH P
Velocity	5.95 -- 6.19	6.10 m/s P
Pendulum Impulse at 10 ms	1.50 -- 1.90	1.78 m/s P
Pendulum Impulse at 20 ms	3.10 -- 3.90	3.56 m/s P
Pendulum Impulse at 30 ms	4.60 -- 5.60	5.28 m/s P
D Plane Rotation	99.0 -- 114.0	102.1 degrees P
Moment During Rotation Interval	-65.0 -- -53.0	-54.3 Nm P
Moment Decay to -10.0 Nm	94.0 -- 114.0	103.0 ms P

All test parameters are within specifications

Technician: **A. Rudniski**

Supervisor: **D. Travale**

Test ID:

Test Time: **9:37:22 AM**

Test Date: **2/1/2012**

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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2012
Endevco	7231CT	C16510	10/3/2011
DentonATD	78051-342	PENDULUM POT	1/25/2012
DentonATD	78051-342	CONDYLE POT	1/25/2012
Denton	1716A	LC-2206My	8/31/2011
Denton	1716A	LC-2206Fx	8/31/2011

Test ID:

Test Time: **9:37:22 AM**

Test Date: **2/1/2012**

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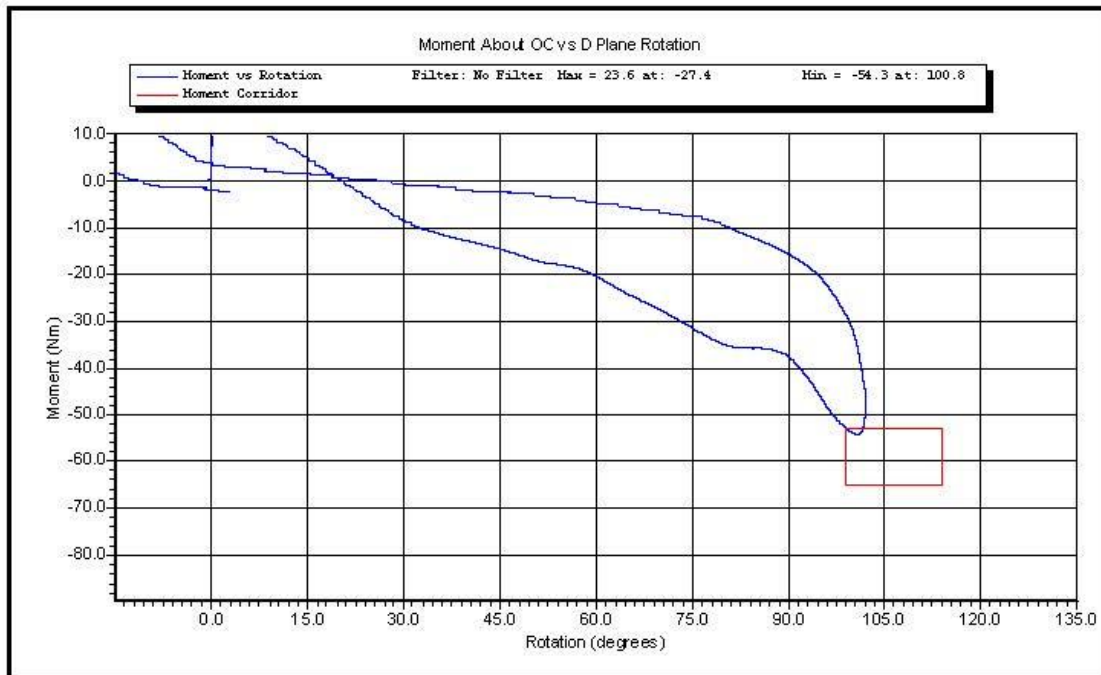


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Test Name:	Neck Extension	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	143		
Test ID:		Test Date:	2/1/2012
Test Number:	1	Test Time:	9:37:22 AM



Test ID:

Test Time: 9:37:22 AM

Test Date: 2/1/2012

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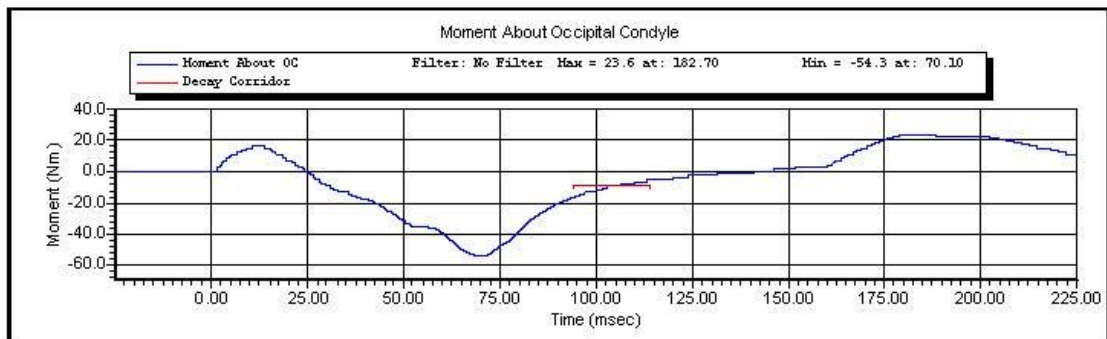
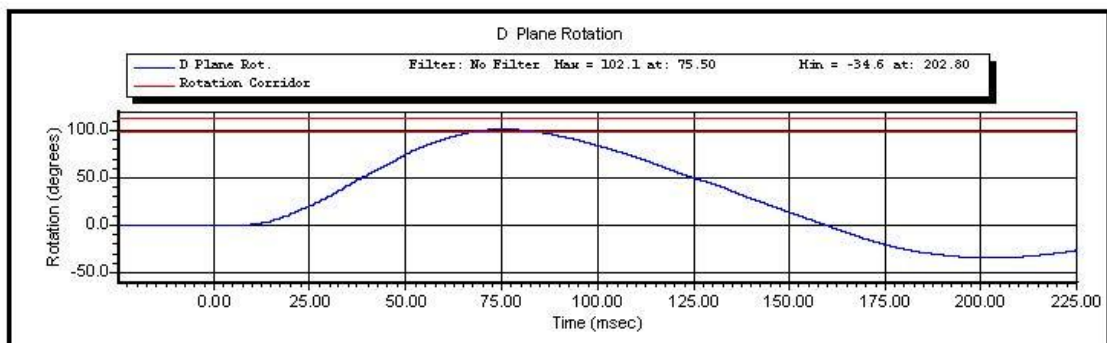
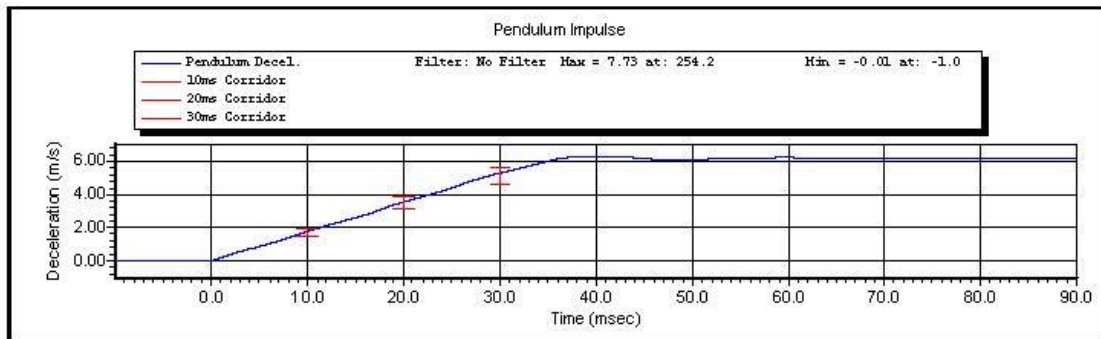
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Test ID:

Test Time: 9:37:22 AM

Test Date: 2/1/2012

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VERIFICATION REPORT

Test Name:	Neck Flexion	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	143		
Test ID:		Test Date:	1/31/2012
Test Number:	1	Test Time:	3:20:25 PM

Component Part Number	Component Serial Number
Neck - 880105-255	050512

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.3 deg C P
Humidity	10 -- 70	28 %RH P
Velocity	6.89 -- 7.13	7.10 m/s P
Pendulum Impulse at 10 ms	2.10 -- 2.50	2.24 m/s P
Pendulum Impulse at 20 ms	4.00 -- 5.00	4.54 m/s P
Pendulum Impulse at 30 ms	5.80 -- 7.00	6.45 m/s P
D Plane Rotation	-91.0 -- -77.0	-80.8 degrees P
Moment During Rotation Interval	69.0 -- 83.0	76.2 Nm P
Moment Decay to 10.0 Nm	80.0 -- 100.0	86.3 ms P

All test parameters are within specifications

Technician: **A. Rudniski**

Supervisor: **D. Travale**

Test ID:

Test Time: **3:20:25 PM**

Test Date: **1/31/2012**

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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2012
Endevco	7231CT	C16510	10/3/2011
DentonATD	78051-342	PENDULUM POT	1/25/2012
DentonATD	78051-342	CONDYLE POT	1/25/2012
Denton	1716A	LC-2206My	8/31/2011
Denton	1716A	LC-2206Fx	8/31/2011

Test ID:

Test Time: 3:20:25 PM

Test Date: 1/31/2012

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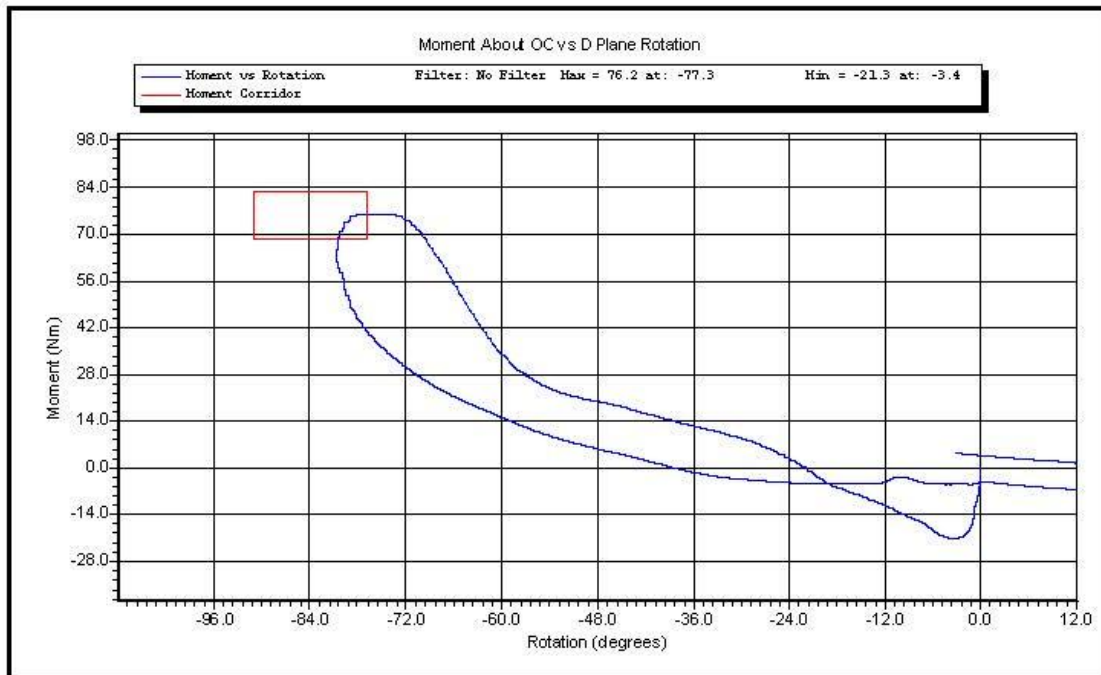


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Test Name:	Neck Flexion	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	143		
Test ID:		Test Date:	1/31/2012
Test Number:	1	Test Time:	3:20:25 PM



Test ID:

Test Time: 3:20:25 PM

Test Date: 1/31/2012

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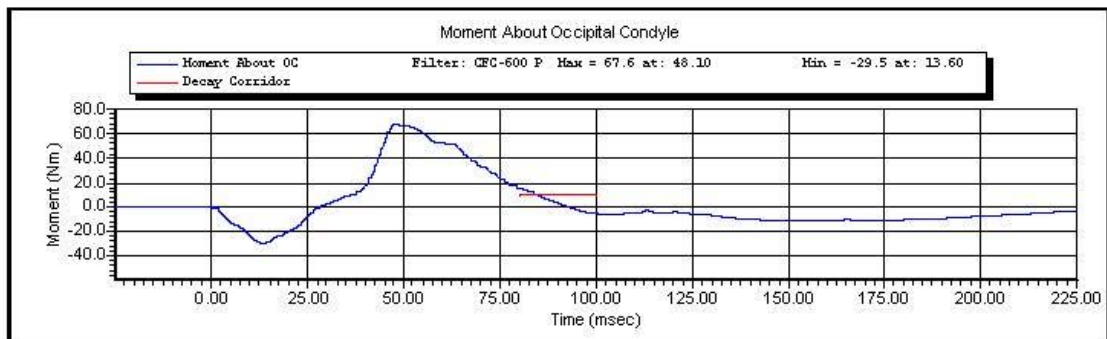
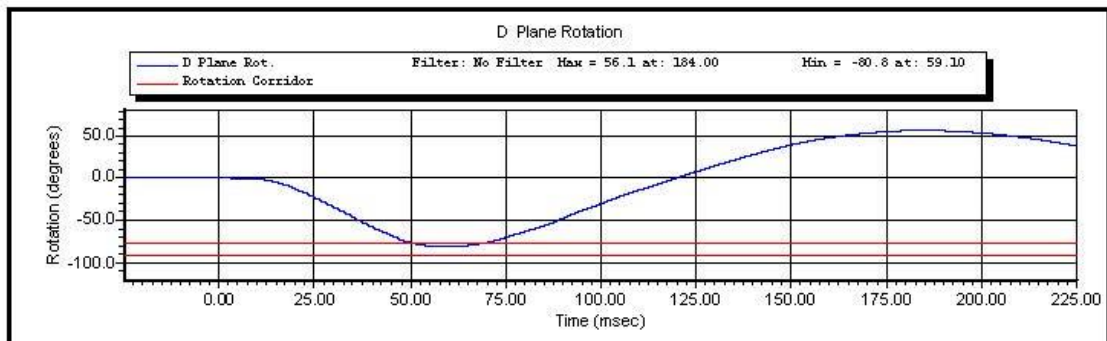
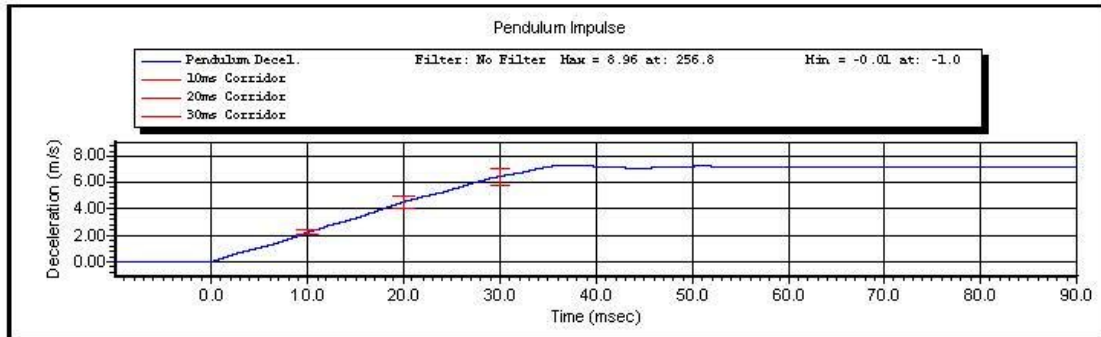
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Test ID:

Test Time: 3:20:25 PM

Test Date: 1/31/2012

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VERIFICATION REPORT

Test Name:	Thorax Impact	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	143		
Test ID:		Test Date:	1/30/2012
Test Number:	2	Test Time:	11:56:32 AM

Component Part Number	Component Serial Number
Ribs 880105-RS	05032021A
Chest Jacket - 880105-355-E	05855
Lumbar Spine - 880105-1095	050330

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.6 deg C P
Humidity	10.0 -- 70.0	19.0 %RH P
Velocity	6.59 -- 6.83	6.73 m/s P
Sternum Displacement	-58.0 -- -50.0	-56.4 mm P
Force During Displacement Interval	-4400 -- -3900	-4360 N P
Force -18.0 to -50.0 Displacement	-4600 -- 0	-4158 N P
Hysteresis	69 -- 85	70 % P

All test parameters are within specifications

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

Test ID:

Test Time: **11:56:32 AM**

Test Date: **1/30/2012**



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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	AGHF5	1/24/2012
DentonATD	H3CD	DS-143	12/10/2011
Endevco	7264-2000	P58884	10/31/2011

Test ID:

Test Time: 11:56:32 AM

Test Date: 1/30/2012

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Test Name:	Thorax Impact	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	143		
Test ID:		Test Date:	1/30/2012
Test Number:	2	Test Time:	11:56:32 AM



Test ID:

Test Time: 11:56:32 AM

Test Date: 1/30/2012

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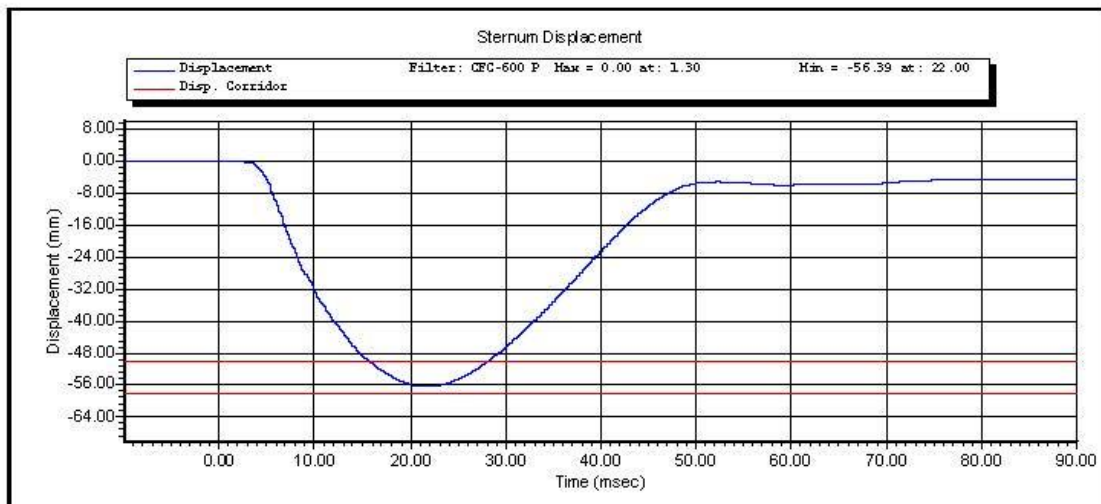
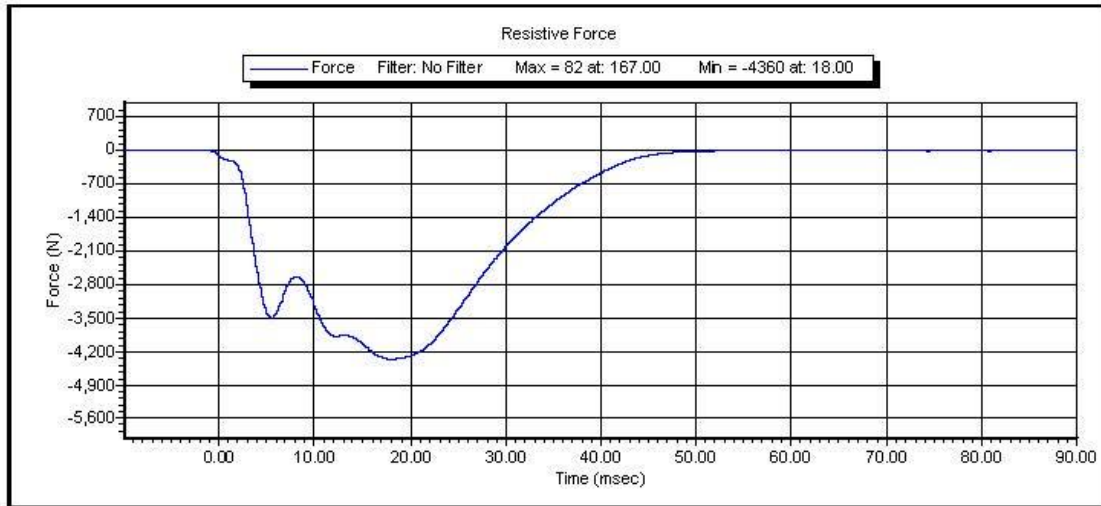
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Test ID:

Test Time: 11:56:32 AM

Test Date: 1/30/2012

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VERIFICATION REPORT

Test Name:	Knee Impact PENDULUM	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	143		
Test ID:	Left Knee	Test Date:	2/6/2012
Test Number:	1	Test Time:	2:59:30 PM

Component Part Number	Component Serial Number
Knee Skin - 880105-508	1687
Knee Insert - 880105-511	2189

Test Parameters	Test Specifications	Test Results
Temperature	18.9 -- 25.6	22.1 deg C P
Humidity	10.0 -- 70.0	27.7 %RH P
Velocity	2.07 -- 2.13	2.10 m/s P
Resistive Force	-4060 -- -3450	-3984 N P

All test parameters are within specifications

Technician: **S. Zito**

Supervisor: **D. Travale**

Test ID: **Left Knee**

Test Time: **2:59:30 PM**

Test Date: **2/6/2012**



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VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD Endevco	Velocity Trap 7264-2000	1 P66927	1/11/2012 12/10/2011

Test ID: **Left Knee**

Test Time: **2:59:30 PM**

Test Date: **2/6/2012**

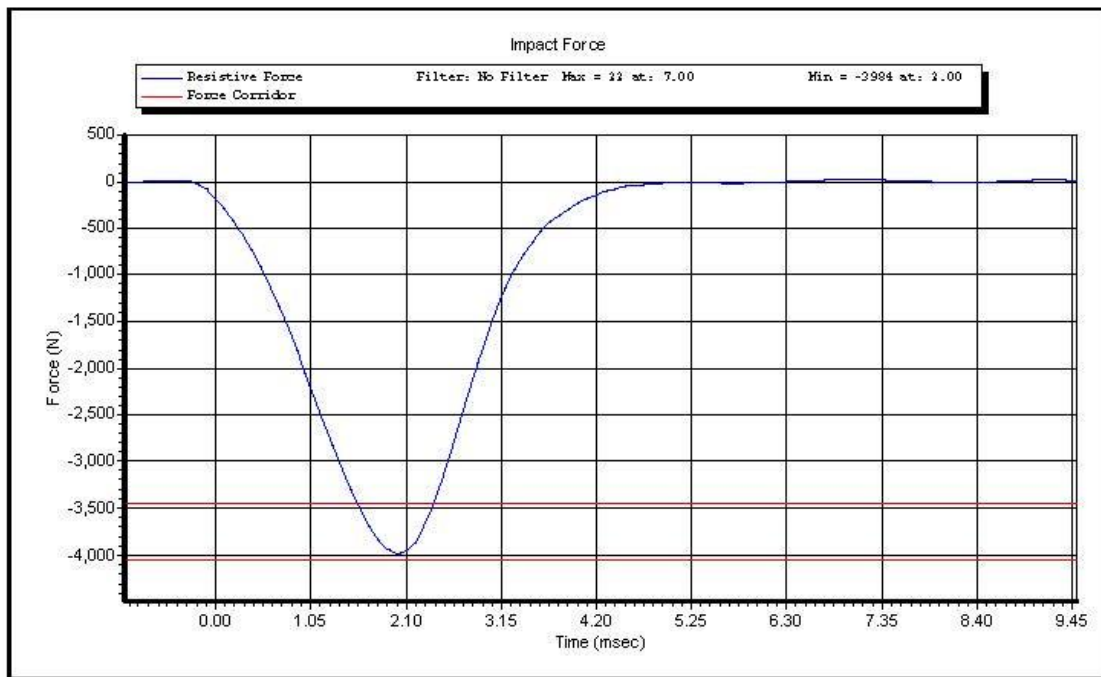


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Test Name:	Knee Impact PENDULUM	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	143		
Test ID:	Left Knee	Test Date:	2/6/2012
Test Number:	1	Test Time:	2:59:30 PM



Test ID: **Left Knee**

Test Time: **2:59:30 PM**

Test Date: **2/6/2012**

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VERIFICATION REPORT

Test Name:	Knee Impact PENDULUM	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	143		
Test ID:	Right Knee	Test Date:	2/7/2012
Test Number:	1	Test Time:	1:07:54 PM

Component Part Number	Component Serial Number
Knee Skin - 880105-508	1028
Knee Insert - 880105-511	2192

Test Parameters	Test Specifications	Test Results
Temperature	18.9 -- 25.6	21.4 deg C P
Humidity	10.0 -- 70.0	33.0 %RH P
Velocity	2.07 -- 2.13	2.09 m/s P
Resistive Force	-4060 -- -3450	-4002 N P

All test parameters are within specifications

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

Test ID: **Right Knee**

Test Time: **1:07:54 PM**

Test Date: **2/7/2012**



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REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD Endevco	Velocity Trap 7264-2000	1 P66927	1/11/2012 12/10/2011

Test ID: **Right Knee**

Test Time: **1:07:54 PM**

Test Date: **2/7/2012**

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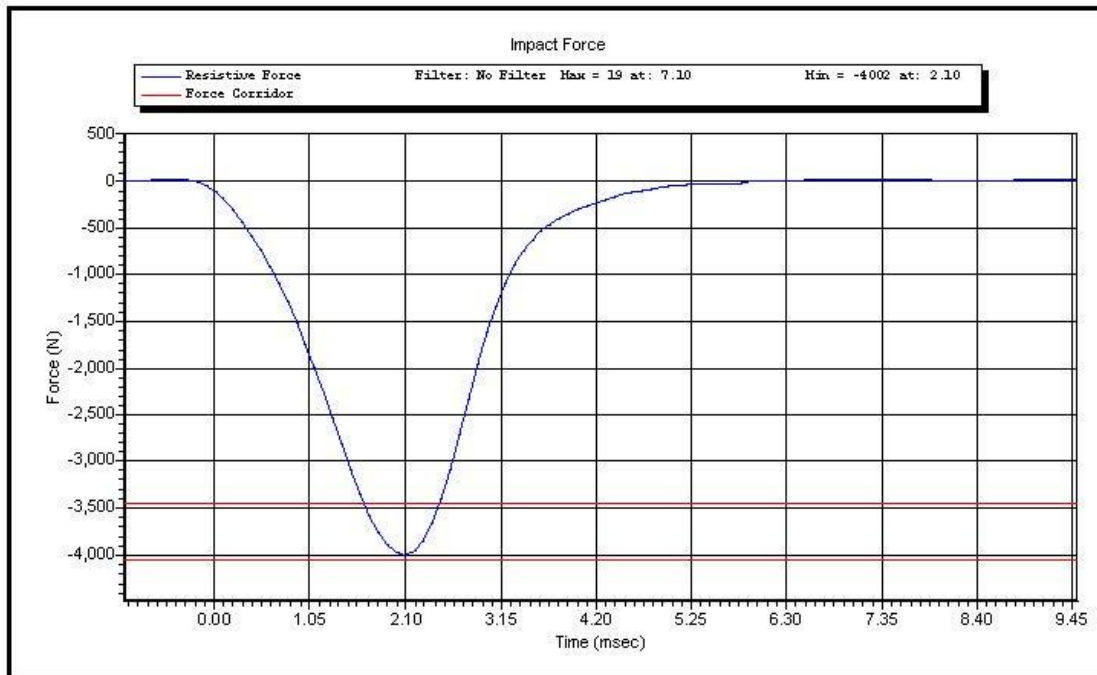


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Test Name:	Knee Impact PENDULUM	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	143		
Test ID:	Right Knee	Test Date:	2/7/2012
Test Number:	1	Test Time:	1:07:54 PM



Test ID: **Right Knee**

Test Time: **1:07:54 PM**

Test Date: **2/7/2012**

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