

REPORT NUMBER: NCAP-CAL-14-008

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

**Toyota Motor Manufacturing, Texas, Inc.
2014 Toyota Tundra Double Cab
Pickup Truck**

NHTSA No: M20145118

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



April 28, 2014

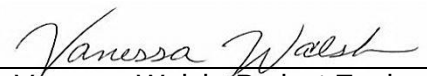
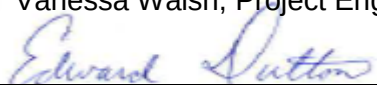
FINAL REPORT

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

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Prepared by:	 Vanessa Walsh, Project Engineer	Date:	<u>April 28, 2014</u>
Approved by:	 Edward J. Dutton, Test Engineer Director Transportation Test Operations	Date:	<u>April 28, 2014</u>

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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16. Abstract A 56.30 km/h (35 mph), NCAP Frontal Impact Test was conducted on a 2014 Toyota Tundra Double Cab pick up truck 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 Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on February 18, 2014. The impact velocity of the vehicle was 56.42 km/h, and the ambient temperature at the barrier face at the time of impact was 21°C. The target vehicle's maximum post-test static crush was 403 mm at the centerline. The test vehicle's occupant performance data is as follows: <table border="1"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th rowspan="2">Units</th> <th colspan="2">Driver ATD (Serial No. 064)</th> <th colspan="2">Passenger ATD (Serial No. 143)</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></td> <td>700</td> <td>821.87*</td> <td>700</td> <td>261.00</td> </tr> <tr> <td>Maximum Chest Compression</td> <td>mm</td> <td>63</td> <td>-31.14</td> <td>52</td> <td>-19.63</td> </tr> <tr> <td>Nij</td> <td></td> <td>1</td> <td>0.56</td> <td>1</td> <td>0.40</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>4,170</td> <td>1808.24</td> <td>2,620</td> <td>1033.65</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>4,000</td> <td>-447.39</td> <td>2,520</td> <td>-221.50</td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>10,008</td> <td>-3118.37</td> <td>6,805</td> <td>-2793.77</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>10,008</td> <td>-1882.05</td> <td>6,805</td> <td>-2209.99</td> </tr> </tbody> </table> <i>*A high driver dummy head injury value was measured in the frontal crash test, which indicates a higher likelihood of head injury. The agency plans to further evaluate this incident.</i>					Measurement Description	Units	Driver ATD (Serial No. 064)		Passenger ATD (Serial No. 143)		Threshold	Result	Threshold	Result	Head Injury Criteria (HIC ₁₅)		700	821.87*	700	261.00	Maximum Chest Compression	mm	63	-31.14	52	-19.63	Nij		1	0.56	1	0.40	Neck Tension	N	4,170	1808.24	2,620	1033.65	Neck Compression	N	4,000	-447.39	2,520	-221.50	Left Femur Force	N	10,008	-3118.37	6,805	-2793.77	Right Femur Force	N	10,008	-1882.05	6,805	-2209.99
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SECTION 1

PURPOSE AND SUMMARY OF TEST

PURPOSE

This 56.3 km/h 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. DTNH22-12-D-00260. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for consumer information purposes.

The 56.3 km/h frontal barrier impact test was conducted in accordance with the Office of Crashworthiness Standards Frontal NCAP Laboratory Test procedure, dated August 2013.

SUMMARY

A load cell barrier consisting of 36 load cells was impacted by a 2014 Toyota Tundra Double Cab pick up truck at a velocity of 56.42 km/h. The test was performed at Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on February 18, 2014. Pre- and post-test photographs of the vehicle and dummies to document the test 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 Data Sheet 6 of this report.

One Part 572E, 50th percentile male anthropomorphic test device (ATD), was placed in the driver seating position and one Part 572O 5th percentile female ATD was placed in the right-front passenger seating position 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 belts to measure the dummy's pelvic section loading. The driver (position 1) ATD (Serial No. 064) and the right-front passenger (position 2) ATD (Serial No. 143) were calibrated previous to this test. Certification details, along with instrumentation calibration data, can be found in Appendix C of this report.

The 136 channels of data were recorded on an on-board data acquisition system. Please refer to Appendix B for 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 a total of 0.0 grams of stoddard solvent leakage after the event and including all phases of the static rollover. The maximum static crush of the test vehicle was 403 mm at the centerline. During and after the impact event, the driver's and passenger's side doors were closed and operational.

The driver's visible contact points were as follows: The driver's head contacted the frontal airbag and then the head restraint and B-Pillar. The upper torso contacted the frontal airbag. Both knees contacted the knee airbag.

The passenger's visible contact points were as follows: The passenger's head contacted the frontal airbag and then the head restraint. The upper torso contacted the frontal airbag. Both knees contacted the knee airbag.

The occupant data is summarized below.

ATD Position	HIC ₁₅	Nij	Neck Tension (N)	Neck Comp. (N)	3ms Chest Clip (Gs)	Chest Disp. (mm)	Left Femur (N)	Right Femur (N)
Driver (50 th)	821.87*	0.56	1808.24	-447.39	48.58	-31.14	-3118.37	-1882.05
Passenger (5 th)	261.00	0.40	1033.65	-221.50	43.99	-19.63	-2793.77	-2209.99

**A high driver dummy head injury value was measured in the frontal crash test, which indicates a higher likelihood of head injury. The agency plans to further evaluate this incident.*

GENERAL COMMENTS:

1. P1 (Driver) serial number - 064
2. P2 (Passenger) serial number - 143

Data Anomalies:

- Engine Top X Acceleration, Questionable data after 50 ms
- Head X Acceleration, Questionable spike from 23 to 30 ms
- Right Lower Tibia X Moment, Questionable data after 82 ms
- Barrier Load Cell B3 Fx, Questionable data after 156 ms
- Barrier Load Cell B6 Fx, Questionable data throughout
- Barrier Load Cell B7 Fx, Questionable data 60 to 70 ms

SECTION 2

OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

This section contains information reporting for the following Data Sheets:

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

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

Data Sheet No. 3 – Dummy Longitudinal Clearance Dimensions

Data Sheet No. 4 – Dummy Lateral Clearance Dimensions

Data Sheet No. 5 – Seat Belt Positioning Data

Data Sheet No. 6 – High-Speed Camera Locations and Data

Data Sheet No. 7 – Vehicle Accelerometer Locations

Data Sheet No. 8 – Photographic Reference Target Locations

Data Sheet No. 9 – Load Cell Locations on Fixed Barrier

Data Sheet No. 10 – Test Vehicle Summary of Results

Data Sheet No. 11 – Post-Test Observations

Data Sheet No. 12 – Vehicle Profile Measurements

Data Sheet No. 13 – Accident Investigation Division Data

Data Sheet No. 14 – Vehicle Intrusion Measurements

Data Sheet No. 15 – Summary of FMVSS 212, 219 (Partial), and 301 Data

Data Sheet No. 16 – FMVSS 301 Static Rollover Results

Data Sheet No. 17 – Dummy/Vehicle Temperature Stabilization Chart

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2014 Toyota Tundra Double Cab pick up truck
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20145118
 Test Date: 2/18/2014

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20145118	Traction Control System (TCS)	Yes
Model Year	2014	Power Steering	Yes
Make	Toyota	Power Window Auto-Reverse	No
Model	Tundra	Driver Frontal Airbag	Yes
Body Style	Double Cab Pickup Truck	Driver Curtain Airbag	Yes
VIN	5TFCY5F14EX016591	Driver Head/Torso Airbag	No
Body Color	Silver	Driver Torso Airbag	No
Odometer Reading (km /mi)	215.7 km / 134 mi	Driver Torso/Pelvis Airbag	Yes
Engine Displacement (L)	5.7	Driver Pelvis Airbag	No
Type / No. Cylinders	V8	Driver Knee Airbag	Yes
Engine Placement	Inline	Front Pass. Frontal Airbag	Yes
Transmission Type	Automatic	Front Pass. Curtain Airbag	Yes
Transmission Speeds	6-Speed	Front Pass. Head/Torso Airbag	No
Overdrive	Yes	Front Pass. Torso Airbag	No
Final Drive	All-Wheel Drive	Front Pass. Torso/Pelvis Airbag	Yes
Roof Rack	No	Front Pass. Pelvis Airbag	No
Sunroof / T-Top	No	Front Pass. Knee Airbag	Yes
Running Boards	No	Driver Pretensioner	Yes
Tilt Steering Wheel	Yes	Driver Load Limiter	Yes
Power Seats	No	Front Pass. Pretensioner	Yes
Anti-Lock Brakes (ABS)	Yes	Front Pass. Load Limiter	Yes
Automatic Door Locks (ADLs)	Yes	Other	-

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

Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Toyota Motor Manufacturing, Texas, INC.	GVWR (kg)	3265
Date of Manufacture	11/13	GAWR Front (kg)	1810
		GAWR Rear (kg)	1880

VEHICLE SEATING AND WEIGHT CAPACITY DATA

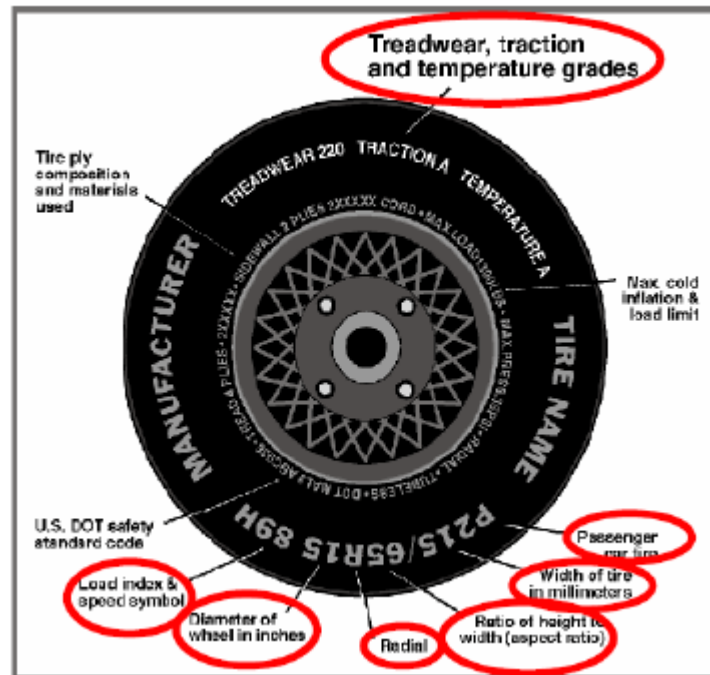
Measured Parameter	Front	Rear	Third	Total
Type of Seats	Split Bench	Bench	-	
Number of Occupants	3	3	-	6
Capacity Wt. (VCW) (kg)				635
Cargo Wt. (RCLW) (kg)				136

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

Test Vehicle: 2014 Toyota Tundra Double Cab pick up truck
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20145118
Test Date: 2/18/2014

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



VEHICLE TIRE INFORMATION

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	210	230
Recommended Tire Size	P255/70R18	P255/70R18
Tire Size on Vehicle	P255/70R18	P255/70R18
Tire Manufacturer	Bridgestone	Bridgestone
Tire Model	Dueler H/T	Dueler H/T
Treadwear	360	360
Traction	B	B
Temperature Grades	B	B
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Polyester, 2 Steel, 1 Nylon	2 Polyester, 2 Steel, 1 Nylon
Load Index / Speed Symbol	112T	112T
Tire Material	Rubber	Rubber
DOT Safety Code Left	7XOP650	7XOP650
DOT Safety Code Right	7XOP650	7XOP650

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

Test Vehicle: 2014 Toyota Tundra Double Cab pick up truck
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20145118
 Test Date: 2/18/2014

TEST VEHICLE WEIGHTS

	Units	As Delivered Weights (UVW)			As Tested Weights (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	799	537		866	607	
Right	kg	730	538		777	622	
Ratio	%	59%	41%		57%	43%	
Totals	kg	1529	1075	2604	1643	1229	2872

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	2604	(A)
Weight of 1 P572E ATD & 1 P572O ATD	kg	140.7	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	136	(C)
Calculated Vehicle Target Weight (TVTW)	kg	2880.7	(A+B+C)

TEST VEHICLE ATTITUDES AND CG

Condition	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	951	951	1011	1005	1730
As Tested	mm	940	937	996	991	1794
Post-Test	mm	1020	975	1024	978	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	4192
Total Vehicle Length at Left Side	mm	6268
Total Vehicle Length at Centerline	mm	6309
Total Vehicle Length at Right Side	mm	6266
Weight of Ballast in Cargo Area	kg	107.3
Weight of Vehicle Components Removed	kg	0
Amount of Stoddard Solvent in Fuel Tank	L	93.0

LIST OF COMPONENTS REMOVED TO MEET TEST WEIGHT:

None.

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

Test Vehicle: 2014 Toyota Tundra Double Cab pick up truck
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20145118
 Test Date: 2/18/2014

TARGET VEHICLE STRUCTURAL MEASUREMENT

No.	Description	Pre-Test
1	Total Length	6309
2	Total Width	2032
3*	Bumper Top Height	532
4*	Bumper Bottom Height	421
5*	Longitudinal Member Top Height	578
6	Distance Between Longitudinal Members	920
7	Longitudinal Member Width	76
8*	Engine Top Height	1171
9*	Engine Bottom Height	248
10	Engine and Gearbox Width	753
11	Front Bumper-Engine Distance	595
12*	Front Shock Absorber Fixing Height	844
13*	Bonnet Leading Edge Height	1129
14	Front Shock Absorber Fixing Width	939
15	Front Bumper – Front Axle Distance	893
16	Front Axle – A Pillar Distance	548
17	A-Pillar – B-Pillar Distance	1174
18	B-Pillar – Rear Axle Distance	2469
19	B-Pillar – C-Pillar Distance	853
20*	Roof Sill Bottom Height	1752
21*	Roof Sill Top Height	1864
22*	Floor Sill Bottom Height	568
23*	Floor Sill Top Height	575

*Height Measurements are taken from the ground
 Note: All measurements are in millimeters

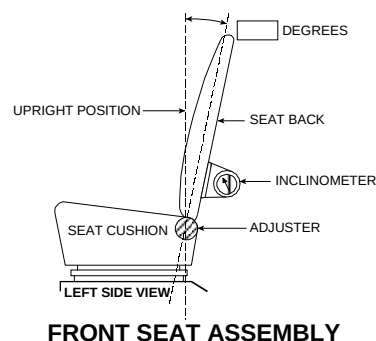
DATA SHEET NO. 2 SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

Test Vehicle: 2014 Toyota Tundra Double Cab pick up truck
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20145118
Test Date: 2/18/2014

NOMINAL DESIGN RIDING POSITION

The driver's seat back was set to the manufacturer's designated angle. The passenger's seat back was positioned in a similar manner as the driver's seat back. Seat back angles are measured at the headrest post bezel using a digital inclinometer.



Seating Position	Degrees
Driver Seat Back Angle	2.8
Passenger Seat Back Angle	-2.9

SEAT FORE / AFT POSITIONS

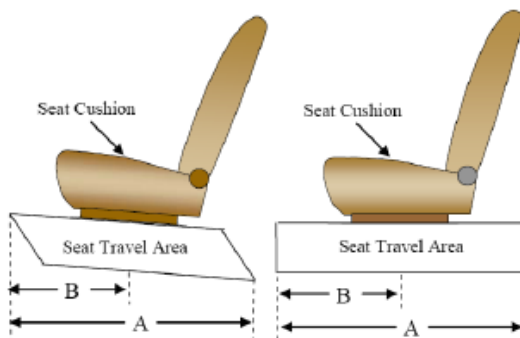
The driver's seat was positioned at the mid-point of fore/aft travel at its lowest position. The passenger's seat was positioned at the most forward position of fore/aft travel. Zero is defined as the forward most position.

Seating Position	Total Fore / Aft Travel	Placed in Position #
Driver Seat	24	12
Passenger Seat	24	0

SEAT BELT UPPER ANCHORAGE

The driver's seat belt anchorage was positioned according to the manufacturer's designated positioning for a 50th percentile adult male ATD. The passenger's seat belt anchorage was positioned according to the manufacturer's designated positioning for a 5th percentile adult female ATD. For this test zero is defined as the uppermost position.

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



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

Test Vehicle: 2014 Toyota Tundra Double Cab pick up truck
 Test Program: NCAP Frontal Barrier Impact Test

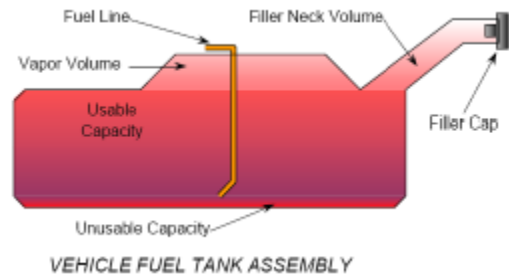
NHTSA No.: M20145118
 Test Date: 2/18/2014

FUEL TANK CAPACITY

Description	Liters
Usable Capacity of "Standard Tank"	99.9
Usable Capacity of "Optional Tank"	N/A
92%-94% of Usable Capacity	91.9 – 93.9
Actual Amount of Solvent Used	93.0
1/3 of Usable Capacity	33.3

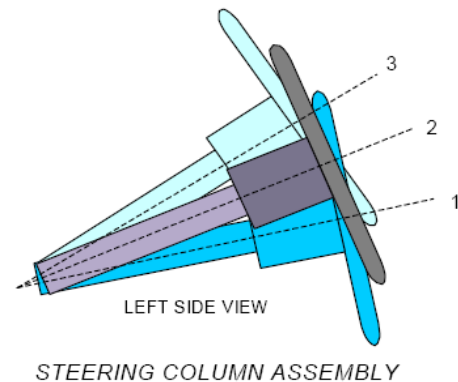
FUEL PUMP

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



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. For angular measurements, a digital inclinometer was used to measure a plate which was placed across the steering wheel rim. A tape measure was used to measure the telescoping steering wheel travel.



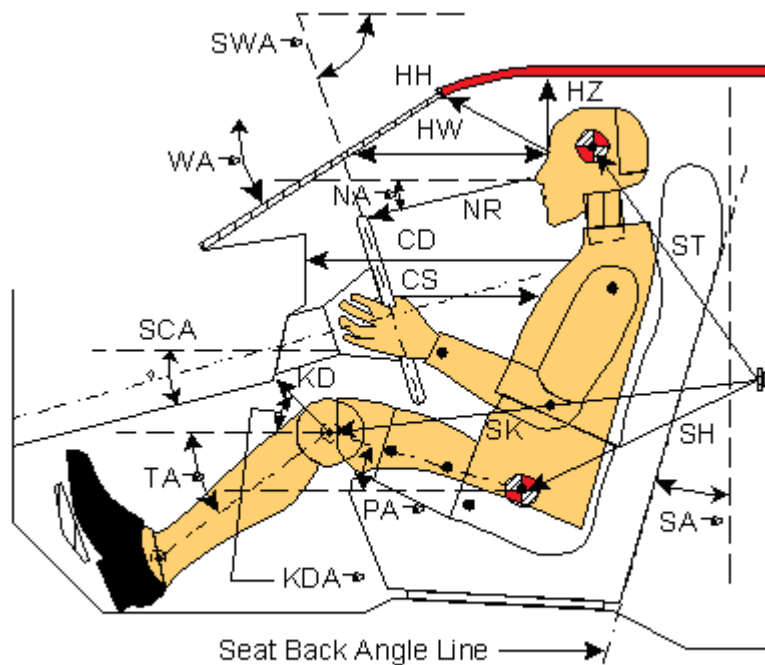
STEERING COLUMN POSITIONS

Description	Degrees	Fore / Aft Position (mm)
Lowermost position No. 1	24	
Geometric center position No. 2	27	
Uppermost position No. 3	30	
Telescoping Steering Wheel Travel		N/A
Test Position	27	N/A

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2014 Toyota Tundra Double Cab pick up truck
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20145118
 Test Date: 2/18/2014



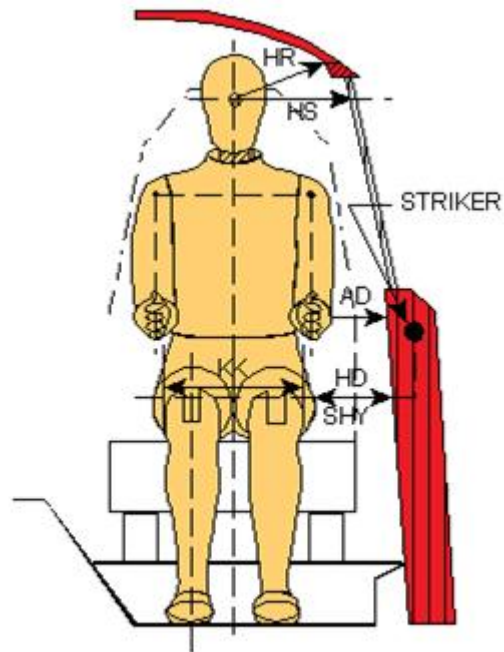
Left Side View

Code	Measurement Description	Driver (SN: 064)		Passenger (SN: 143)	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		33.1		
SWA°	Steering Wheel Angle		27.5		
SCA°	Steering Column Angle		62.5		
SA°	Seat Back Angle (on headrest post)		2.9		-2.9
HZ	Head to Roof (Z)	225	90	261	90
HH	Head to Header	469	20.2	388	38.5
HW	Head to Windshield	723	0	676	0
NR	Nose to Rim	464	-11.9	497	-26.1
CD	Chest to Dash	574		435	
CS	Chest to Steering Hub	337	0		
RA	Rim to Abdomen	221	0		
KDL	Left Knee to Dash	188	27.9	87	28.6
KDR	Right Knee to Dash	187	24.1	90	28.5
PA°	Pelvic Angle		22.3		20.7
TA°	Tibia Angle		38.8		-55.4
SK	Striker to Knee	652	-8.9	743	-7.8
ST	Striker to Head	541	-74.0	527	-56.3
SH	Striker to H-Point	302	-30.7	431	-18.7

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2014 Toyota Tundra Double Cab pick up truck
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20145118
 Test Date: 2/18/2014



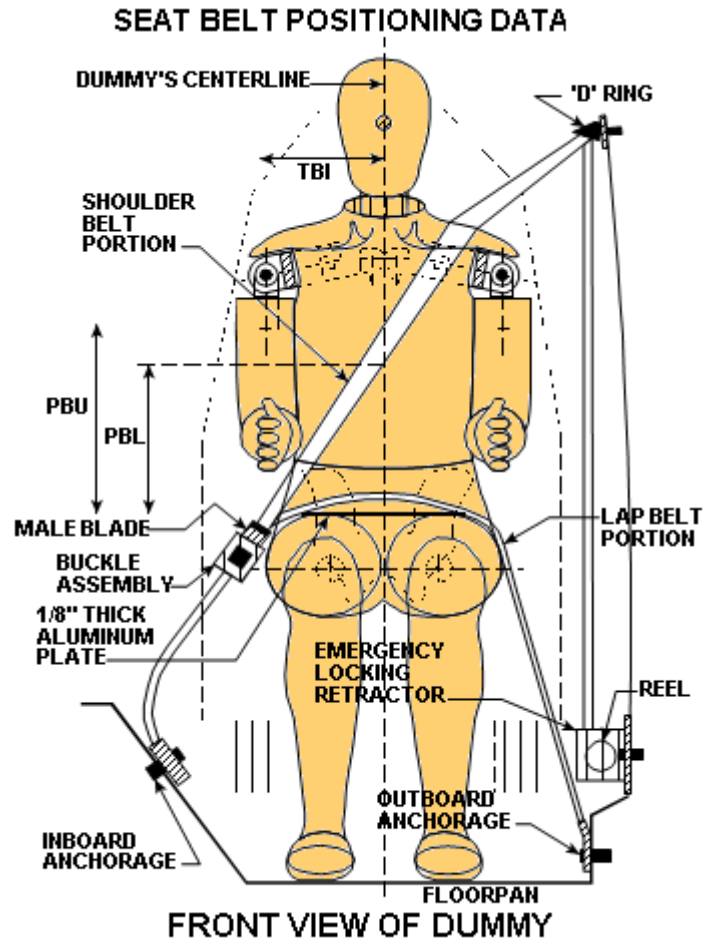
Front View

Code	Description	Driver (mm)	Passenger (mm)
AD	Arm to Door	128	92
HD	H-Point to Door	175	185
HR	Head to Side Header	230	286
HS	Head to Side Window	355	380
KK	Knee to Knee	320	163
SHY	Striker to H-Point (Y Direction)	275	280
AA	Ankle to Ankle	310	166

DATA SHEET NO. 5 **SEAT BELT POSITIONING DATA**

Test Vehicle: 2014 Toyota Tundra Double Cab pick up truck
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20145118
 Test Date: 2/18/2014



SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU — Top surface of reference to belt upper edge	mm	400	365
PBL — Top surface of reference to belt lower edge	mm	325	285

BELT LENGTH DATA

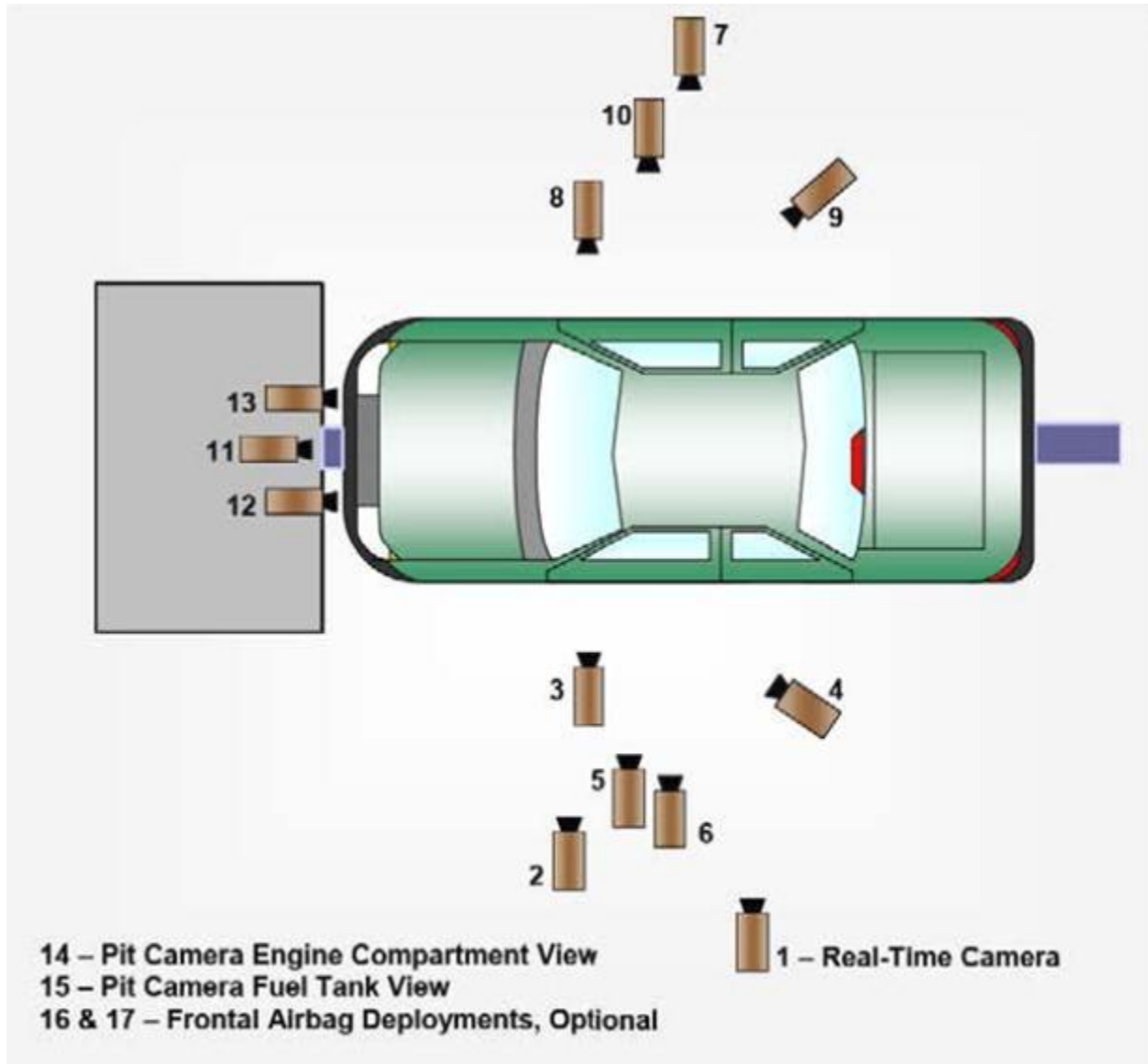
Measurement Description	Units	Driver	Passenger
Shoulder belt length as measured on ATD	mm	930	990
Lap Belt Length as measured on ATD	mm	860	900
Remainder of belt on reel	mm	760	660
Total belt length for continuous webbing systems	mm	2550	2550

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

Test Vehicle: 2014 Toyota Tundra Double Cab pick up truck
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20145118
Test Date: 2/18/2014

CAMERA POSITIONS FOR FRONTAL IMPACTS



Top View

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

Test Vehicle: 2014 Toyota Tundra Double Cab pick up truck
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20145118
 Test Date: 2/18/2014

CAMERA LOCATIONS

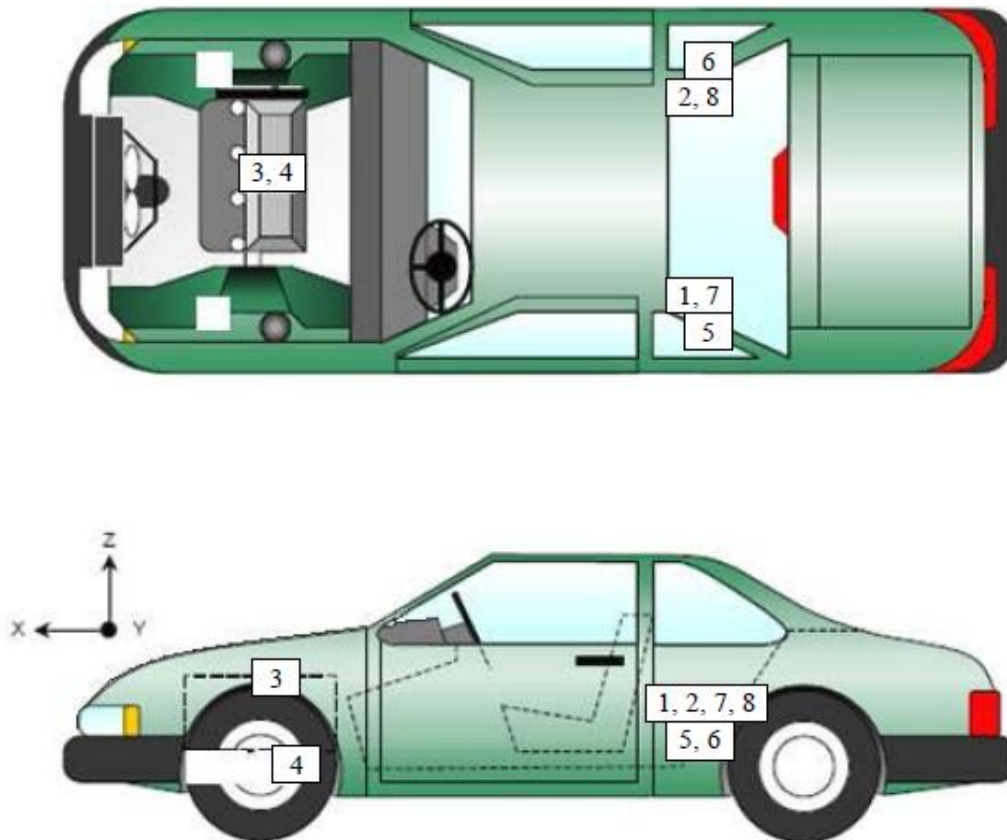
No.	Camera View	Location (mm)			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Overall	-	-	-		60
2	Driver Close-Up	1301	-8310	1504	50	1000
3	Left Front Half	623	-10370	1597	50	1000
4	Left Angle	2952	-3184	2419	28	1000
5	Steering Column - Top	1741	-8257	1961	24-70	1000
6	Steering Column - Bottom	1741	-8257	1370	24-70	1000
7	Right Overall	2081	9325	1108	24	1000
8	Passenger Close-Up	1381	8868	1569	50	1000
9	Right Front Half	1291	7602	1118	50	1000
10	Right Angle	3059	3464	2513	28	1000
11	Windshield	-670	0	3528	24	1000
12	Driver Windshield	-191	-638	2026	25	1000
13	Passenger Windshield	-191	621	2026	25	1000
14	Pit Front	976	0	2052	12.5	1000
15	Pit Rear	2310	0	2052	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 LOCATIONS**

Test Vehicle: 2014 Toyota Tundra Double Cab pick up truck
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20145118
 Test Date: 2/18/2014



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear Accelerometer – X Direction	3370	-804	-75
2	Right Rear Accelerometer – X Direction	3189	1286	-265
3	Engine Top X	5440	-1	-650
4	Engine Bottom X	5362	74	214
5	Left Rear Accelerometer – Z Direction	3376	-804	-73
6	Right Rear Accelerometer – Z Direction	3360	804	-75
7	Left Rear Accelerometer – X Direction Redundant	3370	-804	-75
8	Right Rear Accelerometer – X Direction Redundant	3189	1286	-265

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

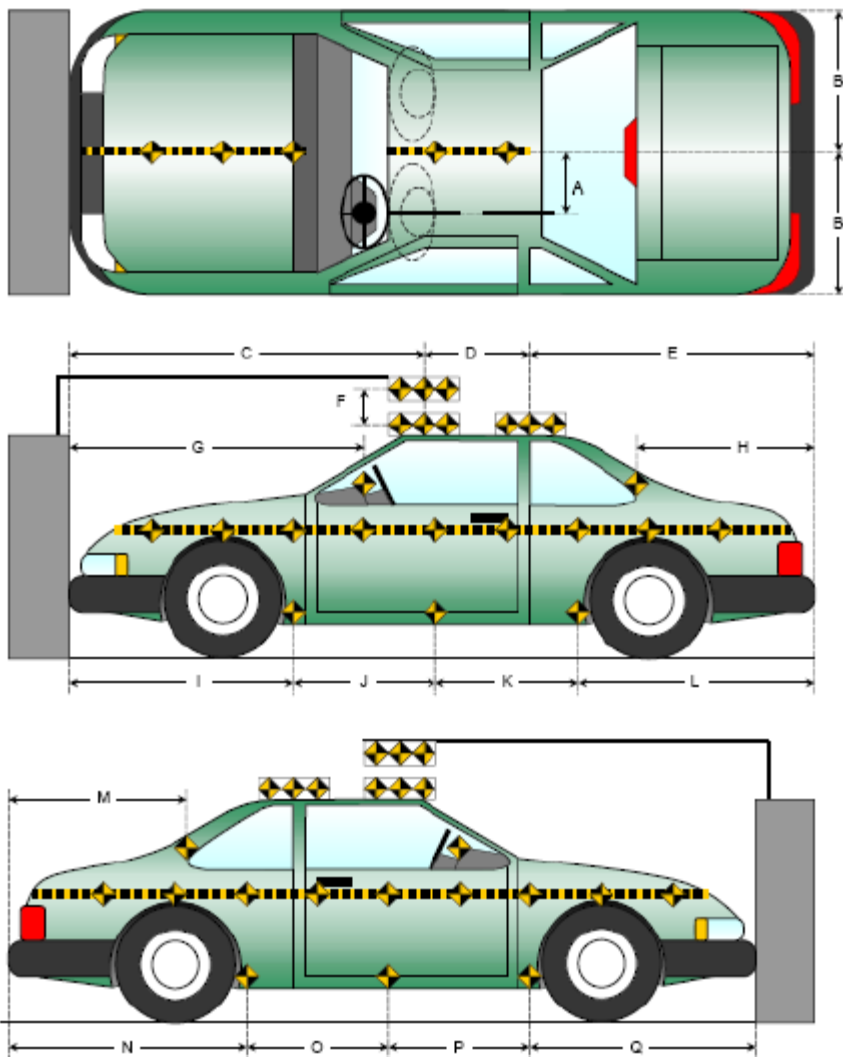
DATA SHEET NO. 8
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2014 Toyota Tundra Double Cab pick up truck
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20145118
 Test Date: 2/18/2014

Item	Value
A	434
B	1016
C	2209
D	1221
E	2880
F	109
G	1777
H	2786
I	1461
J	1525
K	1524
L	1799
M	2791
N	1803
O	1531
P	1524
Q	1452

All units in millimeters



DATA SHEET NO. 9
LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle: 2014 Toyota Tundra Double Cab pick up truck
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20145118
 Test Date: 2/18/2014

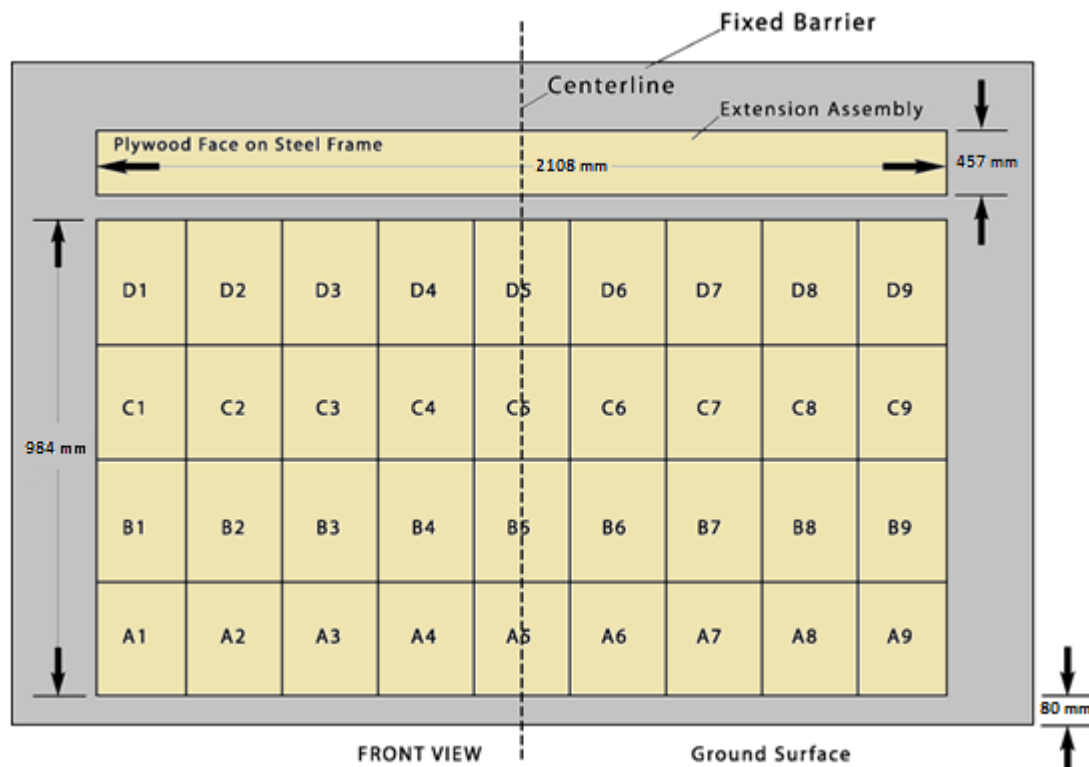


Figure 1 - Load Cell Locations on a 36-Load Cell Barrier with Plywood Height Extension

DATA SHEET NO. 10
TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle: 2014 Toyota Tundra Double Cab pick up truck
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20145118
Test Date: 2/18/2014

INSTRUMENTATION

Instrumentation	Number of Channels Collected
Driver Dummy Accelerometers	46
Passenger Dummy Accelerometers	46
Vehicle Structure Accelerometers	8
Load Cell Barrier	36
Total	136

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: 2014 Toyota Tundra Double Cab pick up truck
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20145118
Test Date: 2/18/2014

TEST DUMMY INFORMATION AND CONTACT LOCATIONS

Description	Driver	Passenger
Dummy Type / Serial No.	P572E 50 th Male / 064	P5720 5 th Female / 143
Head Contact	Front Airbag, Headrest & B-Pillar	Front Airbag & Headrest
Upper Torso Contact	Front Airbag	Front Airbag
Lower Torso Contact	None	None
Left Knee Contact	Knee Airbag	Knee Airbag
Right Knee Contact	Knee Airbag	Knee Airbag

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)	0	0
Seat Back Failure	No	No
Glazing Damage	None	None

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Windshield Damage	None
Window Damage	None
Other Notable Effects	Truck Cab shifted forward from bed during impact

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	755
Center	mm	763
Right Side	mm	792
Average	mm	770

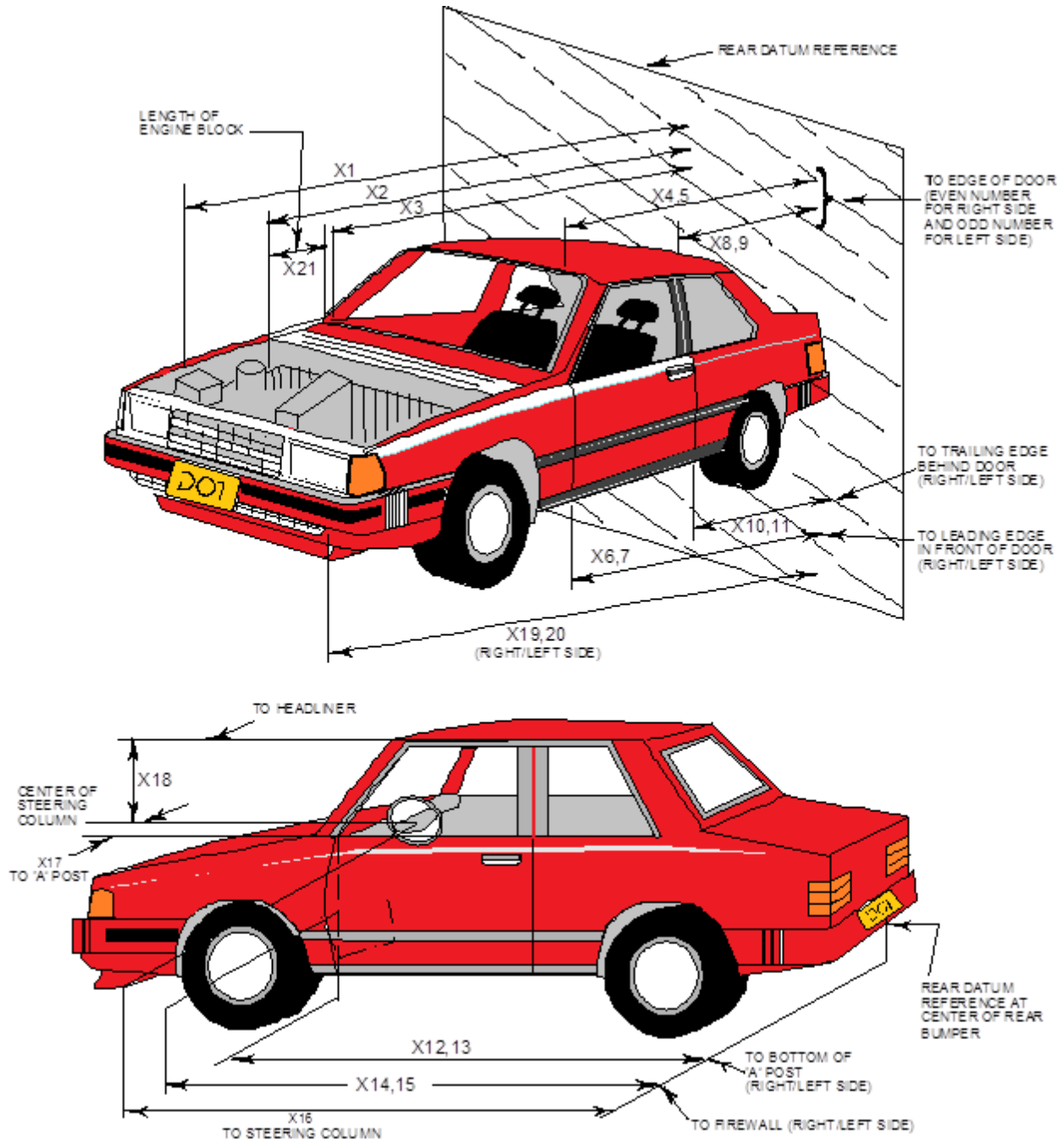
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Driver		Passenger	
	Installed	Deployed	Installed	Deployed
Front Airbag	Yes	Yes	Yes	Yes
Side Airbag 1 - Curtain	Yes	No	Yes	No
Side Airbag 2 - Torso/Pelvis Airbag	Yes	No	Yes	No
Knee Airbag	Yes	Yes	Yes	Yes
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: 2014 Toyota Tundra Double Cab pick up truck
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20145118
Test Date: 2/18/2014



DATA SHEET NO. 12 ... (CONTINUED)
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2014 Toyota Tundra Double Cab pick up truck
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20145118
 Test Date: 2/18/2014

No.	Measurement Description	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	6309	5907	-403
2	Rear Surface of Vehicle (RSOV) to Front of Engine	5714	5627	-87
3	RSOV to Firewall	5275	5026	-249
4	RSOV to Upper Leading Edge of Right Door	4868	4912	45
5	RSOV to Upper Leading Edge of Left Door	4861	4912	51
6	RSOV to Lower Leading Edge of Right Door	4775	4815	40
7	RSOV to Lower Leading Edge of Left Door	4773	4817	44
8	RSOV to Upper Trailing Edge of Right Door	3701	3752	51
9	RSOV to Upper Trailing Edge of Left Door	3696	3749	53
10	RSOV to Lower Trailing Edge of Right Door	3681	3726	45
11	RSOV to Lower Trailing Edge of Left Door	3678	3723	45
12	RSOV to Bottom of "A" Post of Right Side	4936	4940	4
13	RSOV to Bottom of "A" Post of Left Side	4930	4934	4
14	RSOV to Firewall, Right Side	5065	5104	39
15	RSOV to Firewall, Left Side	5064	UR*	UR*
16	RSOV to Steering Column	4377	4406	29
17	Center of Steering Column to "A" Post	302	294	-8
18	Center of Steering Column to Headliner	432	473	41
19	RSOV to Right Side of Front Bumper	6286	5882	-405
20	RSOV to Left Side of Front Bumper	6288	5908	-380
21	Length of Engine Block	543	543	0
RD	RSOV to Right Side of Dash Panel	4584	4636	52
CD	RSOV to Center of Dash Panel	4529	4588	59
LD	RSOV to Left Side of Dash Panel	4569	4625	56

*UR= Unrecoverable data point
 All Dimensions in mm

DATA SHEET NO. 13
ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2014 Toyota Tundra Double Cab pick up truck
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20145118
Test Date: 2/18/2014

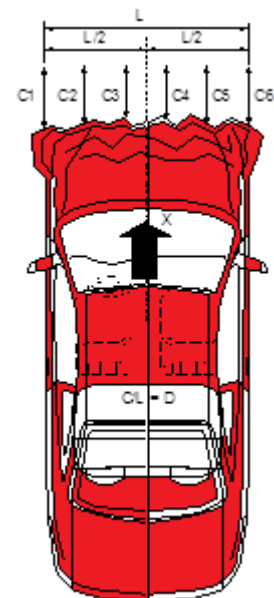
VEHICLE INFORMATION

VIN: 5TFCY5F14EX016591
Vehicle Size Category: Passenger

Wheelbase (mm): 4,192
Test Weight (kg): 2,872

ACCELEROMETER DATA

Accelerometer Locations: Please See Data Sheet No. 7
Cal. Procedure / Interval: Calspan Procedure / 6 month
Integration Algorithm: Trapezoidal
Linearity: > 99%
Impact Velocity (km/h): 56.42
Velocity Change (km/h): 56.42
Time of Separation (ms): 102



CRUSH PROFILE

Collision Deformation Classification: 12FDEW2
Midpoint of Damage: Vehicle Centerline
Damage Region Length (mm): 1106
Impact Mode: Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush Zone 1 at Left Side	mm	6254	5934	320
C2	Crush Zone 2 at Left Side	mm	6289	5949	340
C3	Crush Zone 3 at Left Side	mm	6297	5945	352
C4	Crush Zone 4 at Right Side	mm	6298	5924	374
C5	Crush Zone 5 at Right Side	mm	6289	5906	383
C6	Crush Zone 6 at Right Side	mm	6250	5852	398
L	C1 to C6	mm	1106	1103	3

DATA SHEET NO. 14
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2014 Toyota Tundra Double Cab pick up truck
 Test Program: NCAP Frontal Barrier Impact Test

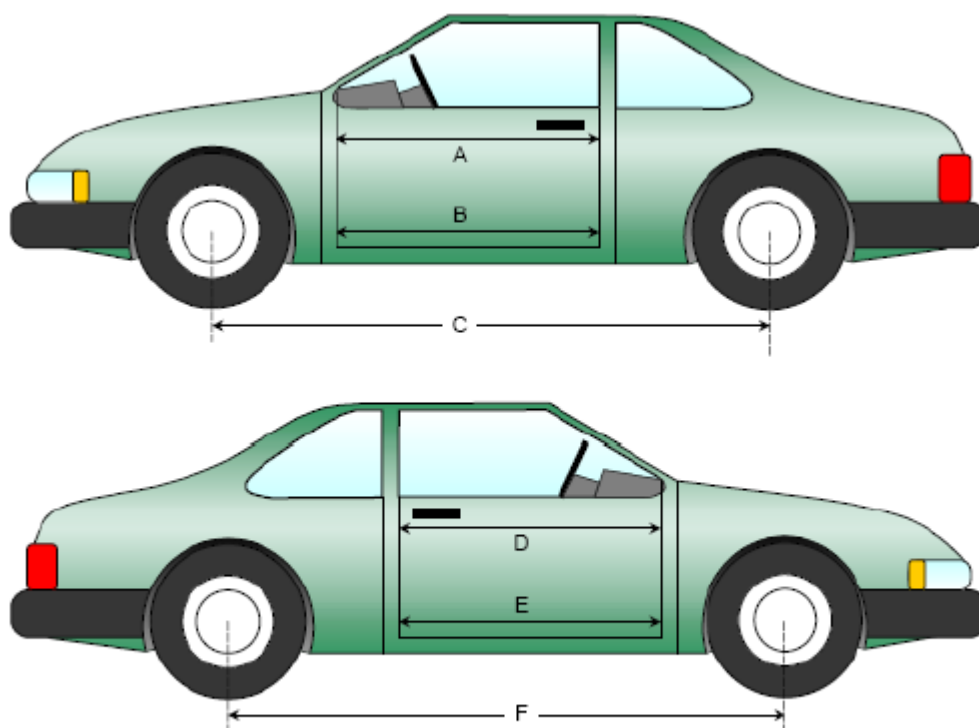
NHTSA No.: M20145118
 Test Date: 2/18/2014

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	1069	1069	0
B	Left Side Lower	mm	916	918	2
D	Right Side Upper	mm	1069	1069	0
E	Right Side Lower	mm	924	925	1

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	4192	4146	-46
F	Right Side Wheelbase	mm	4192	4155	-37



Left & Right Side Views

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

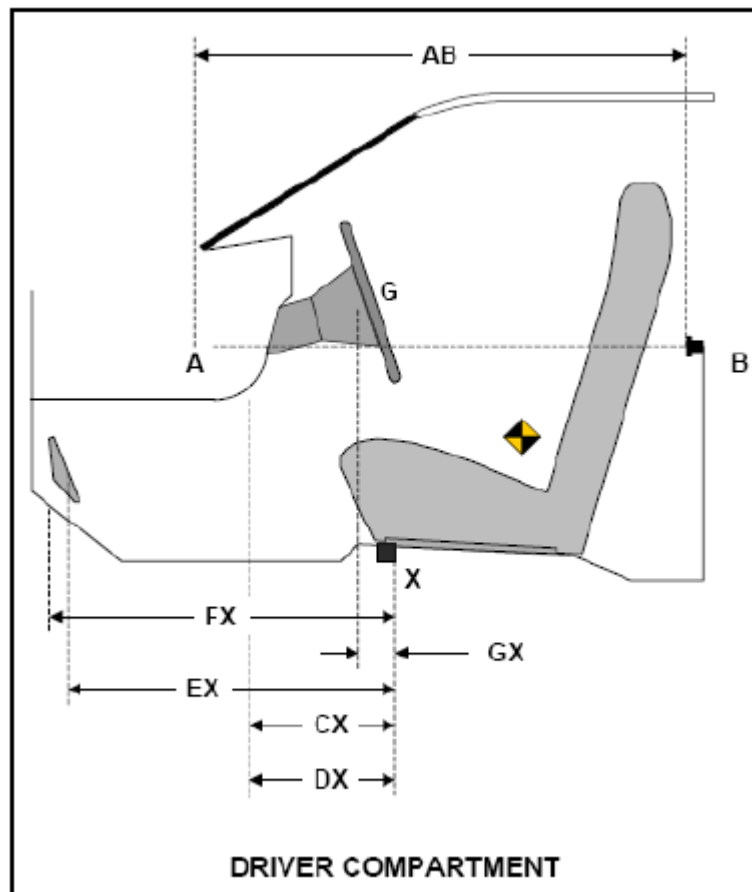
Test Vehicle: 2014 Toyota Tundra Double Cab pick up truck
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20145118
 Test Date: 2/18/2014

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	752	753	1
CX	Left Knee Bolster to X	mm	325	334	9
DX	Right Knee Bolster to X	mm	326	344	18
EX	Brake Pedal to X	mm	563	596	33
FX	Foot Rest to X	mm	664	667	3
GX	Center of Steering Column Wheel Hub to X	mm	75	65	-10

X = Front of Seat Track (Stationary)



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

Test Vehicle: 2014 Toyota Tundra Double Cab pick up truck
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20145118
 Test Date: 2/18/2014

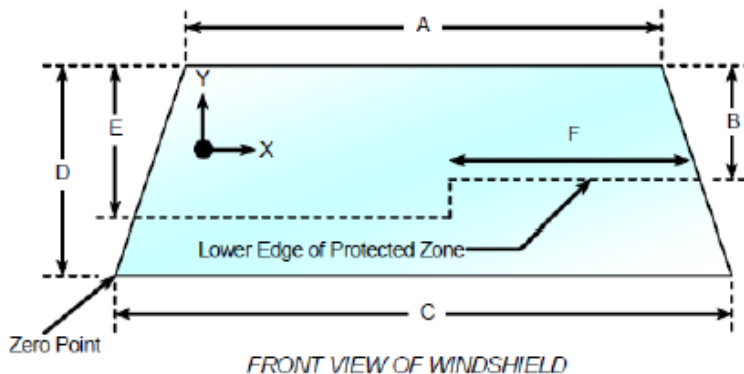
Windshield Mounting Details: A 0.8 mm trim surrounds the top and side of windshield while a plastic shroud is on the bottom.

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 °C

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% Retention
Left Side	2293	2293	100%
Right Side	2293	2293	100%
Total	4586	4586	100%



Item	Units	Value
A	mm	1390
B	mm	420
C	mm	1575
D	mm	810
E	mm	500
F	mm	300

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.*

- No Penetration

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.*

- No Penetration

X	Y

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

Test Vehicle: 2014 Toyota Tundra Double Cab pick up truck
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20145118
Test Date: 2/18/2014

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 21 ° C

Test Time: 1:10 PM

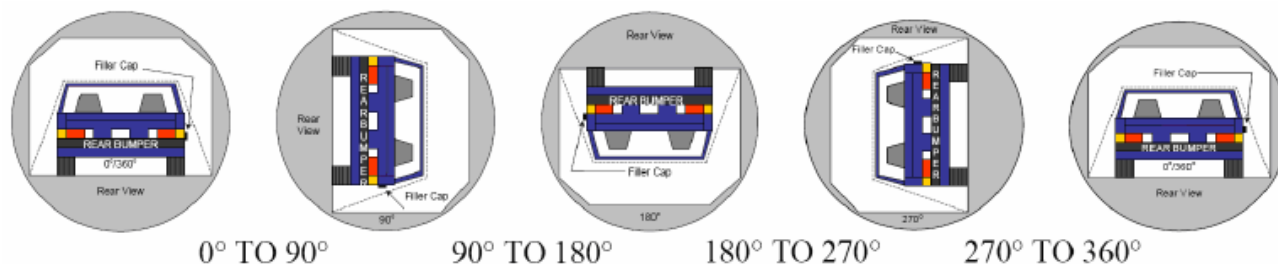
STODDARD SOLVENT SPILLAGE MEASUREMENTS

- A. From impact until vehicle motion ceases: 0 oz.
(Maximum allowable is 1 oz.)
- B. For the 5-minute period after motion ceases: 0 oz.
(Maximum allowable is 5 oz.)
- C. For the following 25 minutes: 0 oz.
(Maximum allowable is 1 oz./minute)
- D. Spillage: No Spillage Occurred

DATA SHEET NO. 16
FMVSS 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2014 Toyota Tundra Double Cab pick up truck
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20145118
 Test Date: 2/18/2014



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: No Spillage Occurred

SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	67	300	367
90° to 180°	68	300	368
180° to 270°	65	300	365
270° to 360°	68	300	368

FMVSS 301 SPILLAGE TABLE

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

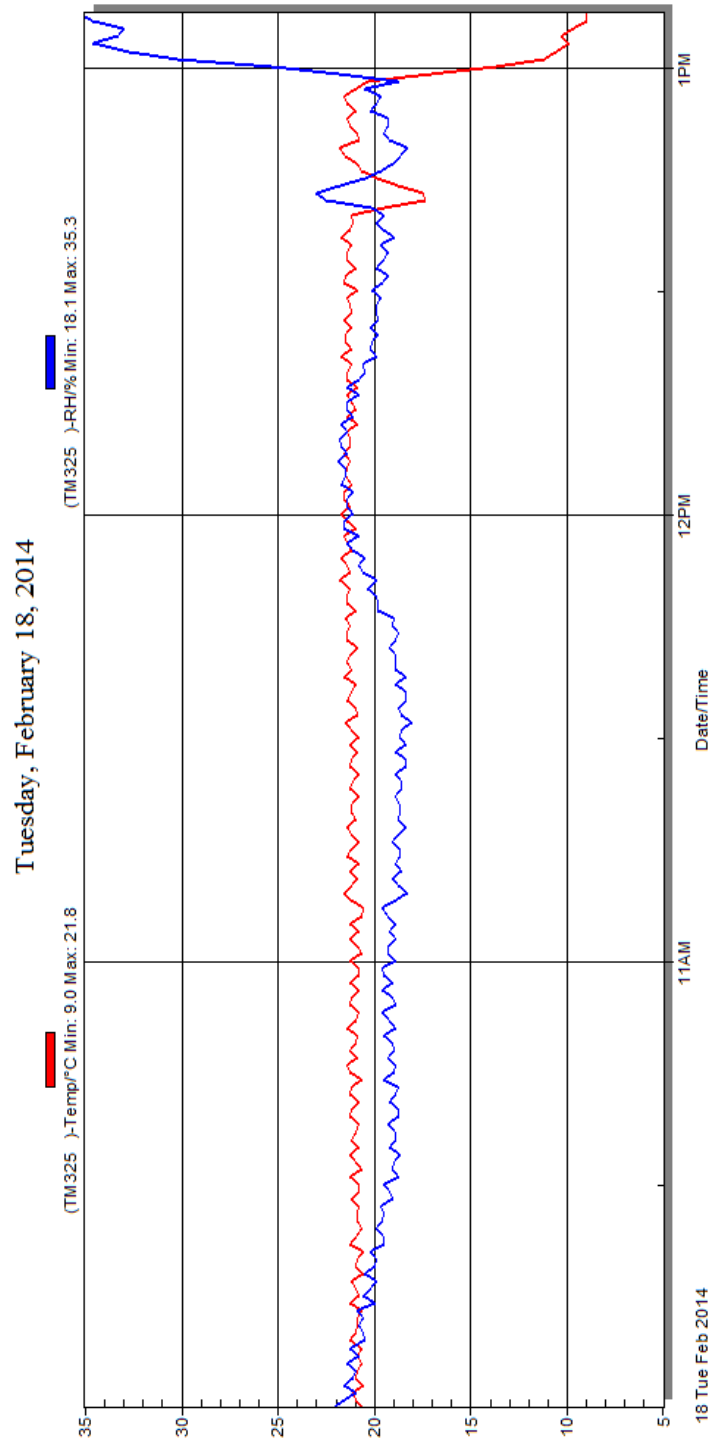
SOLVENT SPILLAGE LOCATION TABLE

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

DATA SHEET NO. 17
DUMMY / VEHICLE TEMPERATURE STABILIZATION CHART

Test Vehicle: 2014 Toyota Tundra Double Cab pick up truck
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20145118
Test Date: 2/18/2014



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

APPENDIX A
PHOTOGRAPHS

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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.*

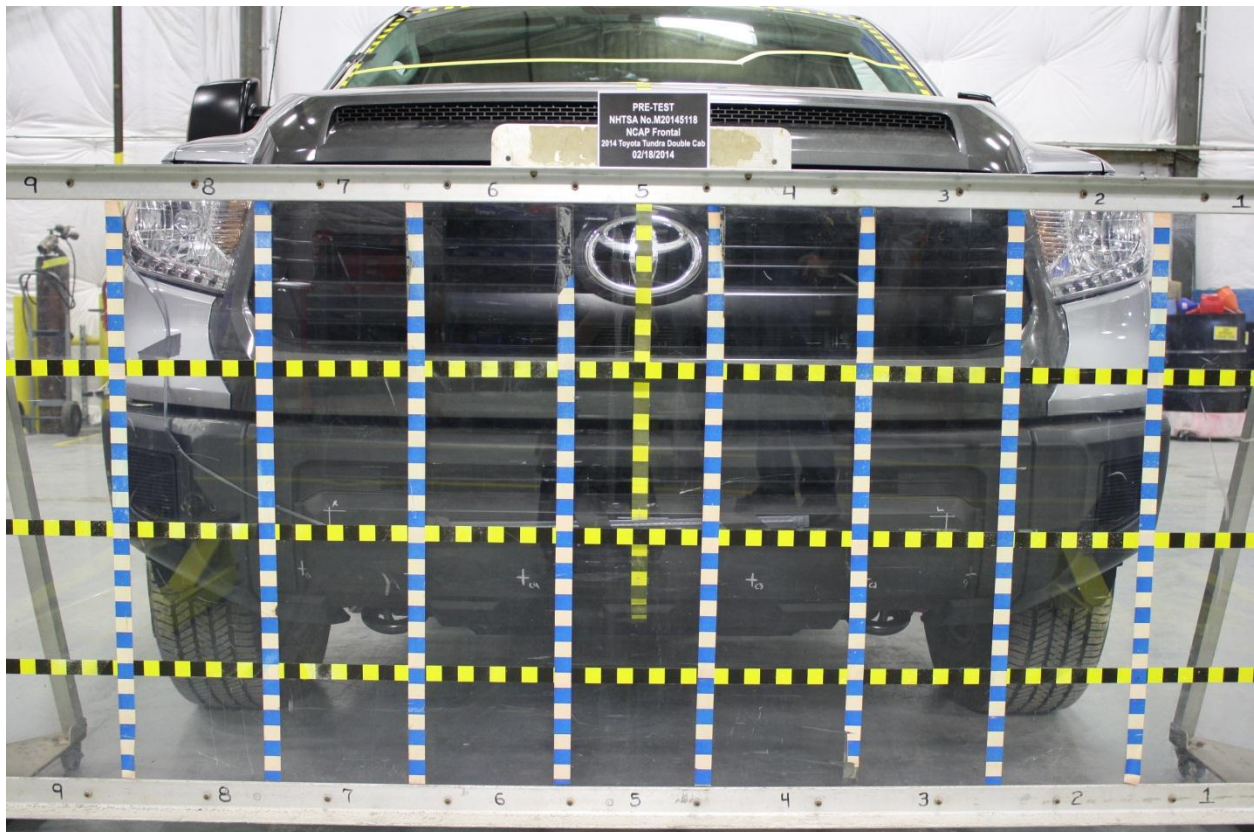


Figure A-1: Load Cell Location

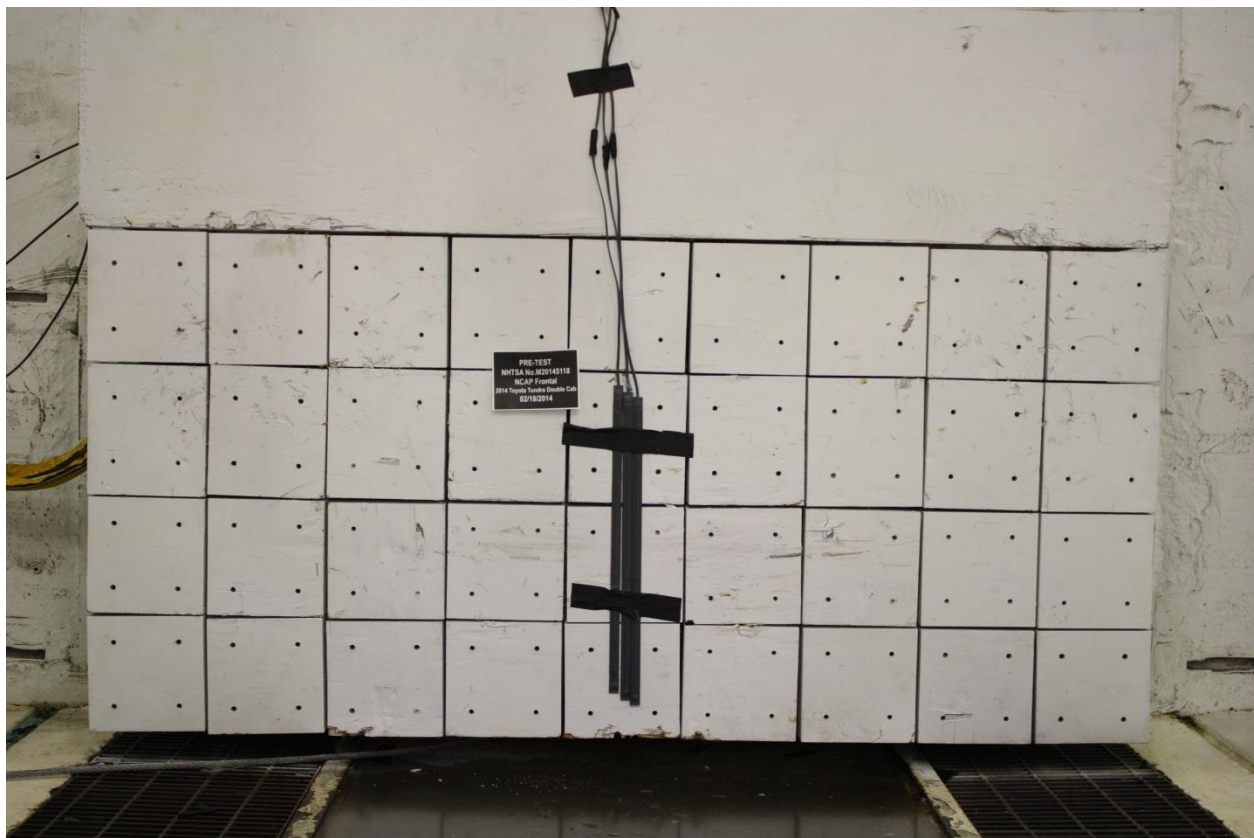


Figure A-2: Load Cell Wall

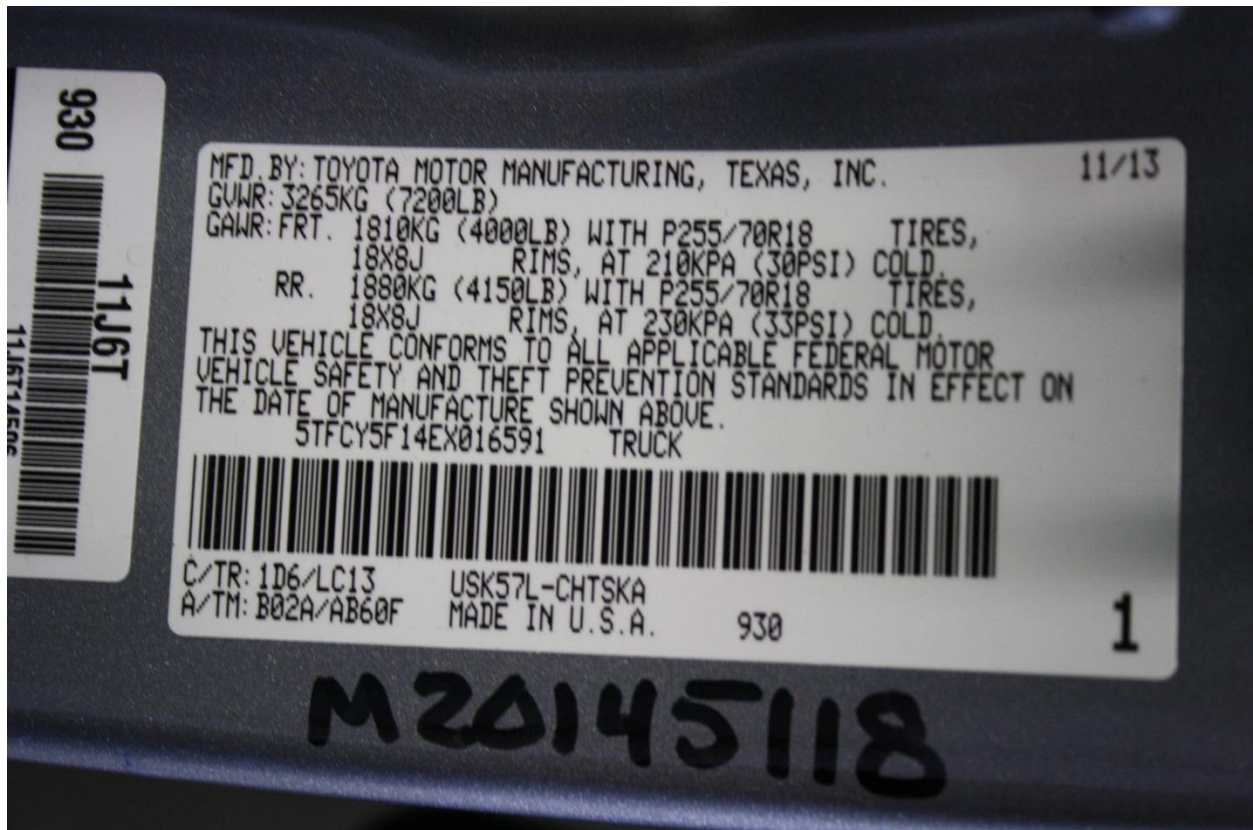


Figure A-3: Manufacturer's Label



Figure A-4: Tire Placard



Figure A-5: 2014 Toyota Tundra Double Cab Frontal As Delivered



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

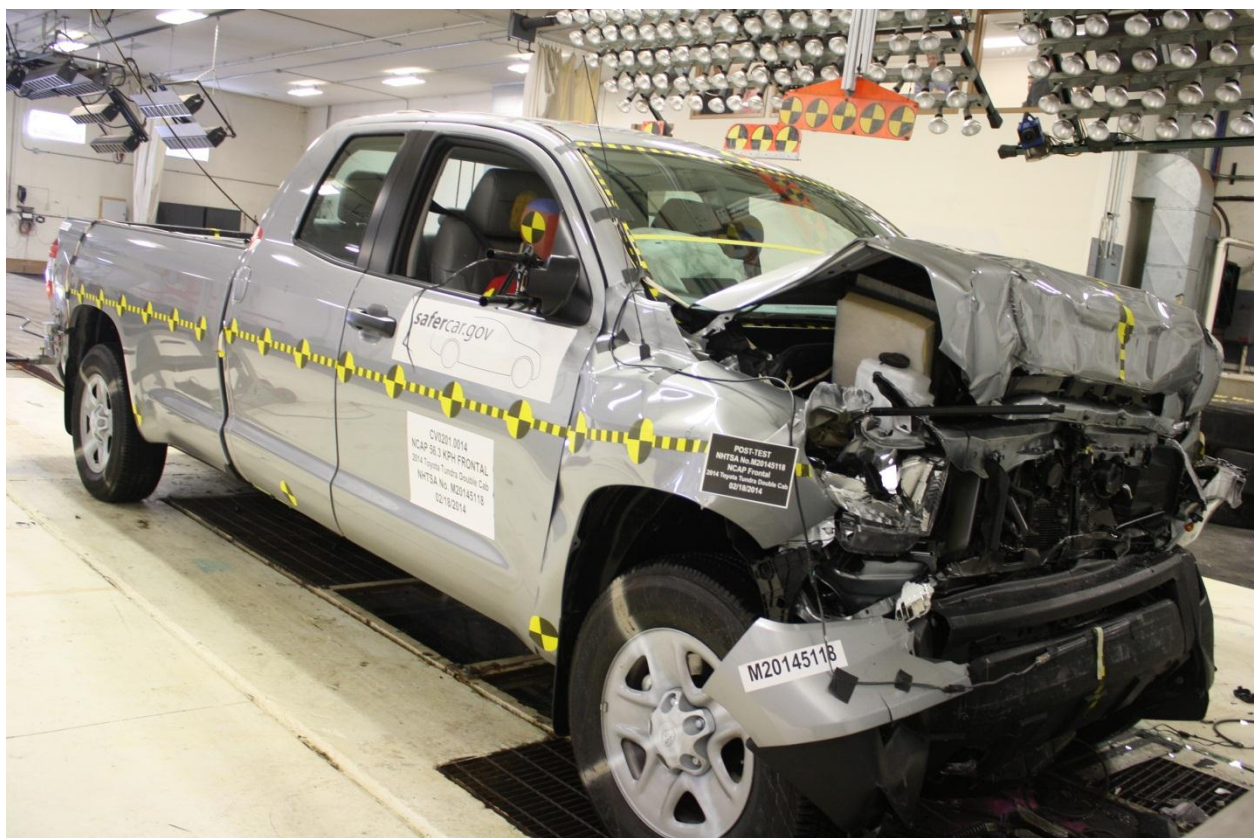


Figure A-14: Post-Test Right Front 3-4 View



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

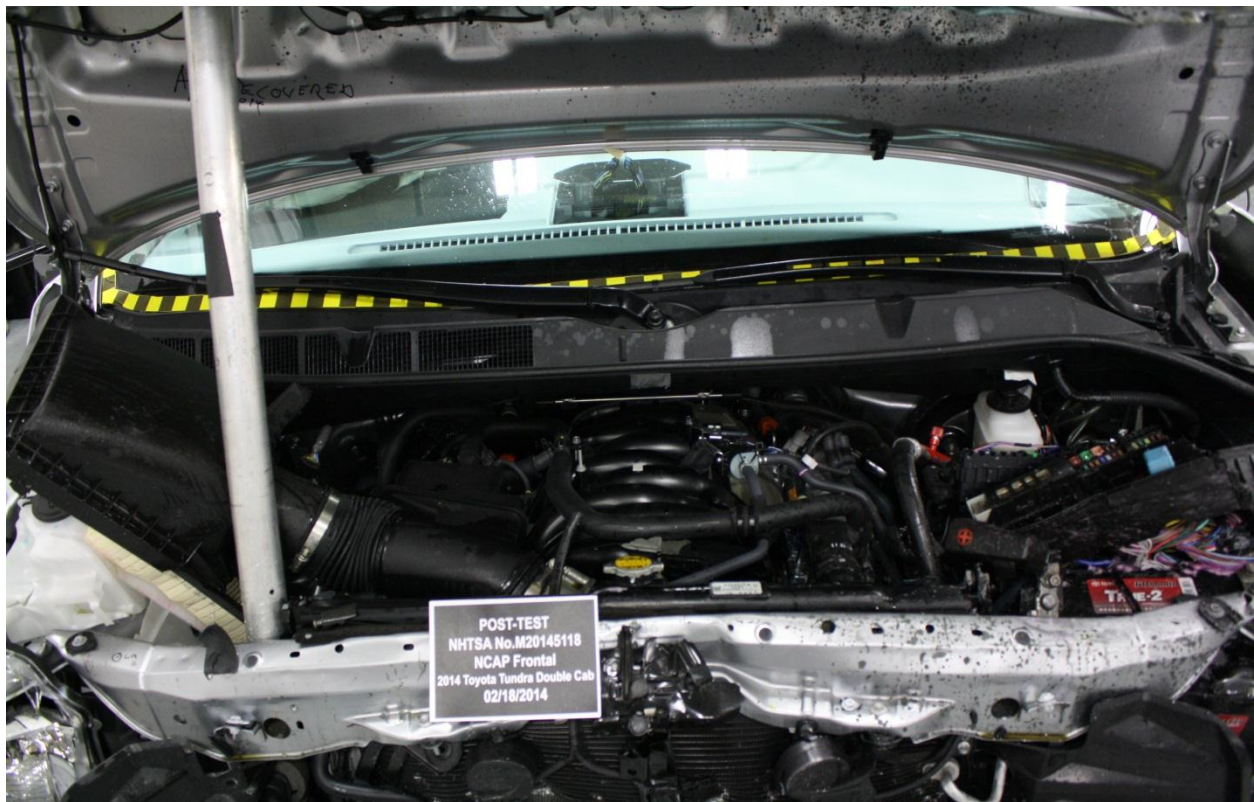


Figure A-20: Post-Test Engine Compartment View



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



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

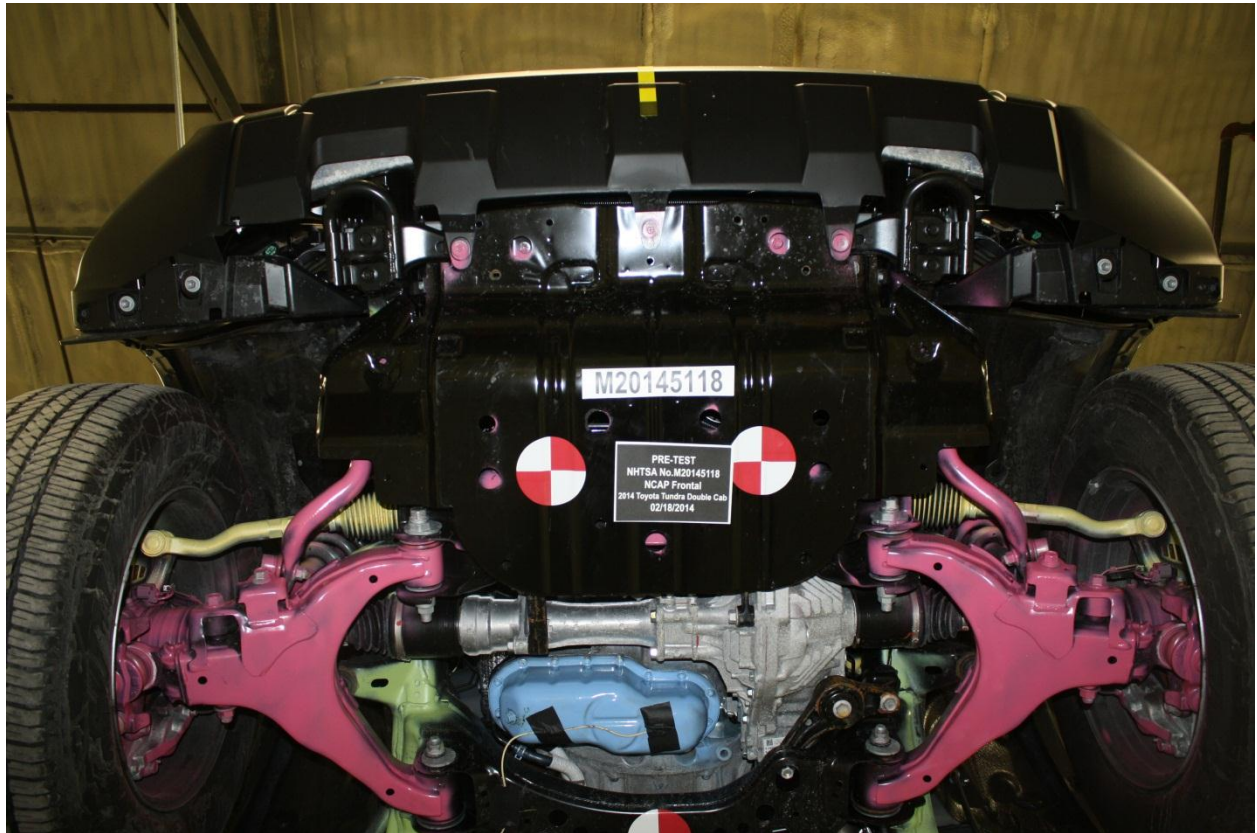


Figure A-23: Pre-Test Front Underbody View

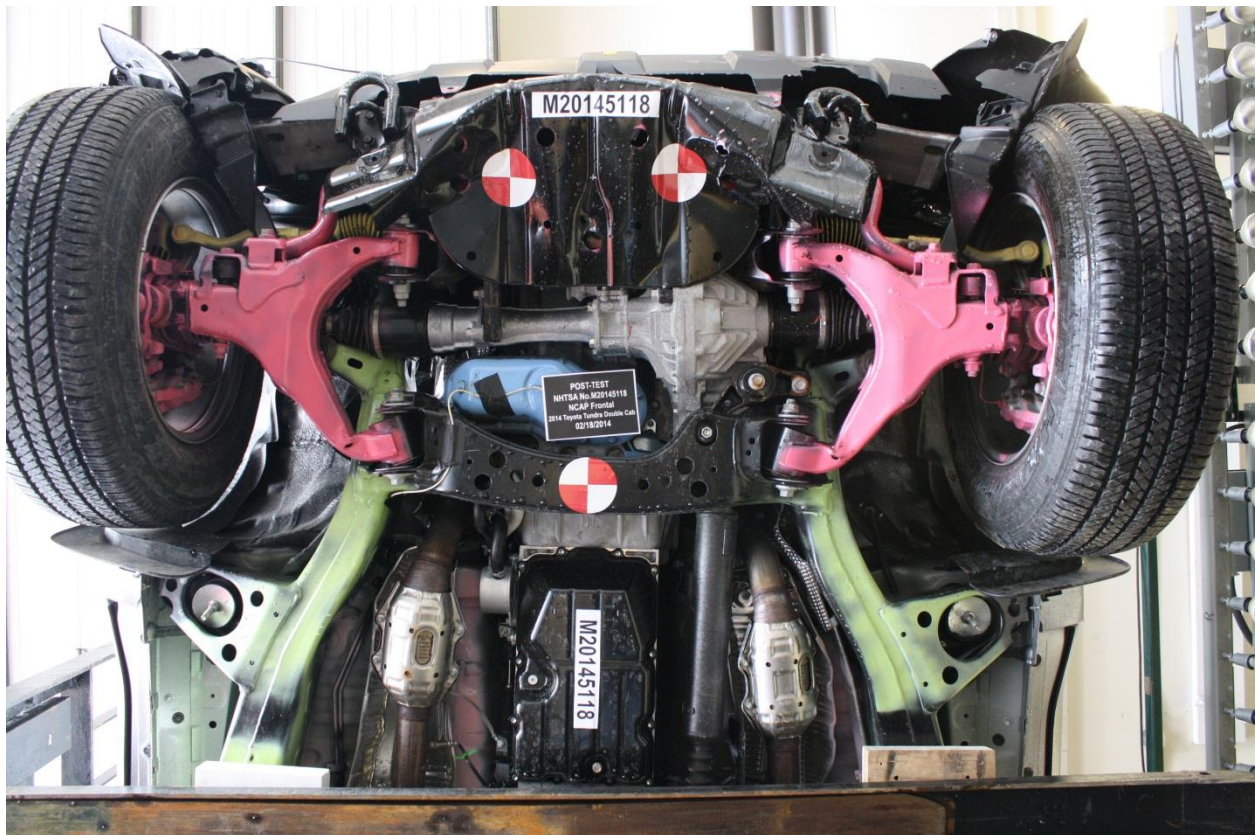


Figure A-24: Post-Test Front Underbody View

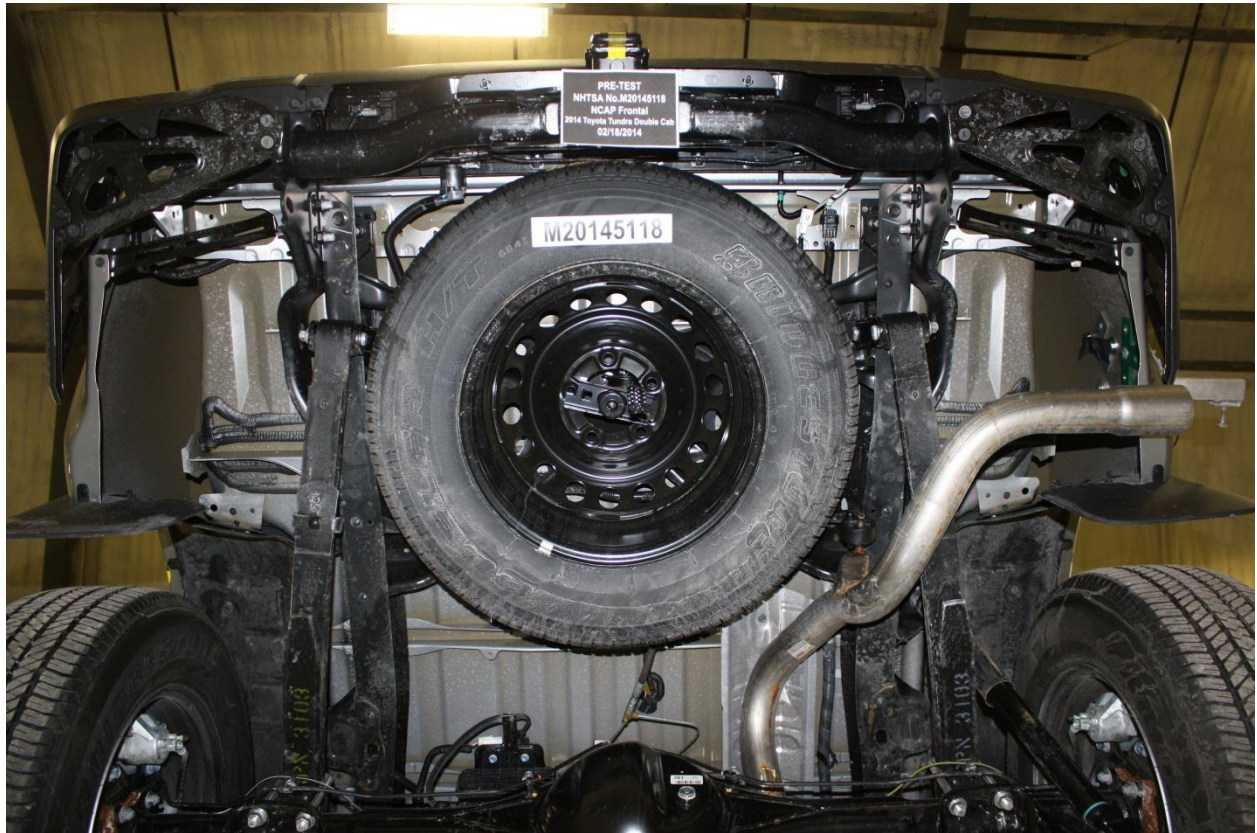


Figure A-25: Pre-Test Rear Underbody View

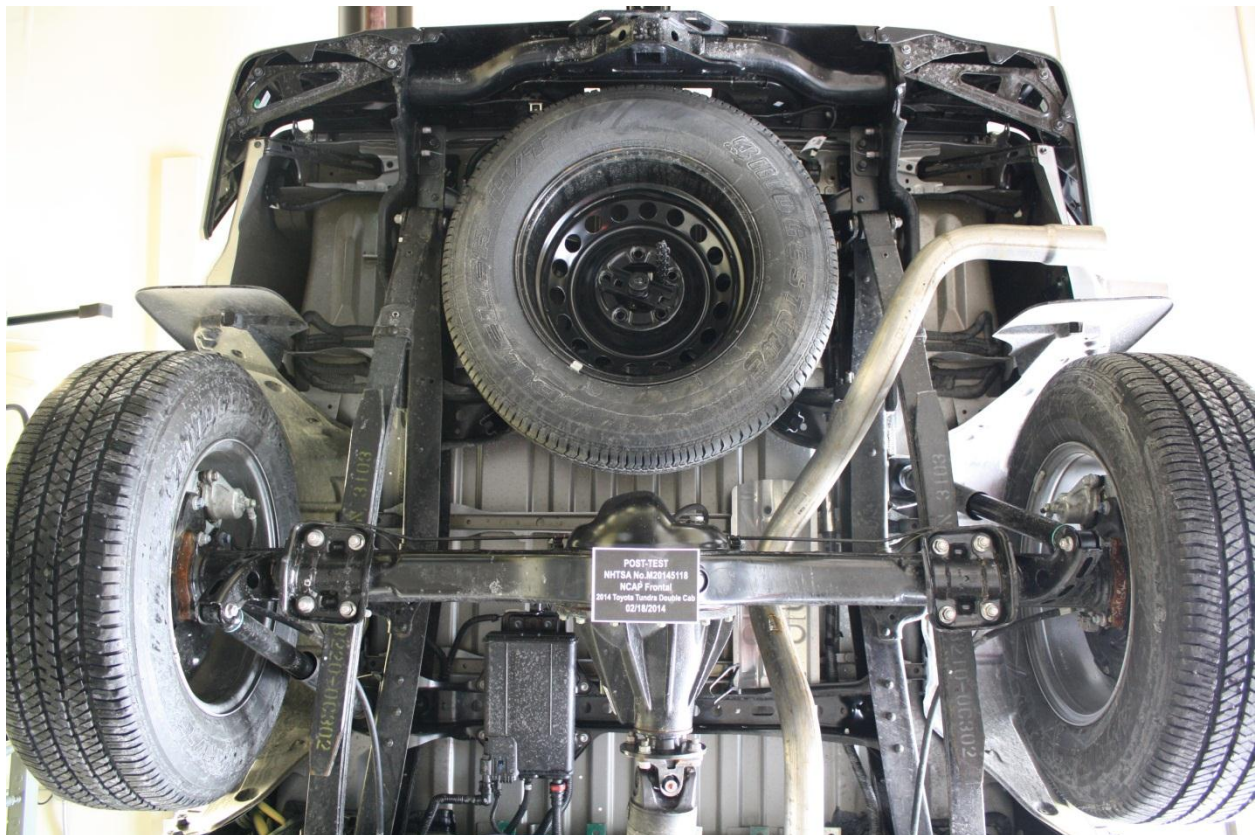


Figure A-26: Post-Test Rear Underbody View



Figure A-27: Pre-Test Dummy Cable Routing

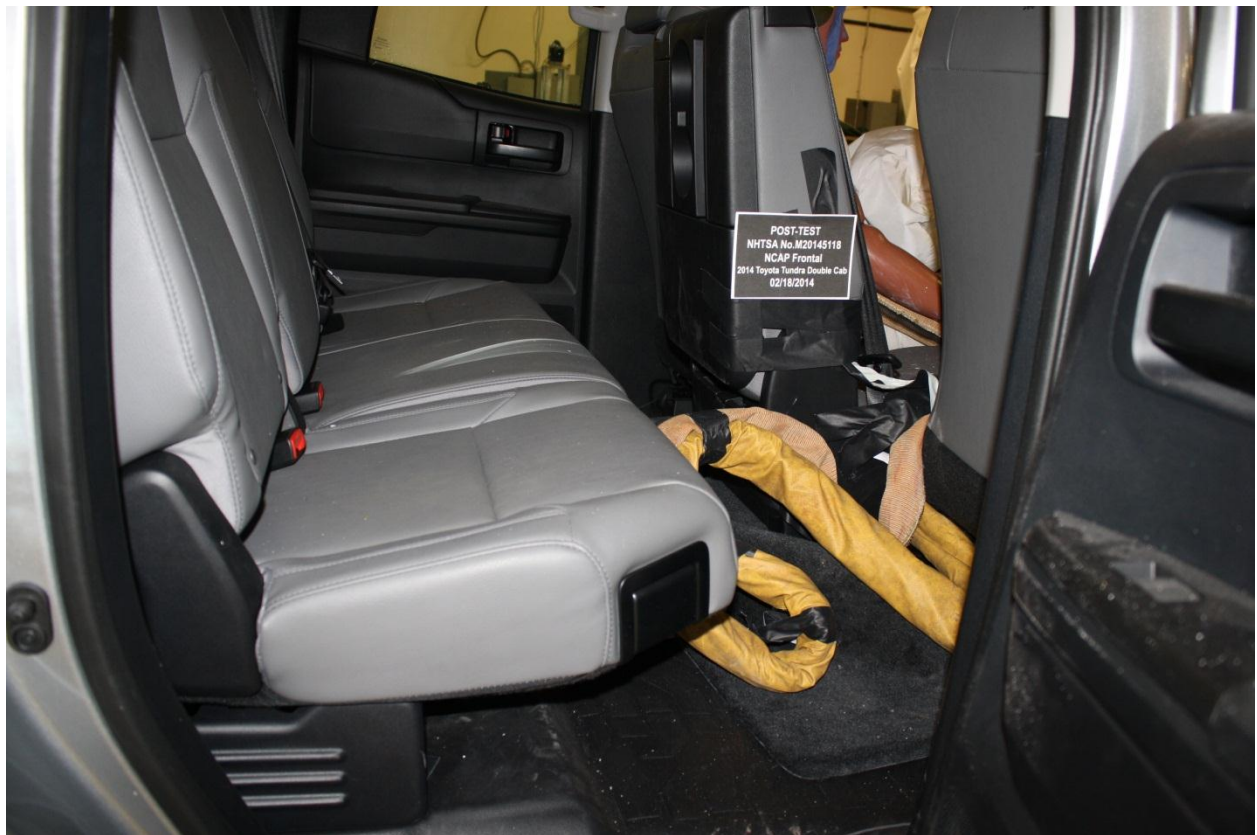


Figure A-28: Post-Test Dummy Cable Routing



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 View of Belt Anchorage for Driver Dummy



Figure A-38: Post-Test View of Belt Anchorage for Driver Dummy



Figure A-39: Pre-Test Driver Dummy Feet



Figure A-40: Post-Test Driver Dummy Feet



Figure A-41: Pre-Test Driver's Side Knee Bolster



Figure A-42: Post-Test Driver's Side Knee Bolster



Figure A-43: Pre-Test Driver's Side Floorpan



Figure A-44: Post-Test Driver's Side Floorpan



Figure A-45: Post-Test Driver Dummy Face



Figure A-46: Post-Test Driver Dummy Contact With Airbag



Figure A-47: Post-Test Driver Dummy Contact With Headrest

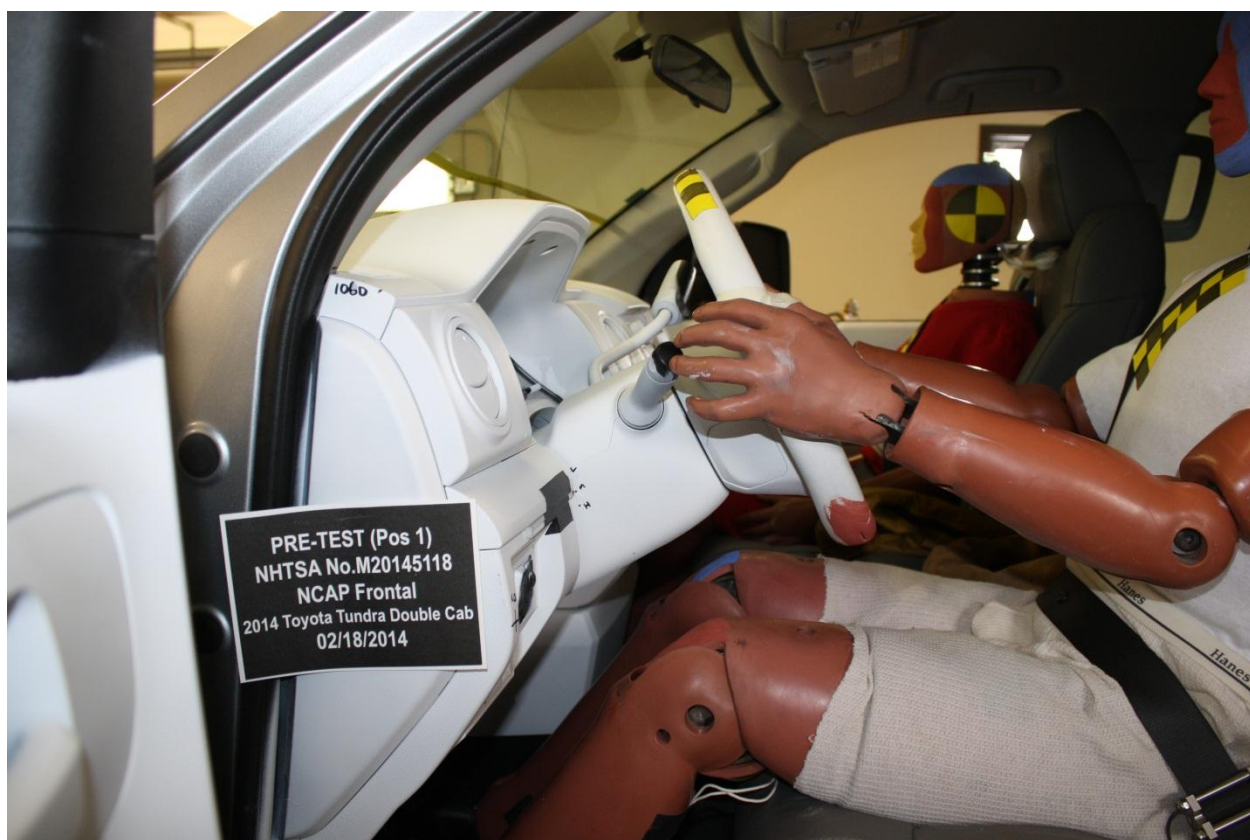


Figure A-48: Pre-Test View of the Steering Wheel

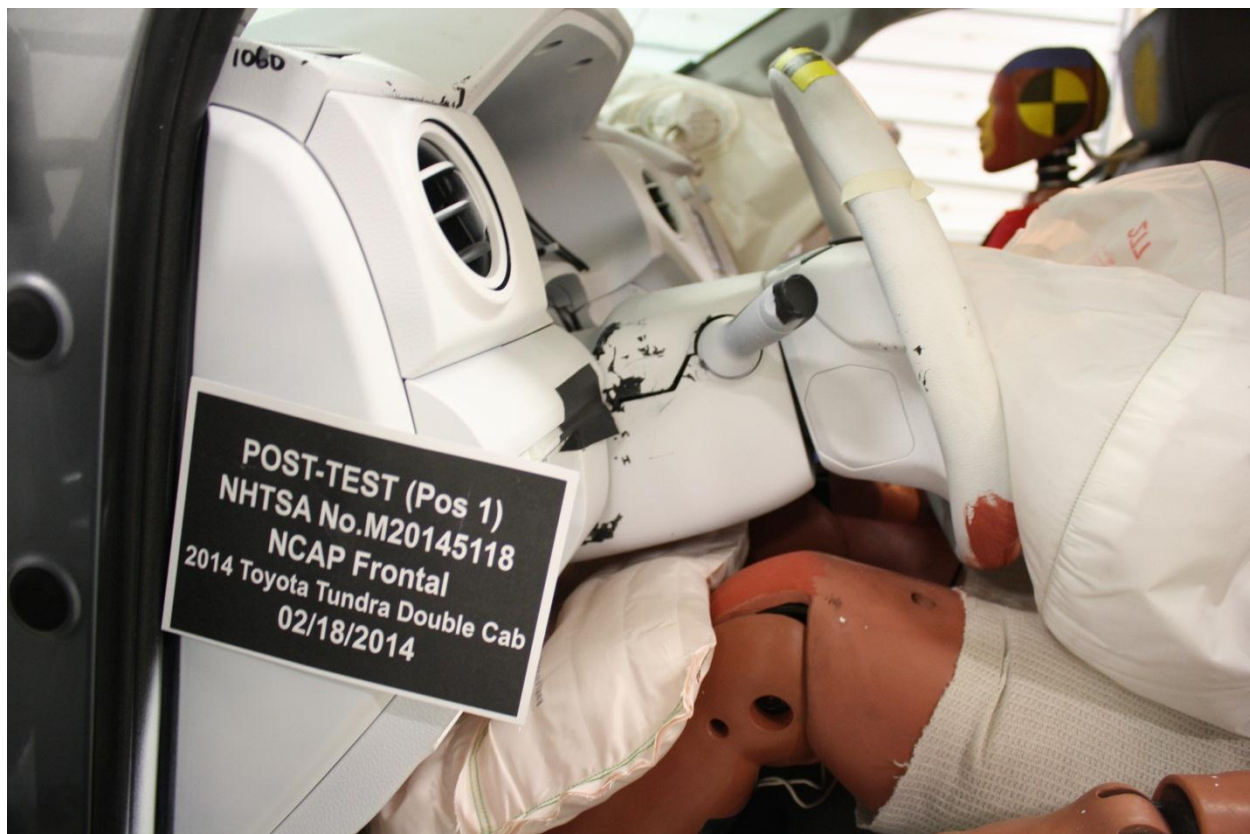


Figure A-49: Post-Test View of the Steering Wheel



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

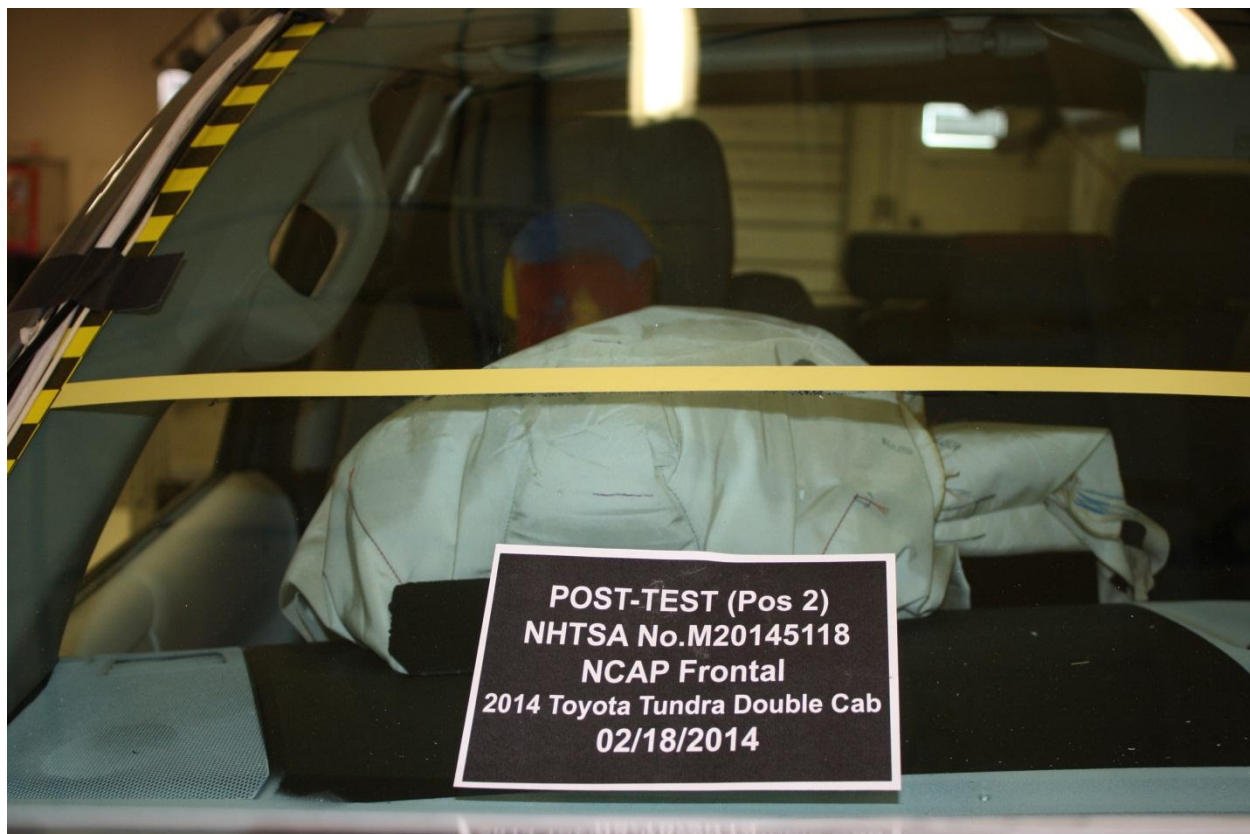


Figure A-51: Post-Test Passenger Dummy Front View



Figure A-52: Pre-Test Passenger Dummy Window View



Figure A-53: Post-Test Passenger Dummy Window View



Figure A-54: Pre-Test Passenger Dummy and Vehicle Interior View



Figure A-55: Post-Test Passenger Dummy and Vehicle Interior View



Figure A-56: Pre-Test Passenger's Seat Fore-Aft Markings



Figure A-57: Post-Test Passenger's Seat Fore-Aft Markings



Figure A-58: Pre-Test View of Belt Anchorage for Passenger Dummy



Figure A-59: Post-Test View of Belt Anchorage for Passenger Dummy



Figure A-60: Pre-Test Passenger Dummy Feet



Figure A-61: Post-Test Passenger Dummy Feet



Figure A-62: Pre-Test Passenger's Side Knee Bolster



Figure A-63: Post-Test Passenger's Side Knee Bolster



Figure A-64: Pre-Test Passenger's Side Floorpan



Figure A-65: Post-Test Passenger's Side Floorpan



Figure A-66: Post-Test Passenger Dummy Face



Figure A-67: Post-Test Passenger Dummy Contact With Airbag



Figure A-68: Post-Test Passenger Dummy Contact With Headrest

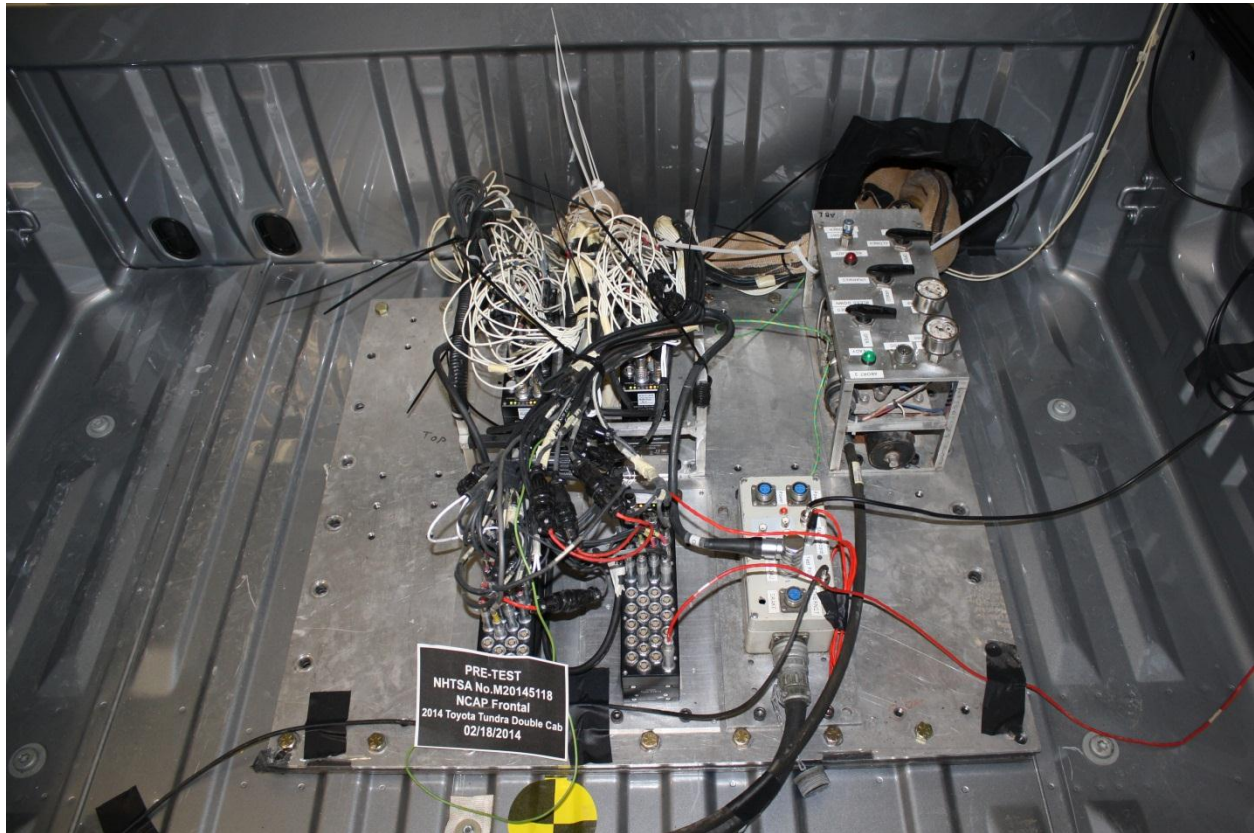


Figure A-69: Photograph of Ballast Installed in Vehicle

Photo Not Applicable

Figure A-70: Post-Test Stoddard Solvent Spillage Location View, If Required



Figure A-71: Post-Test Speed Trap Read-Out



Figure A-72: Vehicle at 0° on Static Rollover Device



Figure A-73: Vehicle at 90° on Static Rollover Device



Figure A-74: Vehicle at 180° on Static Rollover Device



Figure A-75: Vehicle at 270° on Static Rollover Device



Figure A-76: Vehicle at 360° on Static Rollover Device



Figure A-77: 2014 Toyota Tundra Double Cab Frontal Impact Event



TOYOTA

Let's Go Places

DESC.: **TUNDRA 4X4**
 VIN: **5TFCY5F14EX016591**
 PORT/PLANT: San Antonio, TX/TMMTX

SR DBL CAB 5.7L V8
 (01D6/13)
 R10HEAD:

GOVERNMENT 5-STAR SAFETY RATINGS

This vehicle has not been rated by the government for overall vehicle score, frontal crash, side crash or rollover risk.

STANDARD EQUIPMENT

- MECHANICAL & PERFORMANCE
 - 5.7L V-8 FORD V8 DOHC 32V with Dual Independent VVT-i 381 hp / 401 lb-ft
 - 6-Speed Automatic Transmission with Overdrive
 - 4-Wheel Drive Part-Time 4WD w/EBL Controlled Transfer Case, AT-TRAC & Auto LSD
 - Trin-Tech Frame
 - Trail Hitch Bar, 4,300 Rear Dnt.
 - TOW/HAIL Mode, Engine Oil Cooler, Trans Oil Cooler, Heavy Duty Batt & Alt & 7-pin Connector
 - Ind Coil-Spring High-Mounted Double Wishbone Front Susp w/ Stabilizer Bar
 - Trapezoidal Multi-Leaf Rear Suspension w/ Shagreened Outboard Mounted Shocks
 - Power-Assisted 4-Wheel Disc Brakes
 - 18" Style 561 Wheels w/ P255/70R18 Tires
- SAFETY & CONVENIENCE
 - Star Safety System: Vehicle Stability Ctrl, Traction Ctrl, ABS w/ Electronic Brake Force Distribution, Brake Assist & Smart Stop Technology
 - Rear Backup Camera
 - Manual Headlamp Level Control
 - Trailer-Sway Control
 - Dr & Fr Pass Advanced Airbag System
 - Dr & Fr Pass Seat Side & Knee Airbags
 - Roll-Overing Curtain Airbags (ROSA)
 - 3-Point Seatbelts for All Positions with Driver ELR & ALSEBELT for All Passengers
 - Tire Pressure Monitor System (TPMS)

Star ratings range from 1 to 5 stars (★★★★★) with 5 being the highest.

Source: National Highway Traffic Safety Administration (NHTSA)

www.safercar.gov or 1-888-327-4236



Fuel Economy and Environment

Fuel Economy



15

combined city/hwy

13

city

17

highway

6.7 gallons per 100 miles

15 MPG

Std Pickups range from 13 to 21 MPG
The best vehicle range: 121 MPG.

Annual fuel cost

\$ 3,500

Fuel Economy & Greenhouse Gas Rating (single unit)

1

2

The vehicle emits 606 grams CO2 per mile. The best emits 0 grams per mile (single unit). Producing and delivering this fuel also emits greenhouse gases.

Smog Rating (single unit)

1

5

10 Best

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 23 MPG and costs \$11,600 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at \$3.50 per gallon. MPG is miles per gallon on gasoline fuel equivalent. Vehicle weight and are a significant cause of climate change and smog.

economy.gov

MANUFACTURER'S SUGGESTED RETAIL PRICE \$32,735.00

OPTIONAL EQUIPMENT

FE	0 State Emissions	
DS	1 Lock Rail System	125.00
BZ	1 Work Truck Package	~275.00
	1 (Removes Wireless Door Lock and Passenger Seat Back Pocket. Removes Power Windows and Speed and Shift Sensing Power Door Locks in Regular Cab Only. Adds Vinyl Flooring, and Vinyl Seating.	
TM	1 14th Turn Signal Indicators and 1 Manual-extend Feature	50.00
CF	1 Carpet Floor Mats w/Door Sill Protector	195.00

TOYOTA

\$33,825.00

DELIVERY PROCESSING AND HANDLING FEE 995.00

Dealer Name / Address: 31167
 TOYOTA OF BATAVIA
 3888 WEST MAIN STREET RD.
 BATAVIA NY 14020

Ship to:

The new Toyota Tundra. 5-year/60,000-mile basic bumper-to-bumper warranty. 3-year/50,000-mile powertrain warranty. Also Toyota limited-mile corrosion perforation coverage. See Warranty and Maintenance Guide Ask dealer for details.

Manufacturer's suggested retail price includes manufacturer's recommended pre-delivery service, destination, tax, title and license, a possible finance, state and local taxes and dealer and distributor installed options and accessories are not included in the manufacturer's suggested retail price.

Toyota Care, which covers normal factory scheduled maintenance for two years or 25,000 miles, whichever occurs first, is included on top of the sales price of the vehicle for qualifying buyers.

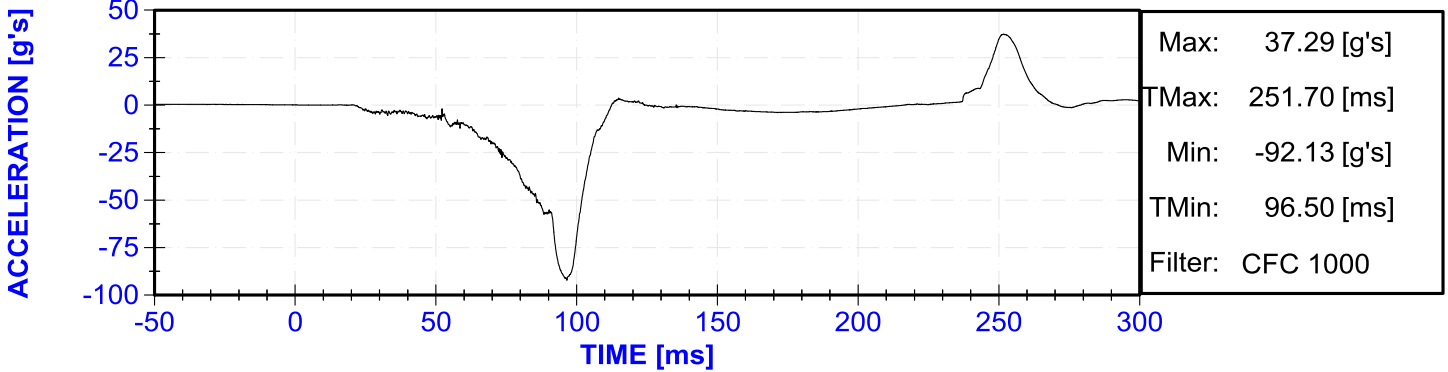
Figure A-78: Monroney Label Photograph

APPENDIX B
VEHICLE & DUMMY RESPONSE DATA TRACES

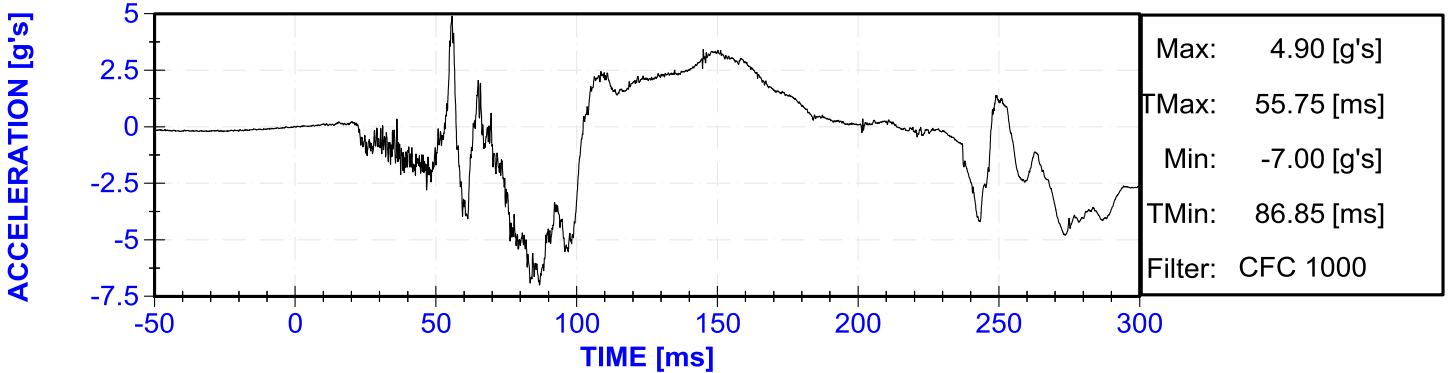
Table of Data Plots

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Plot 2	Driver Head Y Acceleration vs. Time Primary	B-3
Plot 3	Driver Head Z Acceleration vs. Time Primary	B-3
Plot 4	Driver Head Resultant Acceleration vs. Time Primary	B-3
Plot 5	Driver Chest X Deflection vs. Time	B-4
Plot 6	Driver Chest X Acceleration vs. Time Primary	B-4
Plot 7	Driver Chest Y Acceleration vs. Time Primary	B-4
Plot 8	Driver Chest Z Acceleration vs. Time Primary	B-4
Plot 9	Driver Chest Resultant Acceleration vs. Time Primary	B-5
Plot 10	Driver Upper Neck Force X vs. Time Primary	B-5
Plot 11	Driver Upper Neck Force Z vs. Time Primary	B-5
Plot 12	Driver Upper Neck Moment Y vs. Time Primary	B-5
Plot 13	Driver Nij vs. Time Primary	B-6
Plot 14	Driver Left Femur Force vs. Time	B-6
Plot 15	Driver Right Femur Force vs. Time	B-6
Plot 16	Passenger Head X Acceleration vs. Time Primary	B-6
Plot 17	Passenger Head Y Acceleration vs. Time Primary	B-7
Plot 18	Passenger Head Z Acceleration vs. Time Primary	B-7
Plot 19	Passenger Head Resultant Acceleration vs. Time Primary	B-7
Plot 20	Passenger Chest X Deflection vs. Time	B-7
Plot 21	Passenger Chest X Acceleration vs. Time Primary	B-8
Plot 22	Passenger Chest Y Acceleration vs. Time Primary	B-8
Plot 23	Passenger Chest Z Acceleration vs. Time Primary	B-8
Plot 24	Passenger Chest Resultant Acceleration vs. Time Primary	B-8
Plot 25	Passenger Upper Neck Force X vs. Time Primary	B-9
Plot 26	Passenger Upper Neck Force Z vs. Time Primary	B-9
Plot 27	Passenger Upper Neck Moment Y vs. Time Primary	B-9
Plot 28	Passenger Nij vs. Time Primary	B-9
Plot 29	Passenger Left Femur Force vs. Time	B-10
Plot 30	Passenger Right Femur Force vs. Time	B-10

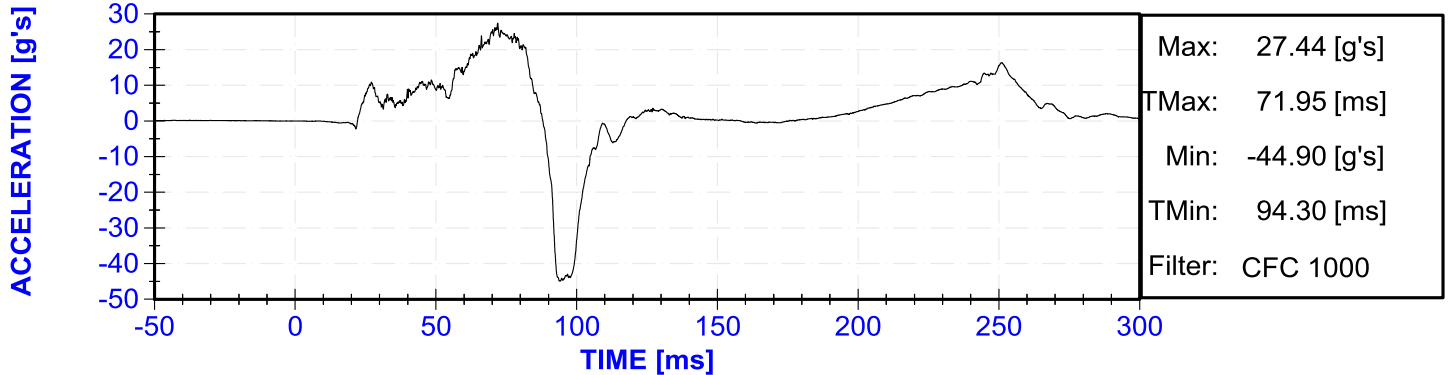
Driver Head X Acceleration vs. Time Primary



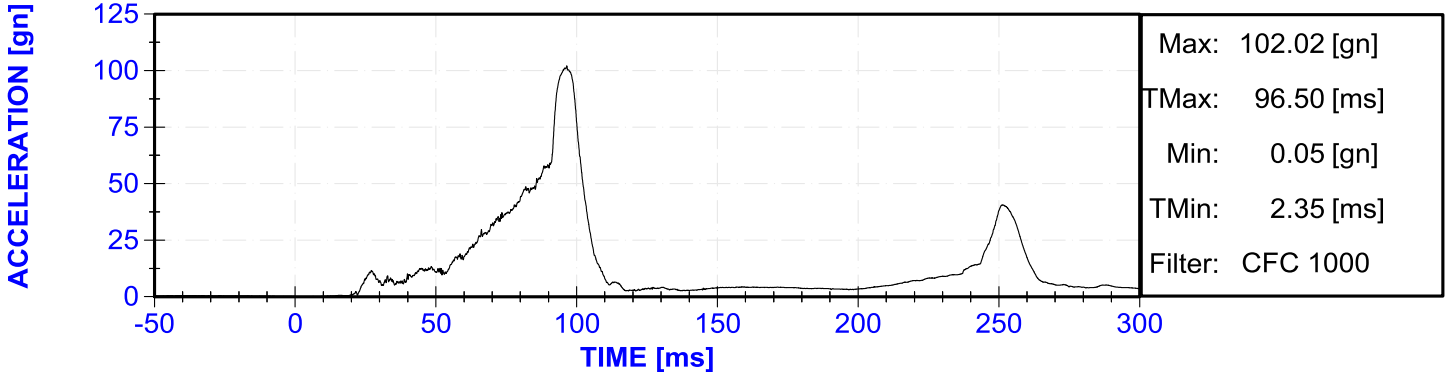
Driver Head Y Acceleration vs. Time Primary



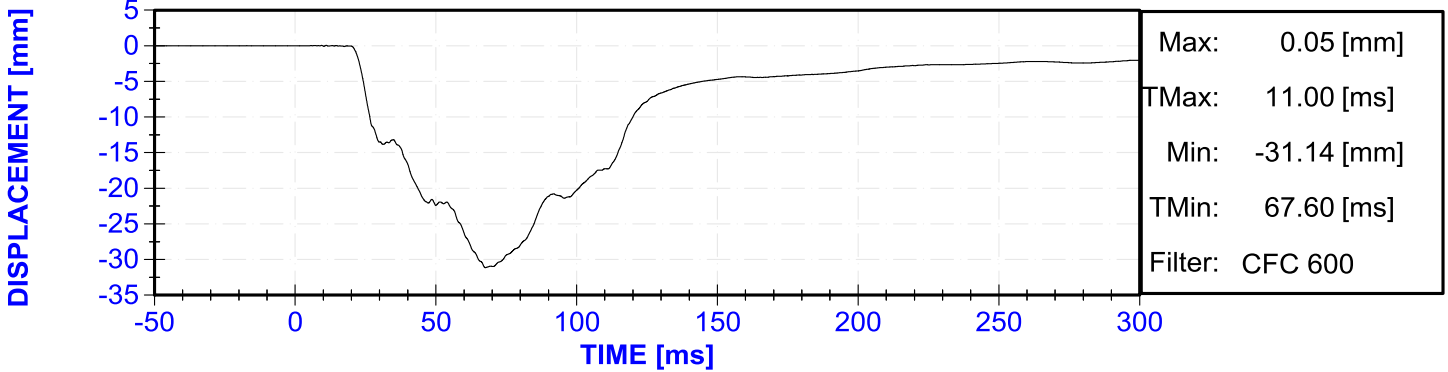
Driver Head Z Acceleration vs. Time Primary



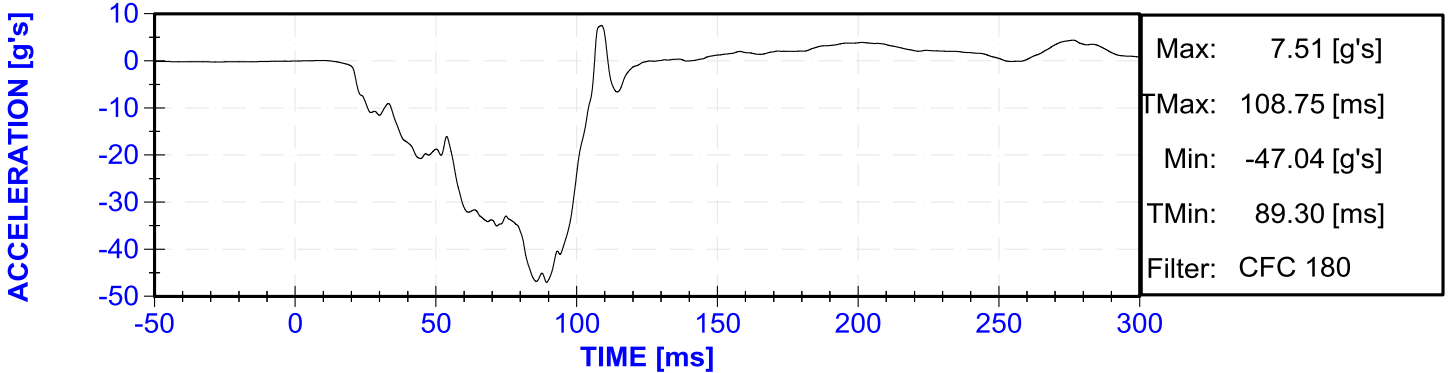
Driver Head Resultant Acceleration vs. Time Primary



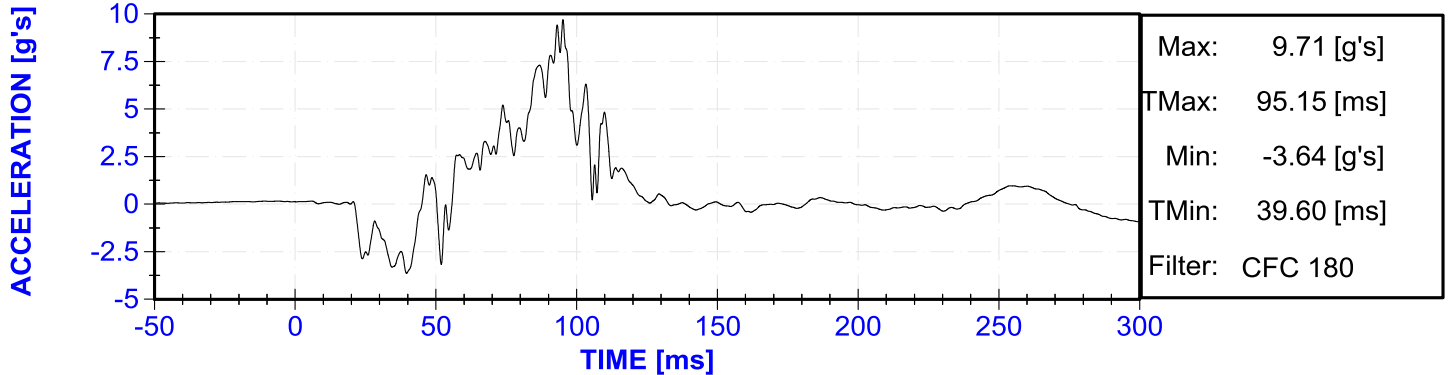
Driver Chest X Deflection vs. Time



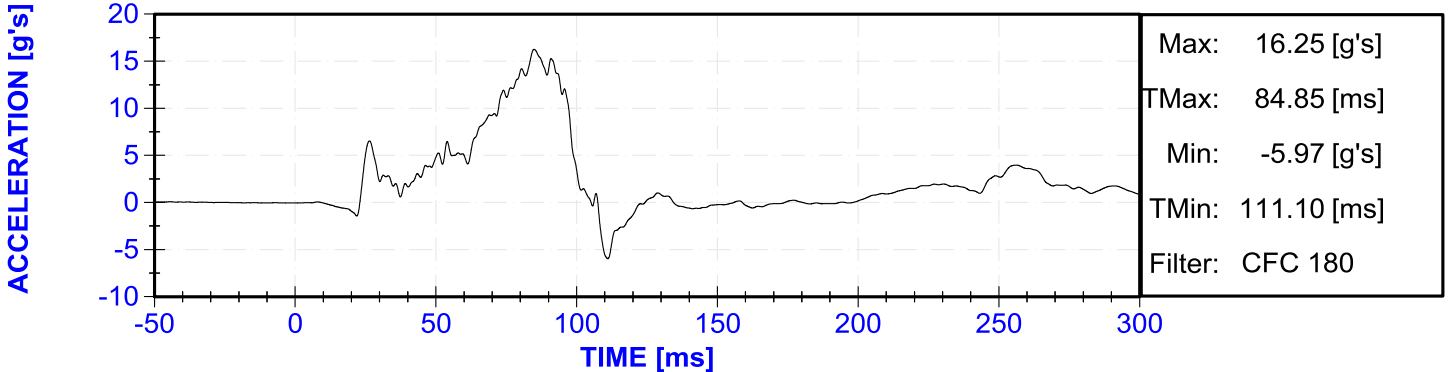
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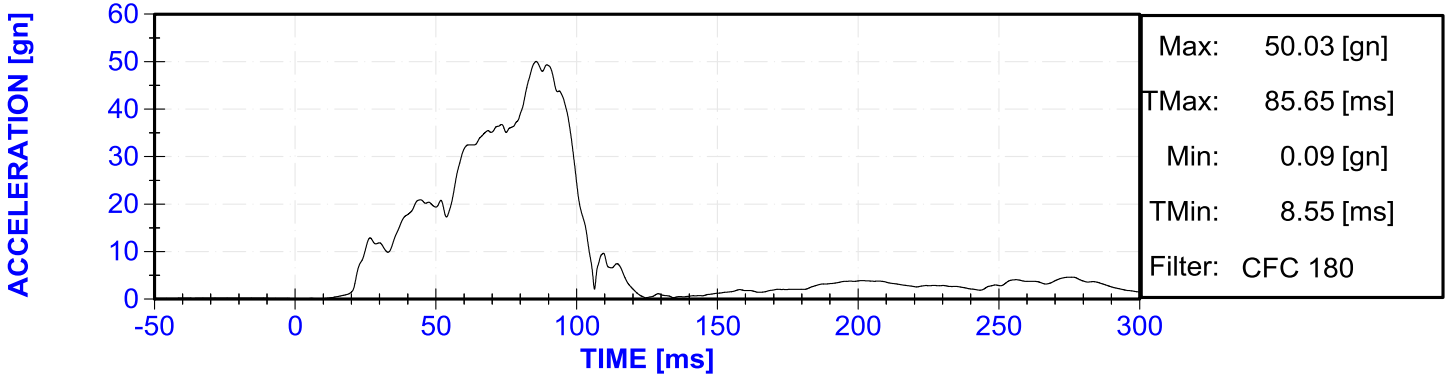
Driver Chest Y Acceleration vs. Time Primary



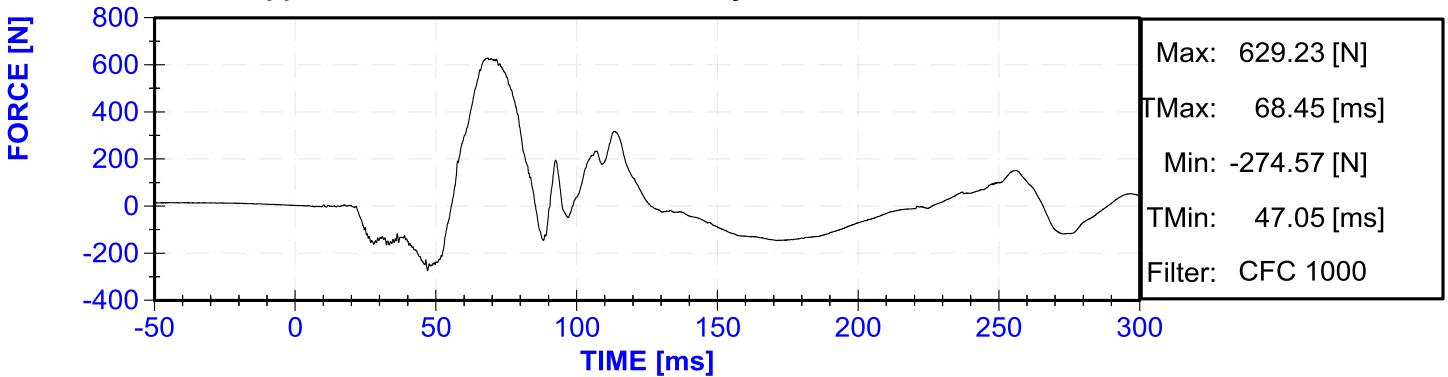
Driver Chest Z Acceleration vs. Time Primary



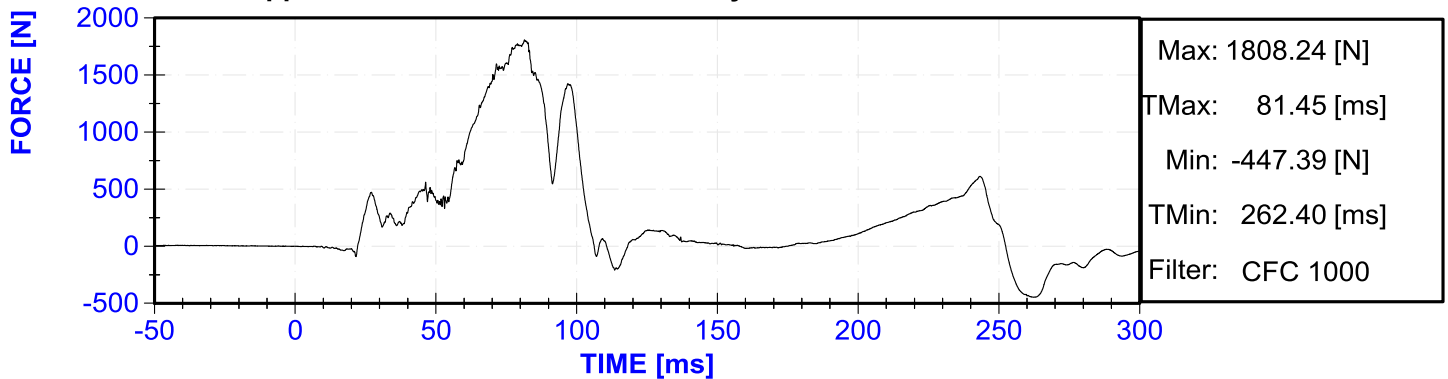
Driver Chest Resultant Acceleration vs. Time Primary



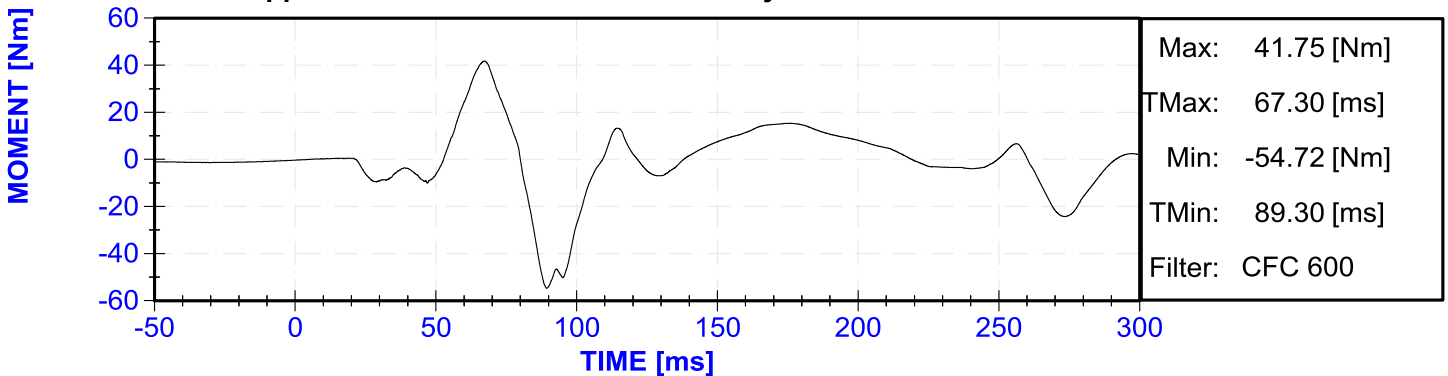
Driver Upper Neck Force X vs. Time Primary

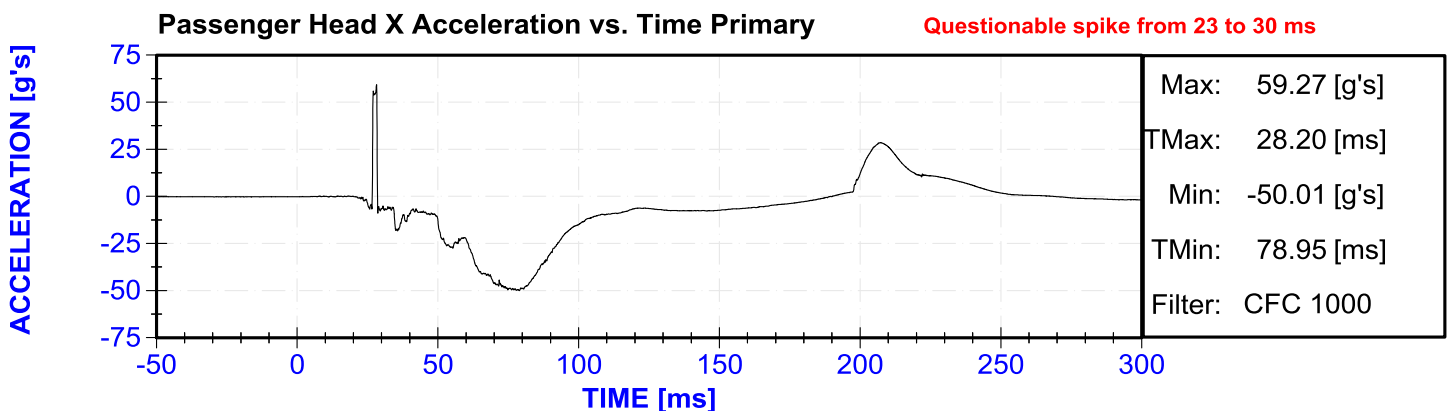
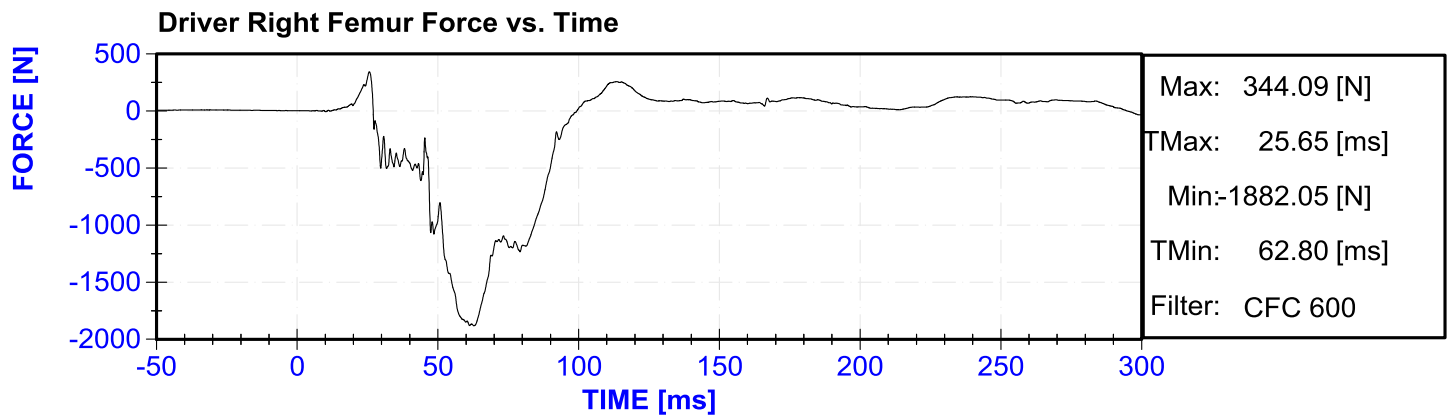
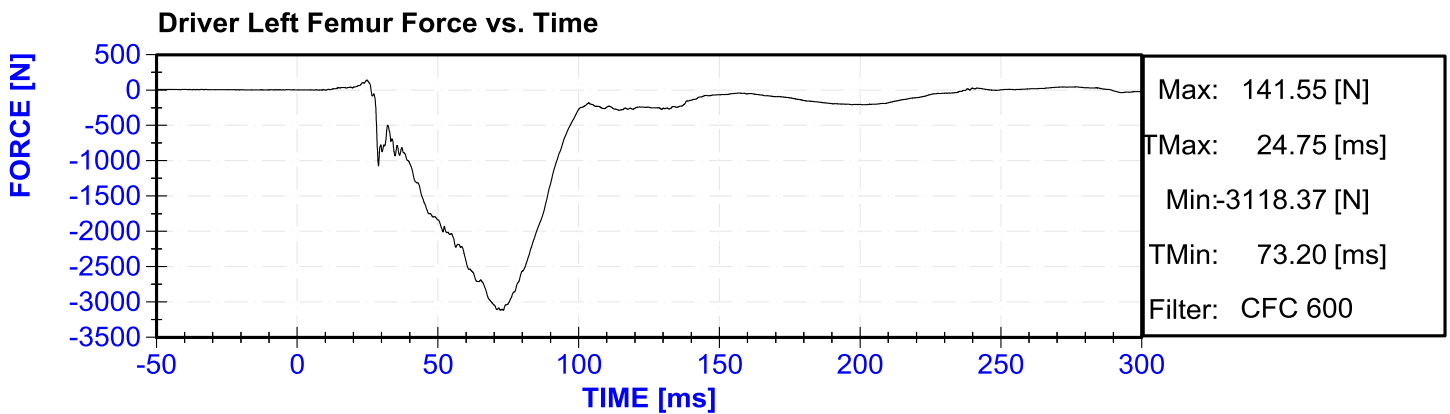
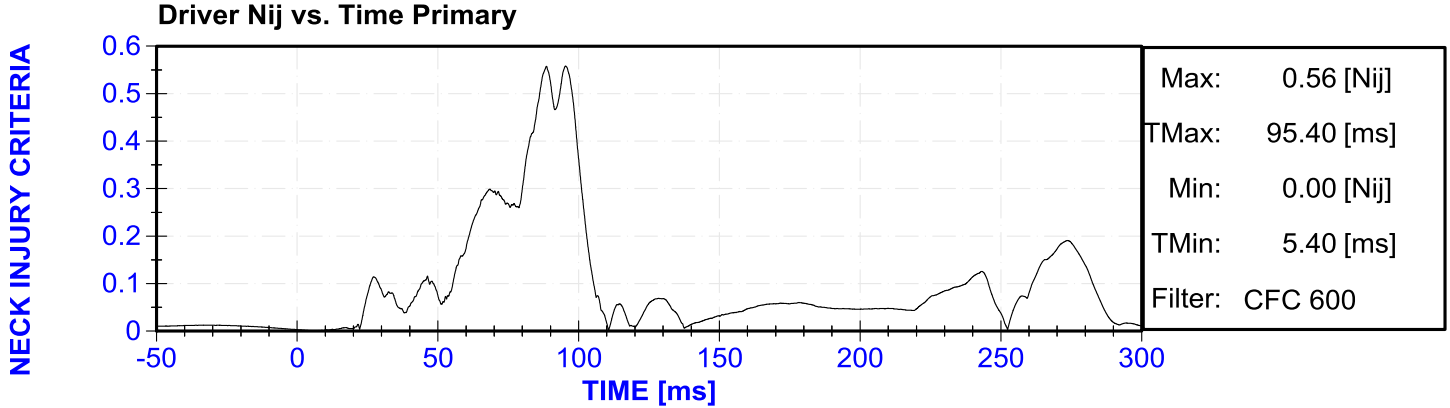


Driver Upper Neck Force Z vs. Time Primary

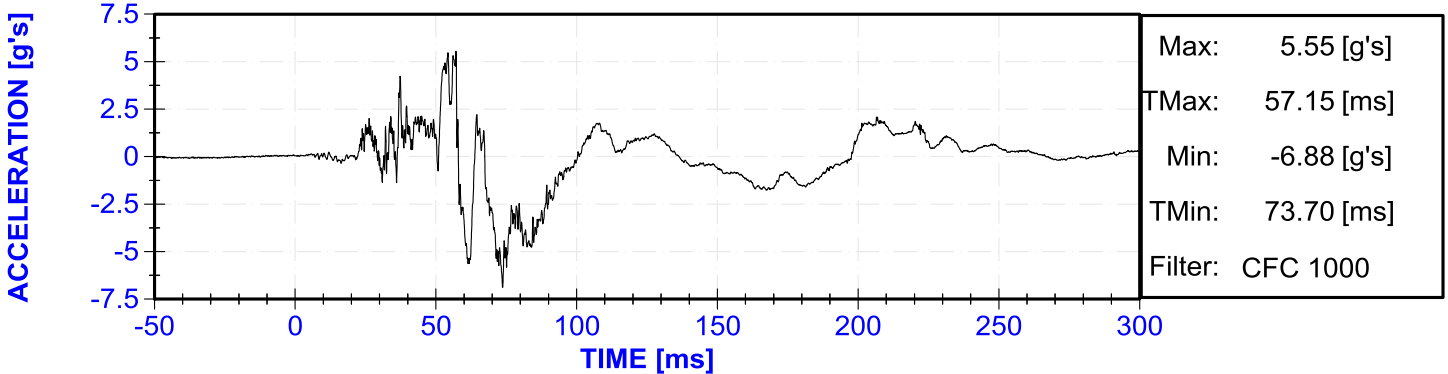


Driver Upper Neck Moment Y vs. Time Primary

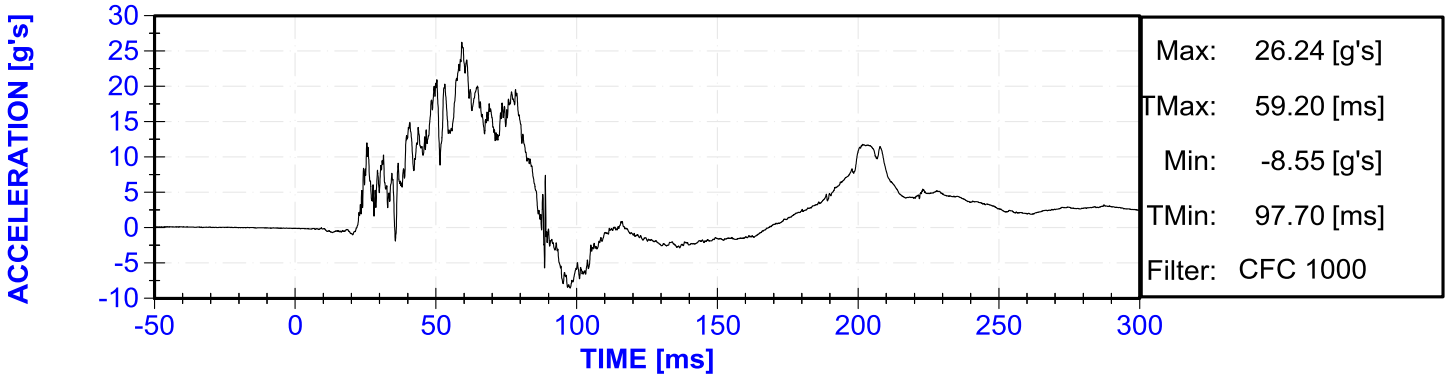




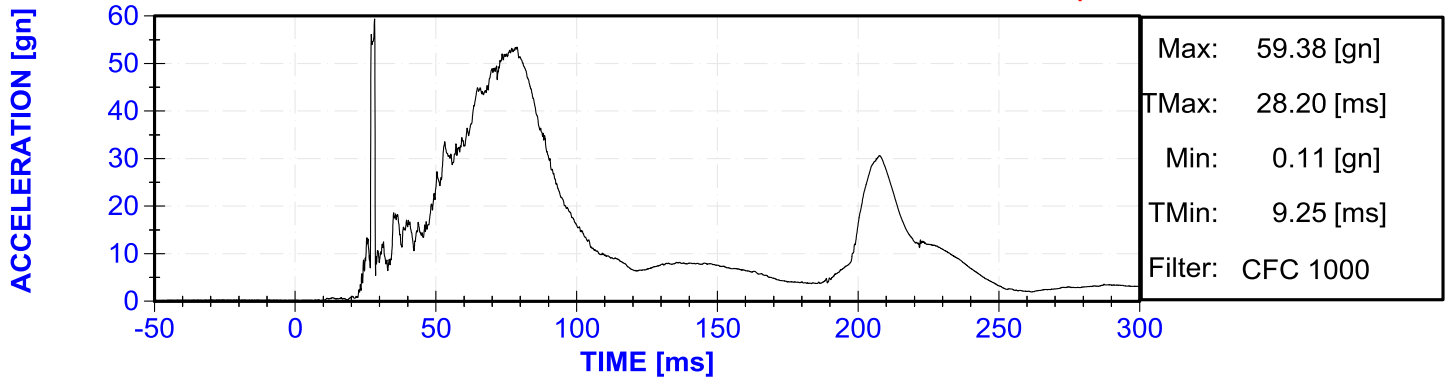
Passenger Head Y Acceleration vs. Time Primary



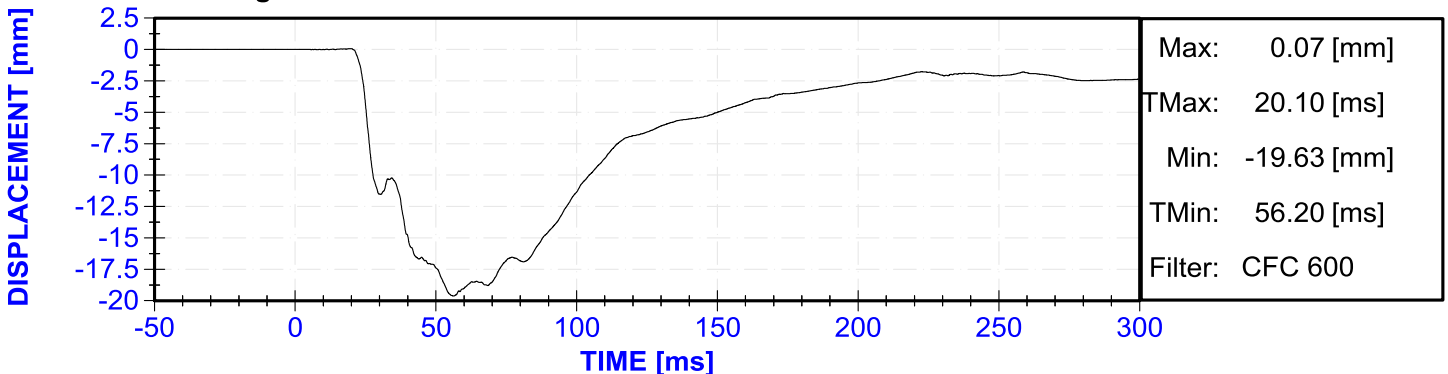
Passenger Head Z Acceleration vs. Time Primary



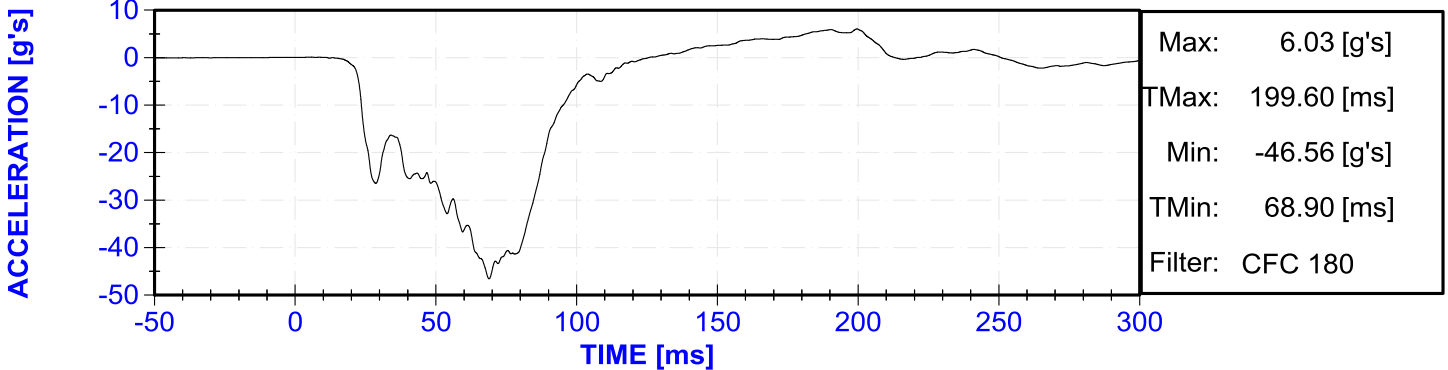
Passenger Head Resultant Acceleration vs. Time Primary Questionable spike from 23 to 30 ms



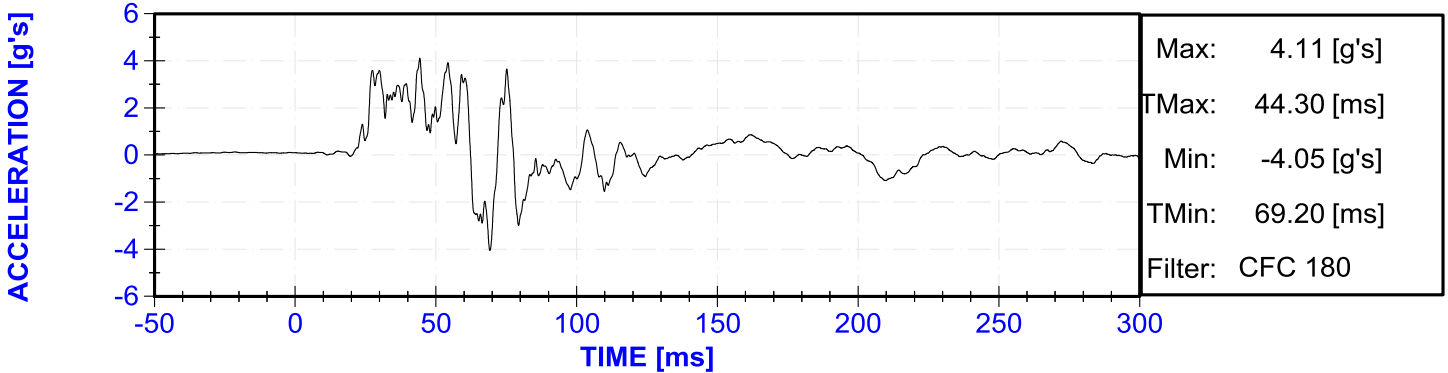
Passenger Chest X Deflection vs. Time



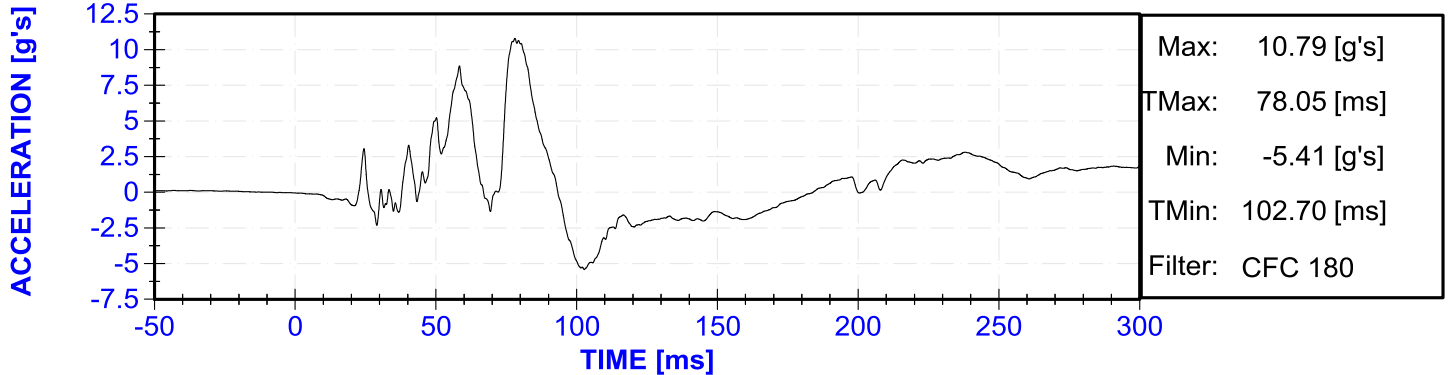
Passenger Chest X Acceleration vs. Time Primary



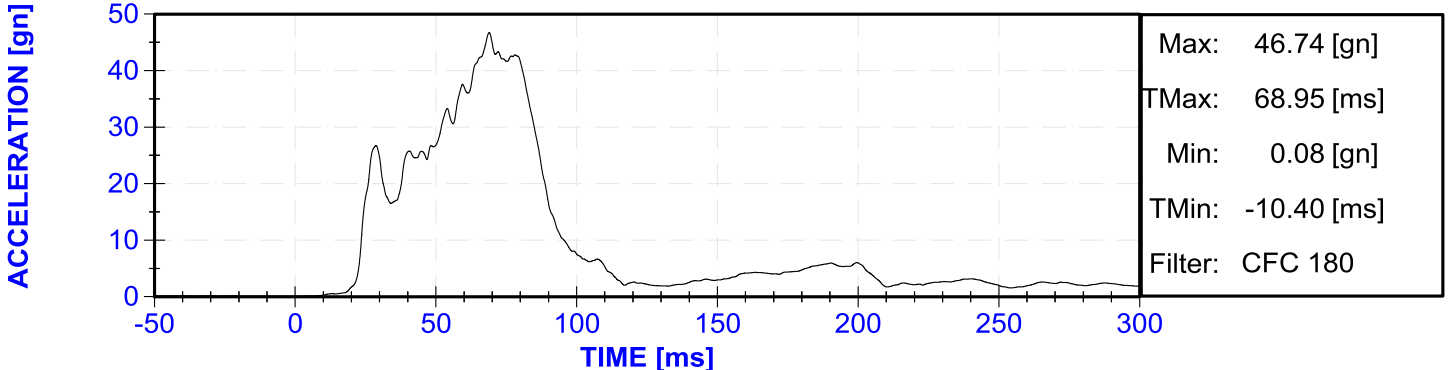
Passenger Chest Y Acceleration vs. Time Primary



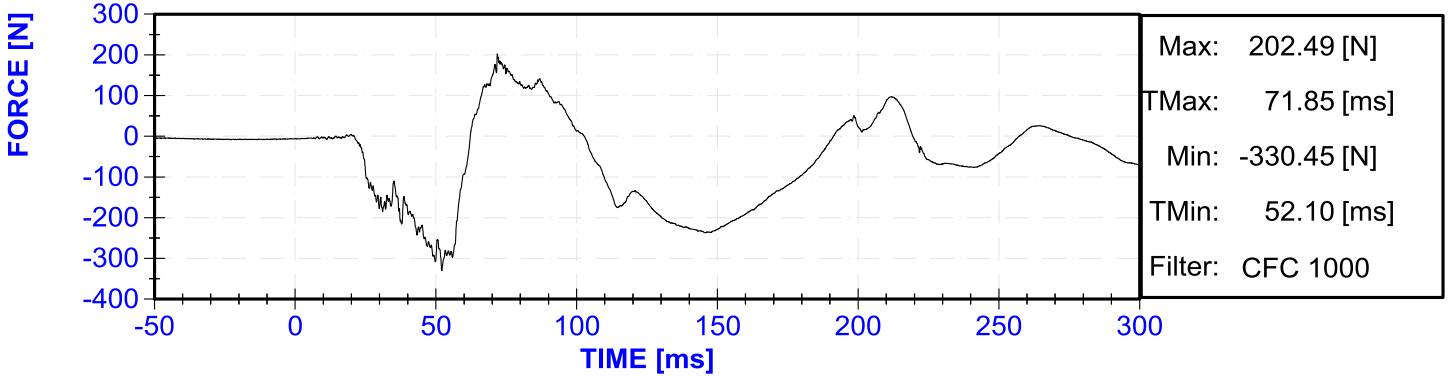
Passenger Chest Z Acceleration vs. Time Primary



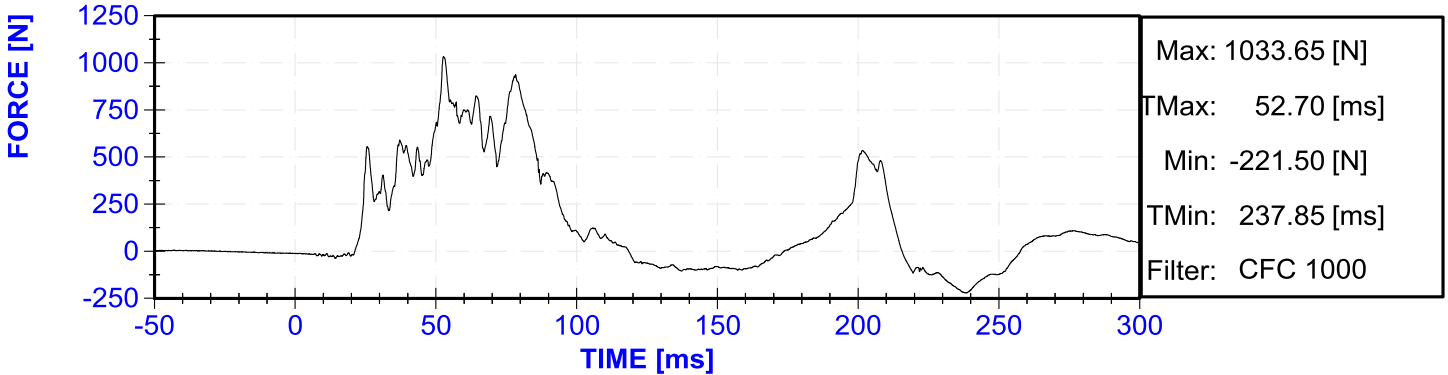
Passenger Chest Resultant Acceleration vs. Time Primary



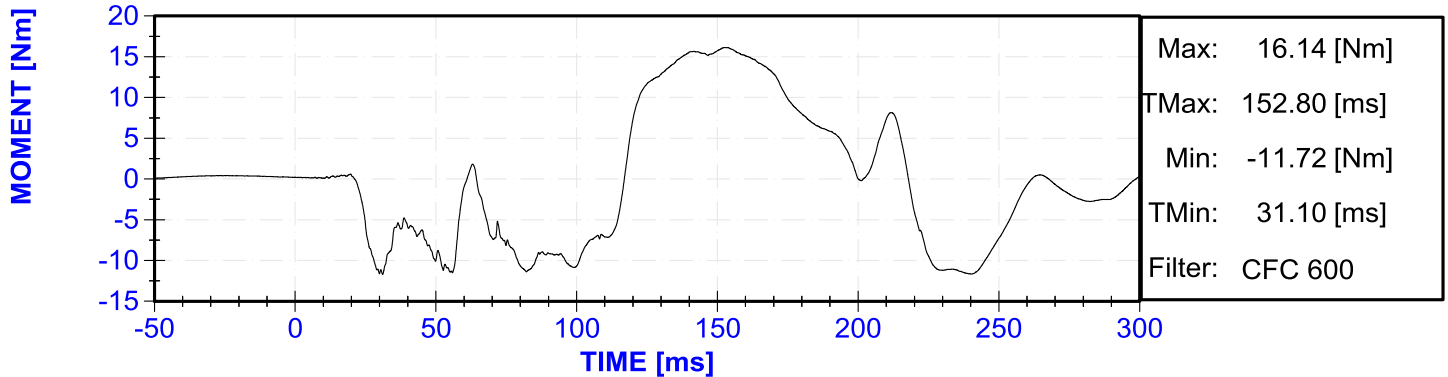
Passenger Upper Neck Force X vs. Time Primary



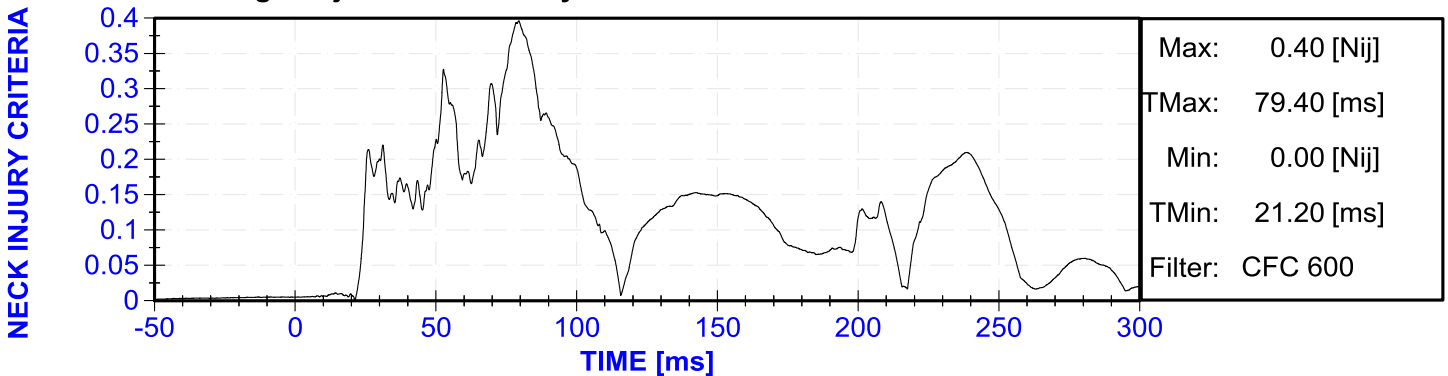
Passenger Upper Neck Force Z vs. Time Primary



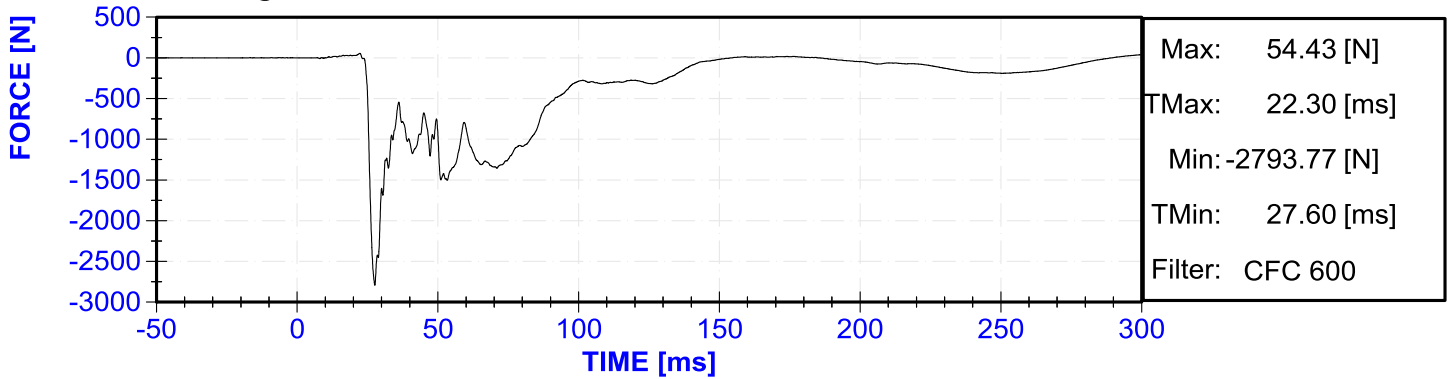
Passenger Upper Neck Moment Y vs. Time Primary



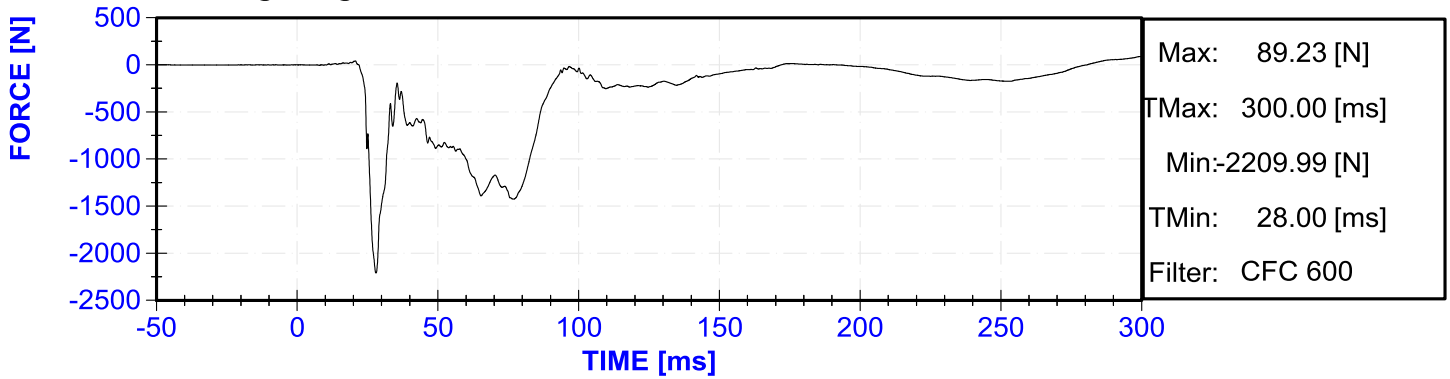
Passenger Nij vs. Time Primary



Passenger Left Femur Force vs. Time



Passenger Right Femur Force vs. Time



APPENDIX C

DUMMY CALIBRATION AND PERFORMANCE VERIFICATION DATA

CALIBRATION TEST RESULTS

PRE-TEST

HYBRID III 50TH PERCENTILE MALE - DRIVER ATD

SERIAL NO: 064



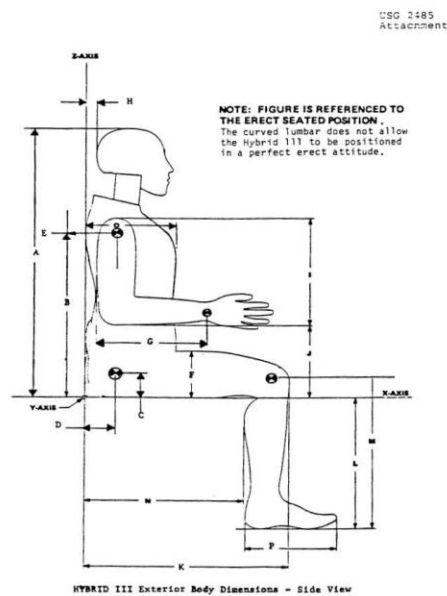
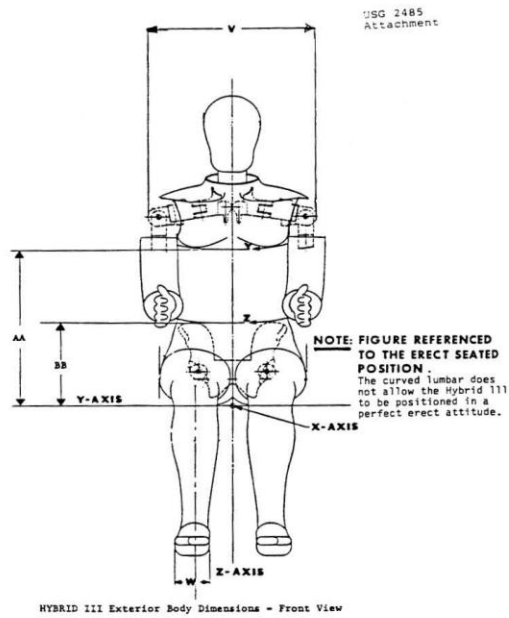
50th Male External Measurements

S/N 064

Symbol	Description	Specification	Results	Pass
		in	In	
A	Sitting Height	34.6 – 35.0	34.8	Yes
B	Shoulder Pivot Height	19.9 – 20.5	20.0	Yes
C	H-Point Height	3.3 – 3.5	3.3	Yes
D	H-Point from Backline	5.3 – 5.5	5.4	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	13.0	Yes
J	Elbow Rest Height	7.5 – 8.3	8.1	Yes
K	Buttock to Knee Length	22.8 – 23.8	23.1	Yes
L	Popliteal Height	16.9 – 17.9	17.1	Yes
M	Knee Pivot Height	19.1 – 19.7	19.3	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	10.3	Yes
V	Shoulder Breadth	16.3 – 17.2	16.8	Yes
W	Foot Breadth	3.6 – 4.2	3.9	Yes
Y	Chest Circumference with Jacket	38.2 – 39.4	39.0	Yes
Z	Waist Circumference	32.9 – 34.1	33.6	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: M. Geesey

02/13/2014





VERIFICATION REPORT

Test Name:	Head Drop	Revision:	7/15/2002
Sub Test Name:			
ATD Type:	Hybrid 3 - 50th Male		
ATD Serial Number:	064		
Test ID:	Head Drop	Test Date:	2/12/2014
		Test Time:	6:54:03 AM

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

Test Parameters	Test Specifications			Test Results	
Temperature	18.9	--	25.6	21.40 deg C	P
Humidity	10	--	70	12.60 %RH	P
Resultant Acceleration	225	--	275	256.9 G's	P
Oscillation	0	--	10	2.2 %	P
Lateral Acceleration	-15	--	15	6.1 G's	P

All test parameters are within specifications

Technician: **R. Weil**

Supervisor: **E. Dutton**



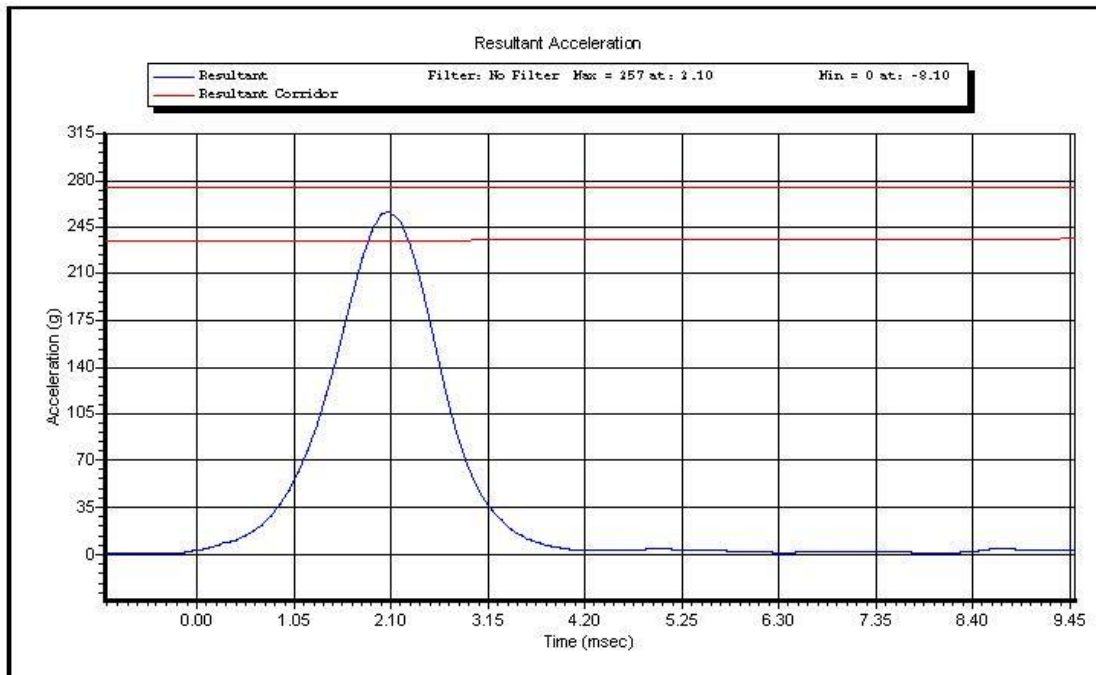
VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Endevco	7264-2000	P58904	12/5/2013
Endevco	7264-2000	P58911	12/5/2013
Endevco	7264-2000	P58776	12/5/2013



Test Name:	Head Drop
Sub Test Name:	
ATD Type:	Hybrid 3 - 50th Male
ATD Serial Number:	064

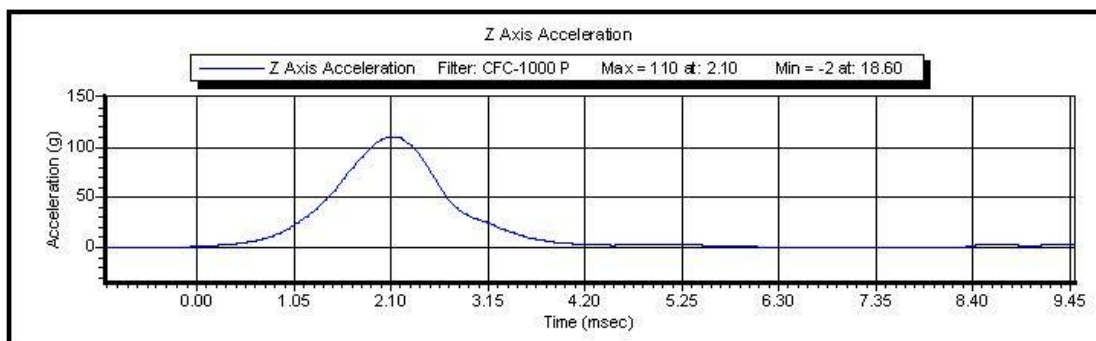
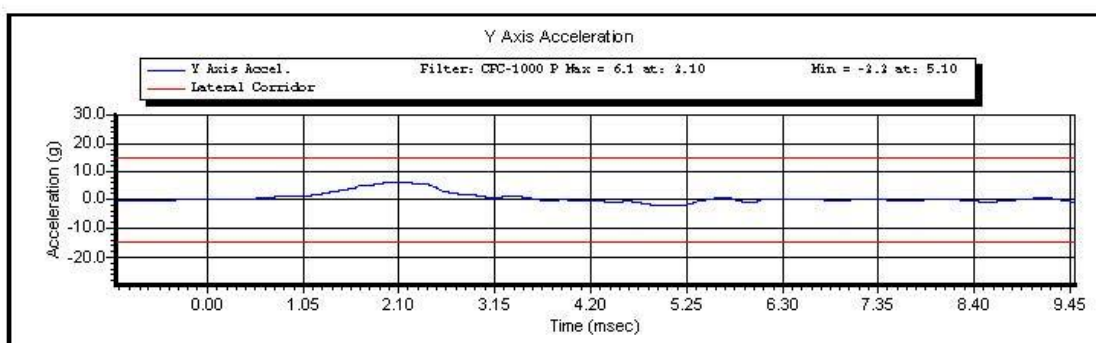
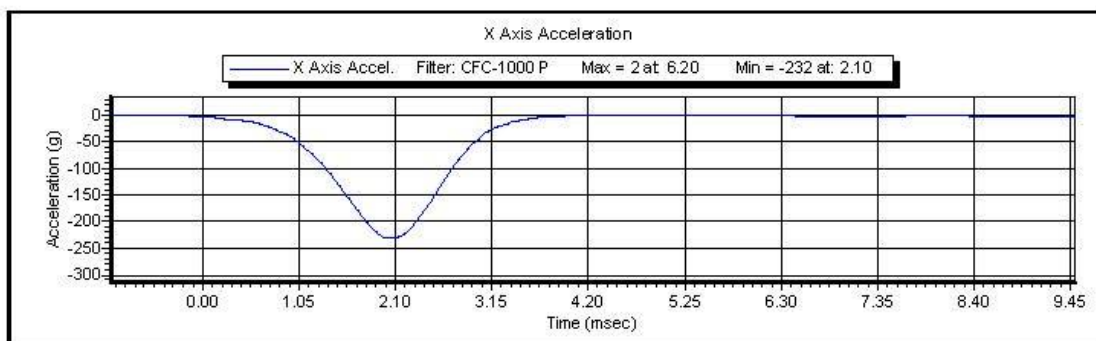


Test ID: **Head Drop**

Test Time: **6:54:03 AM**

Test Date: **2/12/2014**

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0



Test ID: **Head Drop**

Test Time: **6:54:03 AM**

Test Date: **2/12/2014**

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0



VERIFICATION REPORT

Test Name:	Neck Extension	Revision:	10/1/2001
Sub Test Name:			
ATD Type:	Hybrid 3 - 50th Male		
ATD Serial Number:	064		
Test ID:	Neck Extension	Test Date:	2/13/2014
		Test Time:	9:25:39 AM

Component Part Number	Component Serial Number
Neck - 78051-336	021692

Test Parameters		Test Specifications		Test Results	
Temperature		20.6	-- 22.2	21.40	deg C P
Humidity		10	-- 70	16.00	%RH P
Velocity		5.94	-- 6.19	6.030	m/s P
Pendulum Deceleration at	10 ms	17.2	-- 21.2	18.62	G's P
Pendulum Deceleration at	20 ms	14.0	-- 19.0	16.42	G's P
Pendulum Deceleration at	30 ms	11.0	-- 16.0	13.29	G's P
Max Pendulum Deceleration after	30 ms	0.0	-- 22.0	15.09	G's P
Deceleration Time to	5 G's	38	-- 46	41.5	ms P
D Plane Rotation		81	-- 106	98.8	degrees P
Time at Max Rotation		72	-- 82	78.1	ms P
Rotation Decay to Zero		147	-- 174	158.4	ms P
Moment About Occipital Condyle		-80.0	-- -52.9	-66.06	Nm P
Time at Maximum Moment		65	-- 79	73.5	ms P
Moment Decay to Zero		120	-- 148	145.4	ms P

All test parameters are within specifications

Technician: **M. Goehle**
 Supervisor: **E. Dutton**



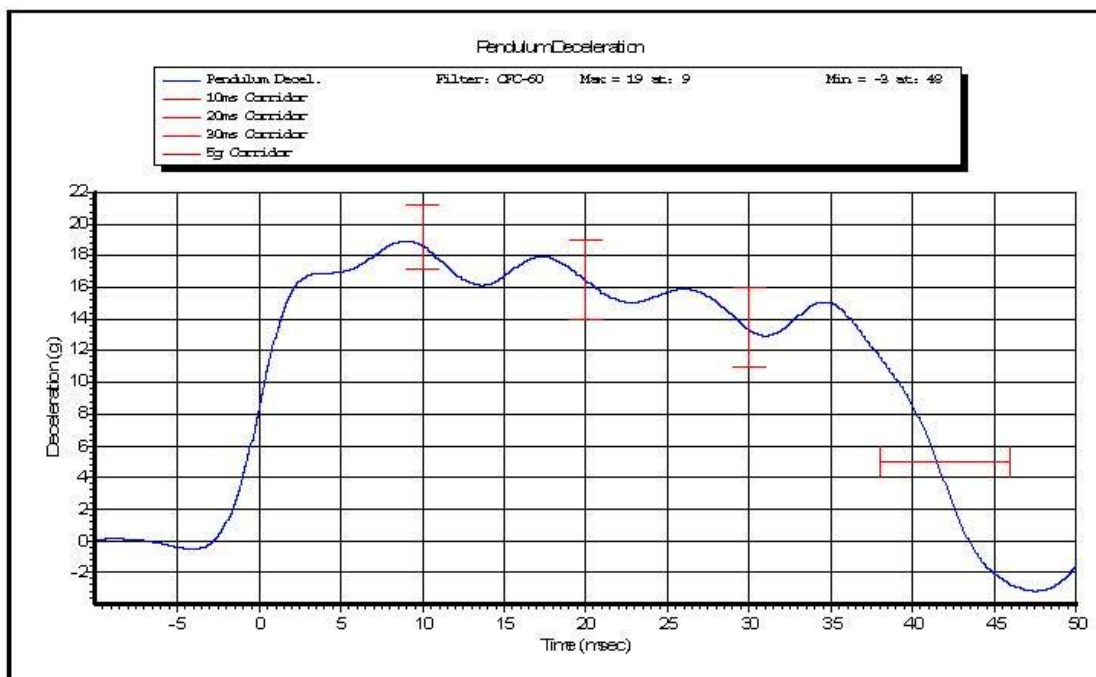
VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2014
Endevco	7231CT	AH5F3	10/16/2013
DentonATD	78051-342	PENDULUM POT	1/31/2014
DentonATD	78051-342	CONDYLE POT	1/31/2014
Denton	1716A	LC-2186 My	5/23/2013
Denton	1716A	LC-2186 Fx	5/23/2013



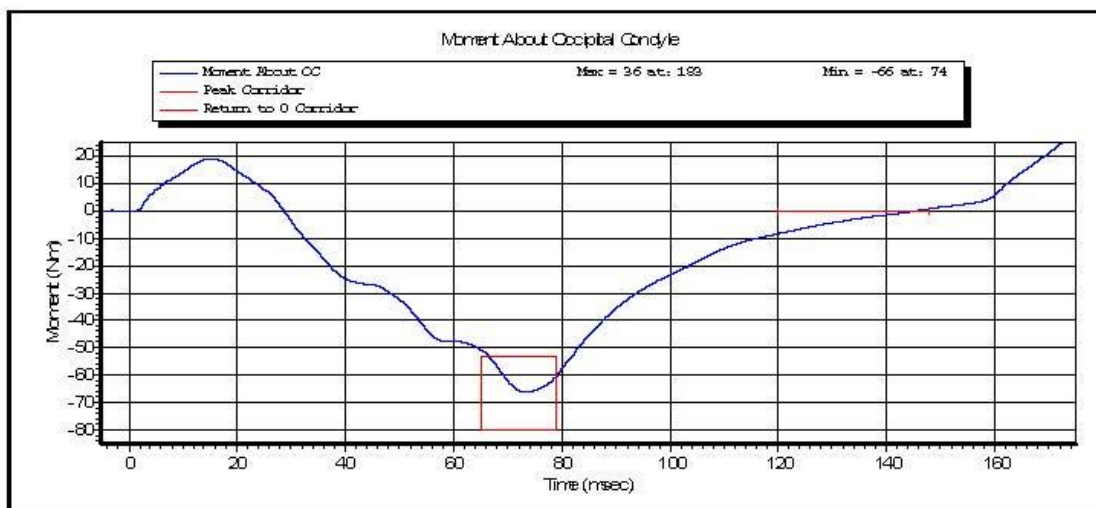
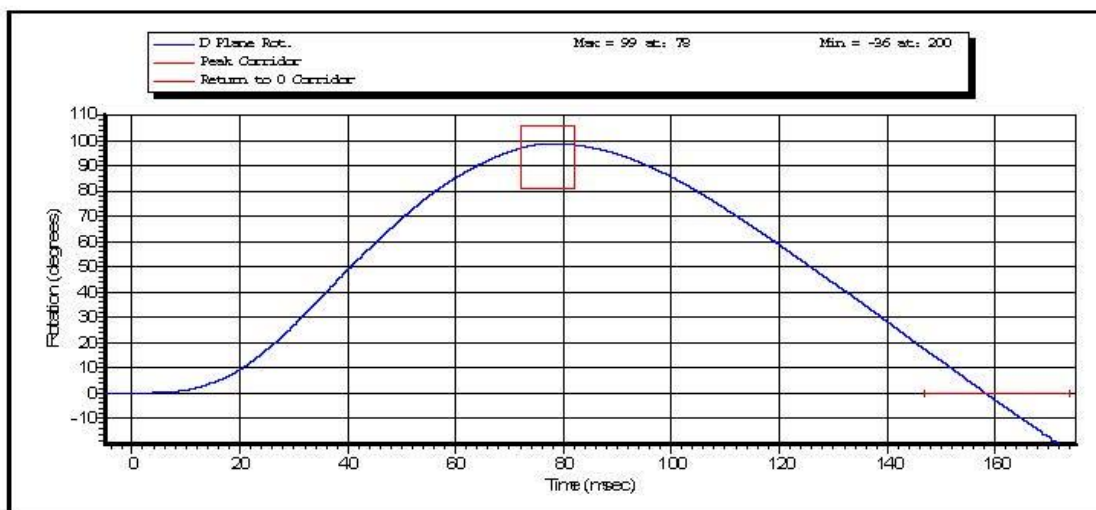
Name of Test:	Neck Extension
Name of Sub Test:	
Type of ATD:	Hybrid 3 - 50th Male
ATD Serial Number:	064



ID of Test: **Neck Extension** Time of Test: **9:25:39 AM**

Date of Test: **2/13/2014**

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

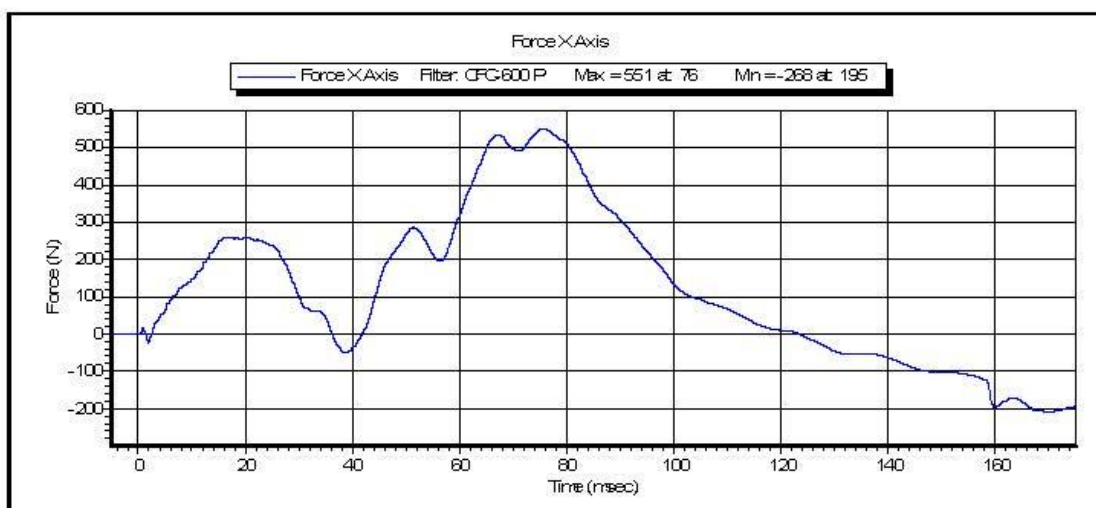
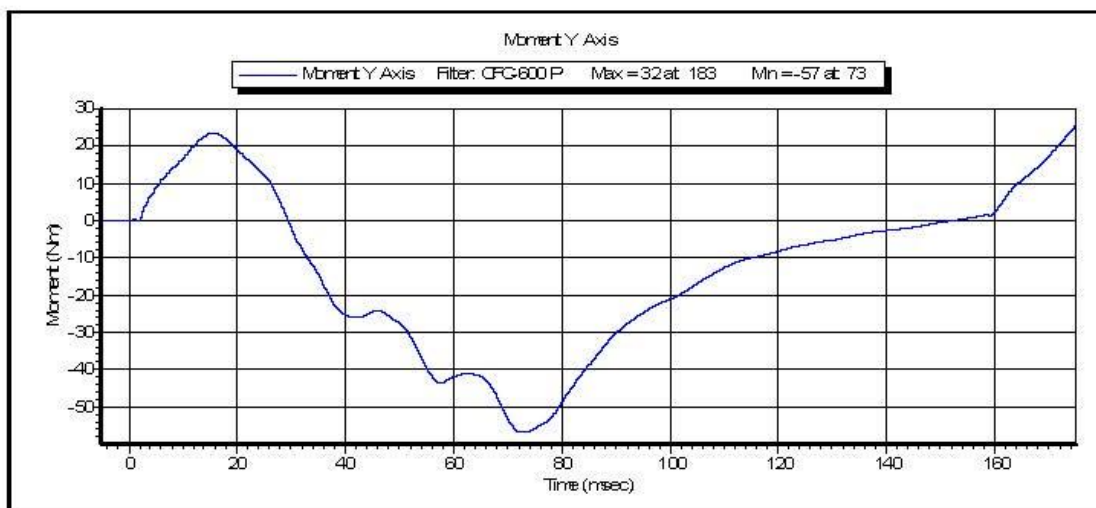


ID of Test: **Neck Extension**

Time of Test: **9:25:39 AM**

Date of Test: **2/13/2014**

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0



ID of Test: **Neck Extension** Time of Test: **9:25:39 AM**
Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

Date of Test: **2/13/2014**



VERIFICATION REPORT

Test Name:	Neck Flexion	Revision:	10/1/2001
Sub Test Name:			
ATD Type:	Hybrid 3 - 50th Male		
ATD Serial Number:	064		
Test ID:	Neck Flexion	Test Date:	2/12/2014
		Test Time:	12:04:13 PM

Component Part Number	Component Serial Number
Neck - 78051-336	021692

Test Parameters		Test Specifications		Test Results	
Temperature		20.6	-- 22.2	21.00 deg C	P
Humidity		10	-- 70	14.60 %RH	P
Velocity		6.89	-- 7.13	6.896 m/s	P
Pendulum Deceleration at	10 ms	22.5	-- 27.5	24.35 G's	P
Pendulum Deceleration at	20 ms	17.6	-- 22.6	21.46 G's	P
Pendulum Deceleration at	30 ms	12.5	-- 18.5	14.83 G's	P
Maximum Pendulum Deceleration After	30 ms	0	-- 29	14.8 G's	P
Deceleration Time to	5 ms	34	-- 42	37.4 ms	P
D Plane Rotation		-78	-- -64	-72.8 degrees	P
Time at Maximum Rotation		57	-- 64	59.1 ms	P
Rotation Decay to Zero		113	-- 128	113.1 ms	P
Moment About Occipital Condyle		88.1	-- 108.4	94.50 Nm	P
Time at Maximum Moment		47	-- 58	52.0 ms	P
Moment Decay to Zero		97.0	-- 107.0	98.2 ms	P

All test parameters are within specifications

Technician: **R. Weil**

Supervisor: **E. Dutton**



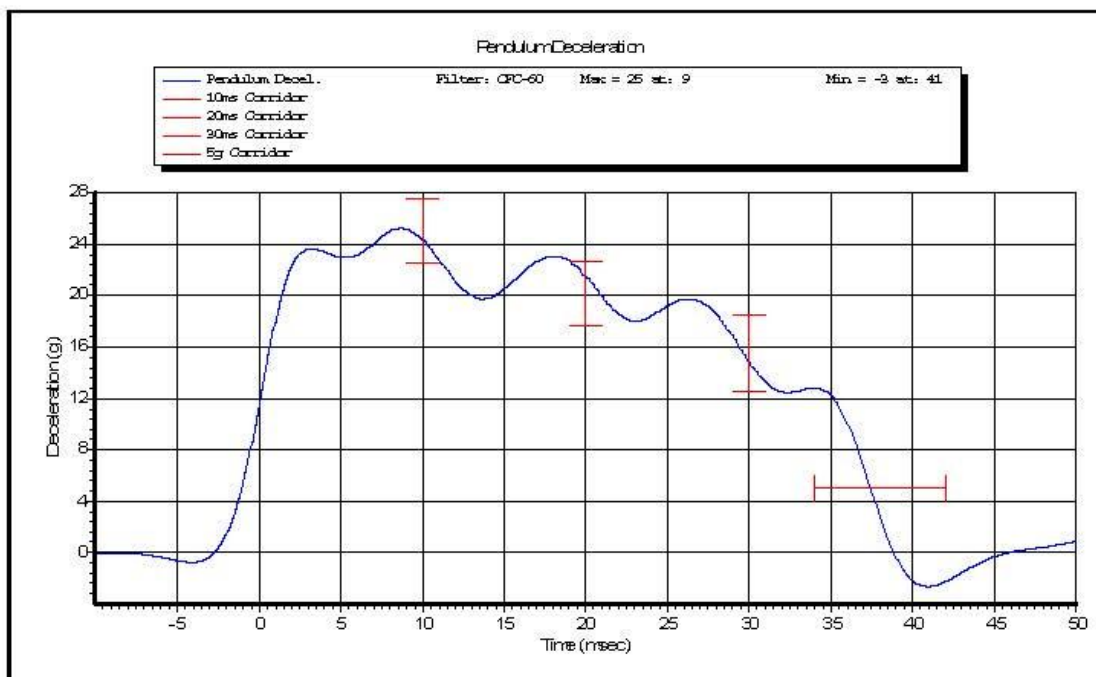
VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2014
Endevco	7231CT	AH5F3	10/16/2013
DentonATD	78051-342	PENDULUM POT	1/31/2014
DentonATD	78051-342	CONDYLE POT	1/31/2014
First Technology	IF-205	LC-161 My	4/30/2013
First Technology	IF-205	LC-161 Fx	4/30/2013



Name of Test:	Neck Flexion
Name of Sub Test:	
Type of ATD:	Hybrid 3 - 50th Male
ATD Serial Number:	064

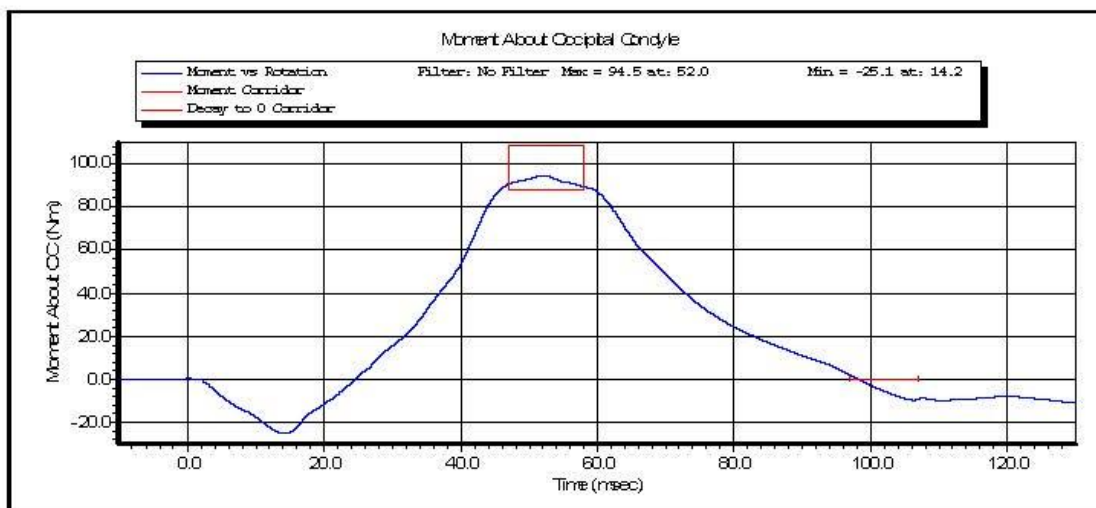
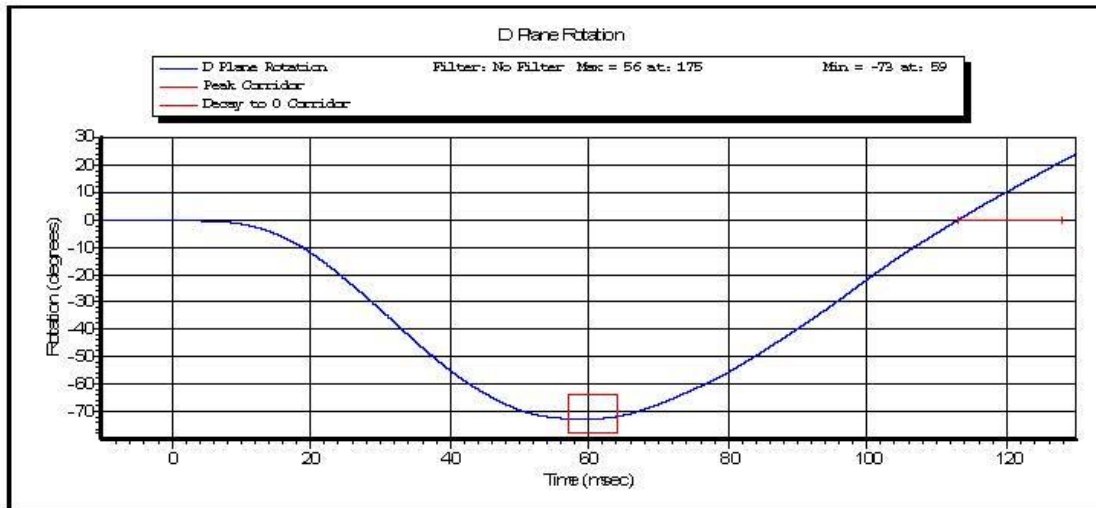


ID of Test: **Neck Flexion**

Time of Test: **12:04:13 PM**

Date of Test: **2/12/2014**

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

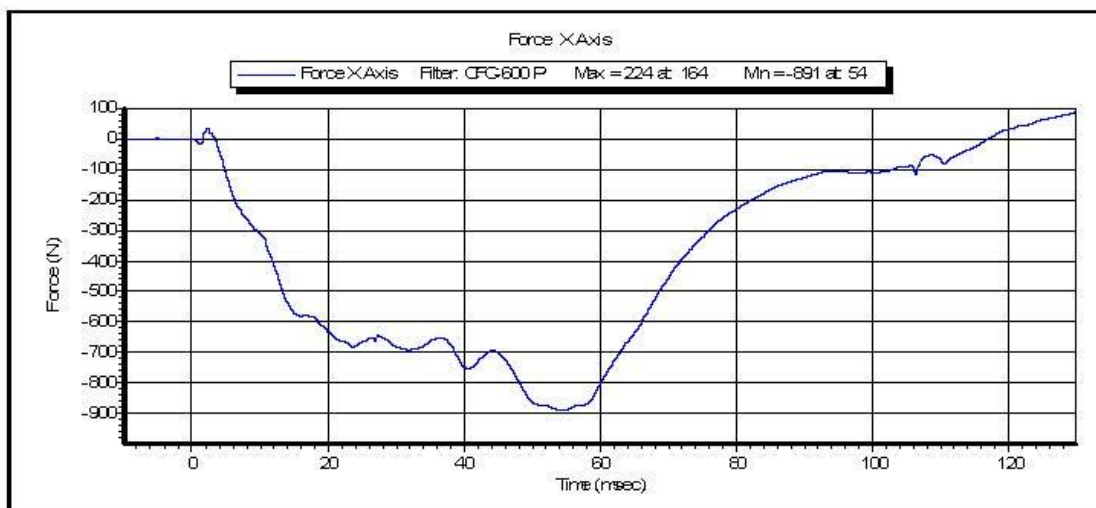
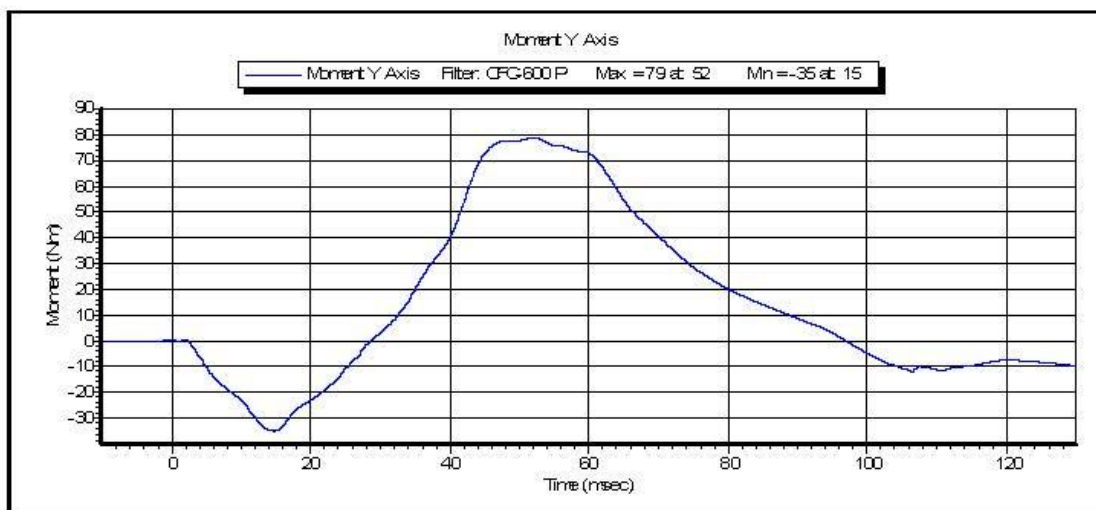


ID of Test: **Neck Flexion**

Time of Test: **12:04:13 PM**

Date of Test: **2/12/2014**

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ID of Test: **Neck Flexion**

Time of Test: **12:04:13 PM**

Date of Test: **2/12/2014**

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VERIFICATION REPORT

Test Name:	Thorax Impact	Revision:	10/1/2001
Sub Test Name:			
ATD Type:	Hybrid 3 - 50th Male		
ATD Serial Number:	064		
Test ID:	Thorax Impact	Test Date:	2/13/2014
		Test Time:	12:37:04 PM

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

Test Parameters	Test Specifications			Test Results	
Temperature	20.6	--	22.2	21.70 deg C	P
Humidity	10	--	70	12.00 %RH	P
Velocity	6.59	--	6.83	6.726 m/s	P
Chest Deflection	-72.6	--	-63.5	-72.11 mm	P
Resistive Force	-5.894	--	-5.160	-5.4329 kN	P
Hysteresis	69	--	85	69.6 %	P

All test parameters are within specifications

Technician: **M. Goehle**

Supervisor: **E. Dutton**



VERIFICATION REPORT

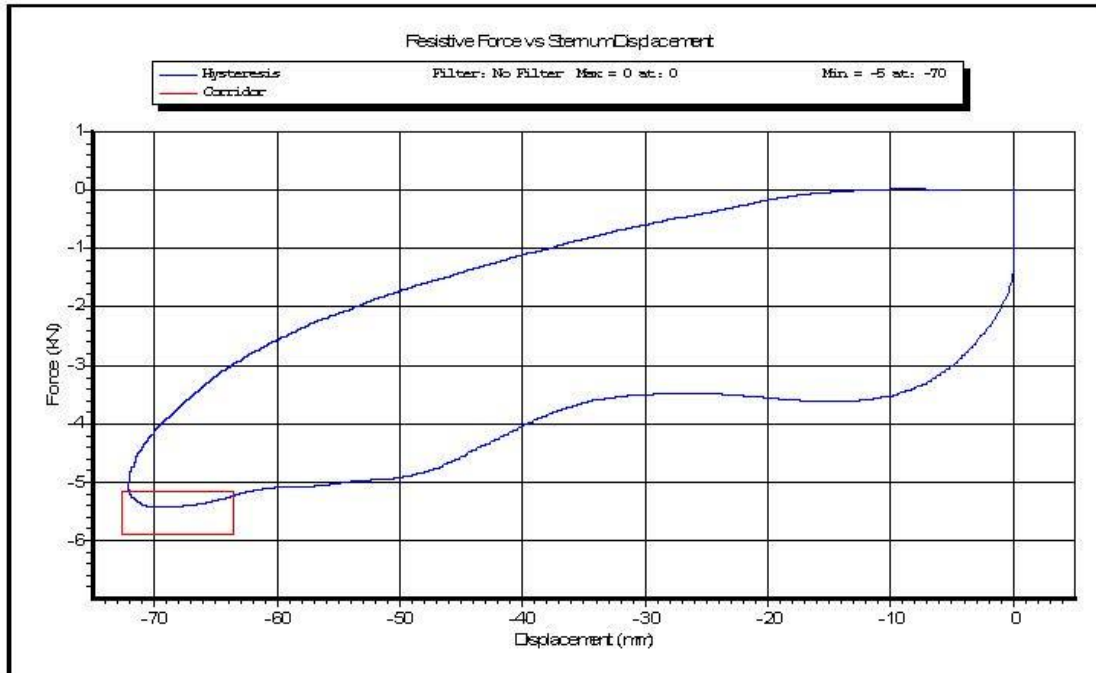
REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2014
Endevco	7231CT	C14953	12/4/2013
DentonATD	78051-342	DS-064	6/18/2013

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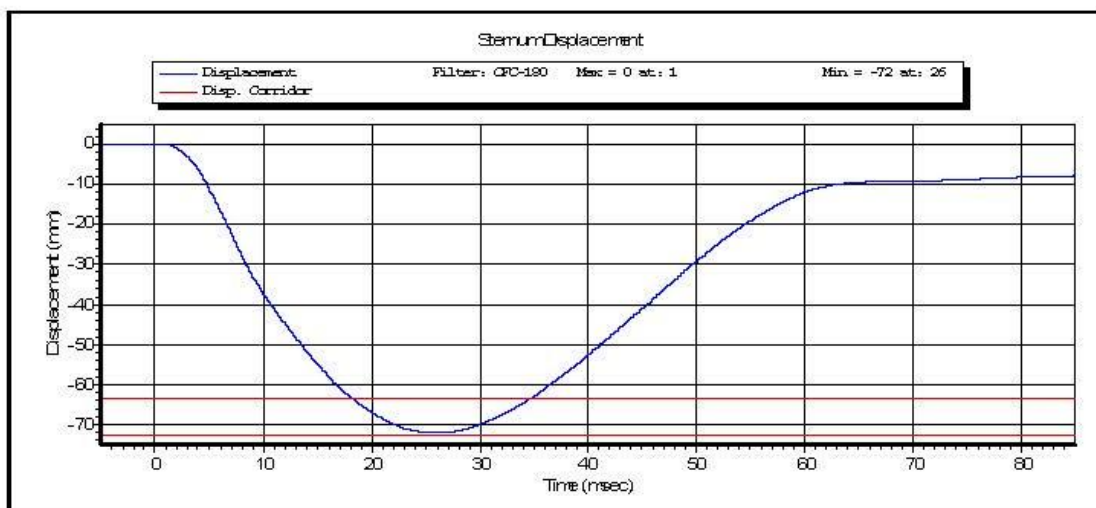
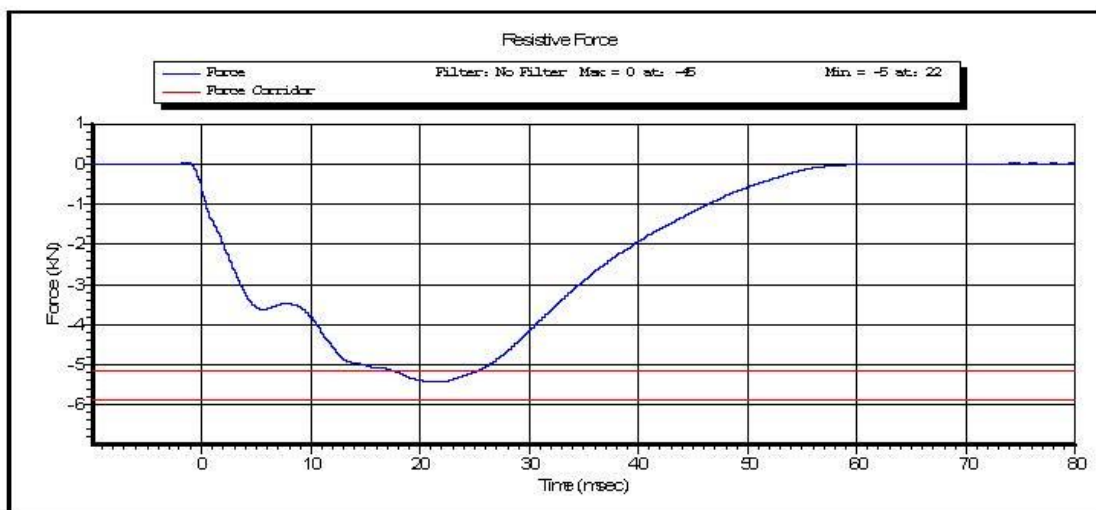
Test Name:	Thorax Impact
Sub Test Name:	
ATD Type:	Hybrid 3 - 50th Male
ATD Serial Number:	064



Test ID: Thorax Impact Test Time: 12:37:04 PM

Test Date: 2/13/2014

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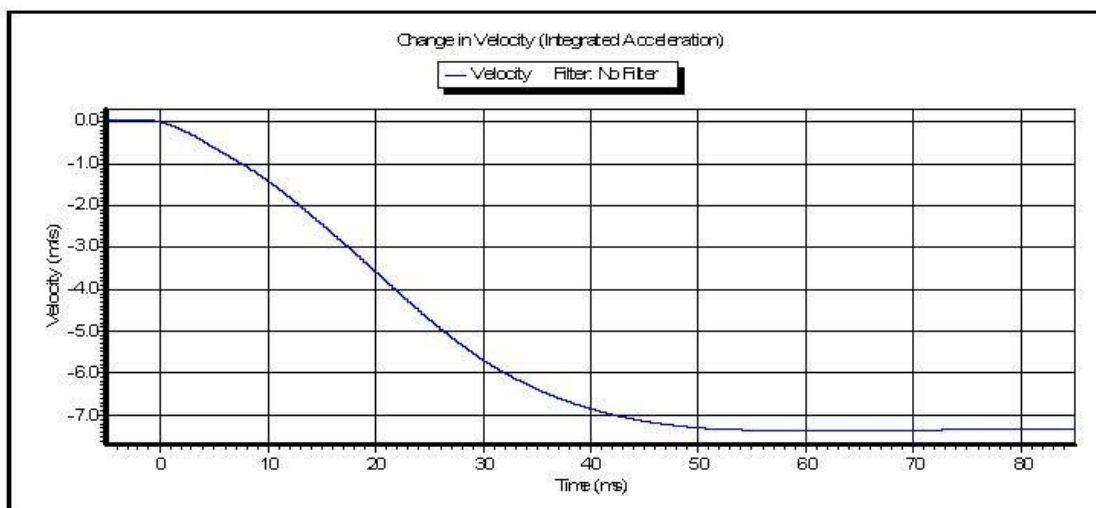
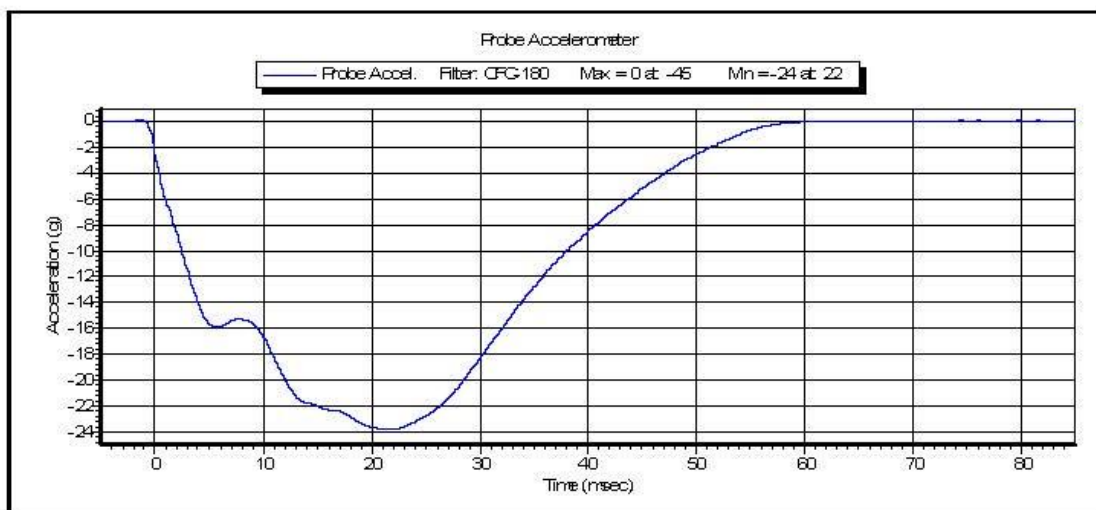


Test ID: **Thorax Impact**

Test Time: **12:37:04 PM**

Test Date: **2/13/2014**

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0



Test ID: **Thorax Impact**

Test Time: **12:37:04 PM**

Test Date: **2/13/2014**

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0



VERIFICATION REPORT

Test Name:	Hip ROM	Revision:	10/1/2001
Sub Test Name:			
ATD Type:	Hybrid 3 - 50th Male		
ATD Serial Number:	064		
Test ID:	Hip ROM Left	Test Date:	2/11/2014
		Test Time:	10:09:52 AM

Component Part Number	Component Serial Number
Pelvis Assembly 78051-60	1445

Test Parameters	Test Specifications	Test Results
Temperature	18.9 -- 25.6	21.70 deg C P
Humidity	10 -- 70	17.80 %RH P
Average Velocity	5 -- 10	6.0 deg/s P
Angle at 203 Nm	40 -- 50	43.0 degrees P
Moment at 30 degrees	0.0 -- 94.9	68.84 Nm P

All test parameters are within specifications

Technician: **R. Weil**

Supervisor: **E. Dutton**

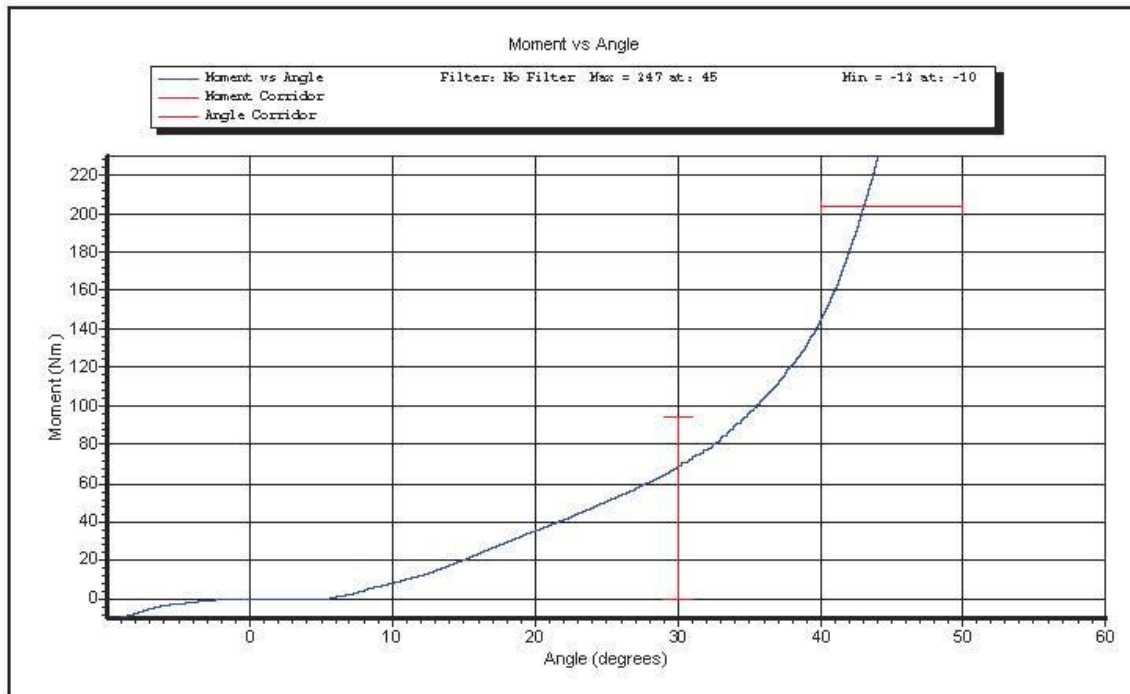
VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Key Trans/PCB	2301-02	115	3/19/2013
DentonATD	14 CB1-3615	0008	2/21/2013
DentonATD	A0 Output	1	1/11/2014



Test Name: **Hip ROM**
Sub Test Name:
ATD Type: **Hybrid 3 - 50th Male**
ATD Serial Number: **064**



Test ID: **Hip ROM Left** Test Time: **10:09:52 AM**
Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

Test Date: **2/11/2014**



VERIFICATION REPORT

Test Name:	Hip ROM	Revision:	10/1/2001
Sub Test Name:			
ATD Type:	Hybrid 3 - 50th Male		
ATD Serial Number:	064		
Test ID:	Hip ROM Right	Test Date:	2/11/2014
		Test Time:	9:43:54 AM

Component Part Number	Component Serial Number
Pelvis Assembly 78051-60	1445

Test Parameters	Test Specifications	Test Results
Temperature	18.9 -- 25.6	21.70 deg C P
Humidity	10 -- 70	17.80 %RH P
Average Velocity	5 -- 10	6.7 deg/s P
Angle at 203 Nm	40 -- 50	41.8 degrees P
Moment at 30 degrees	0.0 -- 94.9	82.43 Nm P

All test parameters are within specifications

Technician: **R. Weil**

Supervisor: **E. Dutton**

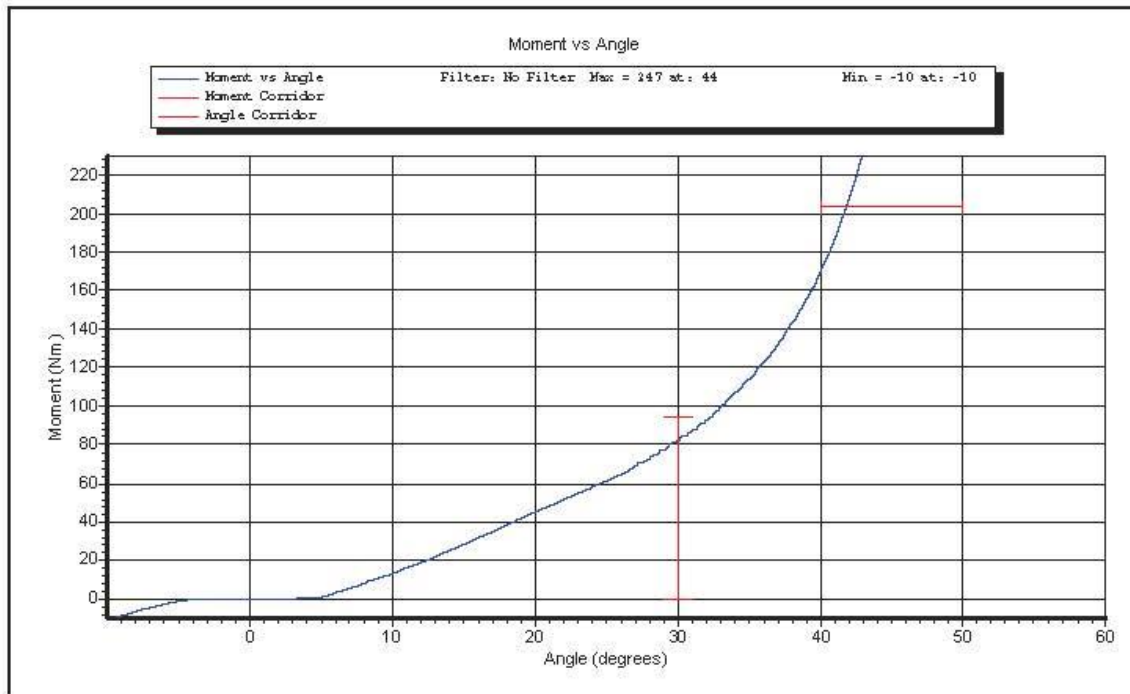
VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Key Trans/PCB	2301-02	115	3/19/2013
DentonATD	14 CB1-3615	0008	2/21/2013
DentonATD	A0 Output	1	1/11/2014



Test Name: **Hip ROM**
Sub Test Name:
ATD Type: **Hybrid 3 - 50th Male**
ATD Serial Number: **064**



Test ID: **Hip ROM Right** Test Time: **9:43:54 AM**
Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

Test Date: **2/11/2014**



VERIFICATION REPORT

Test Name:	Knee Impact	Revision:	10/1/2001
Sub Test Name:			
ATD Type:	Hybrid 3 - 50th Male		
ATD Serial Number:	064		
Test ID:	Knee Left	Test Date:	2/12/2014
		Test Time:	8:30:57 AM

Component Part Number	Component Serial Number
Knee Skin - 78051(L)	2882

Test Parameters	Test Specifications			Test Results	
Temperature	18.9	--	25.6	20.50 deg C	P
Humidity	10	--	70	13.10 %RH	P
Velocity	2.07	--	2.13	2.098 m/s	P
Resistive Force	-5.780	--	-4.720	-4.728 kN	P

All test parameters are within specifications

Technician: **R. Weil**
Supervisor: **E. Dutton**



VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD Endevco	Velocity Trap 7231CT	1 C14953	1/11/2014 12/4/2013

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Test Name:	Knee Impact
Sub Test Name:	
ATD Type:	Hybrid 3 - 50th Male
ATD Serial Number:	064

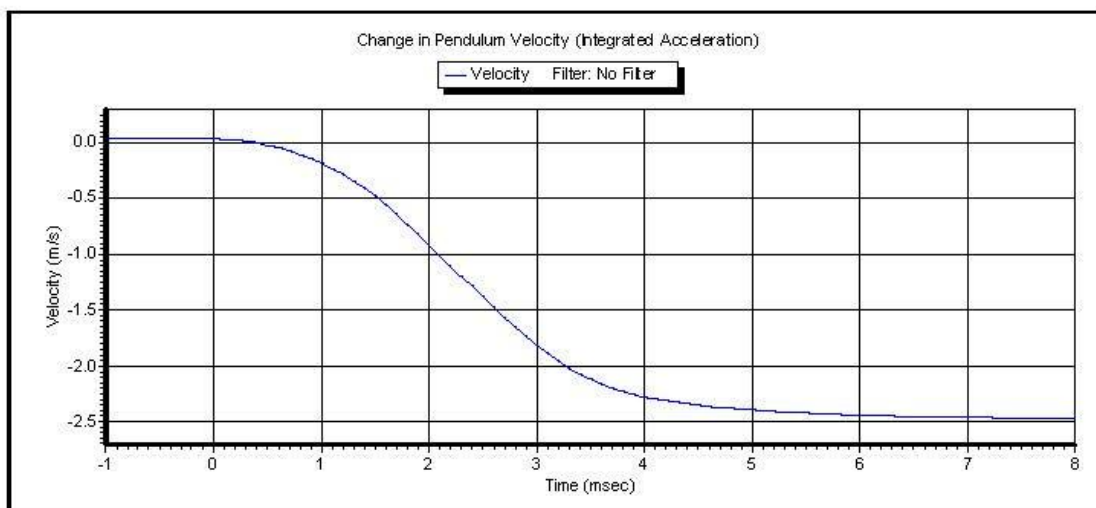
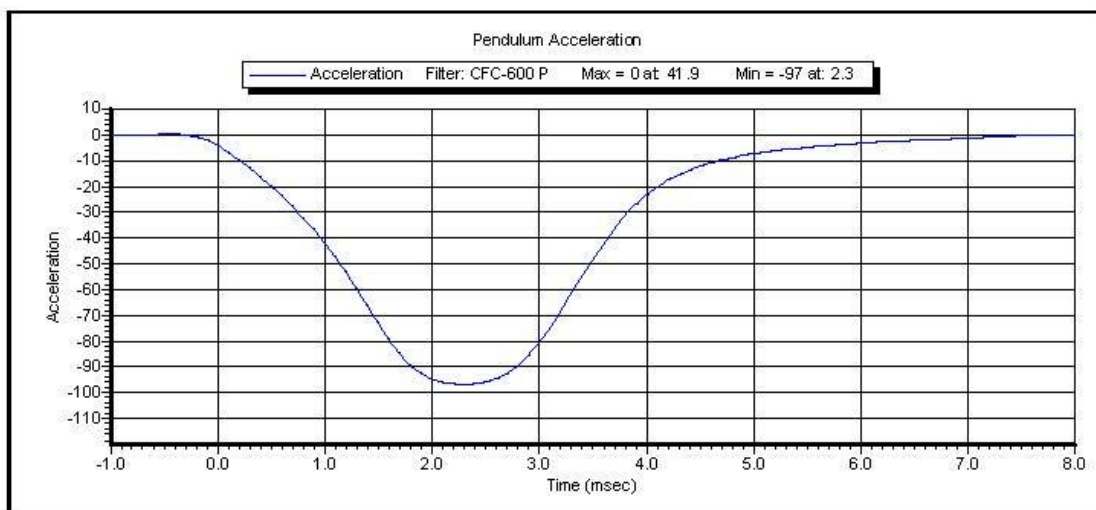


Test ID: **Knee Left**

Test Time: **8:30:57 AM**

Test Date: **2/12/2014**

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Test ID: **Knee Left**

Test Time: **8:30:57 AM**

Test Date: **2/12/2014**

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VERIFICATION REPORT

Test Name:	Knee Impact	Revision:	10/1/2001
Sub Test Name:			
ATD Type:	Hybrid 3 - 50th Male		
ATD Serial Number:	064		
Test ID:	Right Knee	Test Date:	2/12/2014
		Test Time:	8:03:14 AM

Component Part Number	Component Serial Number
Knee Skin - 78056(R)	2531

Test Parameters	Test Specifications	Test Results
Temperature	18.9 -- 25.6	19.70 deg C P
Humidity	10 -- 70	13.10 %RH P
Velocity	2.07 -- 2.13	2.095 m/s P
Resistive Force	-5.780 -- -4.720	-5.160 kN P

All test parameters are within specifications

Technician: **R. Weil**
Supervisor: **E. Dutton**



VERIFICATION REPORT

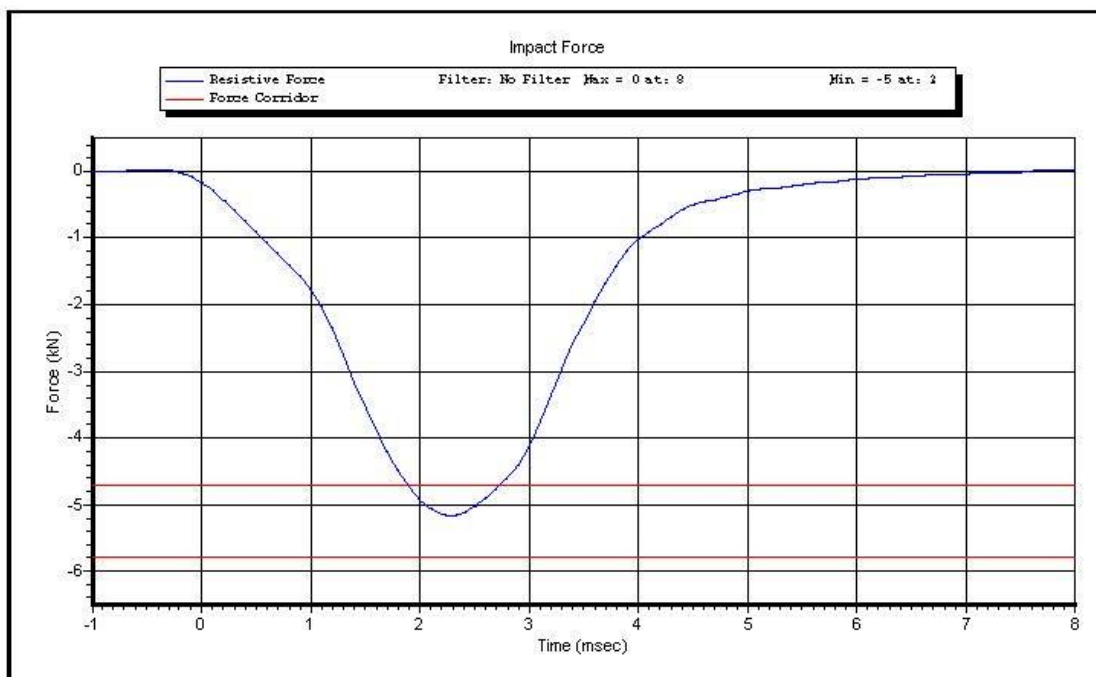
REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD Endevco	Velocity Trap 7231CT	1 C14953	1/11/2014 12/4/2013

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Test Name:	Knee Impact
Sub Test Name:	
ATD Type:	Hybrid 3 - 50th Male
ATD Serial Number:	064

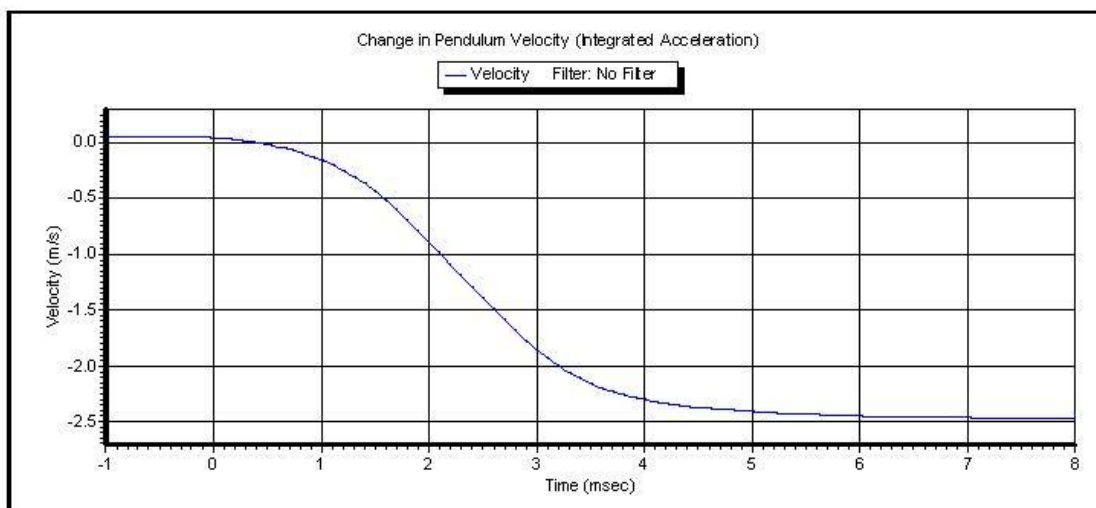
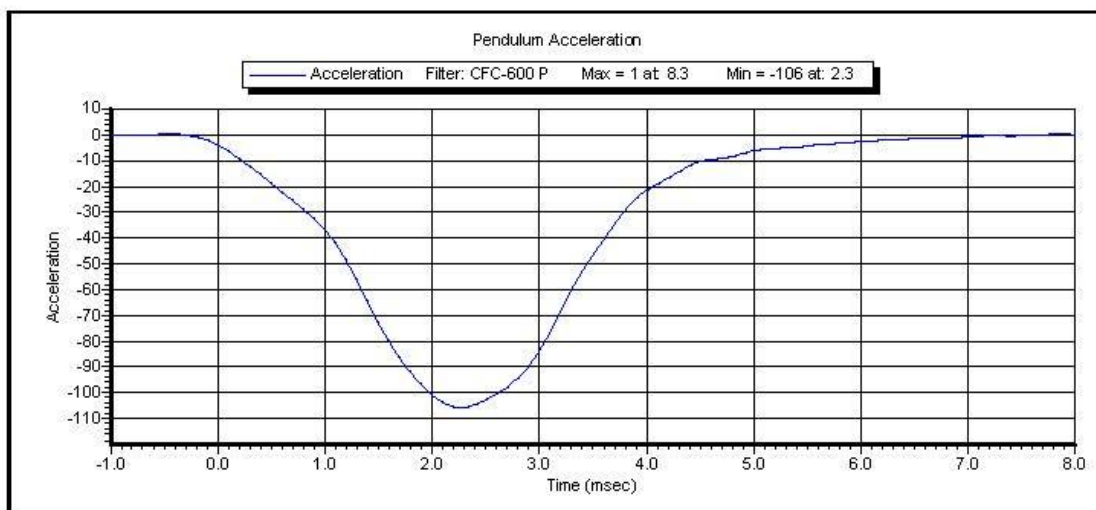


Test ID: **Right Knee**

Test Time: **8:03:14 AM**

Test Date: **2/12/2014**

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0



Test ID: **Right Knee**

Test Time: **8:03:14 AM**

Test Date: **2/12/2014**

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CALIBRATION TEST RESULTS

PRE-TEST

HYBRID III 5TH PERCENTILE FEMALE - PASSENGER ATD

SERIAL NO: 143



External Measurements

5th Female SN 143

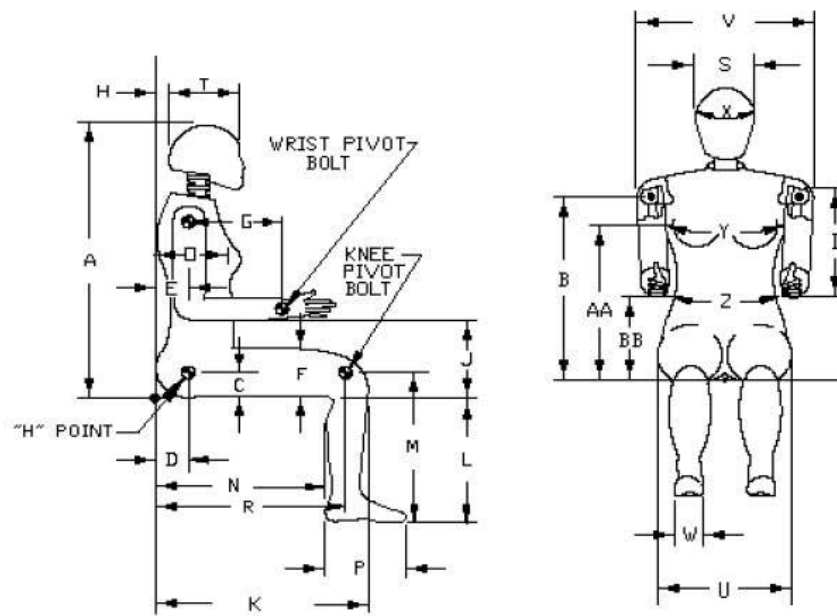
Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Sitting Height	774.7 – 800.1	791	Yes
B	Shoulder Pivot Height	431.8 – 457.2	446	Yes
C	H-Point Height	81.3 – 86.3	84.1	Yes
D	H-Point from Backline	144.8 – 149.8	146	Yes
E	Shoulder Pivot from Backline	68.6 – 83.8	76	Yes
F	Thigh Clearance	119.4 – 134.6	124	Yes
G	Back of Elbow to Wrist Pivot	243.9 – 259.1	246	Yes
H	Head Back to Backline	43.2 – 48.2	45	Yes
I	Shoulder to Elbow Length	276.8 – 297.2	279	Yes
J	Elbow Rest Height	182.8 – 203.2	187	Yes
K	Buttock to Knee Length	520.7 – 546.1	541	Yes
L	Popliteal Height	355.6 – 376	362	Yes
M	Knee Pivot Height	393.7 – 419.1	398	Yes
N	Buttock Popliteal Length	414 – 439.4	422	Yes
O	Chest Depth without Jacket	175.3 – 190.5	184	Yes
P	Foot Length (right)	218.5 – 233.7	220	Yes
R	Buttock To Knee Pivot Length	457.2 – 482.6	472	Yes
S	Head Breadth	137.1 – 147.3	141	Yes
T	Head Depth	177.8 – 188	183	Yes
U	Hip Breadth	299.7 – 314.9	302	Yes
V	Shoulder Breadth	350.5 – 365.7	362	Yes
W	Foot Breadth	78.8 – 94	81	Yes
X	Head Circumference	528.3 – 548.7	537	Yes
Y	Chest Circumference with Jacket	850.9 – 881.3	852	Yes
Z	Waist Circumference	759.5 – 789.9	768	Yes
AA	Reference Location (Chest Circumference)	332.7 – 358.1	357	Yes
BB	Reference Location (Waist Circumference)	160.1 – 170.2	170	Yes

Technician: M. Geesey

Date: 02/07/2014

Hybrid III 5th Female External Measurements

Reference Diagram





VERIFICATION REPORT

Test Name:	Head Drop	Revision:	7/15/2002
Sub Test Name:			
ATD Type:	Hybrid 3 - 5th Female		
ATD Serial Number:	143		
Test ID:	Head Drop	Test Date:	2/5/2014
		Test Time:	2:27:25 PM

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

Test Parameters	Test Specifications			Test Results	
Temperature	18.9	--	25.6	21.60 deg C	P
Humidity	10	--	70	23.20 %RH	P
Resultant Acceleration	250	--	300	272.1 G's	P
Oscillation	0	--	10	0.0 %	P
Lateral Acceleration	-15	--	15	2.2 G's	P

All test parameters are within specifications

Technician: **R. Weil**

Supervisor: **E. Dutton**



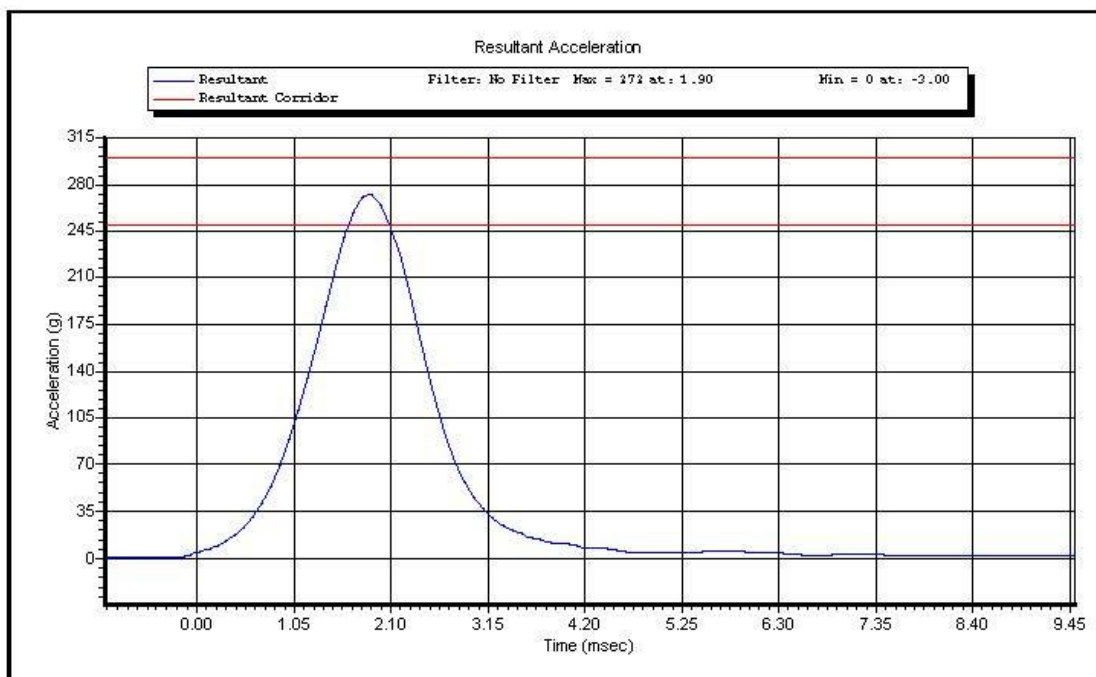
VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Endevco	7264-2000	P15321	2/5/2014
Endevco	7264-2000	P16755	2/5/2014
Endevco	7264-2000	P58868	2/5/2014



Test Name:	Head Drop
Sub Test Name:	
ATD Type:	Hybrid 3 - 5th Female
ATD Serial Number:	143

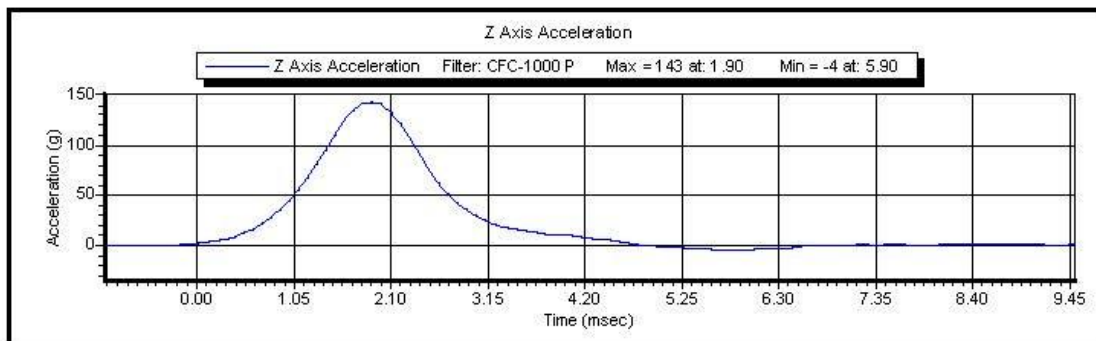
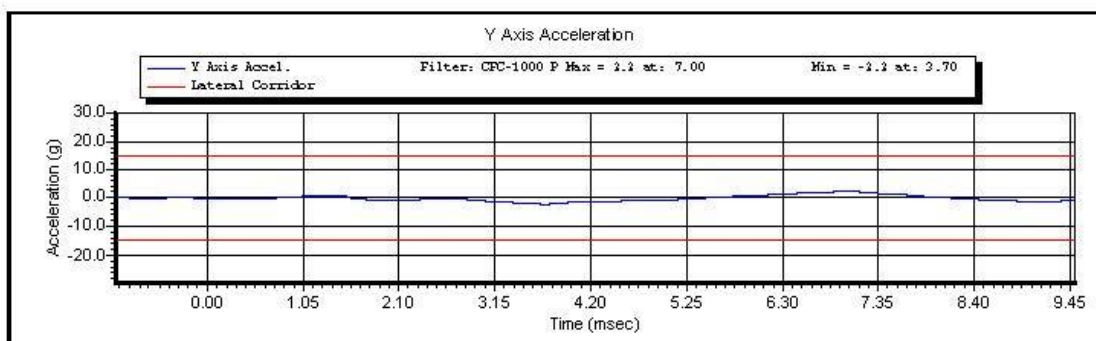
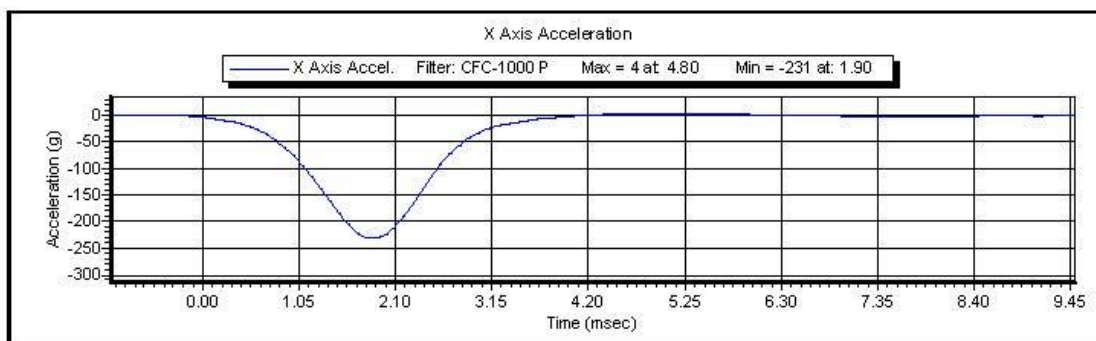


Test ID: **Head Drop**

Test Time: **2:27:25 PM**

Test Date: **2/5/2014**

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Test ID: **Head Drop**

Test Time: **2:27:25 PM**

Test Date: **2/5/2014**

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VERIFICATION REPORT

Test Name:	Neck Extension	Revision:	7/15/2002
Sub Test Name:			
ATD Type:	Hybrid 3 - 5th Female		
ATD Serial Number:	143		
Test ID:	Neck Extension	Test Date:	2/5/2014
		Test Time:	1:05:27 PM

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

Test Parameters		Test Specifications		Test Results	
Temperature		20.6	-- 22.2	21.60 deg C	P
Humidity		10	-- 70	24.10 %RH	P
Velocity		5.95	-- 6.19	6.040 m/s	P
Pendulum Impulse at	10 ms	1.5	-- 1.9	1.79 m/s	P
Pendulum Impulse at	20 ms	3.1	-- 3.9	3.46 m/s	P
Pendulum Impulse at	30 ms	4.6	-- 5.6	5.07 m/s	P
D Plane Rotation		99	-- 114	101.7 degrees	P
Moment During Rotation Interval		-65	-- -53	-53.9 Nm	P
Moment Decay to -10.0 Nm		94	-- 114	103.2 ms	P

All test parameters are within specifications

Technician: **R. Weil**
Supervisor: **E. Dutton**



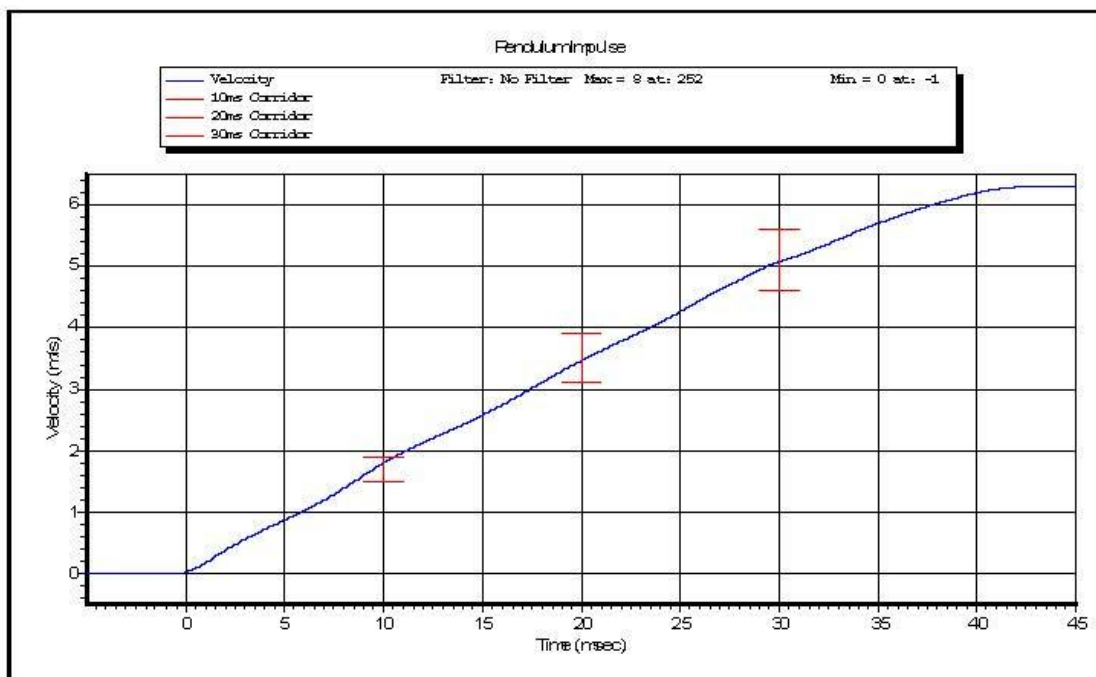
VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2014
Endevco	7231CT	AH5F3	10/16/2013
DentonATD	78051-342	PENDULUM POT	1/31/2014
DentonATD	78051-342	CONDYLE POT	1/31/2014
Denton	1716A	LC-283My	5/29/2013
Denton	1716A	LC-283 Fx	5/29/2013



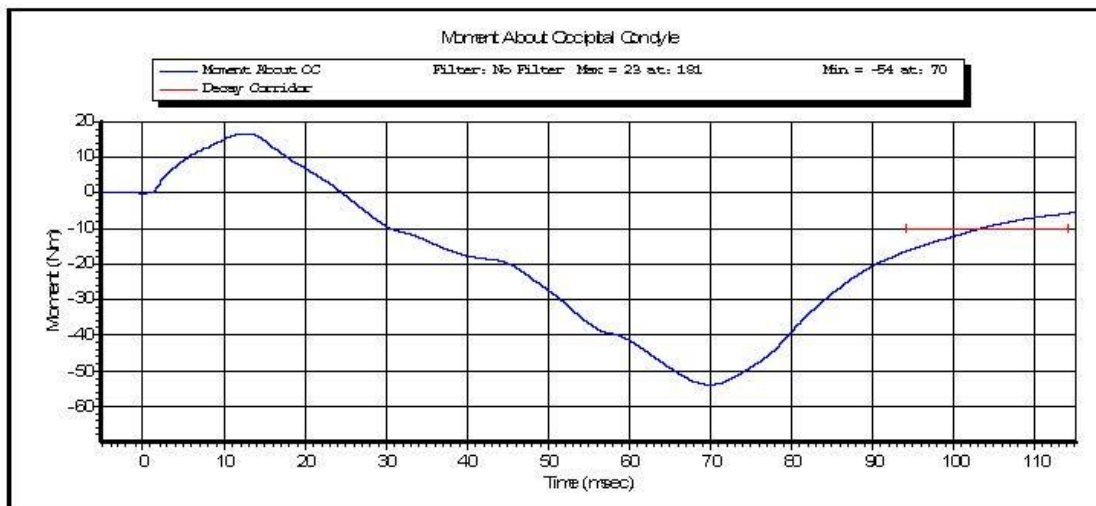
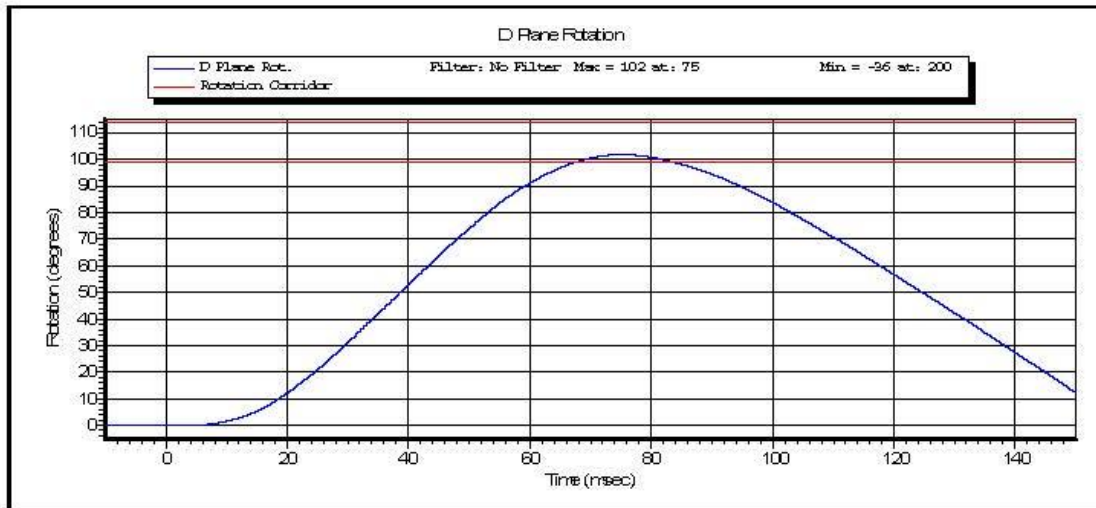
Test Name:	Neck Extension
Sub Test Name:	
ATD Type:	Hybrid 3 - 5th Female
ATD Serial Number:	143



Test ID: Neck Extension Test Time: 1:05:27 PM

Test Date: 2/5/2014

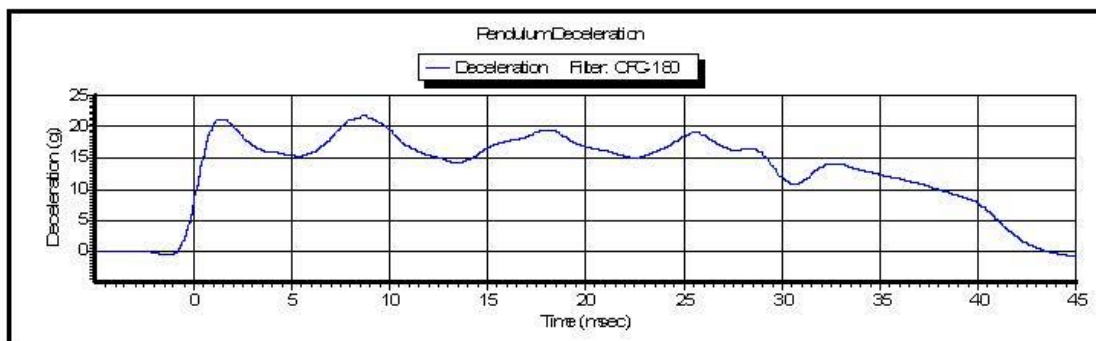
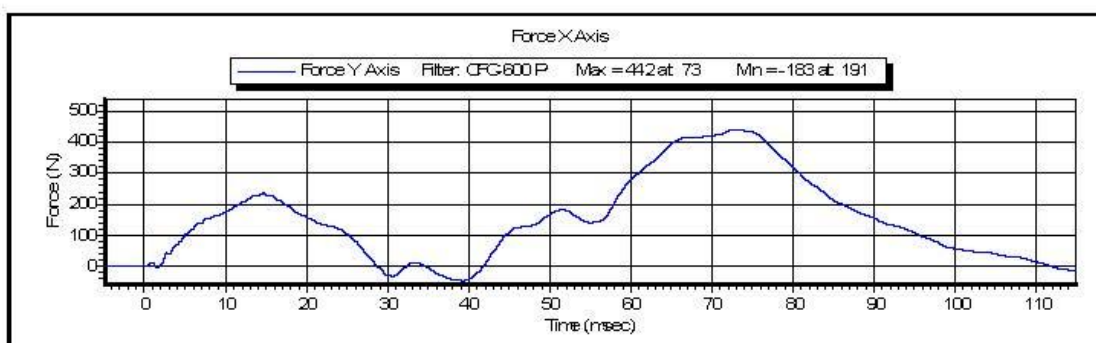
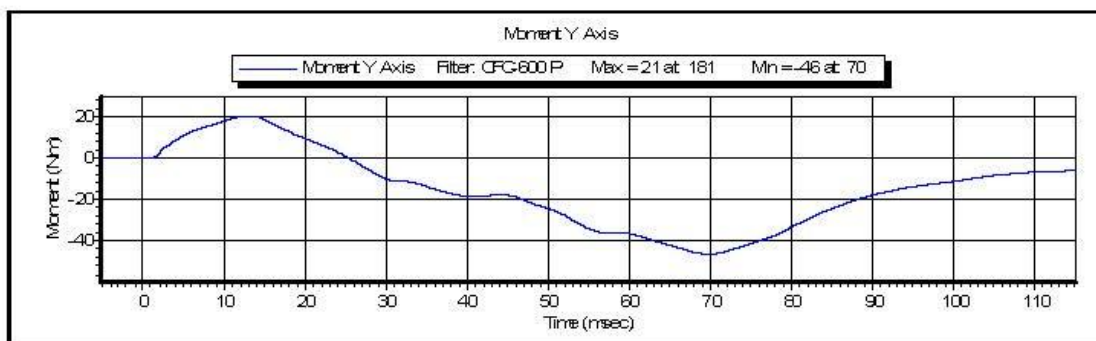
Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0



Test ID: Neck Extension Test Time: 1:05:27 PM

Test Date: 2/5/2014

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0



Test ID: **Neck Extension** Test Time: **1:05:27 PM**

Test Date: **2/5/2014**

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VERIFICATION REPORT

Test Name:	Neck Flexion	Revision:	7/15/2002
Sub Test Name:			
ATD Type:	Hybrid 3 - 5th Female		
ATD Serial Number:	143		
Test ID:	Neck Flexion	Test Date:	2/5/2014
		Test Time:	12:39:38 PM

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

Test Parameters		Test Specifications		Test Results	
Temperature		21	-- 22	21.60	deg C P
Humidity		10	-- 70	24.20	%RH P
Velocity		6.89	-- 7.13	7.004	m/s P
Pendulum Impulse at	10 ms	2.1	-- 2.5	2.42	m/s P
Pendulum Impulse at	20 ms	4	-- 5	4.7	m/s P
Pendulum Impulse at	30 ms	5.8	-- 7.0	6.51	m/s P
D Plane Rotation		-91	-- -77	-78.6	degrees P
Moment During Rotation Interval		69	-- 83	79.9	Nm P
Moment Decay to 10.0 Nm		80	-- 100	84.4	ms P

All test parameters are within specifications

Technician: **M. Goehle**
Supervisor: **E. Dutton**



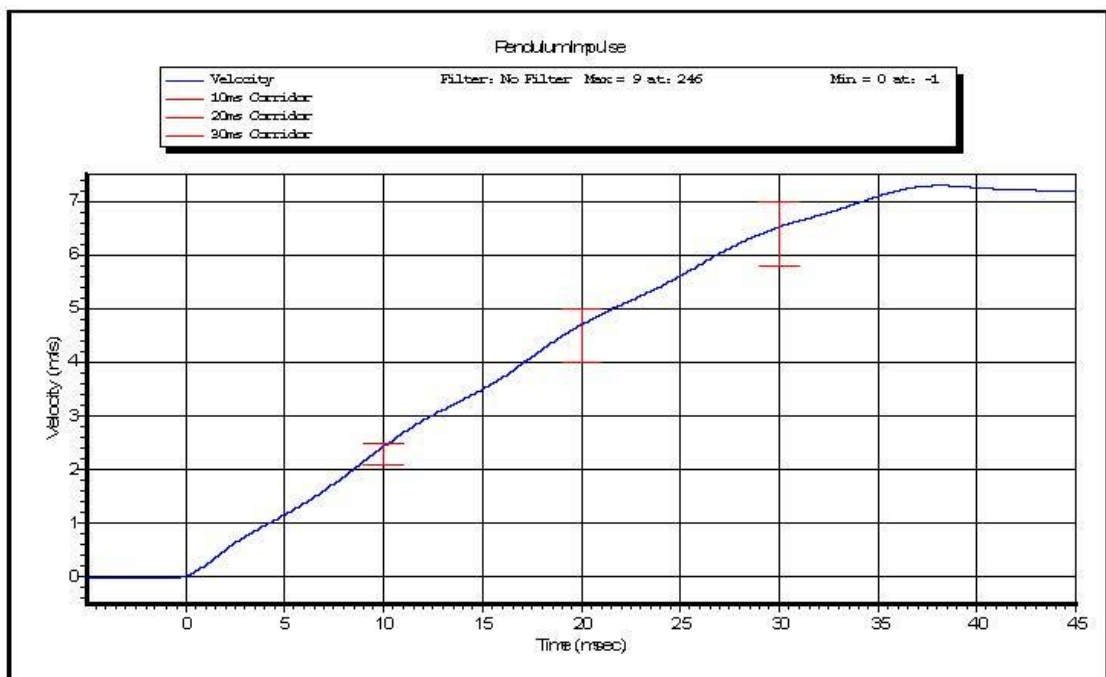
VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2014
Endevco	7231CT	AH5F3	10/16/2013
DentonATD	78051-342	PENDULUM POT	1/31/2014
DentonATD	78051-342	CONDYLE POT	1/31/2014
Denton	1716A	LC-283My	5/29/2013
Denton	1716A	LC-283 Fx	5/29/2013



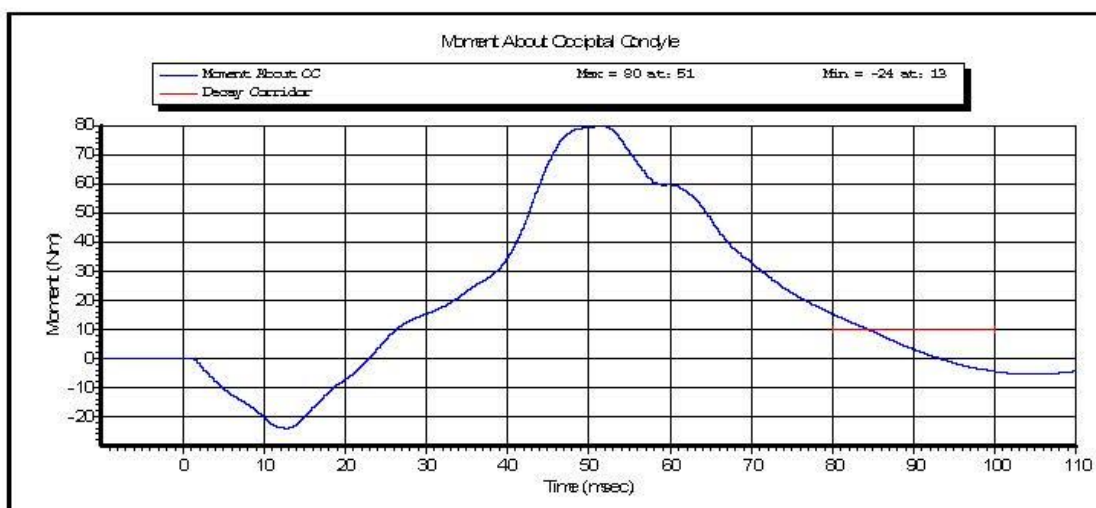
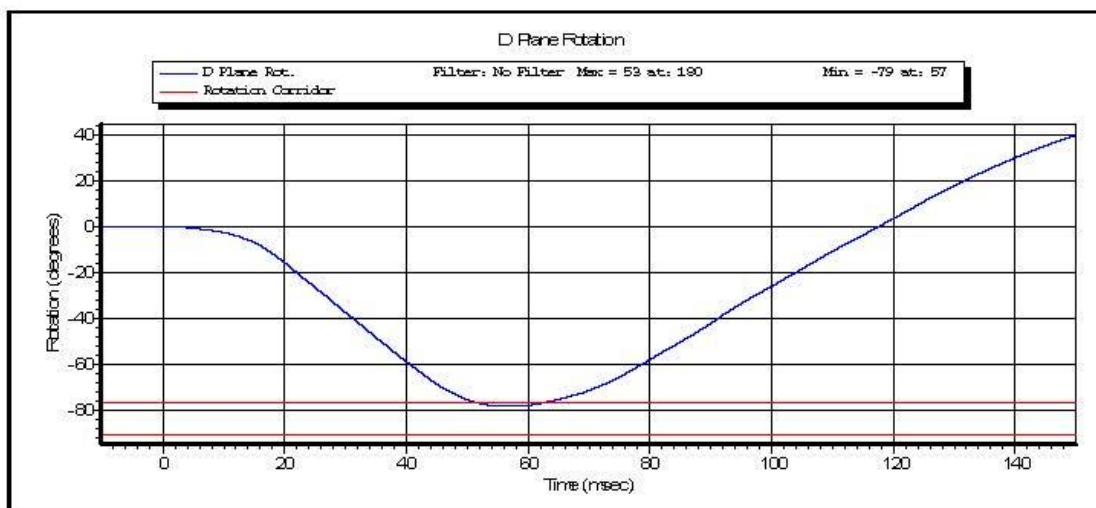
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Sub Test Name:	
ATD Type:	Hybrid 3 - 5th Female
ATD Serial Number:	143



Test ID: **Neck Flexion** Test Time: **12:39:38 PM**

Test Date: **2/5/2014**

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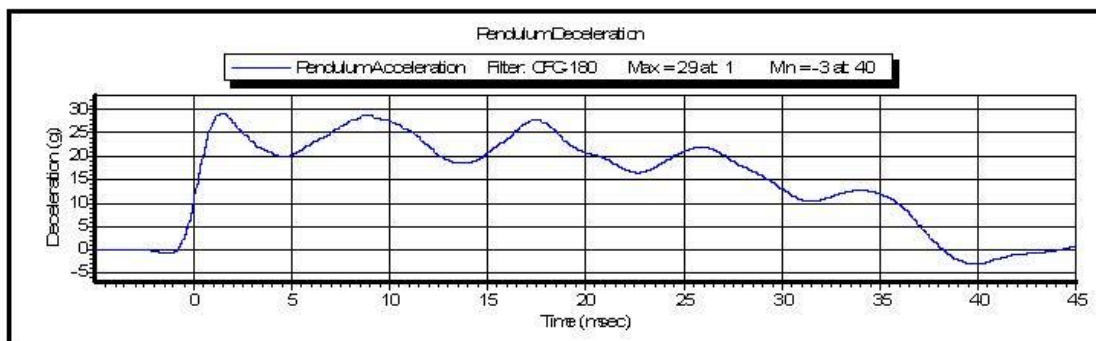
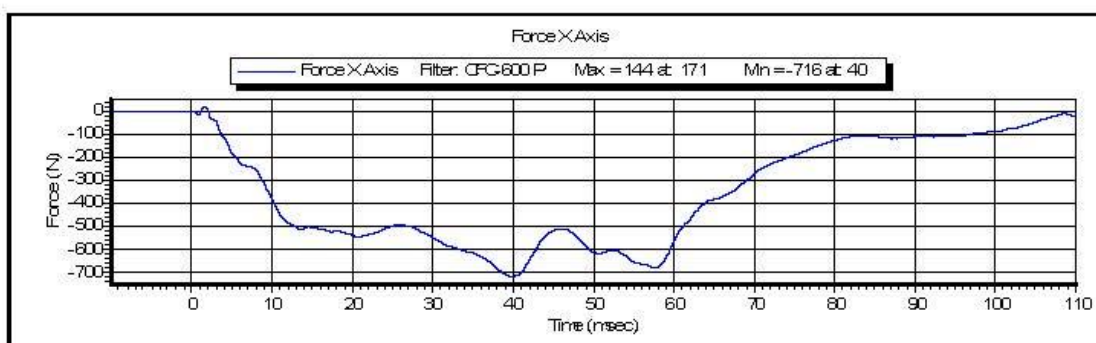
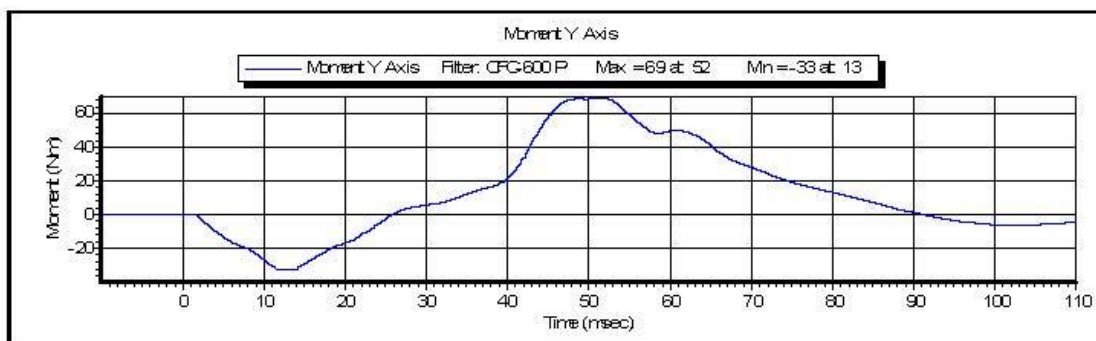


Test ID: **Neck Flexion**

Test Time: **12:39:38 PM**

Test Date: **2/5/2014**

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Test ID: **Neck Flexion**

Test Time: **12:39:38 PM**

Test Date: **2/5/2014**

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Torso Flexion

Part 5720 HIII 5% Female

ATD Serial No: 143

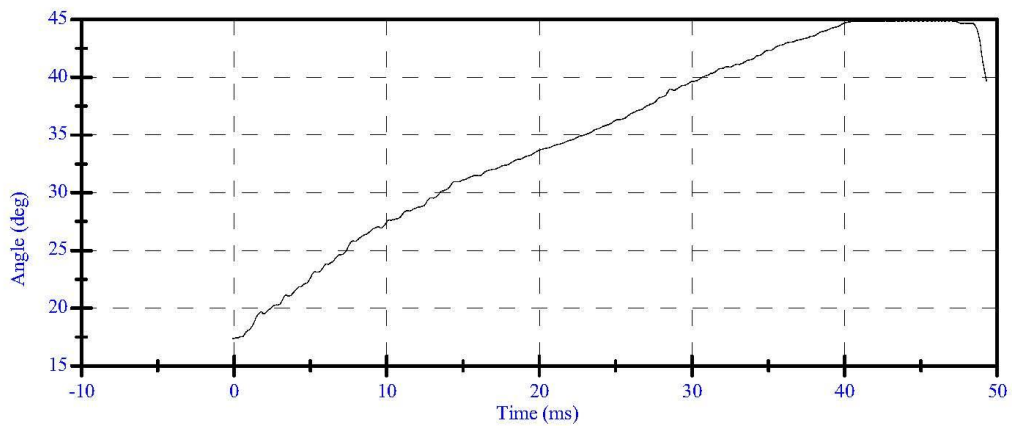
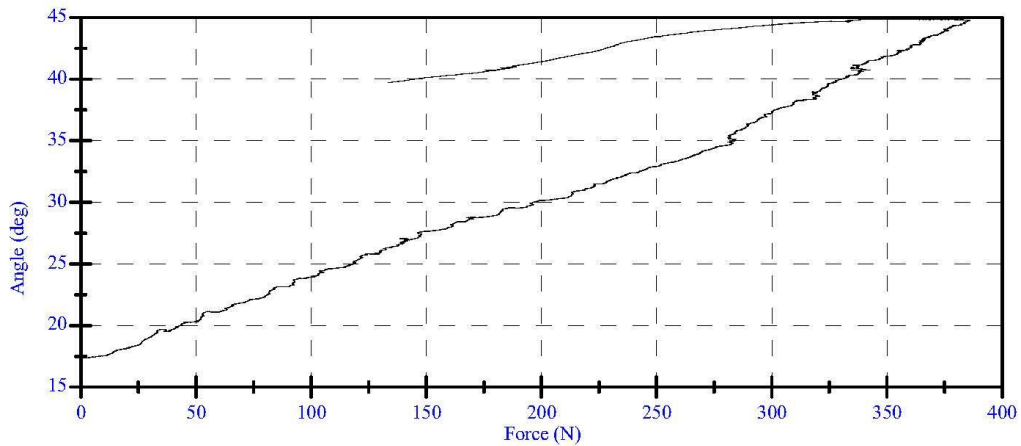
Laboratory Supervisor: E. Dutton

Date: 2/5/2014

Laboratory Technician: M. Goehle

TEST PARAMETER	SPECIFICATION	TEST RESULTS	STATUS
Lab Temperature:	18.9-25.6 C	22.0 C	Passed
Lab Humidity:	10-70 %	17.0 %	Passed
Initial Angle:	0.00-20.00 Deg	17.33 Deg	Passed
Force at 45 Deg	320.00-390.00 N	386.12 N	Passed
Return Angle	8 Deg Max from Initial	21.0 Deg	Passed

LUMBAR SPINE FLEXION TEST





VERIFICATION REPORT

Test Name:	Thorax Impact	Revision:	7/15/2002
Sub Test Name:			
ATD Type:	Hybrid 3 - 5th Female		
ATD Serial Number:	143		
Test ID:	Thorax Impact	Test Date:	2/5/2014
		Test Time:	7:55:26 AM

Component Part Number	Component Serial Number
Chest Jacket - 880105-355-E	05855
Lumbar Spine - 880105-1095	0500-0143

Test Parameters	Test Specifications			Test Results	
Temperature	20.6	--	22.2	20.60 deg C	P
Humidity	10	--	70	17.60 %RH	P
Velocity	6.59	--	6.83	6.814 m/s	P
Sternum Displacement	-58	--	-50	-55.3 mm	P
Force During Displacement Interval	-4400	--	-3900	-4267.1 N	P
Force During -18mm to -50mm Displacem	-4600	--	0	-4188.2 N	P
Hysteresis	69	--	85	71.1 %	P

All test parameters are within specifications

Technician: **M. Geesey**
Supervisor: **E. Dutton**



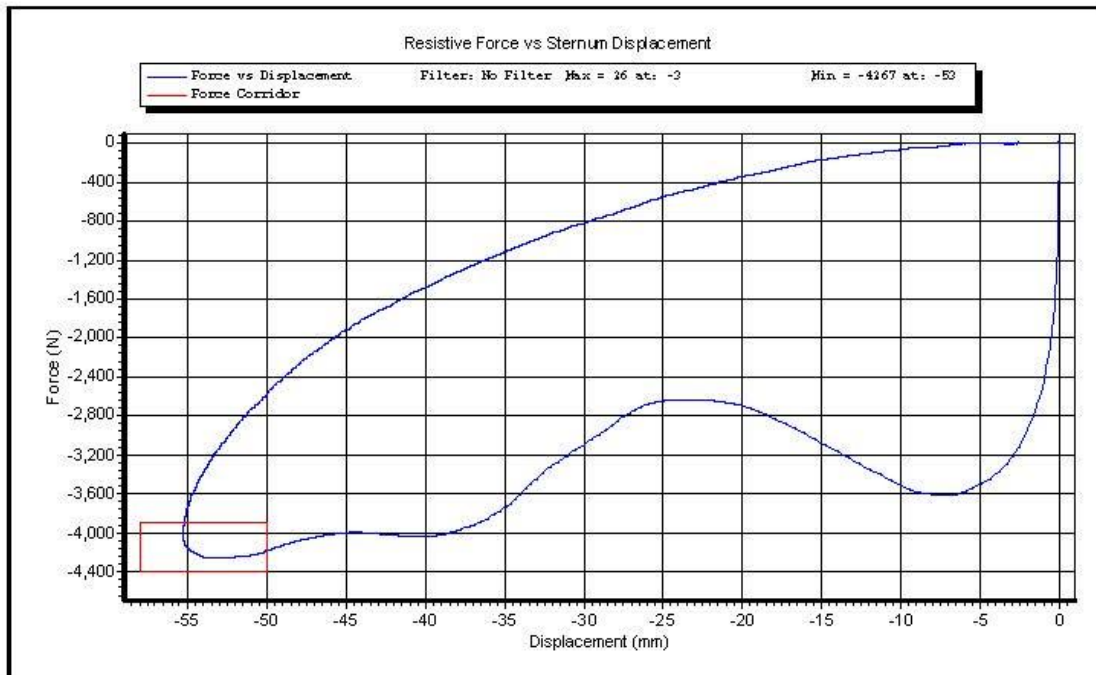
VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2014
Endevco	7231CT	C14953	12/4/2013
DentonATD	H3CD	DS-143	1/30/2014



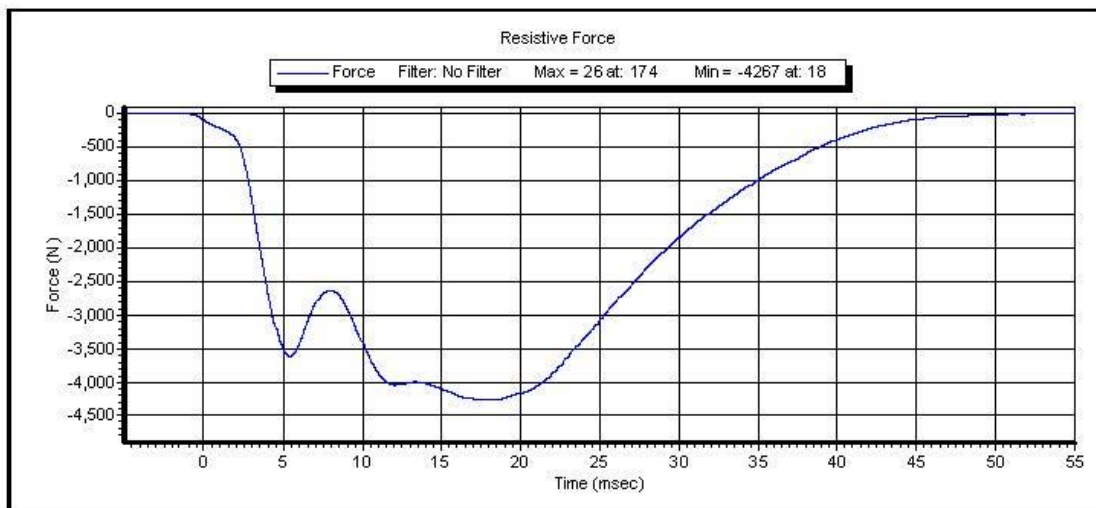
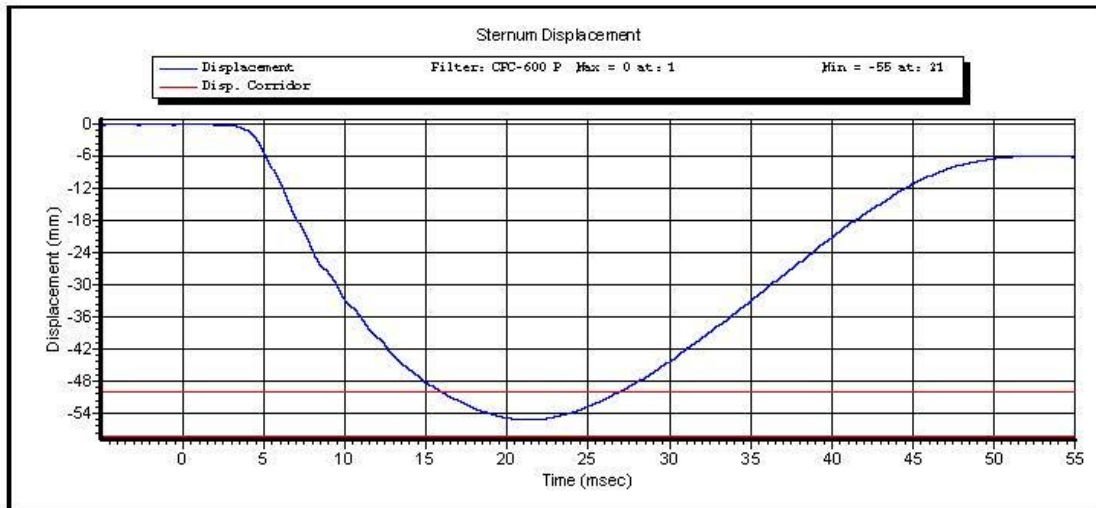
Test Name:	Thorax Impact
Sub Test Name:	
ATD Type:	Hybrid 3 - 5th Female
ATD Serial Number:	143



Test ID: Thorax Impact Test Time: 7:55:26 AM

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Test Date: 2/5/2014

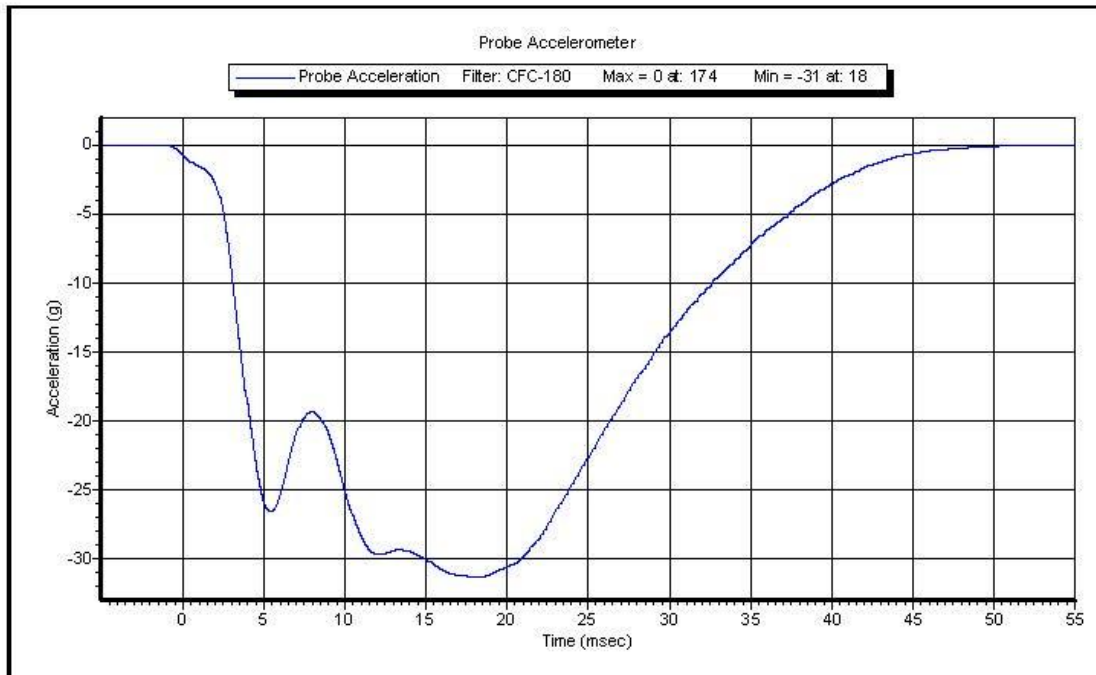


Test ID: **Thorax Impact**

Test Time: **7:55:26 AM**

Test Date: **2/5/2014**

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Test ID: **Thorax Impact**

Test Time: **7:55:26 AM**

Test Date: **2/5/2014**

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VERIFICATION REPORT

Test Name:	Knee Impact	Revision:	7/15/2002
Sub Test Name:			
ATD Type:	Hybrid 3 - 5th Female		
ATD Serial Number:	143		
Test ID:	Knee Impact Left	Test Date:	2/3/2014
		Test Time:	1:13:31 PM

Component Part Number	Component Serial Number
Knee Skin - 880105-508	1687

Test Parameters	Test Specifications	Test Results
Temperature	18.9 -- 25.6	21.60 deg C P
Humidity	10 -- 70	15.10 %RH P
Velocity	2.07 -- 2.13	2.115 m/s P
Resistive Force	-4060 -- -3450	-3793.2 N P

All test parameters are within specifications

Technician: **M. Geesey**

Supervisor: **E. Dutton**



VERIFICATION REPORT

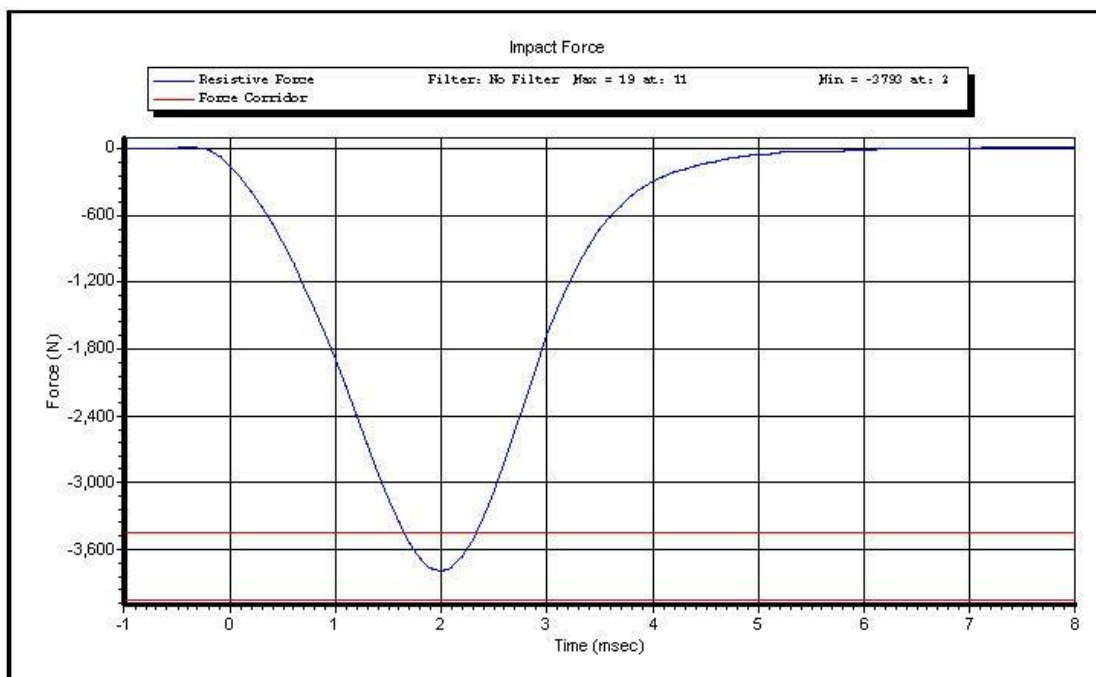
REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2013
Endevco	7231CT	C14953	12/4/2013

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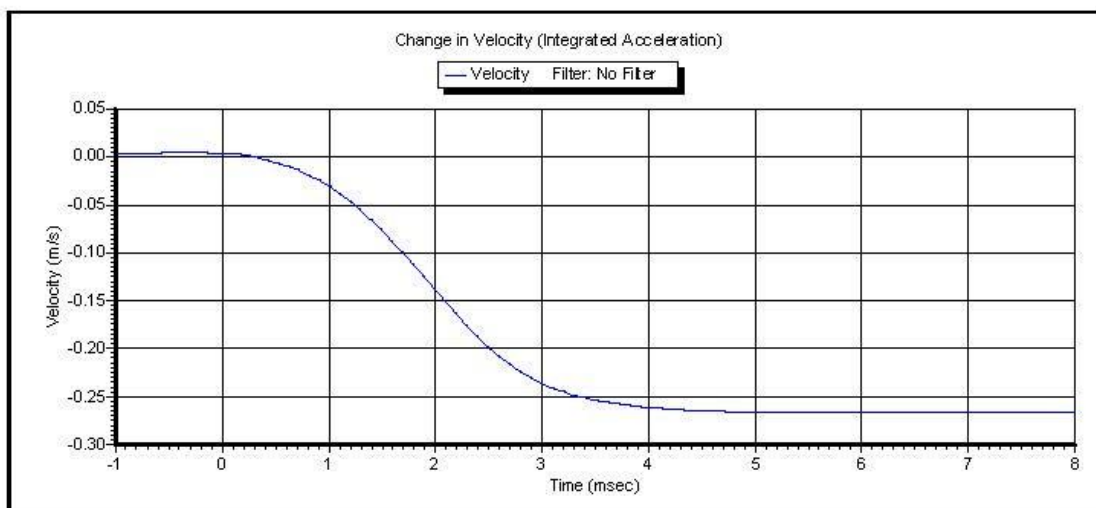
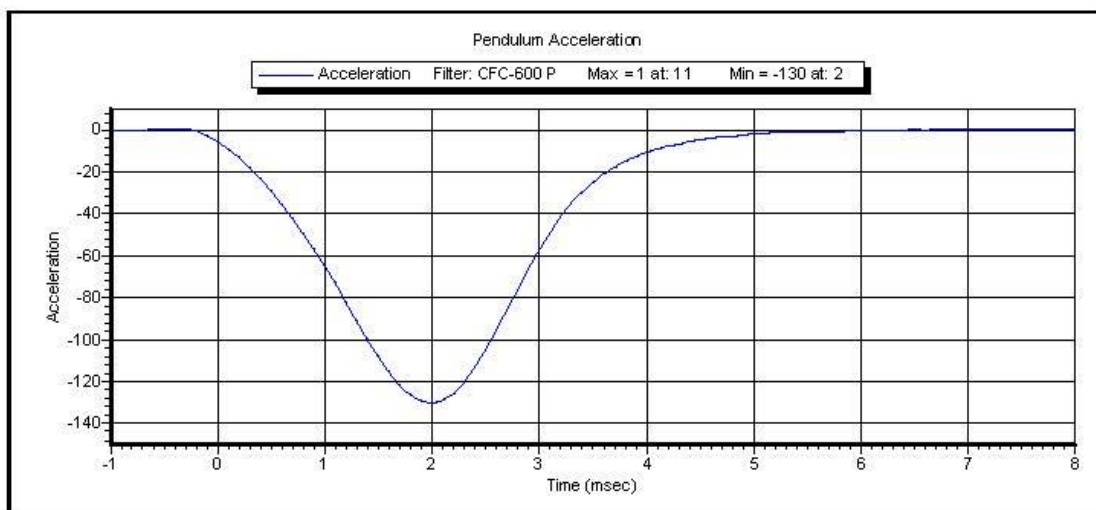


Test Name:	Knee Impact
Sub Test Name:	
ATD Type:	Hybrid 3 - 5th Female
ATD Serial Number:	143



Test ID: **Knee Impact Left** Test Time: **1:13:31 PM**
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Test Date: **2/3/2014**



Test ID: **Knee Impact Left** Test Time: **1:13:31 PM**

Test Date: **2/3/2014**

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VERIFICATION REPORT

Test Name:	Knee Impact	Revision:	7/15/2002
Sub Test Name:			
ATD Type:	Hybrid 3 - 5th Female		
ATD Serial Number:	143		
Test ID:	Knee Impact Right	Test Date:	2/3/2014
		Test Time:	1:06:18 PM

Component Part Number	Component Serial Number
Knee Skin - 880105-508	1028

Test Parameters	Test Specifications			Test Results	
Temperature	18.9	--	25.6	21.30 deg C	P
Humidity	10	--	70	14.90 %RH	P
Velocity	2.07	--	2.13	2.113 m/s	P
Resistive Force	-4060	--	-3450	-3815.3 N	P

All test parameters are within specifications

Technician: **M. Geesey**

Supervisor: **E. Dutton**



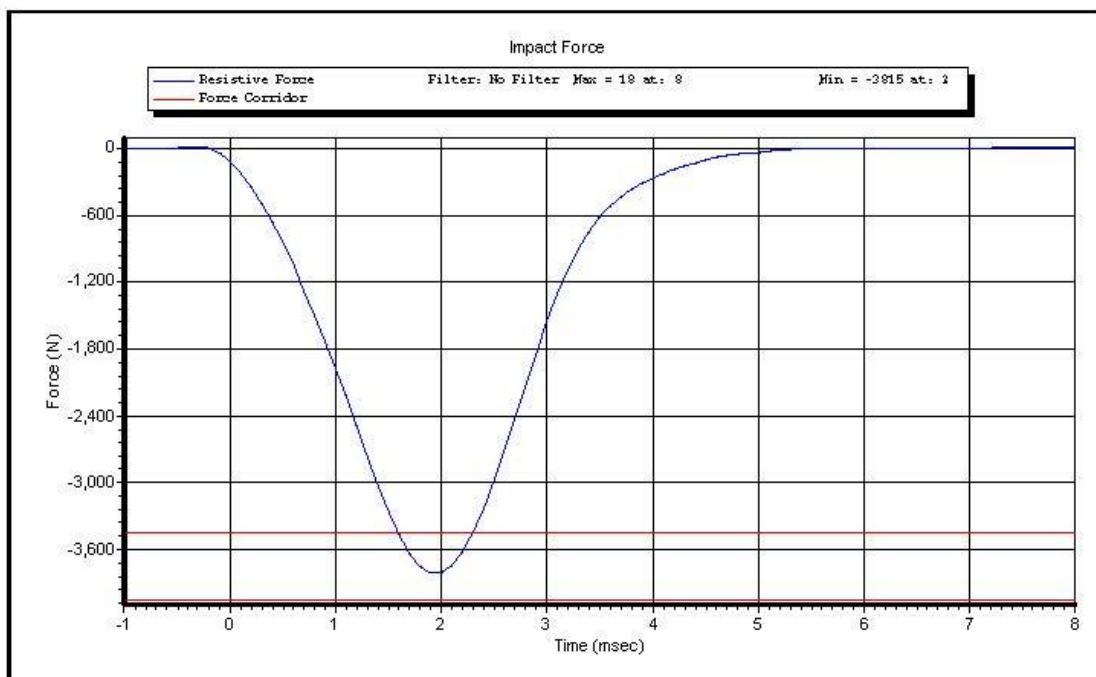
VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2013
Endevco	7231CT	C14953	12/4/2013

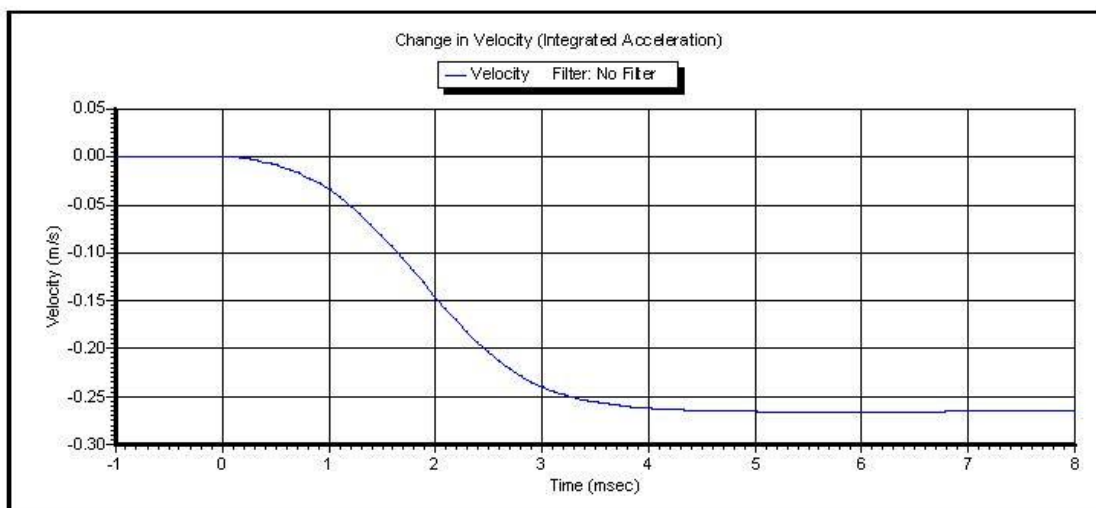
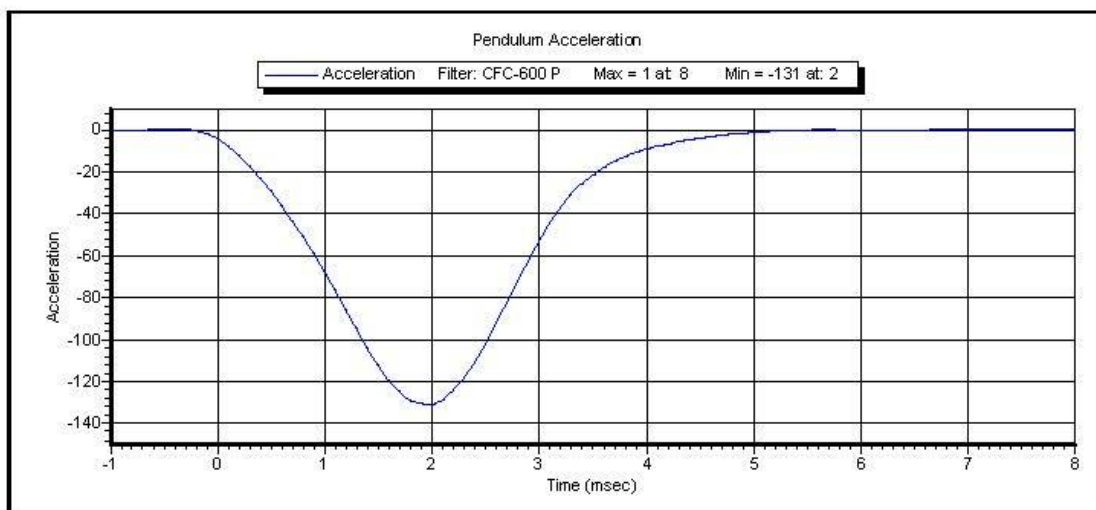


Test Name:	Knee Impact
Sub Test Name:	
ATD Type:	Hybrid 3 - 5th Female
ATD Serial Number:	143



Test ID: **Knee Impact Right** Test Time: **1:06:18 PM**
Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

Test Date: **2/3/2014**



Test ID: **Knee Impact Right** Test Time: **1:06:18 PM**

Test Date: **2/3/2014**

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CALIBRATION TEST RESULTS

POST-TEST

HYBRID III 50TH PERCENTILE MALE - DRIVER ATD

SERIAL NO: 064



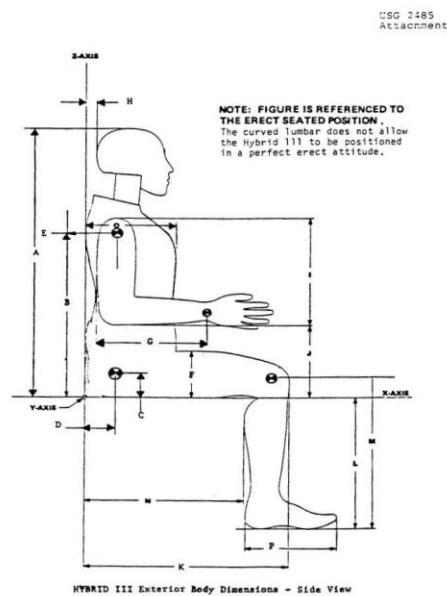
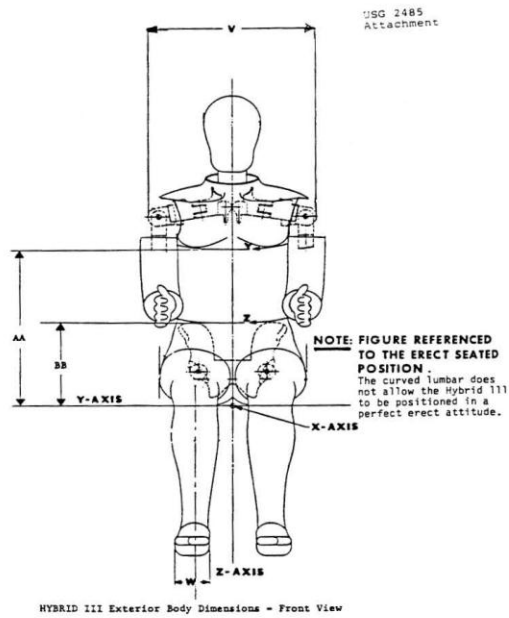
50th Male External Measurements

S/N 064

Symbol	Description	Specification	Results	Pass
		in	In	
A	Sitting Height	34.6 – 35.0	34.8	Yes
B	Shoulder Pivot Height	19.9 – 20.5	20.0	Yes
C	H-Point Height	3.3 – 3.5	3.3	Yes
D	H-Point from Backline	5.3 – 5.5	5.4	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	13.1	Yes
J	Elbow Rest Height	7.5 – 8.3	8.1	Yes
K	Buttock to Knee Length	22.8 – 23.8	23.1	Yes
L	Popliteal Height	16.9 – 17.9	17.2	Yes
M	Knee Pivot Height	19.1 – 19.7	19.3	Yes
N	Buttock Popliteal Length	17.8 – 18.8	18.5	Yes
O	Chest Depth without Jacket	8.4 – 9.0	8.6	Yes
P	Foot Length (right)	9.9 – 10.5	10.3	Yes
V	Shoulder Breadth	16.3 – 17.2	16.8	Yes
W	Foot Breadth	3.6 – 4.2	3.9	Yes
Y	Chest Circumference with Jacket	38.2 – 39.4	39.0	Yes
Z	Waist Circumference	32.9 – 34.1	33.6	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: M. Geesey

02/24/2014





VERIFICATION REPORT

Test Name:	Head Drop	Revision:	7/15/2002
Sub Test Name:			
ATD Type:	Hybrid 3 - 50th Male		
ATD Serial Number:	064		
Test ID:	Head Drop	Test Date:	2/21/2014
		Test Time:	4:38:41 PM

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

Test Parameters	Test Specifications			Test Results	
Temperature	18.9	--	25.6	21.70 deg C	P
Humidity	10	--	70	28.40 %RH	P
Resultant Acceleration	225	--	275	244.4 G's	P
Oscillation	0	--	10	2.2 %	P
Lateral Acceleration	-15	--	15	1.8 G's	P

All test parameters are within specifications

Technician: M. Goehle

Supervisor: E. Dutton



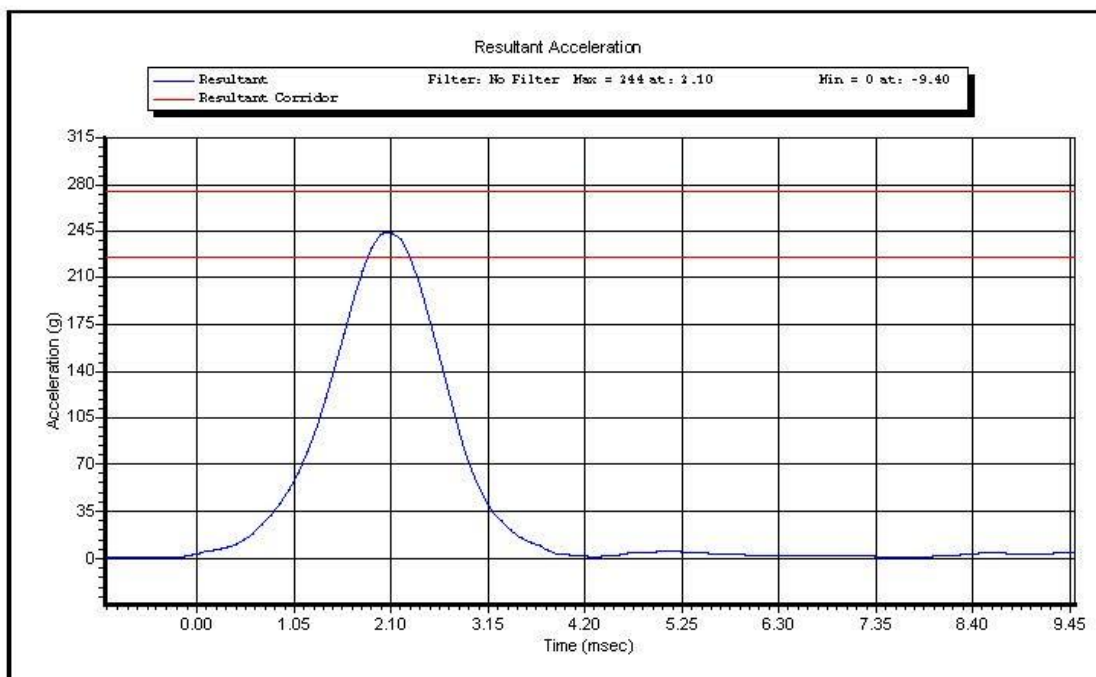
VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Endevco	7264-2000	P58904	12/5/2013
Endevco	7264-2000	P58911	12/5/2013
Endevco	7264-2000	P58776	12/5/2013



Test Name:	Head Drop
Sub Test Name:	
ATD Type:	Hybrid 3 - 50th Male
ATD Serial Number:	064

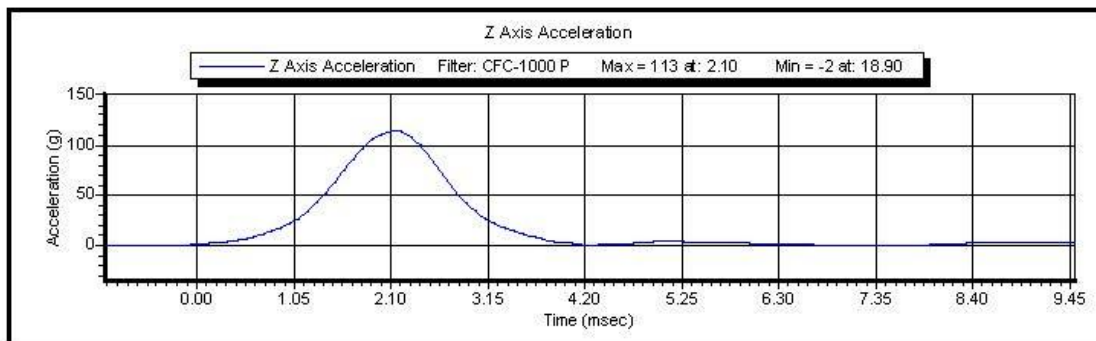
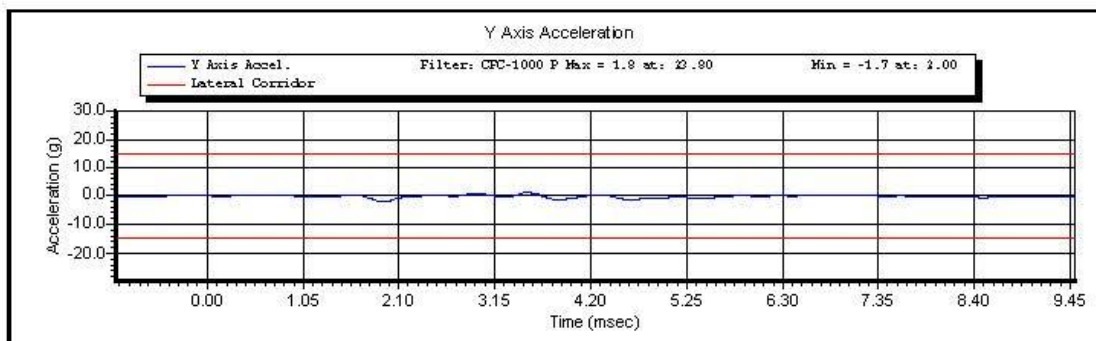
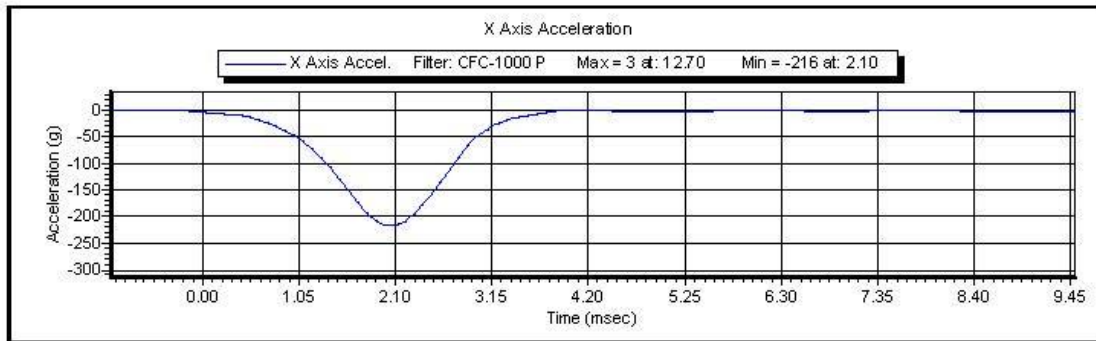


Test ID: **Head Drop**

Test Time: **4:38:41 PM**

Test Date: **2/21/2014**

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Test ID: **Head Drop**

Test Time: **4:38:41 PM**

Test Date: **2/21/2014**

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VERIFICATION REPORT

Test Name:	Neck Extension	Revision:	10/1/2001
Sub Test Name:			
ATD Type:	Hybrid 3 - 50th Male		
ATD Serial Number:	064		
Test ID:	Neck Extension	Test Date:	2/24/2014
		Test Time:	9:11:39 AM

Component Part Number	Component Serial Number
Neck - 78051-336	021692

Test Parameters		Test Specifications		Test Results	
Temperature		20.6	-- 22.2	22.20 deg C	P
Humidity		10	-- 70	16.50 %RH	P
Velocity		5.94	-- 6.19	6.041 m/s	P
Pendulum Deceleration at	10 ms	17.2	-- 21.2	18.31 G's	P
Pendulum Deceleration at	20 ms	14.0	-- 19.0	16.40 G's	P
Pendulum Deceleration at	30 ms	11.0	-- 16.0	11.57 G's	P
Max Pendulum Deceleration after	30 ms	0.0	-- 22.0	12.51 G's	P
Deceleration Time to	5 G's	38	-- 46	44.0 ms	P
D Plane Rotation		81	-- 106	98.2 degrees	P
Time at Max Rotation		72	-- 82	78.2 ms	P
Rotation Decay to Zero		147	-- 174	155.7 ms	P
Moment About Occipital Condyle		-80.0	-- -52.9	-67.45 Nm	P
Time at Maximum Moment		65	-- 79	73.0 ms	P
Moment Decay to Zero		120	-- 148	141.1 ms	P

All test parameters are within specifications

Technician: **M. Geesey**

Supervisor: **E. Dutton**



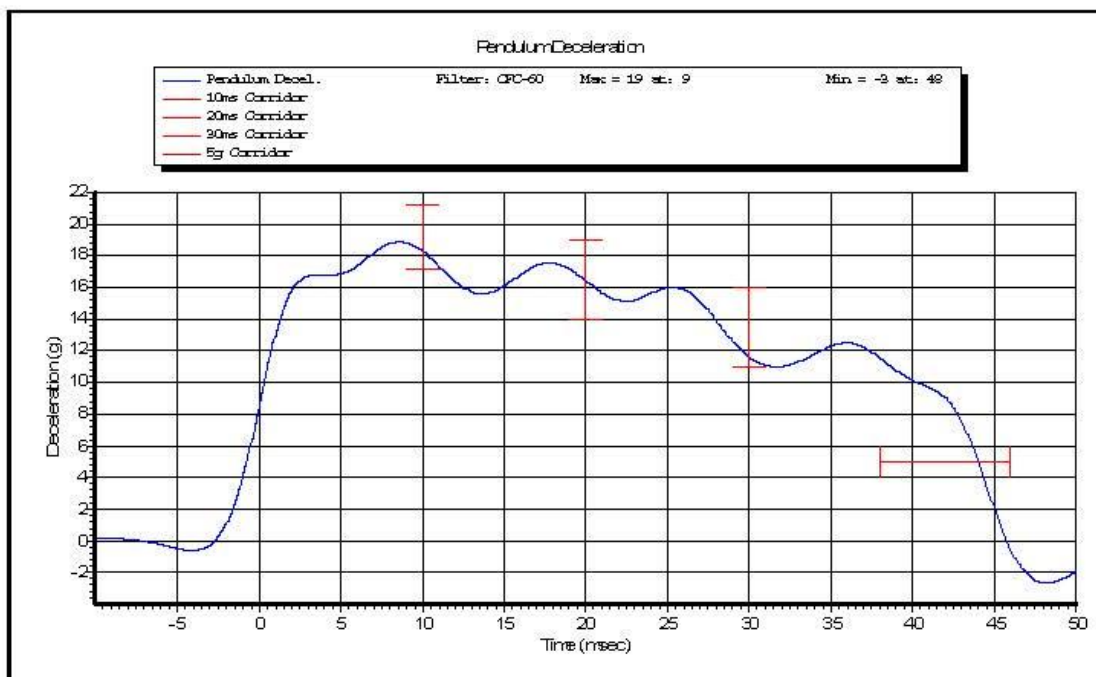
VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2014
Endevco	7231CT	AH5F3	10/16/2013
DentonATD	78051-342	PENDULUM POT	1/31/2014
DentonATD	78051-342	CONDYLE POT	1/31/2014
Denton	1716A	LC-2186 My	5/23/2013
Denton	1716A	LC-2186 Fx	5/23/2013

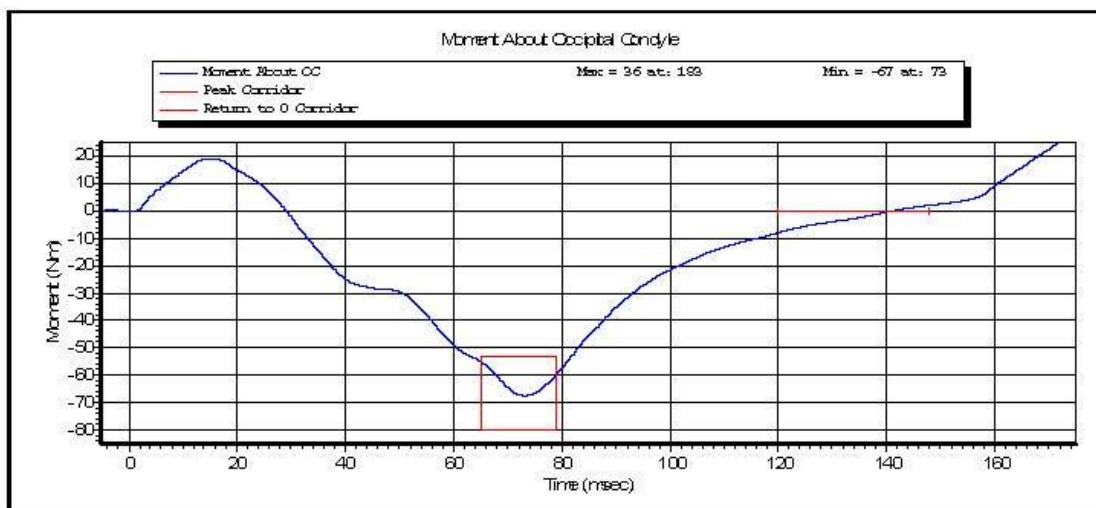
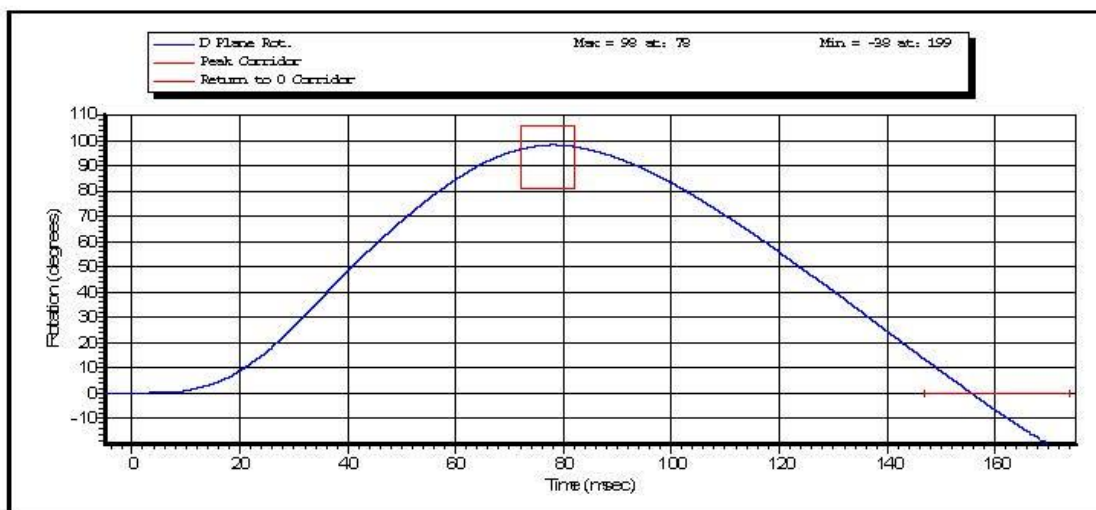


Name of Test:	Neck Extension
Name of Sub Test:	
Type of ATD:	Hybrid 3 - 50th Male
ATD Serial Number:	064



ID of Test: **Neck Extension** Time of Test: **9:11:39 AM**
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Date of Test: **2/24/2014**

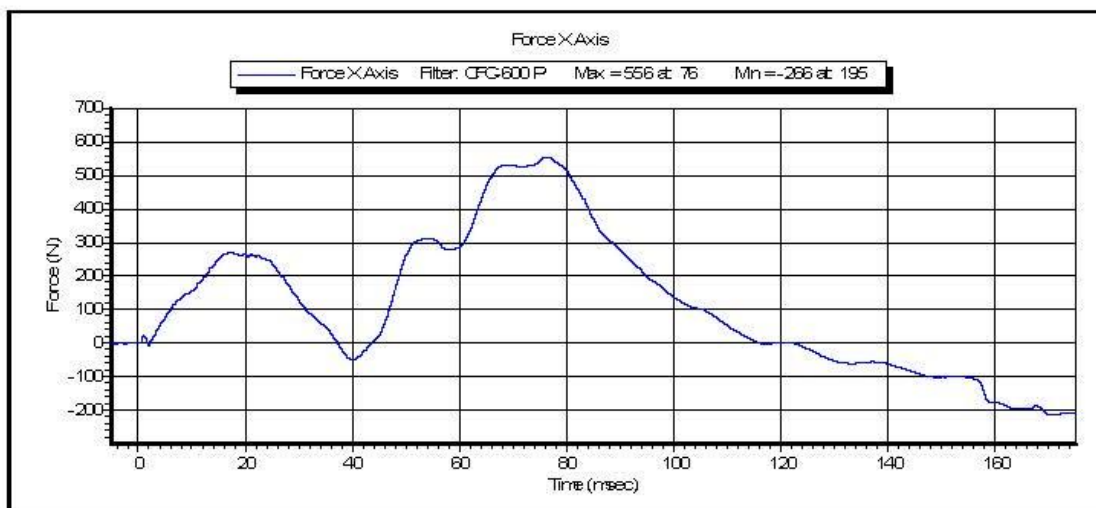
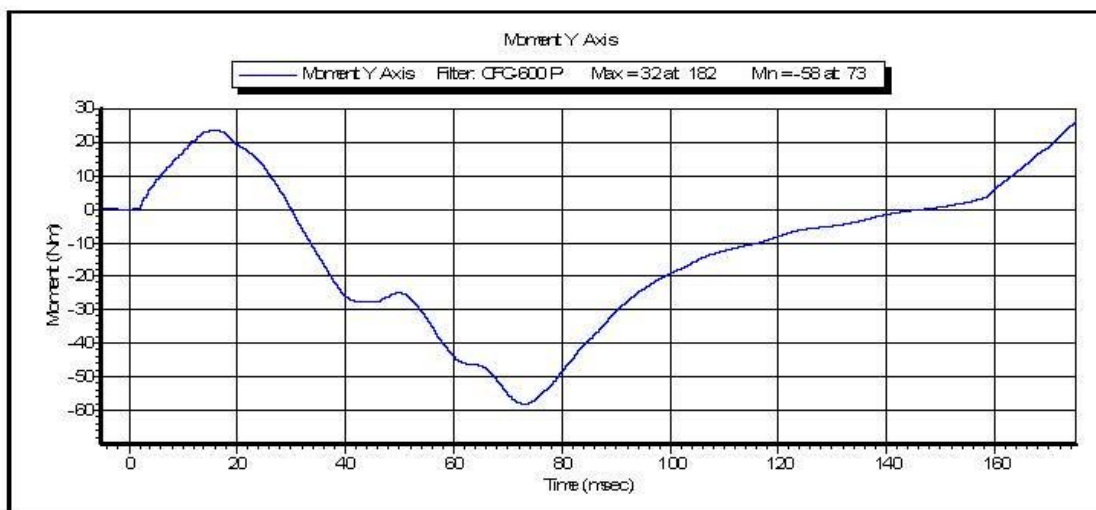


ID of Test: **Neck Extension**

Time of Test: **9:11:39 AM**

Date of Test: **2/24/2014**

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ID of Test: **Neck Extension**

Time of Test: **9:11:39 AM**

Date of Test: **2/24/2014**

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0



VERIFICATION REPORT

Test Name:	Neck Flexion	Revision:	10/1/2001
Sub Test Name:			
ATD Type:	Hybrid 3 - 50th Male		
ATD Serial Number:	064		
Test ID:	Neck Flexion	Test Date:	2/24/2014
		Test Time:	8:29:39 AM

Component Part Number	Component Serial Number
Neck - 78051-336	021692

Test Parameters		Test Specifications		Test Results	
Temperature		20.6	-- 22.2	22.20 deg C	P
Humidity		10	-- 70	15.70 %RH	P
Velocity		6.89	-- 7.13	6.891 m/s	P
Pendulum Deceleration at	10 ms	22.5	-- 27.5	23.75 G's	P
Pendulum Deceleration at	20 ms	17.6	-- 22.6	20.51 G's	P
Pendulum Deceleration at	30 ms	12.5	-- 18.5	15.02 G's	P
Maximum Pendulum Deceleration After	30 ms	0	-- 29	15.0 G's	P
Deceleration Time to	5 ms	34	-- 42	38.8 ms	P
D Plane Rotation		-78	-- -64	-72.9 degrees	P
Time at Maximum Rotation		57	-- 64	59.4 ms	P
Rotation Decay to Zero		113	-- 128	122.0 ms	P
Moment About Occipital Condyle		88.1	-- 108.4	97.43 Nm	P
Time at Maximum Moment		47	-- 58	52.9 ms	P
Moment Decay to Zero		97.0	-- 107.0	100.5 ms	P

All test parameters are within specifications

Technician: **M. Geesey**

Supervisor: **E. Dutton**



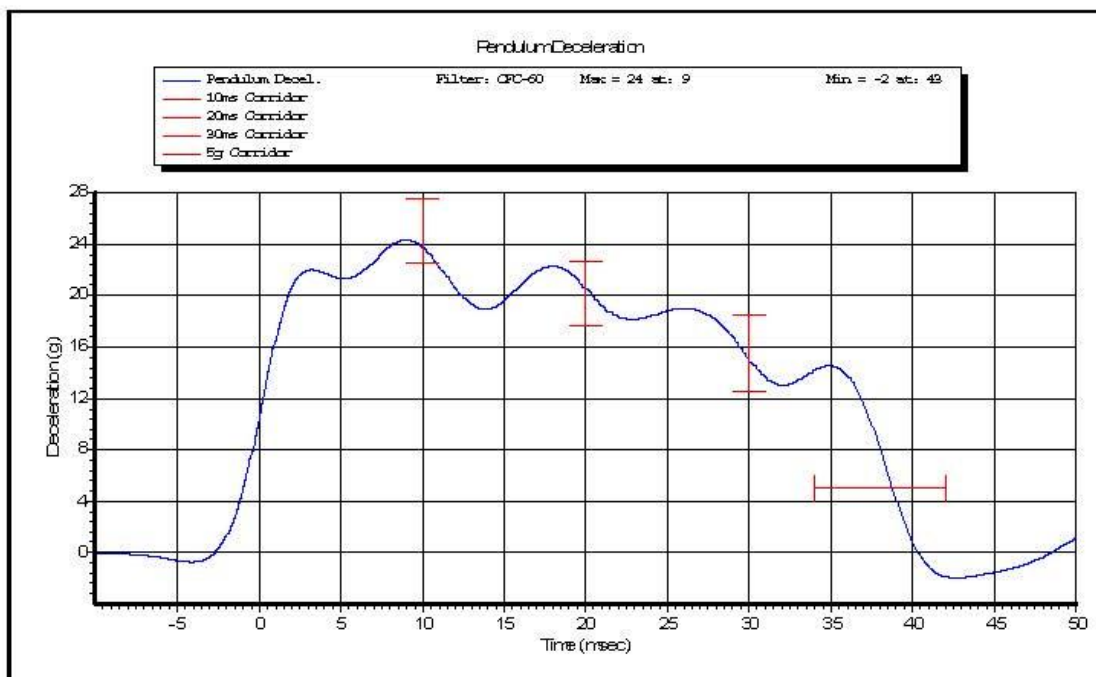
VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2014
Endevco	7231CT	AH5F3	10/16/2013
DentonATD	78051-342	PENDULUM POT	1/31/2014
DentonATD	78051-342	CONDYLE POT	1/31/2014
Denton	1716A	LC-2186 My	5/23/2013
Denton	1716A	LC-2186 Fx	5/23/2013



Name of Test:	Neck Flexion
Name of Sub Test:	
Type of ATD:	Hybrid 3 - 50th Male
ATD Serial Number:	064

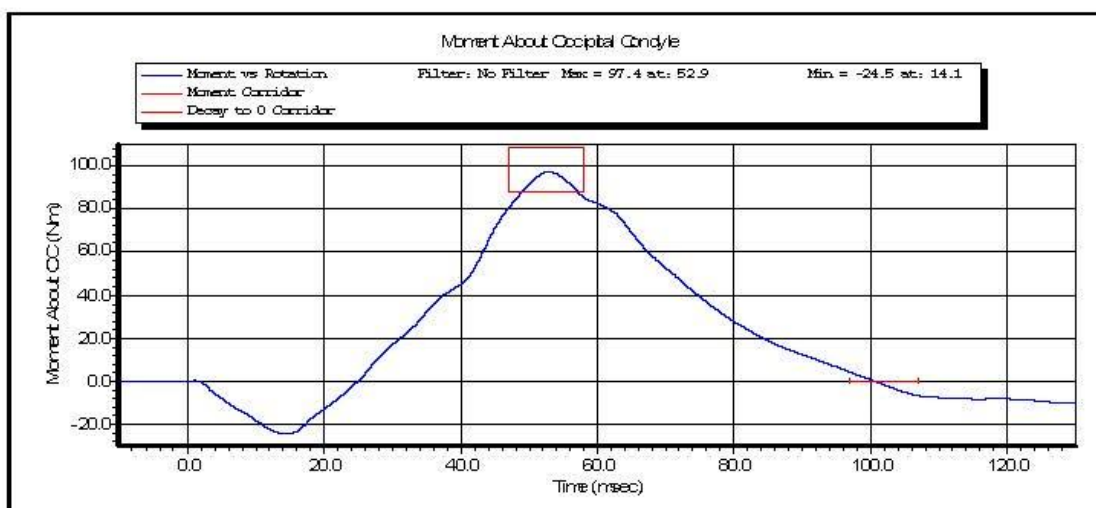
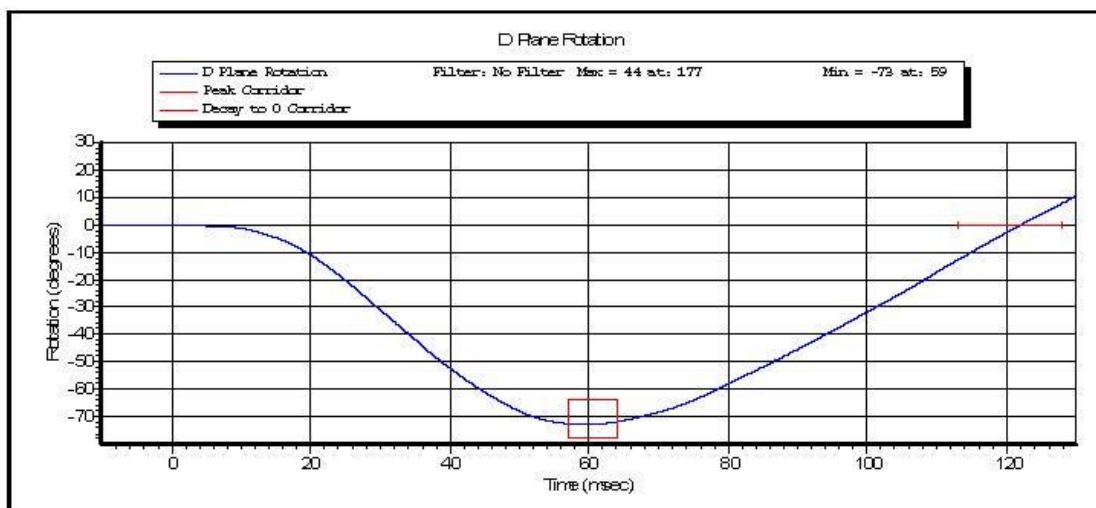


ID of Test: **Neck Flexion**

Time of Test: **8:29:39 AM**

Date of Test: **2/24/2014**

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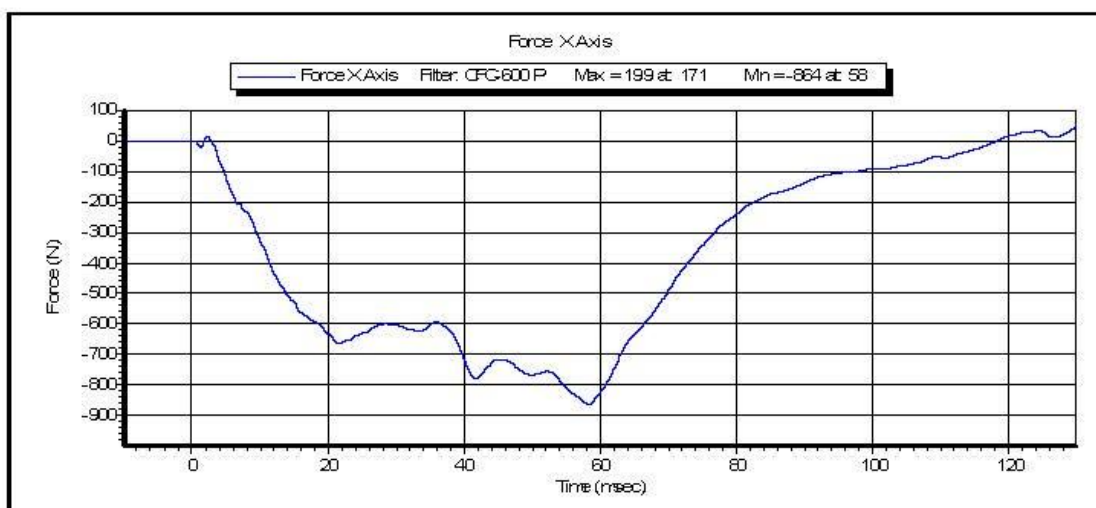
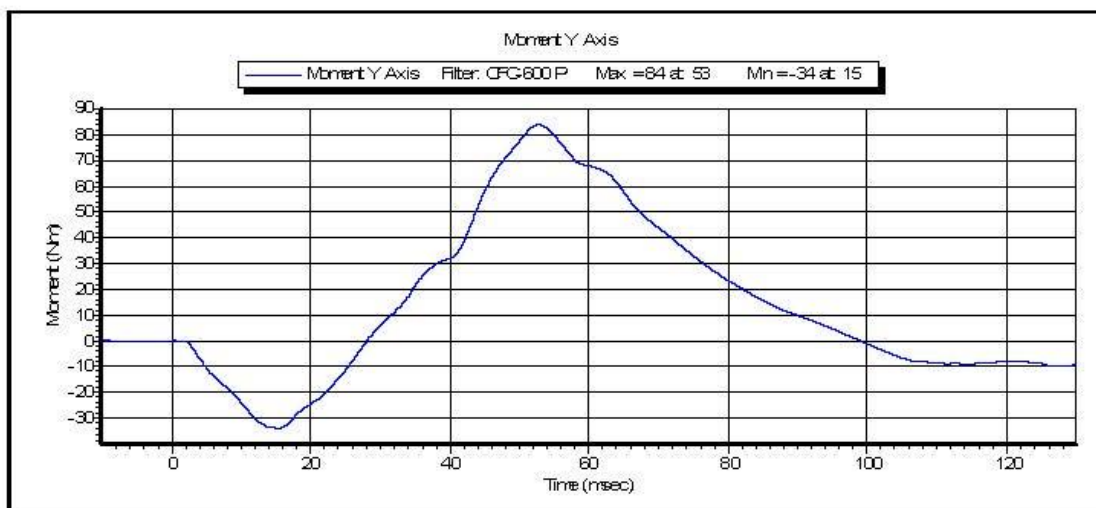


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Time of Test: **8:29:39 AM**

Date of Test: **2/24/2014**

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ID of Test: **Neck Flexion**

Time of Test: **8:29:39 AM**

Date of Test: **2/24/2014**

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VERIFICATION REPORT

Test Name:	Thorax Impact	Revision:	10/1/2001
Sub Test Name:			
ATD Type:	Hybrid 3 - 50th Male		
ATD Serial Number:	064		
Test ID:	Thorax Impact	Test Date:	2/24/2014
		Test Time:	4:16:38 PM

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

Test Parameters	Test Specifications			Test Results	
Temperature	20.6	--	22.2	21.20 deg C	P
Humidity	10	--	70	17.40 %RH	P
Velocity	6.59	--	6.83	6.721 m/s	P
Chest Deflection	-72.6	--	-63.5	-72.39 mm	P
Resistive Force	-5.894	--	-5.160	-5.5209 kN	P
Hysteresis	69	--	85	70.0 %	P

All test parameters are within specifications

Technician: **M.Goehle/M.Geese**

Supervisor: **E. Dutton**



VERIFICATION REPORT

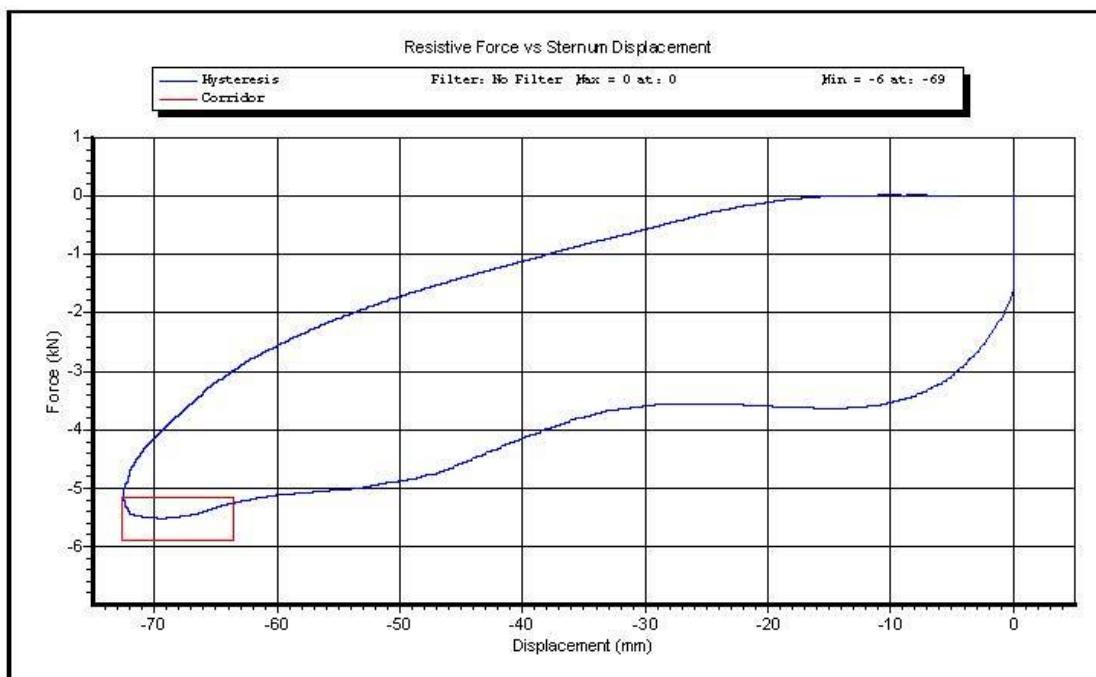
REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2014
Endevco	7231CT	C14953	12/4/2013
DentonATD	78051-342	DS-064	6/18/2013

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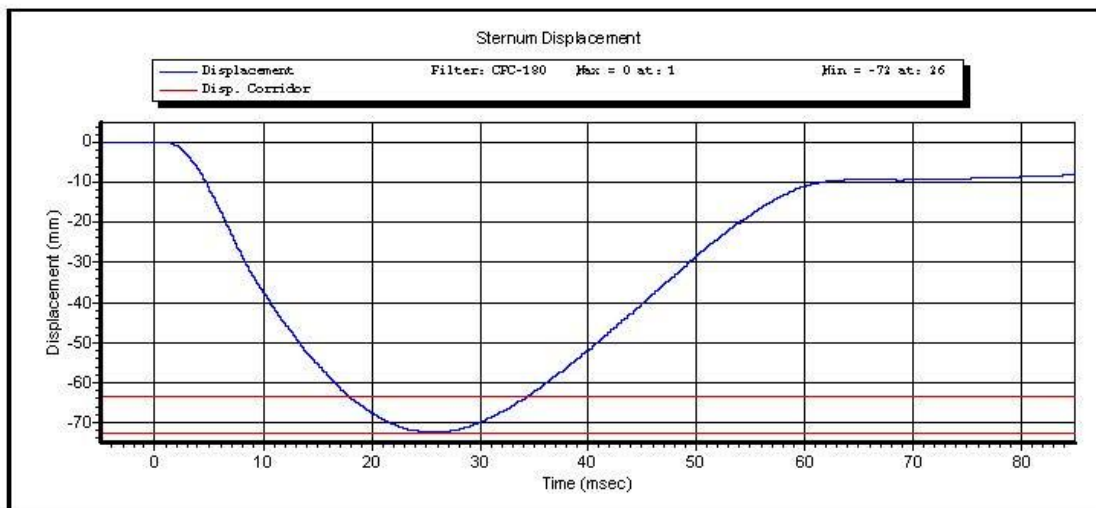
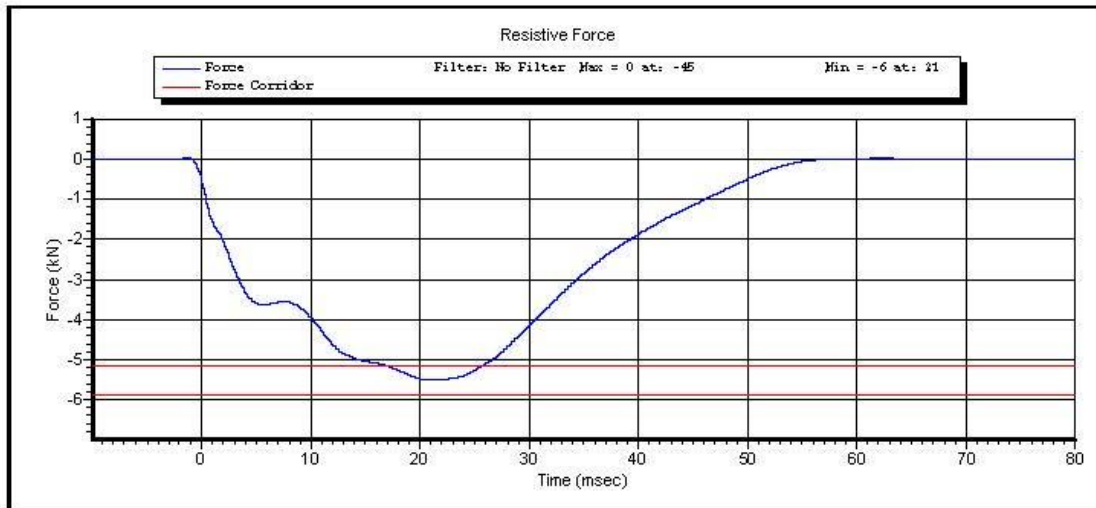


Test Name:	Thorax Impact
Sub Test Name:	
ATD Type:	Hybrid 3 - 50th Male
ATD Serial Number:	064



Test ID: **Thorax Impact** Test Time: **4:16:38 PM**
Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

Test Date: **2/24/2014**

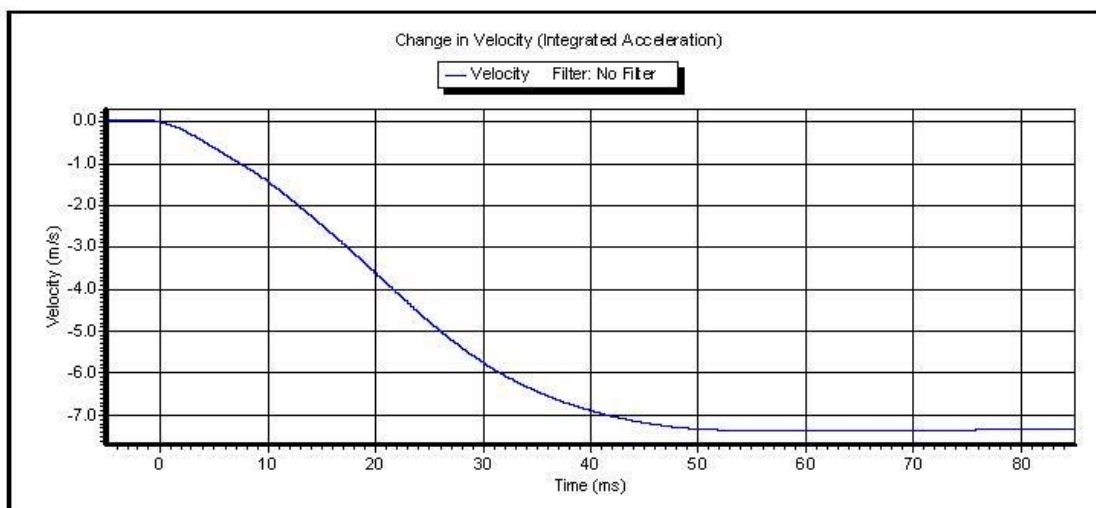
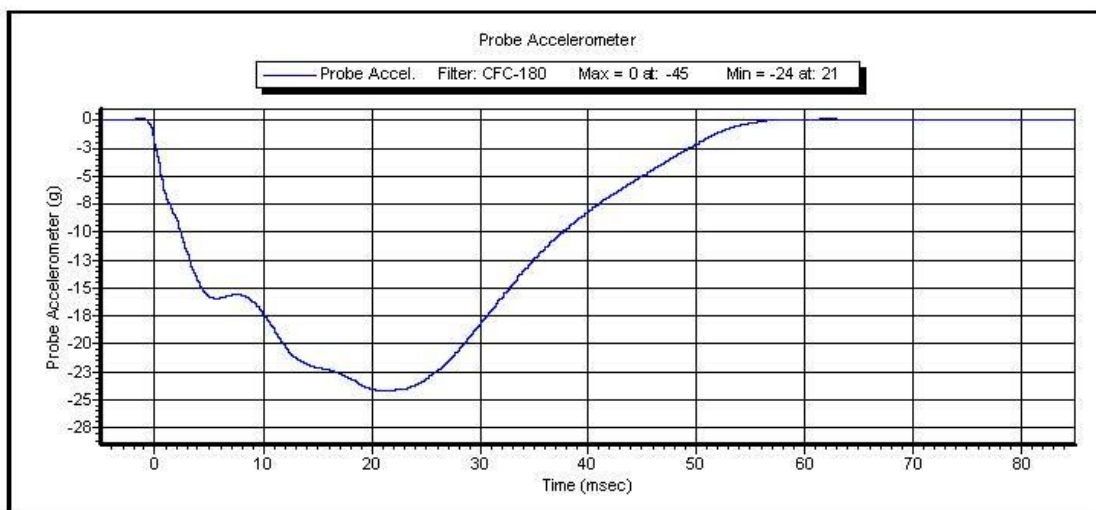


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Test Time: **4:16:38 PM**

Test Date: **2/24/2014**

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Test ID: **Thorax Impact**

Test Time: **4:16:38 PM**

Test Date: **2/24/2014**

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VERIFICATION REPORT

Test Name:	Hip ROM	Revision:	10/1/2001
Sub Test Name:			
ATD Type:	Hybrid 3 - 50th Male		
ATD Serial Number:	064		
Test ID:	Hip ROM Left	Test Date:	2/21/2014
		Test Time:	8:50:21 AM

Component Part Number	Component Serial Number
Pelvis Assembly 78051-60	1445

Test Parameters	Test Specifications			Test Results	
Temperature	18.9	--	25.6	21.20 deg C	P
Humidity	10	--	70	36.00 %RH	P
Average Velocity	5	--	10	6.2 deg/s	P
Angle at 203 Nm	40	--	50	43.5 degrees	P
Moment at 30 degrees	0.0	--	94.9	65.90 Nm	P

All test parameters are within specifications

Technician: **R. Weil**

Supervisor: **E. Dutton**



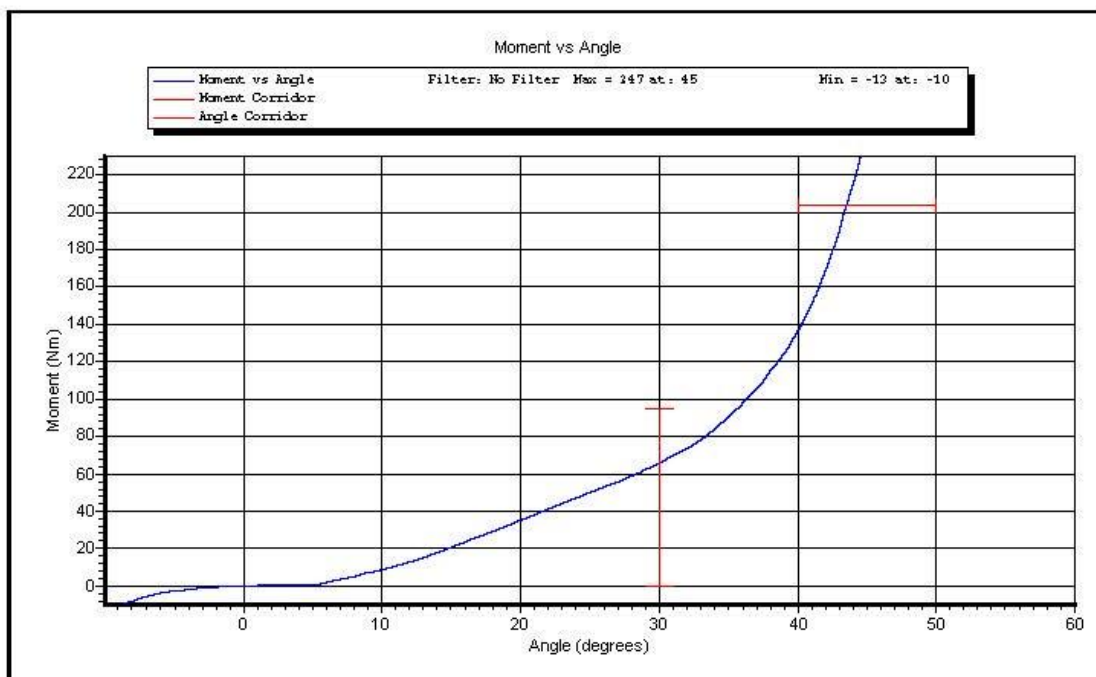
VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Key Trans/PCB	2301-02	115	3/19/2013
DentonATD	14 CB1-3615	0008	2/20/2014
DentonATD	A0 Output	1	1/11/2014



Test Name:	Hip ROM
Sub Test Name:	
ATD Type:	Hybrid 3 - 50th Male
ATD Serial Number:	064



Test ID: Hip ROM Left

Test Time: 8:50:21 AM

Test Date: 2/21/2014

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VERIFICATION REPORT

Test Name:	Hip ROM	Revision:	10/1/2001
Sub Test Name:			
ATD Type:	Hybrid 3 - 50th Male		
ATD Serial Number:	064		
Test ID:	Hip ROM Right	Test Date:	2/21/2014
		Test Time:	7:35:41 AM

Component Part Number	Component Serial Number
Pelvis Assembly 78051-60	1445

Test Parameters	Test Specifications			Test Results	
Temperature	18.9	--	25.6	21.20 deg C	P
Humidity	10	--	70	39.20 %RH	P
Average Velocity	5	--	10	5.8 deg/s	P
Angle at 203 Nm	40	--	50	42.2 degrees	P
Moment at 30 degrees	0.0	--	94.9	80.63 Nm	P

All test parameters are within specifications

Technician: **M. Geesey**

Supervisor: **E. Dutton**



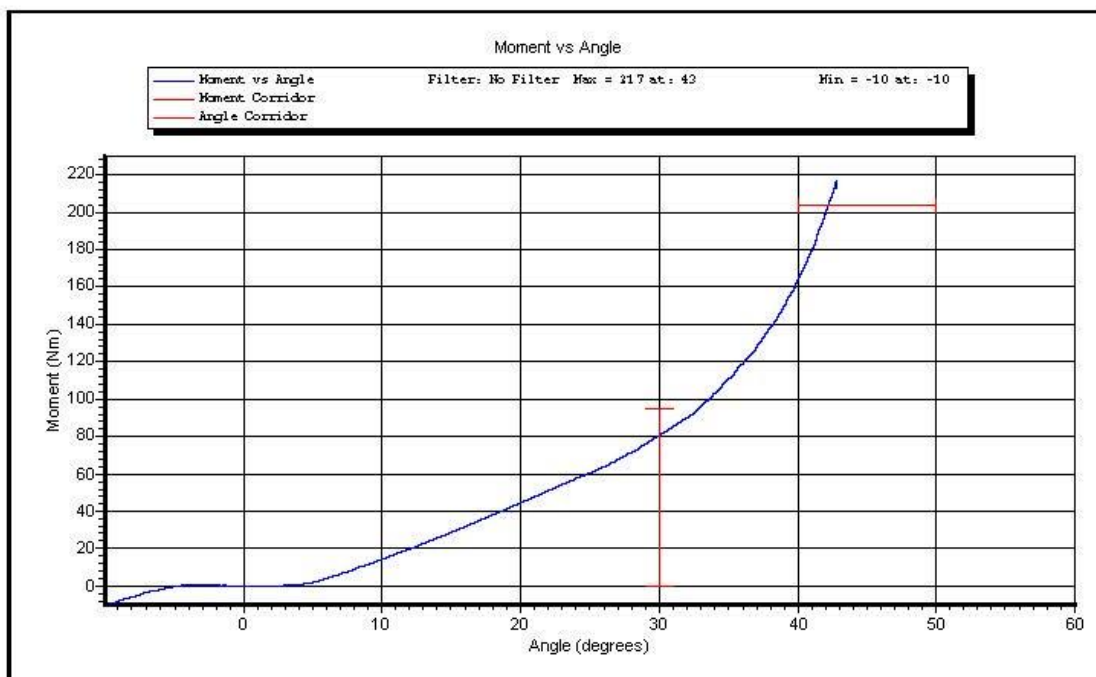
VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Key Trans/PCB	2301-02	115	3/19/2013
DentonATD	14 CB1-3615	0008	2/20/2014
DentonATD	A0 Output	1	1/11/2014



Test Name:	Hip ROM
Sub Test Name:	
ATD Type:	Hybrid 3 - 50th Male
ATD Serial Number:	064



Test ID: **Hip ROM Right**

Test Time: **7:35:41 AM**

Test Date: **2/21/2014**

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VERIFICATION REPORT

Test Name:	Knee Impact	Revision:	10/1/2001
Sub Test Name:			
ATD Type:	Hybrid 3 - 50th Male		
ATD Serial Number:	064		
Test ID:	Knee Impact Left	Test Date:	2/20/2014
		Test Time:	1:27:49 PM

Component Part Number	Component Serial Number
Knee Skin - 78051(L) or 6(R)	2882

Test Parameters	Test Specifications	Test Results
Temperature	18.9 -- 25.6	21.30 deg C P
Humidity	10 -- 70	21.00 %RH P
Velocity	2.07 -- 2.13	2.116 m/s P
Resistive Force	-5.780 -- -4.720	-4.739 kN P

All test parameters are within specifications

Technician: **M. Geesey**

Supervisor: **E. Dutton**



VERIFICATION REPORT

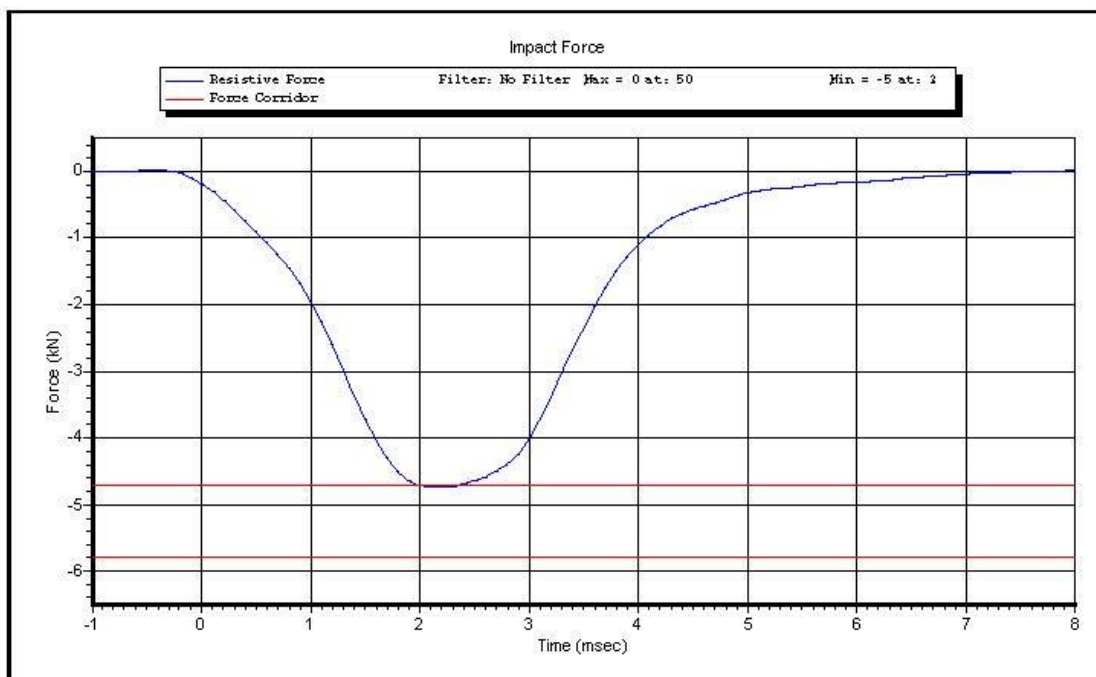
REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD Endevco	Velocity Trap 7231CT	1 C14953	1/11/2014 12/4/2013

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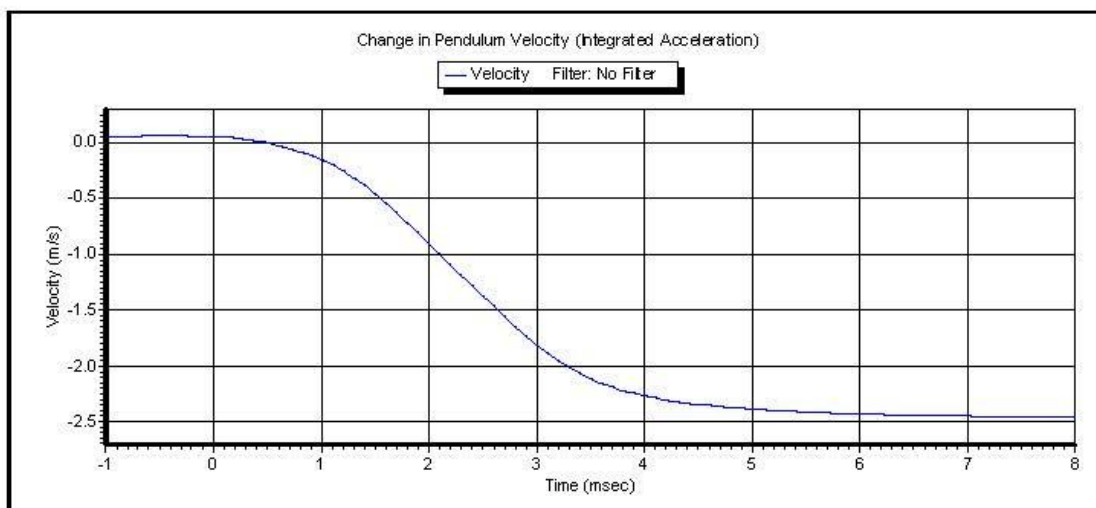
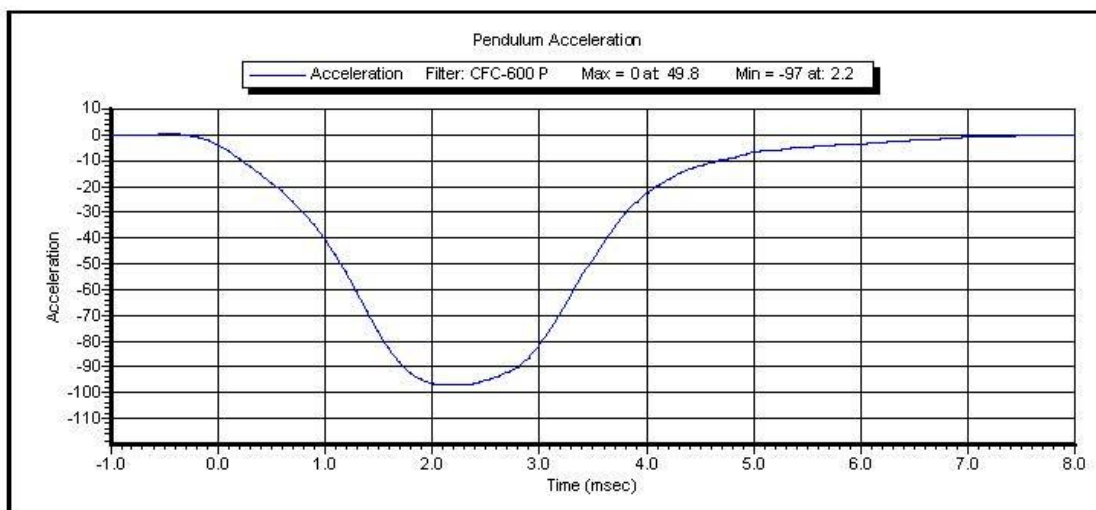


Test Name:	Knee Impact
Sub Test Name:	
ATD Type:	Hybrid 3 - 50th Male
ATD Serial Number:	064



Test ID: **Knee Impact Left** Test Time: **1:27:49 PM**
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Test Date: **2/20/2014**



Test ID: **Knee Impact Left** Test Time: **1:27:49 PM**

Test Date: **2/20/2014**

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VERIFICATION REPORT

Test Name:	Knee Impact	Revision:	10/1/2001
Sub Test Name:			
ATD Type:	Hybrid 3 - 50th Male		
ATD Serial Number:	064		
Test ID:	Knee Impact Right	Test Date:	2/20/2014
		Test Time:	1:14:10 PM

Component Part Number	Component Serial Number
Knee Skin - 78051(L) or 6(R)	2531

Test Parameters	Test Specifications			Test Results	
Temperature	18.9	--	25.6	21.10 deg C	P
Humidity	10	--	70	21.30 %RH	P
Velocity	2.07	--	2.13	2.112 m/s	P
Resistive Force	-5.780	--	-4.720	-5.130 kN	P

All test parameters are within specifications

Technician: **M. Geesey**

Supervisor: **E. Dutton**



VERIFICATION REPORT

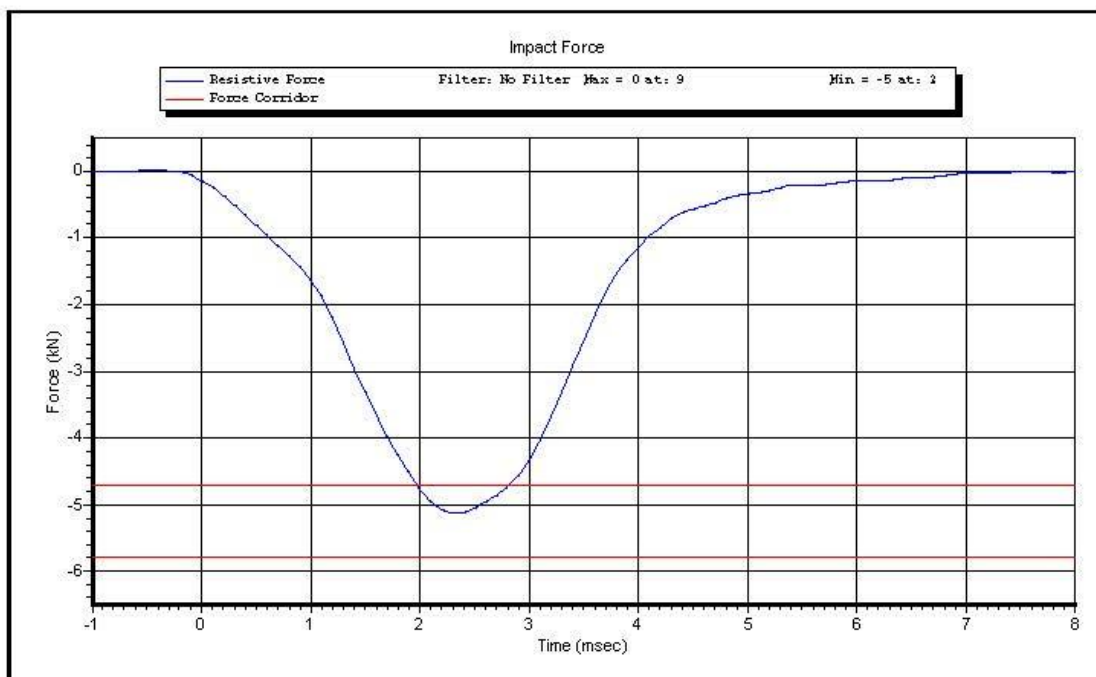
REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD Endevco	Velocity Trap 7231CT	1 C14953	1/11/2014 12/4/2013

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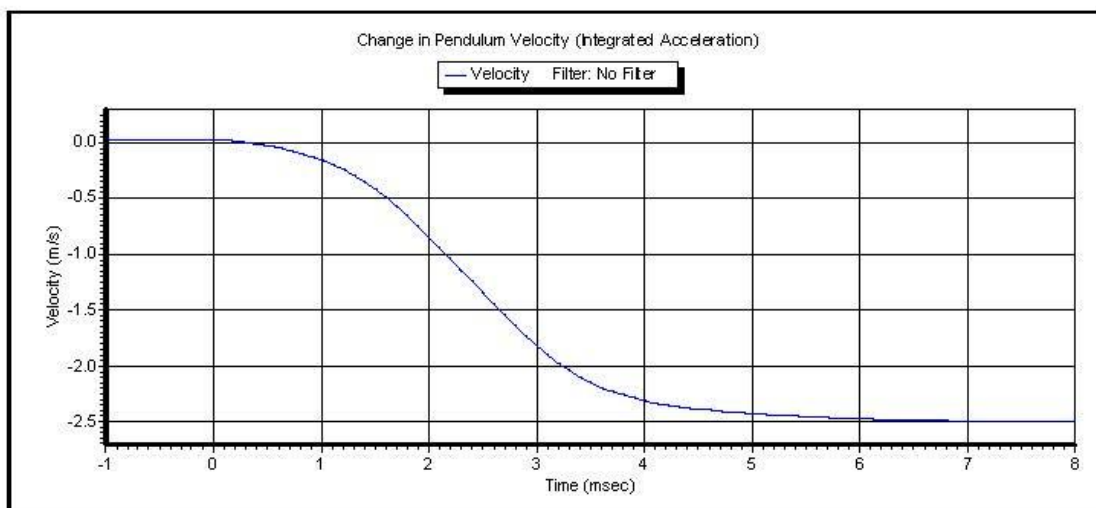
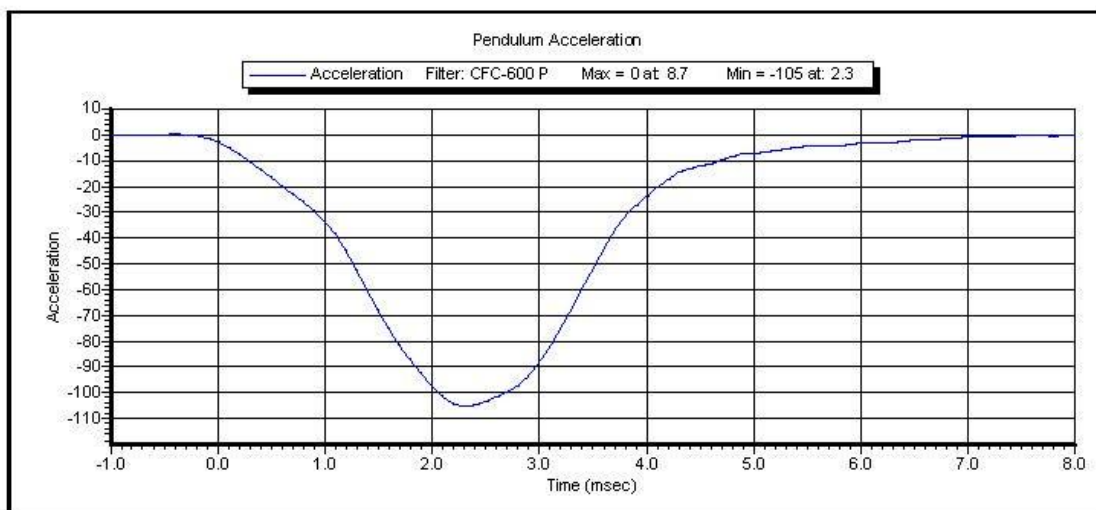
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Sub Test Name:	
ATD Type:	Hybrid 3 - 50th Male
ATD Serial Number:	064



Test ID: **Knee Impact Right** Test Time: **1:14:10 PM**

Test Date: **2/20/2014**

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Test ID: **Knee Impact Right** Test Time: **1:14:10 PM**

Test Date: **2/20/2014**

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CALIBRATION TEST RESULTS

POST-TEST

HYBRID III 5TH PERCENTILE FEMALE - PASSENGER ATD

SERIAL NO: 143



External Measurements

5th Female SN 143

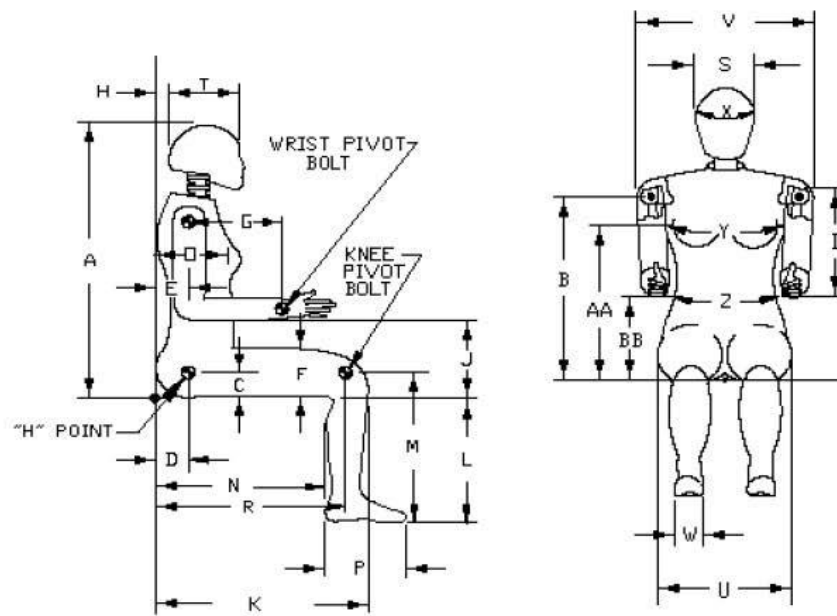
Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Sitting Height	774.7 – 800.1	790	Yes
B	Shoulder Pivot Height	431.8 – 457.2	446	Yes
C	H-Point Height	81.3 – 86.3	84	Yes
D	H-Point from Backline	144.8 – 149.8	146	Yes
E	Shoulder Pivot from Backline	68.6 – 83.8	77	Yes
F	Thigh Clearance	119.4 – 134.6	124	Yes
G	Back of Elbow to Wrist Pivot	243.9 – 259.1	246	Yes
H	Head Back to Backline	43.2 – 48.2	44	Yes
I	Shoulder to Elbow Length	276.8 – 297.2	280	Yes
J	Elbow Rest Height	182.8 – 203.2	186	Yes
K	Buttock to Knee Length	520.7 – 546.1	541	Yes
L	Popliteal Height	355.6 – 376	362	Yes
M	Knee Pivot Height	393.7 – 419.1	398	Yes
N	Buttock Popliteal Length	414 – 439.4	422	Yes
O	Chest Depth without Jacket	175.3 – 190.5	184	Yes
P	Foot Length (right)	218.5 – 233.7	220	Yes
R	Buttock To Knee Pivot Length	457.2 – 482.6	473	Yes
S	Head Breadth	137.1 – 147.3	142	Yes
T	Head Depth	177.8 – 188	183	Yes
U	Hip Breadth	299.7 – 314.9	302	Yes
V	Shoulder Breadth	350.5 – 365.7	362	Yes
W	Foot Breadth	78.8 – 94	81	Yes
X	Head Circumference	528.3 – 548.7	537	Yes
Y	Chest Circumference with Jacket	850.9 – 881.3	852	Yes
Z	Waist Circumference	759.5 – 789.9	768	Yes
AA	Reference Location (Chest Circumference)	332.7 – 358.1	357	Yes
BB	Reference Location (Waist Circumference)	160.1 – 170.2	170	Yes

Technician: M. Geesey

Date: 02/19/2014

Hybrid III 5th Female External Measurements

Reference Diagram





VERIFICATION REPORT

Test Name:	Head Drop	Revision:	7/15/2002
Sub Test Name:			
ATD Type:	Hybrid 3 - 5th Female		
ATD Serial Number:	143		
Test ID:	Head Drop	Test Date:	2/20/2014
		Test Time:	11:28:10 AM

Component Part Number	Component Serial Number
Head Skin - 78051-228	05733
Cap Skin - 78051-229	06108

Test Parameters	Test Specifications	Test Results
Temperature	18.9 -- 25.6	21.40 deg C P
Humidity	10 -- 70	27.10 %RH P
Resultant Acceleration	250 -- 300	269.8 G's P
Oscillation	0 -- 10	0.0 % P
Lateral Acceleration	-15 -- 15	-9.3 G's P

All test parameters are within specifications

Technician: M. Geesey

Supervisor: E. Dutton



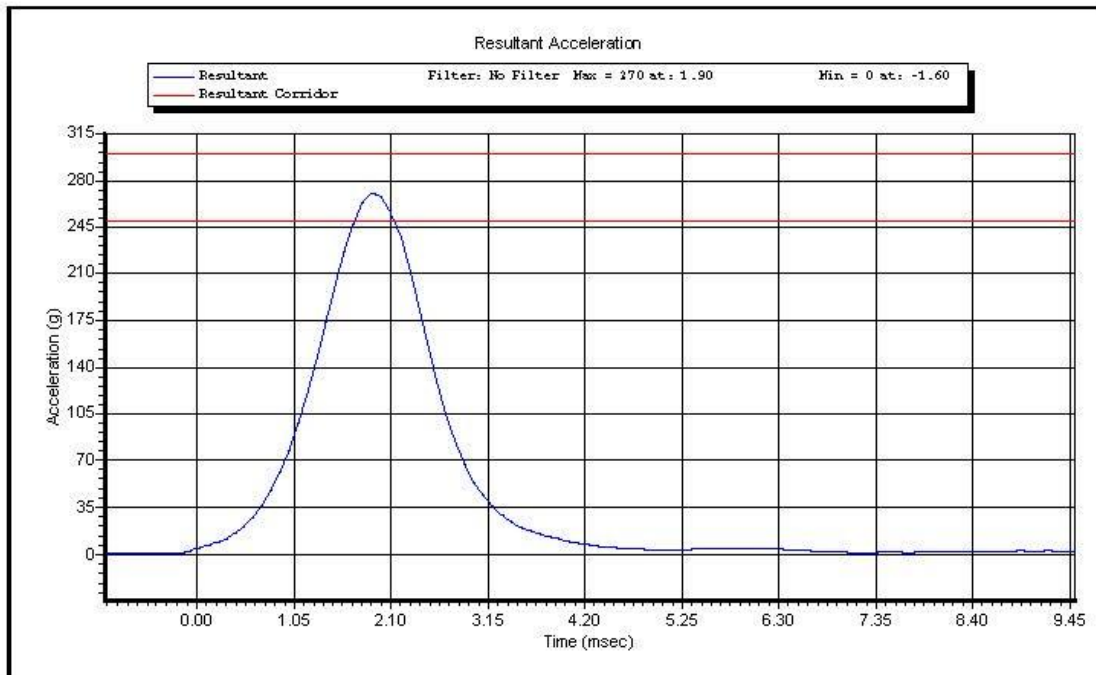
VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Endevco	7264-2000	P15321	2/5/2014
Endevco	7264-2000	P16755	2/5/2014
Endevco	7264-2000	P58868	2/5/2014



Test Name:	Head Drop
Sub Test Name:	
ATD Type:	Hybrid 3 - 5th Female
ATD Serial Number:	143

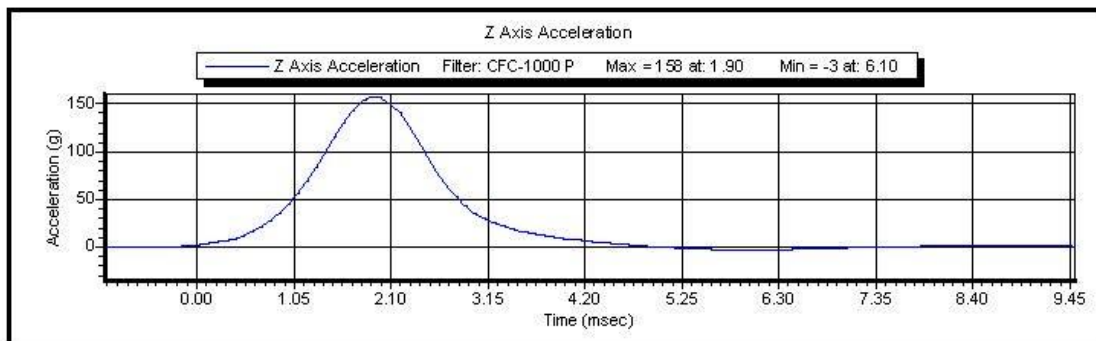
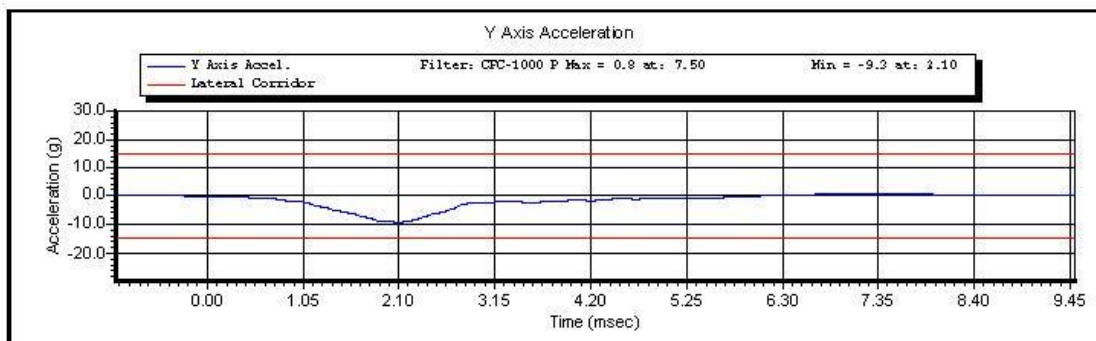
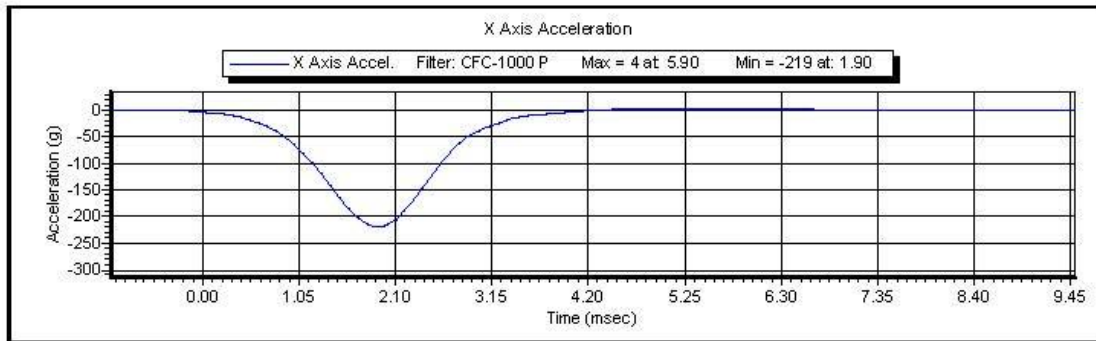


Test ID: **Head Drop**

Test Time: **11:28:10 AM**

Test Date: **2/20/2014**

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Test ID: **Head Drop**

Test Time: **11:28:10 AM**

Test Date: **2/20/2014**

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VERIFICATION REPORT

Test Name:	Neck Extension	Revision:	7/15/2002
Sub Test Name:			
ATD Type:	Hybrid 3 - 5th Female		
ATD Serial Number:	143		
Test ID:	Neck Extension	Test Date:	2/20/2014
		Test Time:	9:38:03 AM

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

Test Parameters		Test Specifications		Test Results	
Temperature		20.6	-- 22.2	21.50 deg C	P
Humidity		10	-- 70	26.60 %RH	P
Velocity		5.95	-- 6.19	6.041 m/s	P
Pendulum Impulse at	10 ms	1.5	-- 1.9	1.84 m/s	P
Pendulum Impulse at	20 ms	3.1	-- 3.9	3.57 m/s	P
Pendulum Impulse at	30 ms	4.6	-- 5.6	5.13 m/s	P
D Plane Rotation		99	-- 114	103.0 degrees	P
Moment During Rotation Interval		-65	-- -53	-55.7 Nm	P
Moment Decay to -10.0 Nm		94	-- 114	102.5 ms	P

All test parameters are within specifications

Technician: **M. Geesey**
Supervisor: **E. Dutton**



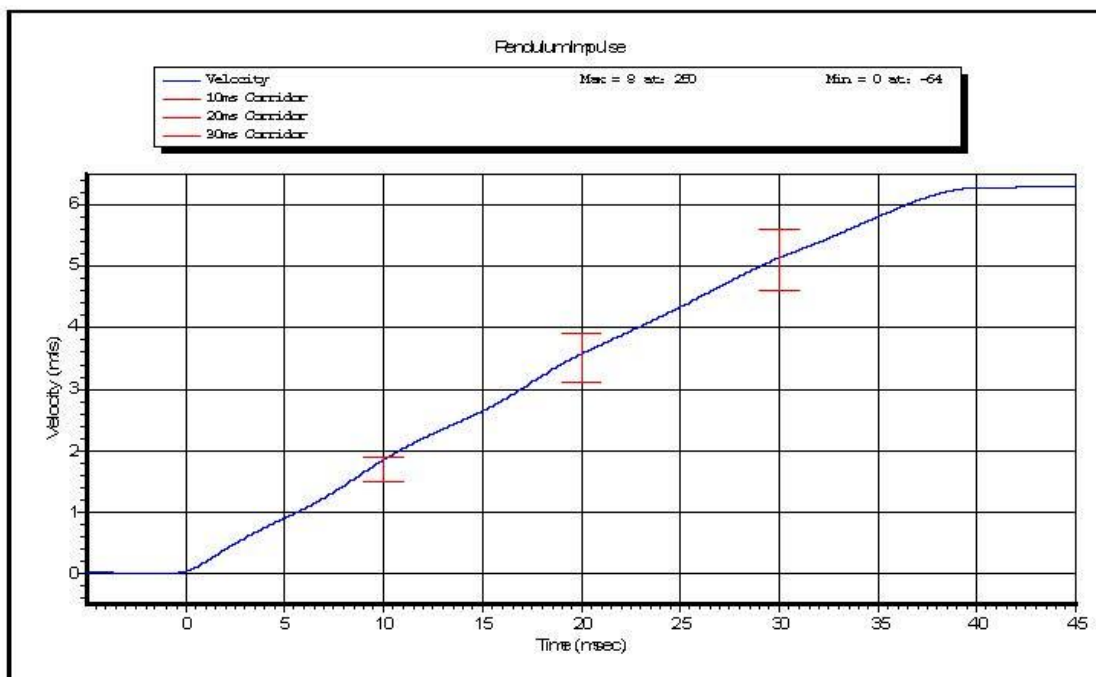
VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2014
Endevco	7231CT	AH5F3	10/16/2013
DentonATD	78051-342	PENDULUM POT	1/31/2014
DentonATD	78051-342	CONDYLE POT	1/31/2014
Denton	1716A	LC-283My	5/29/2013
Denton	1716A	LC-283 Fx	5/29/2013

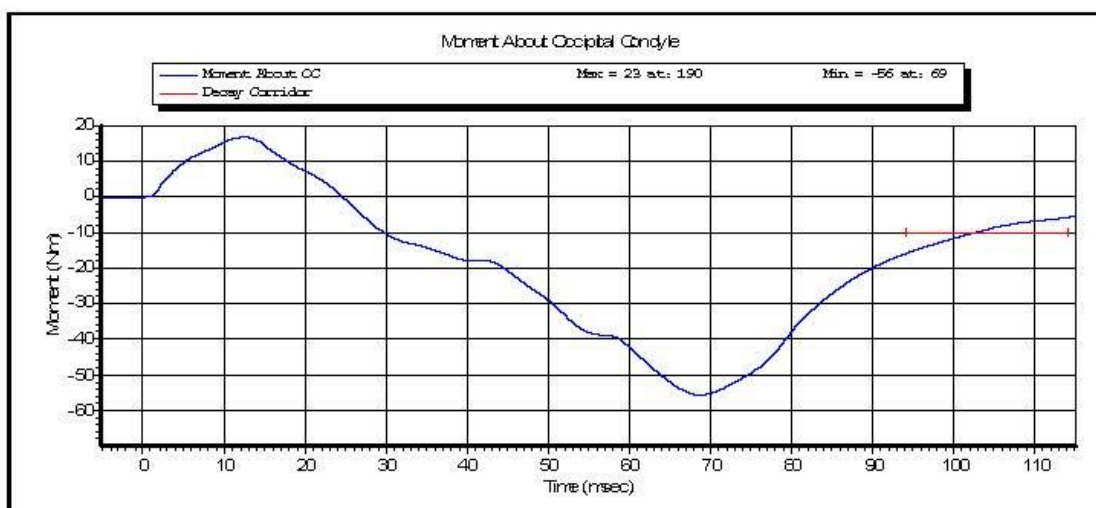
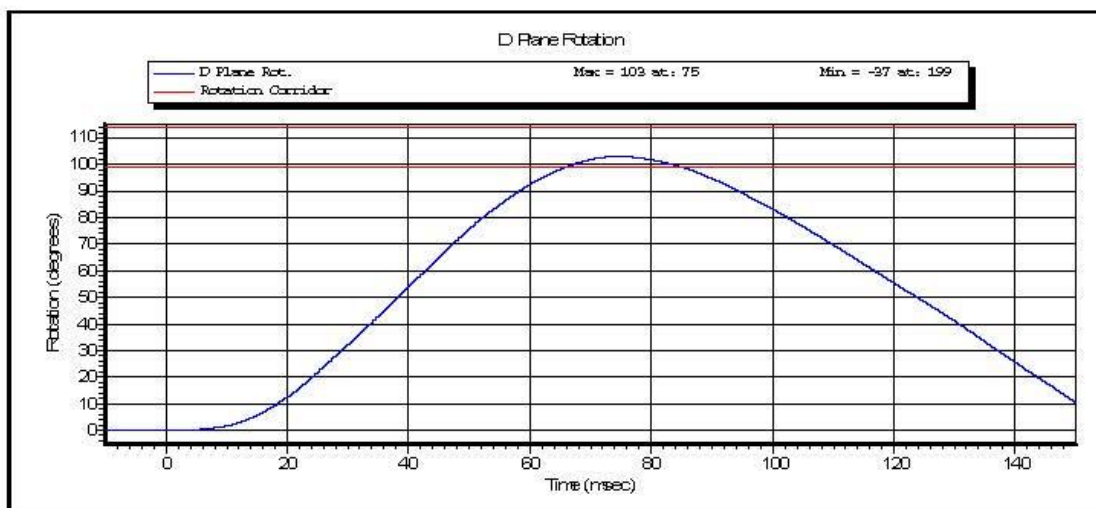


Test Name:	Neck Extension
Sub Test Name:	
ATD Type:	Hybrid 3 - 5th Female
ATD Serial Number:	143



Test ID: **Neck Extension** Test Time: **9:38:03 AM**
Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

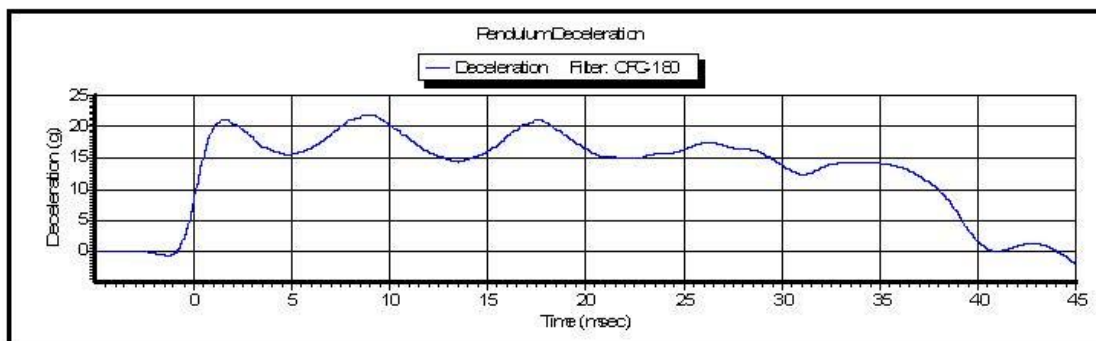
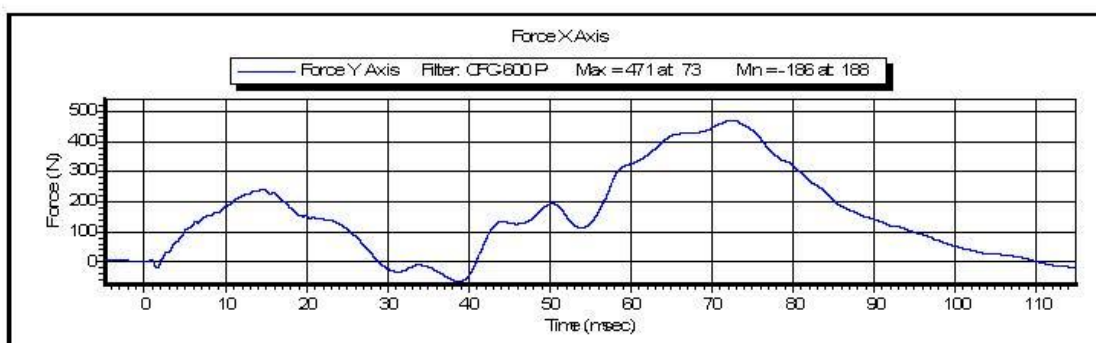
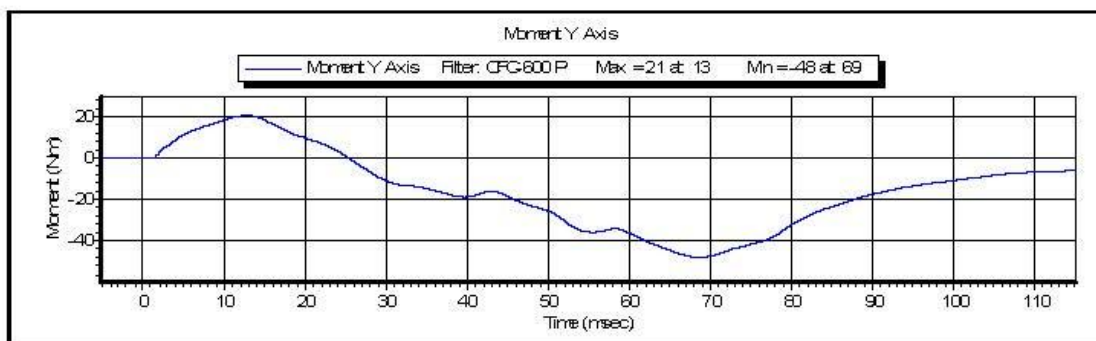
Test Date: **2/20/2014**



Test ID: **Neck Extension** Test Time: **9:38:03 AM**

Test Date: **2/20/2014**

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Test ID: **Neck Extension** Test Time: **9:38:03 AM**

Test Date: **2/20/2014**

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VERIFICATION REPORT

Test Name:	Neck Flexion	Revision:	7/15/2002
Sub Test Name:			
ATD Type:	Hybrid 3 - 5th Female		
ATD Serial Number:	143		
Test ID:	Neck Flexion	Test Date:	2/20/2014
		Test Time:	9:12:23 AM

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

Test Parameters		Test Specifications		Test Results	
Temperature		20.6	-- 22.2	21.50 deg C	P
Humidity		10.0	-- 70.0	26.20 %RH	P
Velocity		6.89	-- 7.13	7.042 m/s	P
Pendulum Impulse at	10 ms	2.1	-- 2.5	2.36 m/s	P
Pendulum Impulse at	20 ms	4	-- 5	4.7 m/s	P
Pendulum Impulse at	30 ms	5.8	-- 7.0	6.73 m/s	P
D Plane Rotation		-91	-- -77	-77.6 degrees	P
Moment During Rotation Interval		69	-- 83	74.9 Nm	P
Moment Decay to 10.0 Nm		80	-- 100	84.7 ms	P

All test parameters are within specifications

Technician: **M. Geesey**
Supervisor: **E. Dutton**



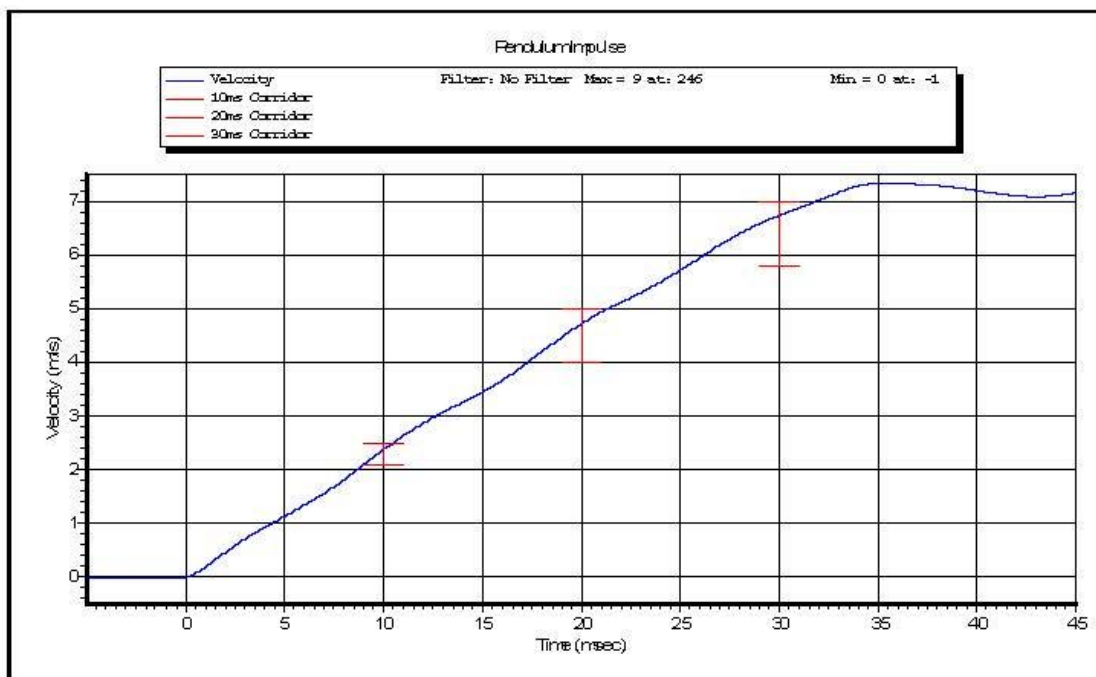
VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2014
Endevco	7231CT	AH5F3	10/16/2013
DentonATD	78051-342	PENDULUM POT	1/31/2014
DentonATD	78051-342	CONDYLE POT	1/31/2014
Denton	1716A	LC-283My	5/29/2013
Denton	1716A	LC-283 Fx	5/29/2013



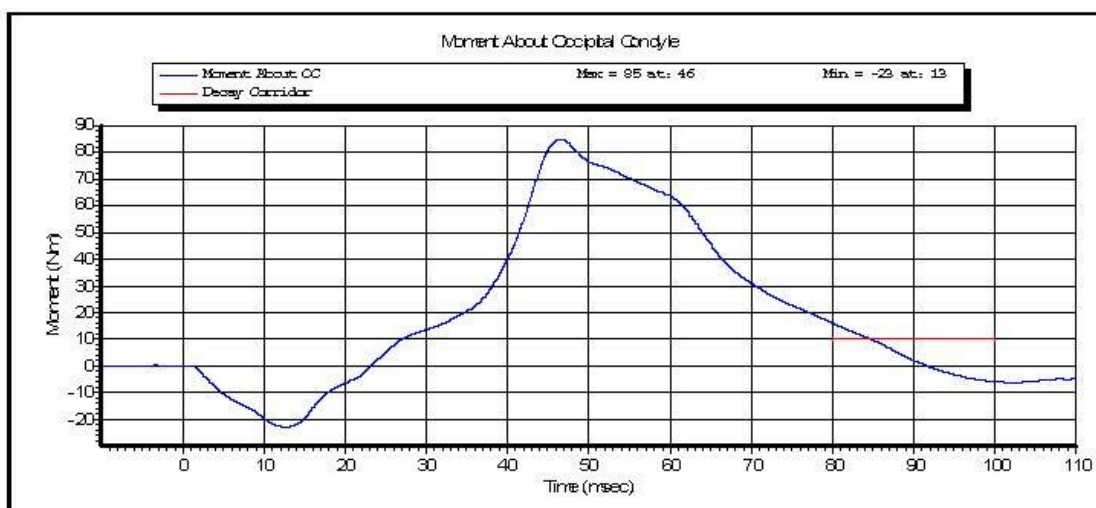
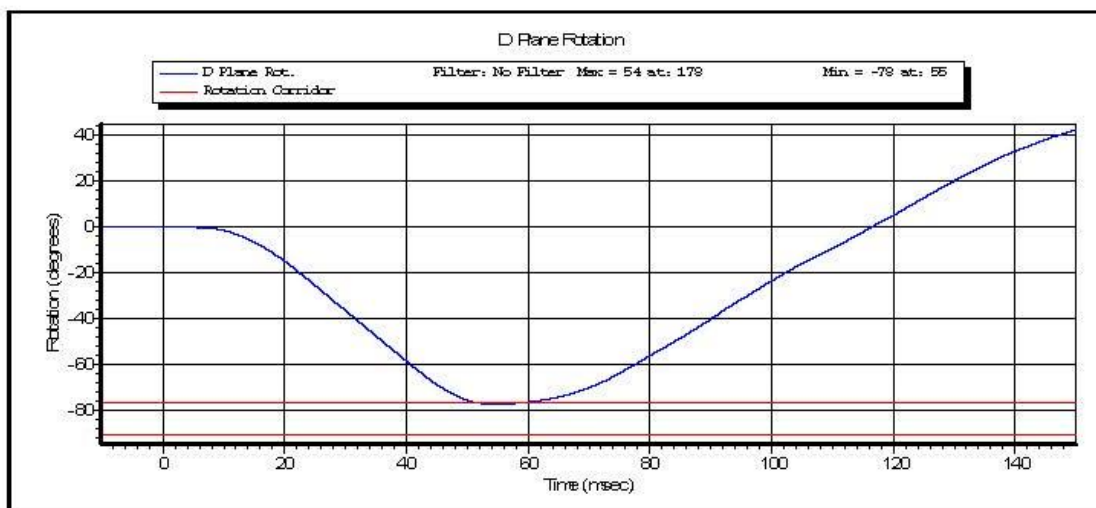
Test Name:	Neck Flexion
Sub Test Name:	
ATD Type:	Hybrid 3 - 5th Female
ATD Serial Number:	143



Test ID: **Neck Flexion** Test Time: **9:12:23 AM**

Test Date: **2/20/2014**

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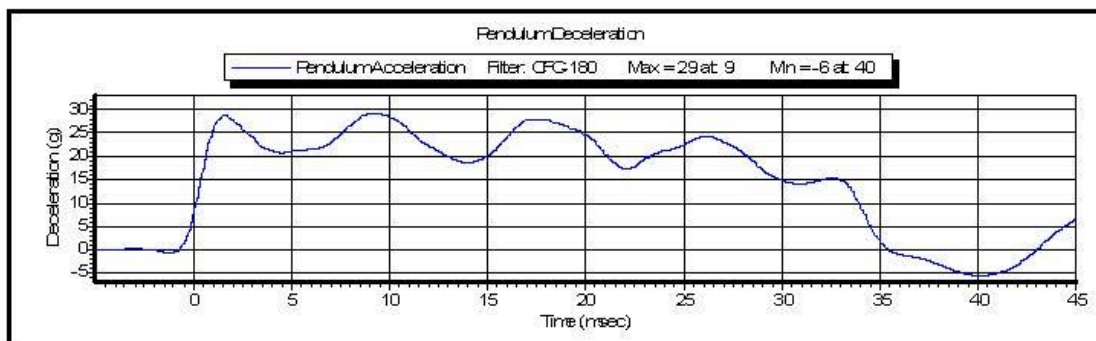
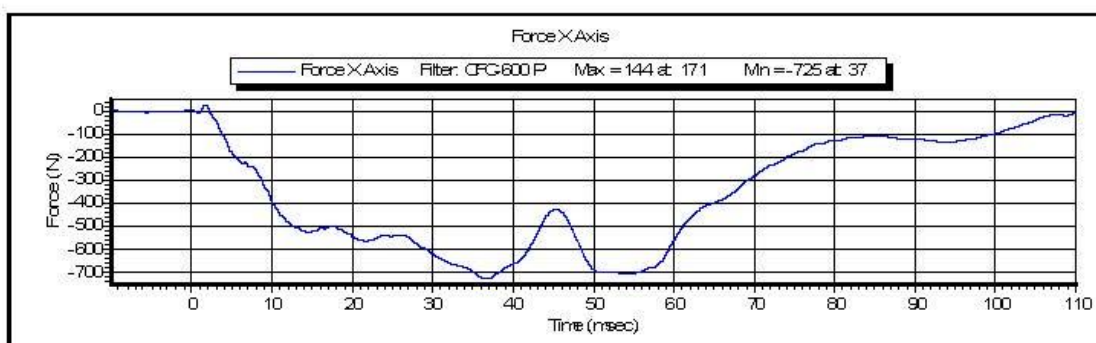
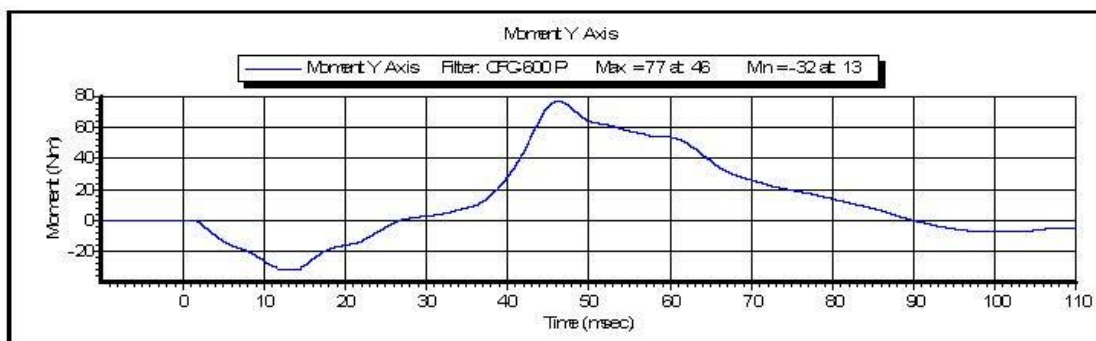


Test ID: **Neck Flexion**

Test Time: **9:12:23 AM**

Test Date: **2/20/2014**

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Test ID: **Neck Flexion**

Test Time: **9:12:23 AM**

Test Date: **2/20/2014**

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Torso Flexion

Part 5720 HIII 5% Female

ATD Serial No: 143

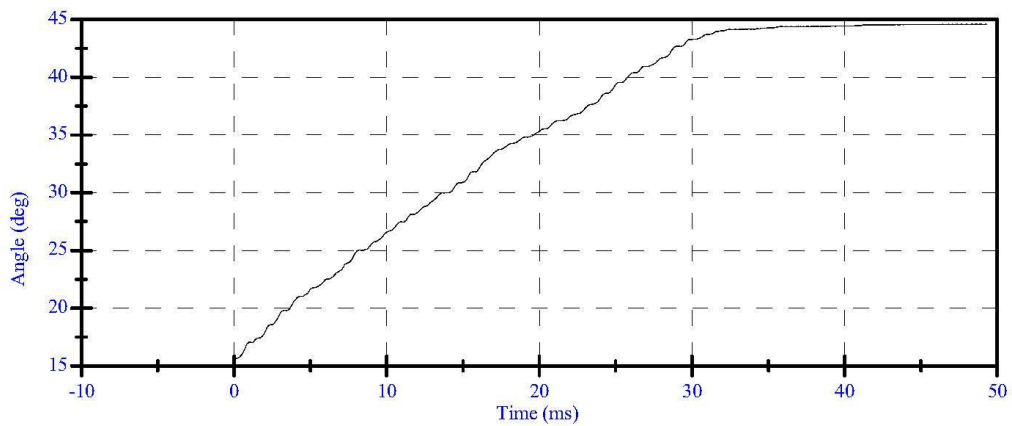
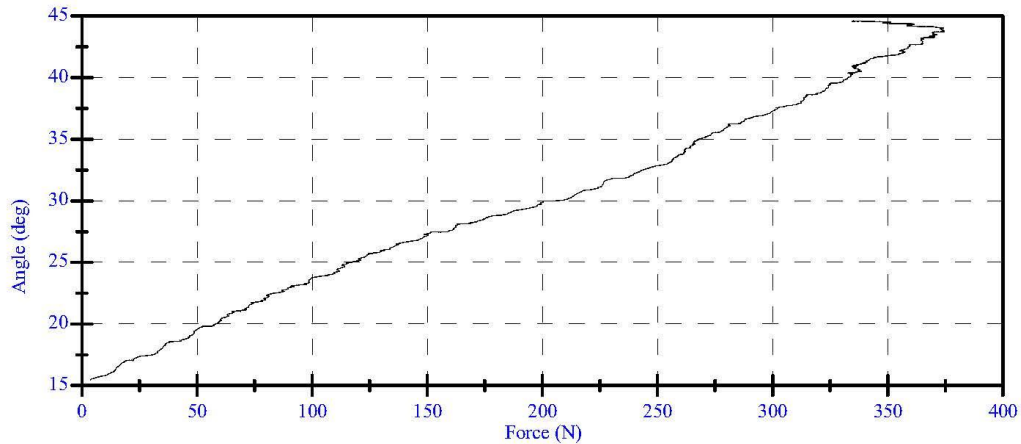
Laboratory Supervisor: E. Dutton

Date: 02/21/2014

Laboratory Technician: M. Goehle

TEST PARAMETER	SPECIFICATION	TEST RESULTS	STATUS
Lab Temperature:	18.9-25.6 C	21.4 C	Passed
Lab Humidity:	10-70 %	34.4 %	Passed
Initial Angle:	0.00-20.00 Deg	15.5 Deg	Passed
Force at 45 Deg	320.00-390.00 N	374.66 N	Passed
Return Angle	8 Deg Max from Initial	21.1 deg	Passed

TORSO FLEXION TEST





VERIFICATION REPORT

Test Name:	Thorax Impact	Revision:	7/15/2002
Sub Test Name:			
ATD Type:	Hybrid 3 - 5th Female		
ATD Serial Number:	143		
Test ID:	Thorax Impact	Test Date:	2/19/2014
		Test Time:	10:46:34 AM

Component Part Number	Component Serial Number
Chest Jacket - 880105-355-E	05855

Test Parameters	Test Specifications			Test Results	
Temperature	20.6	--	22.2	21.30 deg C	P
Humidity	10	--	70	19.20 %RH	P
Velocity	6.59	--	6.83	6.799 m/s	P
Sternum Displacement	-58	--	-50	-56.7 mm	P
Force During Displacement Interval	-4400	--	-3900	-4261.3 N	P
Force During -18mm to -50mm Displacem	-4600	--	0	-4163.6 N	P
Hysteresis	69	--	85	69.5 %	P

All test parameters are within specifications

Technician: **M. Geesey**

Supervisor: **E. Dutton**



VERIFICATION REPORT

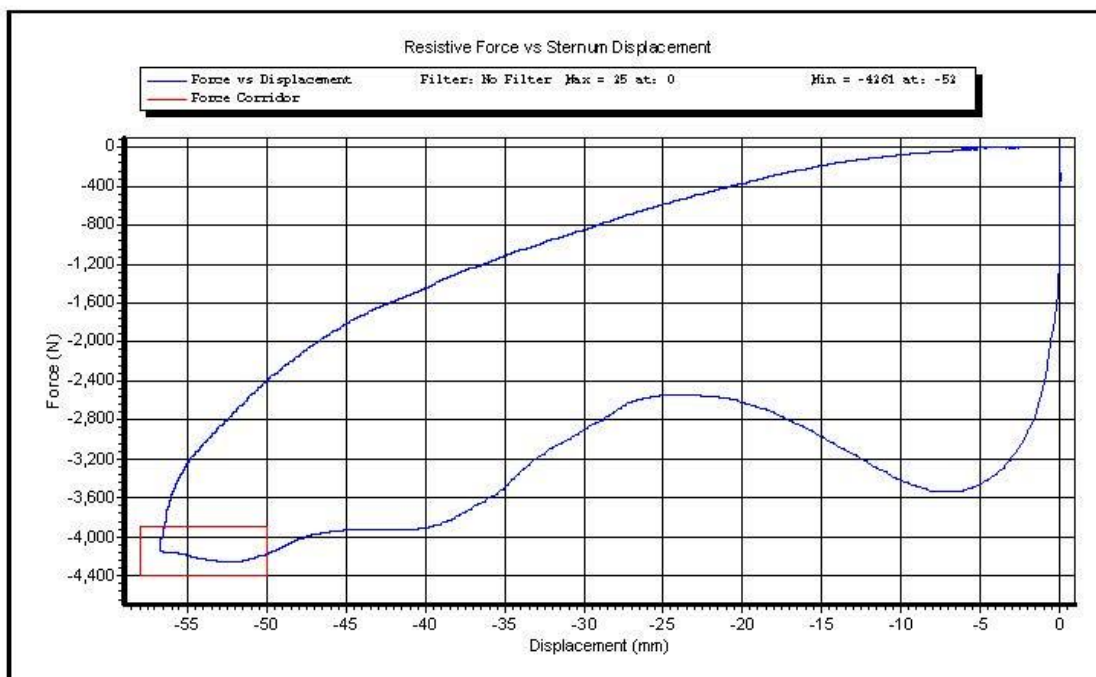
REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2014
Endevco	7231CT	C14953	12/4/2013
DentonATD	H3CD	DS-143	1/30/2014

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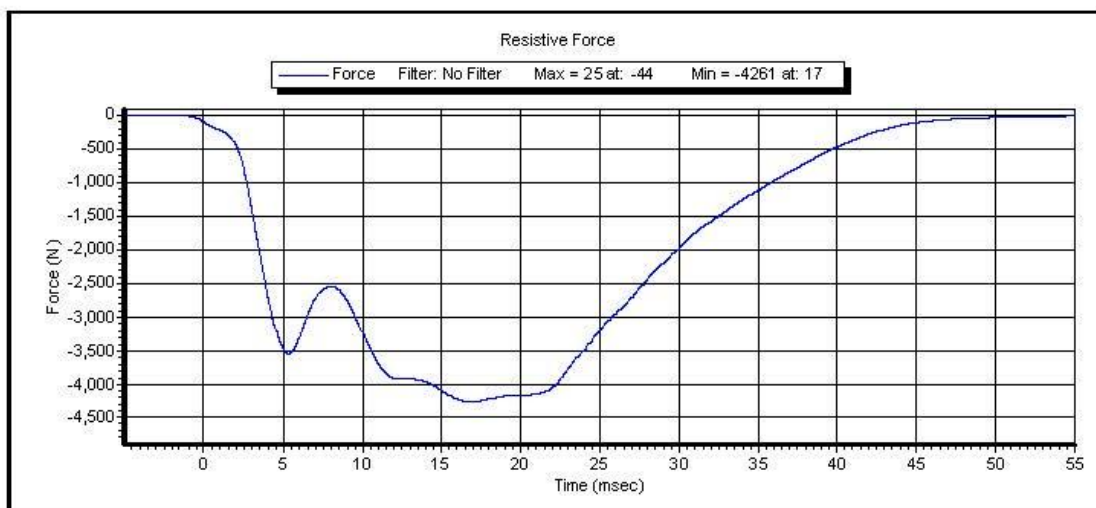
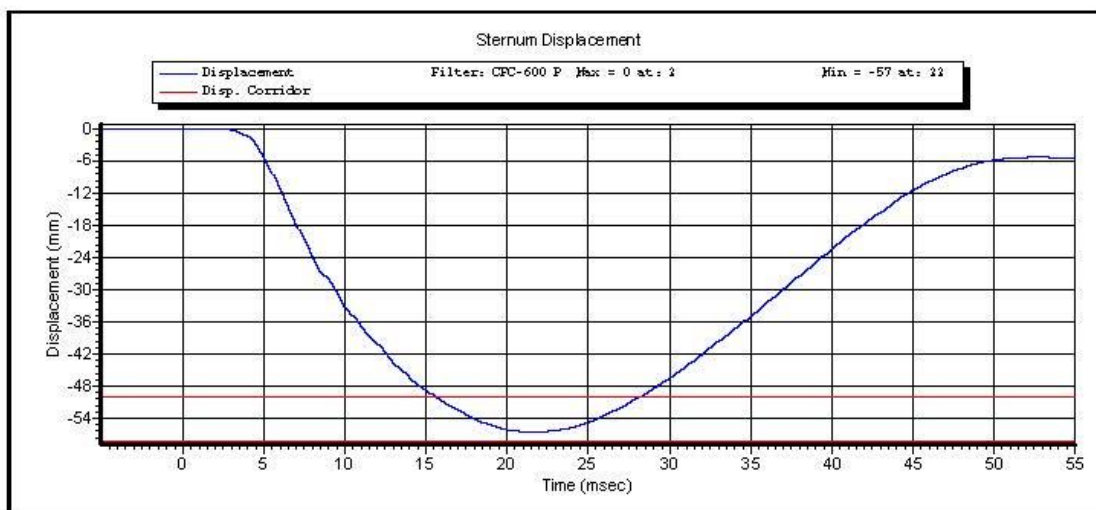
Test Name:	Thorax Impact
Sub Test Name:	
ATD Type:	Hybrid 3 - 5th Female
ATD Serial Number:	143



Test ID: Thorax Impact Test Time: 10:46:34 AM

Test Date: 2/19/2014

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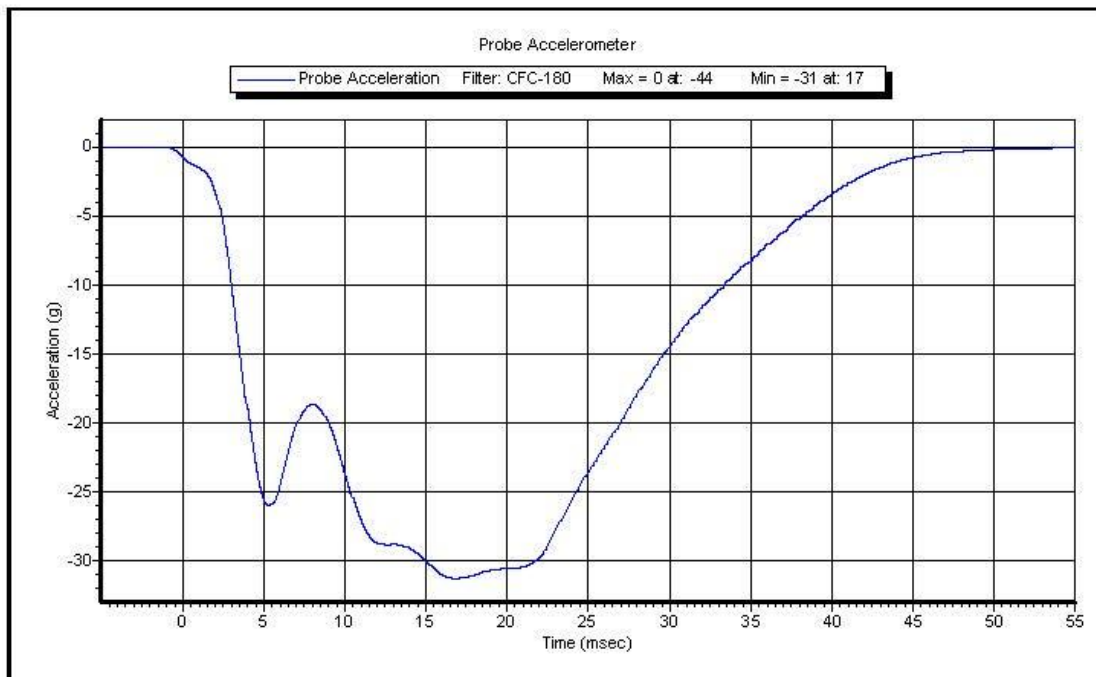


Test ID: **Thorax Impact**

Test Time: **10:46:34 AM**

Test Date: **2/19/2014**

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Test ID: **Thorax Impact**

Test Time: **10:46:34 AM**

Test Date: **2/19/2014**

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VERIFICATION REPORT

Test Name:	Knee Impact	Revision:	7/15/2002
Sub Test Name:			
ATD Type:	Hybrid 3 - 5th Female		
ATD Serial Number:	143		
Test ID:	Knee Impact Left	Test Date:	2/19/2014
		Test Time:	12:15:56 PM

Component Part Number	Component Serial Number
Knee Skin - 880105-508	1687

Test Parameters	Test Specifications	Test Results
Temperature	18.9 -- 25.6	21.50 deg C P
Humidity	10 -- 70	20.10 %RH P
Velocity	2.07 -- 2.13	2.115 m/s P
Resistive Force	-4060 -- -3450	-3779.3 N P

All test parameters are within specifications

Technician: **M. Geesey**

Supervisor: **E. Dutton**



VERIFICATION REPORT

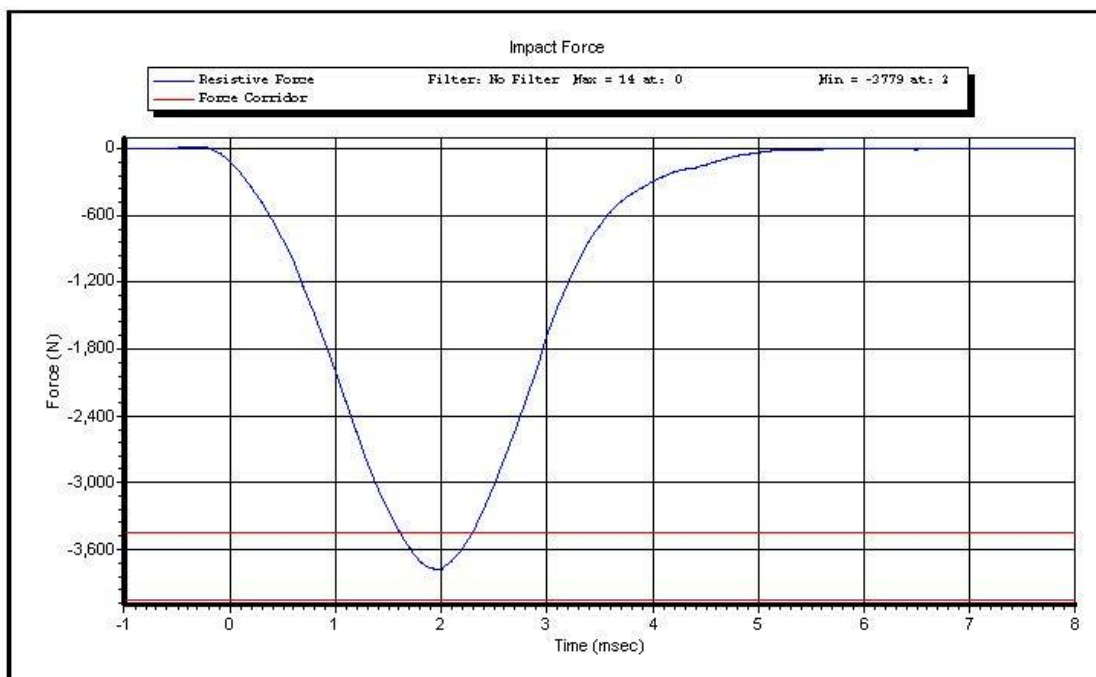
REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD Endevco	Velocity Trap 7231CT	1 C14953	1/11/2014 12/4/2013

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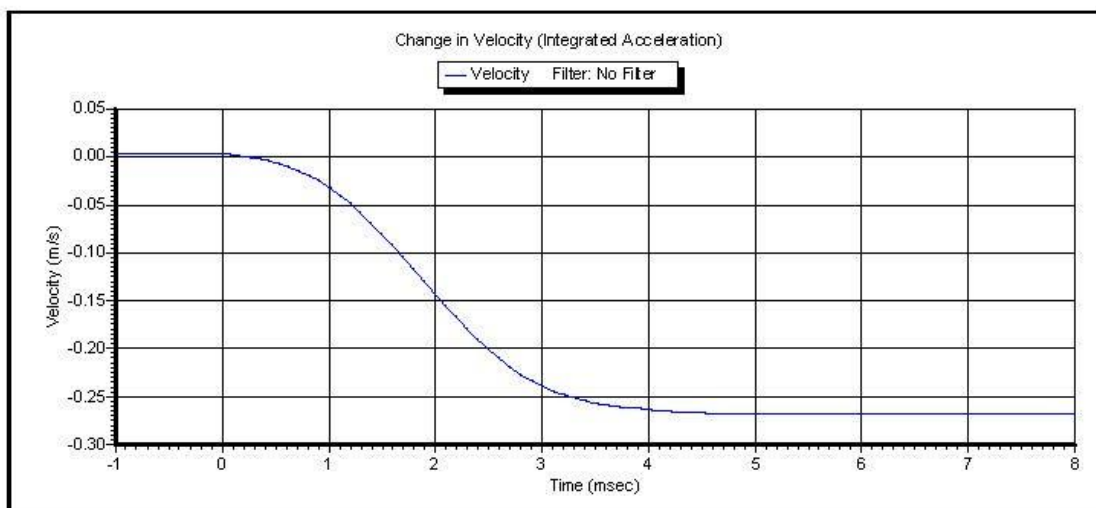
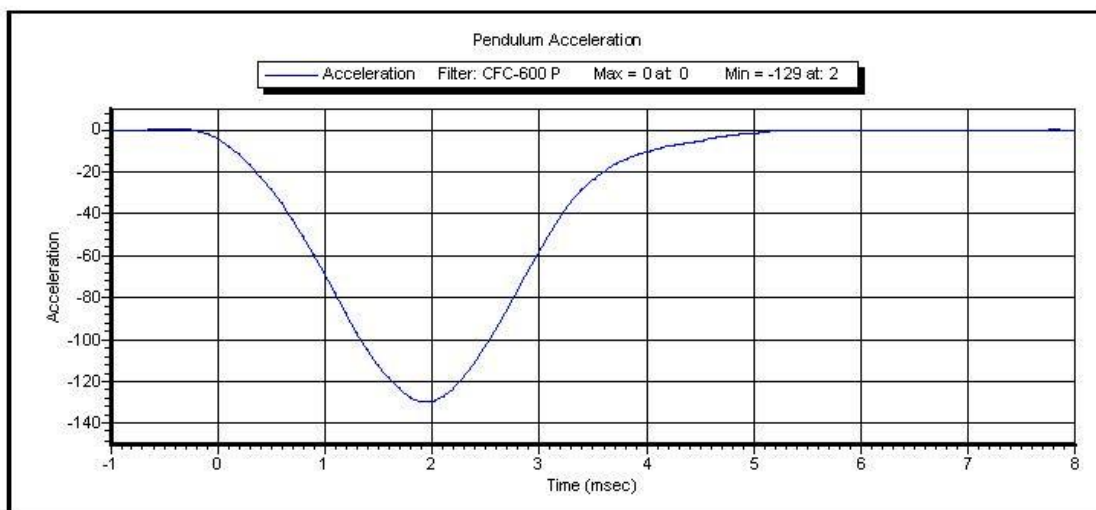


Test Name:	Knee Impact
Sub Test Name:	
ATD Type:	Hybrid 3 - 5th Female
ATD Serial Number:	143



Test ID: **Knee Impact Left** Test Time: **12:15:56 PM**
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Test Date: **2/19/2014**



Test ID: **Knee Impact Left** Test Time: **12:15:56 PM**

Test Date: **2/19/2014**

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VERIFICATION REPORT

Test Name:	Knee Impact	Revision:	7/15/2002
Sub Test Name:			
ATD Type:	Hybrid 3 - 5th Female		
ATD Serial Number:	143		
Test ID:	Knee Impact Right	Test Date:	2/19/2014
		Test Time:	11:39:19 AM

Component Part Number	Component Serial Number
Knee Skin - 880105-508	1028

Test Parameters	Test Specifications	Test Results
Temperature	18.9 -- 25.6	21.40 deg C P
Humidity	10 -- 70	19.80 %RH P
Velocity	2.07 -- 2.13	2.092 m/s P
Resistive Force	-4060 -- -3450	-3798.9 N P

All test parameters are within specifications

Technician: **M. Geesey**

Supervisor: **E. Dutton**



VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD Endevco	Velocity Trap 7231CT	1 C14953	1/11/2014 12/4/2013

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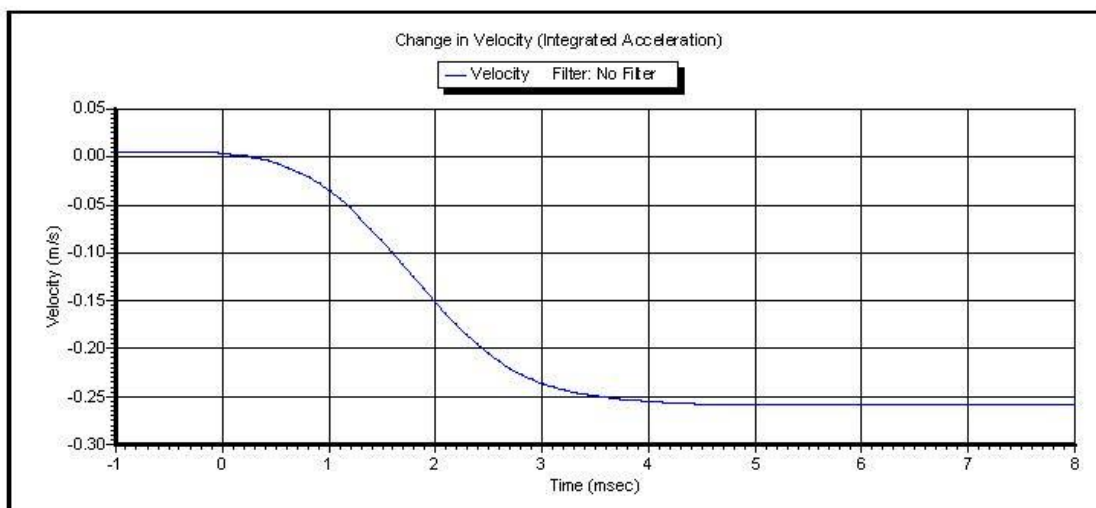
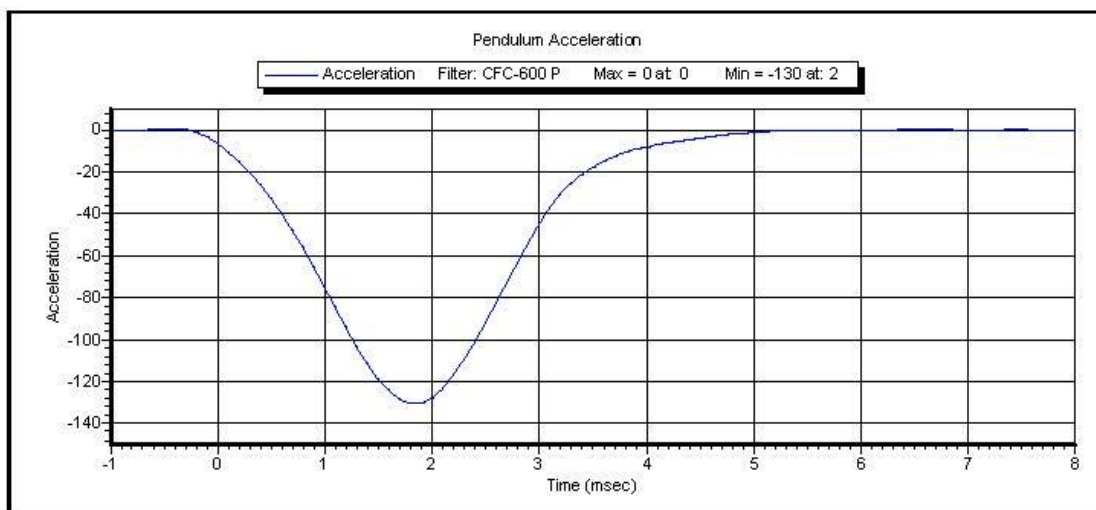
Test Name:	Knee Impact
Sub Test Name:	
ATD Type:	Hybrid 3 - 5th Female
ATD Serial Number:	143



Test ID: **Knee Impact Right** Test Time: **11:39:19 AM**

Test Date: **2/19/2014**

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Test ID: **Knee Impact Right** Test Time: **11:39:19 AM**

Test Date: **2/19/2014**

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