

REPORT NUMBER: R&D-CAL-15-003

**VEHICLE TO FRONTAL BARRIER CRASH TEST IN SUPPORT OF NHTSA'S
FRONTAL RESEARCH PROGRAM**

2015 Toyota Highlander

56.3 KPH RIGID BARRIER FRONTAL

TEST DATE: 8/11/2015

NHTSA No: R20155144

**CALSPAN CORPORATION
TRANSPORTATION TEST OPERATIONS
P.O. BOX 400
BUFFALO, NEW YORK 14225**



FINAL REPORT SUBMITTED:

March 29, 2016

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**

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

Prepared by: Vanessa Hansen
Vanessa Hansen, Test Engineer

Date: March 29, 2016

Approved by: Edward J. Dutton
Edward J. Dutton, Test Engineer Director
Transportation Test Operations

Date: March 29, 2016

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

1. Report No. R&D-CAL-15-003	2. Government Accession No.	3. Recipient's Catalog No.																																																														
4. Title and Subtitle Report for Frontal Research Program Testing of a 2015 Toyota Highlander SUV NHTSA No.: R20155144		5. Report Date 3/29/2016																																																														
		6. Performing Organization Code CAL																																																														
7. Author(s) Vanessa Hansen, Test Engineer Edward Dutton, Operations Manager		8. Performing Organization Report No. CAL-DOT-2015-002																																																														
9. Performing Organization Name and Address Calspan Corporation 4455 Genesee Street Buffalo, New York 14225		10. Work Unit No.																																																														
		11. Contract or Grant No. DTNH22-14-D-00359 TO-0003																																																														
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Vehicle Safety Research 1200 New Jersey Ave SE, Room W46-446 Washington, DC 20590		13. Type of Report and Period Covered Final Report, 3/29/2016																																																														
		14. Sponsoring Agency Code NVS-321																																																														
15. Supplementary Notes																																																																
16. Abstract A test was conducted in accordance with Contract DTNH22-14-D-00359 Task Order 0002. The test consisted of a 2015 Toyota Highlander SUV traveling at a target speed of 56.3 kph into a stationary flat frontal barrier wall. 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 August 11, 2015. The vehicle's impact velocity was 56.41 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 551 mm. The test vehicle's occupant performance was as follows: <table border="1"> <thead> <tr> <th>Measurement Description</th><th>Units</th><th>Driver</th><th>Front Passenger</th><th>Rear Passenger</th></tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₁₅)</td><td>N/A</td><td>261.49</td><td>237.83</td><td>1509.56</td></tr> <tr> <td>Brain Injury Criterion (BrIC)</td><td>N/A</td><td>0.59</td><td>0.58</td><td></td></tr> <tr> <td>Abdomen Deflection</td><td>mm</td><td>-64.44</td><td></td><td></td></tr> <tr> <td>Resultant Acetabulum Force</td><td>N</td><td>2269.89</td><td></td><td></td></tr> <tr> <td>Maximum Chest Compression</td><td>mm</td><td>-65.52</td><td>-25.20</td><td></td></tr> <tr> <td>Neck Injury Criteria (Nij)</td><td>N/A</td><td>0.38</td><td>0.51</td><td>1.35</td></tr> <tr> <td>Neck Tension</td><td>N</td><td>2479.97</td><td>1301.83</td><td>3756.01</td></tr> <tr> <td>Neck Compression</td><td>N</td><td>-365.81</td><td>-279.45</td><td>-862.84</td></tr> <tr> <td>Tibia Index</td><td>N/A</td><td>0.45</td><td>0.52</td><td></td></tr> <tr> <td>Left Femur Force</td><td>N</td><td>-2424.97</td><td>-625.13</td><td>-952.79</td></tr> <tr> <td>Right Femur Force</td><td>N</td><td>-3866.91</td><td>-103.80</td><td>-943.91</td></tr> </tbody> </table>					Measurement Description	Units	Driver	Front Passenger	Rear Passenger	Head Injury Criteria (HIC ₁₅)	N/A	261.49	237.83	1509.56	Brain Injury Criterion (BrIC)	N/A	0.59	0.58		Abdomen Deflection	mm	-64.44			Resultant Acetabulum Force	N	2269.89			Maximum Chest Compression	mm	-65.52	-25.20		Neck Injury Criteria (Nij)	N/A	0.38	0.51	1.35	Neck Tension	N	2479.97	1301.83	3756.01	Neck Compression	N	-365.81	-279.45	-862.84	Tibia Index	N/A	0.45	0.52		Left Femur Force	N	-2424.97	-625.13	-952.79	Right Femur Force	N	-3866.91	-103.80	-943.91
Measurement Description	Units	Driver	Front Passenger	Rear Passenger																																																												
Head Injury Criteria (HIC ₁₅)	N/A	261.49	237.83	1509.56																																																												
Brain Injury Criterion (BrIC)	N/A	0.59	0.58																																																													
Abdomen Deflection	mm	-64.44																																																														
Resultant Acetabulum Force	N	2269.89																																																														
Maximum Chest Compression	mm	-65.52	-25.20																																																													
Neck Injury Criteria (Nij)	N/A	0.38	0.51	1.35																																																												
Neck Tension	N	2479.97	1301.83	3756.01																																																												
Neck Compression	N	-365.81	-279.45	-862.84																																																												
Tibia Index	N/A	0.45	0.52																																																													
Left Femur Force	N	-2424.97	-625.13	-952.79																																																												
Right Femur Force	N	-3866.91	-103.80	-943.91																																																												
17. Key Words THOR ATD HIII 5 th Female RibEye 56.3 kph Frontal Barrier Impact Test		18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Administration Technical Reference Division 1200 New Jersey Ave, SE Washington, DC 20590																																																														
19. Security Classif. (of this report) UNCLASSIFIED	20. Security Classif. (of this page) UNCLASSIFIED	21. No. of Pages	22. Price																																																													

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.

Prepared by: Vanessa Hansen
Vanessa Hansen, Test Engineer

Date: March 29, 2016

Approved by: Edward J. Dutton
Edward J. Dutton, Test Engineer Director
Transportation Test Operations

Date: March 29, 2016

TABLE OF CONTENTS

Test Vehicle: 2015 Toyota Highlander SUV
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: R20155144
Test Date: 8/11/2015

<u>Section</u>		<u>Page No.</u>
1	Purpose of Test	1-1
2	Summary of Test	2-1
	Crash Vehicle Summary	2-3
	Preliminary Injury Summary: Driver	2-4
	Preliminary Injury Summary: Front Right Passenger	2-5
	Preliminary Injury Summary: Rear Passenger	2-6
3	Data Sheets	3-1
<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	3-15
5	Seat Belt Positioning Data	3-16
6	High-Speed Camera Locations and Data	3-17
7	Vehicle Instrumentation Data	3-19
8	Photographic Reference Target Locations	3-22
9	Test Vehicle Summary of Results	3-23
10	Post-Test Observations	3-24
11	Vehicle Profile Measurements	3-25
12	Accident Investigation Division Data	3-27
13	Vehicle Intrusion Measurements	3-28
14	Summary of FMVSS 212, 219 (Partial), and 301 Data	3-30
	Windshield Periphery Measurements	3-30
	Areas of Protected Zone Failures	3-30
	Fuel System Integrity Post Impact Data	3-31
15	FMVSS 301 Static Rollover Results	3-32
16	Dummy / Vehicle Temperature Stabilization	3-33
<u>Appendix</u>		<u>Page No.</u>
A	Photographs	A-1
B	Vehicle & Dummy Response Data Traces	B-1
C	Dummy Calibration and Performance Verification Data Sheets	C-1

SECTION 1
PURPOSE OF TEST

Test Vehicle: 2015 Toyota Highlander SUV
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: R20155144
Test Date: 8/11/2015

This 56.3 kph (35 mph) test vehicle into a rigid barrier is part of the Frontal Rigid Barrier Test a outlined in Contract No. DTNH22-14-D-00359 Task Order 0002. The purpose of this test is to obtain vehicle crashworthiness and occupant restraint system performance data for research purposes.

This test was conducted in accordance with the instructions set forth for a vehicle to rigid barrier impact, outlined in Contract No. DTNH22-14-D-00359 Task Order 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. DTNH22-14-D-00359 Task Order 0002.

SECTION 2 SUMMARY OF TEST

Test Vehicle: 2015 Toyota Highlander SUV
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: R20155144
Test Date: 8/11/2015

A rigid fixed barrier was impacted by a 2015 Toyota Highlander SUV at a velocity of 56.41 km/h. The test was performed at Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on August 11, 2015. Pre- and post-test photographs of the vehicle and dummies to document the test can be found in Appendix A. One real-time camera and 16 high-speed cameras were used to document the frontal barrier impact event. Camera locations and other pertinent camera information can be found in Data Sheet 6 of this report.

One 50% adult male THOR-M anthropomorphic test device (ATD) (Serial No. DL9207), was placed in the driver seating position according to dummy placement instructions specified in the THOR Seating Test Procedure, and one Part 572O 5th percentile female ATD with RibEye (Serial No. 324), was placed in the right-front passenger seating position at mid-track according to dummy placement instructions specified in the frontal NCAP laboratory test procedure. One Part 572O 5th percentile female ATD with RibEye (Serial No. 019) was also placed in the rear seating position (P3) and positioned according to dummy placement instructions specified in the Side MDB NCAP Laboratory Test Procedure.

Seat belt load cells were also on the driver and passengers' shoulder and lap belts to measure the dummy's torso and pelvic section loading. In addition to seat belt load cells, belt movement sensors were utilized on both the driver and front passengers' seat belts to measure displacement. The driver (position 1) ATD (Serial No. DL9207), right-front passenger (position 2) ATD (Serial No. 324), and the rear passenger ATD (Serial No. 019) were calibrated previous to this test. Certification details, along with instrumentation calibration data, can be found in Appendix C of this report.

Two hundred and sixty seven (267) channels of data from the ATD's and test vehicle were collected using Kayser – Threde and DTS data acquisition systems. Appendix B contains dummy and vehicle response data plots.

There was 100% total windshield retention and 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 551 mm at C4 to the right of the vehicle's centerline. Full vehicle measurements are presented in Section 3 of this report.

SECTION 2 (CONTINUED)
SUMMARY OF TEST

Test Vehicle: 2015 Toyota Highlander SUV
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: R20155144
Test Date: 8/11/2015

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

Structure observations include the following:

- Hood bent inwards

The driver ATD's visible contact points were:

- Head contacted the frontal airbag, visor, and headrest
- Torso contacted the frontal airbag
- Knees contacted the knee airbag

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

- Head contacted the frontal airbag, visor and headrest
- Knees contacted the glove box

The rear passenger ATD's visible contact points were:

- Head contacted the headrest

SECTION 2 (CONTINUED)
CRASH VEHICLE SUMMARY

Test Vehicle: 2015 Toyota Highlander SUV
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: R20155144
Test Date: 8/11/2015

Primary Impact Data

Measured Parameter	Units	Value
Test Vehicle Velocity at Impact	kph	56.41
Vehicle Test Weight	kg	2335
Vehicle Maximum Static Crush	mm	551
Number of Data Channels		267
Number of Real-Time Cameras		1
Number of High-Speed Cameras		16

GENERAL COMMENTS:

1. P1 (Driver) serial number – DL9207
2. P2 (Passenger) serial number – 324
3. P3 (Rear Passenger) serial number – 019

Data Anamolies:

- Driver Ankle Right Y Rotation, Questionable Data from 50ms to 100 ms B-34
- Rear Passenger Chest X Displacement, Channel Saturated from 65ms to 115ms B-63
- Rear Passenger Ribeye data not collected B57-B63
- Driver Right Tibia Y Acceleration, Questionable data throughout B-32

PRELIMINARY INJURY SUMMARY: Driver

Test Vehicle: 2015 Toyota Highlander - R20155144

NHTSA No.: R20155144

Test Program: NHTSA R&D Frontal Rigid Barrier

Test Date: 8/11/2015

Driver: THOR Serial No. DL9207 Injury Summary

Location	Description	Unit	Source	Max	Min
Head	15 ms HIC		Compute	261.49	
	Brain Injury Criteria		Compute	0.59	
	Head Rotational Velocity X	Deg/s	60	334.64	-331.94
	Head Rotational Velocity Y	Deg/s	60	707.93	-1643.31
	Head Rotational Velocity Z	Deg/s	60	687.06	-314.05
Neck	Upper Neck Z-axis Force	N	1000	2479.97	-365.81
	Upper Neck Y-axis Moment	N-m	Thortest	37.36	-39.35
Chest	Upper Left Resultant Chest Deflection	mm	Thortest	32.07	
	Upper Right Resultant Chest Deflection	mm	Thortest	65.52	
	Lower Left Resultant Chest Deflection	mm	Thortest	8.45	
	Lower Right Resultant Chest Deflection	mm	Thortest	42.85	
Abdomen	Lower Left X-axis Deflection	mm	Thortest	0.31 ⁽¹⁾	-56.50 ⁽¹⁾
	Lower Right X-axis Deflection	mm	Thortest	0.33	-64.44
Acetabulum	Left Acetabulum Resultant Force	N	Compute	2269.89	0.93
	Right Acetabulum Resultant Force	N	Compute	1596.55	0.35
Femur	Left Femur Force, FZ	N	600	219.91	-2424.97
	Right Femur Force, FZ	N	600	205.39	-3866.91
Tibia	Left Upper Tibia, FZ	N	600	236.51	-1846.46
	Left Upper Tibia Index		Compute	0.45	
	Right Upper Tibia, FZ	N	600	222.39	-1864.20
	Right Upper Tibia Index		Compute	0.52	
	Left Lower Tibia, FZ	N	600	164.66	-2939.04
	Left Lower Tibia Index		Compute	0.41	
	Right Lower Tibia, FZ	N	600	459.84	-2335.55
	Right Lower Tibia Index		Compute	0.41	
Ankle	Left Ankle Rotation, RX	Deg	180	7.05	-7.41
	Left Ankle Rotation, RY	Deg	180	16.11	-13.82
	Left Ankle Dorsiflexion Moment, MY	Nm	Compute	35.45	-102.91
	Left Ankle In/Eversion Moment, MX	Nm	Compute	12.30	-79.75
	Right Ankle Rotation, RX	Deg	180	18.85	-14.59
	Right Ankle Rotation, RY	Deg	180	12.46 ⁽²⁾	-180.65 ⁽²⁾
	Right Ankle Dorsiflexion Moment, MY	Nm	Compute	18.50	-68.82
	Right Ankle In/Eversion Moment, MX	Nm	Compute	246.69	-104.15

Anomalies:

- (1) Questionable Data: Bad Calibration
- (2) Questionable Data from 50ms to 100 ms

PRELIMINARY INJURY SUMMARY: Right Front Passenger

Test Vehicle: 2015 Toyota Highlander - R20155144

NHTSA No.: R20155144

Test Program: NHTSA R&D Frontal Rigid Barrier

Test Date: 8/11/2015

Right Front Passenger: HF Serial No. 324 Injury Summary

Location	Description	Unit	Source	Max	Min
Head	15 ms HIC		Compute	237.83	
	Brain Injury Criteria (BrIC)		Compute	0.58	
Neck	Upper Neck Force Z	N	1000	1301.83	-279.45
	Upper Neck Moment Y	Nm	600	23.09	-30.50
	NIJ		Compute	0.51	
Chest	Chest Potentiometer Deflection	mm	600		-22.63
	Left Ribeye 01 X-Axis Deflection	mm	600	0.21	-25.20
	Left Ribeye 02 X-Axis Deflection	mm	600	0.19	-24.01
	Left Ribeye 03 X-Axis Deflection	mm	600	0.22	-23.10
	Left Ribeye 04 X-Axis Deflection	mm	600	0.22	-21.98
	Left Ribeye 05 X-Axis Deflection	mm	600	0.20	-21.38
	Left Ribeye 06 X-Axis Deflection	mm	600	0.37	-19.88
	Right Ribeye 01 X-Axis Deflection	mm	600	0.24	-16.38
	Right Ribeye 02 X-Axis Deflection	mm	600	0.25	-13.93
	Right Ribeye 03 X-Axis Deflection	mm	600	0.42	-12.25
	Right Ribeye 04 X-Axis Deflection	mm	600	0.51	-10.71
	Right Ribeye 05 X-Axis Deflection	mm	600	0.54	-9.45
	Right Ribeye 06 X-Axis Deflection	mm	600	33.01 ⁽³⁾	-6.96 ⁽³⁾
	Overall Ribeye X-Axis Deflection	mm	600	33.01 ⁽³⁾	-25.20
	Chest Resultant Acceleration	g	Compute	57.64	
	Chest Resultant Acceleration, 3 ms clip	g	Compute	51.64	
	Pelvis Resultant Acceleration	g	Compute	76.63	
Femur	Left Femur Force, FZ	N	600	2155.45	-625.13
	Right Femur Force, FZ	N	600	2051.58	-103.80
Tibia	Left Upper Tibia, FZ	N	600	955.81	-508.22
	Left Upper Tibia Index		Compute	0.61	
	Right Upper Tibia, FZ	N	600	1008.46	-240.16
	Right Upper Tibia Index		Compute	0.45	
	Left Lower Tibia, FZ	N	600	924.41	-1021.72
	Left Lower Tibia Index		Compute	0.72	
	Right Lower Tibia, FZ	N	600	1092.53	-308.27
	Right Lower Tibia Index		Compute	0.69	
Anomalies					
(3) Interference by Chest Pot or Abdominal Insert					

PRELIMINARY INJURY SUMMARY: Right Rear Passenger

Test Vehicle: 2015 Toyota Highlander - R20155144 NHTSA No.: R20155144
 Test Program: NHTSA R&D Frontal Rigid Barrier Test Date: 8/11/2015

Right Rear Passenger: HF Serial No. 019 Injury Summary

Location	Description	Unit	Source	Max	Min
Head	15 ms HIC		Compute	1509.56	
Neck	Upper Neck Force Z	N	1000	3756.01	-862.84
	Upper Neck Moment Y	Nm	600	45.64	-83.40
	NIJ		Compute	1.35	
Chest	Chest Potentiometer Deflection	mm	600		-55.88 ⁽⁴⁾
	Left Ribeye 01 X-Axis Deflection	mm	600	-	-
	Left Ribeye 02 X-Axis Deflection	mm	600	-	-
	Left Ribeye 03 X-Axis Deflection	mm	600	-	-
	Left Ribeye 04 X-Axis Deflection	mm	600	-	-
	Left Ribeye 05 X-Axis Deflection	mm	600	-	-
	Left Ribeye 06 X-Axis Deflection	mm	600	-	-
	Right Ribeye 01 X-Axis Deflection	mm	600	-	-
	Right Ribeye 02 X-Axis Deflection	mm	600	-	-
	Right Ribeye 03 X-Axis Deflection	mm	600	-	-
	Right Ribeye 04 X-Axis Deflection	mm	600	-	-
	Right Ribeye 05 X-Axis Deflection	mm	600	-	-
	Right Ribeye 06 X-Axis Deflection	mm	600	-	-
	Overall Ribeye X-Axis Deflection	mm	600	-	-
	Chest Resultant Acceleration	g	Compute	92.74	
	Chest Resultant Acceleration, 3 ms clip	g	Compute	85.33	
Pelvis	Pelvis Resultant Acceleration	g	Compute	104.96	
	Left ASIS Force X	N	600	31.18	-5761.68
	Right ASIS Force X	N	600	8.93	-5592.90
Femur	Left Femur Force Z	N	600	4940.37	-952.79
	Right Femur Force Z	N	600	4914.07	-943.91
Anomalies					
(4) Channel reached physical stop on spine from 65ms to 115ms					

**SECTION 3
DATA SHEETS**

Test Vehicle: 2015 Toyota Highlander SUV
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: R20155144
Test Date: 8/11/2015

<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	3-15
5	Seat Belt Positioning Data	3-16
6	High-Speed Camera Locations and Data	3-17
7	Vehicle Instrumentation Data	3-19
8	Photographic Reference Target Locations	3-22
9	Test Vehicle Summary of Results	3-23
10	Post-Test Observations	3-24
11	Vehicle Profile Measurements	3-25
12	Accident Investigation Division Data	3-27
13	Vehicle Intrusion Measurements	3-28
14	Summary of FMVSS 212, 219 (Partial), and 301 Data	3-30
	Windshield Periphery Measurements	3-30
	Areas of Protected Zone Failures	3-30
	Fuel System Integrity Post Impact Data	3-31
15	FMVSS 301 Static Rollover Results	3-32
16	Dummy / Vehicle Temperature Stabilization	3-33

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2015 Toyota Highlander SUV
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: R20155144
 Test Date: 8/11/2015

VEHICLE INFORMATION

NHTSA No.	R20155144
Model Year	2015
Make	Toyota
Model	Highlander
Body Style	SUV
VIN	5TDBKRFH5FS177363
Body Color	Red
Odometer Reading (km/mi)	243 km / 151 mi
Engine Displacement. (L)	3.5
Type/No. Cylinders	V6
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	6-Speed
Overdrive	Yes
Final Drive	All Wheel Drive
Roof Rack	No
Sunroof/T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	Yes
Anti-Lock Brakes (ABS)	Yes
All-Wheel Drive (AWD)	Yes
Traction Control System (TCS)	Yes

VEHICLE OPTIONS

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

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

No

DATA FROM CERTIFICATION LABEL

Manufactured By	Toyota Motors Manufacturing Indiana INC
Date of Manufacture	06/15

GVWR (kg)	2720
GAWR Front (kg)	1340
GAWR Rear (kg)	1585

VEHICLE SEATING AND WEIGHT CAPACITY

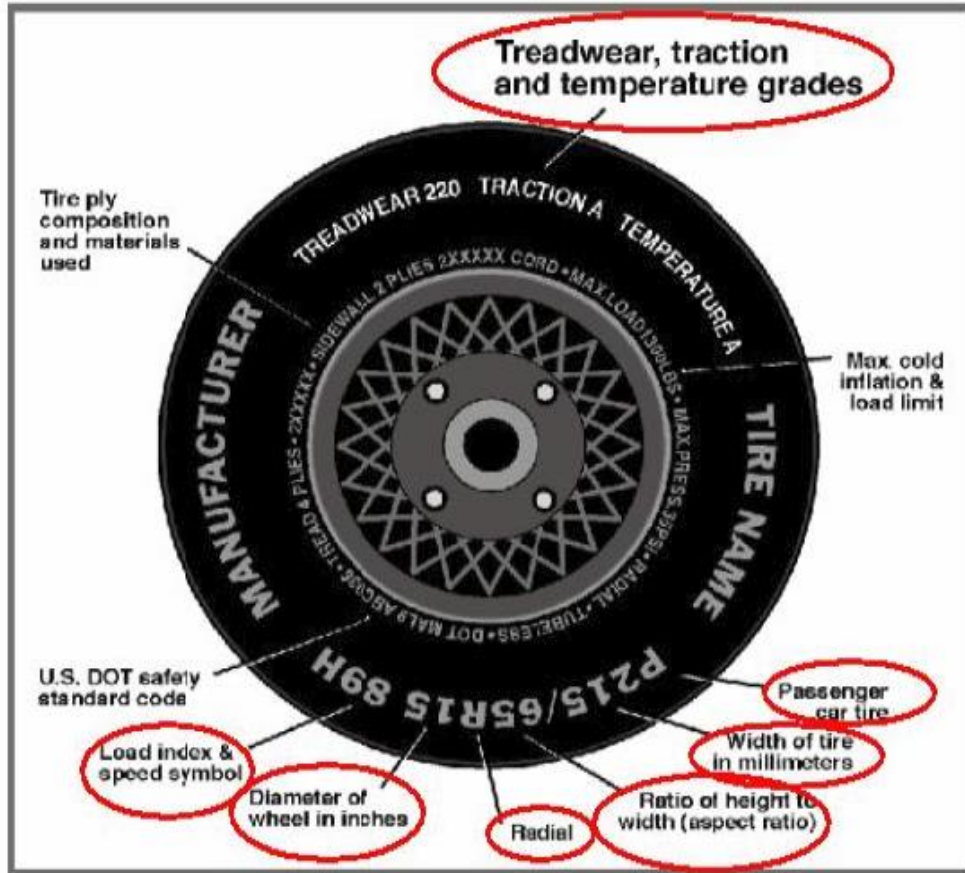
Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Split Bench	Split Bench	
Number of Occupants	2	3	3	8
Capacity Wt. (VCW) (kg)				645
Cargo Wt. (RCLW) (kg)				100.68

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

Test Vehicle: 2015 Toyota Highlander SUV
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: R20155144
 Test Date: 8/11/2015

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



Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	240	240
Recommended Tire Size	P225/60R18	P225/60R18
Tire Size on Vehicle	P225/60R18	P225/60R18
Tire Manufacturer	Bridgestone	Bridgestone
Tire Model	Dueller	Dueller
Treadwear	640	640
Traction	A	A
Temperature Grades	B	B
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Polyester, 2 Steel, 1 Nylon	2 Polyester, 2 Steel, 1 Nylon
Load Index/Speed Symbol	104T	104T
Tire Material	Rubber	Rubber
DOT Safety Code Right	7XVD4212115	7XVD4212115
DOT Safety Code Left	7XVD4212115	7XVD4212115

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

Test Vehicle: 2015 Toyota Highlander SUV
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: R20155144
 Test Date: 8/11/2015

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	550	479		587	586	
Right	kg	553	447		585	577	
Ratio	%	54%	46%		50.2%	49.8%	
Totals	kg	1103	926	2029	1172	1163	2335

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	2029
Weight of 1 THOR & 2 HIII 5 th Females	kg	211
Rated Cargo/Luggage Weight (RCLW)	kg	100.68
Calculated Vehicle Target Weight (TVTW)	kg	2340.68

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	902	899	895	897	1275
As Tested	mm	892	892	858	857	1391
Post Test	mm	902	884	974	852	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2793
Total Vehicle Length at Left Side	mm	4774
Total Vehicle Length at Centerline	mm	4857
Total Vehicle Length at Right Side	mm	4772
Weight of Ballast in Cargo Area	kg	54
Weight of Vehicle Components Removed	kg	66
Amount of Stoddard Solvent in Fuel Tank	L	67.5

LIST OF COMPONENTS REMOVED TO MEET TEST WEIGHT:

Trunk carpeting and plastics, jack, tail light, rear air condition unit, driver rear window, third row seat.

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

Test Vehicle: 2015 Toyota Highlander SUV
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: R20155144
 Test Date: 8/11/2015

TARGET VEHICLE STRUCTURAL MEASUREMENT

	Elements		Pre-Test
1	Total Length	mm	4857
2	Total Width	mm	1898
3*	Bumper Top Height	mm	620
4*	Bumper Bottom Height	mm	507
5*	Longitudinal Member Top Height	mm	622
6	Distance Between Longitudinal Members	mm	1115
7	Longitudinal Member Width	mm	93
8*	Engine Top Height	mm	852
9*	Engine Bottom Height	mm	251
10	Engine and Gearbox Width	mm	499
11	Front Bumper-Engine Distance	mm	512
12*	Front Shock Absorber Fixing Height	mm	1032
13*	Bonnet Leading Edge Height	mm	998
14	Front Shock Absorber Fixing Width	mm	1170
15	Front Bumper – Front Axle Distance	mm	962
16	Front Axle – A Pillar Distance	mm	361
17	A-Pillar – B-Pillar Distance	mm	1261
18	B-Pillar – Rear Axle Distance	mm	1170
19	B-Pillar – C-Pillar Distance	mm	1005
20*	Roof Sill Bottom Height	mm	1589
21*	Roof Sill Top Height	mm	1638
22*	Floor Sill Bottom Height	mm	478
23*	Floor Sill Top Height	mm	502

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

DATA SHEET NO. 2

SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL

Test Vehicle: 2015 Toyota Highlander SUV
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

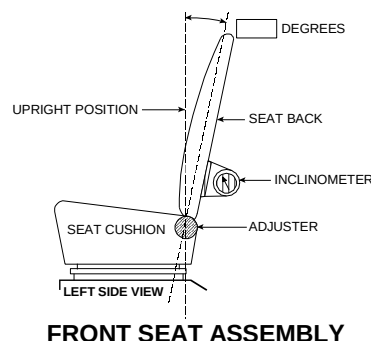
NHTSA No.: R20155144
 Test Date: 8/11/2015

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 and THOR Seating Procedure.

Passenger Seat: The passenger seat back was positioned according to the Nominal Design Riding position listed in FORM 1. Rear Passenger seatback is a fixed angle.



	Deg.
Driver Seat Back Angle	3.0
Passenger Seat Back Angle	1.4
Rear Passenger Seat Back Angle	6.1

SEAT FORE/AFT POSITIONS

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

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

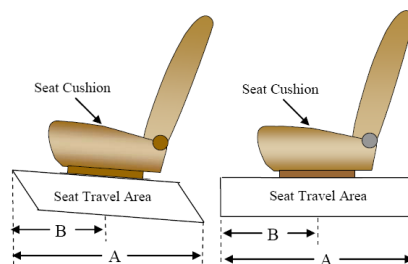
	Total Fore/Aft Travel	Placed in Position #
Driver Seat	260	130
Passenger Seat	27 (0-26)	13
Rear Passenger Seat	11 (0-10)	10 (rearmost)

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
Rear Passenger Seat	FIXED	FIXED



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

Test Vehicle: 2015 Toyota Highlander SUV
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: R20155144
 Test Date: 8/11/2015

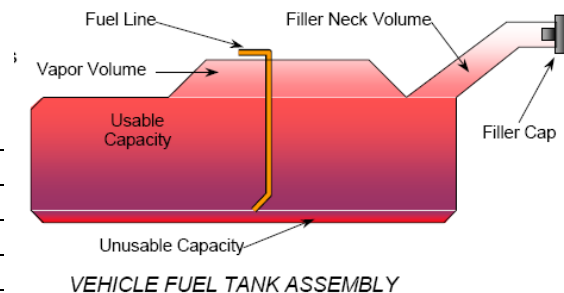
FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank"	72.6
Usable Capacity of "Optional Tank"	
93% of Usable Capacity	67.5
Actual Amount of Solvent Used	67.5
1/3 of Usable Capacity	24.2

FUEL PUMP

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

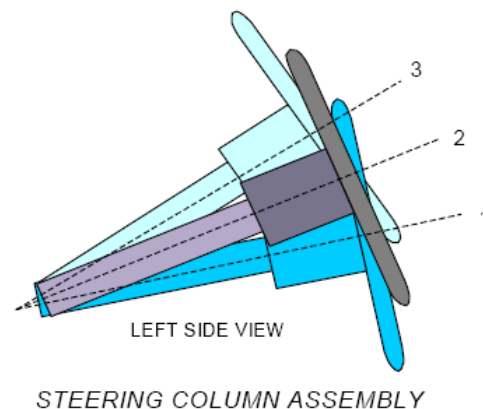
Fuel evacuated according to the specifications provided by the manufacturer in Form 1. Electric fuel pump operates when the ignition is in the 'on' position and the engine is running. The fuel filler neck is located above the left rear wheel.



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)



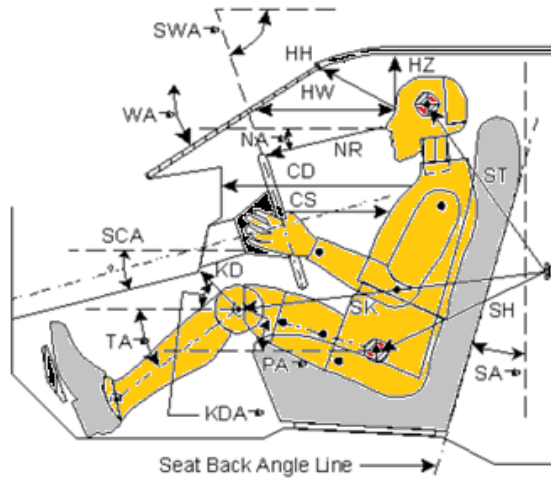
STEERING COLUMN POSITIONS

	Tilt (degrees)	Fore/Aft Position (mm)
Lowermost position No. 1	24.7	
Geometric center position No. 2	26.3	
Uppermost position No. 3	27.9	
Telescoping Steering Wheel Travel		40
Test Position	26.3	20

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2015 Toyota Highlander SUV
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: R20155144
 Test Date: 8/11/2015

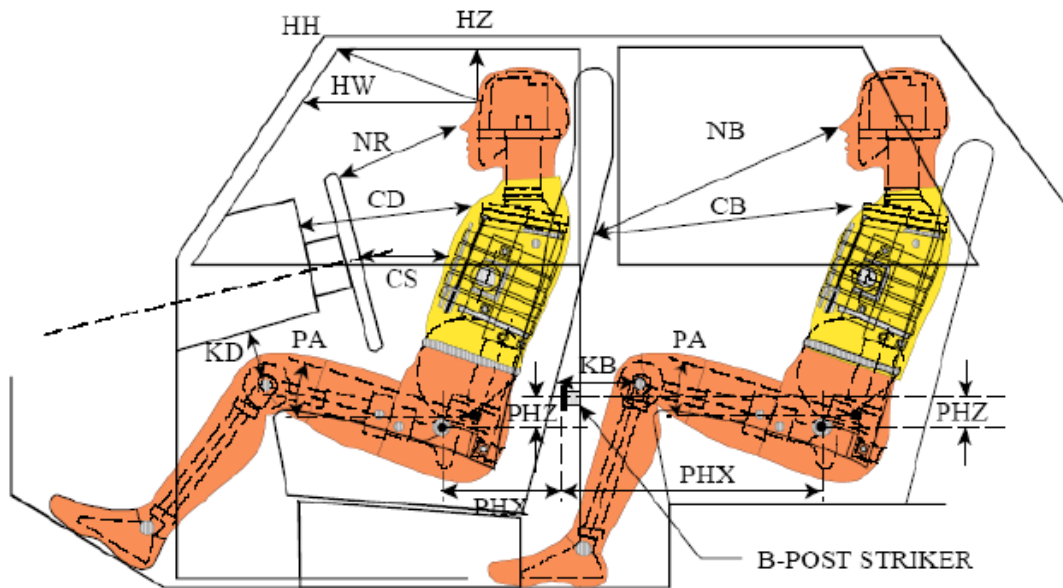


Code	Measurement Description	Driver (Serial # THOR DL9207)		Front Passenger (Serial # 324)	
		Length (mm)	Angle(°)	Length (mm)	Angle (°)
WA°	Windshield Angle		32		
SWA°	Steering Wheel Angle		27.1		
SCA°	Steering Column Angle		62.9		
SA°	Seat Back Angle (on headrest post)		5.2		1.4
HZ	Head to Roof (Z)	233	90	298	90
HH	Head to Header	452	20.1	430	34.9
HW	Head to Windshield	728	0	777	0
NR	Nose to Rim	504	17.8	554	20.1
CD	Chest to Dash	592		525	
CS	Chest to Steering Hub	373	1.2		
RA	Rim to Abdomen	205	0		
KDL	Left Knee to Dash	130	22.7	195	35.8
KDR	Right Knee to Dash	128	19.2	203	33.7
PA°	Pelvic Angle		32.5		19.8
TA°	Tibia Angle		44.7		43.6
SK	Striker to Knee	638	-6	608	-11.9
ST	Striker to Head	478	-84	404	-71.4
SH	Striker to H-Point	304	-37.7	315	-34.6
HAX°	Head Angle (X)		0.4		
HAY°	Head Angle (Y)		-3.0		
TAX°	T6 Angle (X)		-0.2		
TAY°	T6 Angle (Y)		21.5		
TAX°	T1 (X)		-0.2		
TAY°	T1 (Y)		0.1		
TAX°	T12 (X)		-0.3		
TAY°	T12 (Y)		30.2		
	Pelvis (X)		-1.0		
	Pelvis (Y)		32.5		

DATA SHEET NO. 3 (CONTINUED)
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2015 Toyota Highlander SUV
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: R20155144
 Test Date: 8/11/2015



LEFT SIDE VIEW

NOTE: 2-DOOR VEHICLE SHOWN.
 REAR DUMMY PHX & PHZ
 MEASUREMENTS FOR A 4-DOOR
 VEHICLE WOULD USE THE C-POST
 STRIKER AS A REFERENCE POINT

Code	Measurement Description	Rear Passenger (Serial # 019)	
		Length (mm)	Angle (°)
SA°	Seat Back Angle (on headrest post)		6.1
HZ	Head to Roof (Z)	332	
NR	Nose to Seatback	648	
CB	Chest to Seatback	662	
KDL	Left Knee to Seatback	410	20.2
KDR	Right Knee to Seatback	401	20.3
PAX°	Pelvic Tilt Angle (X-axis)		0
PAY°	Pelvic Tilt Angle (Y-axis)		19.0
PHX	Hip Point to Striker (X-Axis)	315	
PHZ	Hip Point to Striker (Z-Axis)	297	

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

Test Vehicle: 2015 Toyota Highlander SUV
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: R20155144
 Test Date: 8/11/2015

MEASUREMENT LOCATIONS

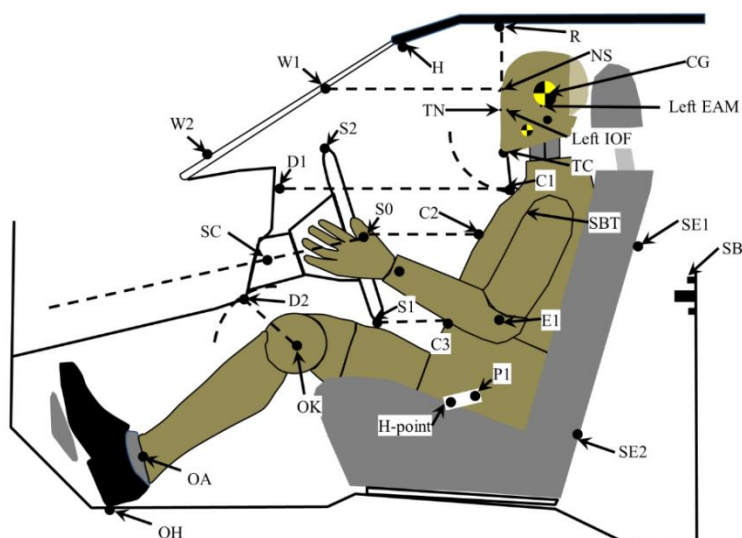


DIAGRAM #1

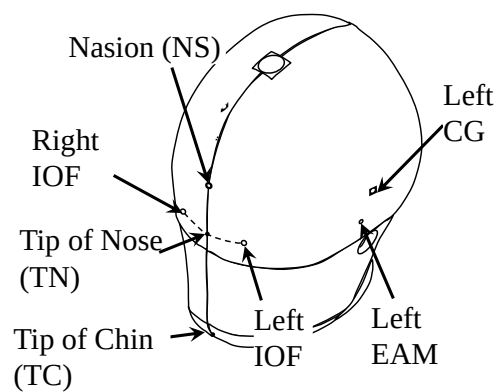


DIAGRAM #2

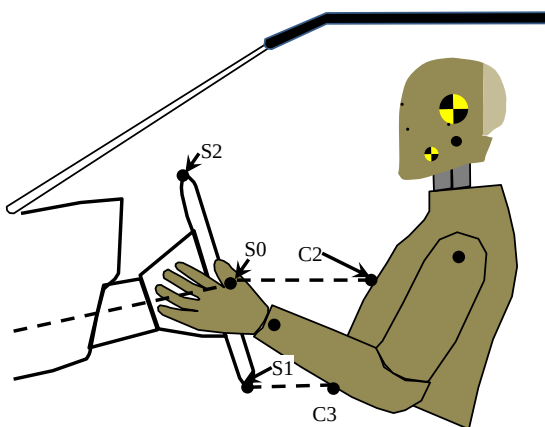


DIAGRAM #3

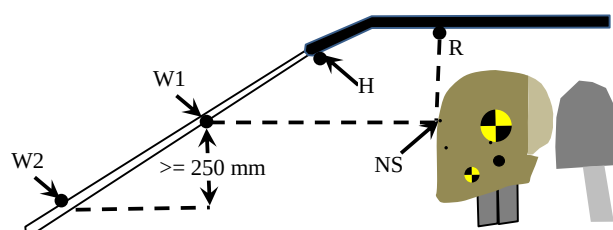


DIAGRAM #4

DATA SHEET NO.3 (CONTINUED)
DUMMY CMM MEASUREMENTS

Test Vehicle: 2015 Toyota Highlander SUV
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: R20155144
 Test Date: 8/11/2015

DRIVER MEASUREMENT PONITS

Description	Units	Driver		
		X	Y	Z
Tip of Striker	mm	2369	-847	-312
Top of Head Restraint	mm	2283	-408	-891
Outboard Head Restraint Post	mm	2218	-487	-649
Head CG	mm	2419	-483	-787
Nasion	mm	2516	-406	-792
Tip of Nose	mm	2513	-409	-755
Tip of Chin	mm	2506	-408	-656
LEAM	mm	2425	-479	-759
LIOF	mm	2510	-439	-754
RIOF	mm	2510	-375	-753
Outboard Elbow	mm	2631	-635	-339
H-Point	mm	2610	-602	-126
Center of H-Point Tool	mm	2535	-650	-156
Left Knee	mm	3003	-625	-245
Right Knee	mm	3023	-306	-226
Left Ankle	mm	3296	-628	55
Right Heel	mm	3301	-595	189
Left Heel	mm	3345	-225	182
W1 – Upper Windshield	mm	3255	-407	-791
W2 – Lower Windshield	mm	3422	-407	-690
Header	mm	2937	-407	-949
Head to Roof	mm	2516	-407	-1029
C1- Upper Chest	mm	2543	-407	-509
C2 – Mid Chest	mm	2547	-408	-500
C3 – Lower Chest	mm	2635	-407	-332
S2 – Top Steering Wheel Rim	mm	2999	-407	-658
S1 – Lower Steering Wheel Rim	mm	2840	-407	-334
SC – Steering Column	mm	3125	-503	-382
D1 – Dash Point	mm	2923	-410	-510
D2 – Knee Bolster	mm	3123	-622	-297
SE1 – Seatback Point	mm	2176	-407	-522
SE2 – Seatback Point	mm	2341	-405	-89
Left Front Outboard Seat Anchor Bolt	mm	2854	-602	154
Left Rear Outboard Seat Anchor Bolt	mm	2338	-637	168

Reference point:

- +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.3 (CONTINUED)
DUMMY CMM MEASUREMENTS

Test Vehicle: 2015 Toyota Highlander SUV
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: R20155144
 Test Date: 8/11/2015

FRONT PASSENGER MEASUREMENT POINTS

Description	Units	Front Passenger		
		X	Y	Z
Tip of Striker	mm	2370	840	-308
Top of Head Restraint	mm	2358	403	-898
Outboard Head Restraint Post	mm	2273	487	-684
Head CG	mm	2498	474	-691
Bridge of Nose	mm	2585	402	-697
Tip of Nose	mm	2606	403	-668
Tip of Chin	mm	2592	403	-598
Outboard Shoulder Bolt	mm	2476	563	-459
Outboard Elbow	mm	2561	620	-256
H-Point	mm	2628	690	-129
Center of H-Point Tool	mm	2544	680	-164
Left Knee	mm	2963	345	-178
Right Knee	mm	2964	509	-183
Left Ankle	mm	3189	324	88
Right Ankle	mm	3183	484	90
Left Heel	mm	3200	308	190
Right Heel	mm	3197	480	192
W1 – Upper Windshield	mm	3400	402	-697
W2 – Lower Windshield	mm	3569	402	-587
Header	mm	2937	403	-943
Head up to Roof	mm	2584	403	-1006
C1 - Upper Chest	mm	2590	402	-459
D1 - Dash Point	mm	3120	402	-460
D2 - Dash Bolster	mm	3121	344	-288
SE1 - Seat Back Point	mm	2223	400	-565
SE2 - Seat Back Point	mm	2357	403	-119
Right Front Outboard Seat Anchor Bolt	mm	2854	600	154
Right Rear Outboard Seat Anchor Bolt	mm	2338	638	168

Reference point:

- +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.3 (CONTINUED)
DUMMY CMM MEASUREMENTS

Test Vehicle: 2015 Toyota Highlander SUV
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: R20155144
 Test Date: 8/11/2015

Description	Units	Rear Passenger		
		X	Y	Z
Tip of Striker	mm	1306	823	-459
Top of Head Restraint	mm	1243	395	-896
Outboard Head Restraint Post	mm	1221	463	-694
Head CG	mm	1465	462	-723
Bridge of Nose	mm	1551	395	-728
Tip of Nose	mm	1573	395	-697
Tip of Chin	mm	1556	396	-622
Outboard Shoulder Bolt	mm	1463	547	-485
Outboard Elbow	mm	1485	625	-270
H-Point	mm	1621	614	-162
Center of H-Point Tool	mm	1536	613	-196
Left Knee	mm	1944	345	-206
Right Knee	mm	1951	505	-210
Left Ankle	mm	2121	324	92
Right Ankle	mm	2117	481	95
Left Heel	mm	2055	286	166
Right Heel	mm	2052	463	163
Head up to Roof	mm	1551	396	-1057
C1 - Upper Chest	mm	1567	396	-489
D1 - Dash Point	mm	2265	395	-491
D2 - Dash Bolster	mm	2323	344	-352
SE1 - Seat Back Point	mm	1177	396	-634
SE2 - Seat Back Point	mm	1288	395	-265

Reference point:

- +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

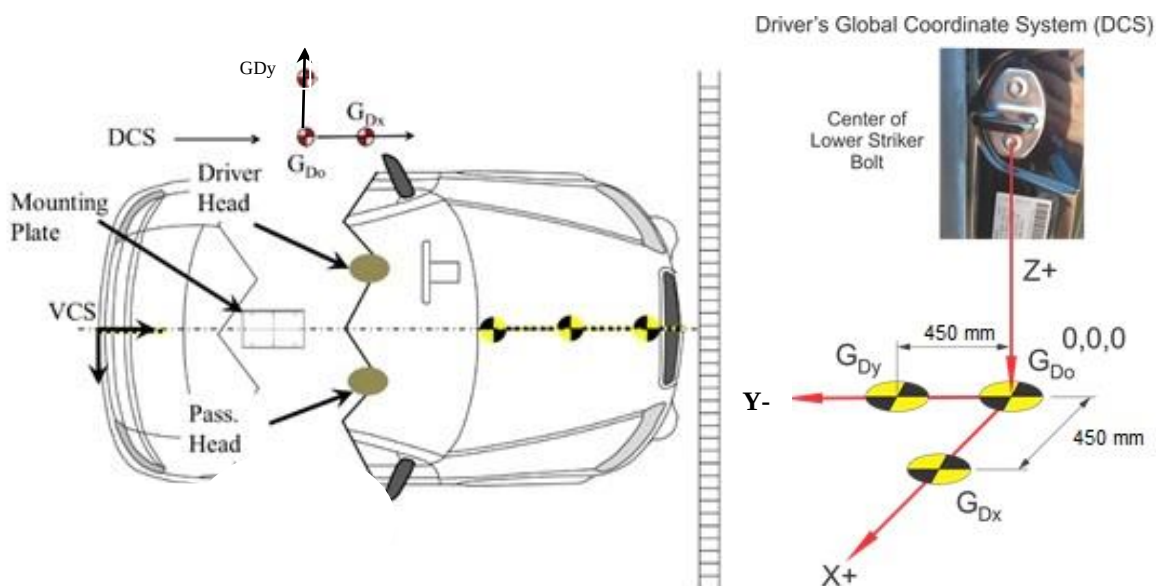
DATA SHEET NO.3 (CONTINUED)

DUMMY CMM MEASUREMENTS

Test Vehicle: 2015 Toyota Highlander SUV
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: R20155144
 Test Date: 8/11/2015

DRIVER GLOBAL COORDINATE SYSTEM



Driver ATD Measurement Points

Measurement Points	Units	Measurements (mm)		
		X	Y	Z
Head CG	mm	83	361	-1386
Nasion	mm	179	437	-1390
Tip of Nose	mm	177	435	-1353
Tip of Chin	mm	169	436	-1254
LEAM	mm	89	365	-1357
LIOF	mm	173	405	-1353
RIOF	mm	174	469	-1352

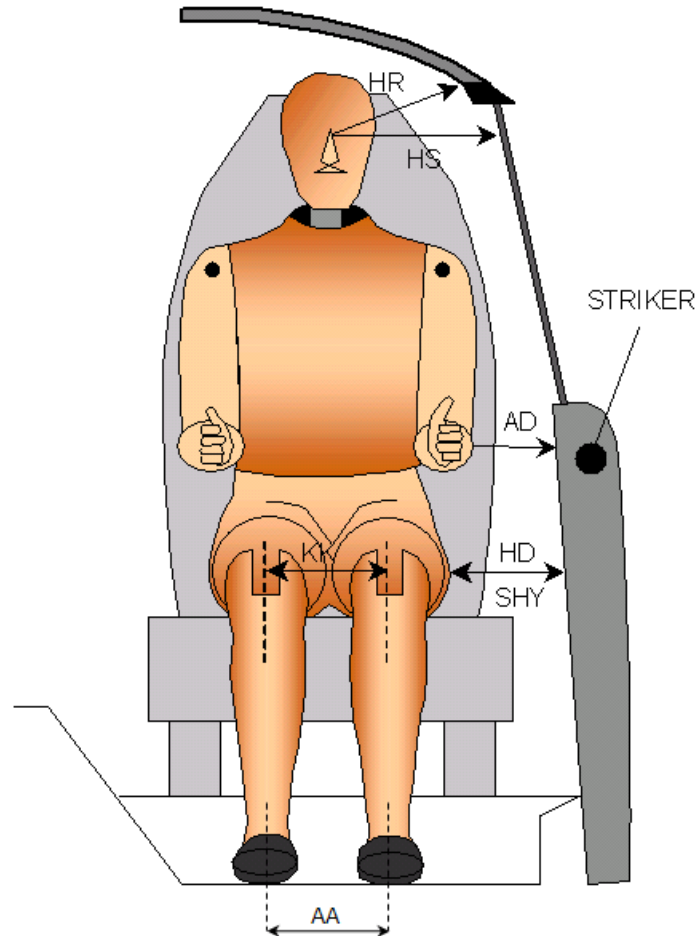
Reference point:

- +X – From GD_0 to the front of the vehicle
- +Y – From GD_0 to the right side of the vehicle
- +Z – From GD_0 into the ground

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2015 Toyota Highlander SUV
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: R20155144
 Test Date: 8/11/2015

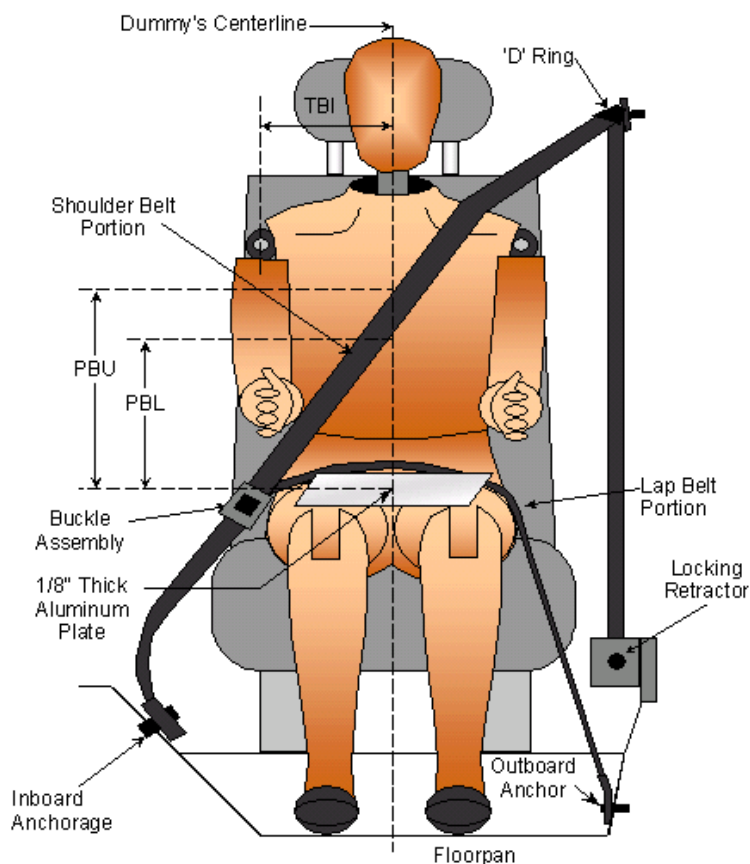


Code	Description	Units	Driver	Front Passenger	Rear Passenger
AD	Arm to Door	mm	150	96	93
HD	H-Point to Door	mm	132	156	181
HR	Head to Side Header	mm	234	290	290
HS	Head to Side Window	mm	354	385	378
KK	Knee to Knee	mm	270	166	161
SHY	Striker to H-Point (Y Direction)	mm	235	265	290
AA	Ankle to Ankle	mm	368	167	162

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

Test Vehicle: 2015 Toyota Highlander SUV
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: R20155144
 Test Date: 8/11/2015



SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger	Rear Pass.
PBU — Top surface of reference to belt upper edge	mm	345	280	275
PBL — Top surface of reference to belt lower edge	mm	270	220	200

BELT LENGTH DATA

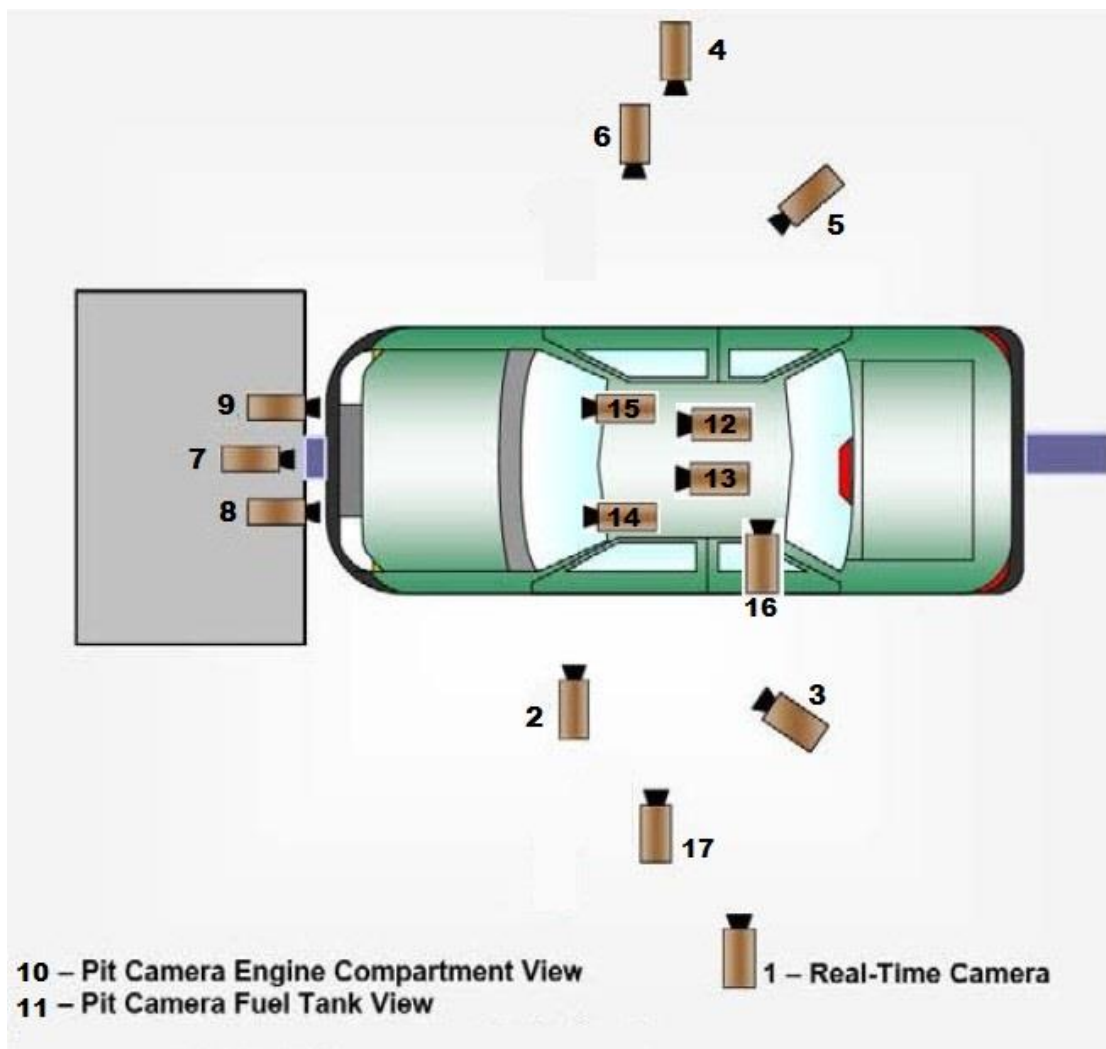
Measurement Description	Units	Driver	Passenger	Rear Pass.
Shoulder belt length as measured on ATD	mm	865	905	875
Lap Belt Length as measured on ATD	mm	960	905	630
Remainder of belt on reel	mm	795	830	1195
Total belt length for continuous webbing systems	mm	2620	2640	2700

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

Test Vehicle: 2015 Toyota Highlander SUV
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: R20155144
Test Date: 8/11/2015

HORIZONTAL LOCATION



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

Test Vehicle: 2015 Toyota Highlander SUV
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: R20155144
 Test Date: 8/11/2015

CAMERA LOCATIONS

No.	Camera View	Location (mm)			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Side	--	--	--	Zoom	30
2	Left Front Half	-1019	-10279	-1604	50	1000
3	Left Angle	-2140	-9091	-2220	28	1000
4	Right Overall	-2014	9267	-1151	24	1000
5	Right Angle	-2636	3068	-2197	28	1000
6	Right Front Half	-990	6789	-1192	28	1000
7	Windshield	100	0	-3525	20	1000
8	Driver Windshield	-450	-606	-1989	25	1000
9	Passenger Windshield	-450	606	-1989	25	1000
10	Pit Front	-810	0	1530	13	1000
11	Pit Rear	-2515	0	1521	13	1000
12	Onboard Driver Airbag	-2680	178	-1257	12.5	1000
13	Onboard Passenger Airbag	-2680	-282	-1257	12.5	1000
14	Onboard Driver Toepan	-2062	-401	-299	6.5	1000
15	Onboard Front Passenger Toepan	-2062	401	-299	6.5	1000
16	Onboard Rear Passenger Side View	-3022	-659	-883	12.5	1000
17	Left Overall	-2097	-9119	-1610	24	1000

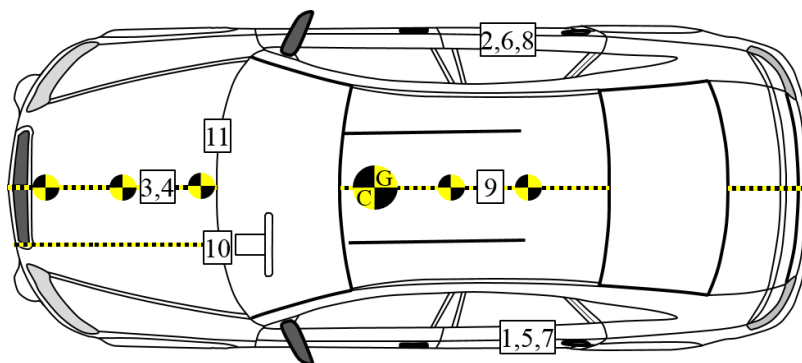
Reference:

- +X – forward of impact plane
- +Y – Right of monorail center
- +Z – into ground

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

Test Vehicle: 2015 Toyota Highlander SUV
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: R20155144
Test Date: 8/11/2015



VEHICLE INSTRUMENTATION PRE-TEST LOCATIONS

No.	Instrumentation Location	Axes	Units	Measurements (mm)		
				X	Y	Z
1	Left Rear Seat Cross Member	X,Z	mm	1989	-418	150
2	Right Rear Seat Cross Member	X,Z	mm	1989	425	148
3	Top of Engine	X	mm	4183	-41	-217
4	Bottom of Engine	X	mm	4299	206	387
5	Left Sill	X,Y	mm	2107	-705	162
6	Right Sill	X,Y	mm	2109	702	161
7	Left Rear Seat Cross Member Redundant	X,Z	mm	2094	-707	162
8	Right Rear Seat Cross Member Redundant	X,Z	mm	2121	703	161
9	Linear Acceleration & Angular Rate Sensor	X	mm	2189	-1	195
		Y	mm	2177	12	196
		Z	mm	2178	1	190
10	Driver Toe Pan	X,Y,Z	mm	3610	-375	-25
11	Front Passenger Toe Pan	X,Y,Z	mm	3609	376	-21

Reference point: Origin at rear centerline of vehicle. Vertical coordinate point for origin determined with contact of vehicle structure by 10 mm deep block moved downward along front edge of a level. The level is positioned perpendicular to ground and in contact with rear centerline of vehicle.

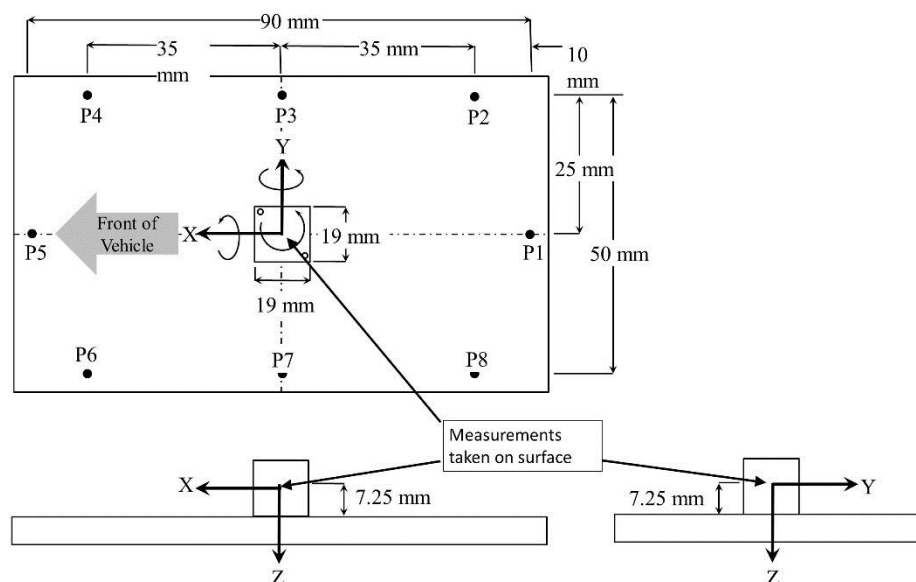
- +X – From the rear of the vehicle to the front of the vehicle
- +Y – From the left side of the vehicle to the right side of the vehicle
- +Z – From the top of the vehicle to the bottom of the vehicle

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

Test Vehicle: 2015 Toyota Highlander SUV
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: R20155144
Test Date: 8/11/2015

ANGULAR RATE SENSOR



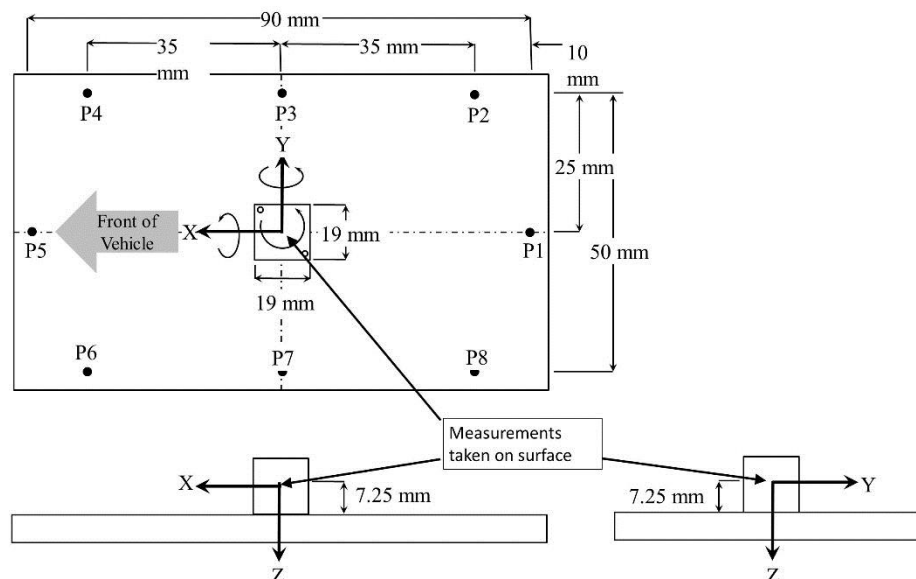
VEHICLE COORDINATE SYSTEM					
No.	Accelerometer Location	Units	Measurements (mm)		
			X	Y	Z
ACC-1	Accelerometer CG – X Direction	mm	2189	-1	195
ACC-2	Accelerometer CG – Y Direction	mm	2177	12	196
ACC-3	Accelerometer CG – Z Direction	mm	2178	1	190
M1	Mounting Bolt 1	mm	2171	-7	190
M2	Mounting Bolt 2	mm	2186	8	189
P1	Plate Point 1	mm	2133	0	204
P2	Plate Point 2	mm	2143	26	203
P3	Plate Point 3	mm	2178	26	204
P4	Plate Point 4	mm	2213	26	204
P5	Plate Point 5	mm	2223	1	205
P6	Plate Point 6	mm	2213	-24	205
P7	Plate Point 7		2178	-24	205
P8	Plate Point 8		2143	-24	204

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

Test Vehicle: 2015 Toyota Highlander SUV
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: R20155144
Test Date: 8/11/2015

ANGULAR RATE SENSOR



DRIVER GLOBAL COORDINATE SYSTEM					
No.	Accelerometer Location	Units	Measurements (mm)		
			X	Y	Z
ACC-1	Accelerometer CG – X Direction	mm	-146	844	-403
ACC-2	Accelerometer CG – Y Direction	mm	-158	857	-403
ACC-3	Accelerometer CG – Z Direction	mm	-157	845	-409
M1	Mounting Bolt 1	mm	-165	838	-409
M2	Mounting Bolt 2	mm	-150	853	-409
P1	Plate Point 1	mm	-202	845	-395
P2	Plate Point 2	mm	-192	870	-395
P3	Plate Point 3	mm	-157	871	-394
P4	Plate Point 4	mm	-122	871	-394
P5	Plate Point 5	mm	-112	846	-394
P6	Plate Point 6	mm	-122	821	-393
P7	Plate Point 7	mm	-157	821	-394
P8	Plate Point 8	mm	-192	821	-394

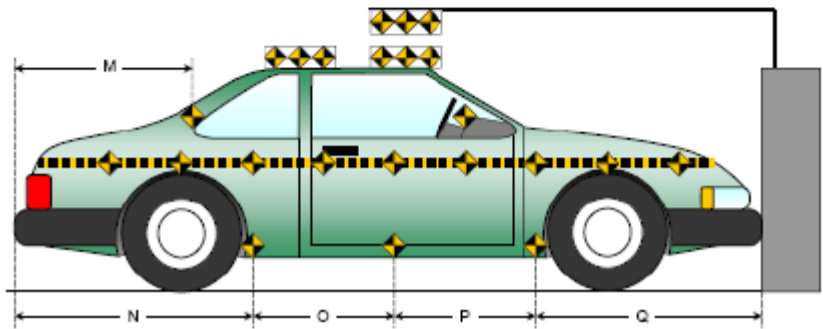
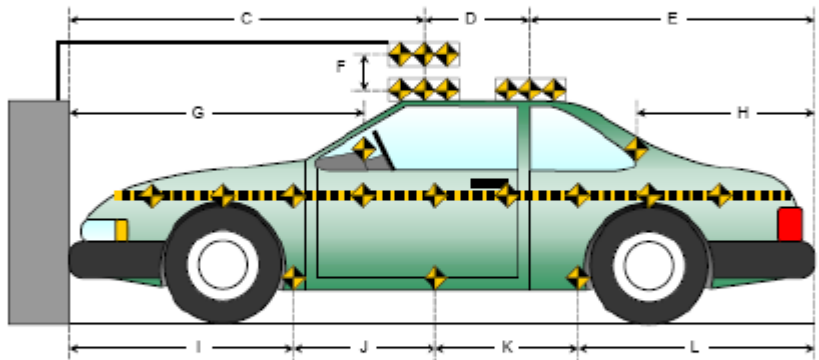
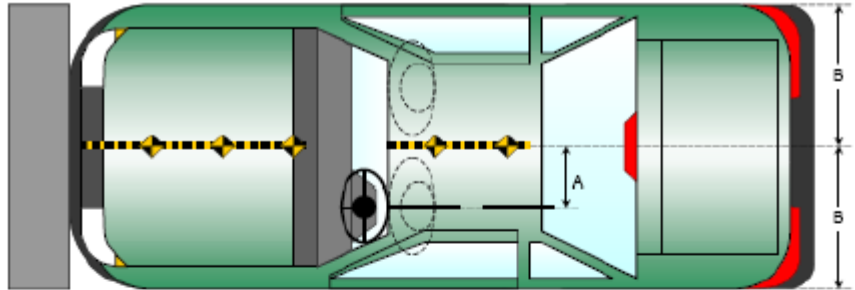
DATA SHEET NO. 8
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2015 Toyota Highlander SUV
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: R20155144
 Test Date: 8/11/2015

Item	Value
A	392
B	949
C	2772
D	608
E	1467
F	127
G	1775
H	1258
I	1517
J	877
K	872
L	1581
M	1253
N	1579
O	865
P	886
Q	1517

All units in millimeters



DATA SHEET NO. 9
TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle: 2015 Toyota Highlander SUV
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: R20155144
Test Date: 8/11/2015

INSTRUMENTATION

Instrumentation	Number of Channels Collected
Driver Dummy Accelerometers	108
Passenger Dummy Accelerometers	74
Rear Passenger Dummy Accelerometers	46
Vehicle Structure Accelerometers	39
Total	267

CAMERA COVERAGE

Type of Camera	Number Used in this Test
High-Speed Vehicle Onboard	5
High-Speed Off-board	11
Real-Time Panning	1
Total	17

DATA SHEET NO. 10
POST TEST OBSERVATIONS

Test Vehicle: 2015 Toyota Highlander SUV
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: R20155144
Test Date: 8/11/2015

TEST DUMMY INFORMATION AND CONTACT LOCATIONS

Description	Driver	Right Front Passenger	Rear Passenger
Dummy Type/Serial No.	DL9207	324	019
Lower Leg Type	LX		
Lower Leg Serial No.	LX0045/LX0046		
Head Contact	Frontal Airbag, Visor & Headrest	Frontal Airbag, Visor & Headrest	Headrest
Upper Torso Contact	Frontal Airbag	None	None
Lower Torso Contact	None	None	None
Left Knee Contact	Knee Airbag	Glove Box	None
Right Knee Contact	Knee Airbag	Glove Box	None

DOOR OPENING AND SEAT TRACK INFORMATION

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

POST TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	Remained in good condition
Windshield Damage	Minor Cracks
Window Damage	None
Other Notable Effects	None

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	378
Center	mm	419
Right Side	mm	407
Average	mm	401

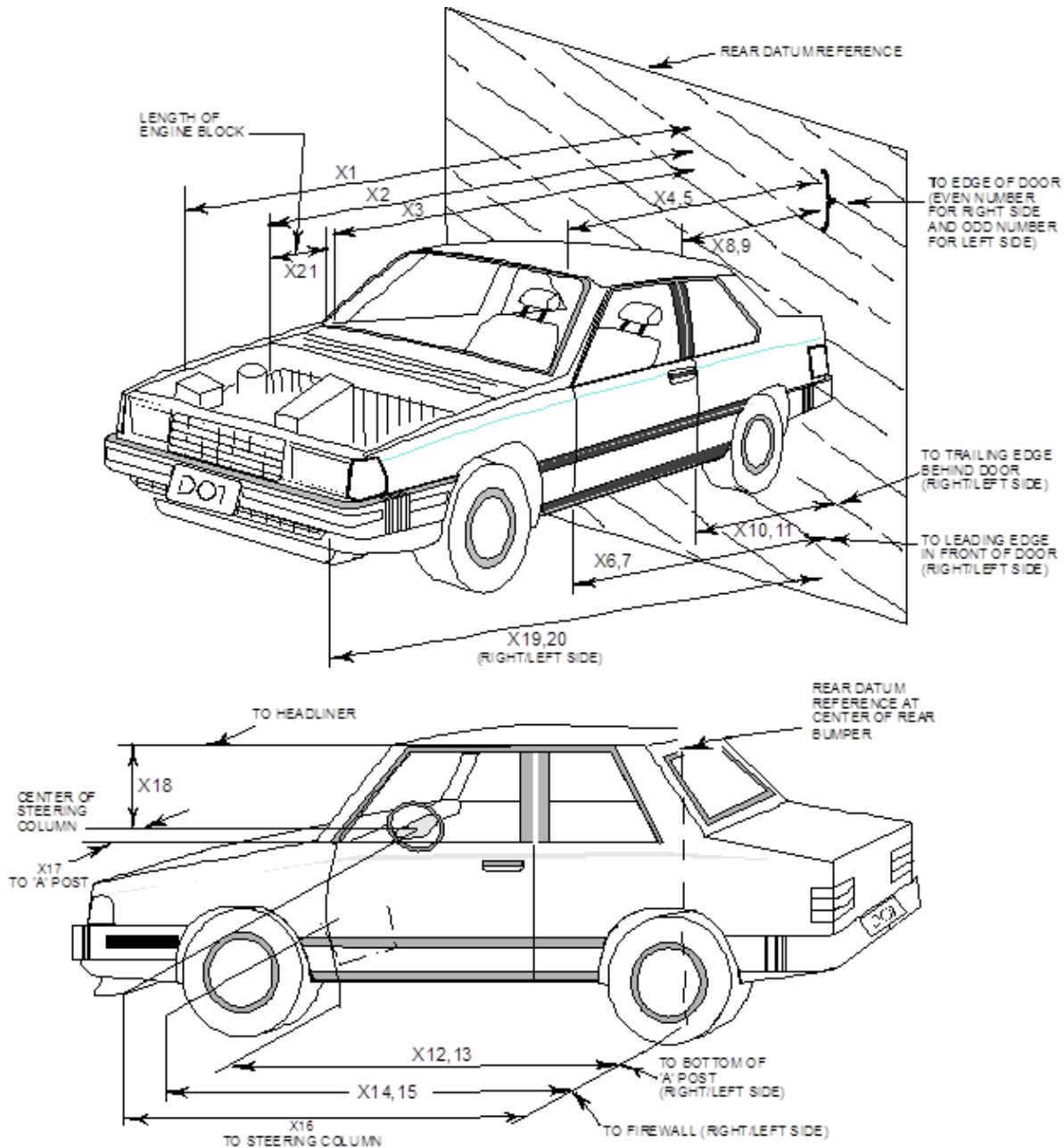
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Driver (Occupant 1)		Right Front Passenger (Occupant 2)		Rear Passenger (Occupant 3)	
	Installed	Deployed	Installed	Deployed	Installed	Deployed
Front Airbag	Yes	Yes	Yes	Yes	No	N/A
Curtain Airbag	Yes	Yes	Yes	Yes	Yes	Yes
Torso Airbag	Yes	Yes	Yes	Yes	No	N/A
Knee Airbag	Yes	Yes	No	N/A	No	N/A
Seat Belt Pretensioner	Yes	Yes	Yes	Yes	No	N/A
Seat Belt Load Limiter	Yes	Yes	Yes	Yes	No	N/A
Other						

DATA SHEET NO. 11 **VEHICLE PROFILE MEASUREMENTS**

Test Vehicle: 2015 Toyota Highlander SUV
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: R20155144
 Test Date: 8/11/2015



DATA SHEET NO. 11 (CONTINUED)
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2015 Toyota Highlander SUV
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: R20155144
 Test Date: 8/11/2015

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	mm	4857	4344	-513
2	Rear Surface of Vehicle (RSOV) to Front of Engine	mm	4345	4071	-274
3	RSOV to Firewall	mm	3910	3825	-85
4	RSOV to Upper Leading Edge of Right Door	mm	3388	3386	-3
5	RSOV to Upper Leading Edge of Left Door	mm	3385	3383	-2
6	RSOV to Lower Leading Edge of Right Door	mm	3355	3357	2
7	RSOV to Lower Leading Edge of Left Door	mm	3354	3354	0
8	RSOV to Upper Trailing Edge of Right Door	mm	2283	2282	-1
9	RSOV to Upper Trailing Edge of Left Door	mm	2280	2280	0
10	RSOV to Lower Trailing Edge of Right Door	mm	2309	2312	3
11	RSOV to Lower Trailing Edge of Left Door	mm	2308	2311	3
12	RSOV to Bottom of "A" Post of Right Side	mm	3665	3453	-212
13	RSOV to Bottom of "A" Post of Left Side	mm	3663	3650	-13
14	RSOV to Firewall, Right Side	mm	3888	3859	-29
15	RSOV to Firewall, Left Side	mm	3890	3864	-25
16	RSOV to Steering Column	mm	2922	2986	64
17	Center of Steering Column to "A" Post	mm	294	290	-4
18	Center of Steering Column to Headliner	mm	428	475	47
19	RSOV to Right Side of Front Bumper	mm	4808	4320	-488
20	RSOV to Left Side of Front Bumper	mm	4809	4347	-462
21	Length of Engine Block	mm	437	437	0
RD	RSOV to Right Side of Dash Panel	mm	3142	3142	0
CD	RSOV to Center of Dash Panel	mm	3109	3109	0
LD	RSOV to Left Side of Dash Panel	mm	3140	3141	1

UR* = Unrecoverable Data Point

DATA SHEET NO. 12
ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2015 Toyota Highlander SUV
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: R20155144
Test Date: 8/11/2015

VEHICLE INFORMATION

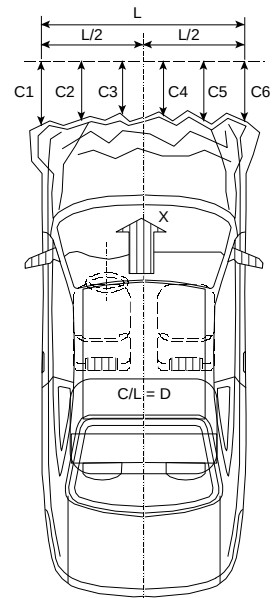
VIN: 5TDBKRFH5FS177363 Wheelbase (mm): 2793
Vehicle Size Category: Passenger Test Weight (kg): 2335

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): 56.41
Velocity Change (kph): 56.41

CRUSH PROFILE

Collision Deformation Classification: 12FDEW3
Midpoint of Damage: C4 & C3
Damage Region Length (mm): 1583
Impact Mode: Frontal Barrier



Crush Measurements: Bumper Cover

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	4616	4325	-291
C2	Crush zone 2 at left side	mm	4795	4338	-457
C3	Crush zone 3 at left side	mm	4837	4324	-513
C4	Crush zone 4 at right side	mm	4838	4287	-551
C5	Crush zone 5 at right side	mm	4797	4311	-486
C6	Crush zone 6 at right side	mm	4621	4323	-298
L	C1 to C6	mm	1583	1656	74
	Logitudinal horizontal distance from the tip of the front bumper to the base of the windshield	mm	1,118	607	-511

DATA SHEET NO. 13
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2015 Toyota Highlander SUV
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

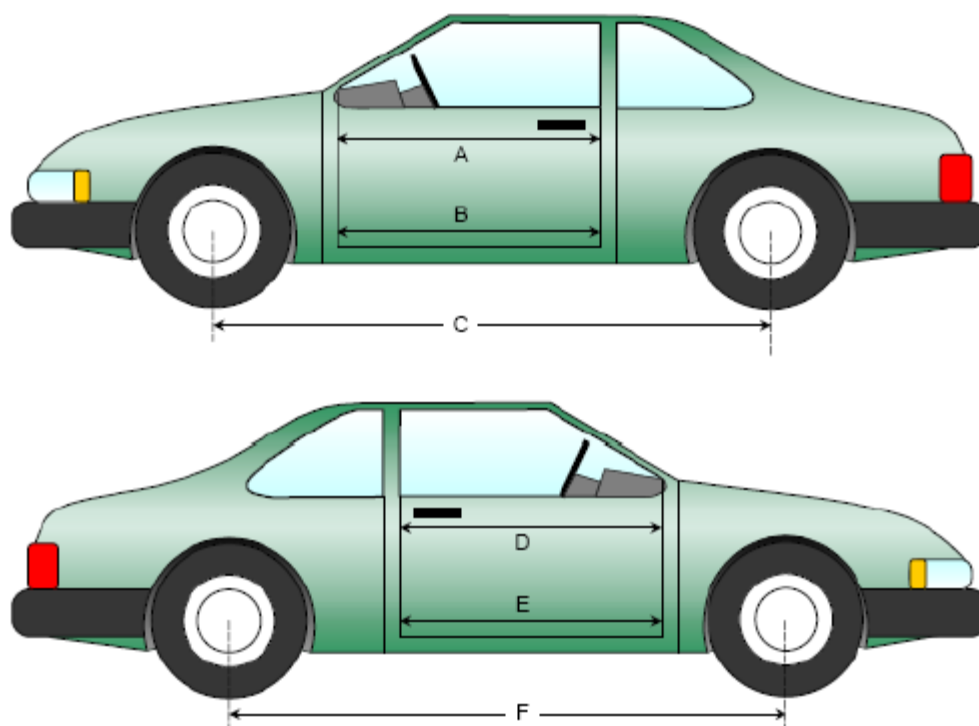
NHTSA No.: R20155144
Test Date: 8/11/2015

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	994	994	0
B	Left Side Lower	mm	832	833	1
D	Right Side Upper	mm	1001	1002	1
E	Right Side Lower	mm	833	835	2

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2793	2736	-57
F	Right Side Wheelbase	mm	2793	2751	-42



Left & Right Side Views

DATA SHEET NO.13 (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

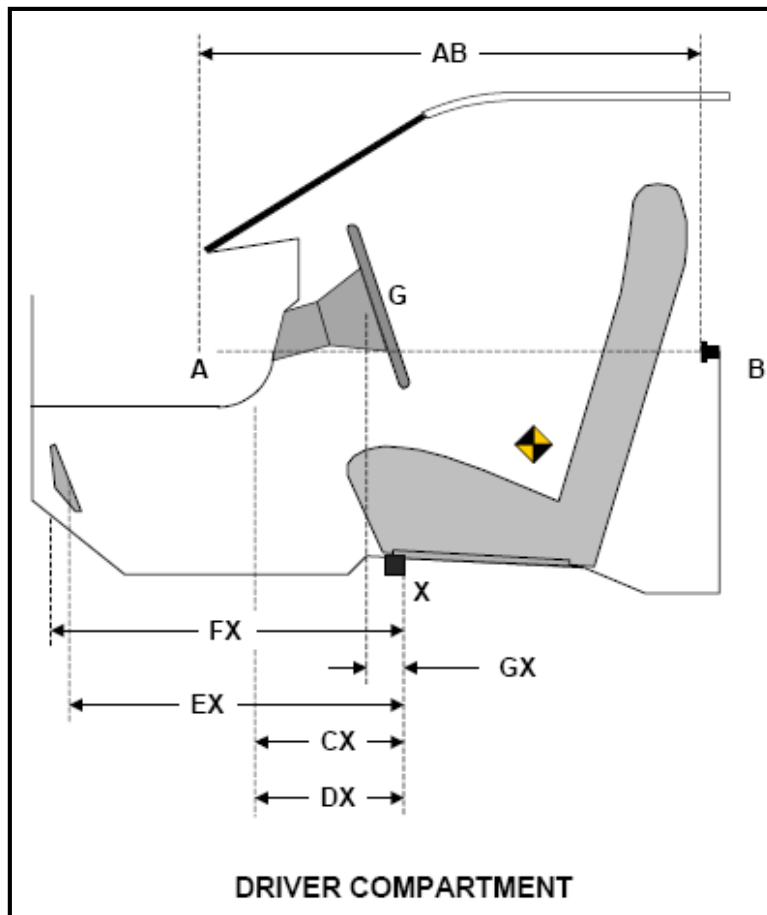
Test Vehicle: 2015 Toyota Highlander SUV
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: R20155144
 Test Date: 8/11/2015

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	839	836	-3
CX	Left Knee Bolster to X	mm	279	291	12
DX	Right Knee Bolster to X	mm	279	284	5
EX	Brake Pedal to X	mm	579	605	26
FX	Foot Rest to X	mm	647	630	-17
GX	Center of Steering Column Wheel Hub to X	mm	58	126	68

X = Front of Seat Track (Stationary)



DATA SHEET NO. 14
SUMMARY OF FMVSS 212, 219 (PARTIAL), AND 301 DATA

Test Vehicle: 2015 Toyota Highlander SUV
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: R20155144
 Test Date: 8/11/2015

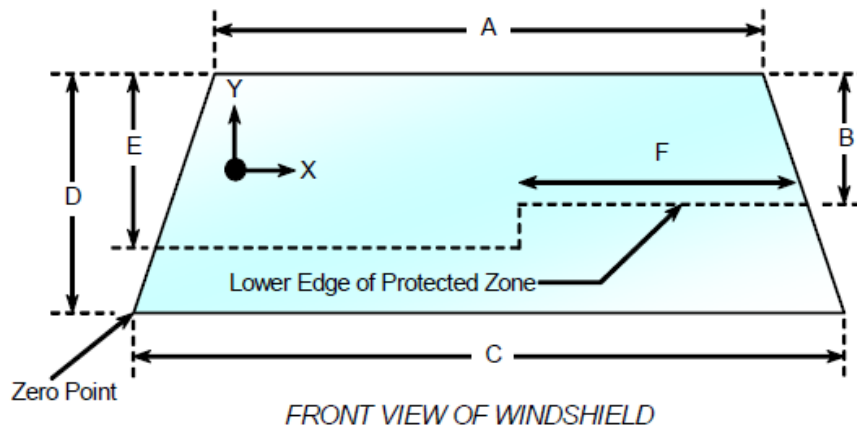
Please provide windshield mounting details. A 0.8 mm trim surrounds the top and side of windshield while a plastic shroud is on the bottom.

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	2255	2255	100%
Right Side	2255	2255	100%
Total	4510	4510	100%



Item	Units	Value
A	mm	1280
B	mm	470
C	mm	1590
D	mm	820
E	mm	480
F	mm	450

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. 14 (CONTINUED)
SUMMARY OF FMVSS 212, 219 (PARTIAL), AND 301 DATA

Test Vehicle: 2015 Toyota Highlander SUV
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: R20155144
Test Date: 8/11/2015

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

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

Test Time: 2:50 PM

Stoddard Solvent Spillage Measurements

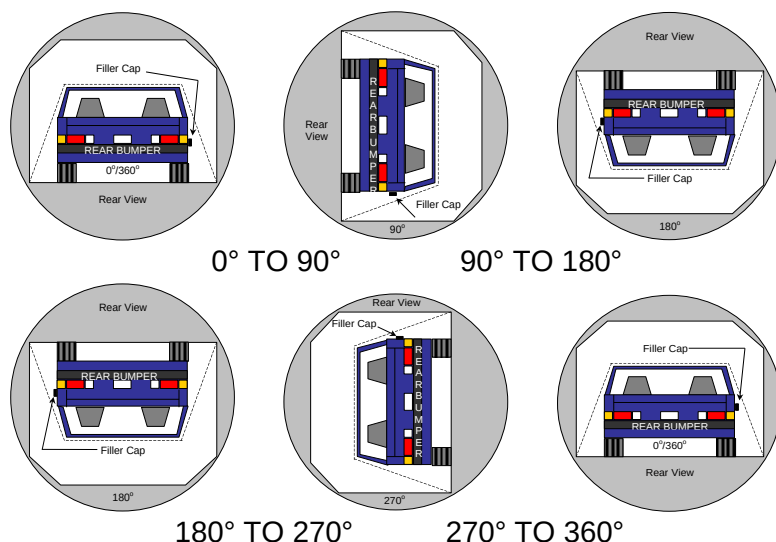
A.	From impact until vehicle motion ceases: (Maximum allowable = 1 oz.)	<u>0</u>	oz
B.	For the 5-minute period after motion ceases: (Maximum allowable = 5 oz.	<u>0</u>	oz
C.	For the following 25 minutes: (Maximum allowable = 1 oz./minute	<u>0</u>	oz
D.	Spillage	<u>0</u>	oz

DATA SHEET NO. 15

FMVSS 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2015 Toyota Highlander SUV
 Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: R20155144
 Test Date: 8/11/2015



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°	72	300	372
90° to 180°	64	300	364
180° to 270°	62	300	362
270° to 360°	66	300	366

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	

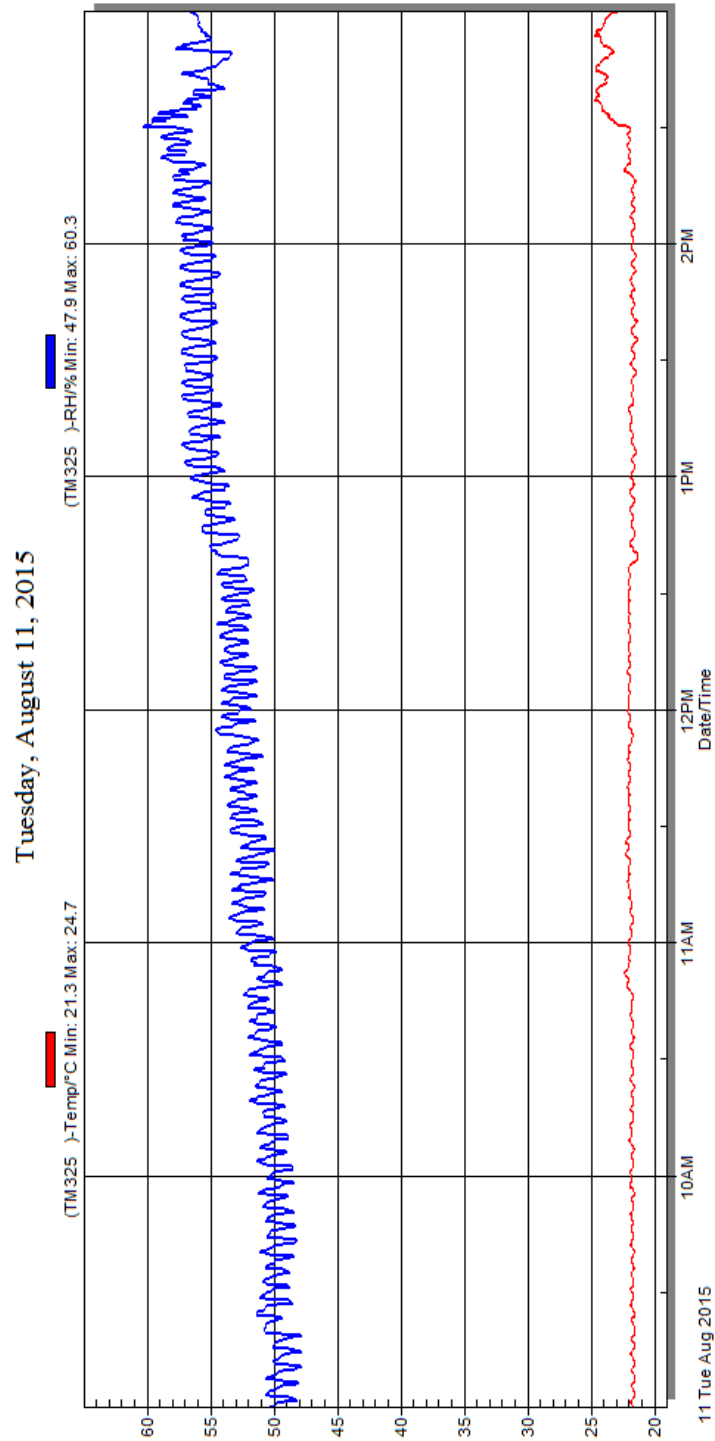
SOLVENT SPILLAGE LOCATION TABLE

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

DATA SHEET NO. 16
DUMMY/VEHICLE TEMPERATURE STABILIZATION

Test Vehicle: 2015 Toyota Highlander SUV
Test Program: 56.3 KPH Research Frontal Rigid Barrier Test

NHTSA No.: R20155144
Test Date: 8/11/2015



Temperature Stabilization Chart/Data

APPENDIX A
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

Fig.	Description	Page
1	Load Cell Location	A-5
2	Load Cell Wall	A-5
3	Manufacturer's Label	A-6
4	Tire Placard	A-6
5	2015 Ford Focus Frontal As Delivered	A-7
6	Left Rear 3-4 View, as Received	A-7
7	Pre-Test Front View of Test Vehicle	A-8
8	Post-Test Front View of Test Vehicle	A-8
9	Pre-Test Left View of Test Vehicle	A-9
10	Post-Test Left View of Test Vehicle	A-9
11	Pre-Test Right View of Test Vehicle	A-10
12	Post-Test Right View of Test Vehicle	A-10
13	Pre-Test Right Front 3-4 View	A-11
14	Post-Test Right Front 3-4 View	A-11
15	Pre-Test Left Rear 3-4 View	A-12
16	Post-Test Left Rear 3-4 View	A-12
17	Pre-Test Windshield View	A-13
18	Post-Test Windshield View	A-13
19	Pre-Test Engine Compartment View	A-14
20	Post-Test Engine Compartment View	A-14
21	Pre-Test Fuel Filler Cap View	A-15
22	Post-Test Fuel Filler Cap View	A-15
23	Pre-Test Front Underbody View	A-16
24	Post-Test Front Underbody View	A-16
25	Pre-Test Rear Underbody View	A-17
26	Post-Test Rear Underbody View	A-17
27	Pre-Test Dummy Cable Routing	A-18
28	Post-Test Dummy Cable Routing	A-18
29	Pre-Test Driver Dummy Front View	A-19
30	Post-Test Driver Dummy Front View	A-19
31	Pre-Test Driver Dummy Window View	A-20
32	Post-Test Driver Dummy Window View	A-20
33	Pre-Test Driver Dummy and Vehicle Interior View	A-21
34	Post-Test Driver Dummy and Vehicle Interior View	A-21

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

Fig.	Description	Page
69	Photograph of Ballast Installed in Vehicle	A-39
70	Post-Test Stoddard Solvent Spillage Location View, if Required	A-39
71	Post-Test Speed Trap Read-Out	A-40
72	Vehicle at 0° on Static Rollover Device	A-40
73	Vehicle at 90° on Static Rollover Device	A-41
74	Vehicle at 180° on Static Rollover Device	A-41
75	Vehicle at 270° on Static Rollover Device	A-42
76	Vehicle at 360° on Static Rollover Device	A-42
77	2015 Ford Focus Frontal Impact Event	A-43
78	Monroney Label Photograph	A-43
79	Pre-Test Rear Passenger Dummy Front view	A-44
80	Post-Test Rear Passenger Dummy Front view	A-44
81	Pre-Test Rear Passenger Dummy Window View	A-45
82	Post-Test Rear Passenger Dummy Window View	A-45
83	Pre-Test Rear Passenger Dummy and Vehicle Interior View	A-46
84	Post-Test Rear Passenger Dummy and Vehicle Interior View	A-46
85	Pre-Test Rear Passenger Seat Fore-Aft Markings	A-47
86	Post-Test Rear Passenger Seat Fore-Aft Markings	A-47
87	Pre-Test View of Belt Anchorage for Rear Passenger Dummy	A-48
88	Post-Test View of Belt Anchorage for Rear Passenger Dummy	A-48
89	Pre-Test Rear Passenger Dummy Feet	A-49
90	Post-Test Rear Passenger Dummy Feet	A-49
91	Pre-Test Rear Passenger Dummy Knee and Seatback View	A-50
92	Post-Test Rear Passenger Dummy Knee Contact with Seatback	A-50
93	Pre-Test Rear Passenger's Side Floorpan	A-51
94	Post-Test Rear Passenger's Side Floorpan	A-51
95	Post-Test Rear Passenger Dummy Face	A-52
96	Post-Test Rear Passenger Dummy Head Contact	A-52
97	Post-Test Rear Passenger dummy Contact with Headrest	A-53

Photo Not Applicable

Figure A-1: Load Cell Location

Photo Not Applicable

Figure A-2: Rigid Barrier Frontal Wall

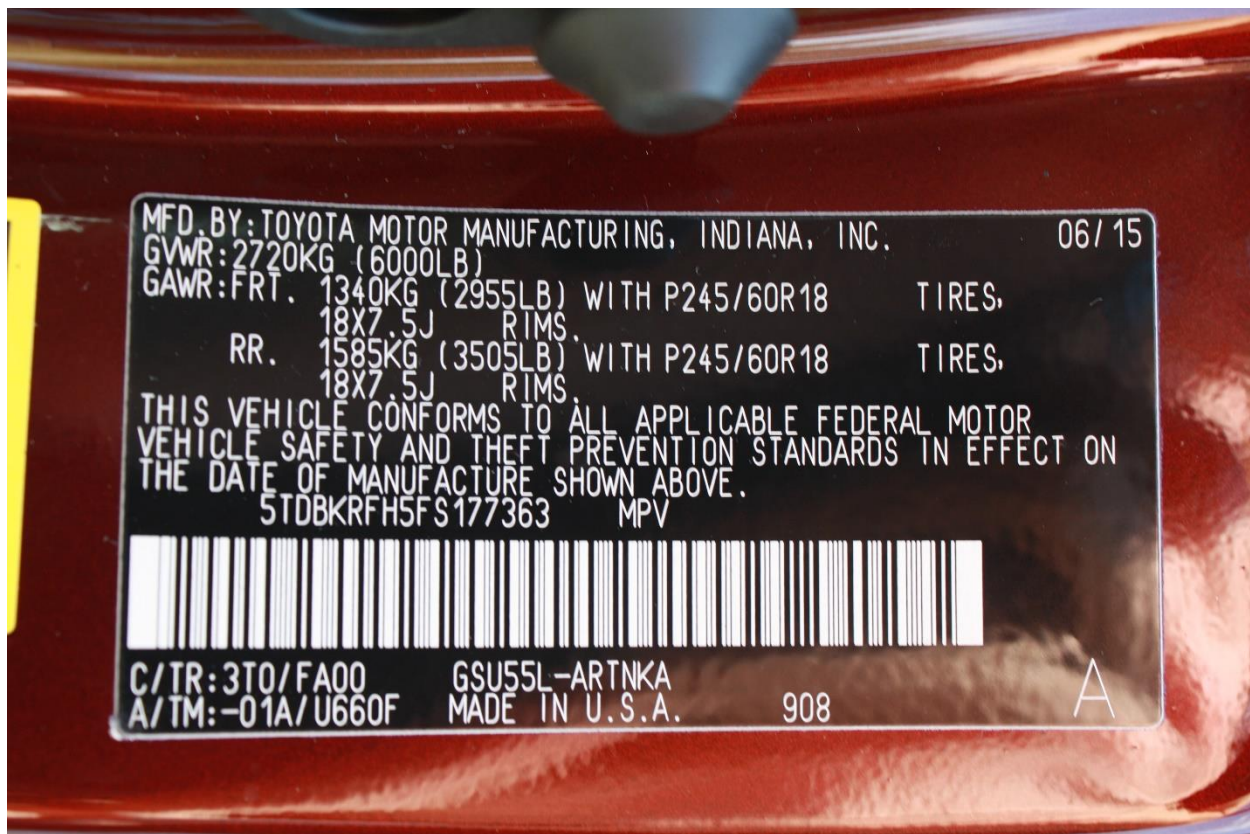


Figure A-3: Manufacturer's Label



Figure A-4: Tire Placard



Figure A-5: 2015 Ford Focus Frontal As Delivered



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



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



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



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



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



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



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

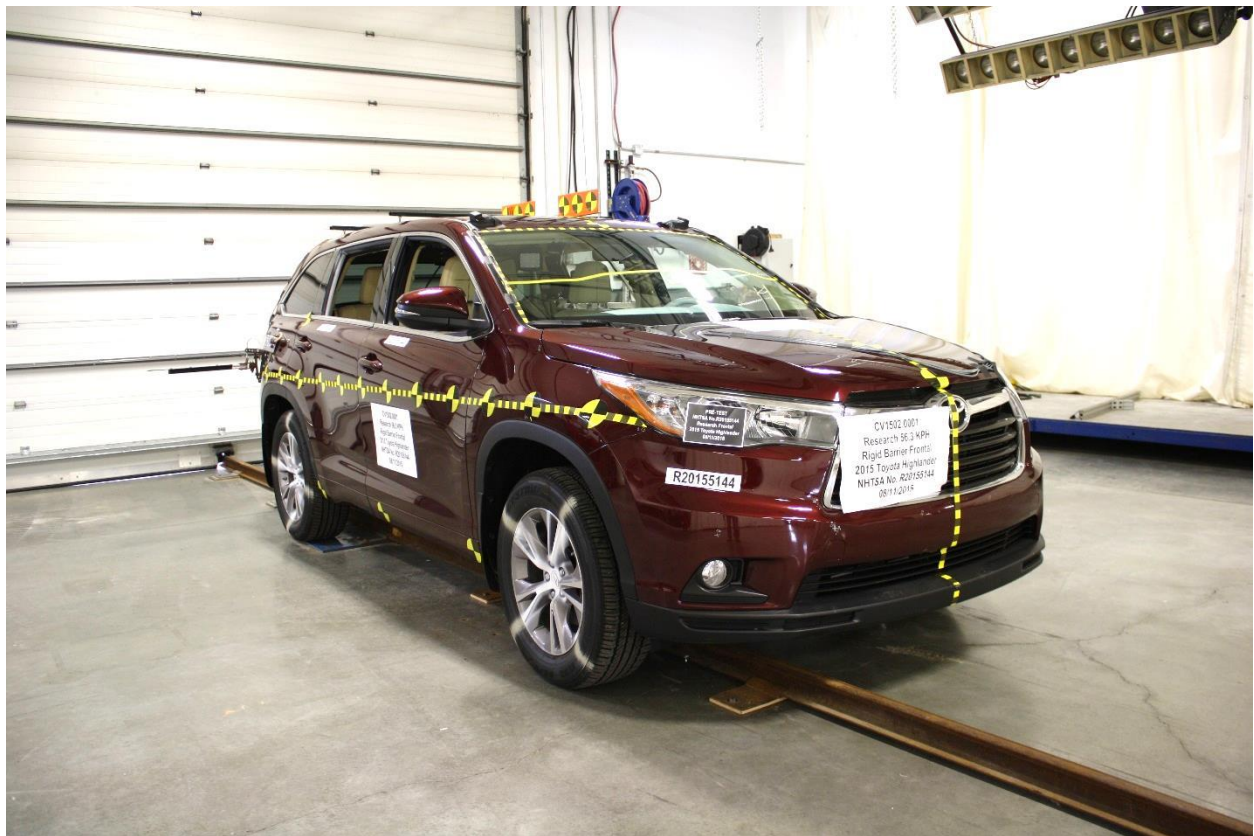


Figure A-13: Pre-Test Right Front 3-4 View



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



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



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



Figure A-17: Pre-Test Windshield View



Figure A-18: Post-Test Windshield View

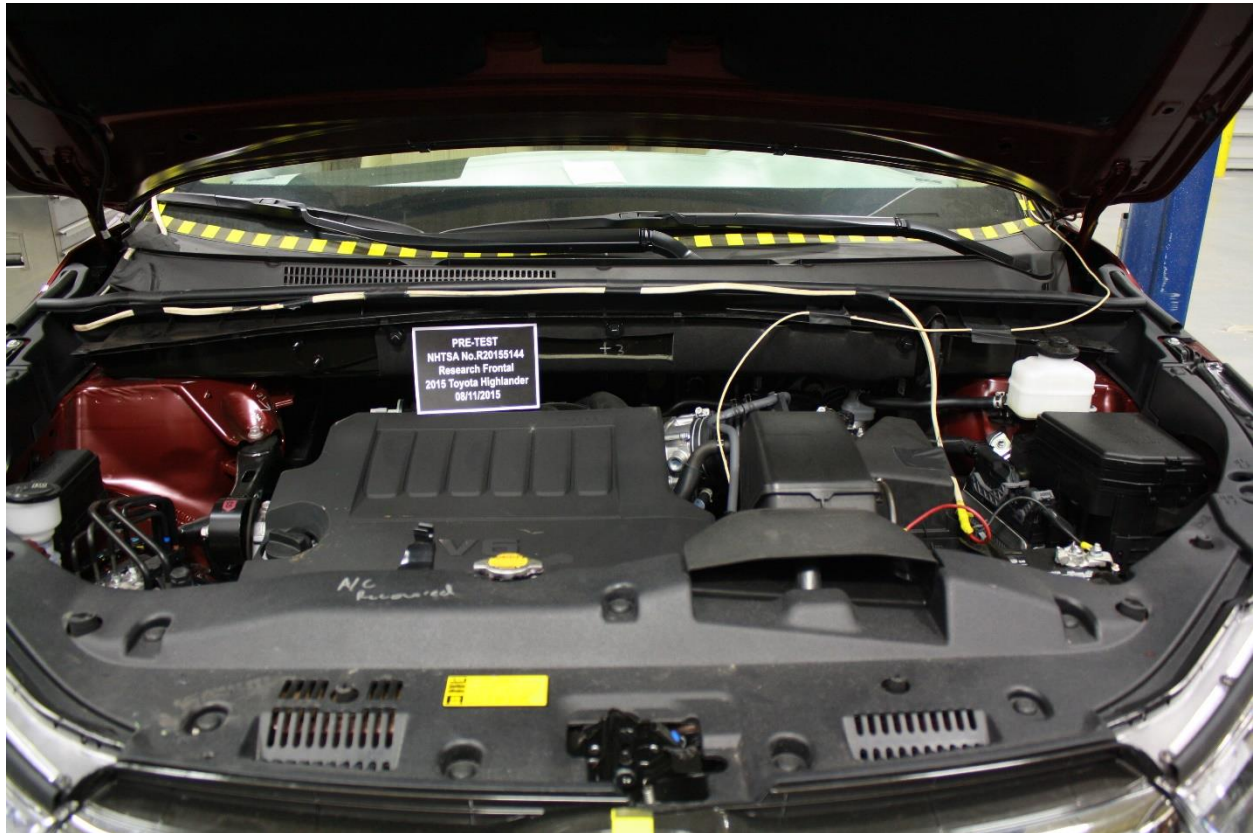


Figure A-19: Pre-Test Engine Compartment View



Figure A-20: Post-Test Engine Compartment View



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



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



Figure A-23: Pre-Test Front Underbody View



Figure A-24: Post-Test Front Underbody View

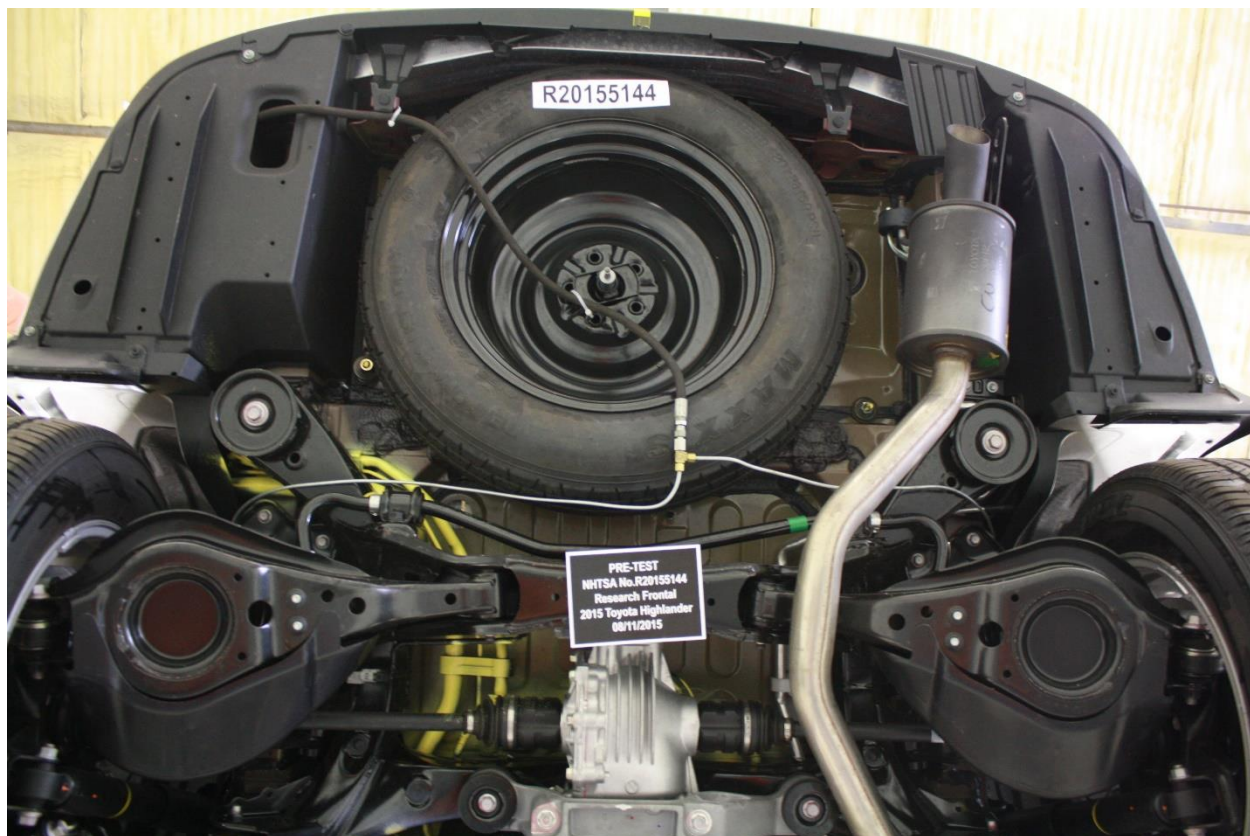


Figure A-25: Pre-Test Rear Underbody View

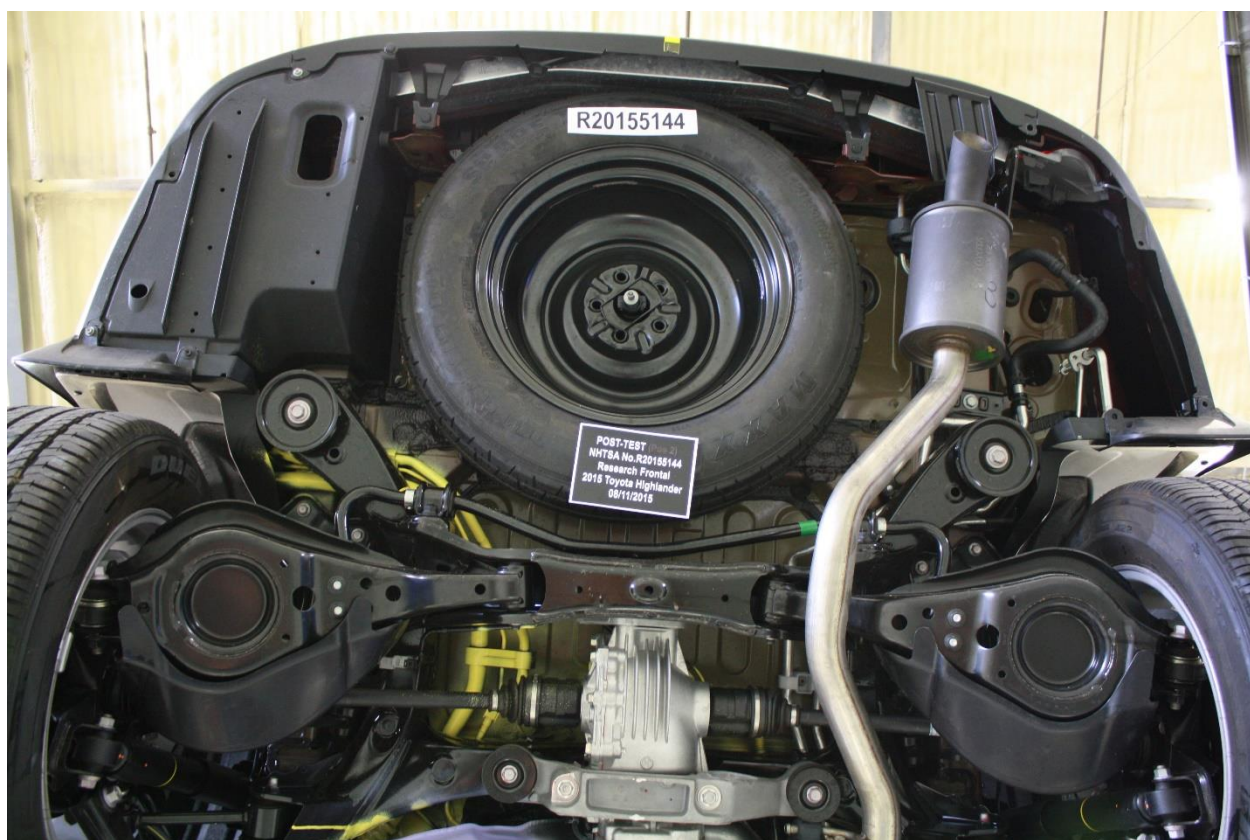


Figure A-26: Post-Test Rear Underbody View



Figure A-27: Pre-Test Dummy Cable Routing



Figure A-28: Post-Test Dummy Cable Routing

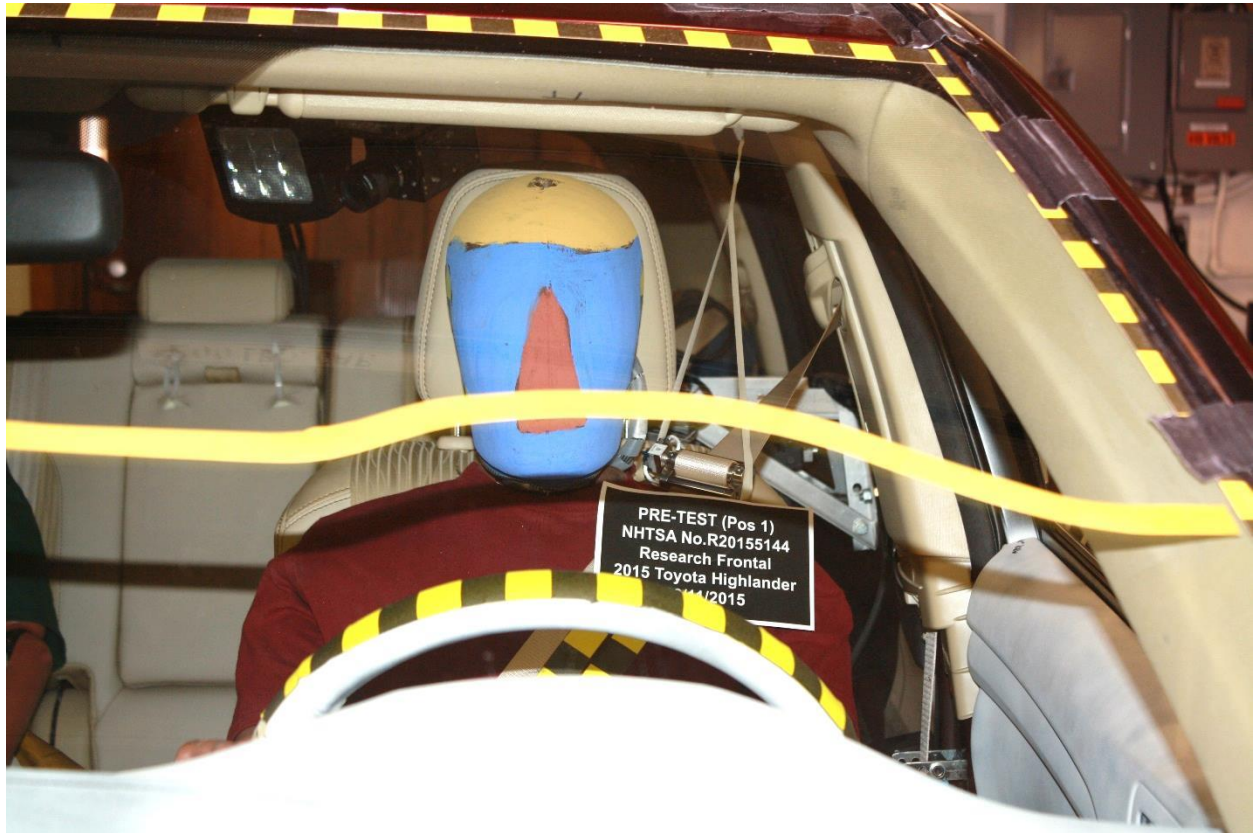


Figure A-29: Pre-Test Driver Dummy Front View



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



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



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



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



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



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

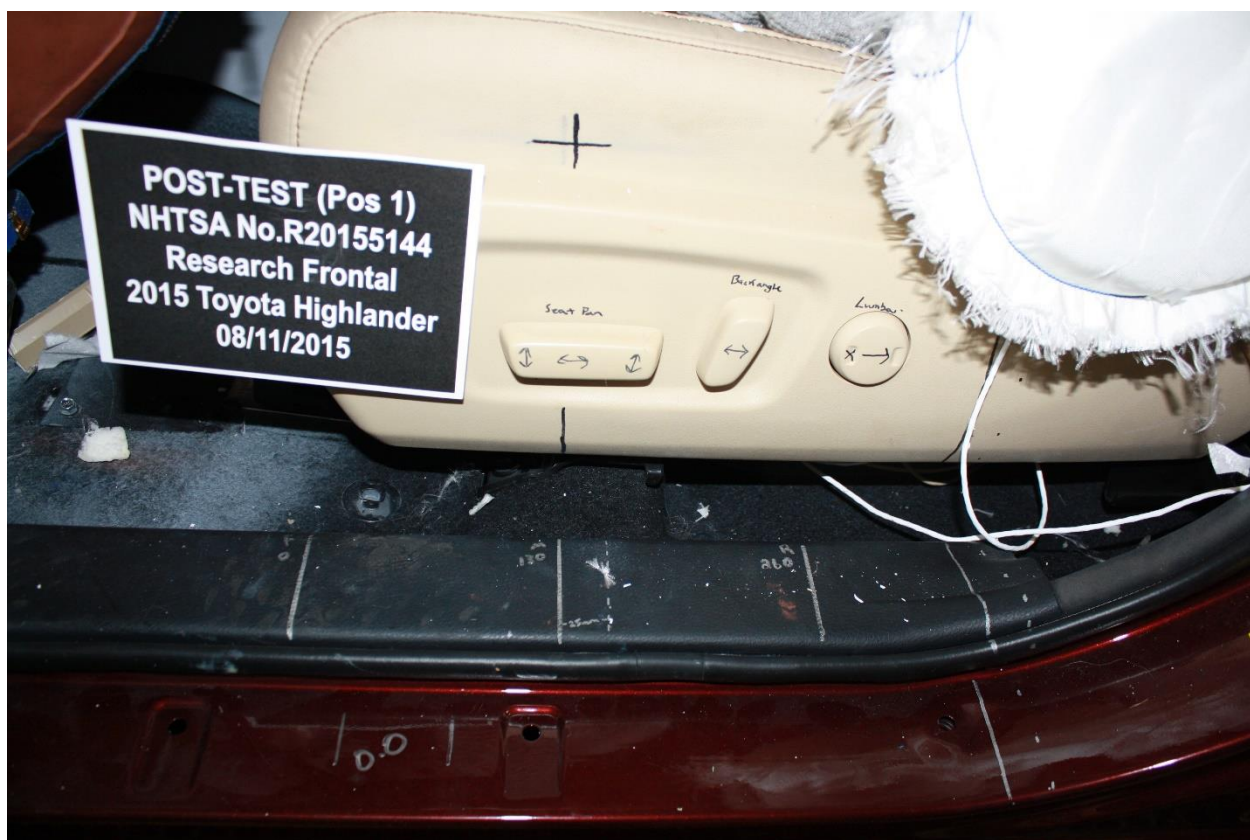


Figure A-36: Post-Test Driver's Seat Fore-Aft Markings

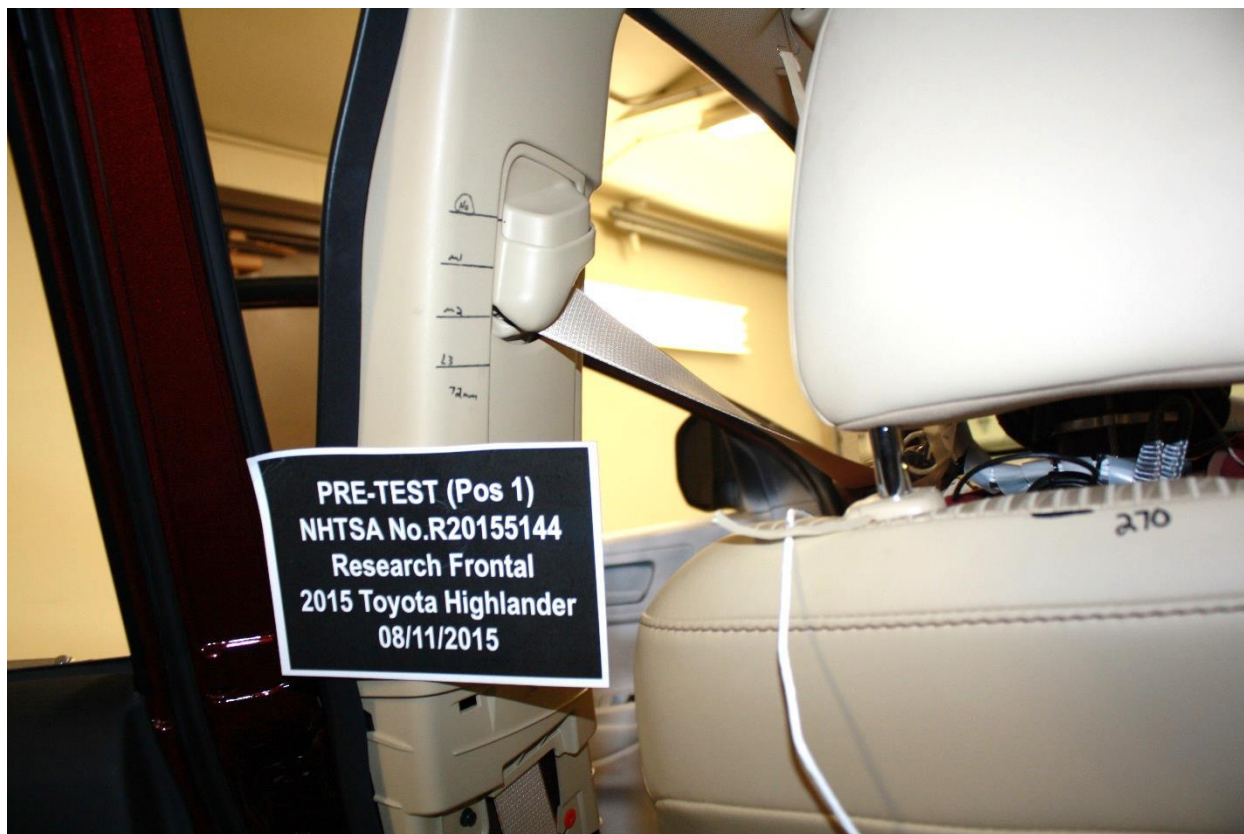


Figure A-37: Pre-Test View of Belt Anchorage for Driver Dummy



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



Figure A-39: Pre-Test Driver Dummy Feet



Figure A-40: Post-Test Driver Dummy Feet



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



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



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



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



Figure A-45: Post-Test Driver Dummy Face



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



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



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



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



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

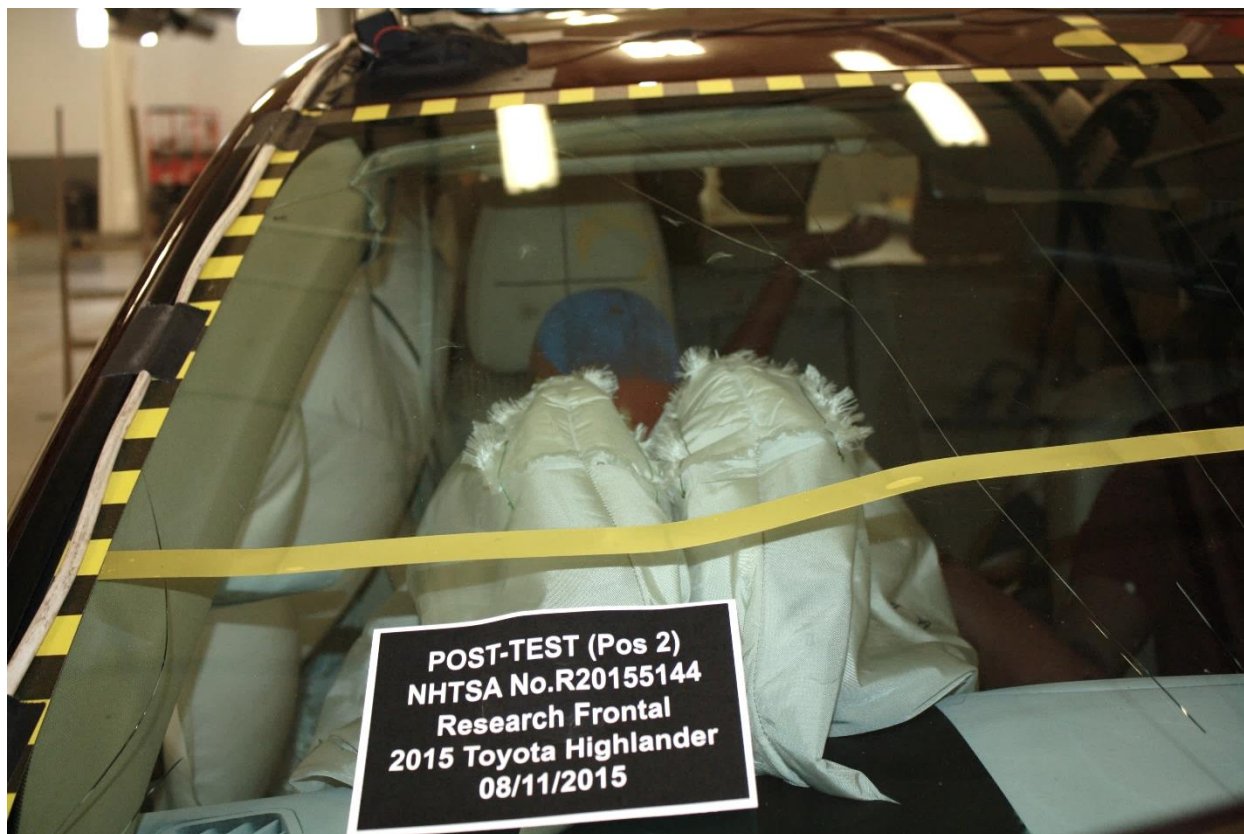


Figure A-51: Post-Test Passenger Dummy Front View



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



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



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



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



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



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

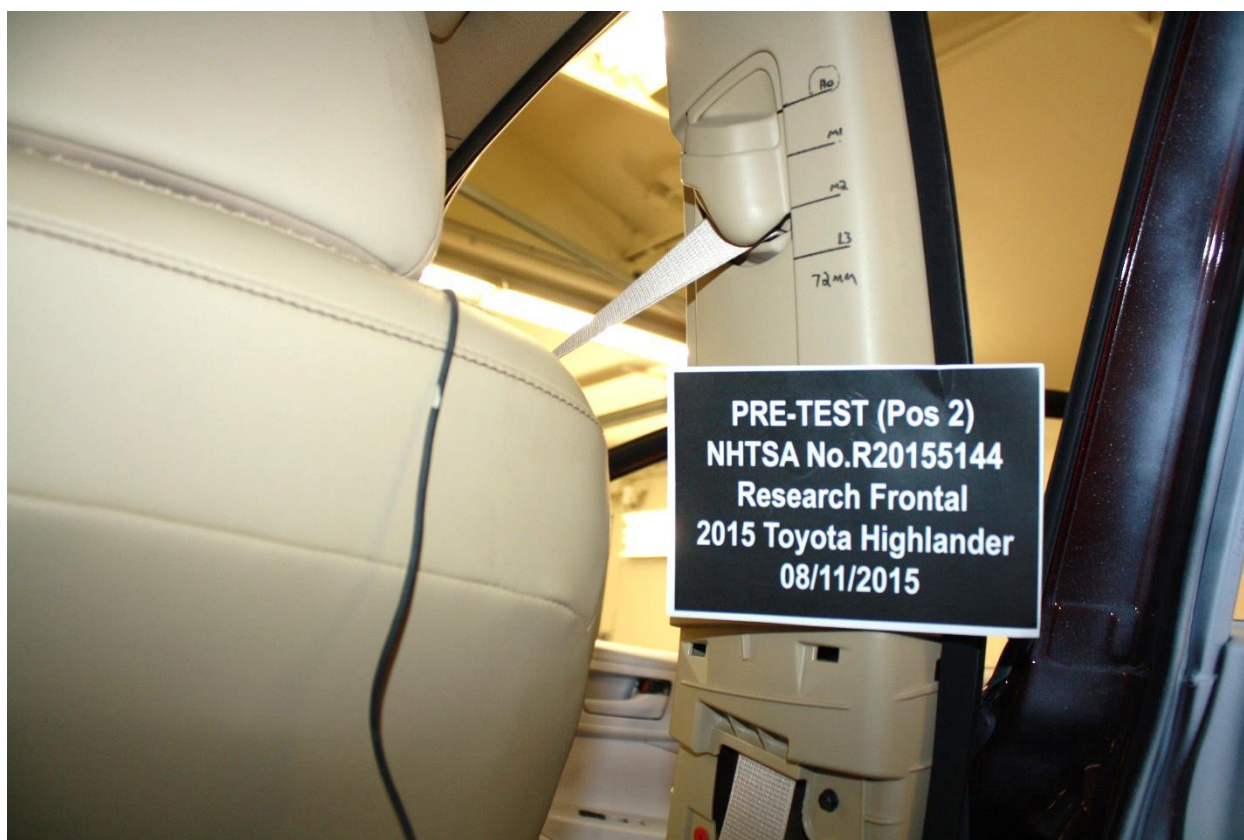


Figure A-58: Pre-Test View of Belt Anchorage for Passenger Dummy



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



Figure A-60: Pre-Test Passenger Dummy Feet



Figure A-61: Post-Test Passenger Dummy Feet

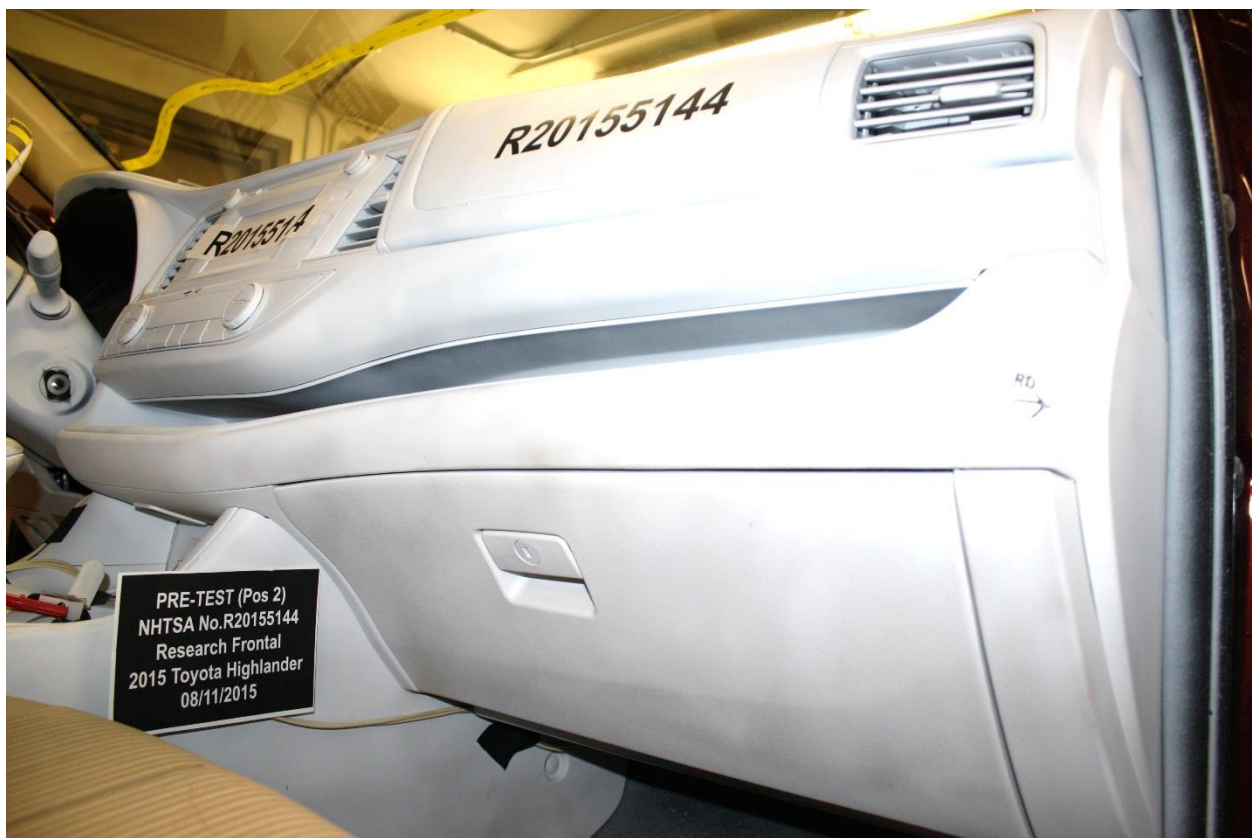


Figure A-62: Pre-Test Passenger's Side Knee Bolster



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



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



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



Figure A-66: Post-Test Passenger Dummy Face



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



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



Figure A-69: Photograph of Ballast Installed in Vehicle

Photo Not Applicable

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

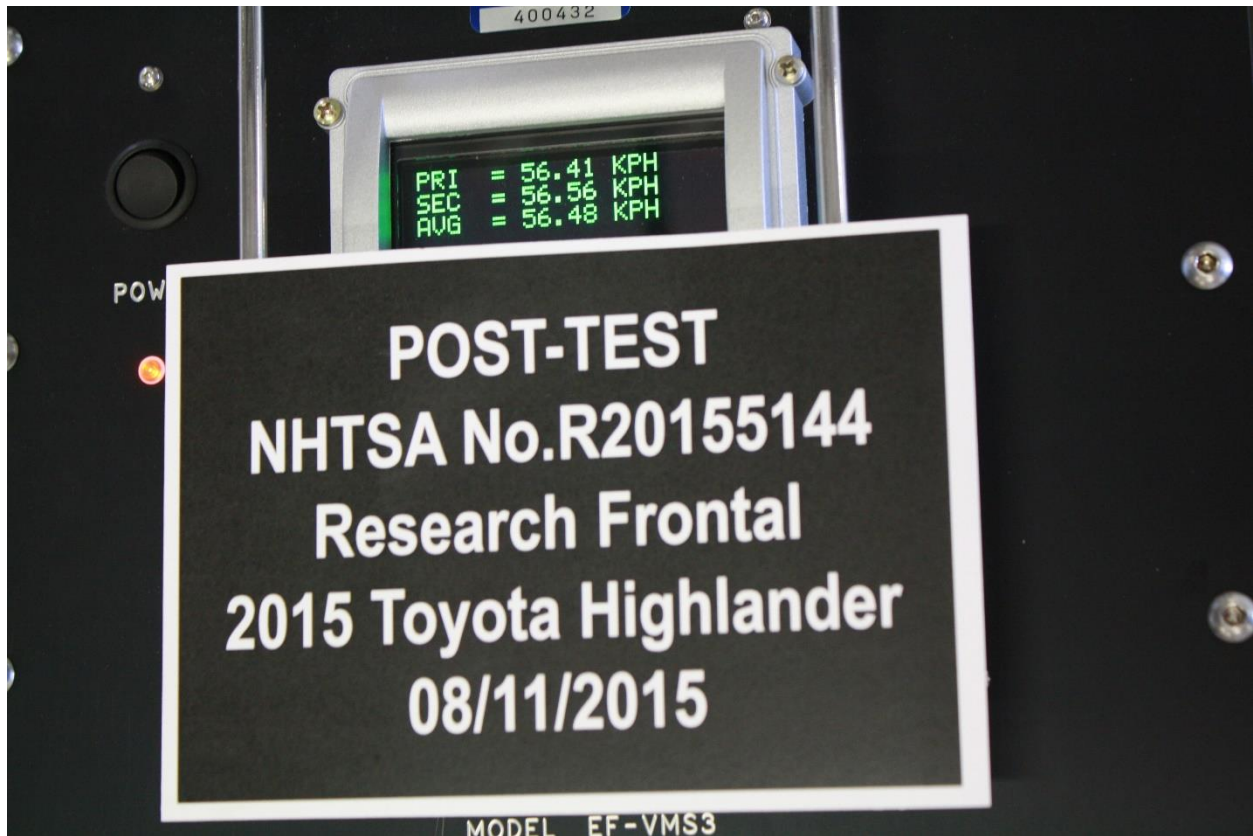


Figure A-71: Post-Test Speed Trap Read-Out



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

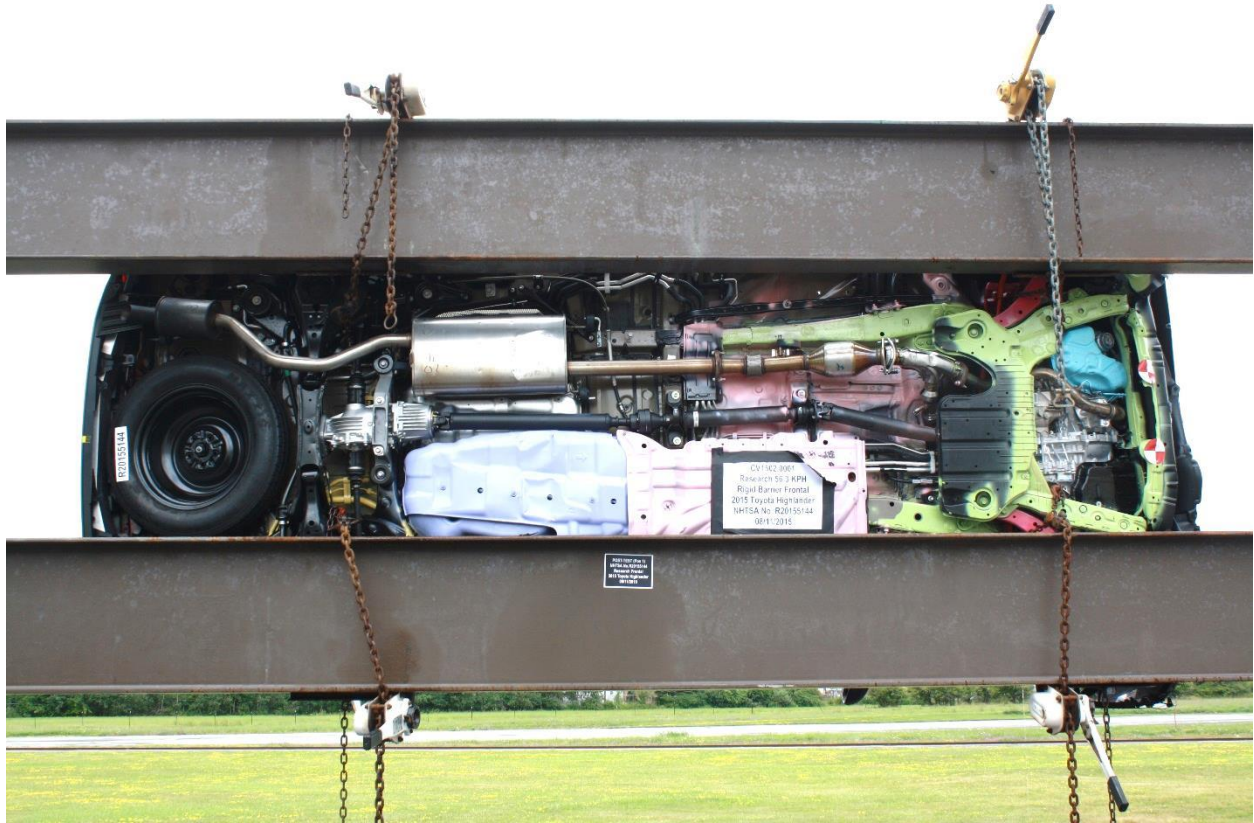


Figure A-73: Vehicle at 90° on Static Rollover Device



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



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



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

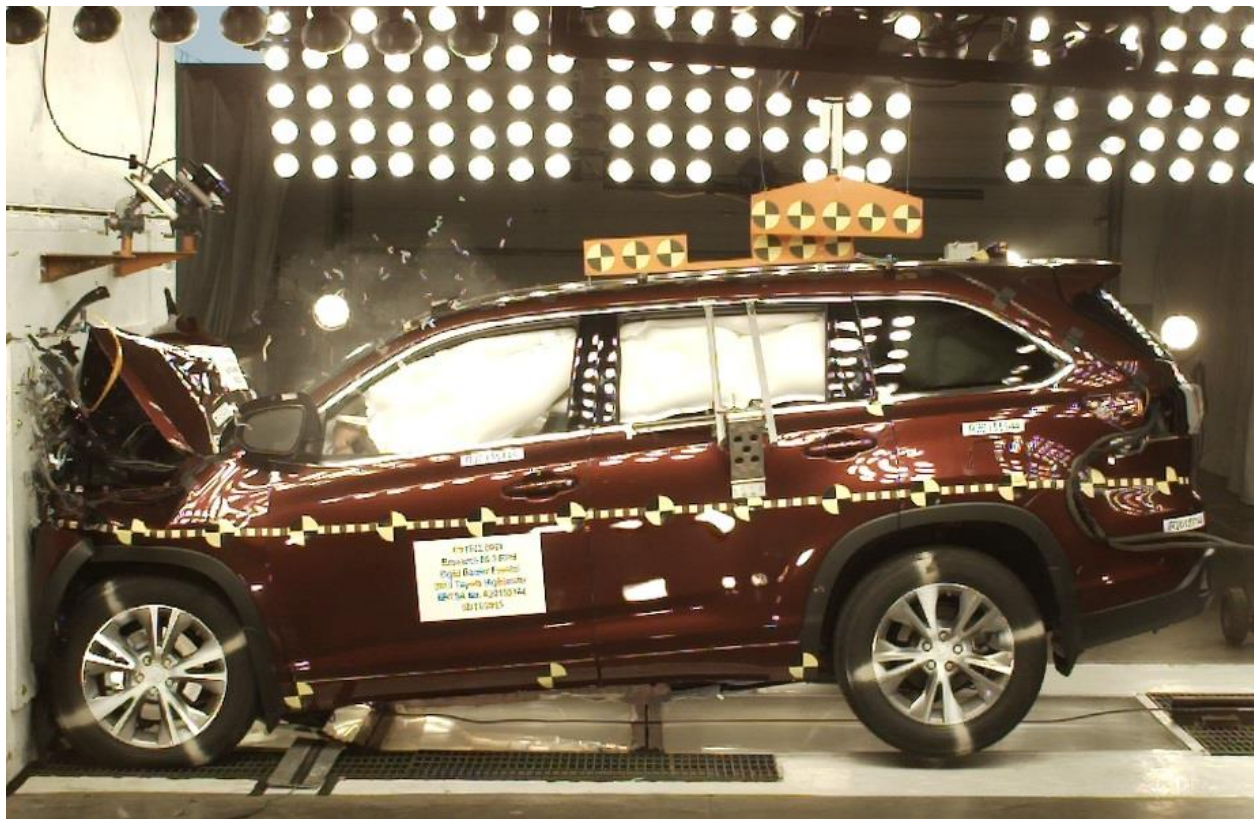


Figure A-77: 2015 Ford Focus Frontal Impact Event



TOYOTA

Let's Go Places

DESC: **HIGHLANDER** LE Plus - V6 AWD

VIN: **5TDBKRFH5F17363**

YR/MO/L: 2015/8/48

CUR: COIL LA LA ROUTE MICA/FA0 (0370/00)

PORT/PLANT: Princeton, IN/TMMI RAILHEAD:

GOVERNMENT 5-STAR SAFETY RATINGS

Overall Vehicle Score ★★★★★

Based on the combined ratings of frontal, side and rollover. Should ONLY be compared to other vehicles of similar size and weight.

Frontal Crash	Driver Passenger	★★★★★
Based on the risk of injury in a frontal impact. Should ONLY be compared to other vehicles of similar size and weight.		

Side Crash	Front seat Rear seat	★★★★★
Based on the risk of injury in a side impact.		

Rollover	★★★★★
Based on the risk of rollover in a single-vehicle crash.	

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

Source: National Highway Traffic Safety Administration (NHTSA)

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

SAFETY EQUIPMENT

- 3.5L DOHC V6 Engine with Dual VVT-i
- 6-Speed Automatic Transmission
- Front Independent MacPherson Strut & Rear Double Wishbone Suspension
- Ultra Low Emission Vehicle II (ULEV-II)
- Power Assisted 4-Wheel Disc Brakes
- 18" Alloy WP36-600111 Tire; Temp Spare
- Dynamic Torque Control All-Wheel Drive
- Hill-Start & Downhill Assist Control
- SAFETY & CONVENIENCE**
- Star Safety System: Includes Enhanced Vehicle Stability Control, Traction Control, Anti-Lock Brake System, Electronic Brake Force Distribution, Brake Assist & Smart Stop Technology
- 4 Airbags: Dr & Fr for Adult Occupants, 3rd Row & PP for Seated-Outside Side, Dr Knees, PP Seat-Cushion & 3rd-Row Side Curtain Airbags
- Whiplash Injury Lessening Front Seats
- Remote Keyless Entry; Engine Immobilizer
- LATCH: Latch Anchors & Ties for Children
- Child Protector Rear Door Locks
- EXTERIOR**
- SmartChrome Auto On/Off Highlights/Foglights
- 12V Windshield, Privacy Glass-Dr, Side, Or, & Hatch Windows, Folding Heated Rear Side Mirrors, Front Water-Wick-Leak
- Adj. Power Liftgate w/Flip-Up Rear Window
- INTERIOR**
- Seating for 8, Cloth/Softex 8-Way Power Dr Seat w/Window, 4-Way Power Seat, 2nd & 3rd Row 60/40 Split Fold-Flat Seats w/Recline
- Rearview Camera with 8.1" Display
- Entune Plus w/8.1" Touch Screen/AM/FM/CD/MP3/USB/HDL, & 5.0M App Access 3-in-1
- Trial Bluetooth Phone & Streaming Music
- 3.5-inch Multi-Info Display w/Navigation
- 3-Zone Automatic A/C - Driver, Pass, R/R
- Steering Wheel/Paddle, Power & Window Controls
- Overhead Map Lights; Conversation Mirror
- Roll-Over Compensation Rest, On-Depth Shift
- 4 Cup & 4 Bottle Holders; 3-12V Outlets
- ***Full Tank of Gas***

MANUFACTURER'S SUGGESTED RETAIL PRICE \$34,750.00

OPTIONAL EQUIPMENT	PRICE
50 State Emissions	
All Weather Floor Mats & Cargo Liner	200.00
Carpet Floor Mats & Cargo Mat	225.00

EPA DOT Fuel Economy and Environment

Fuel Economy

20 MPG

18 24

combined city/hwy city highway

5.0 gallons per 100 miles

You spend \$2,000 more in fuel costs over 5 years

compared to the average new vehicle.

Annual fuel cost \$2,600

Actual results will vary for many reasons, including driving conditions and how often and how far you drive. The average new vehicle gets 24 mpg and costs \$11,500 to fuel for 5 years. Cost differences are based on 15,000 miles per year at \$3.00 per gallon. MPG is based on per gallon gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

Fuel Economy & Greenhouse Gas Rating (EPA est.)

1 5 10 Best

This vehicle gets 20 city/24 hwy/18 combined mpg. The best gets 13 to 20 mpg. The best vehicle rating is 13/19/9/4.

Smog Rating (EPA est.)

1 5 10 Best

0-gallon per mile (higher and) Parking and driving for 15 minutes. This vehicle emits 160 grams of CO2 per mile. The best emits 140 grams or less. Lower emissions mean less air pollution.

ACTUAL RESULTS WILL VARY FOR MANY REASONS, INCLUDING DRIVING CONDITIONS AND HOW OFTEN AND HOW FAR YOU DRIVE. THE AVERAGE NEW VEHICLE GETS 24 MPG AND COSTS \$11,500 TO FUEL FOR 5 YEARS. COST DIFFERENCES ARE BASED ON 15,000 MILES PER YEAR AT \$3.00 PER GALLON. MPG IS BASED ON PER GALLON GALLON EQUIVALENT. VEHICLE EMISSIONS ARE A SIGNIFICANT CAUSE OF CLIMATE CHANGE AND SMOG.

fuel economy and greenhouse gas ratings

Calculate personal and company vehicle emissions.

SAFARI CODE QR CODE



TOTAL \$36,060.00

The New Vehicle Limited Warranty provides 3-year/50,000-mile basic coverage, 5-year/100,000-mile powertrain coverage, and 10-year/unlimited-mile rust-through protection coverage. See Warranty and Maintenance Guide for details. An extended service contract may be available for the vehicle. Manufacturer's suggested retail price includes manufacturer's recommended pre-delivery service. Gasoline, insurance and title fees, applicable federal, state and local taxes and dealer and distributor installed options and accessories are not included in the manufacturer's suggested retail price.

*EPA-est. which covers average factory scheduled maintenance for two years (or 20,000 miles, whichever occurs first), is included as part of the sales price of the vehicle for qualifying buyers.

DEALER NAME / ADDRESS: MAGUIRE TOYOTA 370 ELMIRA ROAD ITHACA NY 14850

11777

Ship to:



Figure A-79: Pre-Test Rear Passenger Dummy Front view



Figure A-80: Post-Test Rear Passenger Dummy Front view



Figure A-81: Pre-Test Rear Passenger Dummy Window View



Figure A-82: Post-Test Rear Passenger Dummy Window View



Figure A-83: Pre-Test Rear Passenger Dummy and Vehicle Interior View



Figure A-84: Post-Test Rear Passenger Dummy and Vehicle Interior View



Figure A-85: Pre-Test Rear Passenger Seat Fore-Aft Markings



Figure A-86: Post-Test Rear Passenger Seat Fore-Aft Markings

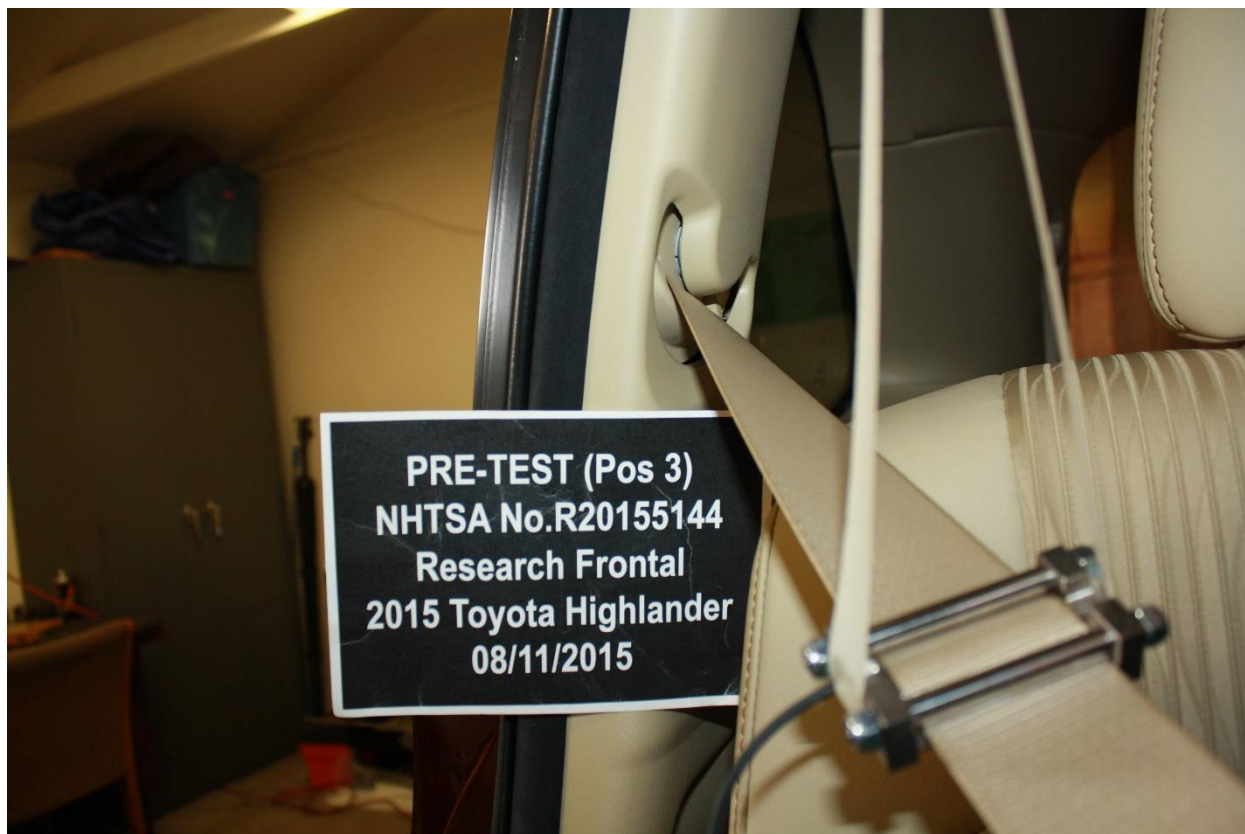


Figure A-87: Pre-Test View of Belt Anchorage for Rear Passenger Dummy



Figure A-88: Post-Test View of Belt Anchorage for Rear Passenger Dummy



Figure A-89: Pre-Test Rear Passenger Dummy Feet



Figure A-90: Post-Test Rear Passenger Dummy Feet



Figure A-91: Pre-Test Rear Passenger Dummy Knee and Seatback View



Figure A-92: Post-Test Rear Passenger Dummy Knee Contact with Seatback



Figure A-93: Pre-Test Rear Passenger's Side Floorpan



Figure A-94: Post-Test Rear Passenger's Side Floorpan



Figure A-95: Post-Test Rear Passenger Dummy Face



Figure A-96: Post-Test Rear Passenger Dummy Contact with Airbag



Figure A-97: Post-Test Rear Passenger dummy Contact with Headrest

APPENDIX B
VEHICLE & DUMMY RESPONSE DATA TRACES

Table of Data Plots

No.	Description	Page
Plot 1	V1P1 Head CG X Acceleration	B-8
Plot 2	V1P1 Head CG Y Acceleration	B-8
Plot 3	V1P1 Head CG Z Acceleration	B-8
Plot 4	V1P1 Head CG Angular Velocity About X	B-8
Plot 5	V1P1 Head CG Angular Velocity About Y	B-9
Plot 6	V1P1 Head CG Angular Velocity About Z	B-9
Plot 7	V1P1 Upper Neck X Force	B-9
Plot 8	V1P1 Upper Neck Y Force	B-9
Plot 9	V1P1 Upper Neck Z Force	B-10
Plot 10	V1P1 Upper Neck X Moment	B-10
Plot 11	V1P1 Upper Neck Y Moment	B-10
Plot 12	V1P1 Upper Neck Z Moment	B-10
Plot 13	V1P1 Lower Neck X Force	B-11
Plot 14	V1P1 Lower Neck Y Force	B-11
Plot 15	V1P1 Lower Neck Z Force	B-11
Plot 16	V1P1 Lower Neck X Moment	B-11
Plot 17	V1P1 Lower Neck Y Moment	B-12
Plot 18	V1P1 Lower Neck Z Moment	B-12
Plot 19	V1P1 Front Neck Spring Tower Load Cell	B-12
Plot 20	V1P1 Rear Neck Spring Tower Load Cell	B-12
Plot 21	V1P1 Occipital Condyle Rotation Potentiometer	B-13
Plot 22	V1P1 Upper Left DGIR X Displacement	B-13
Plot 23	V1P1 Upper Left DGIR Y Rotation	B-13
Plot 24	V1P1 Upper Left DGIR Z Rotation	B-13
Plot 25	V1P1 Upper Right DGIR X Displacement	B-14
Plot 26	V1P1 Upper Right DGIR Y Rotation	B-14
Plot 27	V1P1 Upper Right DGIR Z Rotation	B-14
Plot 28	V1P1 Lower Left DGIR X Displacement	B-14
Plot 29	V1P1 Lower Left DGIR Y Rotation	B-15
Plot 30	V1P1 Lower Left DGIR Z Rotation	B-15
Plot 31	V1P1 Lower Right DGIR X Displacement	B-15
Plot 32	V1P1 Lower Right DGIR Y Rotation	B-15
Plot 33	V1P1 Lower Right DGIR Z Rotation	B-16
Plot 34	V1P1 T1 X Acceleration	B-16
Plot 35	V1P1 T1 Y Acceleration	B-16
Plot 36	V1P1 T1 Z Acceleration	B-16
Plot 37	V1P1 Spine Lower Force X	B-17
Plot 38	V1P1 Spine Lower Force Y	B-17
Plot 39	V1P1 Spine Lower Force Z	B-17
Plot 40	V1P1 Spine Lower Moment X	B-17
Plot 41	V1P1 Spine Lower Moment Y	B-18
Plot 42	V1P1 T6 X Acceleration	B-18
Plot 43	V1P1 T6 Y Acceleration	B-18
Plot 44	V1P1 T6 Z Acceleration	B-18
Plot 45	V1P1 T12 X Acceleration	B-19
Plot 46	V1P1 T12 Y Acceleration	B-19
Plot 47	V1P1 T12 Z Acceleration	B-19
Plot 48	V1P1 Abdomen Left DGIR X Displacement	B-19
Plot 49	V1P1 Abdomen Left DGIR Y Rotation	B-20
Plot 50	V1P1 Abdomen Left DGIR Z Rotation	B-20
Plot 51	V1P1 Abdomen Right DGIR X Displacement	B-20
Plot 52	V1P1 Abdomen Right DGIR Y Rotation	B-20
Plot 53	V1P1 Abdomen Right DGIR Z Rotation	B-21
Plot 54	V1P1 Pelvis Acetabulum Left X Force	B-21
Plot 55	V1P1 Pelvis Acetabulum Left Y Force	B-21
Plot 56	V1P1 Pelvis Acetabulum Left Z Force	B-21
Plot 57	V1P1 Pelvis Acetabulum Right X Force	B-22

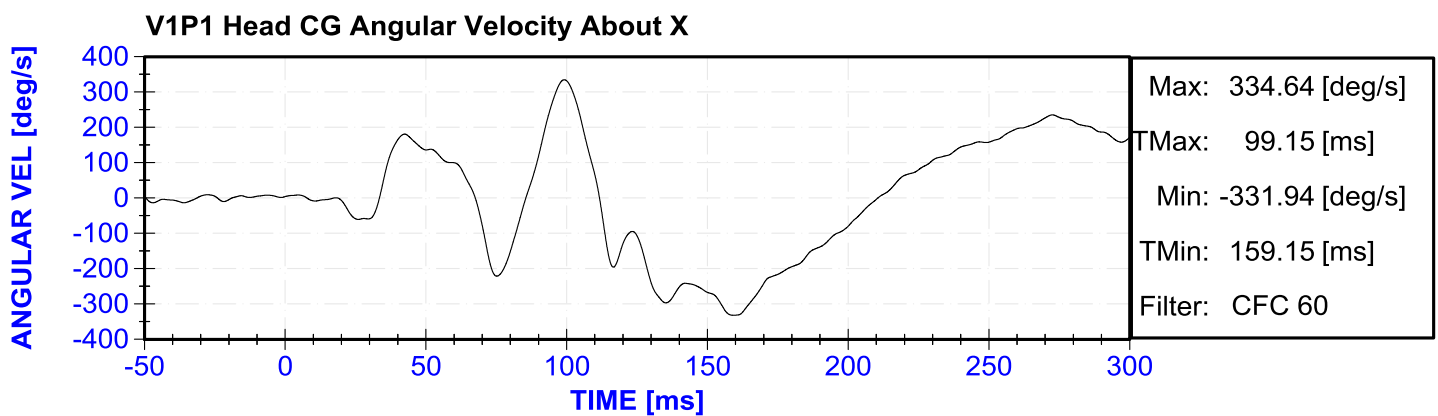
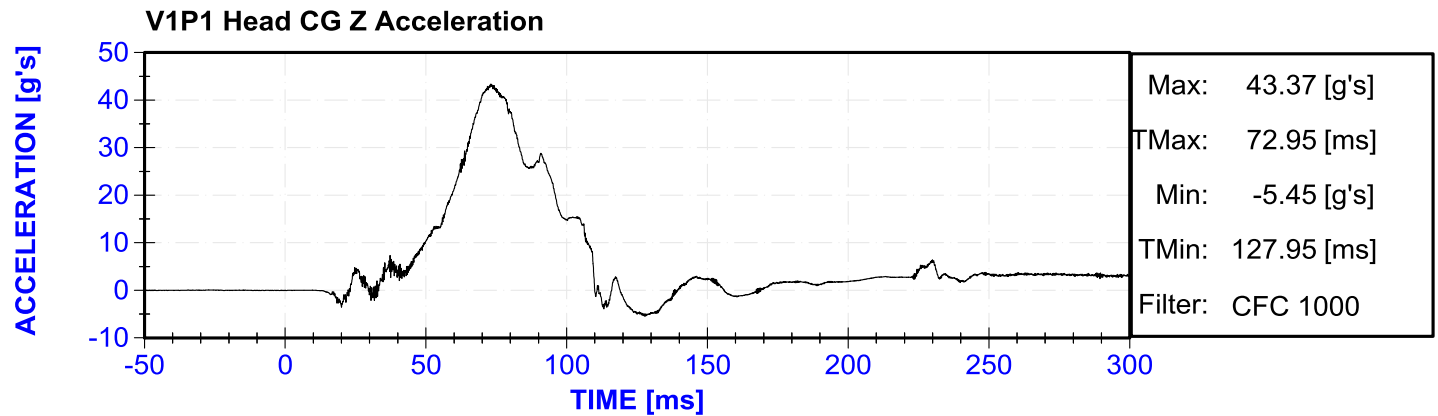
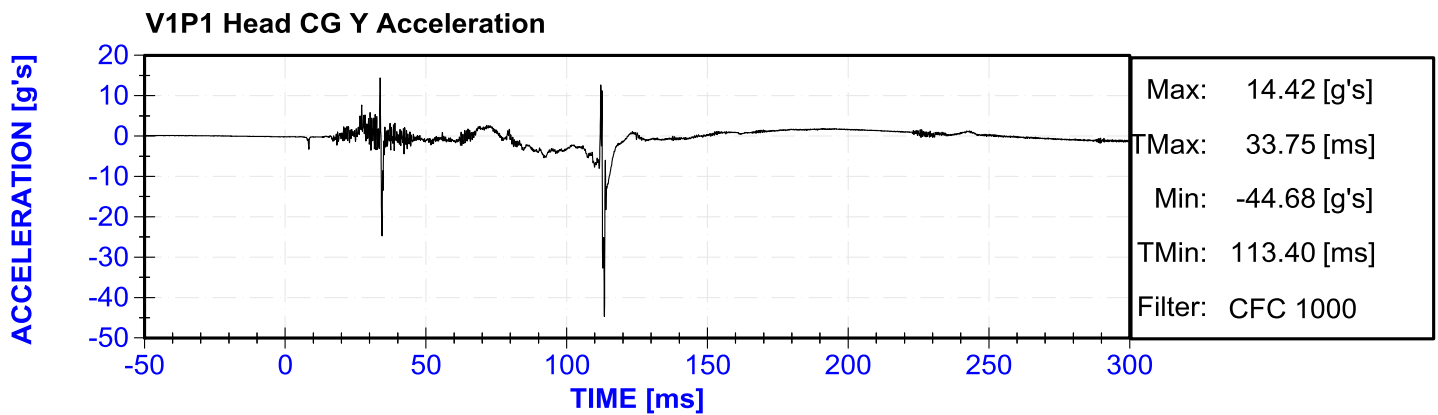
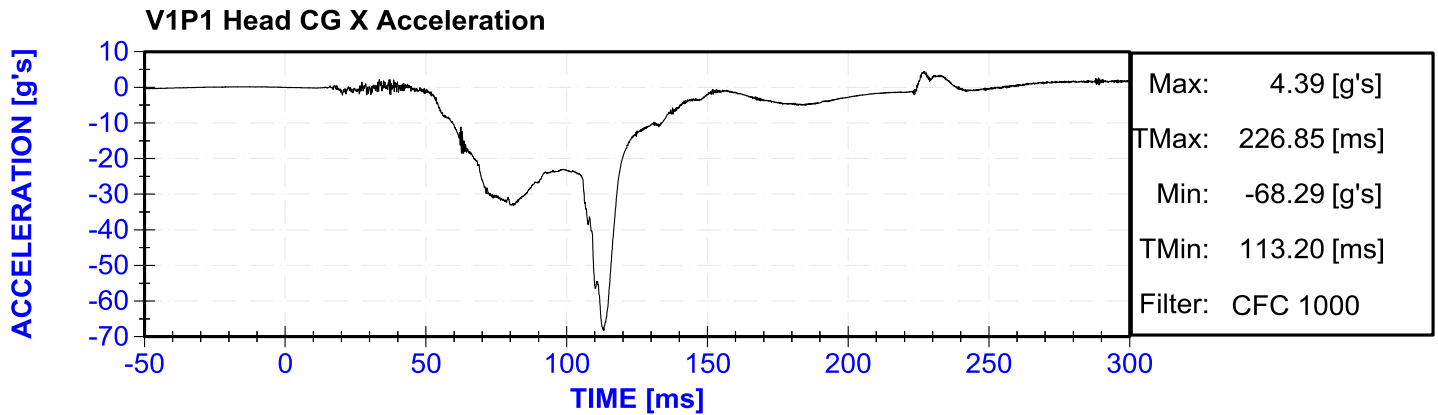
Plot 58	V1P1 Pelvis Acetabulum Right Y Force	B-22
Plot 59	V1P1 Pelvis Acetabulum Right Z Force	B-22
Plot 60	V1P1 Pelvis X Acceleration	B-22
Plot 61	V1P1 Pelvis Y Acceleration	B-23
Plot 62	V1P1 Pelvis Z Acceleration	B-23
Plot 63	V1P1 ASIS Left X Force	B-23
Plot 64	V1P1 ASIS Left Y Moment	B-23
Plot 65	V1P1 ASIS Right X Force	B-24
Plot 66	V1P1 ASIS Right Y Moment	B-24
Plot 67	V1P1 Femur Left X Force	B-24
Plot 68	V1P1 Femur Left Y Force	B-24
Plot 69	V1P1 Femur Left Z Force	B-25
Plot 70	V1P1 Femur Left X Moment	B-25
Plot 71	V1P1 Femur Left Y Moment	B-25
Plot 72	V1P1 Femur Right X Force	B-25
Plot 73	V1P1 Femur Right Y Force	B-26
Plot 74	V1P1 Femur Right Z Force	B-26
Plot 75	V1P1 Femur Right X Moment	B-26
Plot 76	V1P1 Femur Right Y Moment	B-26
Plot 77	V1P1 Knee Left X Displacement	B-27
Plot 78	V1P1 Knee Right X Displacement	B-27
Plot 79	V1P1 Upper Tibia Left Z Force	B-27
Plot 80	V1P1 Upper Tibia Left X Moment	B-27
Plot 81	V1P1 Upper Tibia Left Y Moment	B-28
Plot 82	V1P1 Upper Tibia Right Z Force	B-28
Plot 83	V1P1 Upper Tibia Right X Moment	B-28
Plot 84	V1P1 Upper Tibia Right Y Moment	B-28
Plot 85	V1P1 Lower Tibia Left X Force	B-29
Plot 86	V1P1 Lower Tibia Left Y Force	B-29
Plot 87	V1P1 Lower Tibia Left Z Force	B-29
Plot 88	V1P1 Lower Tibia Left X Moment	B-29
Plot 89	V1P1 Lower Tibia Left Y Moment	B-30
Plot 90	V1P1 Lower Tibia Right X Force	B-30
Plot 91	V1P1 Lower Tibia Right Y Force	B-30
Plot 92	V1P1 Lower Tibia Right Z Force	B-30
Plot 93	V1P1 Lower Tibia Right X Moment	B-31
Plot 94	V1P1 Lower Tibia Right Y Moment	B-31
Plot 95	V1P1 Left Tibia Mid X Acceleration	B-31
Plot 96	V1P1 Left Tibia Mid Y Acceleration	B-31
Plot 97	V1P1 Right Tibia Mid X Acceleration	B-32
Plot 98	V1P1 Right Tibia Mid Y Acceleration	B-32
Plot 99	V1P1 Foot Left X Acceleration	B-32
Plot 100	V1P1 Foot Left Z Acceleration	B-32
Plot 101	V1P1 Foot Right X Acceleration	B-33
Plot 102	V1P1 Foot Right Z Acceleration	B-33
Plot 103	V1P1 Ankle Left X Rotation	B-33
Plot 104	V1P1 Ankle Left Y Rotation	B-33
Plot 105	V1P1 Ankle Left Z Rotation	B-34
Plot 106	V1P1 Ankle Right X Rotation	B-34
Plot 107	V1P1 Ankle Right Y Rotation	B-34
Plot 108	V1P1 Ankle Right Z Rotation	B-34
Plot 109	V1 Driver Lap Belt Force	B-35
Plot 110	V1 Driver Shoulder Belt Upper Force	B-35
Plot 111	V1 Driver Shoulder Belt Displacement	B-35
Plot 112	V1P2 Head CG X Acceleration	B-35
Plot 113	V1P2 Head CG Y Acceleration	B-36
Plot 114	V1P2 Head CG Z Acceleration	B-36
Plot 115	V1P2 Head Redundant X Acceleration	B-36
Plot 116	V1P2 Head Redundant Y Acceleration	B-36

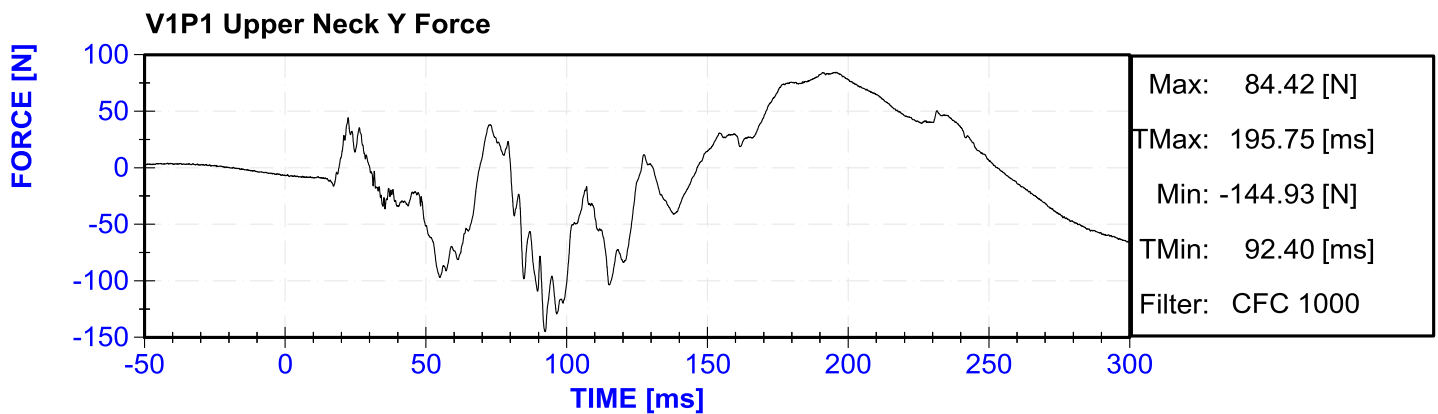
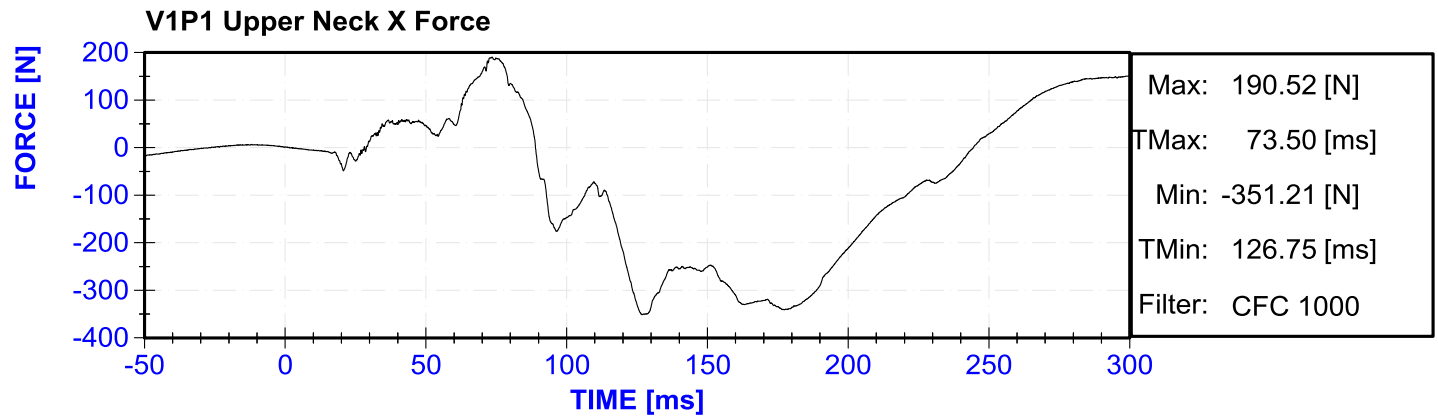
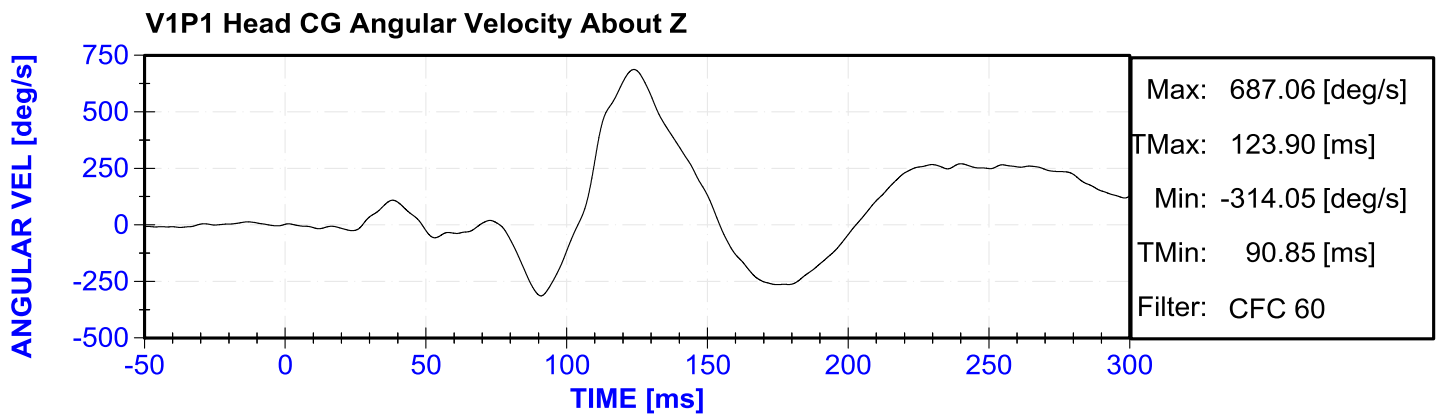
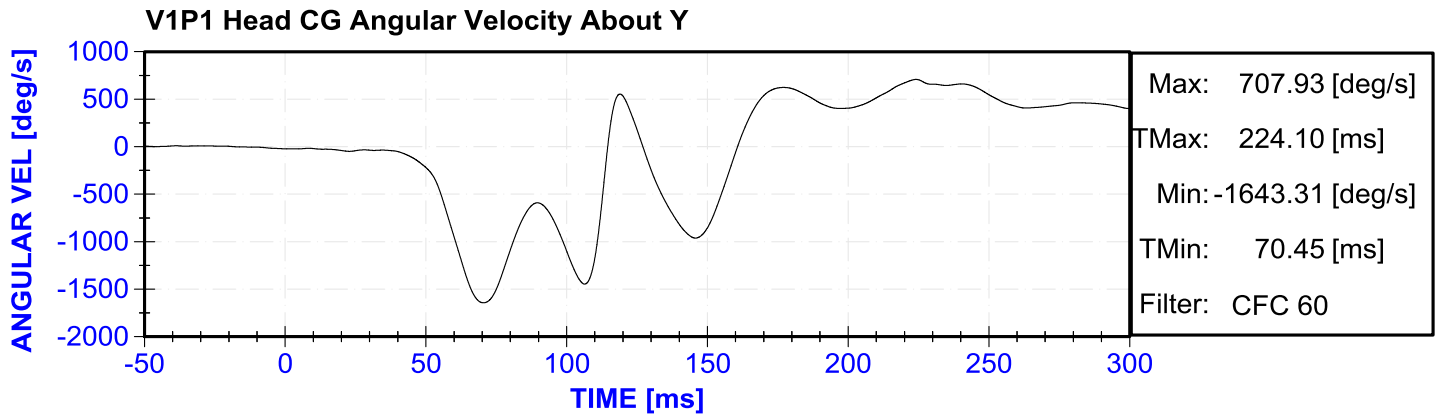
Plot 117	V1P2 Head Redundant Z Acceleration	B-37
Plot 118	V1P2 Head CG Angular Velocity About X	B-37
Plot 119	V1P2 Head CG Angular Velocity About Y	B-37
Plot 120	V1P2 Head CG Angular Velocity About Z	B-37
Plot 121	V1P2 Upper Neck X Force	B-38
Plot 122	V1P2 Upper Neck Y Force	B-38
Plot 123	V1P2 Upper Neck Z Force	B-38
Plot 124	V1P2 Upper Neck X Moment	B-38
Plot 125	V1P2 Upper Neck Y Moment	B-39
Plot 126	V1P2 Upper Neck Z Moment	B-39
Plot 127	V1P2 Ribs Left 01 X Displacement	B-39
Plot 128	V1P2 Ribs Left 01 Y Displacement	B-39
Plot 129	V1P2 Ribs Left 02 X Displacement	B-40
Plot 130	V1P2 Ribs Left 02 Y Displacement	B-40
Plot 131	V1P2 Ribs Left 03 X Displacement	B-40
Plot 132	V1P2 Ribs Left 03 Y Displacement	B-40
Plot 133	V1P2 Ribs Left 04 X Displacement	B-41
Plot 134	V1P2 Ribs Left 04 Y Displacement	B-41
Plot 135	V1P2 Ribs Left 05 X Displacement	B-41
Plot 136	V1P2 Ribs Left 05 Y Displacement	B-41
Plot 137	V1P2 Ribs Left 06 X Displacement	B-42
Plot 138	V1P2 Ribs Left 06 Y Displacement	B-42
Plot 139	V1P2 Ribs Right 01 X Displacement	B-42
Plot 140	V1P2 Ribs Right 01 Y Displacement	B-42
Plot 141	V1P2 Ribs Right 02 X Displacement	B-43
Plot 142	V1P2 Ribs Right 02 Y Displacement	B-43
Plot 143	V1P2 Ribs Right 03 X Displacement	B-43
Plot 144	V1P2 Ribs Right 03 Y Displacement	B-43
Plot 145	V1P2 Ribs Right 04 X Displacement	B-44
Plot 146	V1P2 Ribs Right 04 Y Displacement	B-44
Plot 147	V1P2 Ribs Right 05 X Displacement	B-44
Plot 148	V1P2 Ribs Right 05 Y Displacement	B-44
Plot 149	V1P2 Ribs Right 06 X Displacement	B-45
Plot 150	V1P2 Ribs Right 06 Y Displacement	B-45
Plot 151	V1P2 Chest X Displacement	B-45
Plot 152	V1P2 Chest CG X Acceleration	B-45
Plot 153	V1P2 Chest CG Y Acceleration	B-46
Plot 154	V1P2 Chest CG Z Acceleration	B-46
Plot 155	V1P2 Pelvis X Acceleration	B-46
Plot 156	V1P2 Pelvis Y Acceleration	B-46
Plot 157	V1P2 Pelvis Z Acceleration	B-47
Plot 158	V1P2 Left Femur Z Force	B-47
Plot 159	V1P2 Right Femur Z Force	B-47
Plot 160	V1P2 Left Upper Tibia X Force	B-47
Plot 161	V1P2 Left Upper Tibia Y Force	B-48
Plot 162	V1P2 Left Upper Tibia Z Force	B-48
Plot 163	V1P2 Left Upper Tibia X Moment	B-48
Plot 164	V1P2 Left Upper Tibia Y Moment	B-48
Plot 165	V1P2 Right Upper Tibia X Force	B-49
Plot 166	V1P2 Right Upper Tibia Y Force	B-49
Plot 167	V1P2 Right Upper Tibia Z Force	B-49
Plot 168	V1P2 Right Upper Tibia X Moment	B-49
Plot 169	V1P2 Right Upper Tibia Y Moment	B-50
Plot 170	V1P2 Left Lower Tibia X Force	B-50
Plot 171	V1P2 Left Lower Tibia Y Force	B-50
Plot 172	V1P2 Left Lower Tibia Z Force	B-50
Plot 173	V1P2 Left Lower Tibia X Moment	B-51
Plot 174	V1P2 Left Lower Tibia Y Moment	B-51
Plot 175	V1P2 Right Lower Tibia X Force	B-51

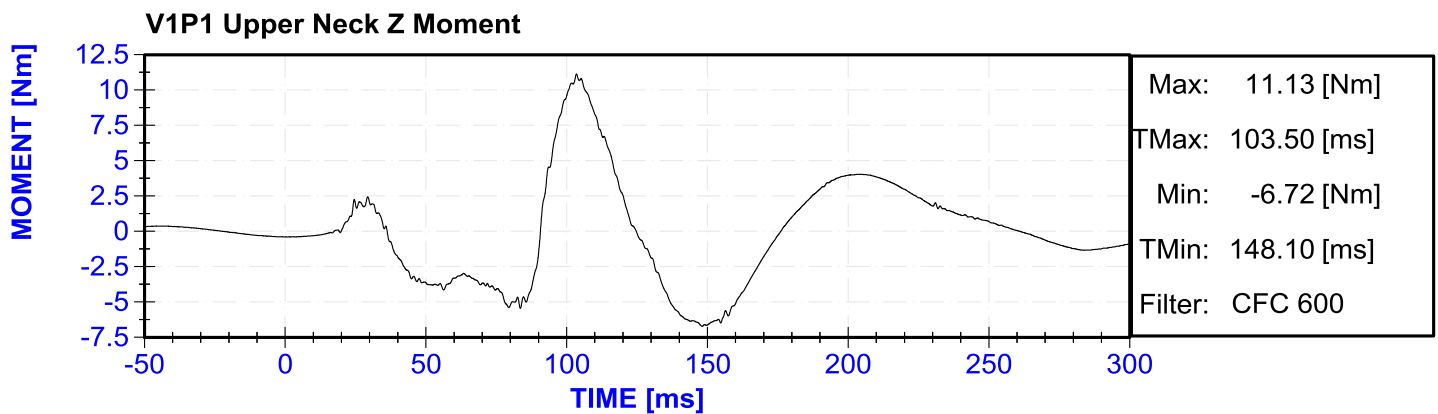
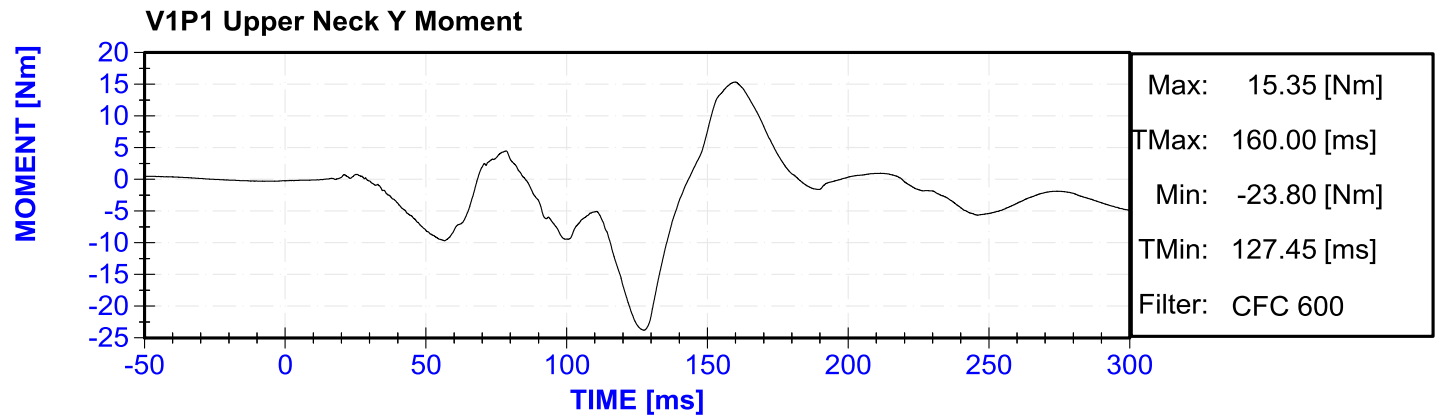
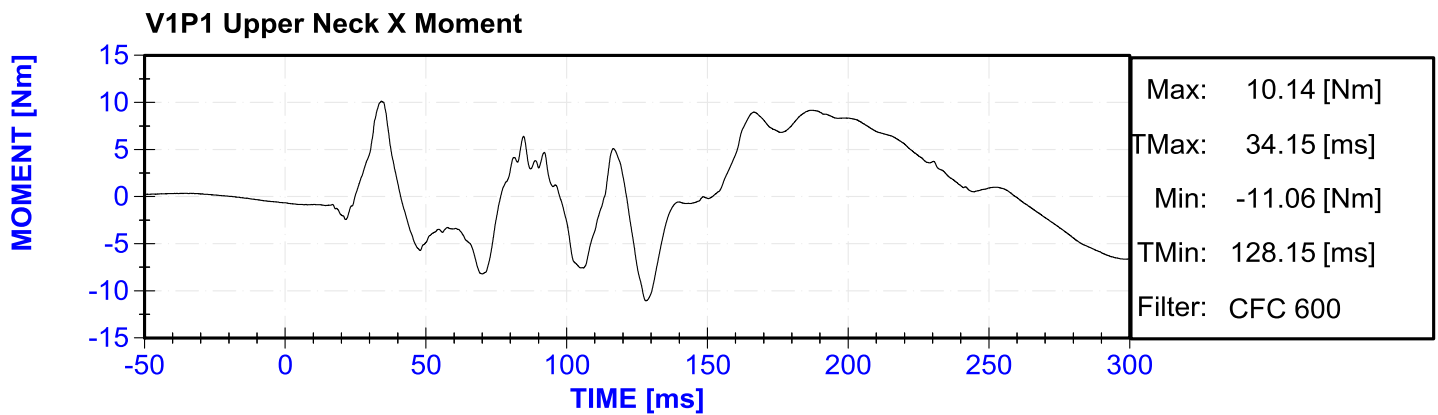
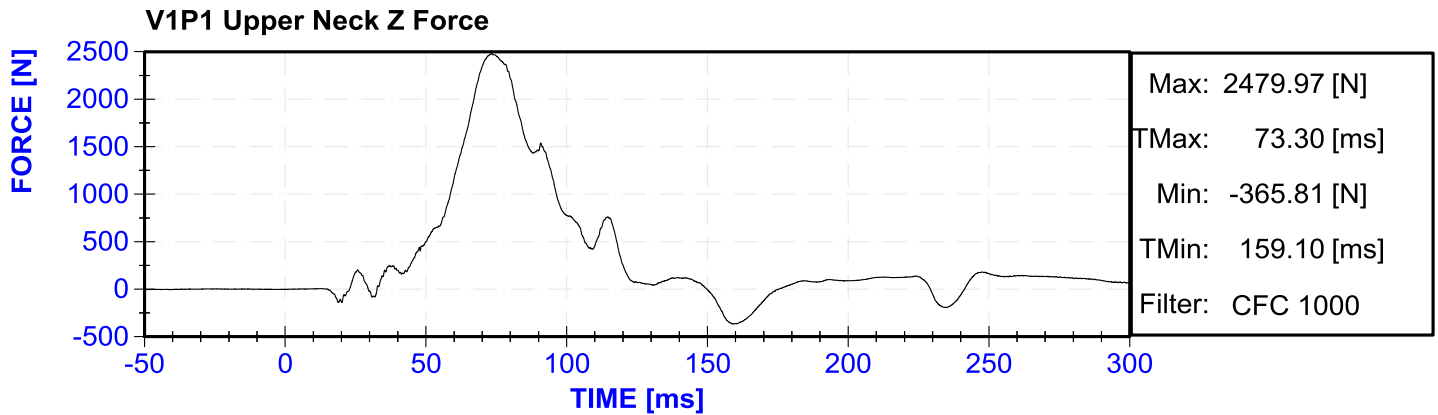
Plot 176	V1P2 Right Lower Tibia Y Force	B-51
Plot 177	V1P2 Right Lower Tibia Z Force	B-52
Plot 178	V1P2 Right Lower Tibia X Moment	B-52
Plot 179	V1P2 Right Lower Tibia Y Moment	B-52
Plot 180	V1P2 Left Foot Aft X Acceleration	B-52
Plot 181	V1P2 Left Foot Aft Z Acceleration	B-53
Plot 182	V1P2 Left Foot Fore Z Acceleration	B-53
Plot 183	V1P2 Right Foot Aft X Acceleration	B-53
Plot 184	V1P2 Right Foot Aft Z Acceleration	B-53
Plot 185	V1P2 Right Foot Fore Z Acceleration	B-54
Plot 186	V1 Front Right Passenger Lap Belt Force	B-54
Plot 187	V1 Front Right Passenger Shoulder Belt Upper Force	B-54
Plot 188	V1 Front Right Passenger Shoulder Belt Displacement	B-54
Plot 189	V1P3 Head CG X Acceleration	B-55
Plot 190	V1P3 Head CG Y Acceleration	B-55
Plot 191	V1P3 Head CG Z Acceleration	B-55
Plot 192	V1P3 Upper Neck X Force	B-55
Plot 193	V1P3 Upper Neck Y Force	B-56
Plot 194	V1P3 Upper Neck Z Force	B-56
Plot 195	V1P3 Upper Neck X Moment	B-56
Plot 196	V1P3 Upper Neck Y Moment	B-56
Plot 197	V1P3 Upper Neck Z Moment	B-57
Plot 198	V1P3 Ribs Left 01 X Displacement	B-57
Plot 199	V1P3 Ribs Left 01 Y Displacement	B-57
Plot 200	V1P3 Ribs Left 02 X Displacement	B-57
Plot 201	V1P3 Ribs Left 02 Y Displacement	B-58
Plot 202	V1P3 Ribs Left 03 X Displacement	B-58
Plot 203	V1P3 Ribs Left 03 Y Displacement	B-58
Plot 204	V1P3 Ribs Left 04 X Displacement	B-58
Plot 205	V1P3 Ribs Left 04 Y Displacement	B-59
Plot 206	V1P3 Ribs Left 05 X Displacement	B-59
Plot 207	V1P3 Ribs Left 05 Y Displacement	B-59
Plot 208	V1P3 Ribs Left 06 X Displacement	B-59
Plot 209	V1P3 Ribs Left 06 Y Displacement	B-60
Plot 210	V1P3 Ribs Right 01 X Displacement	B-60
Plot 211	V1P3 Ribs Right 01 Y Displacement	B-60
Plot 212	V1P3 Ribs Right 02 X Displacement	B-60
Plot 213	V1P3 Ribs Right 02 Y Displacement	B-61
Plot 214	V1P3 Ribs Right 03 X Displacement	B-61
Plot 215	V1P3 Ribs Right 03 Y Displacement	B-61
Plot 216	V1P3 Ribs Right 04 X Displacement	B-61
Plot 217	V1P3 Ribs Right 04 Y Displacement	B-62
Plot 218	V1P3 Ribs Right 05 X Displacement	B-62
Plot 219	V1P3 Ribs Right 05 Y Displacement	B-62
Plot 220	V1P3 Ribs Right 06 X Displacement	B-62
Plot 221	V1P3 Ribs Right 06 Y Displacement	B-63
Plot 222	V1P3 Chest X Displacement	B-63
Plot 223	V1P3 Chest CG X Acceleration	B-63
Plot 224	V1P3 Chest CG Y Acceleration	B-63
Plot 225	V1P3 Chest CG Z Acceleration	B-64
Plot 226	V1P3 Pelvis X Acceleration	B-64
Plot 227	V1P3 Pelvis Y Acceleration	B-64
Plot 228	V1P3 Pelvis Z Acceleration	B-64
Plot 229	V1P3 Left Femur Z Force	B-65
Plot 230	V1P3 Right Femur Z Force	B-65
Plot 231	V1P3 ASIS Left X Force	B-65
Plot 232	V1P3 ASIS Left Y Moment	B-65
Plot 233	V1P3 ASIS Right X Force	B-66
Plot 234	V1P3 ASIS Right Y Moment	B-66

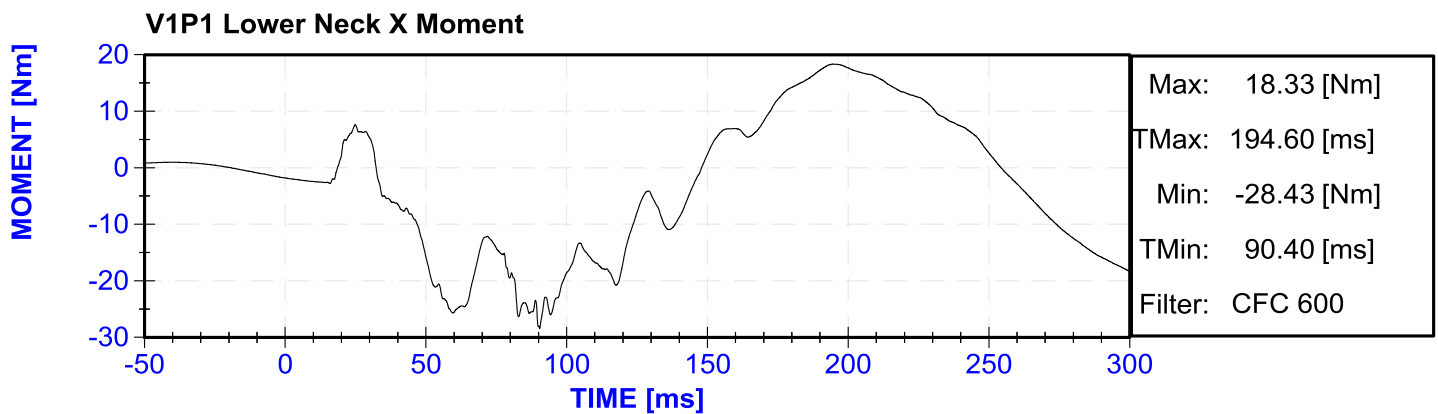
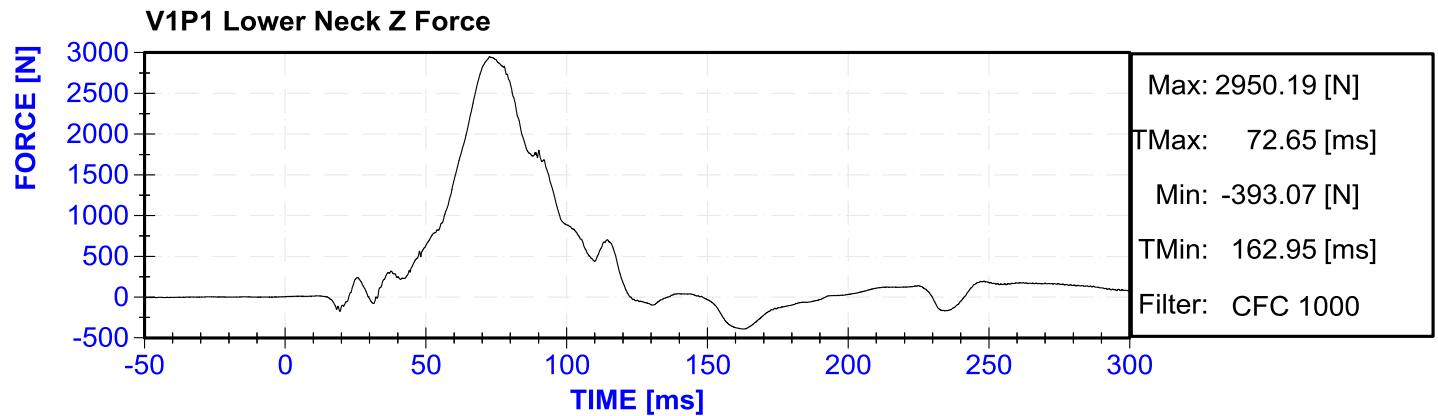
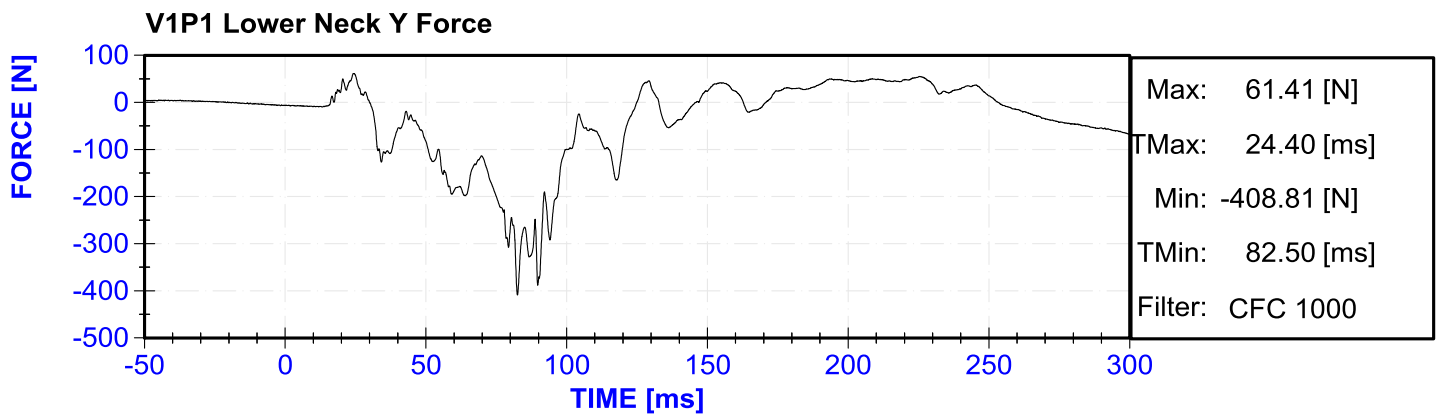
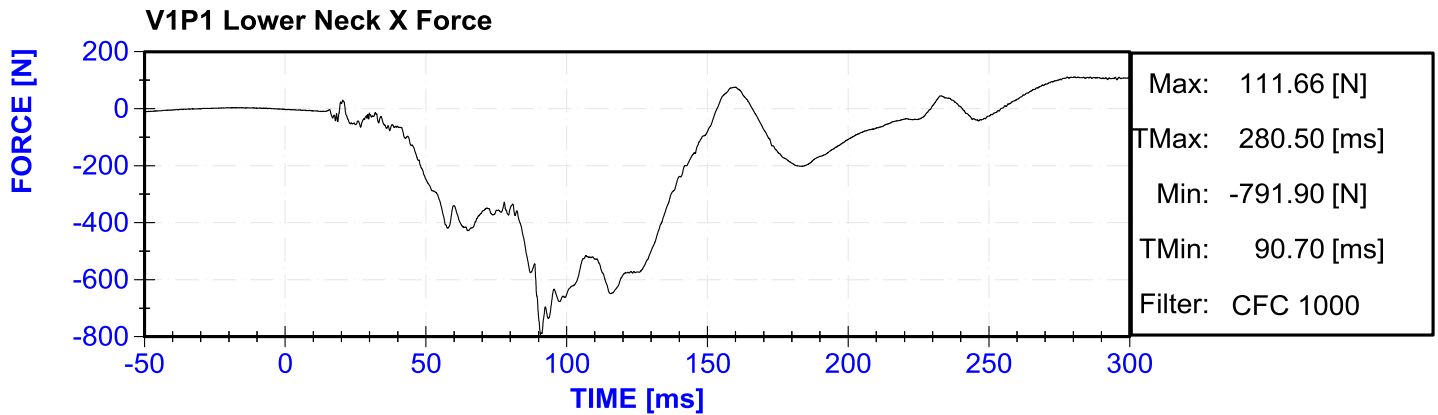
Plot 235	V1 Rear Passenger Lap Belt Force	B-66
Plot 236	V1 Rear Passenger Shoulder Belt Force	B-66
Plot 237	V1 Left Rear Sill X Acceleration	B-67
Plot 238	V1 Left Rear Sill Y Acceleration	B-67
Plot 239	V1 Left Rear Sill Redundant X Acceleration	B-67
Plot 240	V1 Left Rear Sill Redundant Y Acceleration	B-67
Plot 241	V1 Right Rear Sill X Acceleration	B-68
Plot 242	V1 Right Rear Sill Y Acceleration	B-68
Plot 243	V1 Left Rear Sill Redundant X Acceleration	B-68
Plot 244	V1 Left Rear Sill Redundant Y Acceleration	B-68
Plot 245	V1 Left Front Outer Seat Track Mid X Acceleration	B-69
Plot 246	V1 Left Front Outer Seat Track Mid Z Acceleration	B-69
Plot 247	V1 Left Front Seat Cross Member Mid X Acceleration	B-69
Plot 248	V1 Left Front Seat Cross Member Mid Z Acceleration	B-69
Plot 249	V1 Left Rear Seat Cross Member X Acceleration	B-70
Plot 250	V1 Left Rear Seat Cross Member Z Acceleration	B-70
Plot 251	V1 Right Rear Seat Cross Member X Acceleration	B-70
Plot 252	V1 Right Rear Seat Cross Member Z Acceleration	B-70
Plot 253	V1 Vehicle CG X Acceleration	B-71
Plot 254	V1 Vehicle CG Y Acceleration	B-71
Plot 255	V1 Vehicle CG Z Acceleration	B-71
Plot 256	V1 Vehicle CG X Angular Rate	B-71
Plot 257	V1 Vehicle CG Y Angular Rate	B-72
Plot 258	V1 Vehicle CG Z Angular Rate	B-72
Plot 259	V1 Engine Top X Acceleration	B-72
Plot 260	V1 Driver Floor Pan X Acceleration	B-72
Plot 261	V1 Driver Floor Pan Y Acceleration	B-73
Plot 262	V1 Driver Floor Pan Z Acceleration	B-73
Plot 263	V1 Driver Floor Pan X Displacement	B-73
Plot 264	V1 Passenger Floor Pan X Acceleration	B-73
Plot 265	V1 Passenger Floor Pan Y Acceleration	B-74
Plot 266	V1 Passenger Floor Pan Z Acceleration	B-74
Plot 267	V1 Passenger Floor Pan X Displacement	B-74
Plot 268	V1P1 Fx on head acting through the O.C. joint only	B-74
Plot 269	V1P1 Fz on head acting through the O.C. joint only	B-75
Plot 270	V1P1 My on head acting through the O.C. joint only	B-75
Plot 271	V1P1 Fx on head acting through the total neck section	B-75
Plot 272	V1P1 Fy on head acting through the total neck section	B-75
Plot 273	V1P1 Fz on head acting through the total neck section	B-76
Plot 274	V1P1 Mx on head acting through the total neck section	B-76
Plot 275	V1P1 My on head acting through the total neck section	B-76
Plot 276	V1P1 Mz on head acting through the total neck section	B-76
Plot 277	V1P1 Chest Left Upper Dx	B-77
Plot 278	V1P1 Chest Left Upper Dy	B-77
Plot 279	V1P1 Chest Left Upper Dz	B-77
Plot 280	V1P1 Chest Left Upper D	B-77
Plot 281	V1P1 Chest Right Upper Dx	B-78
Plot 282	V1P1 Chest Right Upper Dy	B-78
Plot 283	V1P1 Chest Right Upper Dz	B-78
Plot 284	V1P1 Chest Right Upper D	B-78
Plot 285	V1P1 Chest Left Lower Dx	B-79
Plot 286	V1P1 Chest Left Lower Dy	B-79
Plot 287	V1P1 Chest Left Lower Dz	B-79
Plot 288	V1P1 Chest Left Lower D	B-79
Plot 289	V1P1 Chest Right Lower Dx	B-80
Plot 290	V1P1 Chest Right Lower Dy	B-80
Plot 291	V1P1 Chest Right Lower Dz	B-80
Plot 292	V1P1 Chest Right Lower D	B-80
Plot 293	V1P1 Abdomen Left Lower Dx	B-81

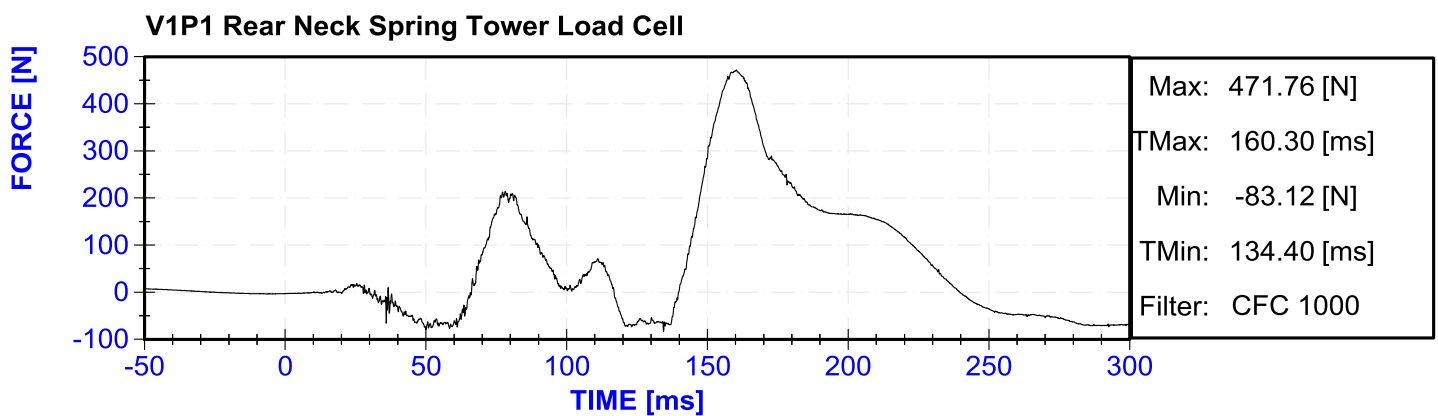
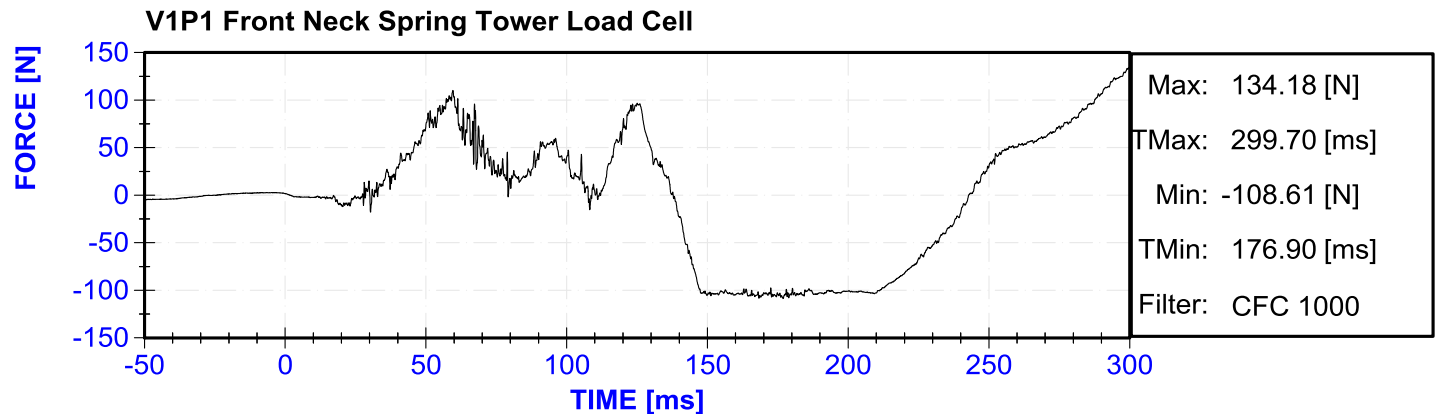
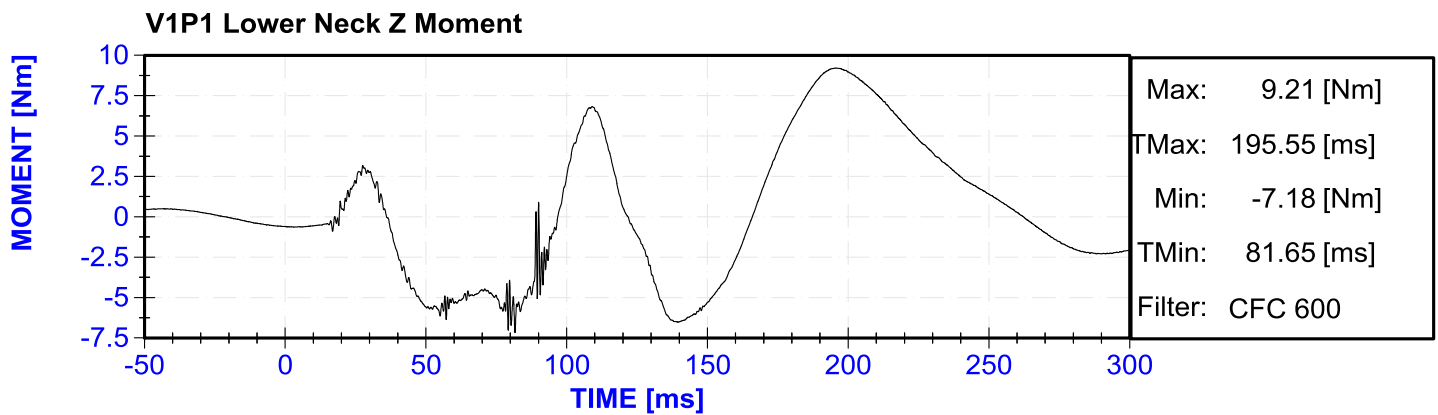
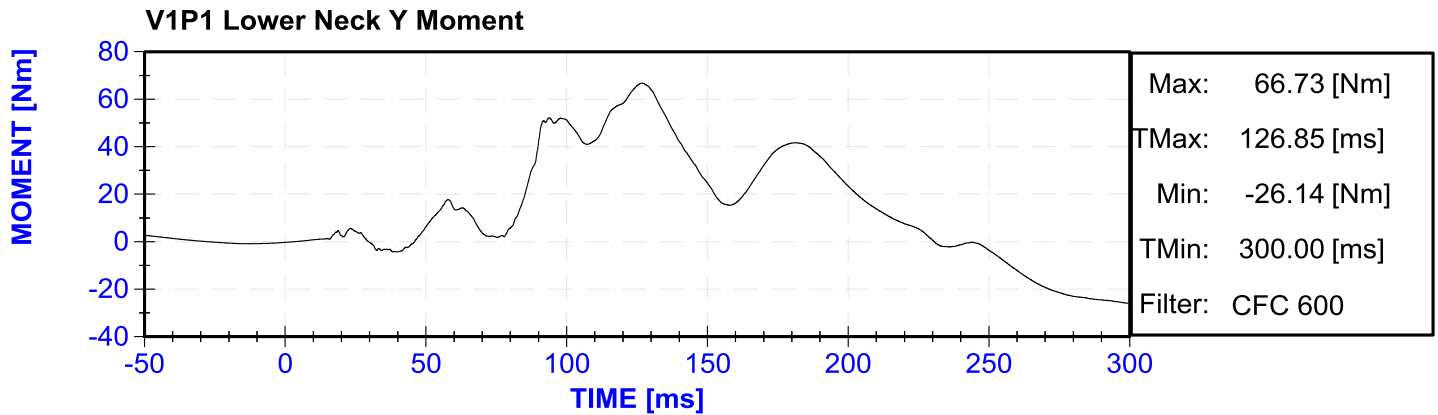
Plot 294	V1P1 Abdomen Left Lower Dy	B-81
Plot 295	V1P1 Abdomen Left Lower Dz	B-81
Plot 296	V1P1 Abdomen Left Lower D	B-81
Plot 297	V1P1 Abdomen Right Lower Dx	B-82
Plot 298	V1P1 Abdomen Right Lower Dy	B-82
Plot 299	V1P1 Abdomen Right Lower Dz	B-82
Plot 300	V1P1 Abdomen Right Lower D	B-82

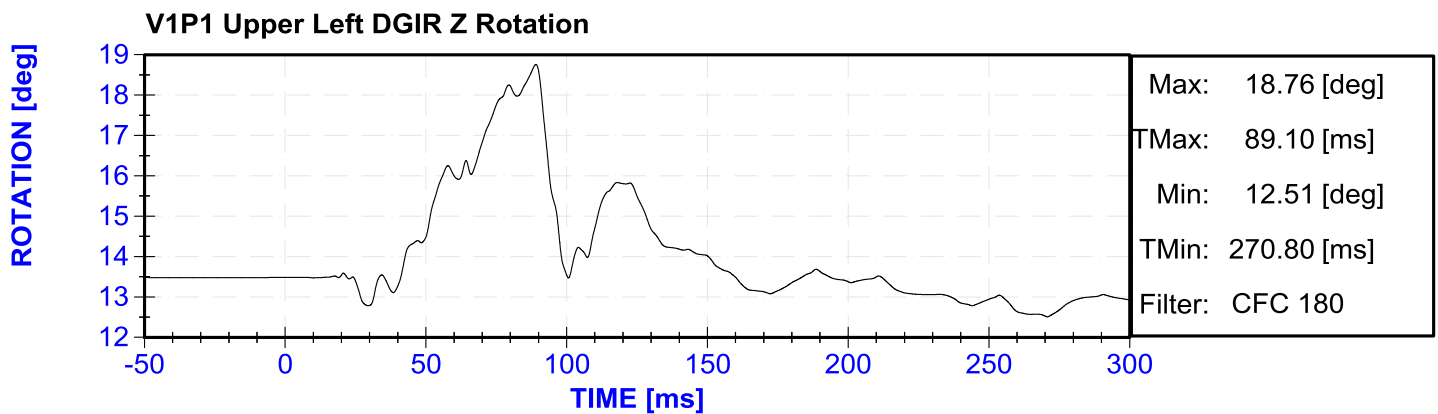
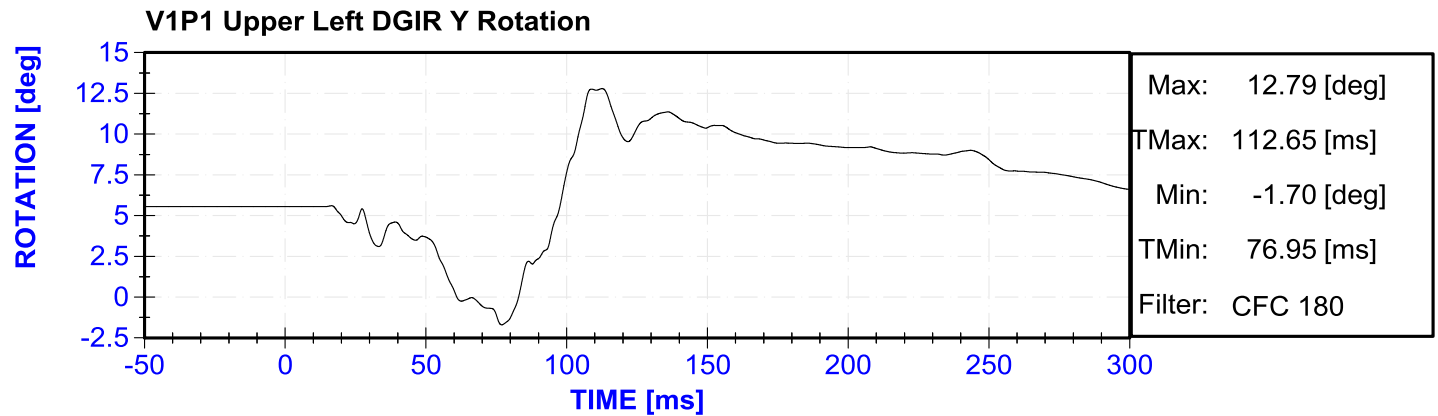
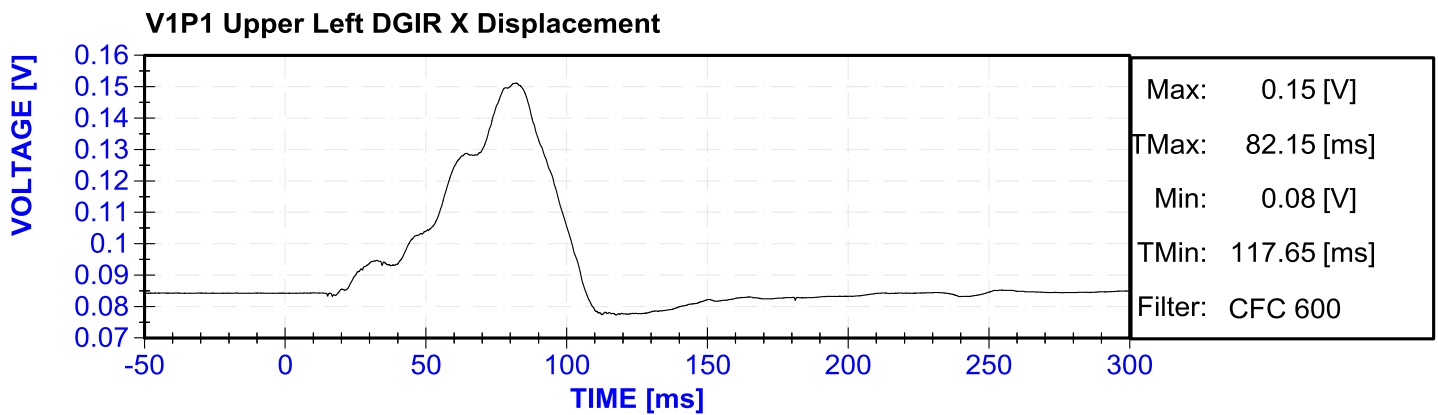
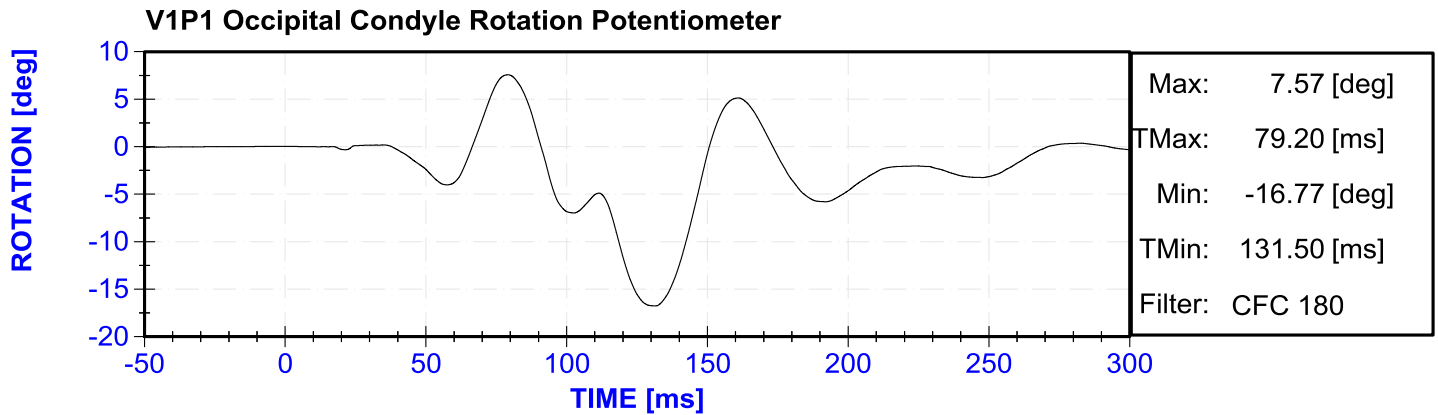


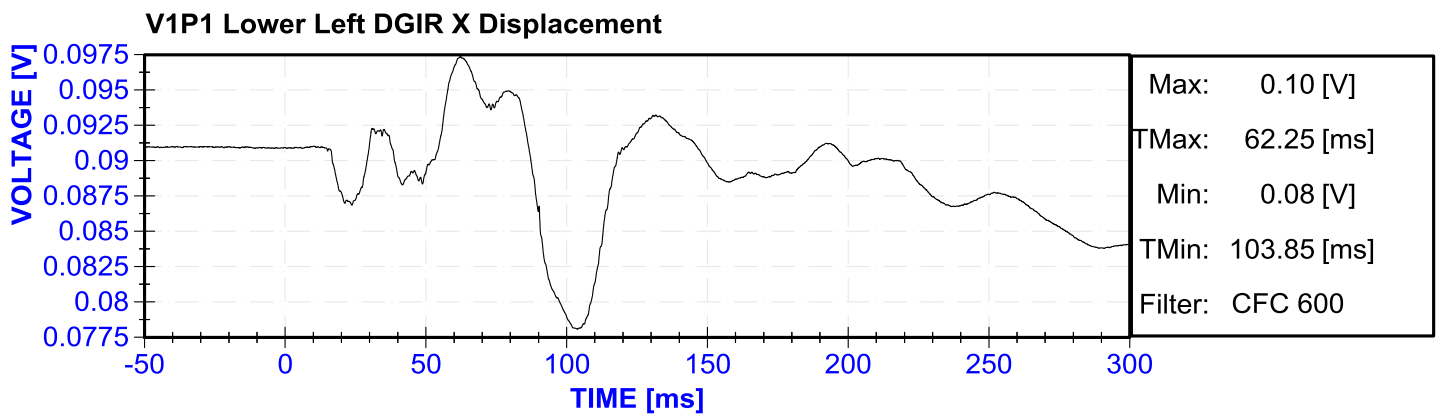
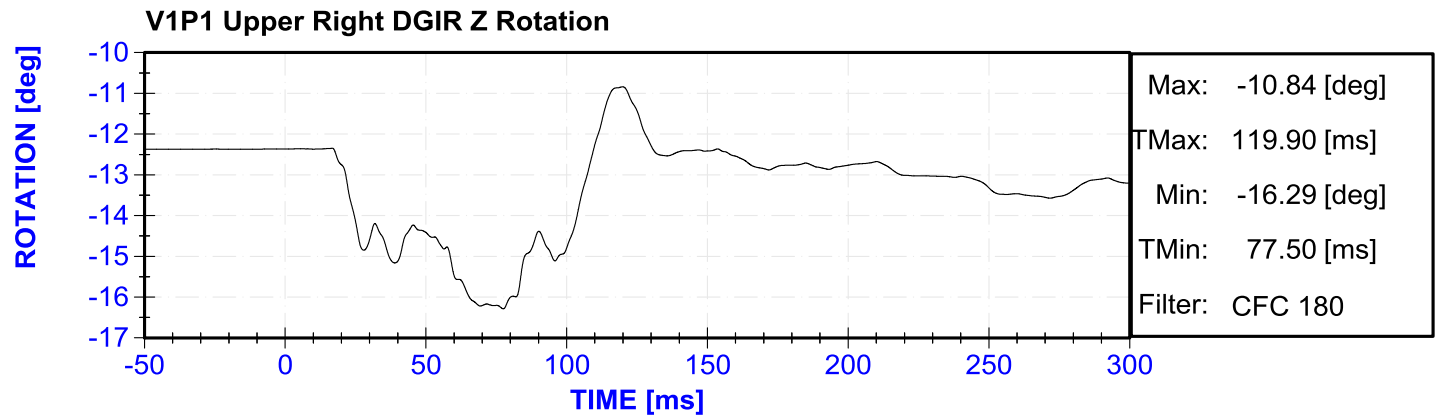
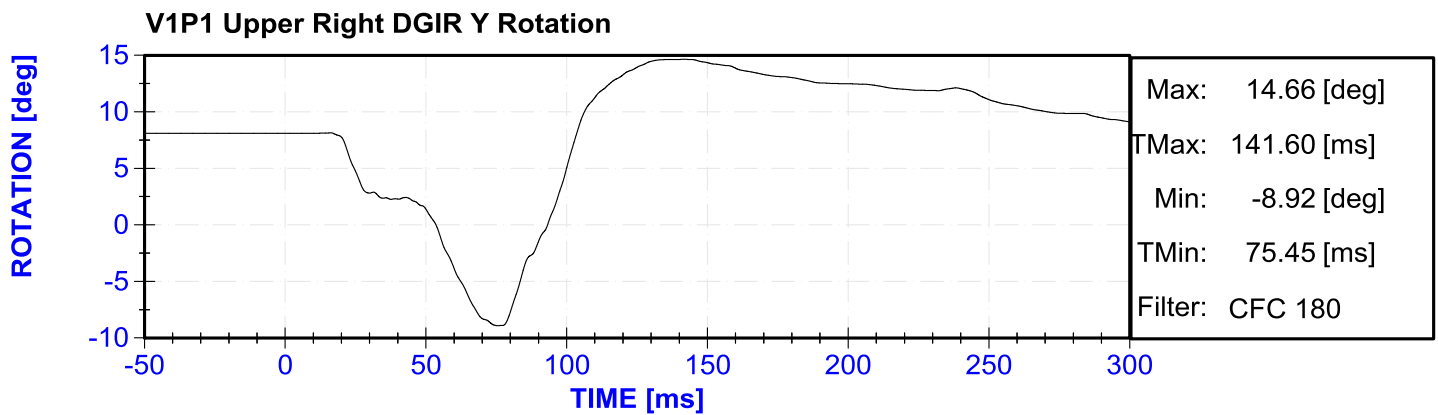
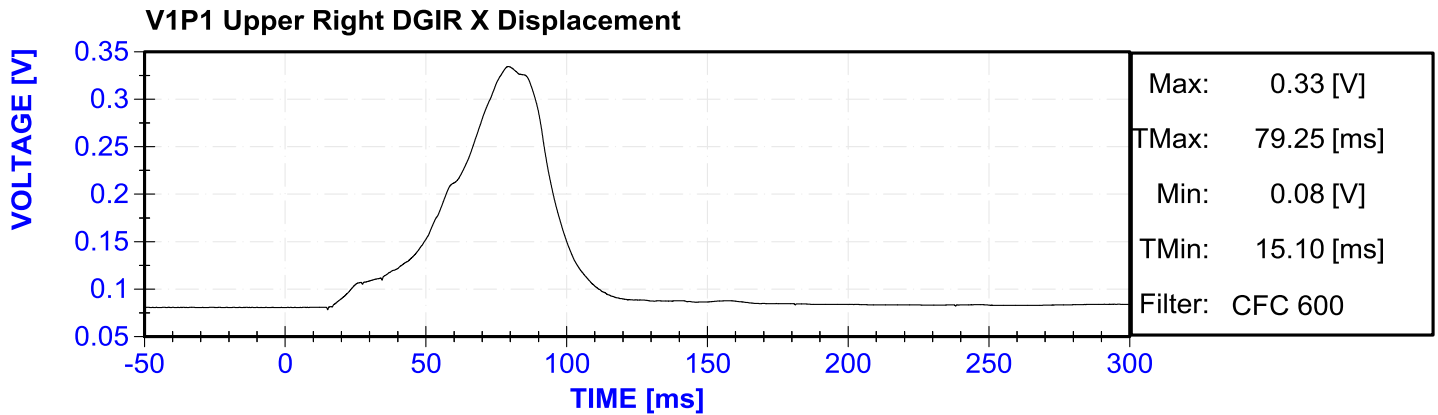


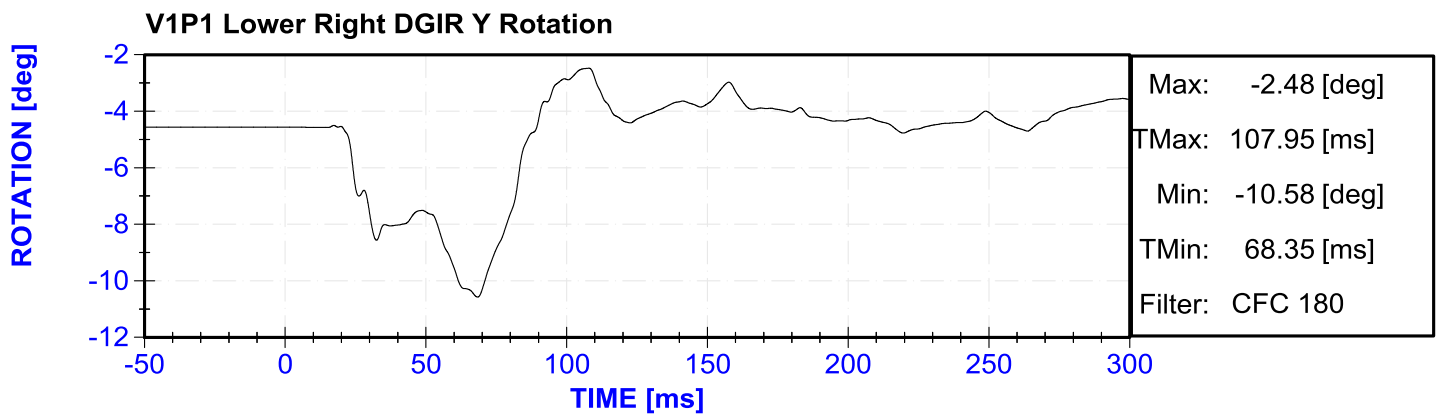
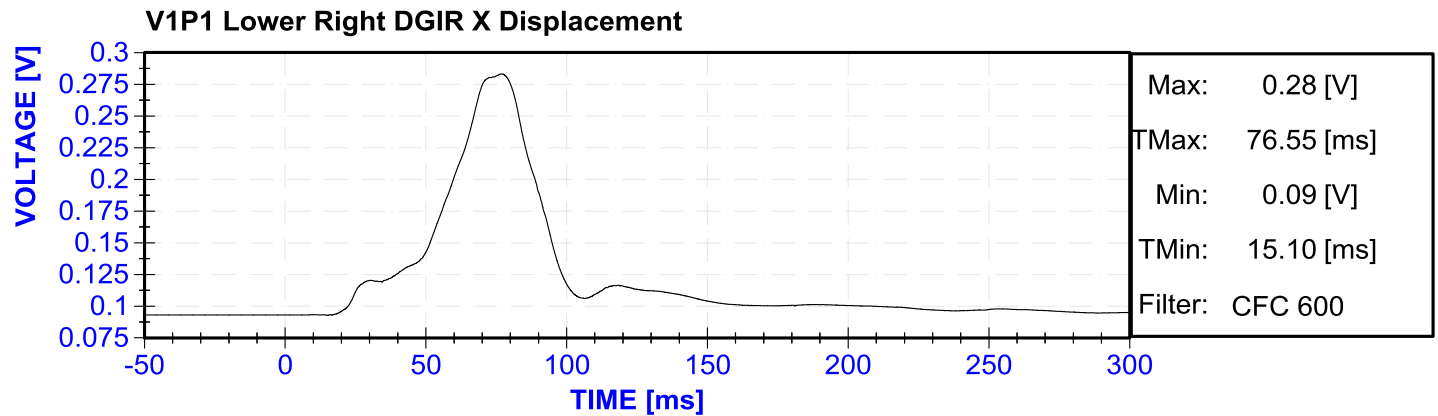
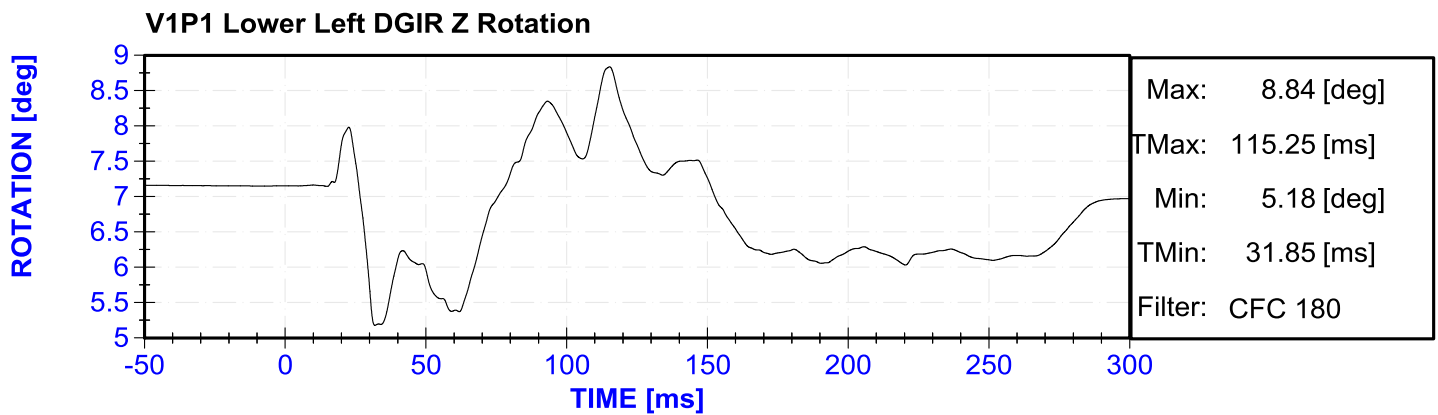
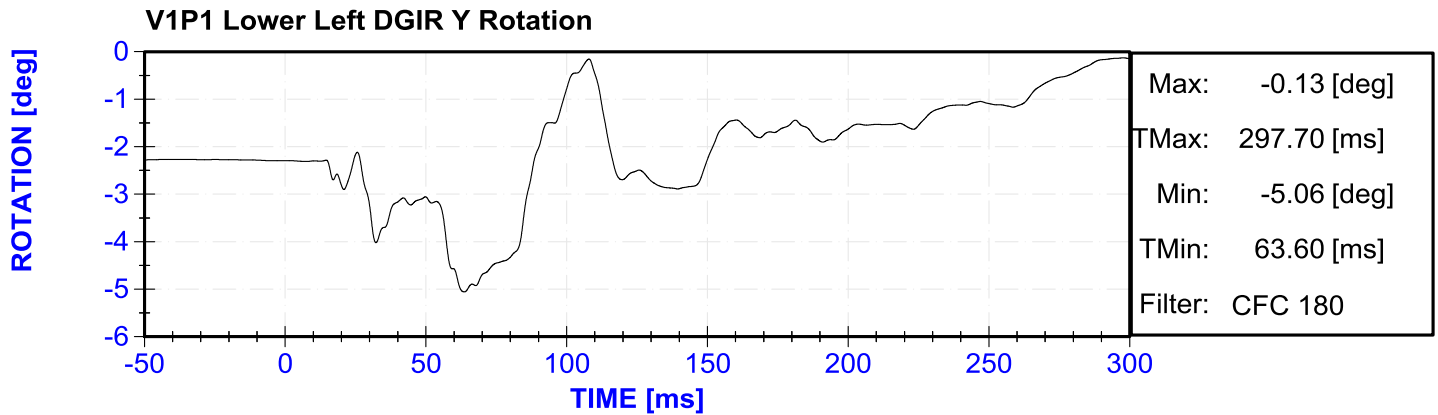


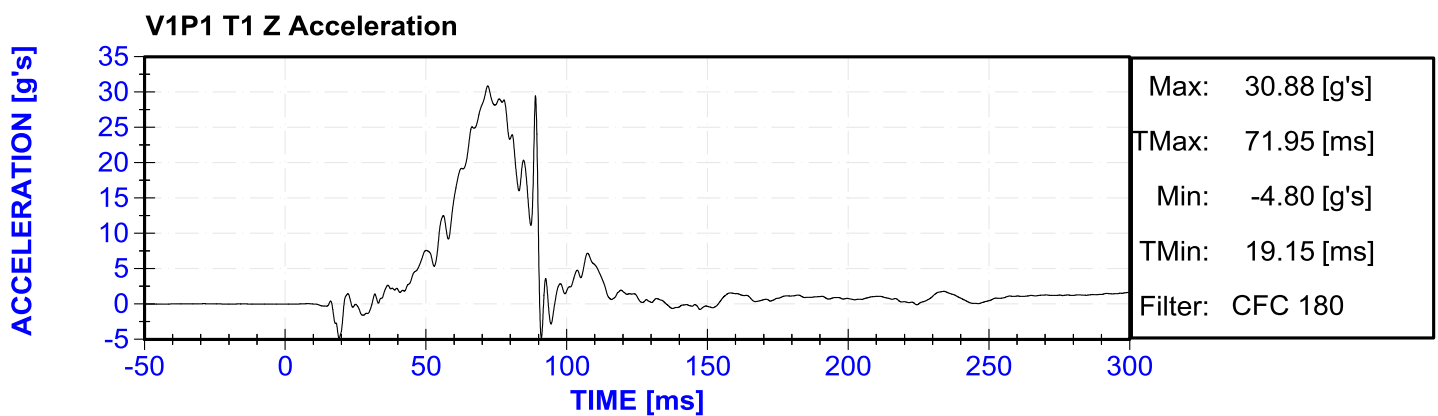
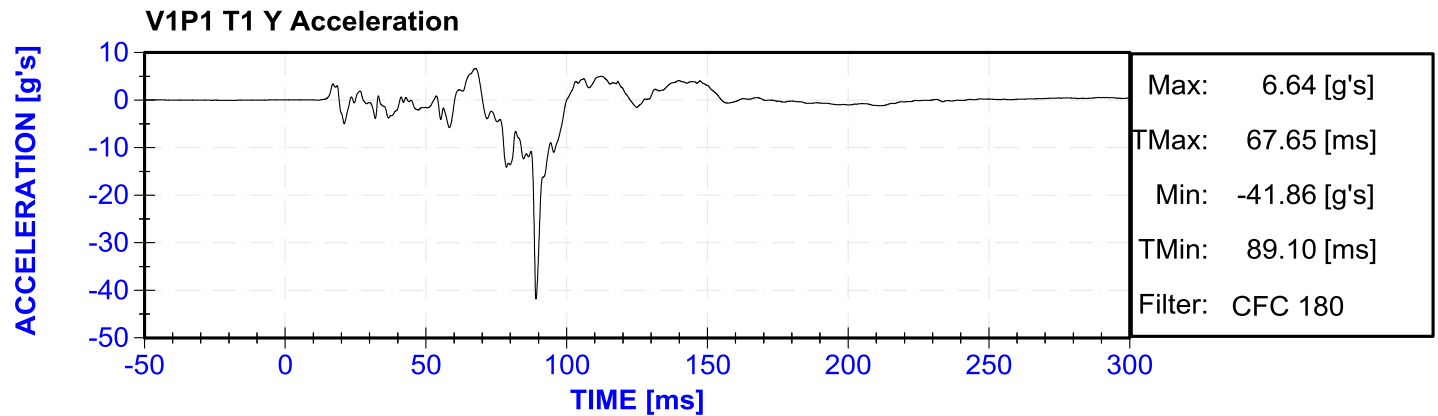
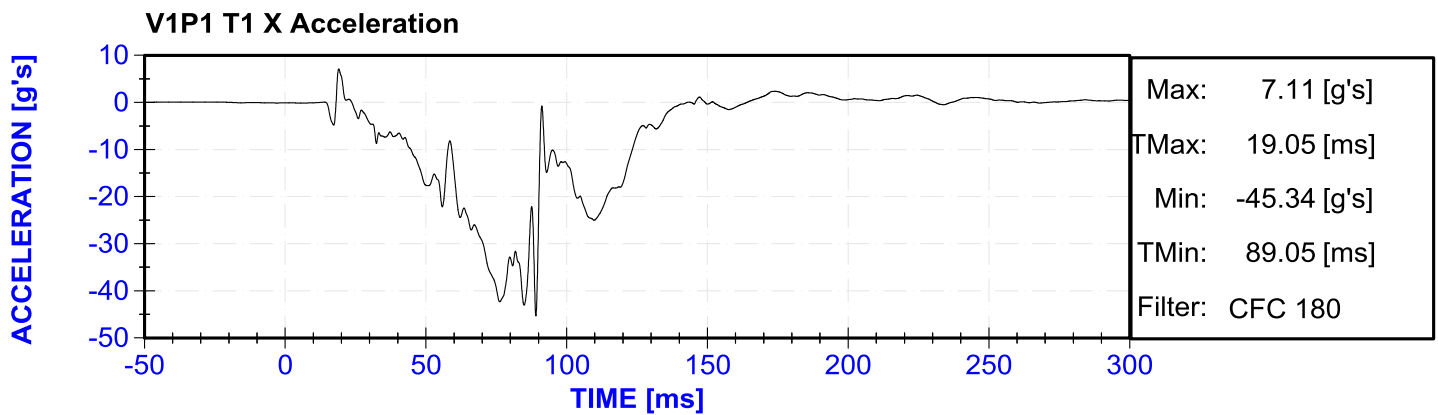
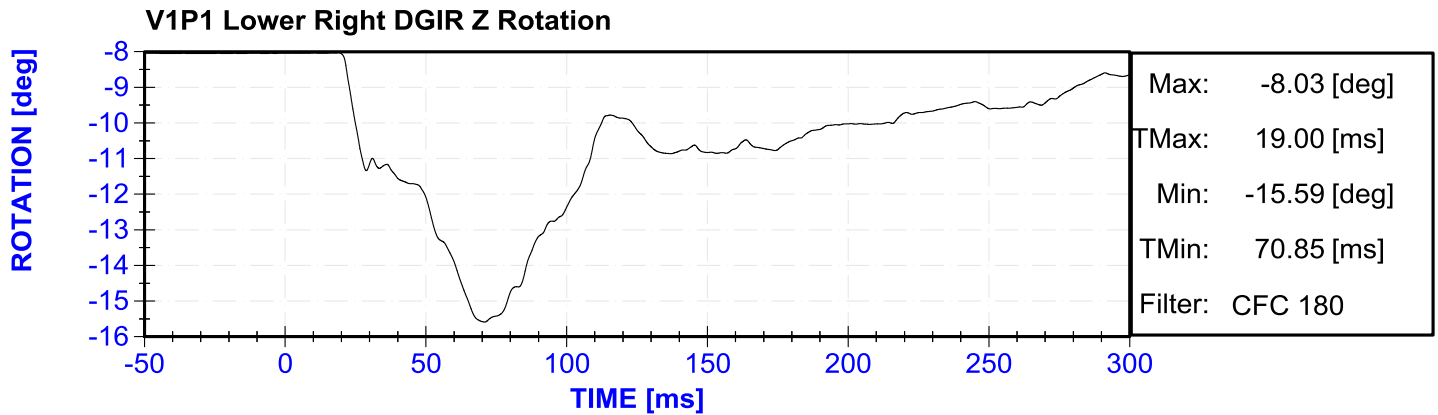


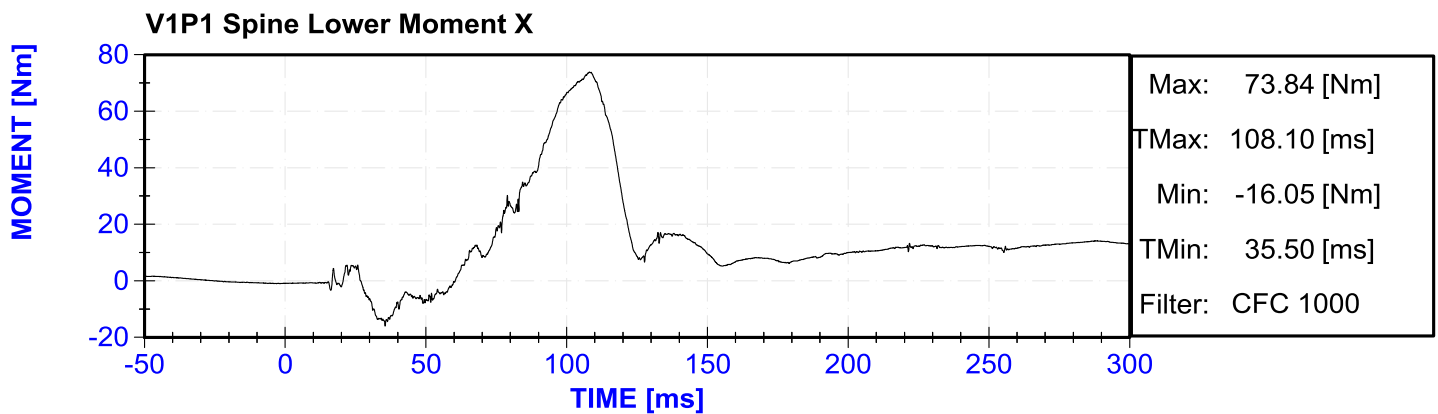
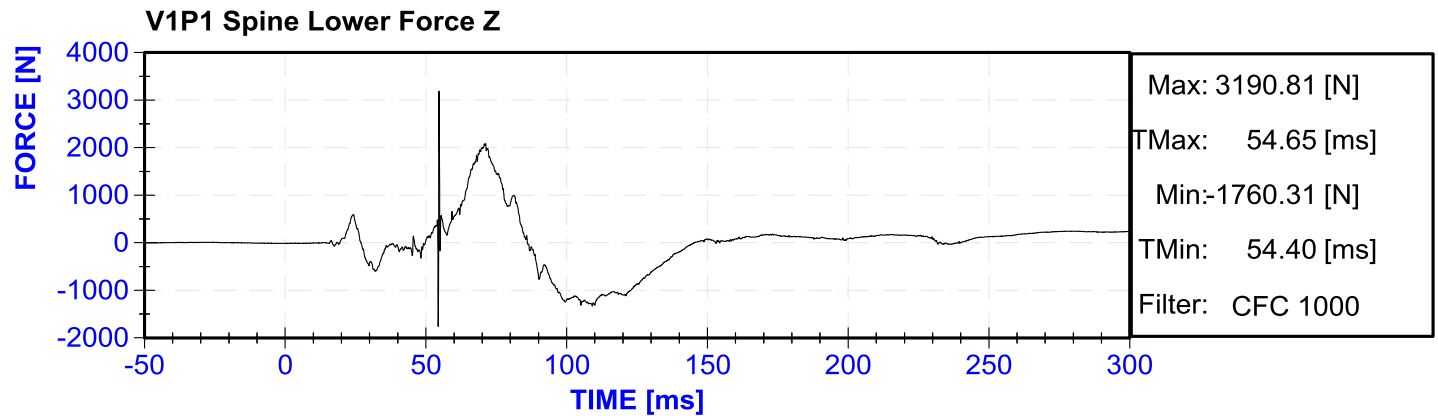
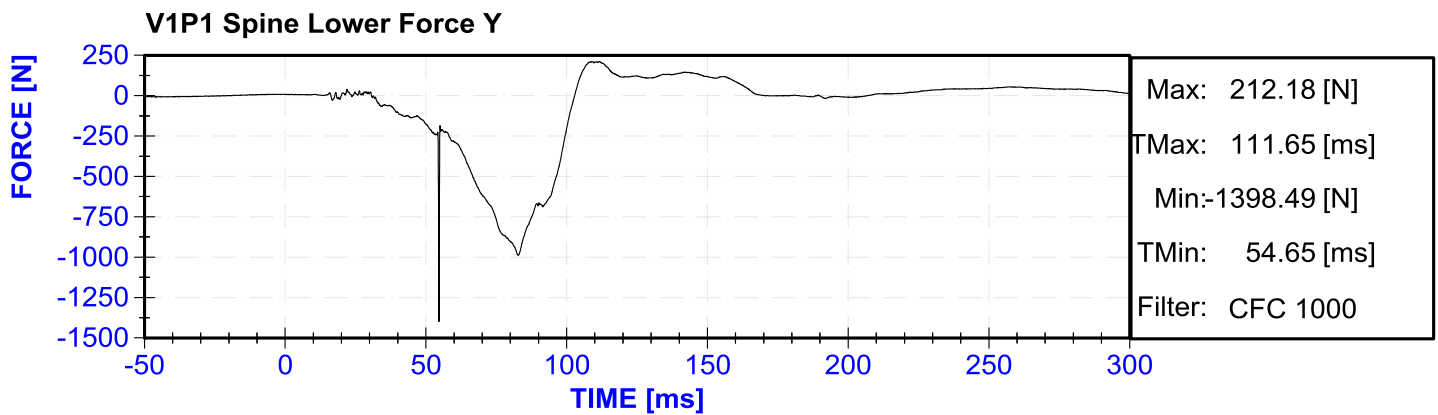
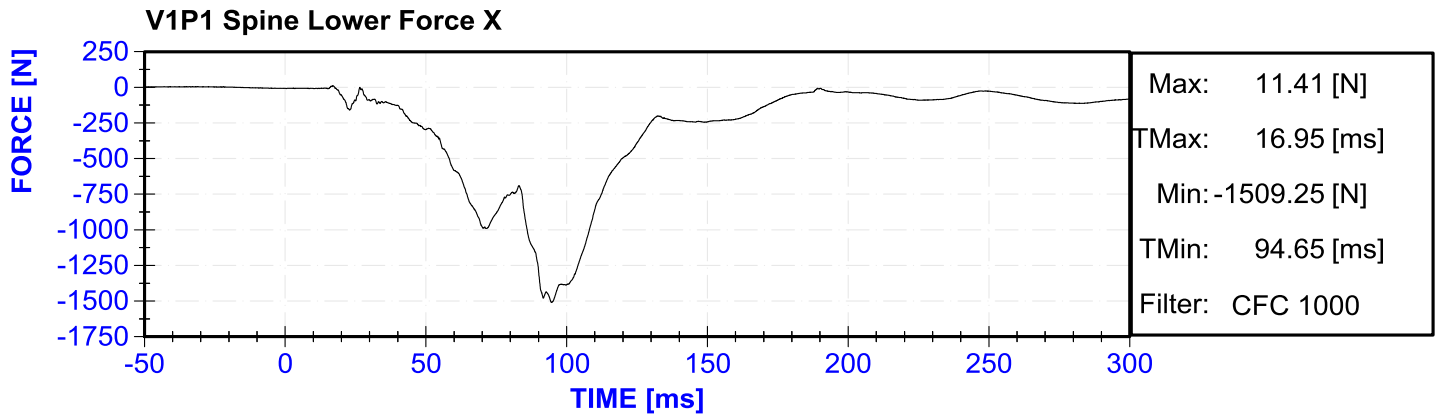


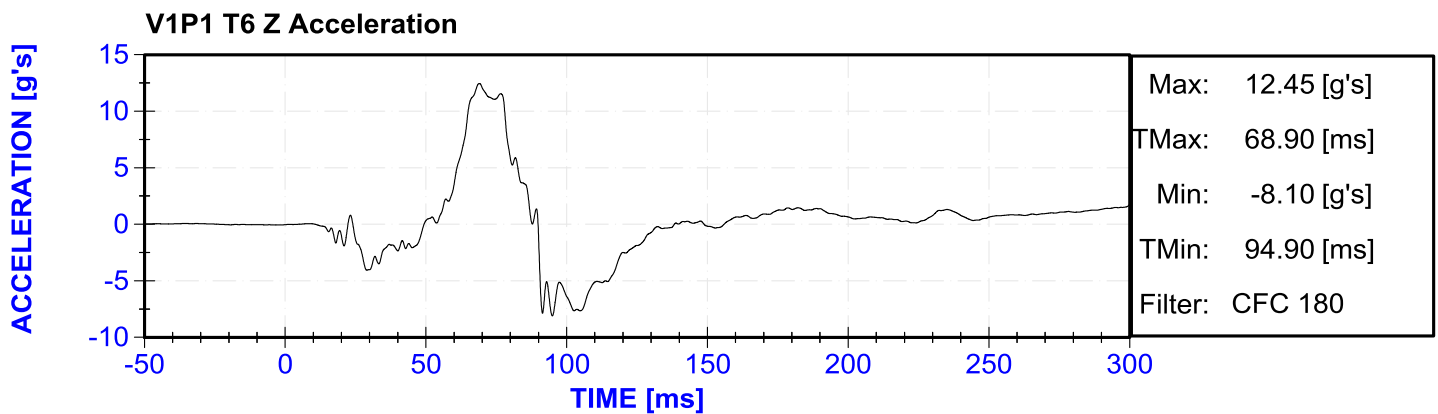
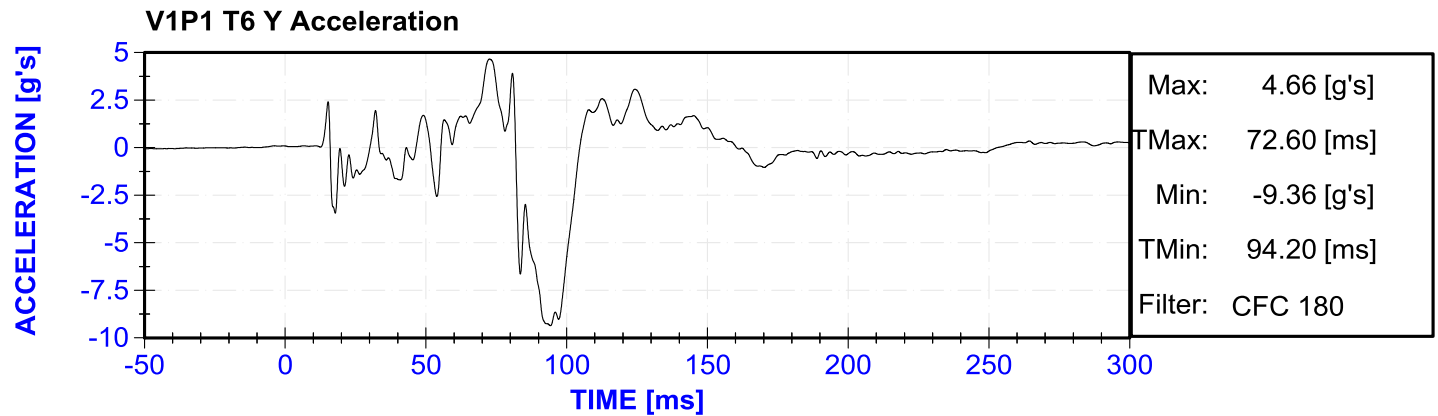
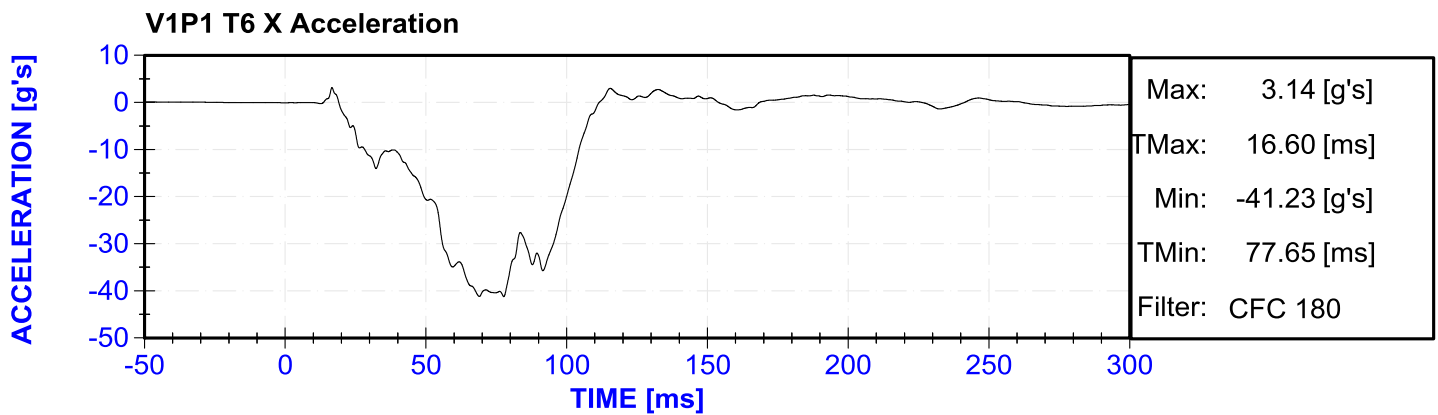
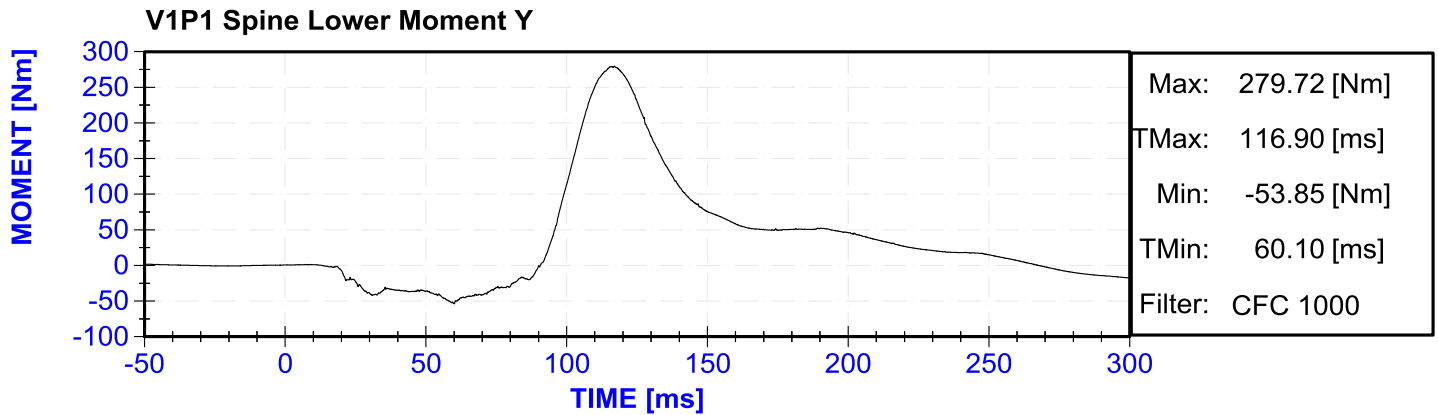


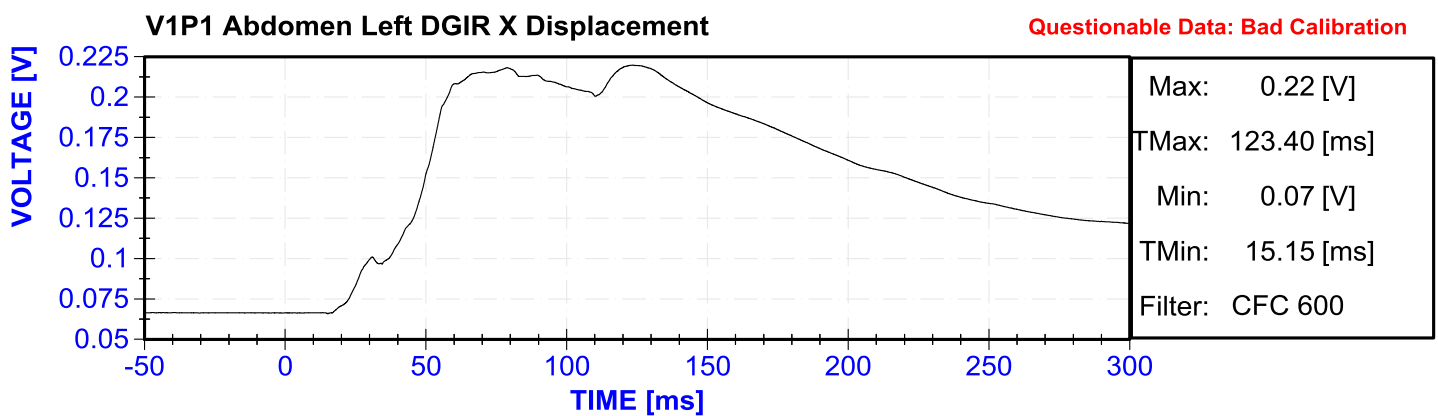
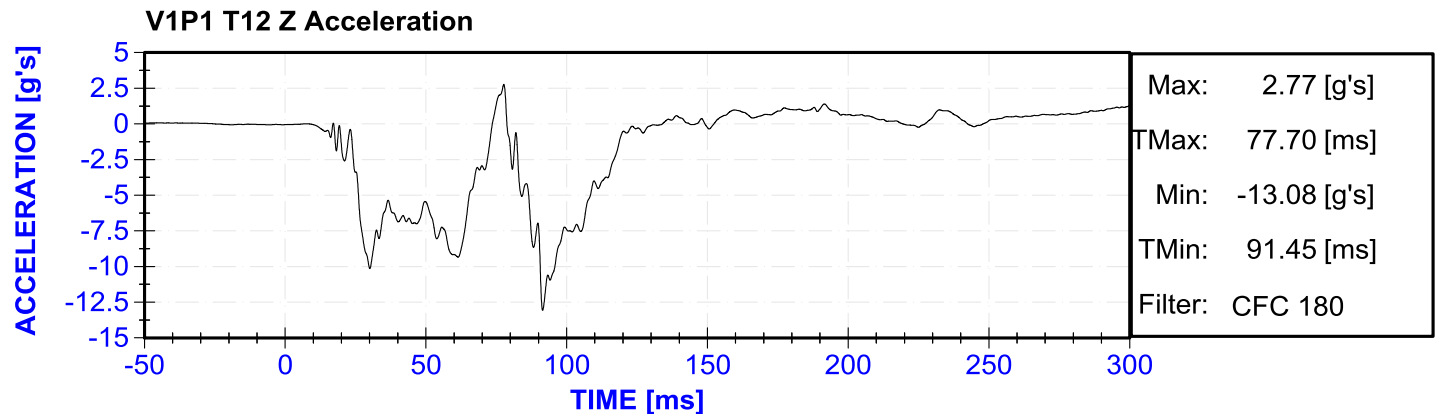
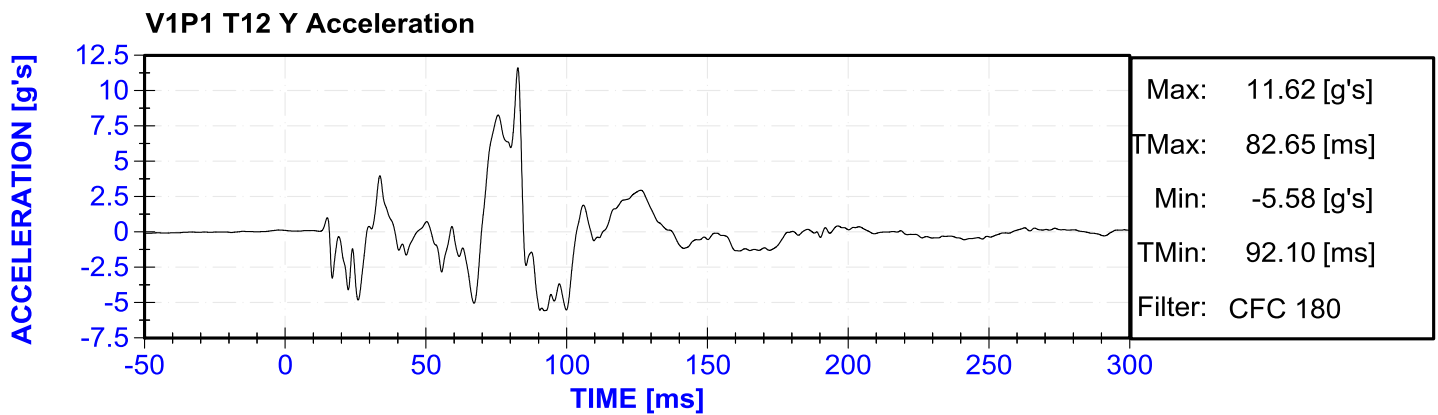
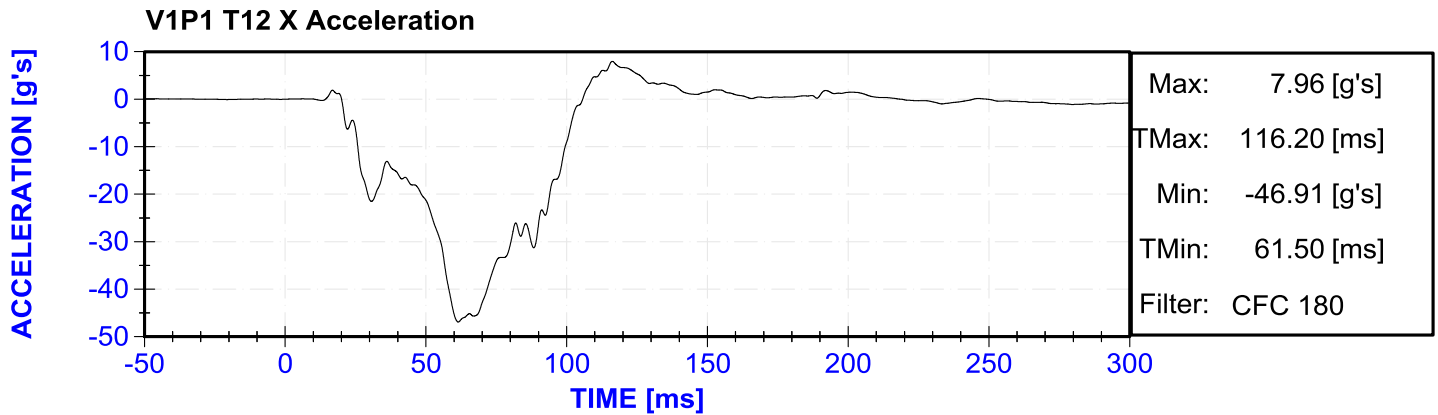


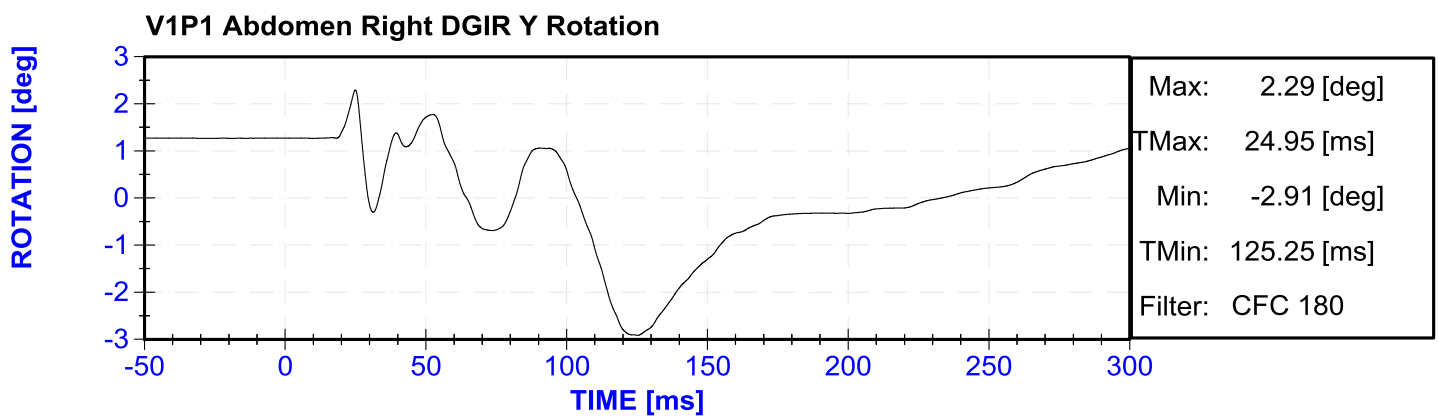
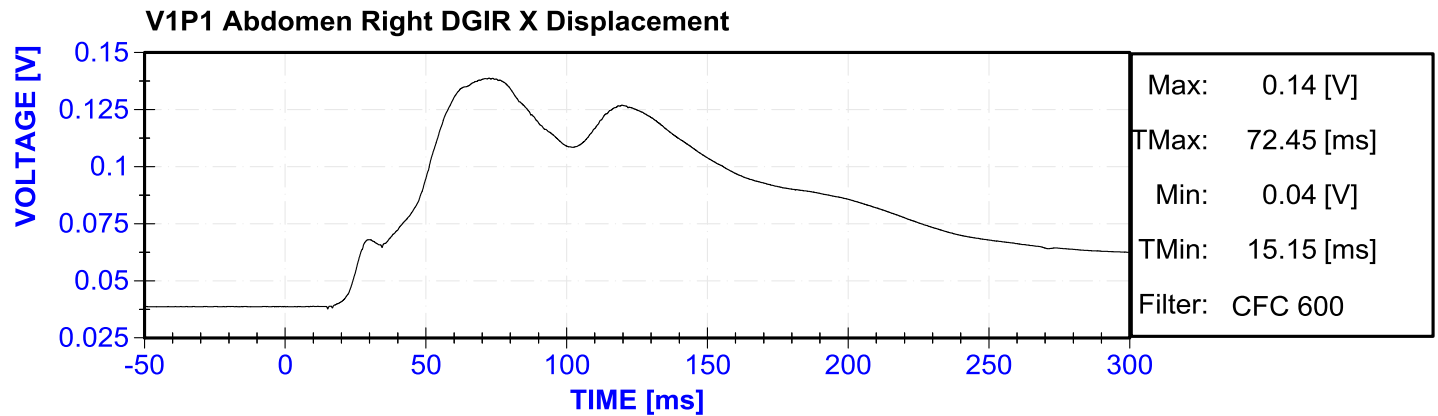
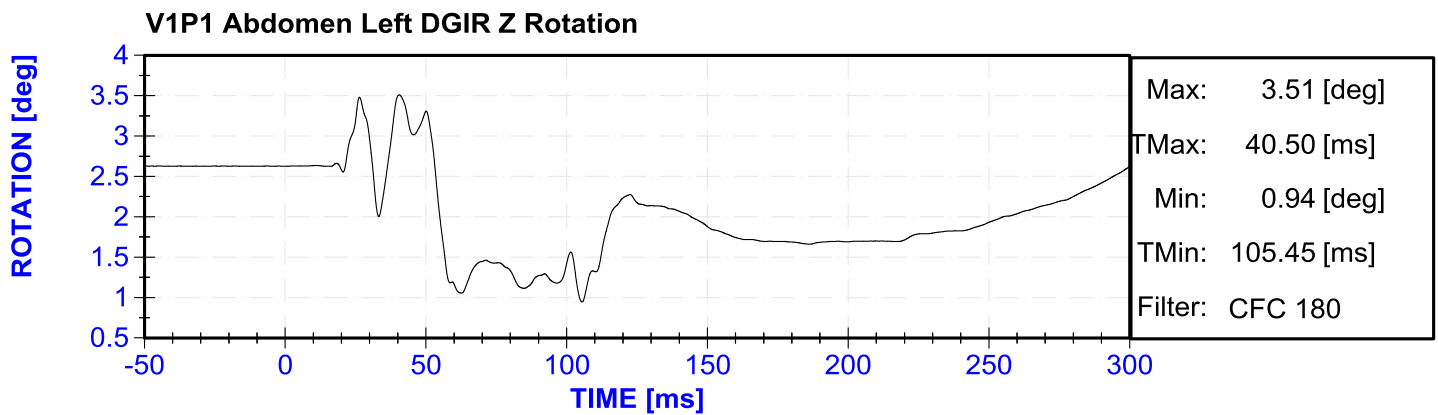
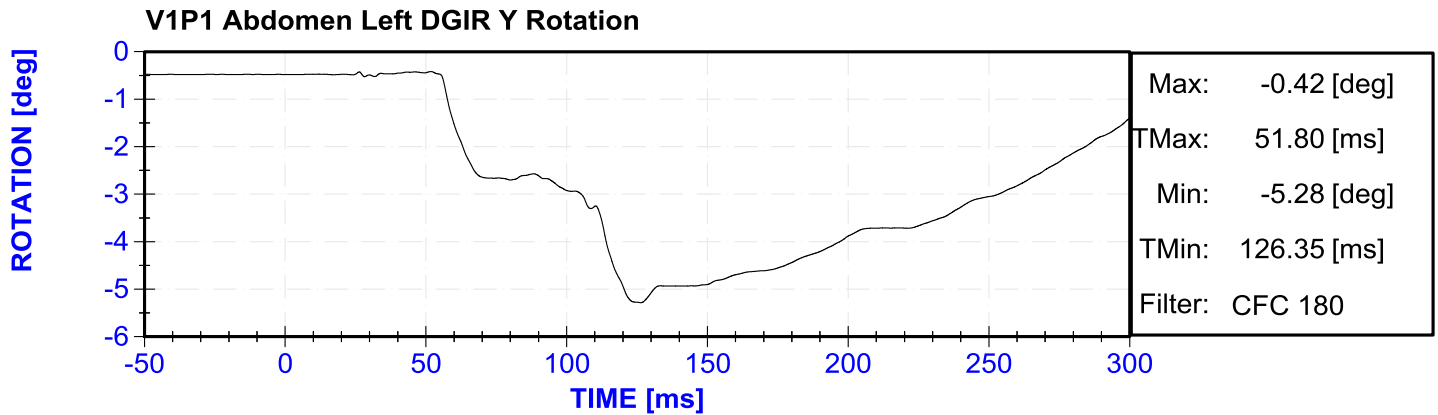


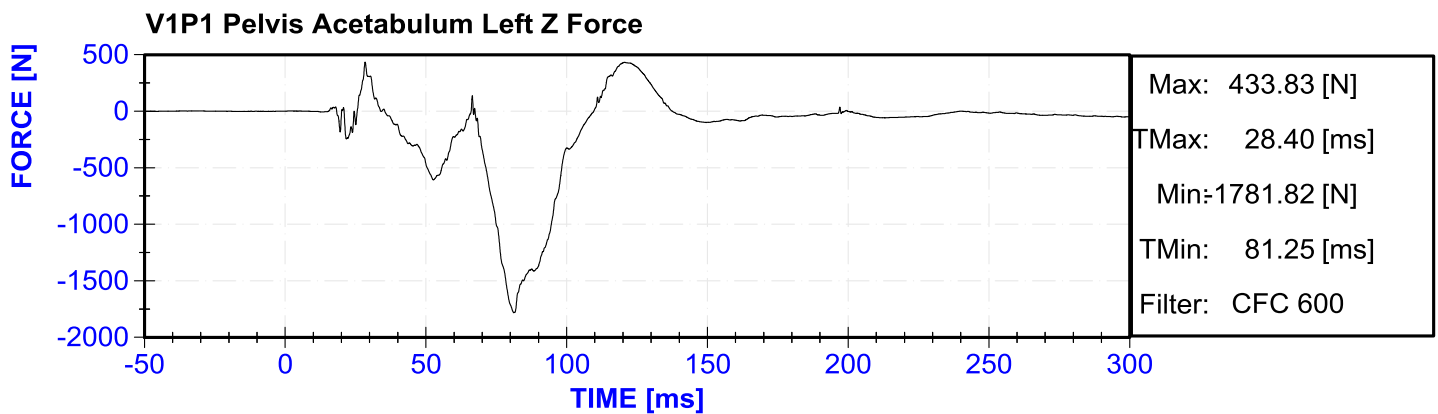
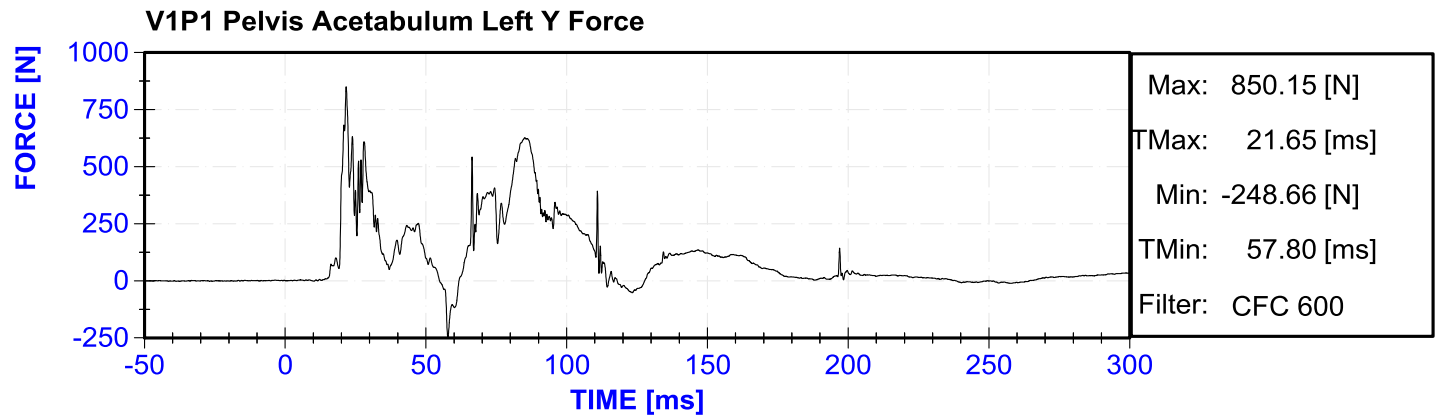
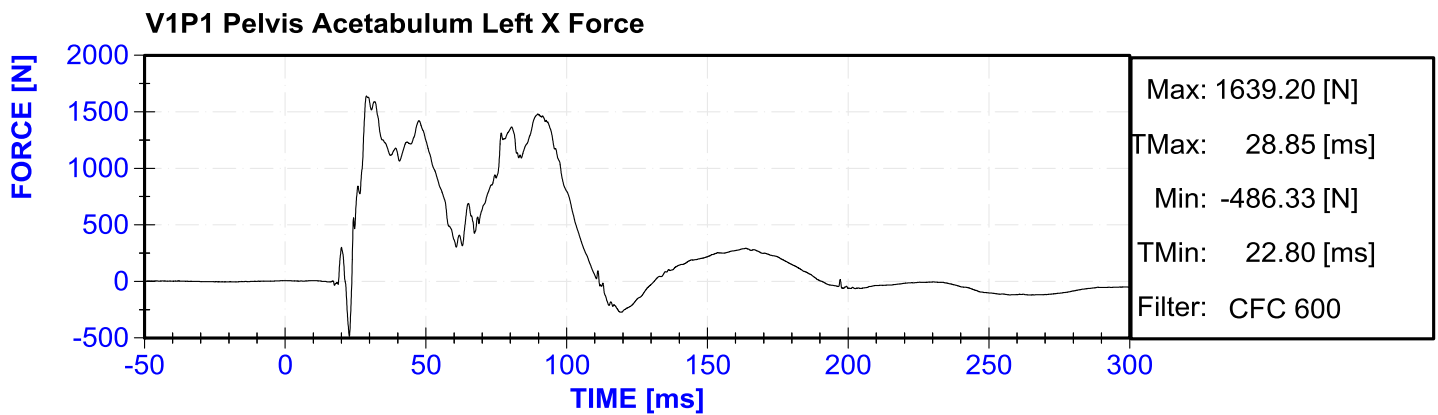
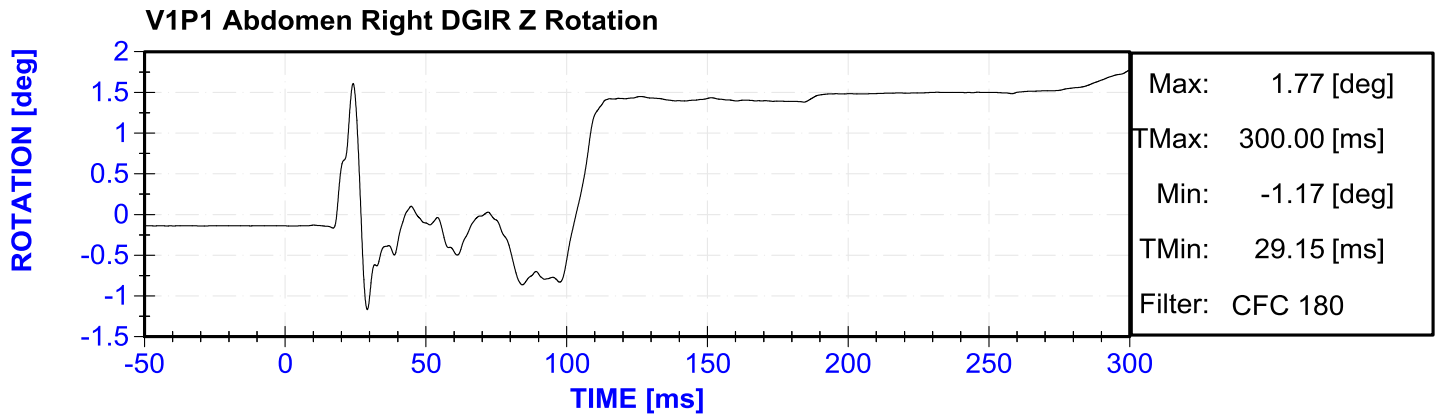


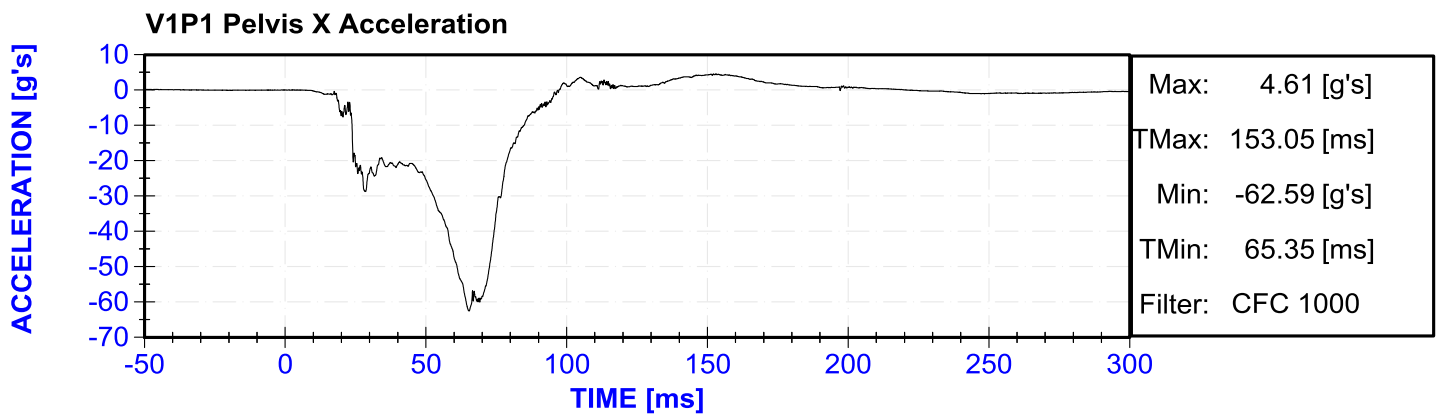
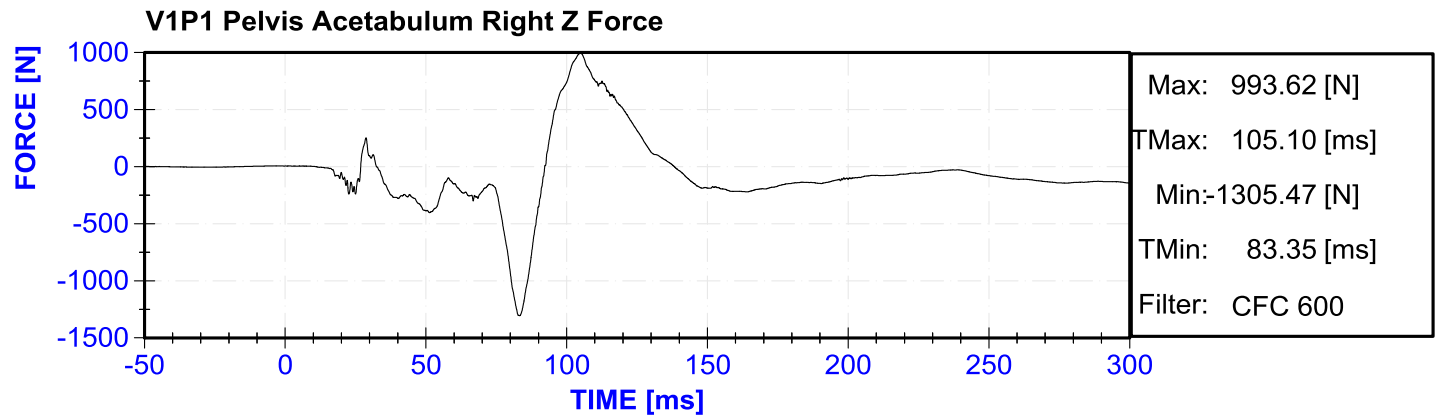
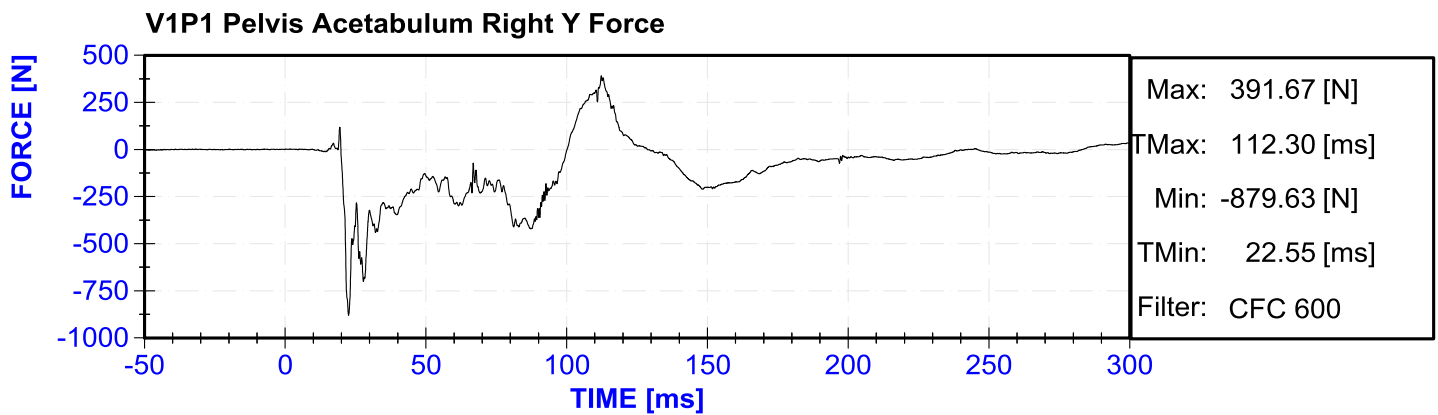
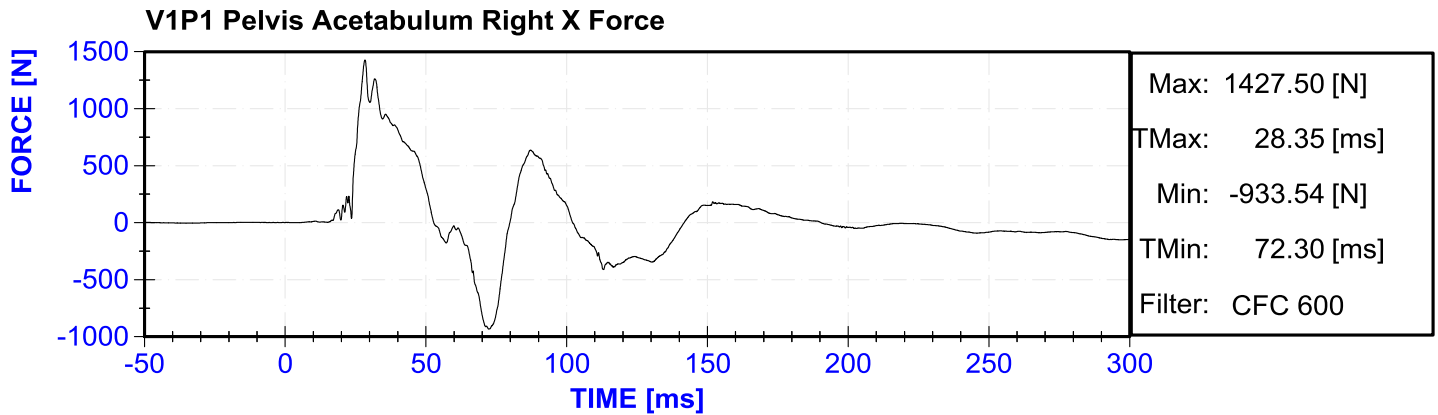


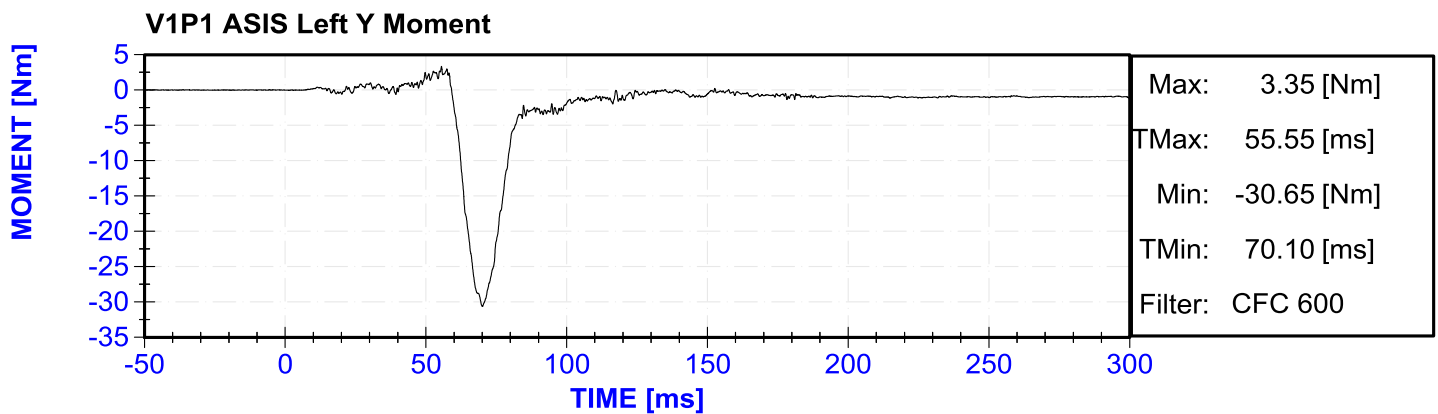
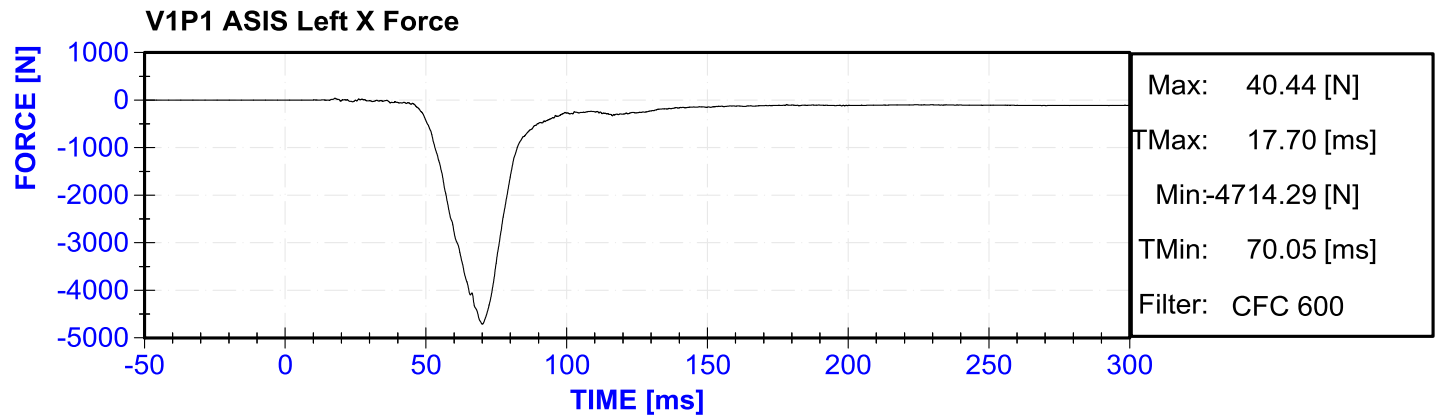
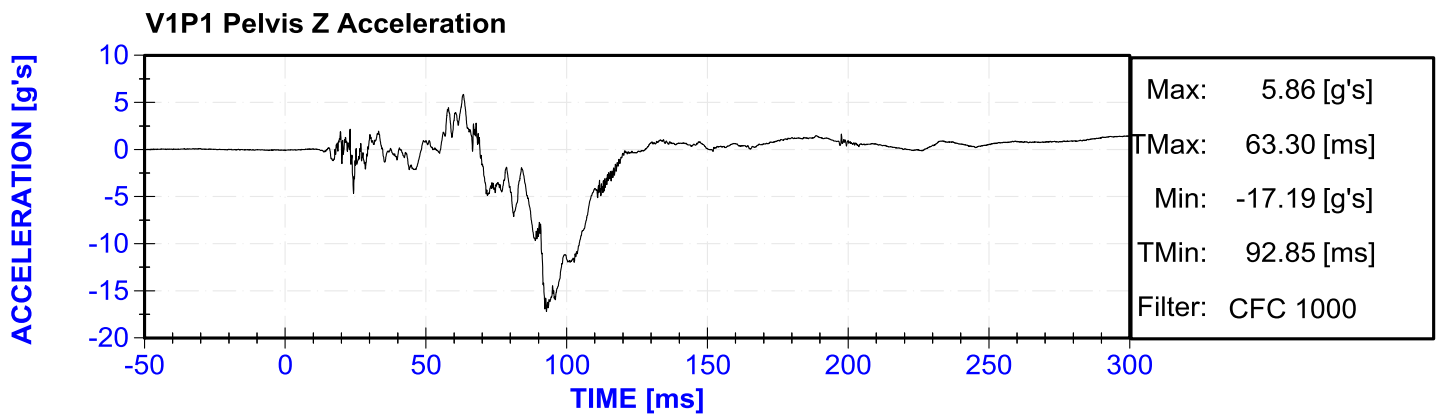
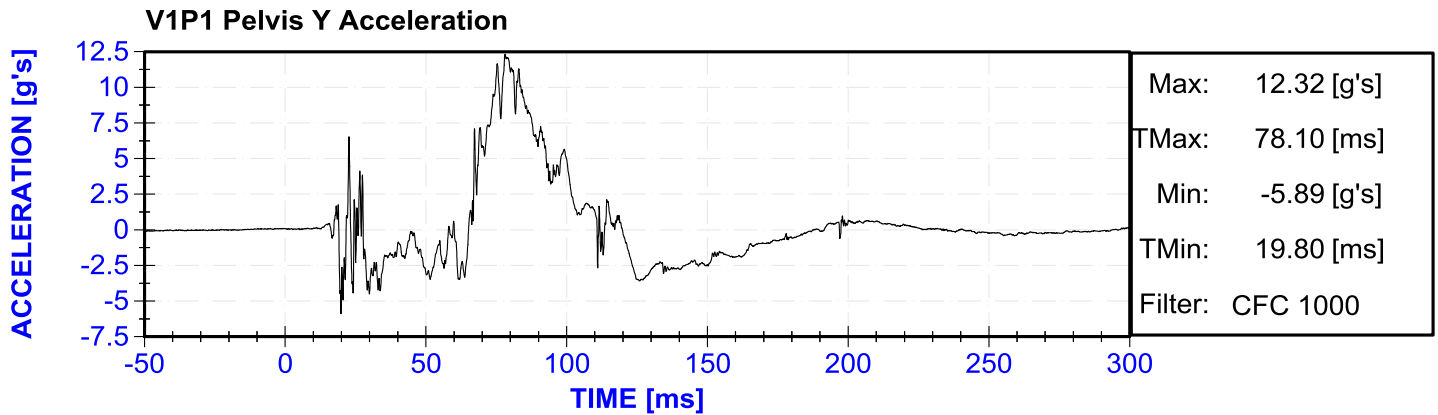


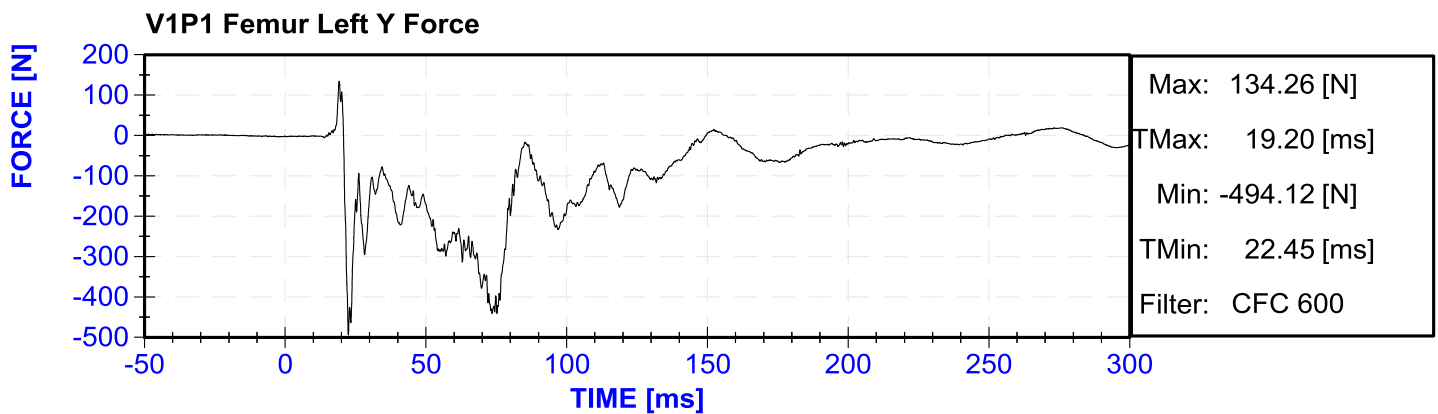
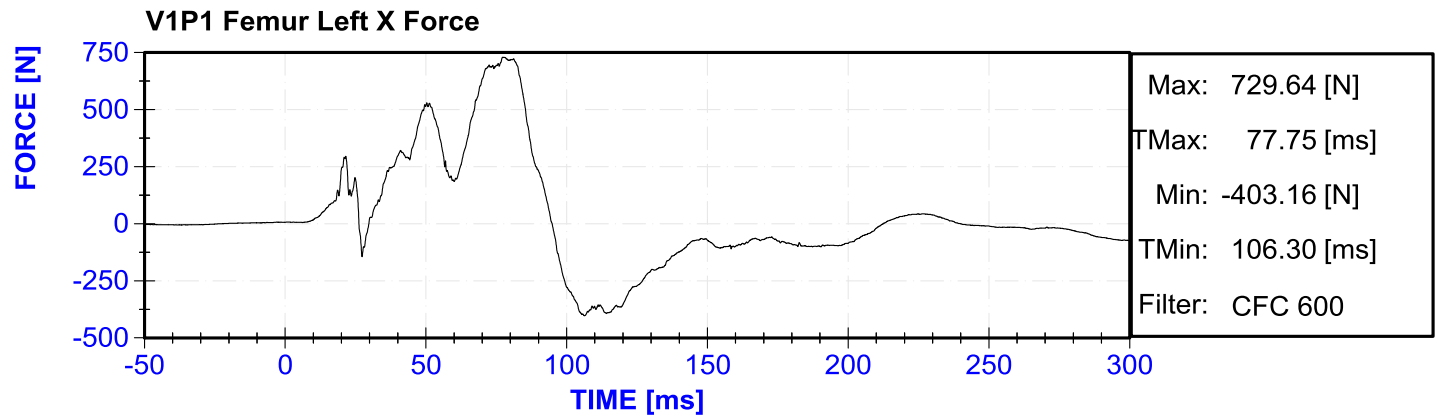
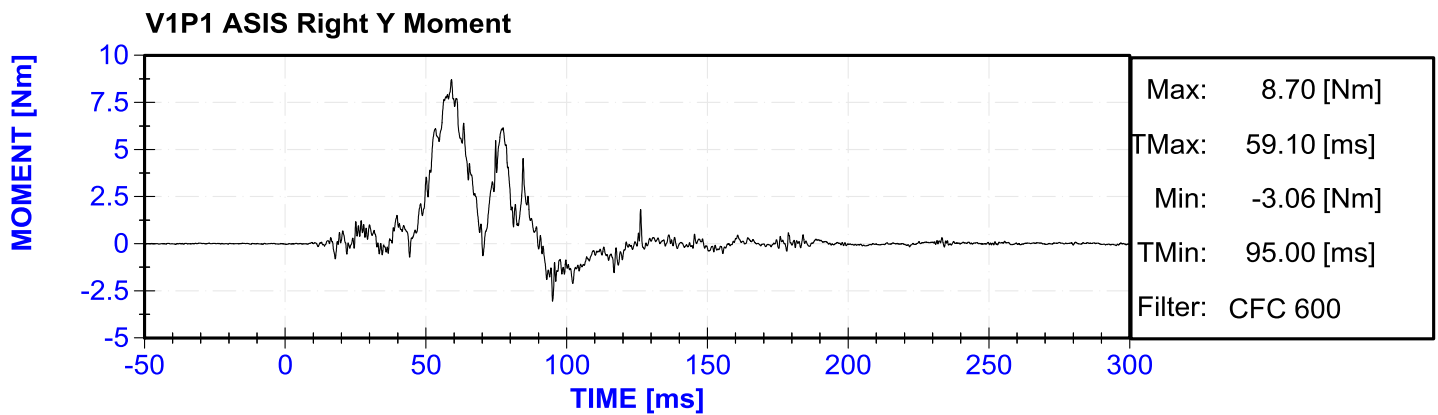
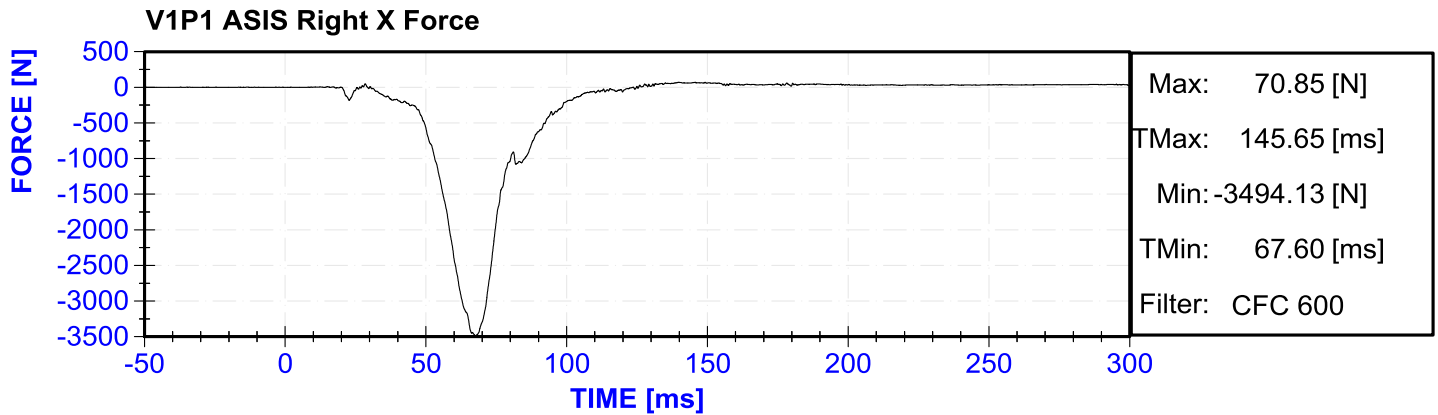


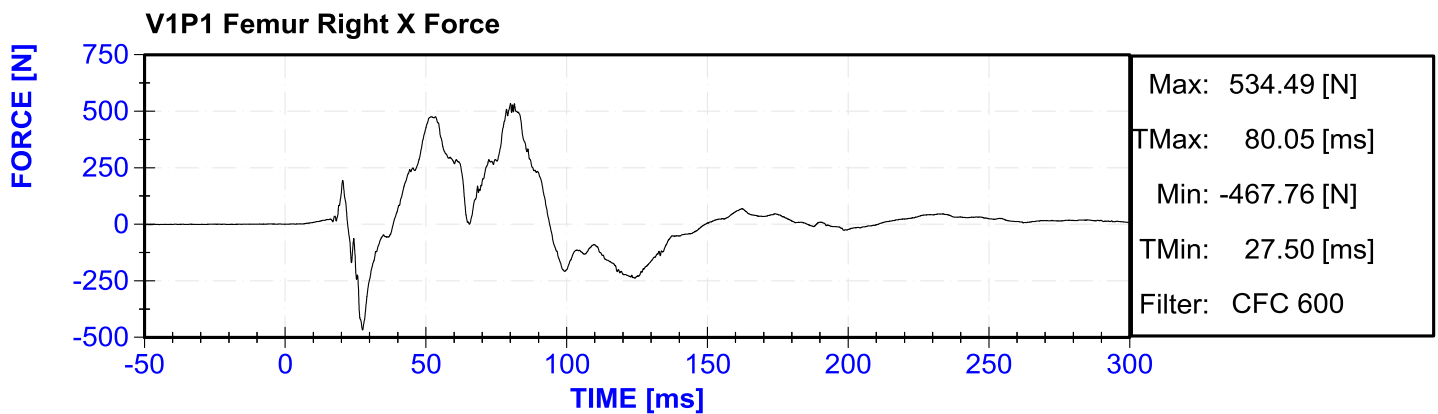
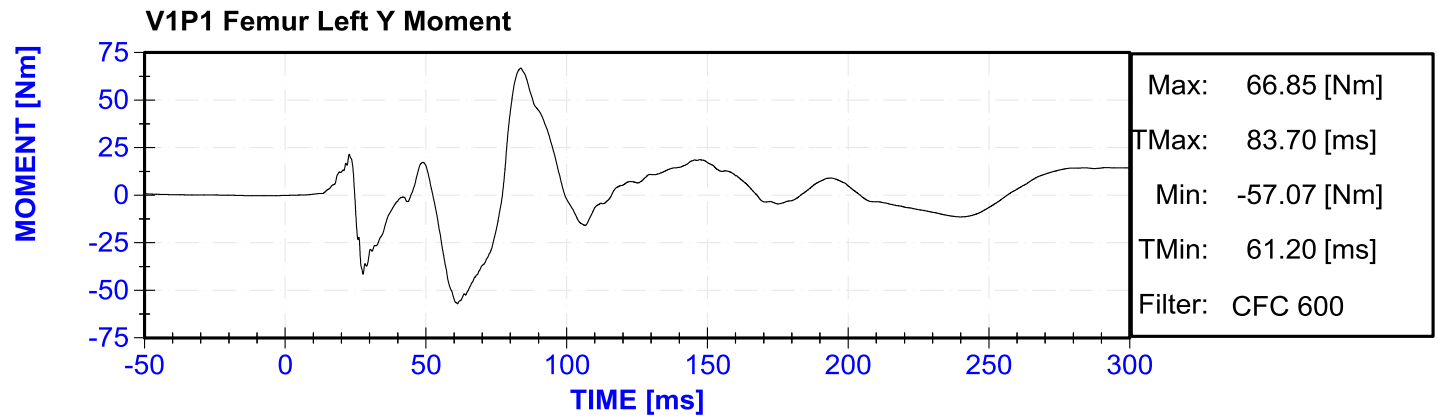
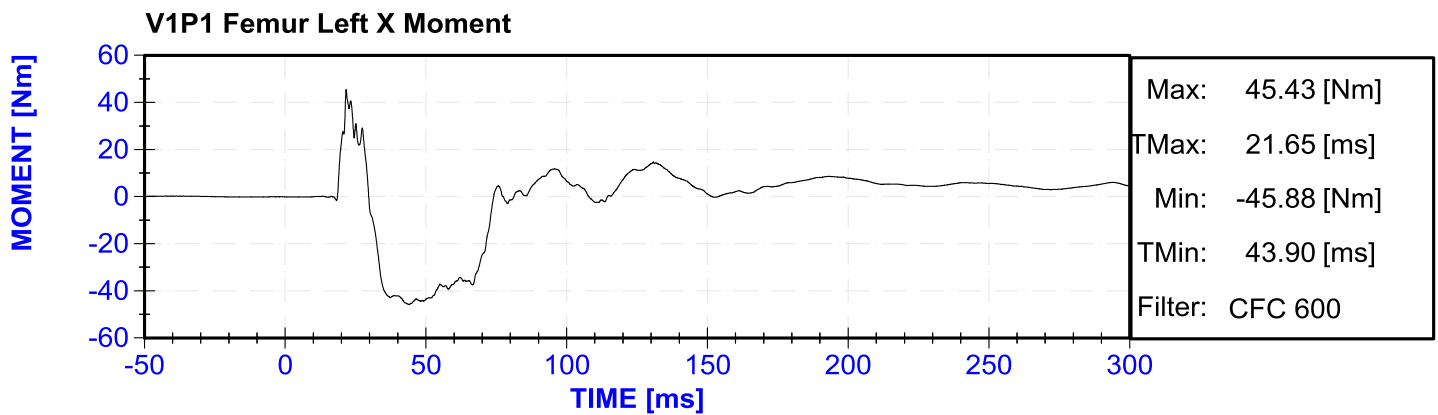
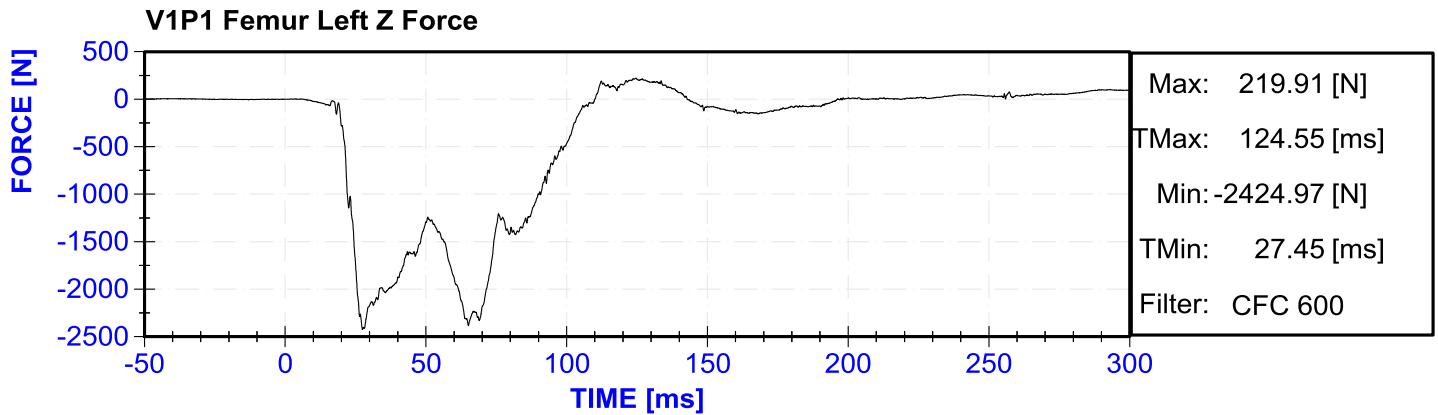


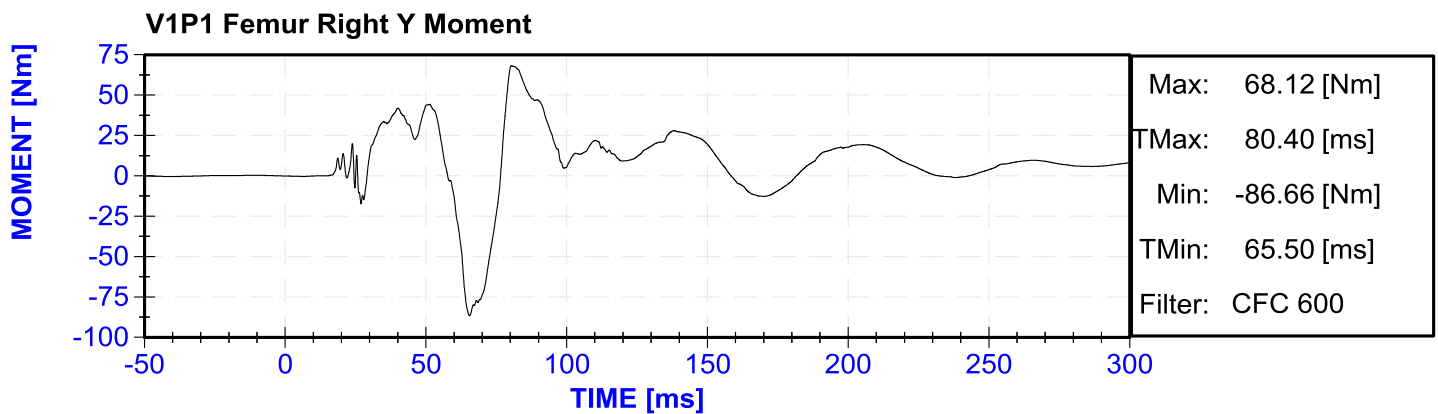
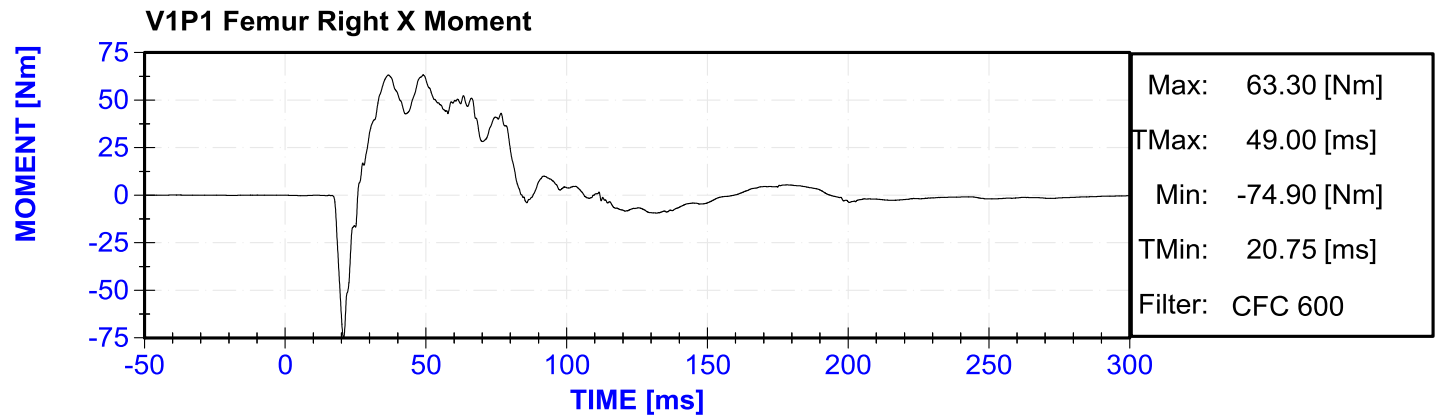
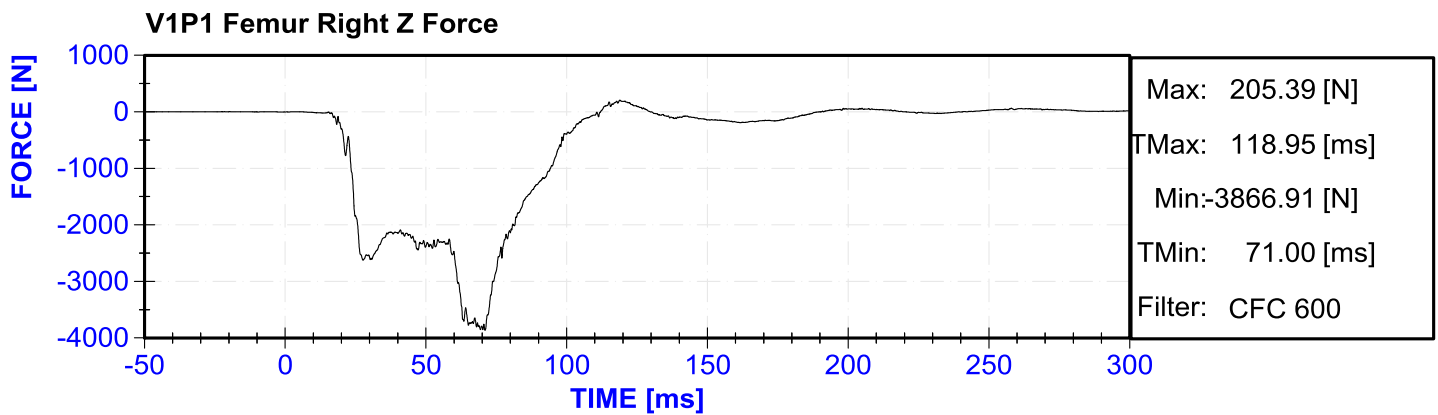
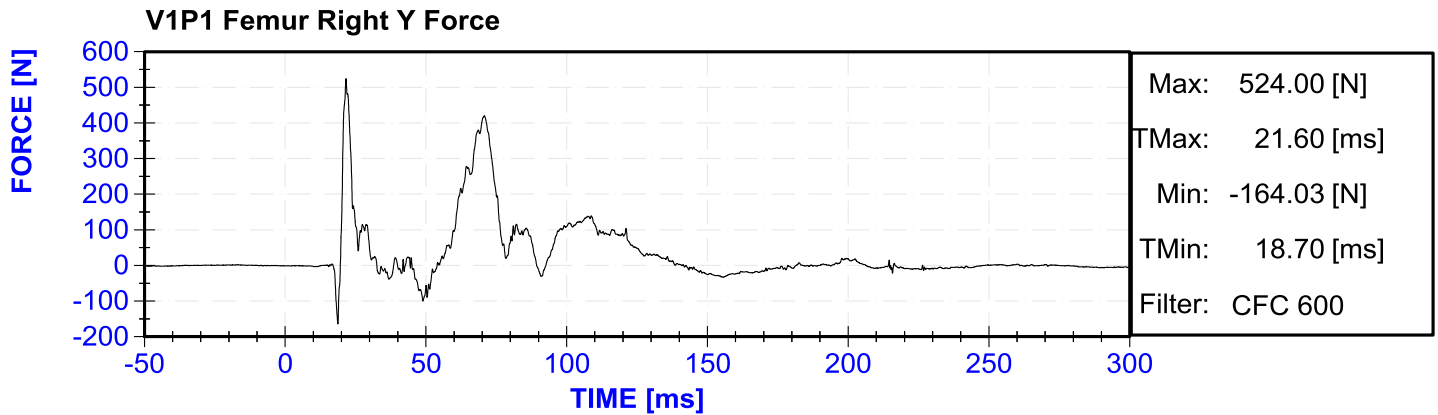


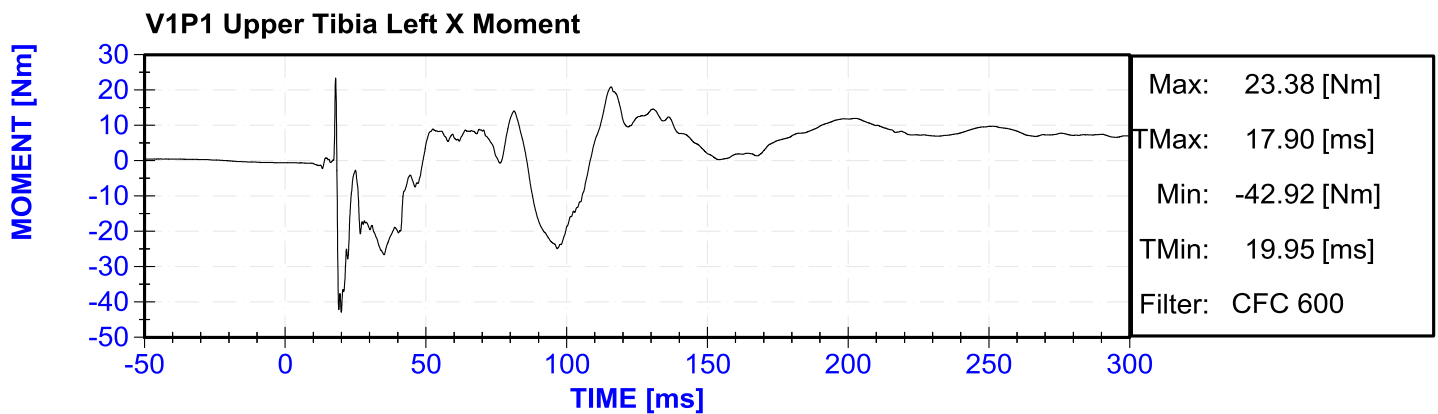
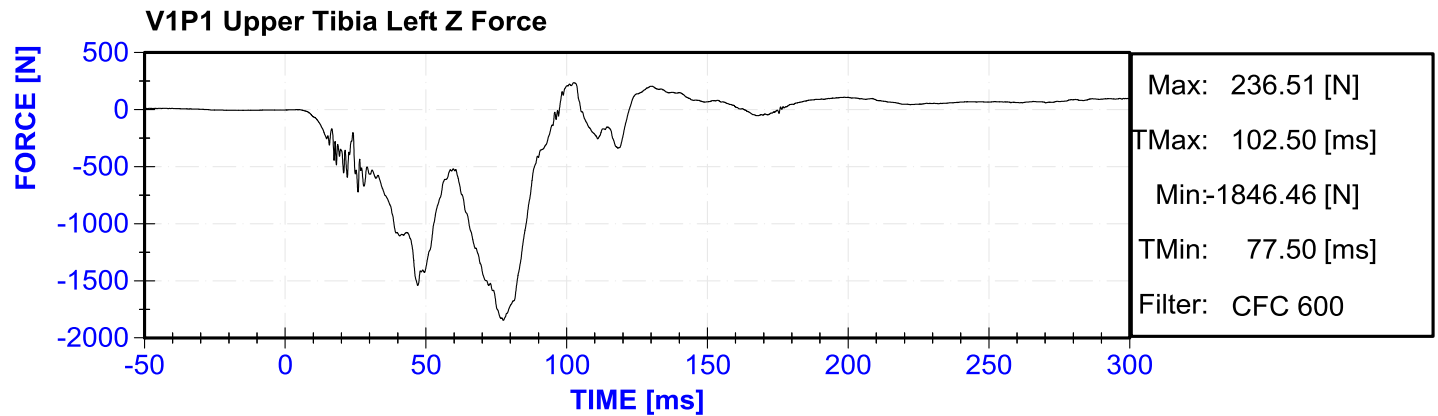
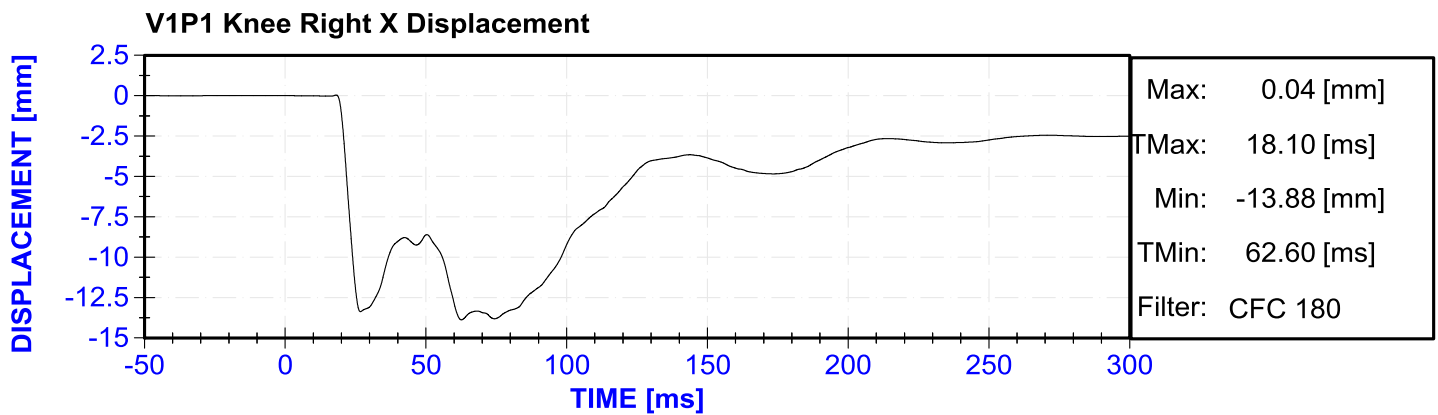
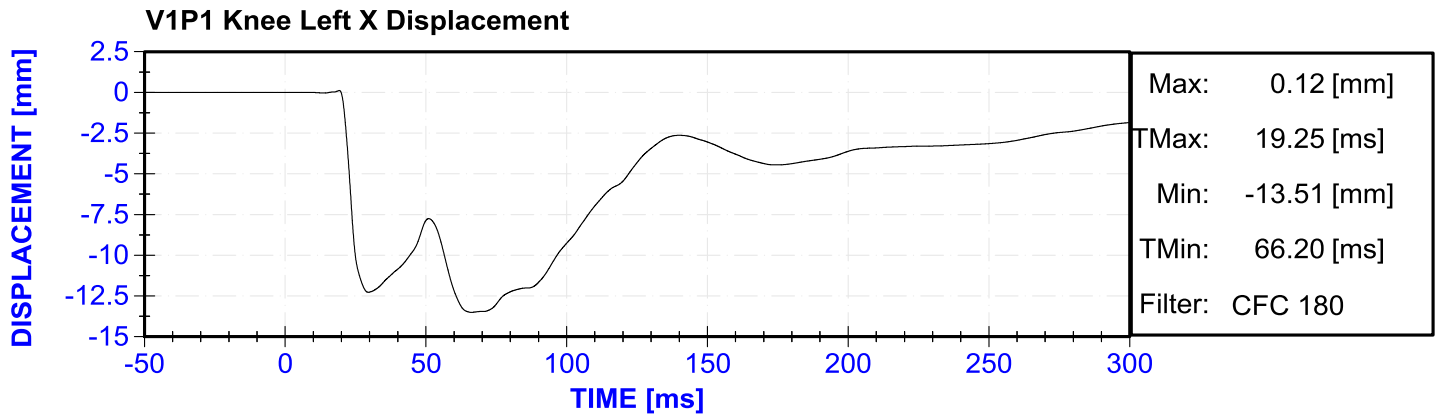


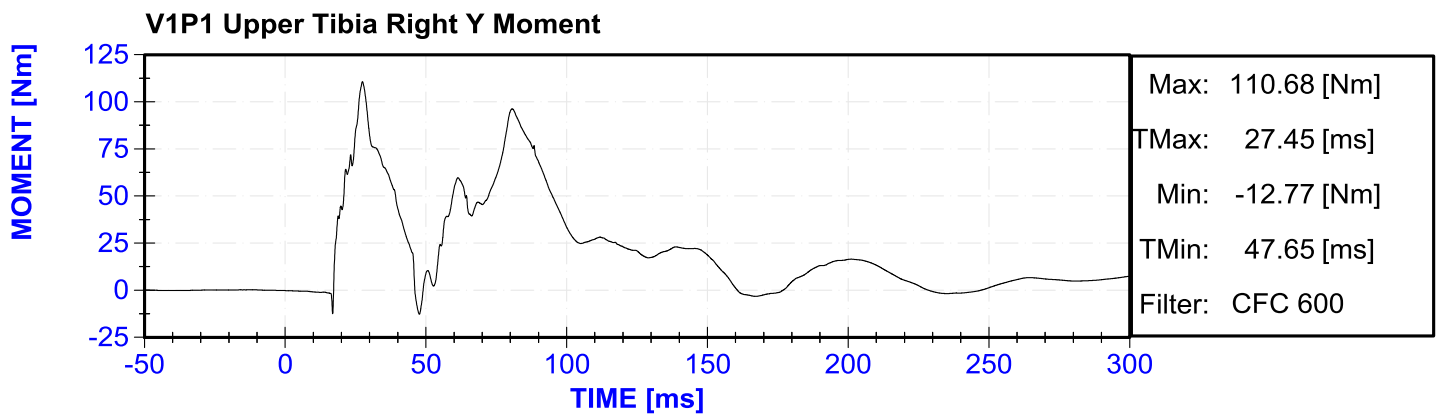
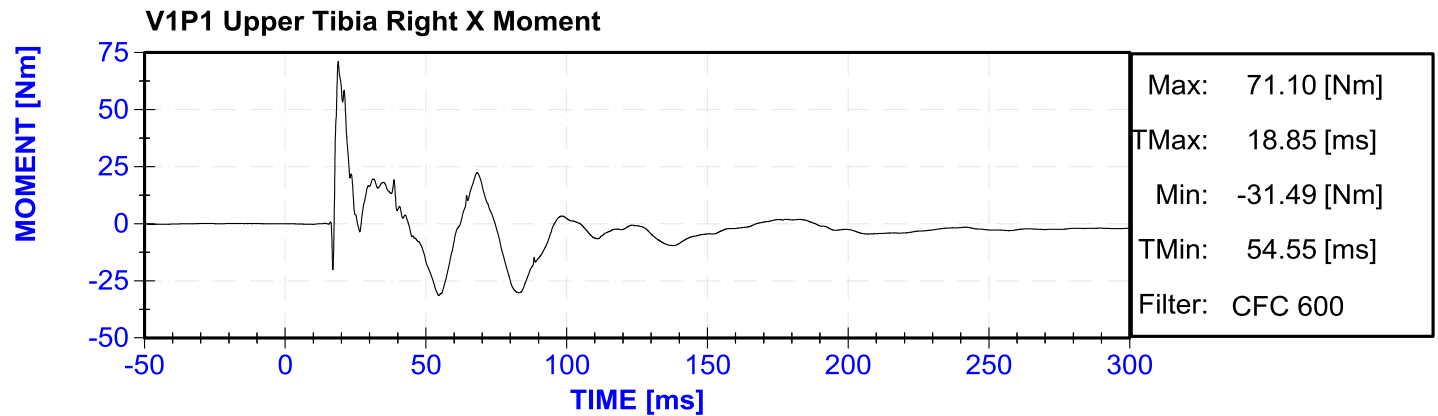
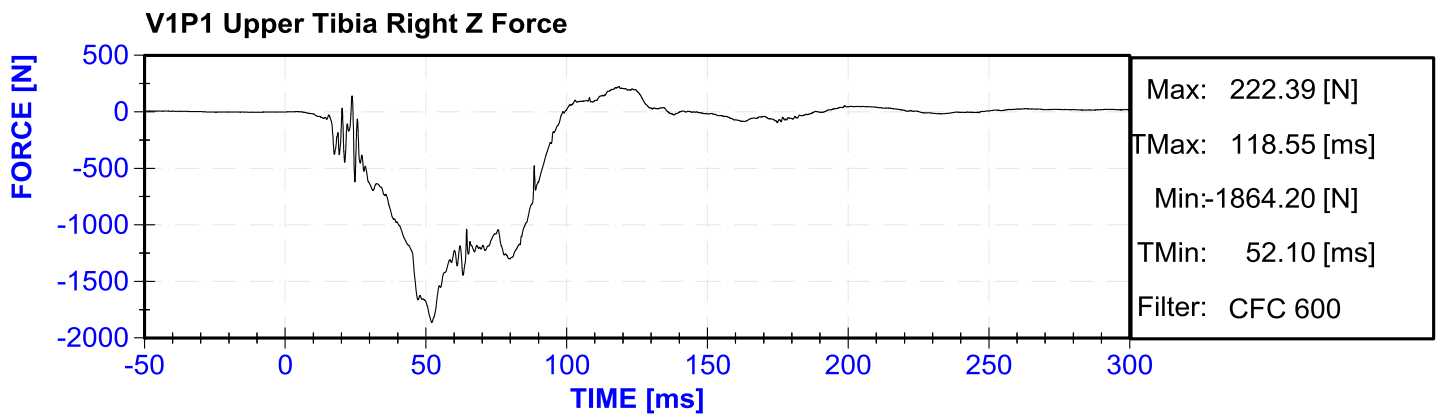
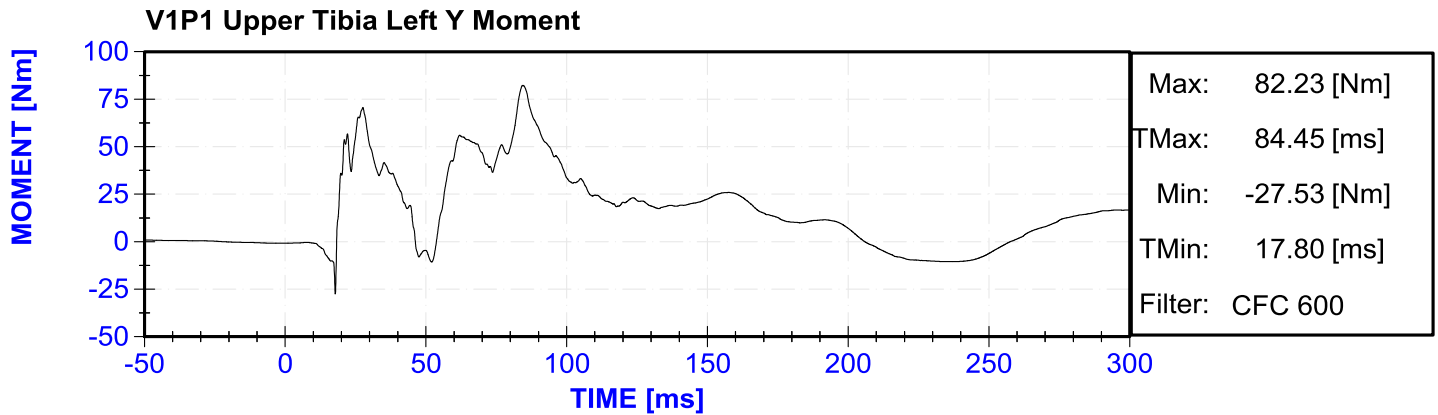


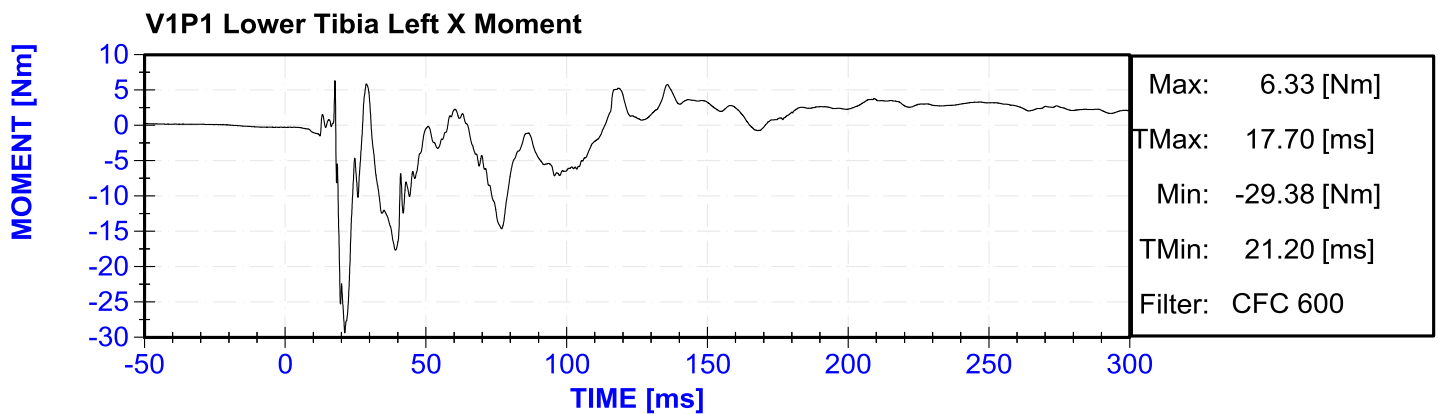
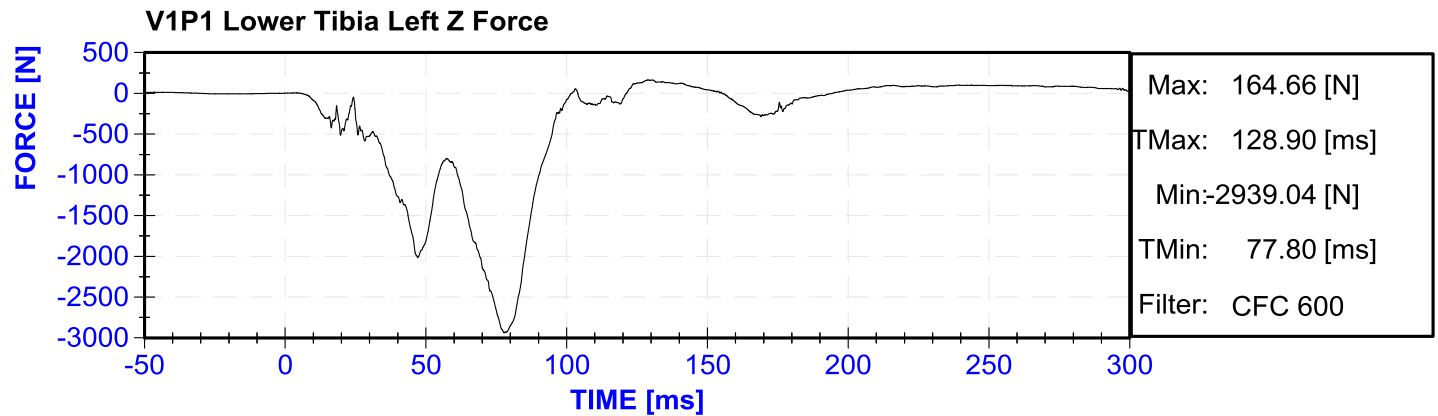
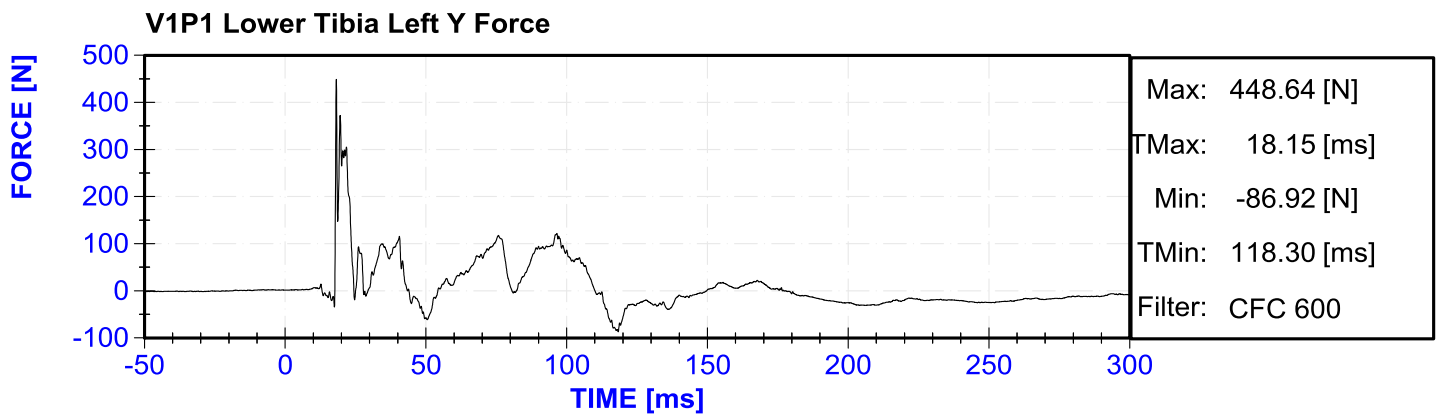
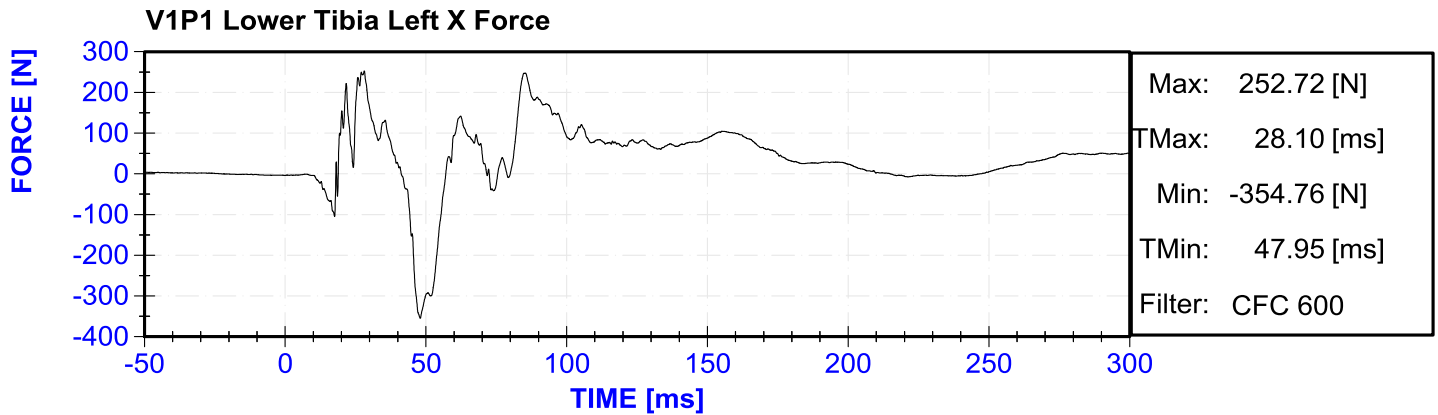


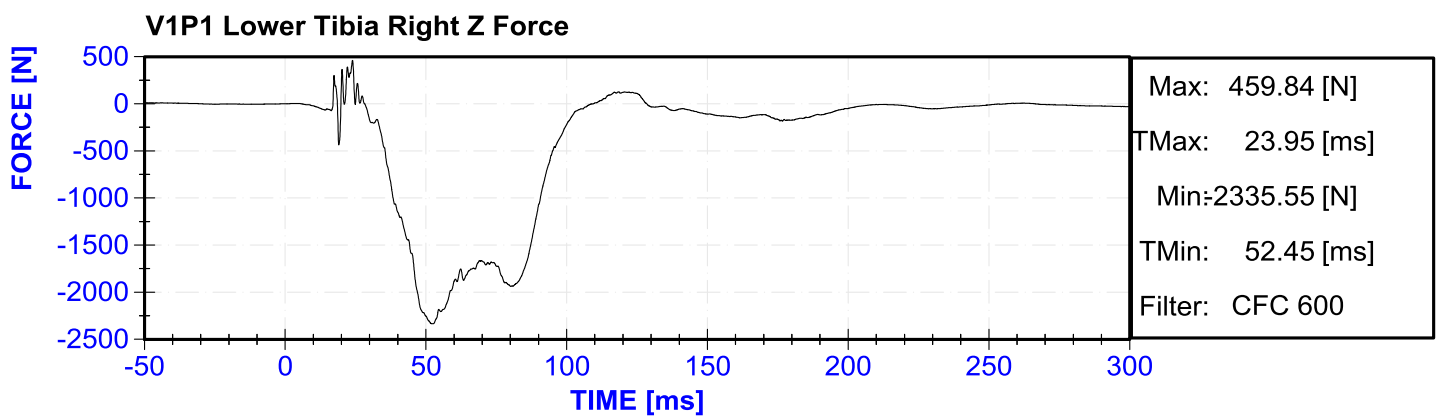
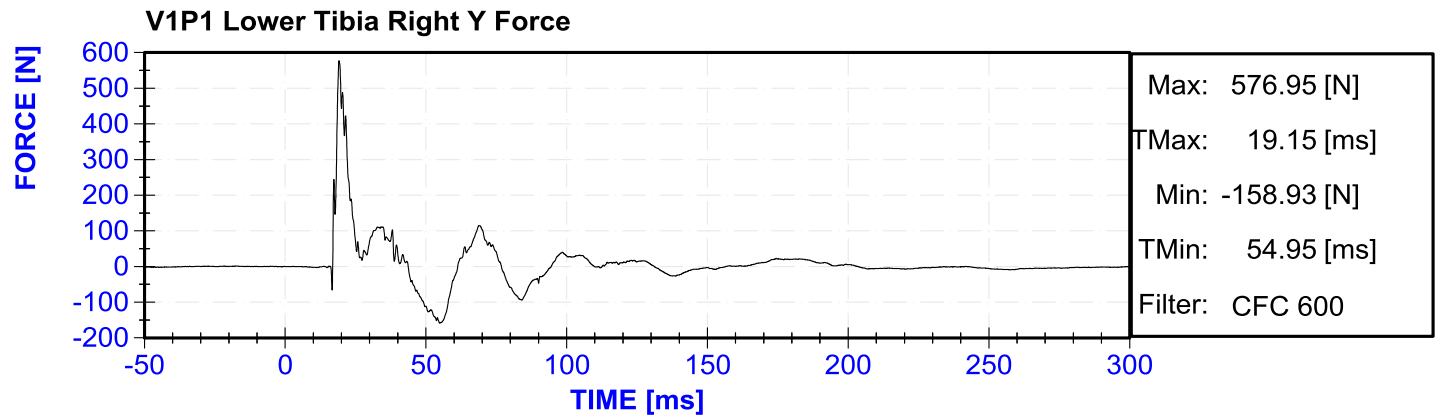
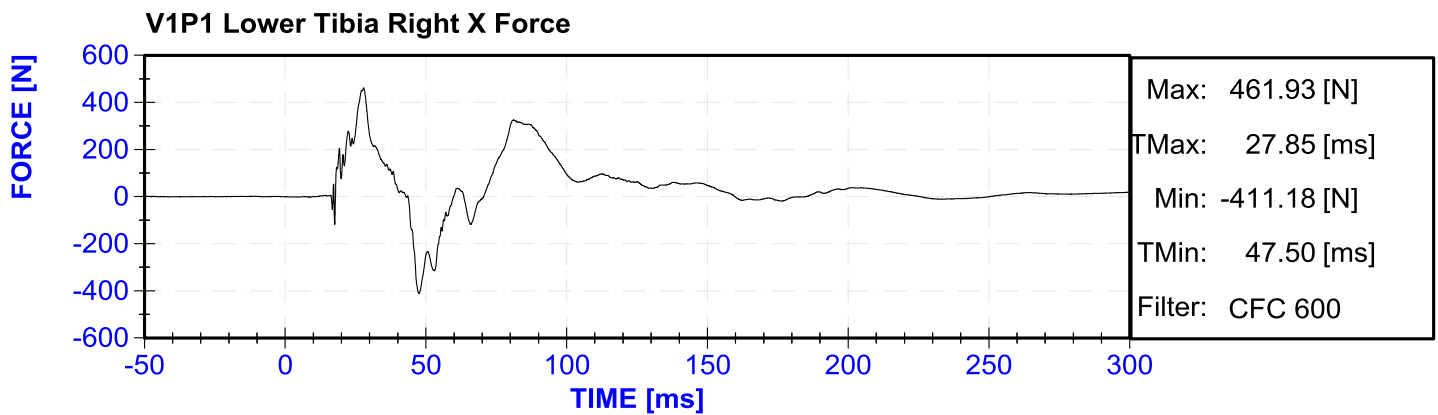
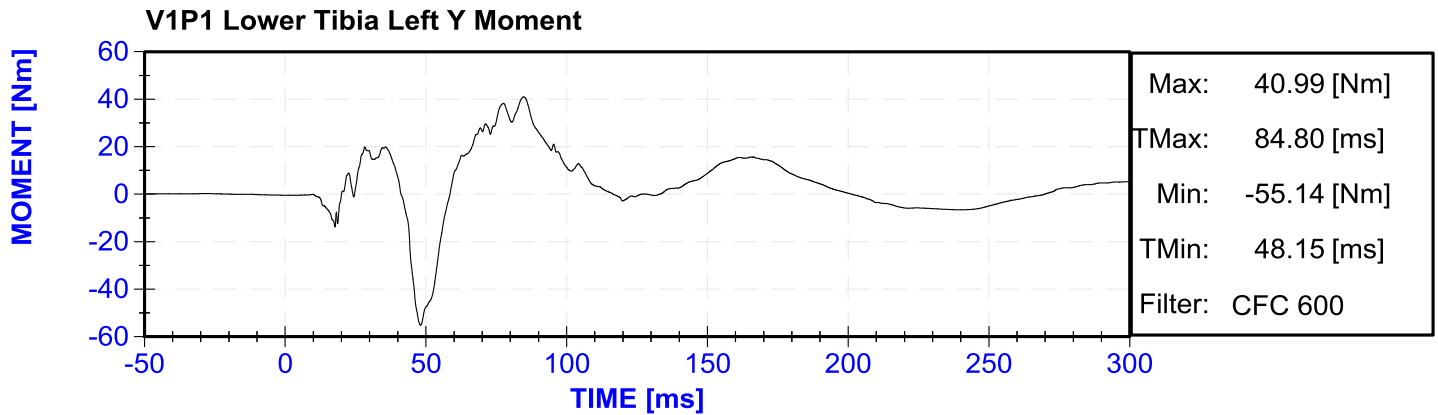


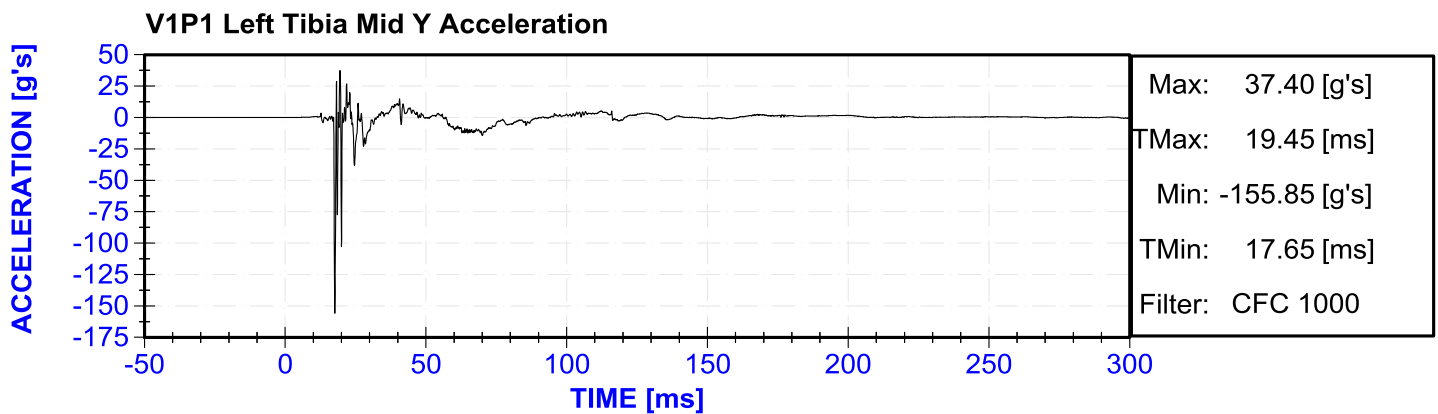
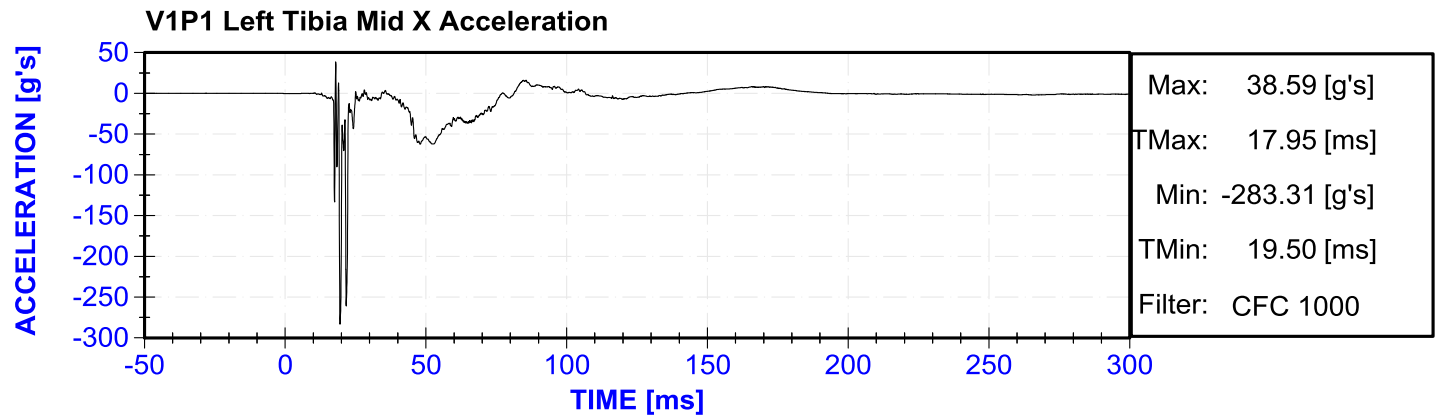
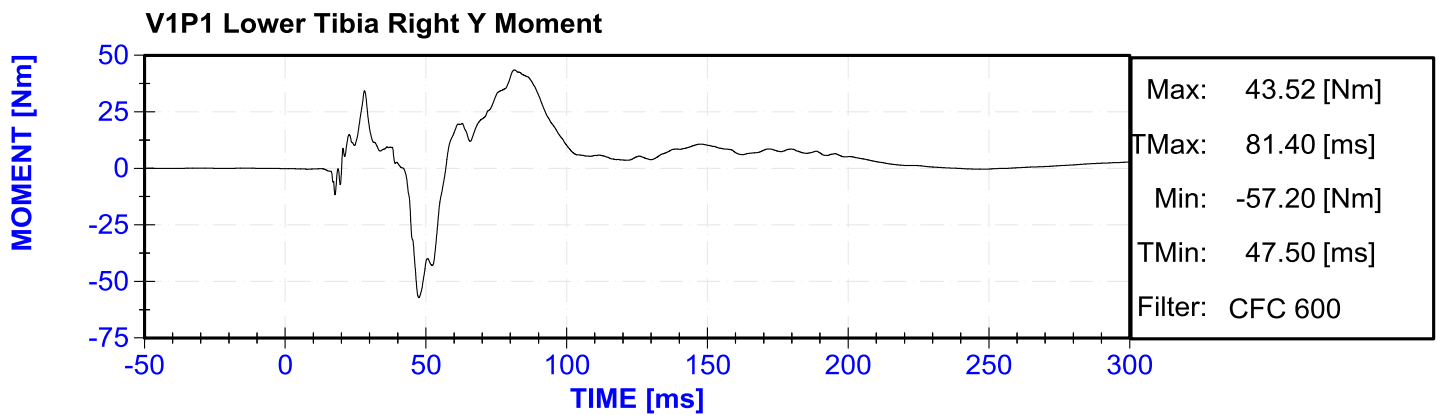
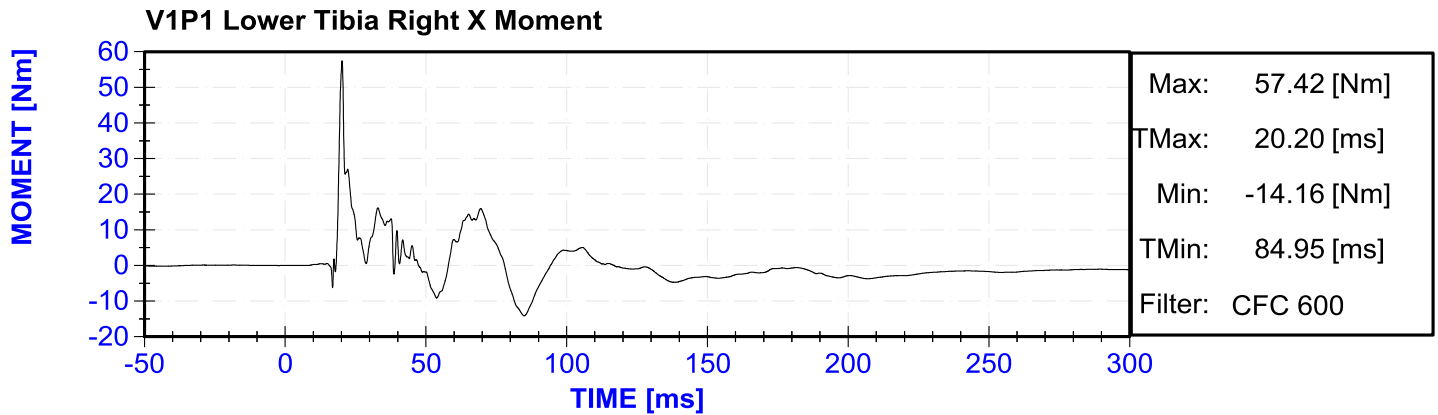


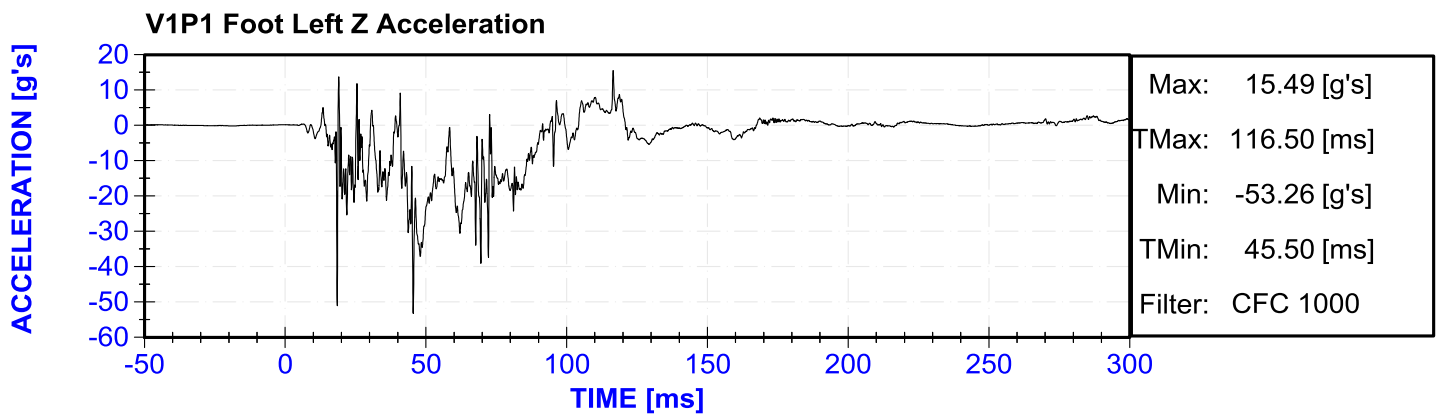
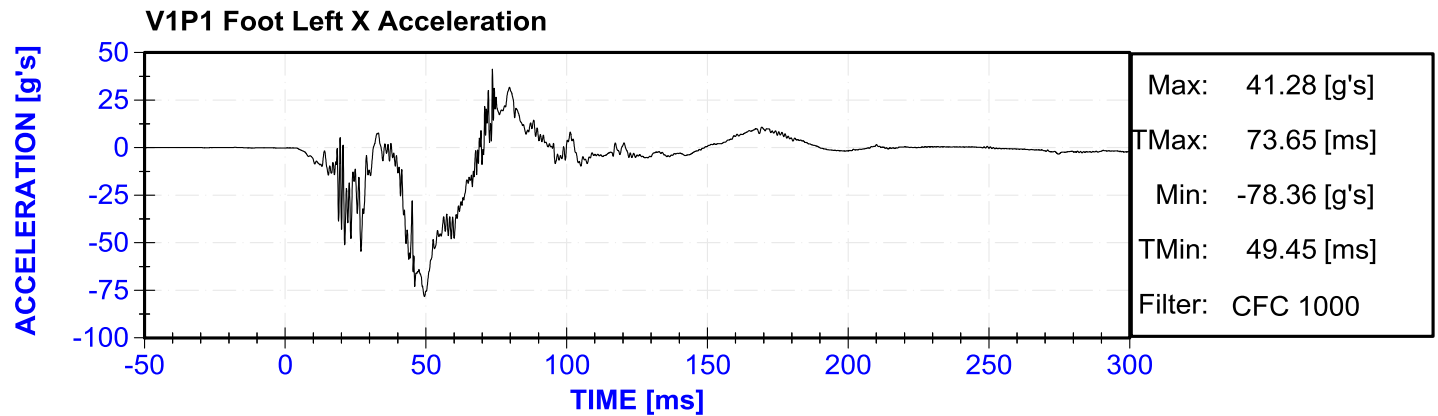
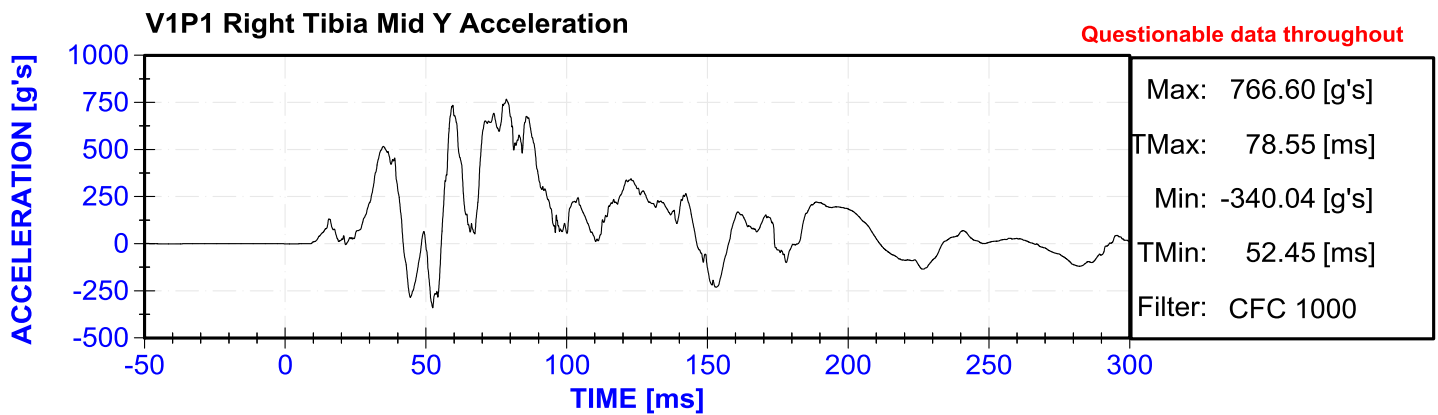
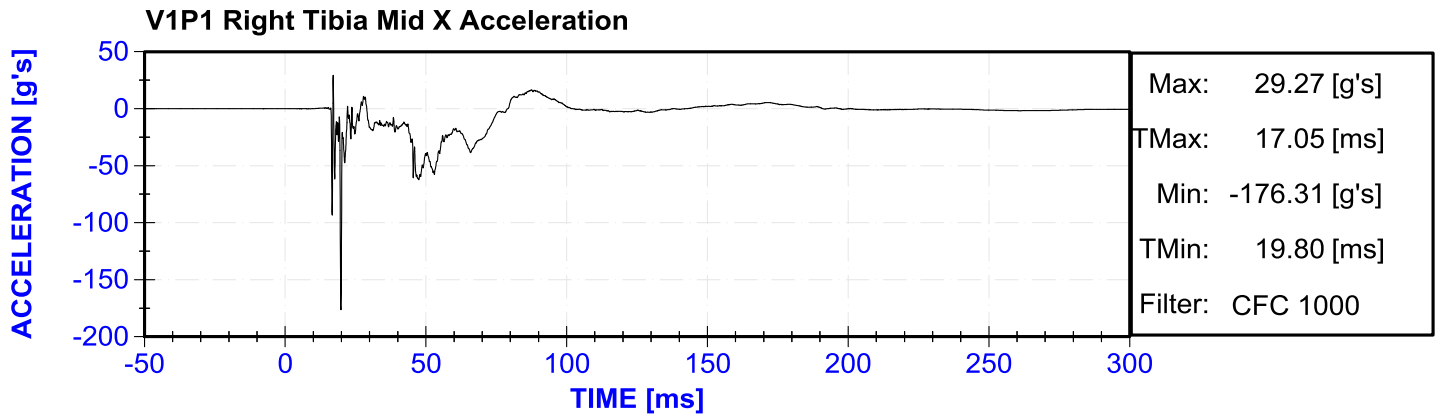


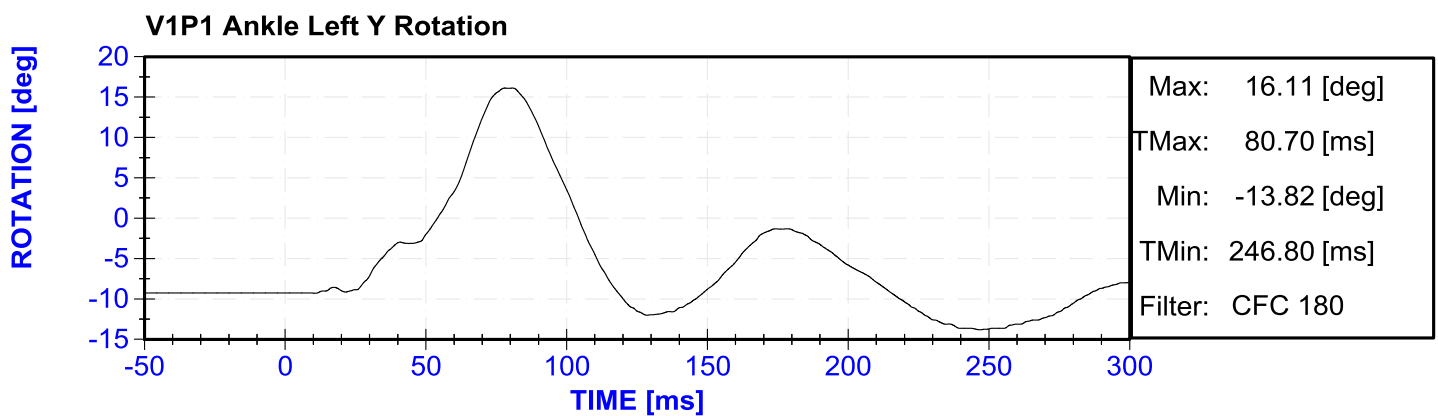
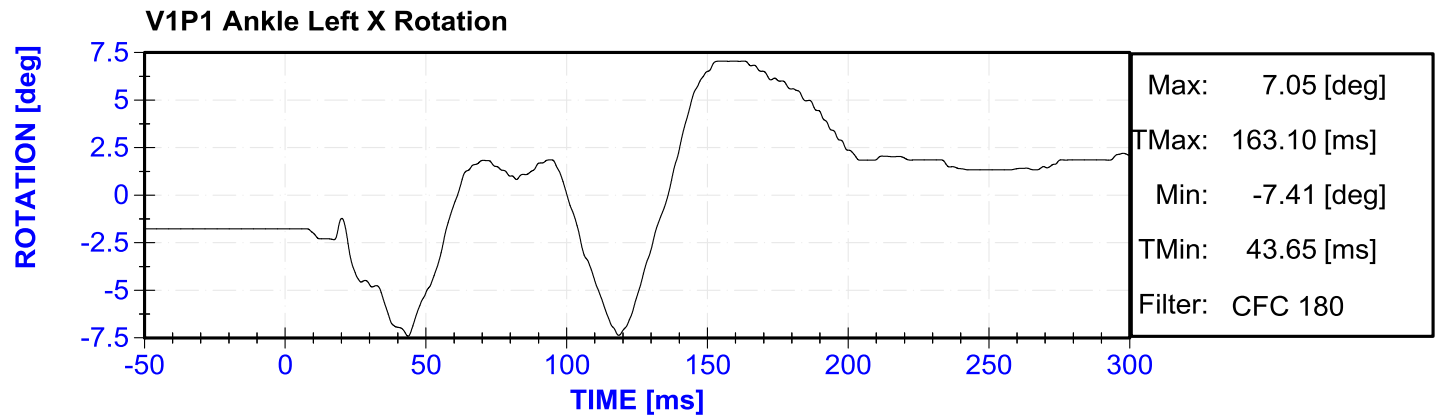
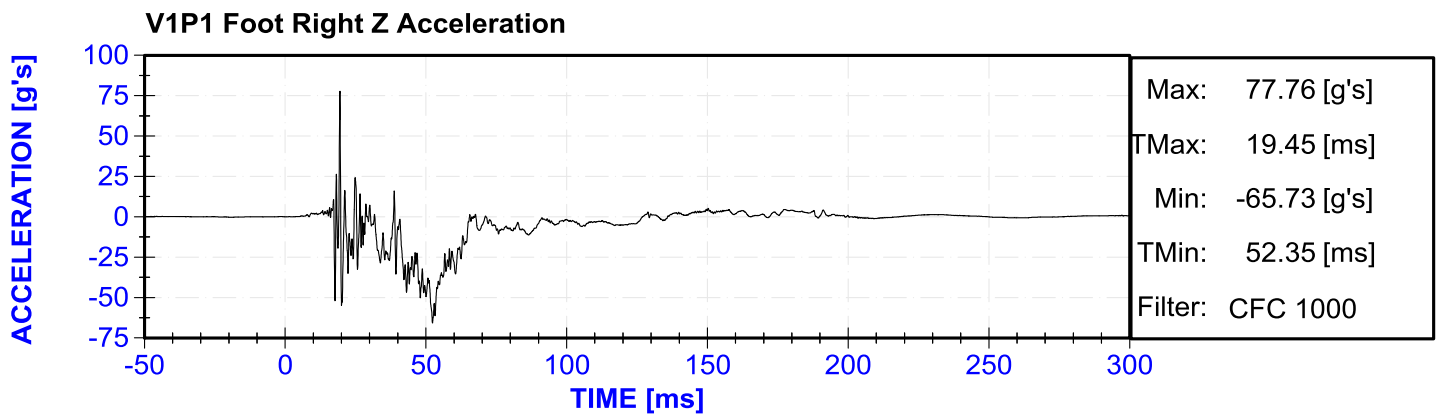
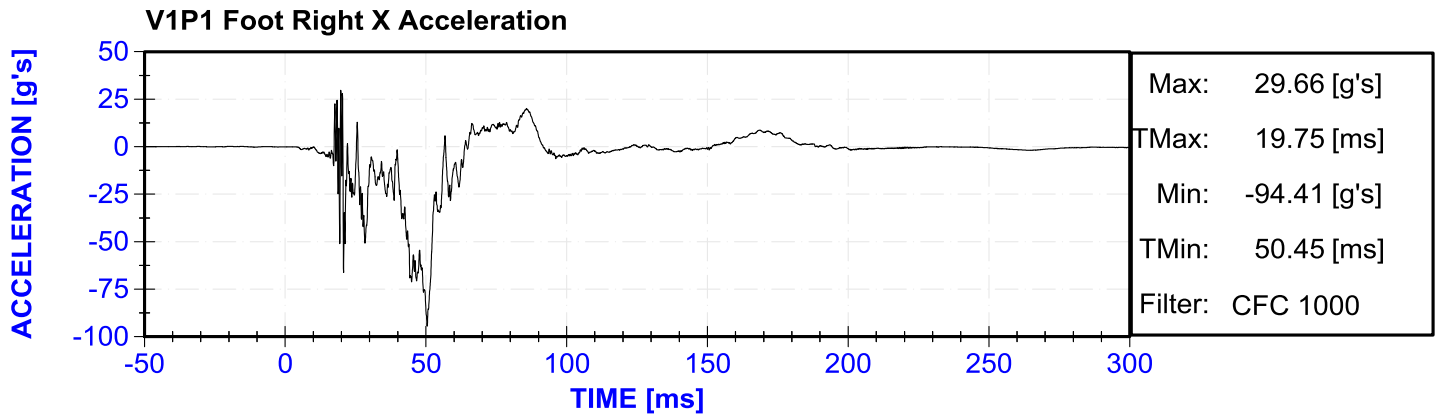


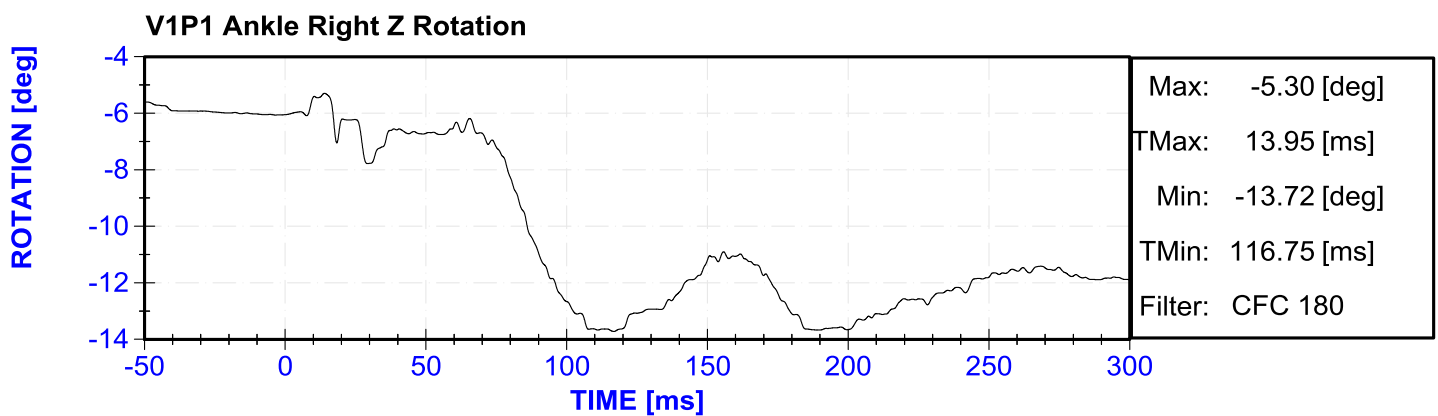
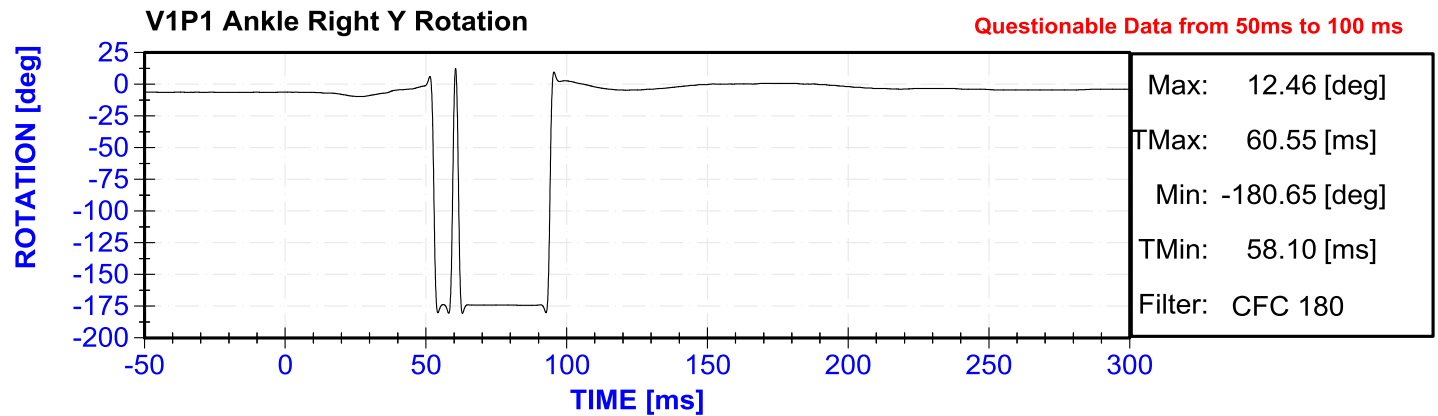
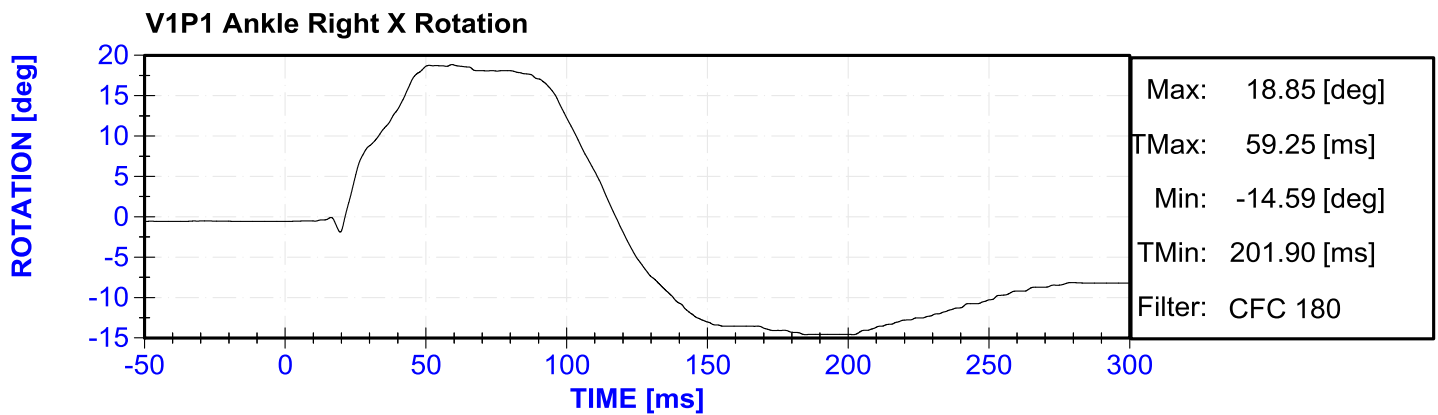
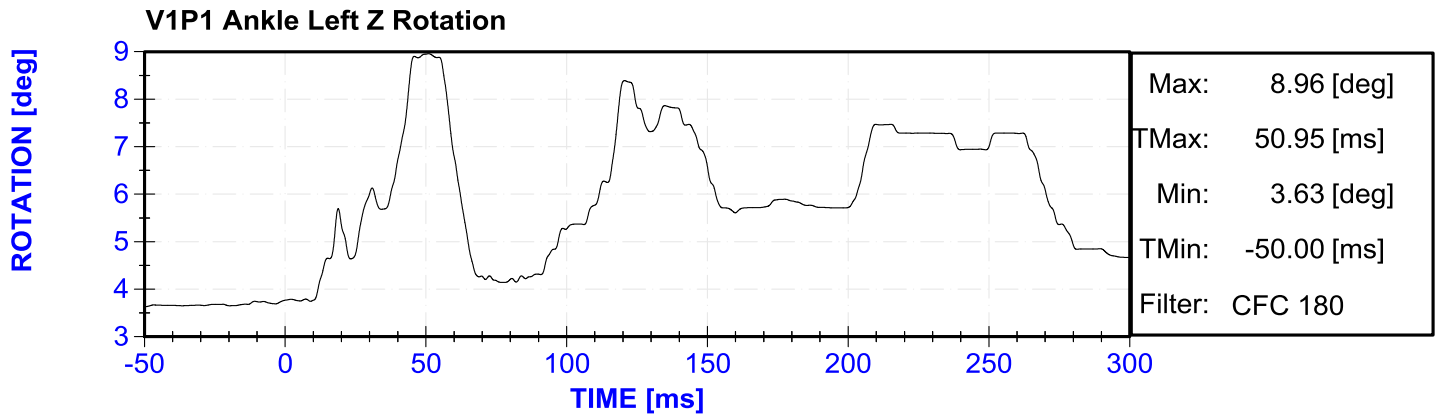


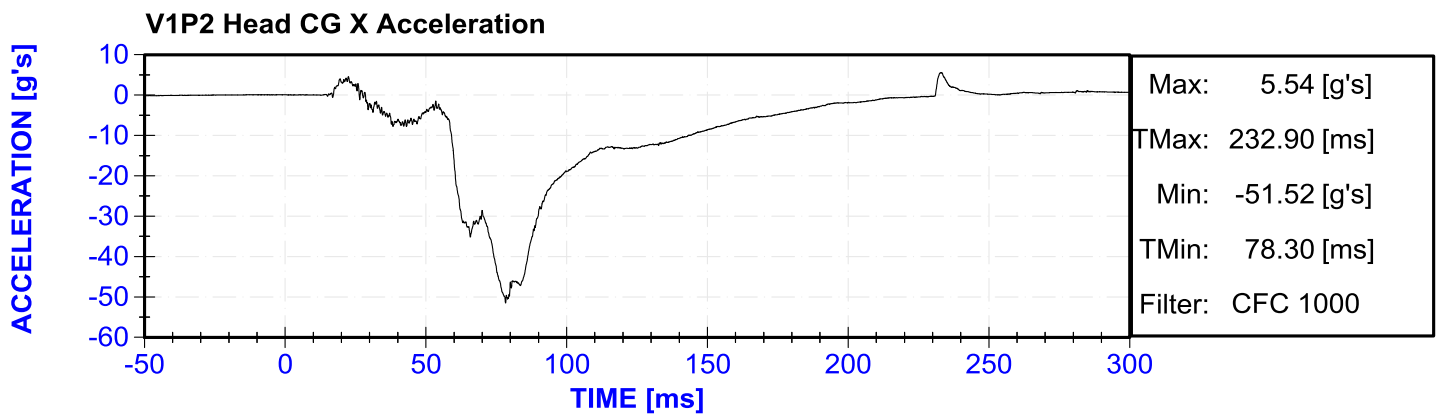
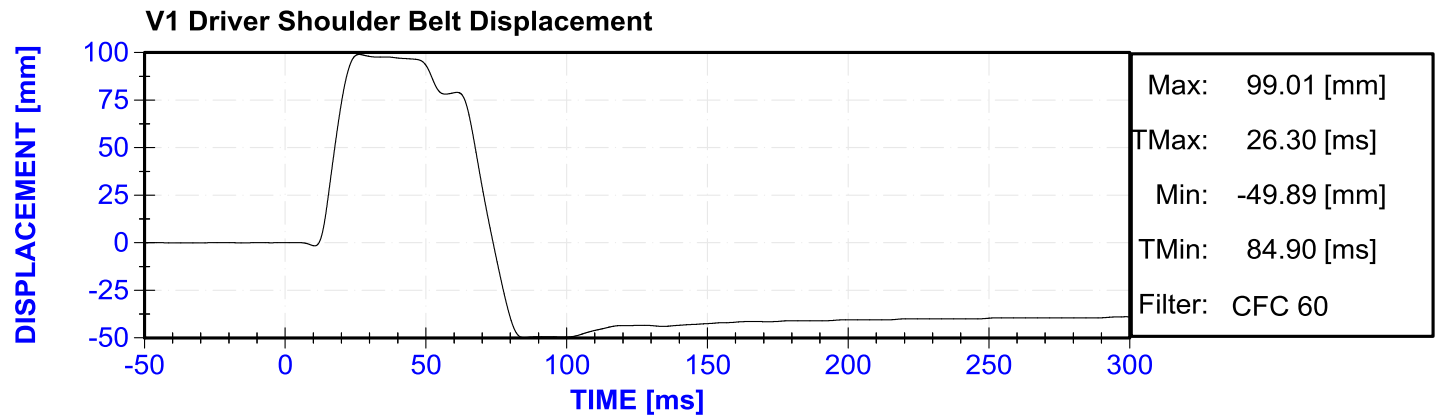
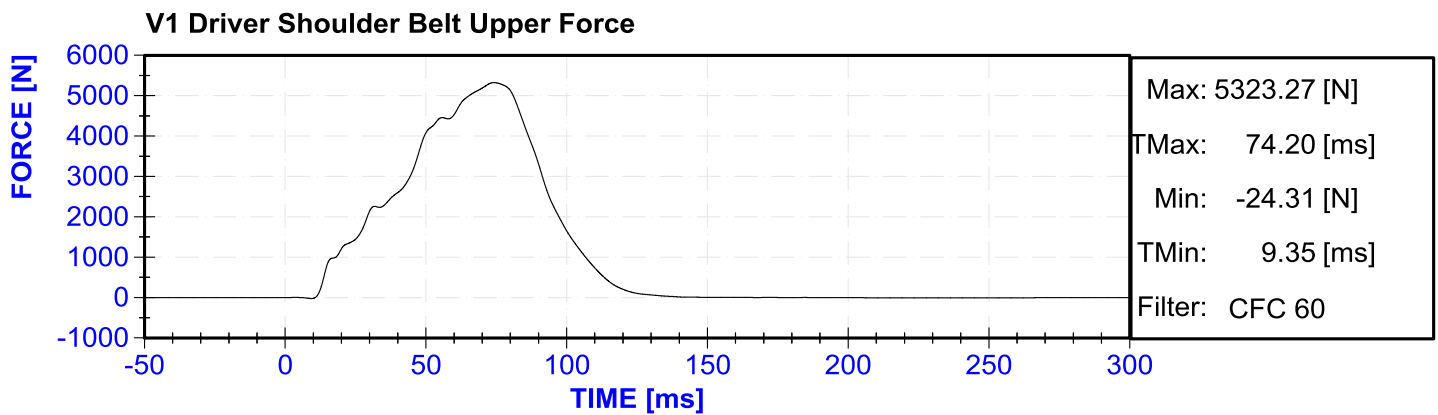
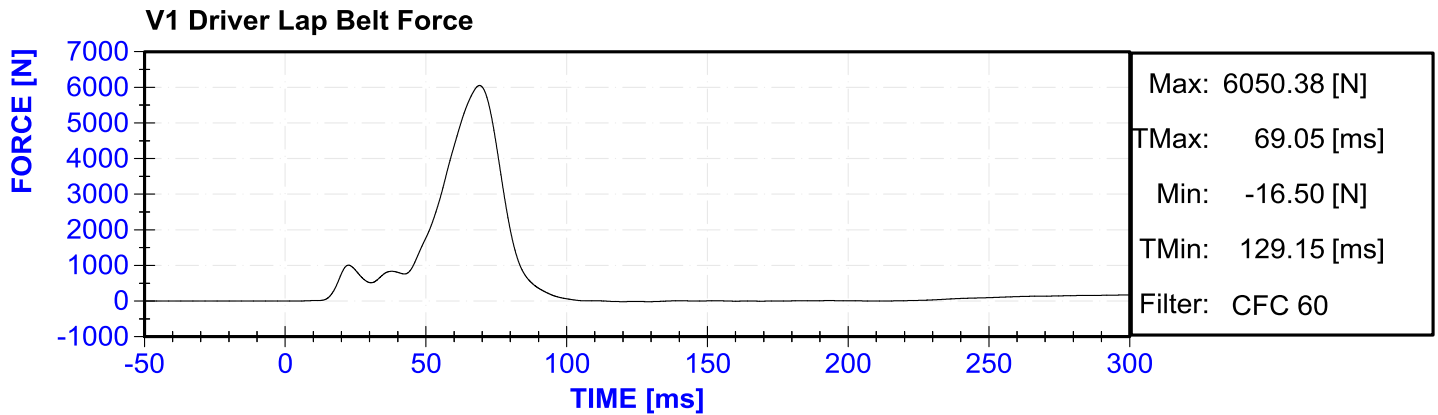


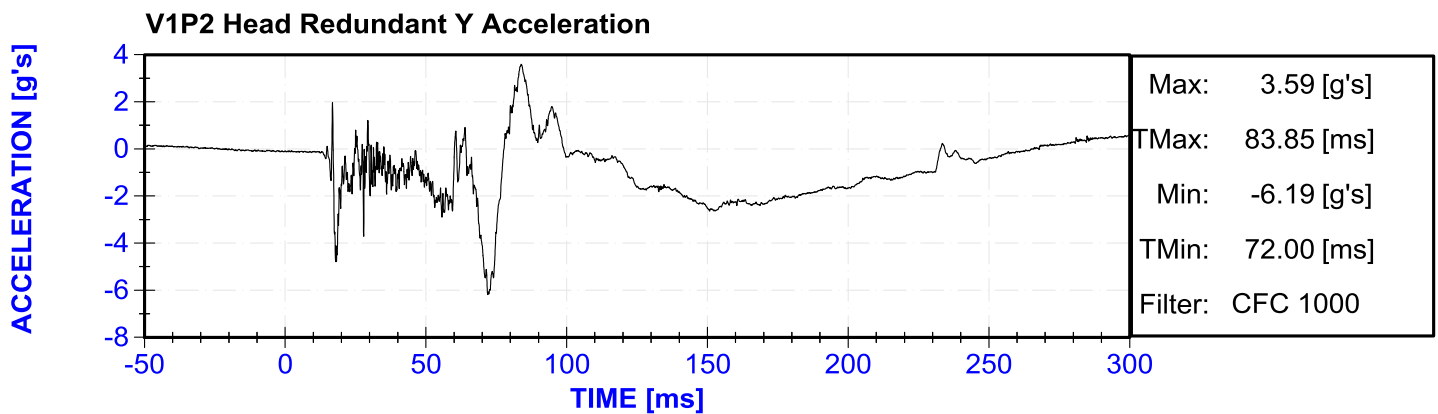
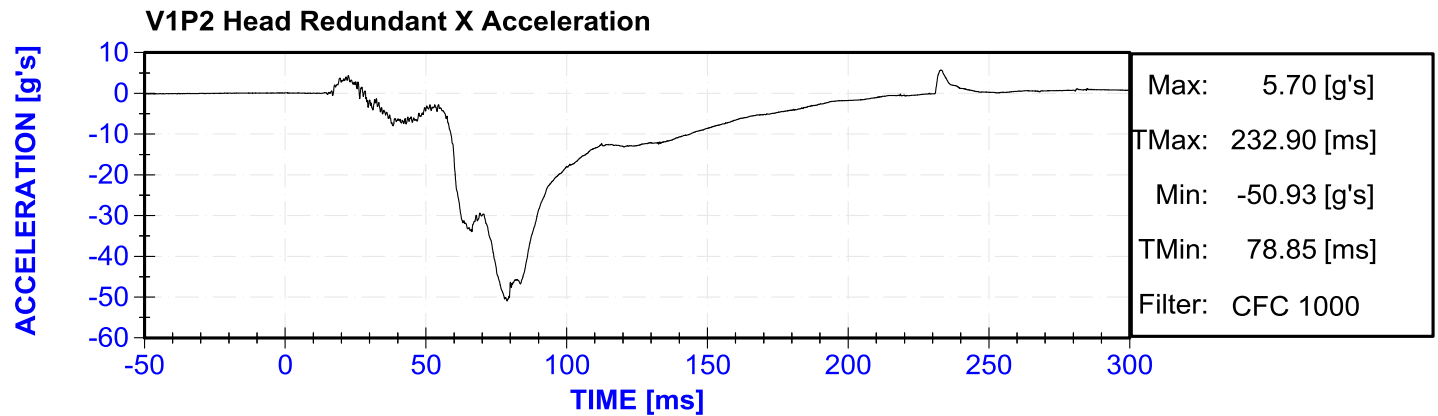
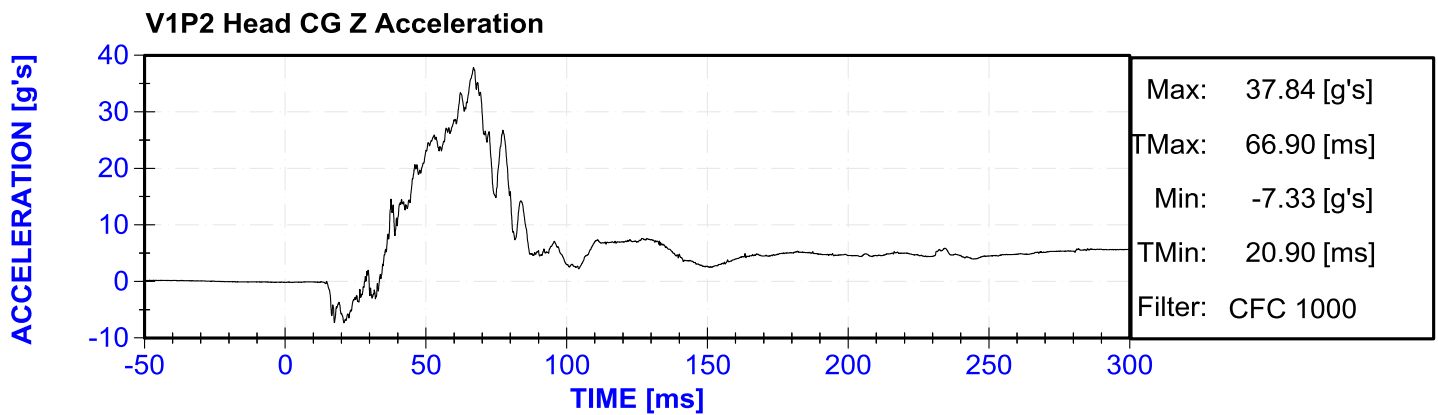
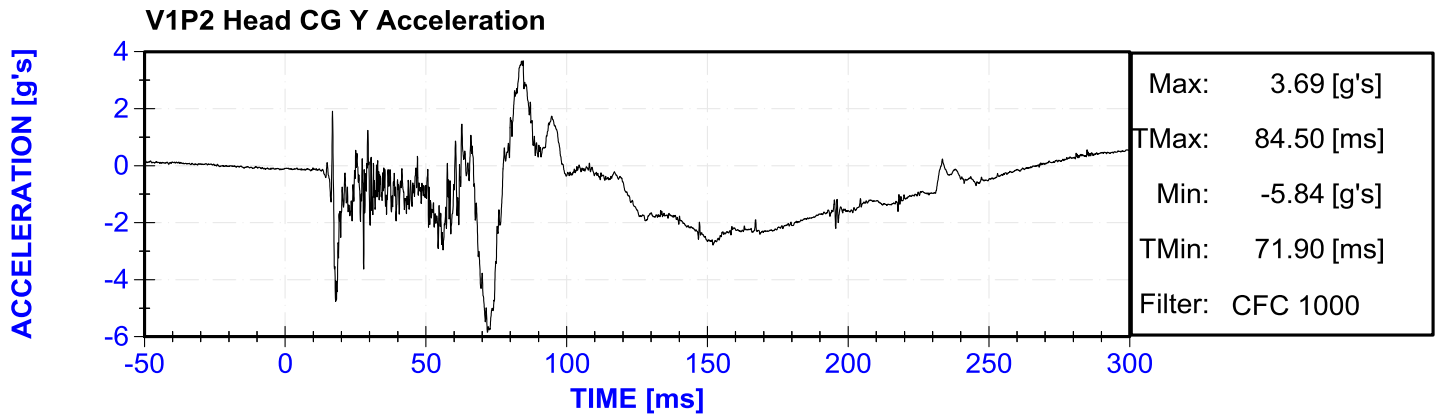


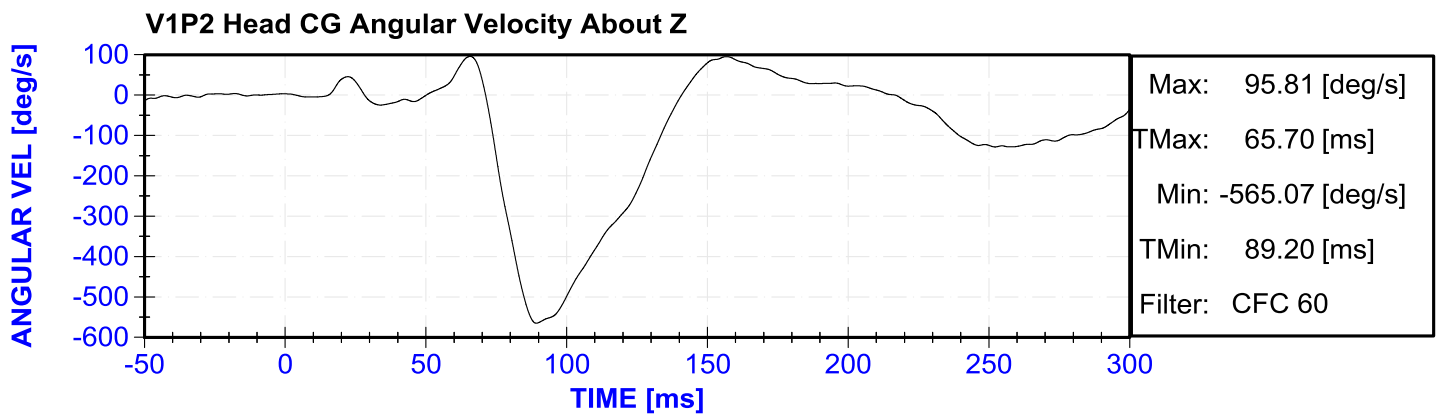
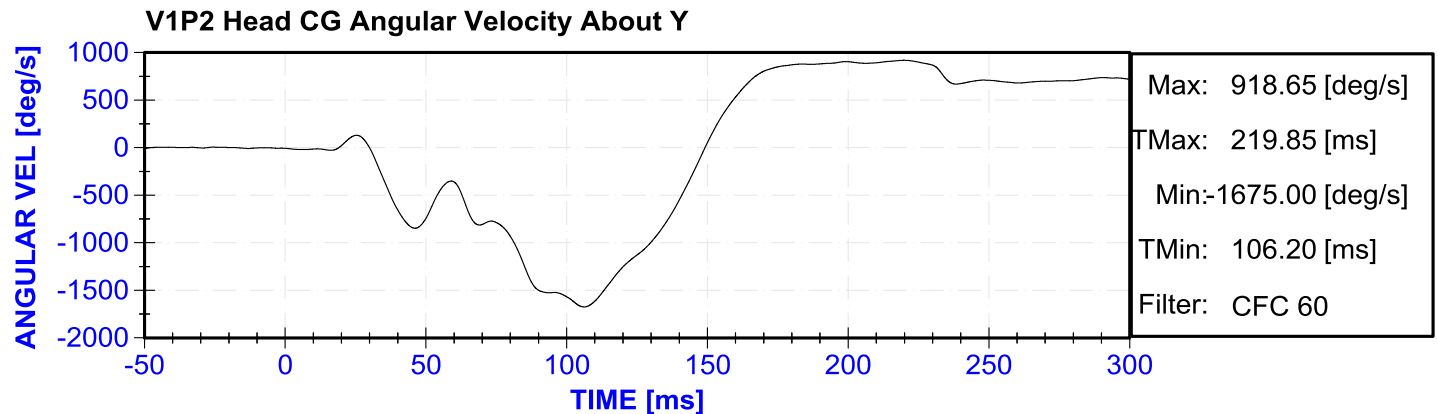
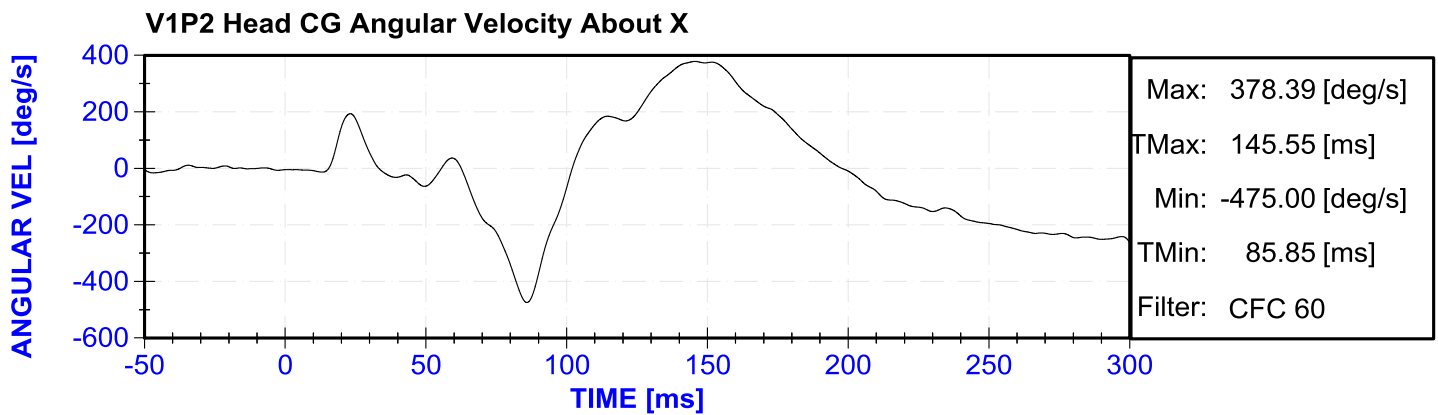
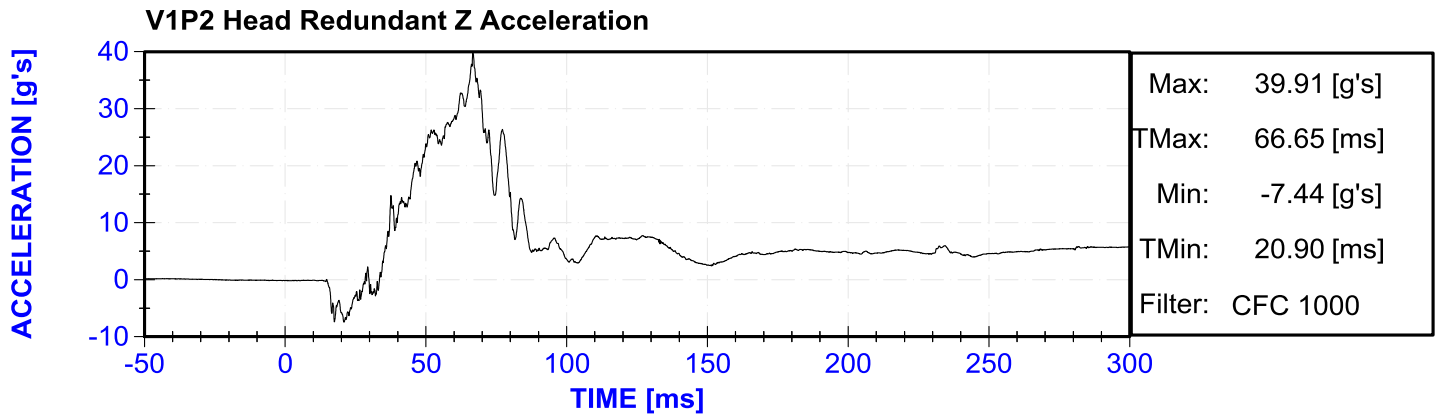


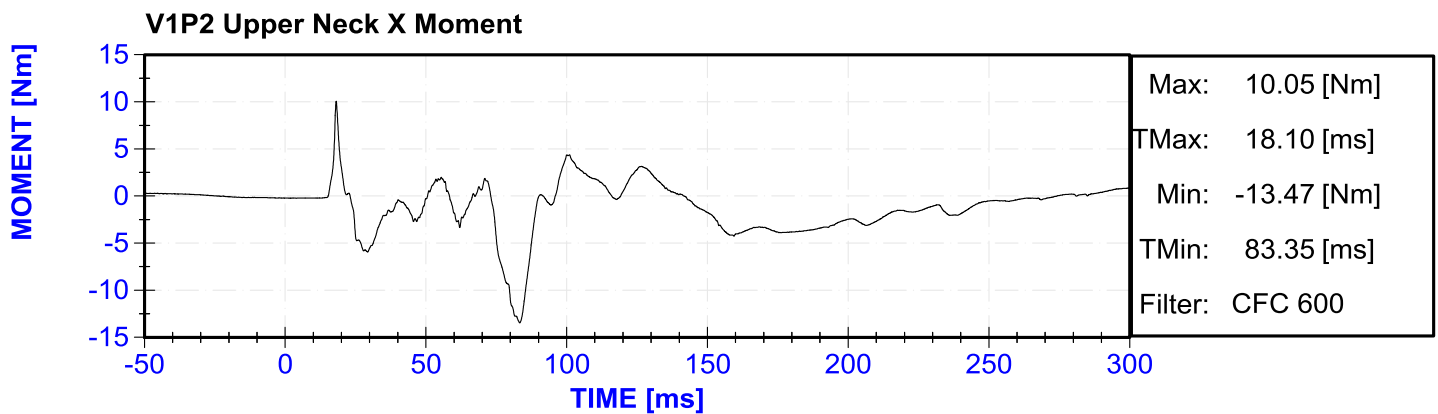
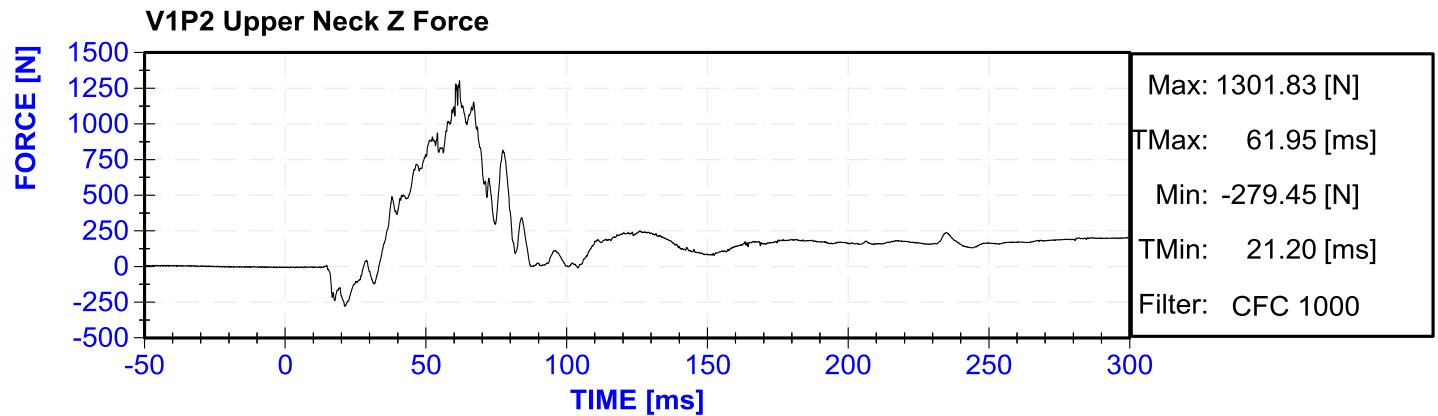
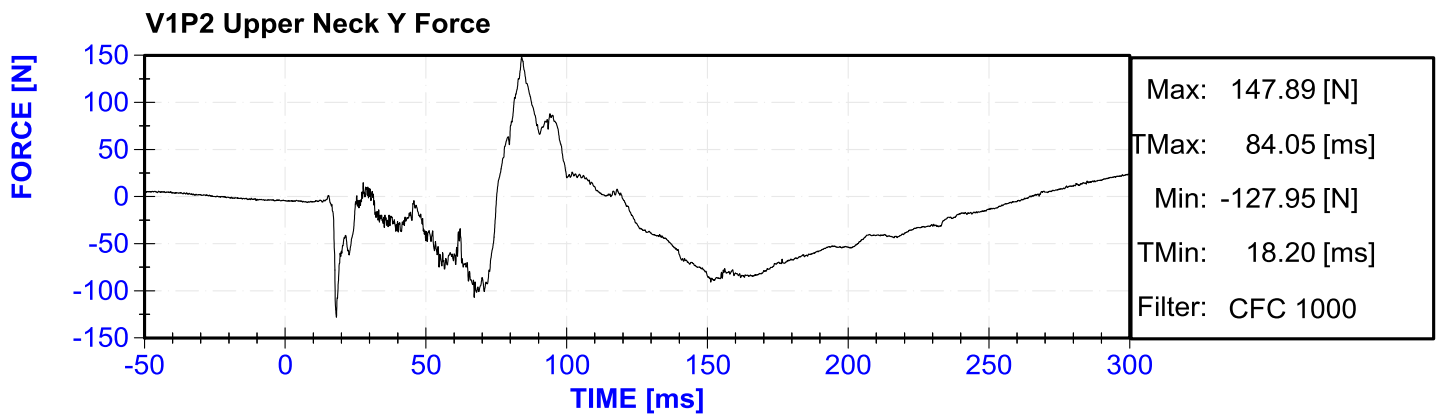
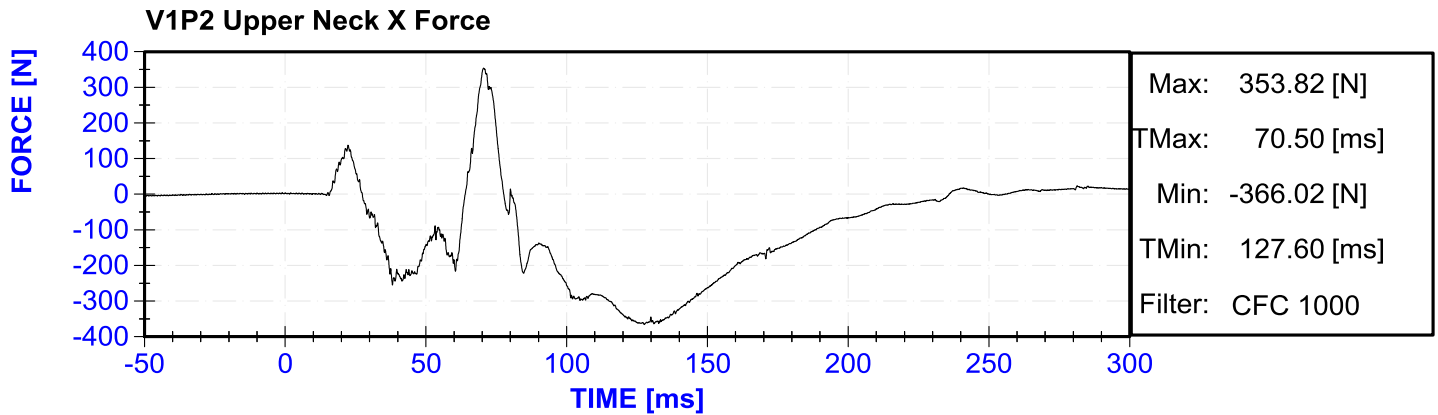


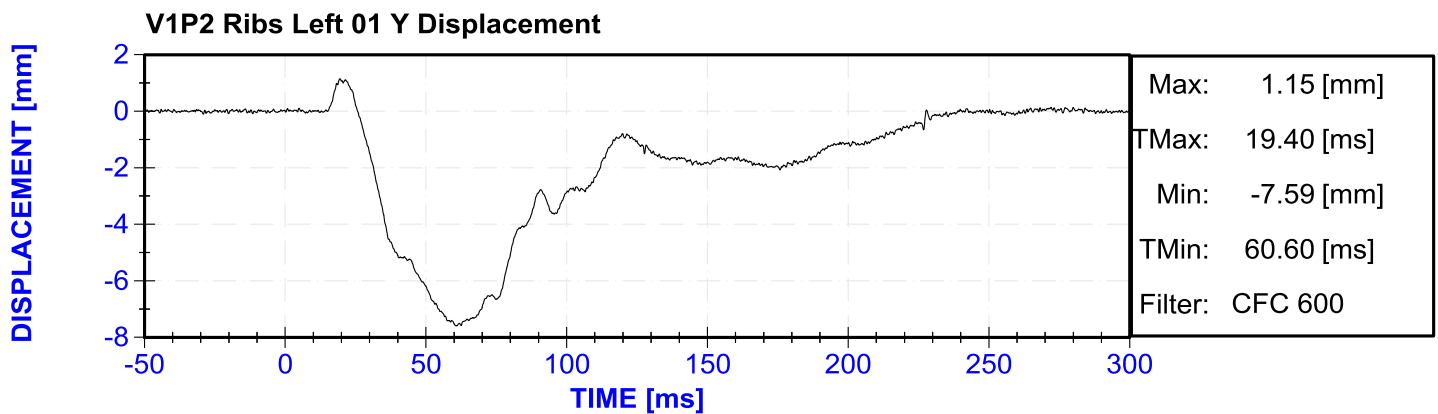
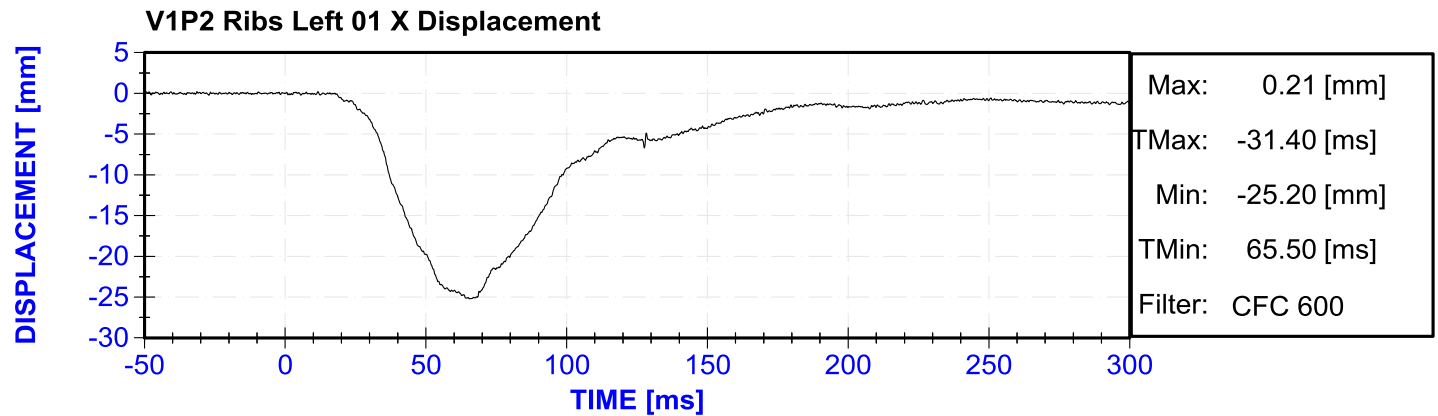
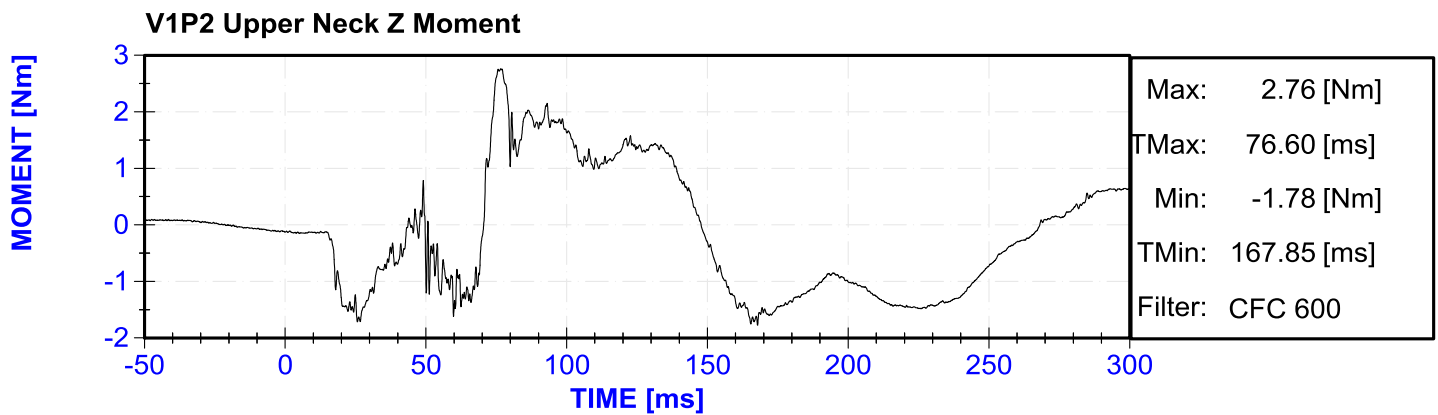
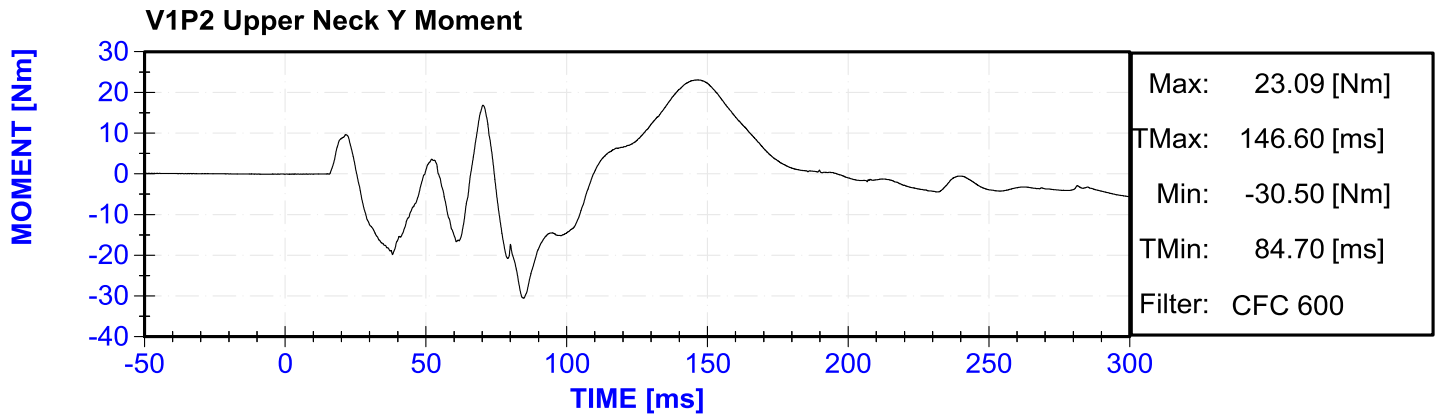


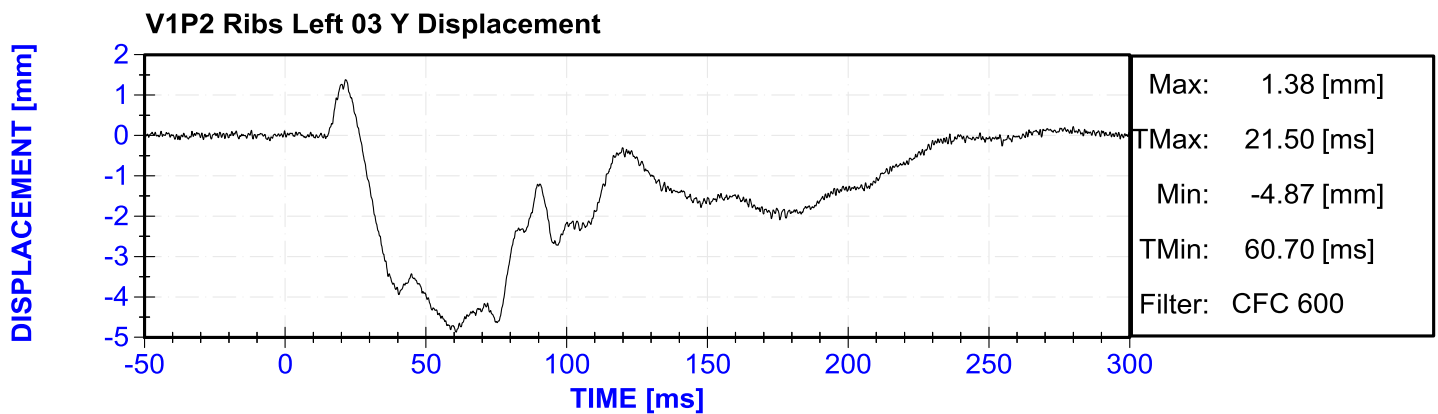
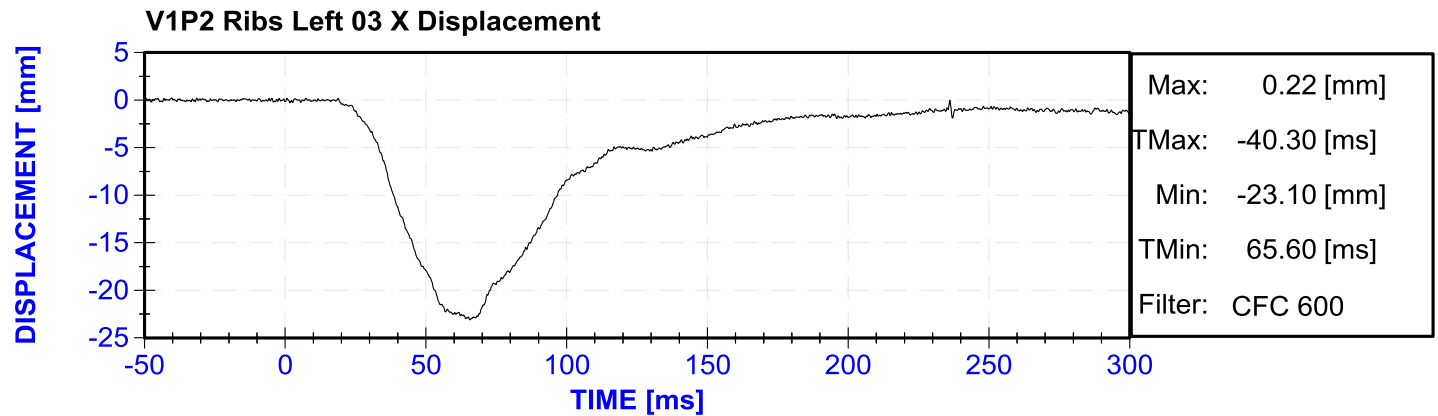
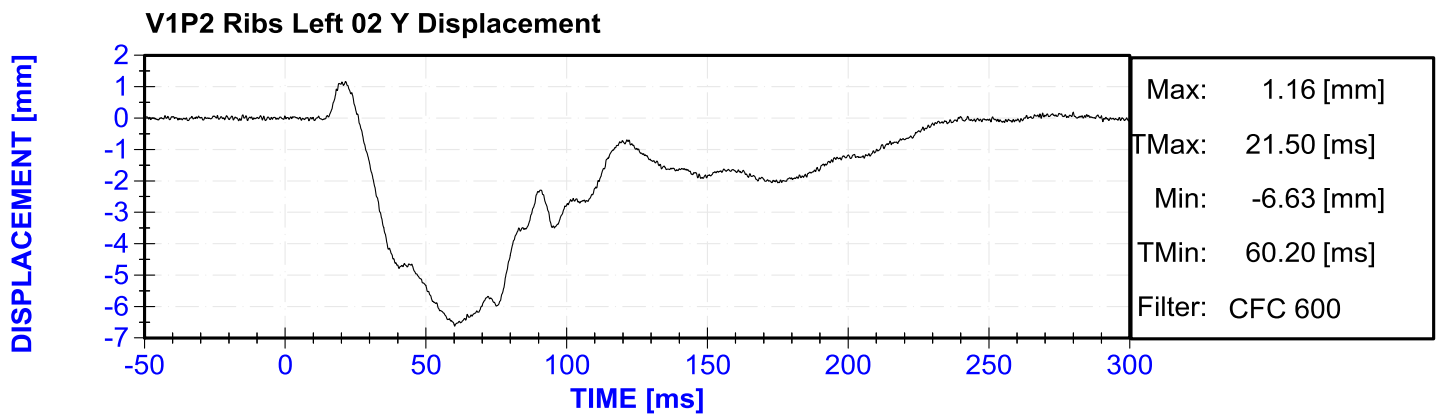
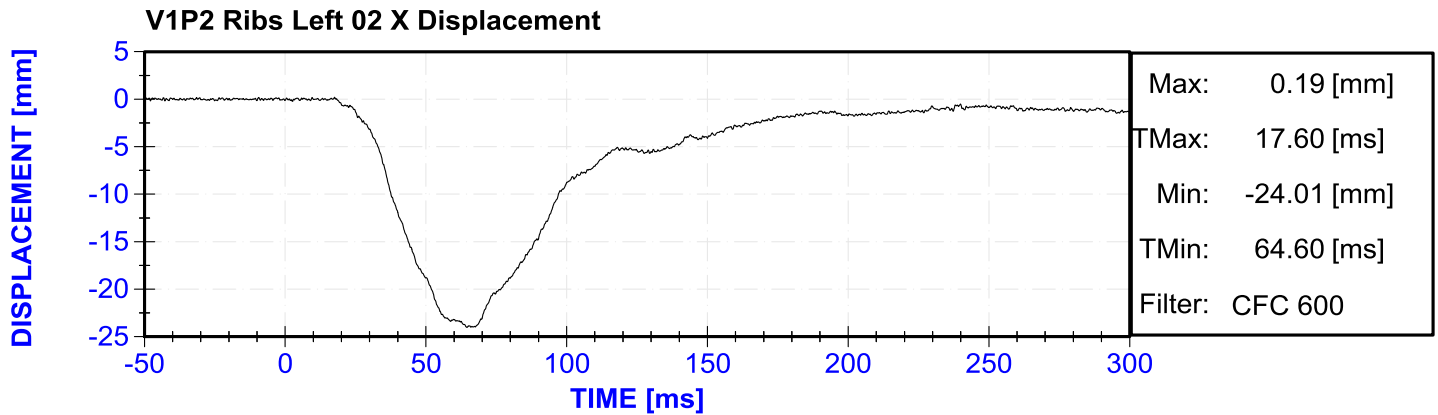


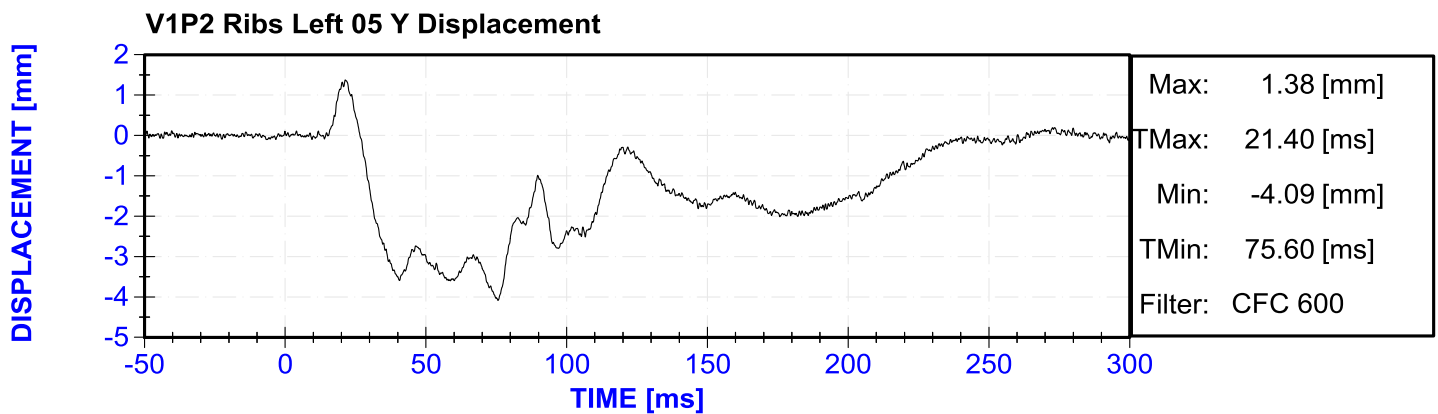
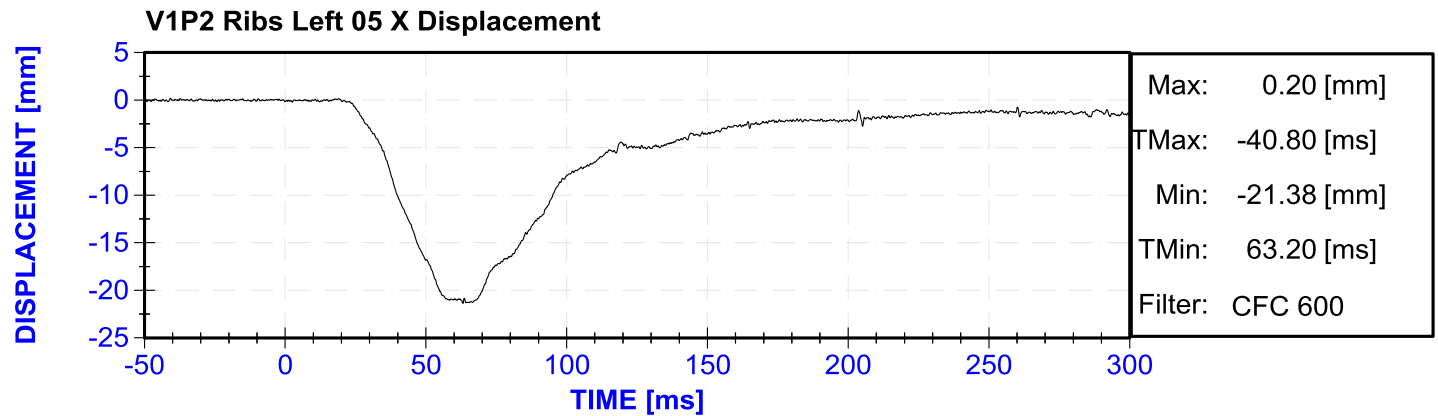
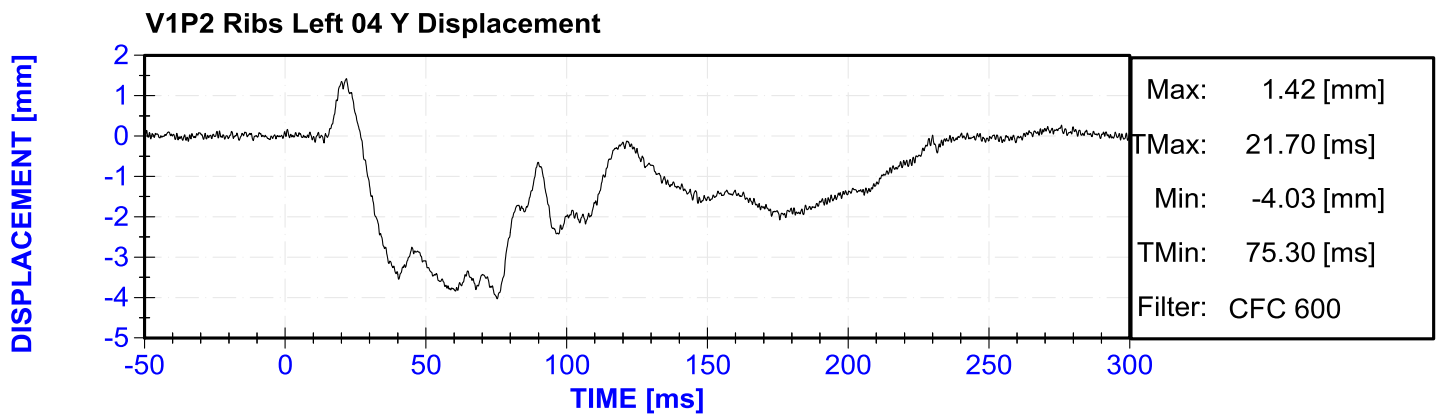
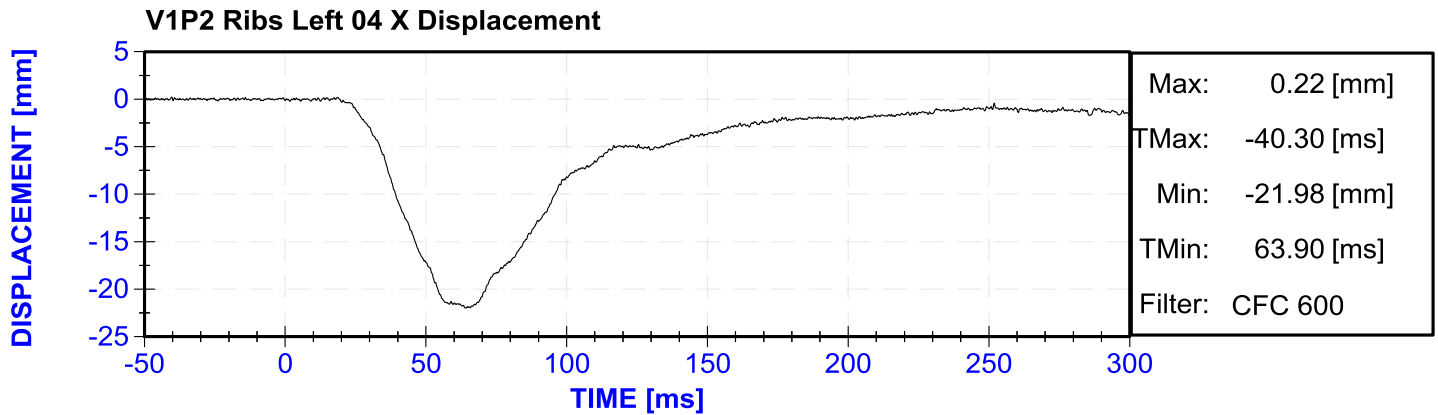


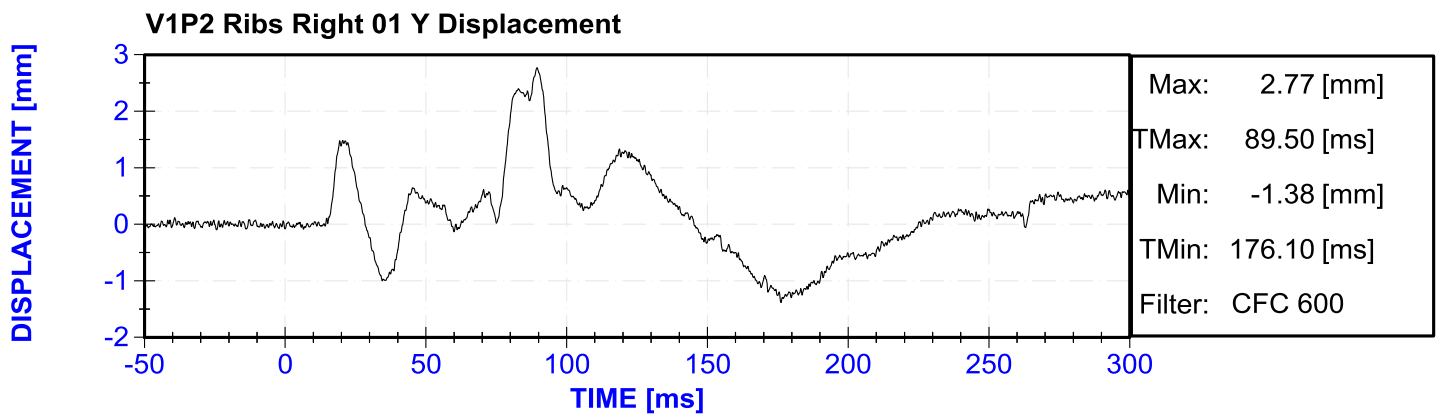
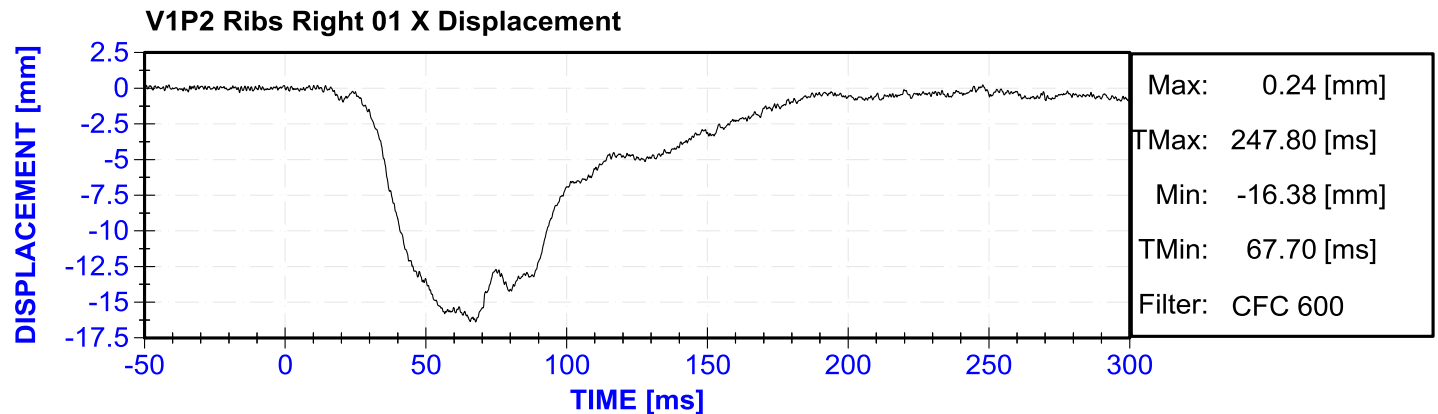
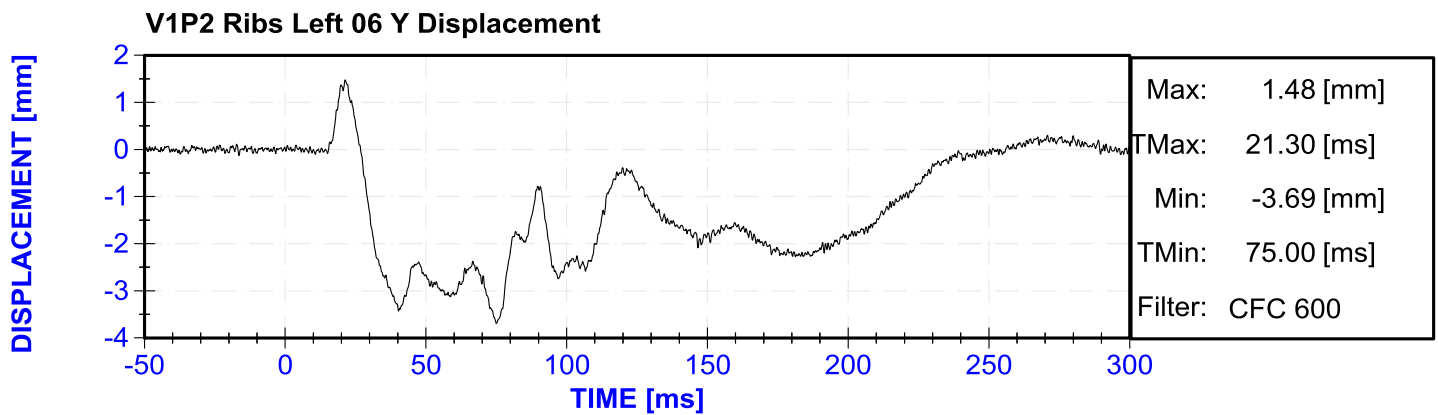
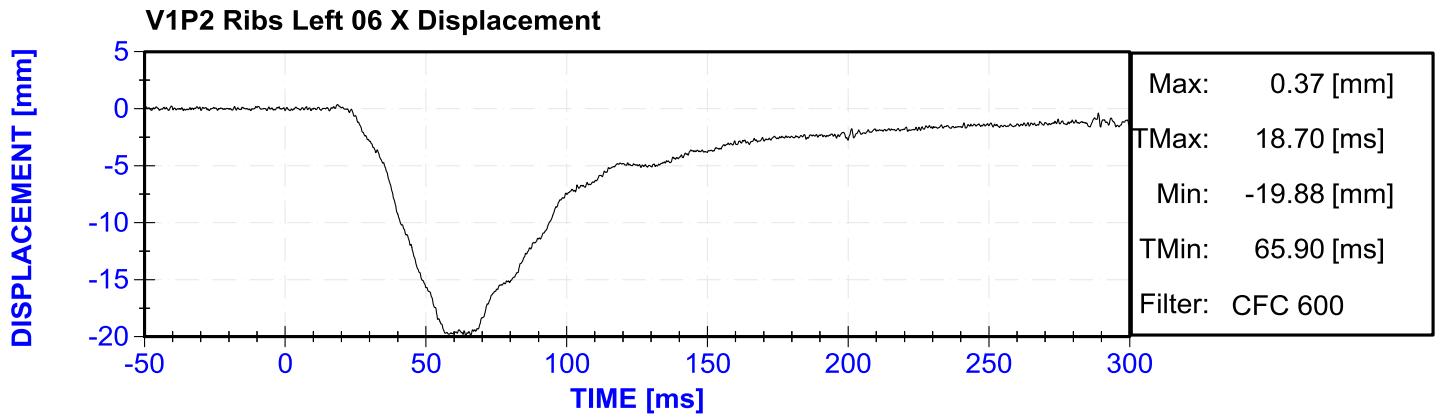


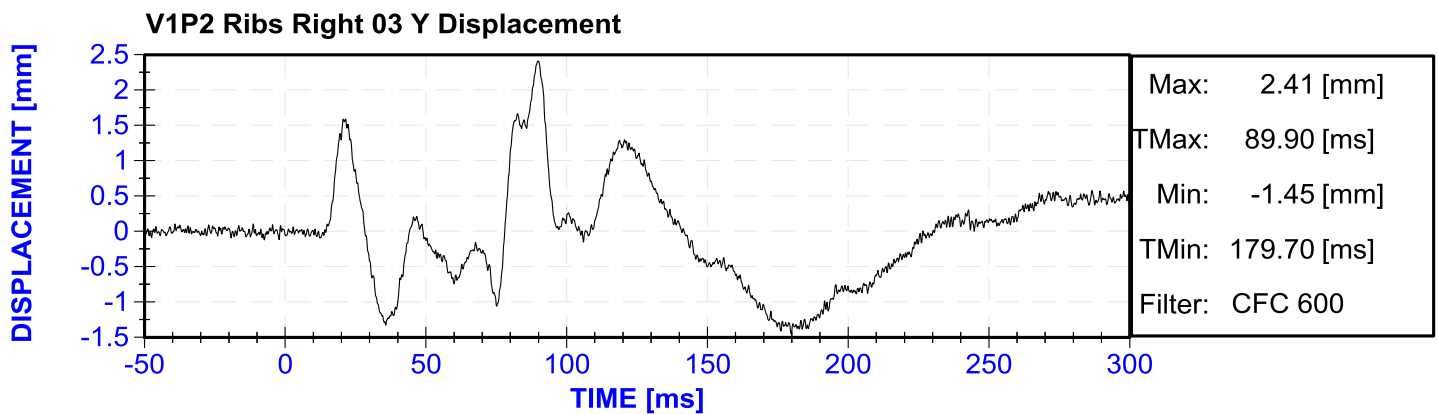
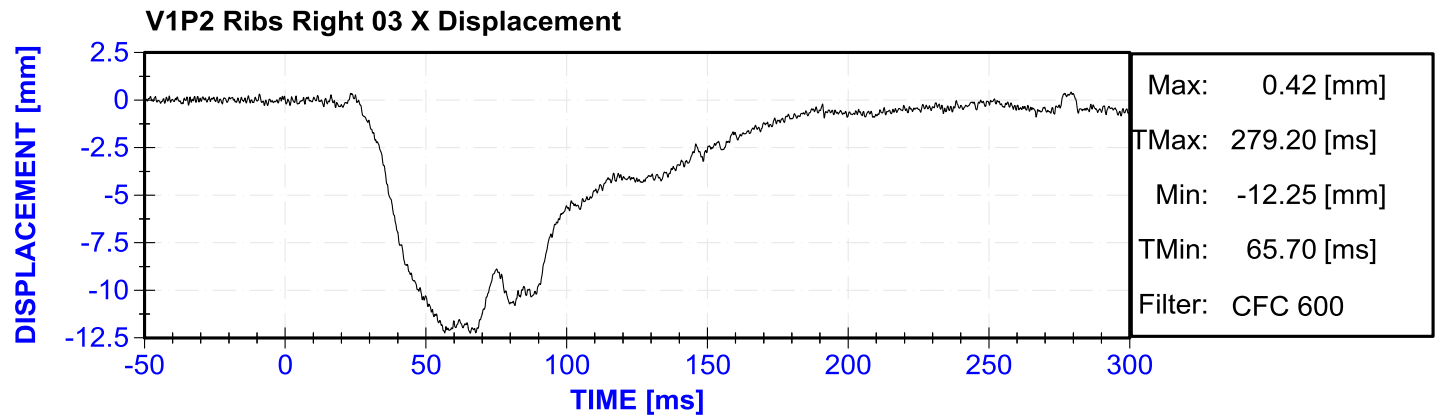
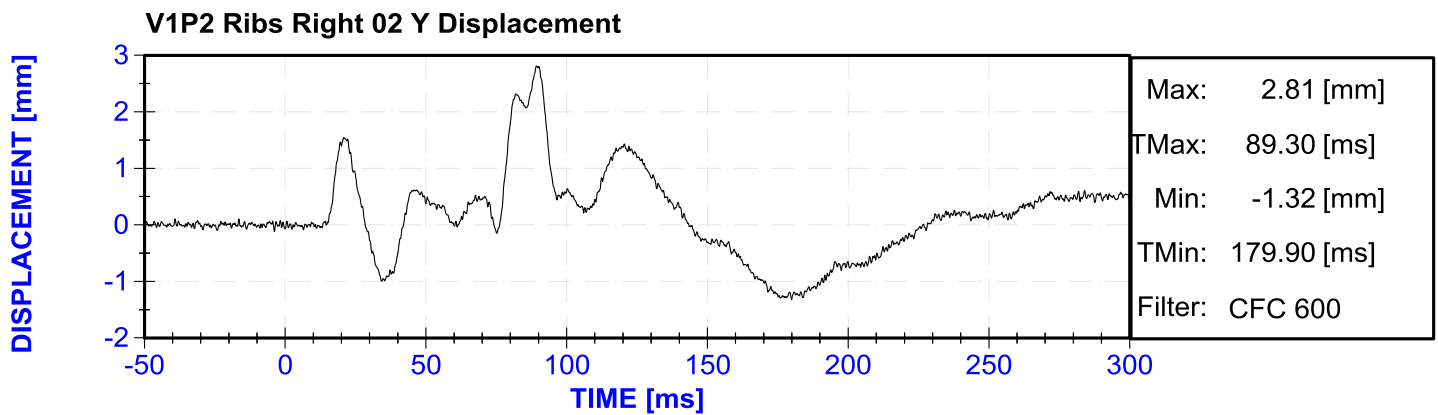
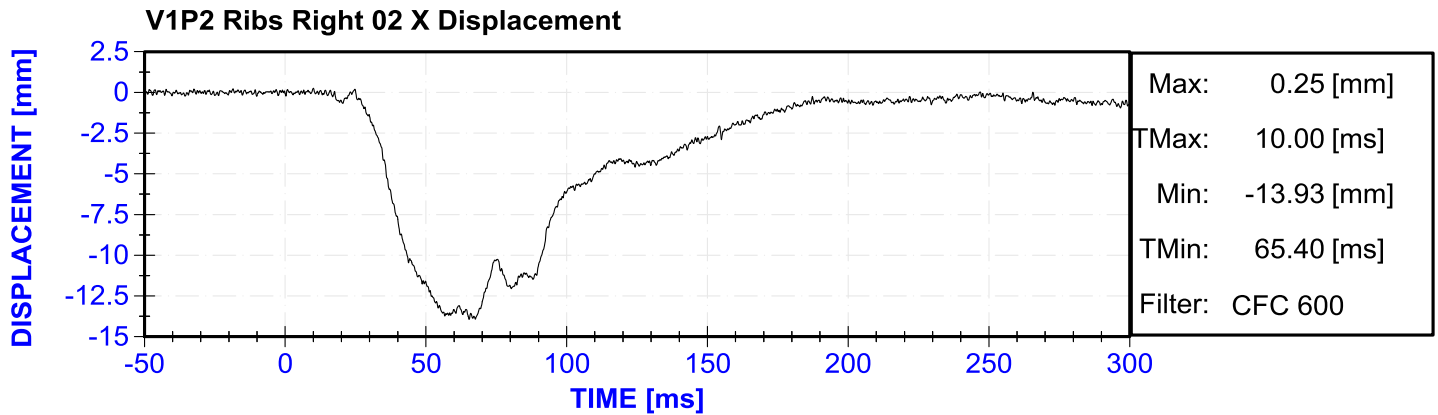


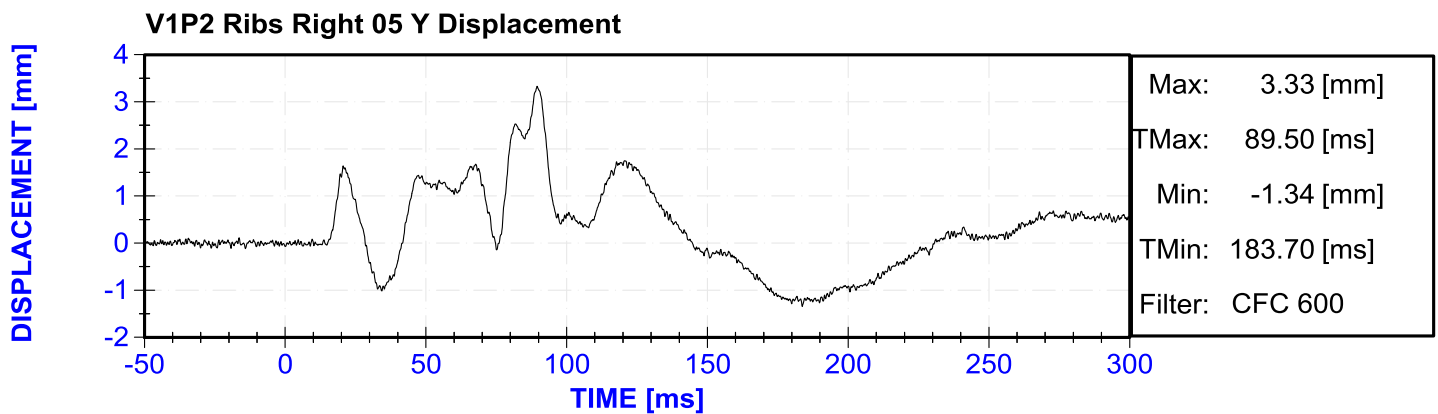
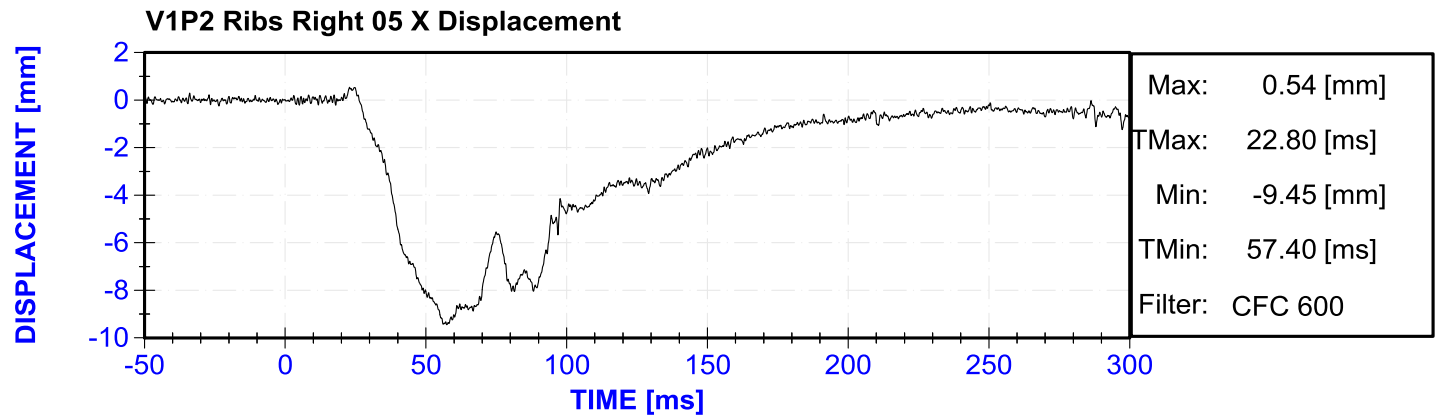
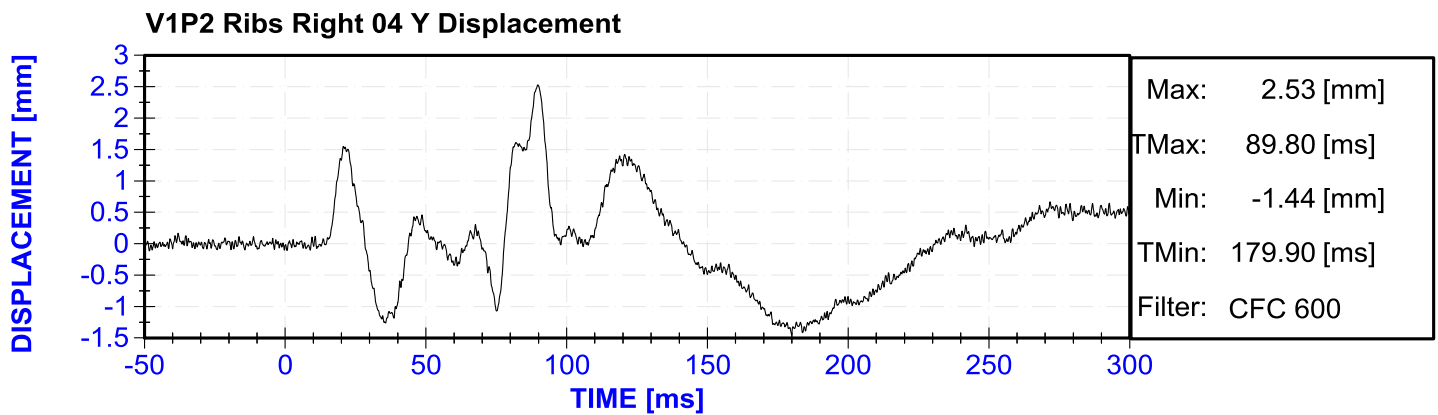
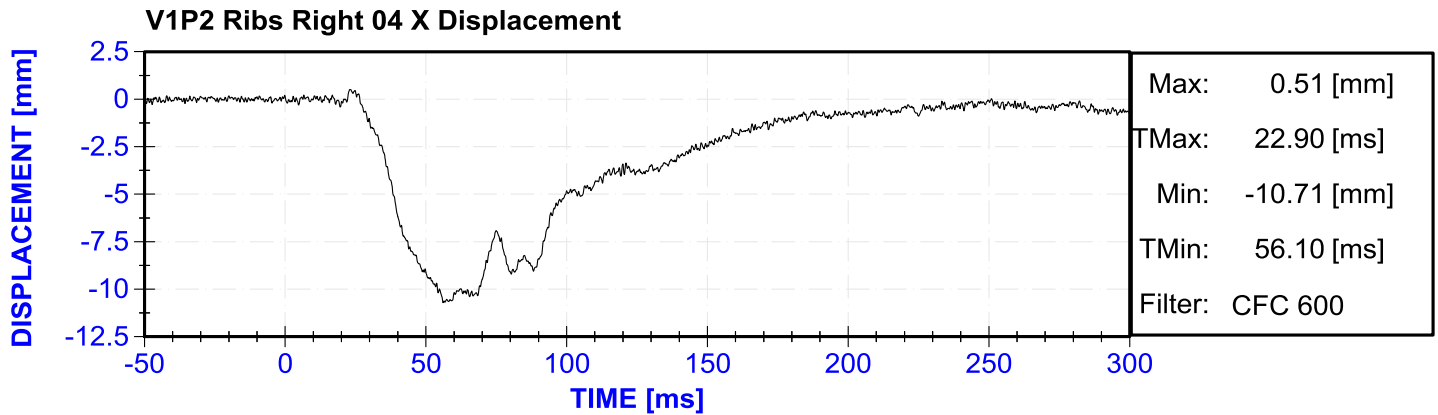


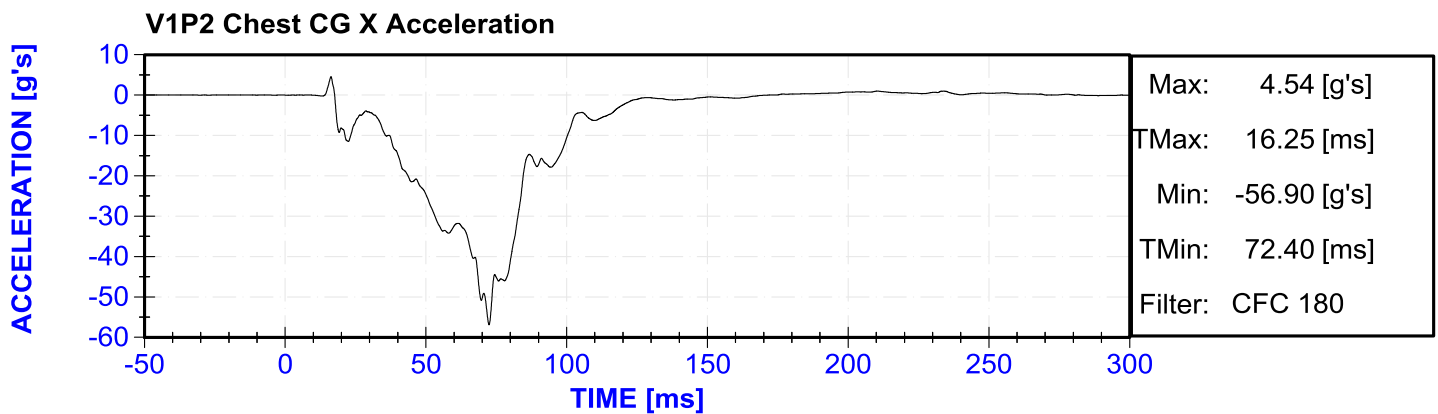
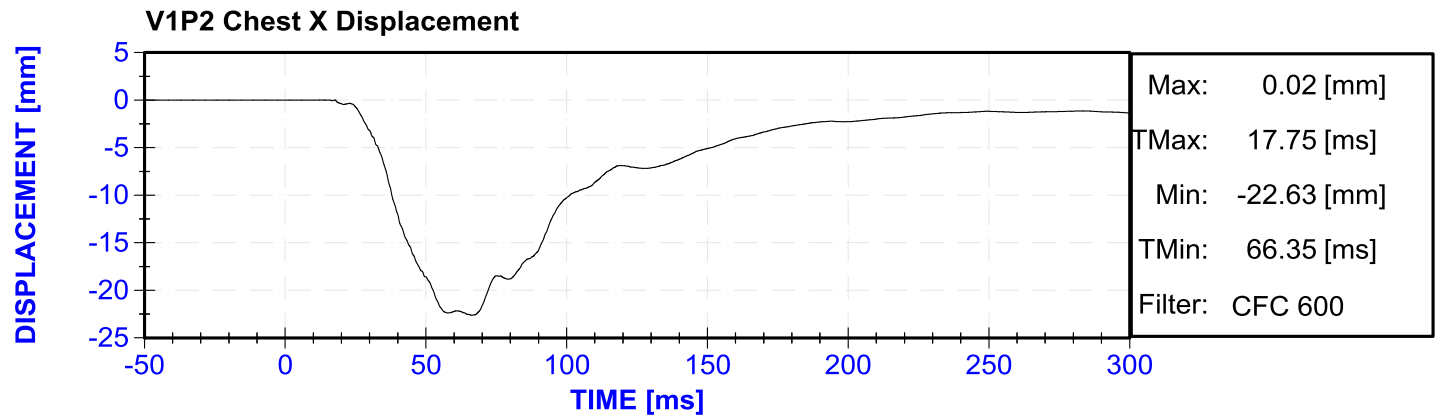
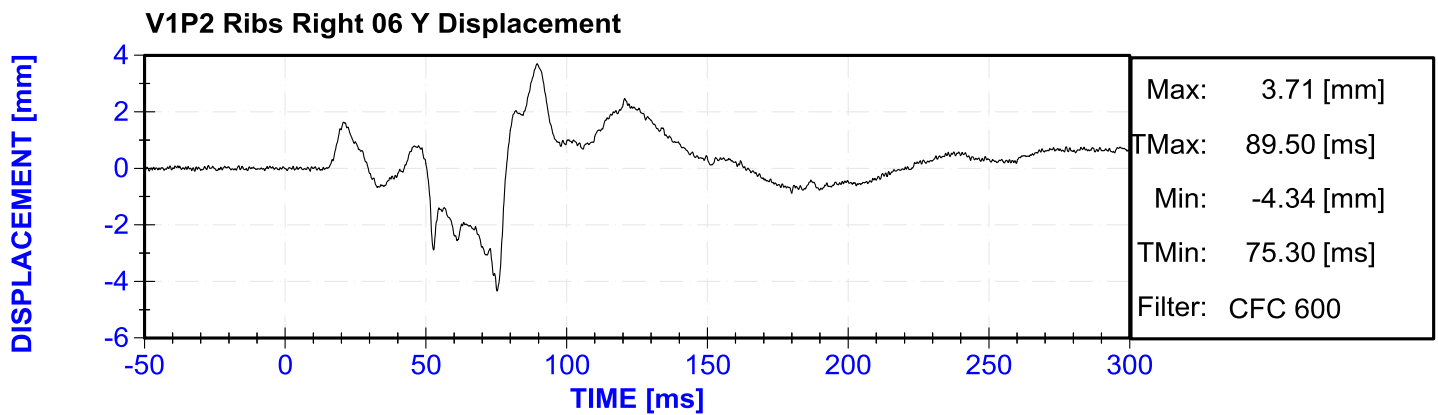
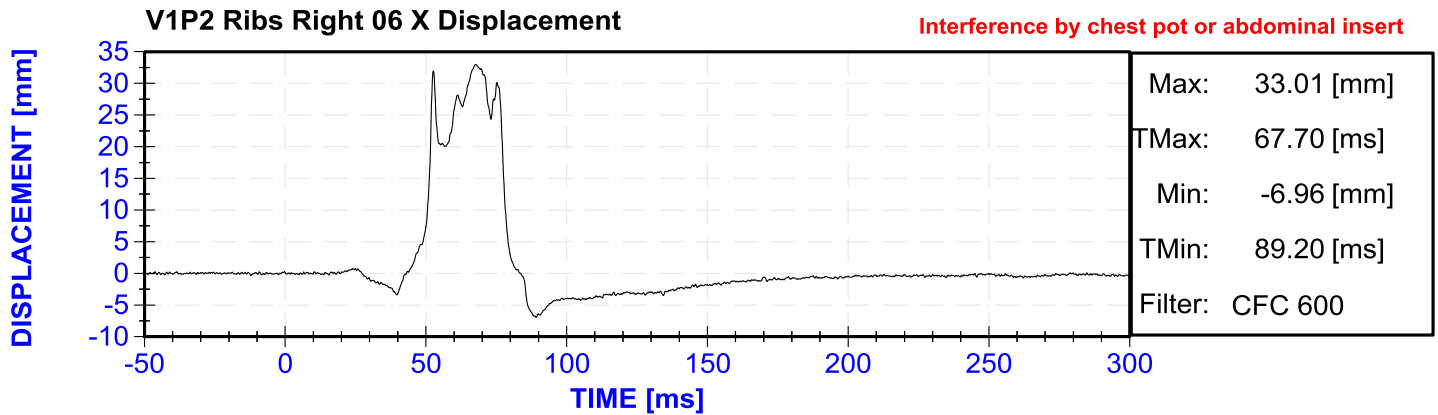


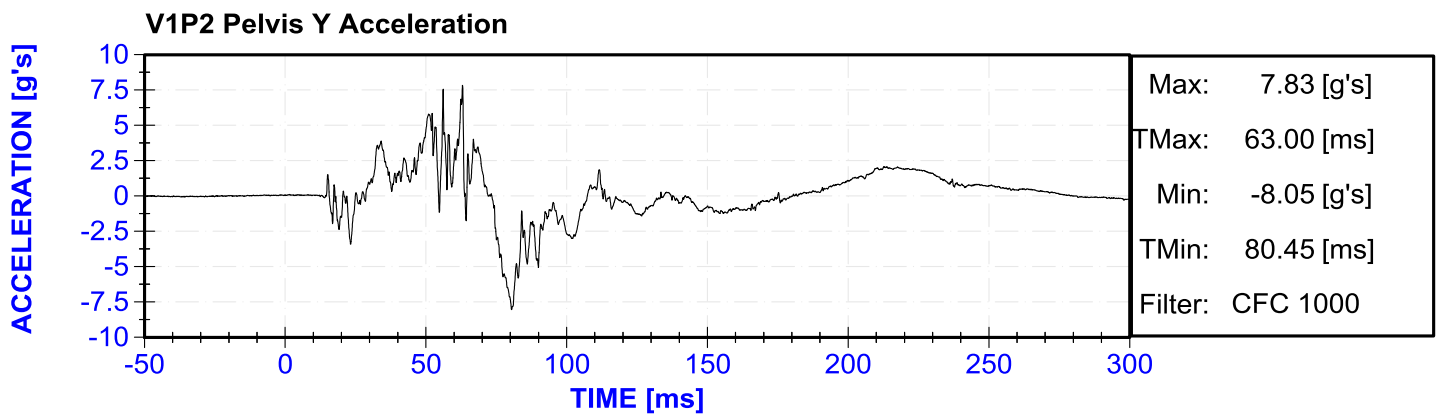
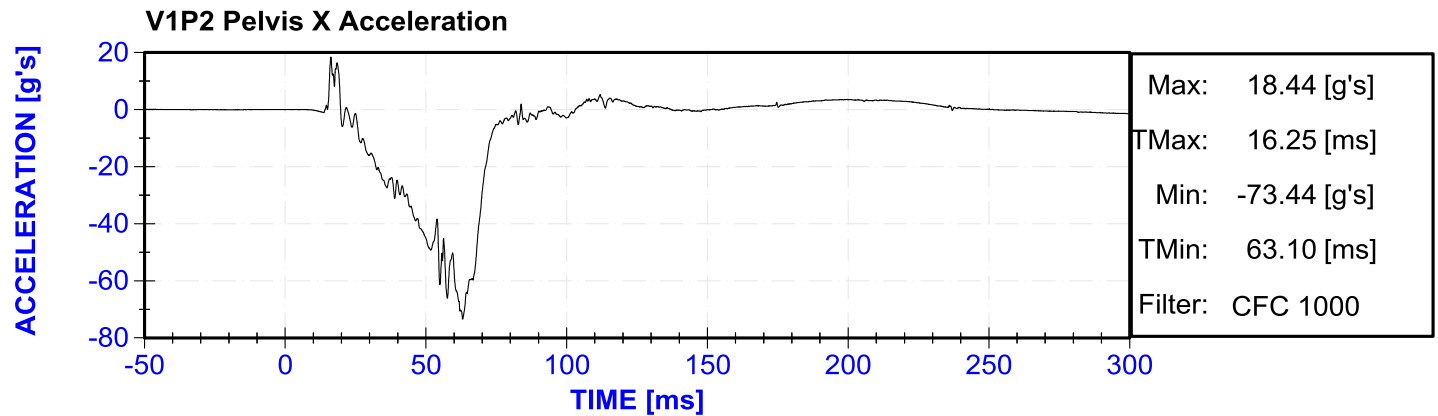
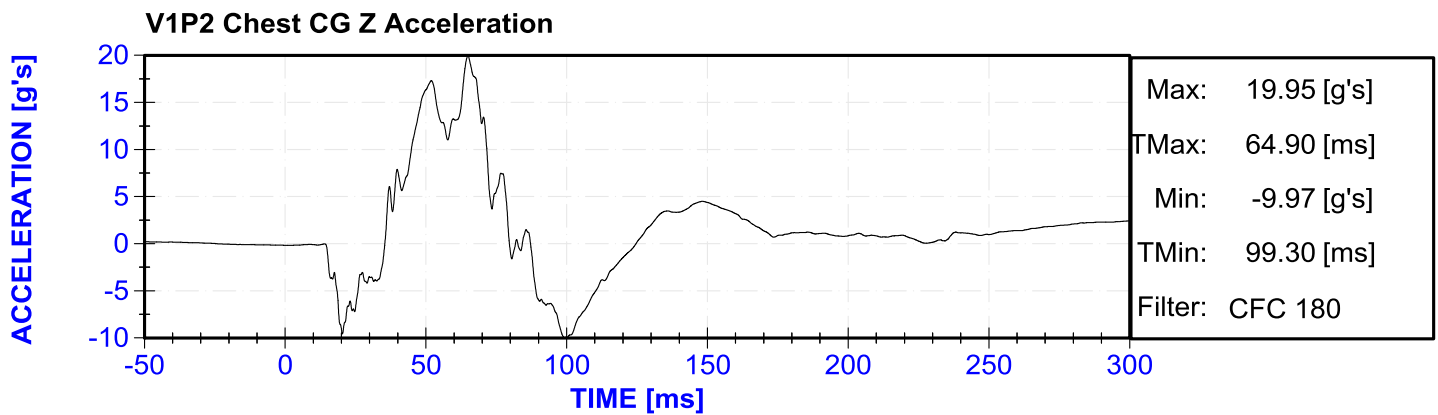
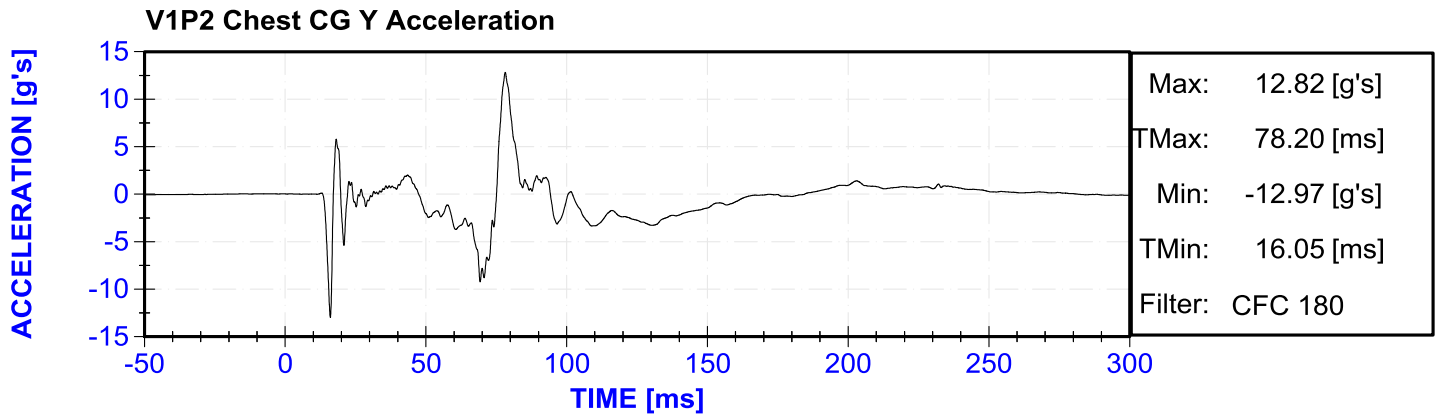


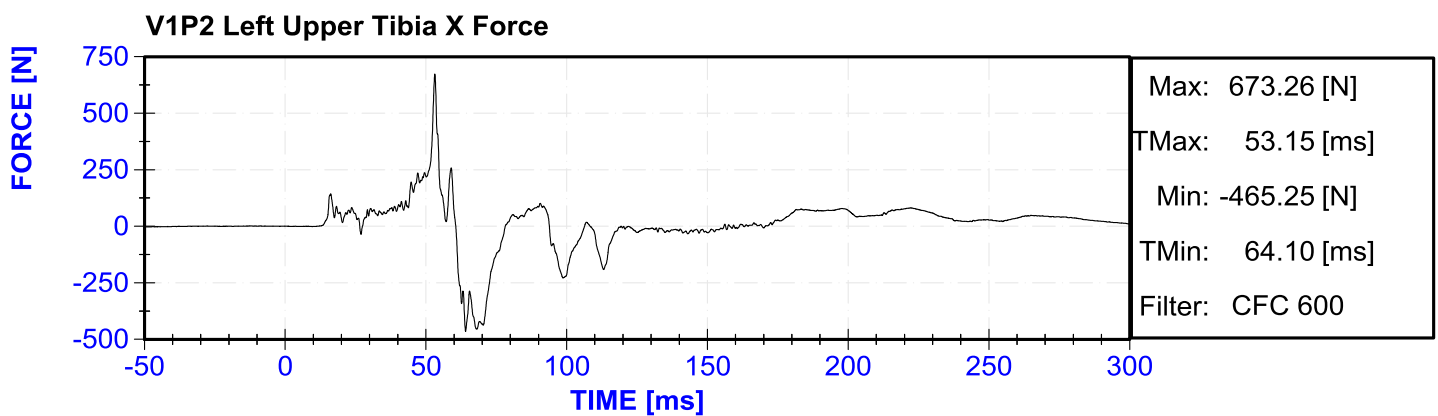
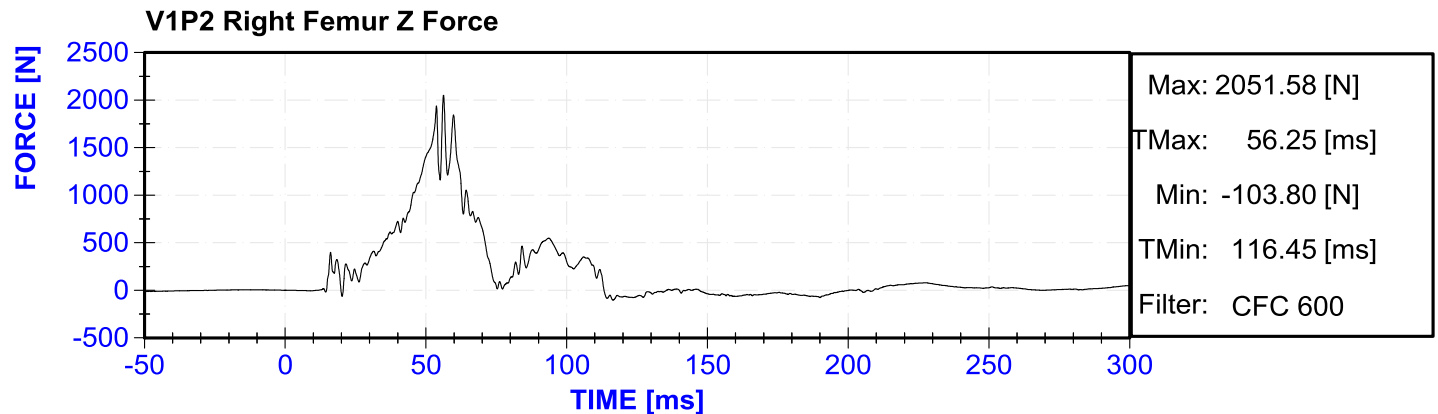
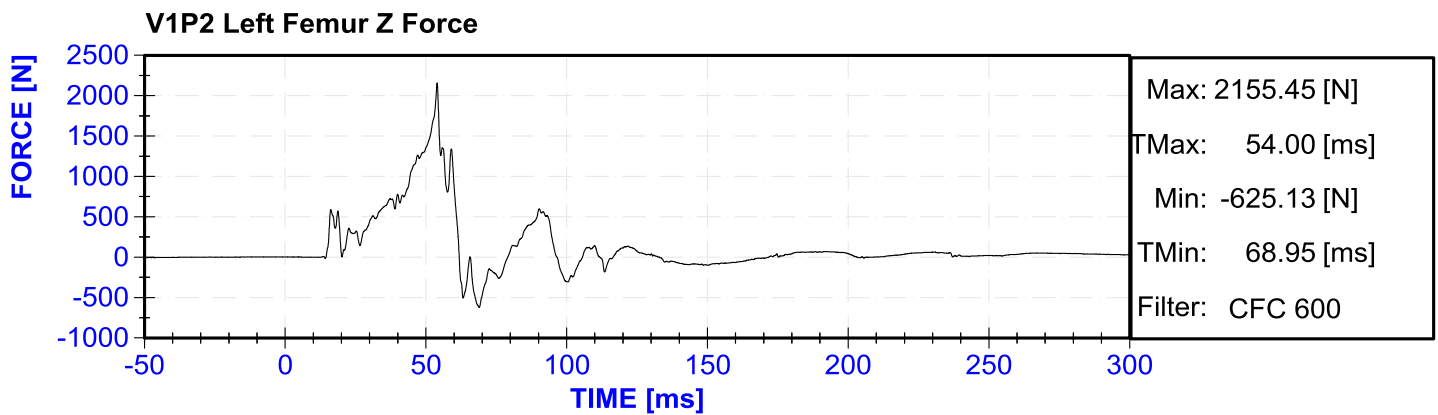
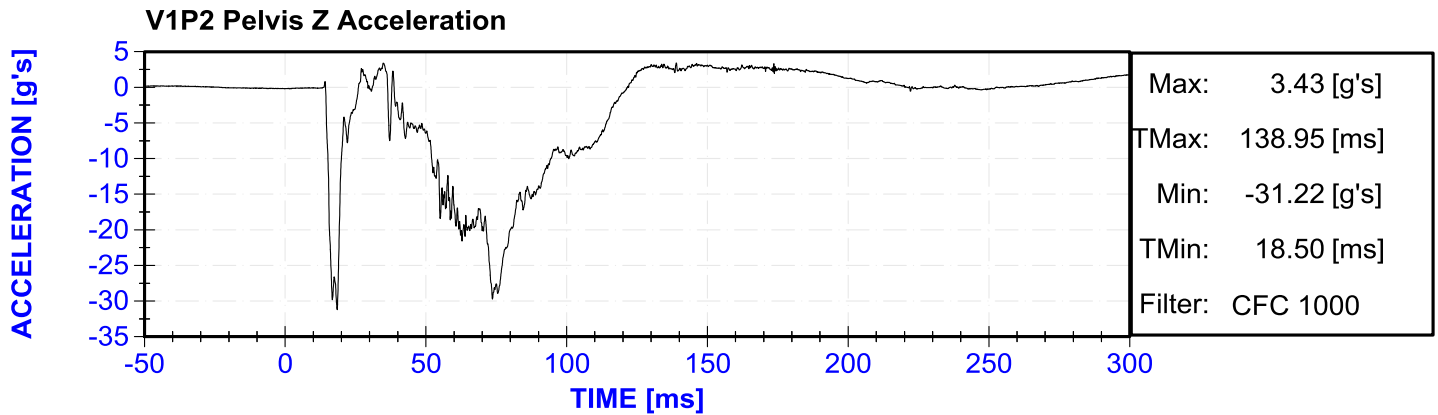


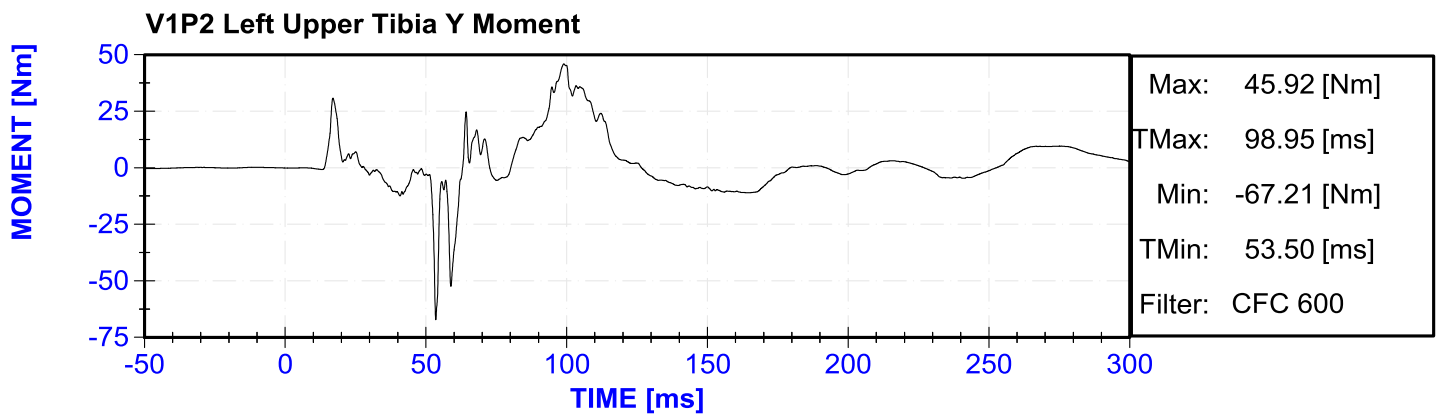
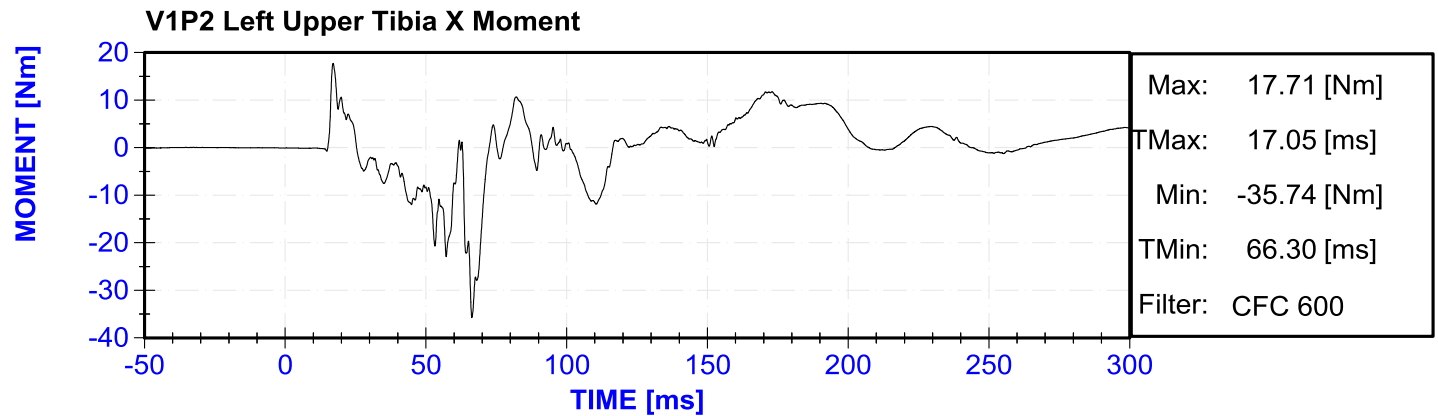
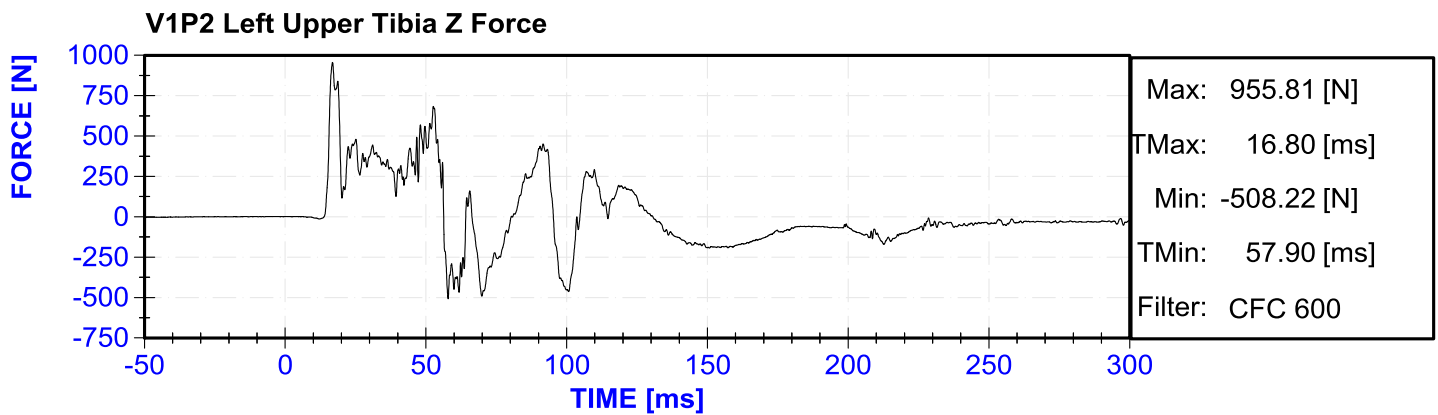
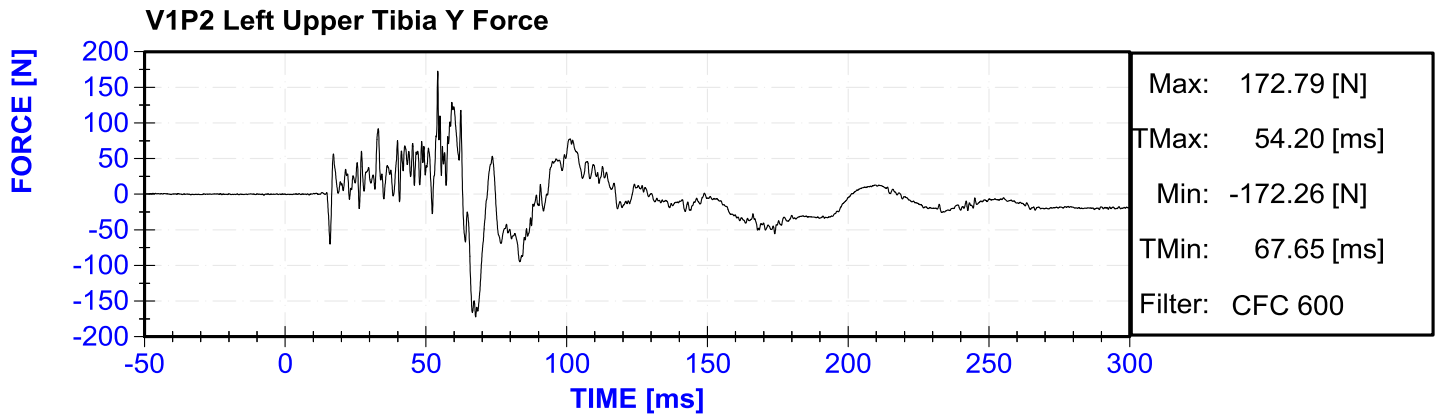


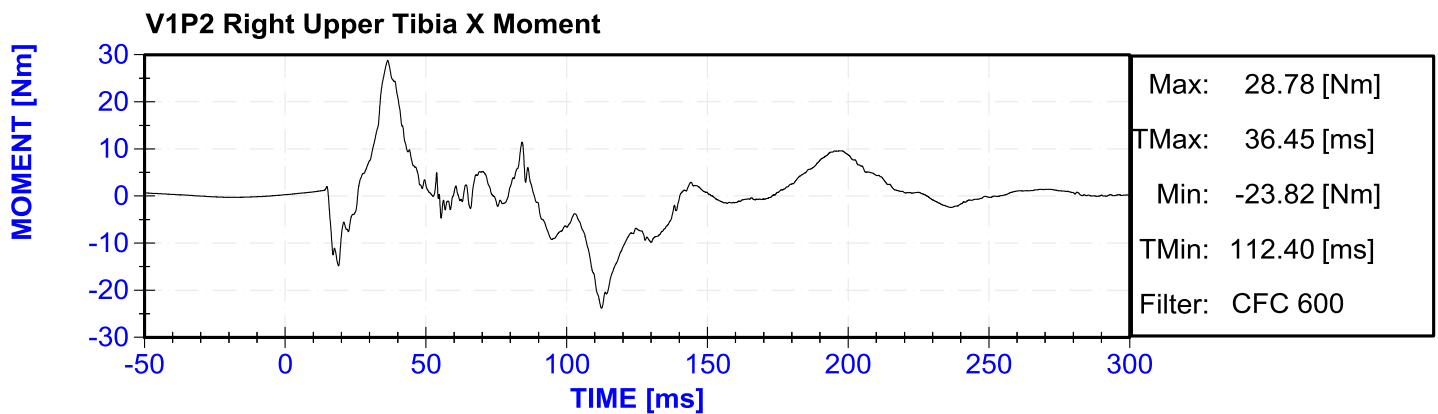
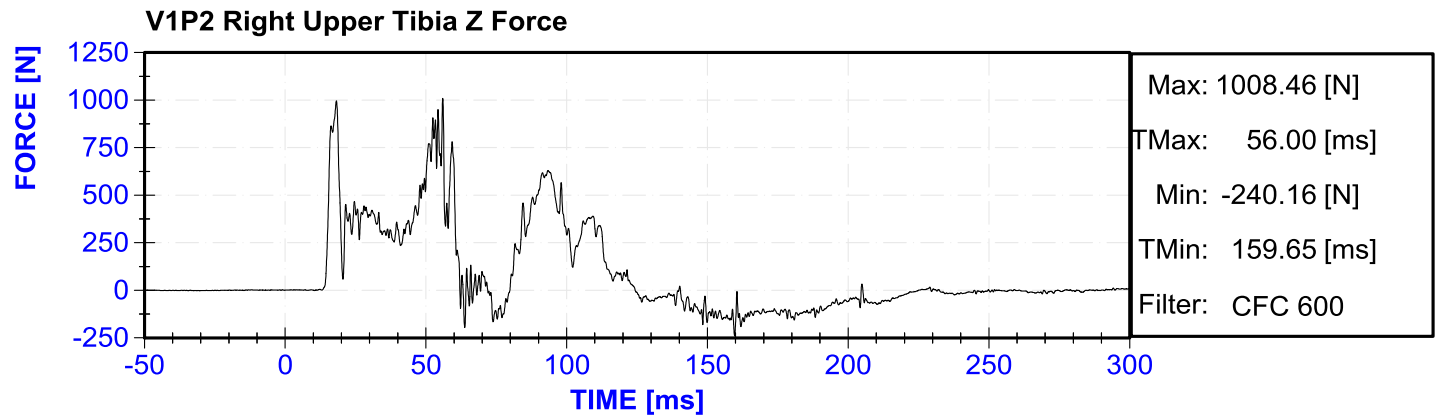
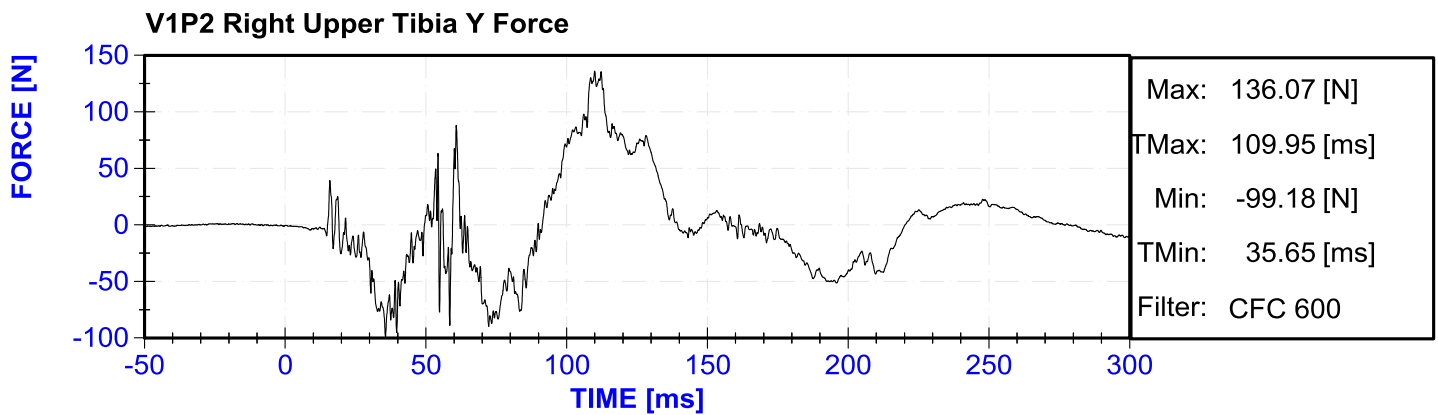
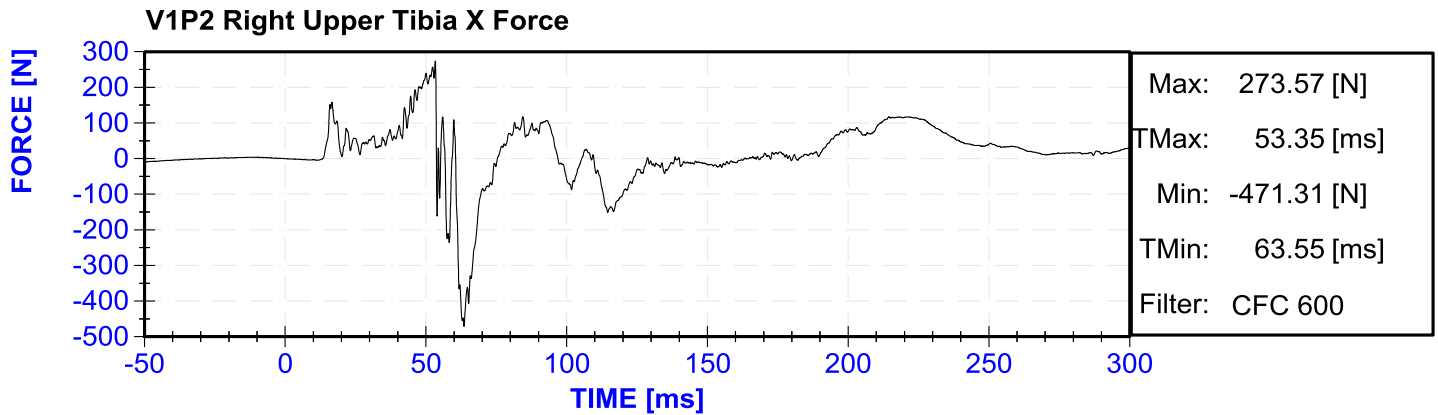


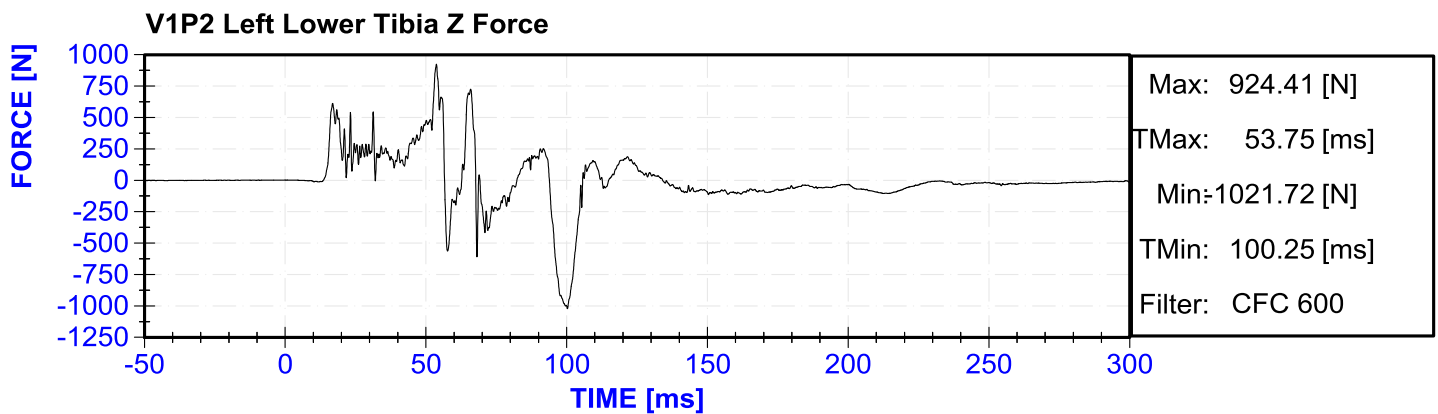
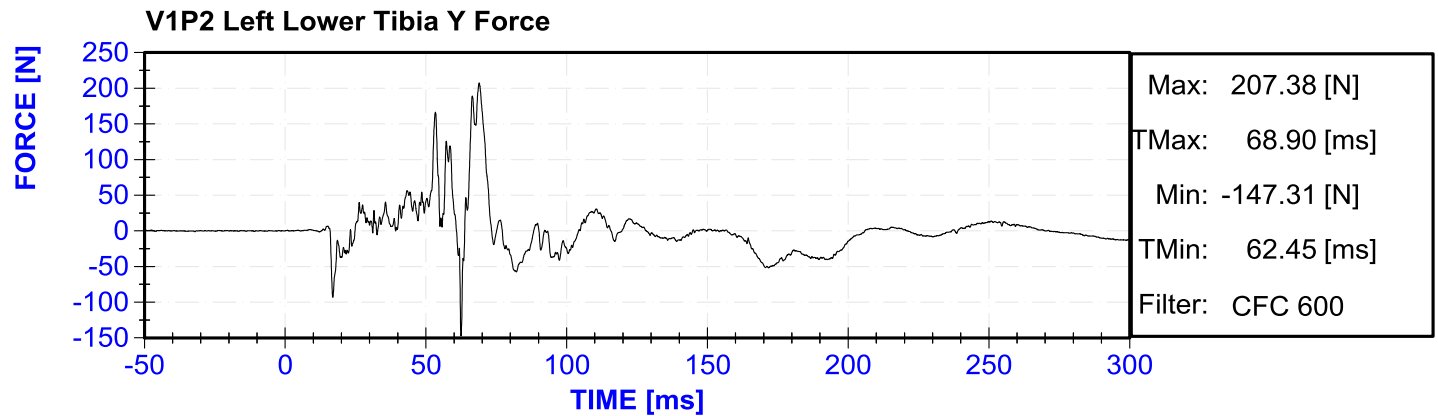
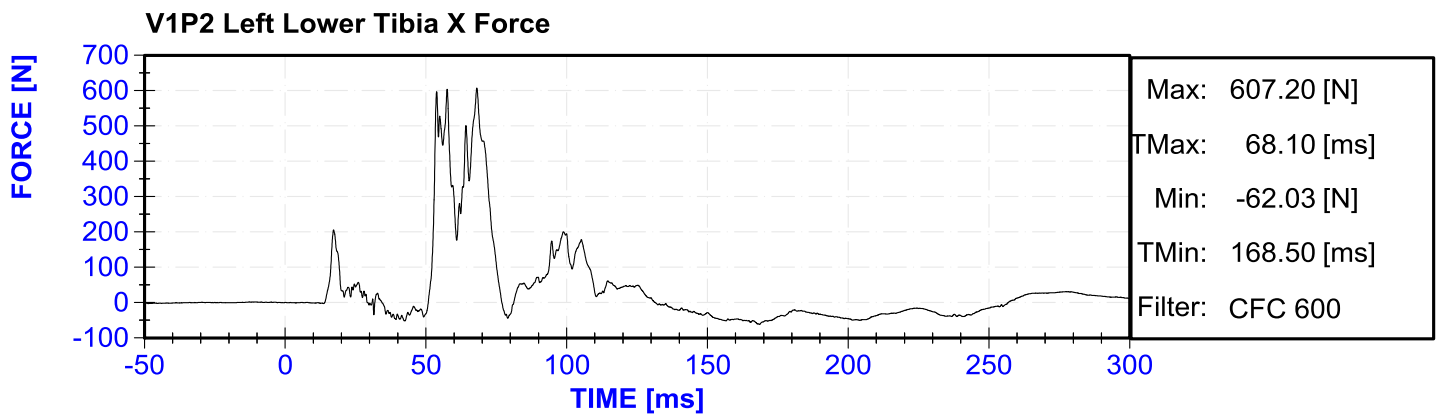
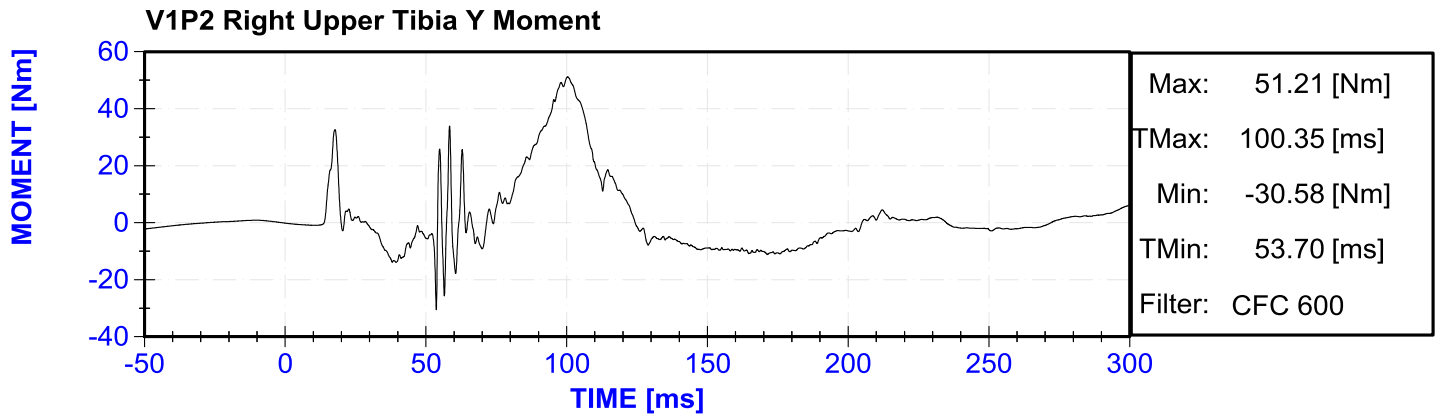


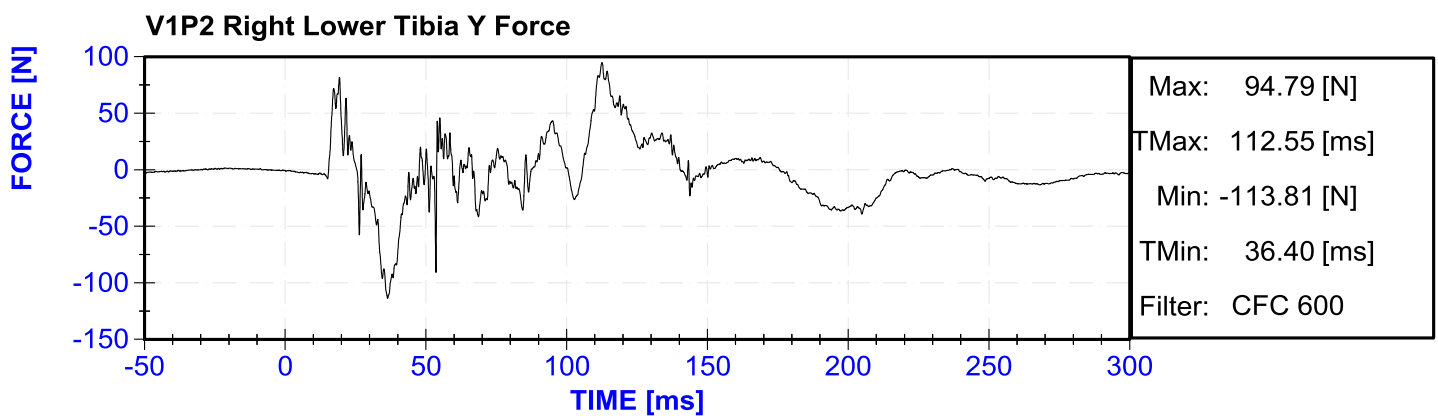
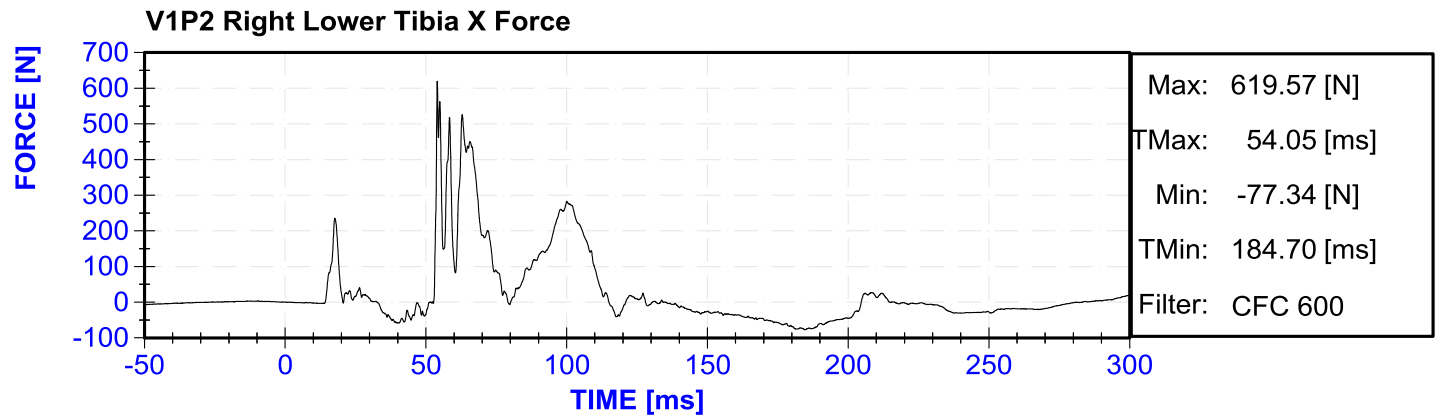
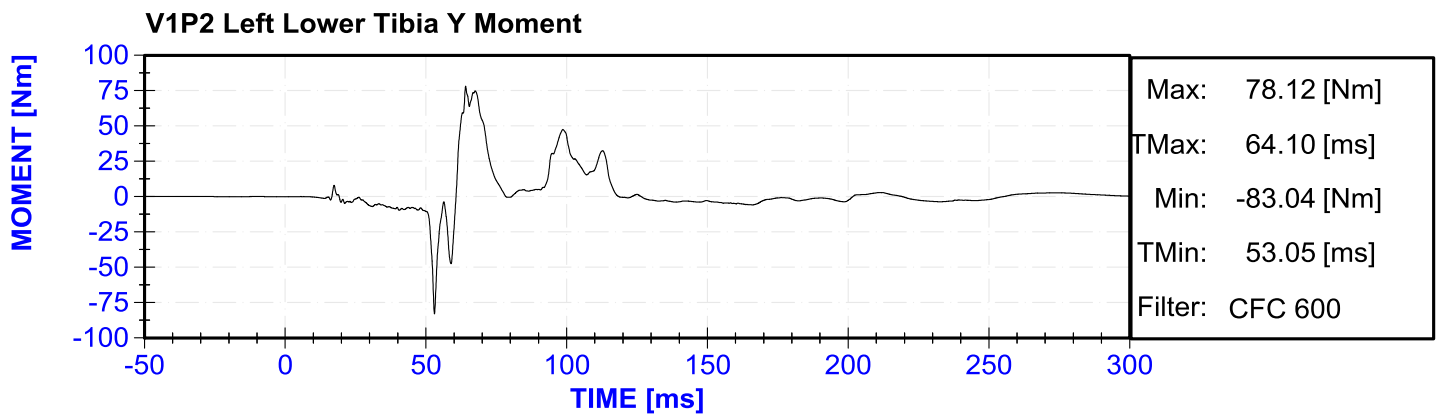
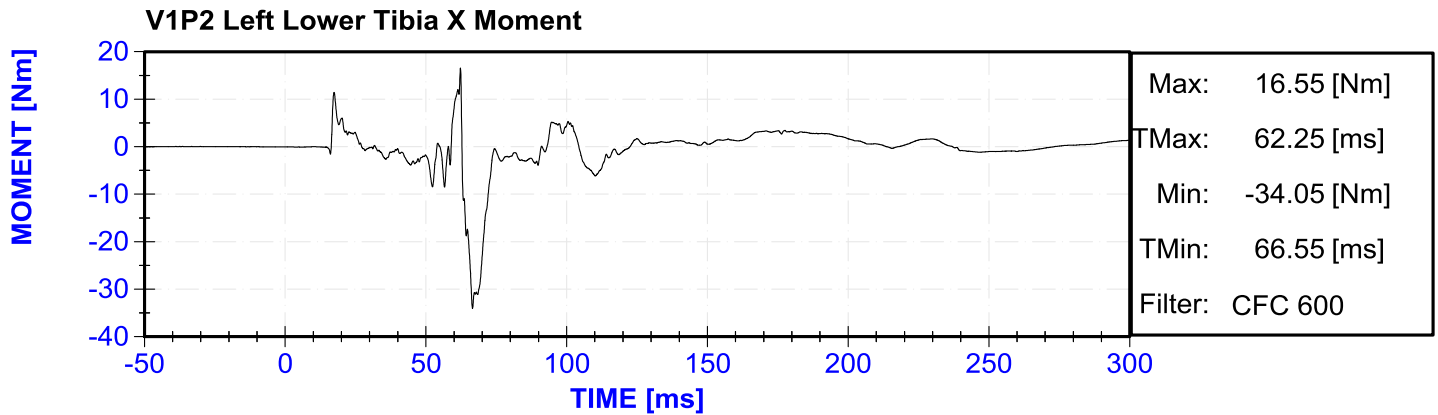


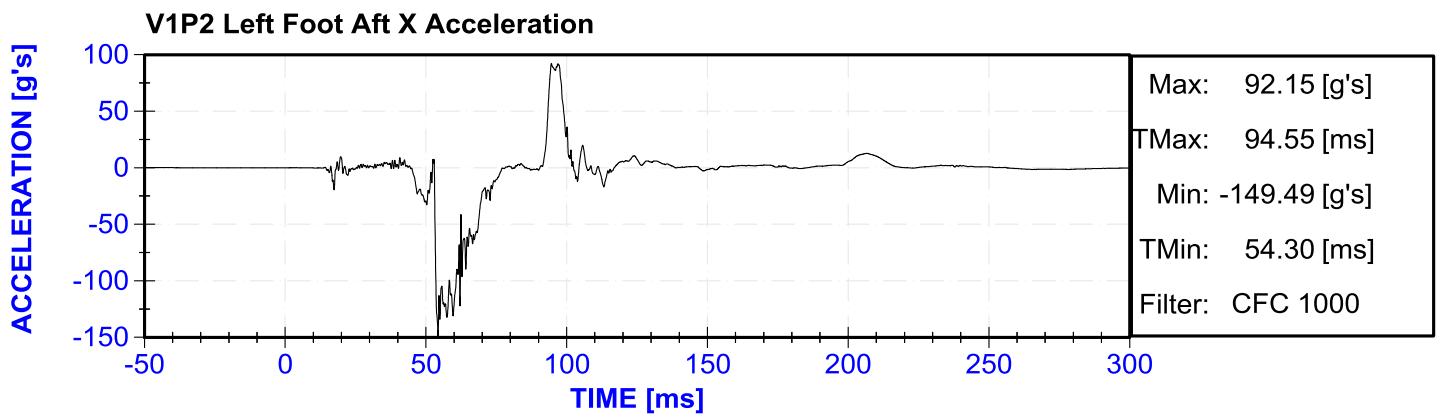
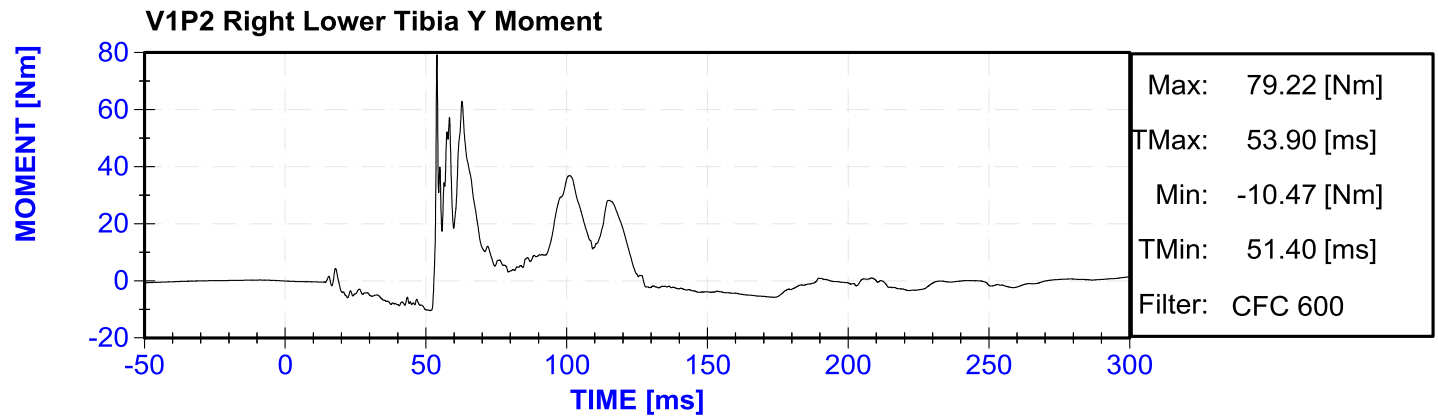
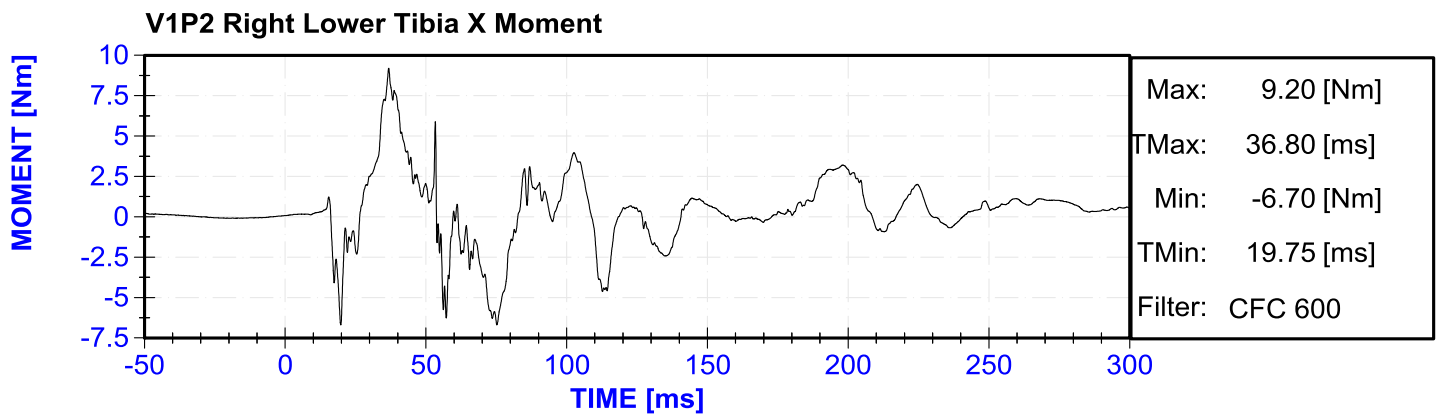
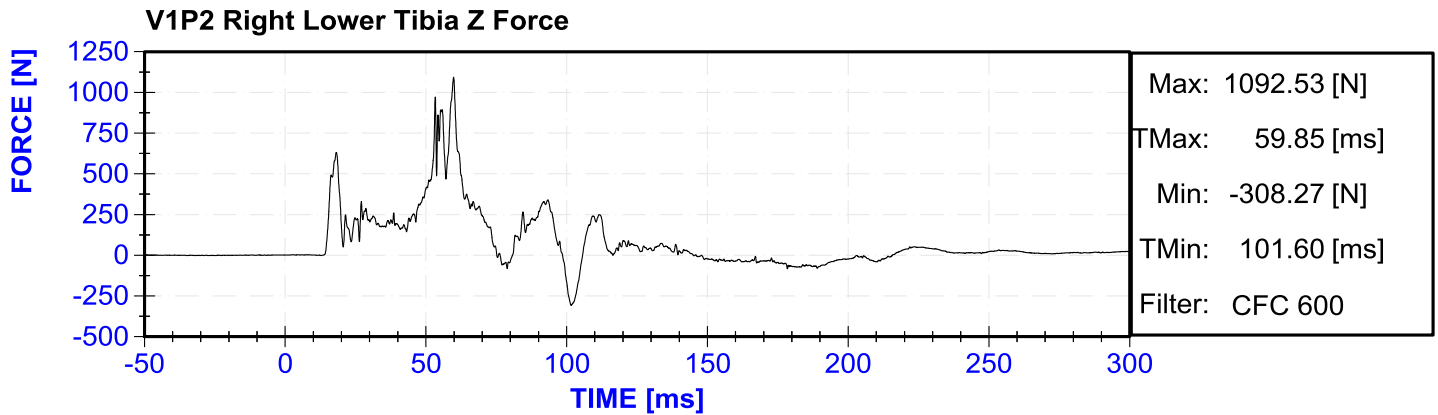


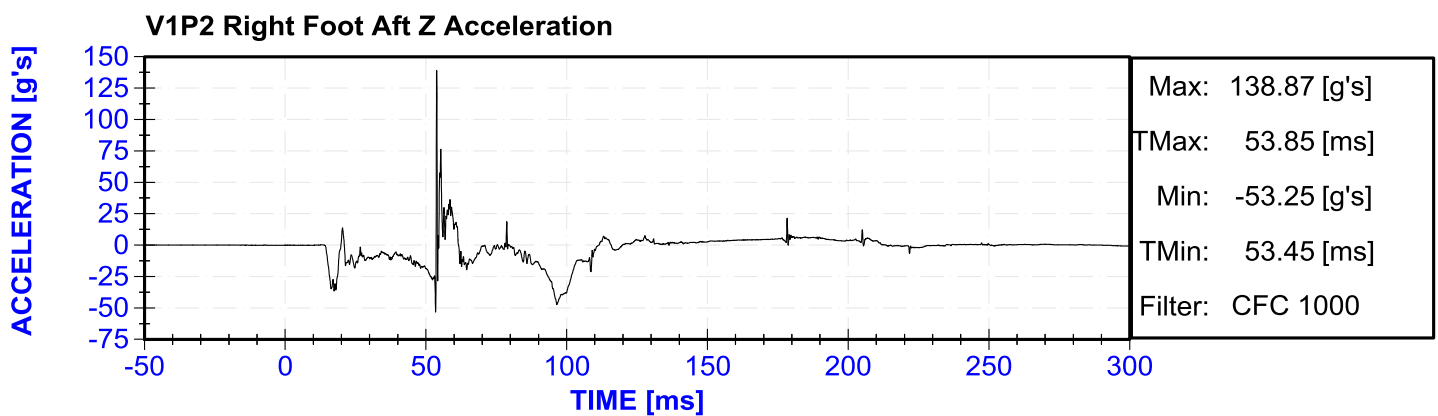
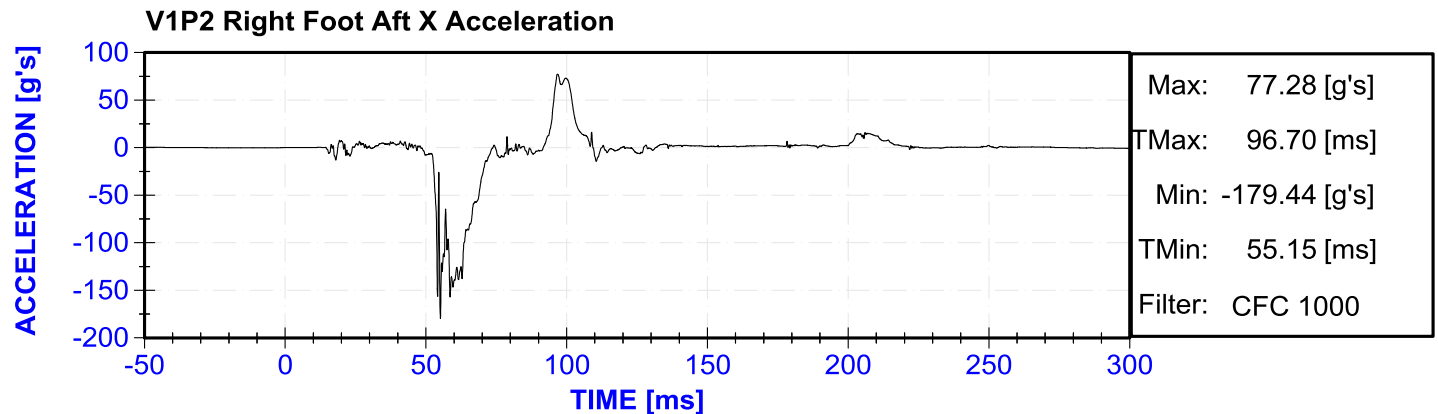
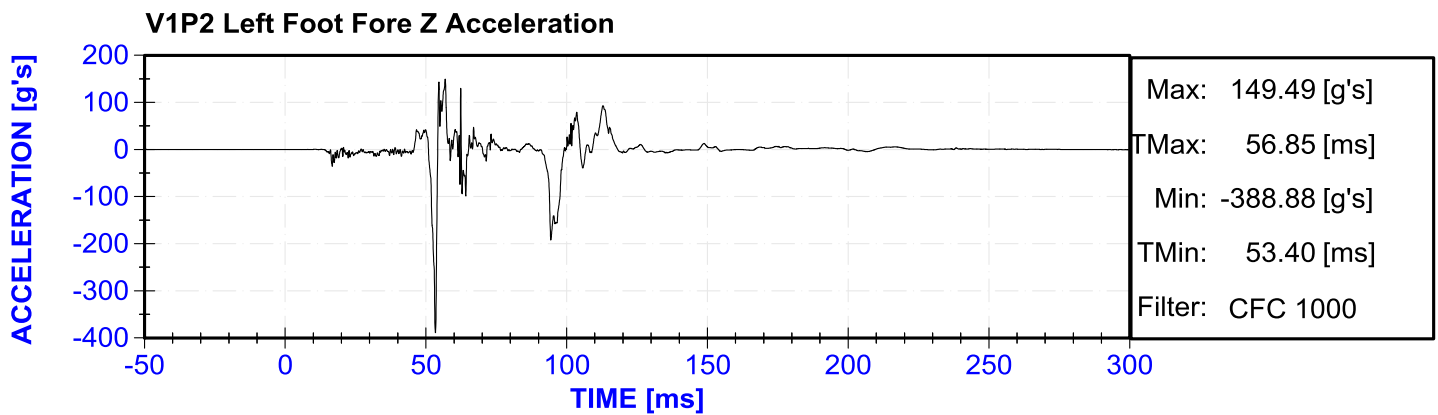
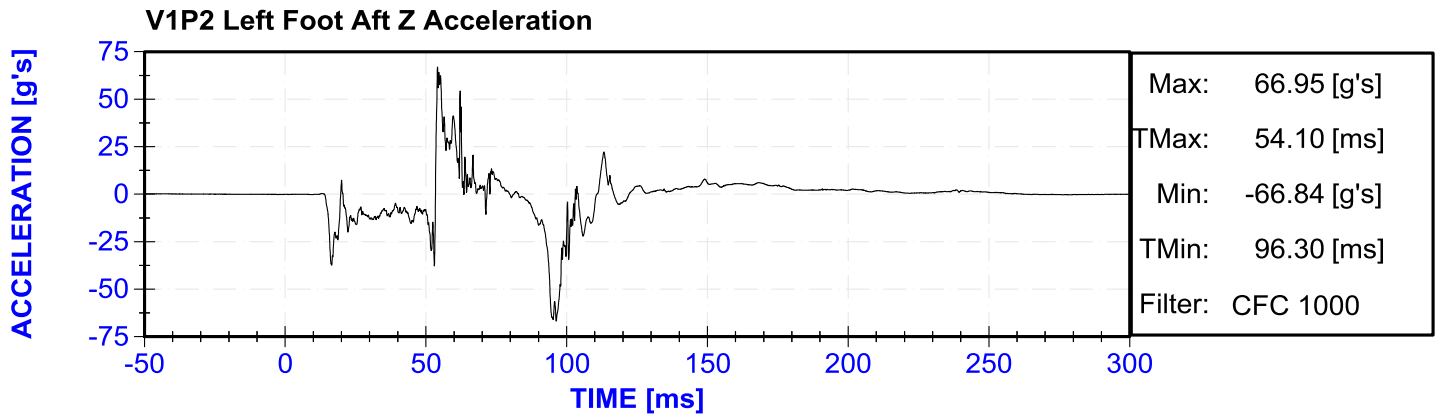


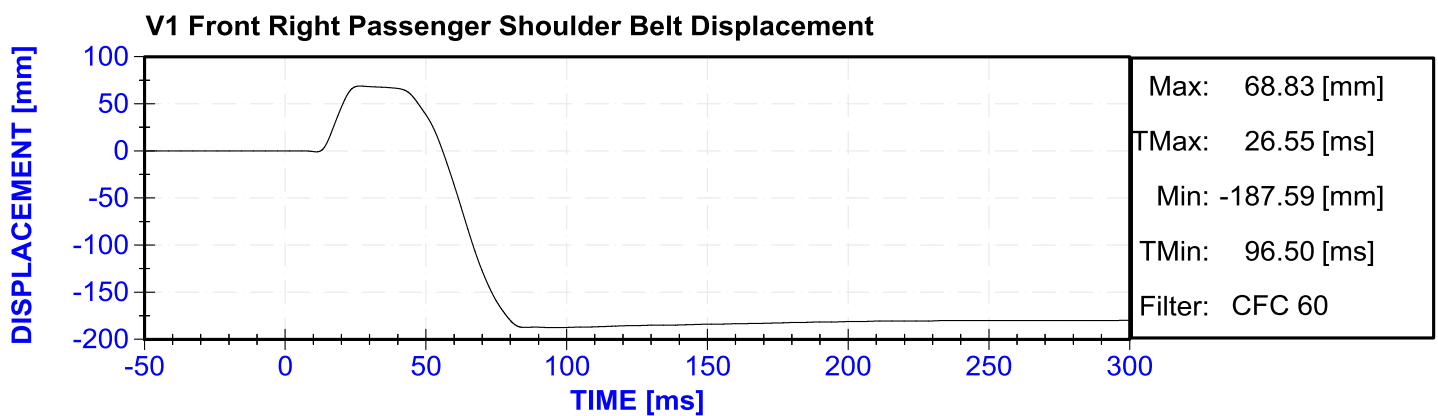
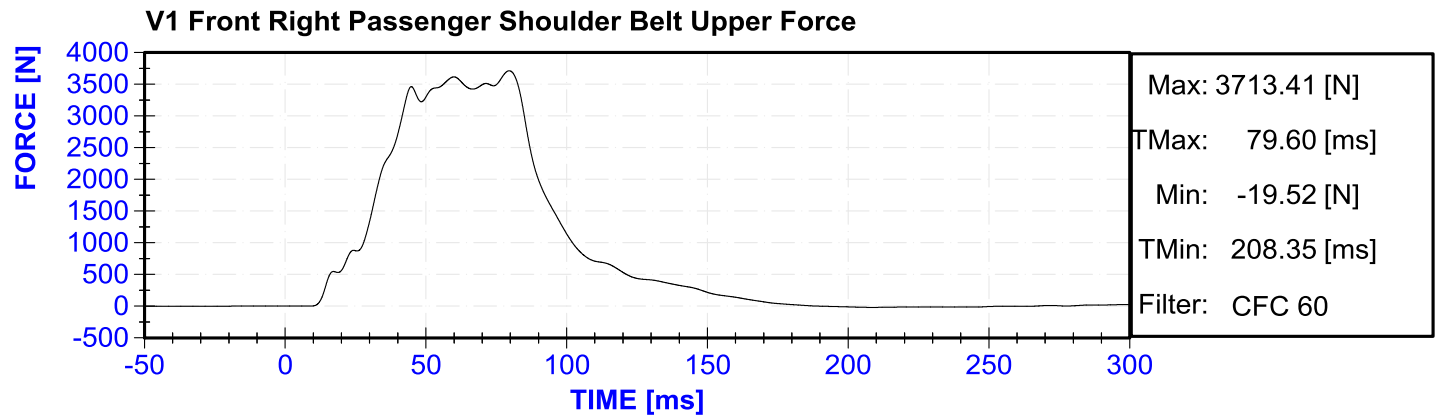
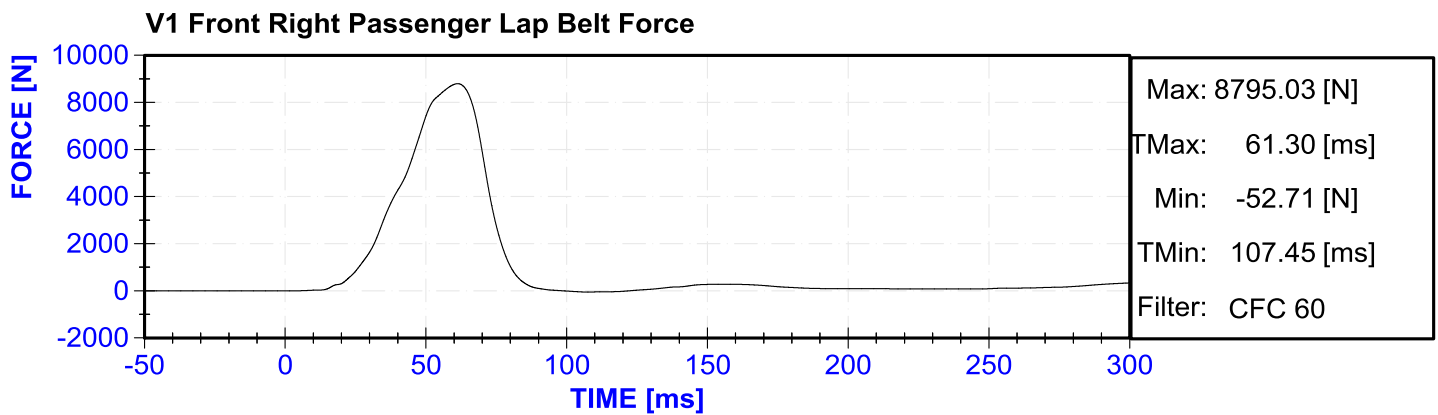
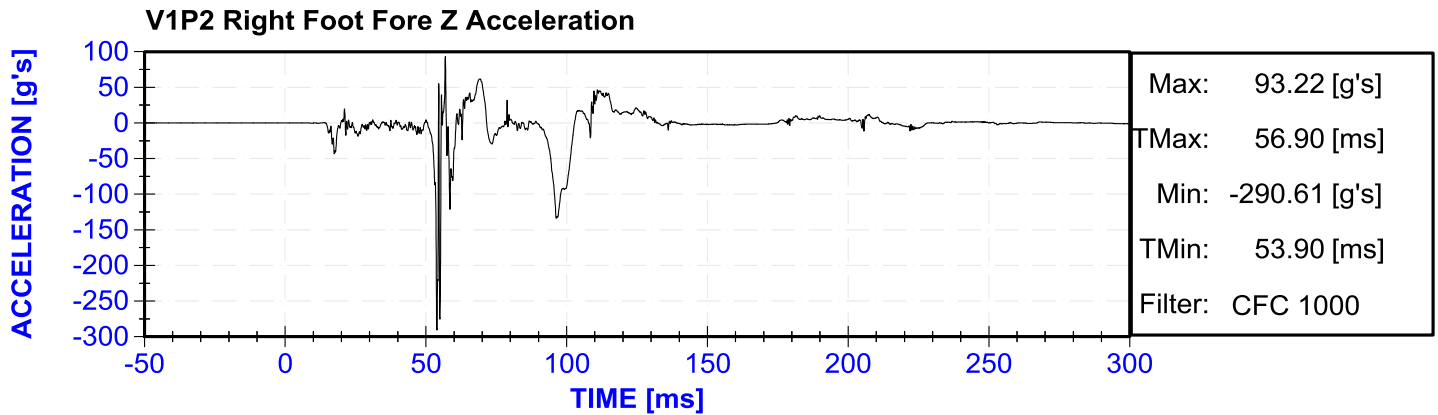


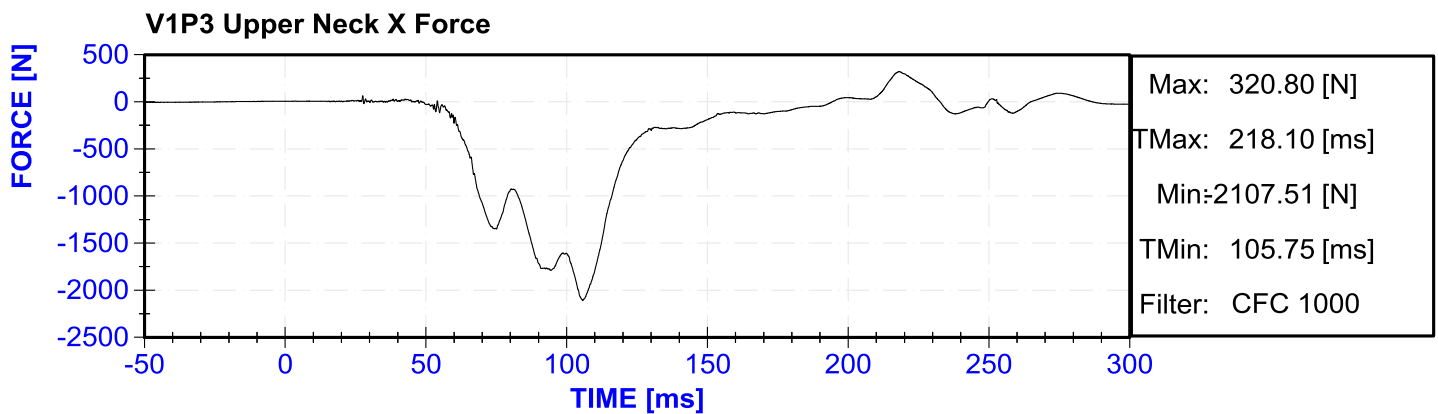
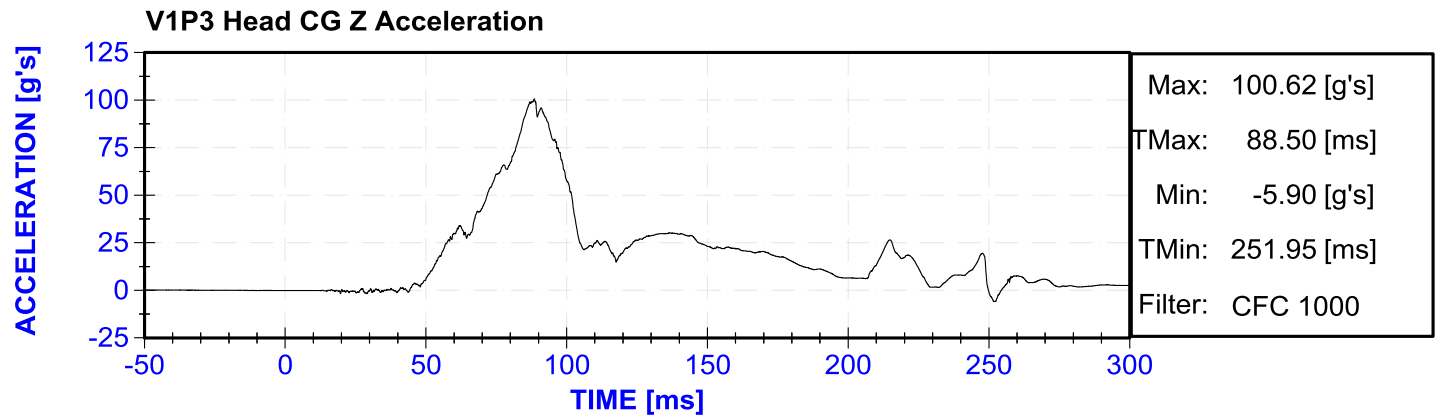
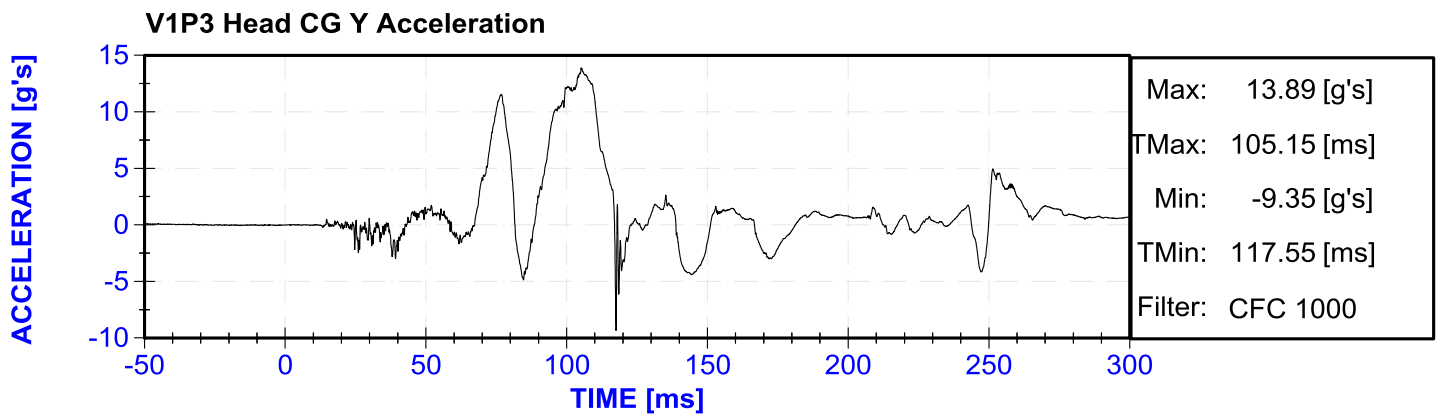
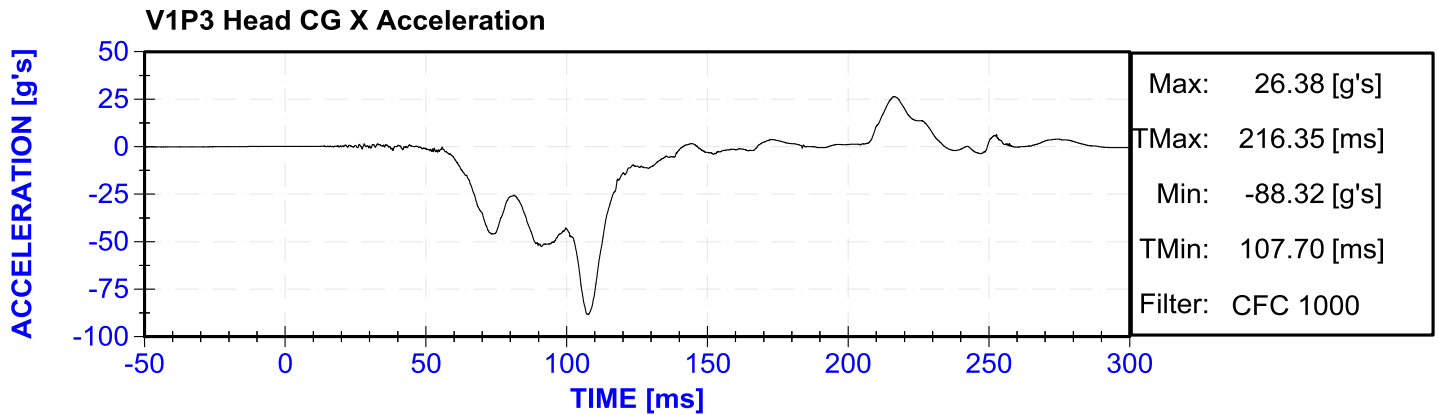


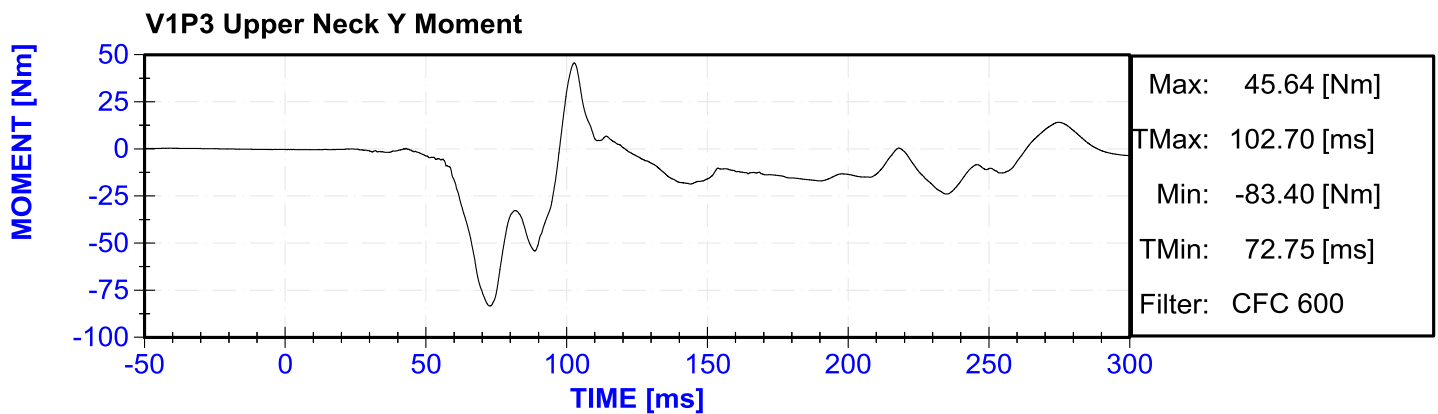
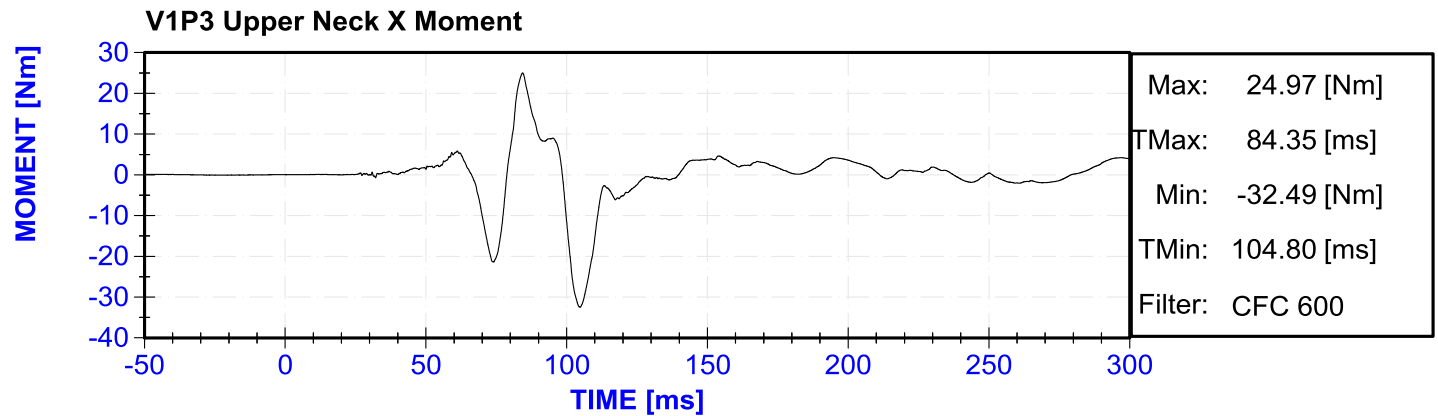
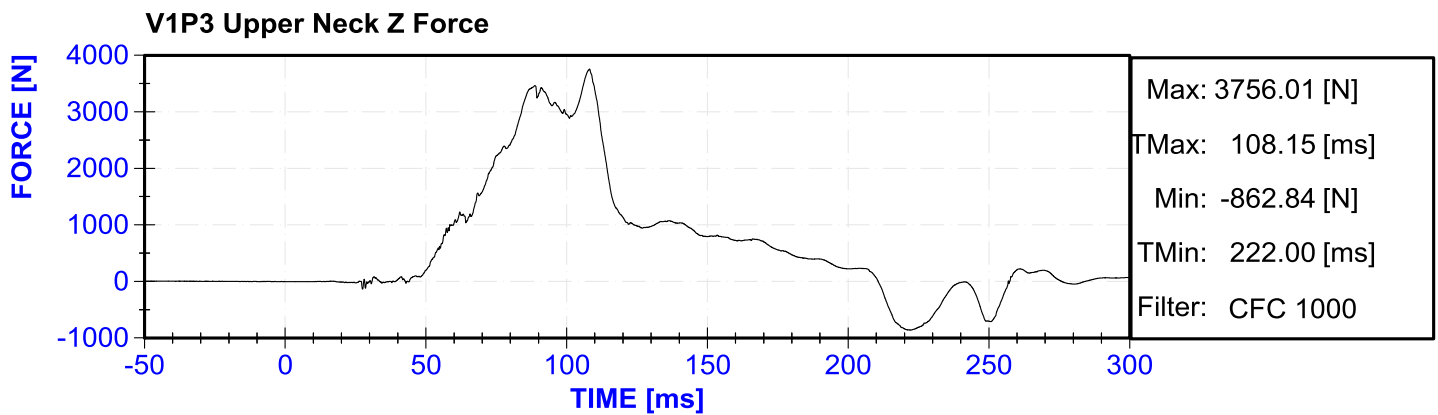
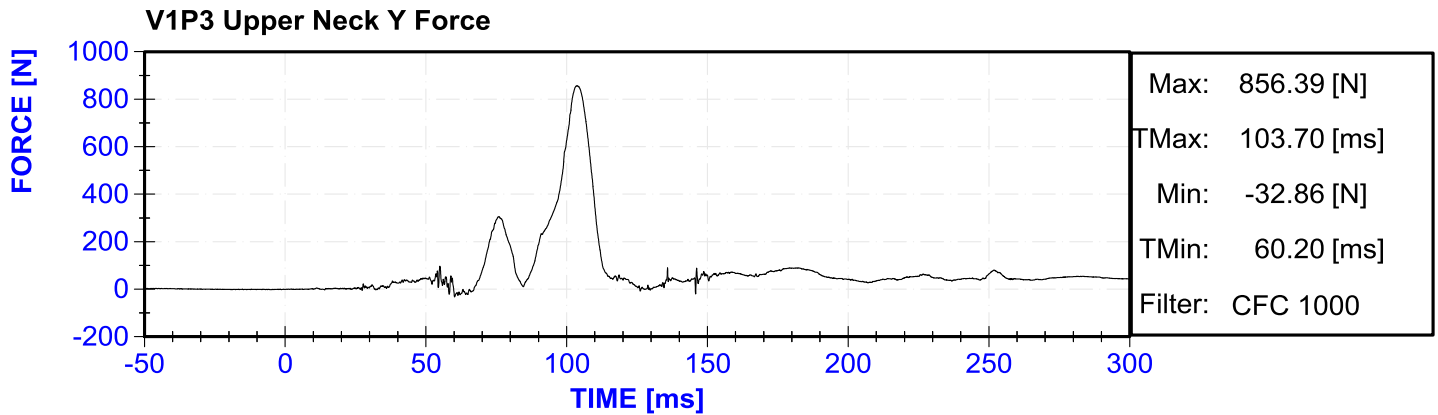


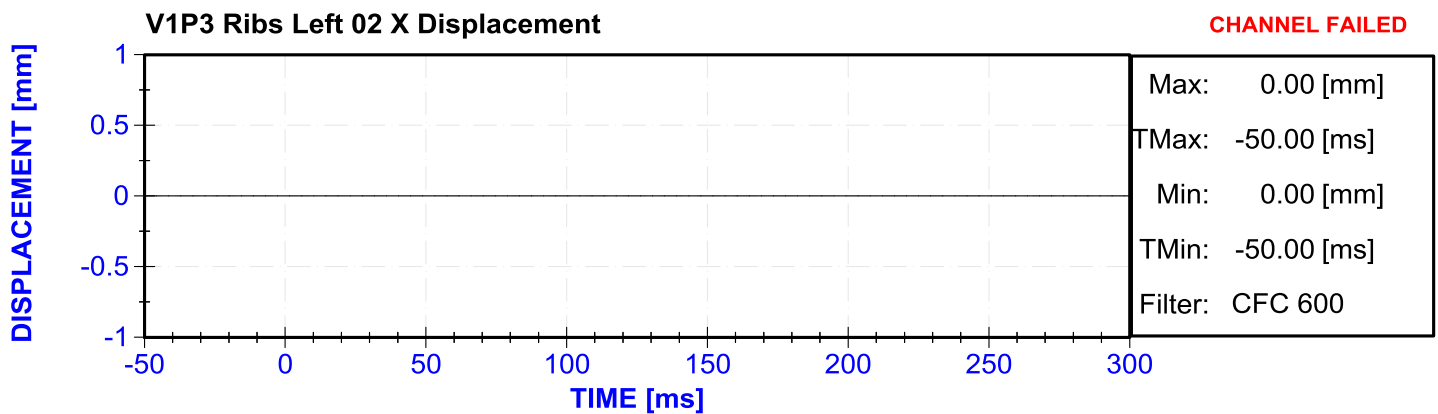
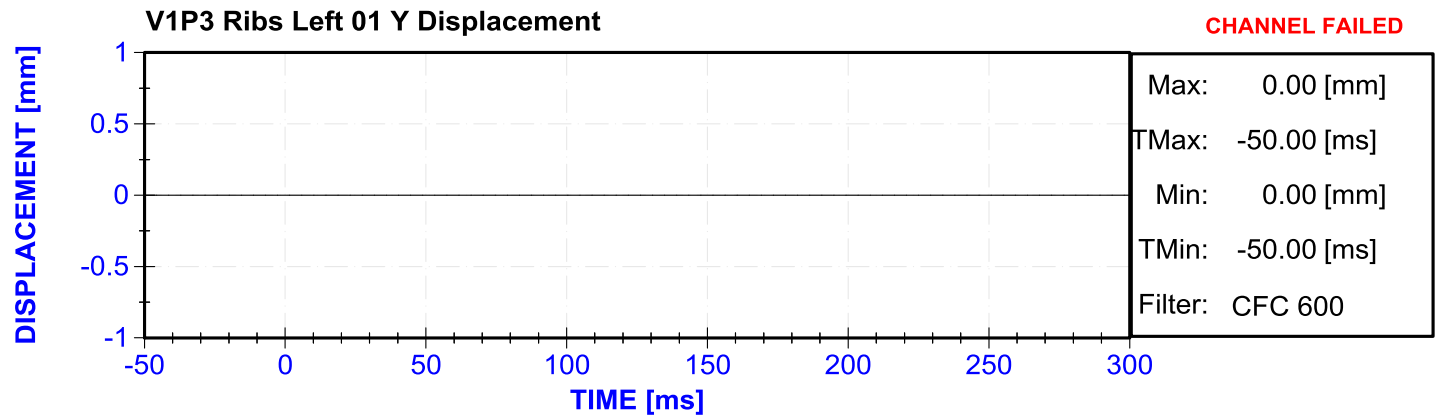
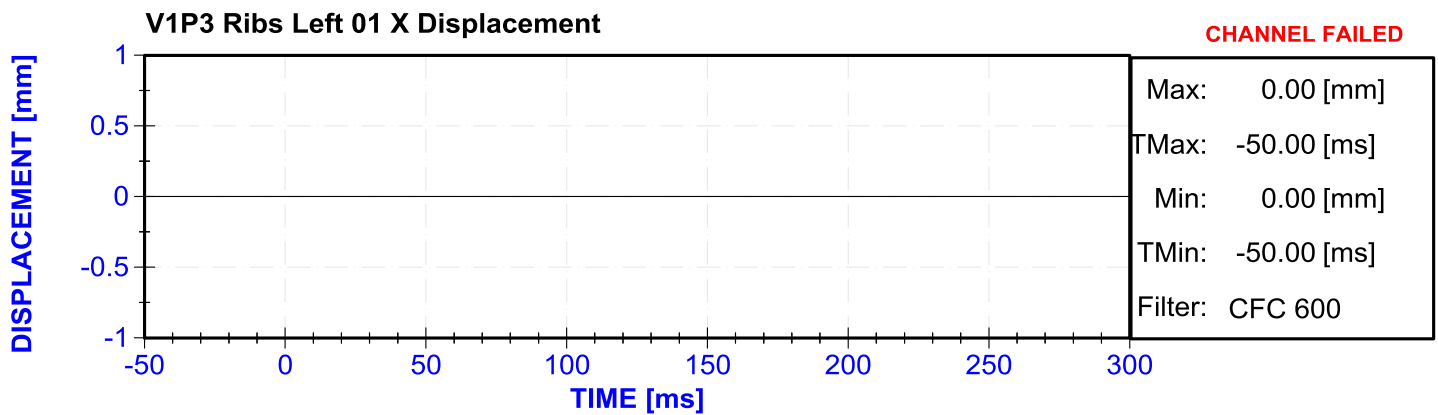
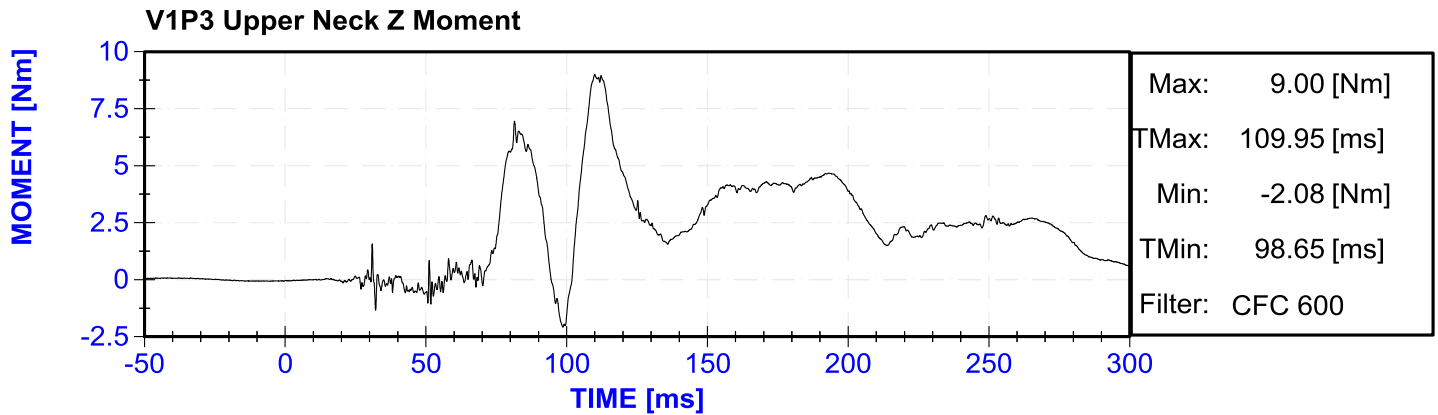


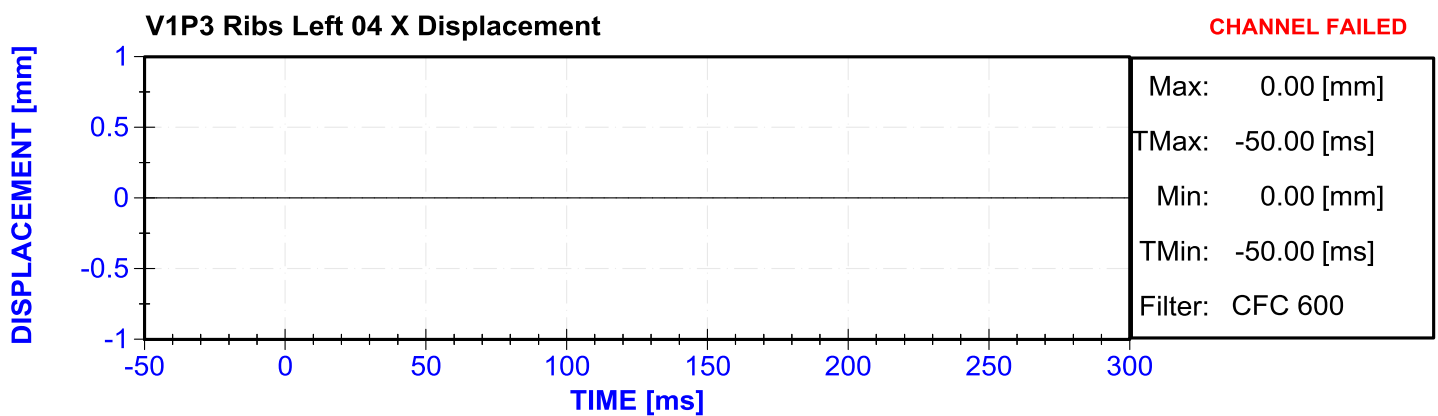
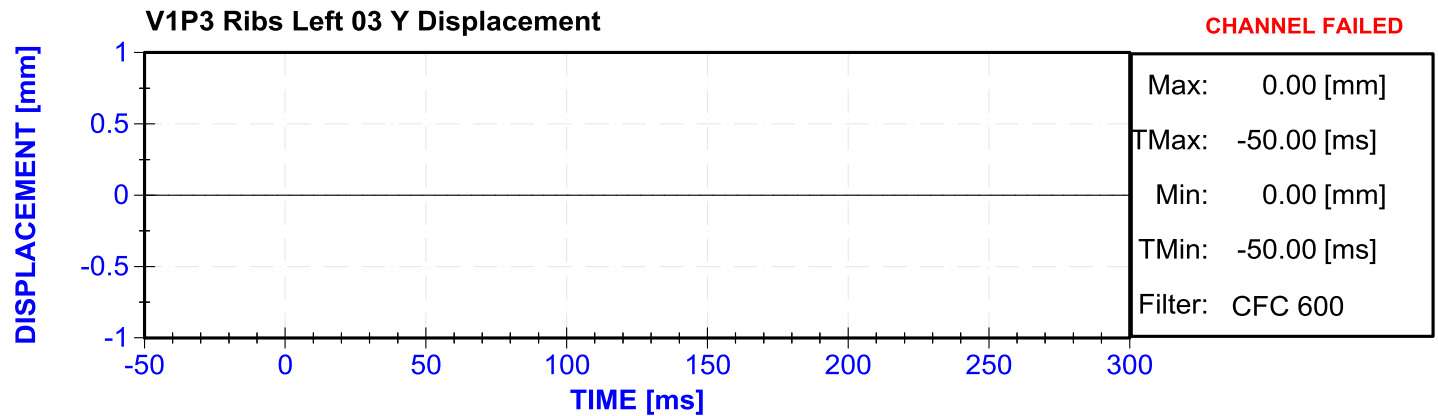
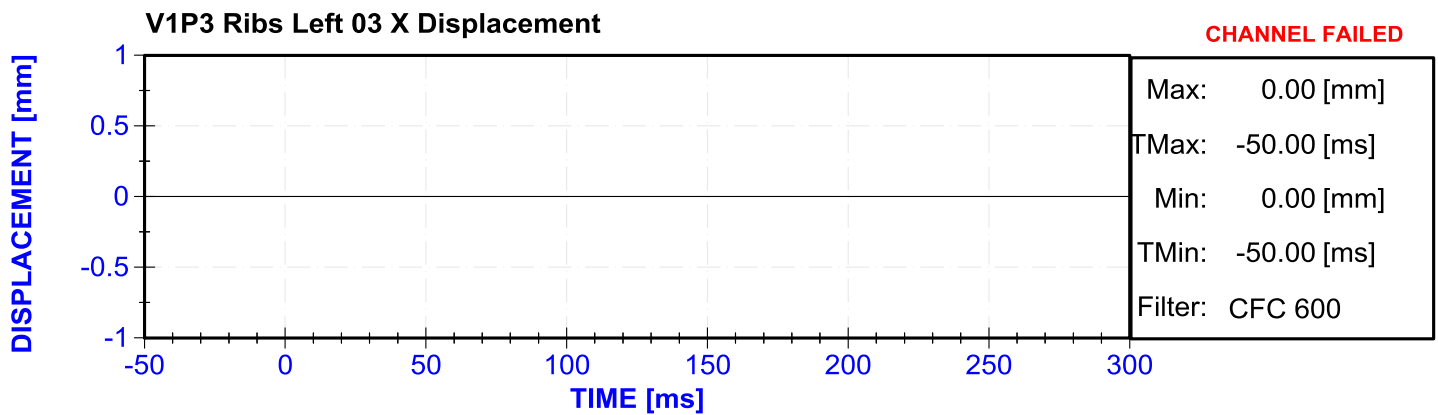
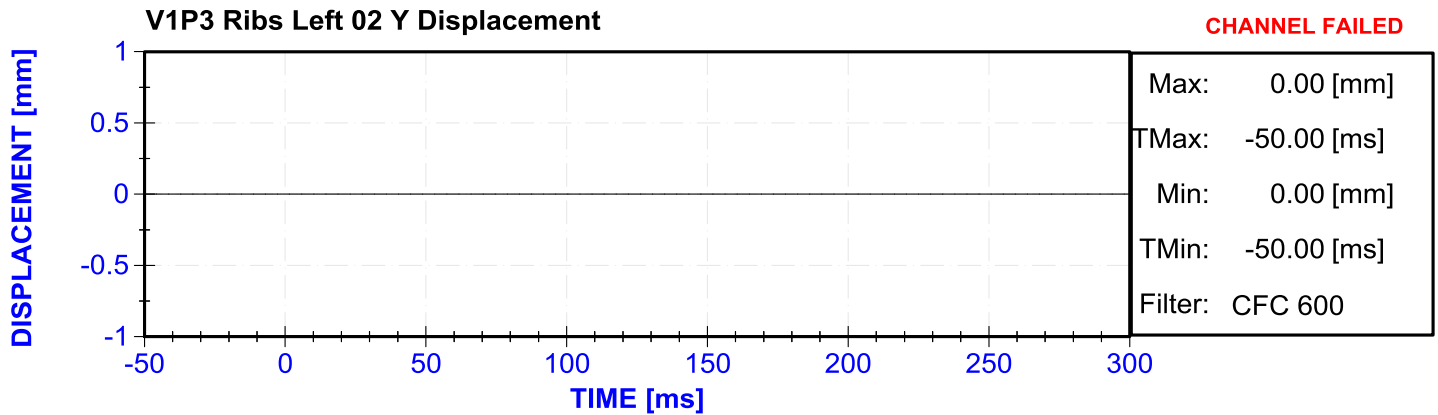


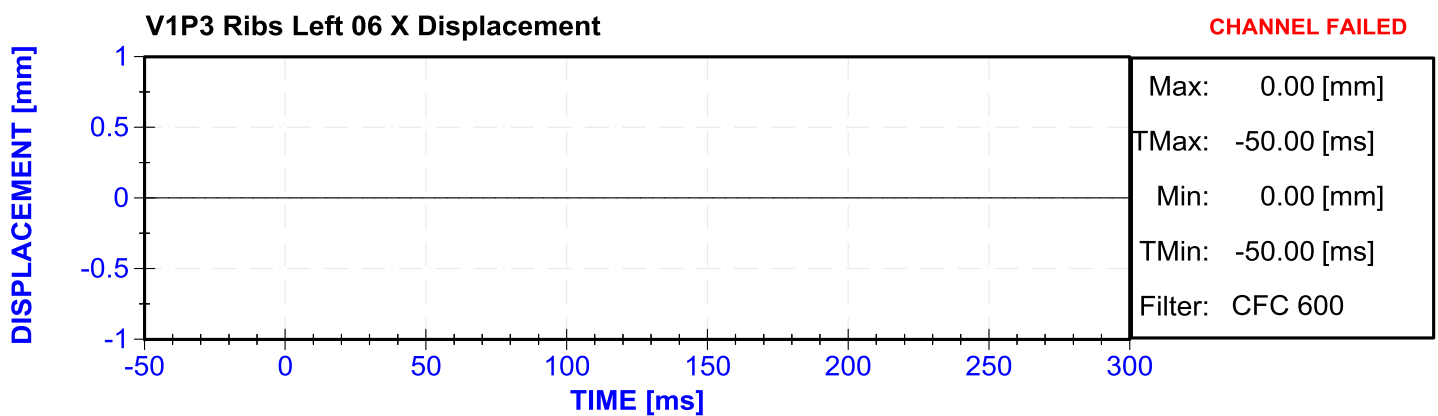
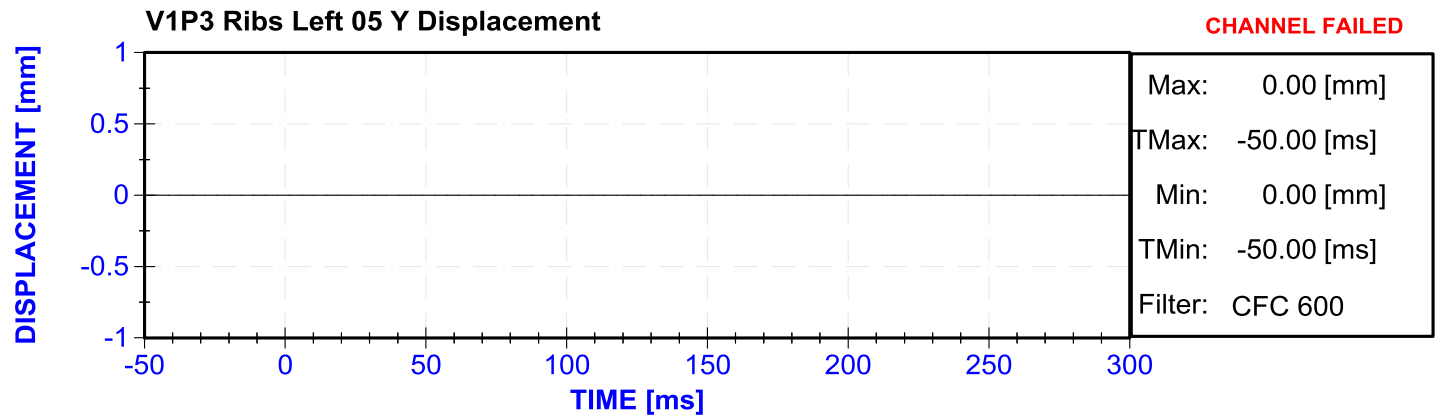
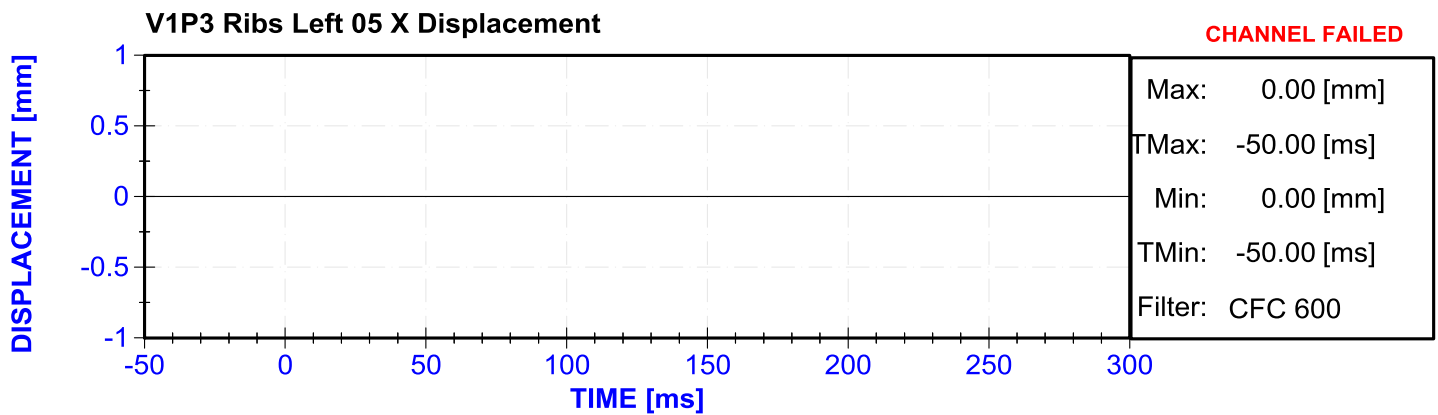
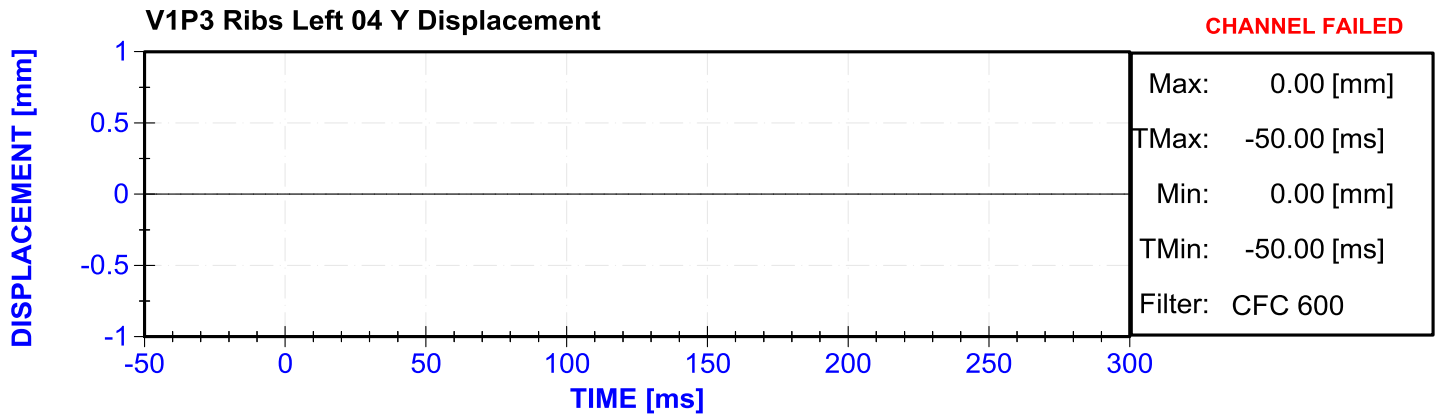


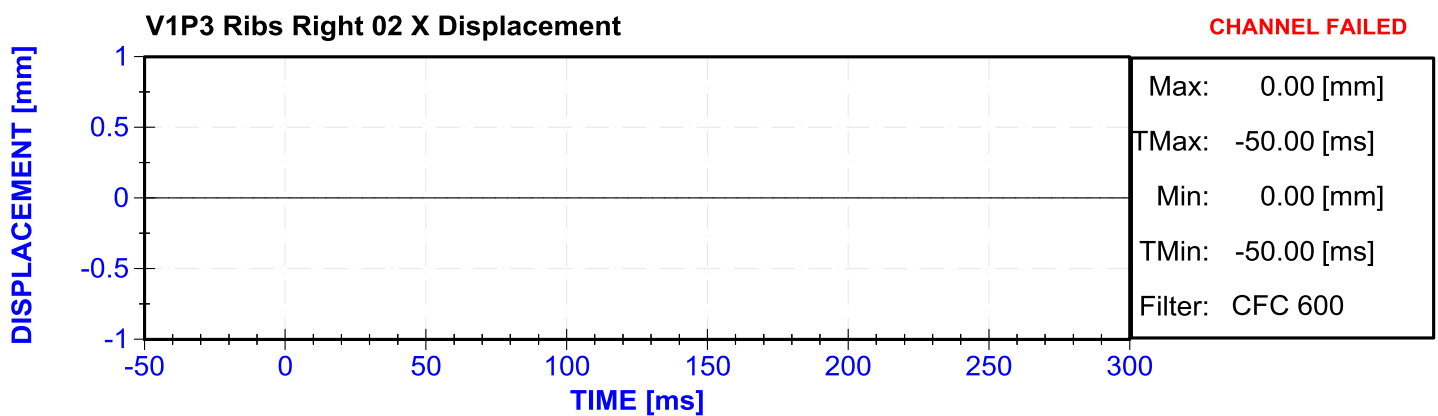
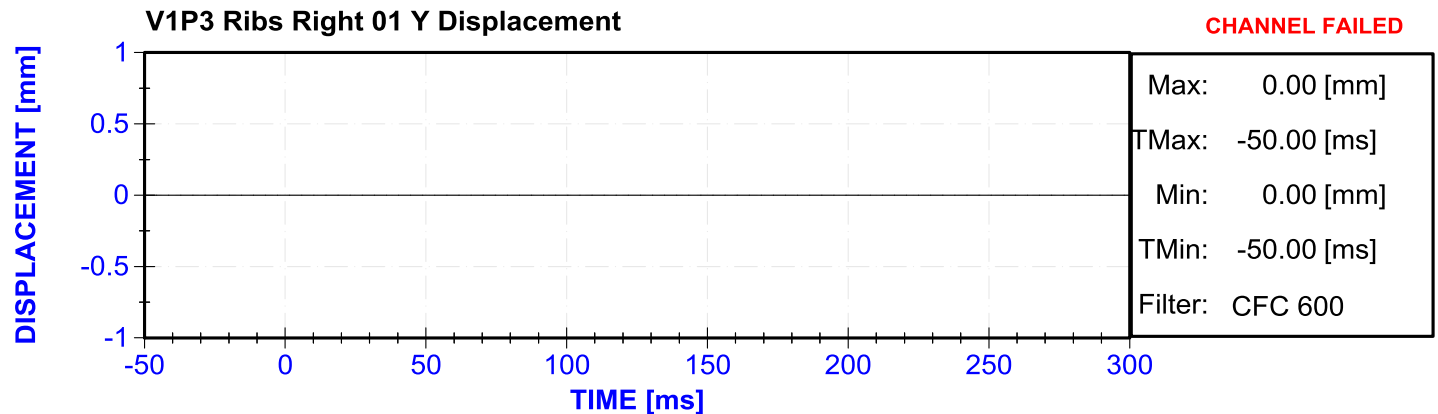
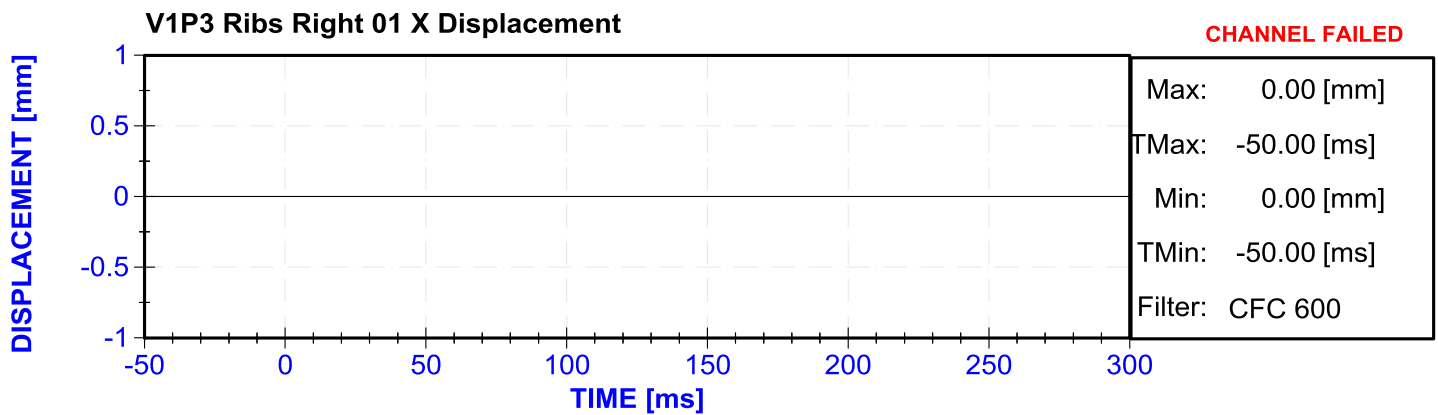
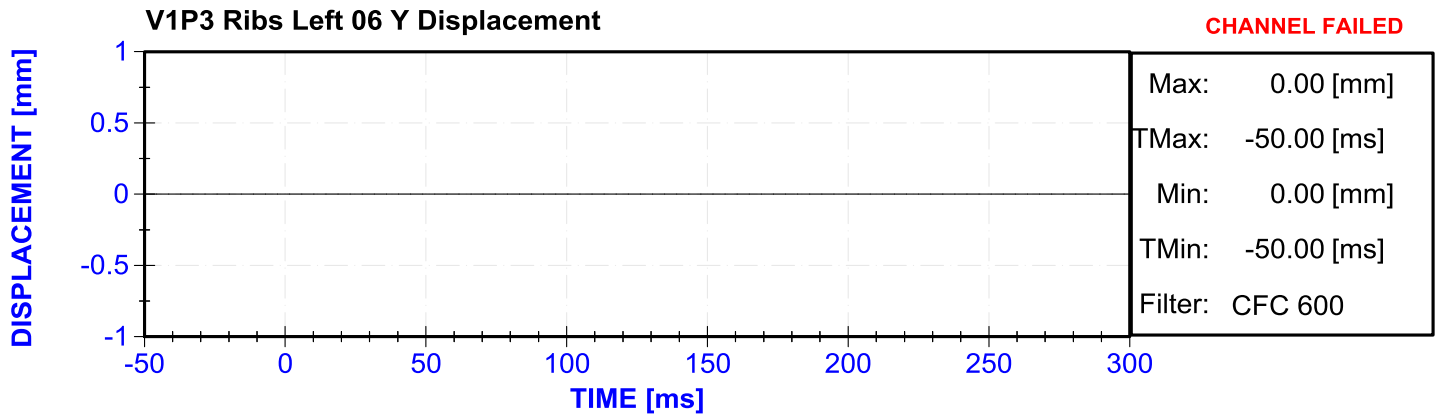


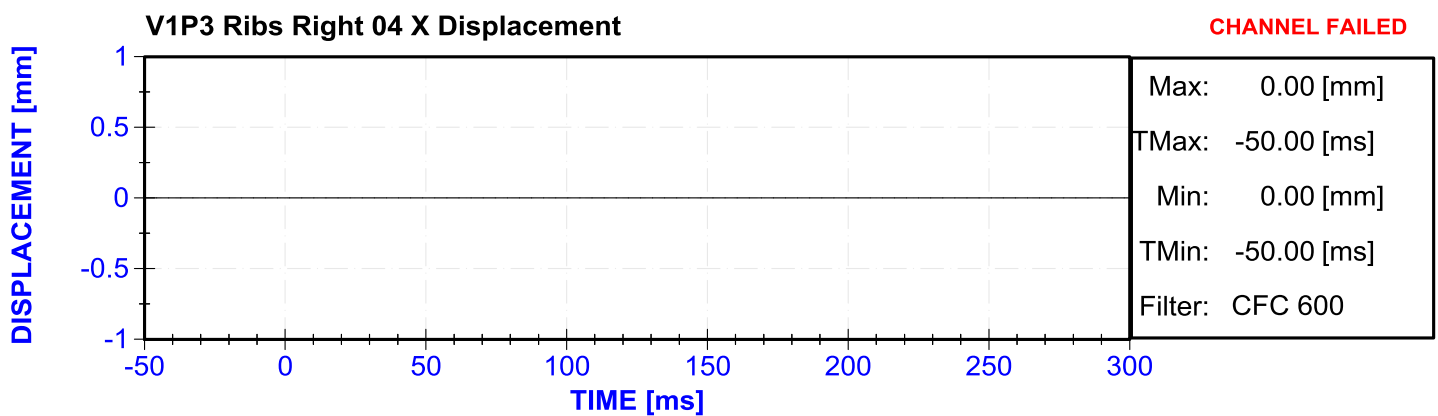
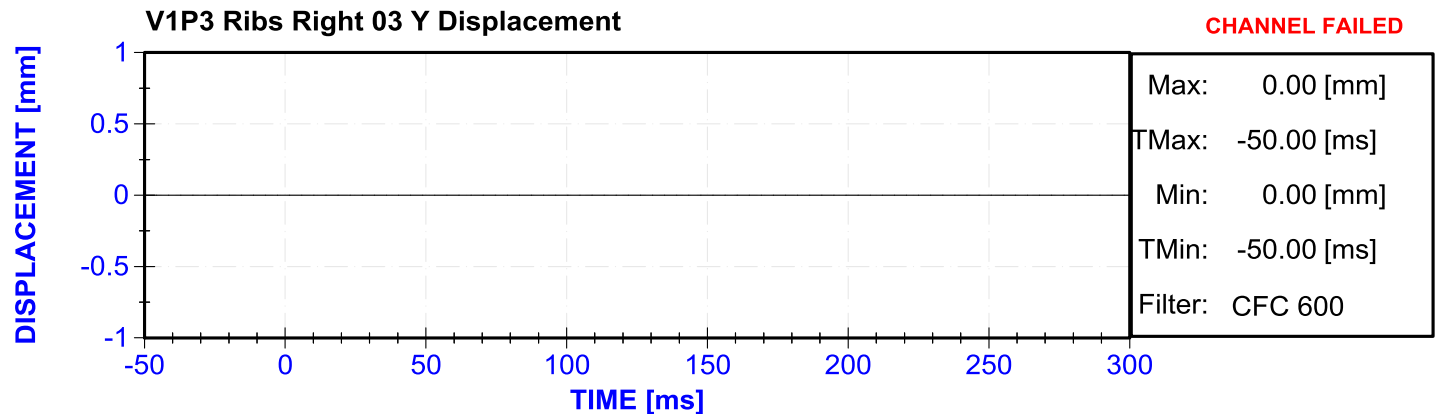
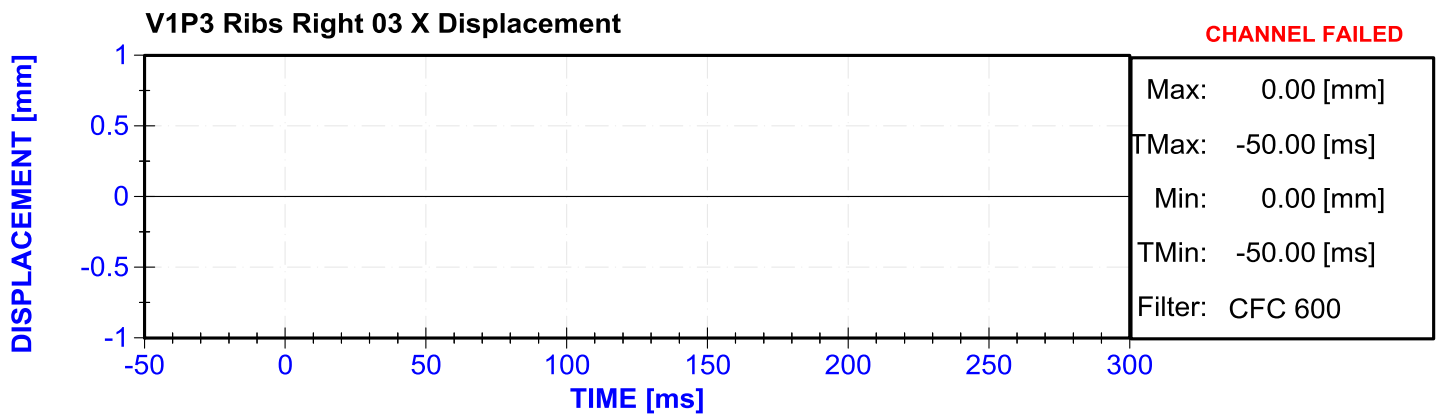
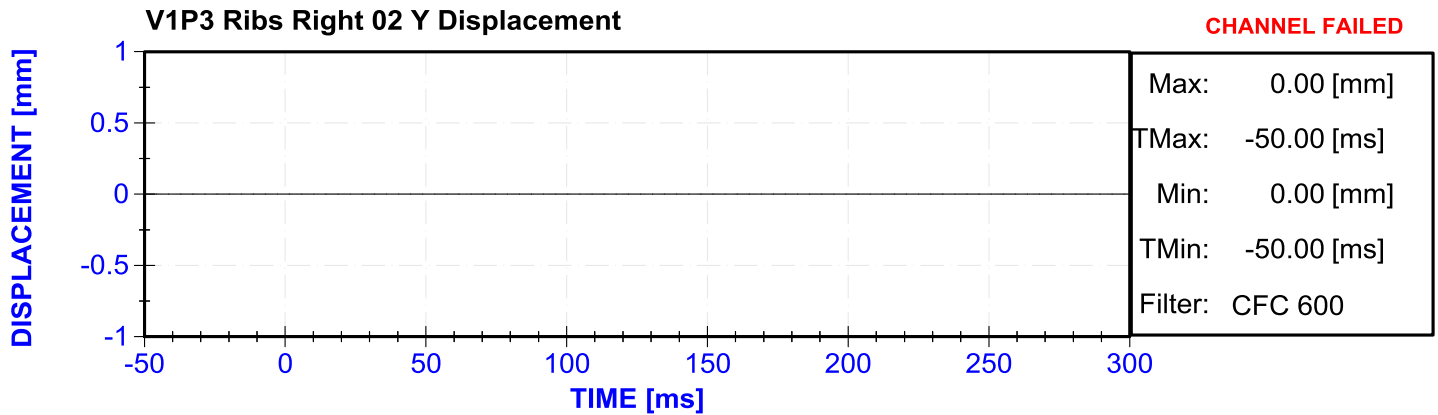


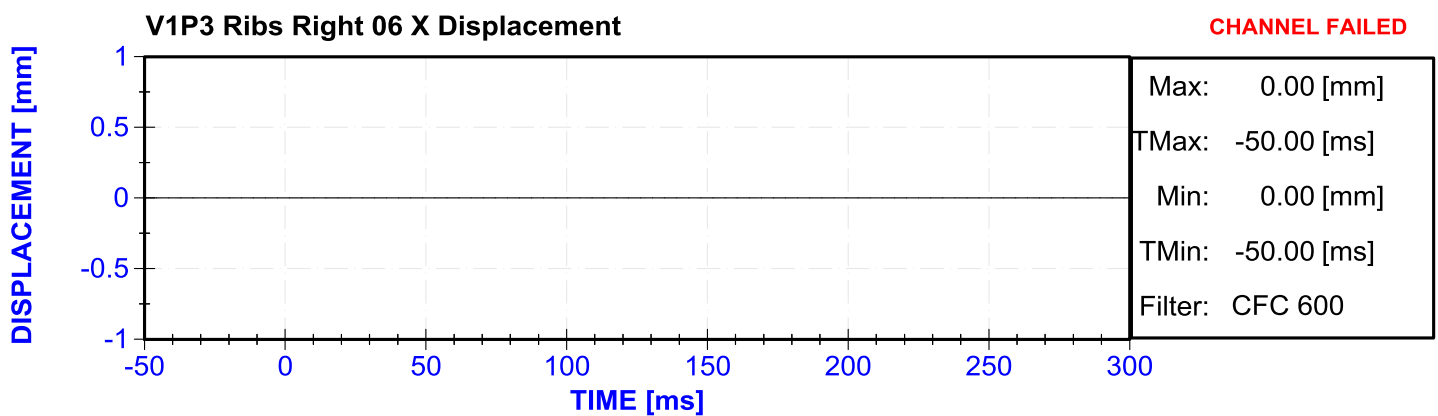
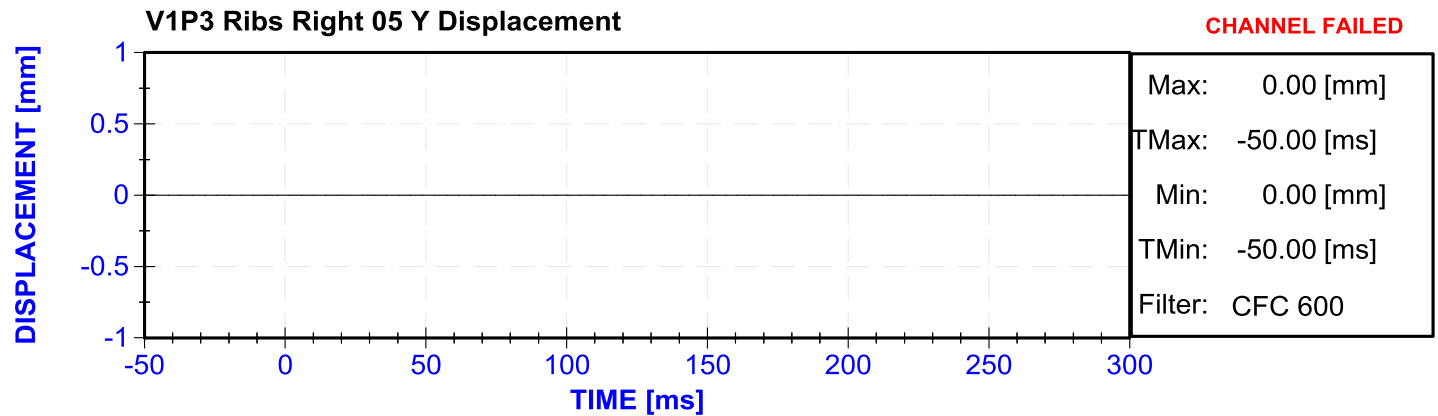
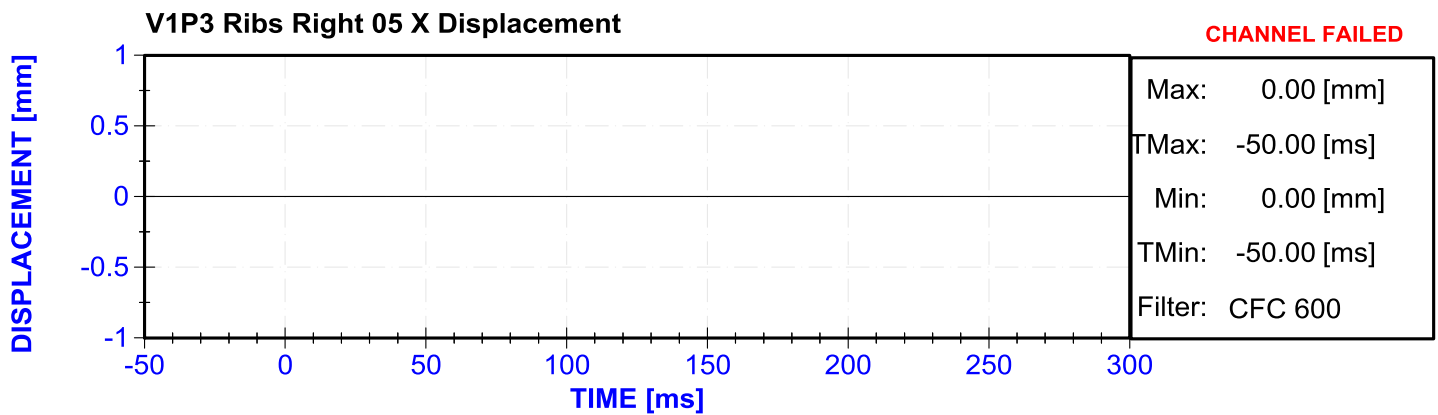
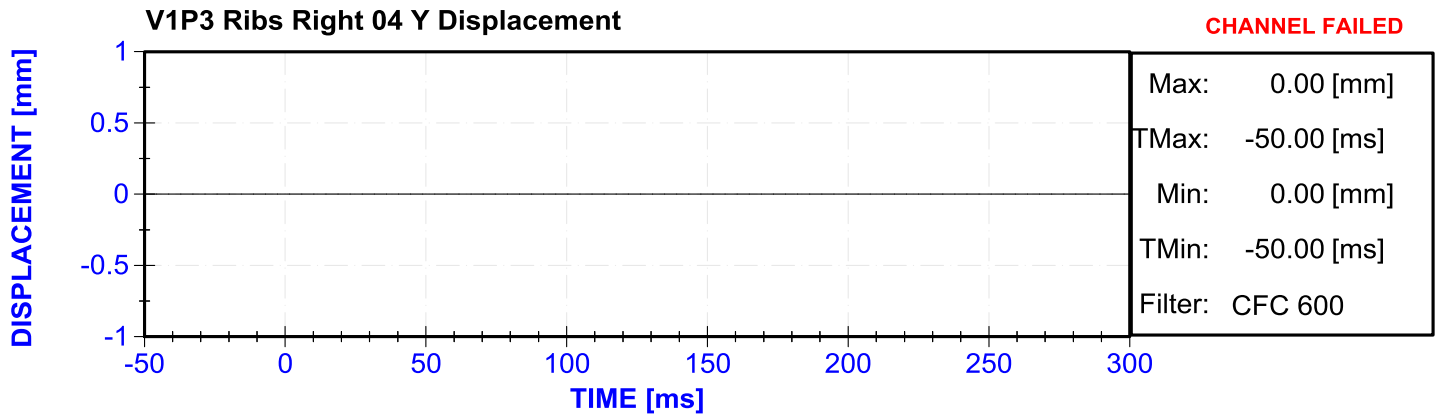


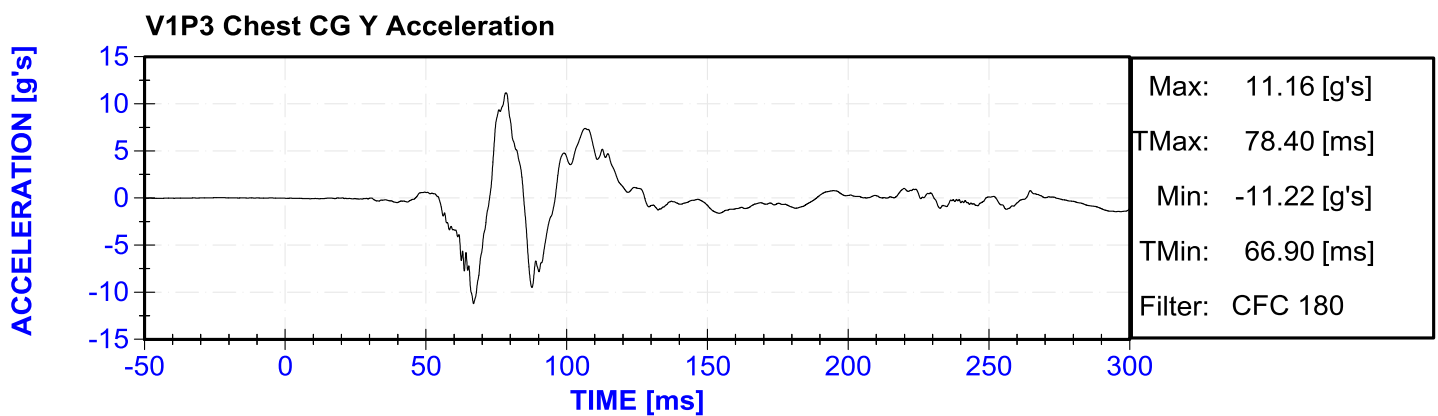
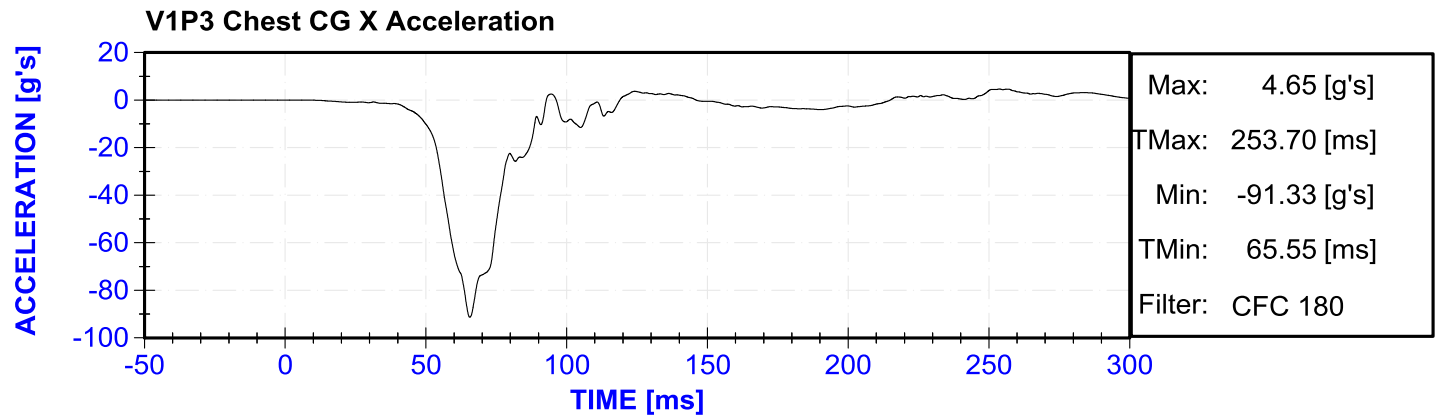
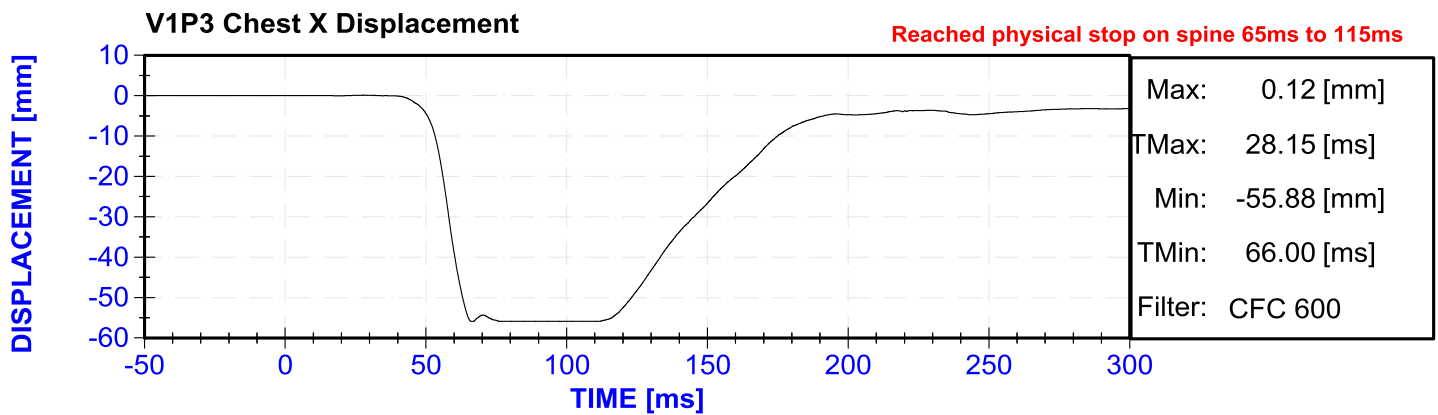
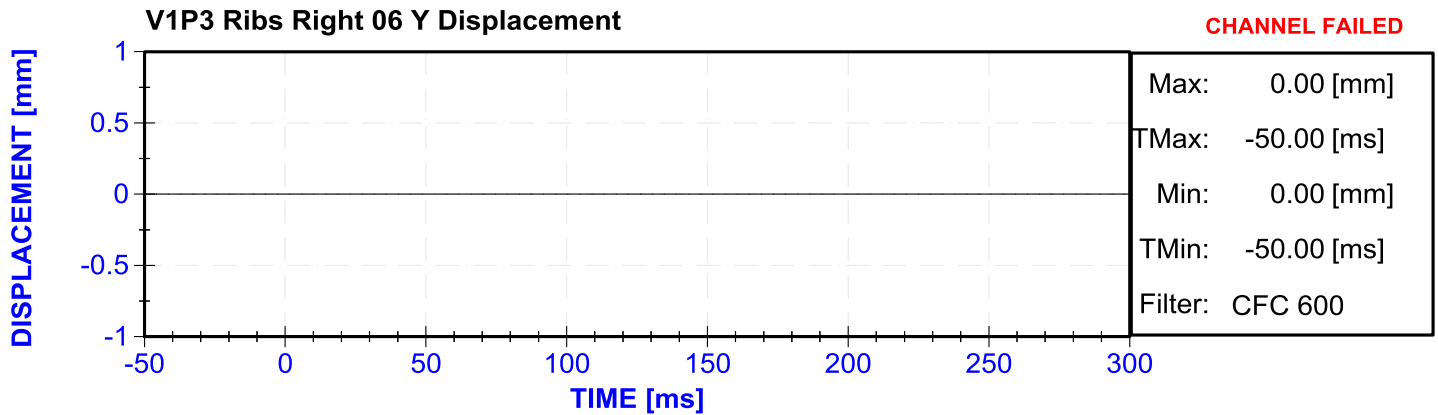


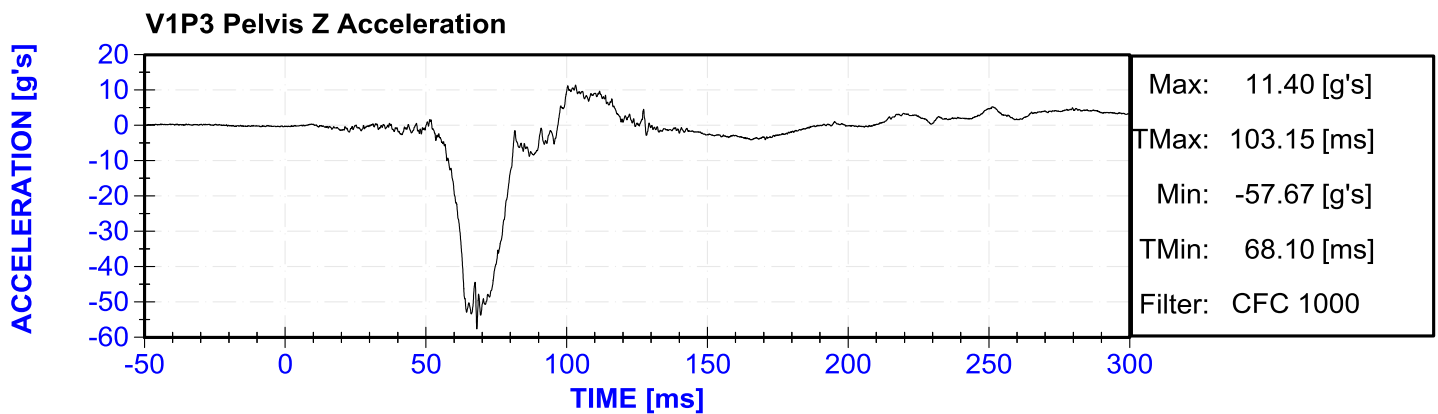
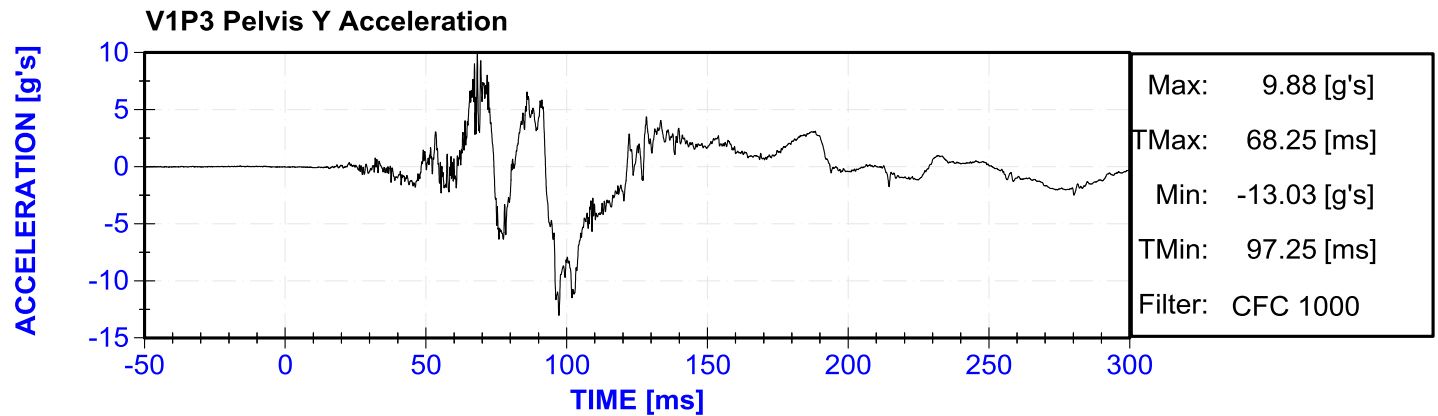
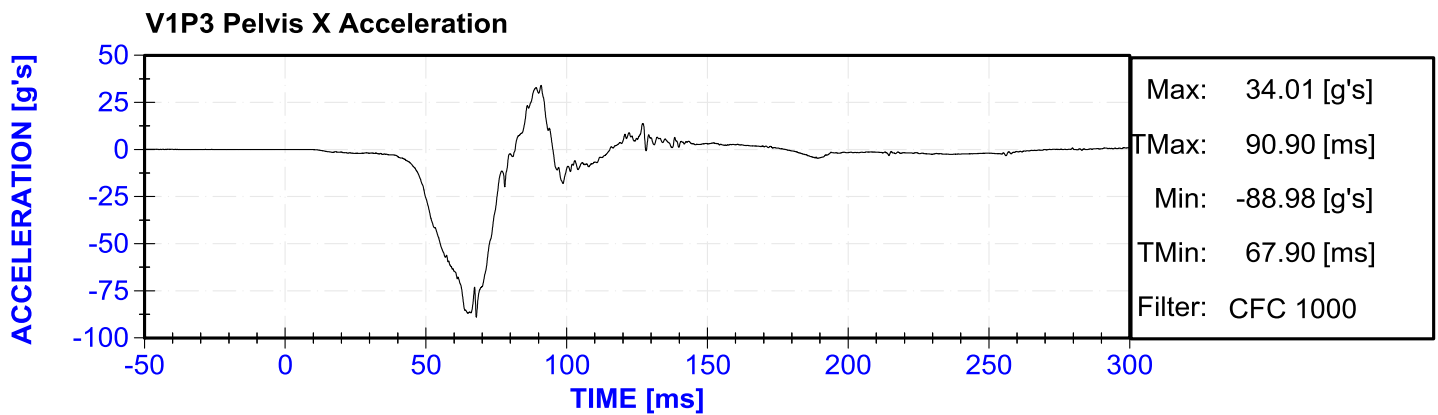
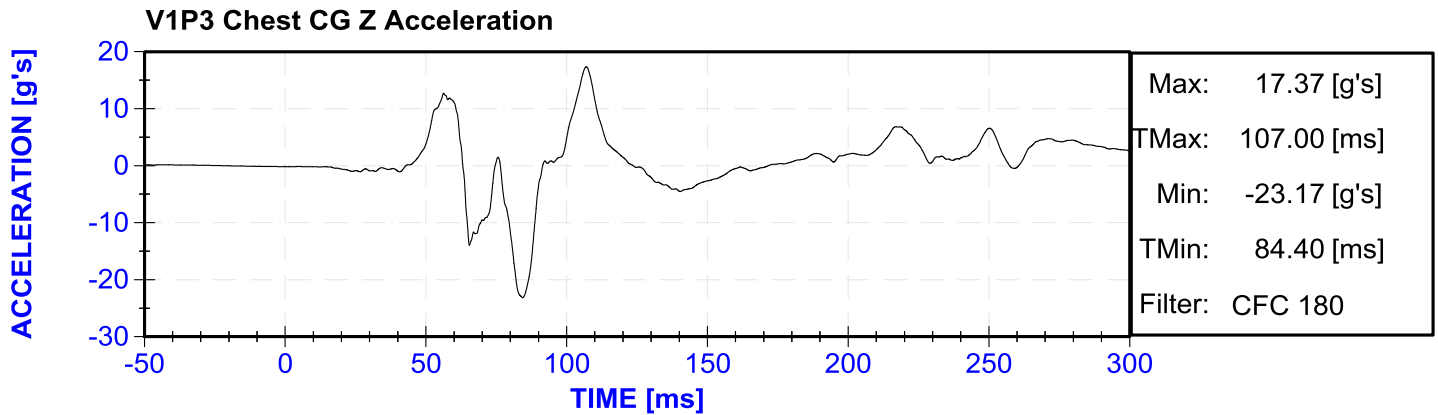


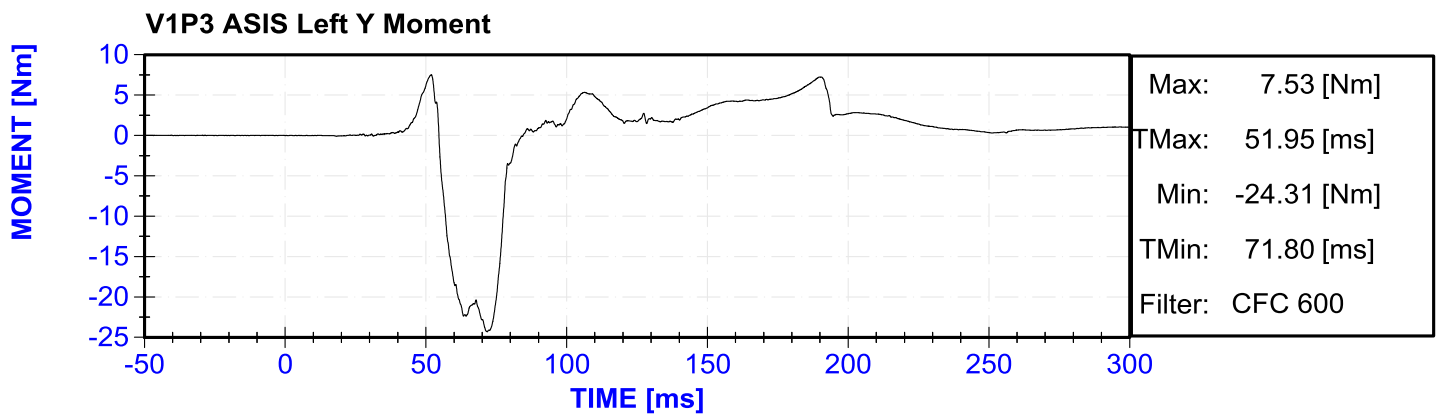
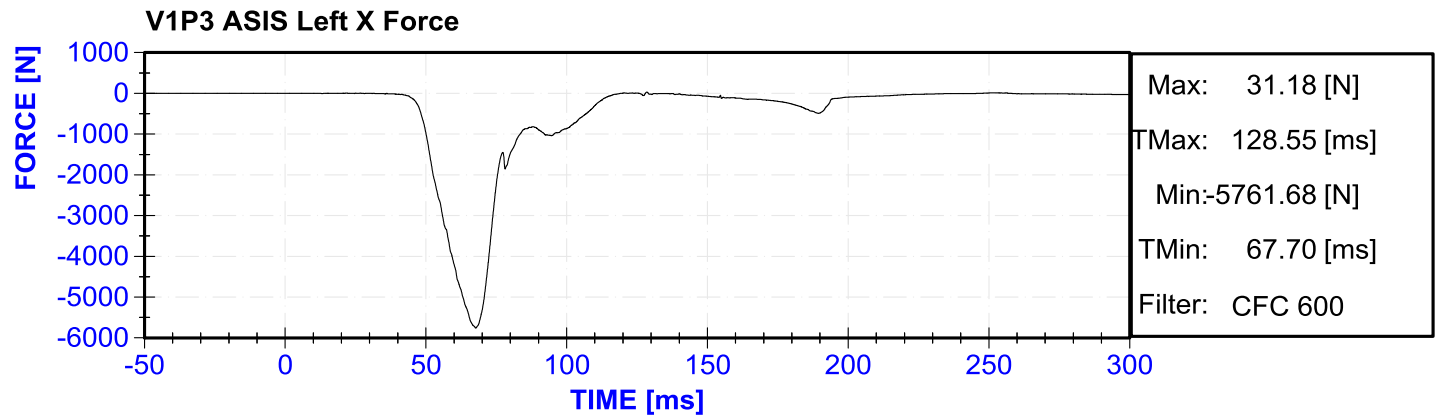
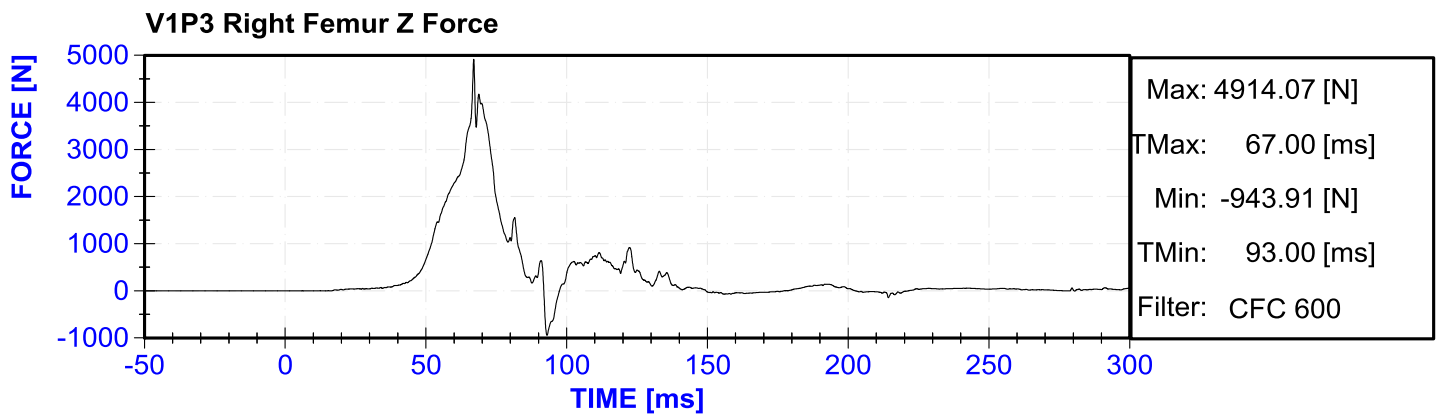
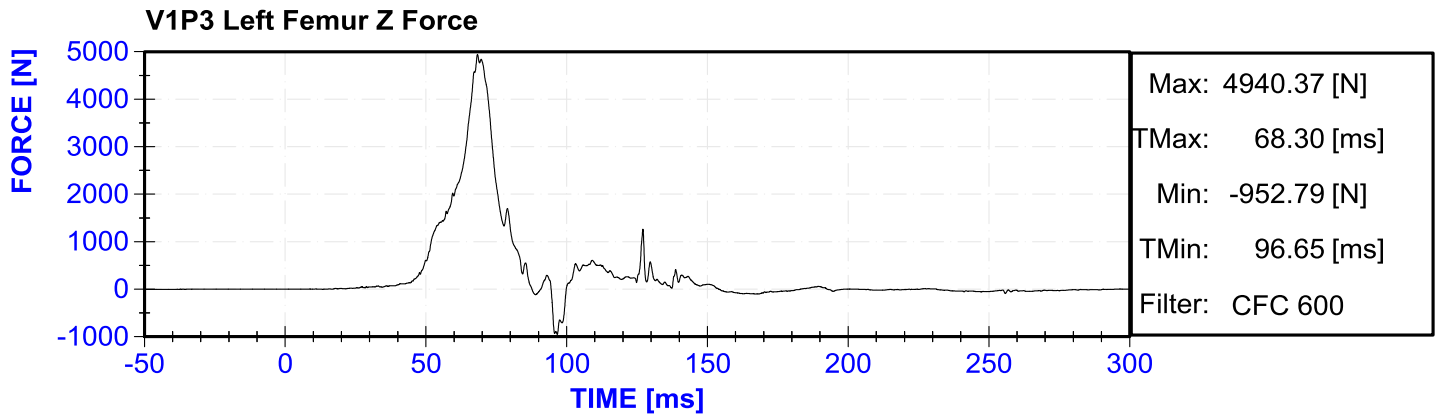


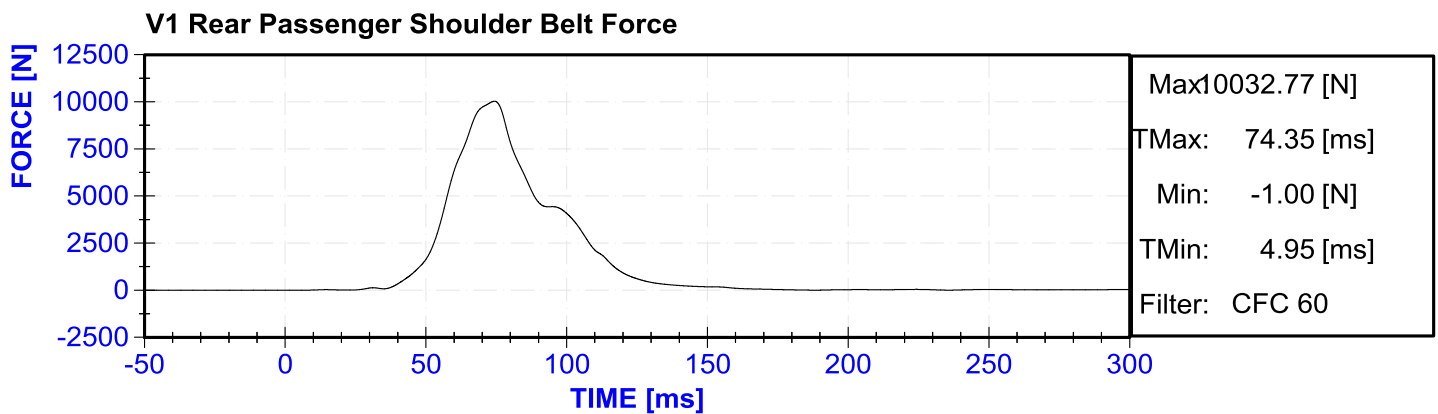
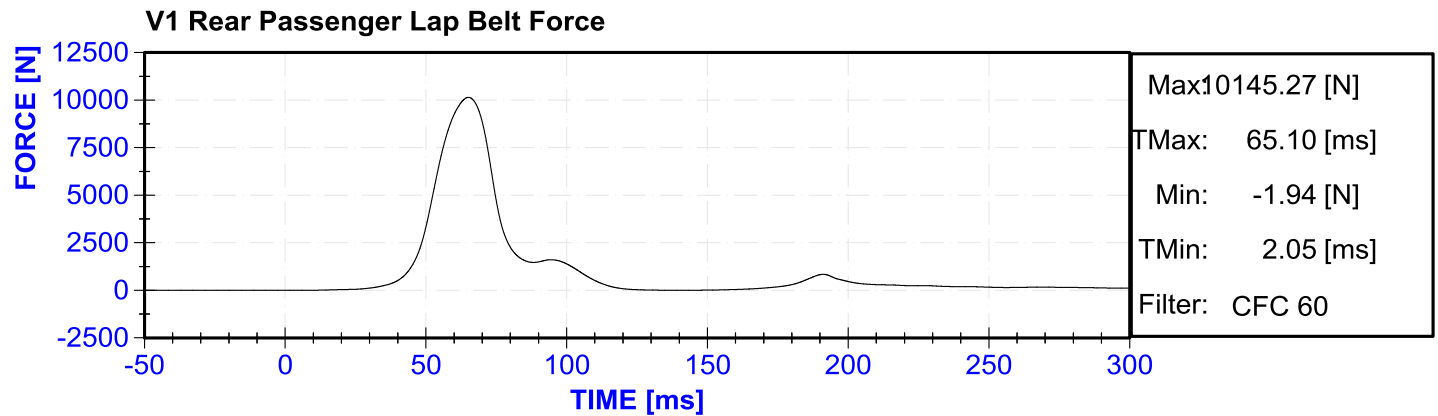
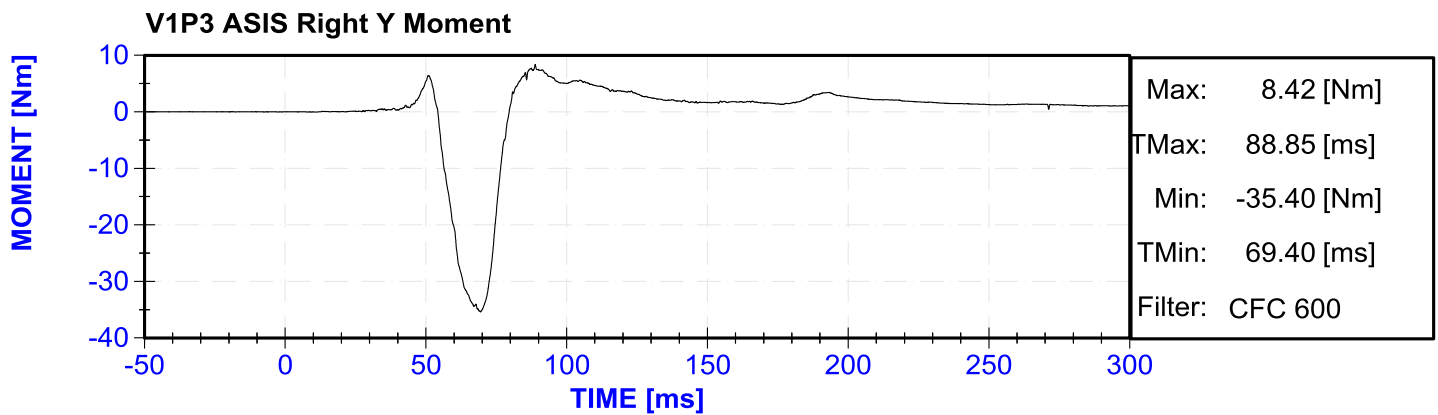
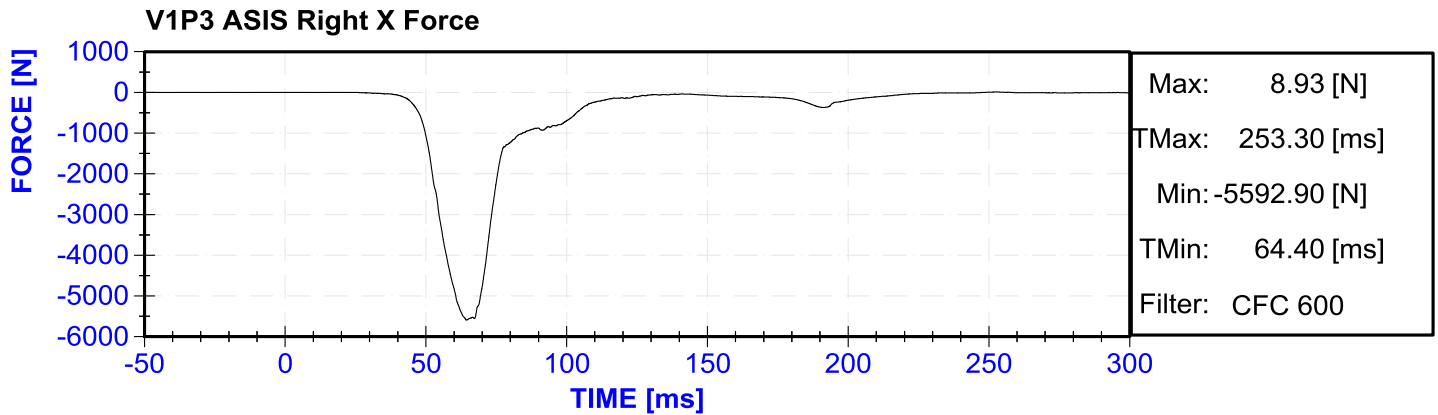


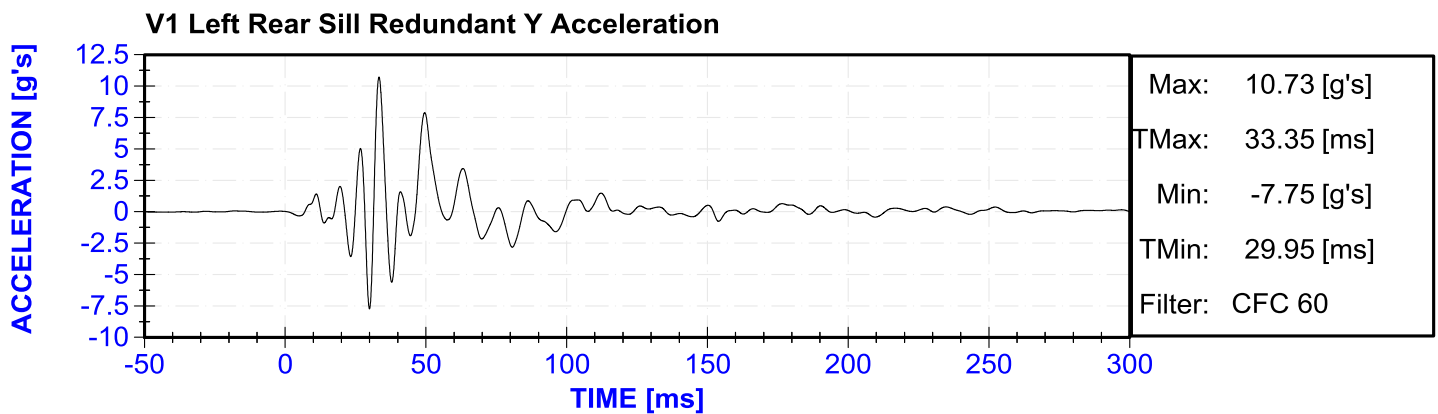
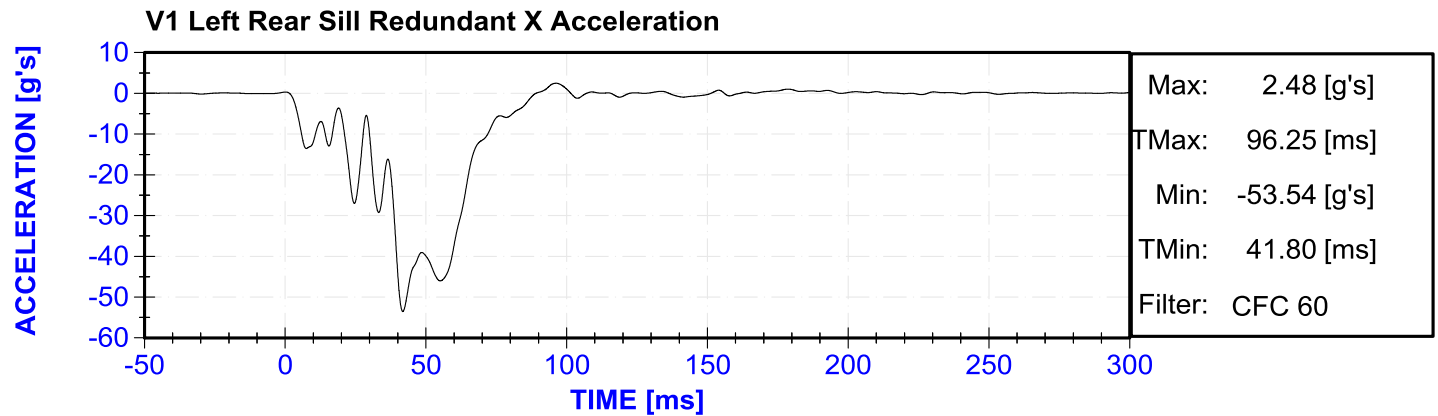
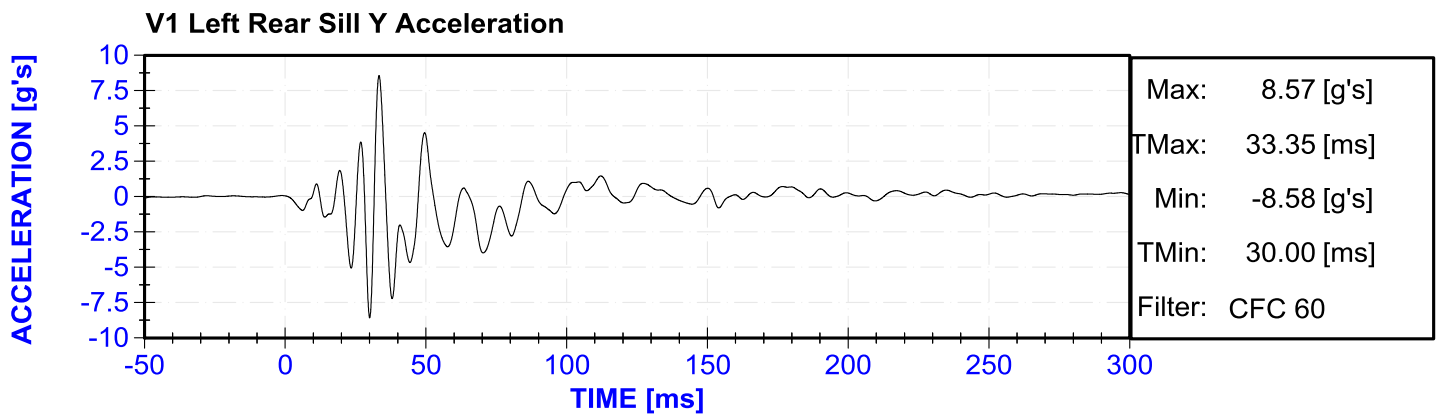
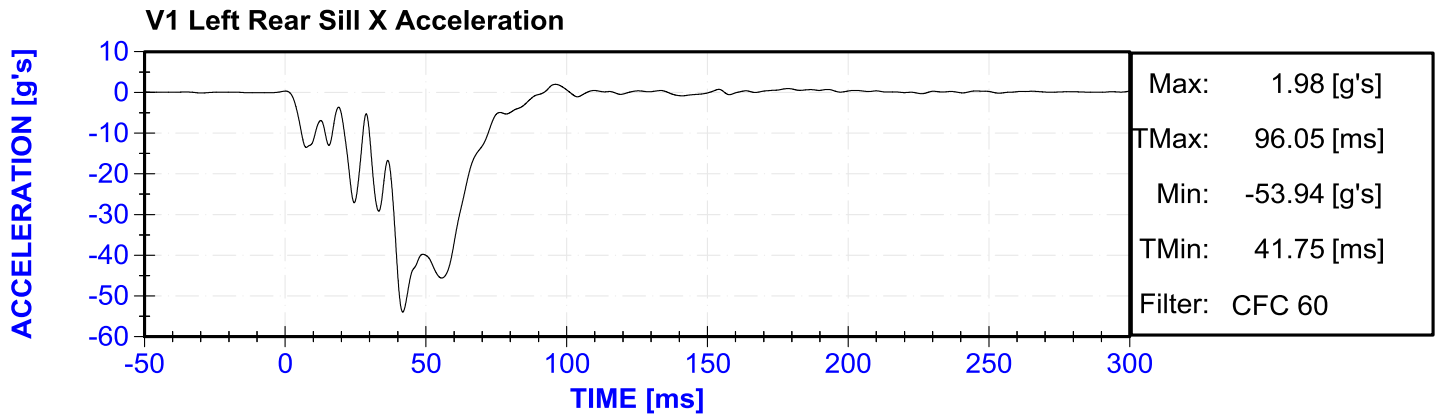


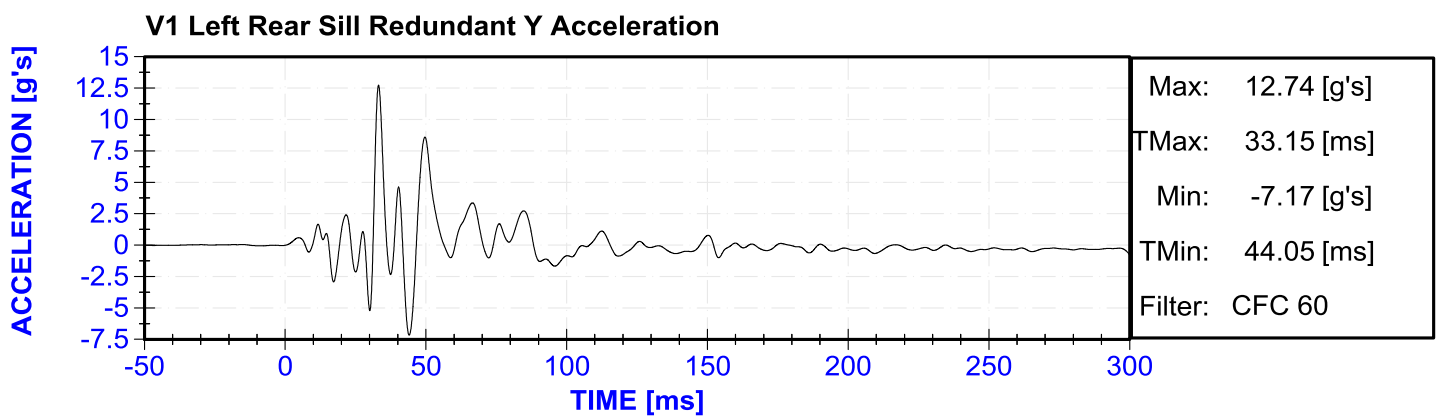
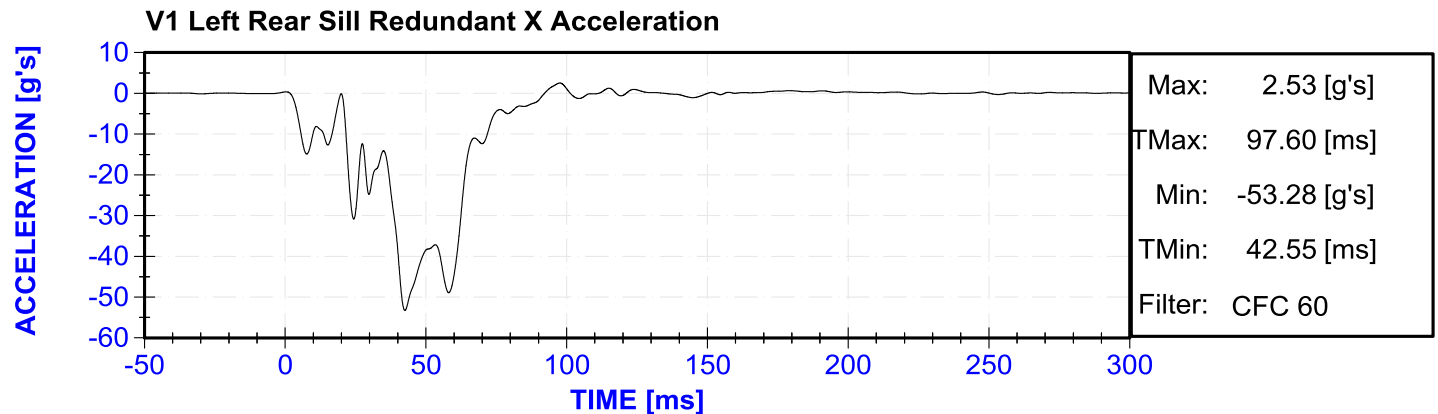
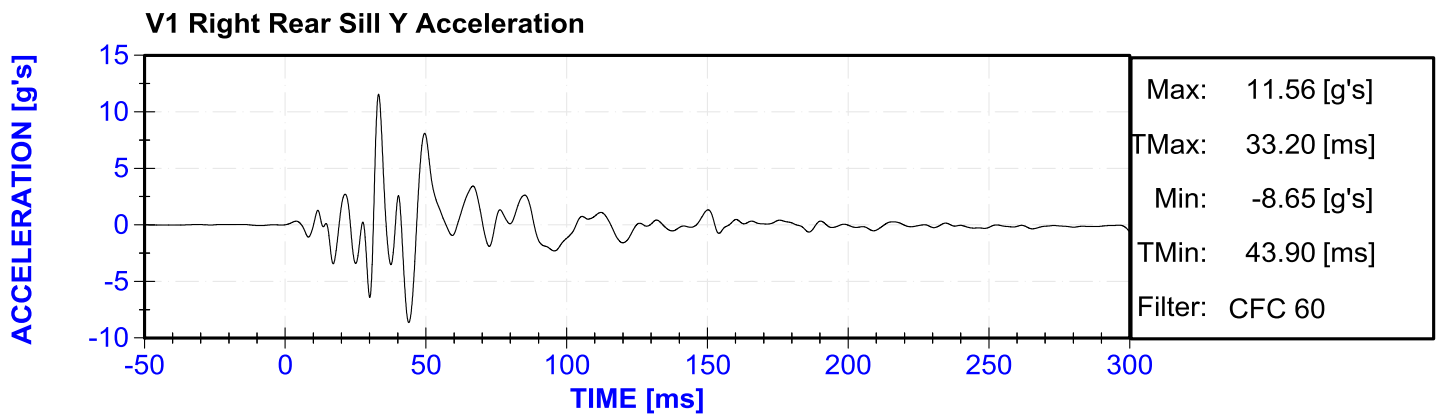
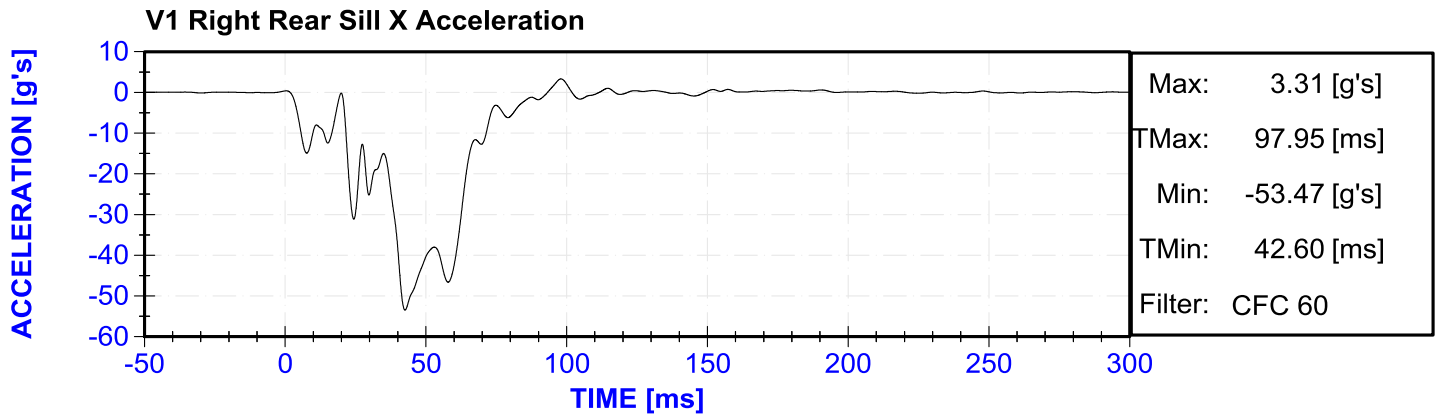


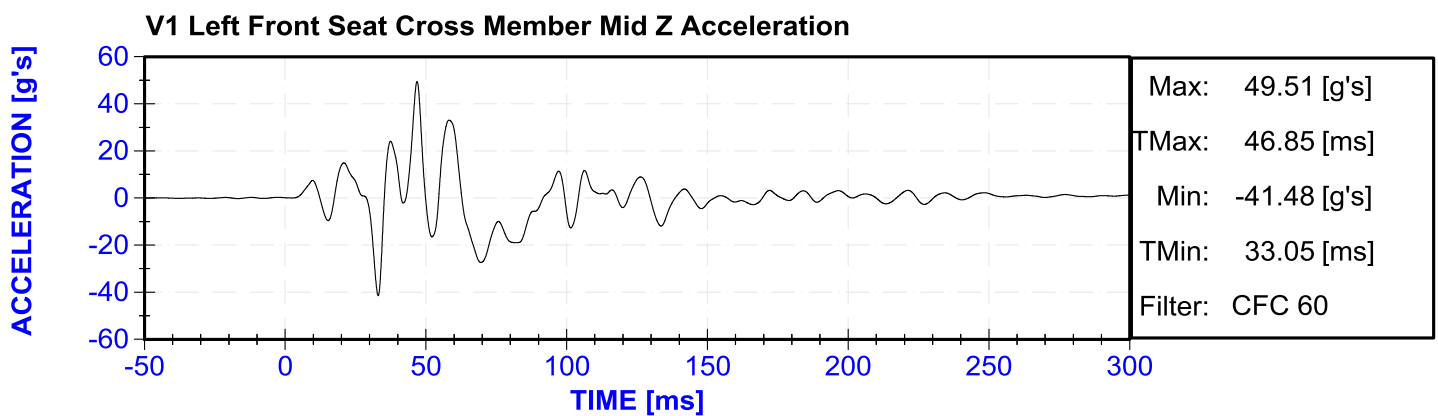
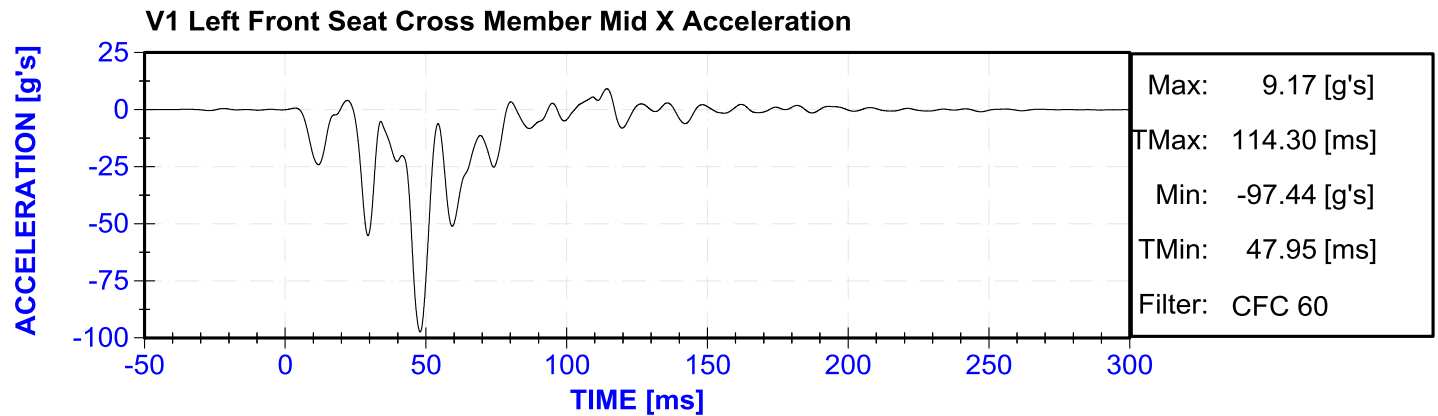
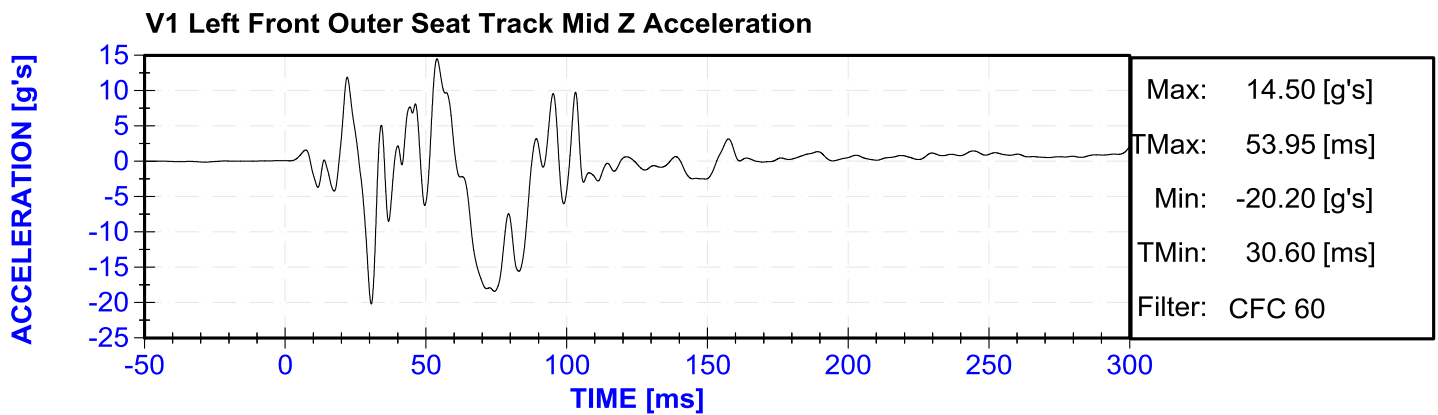
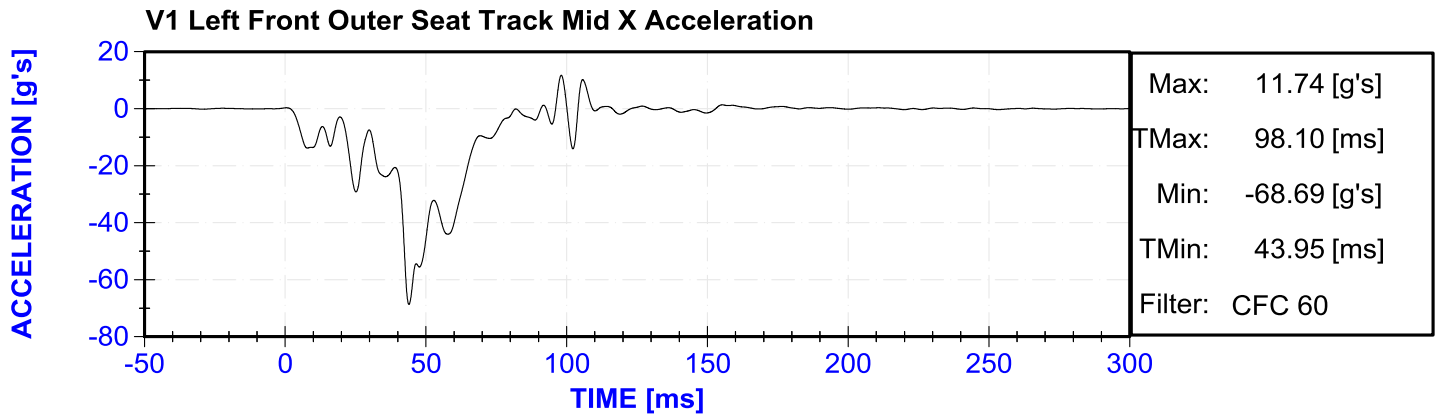


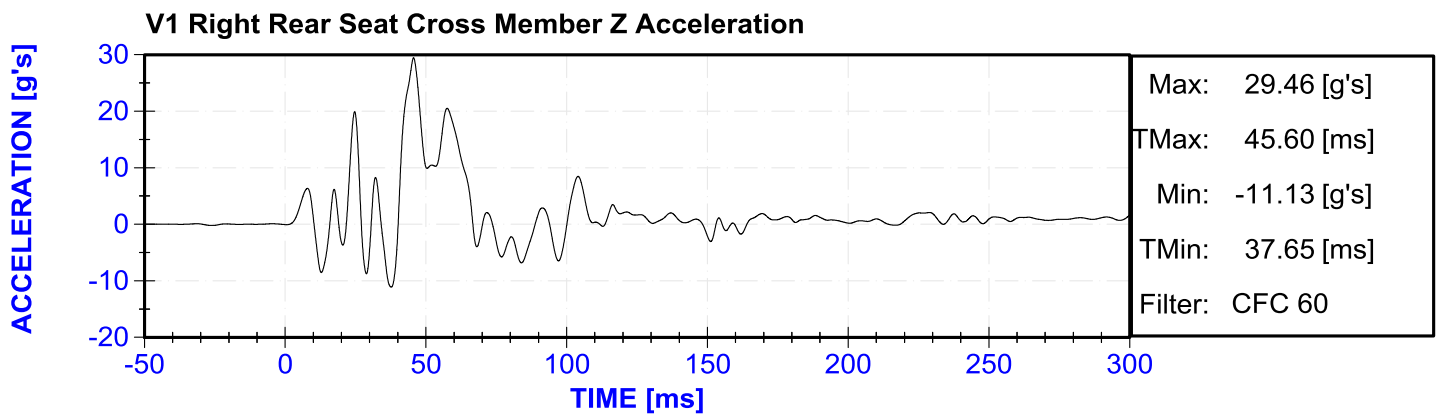
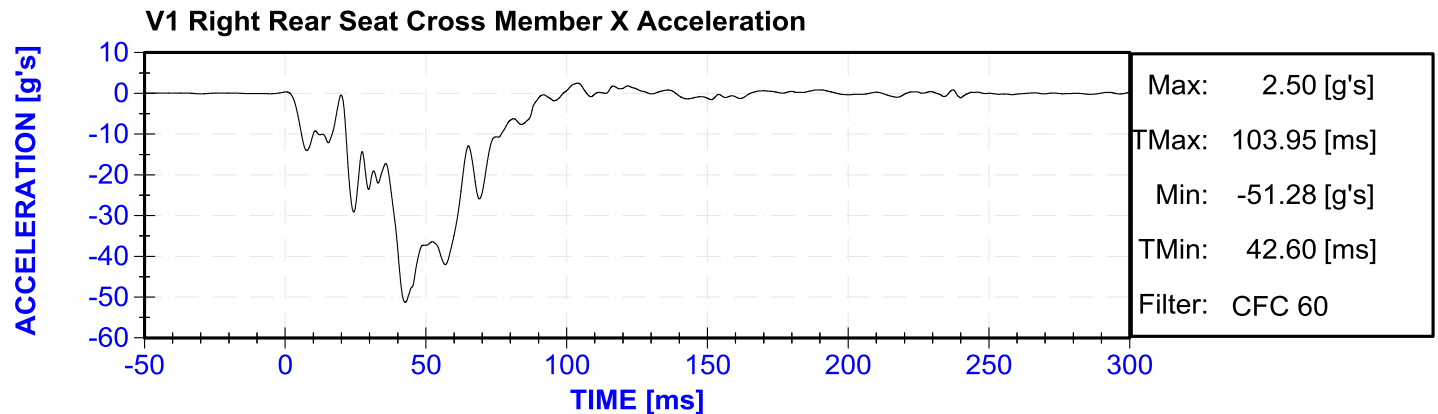
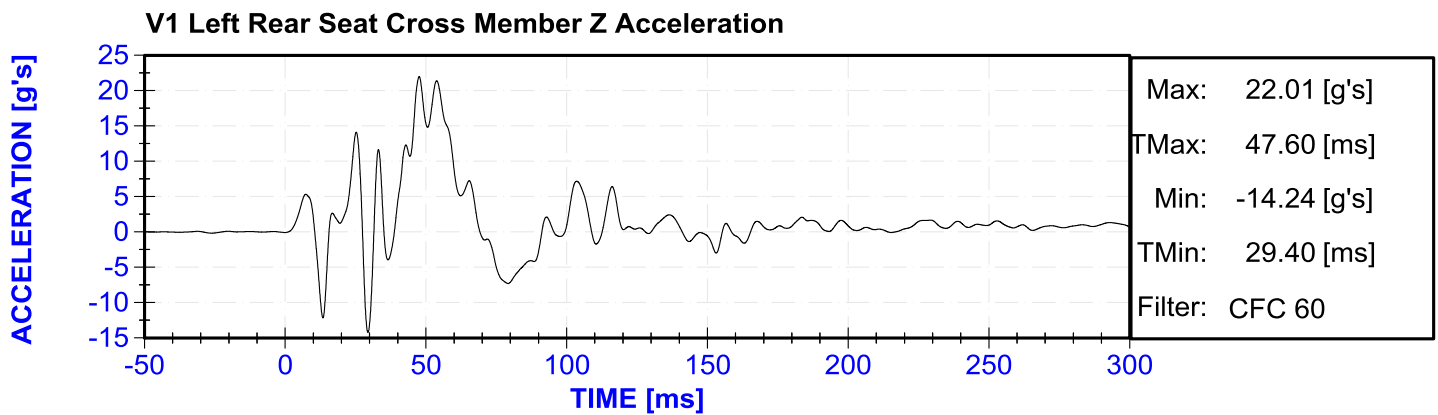
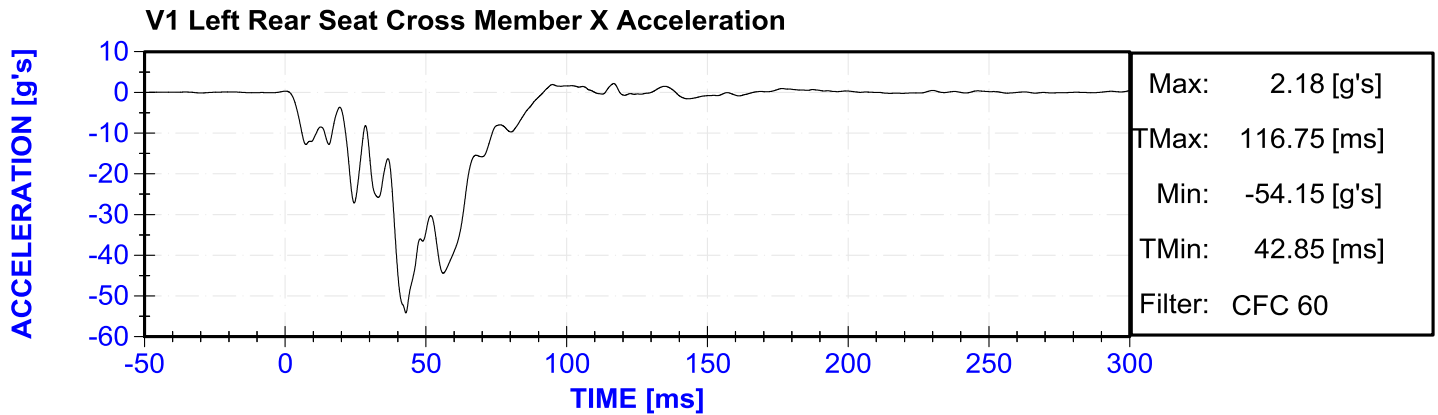


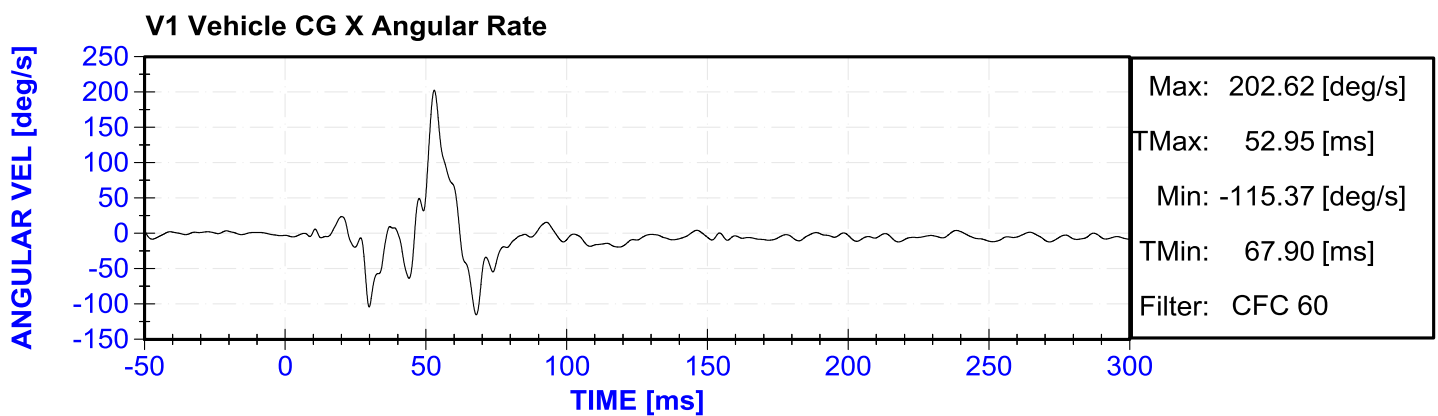
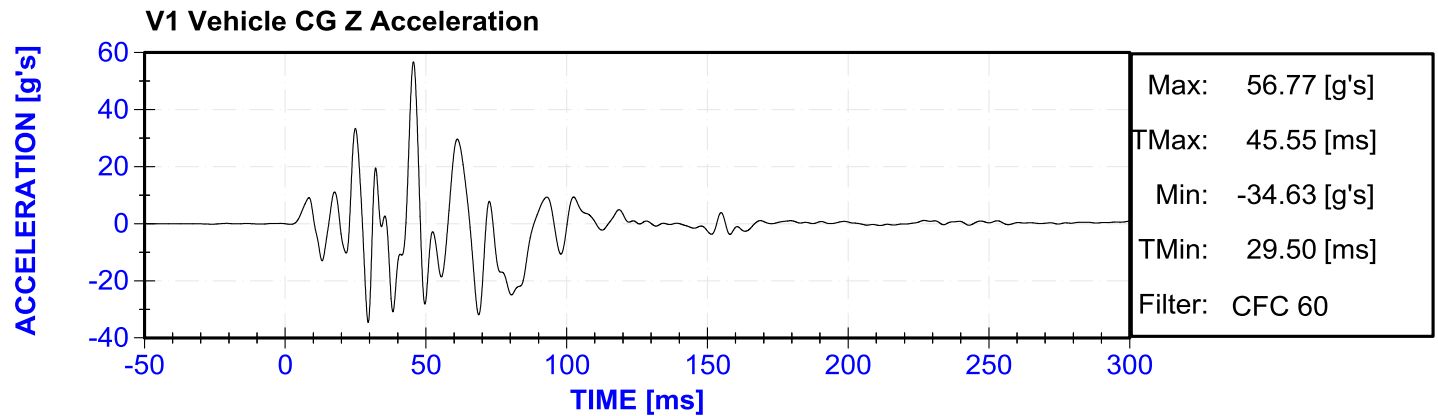
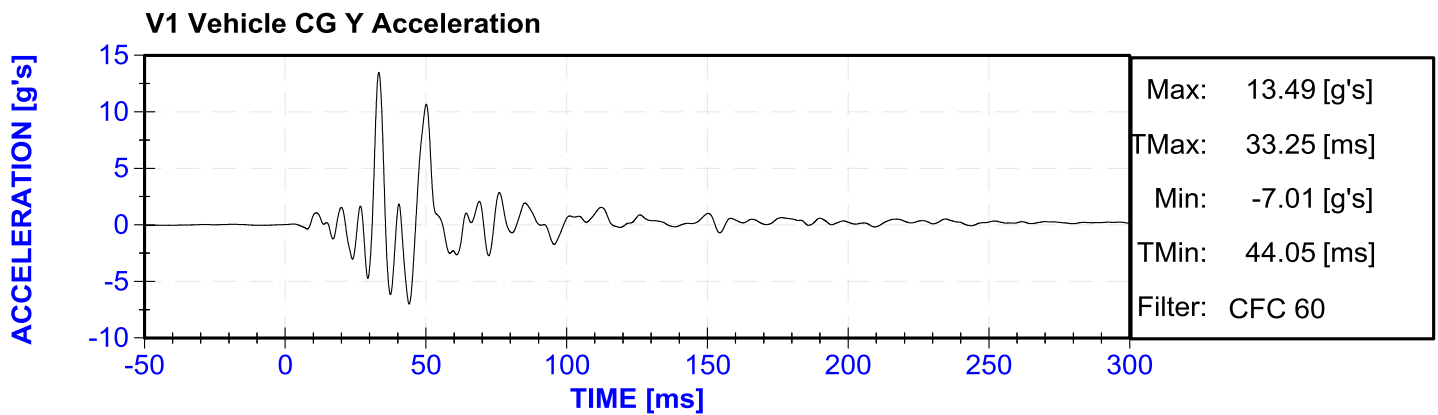
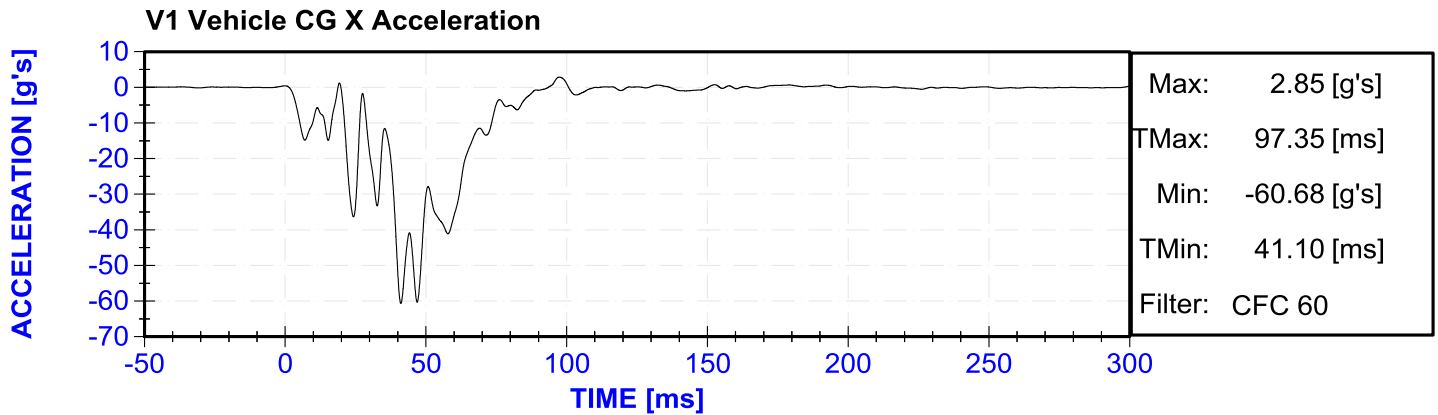


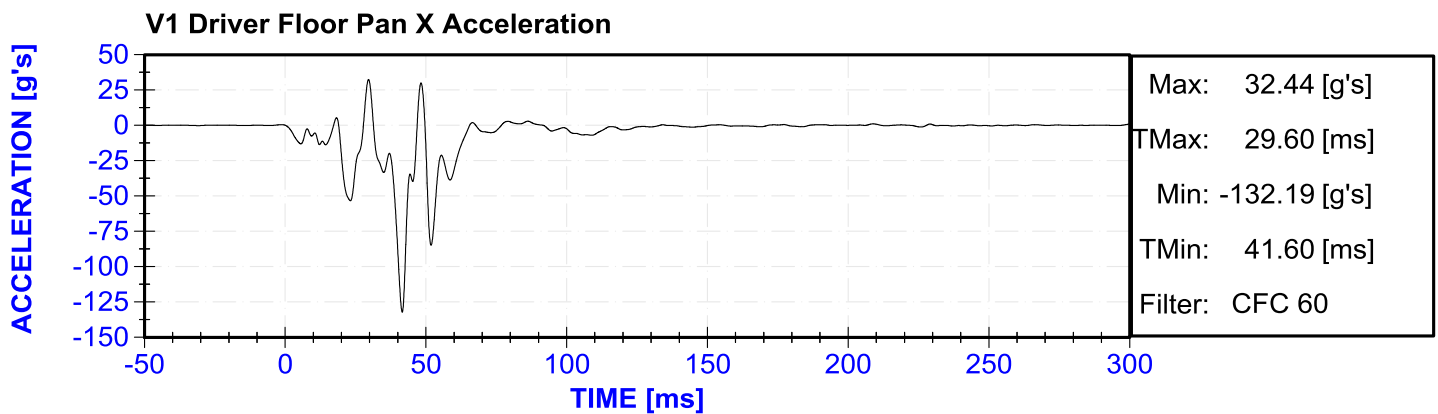
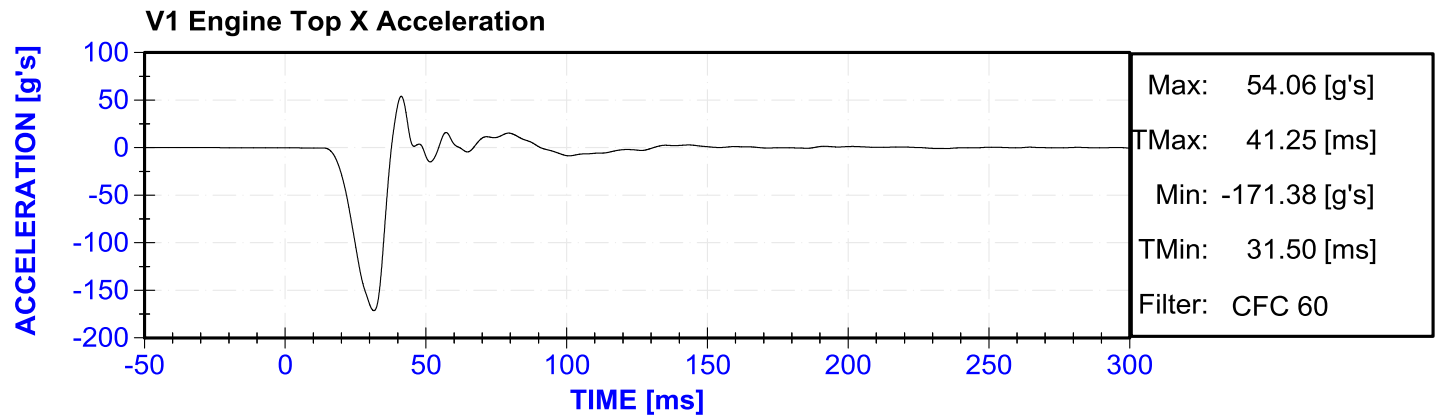
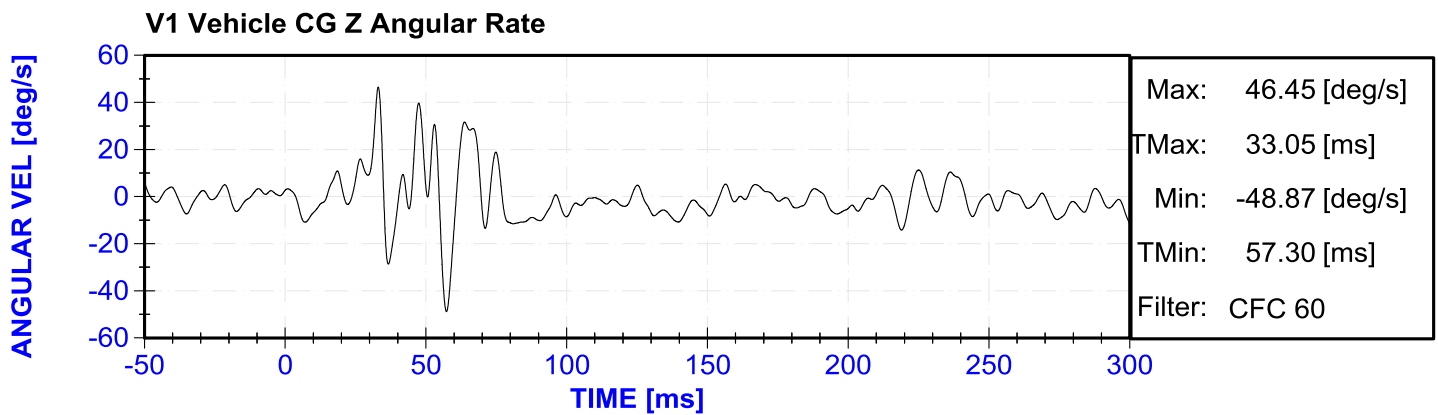
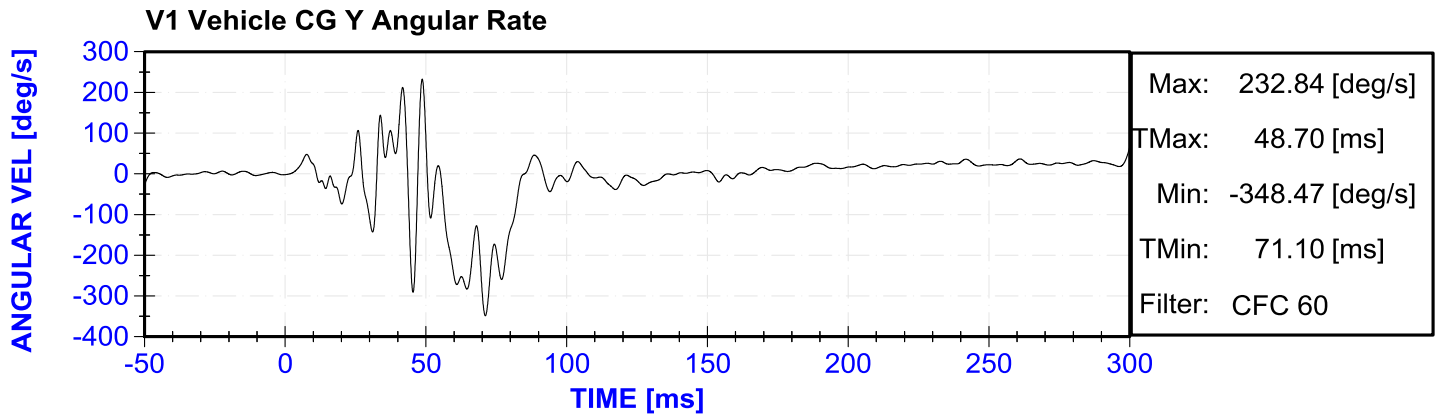


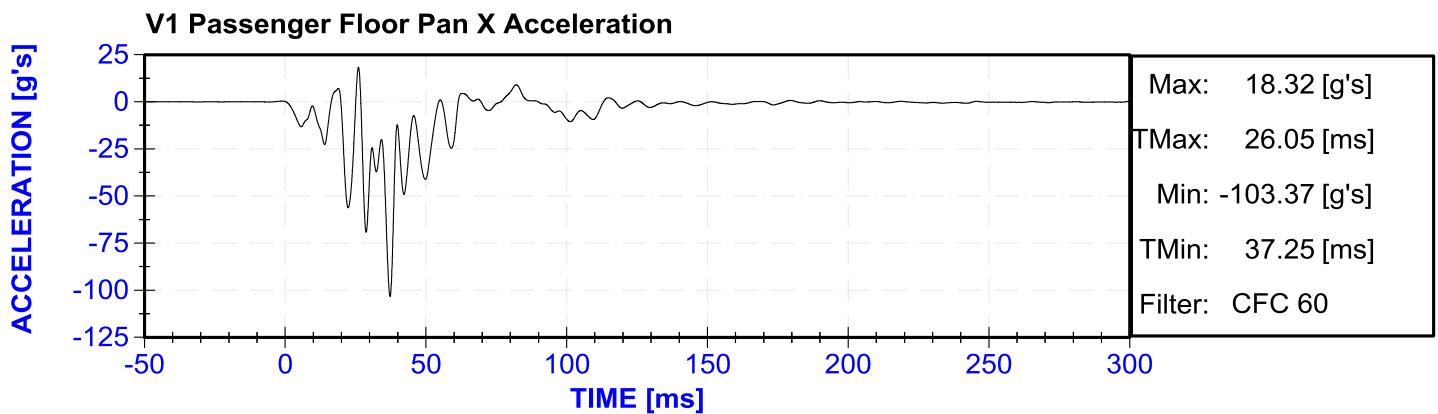
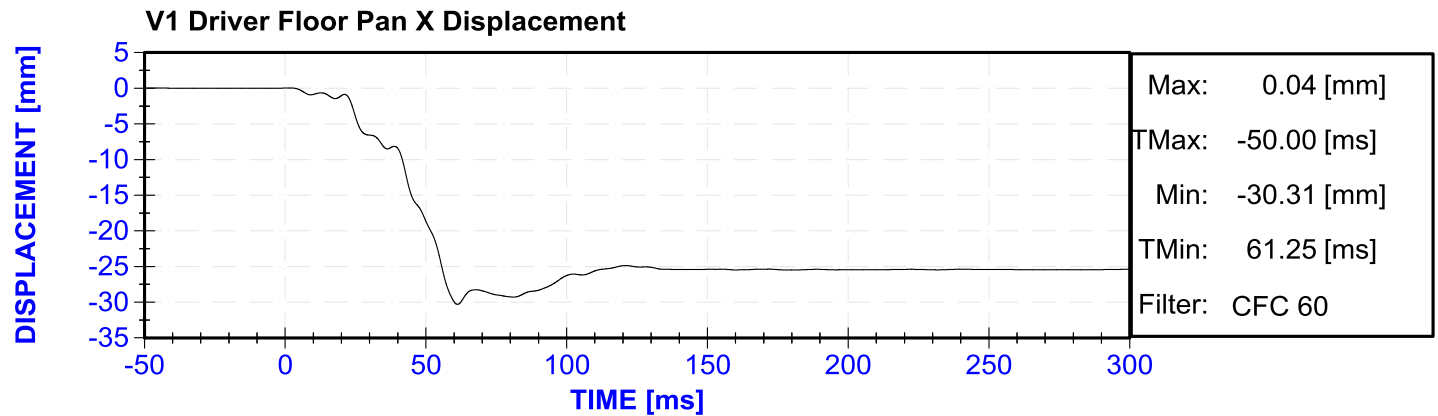
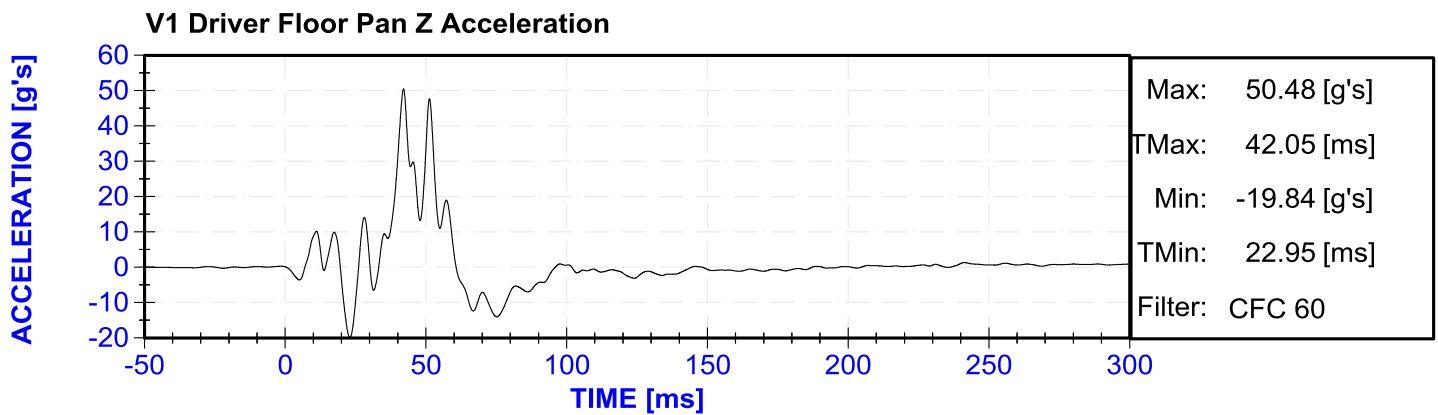
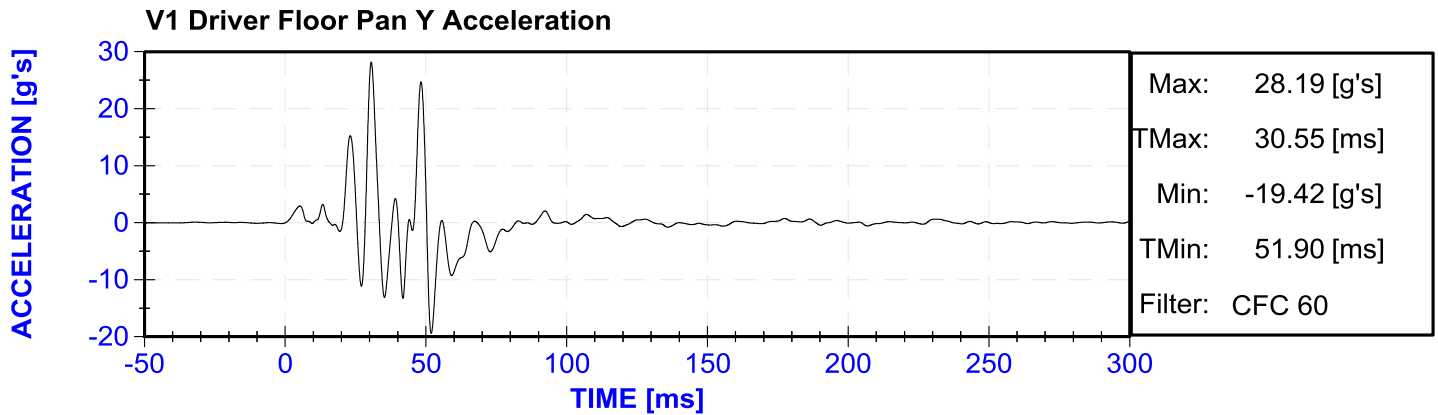


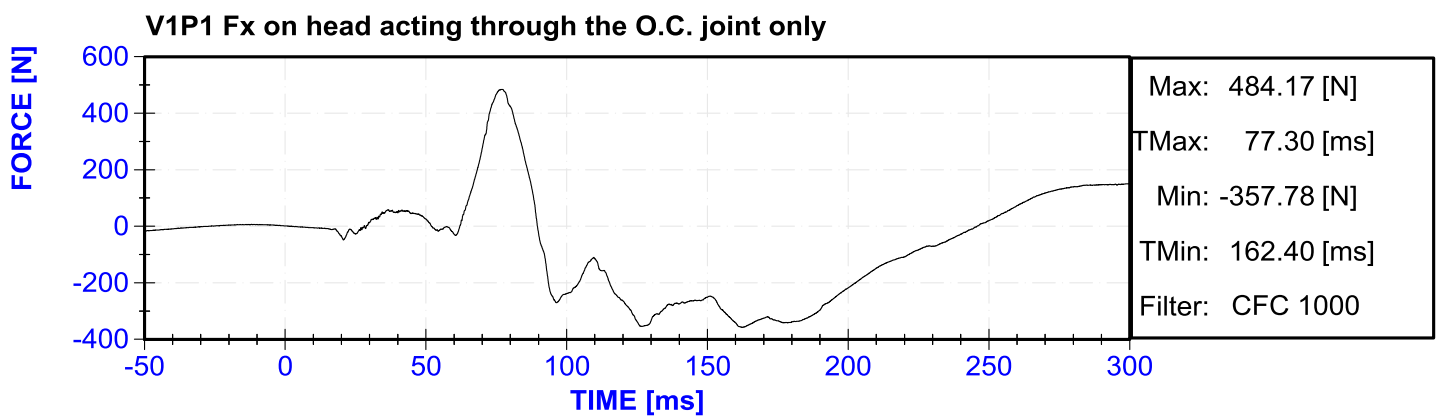
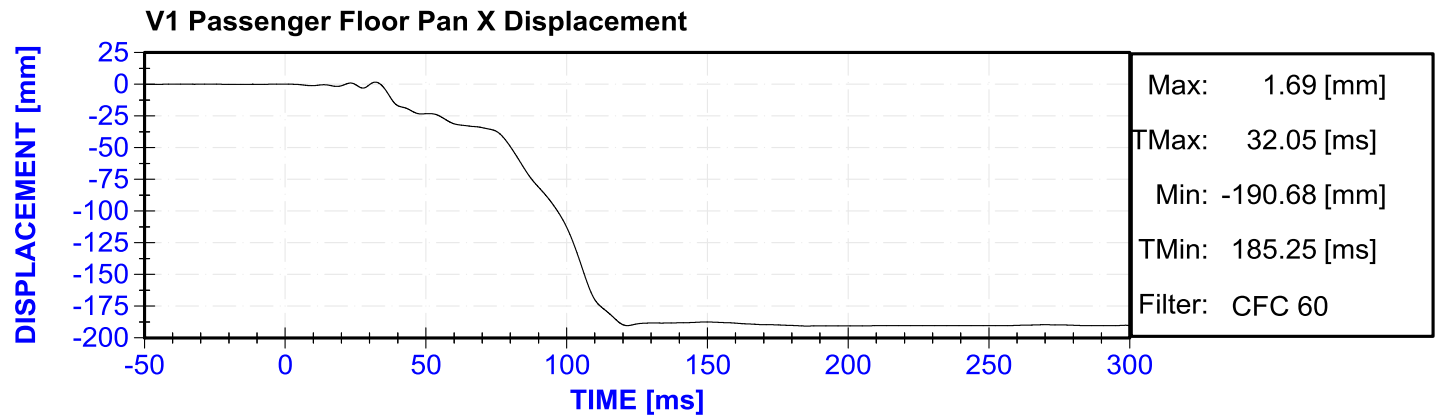
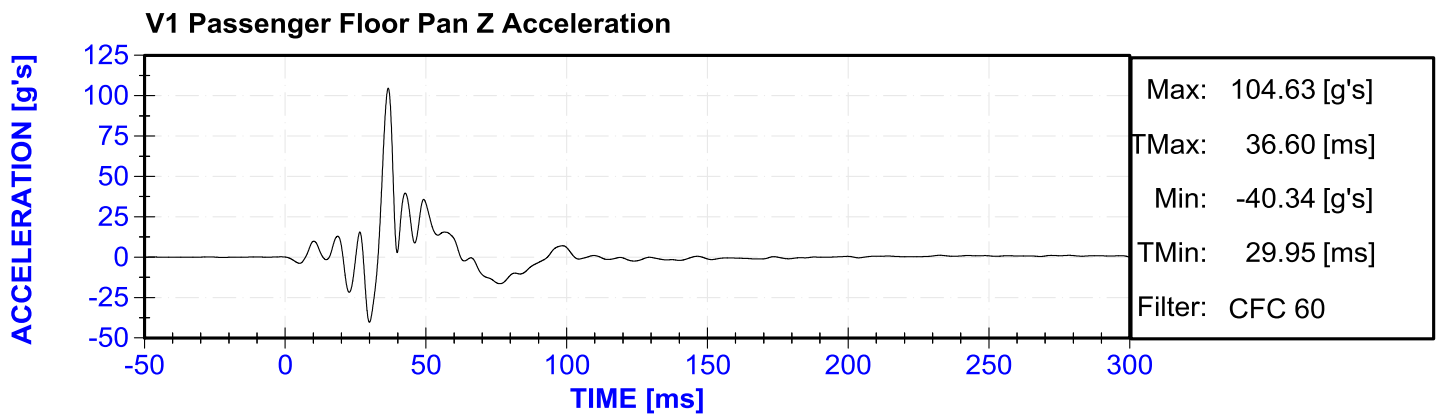
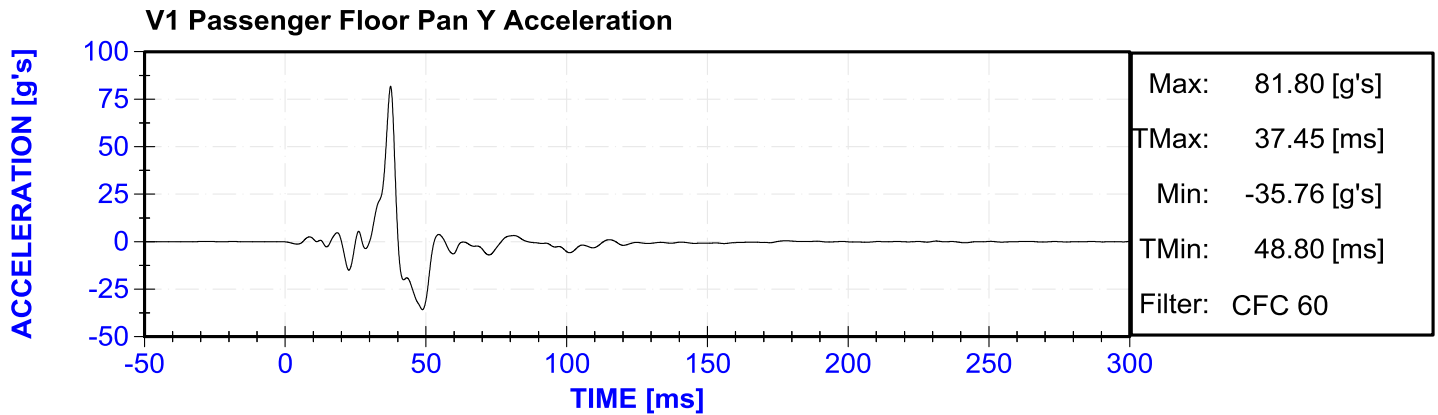


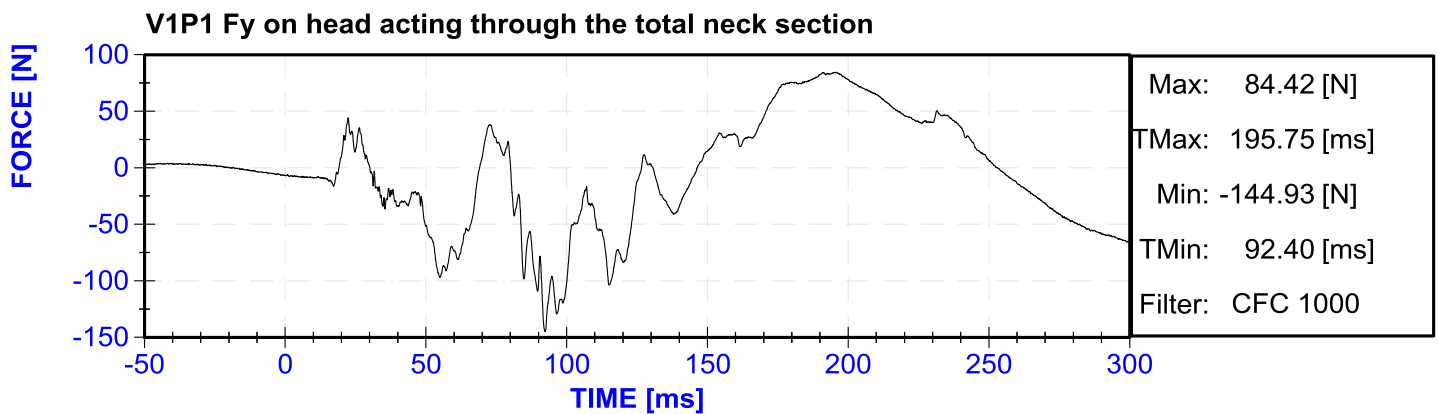
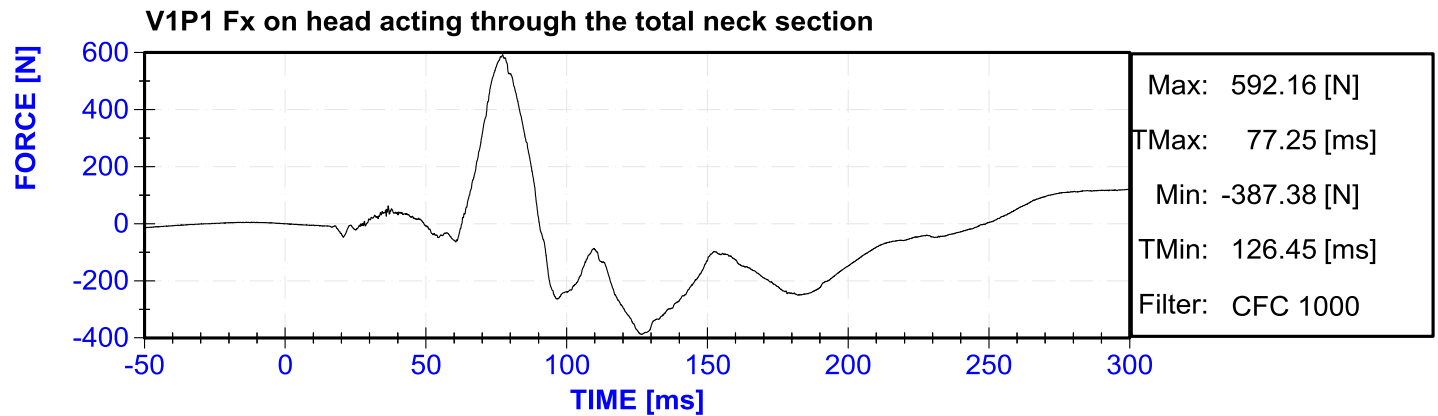
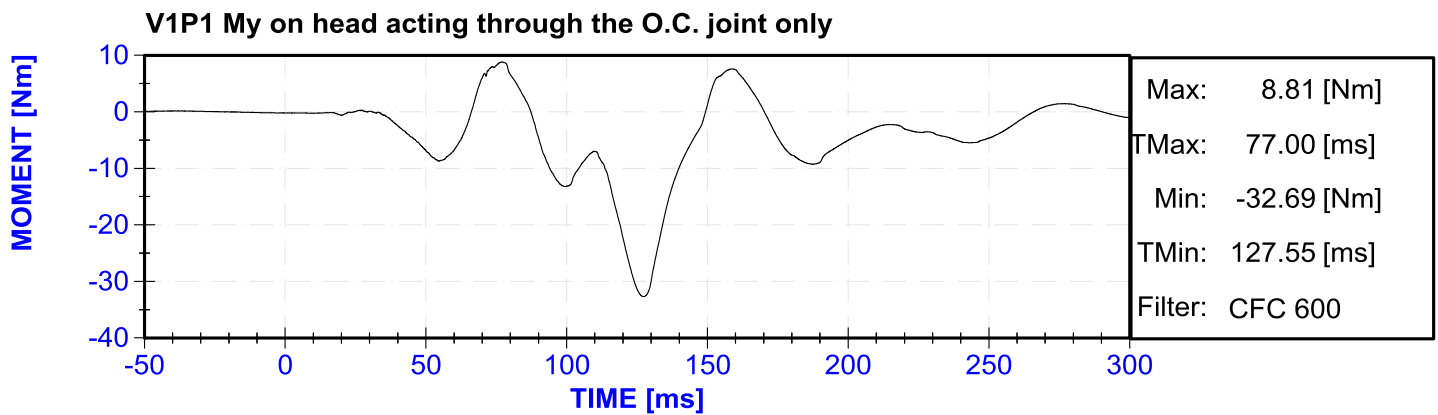
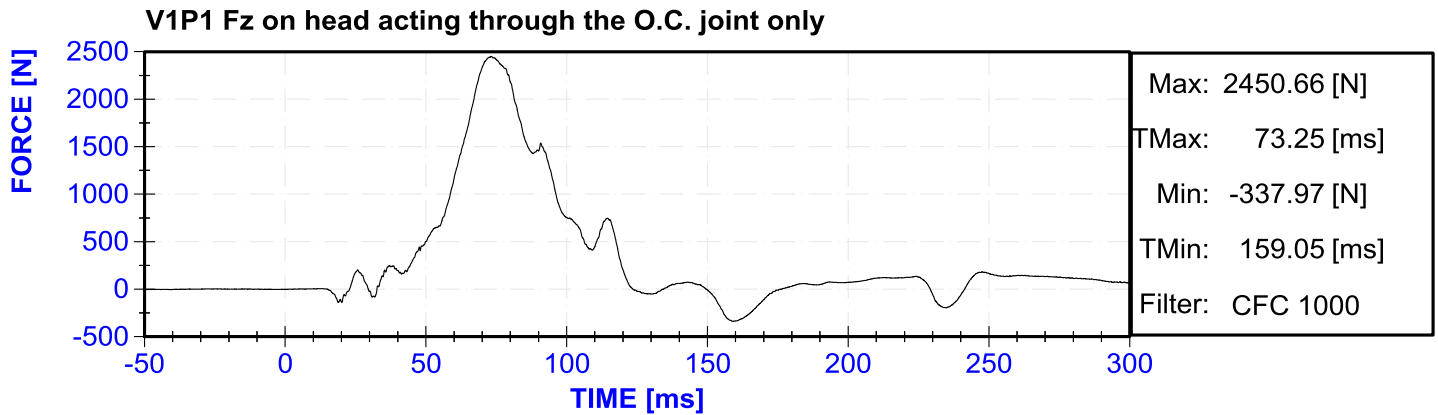




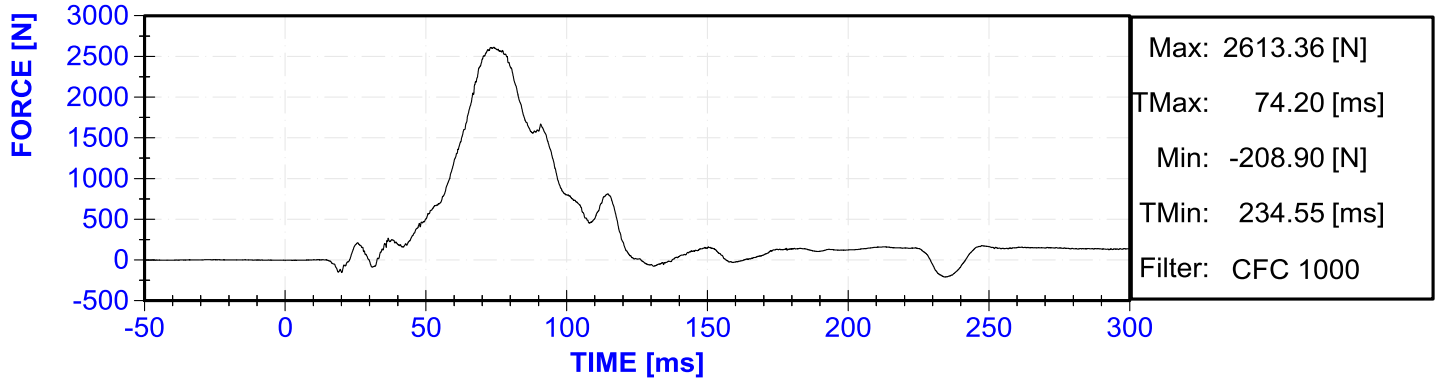




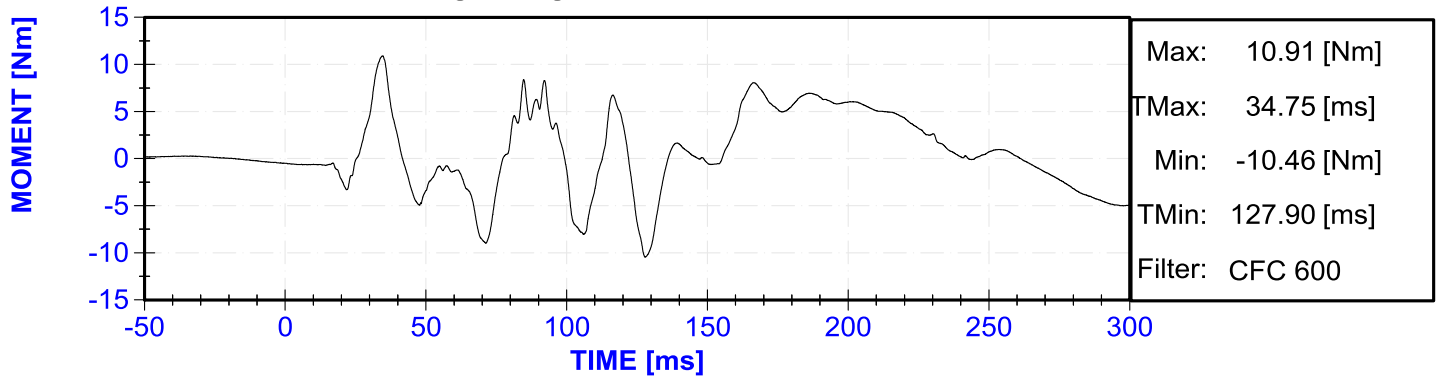




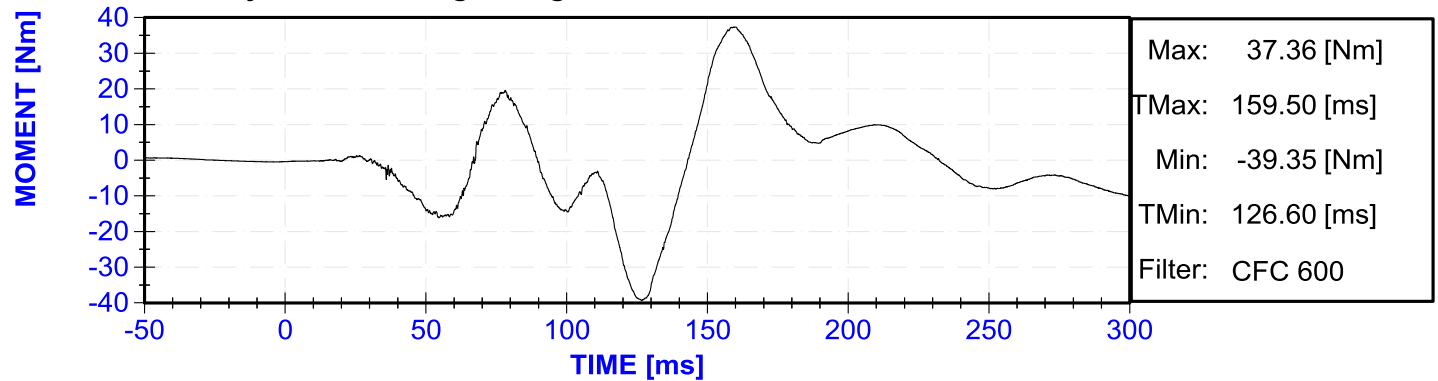
V1P1 Fz on head acting through the total neck section



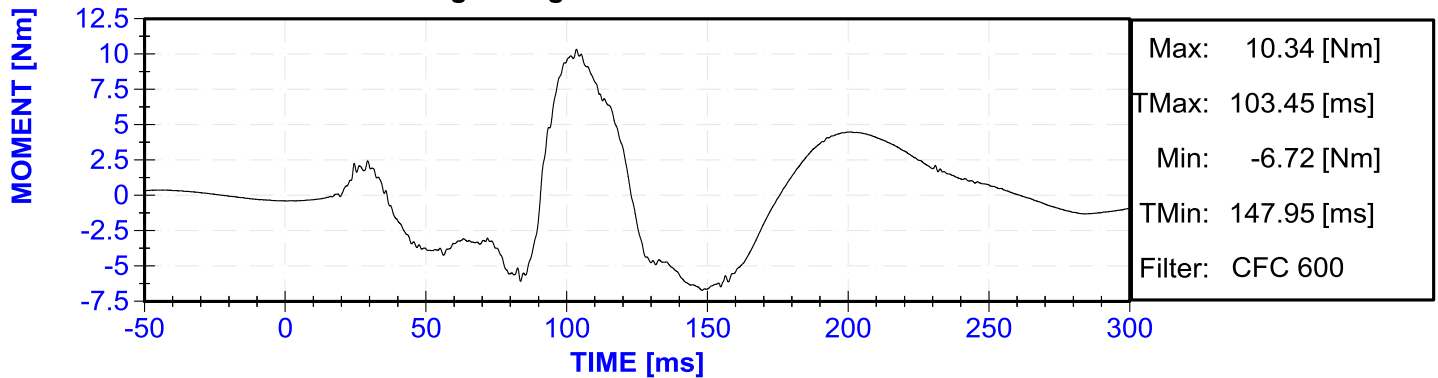
V1P1 Mx on head acting through the total neck section

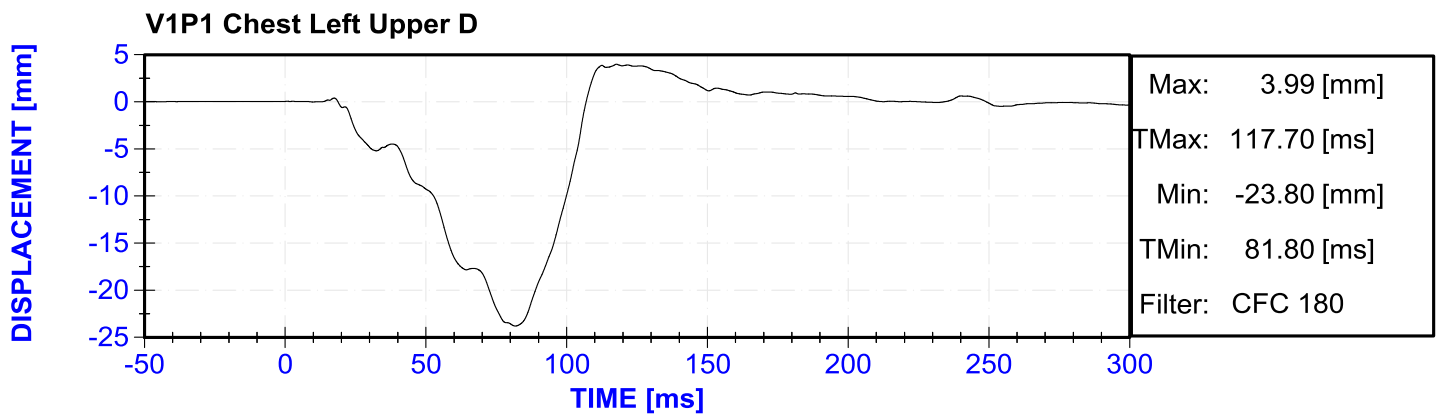
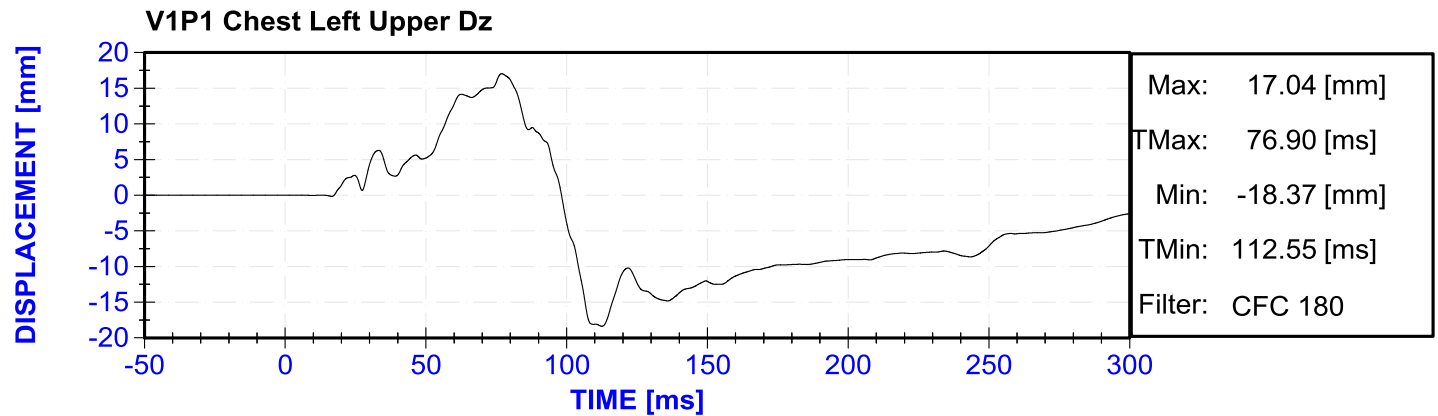
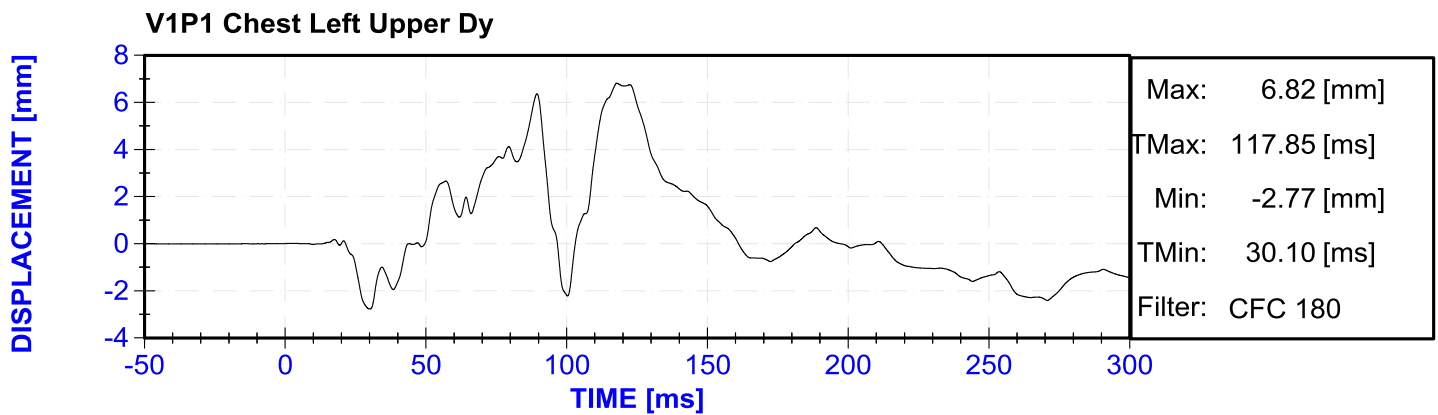
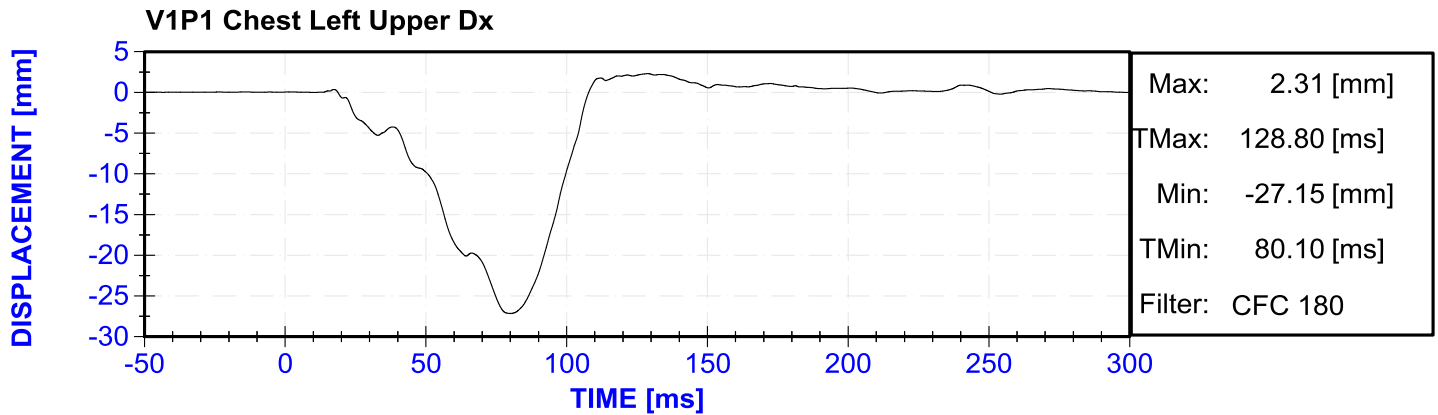


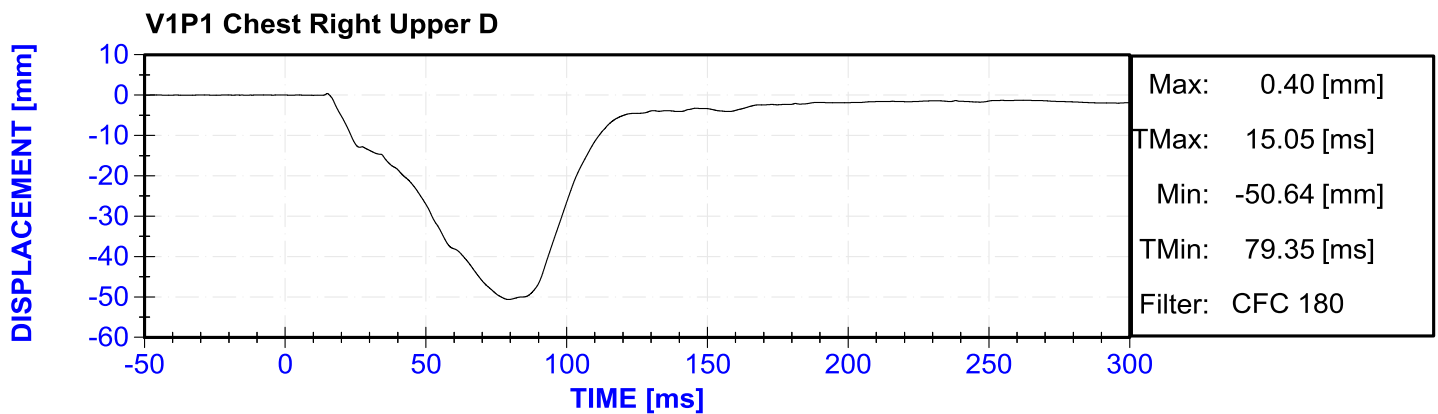
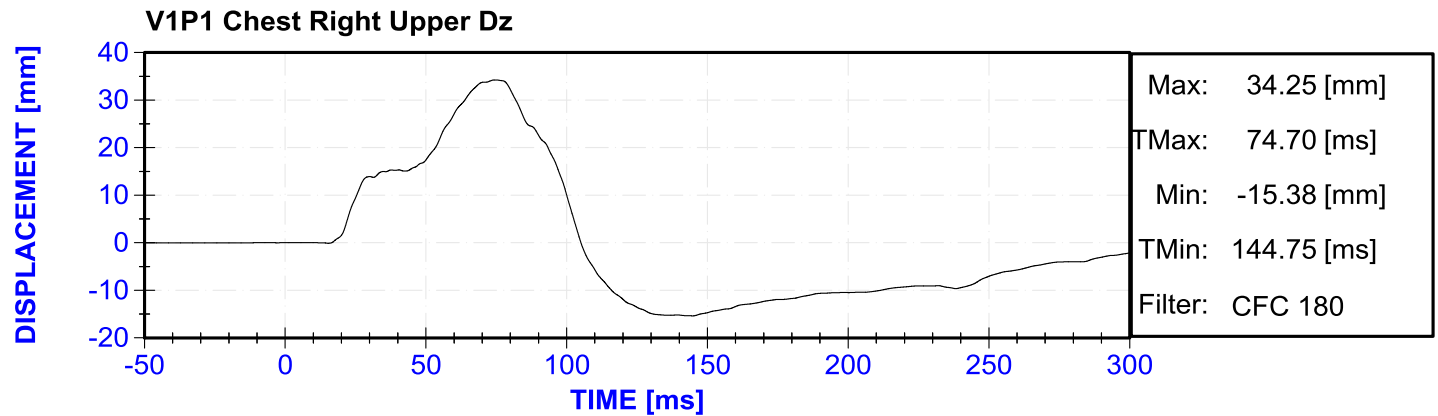
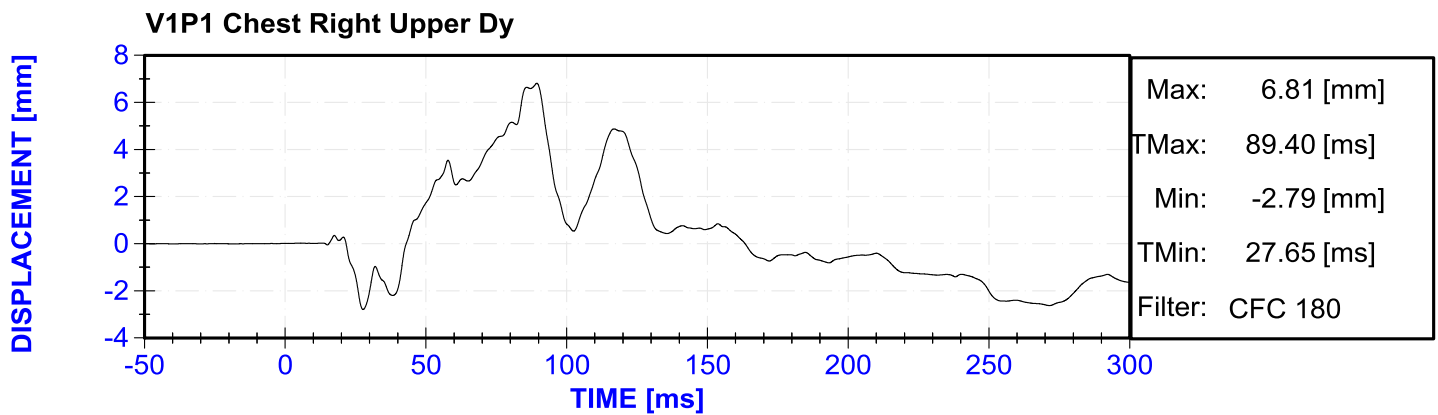
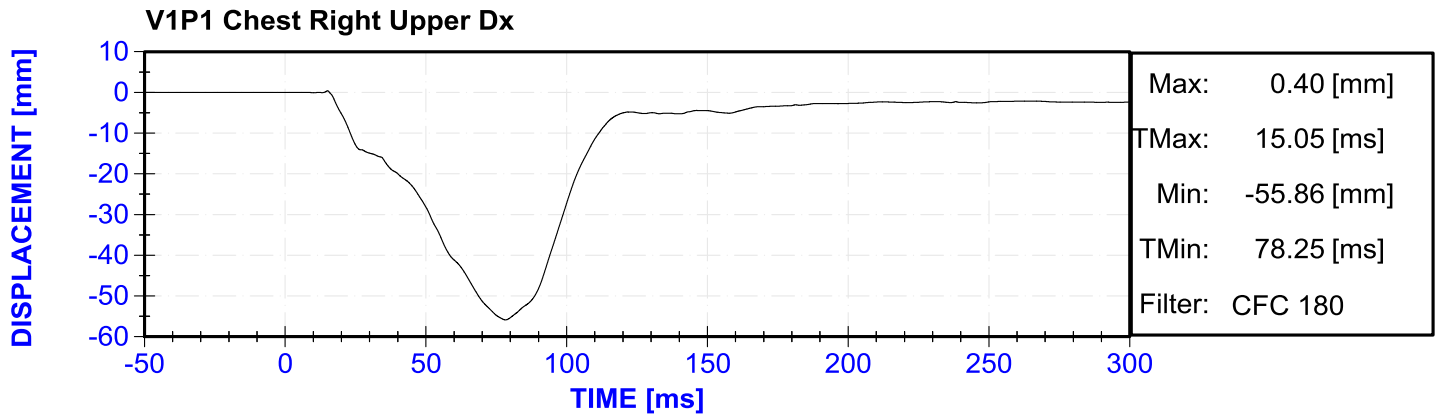
V1P1 My on head acting through the total neck section

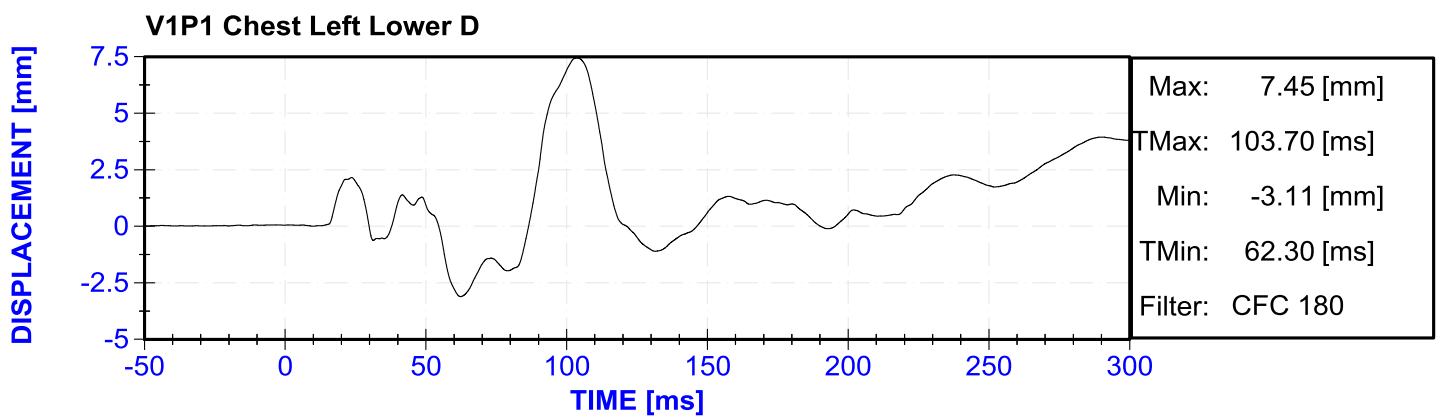
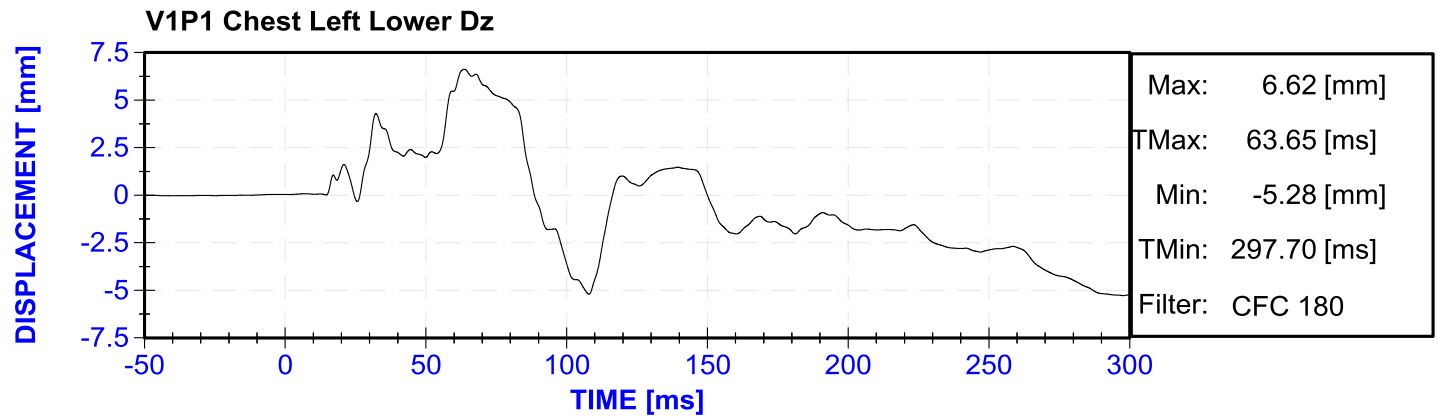
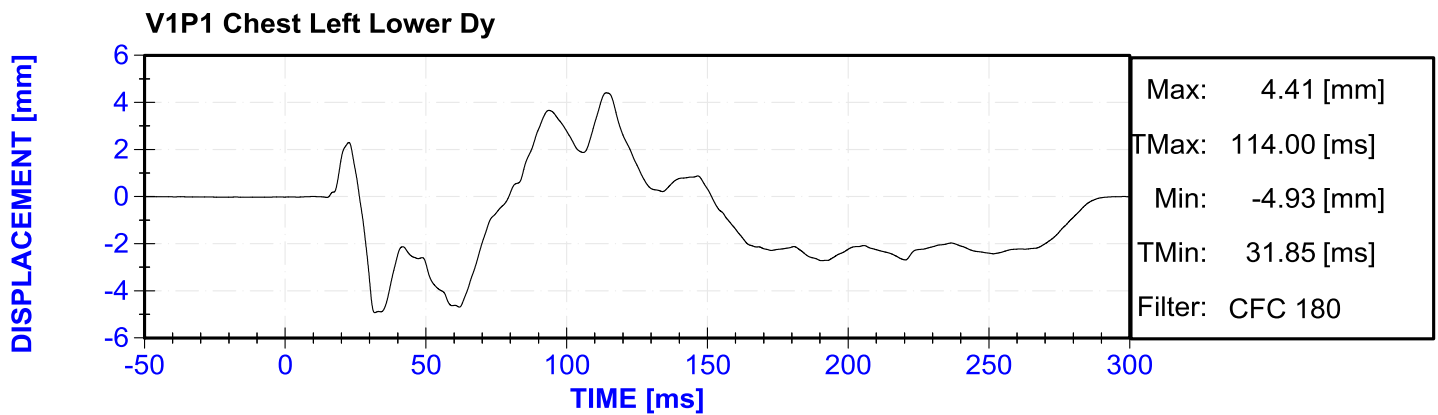
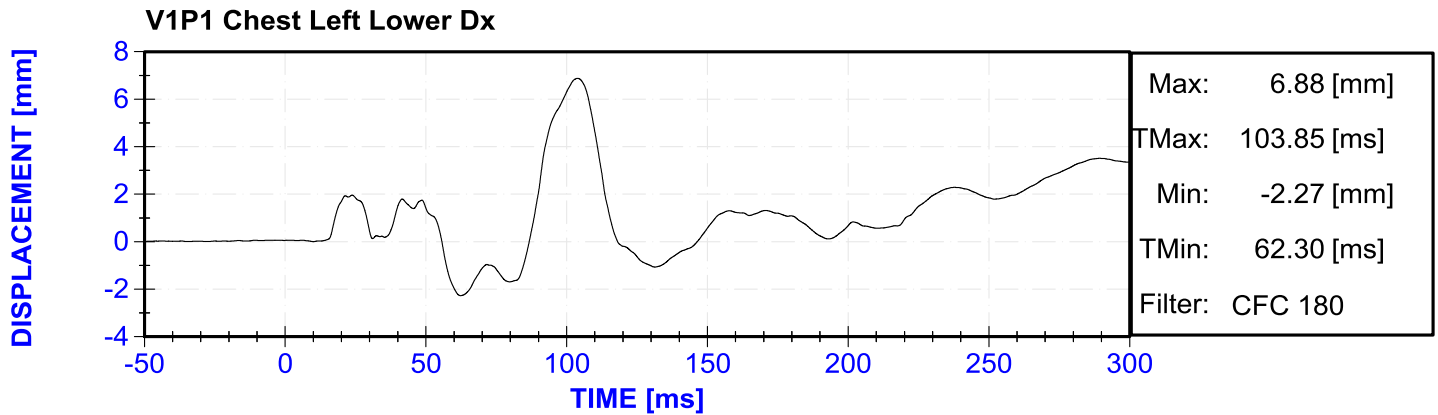


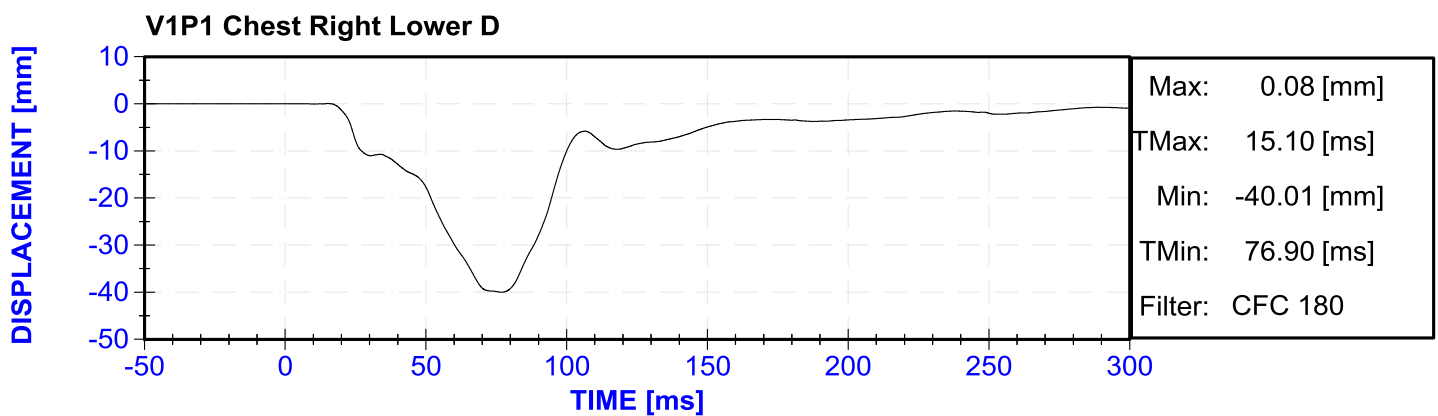
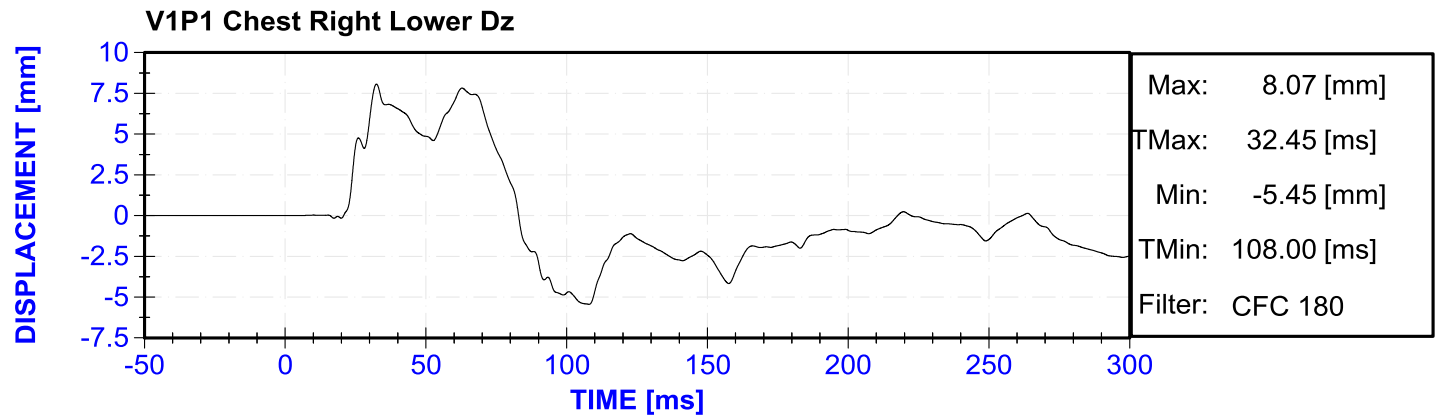
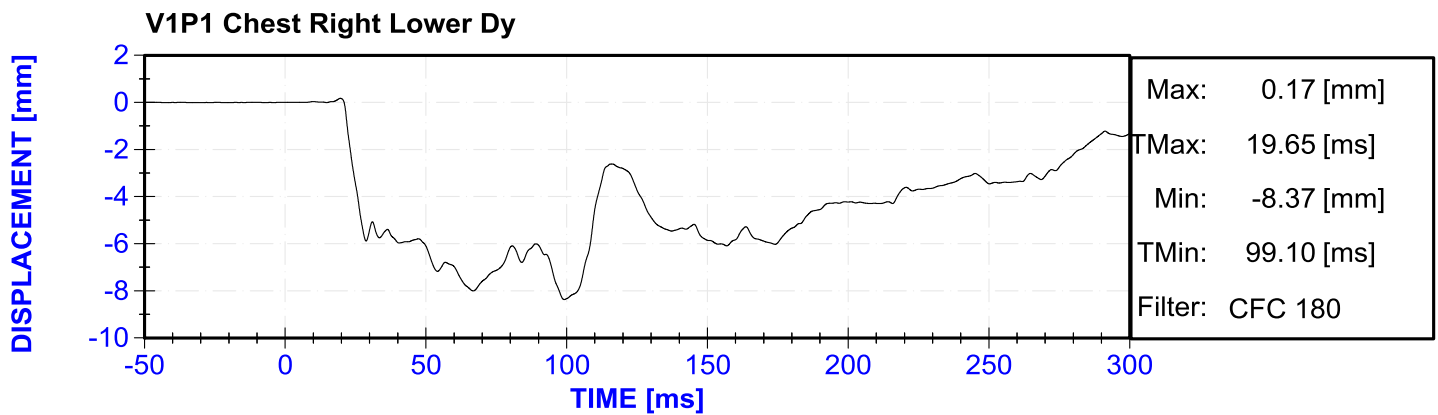
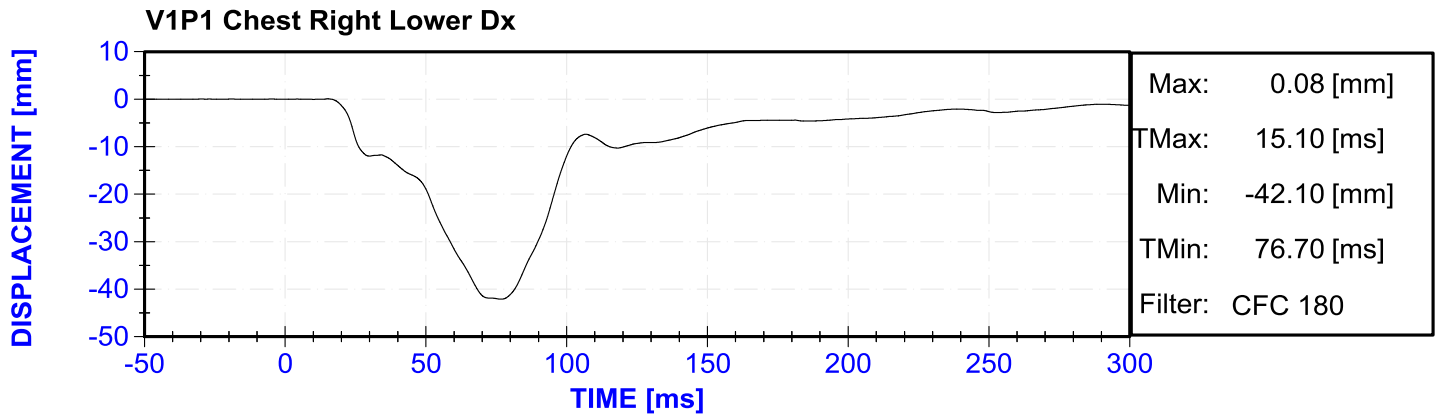
V1P1 Mz on head acting through the total neck section

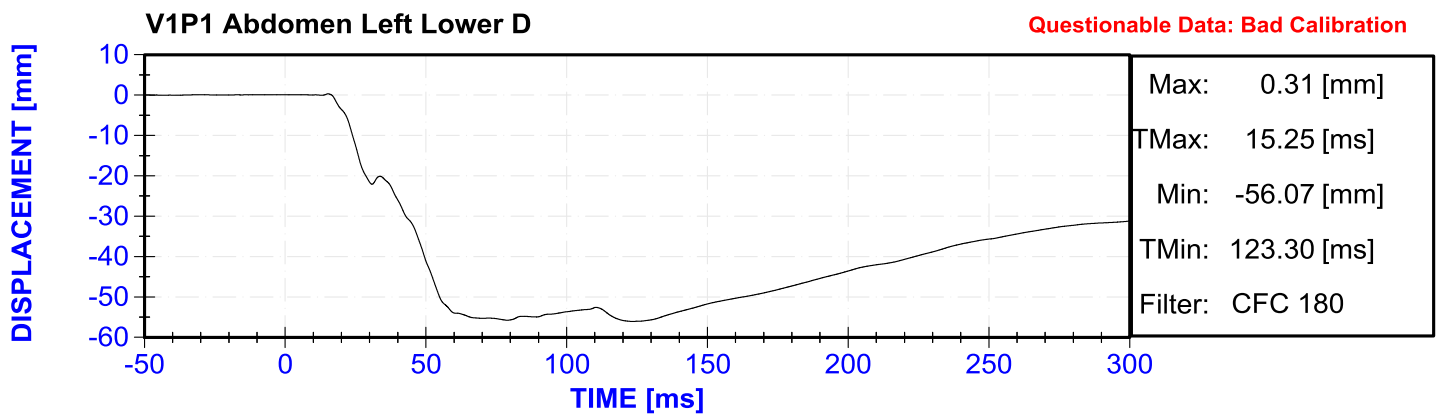
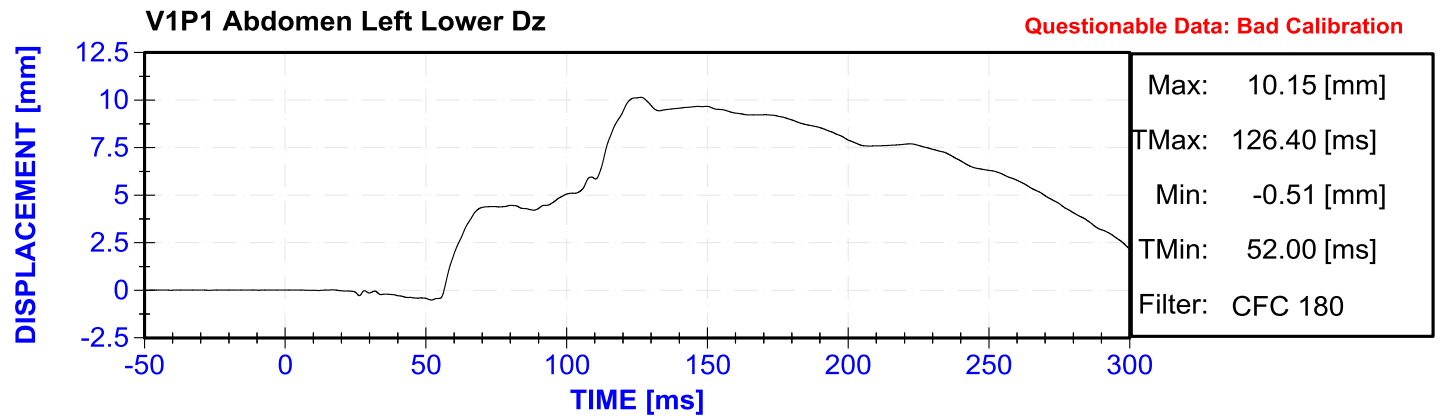
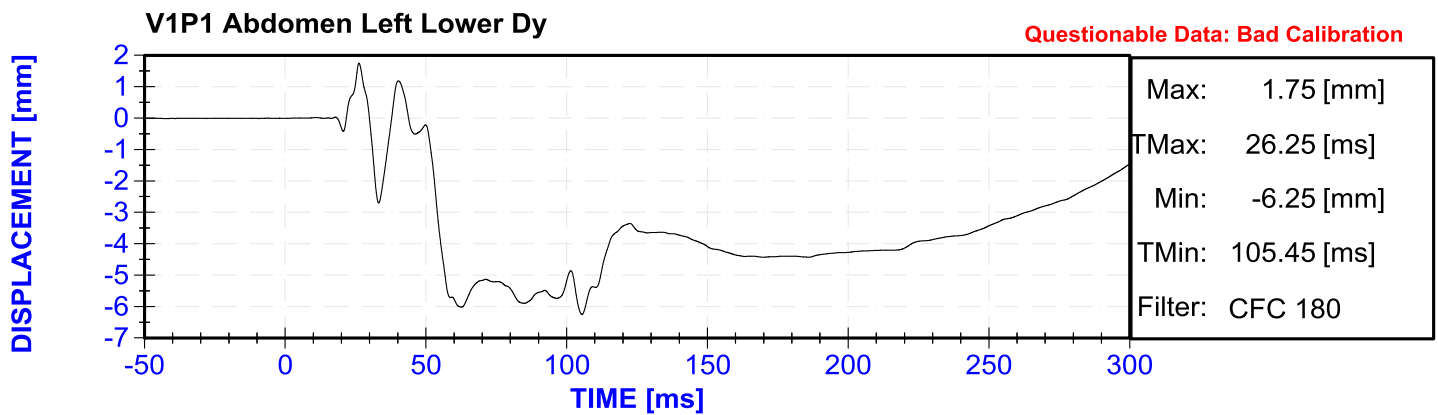
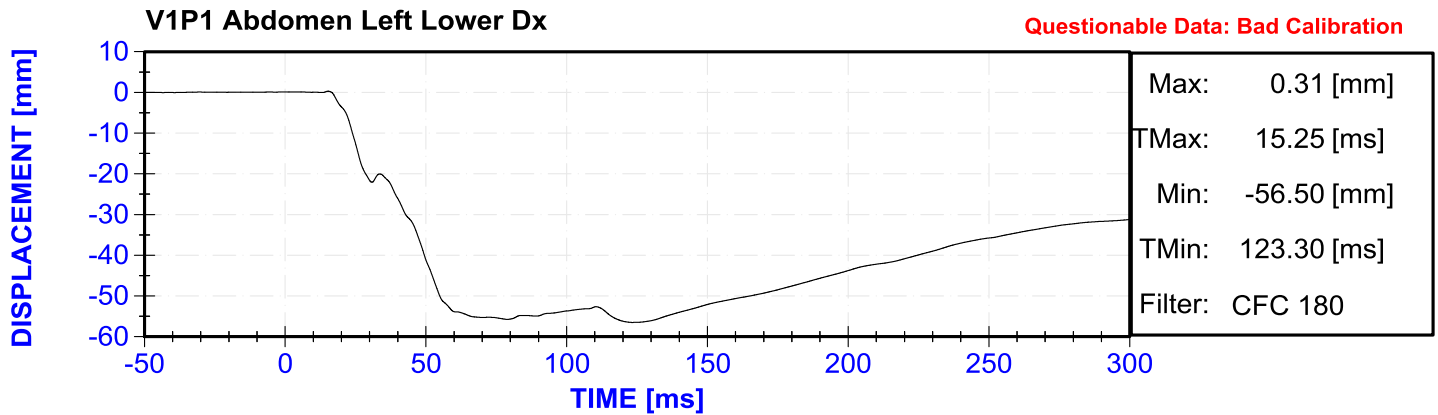


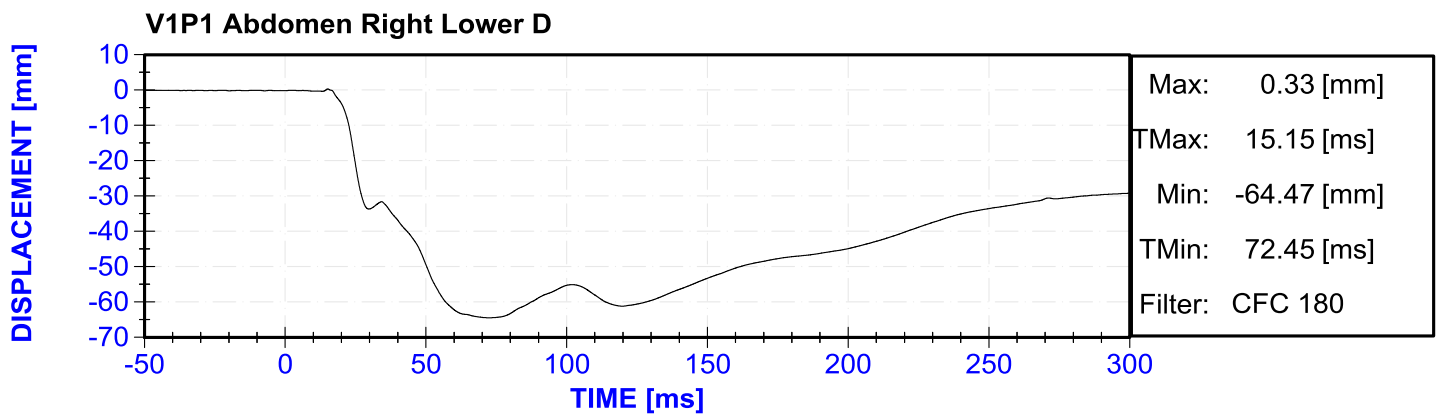
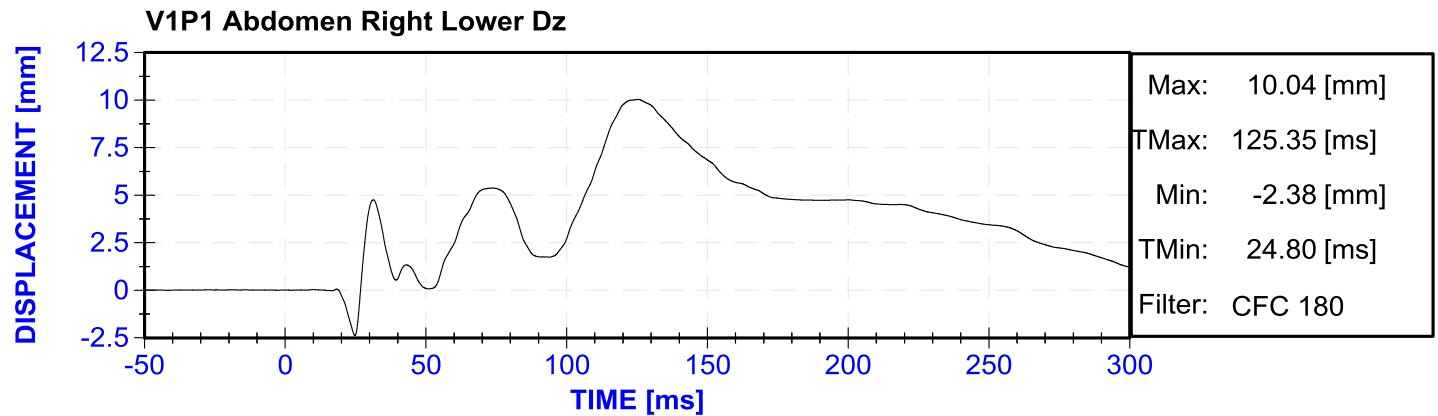
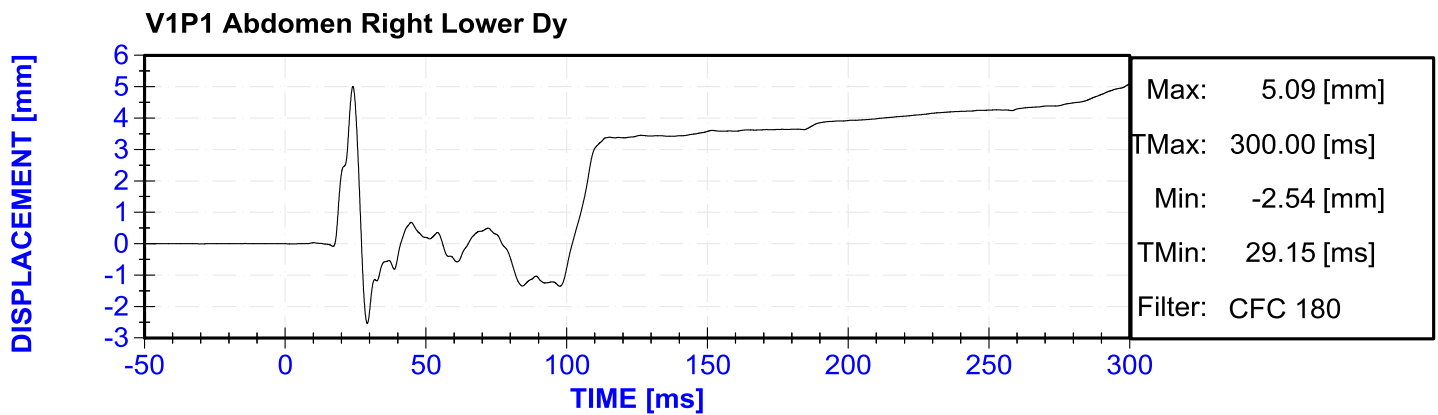
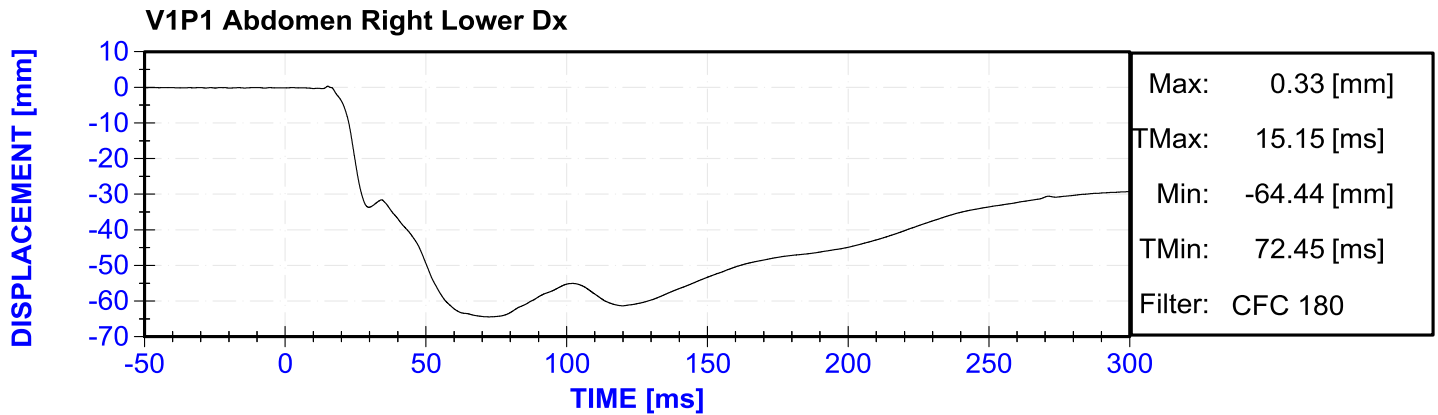












APPENDIX C

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

Table C-1: Dummy Information

TYPE	SERIAL NUMBER
THOR-M 50 TH Male	DL9207
5 th Female	324
5 th Female	019

Table C-2: THOR IR-TRACC Initial Set-Up Information

THOR – M S/N: DL9207		
IR-TRACC Location	IR-TRACC Exponent	IR-TRACC Slope
Upper Left Thorax Dx	-0.43199	36.9703
Upper Right Thorax Dx	-0.48860	29.8982
Lower Left Thorax Dx	-0.45268	35.3389
Lower Right Thorax Dx	-0.43502	37.4827
Left Abdomen Dx	-0.34061	66.5336
Right Abdomen Dx	-0.50000	26.8025

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

THOR – M S/N:					
Sensor	Manufacturer	Serial Number	Range	Sensitivity	Sensitivity Units
Head CG Ax	Endevco	P82183	2000	0.017690000	mV/V/g
Head CG Ay	Endevco	P81384	2000	0.017600000	mV/V/g
Head CG Az	Endevco	P81797	2000	0.019350000	mV/V/g
Head Wx	DTS	ARS4740	18000	0.091430000	mV/deg/sec
Head Wy	DTS	ARS4737	18000	0.095640000	mV/deg/sec
Head Wz	DTS	ARS4073	18000	0.093760000	mV/deg/sec
Skull Spring Front Fz	Humanetics	DO9740	4448.2	0.000512814	mV/V/N
Skull Spring Rear Fz	Humanetics	DO9741	4448.2	0.000508183	mV/V/N
Condyle Pot Ry	Humanetics	DK5911	180	3.021000000	mV/V/deg
Upper Neck Fx	Humanetics	DP3956	8896.4	0.000224158	mV/V/N
Upper Neck Fy	Humanetics	DP3956	8896.4	0.000227755	mV/V/N
Upper Neck Fz	Humanetics	DP3956	13344.7	0.000085255	mV/V/N
Upper Neck Mx	Humanetics	DP3956	282.5	0.005819469	mV/V/Nm
Upper Neck My	Humanetics	DP3956	282.5	0.005983009	mV/V/Nm
Upper Neck Mz	Humanetics	DP3956	282.5	0.009425133	mV/V/Nm
Lower Neck Fx	Humanetics	DP4780	13344.7	0.000173709	mV/V/N
Lower Neck Fy	Humanetics	DP4780	13344.7	0.000174489	mV/V/N

Lower Neck Fz	Humanetics	DP4780	13344.7	0.000070575	mV/V/N
Lower Neck Mx	Humanetics	DP4780	451.9	0.004108210	mV/V/Nm
Lower Neck My	Humanetics	DP4780	451.9	0.004146714	mV/V/Nm
Lower Neck Mz	Humanetics	DP4780	226	0.006740265	mV/V/Nm
T1 Ax	Endevco	P79630	2000	0.020870000	mV/V/g
T1 Ay	Endevco	P78880	2000	0.019820000	mV/V/g
T1 Az	Endevco	P82758	2000	0.018610000	mV/V/g
Upper Left Thorax Dx	Humanetics	DS6355			
Upper Left Thorax Ry	Humanetics	DI2382	180	2.978800000	mV/V/deg
Upper Left Thorax Rz	Humanetics	DI2383	180	3.007300000	mV/V/deg
Upper Right Thorax Dx	Humanetics	DJ2613			
Upper Right Thorax Ry	Humanetics	DI7753	180	3.035900000	mV/V/deg
Upper Right Thorax Rz	Humanetics	DI7752	180	3.052400000	mV/V/deg
Lower Left Thorax Dx	Humanetics	DS6353			
Lower Left Thorax Ry	Humanetics	DM4781	180	3.001400000	mV/V/deg
Lower Left Thorax Rz	Humanetics	DS4092	180	3.072500000	mV/V/deg
Lower Right Thorax Dx	Humanetics	DS6354			
Lower Right Thorax Ry	Humanetics	DM4776	180	3.004900000	mV/V/deg
Lower Right Thorax Rz	Humanetics	DM4777	180	2.994700000	mV/V/deg
T6 Ax	Endevco	P49229	2000	0.018010000	mV/V/g
T6 Ay	Endevco	P49215	2000	0.016950000	mV/V/g
T6 Az	Endevco	P52122	2000	0.017050000	mV/V/g
Thoracic Spine Fx	Humanetics	DP2984	13344.7	0.000146365	mV/V/N
Thoracic Spine Fy	Humanetics	DP2984	13344.7	0.000147107	mV/V/N
Thoracic Spine Fz	Humanetics	DP2984	17792.9	0.000060193	mV/V/N
Thoracic Spine Mx	Humanetics	DP2984	677.9	0.002146039	mV/V/Nm
Thoracic Spine My	Humanetics	DP2984	903.9	0.001914371	mV/V/Nm
T12 Ax	Endevco	P74936	2000	0.017350000	mV/V/g
T12 Ay	Endevco	P74937	2000	0.017230000	mV/V/g
T12 Az	Endevco	P52005	2000	0.019870000	mV/V/g
Abdomen Left Dx	Humanetics	DQ2303			
Abdomen Left Ry	Humanetics	DS8363	150	3.024100000	mV/V/deg
Abdomen Left Rz	Humanetics	DS8361	150	3.047400000	mV/V/deg
Abdomen Right Dx	Humanetics	DM2641			
Abdomen Right Ry	Humanetics	DS4094	150	3.012300000	mV/V/deg
Abdomen Right Rz	Humanetics	DS4121	150	3.021800000	mV/V/deg
Acetabulum Right Fx	Humanetics	DP3835	22241.1	0.000118506	mV/V/N
Acetabulum Right Fy	Humanetics	DP3835	13344.7	0.000059342	mV/V/N
Acetabulum Right Fz	Humanetics	DP3835	13344.7	0.000161173	mV/V/N
Acetabulum Left Fx	Humanetics	DP4639	22241.1	0.000121280	mV/V/N
Acetabulum Left Fy	Humanetics	DP4639	13344.7	0.000059432	mV/V/N
Acetabulum Left Fz	Humanetics	DP4639	13344.7	0.000165871	mV/V/N
Pelvis Ax	Endevco	P83434	2000	0.017540000	mV/V/g
Pelvis Ay	Endevco	P82752	2000	0.018310000	mV/V/g
Pelvis Az	Endevco	P80296	2000	0.019410000	mV/V/g
ASIS Right Fx	Humanetics	DP5091	13000	0.000065215	mV/V/N
ASIS Right My	Humanetics	DP5091	325	0.003697538	mV/V/Nm

ASIS Left Fx	Humanetics	DP5092	13000	0.000067323	mV/V/N
ASIS Left My	Humanetics	DP5092	325	0.003688923	mV/V/Nm
Femur Left Fx	Denton	DM4975	15000	0.000143700	mV/V/N
Femur Left Fy	Denton	DM4975	15000	0.000143600	mV/V/N
Femur Left Fz	Denton	DM4975	15000	0.000072700	mV/V/N
Femur Left Mx	Denton	DM4975	350	0.006601400	mV/V/Nm
Femur Left My	Denton	DM4975	350	0.006642000	mV/V/Nm
Femur Left Mz	Denton	DM4975	300	0.008961300	mV/V/Nm
Femur Right Fx	Denton	DM4976	15000	0.000142600	mV/V/N
Femur Right Fy	Denton	DM4976	15000	0.000142900	mV/V/N
Femur Right Fz	Denton	DM4976	15000	0.000072200	mV/V/N
Femur Right Mx	Denton	DM4976	350	0.006505700	mV/V/Nm
Femur Right My	Denton	DM4976	350	0.006488900	mV/V/Nm
Femur Right Mz	Denton	DM4976	300	0.008811600	mV/V/Nm
Upper Tibia Fx	Denton	97	11120	0.00017270	mv/v/N
Upper Tibia Fz	Denton	97	11120	0.00009330	mv/v/N
Upper Tibia Mx	Denton	97	395	0.00733320	mv/v/Nm
Upper Tibia My	Denton	97	395	0.00739800	mv/v/Nm
Lower Tibia Fx	Denton	121	11100	0.00017510	mv/v/N
Lower Tibia Fy	Denton	121	11100	0.00017180	mv/v/N
Lower Tibia Fz	Denton	121	11100	0.00009580	mv/v/N
Lower Tibia Mx	Denton	121	395	0.00739650	mv/v/Nm
Lower Tibia My	Denton	121	395	0.00744720	mv/v/Nm
Ankle Rx	Contelec	0523	180	3.17860	mv/v/deg
Ankle Ry	Contelec	0524	180	3.19060	mv/v/deg
Ankle Rz	Contelec	0525	180	3.18790	mv/v/deg
Knee Dx	Space Age	C2102639B	33	24.09410	mv/v/mm
Leg Ax	Endevco	P77996	2000	0.01803	mv/v/g
Leg Ay	Endevco	P64094	2000	0.02214	mv/v/g
Foot Ax	Endevco	P80271	2000	0.02100	mv/v/g
Foot Ay	Endevco	P74950	2000	0.01782	mv/v/g
Foot Az	Endevco	P51684	2000	0.01953	mv/v/g
Achilles Fz	Denton	136	4448	0.000257800	mv/V/N
Upper Tibia Fx	Denton	75	11120	0.00017350	mv/v/N
Upper Tibia Fz	Denton	75	11120	0.00009520	mv/v/N
Upper Tibia Mx	Denton	75	395	0.00749000	mv/v/Nm
Upper Tibia My	Denton	75	395	0.00747580	mv/v/Nm
Lower Tibia Fx	Denton	166	11100	0.00017560	mv/v/N
Lower Tibia Fy	Denton	166	11100	0.00017130	mv/v/N
Lower Tibia Fz	Denton	166	11100	0.00009950	mv/v/N
Lower Tibia Mx	Denton	166	395	0.00742480	mv/v/Nm
Lower Tibia My	Denton	166	395	0.00737260	mv/v/Nm
Ankle Rx	Contelec	0528	180	3.20220	mv/v/deg
Ankle Ry	Contelec	0526	180	3.15530	mv/v/deg

Ankle Rz	Contelec	0527-1	180	3.16060	mv/v/deg
Knee Dx	Space Age	021033	30	23.25080	mv/v/mm
Leg Ax	Endevco	P82744	2000	0.01827	mv/v/g
Leg Ay	Endevco	P82322	2000	0.01726	mv/v/g
Foot Ax	Endevco	P74976	2000	0.01784	mv/v/g
Foot Ay	Endevco	P83340	2000	0.02038	mv/v/g
Foot Az	Endevco	P83339	2000	0.01990	mv/v/g
Achilles Fz	Denton	129	4448	0.000278100	mv/V/N

Table C- 4: 5th Female Dummy Initial Set-Up Information

5 th Female S/N: 324					
Sensor	Manufacturer	Serial Number	Range	Sensitivity	Sensitivity Units
Head CG Ax	Endevco	P58729	2000	0.018150000	mV/V/g
Head CG Ax	Endevco	P74955	2000	0.018560000	mV/V/g
Head CG Ax	Endevco	P74778	2000	0.017380000	mV/V/g
Head CG RAx	Endevco	P74972	2000	0.017520000	mV/V/g
Head CG RAY	Endevco	P82756	2000	0.017520000	mV/V/g
Head CG RAz	Endevco	P74773	2000	0.018130000	mV/V/g
Head Wx	DTS	ARS5931	18000	0.093230000	mV/V/sec
Head Wy	DTS	ARS4714	18000	0.094490000	mV/V/sec
Head Wz	DTS	ARS6635	18000	0.098430000	mV/V/sec
Upper Neck Fx	Denton	2193	8896.4	0.000189700	mV/V/N
Upper Neck Fy	Denton	2193	8896.4	0.000184400	mV/V/N
Upper Neck Fz	Denton	2193	13344.6	0.000098300	mV/V/N
Upper Neck Mx	Denton	2193	282.5	0.005692000	mV/V/Nm
Upper Neck My	Denton	2193	282.5	0.005724200	mV/V/Nm
Upper Neck Mz	Denton	2193	282.5	0.008138800	mV/V/Nm
Chest Ax	Endevco	P52012	2000	0.017510000	mV/V/g
Chest Ay	Endevco	P80910	2000	0.018350000	mV/V/g
Chest Az	Endevco	P74774	2000	0.017030000	mV/V/g
Chest Dx	Servo	CST324	54	1.752400000	mV/V/deg
Pelvis Ax	Endevco	P80335	2000	0.016810000	mV/V/g
Pelvis Ay	Endevco	P78730	2000	0.017530000	mV/V/g
Pelvis Az	Endevco	P52128	2000	0.016890000	mV/V/g
Femur Right Fz	Denton	1714	13340	0.000108200	mV/V/N
Femur Left Fz	Denton	1702	13340	0.000109400	mV/V/N
Upper Tibia Right Fx	Denton	372	11120.55	0.000171412	mV/V/N
Upper Tibia Right Fy	Denton	372	11120.55	0.000170342	mV/V/N

Upper Tibia Right Fz	Denton	372	11120.55	0.000092630	mV/V/N
Upper Tibia Right Mx	Denton	372	395.4467	0.007423756	mV/V/Nm
Upper Tibia Right My	Denton	372	395.4467	0.007387342	mV/V/Nm
Lower Tibia Right Fx	Denton	405	11120.55	0.000174398	mV/V/N
Lower Tibia Right Fy	Denton	405	11120.55	0.000178211	mV/V/N
Lower Tibia Right Fz	Denton	405	11120.55	0.000093925	mV/V/N
Lower Tibia Right Mx	Denton	405	395.4467	0.007600771	mV/V/Nm
Lower Tibia Right My	Denton	405	395.4467	0.007638450	mV/V/Nm
Upper Tibia Left Fx	Denton	484	11120.55	0.000172159	mV/V/N
Upper Tibia Left Fy	Denton	484	11120.55	0.000170585	mV/V/N
Upper Tibia Left Fz	Denton	484	11120.55	0.000098853	mV/V/N
Upper Tibia Left Mx	Denton	484	395.4467	0.007399480	mV/V/Nm
Upper Tibia Left My	Denton	484	395.4467	0.007426791	mV/V/Nm
Lower Tibia Left Fx	Denton	397	11120.55	0.000174299	mV/V/N
Lower Tibia Left Fy	Denton	397	11120.55	0.000178453	mV/V/N
Lower Tibia Left Fz	Denton	397	11120.55	0.000095040	mV/V/N
Lower Tibia Left Mx	Denton	397	395.4467	0.007559047	mV/V/Nm
Lower Tibia Left My	Denton	397	395.4467	0.007546908	mV/V/Nm
Right Toe Az	Endevco	P82746	2000	0.017850000	mV/V/g
Right Foot Ax	Endevco	P64098	2000	0.023010000	mV/V/g
Right Foot Az	Endevco	P52046	2000	0.019130000	mV/V/g
Left Toe Az	Endevco	P52045	2000	0.020320000	mV/V/g
Left Foot Ax	Endevco	P52055	2000	0.018800000	mV/V/g
Left Foot Az	Endevco	P79408	2000	0.017150000	mV/V/g
RibEye Rib Deflection System	Boxboro	108	N/A	N/A	N/A

Table C- 5: 5th Female Dummy Initial Set-Up Information

5 th Female S/N: 019					
Sensor	Manufacturer	Serial Number	Range	Sensitivity	Sensitivity Units
Head CG Ax	Endevco	P78168	2000	0.017840000	mV/V/g
Head CG Ay	Endevco	P82323	2000	0.018100000	mV/V/g
Head CG Az	Endevco	P58727	2000	0.017660000	mV/V/g
Upper Neck Fx	Denton	2184	8896.4	0.000186800	mV/V/N
Upper Neck Fy	Denton	2184	8896.4	0.000182300	mV/V/N
Upper Neck Fz	Denton	2184	13344.6	0.000098100	mV/V/N
Upper Neck Mx	Denton	2184	282.5	0.005686400	mV/V/Nm
Upper Neck My	Denton	2184	282.5	0.005715100	mV/V/Nm
Upper Neck Mz	Denton	2184	282.5	0.008202000	mV/V/Nm
Chest Ax	Endevco	P83431	2000	0.017910000	mV/V/g
Chest Ay	Endevco	P84365	2000	0.019440000	mV/V/g
Chest Az	Endevco	P84472	2000	0.019240000	mV/V/g

Chest Ds	Servo	FEM019	54	1.831500000	mV/V/deg
Pelvis Ax	Endevco	P84579	2000	0.017590000	mV/V/g
Pelvis Ay	Endevco	P51698	2000	0.022320000	mV/V/g
Pelvis Az	Endevco	P64084	2000	0.023570000	mV/V/g
ASIS Left Fx	Denton	79	8896.4	0.000185400	mV/V/N
ASIS Left My	Denton	79	225.9	0.005273300	mV/V/Nm
ASIS Right Fx	Denton	76	8896.4	0.000185200	mV/V/N
ASIS Right My	Denton	76	225.9	0.005243000	mV/V/Nm
Left Femur Fz	Denton	1394	13340	0.000108800	mV/V/N
Right Femur Fz	Denton	1395	13340	0.000108300	mV/V/N
RibEye Rib Deflection System	Boxboro	107	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 DL9207

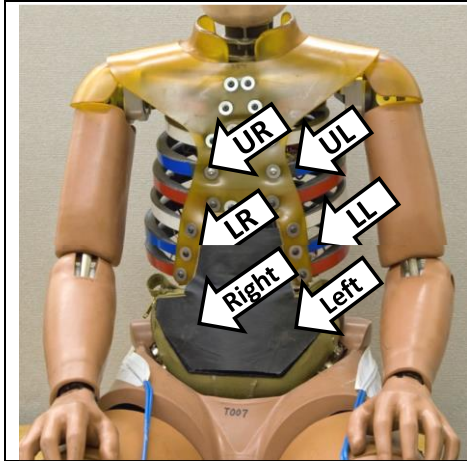


Figure 1. Manipulation to determine thoracic and abdominal IR-TRACC polarity.

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	+	+	DX (V)	N/A	+	+
RY (Deg)	N/A	+	+	RY (Deg)	N/A	+	+
RZ (Deg)	N/A	+	+	RZ (Deg)	N/A	+	+

THOR Inspection Checklist

Date: 8/7/2015		
NHTSA Representative: Timothy Keon		
Inspection Reporter: Matt Goehle		
Inspection type (check one): ☒ Pre-Test ☐ Post-Test		
Dummy S/N: DL9207	Legs S/N: LX0045/LX0046	
Dummy Description: THOR-M 50th Male		
Date of last Certification: Certification performed from 7/2014 through 4/2015		
<u>Tests conducted:</u> <u>Since last inspection:</u> R20150187 - 2015 Malibu <u>Since last certification:</u> S0309 (at UVA) S0310 (at UVA) S0311 (at UVA) S0312 (at UVA)	LX Leg certification performed R20150186 - 2015 Malibu R20150187 - 2015 Malibu	
<u>Known errors in data channels (no data, clipping, unexpected drops):</u> - Right Ankle In/Eversion Moment is significantly higher than R20150186. Inspection appears that right tibia Y Acceleration is higher than expected. Shaking the Amphenol connector causes large datashifts. Female Amphenol pins were tightened, and retests okay.		
<u>Physical evidence of damage:</u> None New		
<u>Anecdotal evidence of damage:</u> None		
<u>Equipment delivered to Borrower:</u> THOR DL9207 ATD 26 Accelerometers 3 Angular Rate Sensors 2 Skull Spring LC 1 Condyle Pot 1 Upper Neck LC 6 IRTraccs 12 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	

Note: New Damage is Noted in Red

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 de-bonding between neck pucks and plates
Y / N	No evidence of de-bonding 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	
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 de-bonding, tearing, or permanent compression of posterior soft stops
OTHER	
SPINE	
Y / N	No evidence of de-bonding between thoracic spine flex joint and metal plates
Y / N	No evidence of de-bonding between lumbar spine flex joint and metal plates
Y / N	Lumbar spine pitch change joint mechanism mating teeth are engaged
OTHER	
THORAX	
Y / N	No evidence of contact at top, bottom, or interior faces of rib damping material
Y / N	No evidence of de-bonding between rib damping material and ribs
Y / N	IRTRACCs securely attached to anterior ribs
Y / N	IRTRACCs 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	Grounding strap disconnected from thorax damper to rib. We will reattach. 

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 Multiple tears and broken stitches in lower abdomen bag. The upper and lower abdomen bags appear to be from THOR SN007
	       
Y / N	Lower abdomen insert securely attached to spine
Y / N	Lower abdomen insert shows no evidence of permanent set
OTHER	
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
Y / N	No cuts, tears, or scuffing of knee flesh
OTHER	Left femur flesh is separating from zipper. We placed gaffer's tape across zipper to prevent further damage. 

LOWER EXTREMITY (LX)	
Y / N	Rotational potentiometers in ankle securely attached
Y / N	Achilles tendon provides resistance to dorsiflexion
Y / N	No evidence of de-bonding, tearing, or permanent compression of ankle soft stops
Y / N	No cuts, tears, or scuffing of leg flesh Left lower leg flesh is torn near zipper. We placed gaffer's tape around the flesh to prevent further damage.
	
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
OTHER	

THOR Inspection Checklist

Date: 8/14/2015		
NHTSA Representative: Timothy Keon		
Inspection Reporter: Matt Goehle		
Inspection type (check one): ☐ Pre-Test ☒ Post-Test		
Dummy S/N: DL9207		Legs S/N: LX0045/LX0046
Dummy Description: THOR-M 50th Male		
Date of last Certification: Certification performed from 7/2014 through 4/2015		
<u>Tests conducted:</u> <u>Since last inspection:</u> R20155144 – 2015 Highlander <u>Since last certification:</u> S0309 (at UVA) S0310 (at UVA) S0311 (at UVA) S0312 (at UVA)	LX Leg certification performed R20150186 - 2015 Malibu R20150187 - 2015 Malibu R20155144 – 2015 Highlander	
<u>Known errors in data channels (no data, clipping, unexpected drops):</u> - 11FOOTRILXTHANYP, Ankle Right Y Rotation, Questionable Data from 50ms to 100 ms, SN:DS-0526 Wires at potentiometer are not insulated, and movement of the ankle causes shorts. This may have occurred during the test. We will heat shrink as necessary to insulate the 3 wires, and secure the cables with gaffer's tape tightly to the leg to prevent a repeat		
<u>Physical evidence of damage:</u> None New		
<u>Anecdotal evidence of damage:</u> None		
<u>Equipment delivered to Borrower:</u> THOR DL9207 ATD 26 Accelerometers 3 Angular Rate Sensors 2 Skull Spring LC 1 Condyle Pot 1 Upper Neck LC 6 IRTraccs 12 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	

Note: New Damage is Noted in Red

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 de-bonding between neck pucks and plates
Y / N	No evidence of de-bonding 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	
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 de-bonding, tearing, or permanent compression of posterior soft stops
OTHER	
SPINE	
Y / N	No evidence of de-bonding between thoracic spine flex joint and metal plates
Y / N	No evidence of de-bonding between lumbar spine flex joint and metal plates
Y / N	Lumbar spine pitch change joint mechanism mating teeth are engaged
OTHER	
THORAX	
Y / N	No evidence of contact at top, bottom, or interior faces of rib damping material
Y / N	No evidence of de-bonding between rib damping material and ribs
Y / N	IRTRACCs securely attached to anterior ribs
Y / N	IRTRACCs 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	Grounding strap disconnected from thorax damper to rib. We will reattach. 

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 Multiple tears and broken stitches in lower abdomen bag. The upper and lower abdomen bags appear to be from THOR SN007
	       
Y / N	Lower abdomen insert securely attached to spine
Y / N	Lower abdomen insert shows no evidence of permanent set
OTHER	
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
Y / N	No cuts, tears, or scuffing of knee flesh
OTHER	Left femur flesh is separating from zipper. We placed gaffer's tape across zipper to prevent further damage. 

LOWER EXTREMITY (LX)	
Y / N	Rotational potentiometers in ankle securely attached
Y / N	Achilles tendon provides resistance to dorsiflexion
Y / N	No evidence of de-bonding, tearing, or permanent compression of ankle soft stops
Y / N	No cuts, tears, or scuffing of leg flesh Left lower leg flesh is torn near zipper. We placed gaffer's tape around the flesh to prevent further damage.
	
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
OTHER	

ATD 324: Pre-Test Inspection



FM-ATD-DC5F-031-R00

Damage Checklist Hybrid III – 5th Female

Dummy Serial Number 324

Technician M. Hartung

Test Date 8/2/15

- ☒ Pre-test calibration
☒ Post-test calibration

- 1) Clean dummy and disassemble as necessary to check for damage.
2) Complete the following table and throughout the certification process, note any physical or anecdotal damage on this form.

Dummy Item	Inspect for	Comments	Damaged	OK
Outer skin	Gashes, rips, cracks			☒
Head	Ballast secure			☒
	General appearance <u>5m Tear Repair / Broken/Corrosion Damage</u>			☒
Neck	Broken or cracked rubber			☒
	Upper neck bracket firmly attached to the lower neck bracket			☒
	Looseness at the condyle joint			☒
	Nodding blocks cracked or out of position			☒
Spine	Broken or cracks in rubber.			☒
Ribs	Broken or bent ribs			☒
	Broken or bent rib supports			☒
	Damping material separated or cracked			☒
	Rubber bumpers in place			☒
Chest Potentiometer	Bent shaft			☒
	Slider arm riding in track			☒
Transducer leads	Torn cables			☒
Accelerometer Mountings	Head mounting secure			☒
	Chest mounting secure			☒
Knees	Skin condition			☒
	Insert (do not remove)			☒
	Casting			☒
Limbs	Normal movement and adjustment			☒
Knee Sliders	Wires intact			☒
	Rubber returned to "at rest" position			☒
Pelvis	Broken			☒
Other	<u>Ribbing</u>			☒

(Discuss any damage with the lab supervisor and if replacement parts are required, complete the "Parts Requested from NHTSA" Section of the Certification Workbook, and forward this form to Calspan's Contracts Department.)

M. Hartung
Signature

8/2/15
Date

ATD 324: Post-Test Inspection



FM-ATD-DC5F-031-R00

Damage Checklist Hybrid III – 5th Female

Dummy Serial Number 324

Technician M. Hanting

Test Date 8/17/15

☒ Pre-test calibration
☐ Post-test calibration

- 1) Clean dummy and disassemble as necessary to check for damage.
2) Complete the following table and throughout the certification process, note any physical or anecdotal damage on this form.

Dummy Item	Inspect for	Comments	Damaged	OK
Outer skin	Gashes, rips, cracks			☒
Head	Ballast secure			☒
	General appearance	Sm Tear (R) Head / Body / Mounting on base		☒
Neck	Broken or cracked rubber			☒
	Upper neck bracket firmly attached to the lower neck bracket			☒
	Looseness at the condyle joint			☒
	Nodding blocks cracked or out of position			☒
Spine	Broken or cracks in rubber.			☒
Ribs	Broken or bent ribs			☒
	Broken or bent rib supports			☒
	Damping material separated or cracked			☒
	Rubber bumpers in place			☒
Chest	Bent shaft			☒
Potentiometer	Slider arm riding in track			☒
Transducer leads	Torn cables			☒
Accelerometer Mountings	Head mounting secure			☒
	Chest mounting secure			☒
Knees	Skin condition			☒
	Insert (do not remove)			☒
	Casting			☒
Limbs	Normal movement and adjustment			☒
Knee Sliders	Wires intact			☒
	Rubber returned to "at rest" position			☒
Pelvis	Broken			☒
Other	<u>None</u>			☒

(Discuss any damage with the lab supervisor and if replacement parts are required, complete the "Parts Requested from NHTSA" Section of the Certification Workbook, and forward this form to Calspan's Contracts Department.)

M. Hanting
Signature

8/17/15
Date

ATD 019: Pre-Test Inspection



FM-ATD-DC5F-031-R00

Damage Checklist Hybrid III – 5th Female

Dummy Serial Number 019

Technician M. Harding

Test Date 8/2/15

☒ Pre-test calibration

☒ Post-test calibration

- 1) Clean dummy and disassemble as necessary to check for damage.
- 2) Complete the following table and throughout the certification process, note any physical or anecdotal damage on this form.

Dummy Item	Inspect for	Comments	Damaged	OK
Outer skin	Gashes, rips, cracks			☒
Head	Ballast secure			☒
	General appearance			☒
Neck	Broken or cracked rubber			☒
	Upper neck bracket firmly attached to the lower neck bracket			☒
	Looseness at the condyle joint			☒
	Nodding blocks cracked or out of position			☒
Spine	Broken or cracks in rubber.			☒
Ribs	Broken or bent ribs			☒
	Broken or bent rib supports			☒
	Damping material separated or cracked			☒
	Rubber bumpers in place			☒
Chest	Bent shaft			☒
Potentiometer	Slider arm riding in track			☒
Transducer leads	Torn cables			☒
Accelerometer Mountings	Head mounting secure			☒
	Chest mounting secure			☒
Knees	Skin condition			☒
	Insert (do not remove)			☒
	Casting			☒
Limbs	Normal movement and adjustment			☒
Knee Sliders	Wires intact			☒
	Rubber returned to "at rest" position			☒
Pelvis	Broken			☒
Other	<u>Pin Bye</u>			☒

(Discuss any damage with the lab supervisor and if replacement parts are required, complete the "Parts Requested from NHTSA" Section of the Certification Workbook, and forward this form to Calspan's Contracts Department.)

Signature M. Harding

Date 8/2/15

ATD 019: Post-Test Inspection



FM-ATD-DC5F-031-R00

Damage Checklist Hybrid III – 5th Female

Dummy Serial Number 819

Technician W. Hartung

Test Date 8/17/15

- ☒ Pre-test calibration
☒ Post-test calibration

- 1) Clean dummy and disassemble as necessary to check for damage.
2) Complete the following table and throughout the certification process, note any physical or anecdotal damage on this form.

Dummy Item	Inspect for	Comments	Damaged	OK
Outer skin	Gashes, rips, cracks			✓
Head	Ballast secure			✓
	General appearance			✓
Neck	Broken or cracked rubber			✓
	Upper neck bracket firmly attached to the lower neck bracket			✓
	Looseness at the condyle joint			✓
	Nodding blocks cracked or out of position			✓
Spine	Broken or cracks in rubber.			✓
Ribs	Broken or bent ribs			✓
	Broken or bent rib supports			✓
	Damping material separated or cracked			✓
	Rubber bumpers in place			✓
Chest Potentiometer	Bent shaft			✓
	Slider arm riding in track			✓
Transducer leads	Torn cables			✓
Accelerometer Mountings	Head mounting secure			✓
	Chest mounting secure			✓
Knees	Skin condition			✓
	Insert (do not remove)			✓
	Casting			✓
Limbs	Normal movement and adjustment			✓
Knee Sliders	Wires intact			✓
	Rubber returned to "at rest" position			✓
Pelvis	Broken			✓
Other	<u>Rebegan</u>			✓

(Discuss any damage with the lab supervisor and if replacement parts are required, complete the "Parts Requested from NHTSA" Section of the Certification Workbook, and forward this form to Calspan's Contracts Department.)

W. Hartung
 Signature

8/17/15
 Date

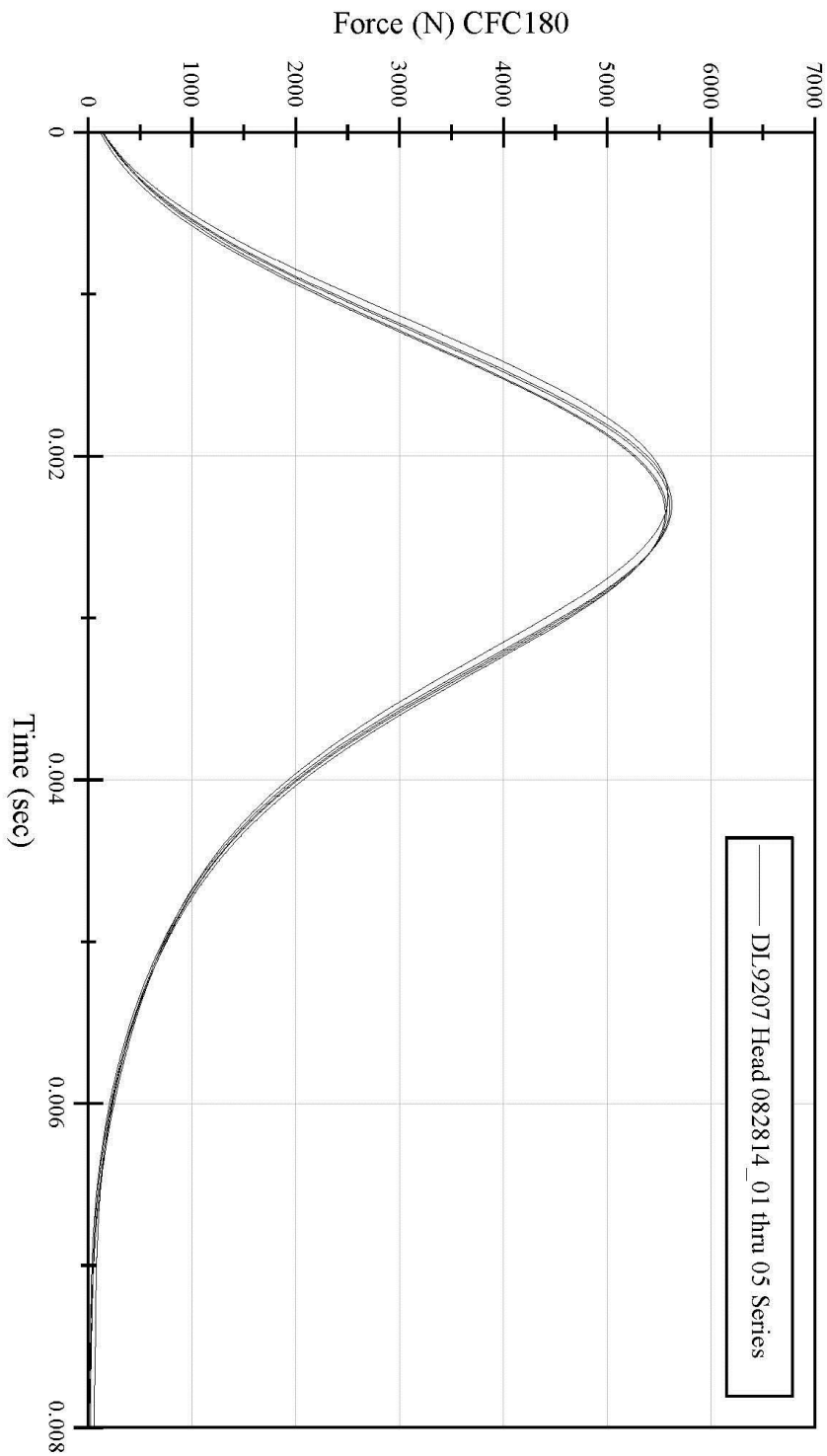
Test Data/Sensor Repair Notes

DUMMY CALIBRATIONS

50% ADULT MALE THOR DL9207 DUMMY CALIBRATIONS

Test Temperature: 71 degrees
Relative Humidity: 50%
Test Velocity: 2 m/s

THOR Head Impact Qualification
Probe Force
Serial Number: DL9207

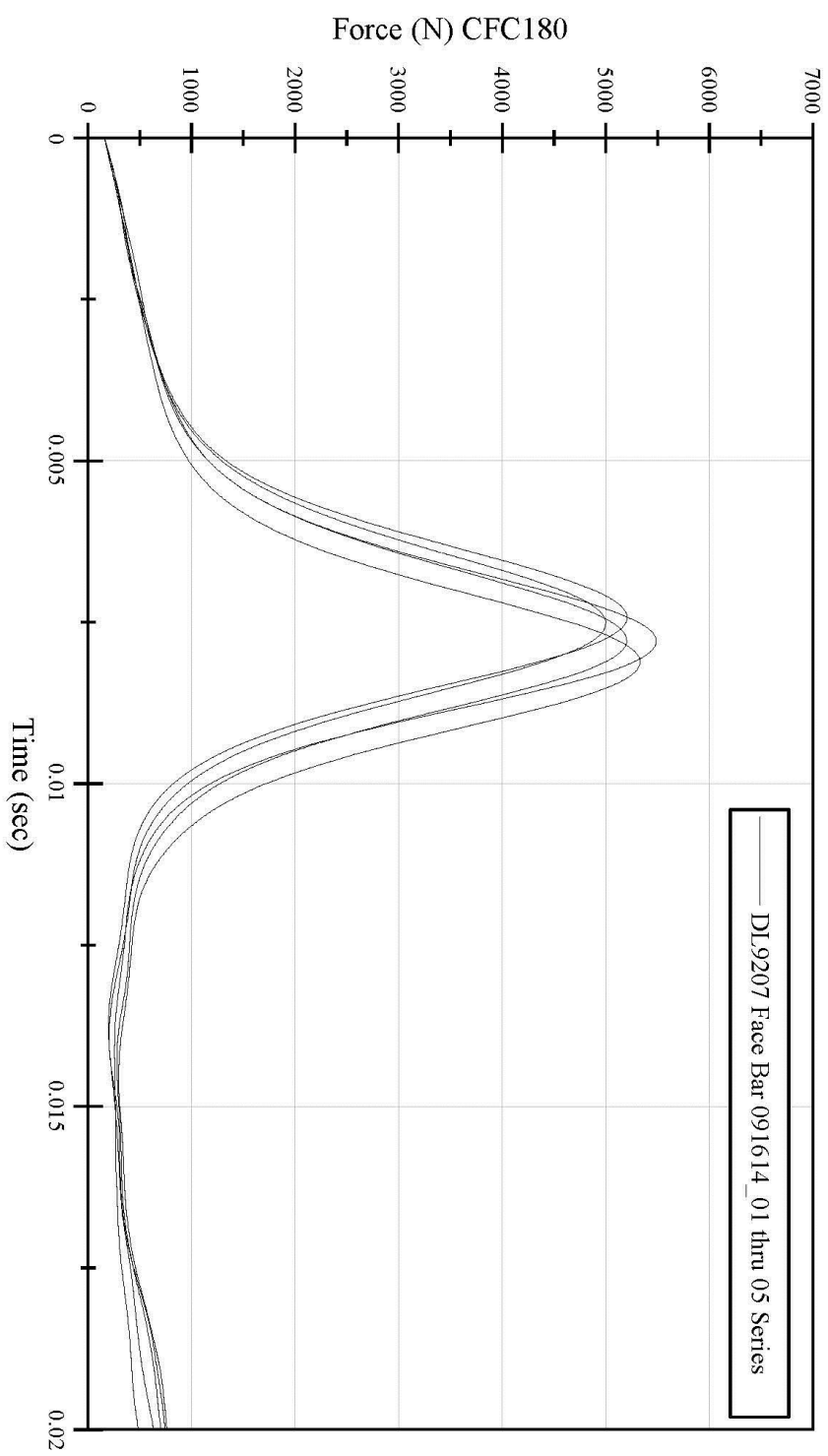


Software Version:

File Name: DL9207Head082814_01 thru 05 Series patrick
08/28/2014 14:08:19.0000

Test Temperature: 71 degrees
Relative Humidity: 44%
Test Velocity: 3.60 m/s

THOR Face-Bar Qualification
Probe Force
Serial Number: DL9207

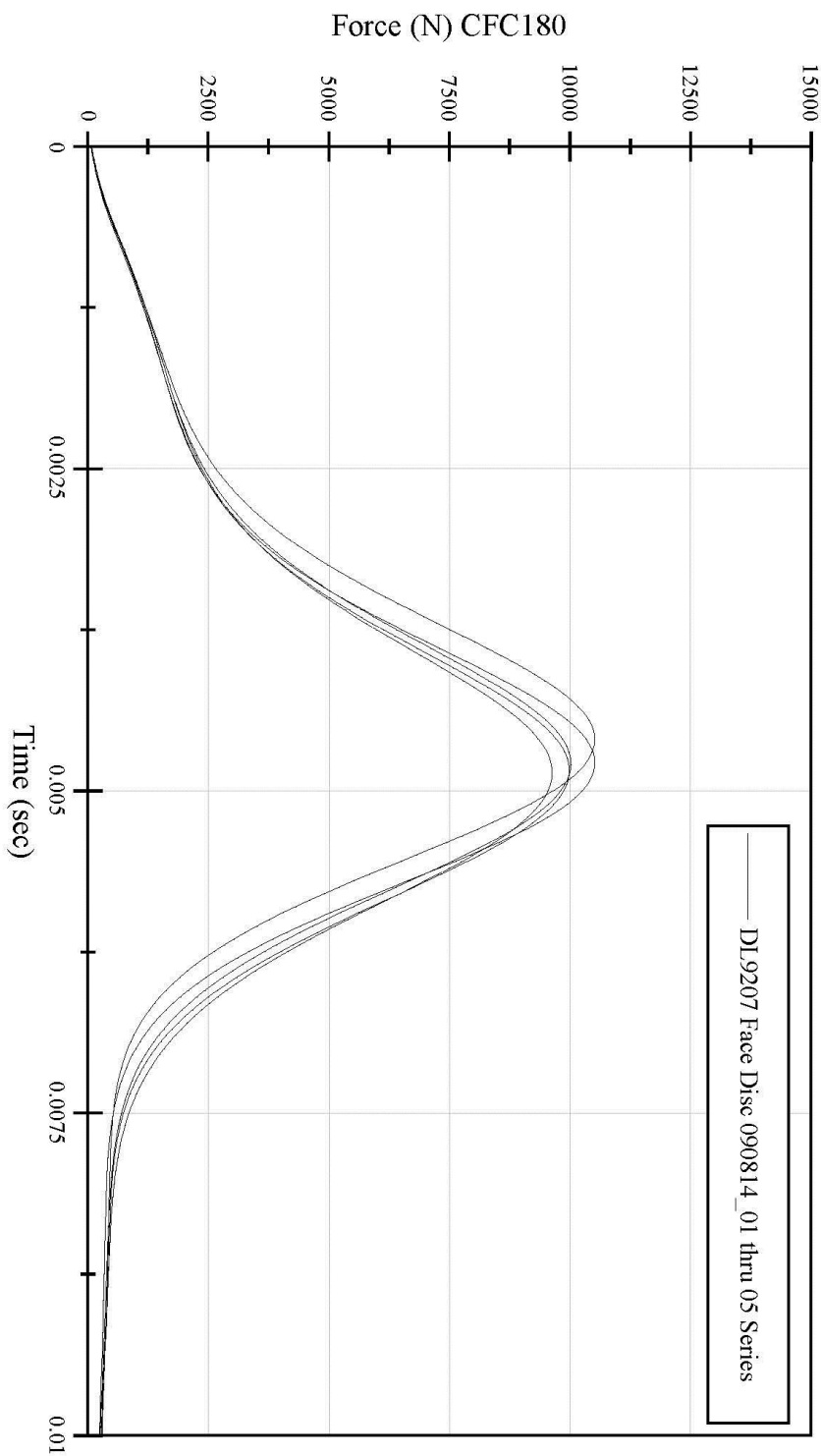


Software Version:

File Name: DL9207FaceBar091614_01 thru 05 Series patrick
09/16/2014 13:05:36.0000

Test Temperature: 71 degrees
Relative Humidity: 50%
Test Velocity: 6.68 m/s

THOR Face-Disk Qualification
Probe Force
Serial Number: DL9207

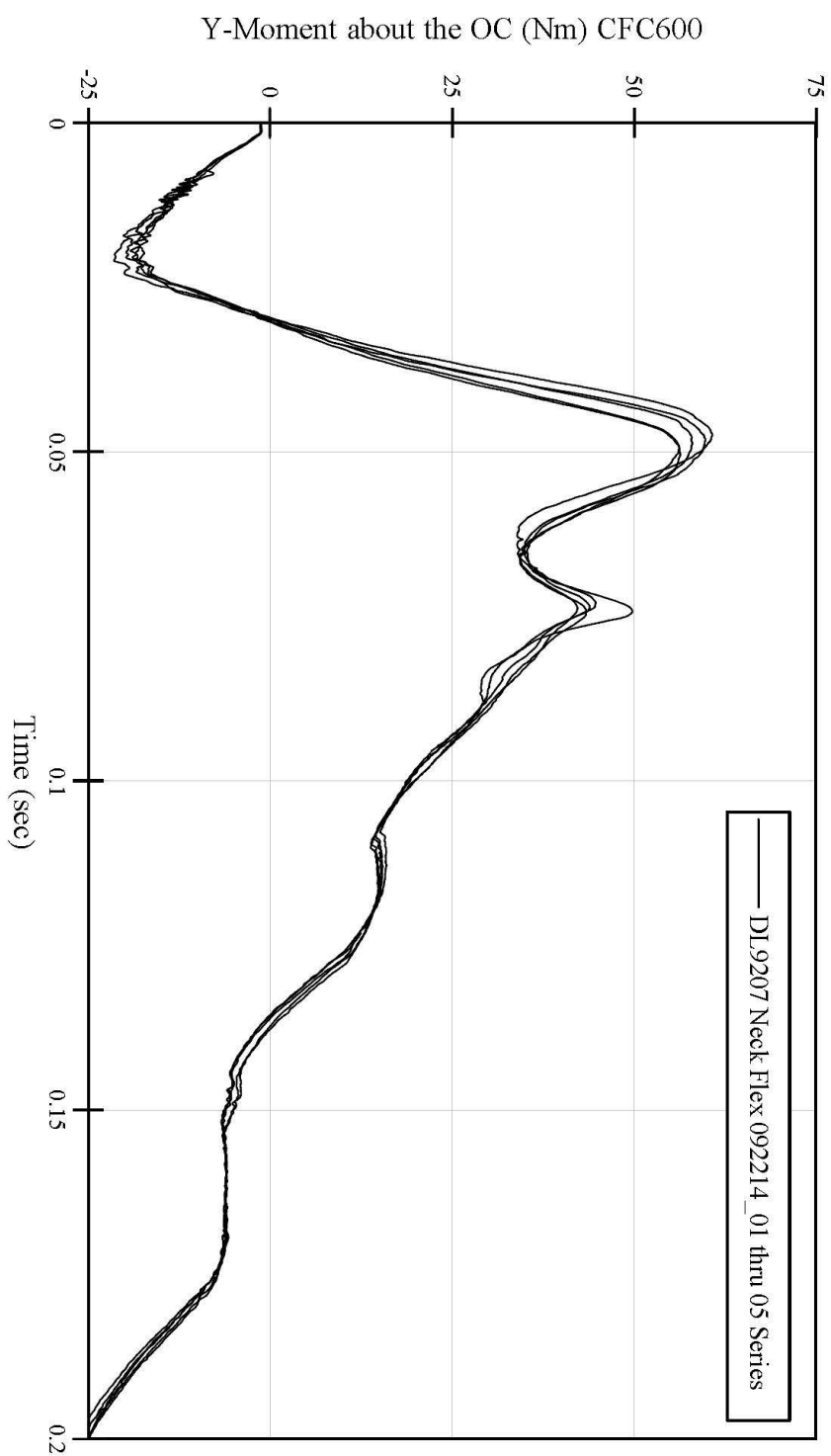


Software Version:

File Name: DL9207FaceDisc090814_01 thru 05 Series patrick
09/08/2014 14:44:59.0000

Test Temperature: 71 degrees
Relative Humidity: 50%
Test Velocity: 5.00 m/s

THOR Neck Flexion Qualification
Y-Moment
Serial Number: DL9207

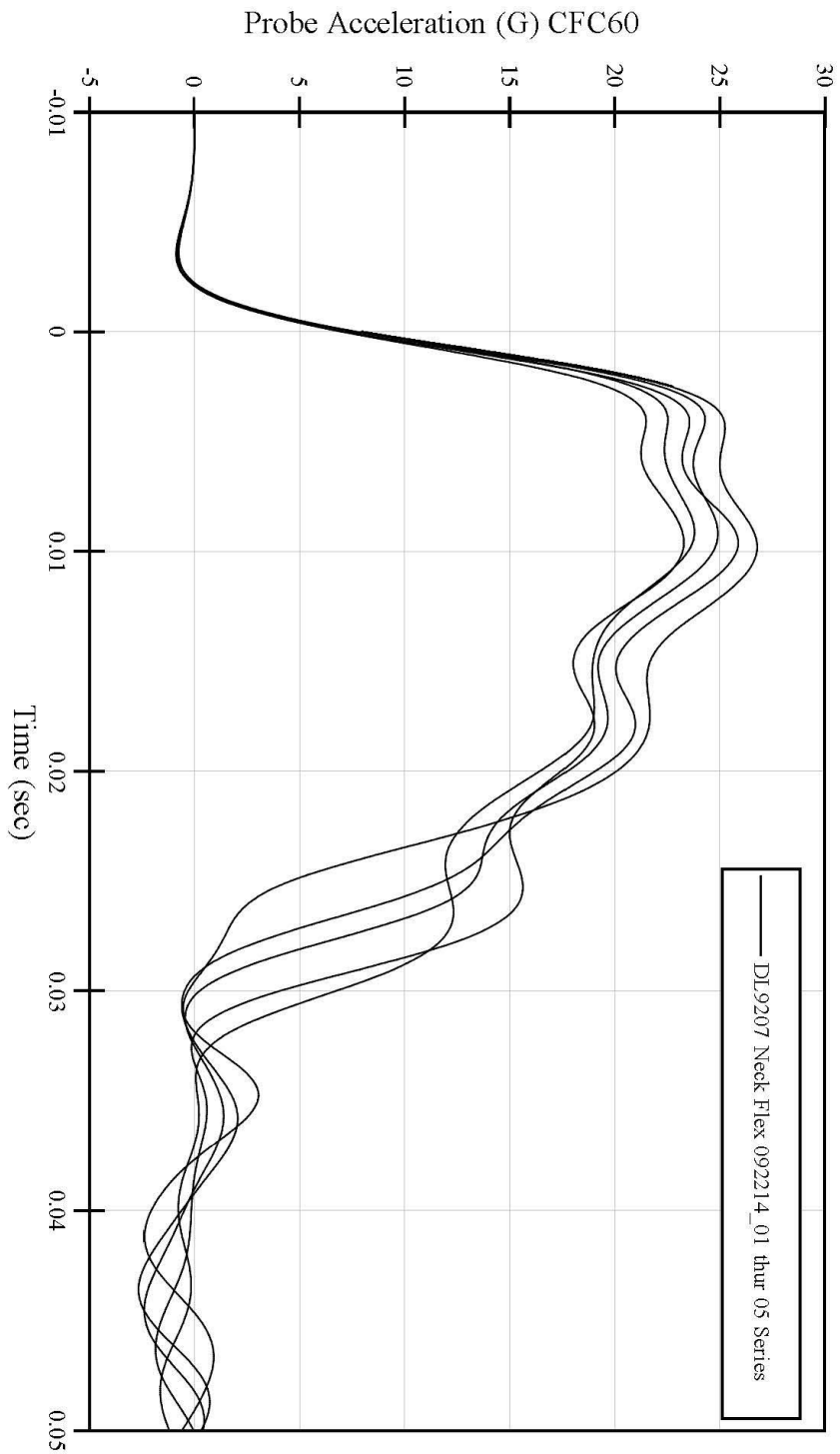


Software Version:

File Name: DL9207NeckFlex092214_01 thru 05 series patrick
09/22/2014 15:12:10.0000

Test Temperature: 71 degrees
Relative Humidity: 50%
Test Velocity: 5.00 m/s

THOR Neck Flexion Qualification
Probe Acceleration
Serial Number: DL9207

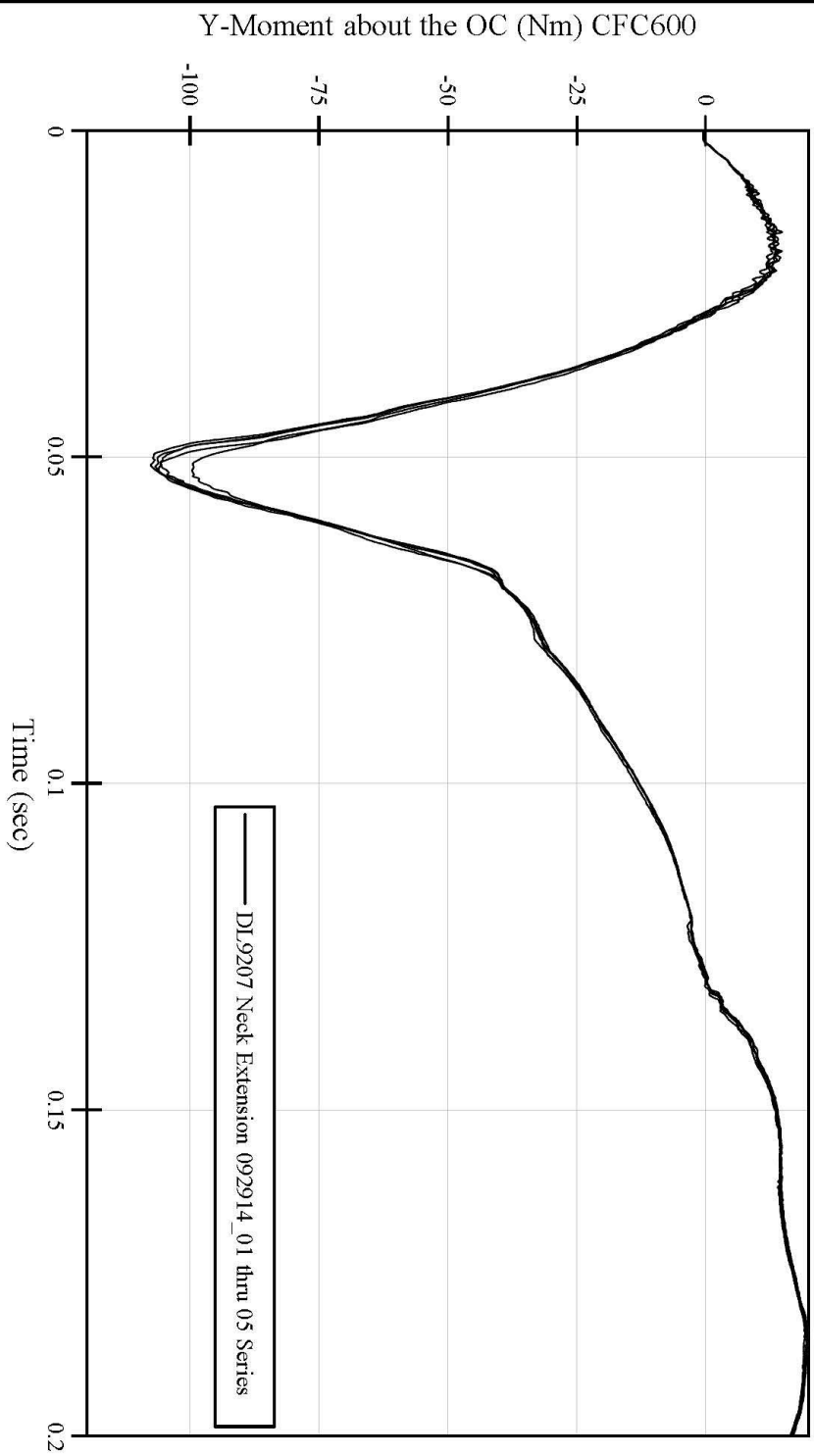


Software Version:

File Name: DL9207NeckFlex092214_01 thru 05 series patrick
09/22/2014 15:12:10.0000

Test Temperature: 71 degrees
Relative Humidity: 50%
Test Velocity: 5.04 m/s

THOR Neck Extension Qualification
Y-Moment
Serial Number: DL9207

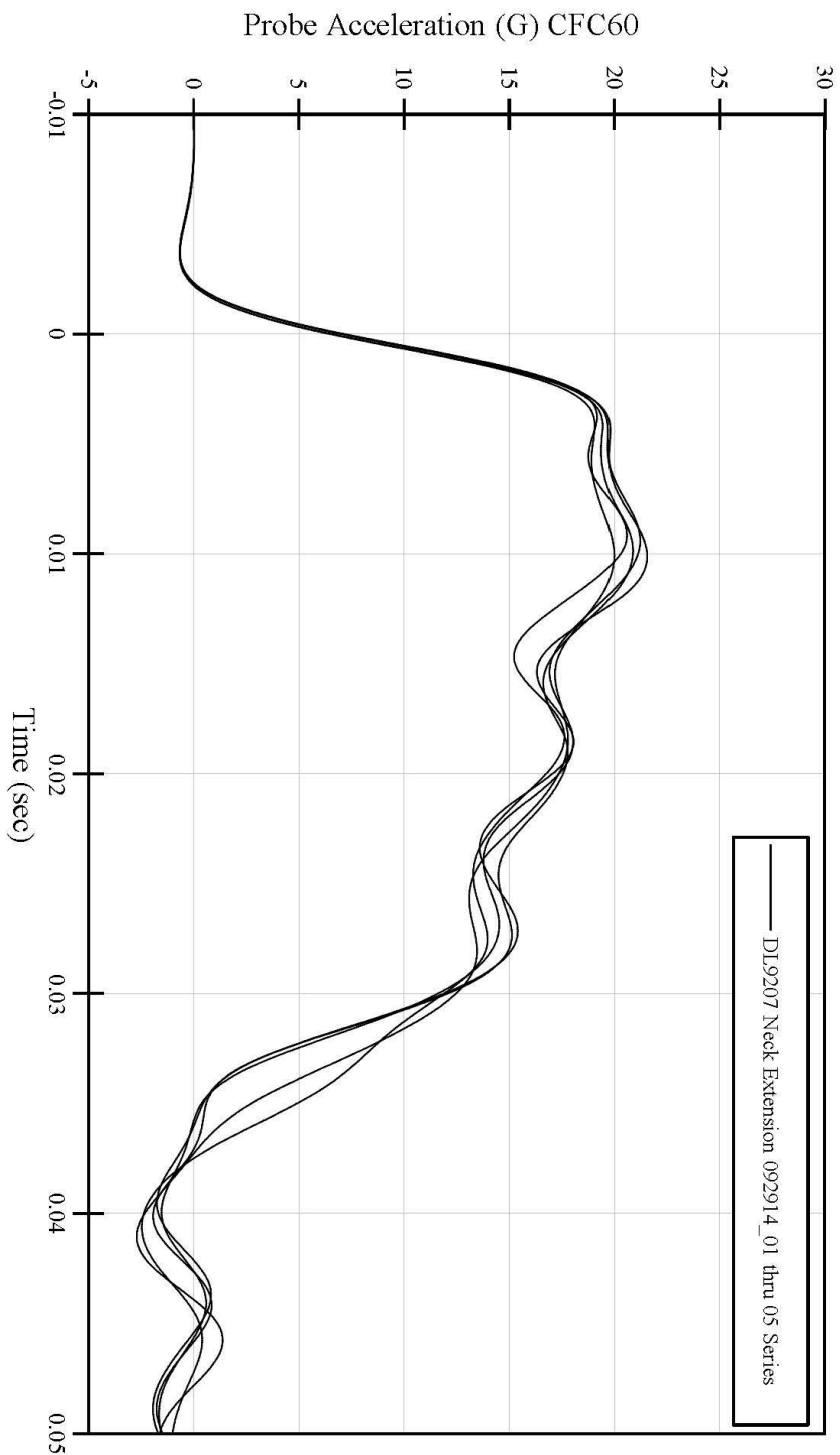


Software Version:

File Name: DL9207NeckExtension092914_01 thru 05 Series patrick
09/30/2014 09:17:19.0000

Test Temperature: 71 degrees
Relative Humidity: 50%
Test Velocity: 5.04 m/s

THOR Neck Extension Qualification
Probe Acceleration
Serial Number: DL9207



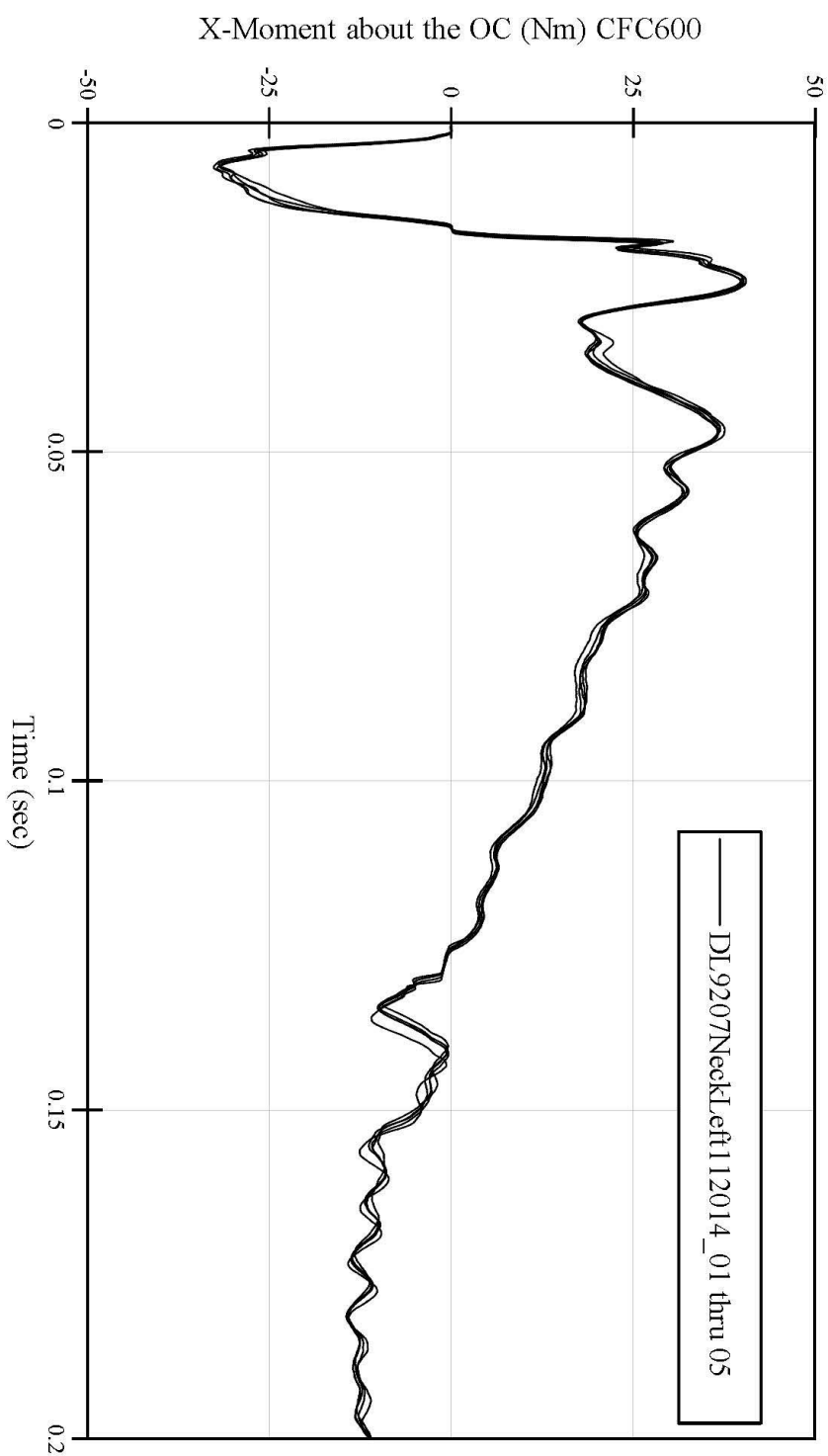
Software Version:

File Name: DL9207NeckExtension092914_01 thru 05 Series patrick
09/30/2014 09:17:19.0000

Test Temperature: 71 degrees
Relative Humidity: 30%
Test Velocity: 3.43 m/s

THOR Neck Left Lateral Flexion Qualification

X-Moment
Serial Number: DL9207



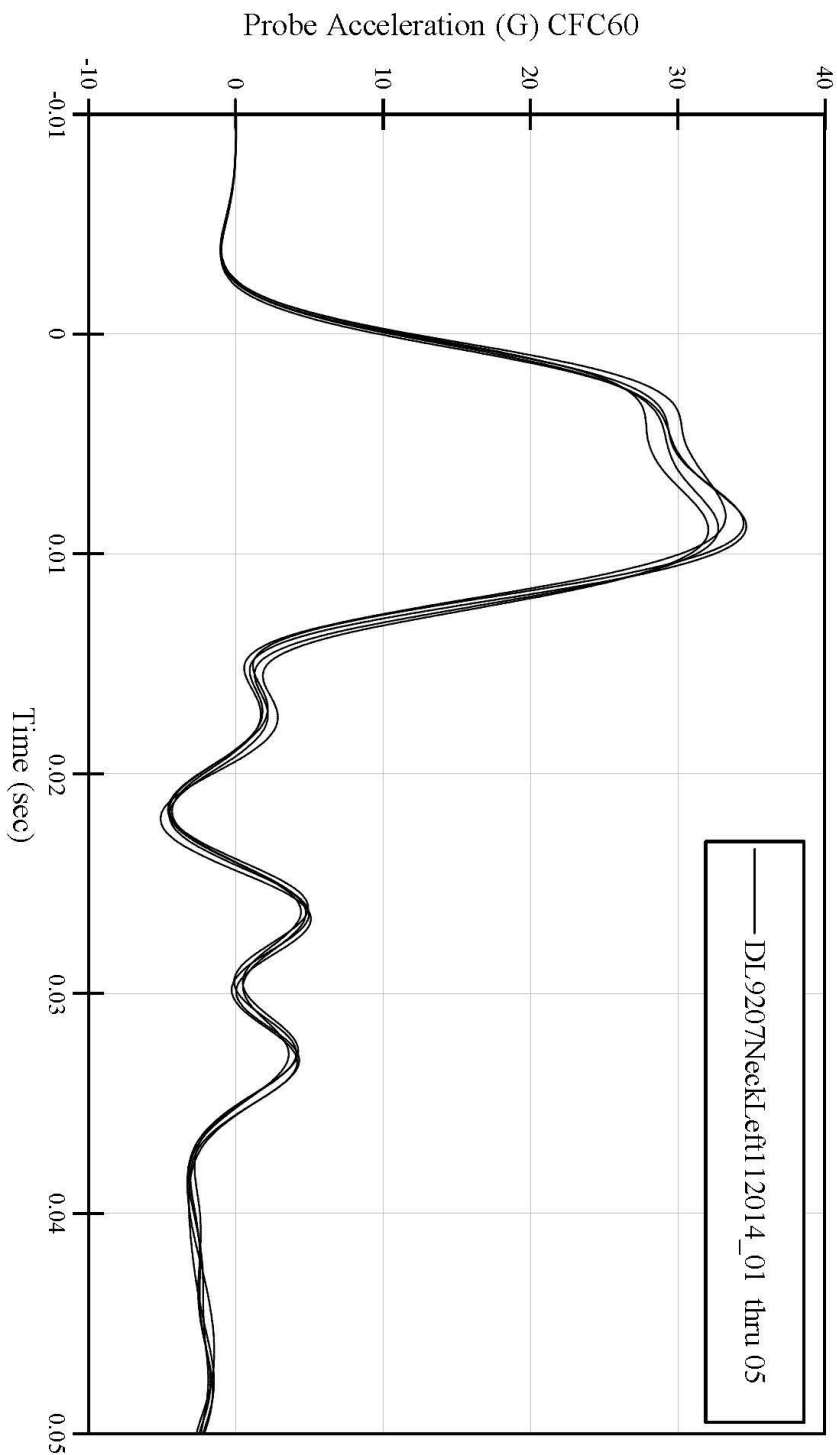
Software Version:

File Name: DL9207NeckLeft112014_01 thru 05 patrick
11/20/2014 12:31:49.0000

Test Temperature: 71 degrees
Relative Humidity: 30%
Test Velocity: 3.43 m/s

THOR Neck Left Lateral Flexion Qualification

Probe Acceleration
Serial Number: DL9207



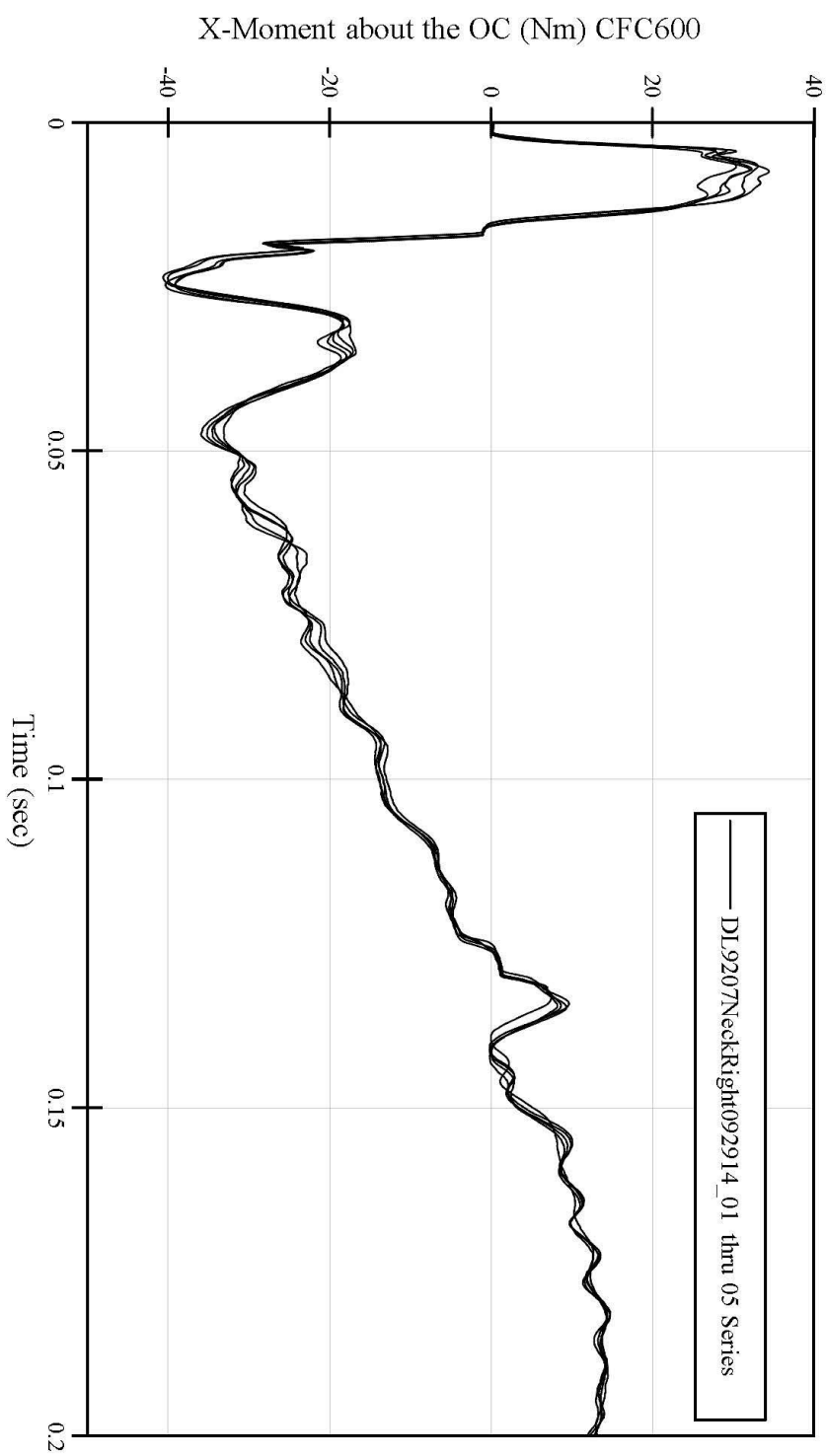
Software Version:

File Name: DL9207NeckLeft112014_01 thru 05 patrick
11/20/2014 12:31:49.0000

Test Temperature: 71 degrees
Relative Humidity: 50%
Test Velocity: 3.39 m/s

THOR Neck Right Lateral Flexion Qualification

X-Moment
Serial Number: DL9207



Software Version:

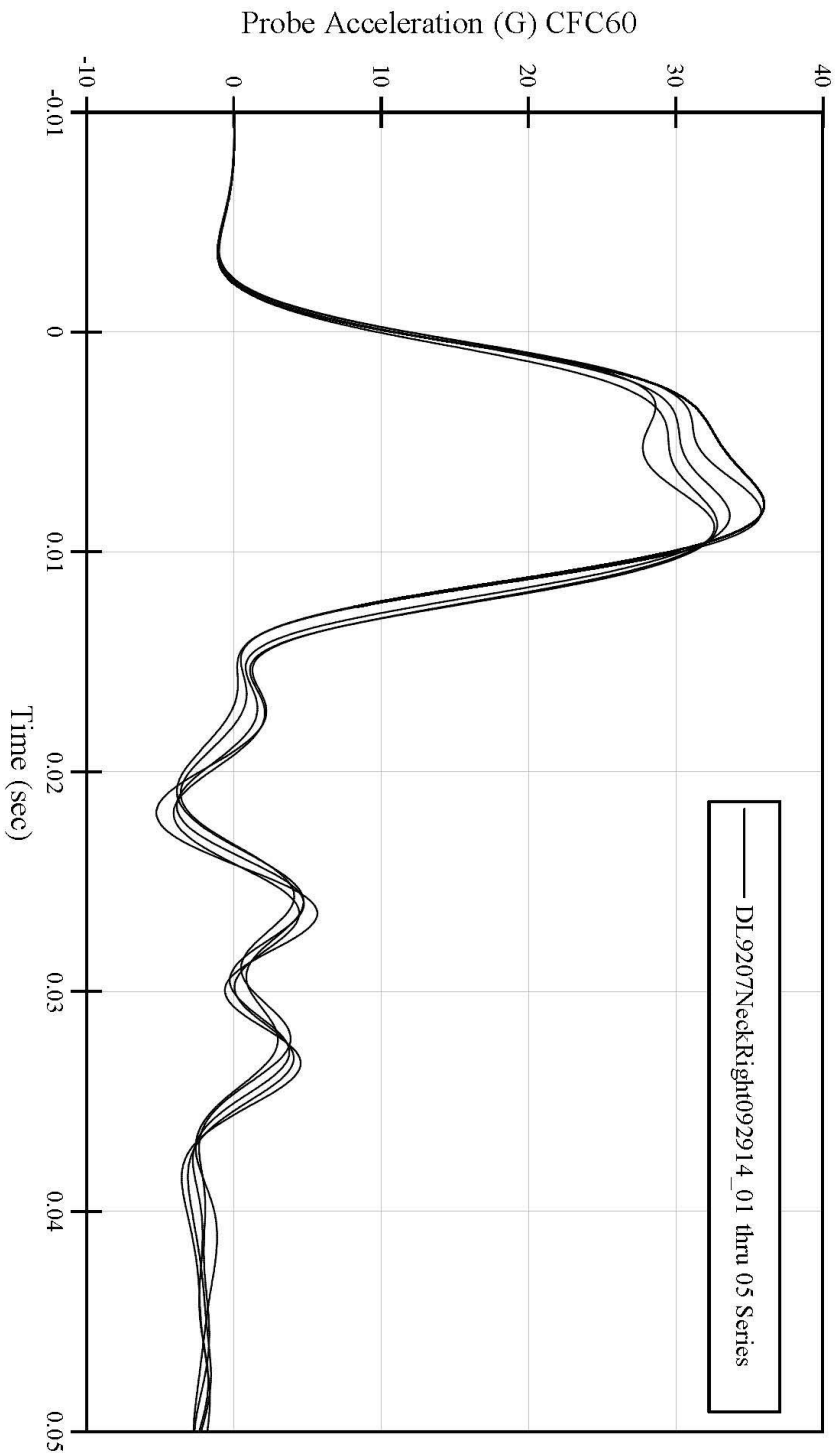
File Name: DL9207NeckRight092914_01 thru 05 Series patrick
09/30/2014 09:09:35.0000

Test Temperature: 71 degrees
Relative Humidity: 50%
Test Velocity: 3.39 m/s

THOR Neck Right Lateral Flexion Qualification

Probe Acceleration

Serial Number: DL9207

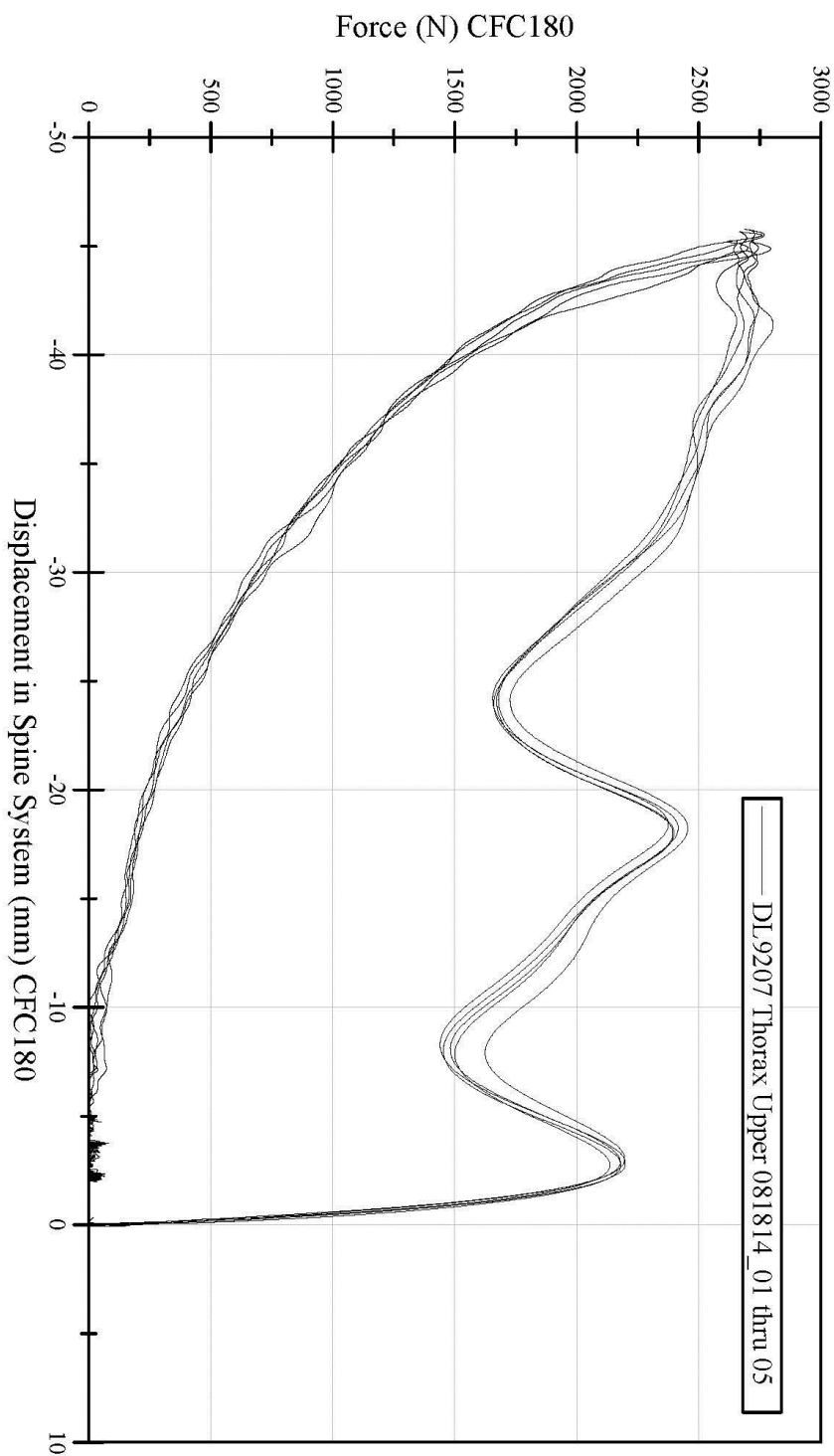


Software Version:

File Name: DL9207NeckRight092914_01 thru 05 Series patrick
09/30/2014 09:09:35.0000

Test Temperature: 71 degrees
Relative Humidity: 50%
Test Velocity: 4.34 m/s

THOR Upper Thorax Qualification
Serial Number: DL9207

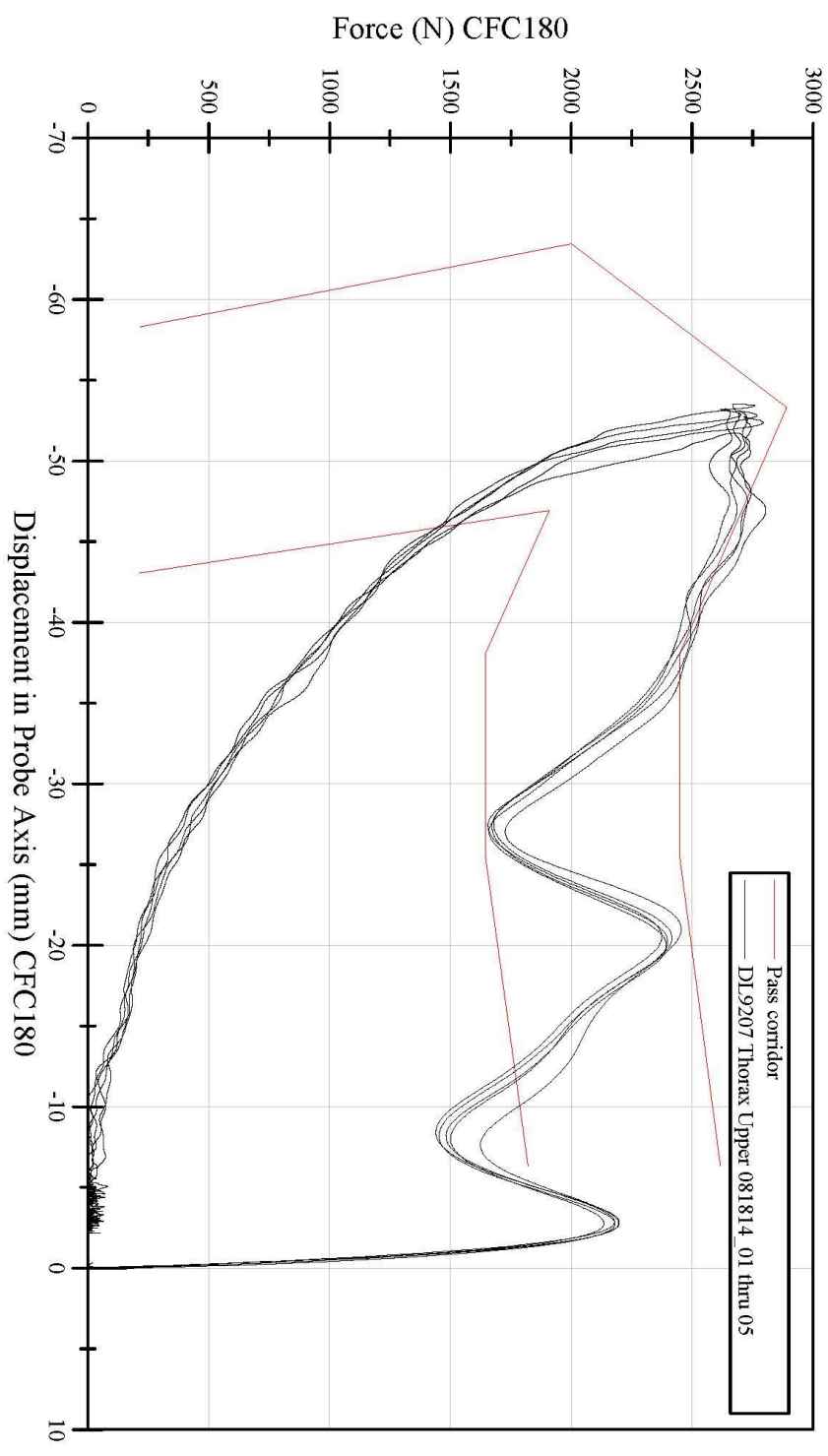


Software Version: 2.5

File Name: DL9207ThoraxUpper081814_01_DIADEMHeader_BINARY.patrick.tdms
08/21/2014 10:13:55.0000

Test Temperature: 71 degrees
Relative Humidity: 50%
Test Velocity: 4.34 m/s

THOR Upper Thorax Qualification
Thorax Response With Kroell Corridor
Serial Number: DL9207

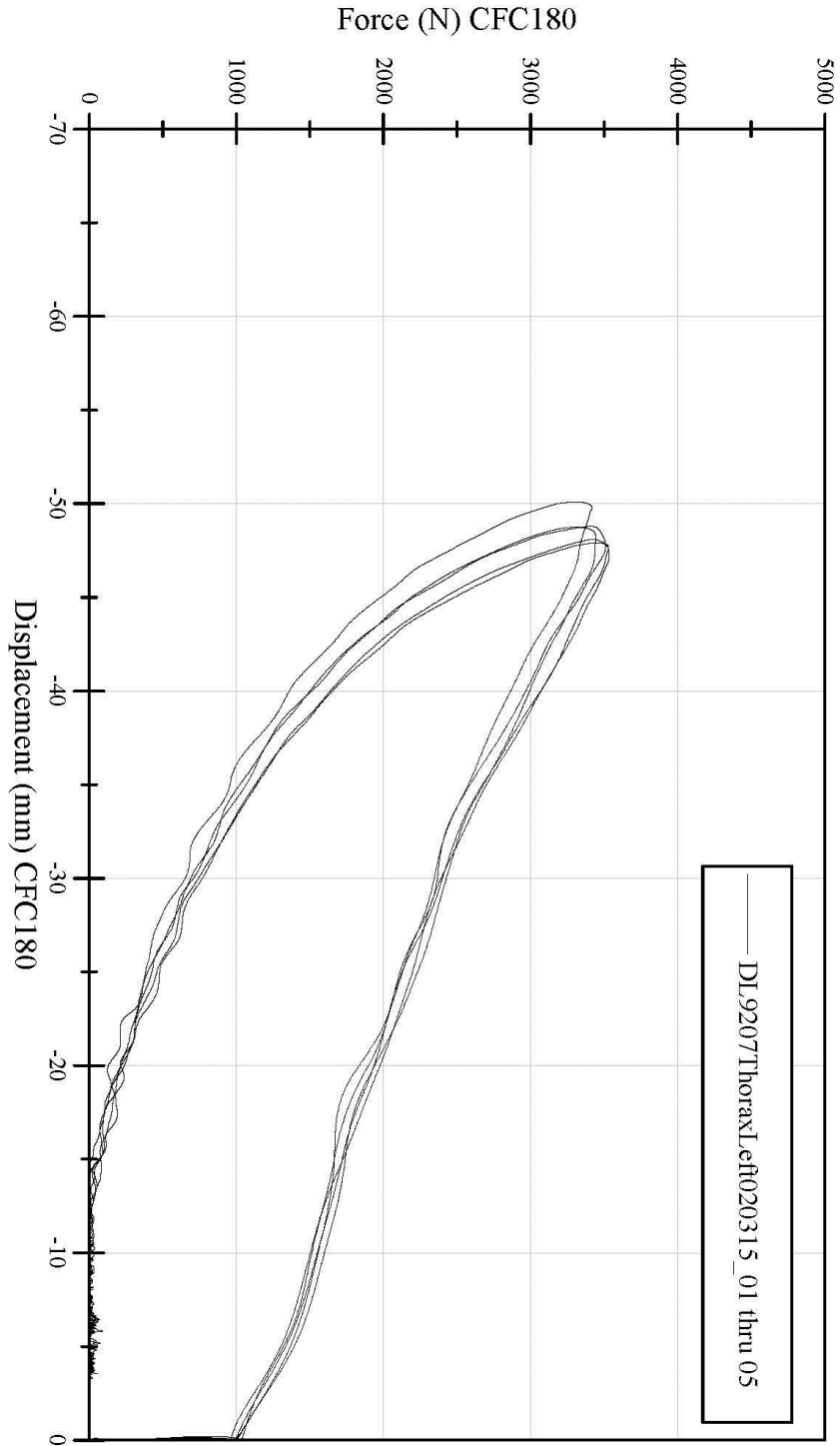


Software Version: 2.5

File Name: DL9207ThoraxUpper081814_01_DIAdemHeader_BINAR\Ypatrick.tdms
08/21/2014 10:13:55.0000

Test Temperature: 71 degrees
Relative Humidity: 30%
Test Velocity: 4.27 m/s

THOR Lower Left Thorax Qualification
Thorax Displacement vs. Probe Force
Serial Number: DL9207

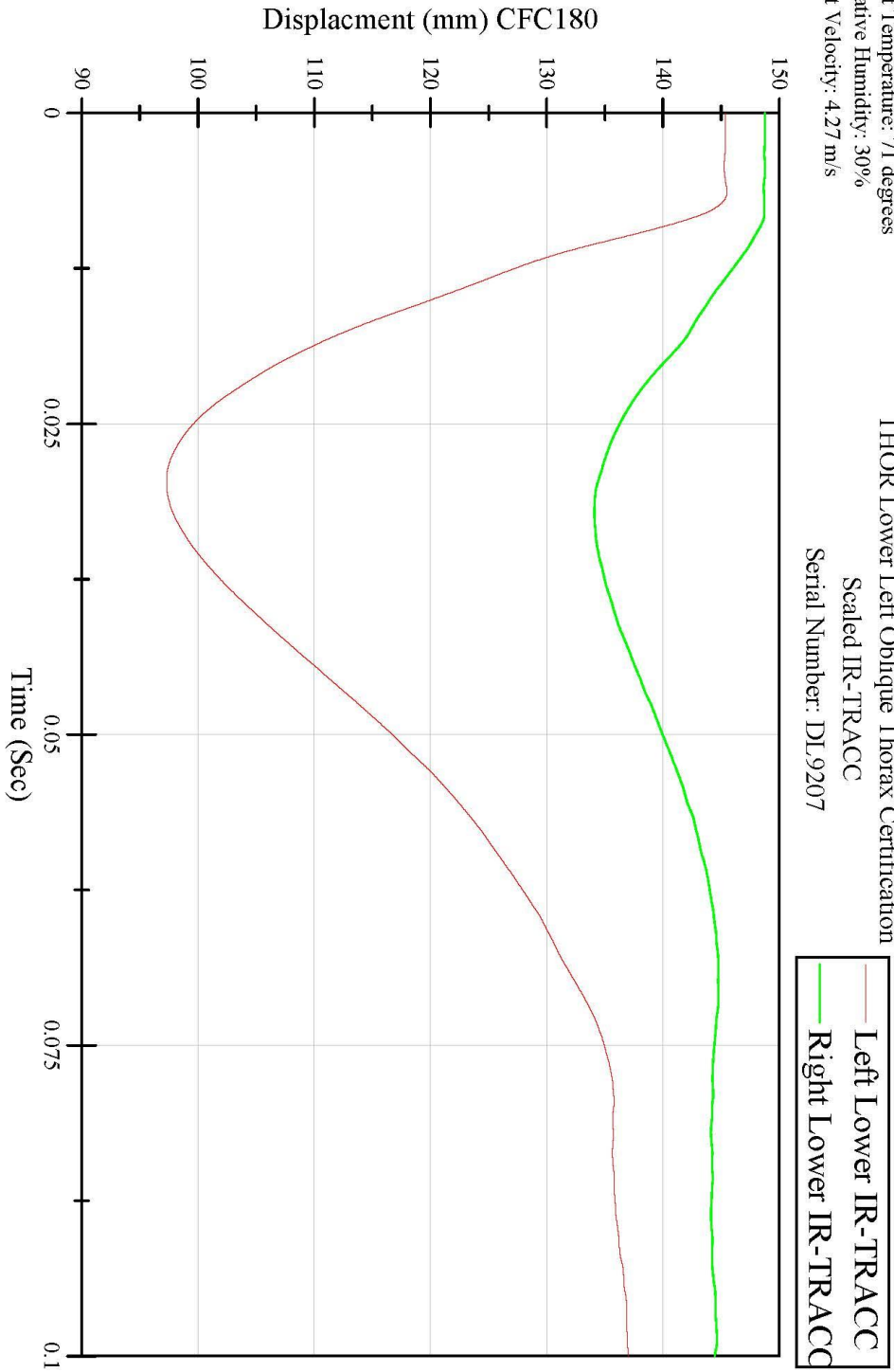


Software Version: 2.5

File Name: DL9207ThoraxLeft020315_01 thru 05 patrick
02/03/2015 13:26:42.0000

Test Temperature: 71 degrees
Relative Humidity: 30%
Test Velocity: 4.27 m/s

THOR Lower Left Oblique Thorax Certification
Scaled IR-TRACC
Serial Number: DL9207

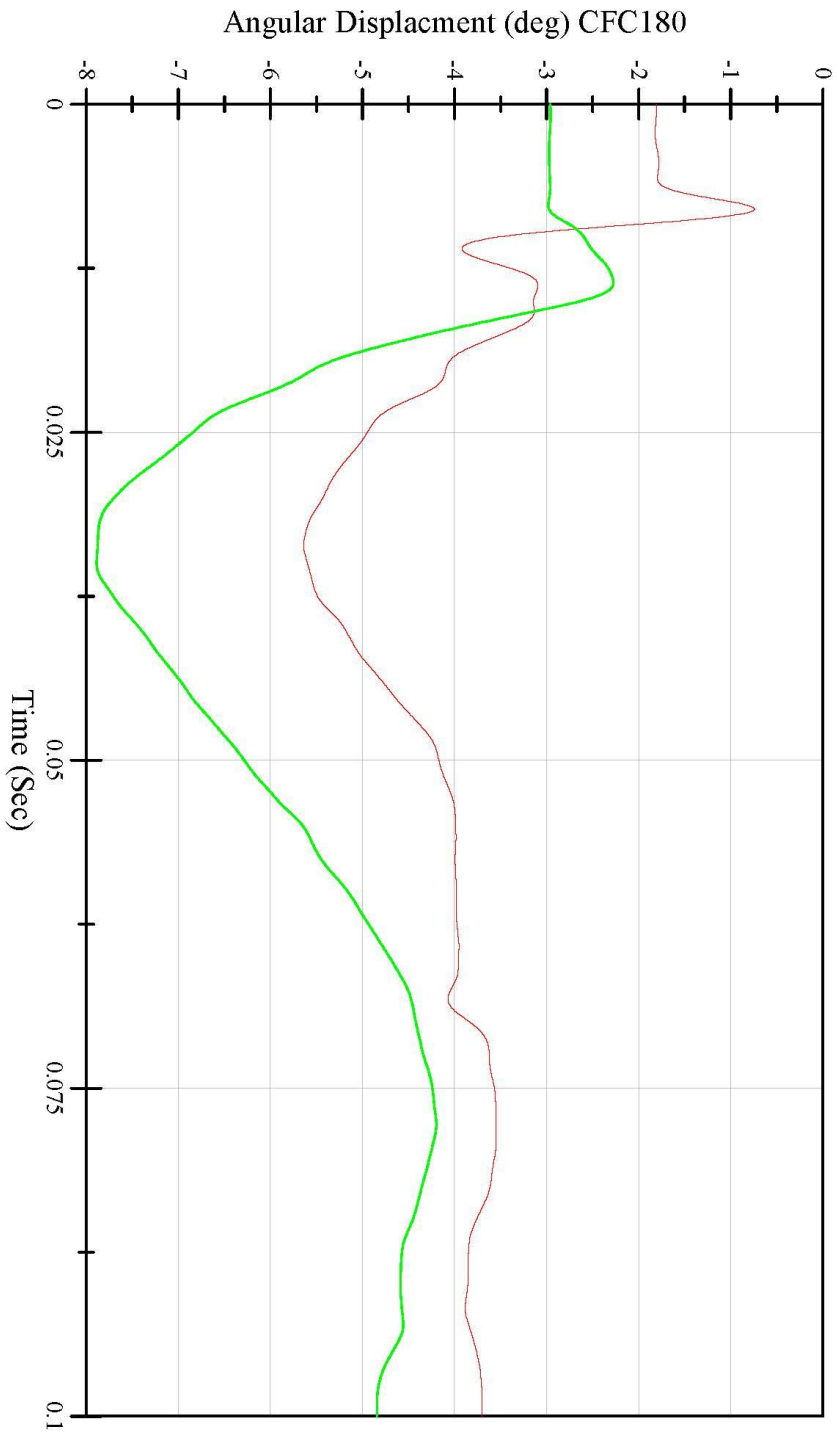


Software Version: 2.5

File Name: DL9207ThoraxLeft020315_01 thru 05 patrick
02/03/2015 13:26:42.0000

Test Temperature: 71 degrees
Relative Humidity: 30%
Test Velocity: 4.27 m/s

THOR Lower Left Oblique Thorax Certification
Y-Potentiometer
Serial Number: DL9207

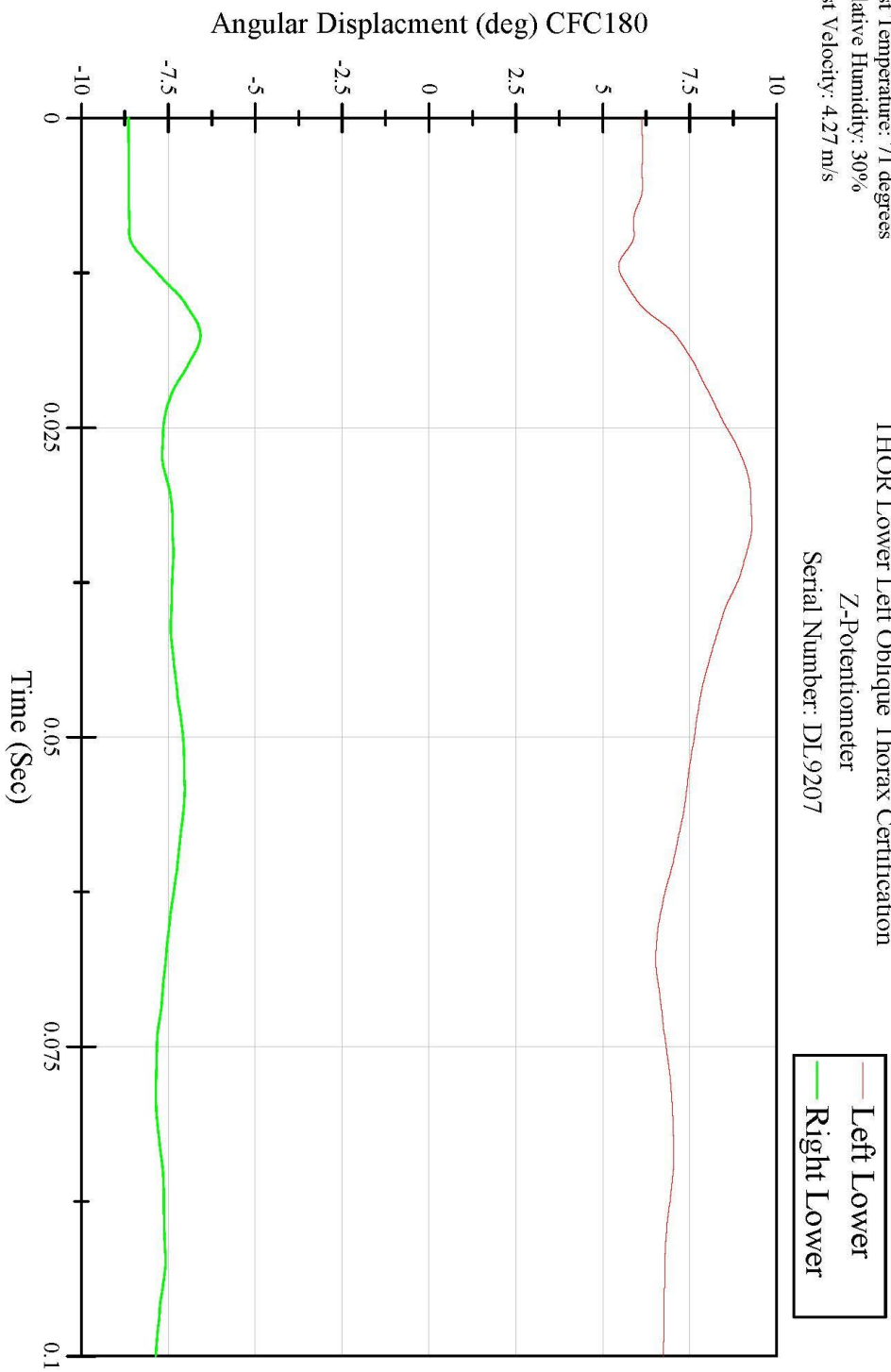


Software Version: 2.5

File Name: DL9207ThoraxLeft020315_01 thru 05 patrick
02/03/2015 13:26:42.0000

Test Temperature: 71 degrees
Relative Humidity: 30%
Test Velocity: 4.27 m/s

THOR Lower Left Oblique Thorax Certification
Z-Potentiometer
Serial Number: DL9207

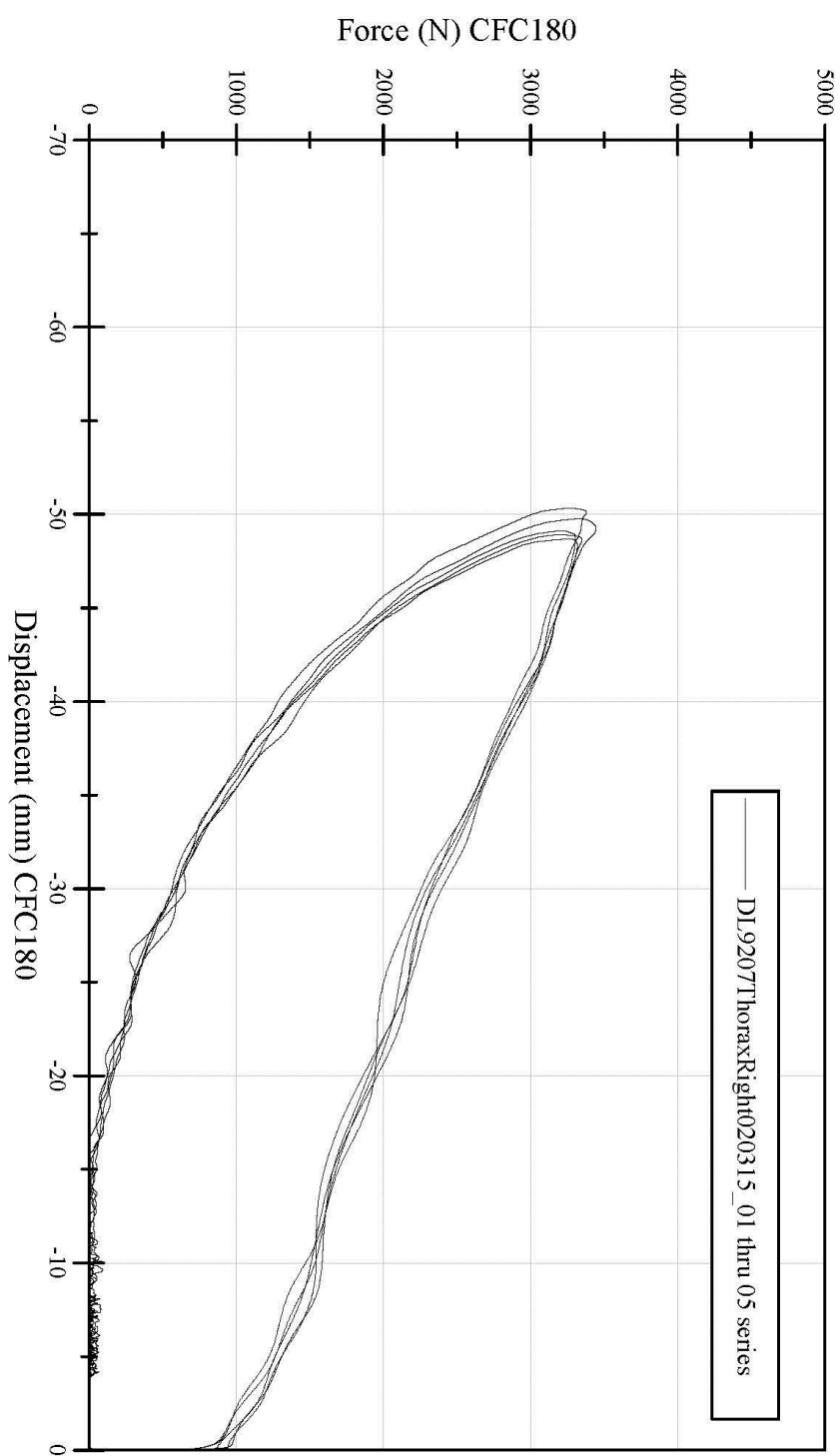


Software Version: 2.5

File Name: DL9207ThoraxLeft020315_01 thru 05 patrick
02/03/2015 13:26:42.0000

Test Temperature: 71 degrees
Relative Humidity: 30%
Test Velocity: 4.31 m/s

THOR Lower Right Thorax Qualification
Thorax Displacement vs. Probe Force
Serial Number: DL9207



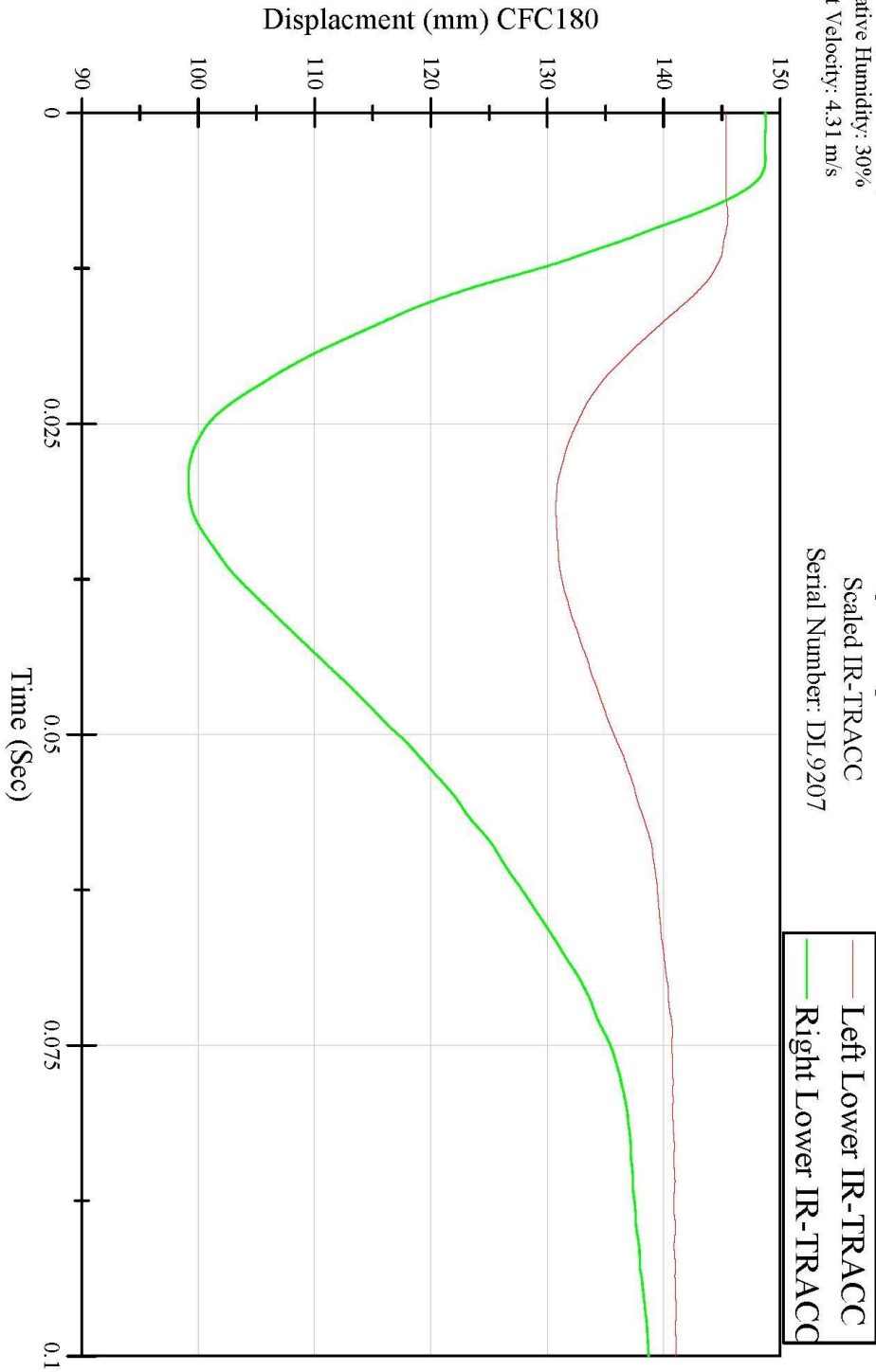
Software Version: 2.5

File Name: DL9207ThoraxRight020315_01 thru 05 series patrick
02/04/2015 06:45:49.0000

Test Temperature: 71 degrees
Relative Humidity: 30%
Test Velocity: 4.31 m/s

THOR Lower Right Oblique Thorax Certification

Scaled IR-TRACC
Serial Number: DL9207



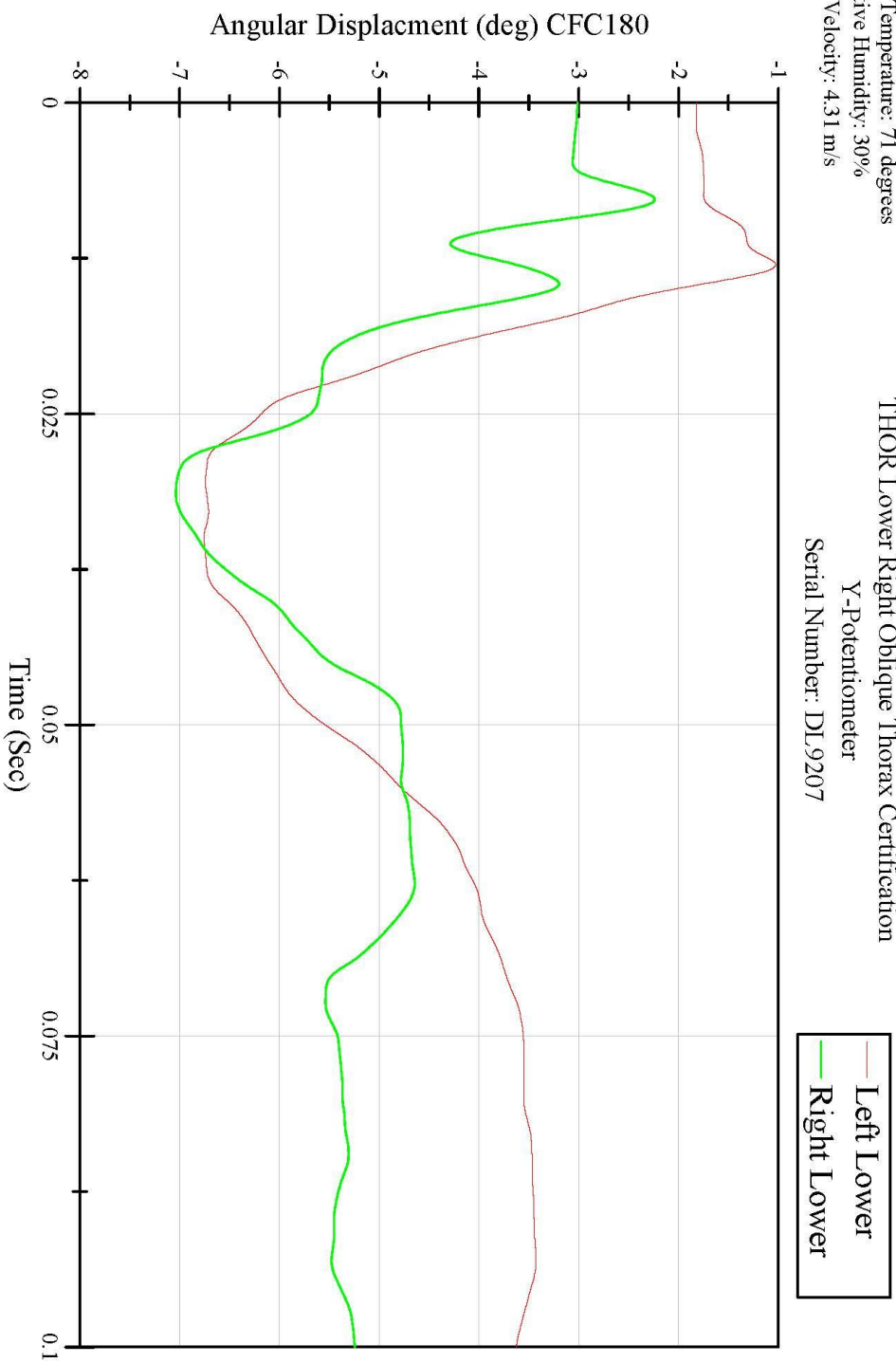
Software Version: 2.5

File Name: DL9207ThoraxRight020315_01 thru 05 series patrick
02/04/2015 06:45:49.0000

Test Temperature: 71 degrees
Relative Humidity: 30%
Test Velocity: 4.31 m/s

THOR Lower Right Oblique Thorax Certification

Y-Potentiometer
Serial Number: DL9207

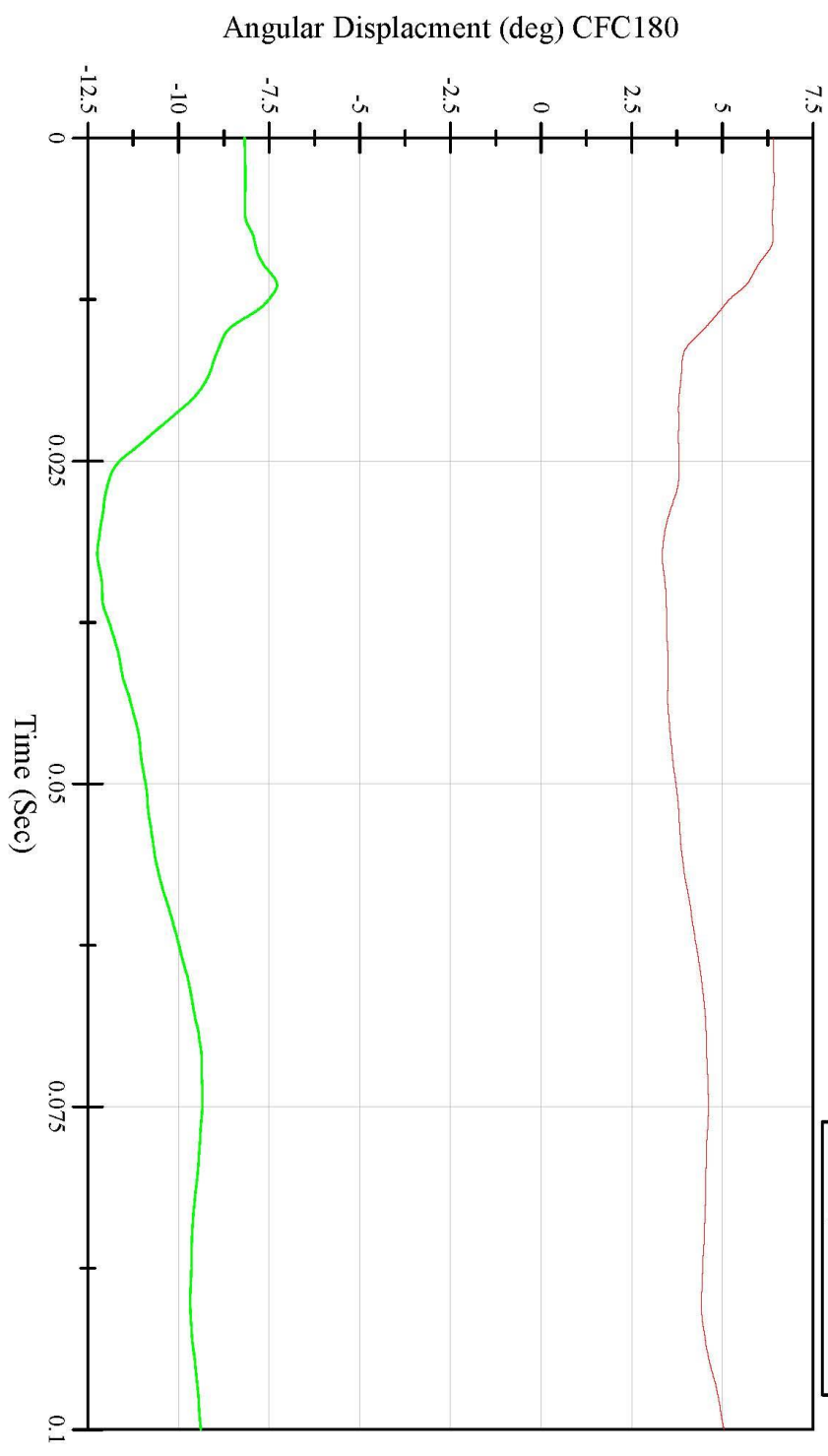


Software Version: 2.5

File Name: DL9207ThoraxRight020315_01 thru 05 series patrick
02/04/2015 06:45:49.0000

Test Temperature: 71 degrees
Relative Humidity: 30%
Test Velocity: 4.31 m/s

THOR Lower Right Oblique Thorax Certification
Z-Potentiometer
Serial Number: DL9207

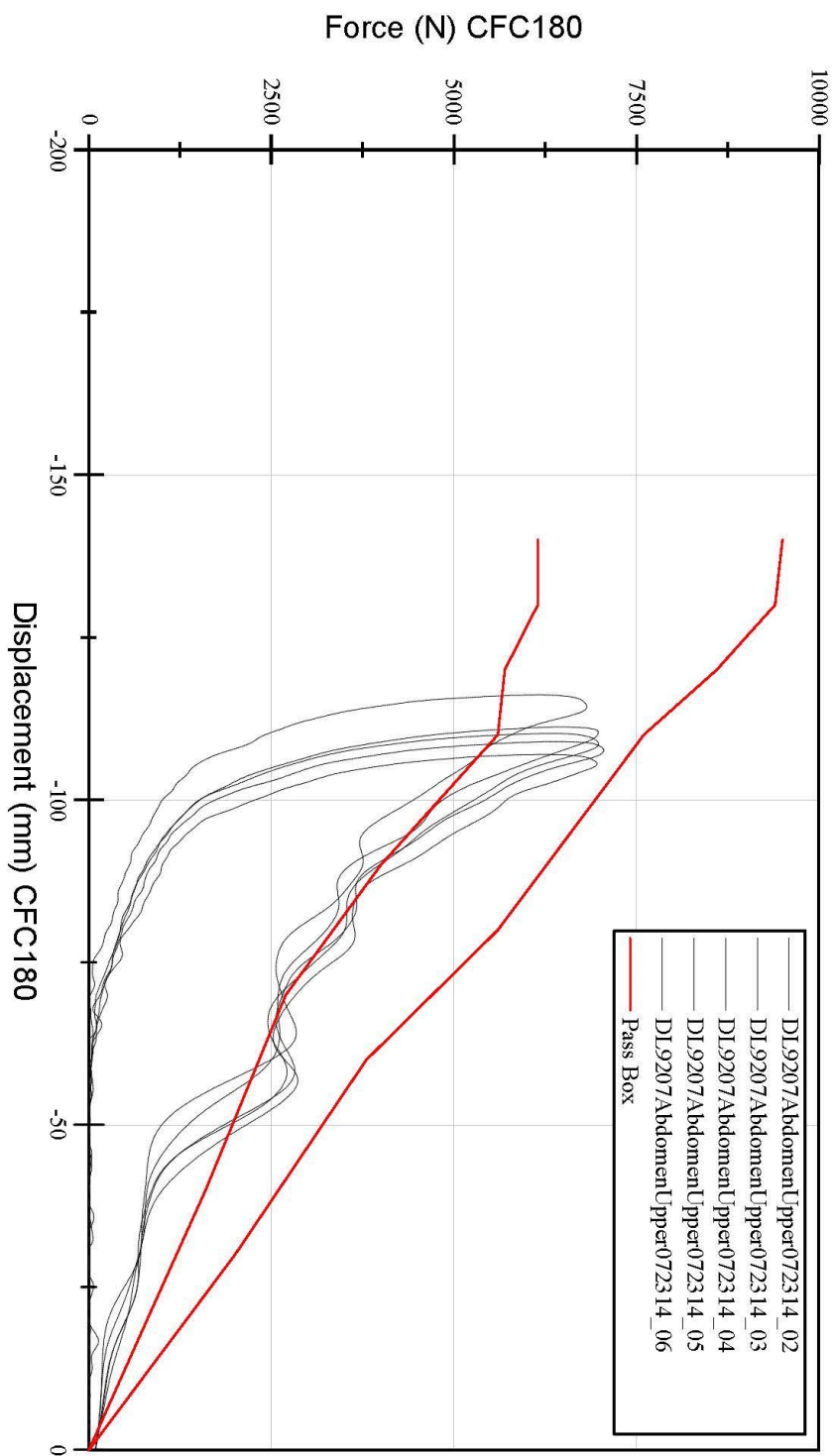


Software Version: 2.5

File Name: DL9207ThoraxRight020315_01 thru 05 series patrick
02/04/2015 06:45:49.0000

Test Temperature: 71 degrees
Relative Humidity: 50%
Test Velocity: 6.68 m/s

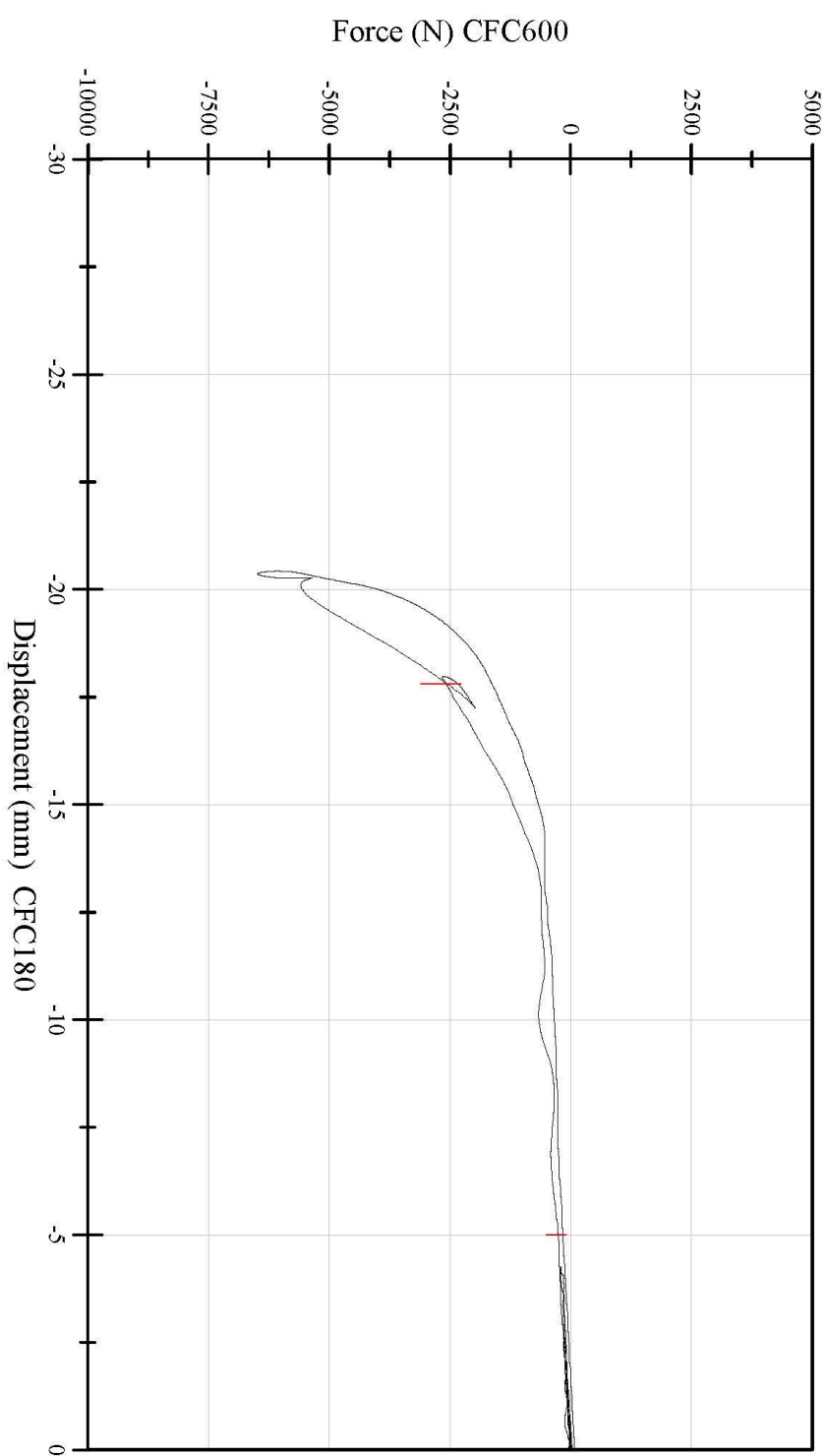
THOR Upper Abdomen Qualification
Abdomen Displacement vs. Probe Force
Serial Number: DL9207



Software Version: File Name: DL9207AbdomenUpper072314_all_DLAdemHeader_BINARYpatrick 07/23/2014 11:21:18.0000

Test Temperature: 70.7 degrees
Relative Humidity: 45%
Test Velocity: 2.78 m/s

THOR Right Knee Certification
Femur Force vs. Knee Displacement
Serial Number: 021033

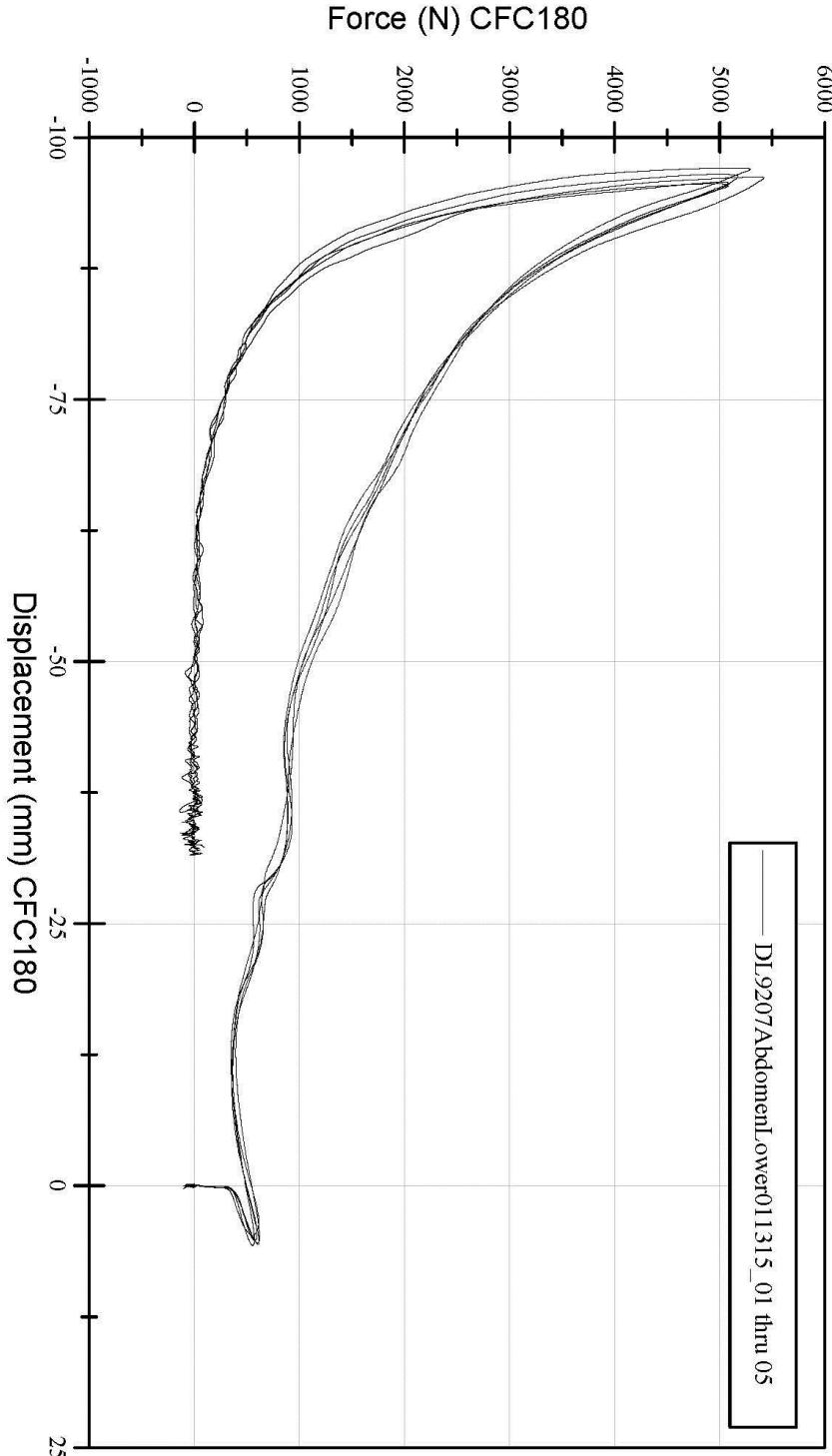


Software Version: 2.4

File Name: 012033 Knee1150407-03processed.dat
04/07/2015 09:51:56.0000

Test Temperature: 71 degrees
Relative Humidity: 25%
Test Velocity: 4.27 m/s

THOR Lower Abdomen Qualification
Abdomen Displacement vs. Probe Force
Serial Number: DL9207

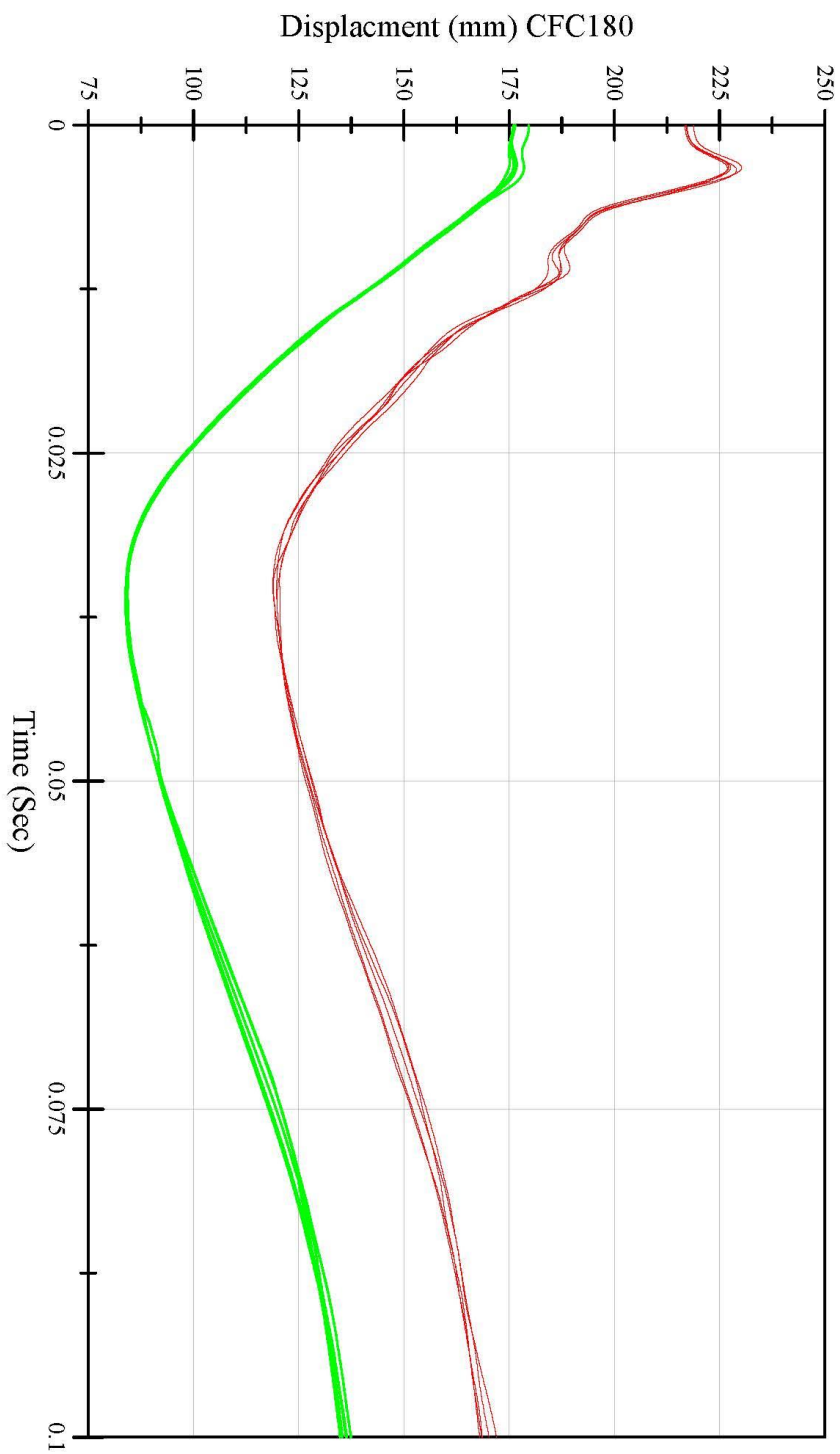


Software Version:

File Name: DL9207AbdomenLower011315_01 thru 05 Series patrick
01/13/2015 12:19:51.0000

Test Temperature: 71 degrees
Relative Humidity: 25%
Test Velocity: 4.27 m/s

THOR Lower Abdomen Qualification
IRTRACC Displacement
Serial Number: DL9207

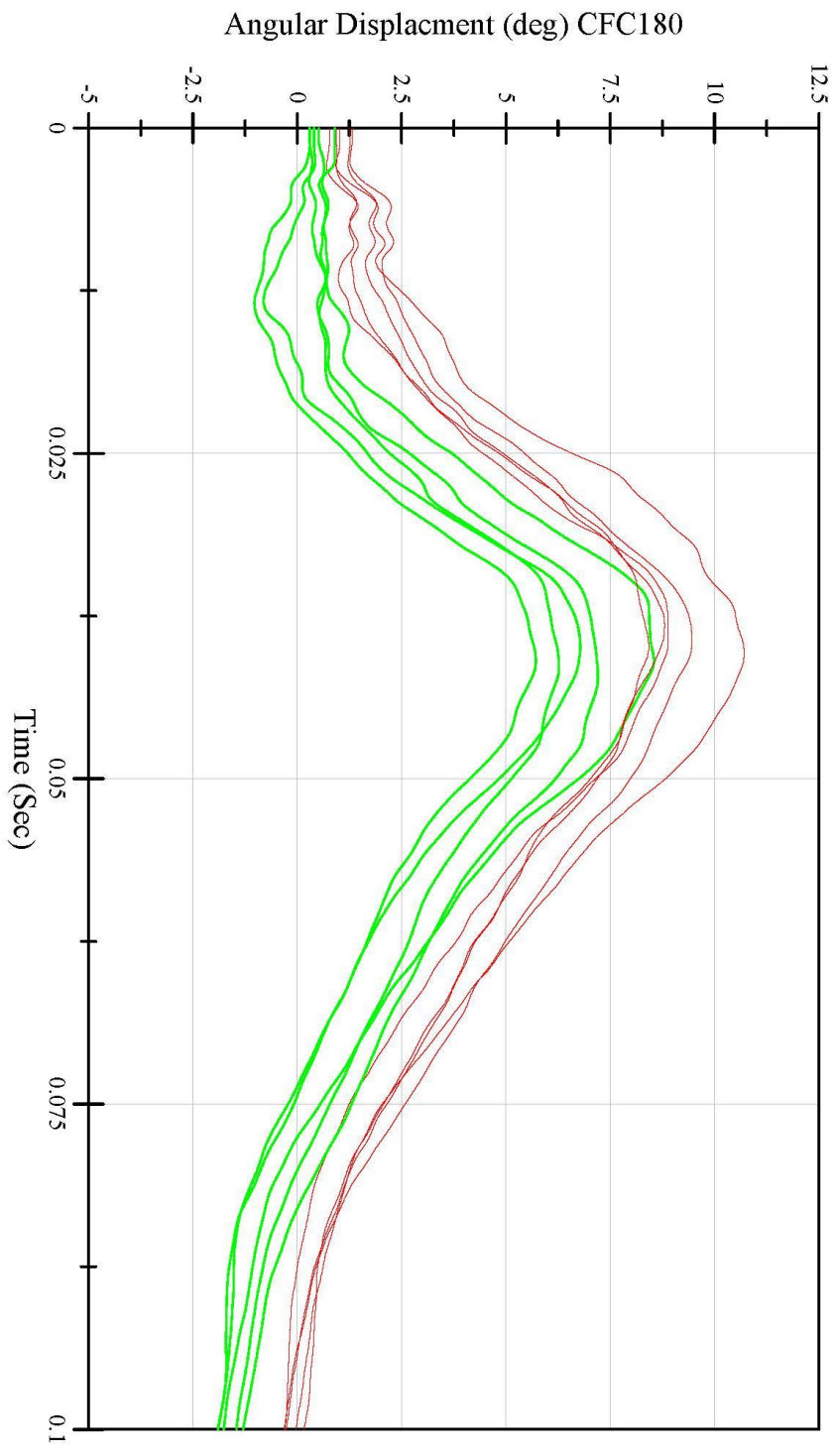


Software Version:

File Name: DL9207AbdomenLower011315_01 thru 05 Series patrick
01/13/2015 12:19:51.0000

Test Temperature: 71 degrees
Relative Humidity: 25%
Test Velocity: 4.27 m/s

THOR Lower Abdomen Qualification
Y-Pot Displacement
Serial Number: DL9207

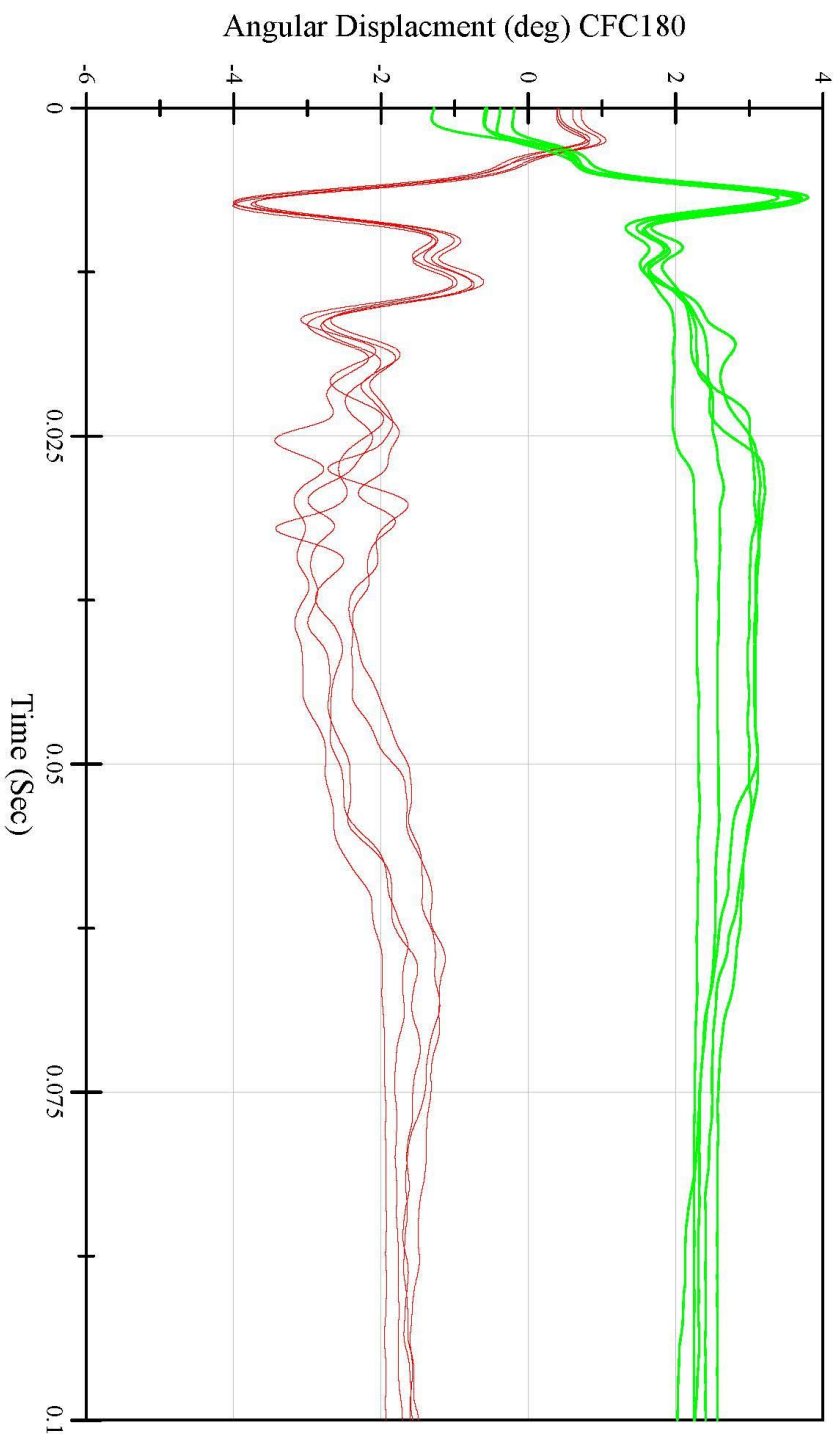


Software Version:

File Name: DL9207AbdomenLower011315_01 thru 05 Series patrick
01/13/2015 12:19:51.0000

Test Temperature: 71 degrees
Relative Humidity: 25%
Test Velocity: 4.27 m/s

THOR Lower Abdomen Qualification
Z-Potentiometer
Serial Number: DL9207

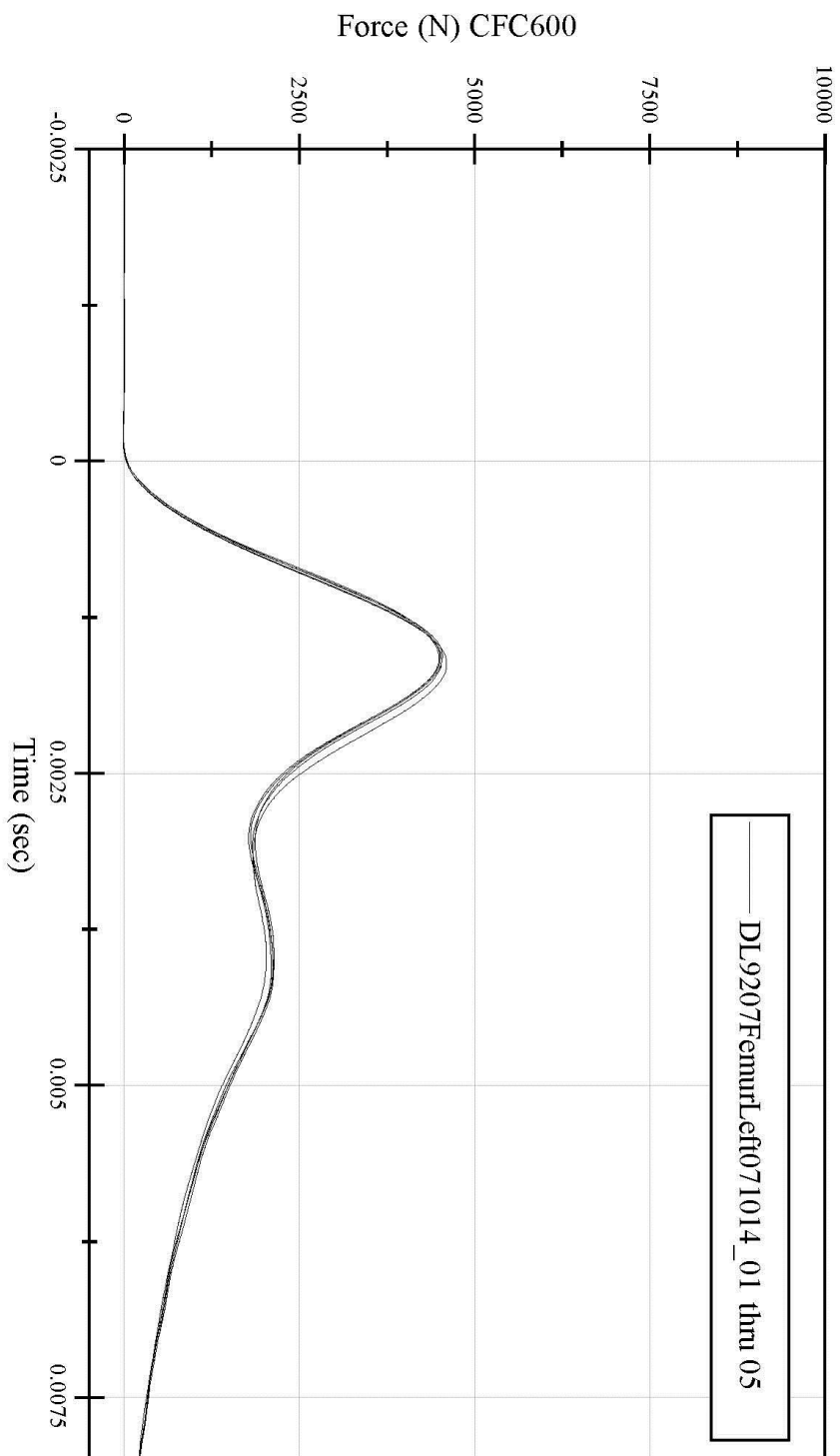


Software Version:

File Name: DL9207AbdomenLower011315_01 thru 05 Series patrick
01/13/2015 12:19:51.0000

Test Temperature: 71 degrees
Relative Humidity: 49%
Test Velocity: 2.58 m/s

THOR Left Femur Qualification
Probe Force
Serial Number: DL9207

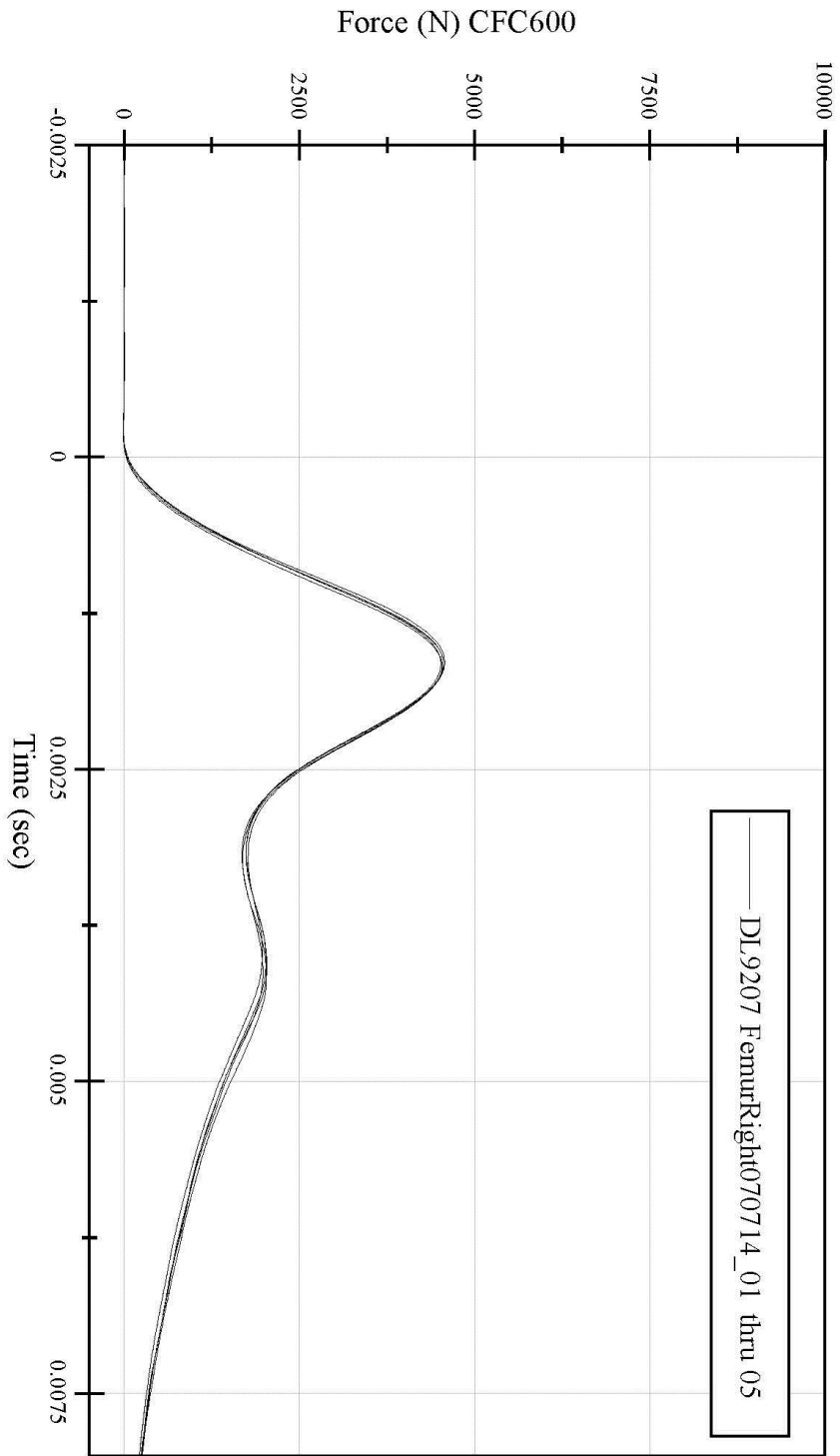


Software Version:

File Name: DL9207 Femur Left 070814_01 thru 05 Series
07/09/2014 09:10:57.0000

Test Temperature: 71 degrees
Relative Humidity: 49%
Test Velocity: 2.58 m/s

THOR Right Femur Qualification
Probe Force
Serial Number: DL9207

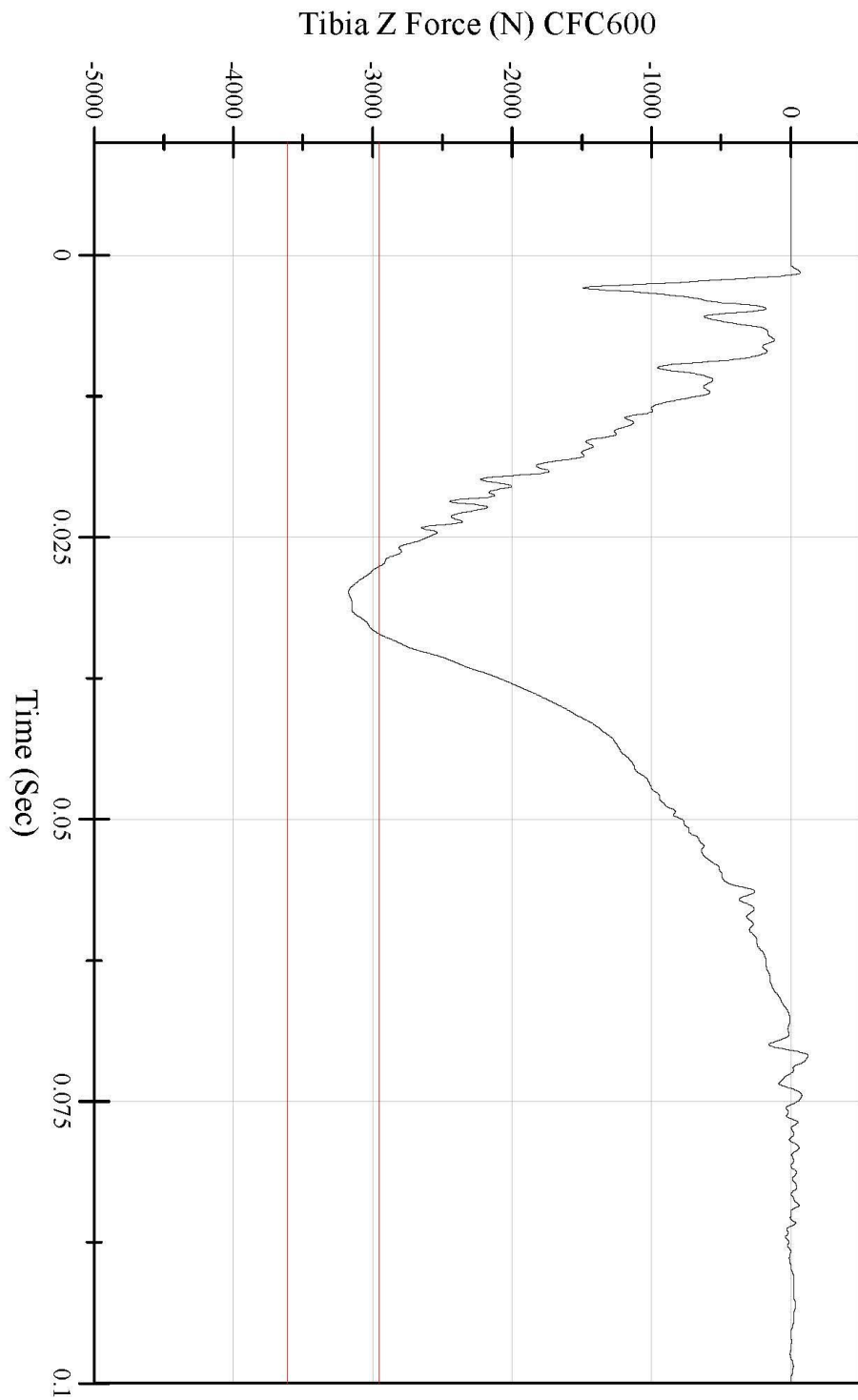


Software Version:

File Name: DL9207 Femur Right 070714_01 thru 05 Series
07/09/2014 09:12:34.0000

Test Temperature: 71.1 degrees
Relative Humidity: 33%
Test Velocity: 5.07 m/s

THOR Left Foot Dorsiflexion Certification
Tibia Load
Serial Number: LX046

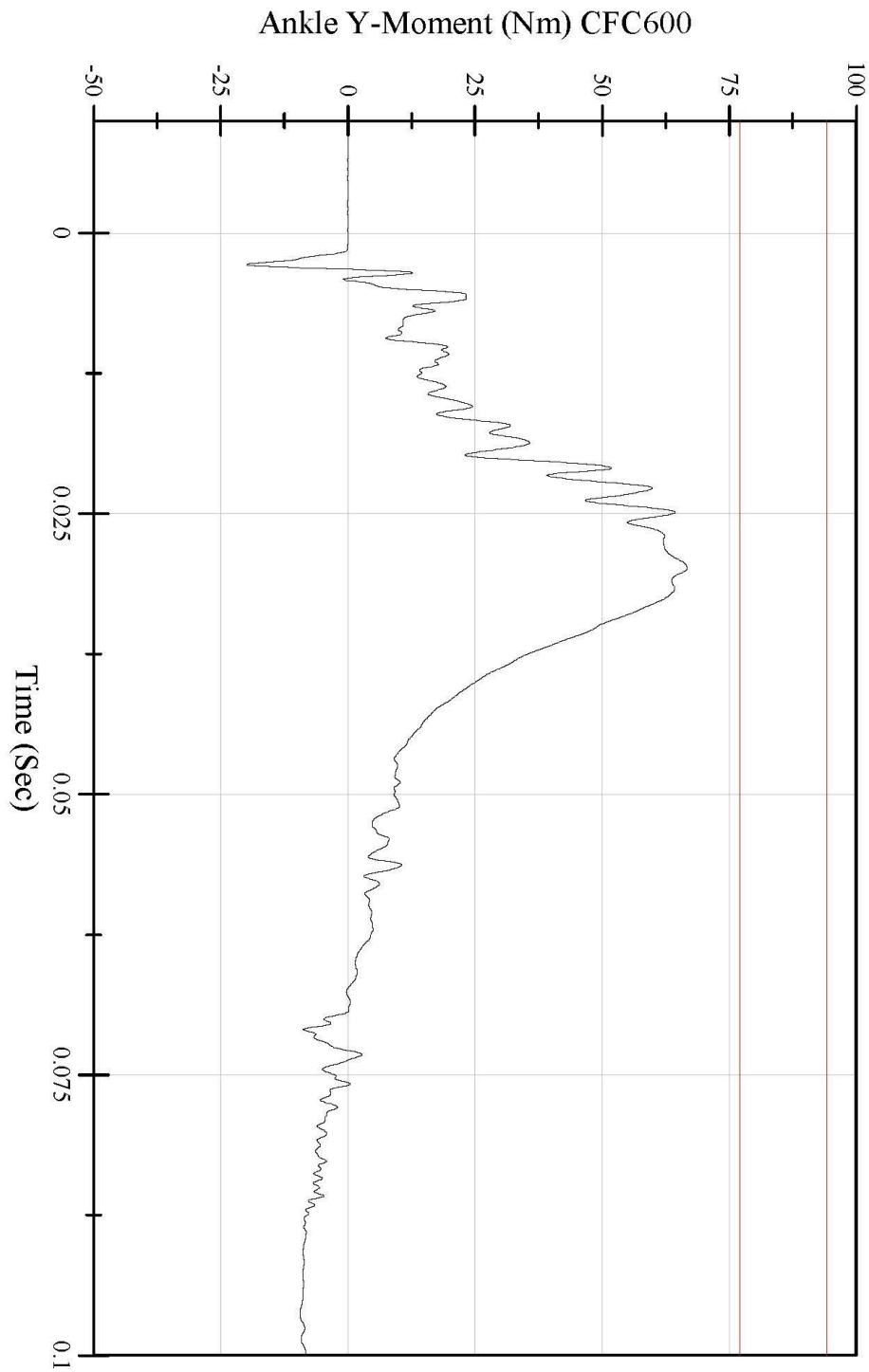


Software Version: 2.4

File Name: LX046Ball150305-07processed.dat
03/05/2015 08:33:51.0000

Test Temperature: 71.1 degrees
Relative Humidity: 33%
Test Velocity: 5.07 m/s

THOR Left Foot Dorsiflexion Certification
Ankle Y-Moment
Serial Number: LX046

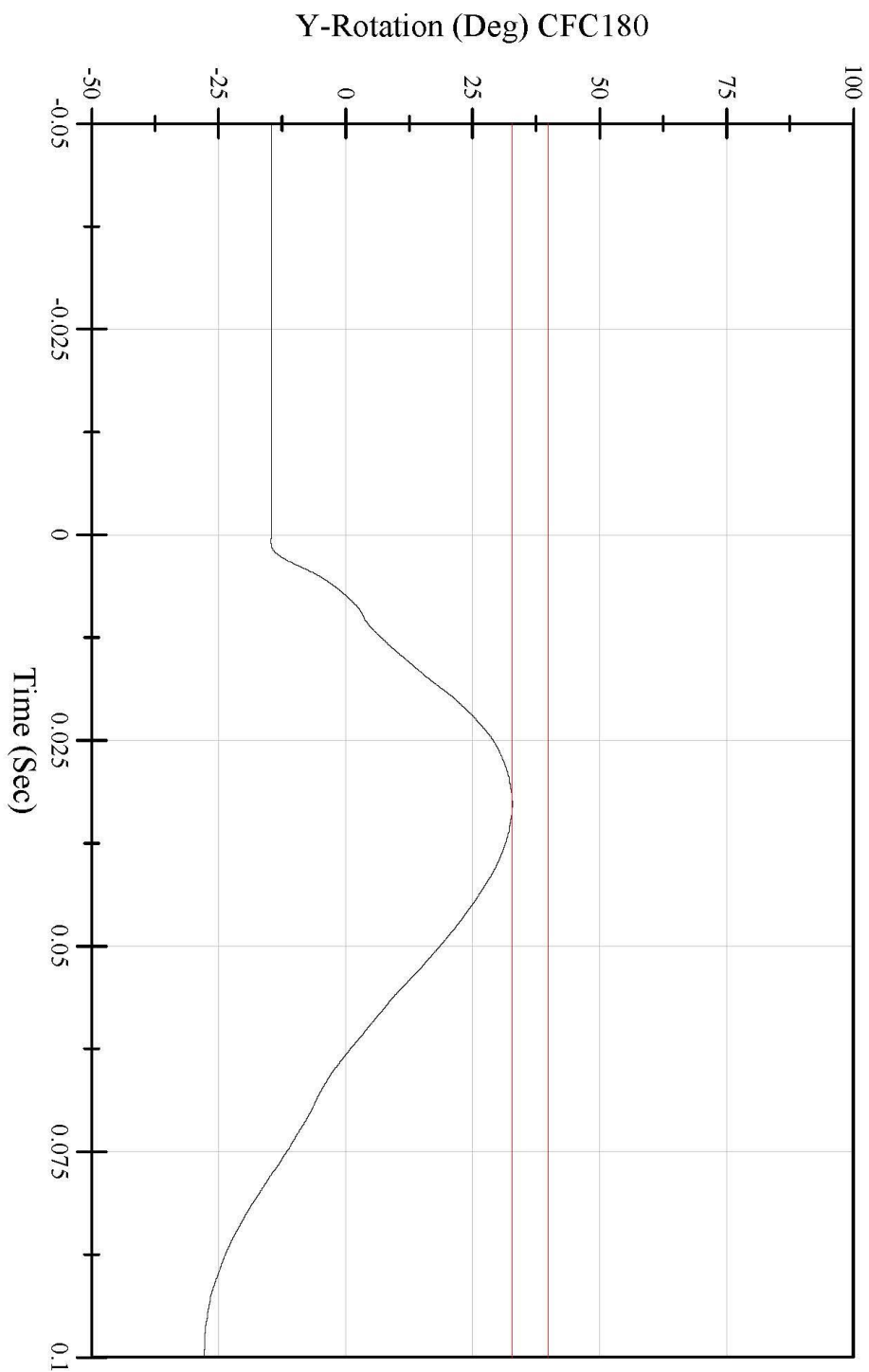


Software Version: 2.4

File Name: LX046Ball150305-07processed.dat
03/05/2015 08:33:51.0000

Test Temperature: 71.1 degrees
Relative Humidity: 33%
Test Velocity: 5.07 m/s

THOR Left Foot Dorsiflexion Certification
Ankle Y-Rotation
Serial Number: LX046

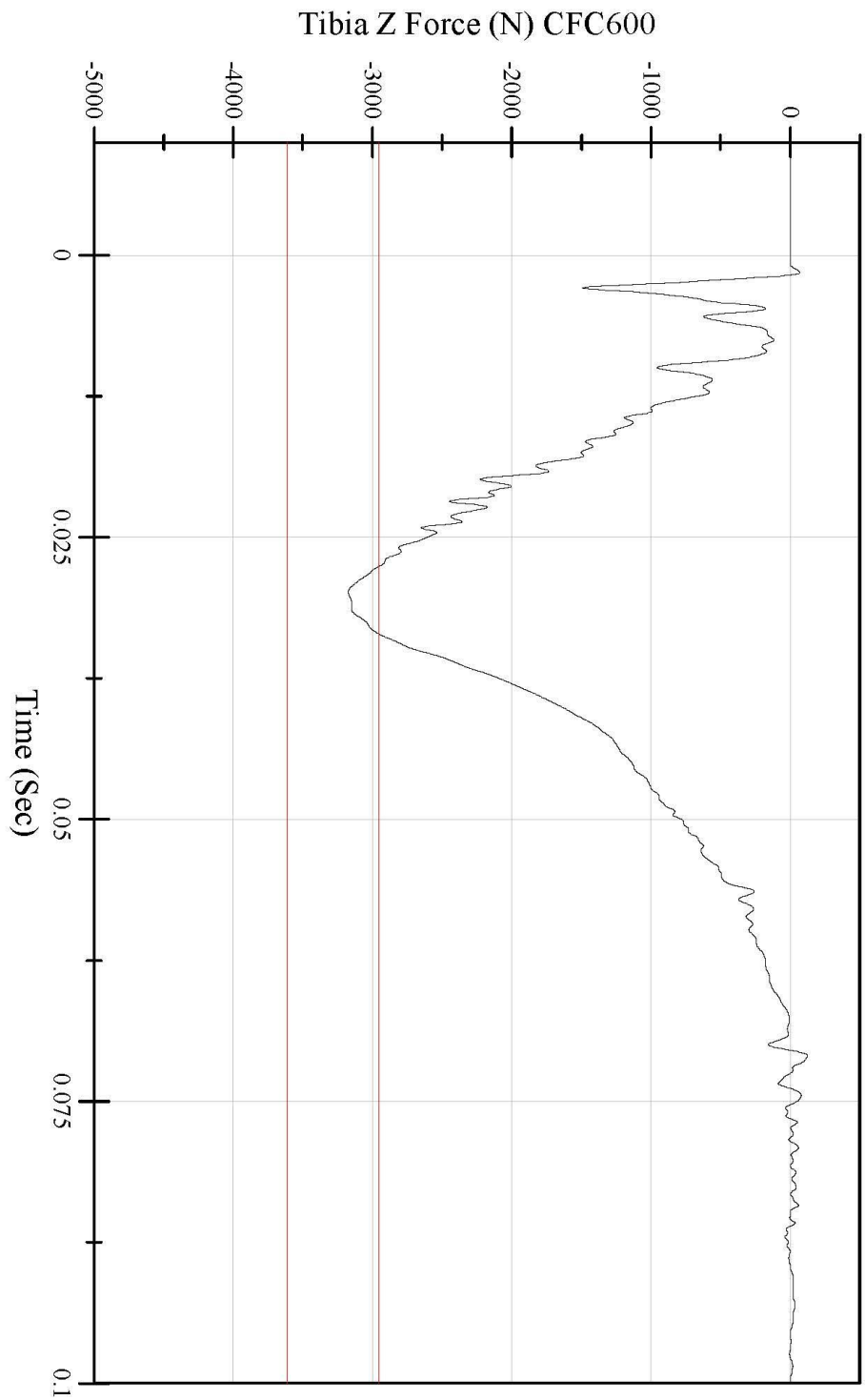


Software Version: 2.4

File Name: LX046Ball150305-07processed.dat
03/05/2015 08:33:51.0000

Test Temperature: 71.1 degrees
Relative Humidity: 33%
Test Velocity: 5.07 m/s

THOR Left Foot Dorsiflexion Certification
Tibia Load
Serial Number: LX046

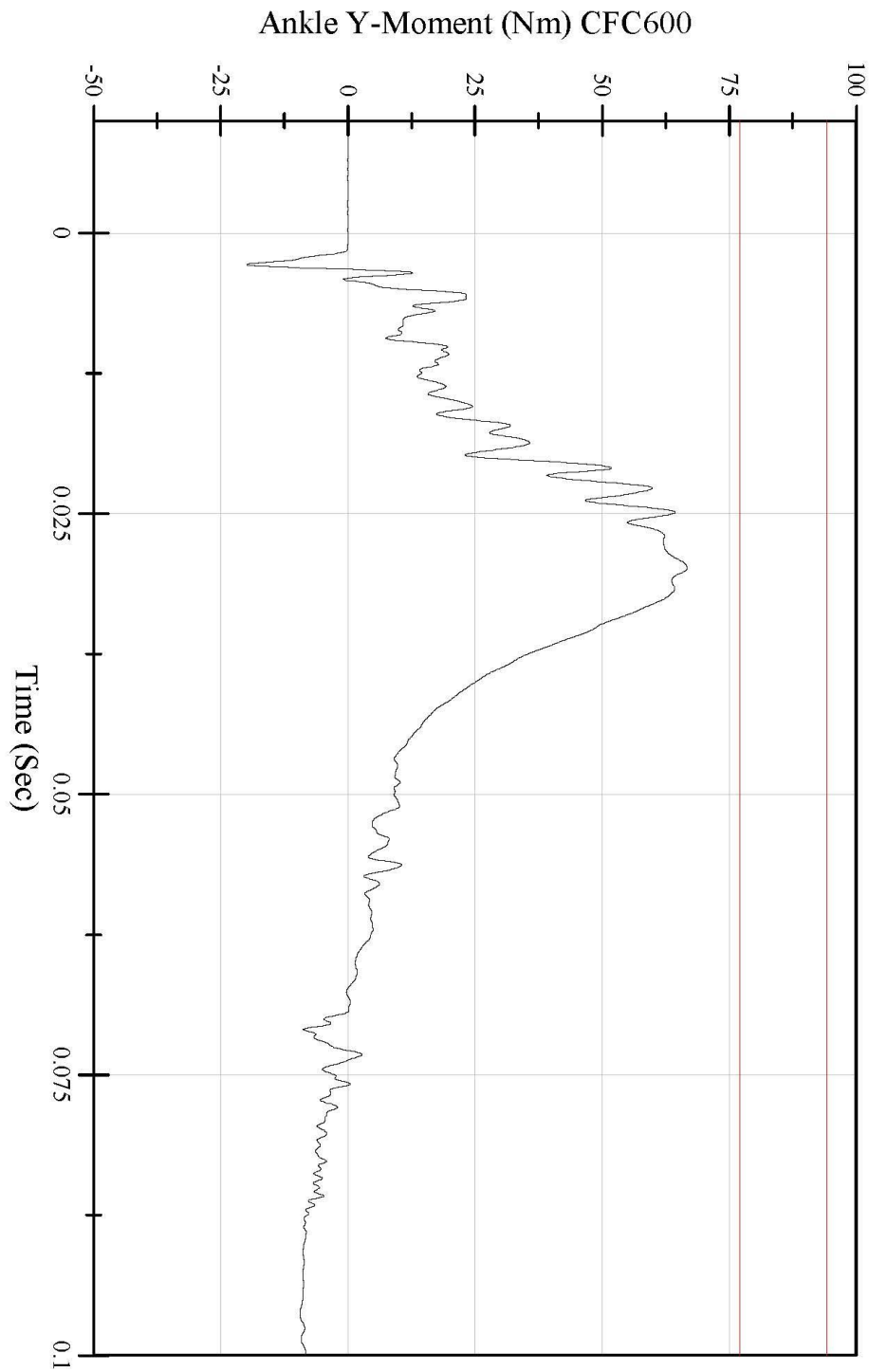


Software Version: 2.4

File Name: LX046Ball150305-07processed.dat
03/05/2015 08:33:51.0000

Test Temperature: 71.1 degrees
Relative Humidity: 33%
Test Velocity: 5.07 m/s

THOR Left Foot Dorsiflexion Certification
Ankle Y-Moment
Serial Number: LX046

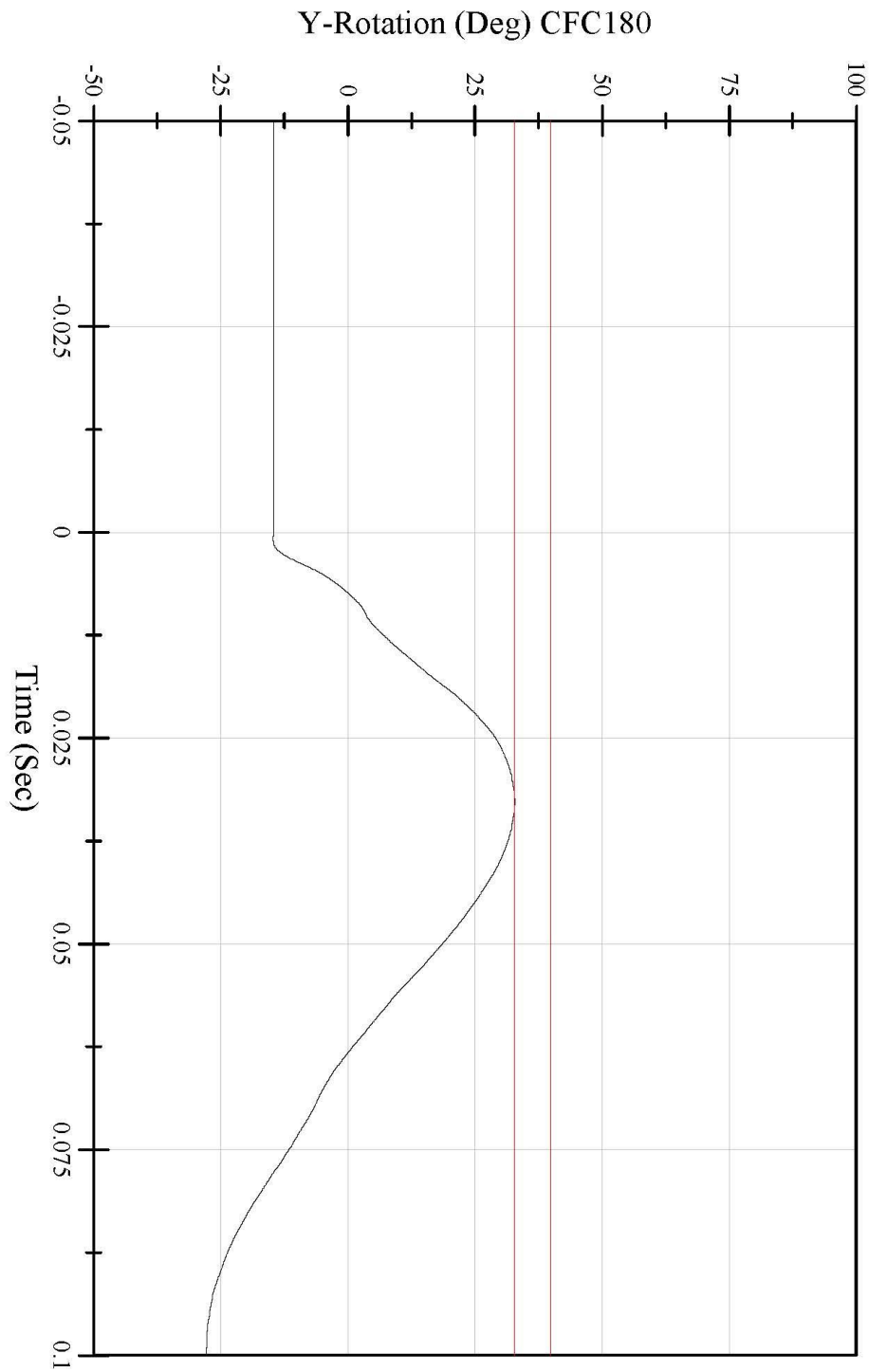


Software Version: 2.4

File Name: LX046Ball150305-07processed.dat
03/05/2015 08:33:51.0000

Test Temperature: 71.1 degrees
Relative Humidity: 33%
Test Velocity: 5.07 m/s

THOR Left Foot Dorsiflexion Certification
Ankle Y-Rotation
Serial Number: LX046

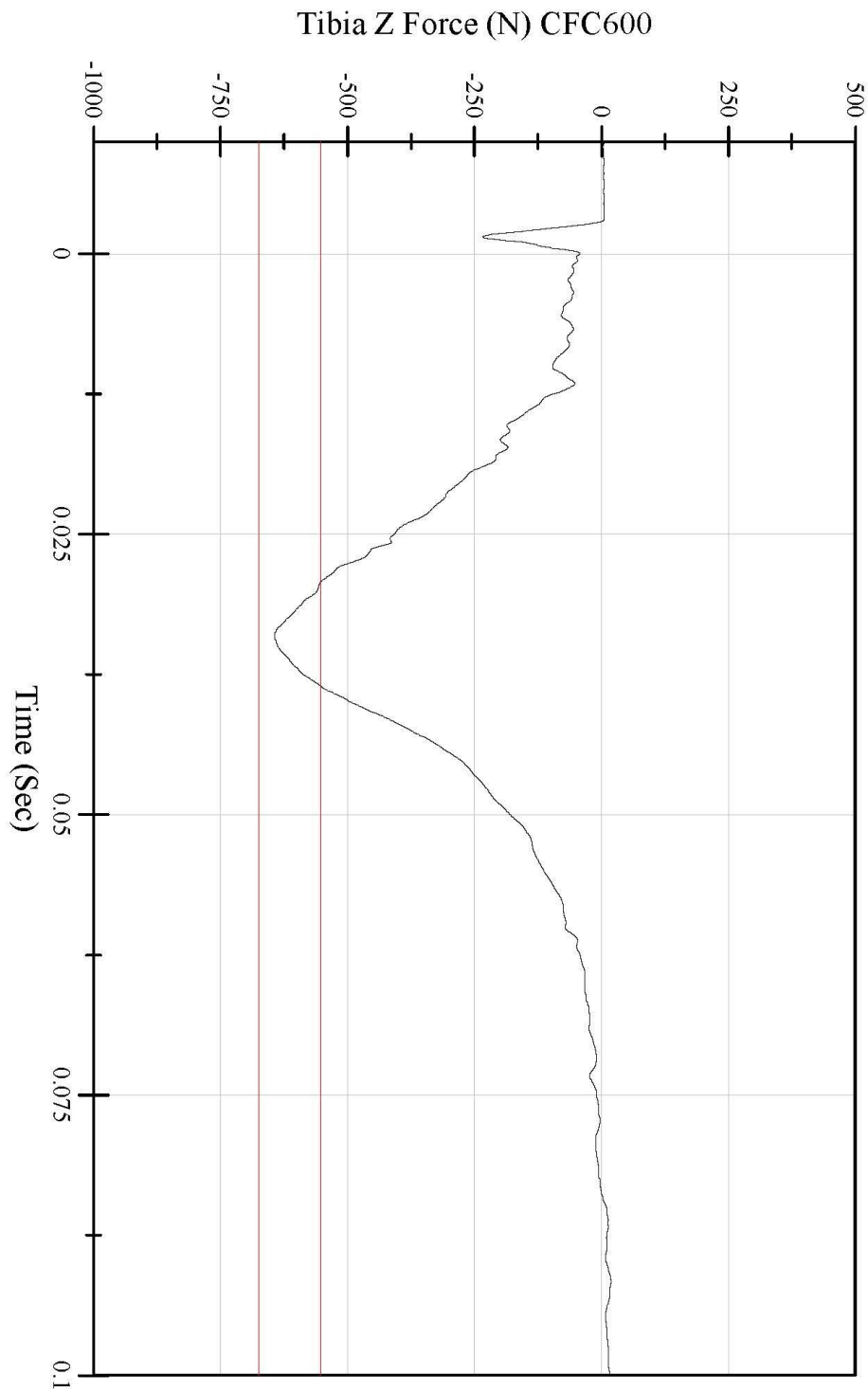


Software Version: 2.4

File Name: LX046Ball150305-07processed.dat
03/05/2015 08:33:51.0000

Test Temperature: 70.9 degrees
Relative Humidity: 37%
Test Velocity: 2.08 m/s

THOR Left Foot Eversion Certification
Tibia Load
Serial Number: LX046

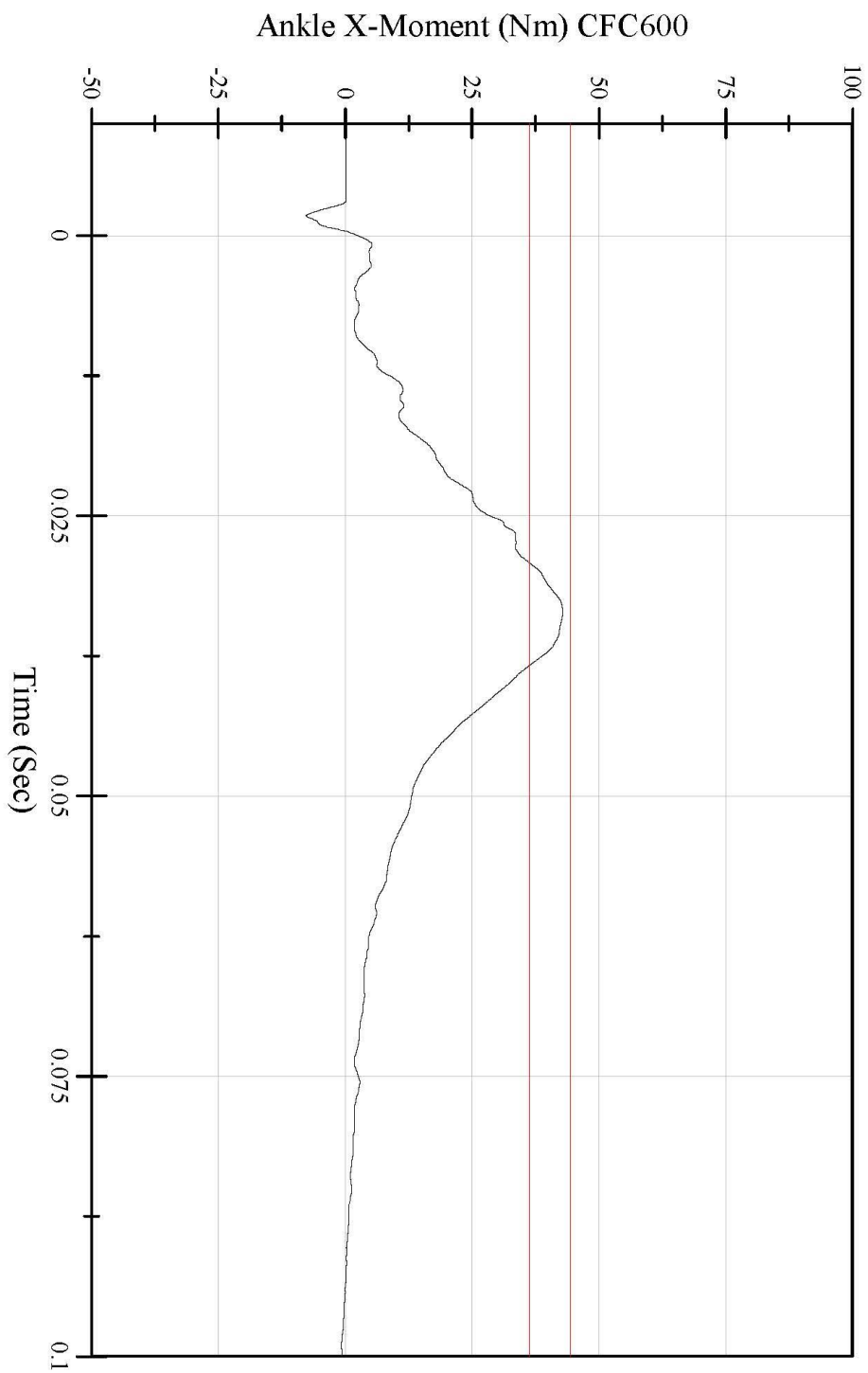


Software Version: 2.4

File Name: LX046Eversion150304-02processed.dat
03/04/2015 11:38:15.0000

Test Temperature: 70.9 degrees
Relative Humidity: 37%
Test Velocity: 2.08 m/s

THOR Left Foot Eversion Certification
Ankle Moment
Serial Number: LX046

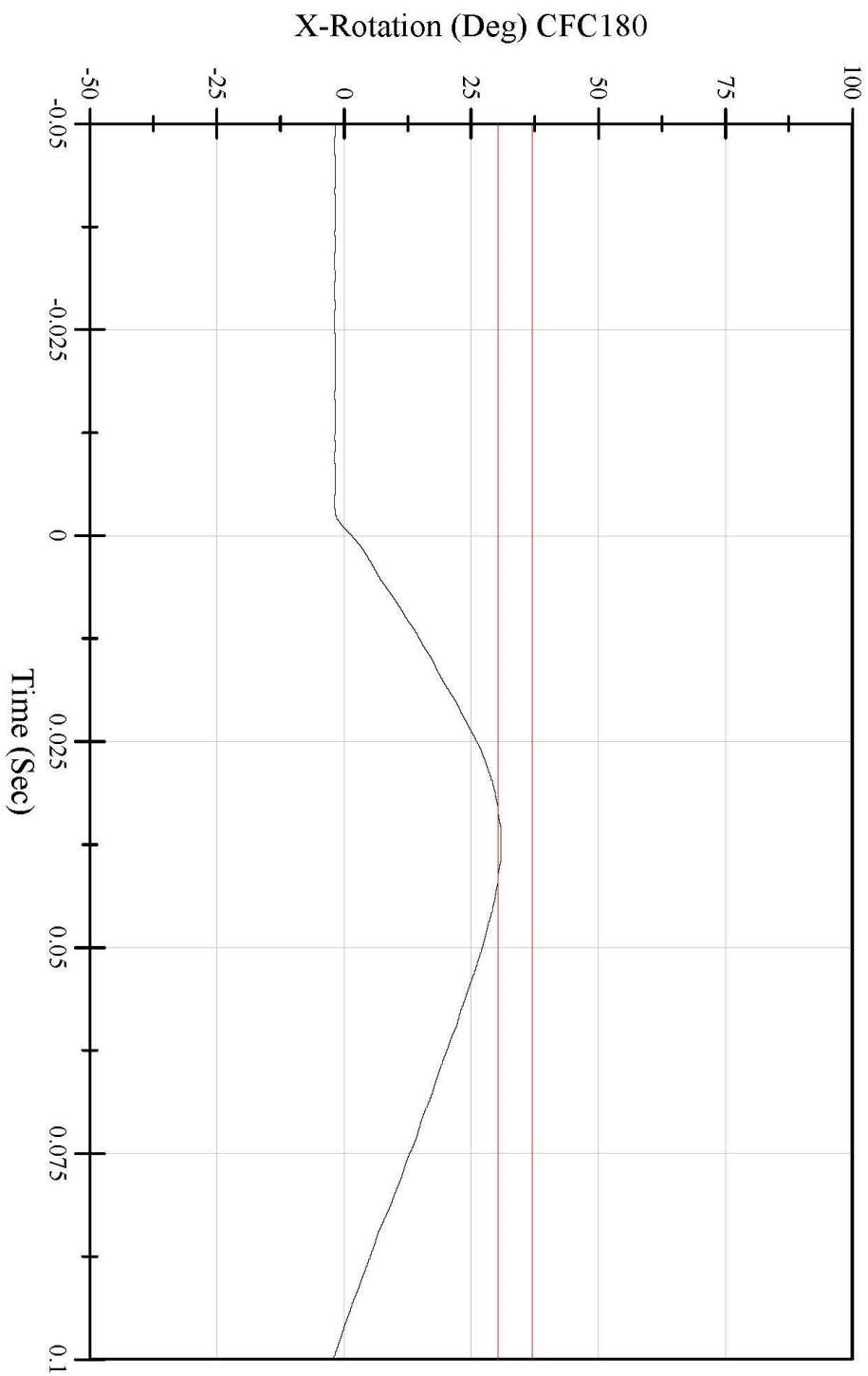


Software Version: 2.4

File Name: LX046Eversion150304-02processed.dat
03/04/2015 11:38:15.0000

Test Temperature: 70.9 degrees
Relative Humidity: 37%
Test Velocity: 2.08 m/s

THOR Left Foot Eversion Certification
Ankle X-Rotation
Serial Number: LX046

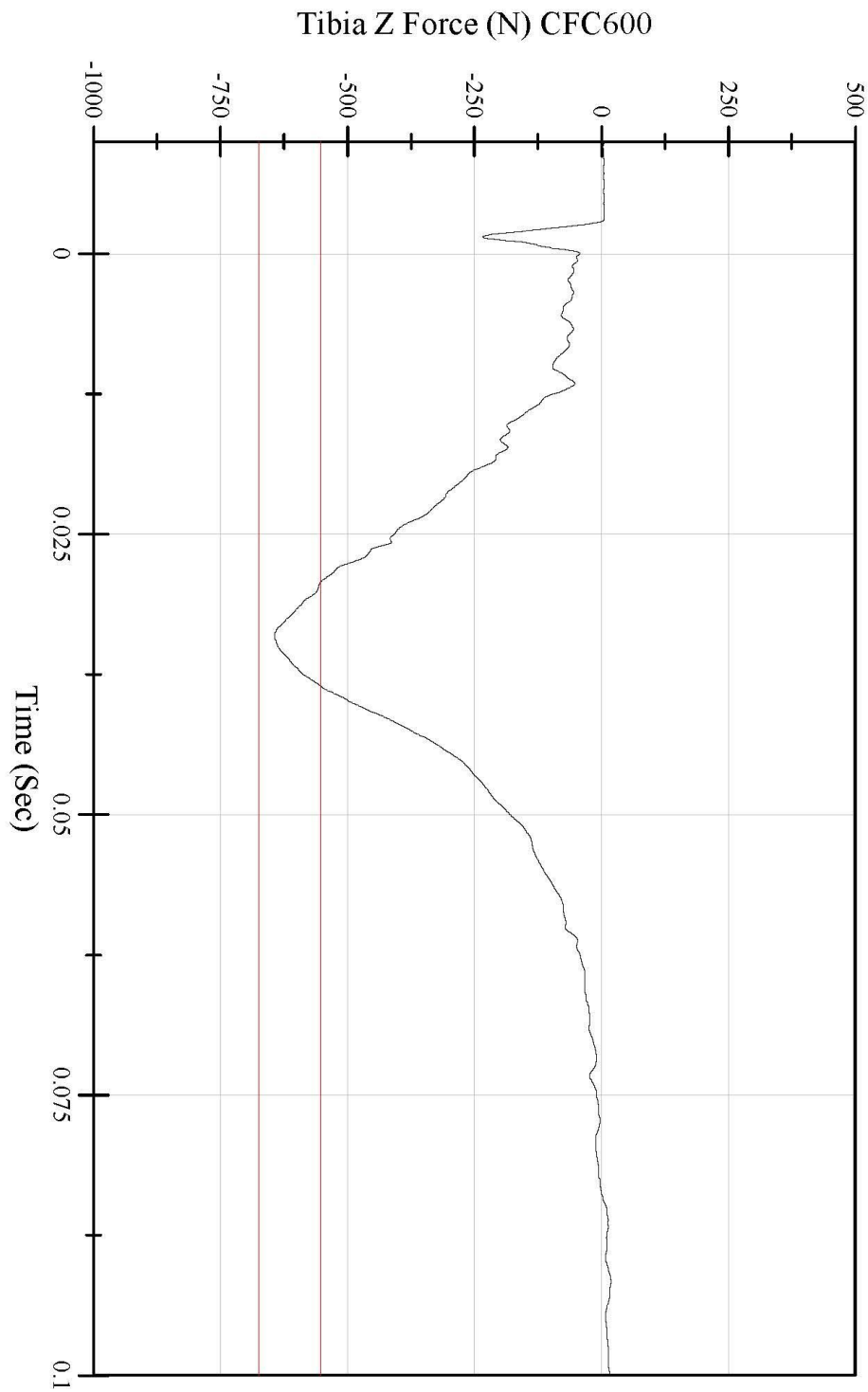


Software Version: 2.4

File Name: LX046Eversion150304-02processed.dat
03/04/2015 11:38:15.0000

Test Temperature: 70.9 degrees
Relative Humidity: 37%
Test Velocity: 2.08 m/s

THOR Left Foot Eversion Certification
Tibia Load
Serial Number: LX046

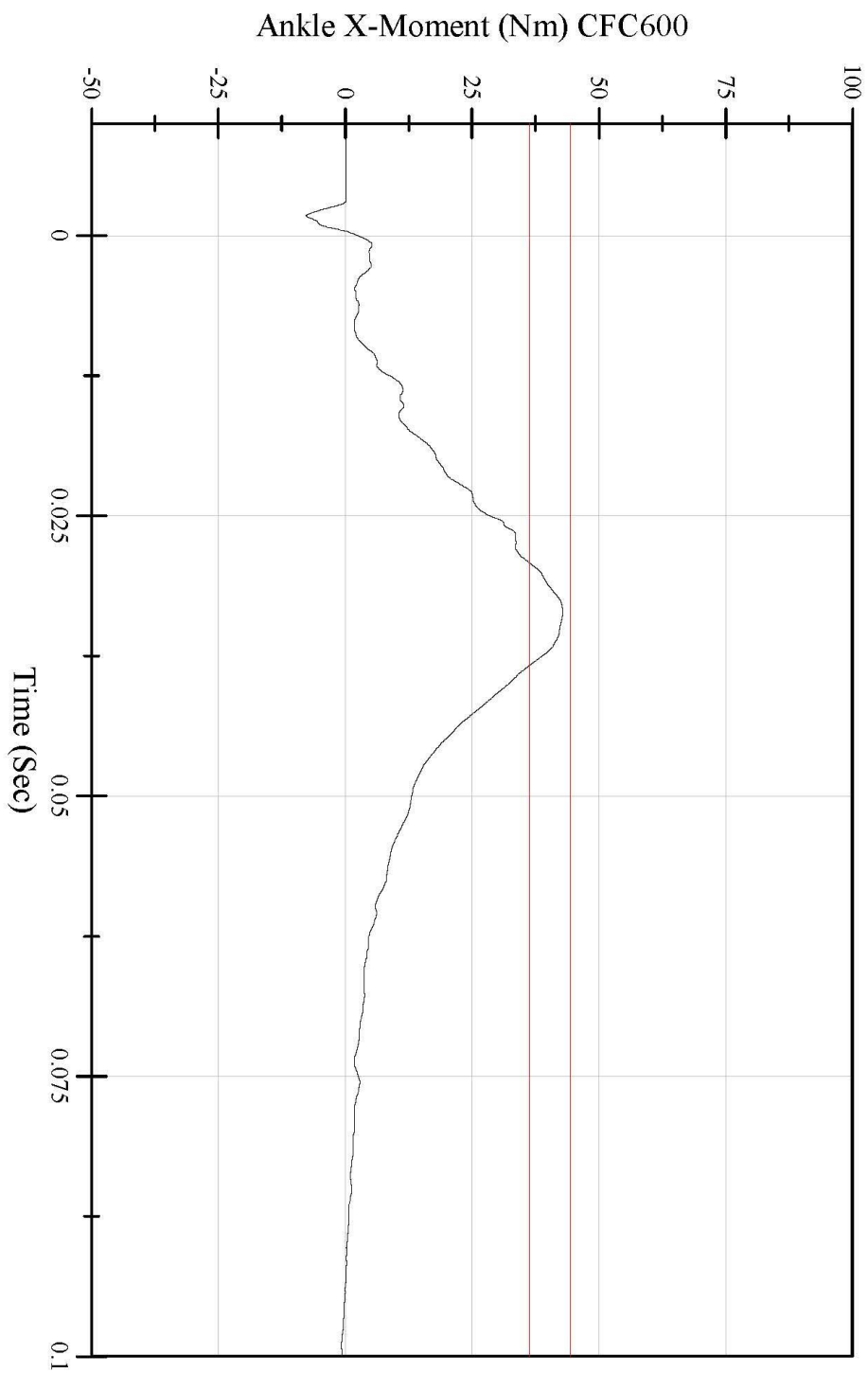


Software Version: 2.4

File Name: LX046Eversion150304-02processed.dat
03/04/2015 11:38:15.0000

Test Temperature: 70.9 degrees
Relative Humidity: 37%
Test Velocity: 2.08 m/s

THOR Left Foot Eversion Certification
Ankle Moment
Serial Number: LX046

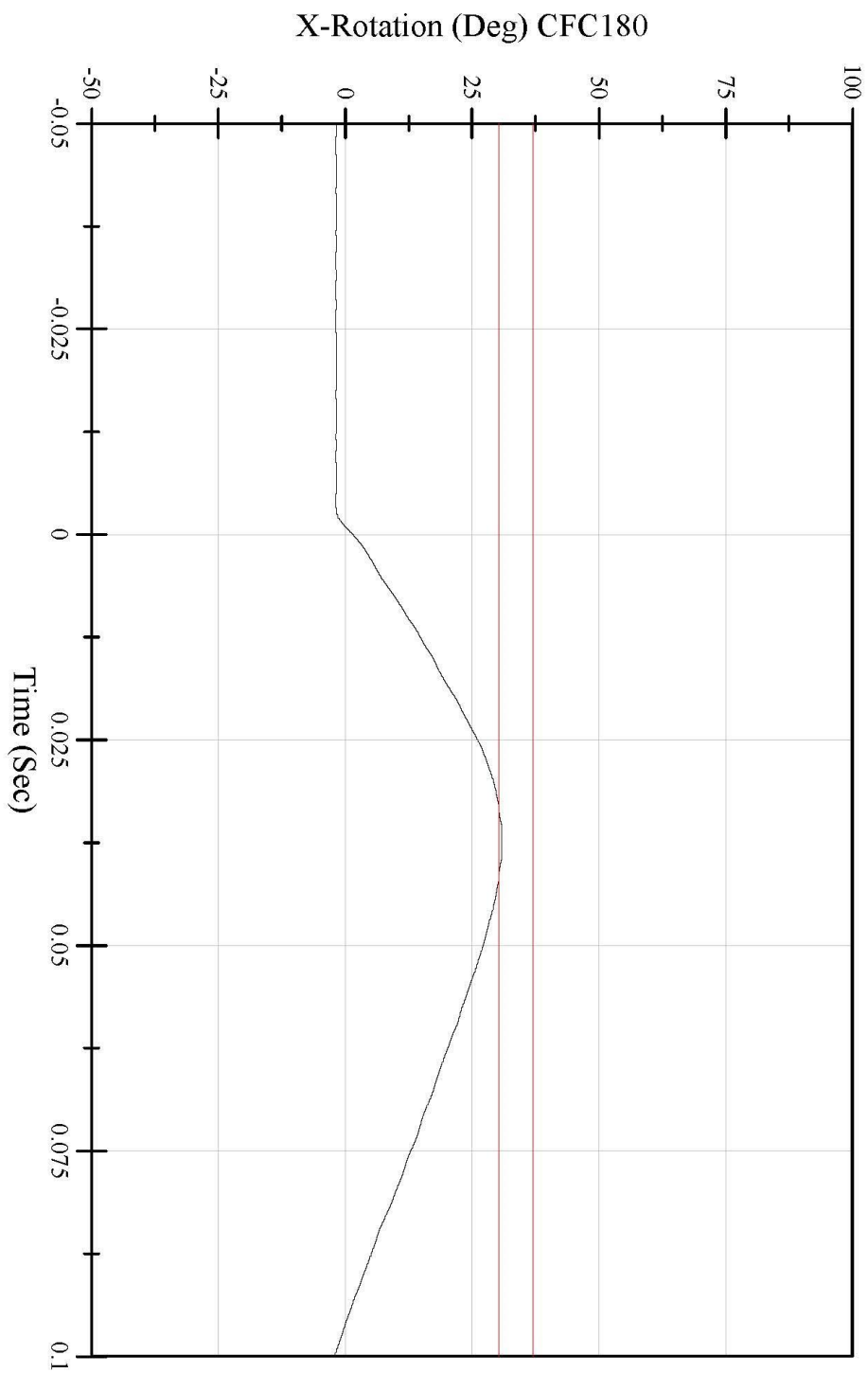


Software Version: 2.4

File Name: LX046Eversion150304-02processed.dat
03/04/2015 11:38:15.0000

Test Temperature: 70.9 degrees
Relative Humidity: 37%
Test Velocity: 2.08 m/s

THOR Left Foot Eversion Certification
Ankle X-Rotation
Serial Number: LX046

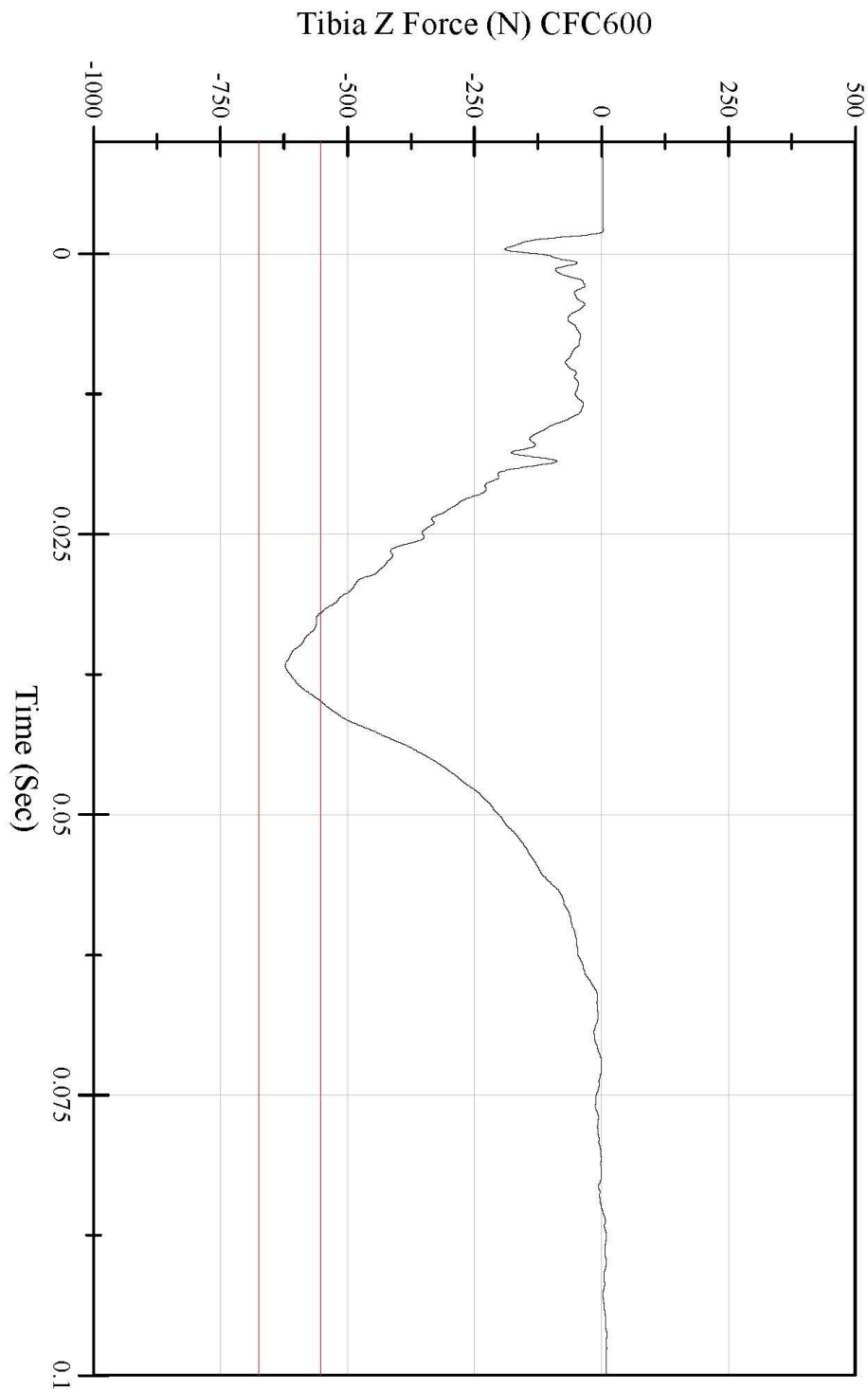


Software Version: 2.4

File Name: LX046Eversion150304-02processed.dat
03/04/2015 11:38:15.0000

Test Temperature: 71 degrees
Relative Humidity: 38%
Test Velocity: 2.04 m/s

THOR Left Foot Inversion Certification
Tibia Load
Serial Number: LX046

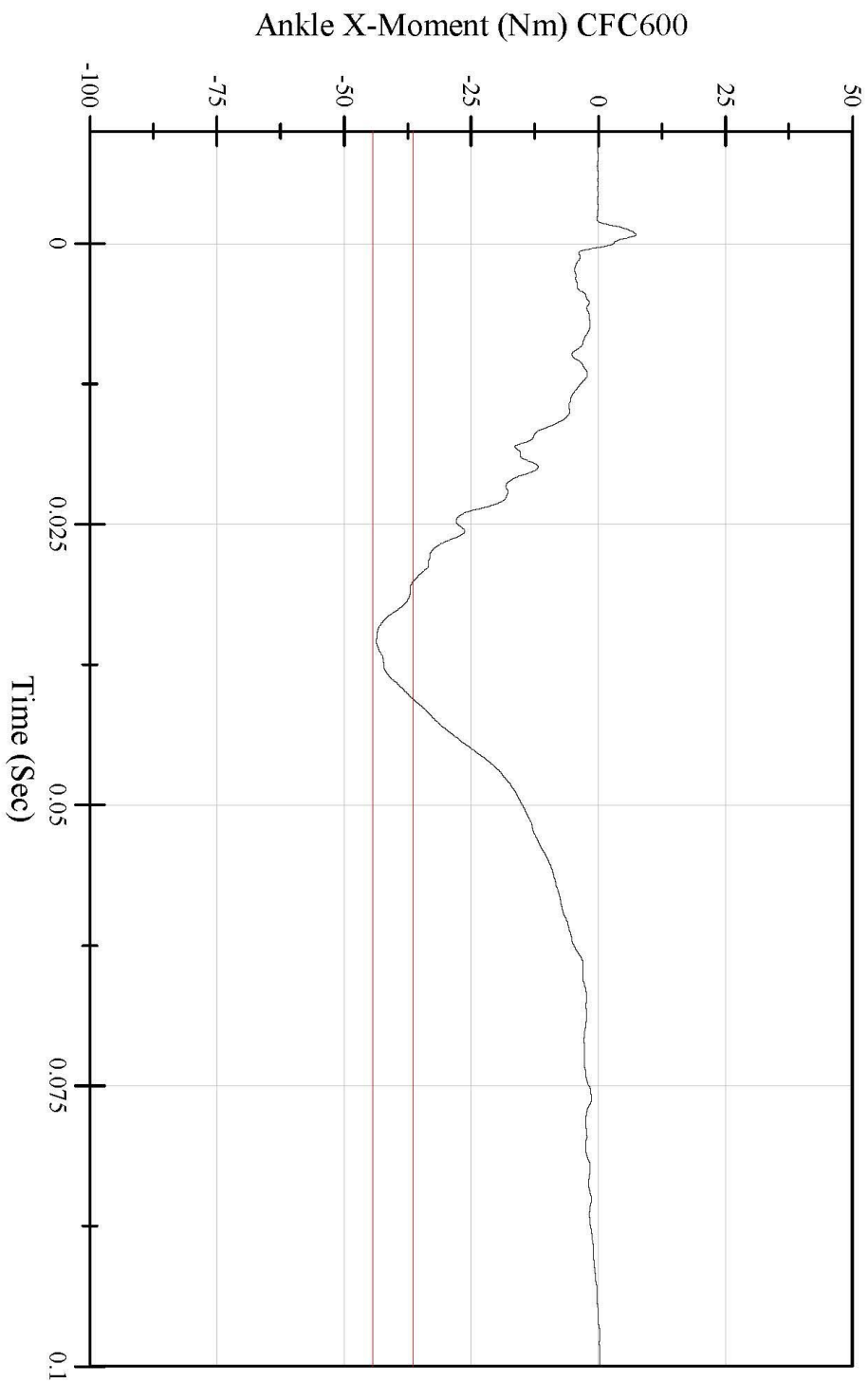


Software Version: 2.4

File Name: LX046Inversion150304-11processed.dat
03/04/2015 10:31:36.0000

Test Temperature: 71 degrees
Relative Humidity: 38%
Test Velocity: 2.04 m/s

THOR Left Foot Inversion Certification
Ankle Moment
Serial Number: LX046

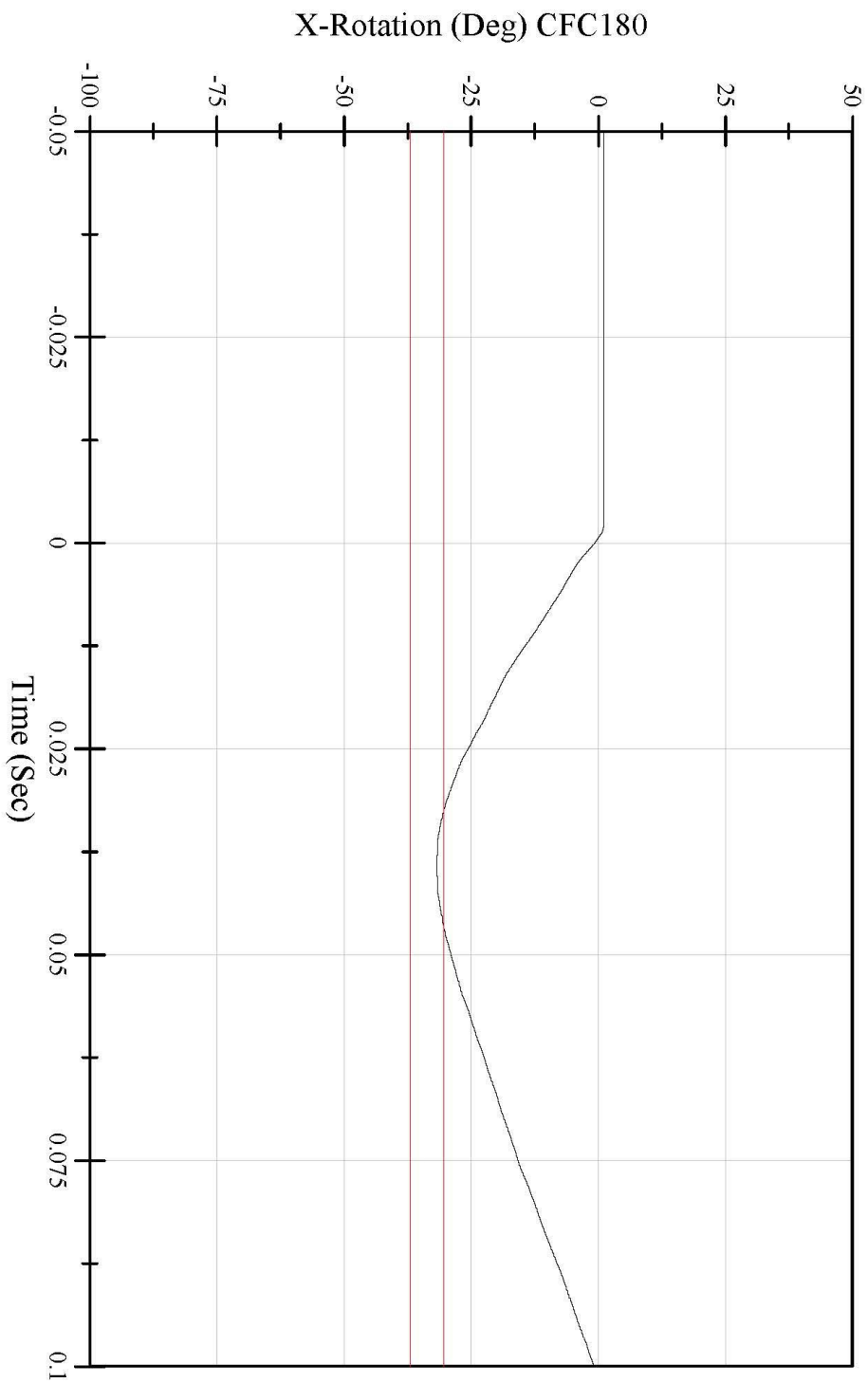


Software Version: 2.4

File Name: LX046Inversion150304-11processed.dat
03/04/2015 10:31:36.0000

Test Temperature: 71 degrees
Relative Humidity: 38%
Test Velocity: 2.04 m/s

THOR Left Foot Inversion Certification
Ankle X-Rotation
Serial Number: LX046

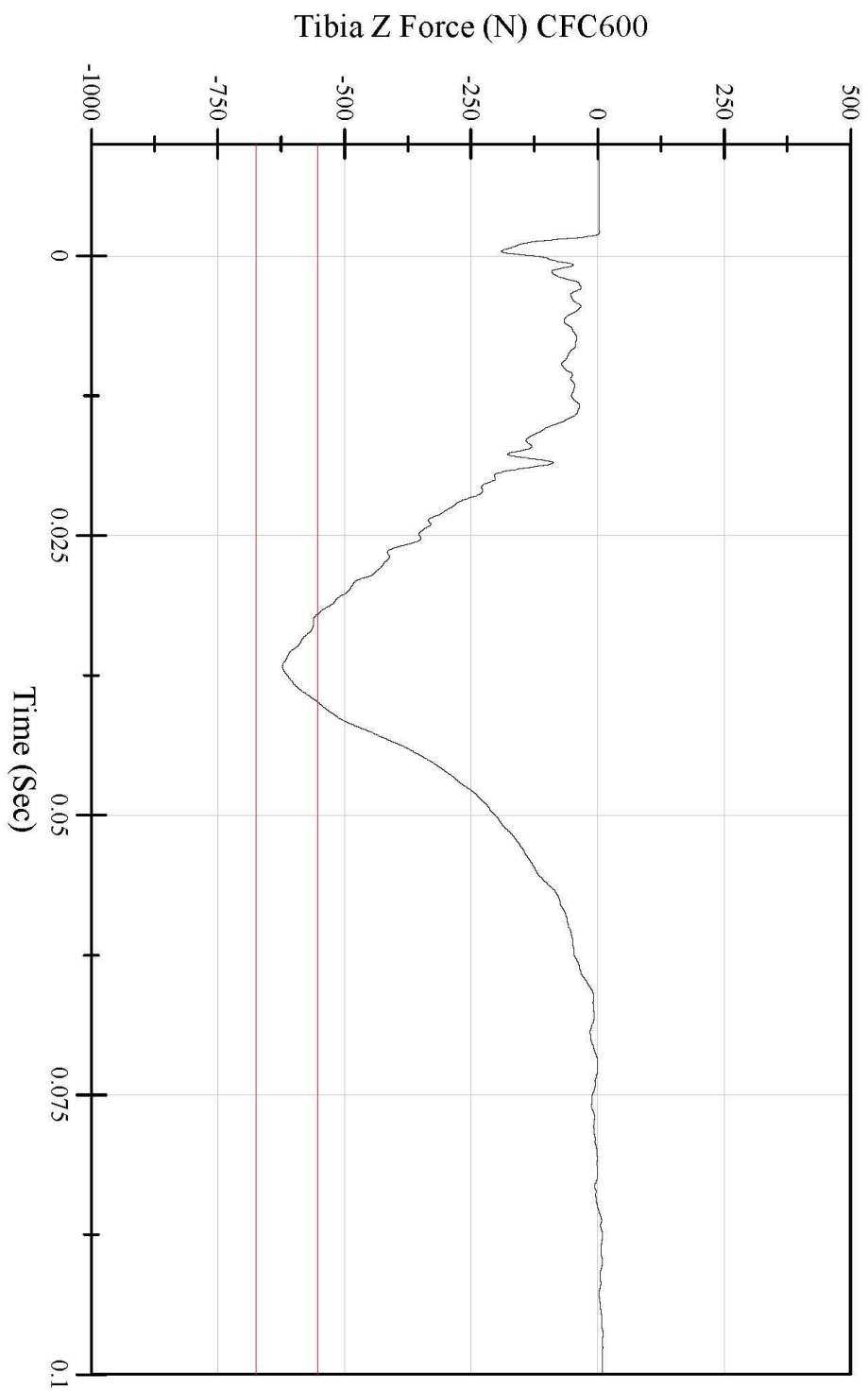


Software Version: 2.4

File Name: LX046Inversion150304-11processed.dat
03/04/2015 10:31:36.0000

Test Temperature: 71 degrees
Relative Humidity: 38%
Test Velocity: 2.04 m/s

THOR Left Foot Inversion Certification
Tibia Load
Serial Number: LX046

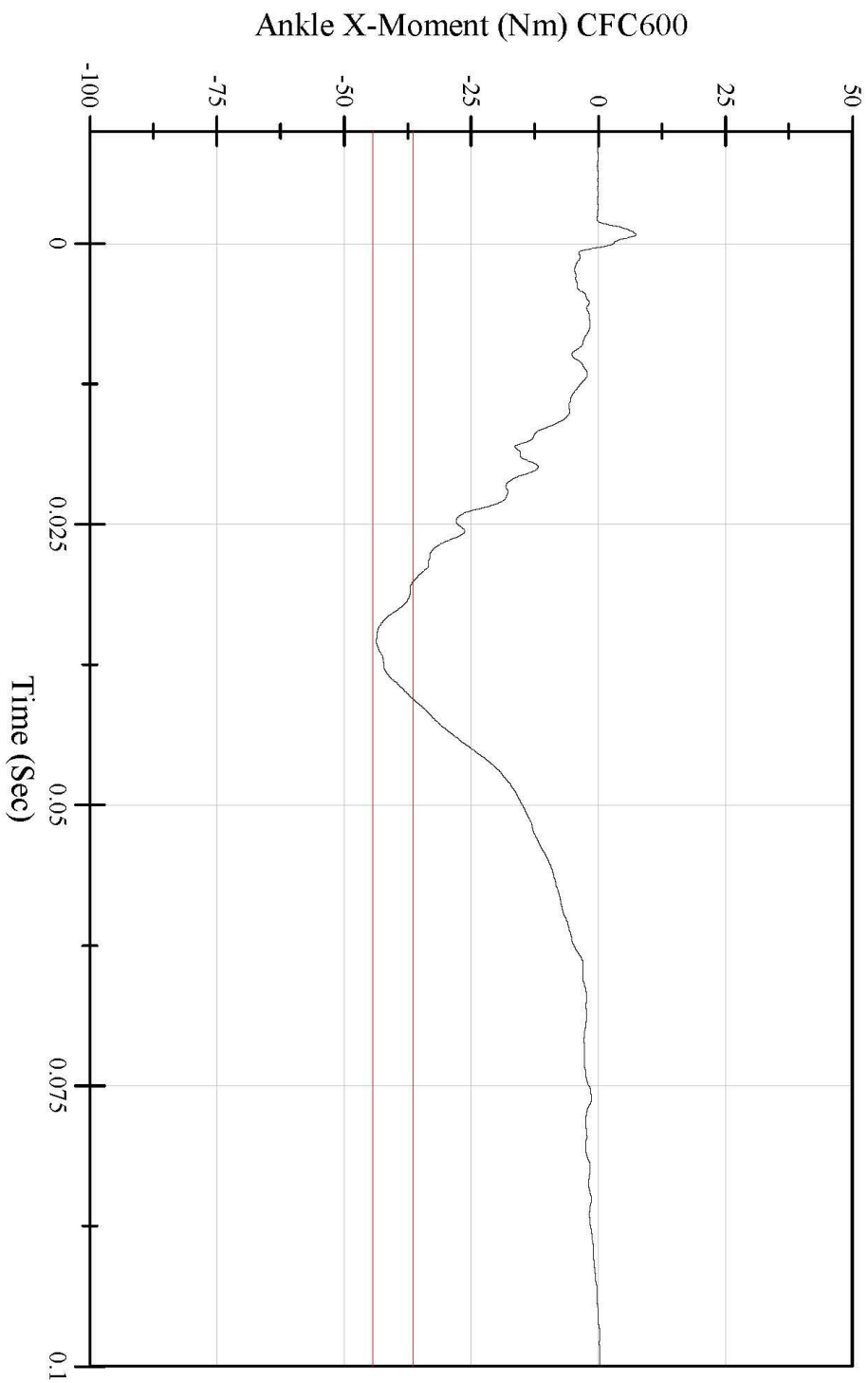


Software Version: 2.4

File Name: LX046Inversion150304-11processed.dat
03/04/2015 10:31:36.0000

Test Temperature: 71 degrees
Relative Humidity: 38%
Test Velocity: 2.04 m/s

THOR Left Foot Inversion Certification
Ankle Moment
Serial Number: LX046

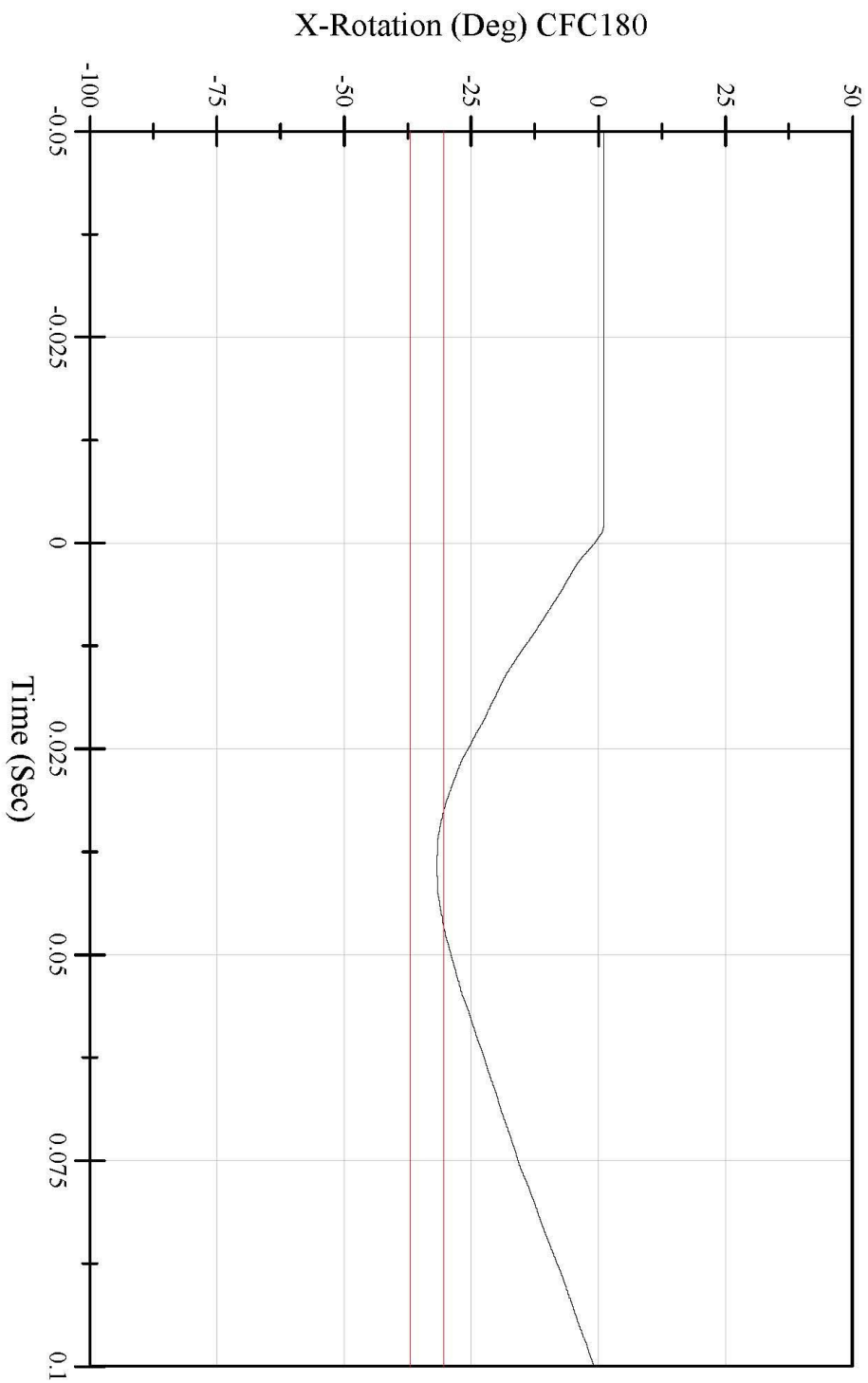


Software Version: 2.4

File Name: LX046Inversion150304-11processed.dat
03/04/2015 10:31:36.0000

Test Temperature: 71 degrees
Relative Humidity: 38%
Test Velocity: 2.04 m/s

THOR Left Foot Inversion Certification
Ankle X-Rotation
Serial Number: LX046

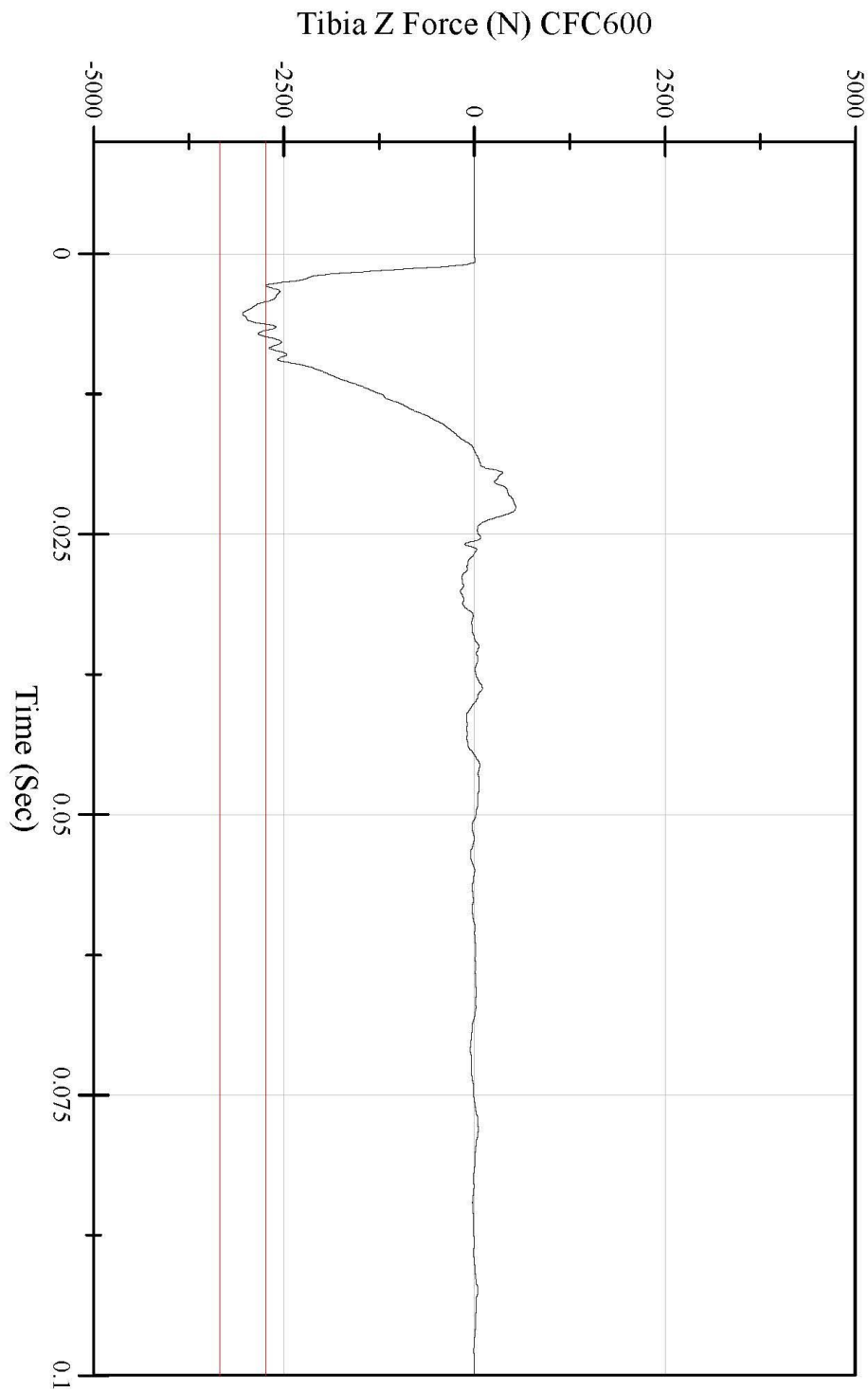


Software Version: 2.4

File Name: LX046Inversion150304-11processed.dat
03/04/2015 10:31:36.0000

Test Temperature: 71.1 degrees
Relative Humidity: 13%
Test Velocity: 4 m/s

THOR Left Foot Heel Certification
Tibia Load
Serial Number: LX046

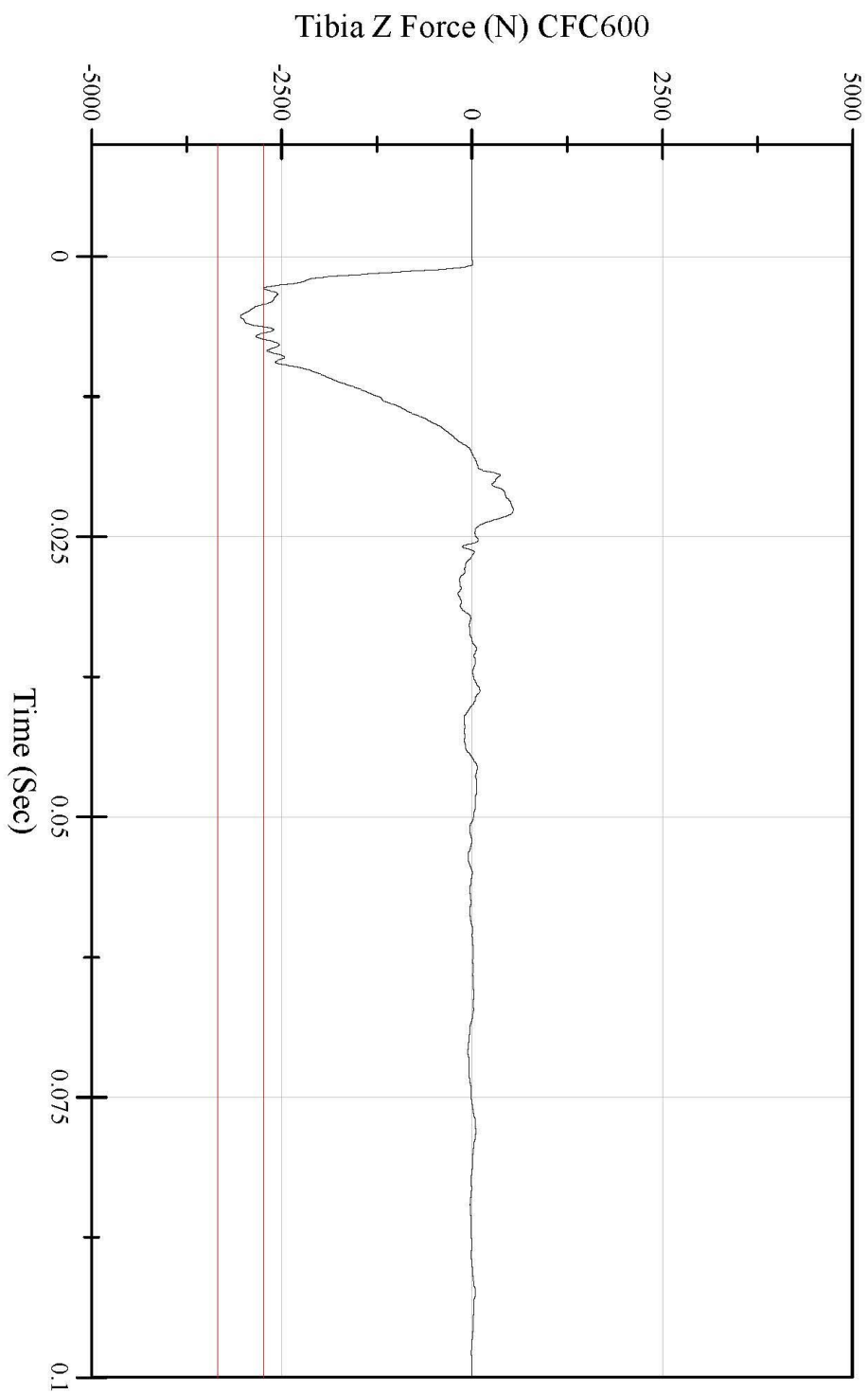


Software Version: 2.4

File Name: LX046Heel150306-01processed.dat
03/06/2015 09:30:51.0000

Test Temperature: 71.1 degrees
Relative Humidity: 13%
Test Velocity: 4 m/s

THOR Left Foot Heel Certification
Tibia Load
Serial Number: LX046

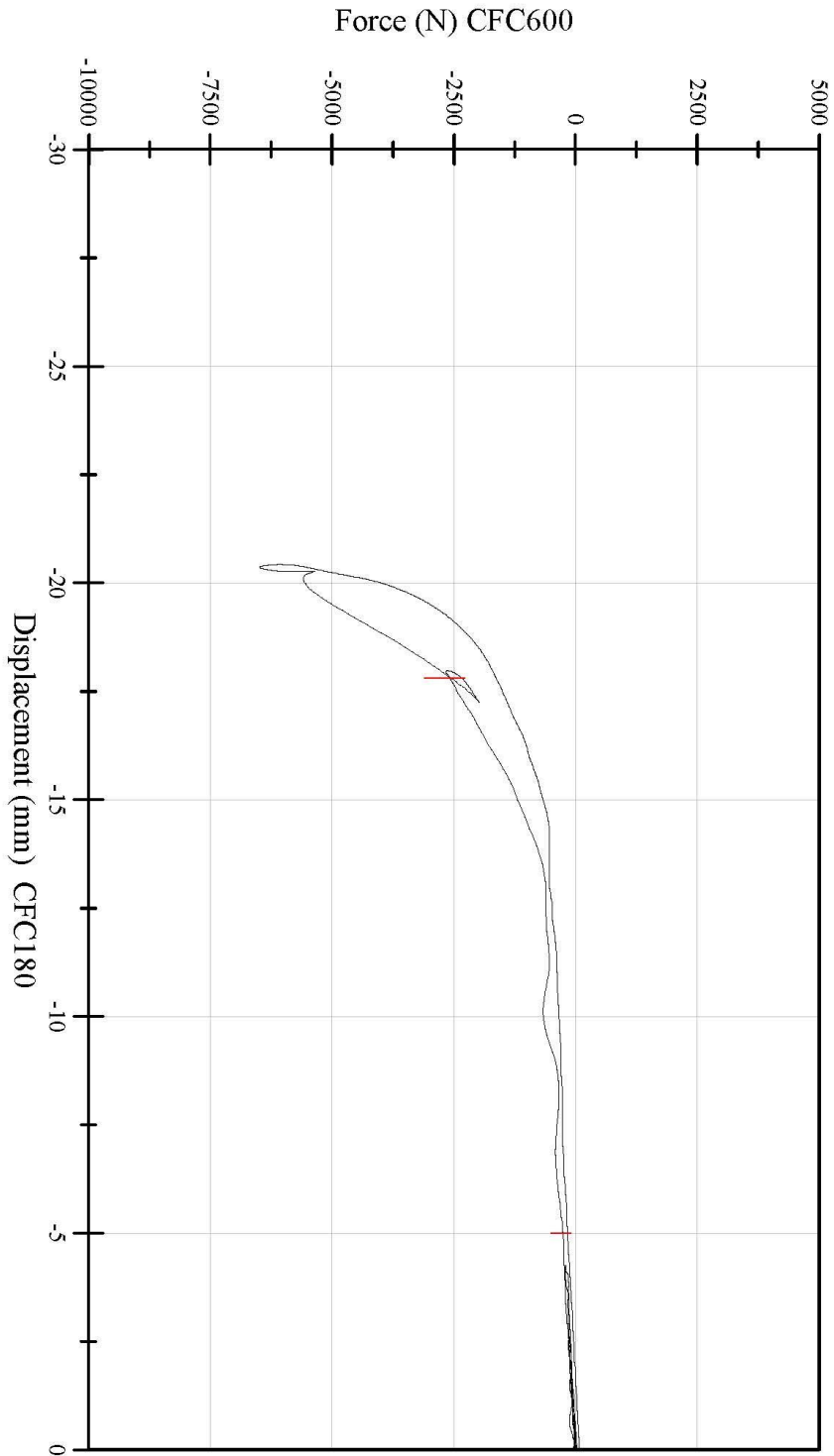


Software Version: 2.4

File Name: LX046Heel150306-01processed.dat
03/06/2015 09:30:51.0000

Test Temperature: 70.7 degrees
Relative Humidity: 45%
Test Velocity: 2.78 m/s

THOR Right Knee Certification
Femur Force vs. Knee Displacement
Serial Number: 021033

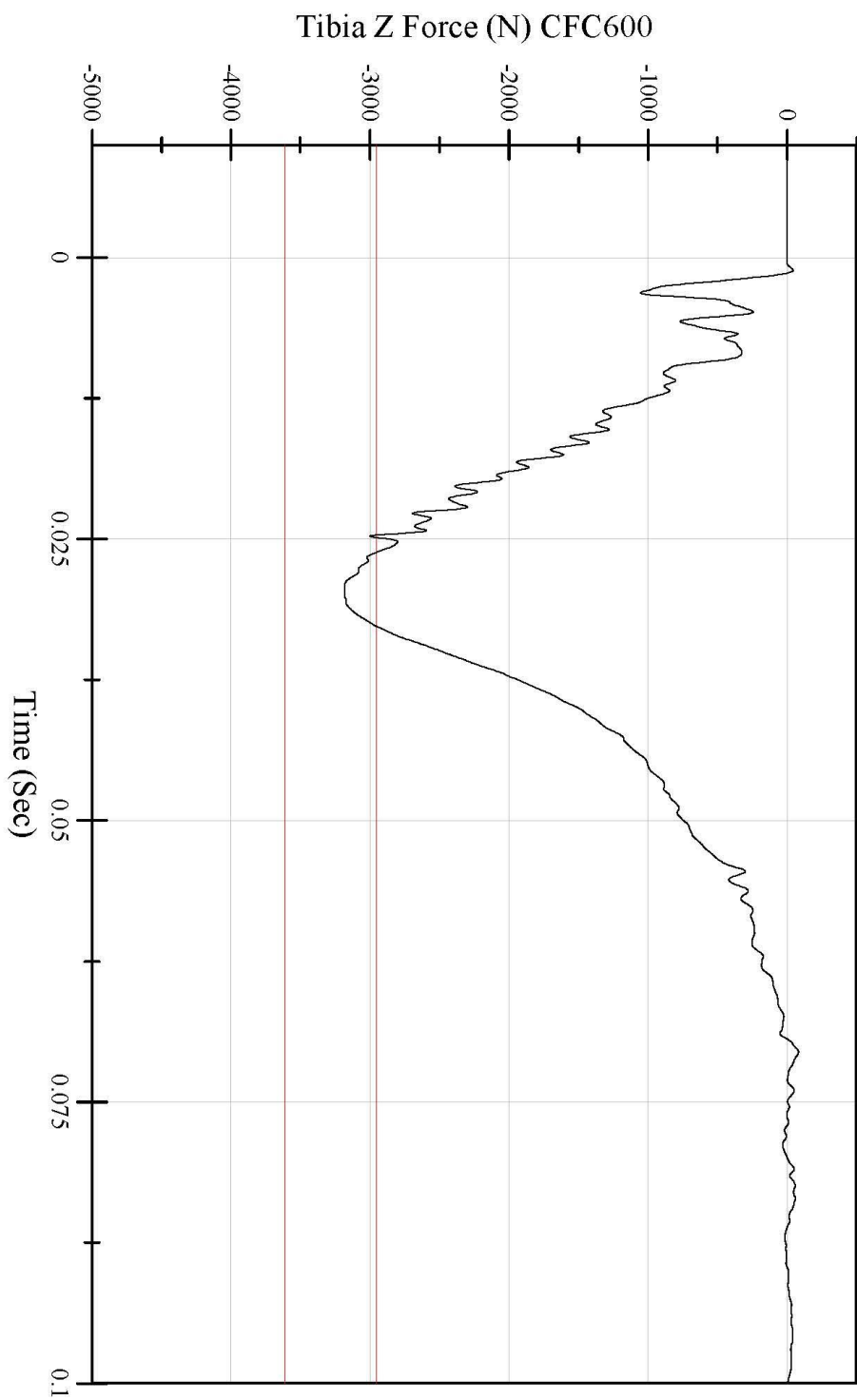


Software Version: 2.4

File Name: 012033 Knee1150407-03processed.dat
04/07/2015 09:51:56.0000

Test Temperature: 71.6 degrees
Relative Humidity: 36%
Test Velocity: 5.09 m/s

THOR Right Foot Dorsiflexion Certification
Tibia Load
Serial Number: LX045

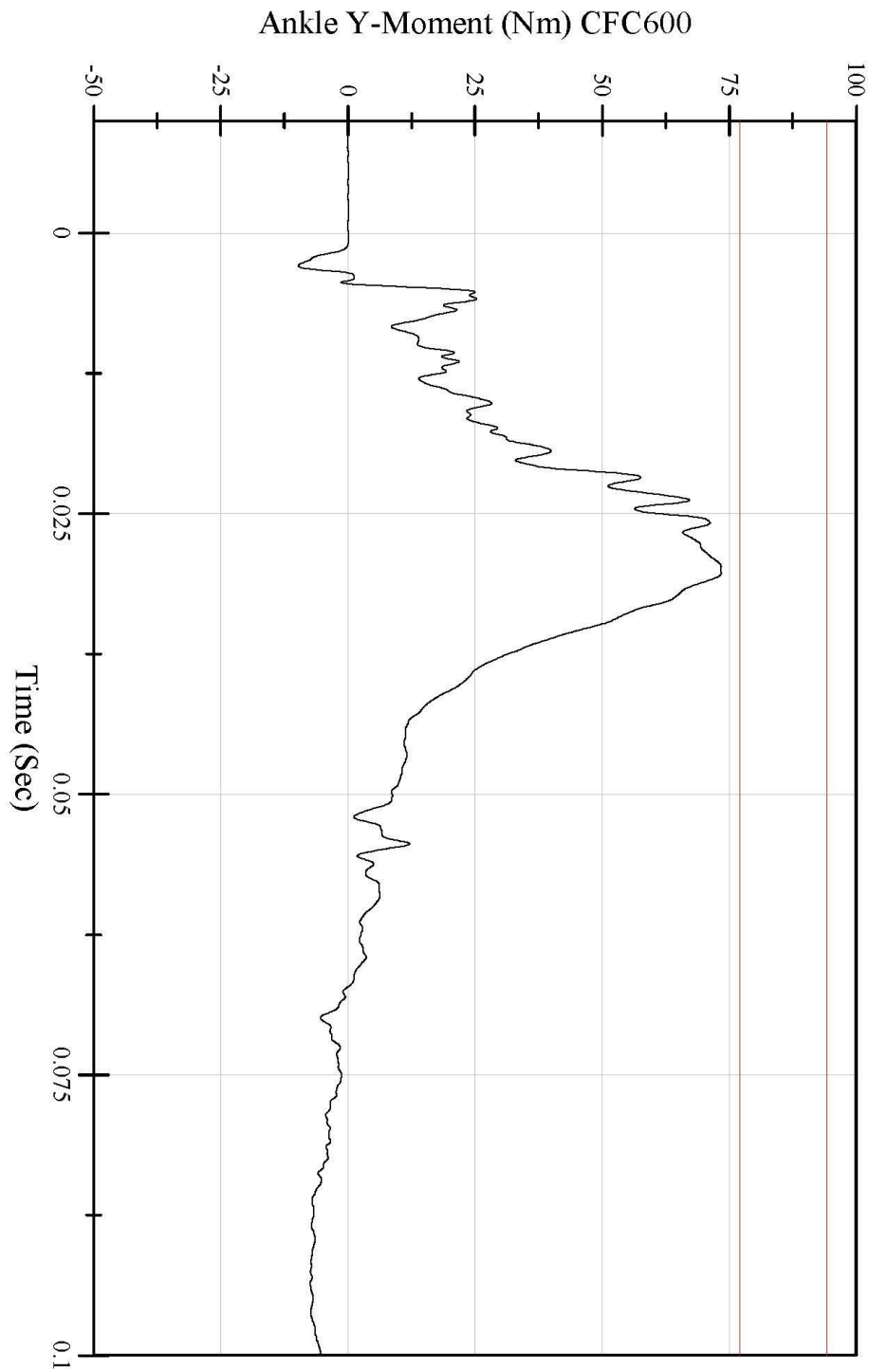


Software Version: 2.4

File Name: LX045Ball150313-07processed.dat
03/13/2015 09:32:27.0000

Test Temperature: 71.6 degrees
Relative Humidity: 36%
Test Velocity: 5.09 m/s

THOR Right Foot Dorsiflexion Certification
Ankle Y-Moment
Serial Number: LX045

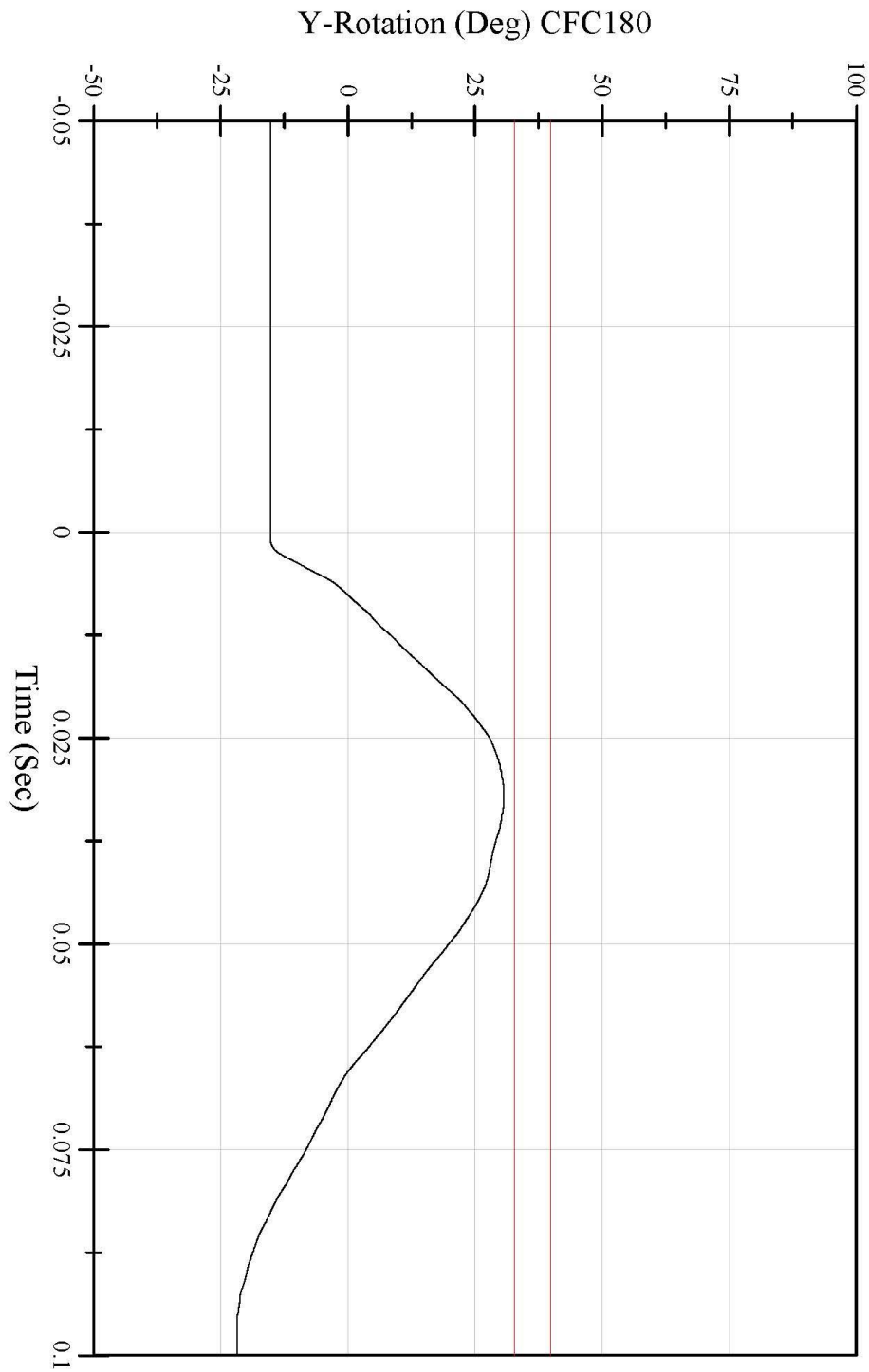


Software Version: 2.4

File Name: LX045Ball150313-07processed.dat
03/13/2015 09:32:27.0000

Test Temperature: 71.6 degrees
Relative Humidity: 36%
Test Velocity: 5.09 m/s

THOR Right Foot Dorsiflexion Certification
Ankle Y-Rotation
Serial Number: LX045

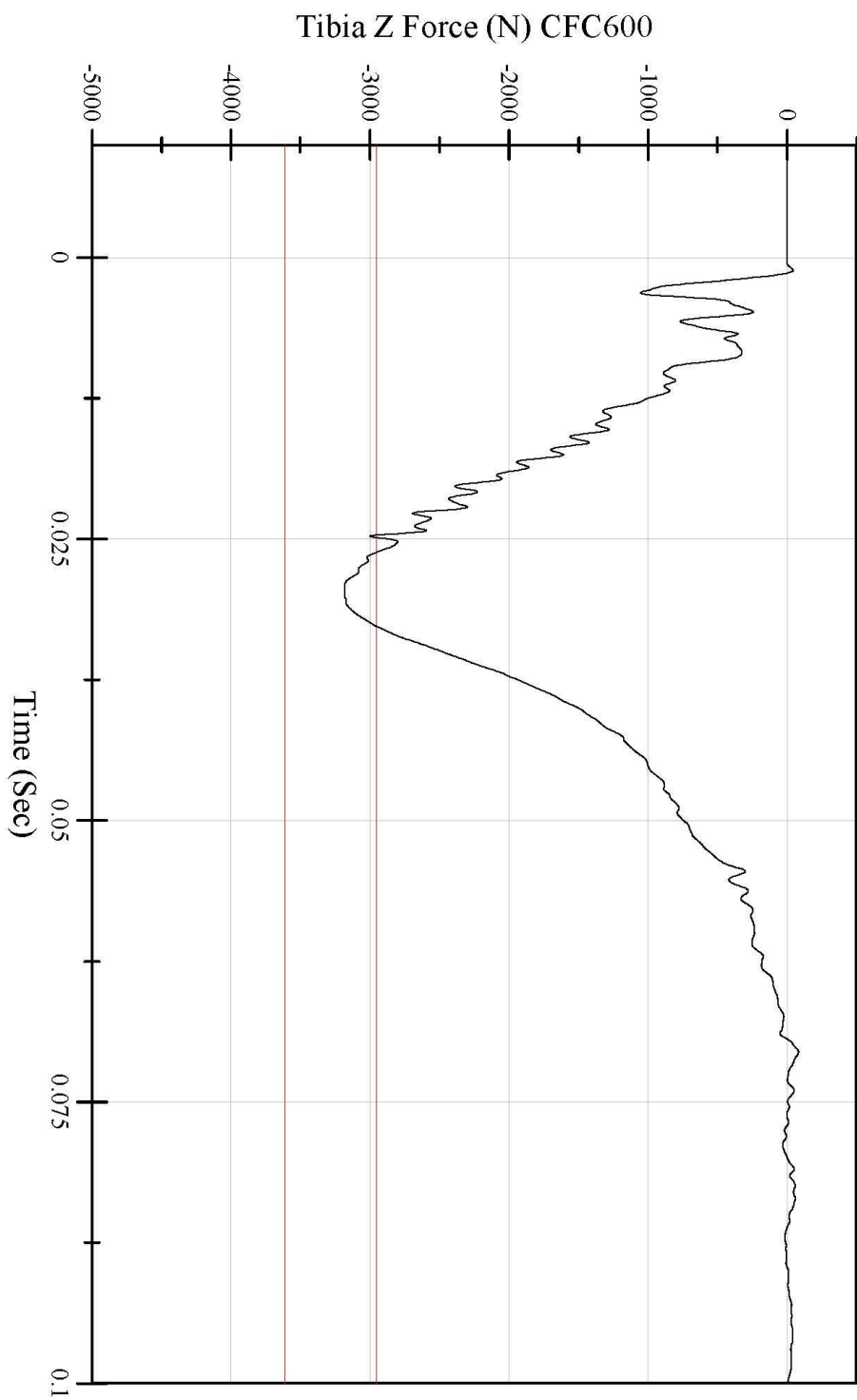


Software Version: 2.4

File Name: LX045Ball150313-07processed.dat
03/13/2015 09:32:27.0000

Test Temperature: 71.6 degrees
Relative Humidity: 36%
Test Velocity: 5.09 m/s

THOR Right Foot Dorsiflexion Certification
Tibia Load
Serial Number: LX045

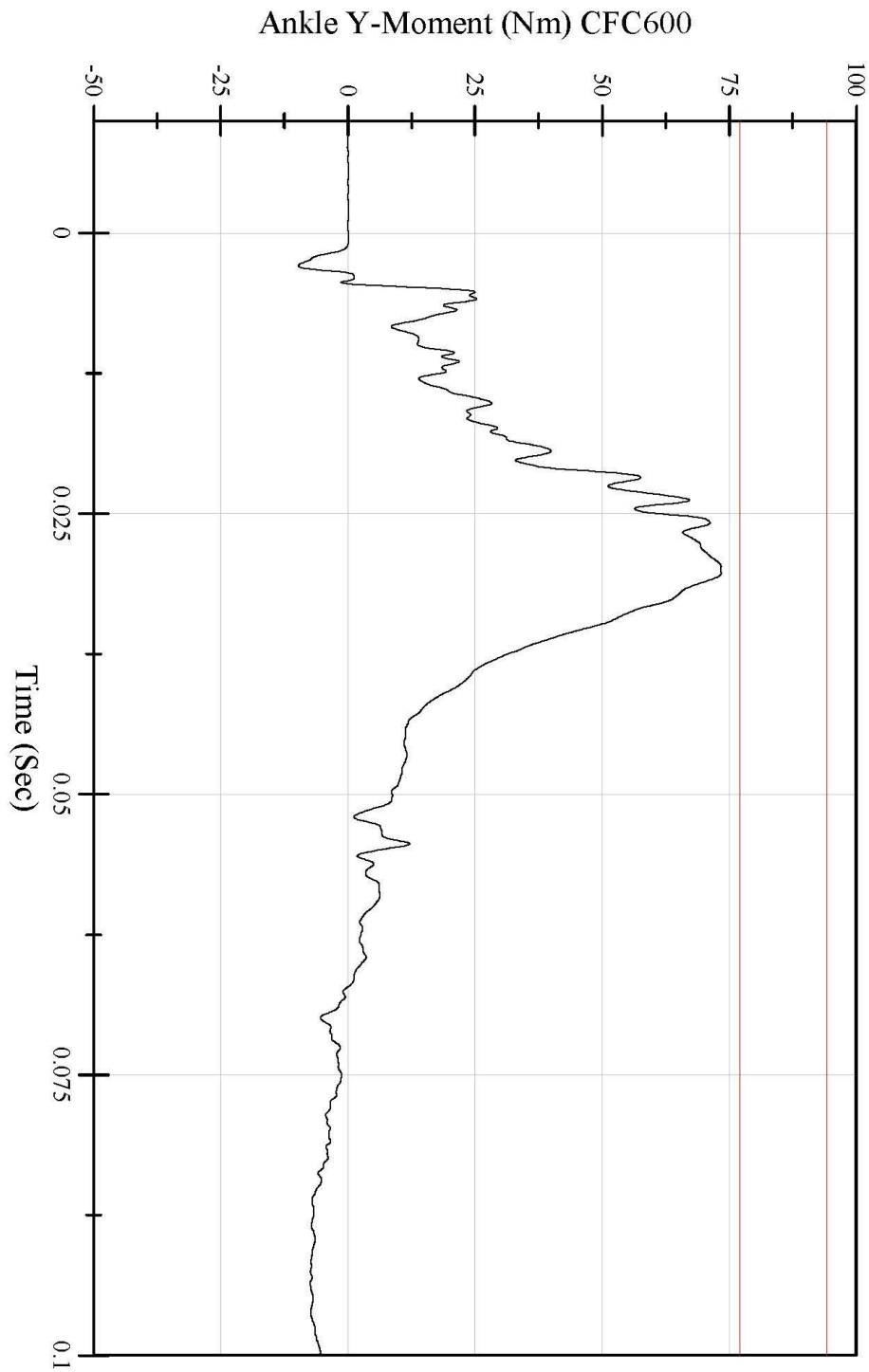


Software Version: 2.4

File Name: LX045Ball150313-07processed.dat
03/13/2015 09:32:27.0000

Test Temperature: 71.6 degrees
Relative Humidity: 36%
Test Velocity: 5.09 m/s

THOR Right Foot Dorsiflexion Certification
Ankle Y-Moment
Serial Number: LX045

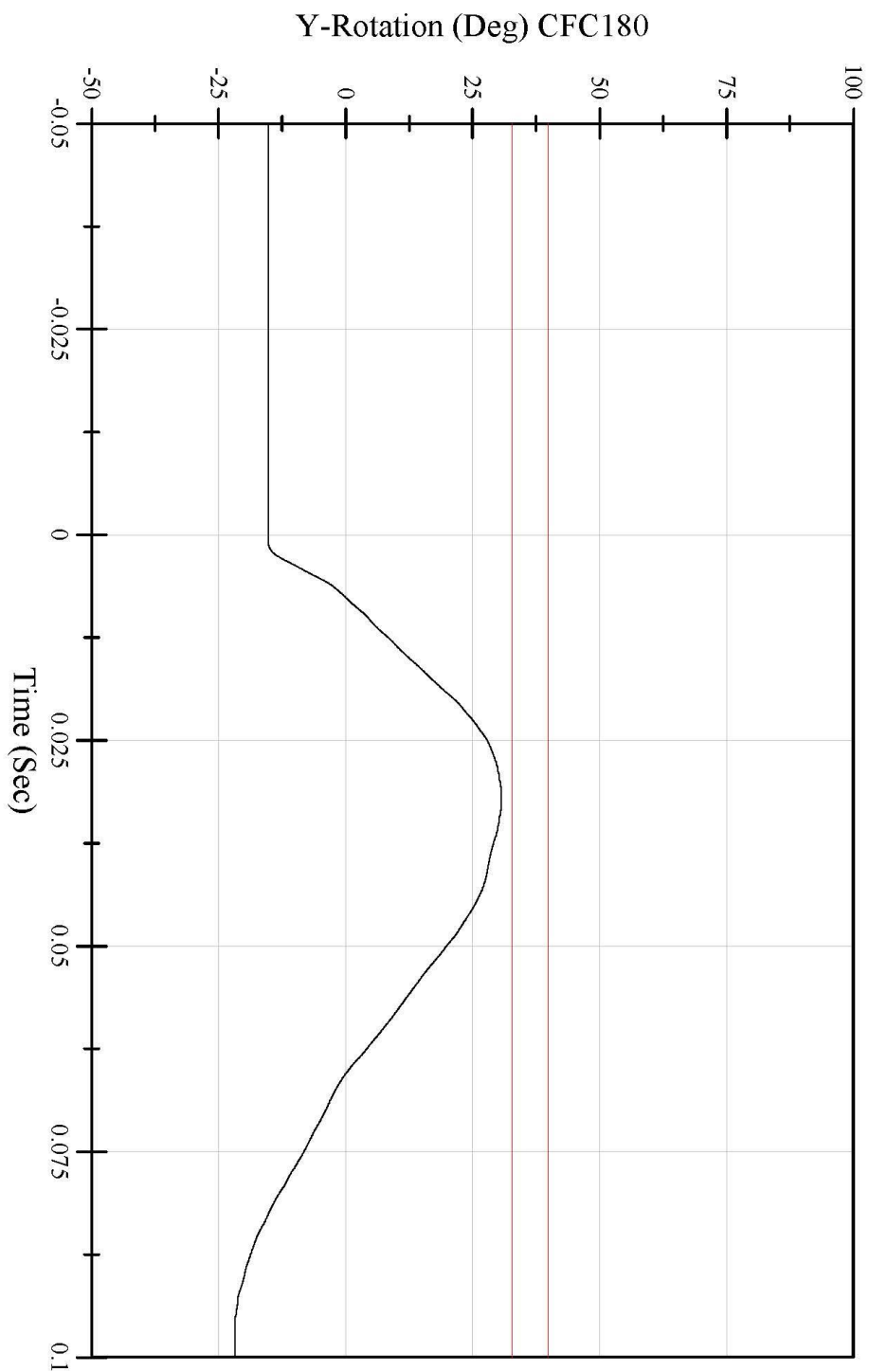


Software Version: 2.4

File Name: LX045Ball150313-07processed.dat
03/13/2015 09:32:27.0000

Test Temperature: 71.6 degrees
Relative Humidity: 36%
Test Velocity: 5.09 m/s

THOR Right Foot Dorsiflexion Certification
Ankle Y-Rotation
Serial Number: LX045

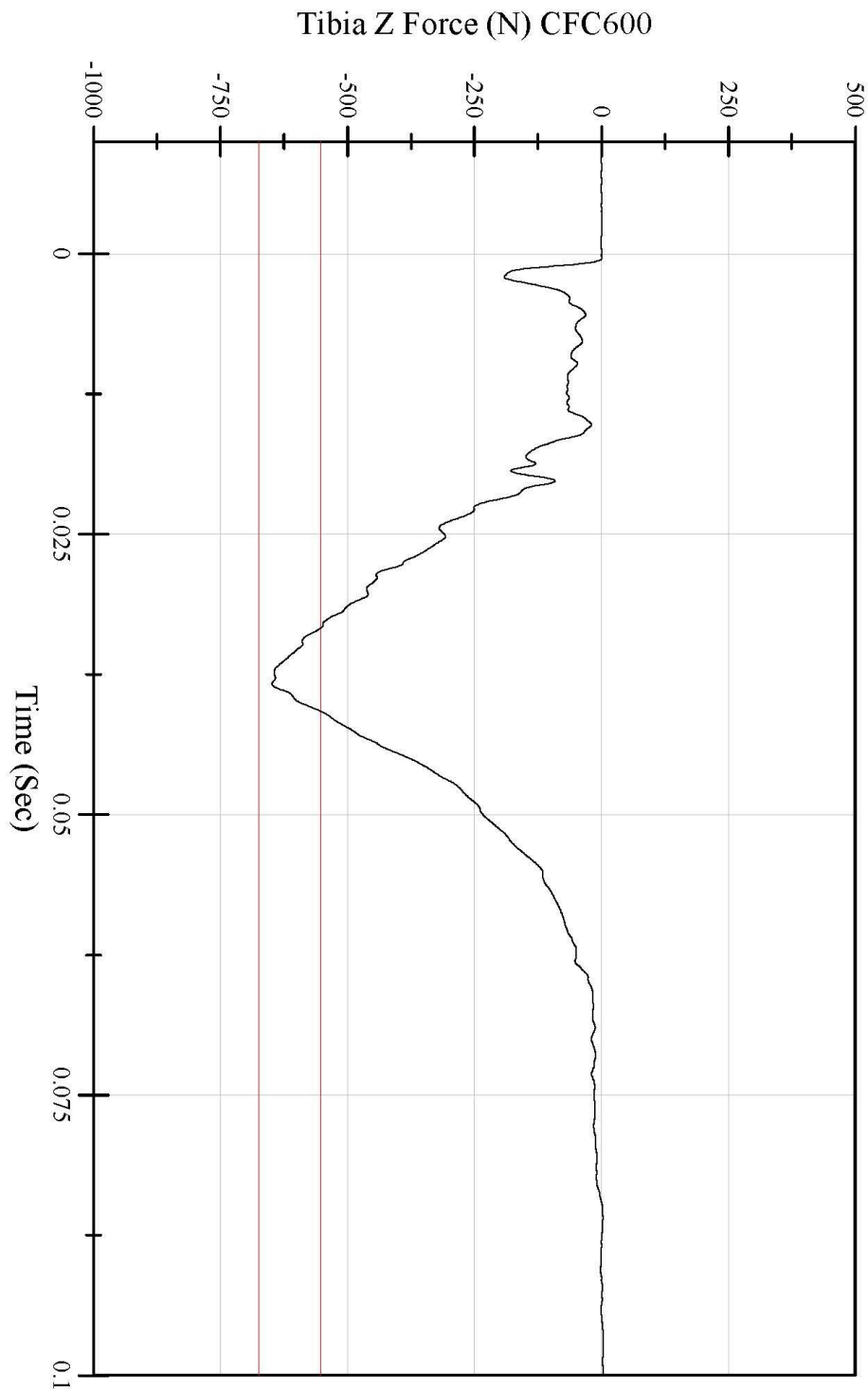


Software Version: 2.4

File Name: LX045Ball150313-07processed.dat
03/13/2015 09:32:27.0000

Test Temperature: 71.5 degrees
Relative Humidity: 28%
Test Velocity: 2.01 m/s

THOR Right Foot Eversion Certification
Tibia Load
Serial Number: LX045

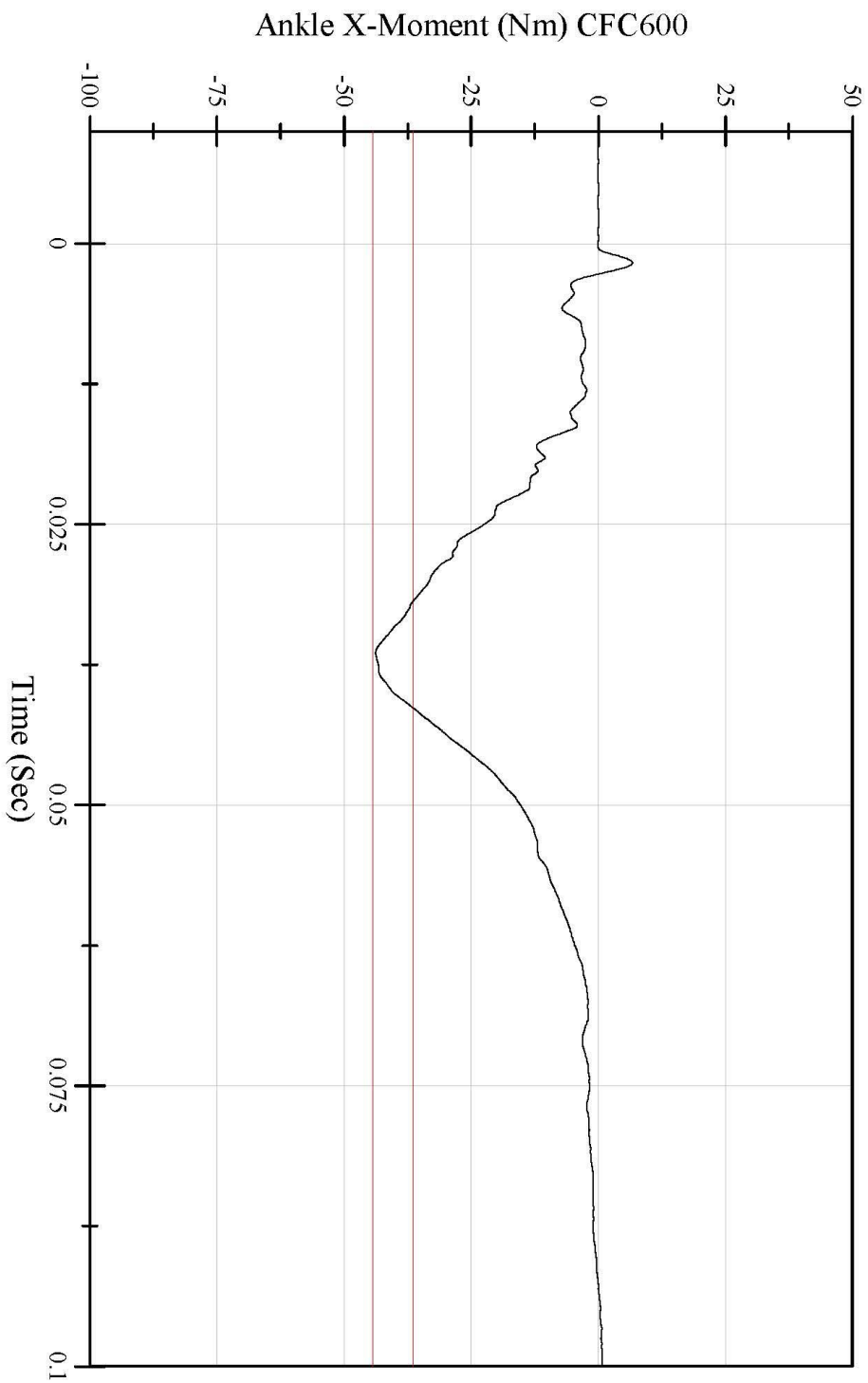


Software Version: 2.4

File Name: LX045Eversion150311-10processed.dat
03/10/2015 09:37:10.0000

Test Temperature: 71.5 degrees
Relative Humidity: 28%
Test Velocity: 2.01 m/s

THOR Right Foot Eversion Certification
Ankle Moment
Serial Number: LX045

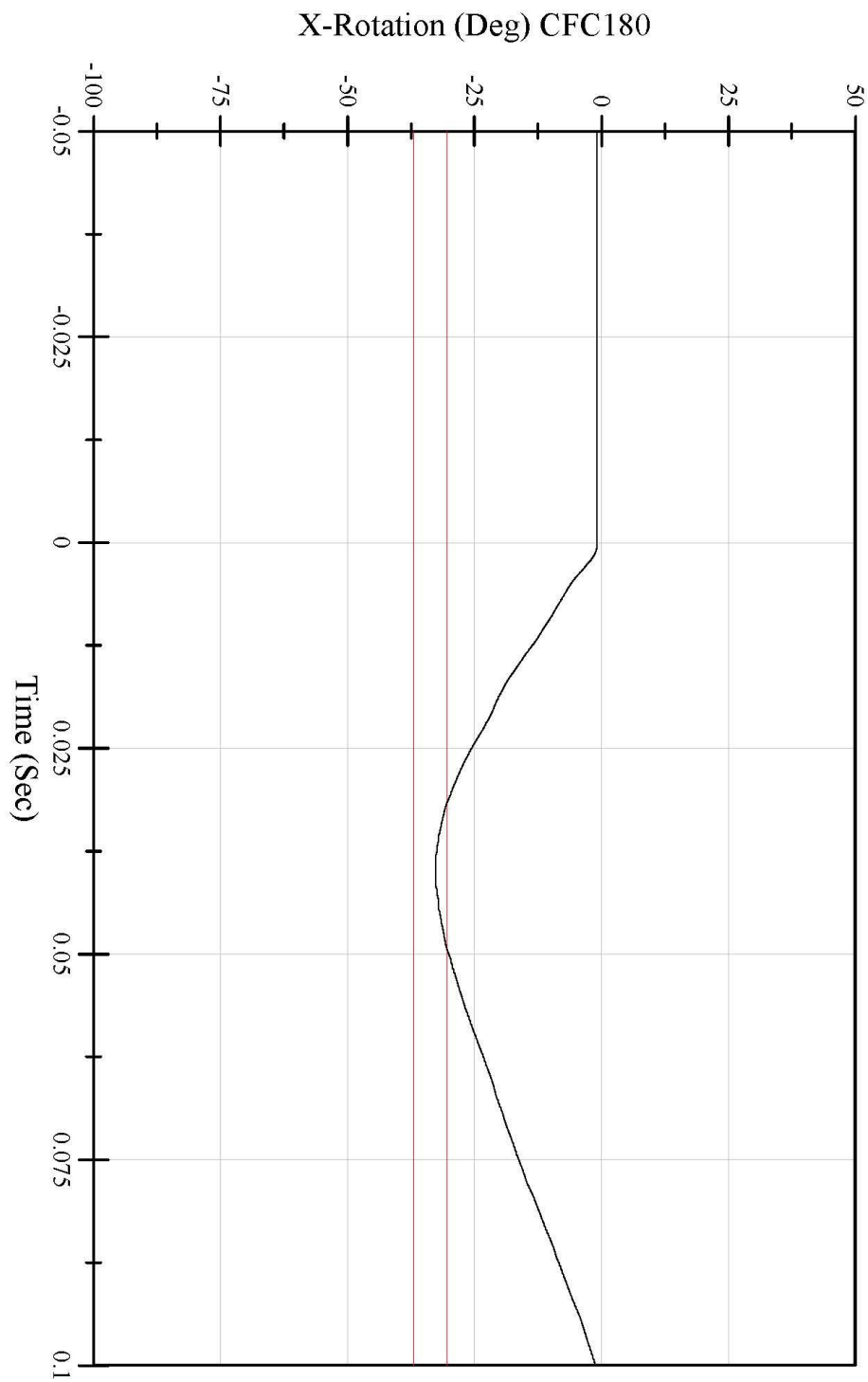


Software Version: 2.4

File Name: LX045Eversion150311-10processed.dat
03/10/2015 09:37:10.0000

Test Temperature: 71.5 degrees
Relative Humidity: 28%
Test Velocity: 2.01 m/s

THOR Right Foot Eversion Certification
Ankle X-Rotation
Serial Number: LX045

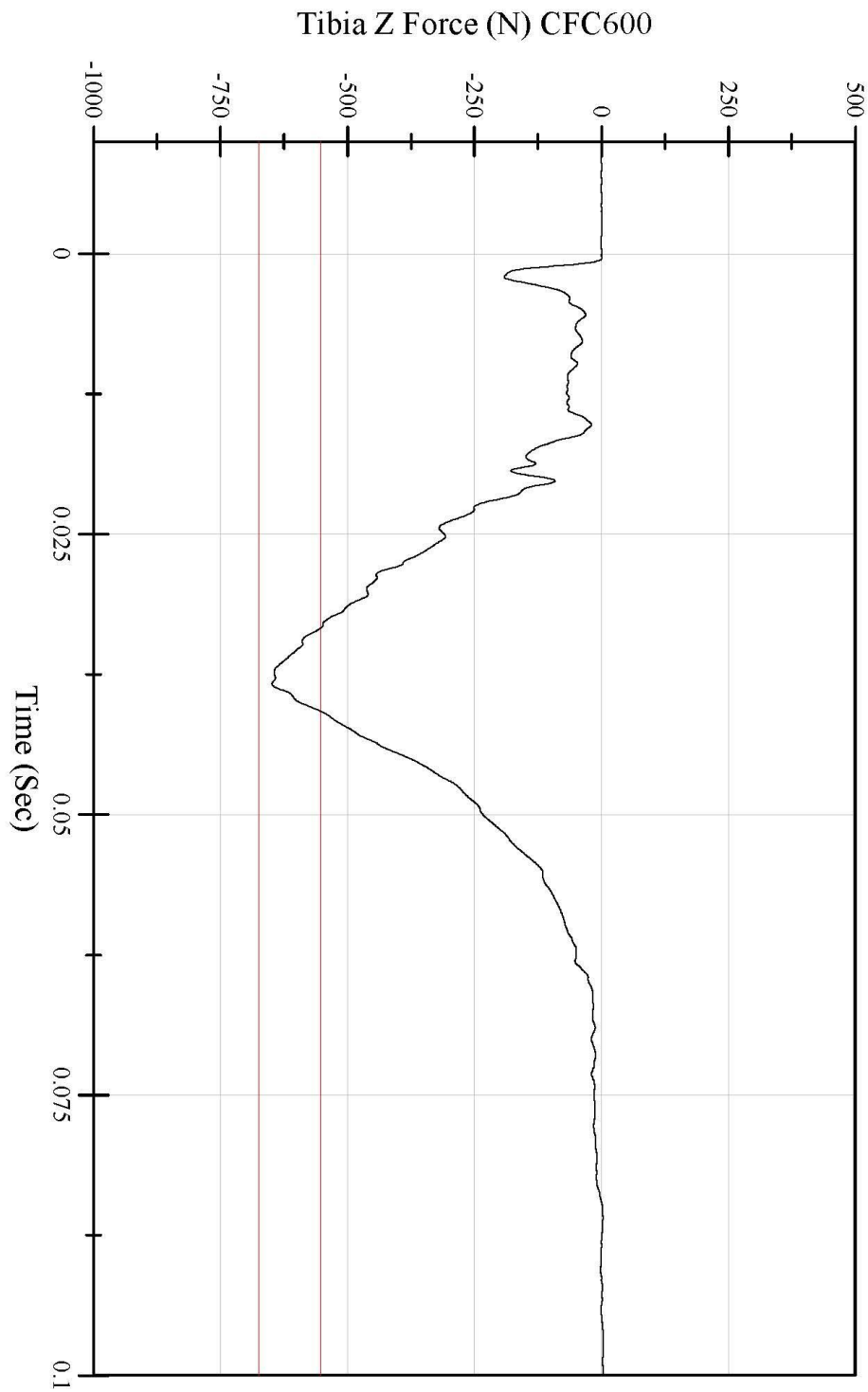


Software Version: 2.4

File Name: LX045Eversion150311-10processed.dat
03/10/2015 09:37:10.0000

Test Temperature: 71.5 degrees
Relative Humidity: 28%
Test Velocity: 2.01 m/s

THOR Right Foot Eversion Certification
Tibia Load
Serial Number: LX045

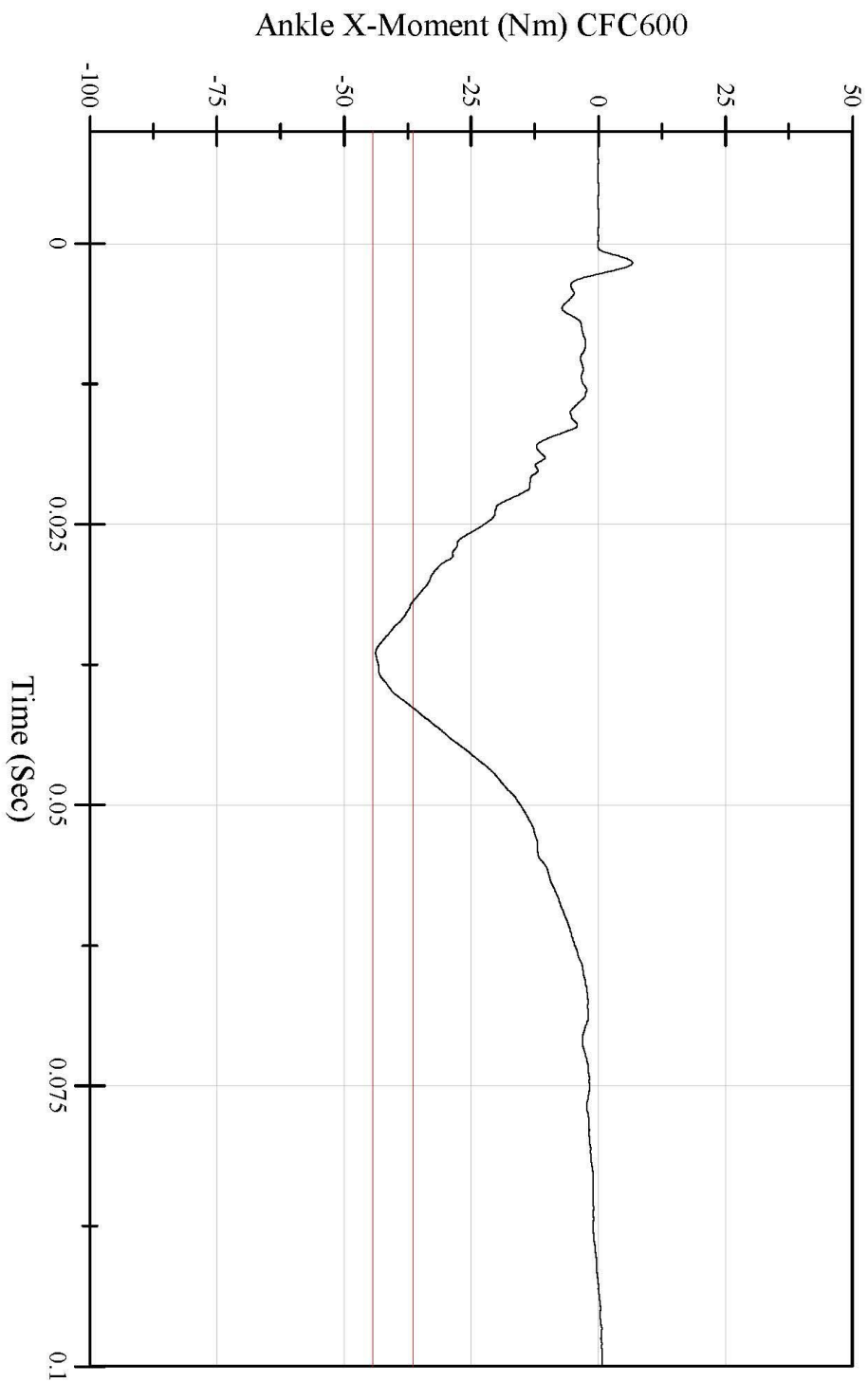


Software Version: 2.4

File Name: LX045Eversion150311-10processed.dat
03/10/2015 09:37:10.0000

Test Temperature: 71.5 degrees
Relative Humidity: 28%
Test Velocity: 2.01 m/s

THOR Right Foot Eversion Certification
Ankle Moment
Serial Number: LX045

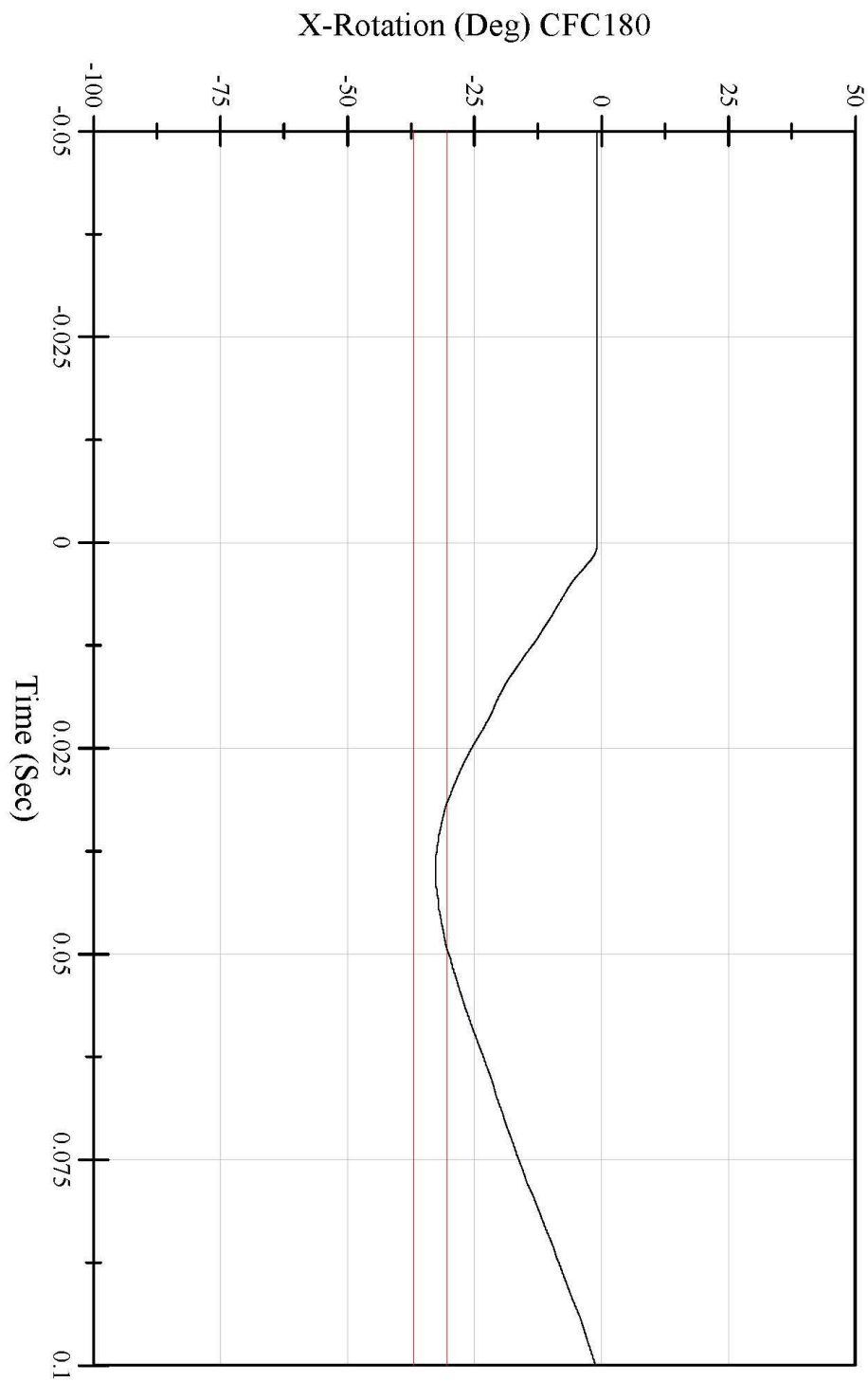


Software Version: 2.4

File Name: LX045Eversion150311-10processed.dat
03/10/2015 09:37:10.0000

Test Temperature: 71.5 degrees
Relative Humidity: 28%
Test Velocity: 2.01 m/s

THOR Right Foot Eversion Certification
Ankle X-Rotation
Serial Number: LX045

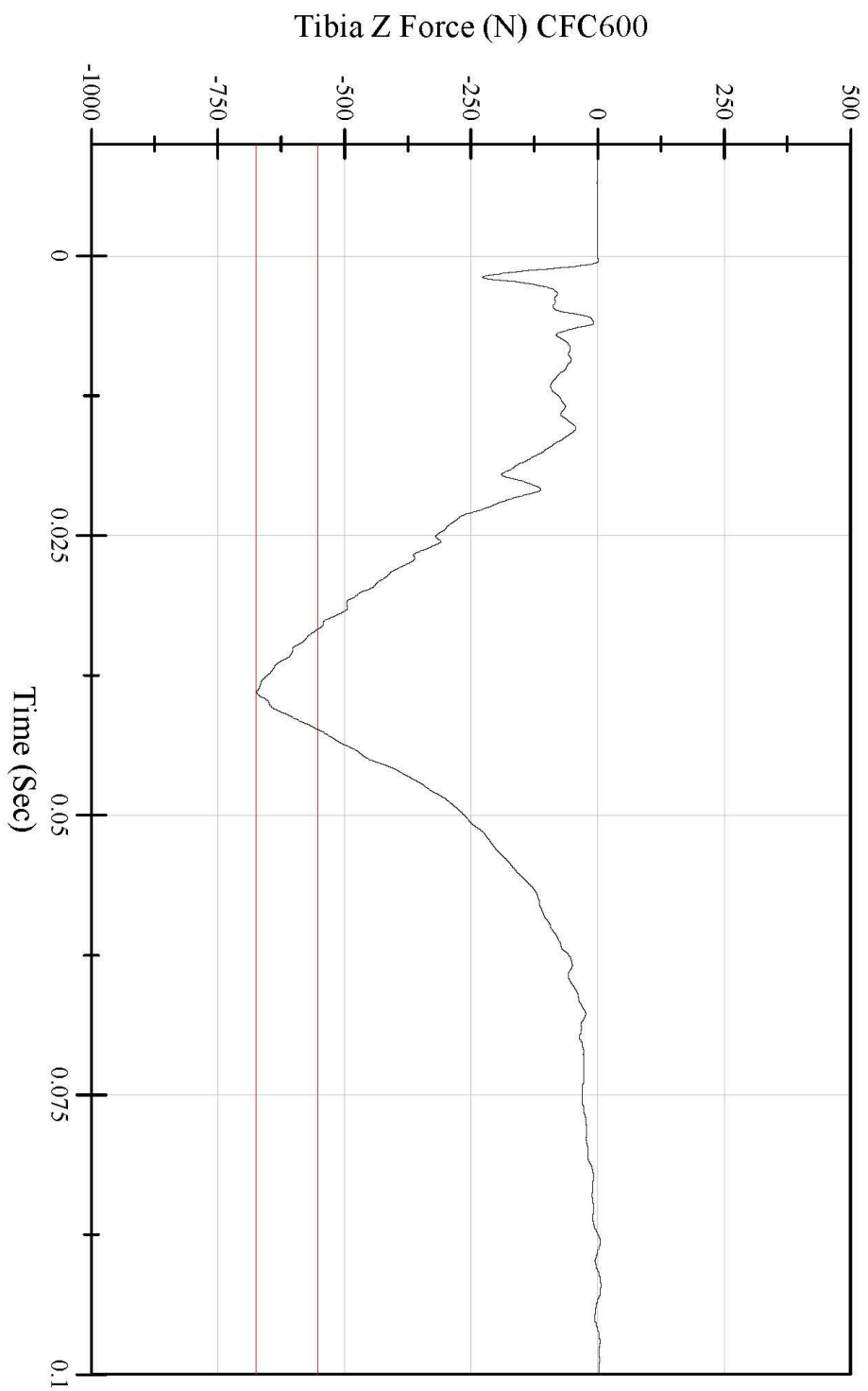


Software Version: 2.4

File Name: LX045Eversion150311-10processed.dat
03/10/2015 09:37:10.0000

Test Temperature: 71.4 degrees
Relative Humidity: 32%
Test Velocity: 2.01 m/s

THOR Right Foot Inversion Certification
Tibia Load
Serial Number: LX045

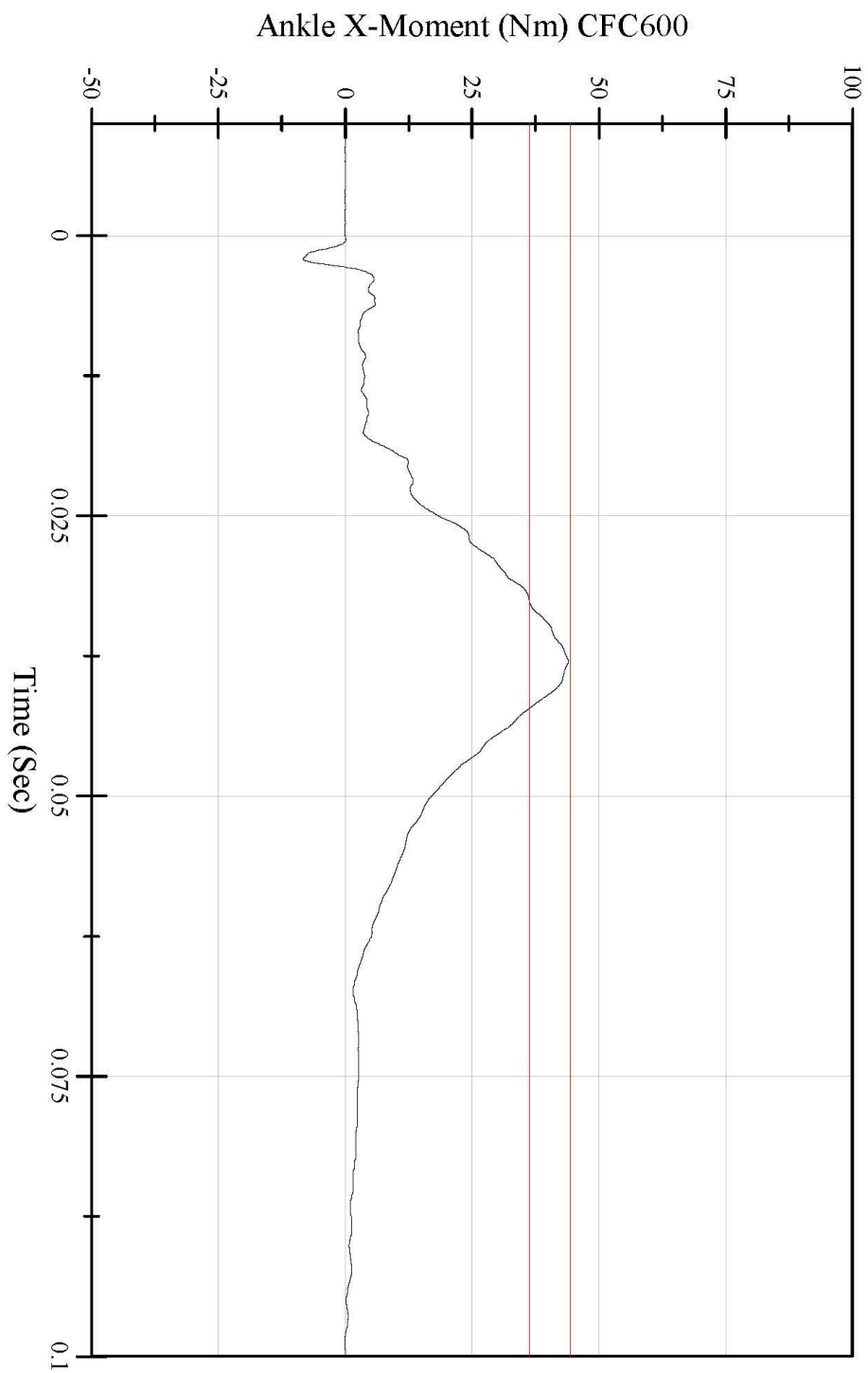


Software Version: 2.4

File Name: LX045Inversion150311-09processed.dat
03/11/2015 08:51:34.0000

Test Temperature: 71.4 degrees
Relative Humidity: 32%
Test Velocity: 2.01 m/s

THOR Right Foot Inversion Certification
Ankle Moment
Serial Number: LX045

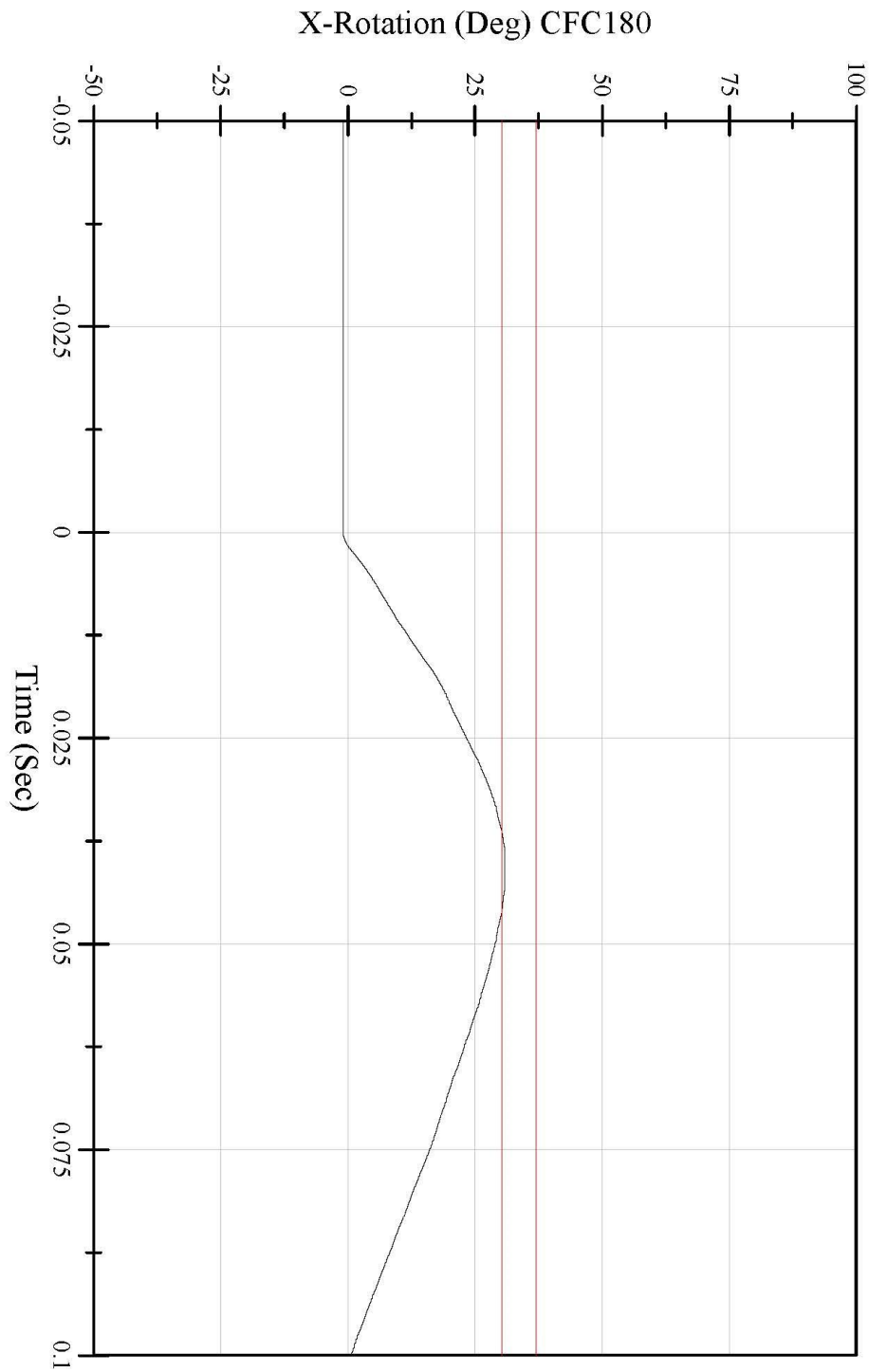


Software Version: 2.4

File Name: LX045Inversion150311-09processed.dat
03/11/2015 08:51:34.0000

Test Temperature: 71.4 degrees
Relative Humidity: 32%
Test Velocity: 2.01 m/s

THOR Right Foot Inversion Certification
Ankle X-Rotation
Serial Number: LX045

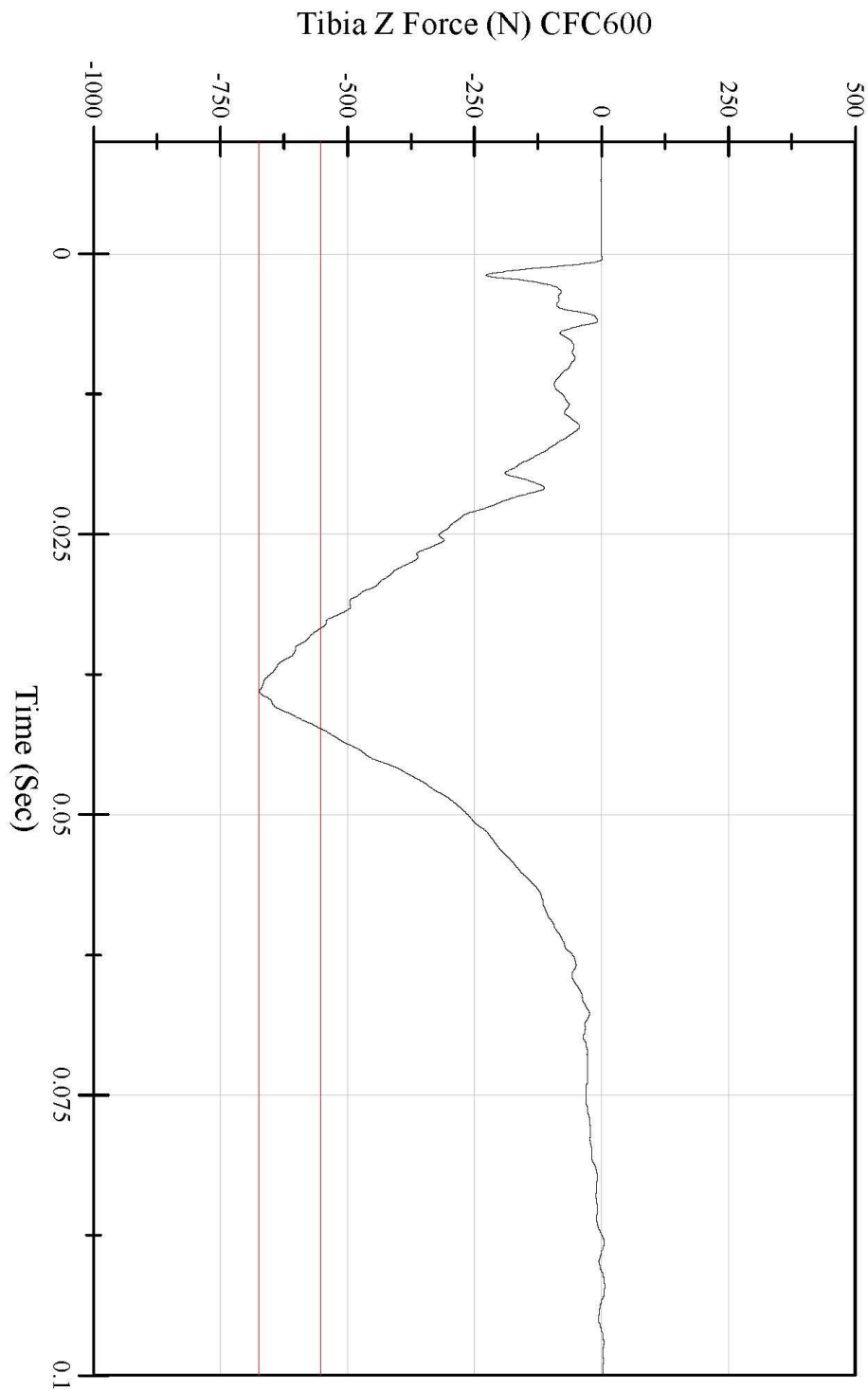


Software Version: 2.4

File Name: LX045Inversion150311-09processed.dat
03/11/2015 08:51:34.0000

Test Temperature: 71.4 degrees
Relative Humidity: 32%
Test Velocity: 2.01 m/s

THOR Right Foot Inversion Certification
Tibia Load
Serial Number: LX045

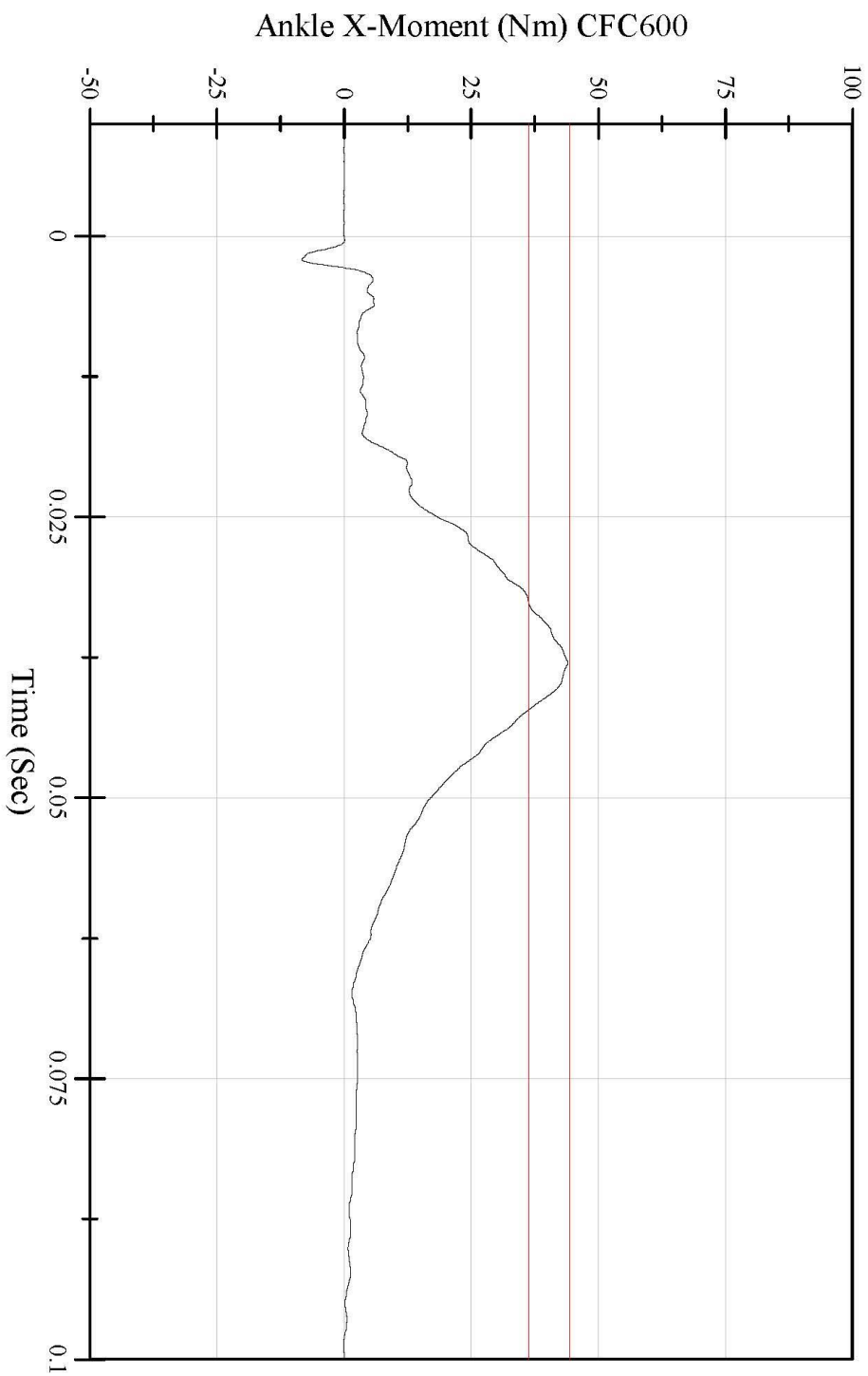


Software Version: 2.4

File Name: LX045Inversion150311-09processed.dat
03/11/2015 08:51:34.0000

Test Temperature: 71.4 degrees
Relative Humidity: 32%
Test Velocity: 2.01 m/s

THOR Right Foot Inversion Certification
Ankle Moment
Serial Number: LX045

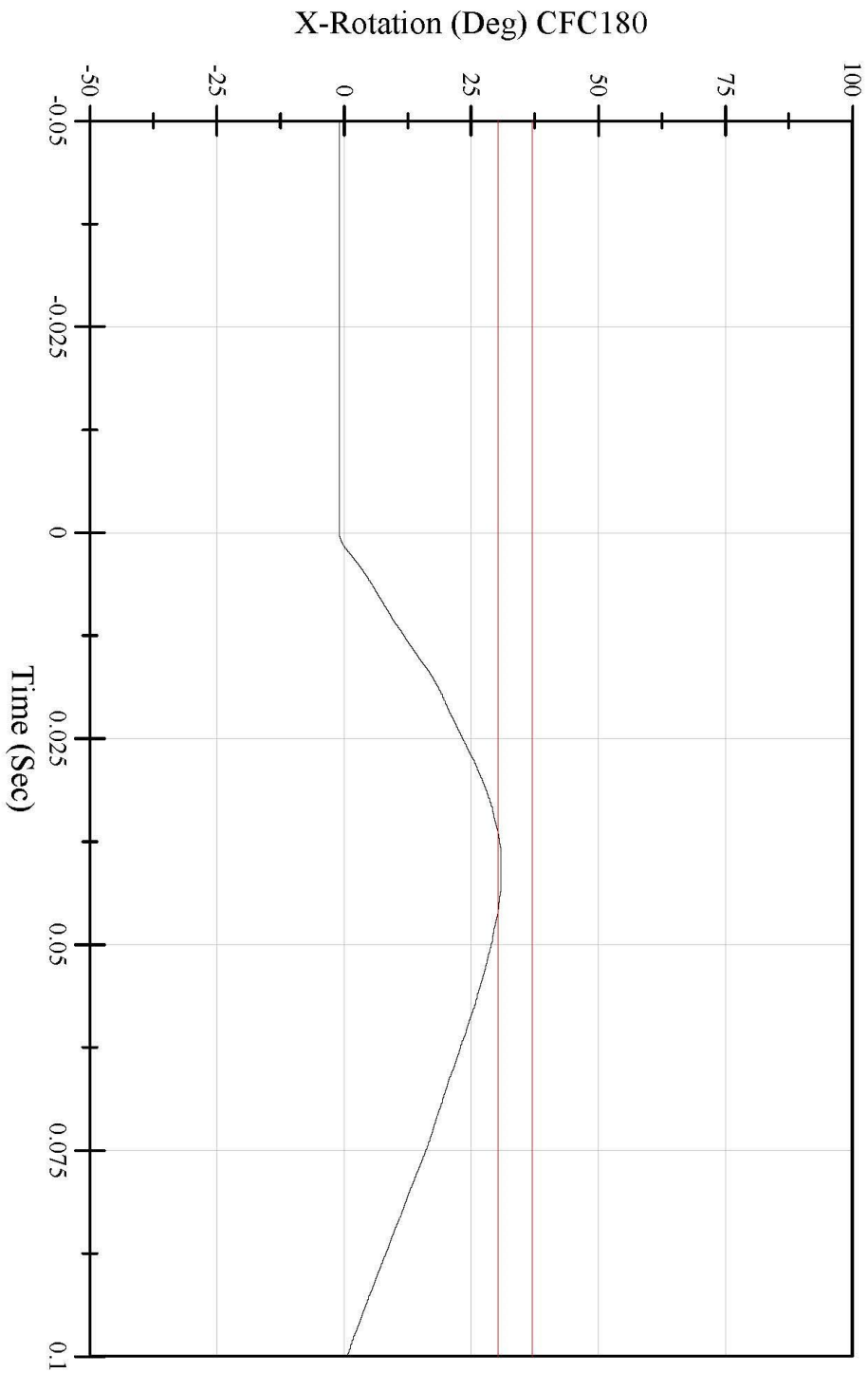


Software Version: 2.4

File Name: LX045Inversion150311-09processed.dat
03/11/2015 08:51:34.0000

Test Temperature: 71.4 degrees
Relative Humidity: 32%
Test Velocity: 2.01 m/s

THOR Right Foot Inversion Certification
Ankle X-Rotation
Serial Number: LX045

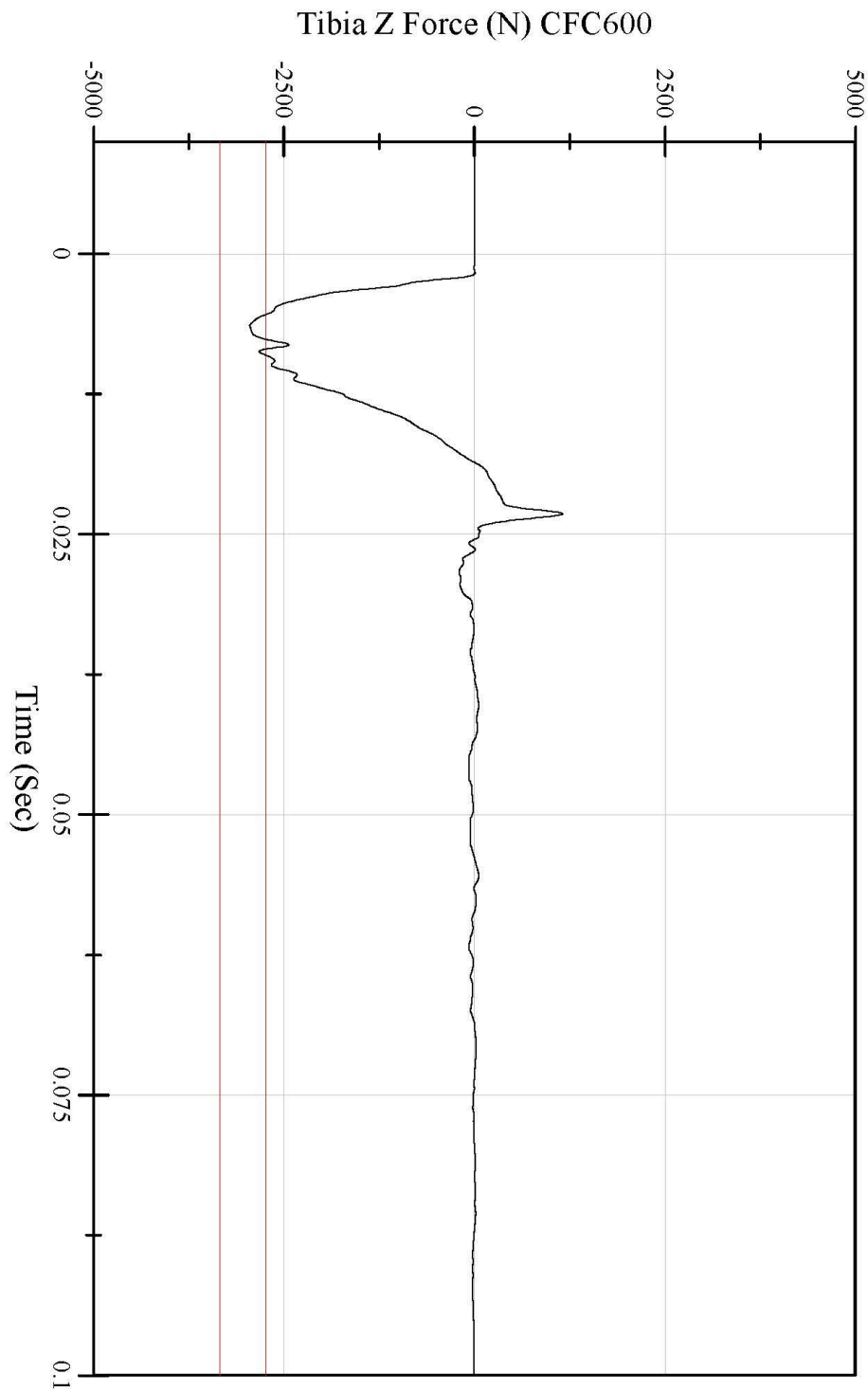


Software Version: 2.4

File Name: LX045Inversion150311-09processed.dat
03/11/2015 08:51:34.0000

Test Temperature: 71 degrees
Relative Humidity: 38%
Test Velocity: 3.93 m/s

THOR Right Foot Heel Certification
Tibia Load
Serial Number: LX045

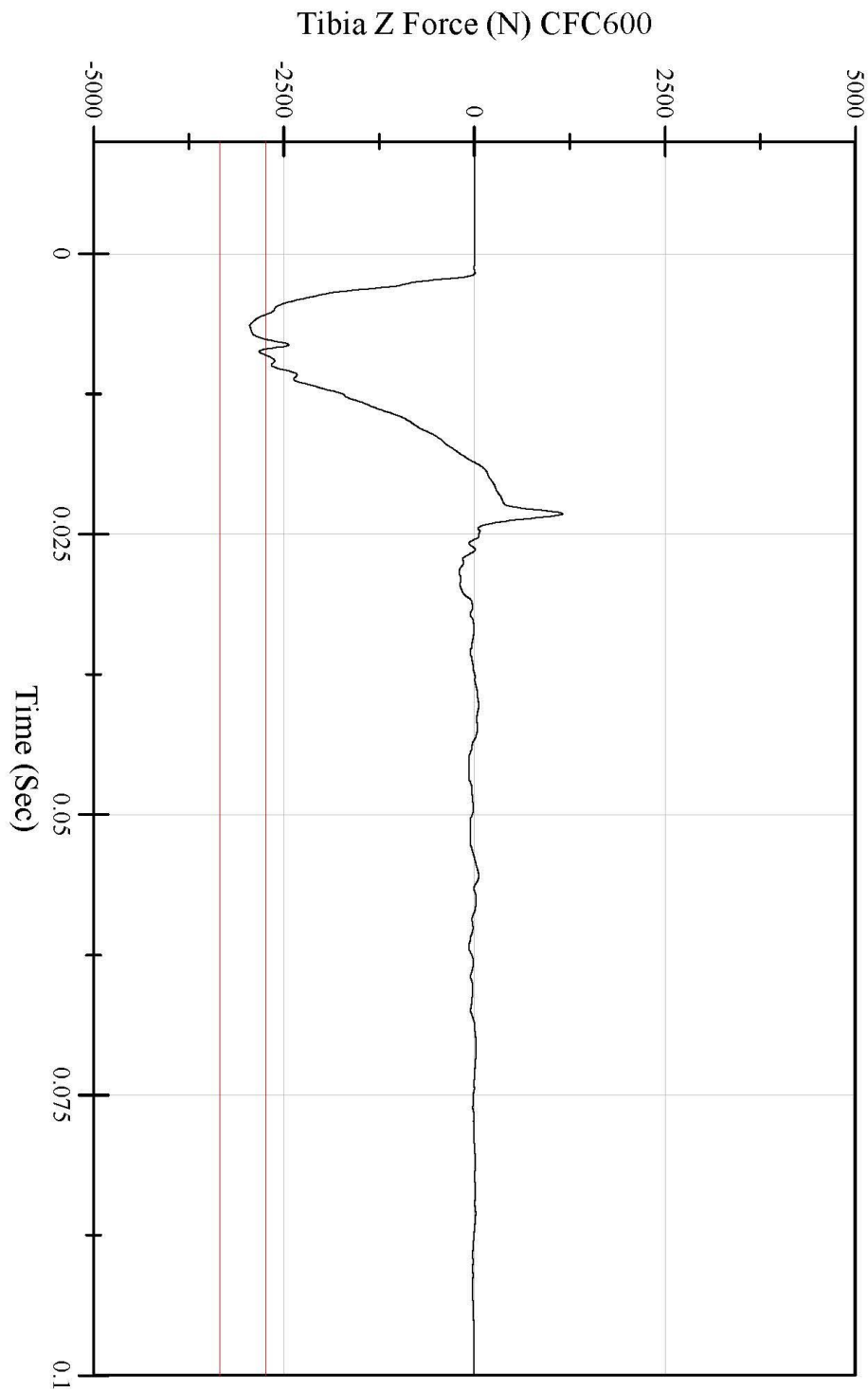


Software Version: 2.4

File Name: LX045Heel150313-01processed.dat
03/13/2015 11:21:50.0000

Test Temperature: 71 degrees
Relative Humidity: 38%
Test Velocity: 3.93 m/s

THOR Right Foot Heel Certification
Tibia Load
Serial Number: LX045



Software Version: 2.4

File Name: LX045Heel150313-01processed.dat
03/13/2015 11:21:50.0000



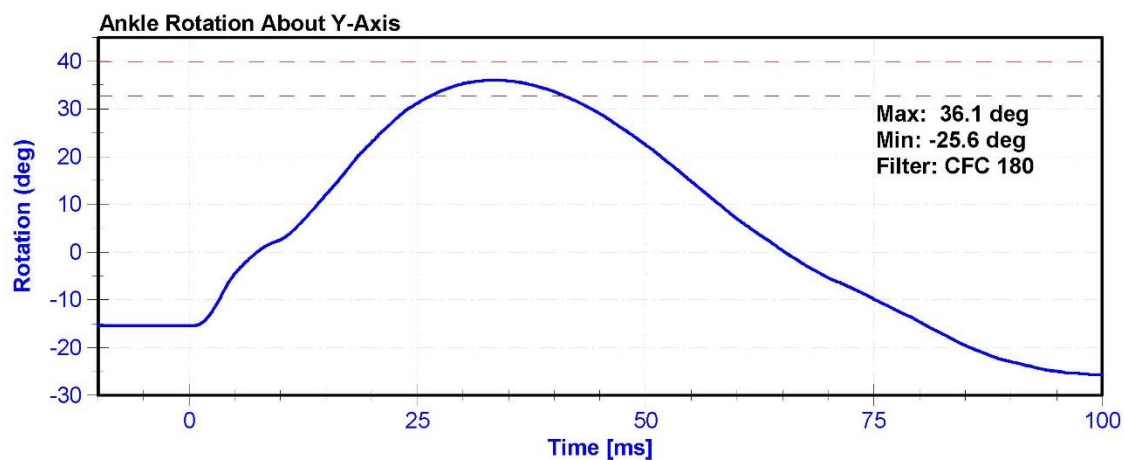
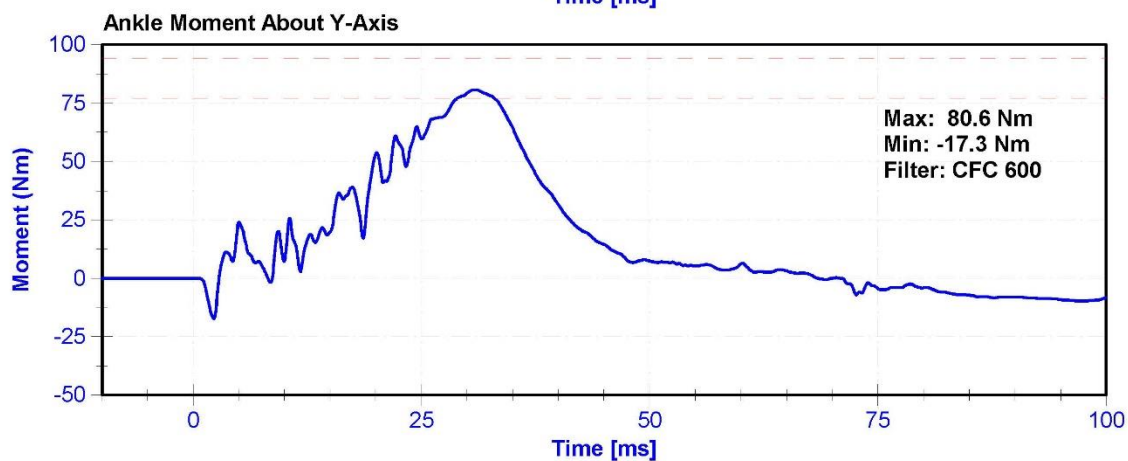
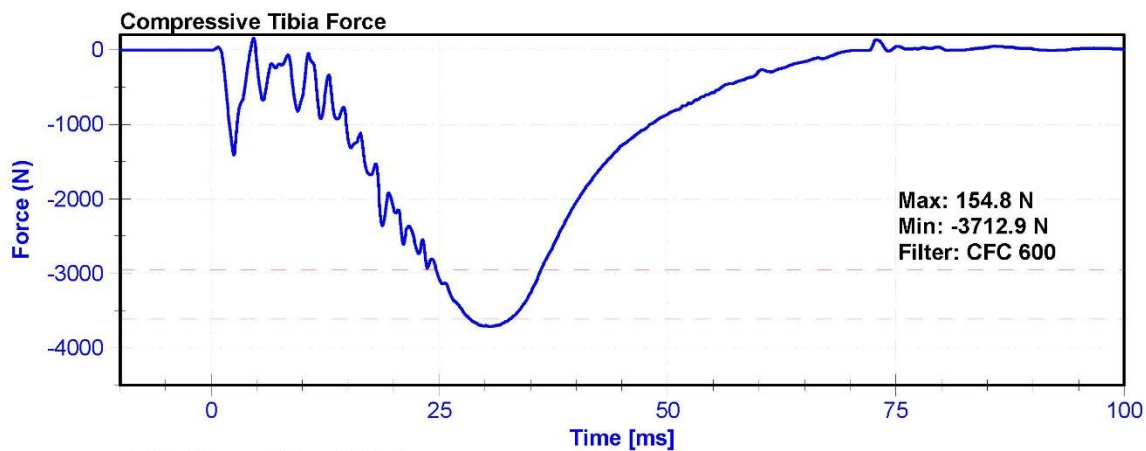
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	53.0	Pass
Velocity	4.9	5.1	m/s	4.916	Pass
Lower Tibia Compressive Force	-3,613	-2,956	N	-3712.9	Fail
Peak Moment about Y-Axis	77.1	94.2	Nm	80.61	Pass
Peak Rotation about Y-Axis	32.7	39.9	deg	36.10	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C15018	7/15/2015	7/14/2016
Lower Tibia Load Cell	Denton 4929J	LC-121 Fz	2/10/2015	2/10/2016
Ankle Y Potentiometer	Contelec PD210-4B	DS-0524	2/18/2015	2/18/2016





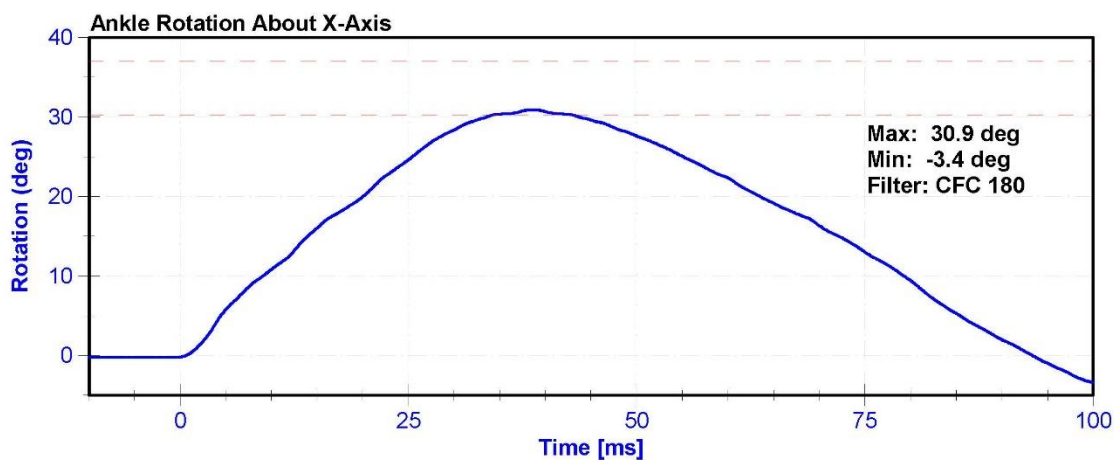
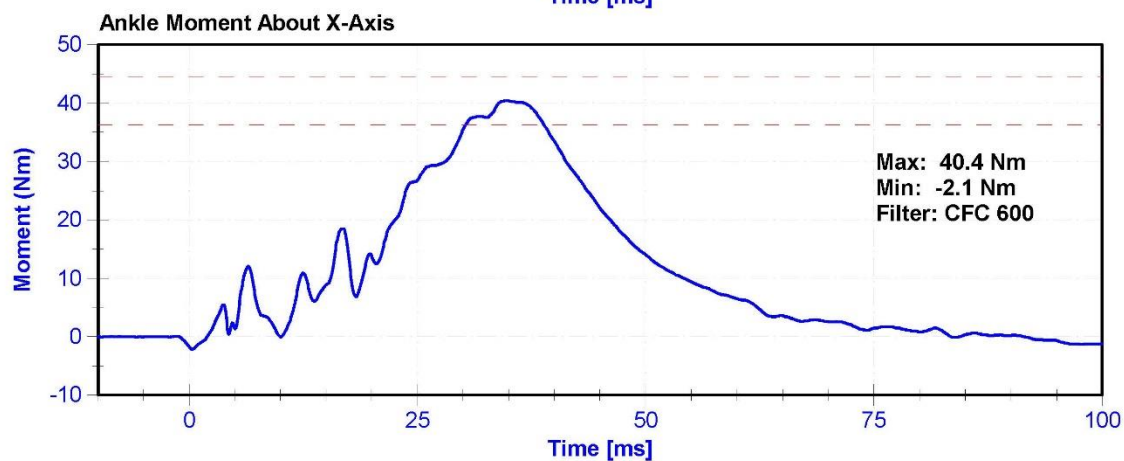
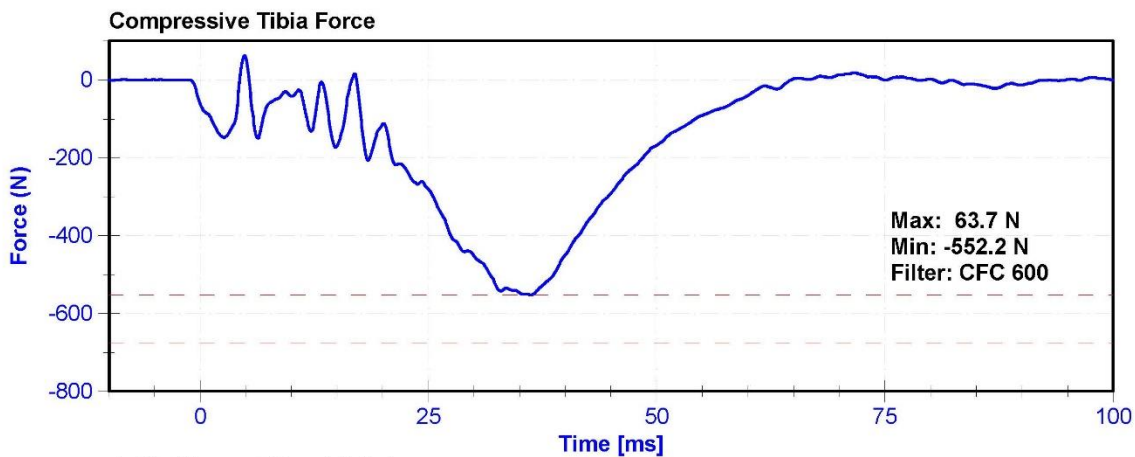
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	54.3	Pass
Velocity	1.9	2.1	m/s	1.964	Pass
Lower Tibia Compressive Force	-675	-552	N	-552.2	Pass
Peak Moment about X-Axis	36.3	44.4	Nm	40.37	Pass
Peak Rotation about X-Axis	30.3	37.0	deg	30.90	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C15018	7/15/2015	7/14/2016
Lower Tibia Load Cell	Denton 4929J	LC-121 Fz	2/10/2015	2/10/2016
Ankle Y Potentiometer	Contelec PD210-4B	DS-0525	2/18/2015	2/18/2016



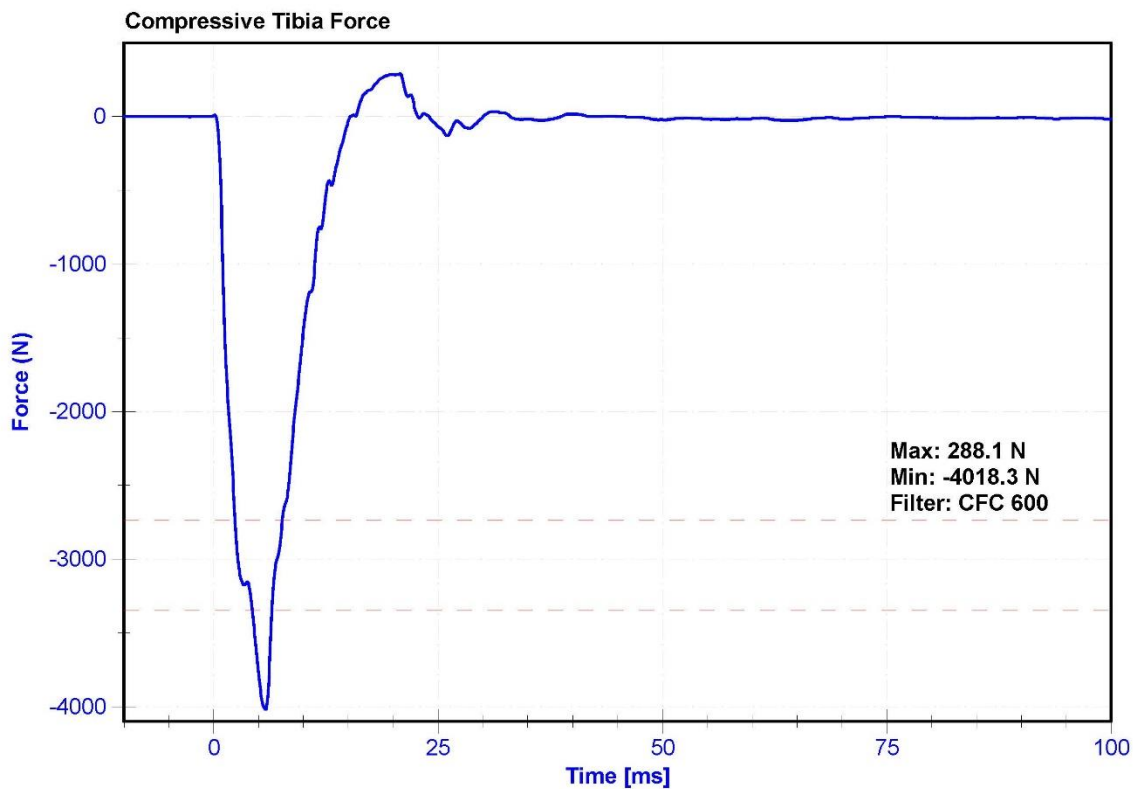
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.4	Pass
Humidity	10	70	%	58.2	Pass
Velocity	3.9	4.1	m/s	3.928	Pass
Lower Tibia Compressive Force	2,738	3,346	N	-4018.3	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C15018	7/15/2015	7/14/2016
Lower Tibia Load Cell	Denton 4929J	LC-121 Fz	2/10/2015	2/10/2016





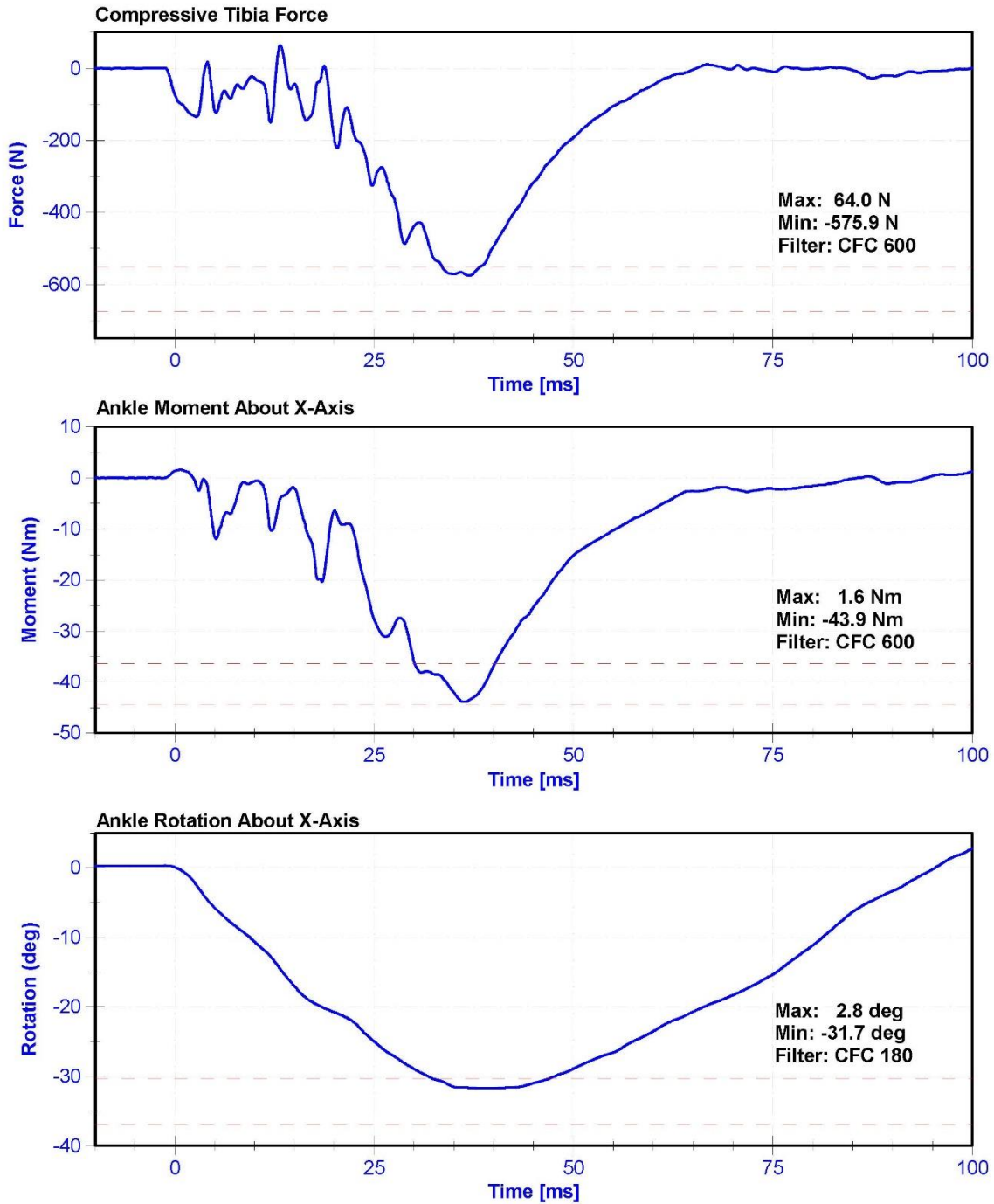
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	54.3	Pass
Velocity	1.9	2.1	m/s	1.934	Pass
Lower Tibia Compressive Force	-675	-552	N	-575.9	Pass
Peak Moment about X-Axis	-44.4	-36.3	Nm	-43.88	Pass
Peak Rotation about X-Axis	-37.0	-30.3	deg	-31.75	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C15018	7/15/2015	7/14/2016
Lower Tibia Load Cell	Denton 4929J	LC-121 Fz	2/10/2015	2/10/2016
Ankle Y Potentiometer	Contelec PD210-4B	DS-0525	2/18/2015	2/18/2016





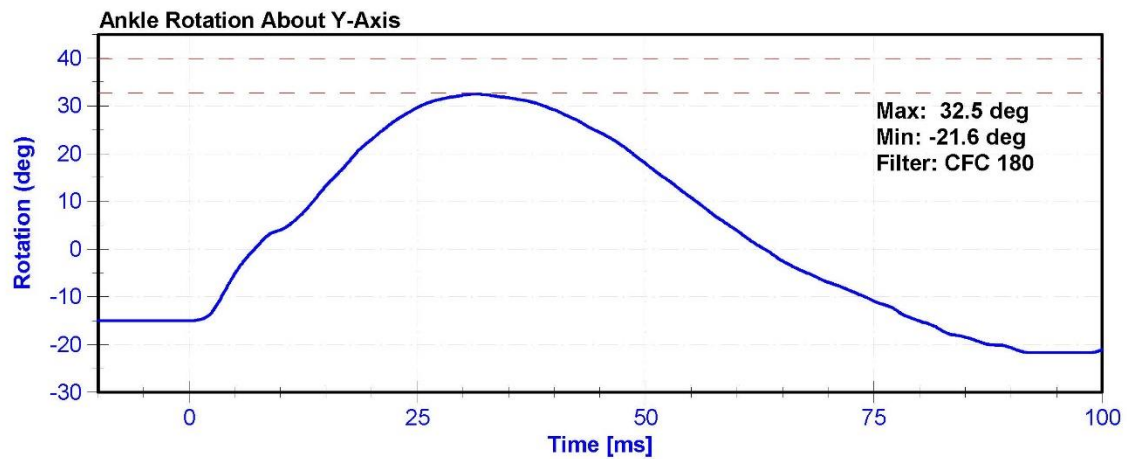
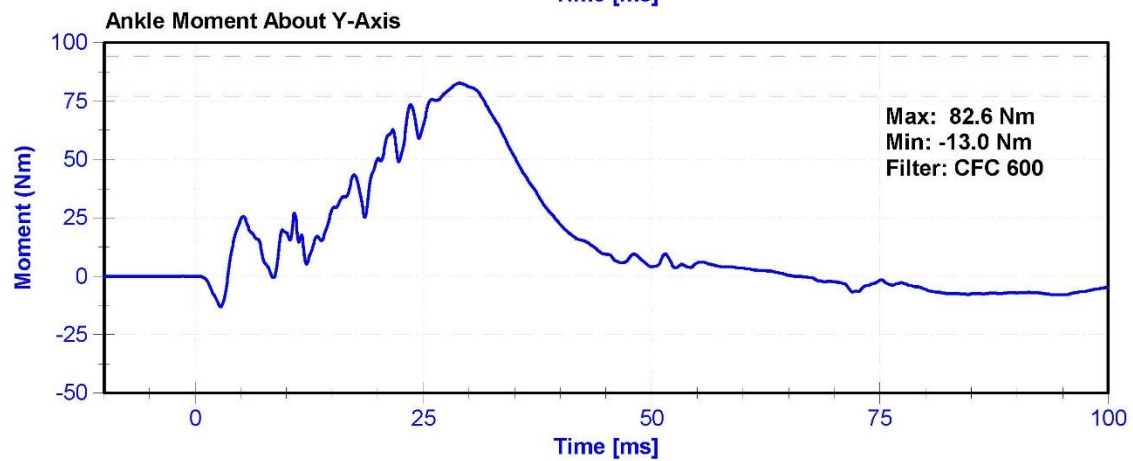
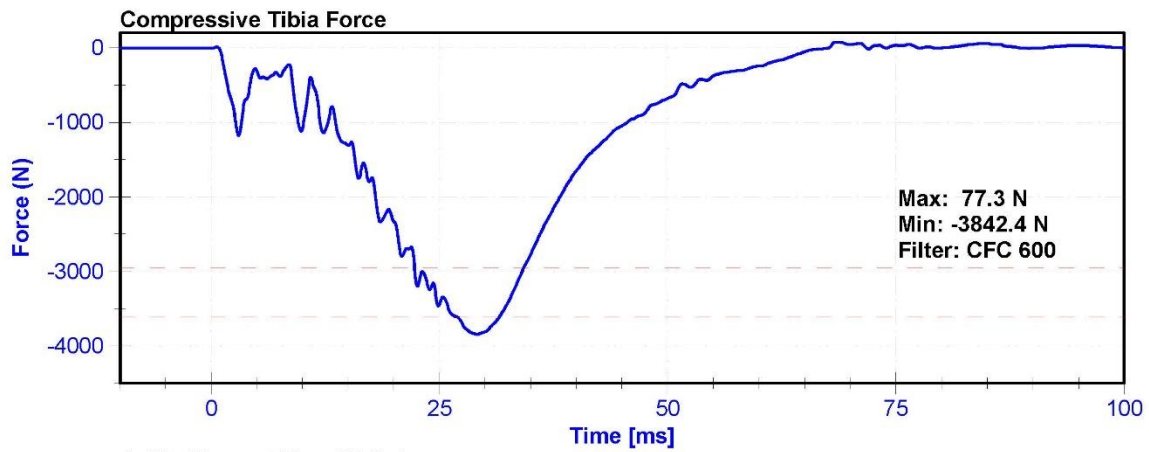
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	56.6	Pass
Velocity	4.9	5.1	m/s	4.916	Pass
Lower Tibia Compressive Force	-3,613	-2,956	N	-3842.4	Fail
Peak Moment about Y-Axis	77.1	94.2	Nm	82.60	Pass
Peak Rotation about Y-Axis	32.7	39.9	deg	32.46	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C15018	7/15/2015	7/14/2016
Lower Tibia Load Cell	Denton 4929J	LC-166 Fz	2/9/2015	2/9/2016
Ankle Y Potentiometer	Contelec PD210-4B	DS-0526	2/19/2015	2/19/2016





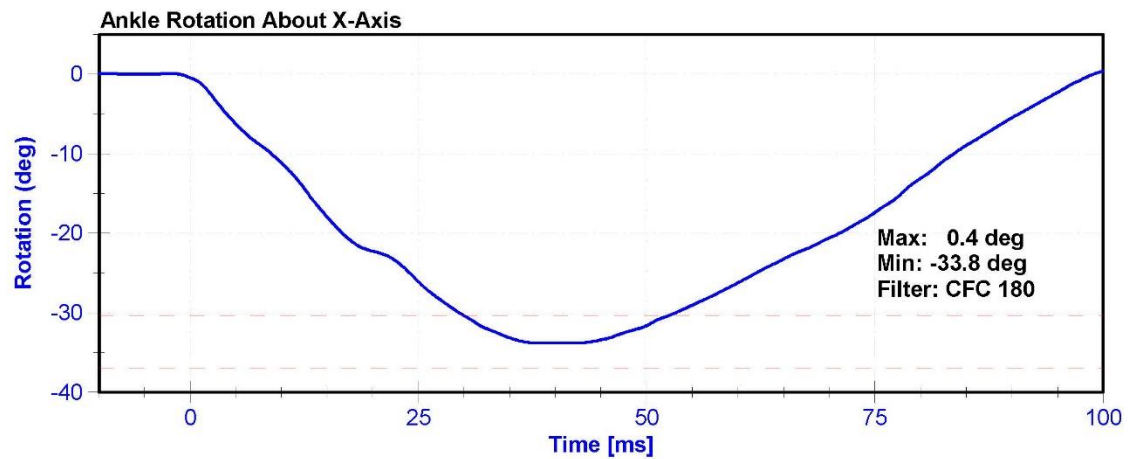
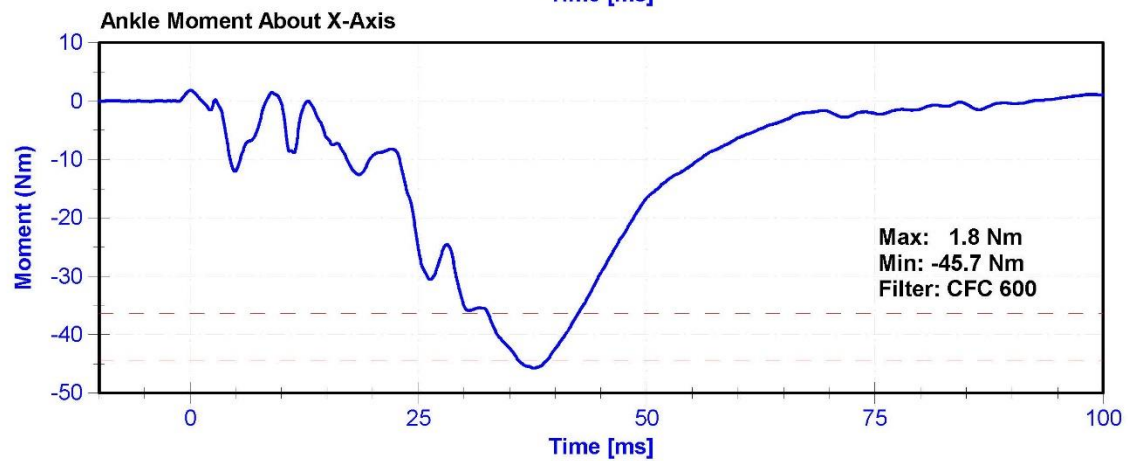
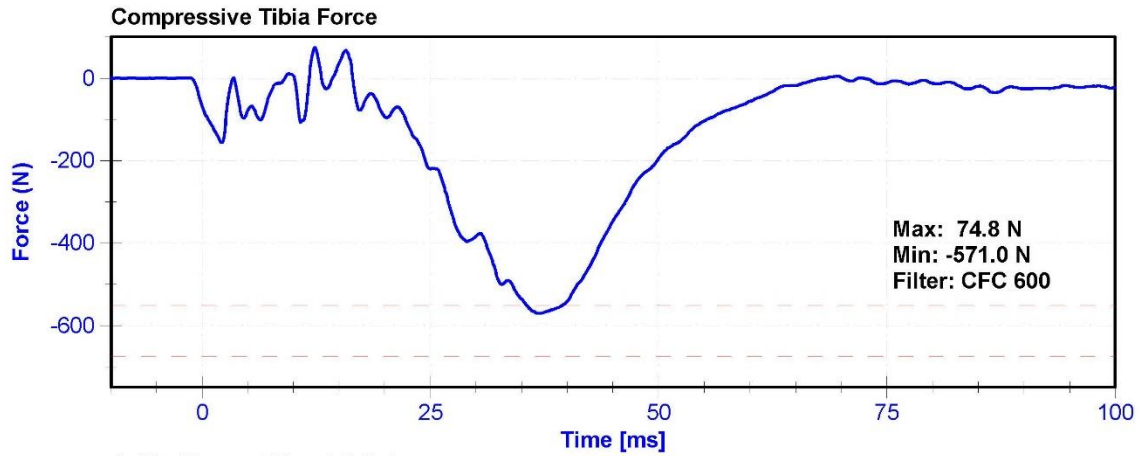
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	67.0	Pass
Velocity	1.9	2.1	m/s	1.969	Pass
Lower Tibia Compressive Force	-675	-552	N	-571.0	Pass
Peak Moment about X-Axis	-44.4	-36.3	Nm	-45.69	Fail
Peak Rotation about X-Axis	-37.0	-30.3	deg	-33.77	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C15018	7/15/2015	7/14/2016
Lower Tibia Load Cell	Denton 4929J	LC-166 Fz	2/9/2015	2/9/2016
Ankle Y Potentiometer	Contelec PD210-4B	DS-0528	2/19/2015	2/19/2016



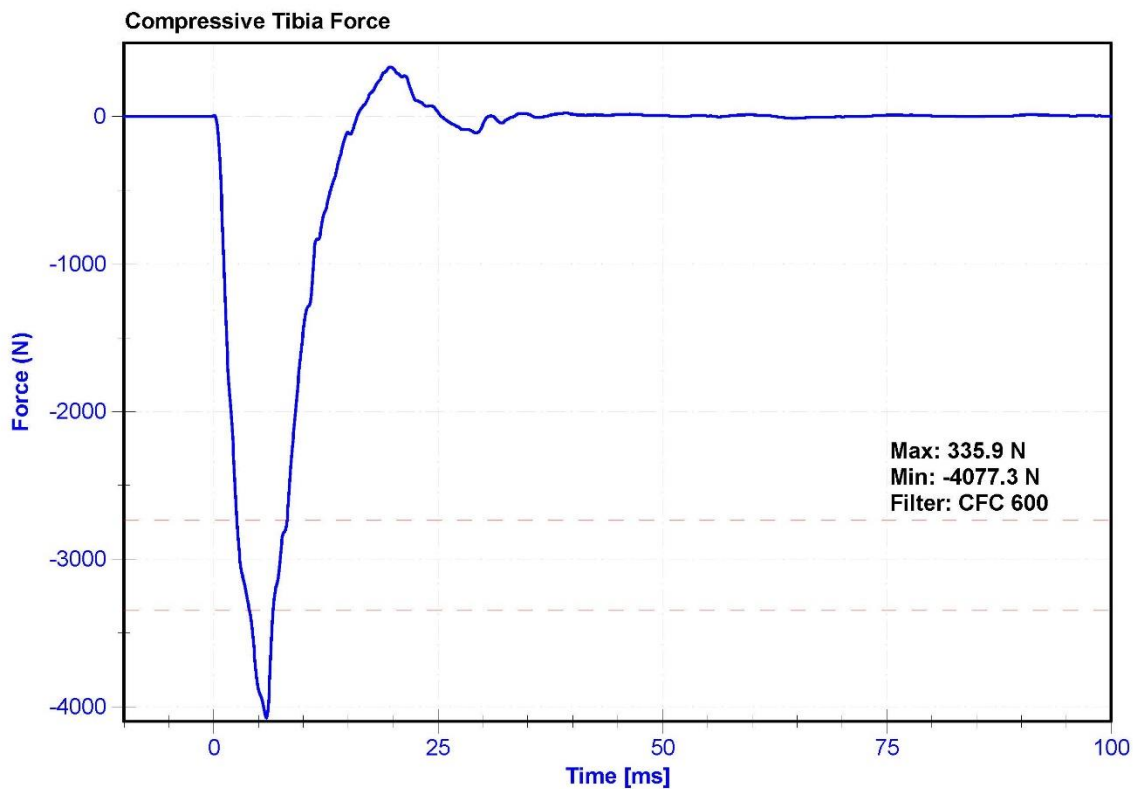
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	63.3	Pass
Velocity	3.9	4.1	m/s	3.908	Pass
Lower Tibia Compressive Force	2,738	3,346	N	-4077.3	Fail

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C15018	7/15/2015	7/14/2016
Lower Tibia Load Cell	Denton 4929J	LC-166 Fz	2/9/2015	2/9/2016





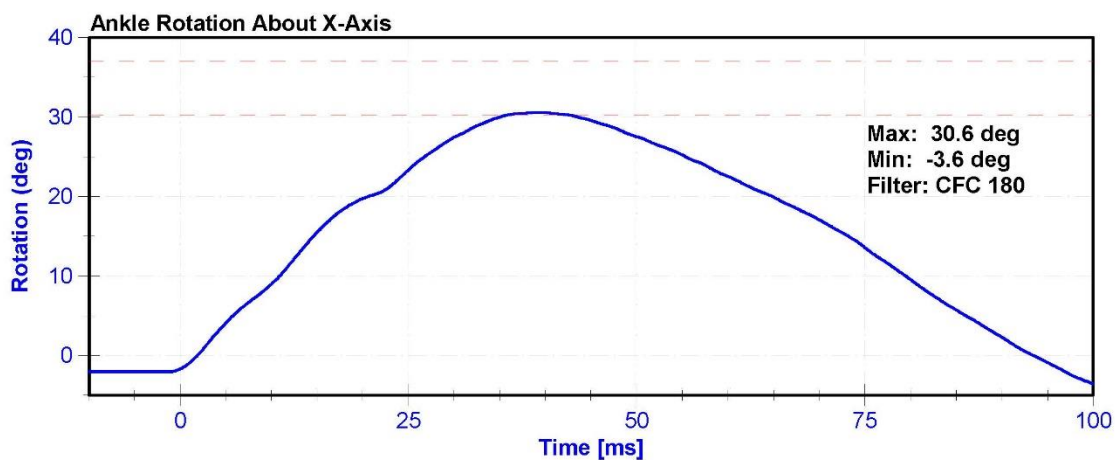
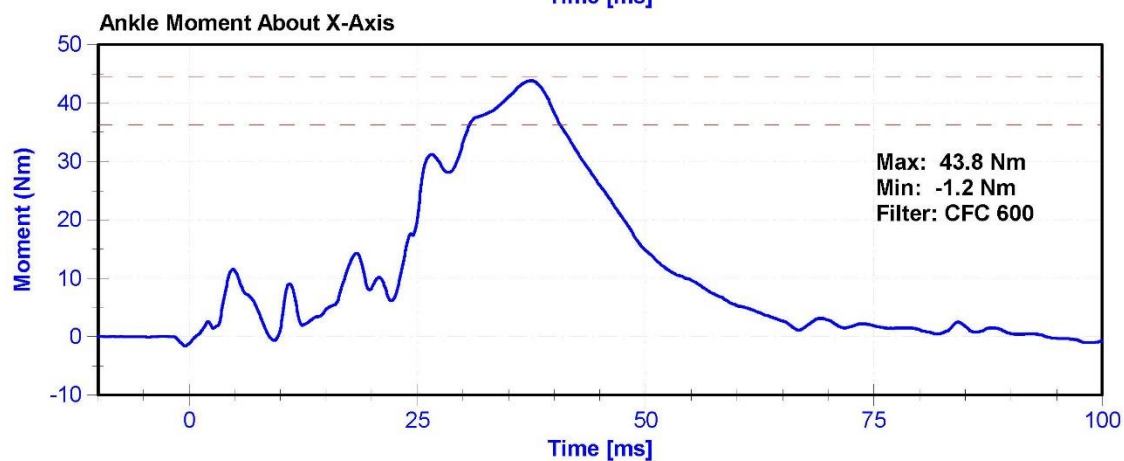
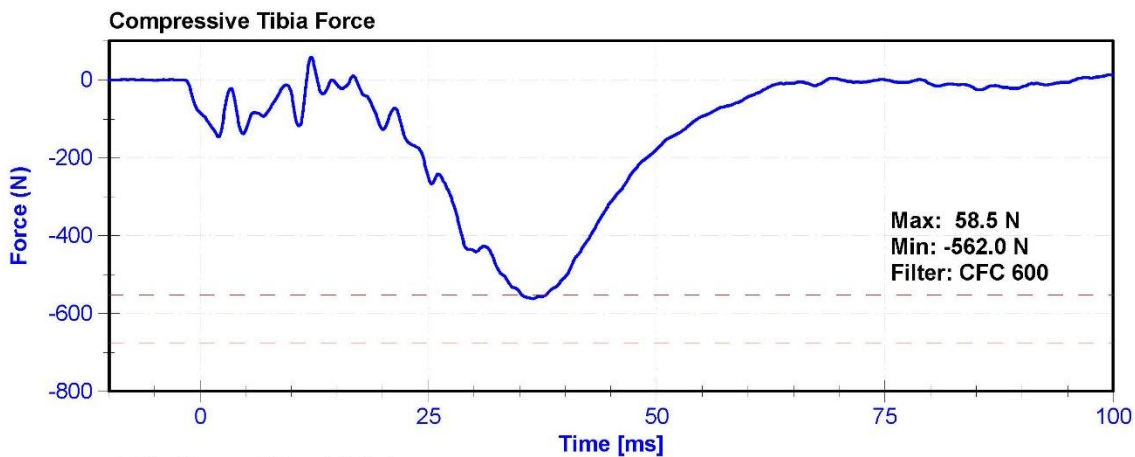
ATD Manufacturer	Humanetics	Test Technician	M. Goehle
ATD Serial Number	DL9207	Laboratory Supervisor	M. Goehle

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	63.2	Pass
Velocity	1.9	2.1	m/s	1.934	Pass
Lower Tibia Compressive Force	-675	-552	N	-562.0	Pass
Peak Moment about X-Axis	36.3	44.4	Nm	43.83	Pass
Peak Rotation about X-Axis	30.3	37.0	deg	30.62	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C15018	7/15/2015	7/14/2016
Lower Tibia Load Cell	Denton 4929J	LC-166 Fz	2/9/2015	2/9/2016
Ankle Y Potentiometer	Contelec PD210-4B	DS-0528	2/19/2015	2/19/2016



Hybrid III 5th Female 019 DUMMY CALIBRATIONS

Transportation Research Center Inc.

ATD Calibration Report

for

VRTC

HIII 5th Serial No. 019
Calibration No. 01



Transportation Research Center Inc.
P.O. Box B-67
10820 St. Rt. 347
East Liberty, OH 43319-0367

Transportation Research Center Inc.

Front Head Drop

HIII 5th Serial No. 019 Certification No. 1-7

Test Date: 12/30/2014

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.5 °C	21.9 °C	Yes
Relative Humidity	10 - 70 %	35 %	Yes
Peak Head Resultant Acceleration	250 - 300 g	283.0 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	-8.9 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	Yes	Yes	Yes

Test meets specifications.

Comments:

Technician

Melissa Schinke

Approved

[Signature]

Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

12.30.2014 13:11:55 607

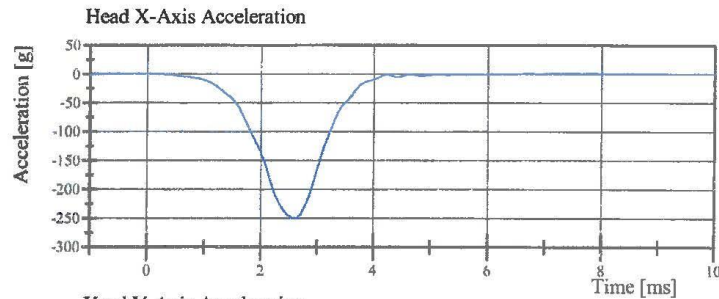


Transportation Research Center Inc.

Front Head Drop

HIII 5th Serial No. 019 Certification No. 1-7

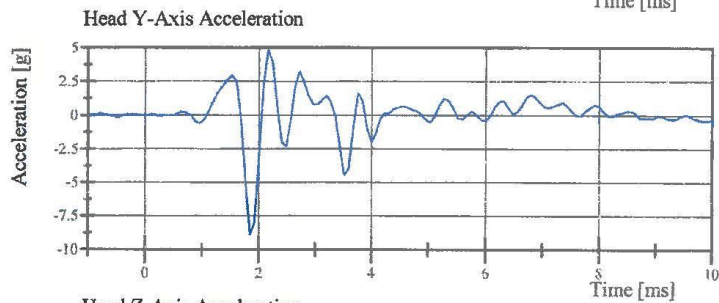
Test Date: 12/30/2014



Filter Class: CFC_1000

Max: 1.4 g at 7.4 ms

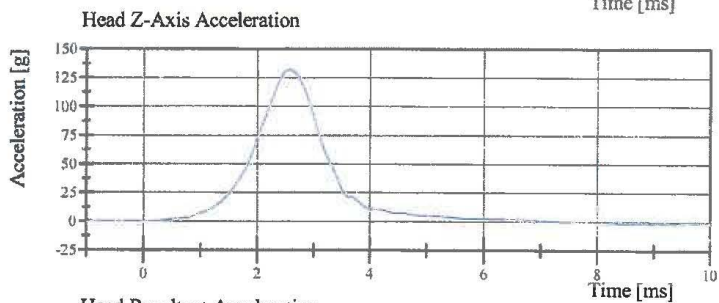
Min: -250.3 g at 2.6 ms



Filter Class: CFC_1000

Max: 4.9 g at 2.2 ms

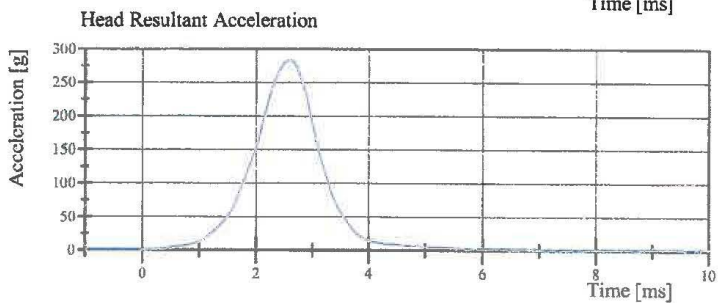
Min: -8.9 g at 1.8 ms



Filter Class: CFC_1000

Max: 132.2 g at 2.6 ms

Min: -2.1 g at 9.0 ms



Filter Class: CFC_1000

Max: 283.0 g at 2.6 ms

Min: 0.0 g at -1.0 ms

Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

12.30.2014 13:12:12 607



Transportation Research Center Inc.

Neck Flexion

HIII 5th Serial No. 019 Certification No. 1-5

Test Date: 12/31/2014

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	34 %	Yes
Pendulum Velocity	6.89 - 7.13 m/s	7.036 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	(-2.1) - (-2.5) m/s	-2.43 m/s	Yes
Pendulum Integrated Velocity Change at 20ms	(-4.0) - (-5.0) m/s	-4.74 m/s	Yes
Pendulum Integrated Velocity Change at 30ms	(-5.8) - (-7.0) m/s	-6.75 m/s	Yes
Total Head D-Plane Rotation	(-77) - (-91) °	-78.9 °	Yes
Total Neck Occipital Condyles Moment Between -77° and -91° Rotation	69 - 83 N·m	73.8 N·m	Yes
Total Neck Occipital Condyles Moment Decay to 10 N·m	80 - 100 ms	85.9 ms	Yes

Test meets specifications.

Comments:

Technician

Melissa Schunker

Approved

[Signature]

Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

12.31.2014 10:33:08 1711

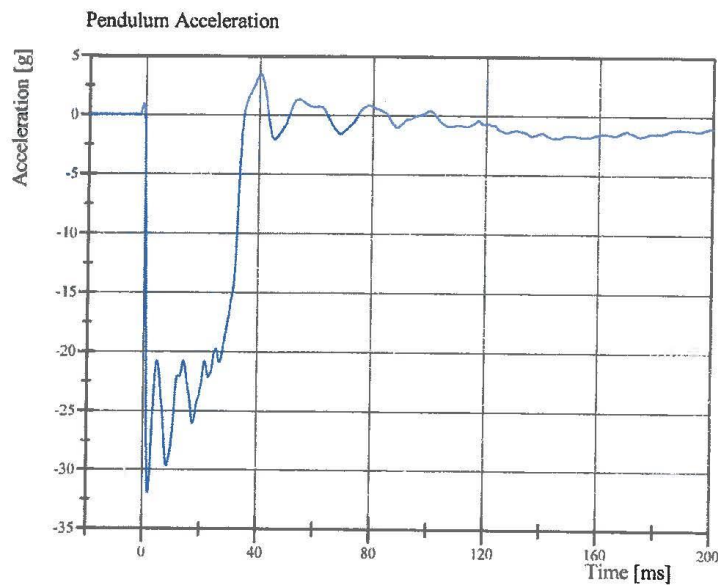


Transportation Research Center Inc.

Neck Flexion

HIII 5th Serial No. 019 Certification No. 1-5

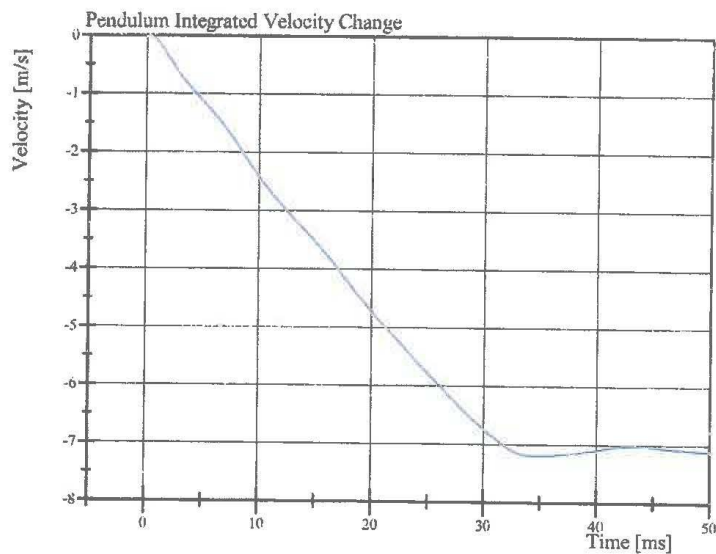
Test Date: 12/31/2014



Filter Class: CFC_180

Max: 3.5 g at 40.2 ms

Min: -31.9 g at 2.0 ms



Filter Class: CFC_180

Max: 0.0 m/s at 0.0 ms

Min: -7.2 m/s at 34.7 ms

Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

12.31.2014 16:33:43 1711



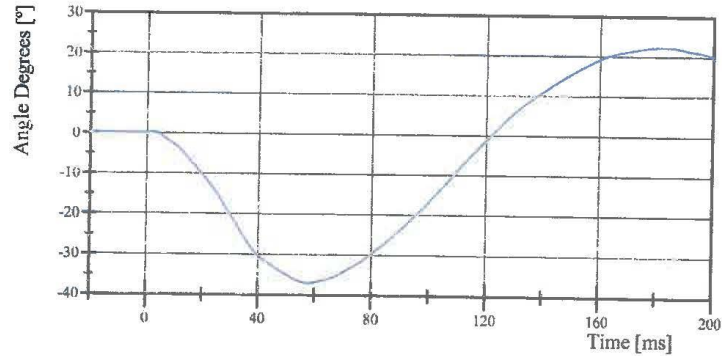
Transportation Research Center Inc.

Neck Flexion

HIII 5th Serial No. 019 Certification No. 1-5

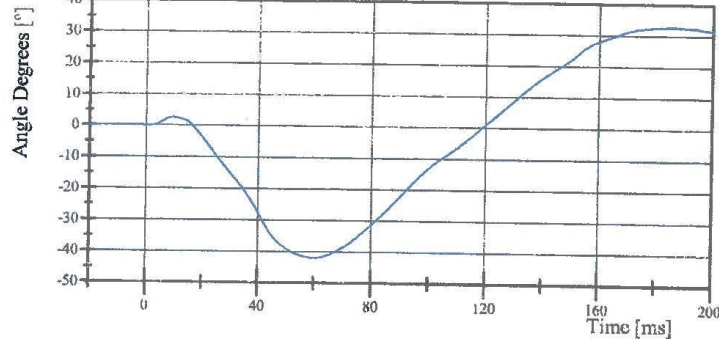
Test Date: 12/31/2014

Pot Rotation at the Base of Neck



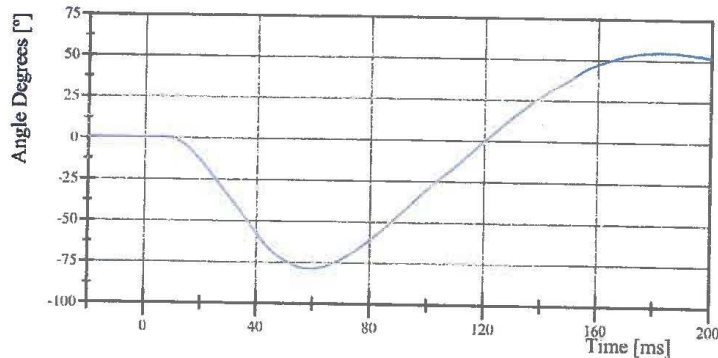
Filter Class: CFC_60
Max: 22.3 ° at 182.8 ms
Min: -37.0 ° at 57.7 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 32.7 ° at 186.3 ms
Min: -42.0 ° at 60.1 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 54.9 ° at 184.0 ms
Min: -78.9 ° at 58.9 ms

Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

12.31.2014 10:33:43 1711

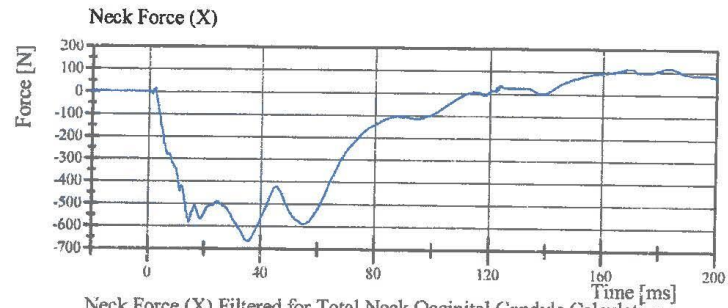


Transportation Research Center Inc.

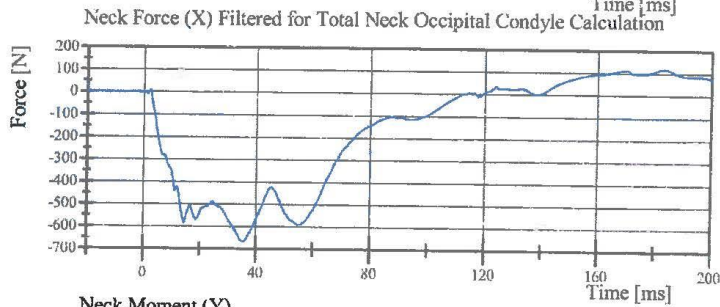
Neck Flexion

HIII 5th Serial No. 019 Certification No. 1-5

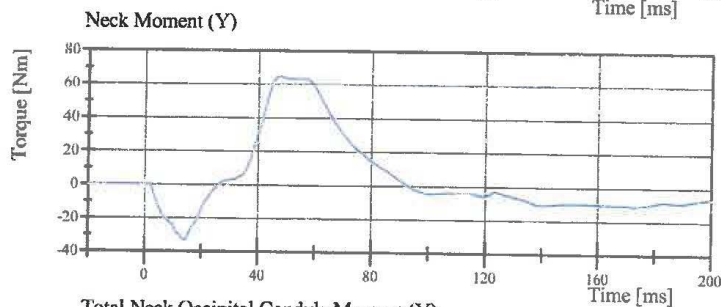
Test Date: 12/31/2014



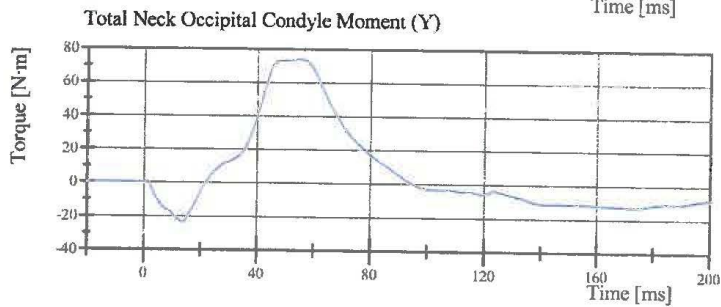
Filter Class: CFC_1000
Max: 118.6 N at 183.2 ms
Min: -667.3 N at 35.6 ms



Filter Class: CFC_600
Max: 118.4 N at 183.4 ms
Min: -666.9 N at 35.6 ms



Filter Class: CFC_600
Max: 64.7 Nm at 47.1 ms
Min: -33.8 Nm at 14.2 ms



Filter Class: Without (Consta
Max: 73.8 N·m at 55.6 ms
Min: -23.6 N·m at 13.8 ms

Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

12.31.2014 10:33:44 1711



Transportation Research Center Inc.

Neck Extension

HIII 5th Serial No. 019 Certification No. 1-1

Test Date: 12/31/2014

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	37 %	Yes
Pendulum Velocity	(-5.95) - (-6.19) m/s	-6.081 m/s	Yes
Pendulum Integrated Velocity Change at 10ms	1.5 - 1.9 m/s	1.87 m/s	Yes
Pendulum Integrated Velocity Change at 20ms	3.1 - 3.9 m/s	3.68 m/s	Yes
Pendulum Integrated Velocity Change at 30ms	4.6 - 5.6 m/s	5.35 m/s	Yes
Total Head D-Plane Rotation	99 - 114 °	103.8 °	Yes
Total Neck Occipital Condyles Moment Between 99° and 114° Rotation	(-53) - (-65) N·m	-53.7 N·m	Yes
Total Neck Occipital Condyles Moment Decay to -10 N·m	94 - 114 ms	101.8 ms	Yes

Test meets specifications.

Comments:

Technician

Melissa Schinkel

Approved

[Signature]

Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

12.31.2014 11:18:26 1833

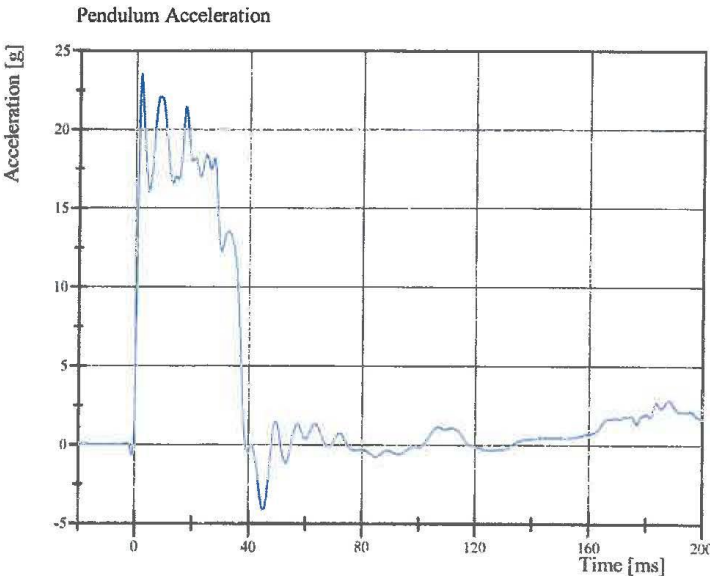


Transportation Research Center Inc.

Neck Extension

HIII 5th Serial No. 019 Certification No. 1-1

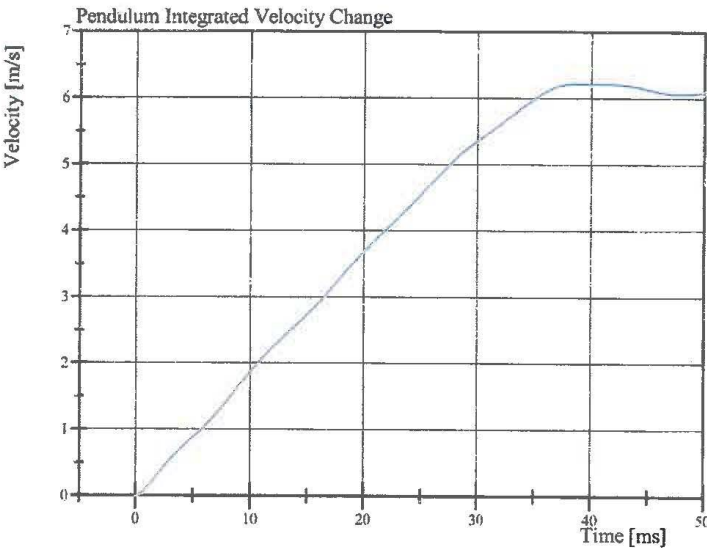
Test Date: 12/31/2014



Filter Class: CFC_180

Max: 23.5 g at 1.8 ms

Min: -4.1 g at 45.0 ms



Filter Class: CFC_180

Max: 6.2 m/s at 38.7 ms

Min: 0.0 m/s at 0.0 ms

Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

12.31.2014 11:18:38 1833



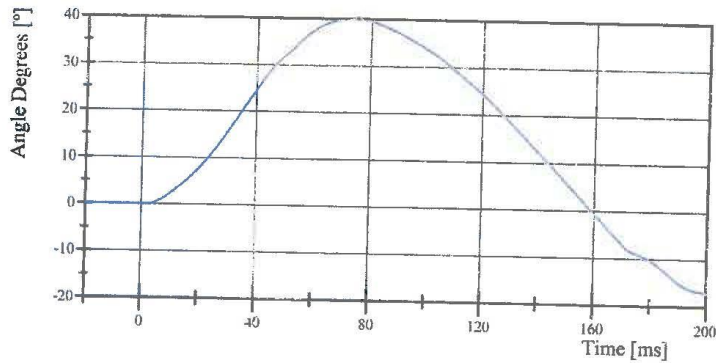
Transportation Research Center Inc.

Neck Extension

HIII 5th Serial No. 019 Certification No. 1-1

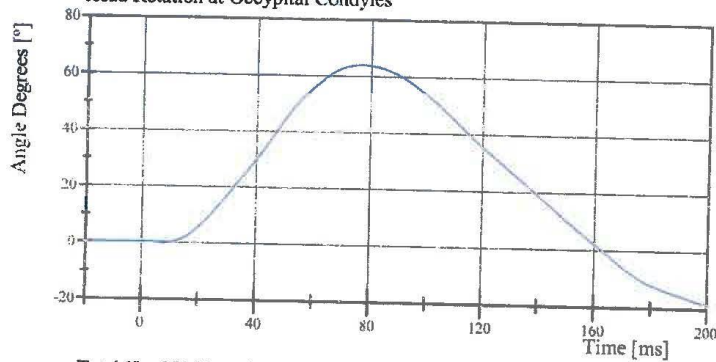
Test Date: 12/31/2014

Pot Rotation at the Base of Neck



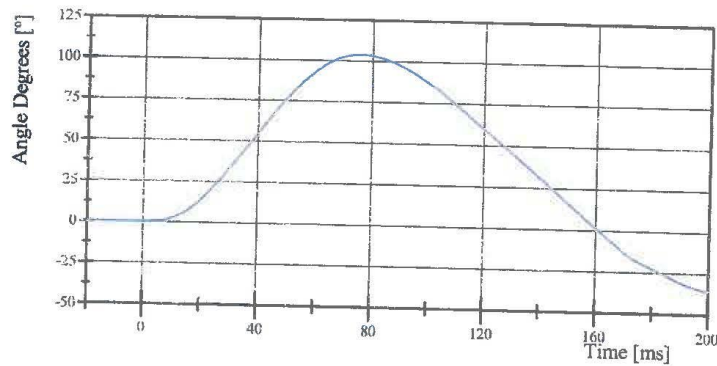
Filter Class: CFC_60
Max: 39.8 ° at 74.8 ms
Min: -17.1 ° at 200.0 ms

Head Rotation at Occypital Condyles



Filter Class: CFC_60
Max: 64.0 ° at 76.6 ms
Min: -18.5 ° at 200.0 ms

Total Head D-Plane Rotation



Filter Class: CFC_60
Max: 103.8 ° at 75.9 ms
Min: -35.6 ° at 200.0 ms

Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

12.31.2014 11:18:39 1833

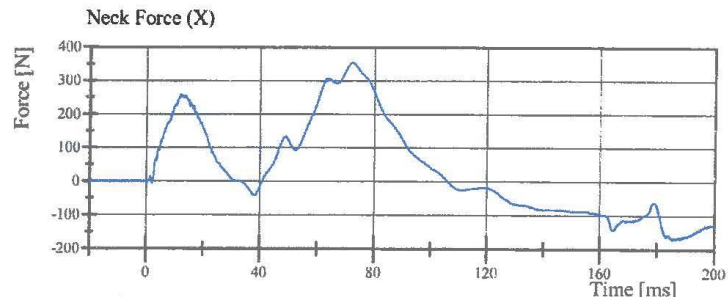


Transportation Research Center Inc.

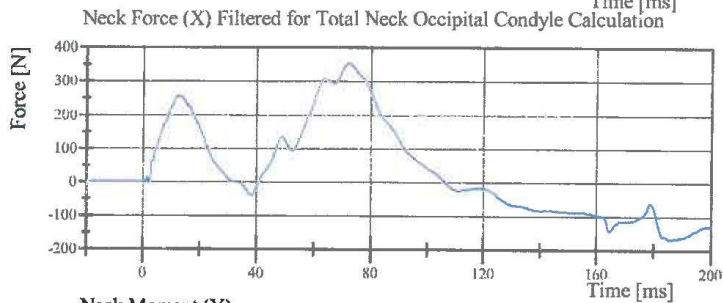
Neck Extension

HIII 5th Serial No. 019 Certification No. 1-1

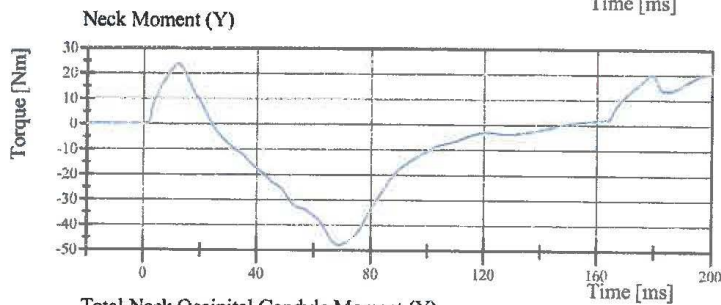
Test Date: 12/31/2014



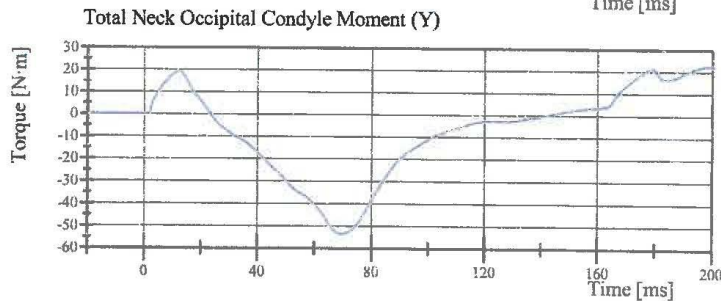
Filter Class: CFC_1000
Max: 353.7 N at 72.0 ms
Min: -170.4 N at 185.4 ms



Filter Class: CFC_600
Max: 353.3 N at 72.0 ms
Min: -169.0 N at 185.4 ms



Filter Class: CFC_600
Max: 23.7 Nm at 12.0 ms
Min: -48.1 Nm at 68.7 ms



Filter Class: Without (Consta
Max: 22.4 N·m at 198.8 ms
Min: -53.7 N·m at 69.6 ms

Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

12.31.2014 11:18:40 1833



Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 5th Serial No. 019 Certification No. 1-12
Test Date: 12/29/2014

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	36 %	Yes
Probe Velocity	2.08 - 2.13 m/s	2.128 m/s	Yes
Peak Femur Force	(-3,450) - (-4,060) N	-3,522.9 N	Yes

Test meets specifications.

Comments:

Technician

Melissa Schenker

Approved

[Signature]

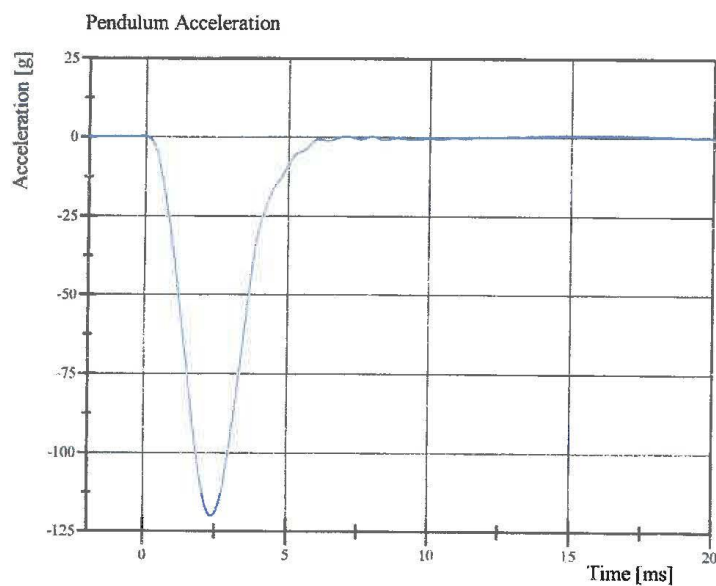
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

12.29.2014 14:01:05 1556

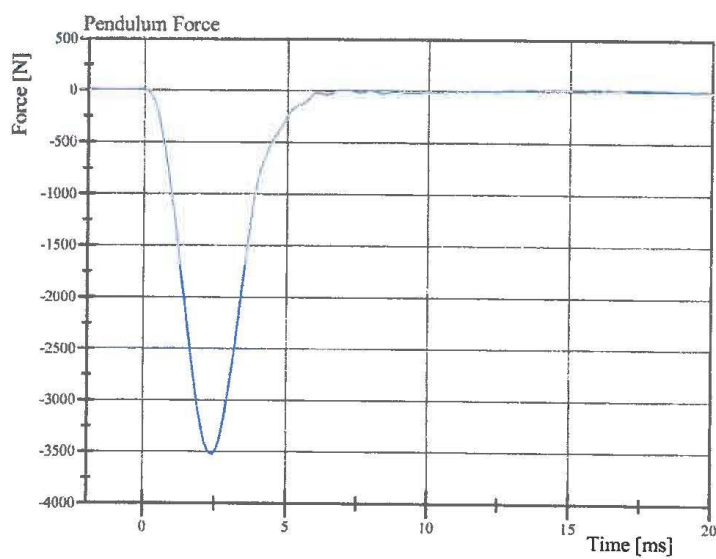


Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 5th Serial No. 019 Certification No. 1-12
Test Date: 12/29/2014



Filter Class: CFC_600
Max: 0.6 g at 15.7 ms
Min: -120.1 g at 2.4 ms



Filter Class: CFC_600
Max: 18.1 N at 15.7 ms
Min: -3,522.9 N at 2.4 ms

Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

12.29.2014 14:01:20 :556



Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 5th Serial No. 019 Certification No. 1-1
Test Date: 12/24/2014

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	22.0 °C	Yes
Relative Humidity	10 - 70 %	49 %	Yes
Probe Velocity	2.08 - 2.13 m/s	2.083 m/s	Yes
Peak Femur Force	(-3,450) - (-4,060) N	-3,603.2 N	Yes

Test meets specifications.

Comments:

Technician

Melissa Schumaker

Approved

[Signature]

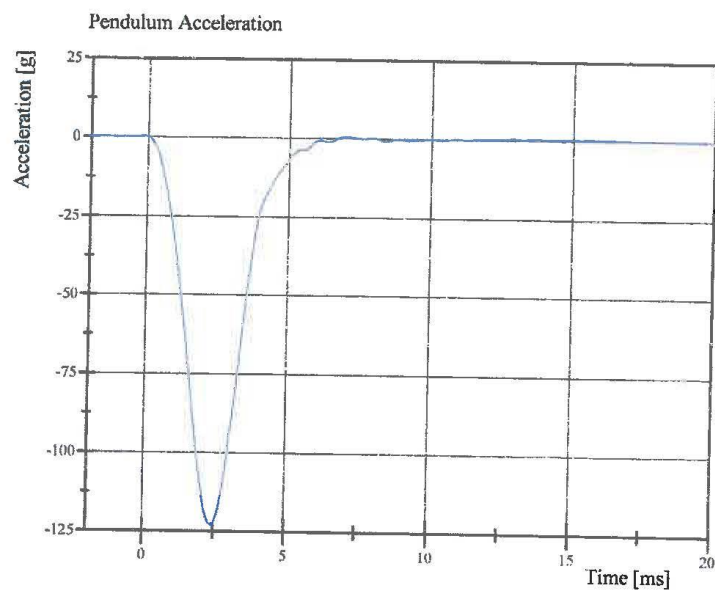
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

12.24.2014 09:47:36 2137

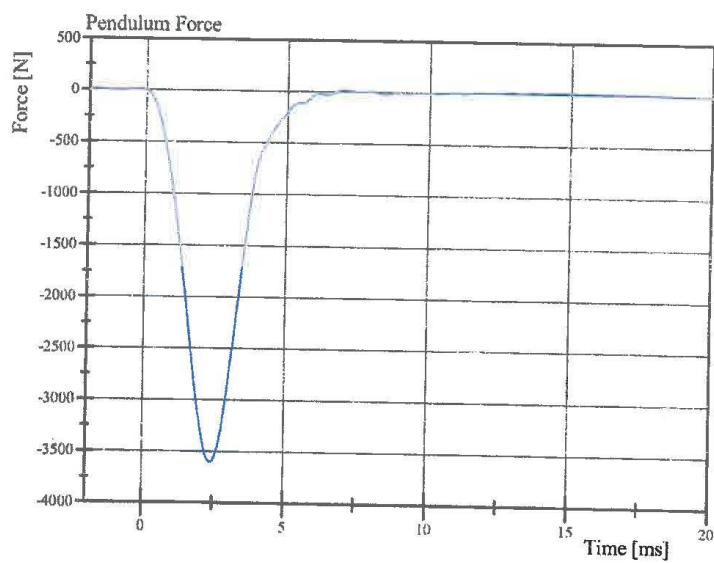


Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 5th Serial No. 019 Certification No. 1-1
Test Date: 12/24/2014



Filter Class: CFC_600
Max: 0.5 g at 13.6 ms
Min: -122.9 g at 2.4 ms

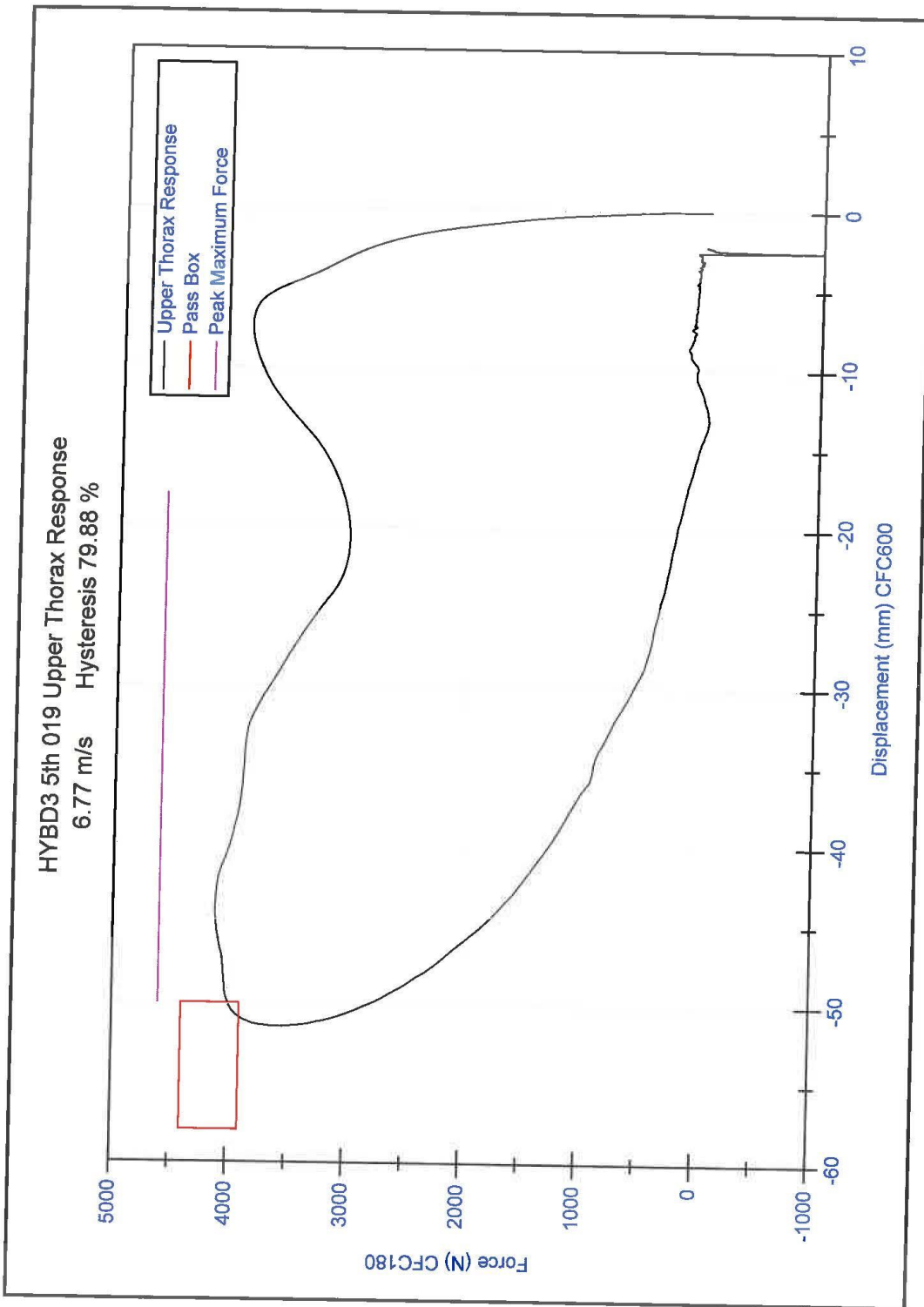


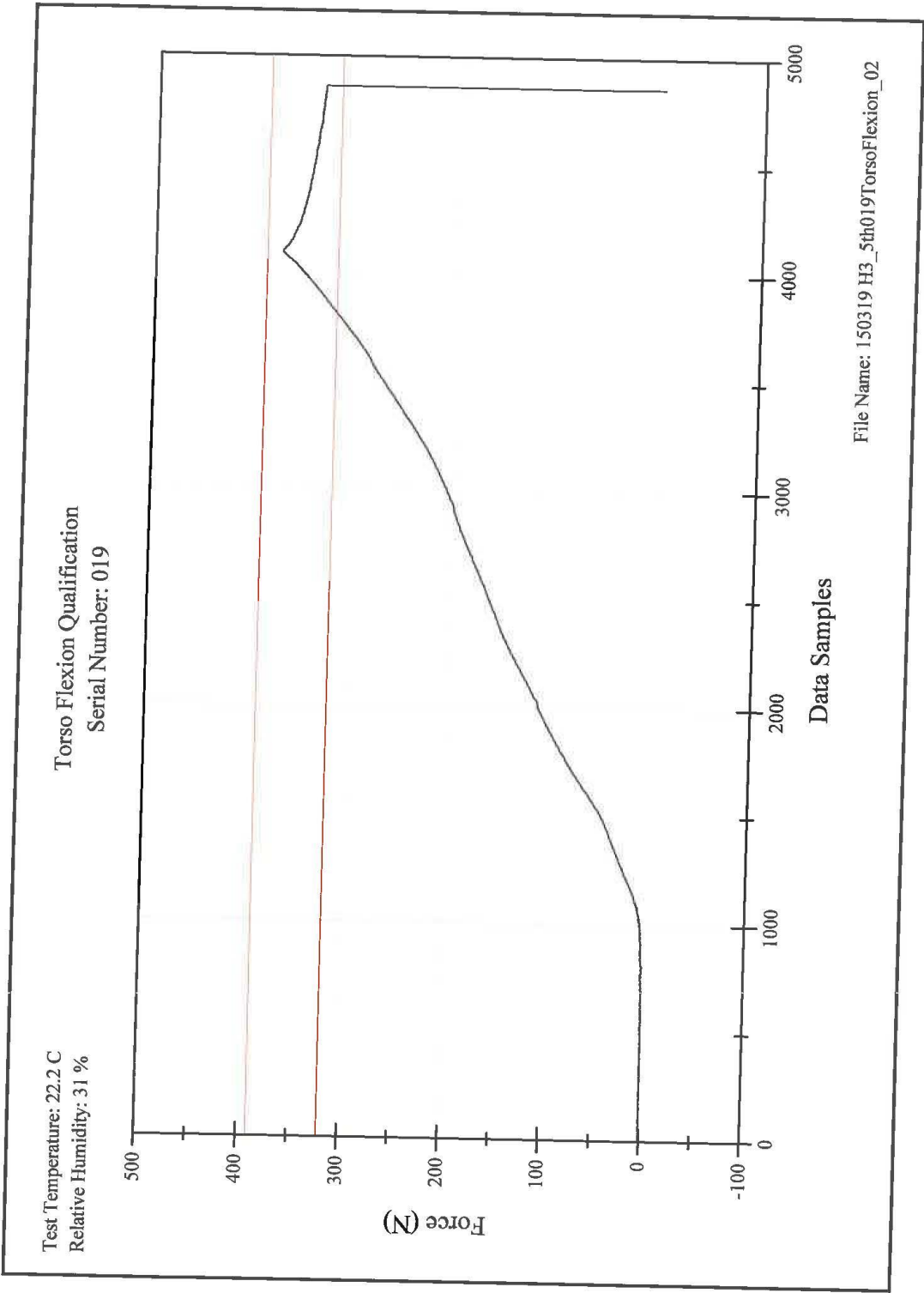
Filter Class: CFC_600
Max: 13.2 N at 13.6 ms
Min: -3,603.2 N at 2.4 ms

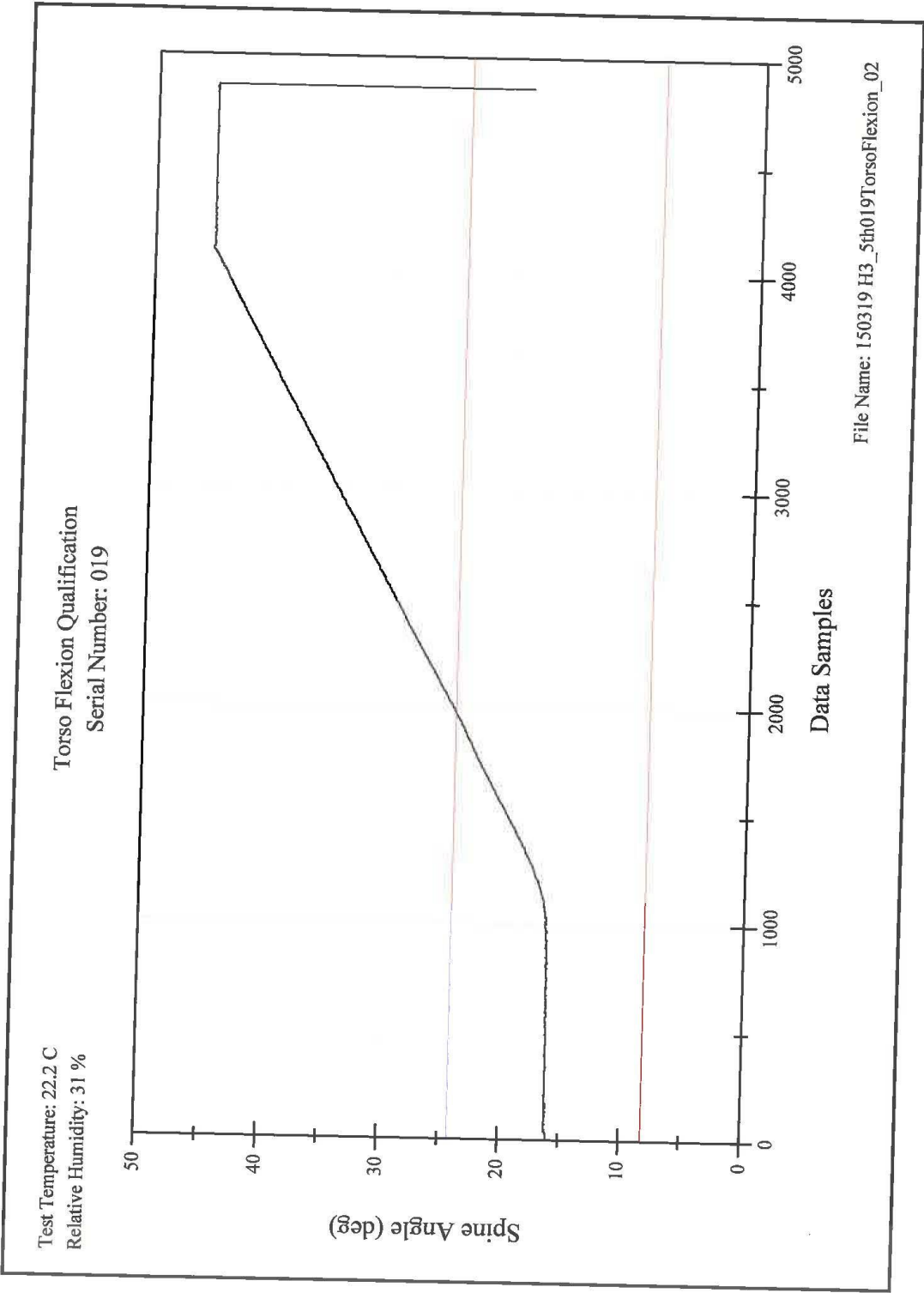
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

12.24.2014 09:47:52 2137









Transportation Research Center Inc.
5720 HIII 5th Female Dummy
External Dimensions
Serial No. 019 Calibration No. 01

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Total Sitting Height	774.7 - 800.1	775	Yes
B	Shoulder Pivot Height	431.8 - 457.2	445	Yes
C	Hip Pivot Height	81.3 - 86.3	82	Yes
D	Hip Pivot from Backline	144.8 - 149.8	145	Yes
E	Shoulder Pivot from Backline	68.6 - 83.8	76	Yes
F	Thigh Clearance	119.4 - 134.6	130	Yes
G	Back of Elbow to Wrist Pivot	243.9 - 259.1	249	Yes
H	Head Back to Backline	43.2 - 48.2	45	Yes
I	Shoulder to Elbow Length	276.8 - 297.2	280	Yes
J	Elbow Rest Height	182.8 - 203.2	185	Yes
K	Buttock Knee Length	520.7 - 546.1	535	Yes
L	Popliteal Height	355.6 - 376.0	360	Yes
M	Knee Pivot Height	393.7 - 419.1	400	Yes
N	Buttock Popliteal Length	414.0 - 439.4	430	Yes
O	Chest Depth without Jacket	175.3 - 190.5	182	Yes
P	Foot Length	218.5 - 233.7	225	Yes
R	Buttock to Knee Pivot Length	457.2 - 482.6	479	Yes
S	Head Breadth	137.1 - 147.3	141	Yes
T	Head Depth	177.8 - 188.0	182	Yes
U	Hip Breadth	299.7 - 314.9	307	Yes
V	Shoulder Breadth	350.5 - 365.7	360	Yes
W	Foot Breadth	78.8 - 94.0	85	Yes
X	Head Circumference	528.3 - 548.7	533	Yes
Y	Chest Circumference with Jacket	850.9 - 881.3	868	Yes
Z	Waist Circumference	759.5 - 789.9	771	Yes
AA	Reference Location for Chest Circumference	332.7 - 358.1	340	Yes
BB	Reference Location for Waist Circumference	160.0 - 170.2	165	Yes

Technician

Melissa Schinzel

Approved

[Signature]

Revised 8/10/2012



Hybrid III 5th Female 019 DUMMY CALIBRATIONS

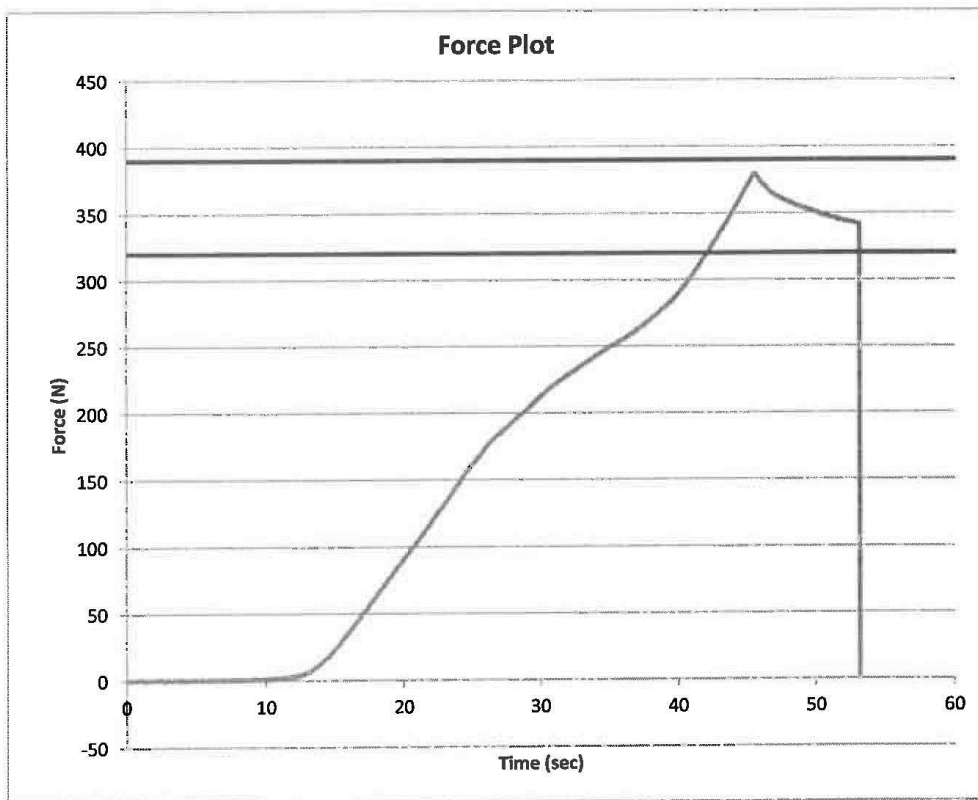
Transportation Research Center Inc.
Hybrid III Small Female Torso Flexion



Serial Number: 324 Date: 2/25/2015
Test Number: 5 Time: 15:01

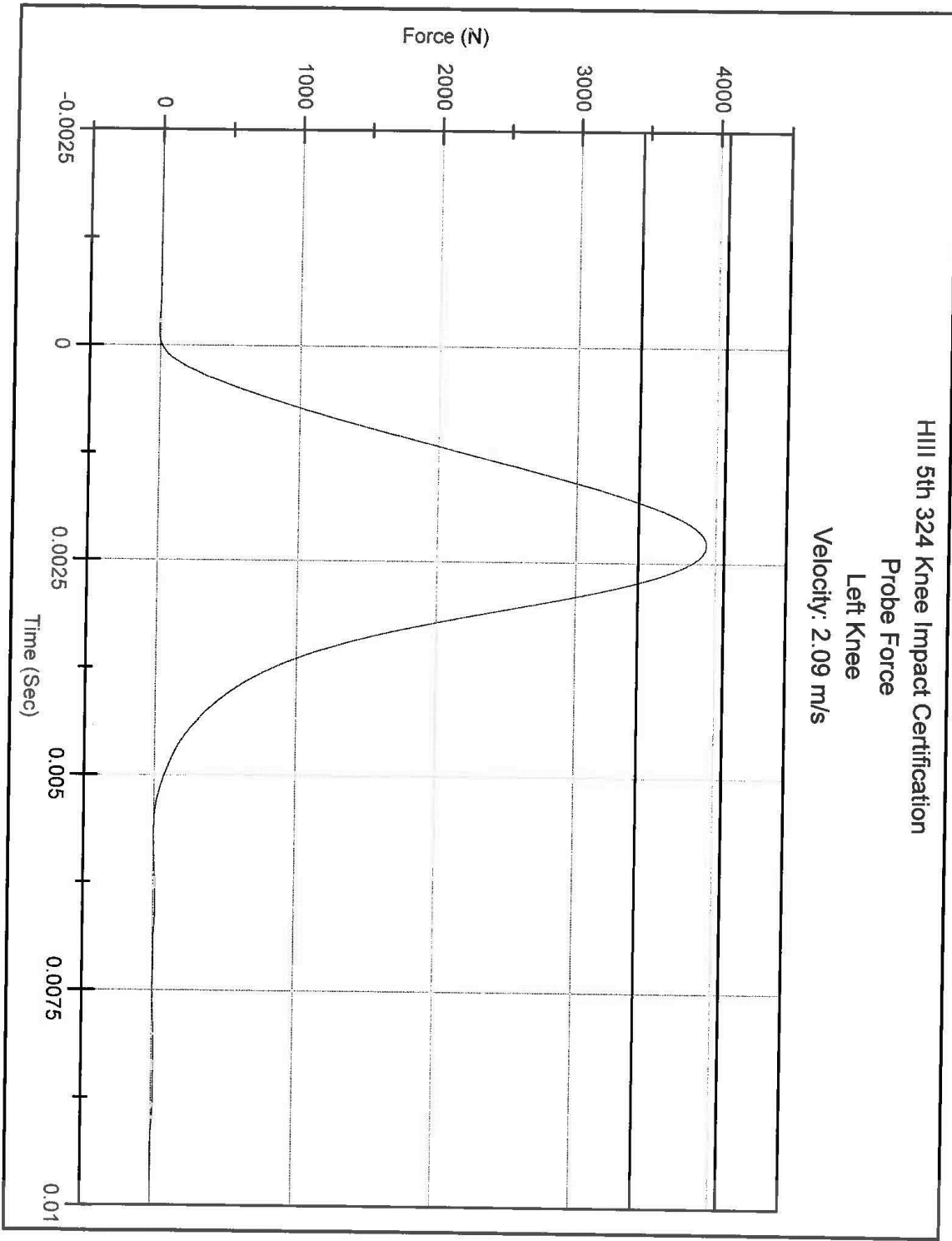
Comments:

TEST PARAMETER	SPECIFICATION		TEST RESULTS		
Temperature	18.9	- 25.6	21.4 °C	Pass	
Humidity	10	- 70	39 %	Pass	
Average Angular Velocity	0.5	- 1.5	0.87 deg/sec	Pass	
Initial Angle	0	- 20	16.57 deg	Pass	
Peak Force at 45.17°	320	- 390	379.61 N	Pass	
Final Angle	-8	- 8	3.3 deg	Pass	



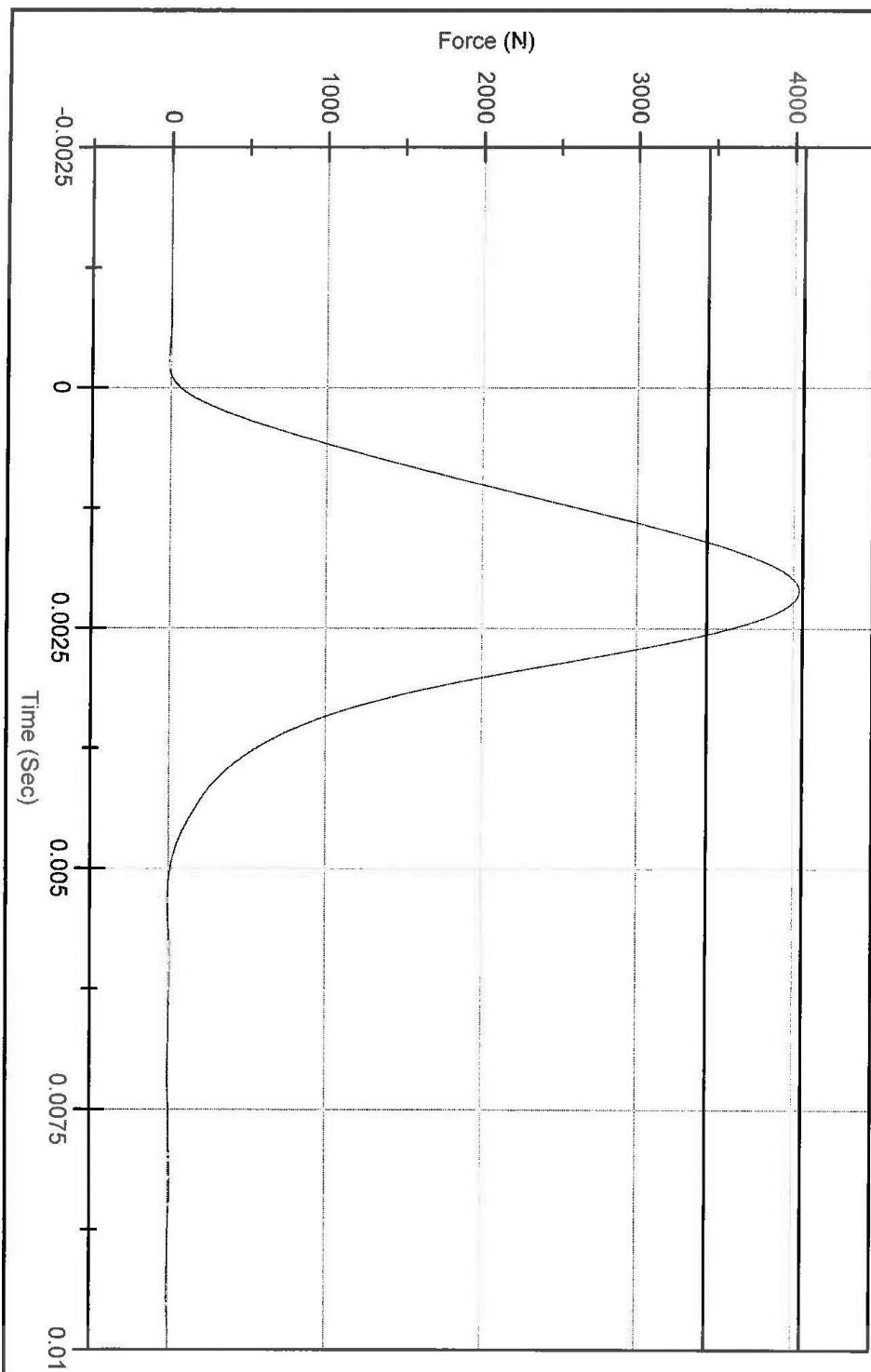
Technician

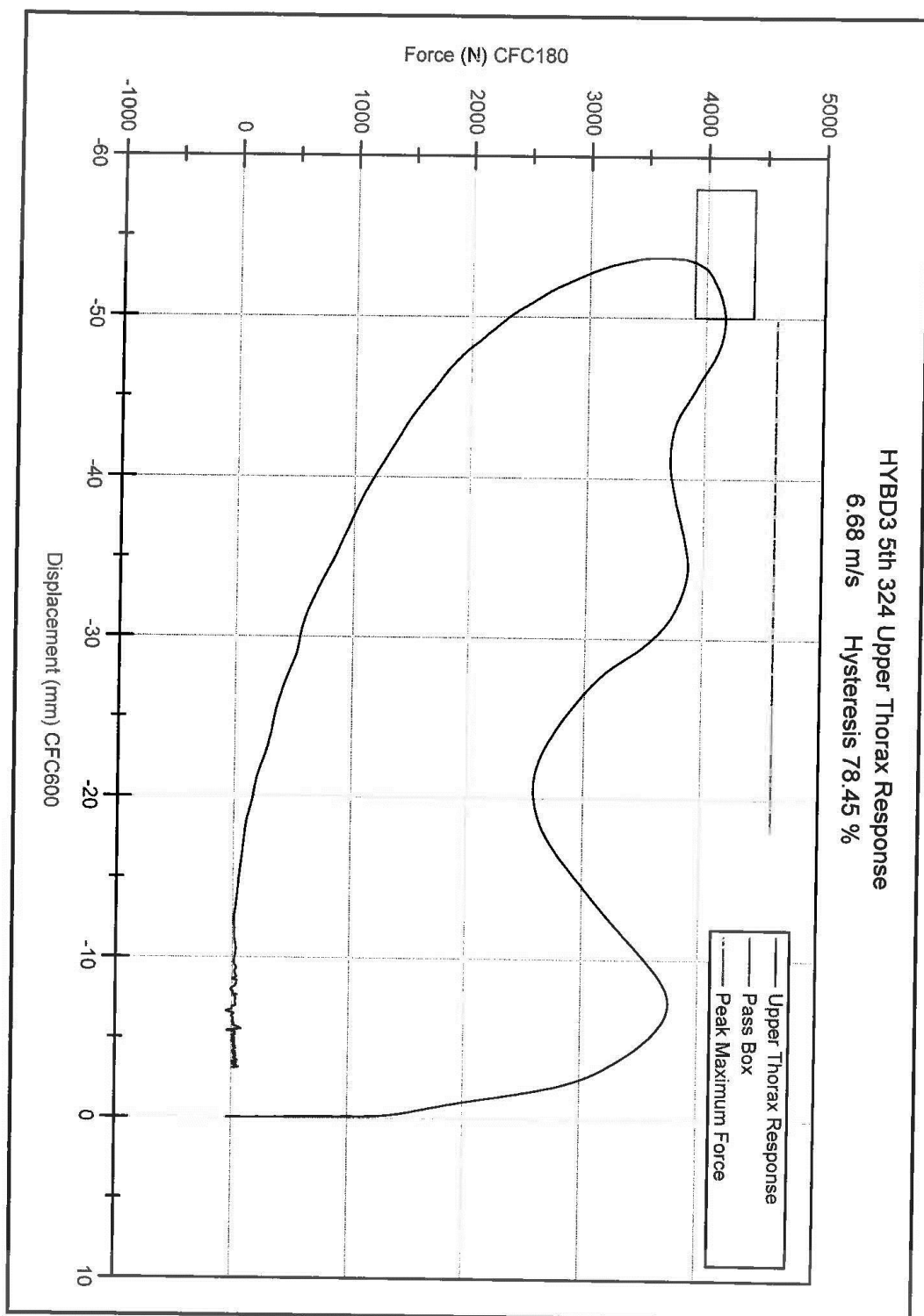
Approved



Hill 5th 324 Knee Impact Certification

Probe Force
Right Knee
Velocity: 2.08 m/s



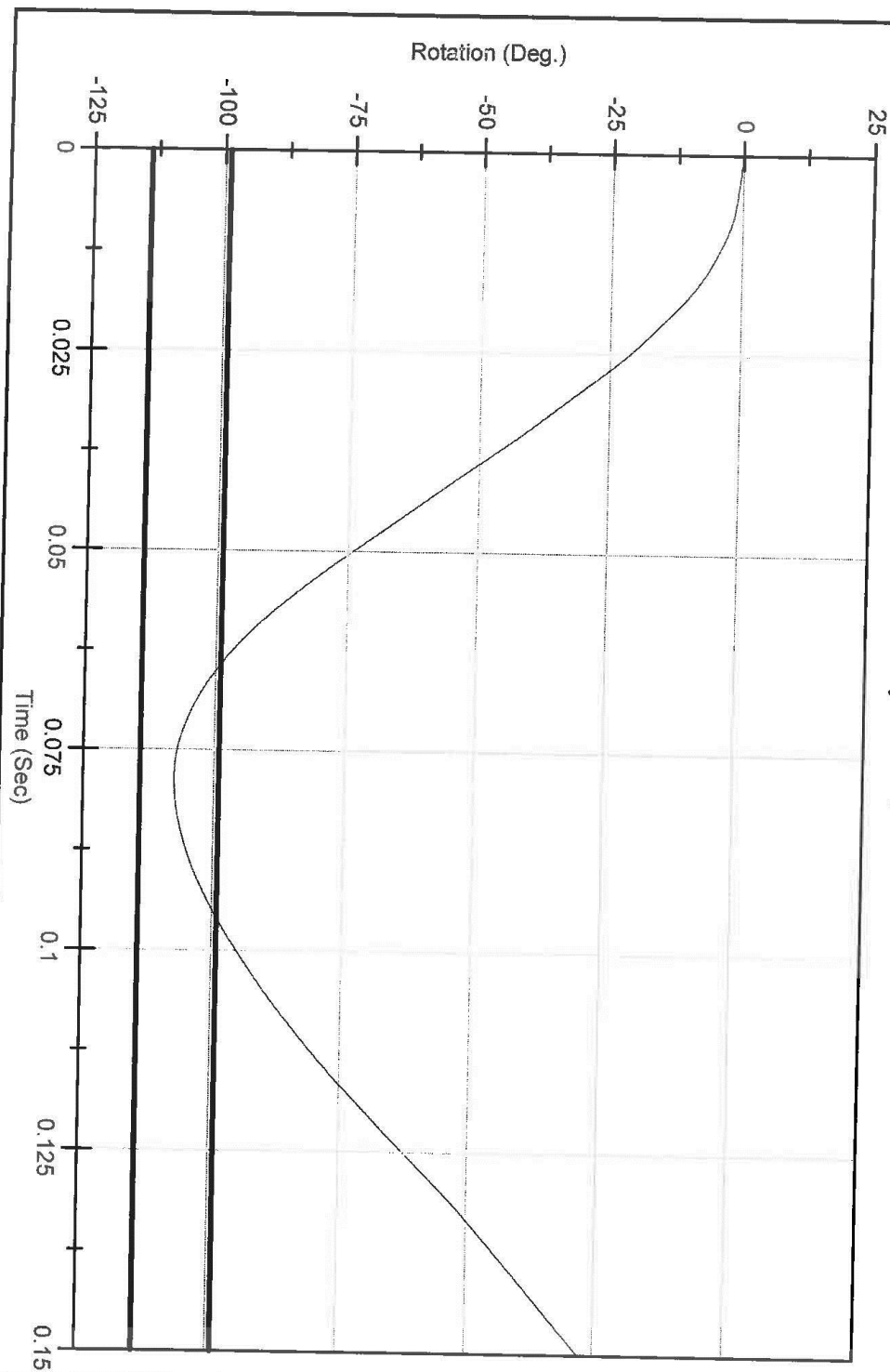


HIII 5th 324 Neck Flexion Certification

Total Rotation

Neck Serial Number: 2081

Velocity: 6.1 m/s

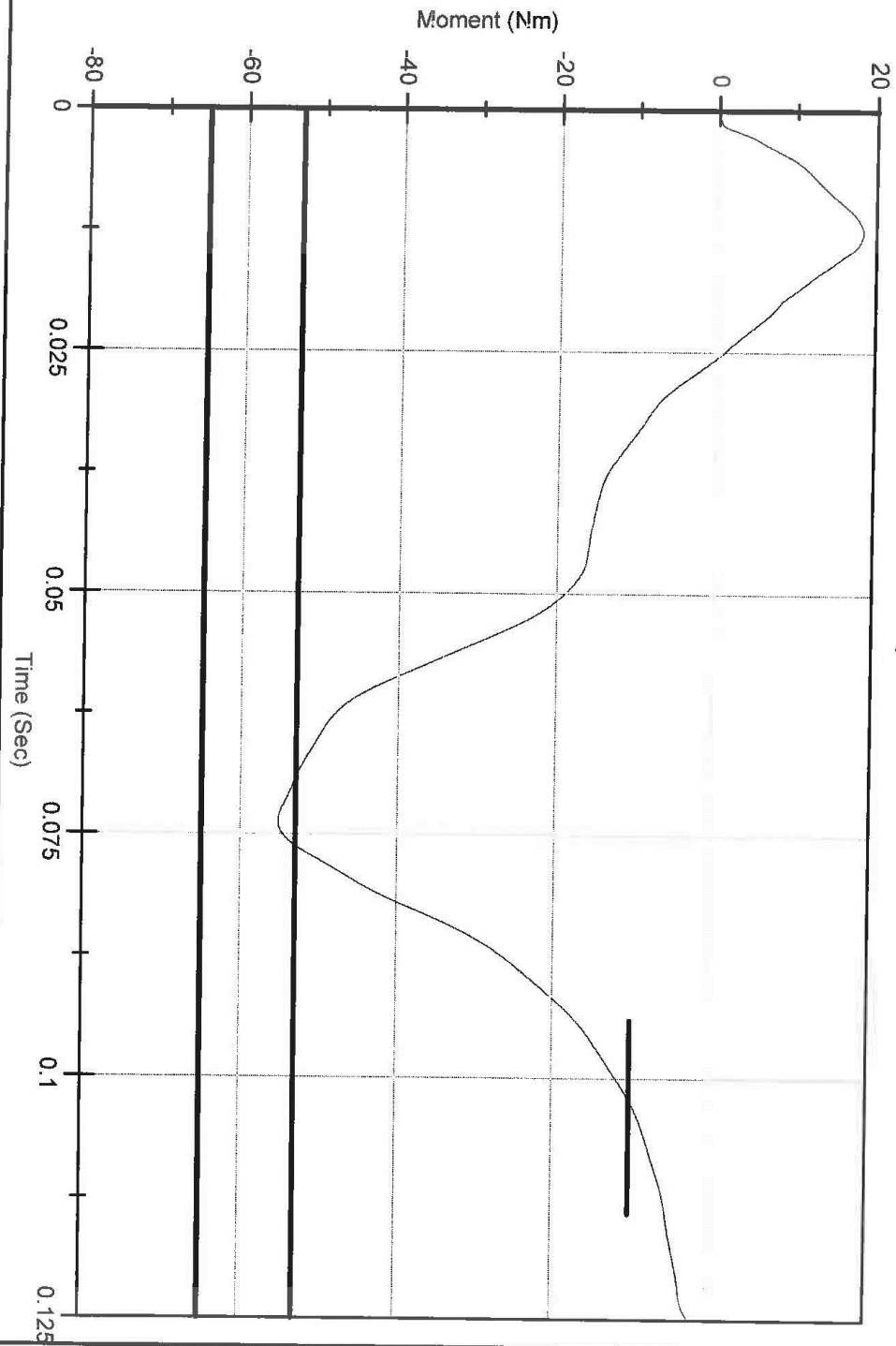


HIII 5th 324 Neck Flexion Certification

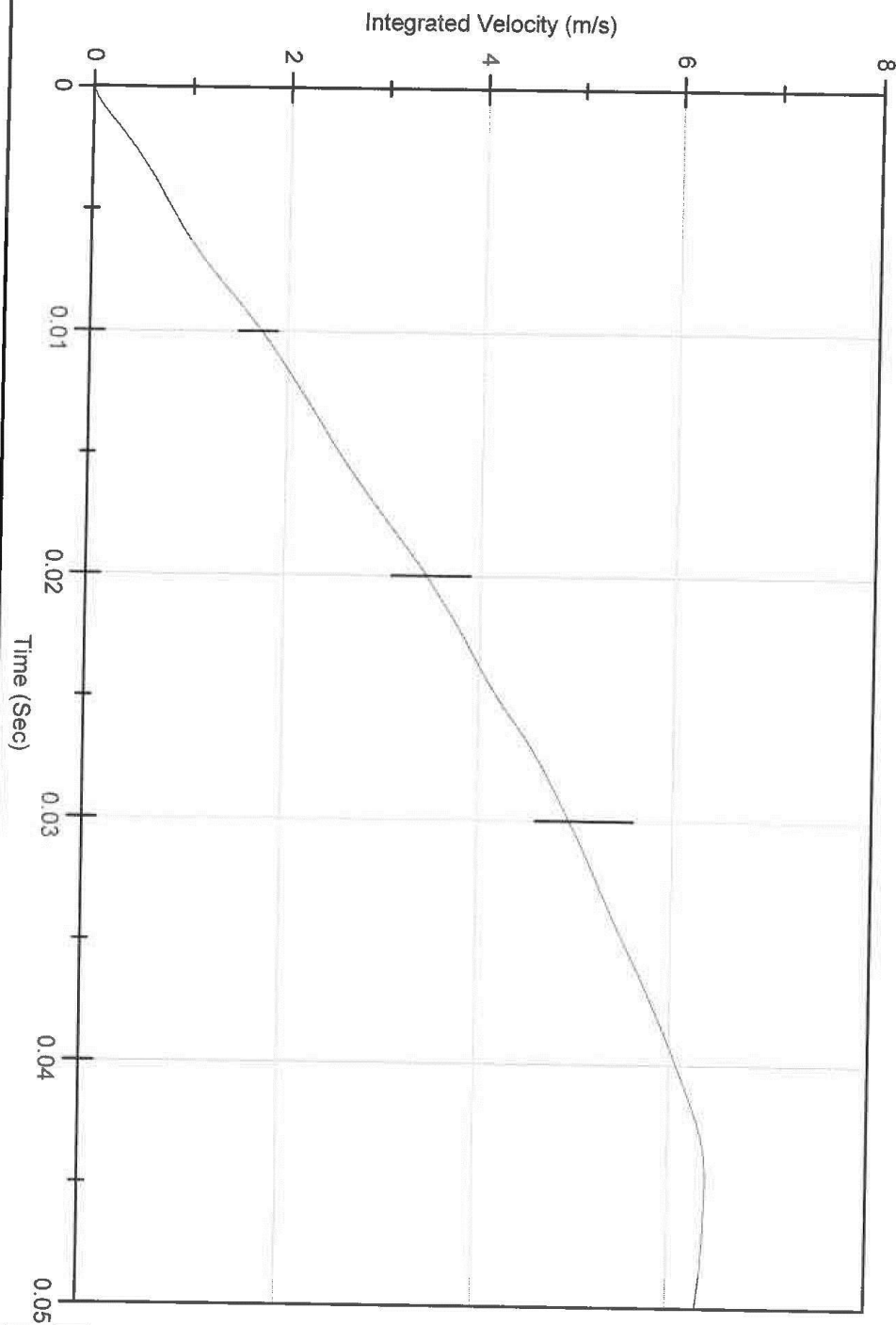
OC Y Moment

Neck Serial Number: 2081

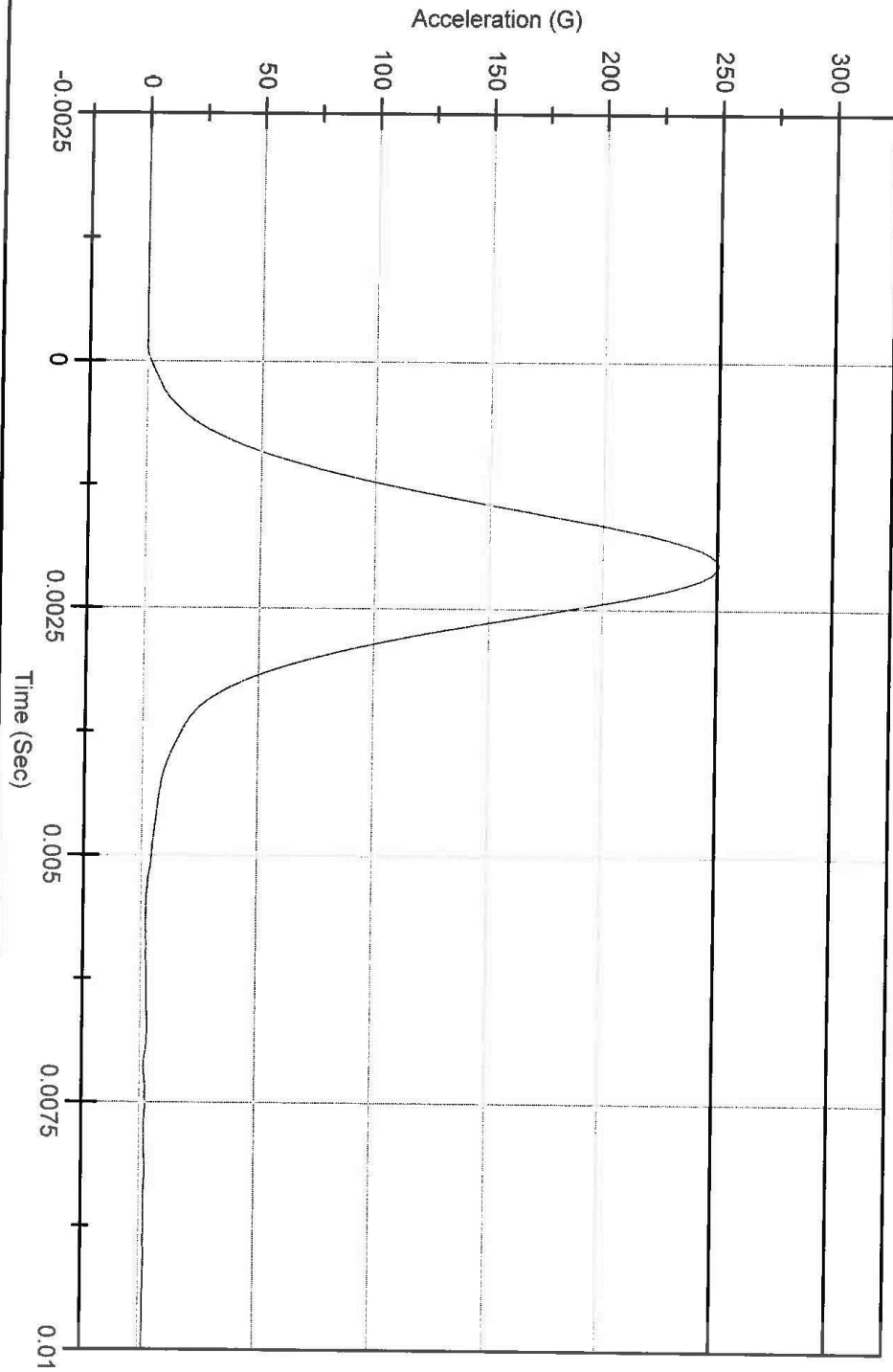
Velocity: 6.1 m/s



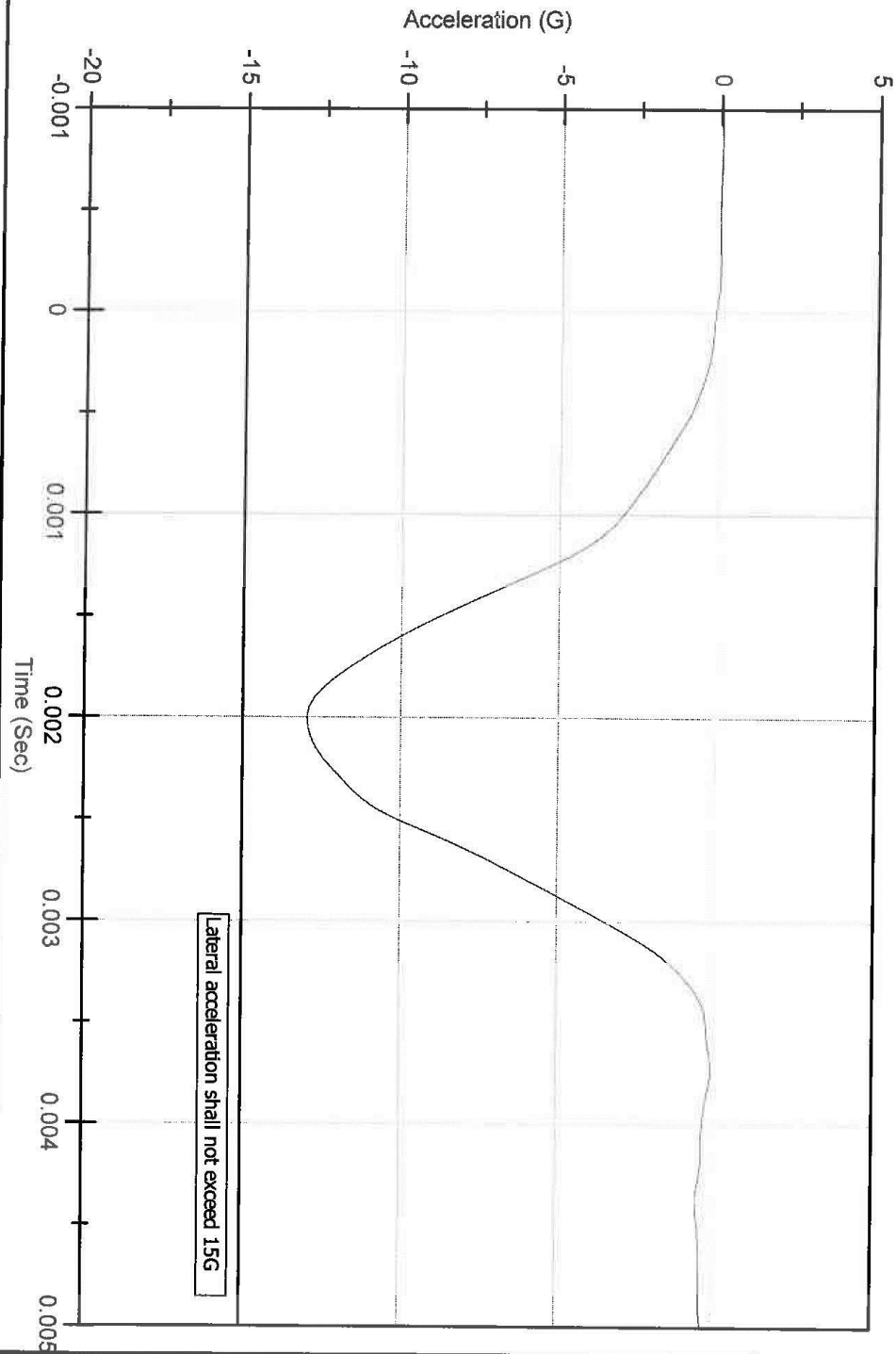
HIII 5th 324 Neck Flexion Certification
Deceleration Pulse
Neck Serial Number: 2081
Velocity: 6.1 m/s



HIII 5th 324 Frontal Head Certification
Resultant Acceleration
Head Skin Serial Number: 03151
Drop Height: 376mm



HIII 5th 324 Frontal Head Certification
Lateral Acceleration
Head Skin Serial Number: 03151
Drop Height: 376mm

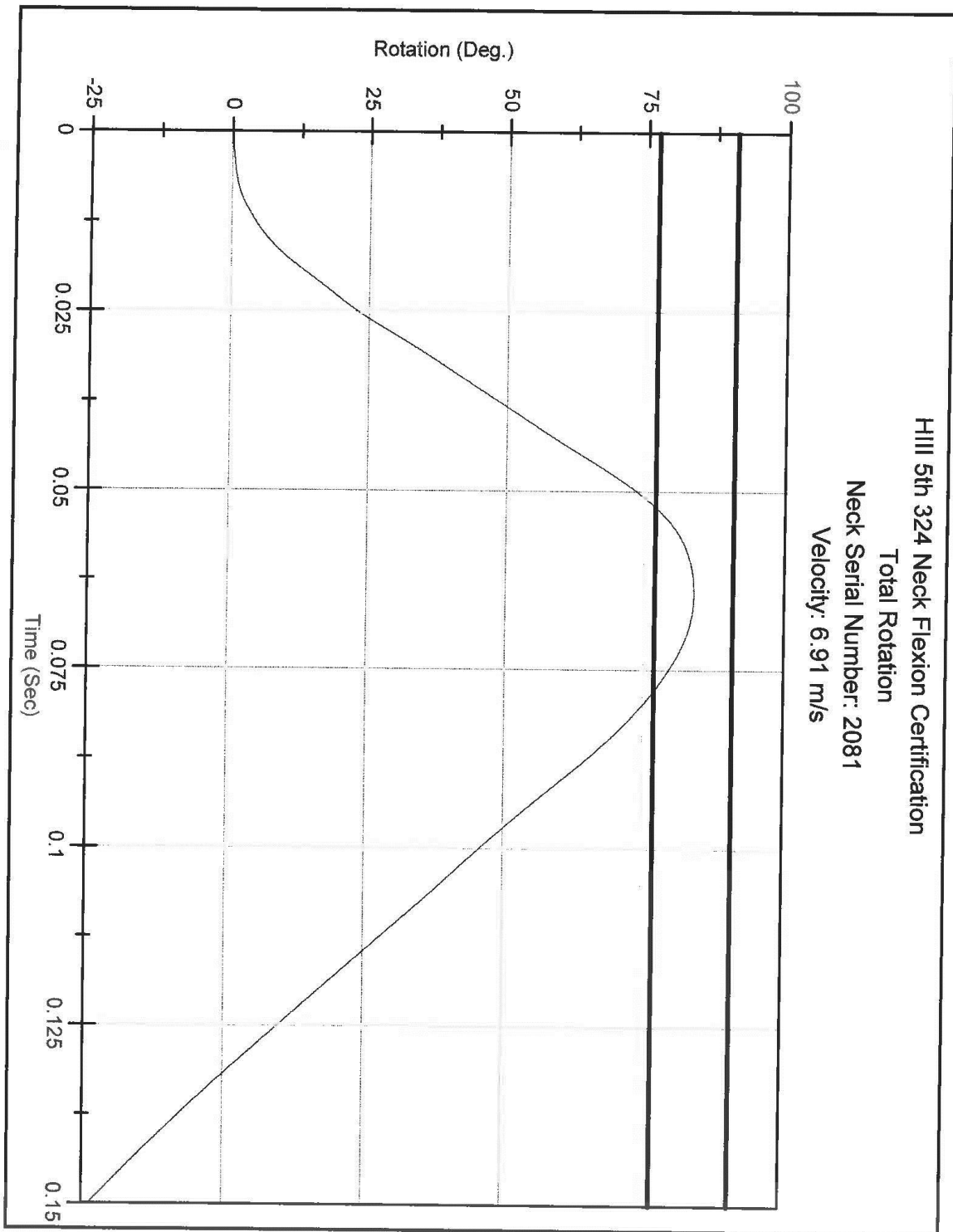


HIII 5th 324 Neck Flexion Certification

Total Rotation

Neck Serial Number: 2081

Velocity: 6.91 m/s

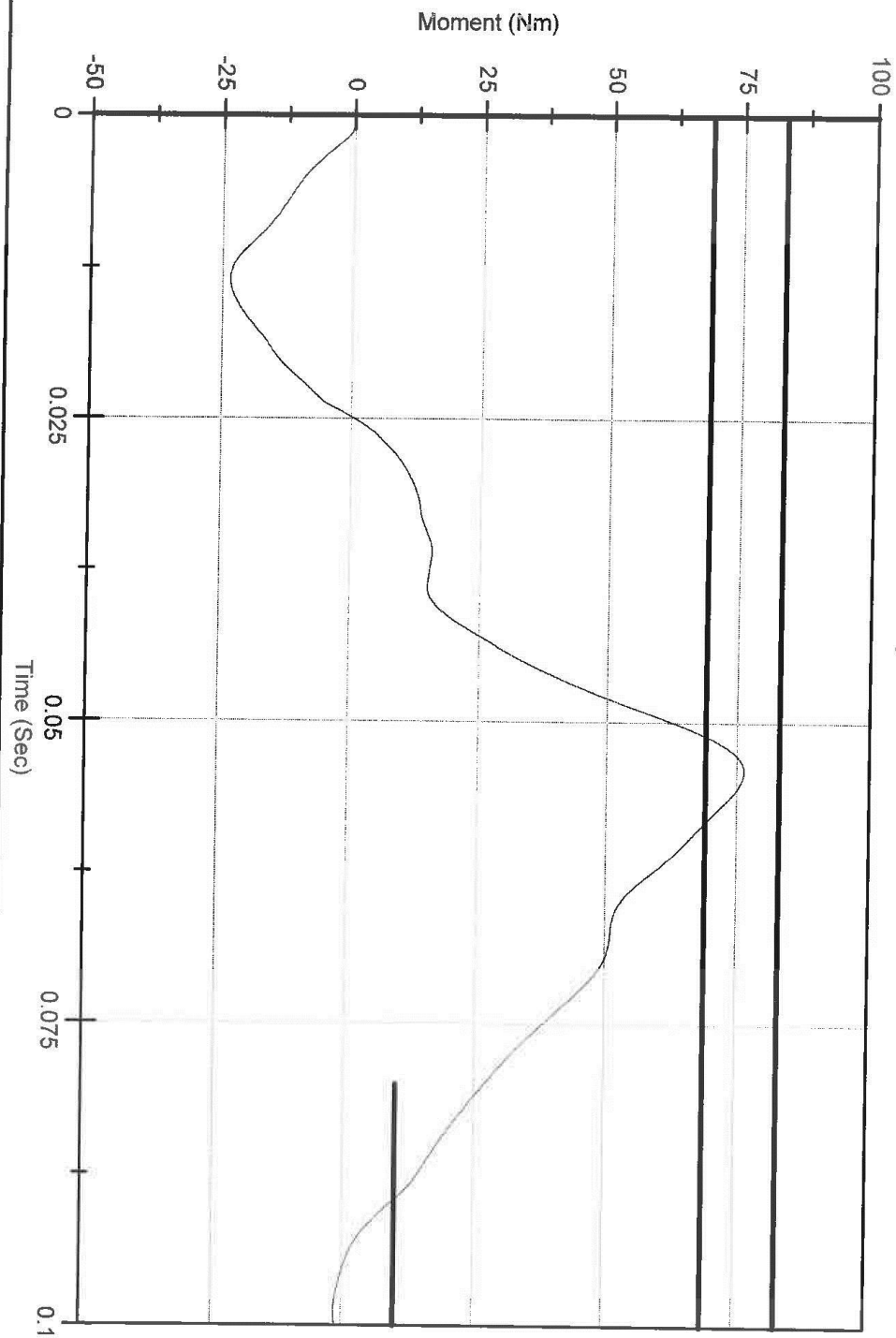


HIII 5th 324 Neck Flexion Certification

OC Y Moment

Neck Serial Number: 2081

Velocity: 6.91 m/s

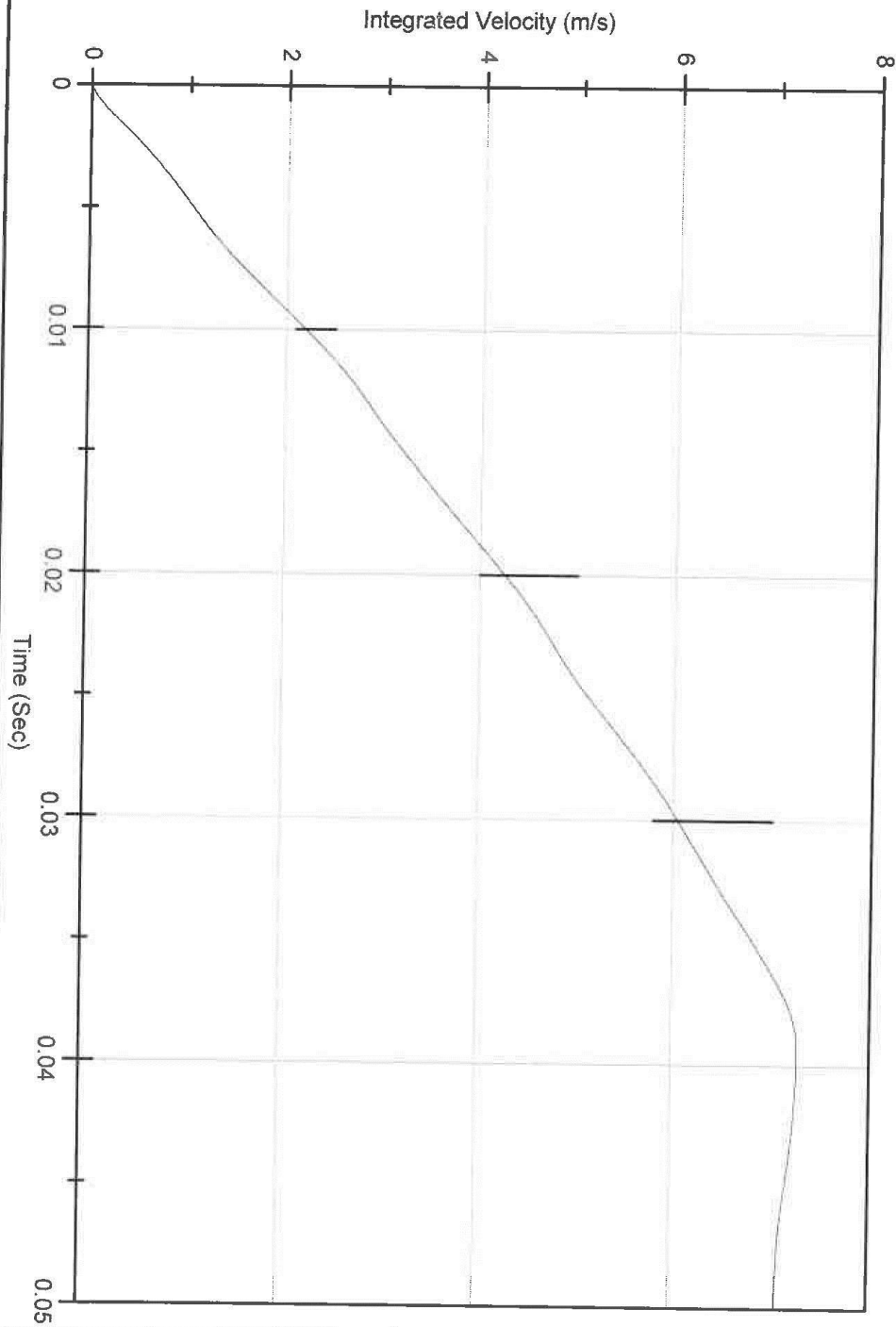


HIII 5th 324 Neck Flexion Certification

Deceleration Pulse

Neck Serial Number: 2081

Velocity: 6.91 m/s

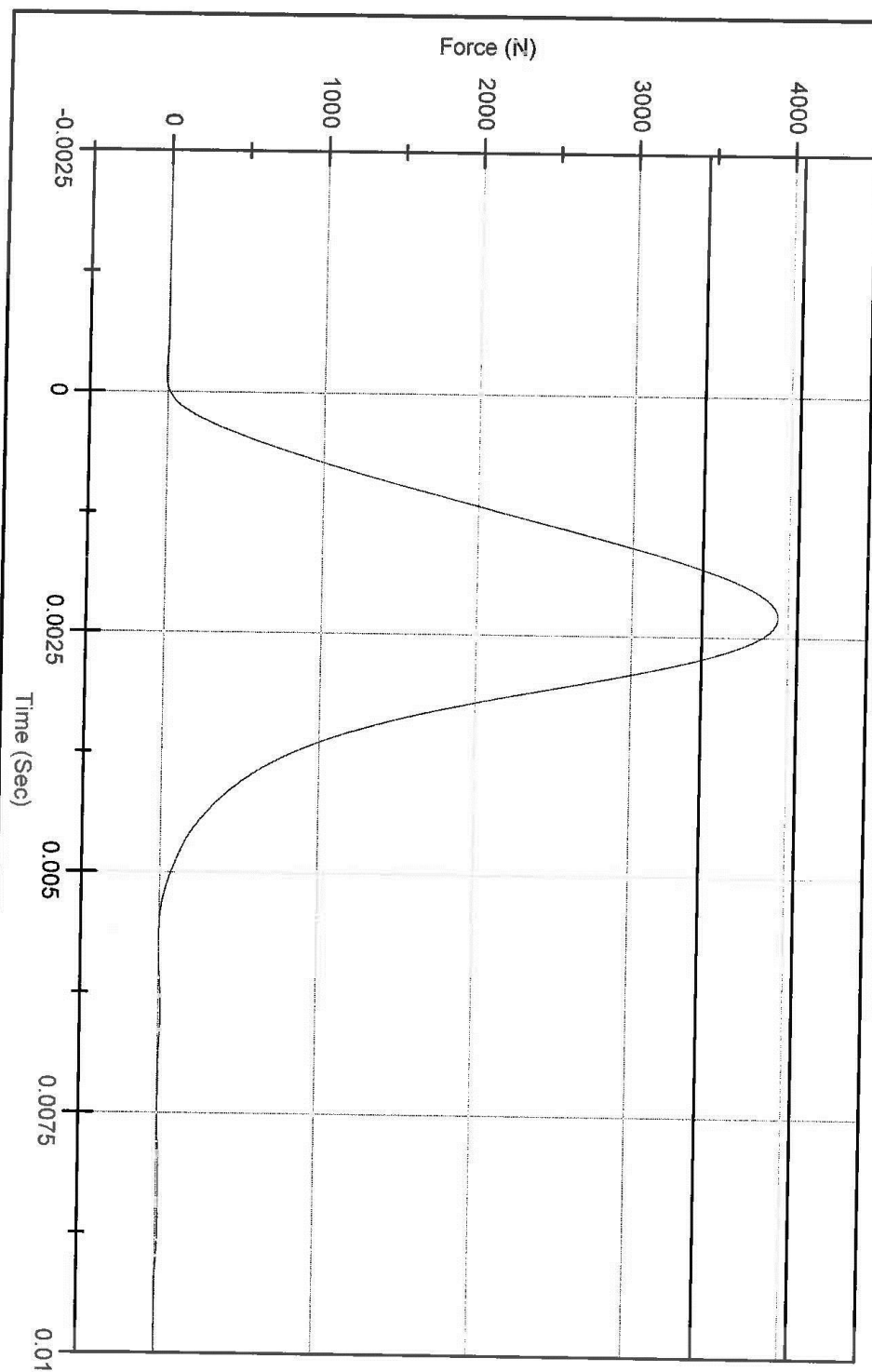


Hill 5th 324 Knee Impact Certification

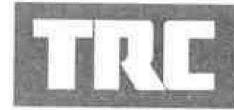
Probe Force

Left Knee

Velocity: 2.09 m/s



Transportation Research Center Inc.
Hybrid III Small Female Torso Flexion

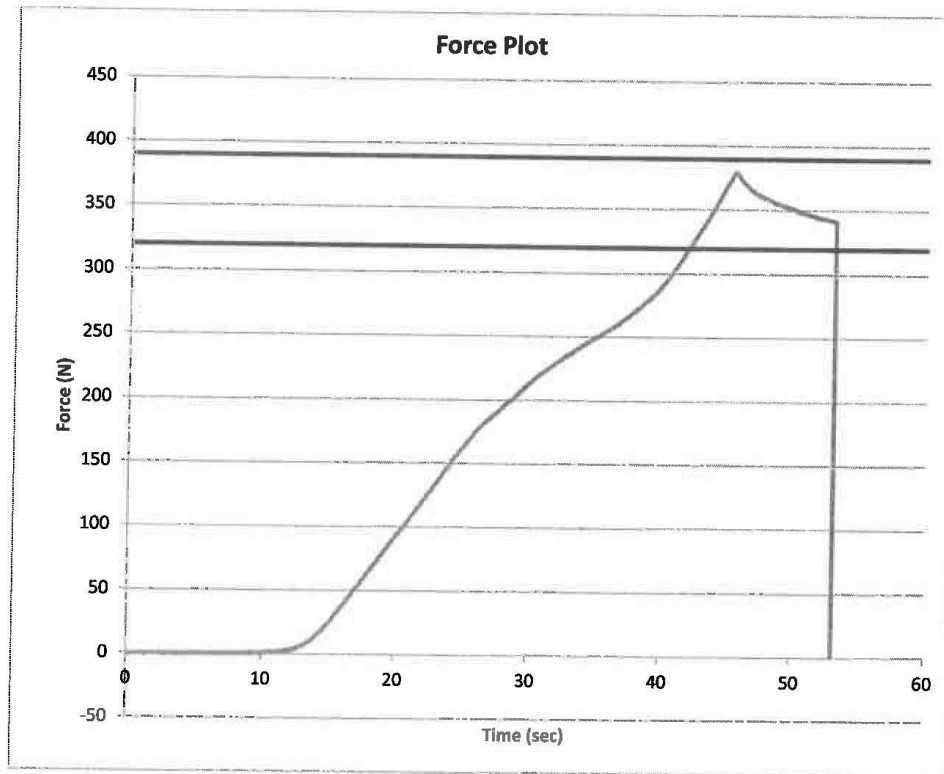


Serial Number: 324
Test Number: 5

Date: 2/25/2015
Time: 15:01

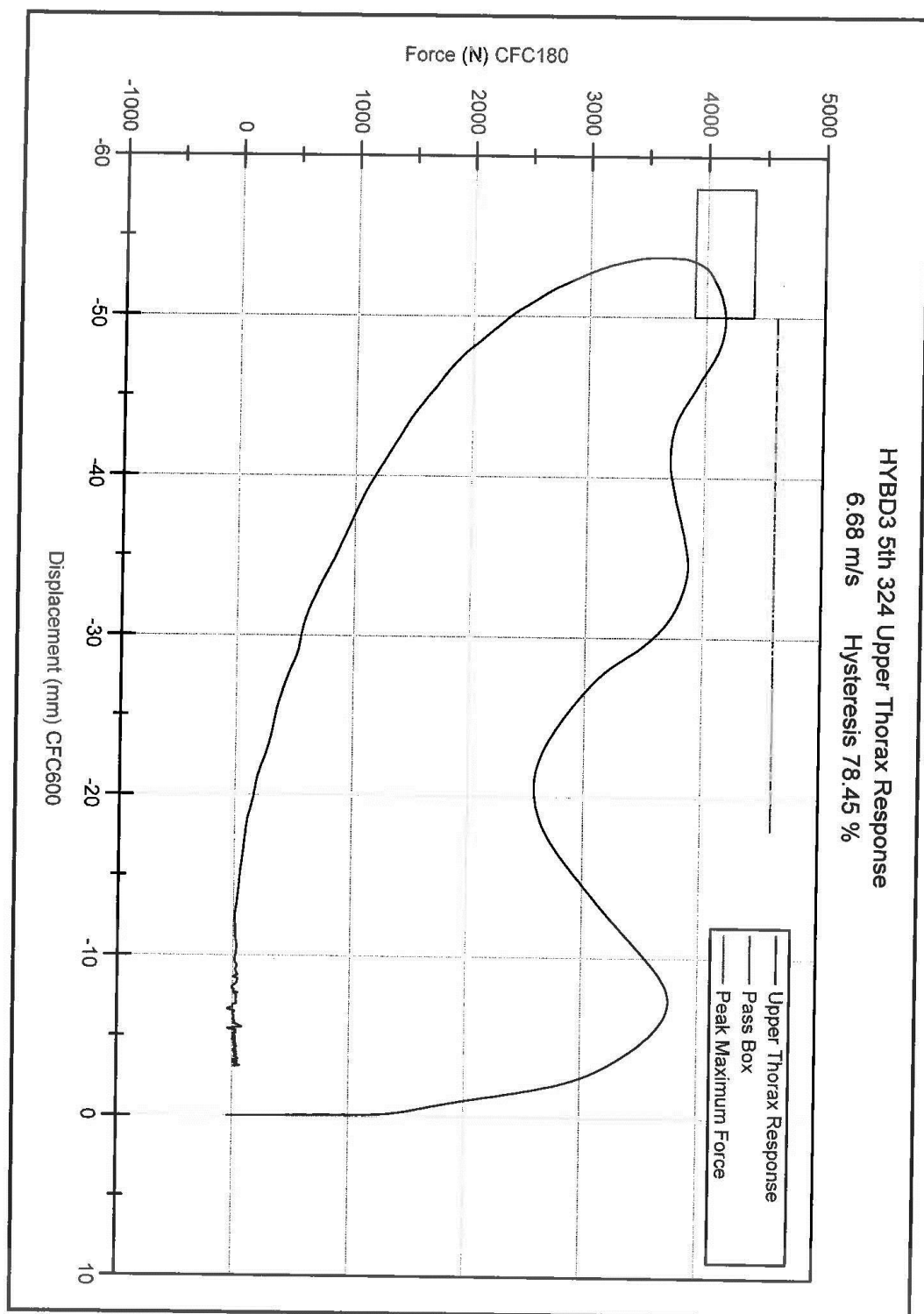
Comments:

TEST PARAMETER	SPECIFICATION		TEST RESULTS		
Temperature	18.9	- 25.6	21.4 °C	Pass	
Humidity	10	- 70	39 %	Pass	
Average Angular Velocity	0.5	- 1.5	0.87 deg/sec	Pass	
Initial Angle	0	- 20	16.57 deg	Pass	
Peak Force at 45.17°	320	- 390	379.61 N	Pass	
Final Angle	-8	- 8	3.3 deg	Pass	



Technician

Approved

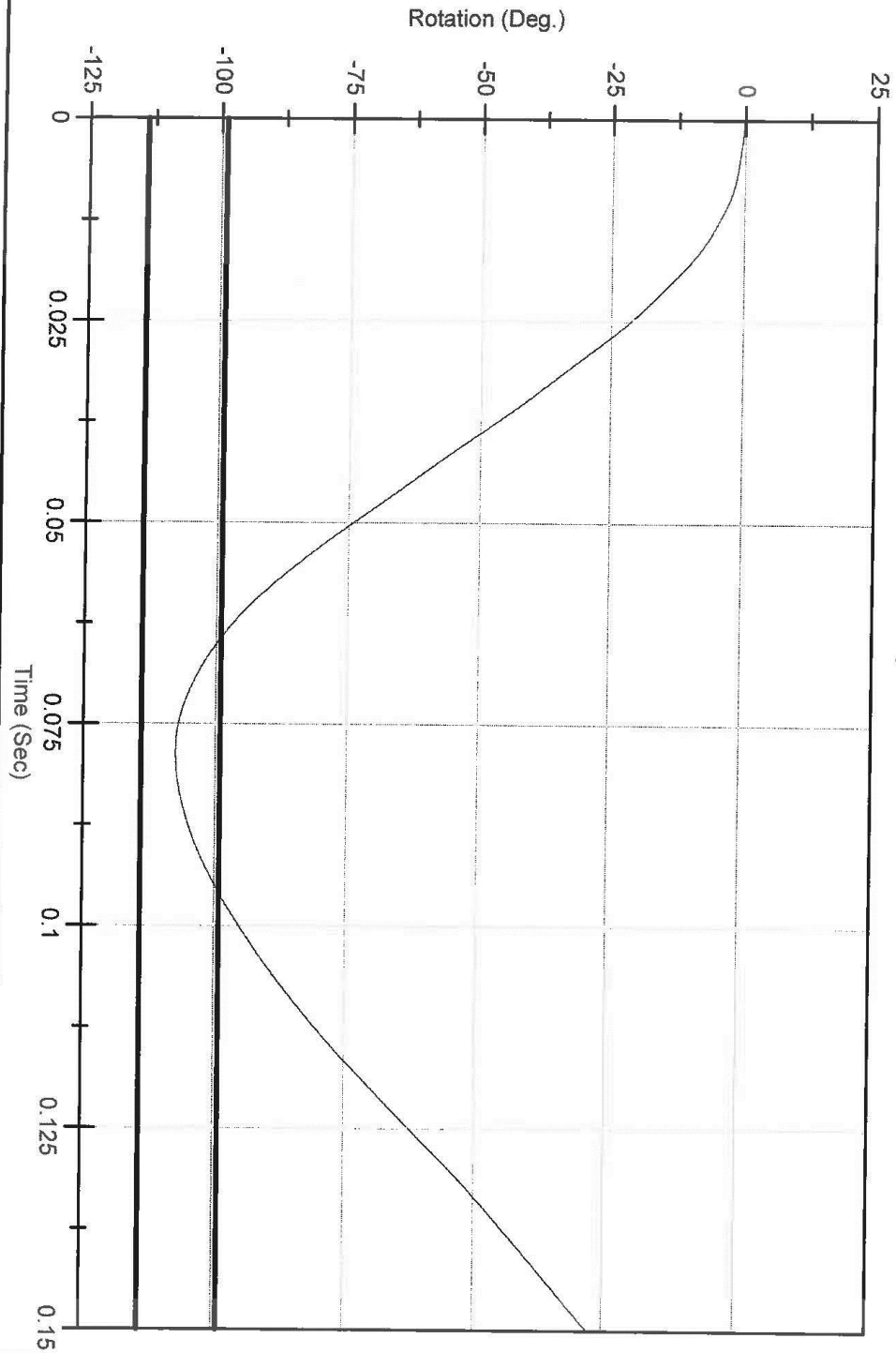


HIII 5th 324 Neck Flexion Certification

Total Rotation

Neck Serial Number: 2081

Velocity: 6.1 m/s

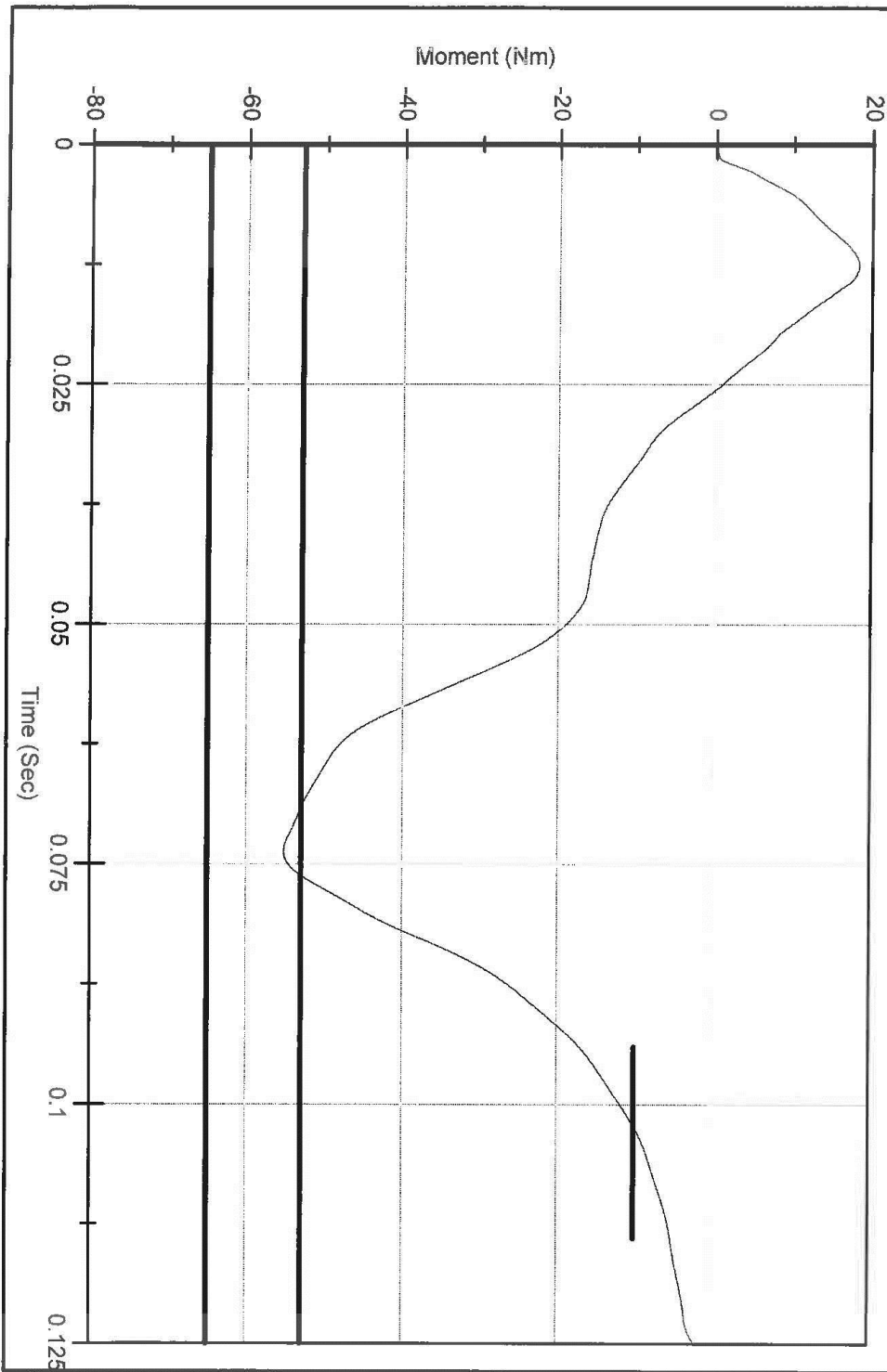


H111 5th 324 Neck Flexion Certification

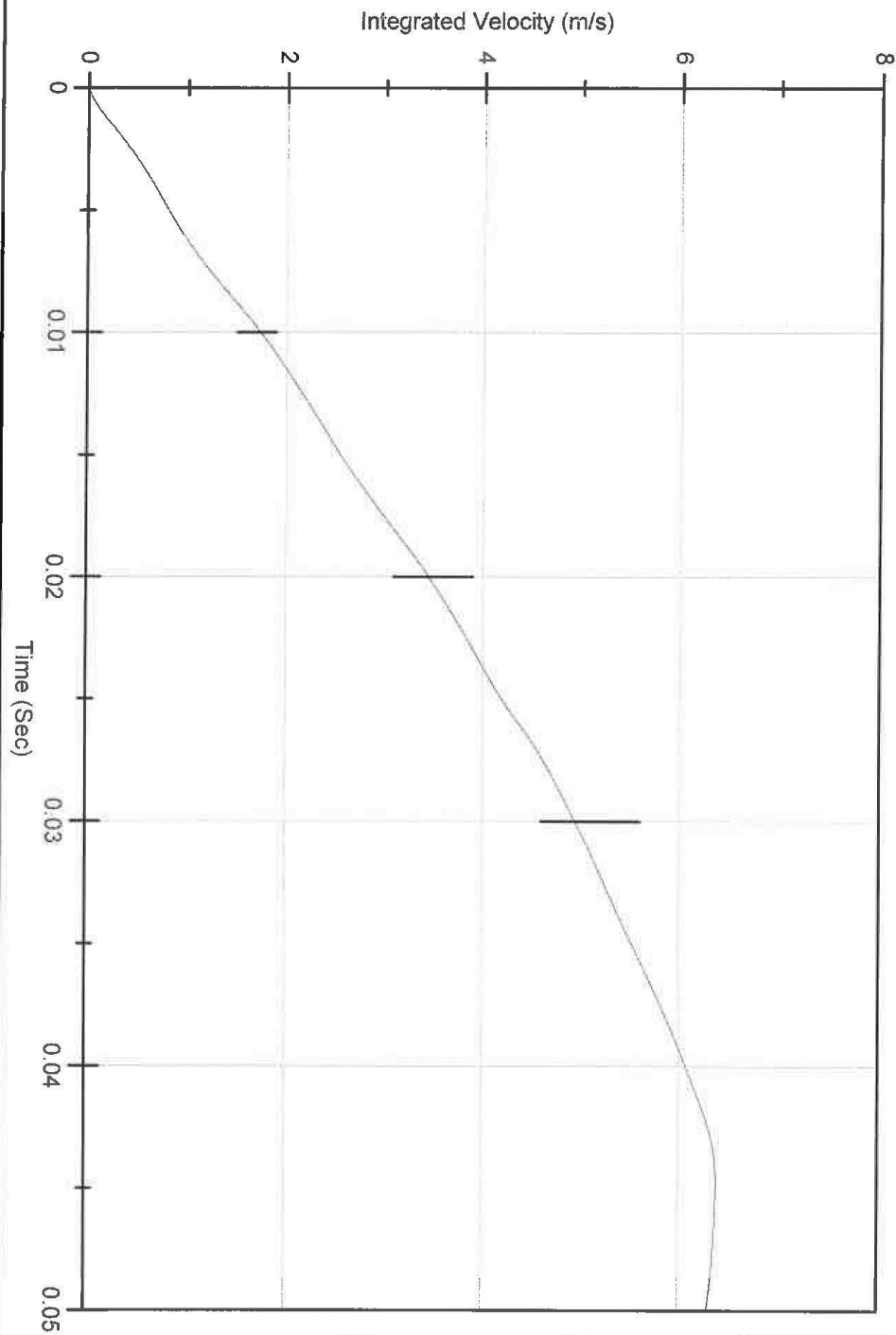
OC Y Moment

Neck Serial Number: 2081

Velocity: 6.1 m/s



HIII 5th 324 Neck Flexion Certification
Deceleration Pulse
Neck Serial Number: 2081
Velocity: 6.1 m/s

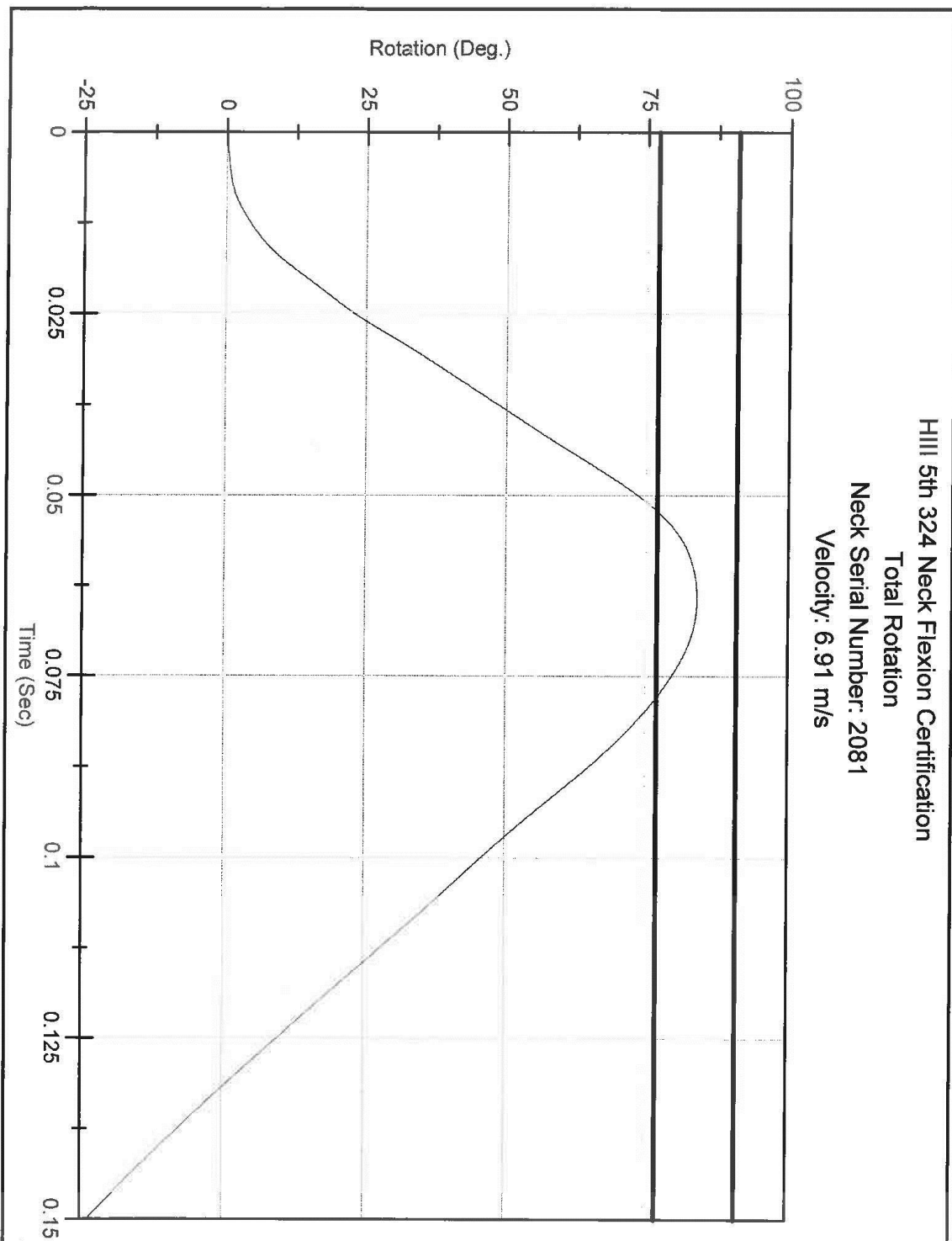


HIII 5th 324 Neck Flexion Certification

Total Rotation

Neck Serial Number: 2081

Velocity: 6.91 m/s

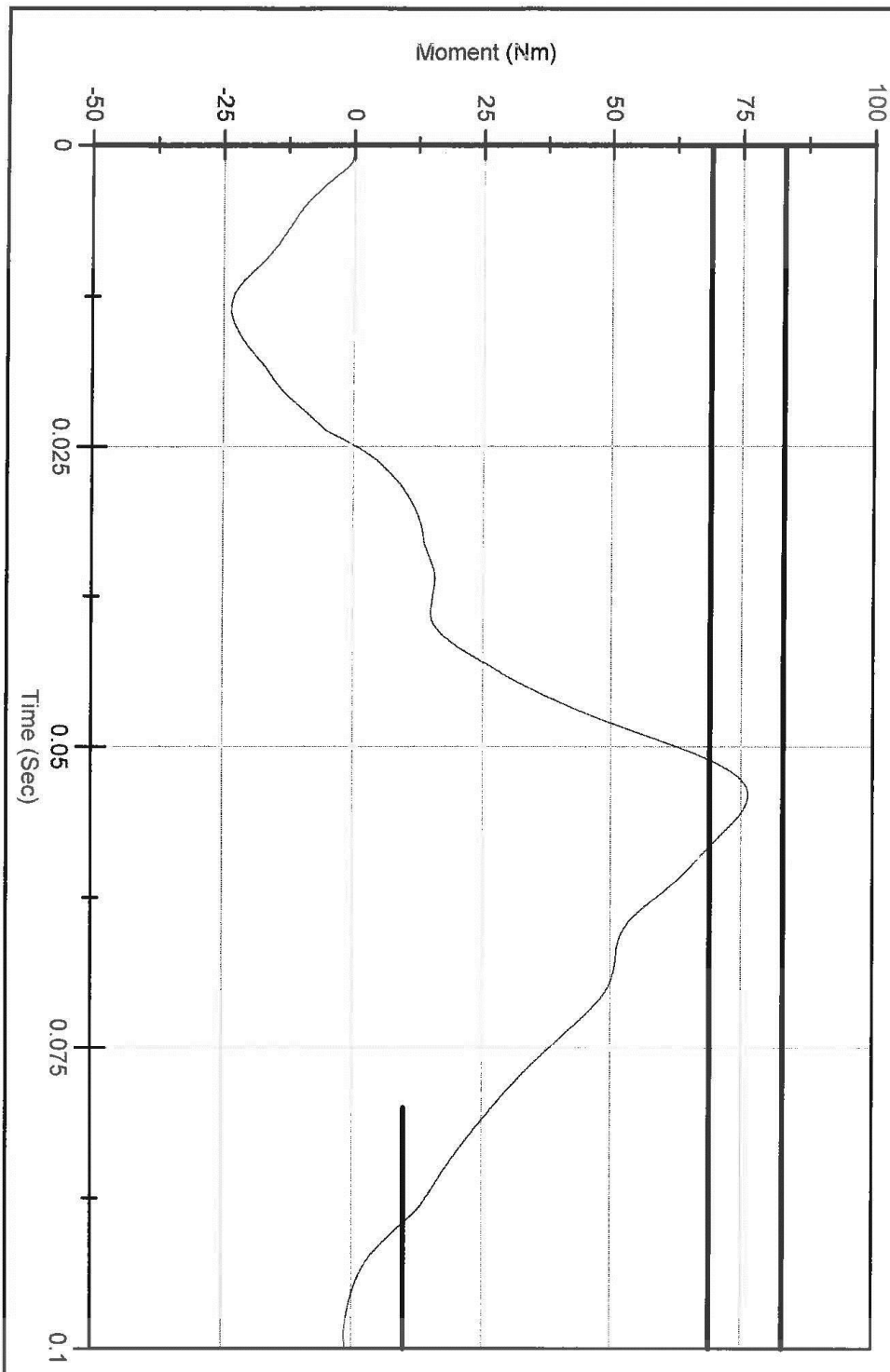


HIII 5th 324 Neck Flexion Certification

OC Y Moment

Neck Serial Number: 2081

Velocity: 6.91 m/s

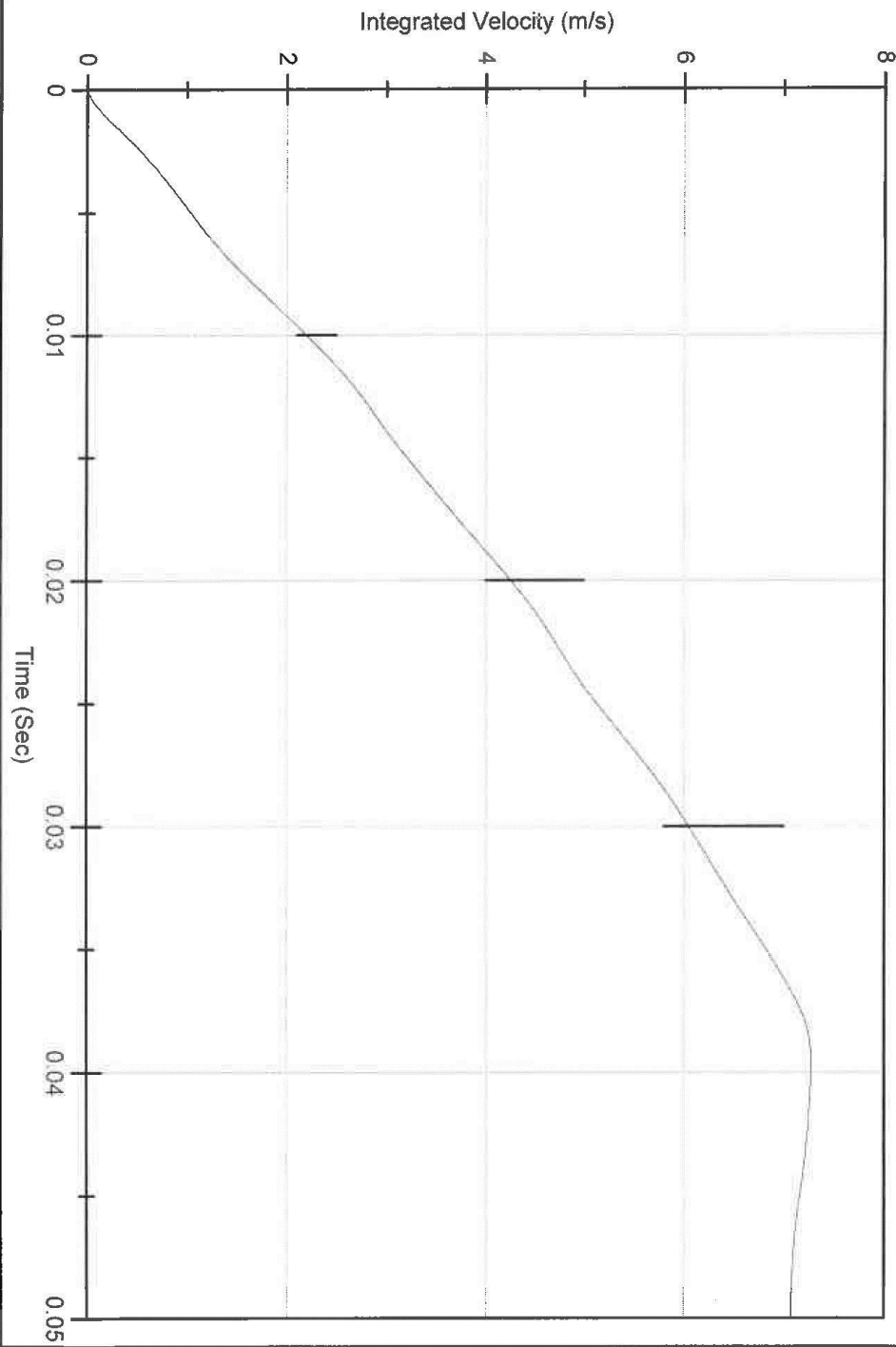


HIII 5th 324 Neck Flexion Certification

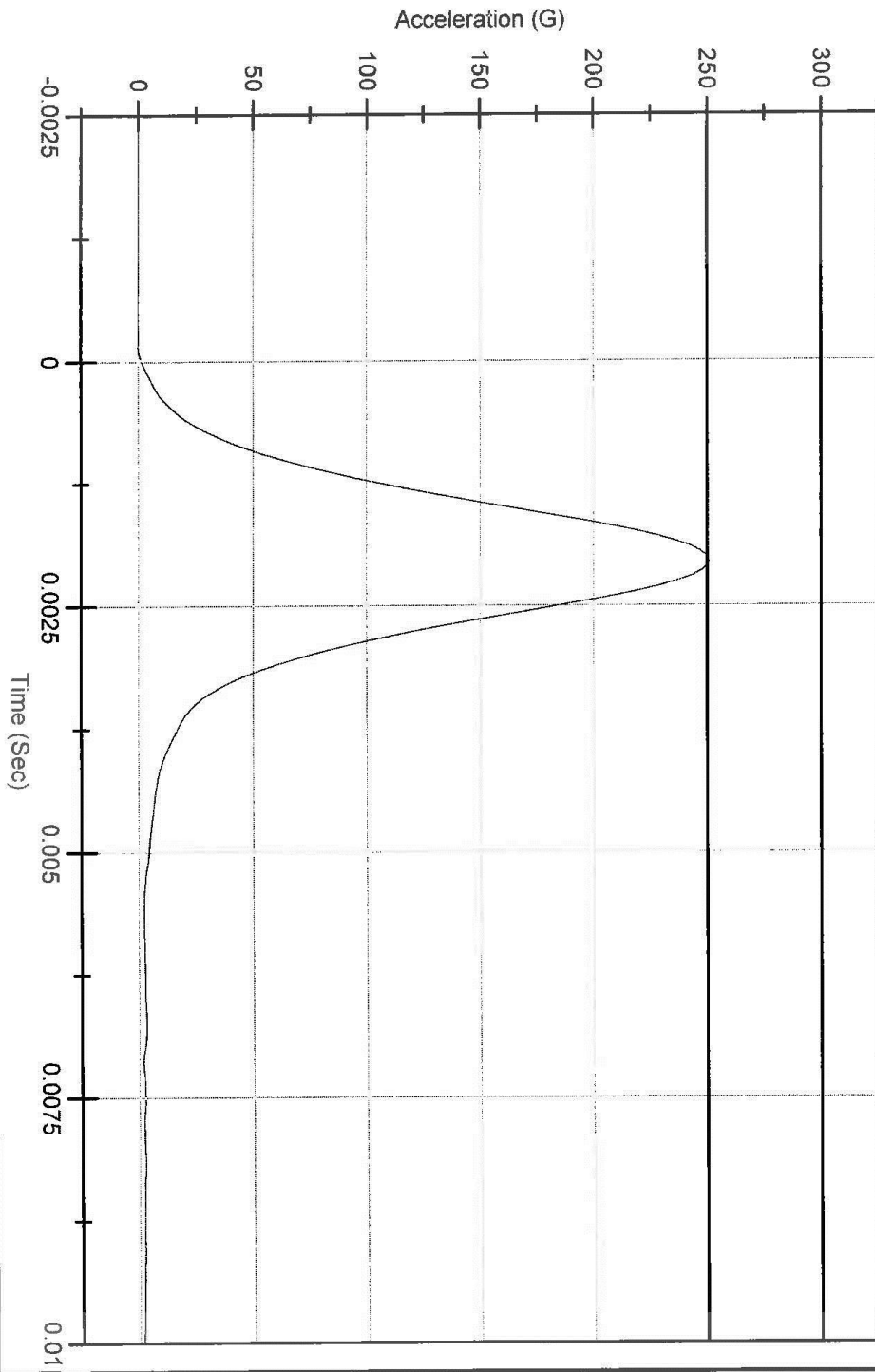
Deceleration Pulse

Neck Serial Number: 2081

Velocity: 6.91 m/s



HIII 5th 324 Frontal Head Certification
Resultant Acceleration
Head Skin Serial Number: 03151
Drop Height: 376mm



HIII 5th 324 Knee Impact Certification

Probe Force

Right Knee

Velocity: 2.08 m/s

