

REPORT NUMBER: NCAP-CAL-12-021

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

**KIA MOTORS CORPORATION
2012 Kia Sportage
Utility Vehicle**

NHTSA No: MC0509

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



January 6, 2012

FINAL REPORT

PREPARED FOR:

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

This publication is distributed by the U.S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration. The United States Government assumes no liability for its contents or use thereof. If trade or manufacturers' names or products are mentioned it is only because they are considered essential to the object of the publication and should not be construed as an endorsement. The United States Government does not endorse products or manufacturers.

Prepared by: _____
Vanessa Walsh, Project Engineer

Date: _____

Approved by: _____
David Travale, Technical Director,
Transportation Operations

Date: _____

FINAL REPORT ACCEPTANCE BY OCWS:

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

COTR, New Car Assessment Program
NHTSA, Office of Crashworthiness Standards
Date: _____

TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No. NCAP-CAL-12-021	2. Government Accession No.	3. Recipient's Catalog No.																																																							
4. Title and Subtitle Final Report of New Car Assessment Program Testing of a 2012 Kia Sportage Utility Vehicle NHTSA No. MC0509		5. Report Date 3/7/2012																																																							
		6. Performing Organization Code CAL																																																							
7. Author(s) David J. Travale, Technical Director Vanessa Walsh, Project Engineer		8. Performing Organization Report No. TR2560																																																							
9. Performing Organization Name and Address Calspan Corporation 4455 Genesee Street Buffalo, New York 14225		10. Work Unit No.																																																							
		11. Contract or Grant No. DTNH22-06-D-00024																																																							
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards 1200 New Jersey Ave SE, Room W43-410 Washington, DC 20590		13. Type of Report and Period Covered Final Report, 3/7/2012																																																							
		14. Sponsoring Agency Code NVS-111																																																							
15. Supplementary Notes																																																									
16. Abstract A 56.3 km/h NCAP Frontal Impact Test was conducted on a 2012 Kia Sportage Utility Vehicle in accordance with the specifications of the Office of Crashworthiness Standards Frontal NCAP Laboratory Test Procedure. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and foot well intrusion performance. The test was conducted at the Calspan Corporation's crash test facility in Buffalo, New York on 12/21/2011. The impact velocity of the vehicle was 56.25 km/h, and the ambient temperature at the barrier face at the time of impact was 12°C. The target vehicle post-test maximum crush was 470 mm of Vehicle. The test vehicle's performance is as follows: <table border="1"> <thead> <tr> <th rowspan="2">Measurement Description</th><th rowspan="2">Units</th><th colspan="2">Driver ATD</th><th colspan="2">Pass. ATD</th></tr> <tr> <th>Threshold</th><th>Result</th><th>Threshold</th><th>Result</th></tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₁₅)</td><td>N/A</td><td>700</td><td>178.30</td><td>700</td><td>352.13</td></tr> <tr> <td>Maximum Chest Compression</td><td>mm</td><td>63</td><td>-19.09</td><td>52</td><td>-7.96</td></tr> <tr> <td>Nij</td><td>N/A</td><td>1</td><td>0.33</td><td>1</td><td>0.41</td></tr> <tr> <td>Neck Tension</td><td>N</td><td>4,170</td><td>1,092.42</td><td>2,620</td><td>821.22</td></tr> <tr> <td>Neck Compression</td><td>N</td><td>4,000</td><td>-88.39</td><td>2,520</td><td>-307.16</td></tr> <tr> <td>Left Femur Force</td><td>N</td><td>10,008</td><td>-463.13</td><td>6,805</td><td>-1,023.89</td></tr> <tr> <td>Right Femur Force</td><td>N</td><td>10,008</td><td>-1889.48</td><td>6,805</td><td>-114.71</td></tr> </tbody> </table>						Measurement Description	Units	Driver ATD		Pass. ATD		Threshold	Result	Threshold	Result	Head Injury Criteria (HIC ₁₅)	N/A	700	178.30	700	352.13	Maximum Chest Compression	mm	63	-19.09	52	-7.96	Nij	N/A	1	0.33	1	0.41	Neck Tension	N	4,170	1,092.42	2,620	821.22	Neck Compression	N	4,000	-88.39	2,520	-307.16	Left Femur Force	N	10,008	-463.13	6,805	-1,023.89	Right Femur Force	N	10,008	-1889.48	6,805	-114.71
Measurement Description	Units	Driver ATD		Pass. ATD																																																					
		Threshold	Result	Threshold	Result																																																				
Head Injury Criteria (HIC ₁₅)	N/A	700	178.30	700	352.13																																																				
Maximum Chest Compression	mm	63	-19.09	52	-7.96																																																				
Nij	N/A	1	0.33	1	0.41																																																				
Neck Tension	N	4,170	1,092.42	2,620	821.22																																																				
Neck Compression	N	4,000	-88.39	2,520	-307.16																																																				
Left Femur Force	N	10,008	-463.13	6,805	-1,023.89																																																				
Right Femur Force	N	10,008	-1889.48	6,805	-114.71																																																				
17. Key Words 35 mph Frontal Barrier Impact test New Car Assessment Program (NCAP)			18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Administration Technical Reference Division 1200 New Jersey Ave, SE Washington, DC 20590																																																						
19. Security Classif. (of this report) UNCLASSIFIED	20. Security Classif. (of this page) UNCLASSIFIED	21. No. of Pages 200	22. Price																																																						

Form DOT F1700.7 (8-69)

TABLE OF CONTENTS

Section		Page No.
1	Purpose and Summary of the Test	1-1
2	Occupant and Vehicle Information / Data Sheets	2-1
Data Sheet No.		Page No.
1	General Test and Vehicle Parameter Data	2-2
2	Seat Adjustment, Fuel System, and Steering Wheel Data	2-6
3	Dummy Longitudinal Clearance Dimensions	2-8
4	Dummy Lateral Clearance Dimensions	2-9
5	Seat Belt Positioning Data	2-10
6	High-Speed Camera Locations and Data	2-11
7	Vehicle Accelerometer Locations	2-13
8	Photographic Reference Target Locations	2-14
9	Load Cell Locations on Fixed Barrier	2-15
10	Test Vehicle Summary of Results	2-16
11	Post-Test Observations	2-17
12	Vehicle Profile Measurements	2-18
13	Accident Investigation Division Data	2-20
14	Vehicle Intrusion Measurements	2-21
15	Summary of FMVSS 212, FMVSS 219 (Partial) Data, and 301 Data	2-24
16	FMVSS 301 Static Rollover Results	2-26
17	Dummy/Vehicle Temperature Stabilization Chart	2-27
Appendix		Page No.
A	Photographs	A-1
B	Dummy Response Data Traces	B-1
C	Dummy Calibration and Performance Verification Data	C-1

SECTION 1

PURPOSE AND SUMMARY OF TEST

1.1 PURPOSE

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

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

1.2 TEST PROCEDURE

A load cell barrier consisting of 36 load cells was impacted by a 2012 Kia Sportage Utility Vehicle at a velocity of 56.25 kph. The test was performed at Calspan on 12/21/2011. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

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

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

Both ATDs were fully instrumented with head, chest and pelvis tri-axial accelerometers, chest displacement potentiometers, upper neck transducers, right/left femur load cells, and lower leg instrumentation. Seat belt load cells were also on the driver's and passenger's lap and shoulder belts to measure dummy torso and pelvic section loading. The driver (position 1) ATD (Serial No. 064) and the right-front passenger (position 2) ATD (Serial No. 139) were calibrated previous to this test. Certification details, along with instrumentation calibration data, are found in Appendix C of this report.

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

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

The maximum static crush of the vehicle was 470 mm and both the driver and passenger side doors remained closed during the impact event and were operable after the impact.

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

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

The occupant data is summarized below.

ATD Position	HIC ₁₅	Nij	Neck Tension (N)	Neck Compression (N)	3ms Chest Clip (Gs)	Chest Disp. (mm)	Left Femur (N)	Right Femur (N)
Driver (50th)	178.30	0.33	1,092.42	-88.39	40.29	-19.09	-463.13	-1,889.48
Passenger (5 th)	352.13	0.41	821.22	-307.16	49.62	-7.96	-1,023.89	-114.71

Data Anamolies:

- V1P1 Pelvic x has a noise spikes after 86 ms
- V1P1 Left Lower Tibia My is questionable data- sensor bad
- V1P2 Upper Neck Fy has a noise spike at 64.8 ms
- V1P2 Pelvic z channel failed - sensor bad
- V1P2 Right Upper Tibia Fz is questionable after 45 ms
- V1 Left Rear Sill Ax is questionable delta-V
- V1 Left Front Brake Caliper has questionable data
- V1 Right Front Brake Caliper has questionable data
- V1 Left Rear Cross Member RED x has questionable delta-V
- V1 Right Rear Cross Member RED x has questionable delta-V

SECTION 2 DATA SHEETS

Data Sheet No.		Page No.
1	General Test and Vehicle Parameter Data	2-2
2	Seat Adjustment, Fuel System, and Steering Wheel Data	2-6
3	Dummy Longitudinal Clearance Dimensions	2-8
4	Dummy Lateral Clearance Dimensions	2-9
5	Seat Belt Positioning Data	2-10
6	High-Speed Camera Locations and Data	2-11
7	Vehicle Accelerometer Locations	2-13
8	Photographic Reference Target Locations	2-14
9	Load Cell Locations on Fixed Barrier	2-15
10	Test Vehicle Summary of Results	2-16
11	Post-Test Observations	2-17
12	Vehicle Profile Measurements	2-18
13	Accident Investigation Division Data	2-20
14	Vehicle Intrusion Measurements	2-21
15	Summary of FMVSS 212, FMVSS 219 (Partial) Data, and 301 Data	2-24
16	FMVSS 301 Static Rollover Results	2-26
17	Dummy/Vehicle Temperature Stabilization Chart	2-27

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2012 Kia Sportage NHTSA No: MC0509
 Test Program: NCAP Frontal Barrier Impact Test Test Date: 12/21/2011

NHTSA No.	MC0509
Model Year	2012
Make	Kia
Model	Sportage
Body Style	Utility Vehicle
VIN	KNDPBCA29C7213275
Body Color	Gold/tan/copper
Odometer Reading (km/mi)	148.1/92
Engine Displacement. (L)	2.4
Type/No. Cylinders	CVVT 4
Engine Placement	Lateral
Transmission Type	Automatic
Transmission Speeds	6-Speed
Overdrive	Yes
Final Drive	All Wheel Drive
Roof Rack	No
Sunroof/T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	No
Anti-Lock Brakes (ABS)	Yes
All-Wheel Drive (AWD)	Yes
Traction Control System (TCS)	Yes

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

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

No

DATA FROM CERTIFICATION LABEL

Manufactured By	KIA Motors Corporation
Date of Manufacture	8/11

GVWR (kg)	2,090
GAWR Front (kg)	1,075
GAWR Rear (kg)	1,125

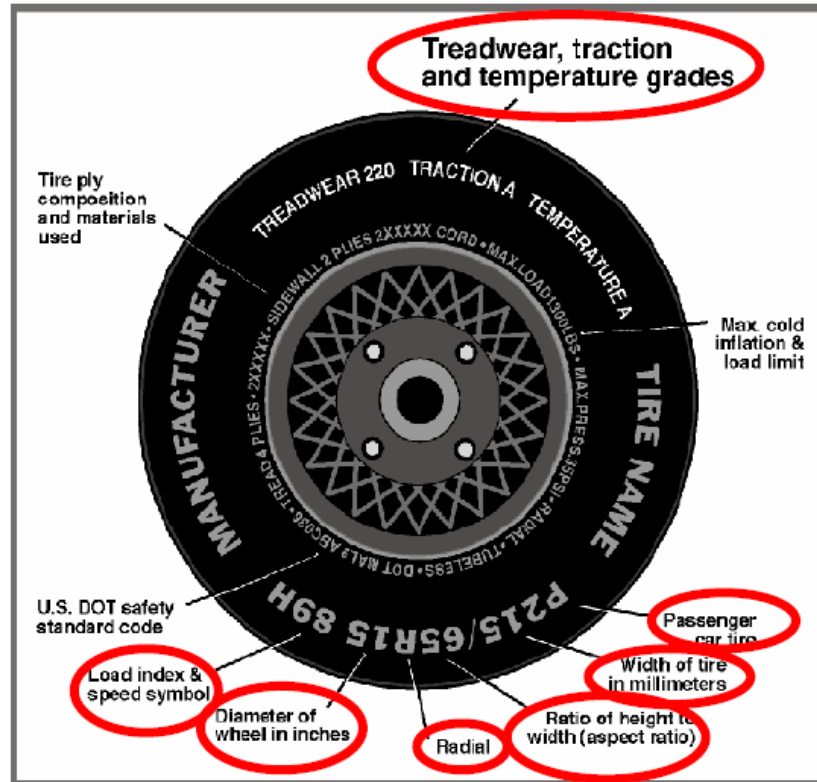
VEHICLE SEATING AND WEIGHT CAPACITY

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench	NA	
Number of Occupants	2	3		5
Capacity Wt. (VCW) (kg)				420.0
Cargo Wt. (RCLW) (kg)				79.8

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

Test Vehicle:	2012 Kia Sportage	NHTSA No:	MC0509
Test Program:	NCAP Frontal Barrier Impact Test	Test Date	12/21/2011

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



Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	230	230
Recommended Tire Size	P225/60R17	P225/60R17
Tire Size on Vehicle	P225/60R17	P225/60R17
Tire Manufacturer	Kumho	Kumho
Tire Model	SOLUS KL21	SOLUS KL21
Treadwear	500	500
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Steel, 2 Polyester, 1Nylon	2 Steel, 2 Polyester, 1Nylon
Load Index/Speed Symbol	99H	99H
Tire Material	Rubber	Rubber
DOT Safety Code Right	27ZAYAL93211	27ZAYAL93211
DOT Safety Code Left	27ZAYAL93211	27ZAYAL93211

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

Test Vehicle:	2012 Kia Sportage	NHTSA No:	MC0509
Test Program:	NCAP Frontal Barrier Impact Test	Test Date	12/21/2011

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	445	331.5		478	416	
Right	kg	447	308		470	379	
Ratio	%	58	42		54	46	
Totals	kg	892	639.5	1,531.5	948	795	1,743

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1,531.5
Weight of 1 P572E ATD & 1 P572O ATD	kg	140.6
Rated Cargo/Luggage Weight (RCLW)	kg	79.8
Calculated Vehicle Target Weight (TVTW)	kg	1,751.9

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	834	837	838	841	1103
As Tested	mm	826	831	805	809	1205
Post Test	mm	840	848	816	798	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2,642
Total Vehicle Length at Left Side	mm	4,373
Total Vehicle Length at Centerline	mm	4,442
Total Vehicle Length at Right Side	mm	4,371
Weight of Ballast in Cargo Area	kg	57.0
Weight of Vehicle Components Removed	kg	0.0
Amount of Stoddard Solvent in Fuel Tank	L	53.7

LIST OF COMPONENTS REMOVED TO MEET TEST WEIGHT:

No components were removed to meet the required test weight.

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

Test Vehicle:	2012 Kia Sportage	NHTSA No:	MC0509
Test Program:	NCAP Frontal Barrier Impact Test	Test Date	12/21/2011

TARGET VEHICLE STRUCTURAL MEASUREMENT

	Elements	Pre-Test (mm)
1	Total Length	4,442
2	Total Width	1,800
3	Bumper Top Height	-661
4	Bumper Bottom Height	456
5	Longitudinal Member Top Height	-557
6	Distance Between Longitudinal Members	1,049
7	Longitudinal Member Width	59
8	Engine Top Height	-901
9	Engine Bottom Height	-235
10	Engine and Gearbox Width	566
11	Front Bumper-Engine Distance	491
12	Front Shock Absorber Fixing Height	-940
13	Bonnet Leading Edge Height	-917
14	Front Shock Absorber Fixing Width	1,198
15	Front Bumper – Front Axle Distance	891
16	Front Axle – A Pillar Distance	487
17	A-Pillar – B-Pillar Distance	1,096
18	B-Pillar – Rear Axle Distance	1,059
19	B-Pillar – C-Pillar Distance	1,025
20	Roof Sill Bottom Height	-1,538
21	Roof Sill Top Height	-1,602
22	Floor Sill Bottom Height	-394
23	Floor Sill Top Height	-485

DATA SHEET NO. 2

SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL

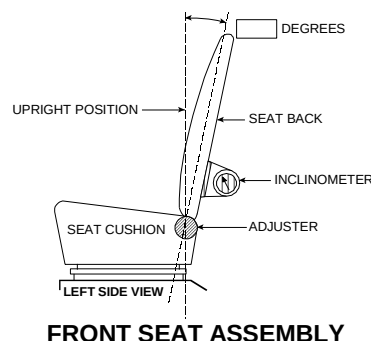
Test Vehicle: 2012 Kia Sportage NHTSA No: MC0509
 Test Program: NCAP Frontal Barrier Impact Test Test Date: 12/21/2011

NORMAL DESIGN RIDING POSITION

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

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

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



	Deg.
Driver Seat Back Angle	8.2
Passenger Seat Back Angle	5.9

SEAT FORE/AFT POSITIONS

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

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

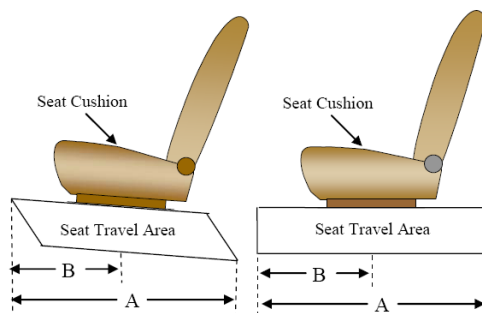
The passenger's seat was positioned at the most forward position of fore/aft travel.

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	296	10
Passenger Seat	296	0

SEAT BELT UPPER ANCHORAGES

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

	Total # of Positions	Placed in Position #
Driver Seat	4	0
Passenger Seat	4	0



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

Test Vehicle:	2012 Kia Sportage	NHTSA No:	MC0509
Test Program:	NCAP Frontal Barrier Impact Test	Test Date	12/21/2011

FUEL TANK CAPACITY

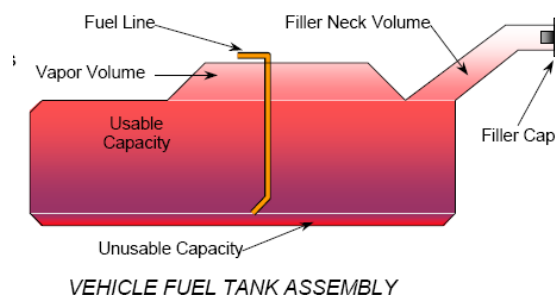
	Liters
Usable Capacity of "Standard Tank"	57.9
Usable Capacity of "Optional Tank"	
92%-94% of Usable Capacity	53.3 - 54.4
Actual Amount of Solvent Used	53.7
1/3 of Usable Capacity	19.3

FUEL PUMP

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

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

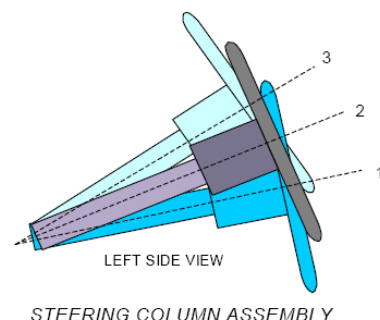
The electric fuel pump operates when the ignition is in the 'on' position and the engine is running. The fuel filler neck is located above the left rear wheel well



STEERING COLUMN ADJUSTMENT

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

The steering wheel was adjusted to the midpoint of tilt angle range and the midpoint of the telescoping travel (if applicable). For this test the steering column does not have the telescoping function.

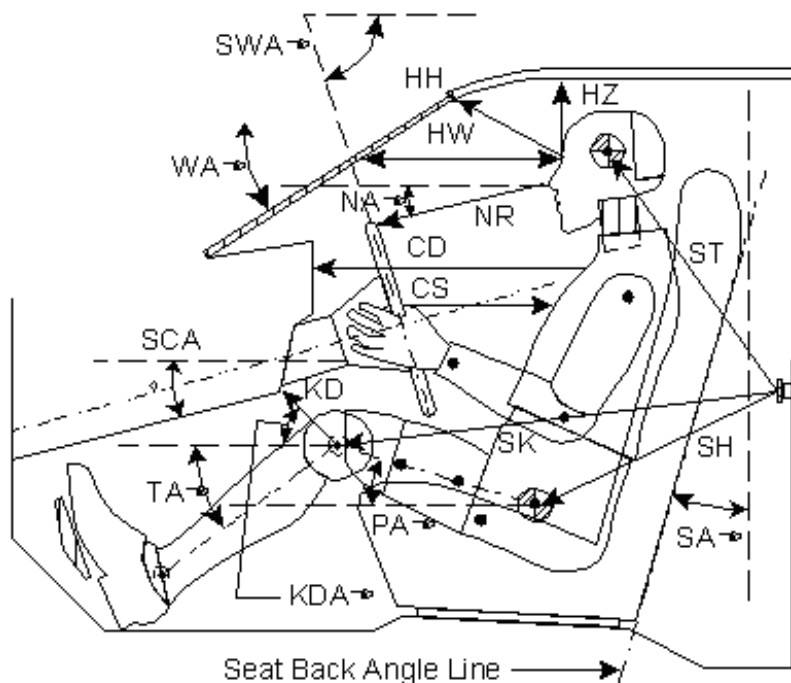


STEERING COLUMN POSITIONS

	Degrees	Fore/Aft Position (mm)
Lowermost position No. 1	63.2	
Geometric center position No. 2	61.3	
Uppermost position No. 3	59.4	
Telescoping Steering Wheel Travel		N/A
Test Position	61.3	

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

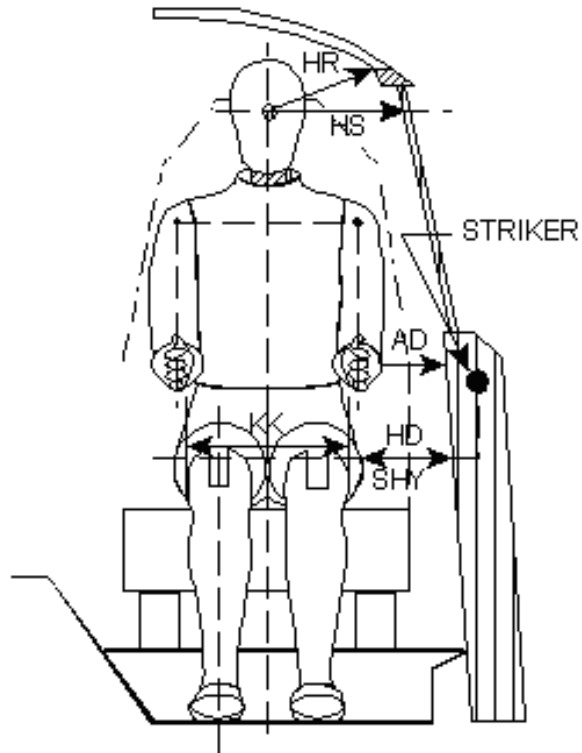
Test Vehicle:	2012 Kia Sportage	NHTSA No:	MC0509
Test Program:	NCAP Frontal Barrier Impact Test	Test Date	12/21/2011



Code	Measurement Description	Driver (S/N: 064)		Passenger (S/N: 139)	
		Length (mm)	Angle(°)	Length (mm)	Angle (°)
WA°	Windshield Angle		-27.2		
SWA°	Steering Wheel Angle		28.0		
SCA°	Steering Column Angle		62.0		
SA°	Seat Back Angle (on headrest post)		8.8		5.9
HZ	Head to Roof (Z)	205	90.0	251	90.0
HH	Head to Header	394	26.3	351	44.8
HW	Head to Windshield	725	0.0	710	0.0
NR	Nose to Rim	432	-9.7		
CD	Chest to Dash	567		433	
CS	Chest to Steering Hub	338	0.0		
RA	Rim to Abdomen	200	0.0		
KDL	Left Knee to Dash	172	22.5	125	32.1
KDR	Right Knee to Dash	144	25.9	122	44.4
PA°	Pelvic Angle		24.6		20.6
TA°	Tibia Angle		-35.0		-37.7
SK	Striker to Knee	609	-13.0	767	-16.0
ST	Striker to Head	392	83.7	373	56.6
SH	Striker to H-Point	321	57.7	433	-42.6

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle:	2012 Kia Sportage	NHTSA No:	MC0509
Test Program:	NCAP Frontal Barrier Impact Test	Test Date	12/21/2011

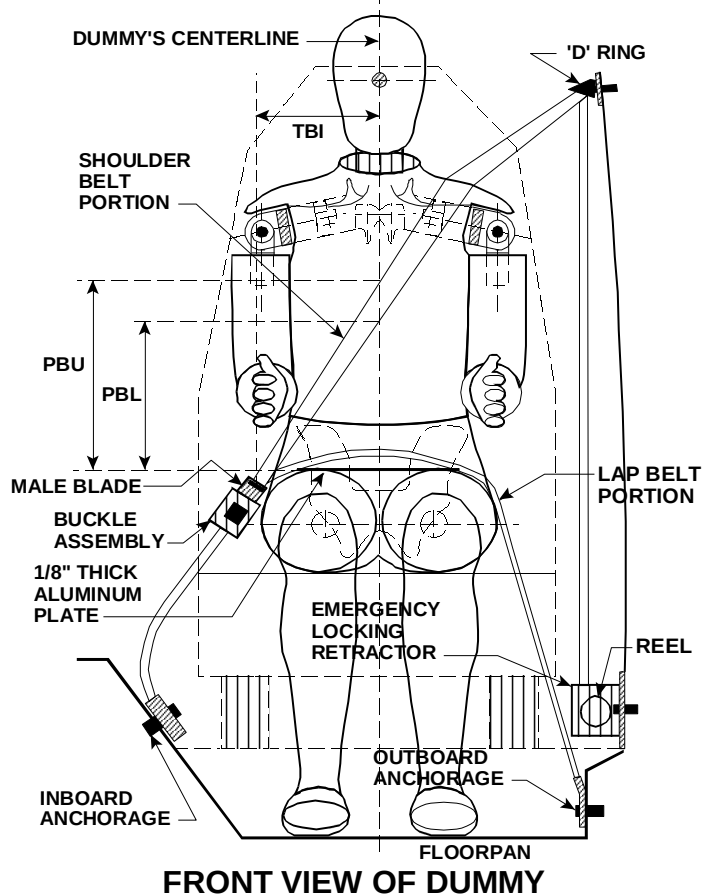


Code	Description	Driver (S/N: 064)	Passenger(S/N: 139)
AD	Arm to Door	138	89
HD	H-Point to Door	157	175
HR	Head to Side Header	232	279
HS	Head to Side Window	345	385
KK	Knee to Knee	335	160
SHY	Striker to H-Point (Y Direction)	240	265
AA	Ankle to Ankle	335	155

DATA SHEET NO. 5 SEAT BELT POSITIONING DATA

Test Vehicle:	2012 Kia Sportage	NHTSA No:	MC0509
Test Program:	NCAP Frontal Barrier Impact Test	Test Date	12/21/2011

SEAT BELT POSITIONING DATA



SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU — Top surface of reference to belt upper edge	mm	390	330
PBL — Top surface of reference to belt lower edge	mm	325	260

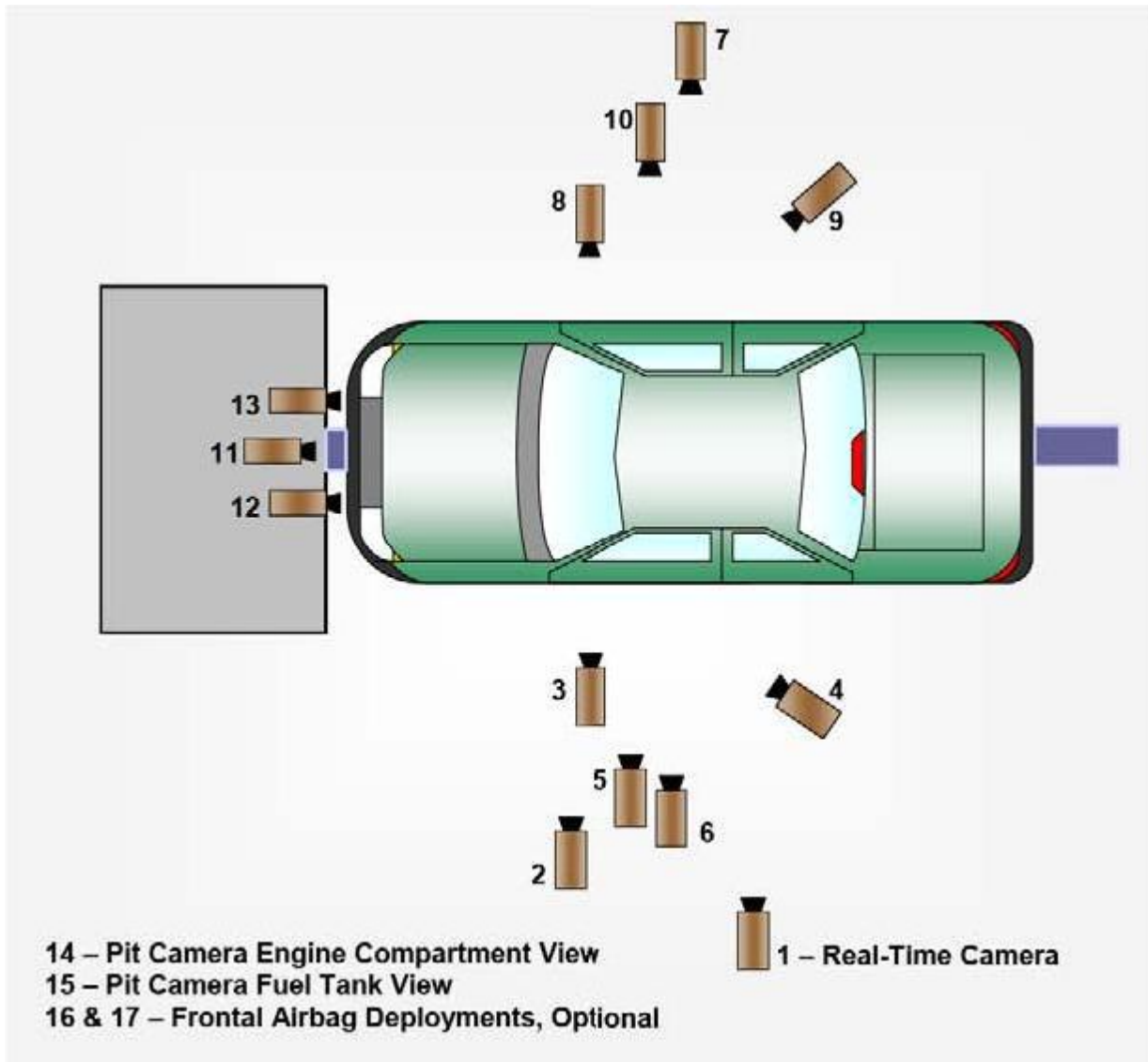
BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Shoulder belt length as measured on ATD	mm	870	930
Lap Belt Length as measured on ATD	mm	630	640
Remainder of belt on reel	mm	900	830
Total belt length for continuous webbing systems	mm	2,400	2,400

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

Test Vehicle:	2012 Kia Sportage	NHTSA No:	MC0509
Test Program:	NCAP Frontal Barrier Impact Test	Test Date	12/21/2011

CAMERA POSITIONS FOR FRONTAL IMPACTS



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

Test Vehicle:	2012 Kia Sportage	NHTSA No:	MC0509
Test Program:	NCAP Frontal Barrier Impact Test	Test Date	12/21/2011

CAMERA LOCATIONS

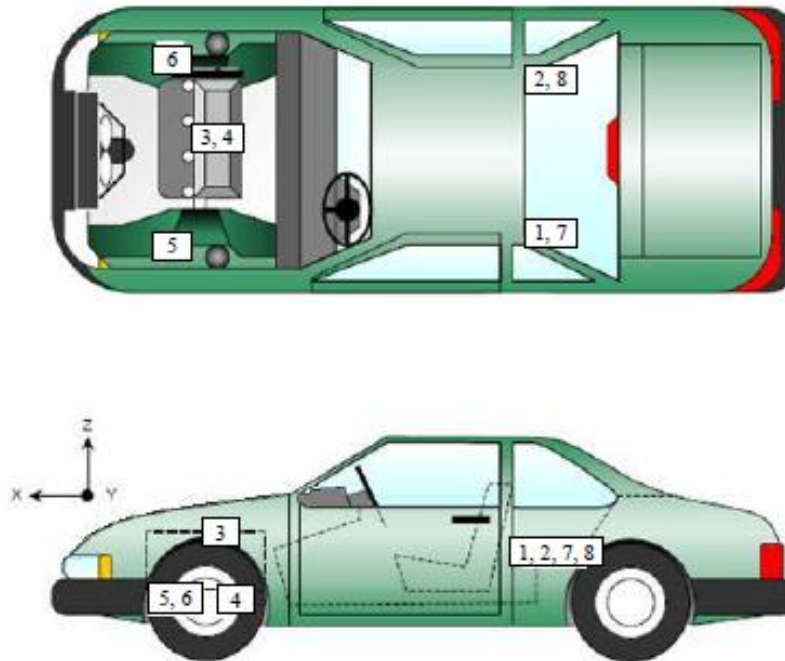
No.	Camera View	Location (mm)			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Overall	-	-	-	Zoom	30
2	Driver Close-Up	1670	8164	1200	50	1000
3	Left Front Half	1300	9312	1060	50	1000
4	Left Angle	3057	2673	2094	24	1000
5	Steering Column - Top	2190	9205	1790	50	1000
6	Steering Column - Bottom	2190	9205	1161	50	1000
7	Right Overall	1760	7140	1075	28	1000
8	Passenger Close-Up	1583	7605	1210	50	1000
9	Right Front Half	1250	9463	990	50	1000
10	Right Angle	3040	3015	2200	28	1000
11	Windshield	-670	0	2930	28	500
12	Driver Windshield	0	500	1950	24	500
13	Passenger Windshield	0	500	1950	24	500
14	Pit Front	850	0	1740	12.5	1000
15	Pit Rear	2350	0	1740	12.5	1000
16	Onboard Driver Airbag (Optional)					
17	Onboard Passenger Airbag (Optional)					

* COORDINATES:

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

DATA SHEET NO. 7 **VEHICLE ACCELEROMETER DATA**

Test Vehicle:	2012 Kia Sportage	NHTSA No:	MC0509
Test Program:	NCAP Frontal Barrier Impact Test	Test Date	12/21/2011



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear Accelerometer – X Direction	1,794	-646	-391
2	Right Rear Accelerometer – X Direction	1,757	650	-389
3	Engine Top X	3,835	24	-901
4	Engine Bottom X	3,954	-163	-196
5	Left Brake Caliper X	3685	-817	444
6	Right Brake Caliper X	3,715	813	395
7	Left Rear Accelerometer – Z Direction	1,794	-646	-391
8	Right Rear Accelerometer – Z Direction	1,757	650	-389

Reference Points:

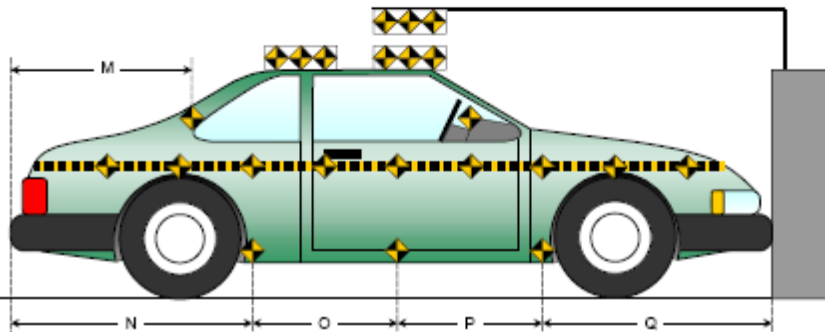
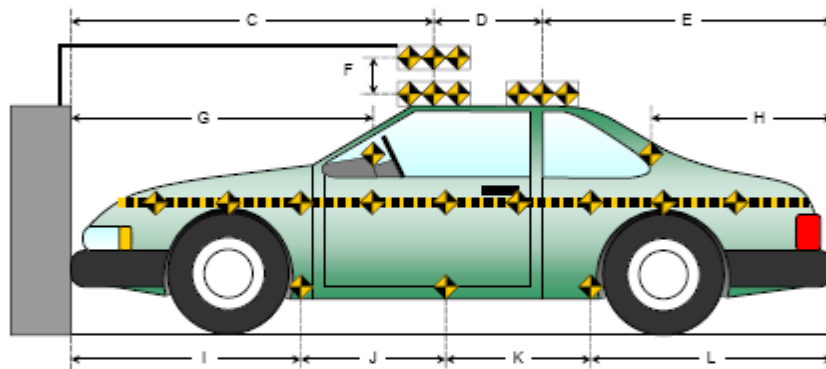
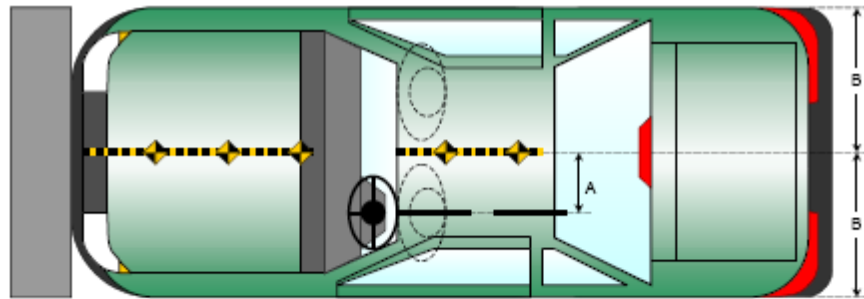
- X – Rear Surface of Vehicle (+ forward)
- Y – Vehicle Centerline (+ to right)
- Z – Ground Plane (+ down)

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

Test Vehicle:	2012 Kia Sportage	NHTSA No:	MC0509
Test Program:	NCAP Frontal Barrier Impact Test	Test Date	12/21/2011

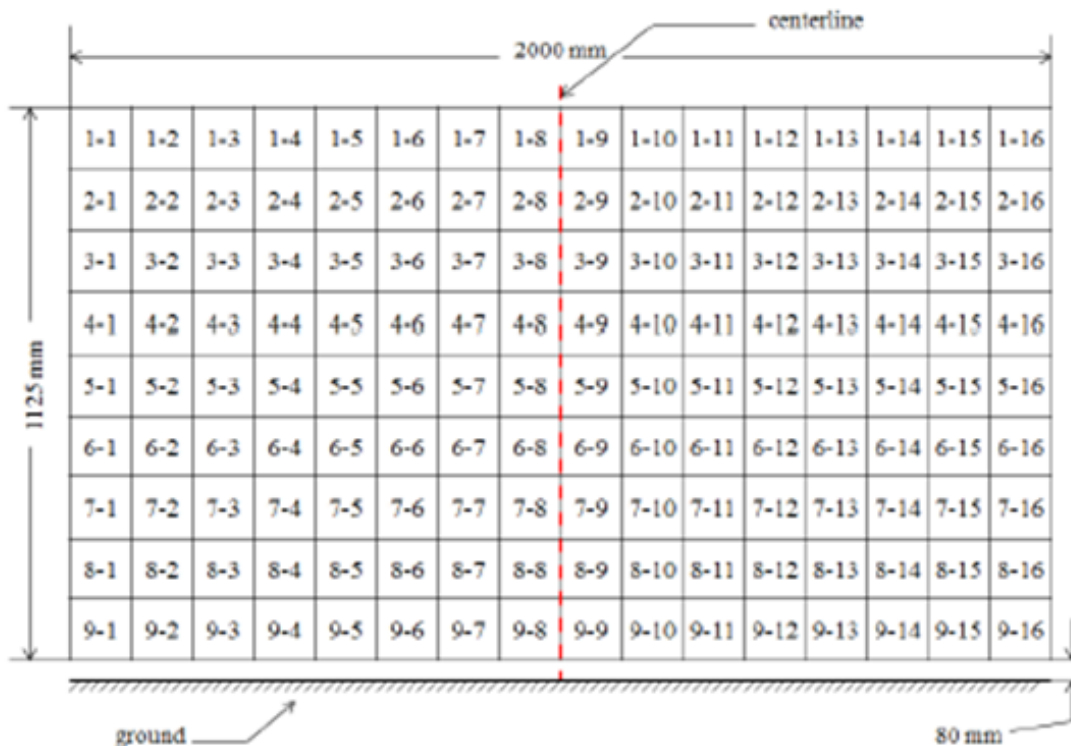
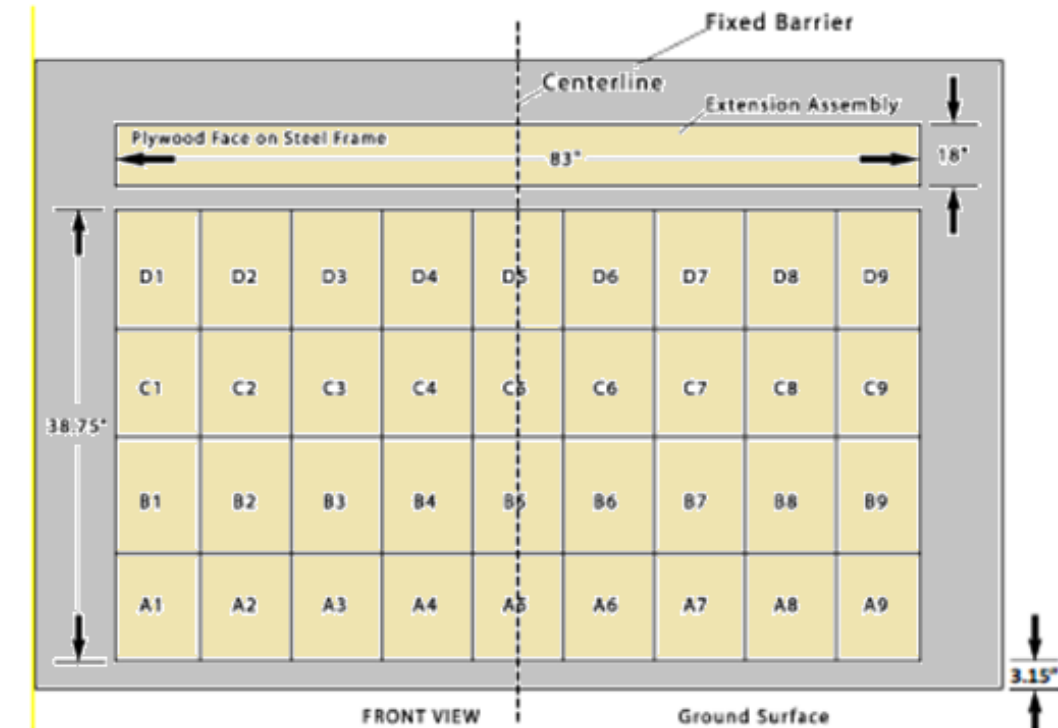
Item	Value
A	366
B	900
C	2,178
D	1,219
E	1,044
F	--
G	1,655
H	841
I	1,364
J	858
K	844
L	1,375
M	837
N	1,381
O	830
P	863
Q	1,368

All units in millimeters



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

Test Vehicle:	2012 Kia Sportage	NHTSA No:	MC0509
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	12/21/2011



DATA SHEET NO. 10
TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle:	2012 Kia Sportage	NHTSA No:	MC0509
Test Program:	NCAP Frontal Barrier Impact Test	Test Date	12/21/2011

INSTRUMENTATION

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

CAMERA COVERAGE

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

DATA SHEET NO. 11 - POST TEST OBSERVATIONS

Test Vehicle: 2012 Kia Sportage NHTSA No: MC0509
 Test Program: NCAP Frontal Barrier Impact Test Test Date: 12/21/2011

TEST DUMMY INFORMATION AND CONTACT LOCATIONS

Description	Driver	Passenger
Dummy Type/Serial No.	064	139
Head Contact	Front Airbag and Headrest	Front Airbag and Headrest
Upper Torso Contact	Front Airbag	Front Airbag
Lower Torso Contact	None	None
Left Knee Contact	Knee Bolster	Glovebox
Right Knee Contact	Knee Bolster	Glovebox

DOOR OPENING AND SEAT TRACK INFORMATION

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

POST TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Windshield Damage	Minor crack along the Driver's A-Pillar
Window Damage	None
Other Notable Effects	None

VEHICLE REBOUND FROM BARRIER

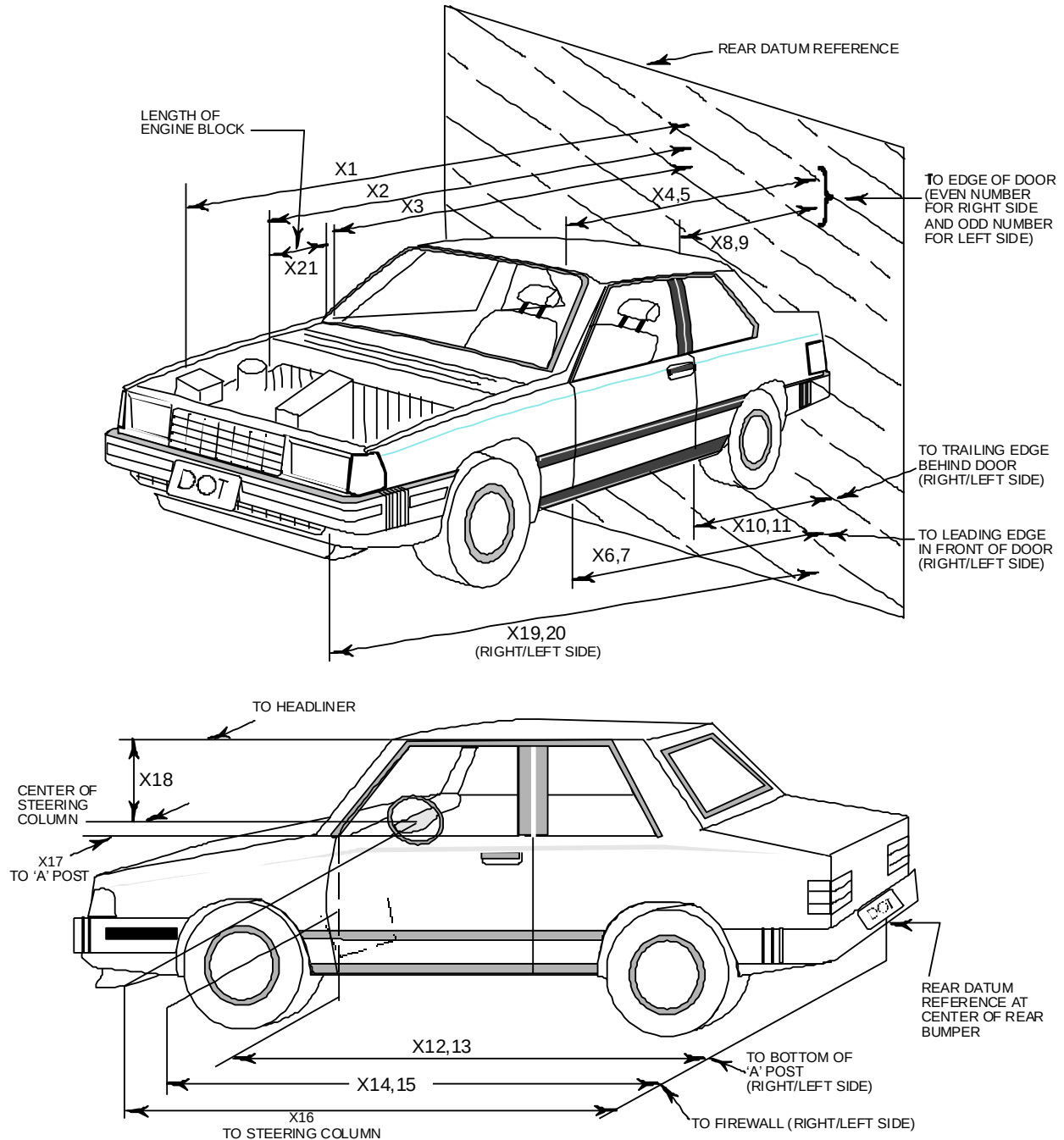
Measured Parameter	Units	Value
Left Side	mm	1,204
Center	mm	1,138
Right Side	mm	1,223
Average	mm	1,188

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

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

Test Vehicle:	2012 Kia Sportage	NHTSA No:	MC0509
Test Program:	NCAP Frontal Barrier Impact Test	Test Date	12/21/2011



DATA SHEET NO. 12 (CONTINUED)
VEHICLE PROFILE MEASUREMENTS

Test Vehicle:	2012 Kia Sportage	NHTSA No:	MC0509
Test Program:	NCAP Frontal Barrier Impact Test	Test Date	12/21/2011

No.	Measurement Description	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	4,442	3,972	-470
2	Rear Surface of Vehicle (RSOV) to Front of Engine	3,951	3,687	-264
3	RSOV to Firewall	3,526	3,507	-19
4	RSOV to Upper Leading Edge of Right Door	3,065	3,067	2
5	RSOV to Upper Leading Edge of Left Door	3,064	3,068	4
6	RSOV to Lower Leading Edge of Right Door	3,048	3,050	2
7	RSOV to Lower Leading Edge of Left Door	3,051	3,057	6
8	RSOV to Upper Trailing Edge of Right Door	1,987	1,990	3
9	RSOV to Upper Trailing Edge of Left Door	1,987	1,992	5
10	RSOV to Lower Trailing Edge of Right Door	1,989	1,993	4
11	RSOV to Lower Trailing Edge of Left Door	1,990	1,997	7
12	RSOV to Bottom of "A" Post of Right Side	3,118	3,118	0
13	RSOV to Bottom of "A" Post of Left Side	3,119	3,120	1
14	RSOV to Firewall, Right Side	3,572	3,520	-52
15	RSOV to Firewall, Left Side	3,578	3,567	-11
16	RSOV to Steering Column illiterate	2,628	2,693	65
17	Center of Steering Column to "A" Post	290	291	-2
18	Center of Steering Column to Headliner	408	434	26
19	RSOV to Right Side of Front Bumper	4,371	3,908	463
20	RSOV to Left Side of Front Bumper	4,373	3,958	415
21	Length of Engine Block	358	358	0
RD	RSOV to Right Side of Dash Panel	2,815	2,815	0
CD	RSOV to Center of Dash Panel	2,850	2,851	1
LD	RSOV to Left Side of Dash Panel	2,816	2,820	4

All Dimensions in mm

DATA SHEET NO. 13
ACCIDENT INVESTIGATION DIVISION DATA

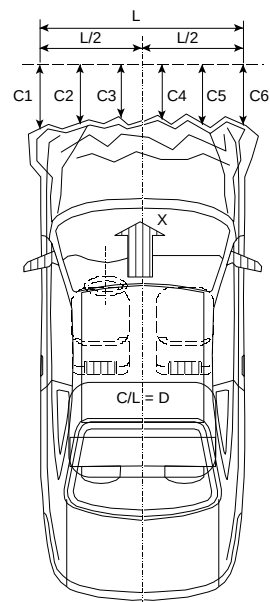
Test Vehicle:	2012 Kia Sportage	NHTSA No:	MC0509
Test Program:	NCAP Frontal Barrier Impact Test	Test Date	12/21/2011

VEHICLE INFORMATION

VIN	KNDPBCA29C7213275	Wheelbase (mm)	2,642
Vehicle Size Category	Passenger - SUV	Test Weight (kg)	1,743

ACCELEROMETER DATA

Accelerometer Locations:	As Described in Data Sheet No. 7
Cal. Procedure/Interval:	Calspan Procedure / 6 month
Integration Algorithm:	Trapezoidal
Linearity:	>99%
Impact Velocity (km/h):	56.3
Velocity Change (km/h):	56.3
Time of Separation (ms):	123



CRUSH PROFILE

Collision Deformation Classification:	12FDEW4
Midpoint of Damage:	Vehicle Centerline
Damage Region Length (mm):	1,388
Impact Mode:	Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	4,225	3,906	-319
C2	Crush zone 2 at left side	mm	4,391	3,961	-430
C3	Crush zone 3 at left side	mm	4,436	3,974	-462
C4	Crush zone 4 at right side	mm	4,435	3,966	-469
C5	Crush zone 5 at right side	mm	4,388	3,922	-466
C6	Crush zone 6 at right side	mm	4,226	3,935	-291
L	C1 to C6	mm	1,388	1,492	104

DATA SHEET NO. 14
VEHICLE INTRUSION MEASUREMENTS

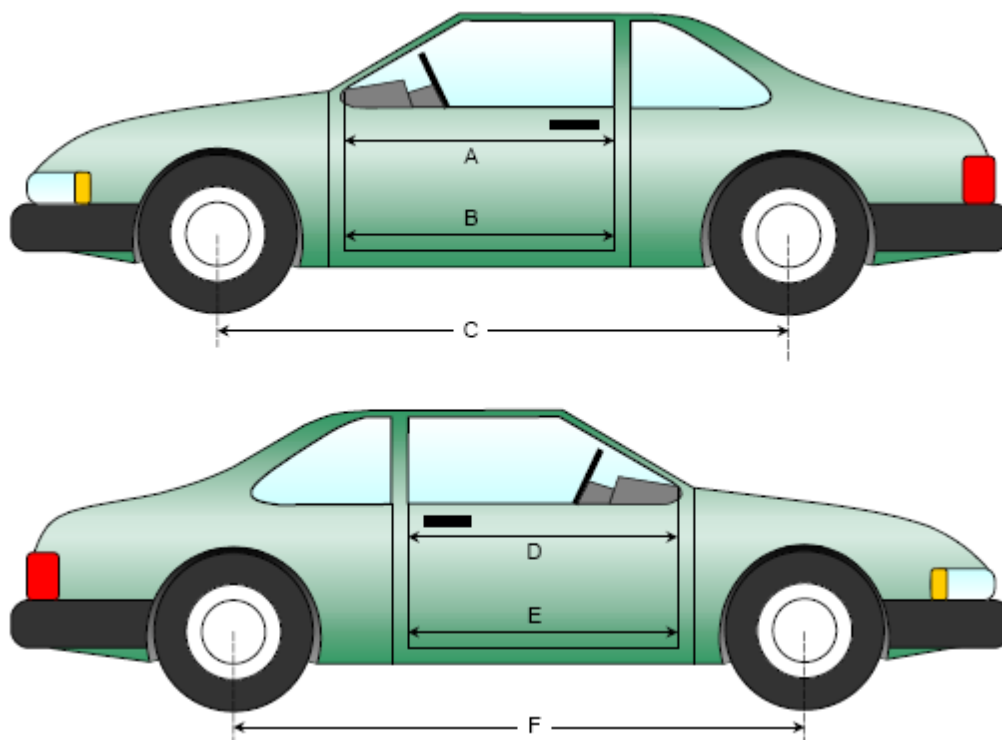
Test Vehicle:	2012 Kia Sportage	NHTSA No:	MC0509
Test Program:	NCAP Frontal Barrier Impact Test	Test Date	12/21/2011

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	972	972	0
B	Left Side Lower	mm	869	870	1
D	Right Side Upper	mm	972	971	-1
E	Right Side Lower	mm	867	866	-1

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2,642	2,600	-42
F	Right Side Wheelbase	mm	2,642	2,615	-27



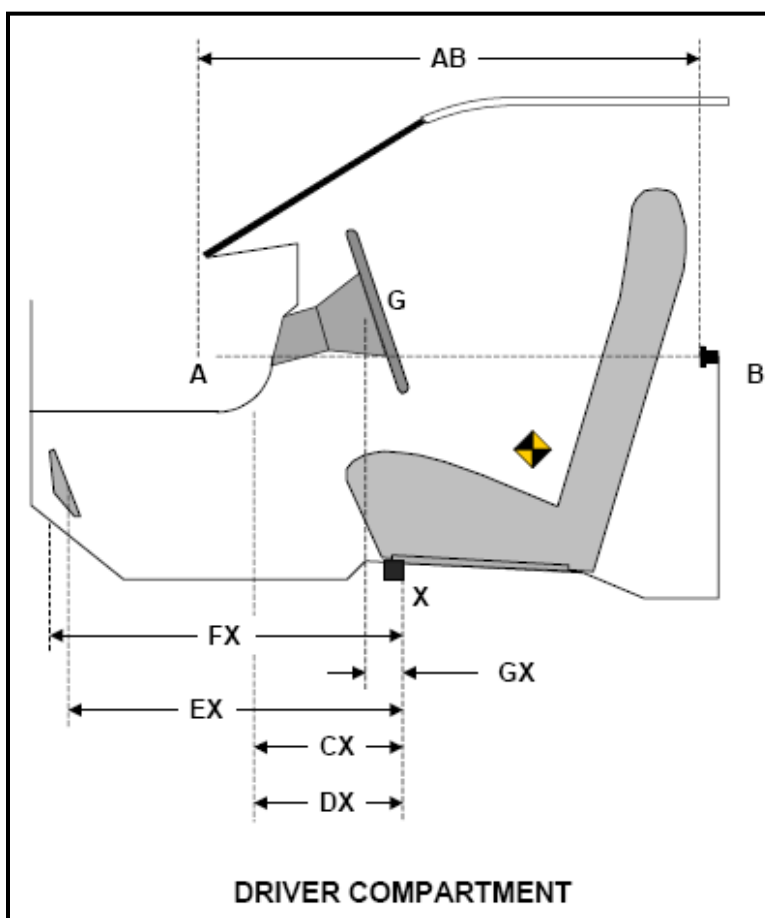
DATA SHEET NO.14 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle:	2012 Kia Sportage	NHTSA No:	MC0509
Test Program:	NCAP Frontal Barrier Impact Test	Test Date	12/21/2011

DRIVER COMPARTMENT INTRUSION

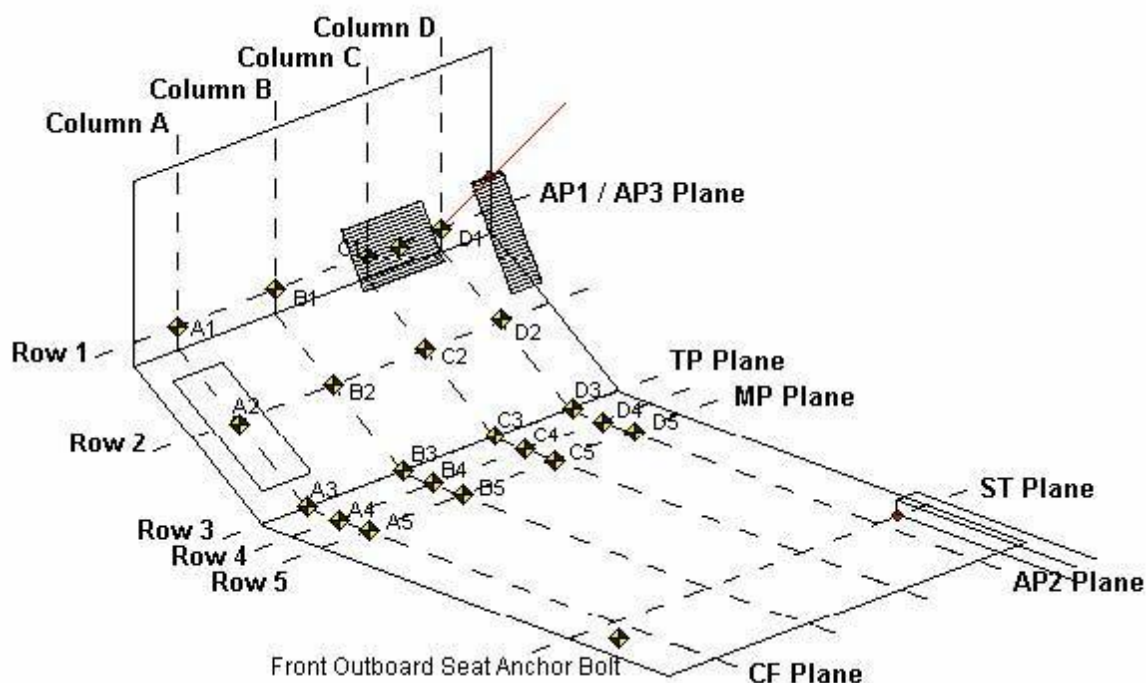
Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	789	790	1
CX	Left Knee Bolster to X	mm	277	280	3
DX	Right Knee Bolster to X	mm	257	267	10
EX	Brake Pedal to X	mm	515	498	-17
FX	Foot Rest to X	mm	610	602	9
GX	Center of Steering Column Wheel Hub to X	mm	67	133	66

X = Front of Seat Track (Stationary)



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

Test Vehicle:	2012 Kia Sportage	NHTSA No:	MC0509
Test Program:	NCAP Frontal Barrier Impact Test	Test Date	12/21/2011



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

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

Test Vehicle: 2012 Kia Sportage NHTSA No: MC0509
 Test Program: NCAP Frontal Barrier Impact Test Test Date: 12/21/2011

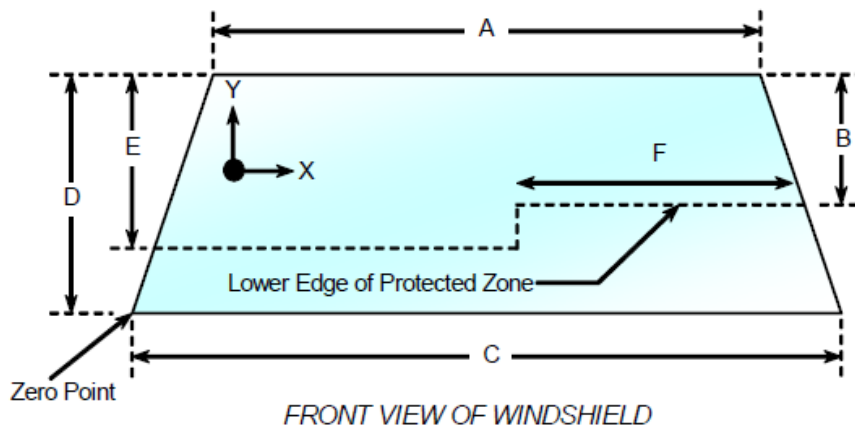
Please provide windshield mounting details. A 0.8 mm trim surrounds the top and side of windshield while a plastic shroud is on the bottom.

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

Temperature of windshield molding during test: 21.3°C

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% Retention
Left Side	2,098	2,098	100%
Right Side	2,098	2,098	100%
Total	4,195	4,195	100%



Item	Units	Value
A	mm	1,220
B	mm	525
C	mm	1,445
D	mm	765
E	mm	513
F	mm	455

AREAS OF PROTECTED ZONE FAILURES

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

X	Y

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

X	Y

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

Test Vehicle:	<u>2012 Kia Sportage</u>	NHTSA No:	<u>MC0509</u>
Test Program:	<u>NCAP Frontal Barrier Impact Test</u>	Test Date	<u>12/21/2011</u>

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

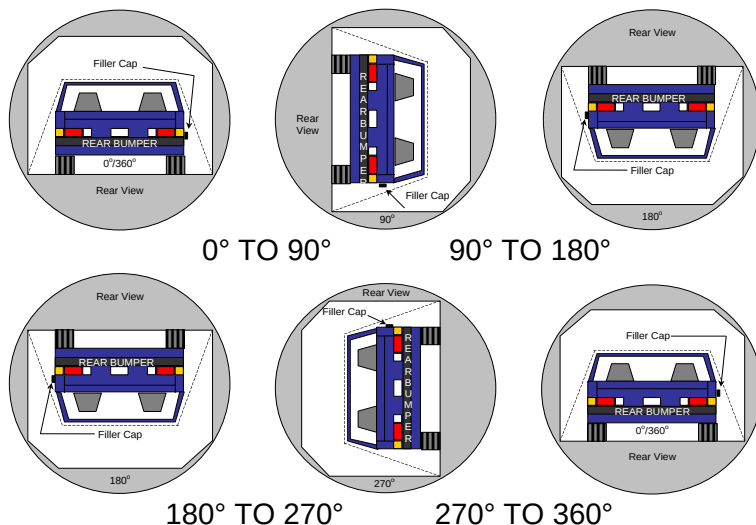
Temperature at Time of Impact: 12° C Test Time: 4:44 PM

Stoddard Solvent Spillage Measurements

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

DATA SHEET NO. 16
FMVSS 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2012 Kia Sportage NHTSA No: MC0509
 Test Program: NCAP Frontal Barrier Impact Test Test Date 12/21/2011



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

SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	71	300	371
90° to 180°	63	300	363
180° to 270°	64	300	364
270° to 360°	70	300	370

FMVSS 301 SPILLAGE TABLE

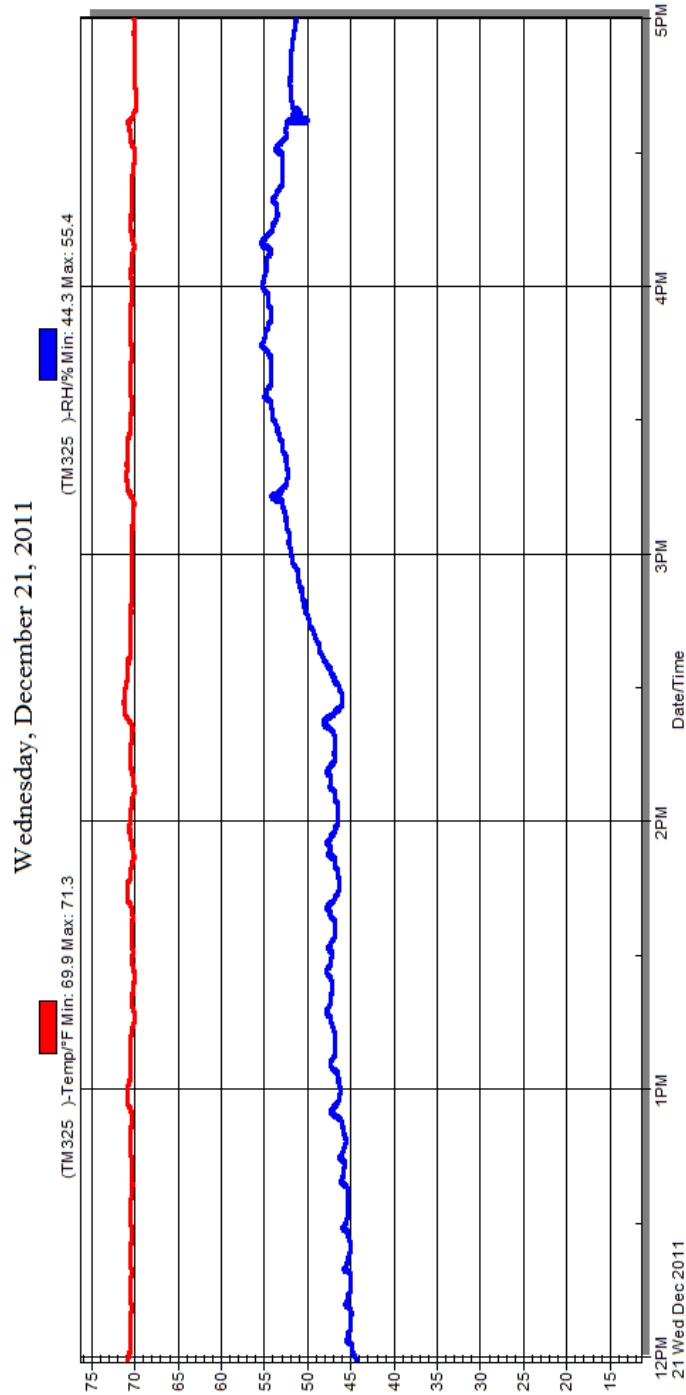
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0° to 90°	0	0		
90° to 180°	0	0		
180° to 270°	0	0		
270° to 360°	0	0		

SOLVENT SPILLAGE LOCATION TABLE

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

DATA SHEET NO. 17
DUMMY/VEHICLE TEMPERATURE STABILIZATION

Test Vehicle:	2012 Kia Sportage	NHTSA No:	MC0509
Test Program:	NCAP Frontal Barrier Impact Test	Test Date	12/21/2011



Temperature Stabilization Chart/Data

**APPENDIX A
PHOTOGRAPHS**

TABLE OF PHOTOGRAPHS		
No.		Page
1	Load Cell Location	A-5
2	Load Cell Wall	A-5
3	Manufacturer's Label	A-6
4	Tire Placard	A-6
5	Right Front 3-4 View, as Received	A-7
6	Left Rear 3-4 View, as Received	A-7
7	Pre-test Front View of Test Vehicle	A-8
8	Post-test Front View of Test Vehicle	A-8
9	Pre-test Left View of Test Vehicle	A-9
10	Post-test Left View of Test Vehicle	A-9
11	Pre-test Right View of Test Vehicle	A-10
12	Post-test Right View of Test Vehicle	A-10
13	Pre-test Right Front 3-4 View	A-11
14	Post-test Right Front 3-4 View	A-11
15	Pre-test Left Rear 3-4 View	A-12
16	Post-test Left Rear 3-4 View	A-12
17	Pre-test Windshield View	A-13
18	Post-test Windshield View	A-13
19	Pre-test Engine Compartment View	A-14
20	Post-test Engine Compartment View	A-14
21	Pre-test Fuel Filler Cap View	A-15
22	Post-test Fuel Filler Cap View	A-15
23	Pre-test Front Underbody View ¹	A-16
24	Post-test Front Underbody View ¹	A-16
25	Pre-test Rear Underbody View ¹	A-17
26	Post-test Rear Underbody View ¹	A-17
27	Pre-test Dummy Cable Routing	A-18
28	Post-test Dummy Cable Routing	A-18
29	Pre-test Driver Dummy Front View	A-19

30	Post-test Driver Dummy Front View	A-19
31	Pre-test Driver Dummy Window View	A-20
32	Post-test Driver Dummy Window View	A-20
33	Pre-test Driver Dummy and Vehicle Interior View	A-21
34	Post-test Driver Dummy and Vehicle Interior View	A-21
35	Pre-test Driver's Seat Fore-Aft Markings	A-22
36	Post-test Driver's Seat Fore-Aft Markings	A-22
37	Pre-test Driver Dummy Feet	A-23
38	Post-test Driver Dummy Feet	A-23
39	Pre-test Driver's Side Knee Bolster	A-24
40	Post-test Driver's Side Knee Bolster	A-24
41	Pre-test Driver's Side Floorpan	A-25
42	Post-test Driver's Side Floorpan	A-25
43	Post-Test Driver Dummy Face	A-26
44	Post-test Driver Dummy Contact With Airbag	A-26
45	Post-test Driver Dummy Contact With Headrest	A-27
46	Pre-test View of the Steering Wheel	A-27
47	Post-test View of the Steering Wheel	A-28
48	Pre-test Passenger Dummy Front View	A-28
49	Post-test Passenger Dummy Front View	A-29
50	Pre-test Passenger Dummy Window View	A-29
51	Post-test Passenger Dummy Window View	A-30
52	Pre-test Passenger Dummy and Vehicle Interior View	A-30
53	Post-test Passenger Dummy and Vehicle Interior View	A-31
54	Pre-test Passenger's Seat Fore-Aft Markings	A-31
55	Post-test Passenger's Seat Fore-Aft Markings	A-32
56	Pre-test Passenger Dummy Feet	A-32
57	Post-test Passenger Dummy Feet	A-33
58	Pre-test Passenger's Side Knee Bolster	A-33
59	Post-test Passenger's Side Knee Bolster	A-34
60	Pre-test Passenger's Side Floorpan	A-34
61	Post-test Passenger's Side Floorpan	A-35

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

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

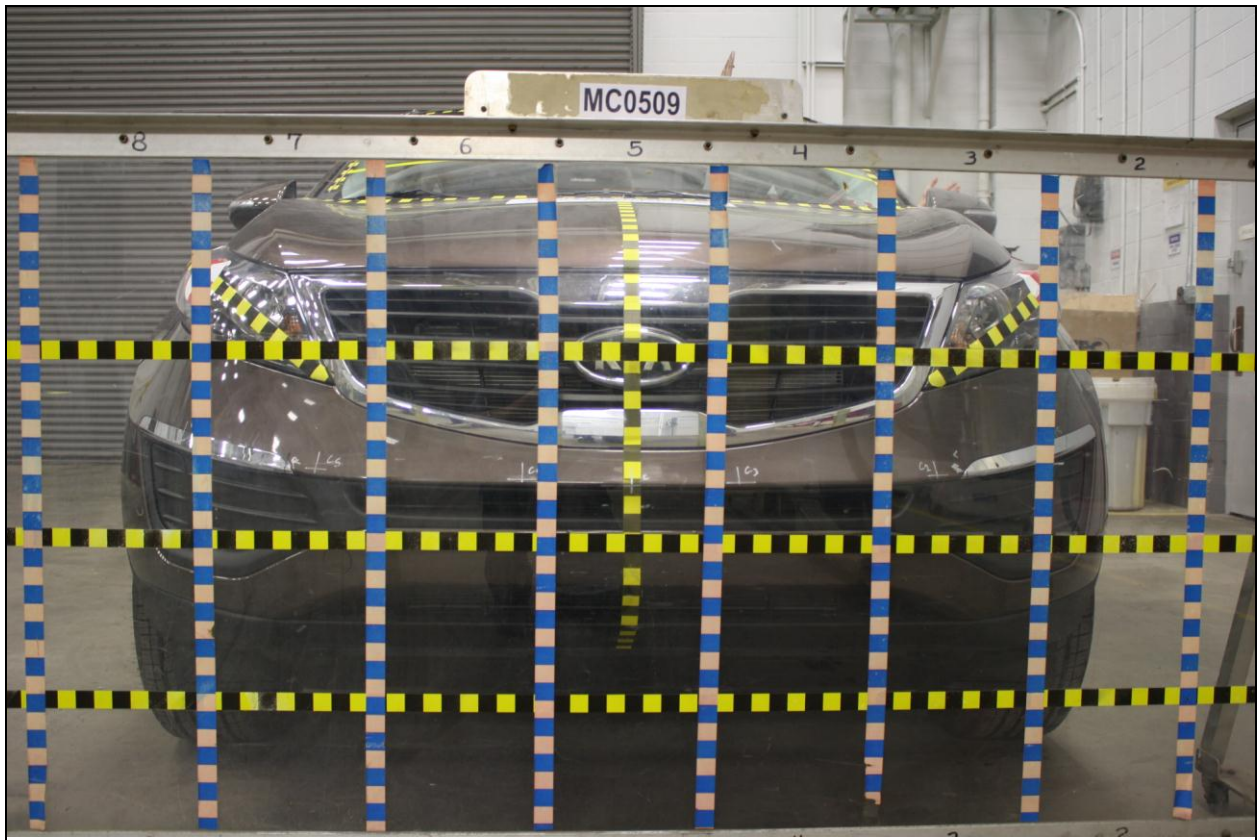


Figure A-1: Load Cell Location



Figure A-2: Load Cell Wall



Figure A-3: Manufacturer's Label

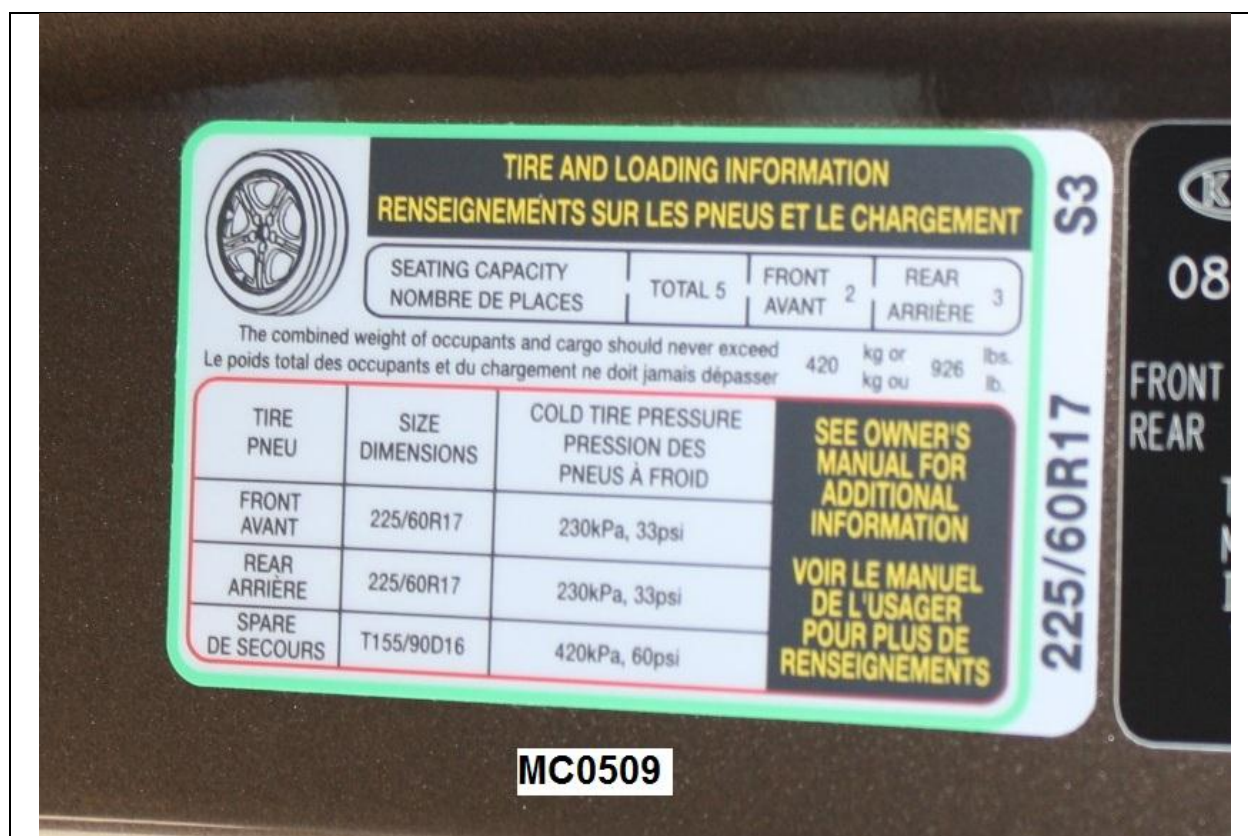


Figure A-4: Tire Placard



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



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



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

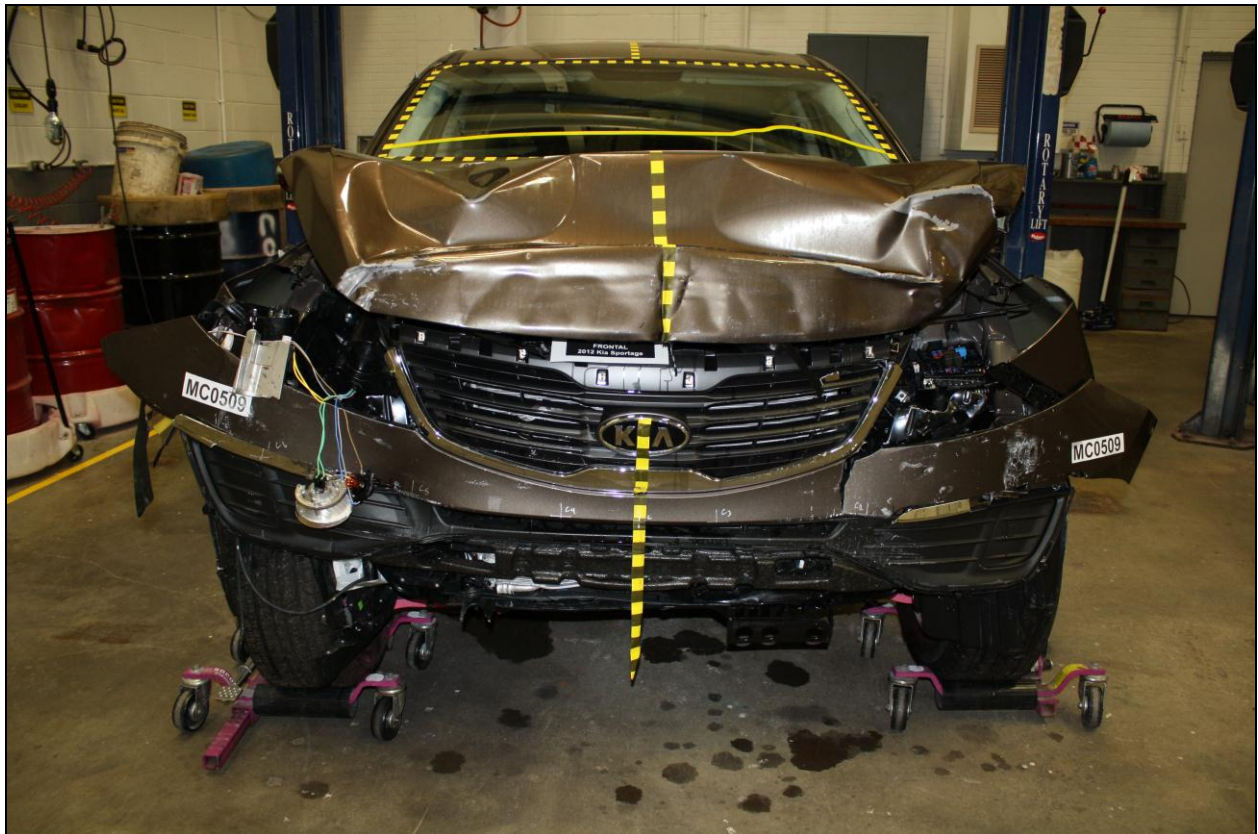


Figure A-8: Post-Test Front View of Test Vehicle



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



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



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



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



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

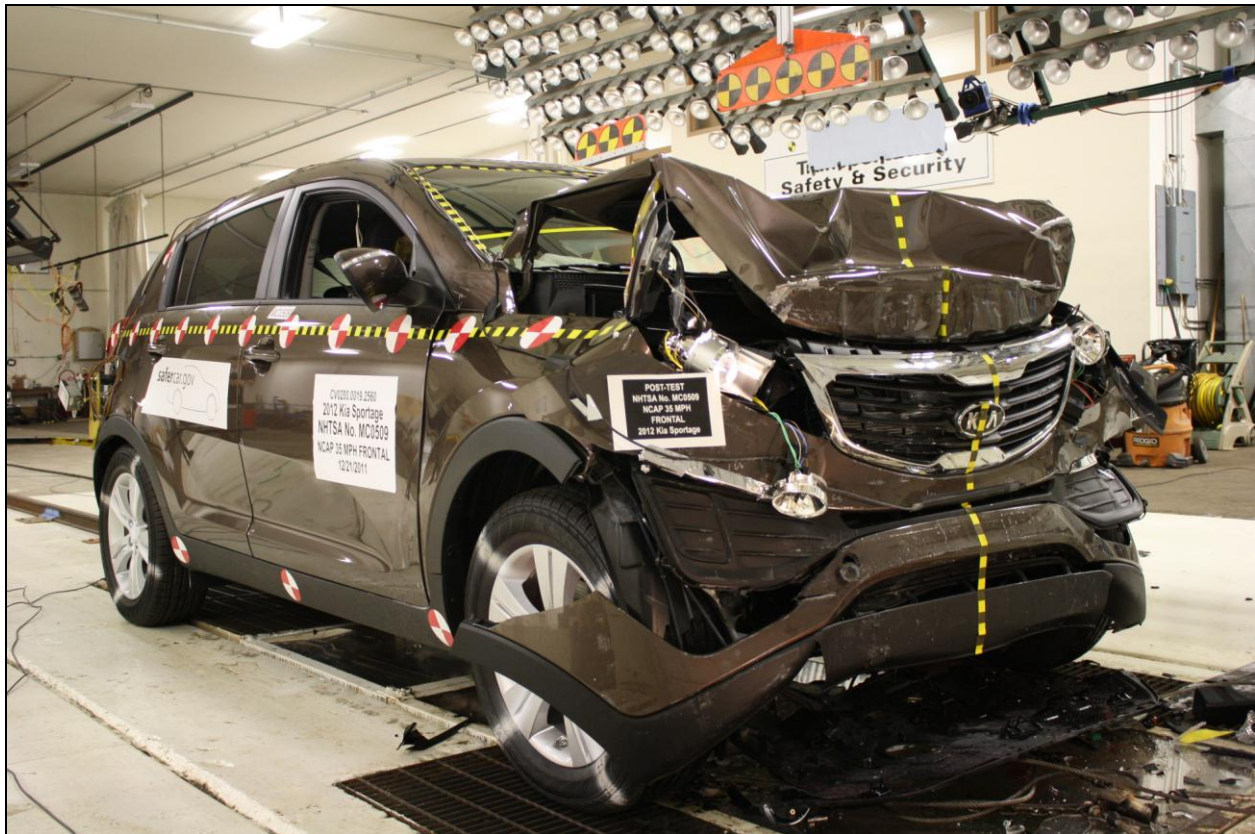


Figure A-14: Post-Test Right Front 3-4 View



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



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



Figure A-17: Pre-Test Windshield View

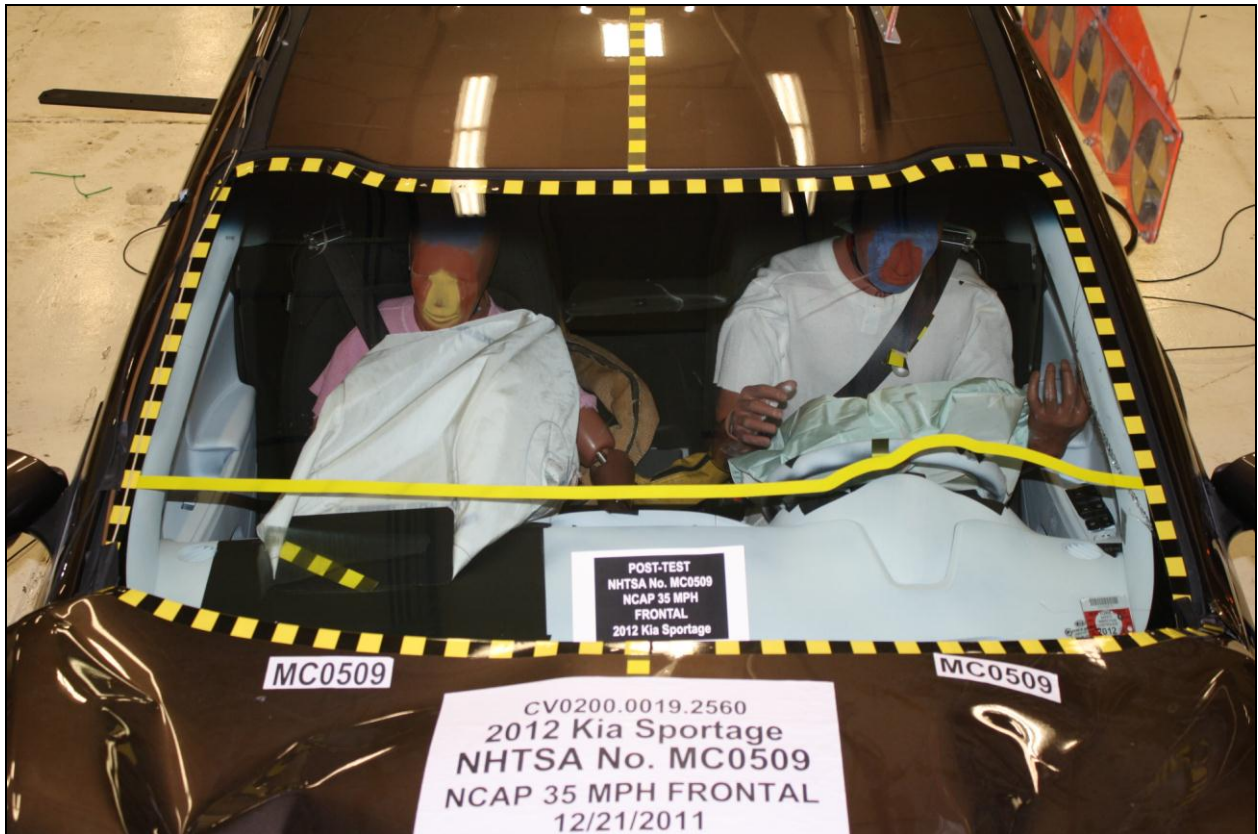


Figure A-18: Post-Test Windshield View

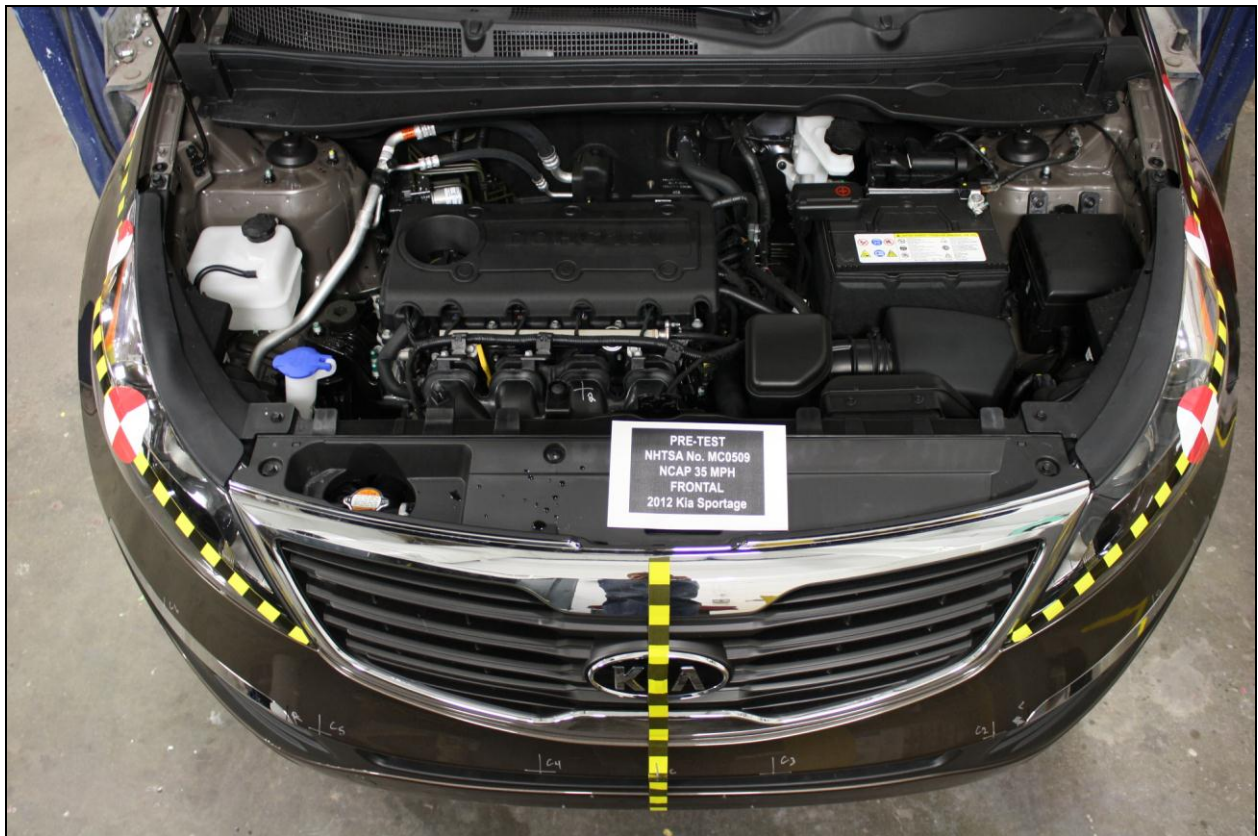


Figure A-19: Pre-Test Engine Compartment View

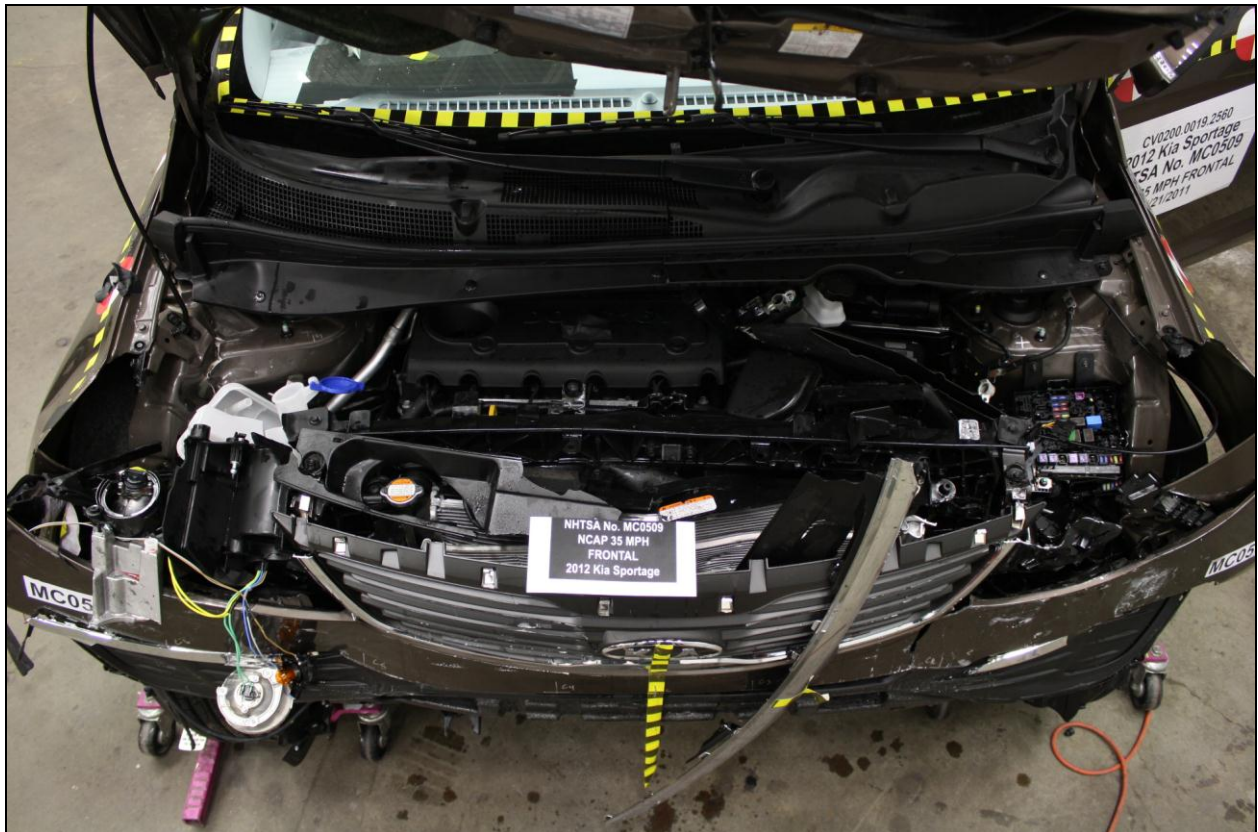


Figure A-20: Post-Test Engine Compartment View



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



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

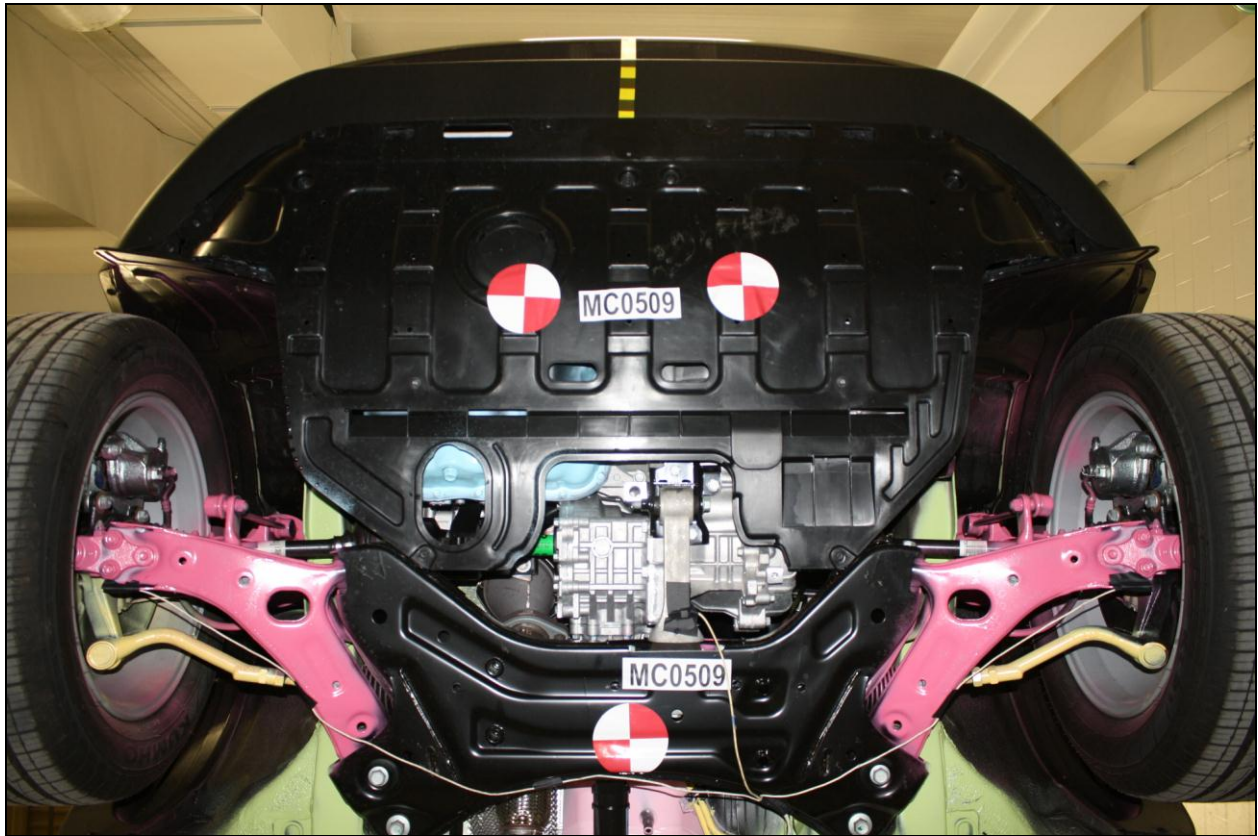


Figure A-23: Pre-Test Front Underbody View

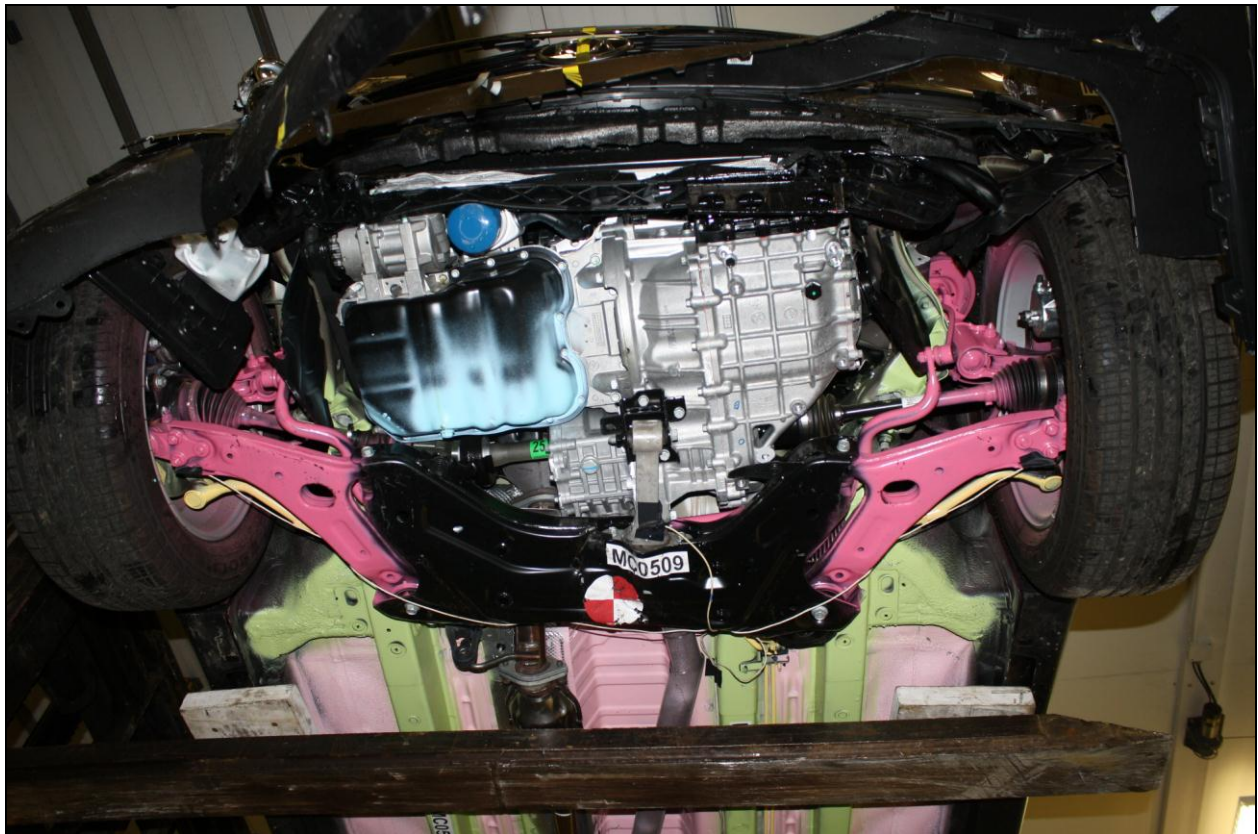


Figure A-24: Post-Test Front Underbody View

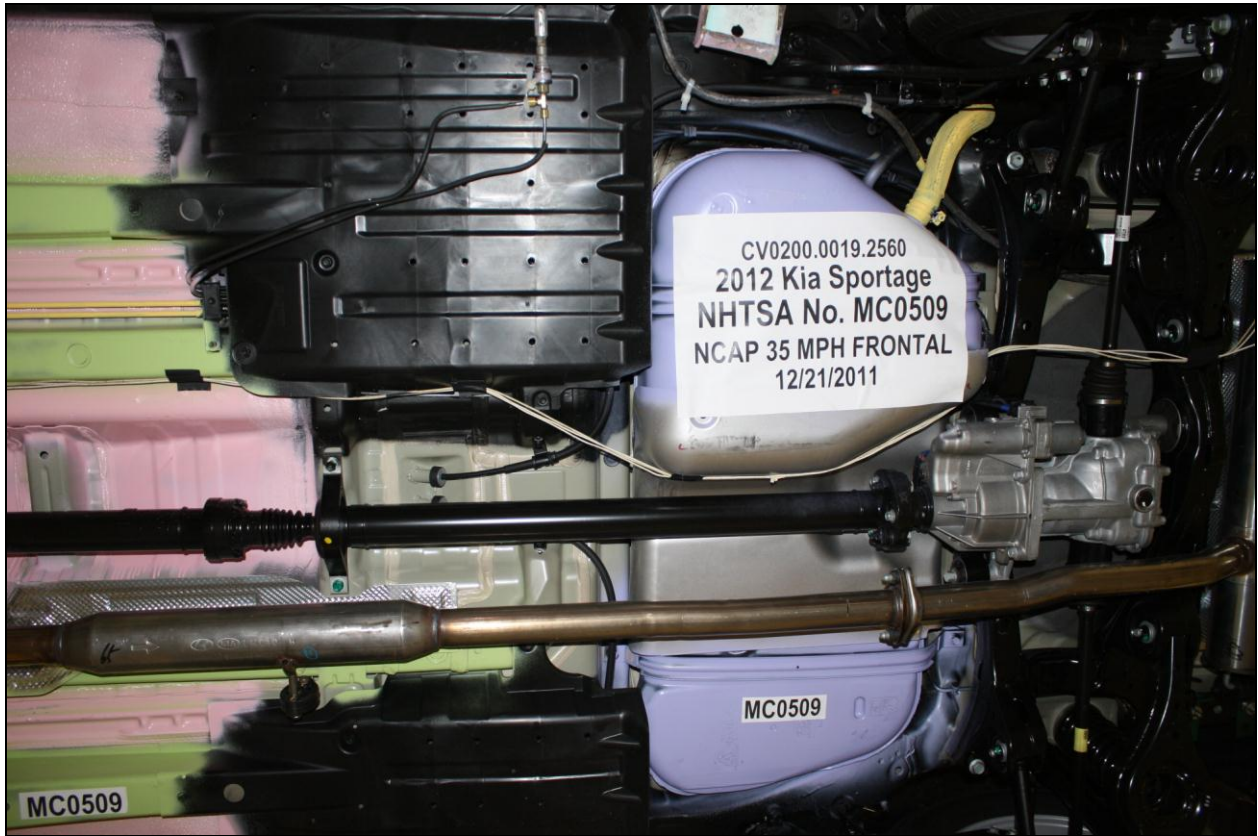


Figure A-25: Pre-Test Rear Underbody View

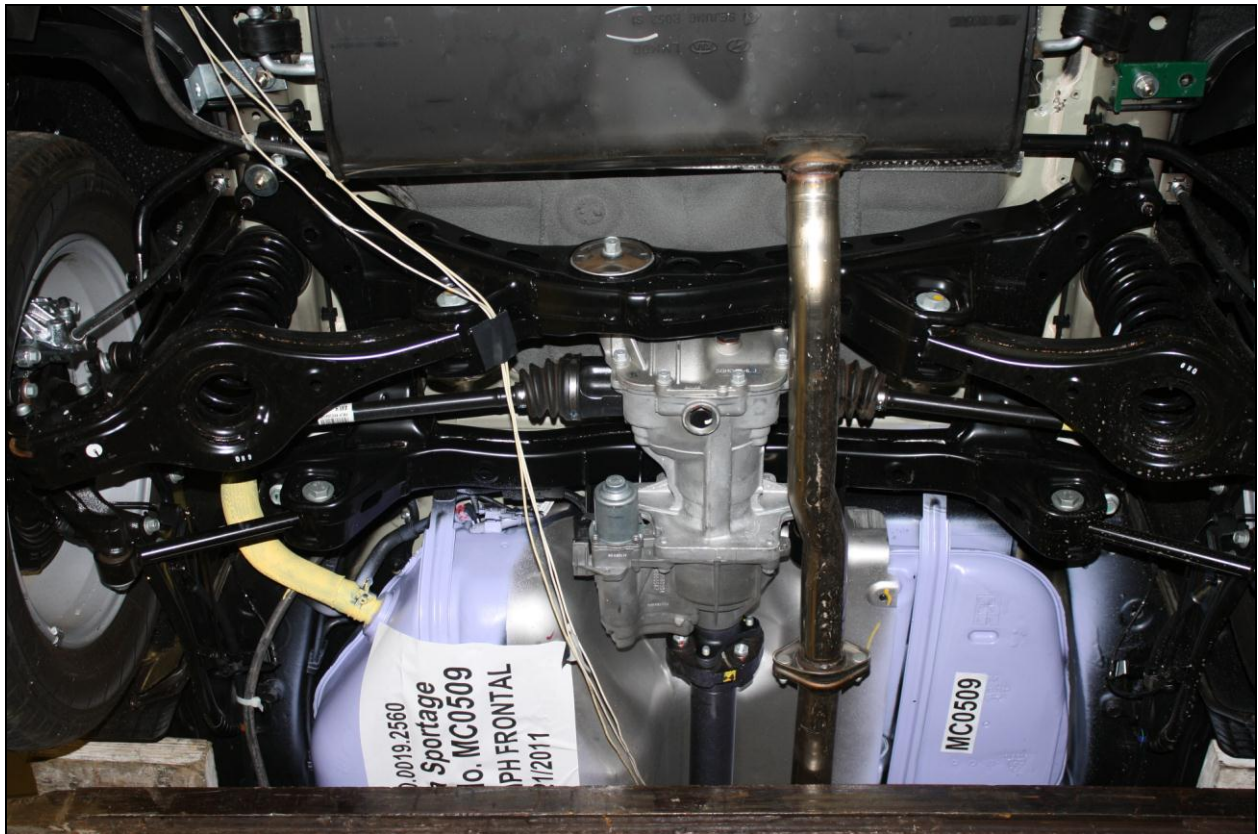


Figure A-26: Post-Test Rear Underbody View



Figure A-27: Pre-Test Dummy Cable Routing



Figure A-28: Post-Test Dummy Cable Routing



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



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



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



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

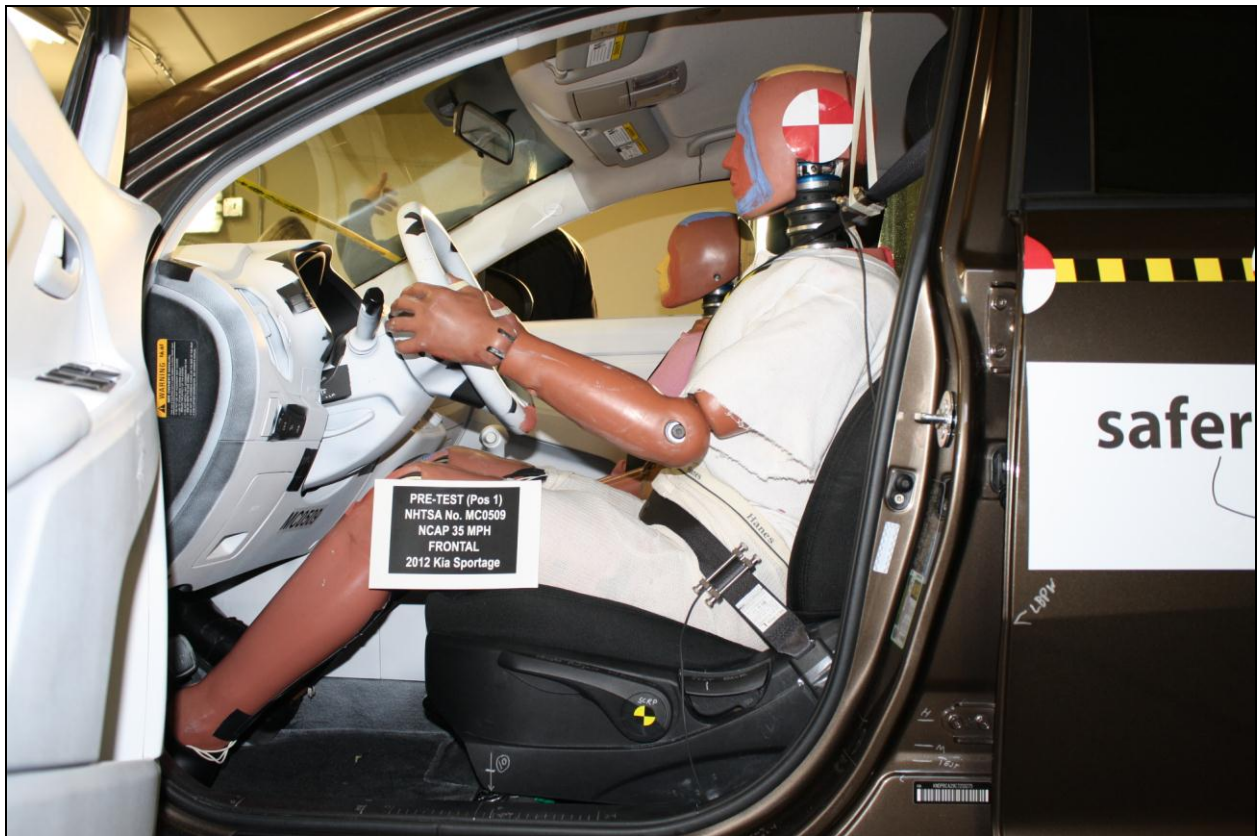


Figure A-33: Pre-Test Driver Dummy and Vehicle Interior View



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



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



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



Figure A-37: Pre-Test Driver Dummy Feet

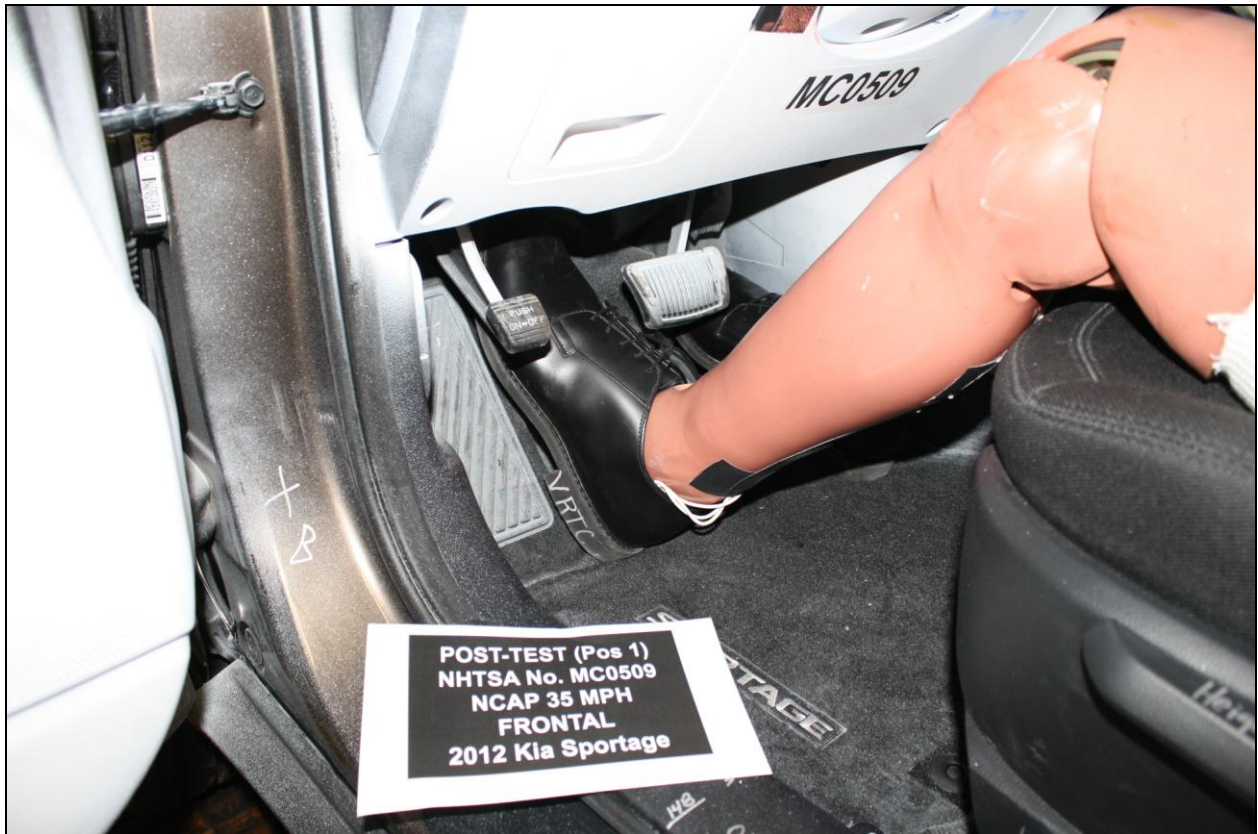


Figure A-38: Post-Test Driver Dummy Feet



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



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



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



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



Figure A-43: Post-Test Driver Dummy Face

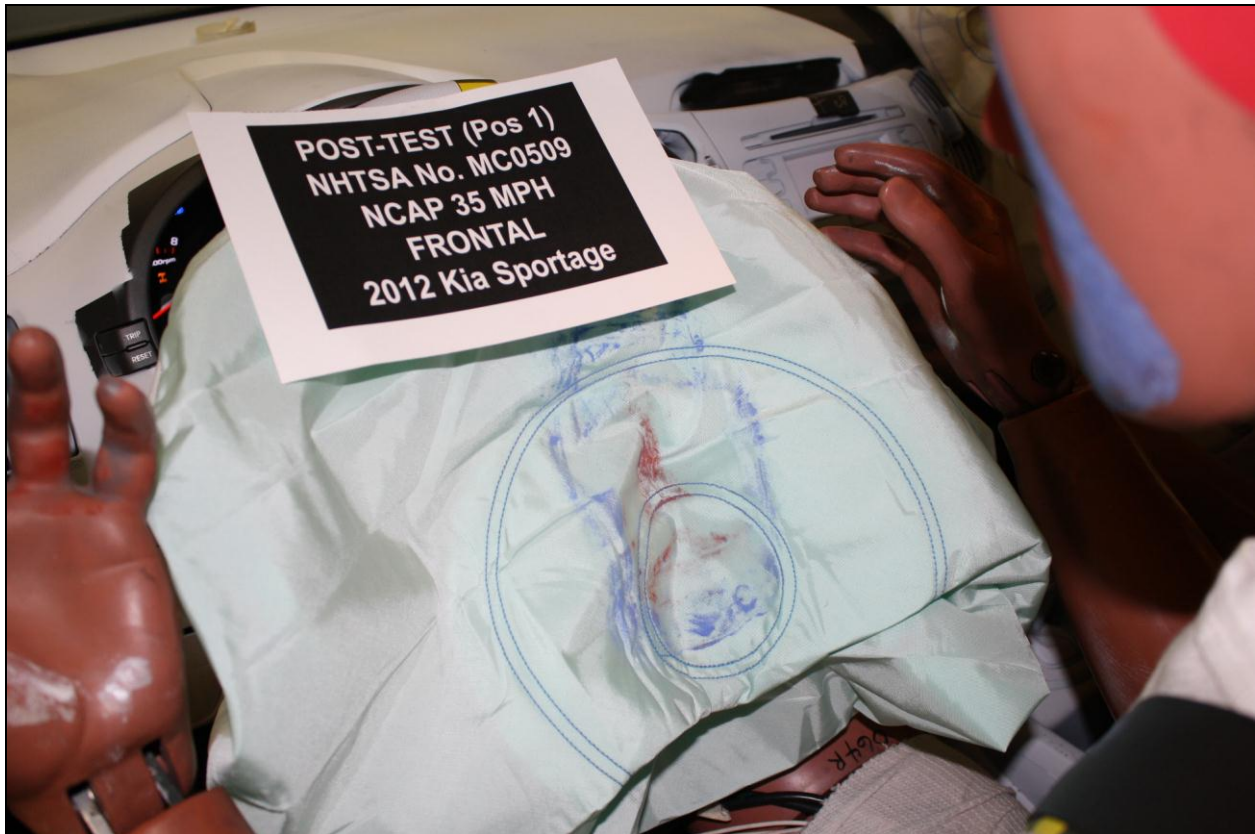


Figure A-44: Post-Test Driver Dummy Contact with Airbag



Figure A-45: Post-Test Driver Dummy Contact with Headrest



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

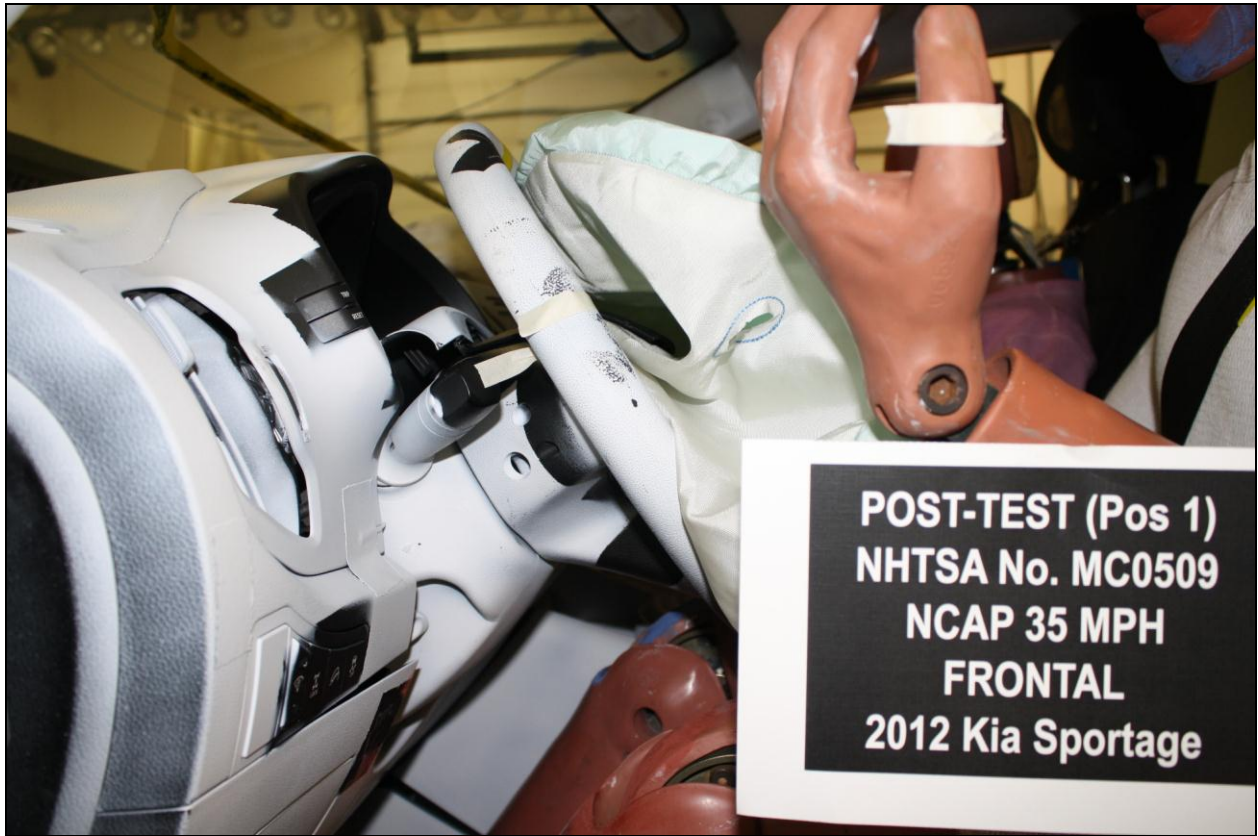


Figure A-47: Post-Test View of the Steering Wheel



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



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



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



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



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



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



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



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



Figure A-56: Pre-Test Passenger Dummy Feet



Figure A-57: Post-Test Passenger Dummy Feet



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



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



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



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



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



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



Figure A-63: Photograph of Ballast Installed in Vehicle

Photo Not Applicable

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



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



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

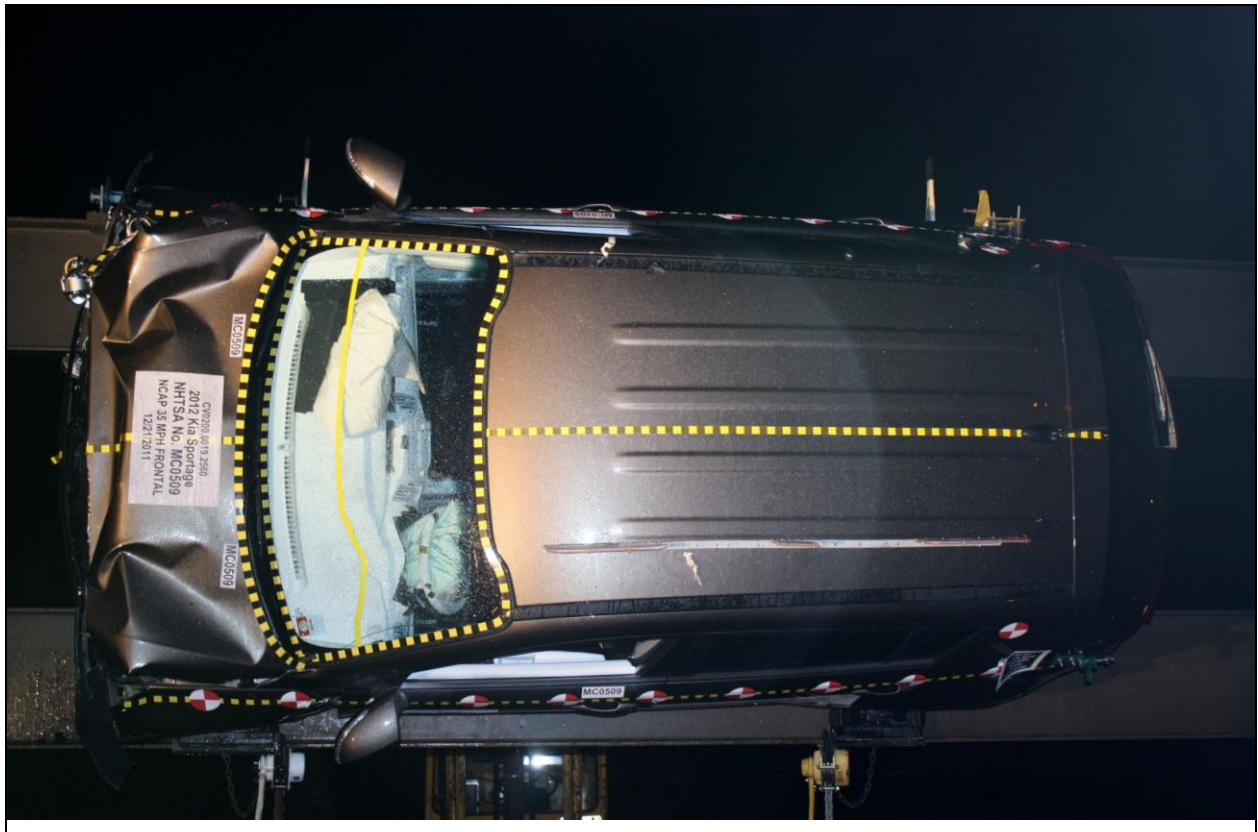


Figure A-67: Vehicle at 90° on Static Rollover Device



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

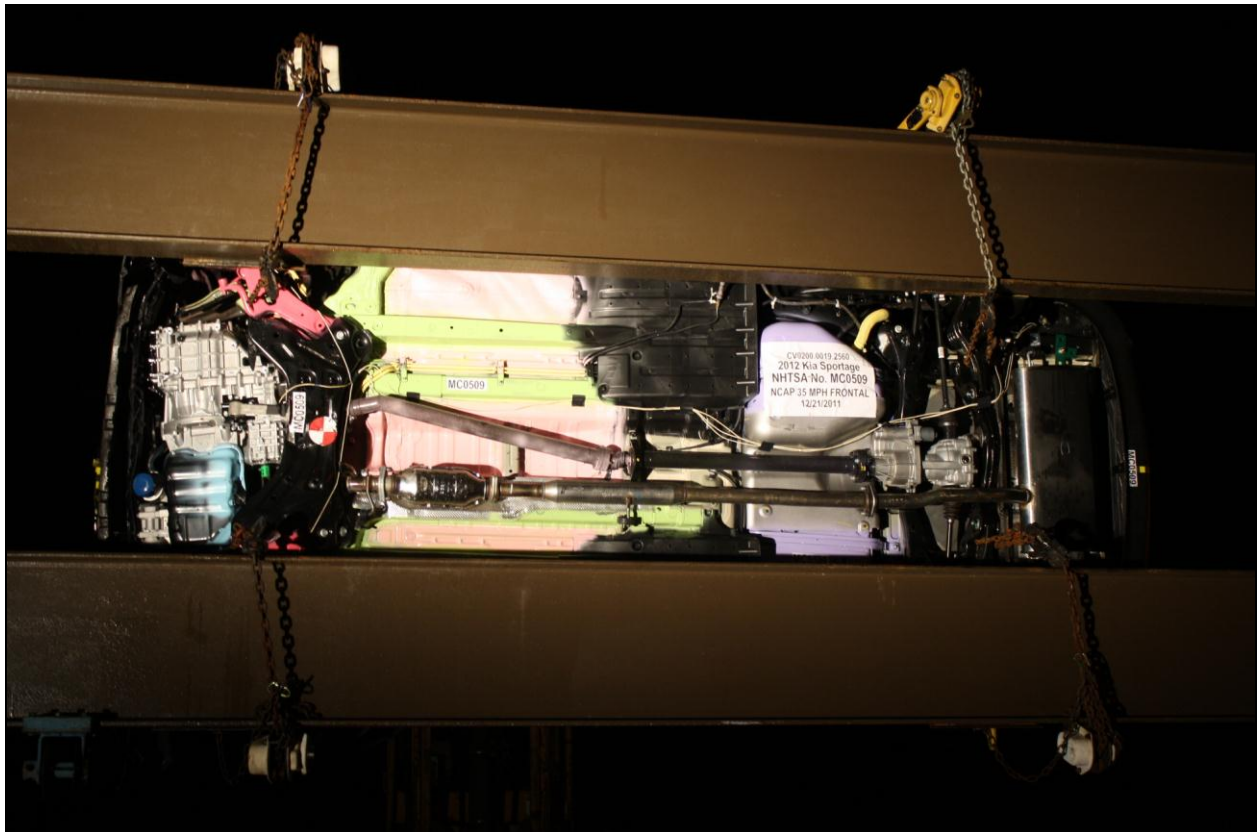


Figure A-69: Vehicle at 270° on Static Rollover Device



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



Figure A-71: 2012 Kia Sportage Frontal Impact Event

		2012 42422 KIA SPORTAGE LX AWD MODEL YEAR MODEL MODEL DESCRIPTION SAND TRACK/BLK EXTERIOR / INTERIOR COLOR KNDPBCA29C713275 G4KEBH45 VEHICLE NUMBER ENGINE NUMBER PHILADELPHIA TRUCK		SOLD TO: NY082 FUCILLO KIA 3950 RIDGE ROAD WEST ROCHESTER NY 14626		SHIP TO: NY082	
STANDARD FEATURES MECHANICAL 2.4L DOHC CVT 4-Cylinder Engine 6-Speed Automatic Transmission Motor Driven Power Steering 17" Tires with Alloy Wheels SAFETY Dual Front Advanced Airbags Front Seat Mounted Side Airbags 3-Point Side Curtain Airbags 3-Point Seatbelts for All Seating Positions Front Active Headrests Lower Anchors and Tethers for Children (LATCH) Anti-Lock Brake System (ABS) Traction Control System (TCS) Electronic Stability Control (ESC) Downhill Brake/Hill-start Assist Control (DBC/HAC) Rollover Protection System (ROPS) Tire Pressure Monitoring System (TPMS)		MANUFACTURER'S SUGGESTED RETAIL PRICE \$22,300.00 \$95.00 \$50.00 \$125.00 \$75.00		ADDITIONAL INSTALLED EQUIPMENT: In addition to or in place of standard features) Cargo Net Cargo Cover Cargo Tray 92 15		MSRP INCLUDING OPTIONS \$22,645.00 \$800.00 \$23,445.00	
EXTERIOR Outside Mirrors w/ Turn Signal Indicators Body Color Door Handles Privacy and Solar Glass WARRANTY 10 Year/100,000 Mile Limited Powertrain Warranty 5 Year/60,000 Mile Limited Basic Warranty 5 Year/60,000 Mile Roadside Assistance * Ask dealer for details		INTERIOR Air Conditioning Power Windows, Door Locks & Outside Mirrors Keyless Entry and Alarm System AM/FM/CD/MP3 Audio System SIRIUS Satellite Radio w/ free 3-mo. subscription** USB & Auxiliary Input Jacks Multi-Adjustable Front Seats 60/40 Split Folding Rear Seats Cruise Control, Trip Computer Bluetooth (Phone and Streaming Audio) Tilt Steering Wheel Steering Wheel Controls (Bluetooth/Audio/Cruise) Front Cup Holders, 2nd Row Armrest w/Cupholders		INLAND FREIGHT AND HANDLING \$22,645.00 \$800.00 \$23,445.00		Manufacturer's suggested retail price includes manufacturer's recommended pre-delivery service. License and title fees, state and local taxes and other dealer installed options and accessories are not included in the manufacturer's suggested retail price.	
TOTAL ADDITIONAL WEIGHT: 21.8							

EPA Fuel Economy Estimates

These estimates reflect new EPA methods beginning with 2018 models.

CITY MPG

21

Expected range for most drivers
17 to 25 MPG

Estimated Annual Fuel Cost

\$1876.00

based on 15,000 miles at \$3.00 per gallon

HIGHWAY MPG

28

Expected range for most drivers
23 to 33 MPG

Combined Fuel Economy

24

This Vehicle

ALL SUVS

Your actual mileage will vary depending on how you drive and maintain your vehicle.

See the FREE Fuel Economy Guide at dealers or www.fueleconomy.gov

GOVERNMENT SAFETY RATINGS

FOR VEHICLES IN THIS CAR LINE U.S./CANADIAN PARTS CONTENT: 1% MAJOR SOURCES OF FOREIGN PARTS: KOREA: 98%

NOTE: PARTS CONTENT DOES NOT INCLUDE FINAL ASSEMBLY, DISTRIBUTION, OR OTHER NON-PARTS COSTS.

FOR THIS VEHICLE FINAL ASSEMBLY POINT: KOREA COUNTRY OF ORIGIN ENGINE: KOREA TRANSMISSION: KOREA

Environmental Performance

Protect the environment, choose vehicles with higher scores:

Global Warming Score

7

new vehicle Average Cleanest

Smog Score

9

new vehicle Average Cleanest

Using alternative fuels may improve scores. See www.DriveClean.ca.gov

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

Figure A-72: Monroney Label Photograph

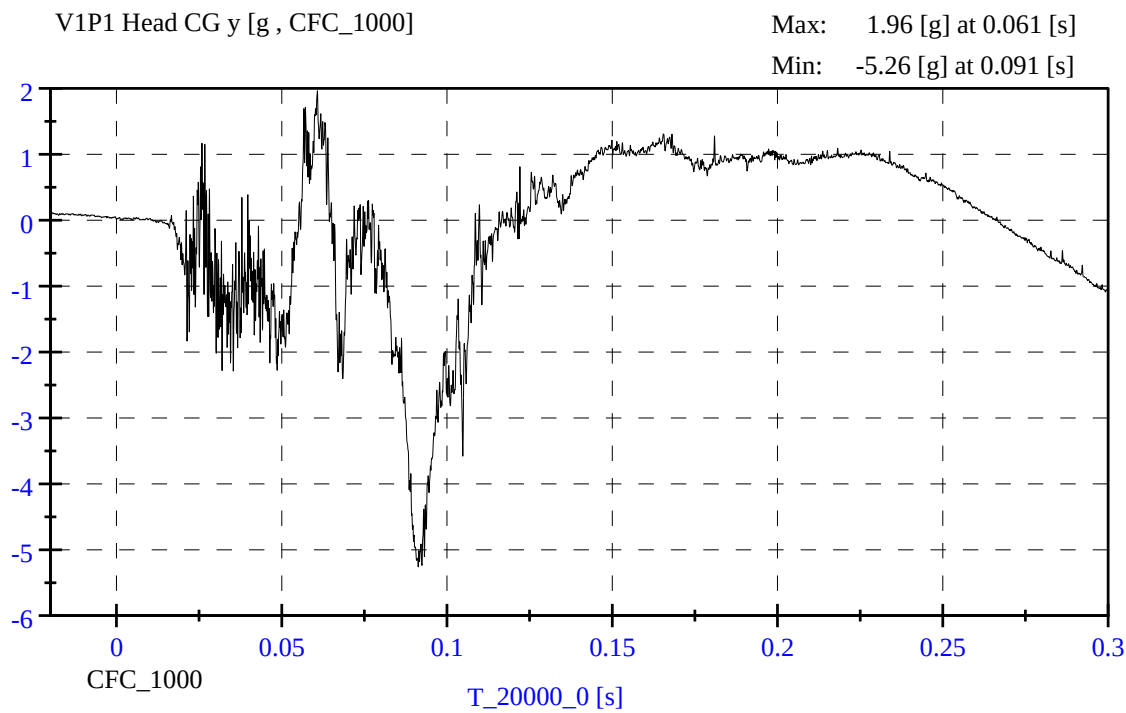
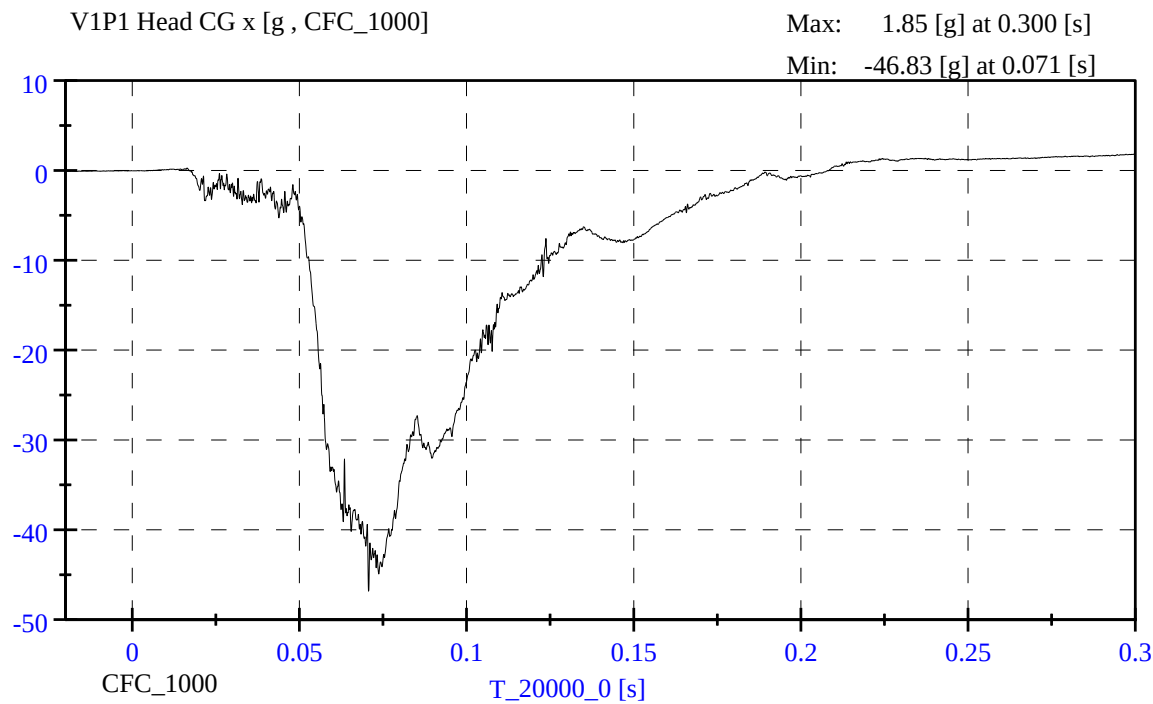
APPENDIX B
DUMMY RESPONSE DATA TRACES

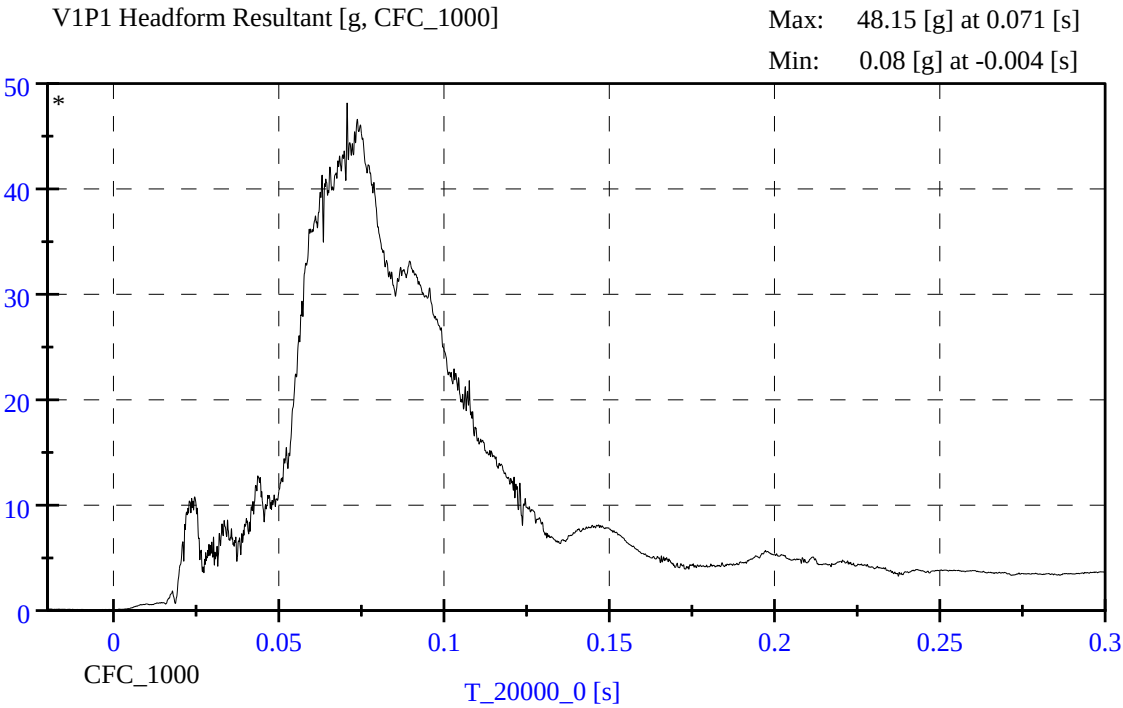
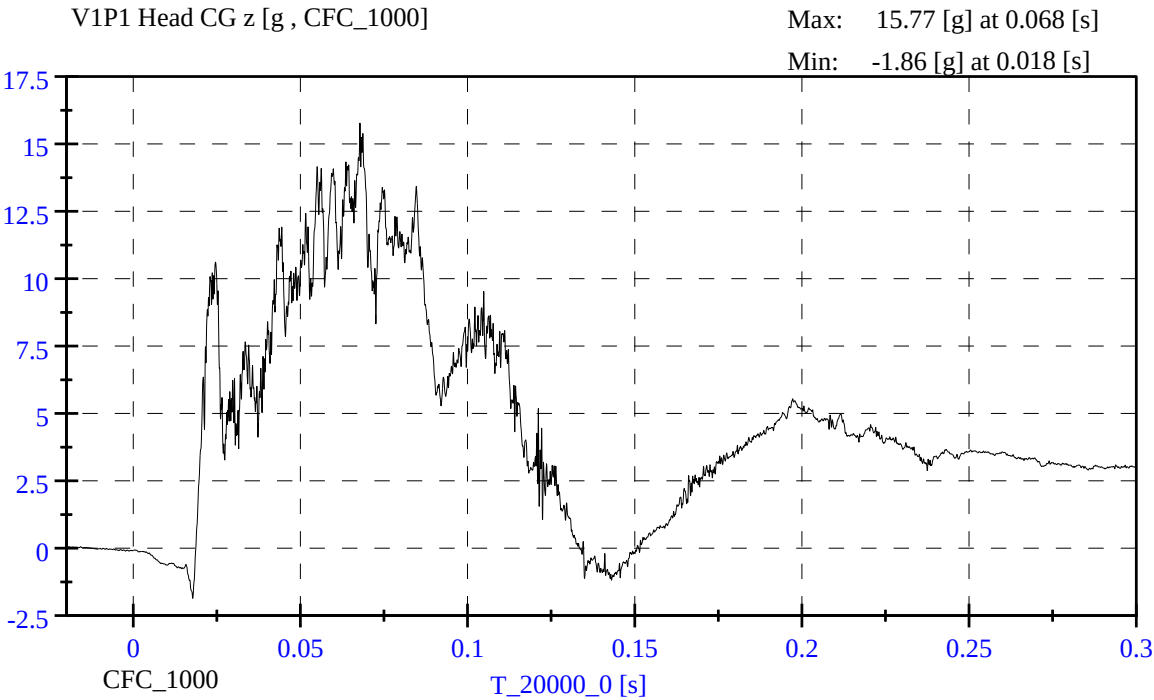
Fig. No.	List of Data Plots Provided In The Test Report	Page No.
1	Driver Head X Acceleration vs. Time Primary	B-5
2	Driver Head Y Acceleration vs. Time Primary	B-5
3	Driver Head Z Acceleration vs. Time Primary	B-6
4	Driver Head Resultant Acceleration vs. Time Primary	B-6
5	Driver Chest X Deflection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

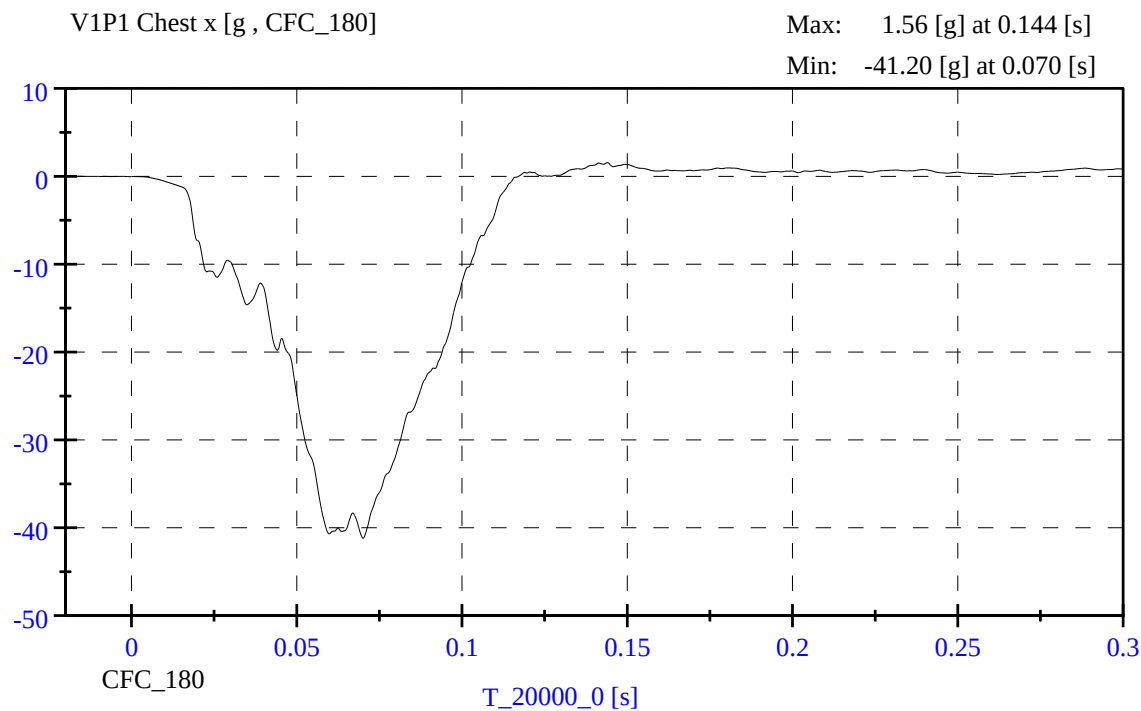
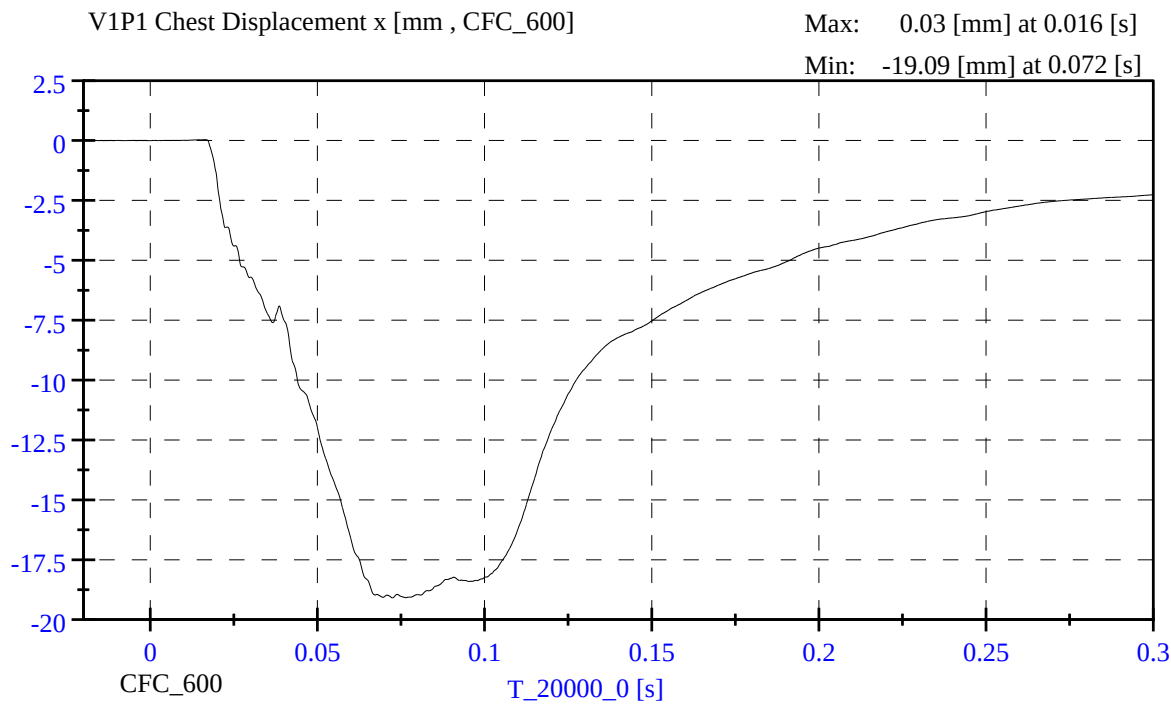
The following additional dummy and vehicle response data can be found in the R&D section of the NHTSA website at www.nhtsa.dot.gov

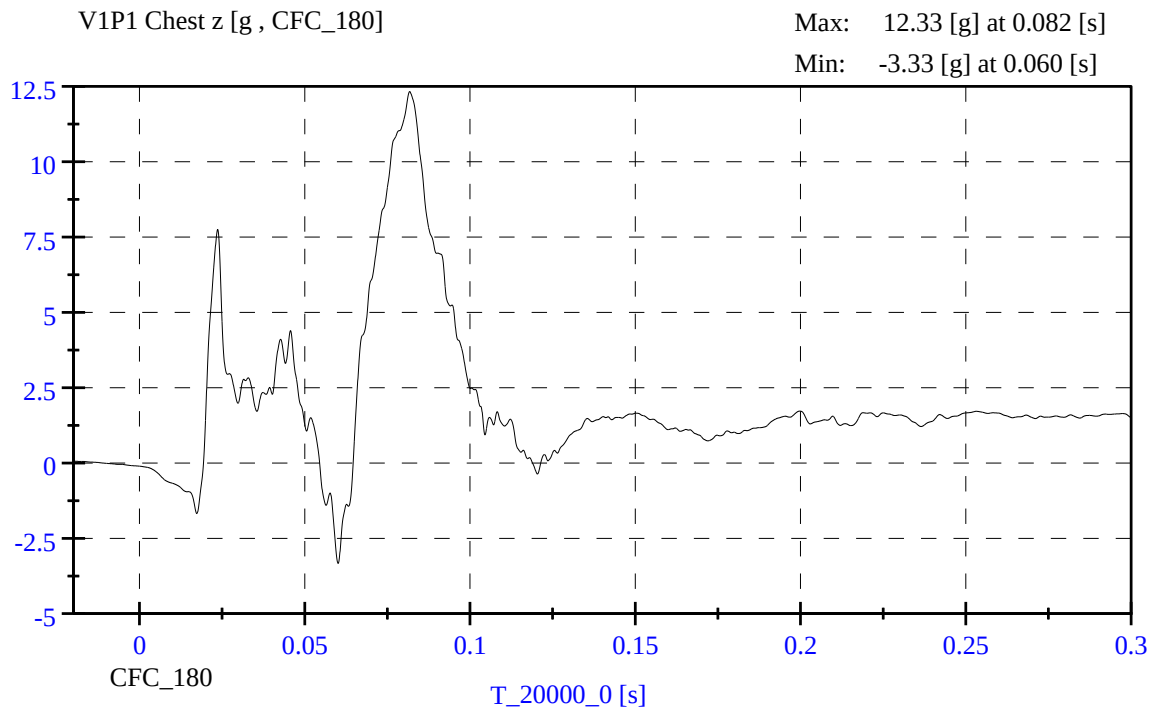
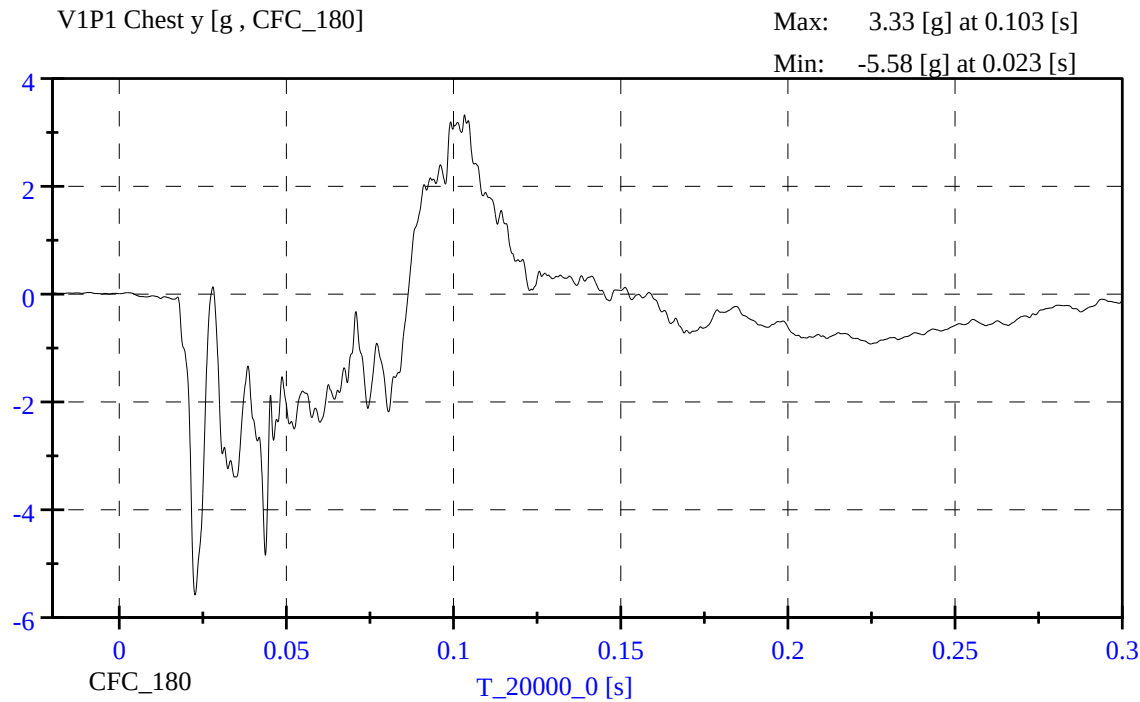
Driver Head X Acceleration Redundant
Driver Head Y Acceleration Redundant
Driver Head Z Acceleration Redundant
Driver Upper Neck Force Y
Driver Upper Neck Moment X
Driver Upper Neck Moment Z
Driver Chest X Acceleration Redundant
Driver Chest Y Acceleration Redundant
Driver Chest Z Acceleration Redundant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

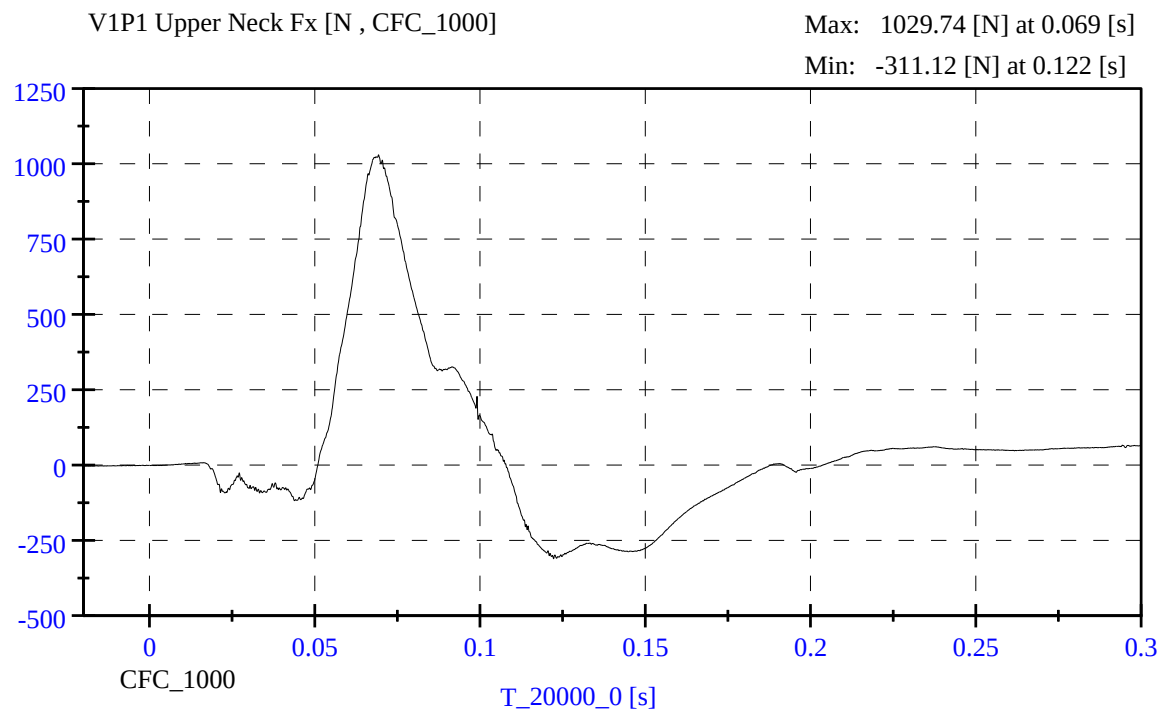
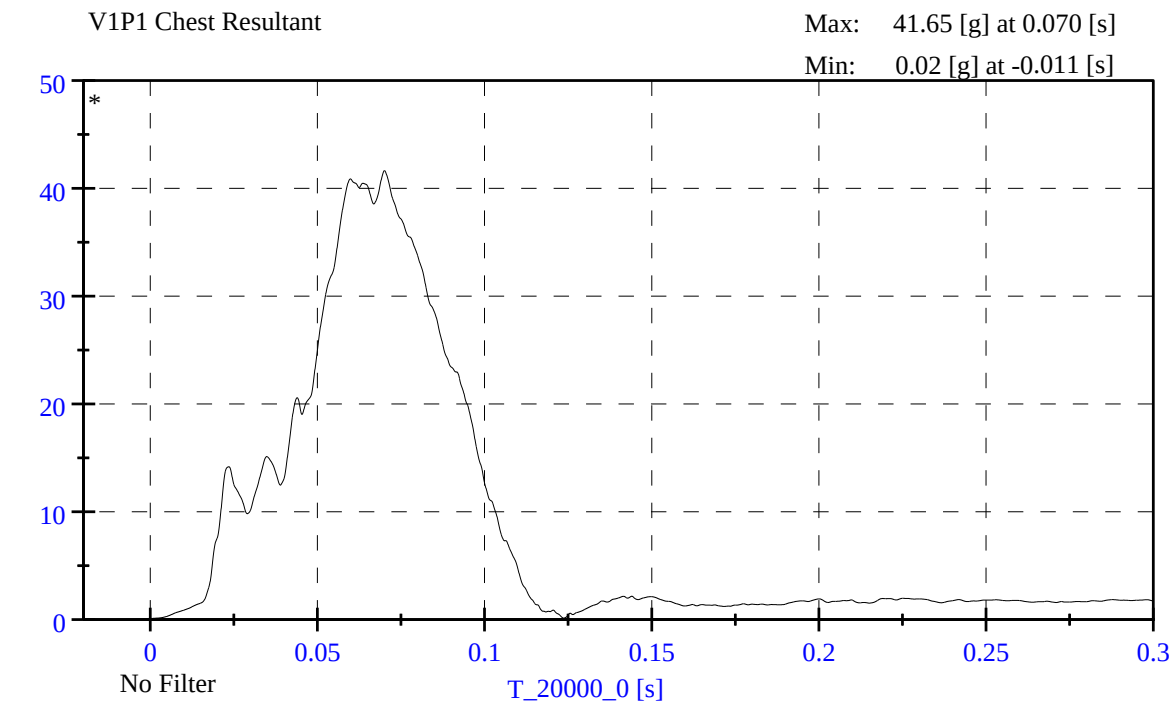
Passenger Left Lower Tibia Moment X
Passenger Left Lower Tibia Moment Y
Passenger Left Lower Tibia Force Z
Passenger Right Upper Tibia Moment X
Passenger Right Upper Tibia Moment Y
Passenger Right Upper Tibia Force Z
Passenger Right Lower Tibia Moment X
Passenger Right Lower Tibia Moment Y
Passenger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

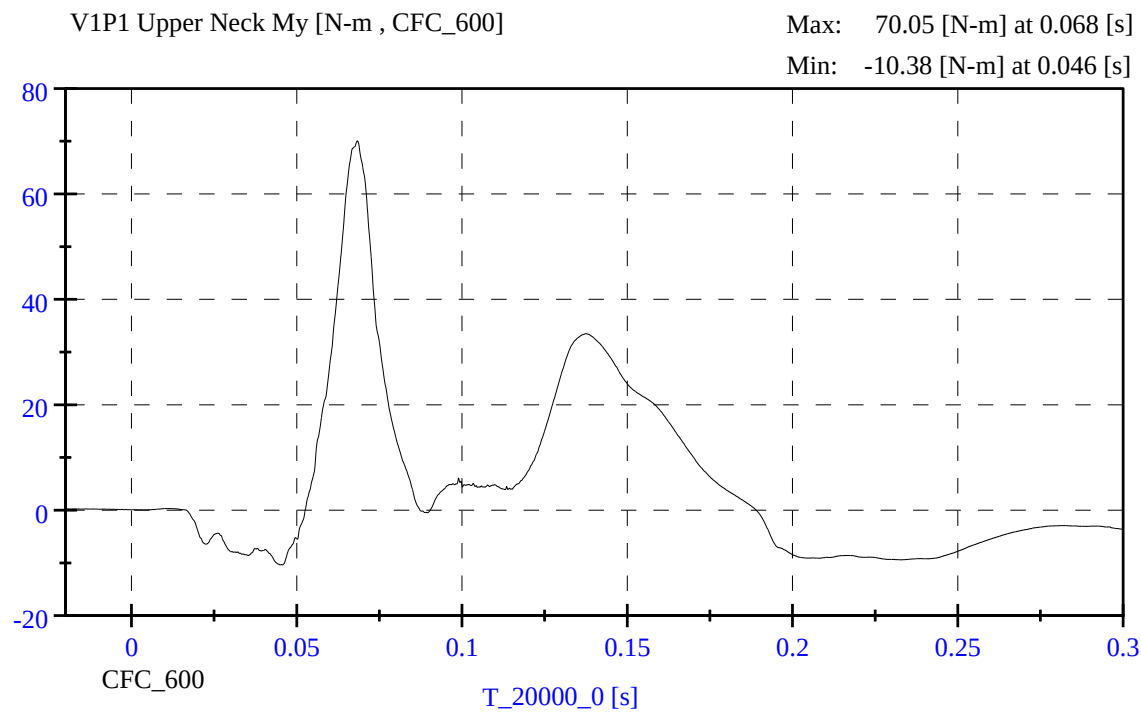
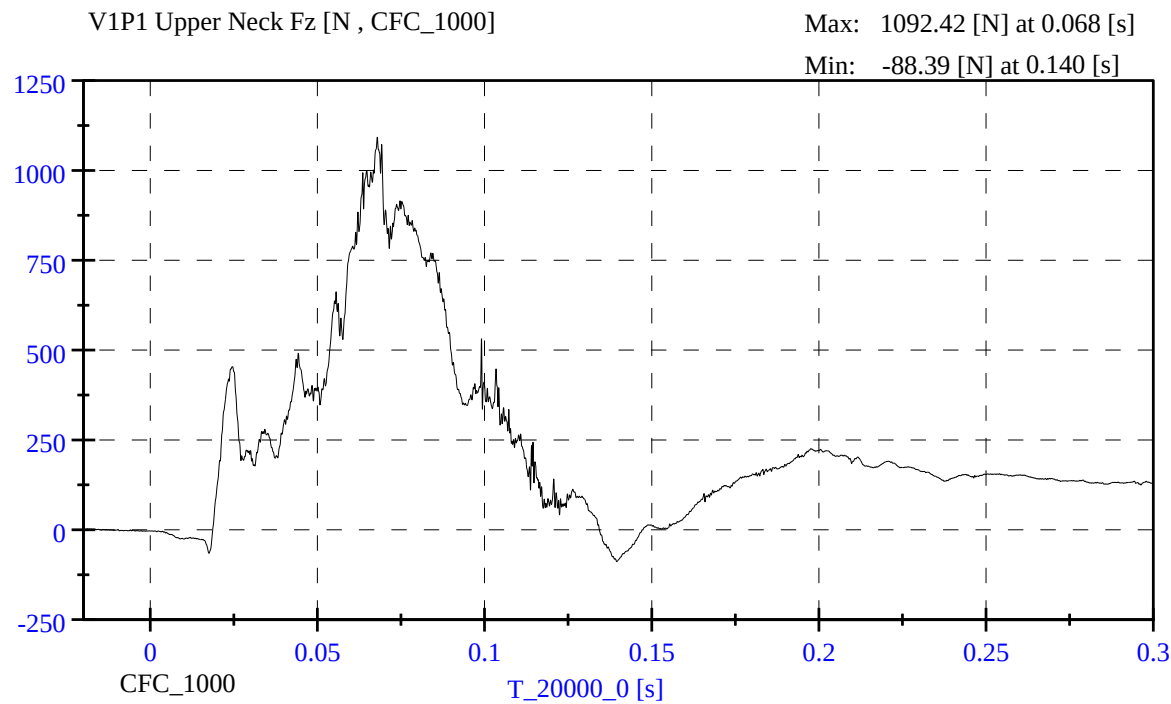


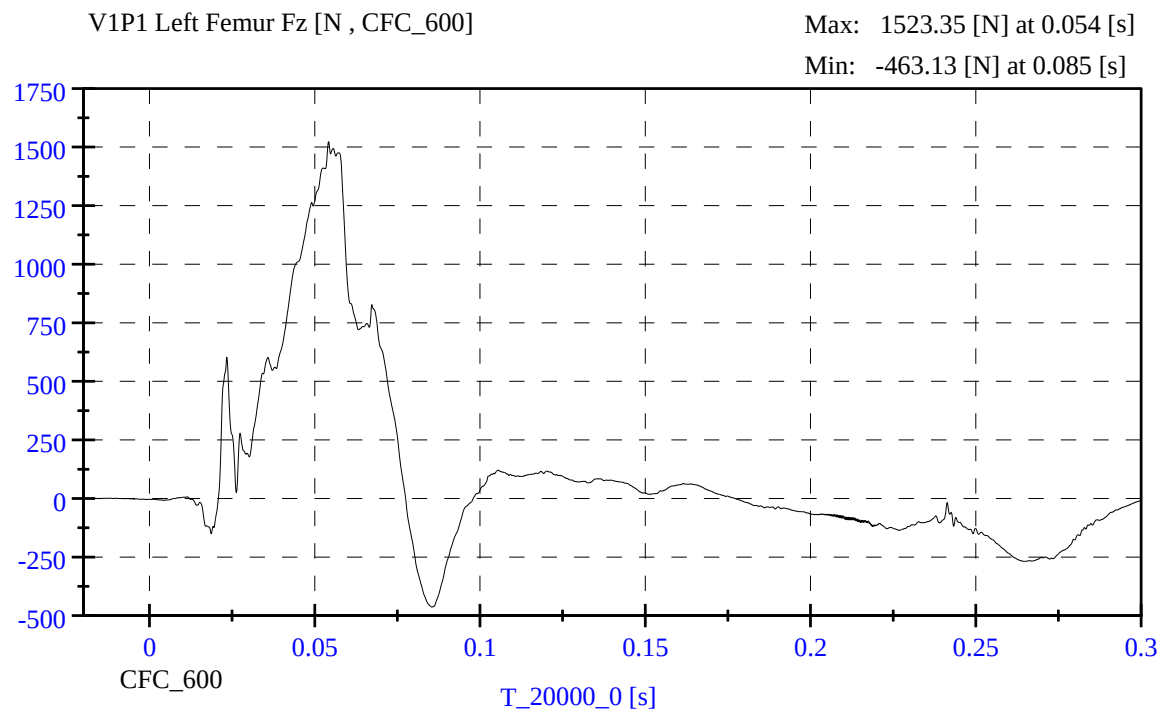
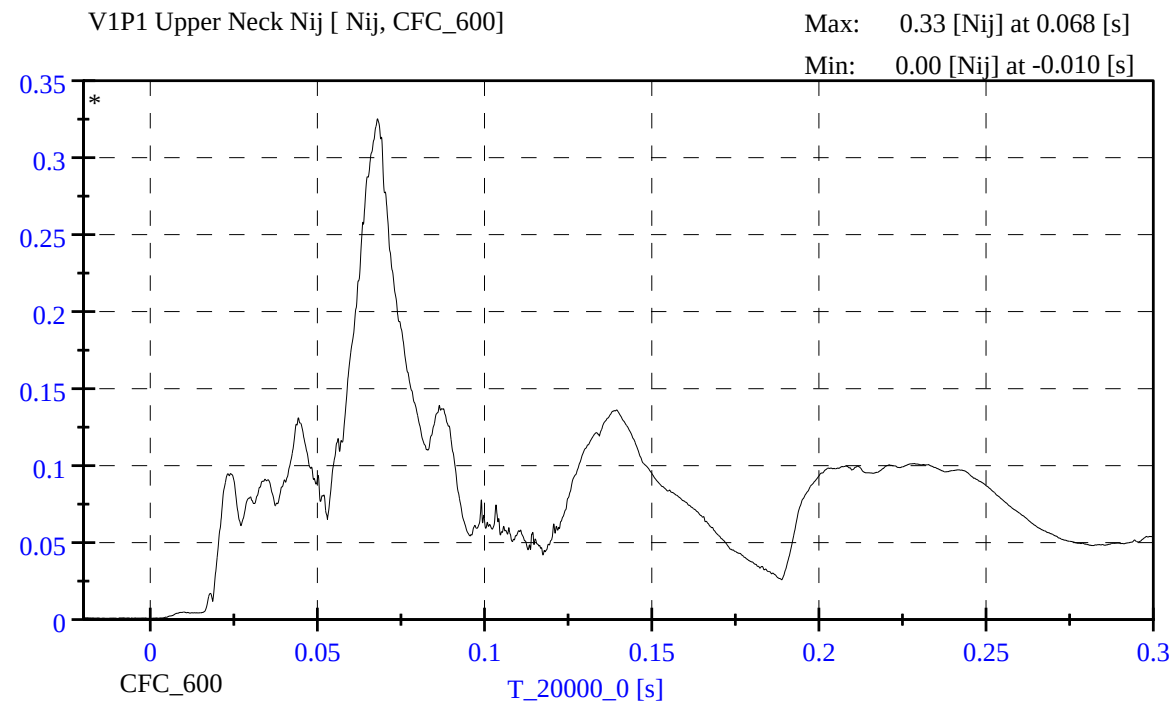


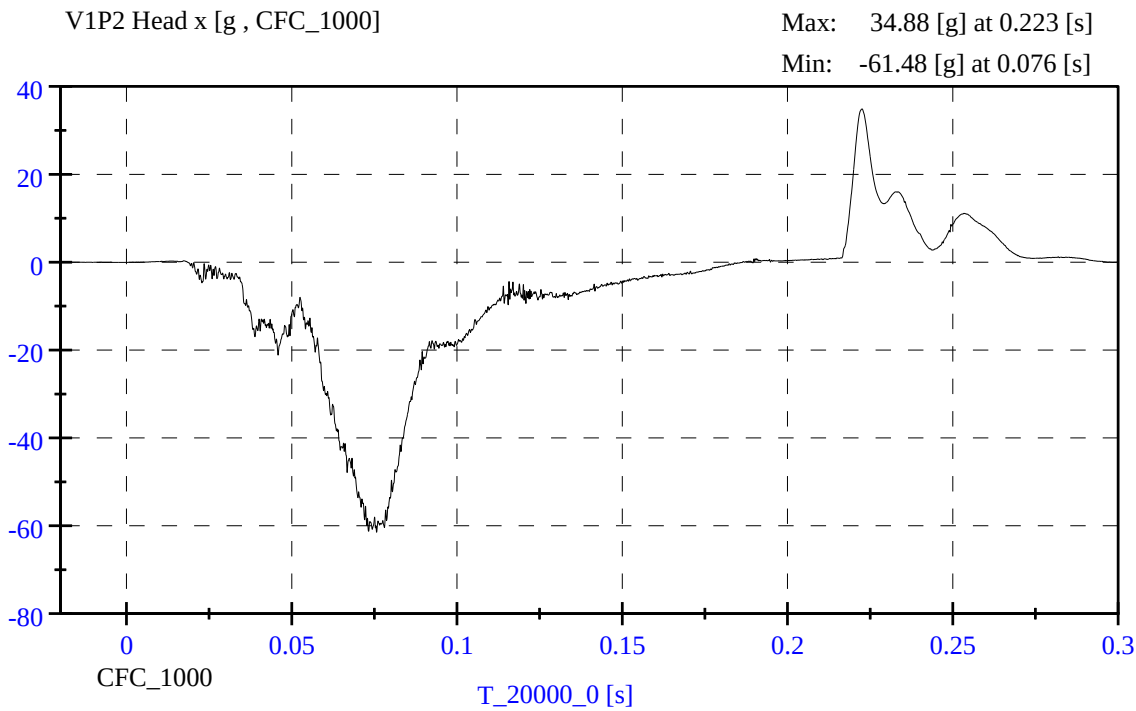
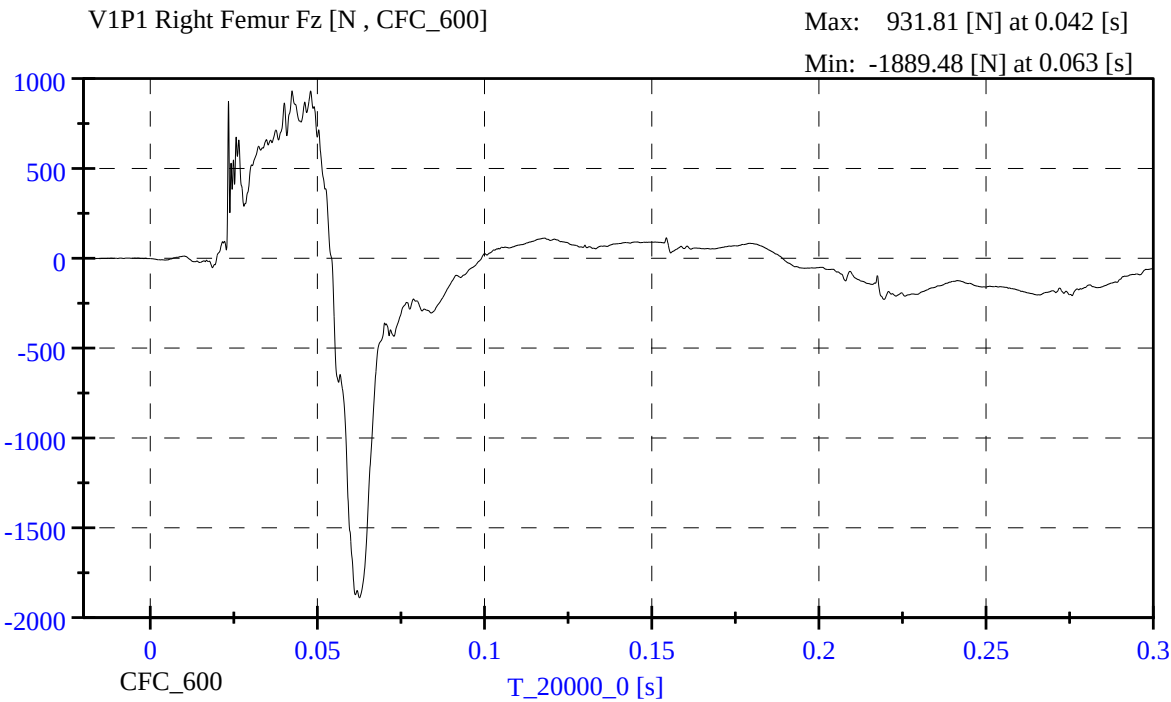


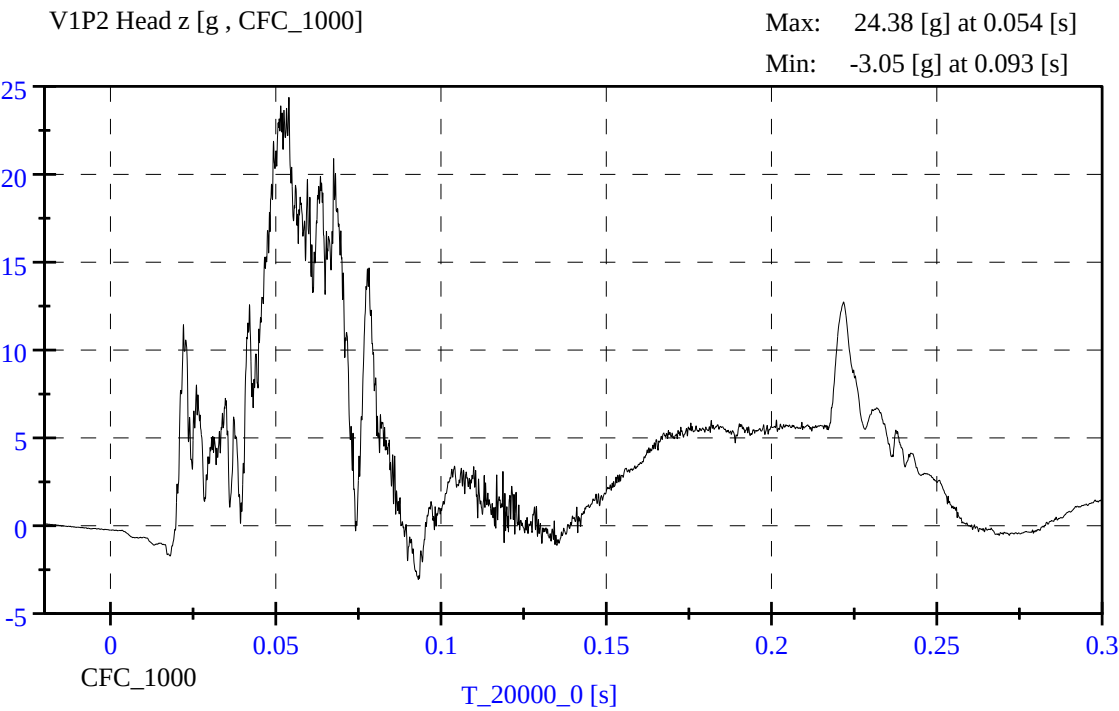
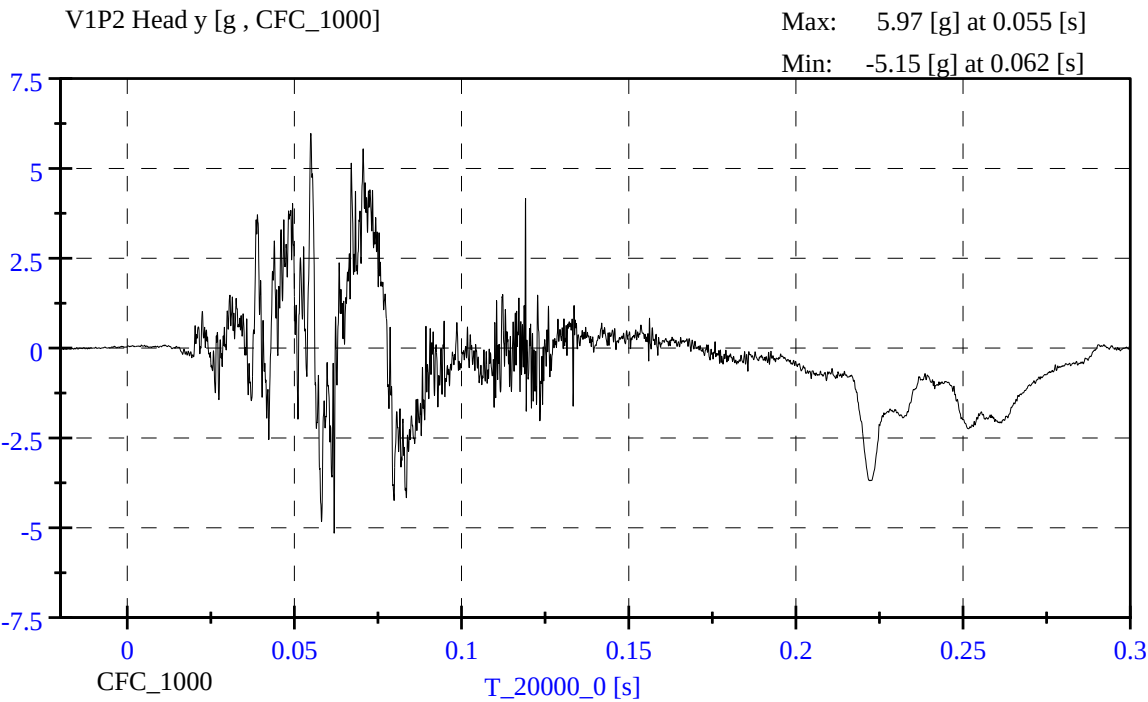


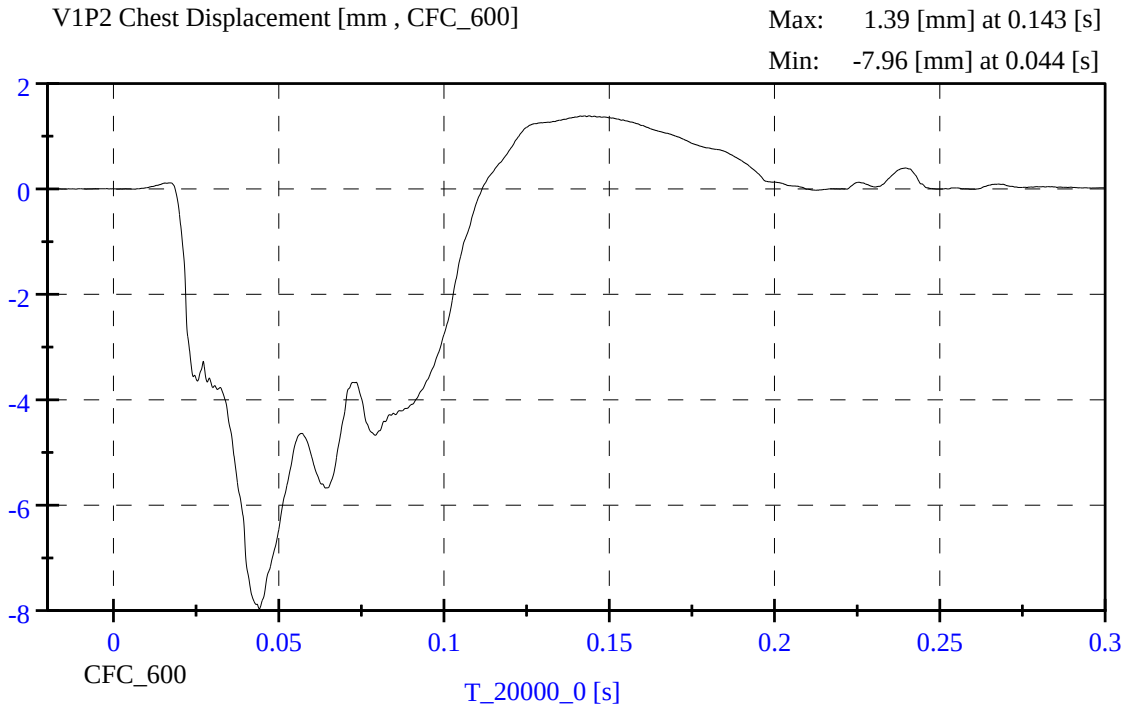
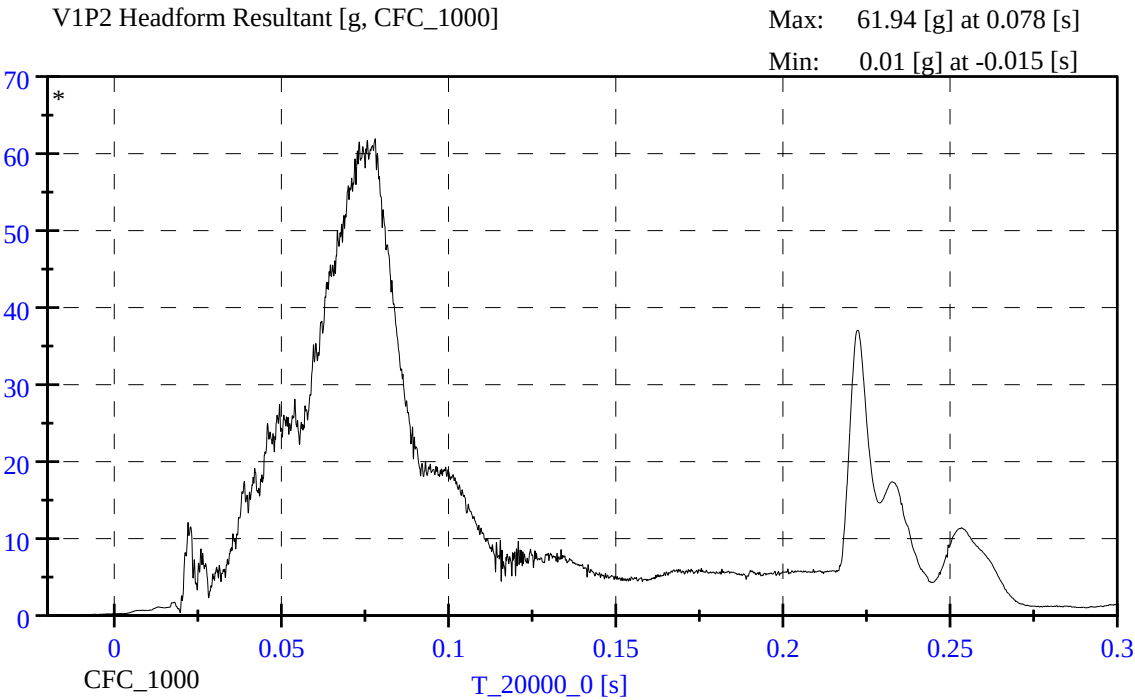


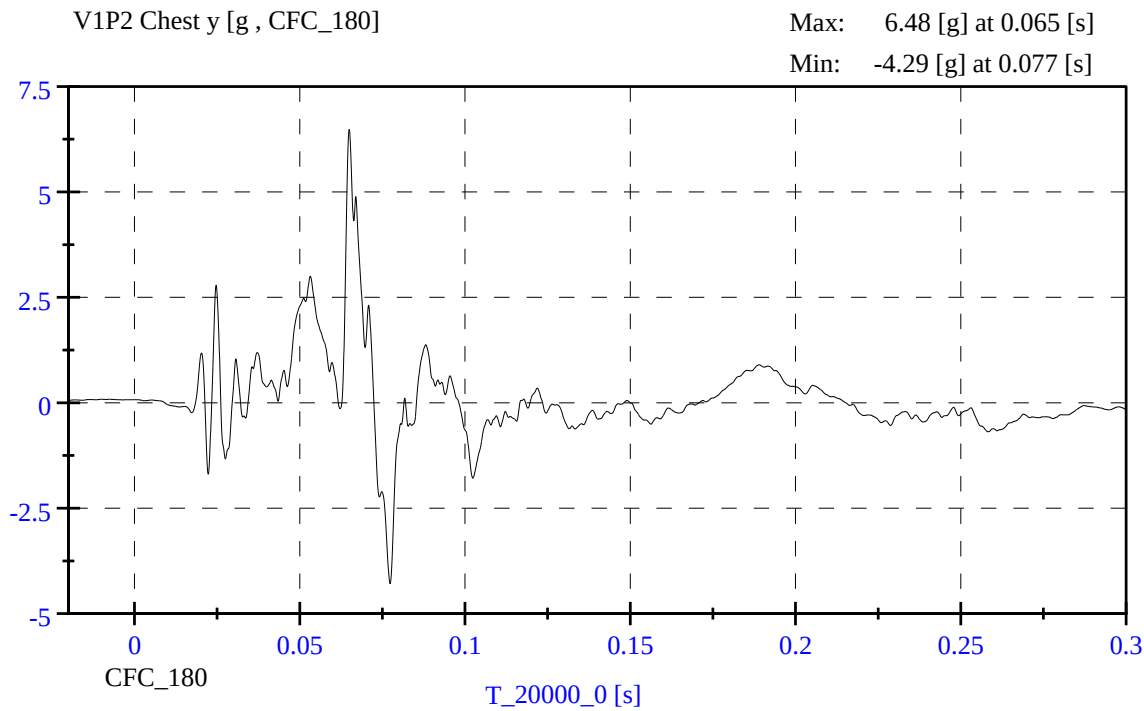
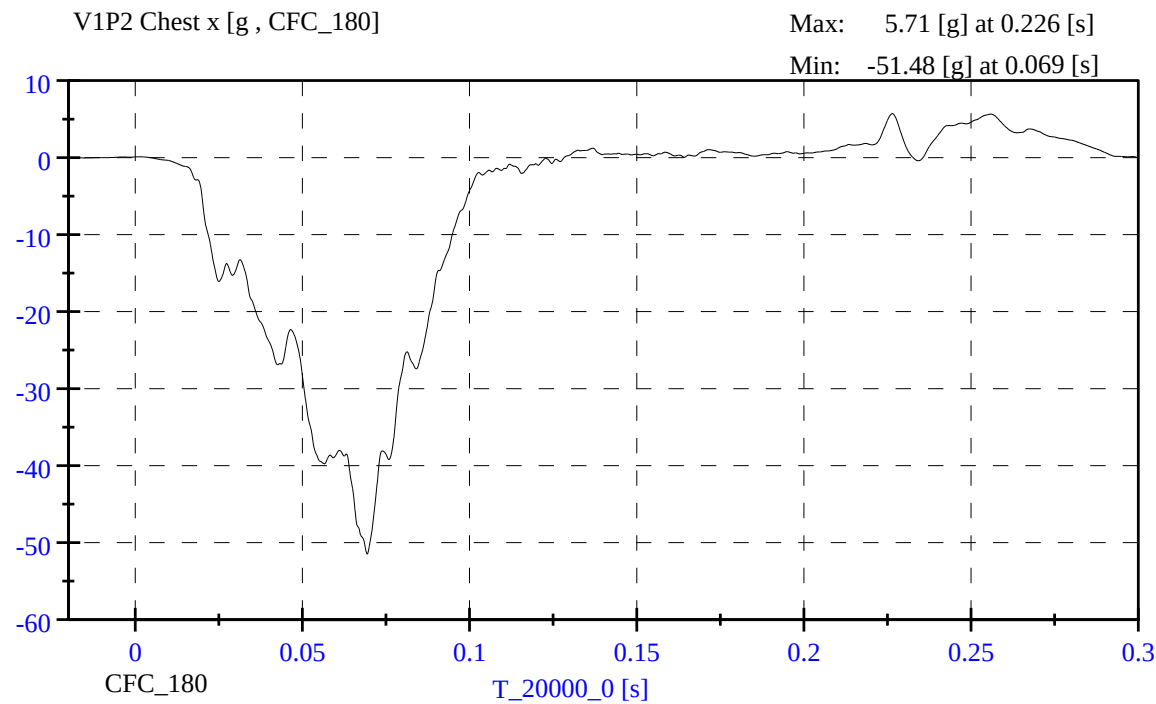


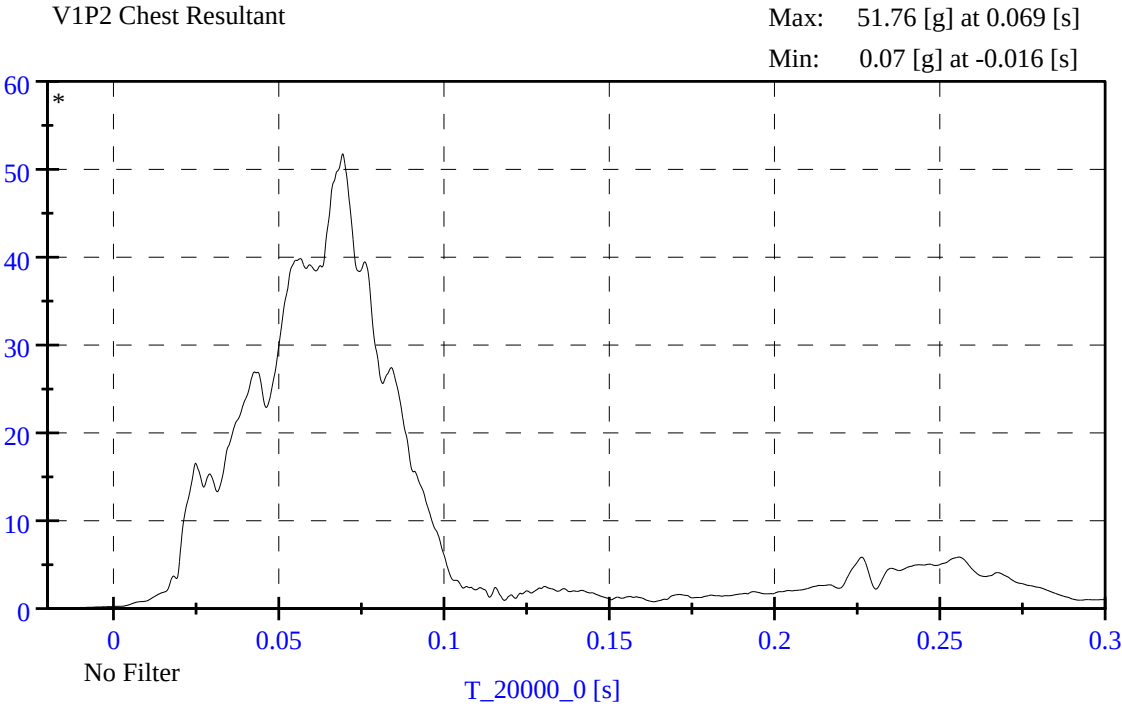
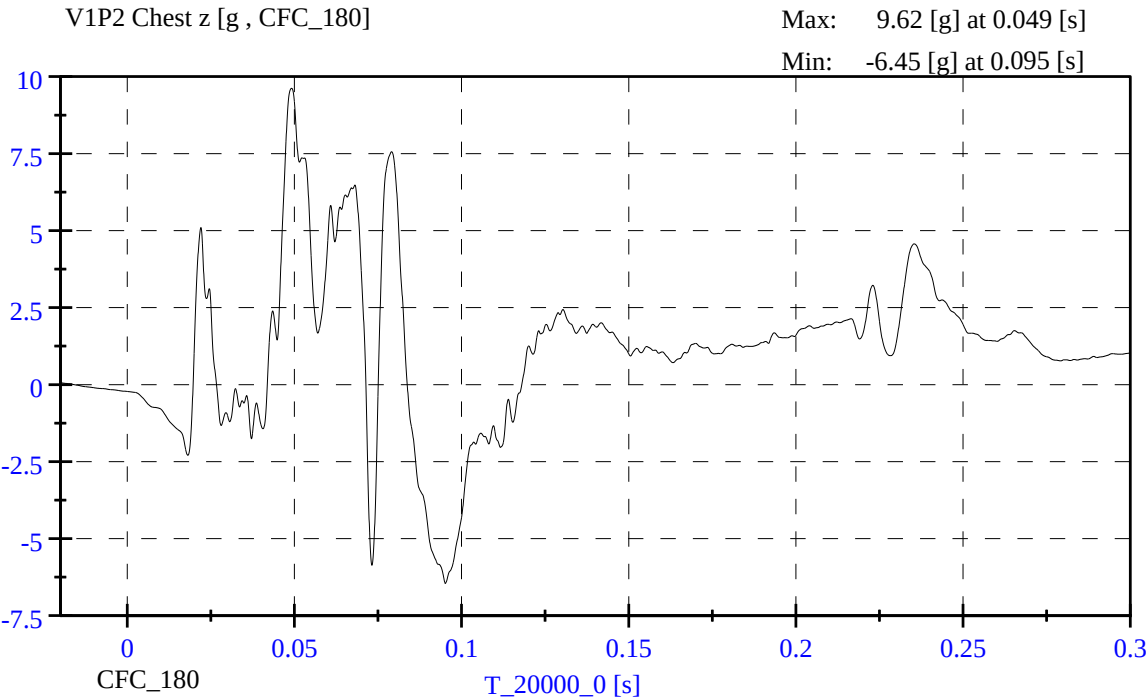


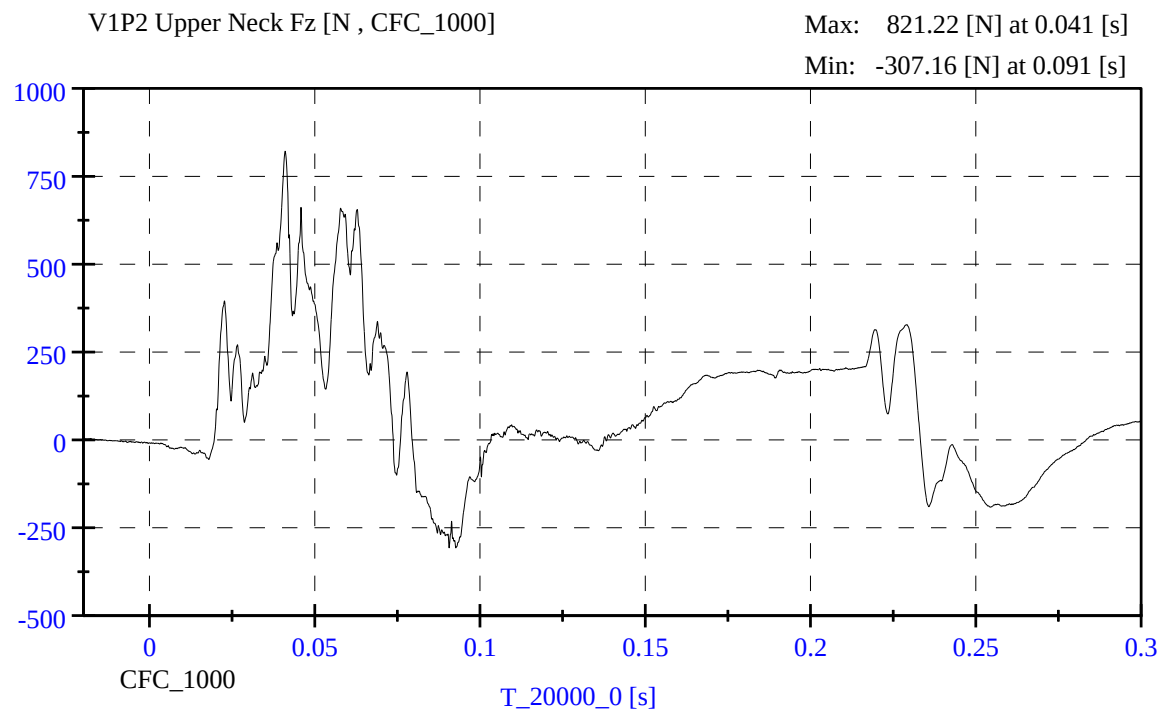
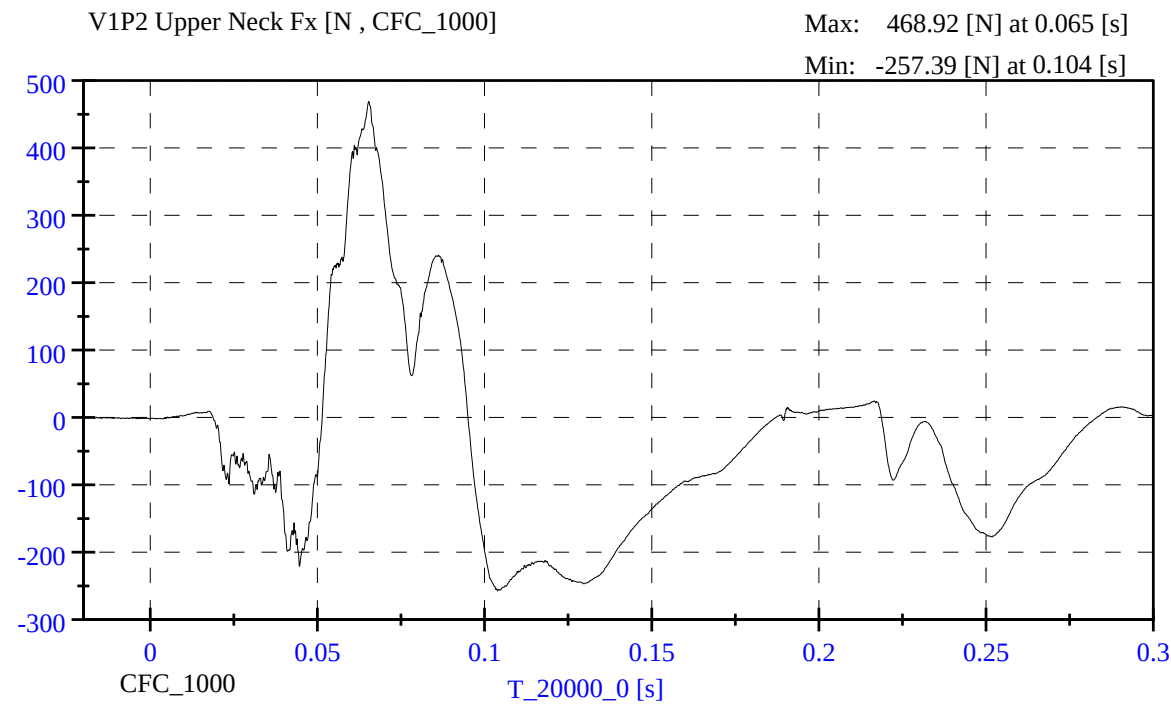


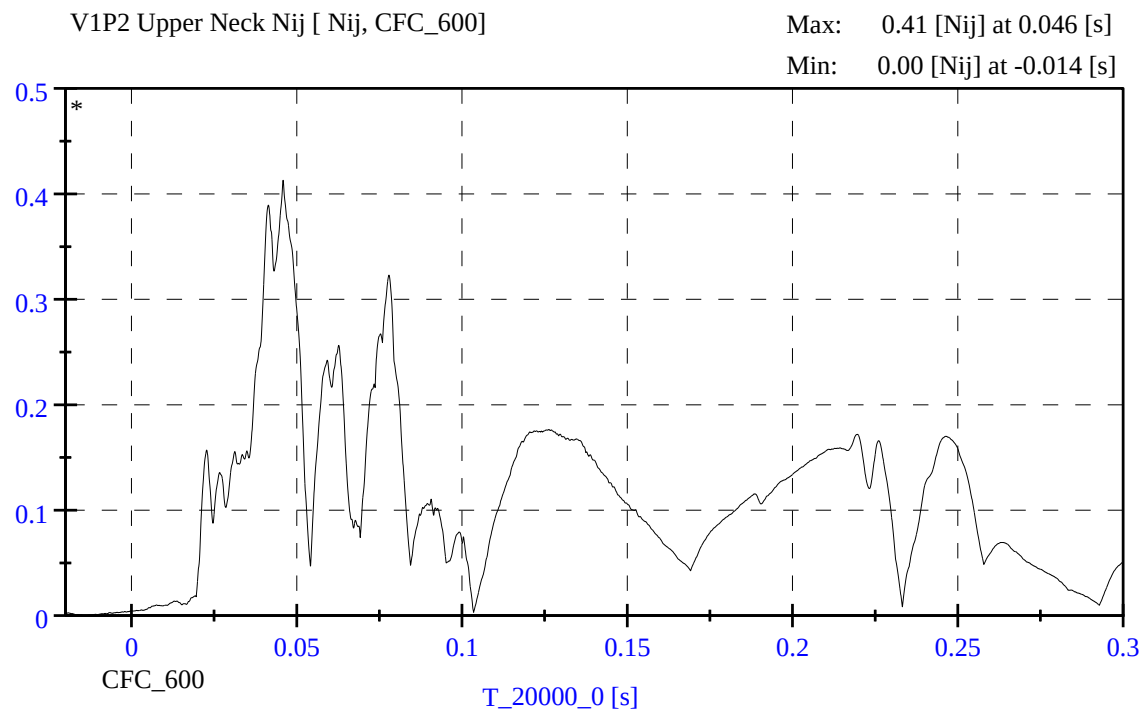
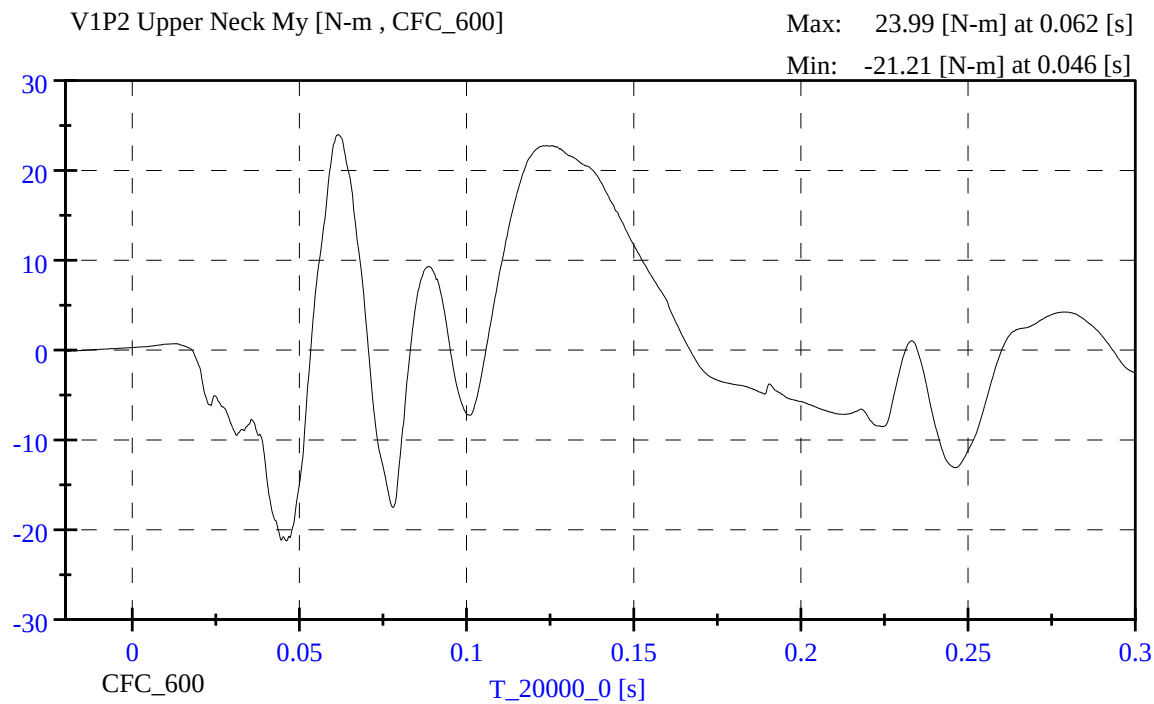


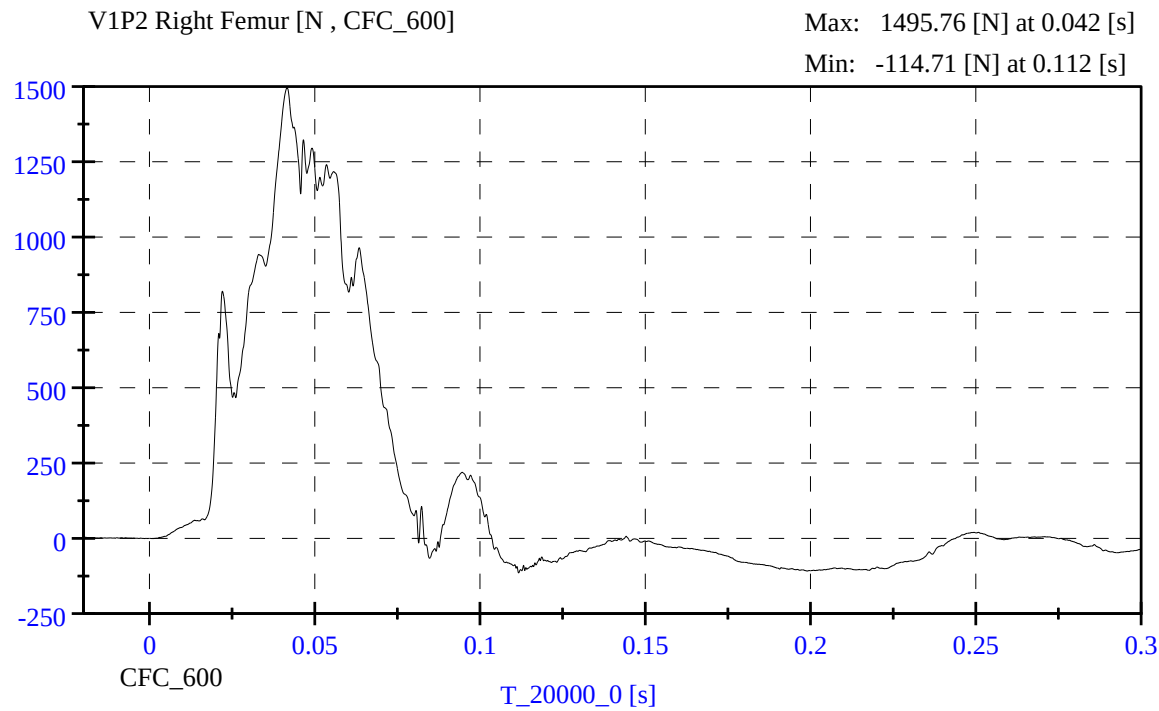
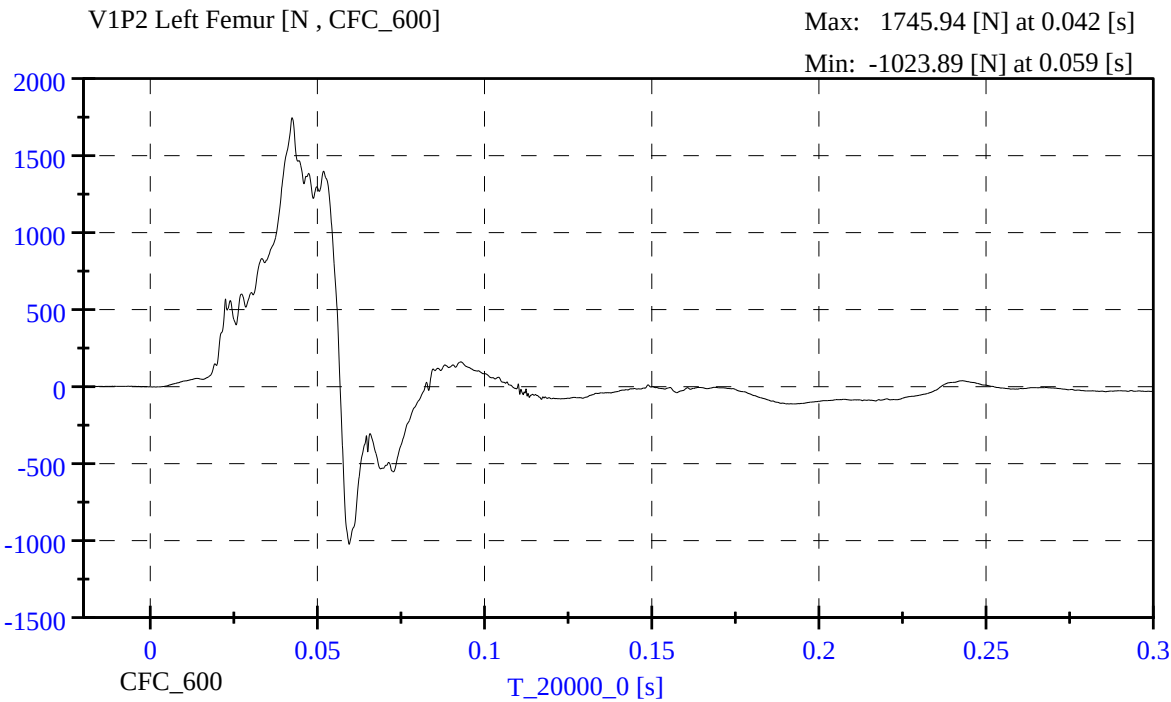












APPENDIX C

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

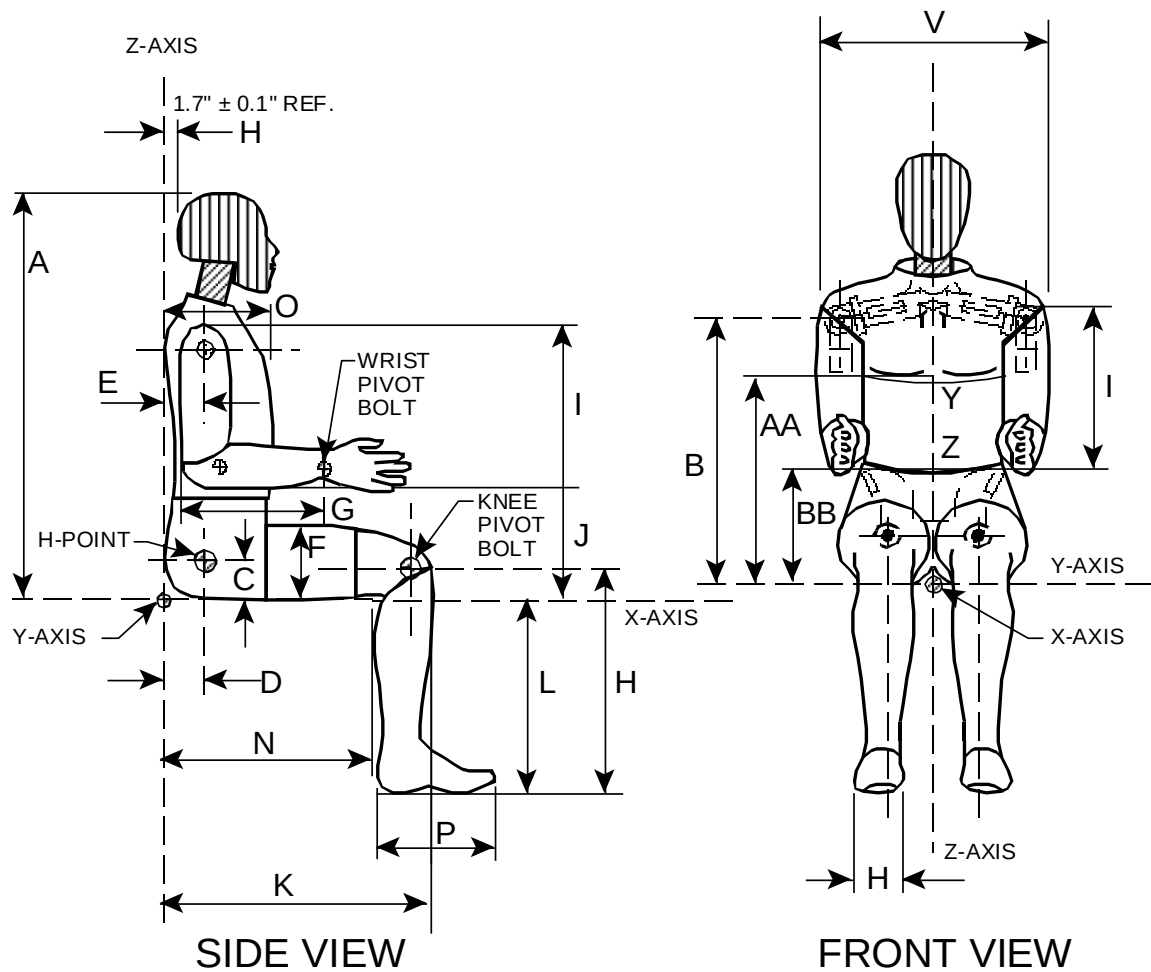
The tests were conducted at the Dummy Certification Test Facility of Calspan. A summary of the test results, and Part 572 specifications are included in this Appendix.

Dummy serial numbers and certification dates are:

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

DUMMY CONFIGURATION DIMENSIONS

EXTERNAL DIMENSIONS SPECIFICATIONS



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

CALIBRATION TEST RESULTS

PRE-TEST

DRIVER DUMMY

S/N: 064



www.calspan.com

Calspan - Transportation Research Group

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

50th Male External Measurements

S/N 064

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

Technician: AR

Date: 12/16/2011



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

Test Name:	Head Drop	Revision:	10/1/2001
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 50'th		
ATD Serial Number:	064		
Test ID:		Test Date:	12/16/2011
Test Number:	1	Test Time:	8:35:15 AM

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

Test Parameters	Test Specifications	Test Results
Temperature	18.9 -- 25.6	21.7 deg C P
Humidity	10 -- 70	27 %RH P
Resultant Acceleration	225 -- 275	244 g P
Oscillation	0.0 -- 10.0	2.2 % P
Lateral Acceleration	-15.00 -- 15.00	3.03 g P

All test parameters are within specifications

Technician: S. Zito

Supervisor: D. Travale

Test ID:

Test Time: **8:35:15 AM**

Test Date: **12/16/2011**

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

1 of 2

PDF created with FinePrint pdfFactory Pro trial version <http://www.fineprint.com>



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

REFERENCE EQUIPMENT

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

Test ID:

Test Time: **8:35:15 AM**

Test Date: **12/16/2011**

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

2 of 2

PDF created with FinePrint pdfFactory Pro trial version <http://www.fineprint.com>

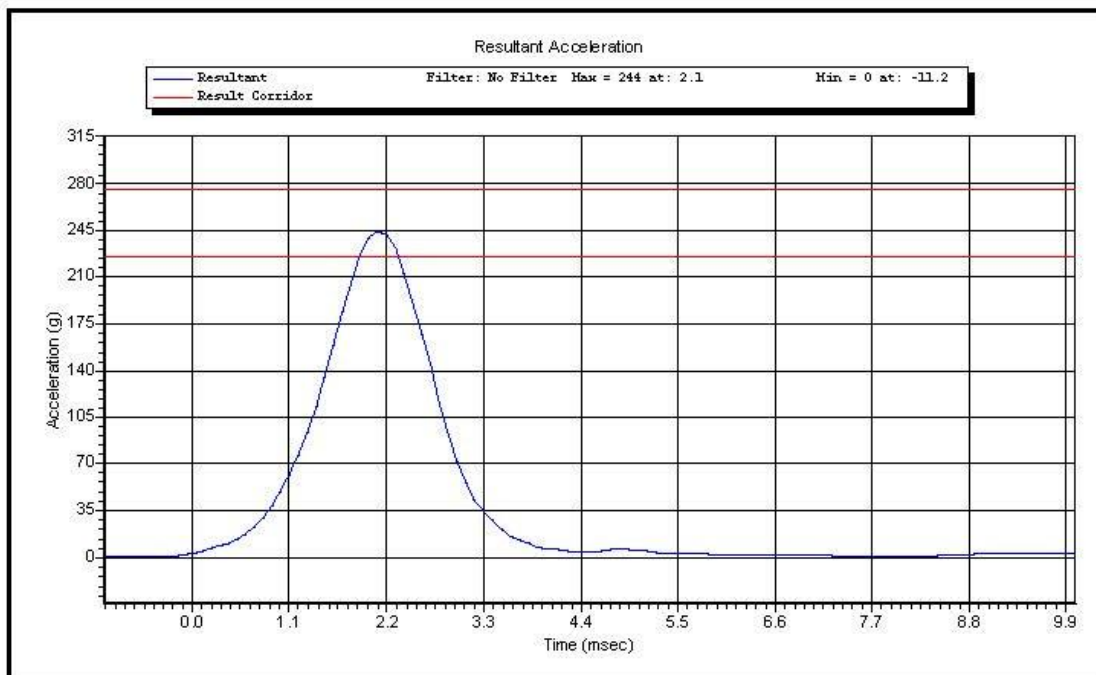


www.calspan.com

Calspan - Transportation Research Group

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

Test Name:	Head Drop	Revision:	10/1/2001
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 50'th		
ATD Serial Number:	064		
Test ID:		Test Date:	12/16/2011
Test Number:	1	Test Time:	8:35:15 AM



Test ID:

Test Time: 8:35:15 AM

Test Date: 12/16/2011

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

1 of 2

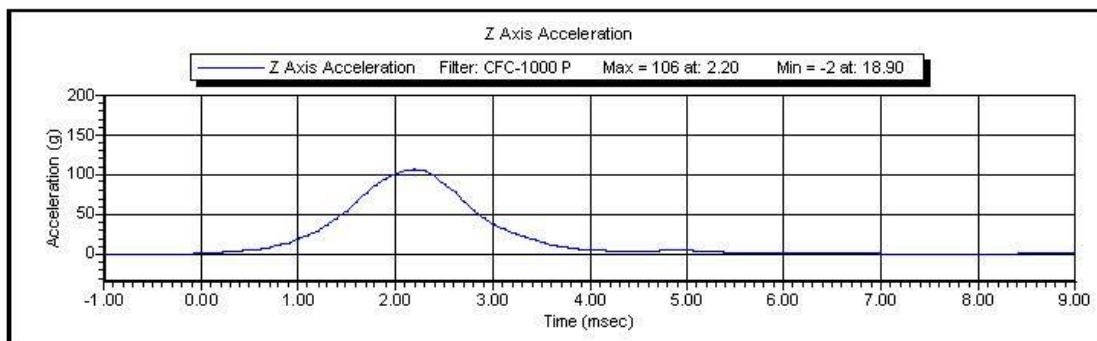
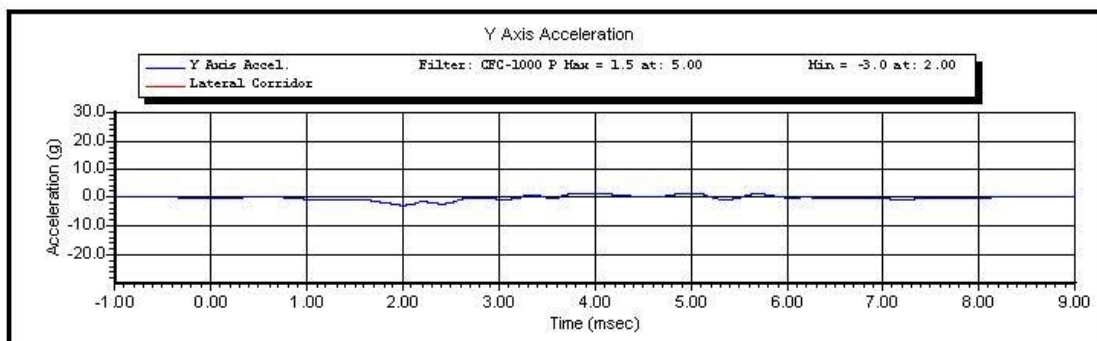
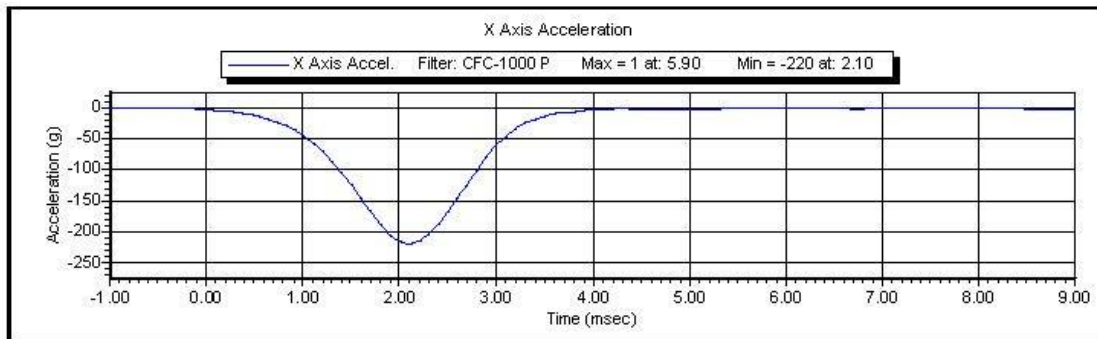
PDF created with FinePrint pdfFactory Pro trial version <http://www.fineprint.com>



www.calspan.com

Calspan - Transportation Research Group

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



Test ID:

Test Time: 8:35:15 AM

Test Date: 12/16/2011

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

2 of 2

PDF created with FinePrint pdfFactory Pro trial version <http://www.fineprint.com>



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

Test Name:	Neck Extension	Revision:	10/1/2001
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 50'th		
ATD Serial Number:	064		
Test ID:		Test Date:	12/16/2011
Test Number:	1	Test Time:	1:11:02 PM

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

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.0 deg C P
Humidity	10 -- 70	26 %RH P
Velocity	5.94 -- 6.19	6.12 m/s P
Pendulum Deceleration at 10 ms	17.2 -- 21.2	20.1 g P
Pendulum Deceleration at 20 ms	14.0 -- 19.0	16.0 g P
Pendulum Deceleration at 30 ms	11.0 -- 16.0	13.4 g P
Max Pendulum Deceleration after 30 ms	0.0 -- 22.0	15.7 g P
Decel Time to 5 g	38.0 -- 46.0	38.6 ms P
D Plane Rotation	81.0 -- 106.0	98.4 degrees P
Time at Max Rotation	72.0 -- 82.0	77.0 ms P
Rotation Decay to Zero	147.0 -- 174.0	155.6 ms P
Moment About Occipital Condyle	-80.0 -- -52.9	-67.7 Nm P
Time at Max Moment	65.0 -- 79.0	72.8 ms P
Moment Decay to Zero	120.0 -- 148.0	142.7 ms P

All test parameters are within specifications

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

Test ID:

Test Time: **1:11:02 PM**

Test Date: **12/16/2011**

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

1 of 2

PDF created with FinePrint pdfFactory Pro trial version <http://www.fineprint.com>



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

REFERENCE EQUIPMENT

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

Test ID:

Test Time: **1:11:02 PM**

Test Date: **12/16/2011**

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

2 of 2

PDF created with FinePrint pdfFactory Pro trial version <http://www.fineprint.com>

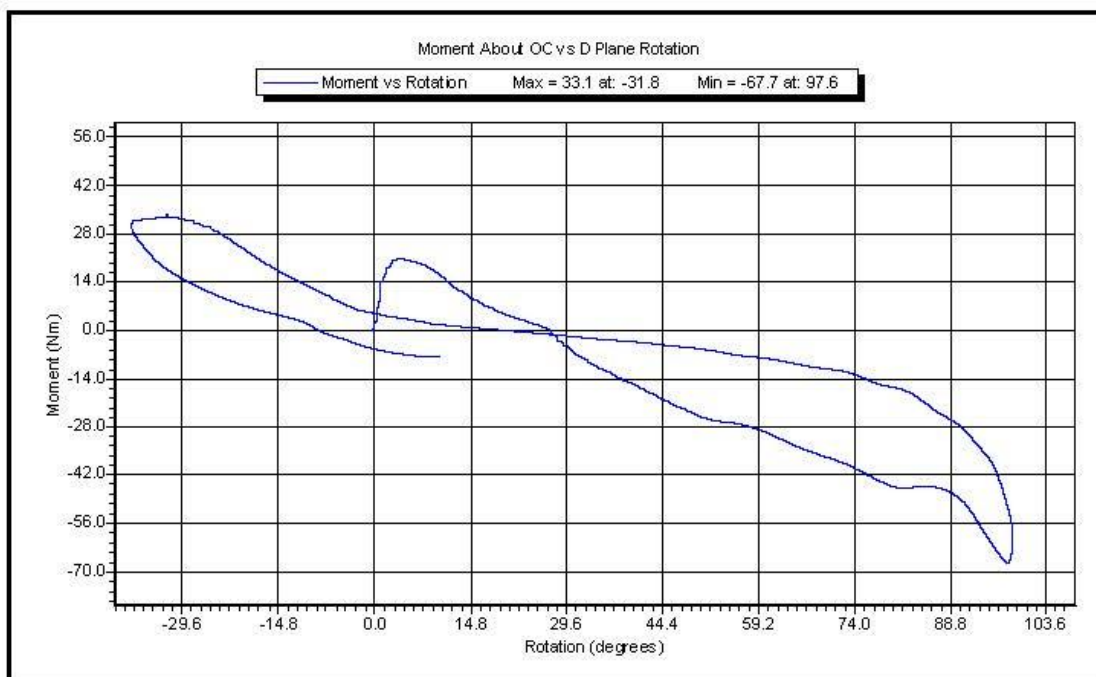


www.calspan.com

Calspan - Transportation Research Group

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

Name of Test:	Neck Extension	REVISION:	10/1/2001
Name of Sub Test:		Type of Spec:	NHTSA
Type of ATD:	Hybrid III 50'th		
ATD Serial Number:	064		
ID of Test:		Date:	12/16/2011
Number of Test:	1	Time of Test:	1:11:02 PM



ID of Test:

Time of Test: 1:11:02 PM

Date of Test: 12/16/2011

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

1 of 2

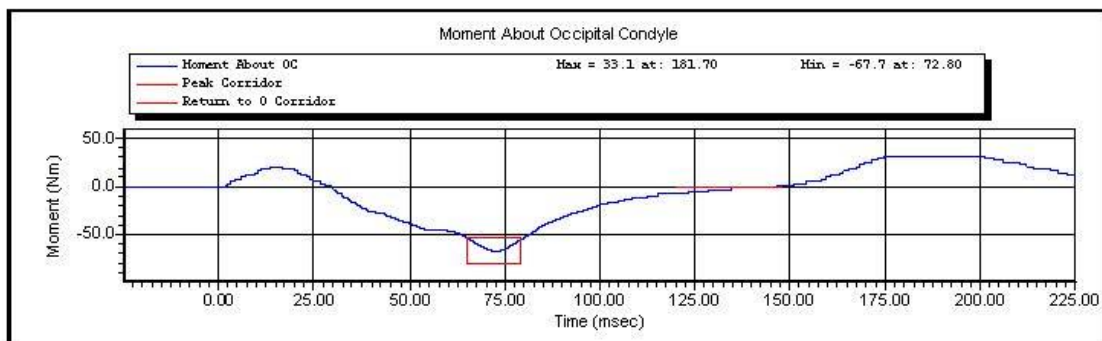
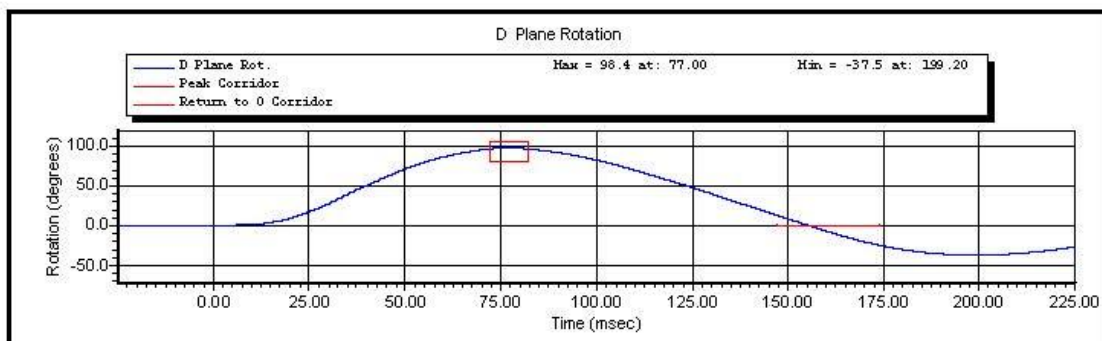
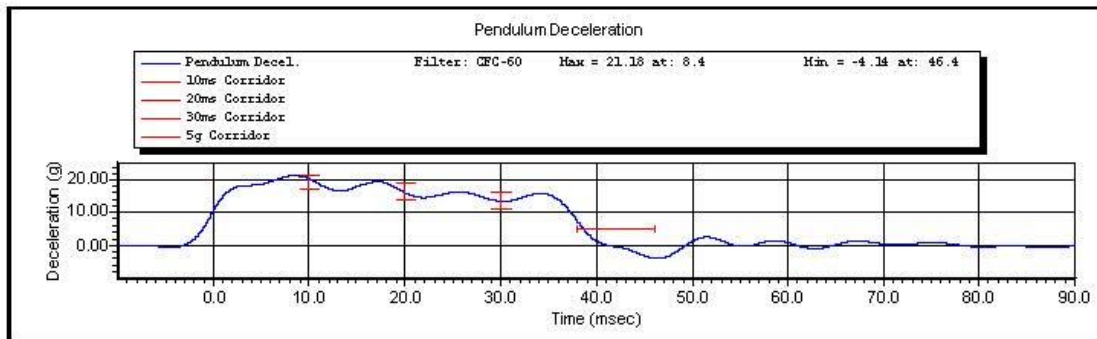
PDF created with FinePrint pdfFactory Pro trial version <http://www.fineprint.com>



www.calspan.com

Calspan - Transportation Research Group

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



ID of Test:

Time of Test: 1:11:02 PM

Date of Test: 12/16/2011

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

2 of 2

PDF created with FinePrint pdfFactory Pro trial version <http://www.fineprint.com>

VERIFICATION REPORT

Test Name:	Neck Flexion	Revision:	10/1/2001
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 50'th		
ATD Serial Number:	064		
Test ID:		Test Date:	12/16/2011
Test Number:	1	Test Time:	11:06:52 AM

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

Test Parameters		Test Specifications		Test Results	
Temperature		20.6	-- 22.2	22.0 deg C	P
Humidity		10	-- 70	26 %RH	P
Velocity		6.89	-- 7.13	7.09 m/s	P
Pendulum Deceleration at	10 ms	22.5	-- 27.5	26.0 g	P
Pendulum Deceleration at	20 ms	17.6	-- 22.6	20.0 g	P
Pendulum Deceleration at	30 ms	12.5	-- 18.5	16.8 g	P
Max Pendulum Deceleration After	30 ms	0.0	-- 29.0	16.8 g	P
Deceleration time to	5 g	34.0	-- 42.0	37.7 ms	P
D Plane Rotation		-78.0	-- -64.0	-72.9 degrees	P
Time at max rotation		57.0	-- 64.0	59.6 ms	P
Rotation Decay to Zero		113.0	-- 128.0	114.7 ms	P
Moment about OC		88.1	-- 108.4	89.6 Nm	P
Time at Max Moment		47.0	-- 58.0	54.3 ms	P
Moment Decay to Zero		97.0	-- 107.0	103.6 ms	P

All test parameters are within specifications

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

Test ID:

Test Time: **11:06:52 AM**

Test Date: **12/16/2011**



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

REFERENCE EQUIPMENT

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

Test ID:

Test Time: **11:06:52 AM**

Test Date: **12/16/2011**

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

2 of 2

PDF created with FinePrint pdfFactory Pro trial version <http://www.fineprint.com>

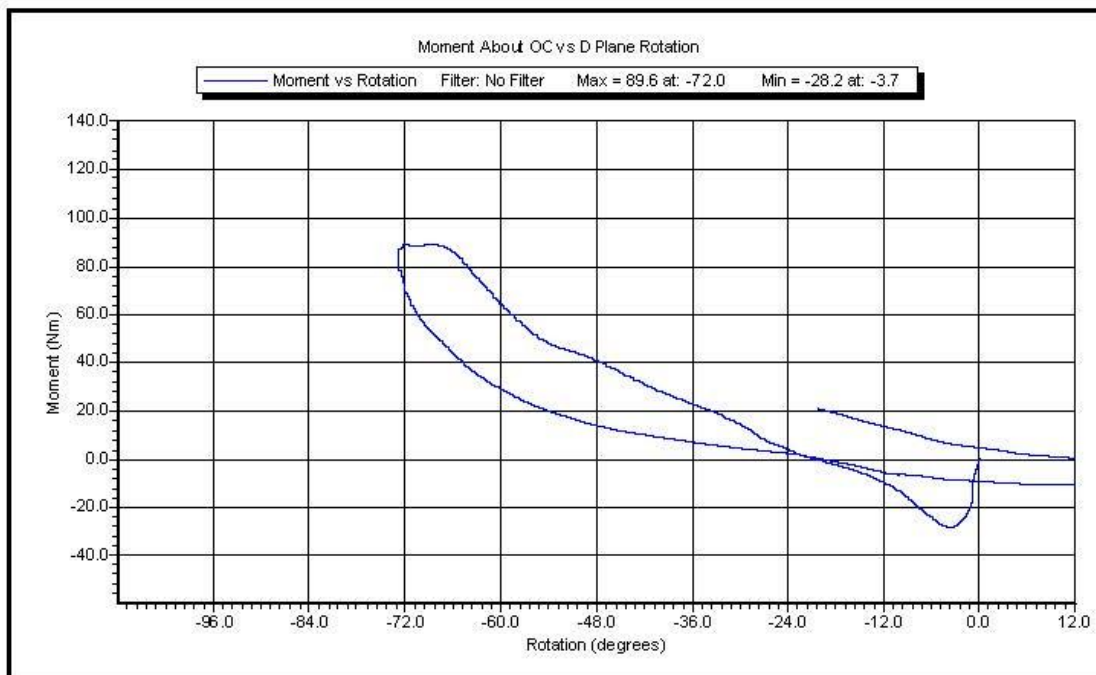


www.calspan.com

Calspan - Transportation Research Group

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

Name of Test:	Neck Flexion	REVISION:	10/1/2001
Name of Sub Test:		Type of Spec:	NHTSA
Type of ATD:	Hybrid III 50'th		
ATD Serial Number:	064		
ID of Test:		Date:	12/16/2011
Number of Test:	1	Time of Test:	11:06:52 AM



ID of Test:

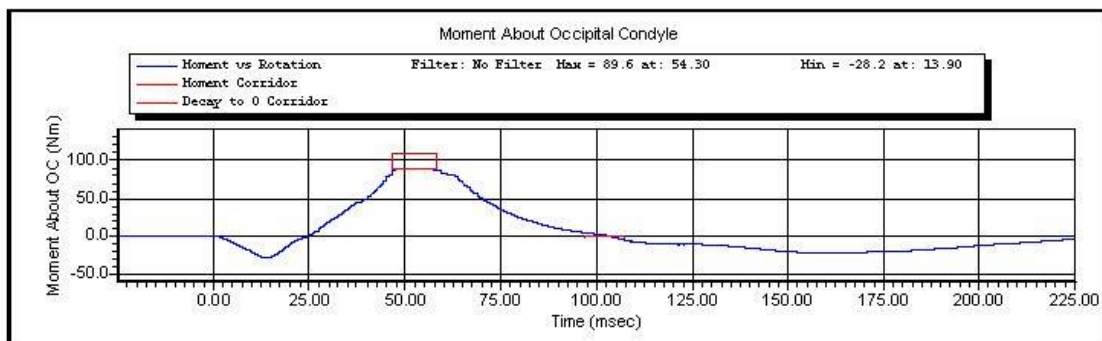
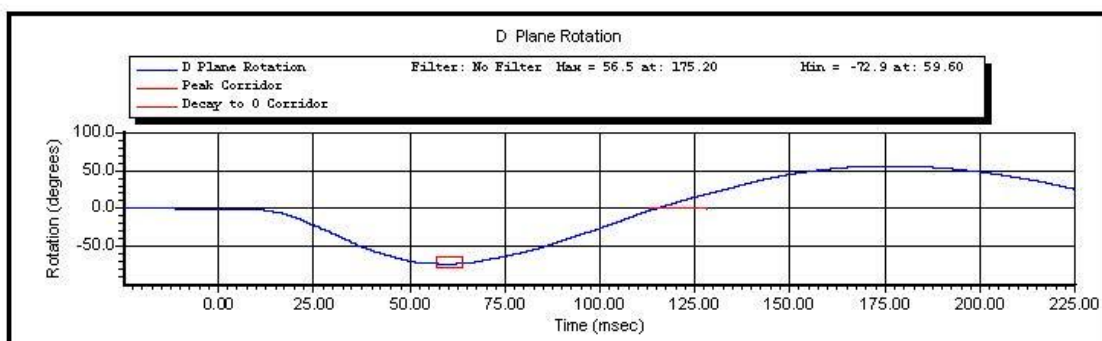
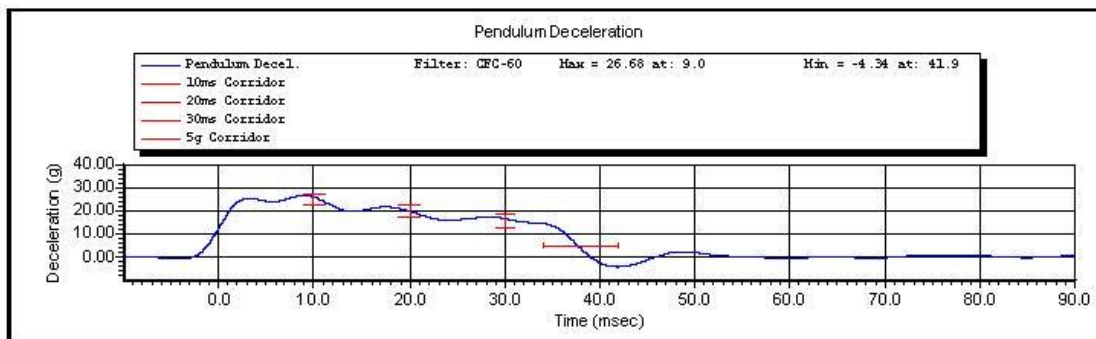
Time of Test: 11:06:52 AM

Date of Test: 12/16/2011

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

1 of 2

PDF created with FinePrint pdfFactory Pro trial version <http://www.fineprint.com>



ID of Test:

Time of Test: 11:06:52 AM

Date of Test: 12/16/2011

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

2 of 2

PDF created with FinePrint pdfFactory Pro trial version <http://www.fineprint.com>



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

Test Name:	Thorax Impact	Revision:	10/1/2001
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 50'th		
ATD Serial Number:	064		
Test ID:		Test Date:	12/19/2011
Test Number:	3	Test Time:	11:57:58 AM

Component Part Number	Component Serial Number
Ribs 78051-RS	3964
Chest Jacket - 78051-169	2589

Test Parameters	Test Specifications			Test Results	
Temperature	20.6	--	22.2	21.6 deg C	P
Humidity	10.0	--	70.0	25.2 %RH	P
Velocity	6.59	--	6.83	6.77 m/s	P
Resistive Force	-5.894	--	-5.160	-5.852 kN	P
Sternum Displacement	-72.6	--	-63.5	-65.1 mm	P
Hysteresis	69	--	85	76 %	P

All test parameters are within specifications

Technician: **S. Zito**

Supervisor: **D. Travale**

Test ID:

Test Time: **11:57:58 AM**

Test Date: **12/19/2011**



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7231CT	AGHF5	12/14/2011
DentonATD	78051-342	DS-064	10/13/2011

Test ID:

Test Time: **11:57:58 AM**

Test Date: **12/19/2011**

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

2 of 2

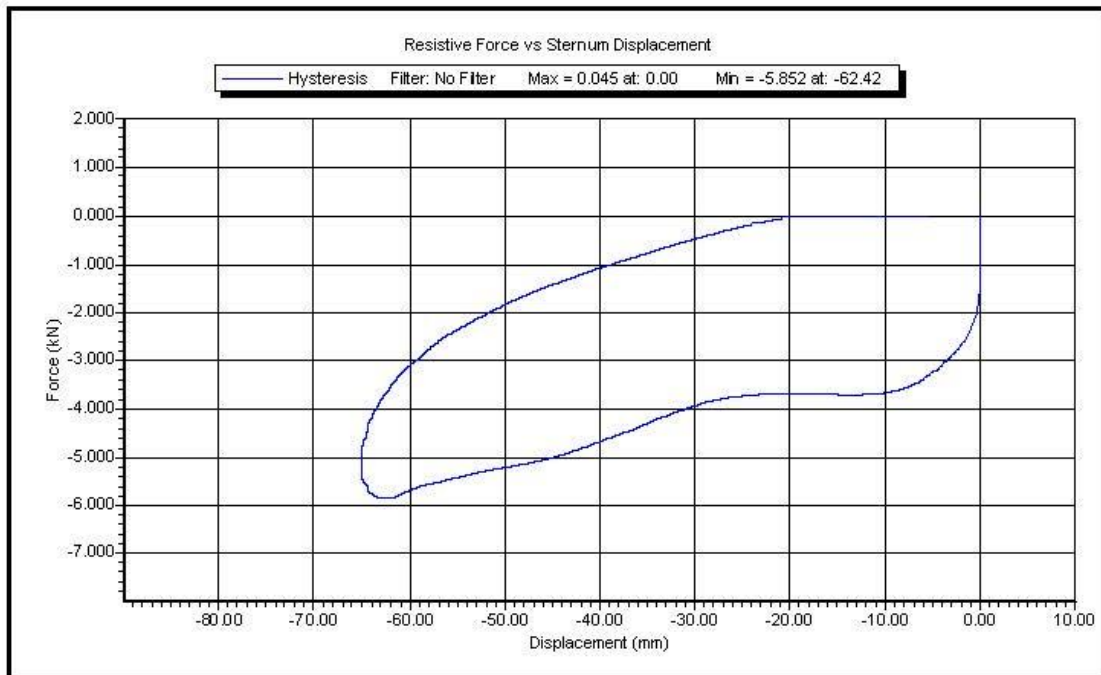


www.calspan.com

Calspan - Transportation Research Group

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

Test Name:	Thorax Impact	Revision:	10/1/2001
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 50'th		
ATD Serial Number:	064		
Test ID:		Test Date:	12/19/2011
Test Number:	3	Test Time:	11:57:58 AM



Test ID:

Test Time: 11:57:58 AM

Test Date: 12/19/2011

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

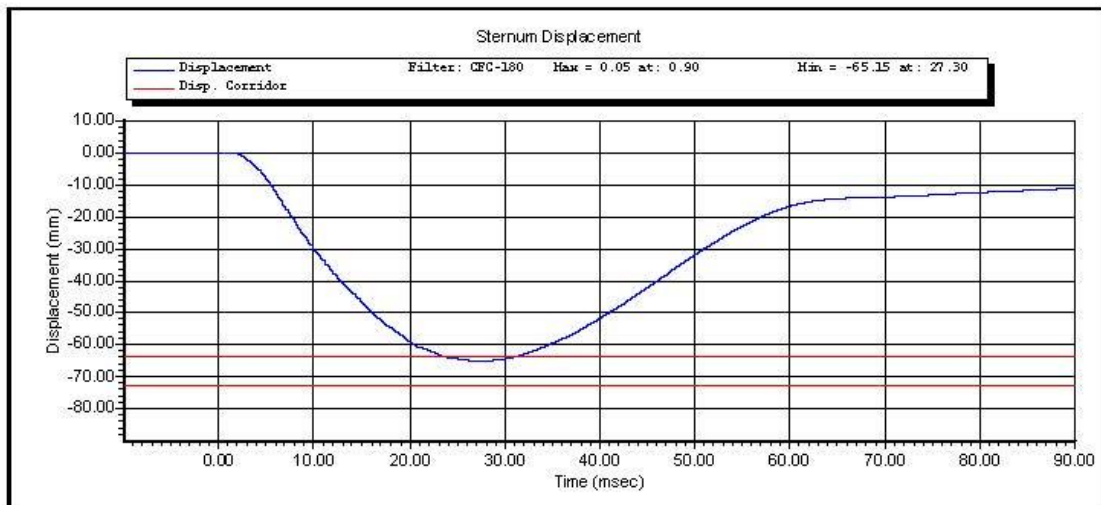
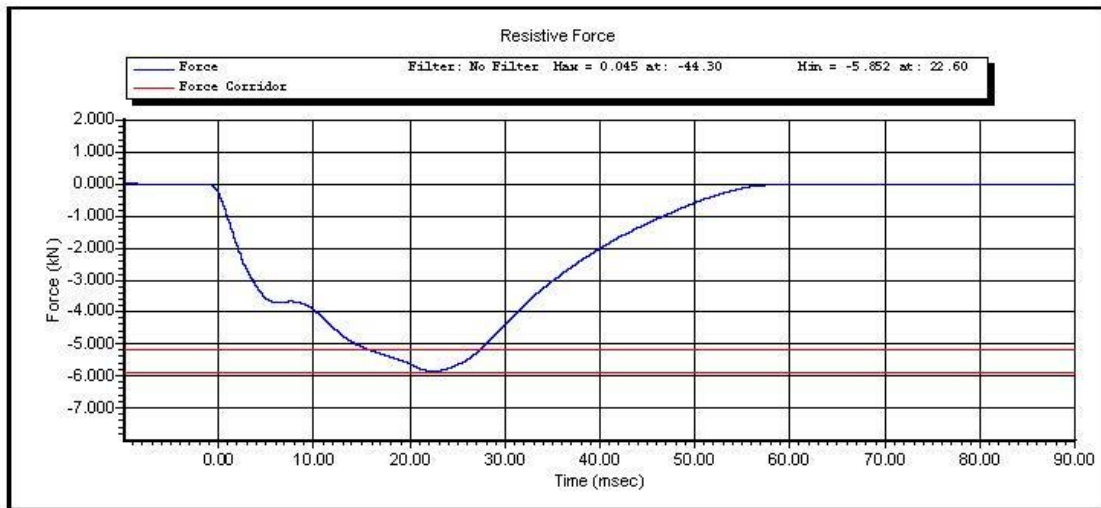
1 of 2



www.calspan.com

Calspan - Transportation Research Group

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



Test ID:

Test Time: 11:57:58 AM

Test Date: 12/19/2011

Copyright 2003 Denton ATD, Inc. LabPaq Version: 1.8.5.0

2 of 2

CALSPAN

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

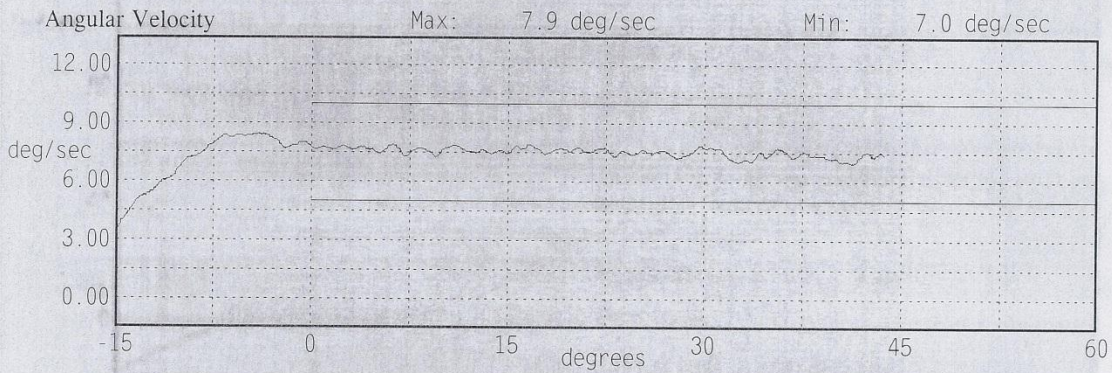
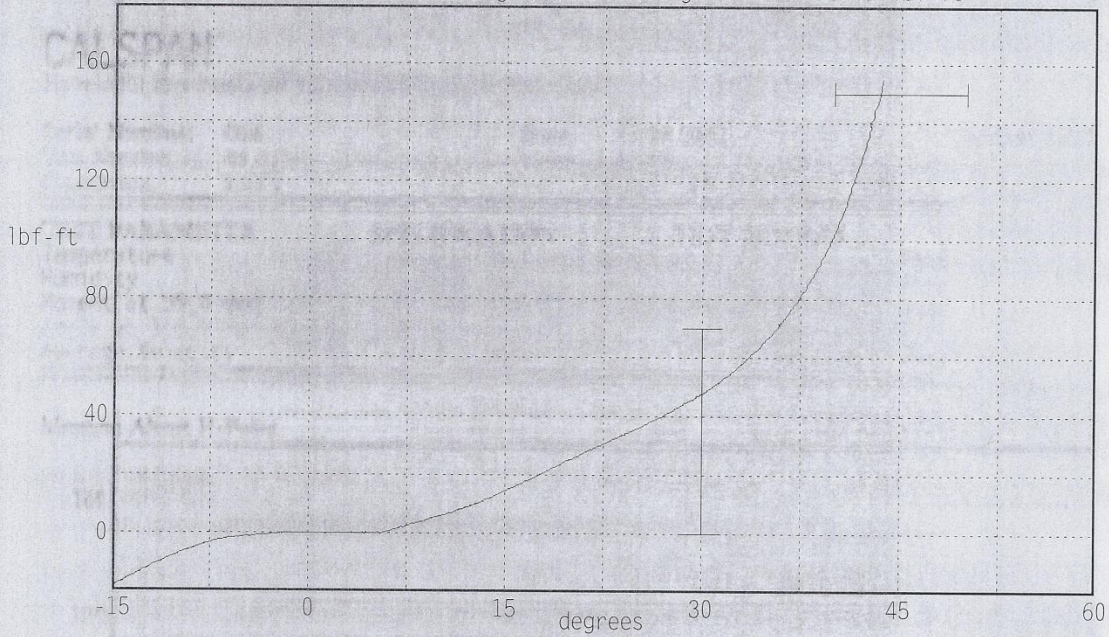
Serial Number: 064
Test Number: 01
Comments: LEFT

Date: 12/19/2011
Time: 13:59

Version: 1.6.3

TEST PARAMETER	SPECIFICATION	TEST RESULTS	
Temperature	66.0 - 78.0	71.0 °F	Pass
Humidity	10 - 70	26 %	Pass
Moment at 30.0 deg	<= 70.0	47.8 lbf-ft	Pass
Angle at 150.0 lbf-ft	40.0 - 50.0	43.5 deg	Pass
Average Velocity	5.0 - 10.0	7.5 deg/sec	Pass

Moment About H-Point
Peak Moment: 154.9 lbf-ft at 43.6 deg
Peak Angle: 43.6 deg at 154.9 lbf-ft



CALSPAN

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

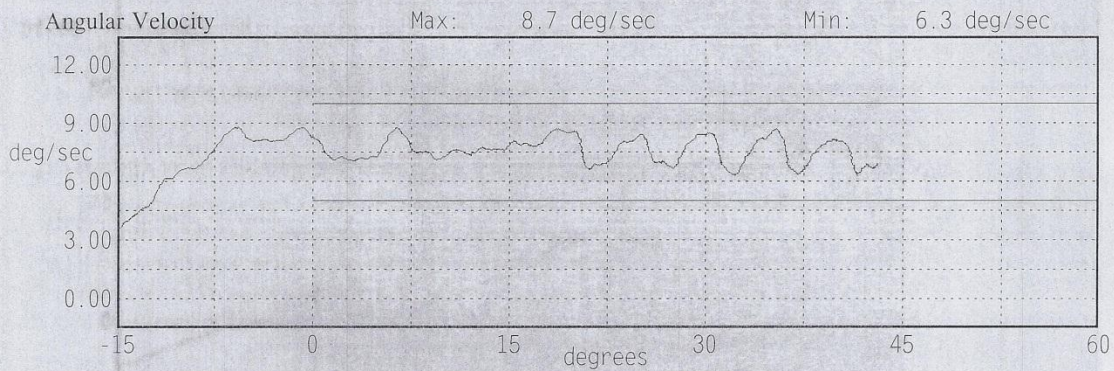
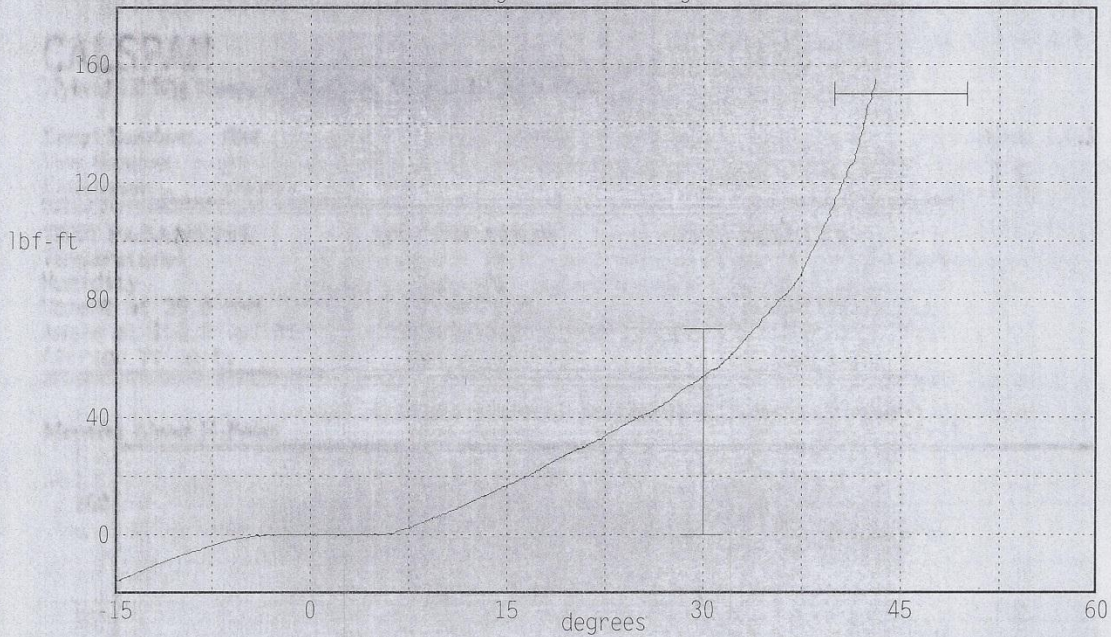
Serial Number: 064
Test Number: 01
Comments: RIGHT

Date: 12/19/2011
Time: 14:13

Version: 1.6.3

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	66.0 - 78.0	71.0 °F Pass
Humidity	10 - 70	26 % Pass
Moment at 30.0 deg	<= 70.0	53.9 lbf-ft Pass
Angle at 150.0 lbf-ft	40.0 - 50.0	42.9 deg Pass
Average Velocity	5.0 - 10.0	7.5 deg/sec Pass

Moment About H-Point
Peak Moment: 154.9 lbf-ft at 43.1 deg
Peak Angle: 43.1 deg at 154.9 lbf-ft





www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

Test Name:	Knee Impact PENDULUM	Revision:	10/1/2001
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 50'th		
ATD Serial Number:	064		
Test ID:	Left Knee	Test Date:	12/19/2011
Test Number:	2	Test Time:	4:23:24 PM

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

Test Parameters	Test Specifications	Test Results
Temperature	18.9 -- 25.6	21.1 deg C P
Humidity	10.0 -- 70.0	30.5 %RH P
Velocity	2.07 -- 2.13	2.09 m/s P
Resistive Force	-5.78 -- -4.72	-5.18 kN P

All test parameters are within specifications

Technician: S. Zito

Supervisor: D. Travale

Test ID: **Left Knee**

Test Time: **4:23:24 PM**

Test Date: **12/19/2011**



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

REFERENCE EQUIPMENT

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

Test ID: **Left Knee**

Test Time: **4:23:24 PM**

Test Date: **12/19/2011**

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

2 of 2

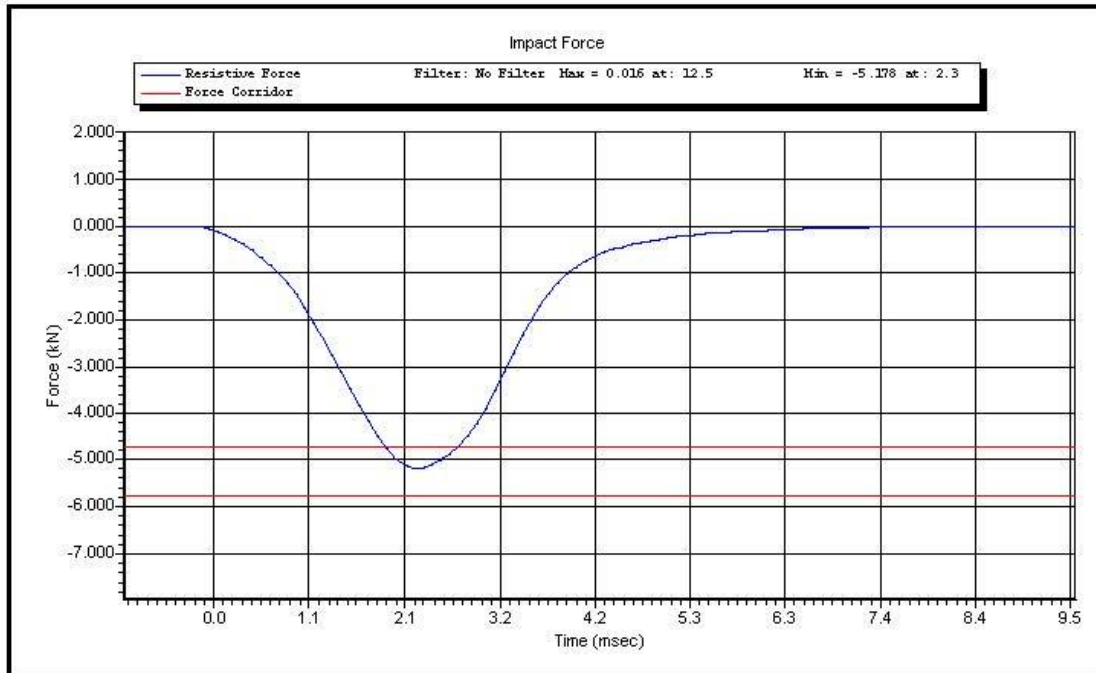


www.calspan.com

Calspan - Transportation Research Group

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

Test Name:	Knee Impact PENDULUM	Revision:	10/1/2001
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 50'th		
ATD Serial Number:	064		
Test ID:	Left Knee	Test Date:	12/19/2011
Test Number:	2	Test Time:	4:23:24 PM



Test ID: **Left Knee**

Test Time: **4:23:24 PM**

Test Date: **12/19/2011**

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

1 of 1



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

Test Name:	Knee Impact PENDULUM	Revision:	10/1/2001
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 50'th		
ATD Serial Number:	064		
Test ID:	Right Knee	Test Date:	12/19/2011
Test Number:	1	Test Time:	3:47:37 PM

Component Part Number	Component Serial Number
Knee Skin - 78056(R)	2880

Test Parameters	Test Specifications	Test Results
Temperature	18.9 -- 25.6	21.2 deg C P
Humidity	10.0 -- 70.0	29.0 %RH P
Velocity	2.07 -- 2.13	2.09 m/s P
Resistive Force	-5.78 -- -4.72	-5.14 kN P

All test parameters are within specifications

Technician: S. Zito
Supervisor: D. Travale

Test ID: **Right Knee**

Test Time: **3:47:37 PM**

Test Date: **12/19/2011**



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

REFERENCE EQUIPMENT

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

Test ID: **Right Knee**

Test Time: **3:47:37 PM**

Test Date: **12/19/2011**

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

2 of 2



www.calspan.com

Calspan - Transportation Research Group

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

Test Name:	Knee Impact PENDULUM	Revision:	10/1/2001
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 50'th		
ATD Serial Number:	064		
Test ID:	Right Knee	Test Date:	12/19/2011
Test Number:	1	Test Time:	3:47:37 PM



Test ID: **Right Knee**

Test Time: **3:47:37 PM**

Test Date: **12/19/2011**

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

1 of 1

CALIBRATION TEST RESULTS

PRE-TEST

RIGHT-FRONT PASSENGER DUMMY

S/N: 139



www.calspan.com

Calspan - Transportation Research Group

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

External Measurements

5th Female SN 139

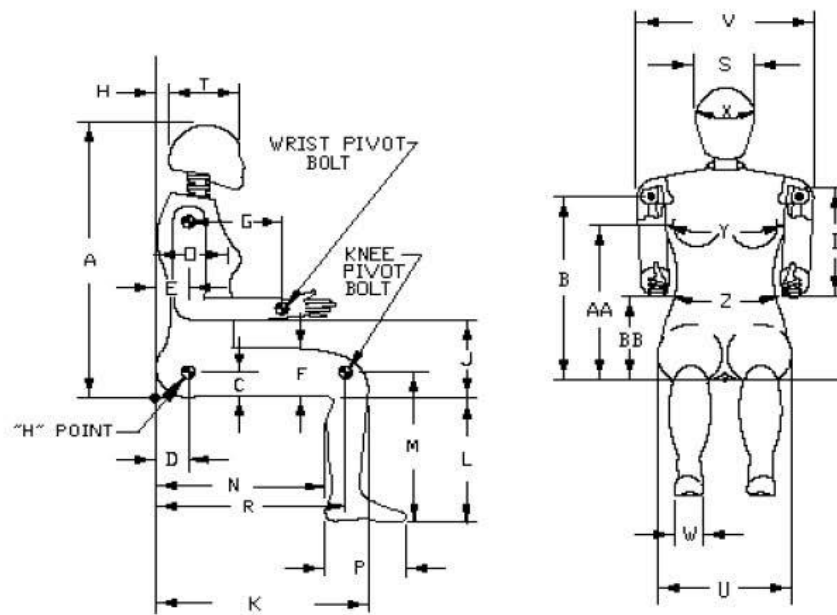
Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Sitting Height	774.7 – 800.1	781	Yes
B	Shoulder Pivot Height	431.8 – 457.2	453	Yes
C	H-Point Height	81.3 – 86.3	83	Yes
D	H-Point from Backline	144.8 – 149.8	146	Yes
E	Shoulder Pivot from Backline	68.6 – 83.8	77	Yes
F	Thigh Clearance	119.4 – 134.6	128	Yes
G	Back of Elbow to Wrist Pivot	243.9 – 259.1	246	Yes
H	Head Back to Backline	43.2 – 48.2	46	Yes
I	Shoulder to Elbow Length	276.8 – 297.2	279	Yes
J	Elbow Rest Height	182.8 – 203.2	192	Yes
K	Buttock to Knee Length	520.7 – 546.1	539	Yes
L	Popliteal Height	355.6 – 376	359	Yes
M	Knee Pivot Height	393.7 – 419.1	391	Yes
N	Buttock Popliteal Length	414 – 439.4	432	Yes
O	Chest Depth without Jacket	175.3 – 190.5	182	Yes
P	Foot Length (right)	218.5 – 233.7	220	Yes
R	Buttock To Knee Pivot Length	457.2 – 482.6	475	Yes
S	Head Breadth	137.1 – 147.3	142	Yes
T	Head Depth	177.8 – 188	184	Yes
U	Hip Breadth	299.7 – 314.9	307	Yes
V	Shoulder Breadth	350.5 – 365.7	362	Yes
W	Foot Breadth	78.8 – 94	83	Yes
X	Head Circumference	528.3 – 548.7	545	Yes
Y	Chest Circumference with Jacket	850.9 – 881.3	858	Yes
Z	Waist Circumference	759.5 – 789.9	773	Yes
AA	Reference Location (Chest Circumference)	332.7 – 358.1	345	Yes
BB	Reference Location (Waist Circumference)	160.1 – 170.2	165	Yes

Technician: AR

Date: 12/20/2011

Hybrid III 5th Female External Measurements

Reference Diagram





www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

Test Name:	Head Drop	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	139		
Test ID:		Test Date:	12/16/2011
Test Number:	1	Test Time:	9:32:21 AM

Component Part Number	Component Serial Number
Head Skin - 78051-228	05067

Test Parameters	Test Specifications	Test Results
Temperature	18.9 -- 25.6	21.8 deg C P
Humidity	10 -- 70	27 %RH P
Resultant Acceleration	250 -- 300	265 g P
Oscillation	0.0 -- 10.0	0.0 % P
Lateral Acceleration	-15.00 -- 15.00	-5.20 g P

All test parameters are within specifications

Technician: S. Zito

Supervisor: D. Travale

Test ID:

Test Time: **9:32:21 AM**

Test Date: **12/16/2011**

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

1 of 2

PDF created with FinePrint pdfFactory Pro trial version <http://www.fineprint.com>



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

REFERENCE EQUIPMENT

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

Test ID:

Test Time: **9:32:21 AM**

Test Date: **12/16/2011**

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

2 of 2

PDF created with FinePrint pdfFactory Pro trial version <http://www.fineprint.com>

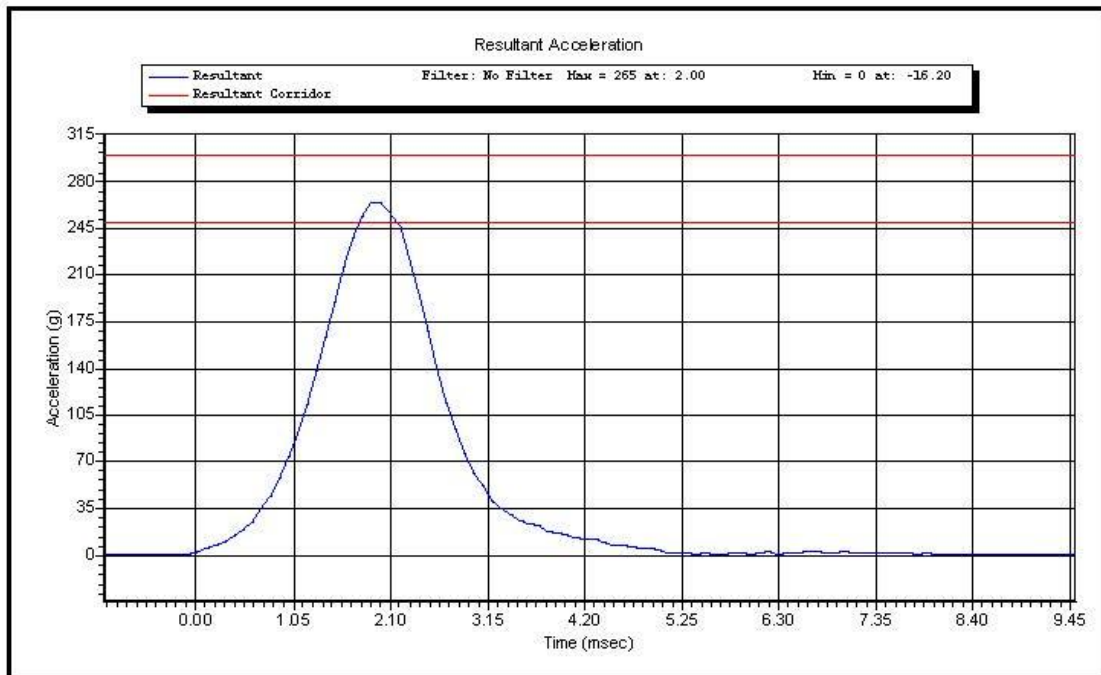


www.calspan.com

Calspan - Transportation Research Group

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

Test Name:	Head Drop	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	139		
Test ID:		Test Date:	12/16/2011
Test Number:	1	Test Time:	9:32:21 AM



Test ID:

Test Time: 9:32:21 AM

Test Date: 12/16/2011

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

1 of 2

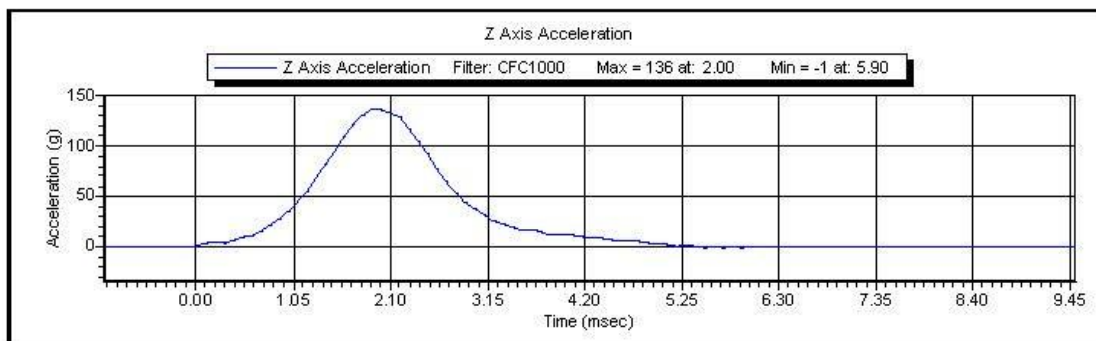
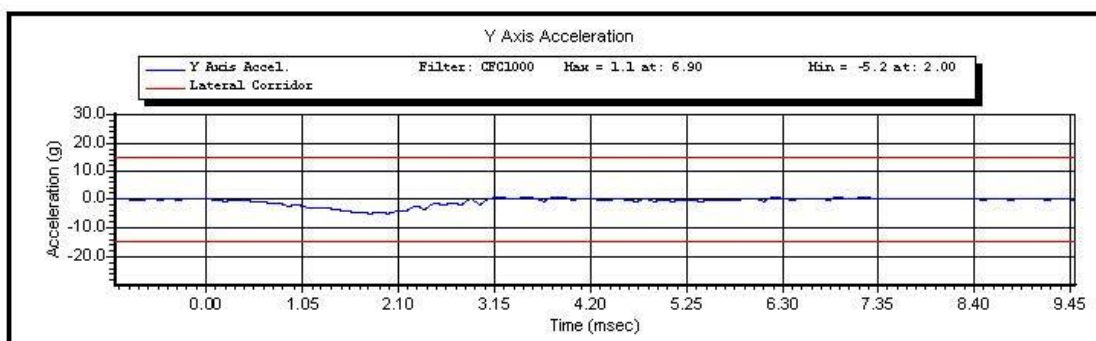
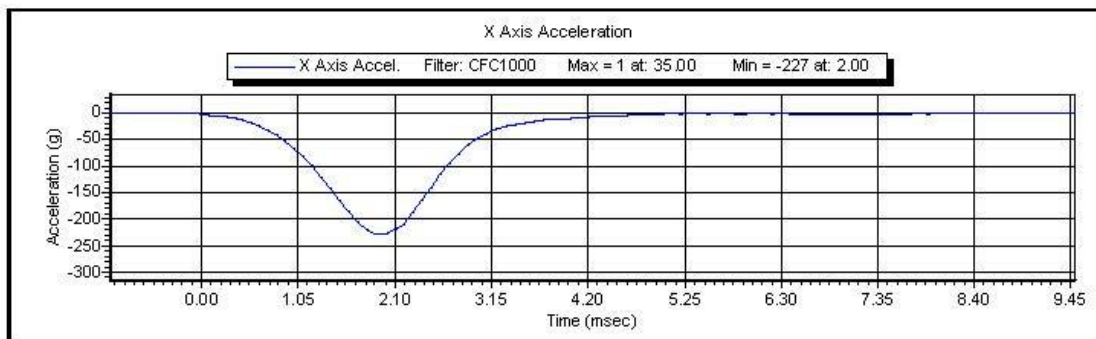
PDF created with FinePrint pdfFactory Pro trial version <http://www.fineprint.com>



www.calspan.com

Calspan - Transportation Research Group

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



Test ID:

Test Time: 9:32:21 AM

Test Date: 12/16/2011

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

2 of 2

PDF created with FinePrint pdfFactory Pro trial version <http://www.fineprint.com>



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

Test Name:	Neck Extension	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	139		
Test ID:		Test Date:	12/20/2011
Test Number:	2	Test Time:	10:34:10 AM

Component Part Number	Component Serial Number
Neck - 880105-255	1952

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.8 deg C P
Humidity	10 -- 70	22 %RH P
Velocity	5.95 -- 6.19	6.16 m/s P
Pendulum Impulse at 10 ms	1.50 -- 1.90	1.88 m/s P
Pendulum Impulse at 20 ms	3.10 -- 3.90	3.79 m/s P
Pendulum Impulse at 30 ms	4.60 -- 5.60	5.49 m/s P
D Plane Rotation	99.0 -- 114.0	103.4 degrees P
Moment During Rotation Interval	-65.0 -- -53.0	-54.0 Nm P
Moment Decay to -10.0 Nm	94.0 -- 114.0	102.1 ms P

All test parameters are within specifications

Technician: **A. Rudniski**

Supervisor: **D. Travale**

Test ID:

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

Test Date: **12/20/2011**



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7231CT	C16510	10/3/2011
DentonATD	78051-342	PENDULUM POT	2/7/2011
DentonATD	78051-342	CONDYLE POT	2/7/2011
Denton	1716A	LC-443 My	6/3/2011
Denton	1716A	LC-443 Fx	6/3/2011

Test ID:

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

Test Date: **12/20/2011**

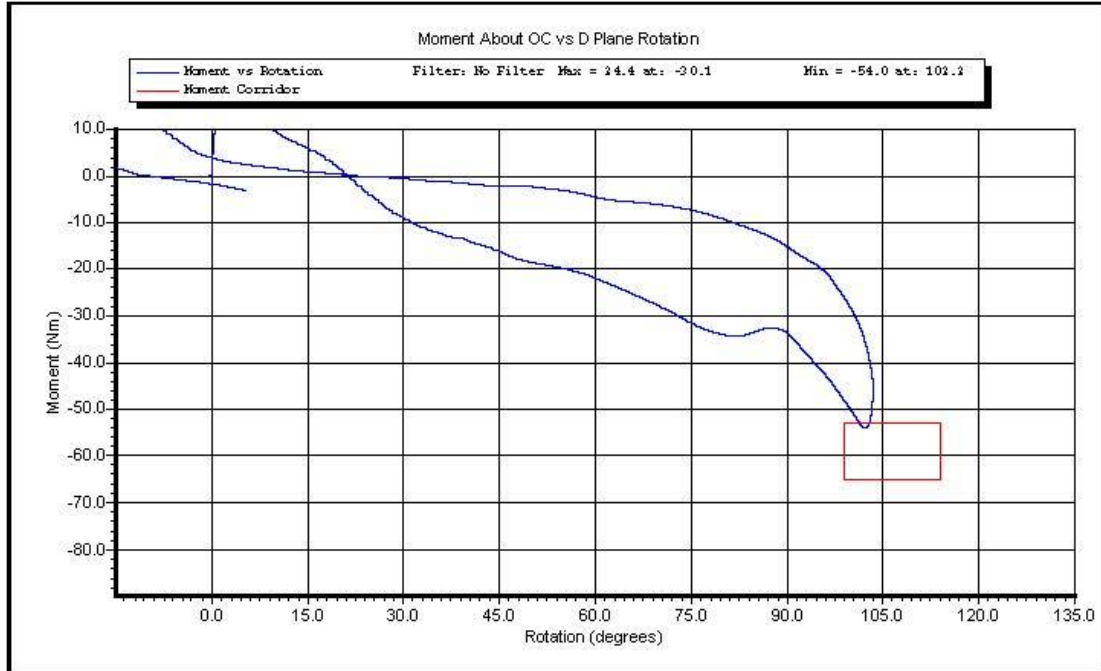


www.calspan.com

Calspan - Transportation Research Group

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

Test Name:	Neck Extension	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	139		
Test ID:		Test Date:	12/20/2011
Test Number:	2	Test Time:	10:34:10 AM



Test ID:

Test Time: 10:34:10 AM

Test Date: 12/20/2011

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

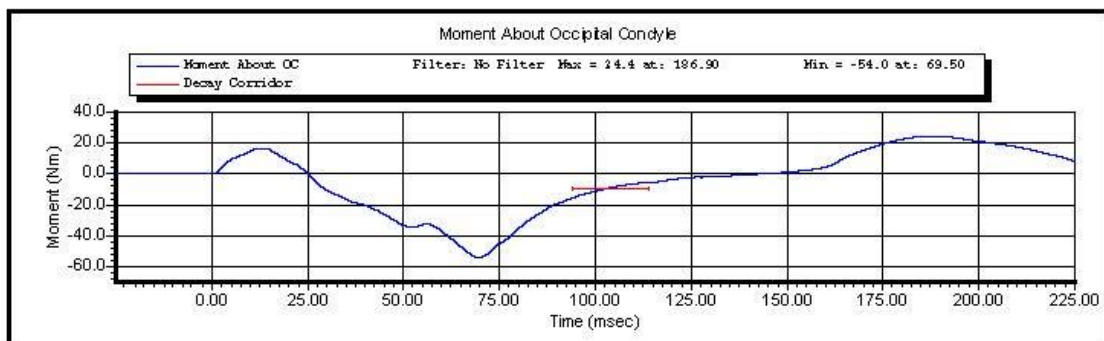
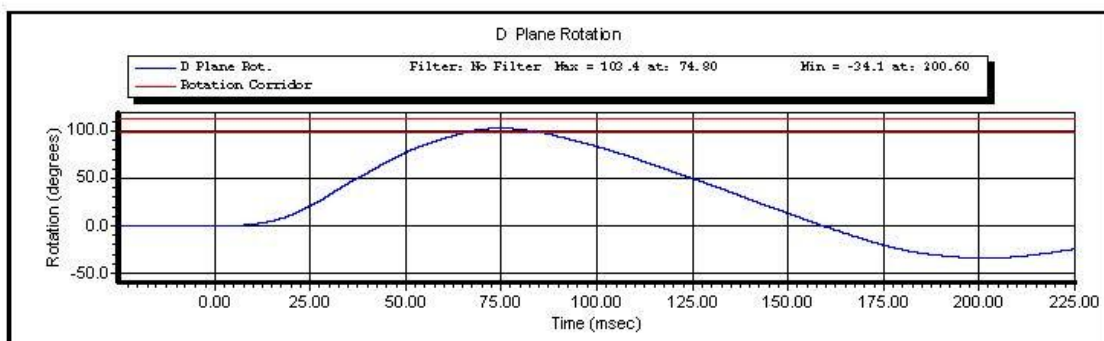
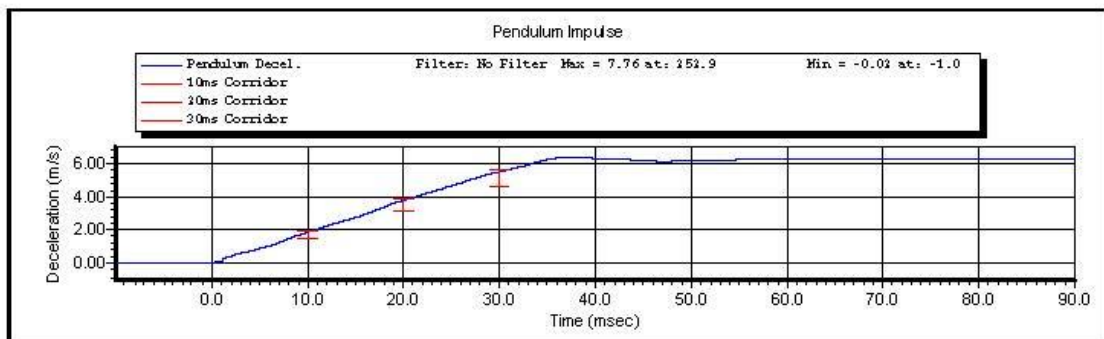
1 of 2



www.calspan.com

Calspan - Transportation Research Group

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



Test ID:

Test Time: 10:34:10 AM

Test Date: 12/20/2011

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

2 of 2



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

Test Name:	Neck Flexion	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	139		
Test ID:		Test Date:	12/19/2011
Test Number:	1	Test Time:	3:03:36 PM

Component Part Number	Component Serial Number
Neck - 880105-255	1952

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.7 deg C P
Humidity	10 -- 70	28 %RH P
Velocity	6.89 -- 7.13	7.12 m/s P
Pendulum Impulse at 10 ms	2.10 -- 2.50	2.39 m/s P
Pendulum Impulse at 20 ms	4.00 -- 5.00	4.69 m/s P
Pendulum Impulse at 30 ms	5.80 -- 7.00	6.59 m/s P
D Plane Rotation	-91.0 -- -77.0	-80.5 degrees P
Moment During Rotation Interval	69.0 -- 83.0	70.7 Nm P
Moment Decay to 10.0 Nm	80.0 -- 100.0	87.0 ms P

All test parameters are within specifications

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

Test ID:

Test Time: **3:03:36 PM**

Test Date: **12/19/2011**



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7231CT	C16510	10/3/2011
DentonATD	78051-342	PENDULUM POT	2/7/2011
DentonATD	78051-342	CONDYLE POT	2/7/2011
Denton	1716A	LC-443 My	6/3/2011
Denton	1716A	LC-443 Fx	6/3/2011

Test ID:

Test Time: **3:03:36 PM**

Test Date: **12/19/2011**

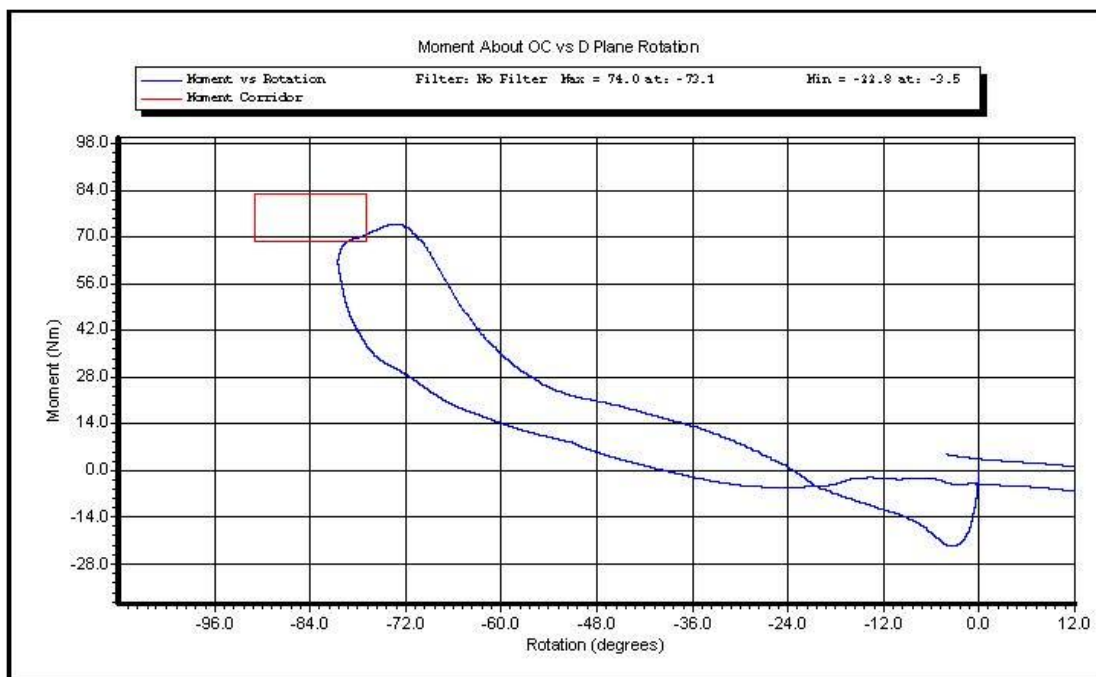


www.calspan.com

Calspan - Transportation Research Group

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

Test Name:	Neck Flexion	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	139		
Test ID:		Test Date:	12/19/2011
Test Number:	1	Test Time:	3:03:36 PM



Test ID:

Test Time: 3:03:36 PM

Test Date: 12/19/2011

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

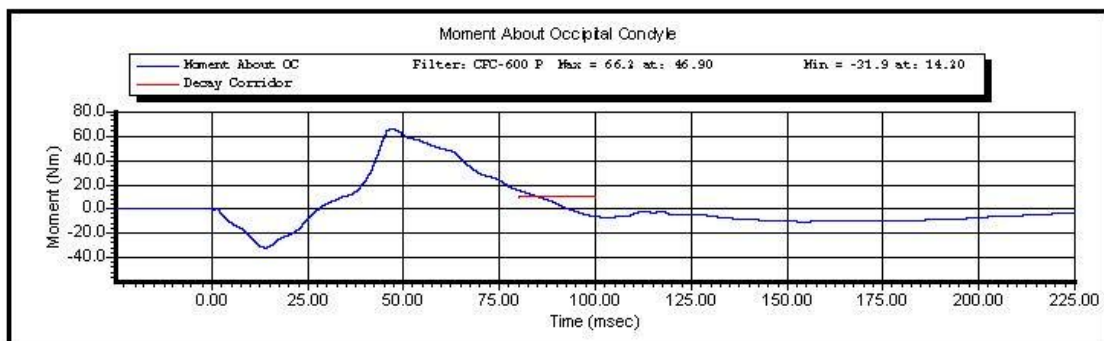
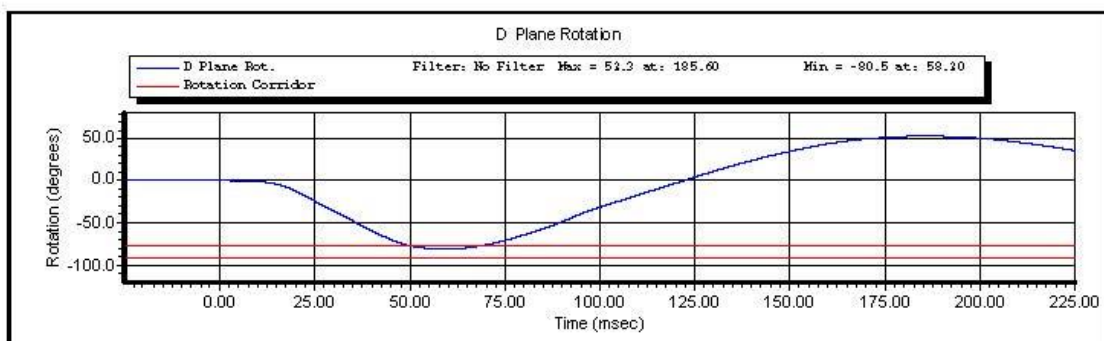
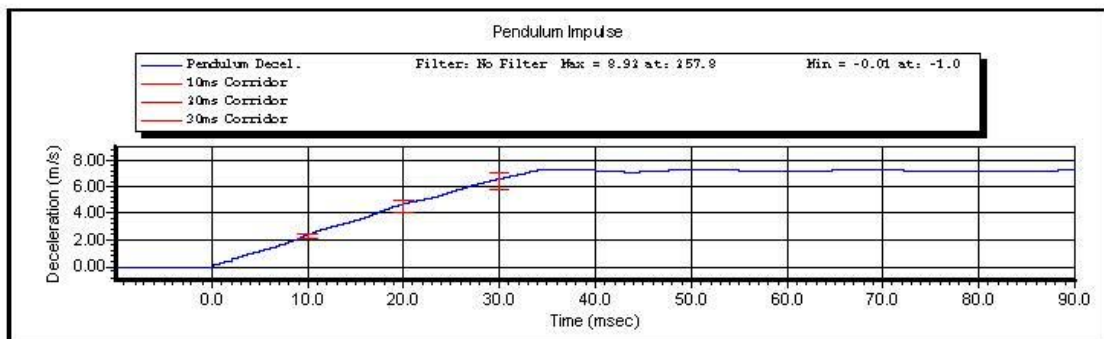
1 of 2



www.calspan.com

Calspan - Transportation Research Group

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



Test ID:

Test Time: 3:03:36 PM

Test Date: 12/19/2011

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

2 of 2



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

Test Name:	Thorax Impact	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	139		
Test ID:		Test Date:	12/20/2011
Test Number:	3	Test Time:	2:01:52 PM

Component Part Number	Component Serial Number
Ribs 880105-RS	05032011A
Chest Jacket - 880105-355-E	05177
Lumbar Spine - 880105-1095	050327

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	22.2 deg C P
Humidity	10.0 -- 70.0	21.0 %RH P
Velocity	6.59 -- 6.83	6.70 m/s P
Sternum Displacement	-58.0 -- -50.0	-53.7 mm P
Force During Displacement Interval	-4400 -- -3900	-4388 N P
Force -18.0 to -50.0 Displacement	-4600 -- 0	-4343 N P
Hysteresis	69 -- 85	72 % P

All test parameters are within specifications

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

Test ID:

Test Time: **2:01:52 PM**

Test Date: **12/20/2011**



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7231CT	AGHF5	12/14/2011
DentonATD	H3CD	DS-139	12/10/2011
Endevco	7264-2000	P58884	10/31/2011

Test ID:

Test Time: 2:01:52 PM

Test Date: 12/20/2011

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

2 of 2



www.calspan.com

Calspan - Transportation Research Group

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

Test Name:	Thorax Impact	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	139		
Test ID:		Test Date:	12/20/2011
Test Number:	3	Test Time:	2:01:52 PM



Test ID:

Test Time: 2:01:52 PM

Test Date: 12/20/2011

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

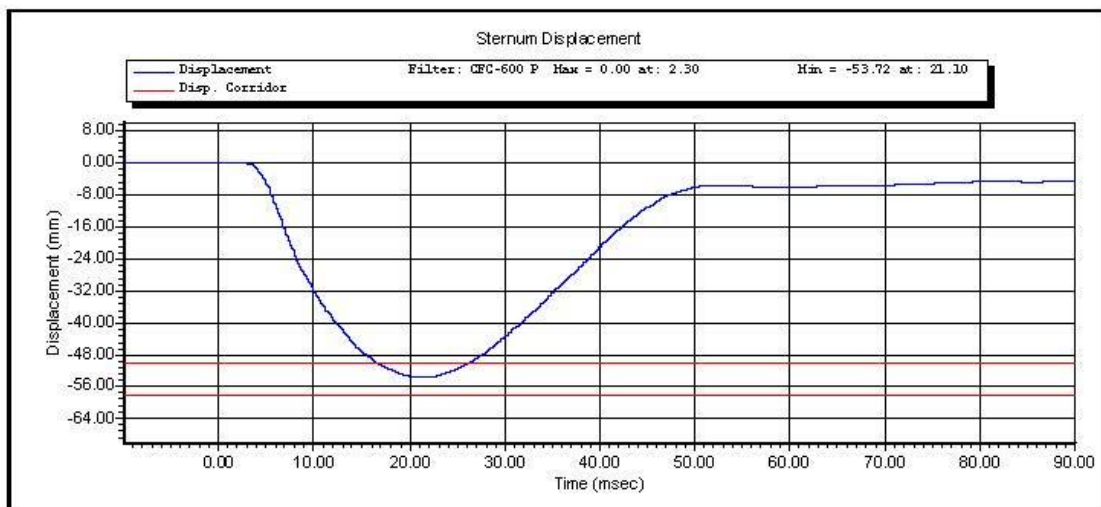
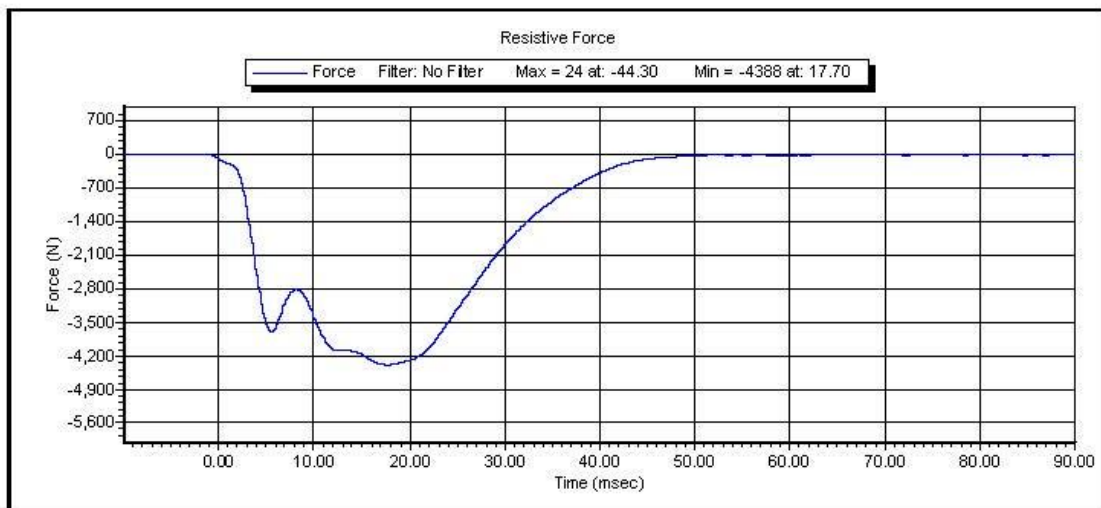
1 of 2



www.calspan.com

Calspan - Transportation Research Group

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



Test ID:

Test Time: 2:01:52 PM

Test Date: 12/20/2011

Copyright 2003 Denton ATD, Inc. LabPaq Version: 1.8.5.0

2 of 2



www.calspan.com

Calspan - Transportation Research Group

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

Torso Flexion Test

Technician: AR
Calibration Date: 12/20/2011
ATD Serial Number: NHTSA 5th Female 139

Test Results			
Test Condition	Parameters	Results	Status
Temperature	18.9-25.6° C	21.7° C	Pass
Lab Humidity: 38%	10-70 %	21%	Pass
Max Force @ 45 deg	320 – 390N	348N	Pass
Torso rotation rate	0.5 °/s ≤ rate ≤ 1.5 °/s	1.0 °/s	Pass
Initial reference angle	≤20 deg	14°	Pass
Final ref plane angle	Initial ref plane ± 8 deg	21°	Pass



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

Test Name:	Knee Impact PENDULUM	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	139		
Test ID:	Left Knee	Test Date:	12/20/2011
Test Number:	1	Test Time:	9:58:07 AM

Component Part Number	Component Serial Number
Knee Skin - 880105-508	1350

Test Parameters	Test Specifications	Test Results
Temperature	18.9 -- 25.6	21.6 deg C P
Humidity	10.0 -- 70.0	23.0 %RH P
Velocity	2.07 -- 2.13	2.09 m/s P
Resistive Force	-4060 -- -3450	-3616 N P

All test parameters are within specifications

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

Test ID: **Left Knee**

Test Time: **9:58:07 AM**

Test Date: **12/20/2011**



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

REFERENCE EQUIPMENT

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

Test ID: **Left Knee**

Test Time: **9:58:07 AM**

Test Date: **12/20/2011**

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

2 of 2

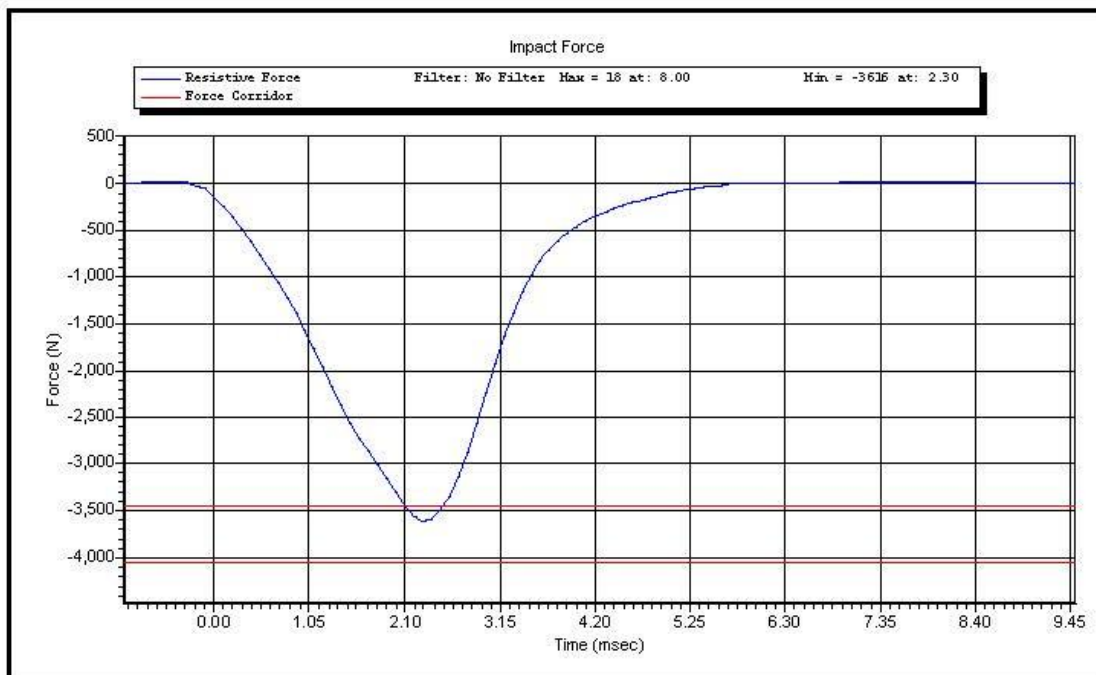


www.calspan.com

Calspan - Transportation Research Group

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

Test Name:	Knee Impact PENDULUM	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	139		
Test ID:	Left Knee	Test Date:	12/20/2011
Test Number:	1	Test Time:	9:58:07 AM



Test ID: **Left Knee**

Test Time: **9:58:07 AM**

Test Date: **12/20/2011**

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

1 of 1



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

Test Name:	Knee Impact PENDULUM	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	139		
Test ID:	Right Knee	Test Date:	12/20/2011
Test Number:	1	Test Time:	10:05:22 AM

Component Part Number	Component Serial Number
Knee Skin - 880105-508	1359

Test Parameters	Test Specifications	Test Results
Temperature	18.9 -- 25.6	21.6 deg C P
Humidity	10.0 -- 70.0	23.2 %RH P
Velocity	2.07 -- 2.13	2.10 m/s P
Resistive Force	-4060 -- -3450	-3850 N P

All test parameters are within specifications

Technician: S. Zito
Supervisor: D. Travale

Test ID: **Right Knee**

Test Time: **10:05:22 AM**

Test Date: **12/20/2011**



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

REFERENCE EQUIPMENT

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

Test ID: **Right Knee**

Test Time: **10:05:22 AM**

Test Date: **12/20/2011**

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

2 of 2

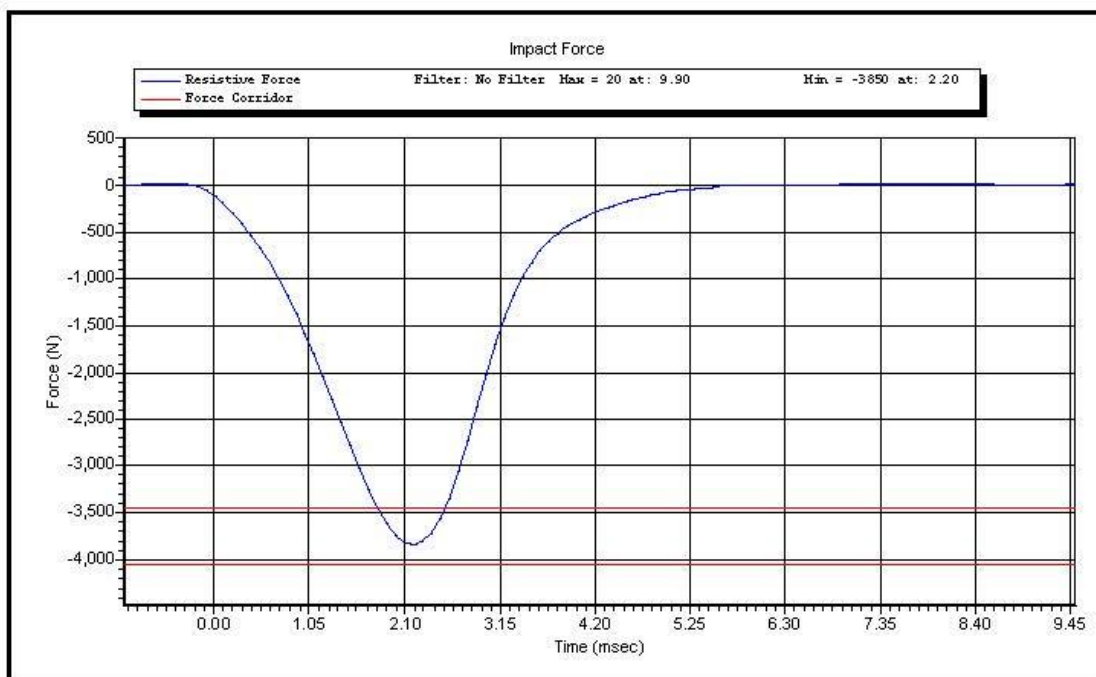


www.calspan.com

Calspan - Transportation Research Group

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

Test Name:	Knee Impact PENDULUM	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	139		
Test ID:	Right Knee	Test Date:	12/20/2011
Test Number:	1	Test Time:	10:05:22 AM



Test ID: **Right Knee**

Test Time: **10:05:22 AM**

Test Date: **12/20/2011**

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

1 of 1

CALIBRATION TEST RESULTS

POST-TEST

DRIVER DUMMY

S/N: 064



www.calspan.com

Calspan - Transportation Research Group

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

50th Male External Measurements

S/N 064

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

Technician: AR

Date: 1/4/2012



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

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

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

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

All test parameters are within specifications

Technician: S. Zito

Supervisor: D. Travale

Test ID:

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

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



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

REFERENCE EQUIPMENT

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

Test ID:

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

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

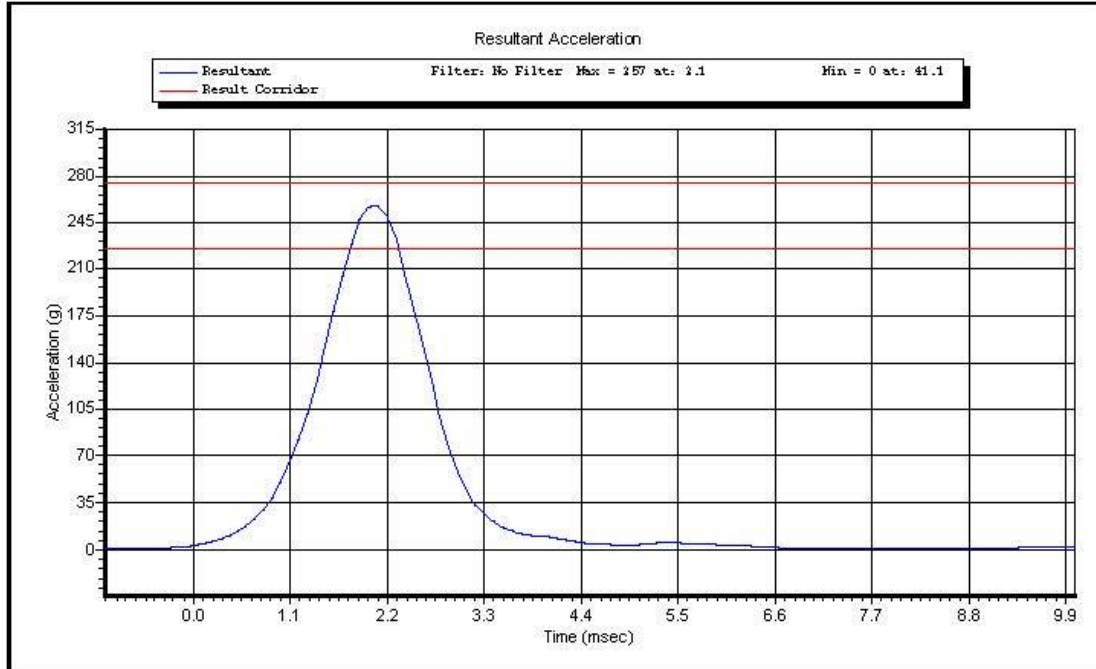


www.calspan.com

Calspan - Transportation Research Group

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

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



Test ID:

Test Time: 1:47:08 PM

Test Date: 1/4/2012

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

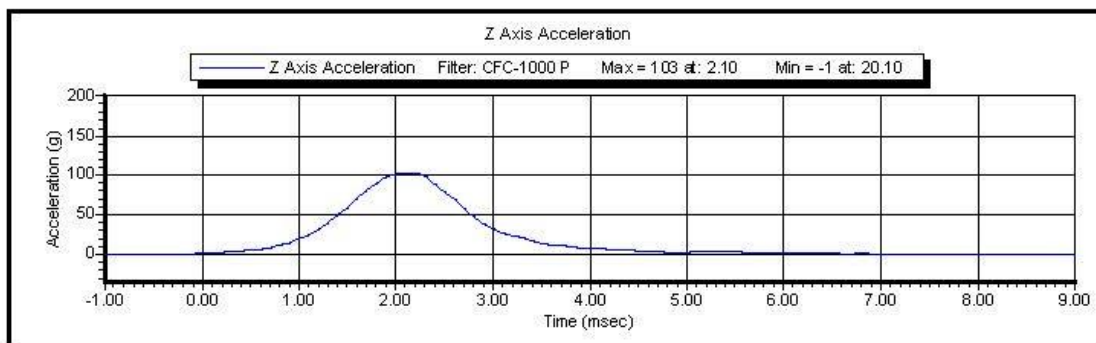
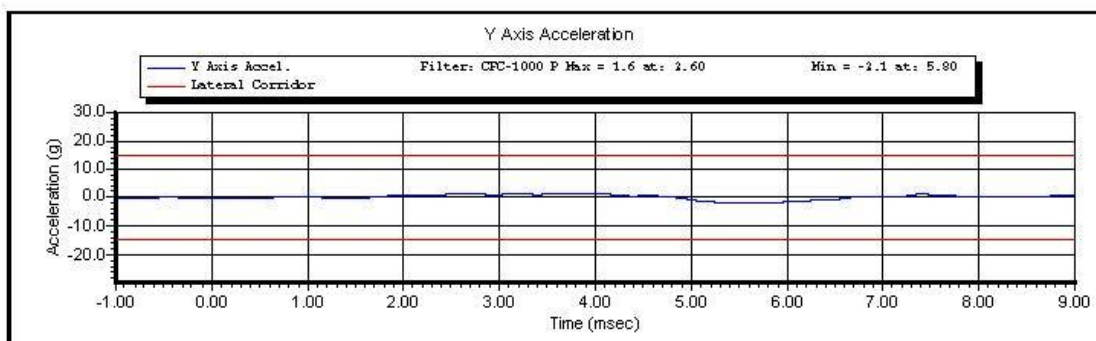
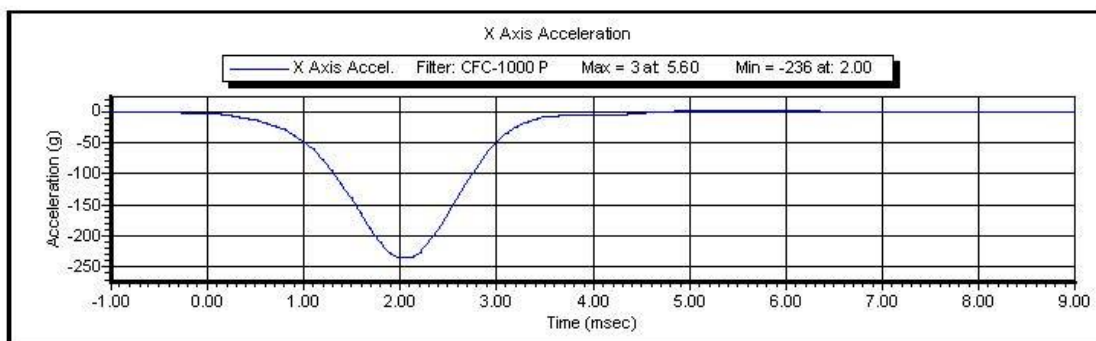
1 of 2



www.calspan.com

Calspan - Transportation Research Group

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



Test ID:

Test Time: 1:47:08 PM

Test Date: 1/4/2012

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

2 of 2



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

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

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

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

All test parameters are within specifications

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

Test ID:

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

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



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

REFERENCE EQUIPMENT

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

Test ID:

Test Time: 9:19:42 AM

Test Date: 1/6/2012

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

2 of 2

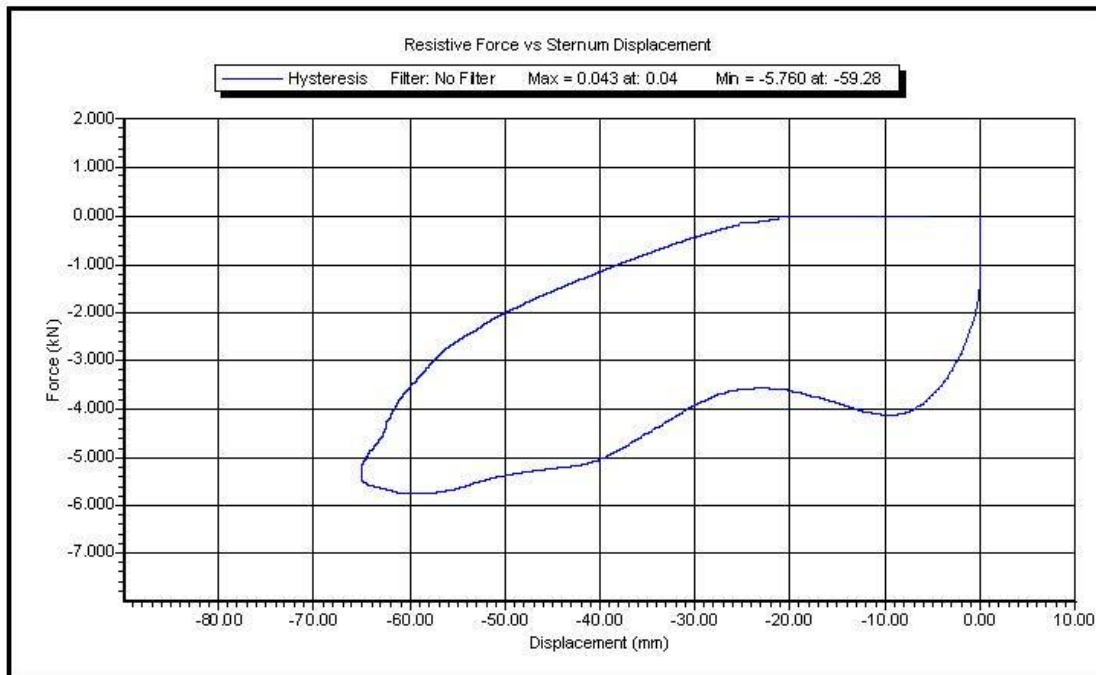


www.calspan.com

Calspan - Transportation Research Group

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

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



Test ID:

Test Time: 9:19:42 AM

Test Date: 1/6/2012

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

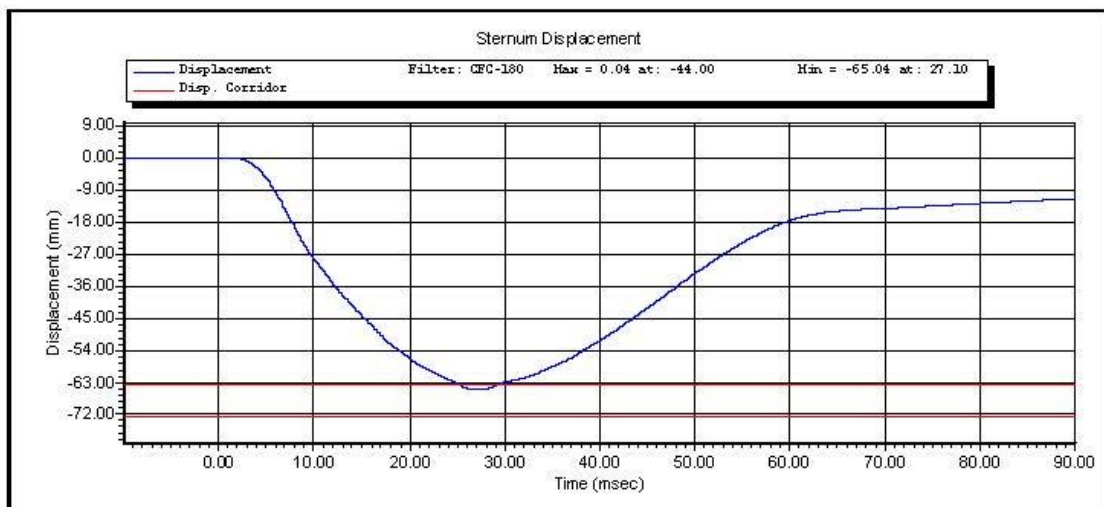
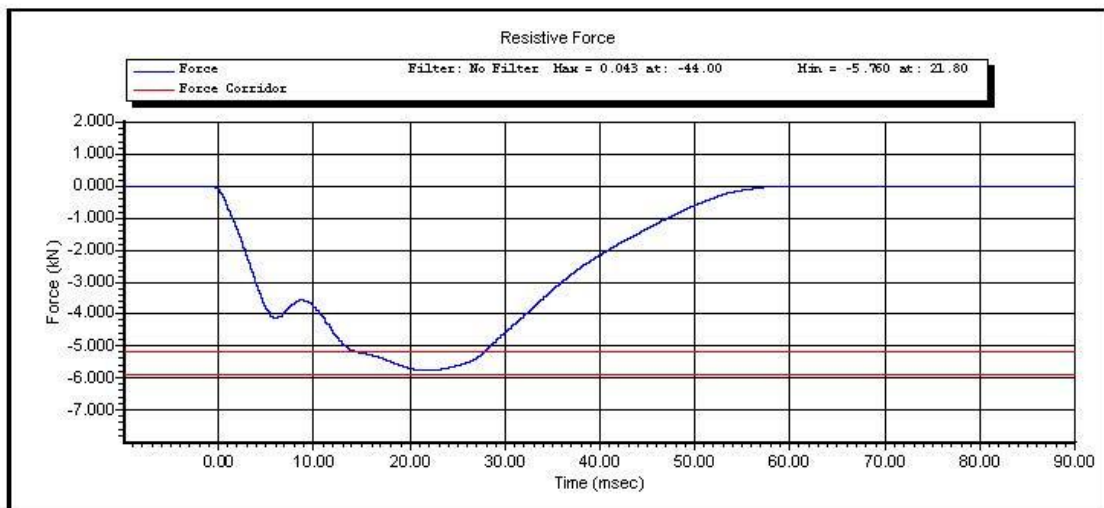
1 of 2



www.calspan.com

Calspan - Transportation Research Group

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



Test ID:

Test Time: 9:19:42 AM

Test Date: 1/6/2012

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

2 of 2



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

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

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

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

All test parameters are within specifications

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

Test ID:

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

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



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

REFERENCE EQUIPMENT

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

Test ID:

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

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

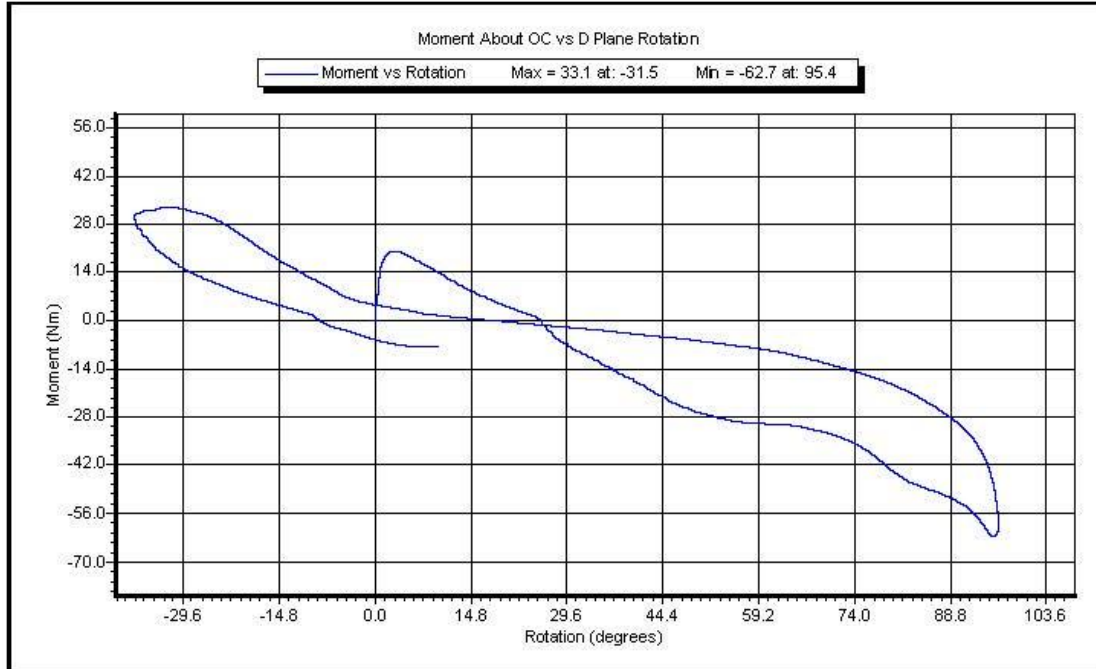


www.calspan.com

Calspan - Transportation Research Group

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

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



ID of Test:

Time of Test: 7:54:58 AM

Date of Test: 1/5/2012

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

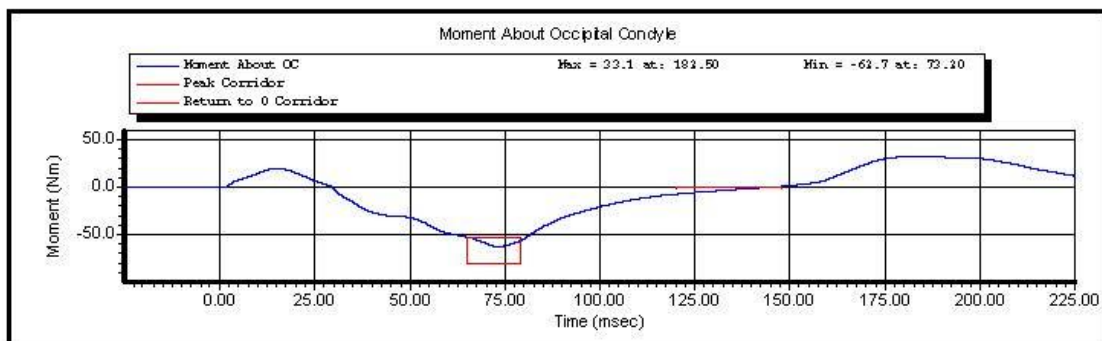
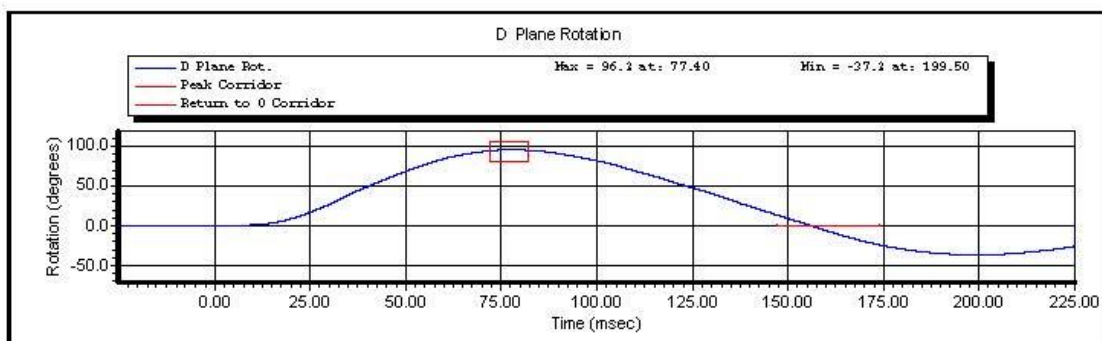
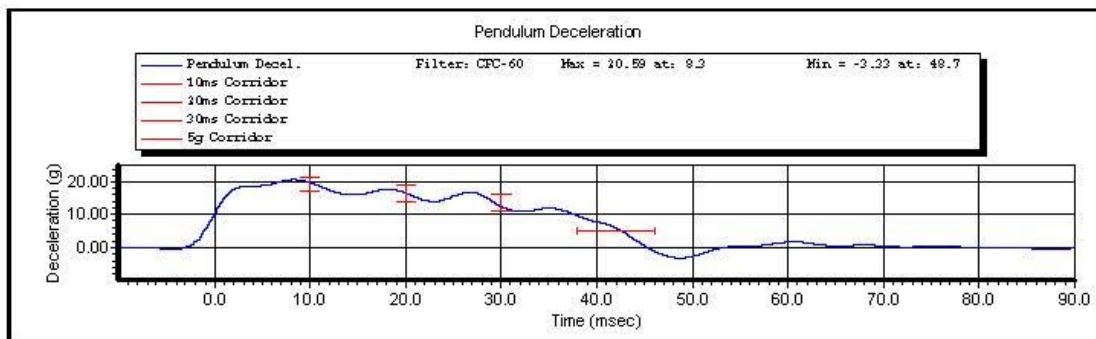
1 of 2



www.calspan.com

Calspan - Transportation Research Group

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



ID of Test:

Time of Test: 7:54:58 AM

Date of Test: 1/5/2012

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

2 of 2



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

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

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

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

All test parameters are within specifications

Technician: S. Zito

Supervisor: D. Travale

Test ID:

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

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



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

REFERENCE EQUIPMENT

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

Test ID:

Test Time: 4:26:38 PM

Test Date: 1/4/2012

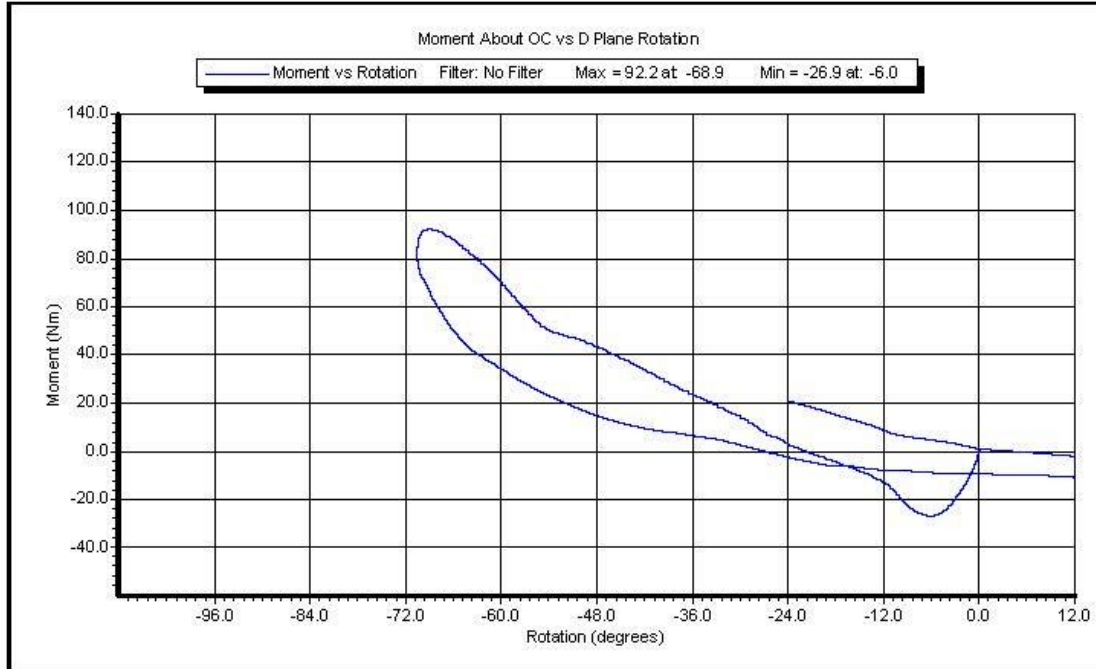


www.calspan.com

Calspan - Transportation Research Group

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

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



ID of Test:

Time of Test: 4:26:38 PM

Date of Test: 1/4/2012

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

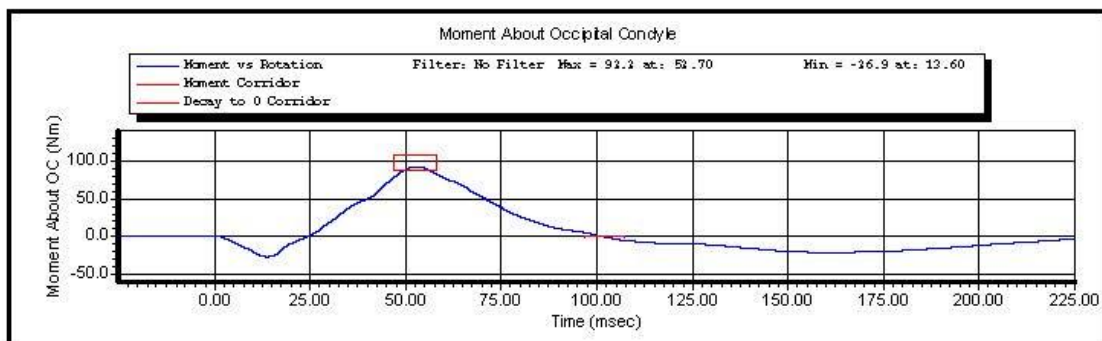
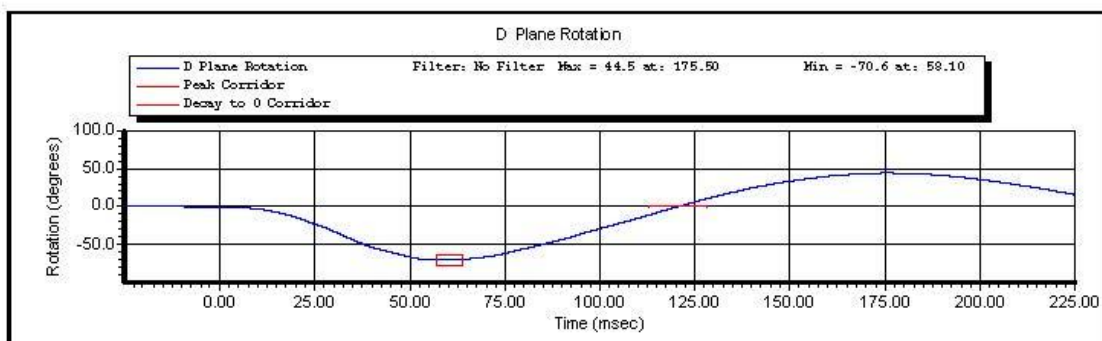
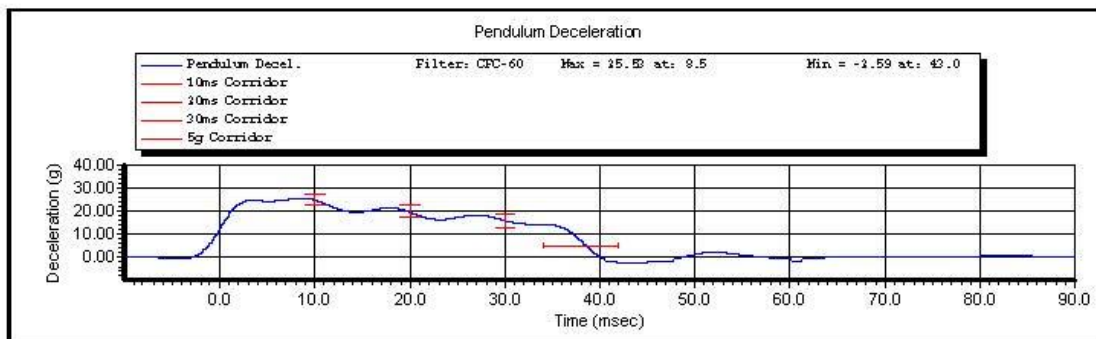
1 of 2



www.calspan.com

Calspan - Transportation Research Group

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



ID of Test:

Time of Test: 4:26:38 PM

Date of Test: 1/4/2012

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

2 of 2

CALSPAN

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

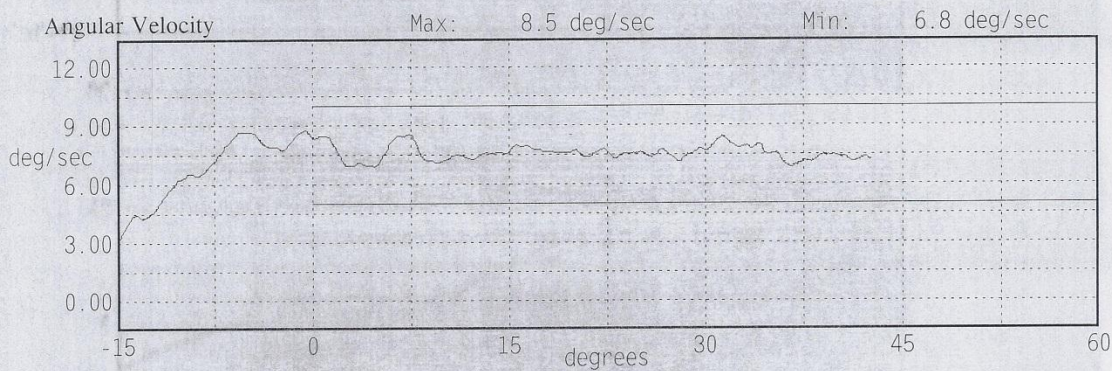
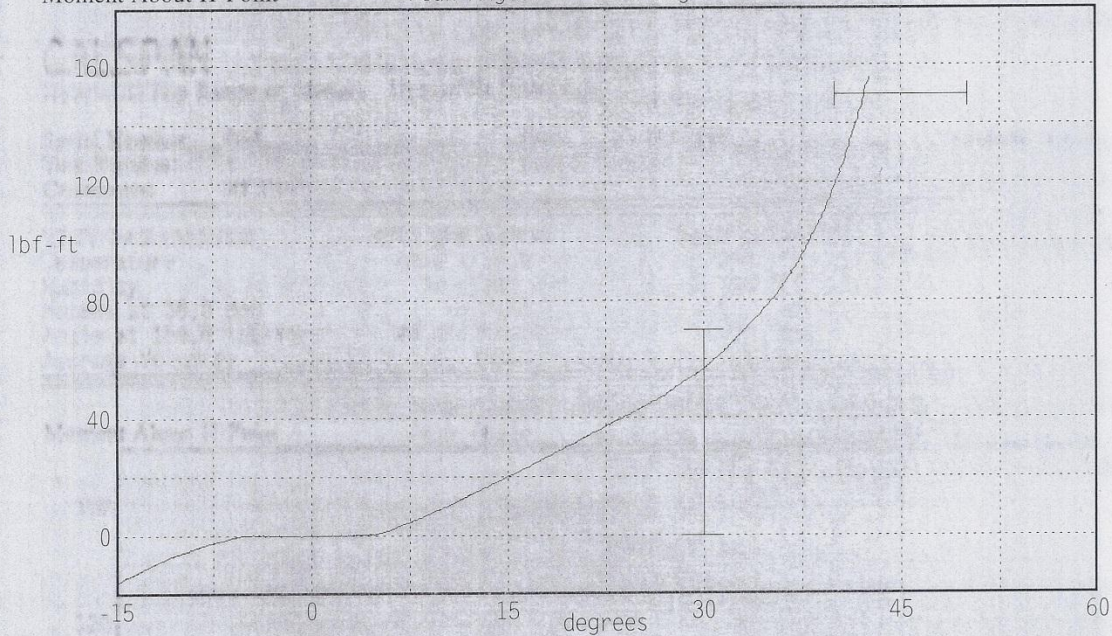
Serial Number: 064
Test Number: 1
Comments: RIGHT

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

Version: 1.6.3

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

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



CALSPAN

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

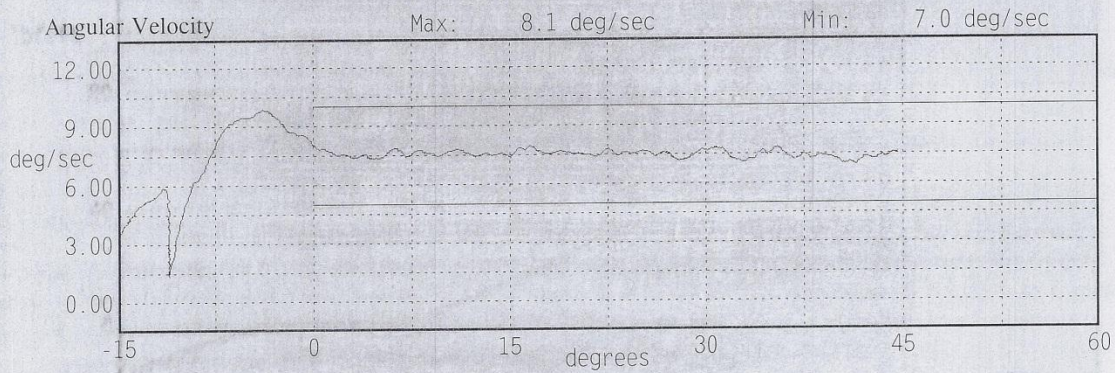
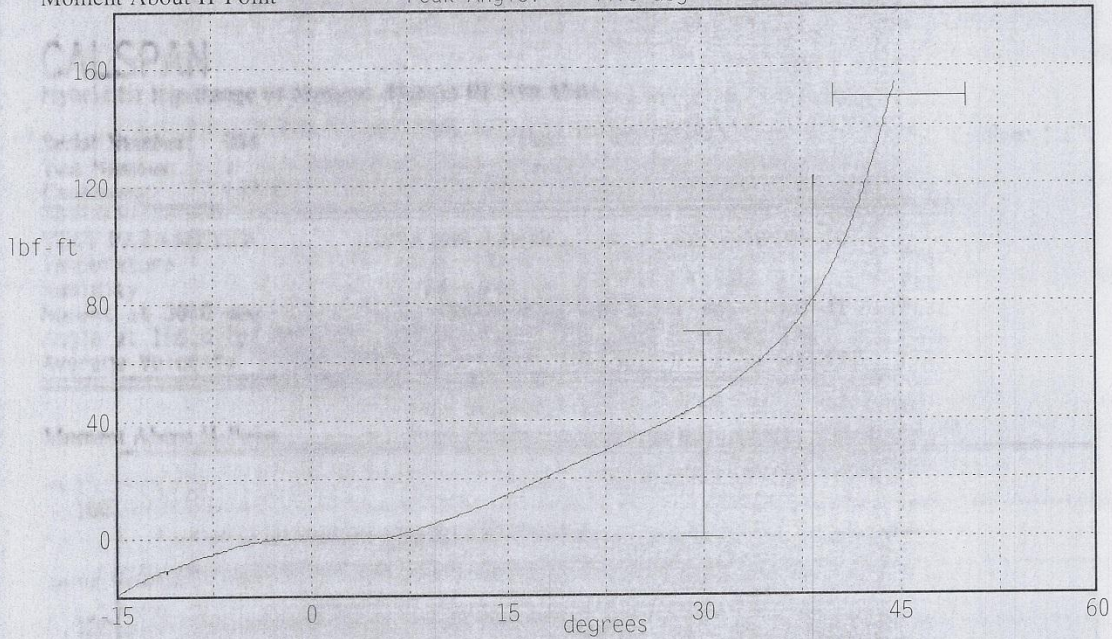
Serial Number: 064
Test Number: 1
Comments: LEFT

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

Version: 1.6.3

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

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





www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

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

Component Part Number	Component Serial Number
Knee Skin - 78051	2792

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

All test parameters are within specifications

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

Test ID: **Left Knee**

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

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



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

REFERENCE EQUIPMENT

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

Test ID: **Left Knee**

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

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

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

2 of 2



www.calspan.com

Calspan - Transportation Research Group

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

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



Test ID: **Left Knee**

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

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

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

1 of 1



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

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

Component Part Number	Component Serial Number
Knee Skin - 78051	2880

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

All test parameters are within specifications

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

Test ID: **Right Knee**

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

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



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

REFERENCE EQUIPMENT

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

Test ID: **Right Knee**

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

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

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

2 of 2

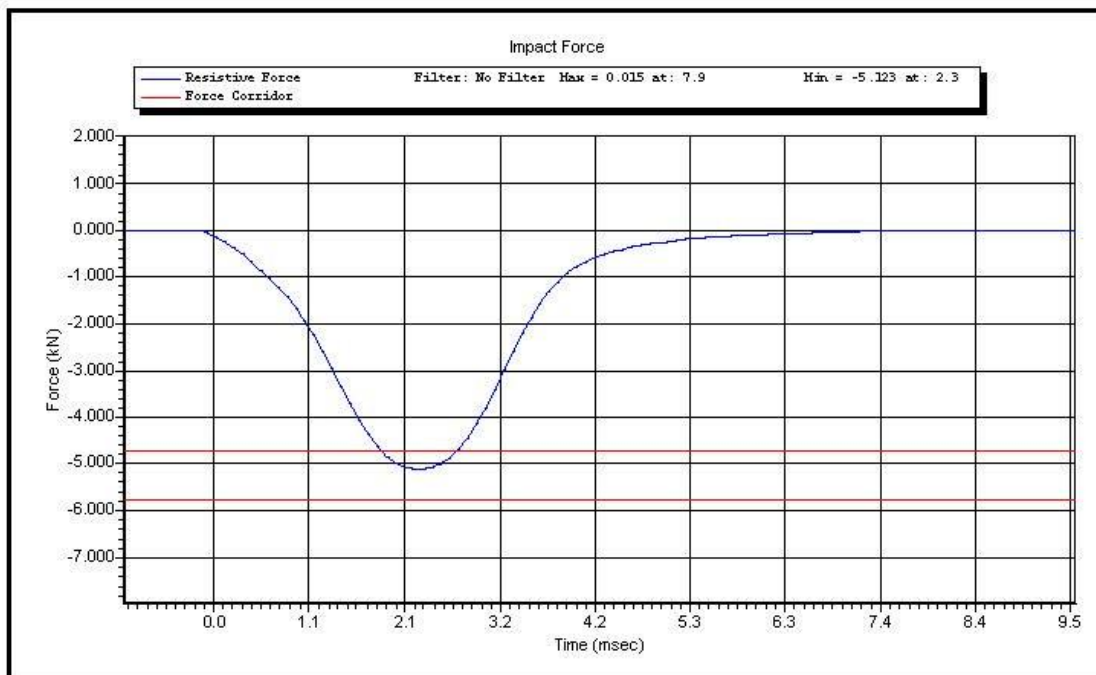


www.calspan.com

Calspan - Transportation Research Group

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

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



Test ID: **Right Knee**

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

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

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

1 of 1

CALIBRATION TEST RESULTS

POST-TEST

RIGHT-FRONT PASSENGER DUMMY

S/N: 139



www.calspan.com

Calspan - Transportation Research Group

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

External Measurements

5th Female SN 139

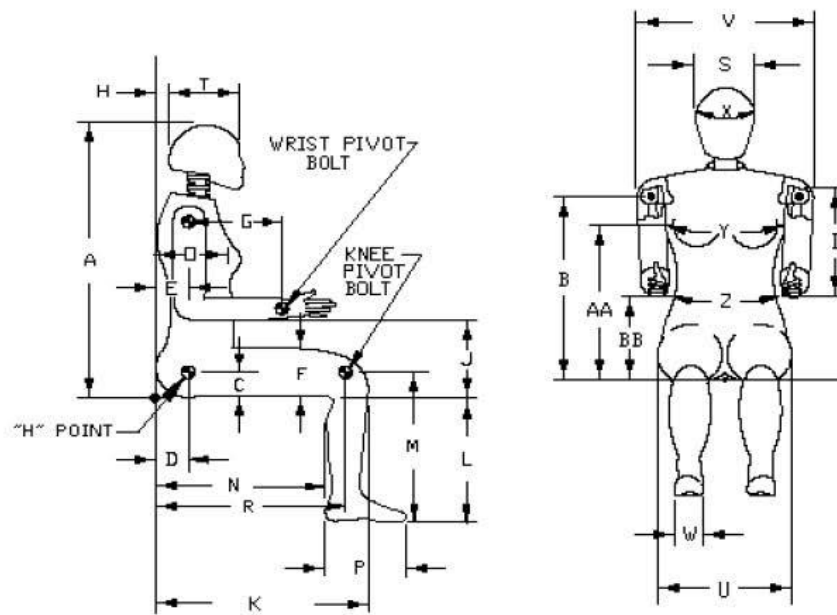
Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Sitting Height	774.7 – 800.1	780	Yes
B	Shoulder Pivot Height	431.8 – 457.2	453	Yes
C	H-Point Height	81.3 – 86.3	83	Yes
D	H-Point from Backline	144.8 – 149.8	146	Yes
E	Shoulder Pivot from Backline	68.6 – 83.8	77	Yes
F	Thigh Clearance	119.4 – 134.6	128	Yes
G	Back of Elbow to Wrist Pivot	243.9 – 259.1	246	Yes
H	Head Back to Backline	43.2 – 48.2	46	Yes
I	Shoulder to Elbow Length	276.8 – 297.2	279	Yes
J	Elbow Rest Height	182.8 – 203.2	192	Yes
K	Buttock to Knee Length	520.7 – 546.1	539	Yes
L	Popliteal Height	355.6 – 376	359	Yes
M	Knee Pivot Height	393.7 – 419.1	391	Yes
N	Buttock Popliteal Length	414 – 439.4	432	Yes
O	Chest Depth without Jacket	175.3 – 190.5	182	Yes
P	Foot Length (right)	218.5 – 233.7	220	Yes
R	Buttock To Knee Pivot Length	457.2 – 482.6	475	Yes
S	Head Breadth	137.1 – 147.3	142	Yes
T	Head Depth	177.8 – 188	184	Yes
U	Hip Breadth	299.7 – 314.9	307	Yes
V	Shoulder Breadth	350.5 – 365.7	362	Yes
W	Foot Breadth	78.8 – 94	83	Yes
X	Head Circumference	528.3 – 548.7	545	Yes
Y	Chest Circumference with Jacket	850.9 – 881.3	858	Yes
Z	Waist Circumference	759.5 – 789.9	773	Yes
AA	Reference Location (Chest Circumference)	332.7 – 358.1	345	Yes
BB	Reference Location (Waist Circumference)	160.1 – 170.2	165	Yes

Technician: AR

Date: 1/14/2012

Hybrid III 5th Female External Measurements

Reference Diagram





www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

Test Name:	Head Drop	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	139		
Test ID:		Test Date:	1/13/2012
Test Number:	1	Test Time:	9:02:07 AM

Component Part Number	Component Serial Number
Head Skin - 78051-228	05067

Test Parameters	Test Specifications	Test Results
Temperature	18.9 -- 25.6	21.1 deg C P
Humidity	10 -- 70	28 %RH P
Resultant Acceleration	250 -- 300	260 g P
Oscillation	0.0 -- 10.0	1.3 % P
Lateral Acceleration	-15.00 -- 15.00	-2.13 g P

All test parameters are within specifications

Technician: **S. Zito**

Supervisor: **D. Travale**

Test ID:

Test Time: **9:02:07 AM**

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



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

REFERENCE EQUIPMENT

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

Test ID:

Test Time: 9:02:07 AM

Test Date: 1/13/2012

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

2 of 2

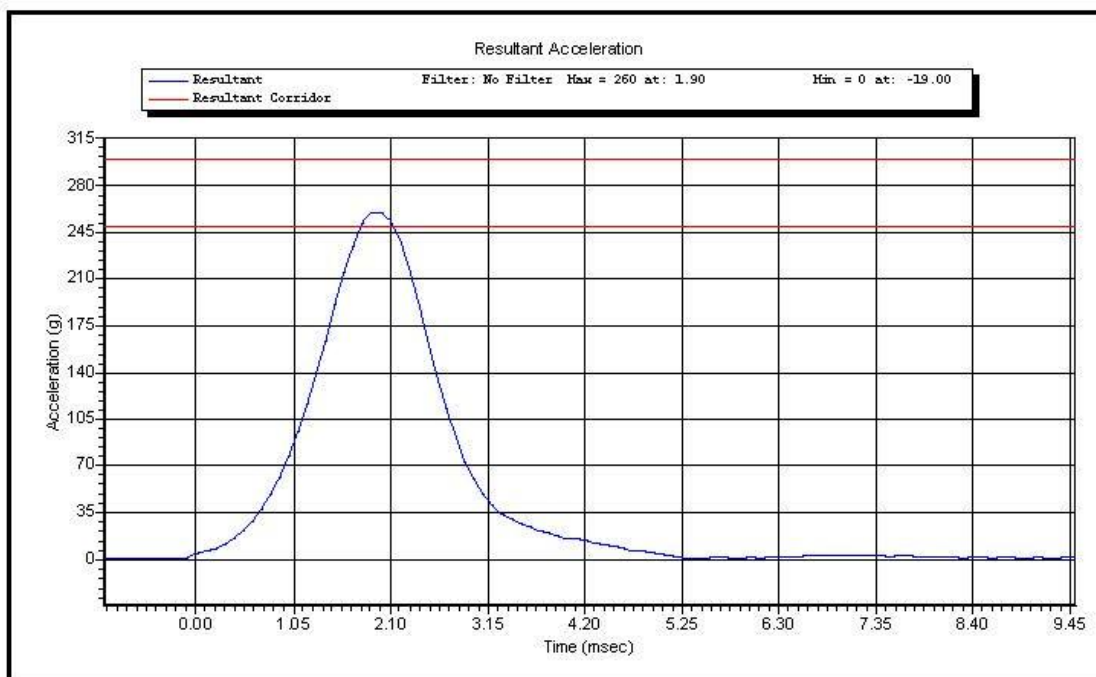


www.calspan.com

Calspan - Transportation Research Group

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

Test Name:	Head Drop	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	139		
Test ID:		Test Date:	1/13/2012
Test Number:	1	Test Time:	9:02:07 AM



Test ID:

Test Time: 9:02:07 AM

Test Date: 1/13/2012

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

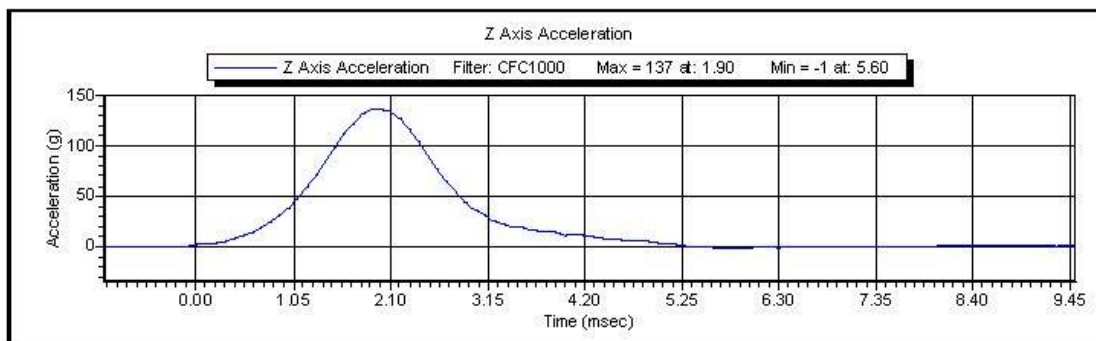
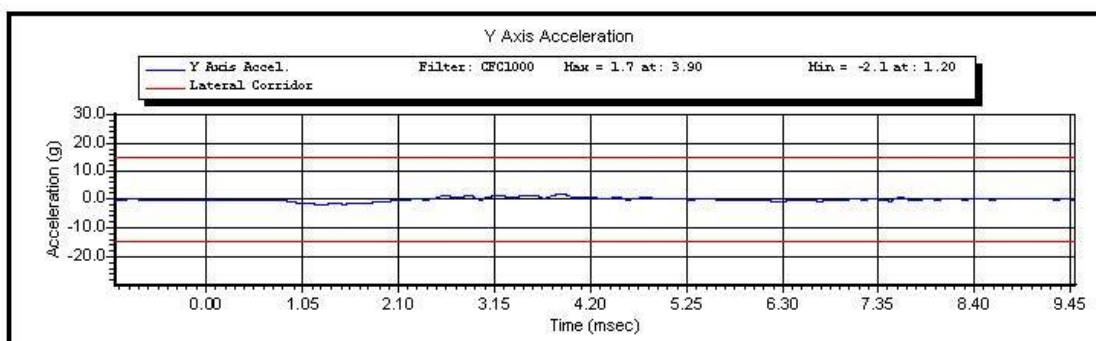
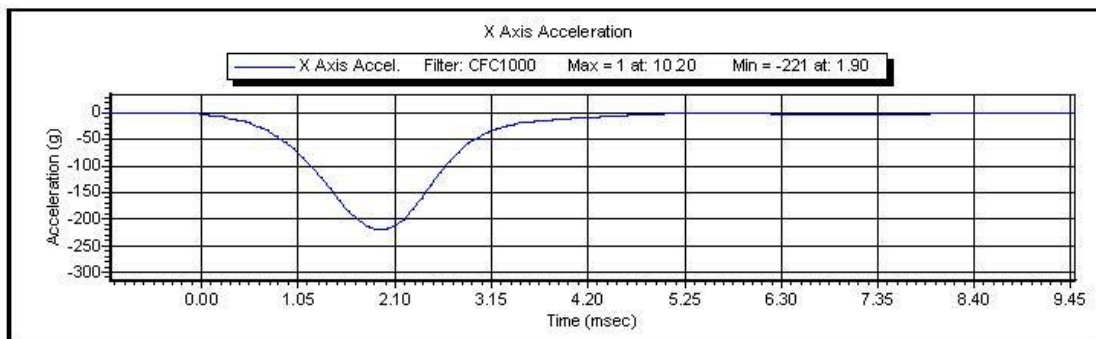
1 of 2



www.calspan.com

Calspan - Transportation Research Group

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



Test ID:

Test Time: 9:02:07 AM

Test Date: 1/13/2012

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

2 of 2



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

Test Name:	Neck Extension	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	139		
Test ID:		Test Date:	1/13/2012
Test Number:	3	Test Time:	4:02:01 PM

Component Part Number	Component Serial Number
Neck - 880105-255	1952

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.6 deg C P
Humidity	10 -- 70	26 %RH P
Velocity	5.95 -- 6.19	6.16 m/s P
Pendulum Impulse at 10 ms	1.50 -- 1.90	1.68 m/s P
Pendulum Impulse at 20 ms	3.10 -- 3.90	3.49 m/s P
Pendulum Impulse at 30 ms	4.60 -- 5.60	5.21 m/s P
D Plane Rotation	99.0 -- 114.0	104.3 degrees P
Moment During Rotation Interval	-65.0 -- -53.0	-54.4 Nm P
Moment Decay to -10.0 Nm	94.0 -- 114.0	104.3 ms P

All test parameters are within specifications

Technician: **A. Rudniski**

Supervisor: **D. Travale**

Test ID:

Test Time: **4:02:01 PM**

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



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2012
Endevco	7231CT	C16510	10/3/2011
DentonATD	78051-342	PENDULUM POT	2/7/2011
DentonATD	78051-342	CONDYLE POT	2/7/2011
Denton	1716A	LC-443 My	6/3/2011
Denton	1716A	LC-443 Fx	6/3/2011

Test ID:

Test Time: 4:02:01 PM

Test Date: 1/13/2012

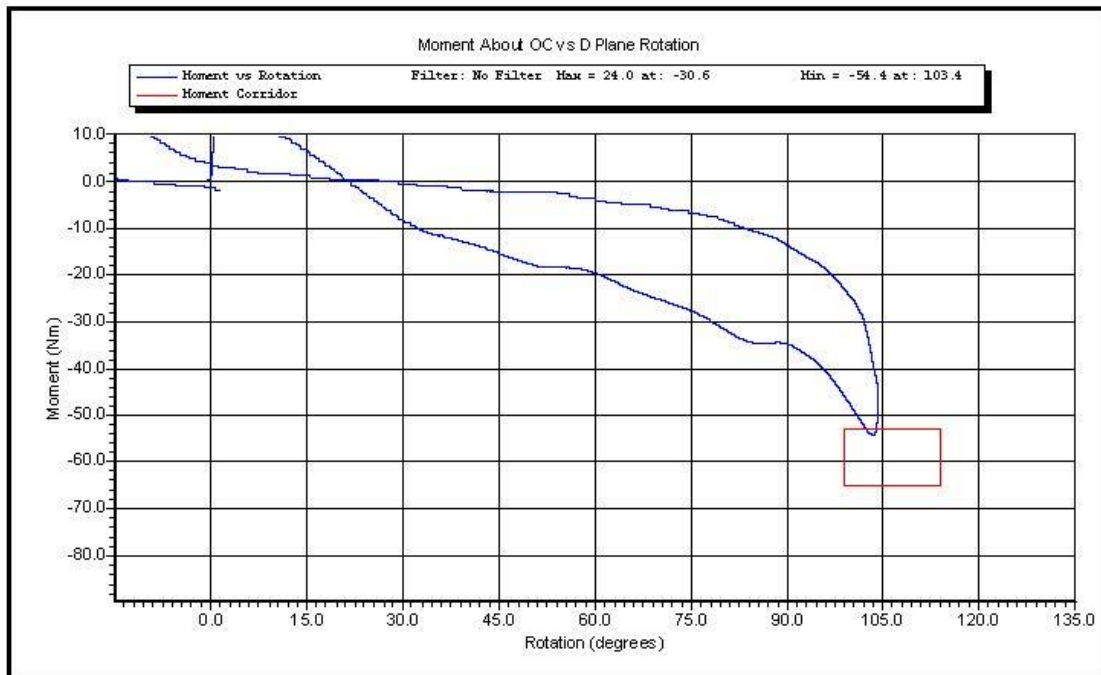


www.calspan.com

Calspan - Transportation Research Group

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

Test Name:	Neck Extension	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	139		
Test ID:		Test Date:	1/13/2012
Test Number:	3	Test Time:	4:02:01 PM



Test ID:

Test Time: 4:02:01 PM

Test Date: 1/13/2012

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

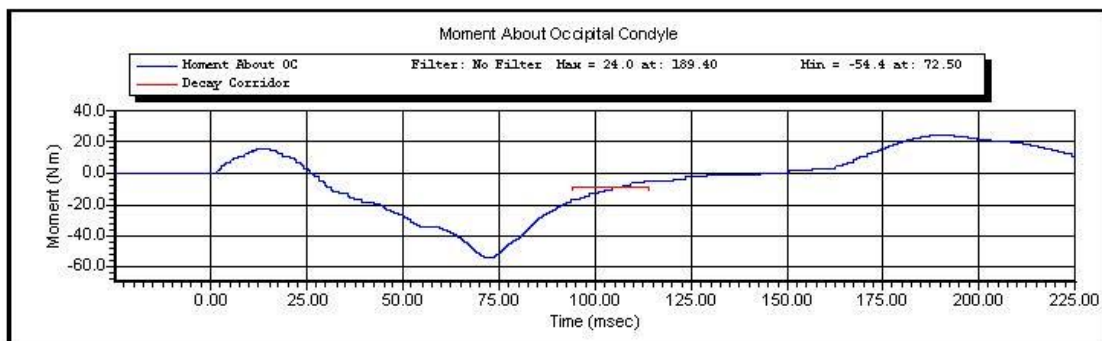
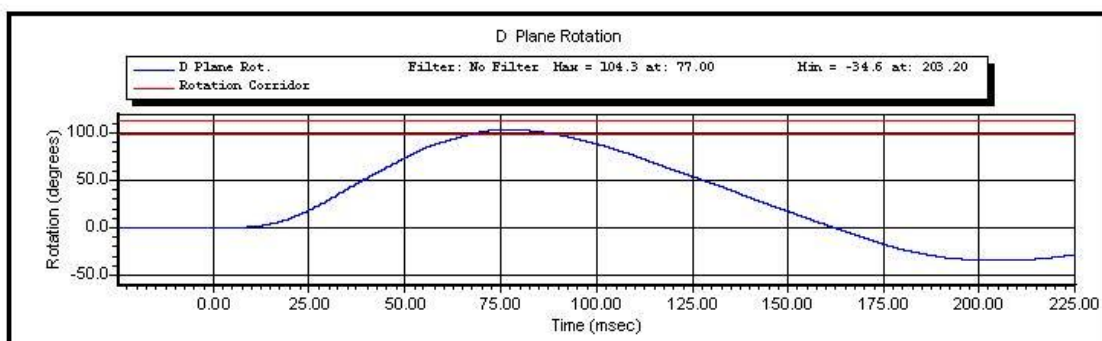
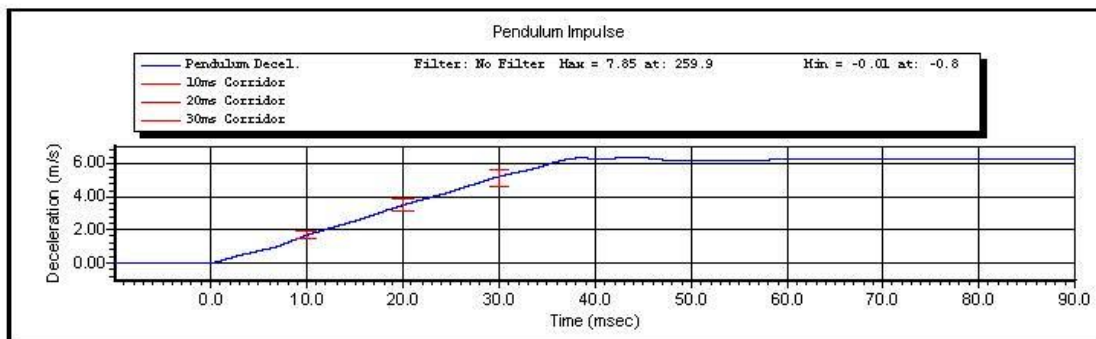
1 of 2



www.calspan.com

Calspan - Transportation Research Group

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



Test ID:

Test Time: 4:02:01 PM

Test Date: 1/13/2012

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

2 of 2



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

Test Name:	Neck Flexion	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	139		
Test ID:		Test Date:	1/13/2012
Test Number:	2	Test Time:	1:03:53 PM

Component Part Number	Component Serial Number
Neck - 880105-255	1952

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.5 deg C P
Humidity	10 -- 70	26 %RH P
Velocity	6.89 -- 7.13	7.13 m/s P
Pendulum Impulse at 10 ms	2.10 -- 2.50	2.30 m/s P
Pendulum Impulse at 20 ms	4.00 -- 5.00	4.34 m/s P
Pendulum Impulse at 30 ms	5.80 -- 7.00	6.08 m/s P
D Plane Rotation	-91.0 -- -77.0	-81.3 degrees P
Moment During Rotation Interval	69.0 -- 83.0	77.6 Nm P
Moment Decay to 10.0 Nm	80.0 -- 100.0	86.5 ms P

All test parameters are within specifications

Technician: **A. Rudniski**

Supervisor: **D. Travale**

Test ID:

Test Time: **1:03:53 PM**

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



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2011
Endevco	7231CT	C16510	10/3/2011
DentonATD	78051-342	PENDULUM POT	2/7/2011
DentonATD	78051-342	CONDYLE POT	2/7/2011
Denton	1716A	LC-443 My	6/3/2011
Denton	1716A	LC-443 Fx	6/3/2011

Test ID:

Test Time: 1:03:53 PM

Test Date: 1/13/2012

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

2 of 2

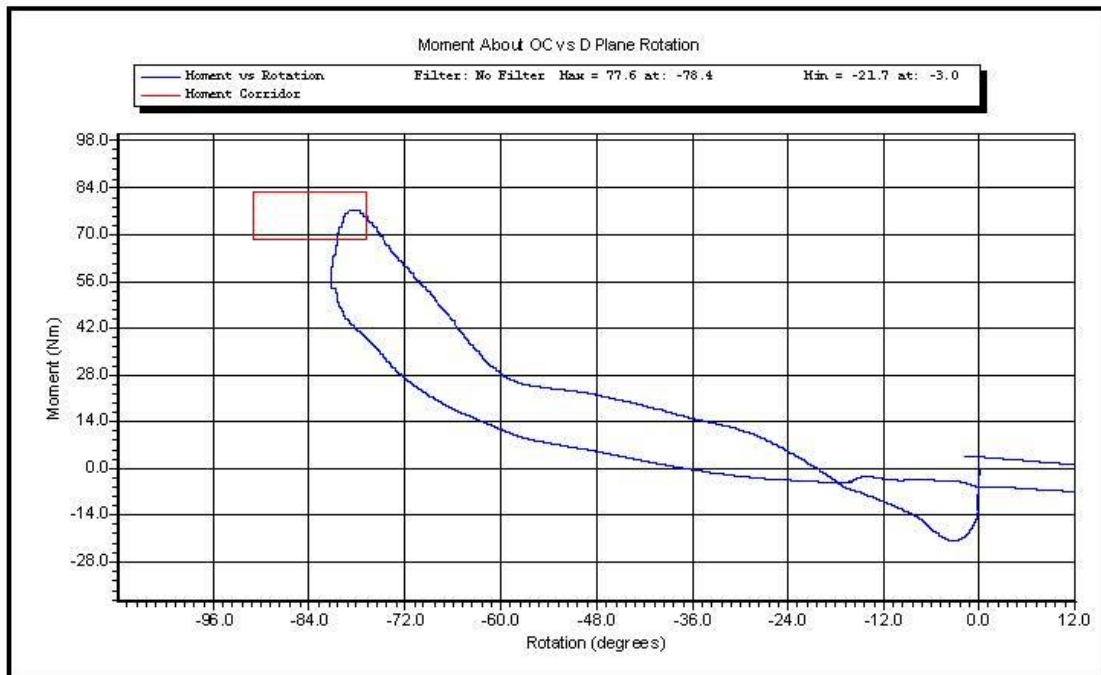


www.calspan.com

Calspan - Transportation Research Group

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

Test Name:	Neck Flexion	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	139		
Test ID:		Test Date:	1/13/2012
Test Number:	2	Test Time:	1:03:53 PM



Test ID:

Test Time: 1:03:53 PM

Test Date: 1/13/2012

Copyright 2003 Denton ATD, Inc. LabPaq! Version: 1.8.5.0

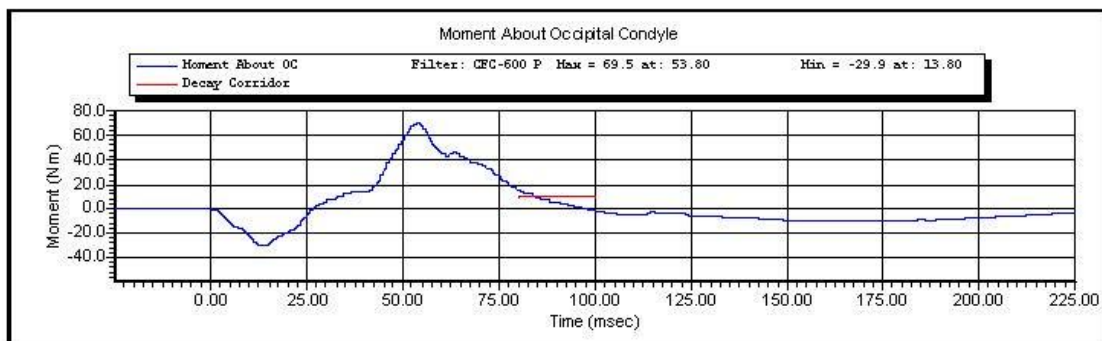
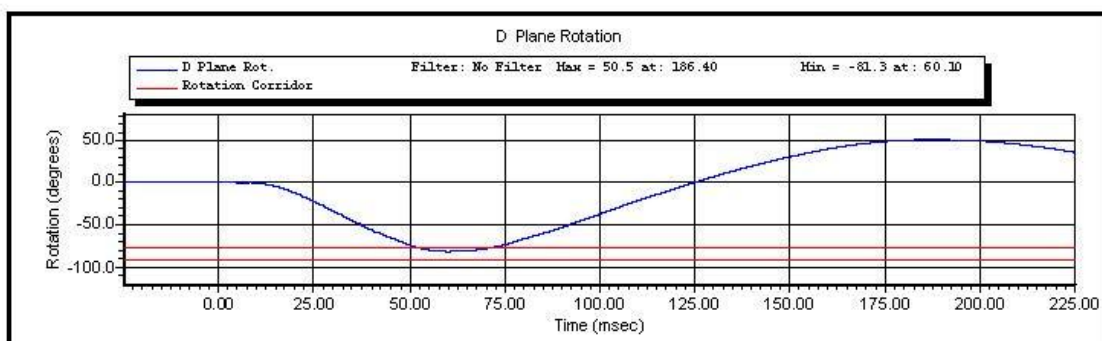
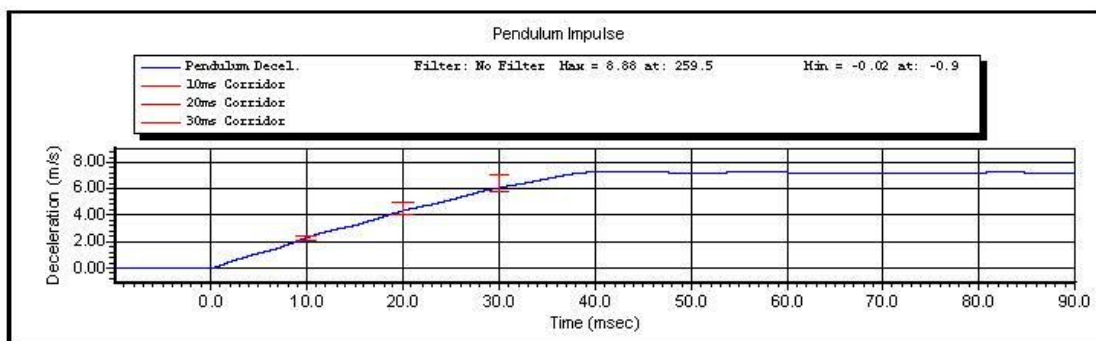
1 of 2



www.calspan.com

Calspan - Transportation Research Group

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



Test ID:

Test Time: 1:03:53 PM

Test Date: 1/13/2012

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

2 of 2



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

Test Name:	Thorax Impact	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	139		
Test ID:		Test Date:	1/16/2012
Test Number:	1	Test Time:	9:35:43 AM

Component Part Number	Component Serial Number
Ribs 880105-RS	05032011A
Chest Jacket - 880105-355-E	05177
Lumbar Spine - 880105-1095	050327

Test Parameters	Test Specifications	Test Results
Temperature	20.6 -- 22.2	21.4 deg C P
Humidity	10.0 -- 70.0	18.0 %RH P
Velocity	6.59 -- 6.83	6.66 m/s P
Sternum Displacement	-58.0 -- -50.0	-50.8 mm P
Force During Displacement Interval	-4400 -- -3900	-4388 N P
Force -18.0 to -50.0 Displacement	-4600 -- 0	-4414 N P
Hysteresis	69 -- 85	74 % P

All test parameters are within specifications

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

Test ID:

Test Time: **9:35:43 AM**

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



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

REFERENCE EQUIPMENT

<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Calibration Date</u>
DentonATD	Velocity Trap	1	1/11/2012
Endevco	7231CT	AGHF5	1/3/2012
DentonATD	H3CD	DS-139	12/10/2011

Test ID:

Test Time: 9:35:43 AM

Test Date: 1/16/2012

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

2 of 2

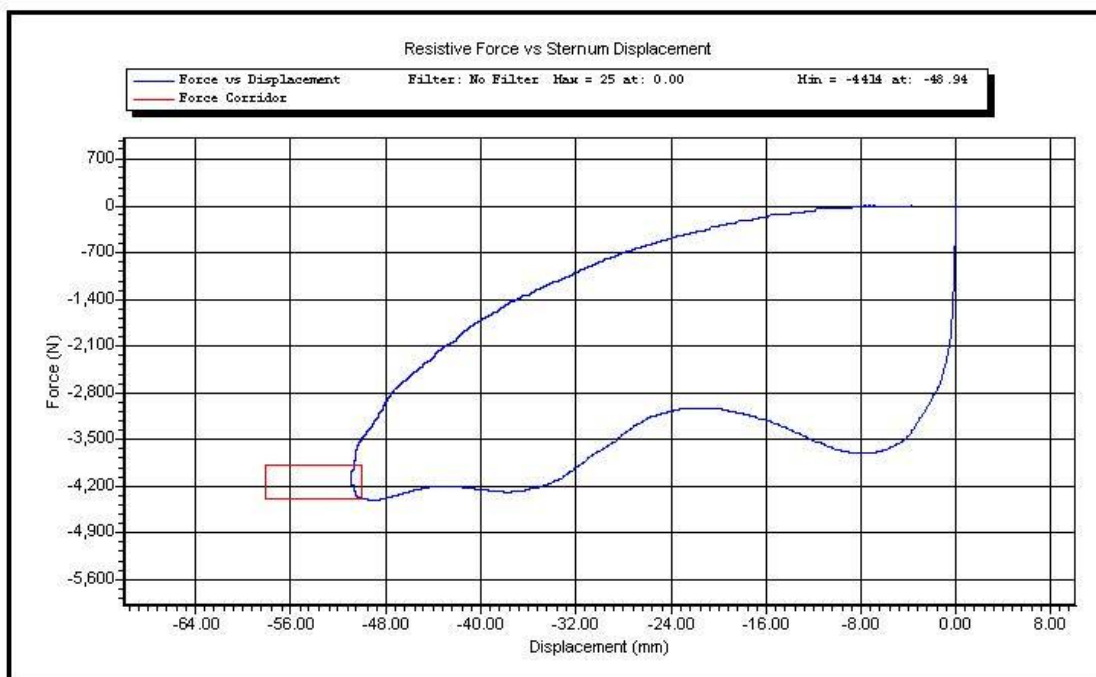


www.calspan.com

Calspan - Transportation Research Group

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

Test Name:	Thorax Impact	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	139		
Test ID:		Test Date:	1/16/2012
Test Number:	1	Test Time:	9:35:43 AM



Test ID:

Test Time: 9:35:43 AM

Test Date: 1/16/2012

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

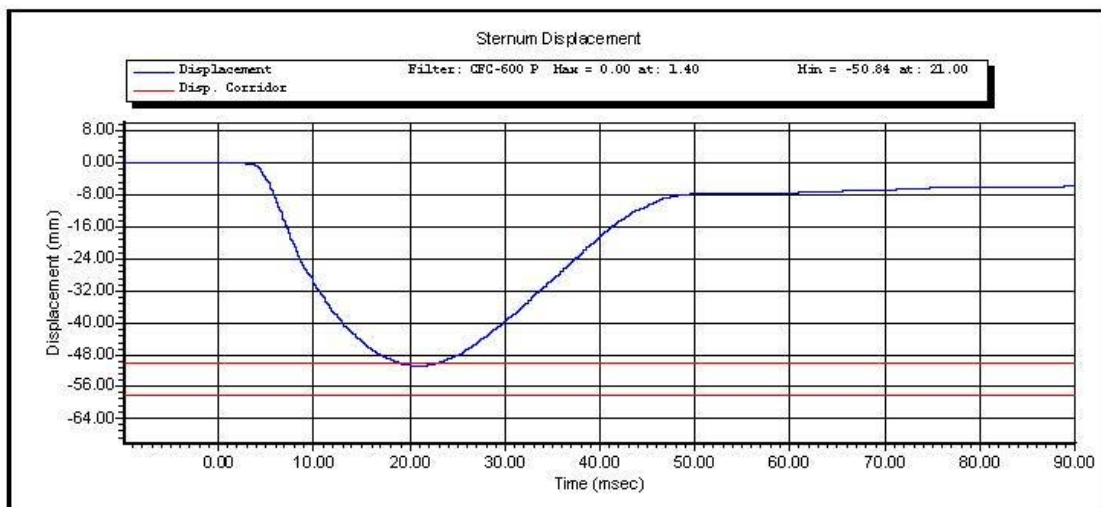
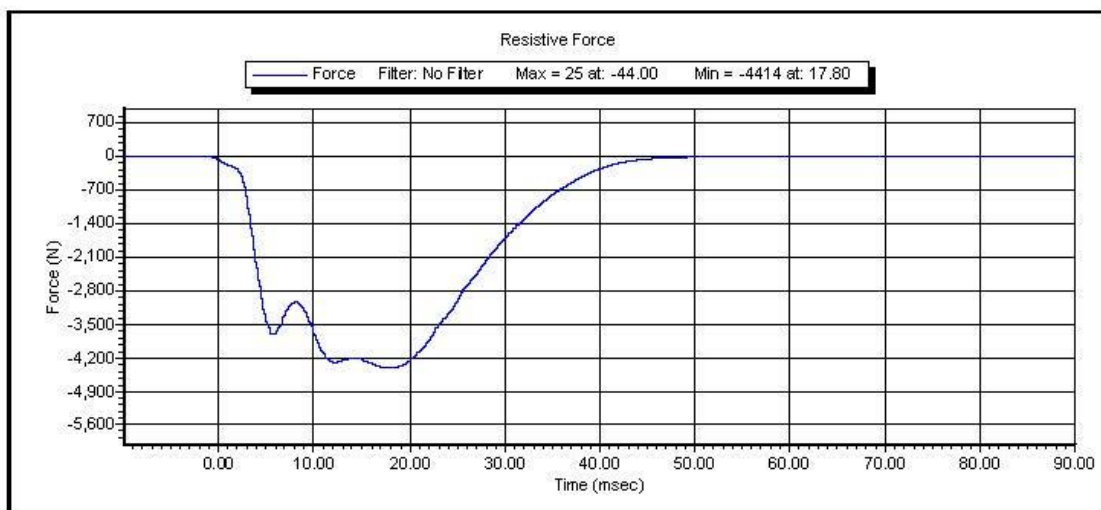
1 of 2



www.calspan.com

Calspan - Transportation Research Group

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



Test ID:

Test Time: 9:35:43 AM

Test Date: 1/16/2012

Copyright 2003 Denton ATD, Inc. LabPaq Version: 1.8.5.0

2 of 2



www.calspan.com

Calspan - Transportation Research Group

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

Torso Flexion Test

Technician: AR
Calibration Date: 1/16/2012
ATD Serial Number: NHTSA 5th Female 139

Test Results			
Test Condition	Parameters	Results	Status
Temperature	18.9-25.6° C	22.0° C	Pass
Lab Humidity: 38%	10-70 %	19%	Pass
Max Force @ 45 deg	320 – 390N	351N	Pass
Torso rotation rate	0.5 °/s ≤ rate ≤ 1.5 °/s	1.0 °/s	Pass
Initial reference angle	≤20 deg	13°	Pass
Final ref plane angle	Initial ref plane ± 8 deg	20°	Pass



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

Test Name:	Knee Impact PENDULUM	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	139		
Test ID:	Left Knee	Test Date:	1/17/2012
Test Number:	1	Test Time:	11:48:20 AM

Component Part Number	Component Serial Number
Knee Skin - 880105-508	1350

Test Parameters	Test Specifications	Test Results
Temperature	18.9 -- 25.6	21.9 deg C P
Humidity	10.0 -- 70.0	36.0 %RH P
Velocity	2.07 -- 2.13	2.10 m/s P
Resistive Force	-4060 -- -3450	-3896 N P

All test parameters are within specifications

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

Test ID: **Left Knee**

Test Time: **11:48:20 AM**

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



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

REFERENCE EQUIPMENT

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

Test ID: **Left Knee**

Test Time: **11:48:20 AM**

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

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

2 of 2

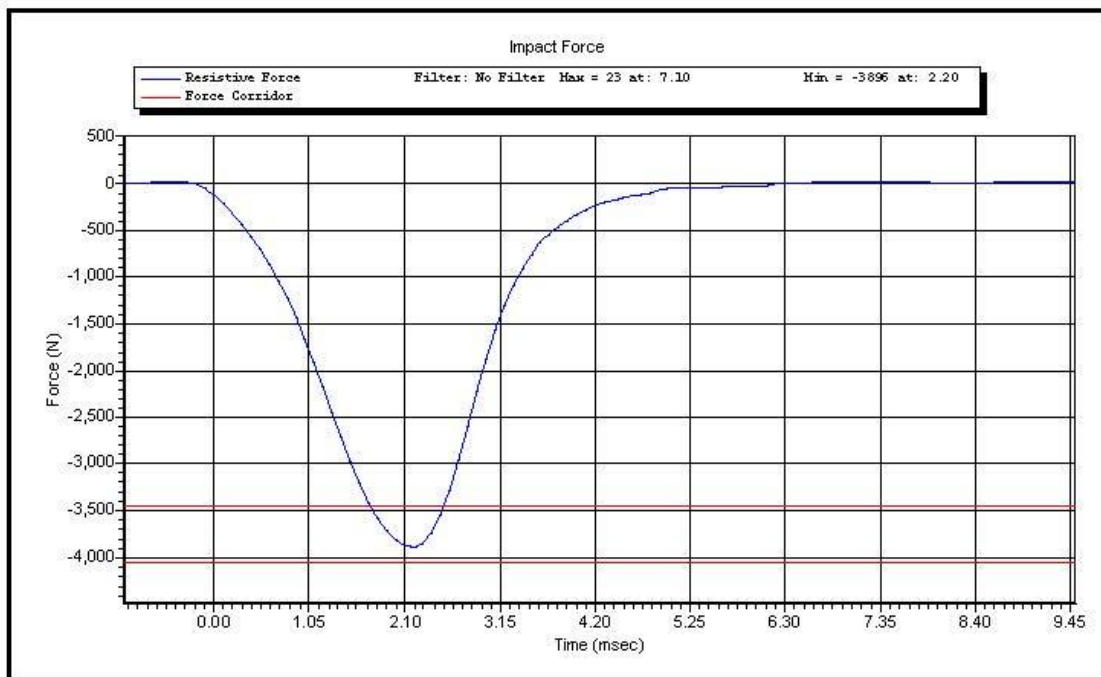


www.calspan.com

Calspan - Transportation Research Group

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

Test Name:	Knee Impact PENDULUM	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	139		
Test ID:	Left Knee	Test Date:	1/17/2012
Test Number:	1	Test Time:	11:48:20 AM



Test ID: **Left Knee**

Test Time: **11:48:20 AM**

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

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

1 of 1



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

Test Name:	Knee Impact PENDULUM	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	139		
Test ID:	Right Knee	Test Date:	1/17/2012
Test Number:	1	Test Time:	11:54:01 AM

Component Part Number	Component Serial Number
Knee Skin - 880105-508	1359

Test Parameters	Test Specifications	Test Results
Temperature	18.9 -- 25.6	21.9 deg C P
Humidity	10.0 -- 70.0	36.0 %RH P
Velocity	2.07 -- 2.13	2.09 m/s P
Resistive Force	-4060 -- -3450	-3997 N P

All test parameters are within specifications

Technician: S. Zito
Supervisor: D. Travale

Test ID: **Right Knee**

Test Time: **11:54:01 AM**

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



www.calspan.com

Calspan - Transportation Research Group

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

VERIFICATION REPORT

REFERENCE EQUIPMENT

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

Test ID: **Right Knee**

Test Time: **11:54:01 AM**

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

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

2 of 2

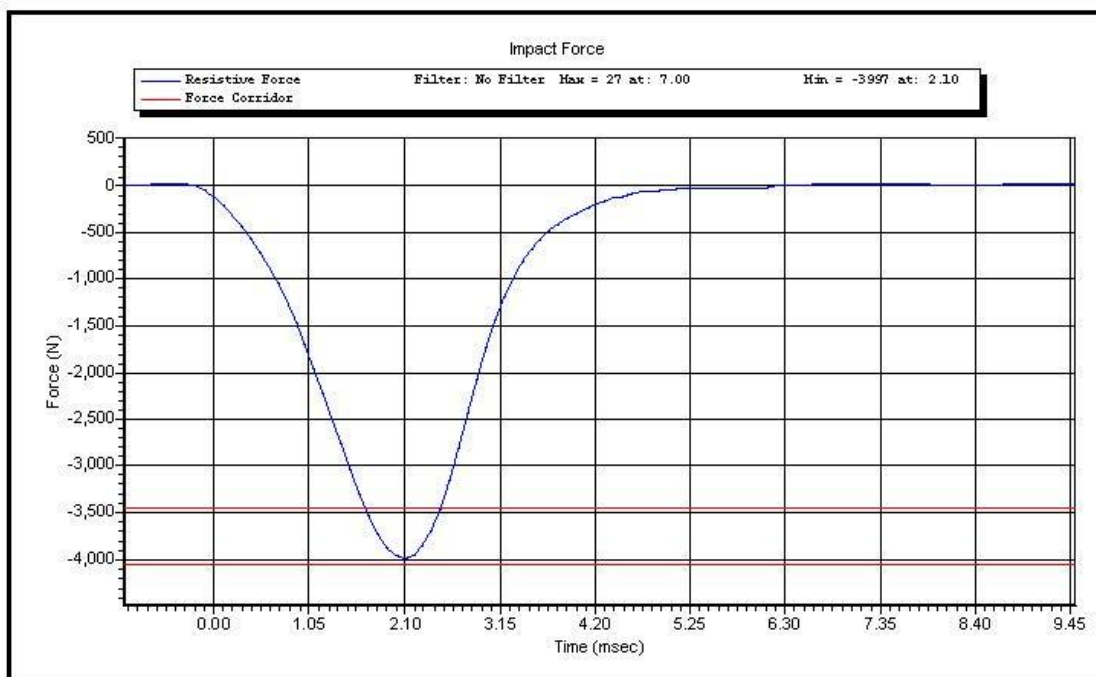


www.calspan.com

Calspan - Transportation Research Group

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

Test Name:	Knee Impact PENDULUM	Revision:	7/15/2002
Sub Test Name:		Spec Type:	NHTSA
ATD Type:	Hybrid III 5'th		
ATD Serial Number:	139		
Test ID:	Right Knee	Test Date:	1/17/2012
Test Number:	1	Test Time:	11:54:01 AM



Test ID: **Right Knee**

Test Time: **11:54:01 AM**

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

Copyright 2003 Denton ATD, Inc. LabPaqII Version: 1.8.5.0

1 of 1