

REPORT NUMBER: R&D-CAL-13-001

**MOVING BARRIER TO VEHICLE CRASH TEST IN SUPPORT OF NHTSA'S
FRONTAL OBLIQUE OFFSET PROGRAM
RESEARCH MOVING DEFORMABLE BARRIER INTO LEFT FRONT OF A**

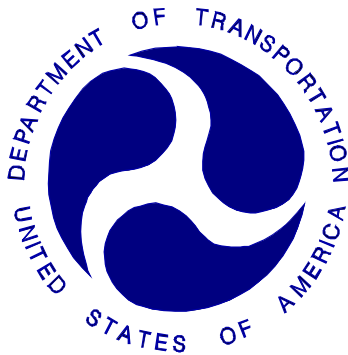
2013 DODGE DART

90.1KPH, 15 DEGREE ANGLE, 35% OVERLAP

TEST DATE: 10/29/2013

NHTSA No: RD0332

**CALSPAN CORPORATION
TRANSPORTATION TEST OPERATIONS
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FINAL REPORT SUBMITTED:

October 30, 2014

PREPARED FOR:

**U. S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Vehicle safety Research
1200 New Jersey Ave, SE
Room W46-446
Washington, DC 20590**

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FINAL REPORT ACCEPTANCE BY VEHICLE SAFETY RESEARCH, OFFICE OF STRUCTURAL AND RESTRAINTS RESEARCH DIVISION:

Date: _____

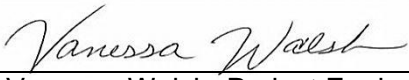
TOM, Vehicle Crash Testing
NHTSA, Office of Structures and Restraints Research
Date: _____

TECHNICAL REPORT STANDARD TITLE PAGE

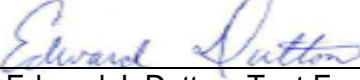
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16. Abstract A test was conducted in accordance with Task Order 0002 of Contract DTNH22-10-D-00155. The Test consisted of a Research Moving Deformable Barrier (RMDB) traveling at a target speed of 90.12 kph into a stationary 2013 Dodge Dart four door sedan. The struck vehicle was positioned 15 degrees relative to the moving barrier and impacted 35% of the left side of the vehicle. The 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 Transportation Test Operation's facility in Buffalo, New York on October 29, 2013. The RMDB impact velocity was 89.8 kph and the ambient temperature at the test vehicle at the time of impact was 21°C. The target vehicle post-test maximum crush was 371 mm. The test vehicle's performance was 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>313.44</td> <td>700</td> <td>113.01</td> </tr> <tr> <td>Maximum Chest Compression</td> <td>mm</td> <td>63</td> <td>-48.66</td> <td>63</td> <td>-35.15</td> </tr> <tr> <td>Neck Injury Criteria (Nij)</td> <td>N/A</td> <td>1</td> <td>0.36</td> <td>1</td> <td>0.26</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>4,170</td> <td>1055.80</td> <td>4,170</td> <td>956.85</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>4,000</td> <td>-1076.51</td> <td>4,000</td> <td>-1296.70</td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>10,008</td> <td>-3859.46</td> <td>10,008</td> <td>-4360.49</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>10,008</td> <td>-4120.10</td> <td>10,008</td> <td>-2237.58</td> </tr> </tbody> </table>						Measurement Description	Units	Driver ATD		Pass. ATD		Threshold	Result	Threshold	Result	Head Injury Criteria (HIC ₁₅)	N/A	700	313.44	700	113.01	Maximum Chest Compression	mm	63	-48.66	63	-35.15	Neck Injury Criteria (Nij)	N/A	1	0.36	1	0.26	Neck Tension	N	4,170	1055.80	4,170	956.85	Neck Compression	N	4,000	-1076.51	4,000	-1296.70	Left Femur Force	N	10,008	-3859.46	10,008	-4360.49	Right Femur Force	N	10,008	-4120.10	10,008	-2237.58
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DISCLAIMER

The contents of this report relate only to the specific product evaluated under the specific test conditions, as defined within this report. The findings and conclusions are those of the author(s) and not necessarily those of Calspan Corporation. For the purposes of this report, Calspan Corporation provided test services only and was not involved with the consulting, design or manufacture of any product. Calspan Corporation does not endorse products or manufacturers. Further, Calspan Corporation (to include: any of its affiliates, parent companies or subsidiaries) assumes no liability associated with the contents of this report or the use of this report.

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Date: October 30, 2014

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 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
 Test Date: 10/29/2013

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**SECTION 1
PURPOSE OF TEST**

Test Vehicle: 2013 Dodge Dart Four Door Sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
Test Date: 10/29/2013

This 90.12 kph (56 mph) Moving Barrier into a test vehicle is part of the Frontal Offset Test outlined in Contract No. DTNH22-10-D-00155, Task Order 0002. The purpose of this test is to obtain vehicle crashworthiness and occupant restraint system performance data for consumer information purposes.

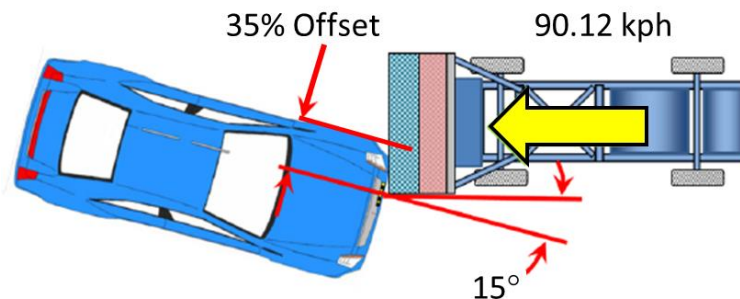
This test was conducted in accordance with the instructions set forth for a 15° angle, 35% offset moving barrier to vehicle impact, outlined in Contract No. DTNH22-10-D-00155, TO 0002. Data was obtained indicant of Federal Motor Vehicle Safety Standard FMVSS 208-Occupant Crash Protection, FMVSS 212 – Windshield Mounting, FMVSS 219 (partial) – Windshield Zone Intrusion, and FMVSS 301 – Fuel System Integrity, in addition to the requirements of Contract No. DTNH22-10-D-00155, TO 0002.

SECTION 2 SUMMARY OF TEST

Test Vehicle: 2013 Dodge Dart Four Door Sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
Test Date: 10/29/2013

A 2013 Dodge Dart Four Door Sedan was impacted on the left front corner by a research moving deformable barrier (RMDB). This test vehicle was stationary and positioned at a target angle of 15° and at a target offset of 35% to the forward line of motion of the RMDB. The RMDB was towed down the test track in a full forward direction, without any crabbing, and at the targeted impact velocity of 90.12 kph (56.0 mph) into the test vehicle. The test vehicle's mass was 1,738 kg (3,823.6 lbs), and the RMDB's mass was 2490.7 kg (5491 lbs). The test was conducted by Calspan Corporation on October 29, 2013.



The test was documented by two (2) real time and fourteen (14) high-speed video cameras. Camera locations and other pertinent data are located in Data Sheet No. 6 of this report. Pre and post – test photographs of the test vehicle, RMDB, and test setup were taken using a digital still camera. Photographic documentation of the test is presented in Appendix A of this report.

One 50% adult male THOR-NT anthropomorphic test device (ATD) (Serial No. 016) was seated in the left, front (P1 -Driver's) seating position and one 50% adult male THOR-NT adult male ATD (Serial No. 015) was seated in the right front passenger seating position (P2). The driver and passenger were positioned according to instructions specified in laboratory test procedures FMVSS 208-14, "Occupant Crash Protection", TP208-14, July 27, 2006.

The driver was restrained with a 3 – point seat belt, a frontal, curtain, torso, and knee airbag. The passenger was restrained with a 3 – point seat belt, frontal and knee airbag. The passenger's curtain and torso airbags were disabled.

SECTION 2 (CONTINUED)
SUMMARY OF TEST

Test Vehicle: 2013 Dodge Dart Four Door Sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
Test Date: 10/29/2013

Two hundred and twenty (220) channels of data from the two ATD's, test vehicle and RMDB were collected using Kayser – Threde and DTS data acquisition systems. Appendix B contains dummy data plots, as well as vehicle and RMDB response data plots.

There was 58.7% total windshield retention, with 42.9% and 74.6% retention on the left and right sides, respectively. There appeared to be no intrusion into the protected zone of the windshield during any portion of the impact event. The maximum static crush of the vehicle was 377 mm at C1 to the left of the vehicle's centerline. The maximum crush of the structural bumper beam was 371 mm at B3, to the left of the vehicle's centerline. Full vehicle measurements are presented in Section 3 of this report.

All four vehicle doors remained closed and latched during the test. All doors remained operational after the impact event.

Structure observations include the following:

- A-Pillar buckled slightly
- Windshield had cracks throughout with minor separation
- Hood bent inwards and exposed part of the engine compartment

The driver ATD's visible contact points were:

- Head contacted the frontal and curtain airbag, side head liner and visor
- Torso contacted the frontal airbag, torso airbag, and driver's shoulder contacted the side door
- Knees contacted the knee airbag and knee bolster

The right front passenger ATD's visible contact points were:

- Head contacted the frontal airbag and visor
- Torso contacted the frontal airbag
- Knee contacted the knee airbag and knee bolster

**SECTION 2 (CONTINUED)
CRASH VEHICLE SUMMARY**

Test Vehicle: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
 Test Date: 10/29/2013

Primary Impact Data

Measured Parameter	Units	Value
RMDB Velocity at Impact	kph	89.8
RMDB Test Weight	kg	2490.7
RMDB Maximum Static Crush	mm	288
Vehicle Test Weight	kg	1738
Actual Vehicle Angle	degrees	15
Vehicle Maximum Static Crush	mm	377
Vertical Offset from Target Point (+ down / - up)*	mm	+20
Lateral Offset from Target Point (+ left / - right)*	mm	+8
Number of Data Channels		220
Number of Real-Time Cameras		2
Number of High-Speed Cameras		14

*Offsets are in relation to the vehicle coordinate system.

Dummy Contacts

	Driver	Picture Ref.	Passenger	Picture Ref.
Dummy Type	THOR, S/N: 016		THOR, S/N: 015	
Head Contact	Front & Curtain Airbag, Side Headliner & Visor	A49-A51	Frontal Airbag & Visor	A70-A72
Left Shoulder Contact	Driver's Side Door	N/A	None	N/A
Upper Torso Contact	Front & Torso/Pelvis Airbags	N/A	Front Airbag	N/A
Lower Torso Contact	Torso/Pelvis Airbag	N/A	None	N/A
Left Knee Contact	Knee Airbag & Bolster	A28	Knee Airbag & Bolster	A52
Left Outside Leg Contact	Driver's Side Door	N/A	N/A	N/A
Right Knee Contact	Knee Airbag	A28	Knee Airbag	A52

Data Anomalies:

- Driver Pelvis X Acceleration - Questionable max spike at 180ms
- Driver Left Femur Y Moment – Questionable throughout
- Passenger Head CG Y Acceleration – Questionable min spike at 125ms
- Passenger Femur Right Y Moment – Questionable spikes throughout

SECTION 2 (CONTINUED)
PRELIMINARY INJURY SUMMARY: Driver

Test Vehicle: 2013 Dodge Dart NHTSA No.: RD0332

Test Program: Research and Development Left Oblique Offset Test Date: 10/29/2013

Driver: Thor Serial No. 016 Injury Summary

	Nomenclature	Units	Source	Max	Min
Head	Head CG X	g	1000	6.59	-81.29
	Head CG Y	g	1000	31.39	-6.56
	Head CG Z	g	1000	33.98	-19.77
	Head Resultant	g	Compute	84.44	
	36 ms HIC		Compute	316.34	
	15 ms HIC		Compute	313.44	
	Head Resultant CG Acceleration, 3 ms Clip	g	Compute	57.45	
	Head Rotational Velocity X	deg/s	60	449.44	-1124.08
	Head Rotational Velocity Y	deg/s	60	681.72	-1696.71
	Head Rotational Velocity Z	deg/s	60	1025.01	-981.88
	Head Rotational Velocity Resultant	deg/s	Compute	2171.33	
	Brain Injury Criteria		Compute	0.73	
	Neck	UNLC Transferred to OC, Neck System, FX	N	1000	306.65
UNLC Neck System Tension, FZ		N	1000	1055.80	
UNLC Neck System Compression, FZ		N	1000		-1076.51
UNLC Transferred to OC, Neck System Flexion, MY		N-m	Thortest	8.23	
UNLC Transferred to OC, Neck System Extension, MY		N-m	Thortest		-15.16
NIJ			Compute	0.36	
On head acting through total neck section, FX		N	Thortest	558.03	-256.24
On head acting through total neck section, FY		N	Thortest	232.88	-127.00
On head acting through total neck section, FZ		N	Thortest	1128.94	-756.99
On head acting through total neck section, MX		N-m	Thortest	27.29	-34.54
On head acting through total neck section, MY		N-m	Thortest	33.76	-25.32
On head acting through total neck section, MZ		N-m	Thortest	5.69	-19.27
On head acting through O.C. joint only, FX		N	Thortest	601.76	-472.50
On head acting through O.C. joint only, FZ		N	Thortest	1033.06	-940.59
On head acting through O.C. joint only, MY		N-m	Thortest	8.23	-15.16
Chest	Upper Left IR-TRACC X - deflection	mm	Thortest	5.91	-23.58
	Upper Left IR-TRACC Y - deflection	mm	Thortest	3.97	-11.56
	Upper Left IR-TRACC Z - deflection	mm	Thortest	1.22	-28.89
	Upper Left IR-TRACC D - deflection	mm	Thortest	5.44	-22.06
	Upper Right IR-TRACC X - deflection	mm	Thortest	0.53	-36.89
	Upper Right IR-TRACC Y - deflection	mm	Thortest	7.64	-11.96
	Upper Right IR-TRACC Z - deflection	mm	Thortest	18.06	-24.82
	Upper Right IR-TRACC D - deflection	mm	Thortest	2.45	-36.30
	Lower Left IR-TRACC X - deflection	mm	Thortest	13.23	-2.27
	Lower Left IR-TRACC Y - deflection	mm	Thortest	4.49	-16.38

SECTION 2 (CONTINUED)
PRELIMINARY INJURY SUMMARY: Driver

Test Vehicle: 2013 Dodge Dart NHTSA No.: RD0332
 Test Program: Research and Development Left Oblique Offset Test Date: 10/29/2013

Driver: Thor Serial No. 016 Injury Summary

	Nomenclature	Units	Source	Max	Min	
Chest (Con't)	Lower Left IR-TRACC Z - deflection	mm	Thortest	1.18	-12.73	
	Lower Left IR-TRACC D - deflection	mm	Thortest	12.08	-1.37	
	Lower Right IR-TRACC X - deflection	mm	Thortest	0.53	-49.49	
	Lower Right IR-TRACC Y - deflection	mm	Thortest	5.68	-21.86	
	Lower Right IR-TRACC Z - deflection	mm	Thortest	5.80	-16.98	
	Lower Right IR-TRACC D - deflection	mm	Thortest	0.49	-48.66	
		Chest CG Acceleration, 3 ms clip	g	Compute	N/A	
Abdomen	Lower Left IR-TRACC X - deflection	mm	Thortest	N/A	N/A	
	Lower Left IR-TRACC Y - deflection	mm	Thortest	N/A	N/A	
	Lower Left IR-TRACC Z - deflection	mm	Thortest	N/A	N/A	
	Lower Left IR-TRACC D - deflection	mm	Thortest	N/A	N/A	
		Left Viscous Criterion Based on X - deflection		Compute	N/A	
	Lower Right IR-TRACC X - deflection	mm	Thortest	N/A	N/A	
	Lower Right IR-TRACC Y - deflection	mm	Thortest	N/A	N/A	
	Lower Right IR-TRACC Z - deflection	mm	Thortest	N/A	N/A	
	Lower Right IR-TRACC D - deflection	mm	Thortest	N/A	N/A	
		Right Viscous Criterion Based on X - deflection		Compute	N/A	
Spine	Upper Spine (T1) AX	g	180	31.26	-45.77	
	Upper Spine (T1) AY	g	180	43.09	-9.84	
	Upper Spine (T1) AZ	g	180	33.65	-19.47	
		Upper Spine (T1) Resultant	g	Compute	56.45	
	Middle Spine (T6) AX	g	180	19.11	-39.67	
	Middle Spine (T6) AY	g	180	19.95	-4.38	
	Middle Spine (T6) AZ	g	180	16.68	-18.51	
		Middle Spine (T6) Resultant	g	Compute	43.44	
Pelvis	Pelvis CG Resultant Acceleration	g	Compute	73.18		
Acetabulum	Left FX force	N	600	1049.95	-1228.38	
	Left FY force	N	600	619.56	-965.52	
	Left FZ force	N	600	1346.18	-2384.95	
		Left Acetabulum Resultant	N	Compute	2589.54	
	Right FX force	N	600	470.68	-1677.26	
	Right FY force	N	600	490.07	-1690.17	
	Right FZ force	N	600	1885.40	-520.59	
		Right Acetabulum Resultant	N	Compute	2593.16	
Anomalies None						

SECTION 2 (CONTINUED)
PRELIMINARY INJURY SUMMARY: Driver

Test Vehicle: 2013 Dodge Dart NHTSA No.: RD0332
 Test Program: Research and Development Left Oblique Offset Test Date: 10/29/2013

Driver: Thor Serial No. 016 Injury Summary

	Nomenclature	Units	Source	Max	Min
Knee	Left Knee Displacement, DX	mm	180	0.24	-14.45
	Right Knee Displacement, DX	mm	180	1.13	-14.73
Femur	Left Femur Force, FZ	N	600	145.89	-3859.46
	Left Femur Moment, MX	N-m	600	83.76	-229.90
	Left Femur Moment, MY	N-m	600	191.15 ⁽¹⁾	-389.86 ⁽¹⁾
	Left Femur Res (MX / MY only, not MZ)	N-m	Compute	443.32 ⁽¹⁾	
	Right Femur Force, FZ	N	600	116.71	-4120.10
	Right Femur Moment, MX	N-m	600	79.08	-112.40
	Right Femur Moment, MY	N-m	600	130.82	-42.77
	Right Femur Res (MX / MY only, not MZ)	N-m	Compute	132.53	
	Tibia	Left Upper Tibia, FZ	N	600	385.39
Left Upper Tibia, MY		N-m	600	41.20	-114.40
Left Upper Tibia, Index			Compute	0.90	
Right Upper Tibia, FZ		N	600	317.58	-1822.26
Right Upper Tibia, MY		N-m	600	98.56	-37.82
Right Upper Tibia, Index			Compute	0.57	
Left Lower Tibia, FZ		N	600	45.78	-2048.04
Left Lower Tibia, MY		N-m	600	23.57	-124.05
Left Lower Tibia, Index			Compute	1.20	
Right Lower Tibia, FZ		N	600	69.79	-3365.84
Right Lower Tibia, MY		N-m	600	60.49	-57.93
Right Lower Tibia, Index			Compute	0.78	
Ankle		Left Ankle Rotation, RX	Deg	180	5.82
	Left Ankle Rotation, RY	Deg	180	17.21	-14.00
	Right Ankle Rotation, RX	Deg	180	-0.27	-37.67
	Right Ankle Rotation, RY	Deg	180	23.53	-10.78
Anomalies					
(1) Questionable data throughout					

SECTION 2 (CONTINUED)

PRELIMINARY INJURY SUMMARY: Right Front Passenger

Test Vehicle: 2013 Dodge Dart NHTSA No.: RD0332

Test Program: Research and Development Left Oblique Offset Test Date: 10/29/2013

Right Front Passenger: Thor Serial No. 015 Injury Summary

	Nomenclature	Units	Source	Max	Min
Head	Head CG X	g	1000	9.37	-31.96
	Head CG Y	g	1000	33.73	-51.39
	Head CG Z	g	1000	21.78	-1.24
	Head Resultant	g	Compute	51.82	
	36 ms HIC		Compute	201.45	
	15 ms HIC		Compute	113.01	
	Head Resultant CG Acceleration, 3 ms Clip	g	Compute	37.26	
	Head Rotational Velocity X	deg/s	60	764.56	-509.98
	Head Rotational Velocity Y	deg/s	60	1332.94	-1825.39
	Head Rotational Velocity Z	deg/s	60	5216.05	-3242.41
	Head Rotational Velocity Resultant	deg/s	Compute	5399.83	
	Brain Injury Criteria		Compute	2.21	
	Neck	UNLC Transferred to OC, Neck System, FX	N	1000	393.42
UNLC Neck System Tension, FZ		N	1000	956.85	
UNLC Neck System Compression, FZ		N	1000		-1296.70
UNLC Transferred to OC, Neck System Flexion, MY		N-m	Thortest	24.00	
UNLC Transferred to OC, Neck System Extension, MY		N-m	Thortest		-20.88
NIJ			Compute	0.26	
On head acting through total neck section, FX		N	Thortest	514.18	-343.48
On head acting through total neck section, FY		N	Thortest	276.14	-433.45
On head acting through total neck section, FZ		N	Thortest	1087.98	-55.85
On head acting through total neck section, MX		N-m	Thortest	28.10	-29.06
On head acting through total neck section, MY		N-m	Thortest	26.69	-35.83
On head acting through total neck section, MZ		N-m	Thortest	26.12	-97.19
On head acting through O.C. joint only, FX		N	Thortest	490.24	-466.65
On head acting through O.C. joint only, FZ		N	Thortest	943.17	-1281.24
On head acting through O.C. joint only, MY		N-m	Thortest	24.00	-20.88
Chest	Upper Left IR-TRACC X - deflection	mm	Thortest	0.05	-35.28
	Upper Left IR-TRACC Y - deflection	mm	Thortest	3.22	-15.50
	Upper Left IR-TRACC Z - deflection	mm	Thortest	16.16	-9.69
	Upper Left IR-TRACC D - deflection	mm	Thortest	0.05	-35.15
	Upper Right IR-TRACC X - deflection	mm	Thortest	1.95	-19.67
	Upper Right IR-TRACC Y - deflection	mm	Thortest	3.66	-14.13
	Upper Right IR-TRACC Z - deflection	mm	Thortest	11.30	-12.53
	Upper Right IR-TRACC D - deflection	mm	Thortest	2.36	-17.18
	Lower Left IR-TRACC X - deflection	mm	Thortest	4.58	-26.21
	Lower Left IR-TRACC Y - deflection	mm	Thortest	14.65	-3.67

SECTION 2 (CONTINUED)

PRELIMINARY INJURY SUMMARY: Right Front Passenger

Test Vehicle: 2013 Dodge Dart NHTSA No.: RD0332

Test Program: Research and Development Left Oblique Offset Test Date: 10/29/2013

	Nomenclature	Units	Source	Max	Min
--	--------------	-------	--------	-----	-----

Right Front Passenger: Thor Serial No. 015 Injury Summary

Chest (Con't)	Lower Left IR-TRACC Z - deflection	mm	Thortest	12.47	-7.14
	Lower Left IR-TRACC D - deflection	mm	Thortest	5.81	-26.16
	Lower Right IR-TRACC X - deflection	mm	Thortest	3.11	-9.30
	Lower Right IR-TRACC Y - deflection	mm	Thortest	10.27	-17.85
	Lower Right IR-TRACC Z - deflection	mm	Thortest	5.43	-10.70
	Lower Right IR-TRACC D - deflection	mm	Thortest	4.74	-8.63
	Chest CG Acceleration, 3 ms clip	g	Compute	N/A	
Abdomen	Lower Left IR-TRACC X - deflection	mm	Thortest	N/A	N/A
	Lower Left IR-TRACC Y - deflection	mm	Thortest	N/A	N/A
	Lower Left IR-TRACC Z - deflection	mm	Thortest	N/A	N/A
	Lower Left IR-TRACC D - deflection	mm	Thortest	N/A	N/A
	Left Viscous Criterion Based on X - deflection		Compute	N/A	
	Lower Right IR-TRACC X - deflection	mm	Thortest	N/A	N/A
	Lower Right IR-TRACC Y - deflection	mm	Thortest	N/A	N/A
	Lower Right IR-TRACC Z - deflection	mm	Thortest	N/A	N/A
	Lower Right IR-TRACC D - deflection	mm	Thortest	N/A	N/A
	Right Viscous Criterion Based on X - deflection		Compute	N/A	
Spine	Upper Spine (T1) AX	g	180	5.59	-33.74
	Upper Spine (T1) AY	g	180	40.60	-14.18
	Upper Spine (T1) AZ	g	180	24.63	-1.76
	Upper Spine (T1) Resultant	g	Compute	56.88	
	Middle Spine (T6) AX	g	180	6.15	-28.24
	Middle Spine (T6) AY	g	180	21.84	-4.58
	Middle Spine (T6) AZ	g	180	8.39	-4.40
	Middle Spine (T6) Resultant	g	Compute	32.44	
Pelvis	Pelvis CG Resultant Acceleration	g	Compute	62.88	
Acetabulum	Left FX force	N	600	2361.19	-2808.53
	Left FY force	N	600	813.44	-997.36
	Left FZ force	N	600	765.98	-672.47
	Left Acetabulum Resultant	N	Compute	2891.57	
	Right FX force	N	600	2058.73	-1402.64
	Right FY force	N	600	418.70	-1704.31
	Right FZ force	N	600	1638.27	-119.77
	Right Acetabulum Resultant	N	Compute	2259.33	
Anomalies					
None					

SECTION 2 (CONTINUED)
PRELIMINARY INJURY SUMMARY: Right Front Passenger Legs

Test Vehicle: 2013 Dodge Dart NHTSA No.: RD0332
 Test Program: Research and Development Left Oblique Offset Test Date: 10/29/2013

Right Front Passenger: Thor Serial No. 015 Injury Summary

	Nomenclature	Units	Source	Max	Min
Knee	Left Knee Displacement, DX	mm	180	0.24	-12.31
	Right Knee Displacement, DX	mm	180	0.71	-11.13
Femur	Left Femur Force, FZ	N	600	532.41	-4360.49
	Left Femur Moment, MX	N-m	600	148.55	-71.39
	Left Femur Moment, MY	N-m	600	146.02	-13.02
	Left Femur Res (MX / MY only, not MZ)	N-m	Compute	157.39	
	Right Femur Force, FZ	N	600	680.25	-2237.58
	Right Femur Moment, MX	N-m	600	117.94	-232.29
	Right Femur Moment, MY	N-m	600	73.01 ⁽²⁾	-51.83 ⁽²⁾
	Right Femur Res (MX / MY only, not MZ)	N-m	Compute	232.86 ⁽²⁾	
Tibia	Left Upper Tibia, FZ	N	600	97.77	-1999.42
	Left Upper Tibia, MY	N-m	600	115.65	-43.90
	Left Upper Tibia, Index		Compute	0.69	
	Right Upper Tibia, FZ	N	600	414.82	-3695.58
	Right Upper Tibia, MY	N-m	600	61.90	-35.89
	Right Upper Tibia, Index		Compute	0.79	
	Left Lower Tibia, FZ	N	600	84.04	-1910.78
	Left Lower Tibia, MY	N-m	600	68.22	-14.34
	Left Lower Tibia, Index		Compute	0.45	
	Right Lower Tibia, FZ	N	600	232.61	-4164.58
	Right Lower Tibia, MY	N-m	600	37.83	-39.48
	Right Lower Tibia, Index		Compute	0.64	
Ankle	Left Ankle Rotation, RX	Deg	180	20.21	-20.89
	Left Ankle Rotation, RY	Deg	180	-18.18	-26.82
	Right Ankle Rotation, RX	Deg	180	25.97	-25.72
	Right Ankle Rotation, RY	Deg	180	-5.60	-26.08

Anomalies

(1) Questionable data throughout

**SECTION 3
DATA SHEETS**

Test Vehicle: 2013 Dodge Dart Four Door Sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
Test Date: 10/29/2013

<u>Data Sheet No.</u>		<u>Page No.</u>
1	General Test and Vehicle Parameter Data	3-2
2	Seat Adjustment, Fuel System, and Steering Wheel	3-6
3	Dummy Longitudinal Clearance Dimensions	3-8
4	Dummy Lateral Clearance Dimensions	3-10
5	Seat Belt Positioning Data	3-11
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7	Vehicle Instrumentation Data	3-15
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15	Summary of FMVSS 212, 219 (Partial), and 301 Data	3-48
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16	FMVSS 301 Static Rollover Results	3-50
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**DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
 Test Date: 10/29/2013

VEHICLE INFORMATION

NHTSA No.	RD0332
Model Year	2013
Make	Dodge
Model	Dart
Body Style	Four Door Sedan
VIN	1C3CDFAA2DD149198
Body Color	Red
Odometer Reading (km/mi)	255.9 km/ 159 mi
Engine Displacement. (L)	2.0
Type/No. Cylinders	I4
Engine Placement	Transvers
Transmission Type	Automatic
Transmission Speeds	6-Speed
Overdrive	Yes
Final Drive	Front 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)	No
Traction Control System (TCS)	Yes

VEHICLE OPTIONS

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

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

No

DATA FROM CERTIFICATION LABEL

Manufactured By	Chrysler Group LLC
Date of Manufacture	10/12

GWR (kg)	1944
GAWR Front (kg)	1076
GAWR Rear (kg)	901

VEHICLE SEATING AND WEIGHT CAPACITY

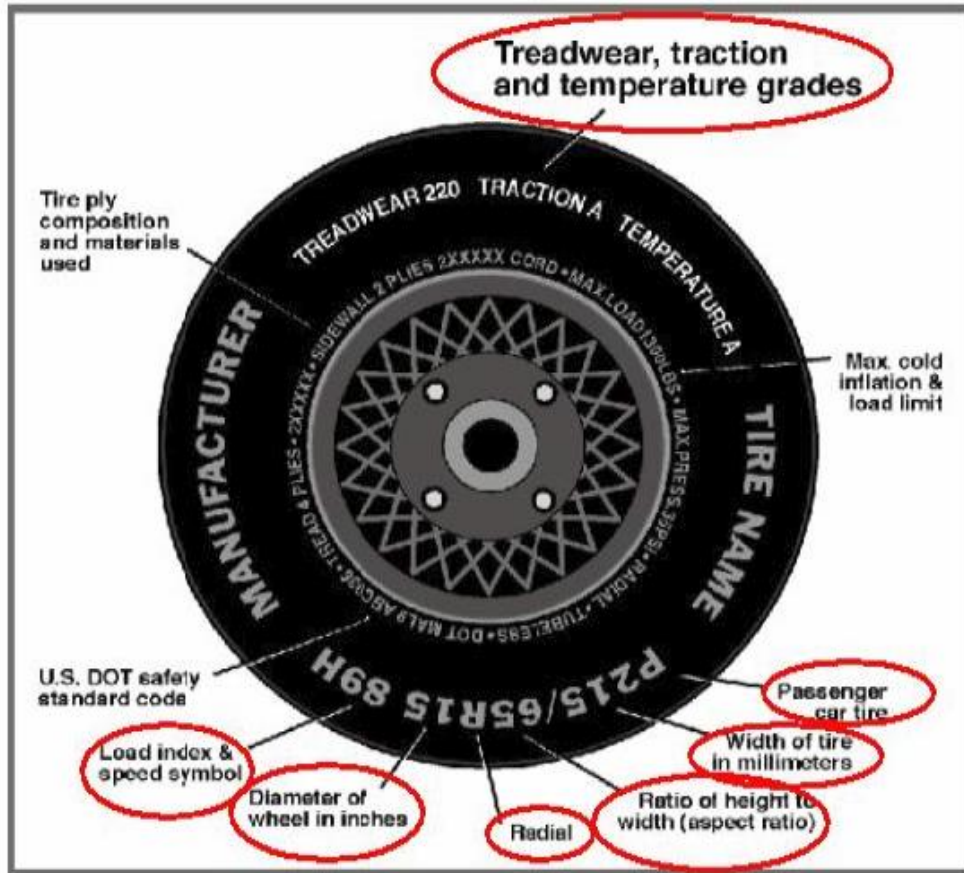
Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench	--	
Number of Occupants	2	3	--	5
Capacity Wt. (VCW) (kg)				374.0
Cargo Wt. (RCLW) (kg)				33.8

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

Test Vehicle: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
 Test Date: 10/29/2013

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



Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	235	235
Recommended Tire Size	P205/55R16	P205/55R16
Tire Size on Vehicle	P205/55R16	P205/55R16
Tire Manufacturer	Kumho	Kumho
Tire Model	Solus KH25	Solus KH25
Treadwear	480	480
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	1 Polyester, 2 Steel, 1 Nylon	1 Polyester, 2 Steel, 1 Nylon
Load Index/Speed Symbol	91H	91H
Tire Material	Rubber	Rubber
DOT Safety Code Right	K2LMYAL8162	K2LMYAL81512
DOT Safety Code Left	K2LMYAL81512	K2LMYAL8162

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

Test Vehicle: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
 Test Date: 10/29/2013

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	454	297		499	382	
Right	kg	467	273		503	354	
Ratio	%	61.8%	38.2%		57.7%	42.3%	
Totals	kg	921	570	1491	1002	736	1738

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1491.0
Weight of 2 P572E ATDs	kg	197.8
Rated Cargo/Luggage Weight (RCLW)	kg	33.8
Calculated Vehicle Target Weight (TVTWT)	kg	1722.6

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	677	681	691	689	1033
As Tested	mm	669	671	660	660	1145
Post Test	mm	653	644	594	734	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2703
Total Vehicle Length at Left Side	mm	4,540
Total Vehicle Length at Centerline	mm	4,673
Total Vehicle Length at Right Side	mm	4,542
Weight of Ballast in Cargo Area	kg	0
Weight of Vehicle Components Removed	kg	59
Amount of Stoddard Solvent in Fuel Tank	L	55.6

LIST OF COMPONENTS REMOVED TO MEET TEST WEIGHT:

The rear tail lights, side view mirrors, rear bumper skin, and vehicle muffler were removed to meet test weight. Rear seats, tail light, spare tire and jack were removed To install the data acquisition and onboard cameras.

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

Test Vehicle: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
 Test Date: 10/29/2013

TARGET VEHICLE STRUCTURAL MEASUREMENT

	Elements		Pre-Test
1	Total Length	mm	4673
2	Total Width	mm	1828
3*	Bumper Top Height	mm	817
4*	Bumper Bottom Height	mm	916
5*	Longitudinal Member Top Height	mm	818
6	Distance Between Longitudinal Members	mm	1030
7	Longitudinal Member Width	mm	72
8*	Engine Top Height	mm	470
9*	Engine Bottom Height	mm	1234
10	Engine and Gearbox Width	mm	631
11	Front Bumper-Engine Distance	mm	487
12*	Front Shock Absorber Fixing Height	mm	501
13*	Bonnet Leading Edge Height	mm	635
14	Front Shock Absorber Fixing Width	mm	1149
15	Front Bumper – Front Axle Distance	mm	979
16	Front Axle – A Pillar Distance	mm	485
17	A-Pillar – B-Pillar Distance	mm	1118
18	B-Pillar – Rear Axle Distance	mm	1099
19	B-Pillar – C-Pillar Distance	mm	895
20*	Roof Sill Bottom Height	mm	1343
21*	Roof Sill Top Height	mm	1453
22*	Floor Sill Bottom Height	mm	307
23*	Floor Sill Top Height	mm	409

*Note: Height measurements are in reference to the ground.

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

Test Vehicle: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

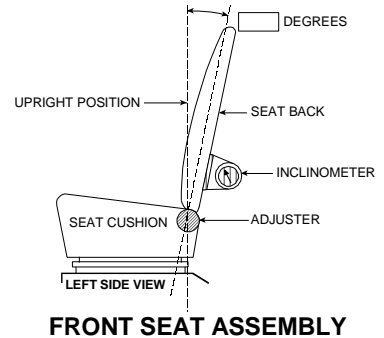
NHTSA No.: RD0332
 Test Date: 10/29/2013

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 was positioned according to the Nominal Design Riding position listed in FORM 1



	Deg.
Driver Seat Back Angle	1.2
Passenger Seat Back Angle	1.0

SEAT FORE/AFT POSITIONS

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

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

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

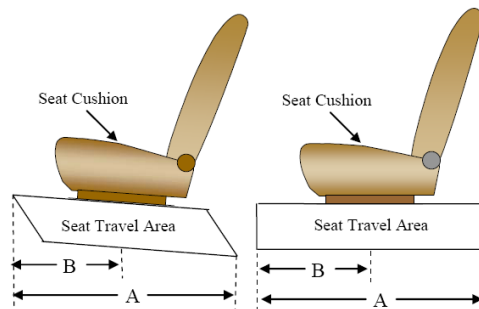
	Total Fore/Aft Travel	Placed in Position #
Driver Seat	22	8
Passenger Seat	22	8

SEAT BELT UPPER ANCHORAGES

Describe the method of positioning seat belt upper anchorages. Belt anchorages were moved along the full range of motion, and marked on the B-Pillar to their respective possible positions.

Photographic evidence can be found in Appendix A of this report. Zero is defined as the upper-most 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: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
 Test Date: 10/29/2013

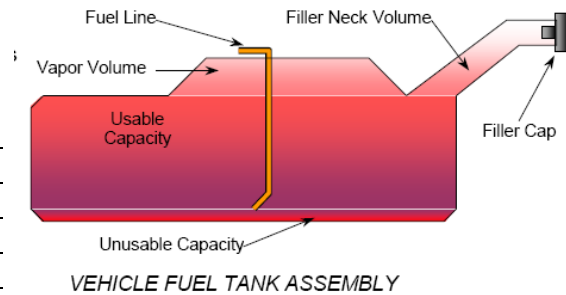
FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	59.8
Usable Capacity of "Optional Tank"	
93% of Usable Capacity	55.6
Actual Amount of Solvent Used	55.6
1/3 of Usable Capacity	19.7

FUEL PUMP

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

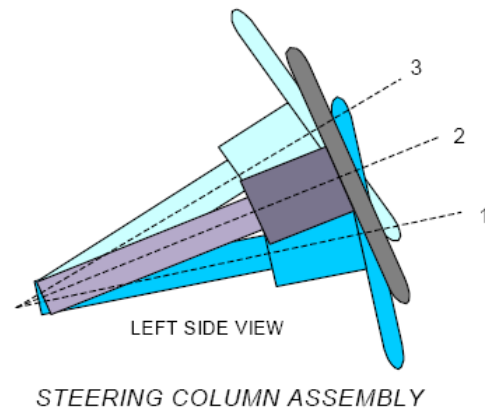
Fuel evacuated according to the specifications provided by the manufacturer in Form 1. Electric fuel pump operates when the ignition is in the 'on' position and the engine is running. The fuel filler neck is located above the right rear wheel.



STEERING COLUMN ADJUSTMENT

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

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



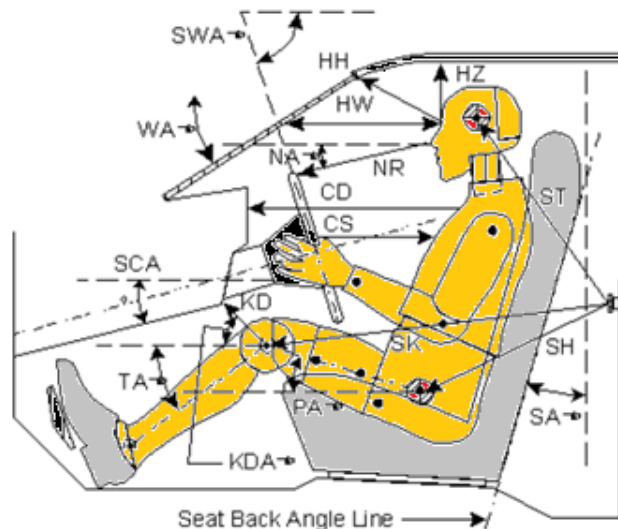
STEERING COLUMN POSITIONS

	Tilt (degrees)	Fore/Aft Position (mm)
Lowermost position No. 1	22.7	
Geometric center position No. 2	24.8	
Uppermost position No. 3	26.9	
Telescoping Steering Wheel Travel		40
Test Position	24.8	20

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2013 Dodge Dart Four Door Sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
Test Date: 10/29/2013



Code	Measurement Description	Driver (Serial # THOR 016)		Passenger (Serial # THOR 015)	
		Length (mm)	Angle(°)	Length (mm)	Angle (°)
WA°	Windshield Angle		-23.6		
SWA°	Steering Wheel Angle		24.7		
SCA°	Steering Column Angle		65.3		
SA°	Seat Back Angle (on headrest post)		1.2		1.0
HZ	Head to Roof (Z)	171	90	89	90
HH	Head to Header	410	14.5	406	16.7
HW	Head to Windshield	678	0	703	0
NR	Nose to Rim	526	-13.2	691	-25.1
CD	Chest to Dash	609		565	
CS	Chest to Steering Hub	378	0		
RA	Rim to Abdomen	205	0		
KDL	Left Knee to Dash	130	31.5	127	39
KDR	Right Knee to Dash	115	41.4	142	42.8
PA°	Pelvic Angle		24.2		24.2
TA°	Tibia Angle		-32.6		-37.7
SK	Striker to Knee	580	-2.7	600	-6.1
ST	Striker to Head	-34	86.3	-25	87.2
SH	Striker to H-Point	188	-40.7	183	-43.9
HAX°	Head Angle (X)		-0.2		-0.2
HAY°	Head Angle (Y)		-0.3		0.2
NAX°	Neck Angle (X)		N/A		N/A
NAY°	Neck Angle (Y)		N/A		N/A
TAX°	T6 Angle (X)		-0.1		-0.1
TAY°	T6 Angle (Y)		20.3		18.2
TAX°	T1 (X)		1.7		-0.9
TAY°	T1 (Y)		-0.1		1.1

**DATA SHEET NO.3 (CONTINUED)
DUMMY CMM MEASUREMENTS**

Test Vehicle: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
 Test Date: 10/29/2013

Description	Units	Driver			Passenger		
		X	Y	Z	X	Y	Z
Striker	mm	969	-795	675	967	789	679
Head CG	mm	971	-445	165	980	443	176
Bridge of Nose	mm	1067	-368	155	1077	367	175
Tip of Nose	mm	1067	-371	198	1076	366	214
Shoulder Bolt	mm	1007	-551	444	1036	555	430
Tip of Chin	mm	1069	-365	291	1075	365	300
H-Point	mm	1193	-566	849	1188	556	863
Left Knee	mm	1585	-581	715	1604	288	748
Right Knee	mm	1604	-293	742	1605	512	751
Left Ankle	mm	1923	-602	955	1945	260	987
Right Ankle	mm	1946	-260	977	1949	483	988
Left Heel	mm	1933	-595	1090	1924	215	1117
Right Heel	mm	1967	-223	1109	1931	440	1121
Head Bolt 1 – Top Left	mm	904	-395	121	917	327	131
Head Bolt 2 – Lower Left	mm	918	-391	207	924	337	215
Head Bolt 3 – Top Right	mm	905	-325	126	918	398	131
Head Bolt 4 – Lower Right	mm	918	-339	209	924	388	216
Driver's Outboard Seat Anchor Bolt	mm	1406	-584	1086	967	789	679
Outboard Head Restraint Post	mm	837	-449	358	830	447	367
Top of Head Restraint	mm	917	-364	102	898	366	111
Center of Steering Wheel	mm	1512	-366	456			

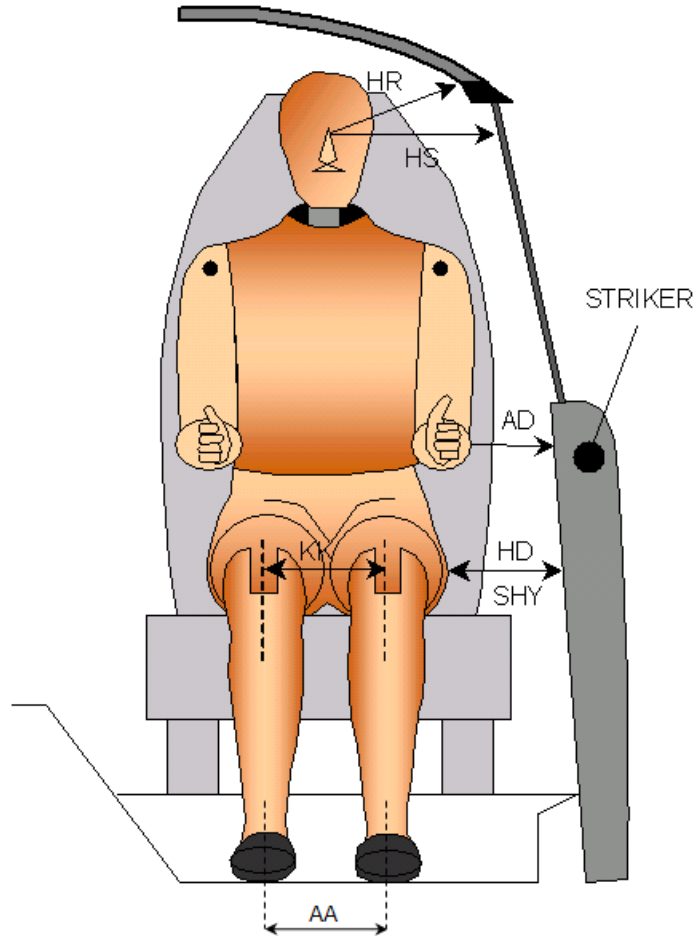
Reference point: Rear most center of the top of rear window (See appendix D for procedure to create coordinate system).

- +X – From the rear of the vehicle to the front of the vehicle
- +Y – From the left side of the vehicle to the right side of the vehicle
- +Z – From the top of the vehicle to the bottom of the vehicle

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

Test Vehicle: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
 Test Date: 10/29/2013

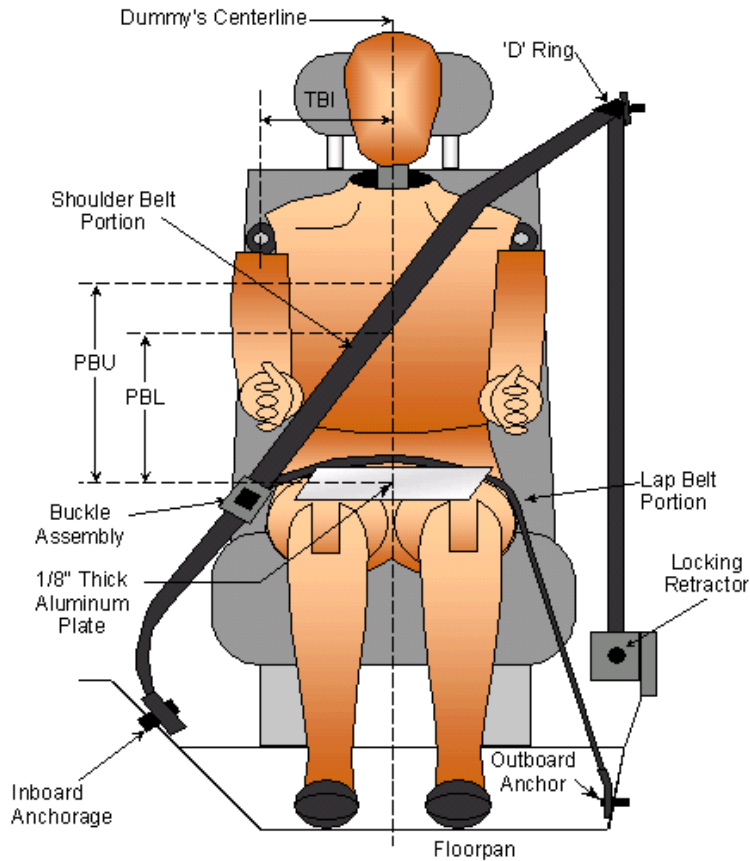


Code	Description	Units	Driver	Passenger
AD	Arm to Door	mm	78	62
HD	H-Point to Door	mm	130	143
HR	Head to Side Header	mm	192	195
HS	Head to Side Window	mm	339	345
KK	Knee to Knee	mm	342	270
SHY	Striker to H-Point (Y Direction)	mm	235	240
AA	Ankle to Ankle	mm	338	220

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

Test Vehicle: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
 Test Date: 10/29/2013



SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU — Top surface of reference to belt upper edge	mm	385	385
PBL — Top surface of reference to belt lower edge	mm	305	305

BELT LENGTH DATA

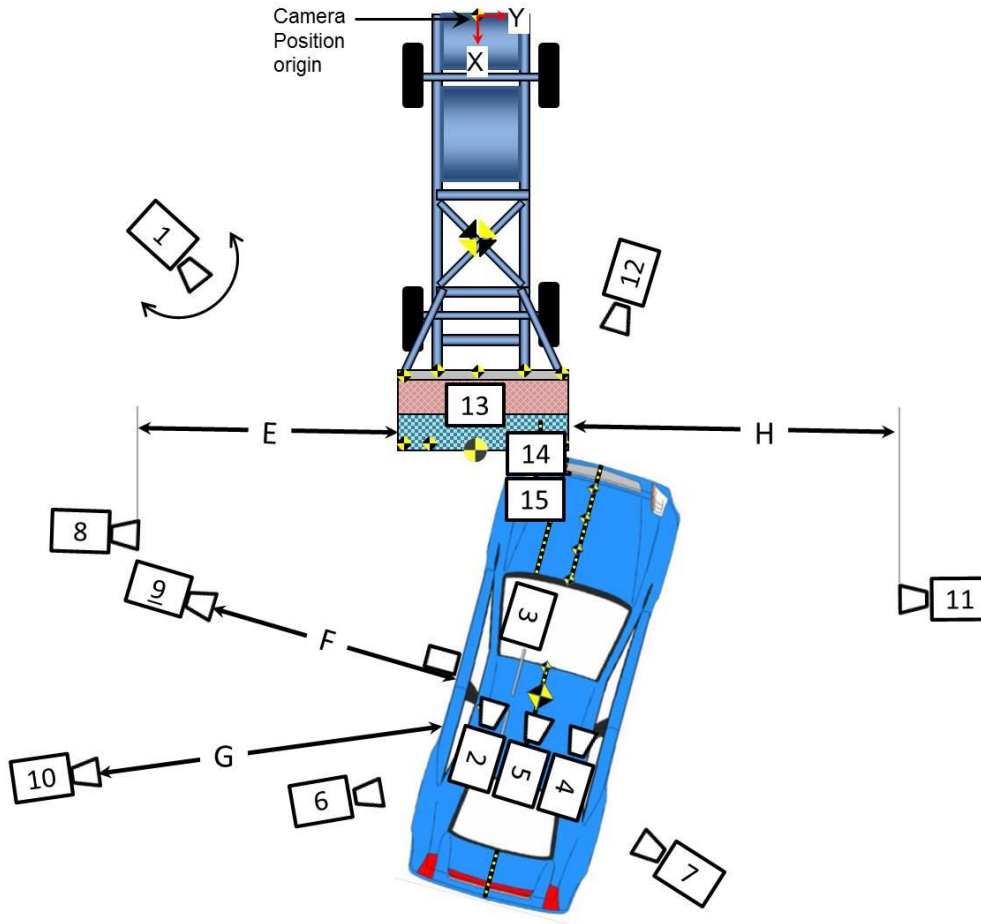
Measurement Description	Units	Driver	Passenger
Shoulder belt length as measured on ATD	mm	778	771
Lap Belt Length as measured on ATD	mm	625	622
Remainder of belt on reel	mm	1197	1207
Total belt length for continuous webbing systems	mm	2600	2600

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

Test Vehicle: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
 Test Date: 10/29/2013

HORIZONTAL LOCATION



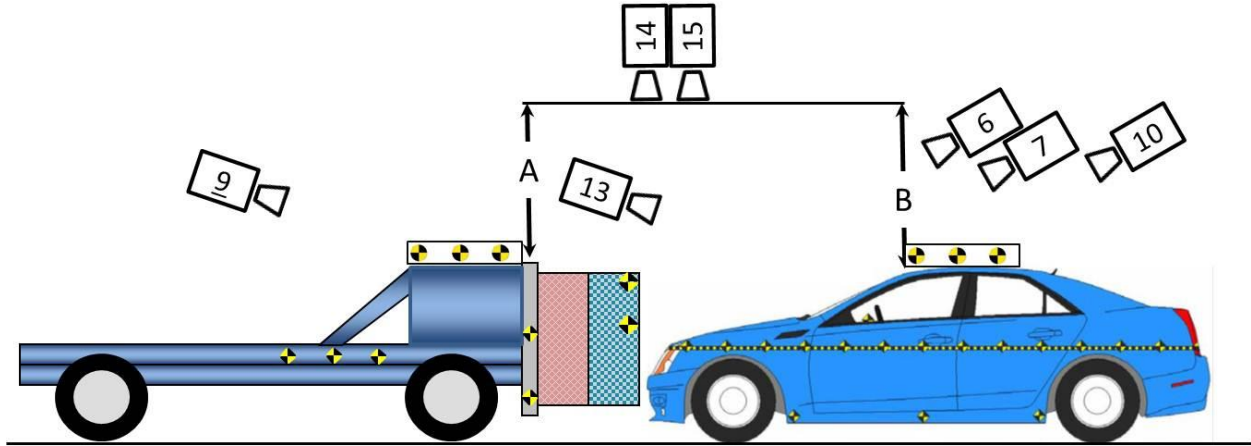
E	mm	6760
F	mm	7377
G	mm	8973
H	mm	6766

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

Test Vehicle: 2013 Dodge Dart Four Door Sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
Test Date: 10/29/2013

VERTICAL LOCATION



A	mm	4164
B	mm	3888

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

Test Vehicle: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
 Test Date: 10/29/2013

CAMERA LOCATIONS

No.	Camera View	Location (mm)			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Side	--	--	--	Zoom	30
2	Onboard Passenger Movement	7570	193	1264	12.5	1000
3	Onboard Driver Lower Leg	6359	515	314	6.5	1000
4	Onboard Driver Movement	7592	882	1231	12.5	1000
5	Onboard Centerline	7951	485	1322	12.5	1000
6	Driver Interaction	7553	2216	3663	24	1000
7	Passenger Interaction	11012	8838	2535	24-70	1000
8	Target Vehicle Left Side Perpendicular (High)	4934	7720	1035	24	1000
9	Target Vehicle Driver Motion	6339	7468	1040	28	1000
10	Target Vehicle Passenger Motion	10148	8908	3445	28-70	1000
11	Target Vehicle Right Side	4830	7851	1035	24	1000
12	Target Vehicle Left Side (High)	-821	2231	1124	28	1000
13	RMDB/Target Vehicle Interaction	4961	1018	4630	28	1000
14	Close-up Impact Point	6767	662	5341	15	1000
15	Overall Impact	4842	662	5341	15	1000

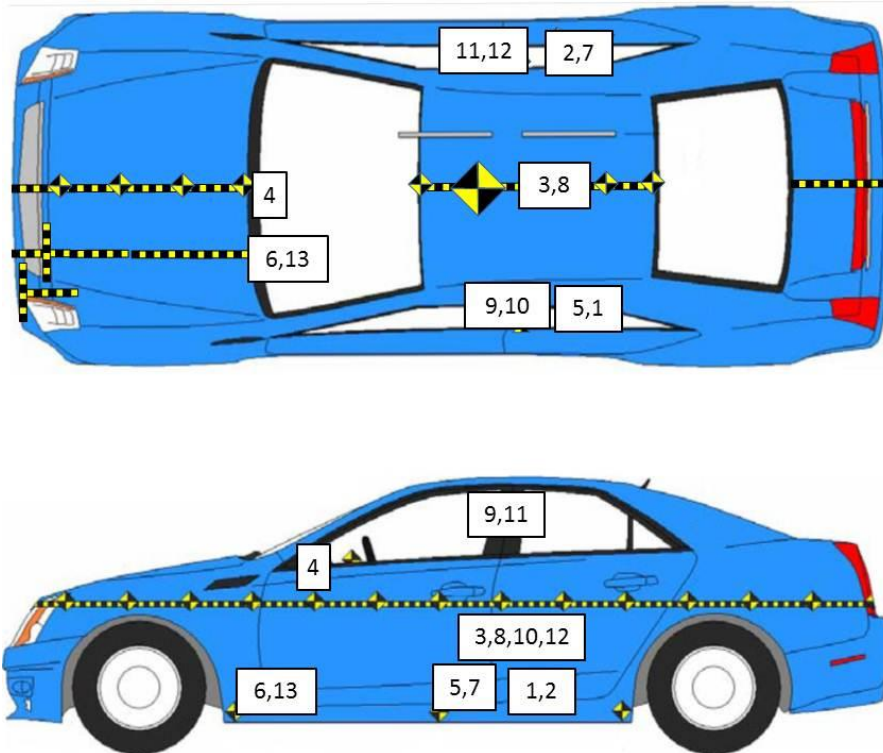
Reference Point: Center most rearward point of the RMDB when in contact with the target vehicle:

- +X – From back of RMDB to front of RMDB
- +Y – Right of monorail center
- +Z – Up from ground

**DATA SHEET NO. 7
VEHICLE INSTRUMENTATION DATA**

Test Vehicle: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
 Test Date: 10/29/2013



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Axes	Units	Measurements (mm)		
				X	Y	Z
1	Left Rear Sill	X,Y	mm	903	-622	1109
2	Right Rear Sill	X,Y	mm	903	629	1093
3	Vehicle CG	X,Y,Z	mm	648	1	1029
4	Instrument Panel	X	mm	1628	37	664
5	Driver Seat Track	X,Y,Z	mm	962	-580	1133
6	Behind Brake Pedal	X,Y,Z	mm	2257	-309	935
7	Passenger Seat Track	X,Y,Z	mm	969	584	1137
8	Angular Rate Sensors	X	mm	648	1	1029
		Y	mm	677	-22	1031
		Z,	mm	679	1	1006

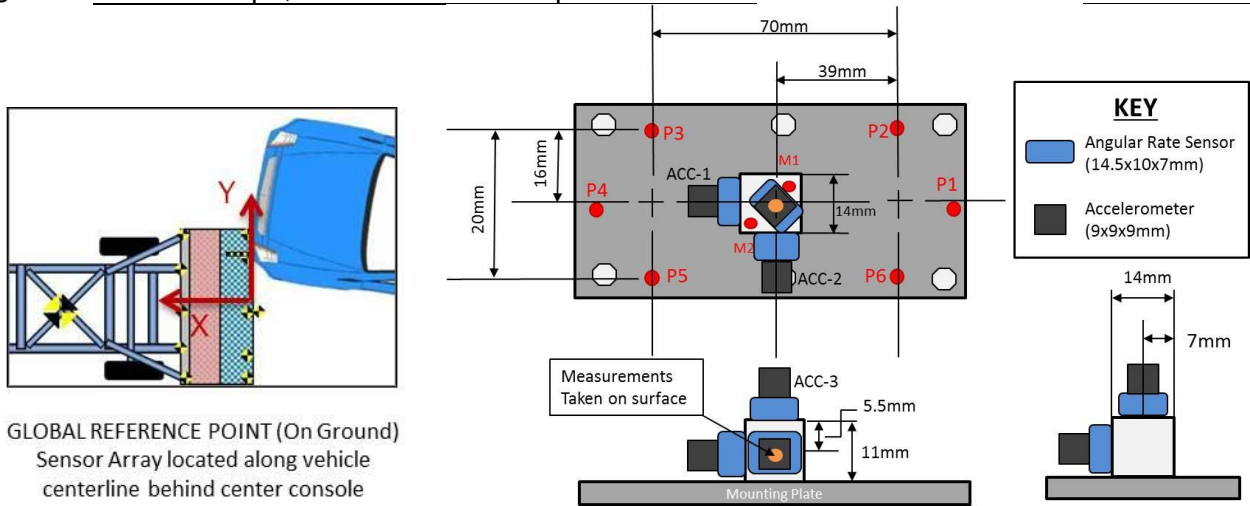
Reference point: Rear most center of the top of rear window (See appendix D for procedure to create coordinate system).

- +X – From the rear of the vehicle to the front of the vehicle
- +Y – From the left side of the vehicle to the right side of the vehicle
- +Z – From the top of the vehicle to the bottom of the vehicle

DATA SHEET NO. 7 VEHICLE INSTRUMENTATION DATA

Test Vehicle: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
 Test Date: 10/29/2013



VEHICLE COORDINATE SYSTEM					
No.	Accelerometer Location	Units	Measurements (mm)		
			X	Y	Z
ACC-1	Accelerometer CG – X Direction	mm	648	1	1029
ACC-2	Accelerometer CG – Y Direction	mm	677	-22	1031
ACC-3	Accelerometer CG – Z Direction	mm	679	1	1006
M1	Mounting Bolt 1	mm	680	-9	1022
M2	Mounting Bolt 2	mm	669	2	1022
P1	Plate Point 1	mm	724	1	1035
P2	Plate Point 2	mm	713	-19	1036
P3	Plate Point 3	mm	644	-20	1035
P4	Plate Point 4	mm	633	1	1035
P5	Plate Point 5	mm	644	21	1034
P6	Plate Point 6	mm	714	22	1035

GLOBAL COORDINATE SYSTEM*					
No.	Accelerometer Location	Units	Measurements (mm)		
			X	Y	Z
ACC-1	Accelerometer CG – X Direction	mm	2493	1355	-325
ACC-2	Accelerometer CG – Y Direction	mm	2465	1332	-323
ACC-3	Accelerometer CG – Z Direction	mm	2463	1355	-349
M1	Mounting Bolt 1	mm	2462	1345	-332
M2	Mounting Bolt 2	mm	2473	1357	-333
P1	Plate Point 1	mm	2417	1356	-319
P2	Plate Point 2	mm	2428	1335	-319
P3	Plate Point 3	mm	2498	1335	-319
P4	Plate Point 4	mm	2509	1355	-320
P5	Plate Point 5	mm	2498	1376	-320
P6	Plate Point 6	mm	2428	1376	-319

*Global coordinate system is located at the front center of RMDB on the ground

**DATA SHEET NO. 7 (CONTINUED)
VEHICLE INSTRUMENTATION DATA**

Test Vehicle: 2013 Dodge Dart Four Door Sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
Test Date: 10/29/2013

VEHICLE INSTRUMENTATION DATA

Loc.	Description	Axes	Units	Positive Direction		Negative Direction	
				Max	Time (ms)	Max	Time (ms)
1	Left Rear Sill	X	g	1.63	166.10	-39.11	40.15
		Y	g	29.51	40.45	-3.58	68.80
2	Right Rear Sill	X	g	3.20	137.85	-51.57	46.45
		Y	g	23.94	39.85	-4.55	82.65
3	Vehicle CG	X	g	2.97	123.00	-43.51	39.25
		Y	g	23.04	40.65	-5.33	68.55
		Z	g	37.38	41.20	-31.01	36.35
4	Instrument Panel	X	g	70.50	115.25	-77.22	46.30
5	Driver Seat Track	X	g	2.79	126.90	-36.18	39.95
		Y	g	30.27	40.00	-7.47	68.05
		Z	g	28.13	41.45	-22.44	77.80
6	Behind Brake Pedal	X	g	19.18	52.10	-126.04	41.35
		Y	g	39.46	37.35	-7.56	66.45
		Z	g	30.06	32.70	-22.85	45.75
7	Passenger Seat Track	X	g	3.24	123.40	-51.22	45.95
		Y	g	29.62	39.80	-5.26	81.75
		Z	g	24.86	40.70	-4.19	64.05
8	Angular Rate Sensors	X	Deg/s	54.65	256.05	-237.18	54.15
		Y	Deg/s	173.06	25.75	-442.00	44.25
		Z	Deg/s	153.07	254.30	-344.57	41.50
9	Driver Shoulder Belt		N	4997.25	69.60	-19.89	123.65
10	Driver Lap Belt		N	6085.15	57.55	-71.75	86.90
11	Passenger Shoulder Belt		N	3934.20	51.30	-11.71	246.10
12	Passenger Lap Belt		N	7894.29	60.20	-1.54	-50.00
13	Driver Floor Pan String Pot		mm	0	0	-34.71	61.15

Note: See Appendix B for all additional vehicle channel data

TIME TO FIRE RESTRAINT TIMING

Loc.	Description	Axes	Units	Time to Fire (ms)
1	Driver Air Bag Squib 1	*	A	20.05
2	Driver Air Bag Squib 2	*	A	40.05
3	Driver Curtain Airbag	*	A	46.30
4	Driver Torso Airbag	*	A	46.30
5	Driver Knee Airbag	*	A	20.05
6	Driver Pretensioner	*	A	20.05
7	Passenger Air Bag Squib 1	*	A	20.00
8	Passenger Air Bag Squib 2	*	A	40.00
9	Passenger Curtain Airbag	*	A	Disabled
10	Passenger Torso Airbag	*	A	Disabled
11	Passenger Knee Airbag	*	A	20.05
12	Passenger Pretensioner	*	A	20.05

* The measurement indicates the time the voltage changed

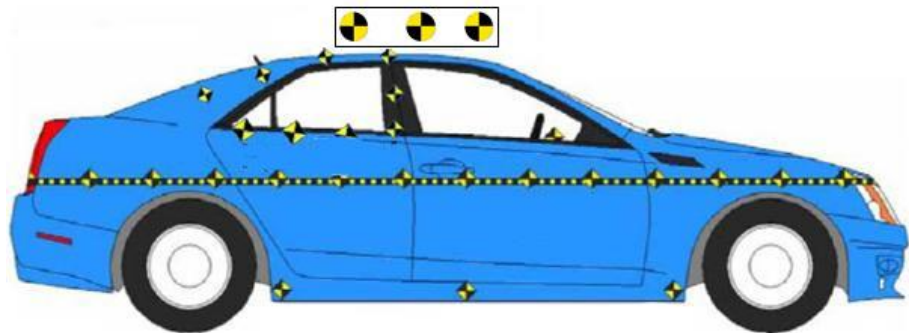
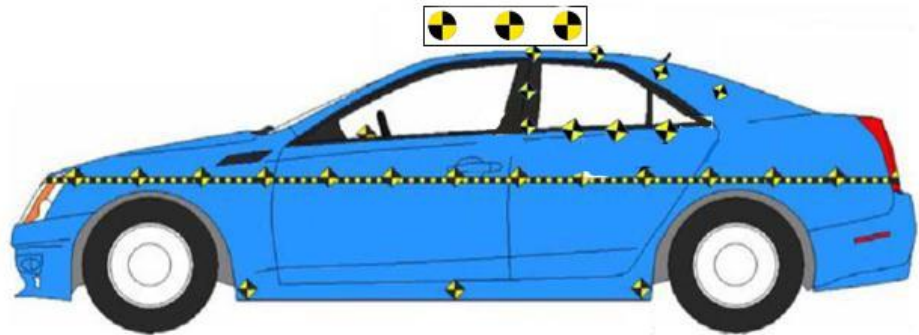
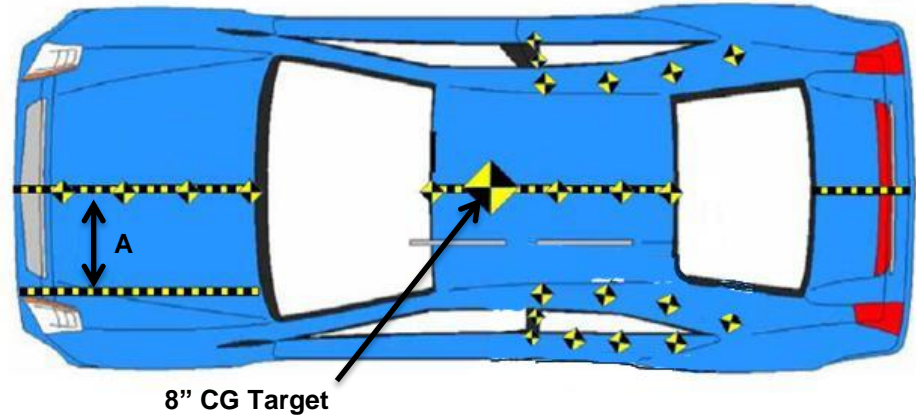
DATA SHEET NO. 8
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
 Test Date: 10/29/2013

Item	Units	Value
A	mm	274

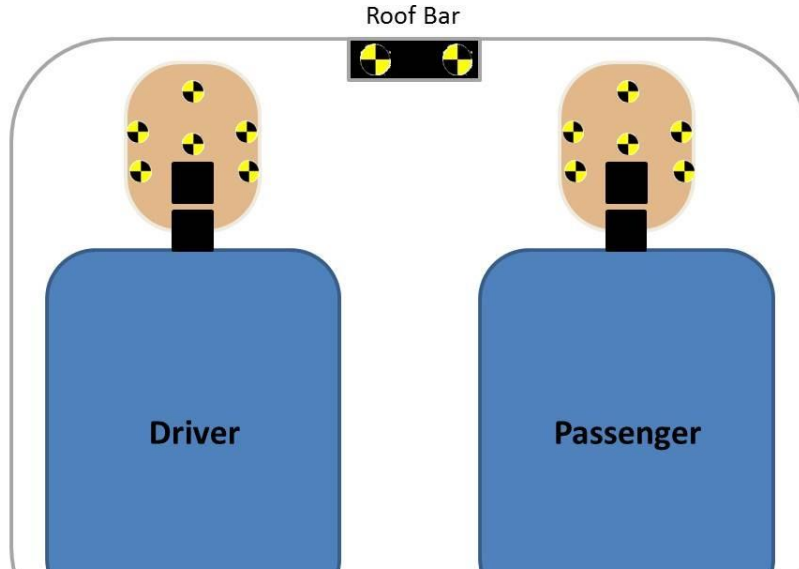
Note: All 6" targets on vehicle are 450 mm apart.



DATA SHEET NO. 8 (CONTINUED)
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
 Test Date: 10/29/2013



Point	Pre-Test		
	X	Y	Z
Roof Bar Driver	1409	-67	126
Roof Bar Passenger	1410	56	128

Reference point: 50mm above the center of the rear windshield (See appendix D for procedure to create coordinate system).

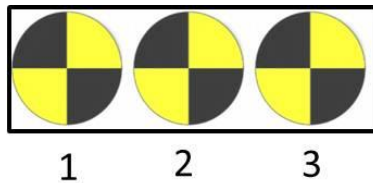
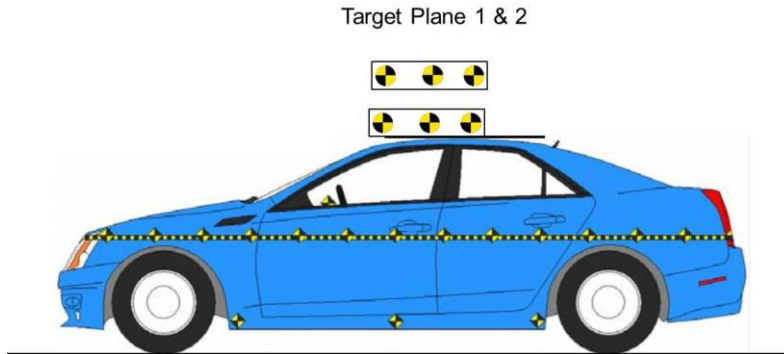
- +X – From the rear of the vehicle to the front of the vehicle
- +Y – From the left side of the vehicle to the right side of the vehicle
- +Z – From the top of the vehicle to the bottom of the vehicle

DATA SHEET NO. 8 (CONTINUED)
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

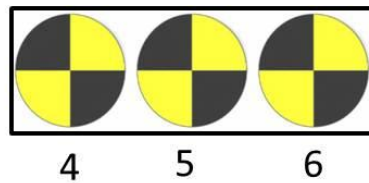
Test Vehicle: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
 Test Date: 10/29/2013

OVERHEAD TARGET BARS



Vertical Target
 Plane 1
 (Driver's Side)



Vertical Target
 Plane 2
 (Passenger Side)

Target	Units	X	Y	Z
1	mm	1381	-369	-381
2	mm	932	-368	-377
3	mm	478	-369	-372
4	mm	1396	357	-375
5	mm	944	348	-376
6	mm	494	340	-375

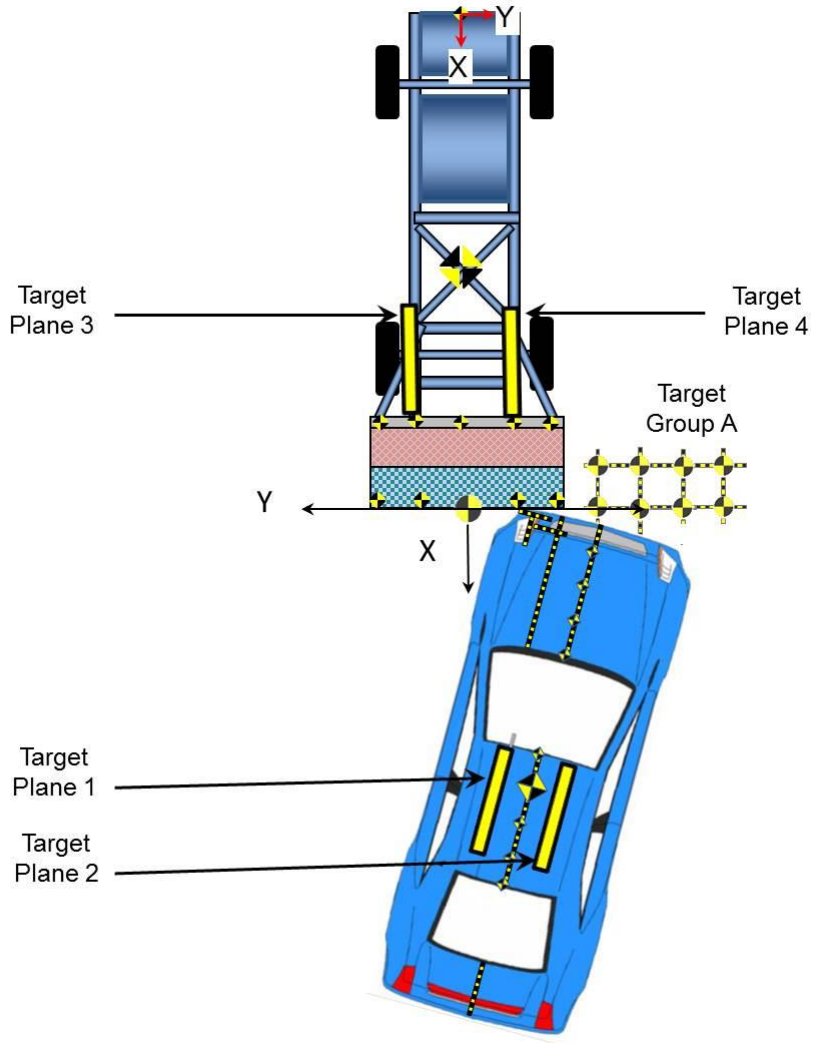
Reference point: 50mm above the center of the rear windshield (See appendix D for procedure to create coordinate system).

- +X – From the rear of the vehicle to the front of the vehicle
- +Y – From the left side of the vehicle to the right side of the vehicle
- +Z – From the top of the vehicle to the bottom of the vehicle

DATA SHEET NO. 8 (CONTINUED)
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
 Test Date: 10/29/2013



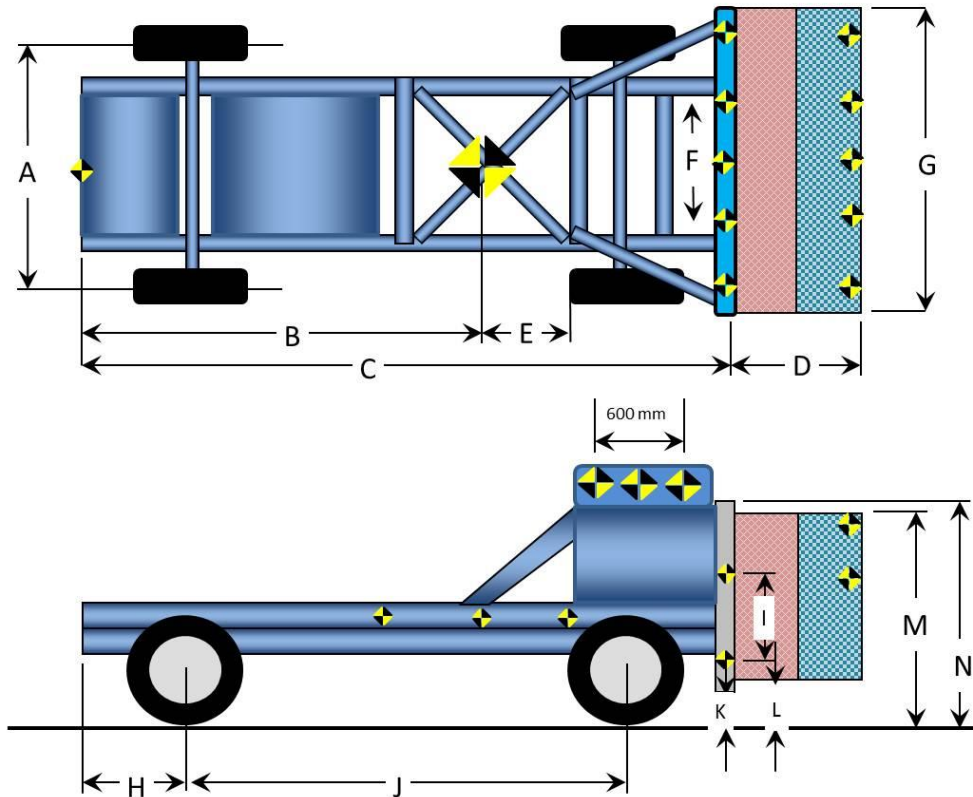
GROUND TARGET LOCATIONS

Target	Units	X	Y
1	mm	0	1411
2	mm	0	1861
3	mm	0	2311
4	mm	-450	1411
5	mm	-450	1861
6	mm	-450	2311

DATA SHEET NO. 8 (CONTINUED)
RMDB PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
 Test Date: 10/29/2013



Item	Units	Value	Item	Units	Value
A	mm	1930	H	mm	800
B	mm	2451	I	mm	450
C	mm	3995	J	mm	2555
D	mm	605	K	mm	77
E	mm	904	L	mm	71
F	mm	900	M	mm	1024
G	mm	2205	N	mm	1177

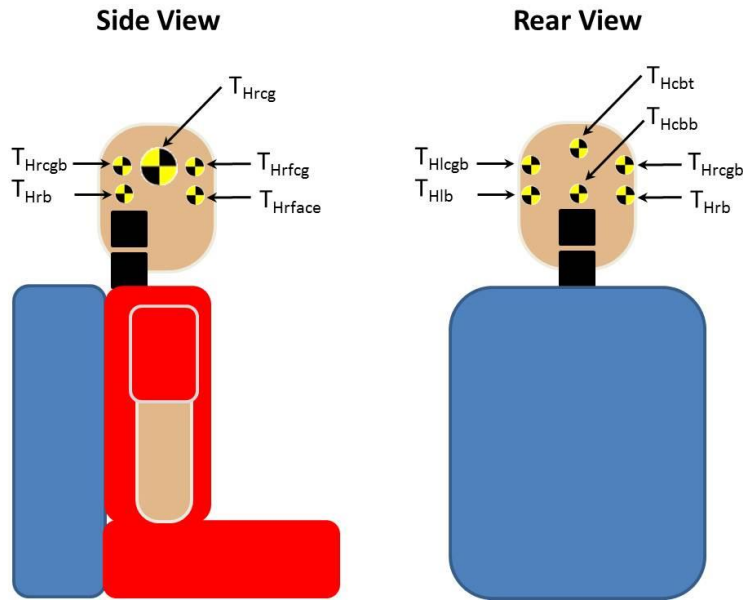
	Units	Front Axle	Rear Axle	Total
Left	kg	802.0	453.6	1255.6
Right	kg	807.4	427.7	1235.1
Ratio	%	65	35	100
Total	kg	1609.4	881.3	2490.7
CG Aft of Front Axle	mm			904

Note: All targets on the RMDB honeycomb are 450mm apart unless otherwise noted.

DATA SHEET NO. 8 (CONTINUED)
DUMMY PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
 Test Date: 10/29/2013



Driver Dummy Head Targets (S/N 016)

Measurement	Units	Value
Distance between T _{Hrcg} & T _{Hrfcg}	mm	38
Distance between T _{Hrcg} & T _{Hrcgb}	mm	38
Distance between T _{Hrcgb} & T _{Hrb}	mm	70
Distance between T _{Hrfcg} & T _{Hrface}	mm	70
Distance between T _{Hlcbg} & T _{Hlcb}	mm	38
Distance between T _{Hlcbg} & T _{Hlfcg}	mm	38
Distance between T _{Hlcbg} & T _{Hlfb}	mm	70
Distance between T _{Hlfcg} & T _{Hlfb}	mm	70
Distance between T _{Hcgt} & T _{Hcbb}	mm	72

Passenger Dummy Head Targets (S/N 015)

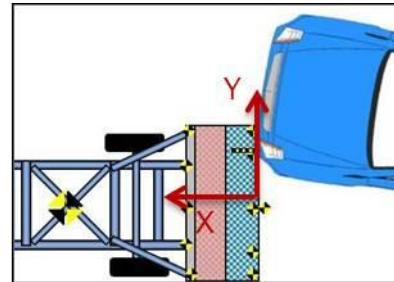
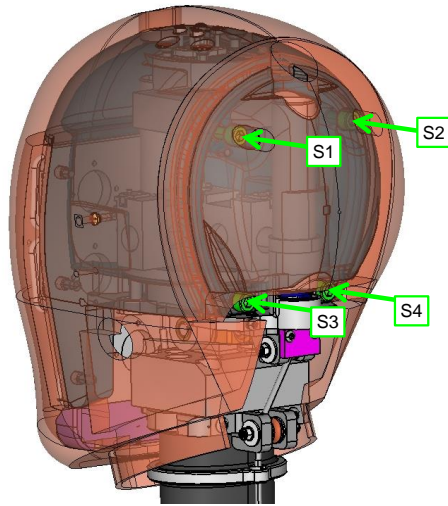
Measurement	Units	Value
Distance between T _{Hrcg} & T _{Hrfcg}	mm	38
Distance between T _{Hrcg} & T _{Hrcgb}	mm	38
Distance between T _{Hrcgb} & T _{Hrb}	mm	70
Distance between T _{Hrfcg} & T _{Hrface}	mm	70
Distance between T _{Hlcbg} & T _{Hlcb}	mm	38
Distance between T _{Hlcbg} & T _{Hlfcg}	mm	38
Distance between T _{Hlcbg} & T _{Hlfb}	mm	70
Distance between T _{Hlfcg} & T _{Hlfb}	mm	70
Distance between T _{Hcgt} & T _{Hcbb}	mm	72

DATA SHEET NO. 8 (CONTINUED)
DUMMY PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
 Test Date: 10/29/2013

THOR HEAD BOLT MEASUREMENTS
GLOBAL COORDINATE SYSTEM
Front of RMDB is the Origin



GLOBAL REFERENCE POINT (On Ground)
 Sensor Array located along vehicle
 centerline behind center console

BOLT POINTS RELATIVE TO HEAD CG

Target	X	Y	Z
S1	-65.32	-35.43	-45.75
S2	-65.32	35.43	-45.75
S3	-60.16	-25.40	36.90
S4	-60.16	25.40	36.90

DRIVER'S HEAD BOLT POINTS

Target	X	Y	Z
S1	-2237	959	-1233
S3	-2223	963	-1147
S2	-2237	1030	-1229
S4	-2224	1015	-1145

FRONT PASSENGER HEAD BOLT POINTS

Target	X	Y	Z
S1	-2225	1681	-1224
S3	-2218	1692	-1139
S2	-2224	1752	-1223
S4	-2218	1742	-1138

*See Datasheet 3 for head bolt locations in reference to the vehicle coordinate system.

DATA SHEET NO. 9
TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
 Test Date: 10/29/2013

INSTRUMENTATION

Instrumentation	Number of Channels Collected
Driver Dummy Accelerometers	87
Passenger Dummy Accelerometers	81
Vehicle Structure Accelerometers	46
RMDB Cart Accelerometers	6
Total	220

CAMERA COVERAGE

Type of Camera	Number Used in this Test
High-Speed Vehicle Onboard	4
High-Speed Off-board	10
Real-Time Panning	2
Total	16

**DATA SHEET NO. 10
POST TEST OBSERVATIONS**

Test Vehicle: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
 Test Date: 10/29/2013

TEST DUMMY INFORMATION AND CONTACT LOCATIONS

Description	Driver	Right Front Passenger
Dummy Type/Serial No.	THOR016	THOR015
Lower Leg Type	LX	LX
Lower Leg Serial No.	LX0018/ LX0019	LX0038/LX0039
Head Contact	Frontal & Curtain Airbags, Side Headliner and Visor	Frontal Airbag & Visor
Upper Torso Contact	Frontal & Torso Airbag	Frontal Airbag
Lower Torso Contact	Torso Airbag	None
Left Knee Contact	Knee Airbag & Bolster	Knee Airbag & Bolster
Right Knee Contact	Knee Airbag & Bolster	Knee Airbag

DOOR OPENING AND SEAT TRACK INFORMATION

Description	Driver	Right Front Passenger
Locked/Unlocked Doors	Locked	Locked
Front Door Opening	Closed & Operational	Closed & Operational
Rear Door Opening	Closed & Operational	Closed & Operational
Seat Track Shift (mm)	0	0
Seat Back Failure	No	No
Glazing Damage	None	None

POST TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions	Photo Taken (Y/N)
Pillar Performance	A-Pillar Bent	Y
Windshield Damage	Cracks throughout with some minor separation	Y
Window Damage	None	Y
Other Notable Effects	None	--

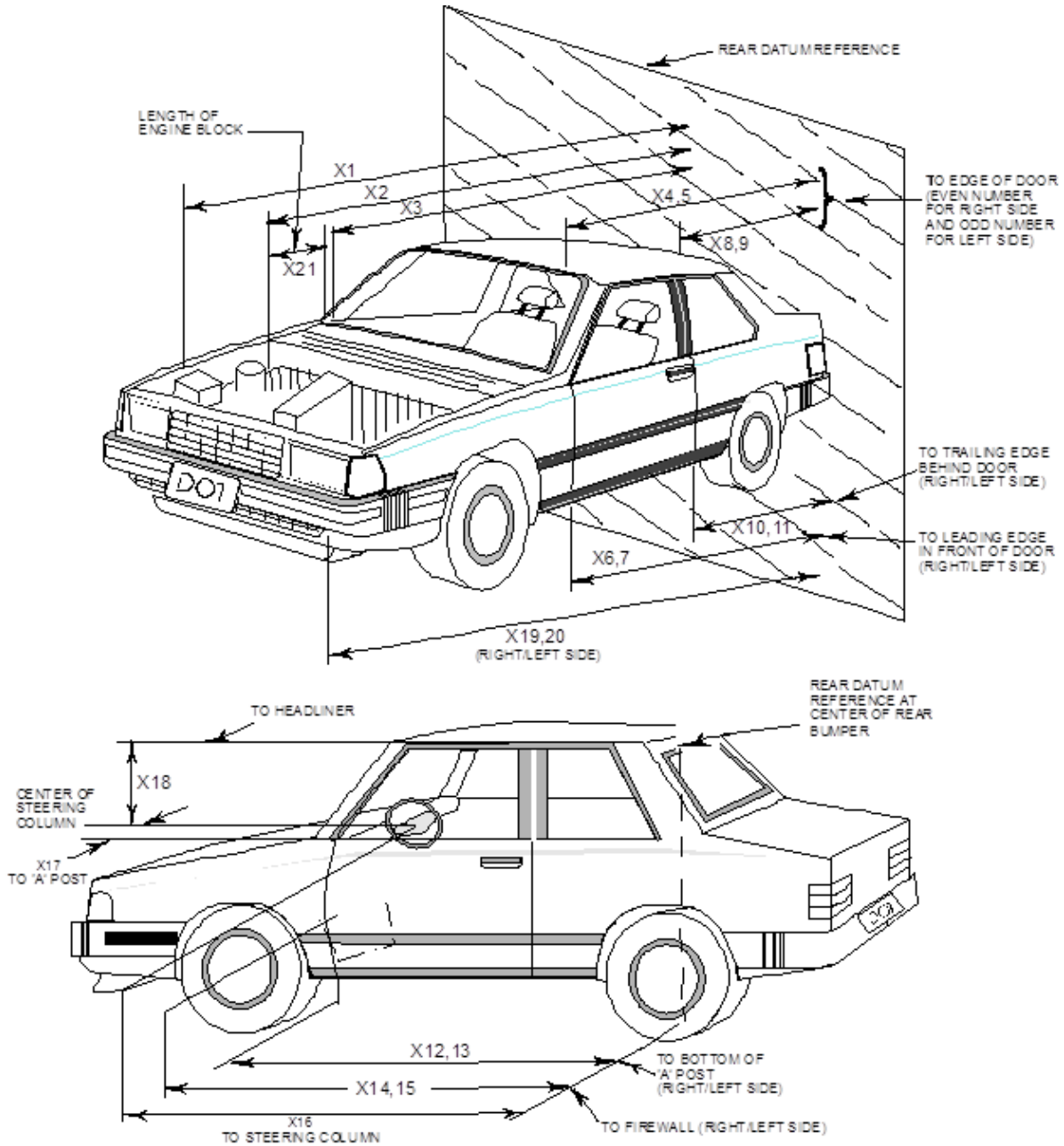
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Driver (Occupant 1)		Right Front Passenger (Occupant 2)	
	Installed	Deployed	Installed	Deployed
Front Airbag	Yes	Yes	Yes	Yes
Curtain Airbag	Yes	Yes	Yes	Disabled
Torso Airbag	Yes	Yes	Yes	Disabled
Knee Airbag	Yes	Yes	Yes	Yes
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load Limiter	Yes	Yes	Yes	Yes
Other				

DATA SHEET NO. 11 VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
 Test Date: 10/29/2013



**DATA SHEET NO. 11 (CONTINUED)
VEHICLE PROFILE MEASUREMENTS**

Test Vehicle: 2013 Dodge Dart Four Door Sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
Test Date: 10/29/2013

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	mm	3461	3328	132
2	Rear Surface of Vehicle (RSOV) to Front of Engine	mm	2974	2898	75
3	RSOV to Firewall	mm	2451	2385	65
4	RSOV to Upper Leading Edge of Right Door	mm	1995	1996	-1
5	RSOV to Upper Leading Edge of Left Door	mm	1993	1993	0
6	RSOV to Lower Leading Edge of Right Door	mm	1976	1975	1
7	RSOV to Lower Leading Edge of Left Door	mm	1974	1976	-2
8	RSOV to Upper Trailing Edge of Right Door	mm	884	885	-1
9	RSOV to Upper Trailing Edge of Left Door	mm	883	883	0
10	RSOV to Lower Trailing Edge of Right Door	mm	943	943	0
11	RSOV to Lower Trailing Edge of Left Door	mm	940	943	-3
12	RSOV to Bottom of "A" Post of Right Side	mm	2023	2021	2
13	RSOV to Bottom of "A" Post of Left Side	mm	2029	2027	2
14	RSOV to Firewall, Right Side	mm	2539	2535	4
15	RSOV to Firewall, Left Side	mm	2541	UR*	UR*
16	RSOV to Steering Column	mm	1512	1507	4
17	Center of Steering Column to "A" Post	mm	309	344	-35
18	Center of Steering Column to Headliner	mm	394	416	-22
19	RSOV to Right Side of Front Bumper	mm	3380	3632	-252
20	RSOV to Left Side of Front Bumper	mm	3378	2902	477
21	Length of Engine Block	mm	474	487	-13
RD	RSOV to Right Side of Dash Panel	mm	1698	1706	-9
CD	RSOV to Center of Dash Panel	mm	1658	1651	7
LD	RSOV to Left Side of Dash Panel	mm	1690	1661	29

UR* = Unrecoverable Data Point

DATA SHEET NO. 12
ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2013 Dodge Dart Four Door Sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
Test Date: 10/29/2013

VEHICLE INFORMATION

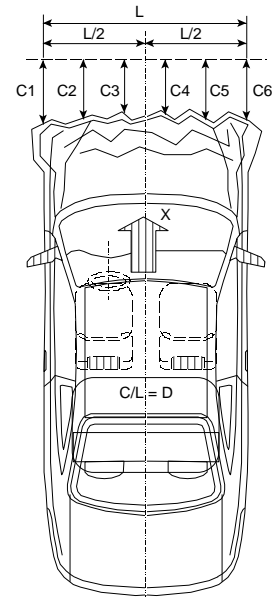
VIN: 1C3CDFAA2DD149198 Wheelbase (mm): 2,703
Vehicle Size Category: Passenger Test Weight (kg): 1,738

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 (kph): 89.8
Velocity Change (kph): 89.8

CRUSH PROFILE

Collision Deformation Classification: 11FYEW3
Midpoint of Damage: C2
Damage Region Length (mm): 1200
Impact Mode: Frontal 15° Angle, 35% Left Offset



Crush Measurements: Bumper Cover

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	3310	2933	377
C2	Crush zone 2 at left side	mm	3411	3078	333
C3	Crush zone 3 at left side	mm	3455	3266	189
C4	Crush zone 4 at right side	mm	3453	3436	17
C5	Crush zone 5 at right side	mm	3410	3571	-161
C6	Crush zone 6 at right side	mm	3306	3667	-361
L	C1 to C6	mm	1200	966	235

Crush Measurements: Bumper Cover Removed

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
B1	Bumper Beam 1 at left side	mm	3246	2878	-368
B2	Bumper Beam 2 at left side	mm	3345	2974	-371
B3	Bumper Beam 3 at left side	mm	3391	3100	-291
B4	Bumper Beam 4 at left side	mm	3401	3216	-185
B5	Bumper Beam 5 at right side	mm	3403	3327	-76
B6	Bumper Beam 6 at right side	mm	3400	3435	35
B7	Bumper Beam 7 at right side	mm	3390	3535	145
B8	Bumper Beam 8 at right side	mm	3344	3593	249
B9	Bumper Beam 9 at right side	mm	3243	3493	250
L	B1 to B9	mm	1274	1013	261

**DATA SHEET NO. 13
VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

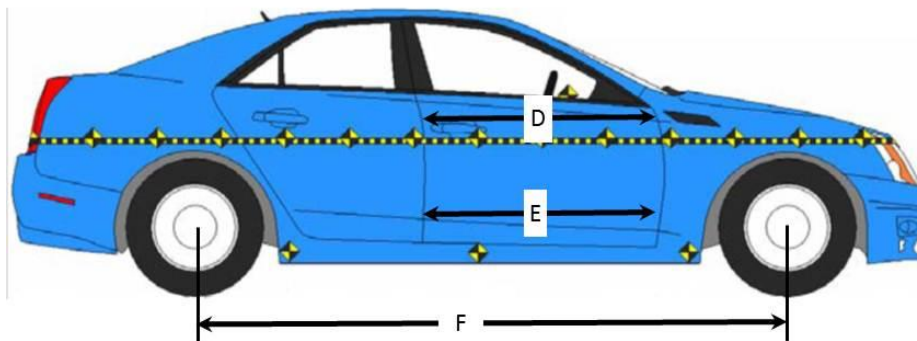
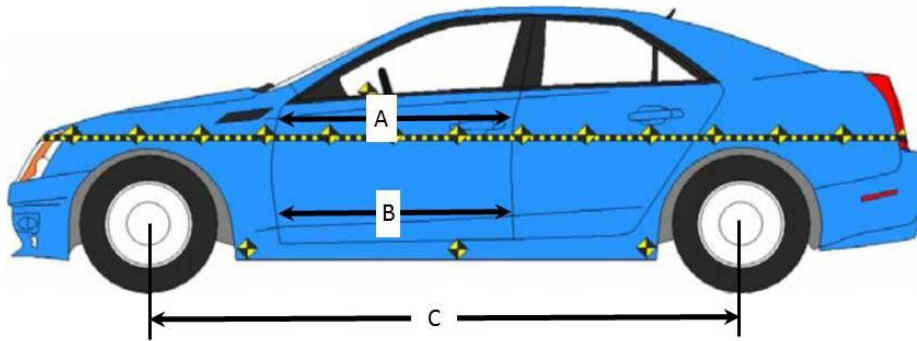
NHTSA No.: RD0332
 Test Date: 10/29/2013

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	988	982	-6
B	Left Side Lower	mm	879	873	-6
D	Right Side Upper	mm	988	986	-2
E	Right Side Lower	mm	881	880	-1

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2703	2630	-73
F	Right Side Wheelbase	mm	2703	2691	-12



**DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS**

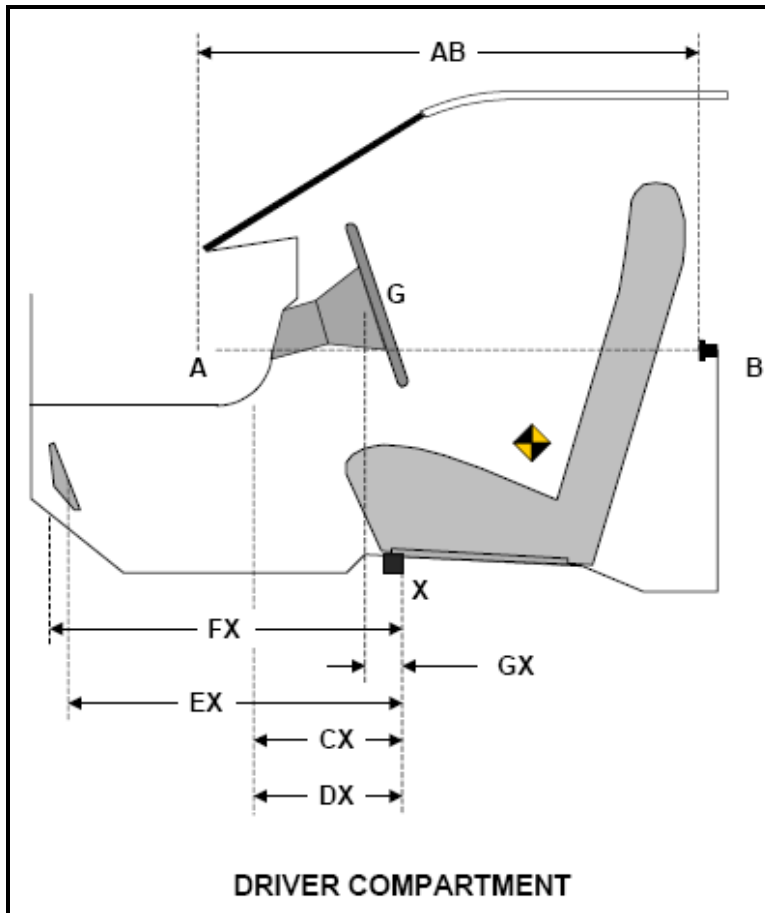
Test Vehicle: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
 Test Date: 10/29/2013

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	788	788	0
CX	Left Knee Bolster to X	mm	287	256	-31
DX	Right Knee Bolster to X	mm	279	260	-18
EX	Brake Pedal to X	mm	595	570	-25
FX	Foot Rest to X	mm	673	622	-51
GX	Center of Steering Column Wheel Hub to X	mm	105	99	-6

X = Front of Seat Track (Stationary)

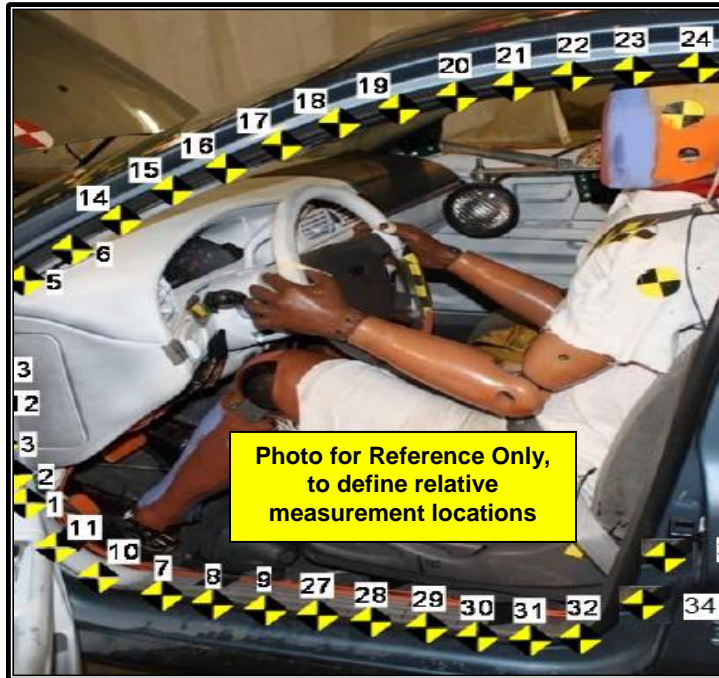


**DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
 Test Date: 10/29/2013

DRIVER SIDE DOOR SILL INTRUSIONS



Reference point: Rear most center of the top of rear window (See appendix D for procedure to create coordinate system).

- +X – From the rear of the vehicle to the front of the vehicle
- +Y – From the left side of the vehicle to the right side of the vehicle
- +Z – From the top of the vehicle to the bottom of the vehicle

Point	Pre-Test			Post-Test			Difference		
	X	Y	Z	X	Y	Z	X	Y	Z
1	1911	-750	928	1904	-760	918	-7	-10	-10
2	1911	-750	854	1903	-765	844	-8	-15	-10
3	1911	-750	779	1902	-771	771	-9	-21	-8
4	1912	-750	478	1907	-782	468	-5	-32	-10
5	1909	-738	403	1905	-771	394	-4	-33	-9
6	1804	-715	330	1801	-742	320	-3	-27	-10
7	1802	-749	1029	1799	-759	1025	-3	-10	-4
8	1651	-749	1029	1651	-751	1025	0	-2	-4
9	1501	-749	1029	1501	-749	1027	0	0	-2
10	1858	-750	1019	1854	-755	1012	-4	-5	-7
11	1899	-749	980	1893	-756	971	-6	-7	-9
12	1911	-749	680	1903	-776	669	-8	-27	-11
13	1911	-750	578	1904	-781	568	-7	-31	-10
14	1738	-704	297	1736	-727	287	-2	-23	-10
15	1674	-691	265	1673	-711	255	-1	-20	-10
16	1611	-678	235	1610	-695	225	-1	-17	-10

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
 Test Date: 10/29/2013

Point	Pre-Test			Post-Test			Difference		
	X	Y	Z	X	Y	Z	X	Y	Z
17	1547	-666	205	1547	-679	197	0	-13	-8
18	1481	-652	178	1481	-663	170	0	-11	-8
19	1414	-640	153	1415	-648	146	1	-8	-7
20	1346	-628	131	1347	-635	125	1	-7	-6
21	1277	-618	112	1278	-623	107	1	-5	-5
22	1207	-609	98	1207	-614	93	0	-5	-5
23	1137	-602	87	1137	-607	83	0	-5	-4
24	1067	-597	79	1068	-601	75	1	-4	-4
25	993	-592	73	994	-596	69	1	-4	-4
26	913	-592	69	913	-594	67	0	-2	-2
27	1449	-749	1028	1450	-748	1028	1	1	0
28	1399	-749	1028	1398	-747	1029	-1	2	1
29	1346	-748	1028	1346	-746	1029	0	2	1
30	1294	-748	1028	1293	-746	1030	-1	2	2
31	1242	-749	1023	1244	-749	1024	2	0	1
32	1195	-749	1012	1196	-749	1012	1	0	0
33	1065	-750	781	1066	-750	780	1	0	0
34	1109	-748	929	1110	-748	926	1	-1	-2

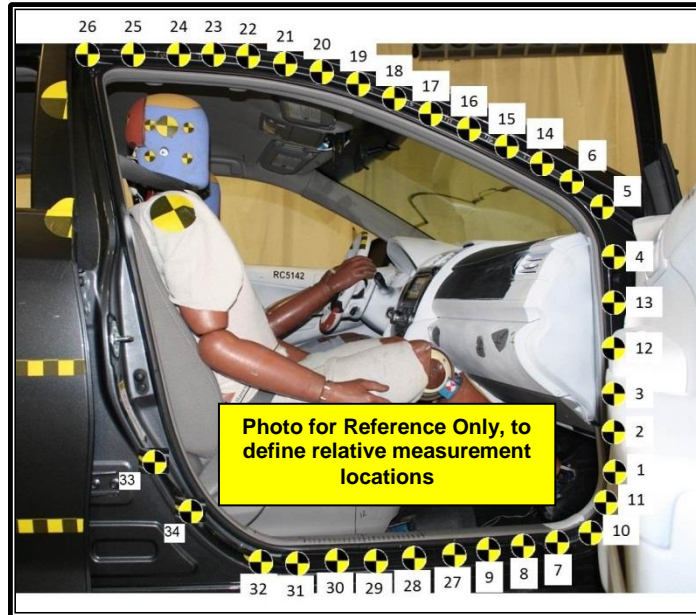
Note: See Appendix D for detailed procedure on how to measure the required door sill intrusions.

**DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
 Test Date: 10/29/2013

PASSENGER SIDE DOOR SILL INTRUSIONS



Reference point: Rear most center of the top of rear window (See appendix D for procedure to create coordinate system).

- +X – From the rear of the vehicle to the front of the vehicle
- +Y – From the left side of the vehicle to the right side of the vehicle
- +Z – From the top of the vehicle to the bottom of the vehicle

Point	Pre-Test			Post-Test			Difference		
	X	Y	Z	X	Y	Z	X	Y	Z
1	1911	745	932	1912	754	930	1	9	-2
2	1912	745	852	1911	756	850	-1	11	-2
3	1912	746	785	1911	757	783	-1	11	-2
4	1912	745	479	1909	761	478	-3	16	-1
5	1910	734	404	1907	750	402	-3	16	-2
6	1807	713	330	1806	725	329	-1	12	-1
7	1803	745	1029	1803	752	1028	0	7	-1
8	1652	745	1030	1652	751	1029	0	6	-1
9	1503	745	1029	1503	750	1029	0	5	0
10	1860	745	1019	1860	752	1018	0	7	-1
11	1895	745	987	1895	753	987	0	8	0
12	1912	745	686	1910	758	684	-2	13	-2
13	1912	746	583	1910	761	581	-2	15	-2
14	1746	702	299	1745	712	297	-1	10	-2
15	1684	690	266	1683	698	264	-1	8	-2
16	1621	678	236	1620	683	234	-1	5	-2

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
 Test Date: 10/29/2013

Point	Pre-Test			Post-Test			Difference		
	X	Y	Z	X	Y	Z	X	Y	Z
17	1555	665	207	1555	668	204	0	3	-3
18	1489	652	179	1489	654	177	0	2	-2
19	1423	640	156	1424	640	152	1	0	-4
20	1354	627	134	1355	627	130	1	0	-4
21	1285	617	114	1285	616	112	0	-1	-2
22	1213	609	100	1214	607	97	1	-2	-3
23	1141	601	88	1141	601	86	0	0	-2
24	1070	596	80	1070	596	78	0	0	-2
25	994	592	73	995	591	71	1	-1	-2
26	912	591	71	912	590	70	0	-1	-1
27	1452	746	1029	1452	751	1029	0	5	0
28	1399	745	1028	1399	751	1028	0	6	0
29	1349	745	1028	1349	751	1028	0	6	0
30	1297	745	1028	1298	750	1028	1	5	0
31	1247	745	1024	1248	750	1024	1	5	0
32	1194	745	1011	1194	750	1011	0	5	0
33	1064	746	779	1064	749	778	0	3	-1
34	1110	746	929	1110	748	928	0	2	-1

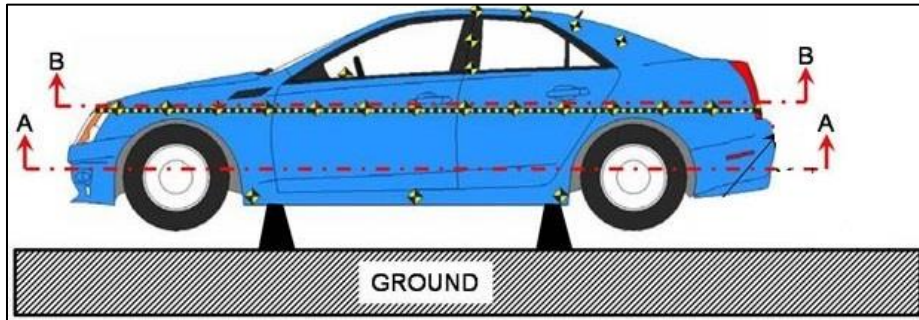
Note: See Appendix D for detailed procedure on how to measure the required door sill intrusions.

**DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
 Test Date: 10/29/2013

**VEHICLE EXTERIOR CRUSH PROFILE
SECTION A-A**



Reference point: Rear most center of the top of rear window (See appendix D for procedure to create coordinate system).

- +X – From the rear of the vehicle to the front of the vehicle
- +Y – From the left side of the vehicle to the right side of the vehicle
- +Z – From the top of the vehicle to the bottom of the vehicle

Point	Pre-Test			Point	Post-Test		
	X	Y	Z		X	Y	Z
1	2800	-902	867	1	2700	-943	867
2	2844	-898	866	2	2730	-857	866
3	2892	-876	866	3	2739	-751	867
4	2965	-841	866	4	2764	-604	866
5	3056	-803	866	5	2816	-550	866
6	3137	-759	866	6	2854	-478	866
7	3223	-694	866	7	2915	-495	866
8	3294	-620	866	8	2969	-476	867
9	3342	-555	866	9	3022	-453	866
10	3382	-482	867	10	2994	-235	867
11	3389	-467	866	11	2972	-109	866
12	3390	-432	866	12	3040	-44	867
13	3416	-343	865	13	3100	62	867
14	3440	-225	866	14	3146	192	867
15	3453	-137	866	15	3185	305	866
16	3459	-37	866	16	3204	361	866
17	3459	53	866	17	3113	430	866
18	3451	149	866	18	3115	560	866
19	3435	250	867	19	3081	589	867
20	3415	342	866	20	2830	783	867
21	3392	420	866	21	2631	923	866
22	3388	461	866	22	2185	916	866
23	3348	540	868	23	2088	919	866
24	3294	615	866	24	1966	905	866
25	3226	686	866	25	1728	903	866

**DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
 Test Date: 10/29/2013

**VEHICLE EXTERIOR CRUSH PROFILE
SECTION A-A (Continued)**

Point	Pre-Test			Point	Post-Test		
	X	Y	Z		X	Y	Z
26	3120	764	866	26	1592	904	866
27	3022	812	866	27	1434	904	866
28	2929	850	865	28	1304	903	866
29	2862	882	866	29	1134	902	867
30	2831	892	866	30	1016	900	866
31	2792	893	866	31	892	898	866
32	2172	907	866	32	746	895	867
33	2110	907	866	33	598	891	866
34	2031	897	867	34	422	887	867
35	1885	889	867	35	256	894	866
36	1717	892	866	36	86	909	866
37	1561	894	867	37	-568	885	866
38	1414	895	867	38	-568	885	866
39	1236	895	867	39	-652	857	866
40	1070	894	867	40	-753	822	867
41	950	893	867	41	-886	789	867
42	825	890	866	42	-986	758	866
43	658	887	866	43	-1074	696	867
44	513	883	866	44	-1127	603	867
45	390	881	866	45	-1169	461	867
46	292	884	867	46	-1200	291	867
47	188	897	868	47	-1209	214	867
48	114	904	866	48	-1174	189	867
49	-511	893	867	49	-1175	44	867
50	-599	877	866	50	-1173	-146	867
51	-714	836	866	51	-1177	-196	867
52	-805	810	866	52	-1211	-223	866
53	-915	783	867	53	-1193	-349	867
54	-993	756	866	54	-1168	-477	866
55	-987	759	867	55	-1132	-596	867
56	-1032	735	867	56	-1057	-718	867
57	-1080	690	867	57	-926	-782	867
58	-1116	629	867	58	-711	-838	867
59	-1146	550	867	59	-578	-885	866
60	-1162	495	867	60	-506	-896	867
61	-1182	403	867	61	87	-907	867
62	-1202	276	867	62	224	-894	866
63	-1208	215	867	63	367	-883	866
64	-1170	182	867	64	559	-887	865
65	-1172	97	867	65	725	-892	865
66	-1173	-4	867	66	875	-895	866

**DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
 Test Date: 10/29/2013

**VEHICLE EXTERIOR CRUSH PROFILE
SECTION A-A (Continued)**

Point	Pre-Test			Point	Post-Test		
	X	Y	Z		X	Y	Z
67	-1172	-88	866	67	1018	-901	866
68	-1170	-183	867	68	1221	-904	866
69	-1208	-214	867	69	1362	-906	865
70	-1201	-283	867	70	1537	-907	866
71	-1183	-396	867	71	1664	-907	864
72	-1164	-487	867	72	1819	-905	866
73	-1136	-585	867	73	1972	-908	865
74	-1099	-666	867	74	1984	-951	865
75	-1037	-735	867	75	2025	-962	865
76	-958	-772	867	76	2061	-947	866
77	-880	-796	867	77	2095	-904	866
78	-809	-814	867	78	2164	-817	865
79	-744	-830	866	79	2318	-850	865
80	-648	-864	867	80	2455	-903	865
81	-575	-889	867	81	2523	-921	864
82	-512	-898	868	82	2599	-957	865
83	85	-909	867	83	2668	-972	865
84	173	-903	867				
85	314	-887	866				
86	420	-885	867				
87	450	-885	866				
88	574	-888	866				
89	726	-892	866				
90	871	-894	867				
91	951	-897	866				
92	1087	-898	867				
93	1182	-899	867				
94	1340	-900	866				
95	1444	-900	867				
96	1599	-899	867				
97	1683	-898	867				
98	1778	-896	867				
99	1878	-894	866				
100	1980	-898	867				
101	2029	-904	867				
102	2082	-910	866				
103	2139	-913	867				
104	2176	-912	866				
105	2800	-902	867				

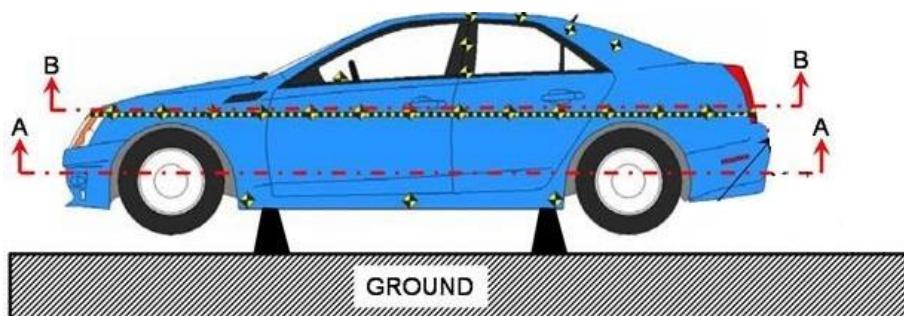
Note: See Appendix D for detailed procedure on how to measure vehicle exterior crush profile

**DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2013 Dodge Dart Four Door Sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
Test Date: 10/29/2013

**VEHICLE EXTERIOR CRUSH PROFILE
SECTION B-B**



Reference point: Rear most center of the top of rear window (See appendix D for procedure to create coordinate system).

- +X – From the rear of the vehicle to the front of the vehicle
- +Y – From the left side of the vehicle to the right side of the vehicle
- +Z – From the top of the vehicle to the bottom of the vehicle

Point	Pre-Test			Point	Post-Test		
	X	Y	Z		X	Y	Z
1	2535	-906	650	1	2592	-522	650
2	2582	-899	650	2	2753	-578	650
3	2671	-878	651	3	2826	-549	650
4	2727	-855	650	4	2852	-426	651
5	2797	-826	650	5	2931	-340	650
6	2834	-810	650	6	2975	-249	651
7	2916	-798	650	7	2988	-199	650
8	3002	-768	650	8	3102	-124	650
9	3075	-725	650	9	3198	-34	650
10	3130	-676	651	10	3295	68	651
11	3186	-600	650	11	3075	301	650
12	3253	-519	650	12	3178	404	650
13	3270	-448	651	13	3105	492	651
14	3324	-316	650	14	3116	536	651
15	3361	-163	650	15	2925	580	651
16	3373	-43	650	16	2816	583	651
17	3373	50	650	17	2696	870	651
18	3355	200	650	18	2611	893	650
19	3319	328	651	19	2473	910	650
20	3289	398	650	20	2353	909	651
21	3262	479	650	21	2262	902	650
22	3247	522	650	22	2104	903	650
23	3204	572	650	23	1985	906	650
24	3156	636	650	24	1741	913	650
25	3095	702	650	25	1553	917	649

**DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
 Test Date: 10/29/2013

**VEHICLE EXTERIOR CRUSH PROFILE
SECTION B-B (Continued)**

Point	Pre-Test			Point	Post-Test		
	X	Y	Z		X	Y	Z
26	3009	760	650	26	1409	919	650
27	2900	797	650	27	1300	920	650
28	2798	818	650	28	1165	921	650
29	2659	874	650	29	1034	920	650
30	2499	902	650	30	947	920	650
31	2326	898	650	31	854	917	650
32	2157	887	650	32	653	914	651
33	2039	888	651	33	504	910	650
34	1968	892	651	34	311	904	649
35	1850	897	651	35	176	900	651
36	1682	903	650	36	48	903	650
37	1541	907	650	37	-39	906	650
38	1393	910	650	38	-65	904	650
39	1193	913	651	39	-152	906	651
40	998	914	651	40	-273	903	651
41	825	912	651	41	-419	885	651
42	638	909	650	42	-568	854	651
43	525	906	651	43	-756	818	650
44	427	903	650	44	-904	778	651
45	299	899	650	45	-1022	696	650
46	188	896	651	46	-1078	570	650
47	86	898	651	47	-1099	453	650
48	-7	900	651	48	-1122	292	651
49	-165	904	651	49	-1134	140	651
50	-287	900	651	50	-1137	11	651
51	-469	874	651	51	-1136	-101	651
52	-643	836	650	52	-1129	-220	650
53	-834	799	650	53	-1113	-364	651
54	-974	741	650	54	-1093	-493	650
55	-1044	663	650	55	-1084	-548	650
56	-1079	572	651	56	-1064	-621	651
57	-1084	534	651	57	-1005	-717	651
58	-1107	406	650	58	-879	-787	651
59	-1126	257	650	59	-745	-821	651
60	-1136	96	651	60	-579	-852	651
61	-1138	-6	651	61	-414	-887	650
62	-1133	-168	652	62	-253	-904	651
63	-1123	-288	650	63	-87	-906	650
64	-1103	-434	651	64	-5	-902	651
65	-1084	-539	651	65	52	-900	650
66	-1076	-588	651	66	213	-897	650
67	-1034	-683	651	67	408	-904	651

**DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
 Test Date: 10/29/2013

**VEHICLE EXTERIOR CRUSH PROFILE
SECTION B-B (Continued)**

Point	Pre-Test			Point	Post-Test		
	X	Y	Z		X	Y	Z
68	-1013	-711	651	68	653	-912	650
69	-931	-768	651	69	822	-915	649
70	-822	-805	650	70	918	-916	650
71	-683	-832	649	71	939	-926	649
72	-471	-877	651	72	1035	-927	650
73	-299	-902	650	73	1121	-927	649
74	-88	-907	651	74	1244	-928	649
75	75	-901	651	75	1378	-928	650
76	271	-900	650	76	1568	-927	650
77	402	-905	650	77	1728	-924	649
78	472	-907	650	78	1867	-921	649
79	592	-910	651	79	1985	-918	649
80	729	-913	651	80	2024	-917	650
81	858	-915	651	81	2028	-998	650
82	988	-916	650	82	2084	-935	649
83	1147	-916	651	83	2111	-875	649
84	1329	-914	650	84	2156	-857	649
85	1441	-913	651	85	2230	-640	649
86	1572	-910	651	86	2484	-508	649
87	1714	-906	650				
88	1841	-902	650				
89	1952	-898	650				
90	2062	-894	650				
91	2195	-895	651				
92	2319	-903	650				
93	2458	-909	650				
94	2510	-908	650				
95	2535	-906	650				

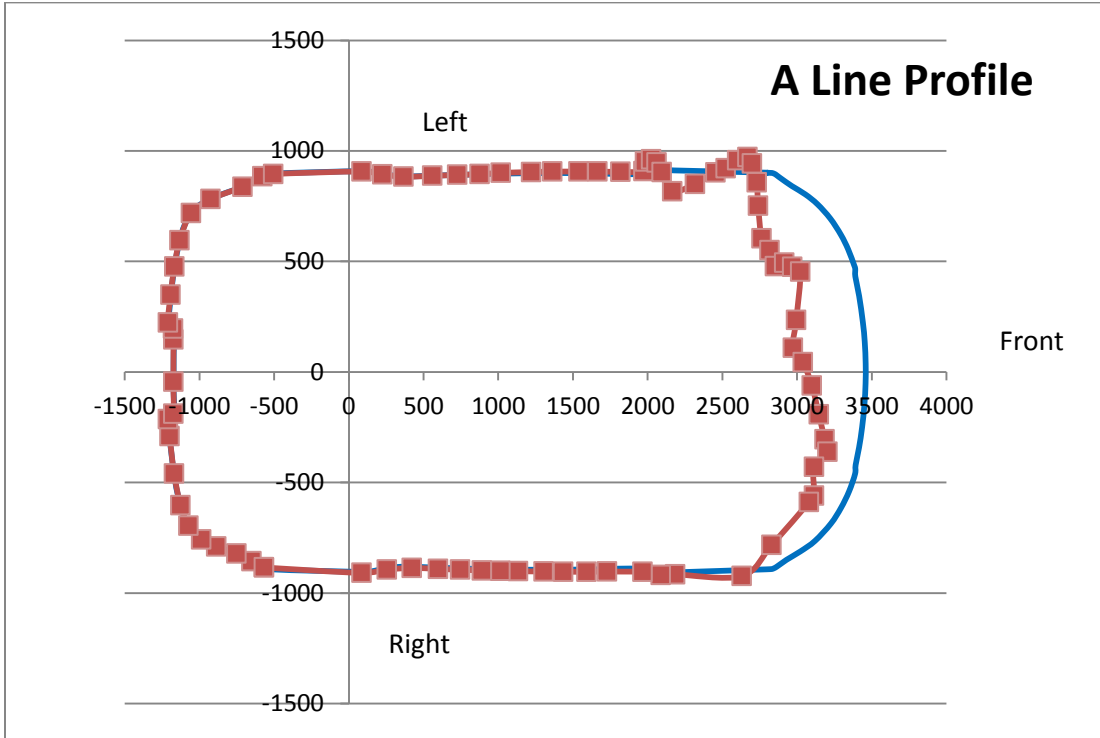
Note: See Appendix D for detailed procedure on how to measure vehicle exterior crush profile

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

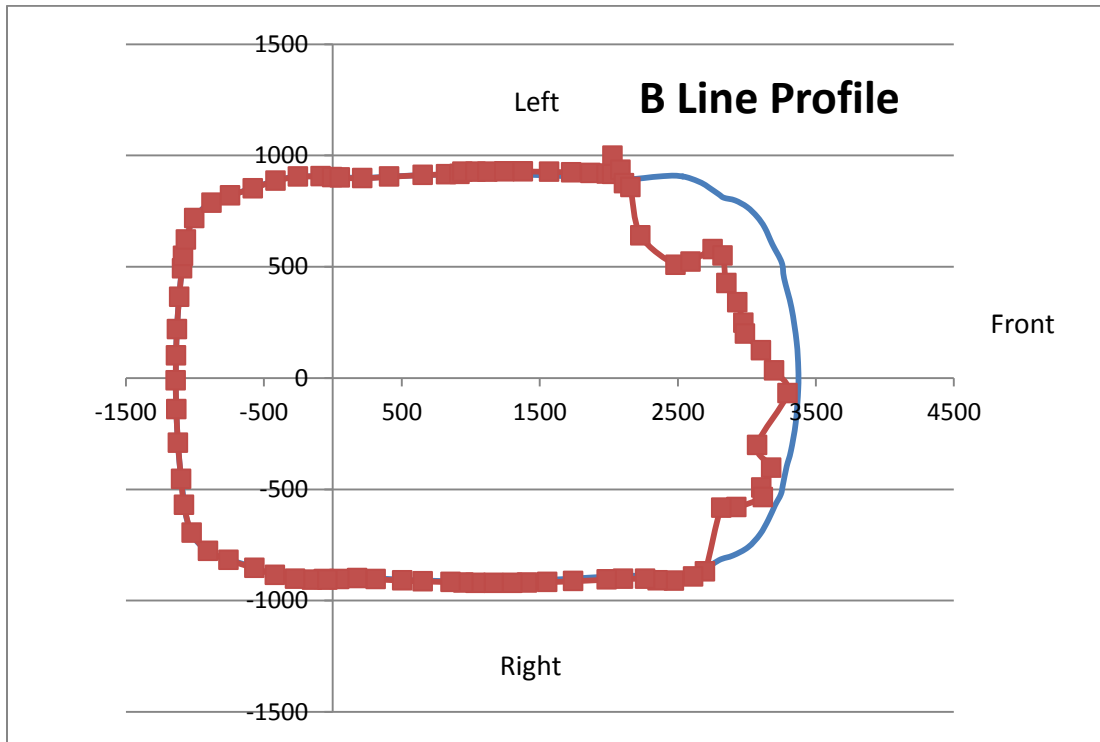
Test Vehicle: 2013 Dodge Dart Four Door Sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
Test Date: 10/29/2013

VEHICLE EXTERIOR CRUSH PROFILE
SECTION A-A



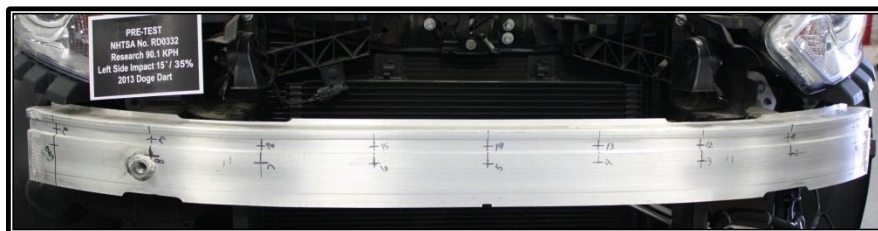
SECTION B-B



**DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
 Test Date: 10/29/2013



STRUCTURAL BUMPER BEAM POINTS

	Point	Pre-Test (mm)			Post-Test (mm)			Difference (mm)		
		X	Y	Z	X	Y	Z	X	Y	Z
Redundant Structural Bumper Beam	B1	3242	-636	841	2868	-365	577	-374	271	-264
	B2	3340	-476	841	2965	-209	595	-375	267	-246
	B3	3385	-319	844	3097	-113	612	-288	206	-232
	B4	3396	-163	842	3211	-7	627	-185	156	-215
	B5	3397	-2	843	3322	108	644	-75	110	-199
	B6	3395	158	843	3430	224	662	35	66	-181
	B7	3383	315	843	3528	346	684	145	31	-159
	B8	3337	474	842	3583	493	714	246	19	-128
	B9	3239	632	843	3486	641	771	247	9	-72
Center Structural Bumper Beam	B1	3246	-639	866	2878	-375	598	-368	264	-268
	B2	3345	-480	866	2974	-217	618	-371	263	-248
	B3	3391	-320	867	3100	-123	632	-291	197	-235
	B4	3401	-162	866	3216	-15	648	-185	147	-218
	B5	3403	-2	866	3327	100	667	-76	102	-199
	B6	3400	158	866	3435	217	685	35	59	-181
	B7	3390	316	867	3535	337	706	145	21	-161
	B8	3344	474	864	3593	486	736	249	12	-128
	B9	3243	635	867	3493	638	796	250	3	-71
Upper Radiator Support	1	3137	-462	645	2666	-231	549	-471	231	-96
	2	3148	-348	625	2681	-124	525	-467	224	-100
	3	3175	-233	630	2765	-58	493	-410	175	-137
	4	3187	-117	648	2854	13	474	-333	130	-174
	5	3164	-3	650	2912	119	481	-252	122	-169
	6	3187	116	649	2990	212	490	-197	96	-159
	7	3174	229	631	3027	319	511	-147	90	-120
	8	3148	344	626	3059	425	550	-89	81	-76
	9	3135	456	644	3113	514	595	-22	58	-49

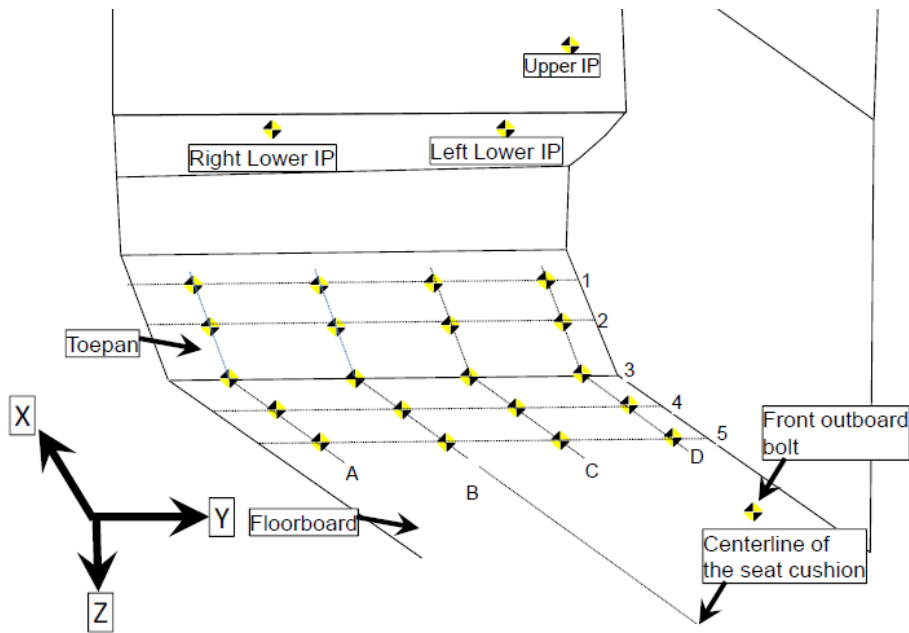
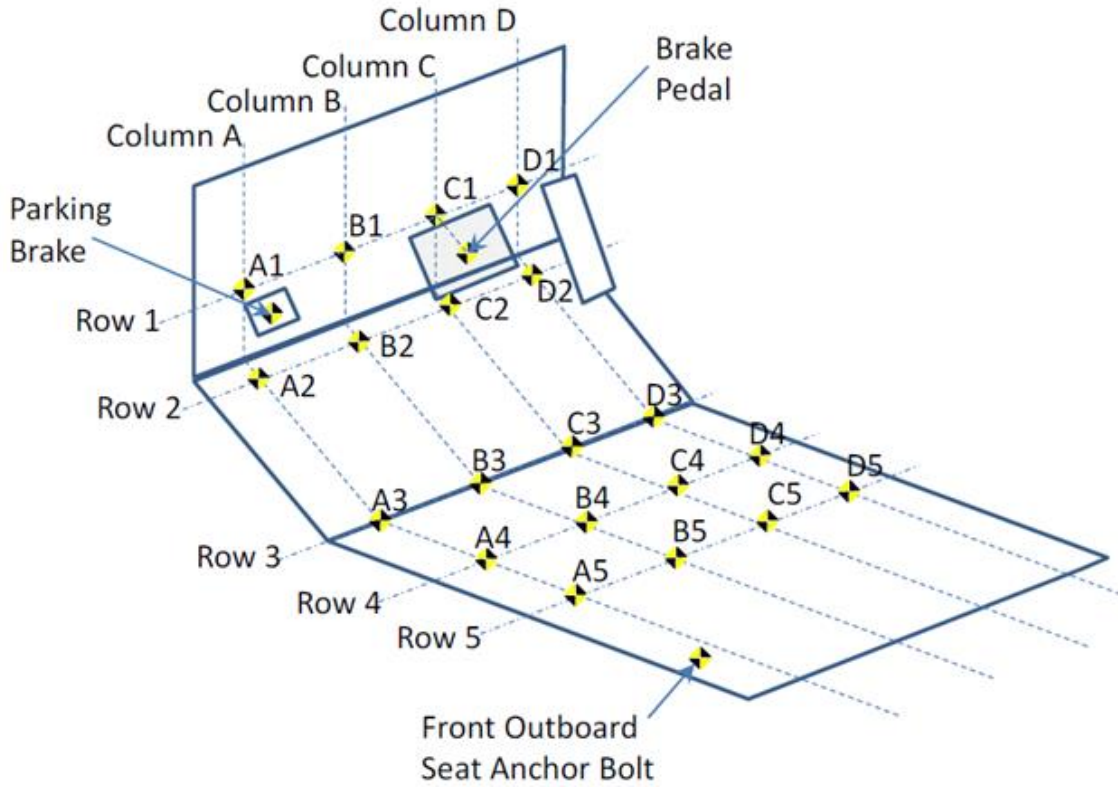
Reference point: Rear most center of the top of rear window (See appendix D for procedure to create coordinate system).

- +X – From the rear of the vehicle to the front of the vehicle
- +Y – From the left side of the vehicle to the right side of the vehicle
- +Z – From the top of the vehicle to the bottom of the vehicle

**DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
 Test Date: 10/29/2013



Note: See Appendix D for toe pan measuring procedure

**DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
 Test Date: 10/29/2013

DRIVER FLOOR PAN MEASUREMENTS

Intrusion Location	Pre-Test (mm)			Post-Test (mm)			Difference (mm)		
	X	Y	Z	X	Y	Z	X	Y	Z
A1	2109	-599	927	2061	-583	897	-48	16	-30
B1	2202	-500	926	2128	-467	883	-74	33	-43
C1	2252	-350	925	2191	-333	880	-61	17	-45
D1	2223	-199	927	2169	-187	903	-54	12	-24
A2	2068	-599	998	2037	-591	974	-31	8	-24
B2	2173	-499	998	2119	-473	958	-54	26	-40
C2	2215	-347	1001	2166	-333	963	-49	14	-38
D2	2175	-201	1000	2137	-187	970	-38	14	-30
A3	2030	-595	1083	2010	-589	1060	-20	6	-23
B3	2066	-498	1082	2039	-489	1055	-27	9	-27
C3	2064	-347	1083	2040	-339	1072	-24	8	-11
D3	2064	-196	1082	2063	-193	1085	-1	3	3
A4	1964	-597	1131	1963	-592	1124	-1	5	-7
B4	1965	-497	1122	1962	-493	1120	-3	4	-2
C4	1963	-347	1126	1959	-343	1129	-4	4	3
D4	1965	-195	1125	1966	-193	1131	1	2	6
A5	1865	-598	1142	1865	-595	1139	0	3	-3
B5	1862	-497	1139	1862	-493	1140	0	4	1
C5	1863	-347	1140	1864	-343	1147	1	4	7
D5	1861	-197	1140	1863	-196	1146	2	1	6
Brake Pedal	2002	-349	928	1978	-357	950	-24	-8	22
Driver IP Left	1693	-516	621	1664	-519	599	-29	-3	-22
Driver IP Right	1685	-214	624	1668	-220	589	-17	-6	-35
DOLP	1687	-597	624	1657	-600	604	-30	-3	-20
Steering Column	1512	-366	456	1507	-344	478	-5	22	22
Front Outboard Bolt	1406	-584	1086	1408	-581	1085	2	3	-1
Emergency Brake									

Reference point: Rear most center of the top of rear window (See appendix D for procedure to create coordinate system).

- +X – From the rear of the vehicle to the front of the vehicle
- +Y – From the left side of the vehicle to the right side of the vehicle
- +Z – From the top of the vehicle to the bottom of the vehicle

**DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2013 Dodge Dart Four Door Sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
Test Date: 10/29/2013

PASSENGER FLOOR PAN MEASUREMENTS

Intrusion Location	Pre-Test (mm)			Post-Test (mm)			Difference (mm)		
	X	Y	Z	X	Y	Z	X	Y	Z
A1	2256	209	929	2246	218	915	-10	9	-14
B1	2181	360	929	2178	375	920	-3	15	-9
C1	2187	511	927	2185	520	919	-2	9	-8
D1	2099	612	926	2098	623	921	-1	11	-5
A2	2176	210	999	2174	218	994	-2	8	-5
B2	2132	361	1000	2134	374	994	2	13	-6
C2	2151	511	999	2149	521	991	-2	10	-8
D2	2061	611	998	2060	621	992	-1	10	-6
A3	2063	210	1082	2064	219	1072	1	9	-10
B3	2052	359	1083	2053	368	1075	1	9	-8
C3	2062	513	1083	2062	521	1077	0	8	-6
D3	2032	610	1082	2031	619	1078	-1	9	-4
A4	1963	209	1126	1964	217	1116	1	8	-10
B4	1961	361	1127	1963	369	1120	2	8	-7
C4	1961	513	1123	1963	520	1118	2	7	-5
D4	1962	611	1139	1962	619	1135	0	8	-4
A5	1863	211	1137	1865	218	1130	2	7	-7
B5	1863	362	1140	1864	369	1134	1	7	-6
C5	1862	513	1141	1863	520	1137	1	7	-4
D5	1864	611	1142	1865	617	1139	1	6	-3
Pass IP Left	1679	211	661	1687	203	639	8	-8	-22
Pass IP Right	1716	510	663	1732	501	648	16	-9	-15
PORP	1704	611	628	1720	604	619	16	-7	-9
Front Outboard Bolt	1411	578	1086	1412	583	1084	1	5	-2

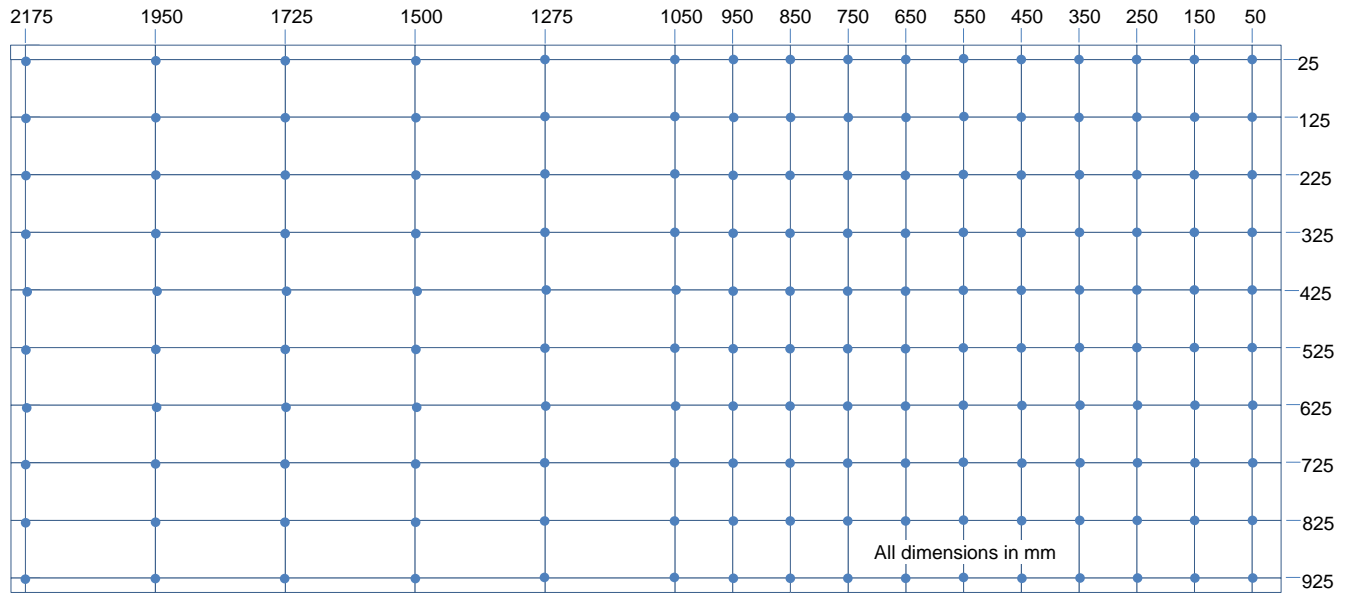
Reference point: Rear most center of the top of rear window (See appendix D for procedure to create coordinate system).

- +X – From the rear of the vehicle to the front of the vehicle
- +Y – From the left side of the vehicle to the right side of the vehicle
- +Z – From the top of the vehicle to the bottom of the vehicle

DATA SHEET NO.14 RMDB CRUSH MEASUREMENTS

Test Vehicle: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
 Test Date: 10/29/2013



	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
R10	-0.3	-0.7	-0.7	-0.7	-0.8	-1.1	-1.0	-1.2	-1.2	-1.4	-1.5	-1.6	-1.9	-2.3	-2.8	
R9	-0.6	-0.8	-0.7	-0.9	-1.0	-1.0	-1.1	-1.1	-1.2	-1.1	-1.4	3.9	-0.9	-1.4	-1.5	2.8
R8	-0.5	-0.6	-0.9	-1.1	-1.0	-1.0	-0.9	1.4	14.5	28.7	32.9	15.3	1.4	0.8	2.1	13.2
R7	-0.5	-0.7	-0.8	-0.8	-0.9	-0.8	2.0	-0.8	30.0	70.6	70.1	61.9	41.5	20.9	22.0	38.8
R6	-0.3	-0.6	-0.9	-0.9	-0.7	-0.8	-0.5	-0.6	9.0	38.4	136.6	142.4	114.3	78.1	58.3	96.8
R5	-0.5	-0.8	-0.6	-0.6	-0.7	-0.6	-0.4	0.3	40.8	8.0	32.2	121.5	209.8	288.0	277.7	279.6
R4	-0.1	-0.2	-0.3	-0.4	-0.4	-0.3	-0.3	44.4	62.5	26.0	14.5	88.1	174.0	264.7	202.8	232.1
R3	-0.2	-0.3	-0.2	-0.3	-0.3	-0.1	10.0	80.4	111.5	53.9	20.8	51.9	143.1	207.6	147.0	170.3
R2	0.2	0.1	0.0	-0.1	-0.1	4.4	40.1	119.2	168.5	99.1	39.8	42.1	123.3	215.6	147.8	129.6
R1	0.2	0.5	0.5	0.5						149.0	76.7	67.0	210.5	135.6	66.2	106.4

*Barrier was cut to accommodate the rail, therefore these points were un-measurable.

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

Test Vehicle: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
 Test Date: 10/29/2013

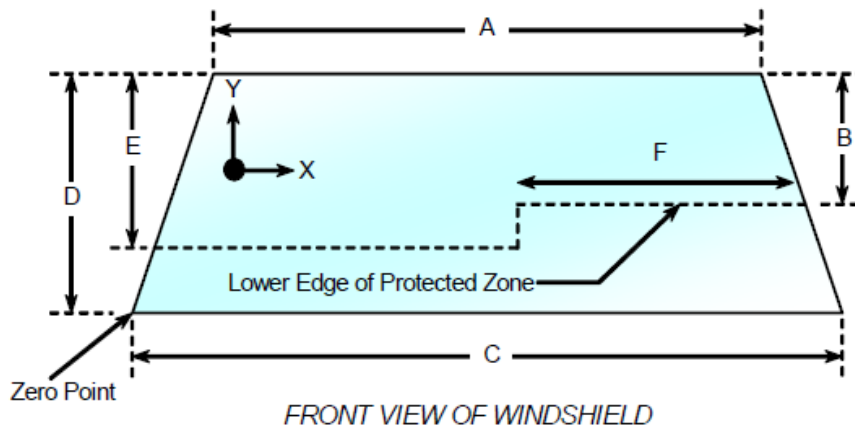
Please provide windshield mounting details. A 0.8 mm trim surrounds the top and side of windshield while a plastic shroud is on the bottom.

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°C

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% Retention
Left Side	2223	953	42.9%
Right Side	2223	1658	74.6%
Total	4446	2611	58.7%



Item	Units	Value
A	mm	1225
B	mm	457
C	mm	1500
D	mm	860
E	mm	541
F	mm	310

AREAS OF PROTECTED ZONE FAILURES

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

- No penetration

X	Y

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

- No Penetration

X	Y

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

Test Vehicle: 2013 Dodge Dart Four Door Sedan
Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
Test Date: 10/29/2013

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Ambient Temperature at Test Vehicle Time of Impact: 21° C

Test Time: 3:20 PM

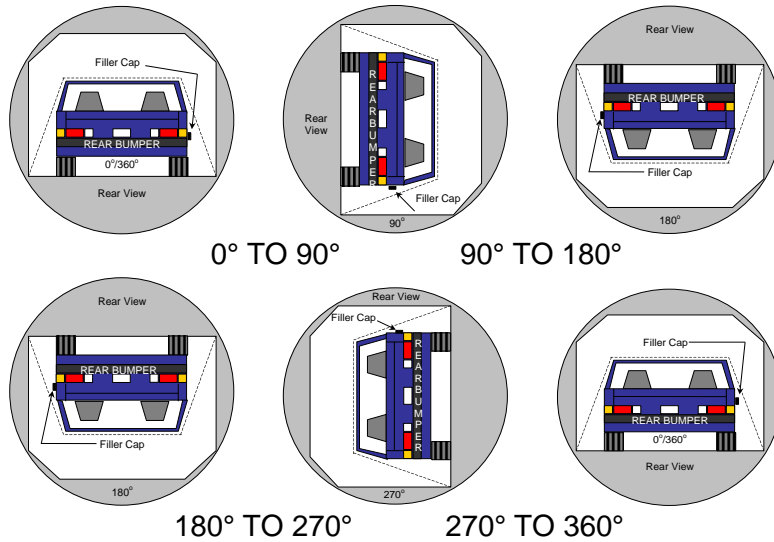
Stoddard Solvent Spillage Measurements

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: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
 Test Date: 10/29/2013



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°	67	300	367
90° to 180°	64	300	364
180° to 270°	61	300	361
270° to 360°	67	300	367

FMVSS 301 SPILLAGE TABLE

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

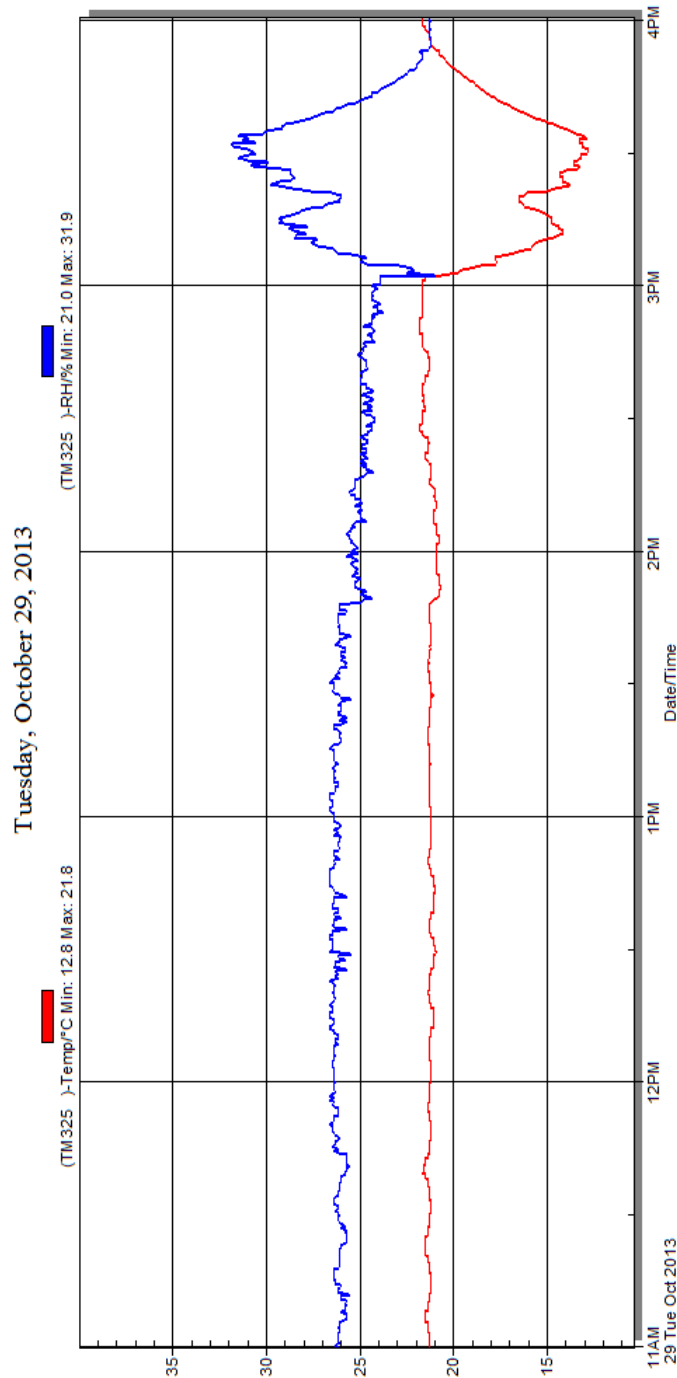
SOLVENT SPILLAGE LOCATION TABLE

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

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

Test Vehicle: 2013 Dodge Dart Four Door Sedan
 Test Program: R&D 90.1kph, 15° / 35% Left Oblique Offset

NHTSA No.: RD0332
 Test Date: 10/29/2013



Temperature Stabilization Chart/Data

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No. 001 As Delivered Right Front 3-4 View of Test Vehicle



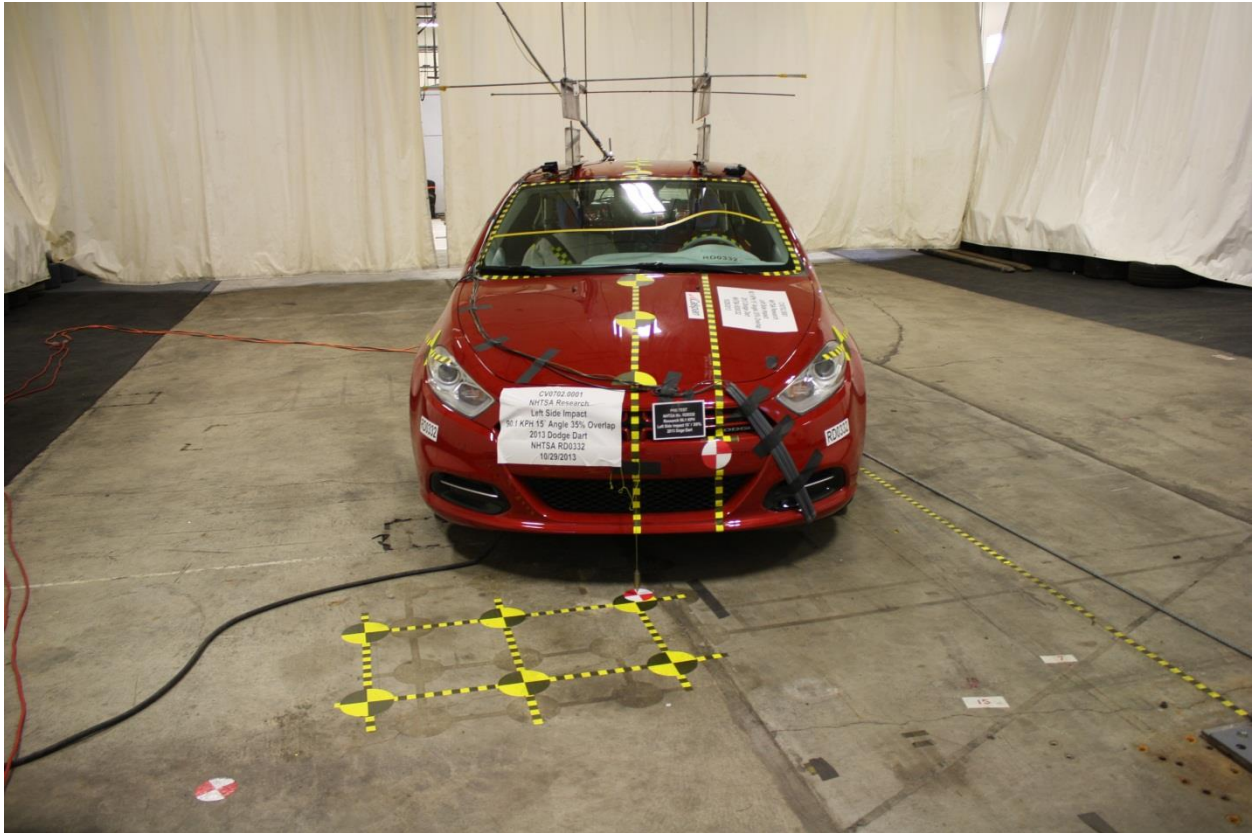
No. 002 As Delivered Left Rear 3-4 View of Test Vehicle



No. 003 Test Vehicle Certification Label



No. 004 Test Vehicle Tire Placard



No. 005 Pre-Test Front View of Test Vehicle



No. 006 Post-Test Front View of Test Vehicle



No. 007 Pre-Test Left Front 3-4 View of Test Vehicle



No. 008 Post-Test Left Front 3-4 View of Test Vehicle



No. 009 Pre-Test Left Side View of Test Vehicle



No. 010 Post-Test Left Side View of Test Vehicle



No. 011 Pre-Test Left Rear 3-4 View of Test Vehicle



No. 012 Post-Test Left Rear 3-4 View of Test Vehicle



No. 013 Pre-Test Rear View of Test Vehicle



No. 014 Post-Test Rear View of Test Vehicle



No. 015 Pre-Test Right Rear 3-4 View of Test Vehicle



No. 016 Post-Test Right Rear 3-4 View of Test Vehicle



No. 017 Pre-Test Right Side View of Test Vehicle



No. 018 Post-Test Right Side View of Test Vehicle



No. 019 Pre-Test Right Front 3-4 View of Test Vehicle



No. 020 Post-Test Right Front 3-4 View of Test Vehicle

2013 DODGE DART SE

THIS VEHICLE IS MANUFACTURED TO MEET SPECIFIC UNITED STATES REQUIREMENTS. THIS VEHICLE IS NOT MANUFACTURED FOR SALE OR REGISTRATION OUTSIDE OF THE UNITED STATES.

MANUFACTURER'S SUGGESTED RETAIL PRICE OF THIS MODEL INCLUDING DEALER PREPARATION

Base Price: \$15,995

DODGE DART SE
 Exterior Color: Redline 2-Coat Pearl Exterior Paint
 Interior Color: Black Interior Color
 Interior: Black Cloth Seats
 Engine: 2.0-Liter I4 DOHC Engine
 Transmission: 6-Speed PowerTech Automatic Transmission

STANDARD EQUIPMENT (UNLESS REPLACED BY OPTIONAL EQUIPMENT)

FUNCTIONAL/SAFETY FEATURES
 Advanced Multistage Front Airbags
 Supplemental Front Seat-Mounted Side Airbags
 Supplemental Side-Curtain Front and Rear Airbags
 Supplemental Rear Seat Side Airbags
 Driver Inflatable Knee-Roller Airbag
 Passenger Inflatable Knee-Roller Airbag
 Child Seat Anchor System-LATCH Ready
 4-Wheel Anti-Lock Disc Power Brakes
 Brake Assist
 Electric Power Steering
 Electronic Stability Control
 All-Speed Traction Control
 Electronic Roll Mitigation
 Hill Start Assist
 Front Seat Reactive Headrests
 Tire Pressure Monitor with Warning Lamp
 Power Windows with Driver's One-Touch-Down Feature
 Variable Intermittent Windshield Wipers
 Rear Window Defroster
 Daytime Running Lamps
 Sentry Key® Theft Deterrent System

INTERIOR FEATURES
 Manual 6-Way Driver Seat
 Driver Seat Height Adjuster
 6-Way Manual Passenger Seat Adjust
 Air Filtering
 Heater with Instrument Panel Ventilation
 Uconnect® 200 AM/FM/CD/MP3 Radio
 4 Speakers
 Audio Jack Input for Mobile Devices
 12-Volt Auxiliary Power Outlet
 Instrument Cluster with Tachometer
 Odometer with Outside Temperature Display

Assembly Point/Port of Entry: BELVIDERE, ILLINOIS, U.S.A.
 VIN: 1C3DFAA20D149198 Model: 5951

For more information visit: www.dodge.com Chrysler Group LLC
 or call 1-800-4ADODGE

EPA DOT Fuel Economy and Environment Gasoline Vehicle

Fuel Economy
27 MPG combined city/hwy
 24 city 34 highway
 3.7 gallons per 100 miles

You Save \$1,850 in fuel costs over 5 years compared to the average new vehicle.

Annual fuel Cost \$1,950

Fuel Economy & Greenhouse Gas Rating (tailpipe only) **Smog Rating (tailpipe only)**

This vehicle emits 326 grams CO2 per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also creates emissions; learn more at fuelconomy.gov.

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 23 MPG and cost \$11,600 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at \$3.36 per gallon. MPGe is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

fuelconomy.gov
 Calculate personalized estimates and compare vehicles

OPTIONAL EQUIPMENT

Customer Preferred Package 24A \$995
 Value Group
 Keyless Entry with Panic Alarm
 Speed Sensitive Power Locks
 Air Conditioning with Micron Filter
 Body-Color Power Mirrors

6-Speed PowerTech Automatic Transmission \$1,100
 6-Speed PowerTech Auto Transmission w/AutoStick®
 205/55R16 Low Rolling Resistance A/S Tires

DESTINATION CHARGE \$795

Totals:
 Base Price: \$15,995
 Destination Charge: \$795
 Total Price: *\$18,885

WARRANTY COVERAGE
 3-year or 100,000-mile Powertrain Limited Warranty.
 3-year or 36,000-mile Basic Limited Warranty.
 Roadside assistance; certain restrictions apply.
 Ask Dealer for a copy of the limited warranties or see your owner's manual for details.

5 YEAR / 100,000 MILE POWERTRAIN WARRANTY

GOVERNMENT 5-STAR SAFETY RATINGS

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

Source: National Highway Traffic Safety Administration (NHTSA) www.safercar.gov or 1-888-327-4236

Bumper Performance
 This vehicle is equipped with bumper systems that can withstand a frontal barrier impact speed of 2.5 miles per hour and a rear barrier impact speed of 2.5 miles per hour with no more damage than allowed by the Federal bumper standard. The Federal bumper standard allows damage to the bumpers and attaching hardware and specifies barrier tests to be conducted at 2.5 miles per hour.

PARTS CONTENT INFORMATION FOR VEHICLES IN THIS COUNTRY:
 U.S./CANADIAN PARTS CONTENT: 57%
 MAJOR SOURCES OF FOREIGN PARTS CONTENT:

MEXICO: 19%
 NOTE: PARTS CONTENT DOES NOT INCLUDE FINAL ASSEMBLY, DISTRIBUTION, OR OTHER WORK-PARTS COSTS.

FOR THIS VEHICLE:
 FINAL ASSEMBLY POINT: BELVIDERE, ILLINOIS, U.S.A.
 COUNTRY OF ORIGIN: ENGINE: UNITED STATES
 TRANSMISSION: KOREA, REPUBLIC OF

No. 021 Monroney Label Photograph



No. 022 Pre-Test Overhead View of RMDB against target vehicle at ideal Impact Point



No. 023 Pre-Test Left Side View of RMDB against target vehicle at ideal Impact Point



No. 024 Pre-Test Right Side View of RMDB against target vehicle at ideal Impact Point



No. 025 Pre-Test Close-up View of Impact Point



No. 026 Post-Test Close-up View of Impact Point



No. 027 Post-Test Vehicle Overhead View



PRE-TEST (Pos 1)
NHTSA No. RD0332
Research 90.1 KPH
Left Side Impact 15° / 35%
2013 Dodge Dart

No. 028 Pre-Test Close-up View of Driver Door Latch

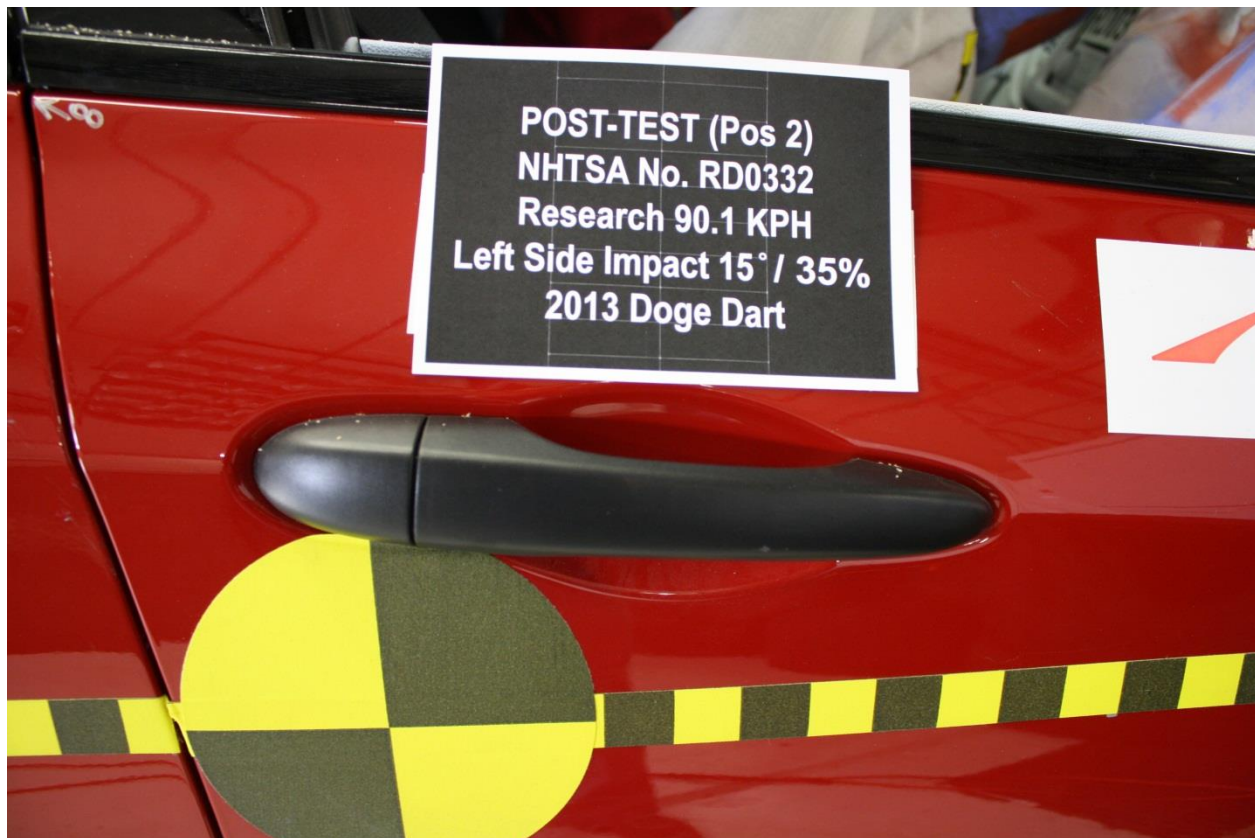


POST-TEST (Pos 1)
NHTSA No. RD0332
Research 90.1 KPH
Left Side Impact 15° / 35%
2013 Dodge Dart

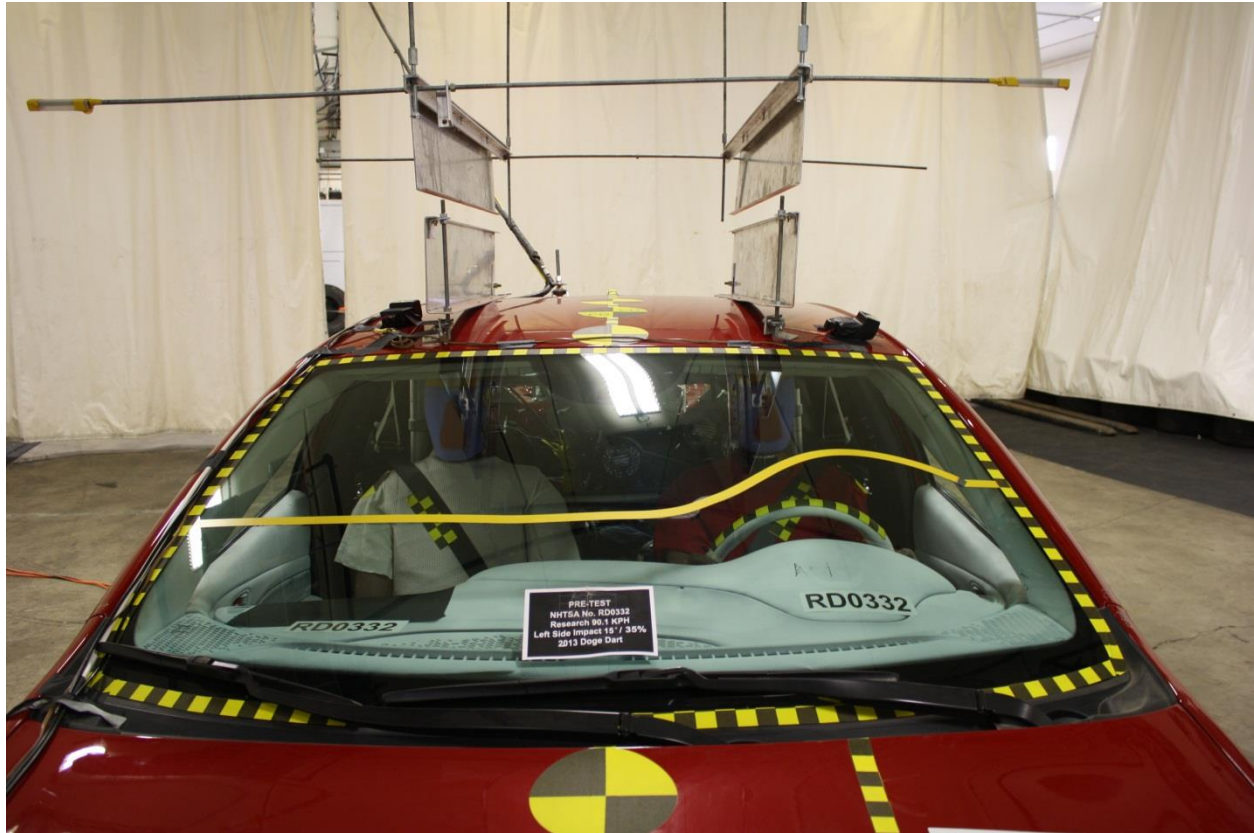
No. 029 Post-Test Close-up View of Driver Door Latch



No. 030 Pre-Test Close-up View of Passenger Door Latch



No. 031 Post-Test Close-up View of Passenger Door Latch



No. 032 Pre-Test Windshield View



No. 033 Post-Test Windshield View



No. 034 Pre-Test View of Driver Inner Door Panel



No. 035 Post-Test View of Driver Inner Door Panel



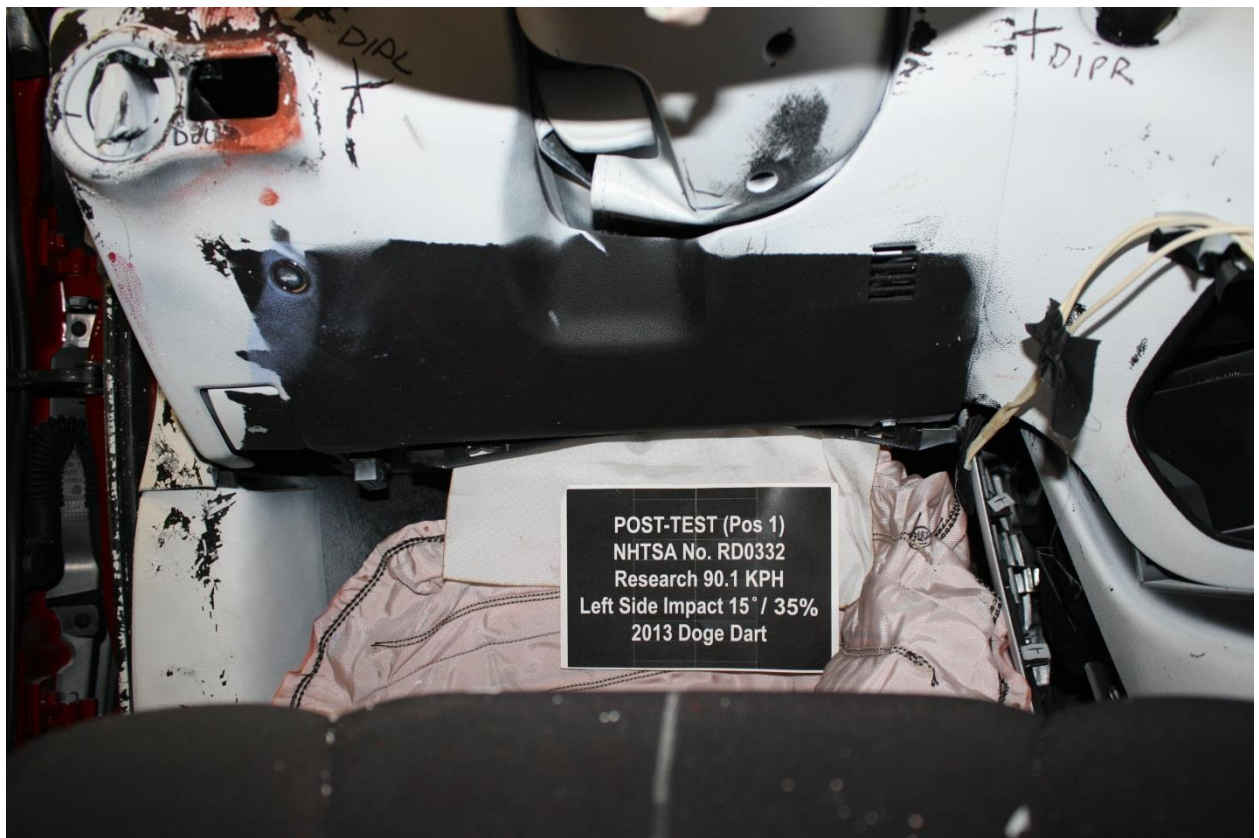
No. 036 Pre-Test View of Passenger Inner Door Panel



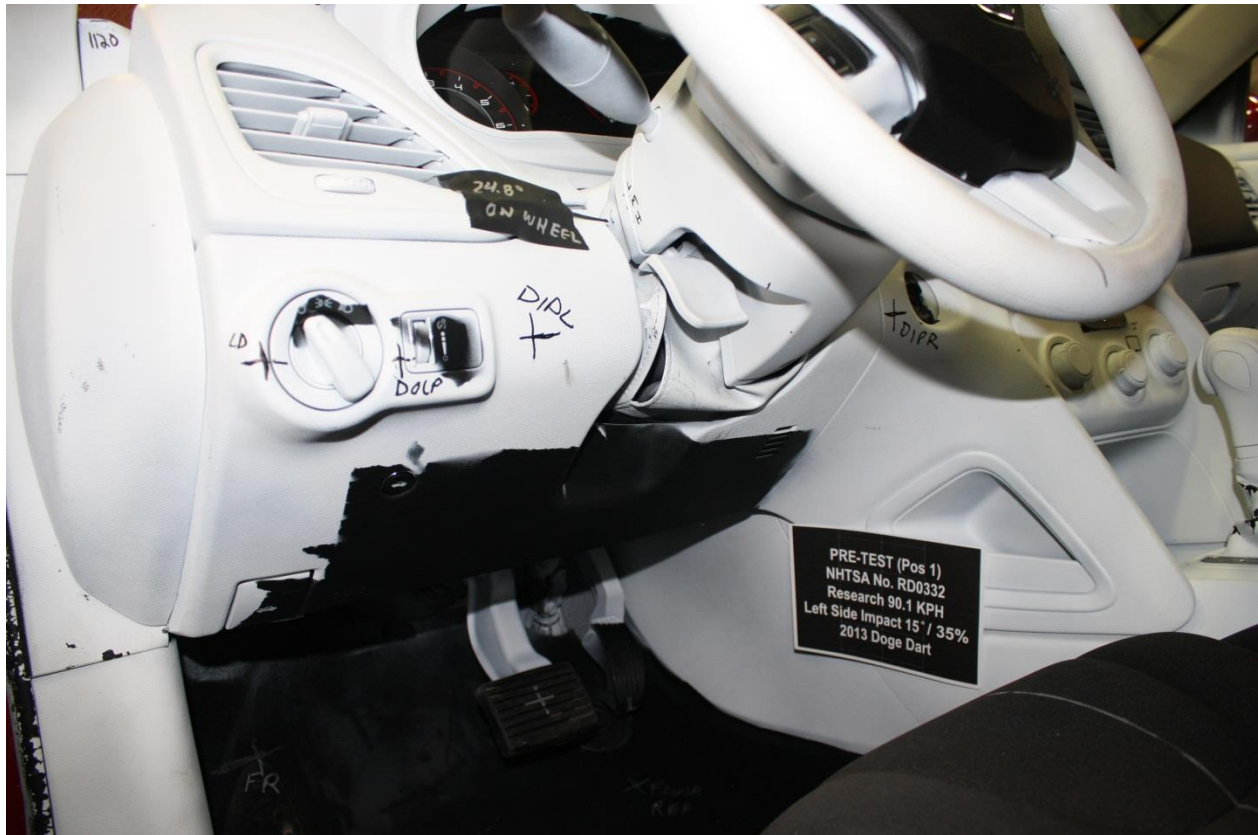
No. 037 Post-Test View of Passenger Inner Door Panel



No. 038 Pre-Test Overall View of Driver Knee Bolsters



No. 039 Post-Test Overall View of Driver Knee Bolsters



No. 040 Pre-Test Left Side View of Driver Knee Bolsters



No. 041 Post-Test Left Side View of Driver Knee Bolsters



No. 042 Pre-Test Right Side View of Driver Knee Bolsters



No. 043 Post-Test Right Side View of Driver Knee Bolsters



No. 044 Pre-Test View of Driver Floor pan at Left sill level, w/carpet



No. 045 Post-Test View of Driver Floor pan at Left sill level, w/carpet



No. 046 Pre-Test View of Driver Floor pan at Mid seat level, w/carpet



No. 047 Post-Test view of Driver Floor pan at Mid seat level, w/carpet



No. 048 Pre-Test View of Driver Floor pan at Left sill level, w/o carpet



No. 049 Post-Test View of Driver Floor pan at Left sill level, w/o carpet



No. 050 Pre-Test View of Driver Floor pan at Mid seat level, w/o carpet



No. 051 Post-Test view of Driver Floor pan at Mid seat level, w/o carpet



No. 052 Pre-Test Driver Front Windshield View



No. 053 Post-Test Driver Front Windshield View



No. 054 Pre-Test Left Side View of Driver and Interior



No. 055 Post-Test Left Side View of Driver and Interior



PRE-TEST (Pos 1)
NHTSA No. RD0332
Research 90.1 KPH
Left Side Impact 15' / 35%
2013 Dodge Dart

Calspan

RD0332

No. 056 Pre-Test Left Side Driver Window View



POST-TEST (Pos 1)
NHTSA No. RD0332
Research 90.1 KPH
Left Side Impact 15' / 35%
2013 Dodge Dart

Calspan

No. 057 Post-Test Left Side Driver Window View



No. 058 Pre-Test Right Side View of Driver and Interior



No. 059 Post-Test Right Side View of Driver and Interior



No. 060 Pre-Test View of Driver Door Clearance



No. 061 Post-Test View of Driver Door Clearance



No. 062 Pre-Test View of Parking Brake



No. 063 Pre-Test Driver Seat Fore Aft Markings



No. 064 Post-Test Driver Seat Fore Aft Markings



No. 065 Pre-Test Driver Seat Back Markings



No. 066 Pre-Test Overhead View of Driver Thighs on Seat



No. 067 Pre-Test Driver Adjustable D-Ring



No. 068 Post-Test Driver Adjustable D-Ring



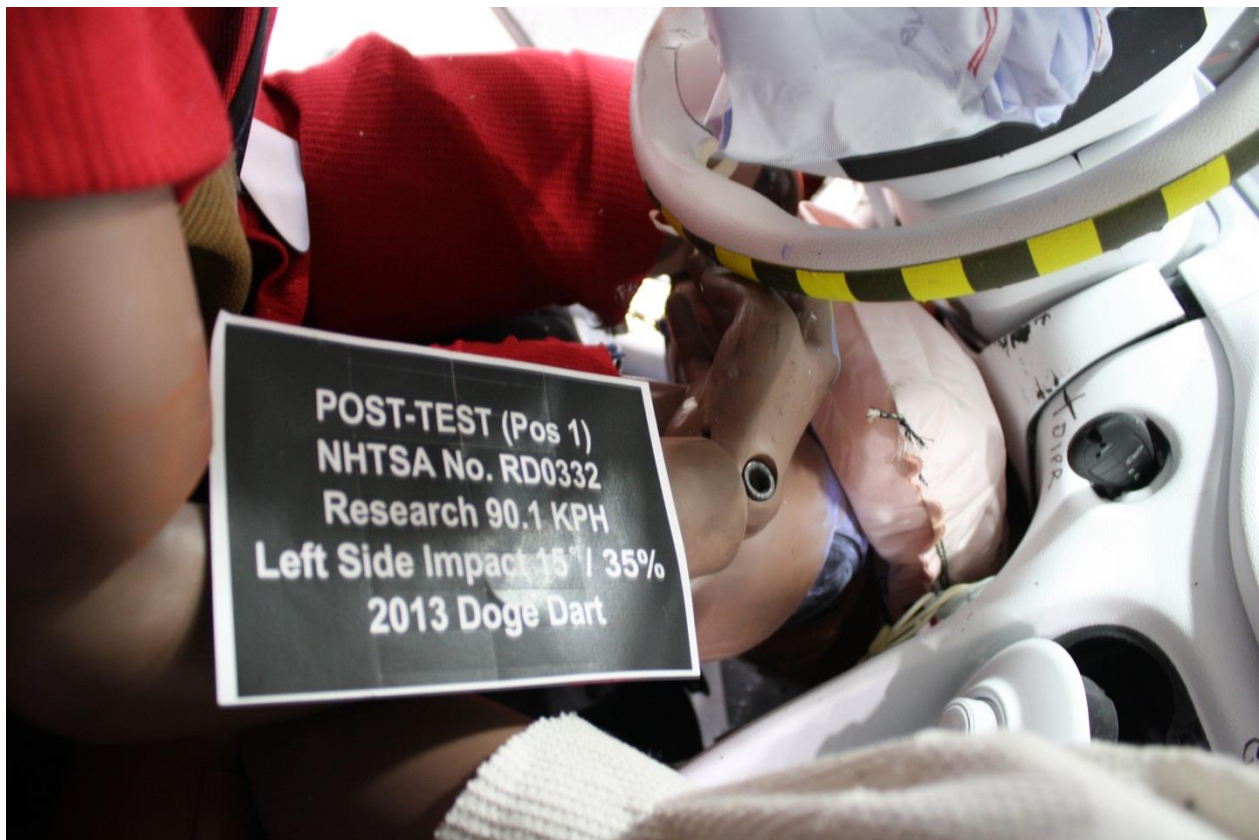
No. 069 Pre-Test Driver Feet



No. 070 Post-Test Driver Feet



No. 071 Pre-Test View of Driver Right Knee and Bolster



No. 072 Post-Test View of Driver Right Knee and Bolster



No. 073 Pre-Test View of Driver Left Knee and Bolster



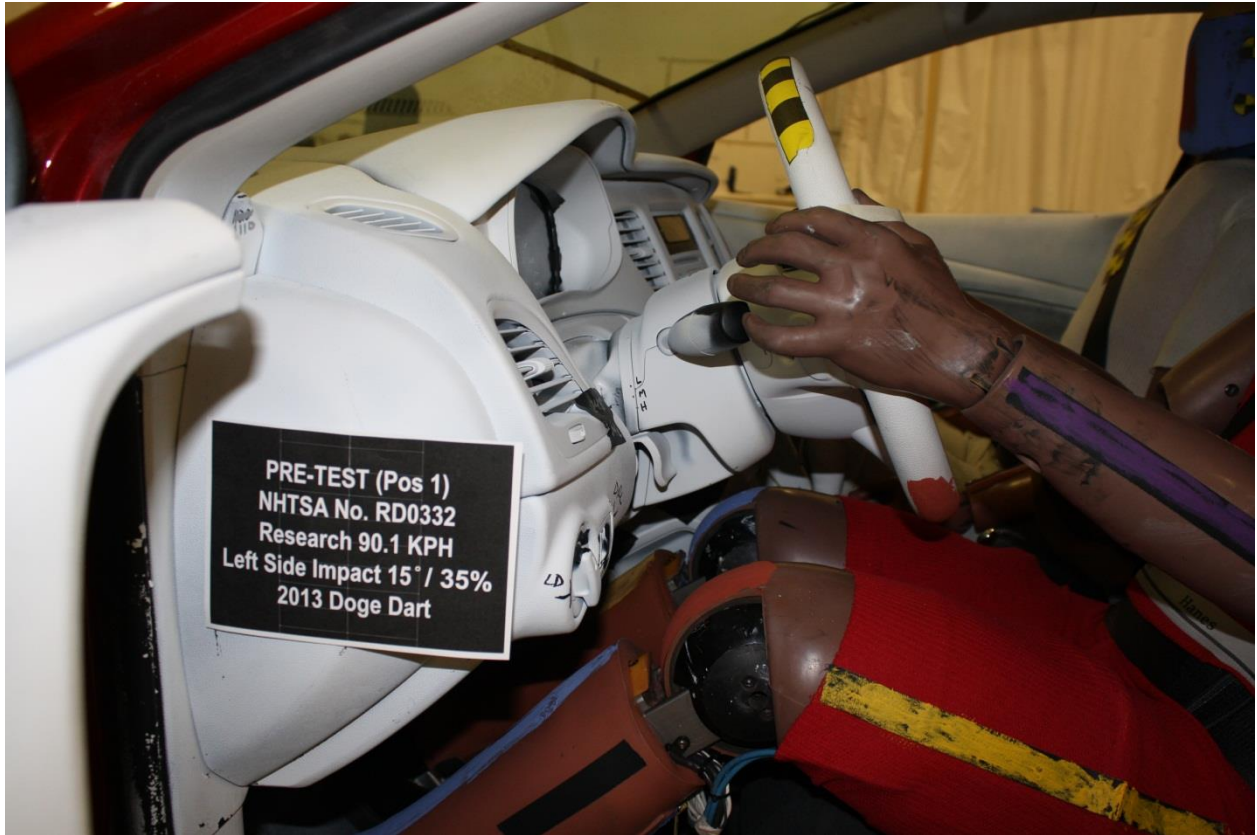
No. 074 Post-Test View of Driver Left Knee and Bolster



No. 075 Pre-Test View of Driver Abdomen



No. 076 Post-Test View of Driver Abdomen



No. 077 Pre-Test Left Side View of Steering Wheel set position



No. 078 Post-Test Left Side View of Steering Wheel set position



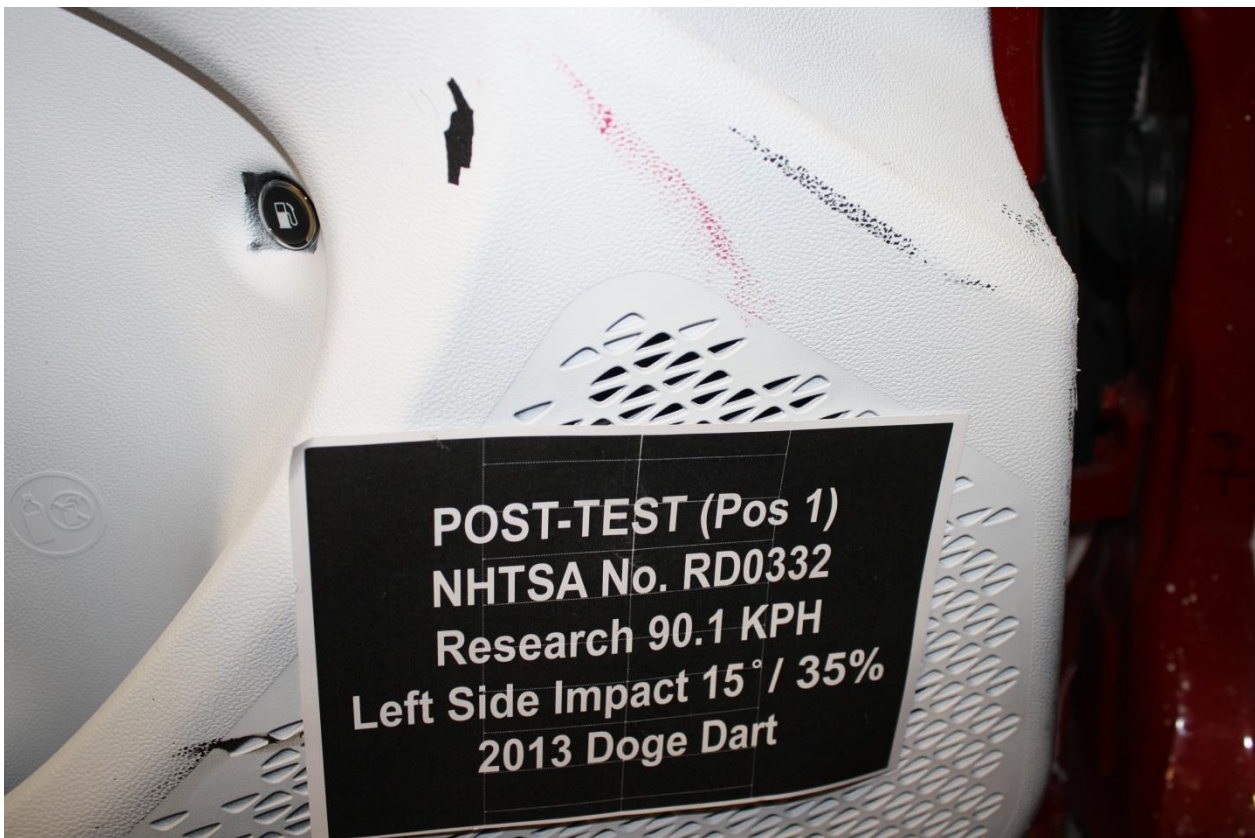
No. 079 Post-Test View of Driver Head Contact with Front Airbag



No. 080 Post-Test View of Driver Head Contact with Curtain Airbag



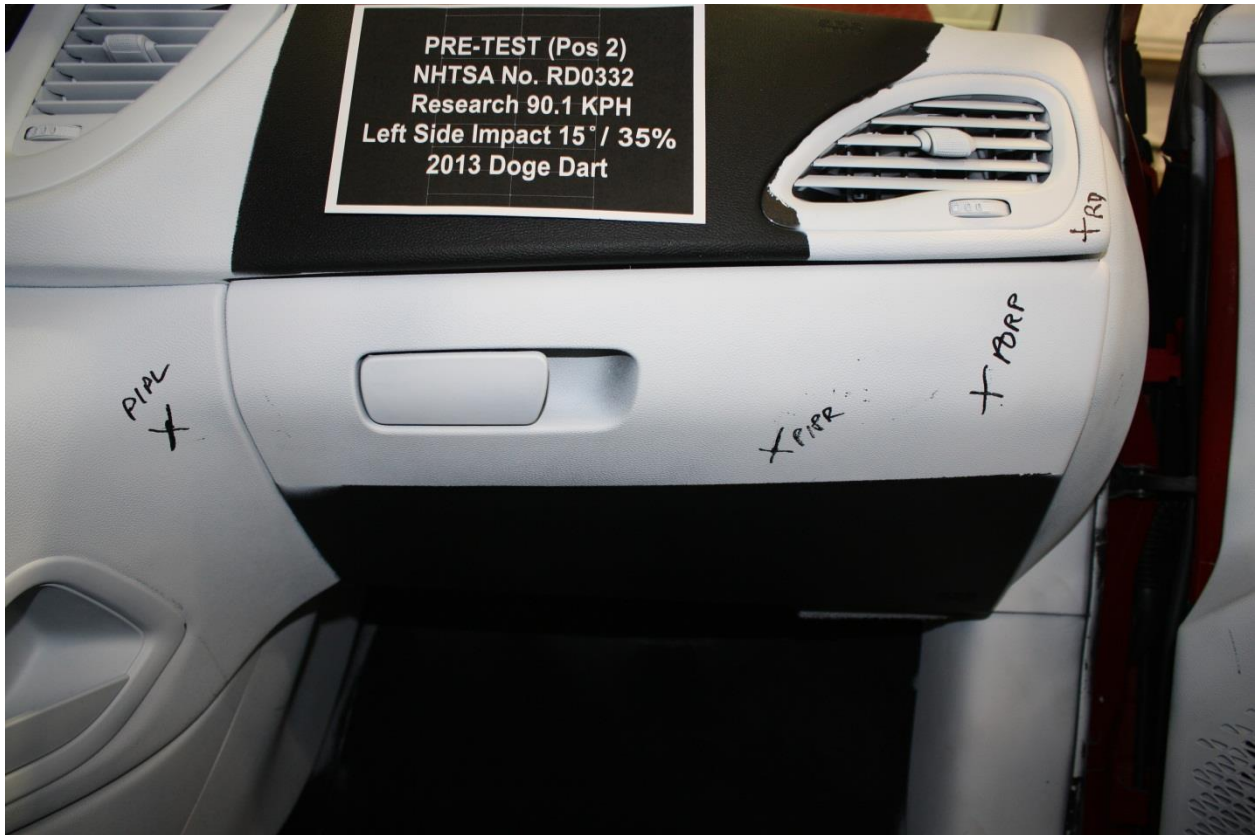
No. 081 Post-Test View of Driver Head Contact with Vehicle Interior – A



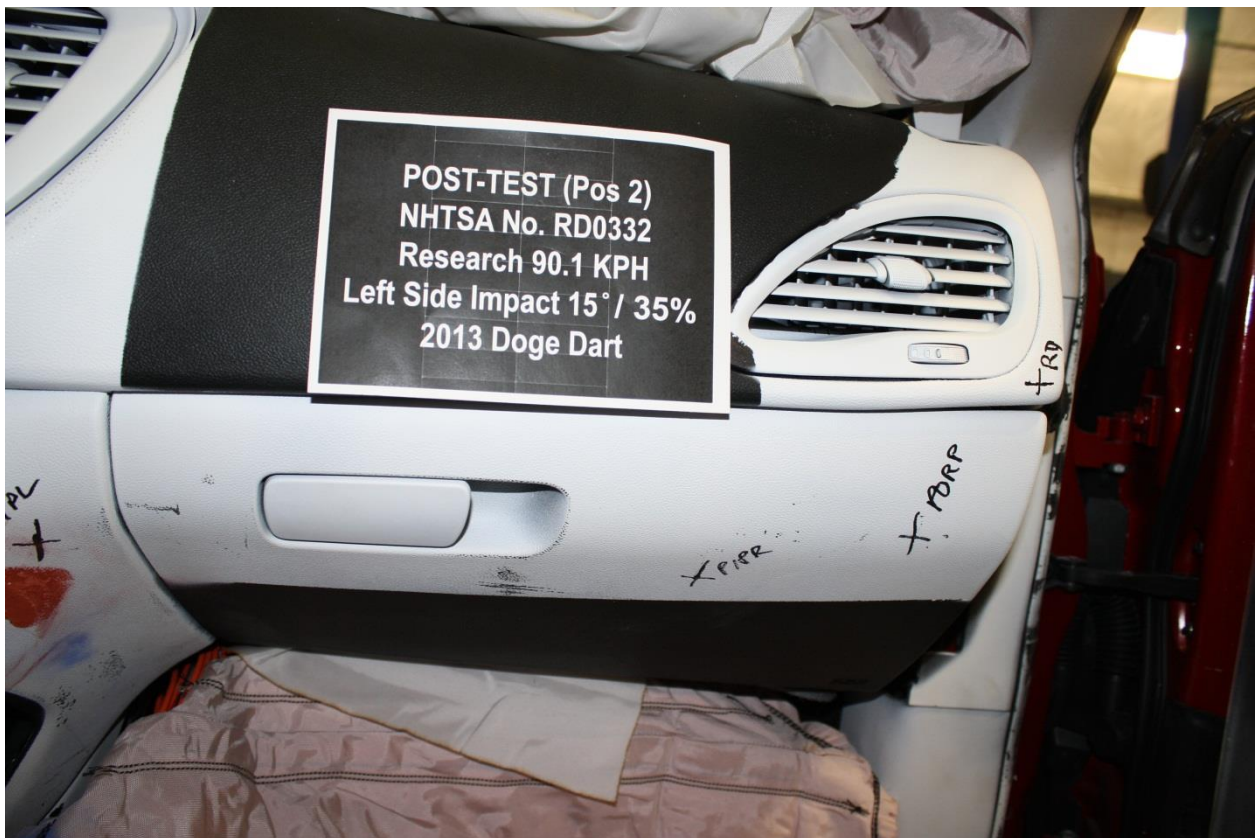
No. 081a Post-Test View of Driver Body Contact with Vehicle Interior - B



No. 081b Post-Test View of Driver Body Contact with Vehicle Interior - C



No. 082 Pre-Test Overall View of Passenger Knee Bolsters



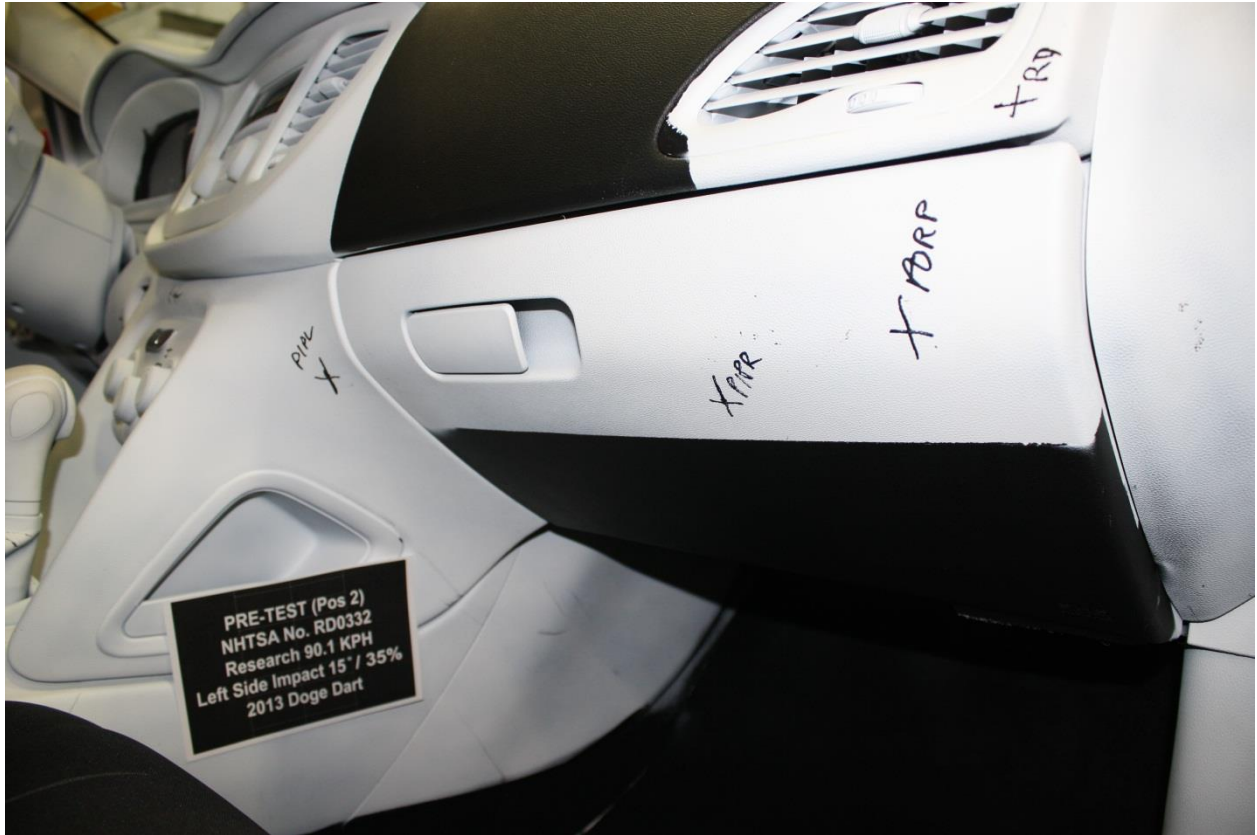
No. 083 Post-Test Overall View of Passenger Knee Bolsters



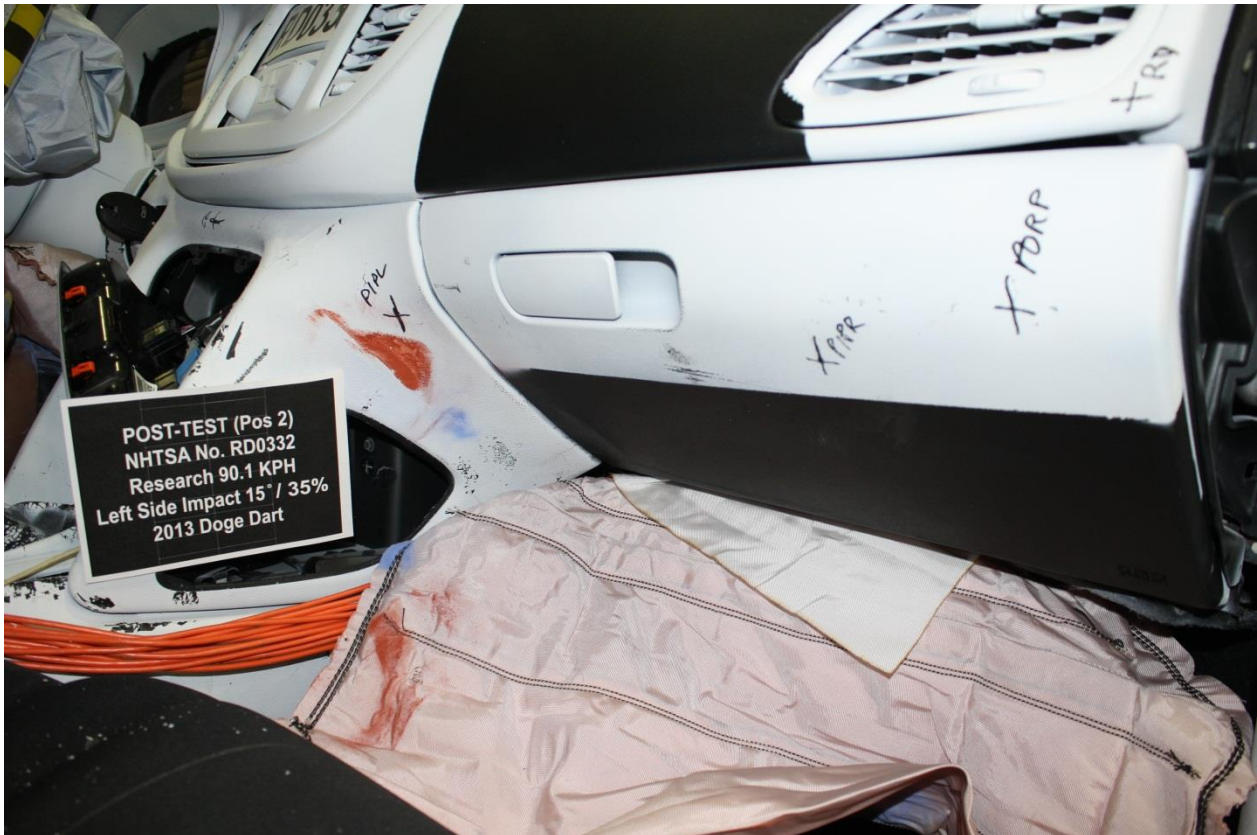
No. 084 Pre-Test Left Side View of Passenger Knee Bolsters



No. 085 Post-Test Left Side View of Passenger Knee Bolsters



No. 086 Pre-Test Right Side View of Passenger Knee Bolsters



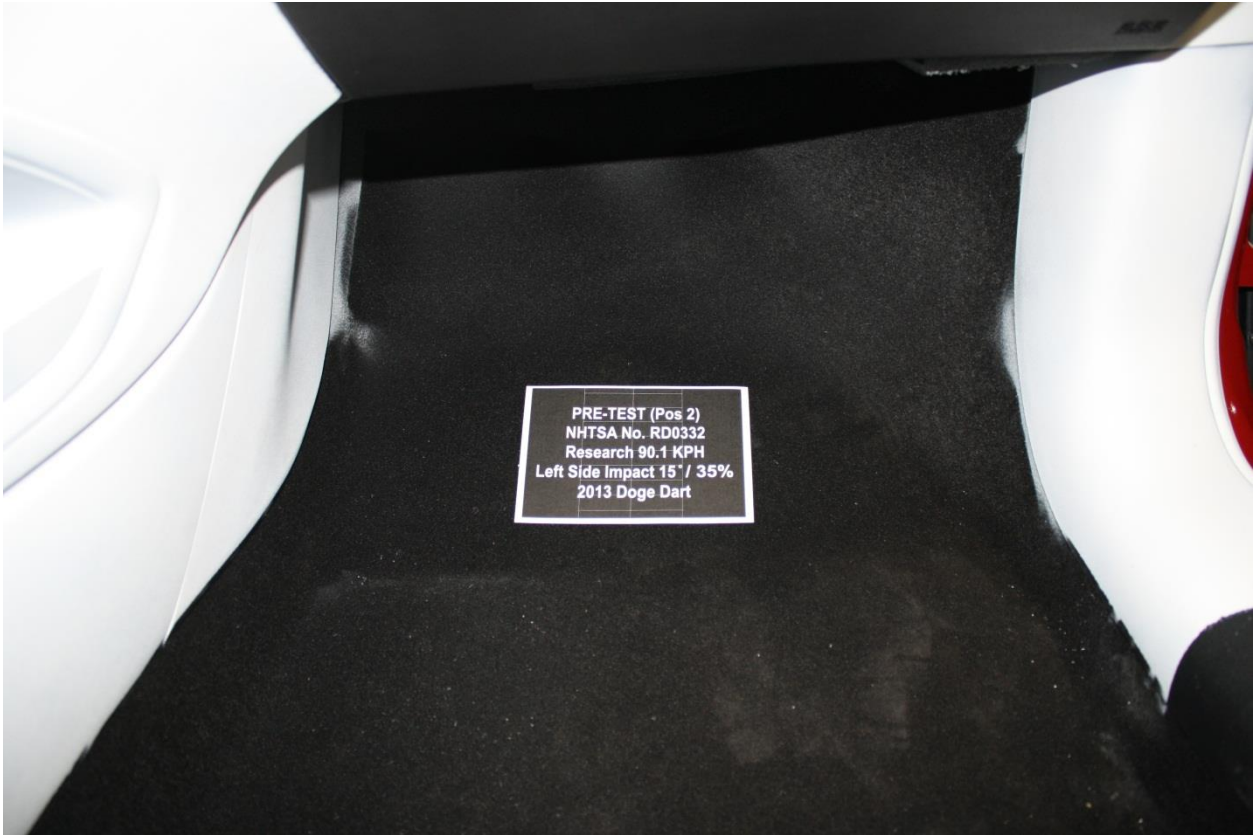
No. 087 Post-Test Right Side View of Passenger Knee Bolsters



No. 088 Pre-Test View of Passenger Floor pan at Left sill level, w/carpet



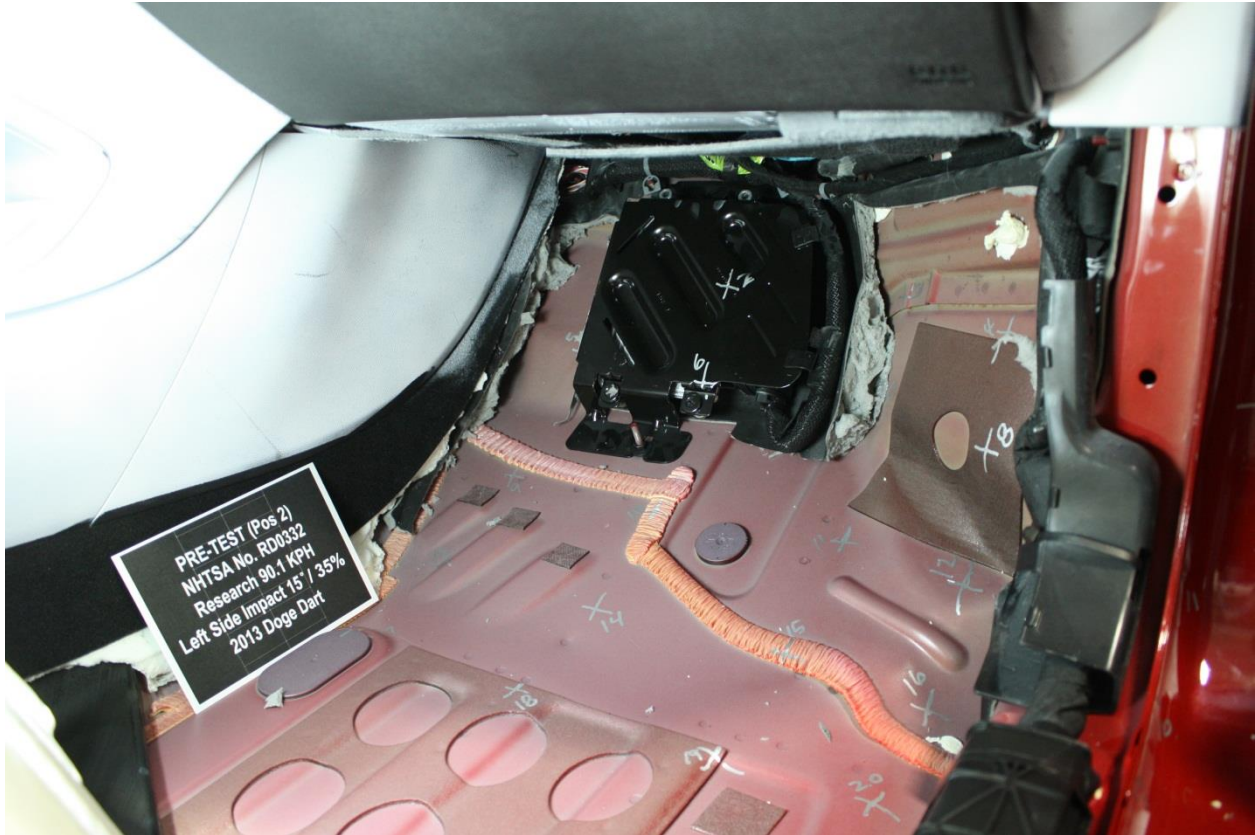
No. 089 Post-Test View of Passenger Floor pan at Left sill level, w/carpet



No. 090 Pre-Test View of Passenger Floor pan at Mid seat level, w/carpet



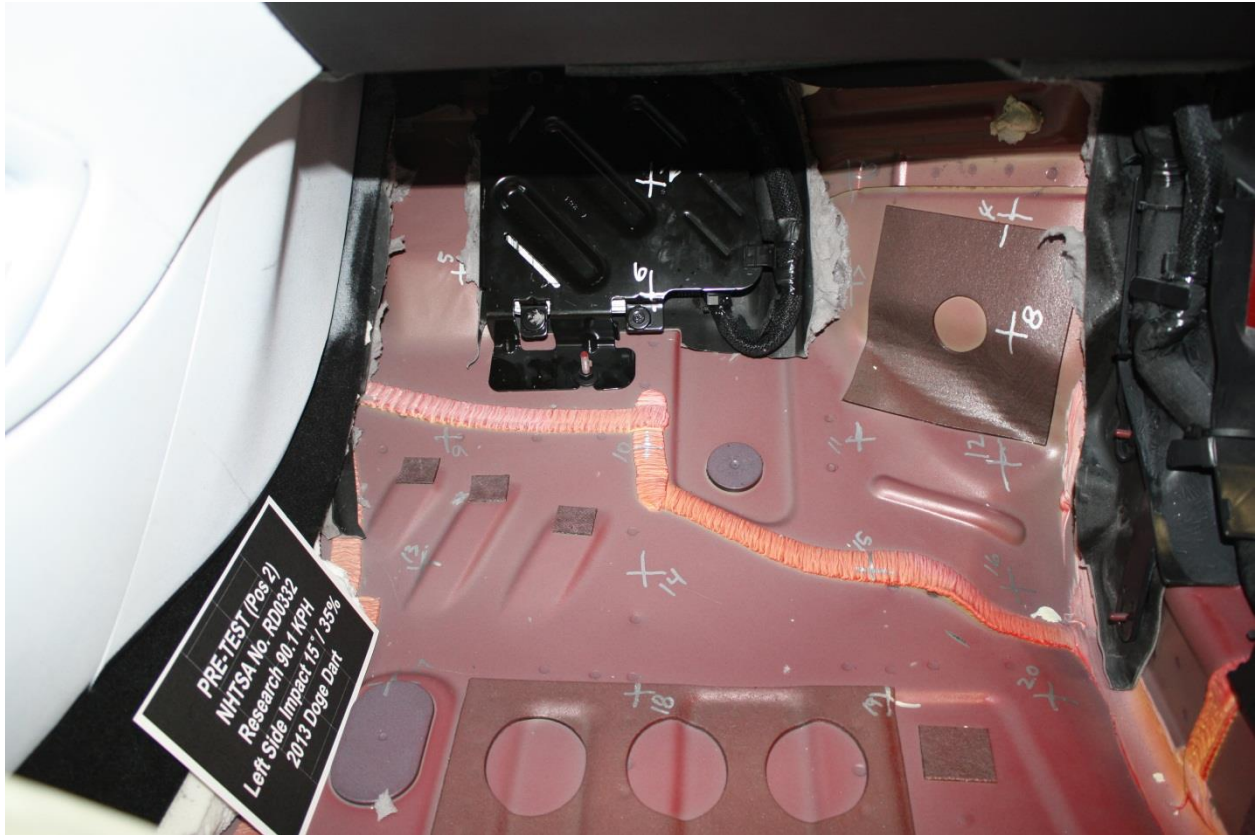
No. 091 Post-Test view of Passenger Floor pan at Mid seat level, w/carpet



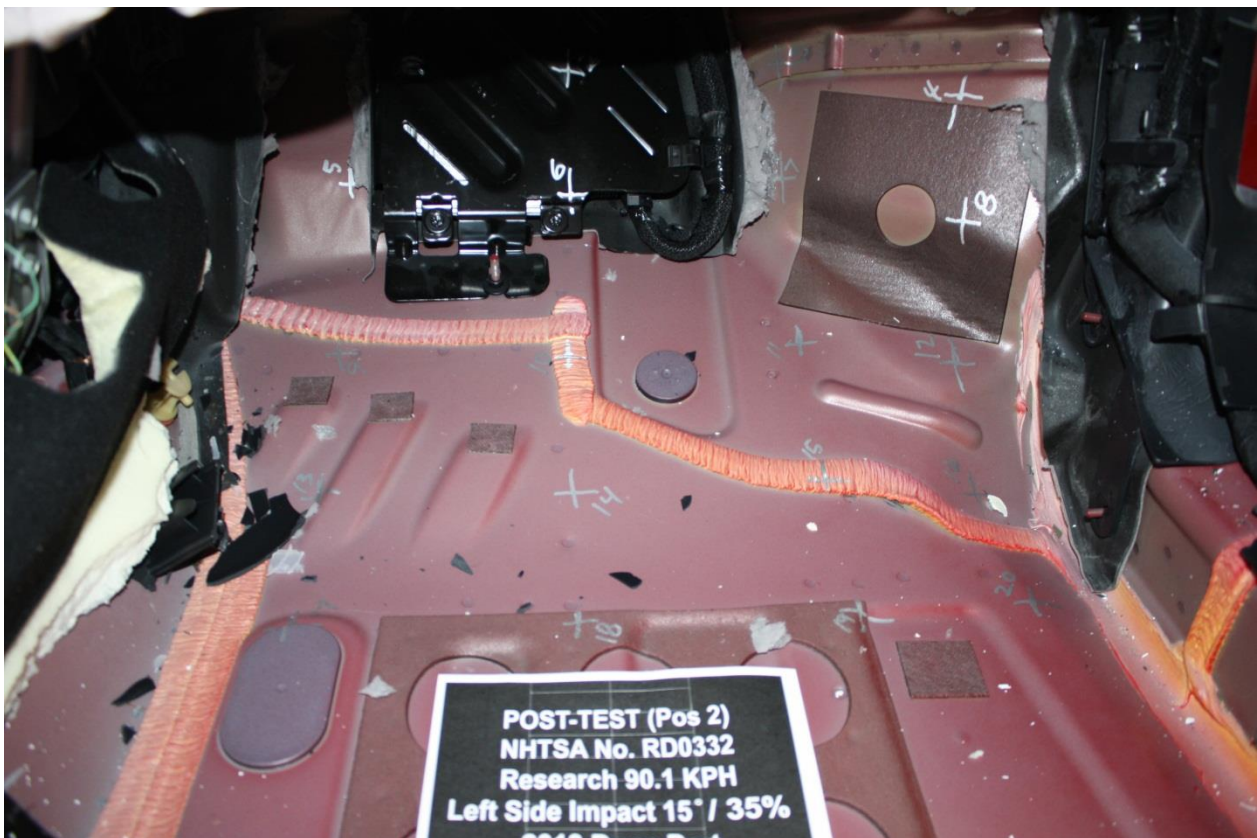
No. 092 Pre-Test View of Passenger Floor pan at Left sill level, w/o carpet



No. 093 Post-Test View of Passenger Floor pan at Left sill level, w/o carpet



No. 094 Pre-Test View of Passenger Floor pan at Mid seat level, without carpet



No. 095 Post-Test view of Passenger Floor pan at Mid seat level, wo carpet



**PRE-TEST (Pos 2)
NHTSA No. RD0332
Research 90.1 KPH
Left Side Impact 15° / 35%
2013 Dodge Dart**

No. 096 Pre-Test Passenger Front Close-up View, Windshield



**POST-TEST (Pos 2)
NHTSA No. RD0332
Research 90.1 KPH
Left Side Impact 15° / 35%
2013 Dodge Dart**

No. 097 Post-Test Passenger Front Close-up View, Windshield



No. 098 Pre-Test Left Side Passenger and Interior View



No. 099 Post-Test Left Side Passenger and Interior View



No. 100 Pre-Test Right Side Passenger Window View



No. 101 Post-Test Right Side Passenger Window View



No. 102 Pre-Test Right Side Passenger and Interior View



No. 103 Post-Test Right Side Passenger and Interior View



No. 104 Pre-Test View of Passenger Door Clearance



No. 105 Post-Test View of Passenger Door Clearance



PRE-TEST (Pos 2)
NHTSA No. RD0332
Research 90.1 KPH
Left Side Impact 15° / 35%
2013 Dodge Dart

No. 106 Pre-Test Passenger Seat Fore-Aft Markings



POST-TEST (Pos 2)
NHTSA No. RD0332
Research 90.1 KPH
Left Side Impact 15° / 35%
2013 Dodge Dart

No. 107 Post-Test Passenger Seat Fore-Aft Markings



No. 108 Pre-Test Passenger Seat Back Markings



No. 109 Pre-Test Overhead View of Passenger Thighs on seat



No. 110 Pre-Test Passenger Adjustable D-ring



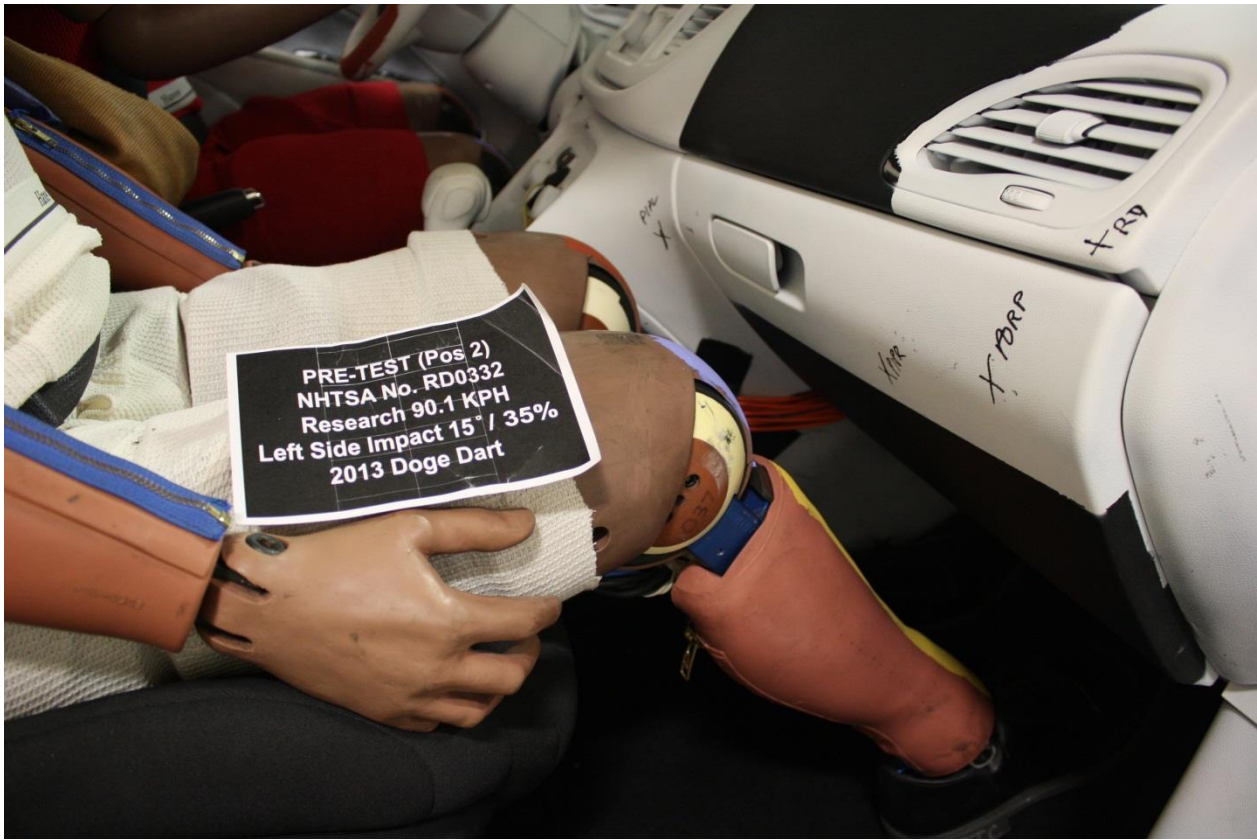
No. 111 Post-Test Passenger Adjustable D-ring



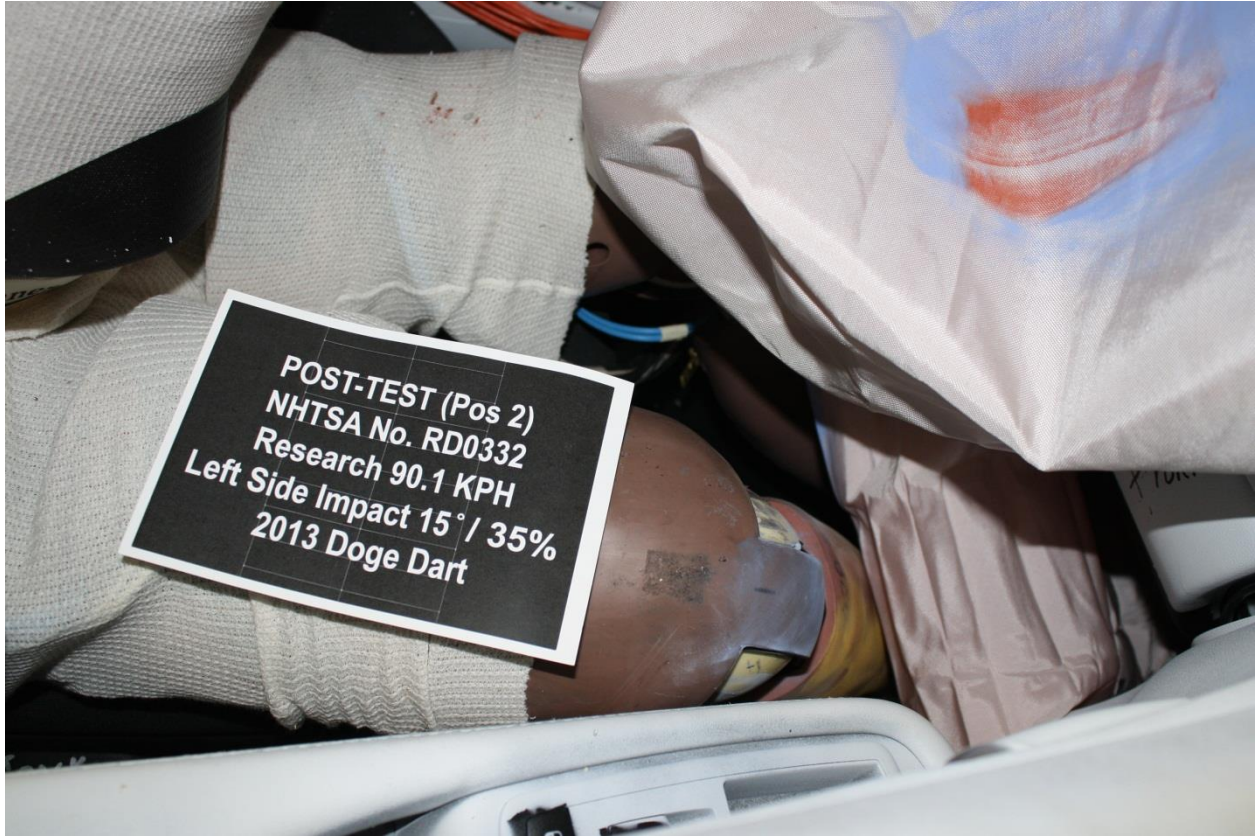
No. 112 Pre-Test View of Passenger Feet



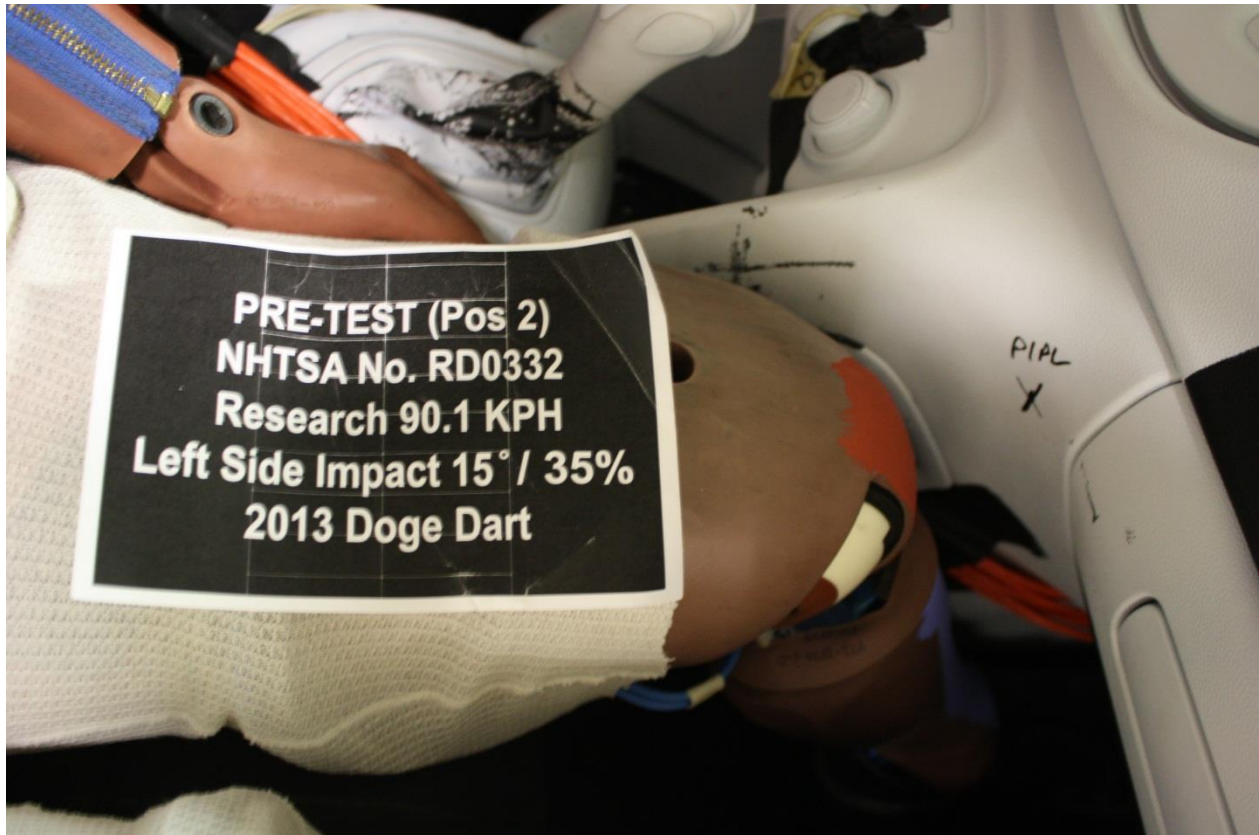
No. 113 Post-Test View of Passenger Feet



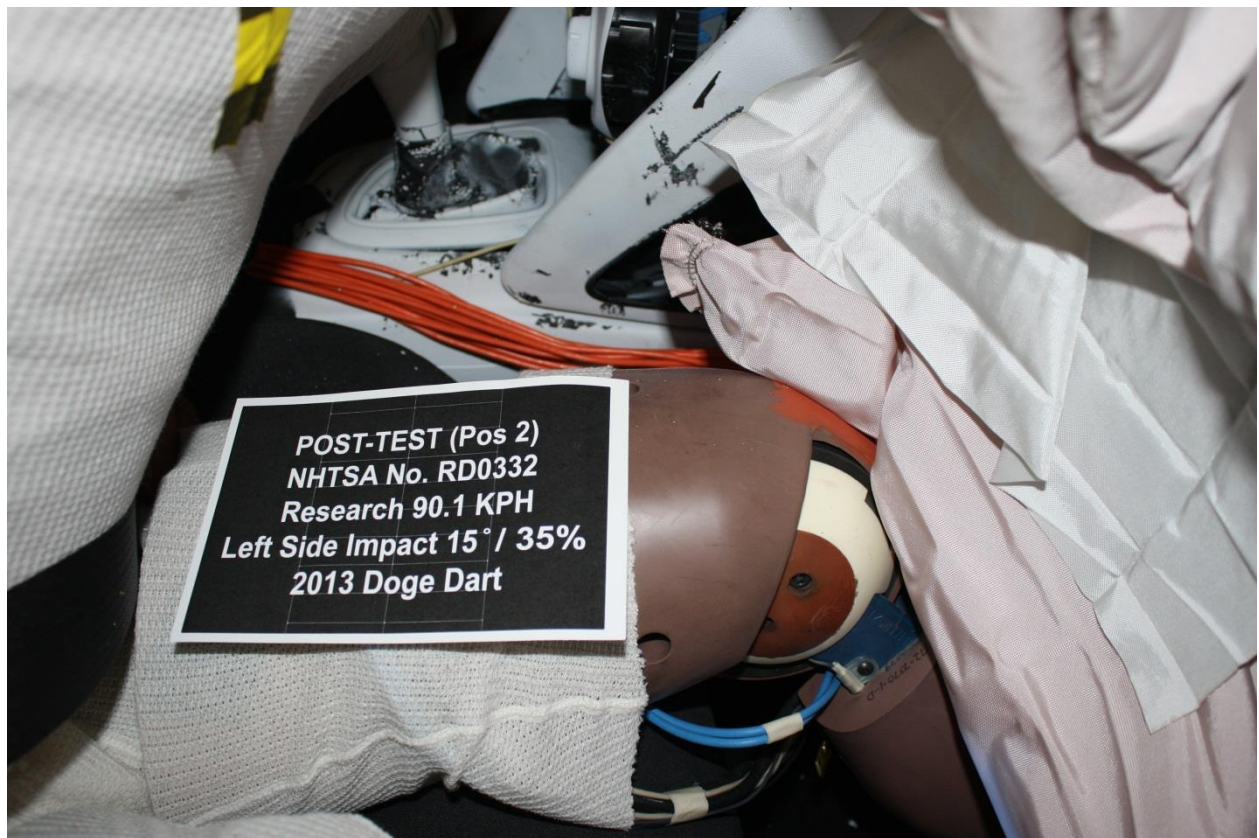
No. 114 Pre-Test View of Passenger Right Knee and Bolster



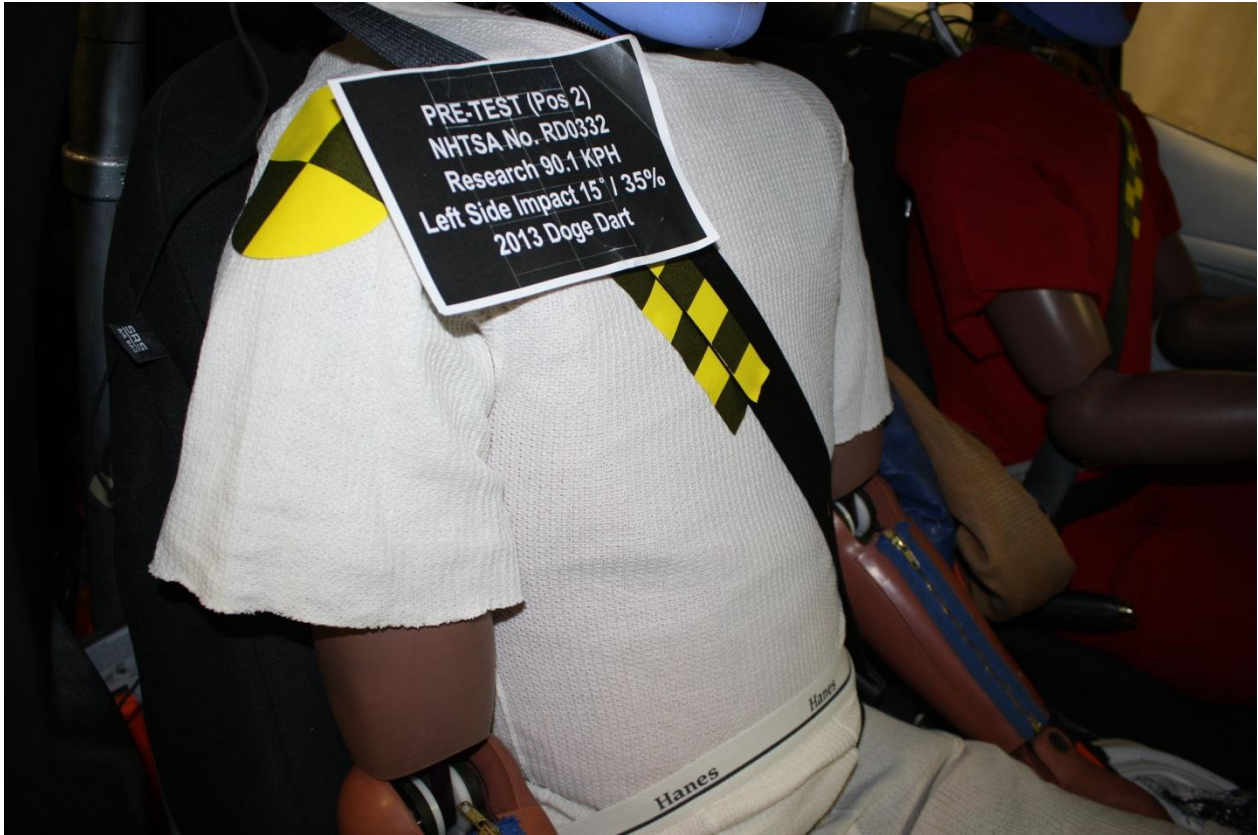
No. 115 Post-Test View of Passenger Right Knee and Bolster



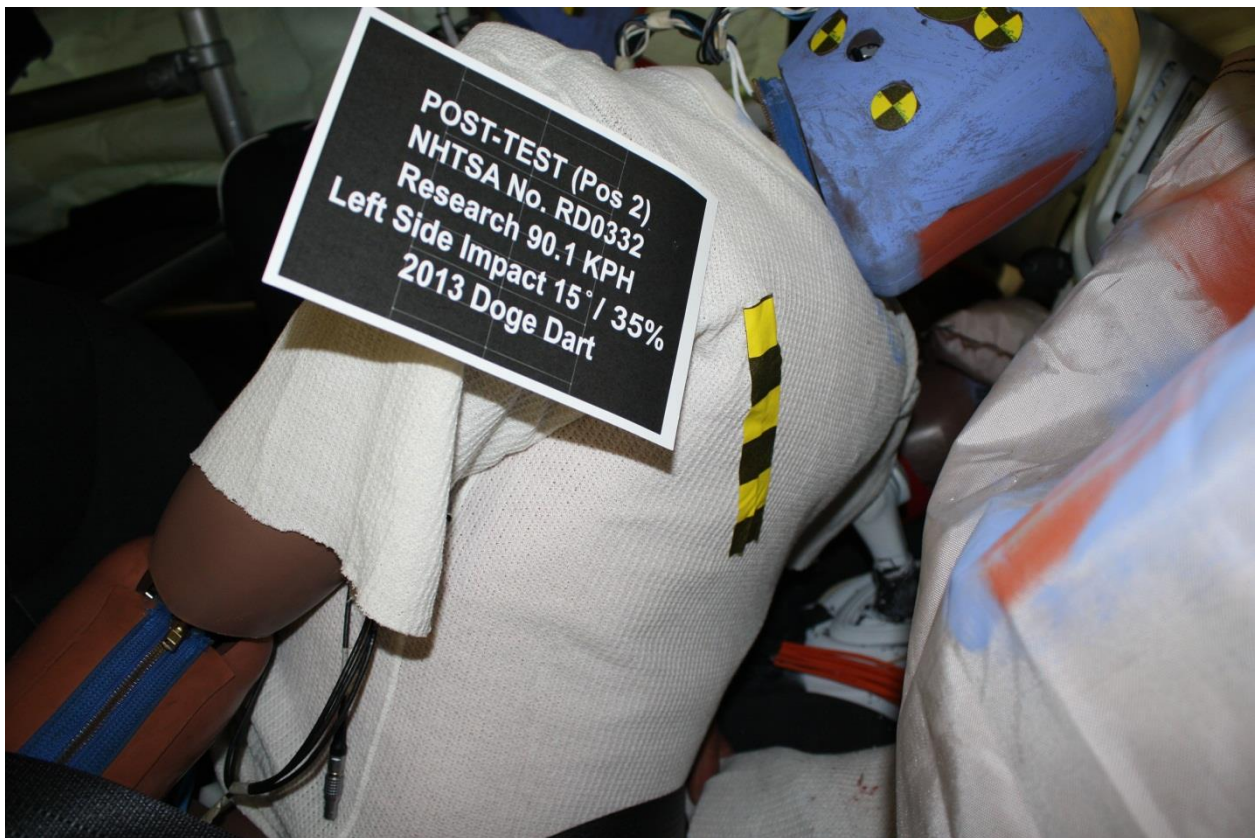
No. 116 Pre-Test View of Passenger Left Knee and Bolster



No. 117 Post-Test View of Passenger Left Knee and Bolster



No. 118 Pre-Test View of Passenger Abdomen



No. 119 Post-Test View of Passenger Abdomen



No. 120 Post-Test View of Passenger Head contact with Airbag – Front

Photo Not Applicable

No. 120a Post-Test View of Passenger Head contact with Airbag - Curtain



No. 121 Post-Test View of Passenger Head contact with Interior

Photo Not Applicable

No. 121a Post-Test View of Passenger Head contact with Interior

Photo Not Applicable

No. 121b Post-Test View of Passenger Head contact with Interior



No. 122 Post-Test Passenger Contact With Glovebox



No. 123 Pre-Test Ballast Locations



No. 124 Post-Test Speed Trap Readout



No. 125 Pre-Test View of Fuel Filler Cap



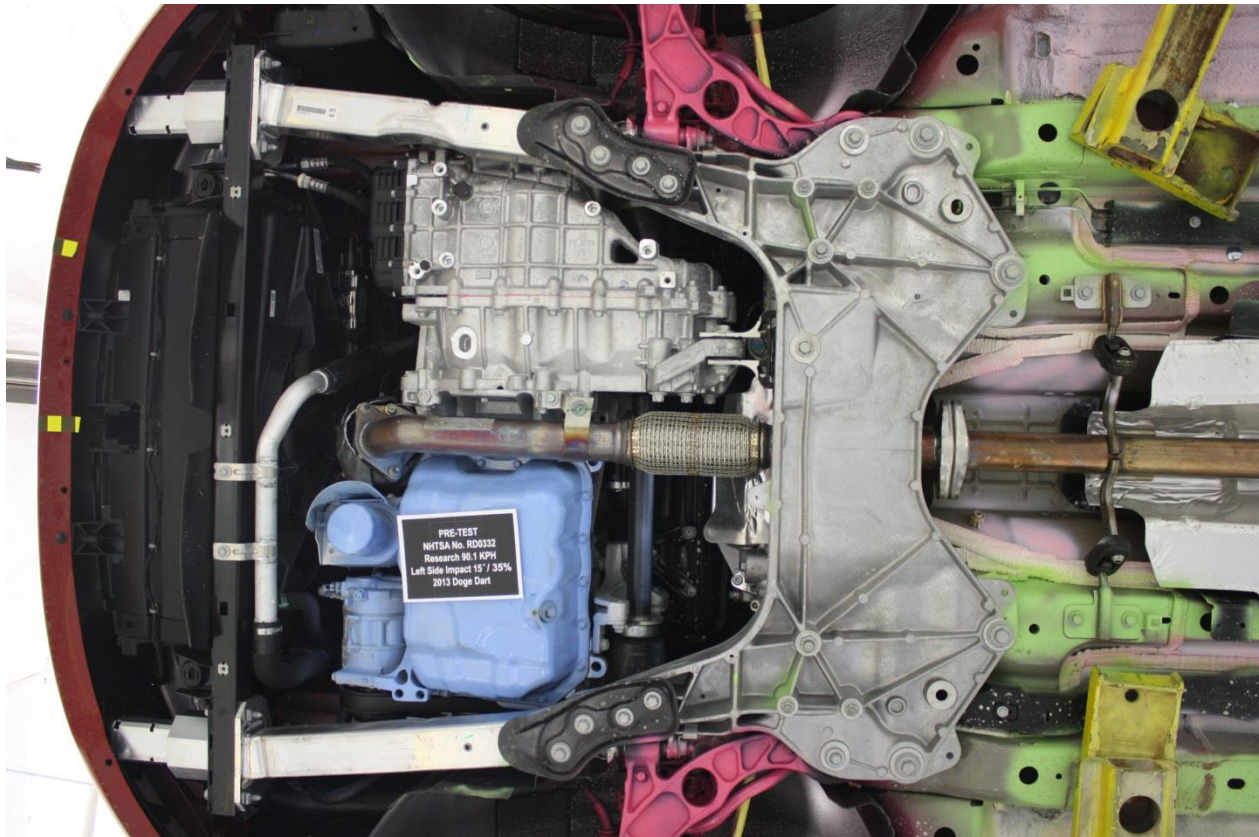
No. 126 Post-Test View of Fuel Filler Cap



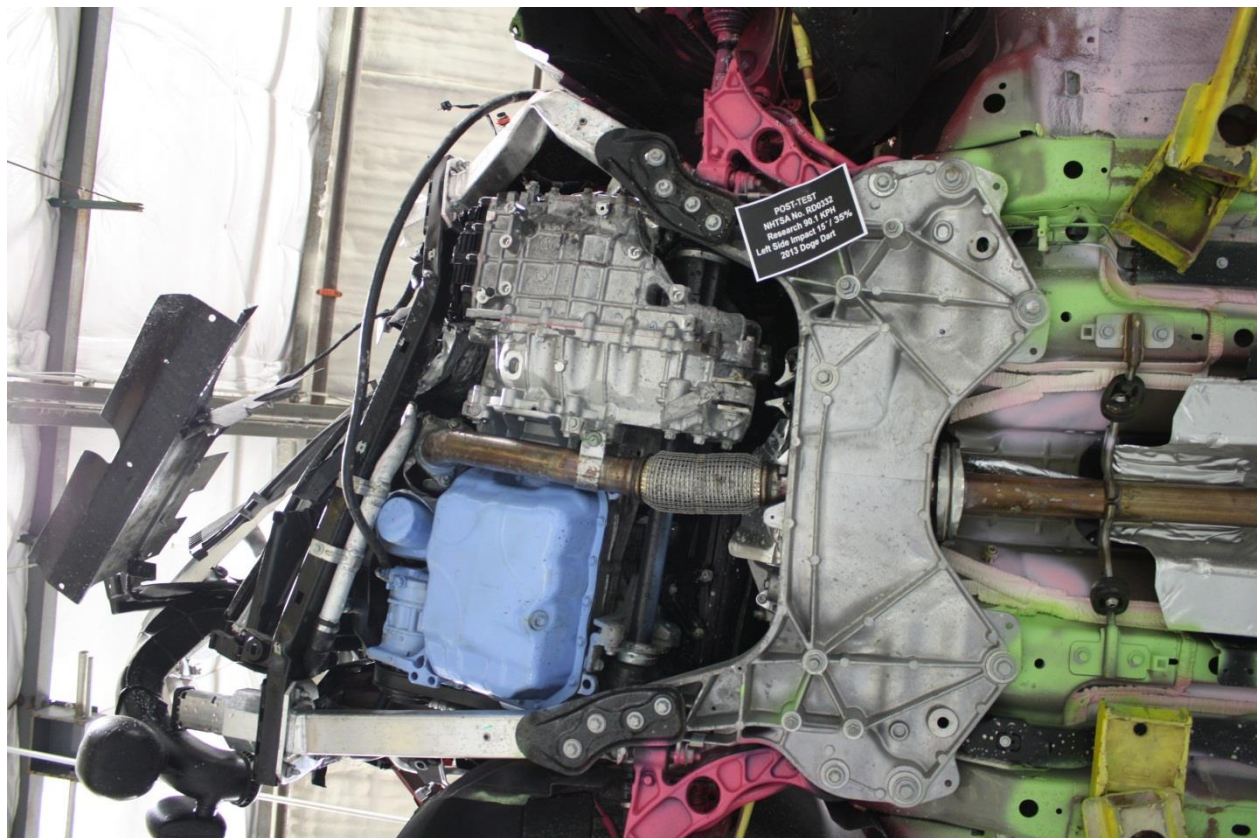
No. 127 Pre-Test Engine Compartment View



No. 128 Post-Test Engine Compartment View



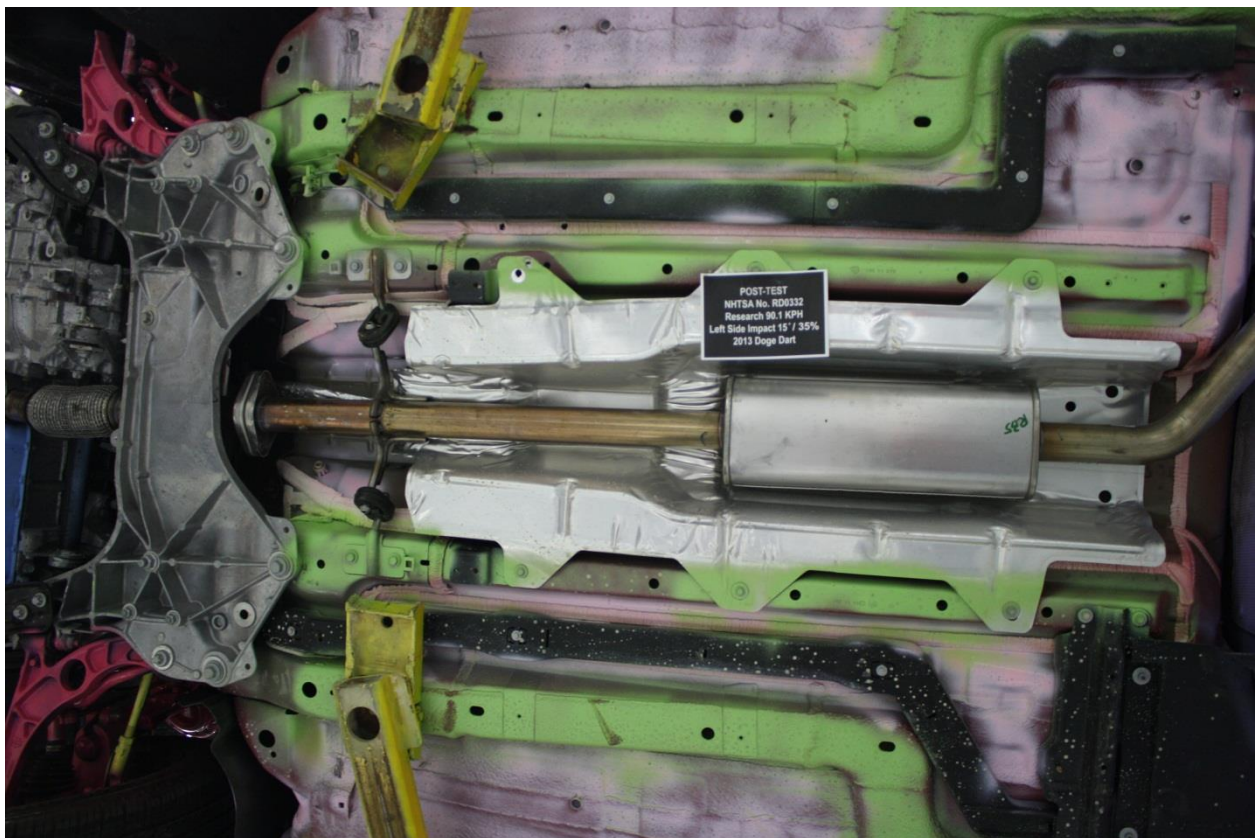
No. 129 Pre-Test View of Front Underbody (perpendicular to vehicle)



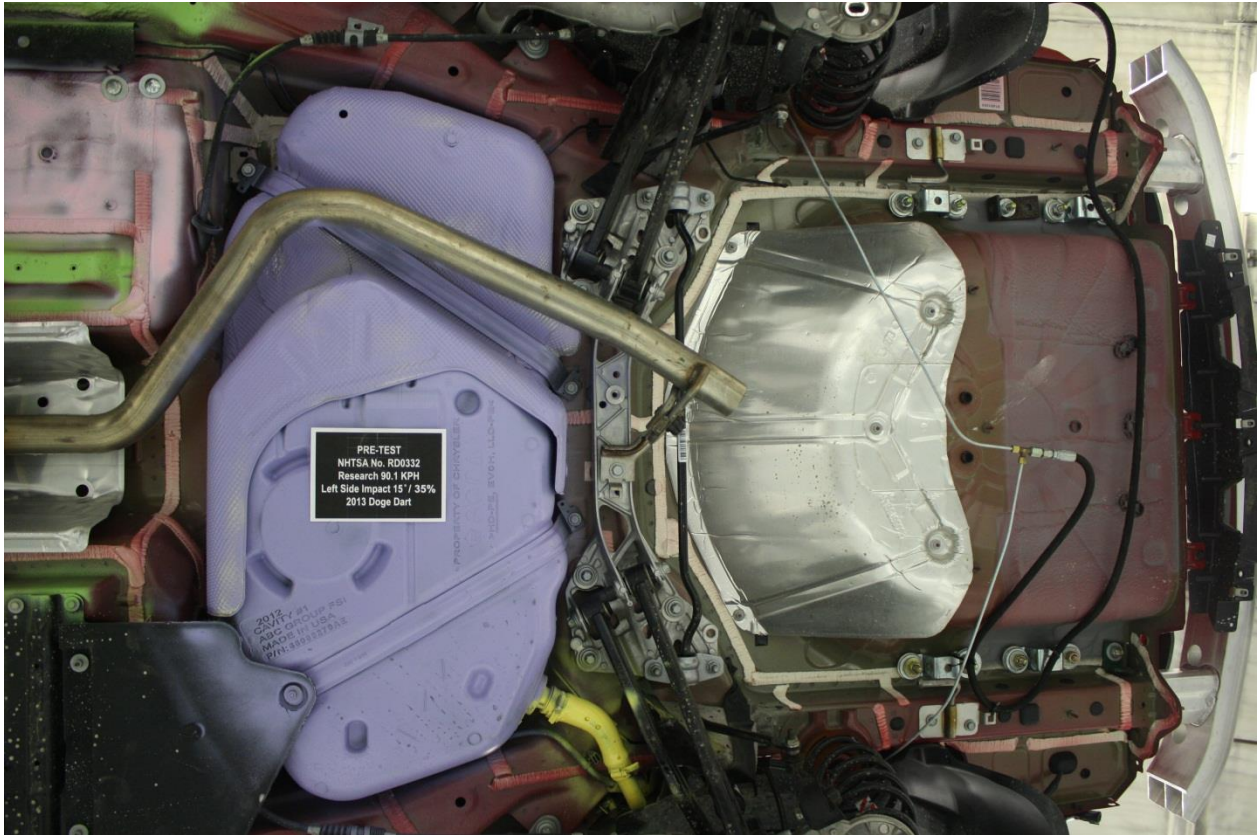
No. 130 Post-Test View of Front Underbody (perpendicular to vehicle)



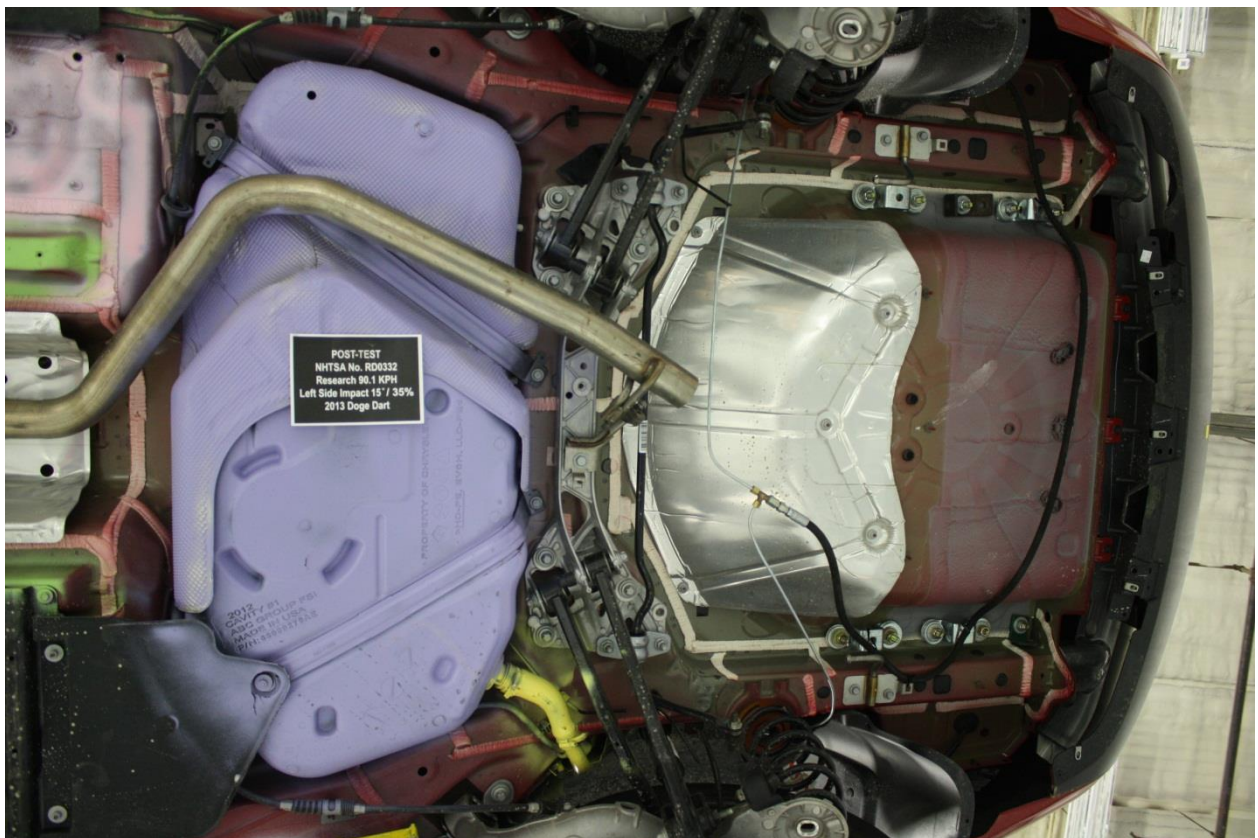
No. 131 Pre-Test View of Mid Underbody (perpendicular to vehicle)



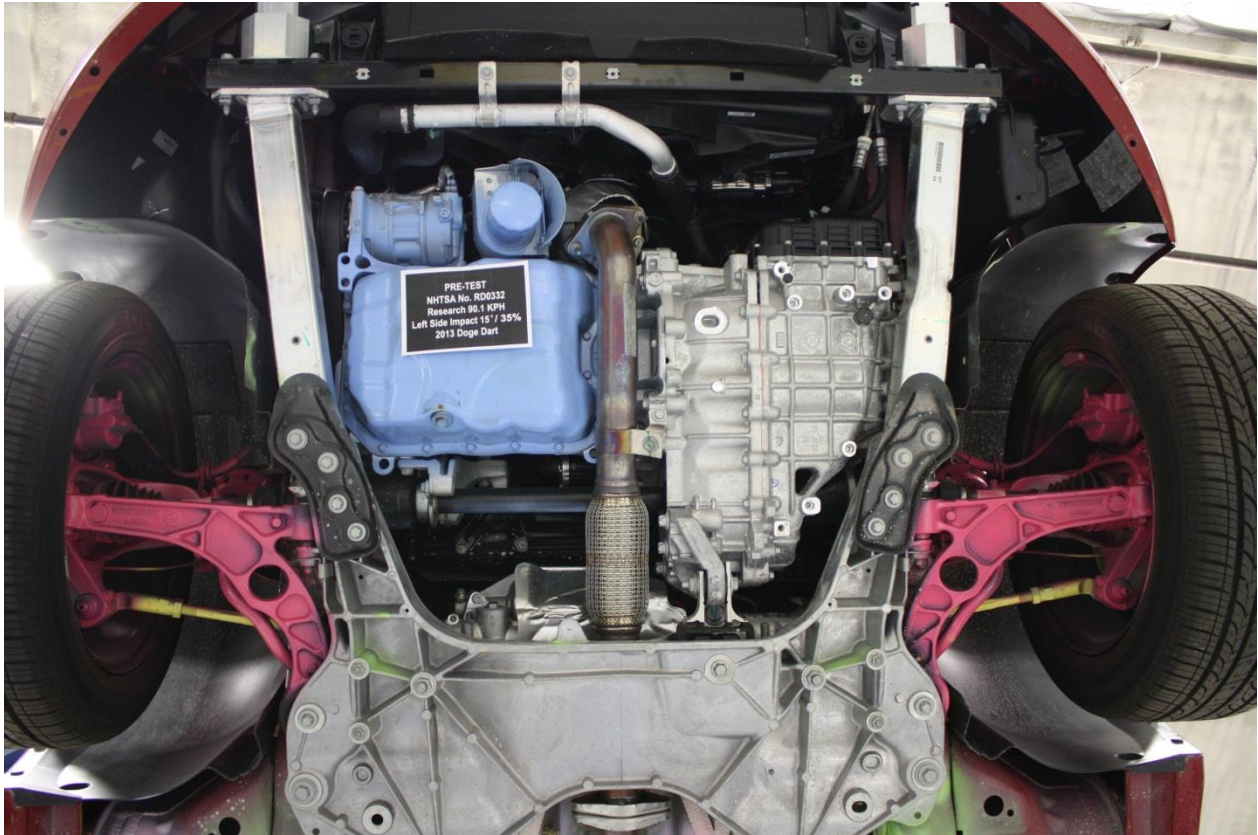
No. 132 Post-Test View of Mid Underbody (perpendicular to vehicle)



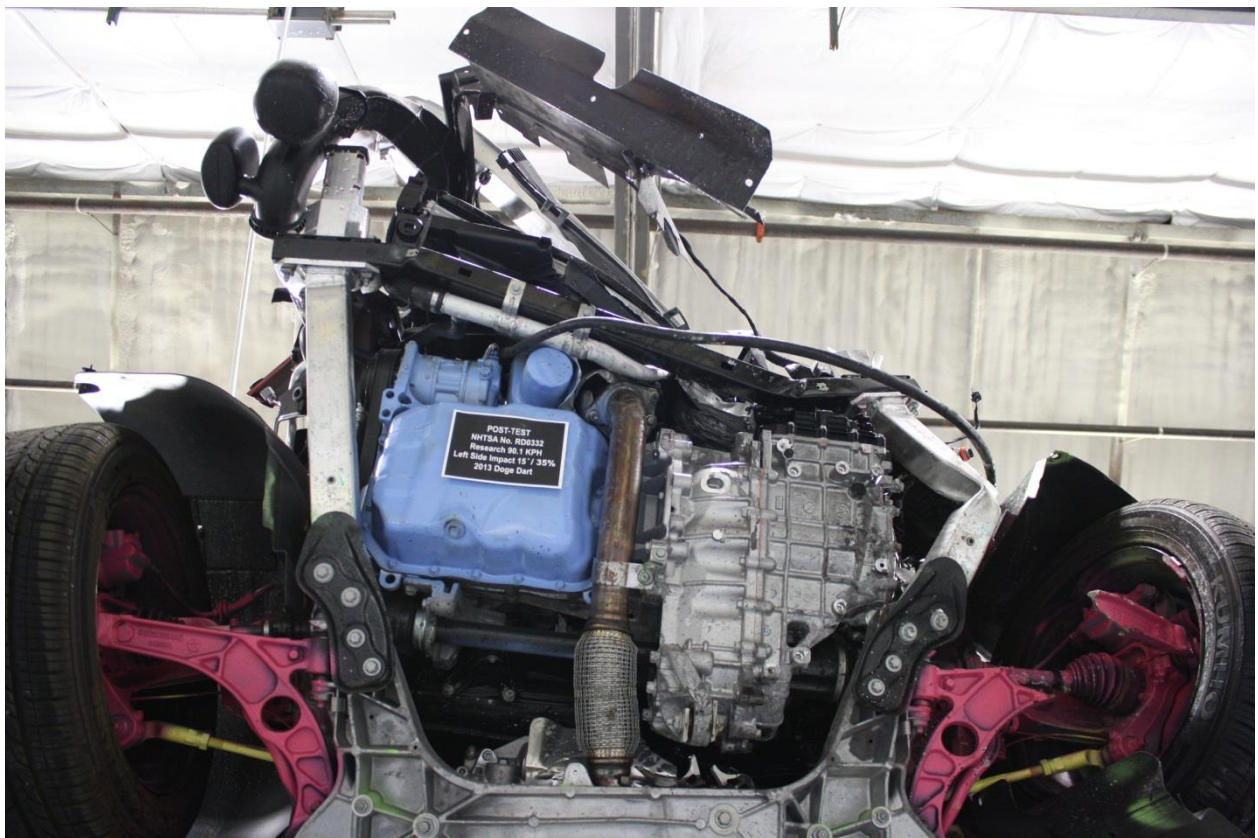
No. 133 Pre-Test View of Rear Underbody (perpendicular to vehicle)



No. 134 Post-Test View of Rear Underbody (perpendicular to vehicle)



No. 135 Pre-Test View of Steering rack and or sway bar



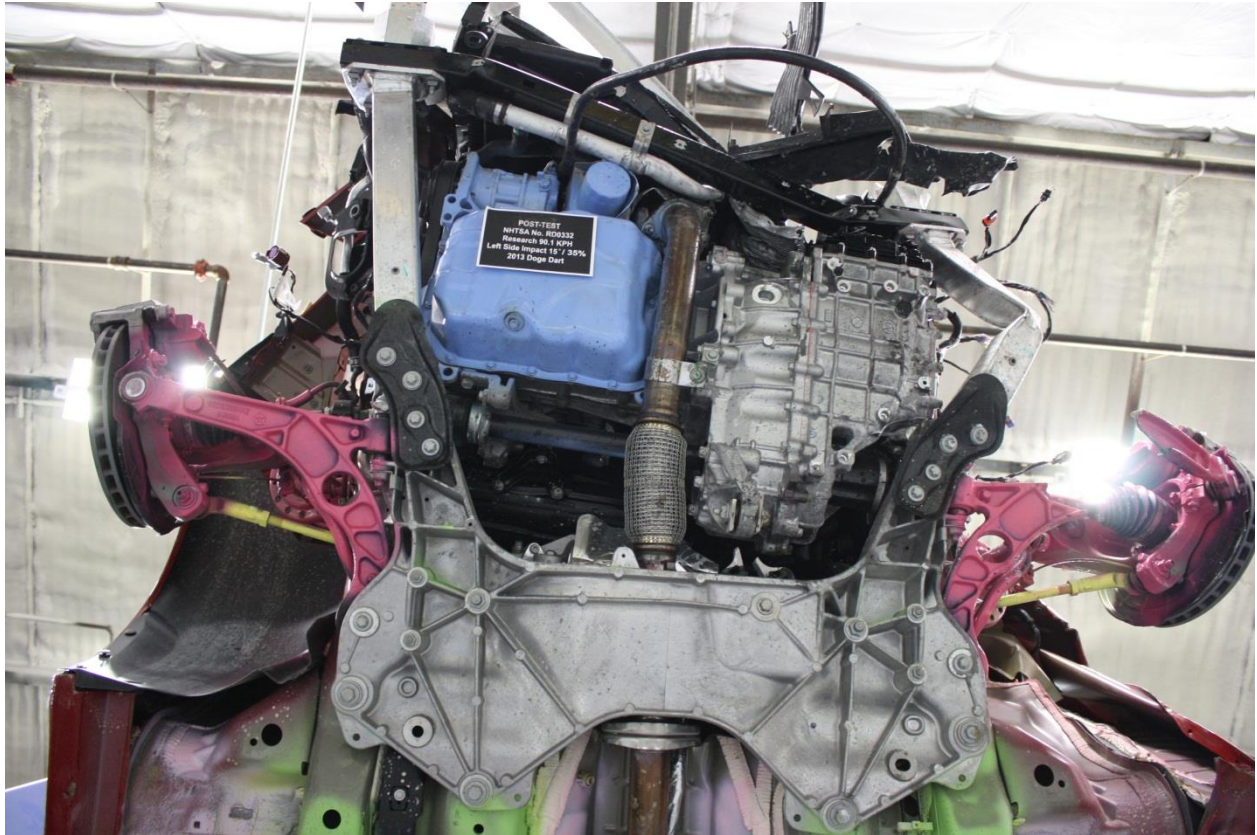
No. 136 Post-Test View of Steering rack and or sway bar



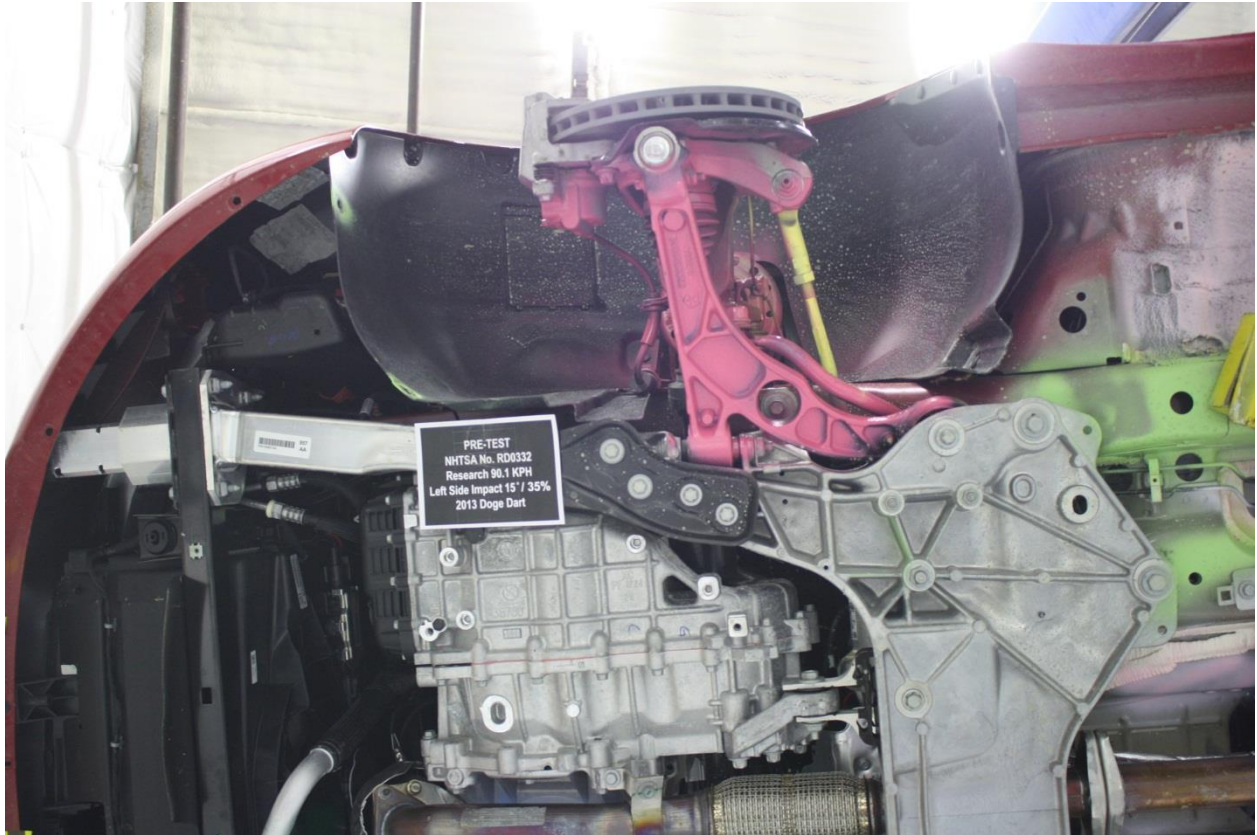
No. 137 Pre-Test Bumper to Rail Attachments and Crush Initiators



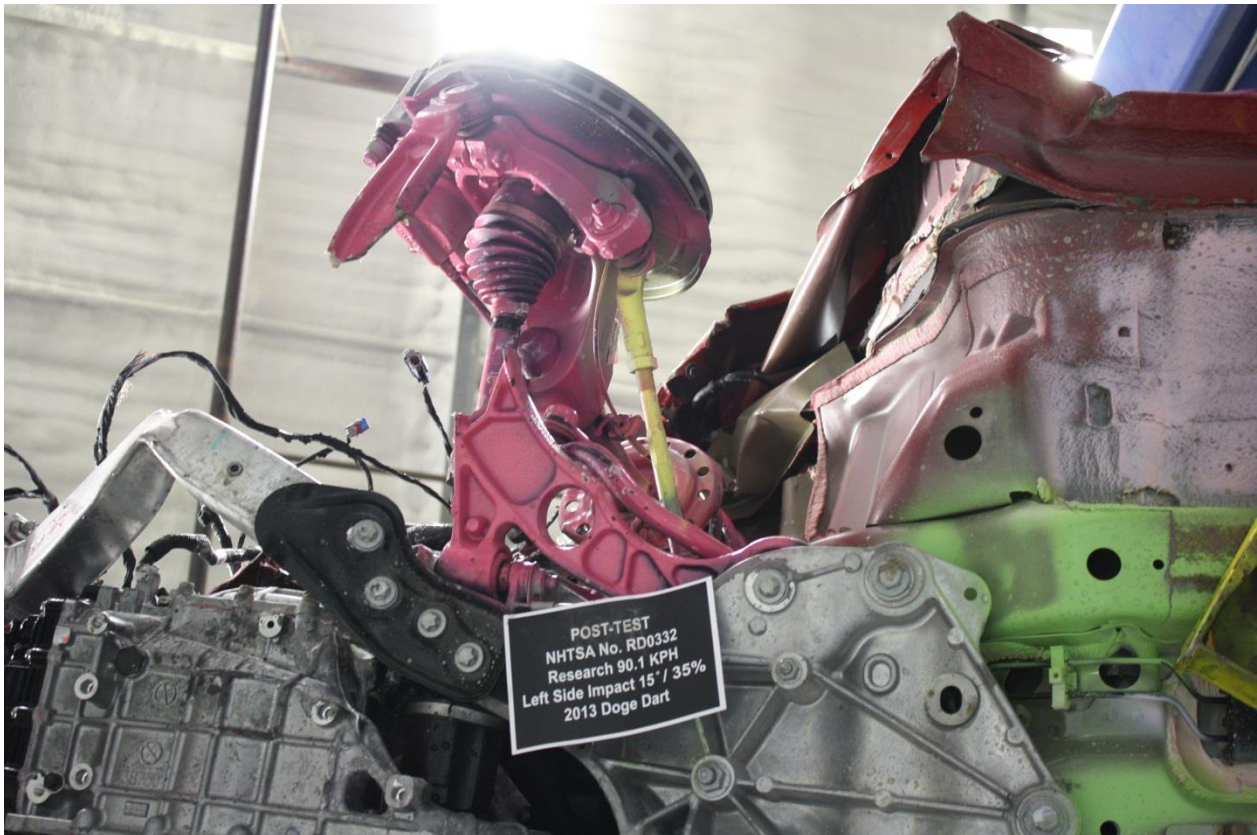
No. 138 Post-Test Bumper to Rail Attachments and Crush Initiators



No. 139 Post-Test View of Front Sub-Frame Deformation



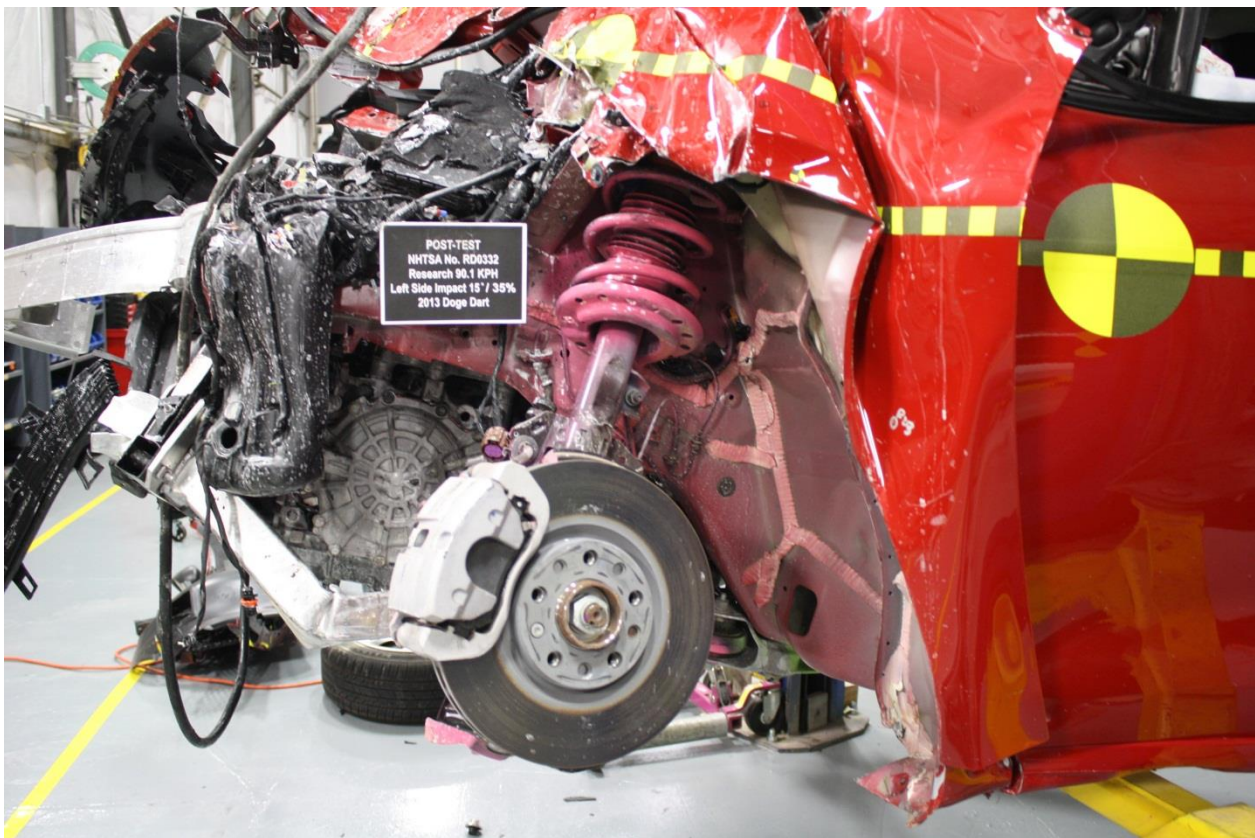
No. 140 Pre-Test Frame Rail with tire removed



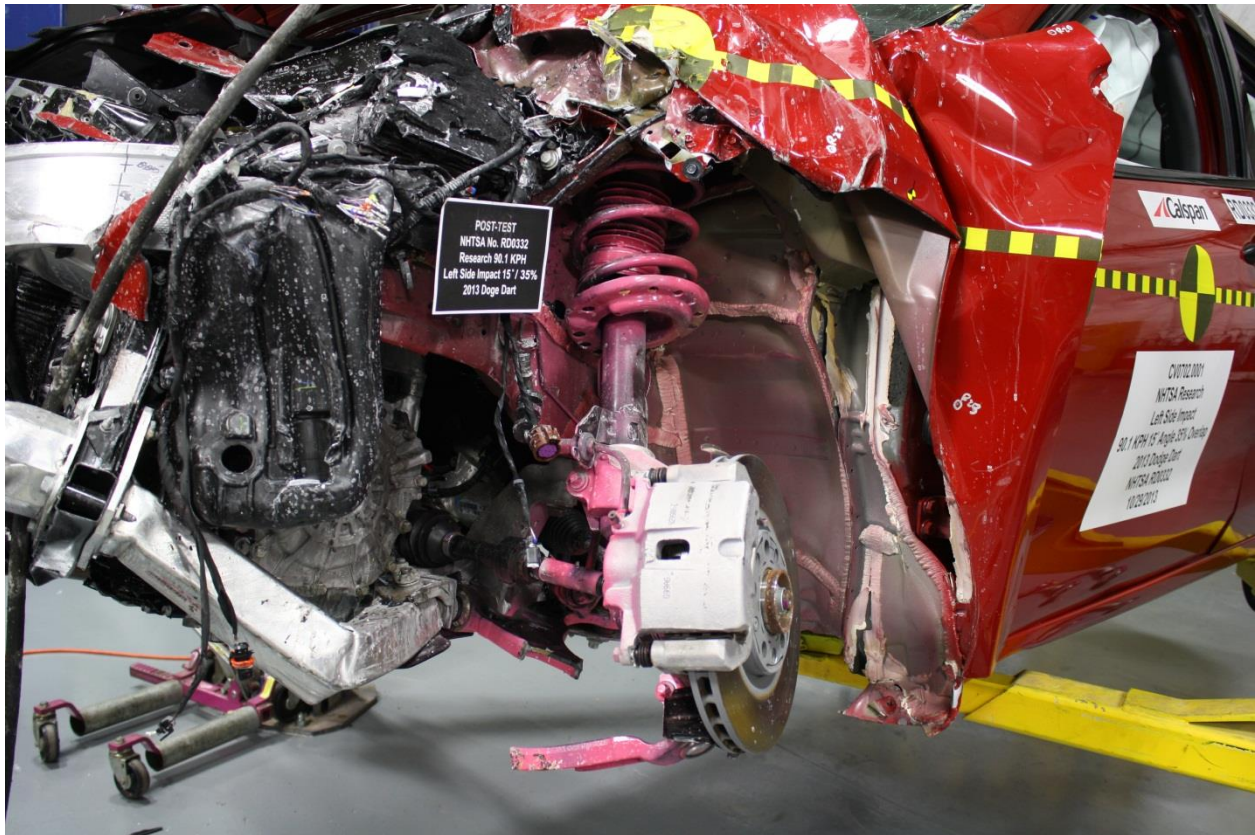
No. 141 Post-Test Frame Rail with tire removed



No. 142 Pre-Test View of Front Driver Wheel Well w/ Tire Removed



No. 143 Post-Test $\frac{3}{4}$ View of Front Driver Wheel Well w/ Tire Removed



No. 144 Post-Test Side View of Front Driver Wheel Well w/ Tire Removed



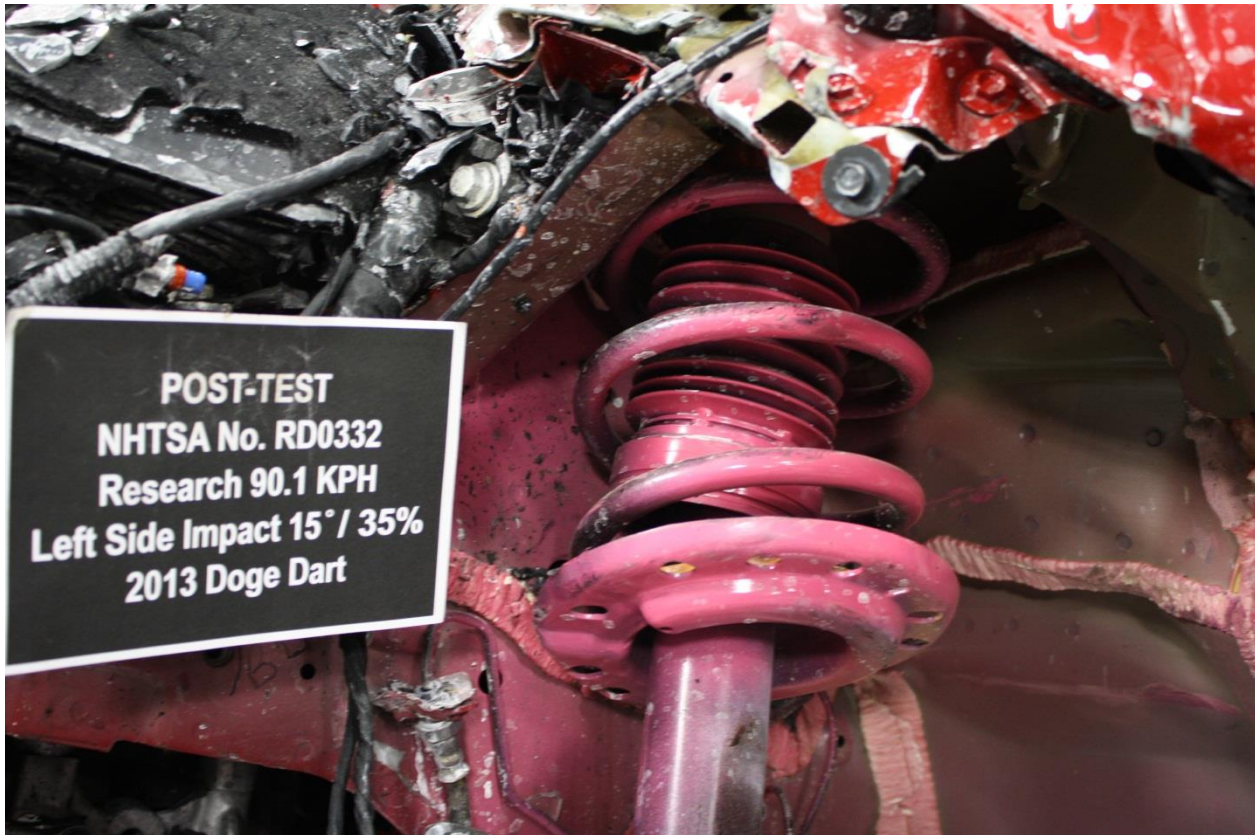
No. 145 Post-Test Right Side 3/4 Rear View of the Front Driver Wheel Well w/ Tire Removed



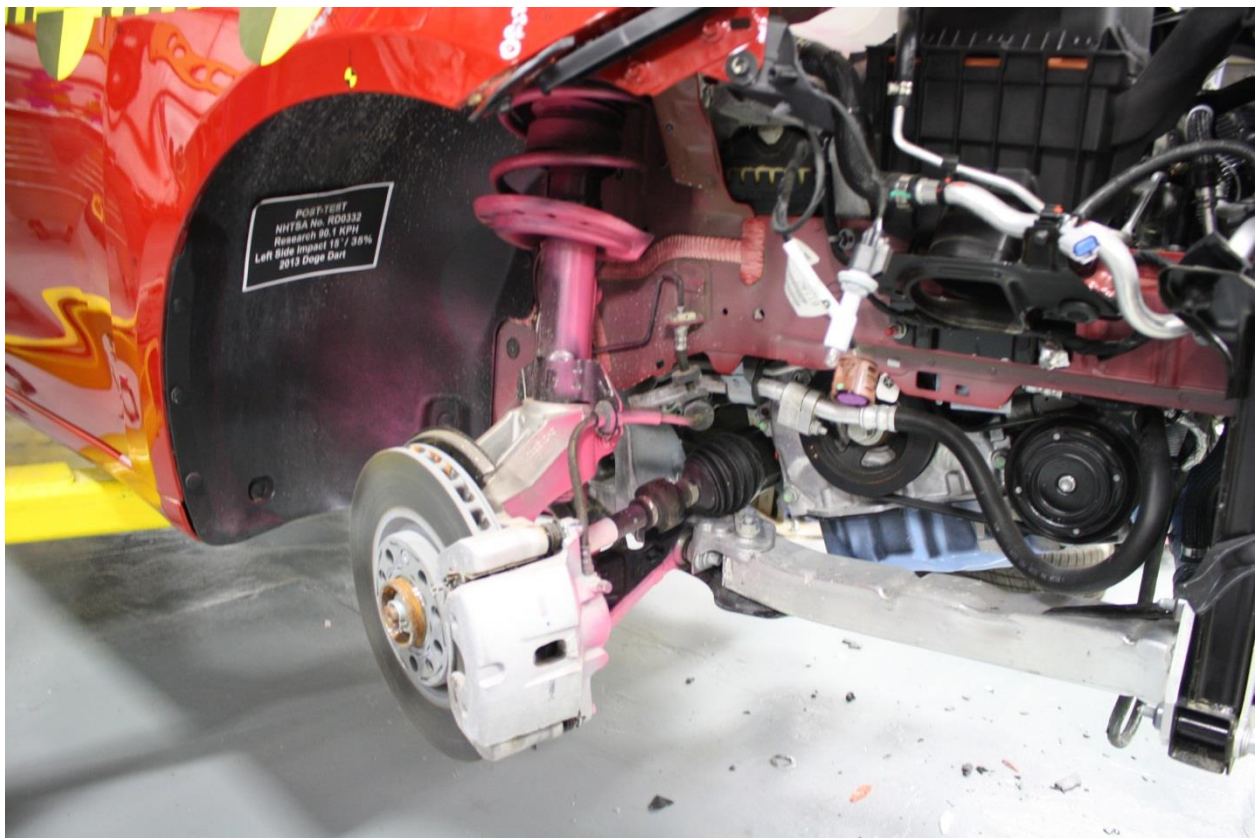
No. 146 Post-Test Looking Down at the Front Driver Shotgun



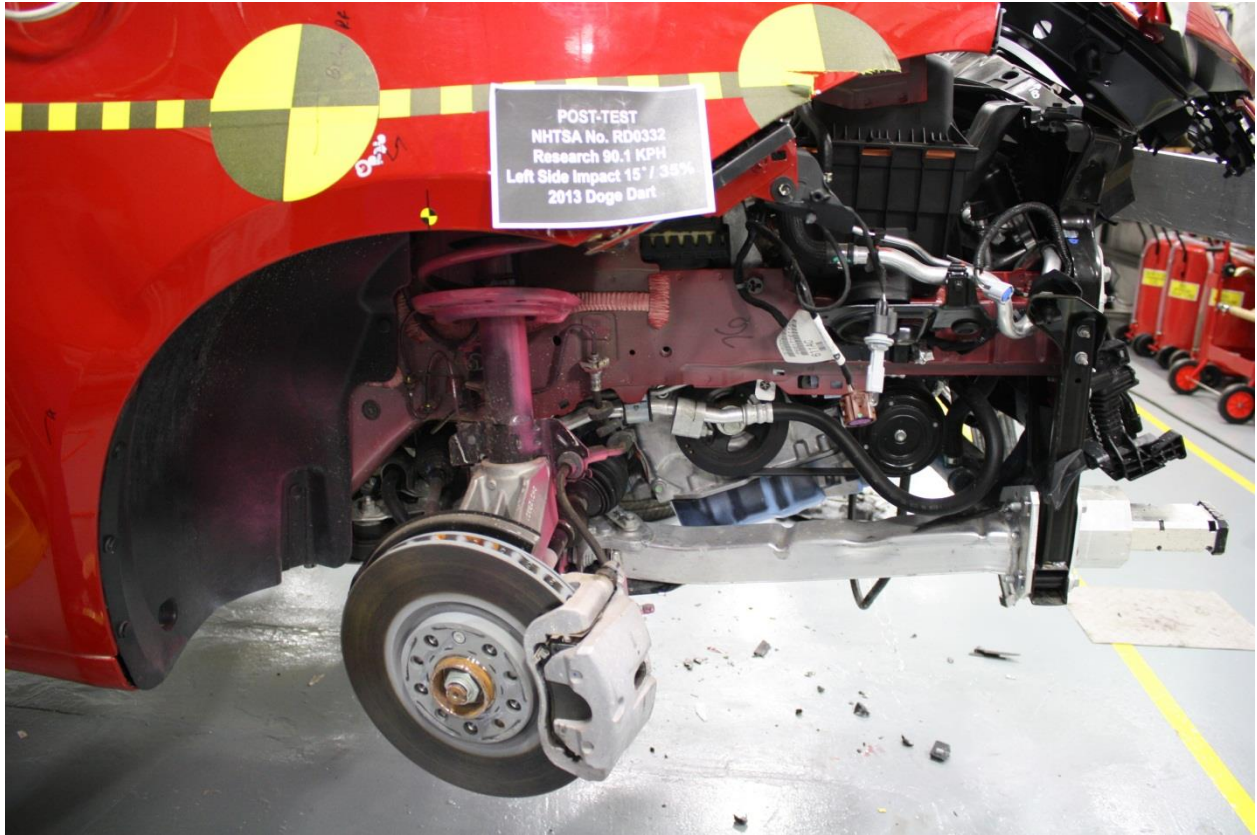
No. 147 Post-Test Right Side 3/4 View of Front Driver Shotgun



No. 148 Post-Test Front Driver Close up View of Suspension w/ Tire Removed



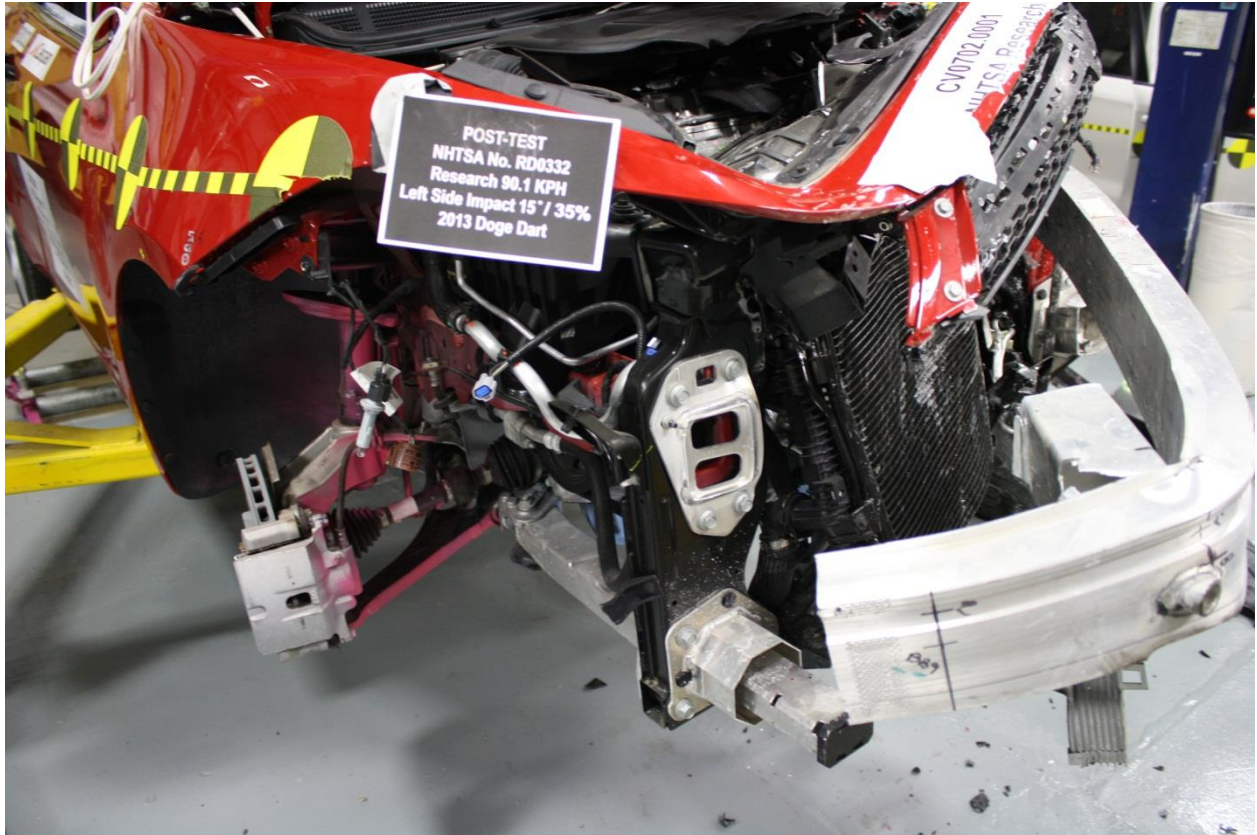
No. 149 Post-Test $\frac{3}{4}$ View of Front Passenger Wheel Well w/ Tire Removed



No. 150 Post-Test Side View of Front Passenger Wheel Well w/ Tire Removed



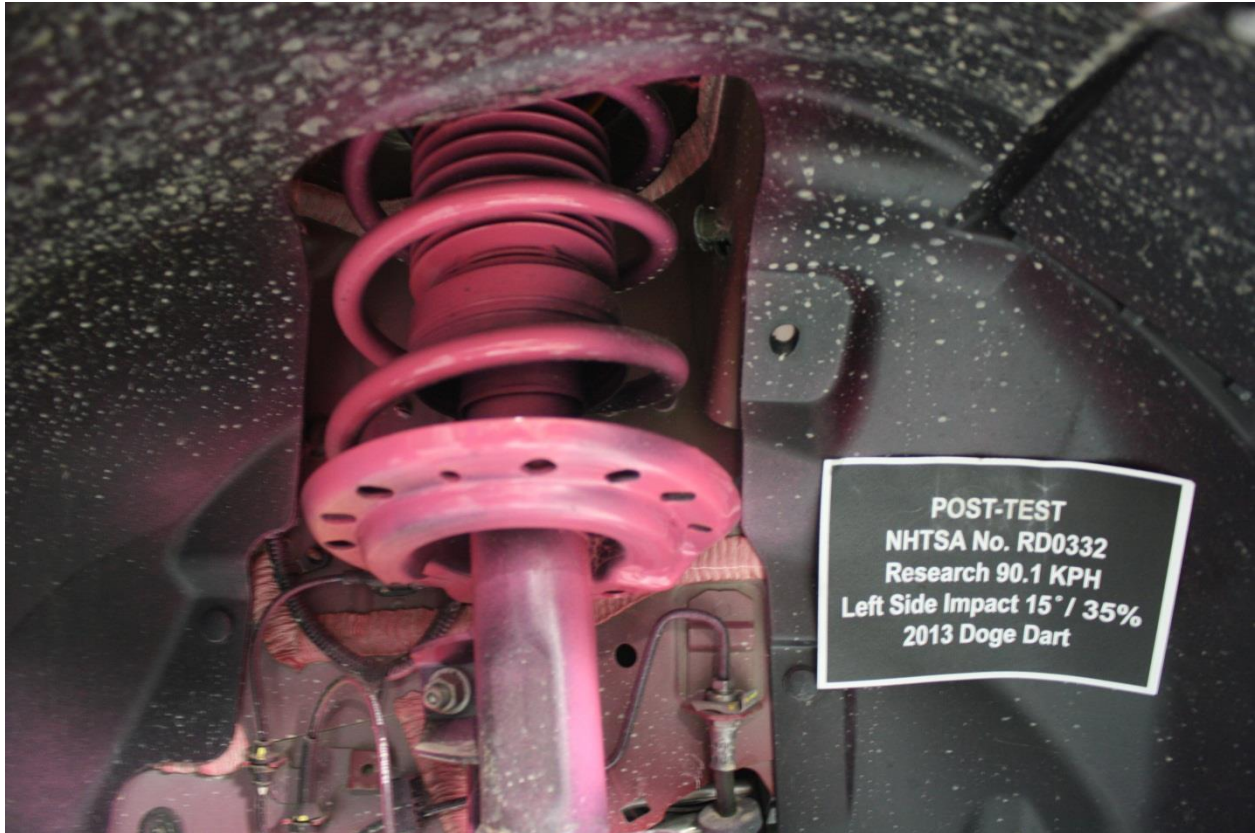
No. 151 Post-Test Right Side 3/4 Rear View of the Front Passenger Wheel Well w/ Tire Removed



No. 152 Post-Test Looking Down at the Front Passenger Shotgun



No. 153 Post-Test Right Side 3/4 View of Front Passenger Shotgun



POST-TEST
NHTSA No. RD0332
Research 90.1 KPH
Left Side Impact 15' / 35%
2013 Dodge Dart

No. 154 Post-Test Front Passenger Close up View of Suspension w/ Tire Removed



POST-TEST (Pos 1)
NHTSA No. RD0332
Research 90.1 KPH
Left Side Impact 15' / 35%
2013 Dodge Dart

No. 155 Post-Test View of Door Sill with Door Open- Struck Side



No. 156 Post-Test View of Deformation of A pillar-Struck Side



No. 157 Post-Test View of Deformation of B pillar-Struck Side



No. 158 Post-Test View of Deformation of C pillar-Struck Side



No. 159 Post-Test View of Wheel and/or Tire Deformation-Struck Side



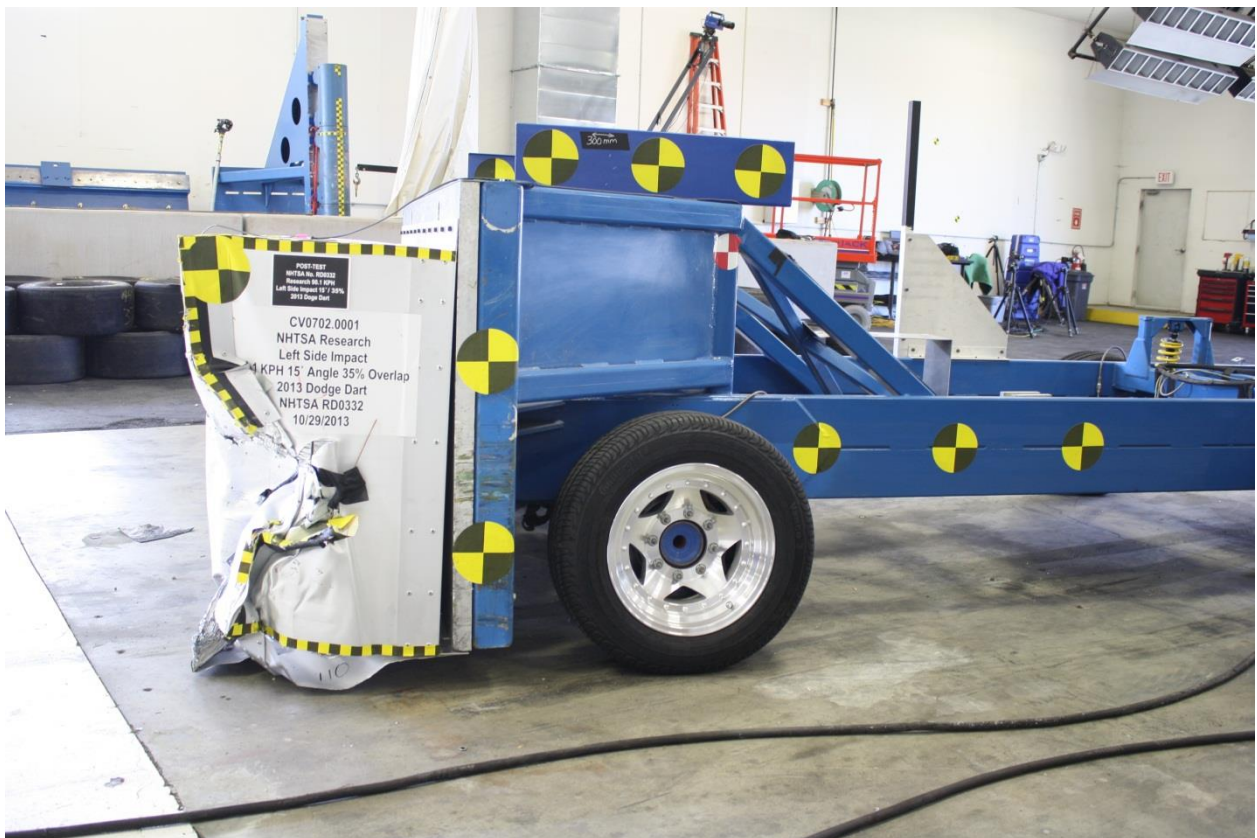
No. 160 Post-Test View of Deformation of Rocker or Post-Struck Side



No. 161 Post-Test View of Windshield Separation



No. 162 Pre-Test Left Side View of RMDB



No. 163 Post-Test Left Side View of RMDB



No. 164 Pre-Test Right Side View of RMDB



No. 165 Post-Test Right Side View of RMDB



No. 166 Pre-Test Top View of RMDB



No. 167 Post-Test Top View of RMDB



No. 168 Pre-Test Front View of RMDB



No. 169 Post-Test Front View of RMDB



No. 170 Pre-Test RMDB & Vehicle, Right Side



No. 171 Post-Test RMDB & Vehicle, Right Side



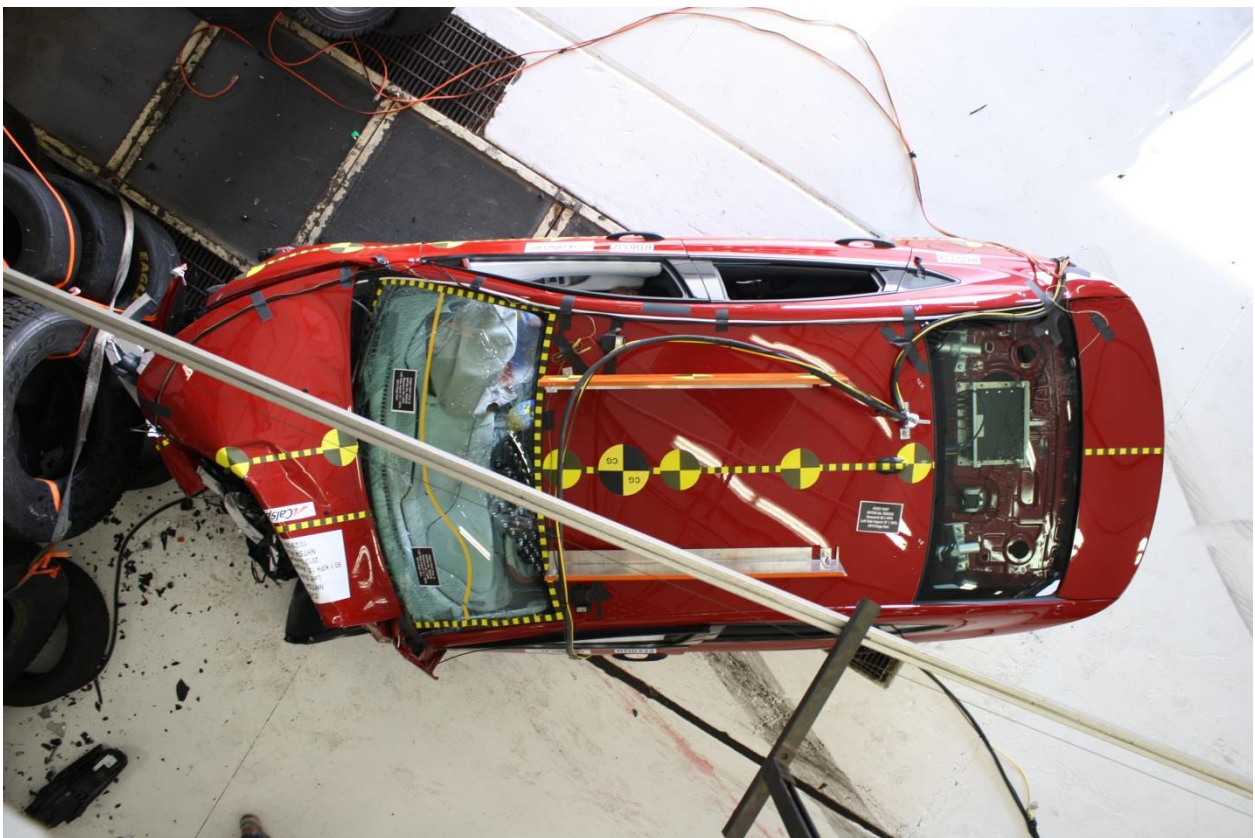
No. 172 Pre-Test RMDB & Vehicle, Left Side



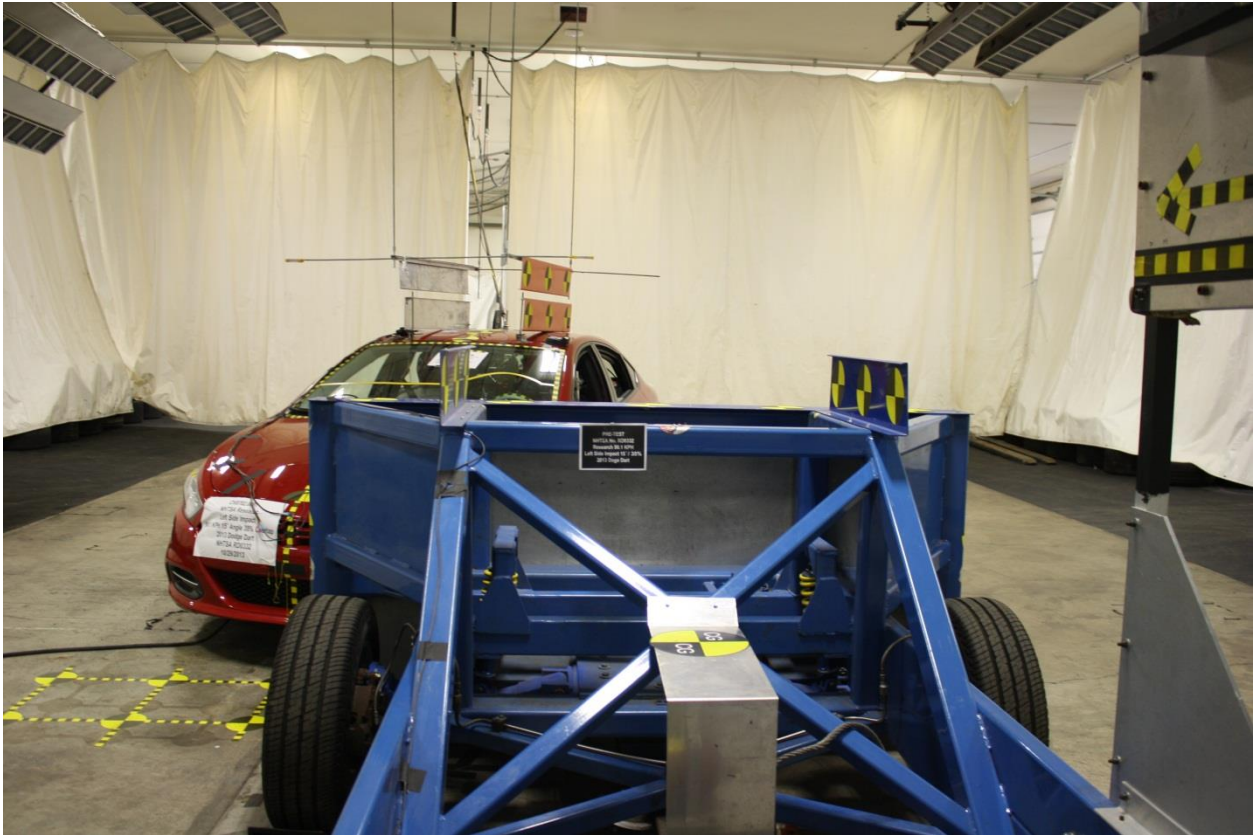
No. 173 Post-Test RMDB & Vehicle, Left Side



No. 174 Pre-Test RMDB & Vehicle, Top View



No. 175 Post-Test RMDB & Vehicle, Top View



No. 176 Pre-Test RMDB & Vehicle, Rear View



No. 177 Post-Test RMDB & Vehicle, Rear View



No. 178 Pre-Test RMDB & Vehicle, Front View



No. 179 Post-Test RMDB & Vehicle, Front View



No. 180 Vehicle at 0 Degrees on Static Rollover Device



No. 181 Vehicle at 90 Degrees on Static Rollover Device



No. 182 Vehicle at 180 Degrees on Static Rollover Device



No. 183 Vehicle at 270 Degrees on Static Rollover Device



No. 184 Vehicle at 360 Degrees on Static Rollover Device



No. 185 Impact Photo

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VEHICLE & DUMMY RESPONSE DATA TRACES

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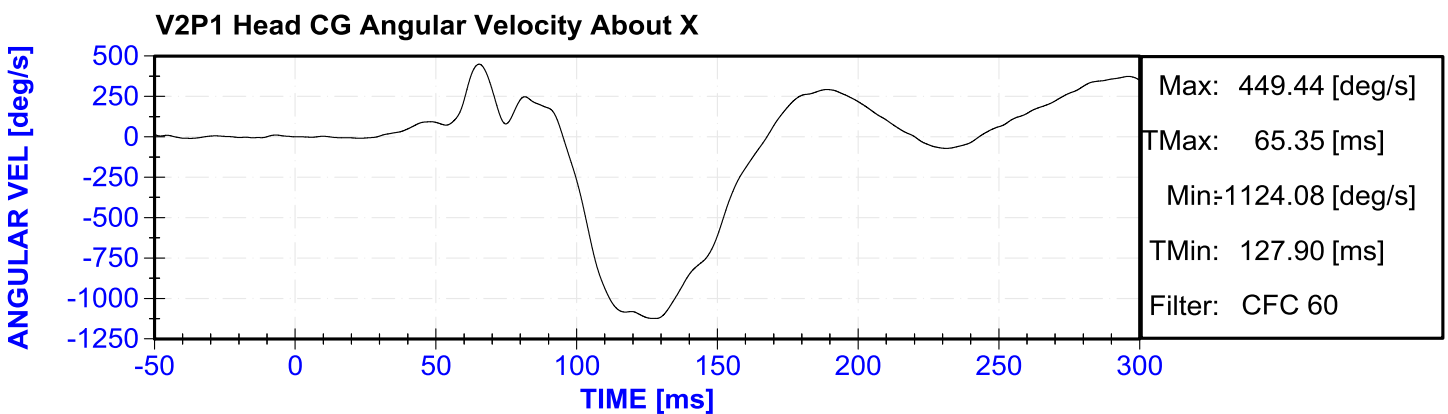
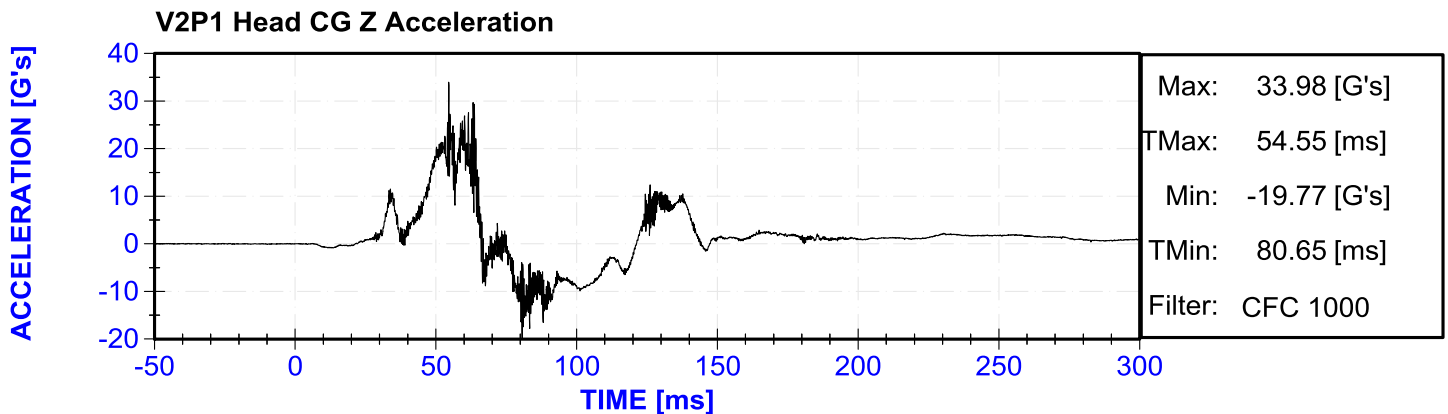
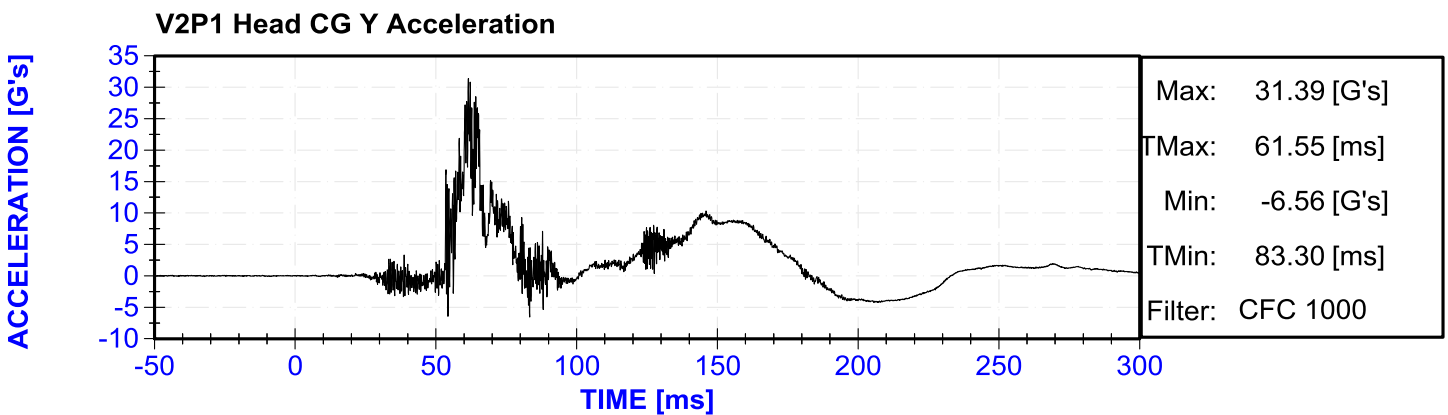
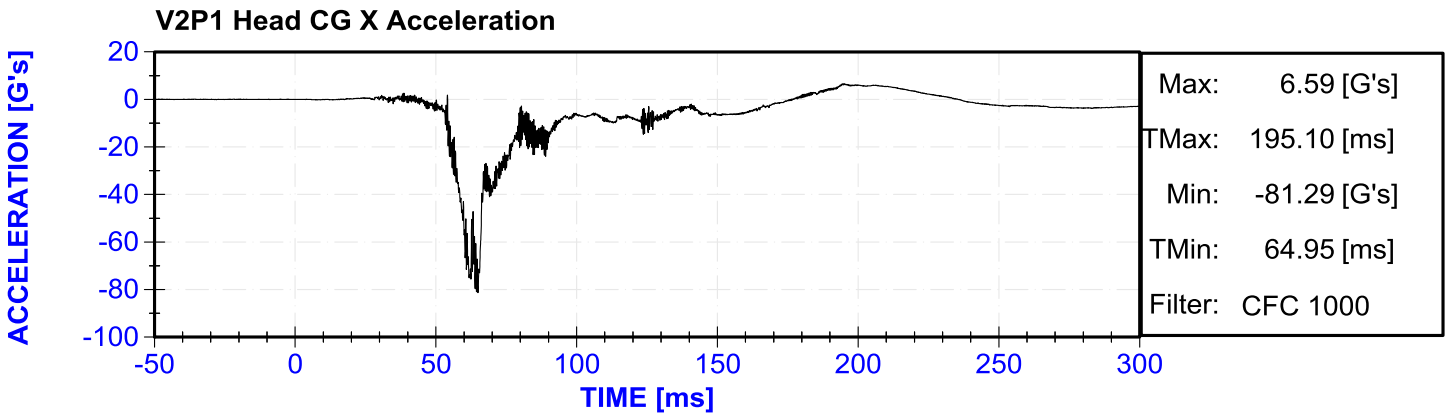
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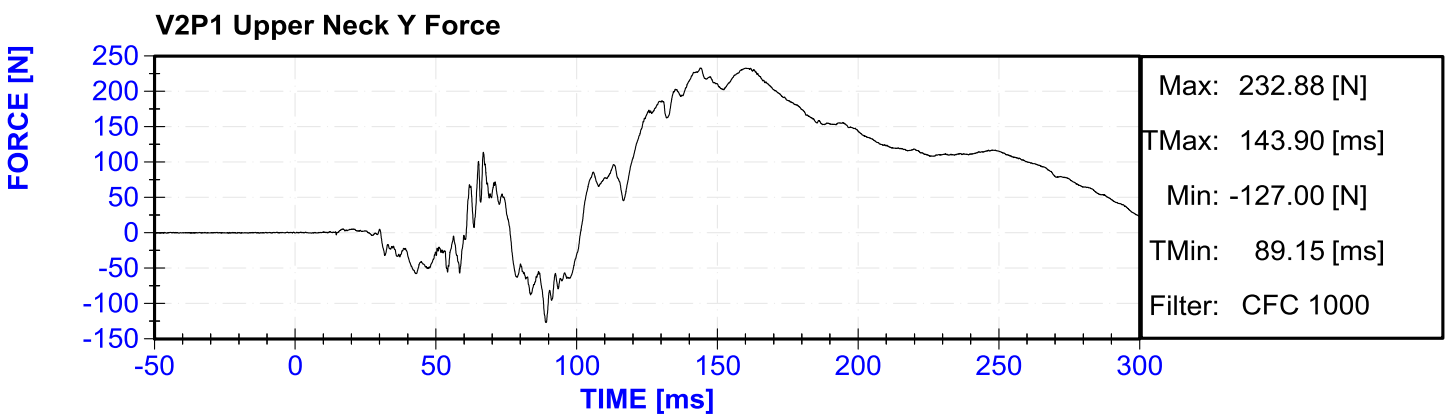
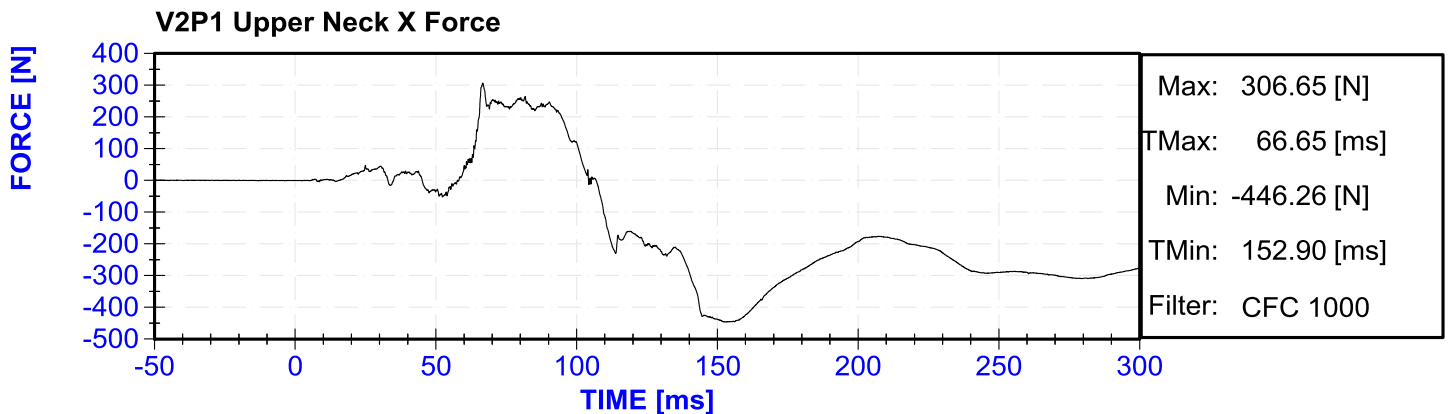
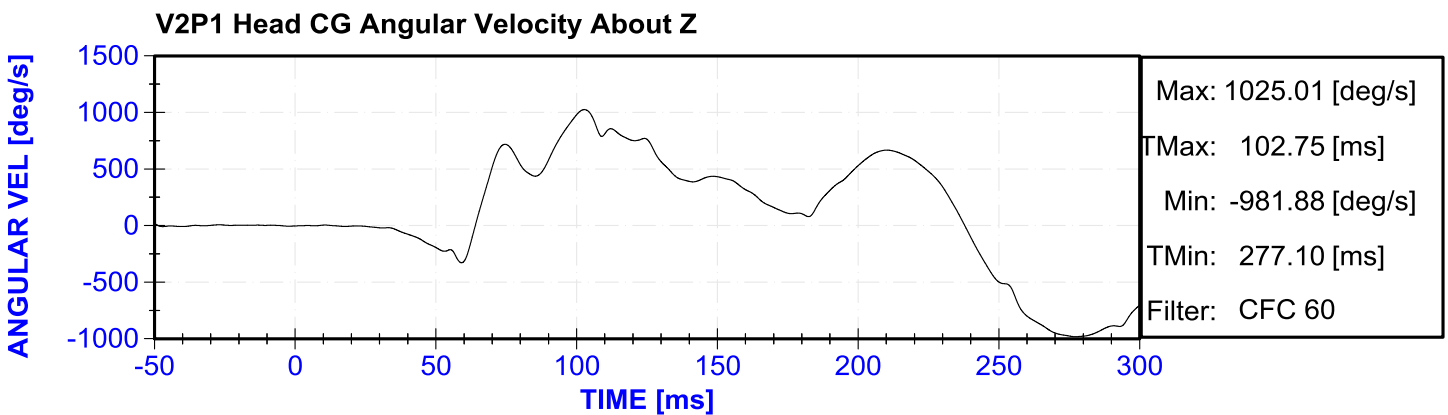
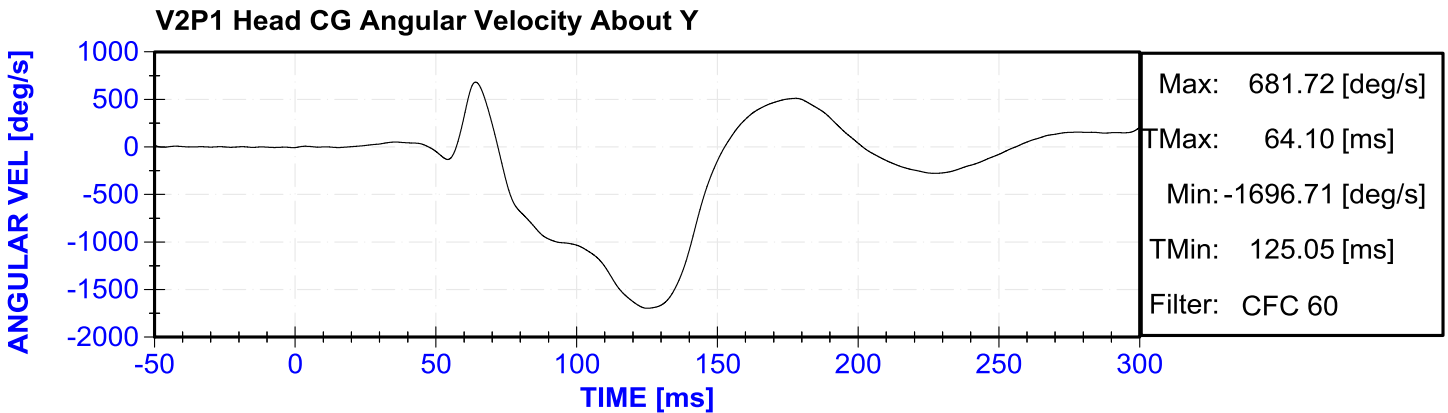
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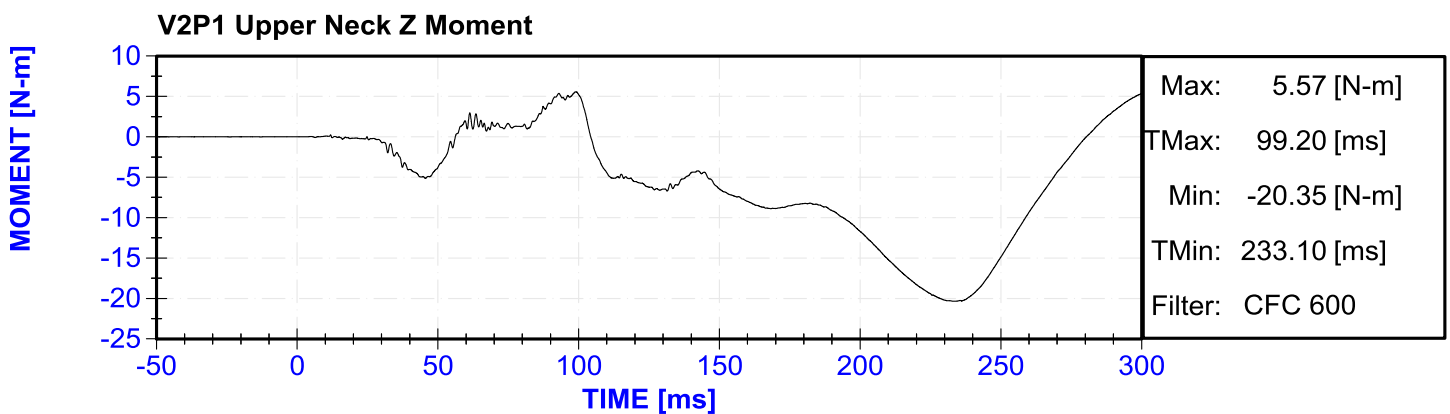
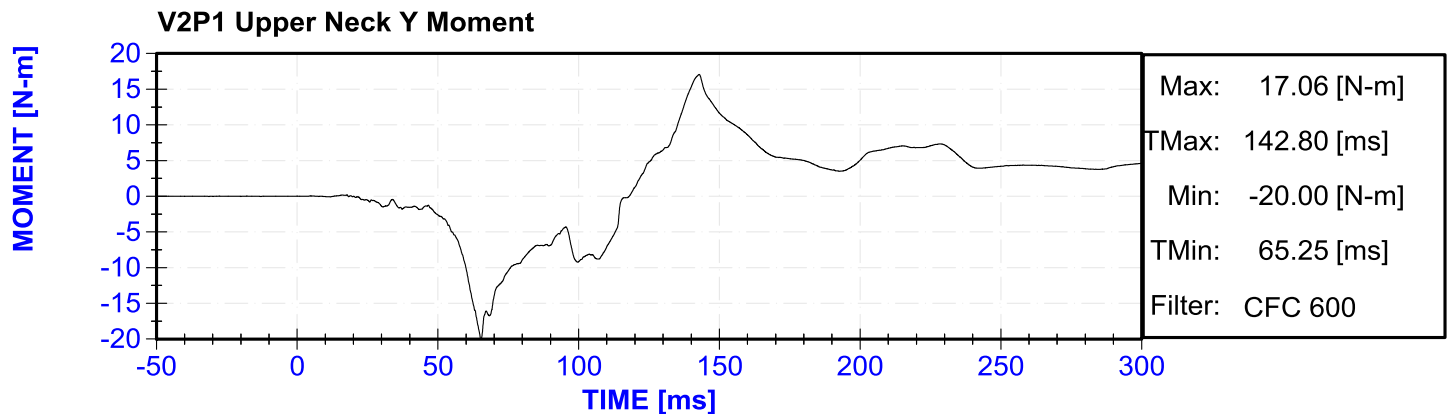
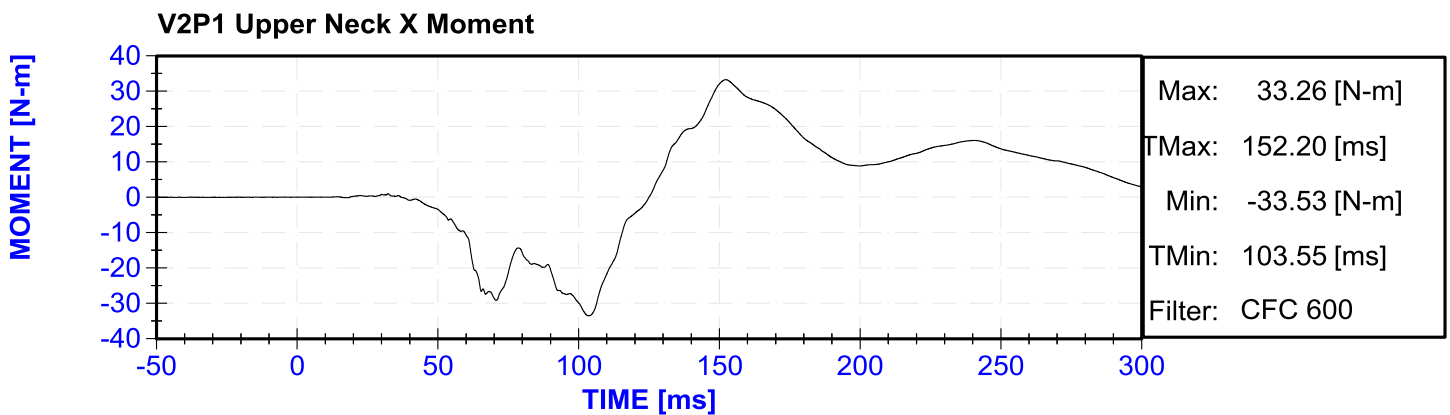
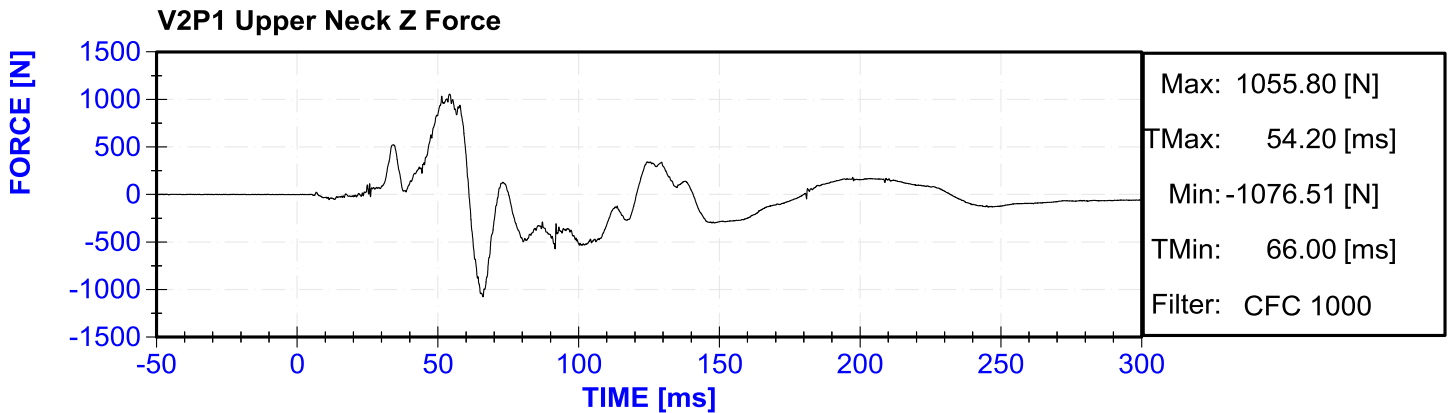
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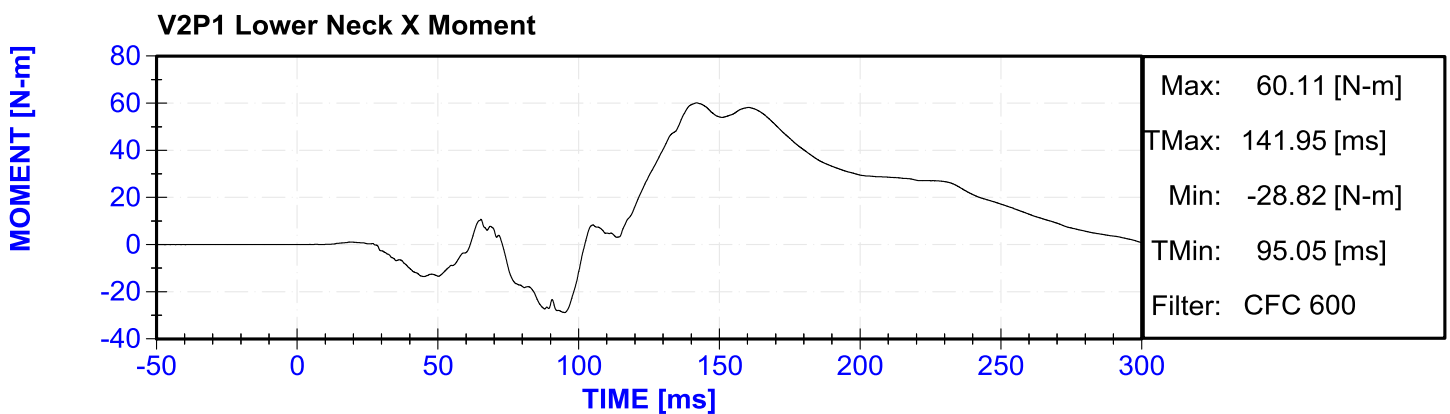
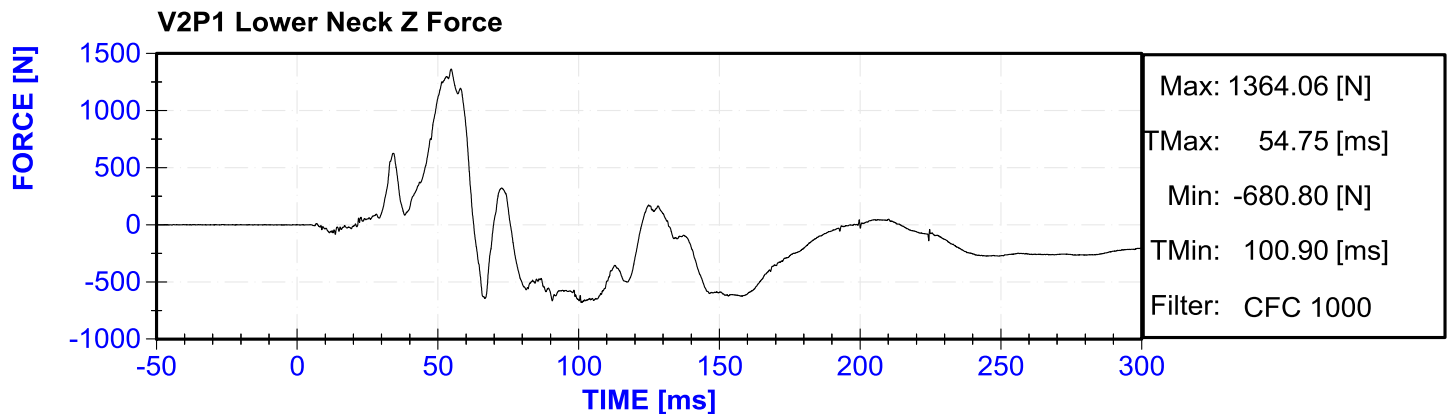
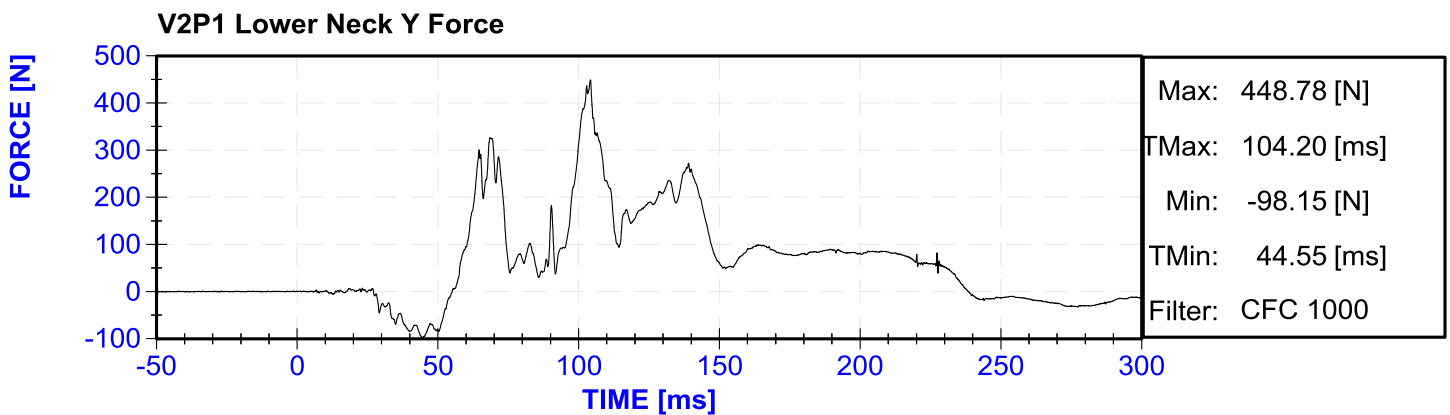
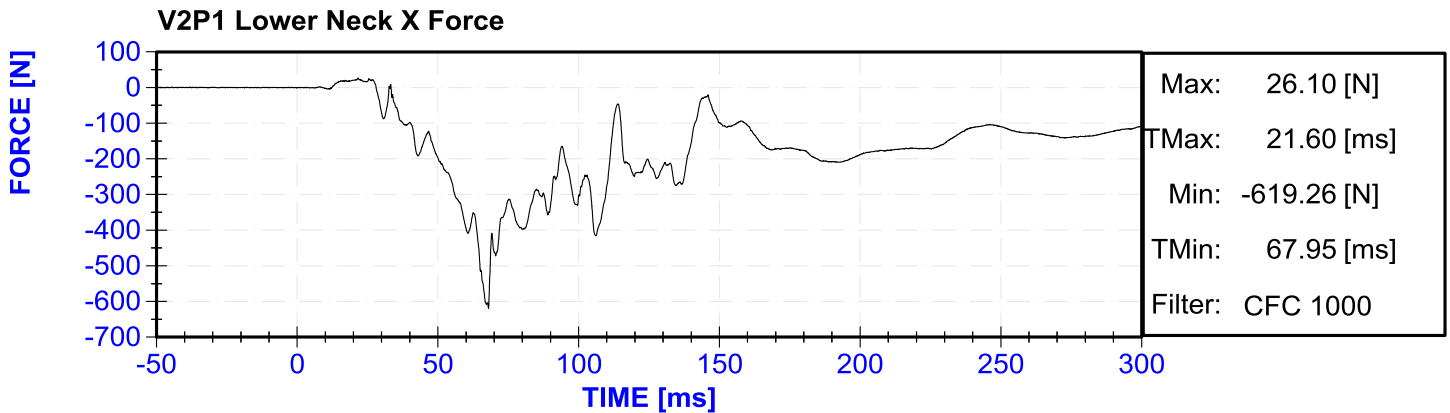
Plot 199	V2 Passenger Seat Pan Z Accelerometer	B-57
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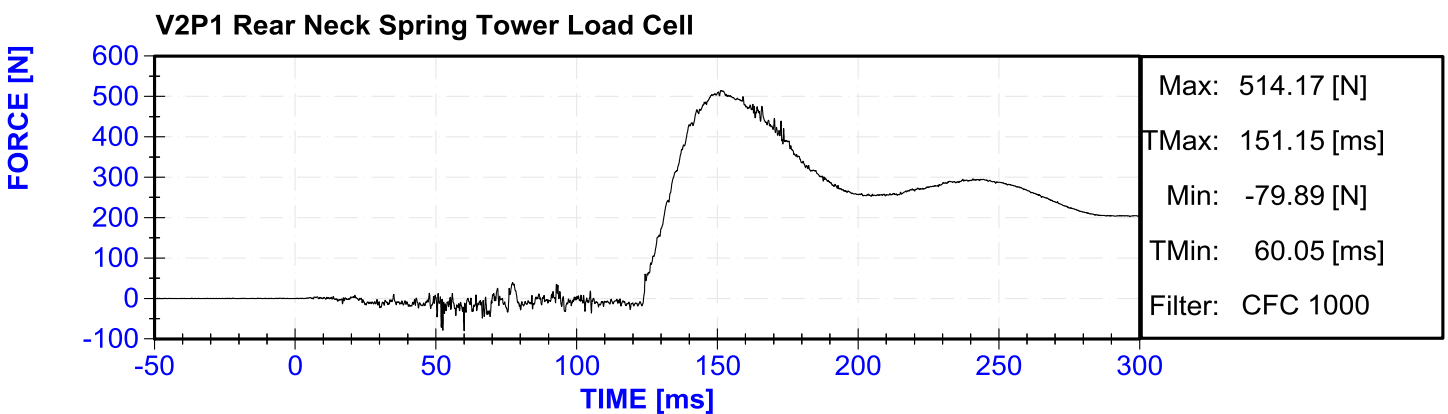
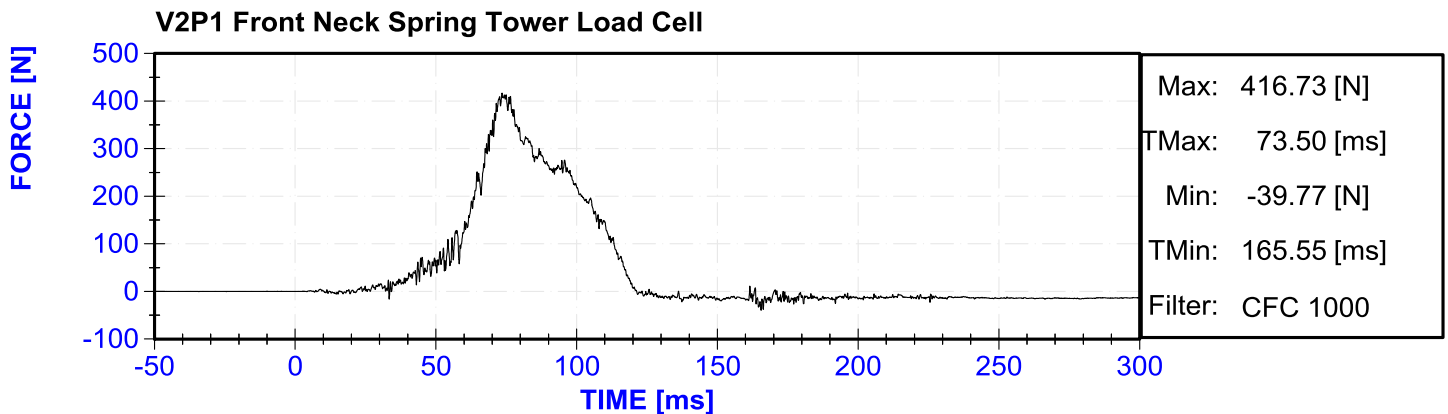
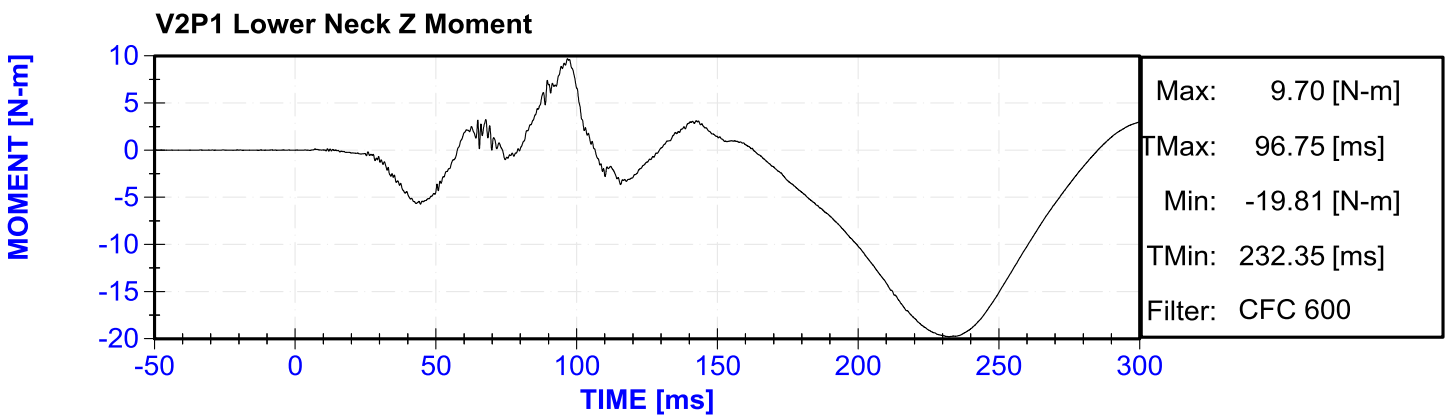
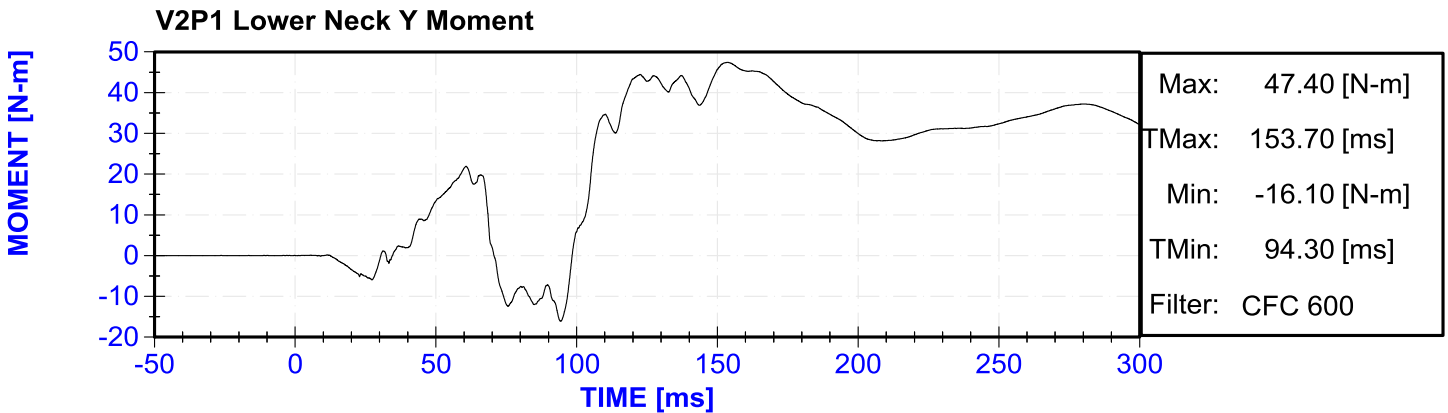
Plot 249	V2P2 Fy on head acting through the total neck section	B-70
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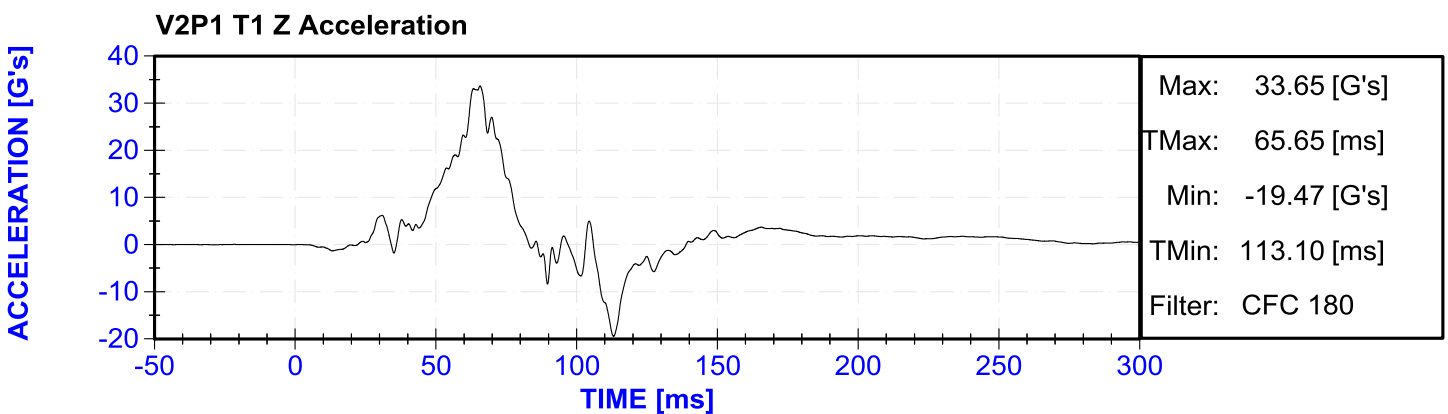
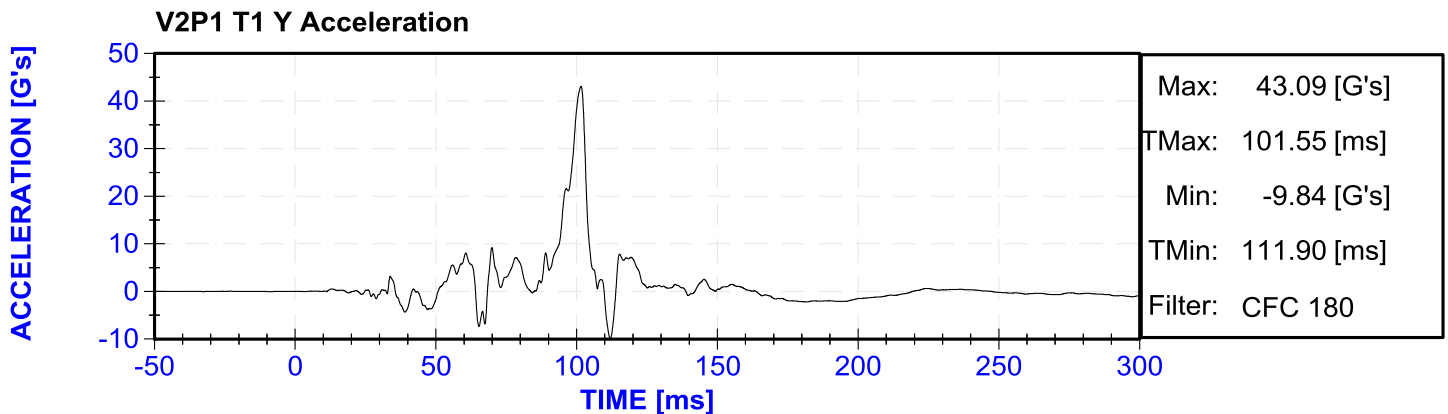
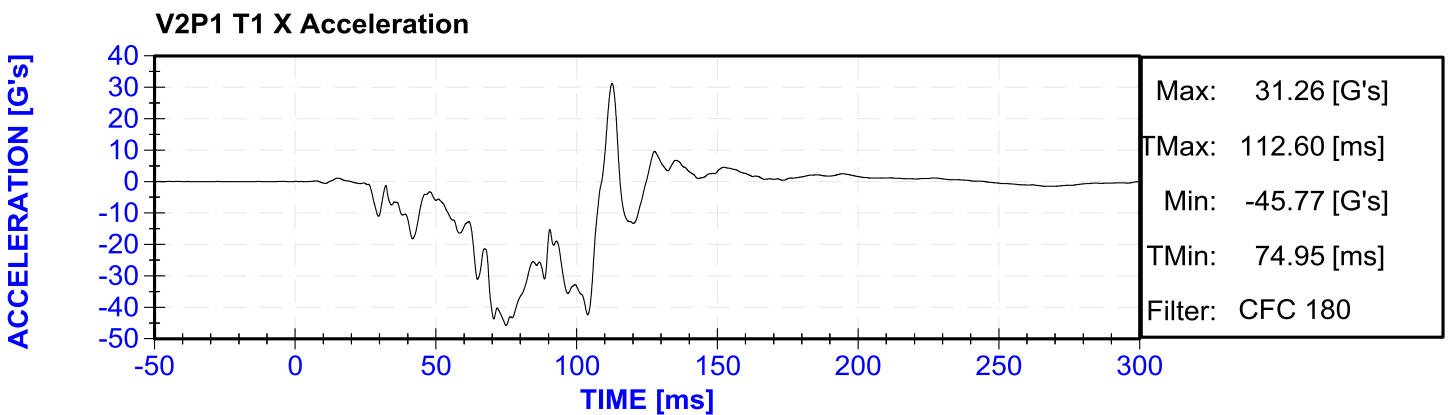
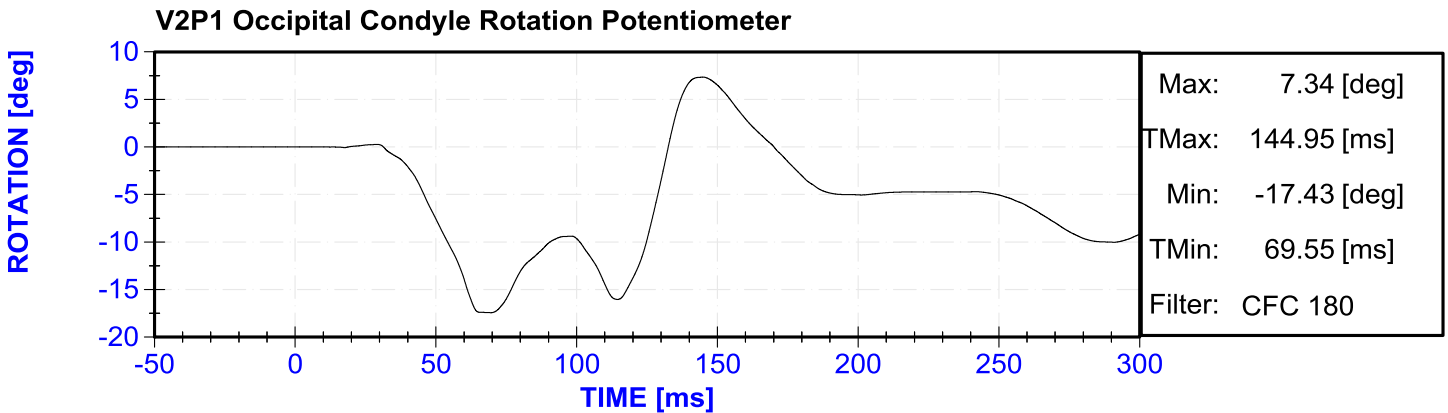


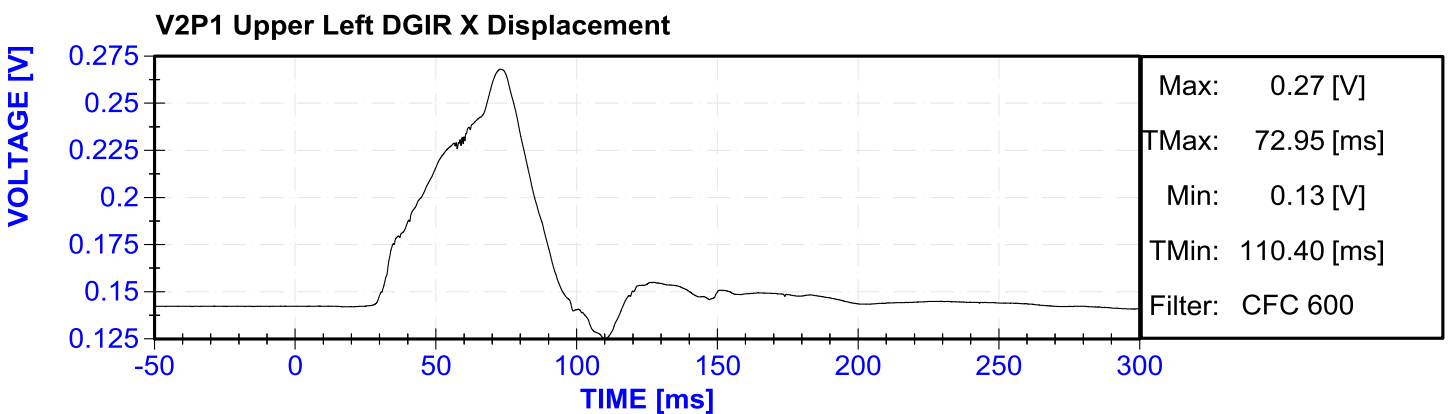
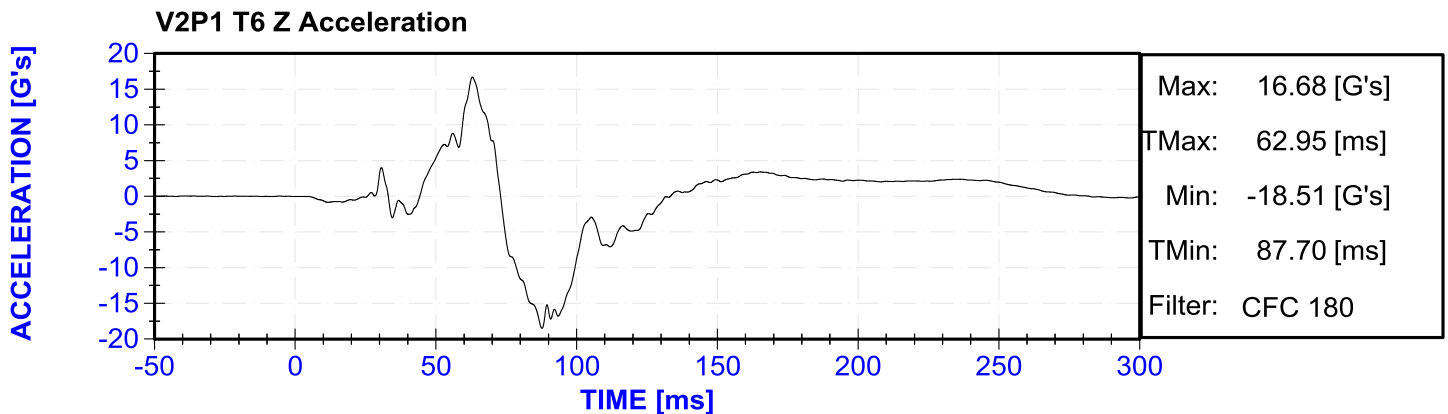
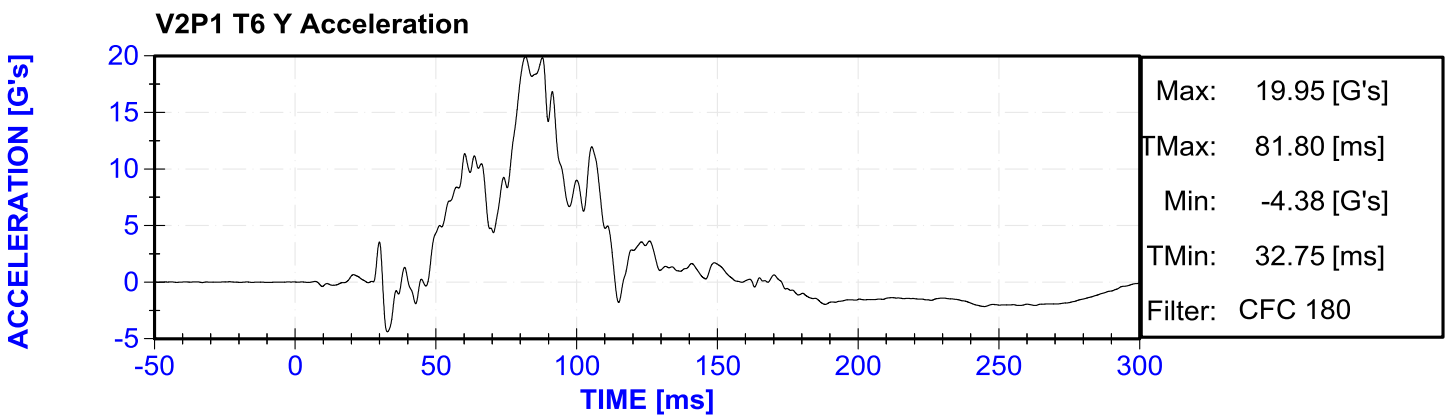
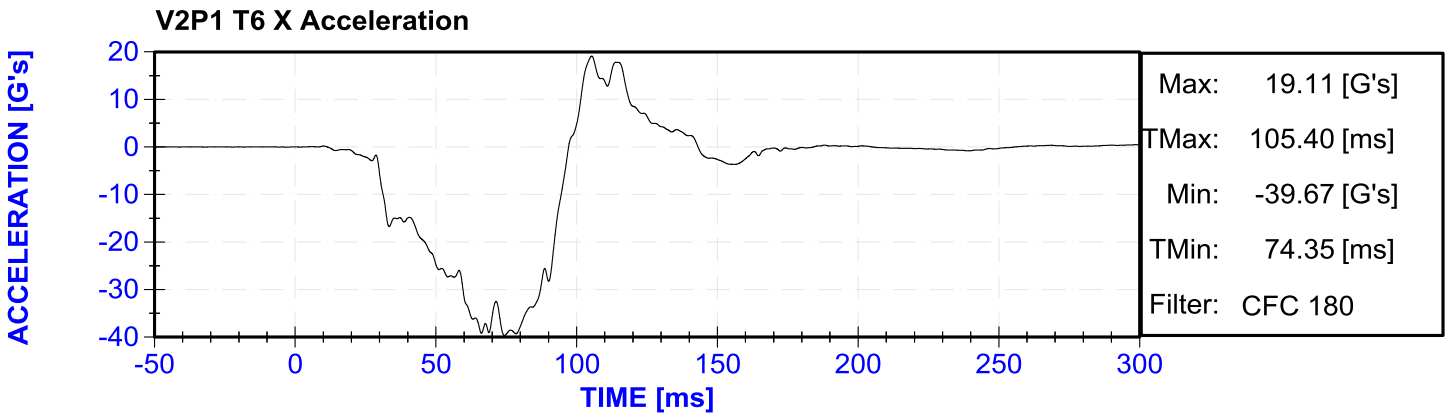


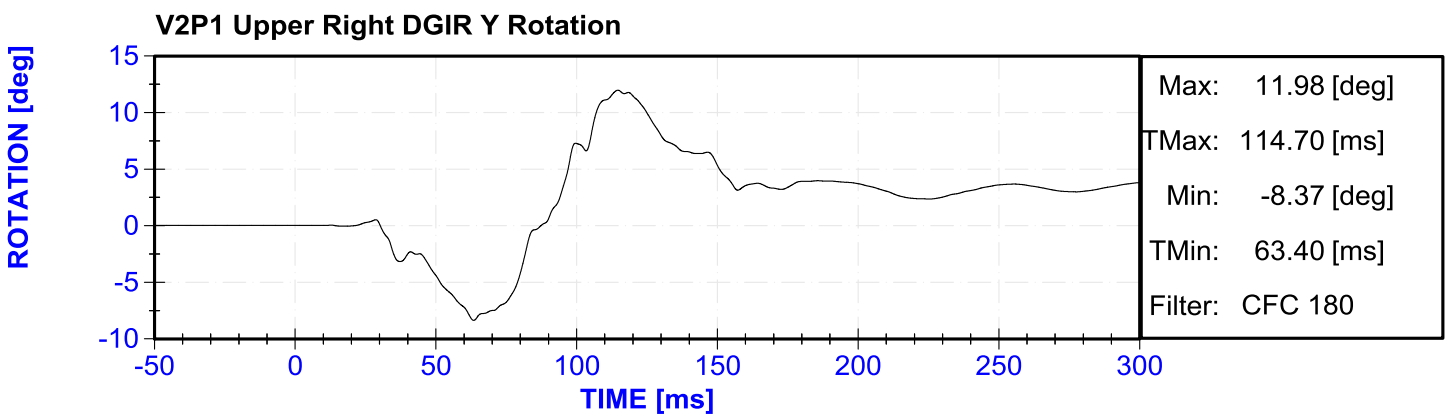
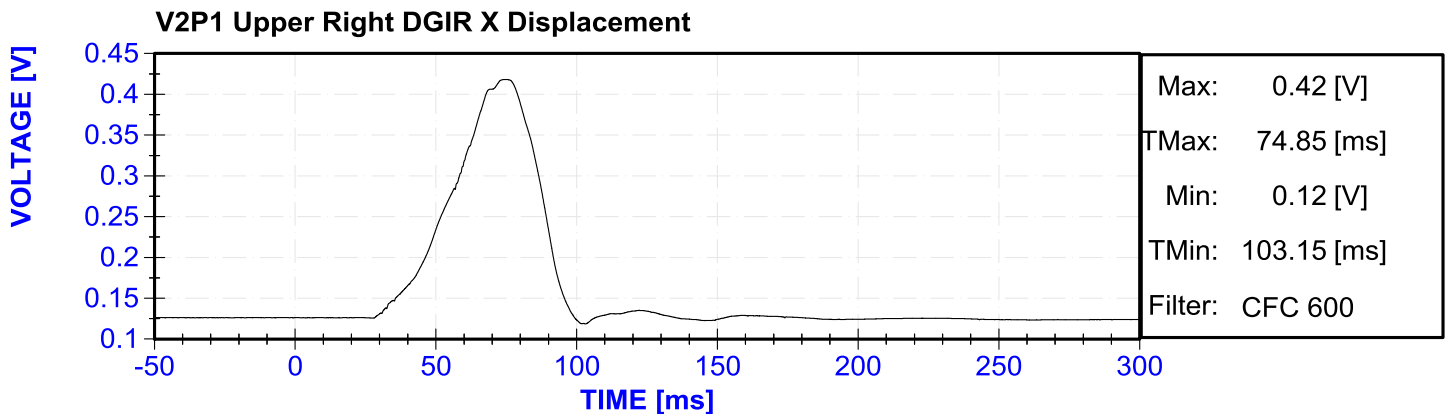
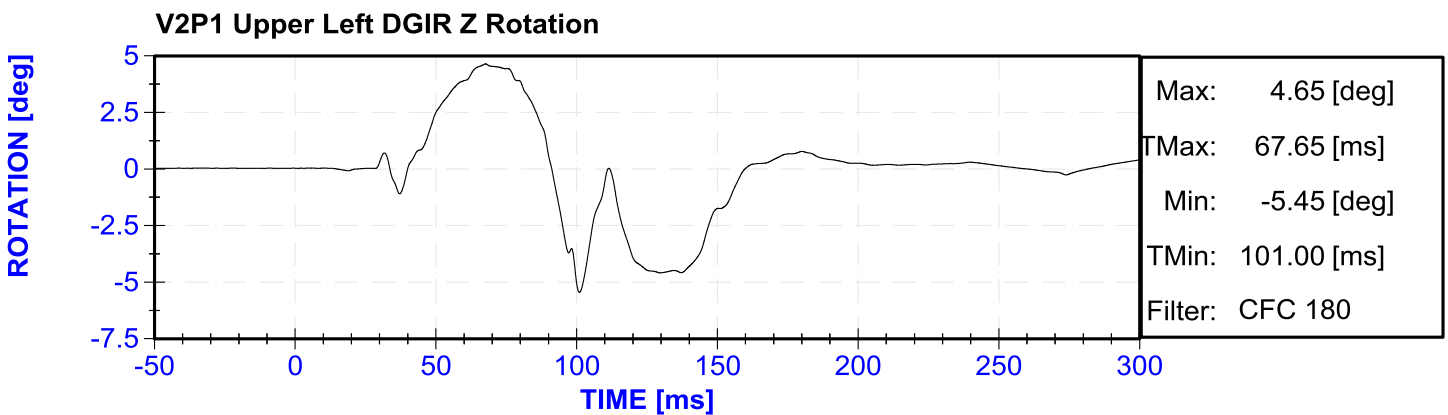
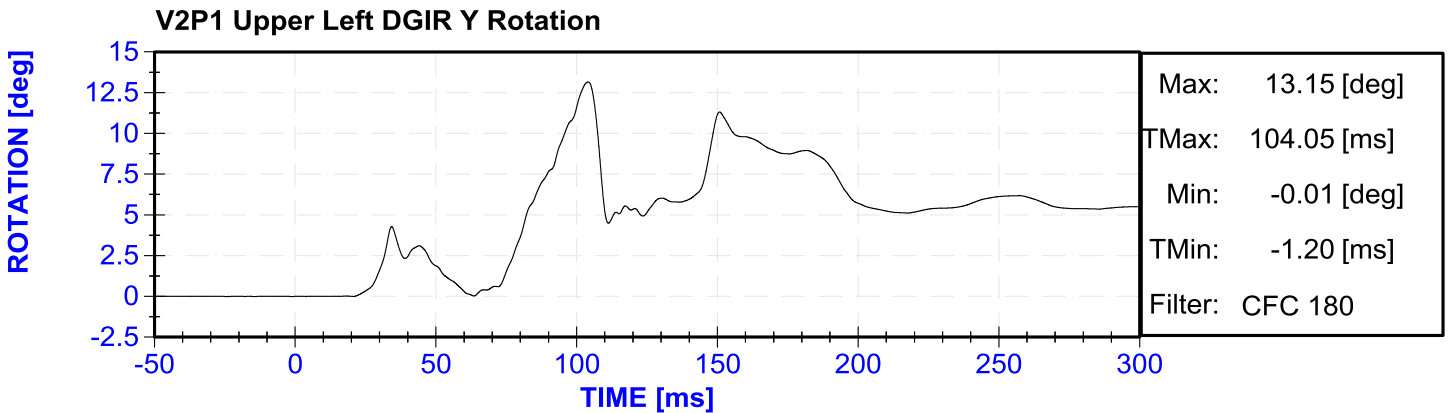


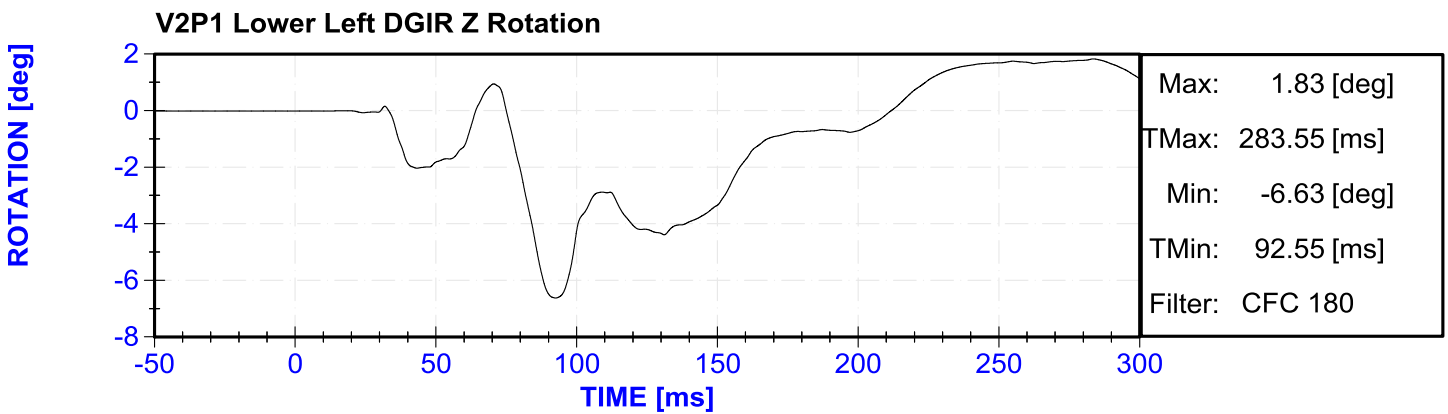
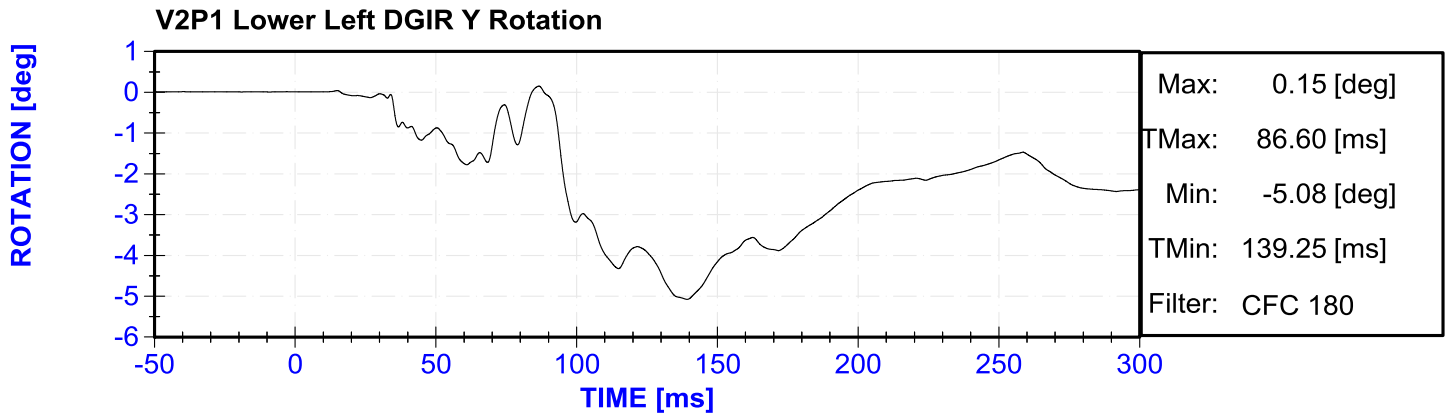
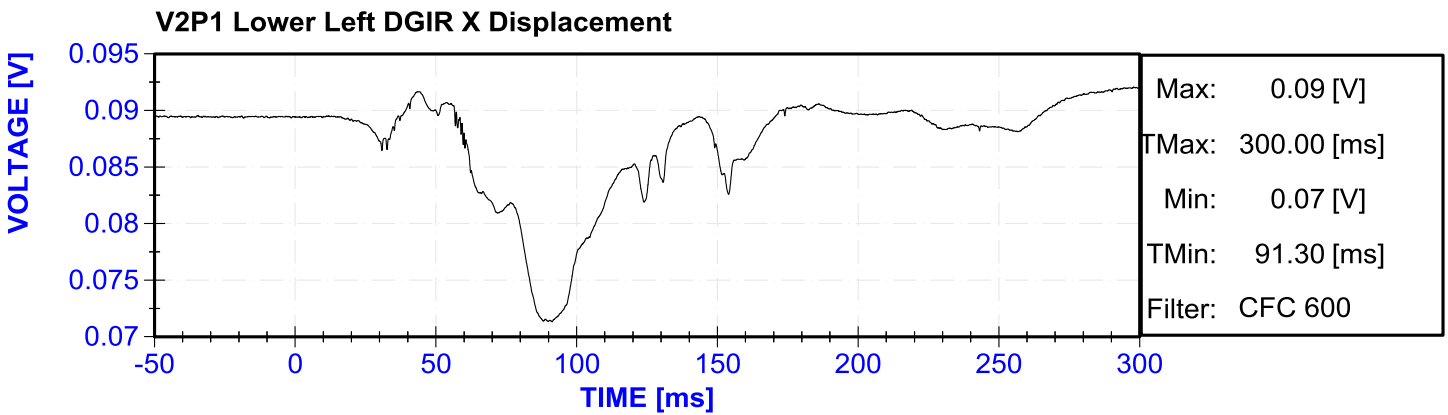
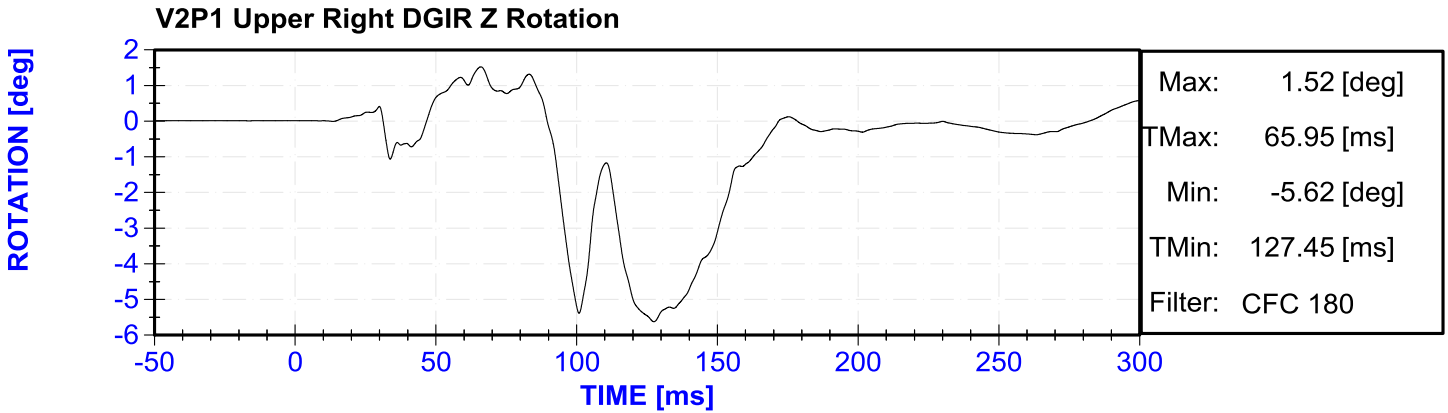


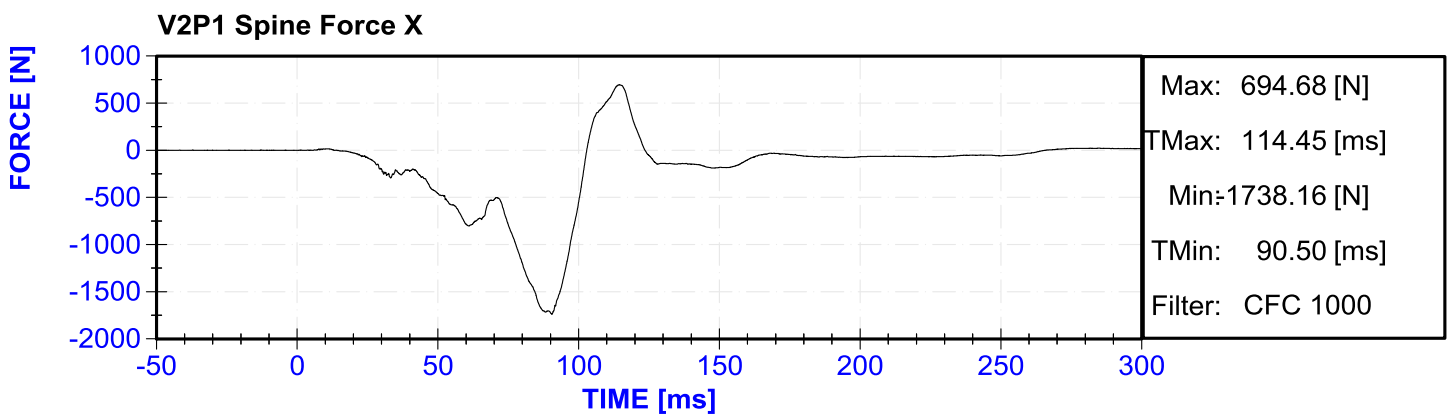
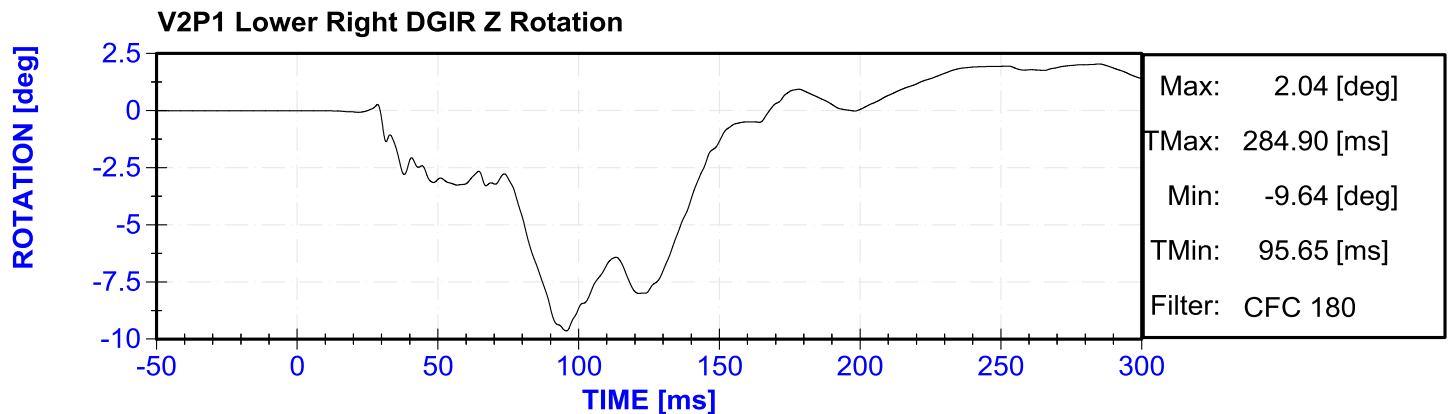
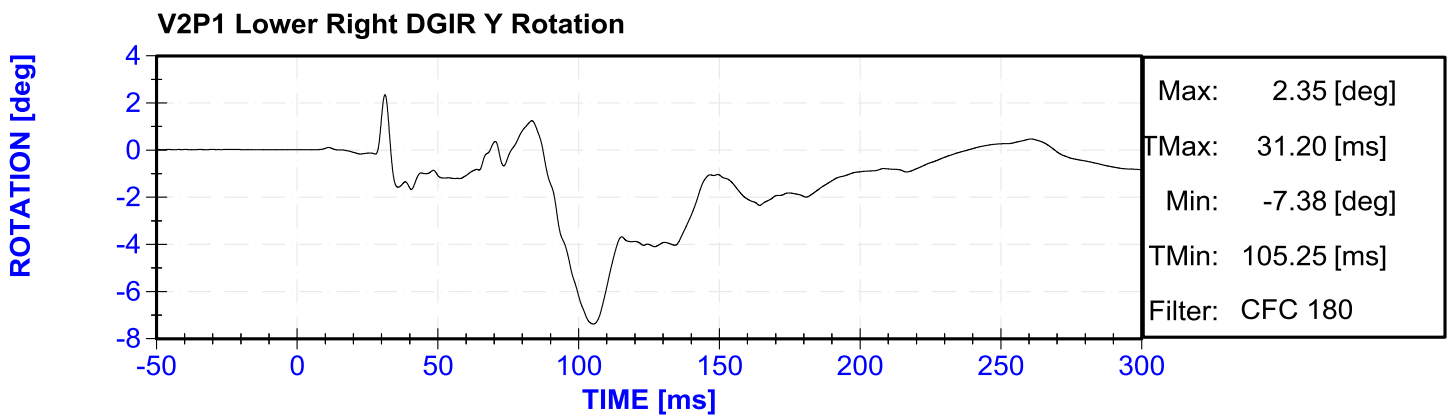
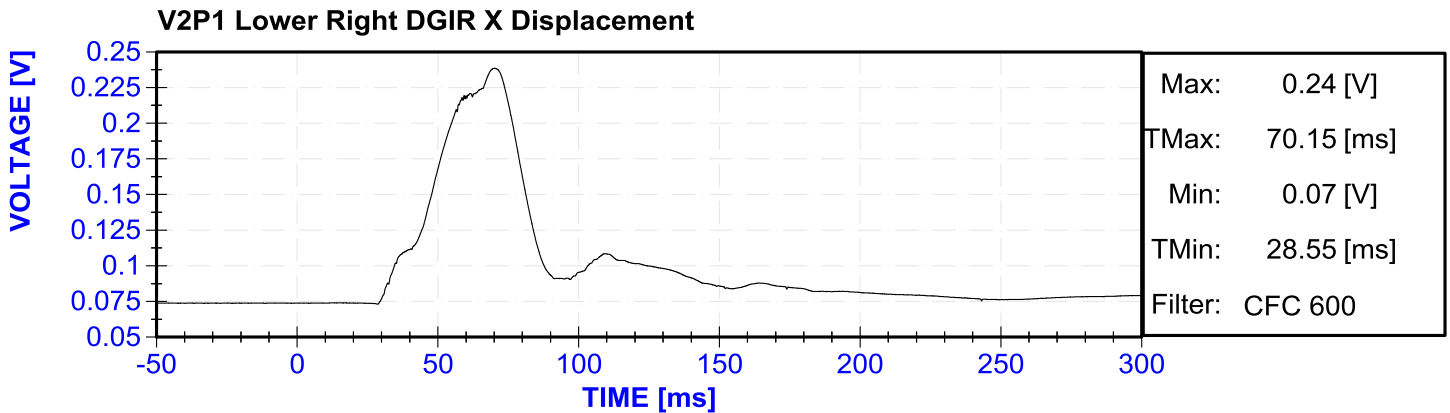


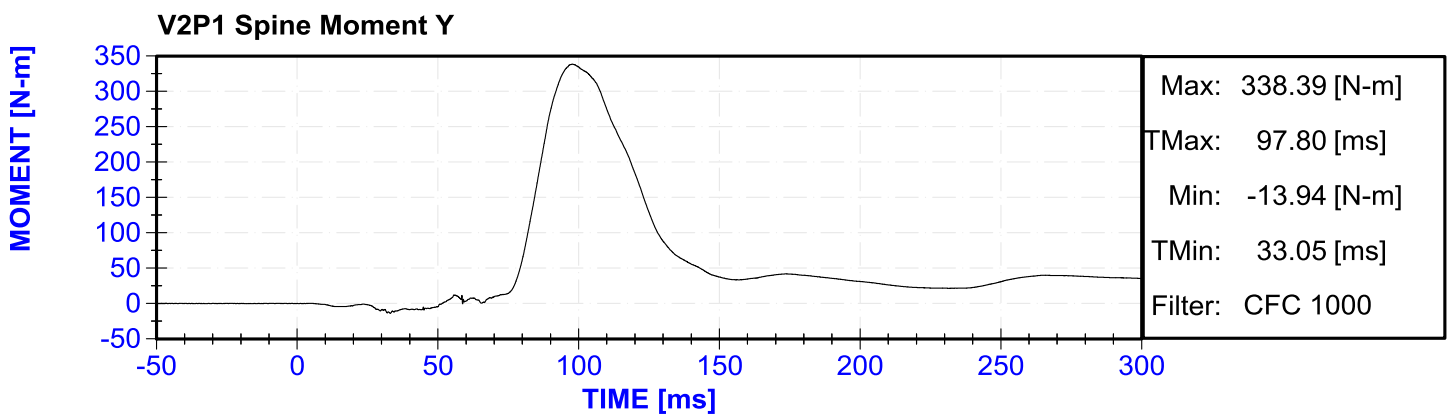
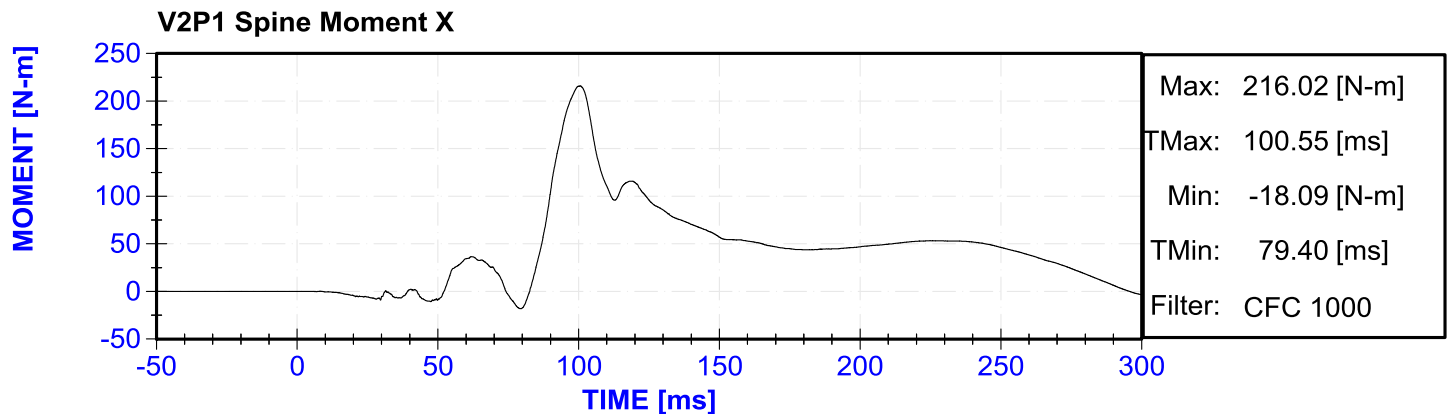
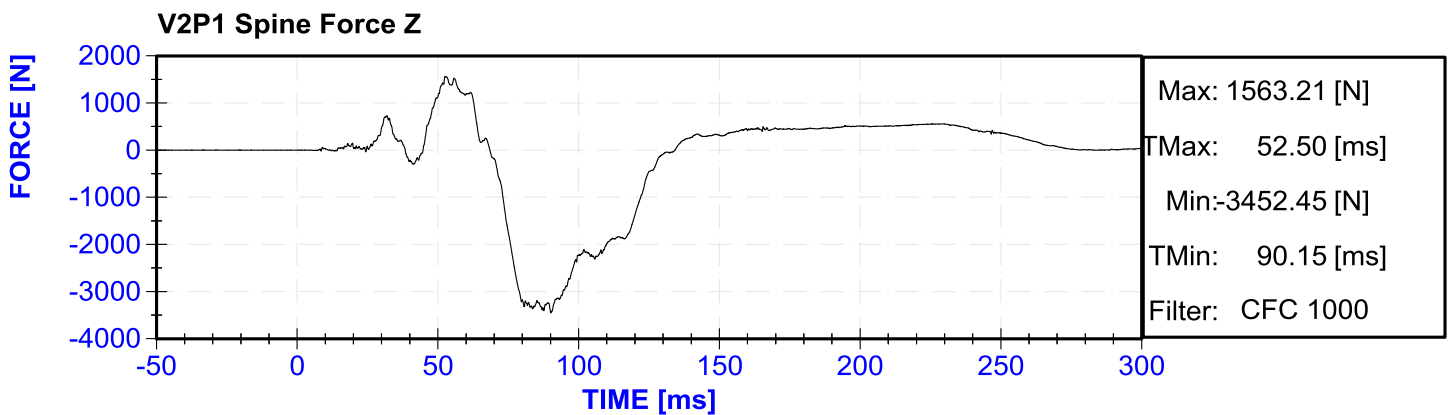
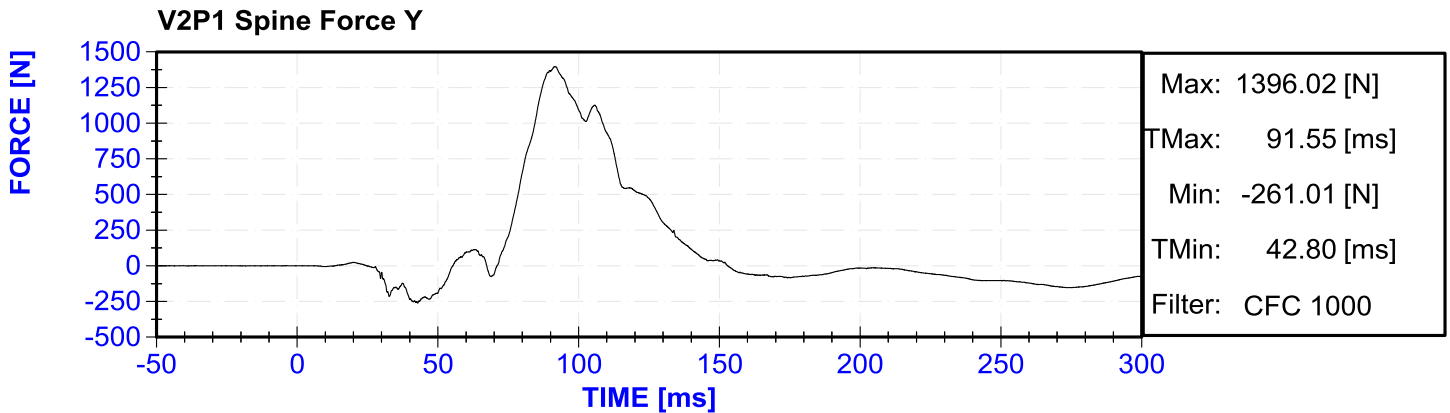


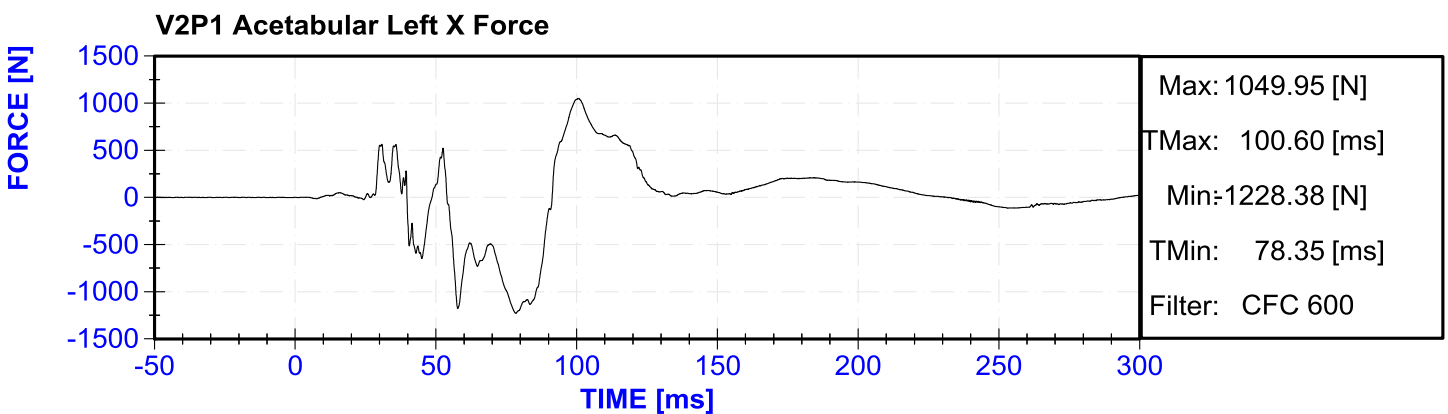
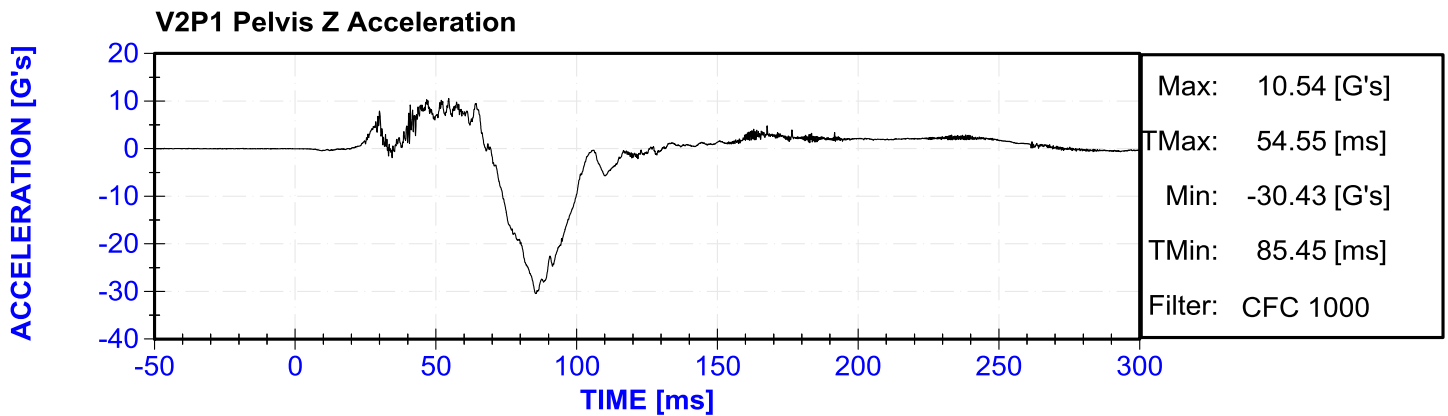
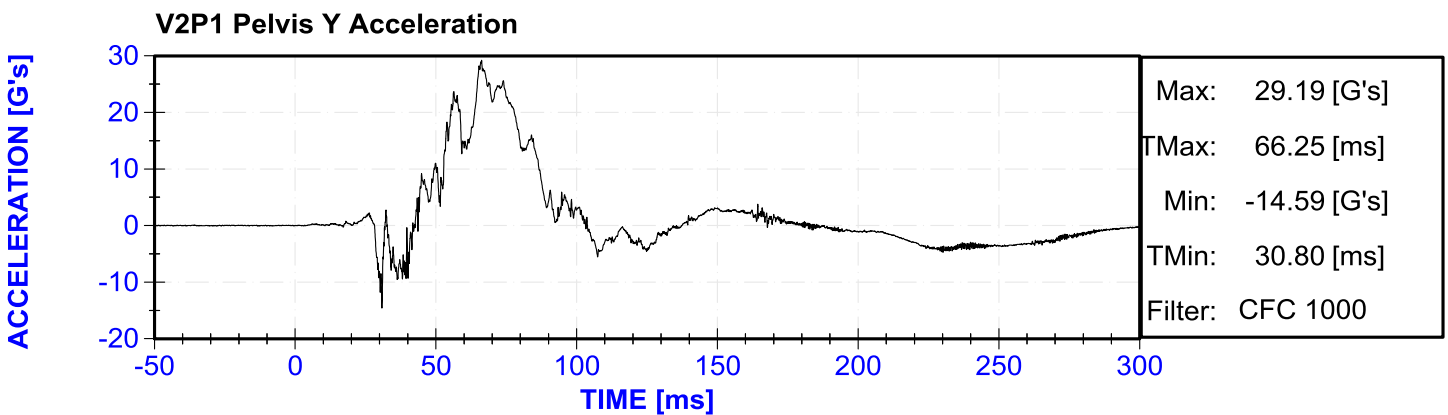
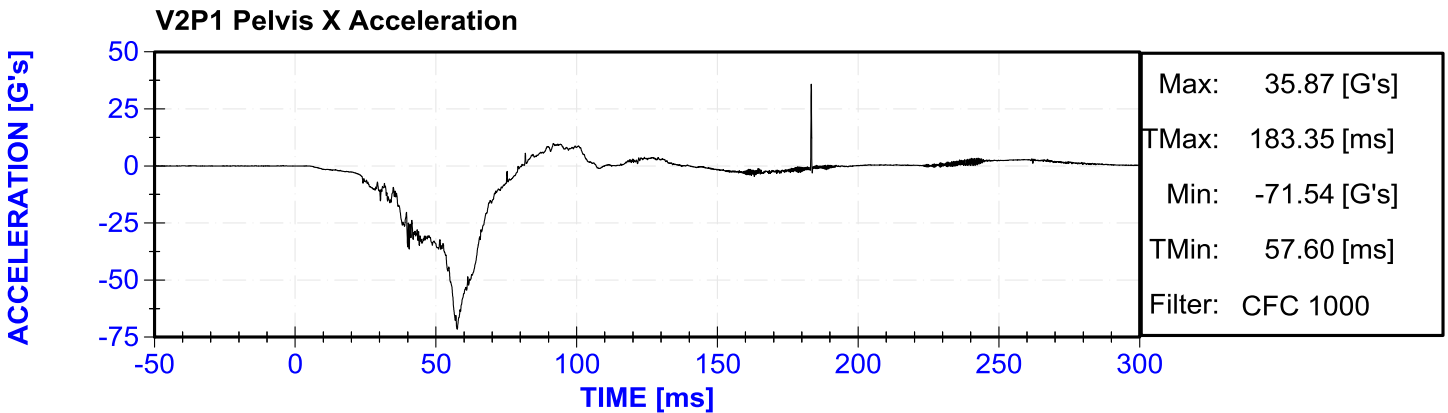


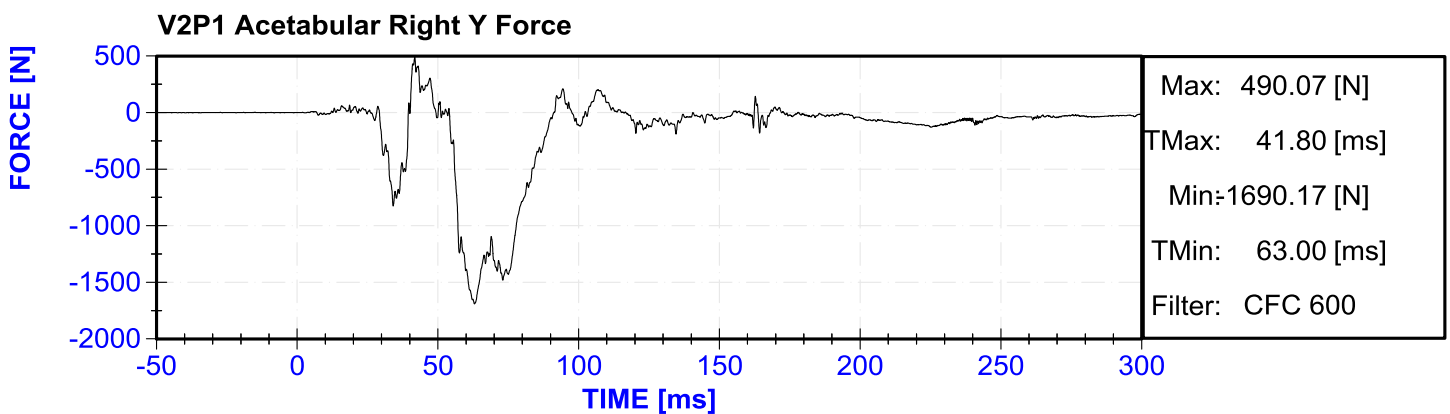
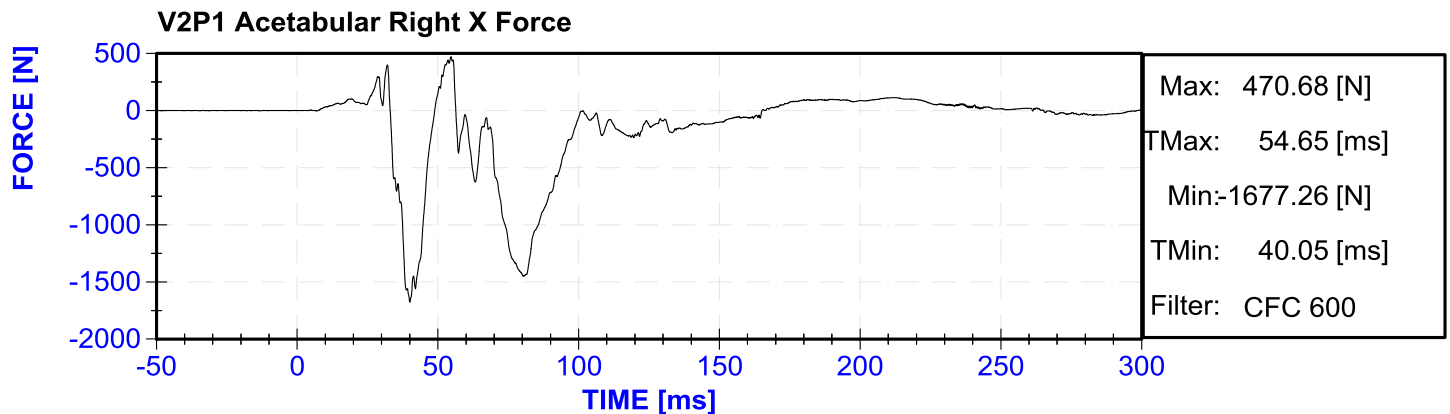
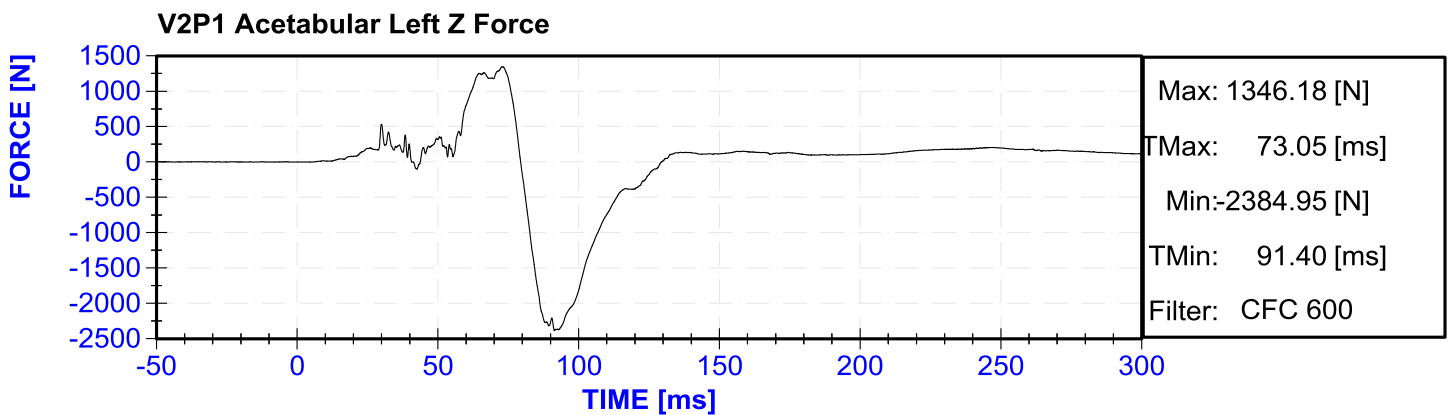
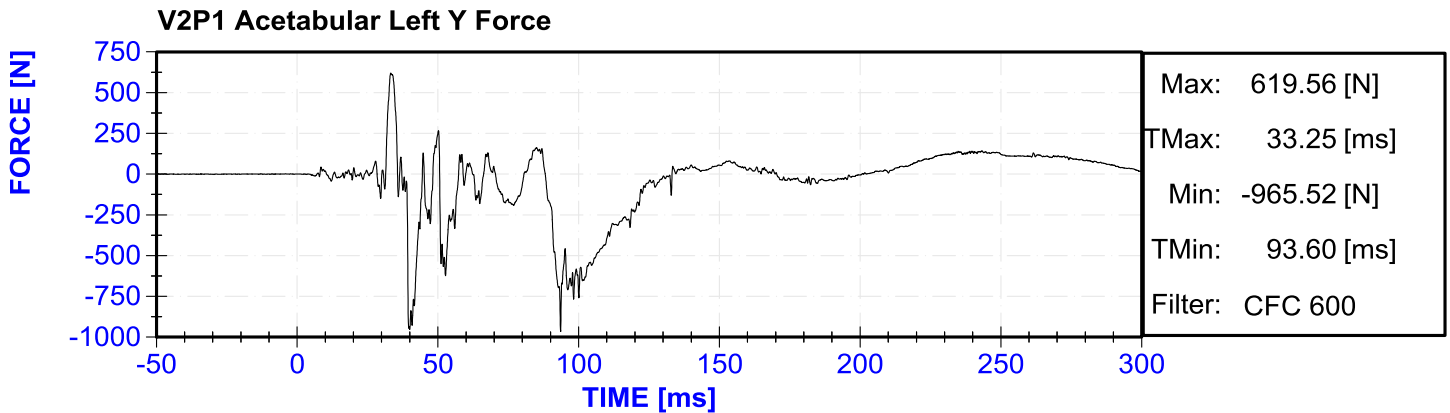


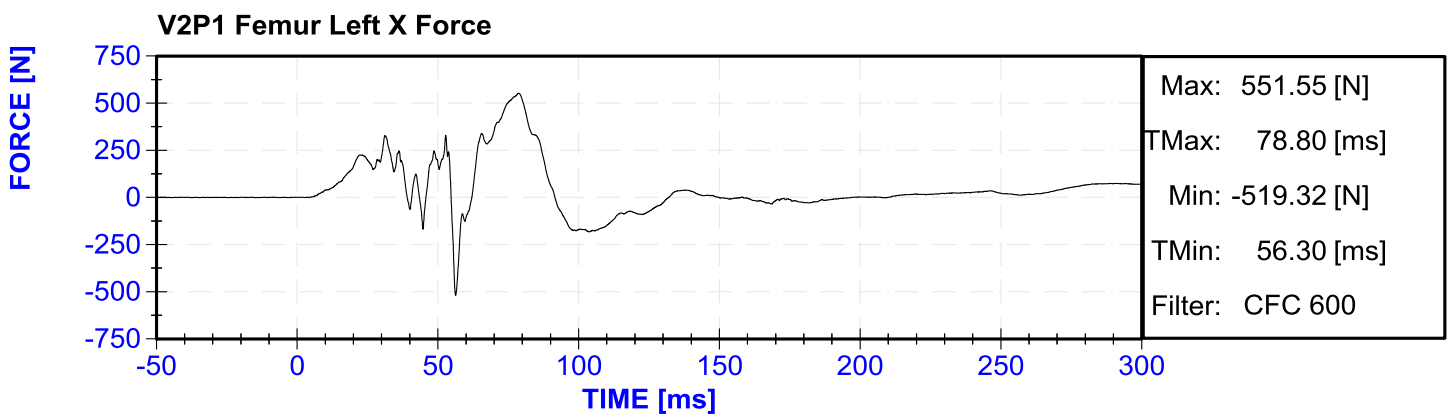
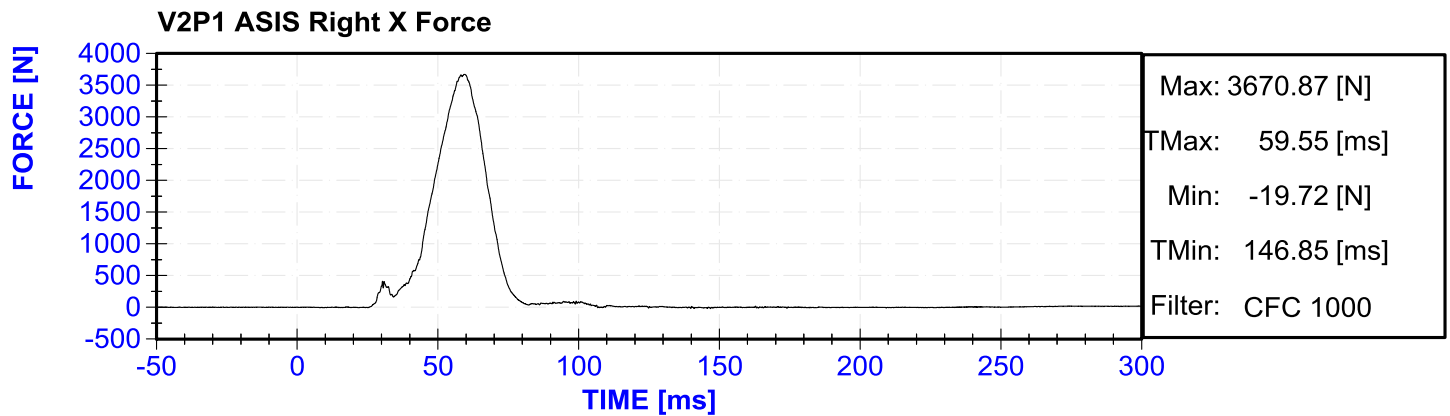
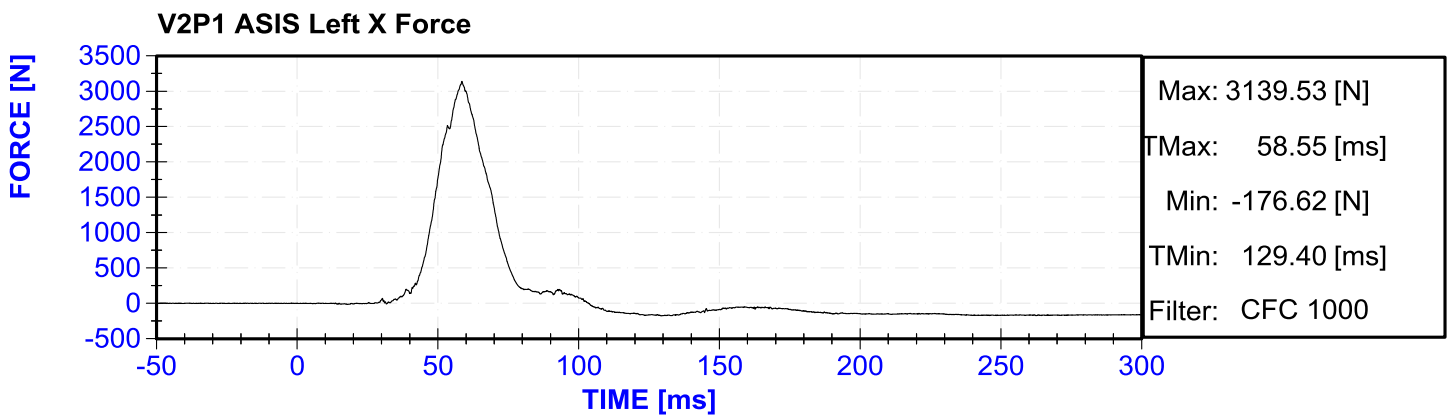
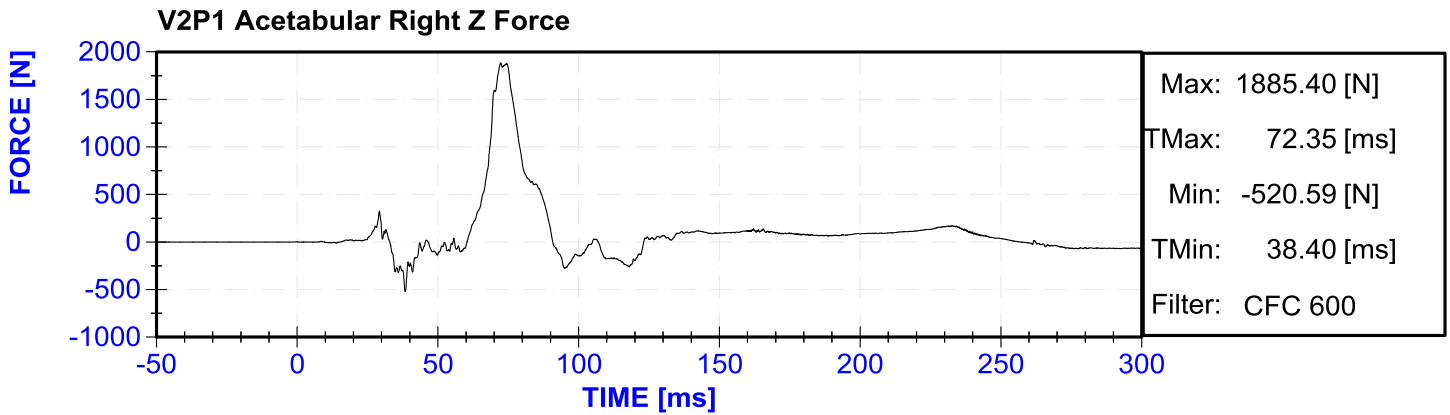


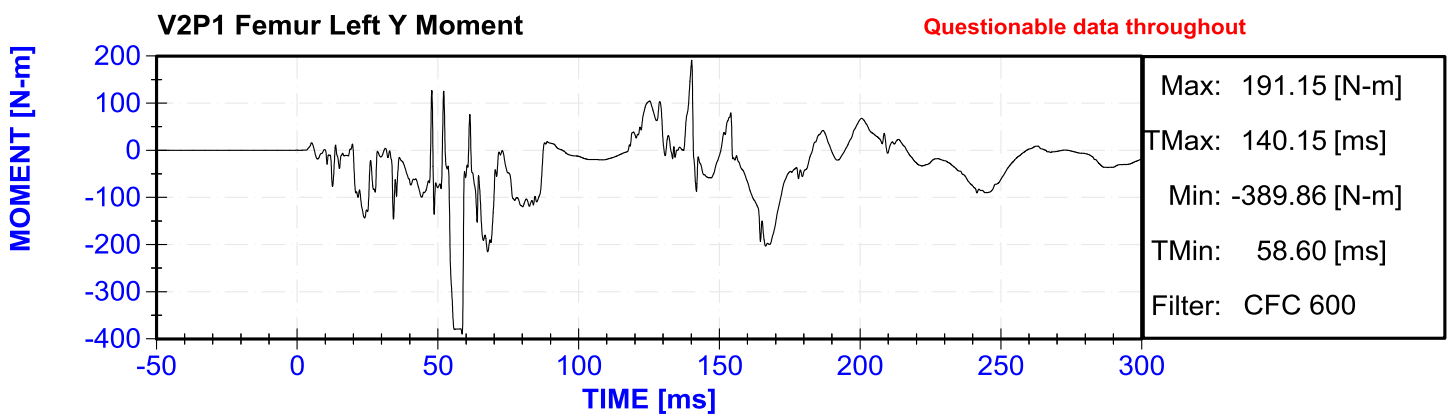
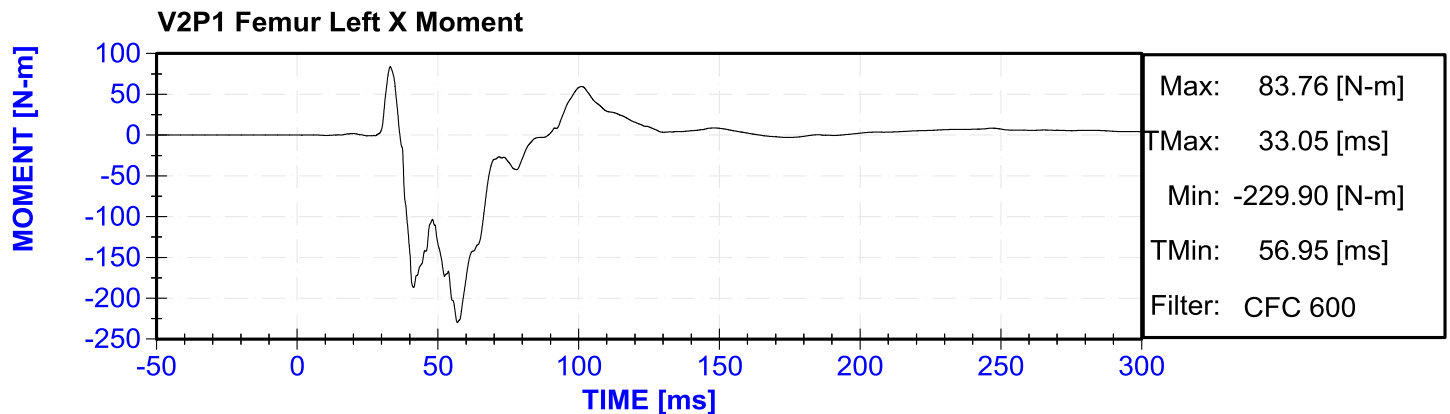
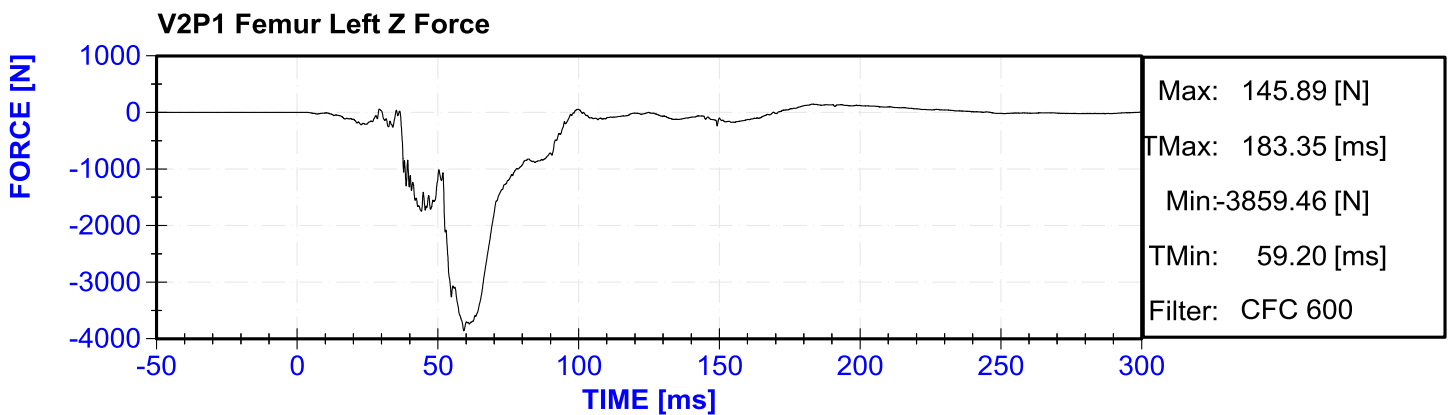
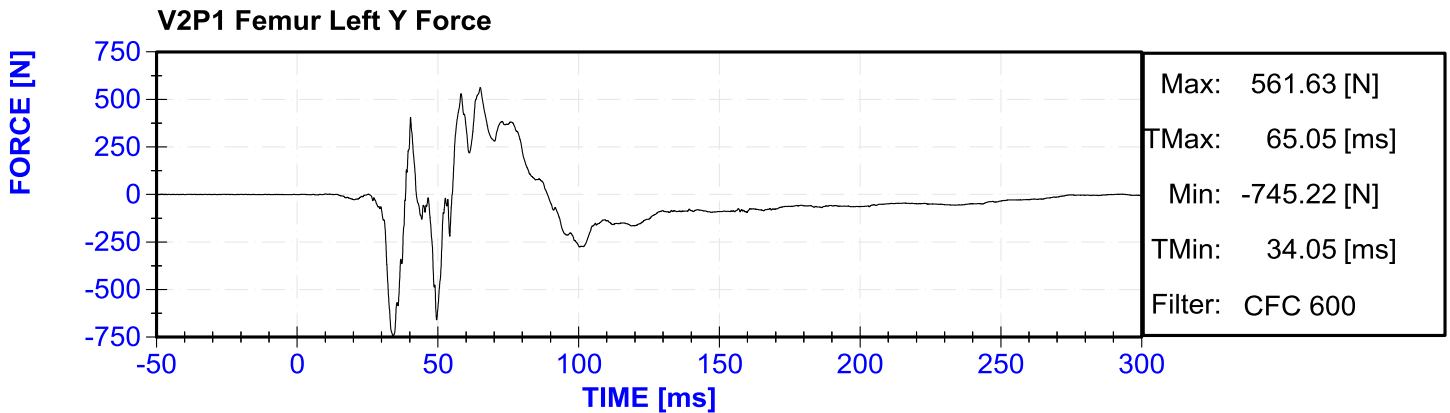


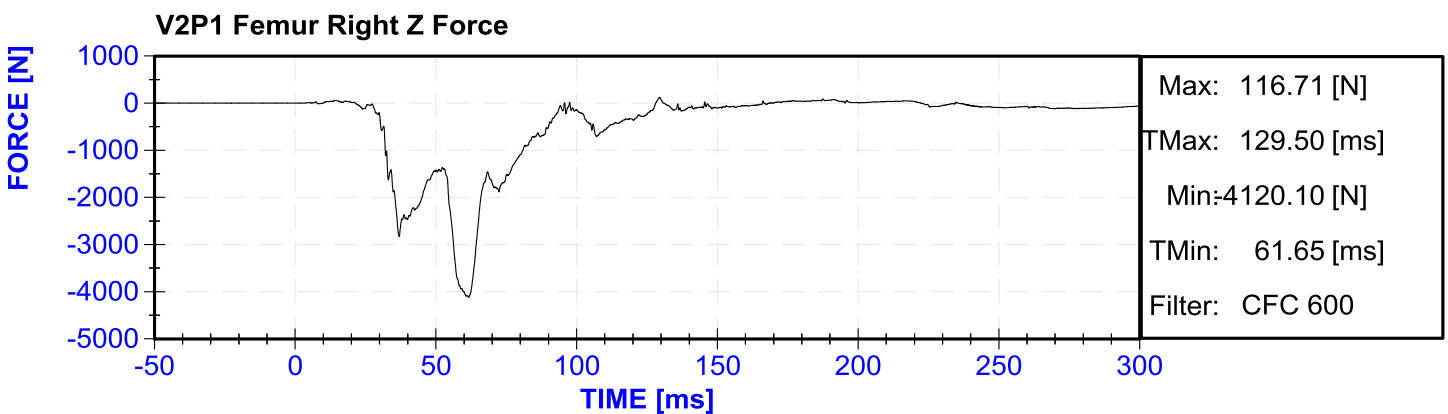
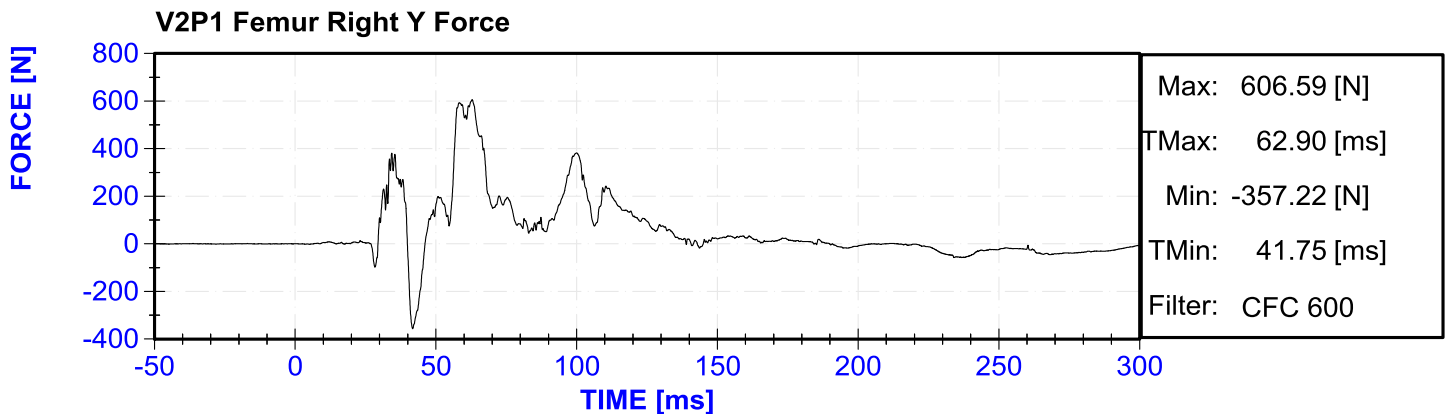
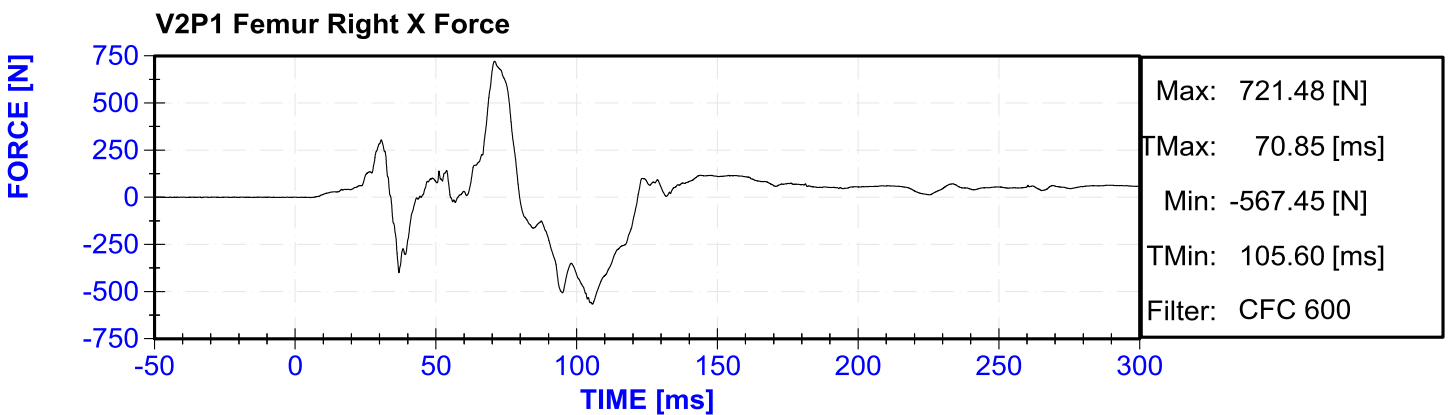
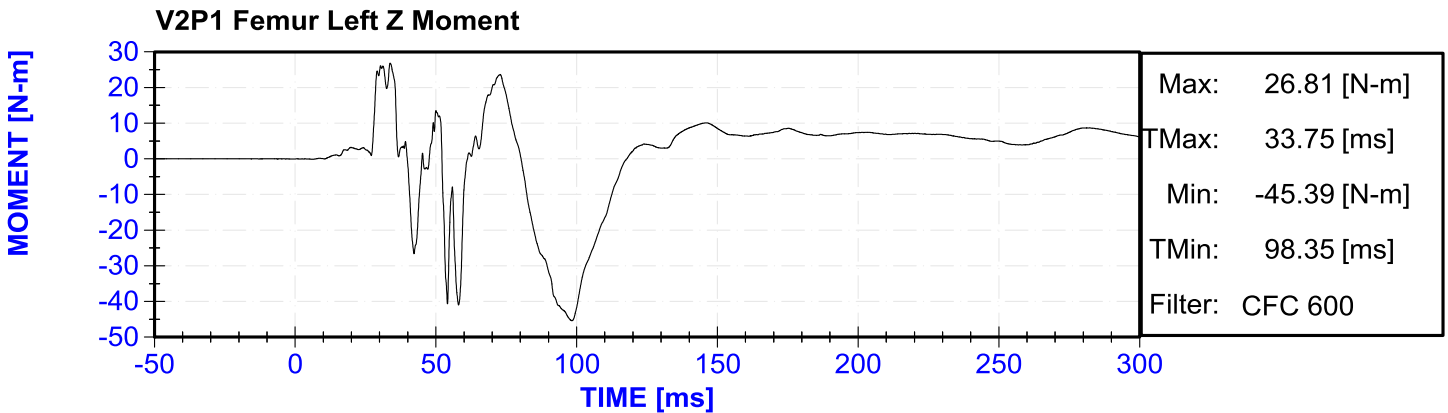


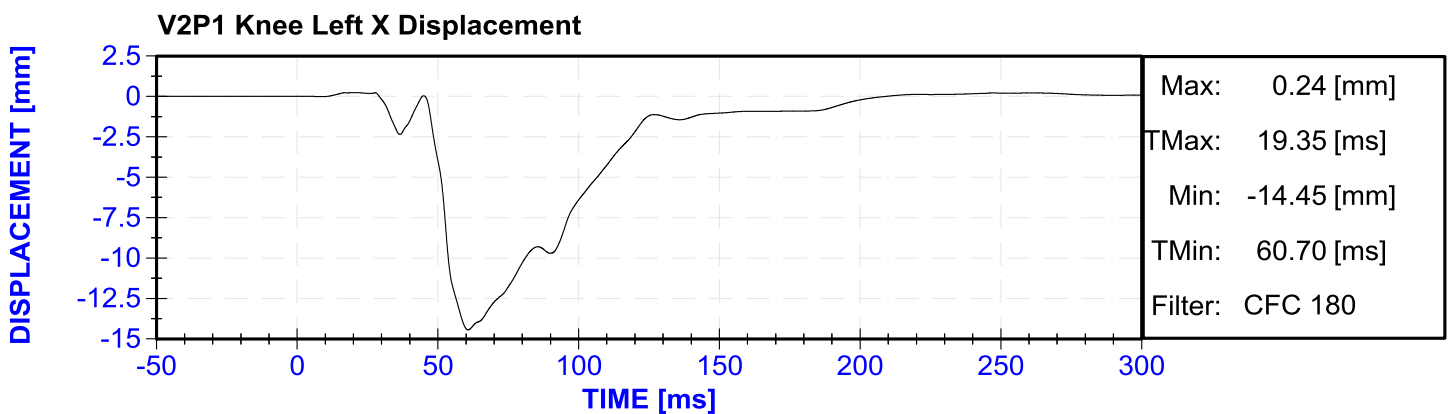
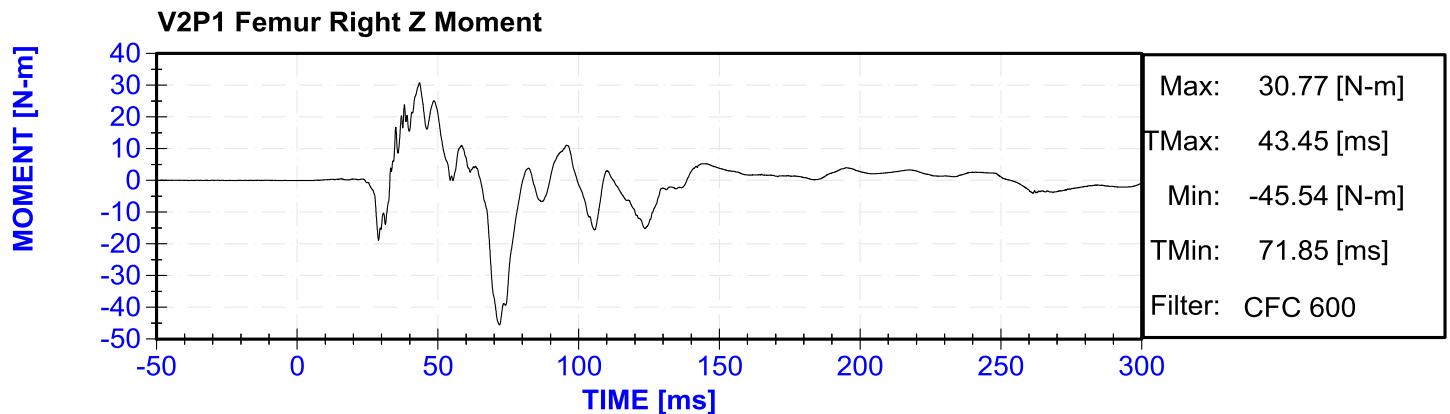
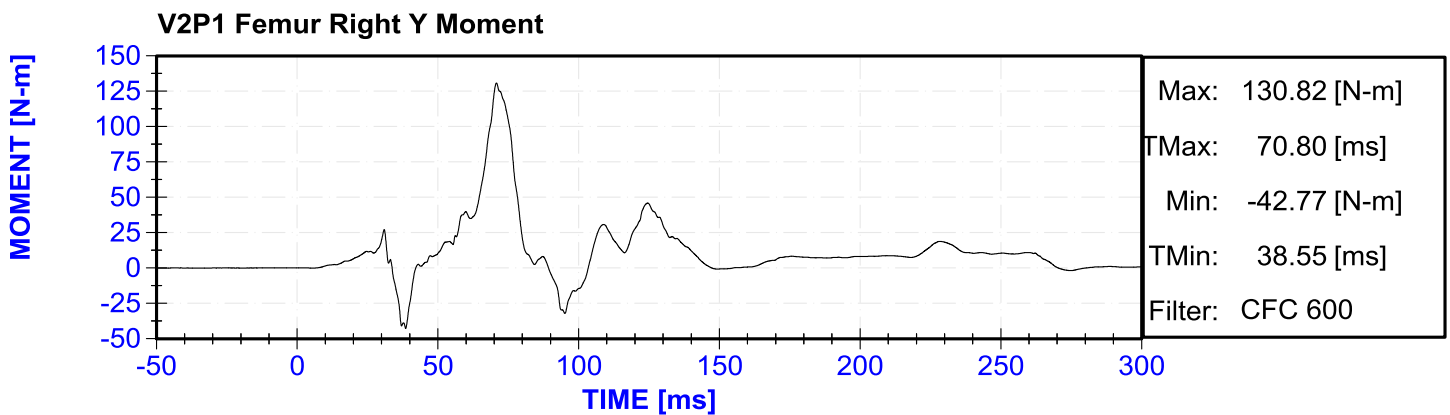
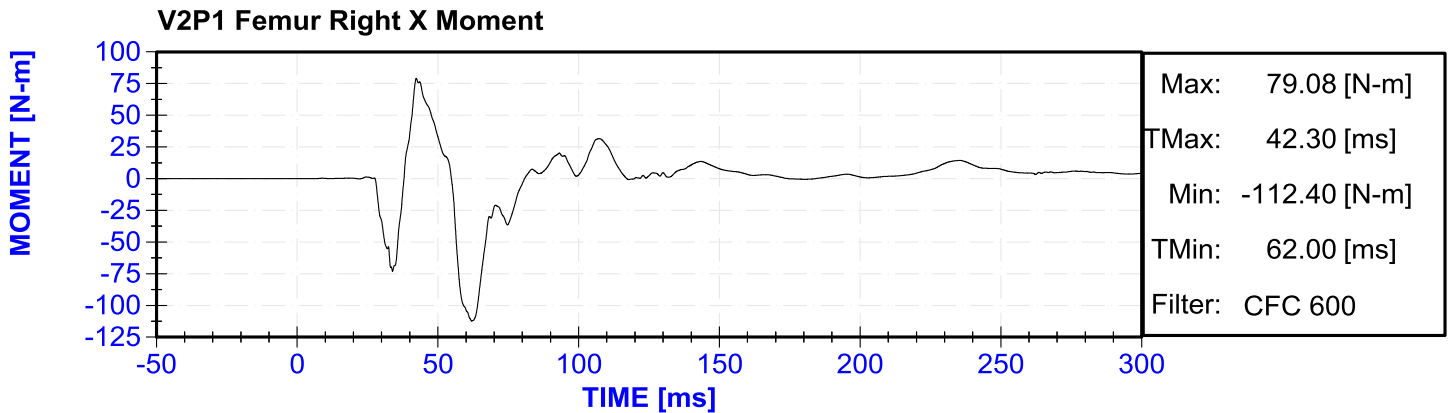


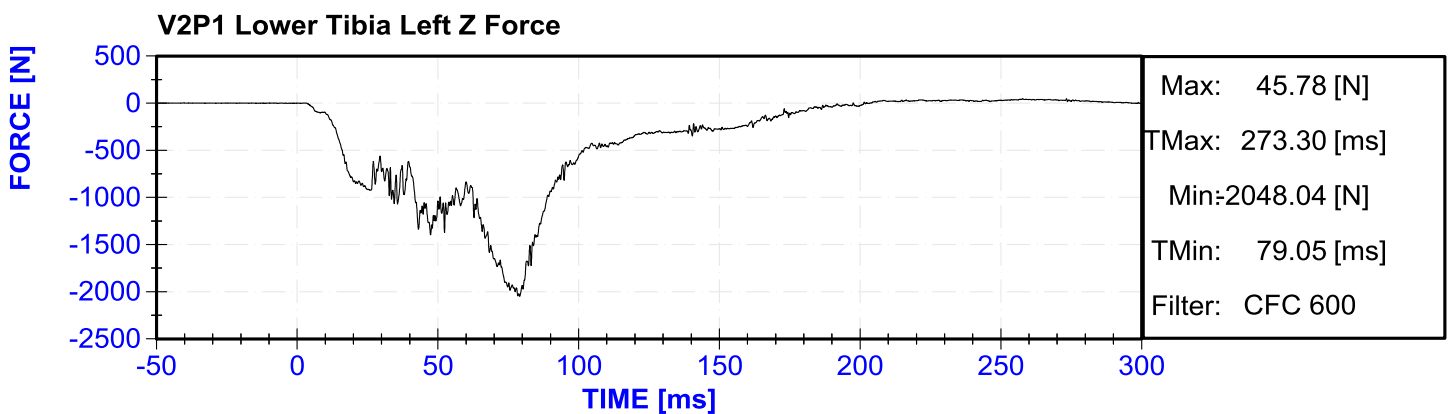
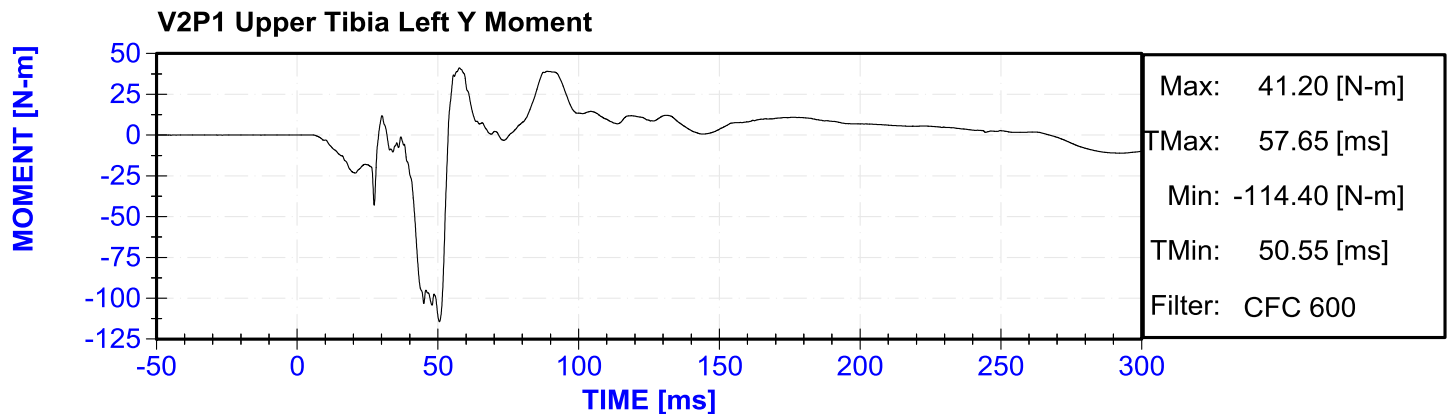
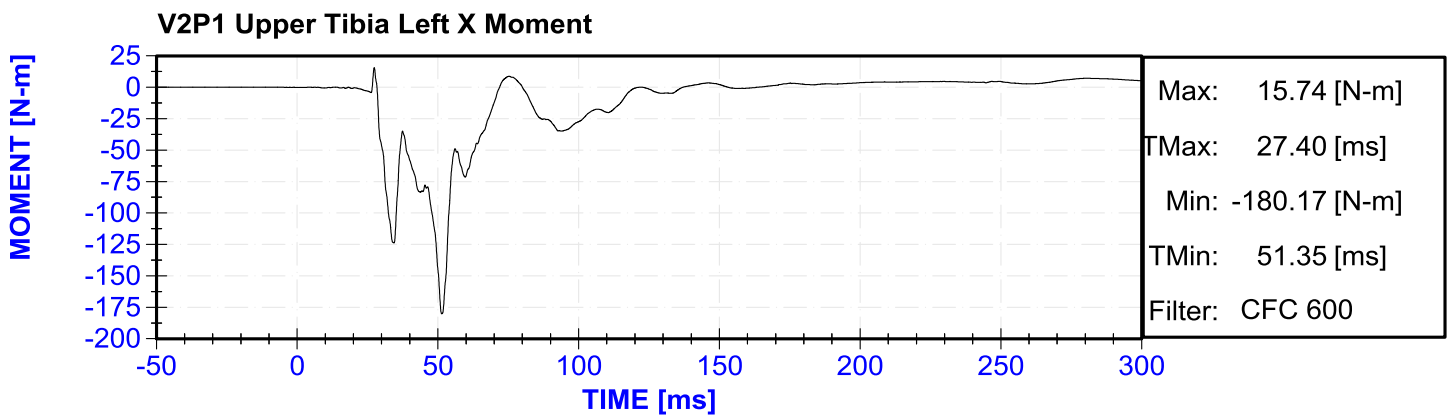
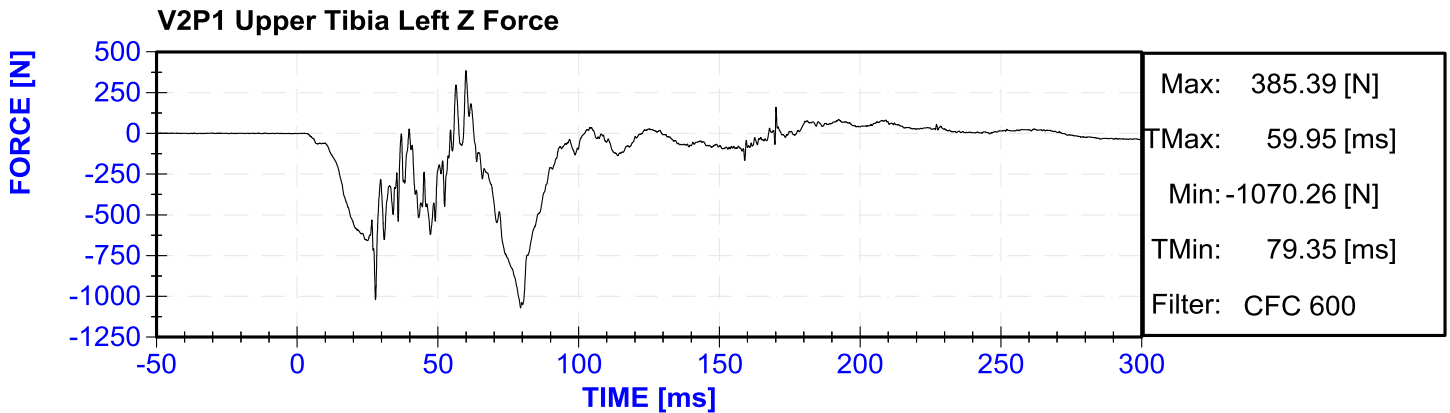


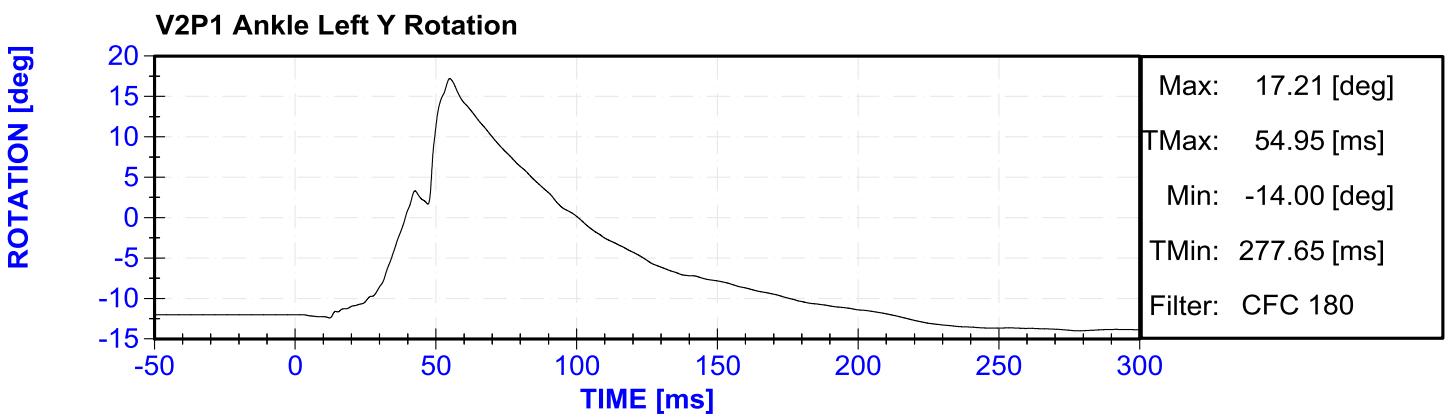
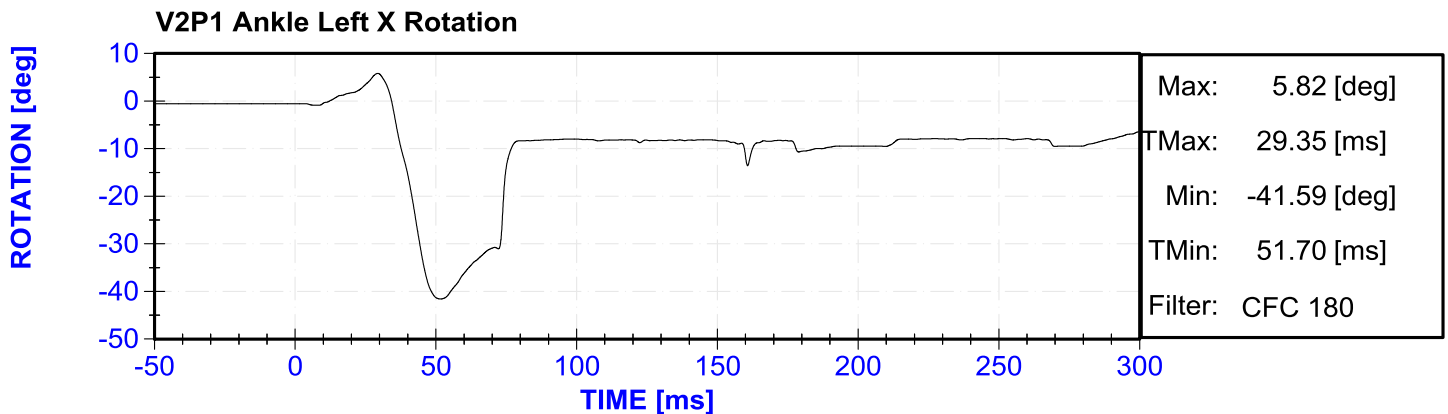
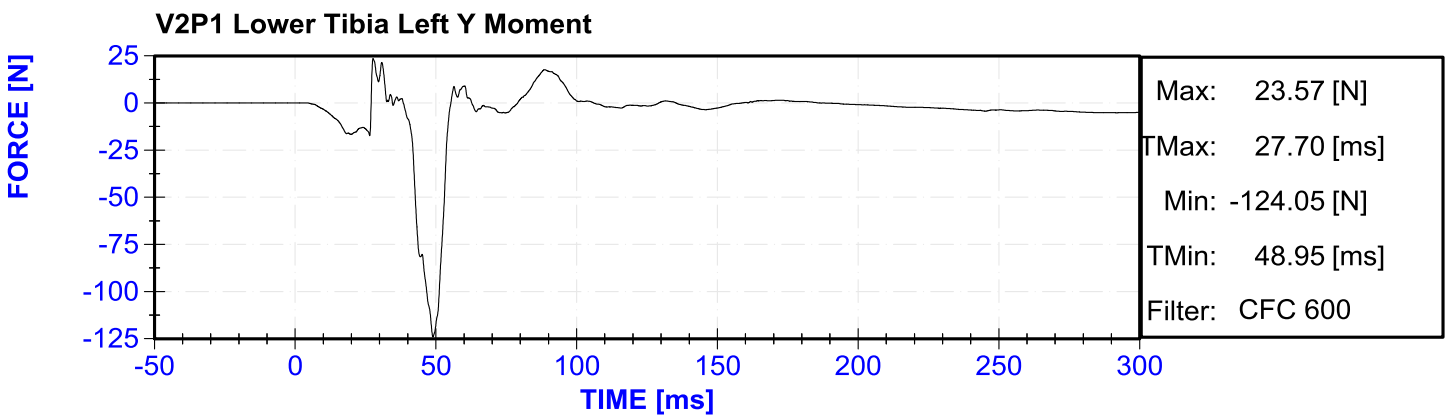
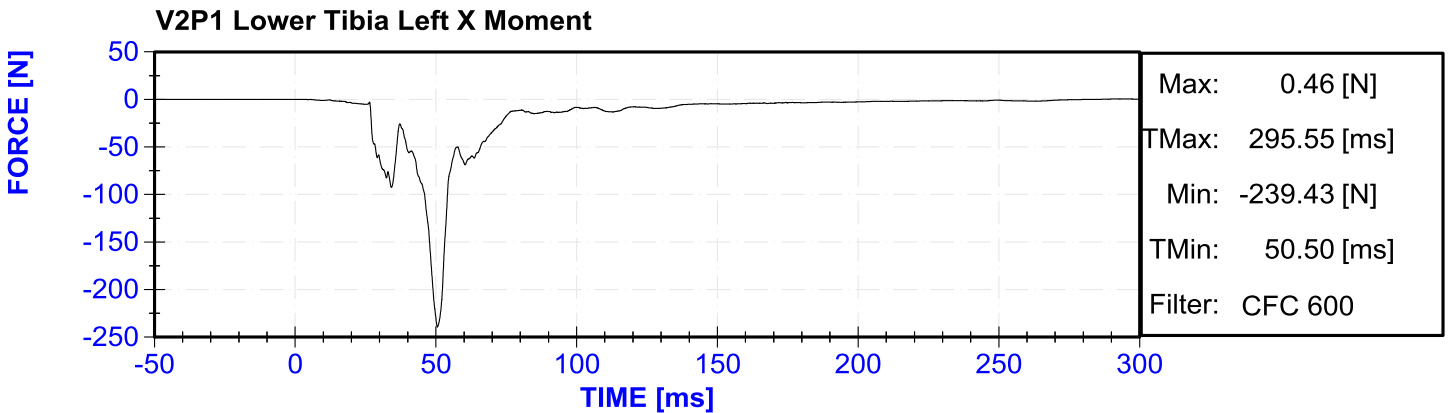


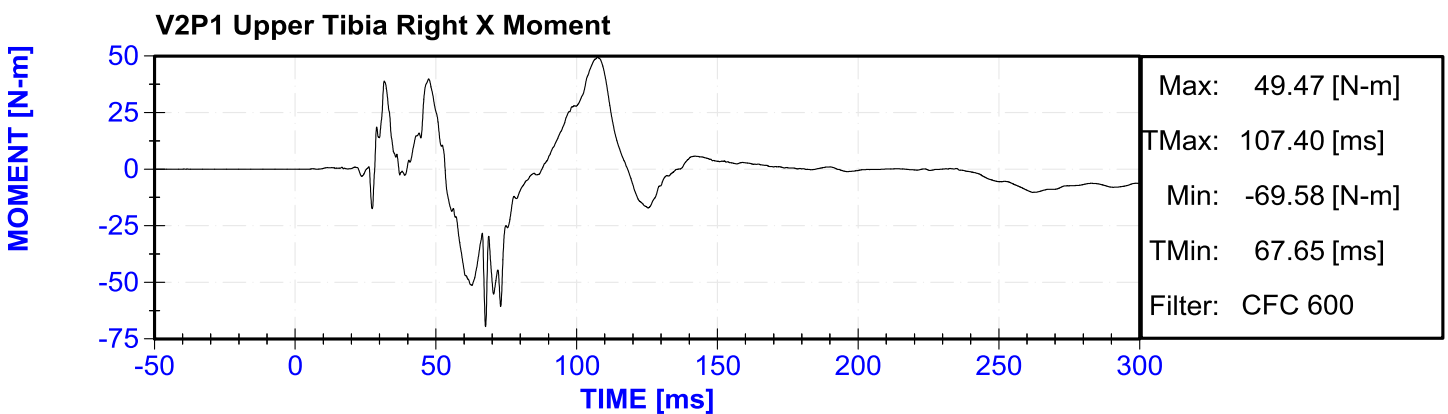
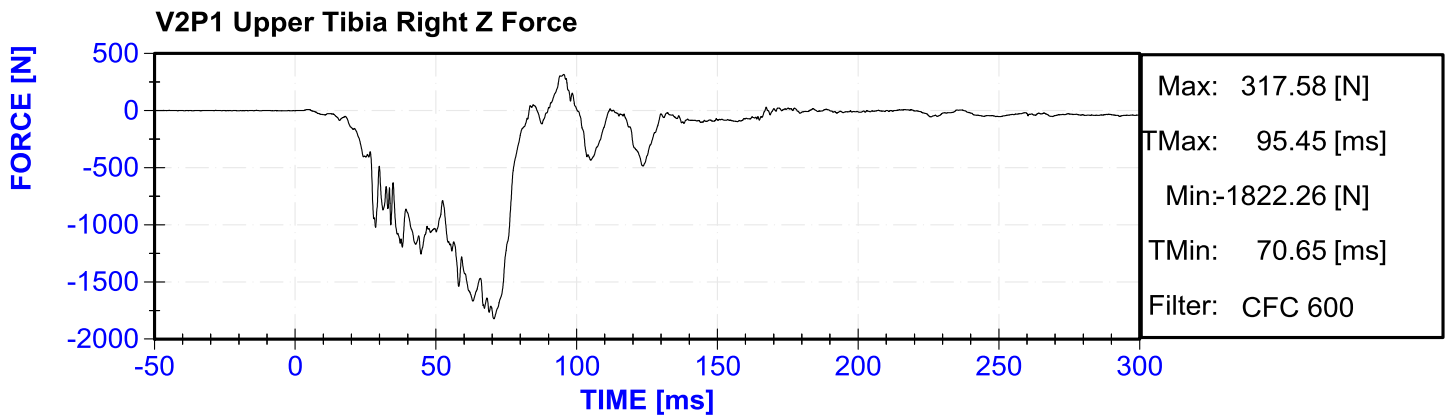
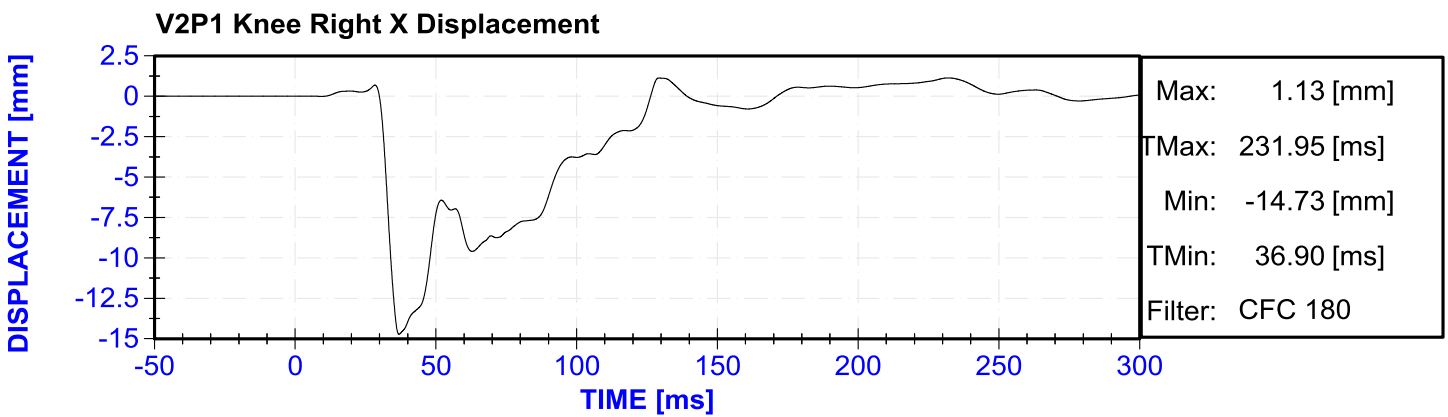
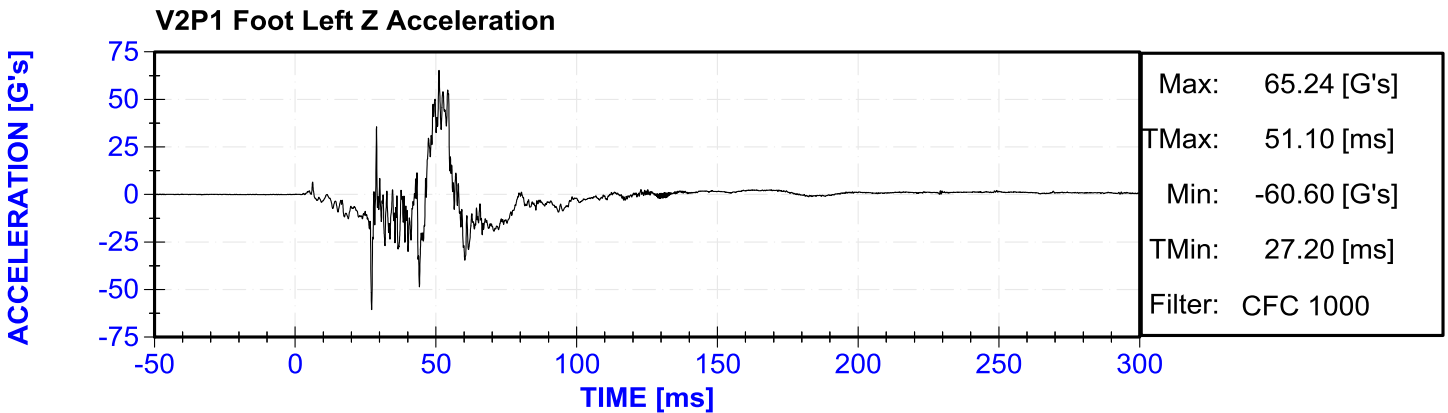


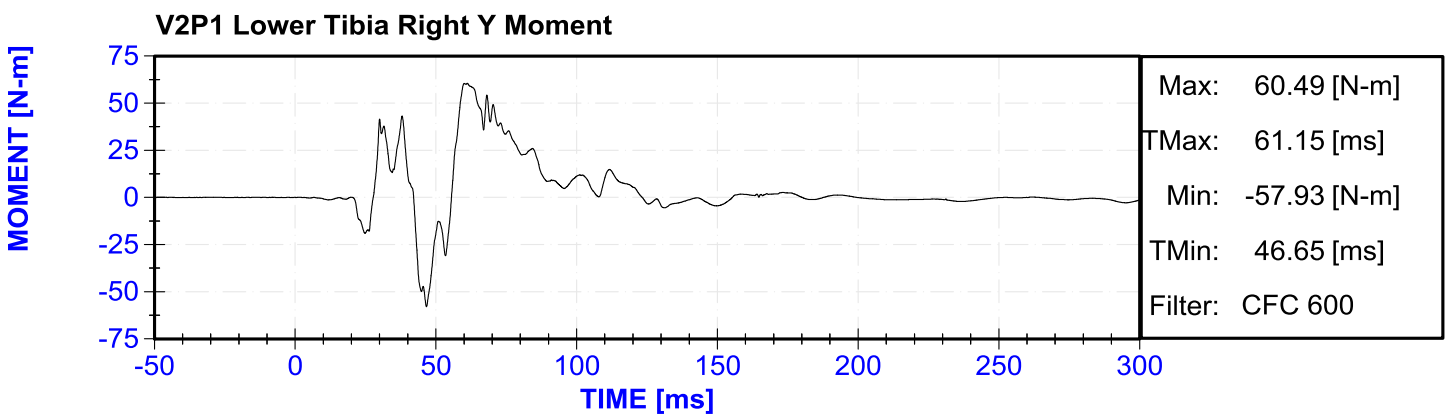
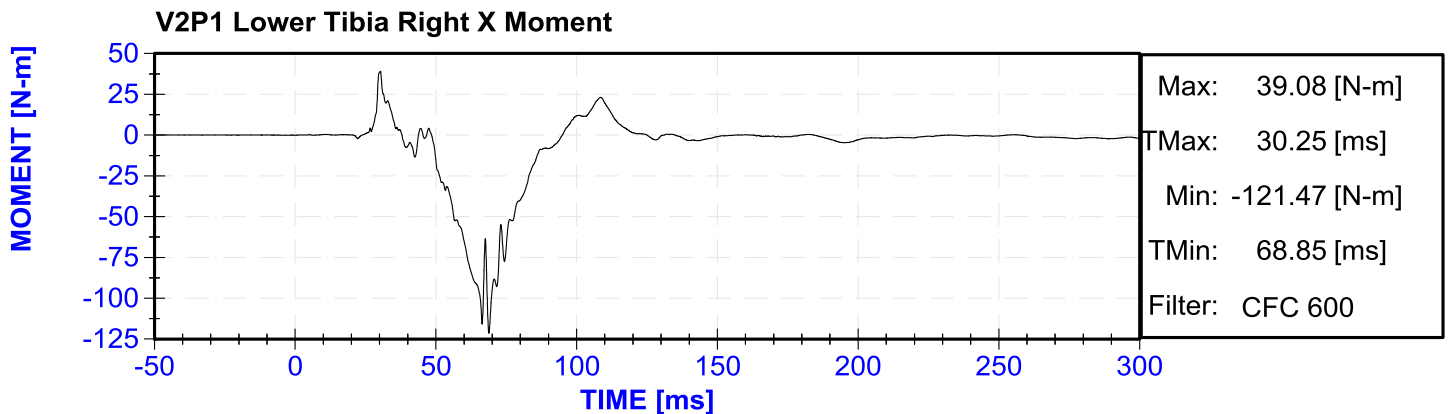
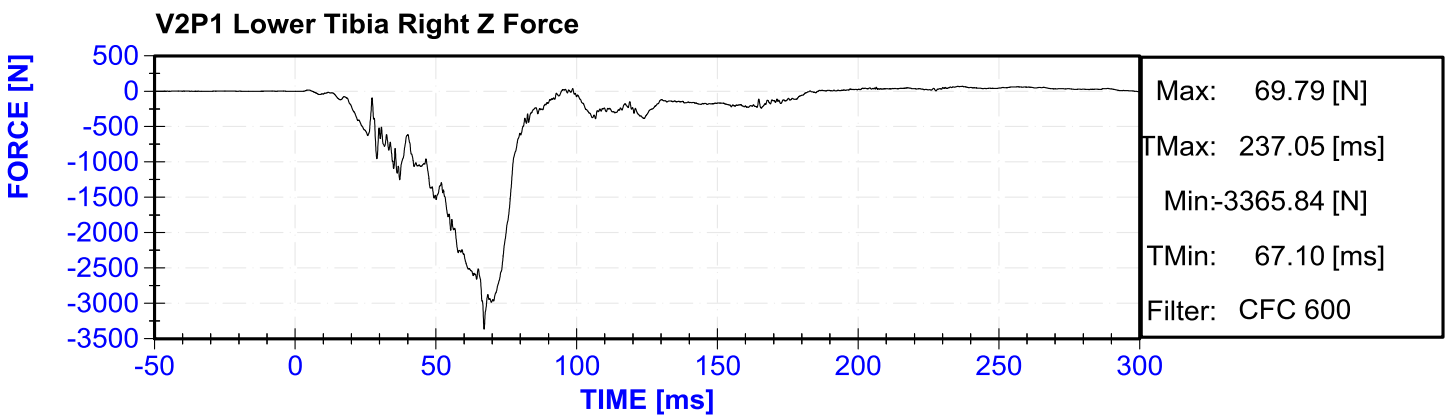
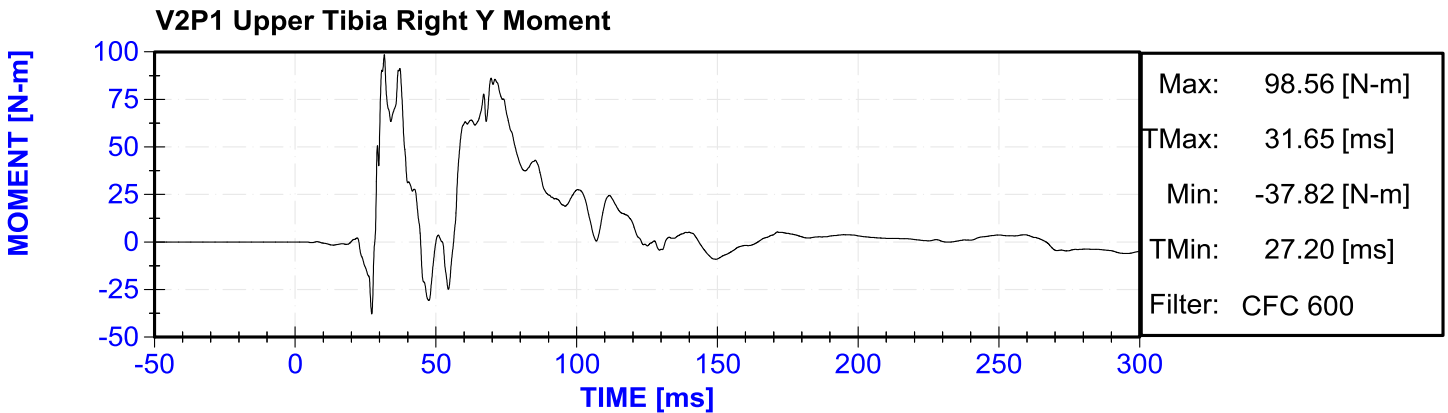


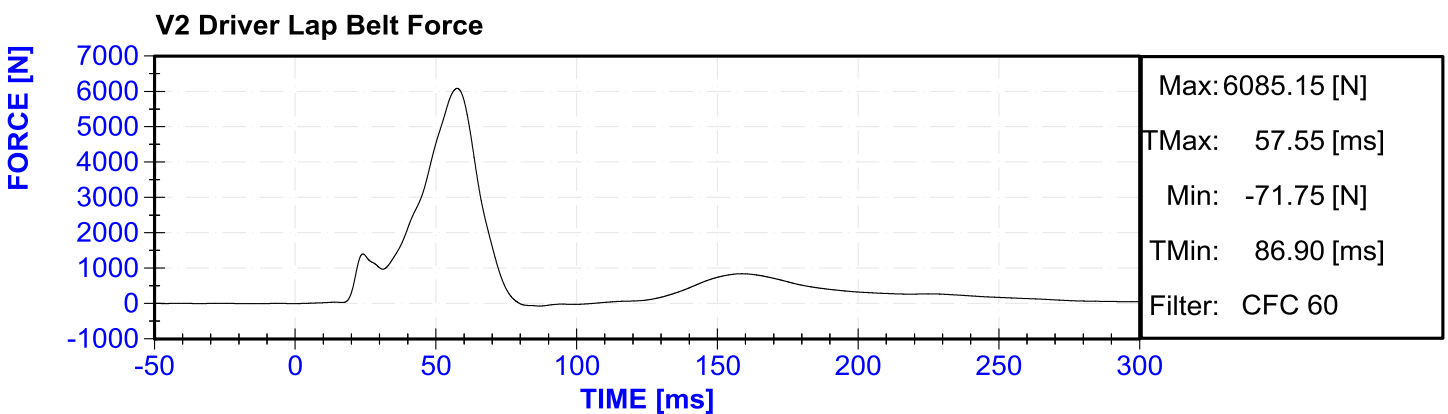
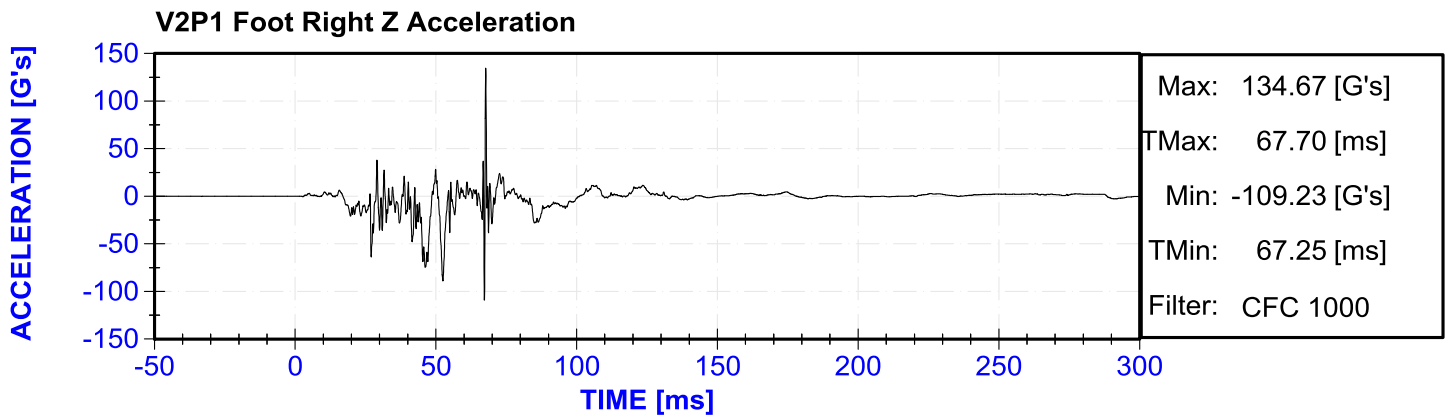
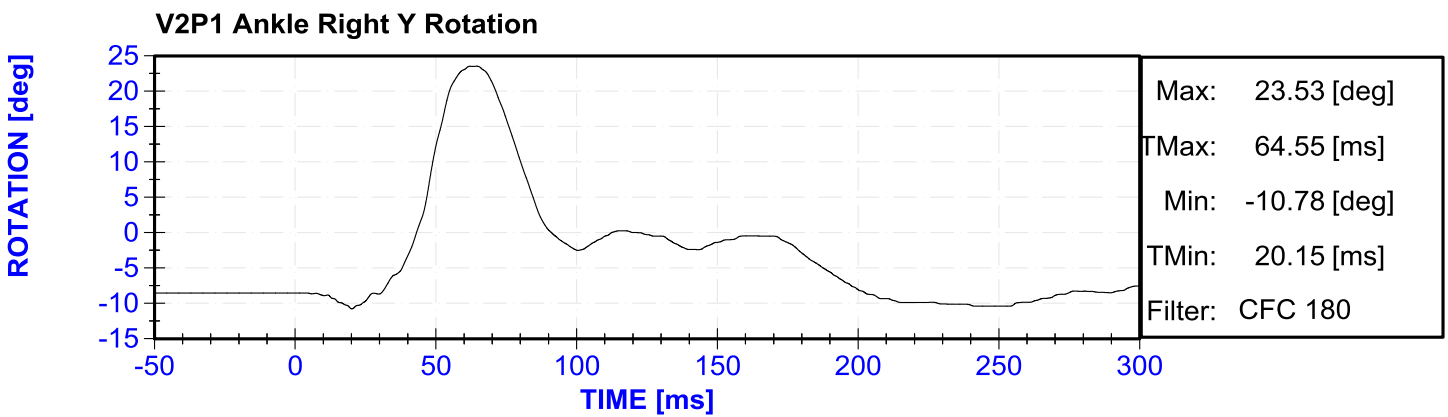
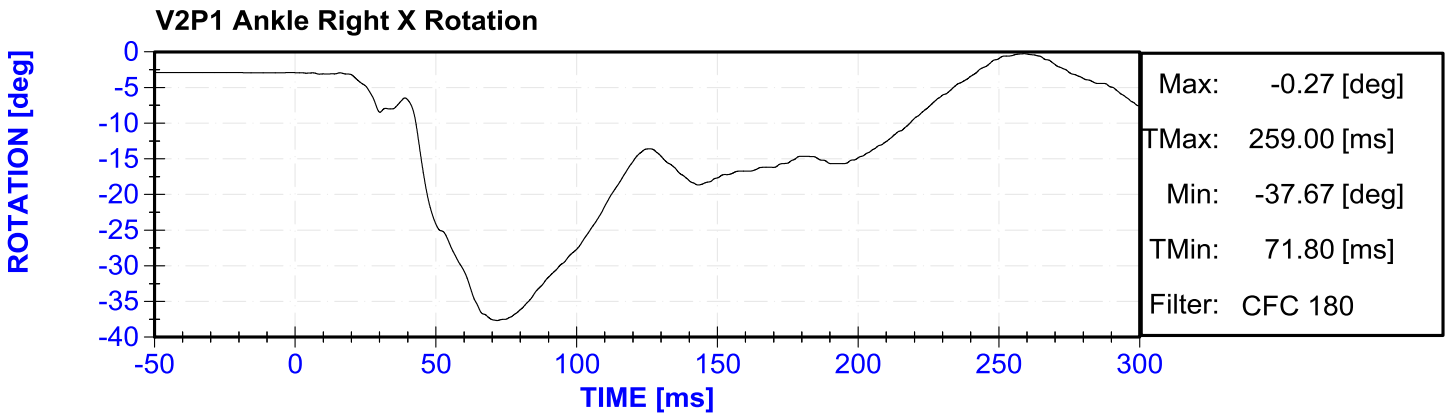




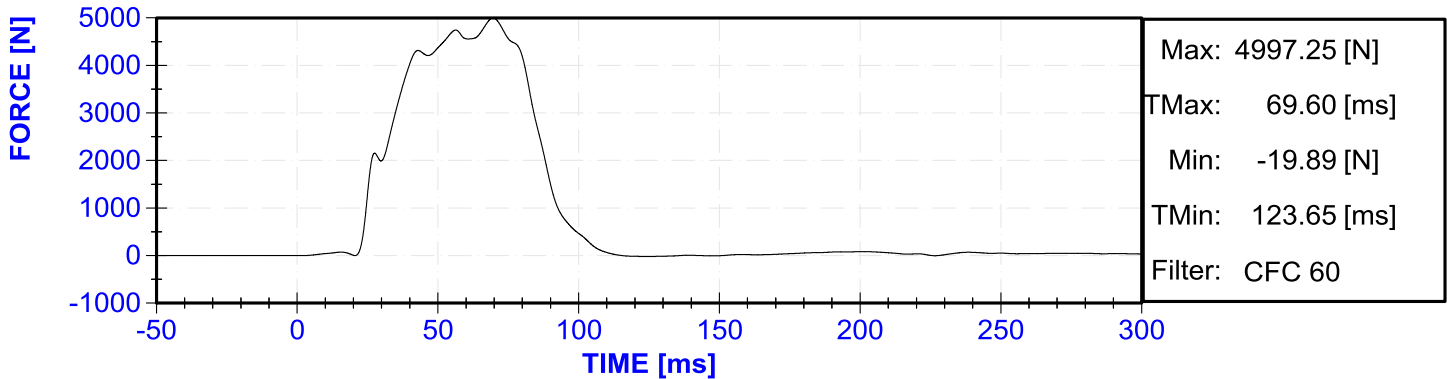




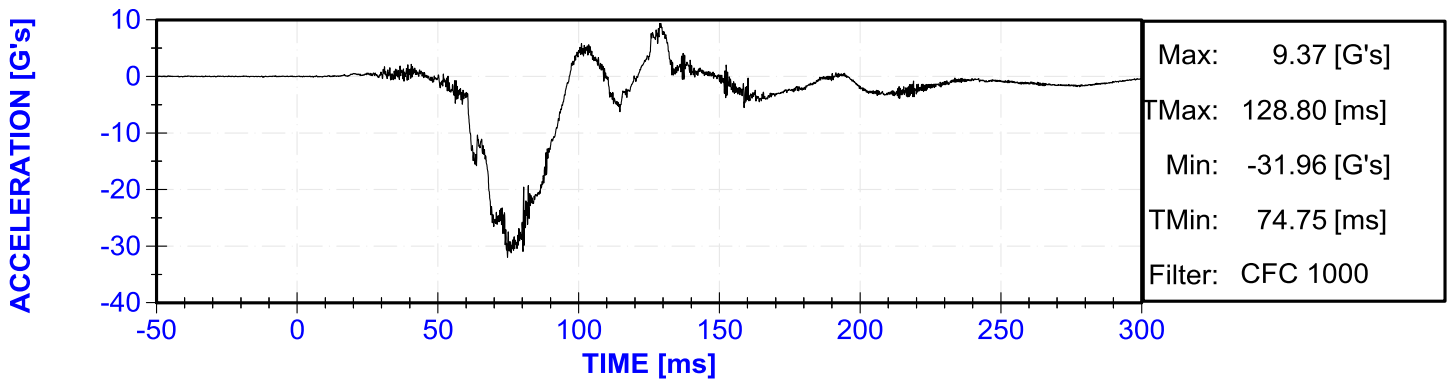




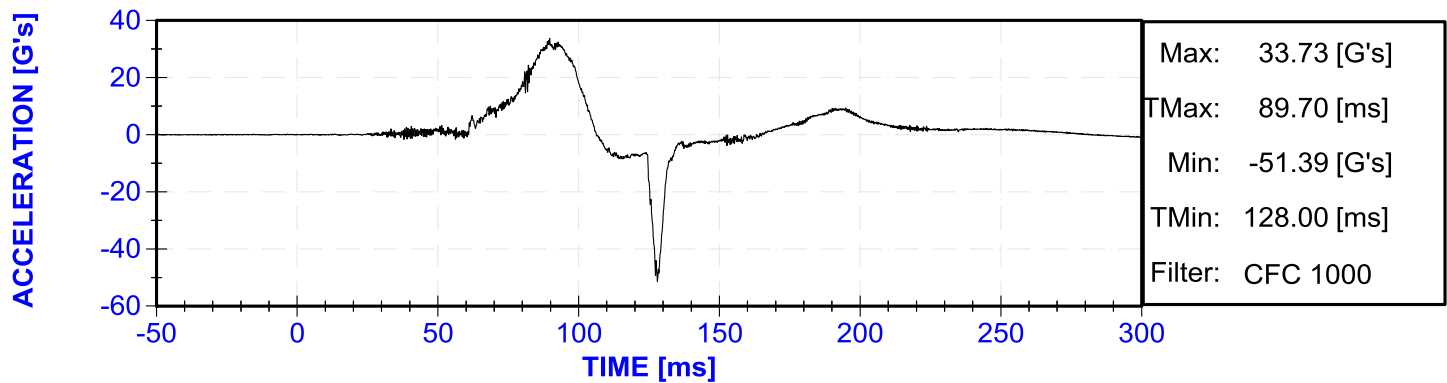
V2 Driver Shoulder Belt Force



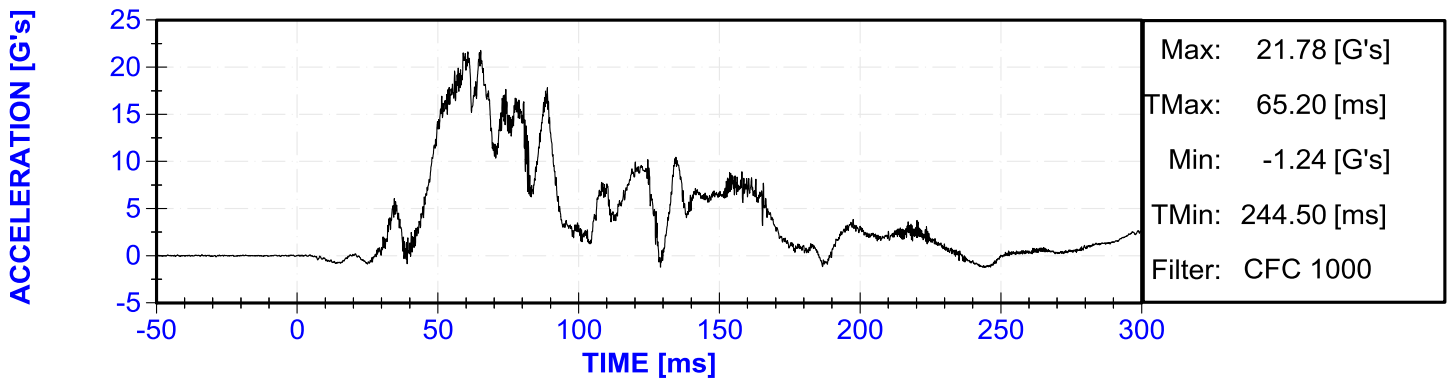
V2P2 Head CG X Acceleration

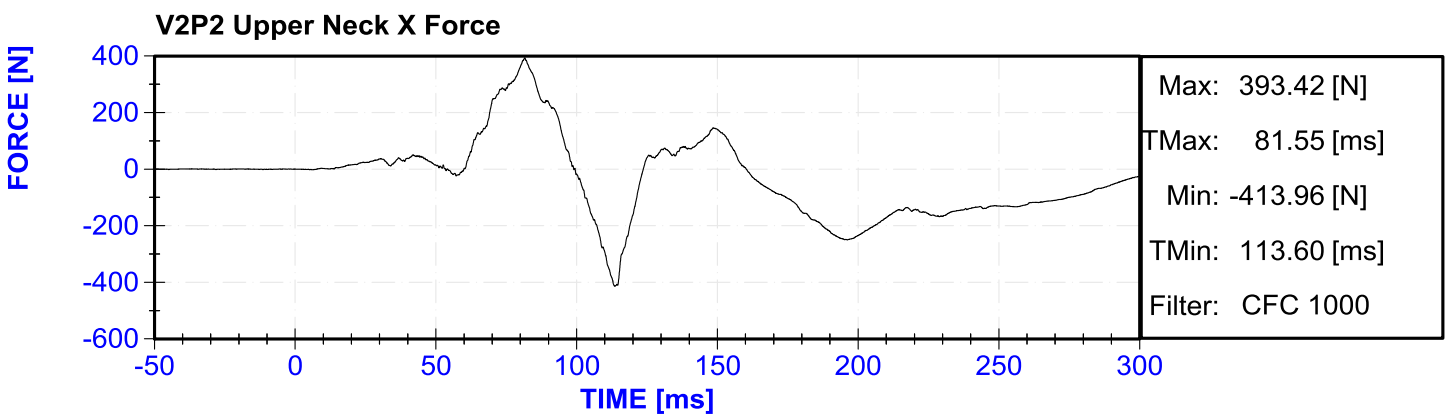
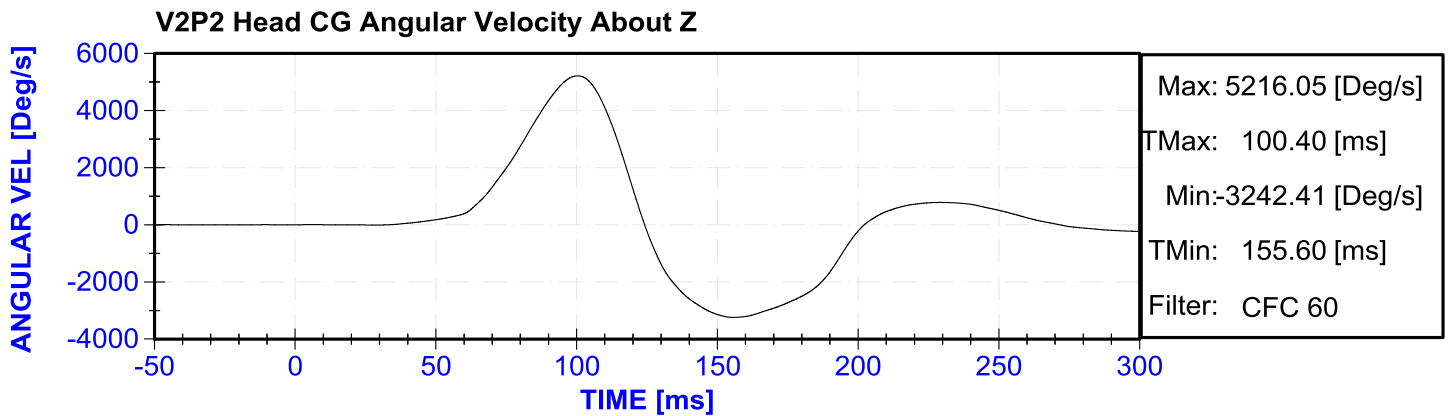
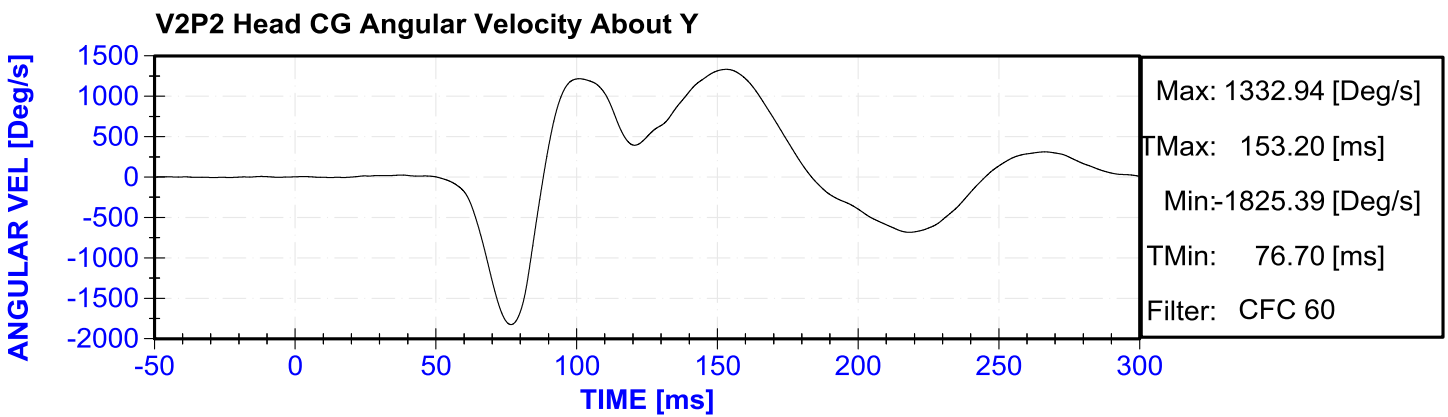
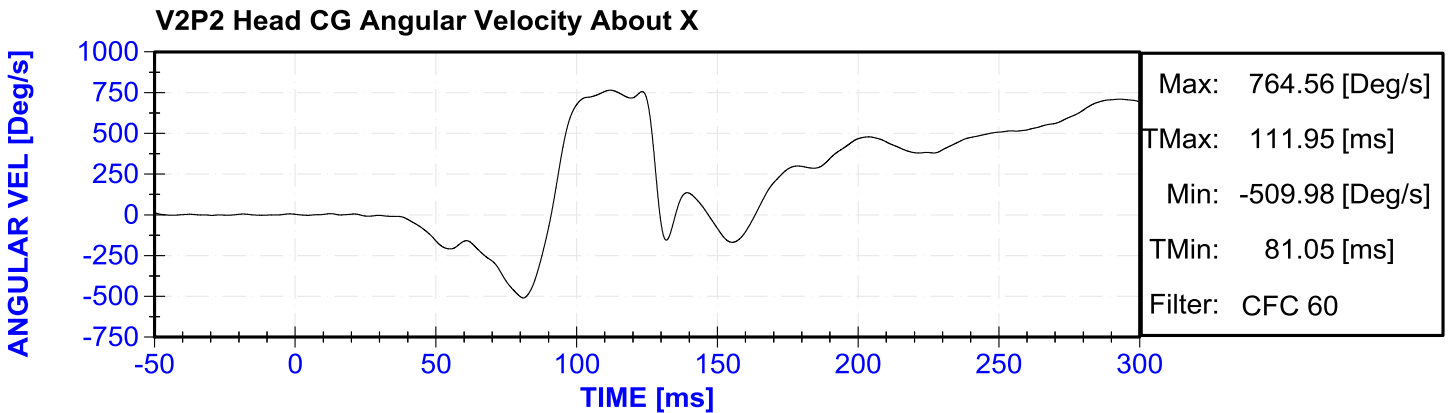


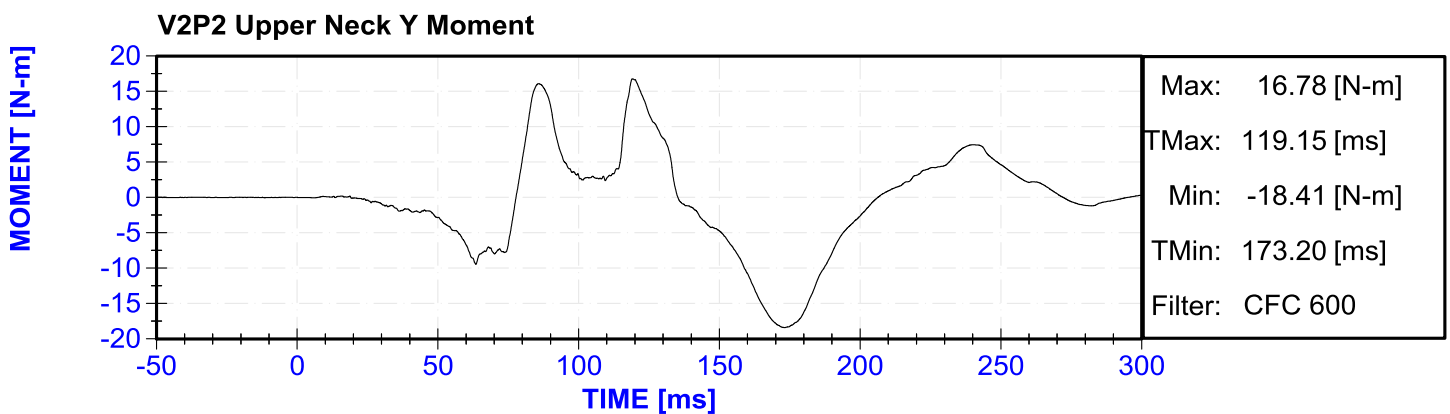
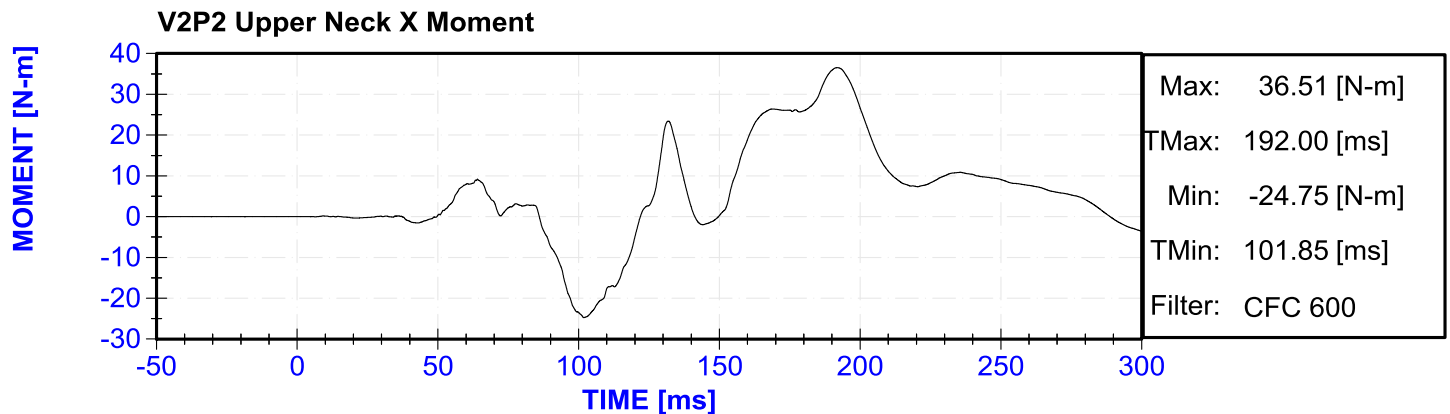
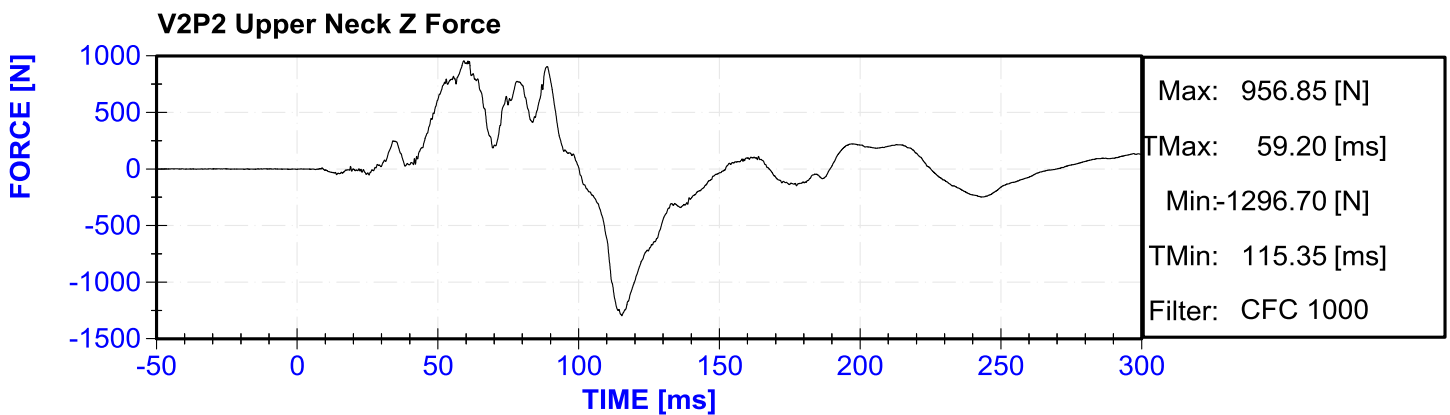
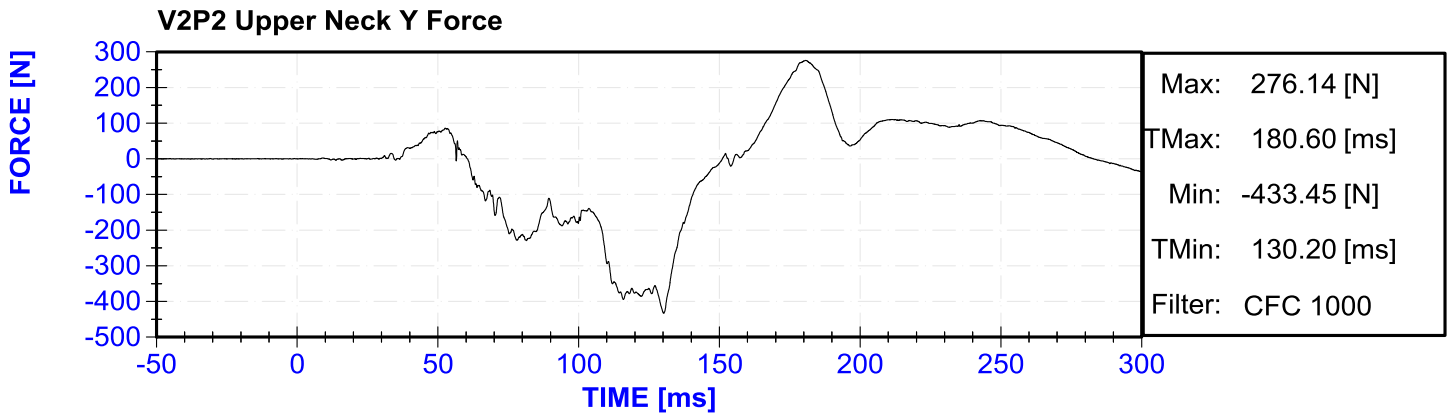
V2P2 Head CG Y Acceleration

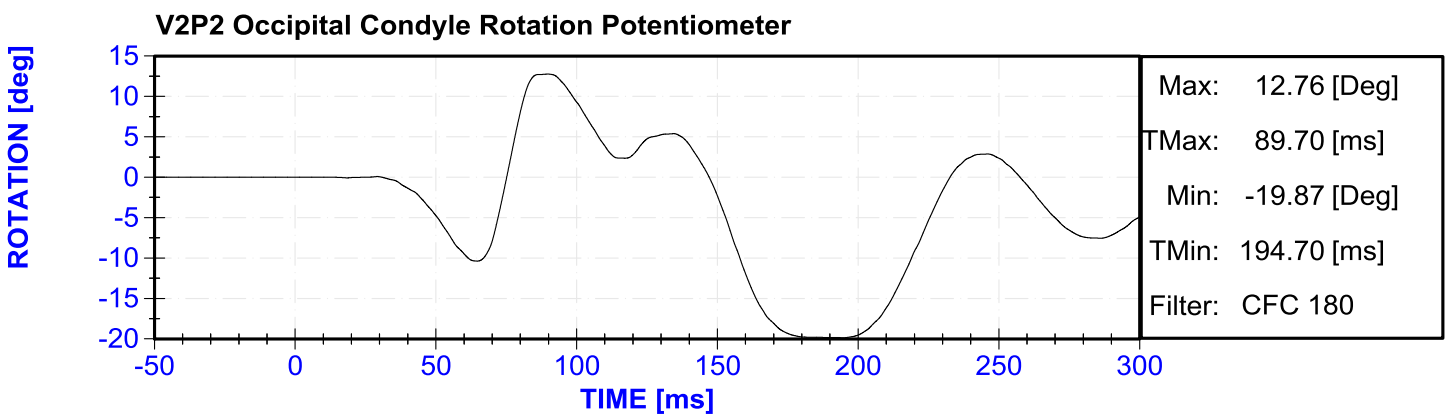
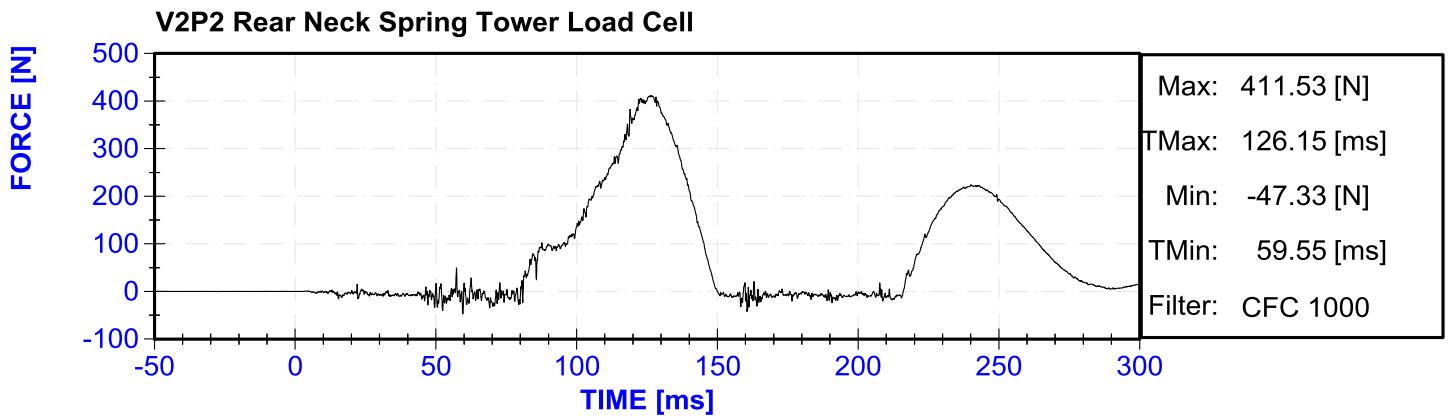
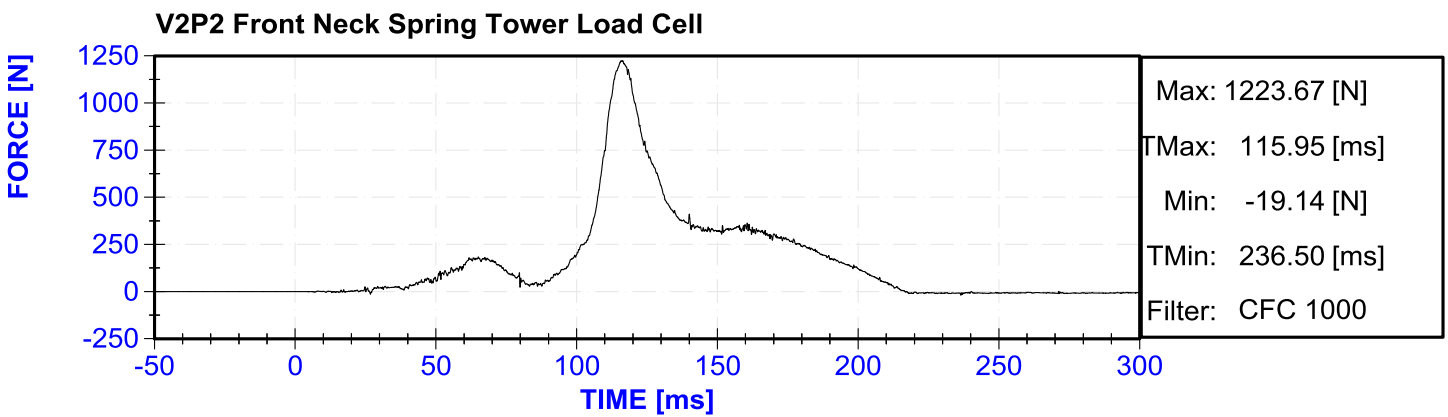
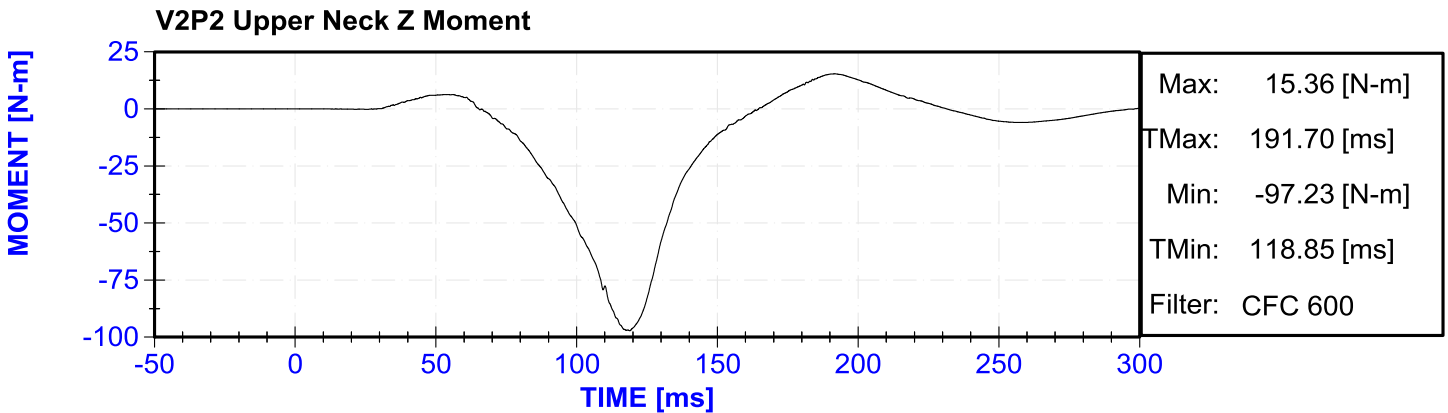


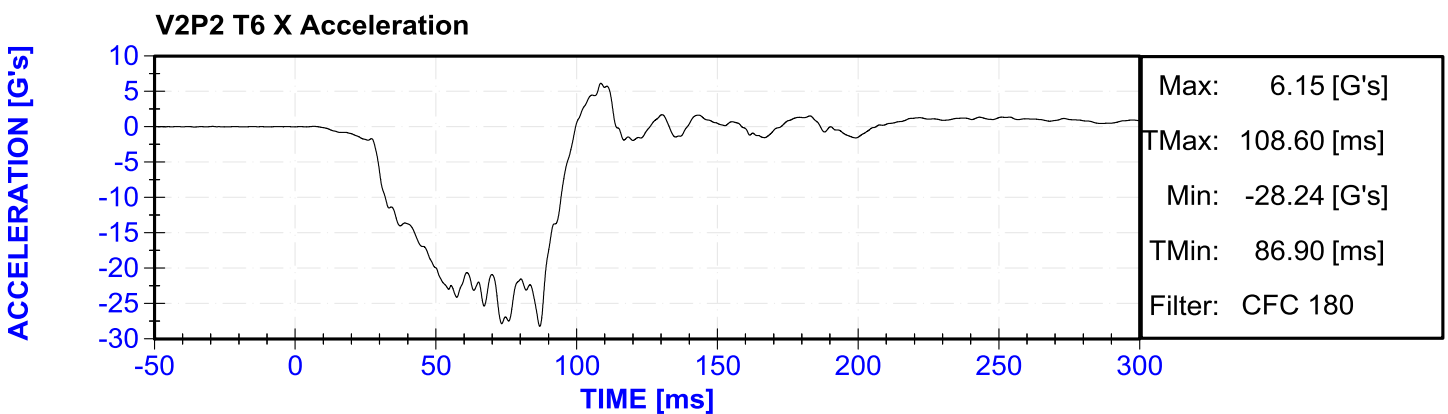
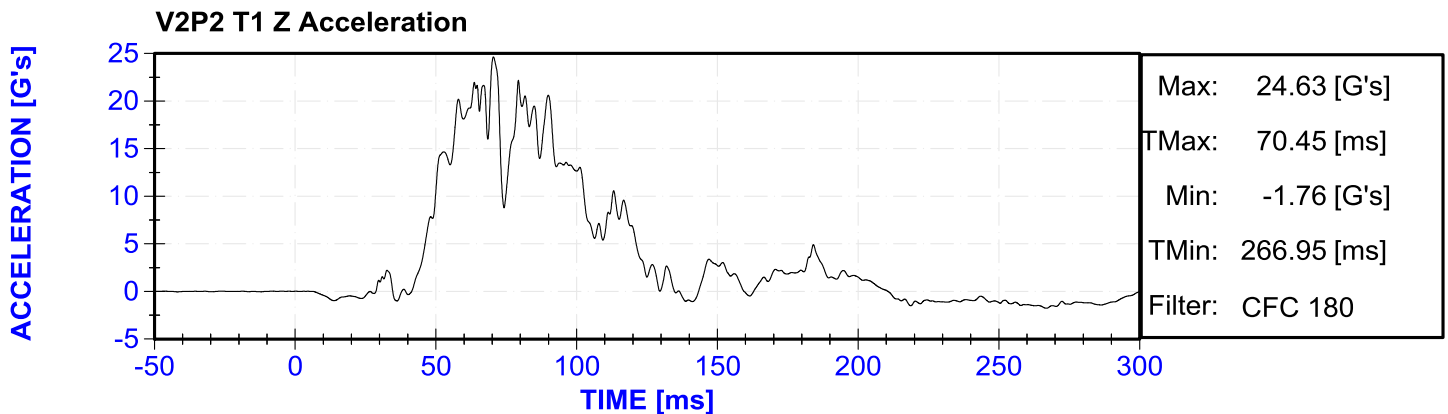
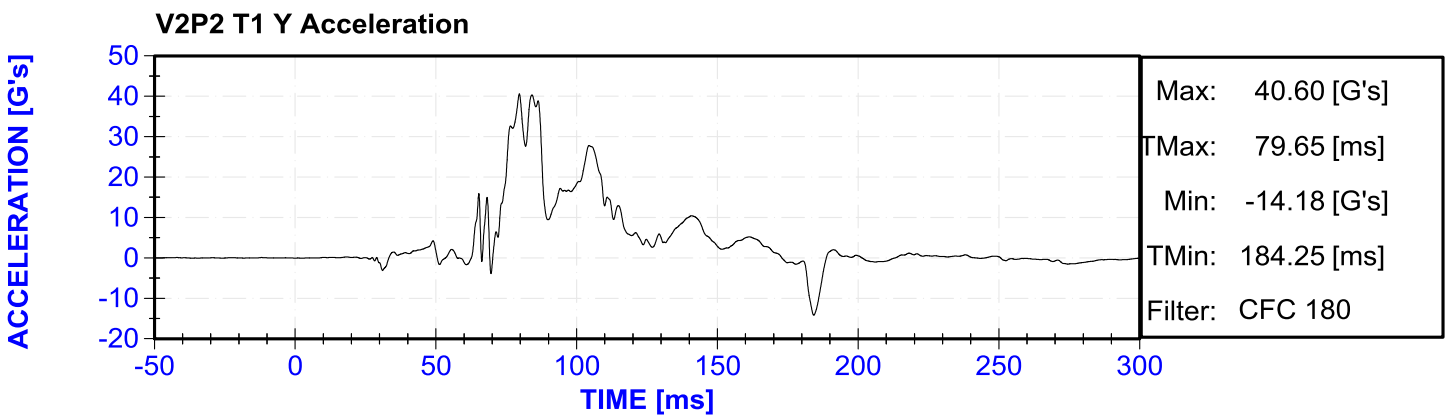
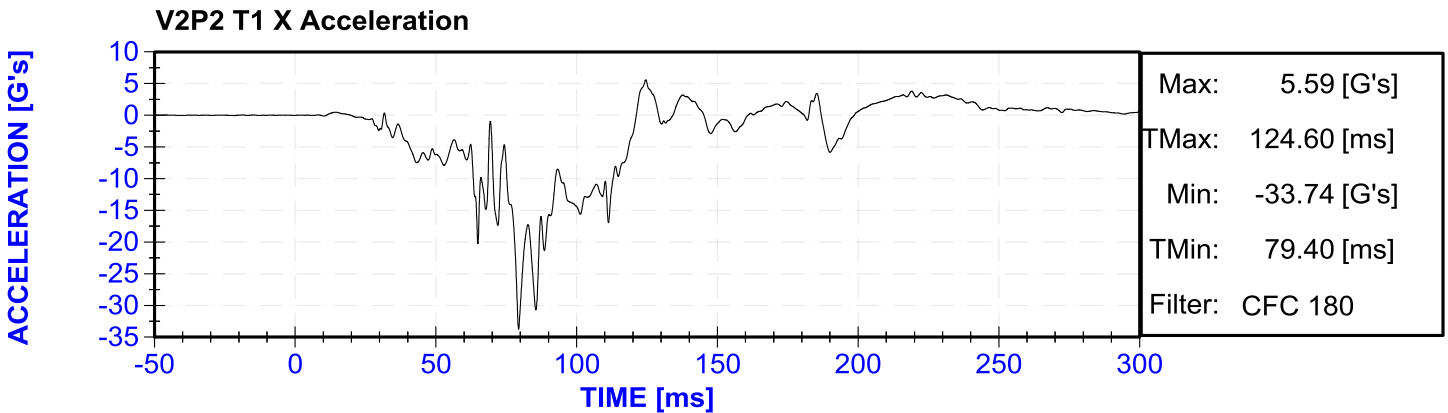
V2P2 Head CG Z Acceleration

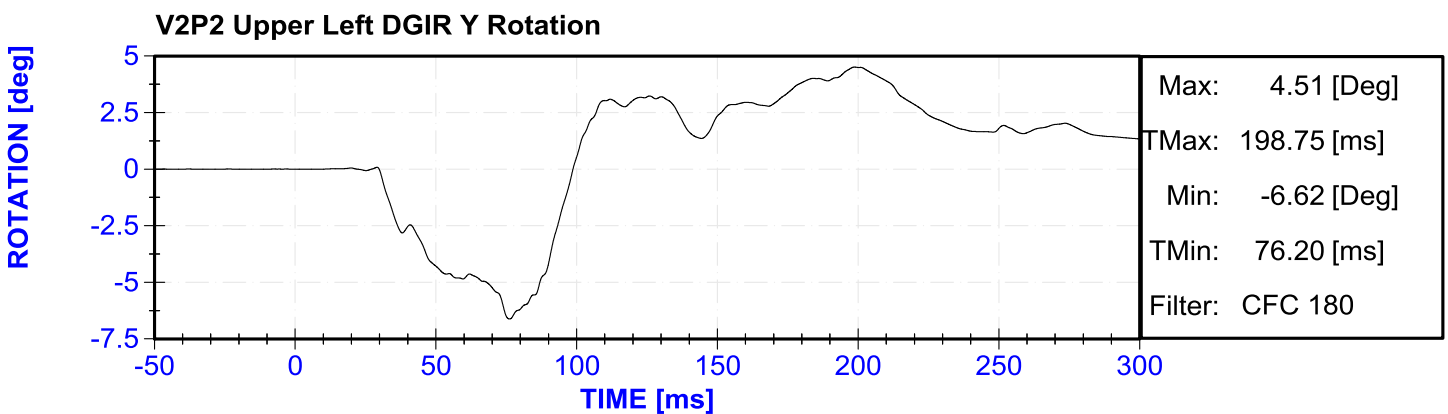
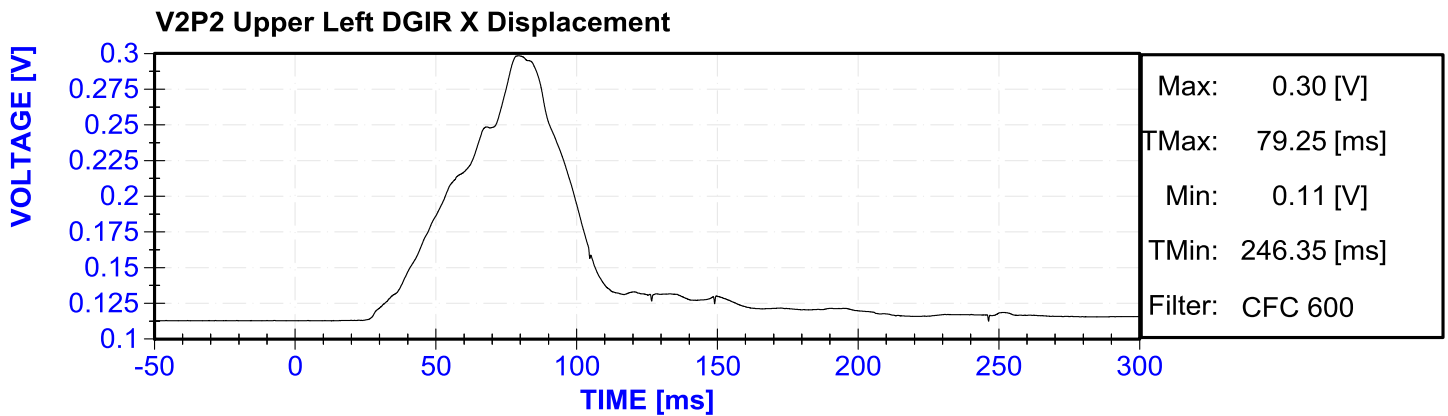
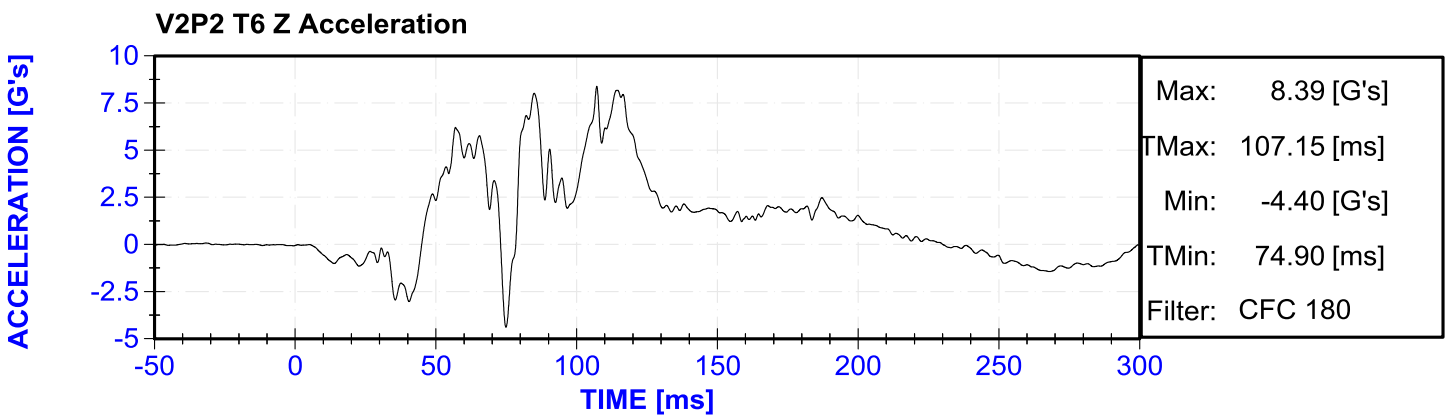
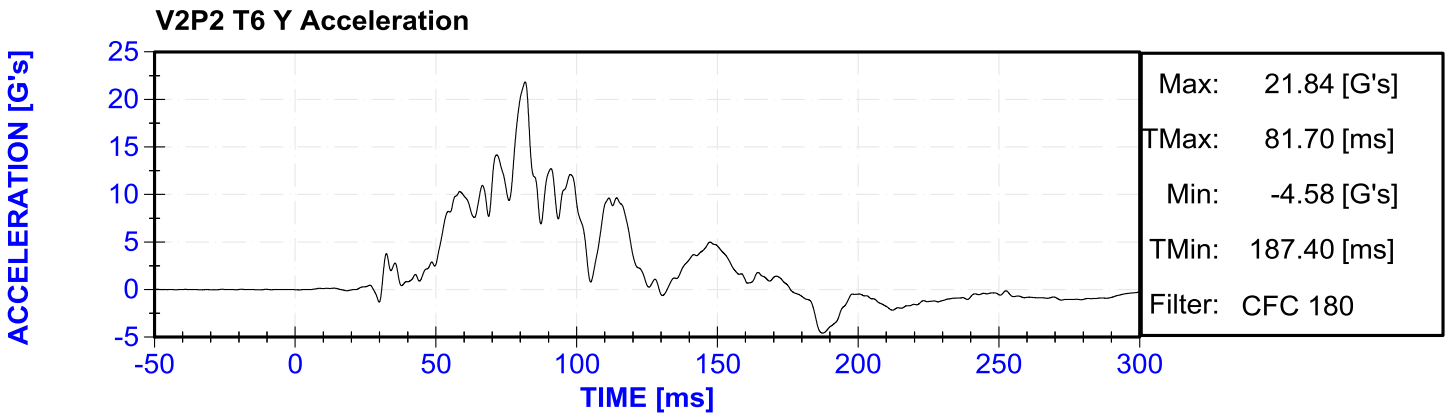


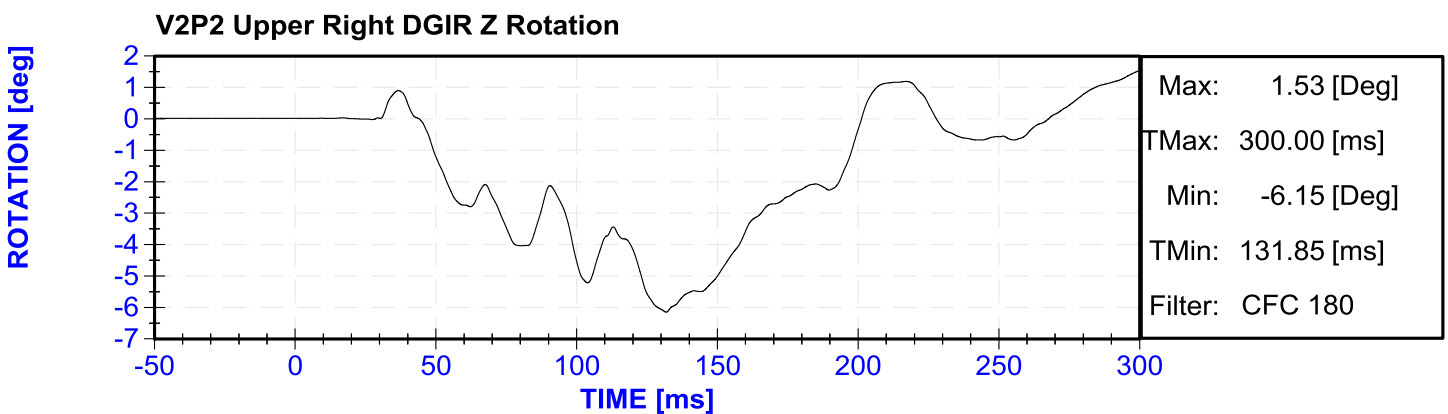
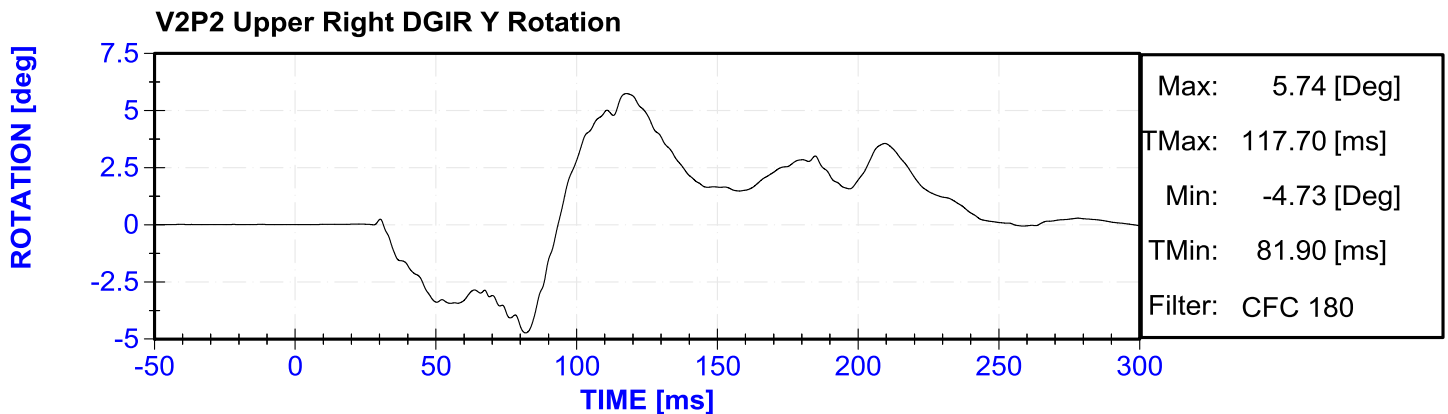
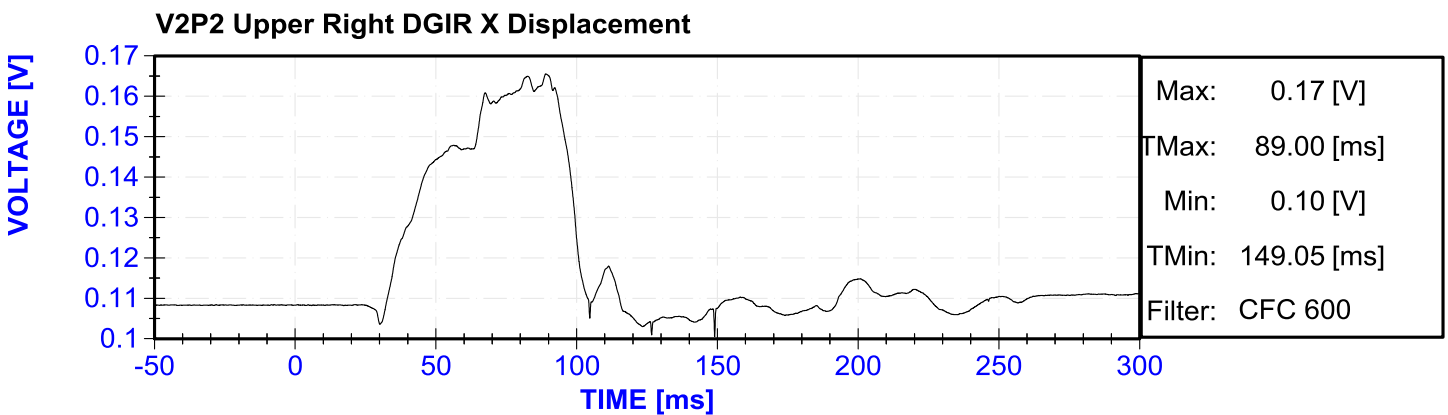
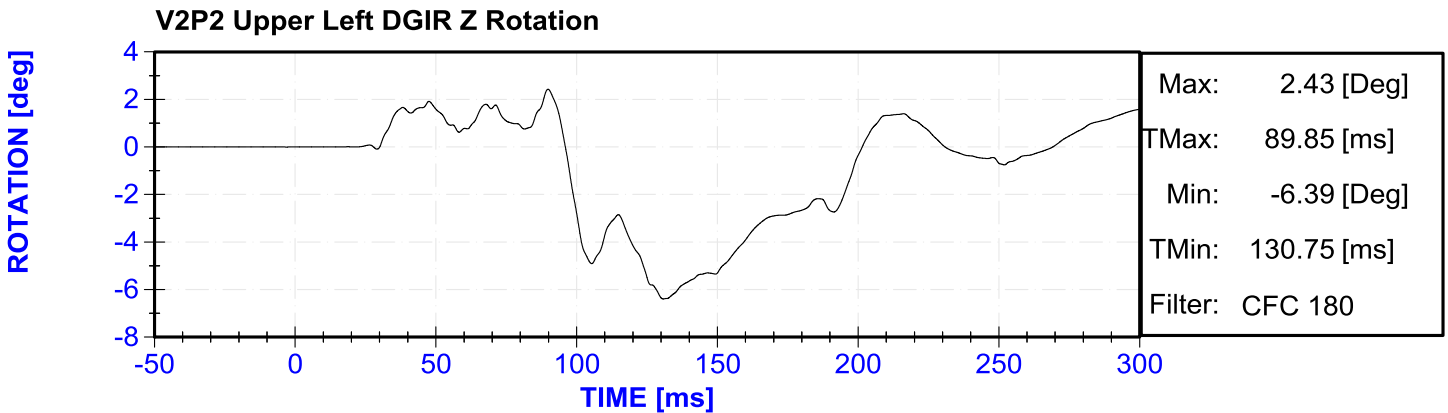


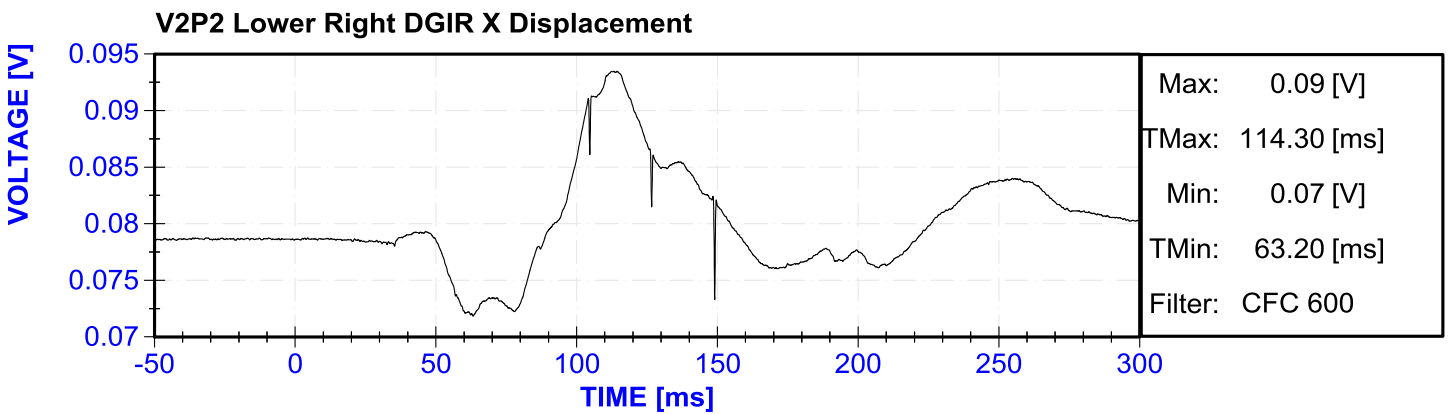
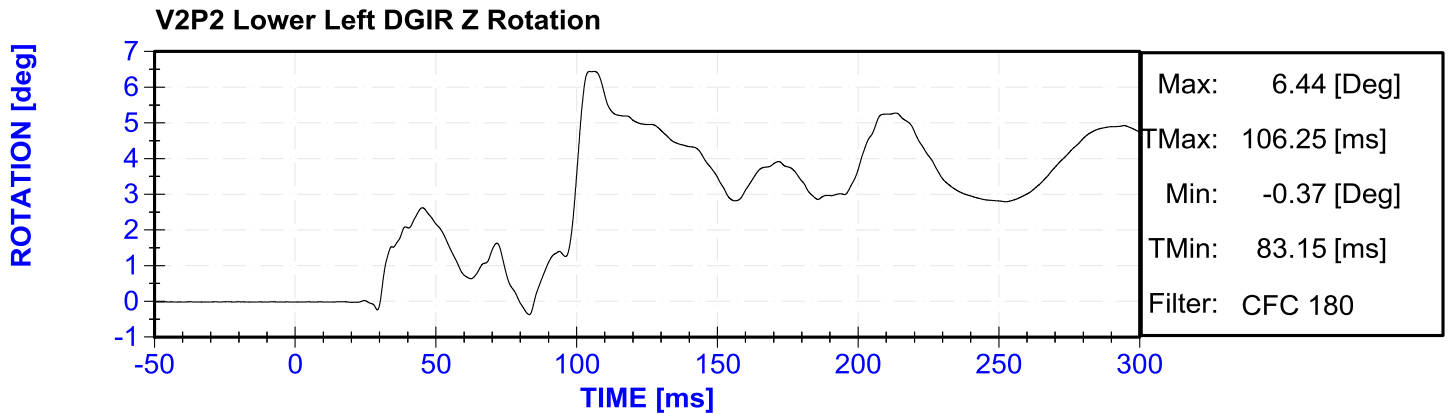
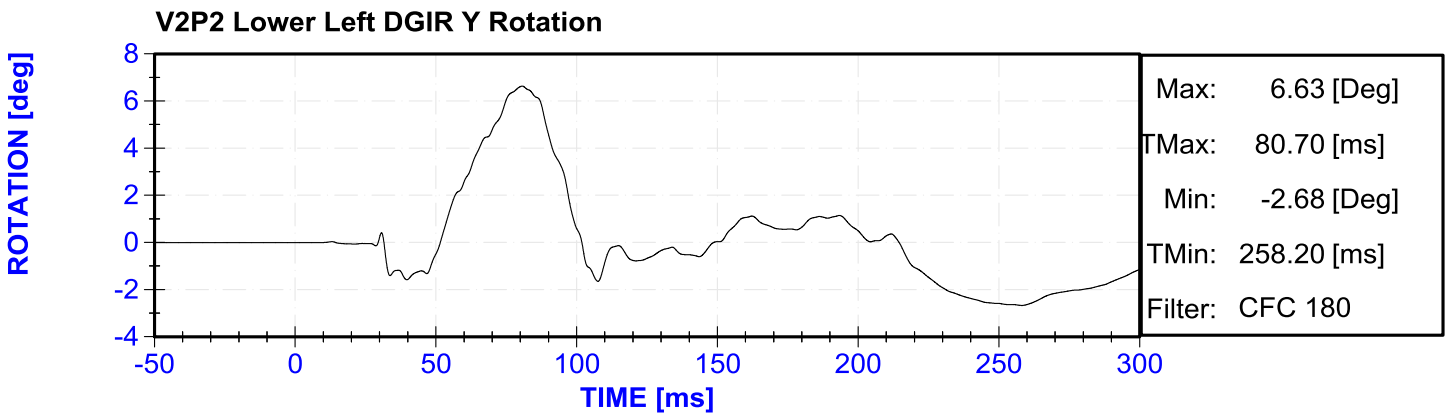
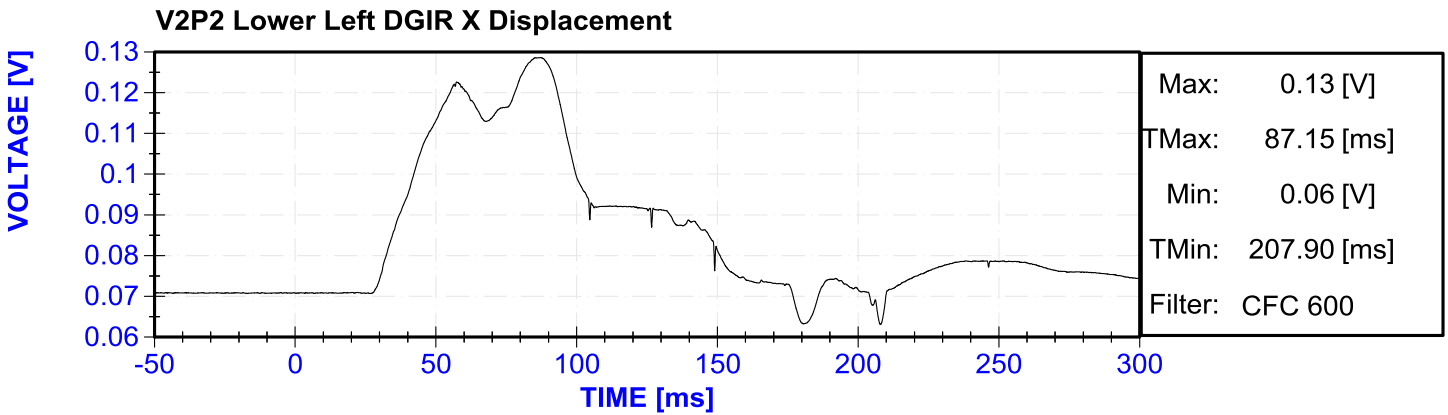


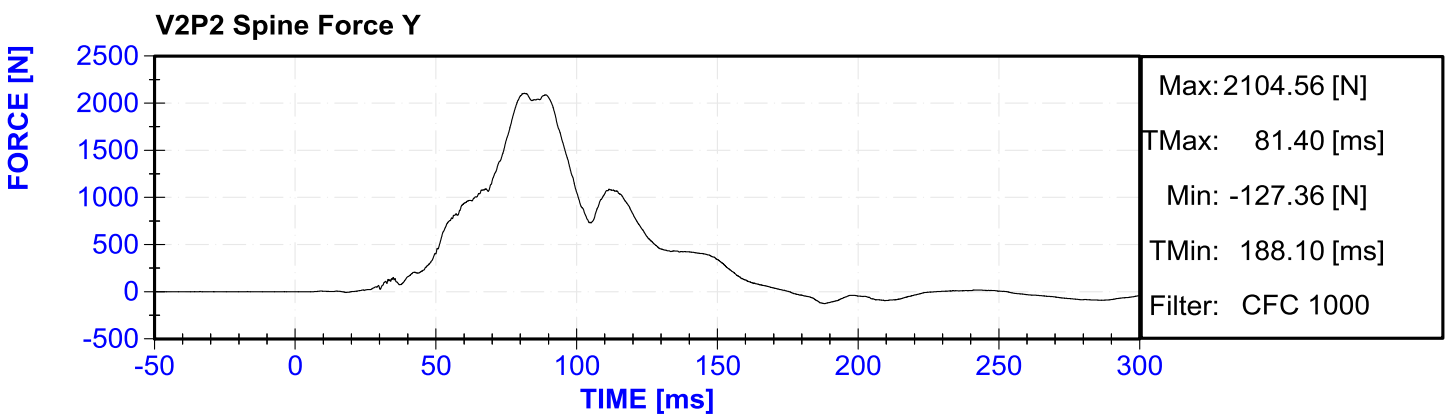
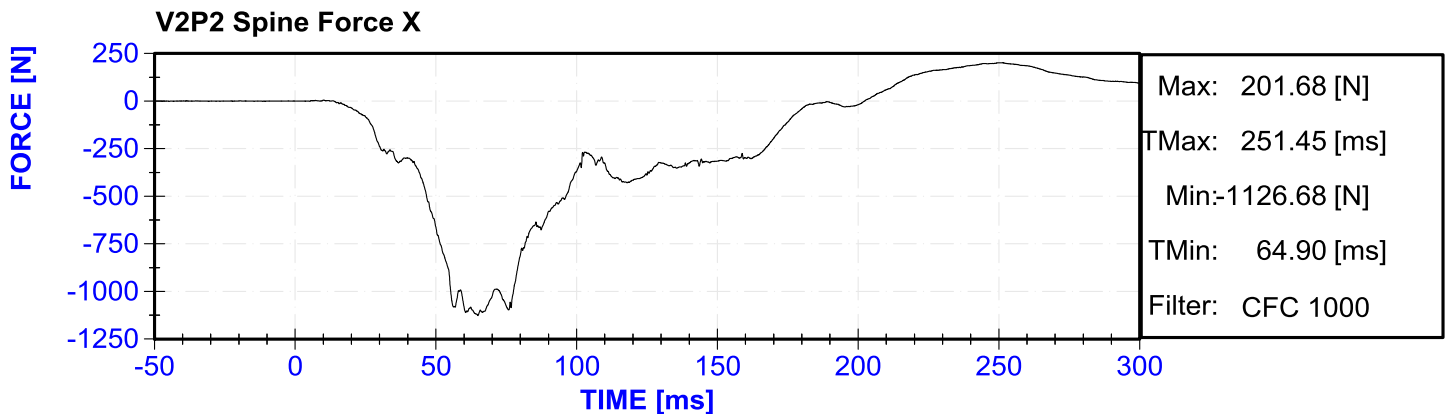
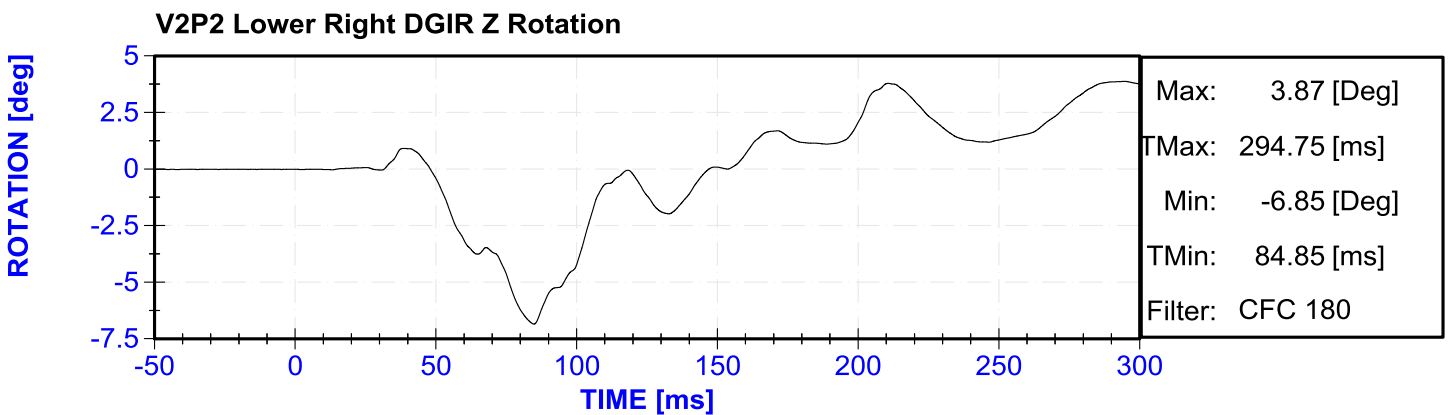
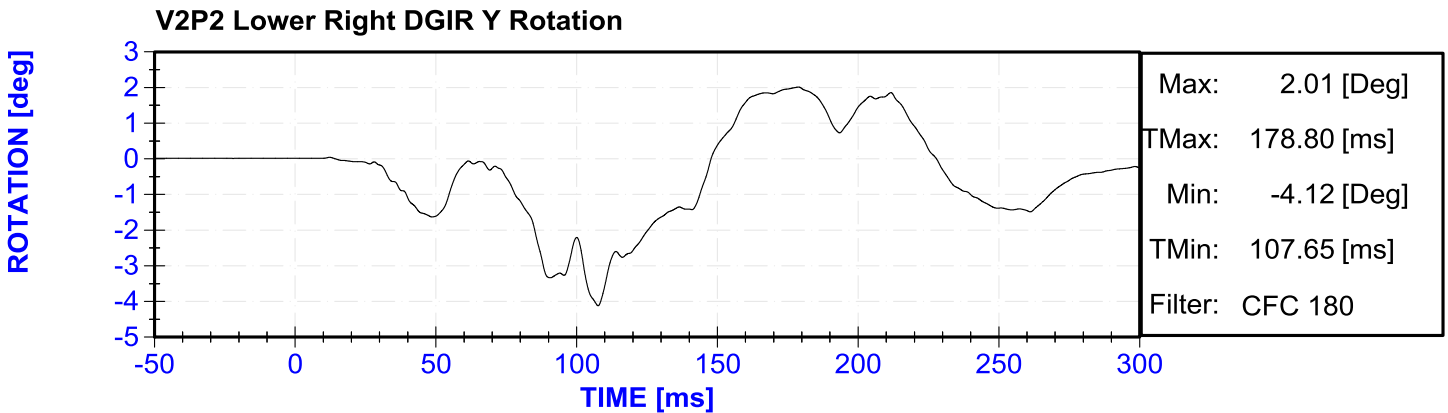


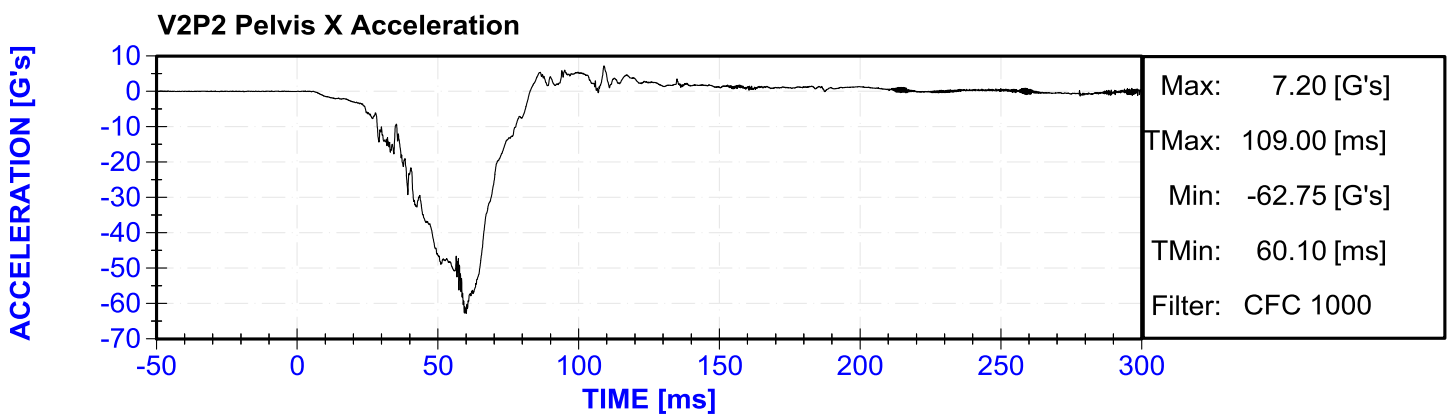
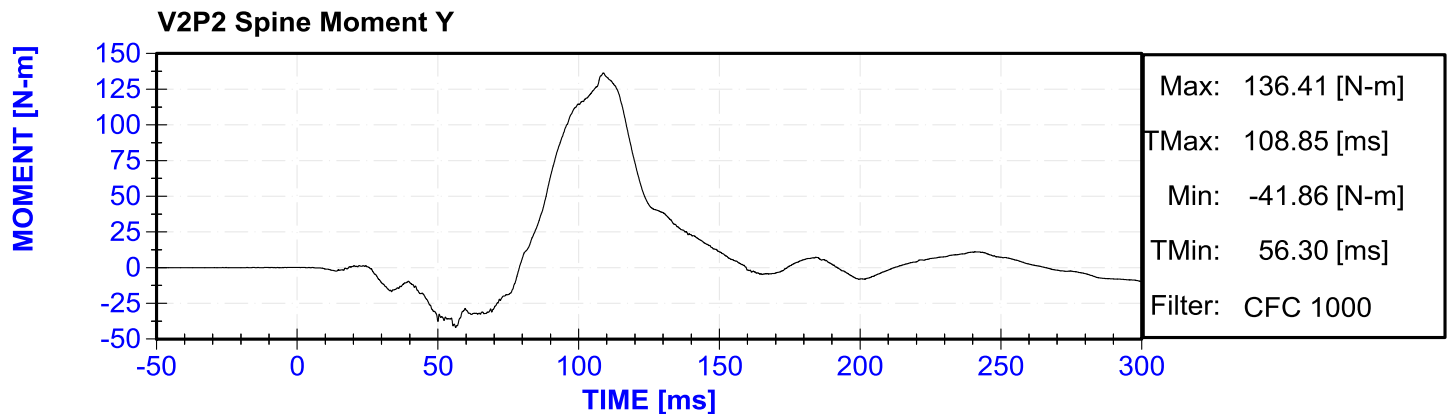
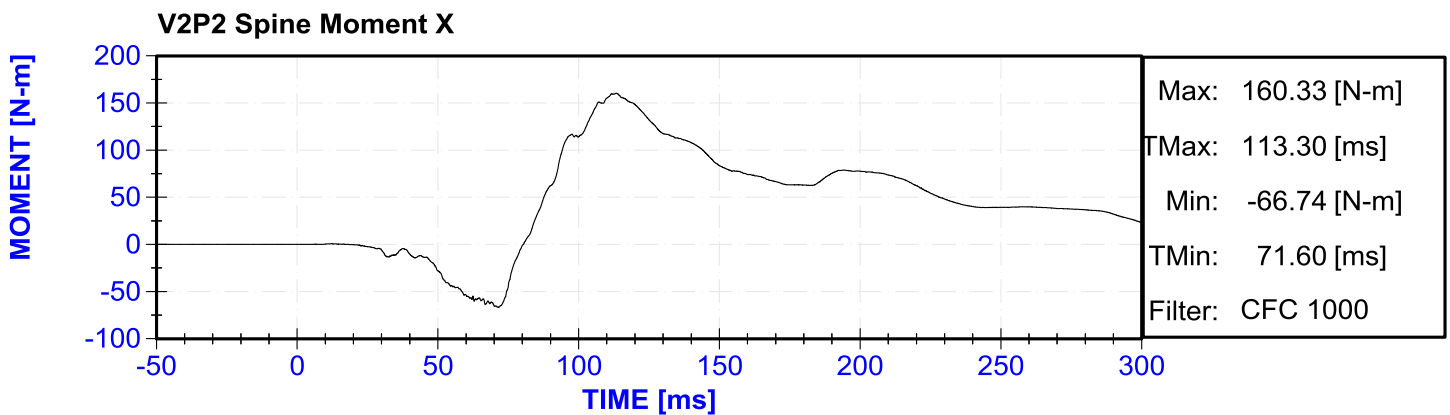
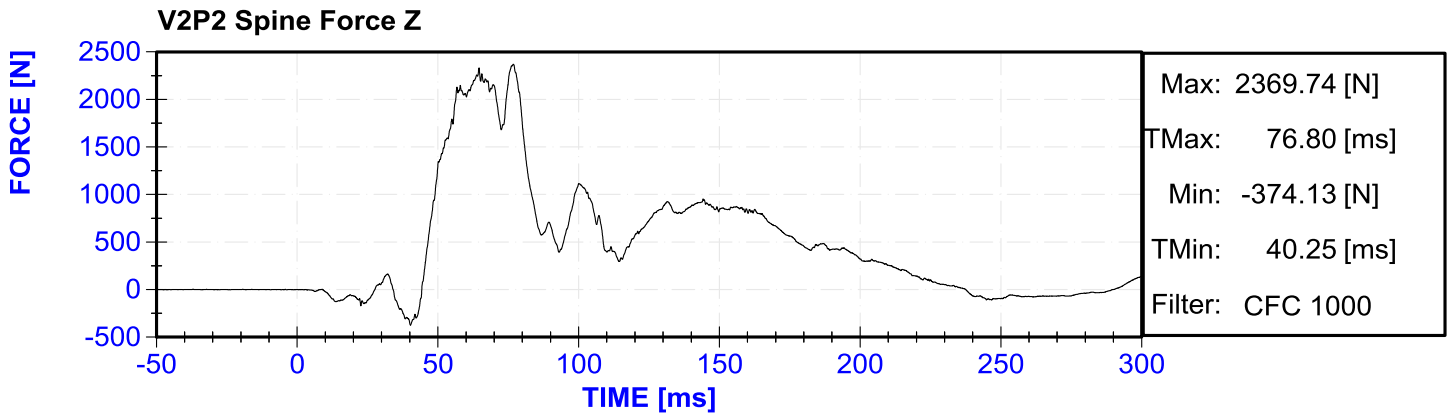


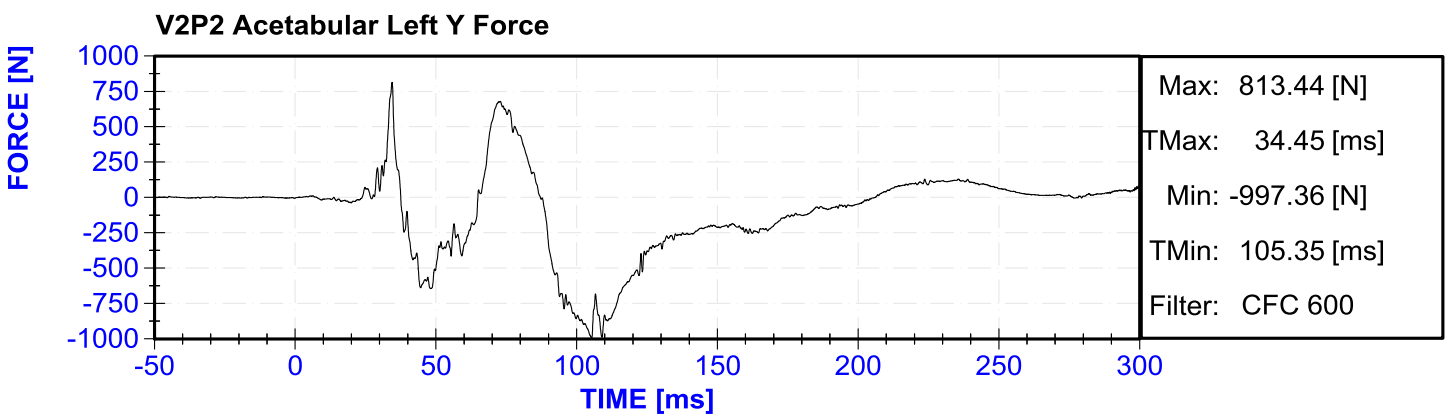
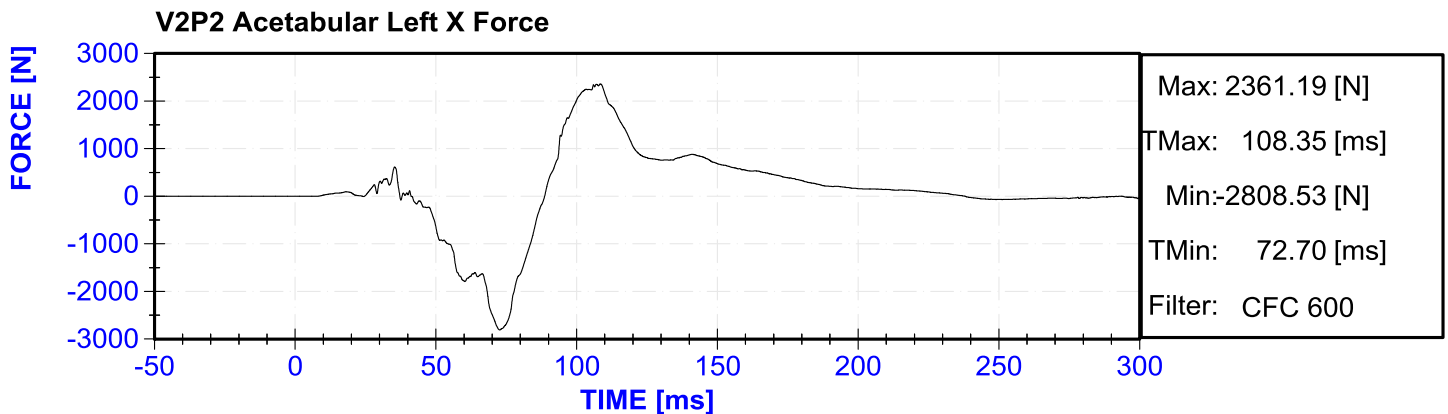
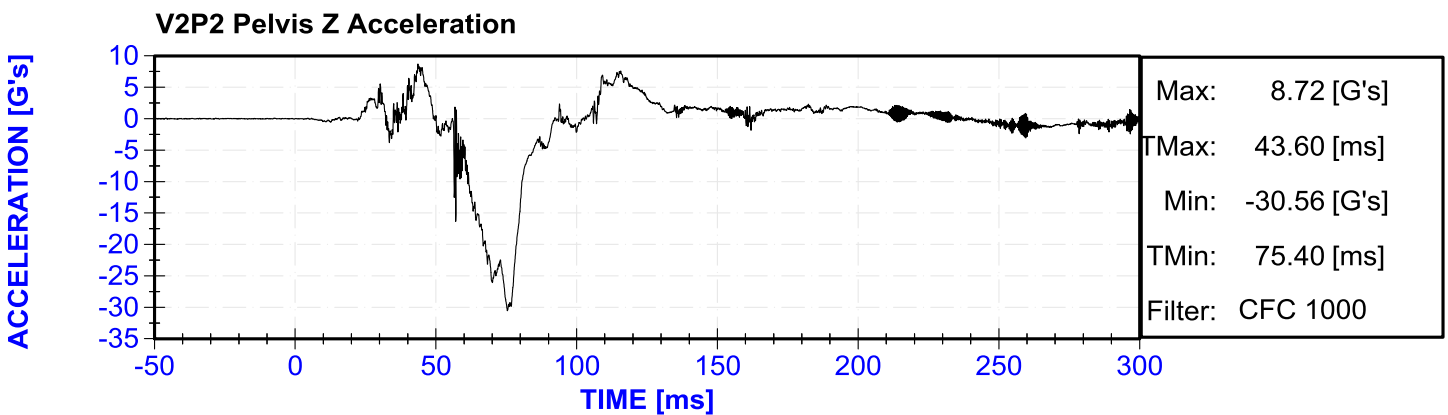
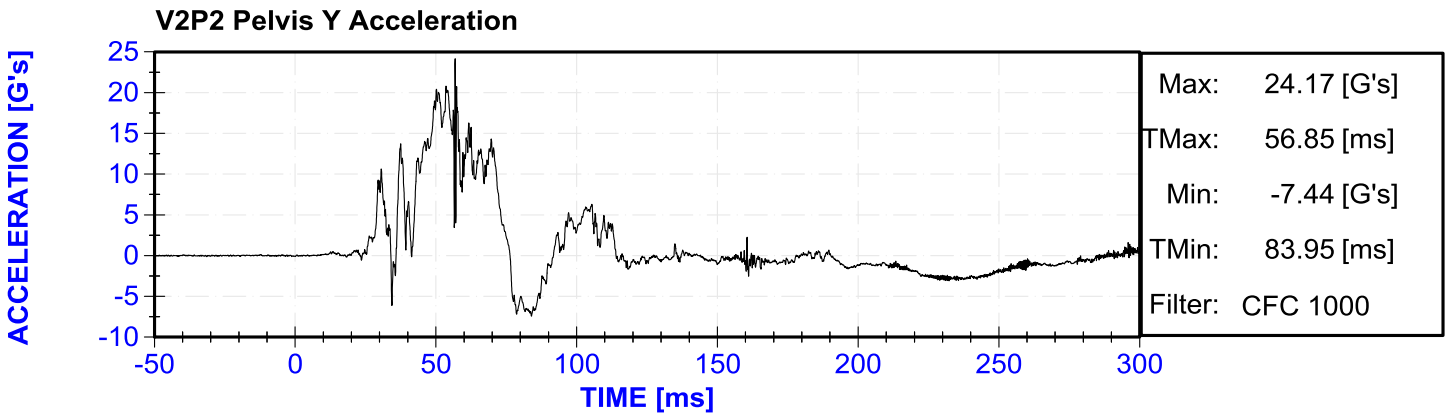


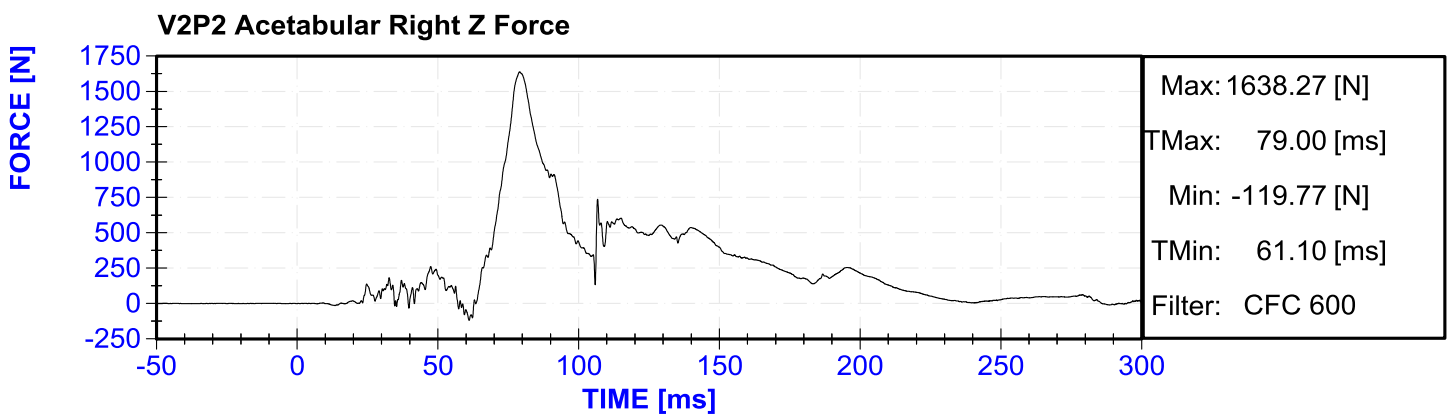
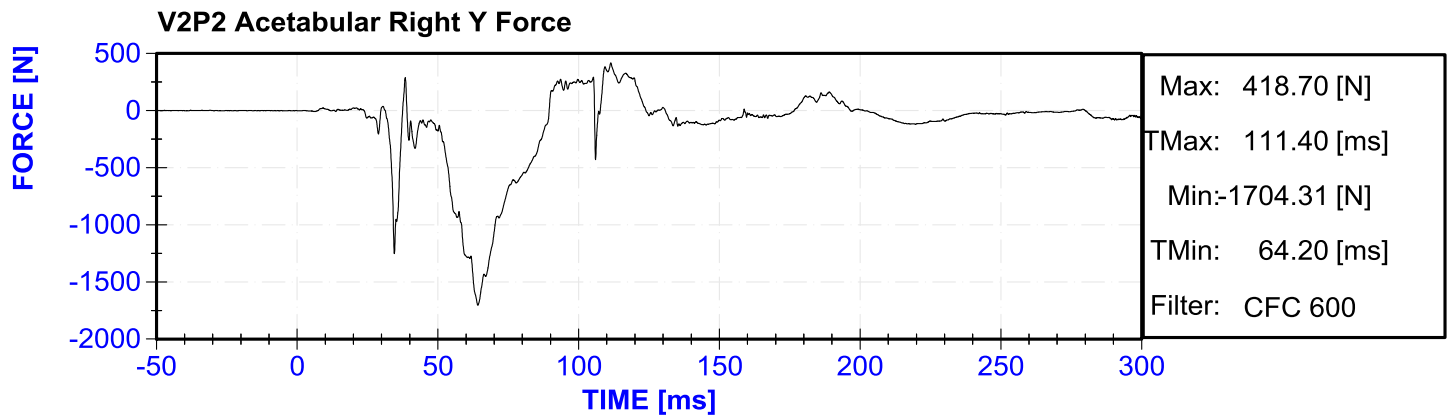
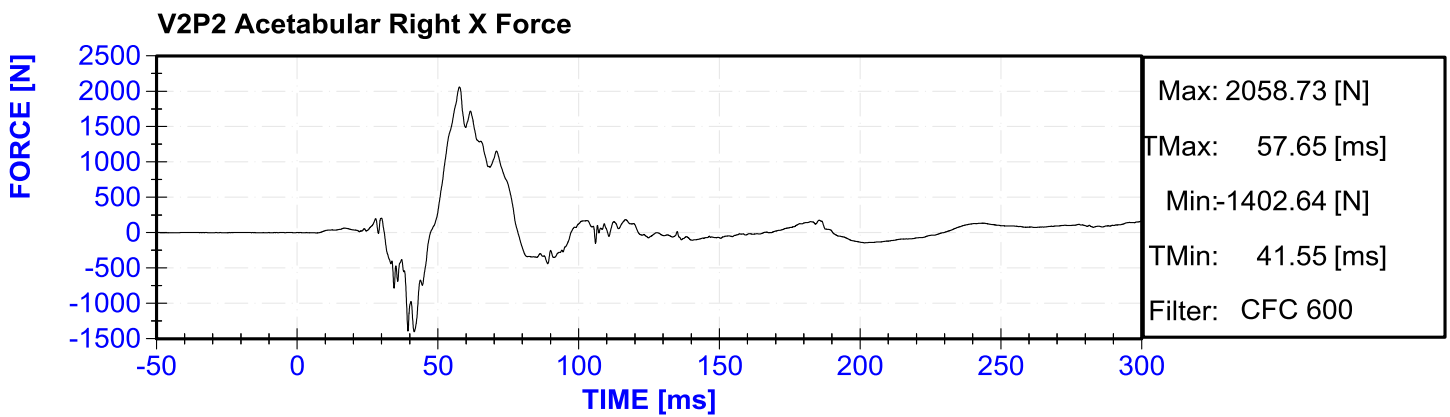
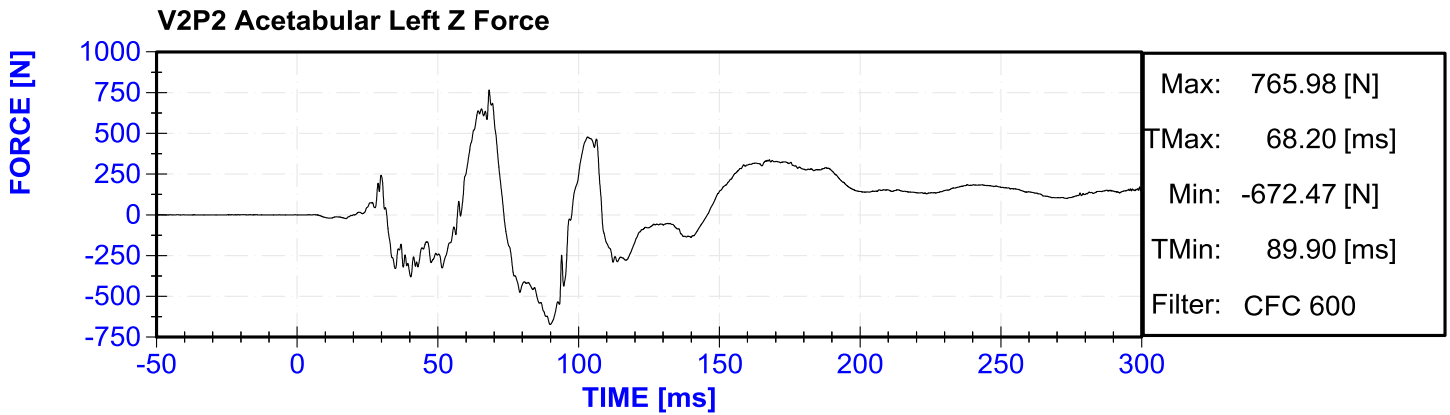


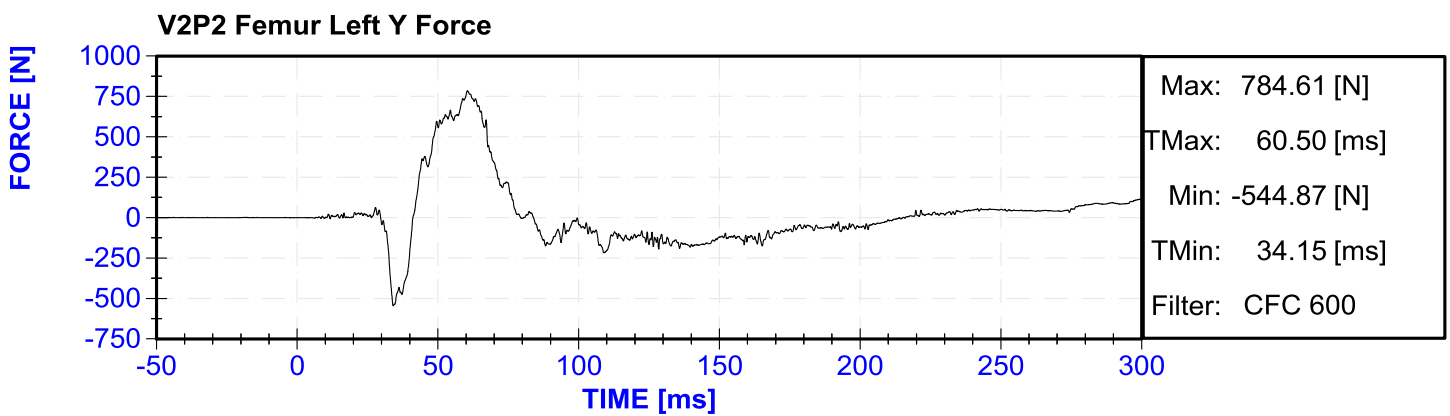
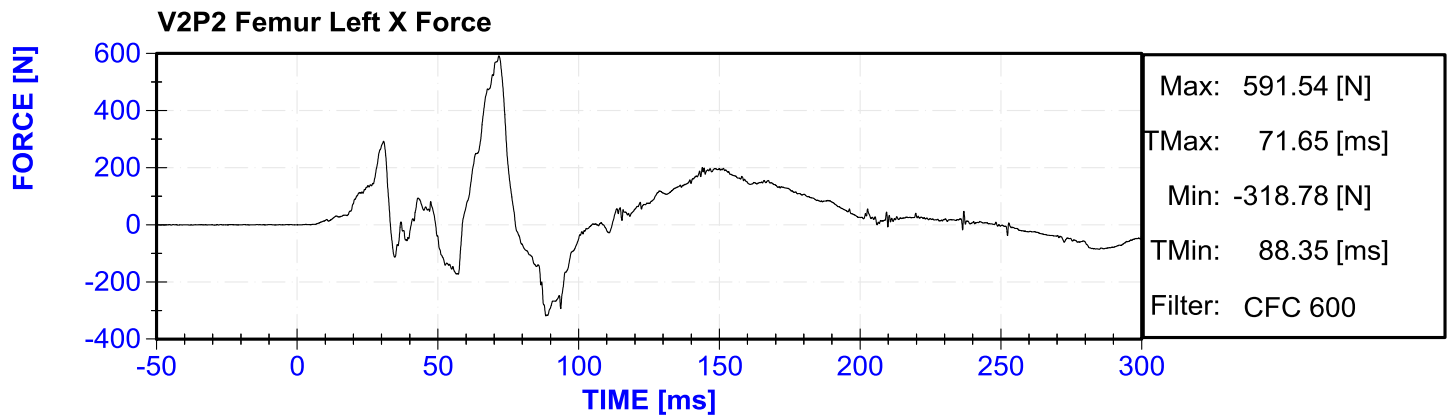
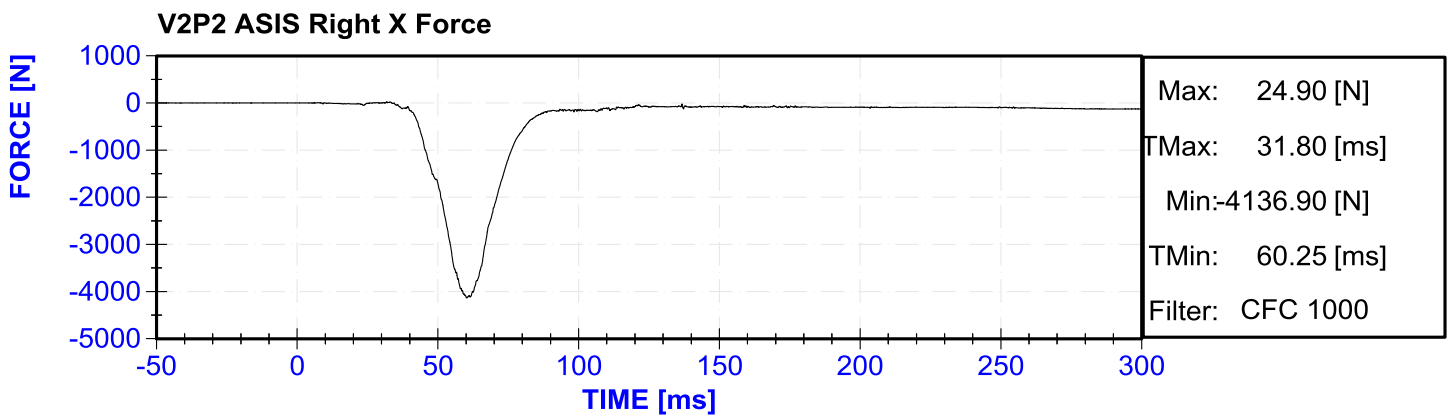
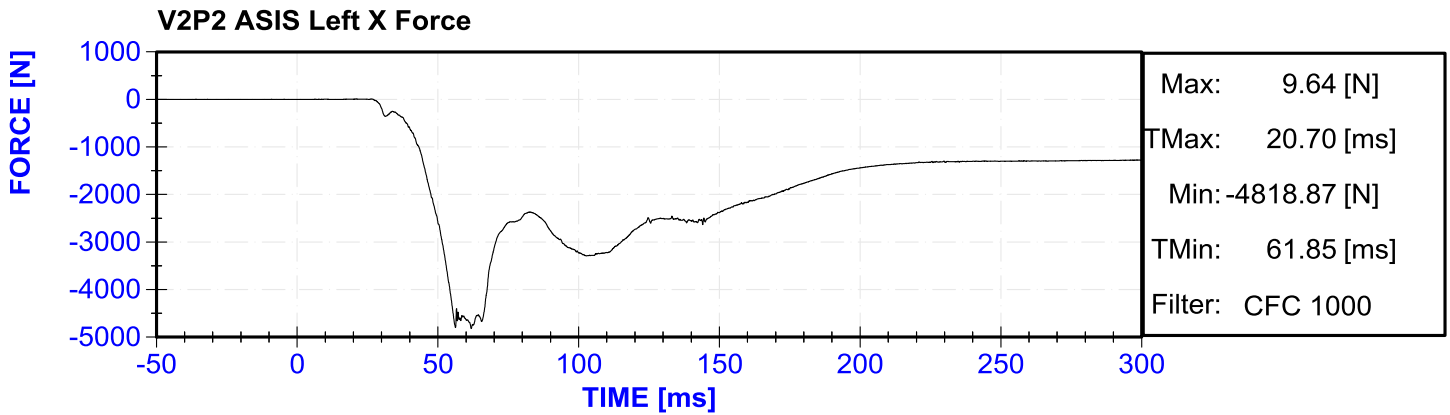


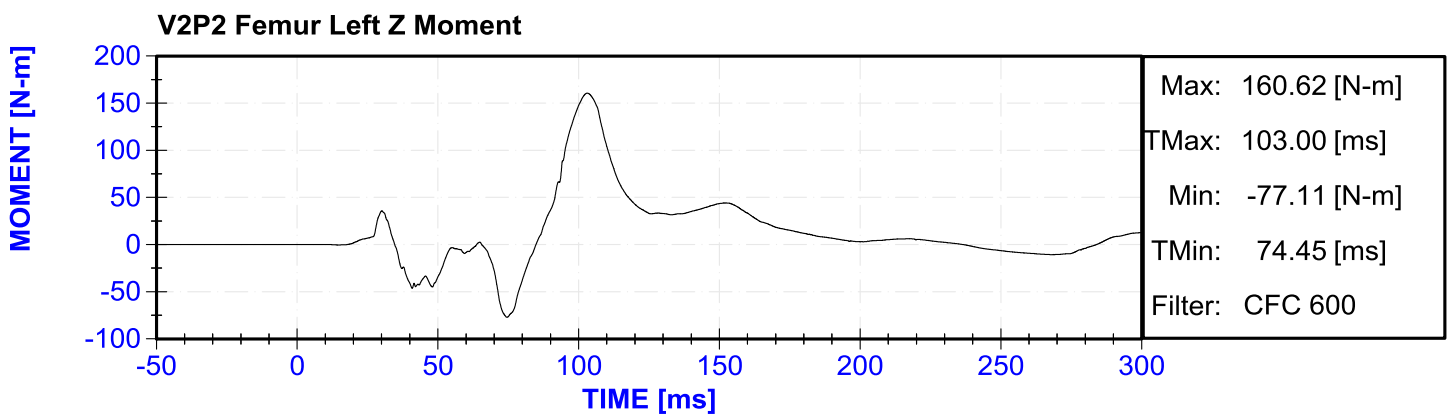
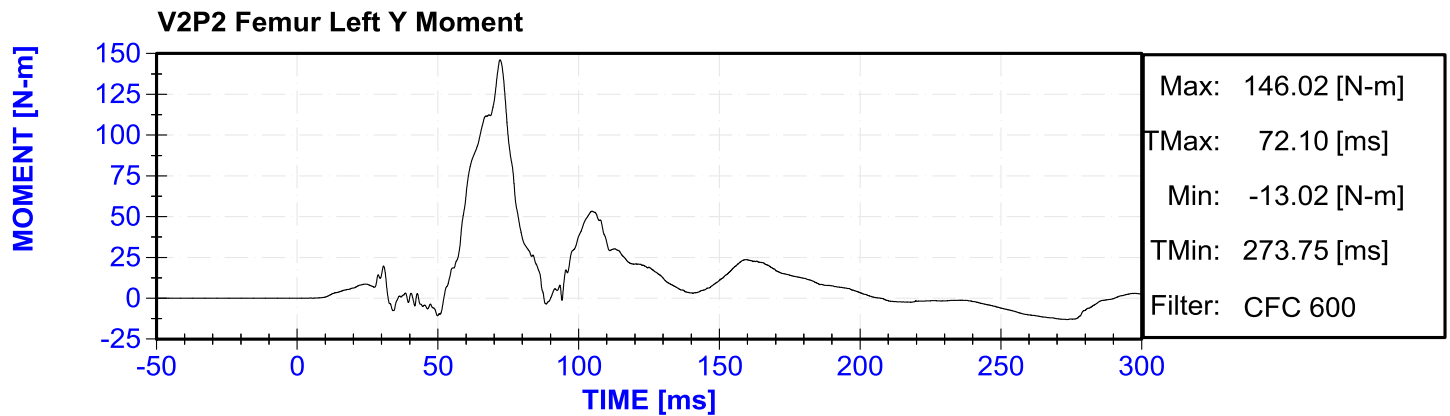
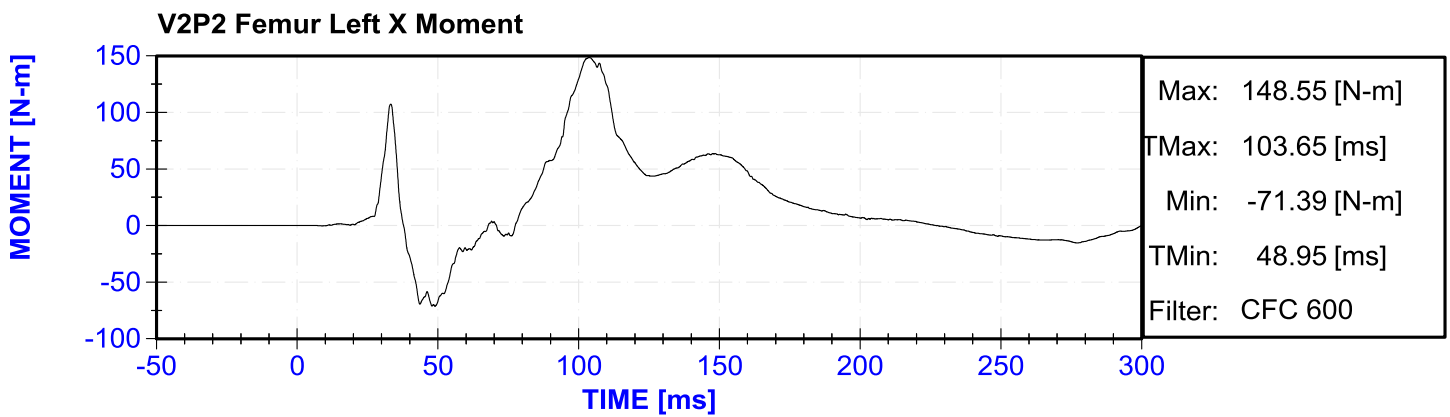
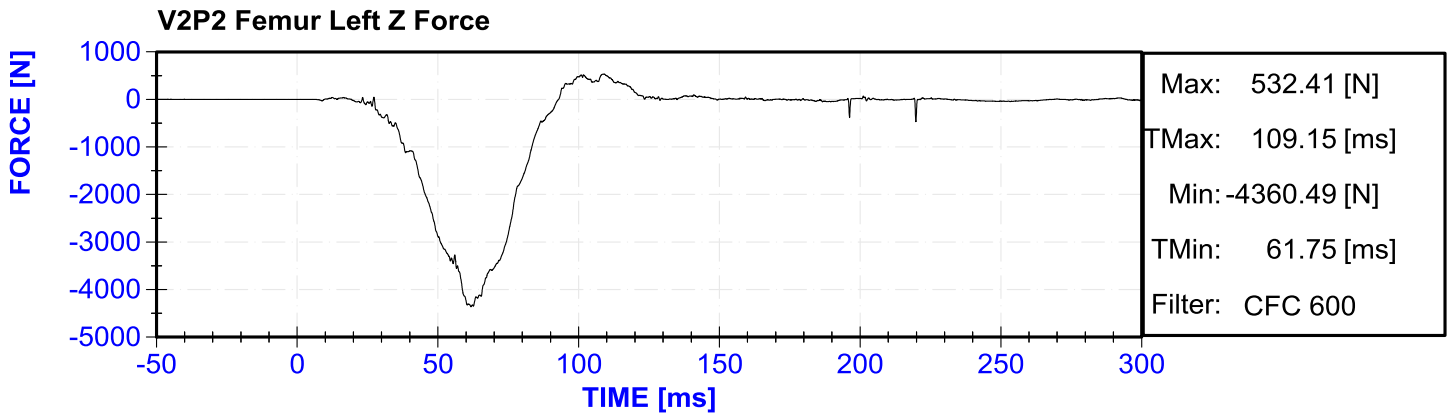


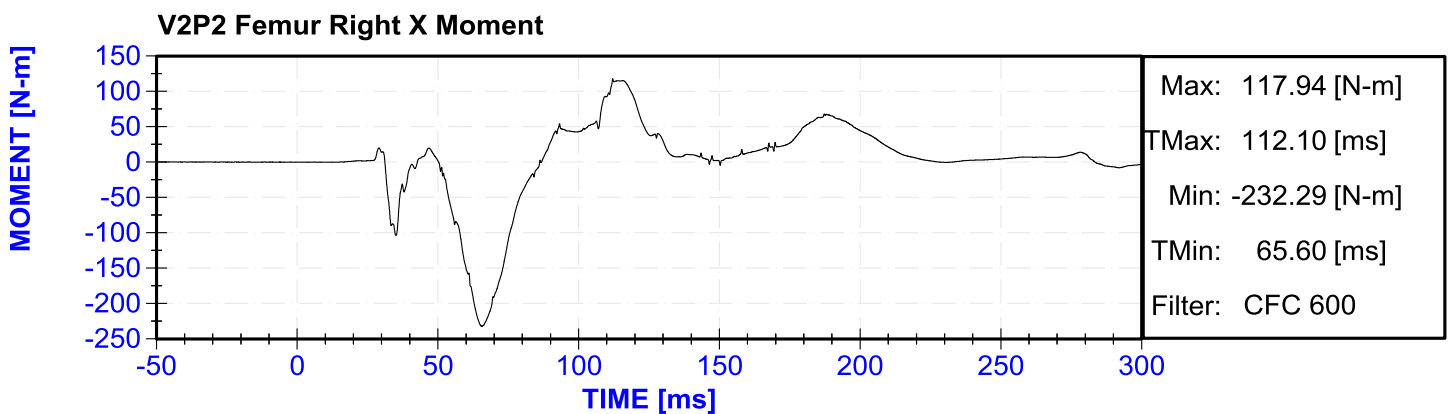
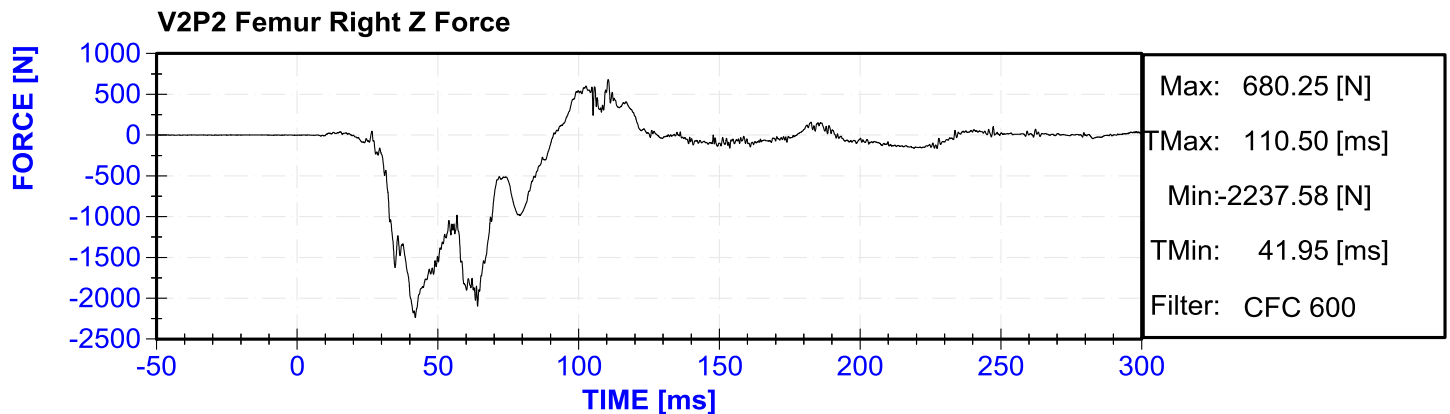
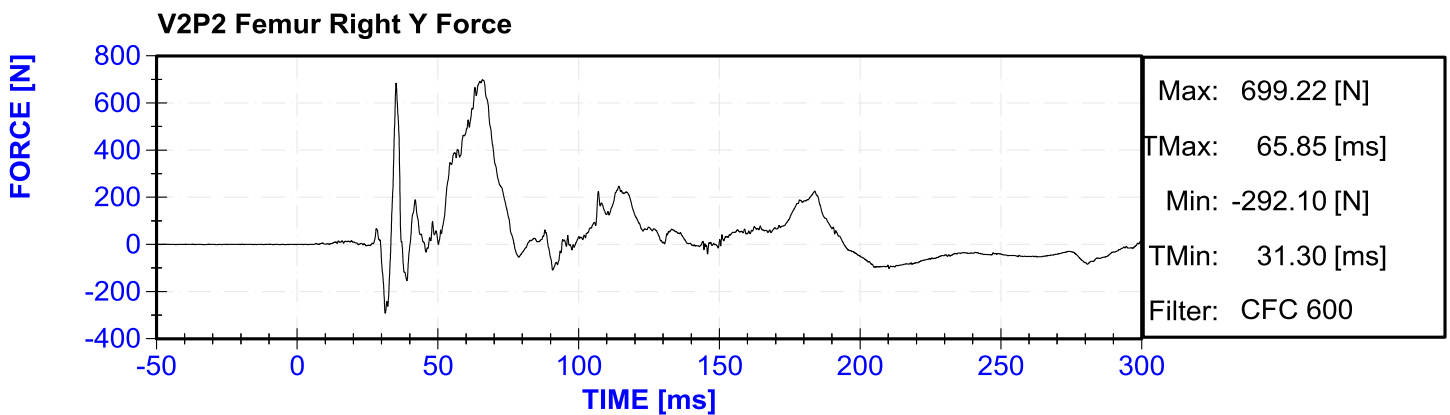
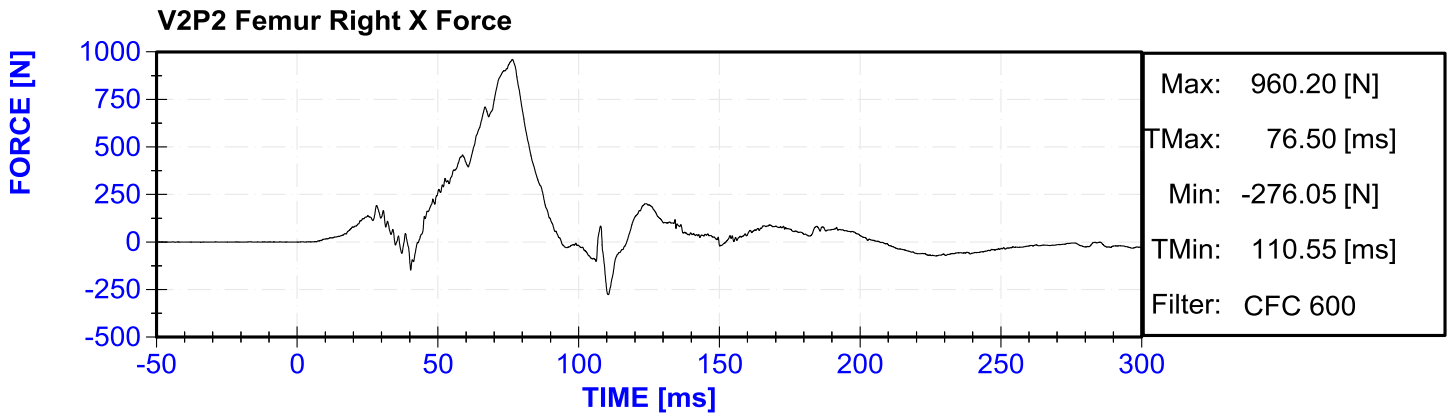


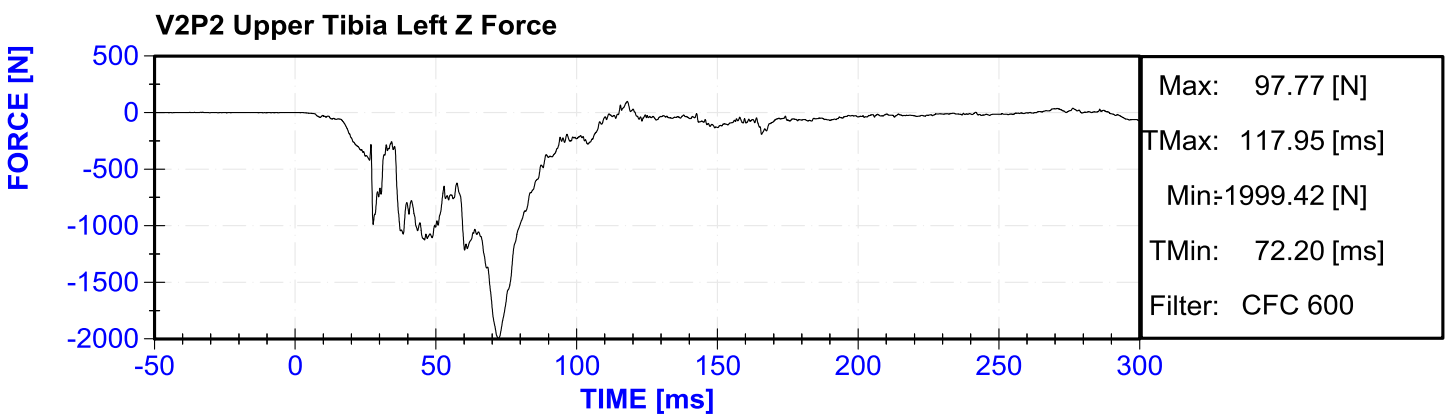
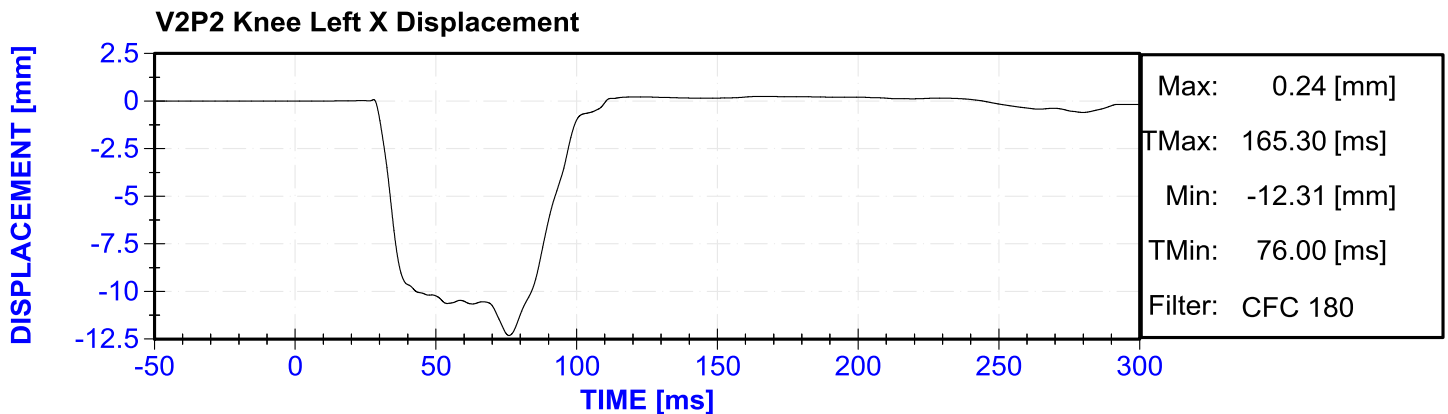
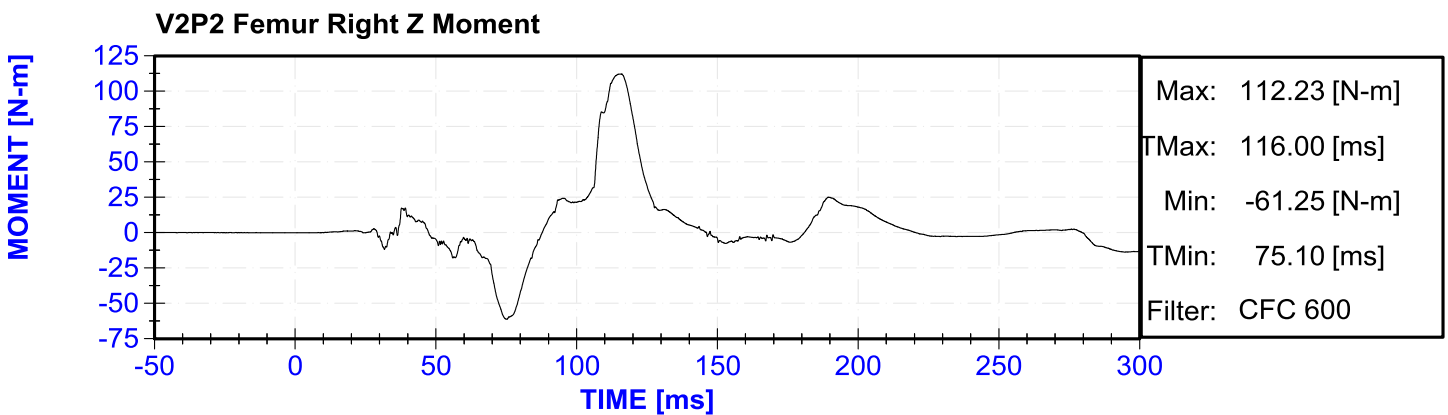
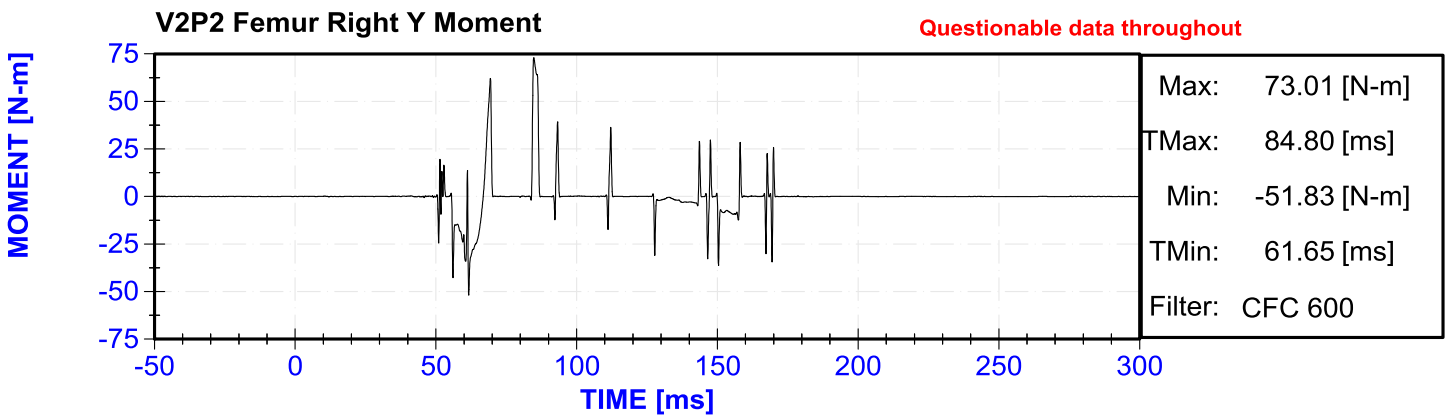


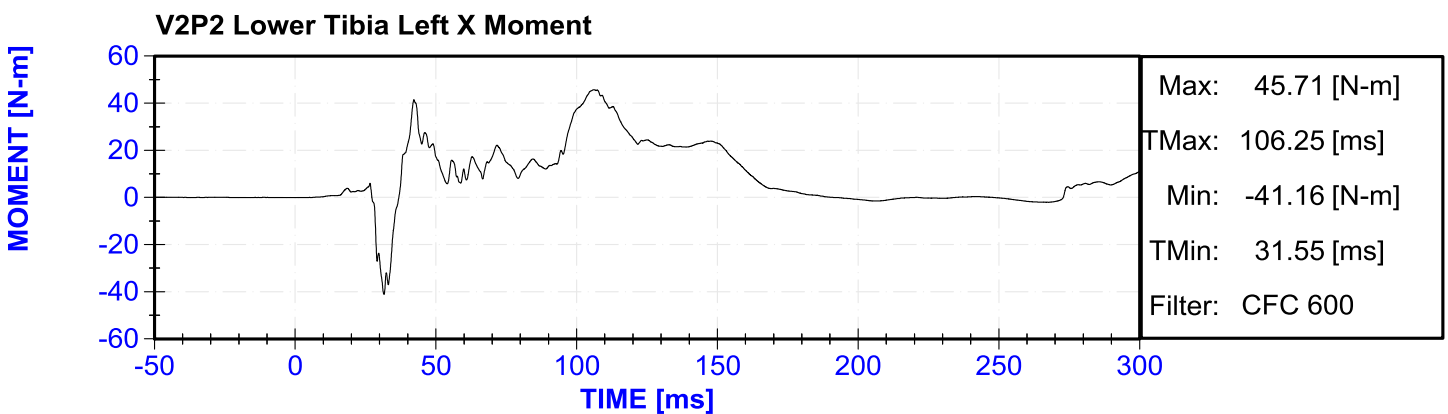
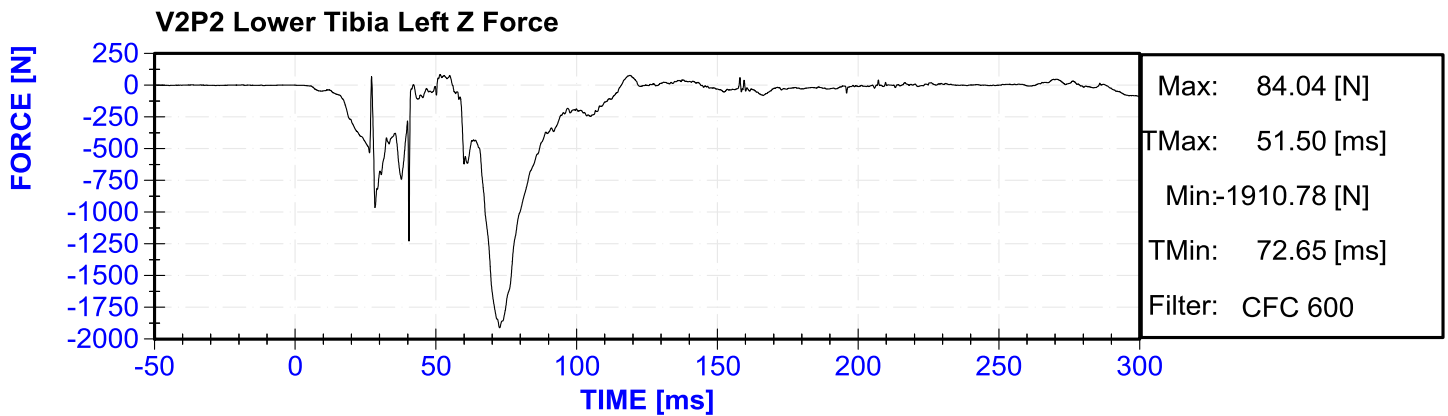
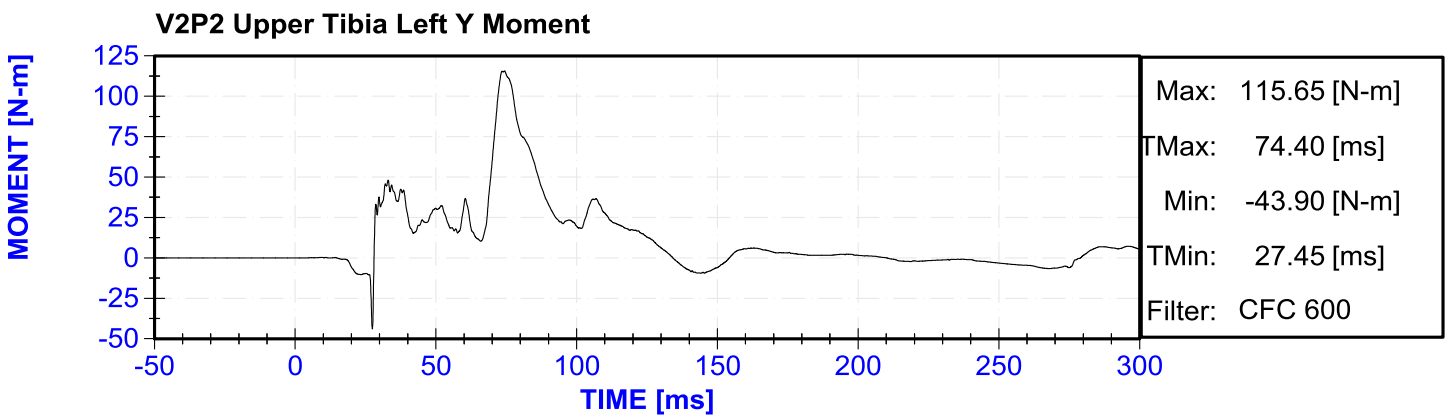
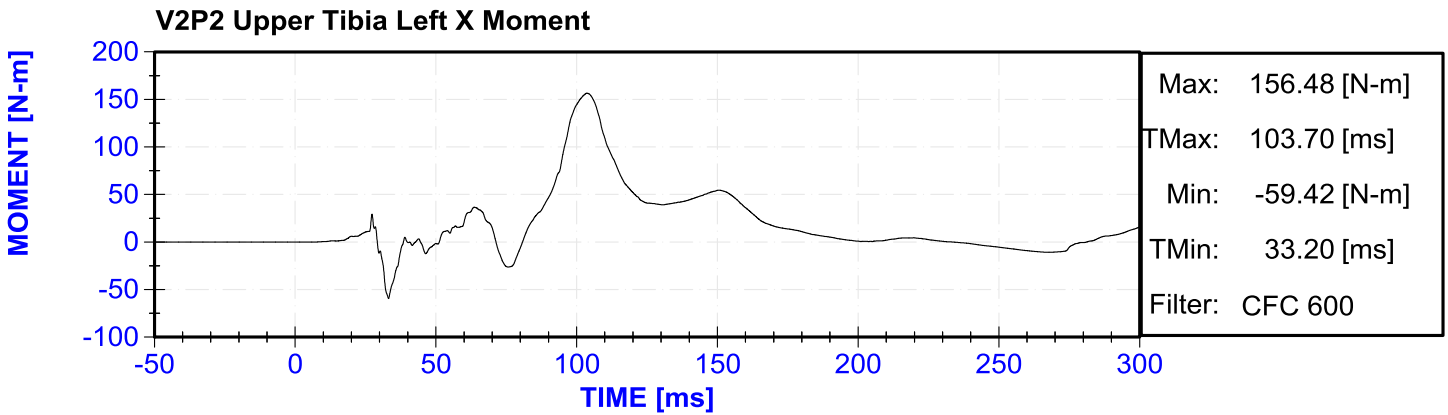


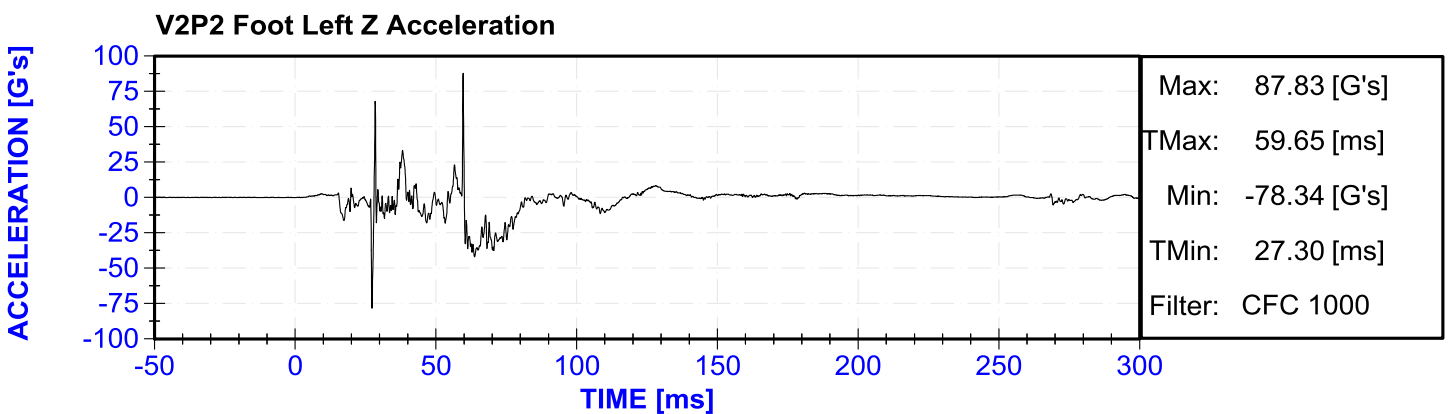
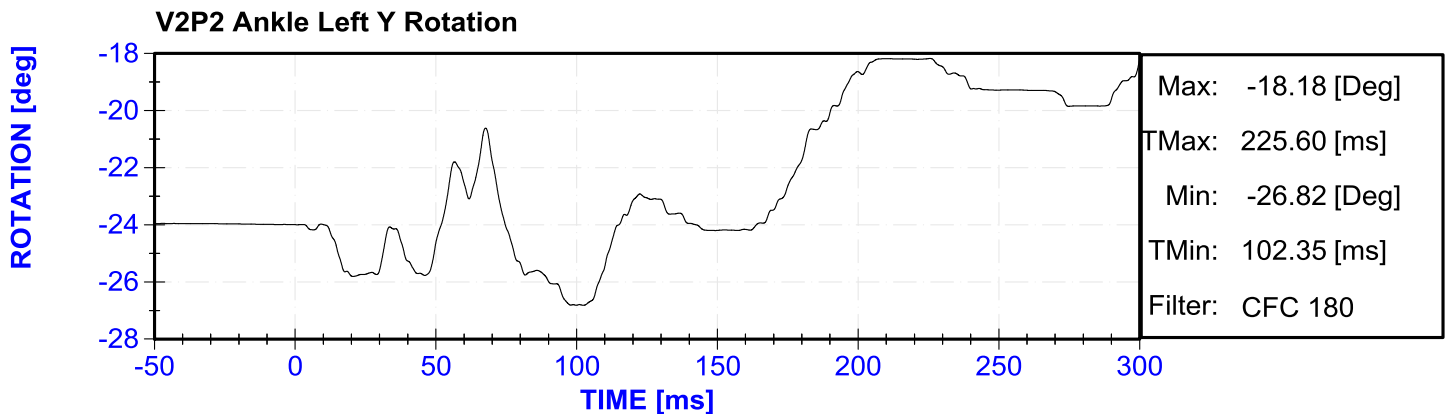
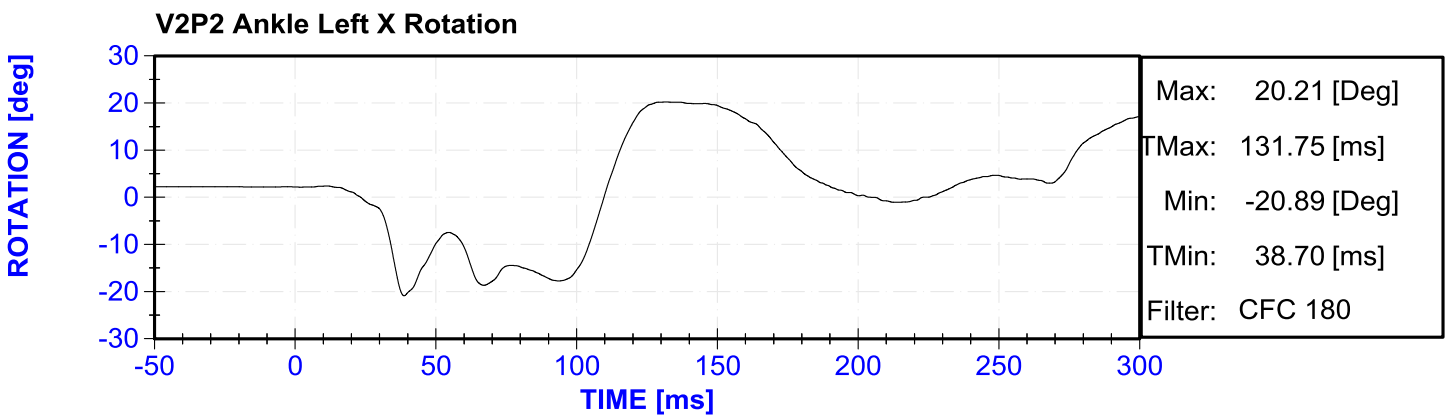
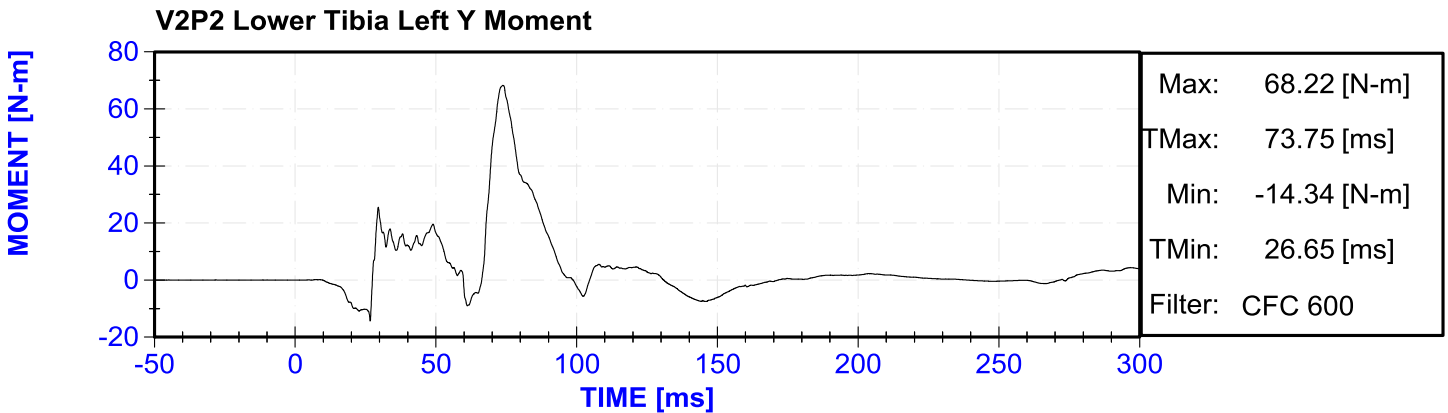


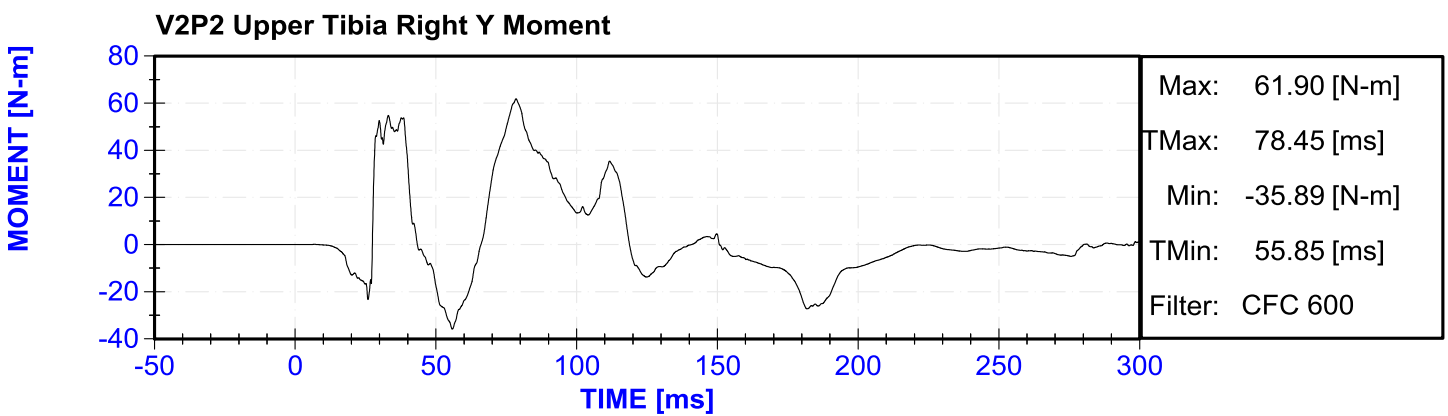
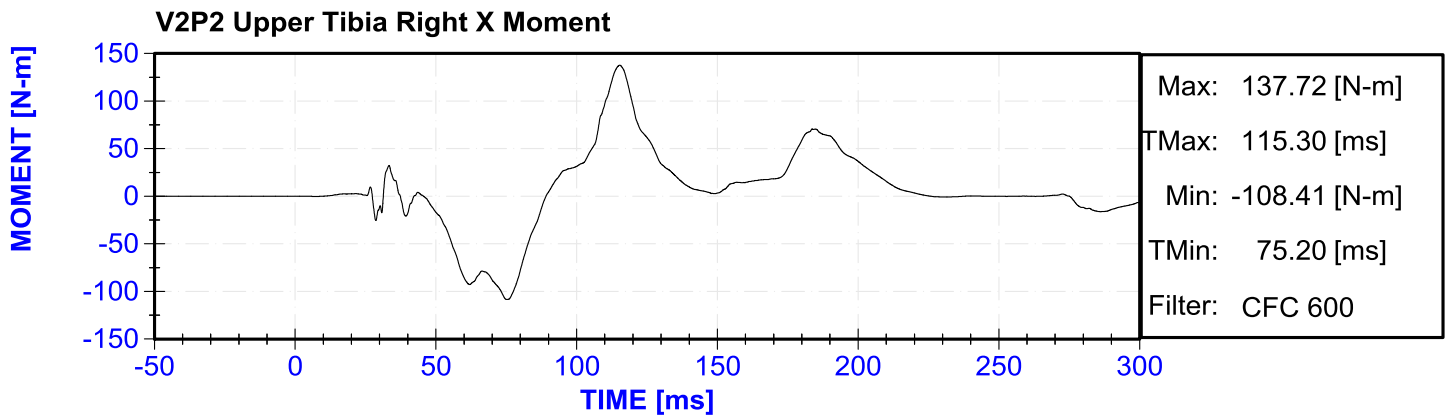
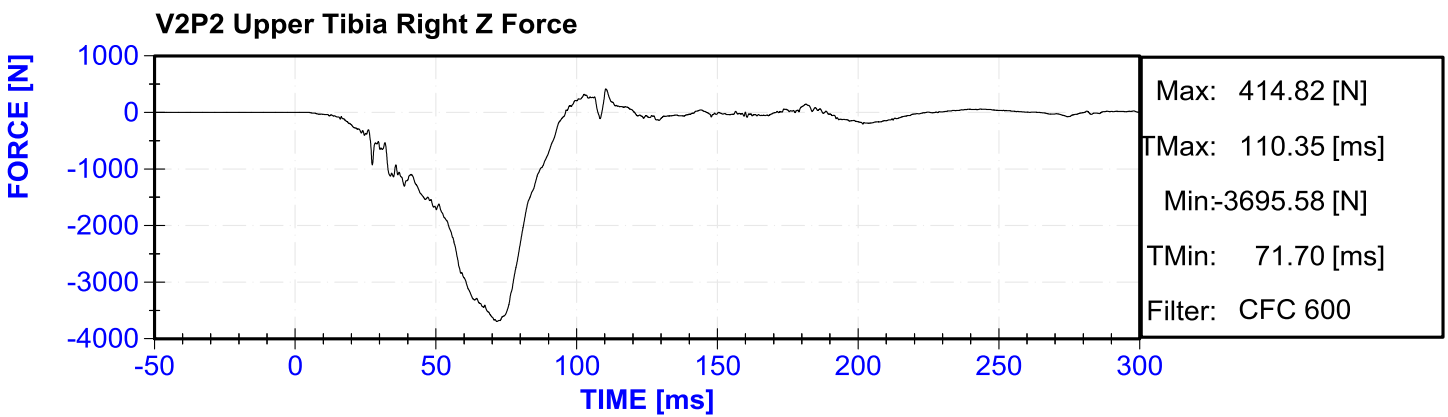
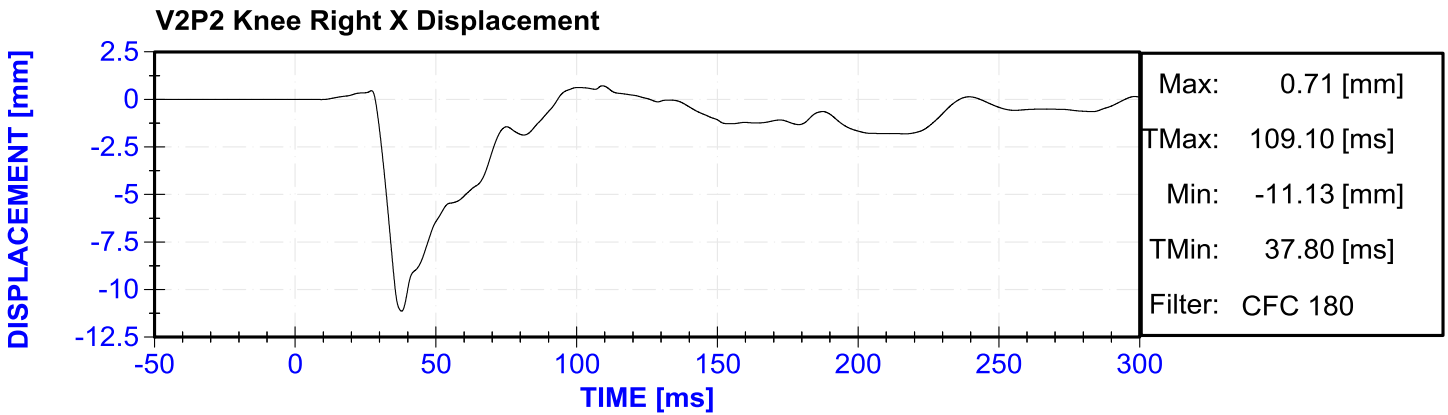


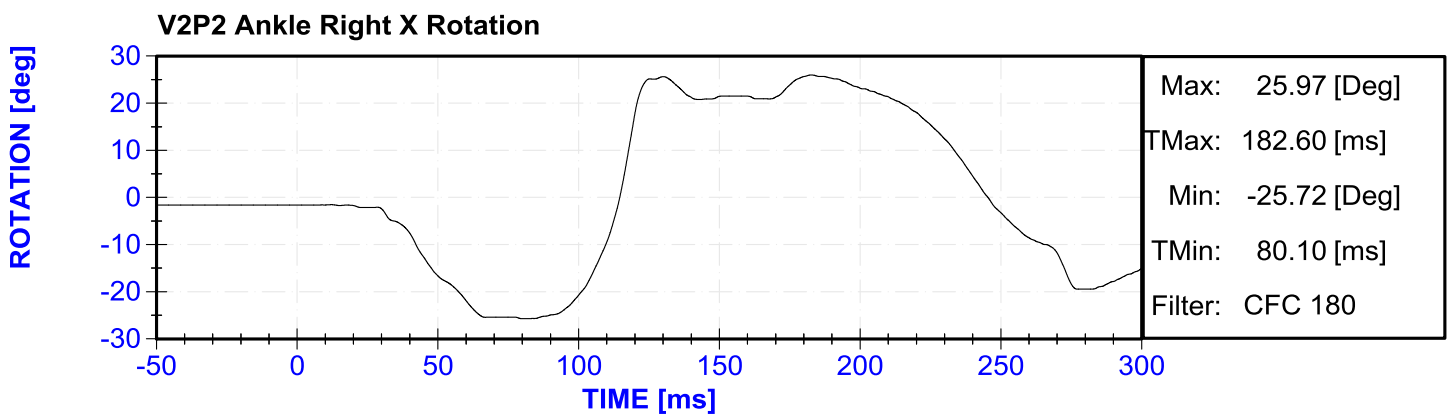
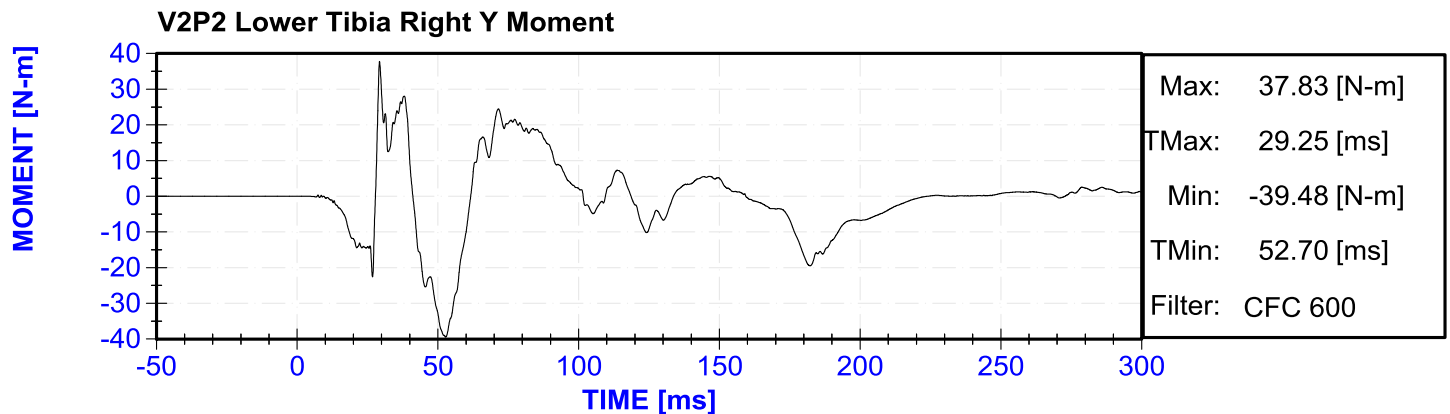
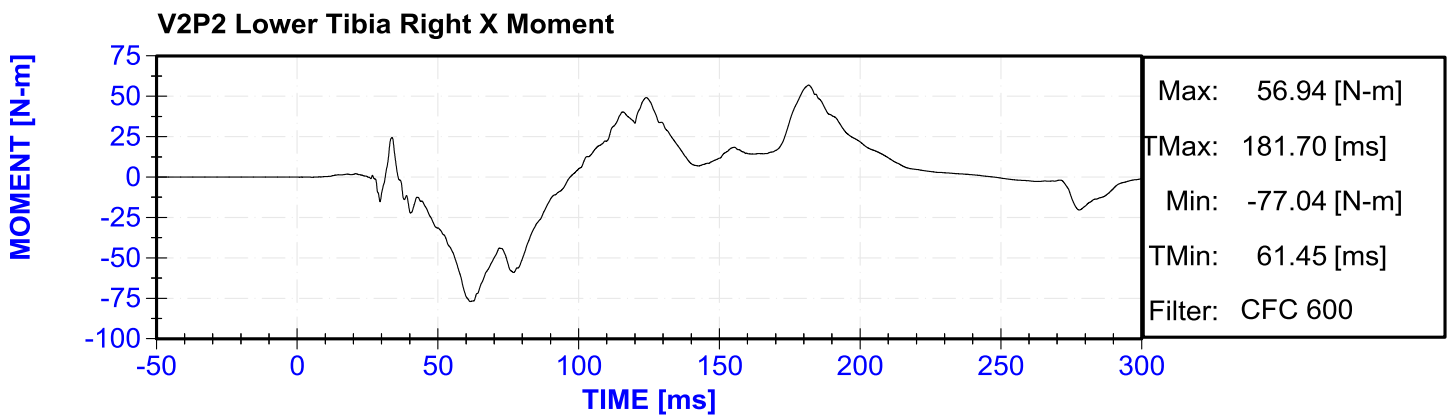
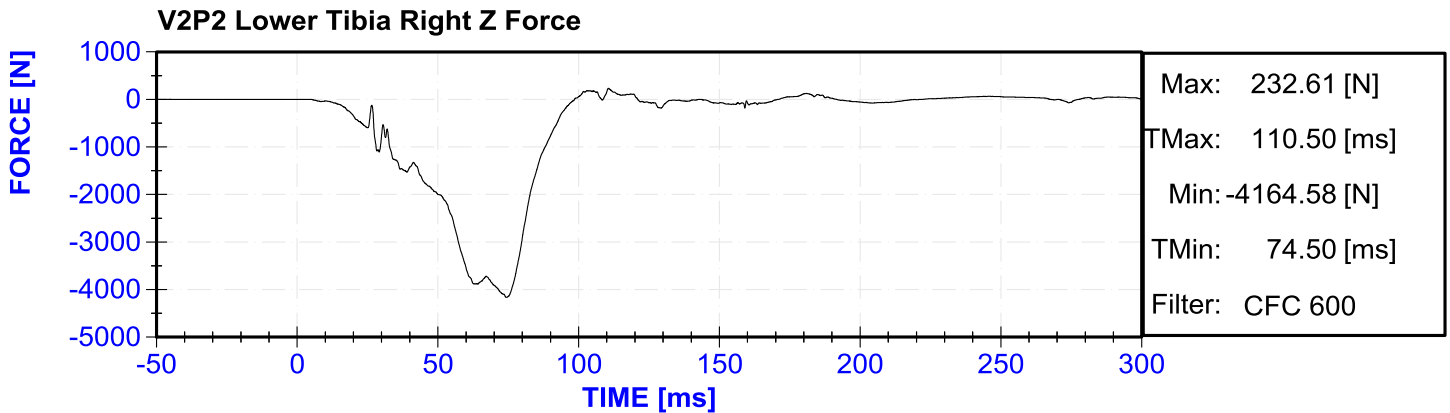


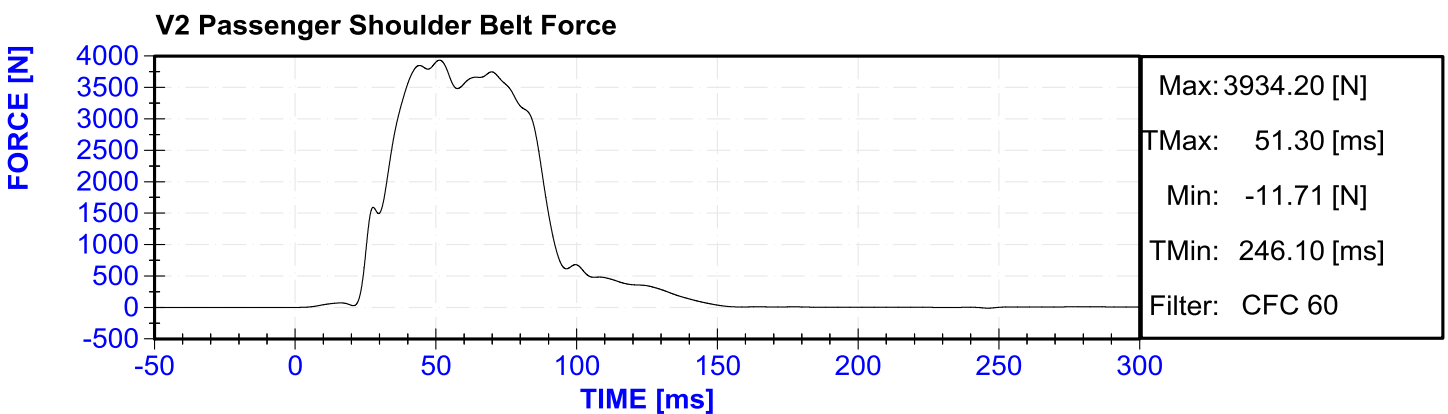
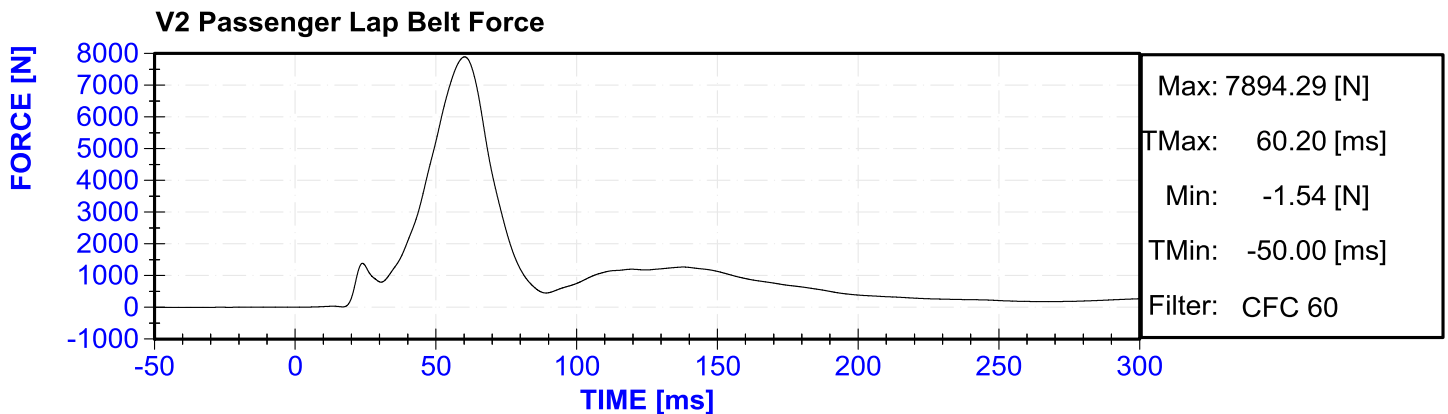
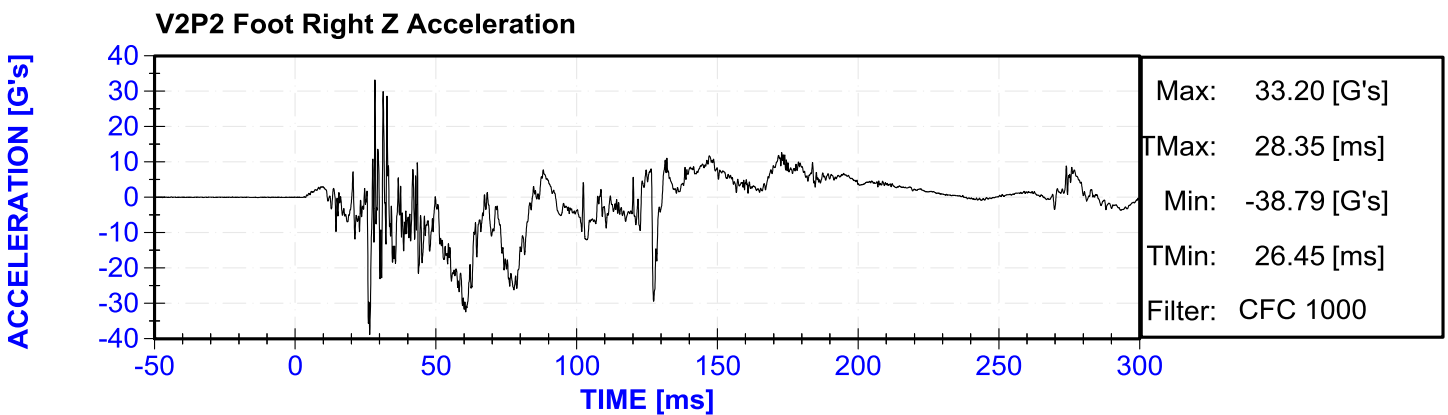
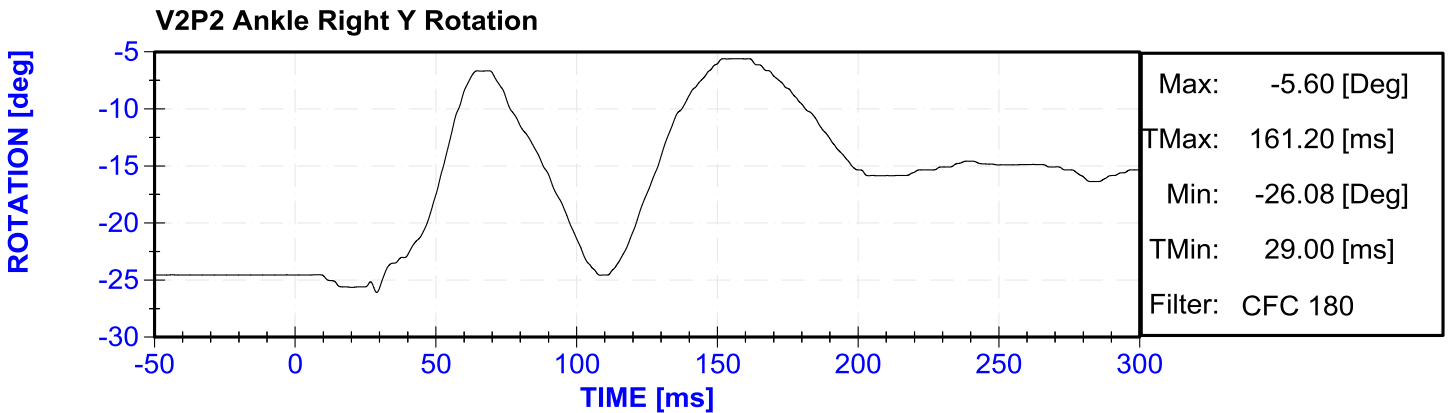


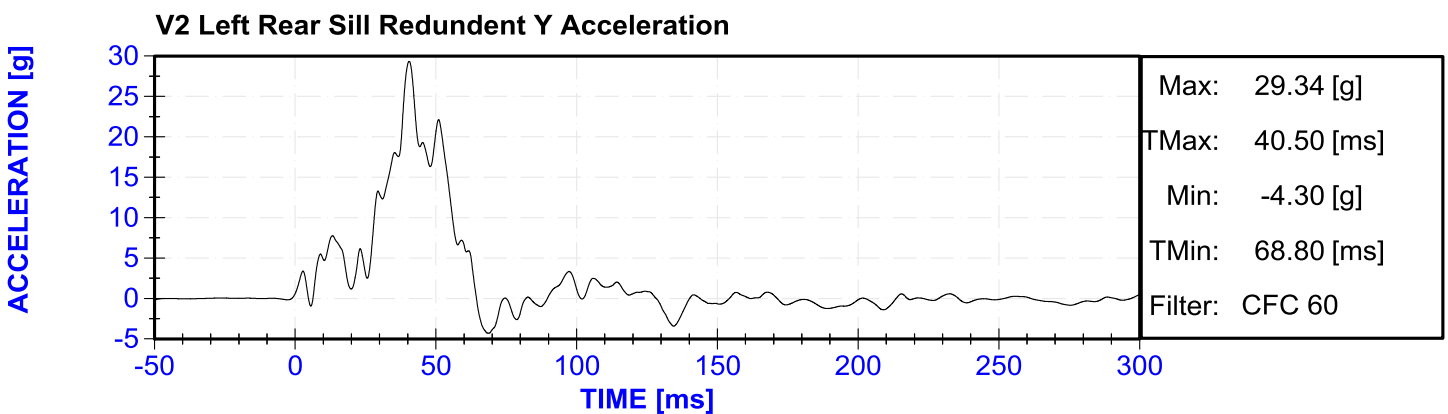
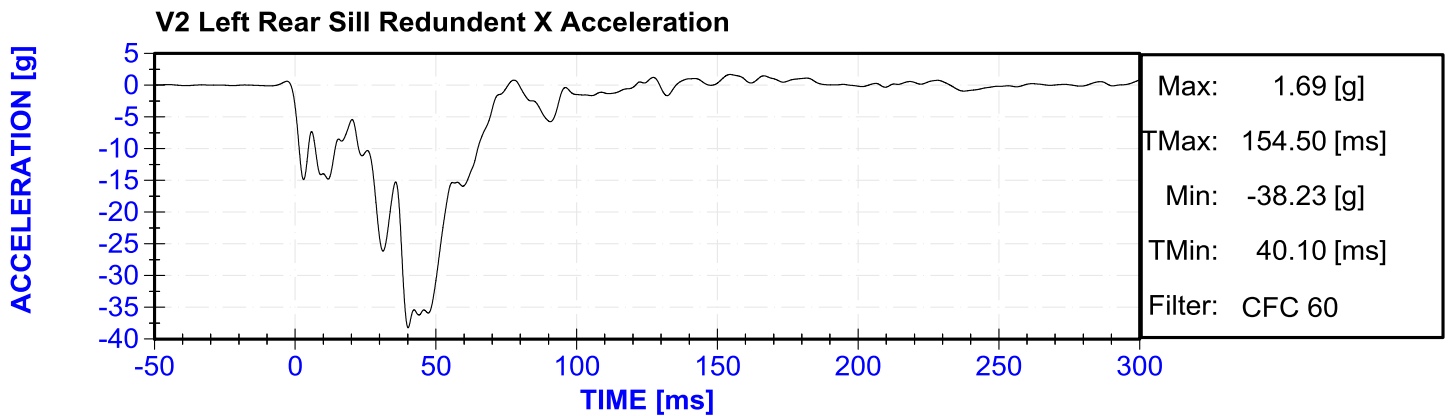
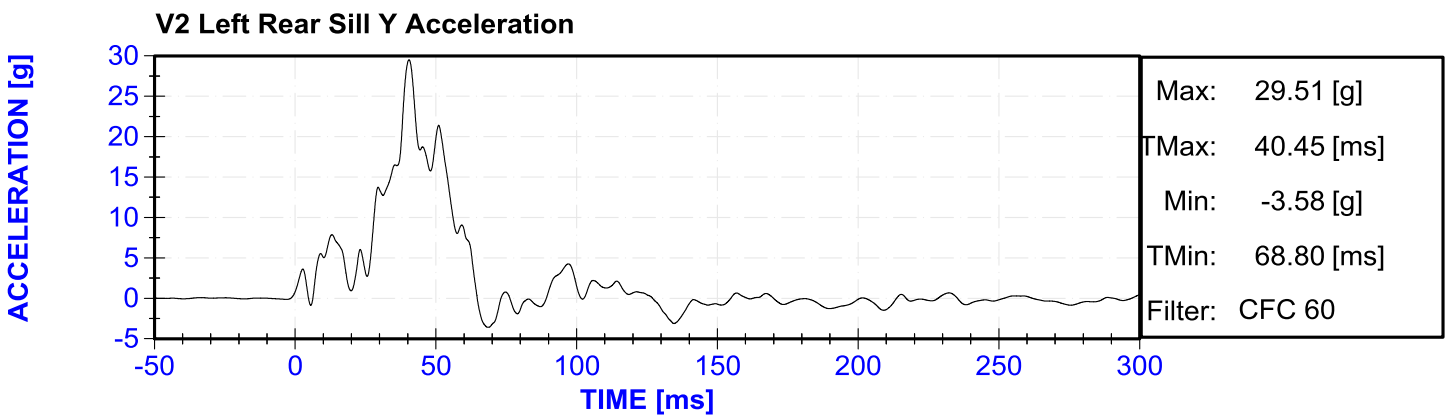
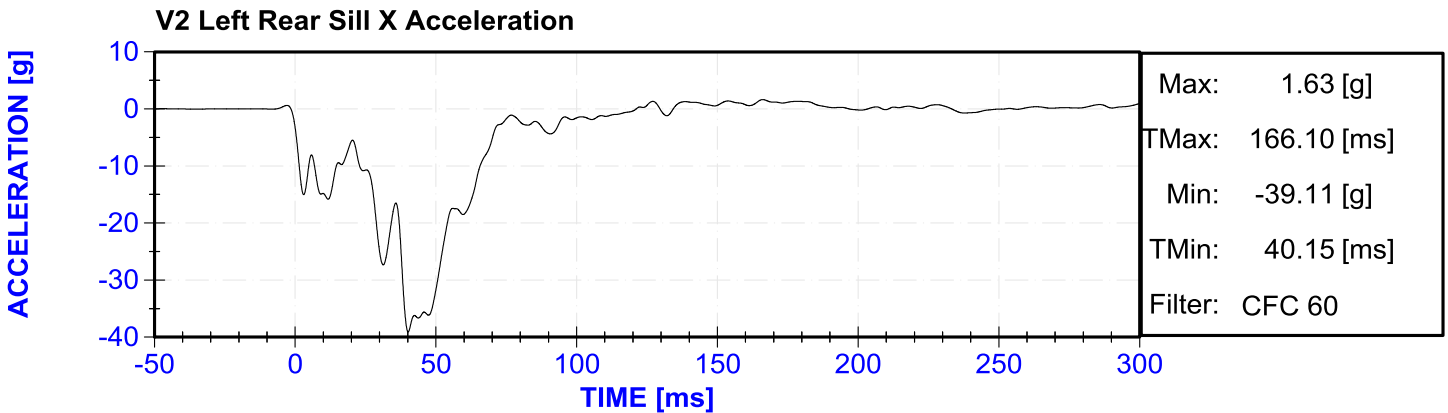


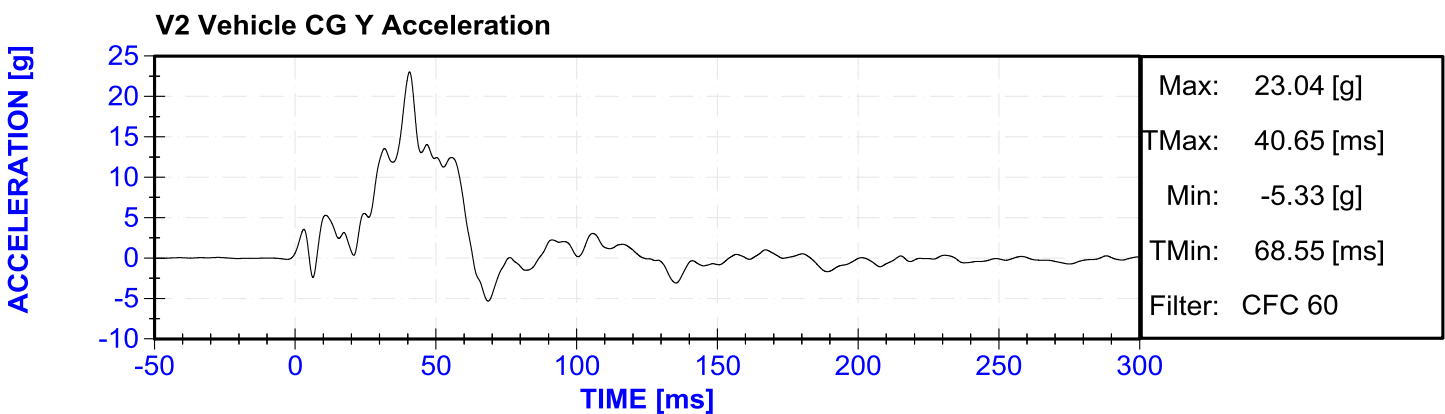
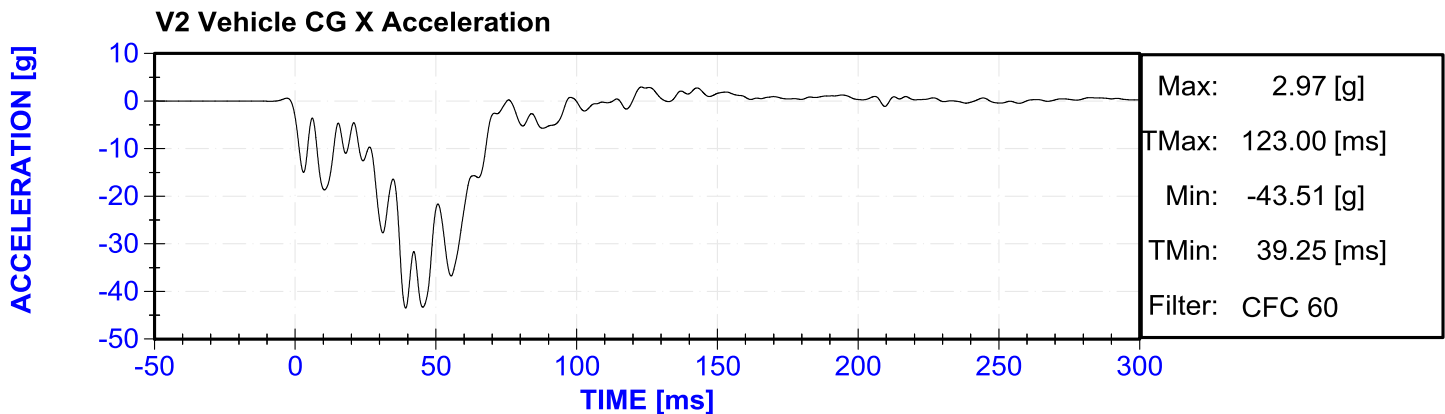
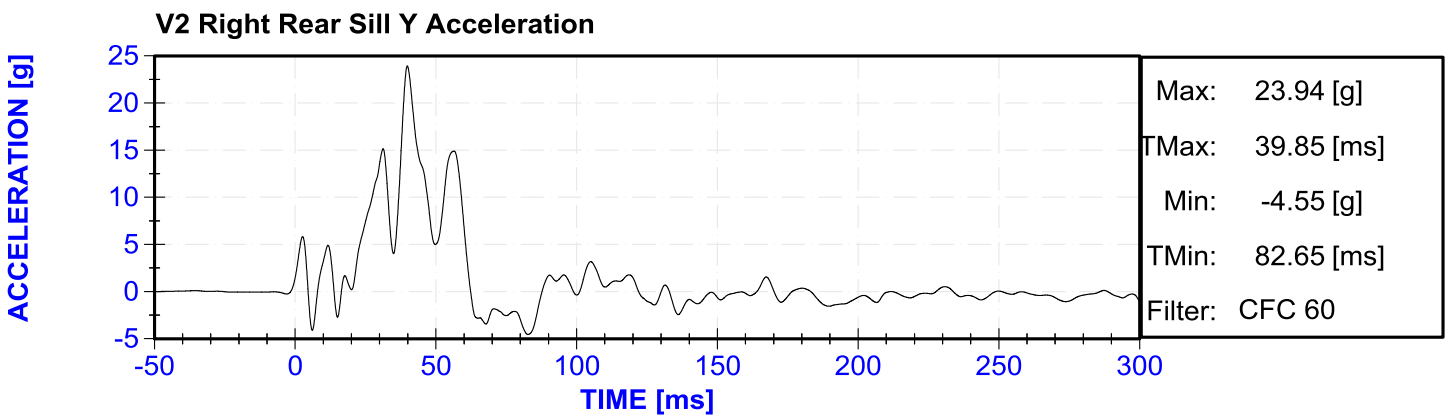
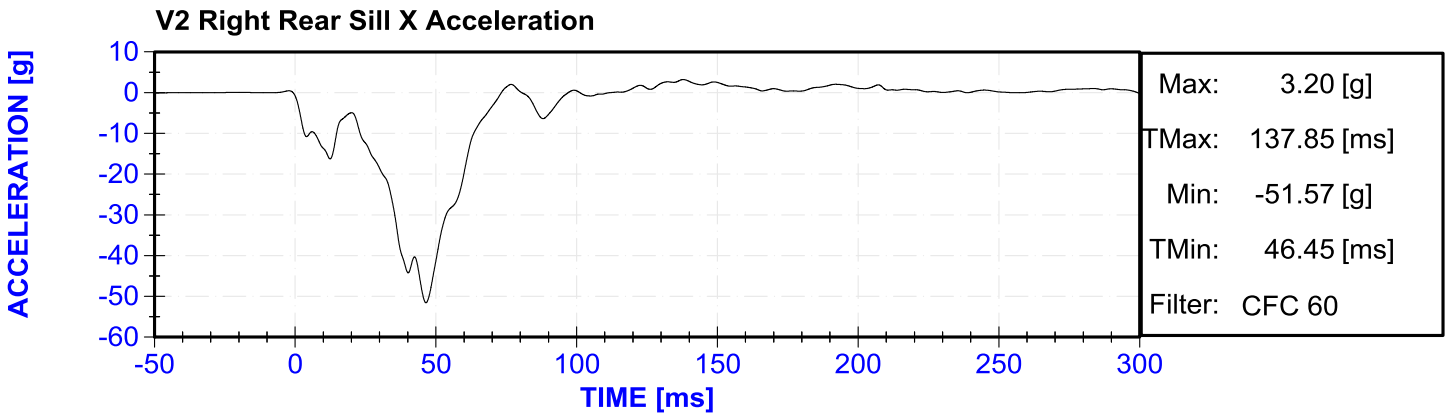


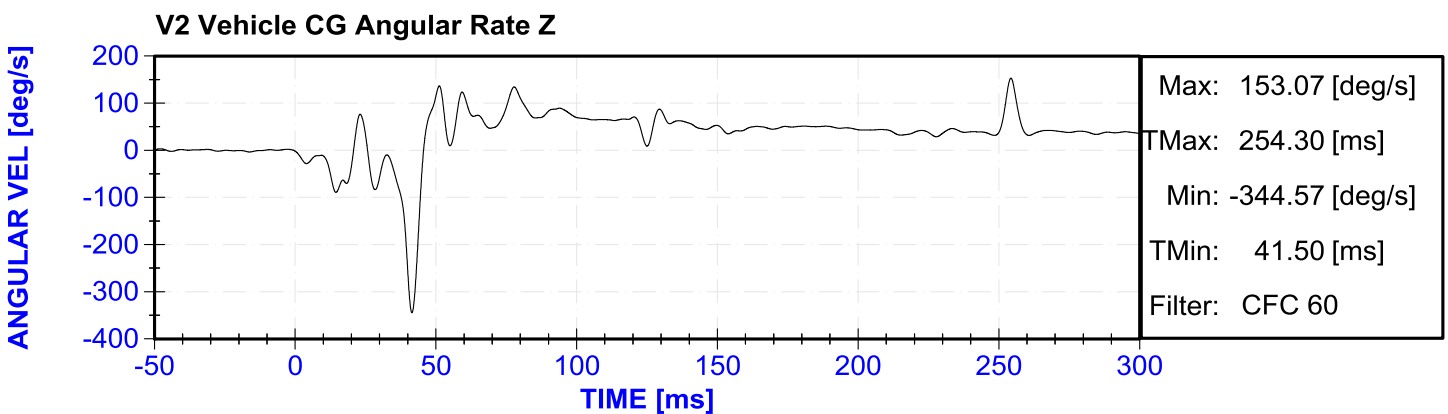
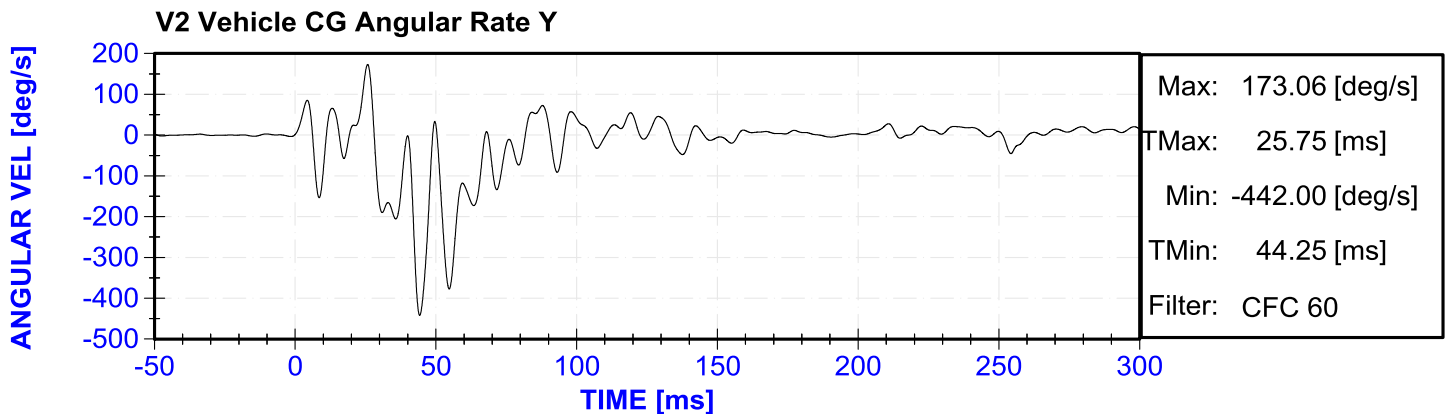
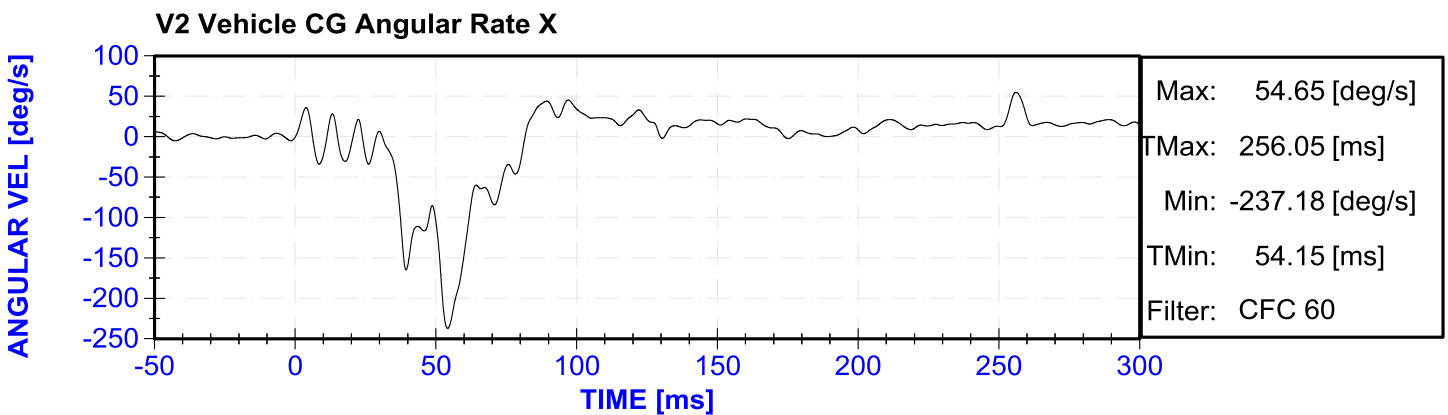
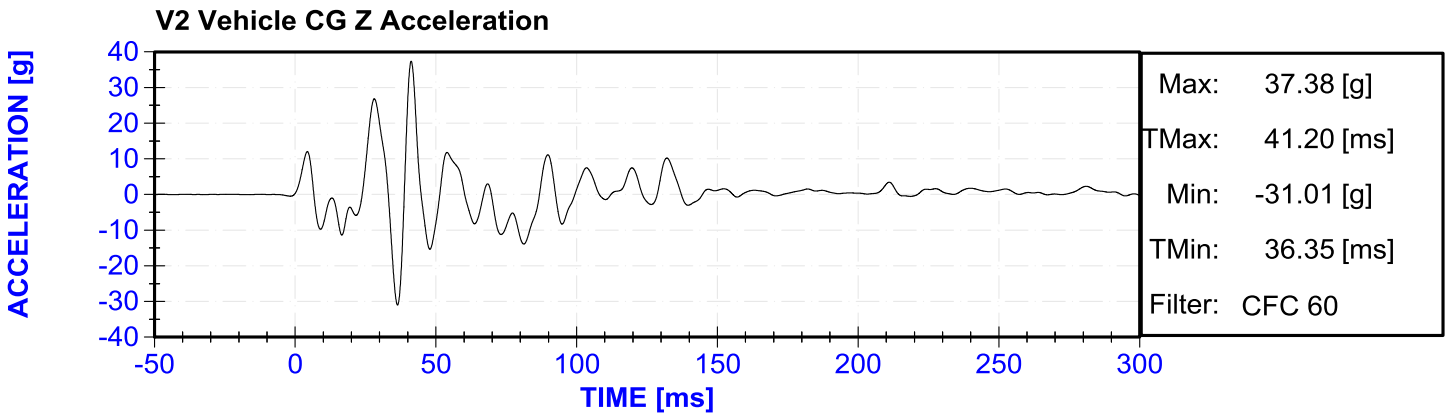


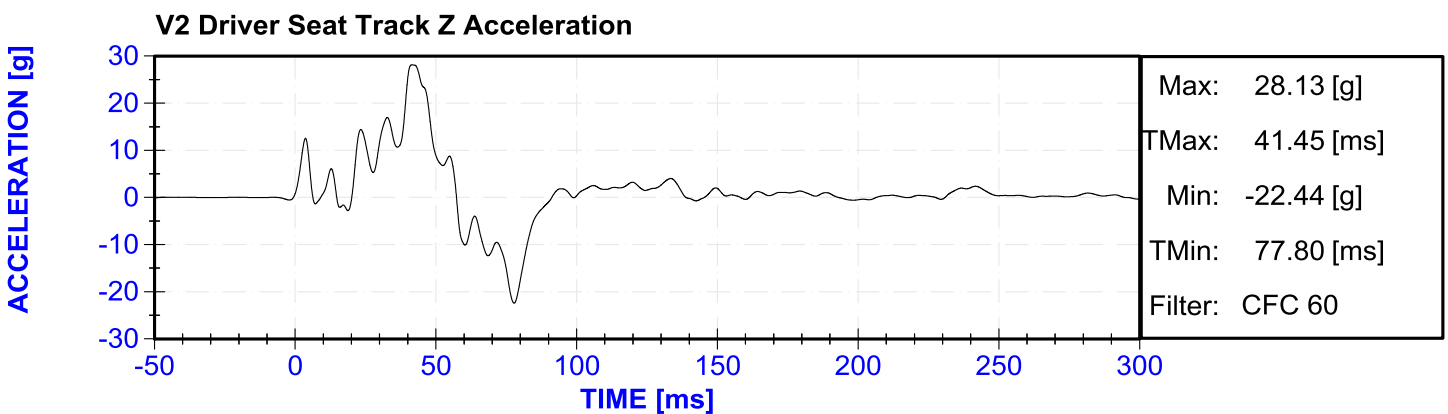
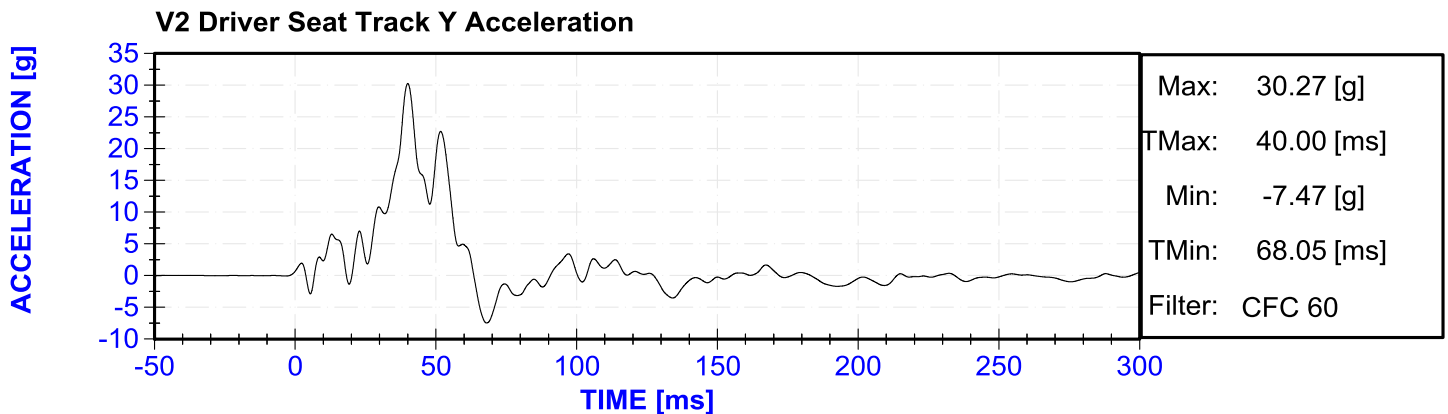
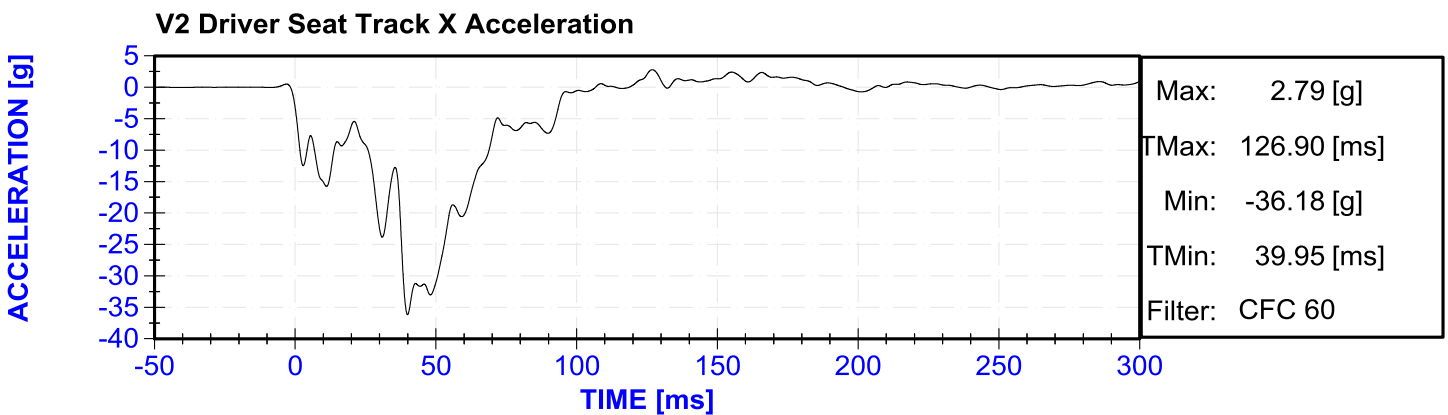
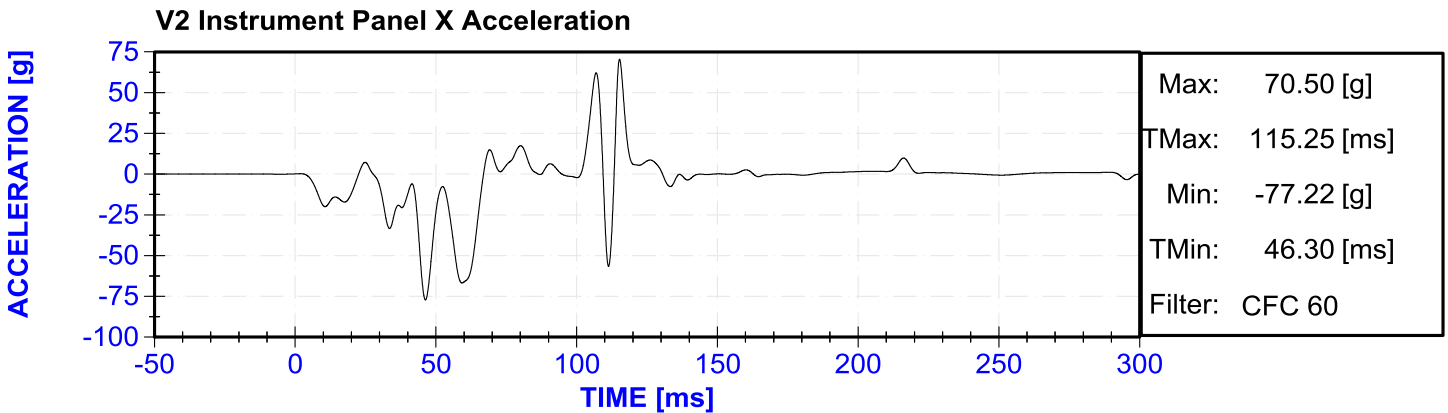


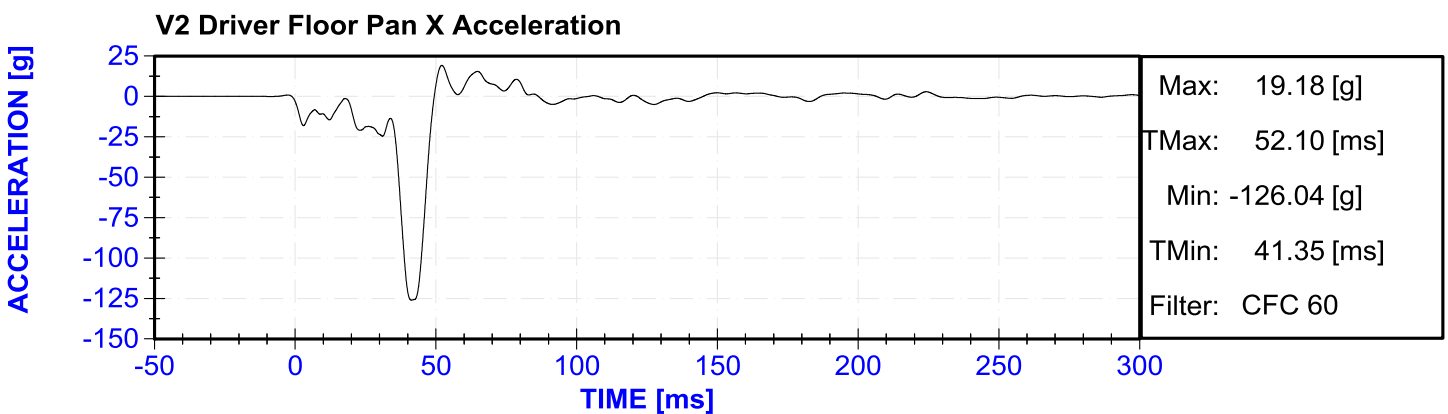
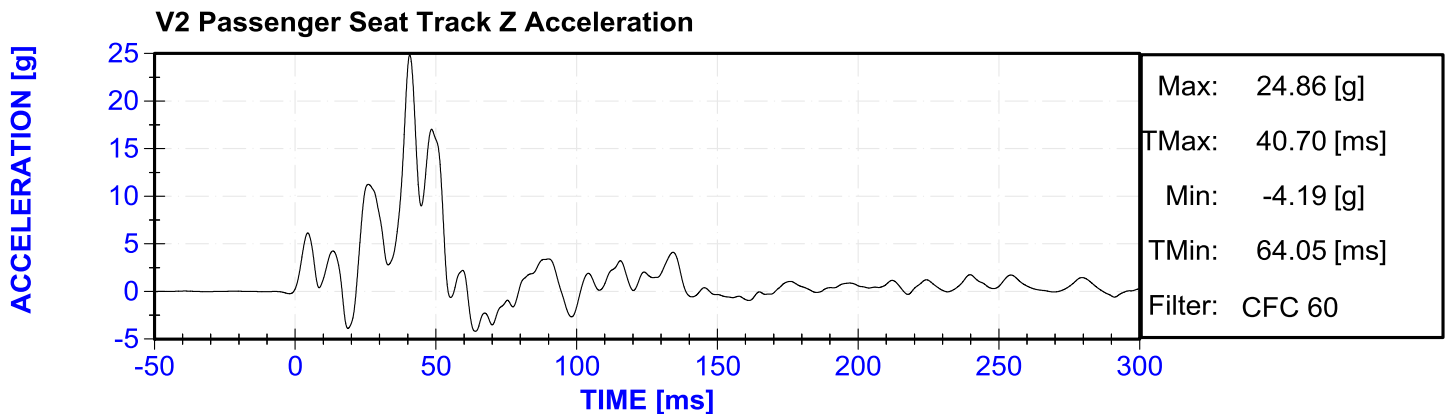
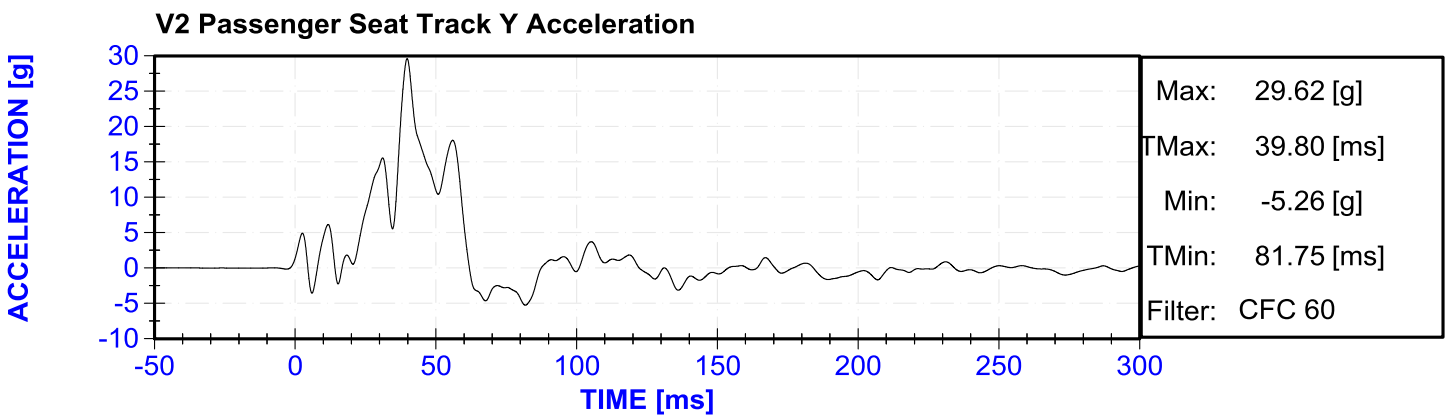
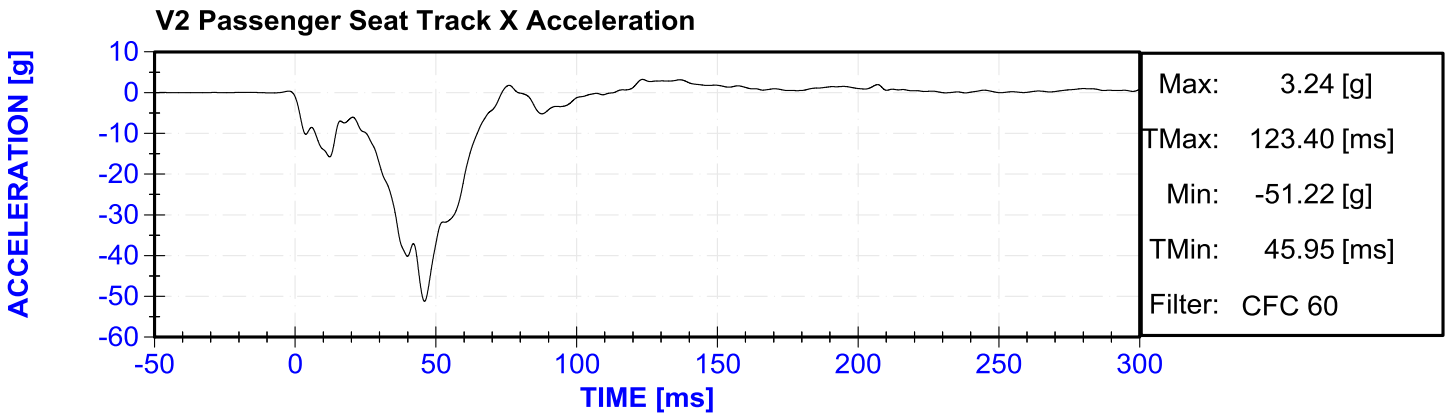


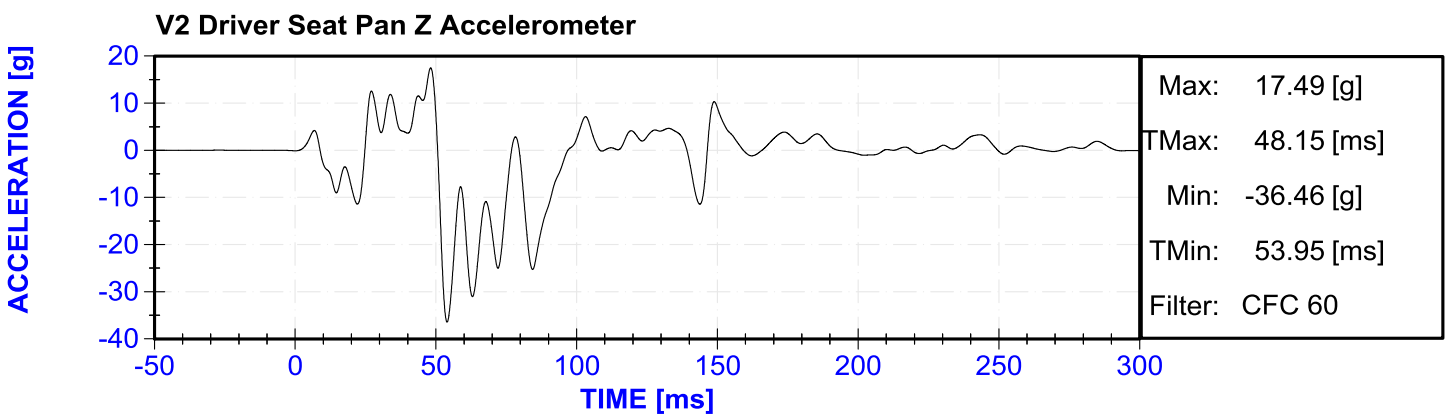
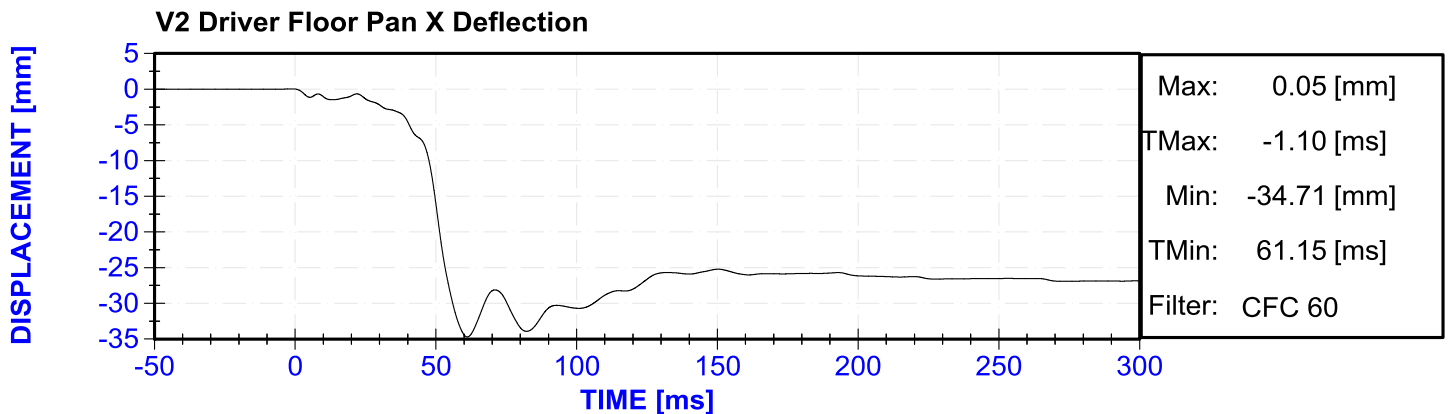
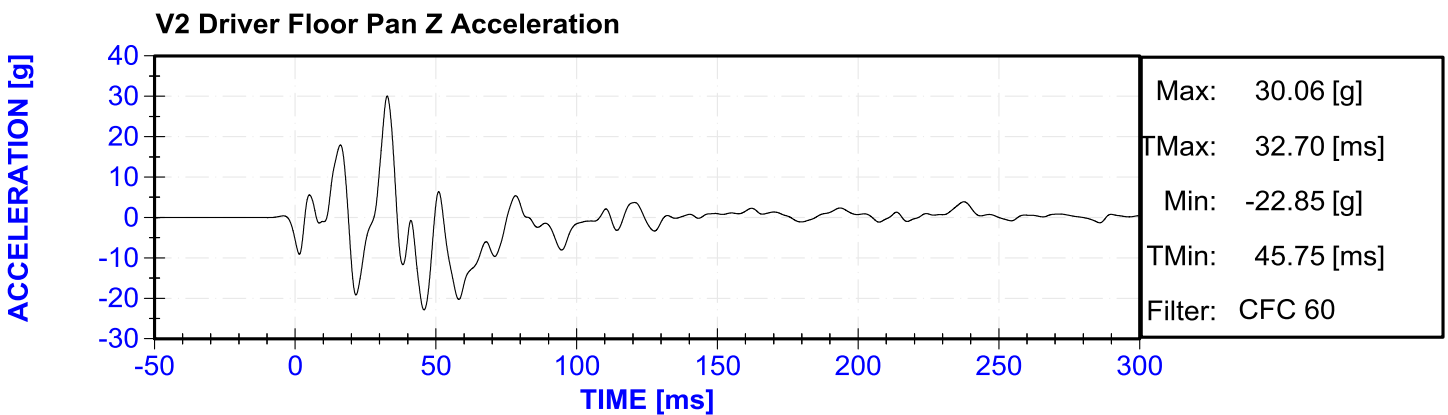
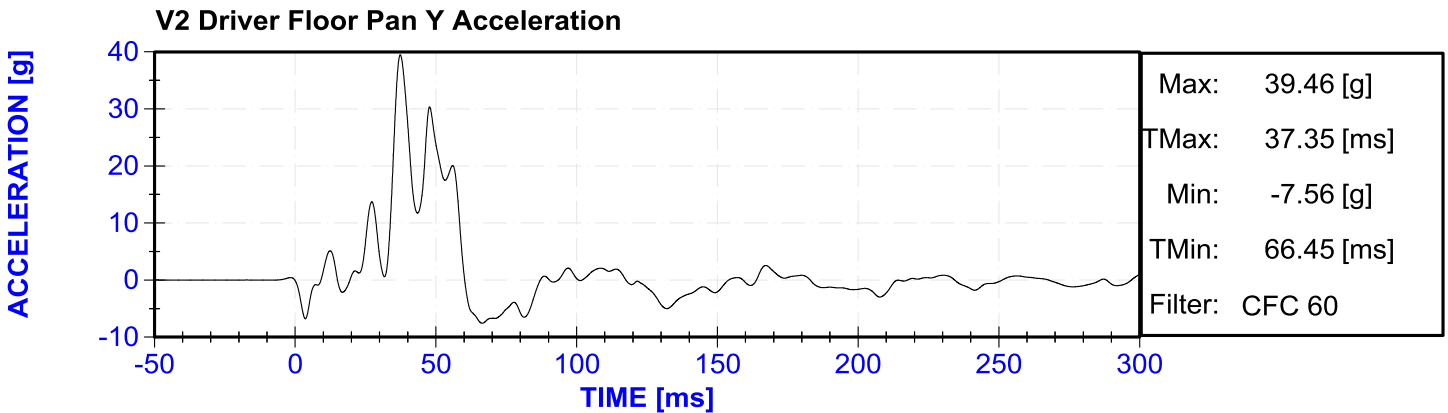


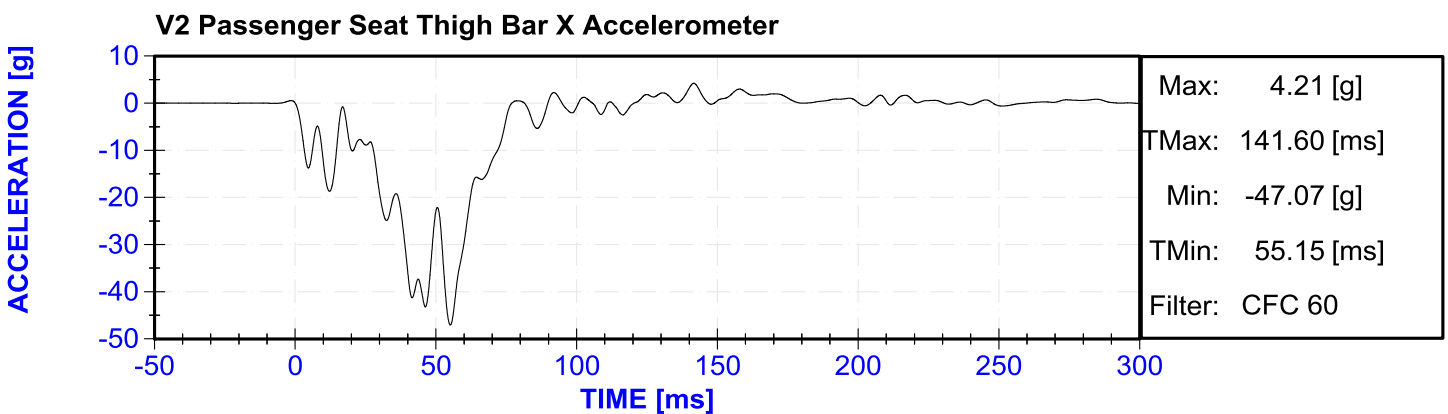
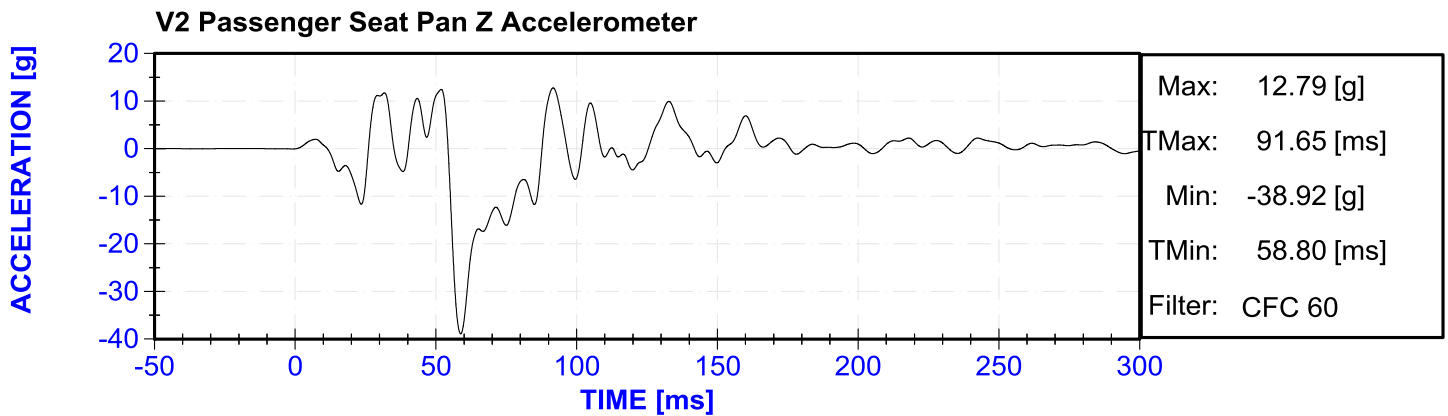
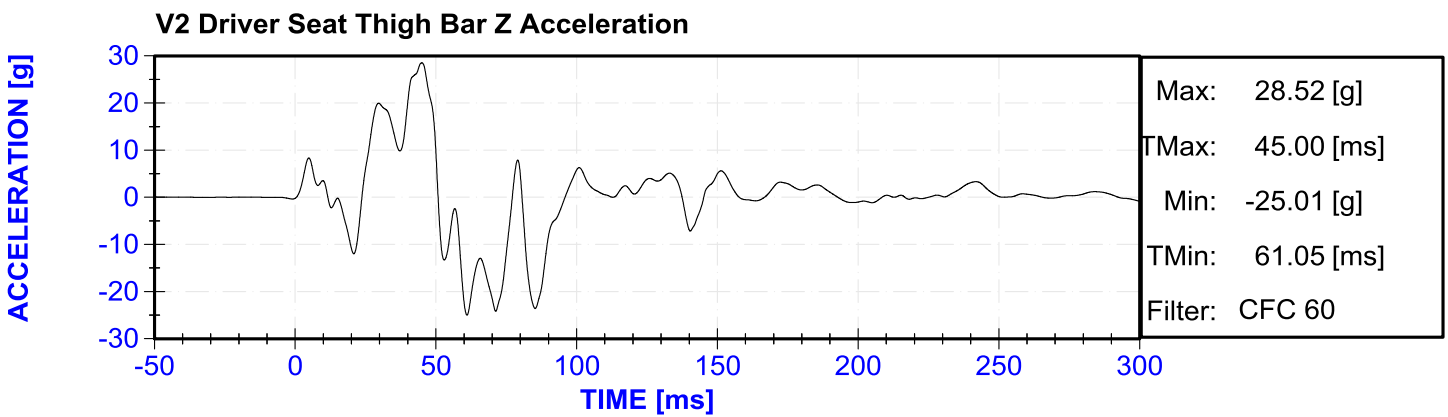
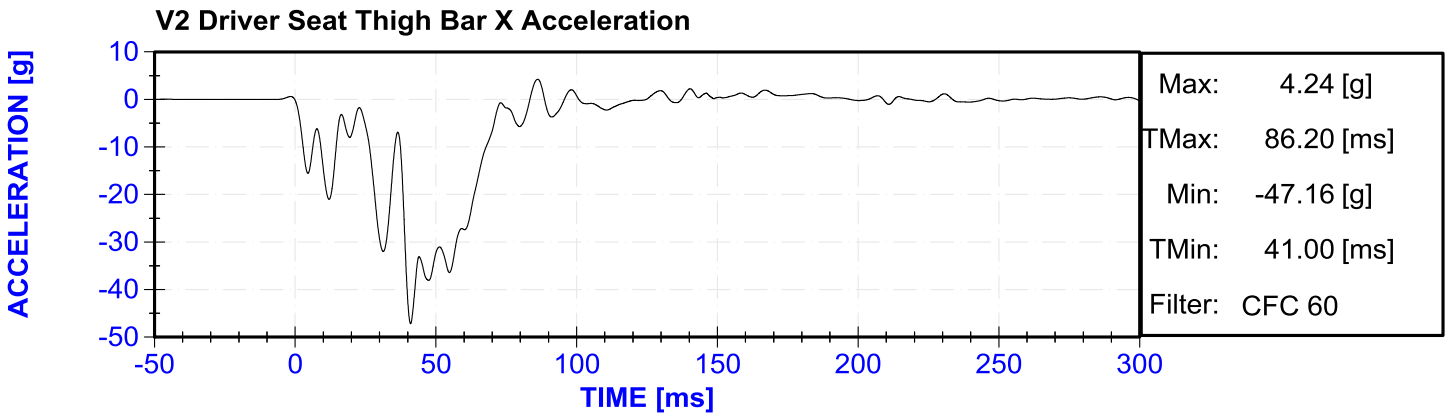


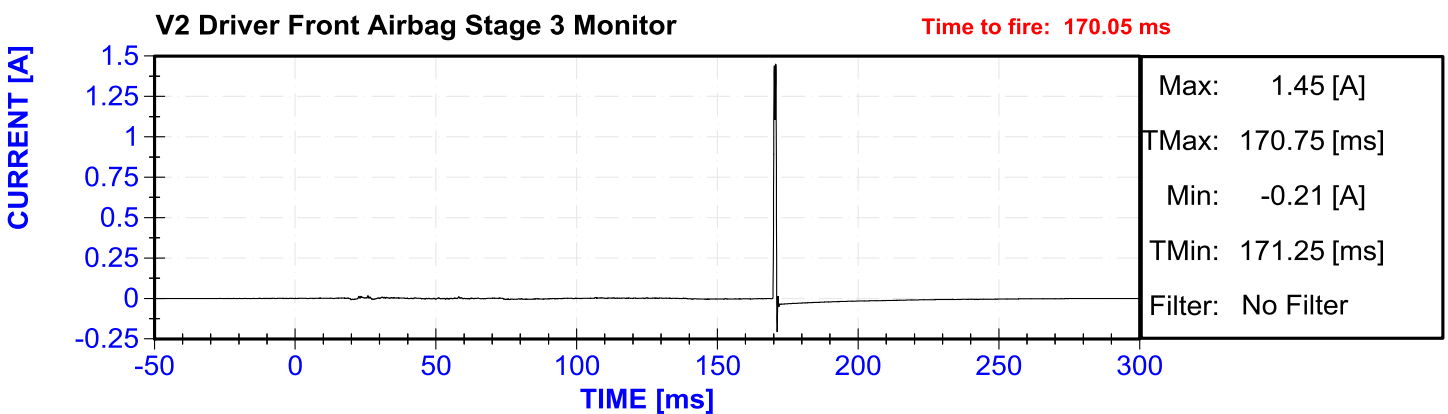
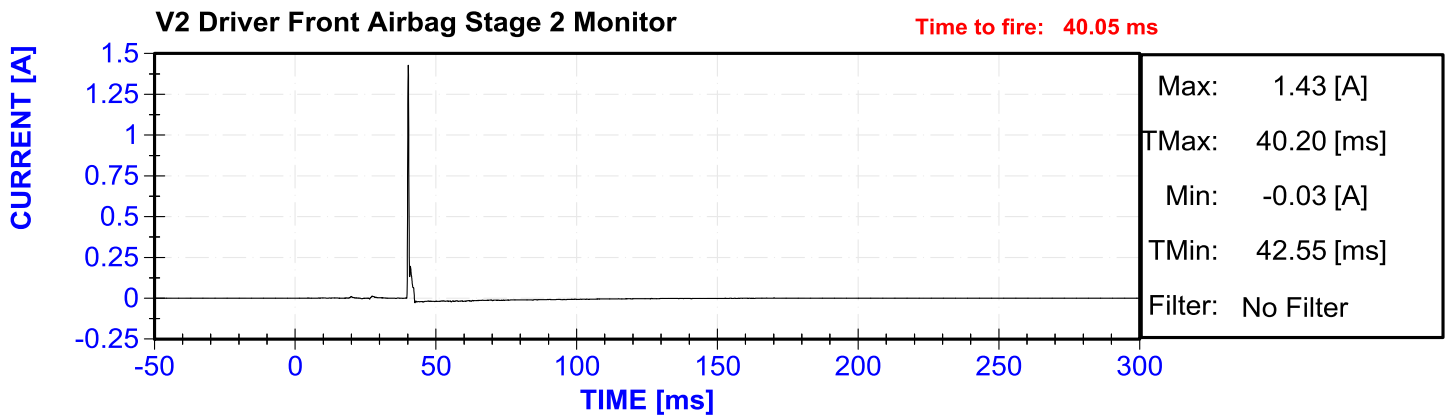
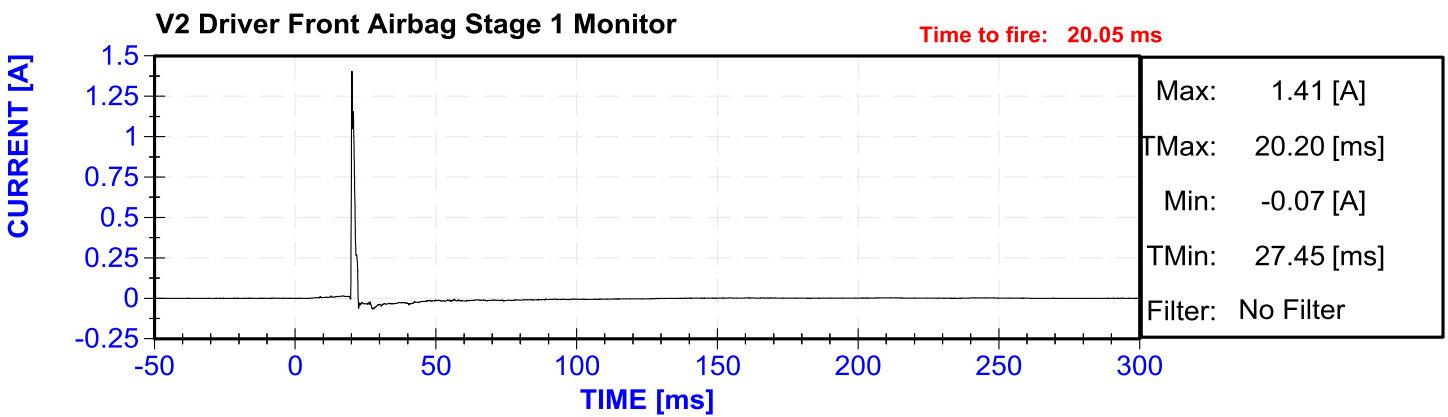
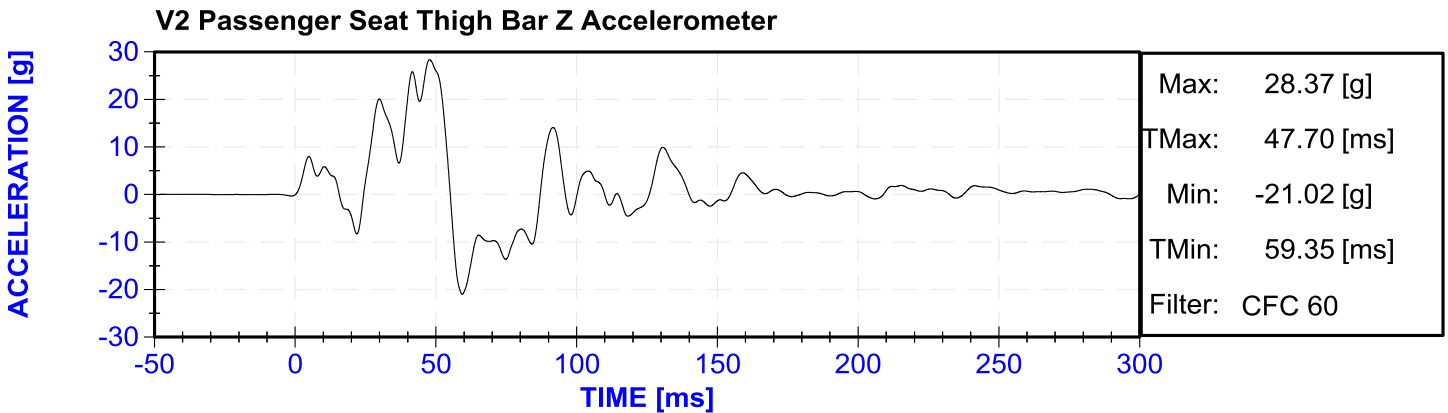






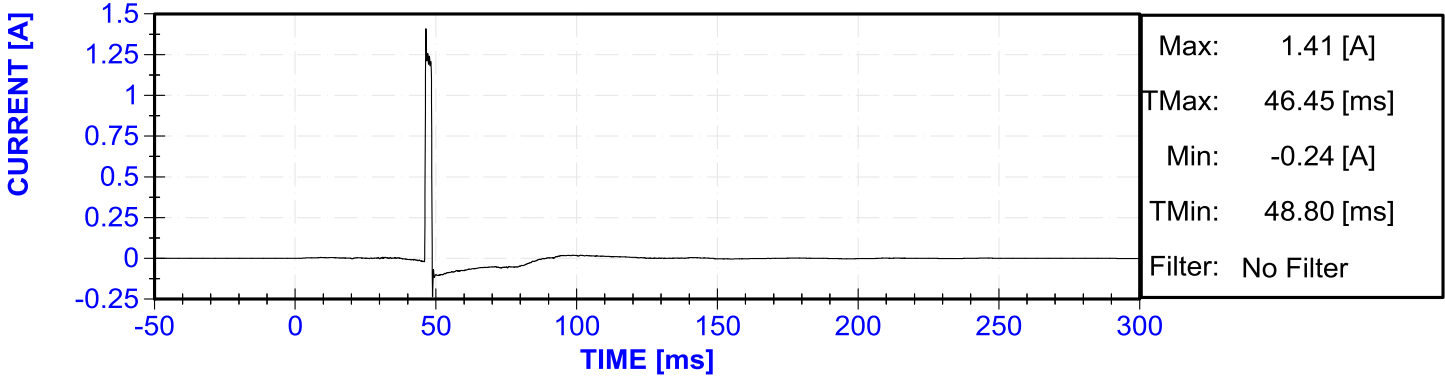






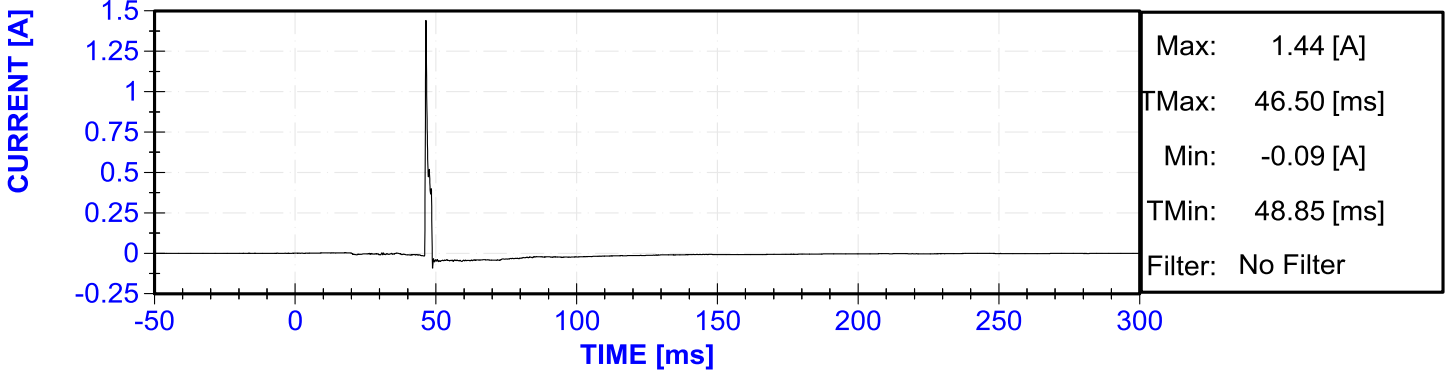
V2 Driver Curtain Airbag Monitor

Time to fire: 46.30 ms



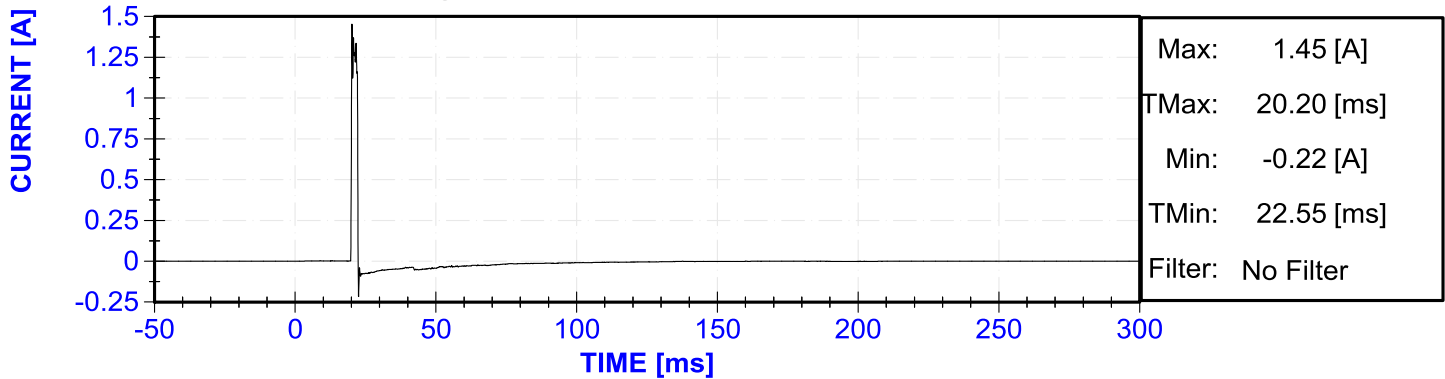
V2 Driver Seat Airbag Monitor

Time to fire: 46.30 ms



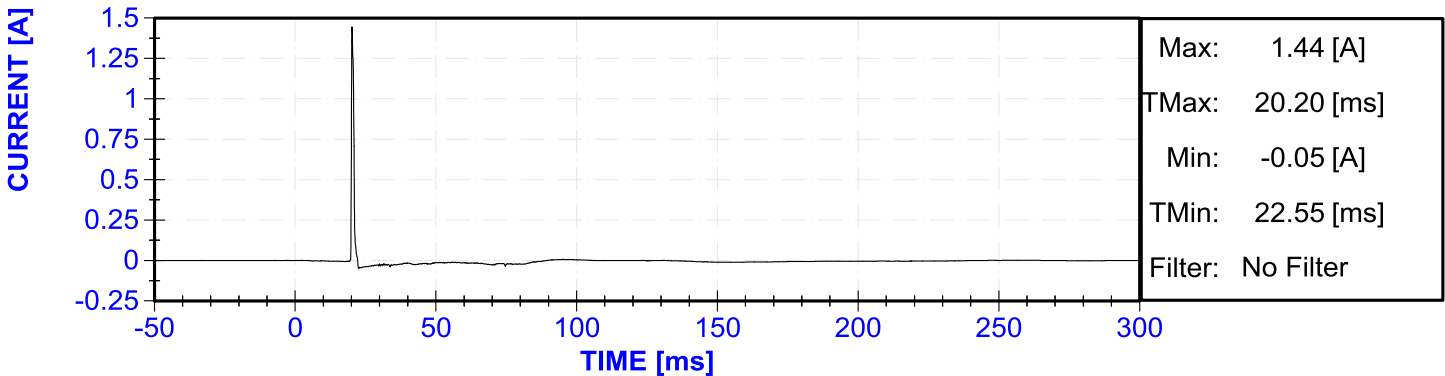
V2 Driver Knee Airbag Monitor

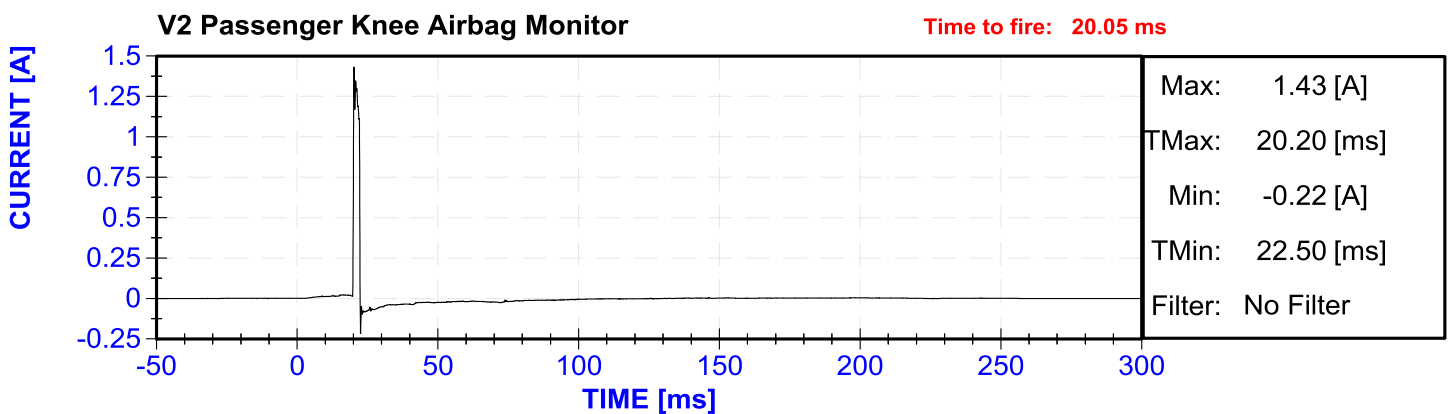
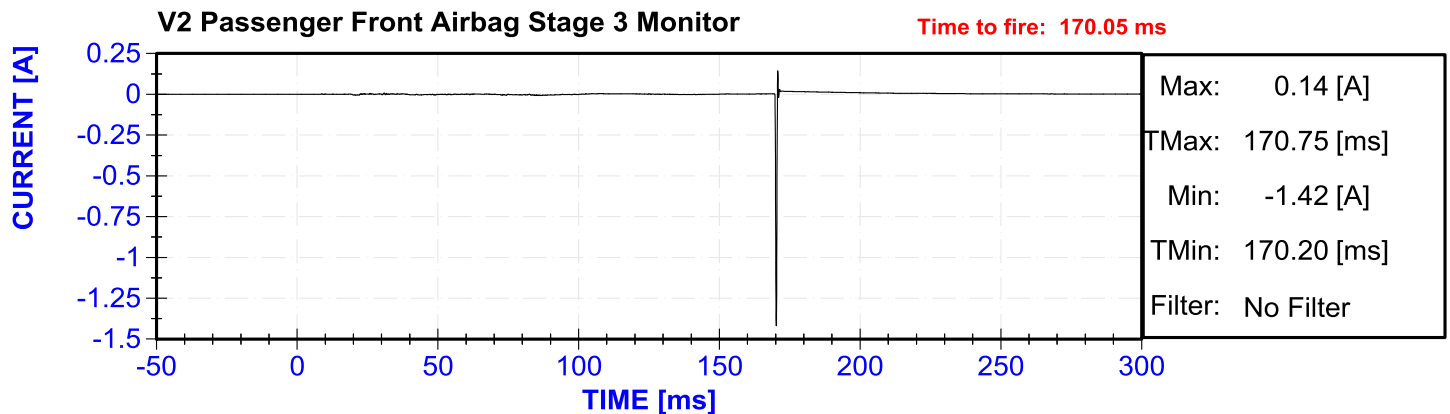
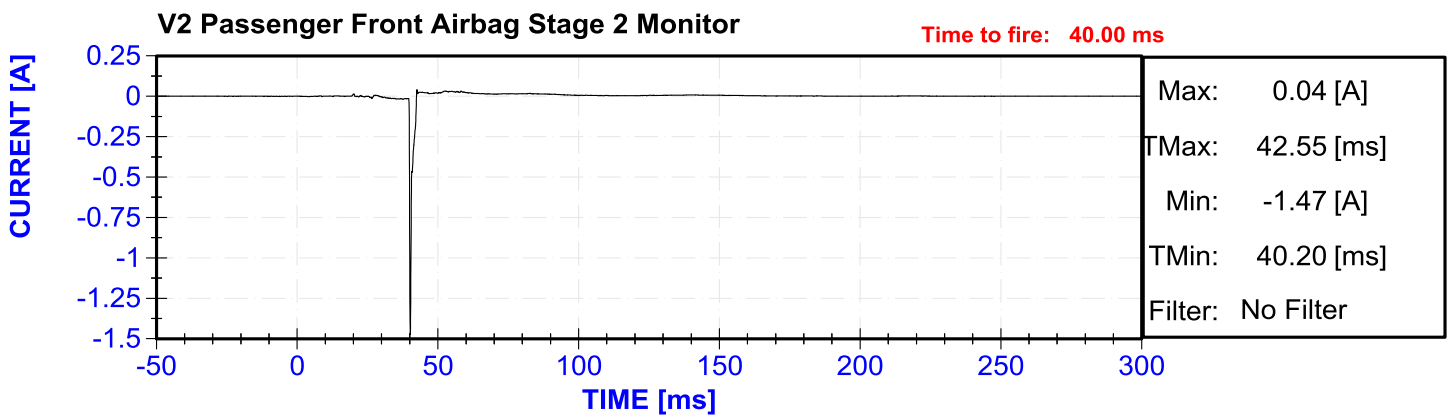
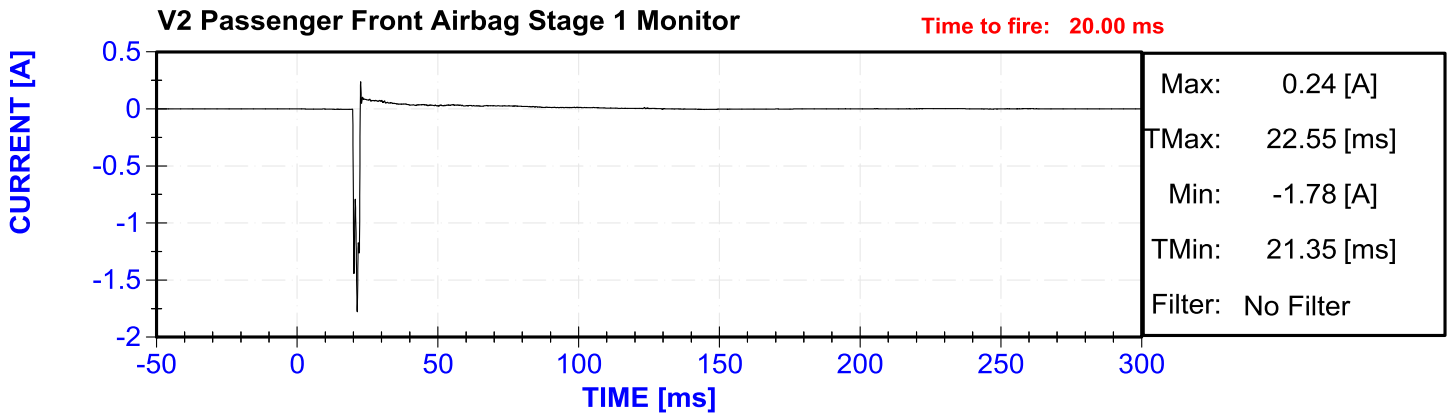
Time to fire: 20.05 ms



V2 Driver Anchor Pretensioner Monitor

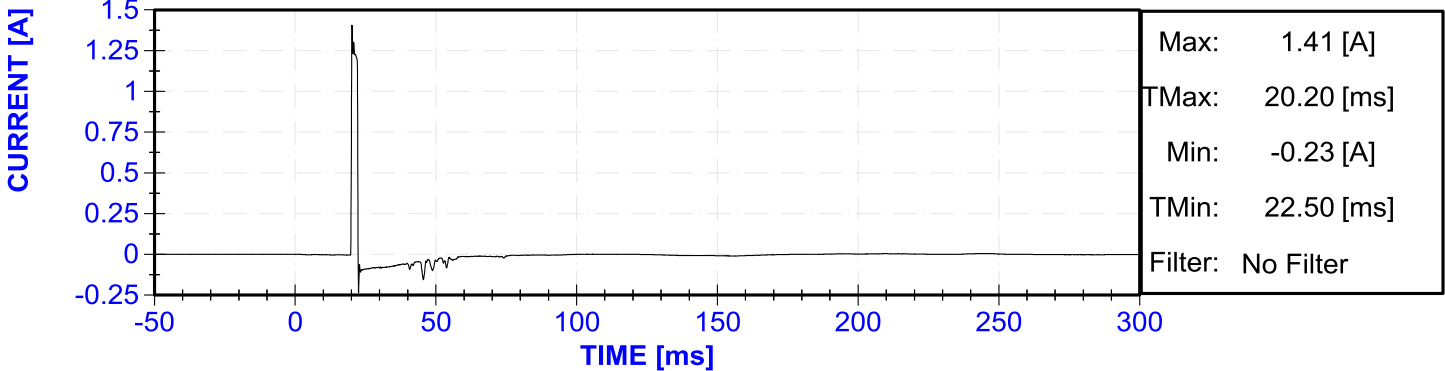
Time to fire: 20.05 ms



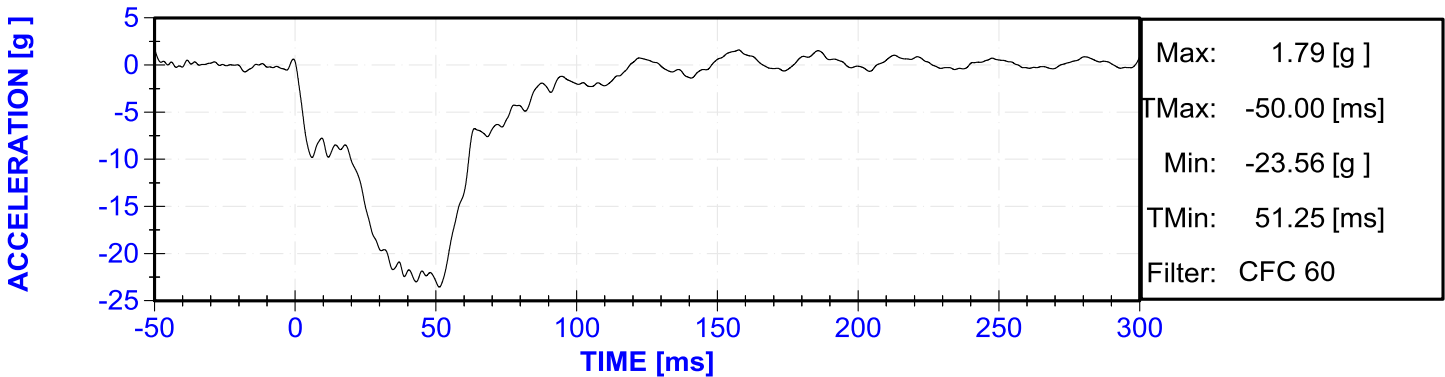


V2 Passenger Anchor Pretensioner Monitor

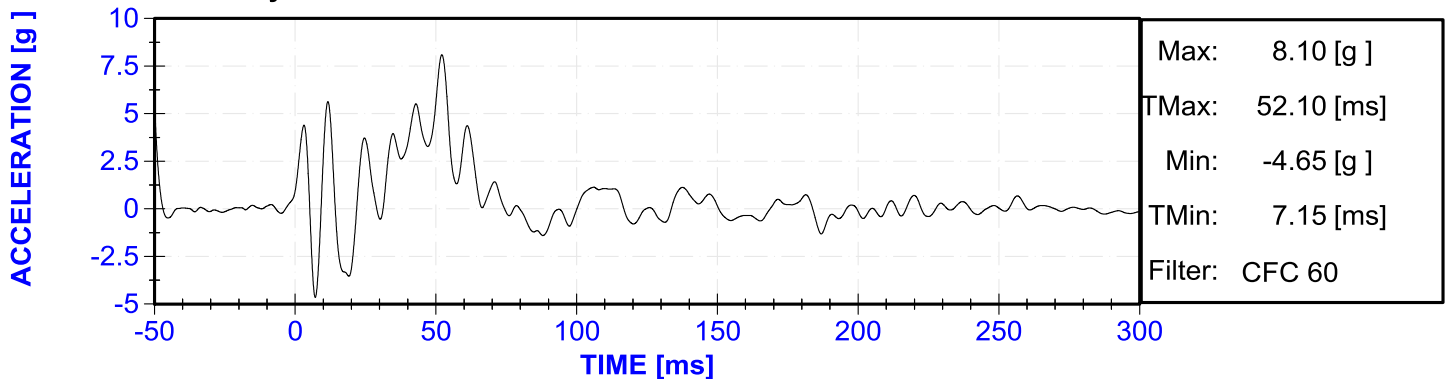
Time to fire: 20.05 ms



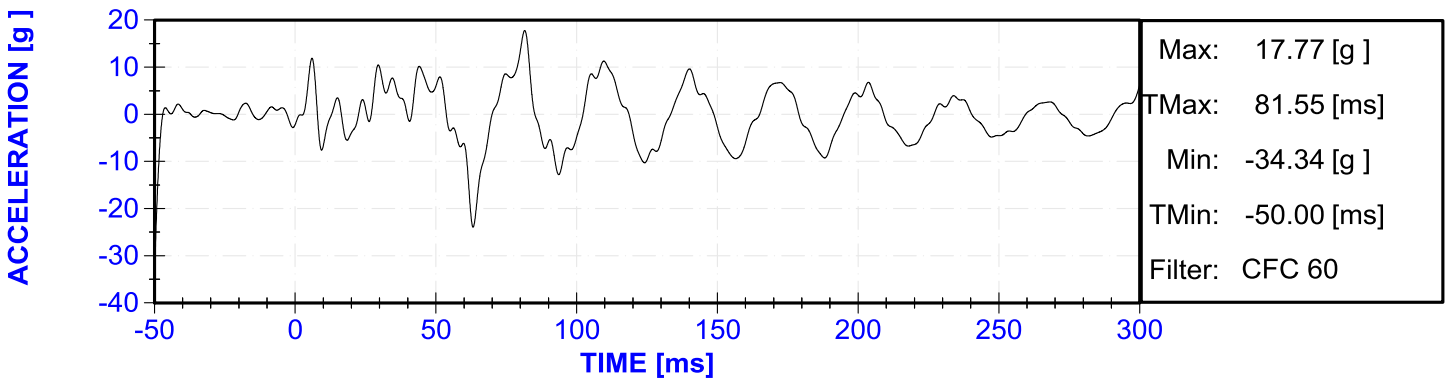
V1 CG Ax

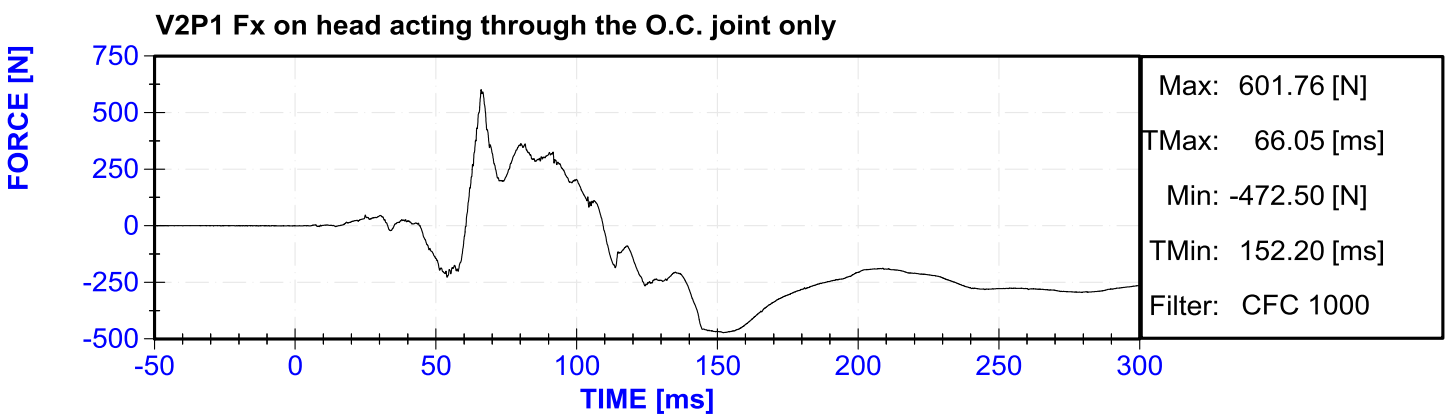
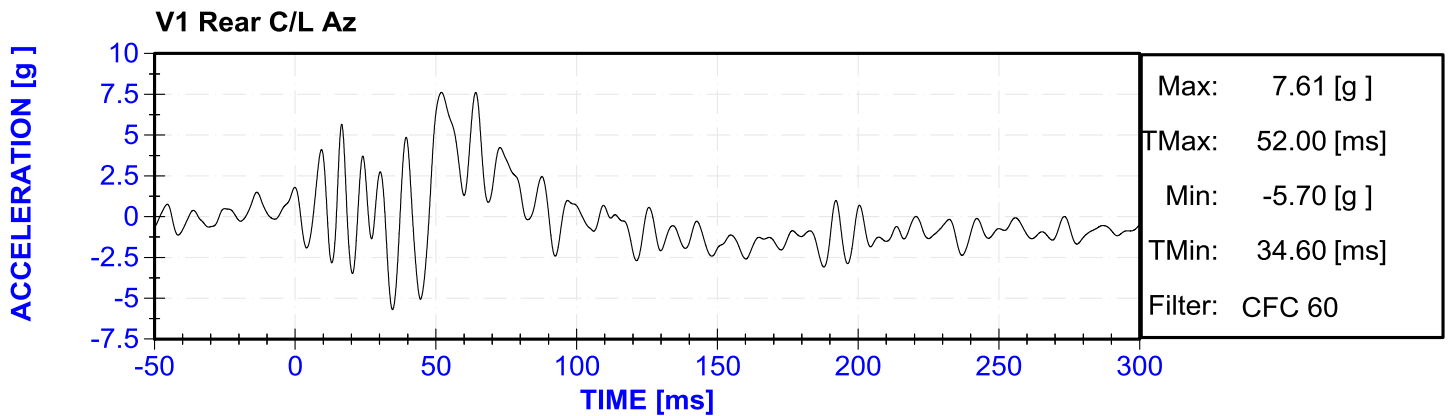
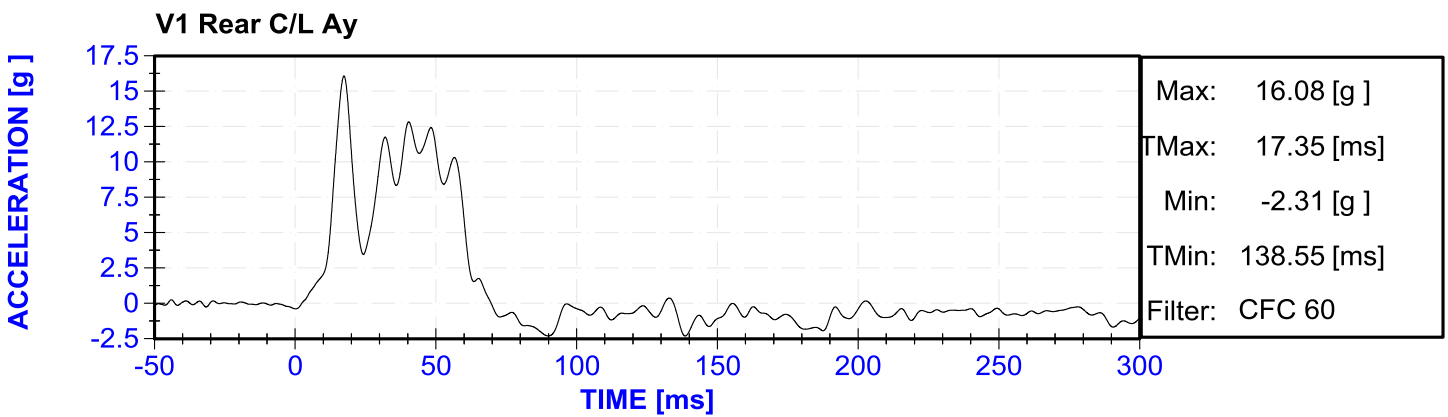
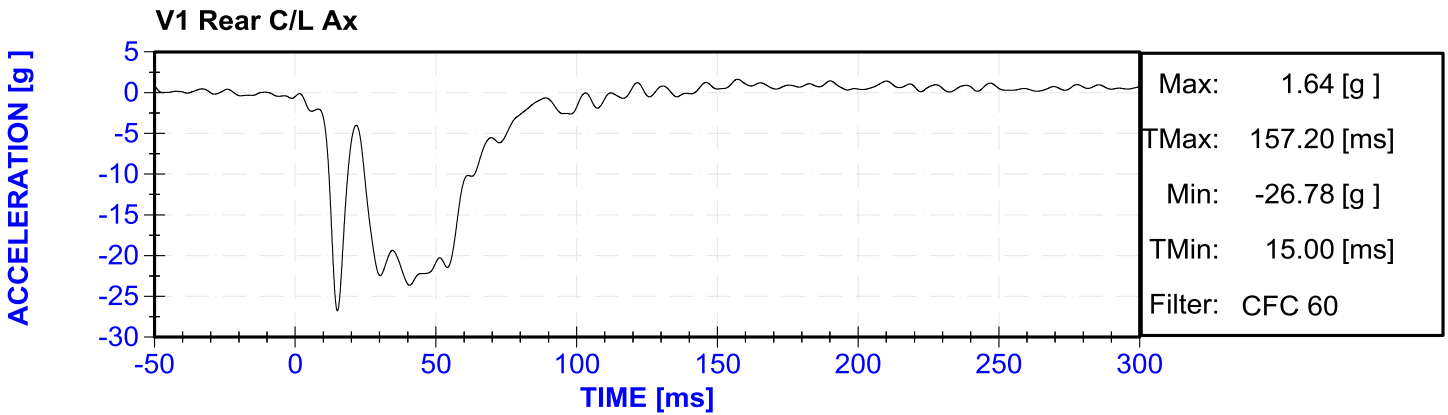


V1 CG Ay

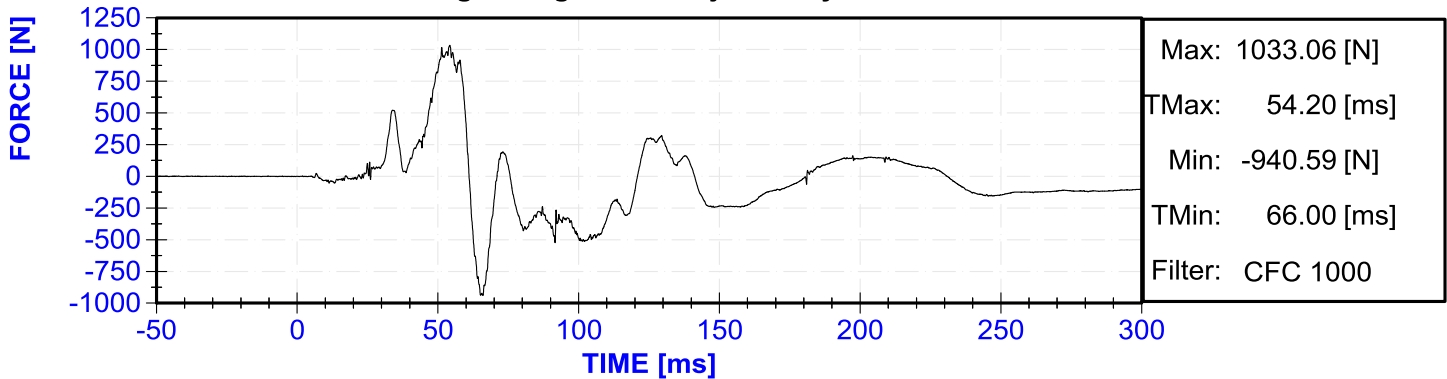


V1 CG Az

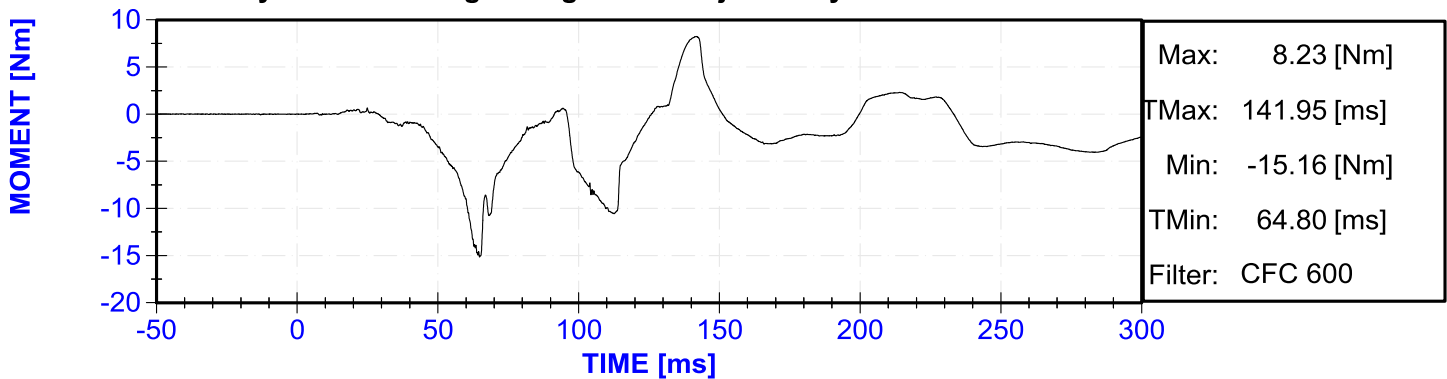




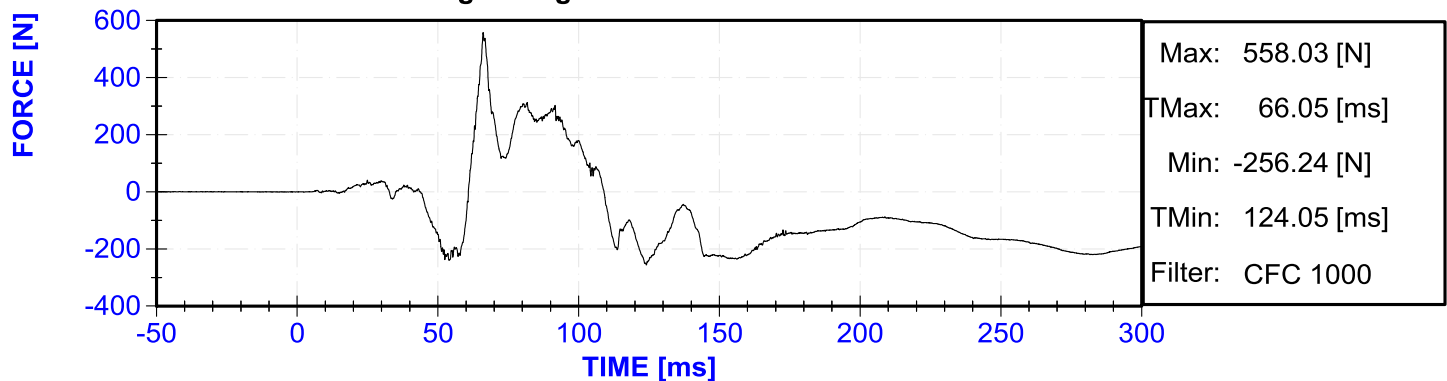
V2P1 Fz on head acting through the O.C. joint only



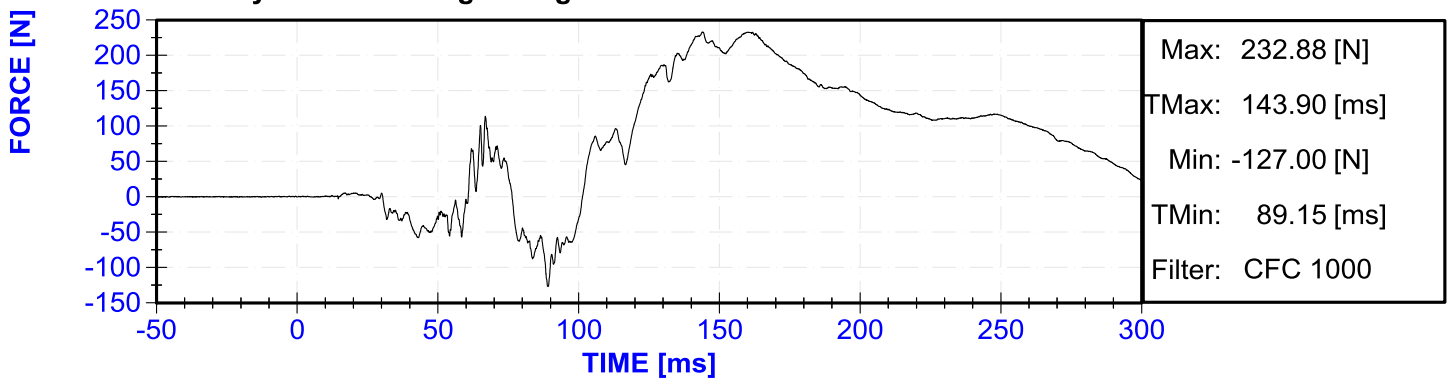
V2P1 My on head acting through the O.C. joint only



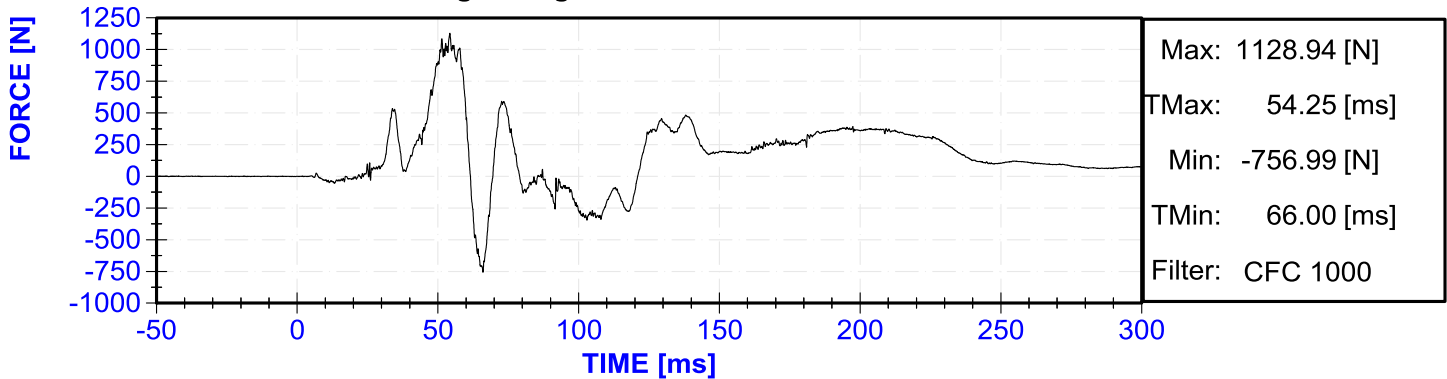
V2P1 Fx on head acting through the total neck section



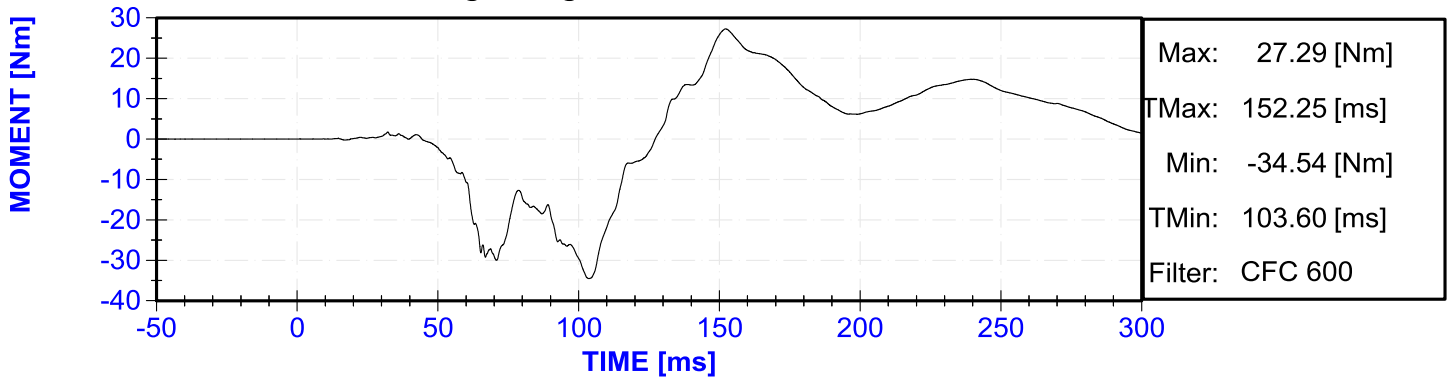
V2P1 Fy on head acting through the total neck section



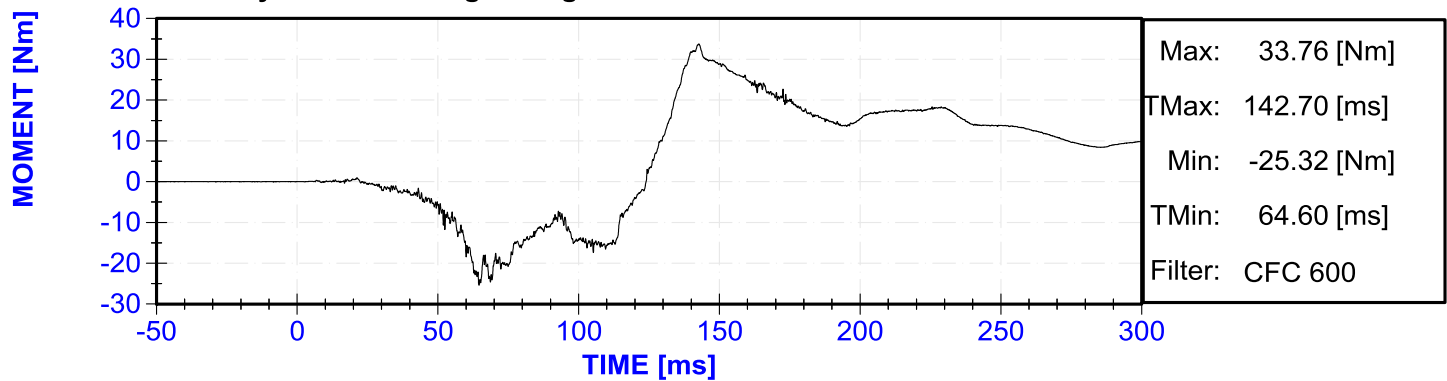
V2P1 Fz on head acting through the total neck section



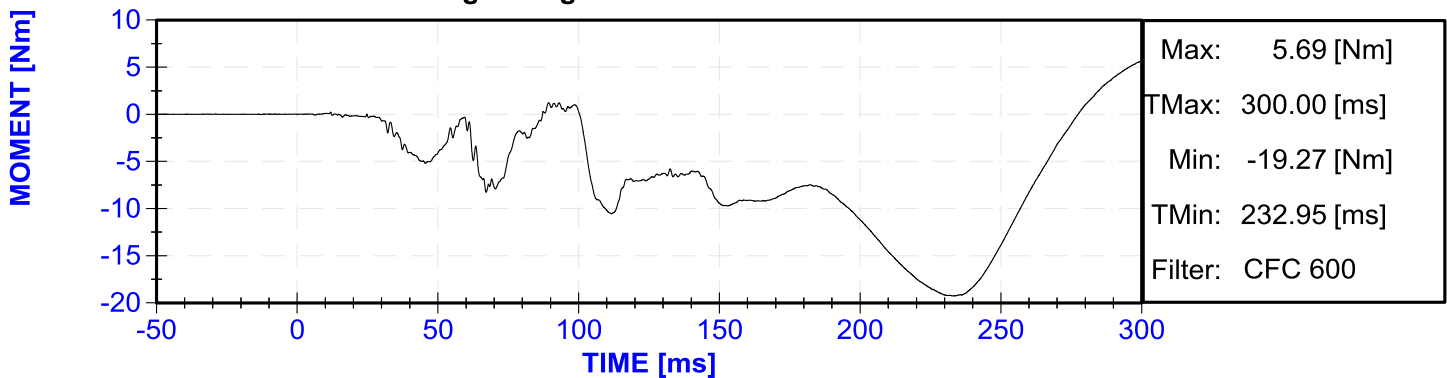
V2P1 Mx on head acting through the total neck section

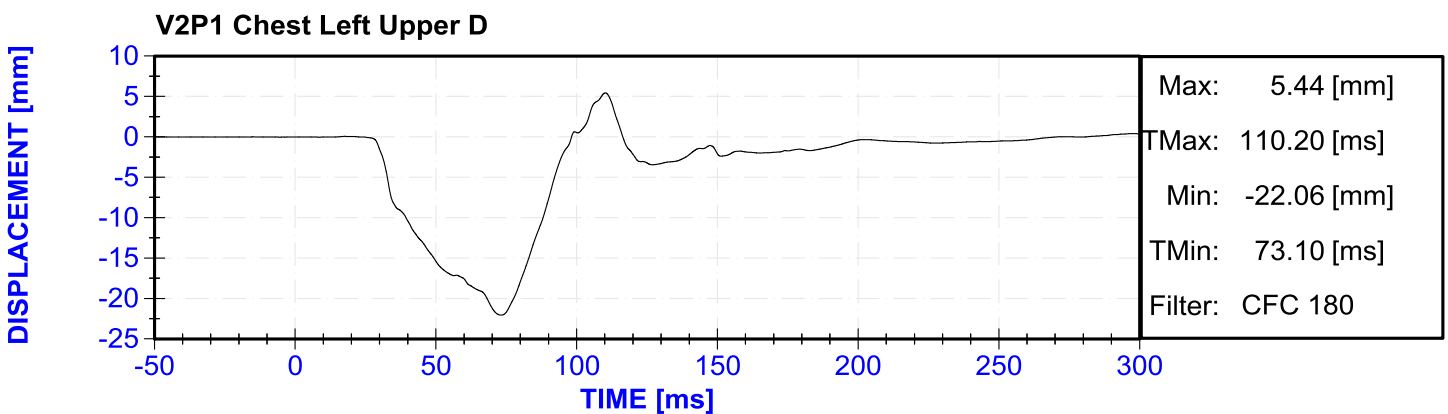
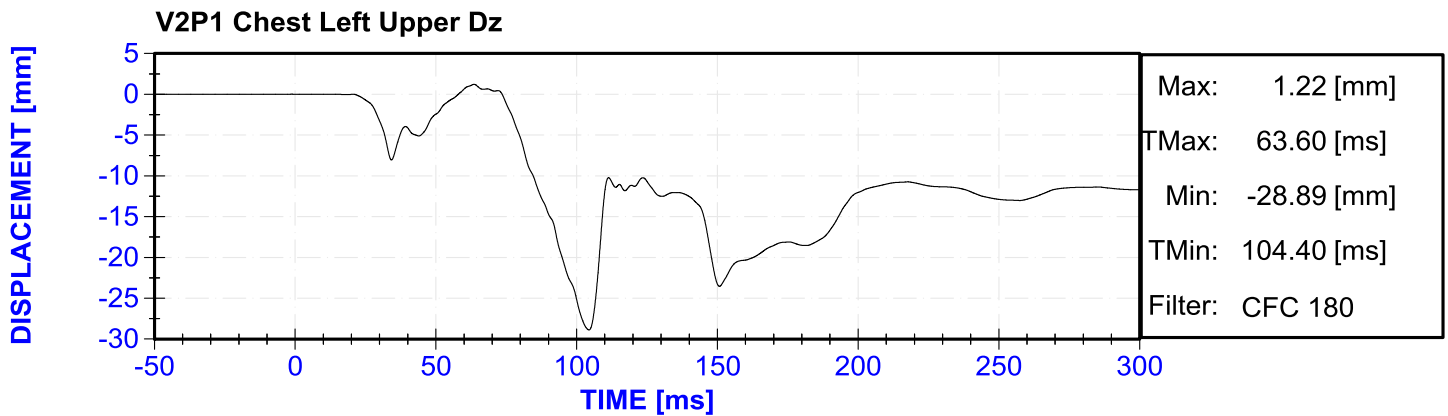
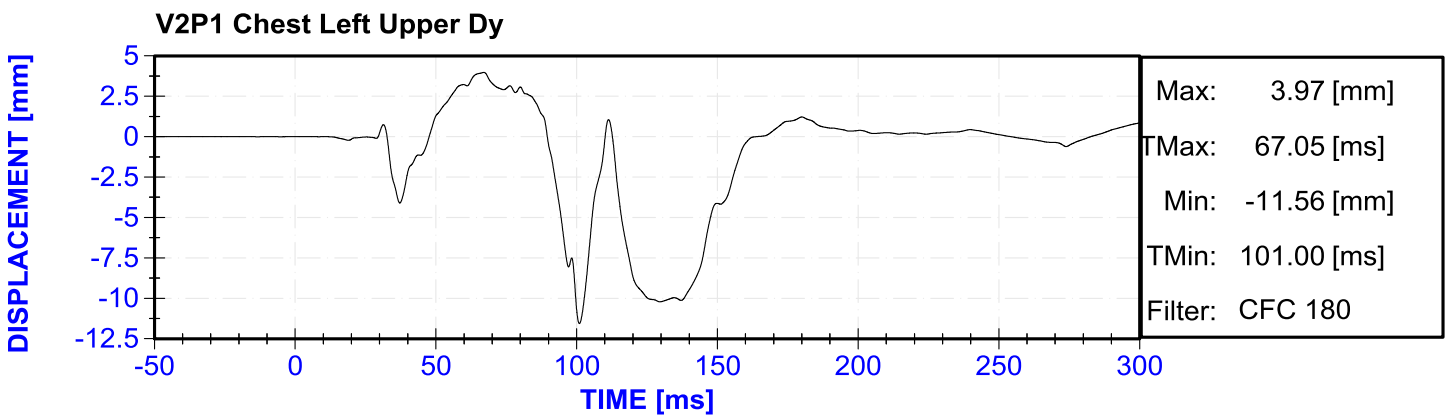
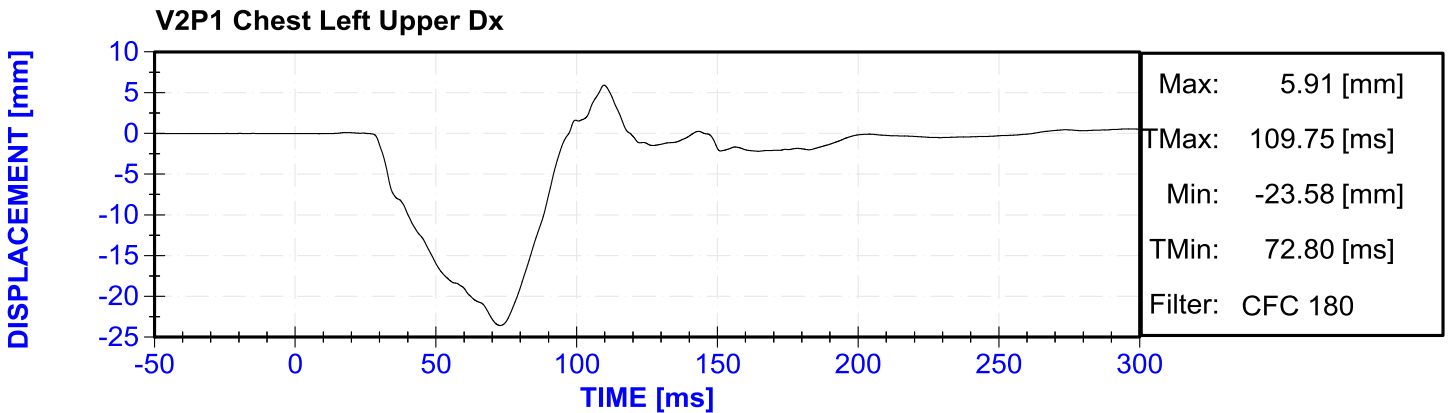


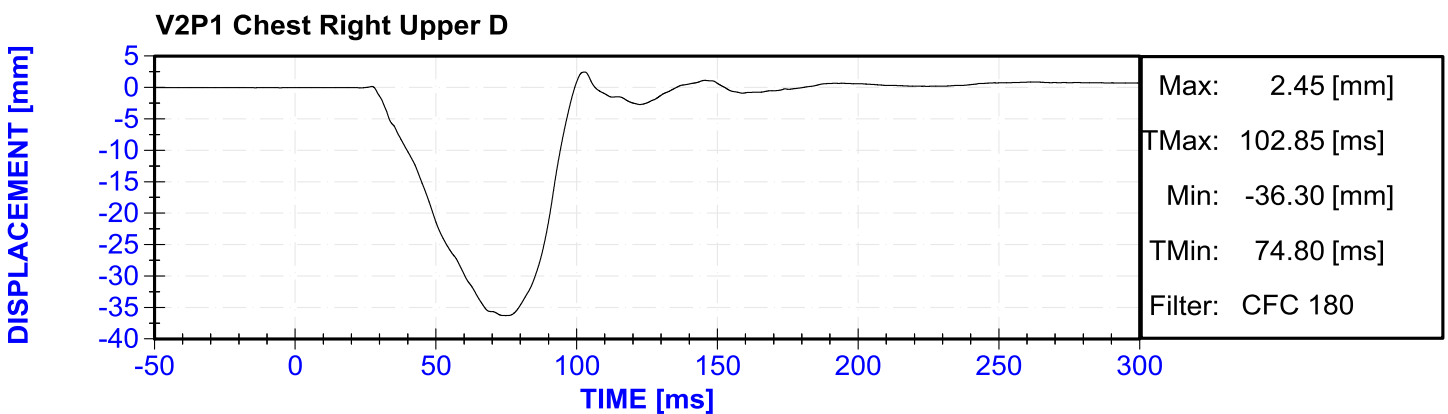
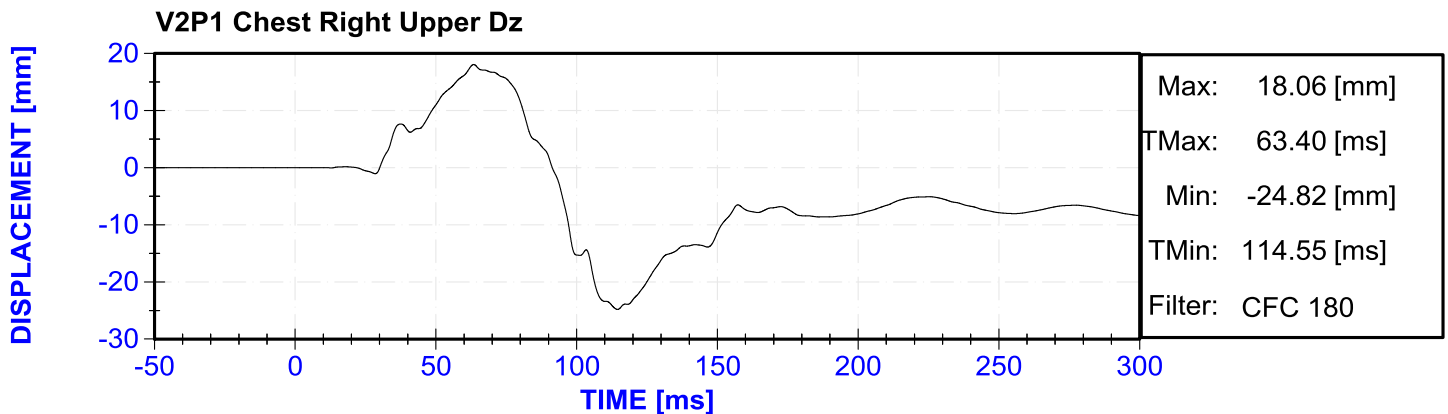
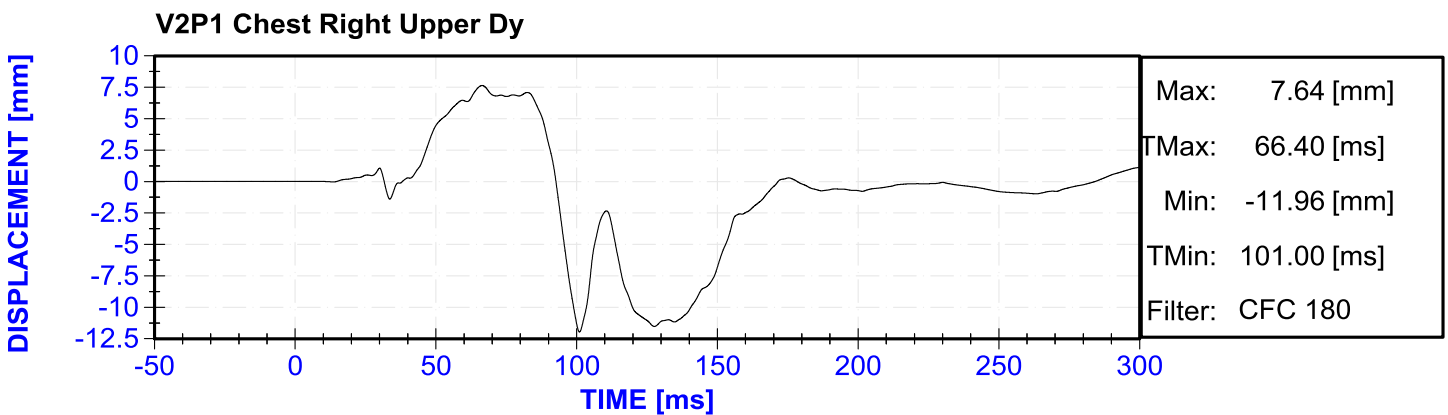
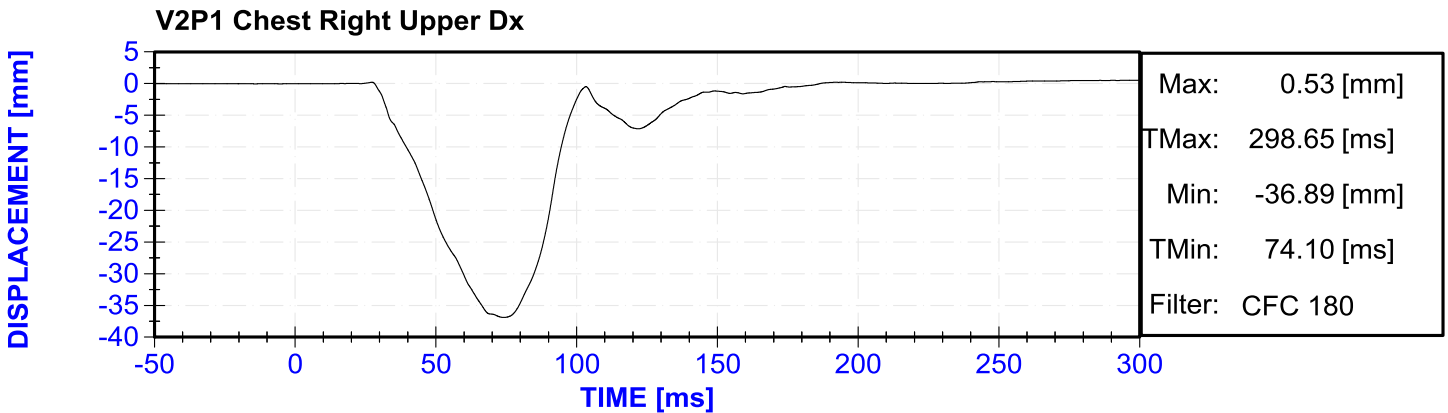
V2P1 My on head acting through the total neck section

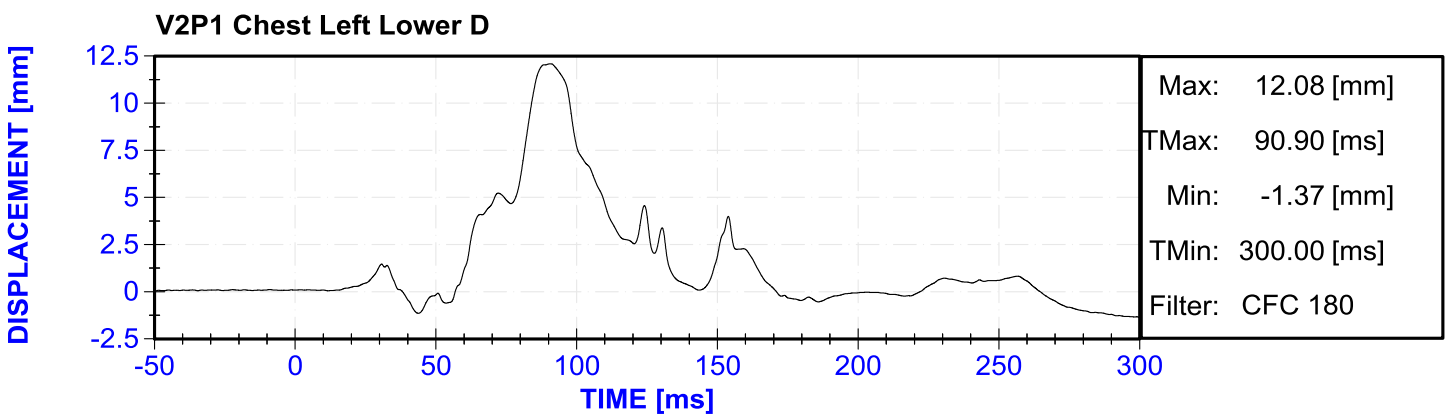
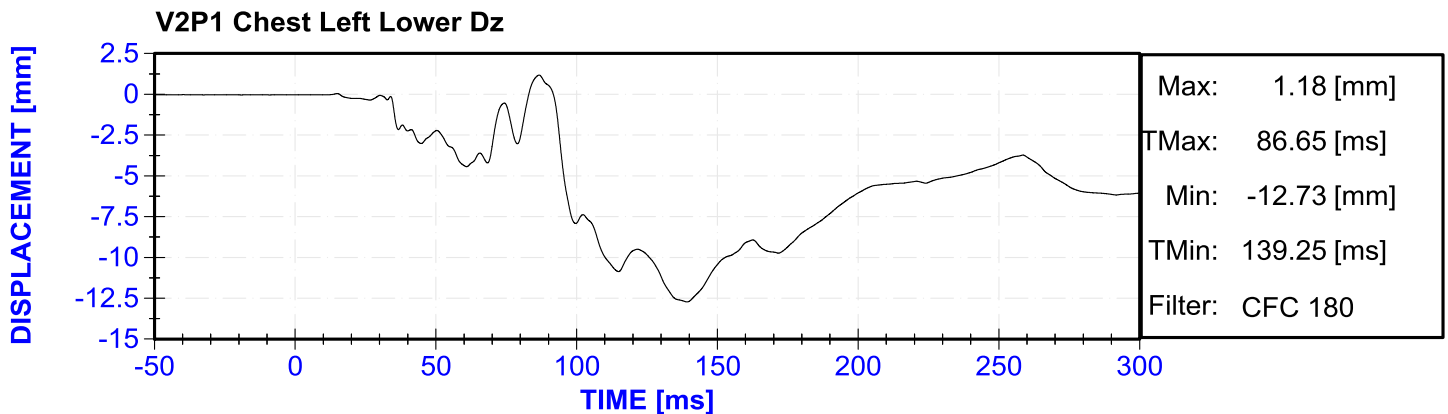
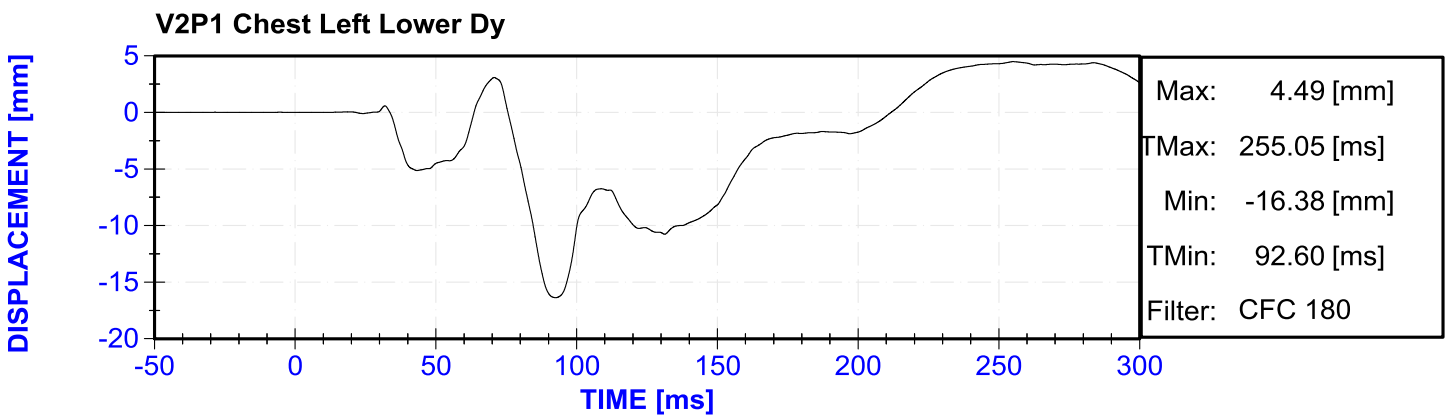


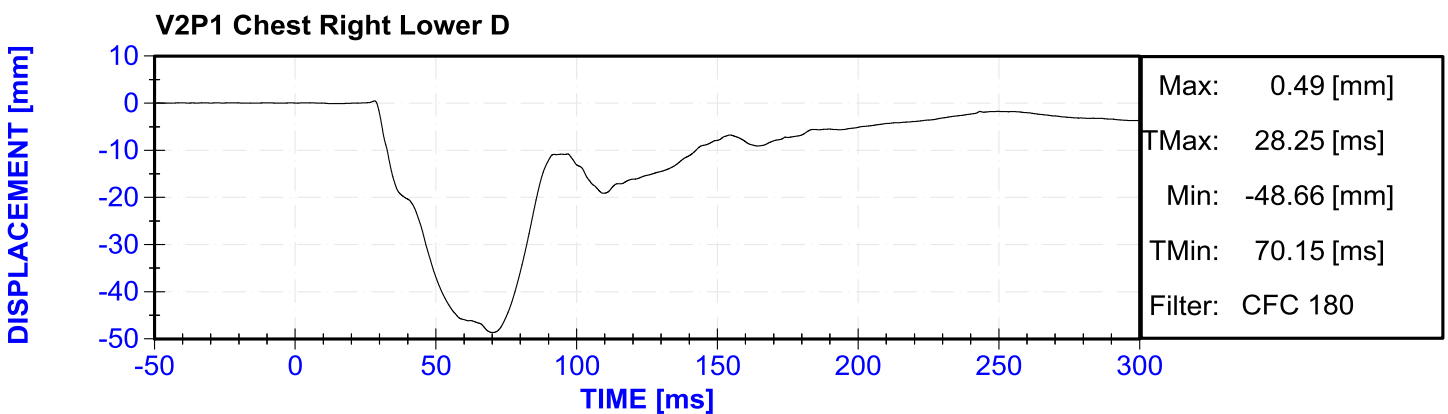
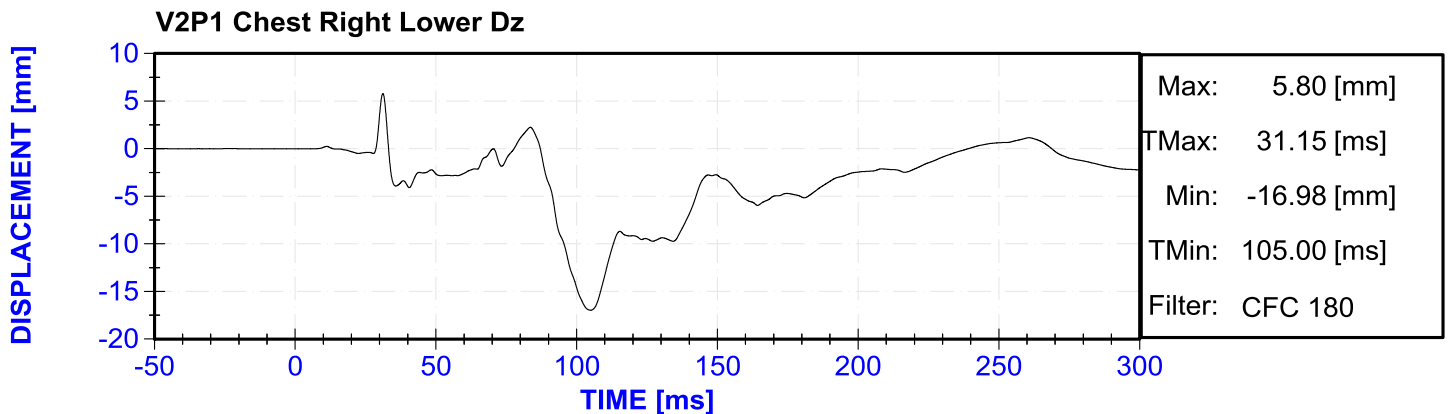
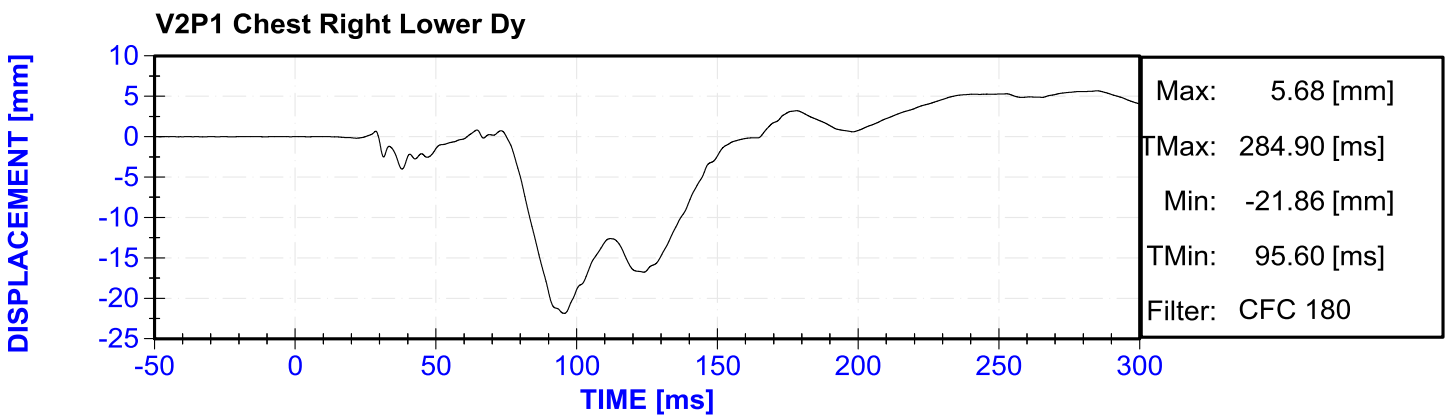
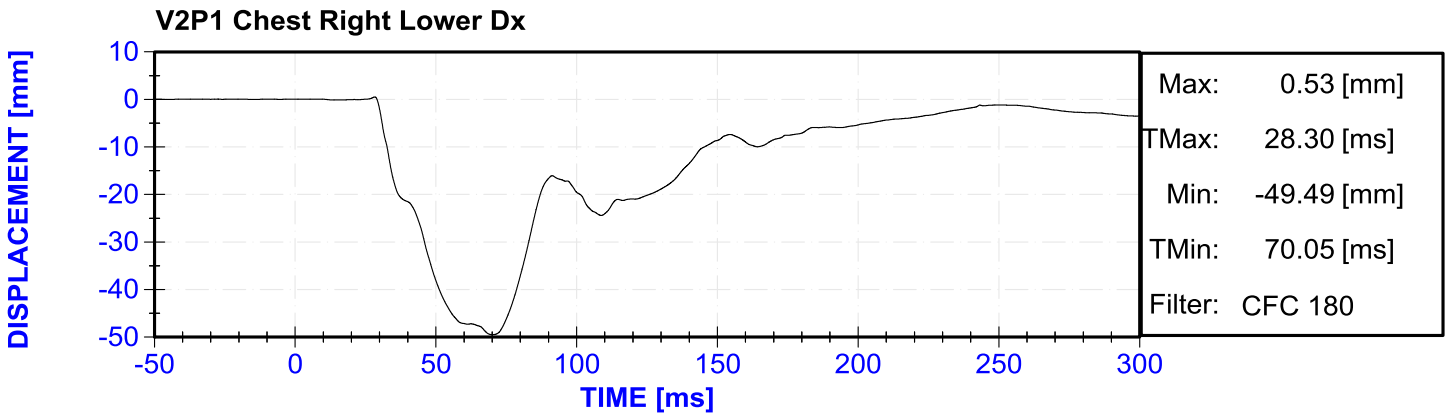
V2P1 Mz on head acting through the total neck section

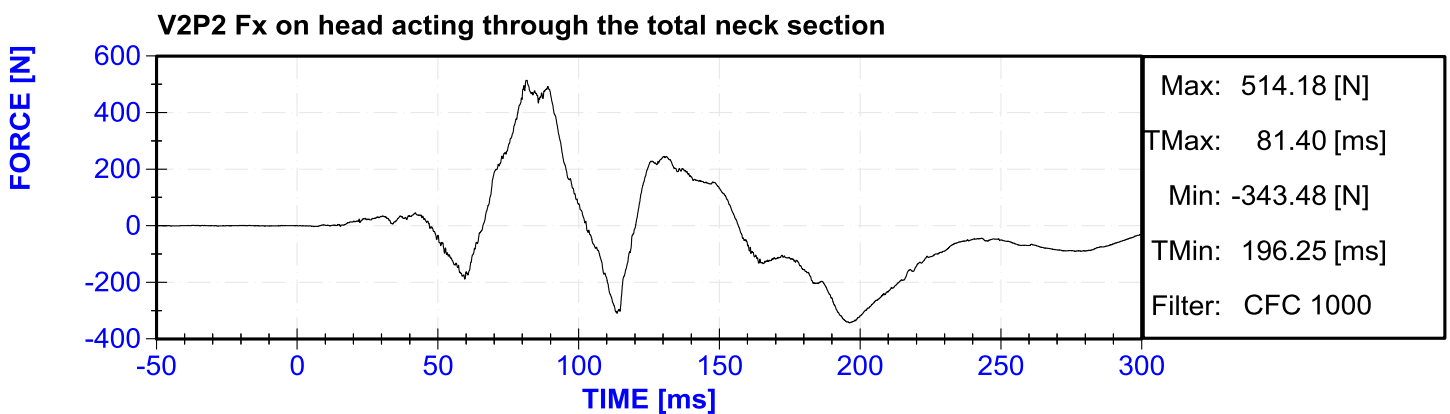
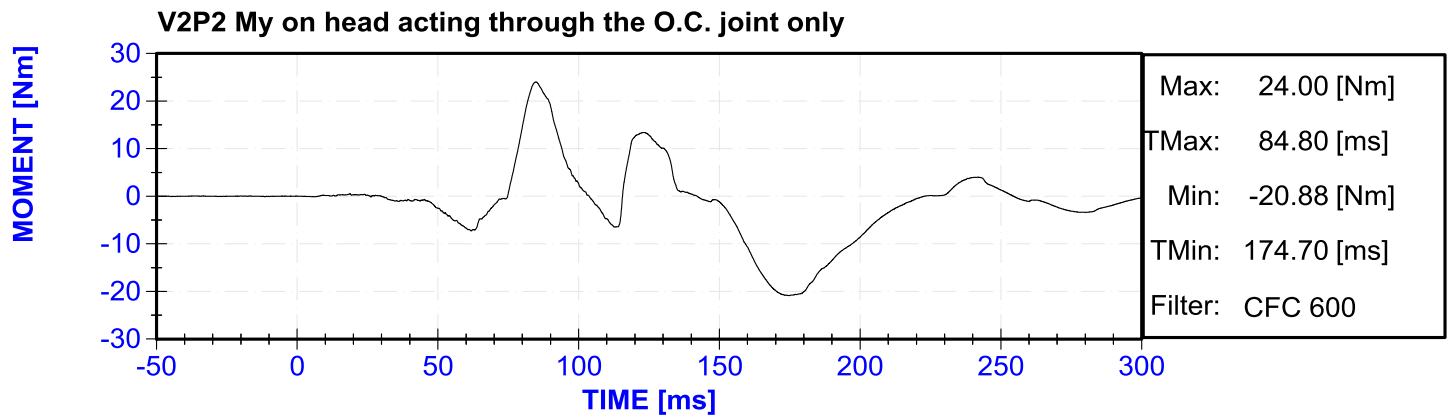
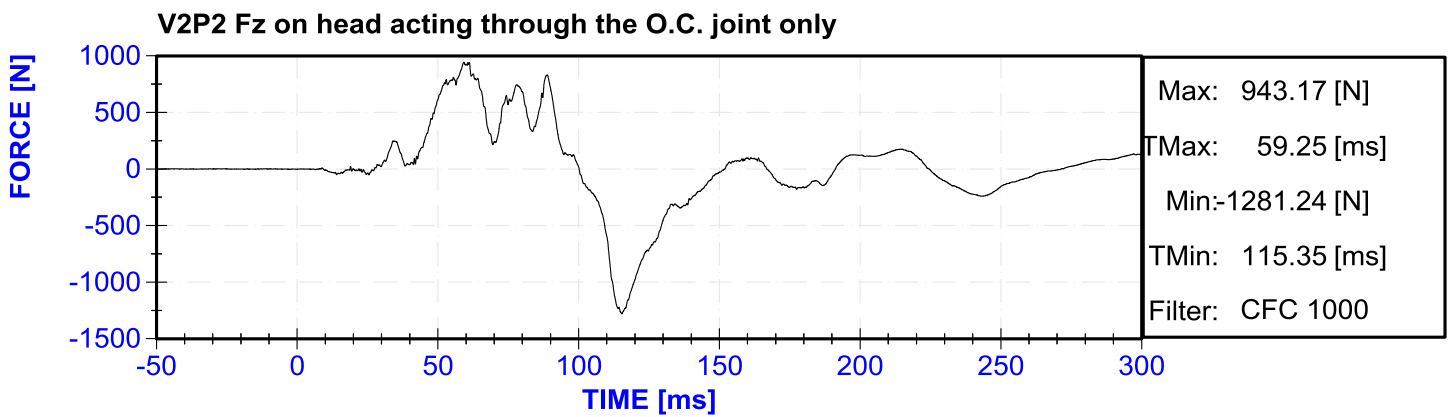
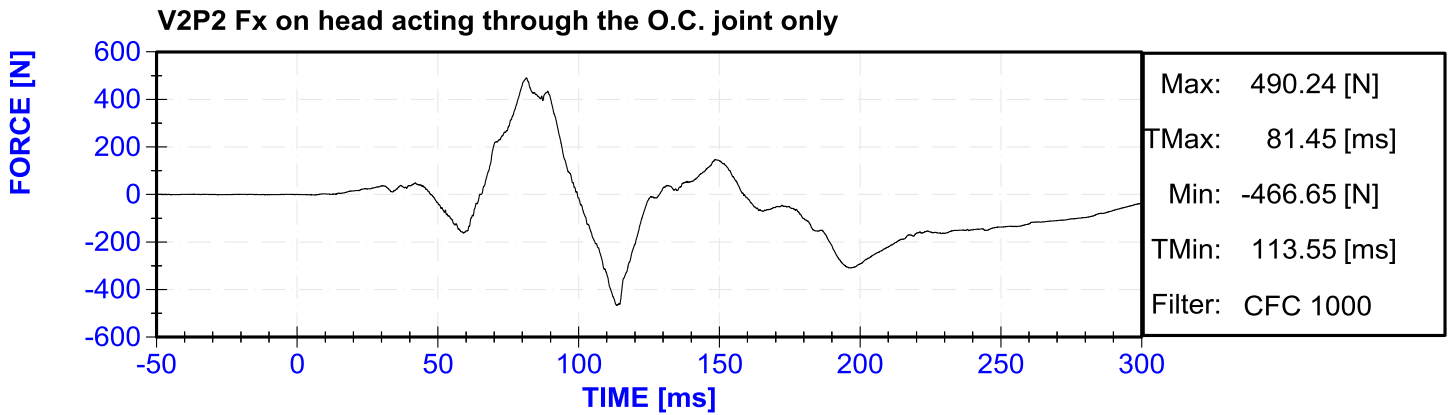


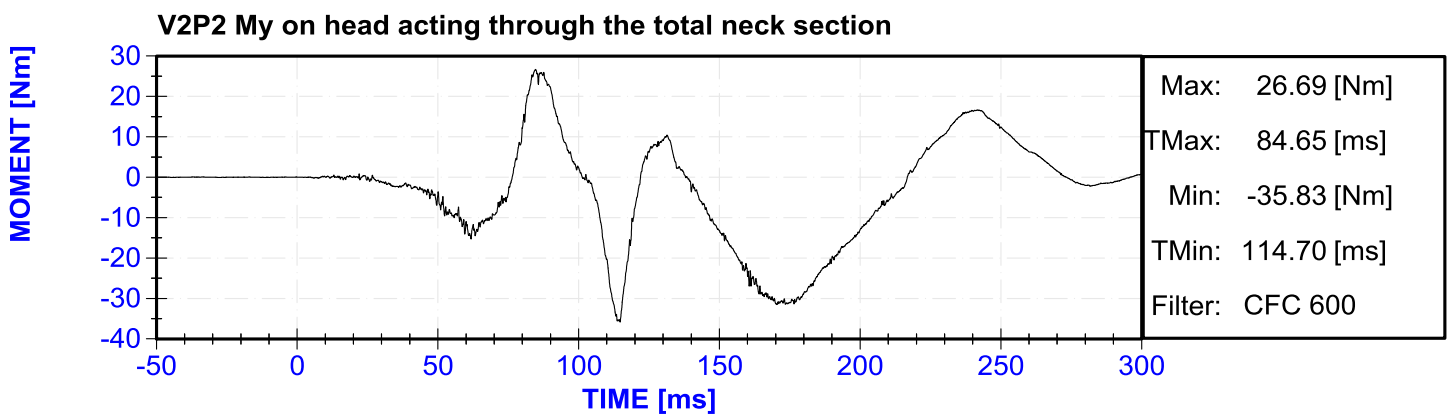
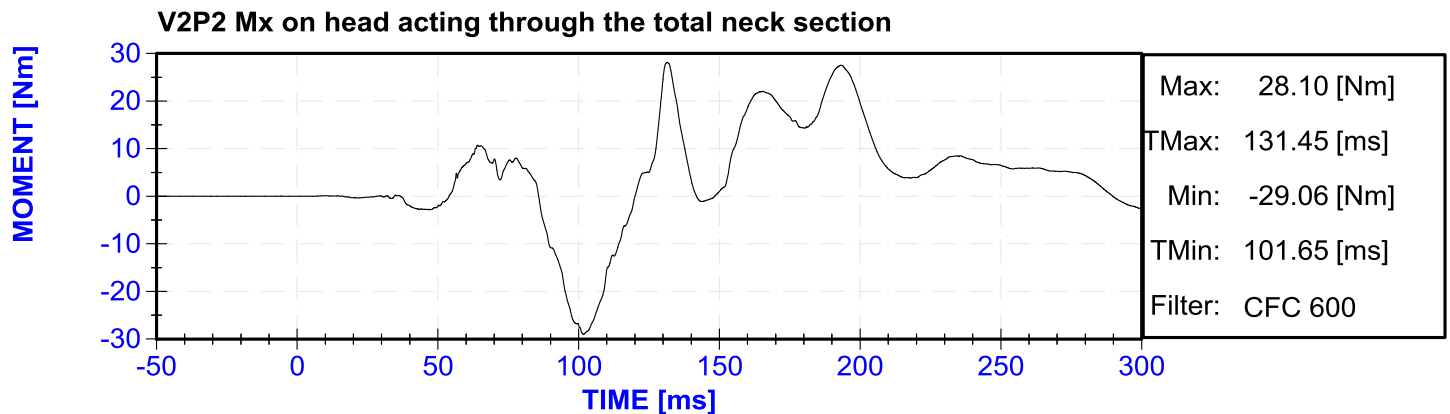
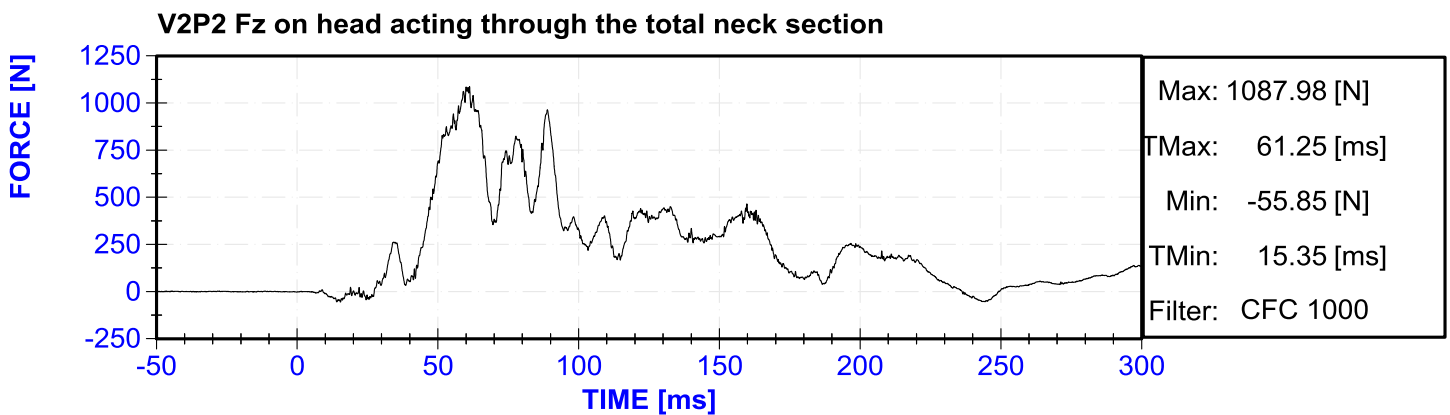
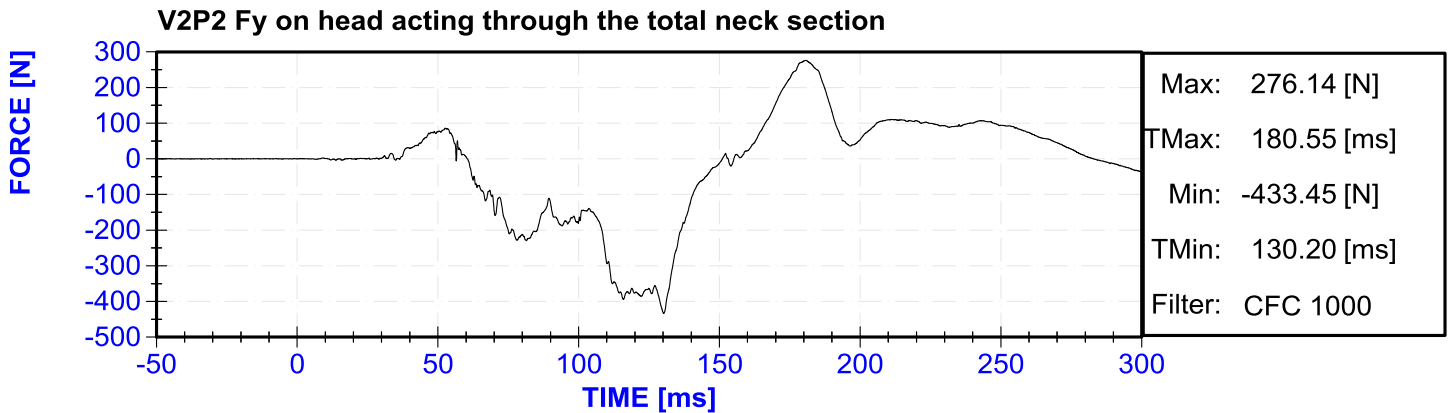




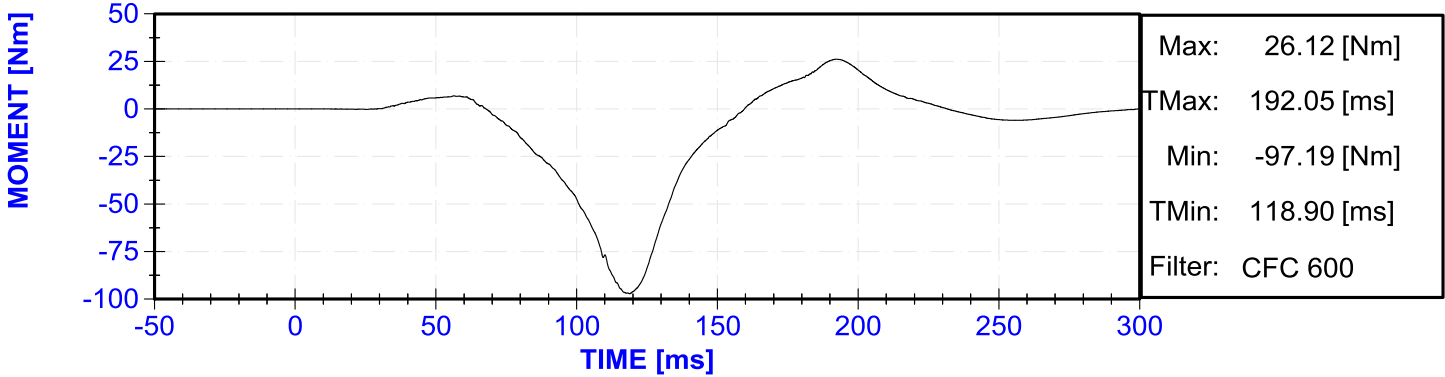




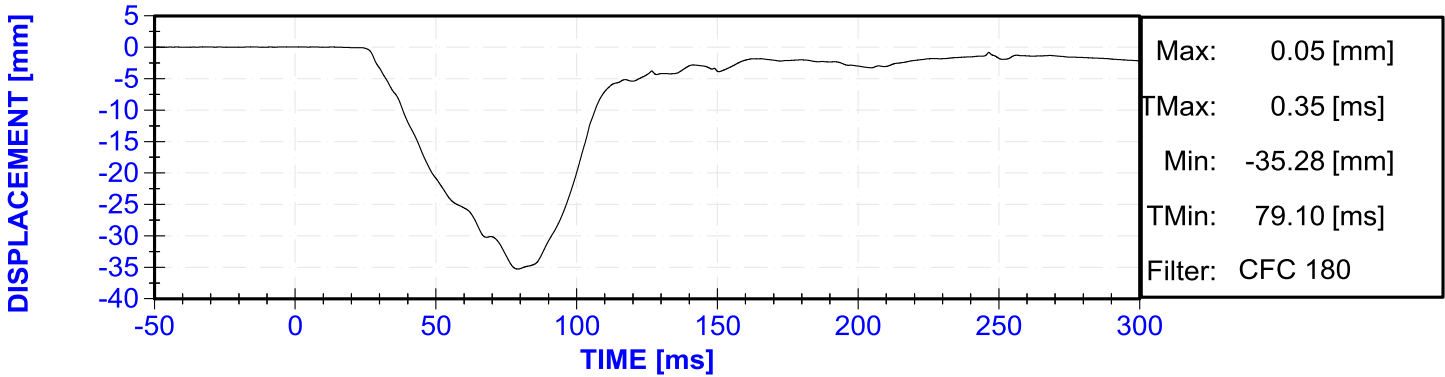




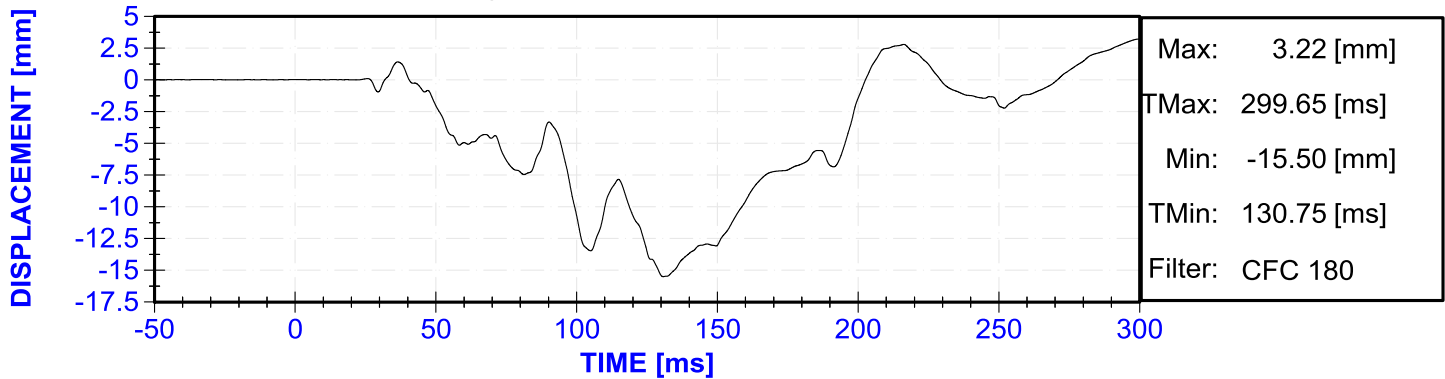
V2P2 Mz on head acting through the total neck section



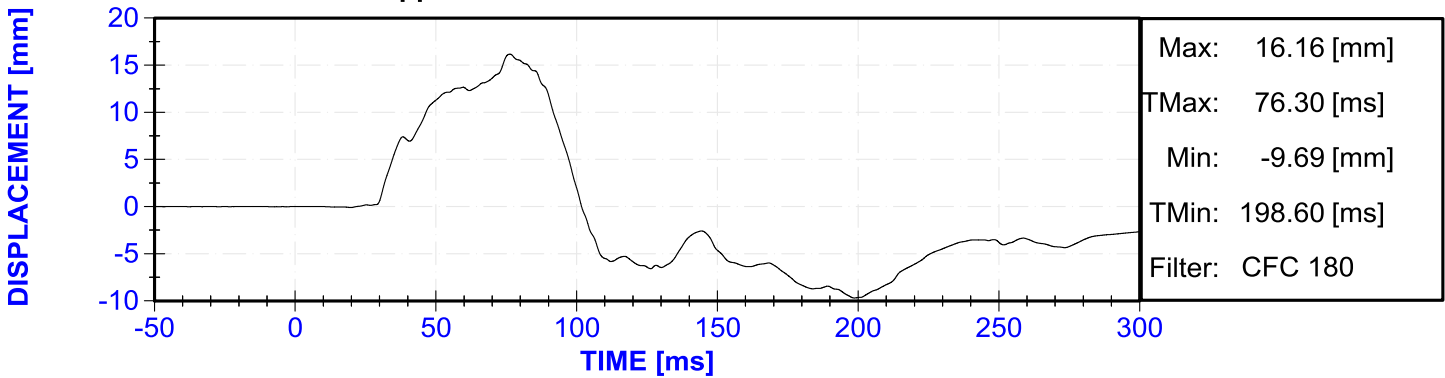
V2P2 Chest Left Upper Dx

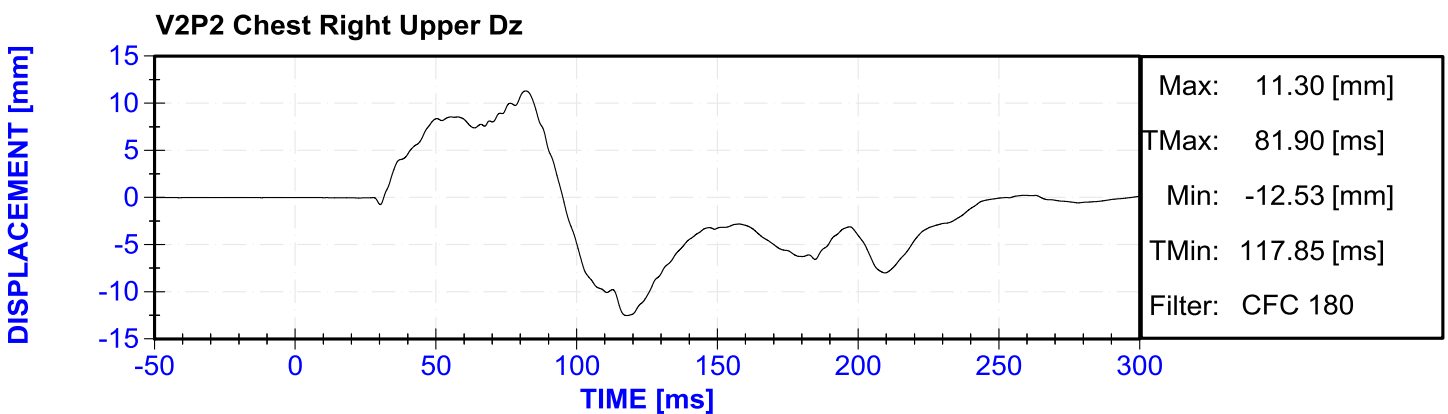
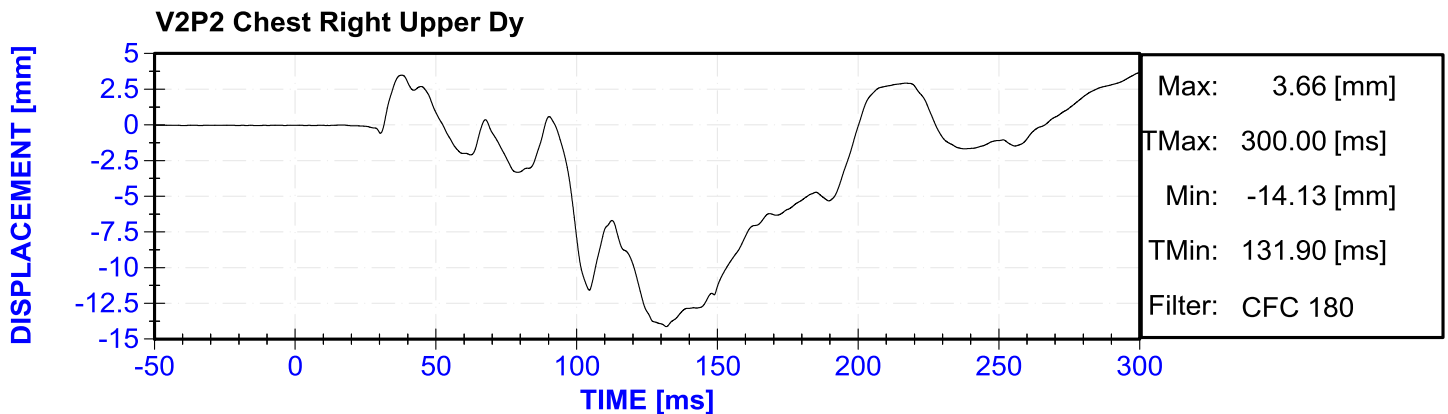
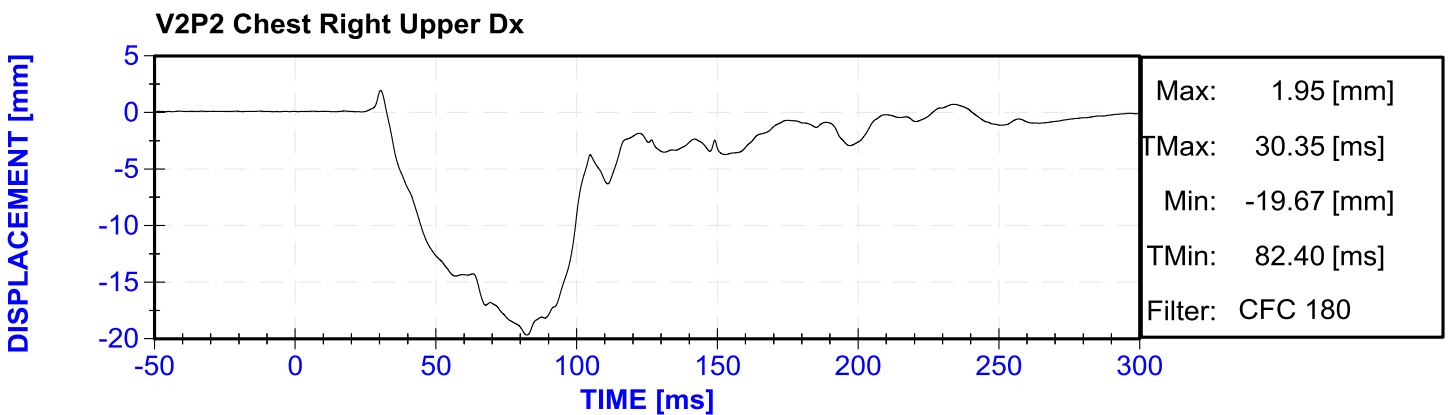
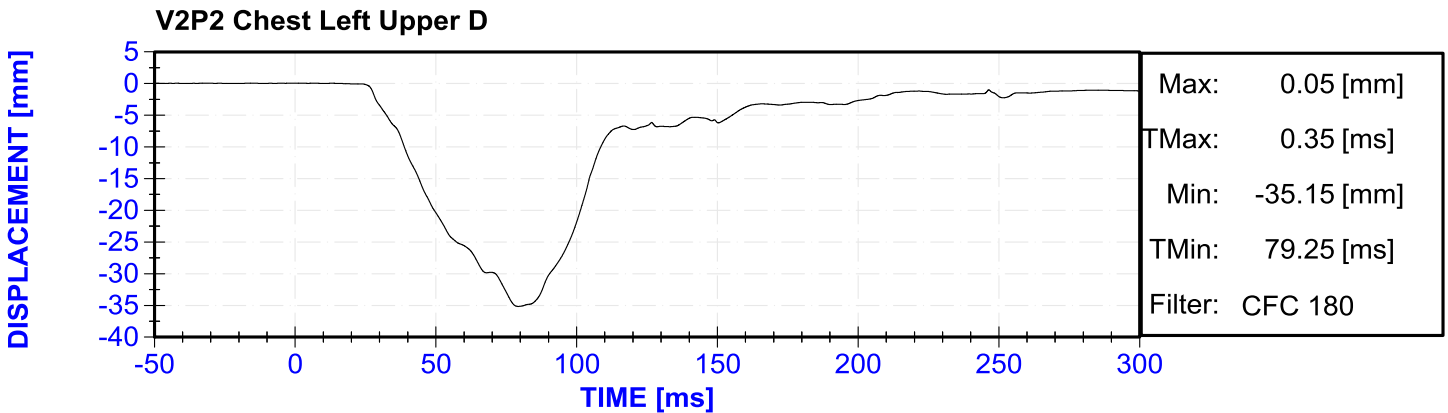


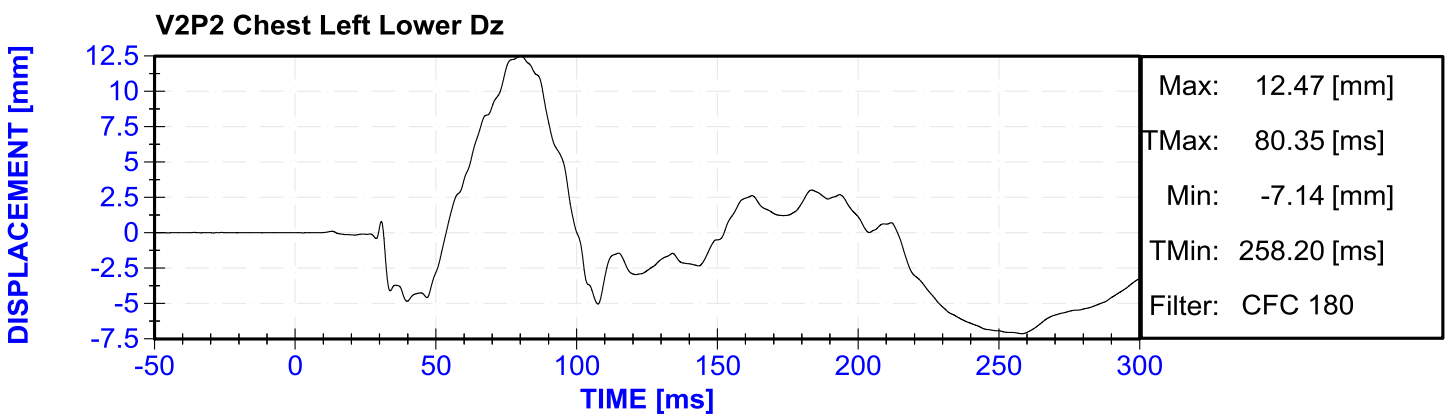
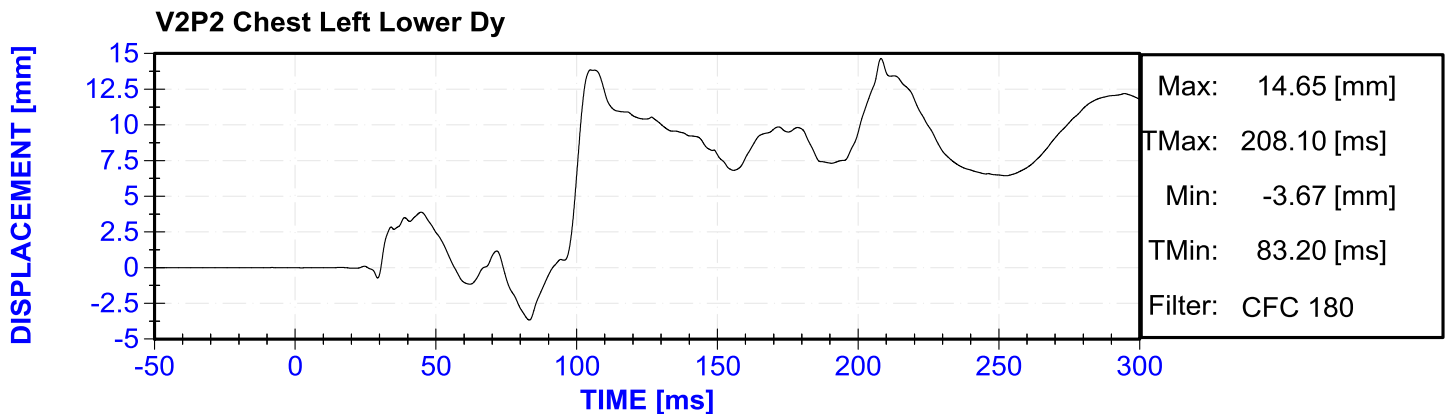
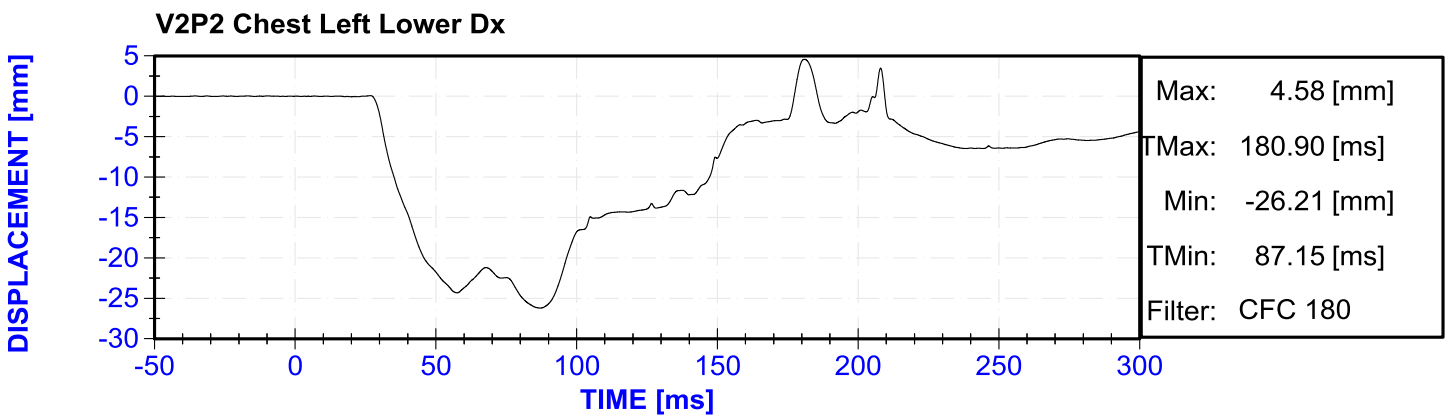
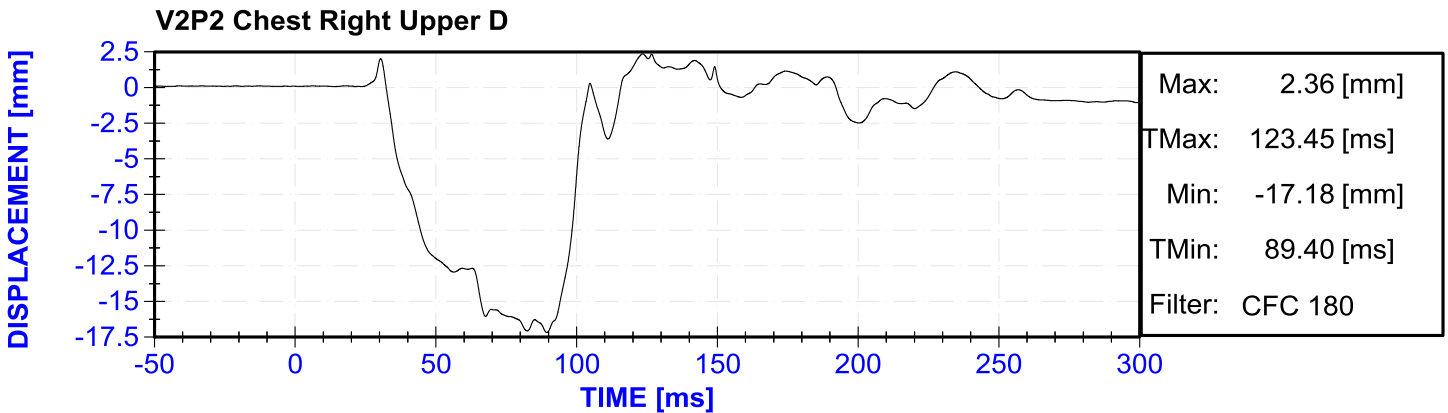
V2P2 Chest Left Upper Dy

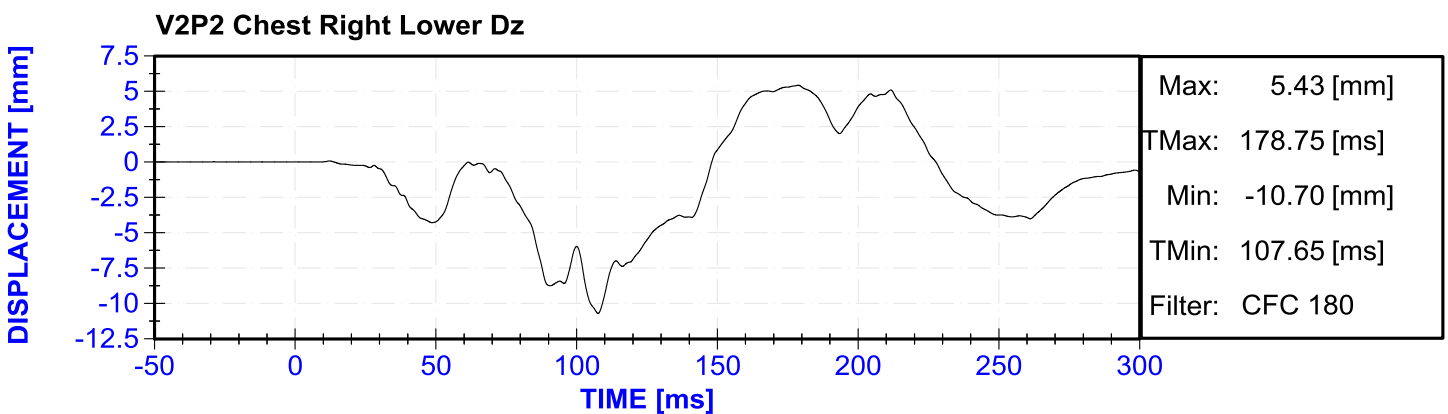
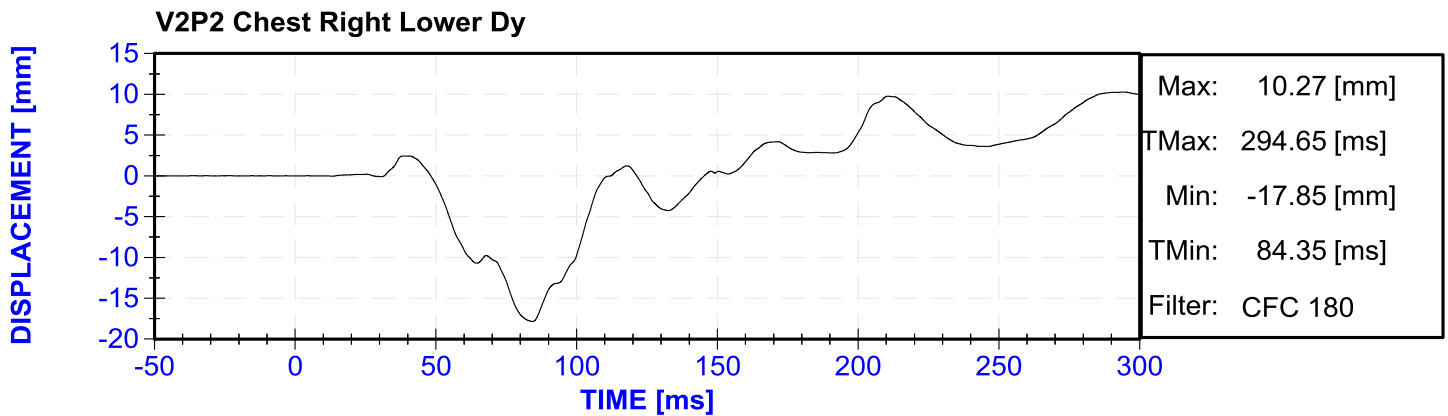
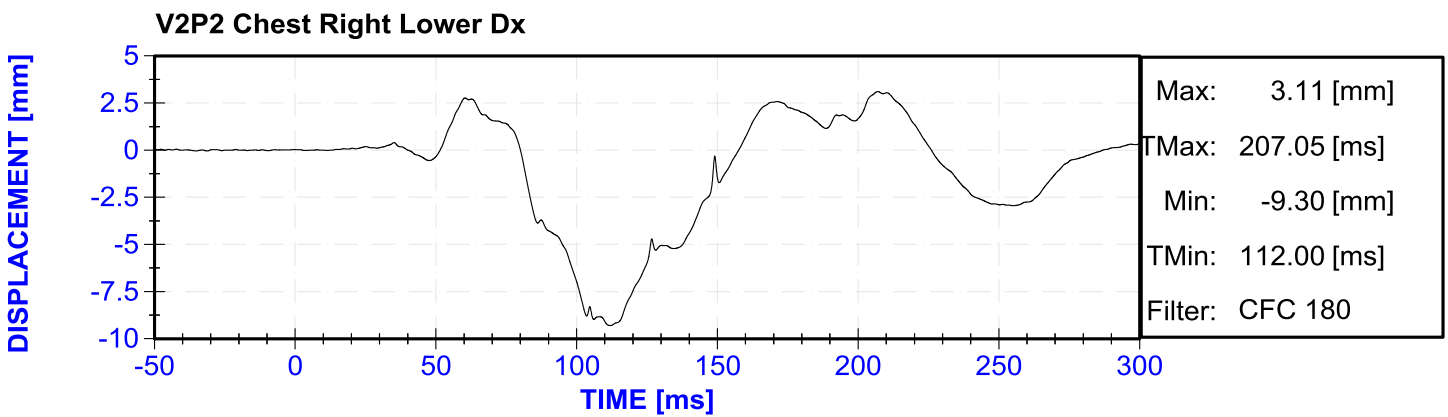
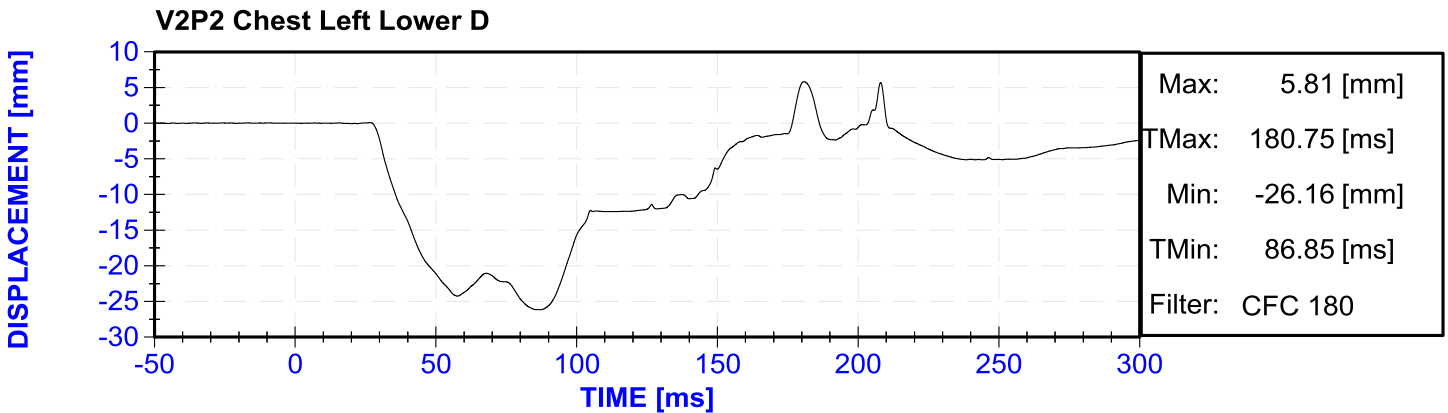


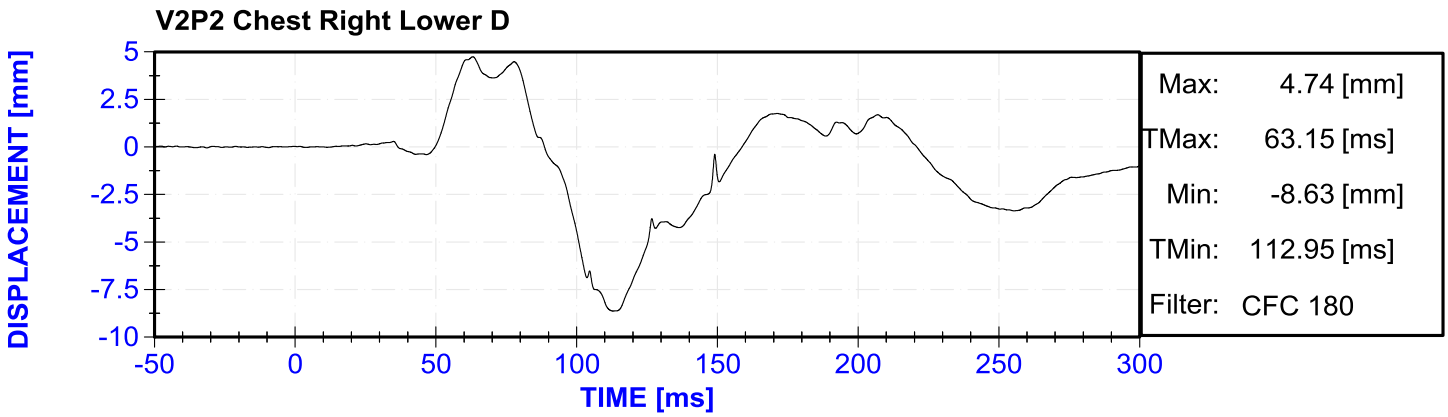
V2P2 Chest Left Upper Dz











APPENDIX C

**PART 572 E/O DUMMY CALIBRATION
AND PERFORMANCE VERIFICATION DATA SHEETS**

Table C-1: Dummy Information

TYPE	DESCRIPTION	SERIAL NUMBER
THOR TK	50 TH Male	016
THOR TK	50 TH Male	015

Table C-2: Ankle Offset Files

THOR – TK S/N: 016					
LFTX	LFTY	LFTZ	RFTX	RFTY	RFTZ
Left Ankle X Rotation	Left Ankle Y Rotation	Left Ankle Z Rotation	Right Ankle X Rotation	Right Ankle Y Rotation	Right Ankle Z Rotation
-0.281010	13.9793		-0.926255	17.6868	
THOR – TK S/N: 015					
LFTX	LFTY	LFTZ	RFTX	RFTY	RFTZ
Left Ankle X Rotation	Left Ankle Y Rotation	Left Ankle Z Rotation	Right Ankle X Rotation	Right Ankle Y Rotation	Right Ankle Z Rotation
.762525	14.9331		-1.31005	13.7803	

Table C- 3: THOR Dummies Initial Set-Up Information

THOR – TK S/N: 016								
Sensor	Manufacturer	Serial #	Capacity	Units (M)	Range	CFC	Sensitivity (mv/V/EU)	Initial Offset (EU)
HEAD CG X	Endevco	AC-P74956	2000	g	2000	1000	0.01851	0.415576
HEAD CG Y	Endevco	AC-P51933	2000	g	2000	1000	0.01927	0
HEAD CG Z	Endevco	AC-P52069	2000	g	2000	1000	0.01904	0
HDCG Wx	DTS	ARS-5928	18000	deg/s	18000	1000	0.09340	-47.3992
HDCG Wy	DTS	ARS-5950	18000	deg/s	18000	1000	0.09373	-82.2398
HDCG Wz	DTS	ARS-5990	18000	deg/s	18000	1000	0.09396	-27.7157
NEKU Fx	Denton	LC-3454J-76Fx	8896	N	8896	1000	0.000231531	-1.74156
NEKU Fy	Denton	LC-3454J-76Fy	8896	N	8896	1000	0.000233790	-1.73876
NEKU Fz	Denton	LC-3454J-76Fz	13345	N	13345	1000	0.000088380	-7.82127
NEKU Mx	Denton	LC-3454J-76Mx	282	N-m	282	600	0.006027005	0
NEKU My	Denton	LC-3454J-76My	282	N-m	282	600	0.005967528	-0.165369
NEKU Mz	Denton	LC-3454J-76Mz	282	N-m	282	600	0.009944701	-0.0552506
NEKL Fx	Denton	LC-DM4552FX	13345	N	13345	1000	0.000170802	0
NEKL Fy	Denton	LC-DM4552FY	13345	N	13345	1000	0.000170203	0
NEKL Fz	Denton	LC-DM4552FZ	13345	N	13345	1000	0.000071152	0
NEKL Mx	Denton	LC-DM4552MX	452	N-m	452	600	0.004108075	-0.0885175
NEKL My	Denton	LC-DM4552MY	452	N-m	452	600	0.004134627	-0.0885933
NEKL Mz	Denton	LC-DM4552MZ	226	N-m	226	600	0.006758431	0
NKCF Fz	Denton	LC-6005J-77Fz	4448	N	4448	1000	0.000850317	-0.871135

THOR – TK (Continued)

S/N: 016

Sensor	Manufacturer	Serial #	Capacity	Units (M)	Range	CFC	Sensitivity (mv/V/EU)	Initial Offset (EU)
NKCR Fz	Denton	LC-6005J-78Fz	4448	N	4448	1000	0.000862839	0
HDOT RDy	Sfernice	DS-007	180	deg	160	180	3.045	0.0328407
SPNU Ax	Endevco	AC-P64099	2000	g	2000	180	0.02212	-0.821963
SPNU Ay	Endevco	AC-P58838	2000	g	2000	180	0.01904	-0.404008
SPNU Az	Entran	AC-02I02I05-F14	2000	g	2000	180	0.02184	0
SPNM Ax	Endevco	AC-P64002	2000	g	2000	180	0.01993	0.41813
SPNM Ay	Endevco	AC-P58735	2000	g	2000	180	0.01954	0.39367
SPNM Az	Entran	AC-03D03D16-F12	2000	g	2000	180	0.02265	0
CHLU Dx	Humanetics	DS-DM1151	3.3	V	3.3	600	Raw	0.144062
CHLU Ry	Humanetics	DS-DJ4106	180	deg	160	180	3.074	0
CHLU Rz	Humanetics	DS-DJ4108	180	deg	160	180	2.995	0.033389
CHRU Dx	Humanetics	DS-DI4716	3.3	V	3.3	600	Raw	0.125521
CHRU Ry	Humanetics	DS-DI2381	180	deg	160	180	3.029	0
CHRU Rz	Humanetics	DS-DI2380	180	deg	160	180	3.064	0
CHLL Dx	Humanetics	DS-DM1152	3.3	V	3.3	600	Raw	0.0989583
CHLL Ry	Humanetics	DS-DI7903	180	deg	160	180	2.997	0
CHLL Rz	Humanetics	DS-DJ0023	180	deg	160	180	3.065	-0.0326264
CHRL Dx	Humanetics	DS-DI4717	3.3	V	3.3	600	Raw	0.08
CHRL Ry	Humanetics	DS-DI2385	180	deg	160	180	2.584	0.0322497
CHRL Rz	Humanetics	DS-DI2384	180	deg	160	180	3.007	0
SPNL Fx	Denton	LC-92Fx	13345	N	13345	1000	0.000137463	2.60741
SPNL Fy	Denton	LC-92Fy	13345	N	13345	1000	0.000138198	-2.61227
SPNL Fz	Denton	LC-92Fz	17793	N	13345	1000	0.000052639	-5.21904
SPNL Mx	Denton	LC-92Mx	678	N-m	678	1000	0.002164893	0
SPNL My	Denton	LC-92My	904	N-m	904	1000	0.001775128	2.68257
PVCG Ax	Endevco	AC-P64087	2000	g	2000	1000	0.02017	0
PVCG Ay	Endevco	AC-P50065	2000	g	2000	1000	0.01704	0
PVCG Az	Endevco	AC-P64123	2000	g	2000	1000	0.01961	-0.392265
PVAL Fx	Humanetics	LC-84Fx	22241	N	22241	600	0.0001229300	8.70164
PVAL Fy	Humanetics	LC-84Fy	13345	N	13345	600	0.0000607883	0
PVAL Fz	Humanetics	LC-84Fz	13345	N	13345	600	0.0001661788	0
PVAR Fx	Humanetics	LC-77Fx	22241	N	22241	600	0.0001216936	-4.34865
PVAR Fy	Humanetics	LC-77Fy	13345	N	13345	600	0.0000598142	0
PVAR Fz	Humanetics	LC-77Fz	13345	N	13345	600	0.0001651371	2.61043
PILL Fx	Humanetics	LC-DI4774 Fx	13000	N	13000	600	0.000067785	5.07945
PILR Fx	Humanetics	LC-DI4775 Fx	13000	N	13000	600	0.000067854	12.7074
FMRL Fx	Humanetics	LC-108Fx	15000	N	15000	600	0.0001449	0
FMRL Fy	Humanetics	LC-108Fy	15000	N	15000	600	0.0001457	2.93308
FMRL Fz	Humanetics	LC-108Fz	15000	N	15000	600	0.0000750	-2.9304
FMRL Mx	Humanetics	LC-108Mx	350	N-m	350	600	0.0065318	-0.0686534
FMRL My	Humanetics	LC-108My	350	N-m	350	600	0.0065158	13.0026
FMRL Mz	Humanetics	LC-108Mz	350	N-m	350	600	0.0093691	-0.0684191
KNEL Dx	Space Age	DS-D2103665B	30	mm	20	180	23.87593	0.00418832
TBLU Fz	Denton	LC-4509J-110Fz	11120	N	11120	600	0.0000923	-6.52665
TBLU Mx	Denton	LC-4509J-110Mx	395	N-m	395	600	0.0073903	-0.0773214
TBLU My	Denton	LC-4509J-110My	395	N-m	395	600	0.0073054	0
TBLL Fz	Denton	LC-76Fz	11120	N	11120	600	0.0000948	-6.52486

THOR – TK (Continued)								
S/N: 016								
Sensor	Manufacturer	Serial #	Capacity	Units (M)	Range	CFC	Sensitivity (mv/V/EU)	Initial Offset (EU)
TBLL Mx	Denton	LC-76Mx	395	N	395	600	0.0074420	0
TBLL My	Denton	LC-76My	395	N	395	600	0.0073706	-0.0775281
ANKL Rx	Contelec	DS-001x	180	deg	150	180	3.20532	-0.28101
ANKL Ry	Contelec	DS-002y	180	deg	150	180	3.16119	13.9793
FOTL Az	Endevco	AC-J19244	2000	g	2000	1000	0.02590	2.36388
FMRR Fx	Humanetics	LC-DJ1045Fx	15000	N	15000	600	0.0001450	-2.9347
FMRR Fy	Humanetics	LC-DJ1045Fy	15000	N	15000	600	0.0001452	-2.93066
FMRR Fz	Humanetics	LC-DJ1045Fz	15000	N	15000	600	0.0000732	0
FMRR Mx	Humanetics	LC-DJ1045Mx	350	N-m	350	600	0.0065293	-0.0683731
FMRR My	Humanetics	LC-DJ1045My	350	N-m	350	600	0.0065638	0.0686265
FMRR Mz	Humanetics	LC-DJ1045Mz	350	N-m	350	600	0.0088260	0
KNER Dx	Space Age	DS-D2103657B	30	mm	20	180	24.06200	0.00415593
TBRU Fz	Denton	LC-4509J-107Fz	11120	N	11120	600	0.0000923	-6.52665
TBRU Mx	Denton	LC-4509J-107Mx	395	N-m	395	600	0.0073875	-0.0773507
TBRU My	Denton	LC-4509J-107My	395	N-m	395	600	0.0073329	0
TBRL Fz	Denton	LC-75Fz	11120	N	11120	600	0.0000958	0
TBRL Mx	Denton	LC-75Mx	395	N-m	395	600	0.0072968	0.0774273
TBRL My	Denton	LC-75My	395	N-m	395	600	0.0073137	0
ANKR Rx	Contelec	DS-004X	180	deg	150	180	3.16542	-0.92625
ANKR Ry	Contelec	DS-0534Y	180	deg	150	180	3.17825	17.6868
FOTR Az	Endevco	AC-P74773	2000	g	2000	1000	0.01818	-0.392896

THOR – TK								
S/N: 015								
Sensor	Manufacturer	Serial #	Capacity	Units (M)	Range	CFC	Sensitivity (mv/V/EU)	Initial Offset (EU)
HEAD CG X	Endevco	P63926	2000	g	2000	1000	0.01887	0
HEAD CG Y	Endevco	P64084	2000	g	2000	1000	0.02366	-1.95673
HEAD CG Z	Endevco	P51732	2000	g	2000	1000	0.01901	-0.404645
HDCG Wx	DTS	ARS4727	18000	deg/s	18000	1000	0.09212	-98.9425
HDCG Wy	DTS	ARS4712	18000	deg/s	18000	1000	0.09309	-11.7494
HDCG Wz	DTS	ARS4714	18000	deg/s	18000	1000	0.09443	-14.892
NEKU Fx	Denton	77	8896	N	8896	1000	0.000231857	-5.6069
NEKU Fy	Denton	77	8896	N	8896	1000	0.000228428	-0.875549
NEKU Fz	Denton	77	13345	N	13345	1000	0.000086454	2.31337
NEKU Mx	Denton	77	282	N-m	282	600	0.005888226	-0.0509491
NEKU My	Denton	77	282	N-m	282	600	0.005997267	-0.0333485
NEKU Mz	Denton	77	282	N-m	282	600	0.009965588	0.100345
NKCF Fz	Denton	LC-6005J-77Fz	80	N	4448	1000	0.000868639	0
NKCR Fz	Denton	LC-6005J-78Fz	75	N	4448	1000	0.000709137	0
HDOT RDy	Humanetics	DS-007	160	deg	160	180	3.036	0
SPNU Ax	Endevco	AC-P64099	2000	g	2000	180	0.01736	0
SPNU Ay	Entran	AC-P58838	2000	g	2000	180	0.02330	-1.18124
SPNU Az	Endevco	AC-02I02I05-F14	2000	g	2000	180	0.01914	0
SPNM Ax	Endevco	AC-P64002	2000	g	2000	180	0.01819	0.39268

THOR – TK (Continued)

S/N: 015

Sensor	Manufacturer	Serial #	Capacity	Units (M)	Range	CFC	Sensitivity (mv/V/EU)	Initial Offset (EU)
SPNM Ay	Endevco	P58717	2000	g	2000	180	0.01797	0
SPNM Az	Endevco	P63843	2000	g	2000	180	0.02361	-0.784351
CHLU Dx	Humanetics	DK3867	3.3	V	3.3	600	Raw	0.112292
CHLU Ry	Humanetics	DJ5448	180	deg	160	180	3.074	-0.0325309
CHLU Rz	Humanetics	DJ5449	180	deg	160	180	3.042	0
CHRU Dx	Humanetics	DK3868	3.3	V	3.3	600	Raw	0.10875
CHRU Ry	Humanetics	DJ5451	180	deg	160	180	3.045	0
CHRU Rz	Humanetics	DJ5450	180	deg	160	180	3.032	0
CHLL Dx	Humanetics	DI4718	3.3	V	3.3	600	Raw	0.0783333
CHLL Ry	Humanetics	DI2386	180	deg	160	180	2.958	0
CHLL Rz	Humanetics	DI6129	180	deg	160	180	3.053	0.0327547
CHRL Dx	Humanetics	DJ2614	3.3	V	3.3	600	Raw	0.0870833
CHRL Ry	Humanetics	DJ4107	180	deg	160	180	2.978	0.0335796
CHRL Rz	Humanetics	DJ4109	180	deg	160	180	3.045	0
SPNL Fx	Denton	125	13345	N	13345	1000	0.000142439	-2.80822
SPNL Fy	Denton	125	13345	N	13345	1000	0.000142551	0.701503
SPNL Fz	Denton	125	17793	N	13345	1000	0.000061260	4.89716
SPNL Mx	Denton	125	678	N-m	678	1000	0.002138341	-0.420887
SPNL My	Denton	125	904	N-m	904	1000	0.001834428	0.272565
PVCG Ax	Endevco	P51294	2000	g	2000	1000	0.02201	0
PVCG Ay	Endevco	P63857	2000	g	2000	1000	0.02371	1.57668
PVCG Az	Endevco	P59011	2000	g	2000	1000	0.01781	0
PVAL Fx	Humanetics	83	22241	N	22241	600	0.0001206055	9.12061
PVAL Fy	Humanetics	83	13345	N	13345	600	0.0000591322	15.2284
PVAL Fz	Humanetics	83	13345	N	13345	600	0.0001630614	-5.51941
PVAR Fx	Humanetics	79	22241	N	22241	600	0.0001206190	-9.94868
PVAR Fy	Humanetics	79	13345	N	13345	600	0.0000595968	-6.71141
PVAR Fz	Humanetics	79	13345	N	13345	600	0.0001636234	2.44464
PILL Fx	Humanetics	DJ5524	13000	N	13000	600	0.000070654	-10.1641
PILR Fx	Humanetics	77	13000	N	13000	600	0.000068416	-7.62598
FMRL Fx	Humanetics	DM4951	15000	N	15000	600	0.000142057	-2.93309
FMRL Fy	Humanetics	DM4951	15000	N	15000	600	0.000142086	-2.9325
FMRL Fz	Humanetics	DM4951	15000	N	15000	600	0.000071741	5.86907
FMRL Mx	Humanetics	DM4951	350	N-m	350	600	0.006425656	-0.137116
FMRL My	Humanetics	DM4951	350	N-m	350	600	0.006432760	-0.0684821
FMRL Mz	Humanetics	DM4951	350	N-m	350	600	0.009035044	0
KNEL Dx	Space Age	C2102639B	30	mm	20	180	24.03214	0.00832219
TBLU Fz	Denton	106	11120	N	11120	600	0.00009360	-6.52776
TBLU Mx	Denton	106	395	N-m	395	600	0.00741550	-0.155003
TBLU My	Denton	106	395	N-m	395	600	0.00742091	0
TBLL Fz	Denton	139	11120	N	11120	600	0.00009648	4.34585

THOR – TK (Continued)								
S/N: 015								
Sensor	Manufacturer	Serial #	Capacity	Units (M)	Range	CFC	Sensitivity (mv/V/EU)	Initial Offset (EU)
TBLL Mx	Denton	139	395	N	395	600	0.00749952	-0.0775243
TBLL My	Denton	139	395	N	395	600	0.00754555	-0.077502
ANKL Rx	Contelec	7921-0382	180	deg	150	180	3.18215	0.762525
ANKL Ry	Contelec	7921-0386	180	deg	150	180	3.17717	14.9331
FOTL Az	Endevco	J27525	2000	g	2000	1000	0.02143	6.36321
FMRR Fx	Humanetics	DM4950	15000	N	15000	600	0.000141110	0
FMRR Fy	Humanetics	DM4950	15000	N	15000	600	0.000141643	0
FMRR Fz	Humanetics	DM4950	15000	N	15000	600	0.000071653	-8.79589
FMRR Mx	Humanetics	DM4950	350	N-m	350	600	0.006388454	0.0686546
FMRR My	Humanetics	DM4950	350	N-m	350	600	0.006411979	-0.136805
FMRR Mz	Humanetics	DM4950	350	N-m	350	600	0.008857852	0
KNER Dx	Space Age	I1807966B	30	mm	20	180	23.38064	0
TBRU Fz	Denton	88	11120	N	11120	600	0.00009280	-4.34511
TBRU Mx	Denton	88	395	N-m	395	600	0.00726490	0
TBRU My	Denton	88	395	N-m	395	600	0.00725530	0
TBRL Fz	Denton	140	11120	N	11120	600	0.00009658	0
TBRL Mx	Denton	140	395	N-m	395	600	0.00760594	0
TBRL My	Denton	140	395	N-m	395	600	0.00764658	0
ANKR Rx	Contelec	7921-0385	180	deg	150	180	3.18522	-1.31005
ANKR Ry	Contelec	7921-0383	180	deg	150	180	3.18949	13.7803
FOTR Az	Endevco	P58616	2000	g	2000	1000	0.01995	0

Table C-4: THOR Dummy Initial Set-Up Information (IR-TRACC)

THOR – TK			
S/N: 016			
Sensor	IR-TRACC Exponent	IR-TRACC Slope	IR-TRACC Intercept
CHLU Dx	-0.54440	26.4269	N/A
CHRU Dx	-0.4872	31.6935	N/A
CHLL Dx	-0.49197	31.3308	N/A
CHRL Dx	-0.4865	30.3707	N/A
ABDL Dx	N/A	N/A	N/A
ABDR Dx	N/A	N/A	N/A
THOR – TK			
S/N: 015			
Sensor	IR-TRACC Exponent	IR-TRACC Slope	IR-TRACC Intercept
CHLU Dx	-0.5268	28.0630	N/A
CHRU Dx	-0.4888	31.4311	N/A
CHLL Dx	-0.4500	34.0200	N/A
CHRL Dx	-0.4647	34.5897	N/A
ABDL Dx	N/A	N/A	N/A
ABDR Dx	N/A	N/A	N/A

Table 5 – THOR IR-TRACC Polarity

In order to reduce the risk of damage to instrumentation, it is recommended that the 3D IR-TRACC units are not disconnected from the rib cage to conduct the polarity test. An alternate procedure for checking the IR-TRACC polarity is described below.

1. Using the data acquisition system control software, open a live view of each channel. If possible, view the DX, RY, and RZ components of a given quadrant simultaneously.
2. Record the initial reading of each channel
3. Perform the following motions on each of the four rib attachment locations and two abdomen attachment locations (specified by the hexagonal bolt attaching the blue ribs).
 - a. DX: Push inward (front-to-back). The IR-TRACC tube voltage should increase.
 - b. RY: Push downward (head-to-pelvis). The Y-axis potentiometer reading should decrease.
 - c. RZ: Push rightward (left-to-right). The Z-axis potentiometer should increase.
4. Record the final reading of each channel
5. If the “Measured” value (increase or decrease) does not match the “Expected” value, the polarity of the channel must be inverted.

THOR 016

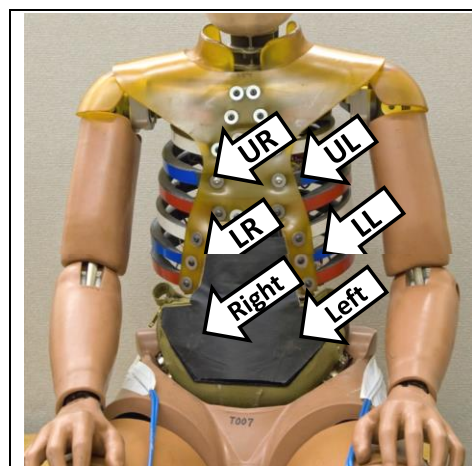


Figure 1. Manipulation to determine thoracic and abdominal IR-TRACC polarity.

Channel	Motion
DX	Push inward
RY	Push upward
RZ	Push rightward

Upper Right Thorax				Upper Left Thorax			
Channel	Initial Value	Expected Polarity	Recorded Polarity	Channel	Initial Value	Expected Polarity	Recorded Polarity
DX (V)	0.12625	+	+	DX (V)	0.14208	+	+
RY (Deg)	8.1864	+	+	RY (Deg)	3.5479	+	+
RZ (Deg)	-8.7763	+	+	RZ (Deg)	11.9783	+	+
Lower Right Thorax				Lower Left Thorax			
Channel	Initial Value	Expected Polarity	Recorded Polarity	Channel	Initial Value	Expected Polarity	Recorded Polarity
DX (V)	0.07354	+	+	DX (V)	0.08948	+	+
RY (Deg)	0.77097	+	+	RY (Deg)	3.7068	+	+
RZ (Deg)	-6.8798	+	+	RZ (Deg)	7.1676	+	+
Abdomen Right				Abdomen Left			
Channel	Initial Value	Expected Polarity	Recorded Polarity	Channel	Initial Value	Expected Polarity	Recorded Polarity
DX (V)	N/A	+	N/A	DX (V)	N/A	+	N/A
RY (Deg)	N/A	+	N/A	RY (Deg)	N/A	+	N/A
RZ (Deg)	N/A	+	N/A	RZ (Deg)	N/A	+	N/A

THOR 015

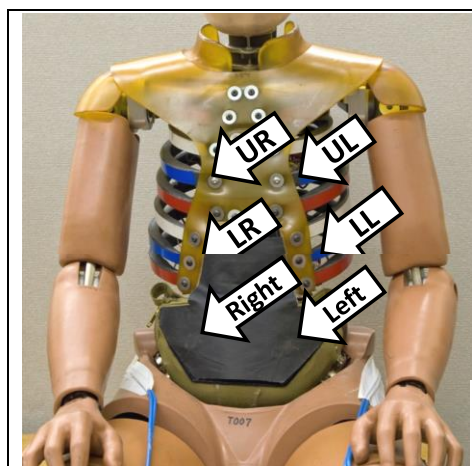
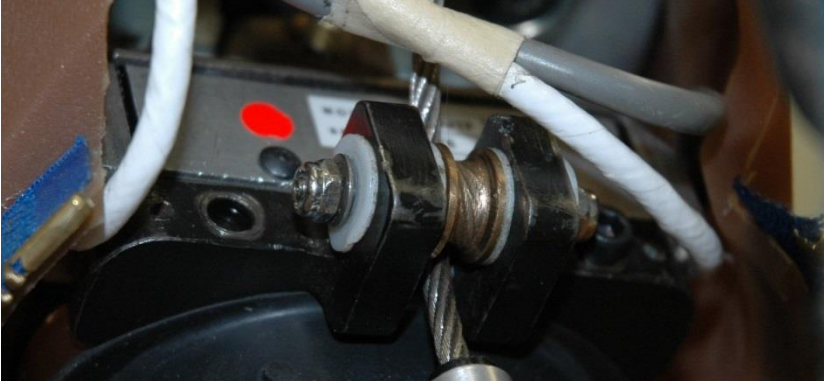




Figure 2. Manipulation to determine thoracic and abdominal IR-TRACC polarity.

Channel	Motion
DX	Push inward
RY	Push upward
RZ	Push rightward




Upper Right Thorax				Upper Left Thorax			
Channel	Initial Value	Expected Polarity	Recorded Polarity	Channel	Initial Value	Expected Polarity	Recorded Polarity
DX (V)	0.10823	+	+	DX (V)	0.11271	+	+
RY (Deg)	6.54762	+	+	RY (Deg)	8.5546	+	+
RZ (Deg)	-16.135	+	+	RZ (Deg)	14.2536	+	+
Lower Right Thorax				Lower Left Thorax			
Channel	Initial Value	Expected Polarity	Recorded Polarity	Channel	Initial Value	Expected Polarity	Recorded Polarity
DX (V)	0.07854	+	+	DX (V)	0.07073	+	+
RY (Deg)	3.8564	+	+	RY (Deg)	4.5322	+	+
RZ (Deg)	-9.8420	+	+	RZ (Deg)	6.39228	+	+
Abdomen Right				Abdomen Left			
Channel	Initial Value	Expected Polarity	Recorded Polarity	Channel	Initial Value	Expected Polarity	Recorded Polarity
DX (V)	N/A	+	N/A	DX (V)	N/A	+	N/A
RY (Deg)	N/A	+	N/A	RY (Deg)	N/A	+	N/A
RZ (Deg)	N/A	+	N/A	RZ (Deg)	N/A	+	N/A



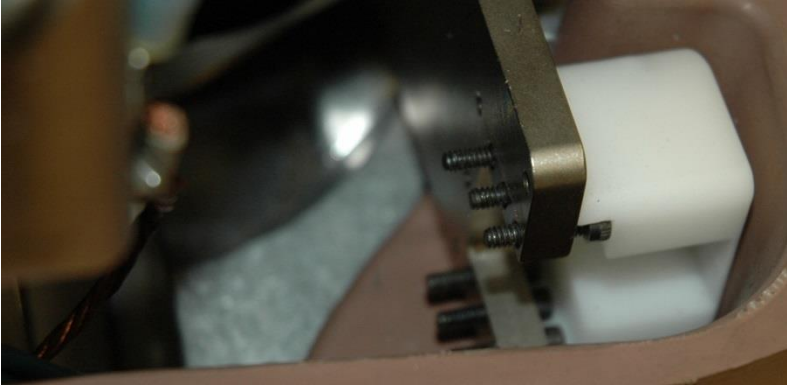
HEAD	
Y / N	Rear head cap mounts securely to head
Y / N	Head skin fits securely over skull
Y / N	Head skin shows no sign of tears or damage
Y / N	Interior components of skull cavity (ballast, accelerometer mount, accelerometers) securely attached
Y / N	Head securely mounted to OC joint
OTHER	


NECK	
Y / N	Neck cables slide freely through holes in neck plates
Y / N	Neck cables show no sign of fraying, broken strands, or kinking
Y / N	No evidence of debonding between neck pucks and plates If N – indicate which interface (where plate/puck 1 attach to upper neck load cell):
Y / N	No evidence of debonding or permanent compression in neck soft stop assemblies
Y / N	Neck securely attached to upper neck load cell
Y / N	Neck securely attached to lower neck load cell
Y / N	Neck pitch change joint mechanism mating teeth are engaged
OTHER	 <p>Bolt missing from rear cable guide adapter</p>

SPINE	
Y / N	No evidence of debonding between thoracic spine flex joint and metal plates  Debonding has occurred at bottom of thoracic spine rubber
Y / N	No evidence of debonding between lumbar spine flex joint and metal plates  Debonding has occurred at bottom of lumbar spine rubber
Y / N	Lumbar spine pitch change joint mechanism mating teeth are engaged
OTHER	

SHOULDER	
Y / N	Urethane shoulder pads show no evidence of contact
Y / N	Clavicles securely attached to sternum and shoulder
Y / N	No evidence of debonding, tearing, or permanent compression of posterior soft stops
OTHER	

THORAX	
Y / N	No evidence of contact at top, bottom, or interior faces of rib damping material
Y / N	No evidence of debonding between rib damping material and ribs
Y / N	CRUX anterior arms securely attached to anterior ribs
Y / N	CRUX posterior arms securely attached to double gimbals, spine
Y / N	Urethane bib is securely attached to ribs with no sign of tearing or washer penetration  Bib has torn in the center of sternum
Y / N	Ribs securely attached to posterior spine
Y / N	Rib stiffeners show no evidence of bending (no gaps between ribs and stiffeners)
OTHER	 Lower Neck LC Cable has been repaired where it passes through the upper rear spine box.  T6 X Accelerometer missing insulation at transducer. Electrical tape covers this.

ABDOMEN	
Y / N	<p>No evidence of tearing, cuts, or broken stitches in upper abdomen bag and zipper</p>  <p>Upper abdomen came held together with black tape</p>
Y / N	<p>Upper abdomen insert securely attached to spine</p>
Y / N	<p>Upper abdomen insert shows no evidence of permanent set</p>
Y / N	<p>No evidence of tearing, cuts, or broken stitches in lower abdomen bag and zipper</p>  <p>Abdomen bag has many broken stitches forming, but no tears occurring.</p>
Y / N	<p>Lower abdomen insert securely attached to spine</p>
Y / N	<p>Lower abdomen insert shows no evidence of permanent set</p>
Other	 <p>Both lower abdomen IRTracc screws are inserted, but the IRTraccs are not installed.</p>

PELVIS	
Y / N	Pelvis flesh fits securely over pelvis bones
Y / N	H-point tool fits securely into hole on both sides of pelvis
OTHER	 <p>Rear of pelvis has torn flesh</p>

FEMUR	
Y / N	Acetabular load cells firmly attached
Y / N	Femur load cells firmly attached
Y / N	No evidence of deformation of knee slider bump stop
Y / N	No cuts, tears, or scuffing of knee flesh
Other	
LOWER EXTREMITY (LX)	
Y / N	Rotational potentiometers in ankle securely attached
Y / N	Achilles tendon provides resistance to dorsiflexion
Y / N	No evidence of debonding, tearing, or permanent compression of ankle soft stops
Y / N	No cuts, tears, or scuffing of leg flesh  <p>Numerous minor cuts</p>

Other	 <p data-bbox="228 464 1187 497">Both leg flesh are for right legs as indicated by the "R" shown in this photo.</p>
-------	--

JACKET

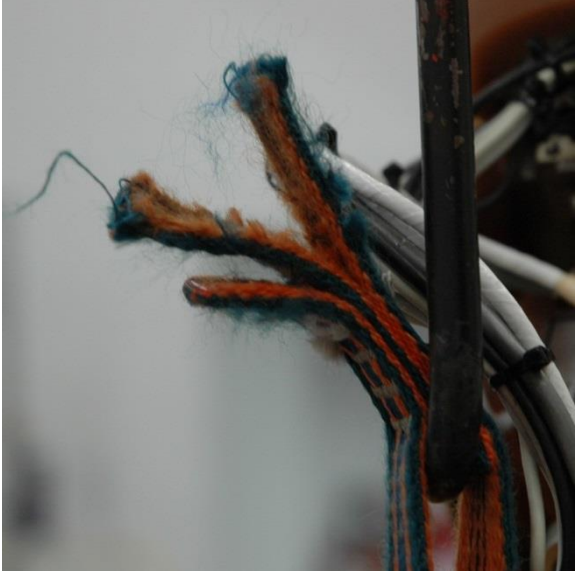
Y / N	Rib stiffeners show no sign of permanent deformation
-------	--

Y / N	No evidence of tears or holes in jacket fabric, Velcro, or zippers
-------	--



Jacket has tears around neck and at most seam ends as seen here on the front left shoulder.


OTHER





Lifting strap torn

THOR Inspection Checklist


Date: 10/029/2013	
NHTSA Representative: James Saunders	
Inspection Reporter: Mary Geesey	
Witness(es):	
Inspection type (check one): <input type="checkbox"/> PRE <input checked="" type="checkbox"/> POST	
Dummy S/N: 0016	Legs S/N: LX019/LX018
Dummy Description: Thor NT 50th Male	
Date of last Certification or Inspection: 10/07/2013	
<u>Tests conducted since last full certification or inspection:</u> <u>Since last inspection:</u> RD0332 Dodge Dart <u>Since last certification:</u> RD0332 Dodge Dart	
<u>Known errors in data channels (no data, clipping, unexpected drops):</u> - Pelvis X Acceleration - Questionable max spike at 180ms -This channel traces normal with no issues while shaking the wire/adaptor.	
<u>Physical evidence of damage:</u> See report	
<u>Anecdotal evidence of damage:</u> N/A	
<u>Equipment delivered to Borrower:</u> Thor 16 ATD 26 Accelerometers 3 Angular Rate Sensors 2 Skull Spring LC 1 Condyle Pot 1 Upper Neck LC 1 Lower Neck LC 4 IRTraccs 8 Rotational Pots 1 Spine LC 2 Acetabulum LC 2 ASIS LC 2 Femur LC	<i>Continued</i> 2 LX Leg Assemblies 2 Upper Tibia LC 2 Lower Tibia LC 6 Ank1e Potentiometers 2 Knee Sliders 1 Neck Skin 1 Neck Foam 1 Tiltview Interface Cable 4 Tilt Sensors 1 H-Point Tool 1 Tool Box 1 Laptop





HEAD	
Y / N	Rear head cap mounts securely to head
Y / N	Head skin fits securely over skull
Y / N	Head skin shows no sign of tears or damage
Y / N	Interior components of skull cavity (ballast, accelerometer mount, accelerometers) securely attached
Y / N	Head securely mounted to OC joint
OTHER	<p>Small tear in the insulation</p> 

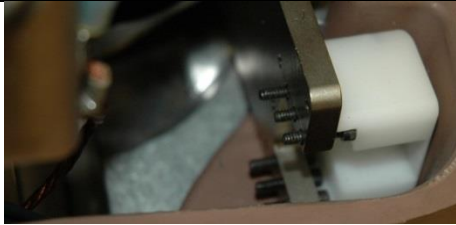
NECK	
Y / N	Neck cables slide freely through holes in neck plates
Y / N	Neck cables show no sign of fraying, broken strands, or kinking
Y / N	No evidence of debonding between neck pucks and plates If N – indicate which interface (where plate/puck 1 attach to upper neck load cell):
Y / N	No evidence of debonding or permanent compression in neck soft stop assemblies
Y / N	Neck securely attached to upper neck load cell
Y / N	Neck securely attached to lower neck load cell
Y / N	Neck pitch change joint mechanism mating teeth are engaged
OTHER	
SPINE	
Y / N	No evidence of debonding between thoracic spine flex joint and metal plates

	 <p>Debonding has occurred at bottom of thoracic spine rubber</p>
Y / N	<p>No evidence of debonding between lumbar spine flex joint and metal plates</p>  <p>Debonding has occurred at bottom of lumbar spine rubber</p>
Y / N	<p>Lumbar spine pitch change joint mechanism mating teeth are engaged</p>
OTHER	

SHOULDER	
Y / N	Urethane shoulder pads show no evidence of contact
Y / N	Clavicles securely attached to sternum and shoulder
Y / N	No evidence of debonding, tearing, or permanent compression of posterior soft stops
OTHER	

THORAX	
Y / N	No evidence of contact at top, bottom, or interior faces of rib damping material
Y / N	No evidence of debonding between rib damping material and ribs
Y / N	CRUX anterior arms securely attached to anterior ribs
Y / N	CRUX posterior arms securely attached to double gimbals, spine
Y / N	<p>Urethane bib is securely attached to ribs with no sign of tearing or washer penetration</p>  <p>Bib has torn in the center of sternum</p>

Y / N	Ribs securely attached to posterior spine
Y / N	Rib stiffeners show no evidence of bending (no gaps between ribs and stiffeners)
OTHER	 <p data-bbox="233 489 1263 520">Lower Neck LC Cable has been repaired where it passes through the upper rear spine box.</p>  <p data-bbox="233 793 1143 825">T6 X Accelerometer missing insulation at transducer. Electrical tape covers this.</p>
ABDOMEN	
Y / N	<p data-bbox="233 884 1094 915">No evidence of tearing, cuts, or broken stitches in upper abdomen bag and zipper</p>  <p data-bbox="233 1178 821 1209">Upper abdomen came held together with black tape</p>
Y / N	Upper abdomen insert securely attached to spine
Y / N	Upper abdomen insert shows no evidence of permanent set
Y / N	<p data-bbox="233 1331 1094 1362">No evidence of tearing, cuts, or broken stitches in lower abdomen bag and zipper</p>  <p data-bbox="233 1646 1057 1677">Abdomen bag has many broken stitches forming, but no tears occurring.</p>
Y / N	Lower abdomen insert securely attached to spine
Y / N	Lower abdomen insert shows no evidence of permanent set
Other	



Both lower abdomen IRTracc screws are inserted, but the IRTraccs are not installed.

PELVIS

Y / N Pelvis flesh fits securely over pelvis bones

Y / N H-point tool fits securely into hole on both sides of pelvis

OTHER



Rear of pelvis has torn flesh

FEMUR

Y / N Acetabular load cells firmly attached

Y / N Femur load cells firmly attached

Y / N No evidence of deformation of knee slider bump stop

Y / N No cuts, tears, or scuffing of knee flesh

Other

LOWER EXTREMITY (LX)

Y / N Rotational potentiometers in ankle securely attached
-Left ankle Y pot has intermittent failure in cable close to amp connector. -Repaired by cutting back cable and reinstalling on connector.

Y / N Achilles tendon provides resistance to dorsiflexion


Y / N No evidence of debonding, tearing, or permanent compression of ankle soft stops

Y / N No cuts, tears, or scuffing of leg flesh

Numerous minor cuts



Zipper on right ankle is pulling away from the flesh

		
Other		

JACKET

Y / N Rib stiffeners show no sign of permanent deformation

Y / **N** No evidence of tears or holes in jacket fabric, Velcro, or zippers

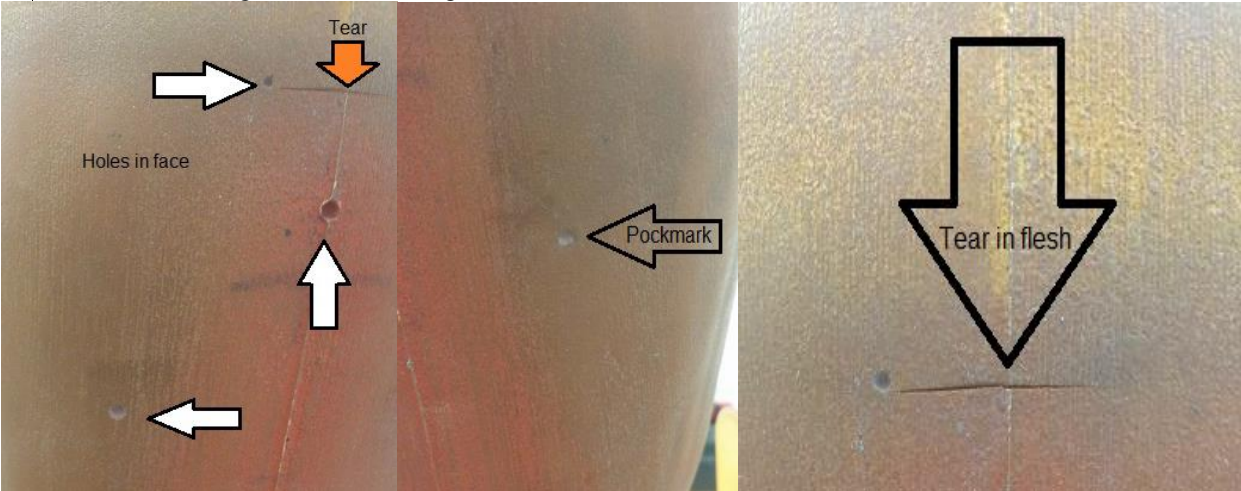
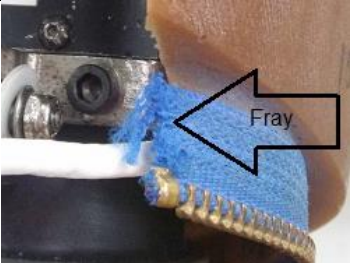


Jacket has tears around neck and at most seam ends as seen here on the front left shoulder.

OTHER



Lifting strap torn

HEAD	
Y / N	Rear head cap mounts securely to head
Y / N	Head skin fits securely over skull
Y / N	Head skin shows no sign of tears or damage  <p>Thor has holes/pockmarks in his head skin, along with a tear</p>
Y / N	Interior components of skull cavity (ballast, accelerometer mount, accelerometers) securely attached
Y / N	Head securely mounted to OC joint
OTHER	 <p>Fraying of material for zipper at the back of the head</p>

NECK	
Y / N	Neck cables slide freely through holes in neck plates
Y / N	Neck cables show no sign of fraying, broken strands, or kinking
Y / N	No evidence of debonding between neck pucks and plates If N – indicate which interface (where plate/puck 1 attach to upper neck load cell):
Y / N	No evidence of debonding or permanent compression in neck soft stop assemblies
Y / N	Neck securely attached to upper neck load cell
Y / N	Neck securely attached to lower neck load cell THOR 0015 does not have a lower neck load cell
Y / N	Neck pitch change joint mechanism mating teeth are engaged

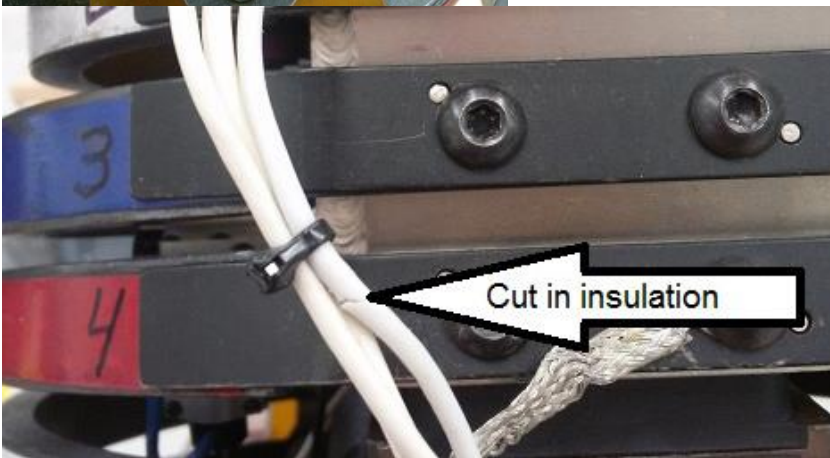
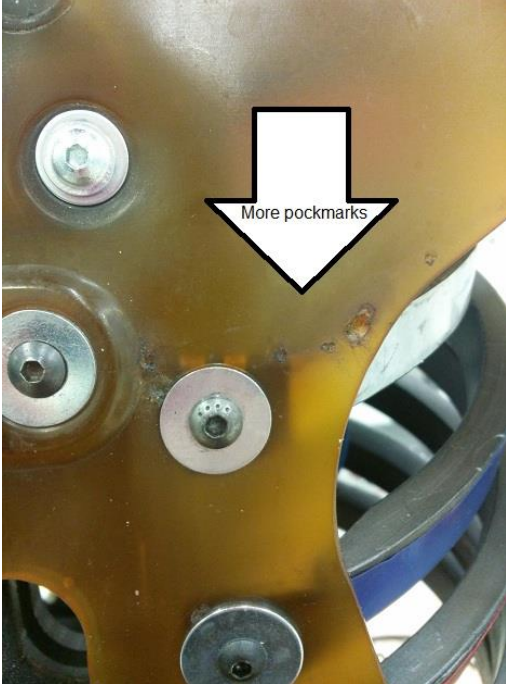
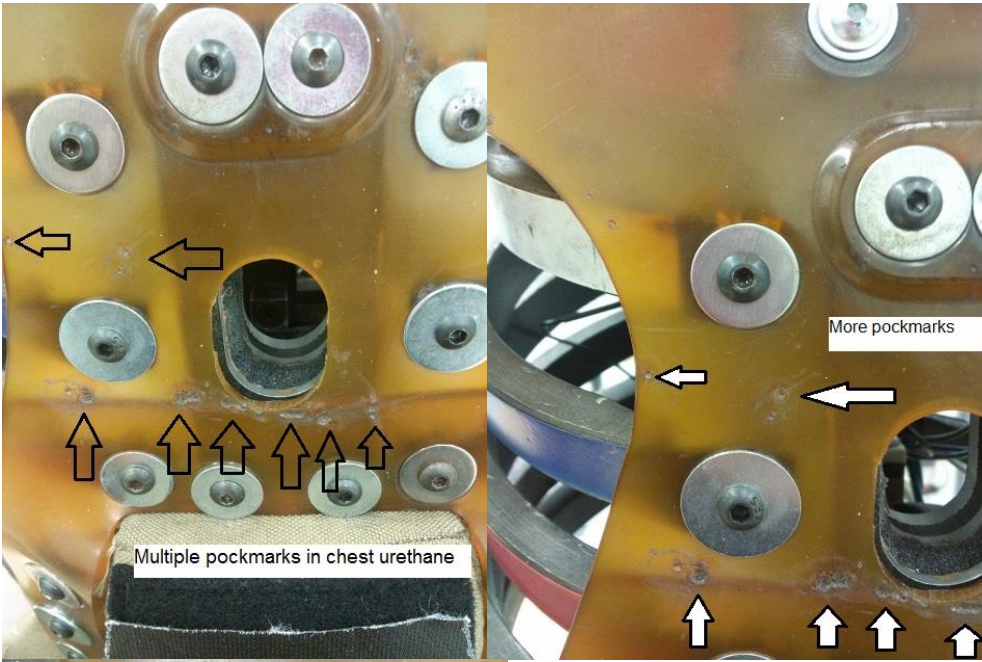
OTHER	
SPINE	
Y / N	No evidence of debonding between thoracic spine flex joint and metal plates
Y / N	No evidence of debonding between lumbar spine flex joint and metal plates
Y / N	Lumbar spine pitch change joint mechanism mating teeth are engaged
OTHER	

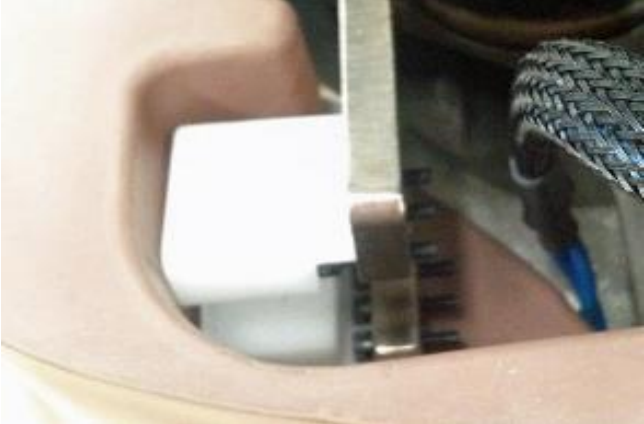
SHOULDER	
Y / N	Urethane shoulder pads show no evidence of contact
Y / N	Clavicles securely attached to sternum and shoulder
Y / N	No evidence of debonding, tearing, or permanent compression of posterior soft stops
OTHER	

THORAX	
Y / N	No evidence of contact at top, bottom, or interior faces of rib damping material
Y / N	No evidence of debonding between rib damping material and ribs
Y / N	CRUX anterior arms securely attached to anterior ribs
Y / N	CRUX posterior arms securely attached to double gimbals, spine
Y / N	Urethane bib is securely attached to ribs with no sign of tearing or washer penetration
Y / N	Ribs securely attached to posterior spine
Y / N	Rib stiffeners show no evidence of bending (no gaps between ribs and stiffeners)

OTHER

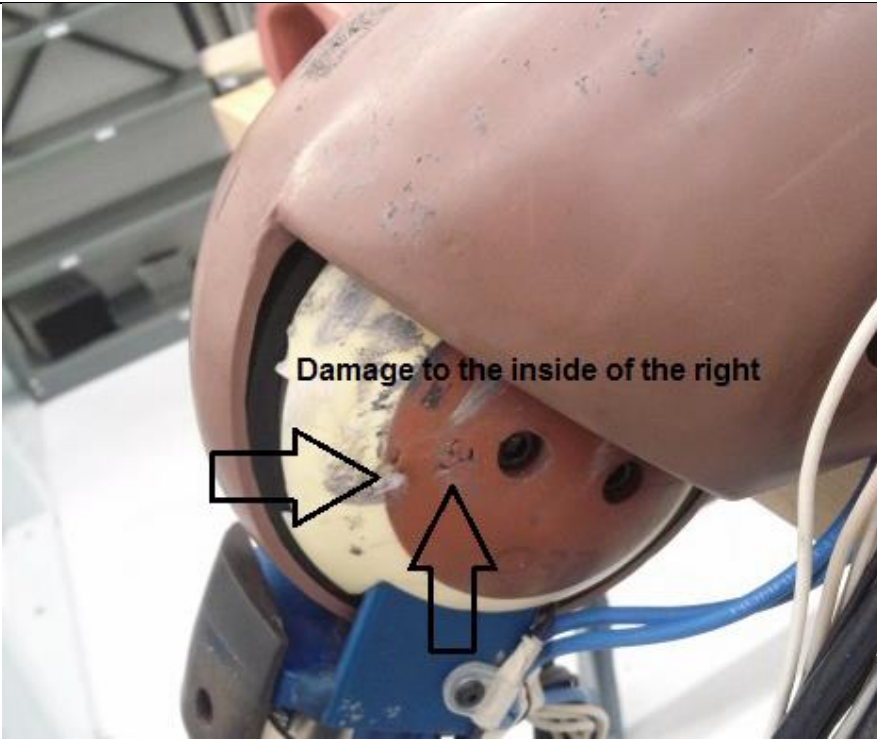
There are multiple pockmarks in the chest urethane, and at the back there is a cut in the insulation to one of the accelerometer wires



ABDOMEN	
Y / N	No evidence of tearing, cuts, or broken stitches in upper abdomen bag and zipper
Y / N	Upper abdomen insert securely attached to spine
Y / N	Upper abdomen insert shows no evidence of permanent set
Y / N	No evidence of tearing, cuts, or broken stitches in lower abdomen bag and zipper
Y / N	Lower abdomen insert securely attached to spine
Y / N	Lower abdomen insert shows no evidence of permanent set
Other	 <p>Both lower abdomen IRTracc screws are inserted, but the IRTraccs are not installed.</p>

PELVIS	
Y / N	Pelvis flesh fits securely over pelvis bones
Y / N	H-point tool fits securely into hole on both sides of pelvis
OTHER	

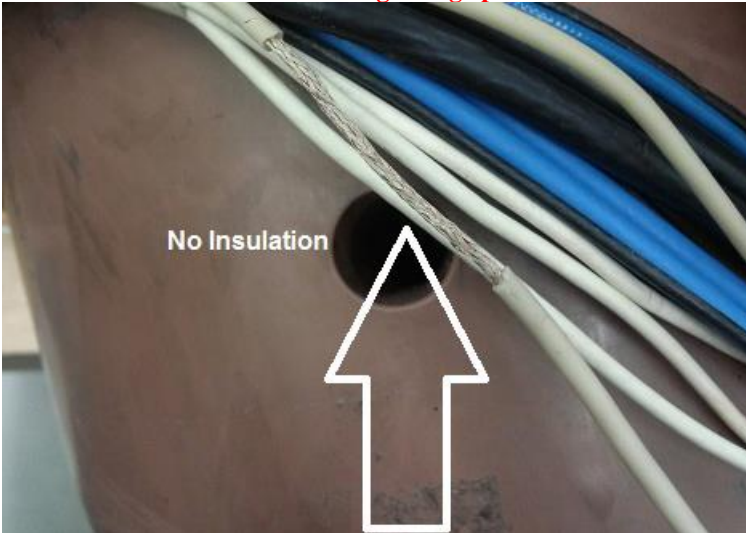
FEMUR	
Y / N	Acetabular load cells firmly attached
Y / N	Femur load cells firmly attached
Y / N	No evidence of deformation of knee slider bump stop



Damage to the inside of the right knee

Y / N No cuts, tears, or scuffing of knee flesh

Other **One accelerometer wire is missing a large portion of insulation**



LOWER EXTREMITY (LX)

Y / N Rotational potentiometers in ankle securely attached

Y / N Achilles tendon provides resistance to dorsiflexion

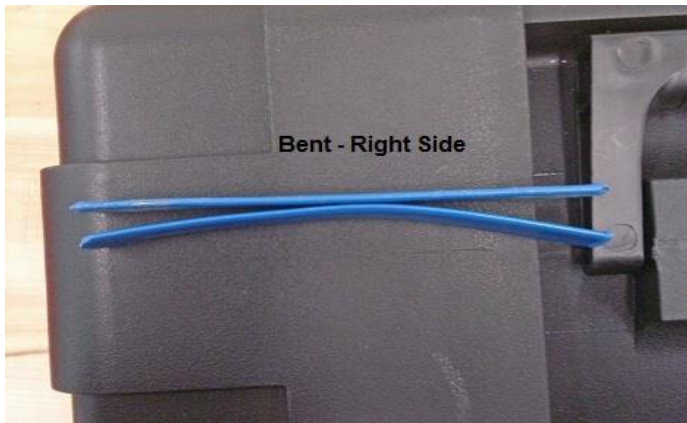
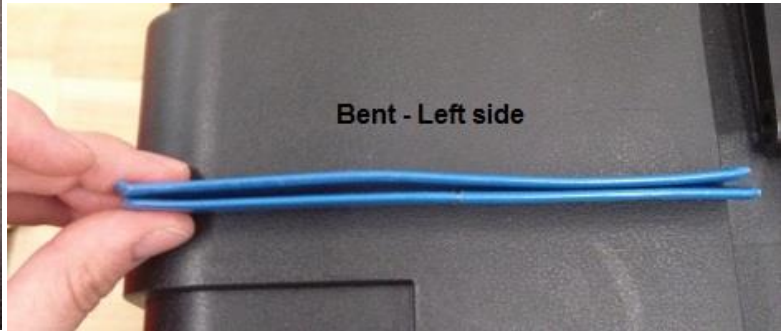
Y / N No evidence of debonding, tearing, or permanent compression of ankle soft stops

Y / N No cuts, tears, or scuffing of leg flesh

Other

JACKET

Y / N Rib stiffeners show no sign of permanent deformation
One of the left rib stiffeners has damage to the outer coating that goes all the way around, also, the rib stiffeners were severely bent when we received 0015.



Y / N


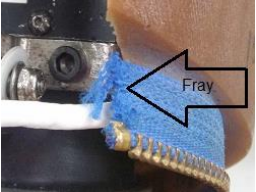

No evidence of tears or holes in jacket fabric, Velcro, or zippers

Many of the seams of the jacket are coming undone, and there is a hole on the bottom left side along with stains all over the jacket.





OTHER

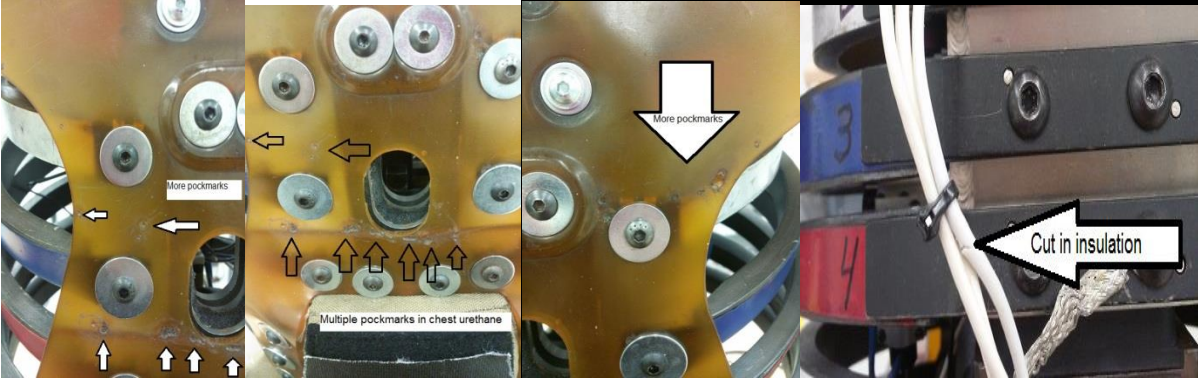
HEAD	
Y / N	Rear head cap mounts securely to head
Y / N	Head skin fits securely over skull
Y / N	Head skin shows no sign of tears or damage  <p>Thor has holes/pockmarks in his head skin, along with a tear</p>
Y / N	Interior components of skull cavity (ballast, accelerometer mount, accelerometers) securely attached
Y / N	Head securely mounted to OC joint
OTHER	<p>Fraying of material for zipper at the back of the head</p>  <p>Head CG Y Accelerometer wire damaged</p> 

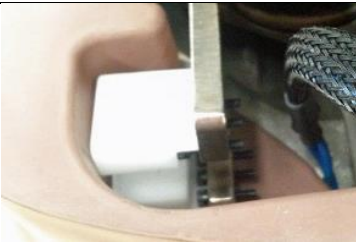
NECK	
Y / N	Neck cables slide freely through holes in neck plates
Y / N	Neck cables show no sign of fraying, broken strands, or kinking
Y / N	No evidence of debonding between neck pucks and plates If N – indicate which interface (where plate/puck 1 attach to upper neck load cell):
Y / N	No evidence of debonding or permanent compression in neck soft stop assemblies

Y / N	Neck securely attached to upper neck load cell
Y / N	Neck securely attached to lower neck load cell
	THOR 0015 does not have a lower neck load cell
Y / N	Neck pitch change joint mechanism mating teeth are engaged
OTHER	
SPINE	
Y / N	No evidence of debonding between thoracic spine flex joint and metal plates
Y / N	No evidence of debonding between lumbar spine flex joint and metal plates
Y / N	Lumbar spine pitch change joint mechanism mating teeth are engaged
OTHER	

SHOULDER	
Y / N	Urethane shoulder pads show no evidence of contact
Y / N	Clavicles securely attached to sternum and shoulder
Y / N	No evidence of debonding, tearing, or permanent compression of posterior soft stops
OTHER	

THORAX	
Y / N	No evidence of contact at top, bottom, or interior faces of rib damping material
Y / N	No evidence of debonding between rib damping material and ribs
Y / N	CRUX anterior arms securely attached to anterior ribs
Y / N	CRUX posterior arms securely attached to double gimbals, spine
Y / N	Urethane bib is securely attached to ribs with no sign of tearing or washer penetration
Y / N	Ribs securely attached to posterior spine
Y / N	Rib stiffeners show no evidence of bending (no gaps between ribs and stiffeners)

OTHER	<p>There are multiple pockmarks in the chest urethane, and at the back there is a cut in the insulation to one of the accelerometer wires</p> 
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ABDOMEN	
Y / N	No evidence of tearing, cuts, or broken stitches in upper abdomen bag and zipper
Y / N	Upper abdomen insert securely attached to spine
Y / N	Upper abdomen insert shows no evidence of permanent set
Y / N	No evidence of tearing, cuts, or broken stitches in lower abdomen bag and zipper
Y / N	Lower abdomen insert securely attached to spine
Y / N	Lower abdomen insert shows no evidence of permanent set
Other	 <p>Both lower abdomen IRTracc screws are inserted, but the IRTraccs are not installed.</p>

PELVIS	
Y / N	Pelvis flesh fits securely over pelvis bones
Y / N	H-point tool fits securely into hole on both sides of pelvis
OTHER	Small tear in pelvis flesh on the left side

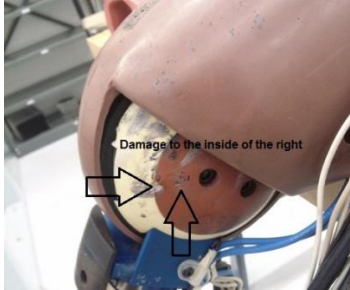


FEMUR

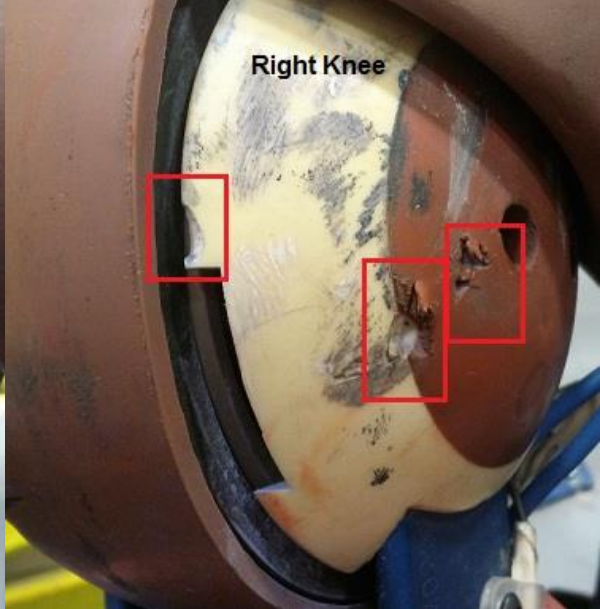
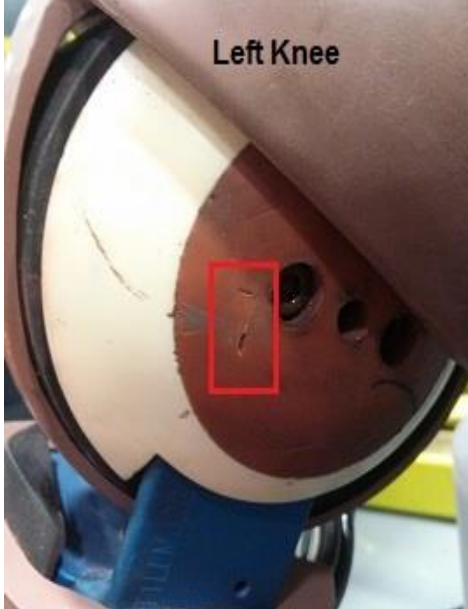
Y / N Acetabular load cells firmly attached

Y / N Femur load cells firmly attached

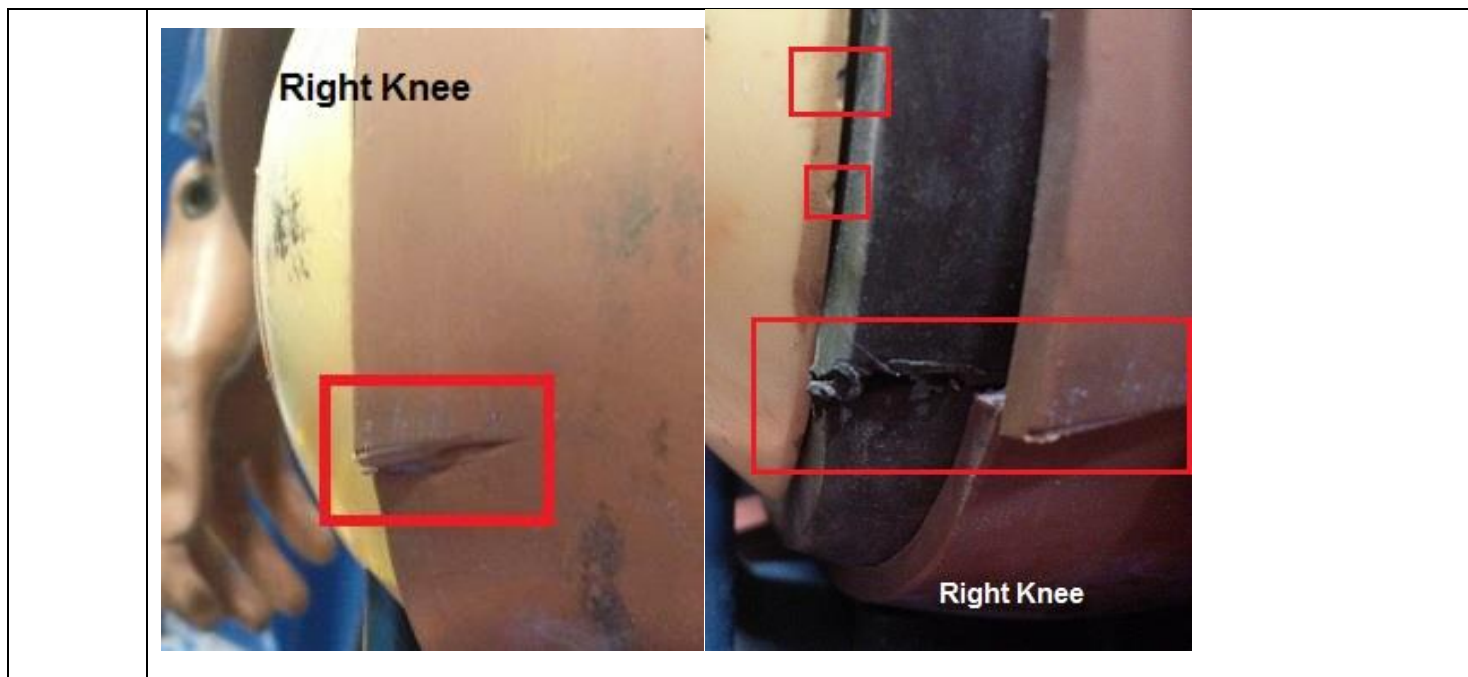
Y / **N** No evidence of deformation of knee slider bump stop
Damage to the inside of the right knee

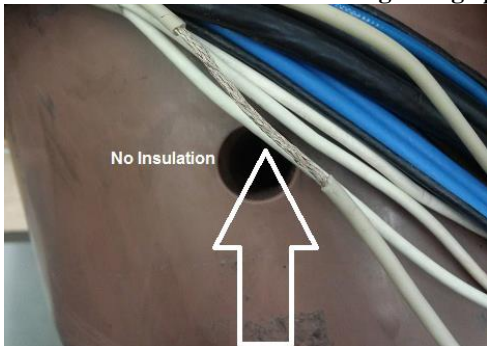


Some damage done to the outer left knee, inside right knee sustained more damage



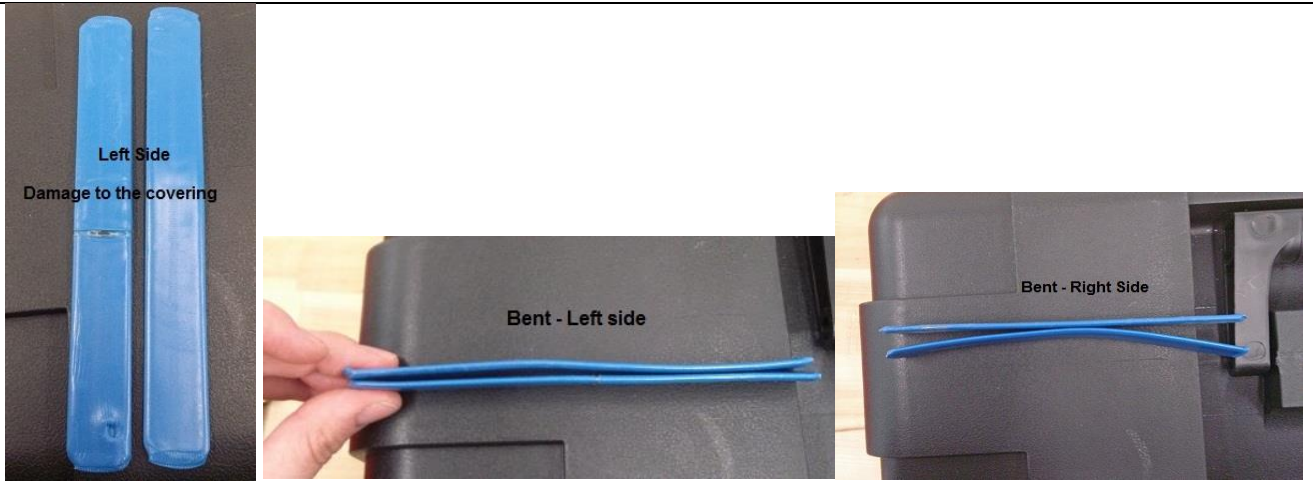
Y / **N** No cuts, tears, or scuffing of knee flesh
Right knee flesh, and rubber insert were cut, chips is white area



Other	<p>One accelerometer wire is missing a large portion of insulation</p> 
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LOWER EXTREMITY (LX)	
Y / N	Rotational potentiometers in ankle securely attached
Y / N	Achilles tendon provides resistance to dorsiflexion
Y / N	No evidence of debonding, tearing, or permanent compression of ankle soft stops
Y / N	No cuts, tears, or scuffing of leg flesh
Other	

JACKET	
Y / N	<p>Rib stiffeners show no sign of permanent deformation</p> <p>One of the left rib stiffeners has damage to the outer coating that goes all the way around, also, the rib stiffeners were severely bent when we received 0015.</p>



Y / N

No evidence of tears or holes in jacket fabric, Velcro, or zippers
Many of the seams of the jacket are coming undone, and there is a hole on the bottom left side along with stains all over the jacket.



OTHER

Test Data/Sensor Repair Notes

DUMMY CALIBRATIONS

50% ADULT MALE THOR016 DUMMY CALIBRATIONS

Summary of Thor 16 Certification Test Results

Reported by: Calspan

Technician: M. Goehle

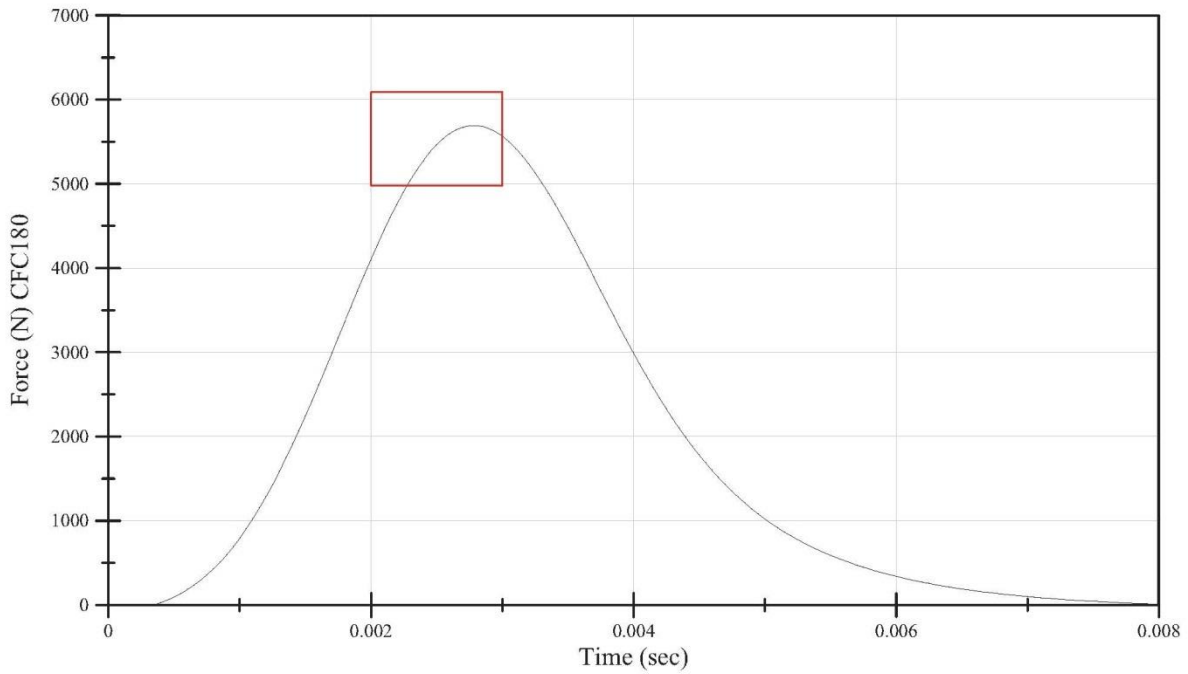
Date: 10/21/2013

Head Impact	Passed
Occipital Condyle Quasi-Static	Failed
Neck Left Lateral Flexion	Failed
Neck Right Lateral Flexion	Failed
Neck Flexion	Failed
Neck Extension	Failed
Upper Thorax	Failed
Lower Left Oblique Thorax	Failed
Lower Right Oblique Thorax	Failed
Upper Abdomen	Failed
Lower Abdomen	Failed
Left Femur	Passed
Right Femur	Passed
Left Knee	Passed
Right Knee	Passed
Left Foot Inversion	Passed
Left Foot Eversion	Passed
Left Heel of Foot	Failed
Left Ball of Foot	Failed
Right Foot Inversion	Failed
Right Foot Eversion	Passed
Right Heel of Foot	Passed
Right Ball of Foot	Passed

Certifications performed by VRTC
Instructed by NHTSA to use "as is"

Test Temperature: 70 degrees
Relative Humidity: 49%
Test Velocity: 1.98 m/s

THOR Head Impact Certification
Probe Force
Serial Number: T016

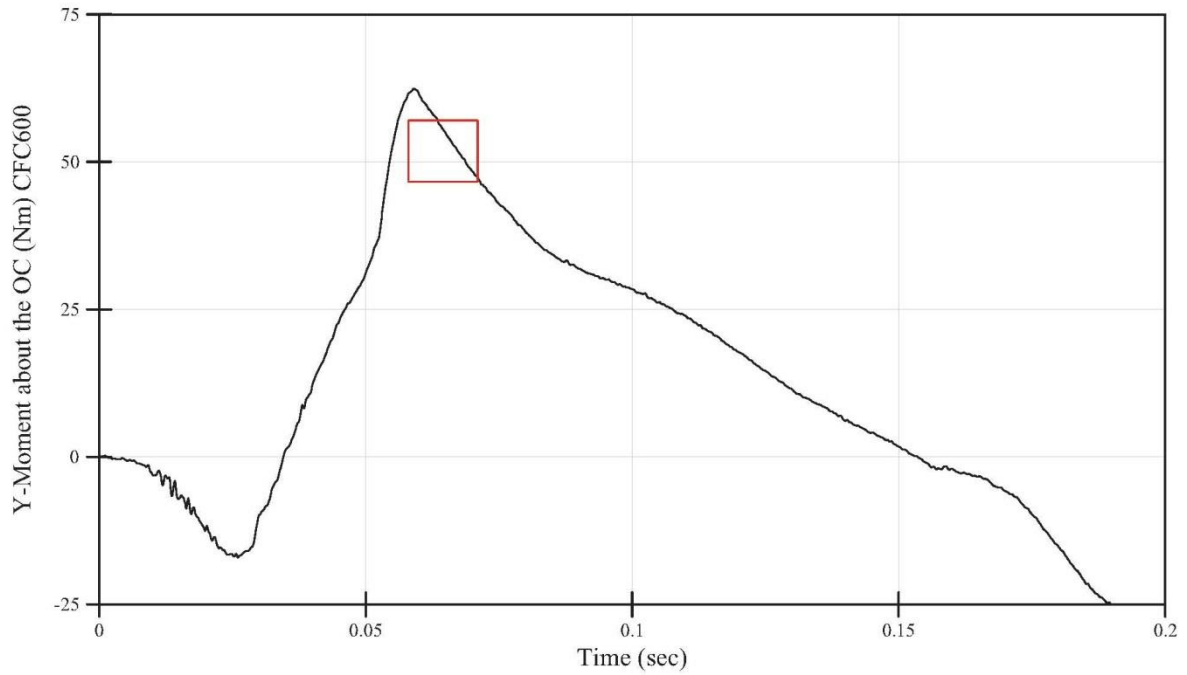


File Name: T016HEAD092513_01_DIADEMHeader_BINARYpp
09/25/2013 11:10:29.0000

Software Version: 2.2

Test Temperature: 71 degrees
Relative Humidity: 49%
Test Velocity: 3.83 m/s

THOR Neck Flexion Certification
Y-Moment
Serial Number: T016

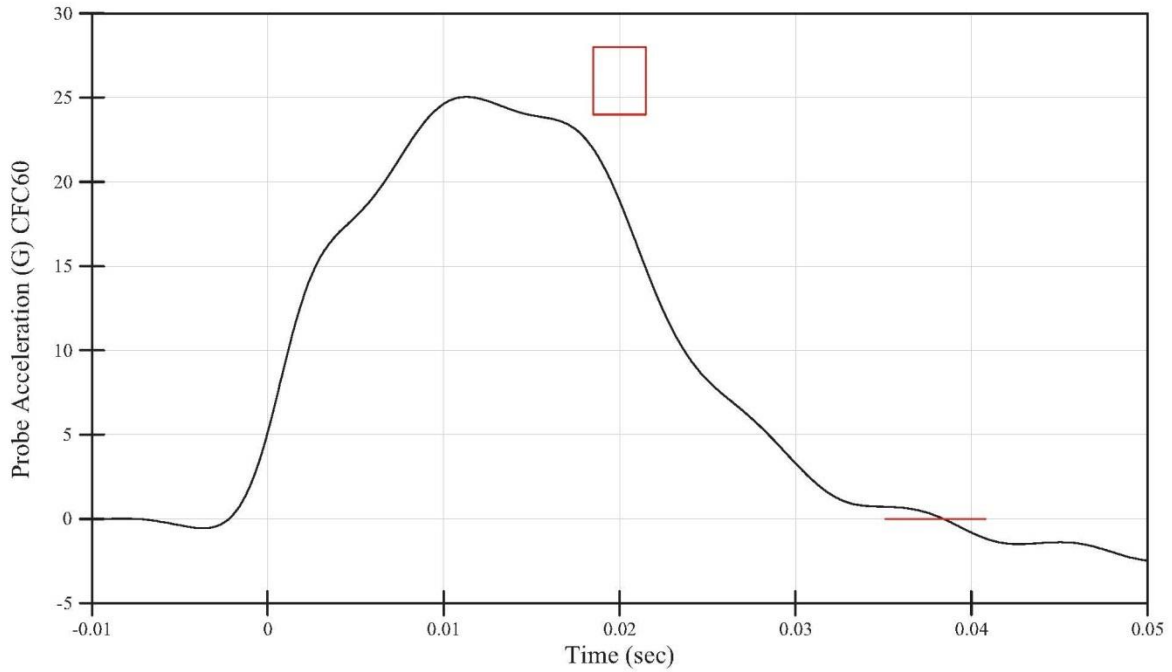


File Name: T016NECKFLEX092313_01_DIADEMHeader_BINARYpp
09/24/2013 07:01:32.0000

Software Version: 2.2

Test Temperature: 71 degrees
Relative Humidity: 49%
Test Velocity: 3.83 m/s

THOR Neck Flexion Certification
Probe Acceleration
Serial Number: T016

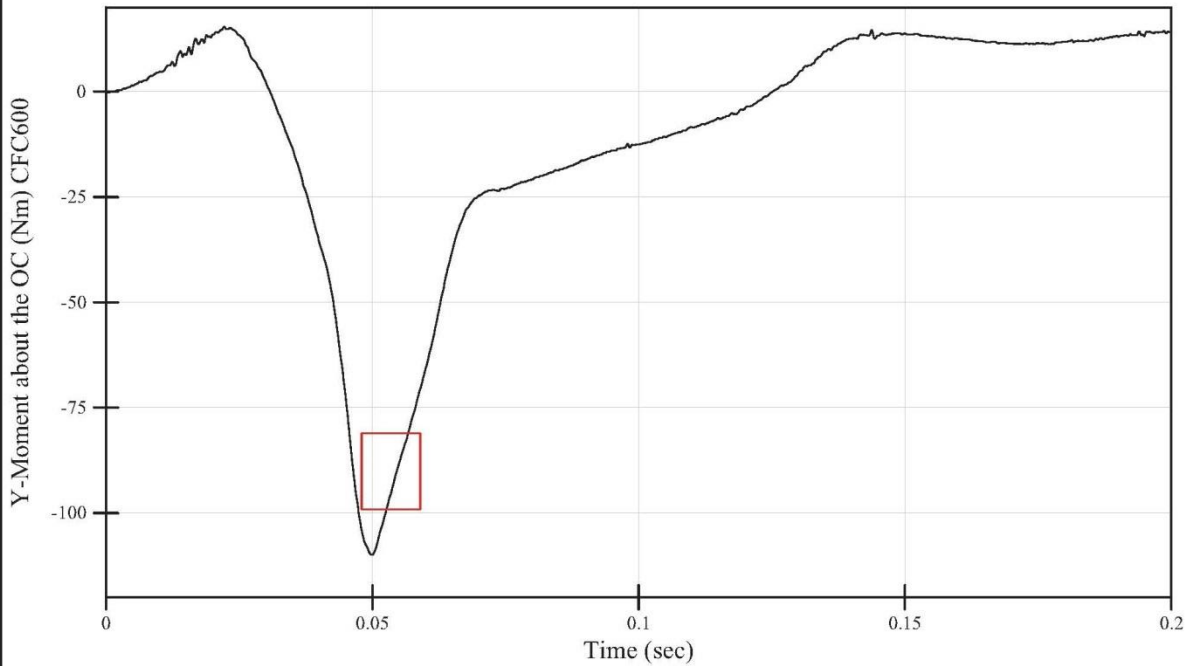


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09/24/2013 07:01:32.0000

Software Version: 2.2

Test Temperature: 71 degrees
Relative Humidity: 49%
Test Velocity: 3.73 m/s

THOR Neck Extension Certification
Y-Moment
Serial Number: T016

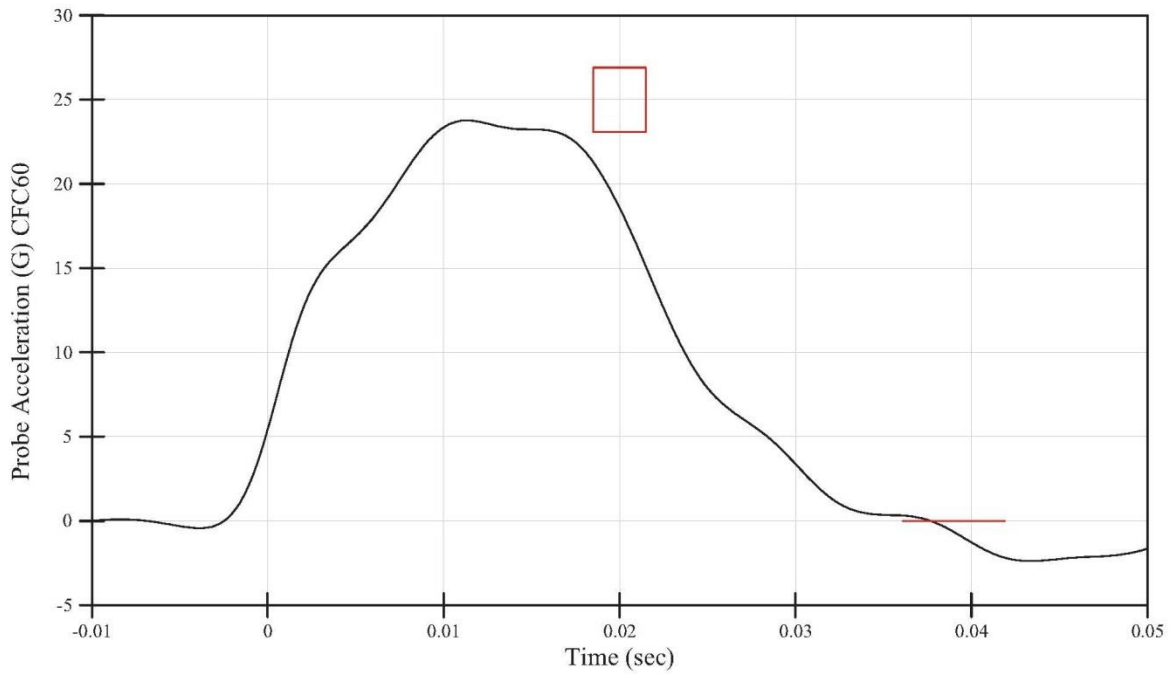


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09/24/2013 07:46:19.0000

Software Version: 2.2

Test Temperature: 71 degrees
Relative Humidity: 49%
Test Velocity: 3.73 m/s

THOR Neck Extension Certification
Probe Acceleration
Serial Number: T016

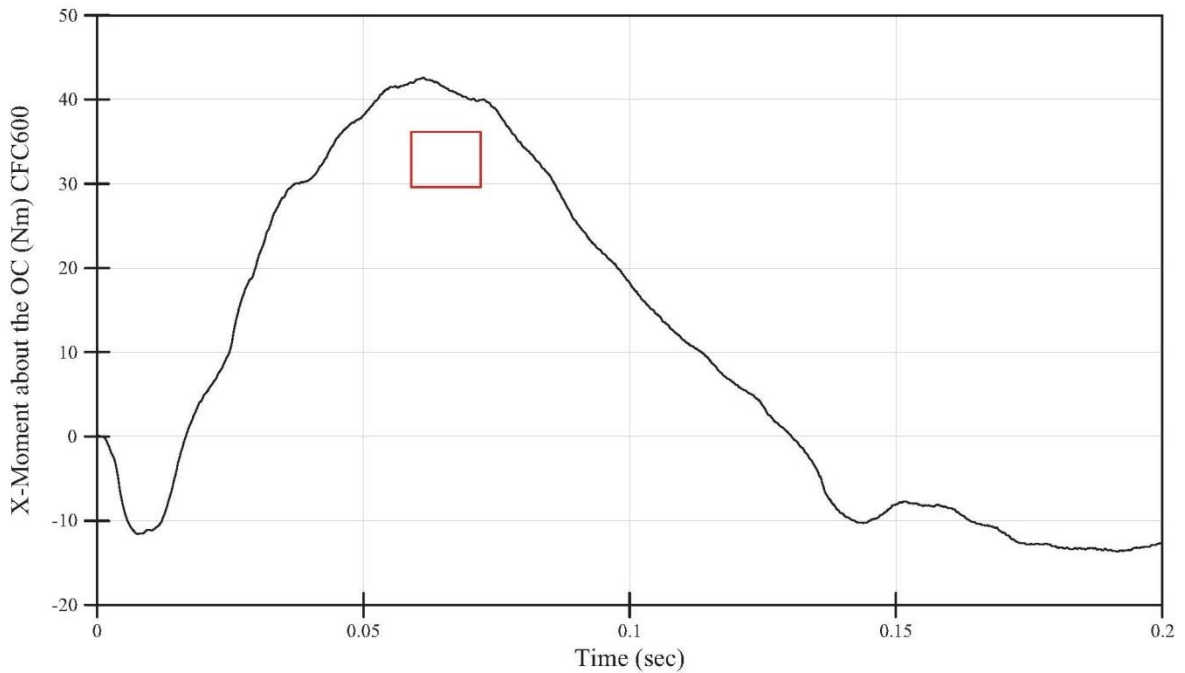


File Name: T016NECKEXT092413_01_DIAdemHeader_BINARYpp
09/24/2013 07:46:19.0000

Software Version: 2.2

Test Temperature: 71 degrees
Relative Humidity: 49%
Test Velocity: 2.91 m/s

THOR Neck Left Lateral Flexion Certification
X-Moment
Serial Number: T016

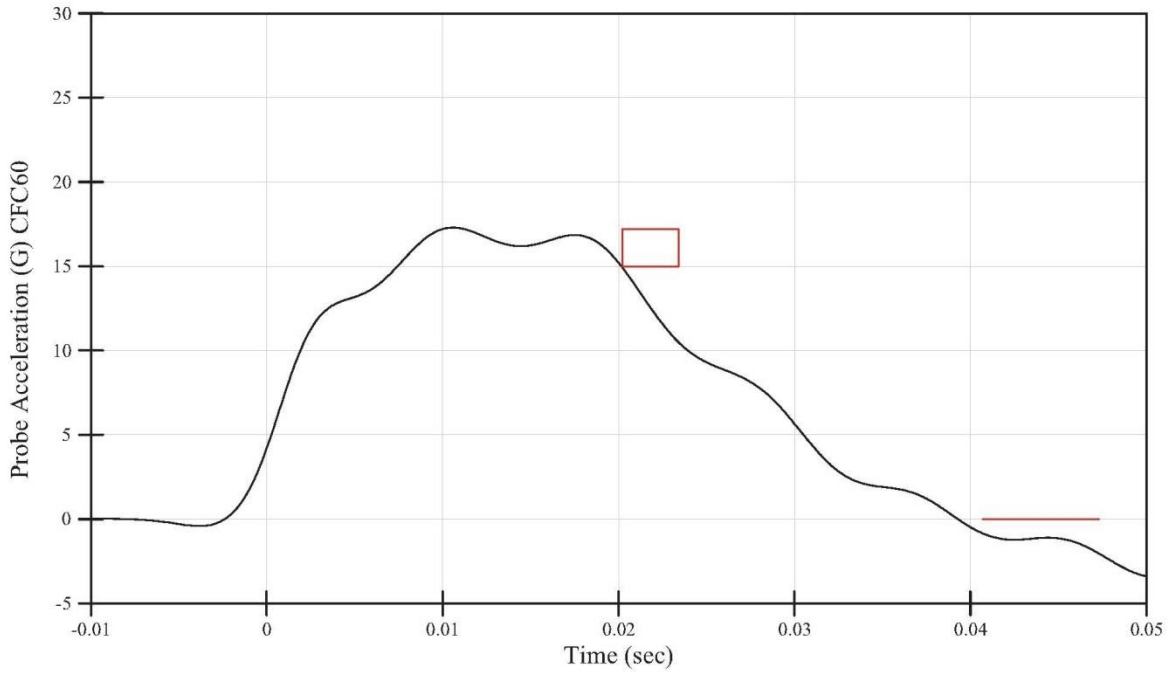


File Name: T016NECKLEFT092413_01_DIAdemHeader_BINARYpp
09/24/2013 08:59:19.0000

Software Version: 2.2

Test Temperature: 71 degrees
Relative Humidity: 49%
Test Velocity: 2.91 m/s

THOR Neck Left Lateral Flexion Certification
Probe Acceleration
Serial Number: T016

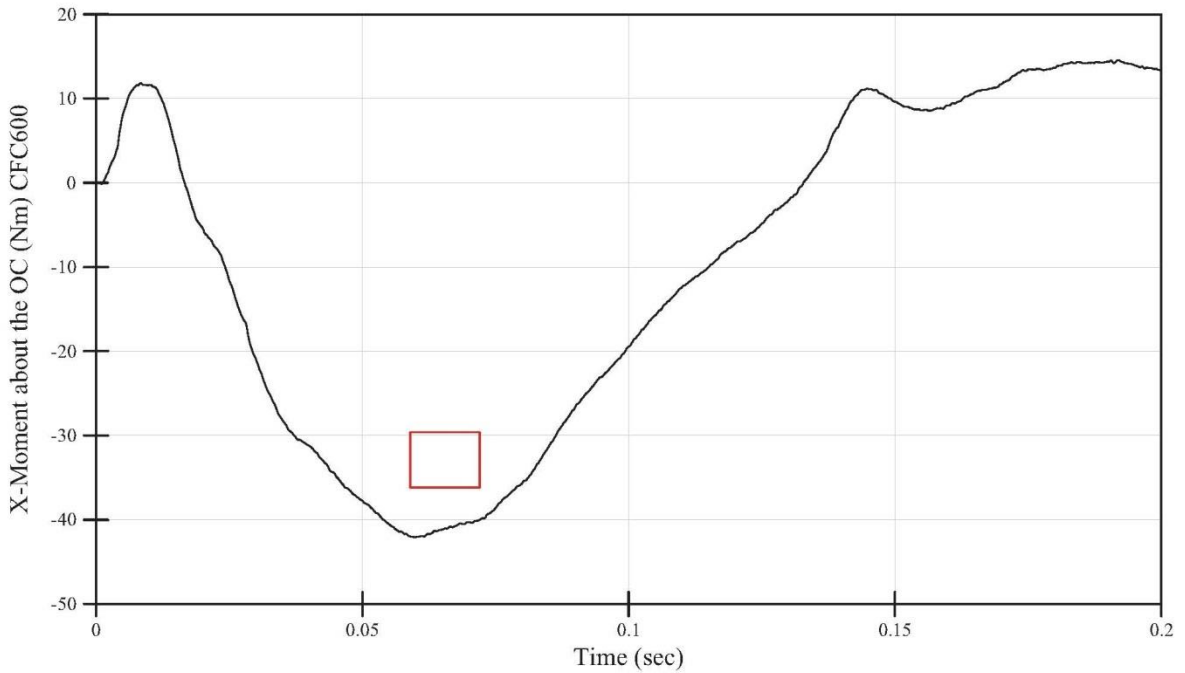


Software Version: 2.2

File Name: T016NECKLEFT092413_01_DIADEMHeader_BINARYpp
09/24/2013 08:59:19.0000

Test Temperature: 71 degrees
Relative Humidity: 49%
Test Velocity: 2.94 m/s

THOR Neck Right Lateral Flexion Certification
X-Moment
Serial Number: T016



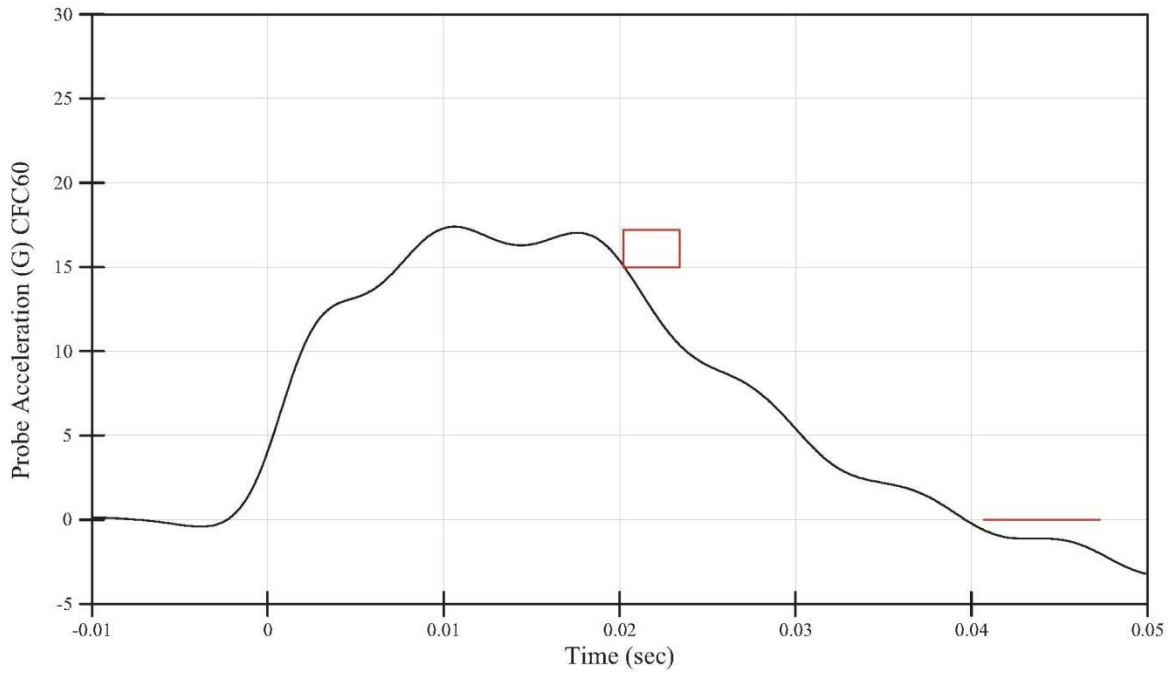
Software Version: 2.2

File Name: T016NECKRIGHT092413_01_DIADEMHeader_BINARYpp
09/24/2013 08:23:43.0000

Test Temperature: 71 degrees
Relative Humidity: 49%
Test Velocity: 2.94 m/s

THOR Neck Right Lateral Flexion Certification

Probe Acceleration
Serial Number: T016



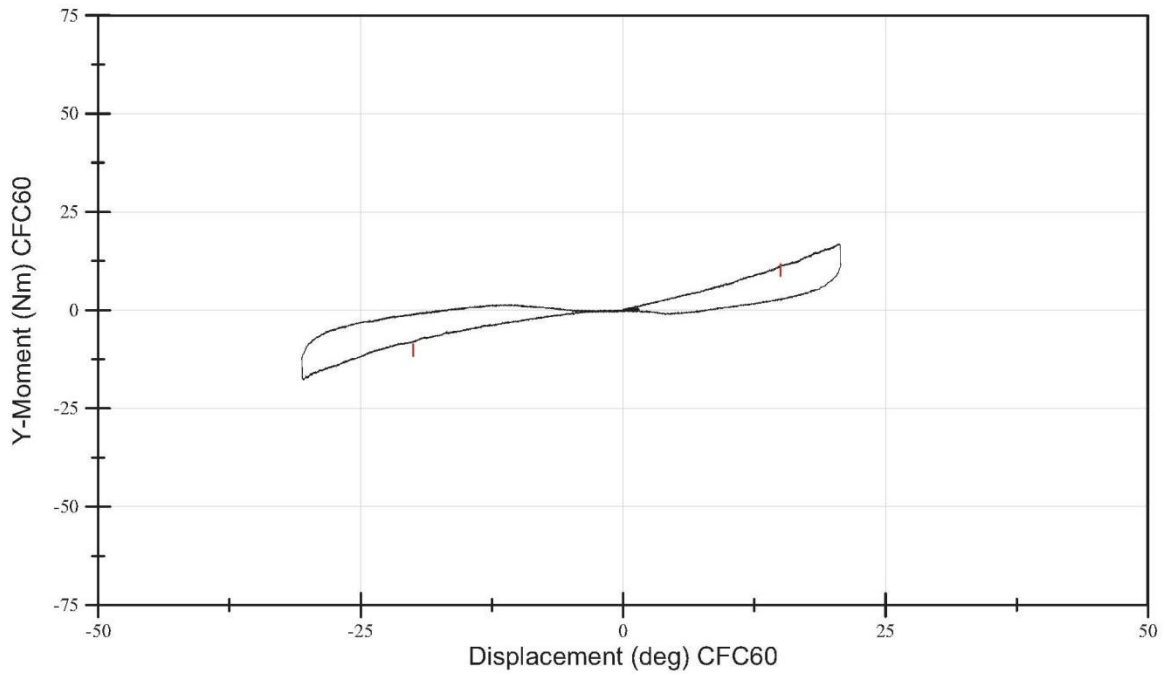
File Name: T016NECKRIGHT092413_01_DIADEMHeader_BINARYpp
09/24/2013 08:23:43.0000

Software Version: 2.2

Test Temperature: 72 degrees
Relative Humidity: 51%
Test Velocity: 0 m/s

THOR Occipital Condyle Quasi-Static Certification

Displacement vs. Torque
Serial Number: T016

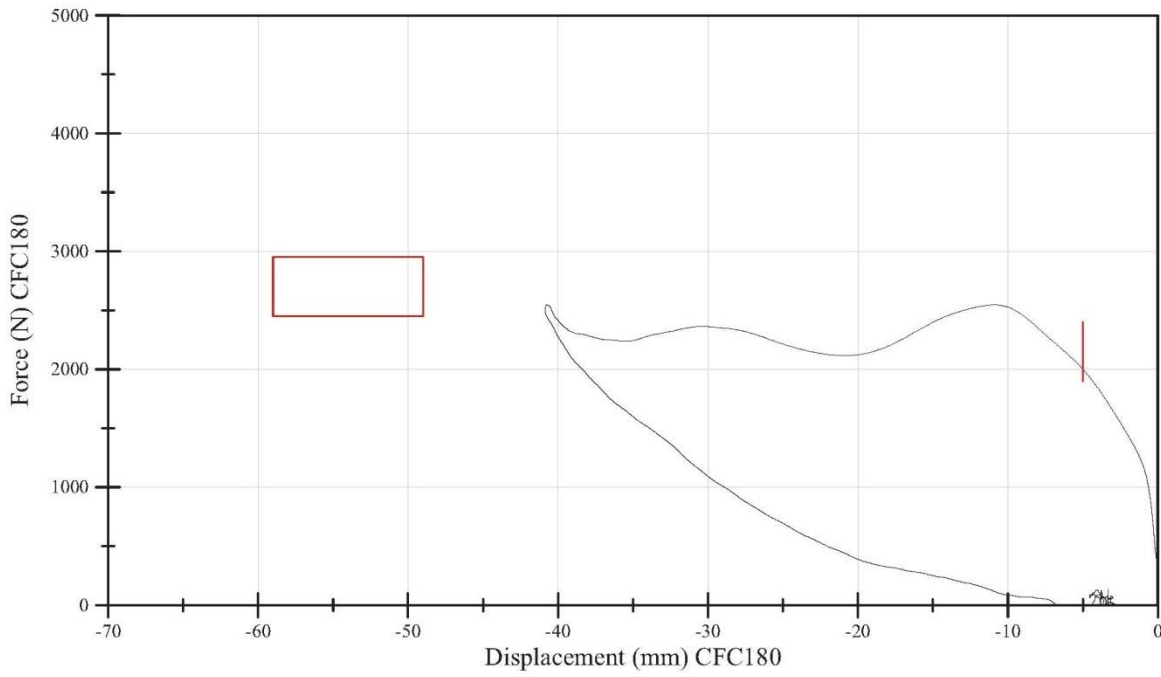


File Name: T016 OC 091813_01
09/19/2013 14:51:47.0000

Software Version: 2.2

Test Temperature: 70 degrees
Relative Humidity: 49%
Test Velocity: 4.31 m/s

THOR Upper Thorax Certification
Thorax Displacement vs. Probe Force
Serial Number: T016

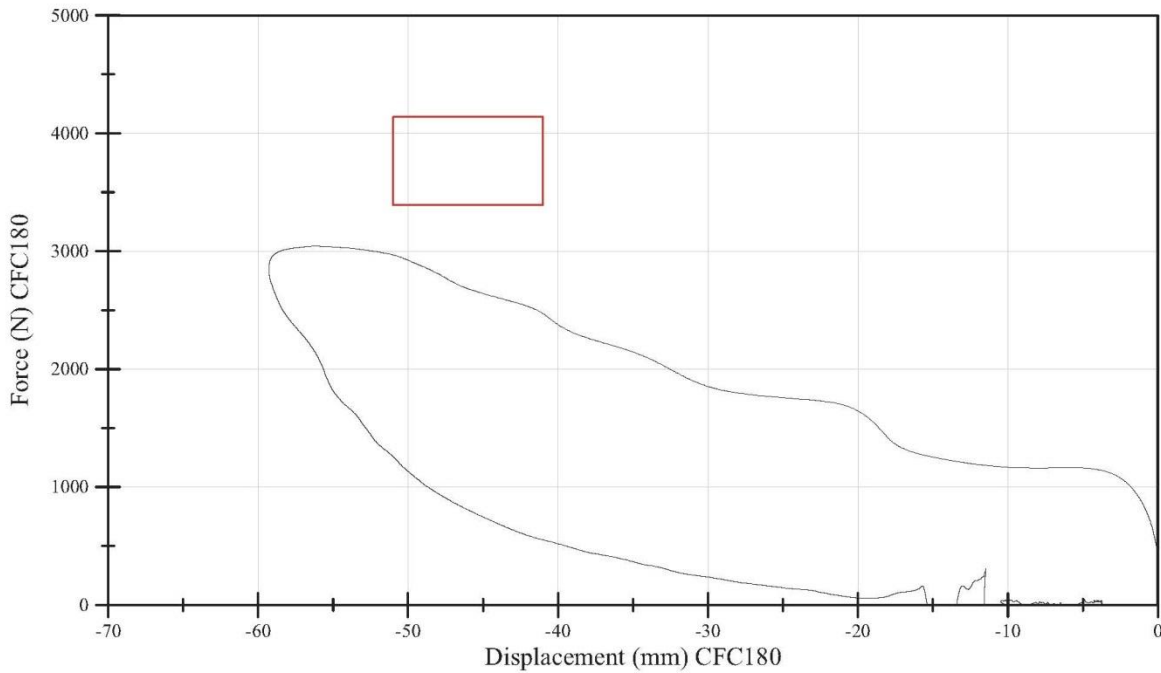


File Name: T016THORAXUPPER092513_01_DIADEMHeader_BINARYpp
09/25/2013 10:28:40.0000

Software Version: 2.2

Test Temperature: 70 degrees
Relative Humidity: 49%
Test Velocity: 4.31 m/s

THOR Lower Left Oblique Thorax Certification
Thorax Displacement vs. Probe Force
Serial Number: T016

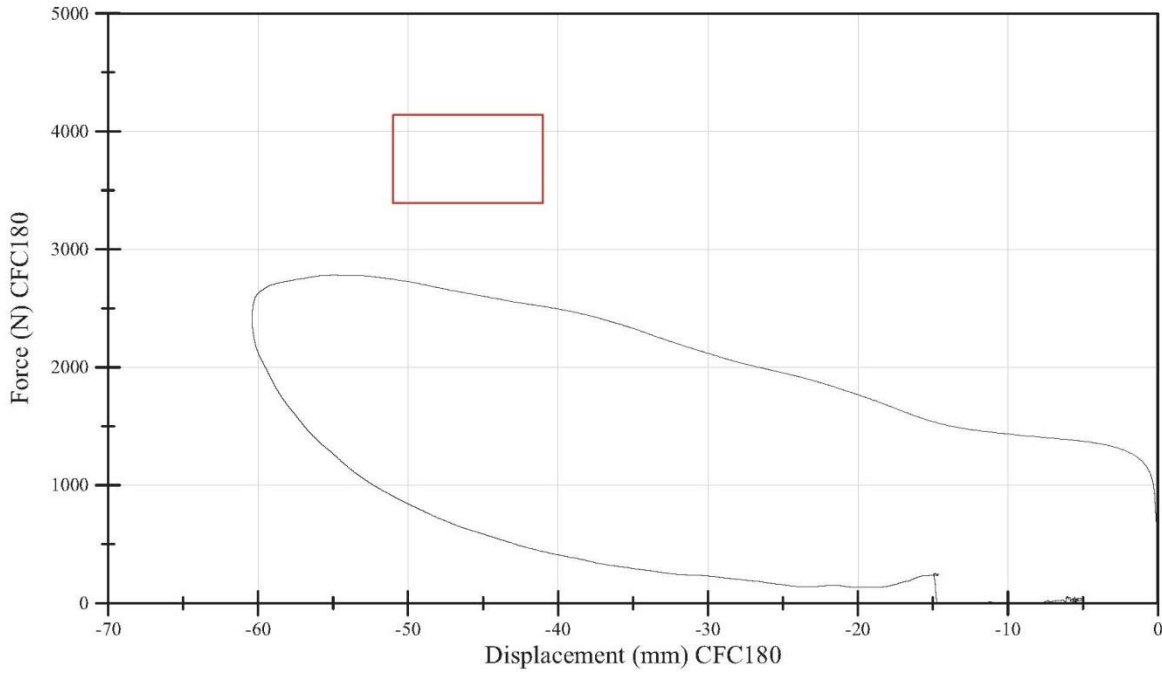


File Name: T016THORAXLEFT092513_01_DIADEMHeader_BINARYpp
09/25/2013 09:37:54.0000

Software Version: 2.2

Test Temperature: 70 degrees
Relative Humidity: 49%
Test Velocity: 4.31 m/s

THOR Lower Right Oblique Thorax Certification
Thorax Displacement vs. Probe Force
Serial Number: T016

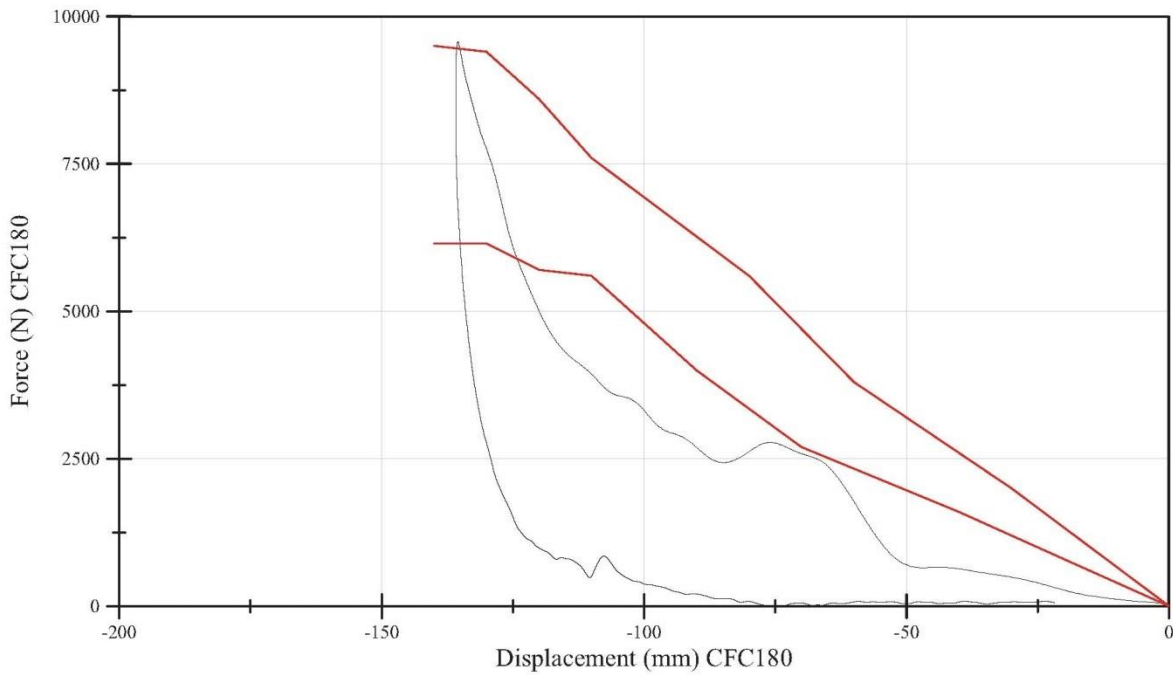


File Name: T016THORAXRIGHT092513_01_DIADEMHEADER_BINARYpp
09/25/2013 09:39:26.0000

Software Version: 2.2

Test Temperature: 71 degrees
Relative Humidity: 49%
Test Velocity: 7.94 m/s

THOR Upper Abdomen Certification
Abdomen Displacement vs. Probe Force
Serial Number: T016

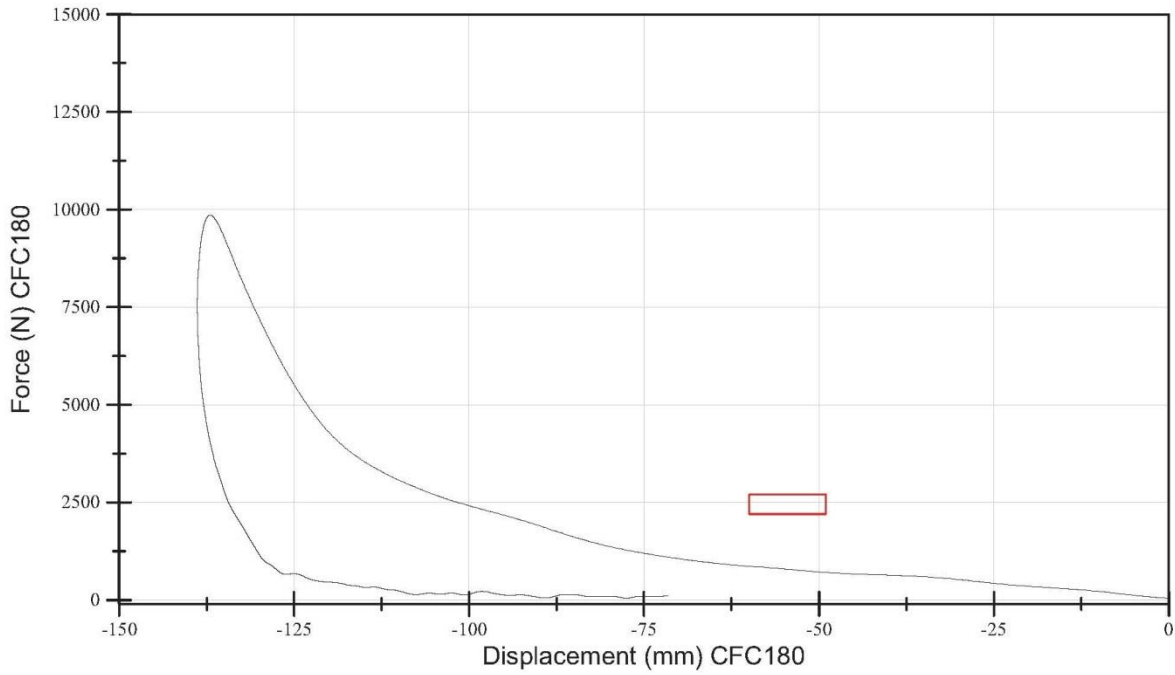


File Name: T016ABDOMENUPPER092413_01_DIADEMHEADER_BINARYpp
09/24/2013 14:27:18.0000

Software Version: 2.2

Test Temperature: degrees
Relative Humidity: %
Test Velocity: m/s

THOR Lower Abdomen Certification
Lower Abdomen Deflection (via PENXG and T12XG) vs. Probe Force
Serial Number: 016



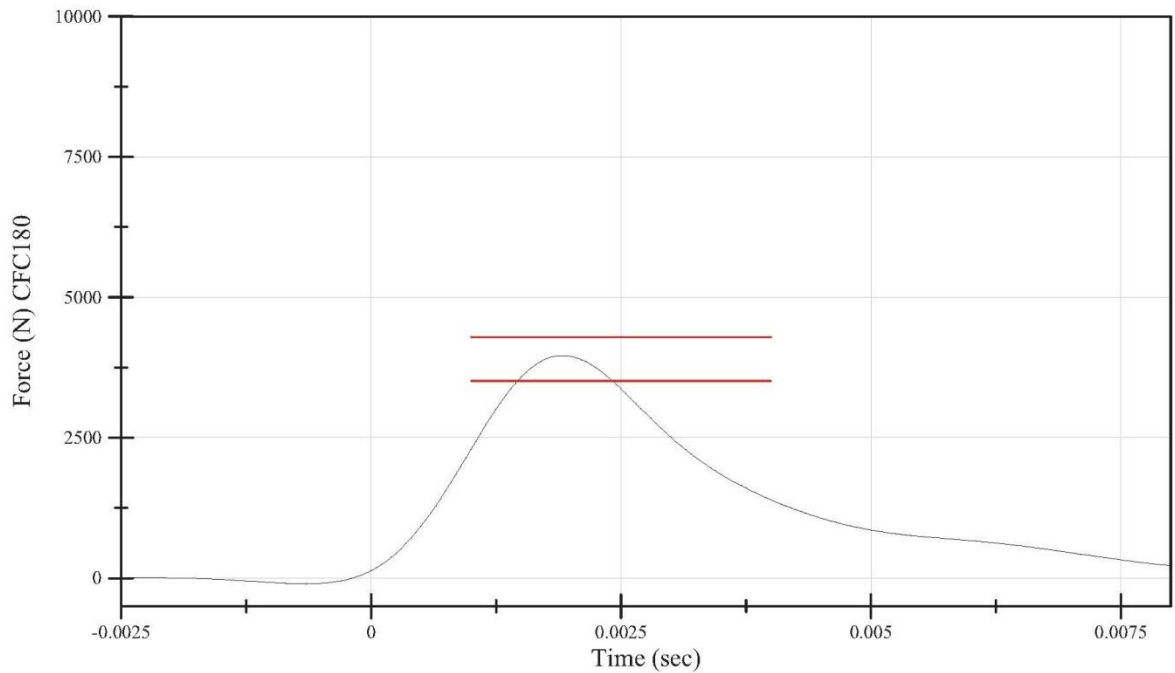
File Name: T016ABDOMENLOWER092413_01_DIAdemHeader_BINARYp

Software Version:

09/24/2013 13:10:11.0000

Test Temperature: 70 degrees
Relative Humidity: 49%
Test Velocity: 2.55 m/s

THOR Left Femur Certification
Probe Force
Serial Number: T015



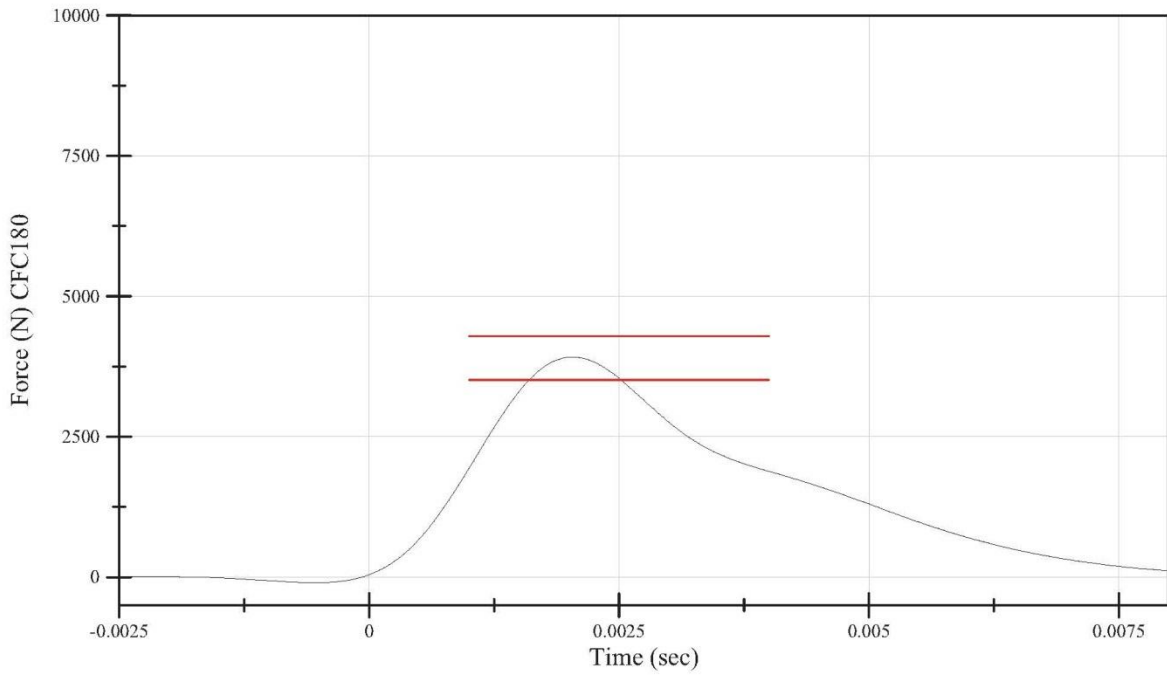
File Name: T016FEMURLEFT092613_01_DIAdemHeader_BINARYpp

Software Version: 2.2

09/26/2013 13:23:16.0000

Test Temperature: 70 degrees
Relative Humidity: 49%
Test Velocity: 2.55 m/s

THOR Right Femur Certification
Probe Force
Serial Number: T015



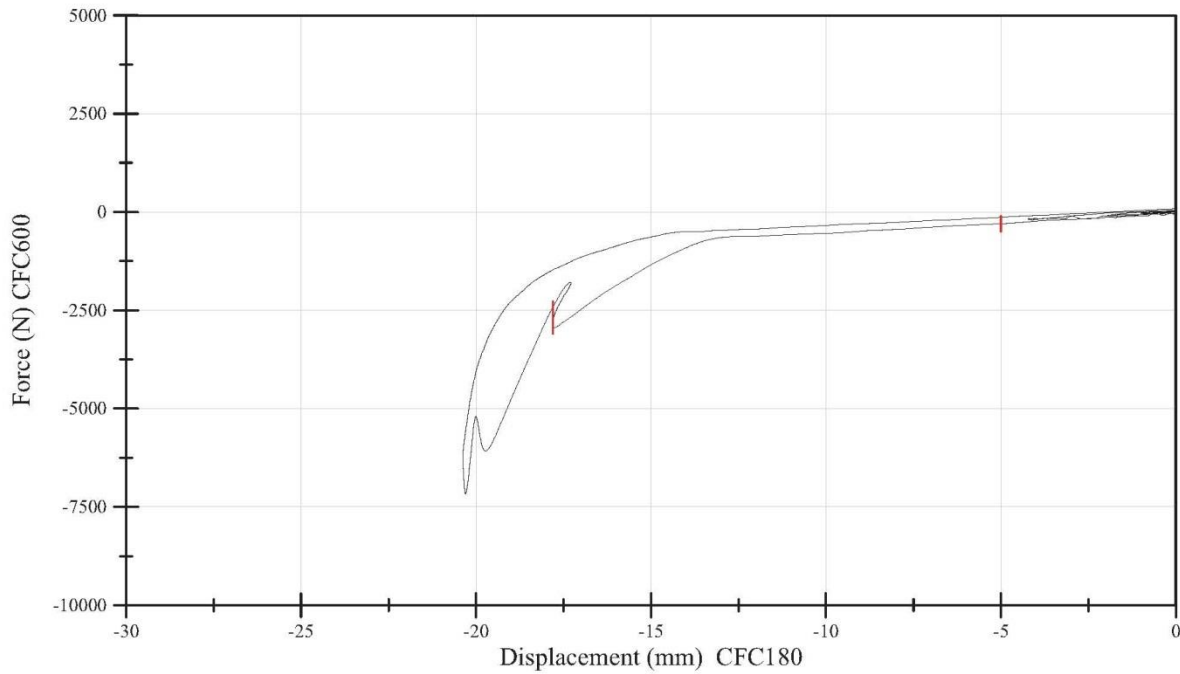
Software Version: 2.2

File Name: T016FEMURRIGHT092613_01_DIAdemHeader_BINARYpp
09/26/2013 13:25:13.0000

**THOR 016 LEG CALIBRATIONS
LX0018/ LX0019**

Test Temperature: 70 degrees
Relative Humidity: 49%
Test Velocity: 2.72 m/s

THOR Left Knee Certification
Femur Force vs. Knee Displacement
Serial Number: LX0019

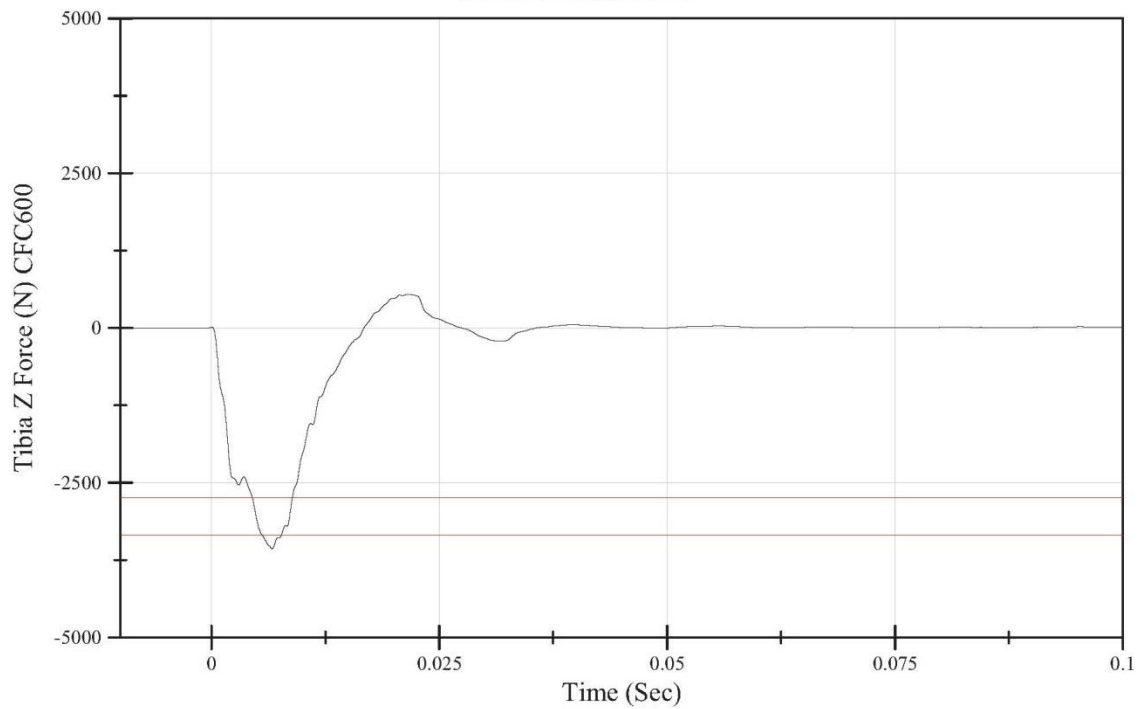


Software Version: 2.2

File Name: D2103665B_092613_01_DIADEMHeader_BINARYpp
09/26/2013 09:33:48.0000

Test Temperature: 70.4 degrees
Relative Humidity: 39.8%
Test Velocity: 4.00 m/s

THOR Left Foot Heel Certification
Tibia Load
Serial Number: LX0019

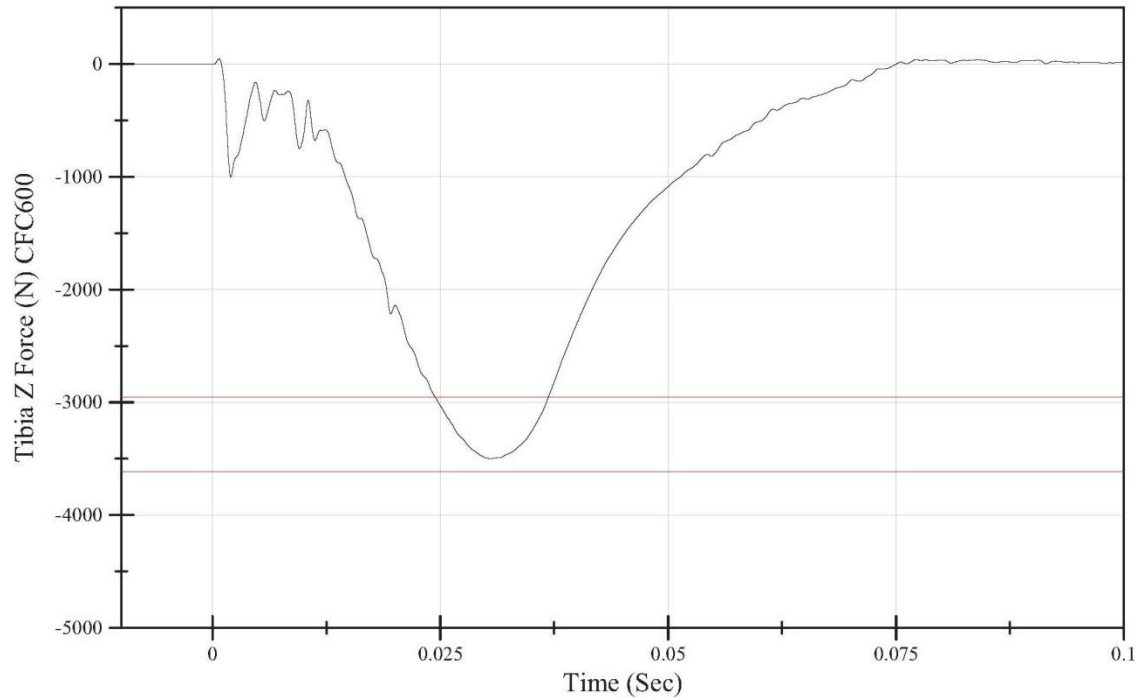


Software Version: 2.2

File Name: Heel_LX0019_2013_09_24 01 processed
09/24/2013 14:14:17.0000

Test Temperature: 70.8 degrees
Relative Humidity: 36.6%
Test Velocity: 5.03 m/s

THOR Left Foot Dorsiflexion Certification
Tibia Load
Serial Number: LX0019

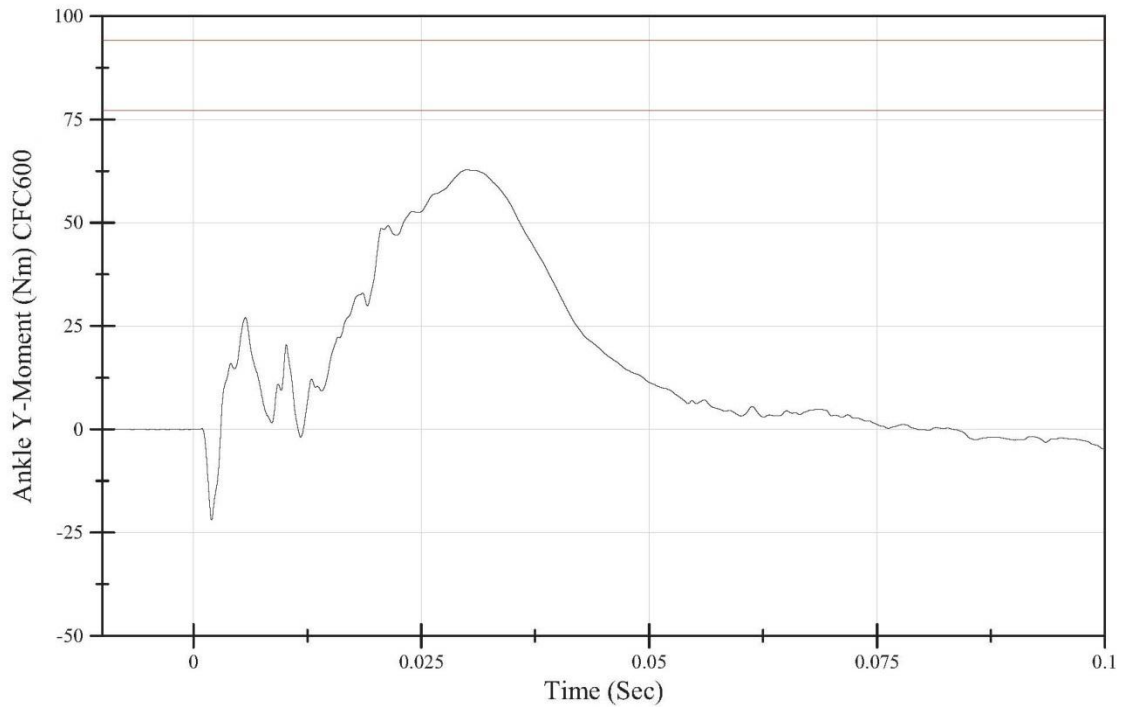


File Name: Ball_LX0019_2013_09_23 01 processed
09/24/2013 10:51:15.0000

Software Version: 2.2

Test Temperature: 70.8 degrees
Relative Humidity: 36.6%
Test Velocity: 5.03 m/s

THOR Left Foot Dorsiflexion Certification
Ankle Y-Moment
Serial Number: LX0019

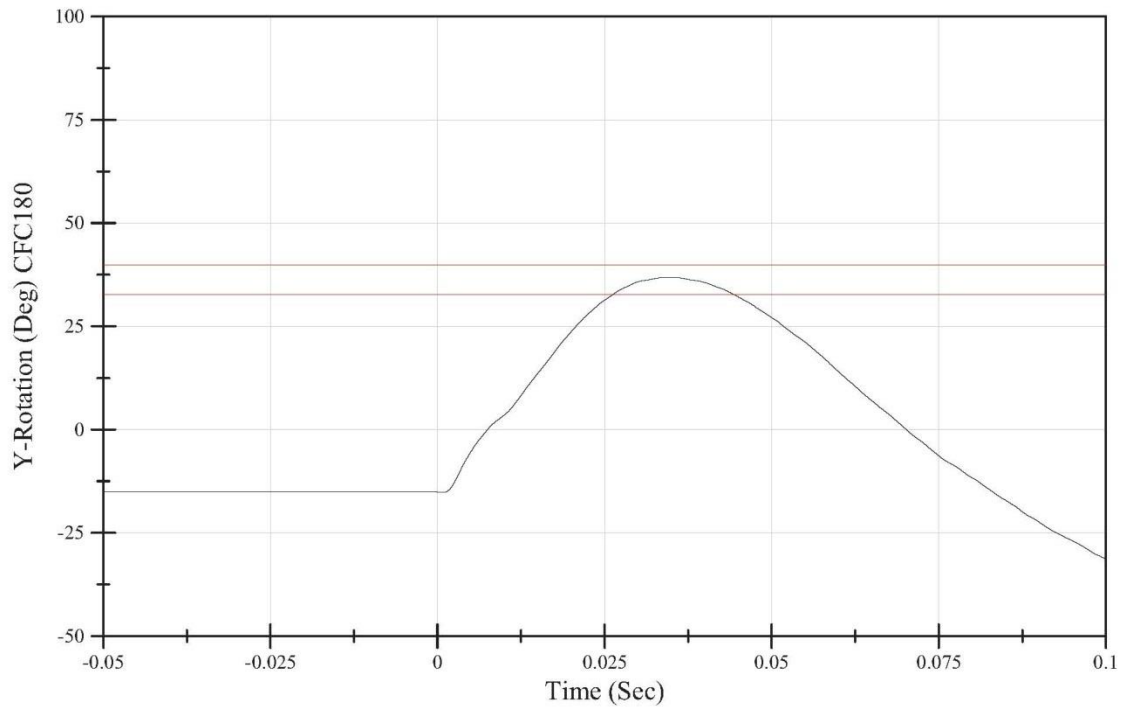


File Name: Ball_LX0019_2013_09_23 01 processed
09/24/2013 10:51:15.0000

Software Version: 2.2

Test Temperature: 70.8 degrees
Relative Humidity: 36.6%
Test Velocity: 5.03 m/s

THOR Left Foot Dorsiflexion Certification
Ankle Y-Rotation
Serial Number: LX0019

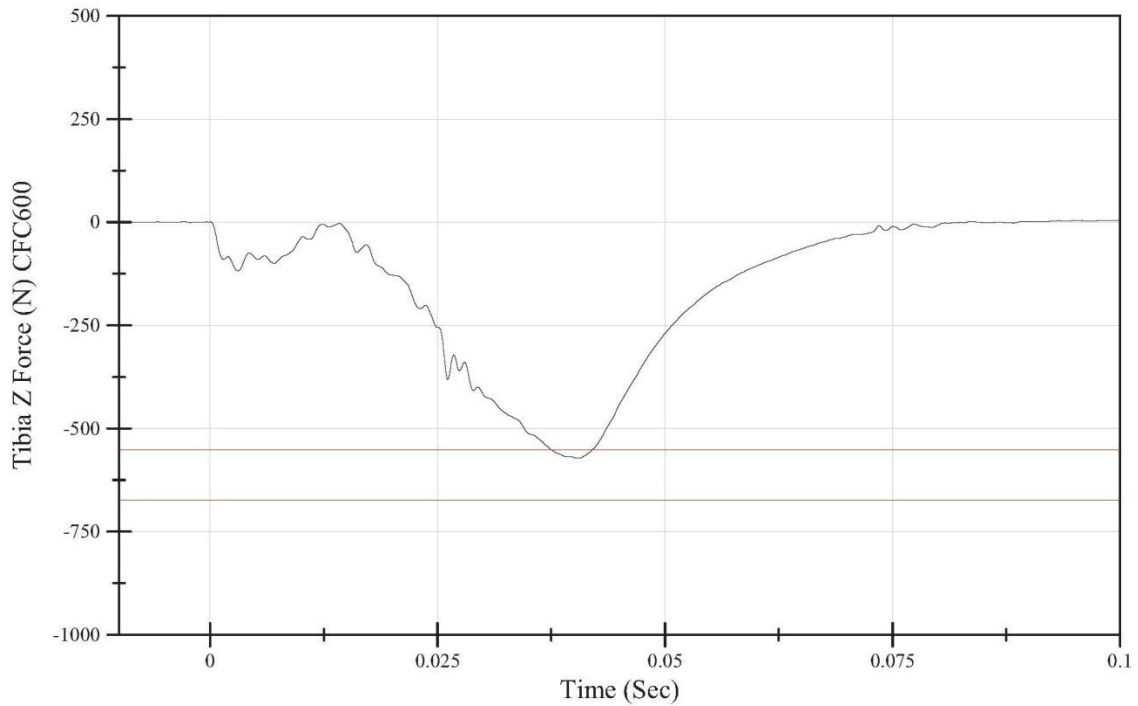


Software Version: 2.2

File Name: Ball_LX0019_2013_09_23 01 processed
09/24/2013 10:51:15.0000

Test Temperature: 71.1 degrees
Relative Humidity: 38.4%
Test Velocity: 1.98 m/s

THOR Left Foot Eversion Certification
Tibia Load
Serial Number: LX0019

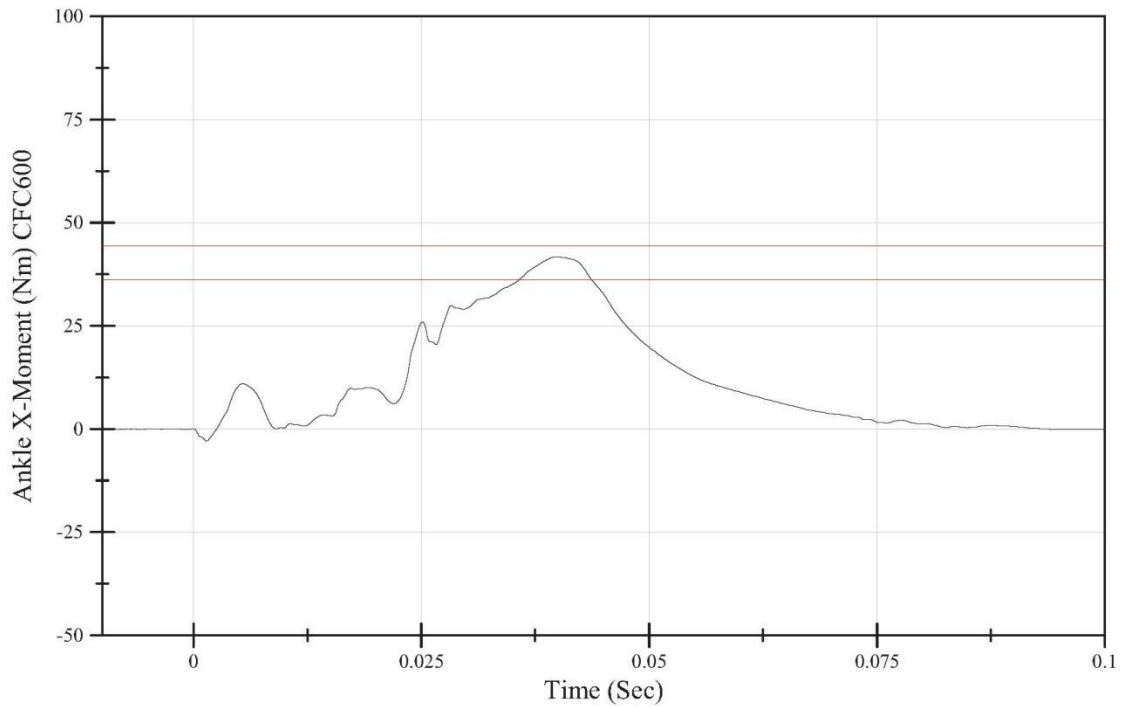


Software Version: 2.2

File Name: Ever_LX0019_2013_09_24 02 processed
09/24/2013 13:30:02.0000

Test Temperature: 71.1 degrees
Relative Humidity: 38.4%
Test Velocity: 1.98 m/s

THOR Left Foot Eversion Certification
Ankle Moment
Serial Number: LX0019

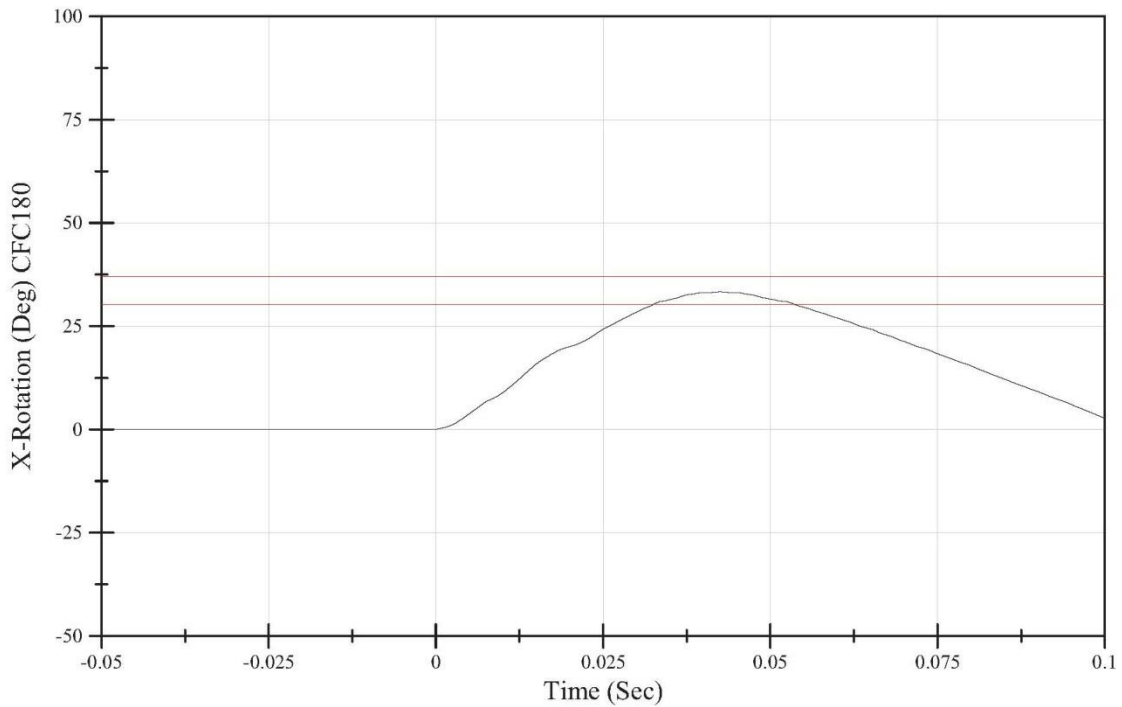


Software Version: 2.2

File Name: Ever_LX0019_2013_09_24 02 processed
09/24/2013 13:30:02.0000

Test Temperature: 71.1 degrees
Relative Humidity: 38.4%
Test Velocity: 1.98 m/s

THOR Left Foot Eversion Certification
Ankle X-Rotation
Serial Number: LX0019

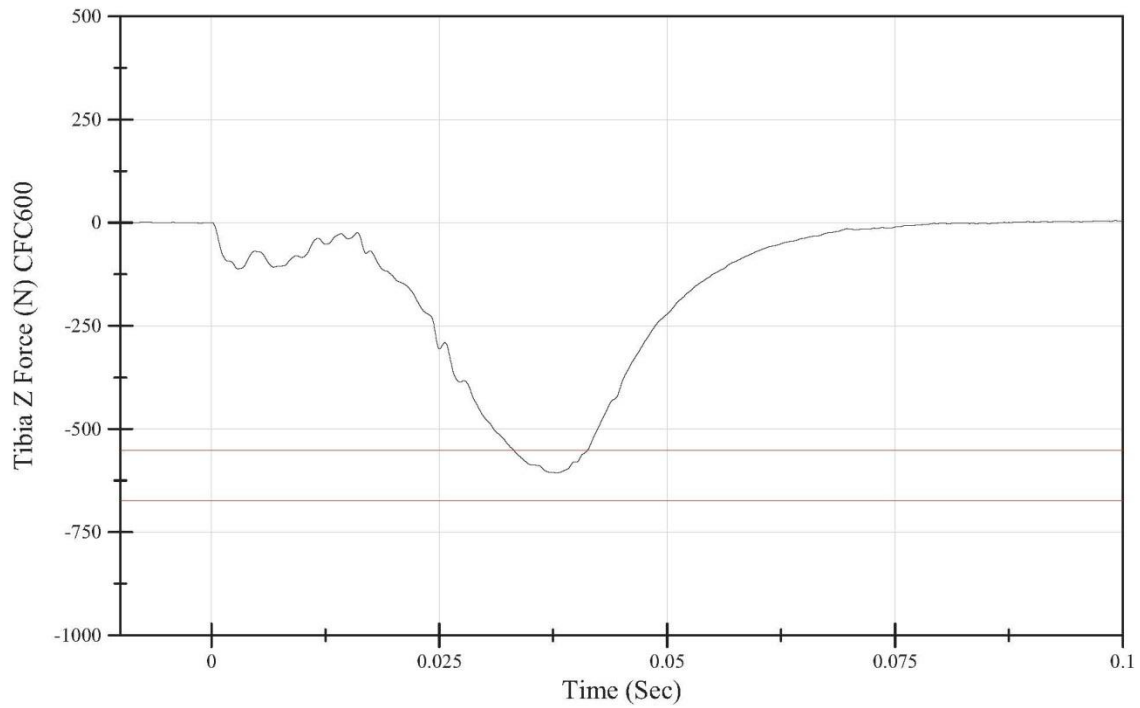


Software Version: 2.2

File Name: Ever_LX0019_2013_09_24 02 processed
09/24/2013 13:30:02.0000

Test Temperature: 70.7 degrees
Relative Humidity: 37.7%
Test Velocity: 1.95 m/s

THOR Left Foot Inversion Certification
Tibia Load
Serial Number: LX0019

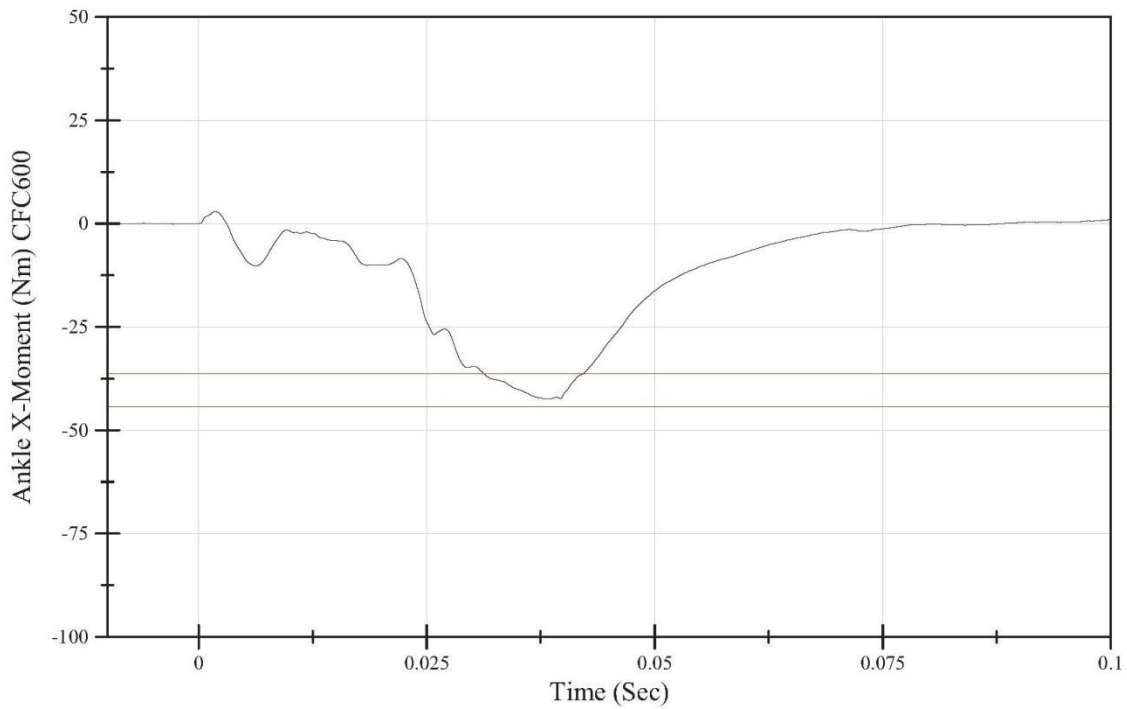


File Name: Inver_LX0019_2013_09_24 01 processed.dat
09/24/2013 12:25:35.0000

Software Version: 2.2

Test Temperature: 70.7 degrees
Relative Humidity: 37.7%
Test Velocity: 1.95 m/s

THOR Left Foot Inversion Certification
Ankle Moment
Serial Number: LX0019

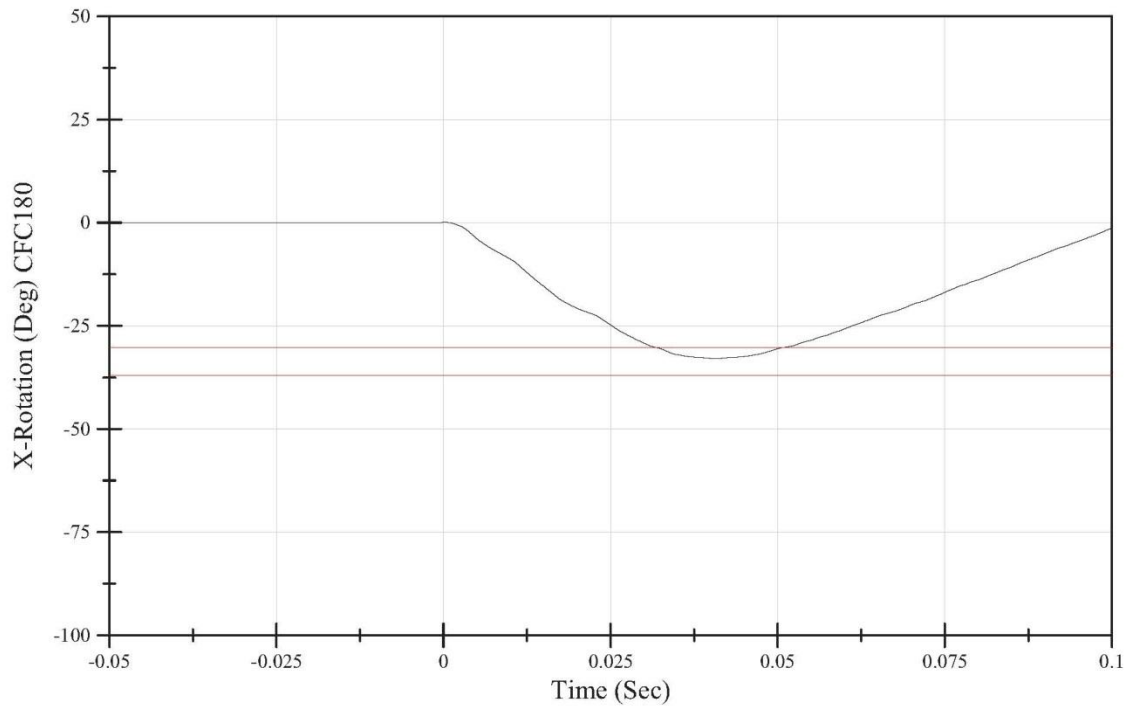


File Name: Inver_LX0019_2013_09_24 01 processed.dat
09/24/2013 12:25:35.0000

Software Version: 2.2

Test Temperature: 70.7 degrees
Relative Humidity: 37.7%
Test Velocity: 1.95 m/s

THOR Left Foot Inversion Certification
Ankle X-Rotation
Serial Number: LX0019

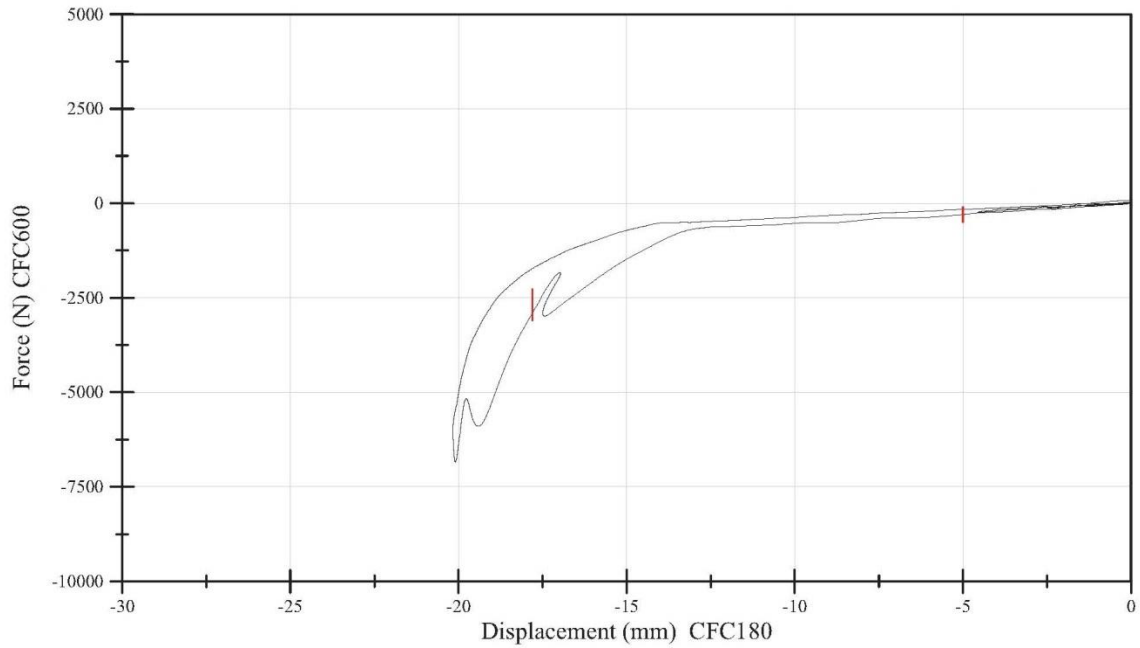


File Name: Inver_LX0019_2013_09_24 01 processed.dat
09/24/2013 12:25:35.0000

Software Version: 2.2

Test Temperature: 70 degrees
Relative Humidity: 49%
Test Velocity: 2.72 m/s

THOR Right Knee Certification
Femur Force vs. Knee Displacement
Serial Number: LX0018

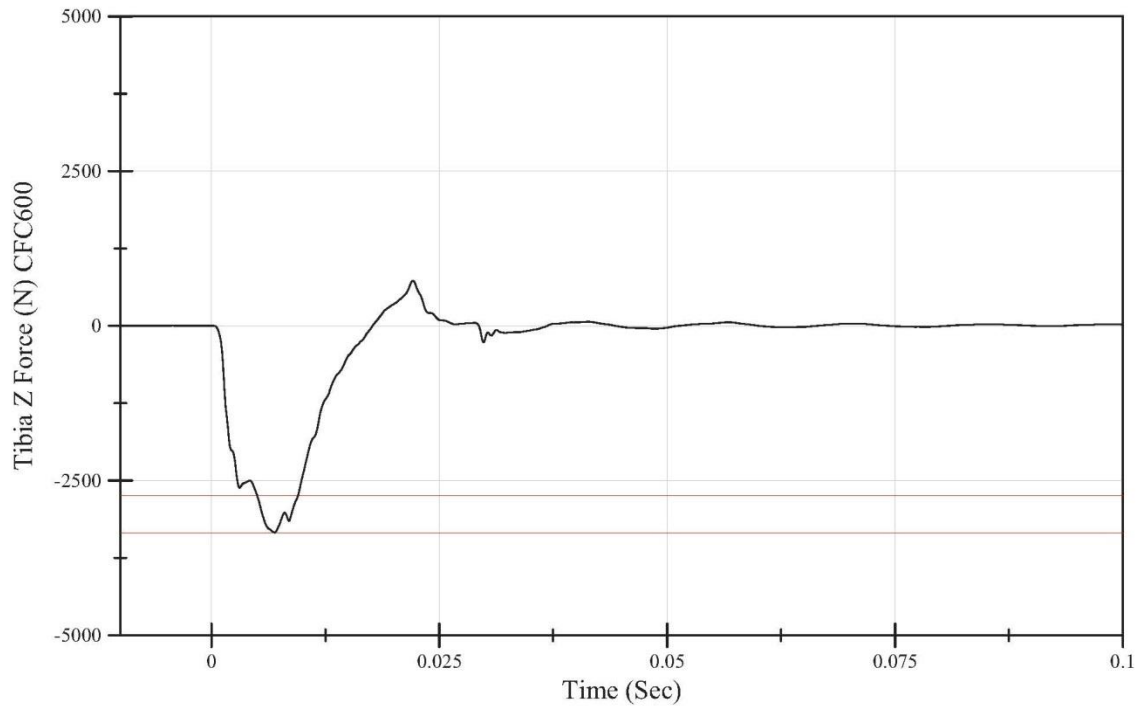


File Name: D2103657B_092613_01_DIAdemHeader_BINARYpp
09/26/2013 08:54:58.0000

Software Version: 2.2

Test Temperature: 70.2 degrees
Relative Humidity: 42.6%
Test Velocity: 4.03 m/s

THOR Right Foot Heel Certification
Tibia Load
Serial Number: LX0018

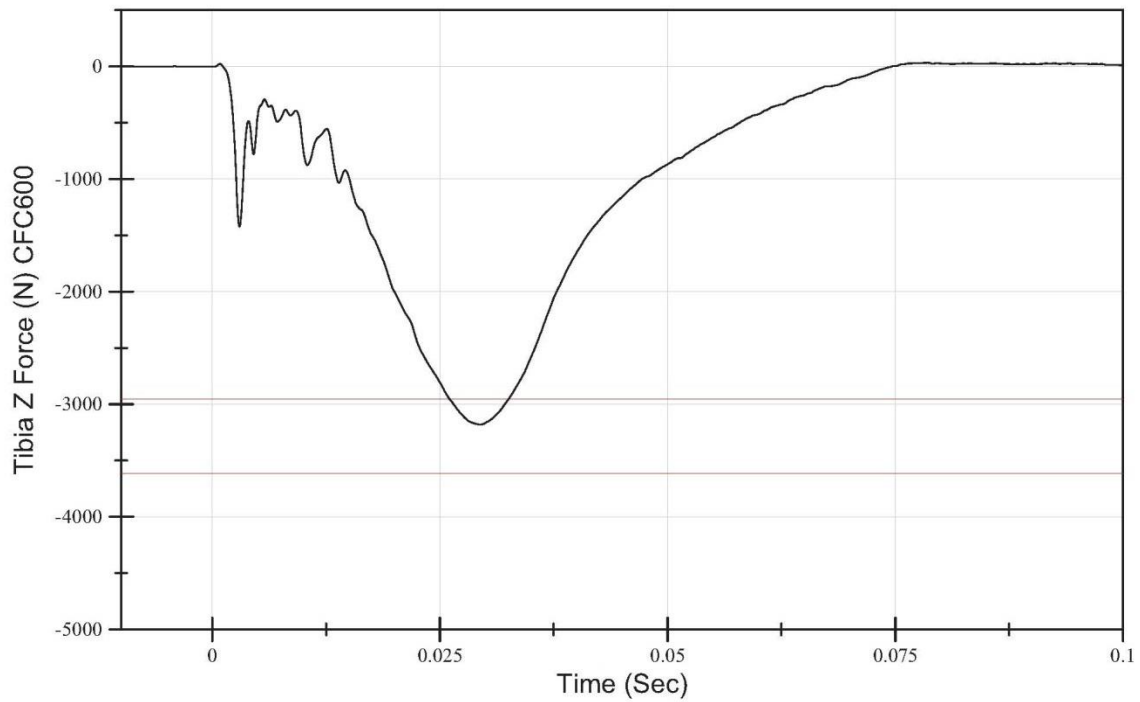


Software Version: 2.2

File Name: Heel_LX0018_2013_09_25 01 processed
09/25/2013 15:41:20.0000

Test Temperature: 70.7 degrees
Relative Humidity: 41.3%
Test Velocity: 5.03 m/s

THOR Right Foot Dorsiflexion Certification
Tibia Load
Serial Number: LX0018

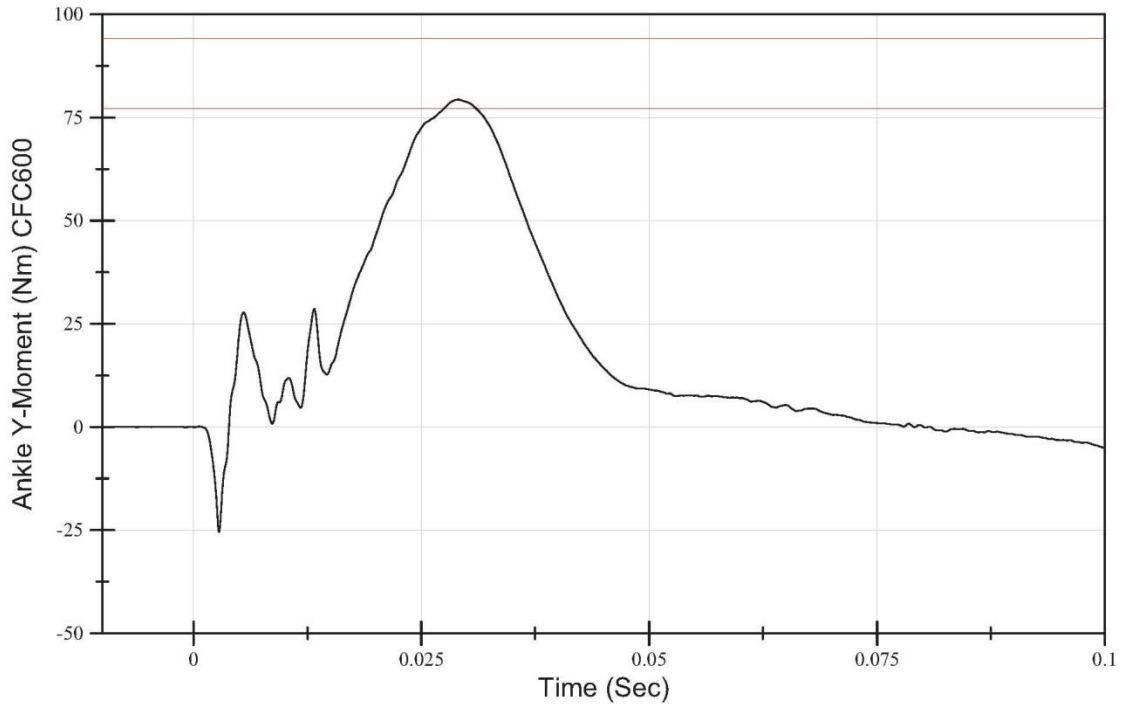


Software Version: 2.2

File Name: Ball_LX0018_2013_09_25 01 processed
09/25/2013 13:53:31.0000

Test Temperature: 70.7 degrees
Relative Humidity: 41.3%
Test Velocity: 5.03 m/s

THOR Right Foot Dorsiflexion Certification
Ankle Y-Moment
Serial Number: LX0018

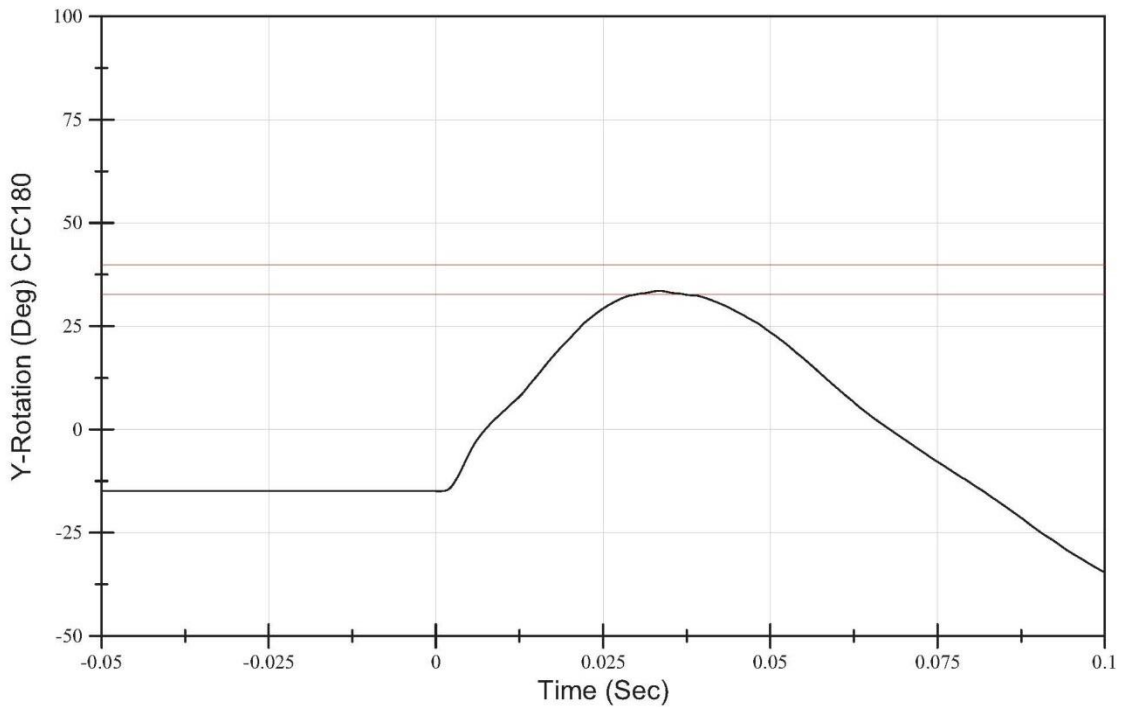


File Name: Ball_LX0018_2013_09_25 01 processed
09/25/2013 13:53:31.0000

Software Version: 2.2

Test Temperature: 70.7 degrees
Relative Humidity: 41.3%
Test Velocity: 5.03 m/s

THOR Right Foot Dorsiflexion Certification
Ankle Y-Rotation
Serial Number: LX0018

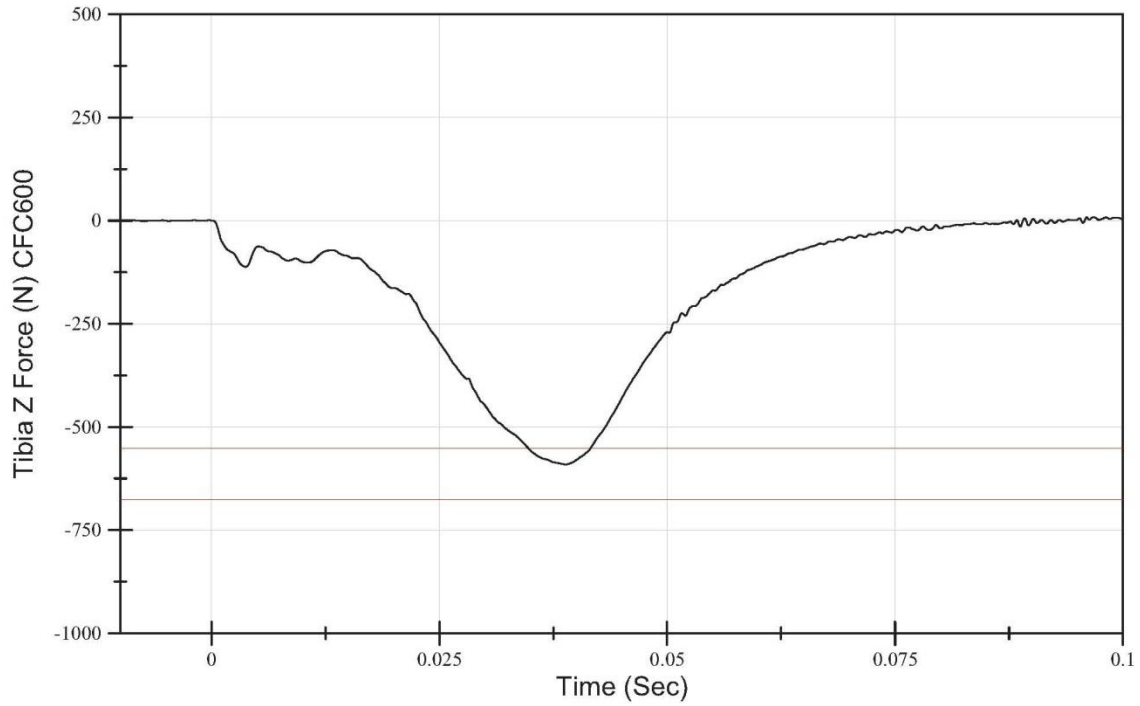


File Name: Ball_LX0018_2013_09_25 01 processed
09/25/2013 13:53:31.0000

Software Version: 2.2

Test Temperature: 70.2 degrees
Relative Humidity: 41.7%
Test Velocity: 1.96 m/s

THOR Right Foot Eversion Certification
Tibia Load
Serial Number: LX0018

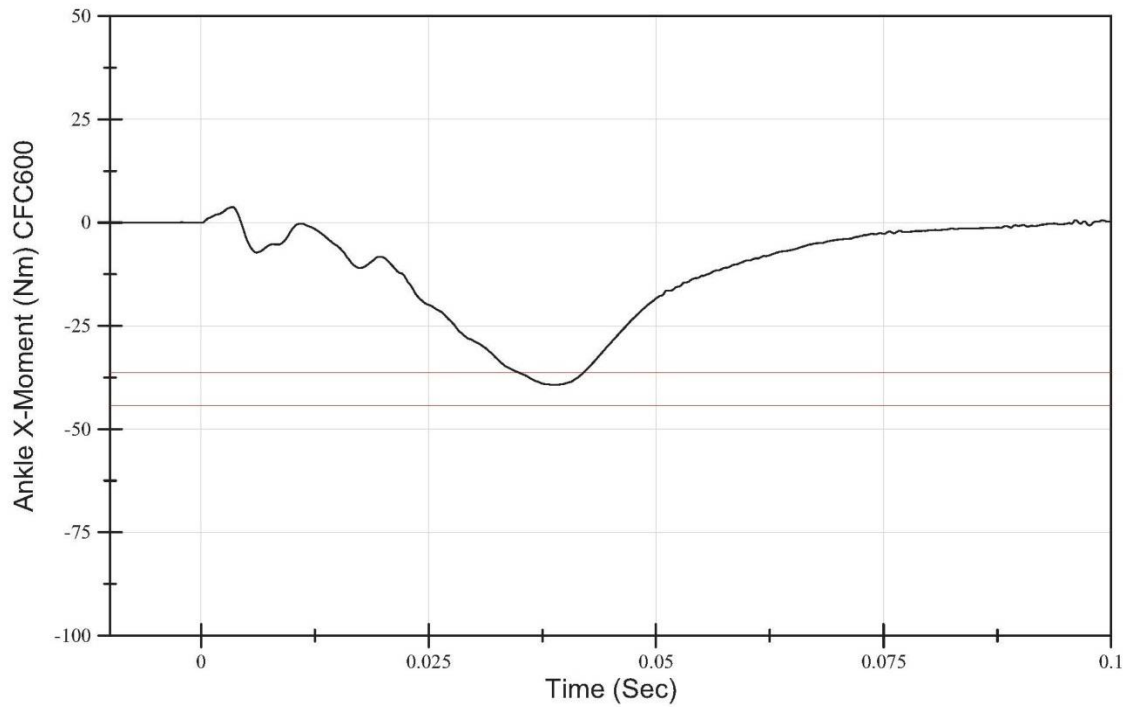


File Name: Ever_LX0018_2013_09_25 01
01/01/0000 00:00:00.0000

Software Version: 2.2

Test Temperature: 70.2 degrees
Relative Humidity: 41.7%
Test Velocity: 1.96 m/s

THOR Right Foot Eversion Certification
Ankle Moment
Serial Number: LX0018

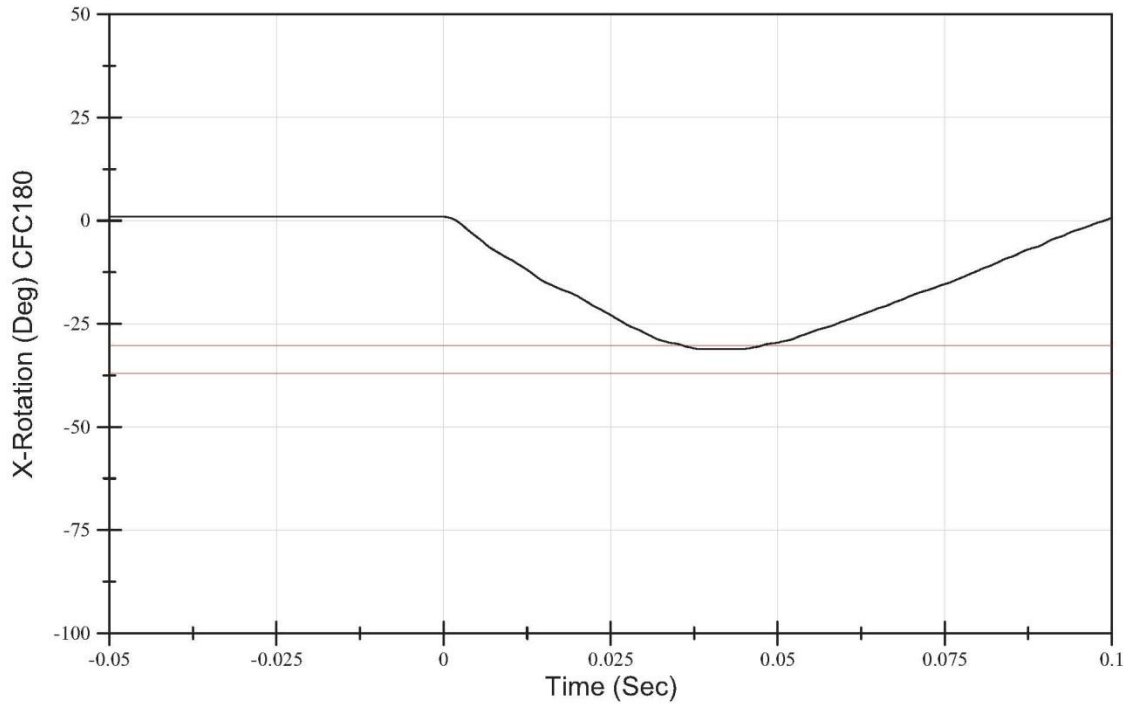


File Name: Ever_LX0018_2013_09_25 01
01/01/0000 00:00:00.0000

Software Version: 2.2

Test Temperature: 70.2 degrees
Relative Humidity: 41.7%
Test Velocity: 1.96 m/s

THOR Right Foot Eversion Certification
Ankle X-Rotation
Serial Number: LX0018

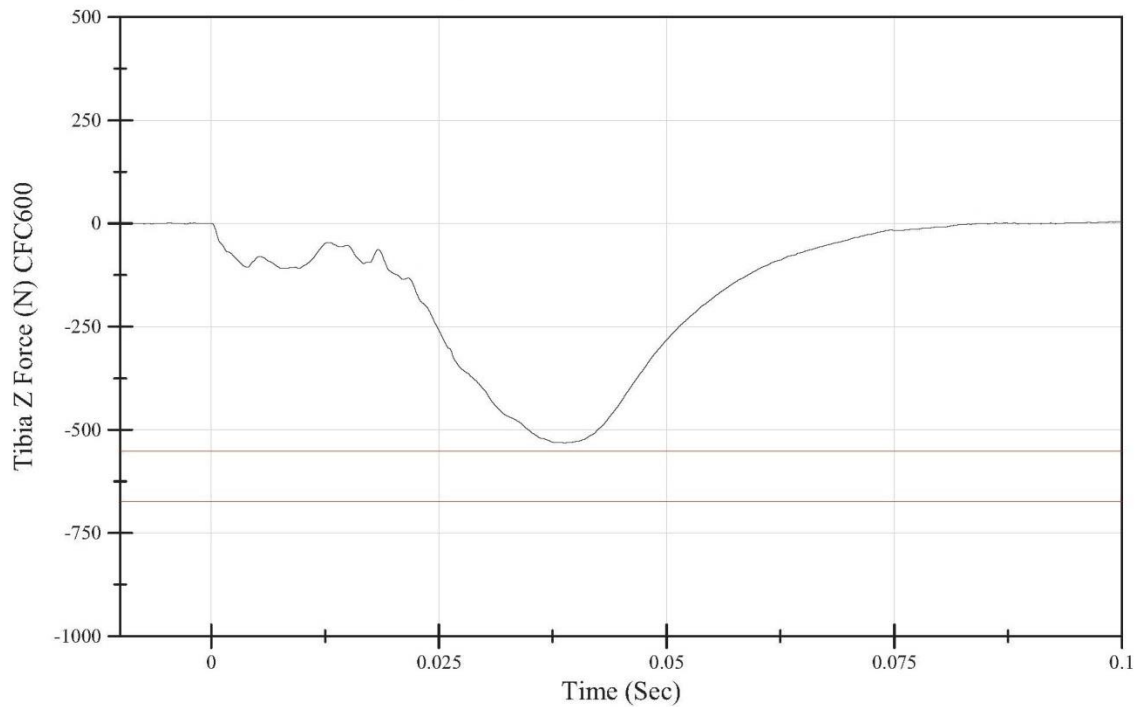


Software Version: 2.2

File Name: Ever_LX0018_2013_09_25 01
01/01/0000 00:00:00.0000

Test Temperature: 70.4 degrees
Relative Humidity: 41.7%
Test Velocity: 1.95 m/s

THOR Right Foot Inversion Certification
Tibia Load
Serial Number: LX0018



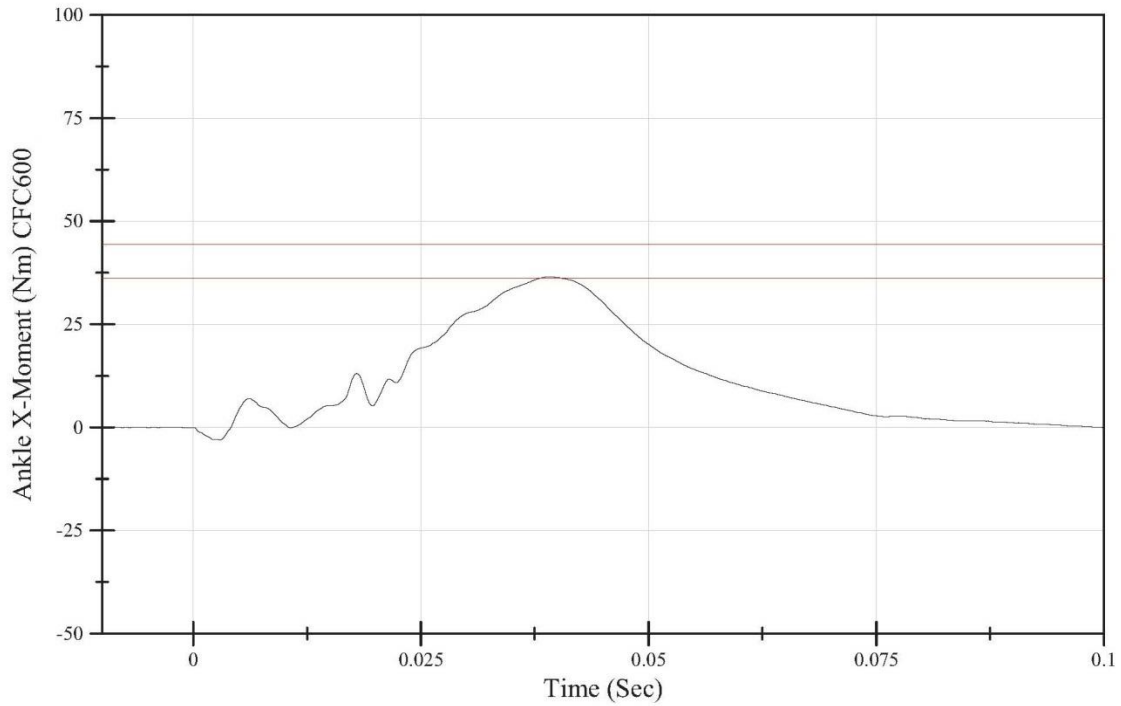
Software Version: 2.2

File Name: Inver_LX0018_2013_09_25 01 processed
09/25/2013 14:22:55.0000

Test Temperature: 70.4 degrees
Relative Humidity: 41.7%
Test Velocity: 1.95 m/s

THOR Right Foot Inversion Certification

Ankle Moment
Serial Number: LX0018



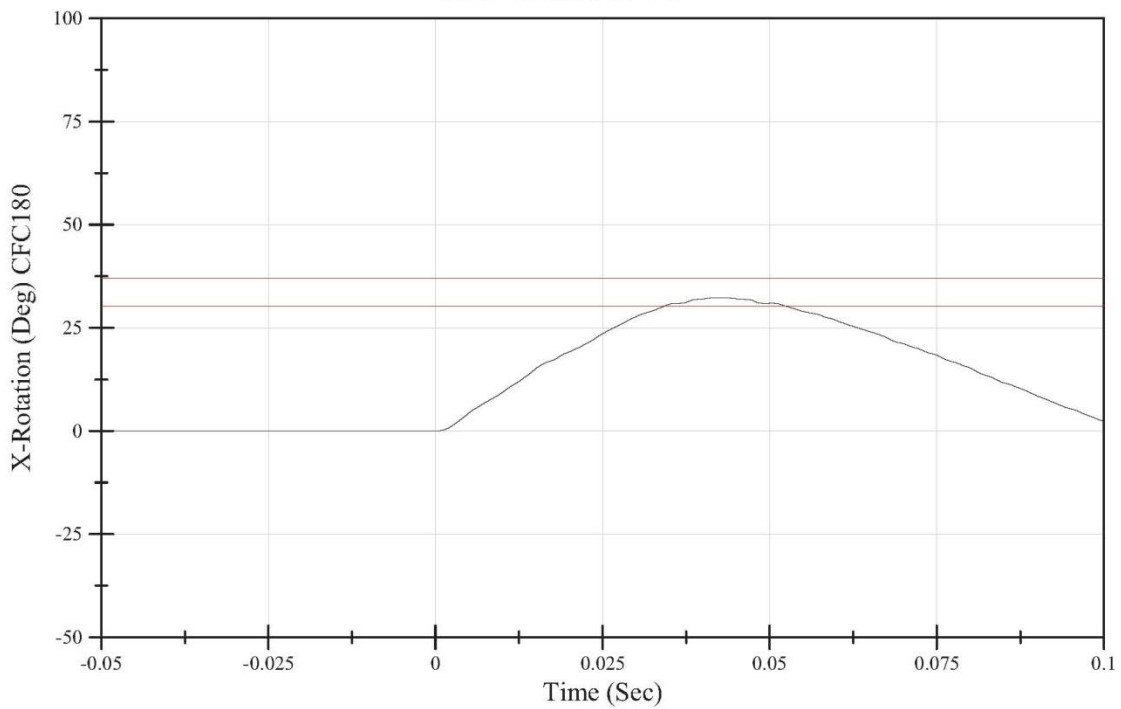
Software Version: 2.2

File Name: Inver_LX0018_2013_09_25 01 processed
09/25/2013 14:22:55.0000

Test Temperature: 70.4 degrees
Relative Humidity: 41.7%
Test Velocity: 1.95 m/s

THOR Right Foot Inversion Certification

Ankle X-Rotation
Serial Number: LX0018



Software Version: 2.2

File Name: Inver_LX0018_2013_09_25 01 processed
09/25/2013 14:22:55.0000

50% ADULT MALE THOR015 DUMMY CALIBRATIONS

Summary of Thor 15 Certification Test Results

Reported by: Calspan

Technician: M. Goehle

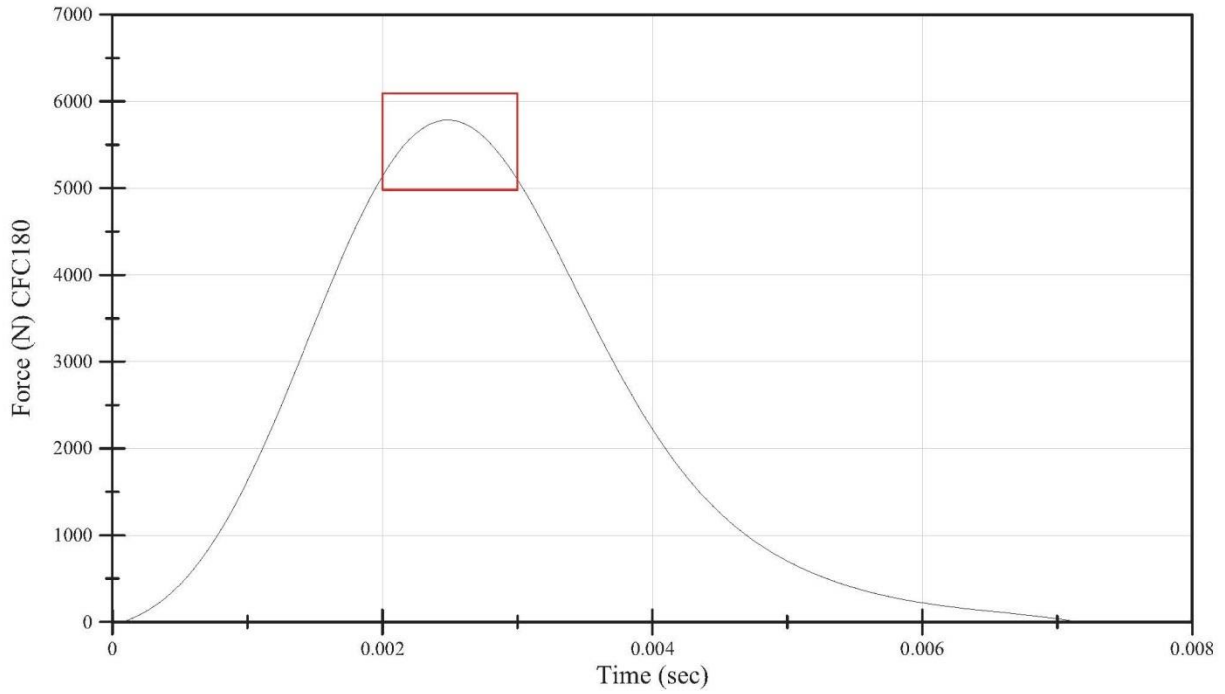
Date: 10/28/2013

Head Impact	Passed
Occipital Condyle Quasi-Static	Failed
Neck Left Lateral Flexion	Failed
Neck Right Lateral Flexion	Failed
Neck Flexion	Failed
Neck Extension	Failed
Upper Thorax	Failed
Lower Left Oblique Thorax	Failed
Lower Right Oblique Thorax	Failed
Upper Abdomen	Failed
Lower Abdomen	Failed
Left Femur	Passed
Right Femur	Passed
Left Knee	Passed
Right Knee	Passed
Left Foot Inversion	Passed
Left Foot Eversion	Passed
Left Heel of Foot	Failed
Left Ball of Foot	Failed
Right Foot Inversion	Failed
Right Foot Eversion	Passed
Right Heel of Foot	Passed
Right Ball of Foot	Passed

Certifications performed by VRTC

Test Temperature: 72 degrees
Relative Humidity: 51%
Test Velocity: 1.98 m/s

THOR Head Impact Certification
Probe Force
Serial Number: T015

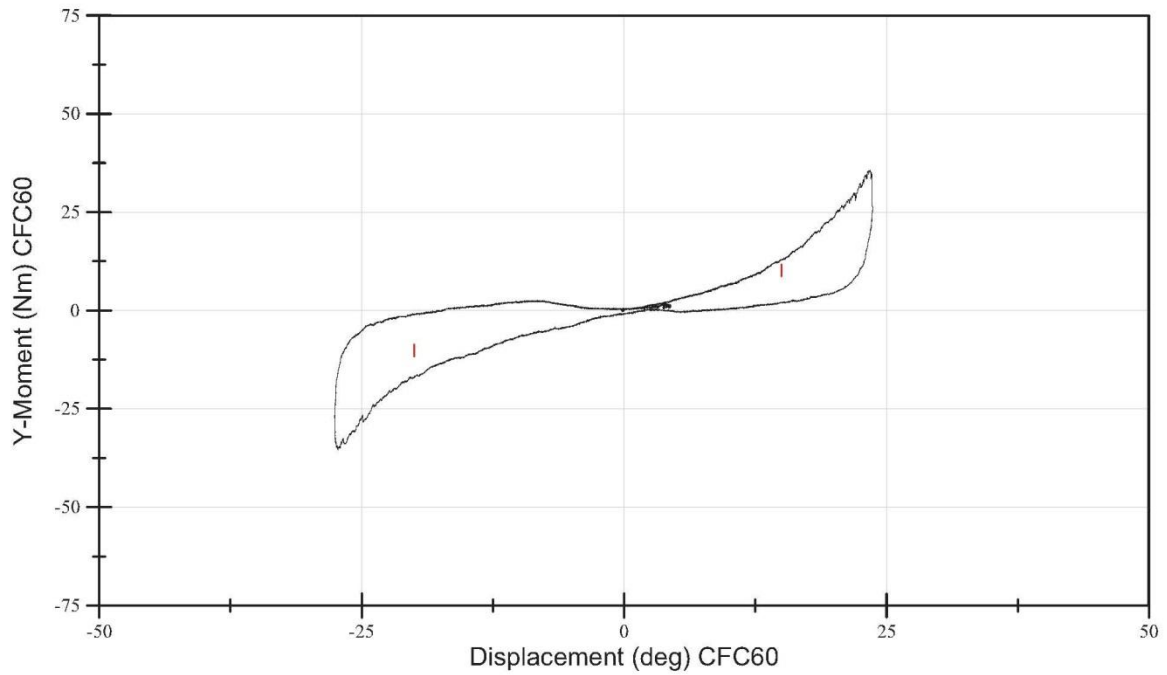


Software Version: 2.2

File Name: T015HEAD102113_01_DIAdemHeader_BINARYpp
10/21/2013 14:14:18.0000

Test Temperature: 70 degrees
Relative Humidity: 49%
Test Velocity: 0 m/s

THOR Occipital Condyle Quasi-Static Certification
Displacement vs. Torque
Serial Number: T015

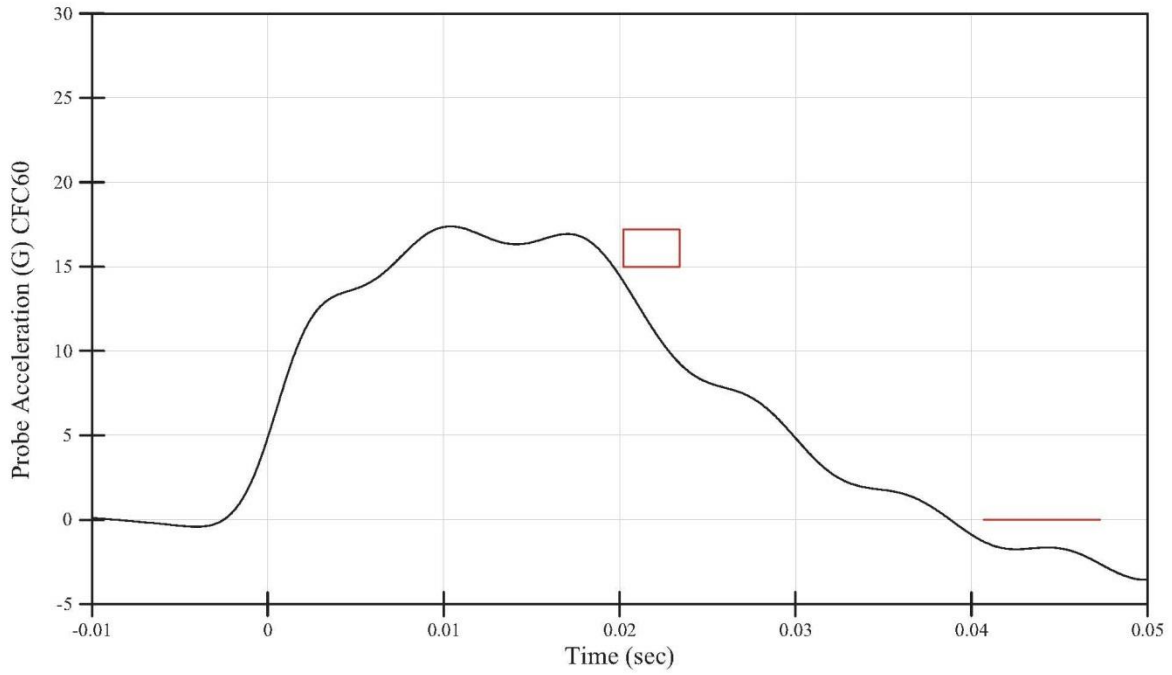


Software Version: 2.2

File Name: T015OC092513_01_DIAdemHeader_BINARYpp
09/25/2013 12:51:25.0000

Test Temperature: 70 degrees
Relative Humidity: 53%
Test Velocity: 2.90 m/s

THOR Neck Left Lateral Flexion Certification
Probe Acceleration
Serial Number: T015

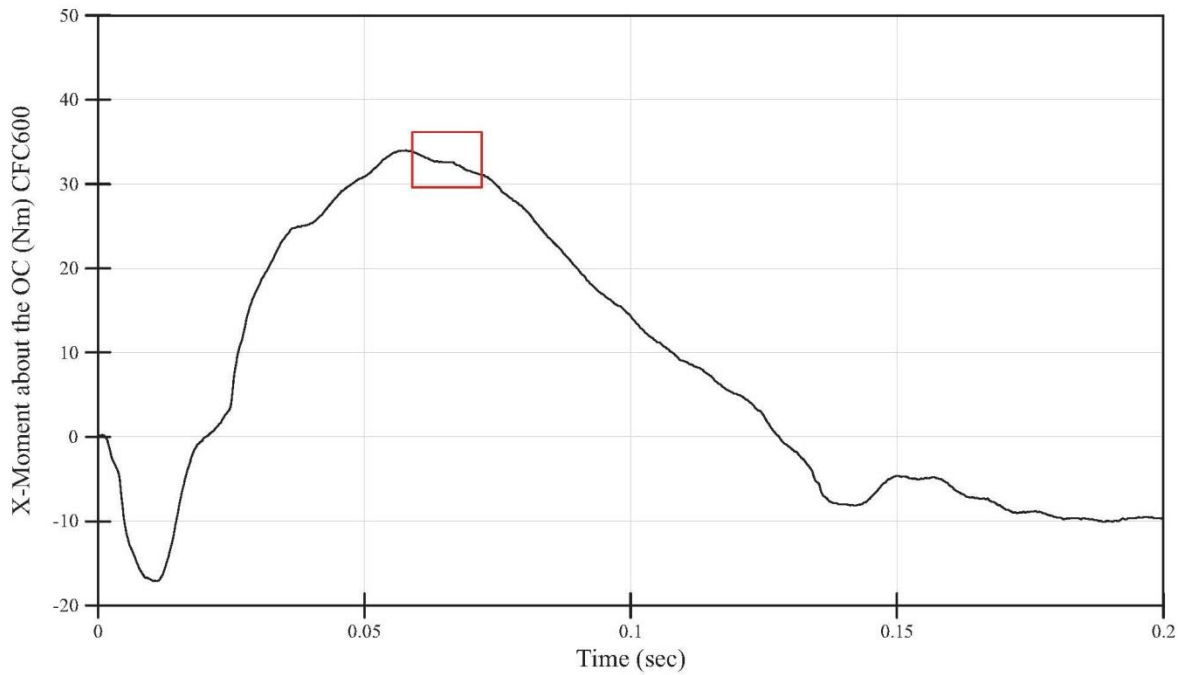


File Name: T015NECKLEFT093013_01_DIADEMHeader_BINARYpp
09/30/2013 13:01:45.0000

Software Version: 2.2

Test Temperature: 70 degrees
Relative Humidity: 53%
Test Velocity: 2.90 m/s

THOR Neck Left Lateral Flexion Certification
X-Moment
Serial Number: T015



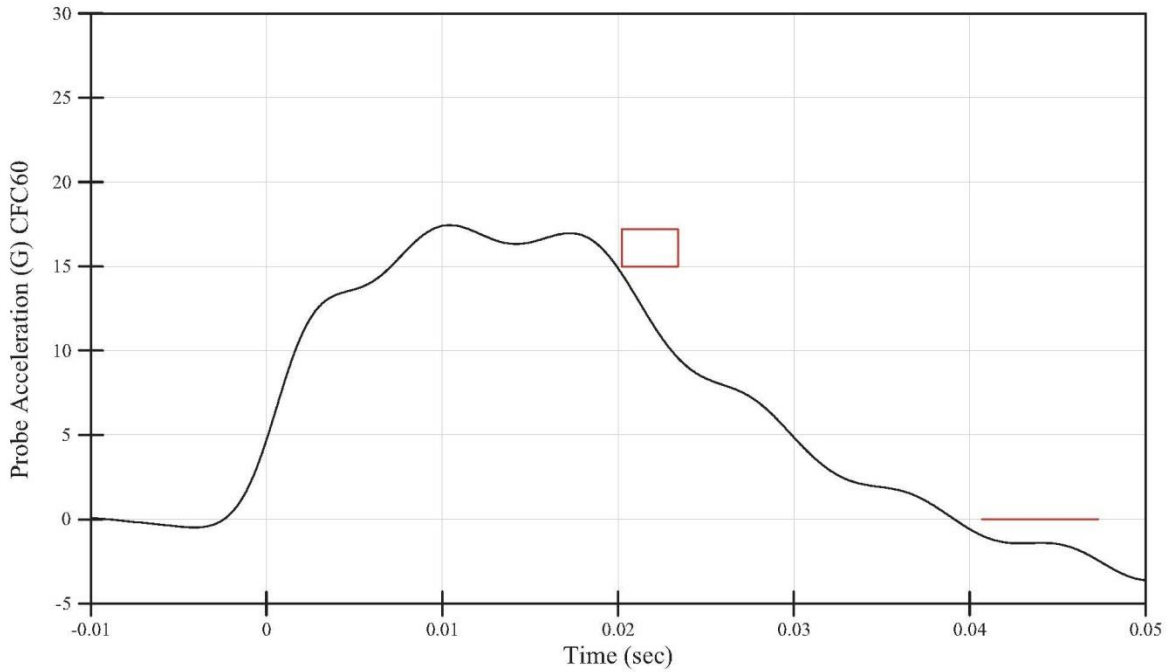
File Name: T015NECKLEFT093013_01_DIADEMHeader_BINARYpp
09/30/2013 13:01:45.0000

Software Version: 2.2

Test Temperature: 70 degrees
Relative Humidity: 53%
Test Velocity: 2.91 m/s

THOR Neck Right Lateral Flexion Certification

Probe Acceleration
Serial Number: T015



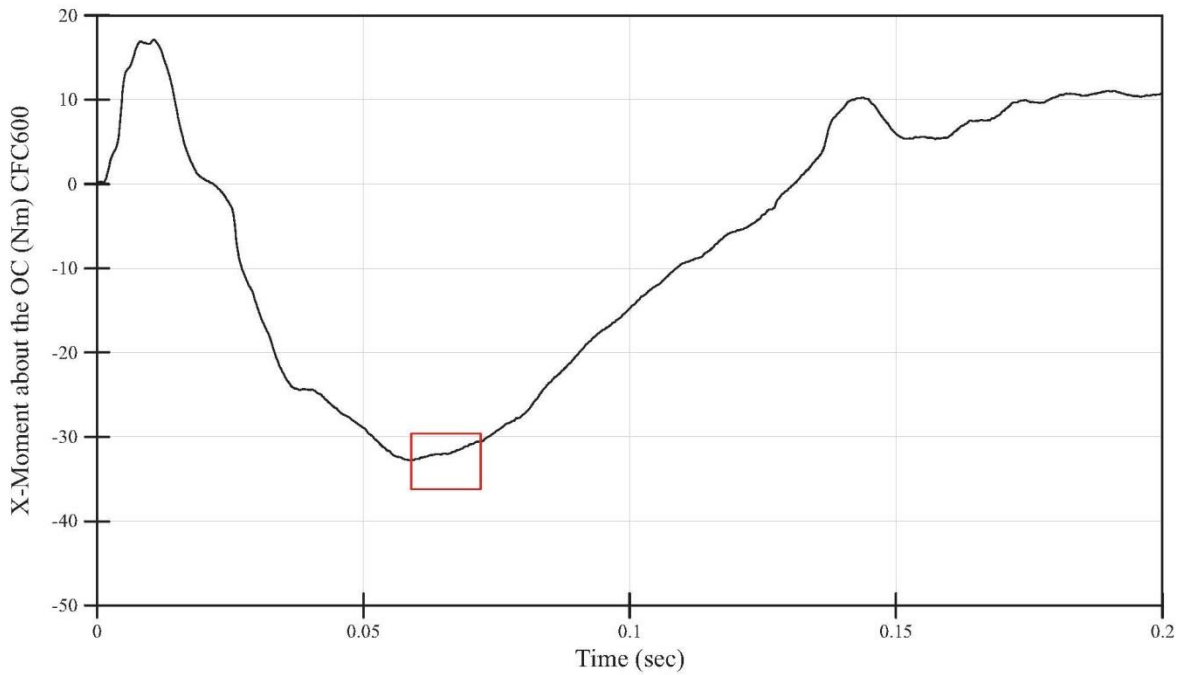
File Name: T015NECKRIGHT093013_01_DIAdemHeader_BINARYpp
09/30/2013 12:10:08.0000

Software Version: 2.2

Test Temperature: 70 degrees
Relative Humidity: 53%
Test Velocity: 2.91 m/s

THOR Neck Right Lateral Flexion Certification

X-Moment
Serial Number: T015

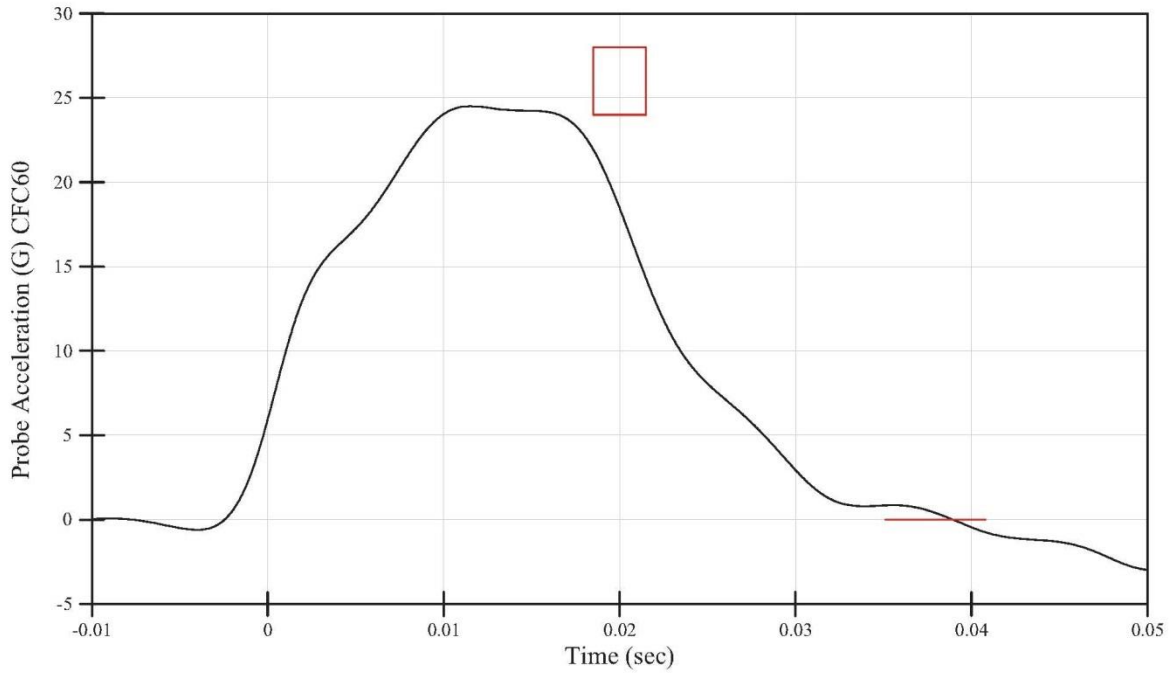


File Name: T015NECKRIGHT093013_01_DIAdemHeader_BINARYpp
09/30/2013 12:10:08.0000

Software Version: 2.2

Test Temperature: 70 degrees
Relative Humidity: 49%
Test Velocity: 3.81 m/s

THOR Neck Flexion Certification
Probe Acceleration
Serial Number: T015

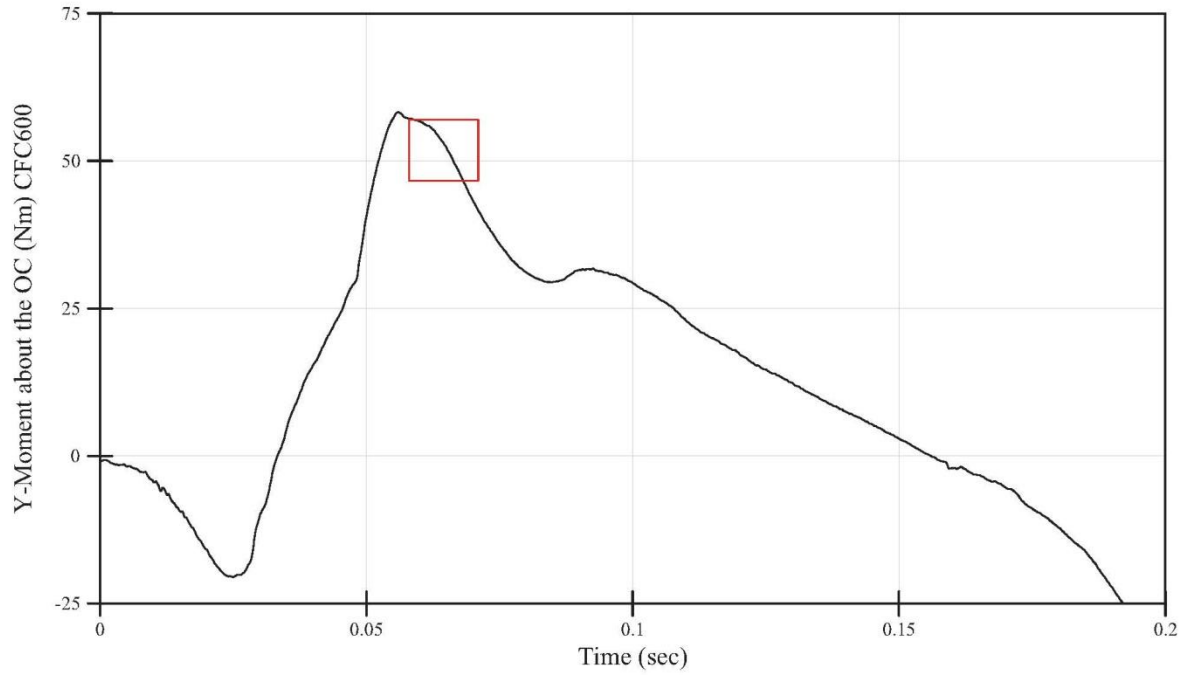


Software Version: 2.2

File Name: T015FLEX093013_01_DIADEMHeader_BINARYpp
09/30/2013 08:55:22.0000

Test Temperature: 70 degrees
Relative Humidity: 49%
Test Velocity: 3.81 m/s

THOR Neck Flexion Certification
Y-Moment
Serial Number: T015

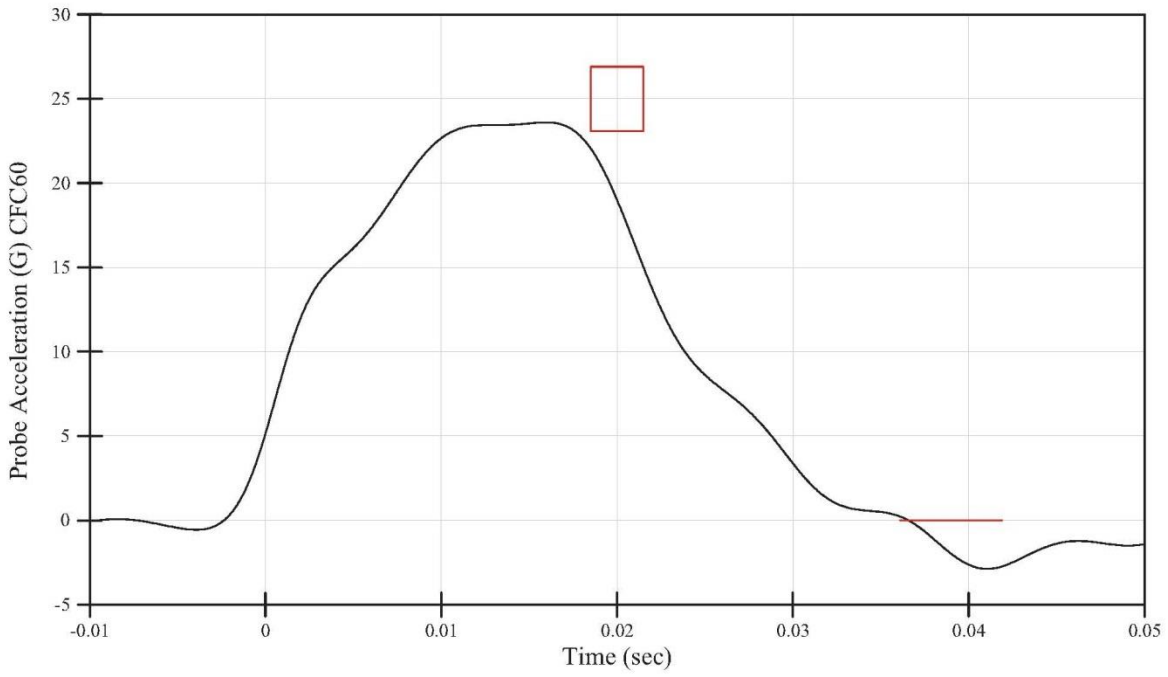


Software Version: 2.2

File Name: T015FLEX093013_01_DIADEMHeader_BINARYpp
09/30/2013 08:55:22.0000

Test Temperature: 70 degrees
Relative Humidity: 52%
Test Velocity: 3.68 m/s

THOR Neck Extension Certification
Probe Acceleration
Serial Number: T015

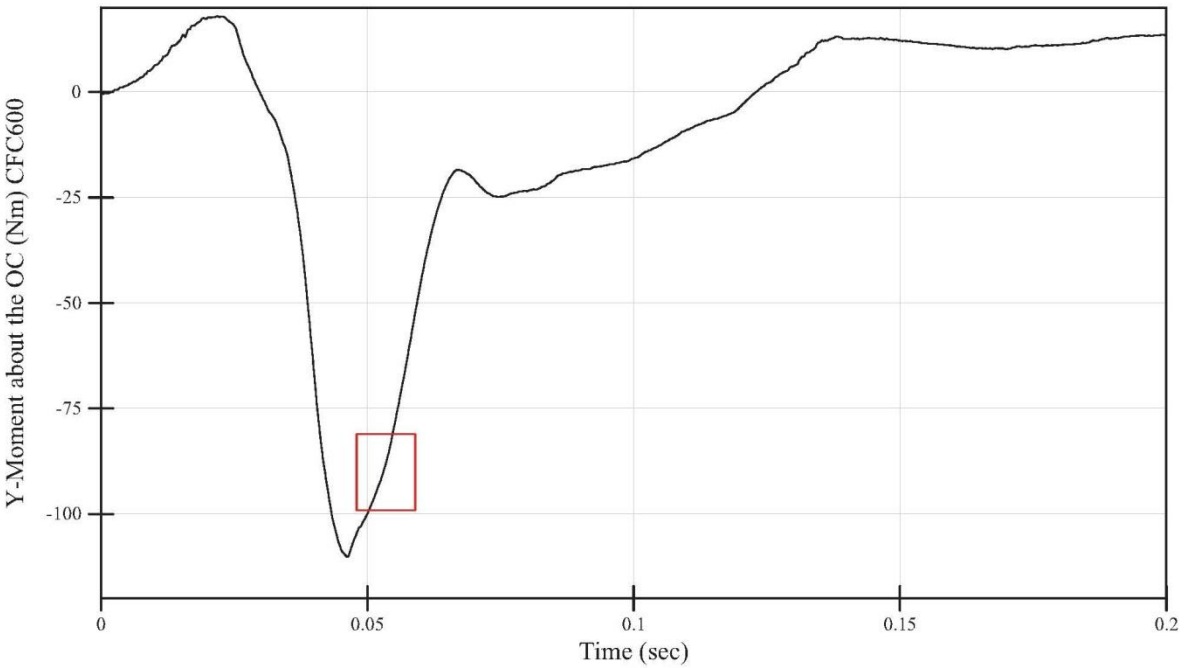


File Name: T015NECKEXT093013_01_DIADEMHeader_BINARYpp
09/30/2013 09:28:21.0000

Software Version: 2.2

Test Temperature: 70 degrees
Relative Humidity: 52%
Test Velocity: 3.68 m/s

THOR Neck Extension Certification
Y-Moment
Serial Number: T015

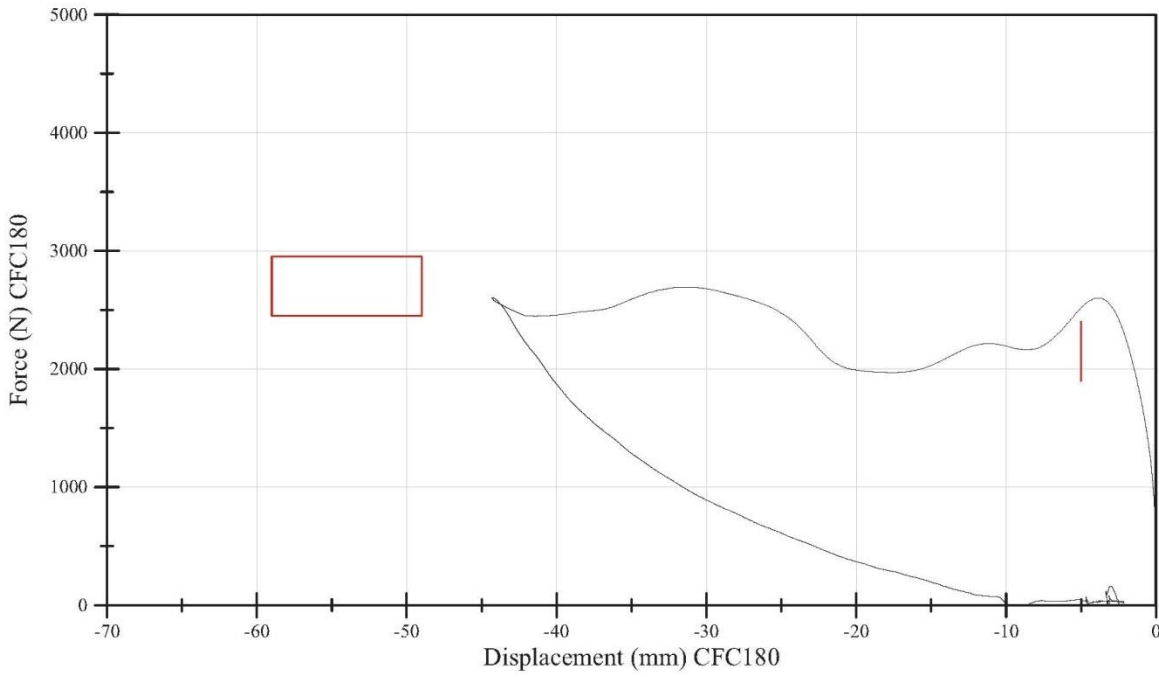


File Name: T015NECKEXT093013_01_DIADEMHeader_BINARYpp
09/30/2013 09:28:21.0000

Software Version: 2.2

Test Temperature: 72 degrees
Relative Humidity: 51%
Test Velocity: 4.31 m/s

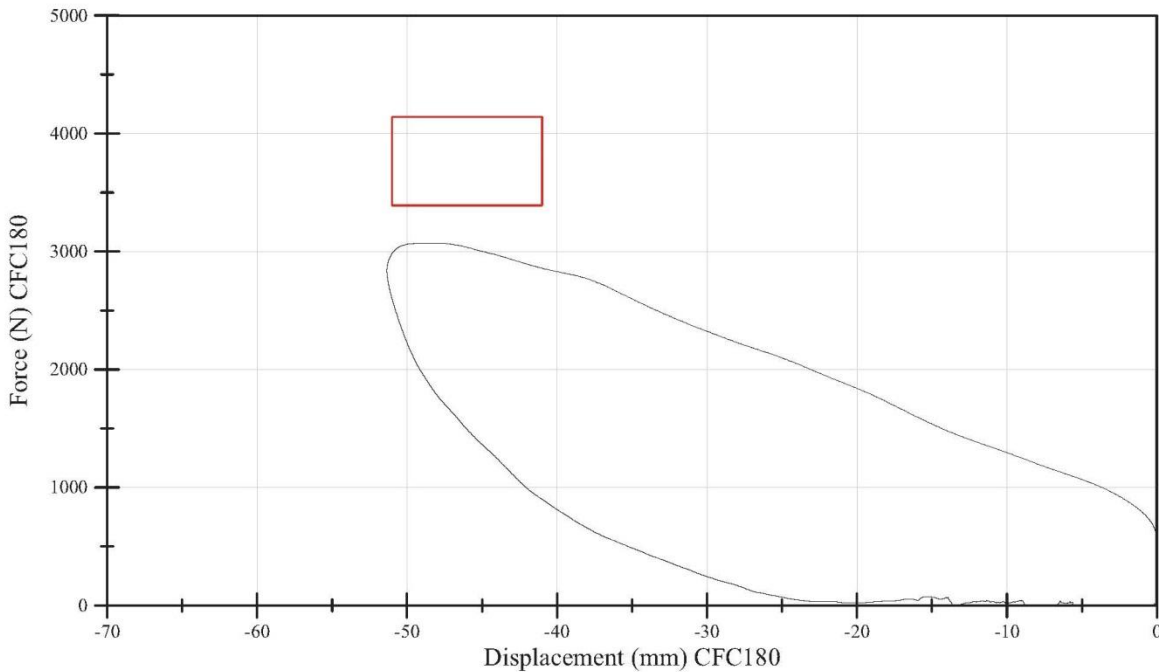
THOR Upper Thorax Certification
Thorax Displacement vs. Probe Force
Serial Number: T015



File Name: T015THORAXUPPER102113_01_DIADEMHeader_BINARYpp
10/21/2013 09:00:19.0000

Test Temperature: 72 degrees
Relative Humidity: 55%
Test Velocity: 4.27 m/s

THOR Lower Left Oblique Thorax Certification
Thorax Displacement vs. Probe Force
Serial Number: T015

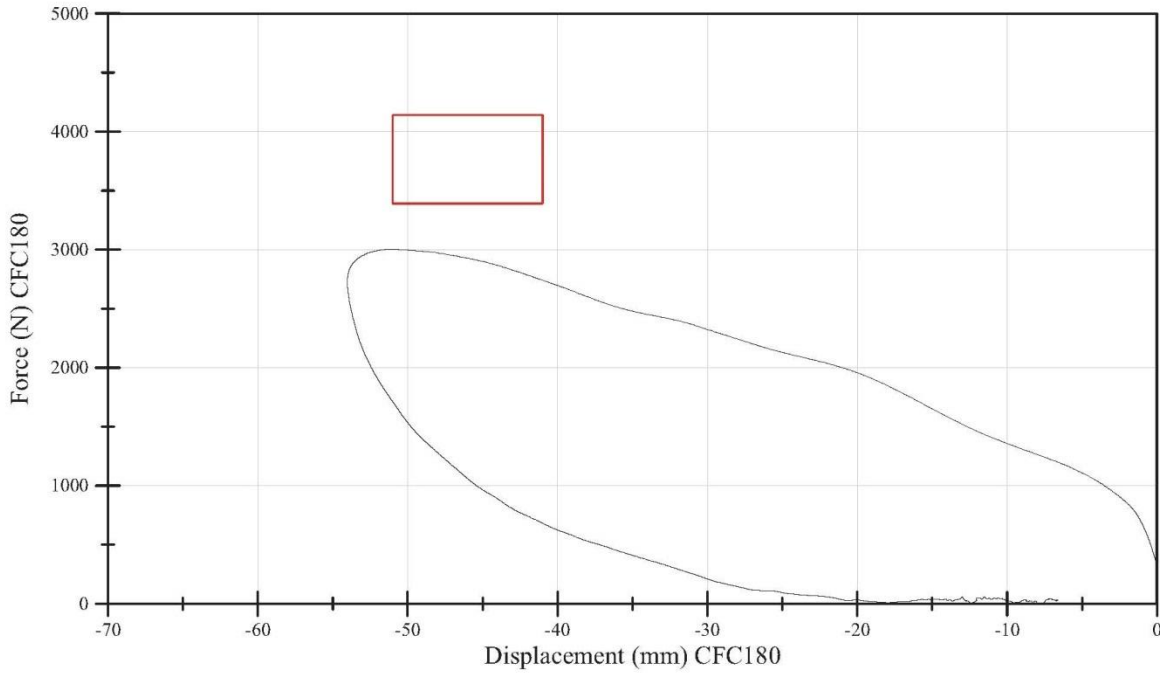


File Name: T015THORAXLEFT101713_01_DIADEMHeader_BINARYpp
10/17/2013 14:07:04.0000

Software Version: 2.2

Test Temperature: 70 degrees
Relative Humidity: 53%
Test Velocity: 4.31 m/s

THOR Lower Right Oblique Thorax Certification
Thorax Displacement vs. Probe Force
Serial Number: T015

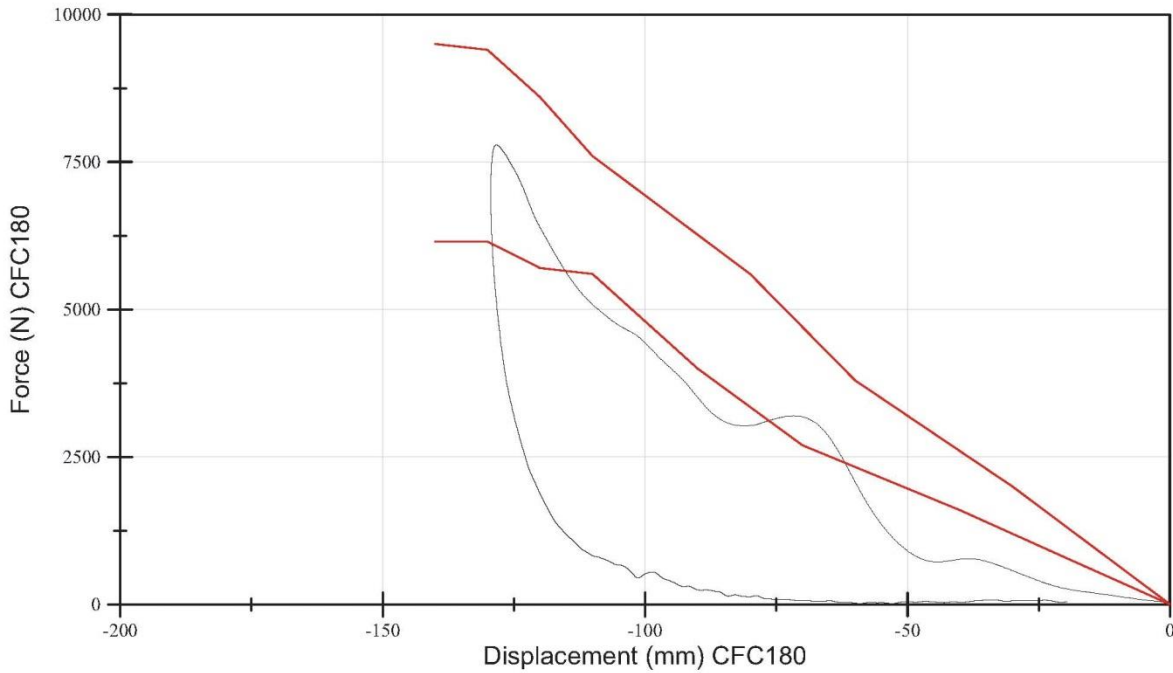


File Name: T015THORAXRIGHT100113_01_DIADEMHEADER_BINARYpp
10/01/2013 08:29:25.0000

Software Version: 2.2

Test Temperature: 71 degrees
Relative Humidity: 51%
Test Velocity: 8.06 m/s

THOR Upper Abdomen Certification
Abdomen Displacement vs. Probe Force
Serial Number: T015

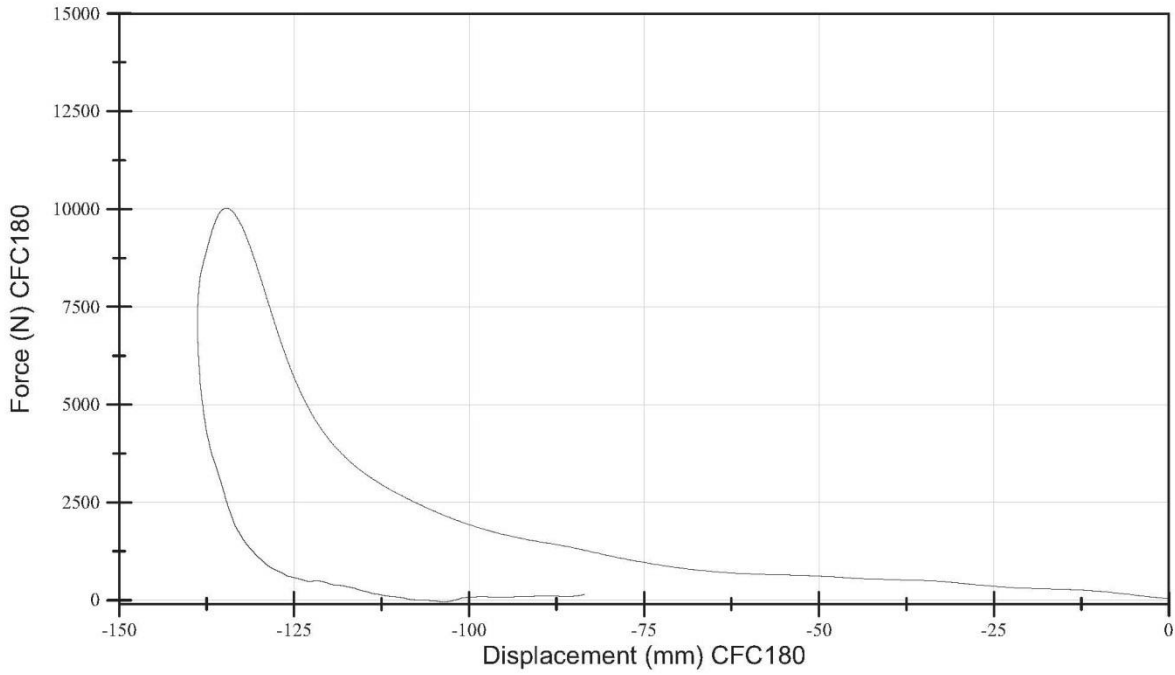


File Name: T015ABDOMENUPPER101713_01_DIADEMHEADER_BINARYpp
10/17/2013 16:20:04.0000

Software Version: 2.2

Test Temperature: 71 degrees
Relative Humidity: 51%
Test Velocity: 6.1 m/s

THOR Lower Abdomen Certification
Lower Abdomen Deflection (via PENXG and T12XG) vs. Probe Force
Serial Number: 015



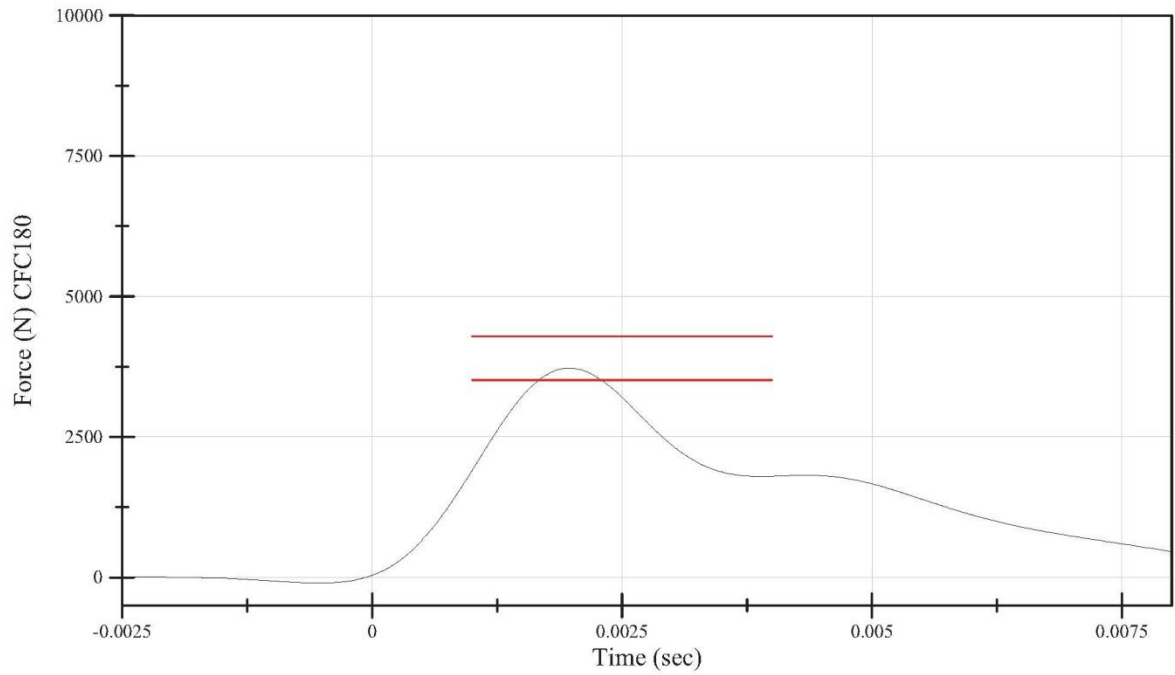
File Name: T015ABDOMENLOWER102113_01_DIAdemHeader_BINARY

Software Version:

01/01/0000 00:00:00.0000

Test Temperature: 72 degrees
Relative Humidity: 51%
Test Velocity: 2.58 m/s

THOR Left Femur Certification
Probe Force
Serial Number: T015



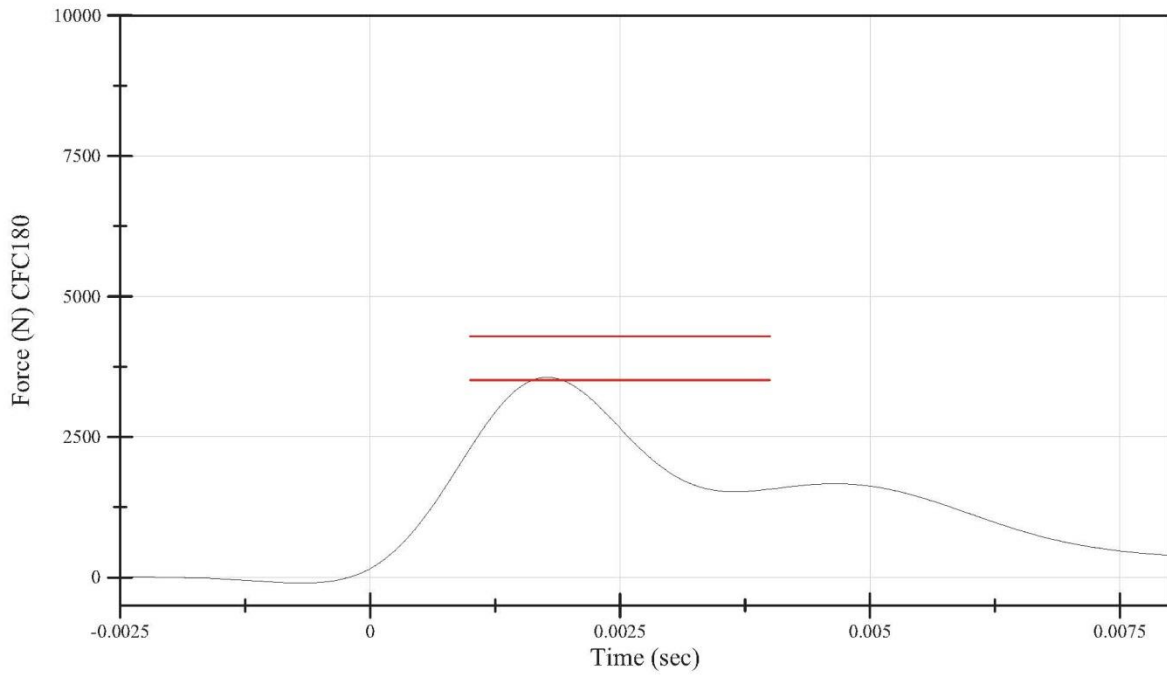
File Name: T015FEMURLEFT102213_01_DIAdemHeader_BINARYpp

Software Version: 2.2

10/22/2013 14:06:02.0000

Test Temperature: 72 degrees
Relative Humidity: 51%
Test Velocity: 2.58 m/s

THOR Right Femur Certification
Probe Force
Serial Number: T015



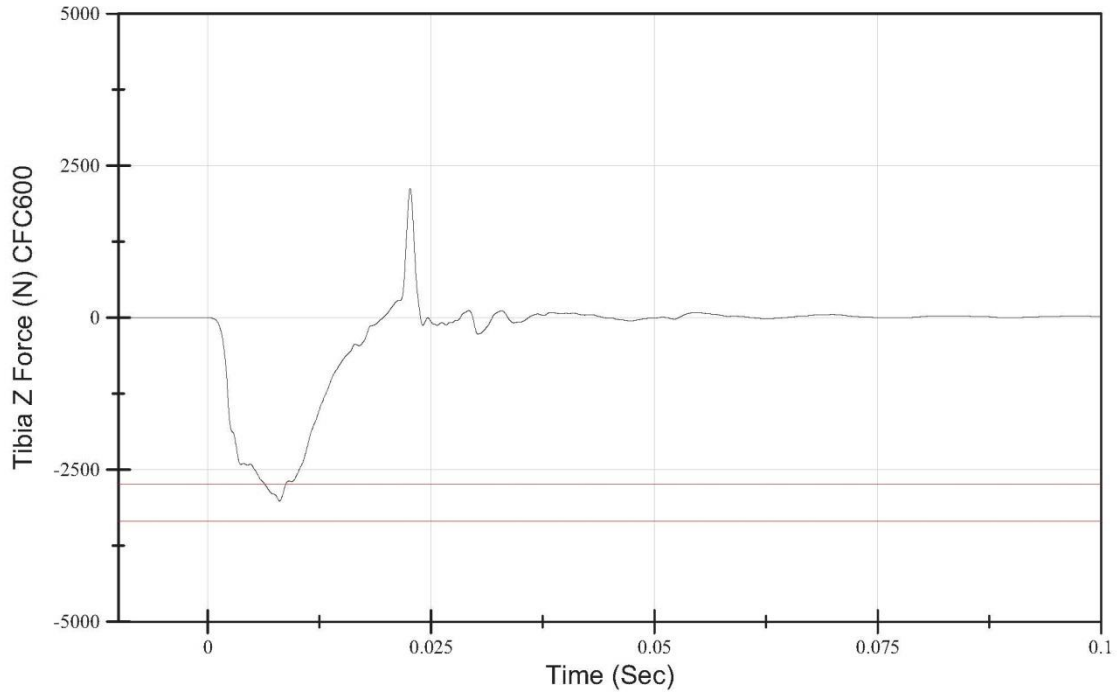
Software Version: 2.2

File Name: T015FEMURRIGHT102213_01_DIAdemHeader_BINARYpp
10/22/2013 14:07:36.0000

**THOR 015 LEG CALIBRATIONS
LX0039 / LX0038**

Test Temperature: 71.4 degrees
Relative Humidity: 35.9%
Test Velocity: 3.97 m/s

THOR Left Foot Heel Certification
Tibia Load
Serial Number: LX0039

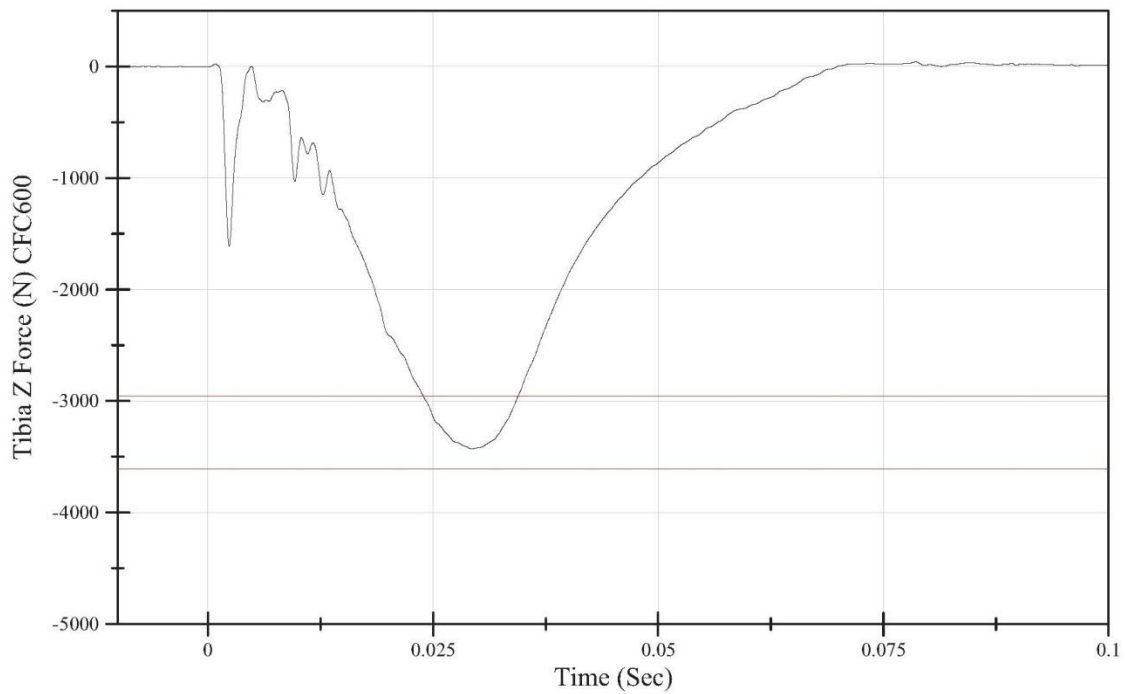


Software Version: 2.2

File Name: Heel_LX0039_2013_10_22 01 processed
10/22/2013 07:59:48.0000

Test Temperature: 70.2 degrees
Relative Humidity: 32.6%
Test Velocity: 5.03 m/s

THOR Left Foot Dorsiflexion Certification
Tibia Load
Serial Number: LX0039

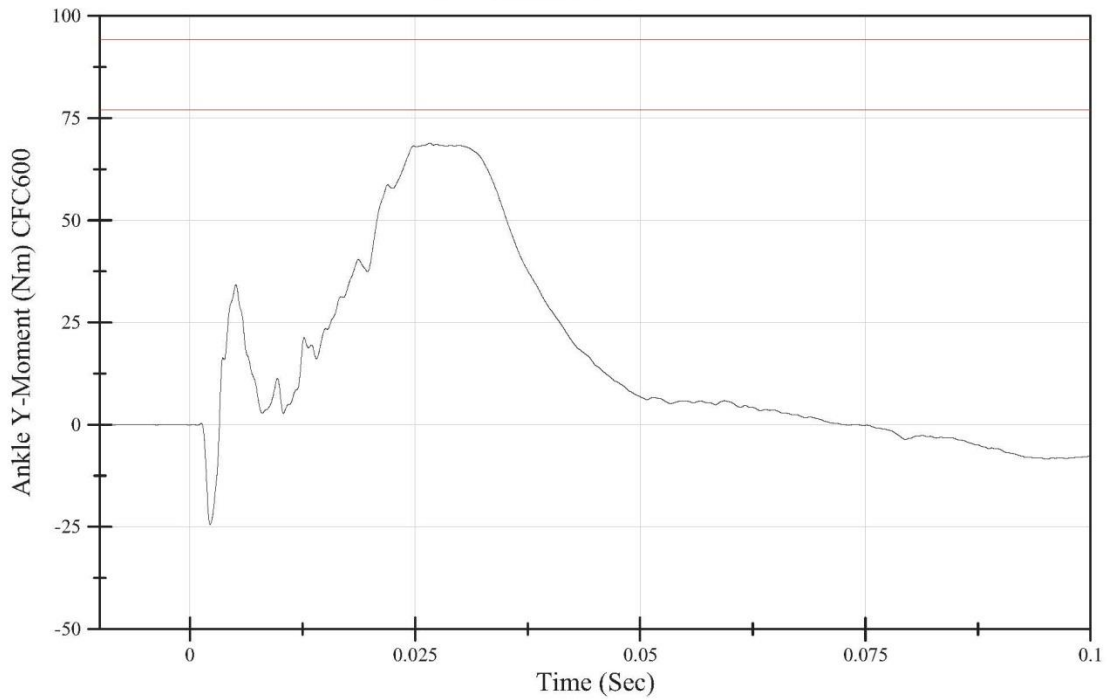


Software Version: 2.2

File Name: Ball_LX0039_2013_10_21 01 processed
10/29/2013 13:51:35.0000

Test Temperature: 70.2 degrees
Relative Humidity: 32.6%
Test Velocity: 5.03 m/s

THOR Left Foot Dorsiflexion Certification
Ankle Y-Moment
Serial Number: LX0039

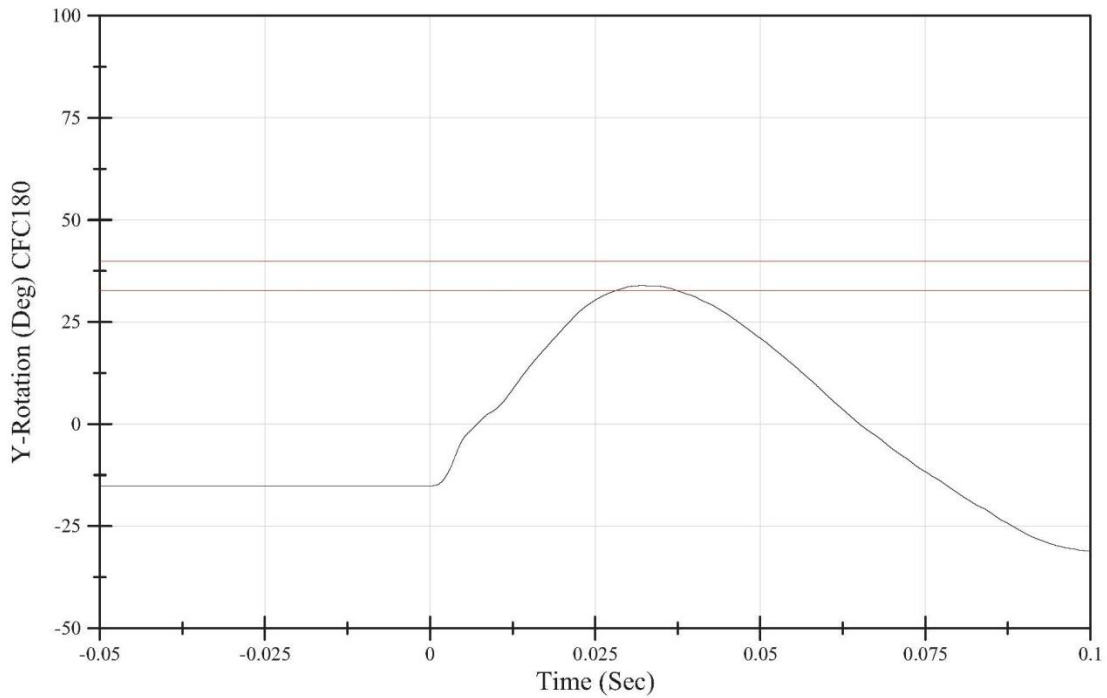


Software Version: 2.2

File Name: Ball_LX0039_2013_10_21 01 processed
10/29/2013 13:51:35.0000

Test Temperature: 70.2 degrees
Relative Humidity: 32.6%
Test Velocity: 5.03 m/s

THOR Left Foot Dorsiflexion Certification
Ankle Y-Rotation
Serial Number: LX0039

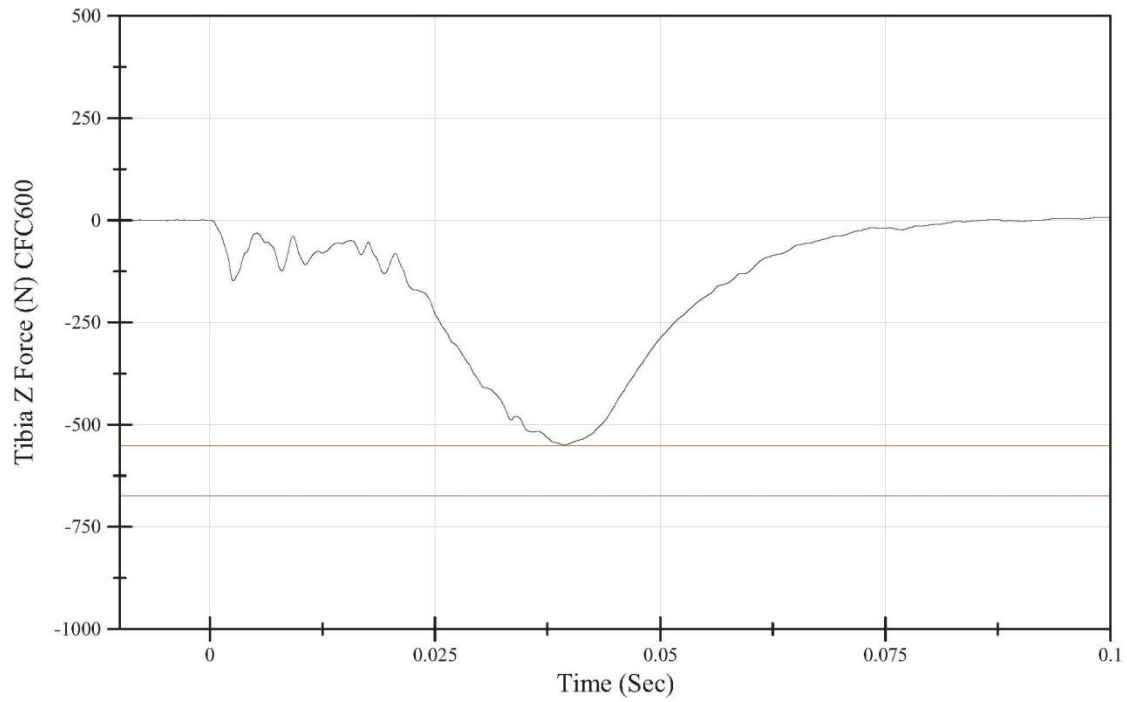


Software Version: 2.2

File Name: Ball_LX0039_2013_10_21 01 processed
10/29/2013 13:51:35.0000

Test Temperature: 71.3 degrees
Relative Humidity: 32.5%
Test Velocity: 1.96 m/s

THOR Left Foot Eversion Certification
Tibia Load
Serial Number: LX0039

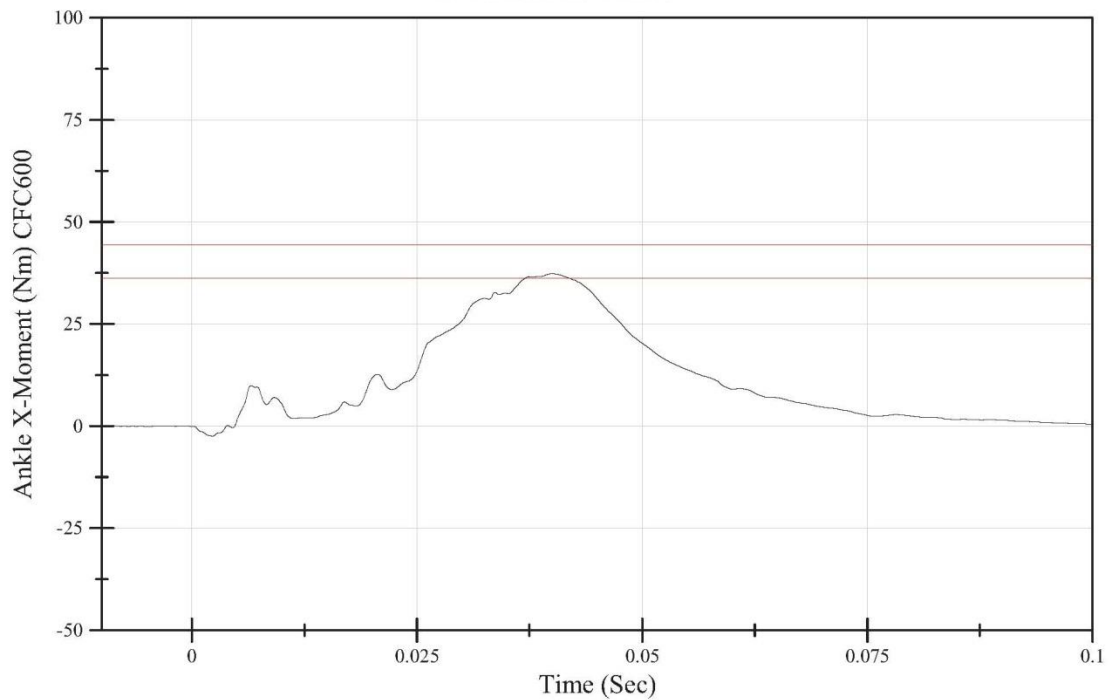


File Name: Ever_LX0039_2013_10_21 02 processed
10/21/2013 15:38:14.0000

Software Version: 2.2

Test Temperature: 71.3 degrees
Relative Humidity: 32.5%
Test Velocity: 1.96 m/s

THOR Left Foot Eversion Certification
Ankle Moment
Serial Number: LX0039

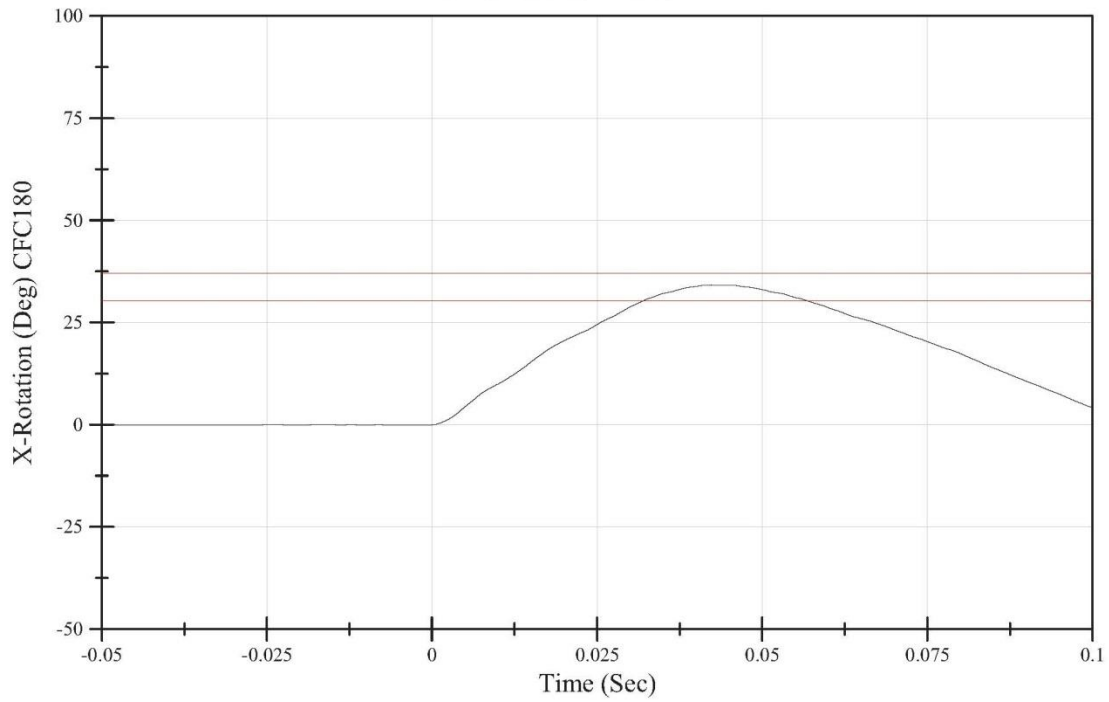


File Name: Ever_LX0039_2013_10_21 02 processed
10/21/2013 15:38:14.0000

Software Version: 2.2

Test Temperature: 71.3 degrees
Relative Humidity: 32.5%
Test Velocity: 1.96 m/s

THOR Left Foot Eversion Certification
Ankle X-Rotation
Serial Number: LX0039

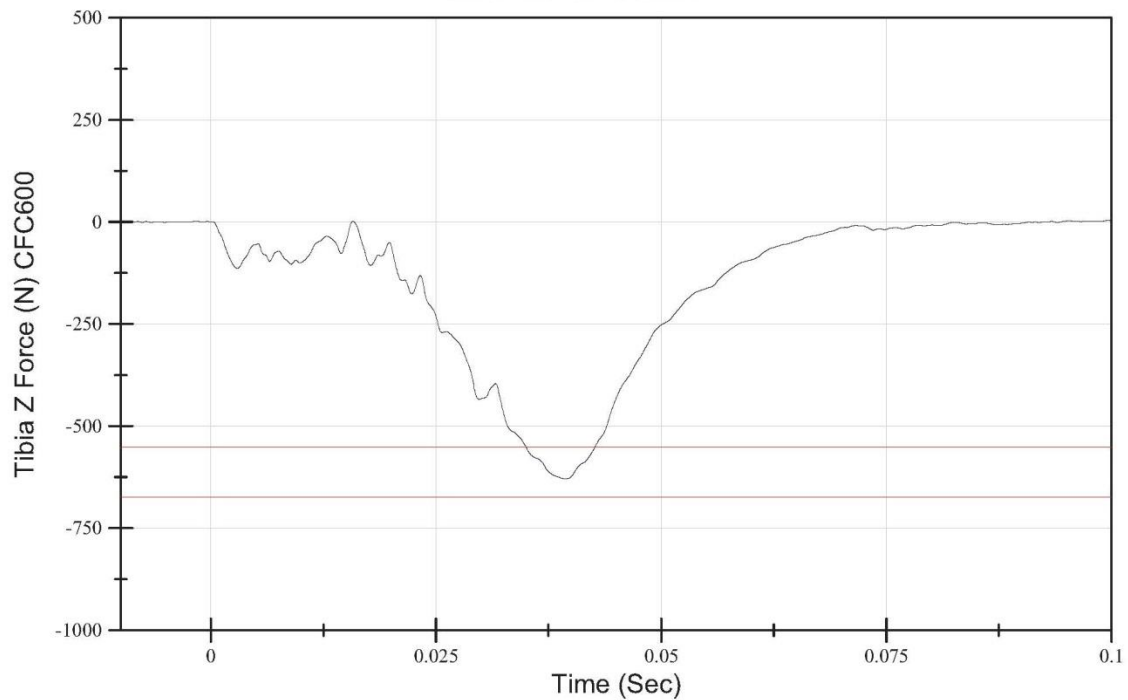


File Name: Ever_LX0039_2013_10_21 02 processed
10/21/2013 15:38:14.0000

Software Version: 2.2

Test Temperature: 70.7 degrees
Relative Humidity: 33.4%
Test Velocity: 1.95 m/s

THOR Left Foot Inversion Certification
Tibia Load
Serial Number: LX0039

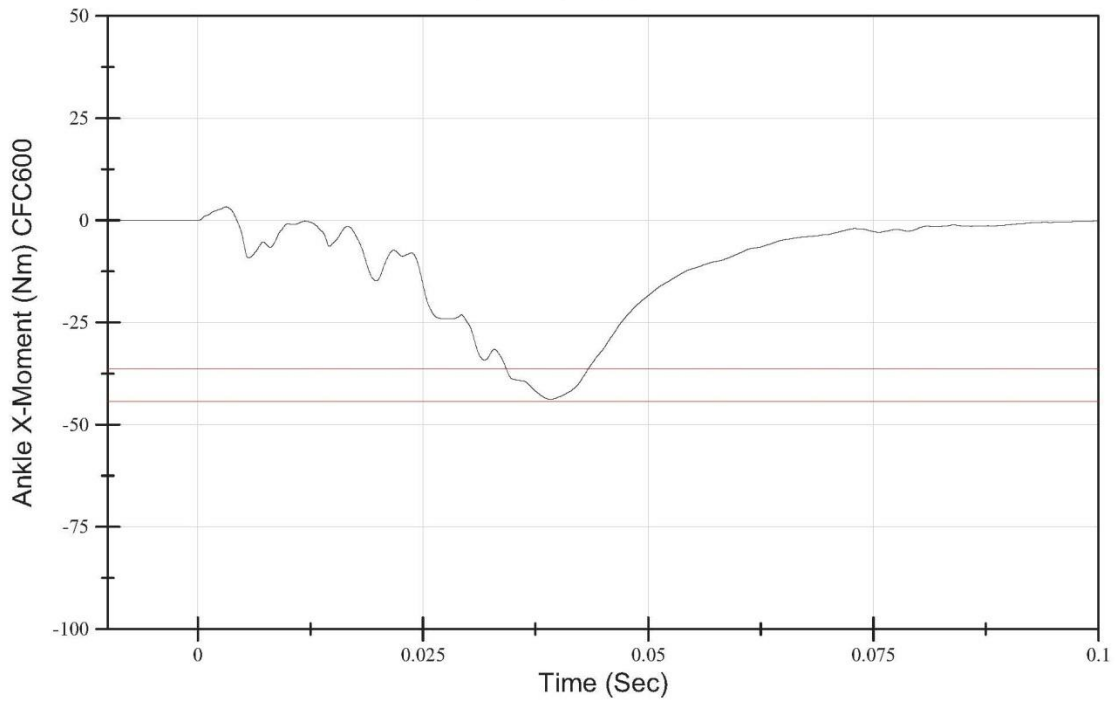


File Name: Inver_LX0039_2013_10_21 02 processed
10/21/2013 15:09:24.0000

Software Version: 2.2

Test Temperature: 70.7 degrees
Relative Humidity: 33.4%
Test Velocity: 1.95 m/s

THOR Left Foot Inversion Certification
Ankle Moment
Serial Number: LX0039

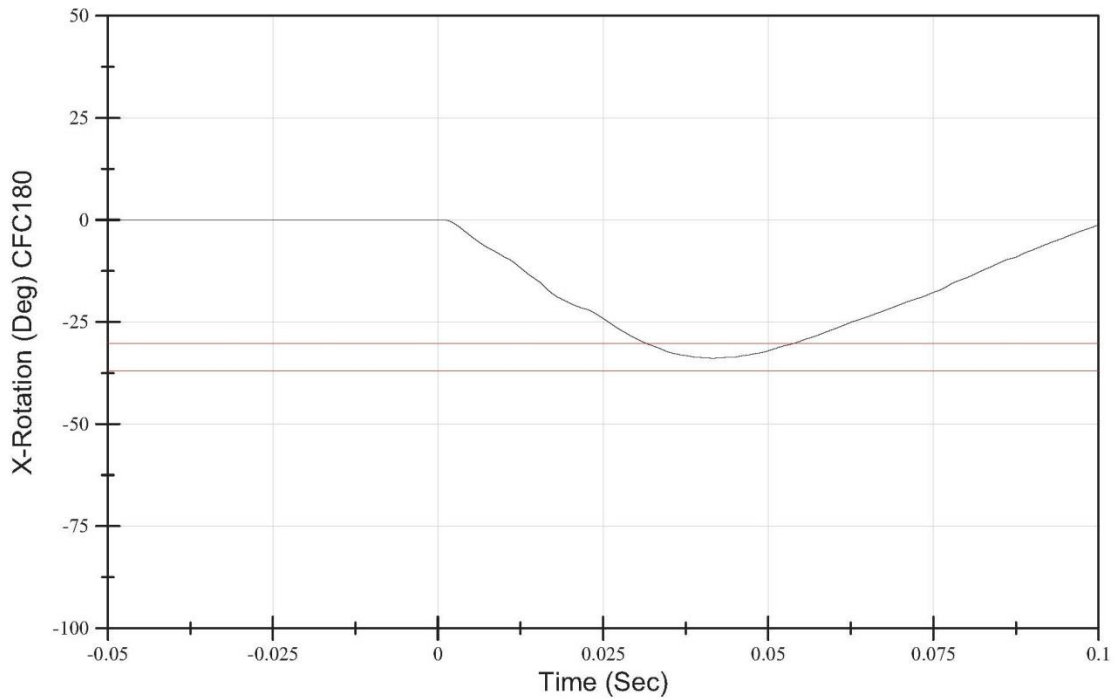


Software Version: 2.2

File Name: Inver_LX0039_2013_10_21 02 processed
10/21/2013 15:09:24.0000

Test Temperature: 70.7 degrees
Relative Humidity: 33.4%
Test Velocity: 1.95 m/s

THOR Left Foot Inversion Certification
Ankle X-Rotation
Serial Number: LX0039

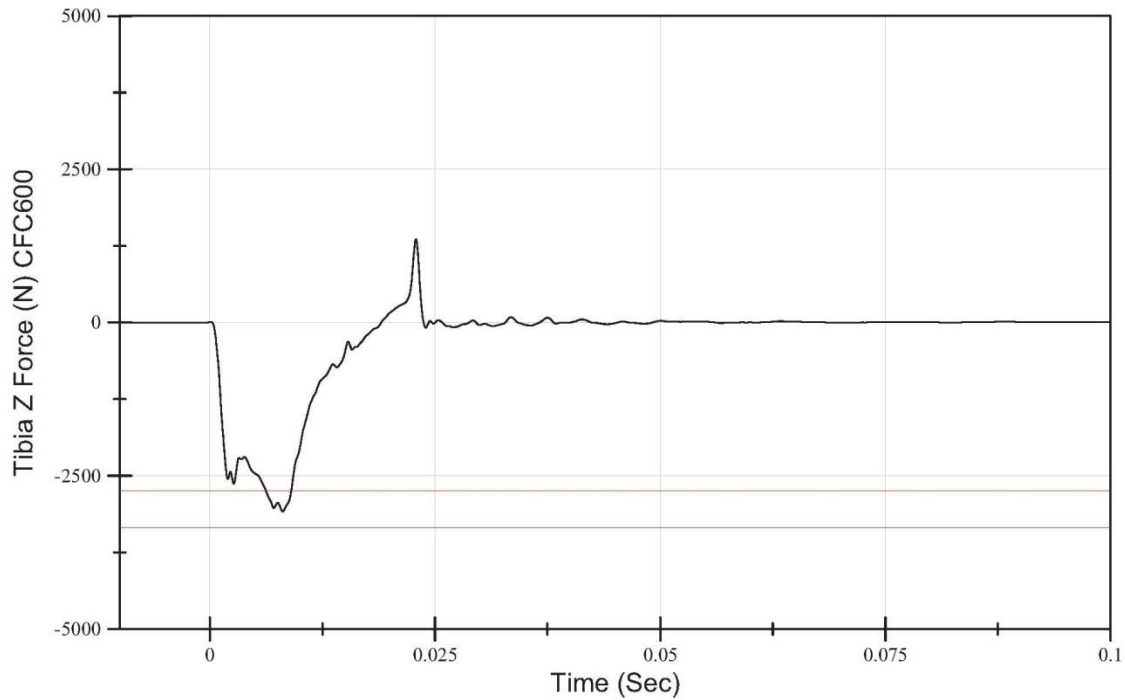


Software Version: 2.2

File Name: Inver_LX0039_2013_10_21 02 processed
10/21/2013 15:09:24.0000

Test Temperature: 71 degrees
Relative Humidity: 37.5%
Test Velocity: 4 m/s

THOR Right Foot Heel Certification
Tibia Load
Serial Number: LX0038

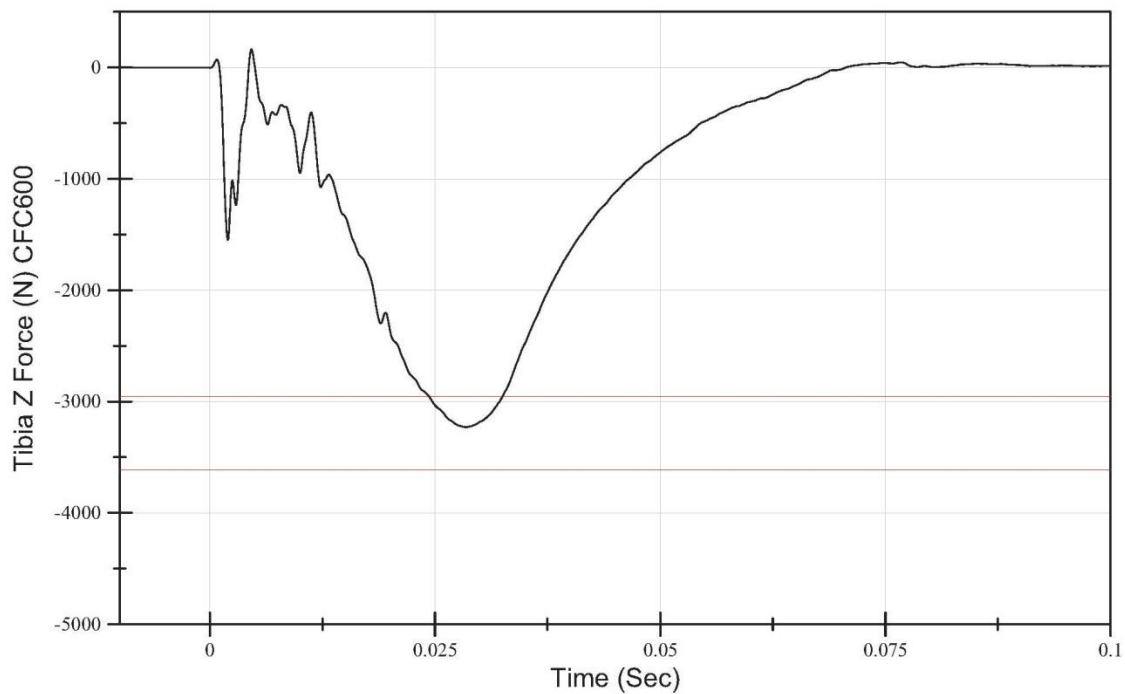


File Name: Heel_LX0038_2013_10_17 01 processed
10/17/2013 10:13:04.0000

Software Version: 2.2

Test Temperature: 68.9 degrees
Relative Humidity: 47%
Test Velocity: 5.03 m/s

THOR Right Foot Dorsiflexion Certification
Tibia Load
Serial Number: LX0038

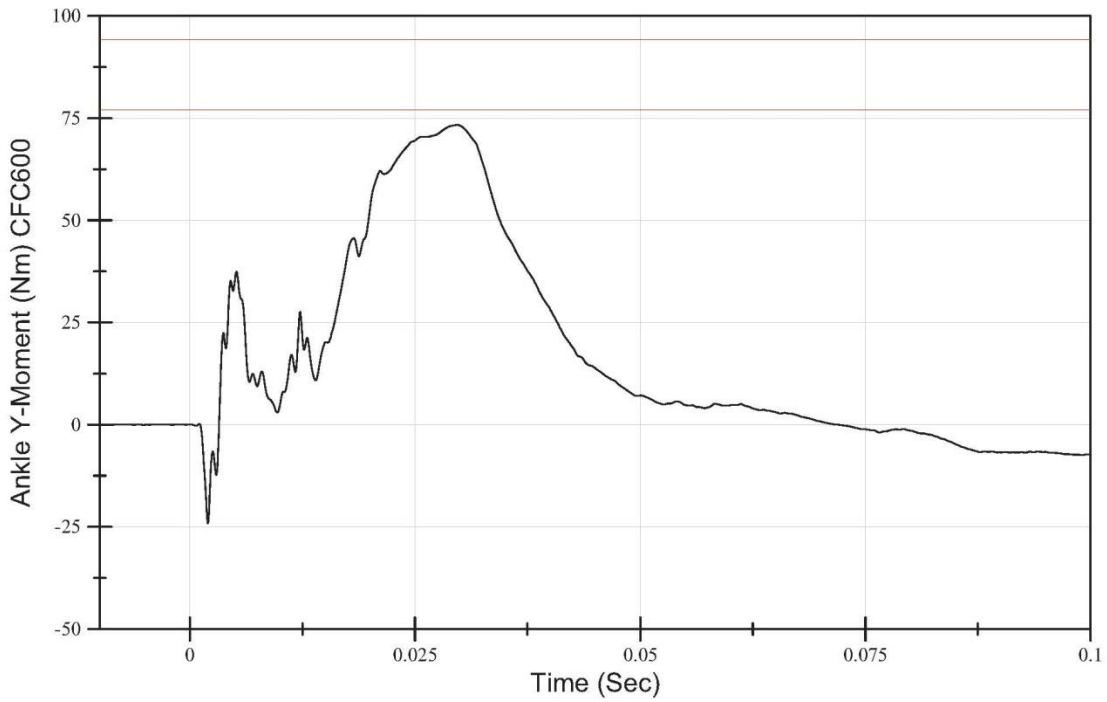


File Name: Ball_LX0038_2013_09_30 01 processed
09/30/2013 16:14:07.0000

Software Version: 2.2

Test Temperature: 68.9 degrees
Relative Humidity: 47%
Test Velocity: 5.03 m/s

THOR Right Foot Dorsiflexion Certification
Ankle Y-Moment
Serial Number: LX0038

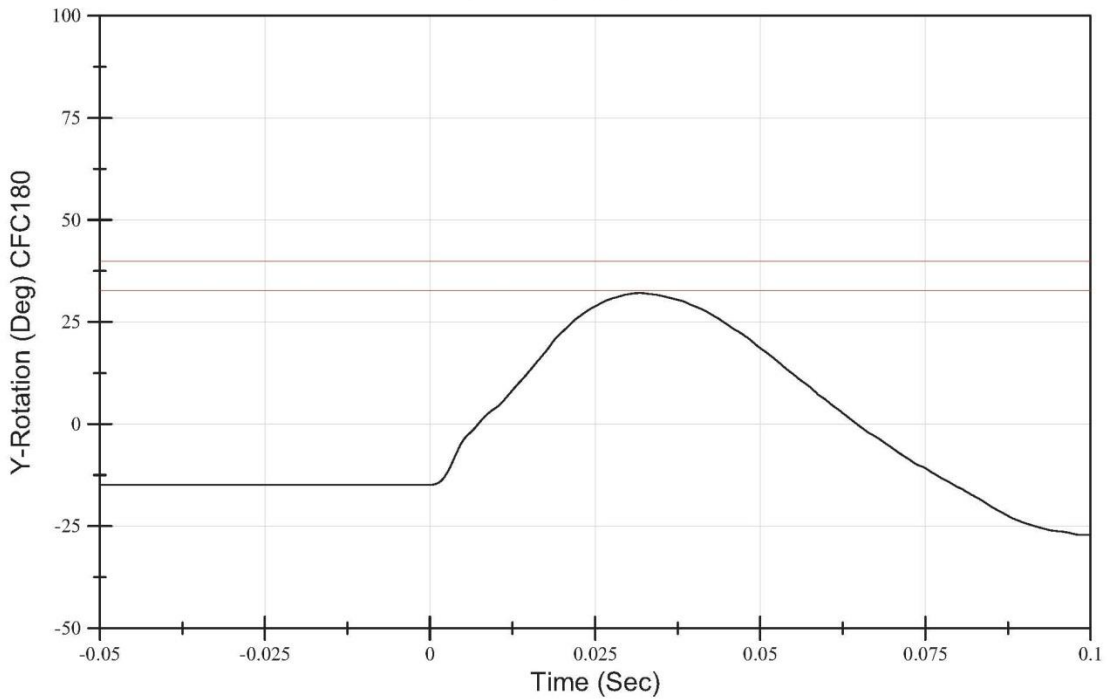


File Name: Ball_LX0038_2013_09_30 01 processed
09/30/2013 16:14:07.0000

Software Version: 2.2

Test Temperature: 68.9 degrees
Relative Humidity: 47%
Test Velocity: 5.03 m/s

THOR Right Foot Dorsiflexion Certification
Ankle Y-Rotation
Serial Number: LX0038

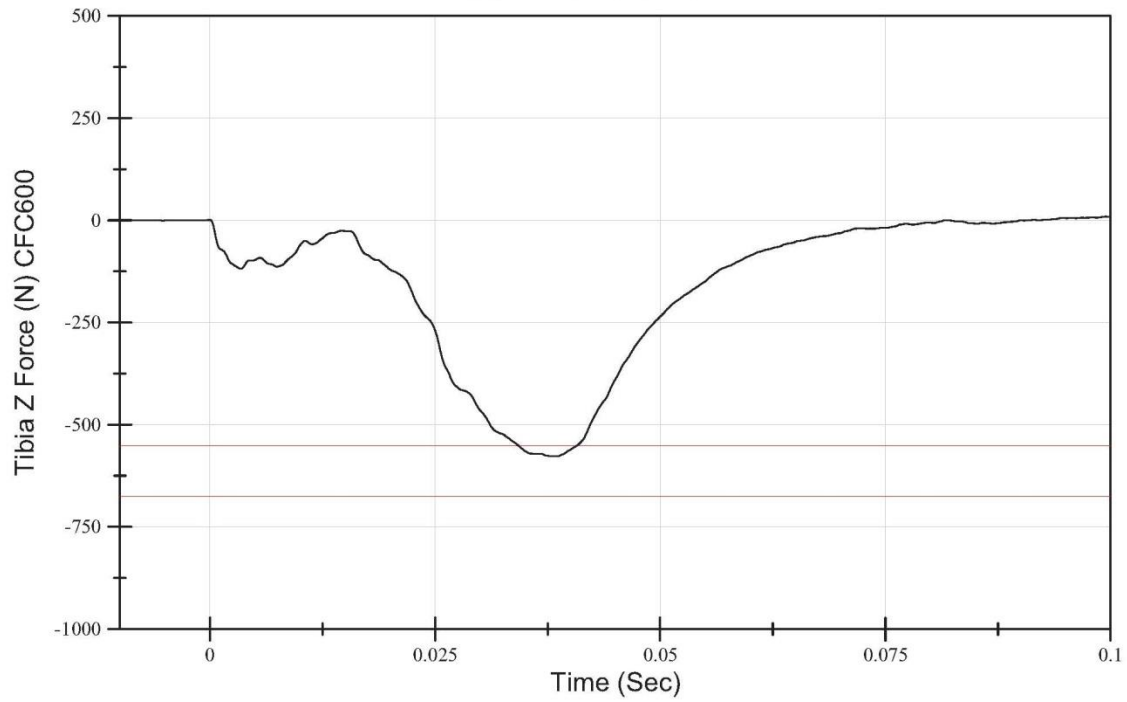


File Name: Ball_LX0038_2013_09_30 01 processed
09/30/2013 16:14:07.0000

Software Version: 2.2

Test Temperature: 69.2 degrees
Relative Humidity: 50.6%
Test Velocity: 1.95 m/s

THOR Right Foot Eversion Certification
Tibia Load
Serial Number: LX0038

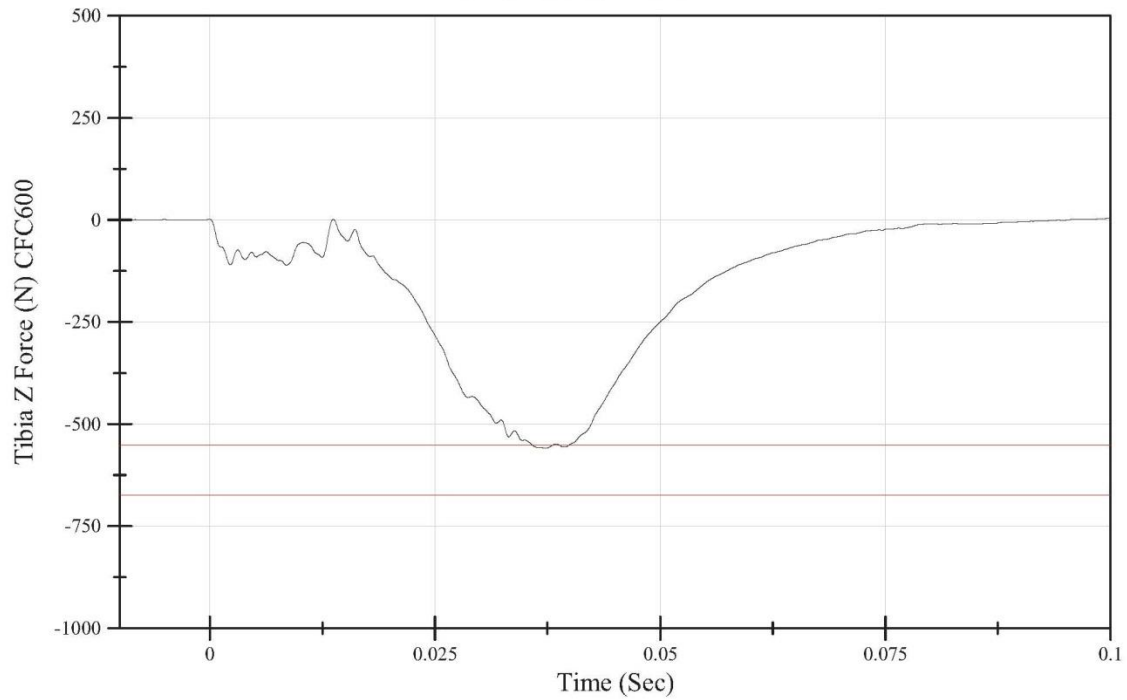


Software Version: 2.2

File Name: Ever_LX0038_2013_10_01 01 processed
10/01/2013 10:12:11.0000

Test Temperature: 69.2 degrees
Relative Humidity: 50.9%
Test Velocity: 1.96 m/s

THOR Right Foot Inversion Certification
Tibia Load
Serial Number: LX0038

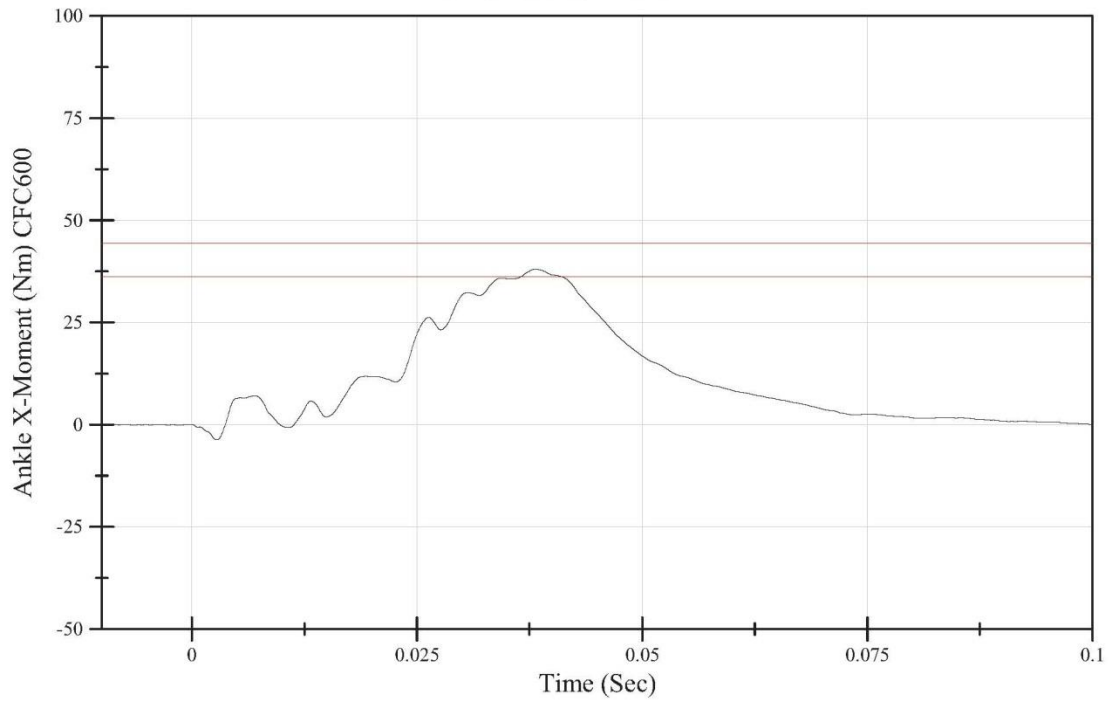


Software Version: 2.2

File Name: Inver_LX0038_2013_10_01 01 processed
10/01/2013 08:27:23.0000

Test Temperature: 69.2 degrees
Relative Humidity: 50.9%
Test Velocity: 1.96 m/s

THOR Right Foot Inversion Certification
Ankle Moment
Serial Number: LX0038

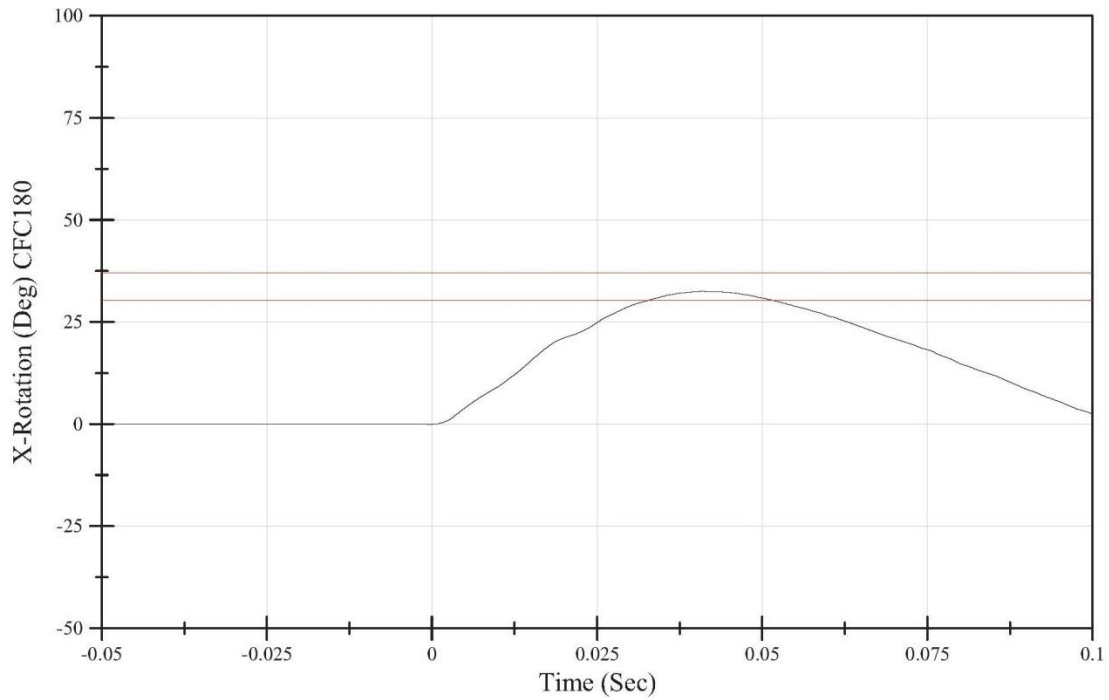


Software Version: 2.2

File Name: Inver_LX0038_2013_10_01 01 processed
10/01/2013 08:27:23.0000

Test Temperature: 69.2 degrees
Relative Humidity: 50.9%
Test Velocity: 1.96 m/s

THOR Right Foot Inversion Certification
Ankle X-Rotation
Serial Number: LX0038

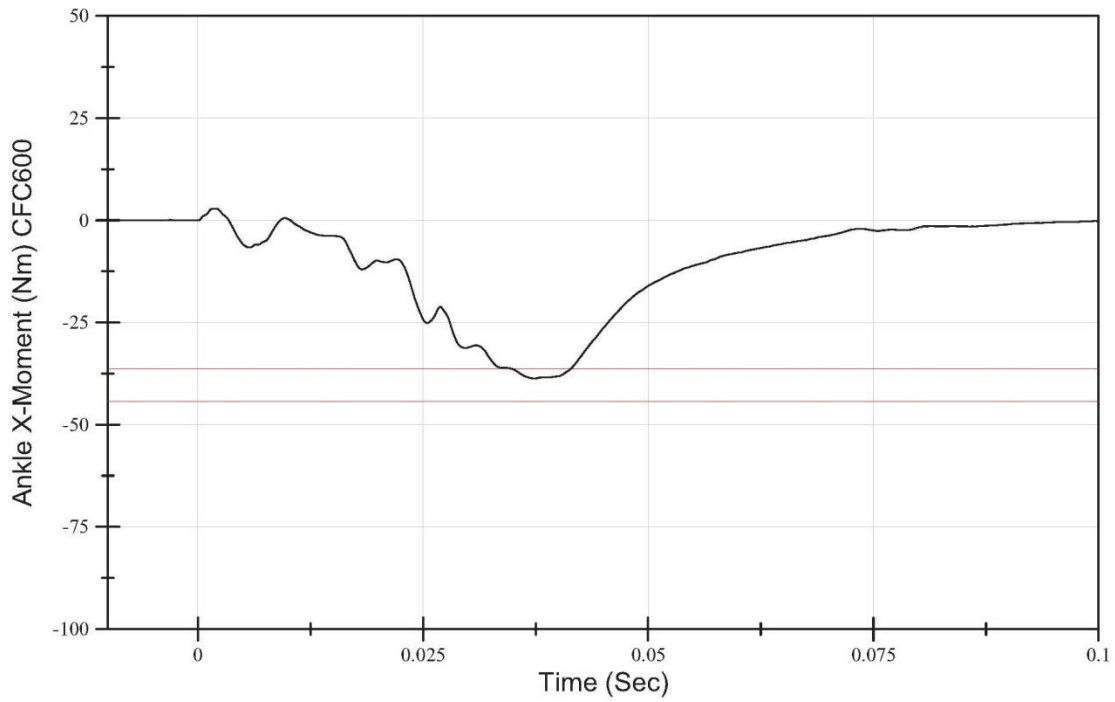


Software Version: 2.2

File Name: Inver_LX0038_2013_10_01 01 processed
10/01/2013 08:27:23.0000

Test Temperature: 69.2 degrees
Relative Humidity: 50.6%
Test Velocity: 1.95 m/s

THOR Right Foot Eversion Certification
Ankle Moment
Serial Number: LX0038

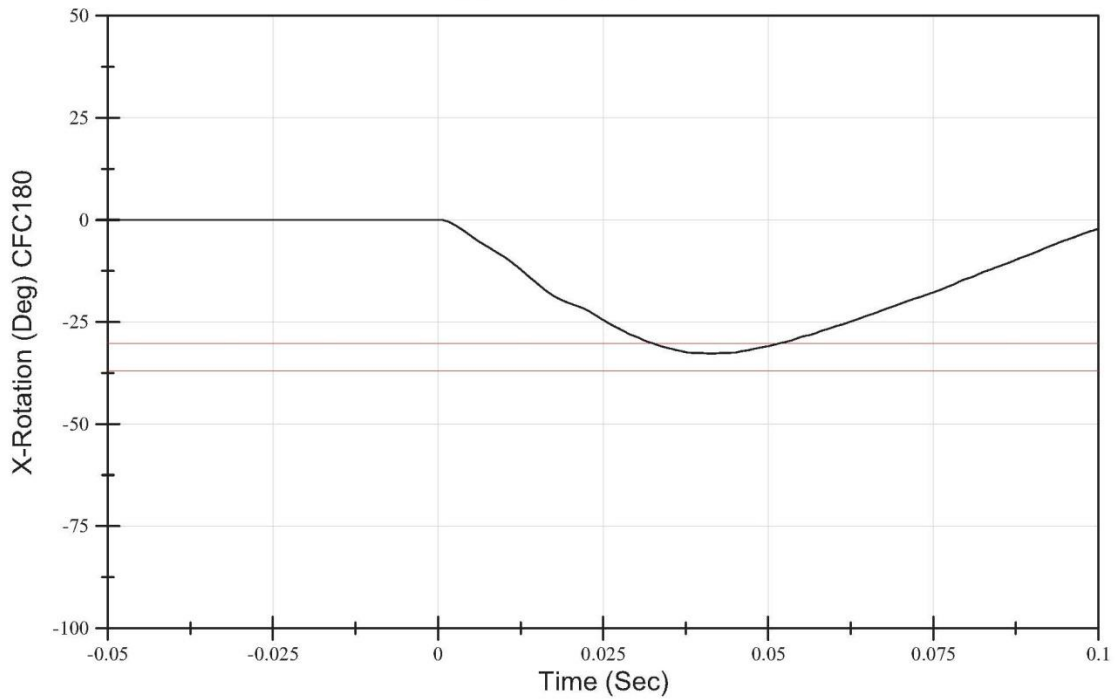


File Name: Ever_LX0038_2013_10_01 01 processed
10/01/2013 10:12:11.0000

Software Version: 2.2

Test Temperature: 69.2 degrees
Relative Humidity: 50.6%
Test Velocity: 1.95 m/s

THOR Right Foot Eversion Certification
Ankle X-Rotation
Serial Number: LX0038



File Name: Ever_LX0038_2013_10_01 01 processed
10/01/2013 10:12:11.0000

Software Version: 2.2

APPENDIX D:
CMM MEASUREMENT PROCEDURES

Vehicle Coordinate System

The origin point of the VCS is a point 50 mm forward of the rear window glass or hatchback door onto the roof of the vehicle along the vehicle's lateral centerline. The ground is not used as a reference.

The following procedure was used to create the Vehicle Coordinate System (VCS):

- 1) Place the As Delivered vehicle on a flat surface.
- 2) Measure the width of the vehicle at the rear of the vehicle to establish a first center point.
- 3) Measure the width of the vehicle at the front of the vehicle to establish a second center point.
- 4) Using a vertical laser beam, connect the two points to establish the lateral centerline of the vehicle.
- 5) Establish a point 50 mm from the edge of the rear window glass or rear hatchback door frame at the intersection of the roof onto the roof to establish the VCS origin point.
- 6) Construct a line perpendicular to the lateral centerline of the vehicle from VCS origin point towards the C-pillar. Mark a point along this line that is on the C-pillar at the body crease line between the roof and pillar geometry. This will be reference point #2.
- 7) Construct another perpendicular line in the opposite direction from the lateral centerline of the vehicle that is the same distance from the centerline as reference point #2. This will be reference point #3.
- 8) The VCS origin point is defined as the following:
 - Positive X is from the VCS origin point to the front of the vehicle
 - Positive Y is from the driver side of the vehicle to the passenger side of the vehicle
 - Positive Z is from the VCS origin point of the vehicle to the bottom of the vehicle

Steering Column Reference Point

The Steering Column Reference point is the x, y, and z location of the geometric center of the steering wheel in the VCS.

Brake Pedal Reference Point

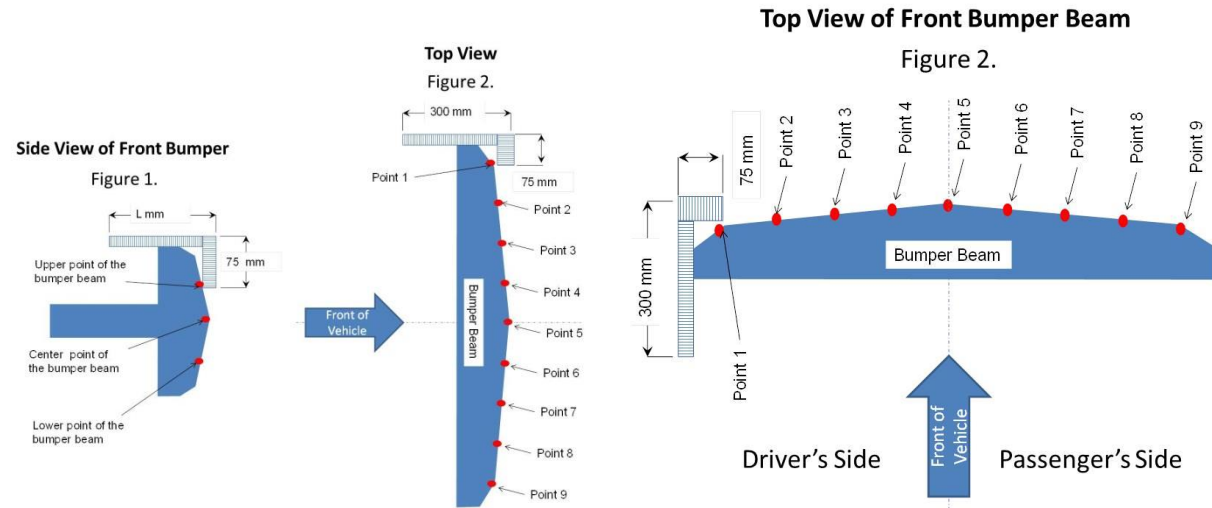
The Brake Pedal Reference Point is the x, y, and z location of the geometric center of the brake pedal pad (top surface) in the VCS.

Floor Reference Point

The Floor Reference Point is the x, y, and z location of the floor in the VCS. Use the following procedure to determine the Floor Reference Point:

1. If the vehicle has an accelerator pedal with fore-aft adjustment, adjust the pedal to its forward most position
2. Locate the centerline of the top surface of the bottom of the accelerator pedal (CLAP)
3. Remove floor mats
4. Project a vertical line down from the CLAP point until contact is made to the floor. This point is the Floor Reference Point

Pre and Post Bumper Beam and Radiator Support Measurement



Find the vertical center of the bumper beam using the following procedure (Reference Figure 1).

- 1) Position a square above the bumper beam at the centerline of the vehicle such that the plane of the square is aligned with the longitudinal axis of the vehicle and the “L mm” part of the square is parallel to the ground.
- 2) Move the square toward the ground until it contacts the bumper beam.
- 3) Move the square toward the rear of the vehicle until it contacts the bumper beam. The point where the 75 mm part of the square contacts the bumper beam is the Upper point of the bumper beam.
- 4) Perform the same procedure for the lower part of the bumper beam. The point where the 75 mm part of the square contacts the bumper beam is the Lower point of the bumper beam.
- 5) The center point of the bumper beam is half the distance between the Upper and Lower points of the bumper beam.
- 6) Transpose the lateral center of the bumper beam up onto the top of the upper radiator support.
- 7) Mark the center of the upper radiator support along its forward leading edge. If the radiator support is not flat this mark is made along the top edge.
- 8) Mark enough points along this edge to define its profile.

Pre and Post Driver Left Lower Instrument Panel

The left lower instrument panel (knee bolster) lateral coordinates are defined by adding 15 cm from the steering column reference lateral coordinate, respectively. The vertical coordinate is defined as 45 cm above the height of the floor reference point. If the panel or knee bolster loosens or breaks away in the crash, the post-crash measurements are taken by pressing and holding the panel against the underlying structure. Create a floor vehicle coordinate system on the floor at the location of this measurement.

Pre and Post Driver Right Lower Instrument Panel

The left lower instrument panel (knee bolster) lateral coordinates are defined by subtracting 15 cm from the steering column reference lateral coordinate, respectively. The vertical coordinate is defined as 45 cm above the height of the floor reference point. If the panel or knee bolster loosens or breaks away in the crash, the post-crash measurements are taken by pressing and holding the panel against the underlying structure.

Pre and Post Brake Pedal (Figure 22)

If the brake pedal is constructed so that it dangles loosely after the crash, the brake pedal is pushed straight forward against the toe pan/floor pan and held there to take the post-crash measurement. If the pedal drops away entirely, no post-crash measurement is taken.

Pre and Post Driver Toe pan and Floor Board (Figure 22)

DRIVER POINT A1

The vertical coordinate for the A1 measurement location is the vertical of the brake pedal reference. The lateral coordinate of the A1 is obtained by subtracting 25 cm from the brake pedal reference lateral coordinate.

DRIVER POINT B1

The vertical coordinate for the B1 location is the vertical coordinate of the brake pedal reference. The lateral coordinate of the B1 is obtained by subtracting 15 cm from the brake pedal reference lateral coordinate.

DRIVER POINT C1

The vertical coordinate for the C1 location is the vertical coordinate of the brake pedal reference. The lateral coordinate of the C1 is obtained by subtracting 0 cm from the brake pedal reference lateral coordinate.

DRIVER POINT D1

The vertical coordinate for the D1 location is the vertical coordinate of the brake pedal reference. The lateral coordinate of the D1 is obtained by adding 15 cm from the brake pedal reference lateral coordinate.

DRIVER POINT A2

The vertical coordinate of the A2 measurement location is obtained by adding half the distance between the vertical coordinate of the brake pedal reference and the vertical coordinate of the floor reference. The lateral coordinate of the A2 is obtained by subtracting 25 cm from the brake pedal reference lateral coordinate.

DRIVER POINT B2

The vertical coordinate of the B2 measurement location is obtained by adding half the distance between the vertical coordinate of the brake pedal reference the vertical coordinate of the floor reference. The lateral coordinate of the B2 is obtained by subtracting 15 cm from the brake pedal reference lateral coordinate.

DRIVER POINT C2

The vertical coordinate of the C2 measurement location is obtained by adding half the distance between the vertical coordinate of the brake pedal reference and the vertical coordinate of the floor reference. The lateral coordinate of the C2 is obtained by subtracting 0 cm from the brake pedal reference lateral coordinate.

DRIVER POINT D2

The vertical coordinate of the D2 measurement location is obtained by adding half the distance between the vertical coordinate of the brake pedal reference and the vertical coordinate of the floor reference. The lateral coordinate of the D2 is obtained by adding 15 cm from the brake pedal reference lateral coordinate.

DRIVER POINT A3

The vertical coordinate of the A3 measurement location is obtained by subtracting 1 cm from the floor reference. The lateral coordinate of the A3 is obtained by subtracting 25 cm from the brake pedal reference lateral coordinate.

DRIVER POINT B3

The vertical coordinate of the B3 measurement location is obtained by subtracting 1 cm from the floor reference. The lateral coordinate of the B3 is obtained by subtracting 15 cm from the brake pedal reference lateral coordinate.

DRIVER POINT C3

The vertical coordinate of the C3 measurement location is obtained by subtracting 1 cm from the floor reference. The lateral coordinate of the C3 is obtained by subtracting 0 cm from the brake pedal reference lateral coordinate.

DRIVER POINT D3

The vertical coordinate of the D3 measurement location is obtained by subtracting 1 cm from the floor reference. The lateral coordinate of the D3 is obtained by adding 15 cm from the brake pedal reference lateral coordinate.

DRIVER POINT A4

The longitudinal coordinate of the A4 measurement location is obtained by subtracting 10 cm from the D3 reference. The lateral coordinate of the A4 is obtained by subtracting 25 cm from the brake pedal reference lateral coordinate.

DRIVER POINT B4

The longitudinal coordinate of the B4 measurement location is obtained by subtracting 10 cm from the D3 reference. The lateral coordinate of the B4 is obtained by subtracting 15 cm from the brake pedal reference lateral coordinate.

DRIVER POINT C4

The longitudinal coordinate of the C4 measurement location is obtained by subtracting 10 cm from the D3 reference. The lateral coordinate of the C4 is obtained by subtracting 0 cm from the brake pedal reference lateral coordinate.

DRIVER POINT D4

The longitudinal coordinate of the D4 measurement location is obtained by subtracting 10 cm from the D3 reference. The lateral coordinate of the D4 is obtained by adding 15 cm from the brake pedal reference lateral coordinate.

DRIVER POINT A5

The longitudinal coordinate of the A5 measurement location is obtained by subtracting 10 cm from the A4 reference. The lateral coordinate of the A5 is obtained by subtracting 25 cm from the brake pedal reference lateral coordinate.

DRIVER POINT B5

The longitudinal coordinate of the B5 measurement location is obtained by subtracting 10 cm from the B4 reference. The lateral coordinate of the B5 is obtained by subtracting 15 cm from the brake pedal reference lateral coordinate.

DRIVER POINT C5

The longitudinal coordinate of the C5 measurement location is obtained by subtracting 10 cm from the C4 reference. The lateral coordinate of the C5 is obtained by subtracting 0 cm from the brake pedal reference lateral coordinate.

DRIVER POINT D5

The longitudinal coordinate of the D5 measurement location is obtained by subtracting 10 cm from the D4 reference. The lateral coordinate of the D5 is obtained by adding 15 cm from the brake pedal reference lateral coordinate.

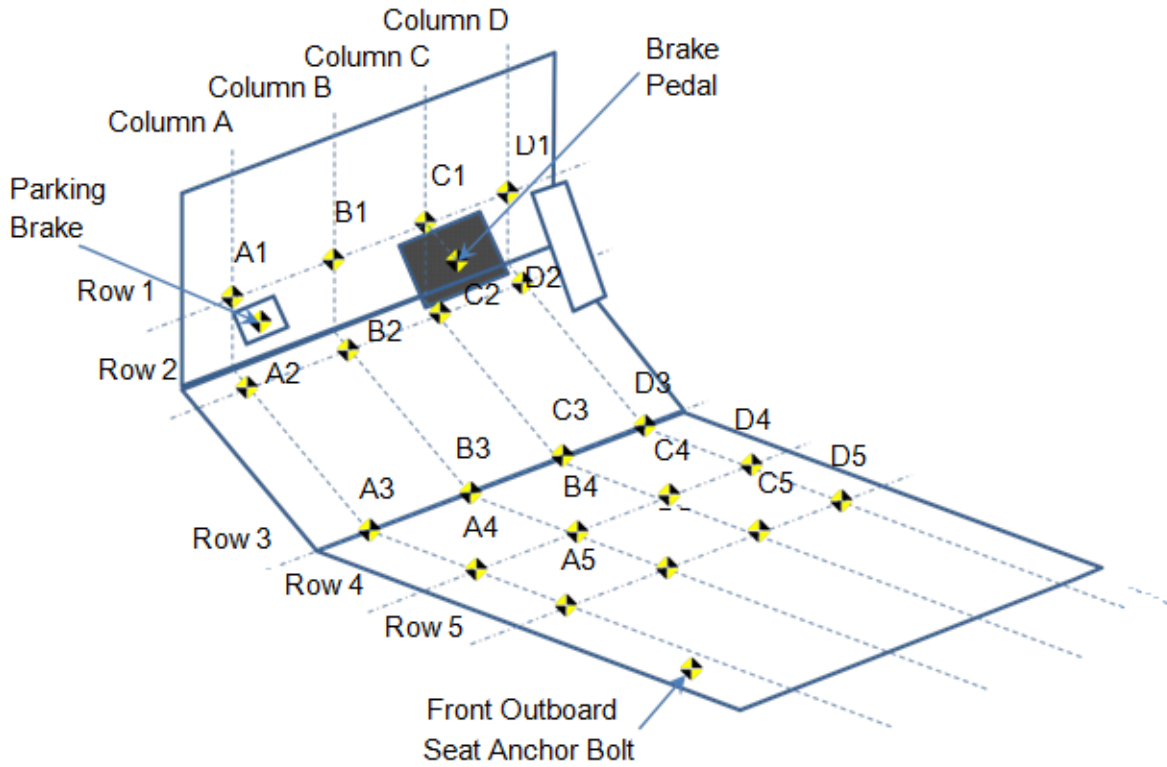
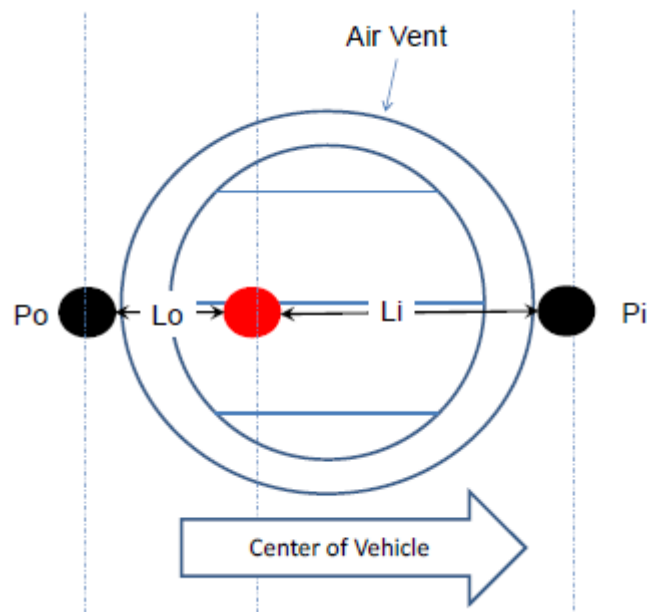


Figure 22: Lower interior intrusion measurements

Driver Upper Dash

The upper dash point is obtained by subtracting 25 cm from the lateral coordinate of the steering column reference lateral coordinate. This defines a line of points on the edge of the upper dash. The upper dash point is located on the rearward most (toward the rear of the vehicle) point on this line. This point must be located at least 30 cm above the brake pedal reference point to ensure a vertical location high enough to represent a location that could be contacted by the driver's upper body or head. If the rearward most point is less than 30 cm above the brake pedal reference point, the upper dash point is located at this 30 cm reference location.

There may be instances when the upper dash point is located on a "soft component" such as an air vent or control knob (Figure 23). To measure a more robust structure, the upper dash point is replaced with two additional points, and the weighted average of their coordinates is used to represent the deformation of a point at the original location (Equation 1). Each new point is determined by moving inboard/outboard to a location that is just off of the soft component.



$$dp = \frac{Li}{Lo + Li} [X_o, Y_o, Z_o] + \frac{Lo}{Lo + Li} [X_o, Y_o, Z_o]$$

Figure 23: Equation for Measuring Soft Component Driver Upper Dash Point

Passenger Left Lower Instrument Panel

The left lower instrument panel (knee bolster) lateral coordinates are defined by adding 15 cm from the center passenger seat reference lateral coordinate, respectively. The vertical coordinate is defined as 45 cm above the height of the floor (without floor mats). If the panel or knee bolster loosens or breaks away in the crash, the post-crash measurements are taken by pressing and holding the panel against the underlying structure.

Create a floor vehicle coordinate system on the floor at the location of this measurement.

Passenger Right Lower Instrument Panel

The left lower instrument panel (knee bolster) lateral coordinates are defined by subtracting 15 cm from the center passenger seat reference lateral coordinate, respectively. The vertical coordinate is defined as 45 cm above the height of the floor (without floor mats). If the panel or knee bolster loosens or breaks away in the crash, the post-crash measurements are taken by pressing and holding the panel against the underlying structure.

Passenger Toe pan and Floor Board (Figure 24)

PASSENGER POINT A1

The vertical coordinate for the A1 measurement location is the vertical coordinate of the brake pedal reference. The lateral coordinate of the A1 is obtained by subtracting 15 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT B1

The vertical coordinate for the B1 location is the vertical coordinate of the brake pedal reference. The lateral coordinate of the B1 is obtained by subtracting 0 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT C1

The vertical coordinate for the C1 location is the vertical coordinate of the brake pedal reference. The lateral coordinate of the C1 is obtained by adding 15 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT D1

The vertical coordinate for the D1 location is the vertical coordinate of the brake pedal reference. The lateral coordinate of the D1 is obtained by adding 25 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT A2

The vertical coordinate of the A2 measurement location is obtained by adding half the distance between the vertical coordinate of the brake pedal reference and the vertical coordinate of the floor reference. The lateral coordinate of the A2 is obtained by subtracting 15 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT B2

The vertical coordinate of the B2 measurement location is obtained by adding half the distance between the vertical coordinate of the brake pedal reference the vertical coordinate of the floor reference. The lateral coordinate of the B2 is obtained by subtracting 0 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT C2

The vertical coordinate of the C2 measurement location is obtained by adding half the distance between the vertical coordinate of the brake pedal reference and the vertical coordinate of the floor reference. The lateral coordinate of the C2 is obtained by adding 15 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT D2

The vertical coordinate of the C2 measurement location is obtained by adding half the distance between the vertical coordinate of the brake pedal reference and the vertical coordinate of the floor reference. The lateral coordinate of the D2 is obtained by adding 25 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT A3

The vertical coordinate of the A3 measurement location is obtained by subtracting 1 cm from the driver's floor reference. The lateral coordinate of the A3 is obtained by subtracting 15 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT B3

The vertical coordinate of the B3 measurement location is obtained by subtracting 1 cm from the driver's floor reference. The lateral coordinate of the B3 is obtained by subtracting 0 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT C3

The vertical coordinate of the C3 measurement location is obtained by subtracting 1 cm from the driver's floor reference. The lateral coordinate of the C3 is obtained by adding 15 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT D3

The vertical coordinate of the D3 measurement location is obtained by subtracting 1 cm from the driver's floor reference. The lateral coordinate of the D3 is obtained by adding 25 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT A4

The longitudinal coordinate of the A4 measurement location is obtained by subtracting 10 cm from the A3 reference. The lateral coordinate of the A4 is obtained by subtracting 15 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT B4

The longitudinal coordinate of the B4 measurement location is obtained by subtracting 10 cm from the A3 reference. The lateral coordinate of the B4 is obtained by subtracting 0 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT C4

The longitudinal coordinate of the C4 measurement location is obtained by subtracting 10 cm from the A3 reference. The lateral coordinate of the C4 is obtained by adding 15 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT D4

The longitudinal coordinate of the D4 measurement location is obtained by subtracting 10 cm from the A3 reference. The lateral coordinate of the D4 is obtained by adding 25 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT A5

The longitudinal coordinate of the A5 measurement location is obtained by subtracting 10 cm from the A4 reference. The lateral coordinate of the A5 is obtained by subtracting 15 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT B5

The longitudinal coordinate of the B5 measurement location is obtained by subtracting 10 cm from the B4 reference. The lateral coordinate of the B5 is obtained by subtracting 0 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT C5

The longitudinal coordinate of the C5 measurement location is obtained by subtracting 10 cm from the C4 reference. The lateral coordinate of the C5 is obtained by adding 15 cm from the center passenger seat reference lateral coordinate.

PASSENGER POINT D5

The longitudinal coordinate of the D5 measurement location is obtained by subtracting 10 cm from the D4 reference. The lateral coordinate of the D5 is obtained by adding 25 cm from the center passenger seat reference lateral coordinate.

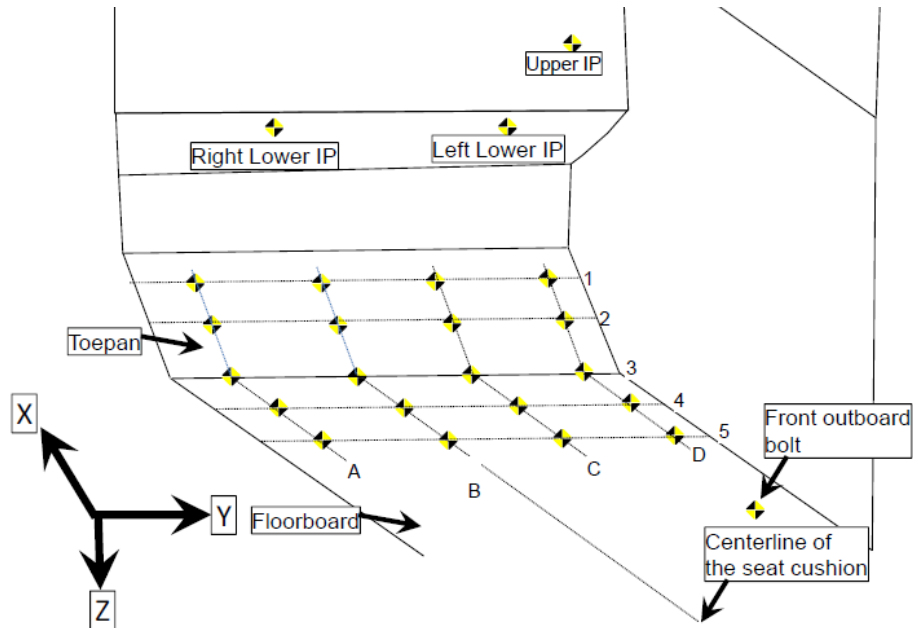


Figure 24: Passenger side lower interior measurements

Passenger Upper Dash

The upper dash point is obtained by adding 25 cm from the lateral coordinate of the center passenger seat reference lateral coordinate. This defines a line of points on the edge of the upper dash. The upper dash point is located on the rearward most (toward the rear of the vehicle) point on this line. This point must be located at least 30 cm above the brake pedal reference point to ensure a vertical location high enough to represent a location that could be contacted by the driver's upper body or head. If the rearward most point is less than 30 cm above the brake pedal reference point, the upper dash point is located at this 30 cm reference location.

There may be instances when the upper dash point is located on a "soft component" such as an air vent or control knob (Figure 23). To measure a more robust structure, the upper dash point is replaced with two additional points, and the weighted average of their coordinates is used to represent the deformation of a point at the original location (Equation 1). Each new point is determined by moving inboard/outboard to a location that is just off of the soft component.

Driver Door Measurements (Figure 25)

Mark the following points on the inner most surface of the door opening, typically on the pinch weld.

- 1) **Point 1:** The vertical coordinates of this point is obtained by subtracting 0 cm from the brake pedal reference point.
- 2) **Point 2:** The vertical coordinates of this point is obtained by subtracting 7.5 cm from the brake pedal reference point.
- 3) **Point 3:** The vertical coordinates of this point is obtained by subtracting 15 cm from the brake pedal reference point
- 4) **Point 4:** The vertical coordinates of this point is obtained by subtracting 45 cm from the brake pedal reference point.
- 5) **Point 5:** The vertical coordinates of this point is obtained by subtracting 52.5 cm from the brake pedal reference point).
- 6) **Point 6:** The vertical coordinates of this point is obtained by subtracting 60 cm from the brake pedal reference point
- 7) **Point 7:** The longitudinal coordinates of this point is obtained by subtracting 20 cm from the brake pedal reference point. If the 20 cm point is forward of the actual door frame, this point is located 5 cm rearward of lower hinge pillar point.
- 8) **Point 8:** The longitudinal coordinates of this point is obtained by subtracting 35 cm from the brake pedal reference point.
- 9) **Point 9:** The longitudinal coordinates of this point is obtained by subtracting 50 cm from the brake pedal reference point.
- 10) **Point 10 and 11:** Mark 2 evenly spaced points between points 1 and 7
- 11) **Point 12 and 13:** Mark 2 evenly spaced points between points 3 and 4
- 12) **Point 26:** Mark a point at the intersection of the roof rail and the start of the B-pillar
- 13) **Points 14-25:** Mark 12 evenly spaced points between points 6 and 26
- 14) **Point 32:** Mark a point at the intersection of the lower sill and the start of the B-pillar
- 15) **Points 27-31:** Mark 5 evenly spaced points between points 9 and 32
- 16) **Point 33:** Subtract 150mm from the vertical coordinate of the brake pedal reference point
- 17) **Point 34:** Subtract 0mm from the vertical coordinate of the brake pedal reference point

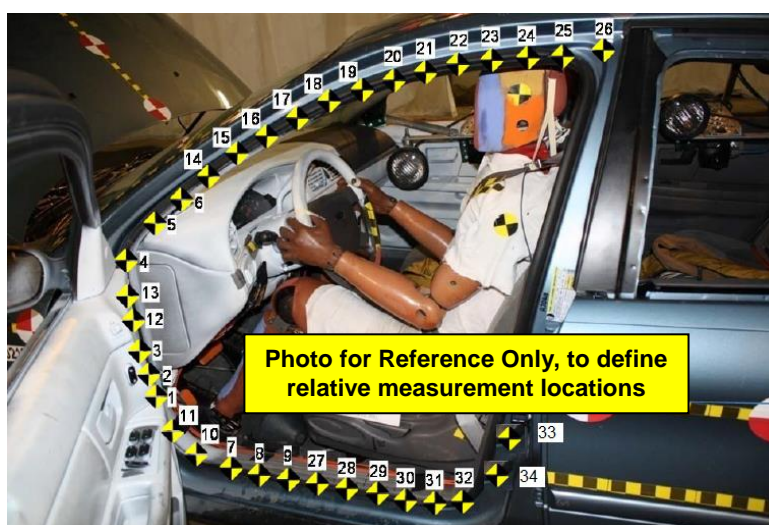


Figure 25: Driver Door Measurements

Passenger Door Measurements

Perform the same procedure as the driver door on the passenger side.

Pre-Test Exterior Profile

- 1) Expose the front bumper beam.
- 2) At the lateral center of the bumper beam, measure and mark the center of the front bumper beam (along front face of beam).
- 3) Using this Z coordinate, mark and measure enough points around the complete circumference of the vehicle to establish cross section A-A.
- 4) Transpose the lateral center of the bumper beam up onto the top of the upper radiator support.
- 5) Mark the center of the upper radiator support along its forward leading edge.
- 6) Using this Z coordinate, mark and measure enough points around the complete circumference of the vehicle to establish cross section B-B.

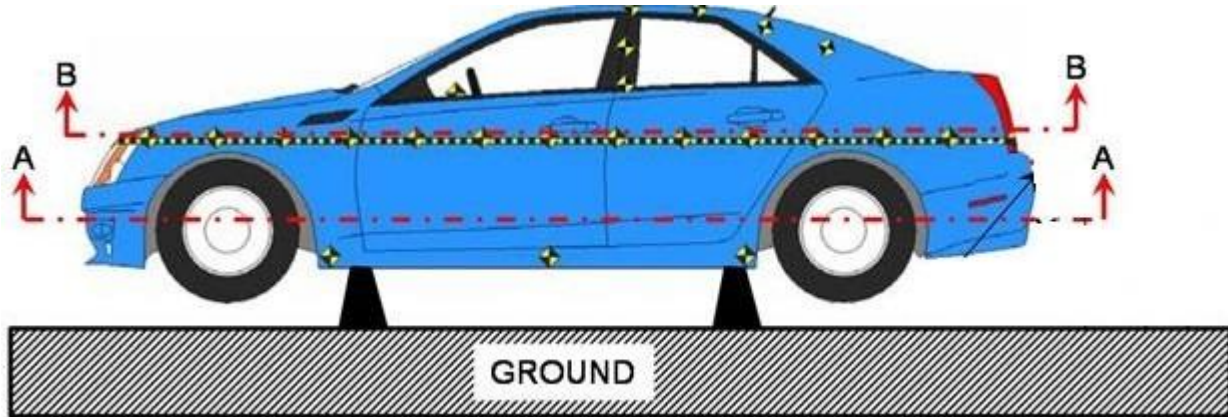


Figure 26: Pre-Test Vehicle Profile

Post-Test Exterior Profile

- 1) Remove bumper cover
- 2) Using the vehicle's origin reference point leap into vehicle's coordinate system.
- 3) Using the pre-Test z-value at section A-A which was recorded from VCS origin, take measurements at this z-distance around the circumference of the vehicle.
- 4) Using the pre-Test z-value at section B-B that was recorded from VCS origin, take measurements at this z-distance around the circumference of the vehicle.

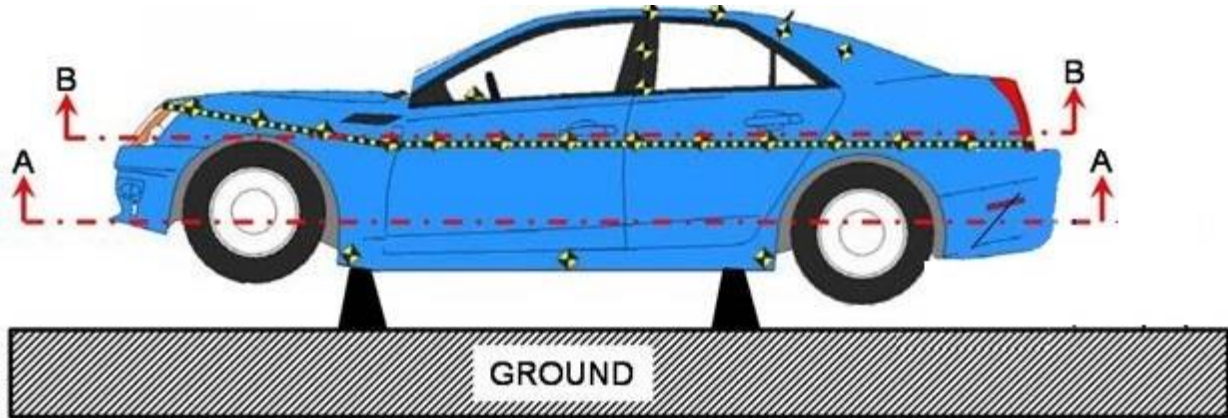
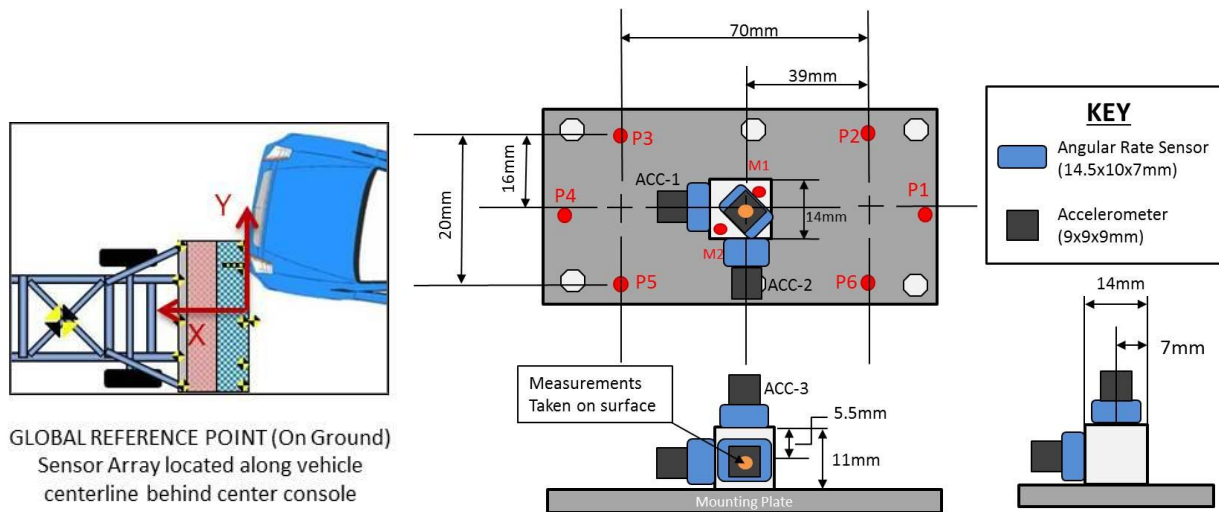


Figure 27: Post-Test Vehicle Profile

Pre and Post Honeycomb Requirements

The contractor shall take pre-and post-crush measurements of the honeycomb while attached to the barrier. These measurements shall be documented in the appropriate datasheet. Also, the contractor shall take pre-and post-Test pictures of the left and right side, top, and front view of the honeycomb while attached to the barrier.

Angular Rate Sensor Mounting & Dimensions:



- 1) Make sure the vehicle is in the **LVC** condition by placing jacks under each jack point and leveling the sill as previously described.
- 2) The ARS sensors and vehicle CG accelerometers were installed directly behind the center console on the floor board using the above pictured mounting block.
- 3) The block was mounted at the longitudinal centerline such that the x, y, and z axis of the block align with the vehicle coordinate system.
 - a. P1 and P4 were placed along the lateral centerline of the vehicle
 - b. P4 is mounted toward the front of the vehicle
 - c. The mounting plate is parallel to the horizontal plan of the vehicle coordinate system

Note: the block shall not move relative to the vehicle during the test

- 4) CMM each position alignment point (P1-P6) while the vehicle is level.
- 5) CMM the middle of the top surface of each direction of the CG accelerometer while the vehicle is level. (ie. Accelerometer CGx will be taken on the surface in the x-direction)
- 6) Transport the vehicle to test area and align with the RMDB barrier
- 7) Once vehicle is aligned with the barrier and all dummies are positioned, create a global coordinate system on the ground (GCS). The origin of the GCS is located at the front most point at the centerline of the RMDB.
 - Positive X is from the GCS origin point to the rear of RMDB
 - Positive Y is from the center of RMDB towards the left of RMDB when looking from the back of the RMDB
 - Positive Z is from the GCS origin point downward into the ground
- 8) Measure and record all points described above