

**REPORT NUMBER: R&D – CAL-11-018**

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

**2011 BUICK LACROSSE  
56 MPH, 7 DEGREE ANGLE, 20% OVERLAP**

**TEST DATE: SEPTEMBER 23<sup>rd</sup> 2011  
NHTSA NO: RB0180**

**PREPARED BY;  
CALSPAN CORPORATION  
4455 GENESEE, BUFFALO NY**



**FINAL REPORT SUBMITTED:**

**FEBRUARY 9, 2012**

**PREPARED FOR:  
U.S. DEPARTMENT OF TRANSPORTATION  
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION  
VEHICLE SAFETY RESEARCH  
1200 NEW JERSEY AVE, SE  
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Prepared by: Vanessa Walsh Date: February 9, 2012  
Vanessa Walsh, Test Engineer

Approved by: David Travale Date: February 9, 2012  
David Travale, Program Manager

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: \_\_\_\_\_

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

Date: \_\_\_\_\_



# Technical Report Document Page

| <b>1. Report No.</b><br>R&D-CAL-11-018                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>2. Government Accession No.</b>                       | <b>3. Recipient's Catalog No.</b>                                                                                                                                                                       |          |                  |           |          |                         |            |  |  |           |  |  |       |           |        |       |           |        |                                           |     |     |       |     |     |        |                           |    |    |        |    |    |        |     |     |   |      |     |   |      |              |   |       |         |   |       |         |                  |   |       |          |   |       |          |                  |   |        |          |   |       |         |                   |   |        |          |   |       |         |
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| <b>4. Title and Subtitle</b><br>Report for Frontal Oblique Offset Program<br>Testing of a 2011 Buick Lacrosse<br>NHTSA No. RB0180                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                          | <b>5. Report Date</b><br>9/2/2011                                                                                                                                                                       |          |                  |           |          |                         |            |  |  |           |  |  |       |           |        |       |           |        |                                           |     |     |       |     |     |        |                           |    |    |        |    |    |        |     |     |   |      |     |   |      |              |   |       |         |   |       |         |                  |   |       |          |   |       |          |                  |   |        |          |   |       |         |                   |   |        |          |   |       |         |
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| <b>7. Author(s)</b><br>David J. Travale, Program Manager<br>Vanessa Walsh, Test Engineer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                          | <b>8. Performing Organization Report No.</b><br>TR2539                                                                                                                                                  |          |                  |           |          |                         |            |  |  |           |  |  |       |           |        |       |           |        |                                           |     |     |       |     |     |        |                           |    |    |        |    |    |        |     |     |   |      |     |   |      |              |   |       |         |   |       |         |                  |   |       |          |   |       |          |                  |   |        |          |   |       |         |                   |   |        |          |   |       |         |
| <b>9. Performing Organization Name and Address</b><br>Calspan Corporation<br>4455 Genesee Street<br>Buffalo, NY 14225                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                          | <b>10. Work Unit No.</b>                                                                                                                                                                                |          |                  |           |          |                         |            |  |  |           |  |  |       |           |        |       |           |        |                                           |     |     |       |     |     |        |                           |    |    |        |    |    |        |     |     |   |      |     |   |      |              |   |       |         |   |       |         |                  |   |       |          |   |       |          |                  |   |        |          |   |       |         |                   |   |        |          |   |       |         |
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| <b>12. Sponsoring Agency Name and Address</b><br>US Department of Transportation<br>National Highway Traffic Safety Administration<br>Office of Vehicle Safety Research<br>1200 New Jersey Ave SE<br>Room W46-446<br>Washington, DC 20590                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                          | <b>13. Type of Report and Period Covered</b><br>Draft Report,                                                                                                                                           |          |                  |           |          |                         |            |  |  |           |  |  |       |           |        |       |           |        |                                           |     |     |       |     |     |        |                           |    |    |        |    |    |        |     |     |   |      |     |   |      |              |   |       |         |   |       |         |                  |   |       |          |   |       |          |                  |   |        |          |   |       |         |                   |   |        |          |   |       |         |
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| <b>15. Supplementary Notes</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                          |                                                                                                                                                                                                         |          |                  |           |          |                         |            |  |  |           |  |  |       |           |        |       |           |        |                                           |     |     |       |     |     |        |                           |    |    |        |    |    |        |     |     |   |      |     |   |      |              |   |       |         |   |       |         |                  |   |       |          |   |       |          |                  |   |        |          |   |       |         |                   |   |        |          |   |       |         |
| <b>16. Abstract</b><br><p>A test was conducted in accordance with Task Order 0001 of Contract DTNH22-10-D-00155. The Test consisted of a research moving deformable barrier (RMDB) traveling at a target speed of 90.12 kph into a stationary 2011 Buick Lacrosse four door sedan. The struck vehicle was positioned 7 degrees relative to the moving barrier, and impacted 20% of the left side of the vehicle. The test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and foot well intrusion performance. The test was conducted at the Calspan Corporation's crash test facility in Buffalo, New York on September 23, 2011.</p> <p>The impact velocity of the vehicle was 90.64 km/h, and the ambient temperature at the barrier face at the time of impact was 22.2°C. The target vehicle post-test maximum crush was 737 mm of Vehicle. The test vehicle's performance is as follows:</p> <table border="1"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th colspan="3">Driver ATD</th> <th colspan="3">Pass. ATD</th> </tr> <tr> <th>Units</th> <th>Threshold</th> <th>Result</th> <th>Units</th> <th>Threshold</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC<sub>15</sub>)</td> <td>N/A</td> <td>700</td> <td>92.81</td> <td>N/A</td> <td>700</td> <td>477.28</td> </tr> <tr> <td>Maximum Chest Compression</td> <td>mm</td> <td>63</td> <td>-42.48</td> <td>mm</td> <td>52</td> <td>-32.90</td> </tr> <tr> <td>Nij</td> <td>N/A</td> <td>1</td> <td>0.87</td> <td>N/A</td> <td>1</td> <td>0.91</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>4,170</td> <td>5816.53</td> <td>N</td> <td>2,620</td> <td>2230.35</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>4,000</td> <td>-6730.42</td> <td>N</td> <td>2,520</td> <td>-1276.04</td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>10,008</td> <td>-4545.69</td> <td>N</td> <td>6,805</td> <td>1822.72</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>10,008</td> <td>-2848.72</td> <td>N</td> <td>6,805</td> <td>2126.22</td> </tr> </tbody> </table> |                                                          |                                                                                                                                                                                                         |          |                  |           |          | Measurement Description | Driver ATD |  |  | Pass. ATD |  |  | Units | Threshold | Result | Units | Threshold | Result | Head Injury Criteria (HIC <sub>15</sub> ) | N/A | 700 | 92.81 | N/A | 700 | 477.28 | Maximum Chest Compression | mm | 63 | -42.48 | mm | 52 | -32.90 | Nij | N/A | 1 | 0.87 | N/A | 1 | 0.91 | Neck Tension | N | 4,170 | 5816.53 | N | 2,620 | 2230.35 | Neck Compression | N | 4,000 | -6730.42 | N | 2,520 | -1276.04 | Left Femur Force | N | 10,008 | -4545.69 | N | 6,805 | 1822.72 | Right Femur Force | N | 10,008 | -2848.72 | N | 6,805 | 2126.22 |
| Measurement Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Driver ATD                                               |                                                                                                                                                                                                         |          | Pass. ATD        |           |          |                         |            |  |  |           |  |  |       |           |        |       |           |        |                                           |     |     |       |     |     |        |                           |    |    |        |    |    |        |     |     |   |      |     |   |      |              |   |       |         |   |       |         |                  |   |       |          |   |       |          |                  |   |        |          |   |       |         |                   |   |        |          |   |       |         |
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| Head Injury Criteria (HIC <sub>15</sub> )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | N/A                                                      | 700                                                                                                                                                                                                     | 92.81    | N/A              | 700       | 477.28   |                         |            |  |  |           |  |  |       |           |        |       |           |        |                                           |     |     |       |     |     |        |                           |    |    |        |    |    |        |     |     |   |      |     |   |      |              |   |       |         |   |       |         |                  |   |       |          |   |       |          |                  |   |        |          |   |       |         |                   |   |        |          |   |       |         |
| Maximum Chest Compression                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | mm                                                       | 63                                                                                                                                                                                                      | -42.48   | mm               | 52        | -32.90   |                         |            |  |  |           |  |  |       |           |        |       |           |        |                                           |     |     |       |     |     |        |                           |    |    |        |    |    |        |     |     |   |      |     |   |      |              |   |       |         |   |       |         |                  |   |       |          |   |       |          |                  |   |        |          |   |       |         |                   |   |        |          |   |       |         |
| Nij                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | N/A                                                      | 1                                                                                                                                                                                                       | 0.87     | N/A              | 1         | 0.91     |                         |            |  |  |           |  |  |       |           |        |       |           |        |                                           |     |     |       |     |     |        |                           |    |    |        |    |    |        |     |     |   |      |     |   |      |              |   |       |         |   |       |         |                  |   |       |          |   |       |          |                  |   |        |          |   |       |         |                   |   |        |          |   |       |         |
| Neck Tension                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | N                                                        | 4,170                                                                                                                                                                                                   | 5816.53  | N                | 2,620     | 2230.35  |                         |            |  |  |           |  |  |       |           |        |       |           |        |                                           |     |     |       |     |     |        |                           |    |    |        |    |    |        |     |     |   |      |     |   |      |              |   |       |         |   |       |         |                  |   |       |          |   |       |          |                  |   |        |          |   |       |         |                   |   |        |          |   |       |         |
| Neck Compression                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | N                                                        | 4,000                                                                                                                                                                                                   | -6730.42 | N                | 2,520     | -1276.04 |                         |            |  |  |           |  |  |       |           |        |       |           |        |                                           |     |     |       |     |     |        |                           |    |    |        |    |    |        |     |     |   |      |     |   |      |              |   |       |         |   |       |         |                  |   |       |          |   |       |          |                  |   |        |          |   |       |         |                   |   |        |          |   |       |         |
| Left Femur Force                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | N                                                        | 10,008                                                                                                                                                                                                  | -4545.69 | N                | 6,805     | 1822.72  |                         |            |  |  |           |  |  |       |           |        |       |           |        |                                           |     |     |       |     |     |        |                           |    |    |        |    |    |        |     |     |   |      |     |   |      |              |   |       |         |   |       |         |                  |   |       |          |   |       |          |                  |   |        |          |   |       |         |                   |   |        |          |   |       |         |
| Right Femur Force                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | N                                                        | 10,008                                                                                                                                                                                                  | -2848.72 | N                | 6,805     | 2126.22  |                         |            |  |  |           |  |  |       |           |        |       |           |        |                                           |     |     |       |     |     |        |                           |    |    |        |    |    |        |     |     |   |      |     |   |      |              |   |       |         |   |       |         |                  |   |       |          |   |       |          |                  |   |        |          |   |       |         |                   |   |        |          |   |       |         |
| <b>17. Key Words</b><br>THOR<br>Oblique<br>Small overlap<br>offset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                          | <b>18. Distribution Statement</b><br>Copies of this report are available from:<br>National Highway Traffic Safety Adm.<br>Technical Ref. Division,<br>1200 New Jersey Ave, SE<br>Washington, D.C. 20590 |          |                  |           |          |                         |            |  |  |           |  |  |       |           |        |       |           |        |                                           |     |     |       |     |     |        |                           |    |    |        |    |    |        |     |     |   |      |     |   |      |              |   |       |         |   |       |         |                  |   |       |          |   |       |          |                  |   |        |          |   |       |         |                   |   |        |          |   |       |         |
| <b>19. Security Classif. (of this report)</b> Unclassified                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>20. Security Classif. (of this page)</b> Unclassified | <b>21. No. of Pages</b><br>248                                                                                                                                                                          |          | <b>22. Price</b> |           |          |                         |            |  |  |           |  |  |       |           |        |       |           |        |                                           |     |     |       |     |     |        |                           |    |    |        |    |    |        |     |     |   |      |     |   |      |              |   |       |         |   |       |         |                  |   |       |          |   |       |          |                  |   |        |          |   |       |         |                   |   |        |          |   |       |         |

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| Test Program: | <u>R&amp;D 56mph, 7° angle, 20% offset</u> | Test Date | <u>9/23/11</u> |

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## SECTION 1 PURPOSE

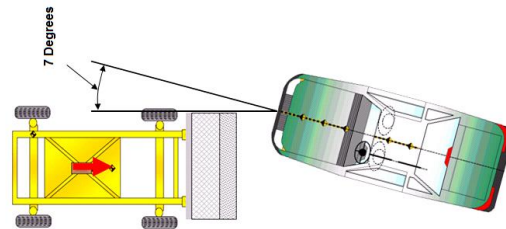
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|---------------|--------------------------------------------|-----------|----------------|
| Test Vehicle: | <u>2011 Buick Lacrosse</u>                 | NHTSA No: | <u>RB0180</u>  |
| Test Program: | <u>R&amp;D 56mph, 7° angle, 20% offset</u> | Test Date | <u>9/23/11</u> |

This 90.12 km/h (56 mph) Moving Barrier into a vehicle test is part of Frontal Offset Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-10-D-00155. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for consumer information purposes. This test was conducted in accordance with the instructions set forth by NHTSA for a 7° angle, 20% offset moving barrier to vehicle impact, outlined in Task Order (TO) DTNH22. 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 TO DTNH22-10-D-00155.

## SECTION 2 SUMMARY OF TEST

|               |                                            |           |                |
|---------------|--------------------------------------------|-----------|----------------|
| Test Vehicle: | <u>2011 Buick Lacrosse</u>                 | NHTSA No: | <u>RB0180</u>  |
| Test Program: | <u>R&amp;D 56mph, 7° angle, 20% offset</u> | Test Date | <u>9/23/11</u> |

A 2011 Buick Lacrosse 4-door sedan was impacted on the left front corner by a Research Moving Deformable Barrier. This test vehicle was stationary and positioned at a target angle of 7° and at a target offset of 20% to the forward line of motion of the MDB. The MDB was towed down the test track in a full forward direction, without any crabbing, and the targeted impact velocity of 90.12 km/h (56 mph) into the test vehicle. The test vehicle mass was 1935.5 kg (4267 lbs), and the MDB mass was 2486.2 kg (5481 lbs). The test was conducted by Calspan Corporation on September 23, 2011.



The test was documented by one (1) real time and fourteen (14) high-speed video cameras. Camera locations and other pertinent data are located in Data Sheet No. 06 of this report. Pre- and post-test photographs of the test vehicle, the MDB and the test setup were taken using a digital still camera. Photographic documentation of the test is presented in Appendix A of this report.

One 50% adult male THOR MK (Mod Kit) anthropomorphic test device (ATD) (Serial No.: 007) was seated in the left front (driver's) seating position and one Part 572O 5% adult female (HIII 5<sup>th</sup>) ATD (Serial No. 070) was seated in the left rear seating position. The THOR MK driver was positioned according to instructions specified in Laboratory Test Procedure for FMVSS No. 208, "Occupant Crash Protection", TP208 13, July 27, 2005. The HIII 5<sup>th</sup>% left rear seat occupant was positioned using a modified procedure of the Laboratory Test Procedure for FMVSS No. 214, "Side Impact Protection – Dynamic", TP214D-08, December 15, 2006. The exact procedure used is presented in Appendix E of this report. The driver was restrained with a 3-point seat belt, a dual stage frontal airbag, a curtain airbag, and a seat mounted torso airbag. The left rear passenger was restrained with a 3-point seat belt, and a curtain airbag.

## SECTION 2 (CONTINUED)

### SUMMARY OF TEST

|               |                                            |           |                |
|---------------|--------------------------------------------|-----------|----------------|
| Test Vehicle: | <u>2011 Buick Lacrosse</u>                 | NHTSA No: | <u>RB0180</u>  |
| Test Program: | <u>R&amp;D 56mph, 7° angle, 20% offset</u> | Test Date | <u>9/23/11</u> |

One hundred and ninety eight (198) channels of data from the two ATD's, test vehicle and MDB were collected using Kayser-Threde and Slice data acquisition systems. Appendix B contains dummy data plots, as well as vehicle and MDB response data plots. There was 98.2% total windshield retention, with 96.4% and 100% retention on the left and right sides respectively. There appeared to be no intrusion into the protected zone of the windshield during any portion of the impact test. The maximum static crush of the vehicle was 737 mm at C1 to the left of the vehicle's centerline. The maximum crush of the lower bumper beam was 196 mm at C1, to the left of the vehicle's centerline. Full vehicle measurements are presented in Section 3 of this report.

All four vehicle doors remained closed and latched during the test. The left front door was jammed shut, but was able to be opened. The left rear, right front, and right rear doors all remained operational after the test.

Structure observations include the following:

- A-Pillar and the door sill buckled, causing some separation at the top of the door from the vehicle.
- The hood also opened as a result of the crash.

The driver ATD's visible contact points are as follows:

- Head contacted the steering wheel airbag and curtain airbag, as well as the left headliner.
- The torso contacted the steering wheel airbag, and the bottom of the steering wheel.
- The knees contacted the knee bolster.

The left rear passenger ATD's visible contact points are as follows:

- Head contacted the headrest on the back of the head.
- Chin comes in contact with passenger's chest.

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

|                                               |                    |
|-----------------------------------------------|--------------------|
| Test Vehicle: 2011 Buick Lacrosse             | NHTSA No: RB0180   |
| Test Program: R&D 56mph, 7° angle, 20% offset | Test Date: 9/23/11 |

**PRIMARY IMPACT DATA**

| Measured Parameter                | Units | Value  |
|-----------------------------------|-------|--------|
| MDB Velocity at Impact            | km/h  | 90.64  |
| MDB Test Weight                   | kg    | 2486.2 |
| MDB Maximum Static Crush          | mm    | 258.4  |
| Vehicle Test Weight               | kg    | 1935.5 |
| Actual Vehicle Angle              | °     | 7      |
| Vehicle Maximum Static Crush      | mm    | 737    |
| Vertical Offset from Target Point | mm    | 18     |
| Lateral Offset from Target Point  | mm    | 18     |
| Number of Data Channels           |       | 198    |
| Number of Real-Time Cameras       |       | 1      |
| Number of High-Speed Cameras      |       | 14     |

**DUMMY CONTACTS**

|                     | Driver                                                 | Picture Ref. | Passenger                                              | Picture Ref. |
|---------------------|--------------------------------------------------------|--------------|--------------------------------------------------------|--------------|
| Dummy Type          | 50% Male, Thor 007                                     | N/A          | 5% HIII Female, 070                                    | N/A          |
| Head Contact        | Steering wheel, Front & curtain airbag, left headliner | A-37 / A-48  | Rear of head contacts the seatback, and Curtain Airbag | A-49 / A-58  |
| Upper Torso Contact | Steering wheel /curtain airbag                         | A-46         | None                                                   |              |
| Lower Torso Contact | None                                                   | A-46         | None                                                   |              |
| Left Knee Contact   | Knee bolster                                           | A-45         | None                                                   | A-59         |
| Right Knee Contact  | Knee bolster                                           | A-44         | None                                                   | A-59         |

**Data Anamolies:**

- V2P1 NECK UPPER FZ - Questionable after 25 ms
- V2P1 UL CHEST IRTACC DX - Questionable 55 - 62 ms - noise
- V2P1 ABDOMEN LEFT RZ - Questionable 31-68 ms - noise sp
- V2P1 ABDOMEN RIGHT IRTACC DX - Questionable 39-43 ms - noise sp
- V2P1 SPINE LOWER MX - Questionable 49-84ms - saturated
- V2P1 RIGHT ILIAC FX - Questionable after 48 ms - shift
- V2P1 RIGHT ILIAC MY - Channel failed
- V2P1 LEFT FEMUR FX - Questionable magnitude
- V2P1 TIBIA LEFT Y - Questionable magnitude
- V2P1 TIBIA LEFT UPPER FZ - Questionable after 8 ms
- V2P1 TIBIA LEFT LOWER MX - Questionable after 30 ms
- V2P1 FOOT LEFT X - Questionable magnitude
- V2P1 TIBIA RIGHT LOWER MY - Questionable after 99 ms
- V2P4 LOWER NECK MZ - Channel failed
- V2P4 CHEST DISPLACEMENT - Questionable 112-123ms

**SECTION 2 (CONTINUED)**  
**PRELIMINARY INJURY SUMMARY: Driver**

Test Vehicle: 2011 Buick Lacrosse CX - Four Door Sedan NHTSA No.: RB0180

Test Program: Research and Development Narrow Offset Test Date: 9/23/2011

**Driver: Thor Serial No. 007 Injury Summary**

|       | Nomenclature                                      | Units              | Source   | Max                    | Min                     |
|-------|---------------------------------------------------|--------------------|----------|------------------------|-------------------------|
| Head  | Head Rotational Acceleration X                    | rad/s <sup>2</sup> | SIMon    | 248356.87              | -209493.13              |
|       | Head Rotational Acceleration Y                    | rad/s <sup>2</sup> | SIMon    | 181519.64              | -280520.36              |
|       | Head Rotational Acceleration Z                    | rad/s <sup>2</sup> | SIMon    | 519784.09              | -280315.91              |
|       | Head Rotational Acceleration Resultant            | rad/s <sup>2</sup> | Compute  | 529651.97              |                         |
|       | Head Rotational Velocity X                        | rad/s              | SIMon    | 22.33                  | -54.10                  |
|       | Head Rotational Velocity Y                        | rad/s              | SIMon    | 14.70                  | -46.72                  |
|       | Head Rotational Velocity Z                        | rad/s              | SIMon    | 51.87                  | -64.28                  |
|       | Head Rotational Velocity Resultant                | rad/s              | Compute  | 75.91                  |                         |
|       | 36 ms HIC                                         |                    | Compute  | 130.58                 |                         |
|       | 15 ms HIC                                         |                    | Compute  | 92.81                  |                         |
|       | Head Resultant CG Acceleration, 3 ms Clip         | g                  | Compute  | 34.14                  |                         |
|       | Skull fracture correlate                          | -                  | SIMon    | 32.86                  |                         |
|       | Cumulative strain (Tolerance = 0.05)              | -                  | SIMon    | 0.99                   | 0.00                    |
|       | Cumulative strain (Tolerance = 0.10)              | -                  | SIMon    | 0.67                   | 0.00                    |
|       | Cumulative strain (Tolerance = 0.15)              | -                  | SIMon    | 0.21                   | 0.00                    |
| Neck  | UNLC Transferred to OC, Neck System, FX           | N                  | 1000     | 367.99                 | -645.60                 |
|       | UNLC Neck System Tension, FZ                      | N                  | 1000     | 5816.53 <sup>(1)</sup> |                         |
|       | UNLC Neck System Compression, FZ                  | N                  | 1000     |                        | -6730.42 <sup>(1)</sup> |
|       | UNLC Transferred to OC, Neck System Flexion, MY   | N-m                | Thortest | 10.34                  |                         |
|       | UNLC Transferred to OC, Neck System Extension, MY | N-m                | Thortest |                        | -17.30                  |
|       | NIJ                                               |                    | Compute  | 0.87                   |                         |
|       | On head acting through total neck section, FX     | N                  | Thortest | 2145.52                | -1692.04                |
|       | On head acting through total neck section, FY     | N                  | Thortest | 402.22                 | -407.72                 |
|       | On head acting through total neck section, FZ     | N                  | Thortest | 5820.75 <sup>(1)</sup> | -6672.17 <sup>(1)</sup> |
|       | On head acting through total neck section, MX     | N-m                | Thortest | 45.18                  | -24.41                  |
|       | On head acting through total neck section, MY     | N-m                | Thortest | 39.55                  | -22.28                  |
|       | On head acting through total neck section, MZ     | N-m                | Thortest | 0.58                   | -22.26                  |
|       | On head acting through O.C. joint only, FX        | N                  | Thortest | 1988.75                | -1839.99                |
|       | On head acting through O.C. joint only, FZ        | N                  | Thortest | 5821.95 <sup>(1)</sup> | -6728.30 <sup>(1)</sup> |
|       | On head acting through O.C. joint only, MY        | N-m                | Thortest | 10.34                  | -17.30                  |
| Chest | Upper Left Crux X – deflection                    | mm                 | Thortest | 103.82 <sup>(2)</sup>  | -16.31 <sup>(2)</sup>   |
|       | Upper Left Crux Y – deflection                    | mm                 | Thortest | 22.44                  | -5.23                   |
|       | Upper Left Crux Z – deflection                    | mm                 | Thortest | 11.92                  | -10.08                  |
|       | Upper Left Crux D – deflection                    | mm                 | Thortest | 104.92 <sup>(2)</sup>  | -18.07 <sup>(2)</sup>   |
|       | Upper Right Crux X – deflection                   | mm                 | Thortest | 0.11                   | -33.71                  |
|       | Upper Right Crux Y – deflection                   | mm                 | Thortest | 3.57                   | -4.38                   |
|       | Upper Right Crux Z – deflection                   | mm                 | Thortest | 22.42                  | -6.77                   |
|       | Upper Right Crux D – deflection                   | mm                 | Thortest | 0.12                   | -31.31                  |

**SECTION 2 (CONTINUED)**  
**PRELIMINARY INJURY SUMMARY: Driver**

Test Vehicle: 2011 Buick Lacrosse CX - Four Door Sedan NHTSA No.: RB0180

Test Program: Research and Development Narrow Offset Test Date: 9/23/2011

**Driver: Thor Serial No. 007 Injury Summary**

|                  | Nomenclature                                    | Units | Source   | Max                   | Min                   |
|------------------|-------------------------------------------------|-------|----------|-----------------------|-----------------------|
| Chest<br>(Con't) | Lower Left Crux X – deflection                  | mm    | Thortest | 6.29                  | -10.16                |
|                  | Lower Left Crux Y – deflection                  | mm    | Thortest | 3.42                  | -15.28                |
|                  | Lower Left Crux Z – deflection                  | mm    | Thortest | 12.65                 | -2.55                 |
|                  | Lower Left Crux D – deflection                  | mm    | Thortest | 4.83                  | -11.40                |
|                  | Lower Right Crux X – deflection                 | mm    | Thortest | 0.23                  | -42.95                |
|                  | Lower Right Crux Y – deflection                 | mm    | Thortest | 3.62                  | -18.06                |
|                  | Lower Right Crux Z – deflection                 | mm    | Thortest | 12.51                 | -0.50                 |
|                  | Lower Right Crux D – deflection                 | mm    | Thortest | 0.25                  | -42.48                |
|                  | Chest CG Acceleration, 3 ms clip                | g     | Compute  | 38.18                 |                       |
| Abdomen          | Lower Left X – deflection                       | mm    | Thortest | 0.02                  | -39.10                |
|                  | Lower Left Y – deflection                       | mm    | Thortest | 13.78                 | -0.05                 |
|                  | Lower Left Z – deflection                       | mm    | Thortest | 16.24 <sup>(3)</sup>  | -0.33 <sup>(3)</sup>  |
|                  | Left Viscous Criterion Based on X - deflection  |       | Compute  | 0.41 <sup>(3)</sup>   |                       |
|                  | Lower Right X – deflection                      | mm    | Thortest | 110.18 <sup>(4)</sup> | -56.80 <sup>(4)</sup> |
|                  | Lower Right Y – deflection                      | mm    | Thortest | 6.10                  | -14.37                |
|                  | Lower Right Z – deflection                      | mm    | Thortest | 15.48                 | -3.08                 |
|                  | Right Viscous Criterion Based on X - deflection |       | Compute  | 44.23 <sup>(4)</sup>  |                       |
| Spine            | Upper Spine (T1) AX                             | g     | 180      | 5.40                  | -40.75                |
|                  | Upper Spine (T1) AY                             | g     | 180      | 15.39                 | -4.21                 |
|                  | Upper Spine (T1) AZ                             | g     | 180      | 17.44                 | -1.53                 |
|                  | Upper Spine (T1) Resultant                      | g     | Compute  | 43.58                 |                       |
|                  | Middle Spine (T6) AX                            | g     | 180      | 4.01                  | -36.49                |
|                  | Middle Spine (T6) AY                            | g     | 180      | 26.49                 | -3.17                 |
|                  | Middle Spine (T6) AZ                            | g     | 180      | 4.91                  | -6.18                 |
|                  | Middle Spine (T6) Resultant                     | g     | Compute  | 39.79                 |                       |
| Pelvis           | Pelvis CG Resultant Acceleration                | g     | Compute  | 73.38                 |                       |
| Acetabulum       | Left FX force                                   | N     | 600      | 629.16                | -2705.88              |
|                  | Left FY force                                   | N     | 600      | 1109.90               | -670.72               |
|                  | Left FZ force                                   | N     | 600      | 1111.08               | -1411.17              |
|                  | Left Acetabulum Resultant                       | N     | Compute  | 2786.86               |                       |
|                  | Right FX force                                  | N     | 600      | 1260.89               | -515.07               |
|                  | Right FY force                                  | N     | 600      | 212.80                | -1107.39              |
|                  | Right FZ force                                  | N     | 600      | 634.56                | -444.04               |
|                  | Right Acetabulum Resultant                      | N     | Compute  | 1486.15               |                       |



**SECTION 2 (CONTINUED)**  
**PRELIMINARY INJURY SUMMARY: Driver Legs**

Test Vehicle: 2011 Buick Lacrosse CX - Four Door Sedan NHTSA No.: RB0180  
 Test Program: Research and Development Narrow Offset Test Date: 9/23/2011

**Driver: Thor Serial No. 007 Injury Summary**

|       | Nomenclature                           | Units | Source  | Max                    | Min                    |
|-------|----------------------------------------|-------|---------|------------------------|------------------------|
| Knee  | Left Knee Displacement, DX             | mm    | 180     | 1.82                   | -6.86                  |
|       | Right Knee Displacement, DX            | mm    | 180     | 1.92                   | -7.56                  |
| Femur | Left Femur Force, FZ                   | N     | 600     | 600.68                 | -4545.69               |
|       | Left Femur Moment, MX                  | N-m   | 600     | 20.96                  | -159.55                |
|       | Left Femur Moment, MY                  | N-m   | 600     | 0.22                   | -635.36                |
|       | Left Femur Res (MX / MY only, not MZ)  | N-m   | Compute | 639.93                 |                        |
|       | Right Femur Force, FZ                  | N     | 600     | 893.09                 | -2848.72               |
|       | Right Femur Moment, MX                 | N-m   | 600     | 13.37                  | -160.27                |
|       | Right Femur Moment, MY                 | N-m   | 600     | 107.71                 | -9.54                  |
|       | Right Femur Res (MX / MY only, not MZ) | N-m   | Compute | 165.78                 |                        |
|       | Left Upper Tibia, FZ                   | N     | 600     | 8697.01 <sup>(5)</sup> | -763.34 <sup>(5)</sup> |
|       | Left Upper Tibia, MY                   | N-m   | 600     | 51.13                  | -64.12                 |
| Tibia | Left Upper Tibia, Index                |       | Compute | 0.36 <sup>(5)</sup>    |                        |
|       | Right Upper Tibia, FZ                  | N     | 600     | 276.40                 | -738.79                |
|       | Right Upper Tibia, MY                  | N-m   | 600     | 91.01                  | -81.83                 |
|       | Right Upper Tibia, Index               |       | Compute | 0.40                   |                        |
|       | Left Lower Tibia, FZ                   | N     | 600     | 39.90                  | -1559.07               |
|       | Left Lower Tibia, MY                   | N-m   | 600     | 23.23                  | -62.47                 |
|       | Left Lower Tibia, Index                |       | Compute | 1.86                   |                        |
|       | Right Lower Tibia, FZ                  | N     | 600     | 383.11                 | -1660.89               |
|       | Right Lower Tibia, MY                  | N-m   | 600     | 51.07 <sup>(6)</sup>   | -100.37 <sup>(6)</sup> |
|       | Right Lower Tibia, Index               |       | Compute | 0.60 <sup>(6)</sup>    |                        |
| Ankle | Left Ankle Rotation, RX                | Deg   | 180     | 15.07 <sup>(7)</sup>   | -6.32 <sup>(7)</sup>   |
|       | Left Ankle Rotation, RY                | Deg   | 180     | 32.63                  | -0.46                  |
|       | Right Ankle Rotation, RX               | Deg   | 180     | 12.18                  | -35.59                 |
|       | Right Ankle Rotation, RY               | Deg   | 180     | 23.32                  | -9.82                  |

**Anomalies**

- (1) Questionable data after 25 ms
- (2) Questionable data from 55 to 62ms
- (3) Questionable 31-68 ms - noise spikes
- (4) Questionable 39-43 ms - noise spikes
- (5) Questionable data after 8 ms
- (6) Questionable data after 99 ms
- (7) Questionable data throughout

**SECTION 2 (CONTINUED)**  
**PRELIMINARY INJURY SUMMARY**

Test Vehicle: 2011 Buick Lacrosse CX - Four Door Sedan NHTSA No.: RB0180  
Test Program: Research and Development Narrow Offset Test Date: 9/23/2011

**Left Rear Passenger: H3 Serial No. 070 Injury Summary**

|                                         | Nomenclature                                    | Source  | Max                  | Min                   |
|-----------------------------------------|-------------------------------------------------|---------|----------------------|-----------------------|
| Head                                    | Angular acceleration (rad/sec^2) - X            | SIMon   | 3242.80              | -1322.70              |
|                                         | Angular acceleration (rad/sec^2) - Y            | SIMon   | 784.93               | -230.25               |
|                                         | Angular acceleration (rad/sec^2) - Z            | SIMon   | 293.04               | -2023.10              |
|                                         | Angular acceleration - resultant (rad/sec^2)    | SIMon   | 3243.64              |                       |
|                                         | Angular velocity (rad/sec) - X                  | SIMon   | 13.18                | -12.89                |
|                                         | Angular velocity (rad/sec) - Y                  | SIMon   | 19.39                | -0.06                 |
|                                         | Angular velocity (rad/sec) - Z                  | SIMon   | 0.06                 | -62.83                |
|                                         | Angular velocity - resultant (rad/sec)          | SIMon   | 65.37                |                       |
|                                         | 36 ms HIC                                       | Compute | 1027.91              |                       |
|                                         | 15 ms HIC                                       | Compute | 477.28               |                       |
|                                         | Skull fracture correlate                        | SIMon   | 63.25                |                       |
|                                         | Cumulative strain (Tolerance = 0.05)            | SIMon   | 0.99                 |                       |
|                                         | Cumulative strain (Tolerance = 0.10)            | SIMon   | 0.78                 |                       |
|                                         | Cumulative strain (Tolerance = 0.15)            | SIMon   | 0.43                 |                       |
|                                         | Head resultant CG acceleration, 3 ms clip (g's) | Compute | 84.51                |                       |
| Neck                                    | Upper Neck Tension (N) Fz                       | 1000    | 2230.35              |                       |
|                                         | Upper Neck Compression (N) Fz                   | 1000    |                      | -1276.04              |
|                                         | Upper Neck NTF                                  | Compute | 0.91                 |                       |
|                                         | Upper Neck NTE                                  | Compute | 0.77                 |                       |
|                                         | Upper Neck NCF                                  | Compute | 0.42                 |                       |
|                                         | Upper Neck NCE                                  | Compute | 0.21                 |                       |
| Chest                                   | Chest Deflection (mm)                           | 600     | 10.96 <sup>(8)</sup> | -32.90 <sup>(8)</sup> |
|                                         | Upper Left Chest X (mm)                         | Compute | 0.03                 | -25.82                |
|                                         | Upper Left Chest Y (mm)                         | Compute | 3.63                 | -5.26                 |
|                                         | Upper Right Chest X (mm)                        | Compute | 0.04                 | -40.33                |
|                                         | Upper Right Chest Y (mm)                        | Compute | 8.56                 | -2.21                 |
|                                         | Lower Left Chest X (mm)                         | Compute | 0.02                 | -15.39                |
|                                         | Lower Left Chest Y (mm)                         | Compute | 7.69                 | -3.97                 |
|                                         | Lower Right Chest X (mm)                        | Compute | 0.02                 | -33.69                |
|                                         | Lower Right Chest Y (mm)                        | Compute | 14.08                | -0.51                 |
|                                         | Chest CG acceleration, 3 ms clip, (G's)         | Compute | 46.14                |                       |
| Femur                                   | Right Fz Force (N)                              | 600     | 2126.22              | -99.44                |
|                                         | Left Fz Force (N)                               | 600     | 1822.72              | -83.01                |
| <b>Anomalies</b>                        |                                                 |         |                      |                       |
| (8) Questionable data between 112-123ms |                                                 |         |                      |                       |

### SECTION 3 DATA SHEETS

|               |                                 |           |         |
|---------------|---------------------------------|-----------|---------|
| Test Vehicle: | 2011 Buick Lacrosse             | NHTSA No: | RB0180  |
| Test Program: | R&D 56mph, 7° angle, 20% offset | Test Date | 9/23/11 |

| Data Sheet<br>No. |                                                       | Page No. |
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**DATA SHEET NO. 1**  
**GENERAL TEST AND VEHICLE PARAMETER DATA**

|                                               |                    |
|-----------------------------------------------|--------------------|
| Test Vehicle: 2011 Buick Lacrosse             | NHTSA No: RB0180   |
| Test Program: R&D 56mph, 7° angle, 20% offset | Test Date: 9/23/11 |

**TEST VEHICLE INFORMATION**

|                          |                   |
|--------------------------|-------------------|
| NHTSA No.                | RB0180            |
| Model Year               | 2011              |
| Make                     | Buick             |
| Model                    | Lacrosse CX       |
| Body Style               | Four Door Sedan   |
| VIN                      | 1G4GA5EC8BF353173 |
| Body Color               | White             |
| Delivery Date            | 7/28/2011         |
| Odometer Reading (km/mi) | 91.7 km / 57 mi   |
| Dealer                   | East Aurora Buick |
| Transmission             | 6-Speed Automatic |
| Final Drive              | Front Wheel Drive |
| Type/No. Cylinders       | V4                |
| Engine Displacement (L)  | 2.4               |
| Engine Placement         | Lateral           |
| Roof Rack                | No                |
| Sunroof/T-Top            | No                |
| Tinted Glass             | No                |
| Traction Control         | Yes               |
| Power Brakes             | Yes               |
| Front Disc               | Yes               |
| Rear Disc                | Yes               |
| Other                    | --                |

**TEST VEHICLE OPTIONS**

|                                 |     |
|---------------------------------|-----|
| Anti-Lock Brakes                | Yes |
| All-Wheel Drive                 | No  |
| Power Steering                  | Yes |
| 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              | No  |
| Front Pass. Front Airbag        | No  |
| Front Pass. Curtain Airbag      | No  |
| Front Pass. Head/Torso Airbag   | No  |
| Front Pass. Torso Airbag        | No  |
| Front Pass. Torso/Pelvis Airbag | No  |
| Front Pass. Knee Airbag         | No  |
| Pretensioners                   | Yes |
| Load Limiters                   | Yes |
| Tilt Steering                   | Yes |
| Automatic Door Locks            | Yes |
| Power Windows                   | Yes |
| Power Seats                     | Yes |
| Air Conditioning                | Yes |

Does owner's manual provide instructions to turn off automatic door locks? No

**DATA FROM CERTIFICATION LABEL**

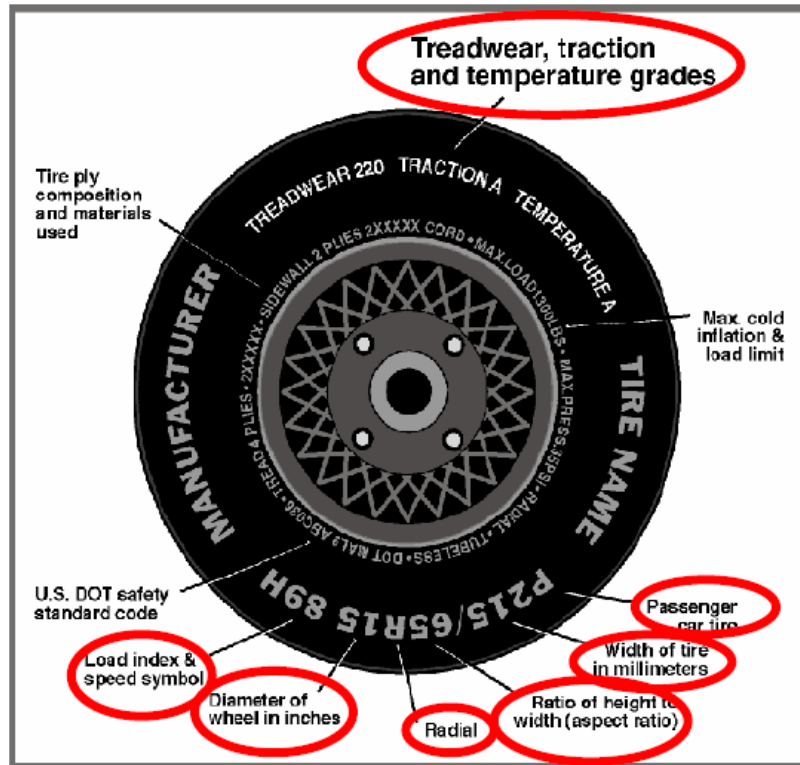
|                     |                    |                 |       |
|---------------------|--------------------|-----------------|-------|
| Manufactured By     | General Motors LLC | GVWR (kg)       | 2,158 |
| Date of Manufacture | 4/2010             | GAWR Front (kg) | 1,102 |
|                     |                    | GAWR Rear (kg)  | 1,056 |

**VEHICLE SEATING AND WEIGHT CAPACITY**

| Measured Parameter      | Front  | Rear  | Third | Total |
|-------------------------|--------|-------|-------|-------|
| Type of Seats           | Bucket | Bench | N/A   |       |
| Number of Occupants     | 2      | 3     | -     | 5     |
| Capacity Wt. (VCW) (kg) |        |       |       | 420   |
| Cargo Wt. (RCLW) (kg)   |        |       |       | 80    |

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

|                                               |                    |
|-----------------------------------------------|--------------------|
| Test Vehicle: 2011 Buick Lacrosse             | NHTSA No: RB0180   |
| Test Program: R&D 56mph, 7° angle, 20% offset | Test Date: 9/23/11 |



| Measured Parameter      | Front                                | Rear                                 |
|-------------------------|--------------------------------------|--------------------------------------|
| Maximum Tire Pressure   | 300                                  | 300                                  |
| Cold Pressure (kPa)     | 230                                  | 230                                  |
| Recommended Tire Size   | P245/50R17                           | P245/50R17                           |
| Tire Size on Vehicle    | P245/50R17                           | P245/50R17                           |
| Tire Manufacturer       | MICHELIN                             | MICHELIN                             |
| Tire Model              | PRIMACY MXM4                         | PRIMACY MXM4                         |
| Treadwear               | 500                                  | 500                                  |
| Traction                | A                                    | A                                    |
| Temperature Grades      | A                                    | A                                    |
| Tire Plies Sidewall     | 1 Polyester                          | 1 Polyester                          |
| Tire Plies Body         | 1 Polyester,<br>1 Polyamide, 2 Steel | 1 Polyester,<br>1 Polyamide, 2 Steel |
| Load Index/Speed Symbol | 98H                                  | 98H                                  |
| Tire Material           | Rubber                               | Rubber                               |
| DOT Safety Code Right   | B9LM001X1011                         | B9LM001X1011                         |
| DOT Safety Code Left    | B9LM001X1011                         | B9LM001X1011                         |

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

Test Vehicle: 2011 Buick Lacrosse NHTSA No: RB0180  
 Test Program: R&D 56mph, 7° angle, 20% offset Test Date: 9/23/11

**TEST VEHICLE WEIGHTS**

|        | Units | As Delivered (UVW) (Axle) |       |       | As Tested (ATW) (Axle) |       |        |
|--------|-------|---------------------------|-------|-------|------------------------|-------|--------|
|        |       | Front                     | Rear  | Total | Front                  | Rear  | Total  |
| Left   | kg    | 504                       | 372   |       | 552.5                  | 469   |        |
| Right  | kg    | 491                       | 343   |       | 487                    | 427   |        |
| Ratio  | %     | 58.2%                     | 41.8% |       | 53.7%                  | 46.3% |        |
| Totals | kg    | 995                       | 715   | 1710  | 1039.5                 | 896   | 1935.5 |

**TARGET TEST WEIGHT CALCULATION**

| Measured Parameter                      | Units | Value   |
|-----------------------------------------|-------|---------|
| Total Delivered Weight (UVW)            | kg    | 1710    |
| Weight of 1 P572E ATD & 1 P572O ATD     | kg    | 153.54  |
| Rated Cargo/Luggage Weight (RCLW)       | kg    | 80      |
| Calculated Vehicle Target Weight (TVTW) | kg    | 1943.54 |

**TEST VEHICLE ATTITUDES AND CG**

|              | Units | LF  | RF  | LR  | RR  | CG<br>(aft of front axle) |
|--------------|-------|-----|-----|-----|-----|---------------------------|
| As Delivered | mm    | 745 | 747 | 754 | 759 | 1187.5                    |
| As Tested    | mm    | 734 | 743 | 716 | 730 | 1314.7                    |
| Post Test    | mm    | -   | -   | -   | -   |                           |

**GENERAL TEST VEHICLE DATA**

| Measurement Description                 | Units | Value |
|-----------------------------------------|-------|-------|
| Total Vehicle Wheel Base                | mm    | 2840  |
| Total Vehicle Length at Left Side       | mm    | 4732  |
| Total Vehicle Length at Centerline      | mm    | 5000  |
| Total Vehicle Length at Right Side      | mm    | 4732  |
| Weight of Ballast in Cargo Area         | kg    | 11.4  |
| Weight of Vehicle Components Removed    | kg    |       |
| Amount of Stoddard Solvent in Fuel Tank | L     | 64.7  |

LIST OF COMPONENTS REMOVED TO MEET TEST WEIGHT: None

MASS OF BALLAST ADDED (kg) 11.4

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

|                                                          |                           |
|----------------------------------------------------------|---------------------------|
| Test Vehicle: <u>2011 Buick Lacrosse</u>                 | NHTSA No: <u>RB0180</u>   |
| Test Program: <u>R&amp;D 56mph, 7° angle, 20% offset</u> | Test Date: <u>9/23/11</u> |

**TARGET VEHICLE STRUCTURAL MEASUREMENT**

|    | Elements                              | Pre-Test (mm) |
|----|---------------------------------------|---------------|
| 1  | Total Length                          | 5000          |
| 2  | Total Width                           | 1818          |
| 3  | Bumper Top Height                     | -102          |
| 4  | Bumper Bottom Height                  | 76            |
| 5  | Longitudinal Member Top Height        | -82           |
| 6  | Distance Between Longitudinal Members | 1074          |
| 7  | Longitudinal Member Width             | 99            |
| 8  | Engine Top Height                     | -405          |
| 9  | Engine Bottom Height                  | 265           |
| 10 | Engine and Gearbox Width              | 577           |
| 11 | Front Bumper-Engine Distance          | 467           |
| 12 | Front Shock Absorber Fixing Height    | -437          |
| 13 | Bonnet Leading Edge Height            | -360          |
| 14 | Front Shock Absorber Fixing Width     | 1183          |
| 15 | Front Bumper – Front Axle Distance    | 1025          |
| 16 | Front Axle – A Pillar Distance        | 475           |
| 17 | A- Pillar – B-Pillar Distance         | 1131          |
| 18 | B-Pillar – Rear Axle Distance         | 1235          |
| 19 | B-Pillar – C-Pillar Distance          | 1074          |
| 20 | Roof Sill Bottom Height               | -880          |
| 21 | Roof Sill Top Height                  | -973          |
| 22 | Floor Sill Bottom Height              | 233           |
| 23 | Floor Sill Top Height                 | 78            |

## DATA SHEET NO. 2

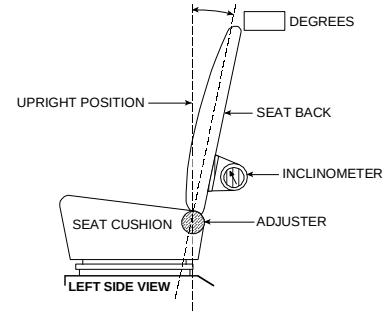
### SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL

|                                                          |                           |
|----------------------------------------------------------|---------------------------|
| Test Vehicle: <u>2011 Buick Lacrosse</u>                 | NHTSA No: <u>RB0180</u>   |
| Test Program: <u>R&amp;D 56mph, 7° angle, 20% offset</u> | Test Date: <u>9/23/11</u> |

#### NOMINAL DESIGN RIDING POSITION

Inclinometer was zeroed on the door sill, then placed on the head rest post to measure the set angle, according to form 1.

|                            | Deg.  |
|----------------------------|-------|
| Driver seat back angle:    | -13.9 |
| Passenger seat back angle: | FIXED |



**FRONT SEAT ASSEMBLY**

#### SEAT FORE/AFT POSITIONS

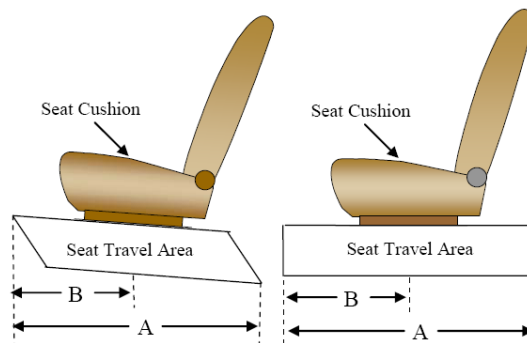
Seat was set to full forward, full up and marked. Then moved to the full rear, full down position, and marked. Mid-point was measured, and seat was set to full down, mid position, as per Form 1.

|                | Total Fore/Aft Travel | Placed in Position # |
|----------------|-----------------------|----------------------|
| Driver Seat    | 310                   | 155                  |
| Passenger Seat | FIXED                 | FIXED                |

#### SEAT BELT UPPER ANCHORAGE

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.

|                | Total # of Positions | Placed in Position # |
|----------------|----------------------|----------------------|
| Driver Seat    | 5                    | 0                    |
| Passenger Seat | FIXED                | FIXED                |

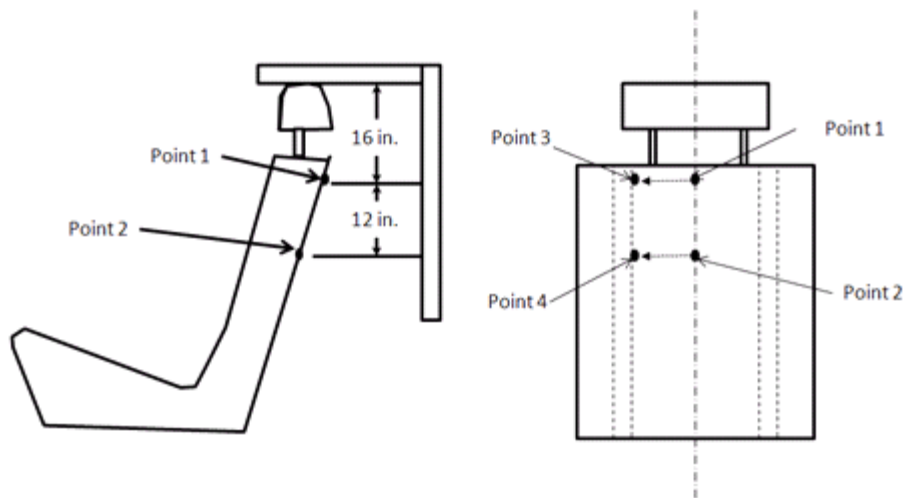




**DATA SHEET NO. 2 (CONTINUED)**  
**SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA**

|                                                          |                           |
|----------------------------------------------------------|---------------------------|
| Test Vehicle: <u>2011 Buick Lacrosse</u>                 | NHTSA No: <u>RB0180</u>   |
| Test Program: <u>R&amp;D 56mph, 7° angle, 20% offset</u> | Test Date: <u>9/23/11</u> |

**SEAT BACK MEASUREMENT POINTS**



Reference point: Rear most center of the top of rear bumper beam  
 +X - From the rear of the vehicle to the front of the vehicle  
 +Y - From 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

|         | X        | Y        | Z        |
|---------|----------|----------|----------|
| Point 3 | 2207.393 | -536.664 | -453.352 |
| Point 4 | 2328.717 | -568.241 | -159.043 |

See Appendix F.1 for detailed description of the CMM measurement procedure

## DATA SHEET NO. 2 (CONTINUED)

### SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

|                                                          |                           |
|----------------------------------------------------------|---------------------------|
| Test Vehicle: <u>2011 Buick Lacrosse</u>                 | NHTSA No: <u>RB0180</u>   |
| Test Program: <u>R&amp;D 56mph, 7° angle, 20% offset</u> | Test Date: <u>9/23/11</u> |

#### FUEL TANK CAPACITY

|                                    | Liters |
|------------------------------------|--------|
| Usable Capacity of "Standard Tank" | 70.4   |
| Usable Capacity of "Optional Tank" |        |
| 92%-94% of Usable Capacity         | 64.7   |
| Actual Amount of Solvent Used      | 64.7   |
| 1/3 of Usable Capacity             | 23.5   |

#### Electric fuel pump:

Gray wire (+)

Black/Green wire (-)

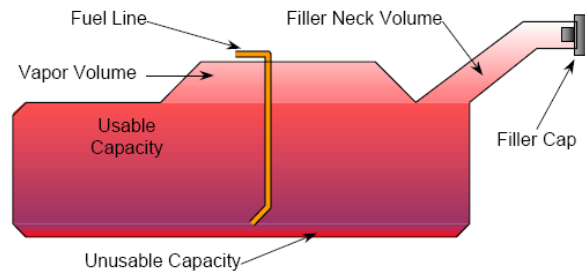
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VEHICLE FUEL TANK ASSEMBLY

#### STEERING COLUMN ADJUSTMENT

A level line was drawn on the steering wheel and an inclinometer was used to determine the angle of adjustment. The steering column was then moved full in and full out. Positions were marked and the steering wheel was set to the geometric center of its possible movement.

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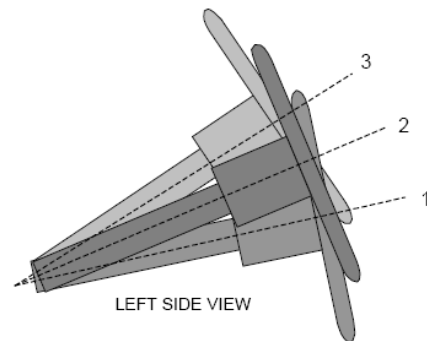
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STEERING COLUMN ASSEMBLY

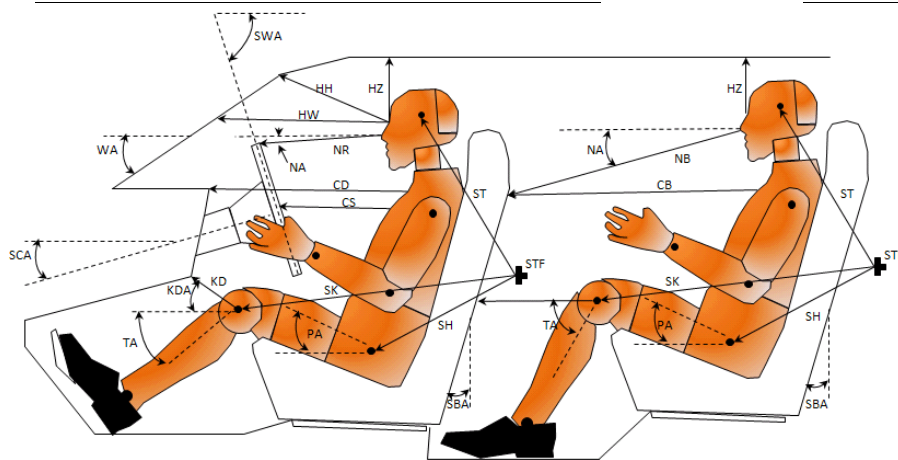
#### STEERING COLUMN POSITIONS

|                                   | Degrees | Fore/Aft Position (mm) |
|-----------------------------------|---------|------------------------|
| Lowermost position No. 1          | 66.2    |                        |
| Geometric center position No. 2   | 68.3    |                        |
| Uppermost position No. 3          | 70.4    |                        |
| Telescoping Steering Wheel Travel |         | 54                     |
| Test Position                     | 68.3    | 27                     |

## DATA SHEET NO. 3

### DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

|               |                                 |           |         |
|---------------|---------------------------------|-----------|---------|
| Test Vehicle: | 2011 Buick Lacrosse             | NHTSA No: | RB0180  |
| Test Program: | R&D 56mph, 7° angle, 20% offset | Test Date | 9/23/11 |



| Code    | Measurement Description            | Driver      |          | Left Rear Passenger |           |
|---------|------------------------------------|-------------|----------|---------------------|-----------|
|         |                                    | Length (mm) | Angle(°) | Length (mm)         | Angle (°) |
| WA°     | Windshield Angle                   |             | 25.8     |                     |           |
| SWA°    | Steering Wheel Angle               |             | 22.2     |                     |           |
| SCA°    | Steering Column Angle              |             | 16       |                     |           |
| SA°     | Seat Back Angle (on headrest post) |             | 14.3     |                     | 17.3      |
| HZ      | Head to Roof (Z)                   | 180         | 90       | 285                 | 90        |
| HH      | Head to Header                     | 450         | 16.8     |                     |           |
| HW      | Head to Windshield                 | 763         | 0        |                     |           |
| NR/NB   | Nose to Rim/Seat Back              | 478         | -14      | 555                 | -12.5     |
| CD/CB   | Chest to Dash/Seat Back            | 675         |          | 578                 |           |
| CS      | Chest to Steering Hub              | 378         | 0        |                     |           |
| RA      | Rim to Abdomen                     | 218         | 0        |                     |           |
| KDL/KBL | Left Knee to Dash/Seat Back        | 180         | 26.2     | 301                 | 22        |
| KDR/KBR | Right Knee to Dash/Seat Back       | 180         | 27.2     | 278                 | 28.9      |
| PA°     | Pelvic Angle                       |             | -24.7    |                     | 21.4      |
| TA°     | Tibia Angle                        |             | -48.2    |                     | -61.1     |
| SK      | Striker to Knee                    | 555         | 8.2      | 615                 | -22.2     |
| ST      | Striker to Head                    | 560         | 86.7     | 325                 | 64.5      |
| SH      | Striker to H-Point                 | 210         | -51.2    | 290                 | -53.7     |
| HAX°    | Head Angle X                       |             | 0.3      |                     |           |
| HAY°    | Head Angle Y                       |             | 4        |                     |           |
| NAX°    | Neck Angle X                       |             | 0.1      |                     |           |
| NAY°    | Neck Angle Y                       |             | 1.8      |                     |           |
| TAX°    | T6 Angle X                         |             | 15.8     |                     |           |
| TAY°    | T6 Angle Y                         |             | 2.2      |                     |           |
| LAX°    | Lumbar Angle (X)                   |             | -1.7     |                     |           |
| LAY°    | Lumbar Angle (Y)                   |             | 22.7     |                     |           |

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

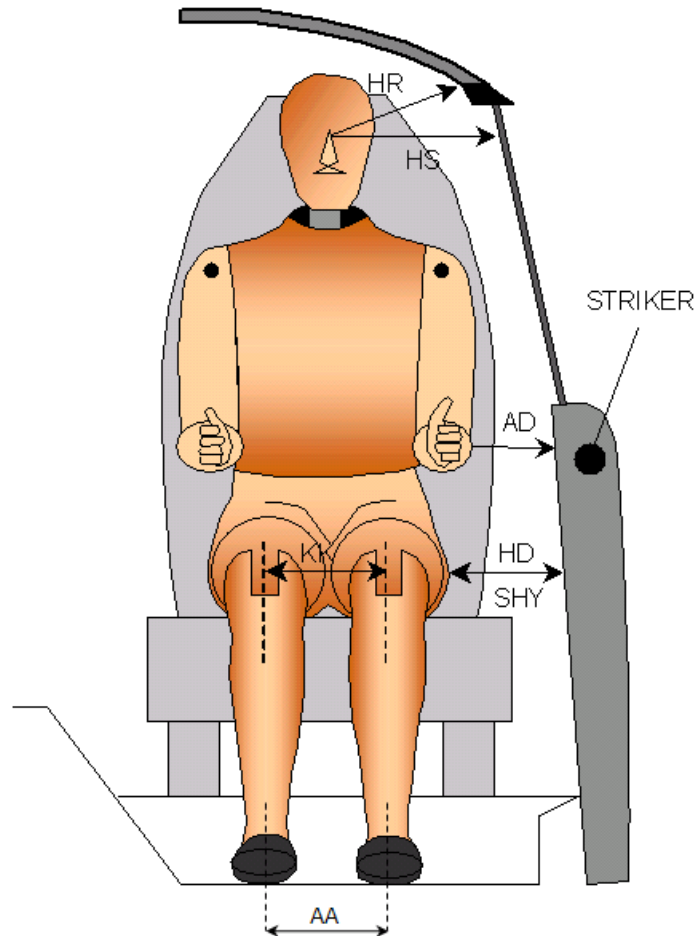
|               |                                            |           |                |
|---------------|--------------------------------------------|-----------|----------------|
| Test Vehicle: | <u>2011 Buick Lacrosse</u>                 | NHTSA No: | <u>RB0180</u>  |
| Test Program: | <u>R&amp;D 56mph, 7° angle, 20% offset</u> | Test Date | <u>9/23/11</u> |

| Description                           | Units | Driver   |   |          | Left Rear Passenger |         |          |
|---------------------------------------|-------|----------|---|----------|---------------------|---------|----------|
|                                       |       | X        | Y | Z        | X                   | Y       | Z        |
| Striker<br>(Driver/Passenger)         | mm    | 2462.29  | - | -248.786 | 1411.774            | -789.45 | -365.171 |
| Head CG                               | mm    | 2482.898 | - | -760.371 | 1517.599            | -       | -655.74  |
| Bridge of Nose                        | mm    | 2582.493 | - | -759.578 | 1603.84             | -       | -654.636 |
| Tip of Nose                           | mm    | 2579.849 | - | -707.751 | 1628.669            | -       | -622.623 |
| Shoulder Bolt                         | mm    | 2509.548 | - | -507.445 | 1506.929            | -       | -417.28  |
| Tip of Chin                           | mm    | 2573.774 | - | -627.855 | 1614.666            | -       | -549.653 |
| H-point                               | mm    | 2638.376 | - | -73.4607 | 1596.216            | -       | -116.569 |
| Left Knee                             | mm    | 3041.062 | - | -191.941 | 2011.833            | -       | -157.17  |
| Right Knee                            | mm    | 3054.189 | - | -194.415 | 2015.36             | -       | -160.452 |
| Left Ankle                            | mm    | 3372.57  | - | 66.8186  | 2189.578            | -       | 127.073  |
| Right Ankle                           | mm    | 3380.728 | - | 69.5506  | 2190.861            | -       | 126.1117 |
| Left Heel                             | mm    | 3378.66  | - | 202.3555 | 2122.38             | -       | 212.6416 |
| Right Heel                            | mm    | 3394.216 | - | 205.5993 | 2125.968            | -       | 217.1237 |
| Driver's Outboard<br>Seat Anchor Bolt | mm    | 2904.159 | - | 109.4192 |                     |         |          |
| Outboard Head<br>Restraint Post       | mm    | 2252.308 | - | -552.407 | 1264.843            | -       | -620.371 |
| Top of Head<br>Restraint*             | mm    | 2306.913 | - | -861.739 | 1280.352            | -       | -766.104 |
| Center of Steering<br>Wheel           | mm    |          |   |          |                     |         |          |

Reference point: Rear most center of the top of rear bumper beam  
 +X - From the rear of the vehicle to the front of the vehicle  
 +Y - From left side of the vehicle to the right side of the vehicle  
 +Z - From the top of the vehicle to the bottom of the vehicle

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

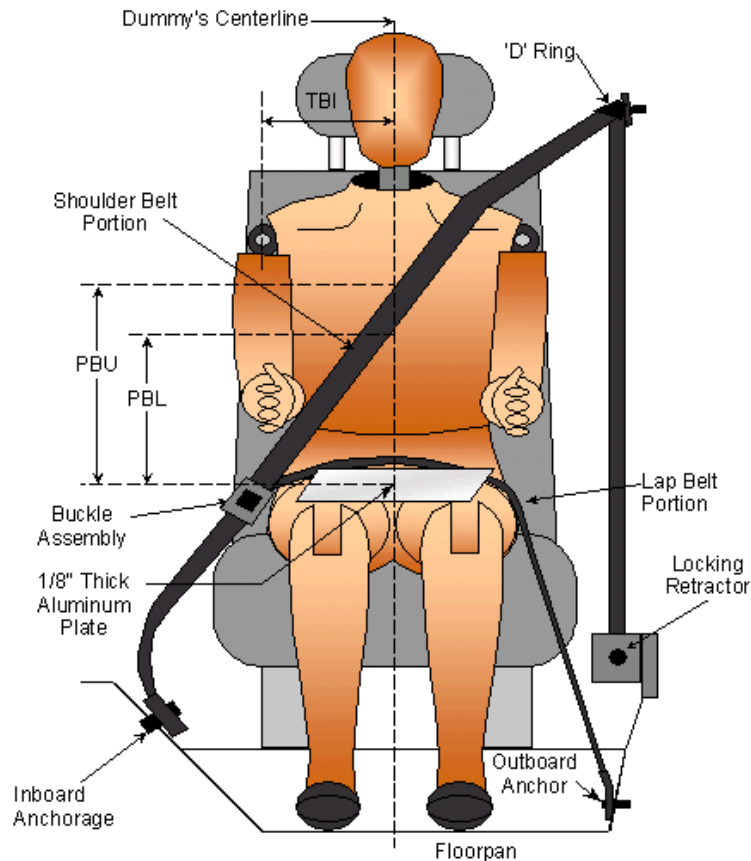
|                                                          |                           |
|----------------------------------------------------------|---------------------------|
| Test Vehicle: <u>2011 Buick Lacrosse</u>                 | NHTSA No: <u>RB0180</u>   |
| Test Program: <u>R&amp;D 56mph, 7° angle, 20% offset</u> | Test Date: <u>9/23/11</u> |



| Code | Description                      | Units | Driver (P1) | Passenger (P4) |
|------|----------------------------------|-------|-------------|----------------|
| AD   | Arm to Door                      | mm    | 122         | 92             |
| HD   | H-Point to Door                  | mm    | 135         | 190            |
| HR   | Head to Side Header              | mm    | 201         | 271            |
| HS   | Head to Side Window              | mm    | 345         | 380            |
| KK   | Knee to Knee                     | mm    | 270         | 168            |
| SHY  | Striker to H-Point (Y Direction) | mm    | 235         | 295            |
| AA   | Ankle to Ankle                   | mm    | 305         | 162            |

## DATA SHEET NO. 5 SEAT BELT POSITIONING DATA

|                                                                                                      |                                                      |
|------------------------------------------------------------------------------------------------------|------------------------------------------------------|
| Test Vehicle: <u>2011 Buick Lacrosse</u><br>Test Program: <u>R&amp;D 56mph, 7° angle, 20% offset</u> | NHTSA No: <u>RB0180</u><br>Test Date: <u>9/23/11</u> |
|------------------------------------------------------------------------------------------------------|------------------------------------------------------|



### SEAT BELT POSITIONING MEASUREMENTS

| Measurement Description                                | Units | Driver | Passenger |
|--------------------------------------------------------|-------|--------|-----------|
| PBU — Top surface of aluminum plate to belt upper edge | mm    | 345    | 295       |
| PBL — Top surface of aluminum plate to belt lower edge | mm    | 270    | 215       |

### BELT LENGTH DATA

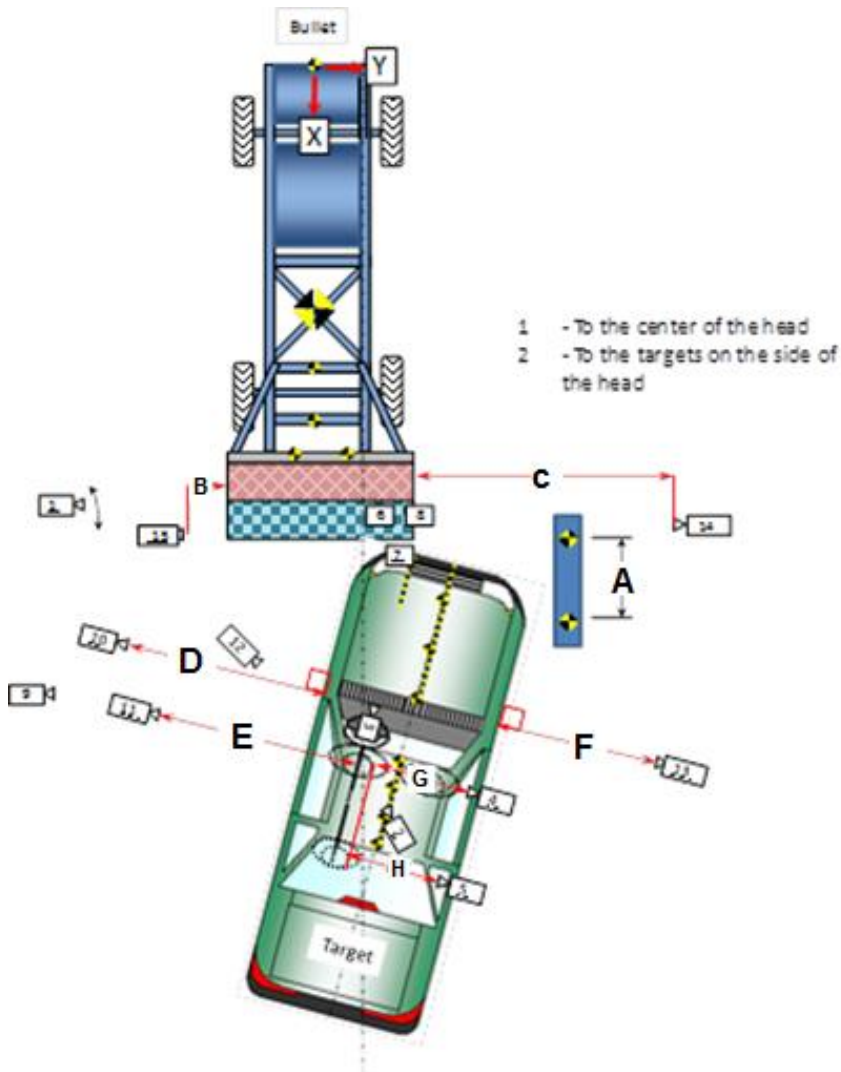
| Measurement Description                          | Units | Driver | Passenger |
|--------------------------------------------------|-------|--------|-----------|
| Shoulder belt length as measured on ATD          | mm    | 830    | 950       |
| Lap Belt Length as measured on ATD               | mm    | 530    | 540       |
| Remainder of belt on reel                        | mm    | 1040   | 960       |
| Total belt length for continuous webbing systems | mm    | 2400   | 2450      |

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

|               |                                            |           |                |
|---------------|--------------------------------------------|-----------|----------------|
| Test Vehicle: | <u>2011 Buick Lacrosse</u>                 | NHTSA No: | <u>RB0180</u>  |
| Test Program: | <u>R&amp;D 56mph, 7° angle, 20% offset</u> | Test Date | <u>9/23/11</u> |

## **Horizontal Location**

|   |    |      |
|---|----|------|
| A | mm | 915  |
| B | mm | 8639 |
| C | mm |      |
| D | mm | 9236 |
| E | mm | 9725 |
| F | mm | 7385 |
| G | mm | 911  |
| H | mm | 880  |







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

|                                                          |                           |
|----------------------------------------------------------|---------------------------|
| Test Vehicle: <u>2011 Buick Lacrosse</u>                 | NHTSA No: <u>RB0180</u>   |
| Test Program: <u>R&amp;D 56mph, 7° angle, 20% offset</u> | Test Date: <u>9/23/11</u> |

**CAMERA LOCATIONS**

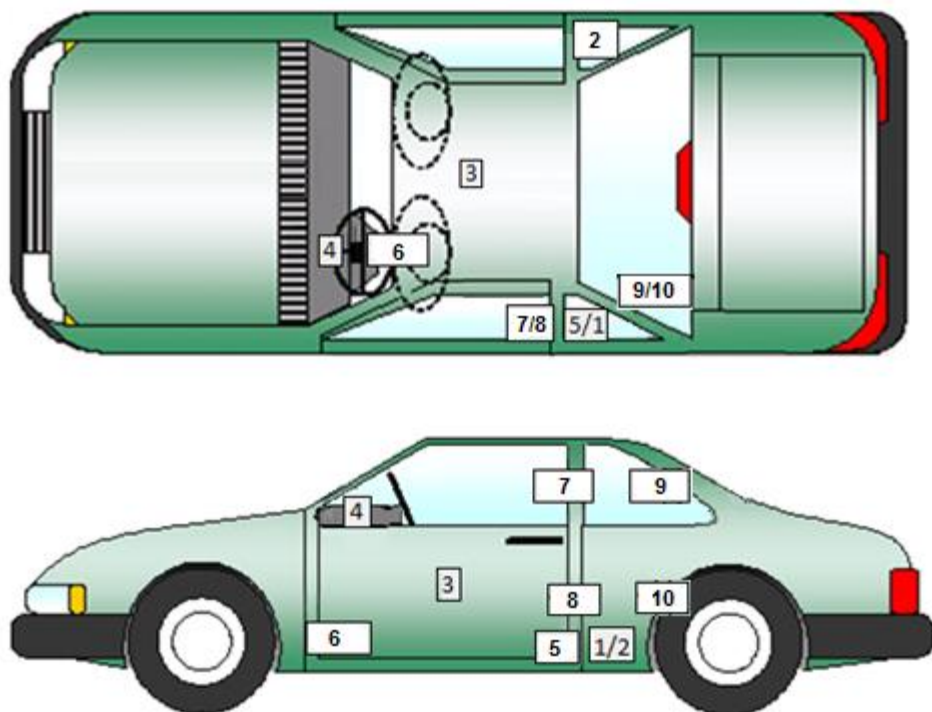
| No. | Camera View                               | Location (mm) |       |      | Lens (mm) | Speed (fps) |
|-----|-------------------------------------------|---------------|-------|------|-----------|-------------|
|     |                                           | X             | Y     | Z    |           |             |
| 1   | Real-Time Left Side View                  |               |       |      |           |             |
| 2   | Onboard Driver Over Shoulder              | 2935          | 1530  | 1255 | 12.5      | 500         |
| 3   | Onboard Driver Lower Leg                  | 1860          | 950   | 300  | 6.5       | 500         |
| 4   | Onboard Driver Perpendicular              | 2115          | 2020  | 875  | 12.5      | 500         |
| 5   | Onboard Left Rear Passenger Perpendicular | 3050          | 1870  | 950  | 12.5      | 500         |
| 6   | Overall Top View                          | 1835          | 865   | 5122 | 14        | 500         |
| 7   | Zoomed Top View                           | 0             | 1120  | 3805 | 28        | 1000        |
| 8   | Pit Front                                 |               |       |      |           |             |
| 9   | Front Ladder                              | -336          | 10130 | 2803 | 24        | 1000        |
| 10  | Target Vehicle Left Side                  | 1530          | 8620  | 1430 | 28        | 1000        |
| 11  | Driver's Motion                           | 1465          | 10003 | 1260 | 50        | 1000        |
| 12  | Look Down Driver's Motion                 | 2697          | 460   | 3640 | 13        | 1000        |
| 13  | Rear Ladder                               | 4220          | 10090 | 3040 | 24        | 1000        |
| 14  | Bullet Vehicle Left Side                  |               |       |      |           |             |
| 15  | Bullet Vehicle Right Side                 | 3690          | -9575 | 1530 | 24        | 1000        |
| 16  | Onboard MDB                               | -250          | 812   | 1711 | 13        | 1000        |

Reference point: center most rearward point of the MDB when in contact with the Target Vehicle):

- +X = from back of MDB to front of MDB
- +Y = right of monorail center
- +Z = up from ground

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

|               |                                            |           |                |
|---------------|--------------------------------------------|-----------|----------------|
| Test Vehicle: | <u>2011 Buick Lacrosse</u>                 | NHTSA No: | <u>RB0180</u>  |
| Test Program: | <u>R&amp;D 56mph, 7° angle, 20% offset</u> | Test Date | <u>9/23/11</u> |



| Accelerometer Location | Axes    | Units | Location |      |      |
|------------------------|---------|-------|----------|------|------|
|                        |         |       | X        | Y    | Z    |
| Left Rear Sill         | X,Y     | mm    | 2105     | -647 | 199  |
| Right Rear Sill        | X,Y     | mm    | 2098     | 650  | 209  |
| Vehicle CG             | X, Y, Z | mm    | 3135     | 135  | 22   |
| Driver Seat Track      | X       | mm    | 3277     | -2   | -416 |
| Instrument Panel       | X, Y, Z | mm    | 2430     | -188 | 218  |
| Behind Brake Pedal     | X, Y, Z | mm    | 3707     | -372 | 23   |

Reference point: Rear most center of the top of rear bumper beam  
 +X - From the rear of the vehicle to the front of the vehicle  
 +Y - From 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: <u>2011 Buick Lacrosse</u>                 | NHTSA No: <u>RB0180</u>   |
| Test Program: <u>R&amp;D 56mph, 7° angle, 20% offset</u> | Test Date: <u>9/23/11</u> |

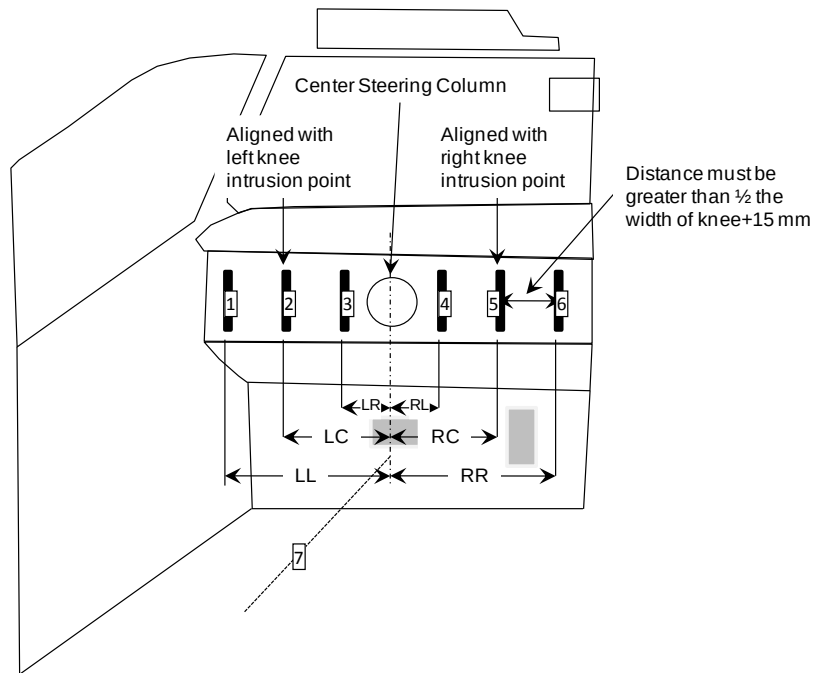
**VEHICLE INSTRUMENTATION DATA**

| Loc. | Description             | Axes | Units | Positive Direction |           | Negative Direction |           |
|------|-------------------------|------|-------|--------------------|-----------|--------------------|-----------|
|      |                         |      |       | Max                | Time (ms) | Max                | Time (ms) |
| 1    | Left Rear Cross Member  | X    | G     | 1.01               | 144.20    | -32.34             | 44.75     |
|      |                         | Y    | G     | 18.79              | 46.05     | -1.00              | 39.40     |
| 2    | Right Rear Cross Member | X    | G     | 0.17               | -1.00     | -33.64             | 44.40     |
|      |                         | Y    | G     | 15.15              | 59.50     | -1.16              | 299.95    |
| 3    | Vehicle CG              | X    | G     | 0.87               | 144.65    | -27.38             | 44.40     |
|      |                         | Y    | G     | 23.51              | 55.10     | -10.22             | 37.60     |
|      |                         | Z    | G     | 10.11              | 37.15     | -9.82              | 81.05     |
| 4    | Instrument Panel        | X    | G     | 27.23              | 114.05    | -76.63             | 53.30     |
| 5    | Driver Seat Track       | X    | G     | 0.77               | 144.20    | -26.53             | 44.35     |
|      |                         | Y    | G     | 28.85              | 44.45     | -2.27              | 6.45      |
|      |                         | Z    | G     | 44.33              | 39.00     | -34.25             | 43.00     |
| 6    | Behind Brake Pedal      | X    | G     | 10.94              | 55.55     | -61.73             | 45.75     |
|      |                         | Y    | G     | 22.33              | 42.90     | -7.21              | 76.65     |
|      |                         | Z    | G     | 29.92              | 32.55     | -18.71             | 58.50     |
| 7    | Driver Shoulder Belt    |      | N     | 3225.15            | 86.40     | -38.52             | 199.20    |
| 8    | Driver Lap Belt         |      | N     | 3007.02            | 66.10     | -1.39              | 4.05      |
| 9    | Passenger Shoulder Belt |      | N     | 6413.13            | 86.90     | -94.03             | 232.95    |
| 10   | Passenger Lap Belt      |      | N     | 4804.40            | 74.25     | -0.48              | 0.45      |

## DATA SHEET NO. 7 (CONTINUED)

### VEHICLE INSTRUMENTATION DATA

|                                                          |                           |
|----------------------------------------------------------|---------------------------|
| Test Vehicle: <u>2011 Buick Lacrosse</u>                 | NHTSA No: <u>RB0180</u>   |
| Test Program: <u>R&amp;D 56mph, 7° angle, 20% offset</u> | Test Date: <u>9/23/11</u> |



| Location | Distance (mm) | Location | Distance (mm) |
|----------|---------------|----------|---------------|
| LL       | 200           | RL       | 100           |
| LC       | 150           | RC       | 150           |
| LR       | 100           | RR       | 200           |

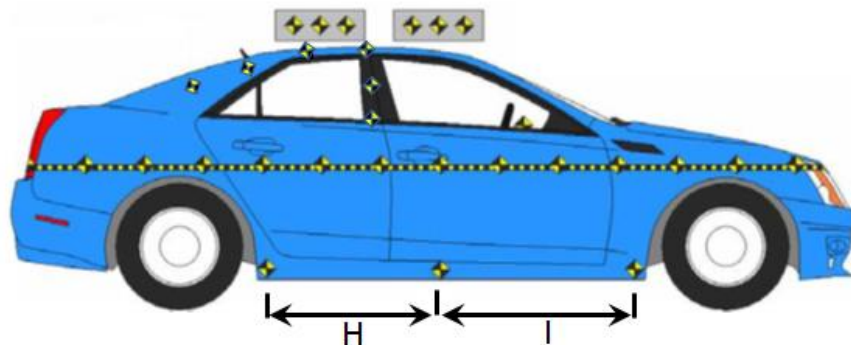
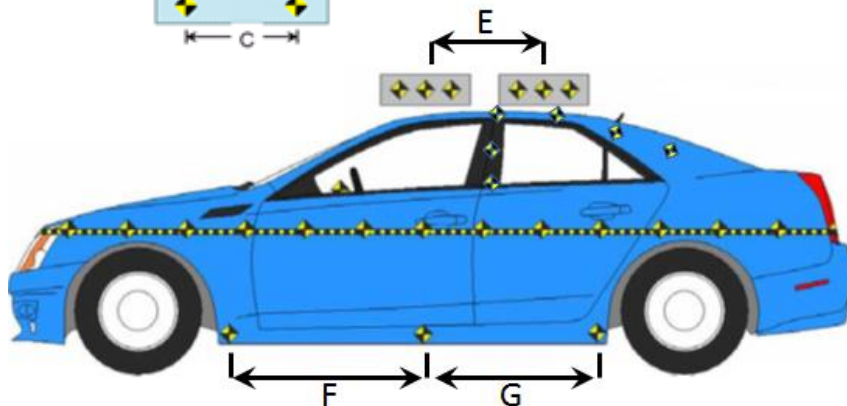
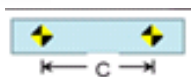
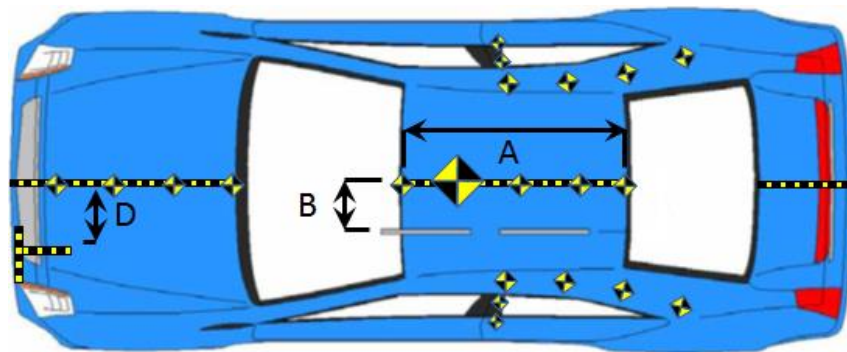
### VEHICLE INSTRUMENTATION DATA

| Loc. | Description                         |   | Positive Direction |           | Negative Direction |           |
|------|-------------------------------------|---|--------------------|-----------|--------------------|-----------|
|      |                                     |   | Max                | Time (ms) | Max                | Time (ms) |
| 1    | Left knee contact switch (LL) (ms)  | * | 0                  | -50       | 0                  | -50.00    |
| 2    | Left knee contact switch (LC) (ms)  | * | 0                  | -50       | -1                 | 59.75     |
| 3    | Left knee contact switch (LR) (ms)  | * | 0                  | -50       | -1                 | 51.85     |
| 4    | Right knee contact switch (RL) (ms) | * | 0                  | -50       | -1                 | 55.30     |
| 5    | Right knee contact switch (RC) (ms) | * | 0                  | -50       | -1                 | 54.85     |
| 6    | Right knee contact switch (RR) (ms) | * | 0                  | -50       | -1                 | 58.00     |
| 7    | Toe pan string pot (mm)             |   | 0.03               | -0.60     | -30.43             | 125.30    |

\* The measurement indicates the initial time the voltage changed

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

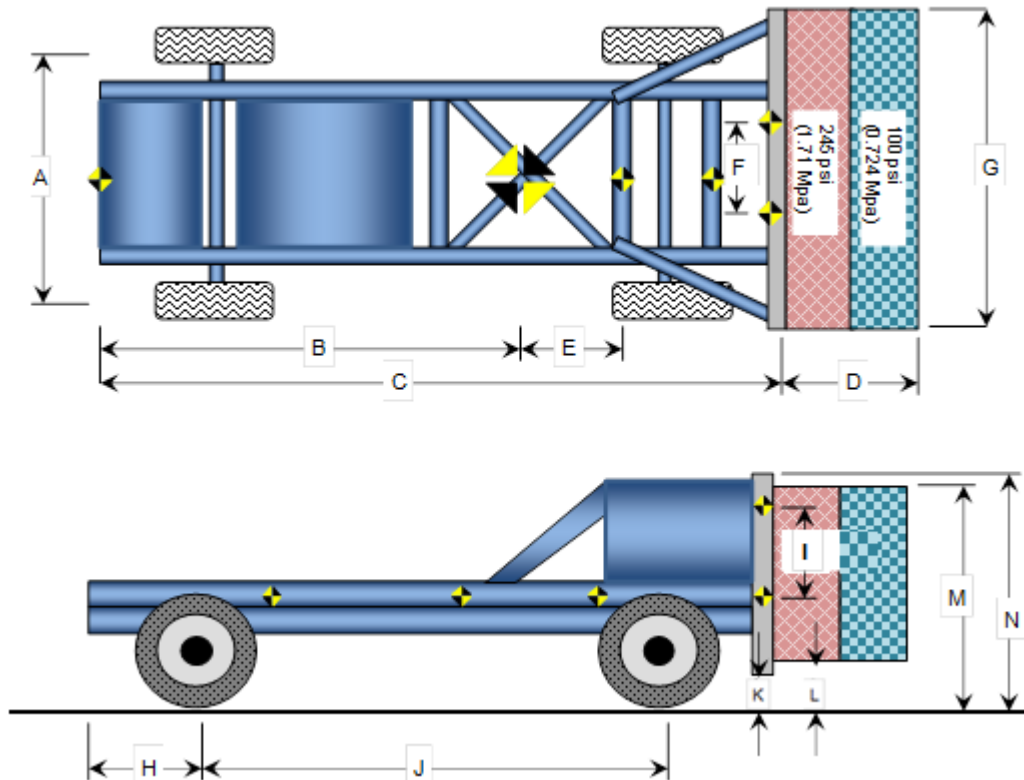
|               |                                 |           |         |
|---------------|---------------------------------|-----------|---------|
| Test Vehicle: | 2011 Buick Lacrosse             | NHTSA No: | RB0180  |
| Test Program: | R&D 56mph, 7° angle, 20% offset | Test Date | 9/23/11 |



| Item | Units | Value |
|------|-------|-------|
| A    | mm    | 610   |
| B    | mm    | 280   |
| C    | mm    | 915   |
| D    | mm    | 545   |
| E    | mm    | 699   |
| F    | mm    | 957   |
| G    | mm    | 969   |
| H    | mm    | 966   |
| I    | mm    | 958   |

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

|                                               |                    |
|-----------------------------------------------|--------------------|
| Test Vehicle: 2011 Buick Lacrosse             | NHTSA No: RB0180   |
| Test Program: R&D 56mph, 7° angle, 20% offset | Test Date: 9/23/11 |

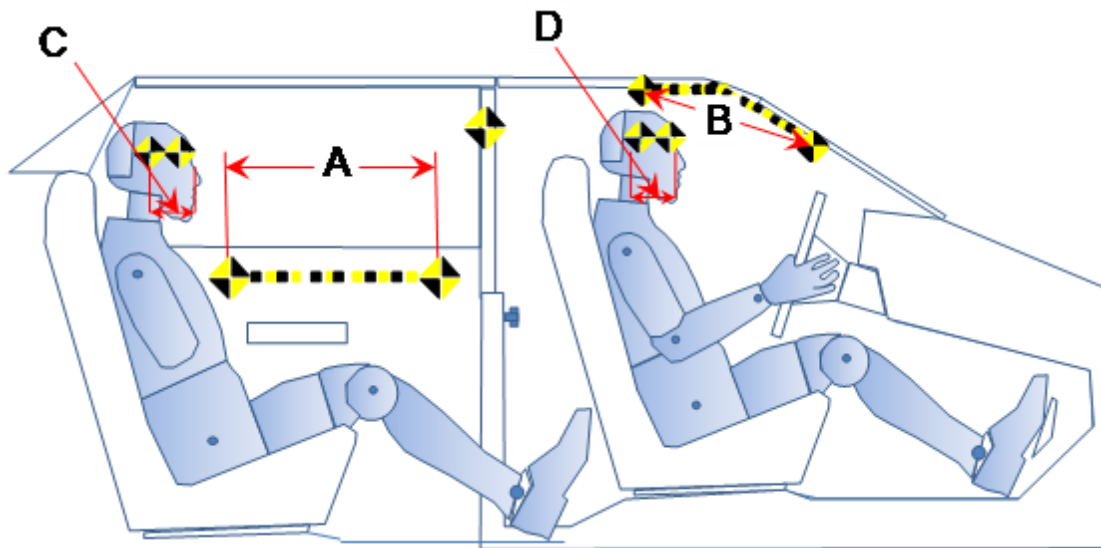


| Item | Units | Value | Item | Units | Value |
|------|-------|-------|------|-------|-------|
| A    | mm    | 1313  | H    | mm    | 795   |
| B    | mm    | 2215  | I    | mm    | 500   |
| C    | mm    | 3940  | J    | mm    | 2585  |
| D    | mm    | 606   | K    | mm    | 90    |
| E    | mm    | 1185  | L    | mm    | 83    |
| F    | mm    | 1127  | M    | mm    | 1034  |
| G    | mm    | 2210  | N    | mm    | 1187  |

|                        | Units | Front Axle | Rear Axle | Total  |
|------------------------|-------|------------|-----------|--------|
| Left                   | kg    | 779.3      | 470.4     | 1249.7 |
| Right                  | kg    | 749.3      | 487.2     | 1236.5 |
| Ratio                  | %     | 61.5%      | 38.5%     | 100%   |
| Total                  | kg    | 1528.6     | 957.6     | 2486.2 |
| CG After of Front Axle | mm    |            |           | 1285.6 |

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

|               |                                            |           |                |
|---------------|--------------------------------------------|-----------|----------------|
| Test Vehicle: | <u>2011 Buick Lacrosse</u>                 | NHTSA No: | <u>RB0180</u>  |
| Test Program: | <u>R&amp;D 56mph, 7° angle, 20% offset</u> | Test Date | <u>9/23/11</u> |



| Item | Units | Value |
|------|-------|-------|
| A    | mm    | 307   |
| B    | mm    | 305   |
| C    | mm    | 52    |
| D    | mm    | 52    |

**DATA SHEET NO. 9**  
**TEST VEHICLE SUMMARY OF RESULTS**

|               |                                            |           |                |
|---------------|--------------------------------------------|-----------|----------------|
| Test Vehicle: | <u>2011 Buick Lacrosse</u>                 | NHTSA No: | <u>RB0180</u>  |
| Test Program: | <u>R&amp;D 56mph, 7° angle, 20% offset</u> | Test Date | <u>9/23/11</u> |

**INSTRUMENTATION**

|                                  |     |
|----------------------------------|-----|
| Driver Dummy Accelerometers      | 119 |
| Passenger Dummy Accelerometers   | 34  |
| Vehicle Structure Accelerometers | 16  |
| Total                            | 169 |

**CAMERA COVERAGE**

|                            |    |
|----------------------------|----|
| High-Speed Vehicle Onboard | 4  |
| High-Speed Off board       | 10 |
| Real-Time Panning          | 1  |
| Total                      | 15 |



# DATA SHEET NO. 10

## POST TEST OBSERVATIONS

|                                               |                    |
|-----------------------------------------------|--------------------|
| Test Vehicle: 2011 Buick Lacrosse             | NHTSA No: RB0180   |
| Test Program: R&D 56mph, 7° angle, 20% offset | Test Date: 9/23/11 |

### TEST DUMMY INFORMATION AND CONTACT

| Description          | Driver                                                    | Picture Ref. | Passenger                      | Picture Ref. |
|----------------------|-----------------------------------------------------------|--------------|--------------------------------|--------------|
| Dummy Type           | THOR 50 <sup>th</sup> Male                                | N/A          | IIII 5 <sup>th</sup> Female    | N/A          |
| Dummy Serial No.     | 0007                                                      | N/A          | 070                            | N/A          |
| Lower Leg Type       | THOR-FLX Lower Leg                                        | N/A          | IIII Lower Leg                 | N/A          |
| Lower Leg Serial No. | LX0036/0037                                               | N/A          |                                | N/A          |
| Head Contact         | Steering wheel airbag, curtain airbag, and left headliner | A-37<br>A-48 | Back of head hits the headrest | A-49<br>A-58 |
| Upper Torso Contact  | Steering wheel airbag                                     | A-46         | None                           |              |
| Lower Torso Contact  | Steering wheel                                            | A-46         | None                           |              |
| Left Knee Contact    | Knee bolster                                              | A-45         | None                           | A-59         |
| Right Knee Contact   | Knee bolster                                              | A-44         | None                           | A-59         |

### DOOR OPENING AND SEAT TRACK INFORMATION

| Description           | Driver                   | Passenger            |
|-----------------------|--------------------------|----------------------|
| Locked/Unlocked Doors | Unlocked                 | Unlocked             |
| Front Door Opening    | Closed                   | Closed / Operational |
| Rear Door Opening     | Closed / Operational     | Closed / Operational |
| Seat Track Shift (mm) | Yes – 5 mm could be trim | No Shift             |
| Seat Back Failure     | No Failure               | No Failure           |
| Glazing Damage        | None                     | None                 |

### POST TEST STRUCTURAL OBSERVATIONS

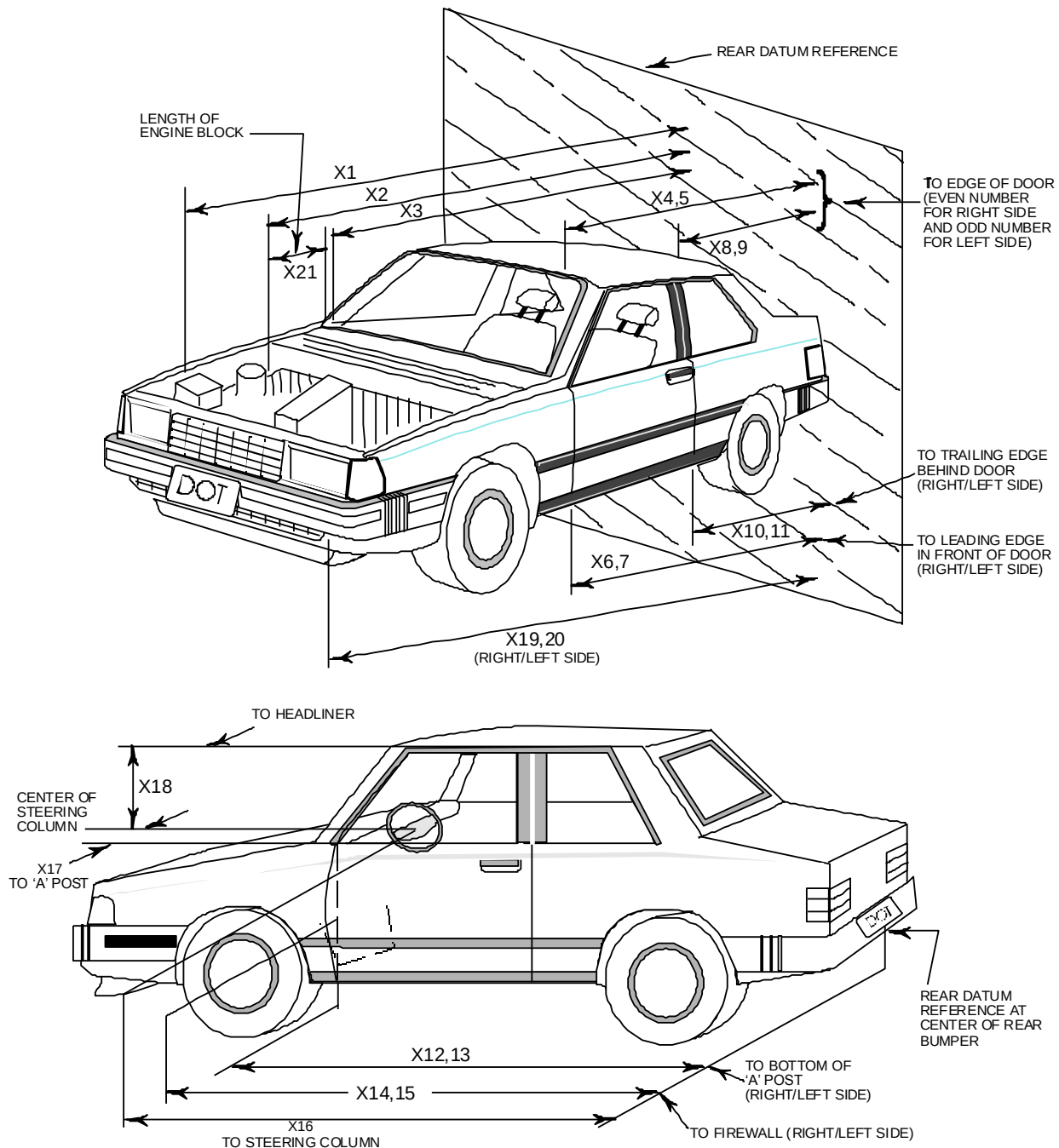
| Critical Areas of Performance | Observations and Conclusions                                                                     | Picture Ref |
|-------------------------------|--------------------------------------------------------------------------------------------------|-------------|
| Pillar Performance            | A-Pillar and door sill buckled, causing some separation at the top of the door from the vehicle. |             |
| Windshield Damage             | Cracks along the bottom and Driver's side A-Pillar                                               | A-21        |
| Window Damage                 | Driver's window cracked during impact                                                            | A-36 / A-51 |

### SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

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

|               |                                            |           |                |
|---------------|--------------------------------------------|-----------|----------------|
| Test Vehicle: | <u>2011 Buick Lacrosse</u>                 | NHTSA No: | <u>RB0180</u>  |
| Test Program: | <u>R&amp;D 56mph, 7° angle, 20% offset</u> | Test Date | <u>9/23/11</u> |



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

Test Vehicle: 2011 Buick Lacrosse NHTSA No: RB0180  
Test Program: R&D 56mph, 7° angle, 20% offset Test Date: 9/23/11

| No. | Measurement Description                           | Pre-Test | Post-Test | Difference |
|-----|---------------------------------------------------|----------|-----------|------------|
| 1   | Total Length of Vehicle at Centerline             | 5000     | 4868      | 132        |
| 2   | Rear Surface of Vehicle (RSOV) to Front of Engine | 4533     | 4463      | 70         |
| 3   | RSOV to Firewall                                  | 3852     | 3733      | 119        |
| 4   | RSOV to Upper Leading Edge of Right Door          | 3500     | 3499      | 1          |
| 5   | RSOV to Upper Leading Edge of Left Door           | 3499     | 3443      | 56         |
| 6   | RSOV to Lower Leading Edge of Right Door          | 3492     | 3494      | -2         |
| 7   | RSOV to Lower Leading Edge of Left Door           | 3491     | 3443      | 48         |
| 8   | RSOV to Upper Trailing Edge of Right Door         | 2370     | 2370      | 0          |
| 9   | RSOV to Upper Trailing Edge of Left Door          | 2367     | 2341      | 26         |
| 10  | RSOV to Lower Trailing Edge of Right Door         | 2410     | 2412      | -2         |
| 11  | RSOV to Lower Trailing Edge of Left Door          | 2407     | 2366      | 41         |
| 12  | RSOV to Bottom of "A" Post of Right Side          | 3587     | 3587      | 0          |
| 13  | RSOV to Bottom of "A" Post of Left Side           | 3584     | 3547      | 37         |
| 14  | RSOV to Firewall, Right Side                      | 3958     | 3961      | -3         |
| 15  | RSOV to Firewall, Left Side                       | 3949     | 3785      | 164        |
| 16  | RSOV to Steering Column                           | 3014     | 2973      | 41         |
| 17  | Center of Steering Column to "A" Post             | 266      | 275       | -9         |
| 18  | Center of Steering Column to Headliner            | 414      | 425       | -11        |
| 19  | RSOV to Right Side of Front Bumper                | 4844     | 4878      | -34        |
| 20  | RSOV to Left Side of Front Bumper                 | 4845     | 4759      | 86         |
| 21  | Length of Engine Block                            | 569      | 548       | 22         |
| RD  | RSOV to Right Side of Dash Panel                  | 3140     | 3140      | 1          |
| CD  | RSOV to Center of Dash Panel                      | 3279     | 3251      | 29         |
| LD  | RSOV to Left Side of Dash Panel                   | 3140     | 3069      | 71         |

All Dimensions in mm

# DATA SHEET NO. 12

## ACCIDENT INVESTIGATION DIVISION DATA

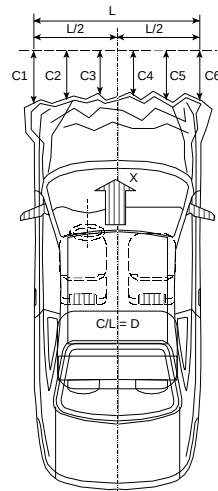
Test Vehicle: 2011 Buick Lacrosse NHTSA No: RB0180  
 Test Program: R&D 56mph, 7° angle, 20% offset Test Date: 9/23/11

### VEHICLE INFORMATION

VIN: 1G4GA5EC8BF353173 Wheelbase: 2840  
 Vehicle Size Category: Passenger Test Weight (kg): 1935.5

### ACCELEROMETER DATA

Accelerometer Locations: Data Sheet No.7 Linearity: 99%  
 Cal. Procedure/Interval: Calspan/6 months  
 Integration Algorithm: Trapezoidal  
 Impact Velocity (km/h): 90.64  
 Velocity Change (km/h): -  
 Time of Separation (msec): 250 msec



### CRUSH PROFILE

Collision Deformation Classification : 12FLEE5  
 Midpoint of Damage: C2  
 Damage Region Length (mm): 1408  
 Impact Mode: 20%Offset, 7° Angle

### CRUSH MEASUREMENTS: WITH BUMPER COVER

| No. | Measurement Description    | Units | Pre-Test | Post-Test | Difference |
|-----|----------------------------|-------|----------|-----------|------------|
| C1  | Crush zone 1 at left side  | mm    | 4762     | 4025      | 737        |
| C2  | Crush zone 2 at left side  | mm    | 4908     | 4796      | 112        |
| C3  | Crush zone 3 at left side  | mm    | 4979     | 4901      | 78         |
| C4  | Crush zone 4 at right side | mm    | 4978     | 4890      | 88         |
| C5  | Crush zone 5 at right side | mm    | 4905     | 4880      | 25         |
| C6  | Crush zone 6 at right side | mm    | 4763     | 4782      | -19        |
| L   | C1 to C6                   | mm    | 1408     | 1354      | 54         |

### CRUSH MEASUREMENTS: WITH BUMPER COVER REMOVED

| No. | Measurement Description    | Units | Pre-Test | Post-Test | Difference |
|-----|----------------------------|-------|----------|-----------|------------|
| C1  | Crush zone 1 at left side  | mm    | 4704     | 4508      | 196        |
| C2  | Crush zone 2 at left side  | mm    | 4822     | 4735      | 87         |
| C3  | Crush zone 3 at left side  | mm    | 4871     | 4812      | 59         |
| C4  | Crush zone 4 at right side | mm    | 4871     | 4840      | 31         |
| C5  | Crush zone 5 at right side | mm    | 4821     | 4818      | 3          |
| C6  | Crush zone 6 at right side | mm    | 4699     | 4720      | -21        |
| L   | C1 to C6                   | mm    | 1394     | 1239      | 155        |

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

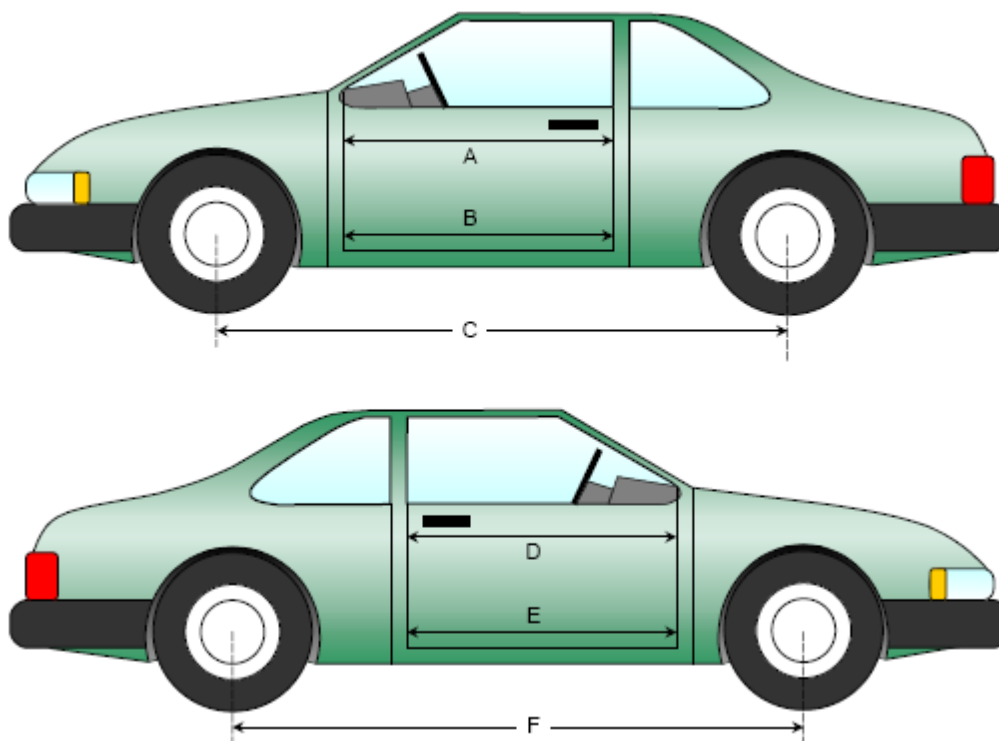
Test Vehicle: 2011 Buick Lacrosse NHTSA No: RB0180  
 Test Program: R&D 56mph, 7° angle, 20% offset Test Date 9/23/11

## **DOOR OPENING WIDTH**

| Item | Description      | Units | Pre-Test | Post-Test | Difference |
|------|------------------|-------|----------|-----------|------------|
| A    | Left Side Upper  | mm    | 969      | 896       | -73        |
| B    | Left Side Lower  | mm    | 891      | 821       | -70        |
| D    | Right Side Upper | mm    | 965      | 965       | -1         |
| E    | Right Side Lower | mm    | 903      | 902       | -1         |

## **WHEELBASE MEASUREMENTS**

| Item | Description          | Units | Pre-Test | Post-Test | Difference |
|------|----------------------|-------|----------|-----------|------------|
| C    | Left Side Wheelbase  | mm    | 2842     | 2564      | -278       |
| F    | Right Side Wheelbase | mm    | 2839     | 2841      | 2          |



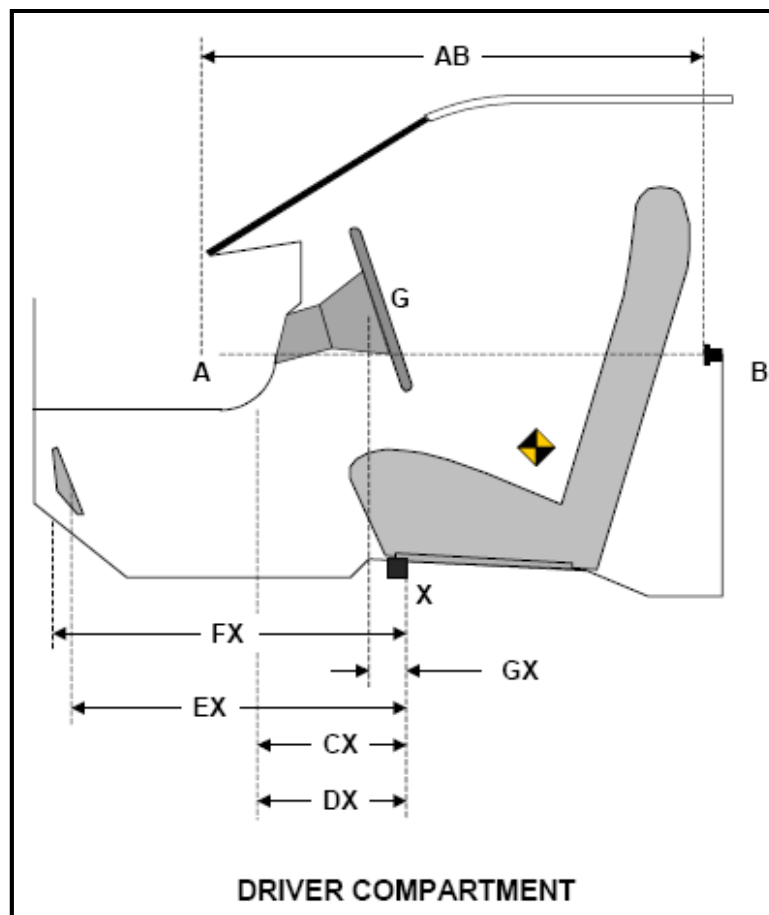
# **DATA SHEET NO.13 (CONTINUED)** **VEHICLE INTRUSION MEASUREMENTS**

|               |                                            |           |                |
|---------------|--------------------------------------------|-----------|----------------|
| Test Vehicle: | <u>2011 Buick Lacrosse</u>                 | NHTSA No: | <u>RB0180</u>  |
| Test Program: | <u>R&amp;D 56mph, 7° angle, 20% offset</u> | Test Date | <u>9/23/11</u> |

## **DRIVER COMPARTMENT INTRUSION**

| Item | Description                              | Units | Pre-Test | Post-Test | Difference |
|------|------------------------------------------|-------|----------|-----------|------------|
| AB   | Door Opening (Inside Window Jam)         | mm    | 820      | 814       | -7         |
| CX   | Left Knee Bolster to X                   | mm    | 313      | 220       | -93        |
| DX   | Right Knee Bolster to X                  | mm    | 321      | 262       | -59        |
| EX   | Brake Pedal to X                         | mm    | 576      | 596       | 20         |
| FX   | Foot Rest to X                           | mm    | 686      | 597       | -88        |
| GX   | Center of Steering Column Wheel Hub to X | mm    | 110      | 42        | -69        |

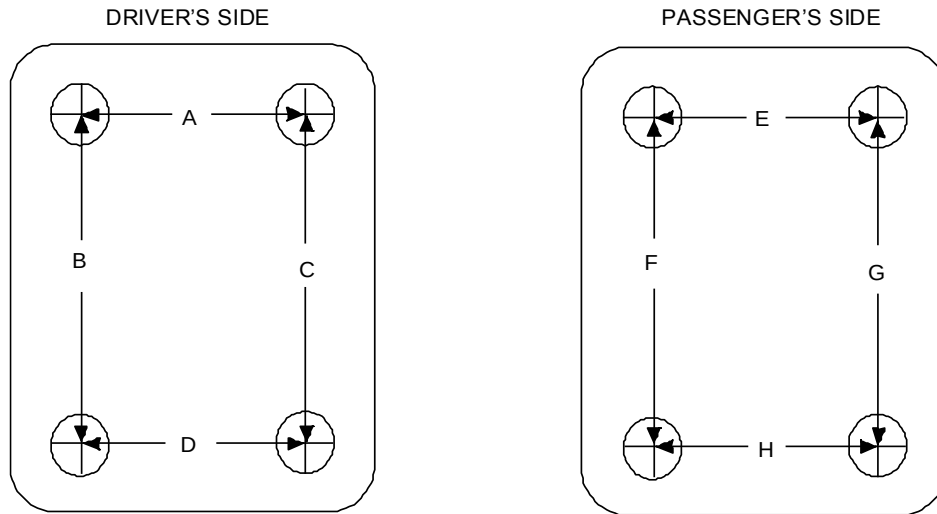
*X = Front of Seat Track (Stationary)*



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

|               |                                            |           |                |
|---------------|--------------------------------------------|-----------|----------------|
| Test Vehicle: | <u>2011 Buick Lacrosse</u>                 | NHTSA No: | <u>RB0180</u>  |
| Test Program: | <u>R&amp;D 56mph, 7° angle, 20% offset</u> | Test Date | <u>9/23/11</u> |

## **TOP VIEW THROUGH FLOOR PAN**



## **UNDERBODY FLOORBOARD DEFORMATION**

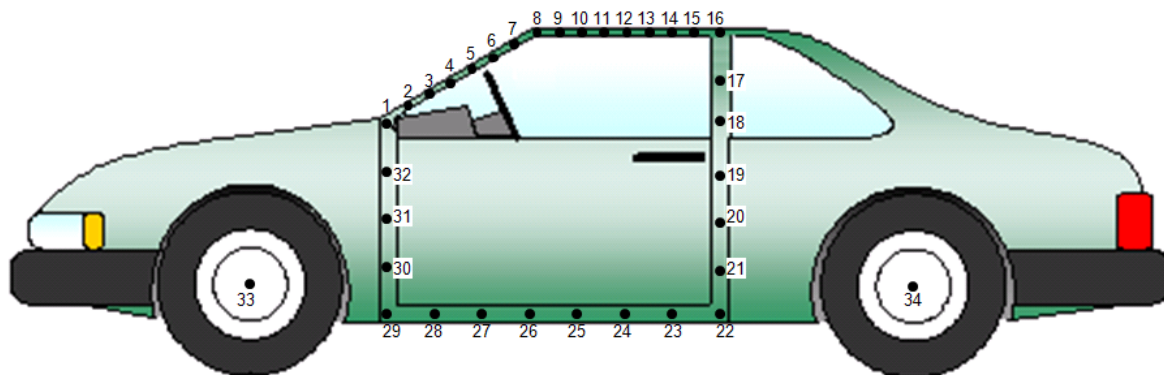
| Measurement | Pre-Test | Post-Test | Difference |
|-------------|----------|-----------|------------|
| A           | 421      | 418       | 3          |
| B           | 406      | 399       | 7          |
| C           | 396      | 397       | -1         |
| D           | 434      | 433       | 1          |
| E           | 404      | 395       | 8          |
| F           | 379      | 382       | -3         |
| G           | 371      | 373       | -2         |
| H           | 472      | 466       | 5          |

All units in millimeters

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

|               |                                            |           |                |
|---------------|--------------------------------------------|-----------|----------------|
| Test Vehicle: | <u>2011 Buick Lacrosse</u>                 | NHTSA No: | <u>RB0180</u>  |
| Test Program: | <u>R&amp;D 56mph, 7° angle, 20% offset</u> | Test Date | <u>9/23/11</u> |

**DRIVER SIDE DOOR SILL INTRUSIONS**



Left Side View

Reference point: Rear most center of the top of rear bumper beam

+X – From the rear of the vehicle to the front of the vehicle

+Y – From 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

Note: See appendix F.2 for detailed procedure to measure required Door sill intrusion.



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

|                                               |                    |
|-----------------------------------------------|--------------------|
| Test Vehicle: 2011 Buick Lacrosse             | NHTSA No: RB0180   |
| Test Program: R&D 56mph, 7° angle, 20% offset | Test Date: 9/23/11 |

**DRIVER SIDE DOOR SILL INTRUSIONS**

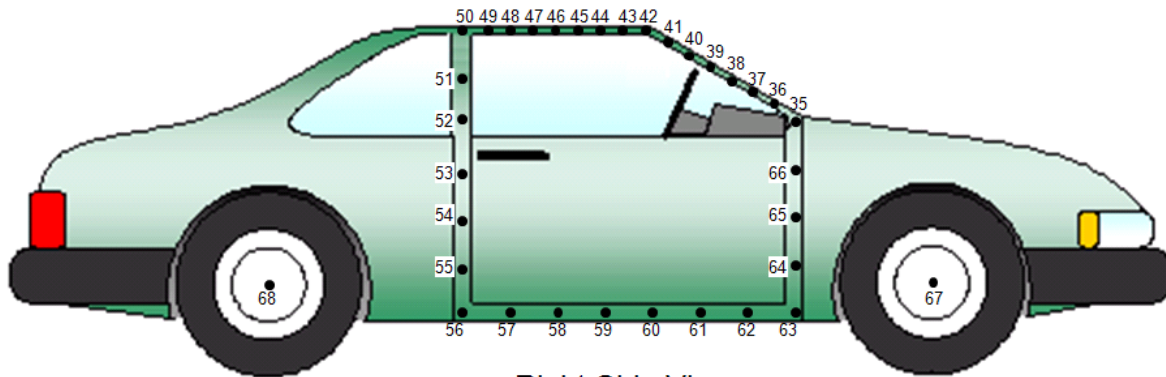
| Pt. | Pre-Test |        |        | Post-Test |        |        | Difference |     |     |
|-----|----------|--------|--------|-----------|--------|--------|------------|-----|-----|
|     | X        | Y      | Z      | X         | Y      | Z      | X          | Y   | Z   |
| 1   | 3412.8   | -741.4 | -604.1 | 3393.6    | -746.5 | -602.0 | -19        | -5  | 2   |
| 2   | 3349.3   | -727.2 | -656.0 | 3348.7    | -726.1 | -670.2 | -1         | 1   | -14 |
| 3   | 3283.0   | -713.4 | -690.2 | 3280.6    | -721.1 | -701.5 | -2         | -8  | -11 |
| 4   | 3209.9   | -699.6 | -729.6 | 3207.6    | -709.8 | -737.9 | -2         | -10 | -8  |
| 5   | 3134.4   | -684.6 | -764.6 | 3136.0    | -691.4 | -773.0 | 2          | -7  | -8  |
| 6   | 3061.0   | -670.4 | -796.1 | 3061.3    | -675.1 | -805.5 | 0          | -5  | -9  |
| 7   | 2987.4   | -657.4 | -825.3 | 2985.9    | -659.8 | -832.6 | -2         | -2  | -7  |
| 8   | 2910.3   | -645.4 | -849.2 | 2912.3    | -646.0 | -855.9 | 2          | -1  | -7  |
| 9   | 2832.6   | -635.6 | -868.9 | 2834.5    | -637.7 | -874.8 | 2          | -2  | -6  |
| 10  | 2752.5   | -627.5 | -882.1 | 2754.0    | -629.9 | -886.9 | 1          | -2  | -5  |
| 11  | 2675.4   | -622.3 | -893.6 | 2676.1    | -624.7 | -898.9 | 1          | -2  | -5  |
| 12  | 2594.1   | -618.9 | -902.5 | 2594.3    | -620.8 | -905.4 | 0          | -2  | -3  |
| 13  | 2514.9   | -617.1 | -909.0 | 2516.0    | -619.1 | -909.9 | 1          | -2  | -1  |
| 14  | 2448.8   | -616.0 | -910.1 | 2449.8    | -618.6 | -910.3 | 1          | -3  | 0   |
| 15  | 2385.5   | -615.6 | -909.2 | 2385.5    | -618.1 | -909.4 | 0          | -2  | 0   |
| 16  | 2320.0   | -615.9 | -905.6 | 2321.0    | -618.2 | -904.8 | 1          | -2  | 1   |
| 17  | 2357.8   | -705.2 | -753.9 | 2356.4    | -706.5 | -752.1 | -1         | -1  | 2   |
| 18  | 2399.2   | -765.4 | -589.9 | 2396.5    | -765.2 | -590.5 | -3         | 0   | -1  |
| 19  | 2439.4   | -805.6 | -420.7 | 2438.7    | -803.7 | -420.0 | -1         | 2   | 1   |
| 20  | 2454.4   | -828.3 | -243.1 | 2453.5    | -825.7 | -243.3 | -1         | 3   | 0   |
| 21  | 2488.2   | -817.2 | -67.1  | 2483.8    | -813.9 | -68.9  | -4         | 3   | -2  |
| 22  | 2502.0   | -828.2 | 117.4  | 2500.2    | -823.8 | 118.8  | -2         | 4   | 1   |
| 23  | 2629.9   | -828.2 | 109.3  | 2632.8    | -823.5 | 113.2  | 3          | 5   | 4   |
| 24  | 2764.8   | -825.7 | 110.3  | 2763.3    | -821.8 | 113.5  | -1         | 4   | 3   |
| 25  | 2892.8   | -825.5 | 115.0  | 2892.3    | -819.6 | 117.3  | -1         | 6   | 2   |
| 26  | 3024.1   | -823.4 | 114.4  | 3024.0    | -813.2 | 118.3  | 0          | 10  | 4   |
| 27  | 3150.9   | -823.9 | 115.2  | 3154.3    | -810.9 | 121.2  | 3          | 13  | 6   |
| 28  | 3281.2   | -816.2 | 108.1  | 3278.0    | -793.6 | 116.9  | -3         | 23  | 9   |
| 29  | 3343.6   | -801.7 | 72.6   | 3309.5    | -773.3 | 77.4   | -34        | 28  | 5   |
| 30  | 3424.6   | -788.7 | -86.8  | 3350.3    | -784.5 | -94.6  | -74        | 4   | -8  |
| 31  | 3430.1   | -782.7 | -266.1 | 3349.2    | -780.4 | -270.0 | -81        | 2   | -4  |
| 32  | 3419.5   | -773.7 | -436.8 | 3351.2    | -776.0 | -441.8 | -68        | -2  | -5  |

Note: See appendix F.2 for detailed procedure to measure required Door sill intrusion

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

|               |                                            |           |                |
|---------------|--------------------------------------------|-----------|----------------|
| Test Vehicle: | <u>2011 Buick Lacrosse</u>                 | NHTSA No: | <u>RB0180</u>  |
| Test Program: | <u>R&amp;D 56mph, 7° angle, 20% offset</u> | Test Date | <u>9/23/11</u> |

**PASSENGER SIDE DOOR SILL INTRUSIONS**



Right Side View

Reference point: Rear most center of the top of rear bumper beam

+X – From the rear of the vehicle to the front of the vehicle

+Y – From 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

Note: See appendix F.2 for detailed procedure to measure required Door sill intrusion.

+Z – From the top of the vehicle to the bottom of the vehicle

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

|                                                          |                           |
|----------------------------------------------------------|---------------------------|
| Test Vehicle: <u>2011 Buick Lacrosse</u>                 | NHTSA No: <u>RB0180</u>   |
| Test Program: <u>R&amp;D 56mph, 7° angle, 20% offset</u> | Test Date: <u>9/23/11</u> |

**PASSENGER SIDE DOOR SILL INTRUSION**

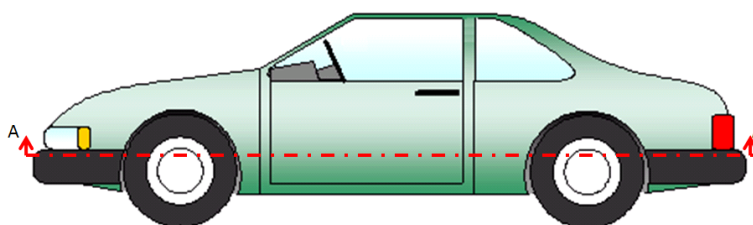
| Pt. | Pre-Test |       |        | Post-Test |       |        | Difference |    |    |
|-----|----------|-------|--------|-----------|-------|--------|------------|----|----|
|     | X        | Y     | Z      | X         | Y     | Z      | X          | Y  | Z  |
| 35  | 3434.5   | 745.6 | -581.9 | 3432.0    | 748.3 | -581.9 | -3         | 3  | 0  |
| 36  | 3376.8   | 729.5 | -639.1 | 3375.7    | 731.5 | -638.3 | -1         | 2  | 1  |
| 37  | 3310.4   | 716.5 | -680.3 | 3308.7    | 717.3 | -680.3 | -2         | 1  | 0  |
| 38  | 3243.2   | 704.8 | -717.7 | 3242.3    | 707.3 | -719.1 | -1         | 3  | -1 |
| 39  | 3172.8   | 690.0 | -752.3 | 3171.9    | 688.9 | -751.0 | -1         | -1 | 1  |
| 40  | 3100.0   | 674.8 | -785.1 | 3098.9    | 673.3 | -783.4 | -1         | -1 | 2  |
| 41  | 3027.5   | 660.3 | -814.0 | 3026.9    | 660.0 | -814.7 | -1         | 0  | -1 |
| 42  | 2953.2   | 647.6 | -840.4 | 2952.4    | 646.3 | -839.9 | -1         | -1 | 1  |
| 43  | 2875.6   | 636.2 | -862.4 | 2874.9    | 635.0 | -862.0 | -1         | -1 | 0  |
| 44  | 2796.3   | 627.1 | -880.0 | 2796.2    | 626.3 | -880.0 | 0          | -1 | 0  |
| 45  | 2717.2   | 620.2 | -892.6 | 2717.1    | 619.3 | -892.1 | 0          | -1 | 0  |
| 46  | 2637.8   | 615.9 | -902.2 | 2636.6    | 615.2 | -902.3 | -1         | -1 | 0  |
| 47  | 2555.8   | 612.7 | -907.2 | 2555.6    | 612.2 | -907.6 | 0          | -1 | 0  |
| 48  | 2474.3   | 611.6 | -912.0 | 2473.0    | 611.5 | -913.6 | -1         | 0  | -2 |
| 49  | 2394.9   | 610.8 | -912.4 | 2393.4    | 610.4 | -912.0 | -1         | 0  | 0  |
| 50  | 2319.9   | 611.4 | -908.1 | 2318.2    | 611.0 | -907.5 | -2         | 0  | 1  |
| 51  | 2352.9   | 703.7 | -757.6 | 2352.2    | 702.8 | -758.5 | -1         | -1 | -1 |
| 52  | 2396.3   | 764.0 | -595.2 | 2395.6    | 763.0 | -596.3 | -1         | -1 | -1 |
| 53  | 2444.3   | 802.4 | -425.4 | 2442.8    | 802.7 | -426.1 | -1         | 0  | -1 |
| 54  | 2458.6   | 826.9 | -247.9 | 2458.6    | 826.5 | -246.2 | 0          | 0  | 2  |
| 55  | 2495.0   | 821.0 | -71.3  | 2495.2    | 822.1 | -73.0  | 0          | 1  | -2 |
| 56  | 2540.4   | 831.7 | 110.9  | 2537.8    | 832.6 | 109.6  | -3         | 1  | -1 |
| 57  | 2669.3   | 831.9 | 117.5  | 2668.2    | 832.5 | 118.8  | -1         | 1  | 1  |
| 58  | 2799.4   | 832.2 | 126.4  | 2800.1    | 833.0 | 125.1  | 1          | 1  | -1 |
| 59  | 2934.9   | 832.0 | 117.4  | 2937.4    | 832.2 | 115.6  | 3          | 0  | -2 |
| 60  | 3064.1   | 832.1 | 118.2  | 3063.1    | 832.8 | 118.1  | -1         | 1  | 0  |
| 61  | 3193.1   | 830.4 | 116.1  | 3191.7    | 832.3 | 118.1  | -1         | 2  | 2  |
| 62  | 3315.8   | 831.6 | 107.3  | 3314.8    | 832.5 | 104.9  | -1         | 1  | -2 |
| 63  | 3392.8   | 807.6 | 18.7   | 3392.3    | 810.6 | 21.3   | 0          | 3  | 3  |
| 64  | 3430.8   | 788.5 | -127.4 | 3429.9    | 792.2 | -128.9 | -1         | 4  | -2 |
| 65  | 3424.5   | 755.8 | -277.6 | 3423.2    | 758.7 | -279.5 | -1         | 3  | -2 |
| 66  | 3412.5   | 750.6 | -424.9 | 3410.9    | 751.3 | -425.5 | -2         | 1  | -1 |

Note: See appendix F.2 for detailed procedure to measure required Door sill intrusion

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

|               |                                 |           |         |
|---------------|---------------------------------|-----------|---------|
| Test Vehicle: | 2011 Buick Lacrosse             | NHTSA No: | RB0180  |
| Test Program: | R&D 56mph, 7° angle, 20% offset | Test Date | 9/23/11 |

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



Reference point: Rear most center of the top of rear bumper beam  
 +X - From the rear of the vehicle to the front of the vehicle  
 +Y - From 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

| Pt. | Pre-Test |        |        | Pt. | Post-Test |        |        |
|-----|----------|--------|--------|-----|-----------|--------|--------|
|     | X        | Y      | Z      |     | X         | Y      | Z      |
| 1   | 822.9    | -914.5 | -125.3 | 1   | 849.3     | -917.7 | -147.5 |
| 2   | 650.0    | -869.1 | -131.0 | 2   | 650.9     | -878.2 | -138.8 |
| 3   | 330.3    | -789.6 | -127.7 | 3   | 342.2     | -797.4 | -130.2 |
| 4   | 232.6    | -748.2 | -124.8 | 4   | 220.7     | -742.8 | -124.5 |
| 5   | 165.5    | -677.7 | -122.4 | 5   | 163.2     | -681.8 | -120.6 |
| 6   | 114.7    | -570.8 | -125.9 | 6   | 93.9      | -535.4 | -112.3 |
| 7   | 44.3     | -312.8 | -122.9 | 7   | 39.0      | -340.2 | -99.0  |
| 8   | 7.1      | -2.5   | -115.2 | 8   | -6.5      | -1.4   | -78.7  |
| 9   | 37.5     | 294.0  | -104.8 | 9   | 19.9      | 293.5  | -60.0  |
| 10  | 127.5    | 611.5  | -108.8 | 10  | 122.3     | 650.5  | -42.5  |
| 11  | 193.2    | 718.2  | -115.6 | 11  | 185.8     | 736.6  | -42.8  |
| 12  | 286.0    | 778.2  | -120.0 | 12  | 277.3     | 790.7  | -40.2  |
| 13  | 494.9    | 833.0  | -123.6 | 13  | 594.9     | 865.2  | -41.1  |
| 14  | 822.2    | 916.2  | -124.4 | 14  | 782.0     | 913.3  | -45.0  |
| 15  | 1462.3   | 925.9  | -130.6 | 15  | 1494.3    | 920.3  | -63.3  |
| 16  | 1818.2   | 902.9  | -128.2 | 16  | 1709.4    | 900.2  | -64.5  |
| 17  | 2408.8   | 903.7  | -129.2 | 17  | 2152.9    | 896.8  | -75.8  |
| 18  | 3005.2   | 903.2  | -127.4 | 18  | 2405.1    | 899.2  | -78.7  |
| 19  | 3510.4   | 907.4  | -125.6 | 19  | 2886.9    | 902.0  | -90.9  |
| 20  | 3661.6   | 923.7  | -122.7 | 20  | 3372.8    | 902.2  | -101.8 |
| 21  | 4295.5   | 910.0  | -124.8 | 21  | 3646.8    | 927.5  | -106.3 |
| 22  | 4438.1   | 867.7  | -127.3 | 22  | 4262.6    | 911.1  | -136.4 |
| 23  | 4654.8   | 784.3  | -125.4 | 23  | 4325.6    | 872.9  | -139.1 |
| 24  | 4729.0   | 720.4  | -128.8 | 24  | 4377.2    | 836.1  | -144.3 |

Note:

See appendix F.3 for a detailed procedure on how to measure vehicle exterior crush profile

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

|                                               |                    |
|-----------------------------------------------|--------------------|
| Test Vehicle: 2011 Buick Lacrosse             | NHTSA No: RB0180   |
| Test Program: R&D 56mph, 7° angle, 20% offset | Test Date: 9/23/11 |

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

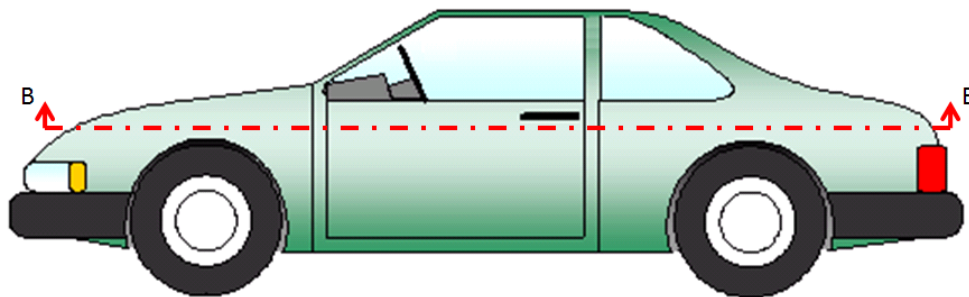
| Pt. | Pre-Test |        |        | Pt. | Post-Test |        |        |
|-----|----------|--------|--------|-----|-----------|--------|--------|
|     | X        | Y      | Z      |     | X         | Y      | Z      |
| 25  | 4792.7   | 622.4  | -133.2 | 25  | 4461.4    | 829.4  | -148.0 |
| 26  | 4894.3   | 371.8  | -130.4 | 26  | 4579.3    | 807.5  | -143.8 |
| 27  | 4954.2   | -3.6   | -116.8 | 27  | 4672.2    | 755.6  | -154.1 |
| 28  | 4911.0   | -323.2 | -126.1 | 28  | 4747.8    | 657.4  | -159.5 |
| 29  | 4806.2   | -596.2 | -131.7 | 29  | 4835.8    | 499.1  | -170.8 |
| 30  | 4727.1   | -722.8 | -131.5 | 30  | 4850.2    | 423.1  | -175.3 |
| 31  | 4675.6   | -771.2 | -130.4 | 31  | 4826.3    | 371.6  | -171.2 |
| 32  | 4613.8   | -807.2 | -126.4 | 32  | 4826.1    | 252.3  | -184.5 |
| 33  | 4293.1   | -913.4 | -127.5 | 33  | 4690.2    | 121.5  | -184.2 |
| 34  | 3673.8   | -924.7 | -136.2 | 34  | 4679.2    | -72.0  | -224.9 |
| 35  | 3513.2   | -907.3 | -133.4 | 35  | 4675.2    | -122.8 | -232.9 |
| 36  | 2998.9   | -902.7 | -124.0 | 36  | 4791.5    | -201.3 | -226.0 |
| 37  | 2419.0   | -905.0 | -127.6 | 37  | 4738.2    | -393.0 | -232.6 |
| 38  | 1989.5   | -902.3 | -127.9 | 38  | 4692.0    | -507.8 | -235.5 |
| 39  | 1526.1   | -919.2 | -130.9 | 39  | 4507.9    | -531.6 | -236.5 |
| 40  | 1458.2   | -923.1 | -129.6 | 40  | 4435.3    | -491.9 | -229.2 |
| 41  | 822.9    | -914.5 | -125.3 | 41  | 4293.3    | -482.6 | -227.8 |
|     |          |        |        | 42  | 4282.4    | -545.3 | -235.8 |
|     |          |        |        | 43  | 4009.4    | -599.0 | -224.4 |
|     |          |        |        | 44  | 3888.7    | -578.7 | -220.8 |
|     |          |        |        | 45  | 3924.1    | -713.6 | -229.1 |
|     |          |        |        | 46  | 3926.2    | -736.6 | -234.1 |
|     |          |        |        | 47  | 3831.9    | -799.5 | -233.4 |
|     |          |        |        | 48  | 3561.8    | -849.2 | -219.6 |
|     |          |        |        | 49  | 3542.9    | -824.3 | -218.3 |
|     |          |        |        | 50  | 3496.9    | -927.6 | -221.2 |
|     |          |        |        | 51  | 3474.3    | -891.1 | -221.7 |
|     |          |        |        | 52  | 3028.6    | -927.3 | -210.9 |
|     |          |        |        | 53  | 2785.1    | -936.4 | -206.4 |
|     |          |        |        | 54  | 2604.6    | -959.9 | -204.2 |
|     |          |        |        | 55  | 2463.4    | -958.6 | -200.8 |
|     |          |        |        | 56  | 2402.8    | -910.8 | -193.6 |
|     |          |        |        | 57  | 2355.9    | -905.0 | -193.8 |
|     |          |        |        | 58  | 2095.9    | -905.8 | -191.5 |
|     |          |        |        | 59  | 1862.9    | -904.6 | -186.1 |
|     |          |        |        | 60  | 1506.3    | -919.8 | -179.5 |
|     |          |        |        | 61  | 1397.5    | -926.3 | -175.1 |
|     |          |        |        | 62  | 849.3     | -917.7 | -147.5 |

Note: See appendix F.3 for a detailed procedure on how to measure vehicle exterior crush profile

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

|               |                                            |           |                |
|---------------|--------------------------------------------|-----------|----------------|
| Test Vehicle: | <u>2011 Buick Lacrosse</u>                 | NHTSA No: | <u>RB0180</u>  |
| Test Program: | <u>R&amp;D 56mph, 7° angle, 20% offset</u> | Test Date | <u>9/23/11</u> |

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



Reference point: Rear most center of the top of rear bumper beam  
 +X - From the rear of the vehicle to the front of the vehicle  
 +Y - From 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

| Pt. | Pre-Test |        |        | Pt. | Post-Test |        |        |
|-----|----------|--------|--------|-----|-----------|--------|--------|
|     | X        | Y      | Z      |     | X         | Y      | Z      |
| 1   | 1137.8   | -921.0 | -333.8 | 1   | 1138.4    | -916.6 | -345.9 |
| 2   | 991.2    | -910.0 | -332.6 | 2   | 995.5     | -907.0 | -343.9 |
| 3   | 691.3    | -861.8 | -325.4 | 3   | 689.3     | -860.8 | -332.3 |
| 4   | 393.5    | -798.9 | -328.1 | 4   | 564.2     | -838.5 | -330.0 |
| 5   | 289.3    | -740.2 | -319.8 | 5   | 386.2     | -811.8 | -326.8 |
| 6   | 222.6    | -650.1 | -310.5 | 6   | 286.7     | -746.7 | -317.2 |
| 7   | 153.2    | -450.3 | -324.2 | 7   | 211.5     | -638.7 | -307.4 |
| 8   | 131.8    | -350.7 | -326.9 | 8   | 138.0     | -427.4 | -300.8 |
| 9   | 137.2    | -258.3 | -319.7 | 9   | 88.7      | -17.5  | -280.4 |
| 10  | 132.2    | 1.4    | -316.1 | 10  | 124.1     | 360.4  | -253.5 |
| 11  | 130.9    | 269.6  | -306.8 | 11  | 96.0      | 395.9  | -251.8 |
| 12  | 130.7    | 346.4  | -314.0 | 12  | 167.9     | 637.4  | -234.6 |
| 13  | 149.7    | 426.7  | -312.0 | 13  | 234.9     | 729.7  | -237.9 |
| 14  | 240.6    | 686.6  | -312.5 | 14  | 353.4     | 801.8  | -238.0 |
| 15  | 293.1    | 753.1  | -309.9 | 15  | 527.4     | 847.8  | -235.1 |
| 16  | 358.0    | 793.0  | -312.9 | 16  | 707.3     | 876.2  | -242.0 |
| 17  | 490.8    | 827.5  | -315.0 | 17  | 992.4     | 929.2  | -245.8 |
| 18  | 706.6    | 865.8  | -321.0 | 18  | 1281.4    | 931.8  | -245.8 |
| 19  | 1007.9   | 914.6  | -333.9 | 19  | 1610.2    | 910.9  | -247.1 |
| 20  | 1155.8   | 925.3  | -333.0 | 20  | 2011.8    | 909.5  | -255.8 |

Note:  
 See appendix F.3 for a detailed procedure on how to measure vehicle exterior crush profile

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

|                                               |                    |
|-----------------------------------------------|--------------------|
| Test Vehicle: 2011 Buick Lacrosse             | NHTSA No: RB0180   |
| Test Program: R&D 56mph, 7° angle, 20% offset | Test Date: 9/23/11 |

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

| Pt. | Pre-Test |        |        | Pt. | Post-Test |        |        |
|-----|----------|--------|--------|-----|-----------|--------|--------|
|     | X        | Y      | Z      |     | X         | Y      | Z      |
| 21  | 1207.6   | 925.0  | -335.4 | 21  | 2406.2    | 907.9  | -265.1 |
| 22  | 1309.9   | 919.4  | -334.4 | 22  | 2940.8    | 908.5  | -276.8 |
| 23  | 1616.3   | 905.1  | -333.1 | 23  | 3308.8    | 902.2  | -284.8 |
| 24  | 1921.5   | 908.1  | -331.1 | 24  | 3629.6    | 905.9  | -292.7 |
| 25  | 2225.9   | 907.4  | -333.8 | 25  | 3851.7    | 927.8  | -297.4 |
| 26  | 2530.3   | 908.2  | -329.5 | 26  | 3912.9    | 935.4  | -293.6 |
| 27  | 2909.4   | 907.4  | -326.8 | 27  | 4028.2    | 933.6  | -295.1 |
| 28  | 3137.4   | 904.1  | -321.5 | 28  | 4351.4    | 858.7  | -306.1 |
| 29  | 3445.2   | 894.9  | -322.4 | 29  | 4557.7    | 785.7  | -315.4 |
| 30  | 3752.6   | 901.8  | -328.9 | 30  | 4639.3    | 708.3  | -321.8 |
| 31  | 3827.4   | 902.8  | -335.1 | 31  | 4725.7    | 564.7  | -328.9 |
| 32  | 3892.4   | 902.4  | -335.6 | 32  | 4631.2    | 439.4  | -333.1 |
| 33  | 4052.1   | 892.3  | -336.2 | 33  | 4698.4    | 395.8  | -336.4 |
| 34  | 4351.0   | 836.3  | -319.6 | 34  | 4688.7    | 336.2  | -337.8 |
| 35  | 4508.4   | 781.0  | -325.7 | 35  | 4759.5    | 295.2  | -343.7 |
| 36  | 4591.5   | 730.9  | -323.8 | 36  | 4728.9    | 243.6  | -347.4 |
| 37  | 4658.9   | 649.8  | -315.4 | 37  | 4740.5    | 194.0  | -350.1 |
| 38  | 4774.9   | 414.9  | -320.3 | 38  | 4790.4    | 202.7  | -350.9 |
| 39  | 4866.1   | -1.8   | -322.0 | 39  | 4822.5    | 100.6  | -354.1 |
| 40  | 4779.2   | -428.2 | -312.7 | 40  | 4846.4    | -315.2 | -389.9 |
| 41  | 4717.2   | -546.5 | -312.0 | 41  | 4780.6    | -282.7 | -386.3 |
| 42  | 4622.5   | -693.8 | -326.0 | 42  | 4619.7    | -317.8 | -378.3 |
| 43  | 4567.3   | -751.0 | -329.5 | 43  | 4562.4    | -419.3 | -392.7 |
| 44  | 4493.6   | -789.0 | -330.6 | 44  | 4413.7    | -413.1 | -385.4 |
| 45  | 4354.5   | -834.9 | -331.7 | 45  | 4232.1    | -358.7 | -382.9 |
| 46  | 4053.7   | -889.0 | -344.7 | 46  | 4211.4    | -423.5 | -392.6 |
| 47  | 3922.2   | -899.1 | -345.6 | 47  | 4030.0    | -447.9 | -383.2 |
| 48  | 3875.1   | -900.4 | -342.7 | 48  | 3892.9    | -552.5 | -383.9 |
| 49  | 3750.7   | -898.6 | -338.6 | 49  | 3866.8    | -656.6 | -383.3 |
| 50  | 3442.6   | -895.2 | -330.0 | 50  | 3776.2    | -762.6 | -387.7 |
| 51  | 3136.5   | -901.7 | -324.9 | 51  | 3662.5    | -823.4 | -387.7 |
| 52  | 2829.0   | -905.4 | -329.4 | 52  | 3640.8    | -821.8 | -392.4 |
| 53  | 2523.1   | -908.1 | -327.7 | 53  | 3638.7    | -800.5 | -389.5 |
| 54  | 2217.5   | -907.4 | -329.6 | 54  | 3588.7    | -810.2 | -386.9 |

Note:  
See appendix F.3 for a detailed procedure on how to measure vehicle exterior crush profile

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

|                                                          |                           |
|----------------------------------------------------------|---------------------------|
| Test Vehicle: <u>2011 Buick Lacrosse</u>                 | NHTSA No: <u>RB0180</u>   |
| Test Program: <u>R&amp;D 56mph, 7° angle, 20% offset</u> | Test Date: <u>9/23/11</u> |

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

| Pt. | Pre-Test |        |        | Pt. | Post-Test |        |        |
|-----|----------|--------|--------|-----|-----------|--------|--------|
|     | X        | Y      | Z      |     | X         | Y      | Z      |
| 55  | 1912.1   | -905.9 | -326.1 | 55  | 3565.0    | -852.8 | -386.5 |
| 56  | 1605.2   | -903.8 | -326.8 | 56  | 3509.9    | -893.7 | -390.3 |
| 57  | 1297.5   | -917.0 | -331.0 | 57  | 3483.3    | -941.4 | -393.4 |
| 58  | 1167.8   | -921.9 | -331.3 | 58  | 3461.5    | -880.0 | -389.1 |
| 59  | 1137.8   | -921.0 | -333.8 | 59  | 3138.7    | -924.0 | -384.5 |
|     |          |        |        | 60  | 2787.0    | -944.6 | -376.0 |
|     |          |        |        | 61  | 2615.1    | -957.2 | -372.5 |
|     |          |        |        | 62  | 2399.9    | -903.3 | -353.6 |
|     |          |        |        | 63  | 2212.3    | -904.0 | -357.4 |
|     |          |        |        | 64  | 1913.1    | -904.5 | -356.1 |
|     |          |        |        | 65  | 1604.2    | -904.0 | -352.8 |
|     |          |        |        | 66  | 1295.1    | -915.9 | -340.9 |
|     |          |        |        | 67  | 1169.4    | -920.0 | -341.5 |
|     |          |        |        | 68  | 1138.4    | -916.6 | -345.9 |

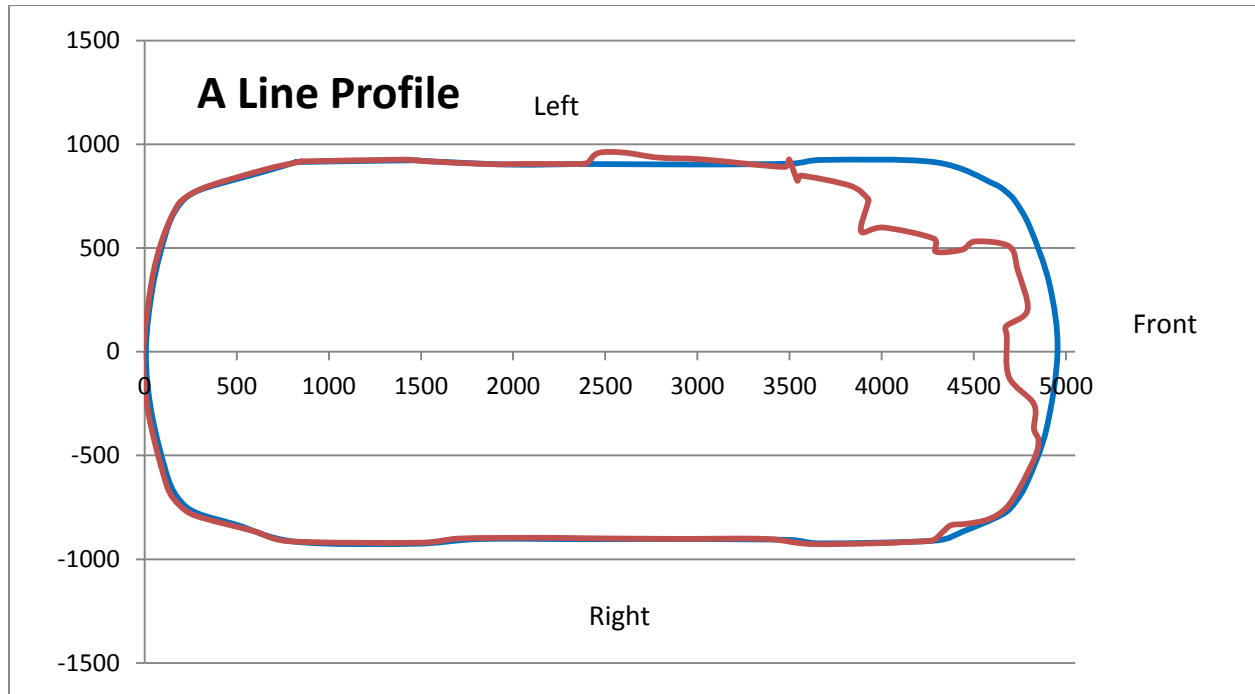
Note:  
 See appendix F.3 for a detailed procedure on how to measure vehicle exterior crush profile



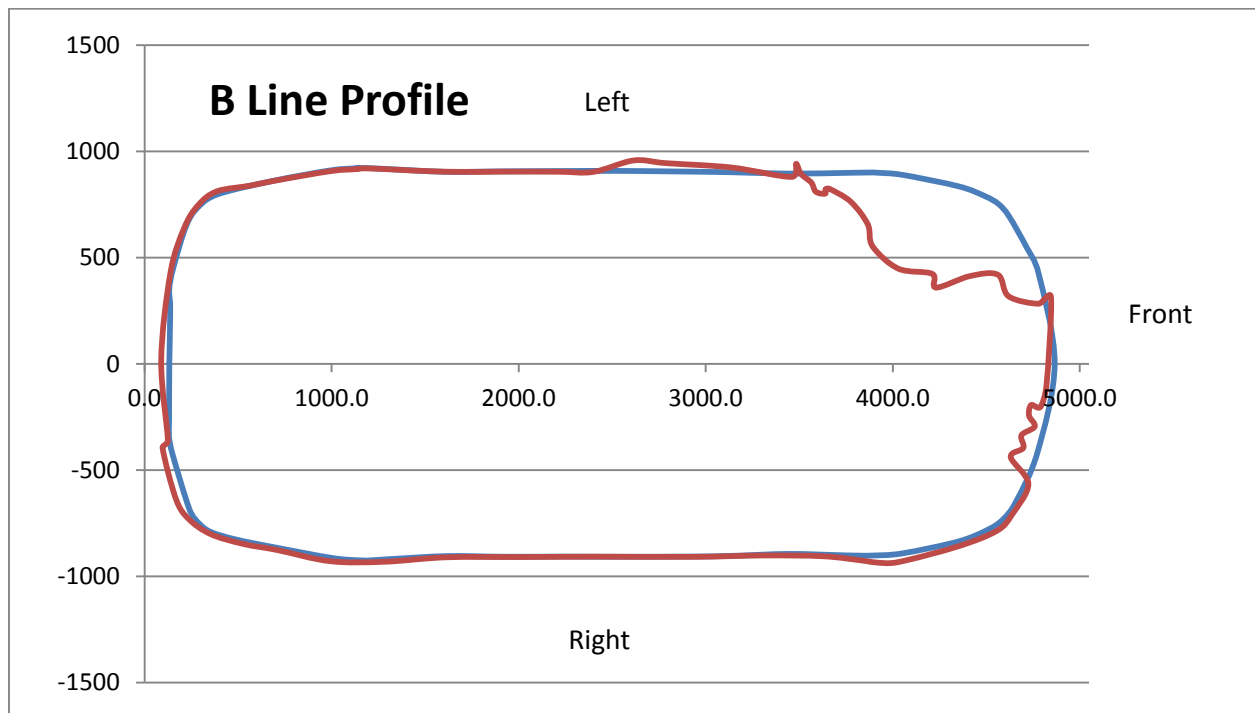
**DATA SHEET NO.13 (CONTINUED)**  
**VEHICLE INTRUSION MEASUREMENTS**

|               |                                            |           |                |
|---------------|--------------------------------------------|-----------|----------------|
| Test Vehicle: | <u>2011 Buick Lacrosse</u>                 | NHTSA No: | <u>RB0180</u>  |
| Test Program: | <u>R&amp;D 56mph, 7° angle, 20% offset</u> | Test Date | <u>9/23/11</u> |

**SECTION A-A**



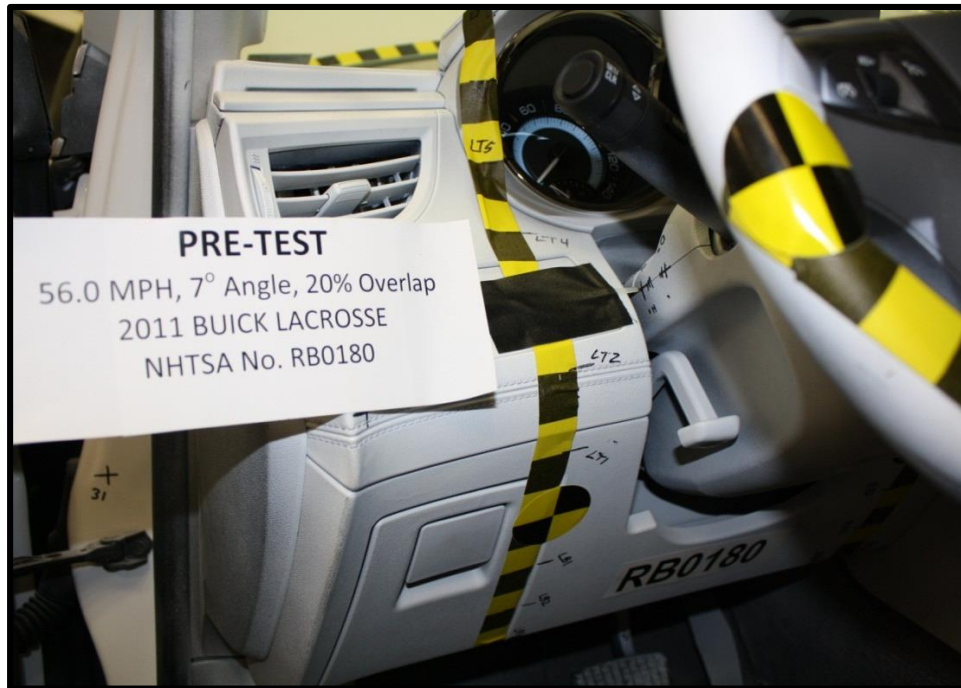
**SECTION B-B**



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

|               |                                            |           |                |
|---------------|--------------------------------------------|-----------|----------------|
| Test Vehicle: | <u>2011 Buick Lacrosse</u>                 | NHTSA No: | <u>RB0180</u>  |
| Test Program: | <u>R&amp;D 56mph, 7° angle, 20% offset</u> | Test Date | <u>9/23/11</u> |

## **Left Profile of the Dash**



| Points | Pre-Test (mm) |        |        | Post-Test (mm) |        |        | Difference (mm) |      |       |
|--------|---------------|--------|--------|----------------|--------|--------|-----------------|------|-------|
|        | X             | Y      | Z      | X              | Y      | Z      | X               | Y    | Z     |
| LB3    | 3311.5        | -524.2 | -135.1 | 3250.1         | -509.0 | -140.3 | -61.4           | 15.2 | -5.2  |
| LB2    | 3278.6        | -524.2 | -171.3 | 3214.7         | -505.1 | -178.6 | -63.8           | 19.2 | -7.3  |
| LB1    | 3246.0        | -523.7 | -211.4 | 3182.2         | -501.5 | -216.9 | -63.8           | 22.2 | -5.6  |
| DIPL   | 3217.5        | -525.0 | -251.2 | 3151.5         | -496.8 | -256.5 | -66.0           | 28.2 | -5.3  |
| LT1    | 3187.2        | -523.8 | -294.6 | 3121.0         | -495.9 | -299.1 | -66.2           | 27.9 | -4.5  |
| LT2    | 3173.5        | -523.5 | -342.2 | 3122.5         | -492.7 | -362.8 | -51.0           | 30.8 | -20.6 |
| LT3    | 3203.4        | -523.4 | -381.3 | 3150.9         | -500.2 | -400.3 | -52.5           | 23.2 | -19.0 |
| LT4    | 3238.7        | -522.9 | -416.5 | 3183.3         | -503.5 | -435.5 | -55.4           | 19.4 | -19.0 |
| LT5    | 3260.1        | -523.6 | -460.1 | 3205.4         | -504.9 | -481.0 | -54.8           | 18.7 | -20.8 |
| LT6    | 3264.7        | -522.3 | -511.0 | 3208.1         | -503.9 | -531.0 | -56.6           | 18.4 | -20.0 |
| LT7    | 3261.5        | -524.0 | -561.1 | 3203.2         | -505.1 | -581.7 | -58.3           | 18.9 | -20.6 |

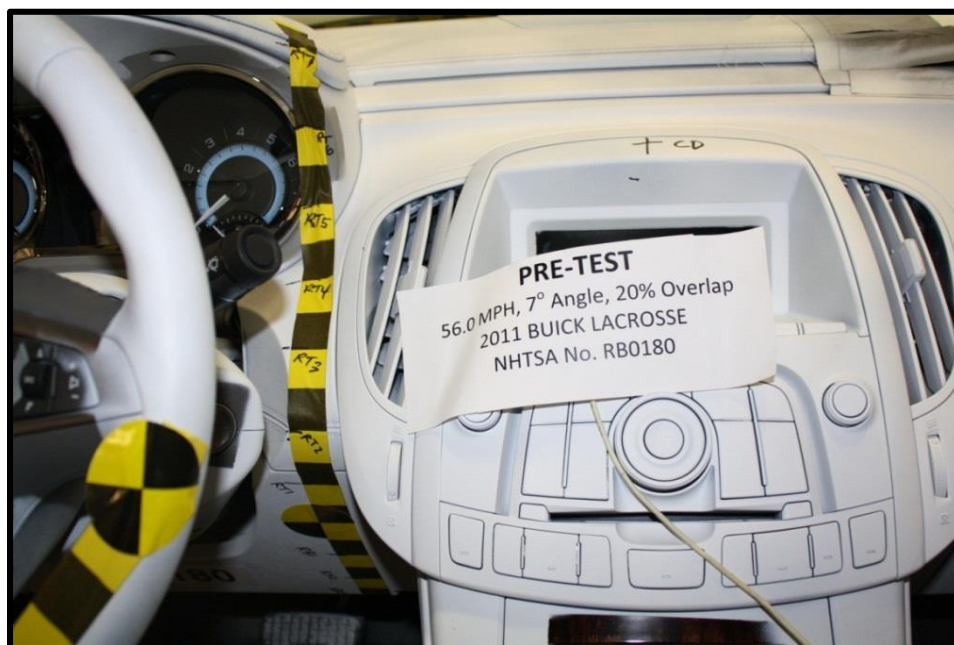
Reference point: Rear most center of the top of rear bumper beam  
 +X - From the rear of the vehicle to the front of the vehicle  
 +Y - From left side of the vehicle to the right side of the vehicle  
 +Z - From the top of the vehicle to the bottom of the vehicle

Note: See Appendix F.4 for a detailed procedure on how to measure the required profile dash.

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

|               |                                            |           |                |
|---------------|--------------------------------------------|-----------|----------------|
| Test Vehicle: | <u>2011 Buick Lacrosse</u>                 | NHTSA No: | <u>RB0180</u>  |
| Test Program: | <u>R&amp;D 56mph, 7° angle, 20% offset</u> | Test Date | <u>9/23/11</u> |

## **Right Profile of the Dash**



| Points | Pre-Test (mm) |        |        | Post-Test (mm) |        |        | Difference (mm) |      |       |
|--------|---------------|--------|--------|----------------|--------|--------|-----------------|------|-------|
|        | X             | Y      | Z      | X              | Y      | Z      | X               | Y    | Z     |
| RB3    | 3319.3        | -228.5 | -135.0 | 3290.4         | -219.7 | -140.4 | -28.9           | 8.9  | -5.4  |
| RB2    | 3287.0        | -225.4 | -170.7 | 3257.4         | -214.0 | -177.0 | -29.6           | 11.5 | -6.3  |
| RB1    | 3256.2        | -225.7 | -209.7 | 3224.1         | -209.7 | -216.1 | -32.1           | 16.0 | -6.4  |
| DIPR   | 3225.5        | -225.8 | -253.4 | 3193.9         | -205.6 | -256.5 | -31.6           | 20.2 | -3.1  |
| RT1    | 3198.3        | -223.9 | -297.0 | 3166.1         | -202.4 | -298.9 | -32.2           | 21.5 | -1.8  |
| RT2    | 3181.6        | -222.7 | -341.0 | 3153.7         | -201.8 | -345.1 | -27.9           | 21.0 | -4.1  |
| RT3    | 3205.1        | -223.0 | -387.0 | 3174.6         | -203.0 | -395.3 | -30.5           | 19.9 | -8.3  |
| RT4    | 3243.3        | -222.8 | -418.8 | 3208.1         | -204.6 | -430.0 | -35.2           | 18.1 | -11.2 |
| RT5    | 3259.6        | -224.3 | -463.5 | 3220.4         | -202.4 | -480.5 | -39.2           | 21.9 | -17.0 |
| RT6    | 3265.1        | -222.5 | -511.9 | 3233.9         | -187.9 | -521.6 | -31.3           | 34.6 | -9.7  |
| RT7    | 3265.1        | -222.0 | -565.8 | 3221.7         | -201.8 | -581.4 | -43.4           | 20.2 | -15.6 |

Reference point: Rear most center of the top of rear bumper beam  
 +X - From the rear of the vehicle to the front of the vehicle  
 +Y - From 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

Note: See Appendix F.4 for a detailed procedure on how to measure the required profile dash.

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

|                                               |                    |
|-----------------------------------------------|--------------------|
| Test Vehicle: 2011 Buick Lacrosse             | NHTSA No: RB0180   |
| Test Program: R&D 56mph, 7° angle, 20% offset | Test Date: 9/23/11 |

|                        | Points | Pre-Test (mm) |        |        | Post-Test (mm) |        |        | Difference (mm) |     |      |
|------------------------|--------|---------------|--------|--------|----------------|--------|--------|-----------------|-----|------|
|                        |        | X             | Y      | Z      | X              | Y      | Z      | X               | Y   | Z    |
| Lower Bumper Beam      | 1      | 4703.9        | -693.7 | 27.5   | 4508.3         | -534.2 | -182.5 | -196            | 159 | -210 |
|                        | 2      | 4822.2        | -431.7 | 23.8   | 4734.9         | -418.1 | -157.8 | -87             | 14  | -182 |
|                        | 3      | 4870.5        | -145.1 | 46.0   | 4811.7         | -145.8 | -88.5  | -59             | -1  | -134 |
|                        | 4      | 4870.5        | 151.3  | 37.5   | 4840.2         | 148.1  | -47.0  | -30             | -3  | -84  |
|                        | 5      | 4820.8        | 439.6  | 11.6   | 4817.5         | 439.4  | -21.6  | -3              | 0   | -33  |
|                        | 6      | 4698.9        | 700.2  | 19.9   | 4720.3         | 704.8  | 34.7   | 21              | 5   | 15   |
| Upper Bumper Beam      | 1      | 4710.7        | -682.5 | -39.1  | 4528.0         | -525.2 | -246.8 | -183            | 157 | -208 |
|                        | 2      | 4823.0        | -429.9 | -44.6  | 4734.6         | -404.8 | -225.8 | -88             | 25  | -181 |
|                        | 3      | 4870.5        | -145.2 | -66.3  | 4810.1         | -124.6 | -196.0 | -60             | 21  | -130 |
|                        | 4      | 4870.7        | 145.4  | -67.5  | 4838.3         | 160.1  | -150.2 | -32             | 15  | -83  |
|                        | 5      | 4822.3        | 433.1  | -54.1  | 4817.4         | 444.3  | -87.9  | -5              | 11  | -34  |
|                        | 6      | 4721.3        | 662.9  | -58.4  | 4737.8         | 679.9  | -50.6  | 17              | 17  | 8    |
| Upper Radiator Support | 1      | 4614.0        | -466.5 | -307.5 | 4484.1         | -391.2 | -487.2 | -130            | 75  | -180 |
|                        | 2      | 4654.5        | -280.2 | -308.5 | 4534.2         | -208.1 | -476.4 | -120            | 72  | -168 |
|                        | 3      | 4657.4        | -90.4  | -310.3 | 4542.2         | -22.7  | -448.4 | -115            | 68  | -138 |
|                        | 4      | 4660.5        | 99.8   | -310.4 | 4583.9         | 154.3  | -407.4 | -77             | 55  | -97  |
|                        | 5      | 4658.6        | 286.0  | -310.7 | 4637.8         | 325.7  | -360.6 | -21             | 40  | -50  |
|                        | 6      | 4611.2        | 462.9  | -310.0 | 4604.6         | 493.1  | -324.8 | -7              | 30  | -15  |

\*Points unrecoverable, support beam was destroyed in crash

Reference point: Rear most center of the top of rear bumper beam

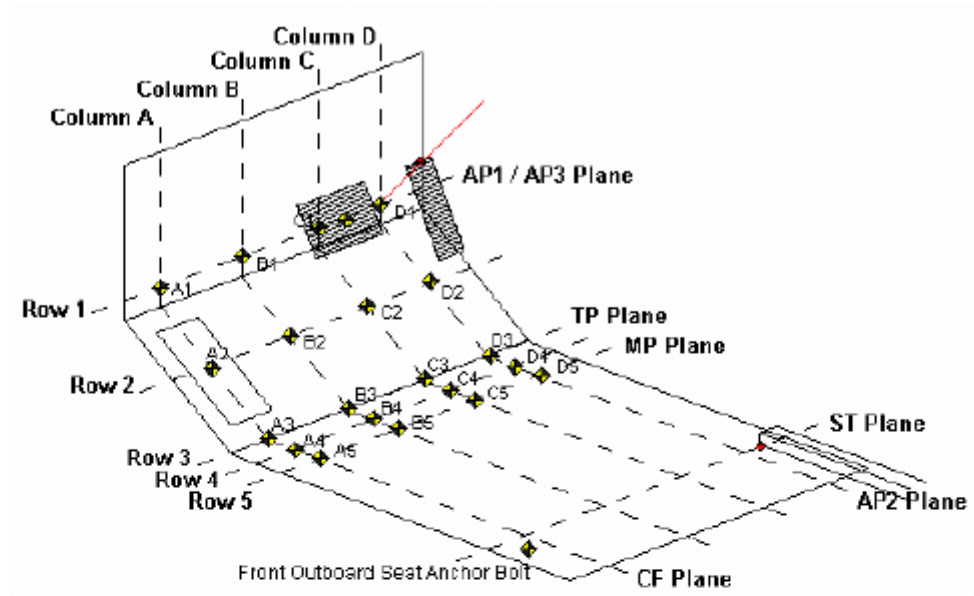
+X - From the rear of the vehicle to the front of the vehicle

+Y - From left side of the vehicle to the right side of the vehicle

+Z - From the top of the vehicle to the bottom of the vehicle

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

|                                               |                    |
|-----------------------------------------------|--------------------|
| Test Vehicle: 2011 Buick Lacrosse             | NHTSA No: RB0180   |
| Test Program: R&D 56mph, 7° angle, 20% offset | Test Date: 9/23/11 |



AP1: Y-Z Plane passing through D1

AP2: X-Z Plane passing through D1

AP3: X-Y plane passing through D1

MP: Y-Z plane, halfway between the ST plane and AP1 plane

CF Plane: X-Z plane passes through center of footrest.

BP Plane: X-Z plane passes through center of brake pedal

TP Plane: Y-Z plane, intersection of BP Plane and the intersection of the toe pan and floorboard

Column A: intersection of vehicle and CF plane

Column D: Intersection of vehicle and AP2 plane

Row 1: intersection of the vehicle and the AP3 Plane

Row 3: intersection of the vehicle and TP plane

Row 5: intersection of the vehicle and MP plane

Row 2: evenly spaced between row 1 and 3

Row 4: evenly spaced between row 3 and 5

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

|                                               |                    |
|-----------------------------------------------|--------------------|
| Test Vehicle: 2011 Buick Lacrosse             | NHTSA No: RB0180   |
| Test Program: R&D 56mph, 7° angle, 20% offset | Test Date: 9/23/11 |

| Intrusion Location  | Pre-Test (mm) |        |        | Post-Test (mm) |        |        | Difference (mm) |       |       |
|---------------------|---------------|--------|--------|----------------|--------|--------|-----------------|-------|-------|
|                     | X             | Y      | Z      | X              | Y      | Z      | X               | Y     | Z     |
| A1                  | 3589.8        | -577.1 | 73.0   | 3528.7         | -537.9 | 55.6   | -61.1           | 39.3  | -17.4 |
| B1                  | 3670.1        | -437.3 | 81.1   | 3631.3         | -419.3 | 44.7   | -38.8           | 18.0  | -36.4 |
| C1                  | 3694.1        | -304.3 | 73.9   | 3659.2         | -290.8 | 56.1   | -34.9           | 13.4  | -17.8 |
| D1                  | 3672.8        | -171.5 | 81.5   | 3643.9         | -157.2 | 74.7   | -28.8           | 14.3  | -6.8  |
| A2                  | 3570.8        | -565.8 | 169.4  | 3541.1         | -546.2 | 155.8  | -29.7           | 19.6  | -13.6 |
| B2                  | 3530.8        | -428.9 | 170.0  | 3524.5         | -420.3 | 164.9  | -6.3            | 8.5   | -5.0  |
| C2                  | 3566.2        | -304.5 | 169.7  | 3552.0         | -289.2 | 177.1  | -14.2           | 15.3  | 7.4   |
| D2                  | 3597.0        | -173.0 | 172.8  | 3593.7         | -163.2 | 178.6  | -3.2            | 9.9   | 5.8   |
| A3                  | 3458.2        | -571.0 | 222.4  | 3453.0         | -557.8 | 230.7  | -5.2            | 13.2  | 8.2   |
| B3                  | 3447.6        | -436.3 | 203.8  | 3445.7         | -428.7 | 210.0  | -1.9            | 7.6   | 6.2   |
| C3                  | 3452.9        | -300.9 | 239.1  | 3446.4         | -289.6 | 254.3  | -6.5            | 11.3  | 15.2  |
| D3                  | 3453.8        | -172.9 | 241.9  | 3451.0         | -163.3 | 253.5  | -2.8            | 9.5   | 11.5  |
| A4                  | 3382.8        | -569.8 | 233.6  | 3378.1         | -557.0 | 242.5  | -4.6            | 12.8  | 8.9   |
| B4                  | 3383.9        | -434.0 | 208.6  | 3380.3         | -425.1 | 221.8  | -3.6            | 8.9   | 13.2  |
| C4                  | 3387.0        | -303.3 | 244.0  | 3384.3         | -288.6 | 267.9  | -2.7            | 14.7  | 23.9  |
| D4                  | 3382.5        | -168.7 | 240.3  | 3379.0         | -158.1 | 251.2  | -3.4            | 10.6  | 10.9  |
| A5                  | 3306.8        | -566.8 | 233.8  | 3301.5         | -554.9 | 242.1  | -5.3            | 11.9  | 8.3   |
| B5                  | 3304.1        | -436.6 | 209.7  | 3304.0         | -430.1 | 227.8  | -0.1            | 6.5   | 18.0  |
| C5                  | 3298.7        | -300.8 | 244.6  | 3298.9         | -291.2 | 257.8  | 0.2             | 9.5   | 13.1  |
| D5                  | 3300.2        | -167.9 | 243.2  | 3299.4         | -160.7 | 253.4  | -0.8            | 7.2   | 10.2  |
| Brake Pedal         | 3480.1        | -335.8 | 30.6   | 3527.2         | -375.7 | 22.0   | 47.1            | -39.9 | -8.6  |
| IP Left             | 3217.5        | -525.0 | -251.2 | 3151.5         | -496.8 | -256.5 | -66.0           | 28.2  | -5.3  |
| IP Right            | 3225.5        | -225.8 | -253.4 | 3193.9         | -205.6 | -256.5 | -31.6           | 20.2  | -3.1  |
| Steering Column     | 3014.3        | -372.9 | -462.4 | 2973.0         | -337.6 | -453.8 | -41.3           | 35.3  | 8.6   |
| Front Outboard Bolt | 2904.2        | -597.9 | 109.4  | 2931.4         | -590.7 | 131.9  | 27.2            | 7.1   | 22.5  |

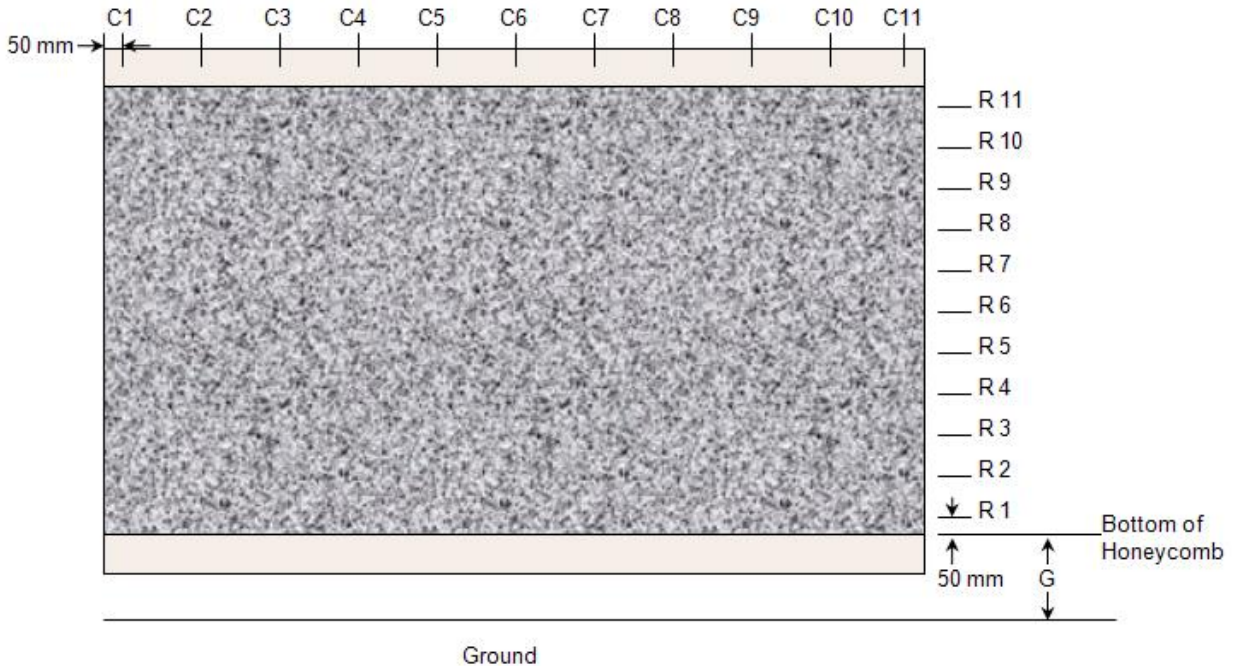
Reference point: Rear most center of the top of rear bumper beam

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



# **DATA SHEET NO.14** **MDB CRUSH MEASUREMENTS**

Test Vehicle: 2011 Buick Lacrosse NHTSA No: RB0180  
 Test Program: R&D 56mph, 7° angle, 20% offset Test Date: 9/23/11



## **BARRIER X-CRUSH**

|     |       | C1    | C2     | C3     | C4     | C5     | C6      | C7      | C8      | C9      | C10     | C11     |
|-----|-------|-------|--------|--------|--------|--------|---------|---------|---------|---------|---------|---------|
|     |       | 50mm  | 260 mm | 470 mm | 680 mm | 890 mm | 1100 mm | 1310 mm | 1520 mm | 1730 mm | 1940 mm | 2150 mm |
| R11 | 910mm | -9.1  | -6.2   | -4.7   | -3.9   | -2.3   | -1.0    | 0.2     | 1.3     | 2.2     | 12.1    | 32.2    |
| R10 | 824mm | -11.0 | -9.4   | -8.4   | -7.4   | -5.9   | -4.7    | -2.9    | -1.8    | -0.1    | 16.0    | 84.5    |
| R9  | 738mm | -12.4 | -11.1  | -10.0  | -8.9   | -7.4   | -5.9    | -4.6    | -2.9    | 3.1     | 59.4    | 147.7   |
| R8  | 652mm | -13.6 | -12.3  | -11.4  | -10.2  | -8.4   | -7.4    | -5.8    | -4.2    | 16.4    | 123.0   | 194.7   |
| R7  | 566mm | -15.1 | -13.9  | -12.8  | -11.5  | -9.9   | -8.8    | -7.1    | -5.2    | 13.5    | 189.3   | 219.5   |
| R6  | 480mm | -16.3 | -14.8  | -13.8  | -12.4  | -11.1  | -10.0   | -8.3    | -5.6    | 87.9    | 154.1   | 232.3   |
| R5  | 384mm | -17.6 | -16.3  | -15.0  | -13.7  | -12.4  | -11.1   | -9.7    | -4.2    | 113.4   | 171.6   | 192.8   |
| R4  | 308mm | -18.9 | -17.5  | -16.4  | -15.0  | -13.7  | -12.3   | -10.9   | -1.6    | 129.4   | 206.9   | 158.5   |
| R3  | 222mm | -20.0 | -18.9  | -17.4  | -16.0  | -14.9  | -13.5   | -12.0   | 1.6     | 146.6   | 237.8   | 166.8   |
| R2  | 136mm | -21.4 | -20.0  | -18.3  | -17.0  | -15.9  | -14.4   | -13.0   | 7.2     | 166.1   | 250.8   | 202.7   |
| R1  | 50mm  | -22.4 | -20.7  | -19.2  | -17.9  | *      | *       | -13.8   | 16      | 182     | 258.4   | 233.8   |

\*Barrier was cut to clear rail and defined points were unmeasurable

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

Test Vehicle: 2011 Buick Lacrosse NHTSA No: RB0180  
 Test Program: R&D 56mph, 7° angle, 20% offset Test Date: 9/23/11

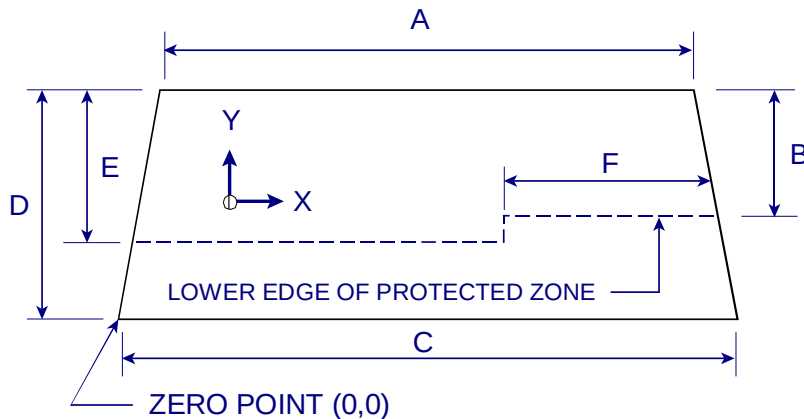
Please provide windshield mounting details. Windshield bonded in place along periphery with urethane

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: 22.2°C

## **WINDSHIELD PERIPHERY MEASUREMENTS**

| Measurement | Pre-Test (mm) | Post-Test (mm) | % Retention |
|-------------|---------------|----------------|-------------|
| Left Side   | 2108          | 2032           | 96.4        |
| Right Side  | 2108          | 2108           | 100.0       |
| Total       | 4215          | 4140           | 98.2        |



| Item | Units | Value |
|------|-------|-------|
| A    | mm    | 1215  |
| B    | mm    | 500   |
| C    | mm    | 1460  |
| D    | mm    | 770   |
| E    | mm    | 477   |
| F    | mm    | 490   |

## **AREAS OF PROTECTED ZONE FAILURES**

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

| X | Y |
|---|---|
|   |   |
|   |   |
|   |   |
|   |   |

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

| X | Y |
|---|---|
|   |   |
|   |   |
|   |   |
|   |   |



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

|               |                                            |           |                |
|---------------|--------------------------------------------|-----------|----------------|
| Test Vehicle: | <u>2011 Buick Lacrosse</u>                 | NHTSA No: | <u>RB0180</u>  |
| Test Program: | <u>R&amp;D 56mph, 7° angle, 20% offset</u> | Test Date | <u>9/23/11</u> |

**FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA**

Temperature at Time of Impact: 22.2°C

Test Time: 5:30 PM

Stoddard Solvent Spillage Measurements

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

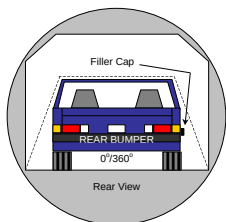
# **DATA SHEET NO. 16** **FMVSS 301 STATIC ROLLOVER RESULTS**

Test Vehicle: 2011 Buick Lacrosse

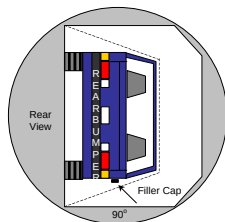
NHTSA No: RB0180

Test Program: R&D 56mph, 7° angle, 20% offset

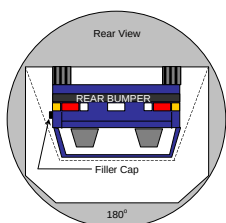
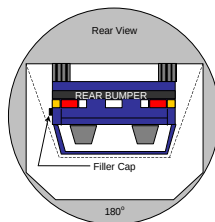
Test Date 9/23/11



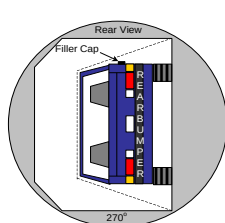
0° TO 90°



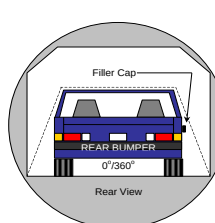
90° TO 180°



180° TO 270°



270° TO 360°



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).

2. Details of Stoddard Solvent spillage: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## **SOLVENT COLLECTION TIME TABLE IN SECONDS**

| Test Phase   | Rotation Time | Hold Time | Total Time |
|--------------|---------------|-----------|------------|
| 0° to 90°    | 66            | 300       | 366        |
| 90° to 180°  | 64            | 300       | 364        |
| 180° to 270° | 59            | 300       | 359        |
| 270° to 360° | 71            | 300       | 371        |

## **FMVSS 301 SPILLAGE TABLE**

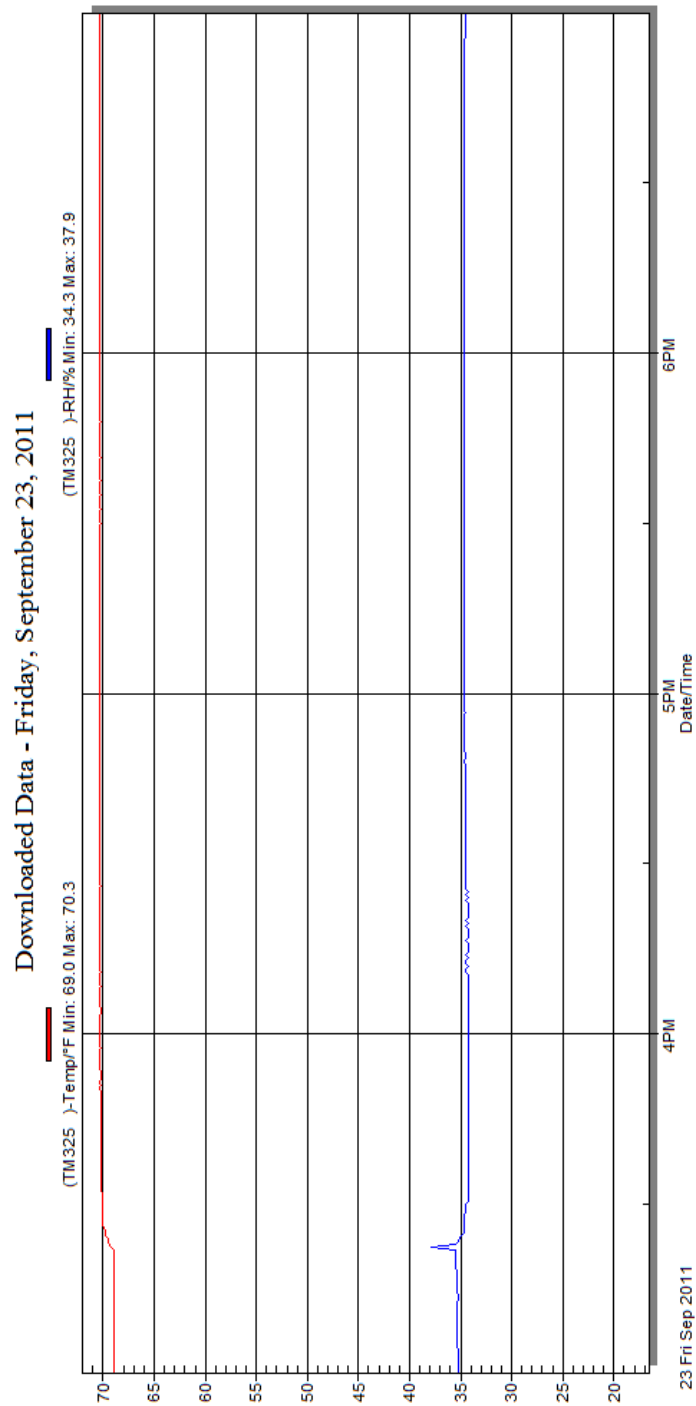
| Test Phase   | First 5 Minutes | Sixth Minute | Seventh Minute | Eighth Minute |
|--------------|-----------------|--------------|----------------|---------------|
| 0° to 90°    | 0               | 0            |                |               |
| 90° to 180°  | 0               | 0            |  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

## **SOLVENT SPILLAGE LOCATION TABLE**

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

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

|               |                                            |           |                |
|---------------|--------------------------------------------|-----------|----------------|
| Test Vehicle: | <u>2011 Buick Lacrosse</u>                 | NHTSA No: | <u>RB0180</u>  |
| Test Program: | <u>R&amp;D 56mph, 7° angle, 20% offset</u> | Test Date | <u>9/23/11</u> |



**APPENDIX A**  
**PHOTOGRAPHS**

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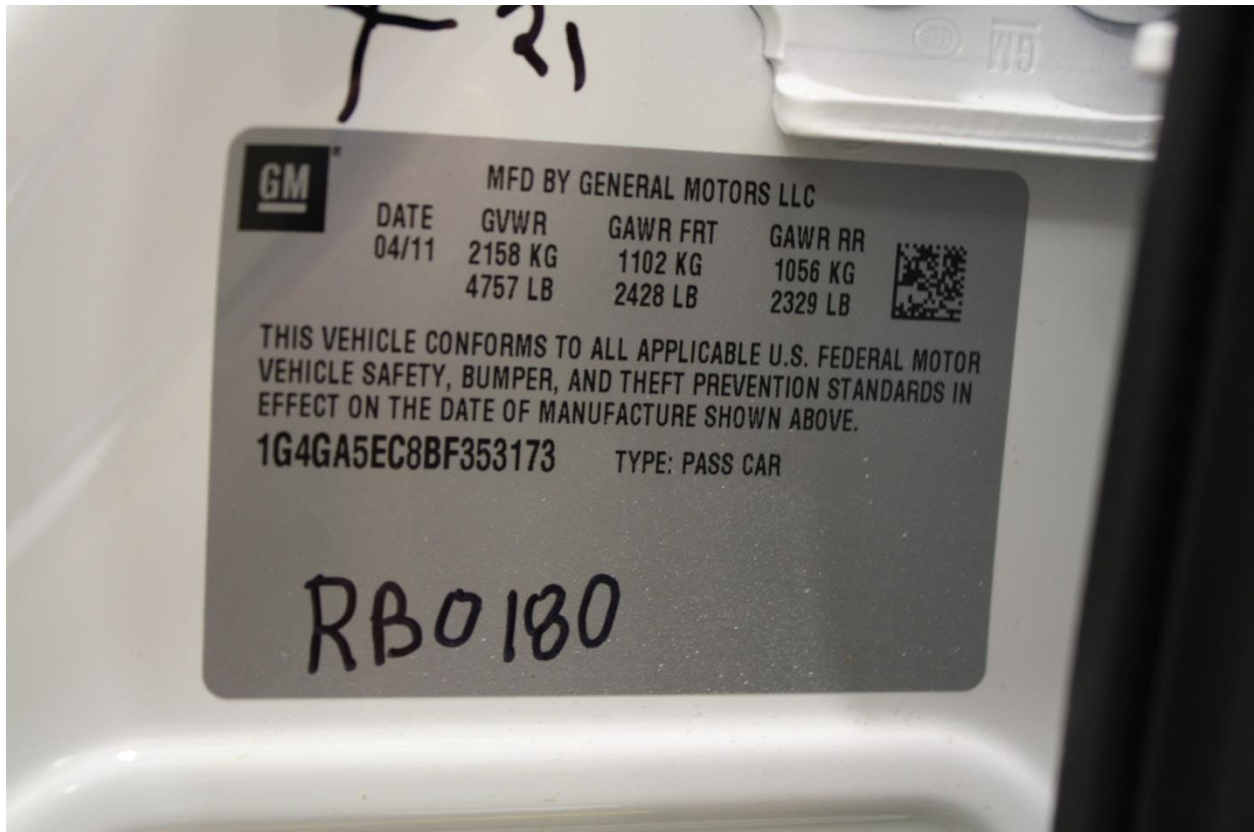
|     |                                                  |      |
|-----|--------------------------------------------------|------|
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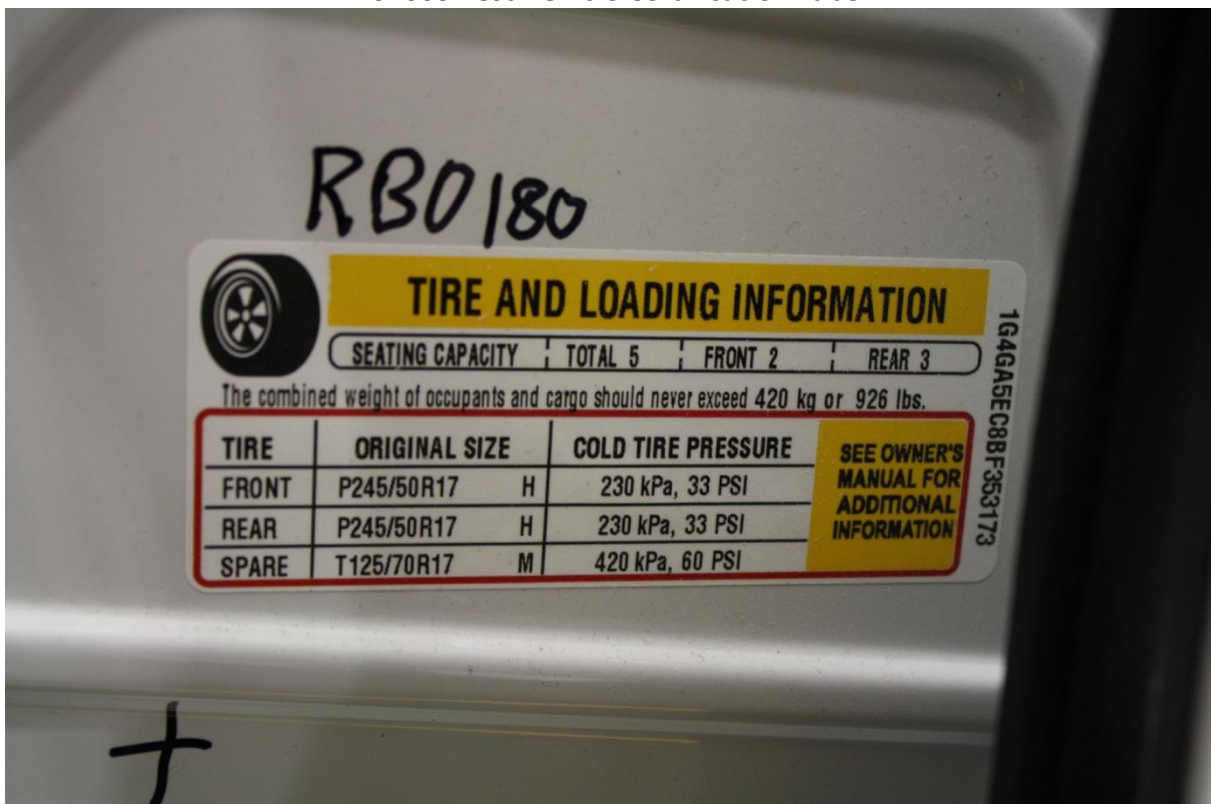
**No. 001 As Delivered Right Front 3-4 View of Test Vehicle**



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



No. 003 Test Vehicle Certification Label



No. 004 Test Vehicle Tire Placard





**No. 005 Pre-Test Front View of Test Vehicle**



**No. 006 Post-Test Front View of Test Vehicle**





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



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





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



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





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



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

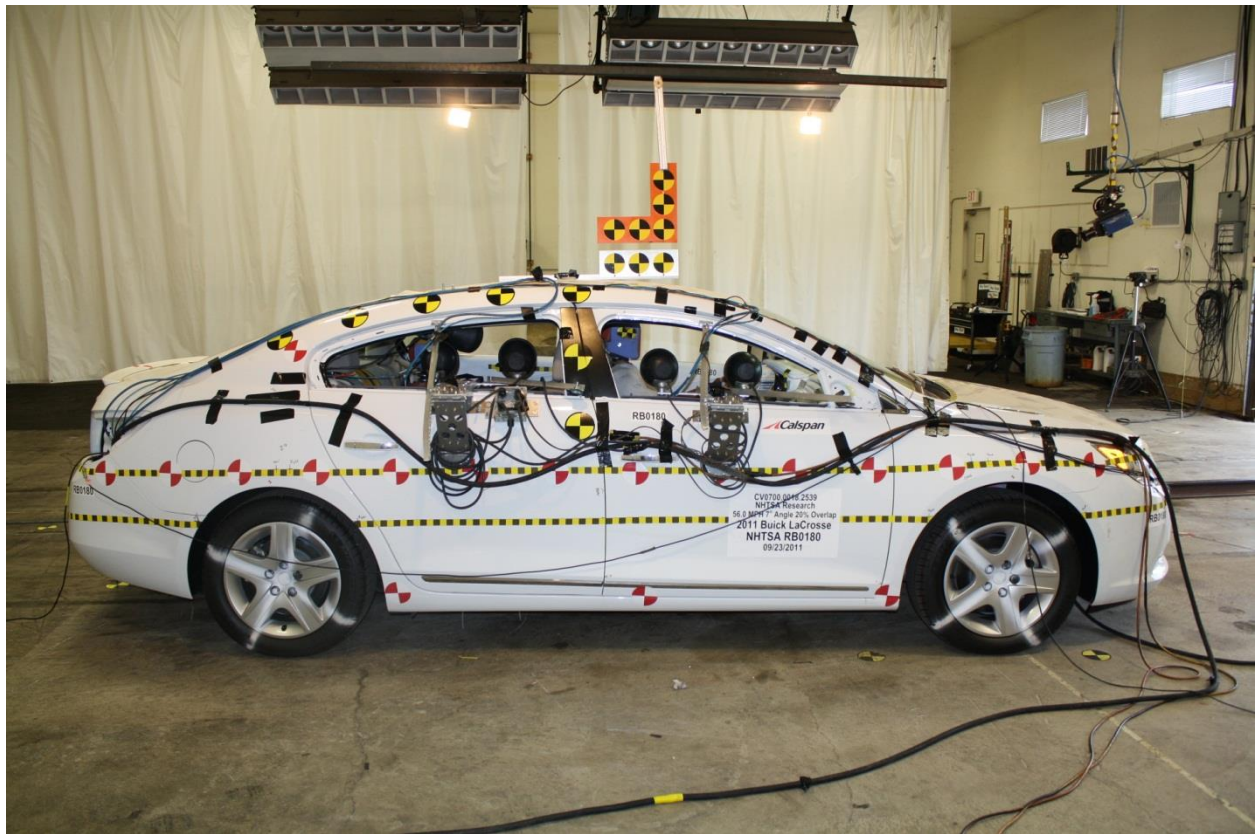


**No. 013 Pre-Test Rear View of Test Vehicle**



**No. 014 Post-Test Rear View of Test Vehicle**





**No. 015 Pre-Test Right Side View of Test Vehicle**



**No. 016 Post-Test Right Side View of Test Vehicle**





**No. 017 Pre-Test Right Front 3-4 View of Test Vehicle**



**No. 018 Post-Test Right Front 3-4 View of Test Vehicle**





**No. 019 Pre-Test Overhead View of RMDB against target vehicle at ideal Impact Point**

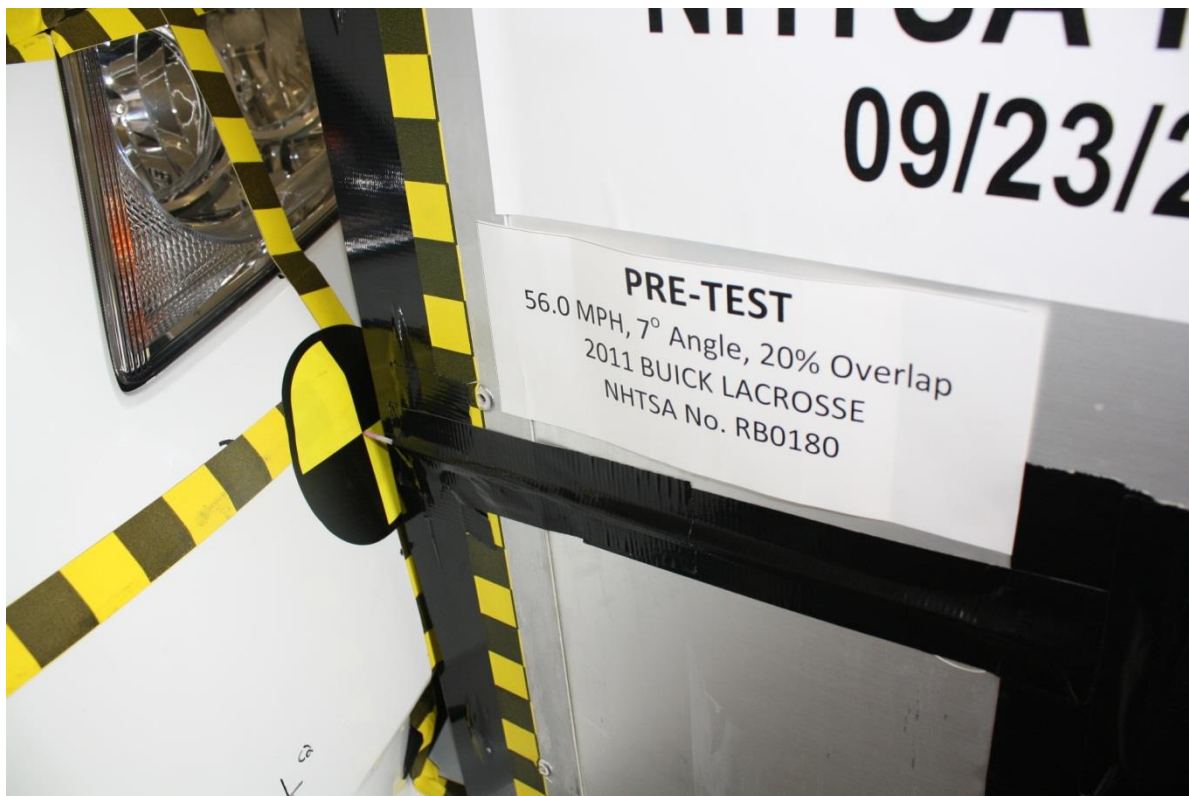


**No. 020 Pre-Test Left Side View of RMDB against target vehicle at ideal Impact Point**

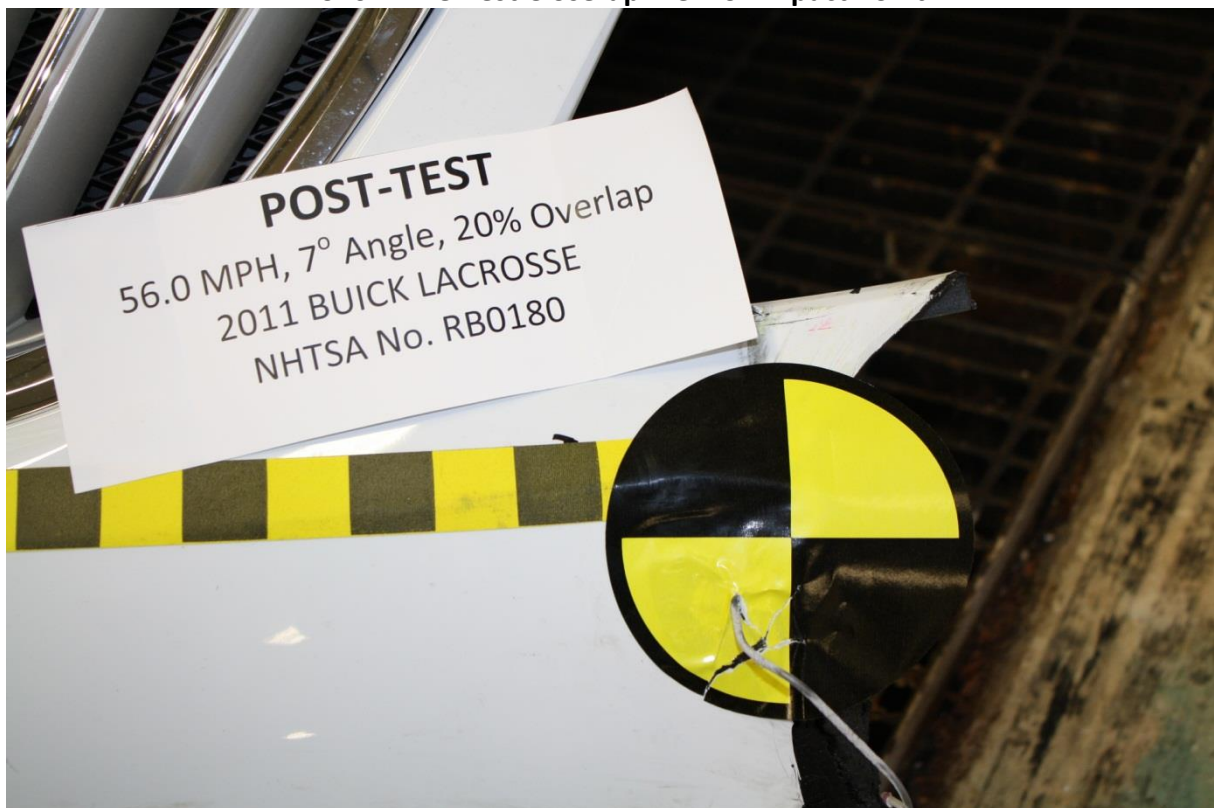


**No. 021 Pre-Test Right Side View of RMDB against target vehicle at ideal Impact Point**





**No. 022 Pre-Test Close-up View of Impact Point**



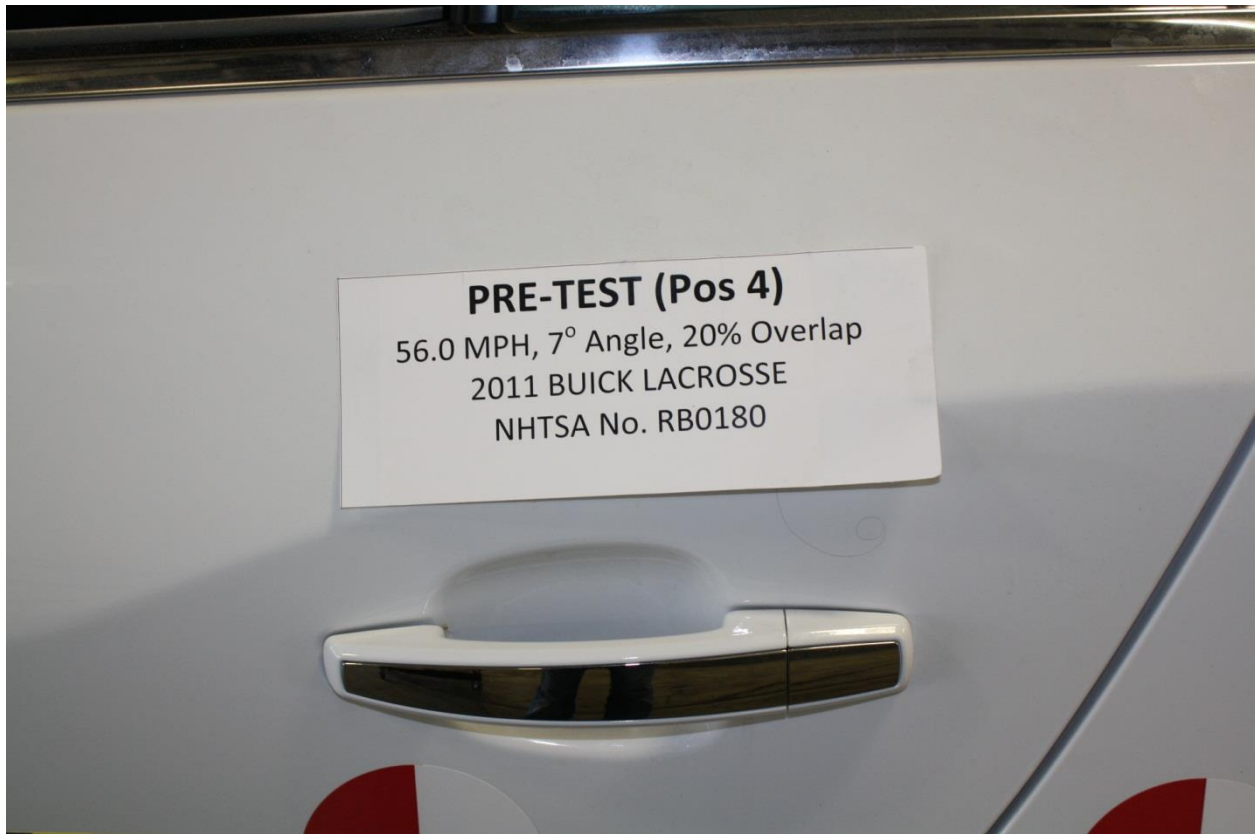
**No. 023 Post-Test Close-up View of Impact Point**



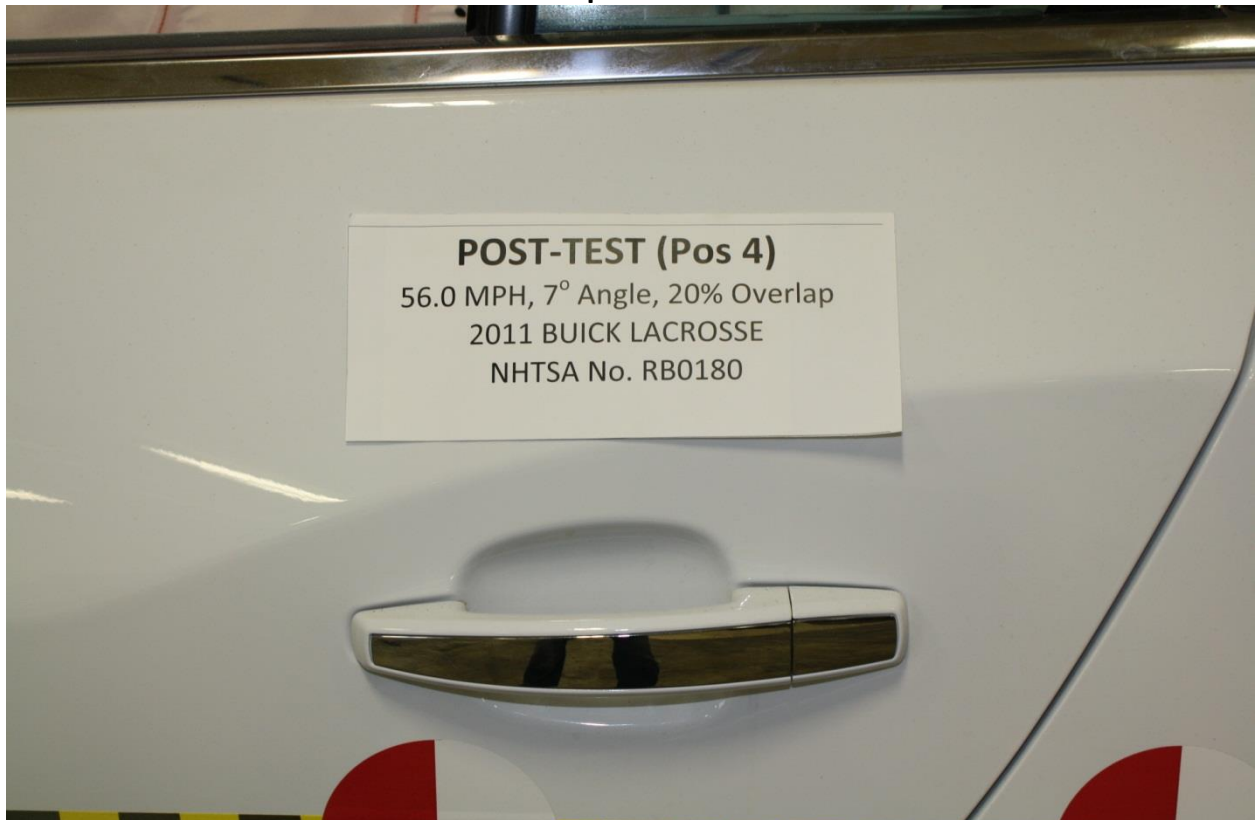
No. 024 Pre-Test Close-up View of Left Front Door Latch



No. 025 Post-Test Close-up View of Left Front Door Latch



**No. 026 Pre-Test Close-up View of Left Rear Door Latch**



**No. 027 Post-Test Close-up View of Left Rear Door Latch**





**No. 028 Pre-Test Windshield View**



**No. 029 Post-Test Windshield View**



**No. 030 Pre-Test View of Driver Inner Door Panel**



**No. 031 Post-Test View of Driver Inner Door Panel**





**No. 032 Pre-Test View of Passenger Inner Door Panel**



**No. 033 Post-Test View of Passenger Inner Door Panel**

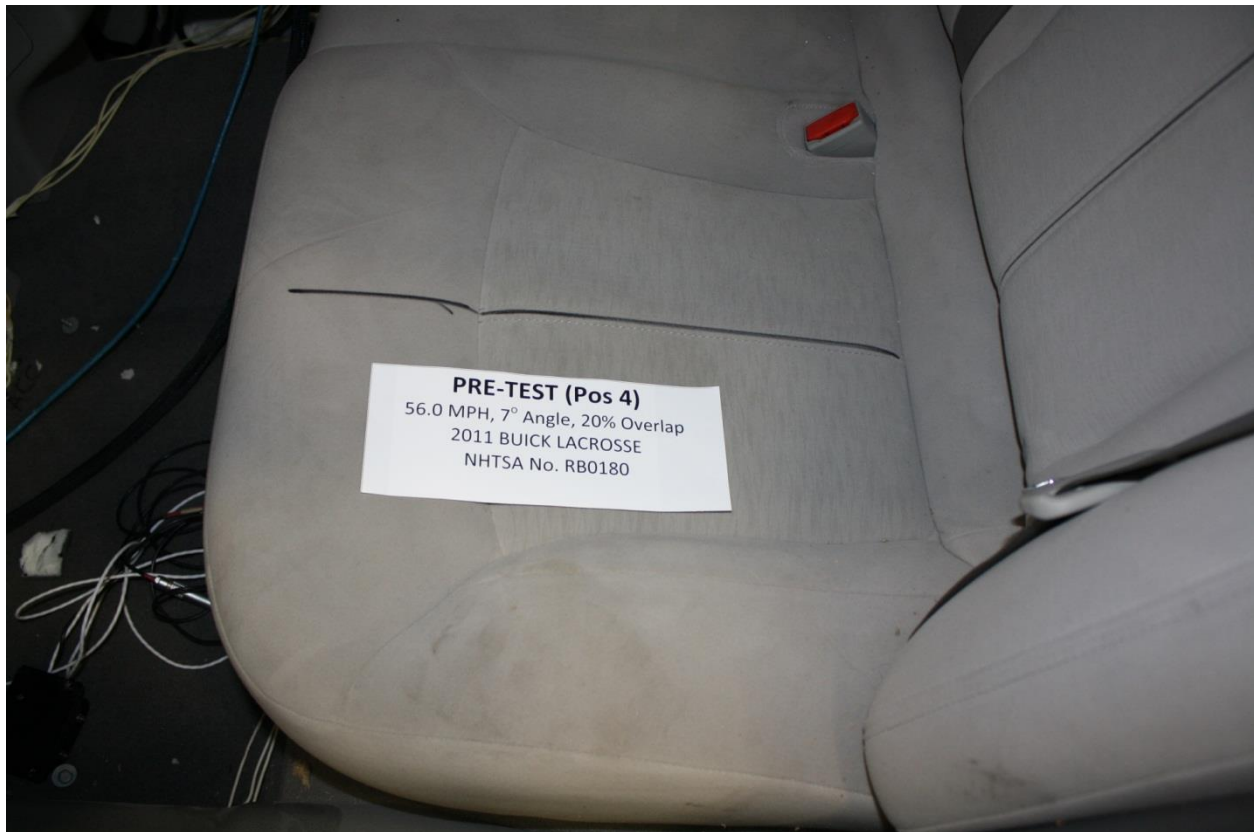


**No. 034 Pre-Test Frontal View of Driver Seat pan**



**No. 035 Pre-Test Frontal View of Driver Seat back**

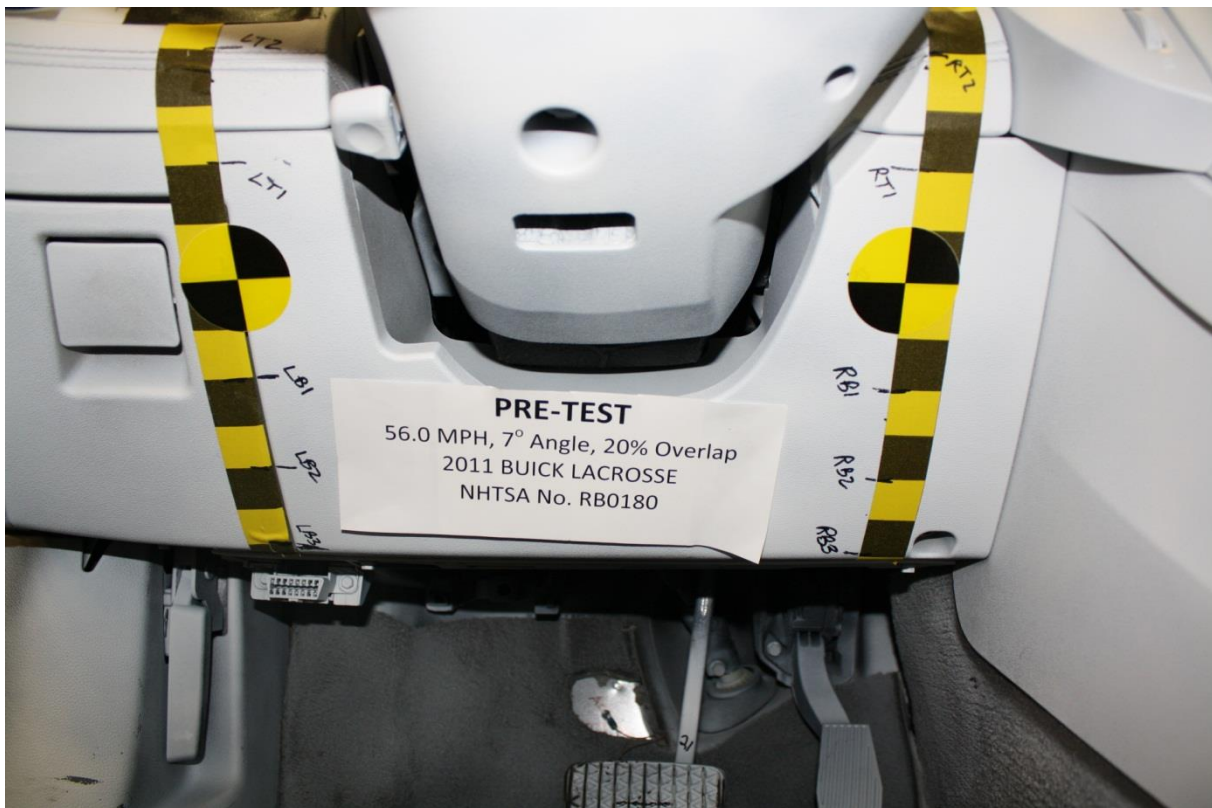




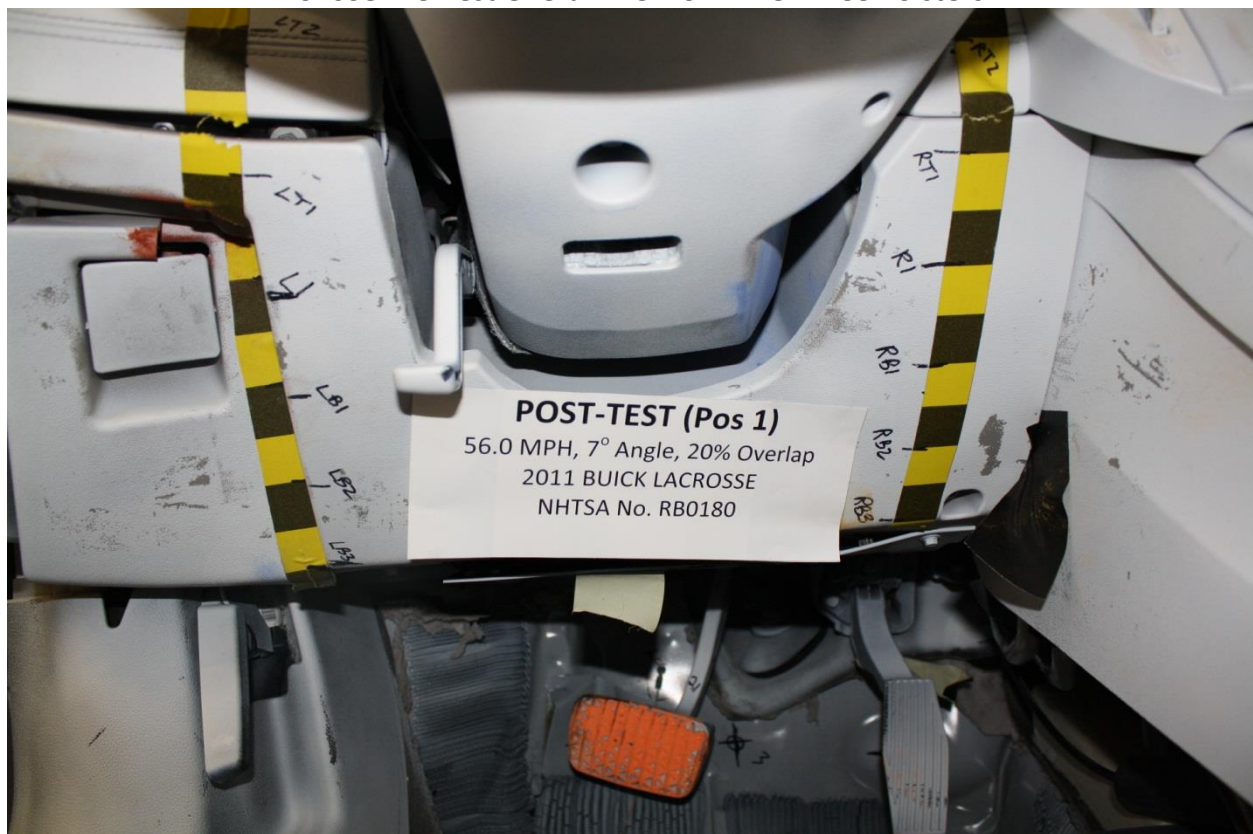
**No. 036 Pre-Test Frontal View of Left Rear Seat pan**



**No. 037 Pre-Test Frontal View of Left Rear Seat back**



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



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

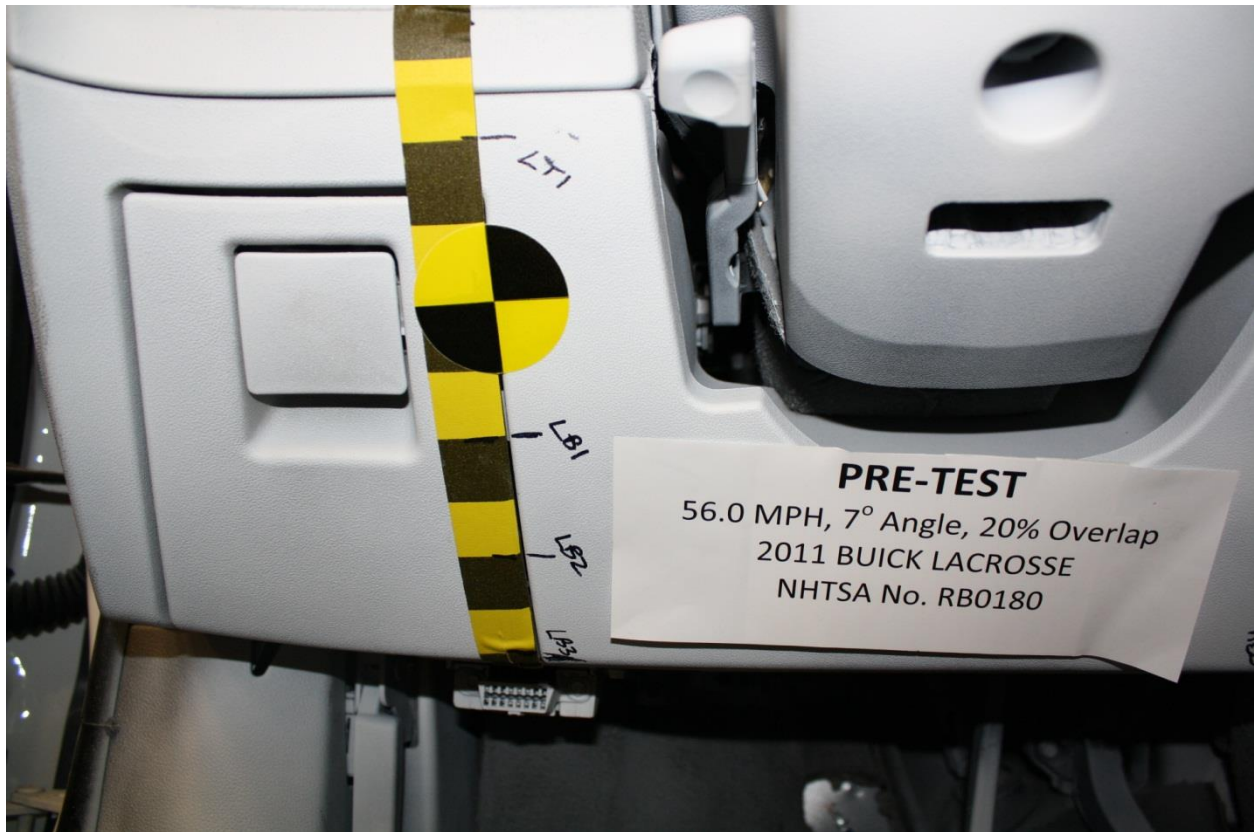




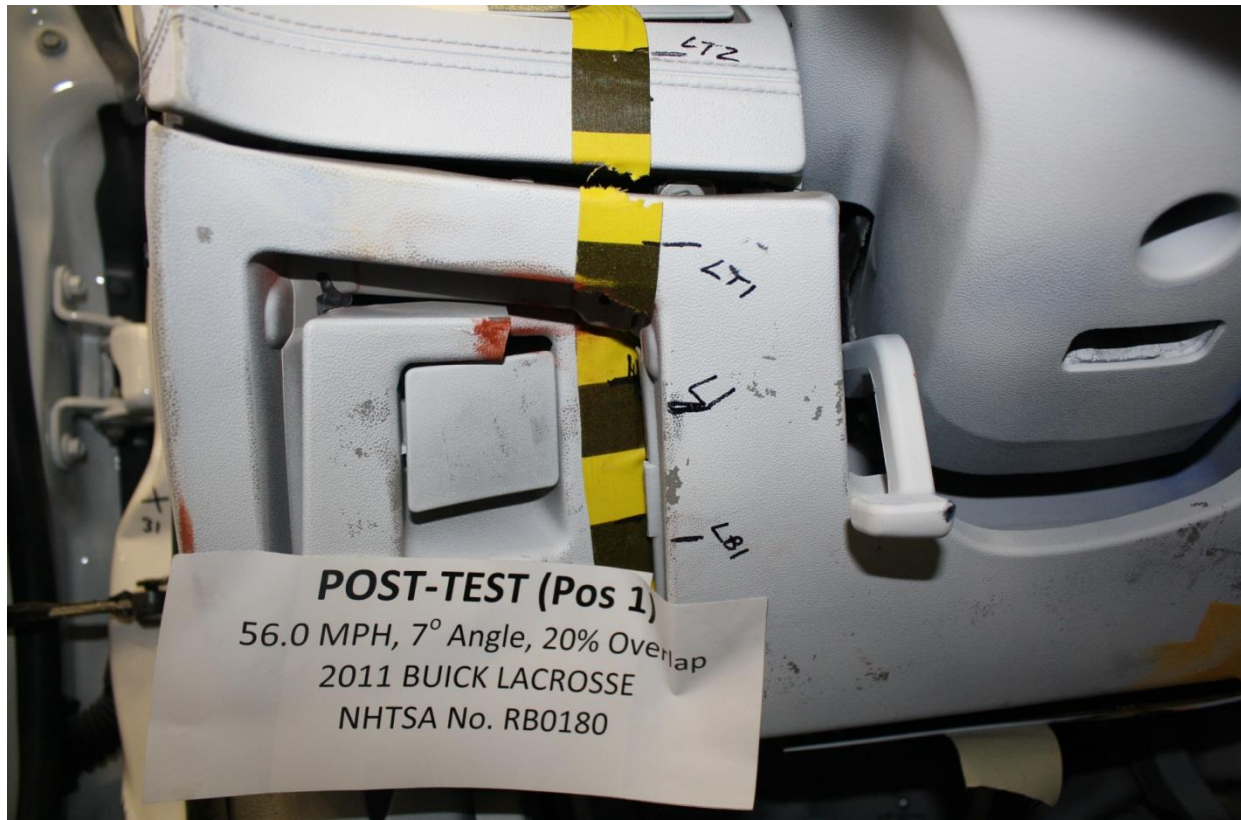
**No. 040 Pre-Test Overall View of Driver Knee Bolsters with panel removed**



**No. 041 Post-Test Overall View of Driver Knee Bolsters with panel removed**



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



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

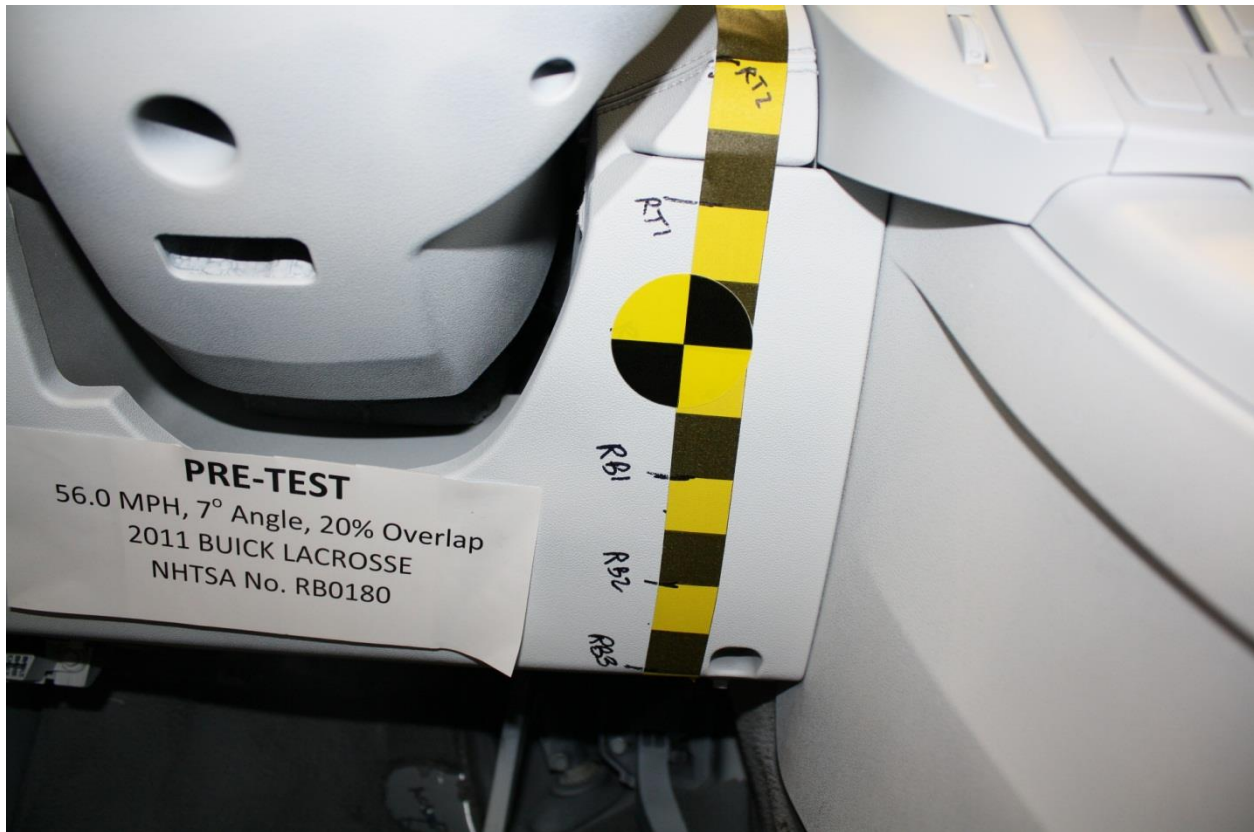




**No. 044 Pre-Test Left Side View of Driver Knee Bolsters with panel removed**



**No. 045 Post-Test Left Side View of Driver Knee Bolsters with panel removed**



**No. 046 Pre-Test Right Side View of Driver Knee Bolsters**



**No. 047 Post-Test Right Side View of Driver Knee Bolsters**





**No. 048 Pre-Test Right Side View of Driver Knee Bolster with panel removed**



**No. 049 Post-test right side view of driver knee bolster with panel removed**





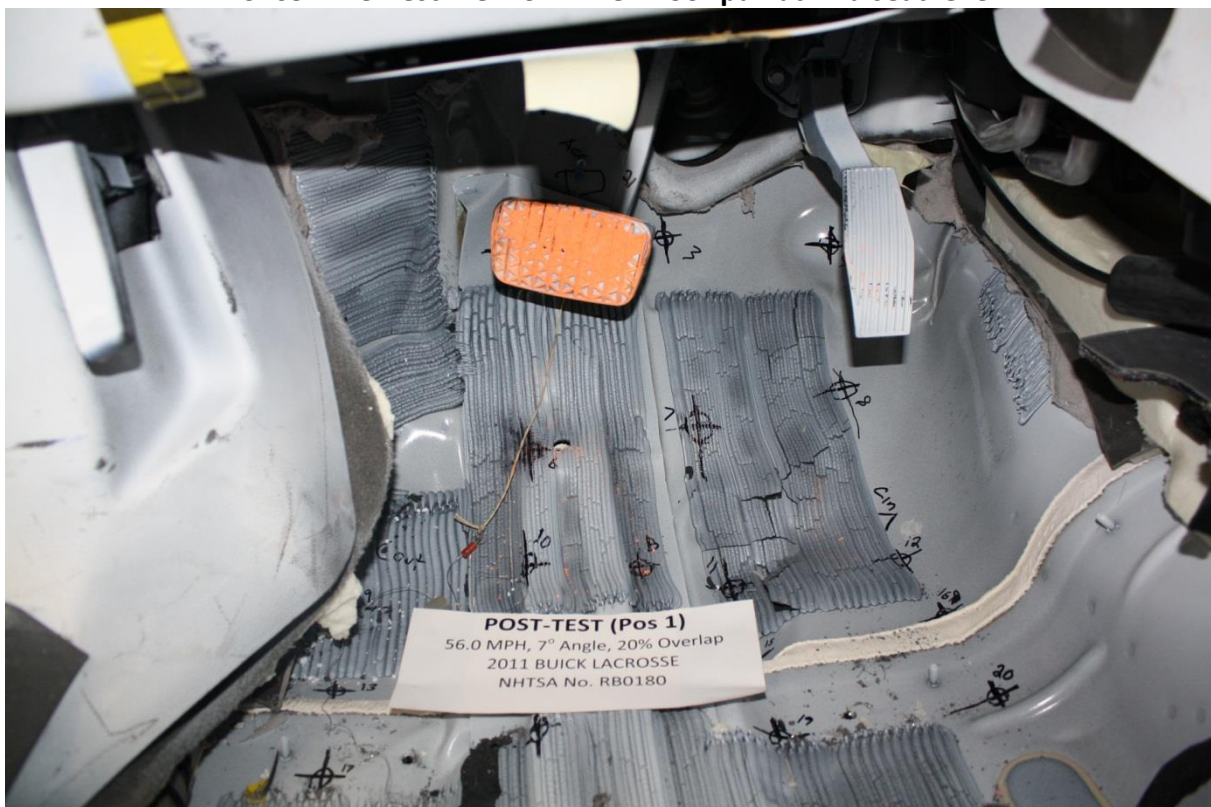
**No. 050 Pre-Test View of Driver Floor pan at Left sill level**



**No. 051 Post-Test View of Driver Floor pan at Left sill level**



No. 052 Pre-Test View of Driver Floor pan at Mid seat level



No. 053 Post-Test view of Driver Floor pan at Mid seat level

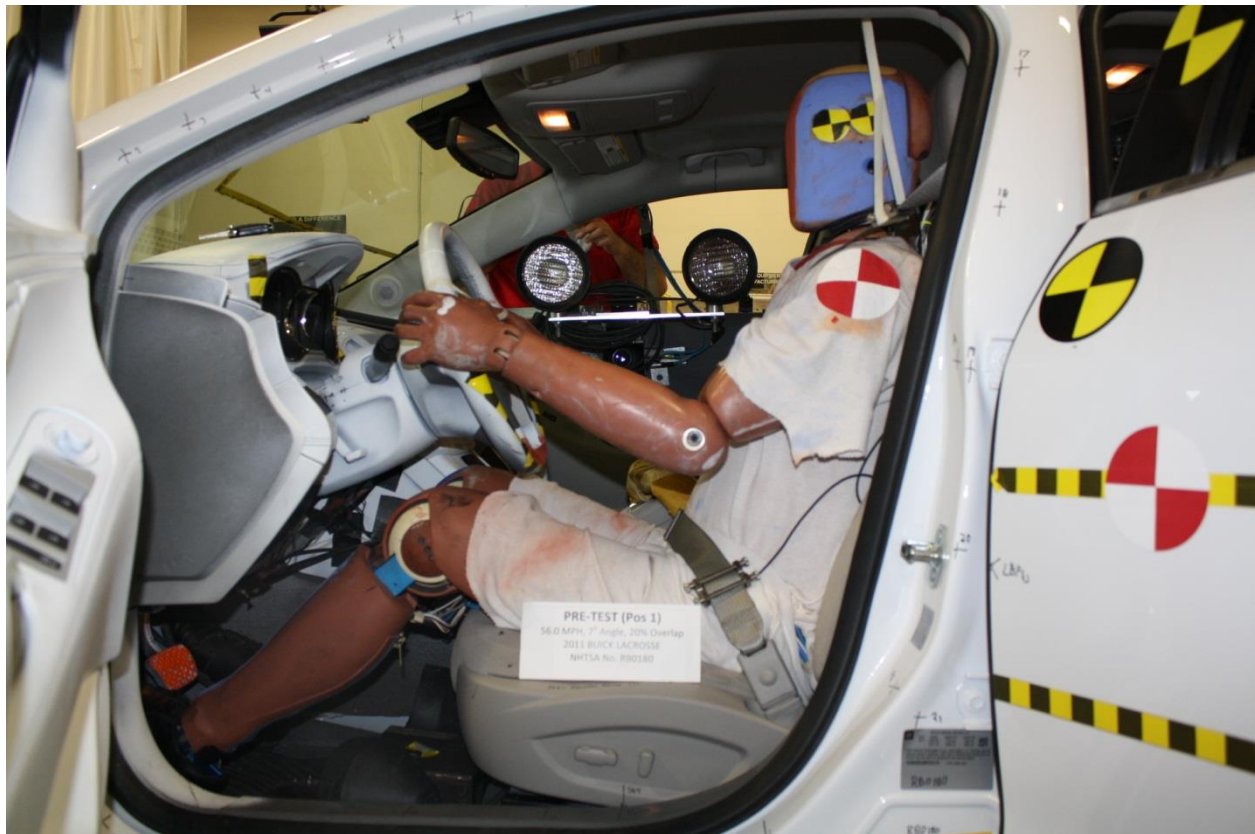




**No. 054 Pre-Test Driver Dummy Front Windshield View**

**Photo Not Applicable**

**No. 055 Post-Test Driver Dummy Front Windshield View**



**No. 056 Pre-Test Left Side View of Driver Dummy and Interior**



**No. 057 Post-Test Left Side View of Driver Dummy and Interior**





**No. 058 Pre-Test Left Side Driver Dummy Window View**



**No. 059 Post-Test Left Side Driver Dummy Window View**





**No. 060 Pre-Test Right Side View of Driver Dummy and Interior**



**No. 061 Post-Test Right Side View of Driver Dummy and Interior**





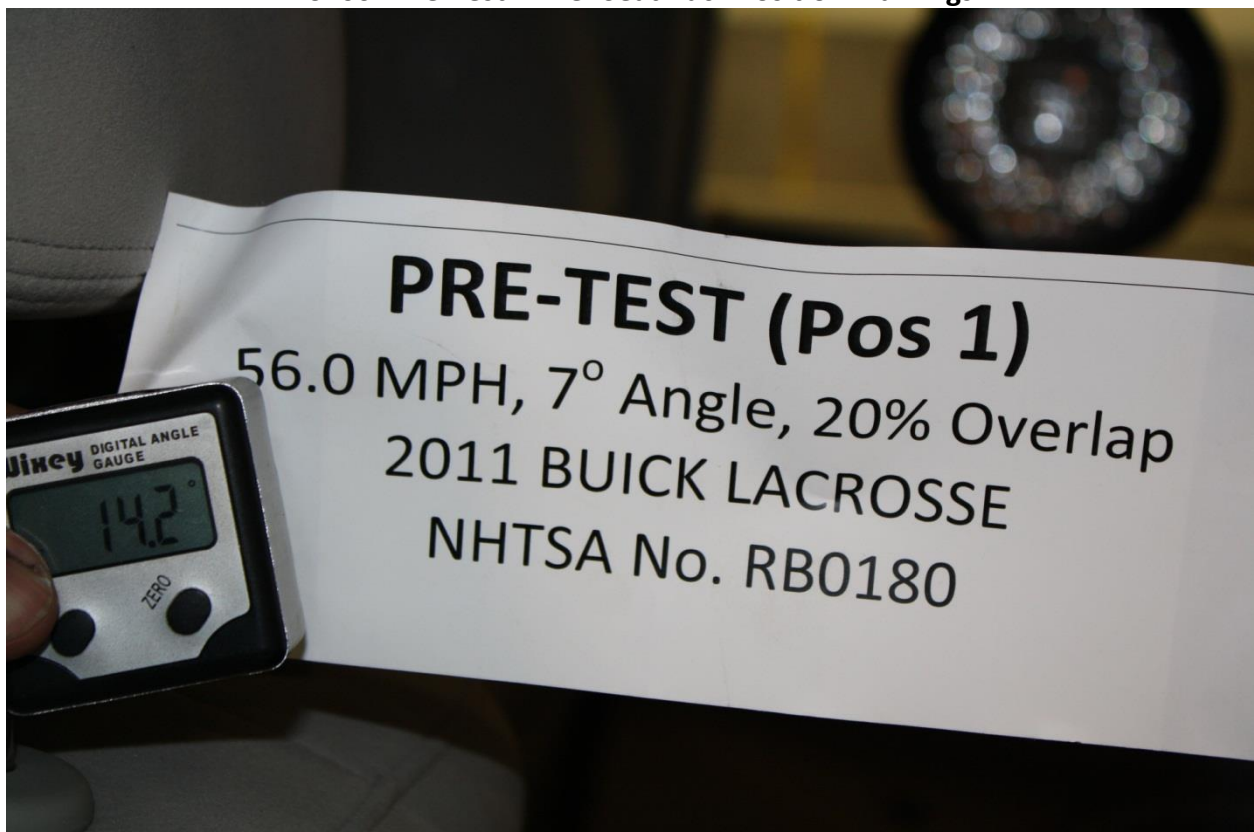
No. 062 Pre-Test View of Driver Dummy Door Clearance



No. 063 Post-Test View of Driver Dummy Door Clearance



No. 064 Pre-Test Driver Seat Back Position markings



No. 065 Pre-Test Driver Seat Back Position with Level or Inclinometer



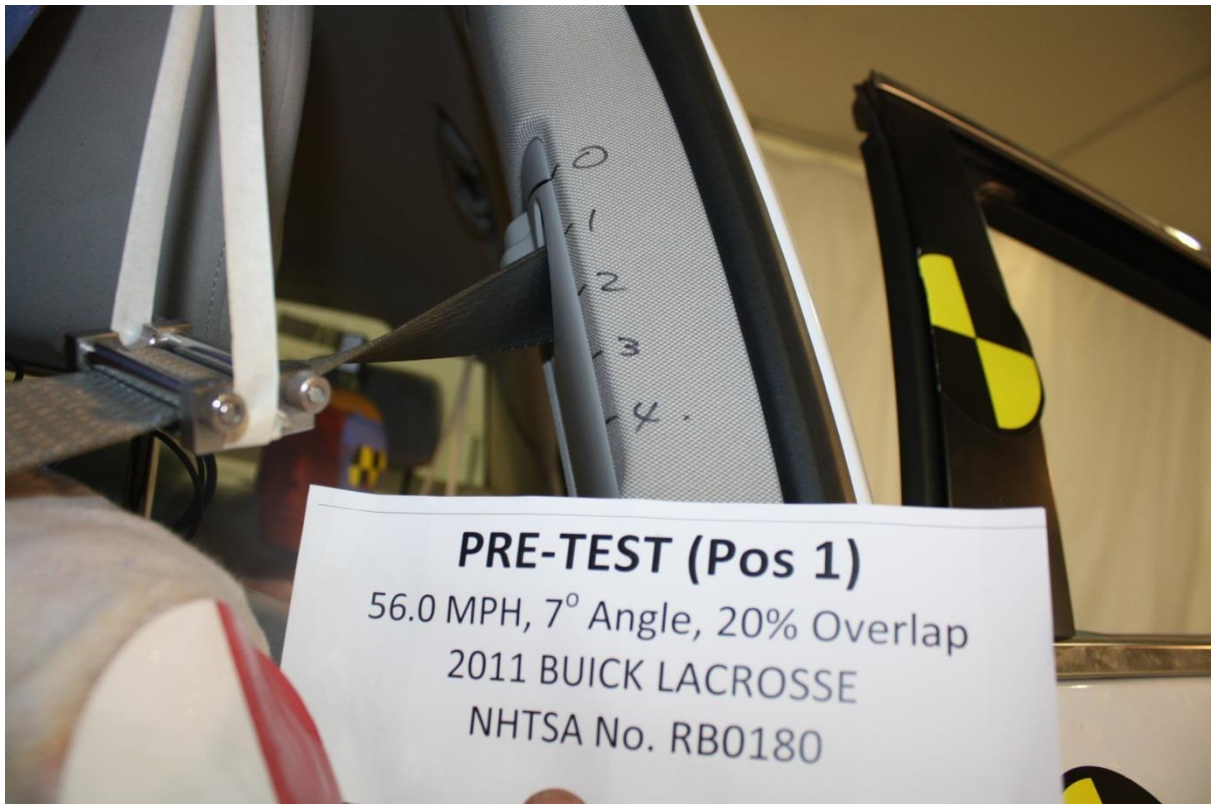


No. 066 Pre-Test Driver Seat Fore Aft Markings

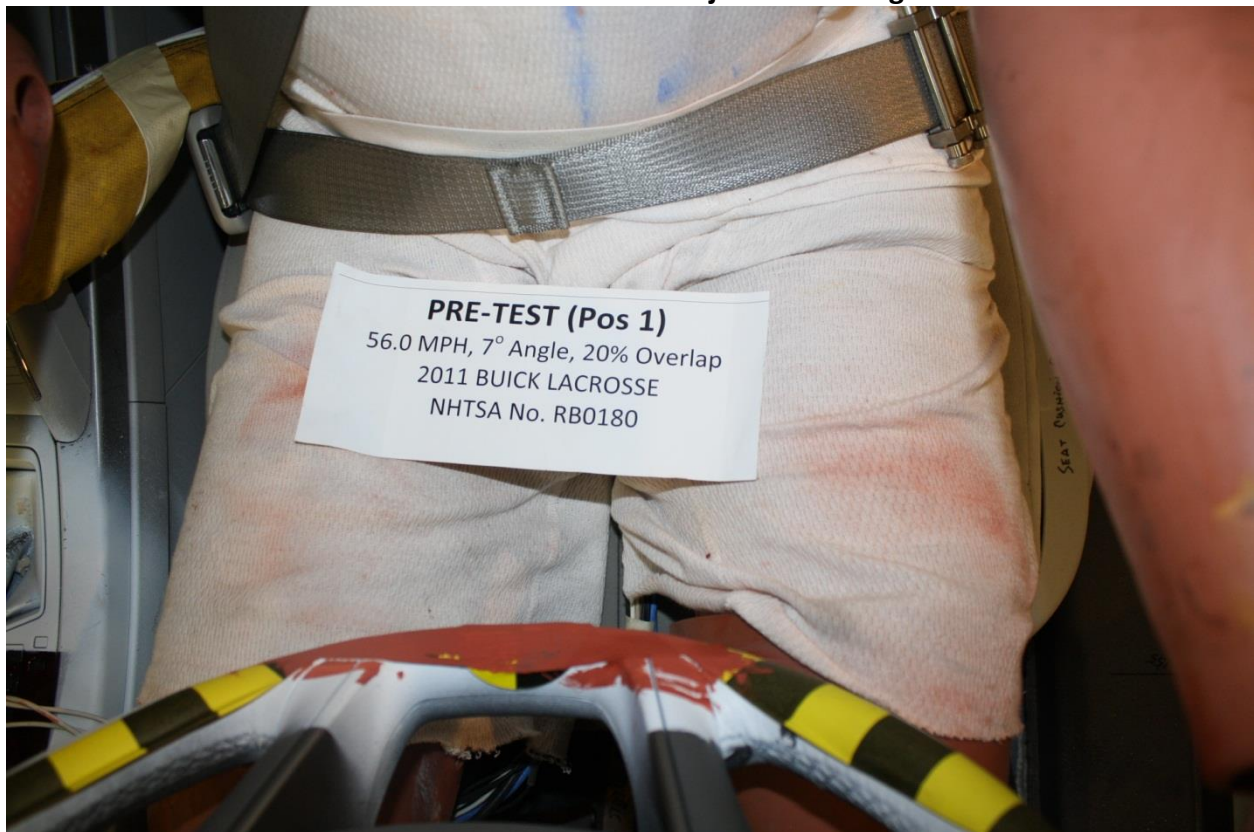


No. 067 Post-Test Driver Seat Fore Aft Markings

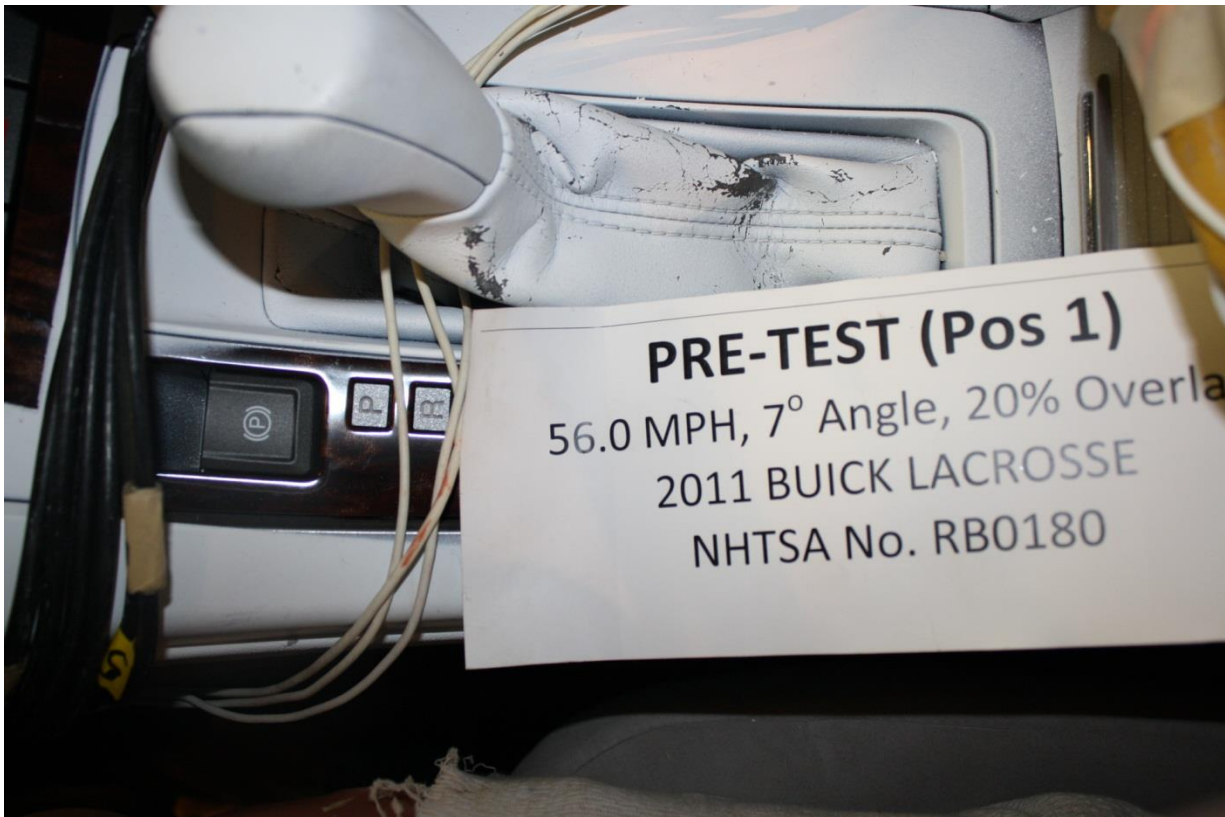




**No. 068 Pre-Test Driver Adjustable D-ring**



**No. 069 Pre-Test Overhead View of Driver Dummy Thighs in seat**

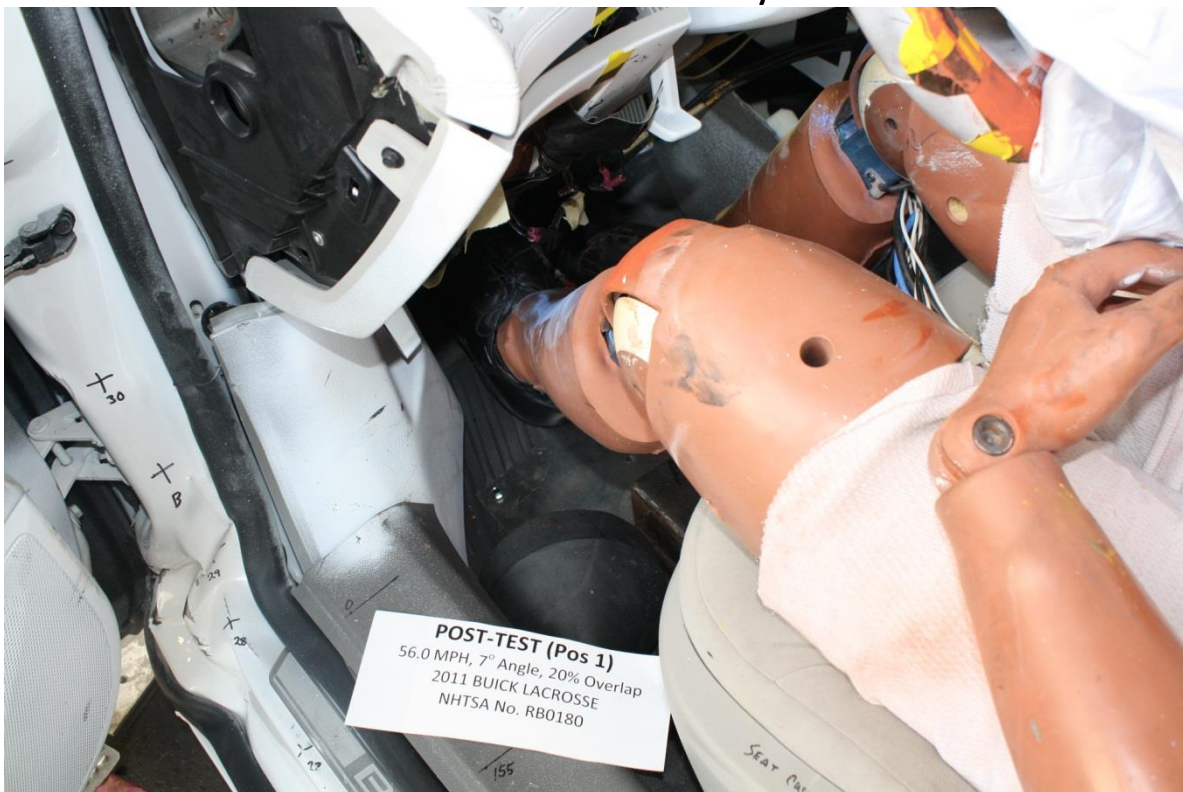


No. 070 Pre-Test View of Parking Brake

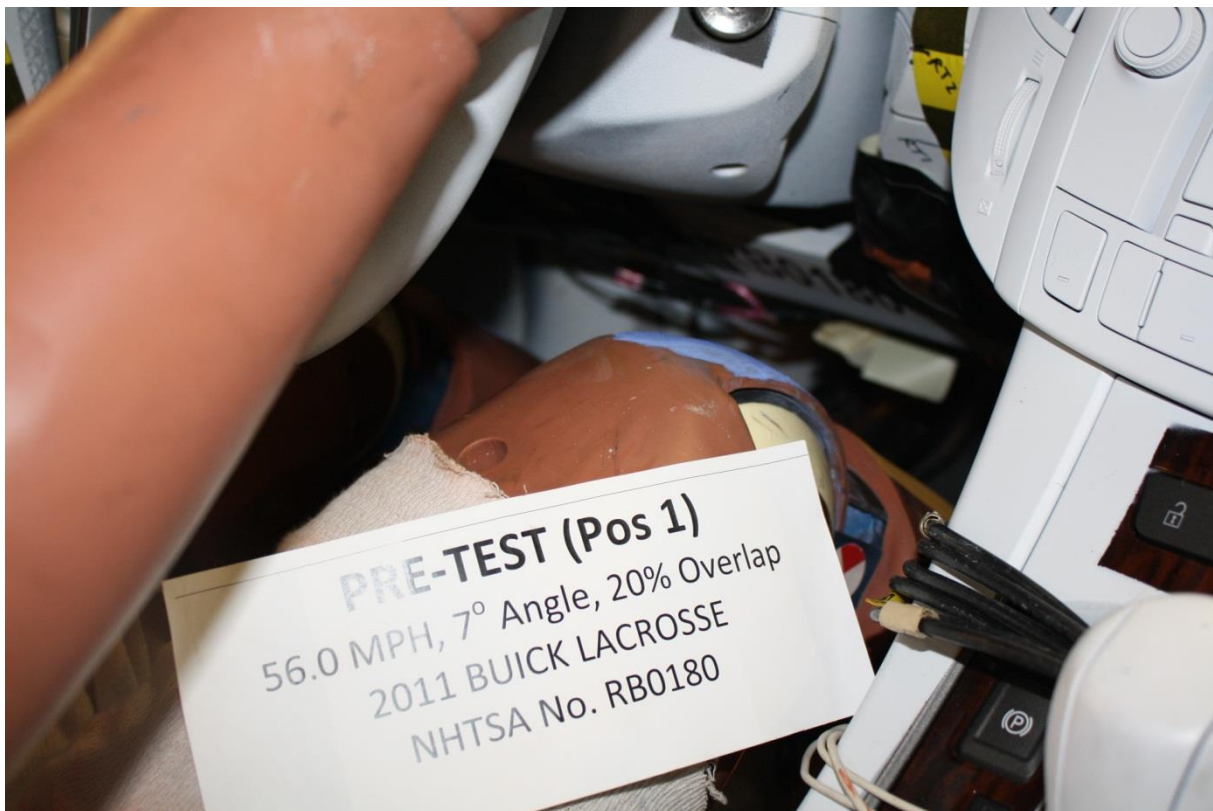




**No. 071 Pre-Test Driver Dummy Feet**



**No. 072 Post-Test Driver Dummy Feet**

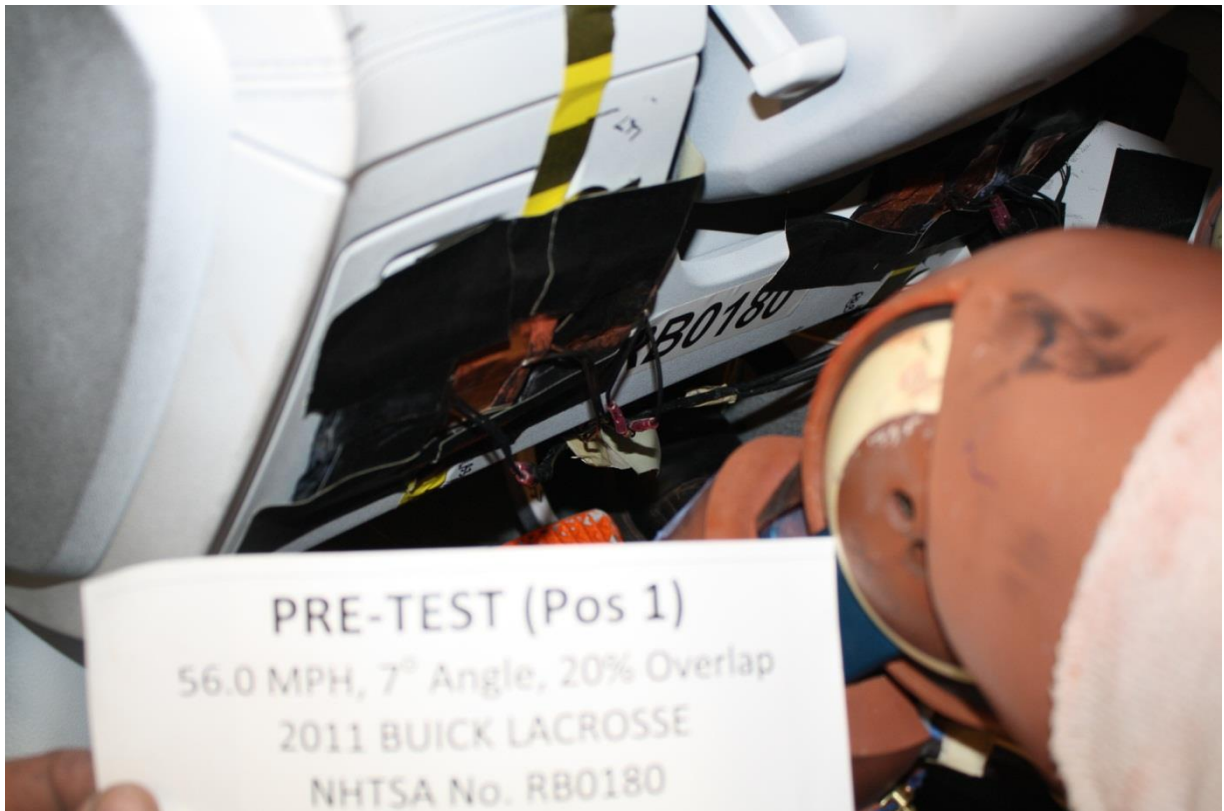


**No. 073 Pre-Test View of Driver Dummy Right Knee and Bolster**



**No. 074 Post-Test View of Driver Dummy Right Knee and Bolster**





**No. 075 Pre-Test View of Driver Dummy Left Knee and Bolster**



**No. 076 Post-Test View of Driver Dummy Left Knee and Bolster**



**No. 077 Pre-Test View of Driver Dummy Abdomen**



**No. 078 Post-Test View of Driver Dummy Abdomen**





**No. 079 Pre-Test Left Side View of Steering Wheel set position**



**No. 080 Post-Test Left Side View of Steering Wheel set position**



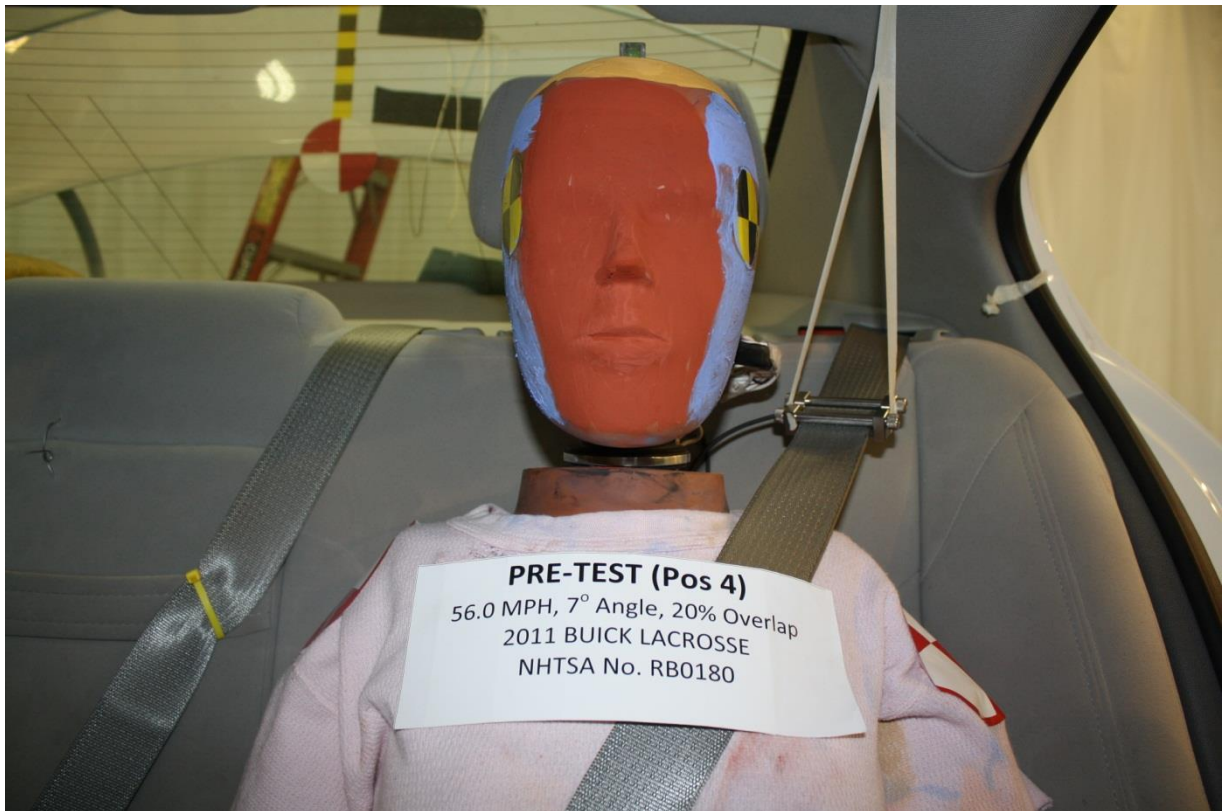


**No. 081 Post-Test View of Driver Dummy Head Contact with Airbag**



**No. 082 Post-Test View of Driver Dummy Head Contact with Vehicle Interior (a, b, c, etc)**





**No. 083 Pre-Test Passenger Dummy Front Close-up View**



**No. 084 Post-Test Passenger Dummy Front Close-up View**



**No. 085 Pre-Test Left Side Passenger Dummy and Interior View**



**No. 086 Post-Test Left Side Passenger Dummy and Interior View**





**No. 087 Pre-Test Left Side Passenger Dummy Window View**



**No. 088 Post-Test Left Side Passenger Dummy Window View**



**No. 089 Pre-Test Right Side View of Passenger Dummy and Interior**



**No. 090 Post-Test Right Side View of Passenger Dummy and Interior**

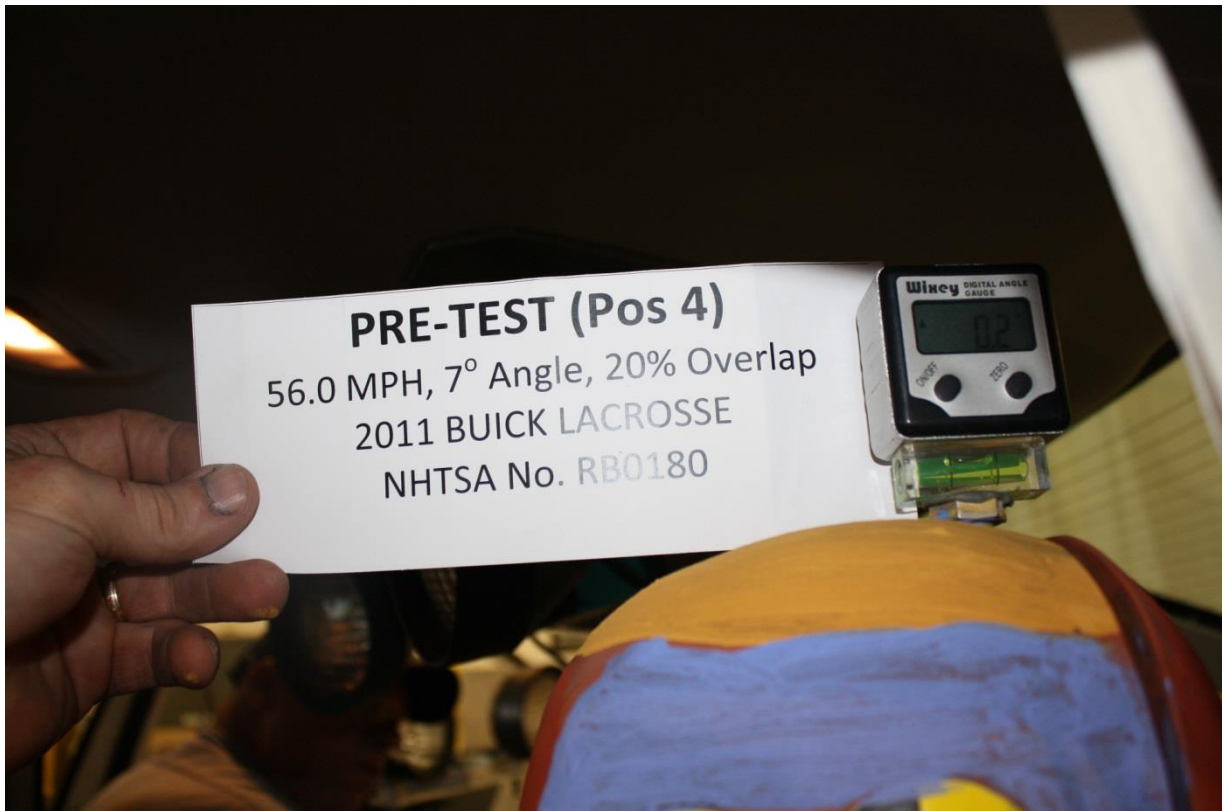




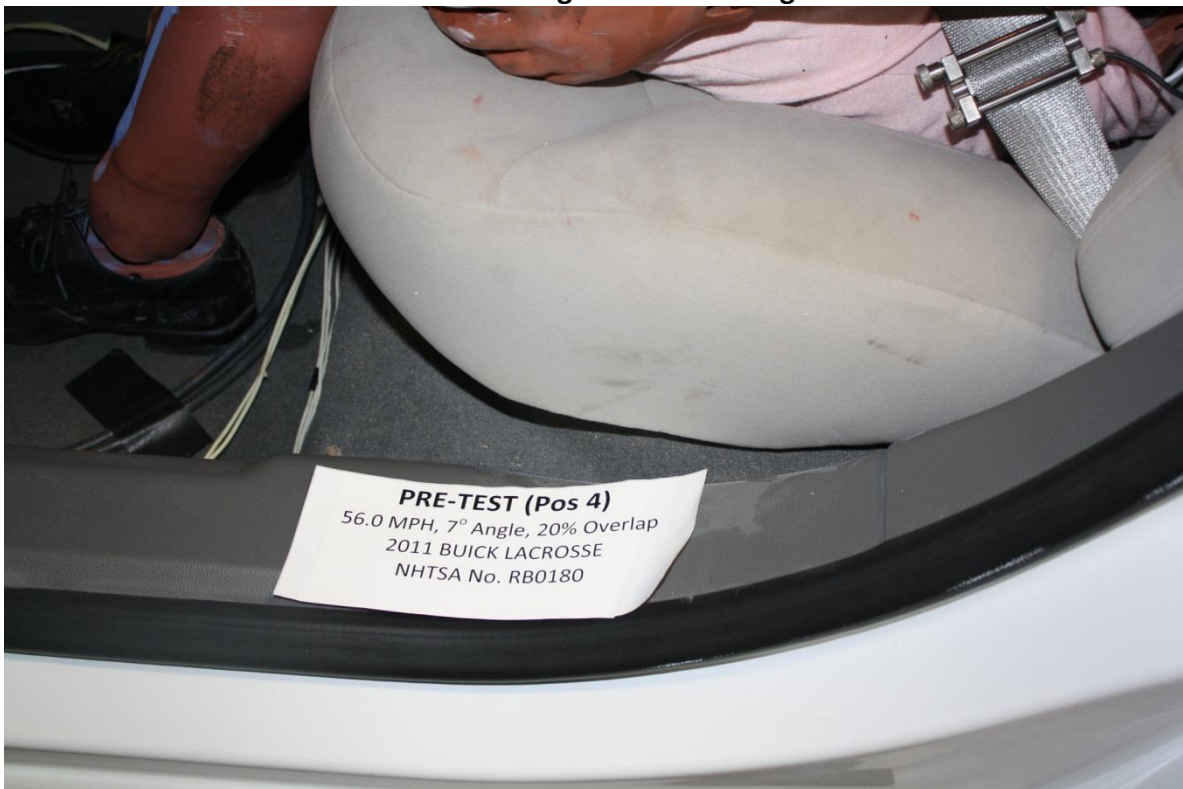
**No. 091 Pre-Test View of Passenger Dummy Door Clearance**



**No. 092 Post-Test View of Passenger Dummy Door Clearance**

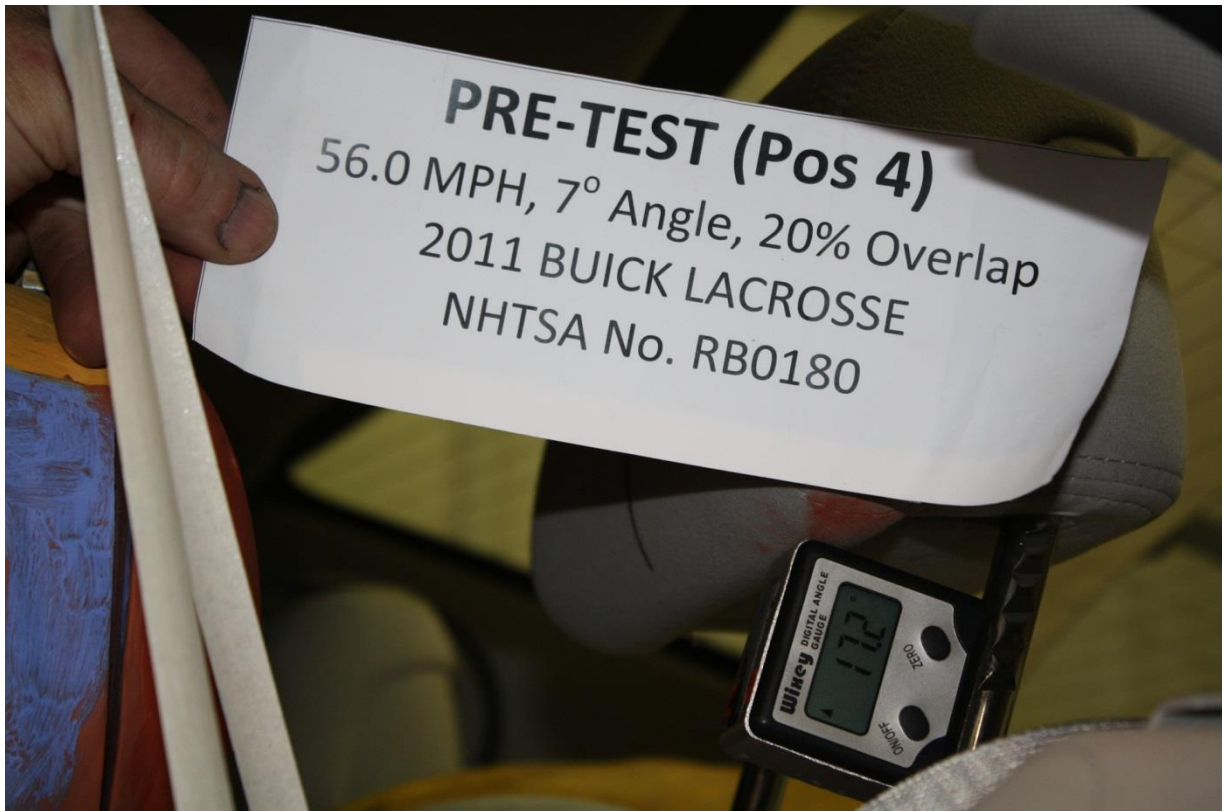


**No. 093 Pre-Test Passenger View Showing Head Level**



**No. 094 Pre-Test Passenger Seat Fore-Aft Markings**

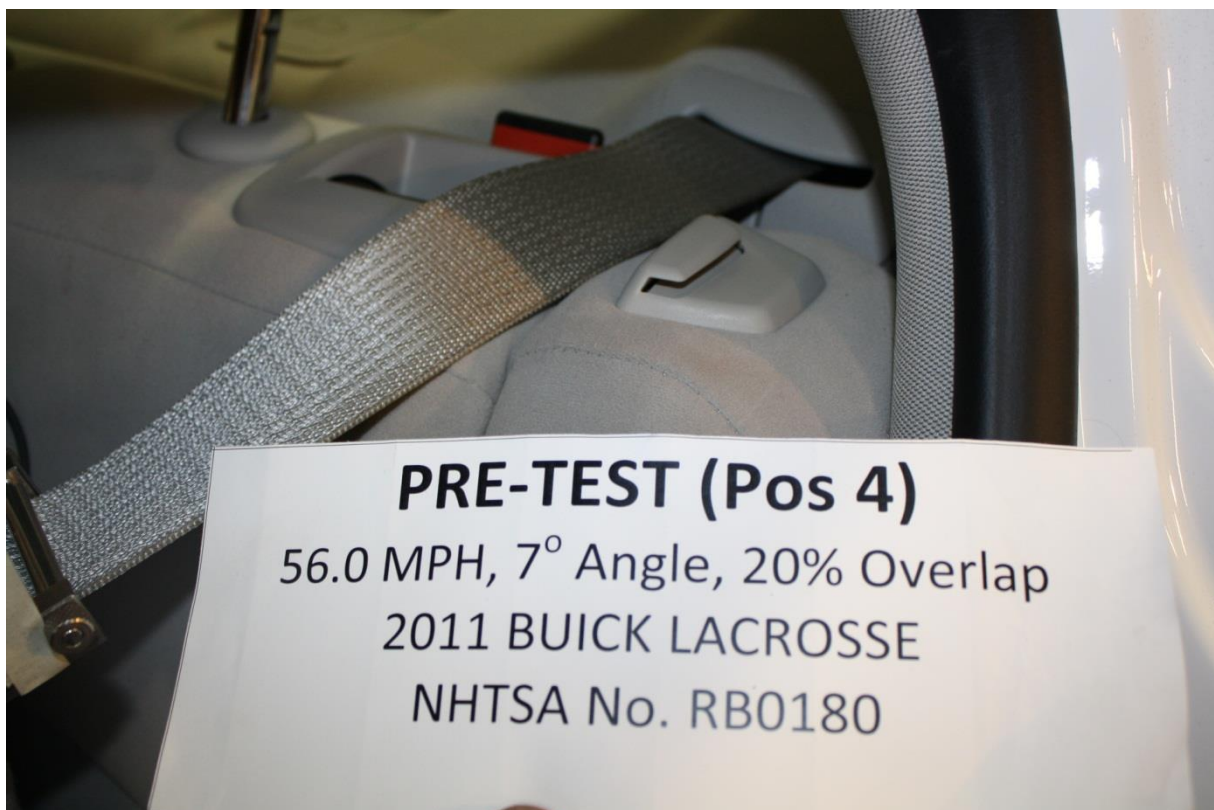




**No. 095 Pre-Test Passenger Seat Back Angle**

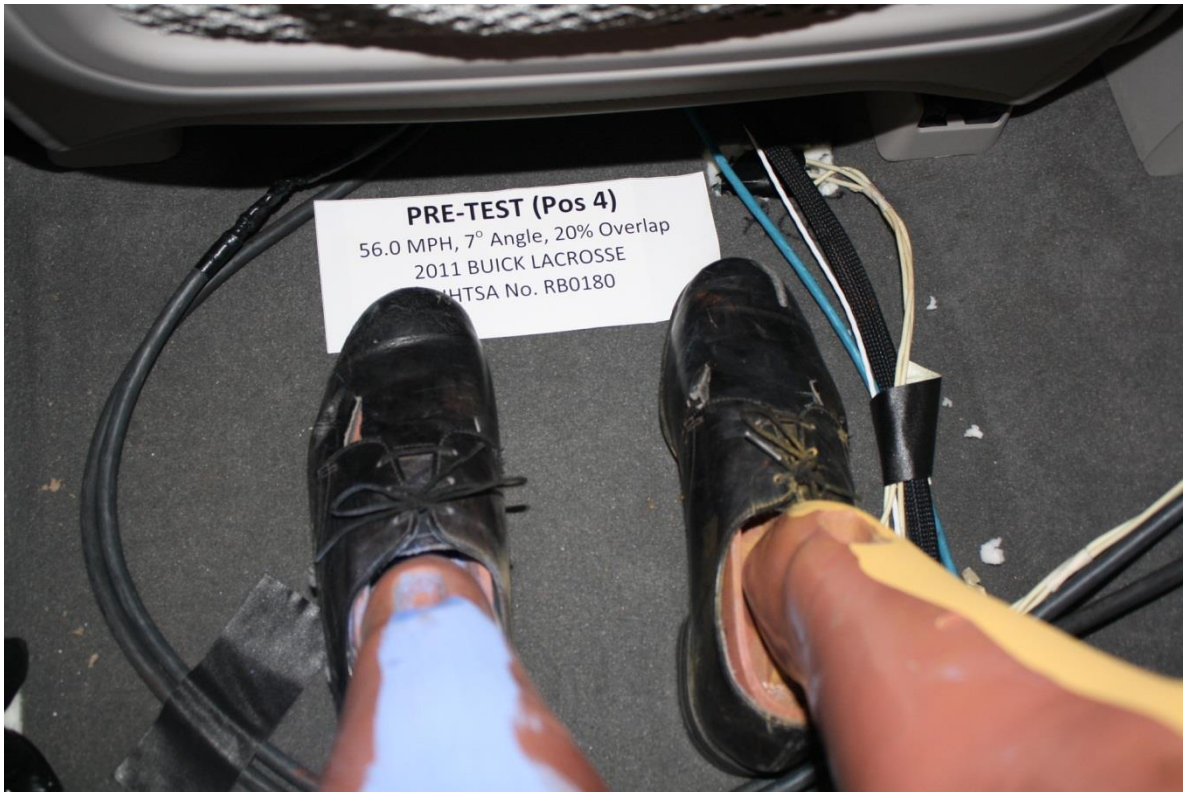


**No. 096 Pre-Test Overhead View of Passenger Dummy Thighs on seat**



**No. 097 Pre-Test Passenger Adjustable D-ring**





**No. 098 Pre-Test View of Passenger Dummy Feet**

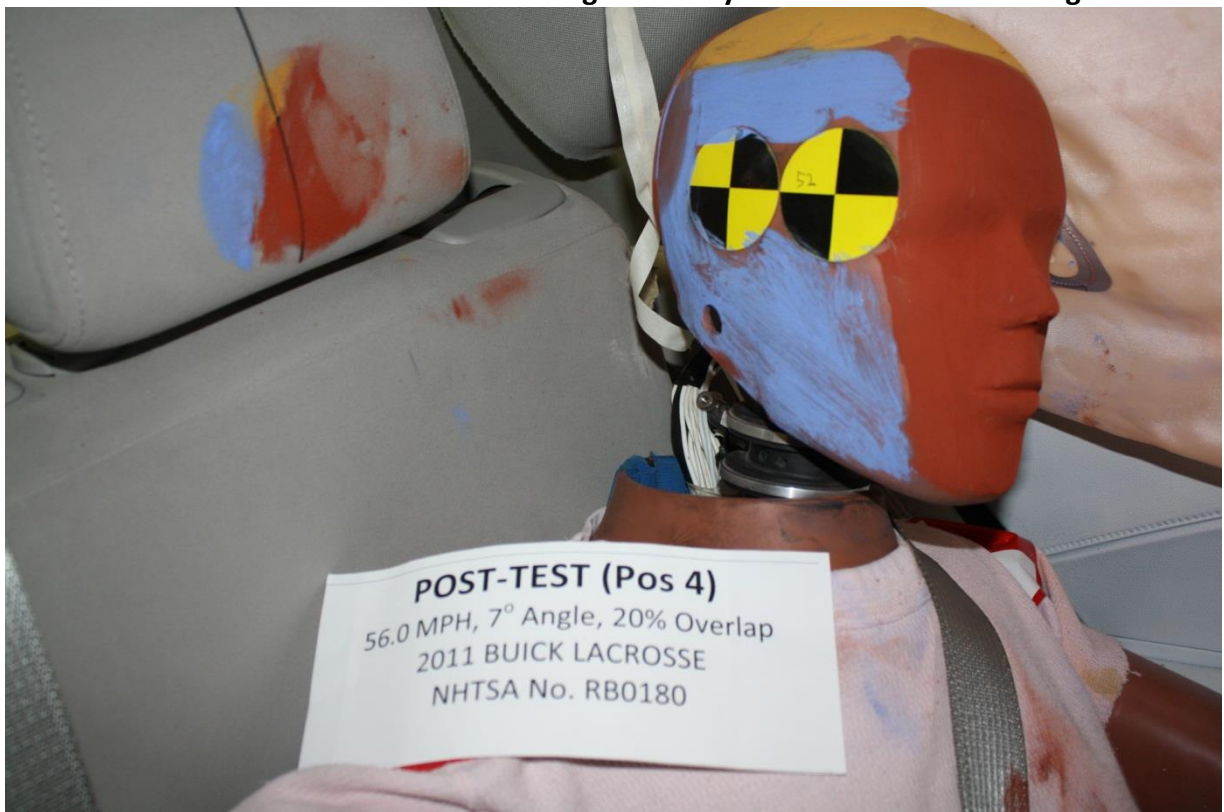


**No. 099 Post-Test View of Passenger Dummy Feet**

# Photo Not Applicable

No. 100 Post-Test View of Passenger Dummy Head contact with Airbag

No. 100 Post-Test View of Passenger Dummy Head contact with Airbag



No. 101 Post-Test View of Passenger Dummy Head contact with Interior (a,b,c)





**No. 102 Post-Test View of Passenger Dummy Knee Contact with Seatback**

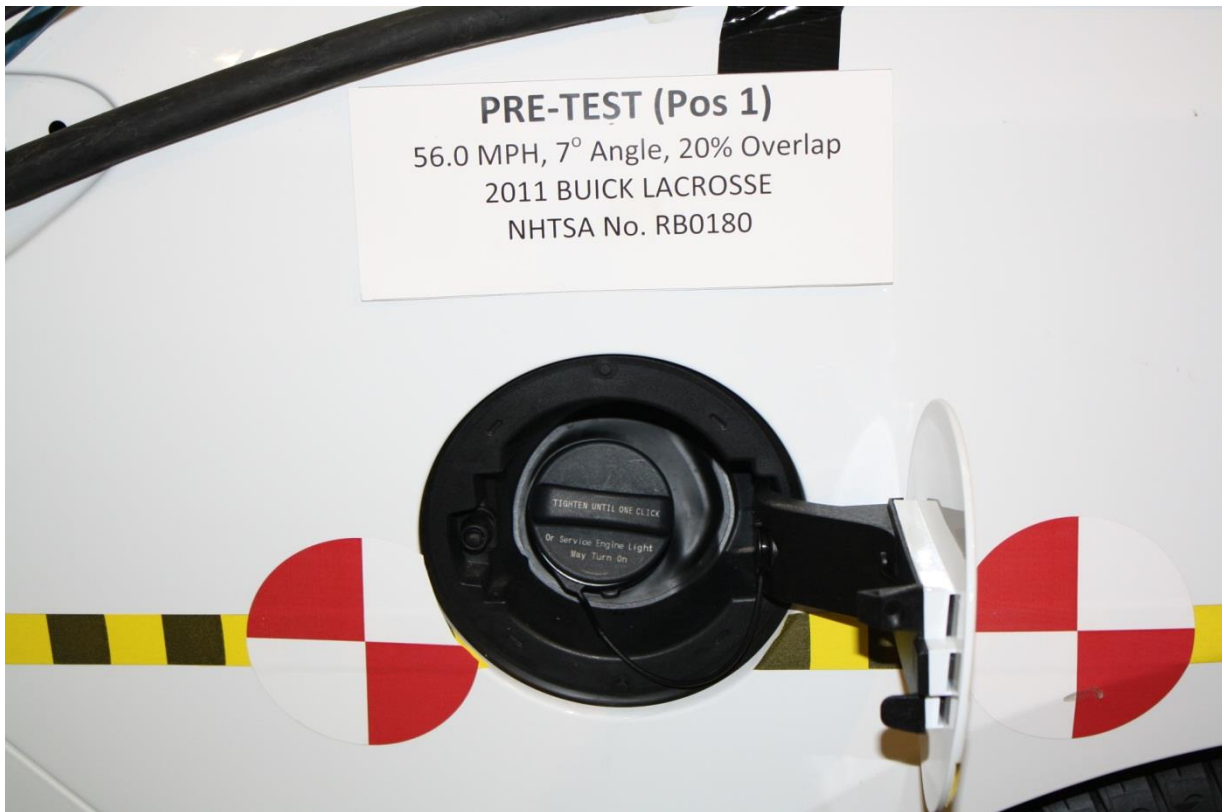


**No. 103 Pre-Test Ballast Locations**

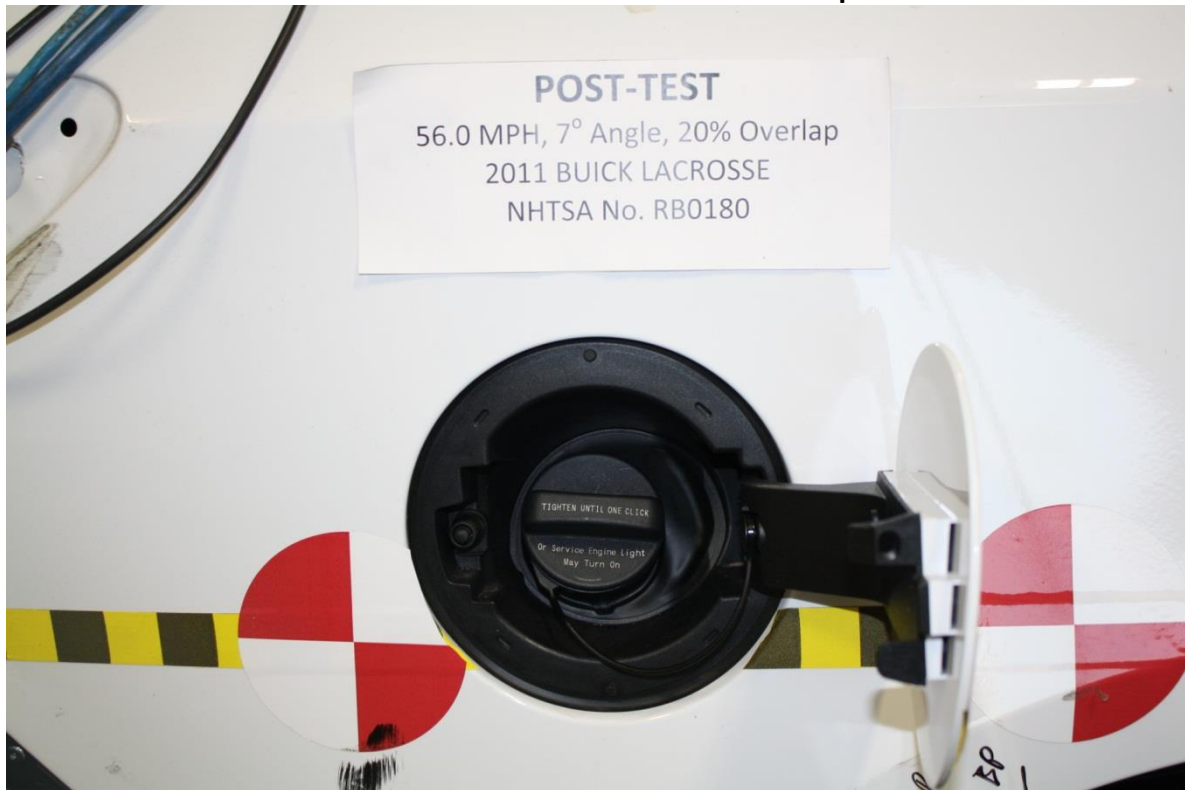


No. 104 Post-Test Speed Trap Readout





**No. 105 Pre-Test View of Fuel Filler Cap**



**No. 106 Post-Test View of Fuel Filler Cap**

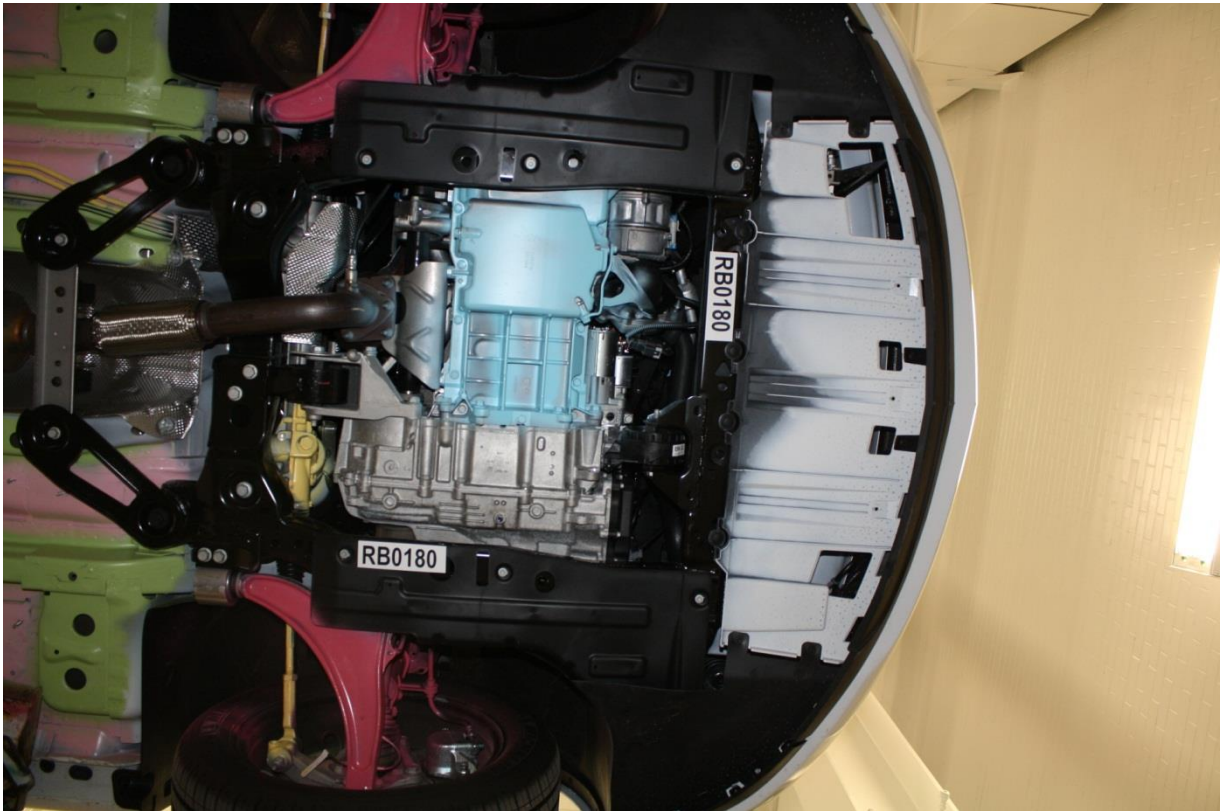


**No. 107 Pre-Test Engine Compartment View**

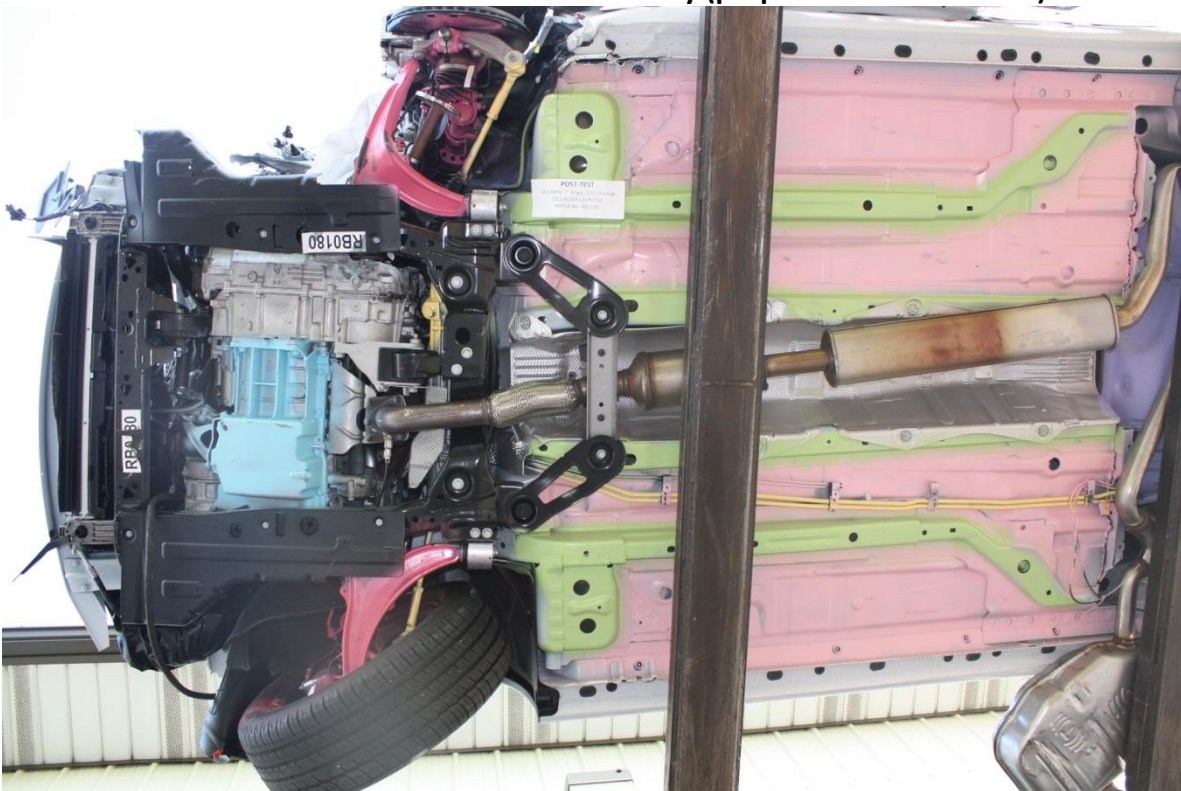


**No. 108 Post-Test Engine Compartment View**



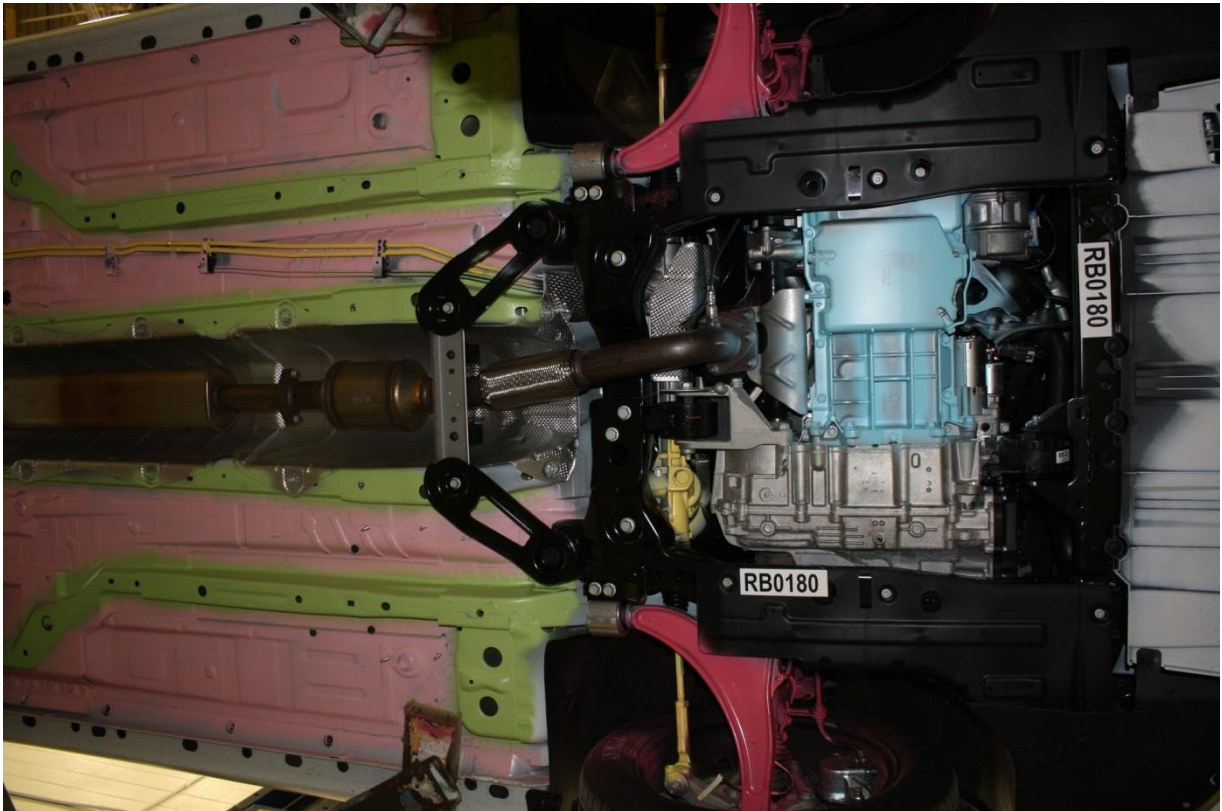


**No. 109 Pre-Test View of Front Underbody (perpendicular to vehicle)**

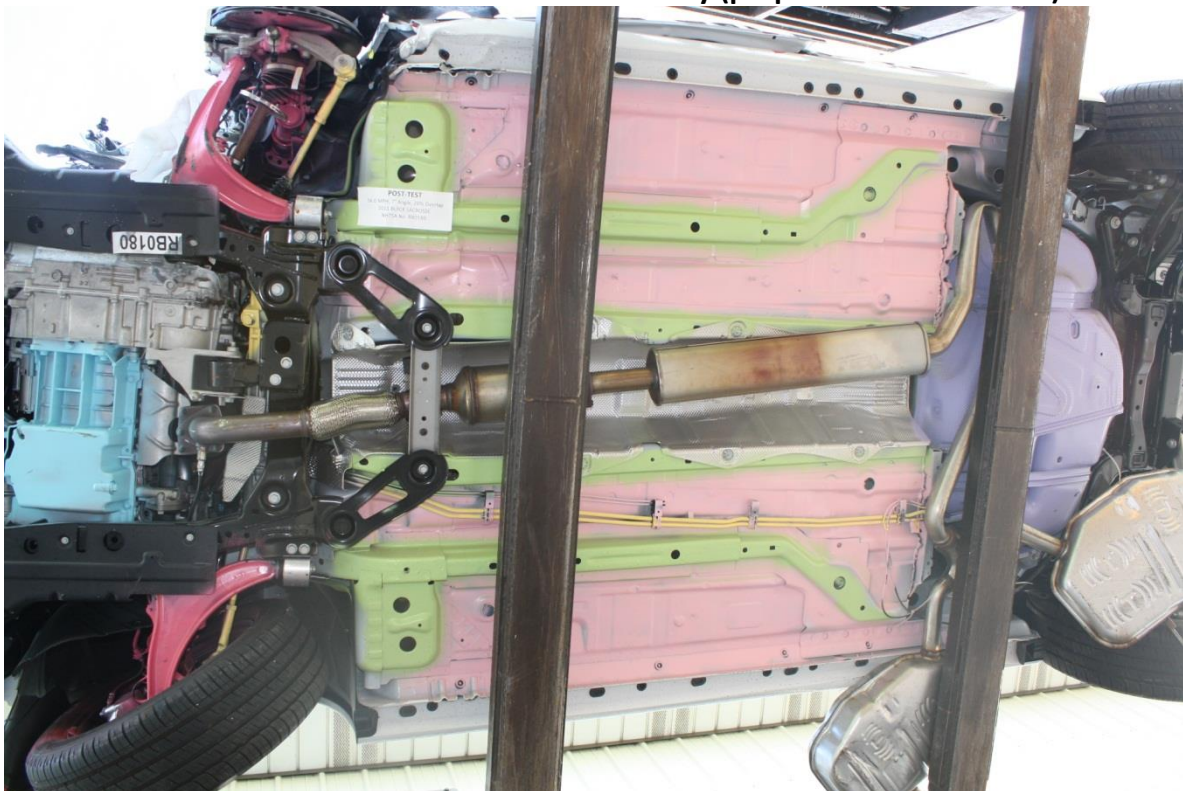


**No. 110 Post-Test View of Front Underbody (perpendicular to vehicle)**





**No. 111 Pre-Test View of Overall Underbody (perpendicular to vehicle)**

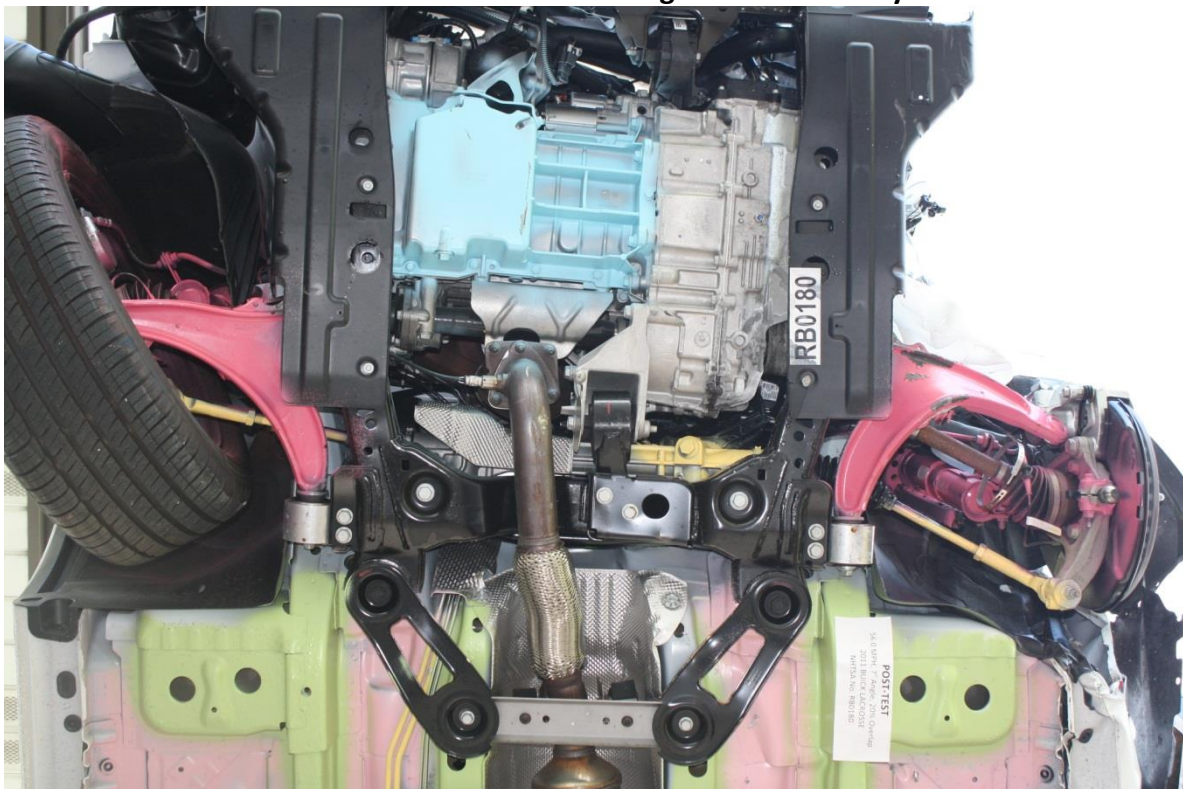


**No. 112 Post-Test View of Overall Underbody (perpendicular to vehicle)**





**No. 113 Pre-Test View of Steering rack and or sway bar**



**No. 114 Post-Test View of Steering rack and or sway bar**

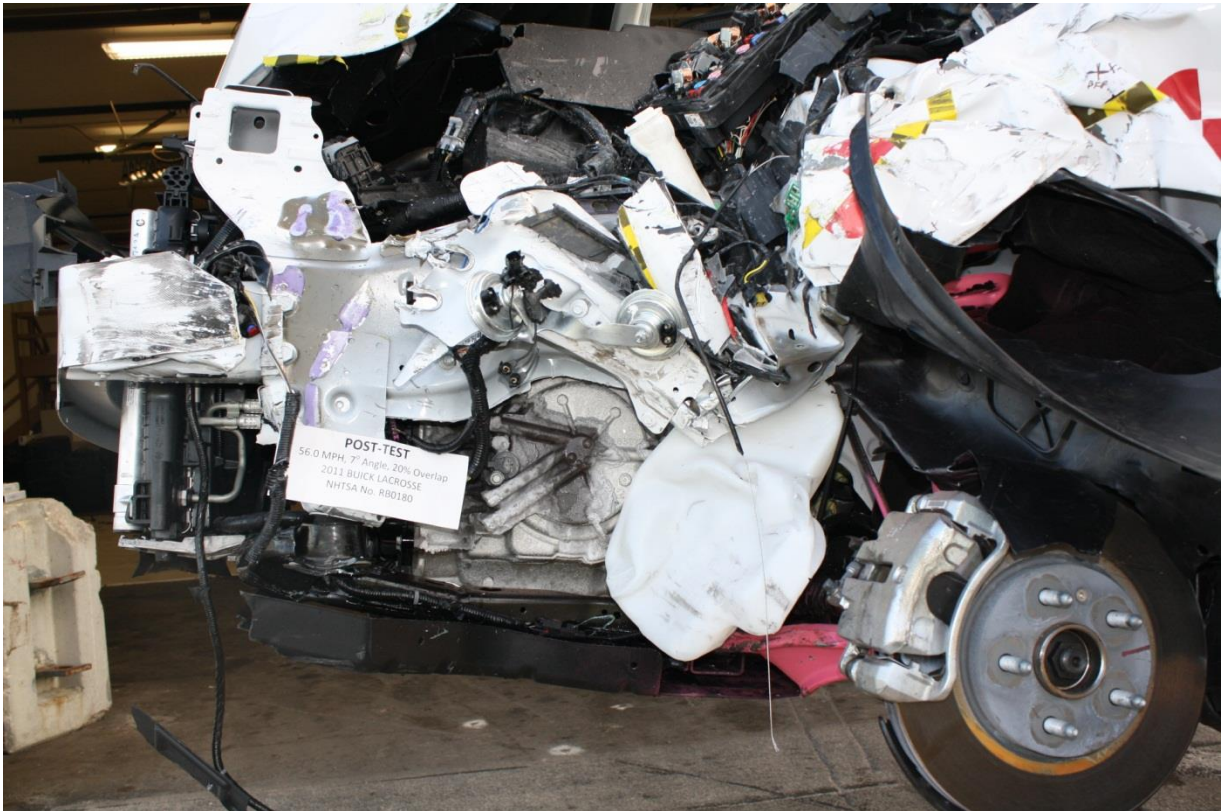


**No. 115 Pre-Test Close up of Bumper and Crush Initiators**

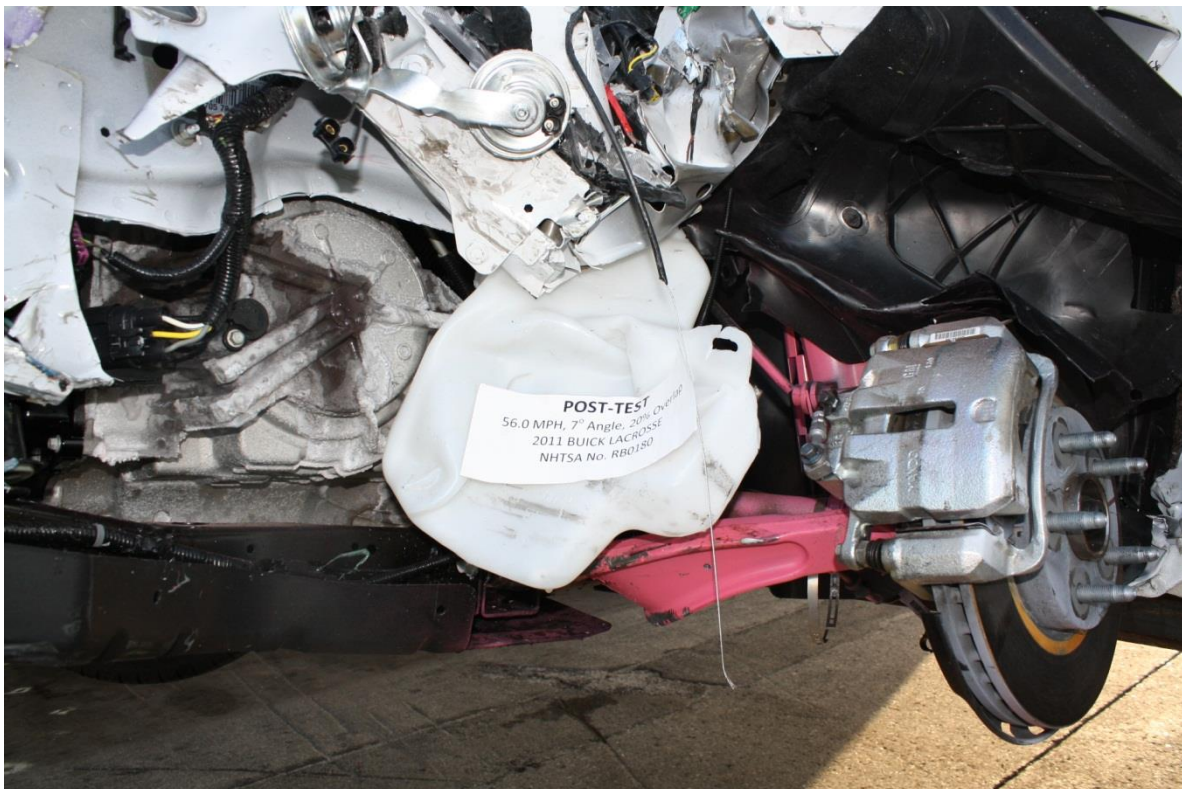


**No. 116 Post-Test View of Front Sub-Frame Deformation**





**No. 117 Pre-Test Frame Rail with tire removed**



**No. 118 Post-Test Frame Rail with tire removed**

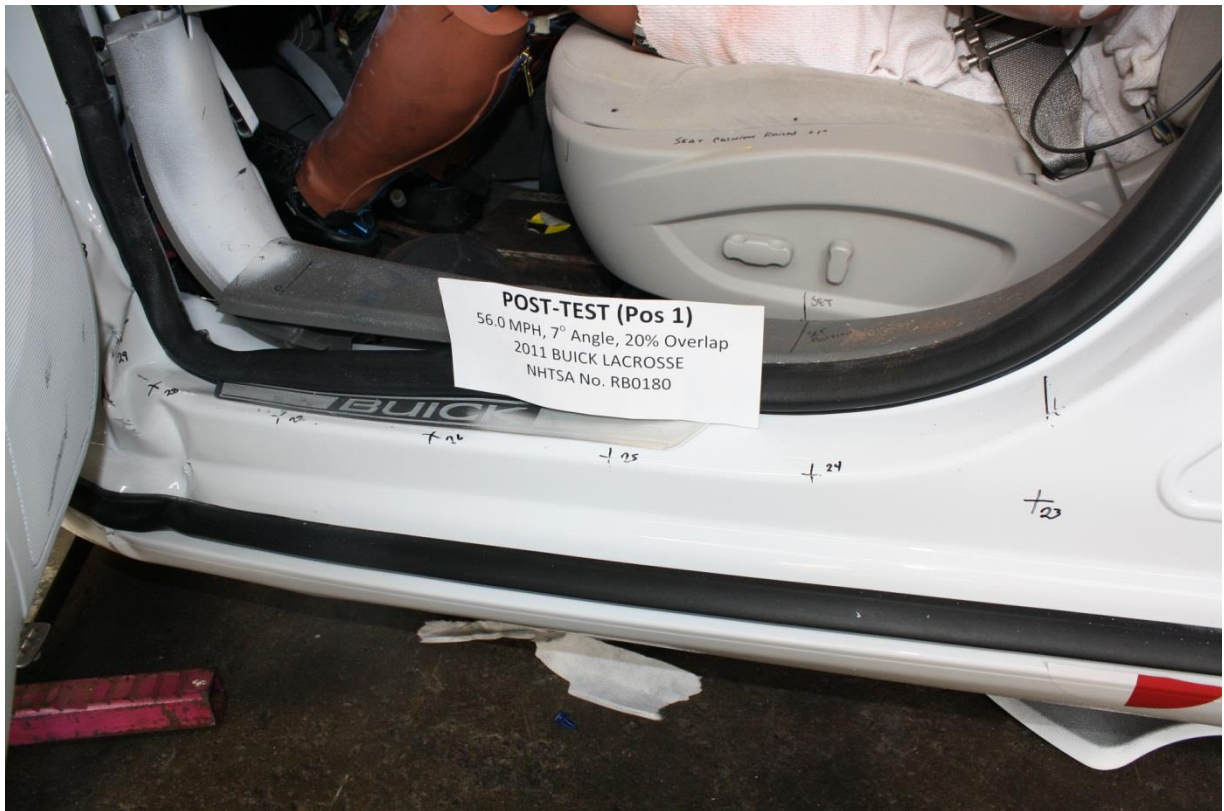




**No. 119 Pre-Test View of Wheel Well with tire removed**



**No. 120 Post-Test View of Wheel Well with tire removed**



**No. 121 Post-Test View of Door Sill with door open**



**No. 122 Post-Test View of Deformation of A pillar**





**No. 123 Post-Test View of Deformation of B pillar**



**No. 124 Post-Test View of Deformation of C pillar**





**No. 125 Post-Test View of Wheel and or Tire Deformation**



**No. 126 Post-Test View of Deformation of Rocker or Post**



**No. 127 Post-Test View of Windshield Separation**





**No. 128 Pre-Test Left Side View of RMDB**



**No. 129 Post-Test Left Side View of RMDB**





**No. 130 Pre-Test Right Side View of RMDB**



**No. 131 Post-Test Right Side View of RMDB**

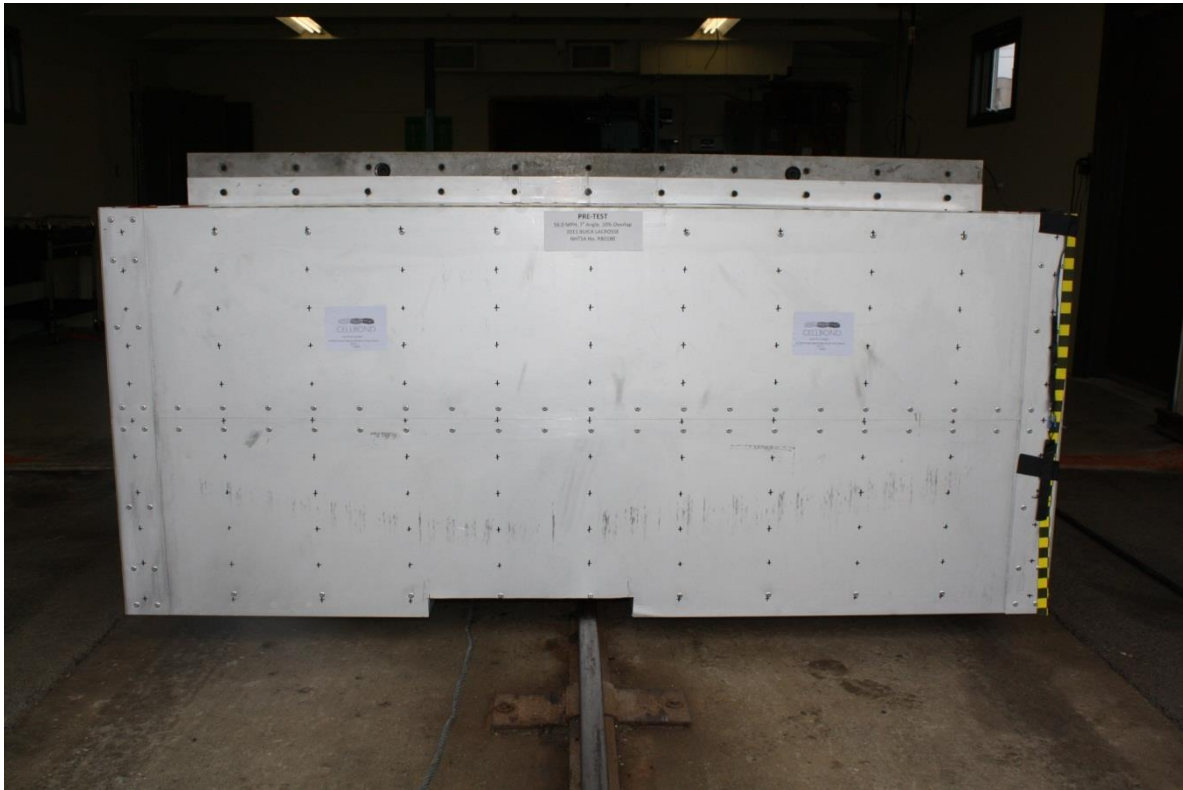


**No. 132 Pre-Test Top View of RMDB**



**No. 133 Post-Test Top View of RMDB**





**No. 134 Pre-Test Front View of RMDB**



**No. 135 Post-Test Front View of RMDB**





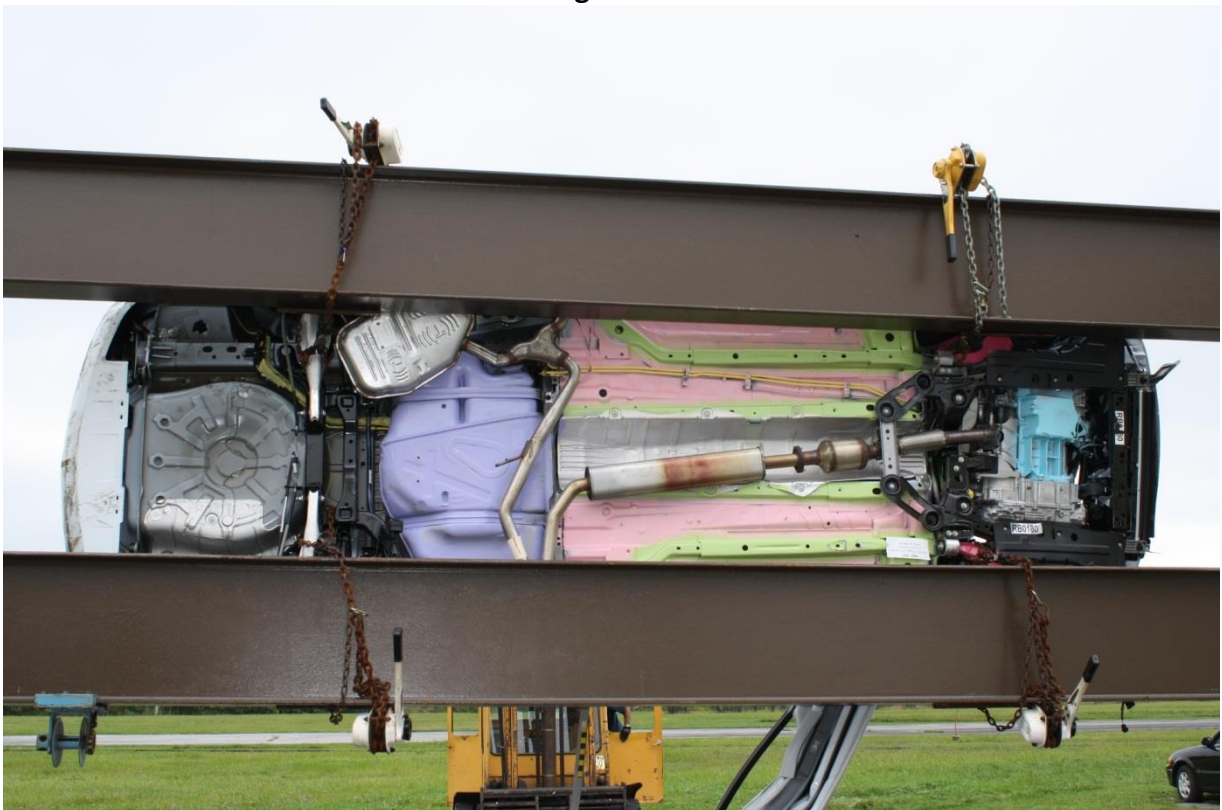
**No. 136 Vehicle at 0 Degrees on Static Rollover Device**



**No. 137 Vehicle at 90 Degrees on Static Rollover Device**



**No. 138 Vehicle at 180 Degrees on Static Rollover Device**



**No. 139 Vehicle at 270 Degrees on Static Rollover Device**



**No. 140 Vehicle at 360 Degrees on Static Rollover Device**



**APPENDIX B**  
**VEHICLE & DUMMY RESPONSE DATA TRACES**

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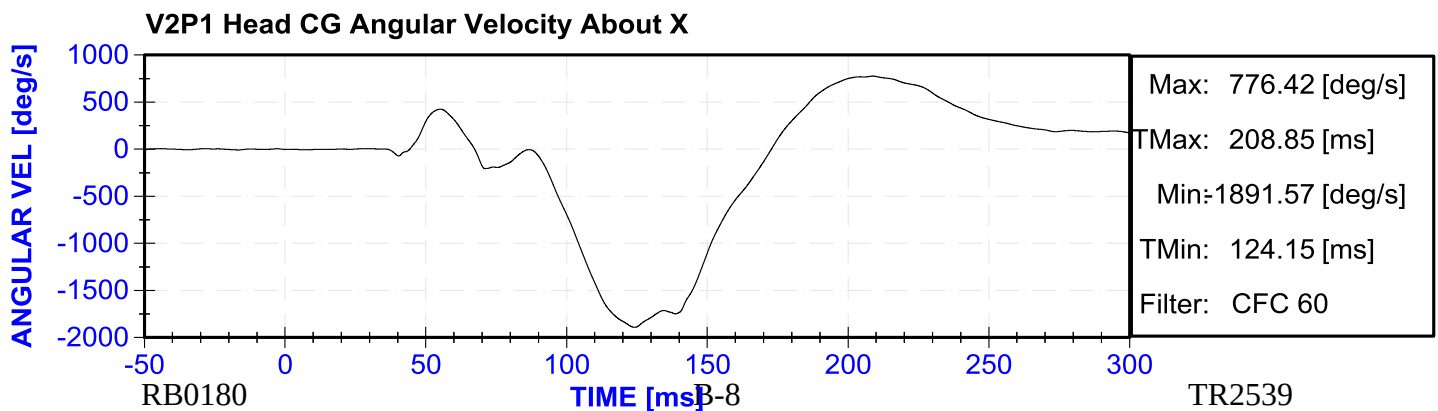
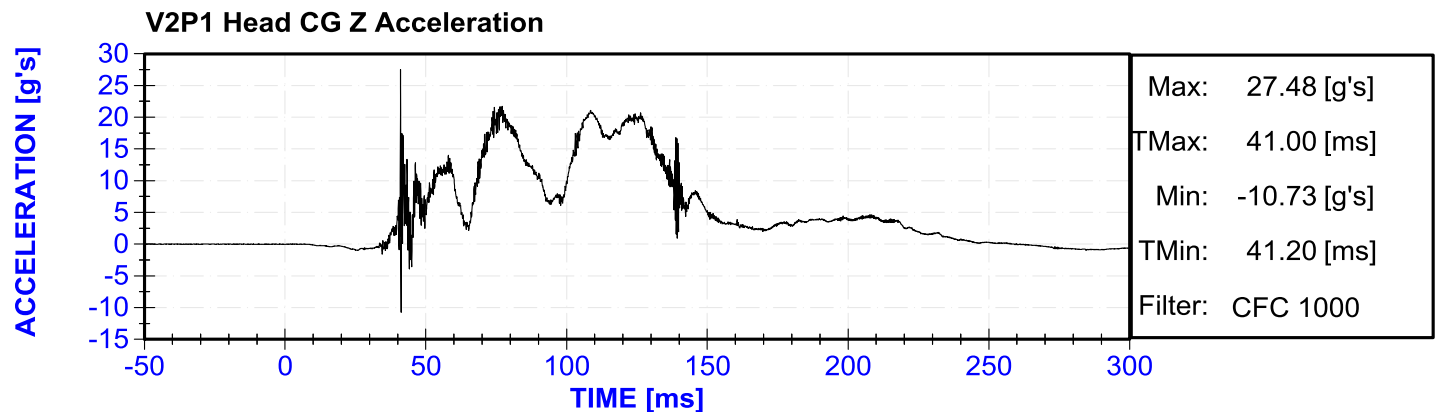
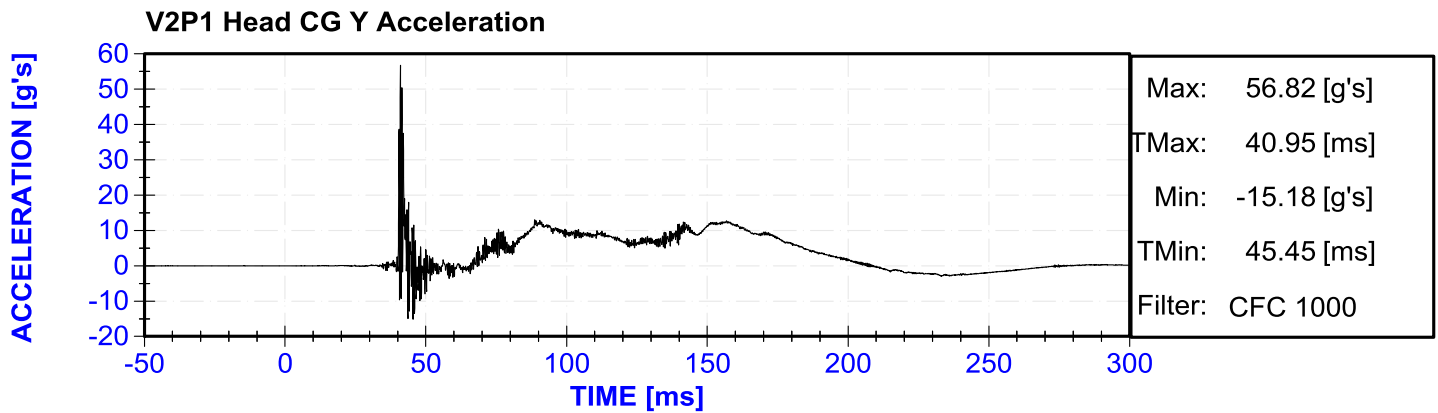
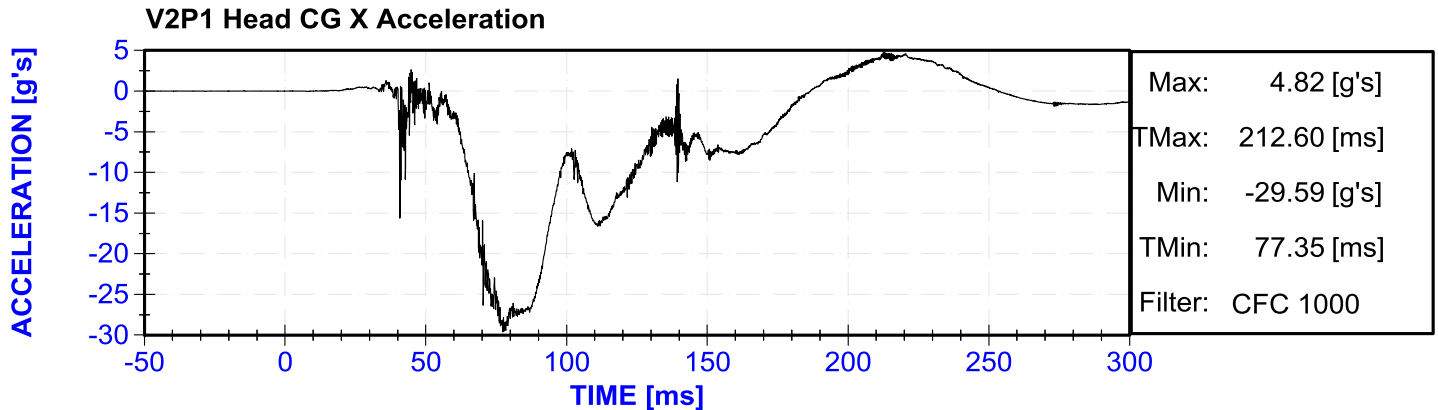
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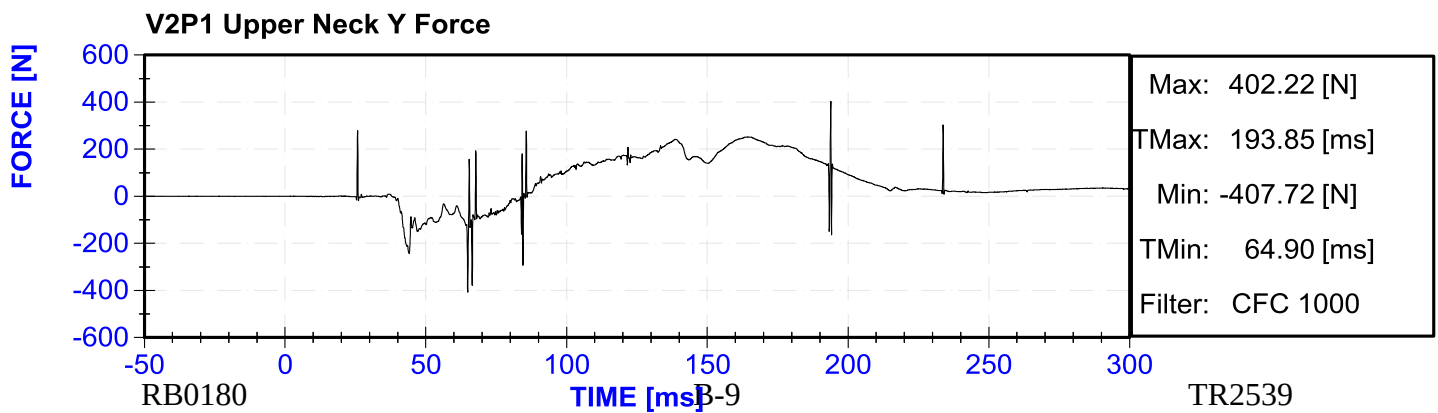
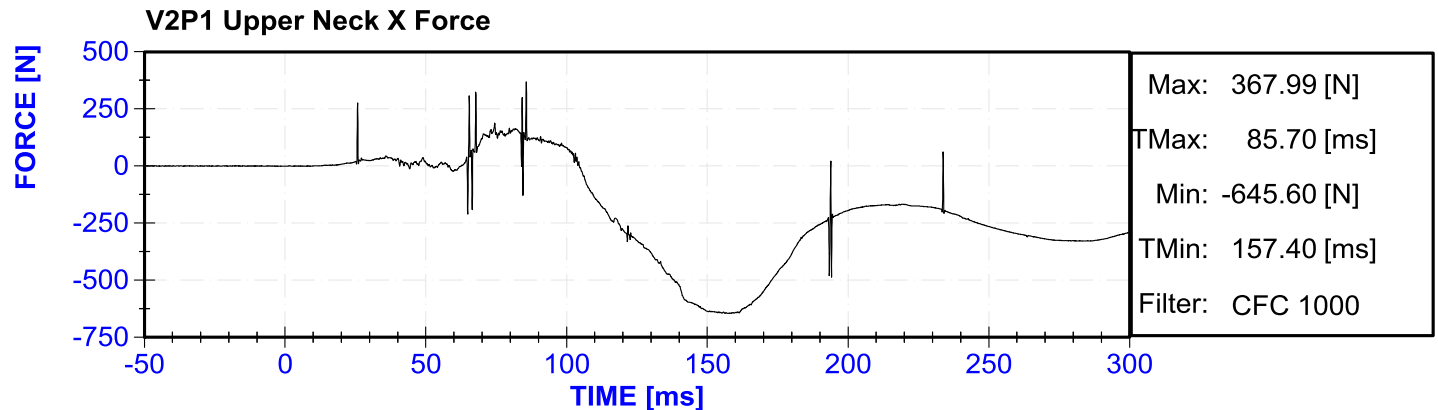
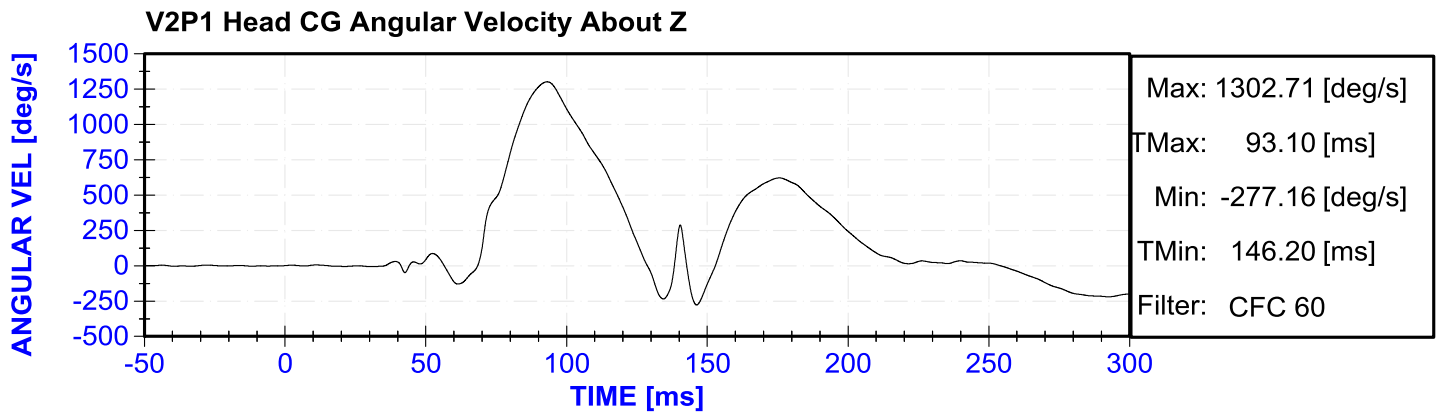
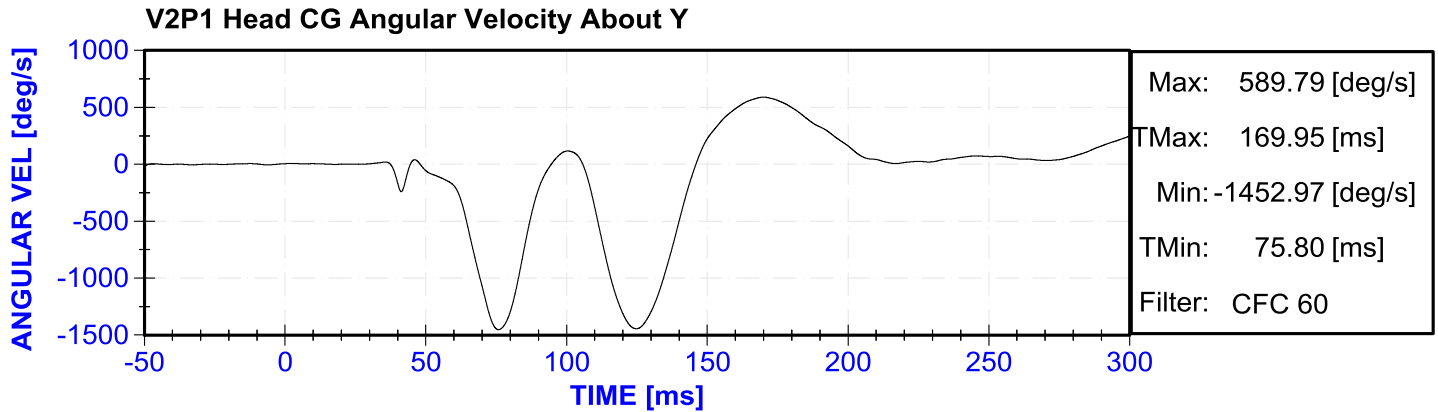
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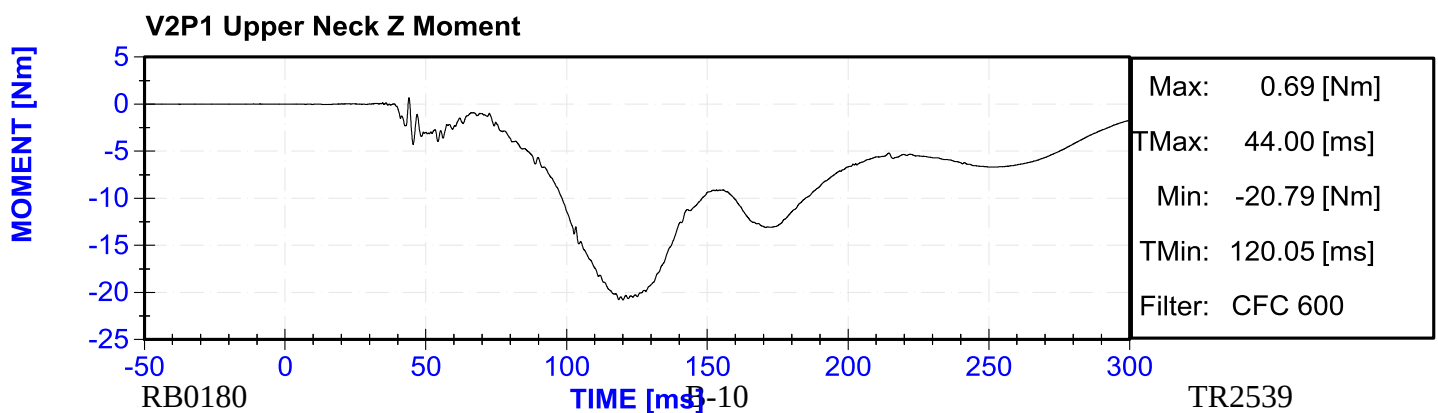
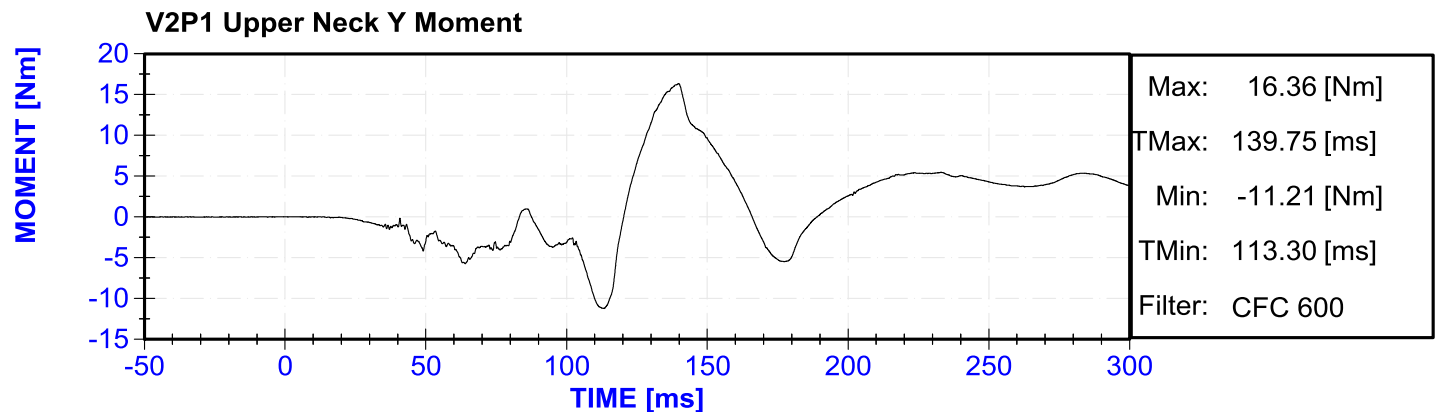
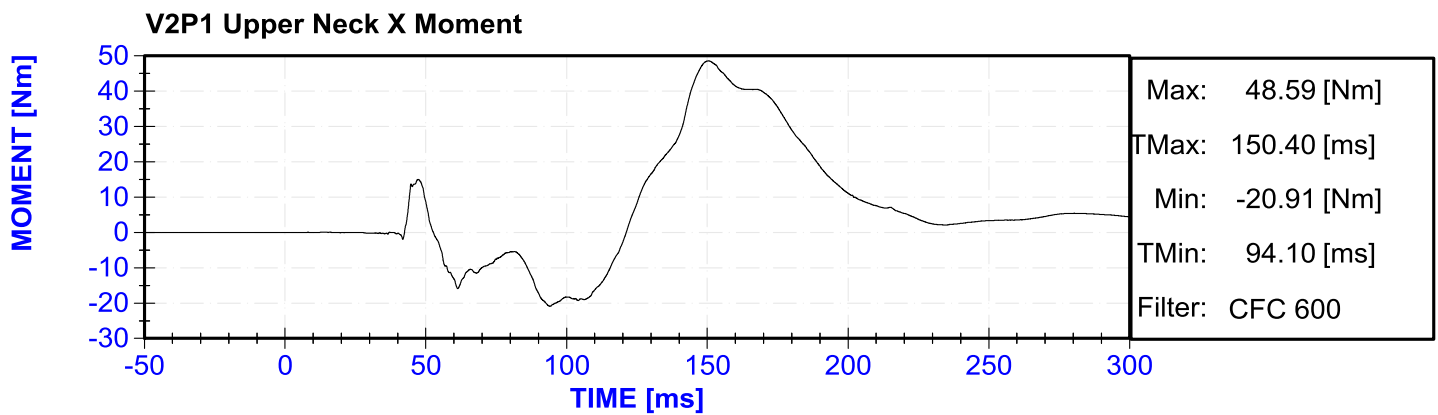
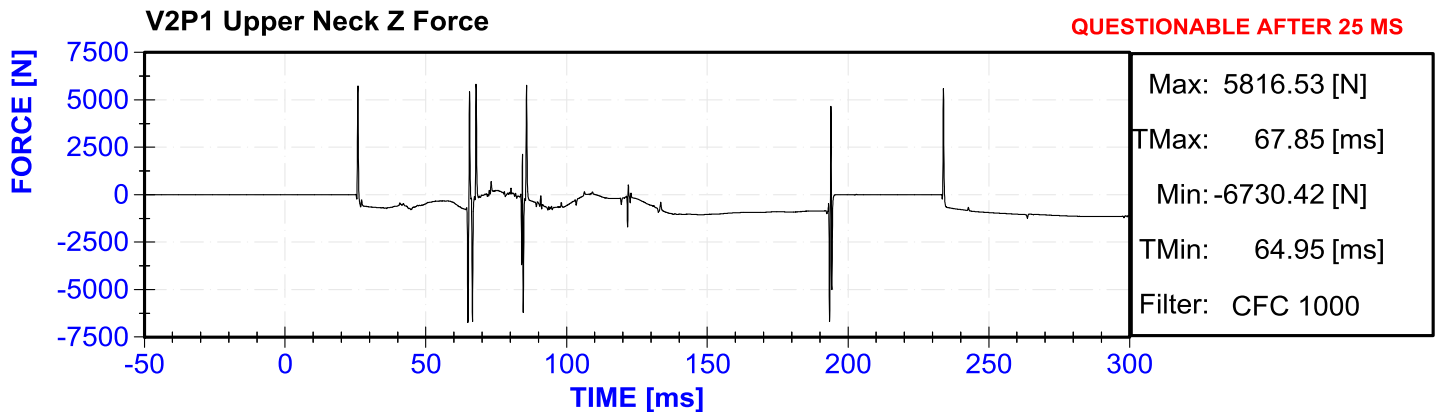


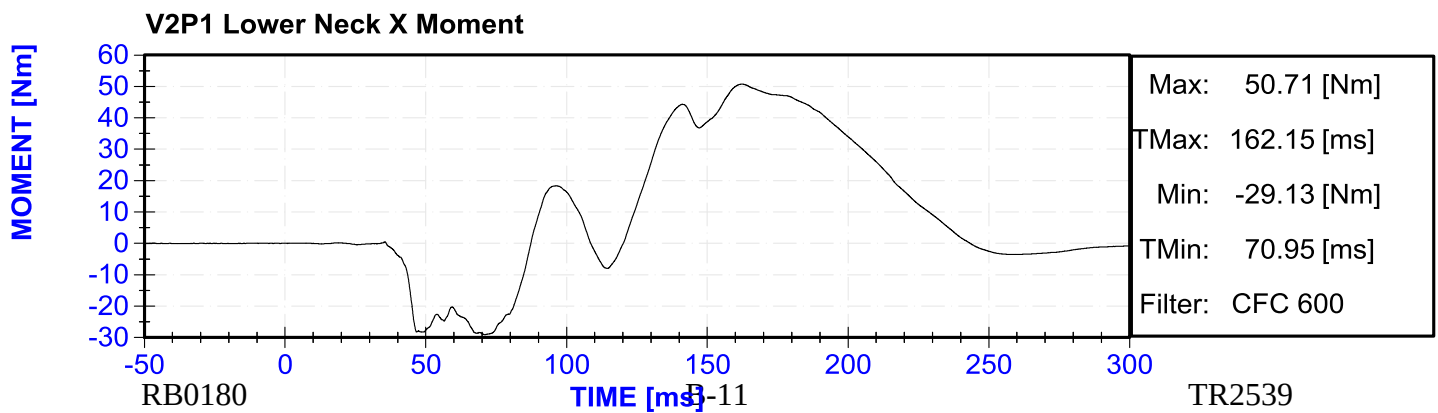
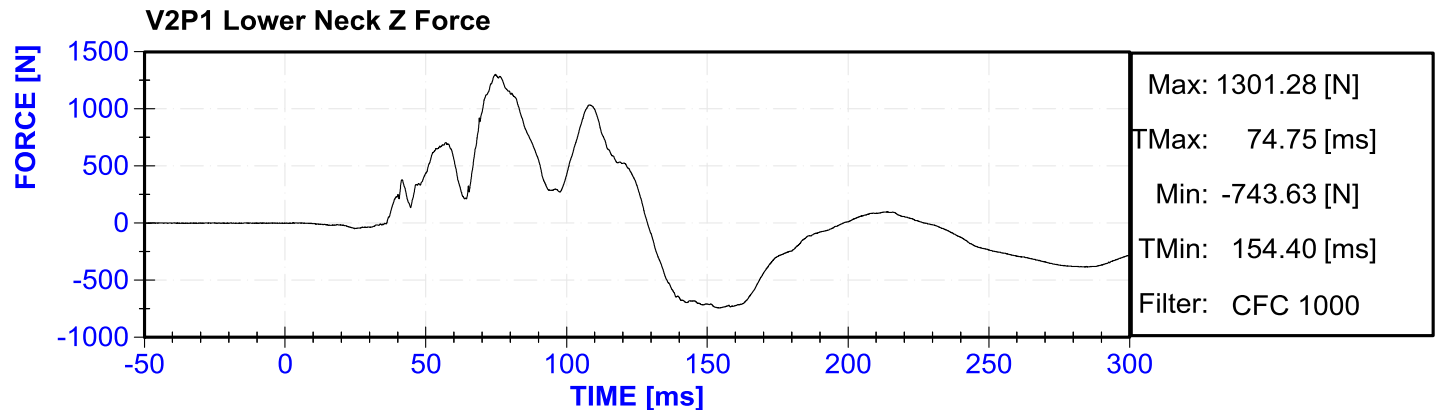
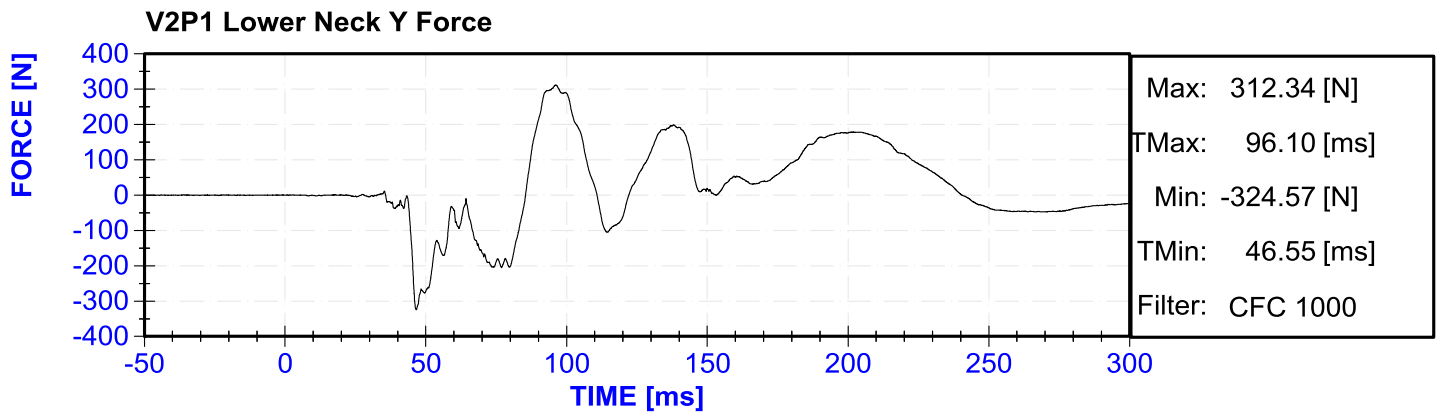
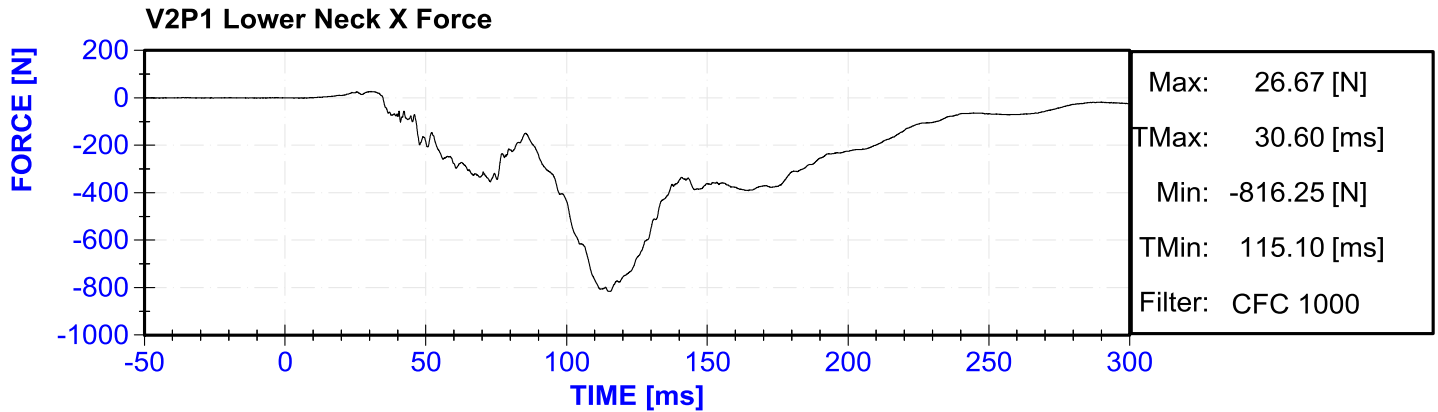
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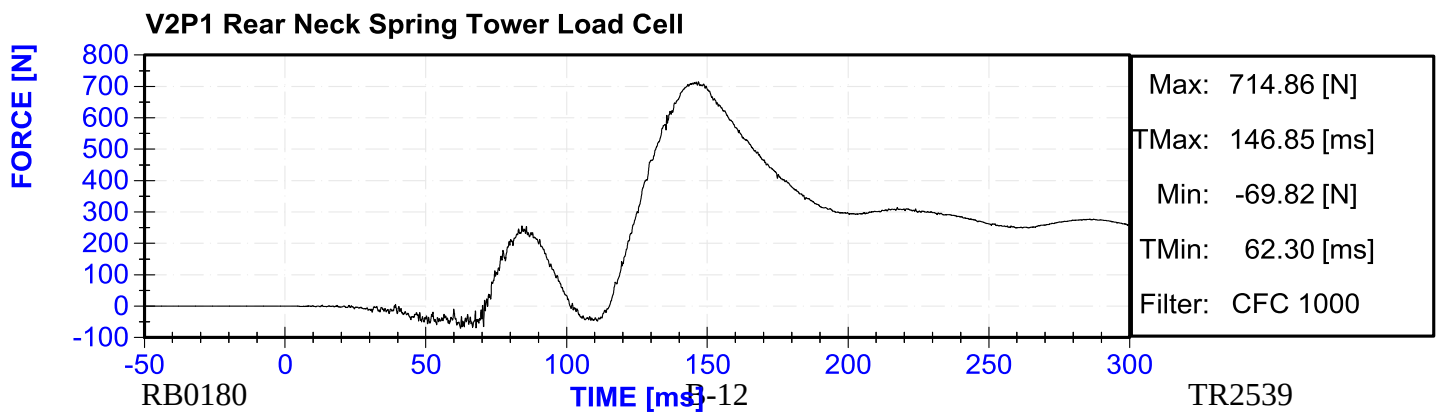
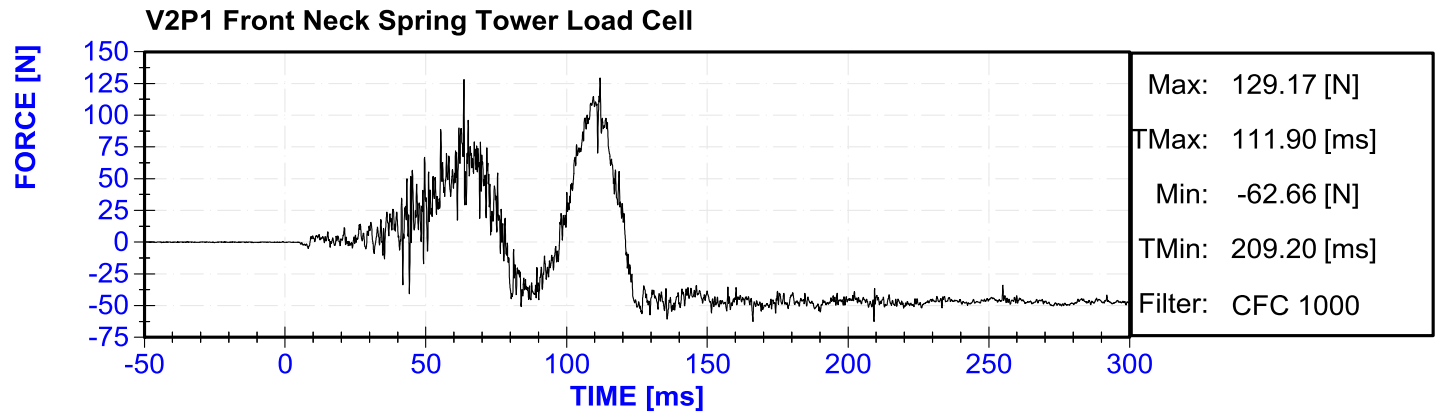
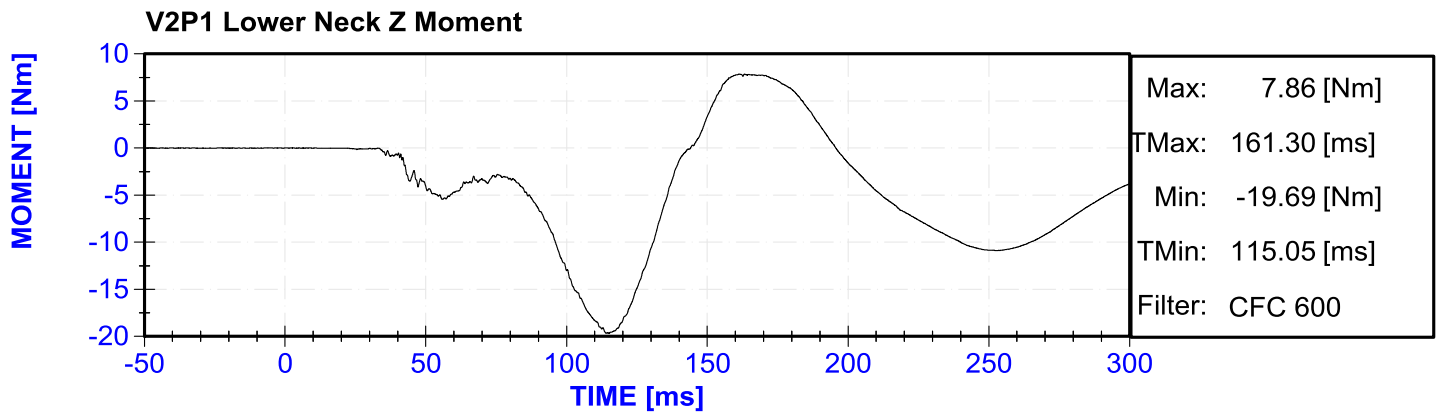
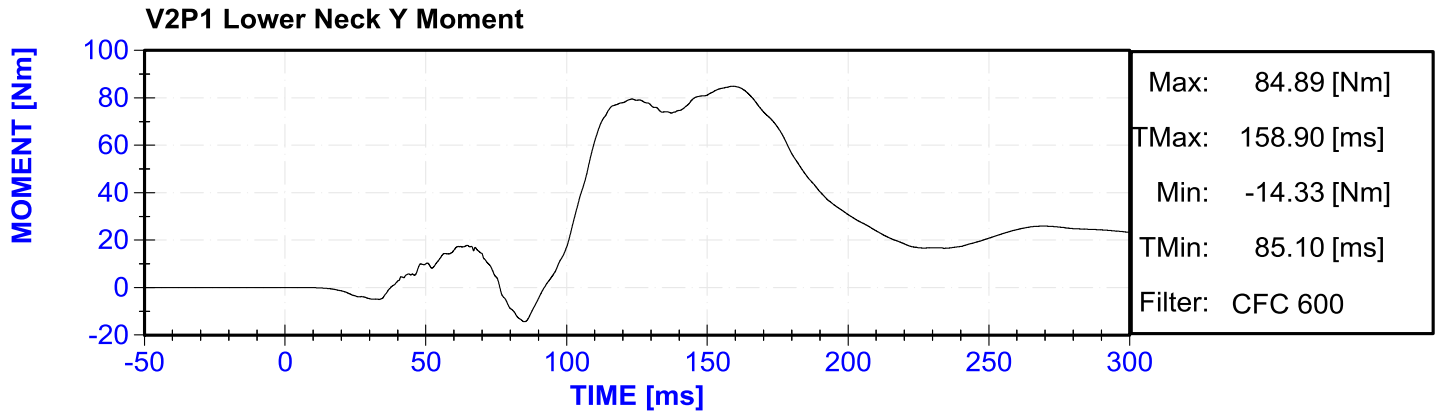






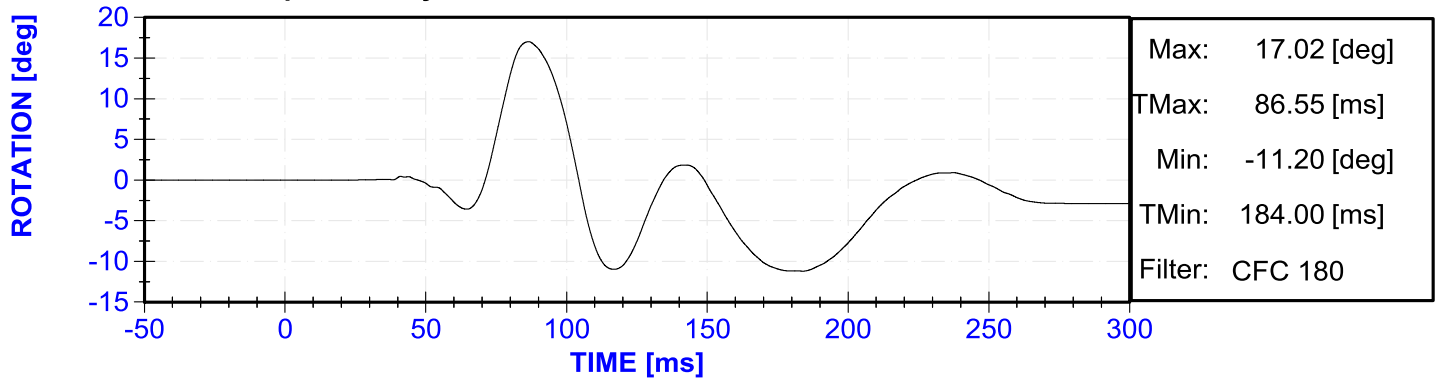




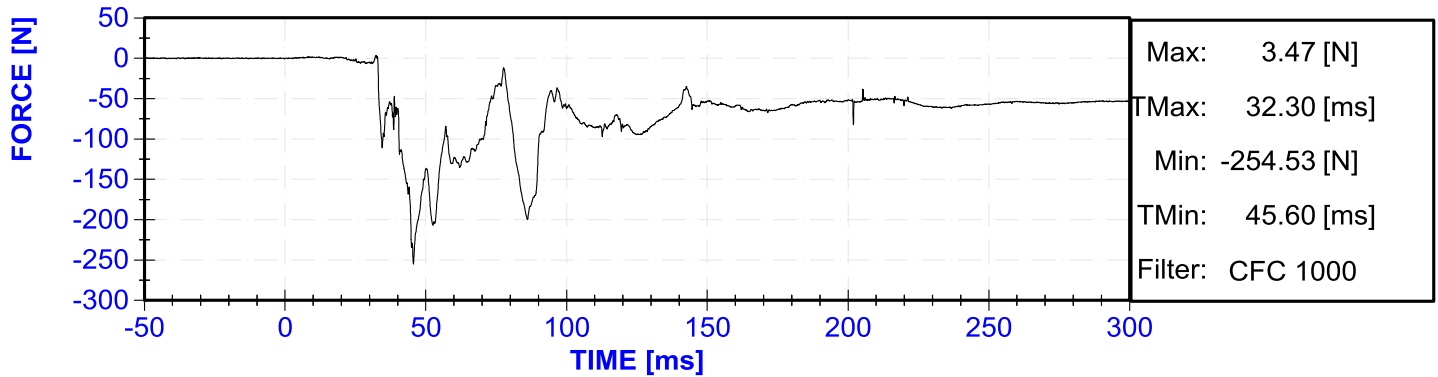




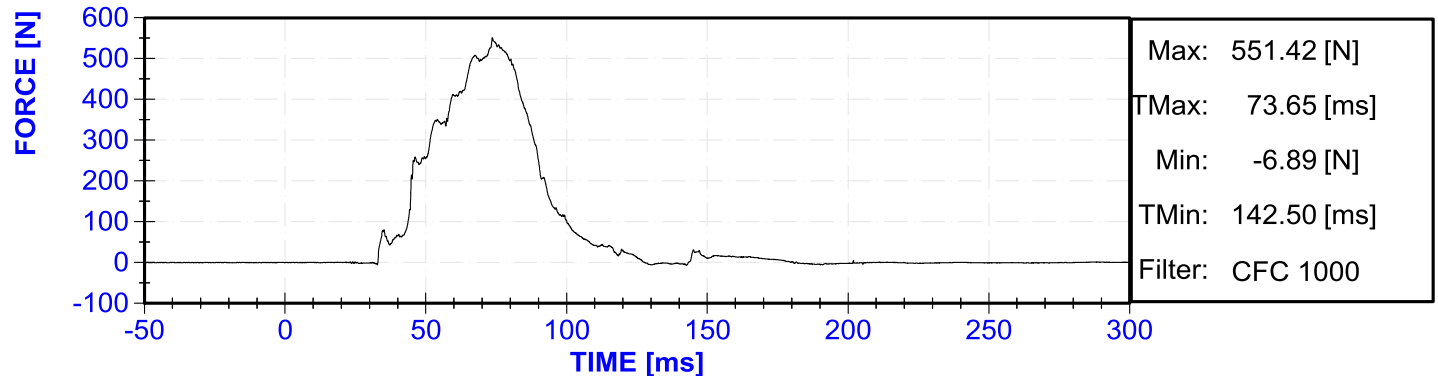
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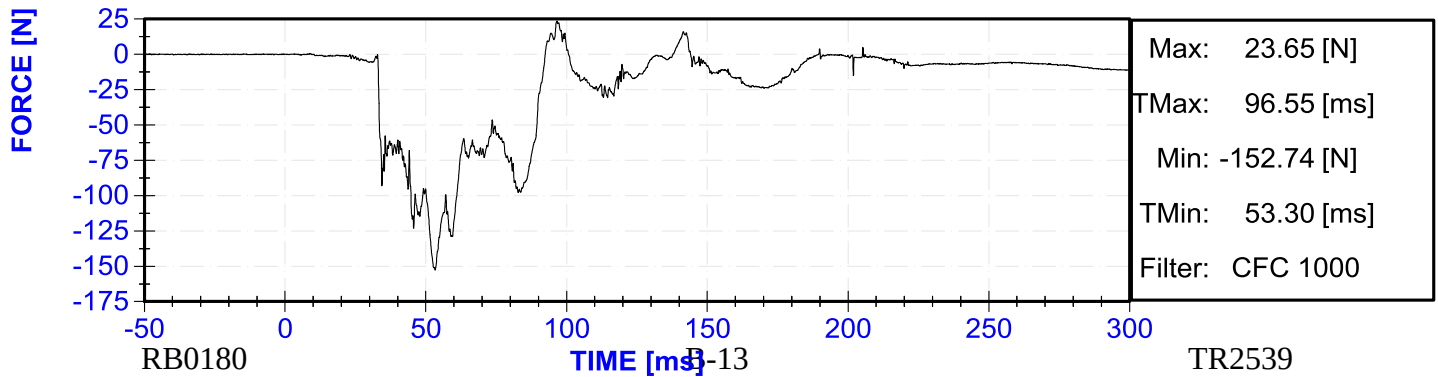
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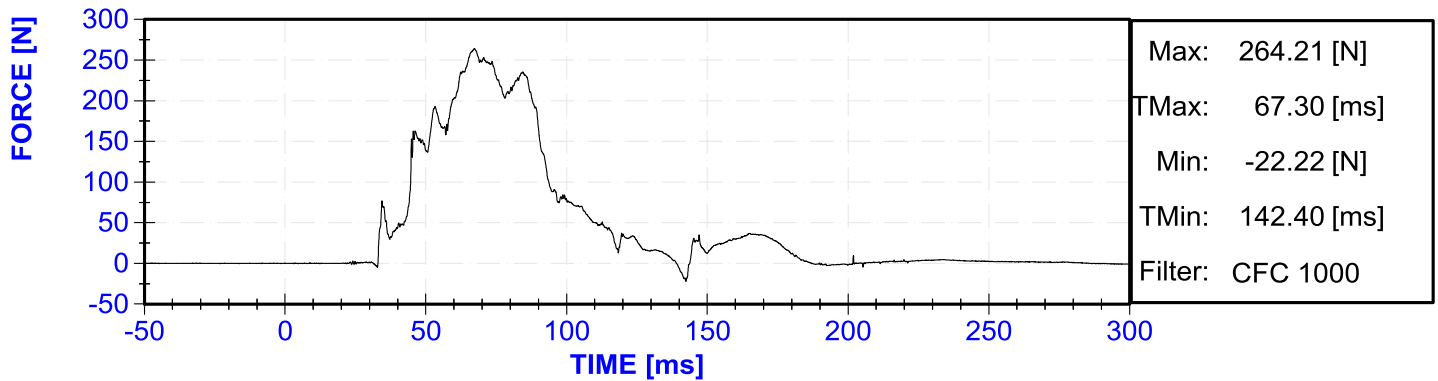
**V2P1 CLAVICLE - LEFT OUTER LC FZ**



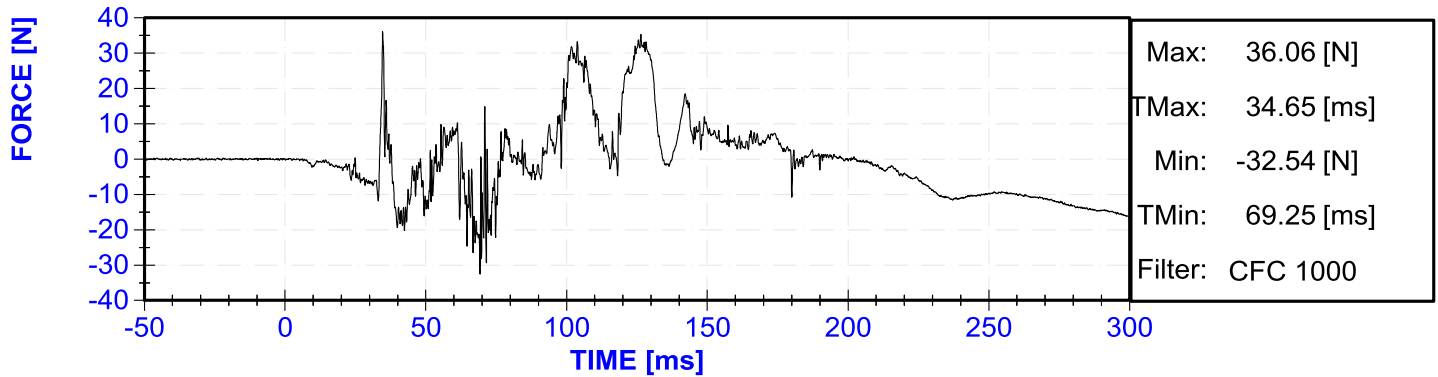
**V2P1 CLAVICLE - LEFT INNER LC FX**



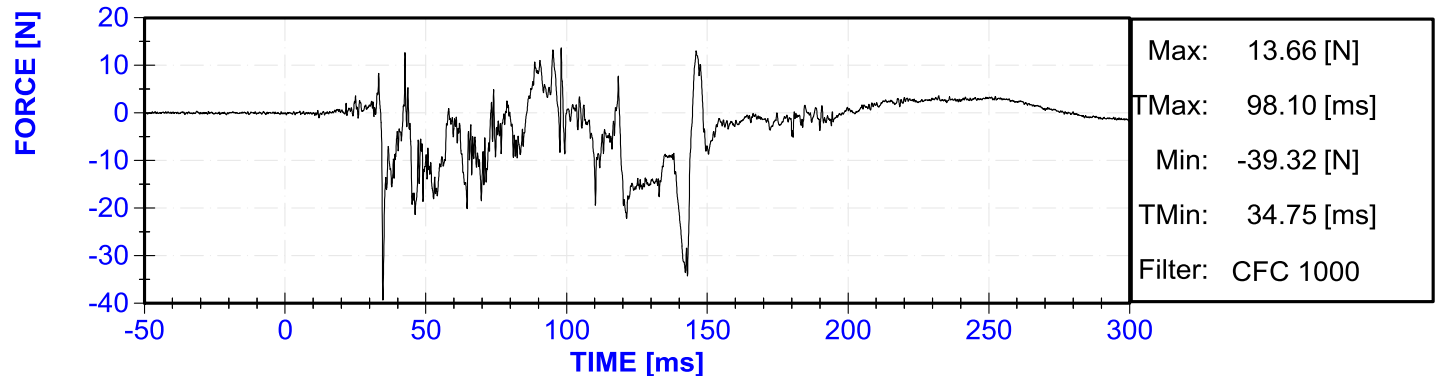
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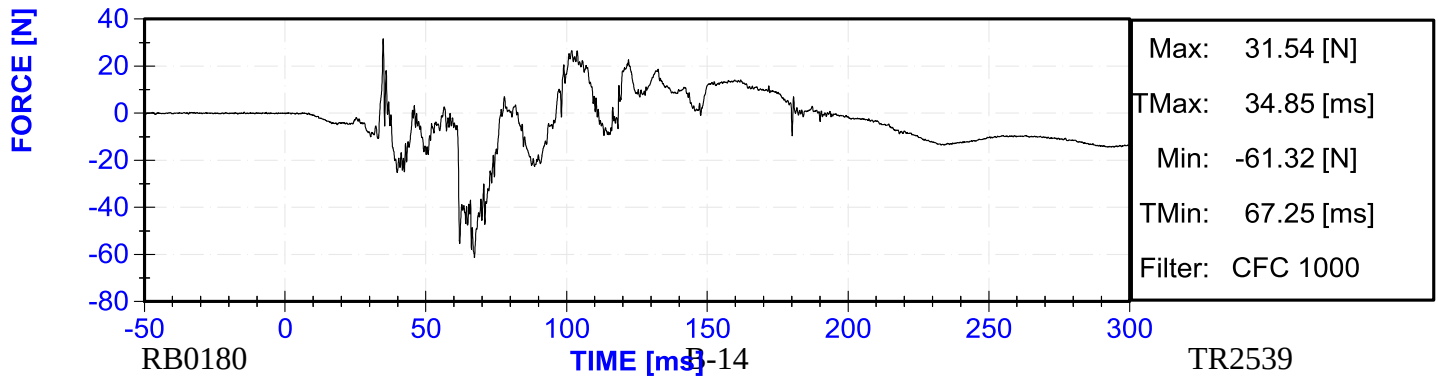
V2P1 CLAVICLE - RIGHT OUTER LC FX



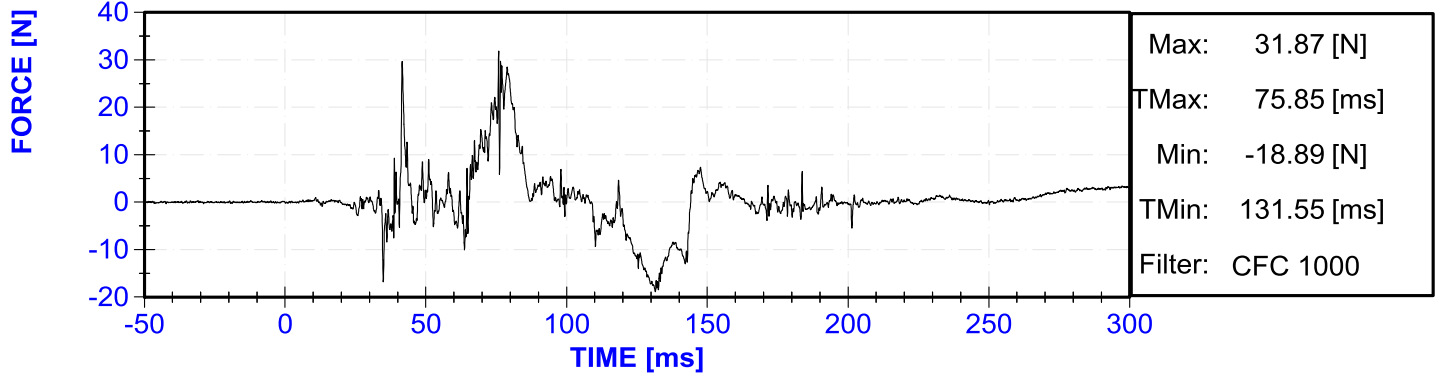
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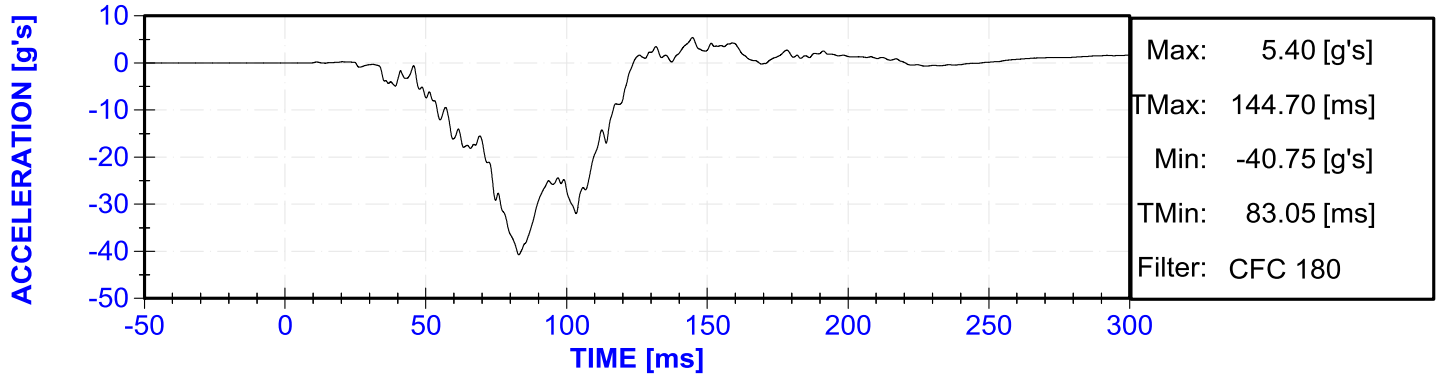
V2P1 CLAVICLE - RIGHT INNER LC FX



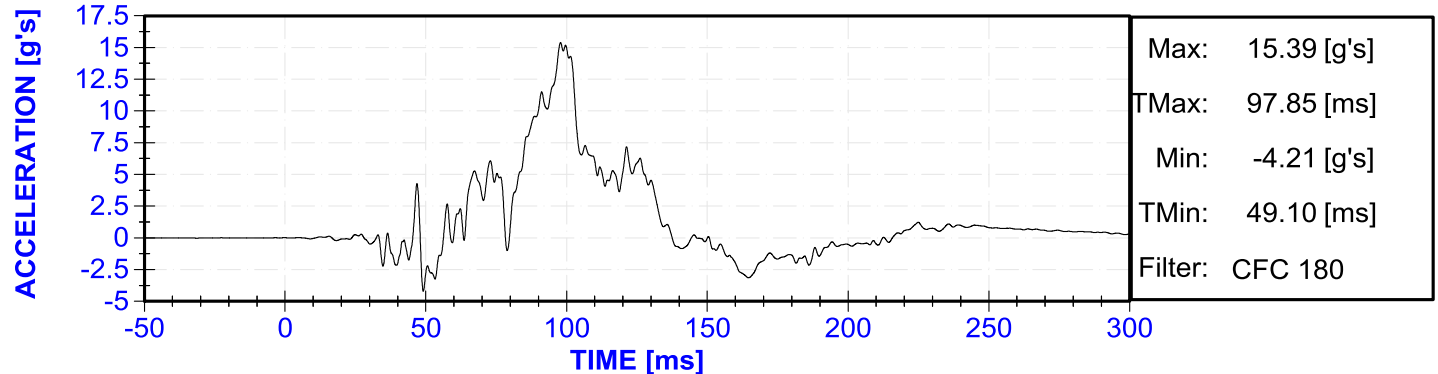
**V2P1 CLAVICLE - RIGHT INNER LC FZ**



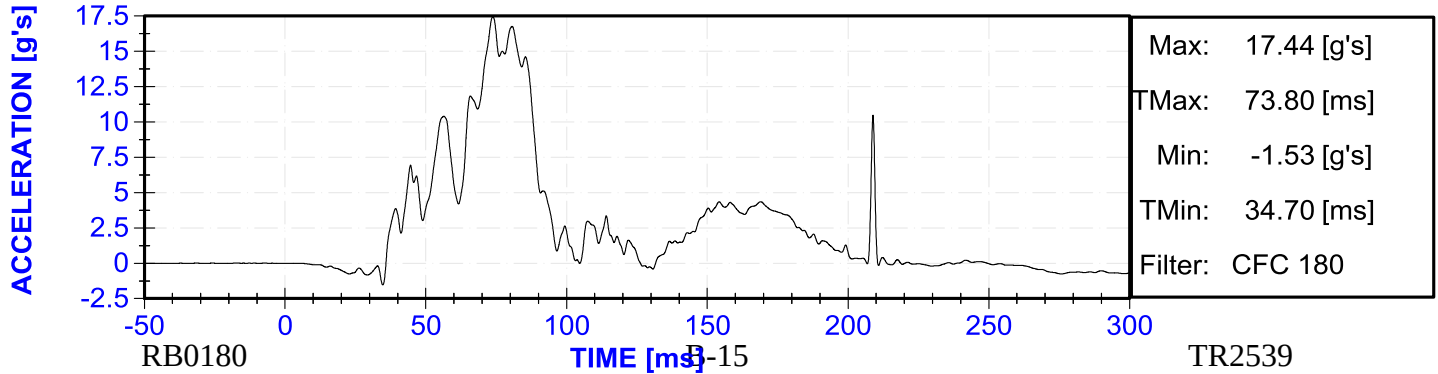
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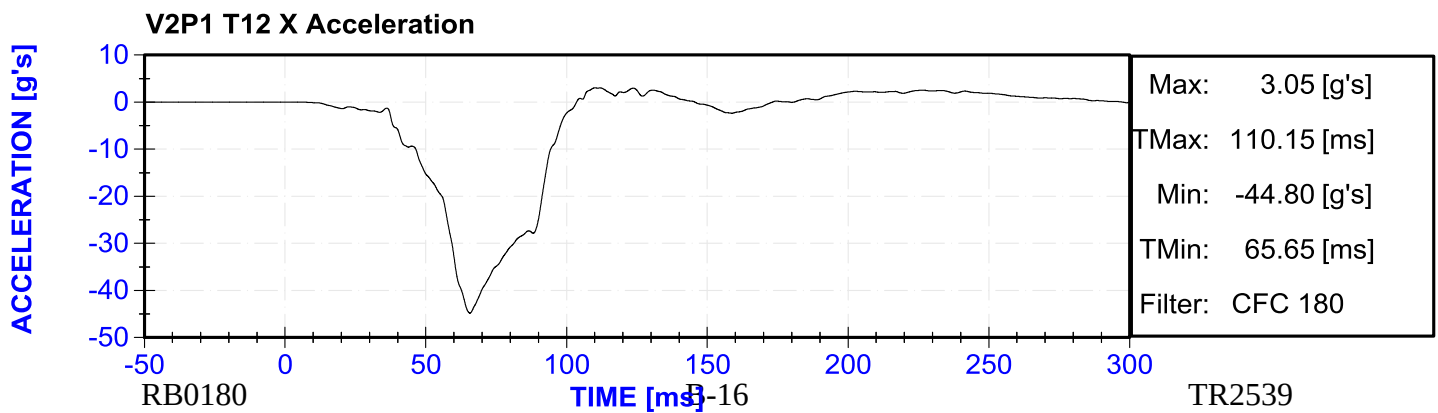
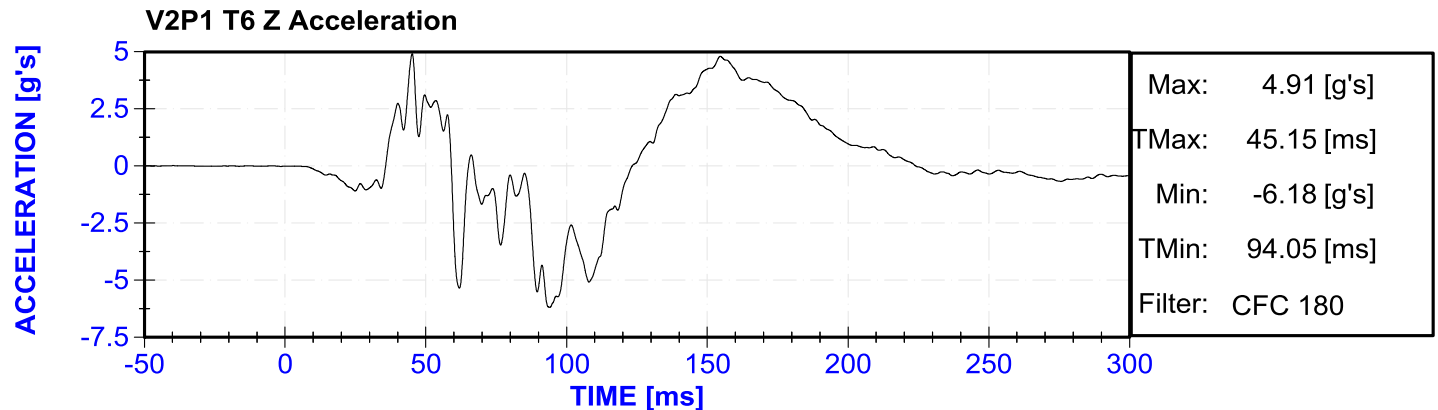
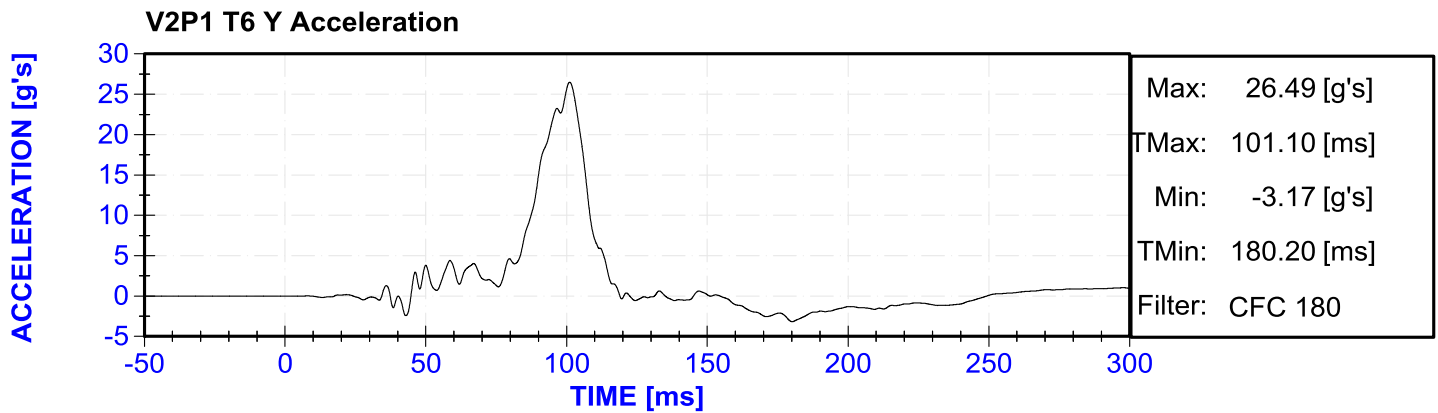
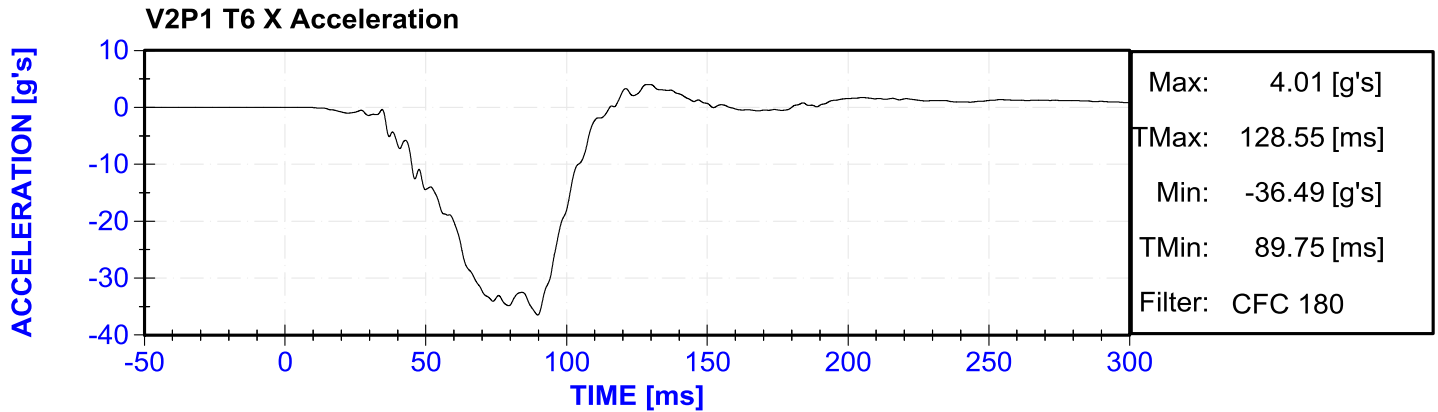
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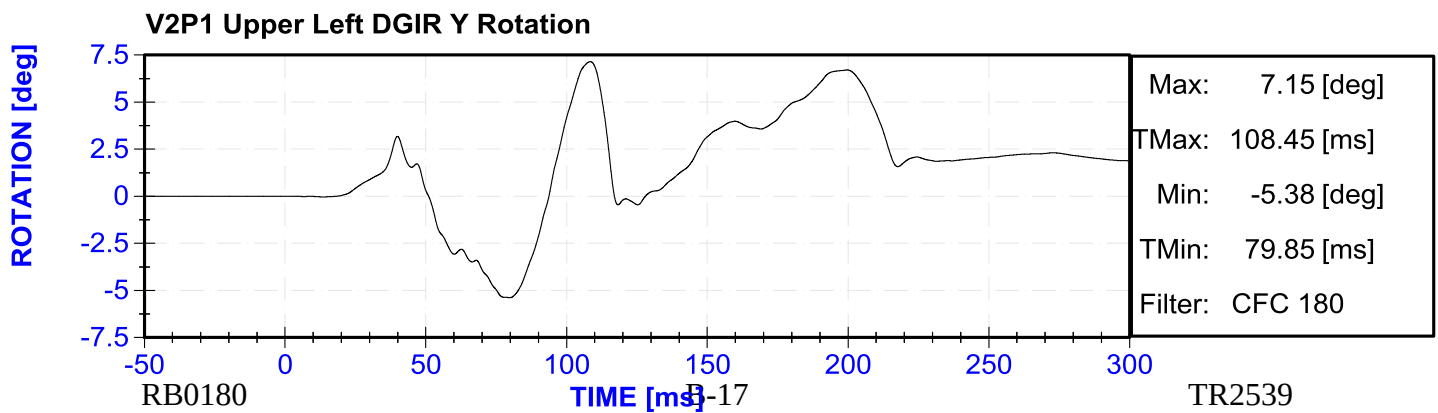
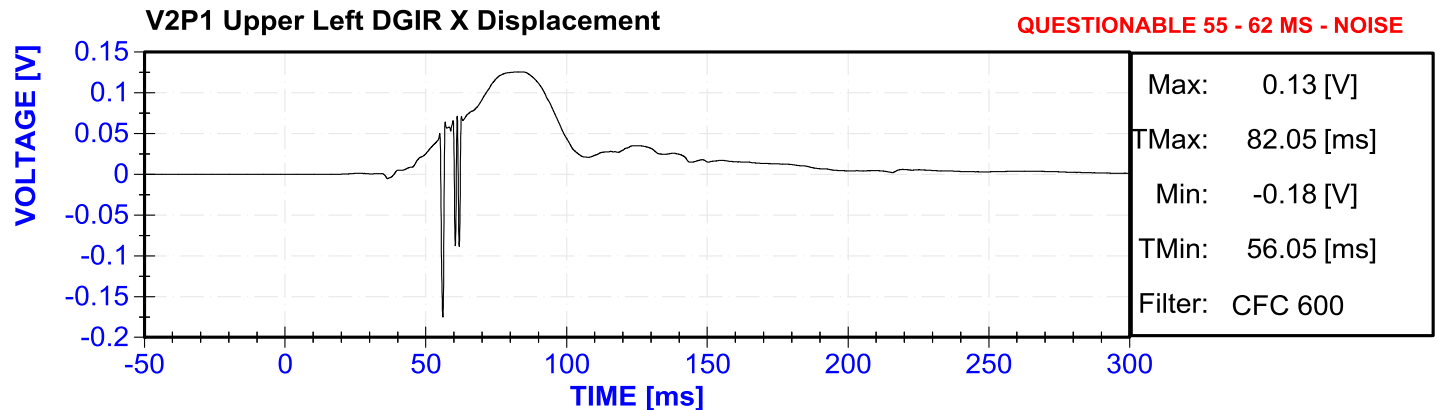
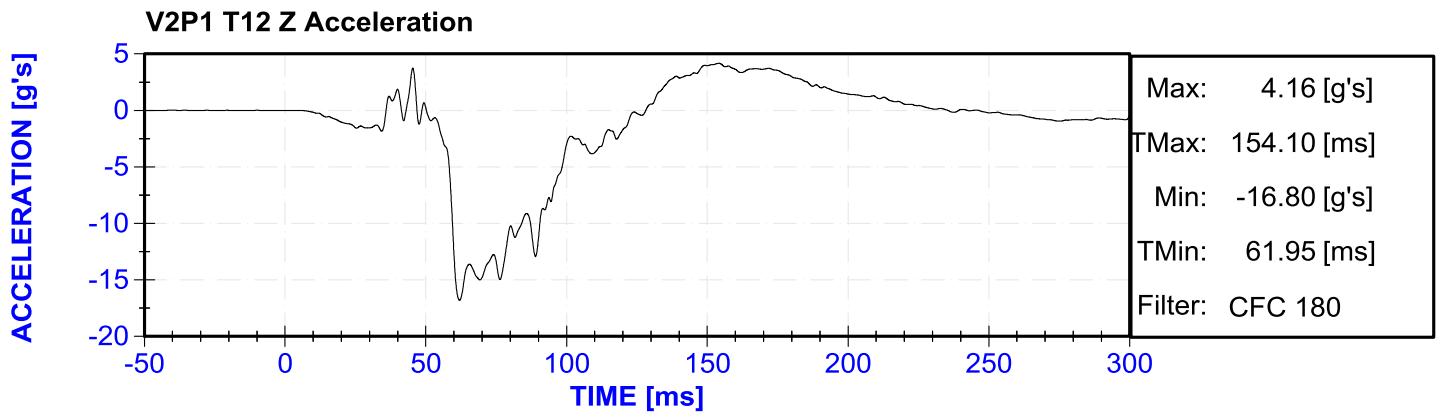
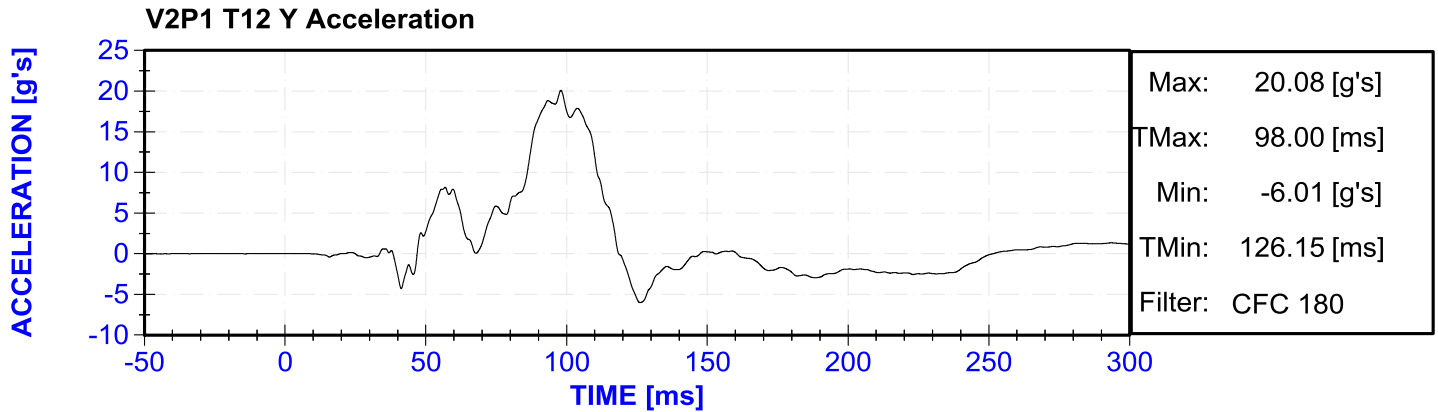


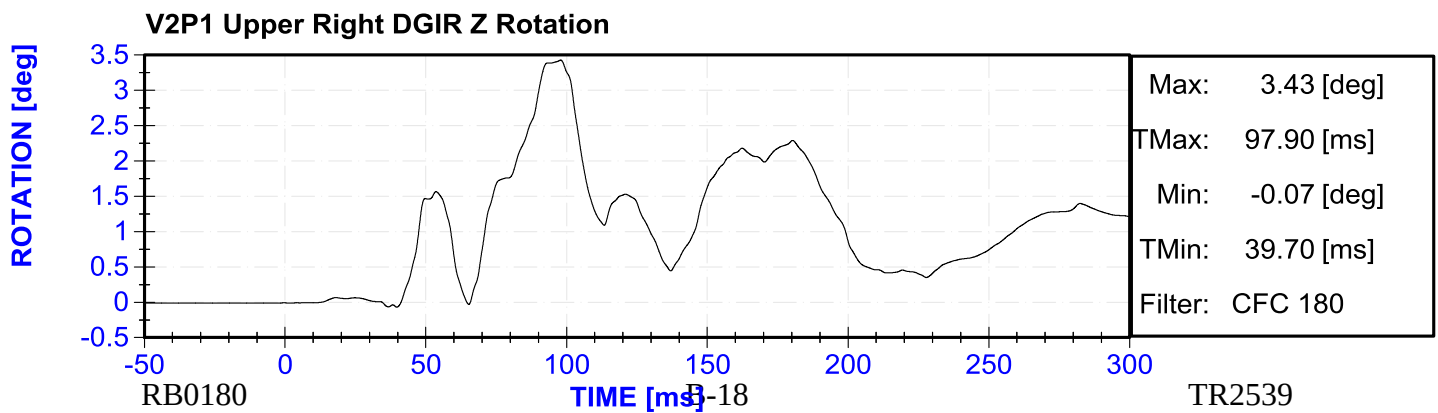
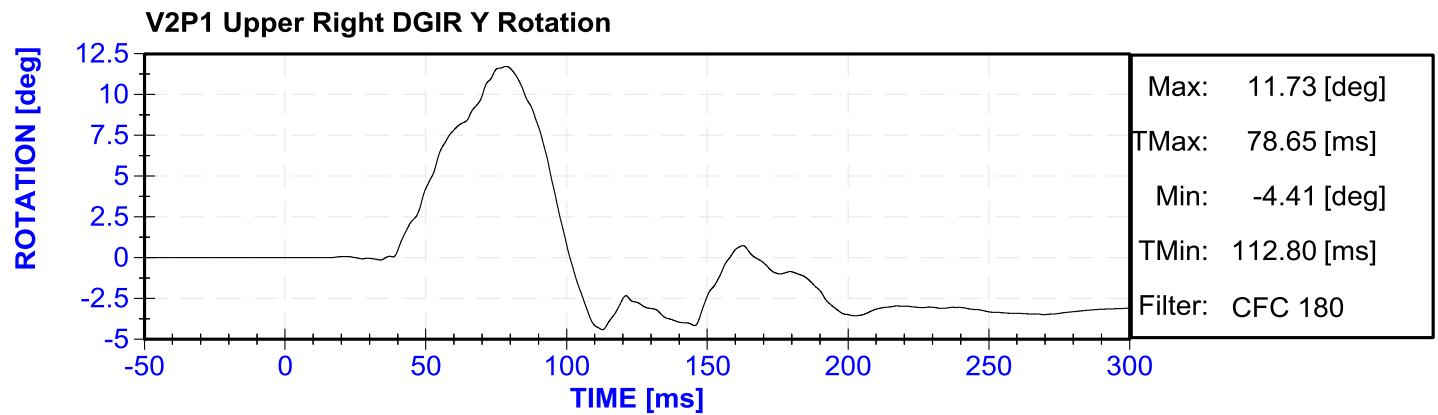
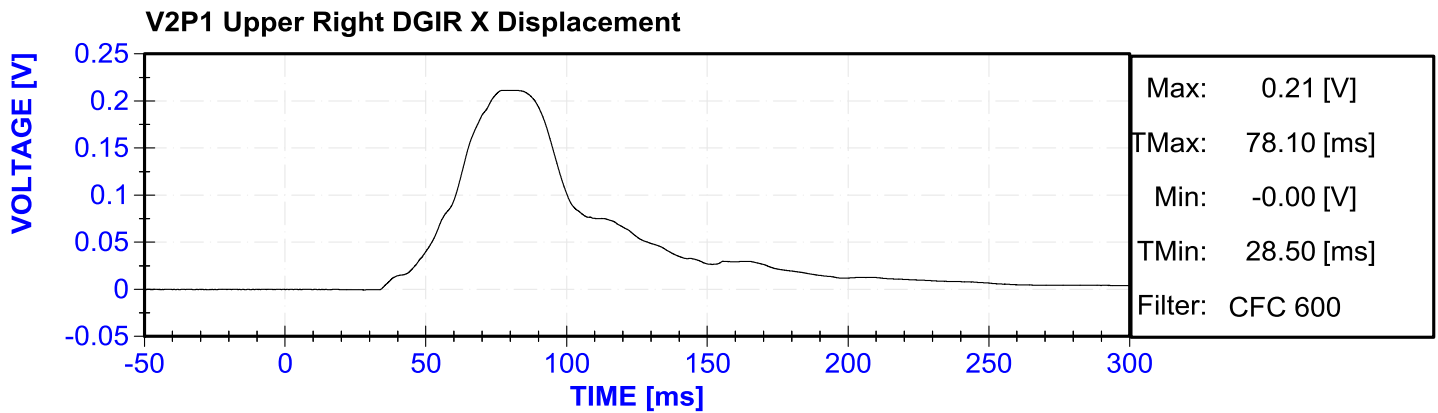
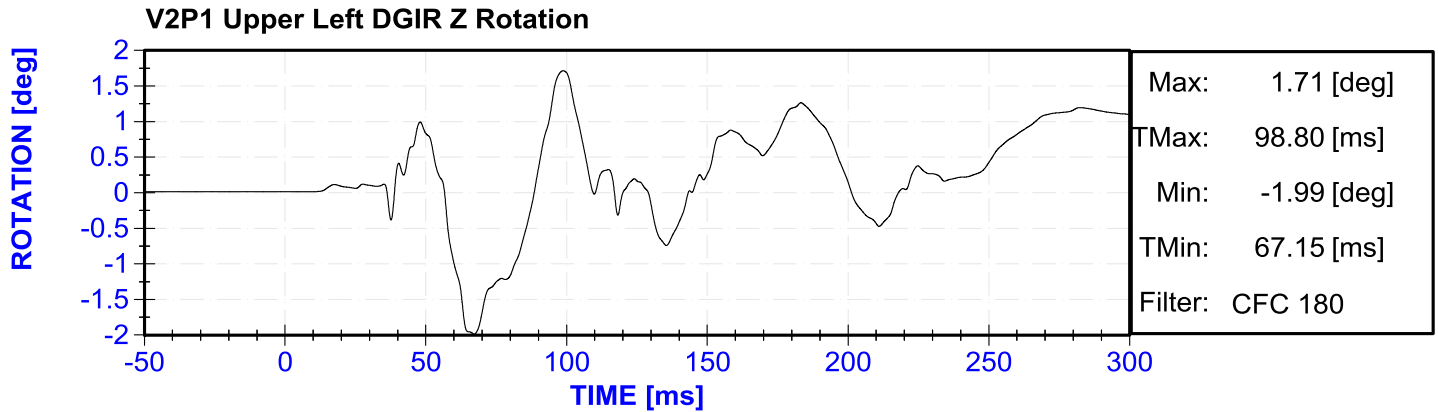
**V2P1 T1 Z Acceleration**





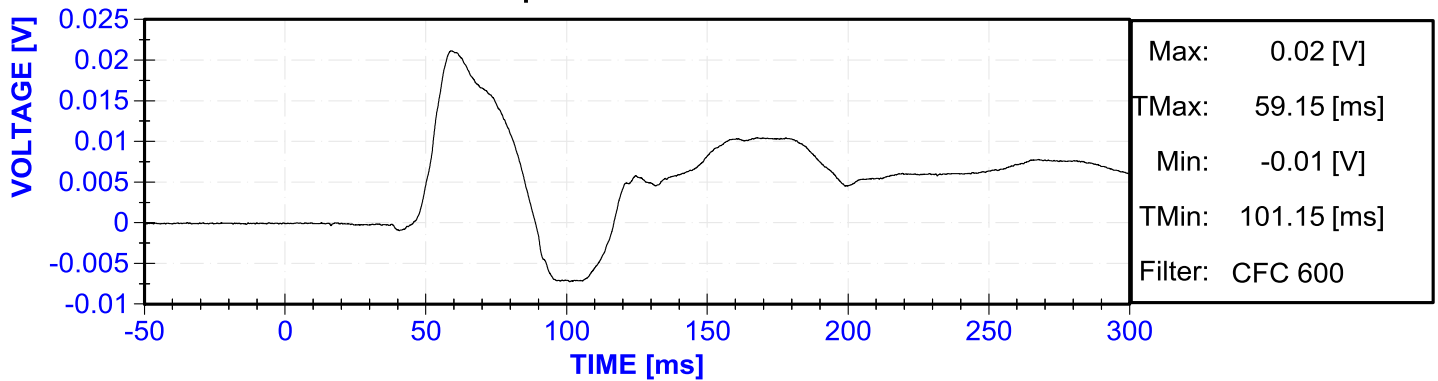




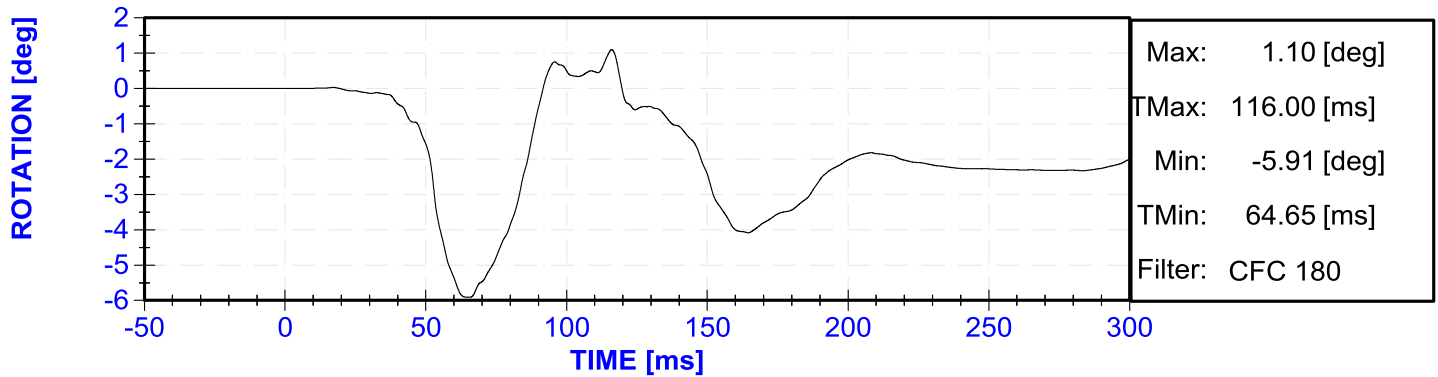




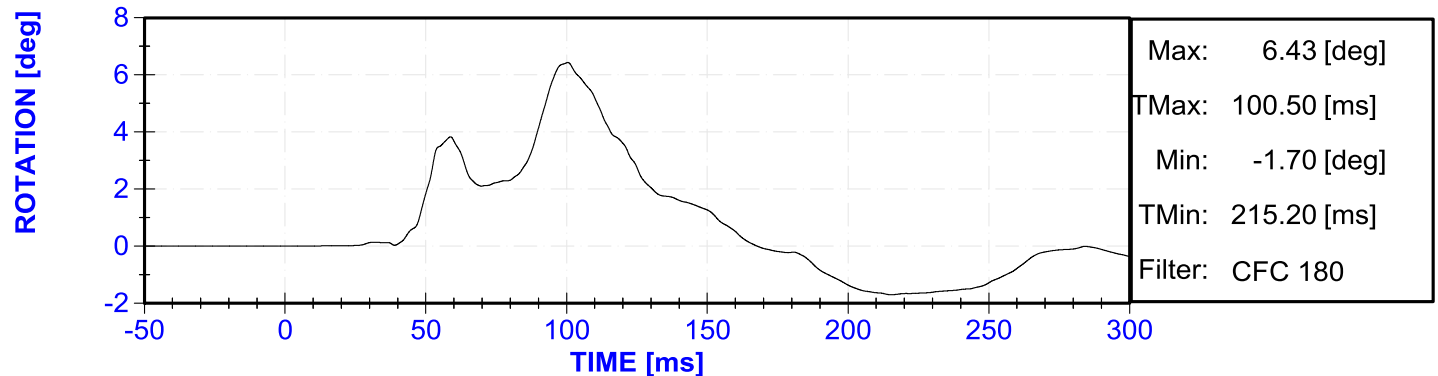
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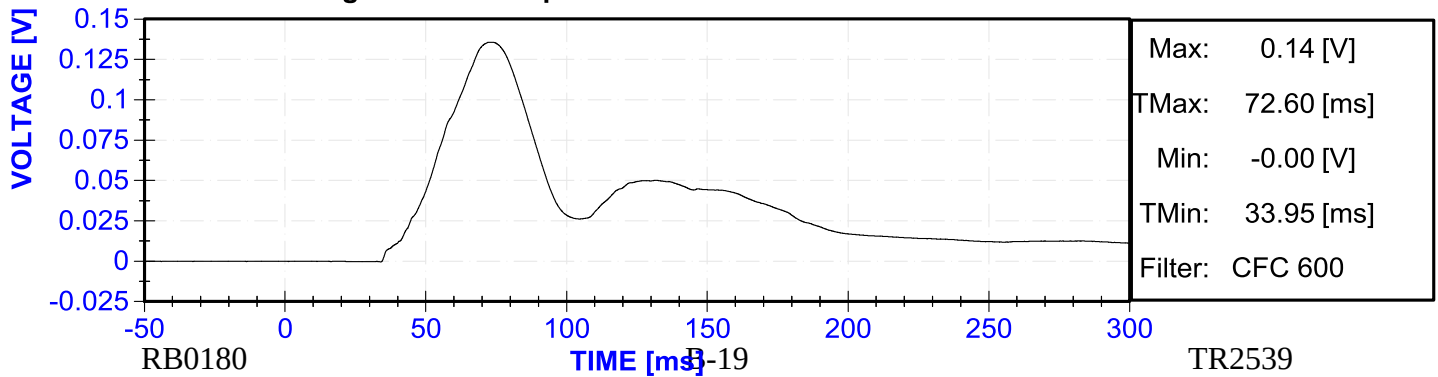
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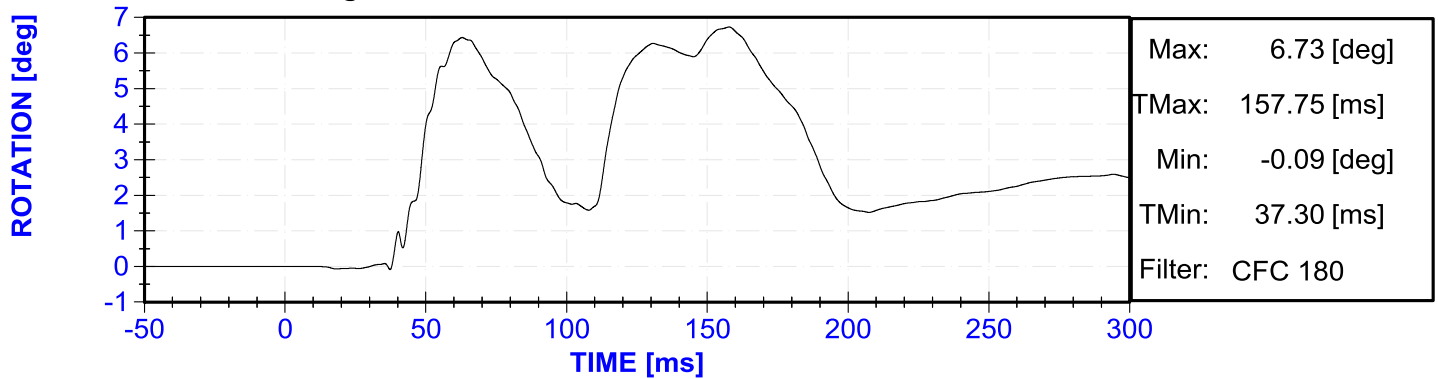
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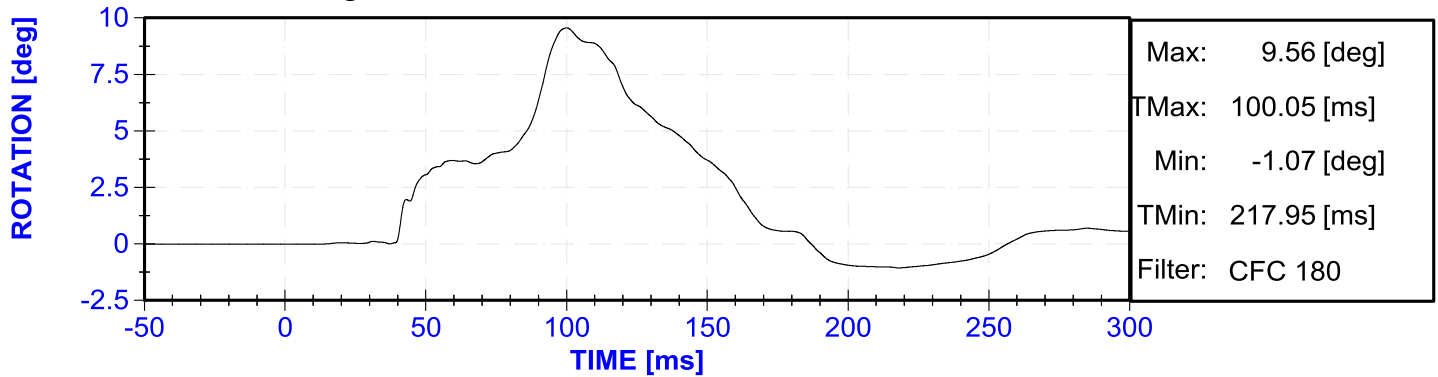
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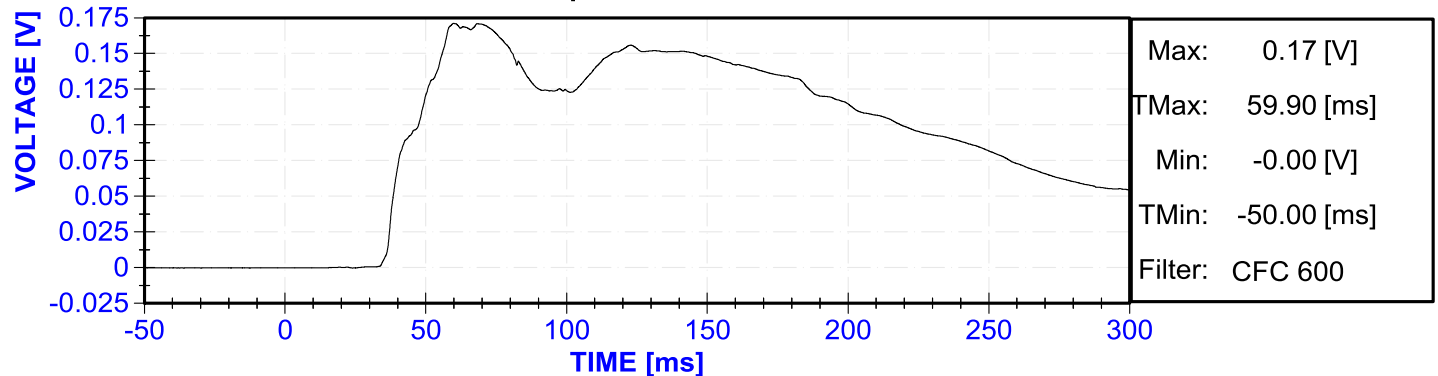
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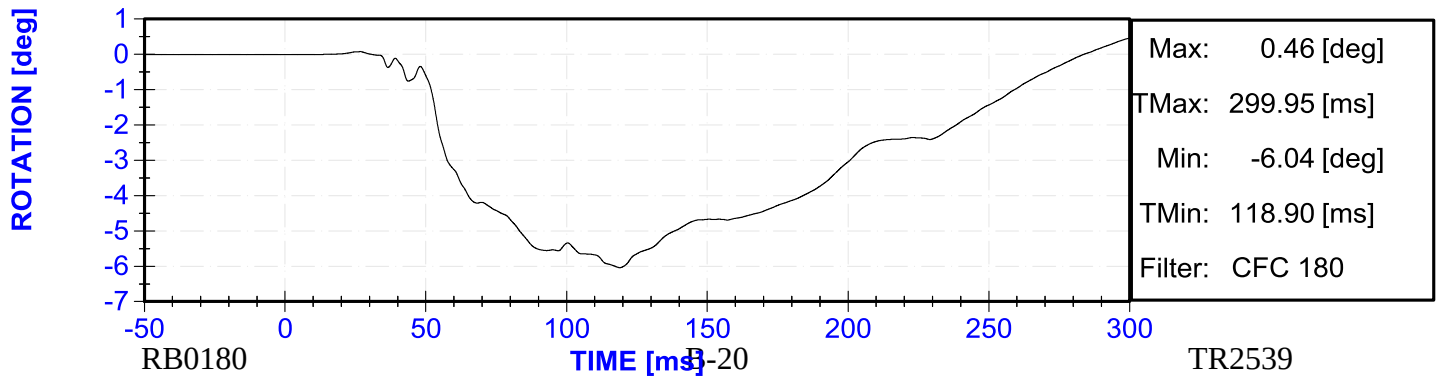
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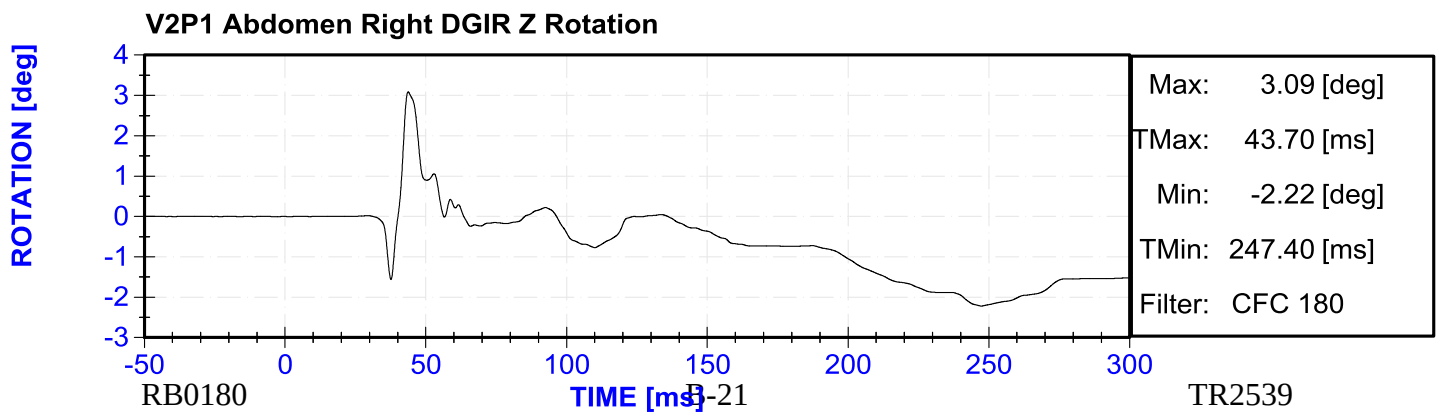
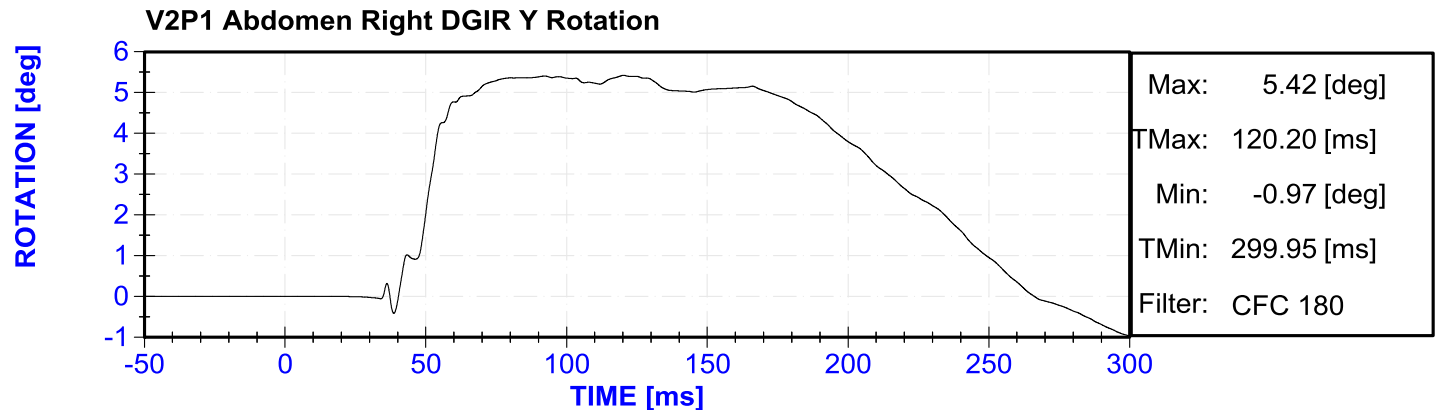
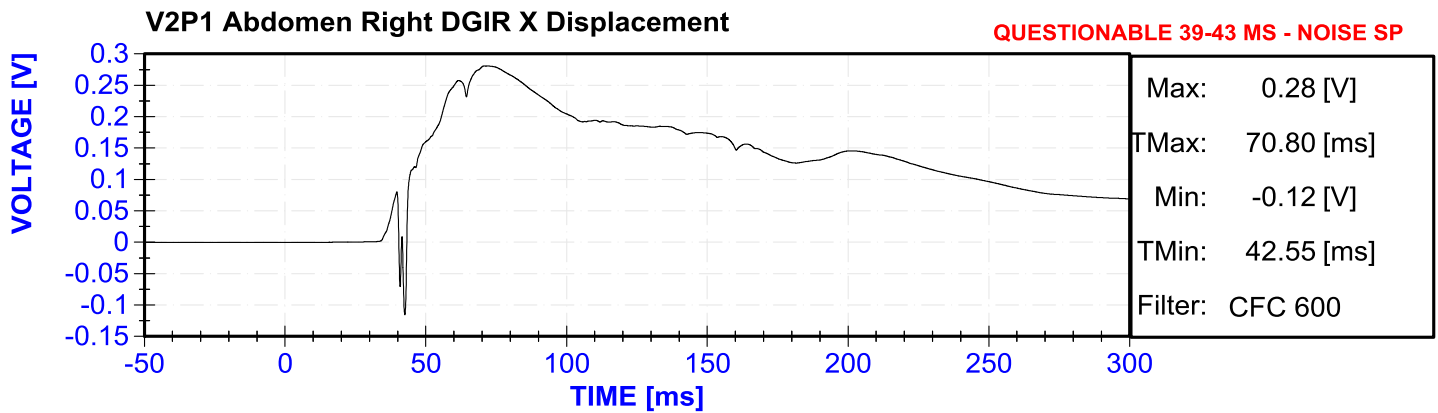
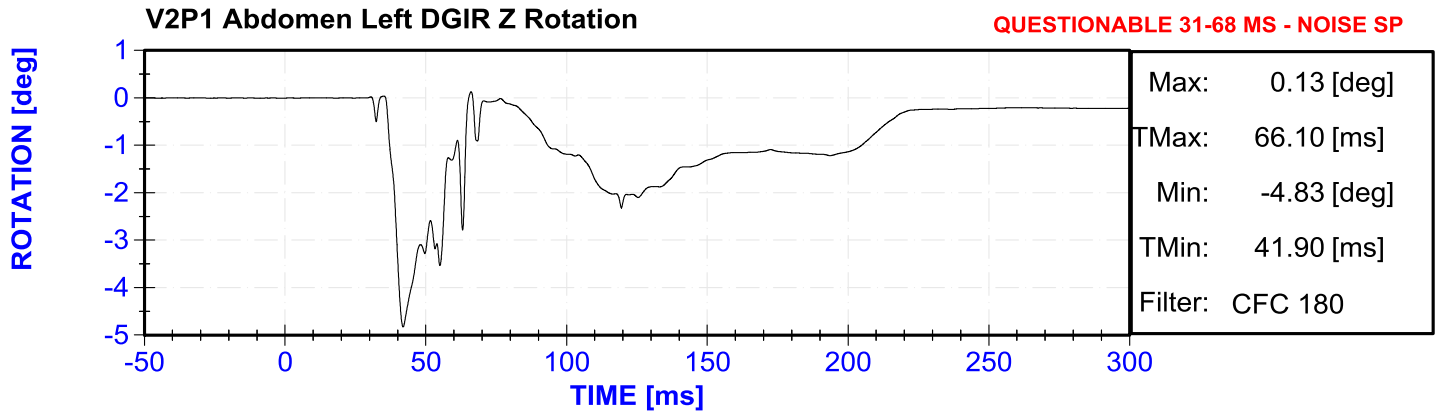


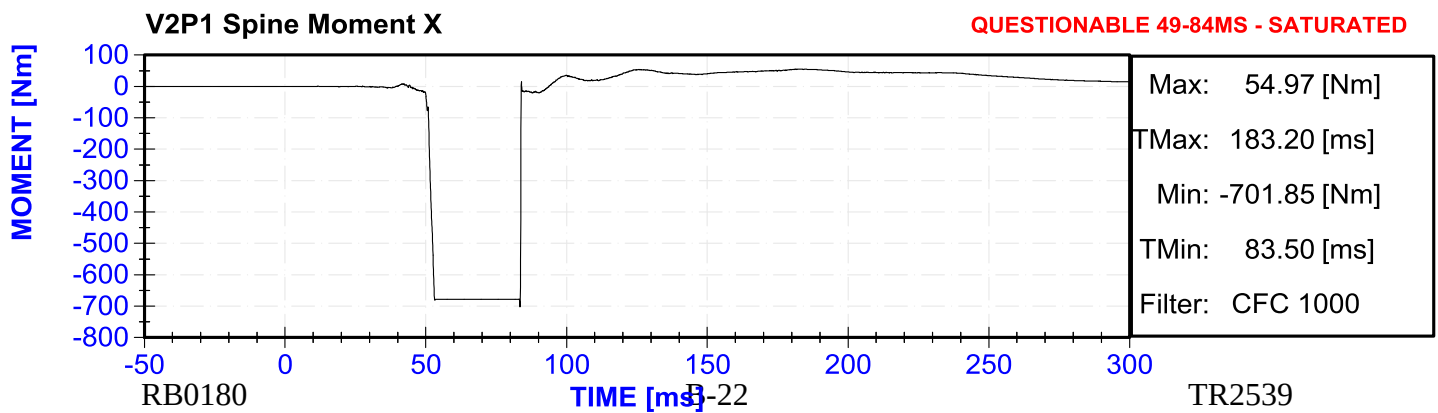
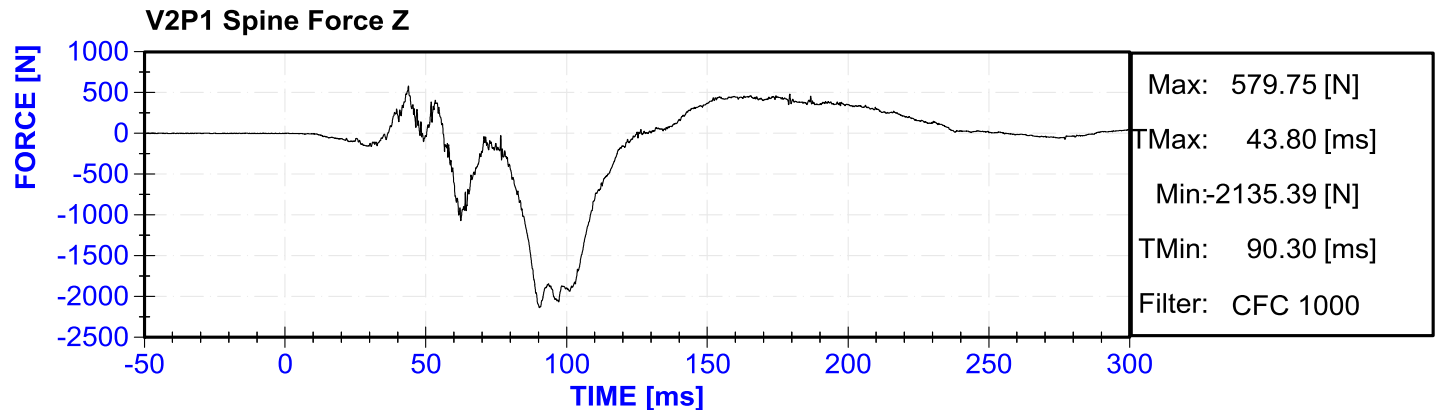
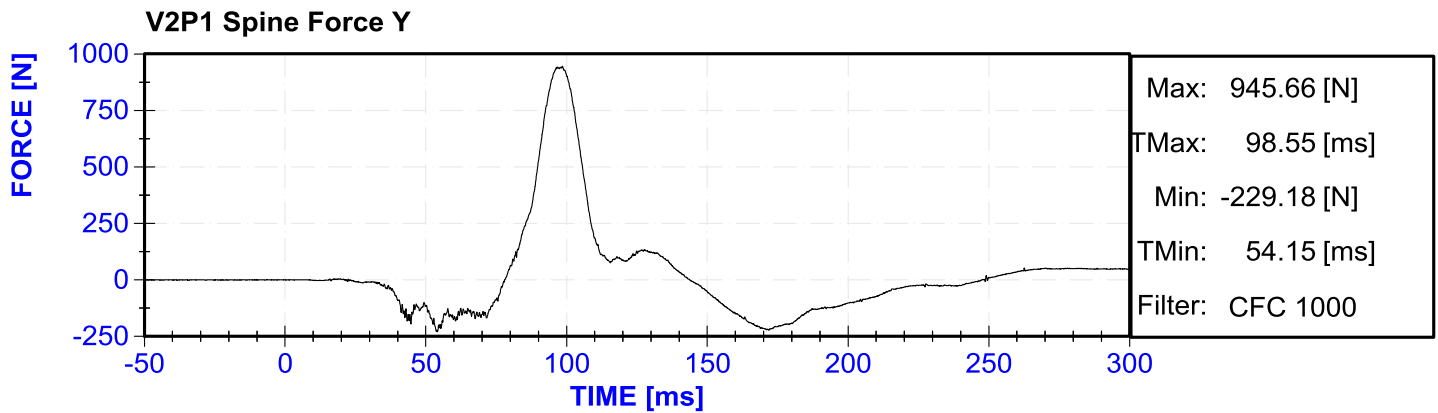
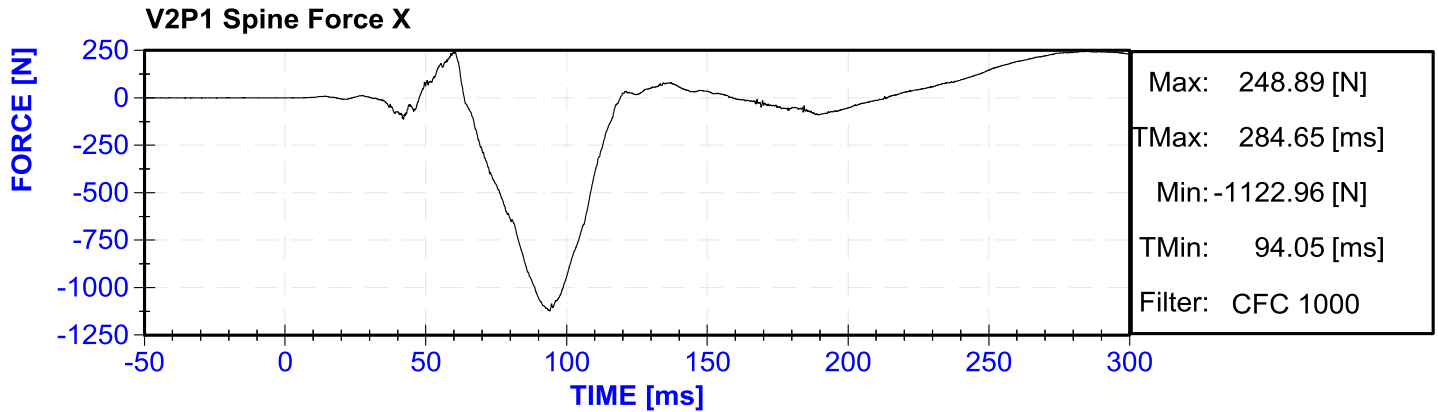
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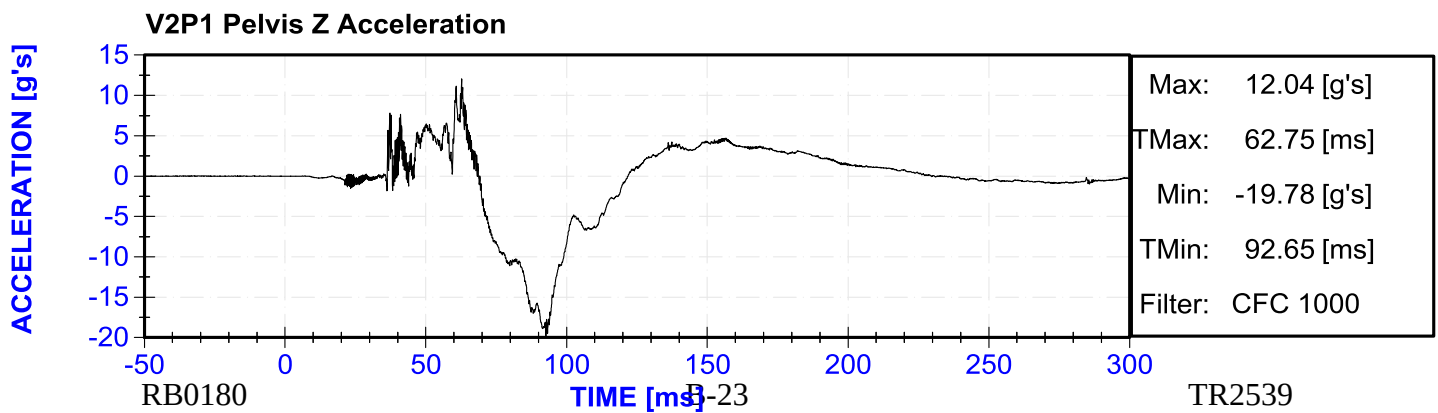
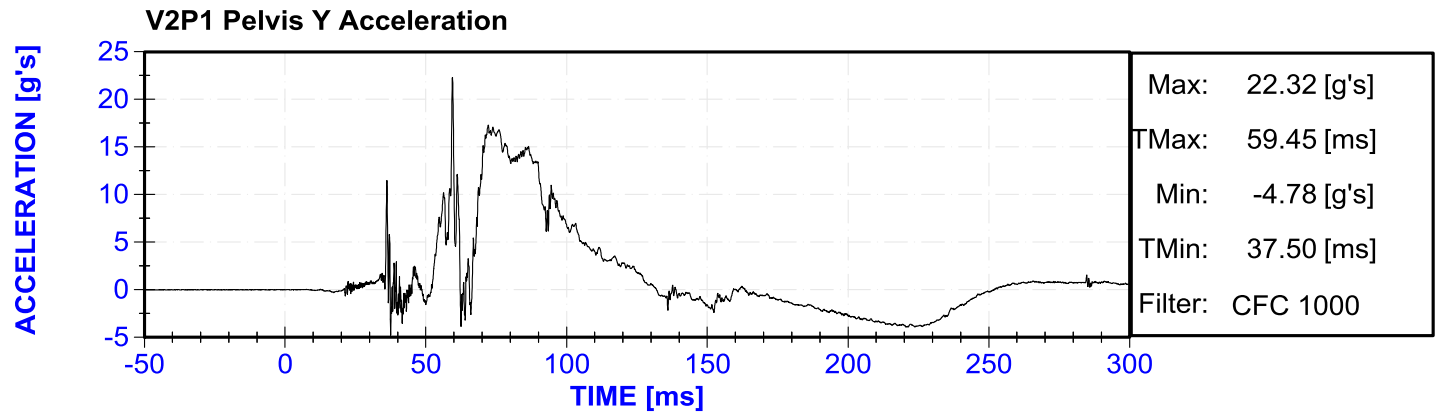
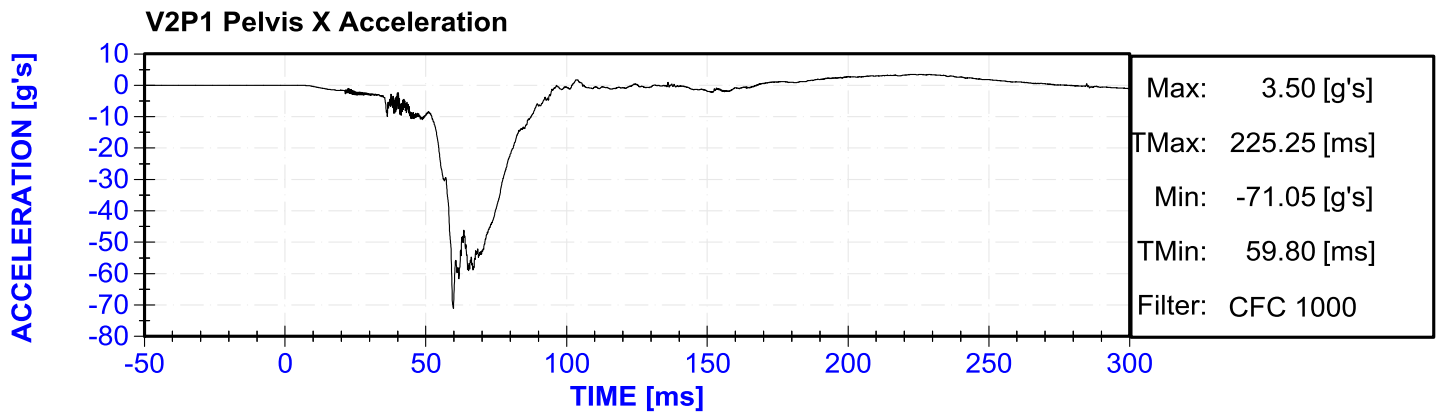
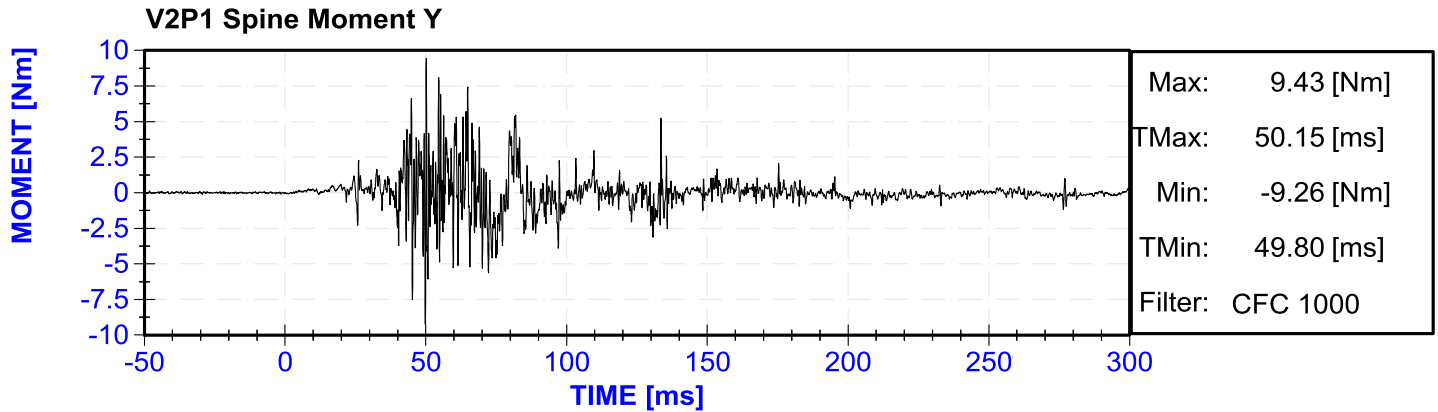
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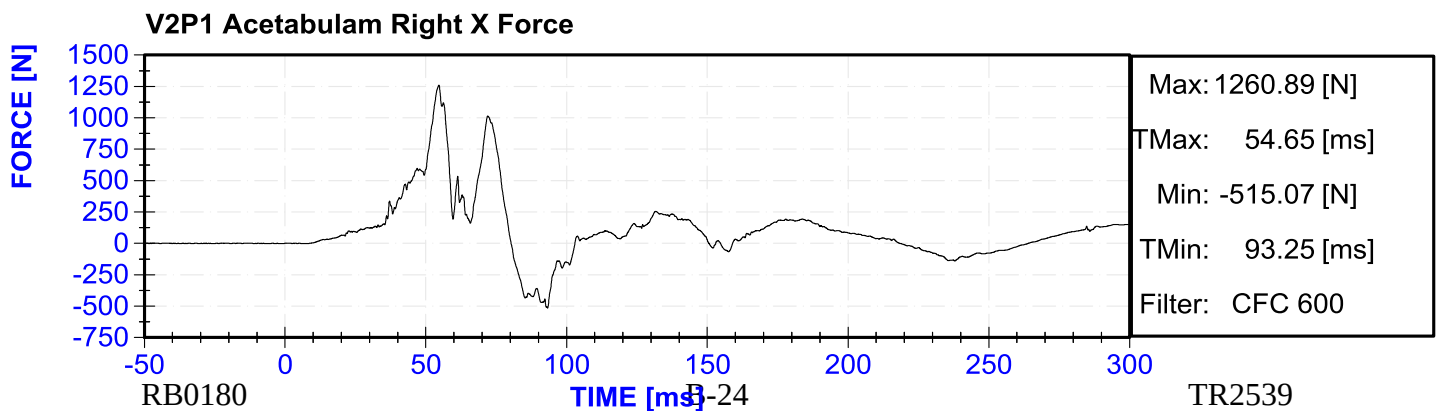
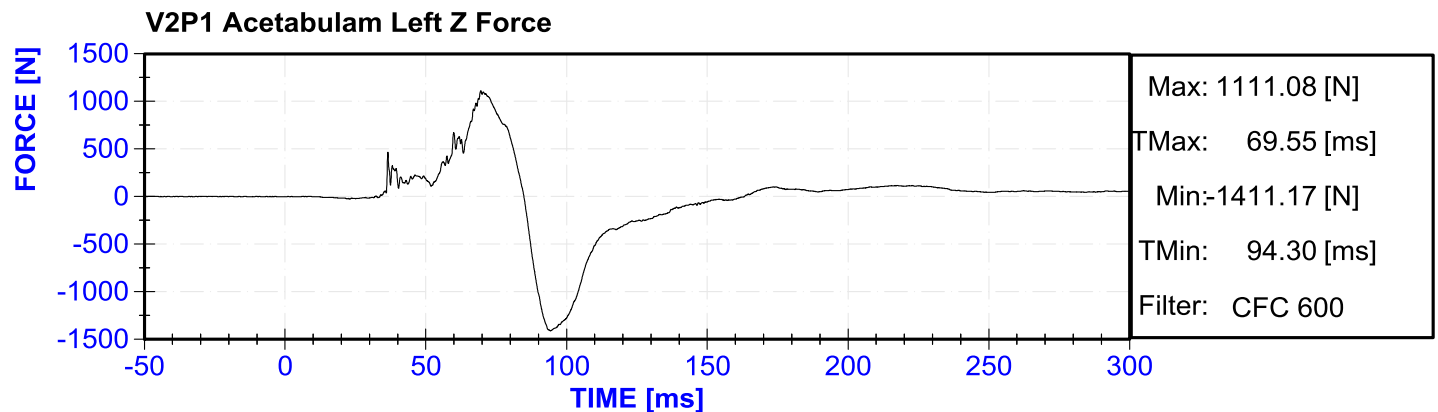
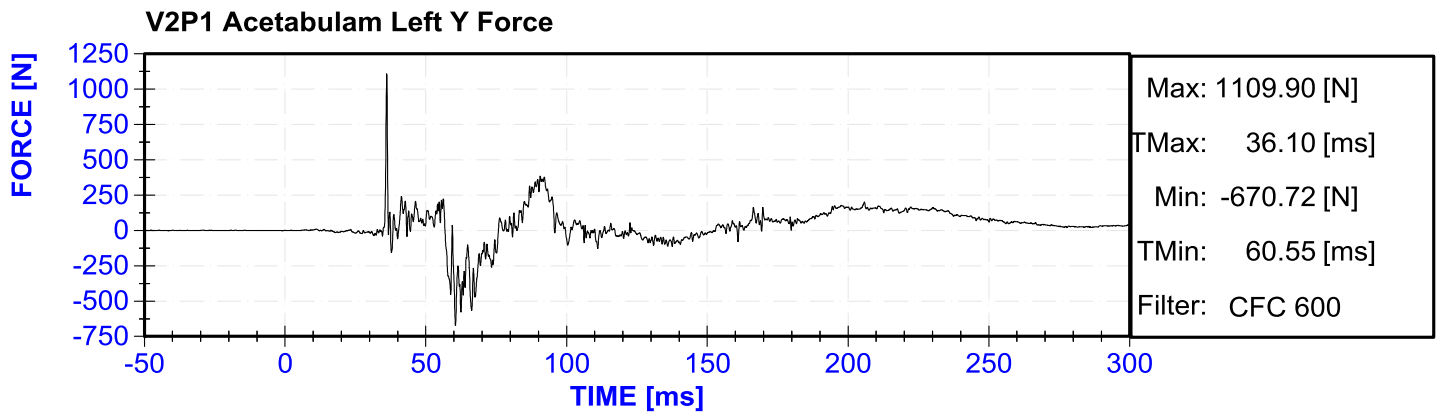
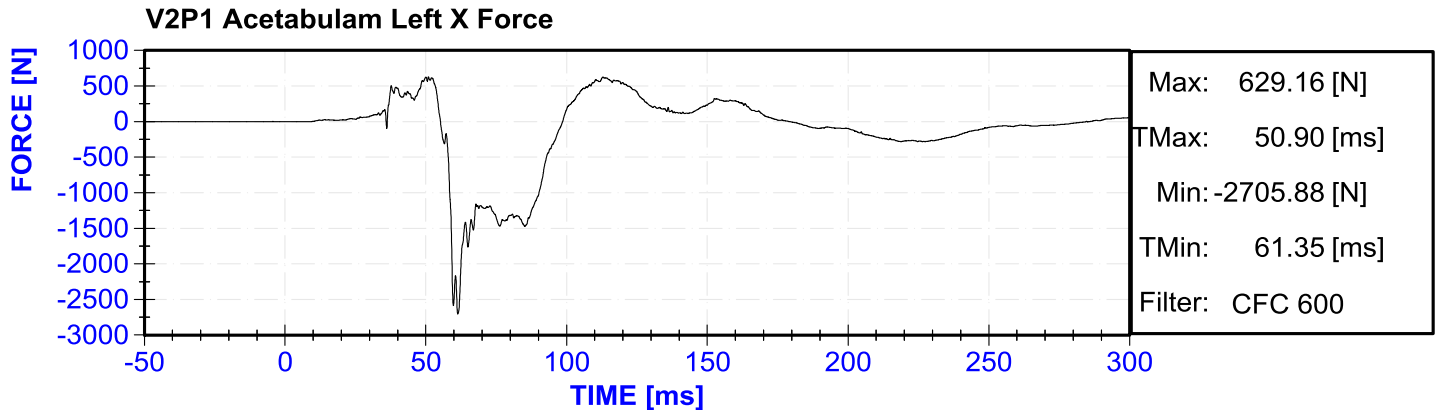


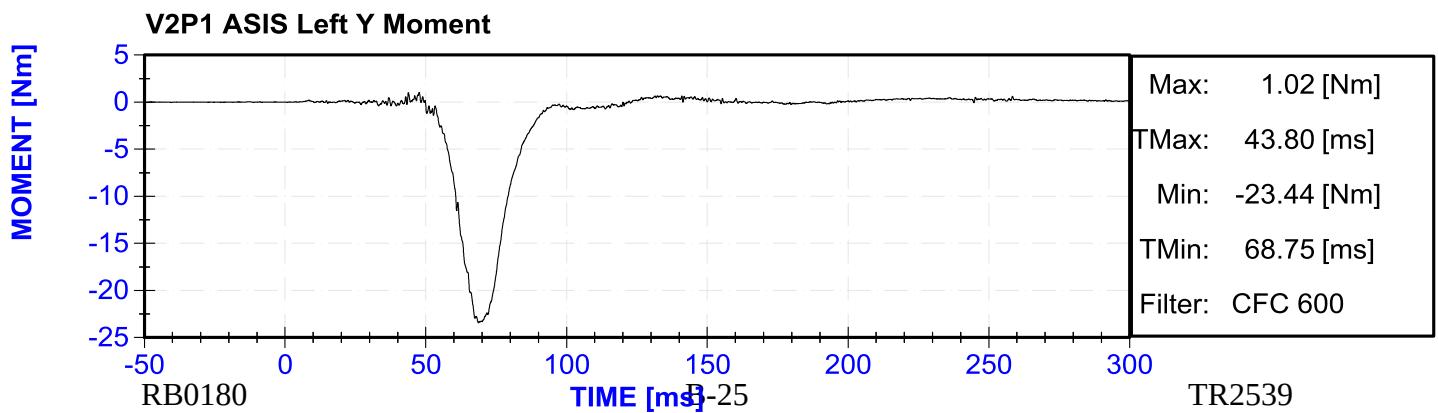
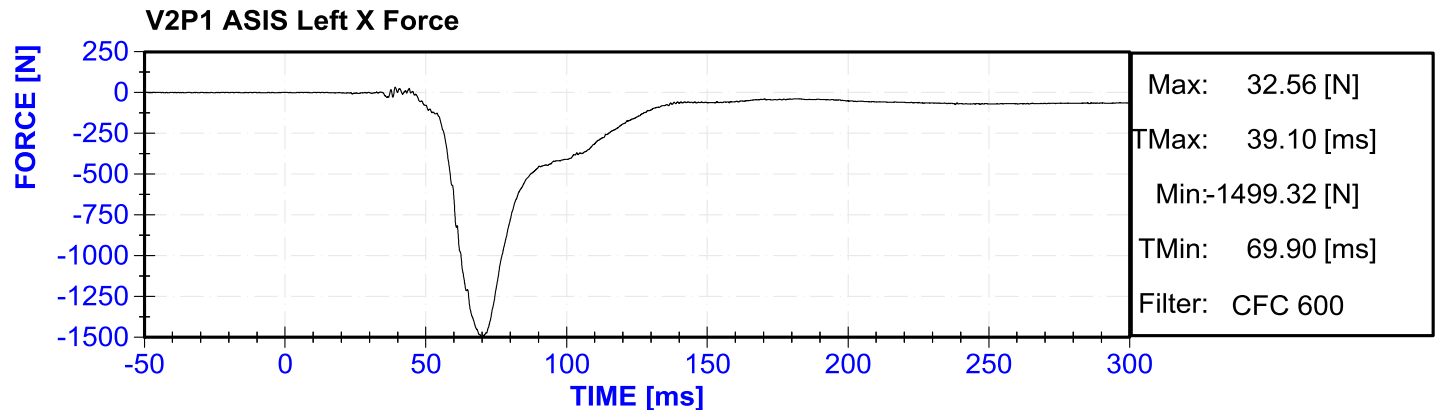
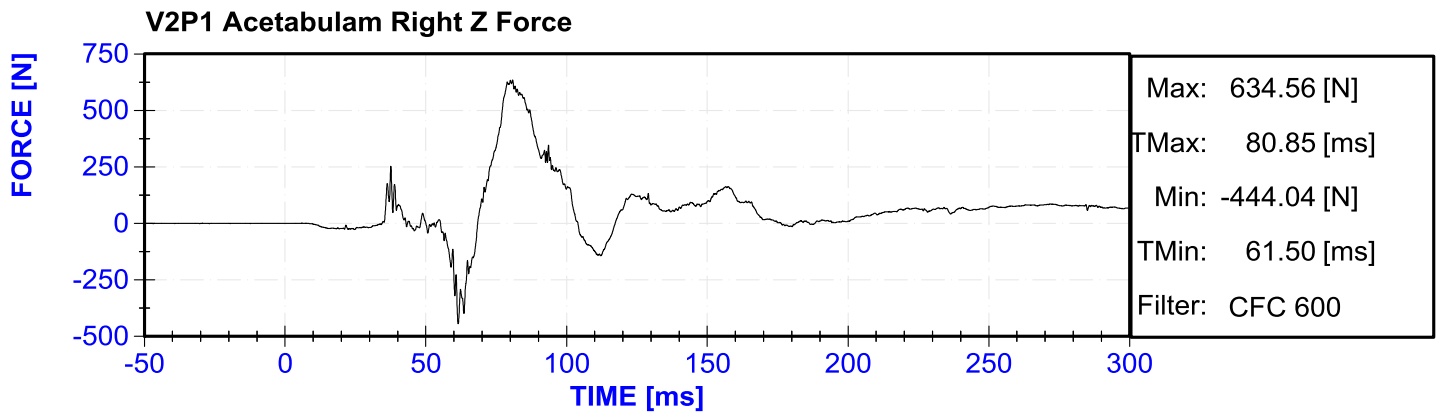
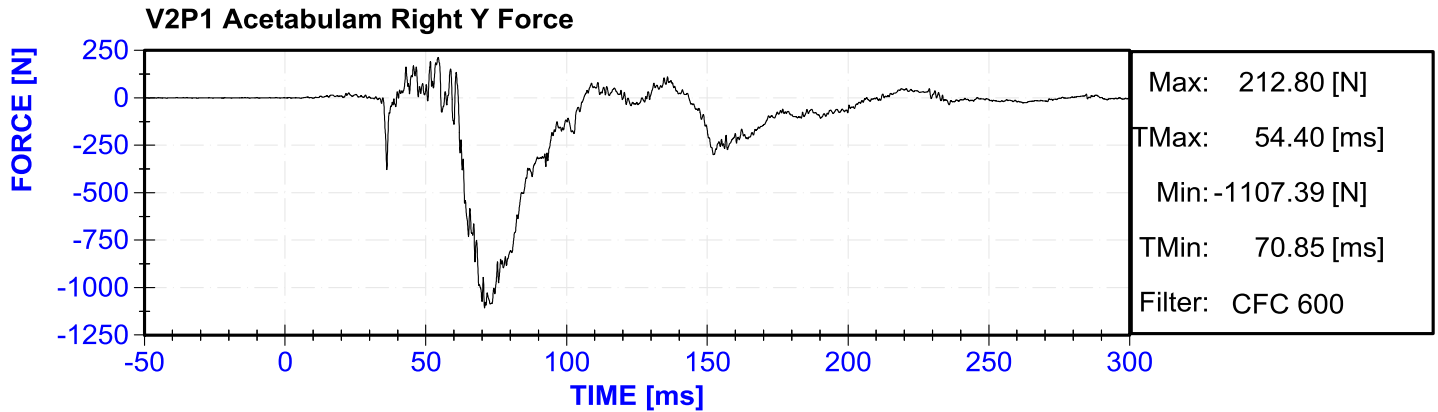


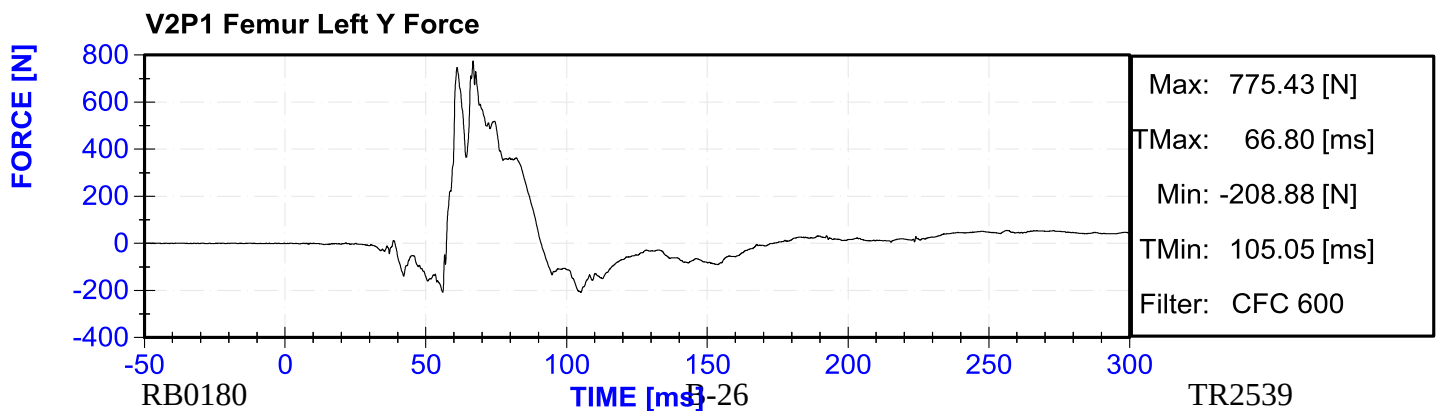
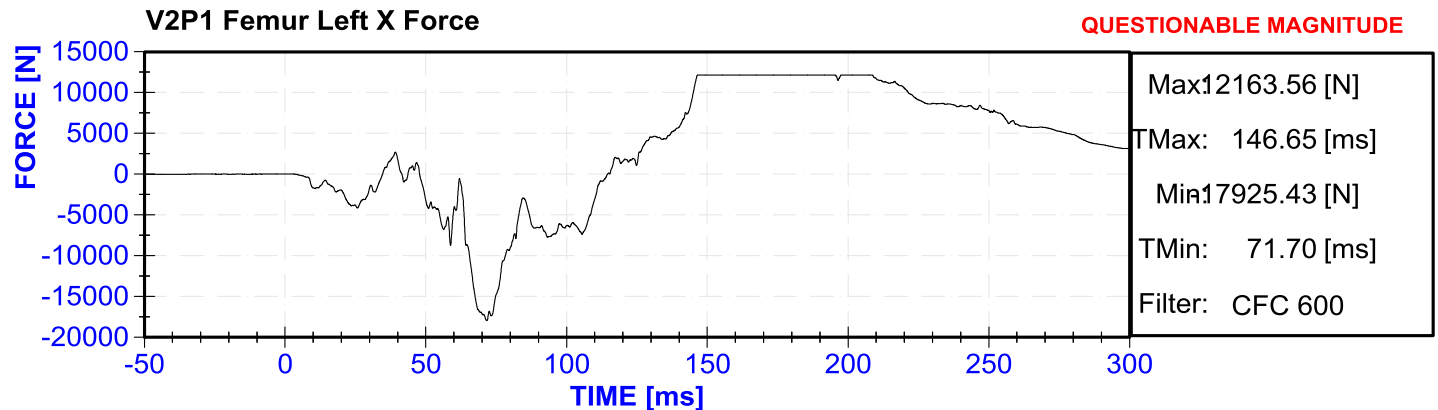
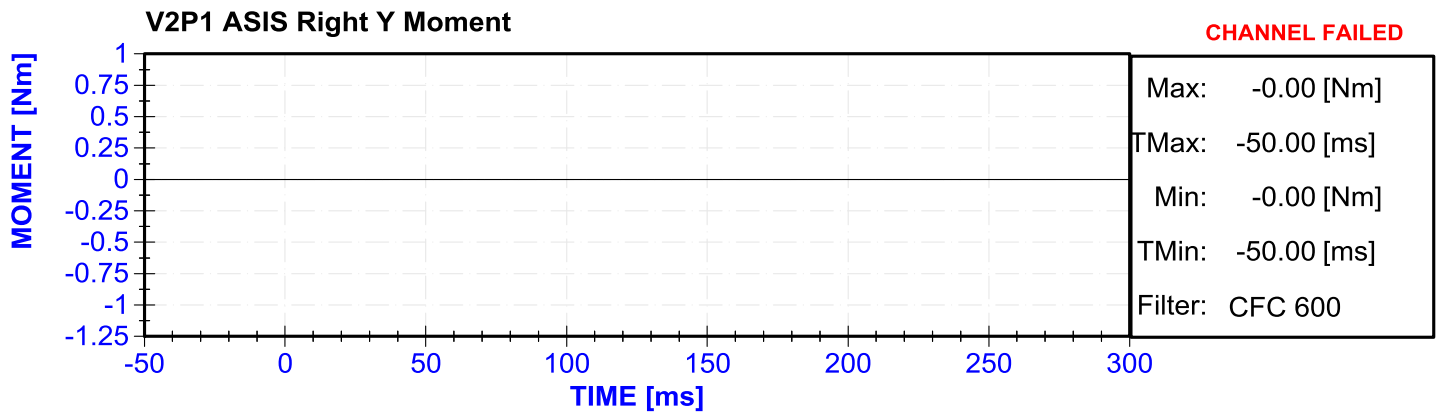
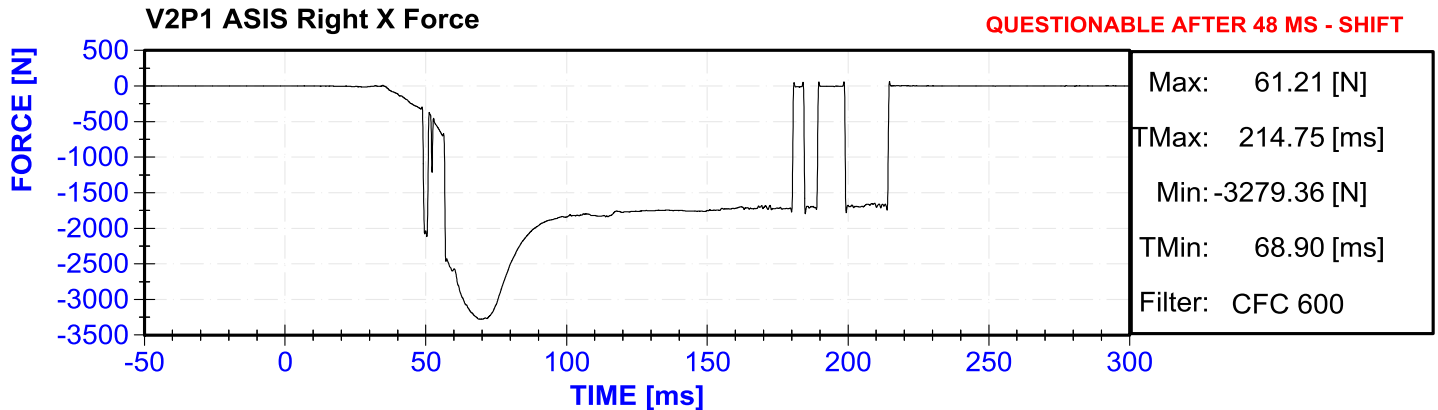




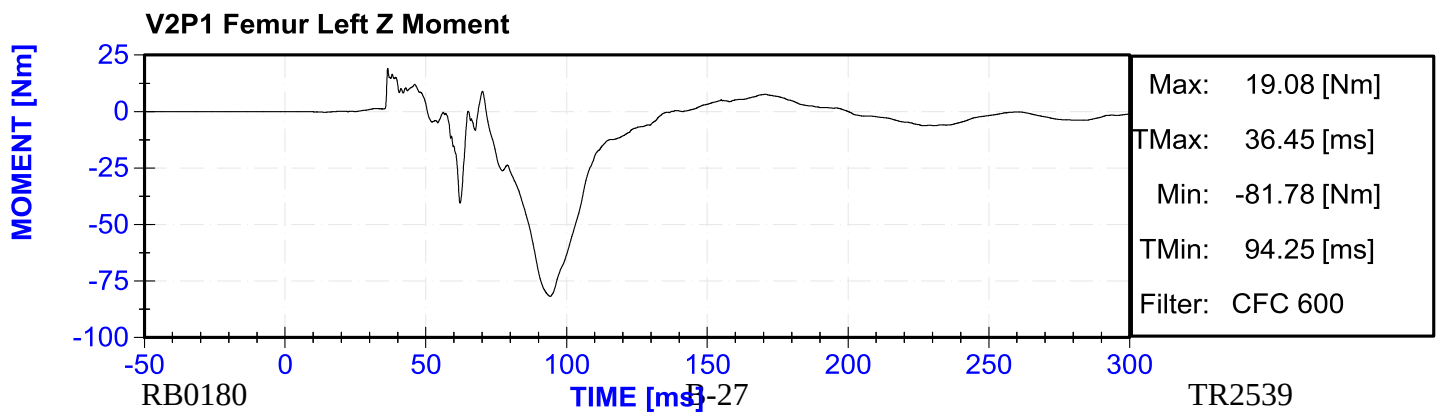
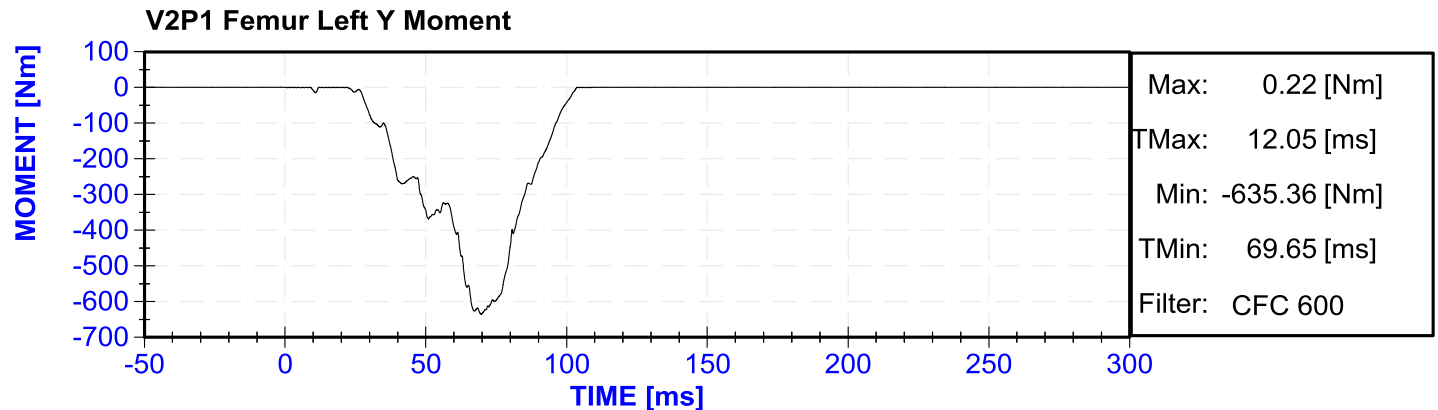
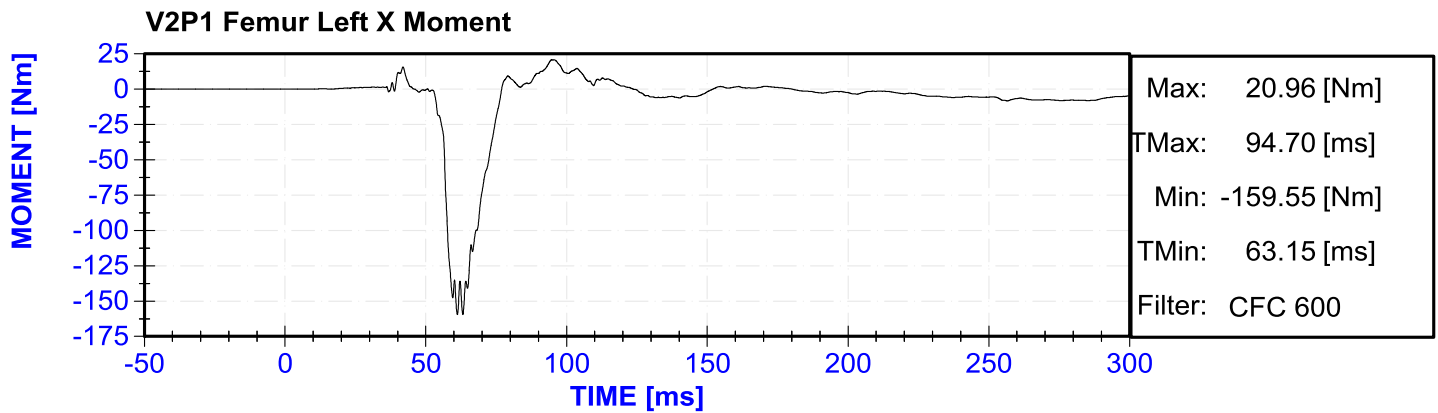
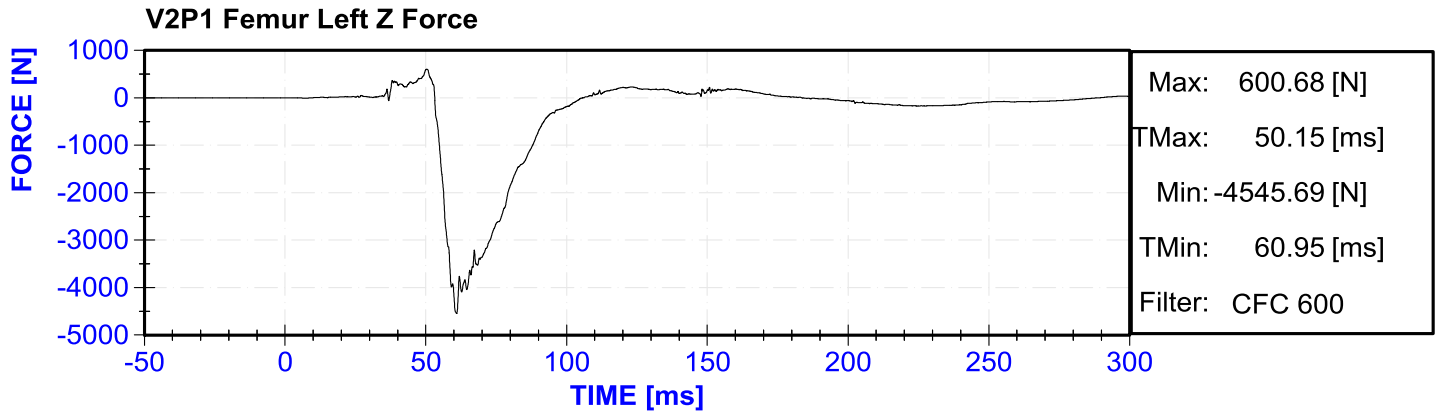


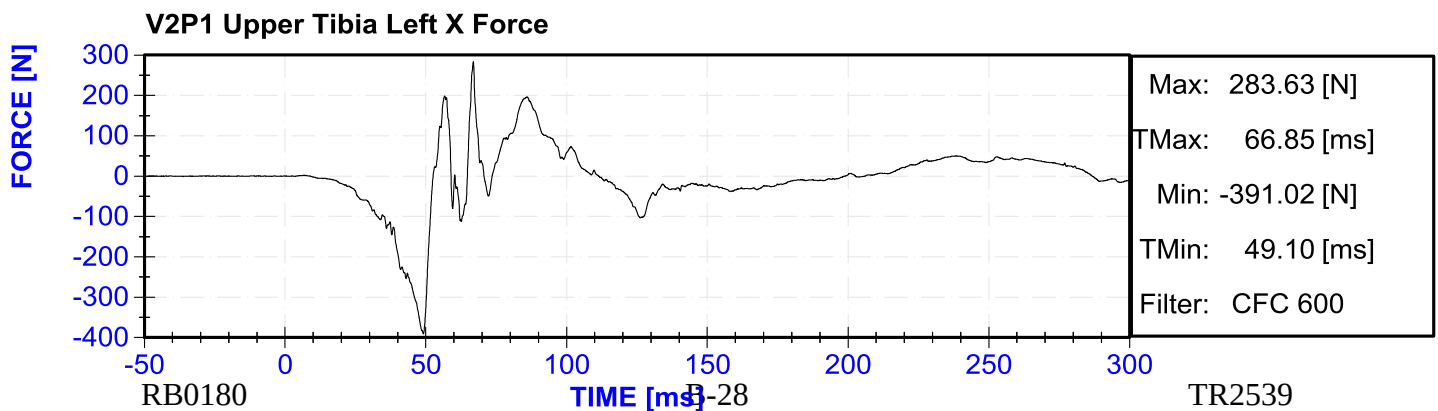
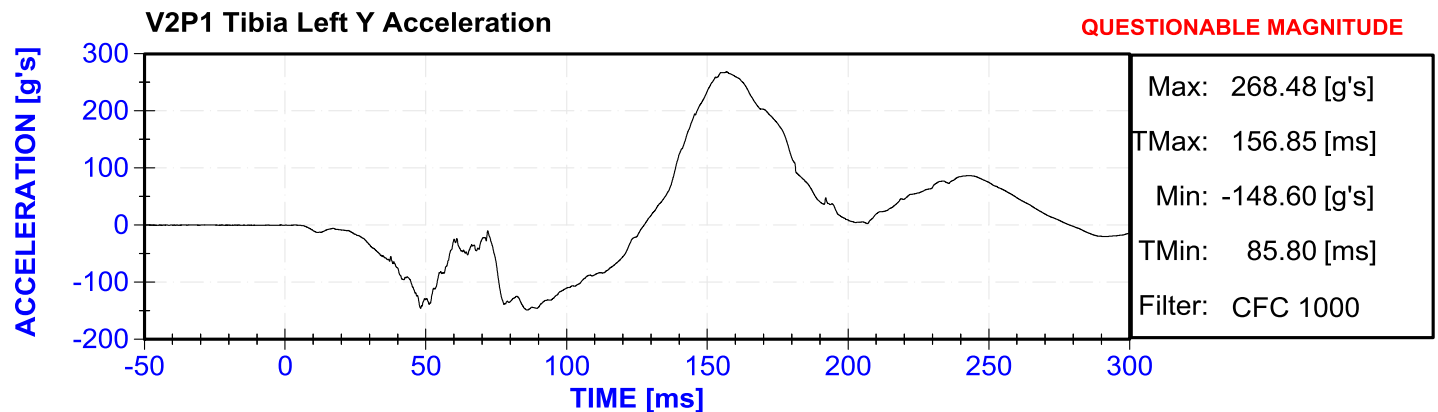
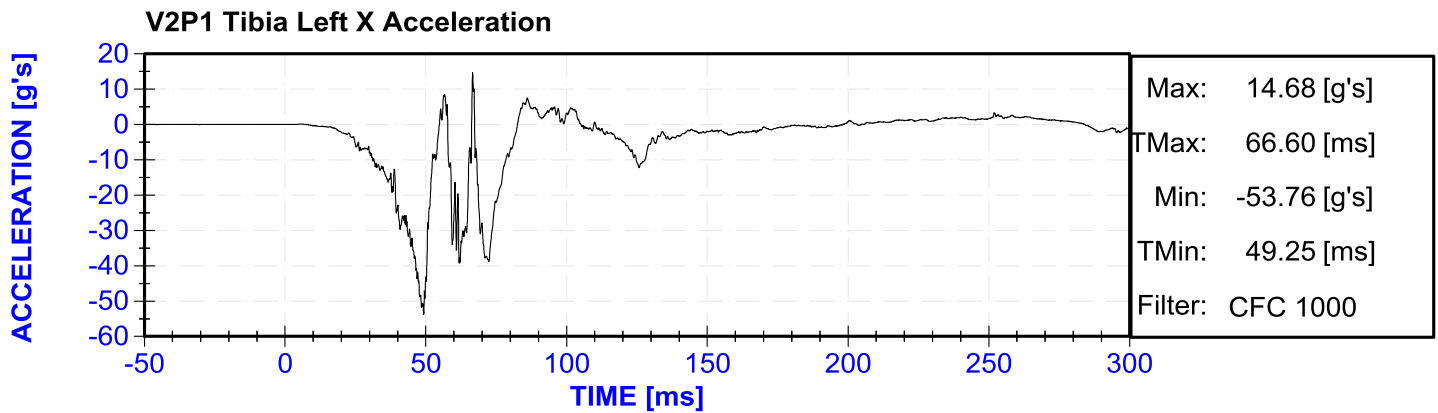
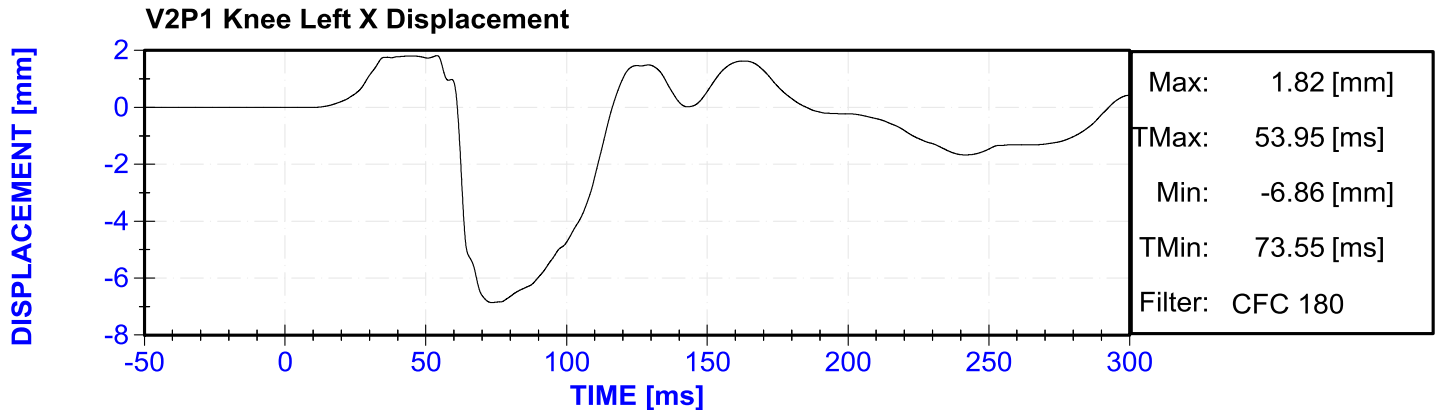


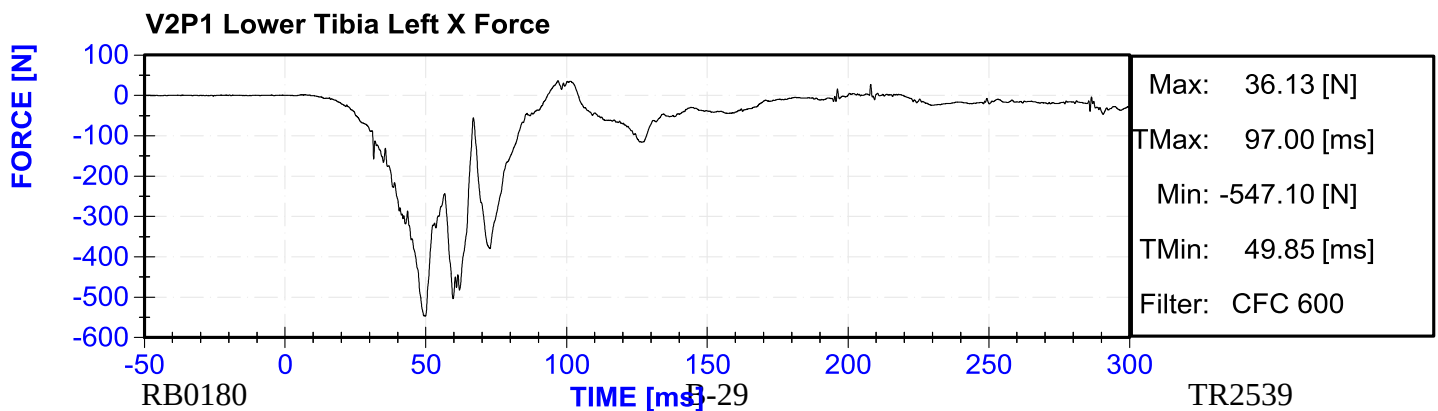
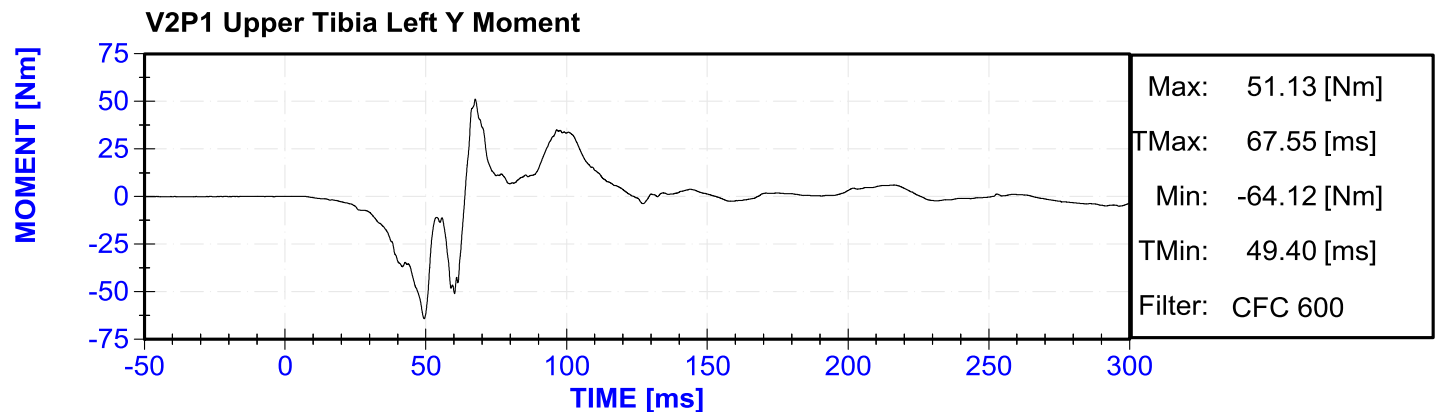
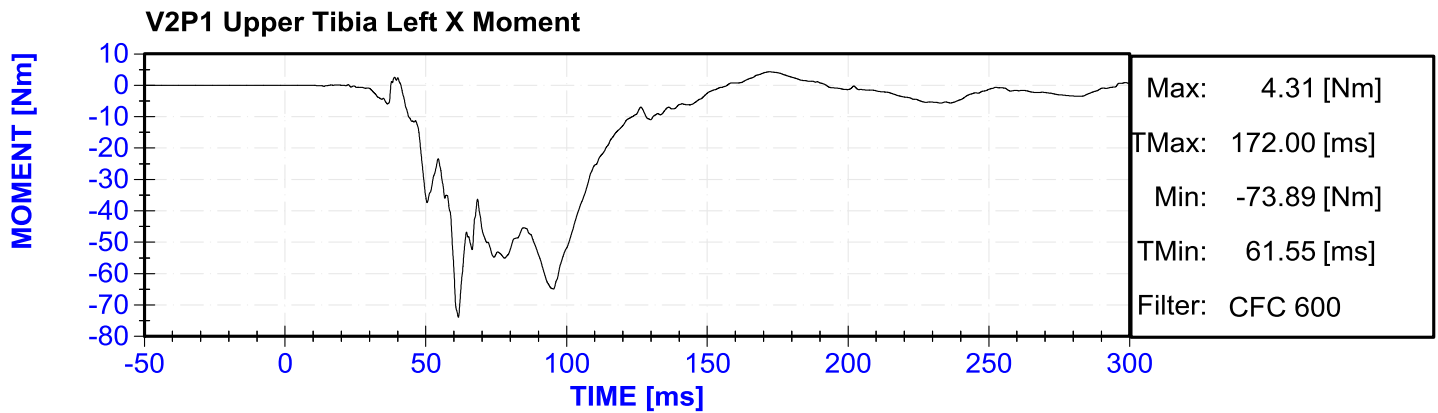
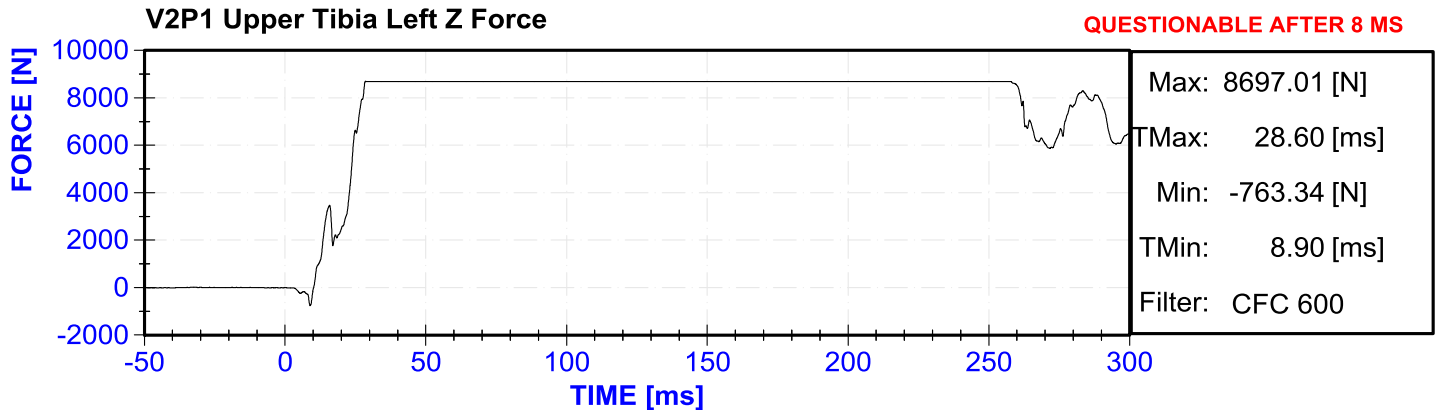


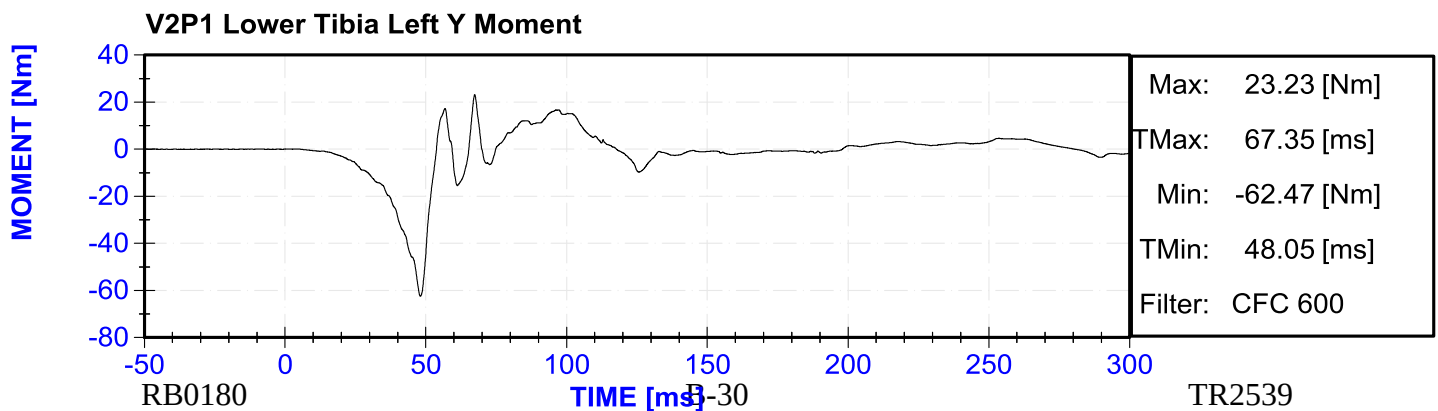
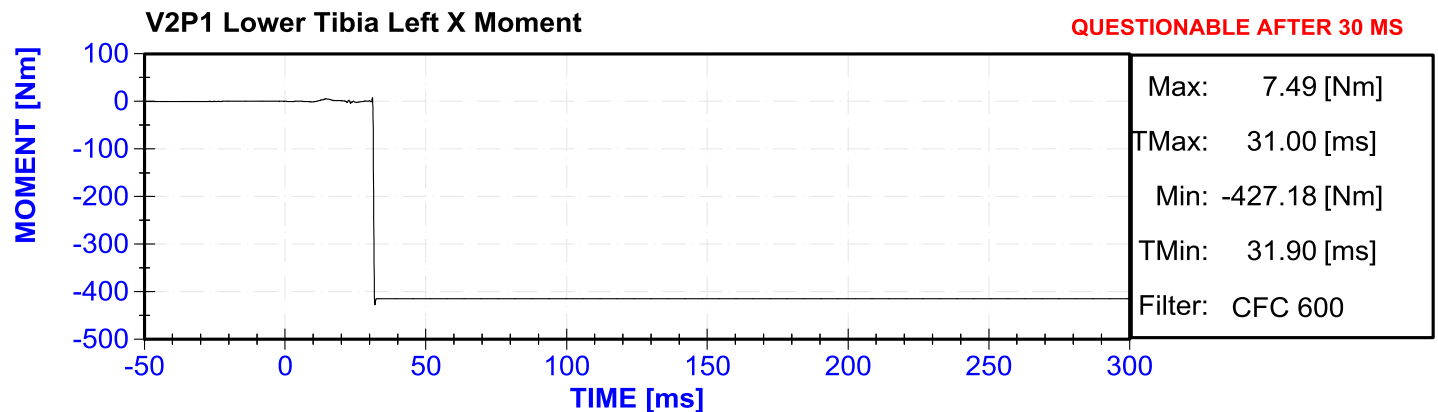
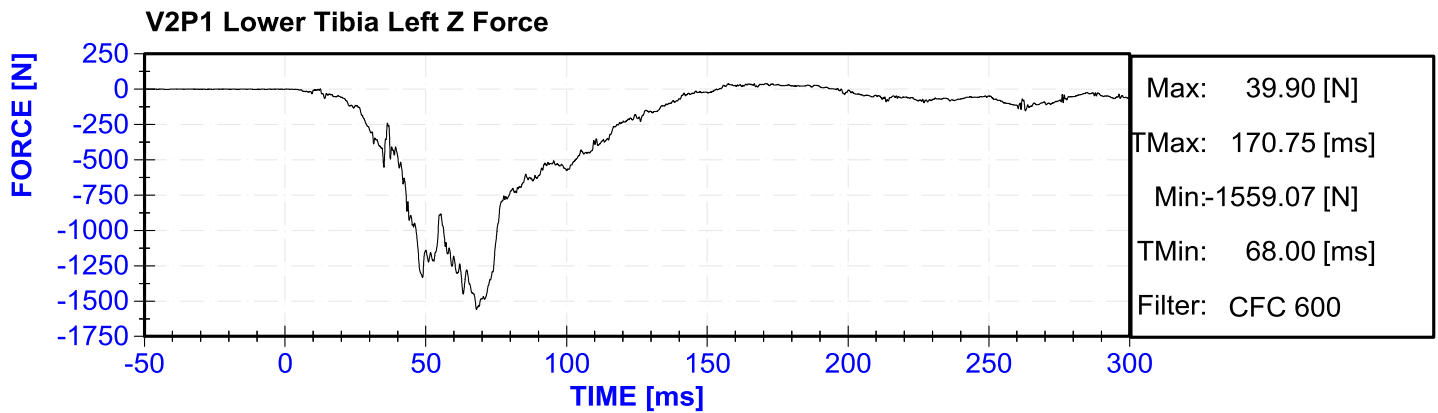
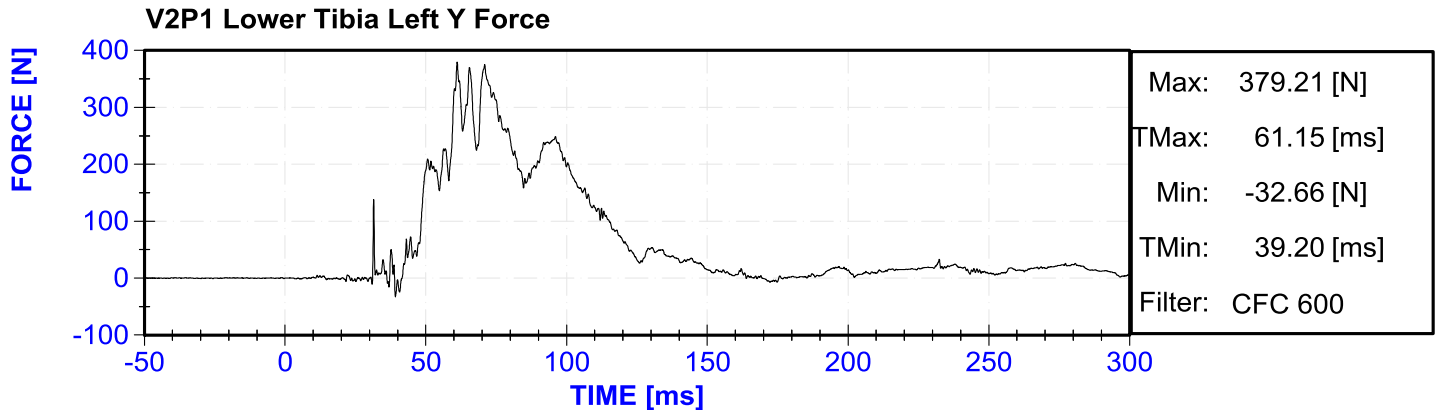




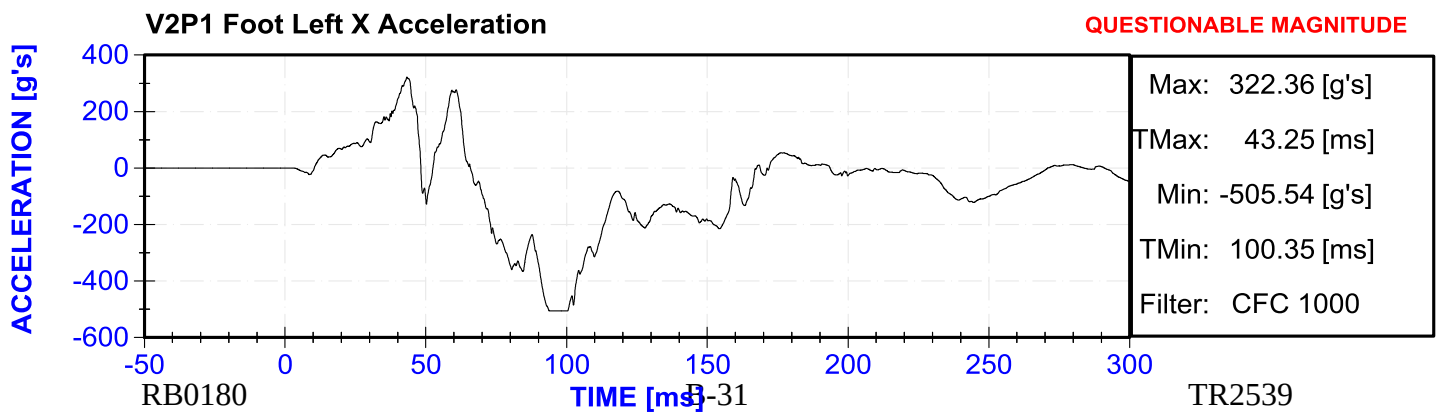
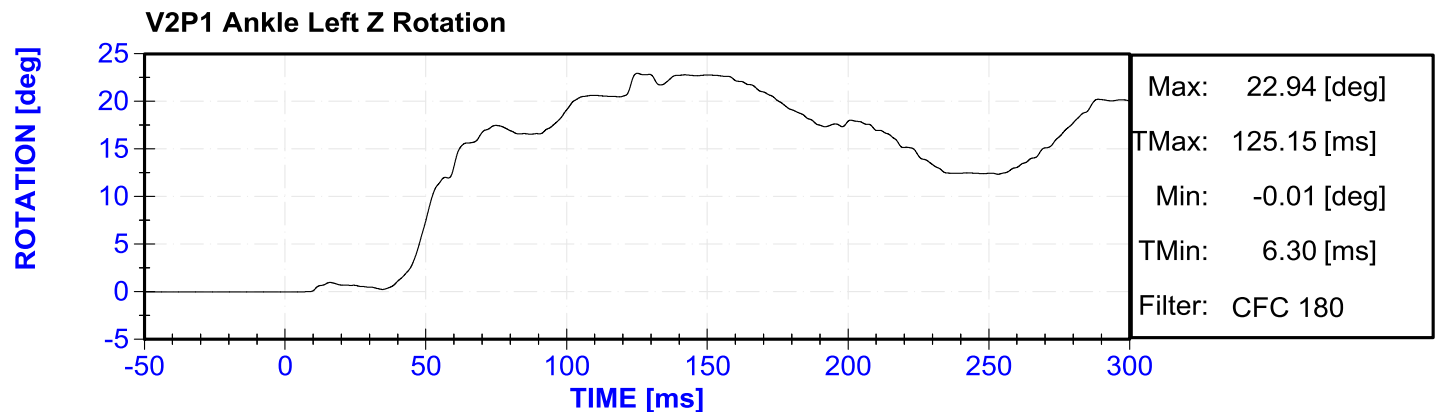
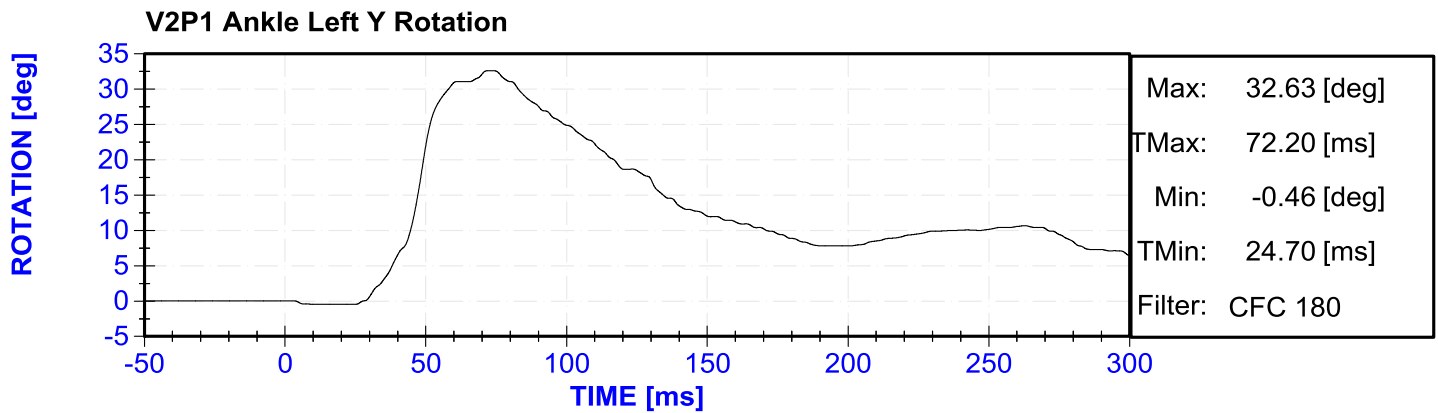
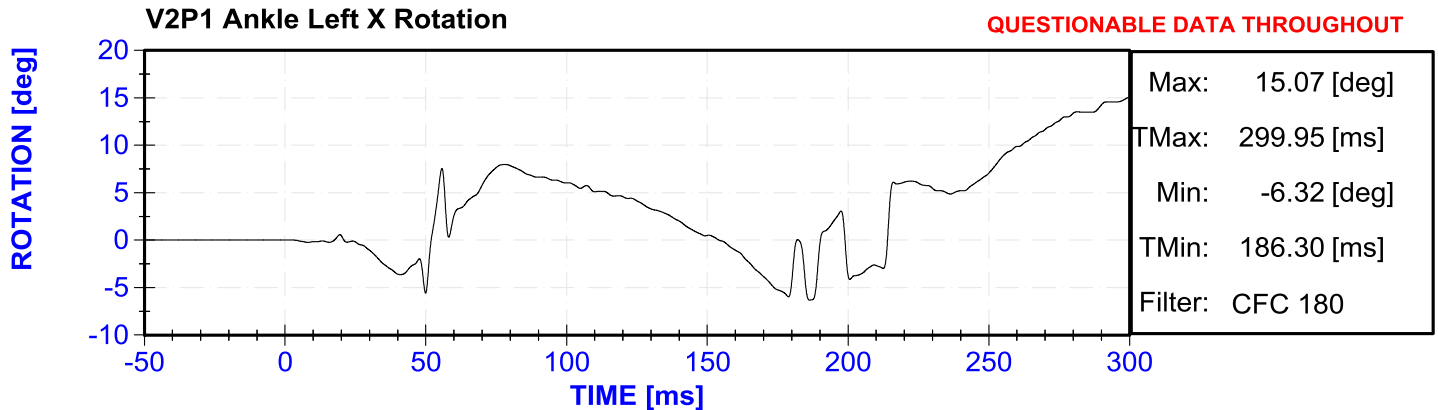


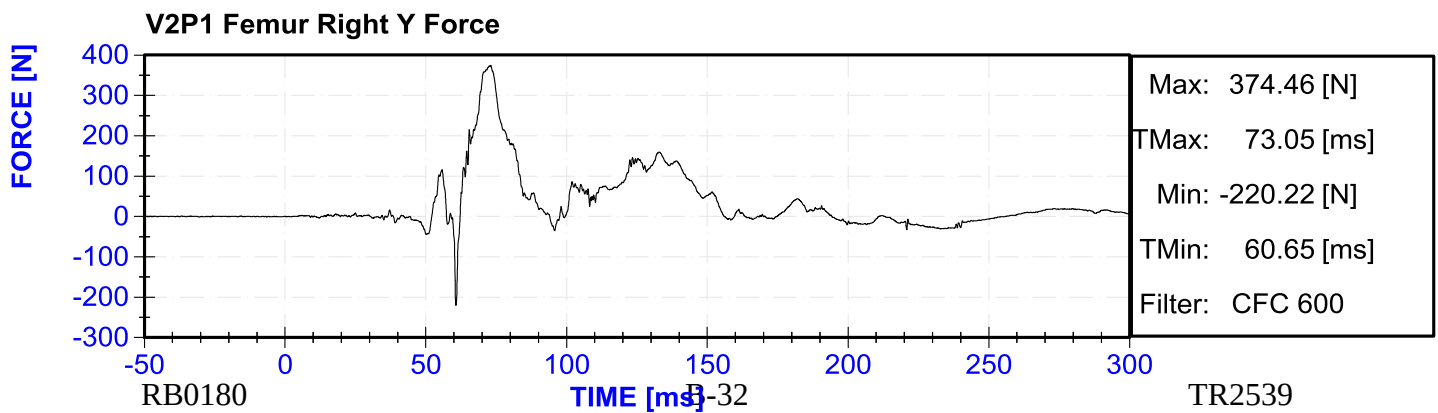
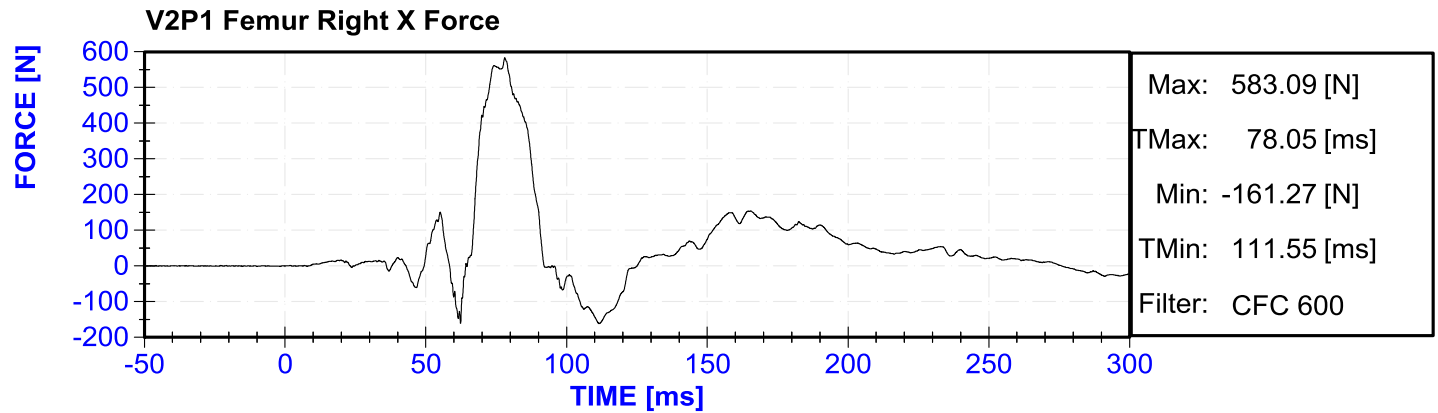
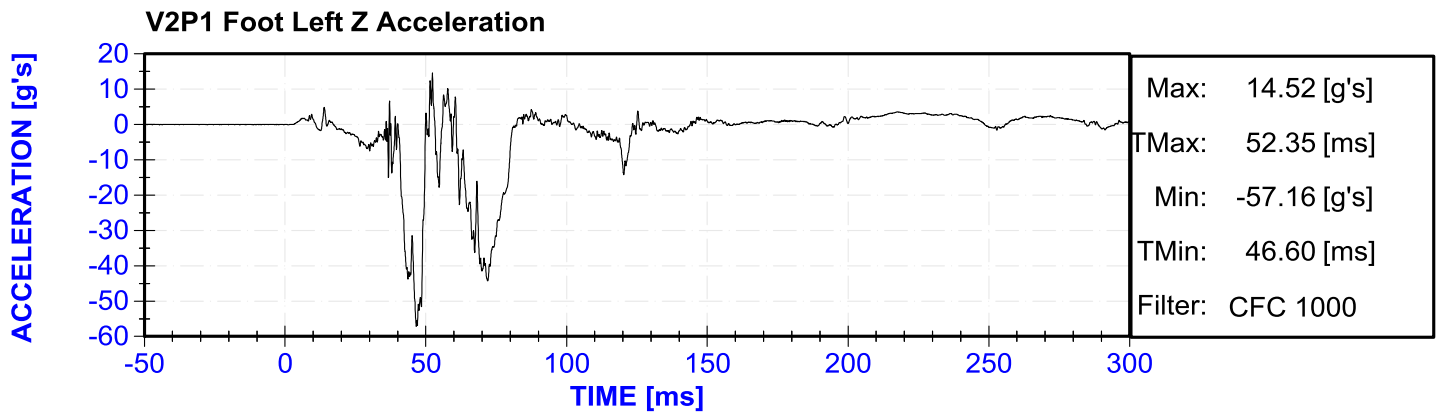
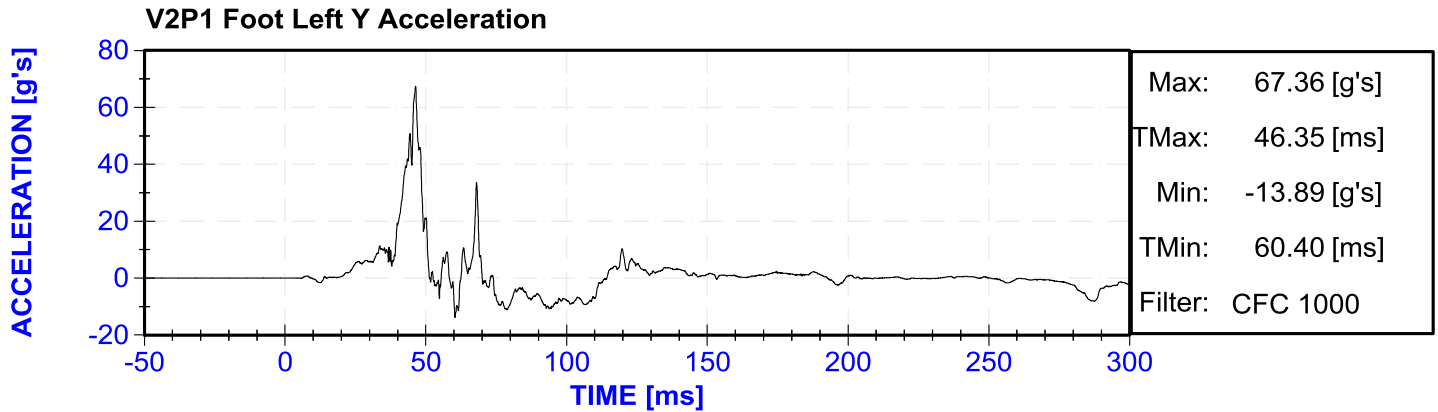


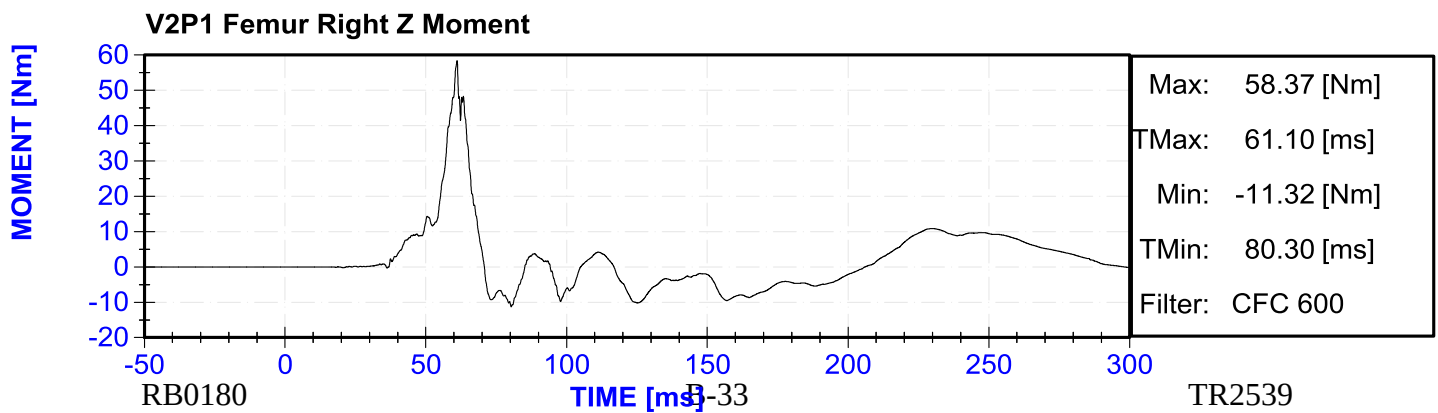
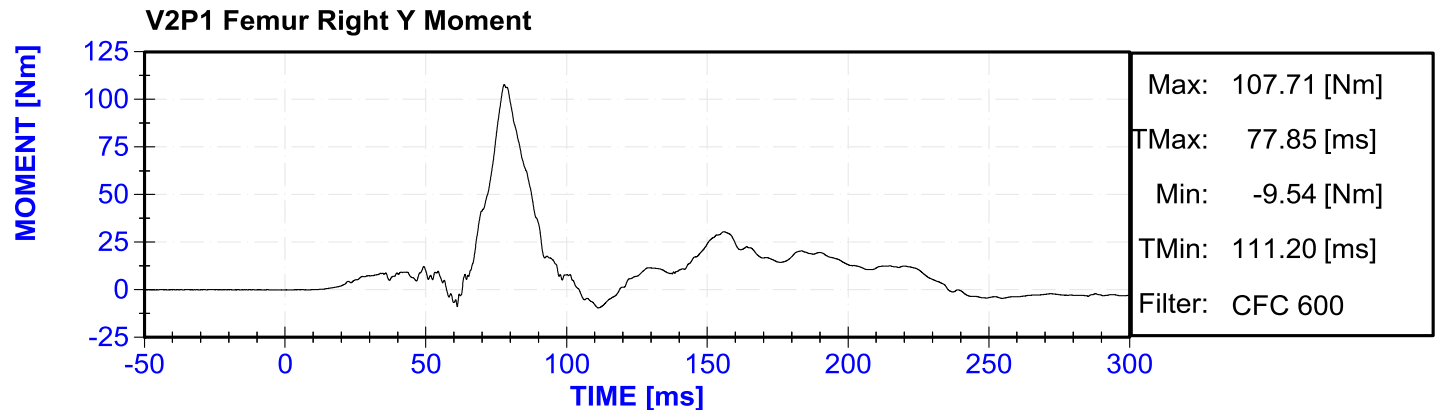
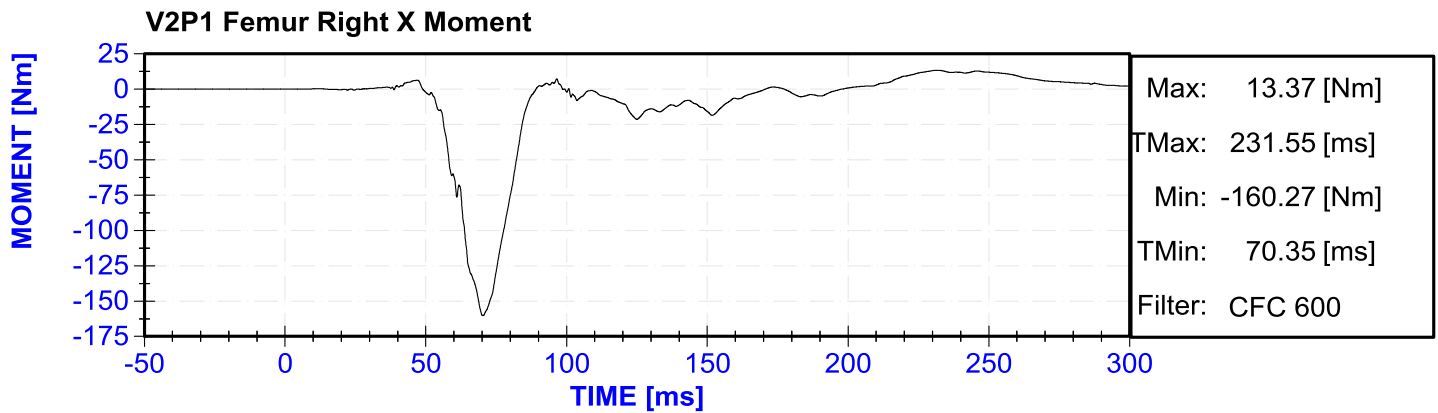
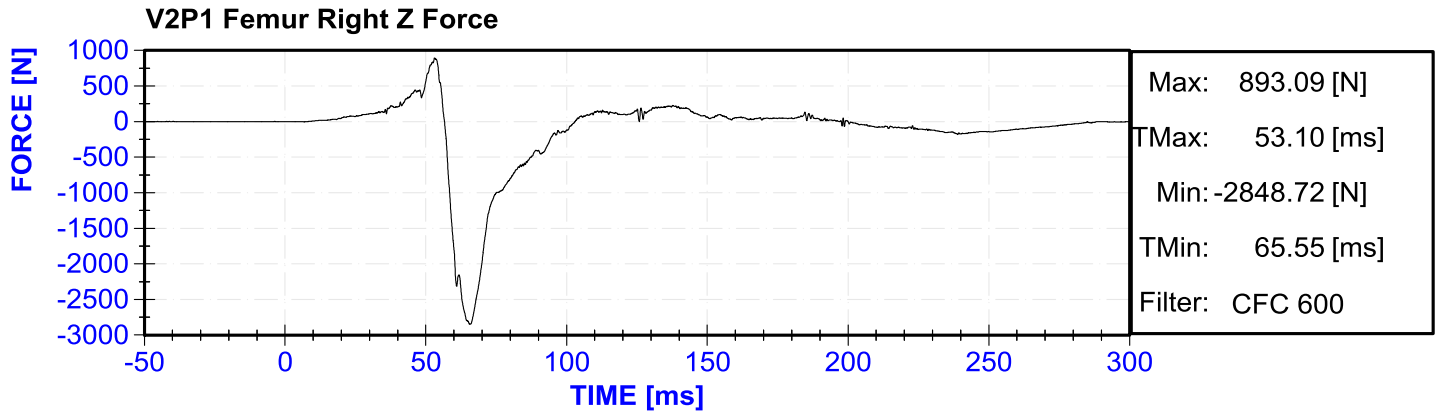


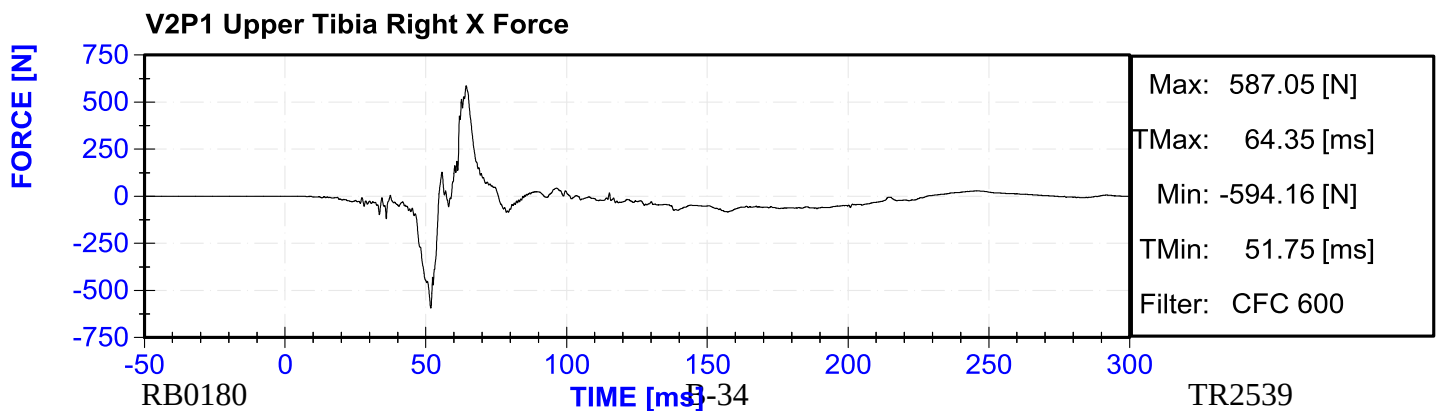
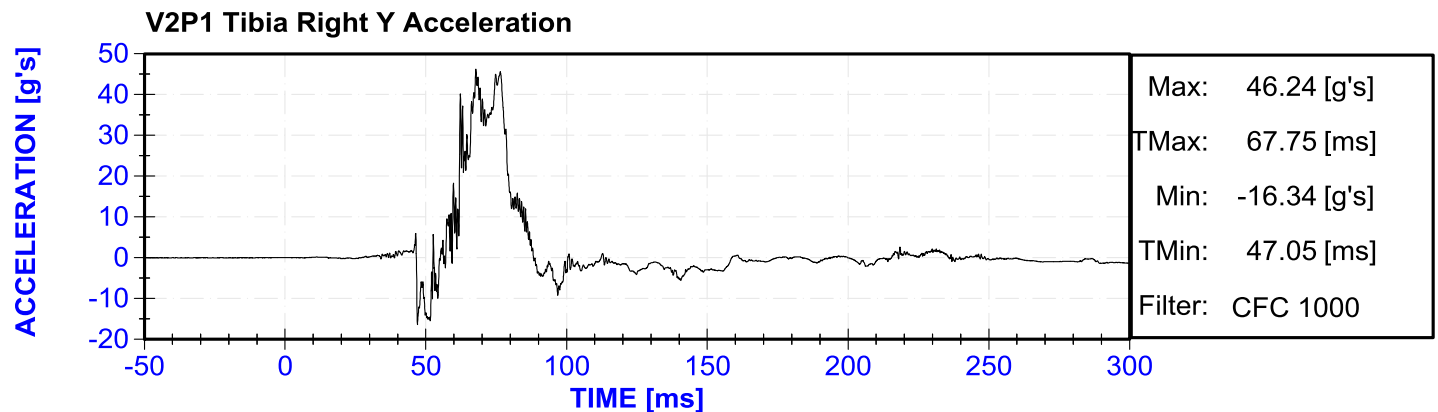
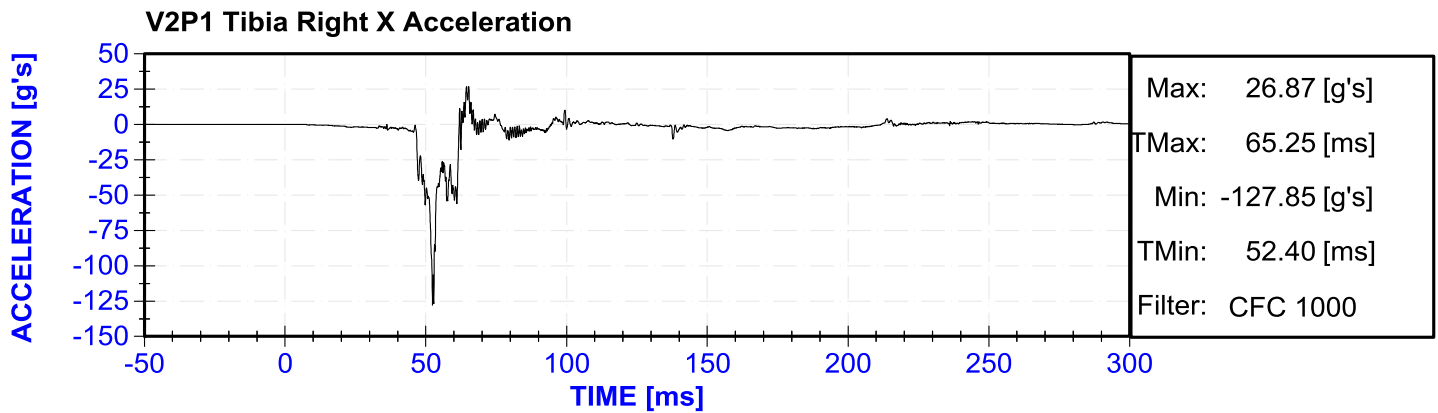
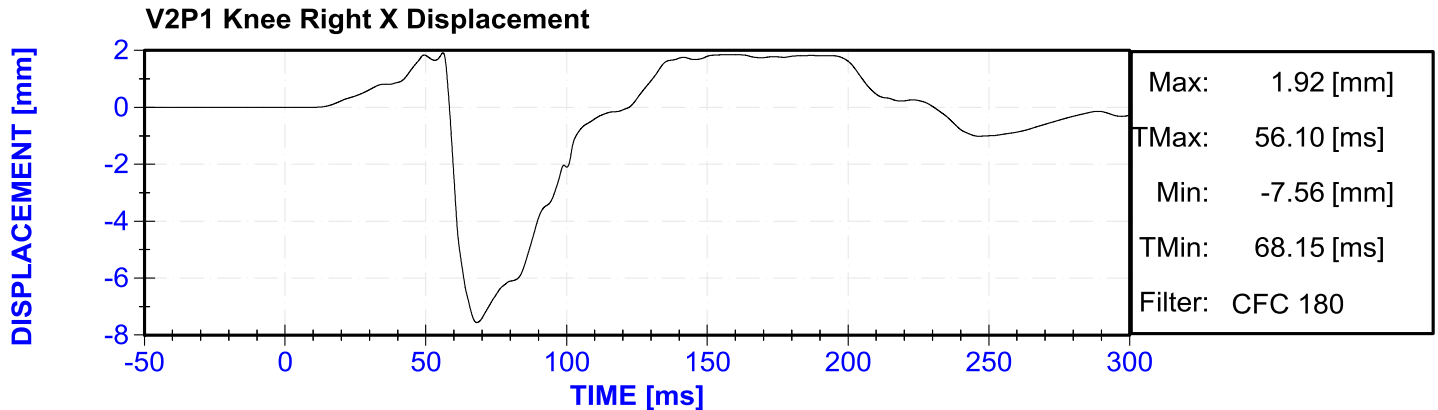






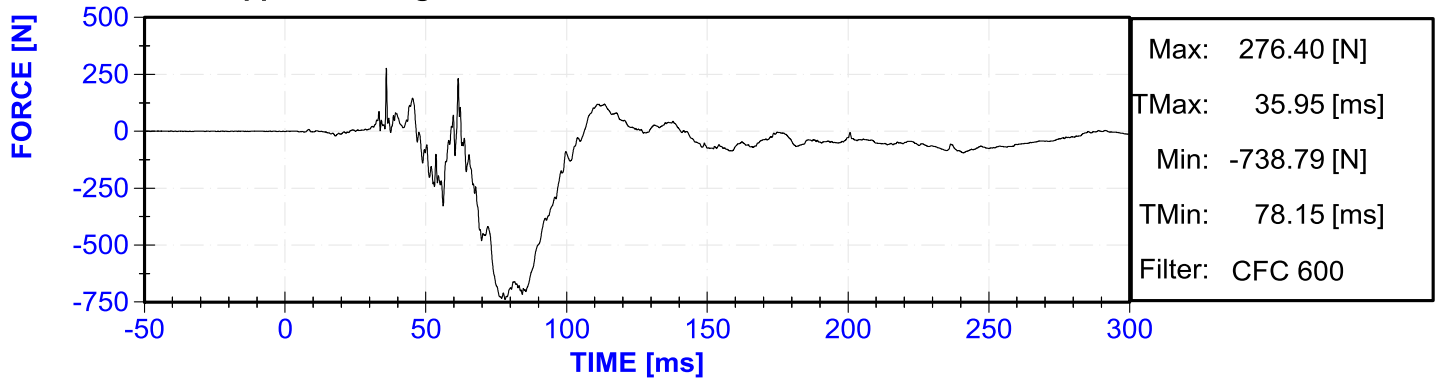




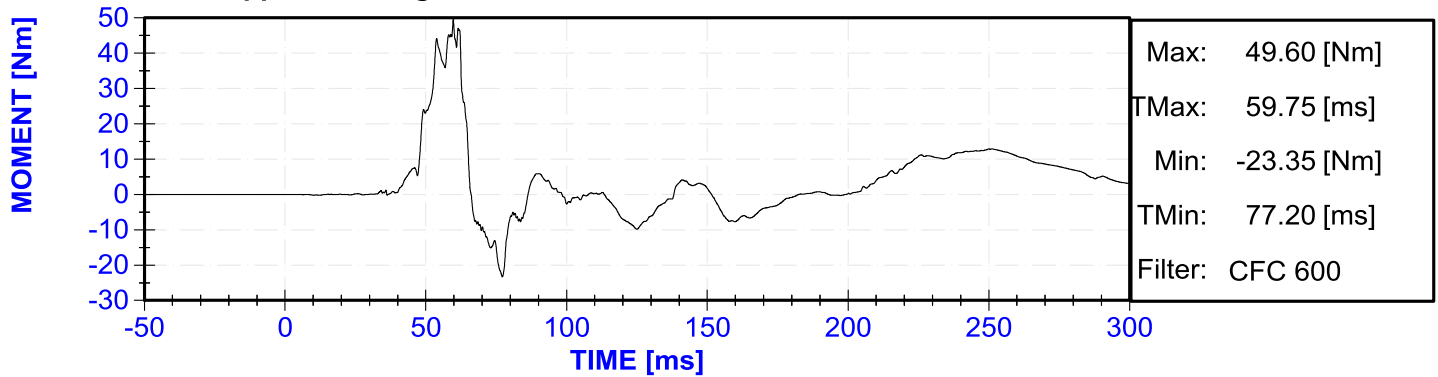




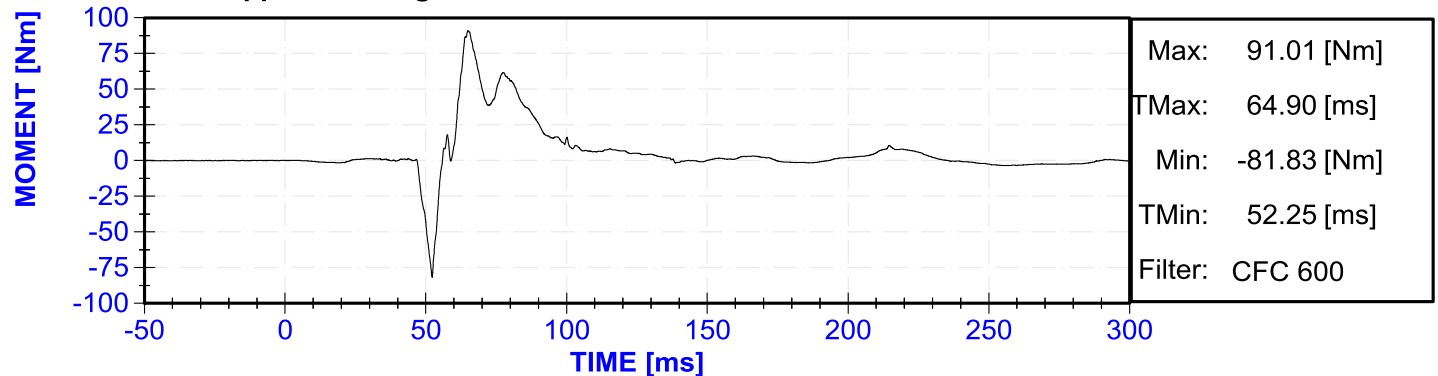
V2P1 Upper Tibia Right Z Force



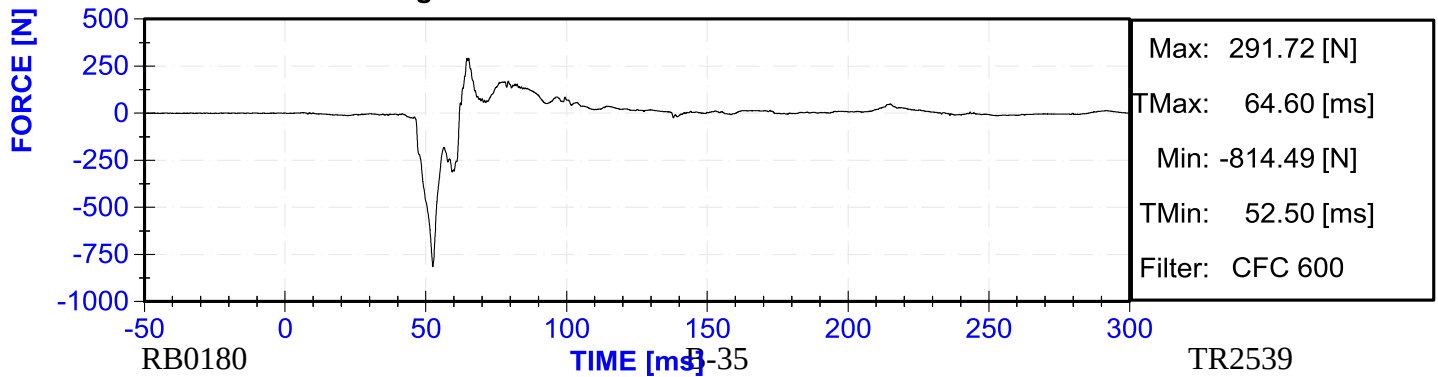
V2P1 Upper Tibia Right X Moment

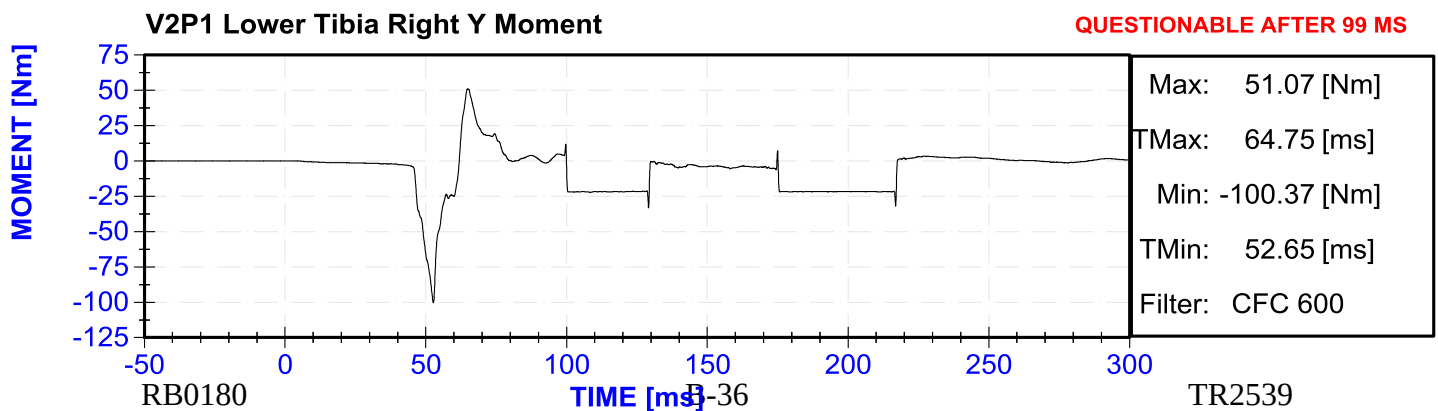
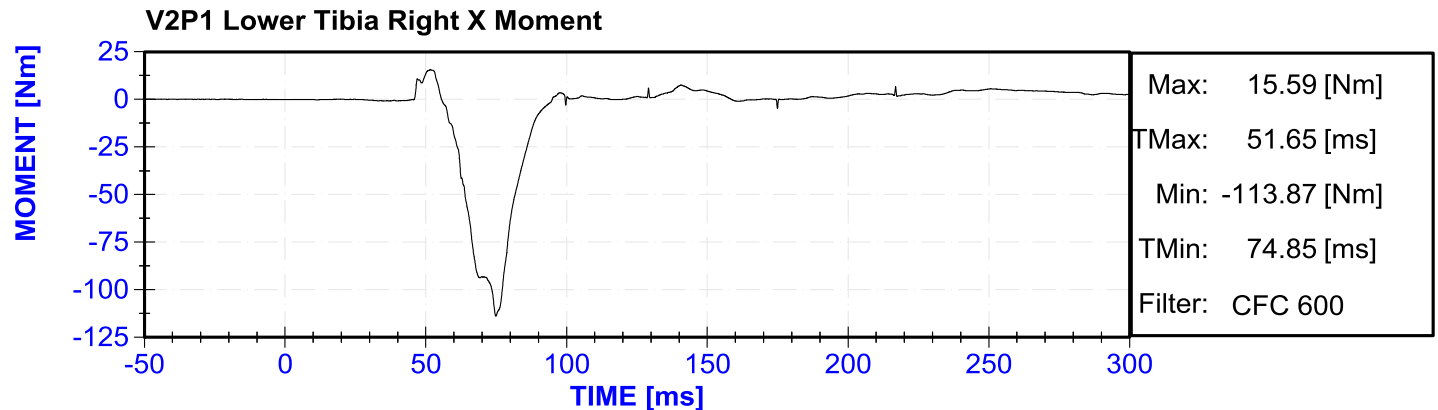
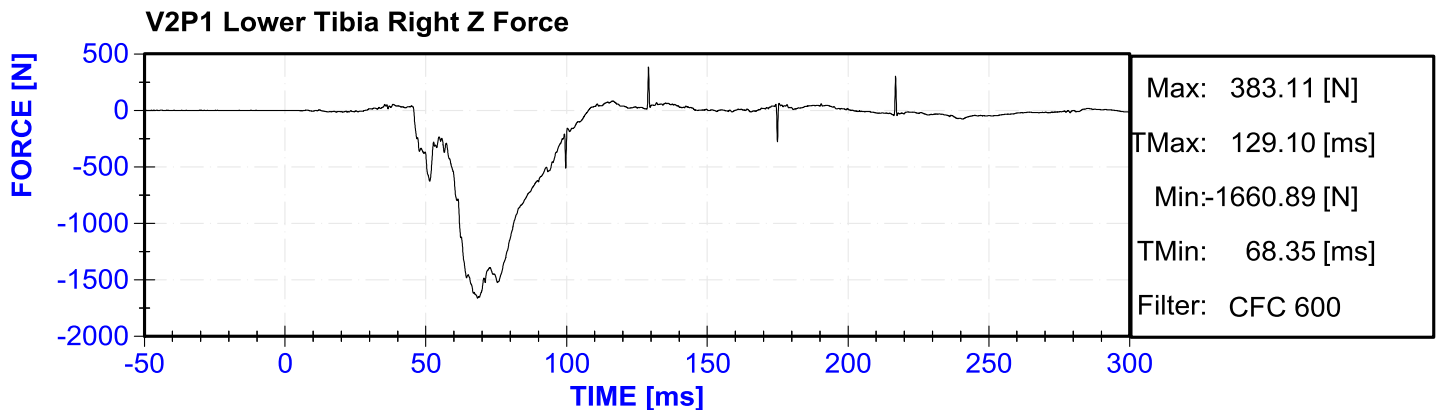
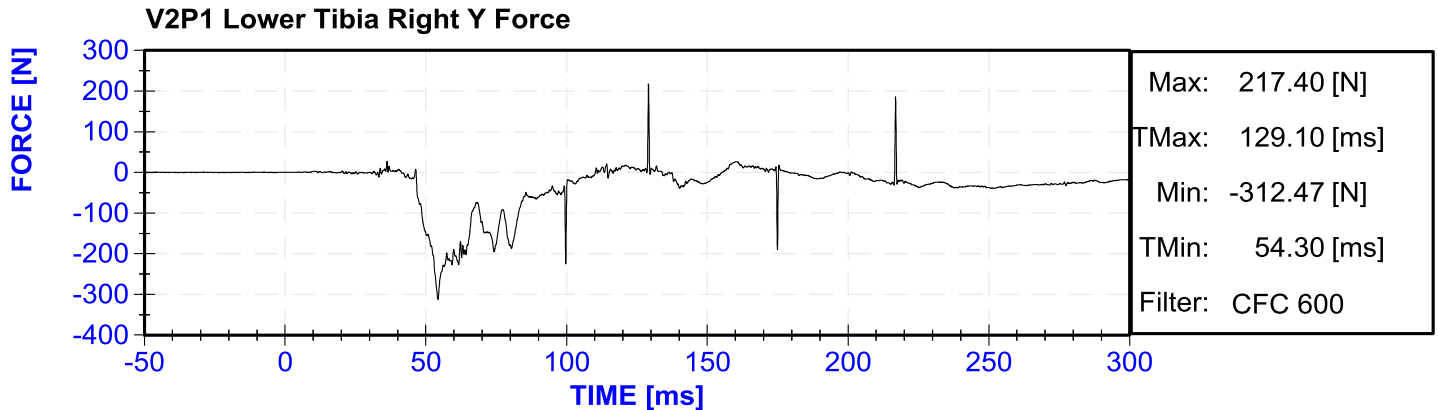


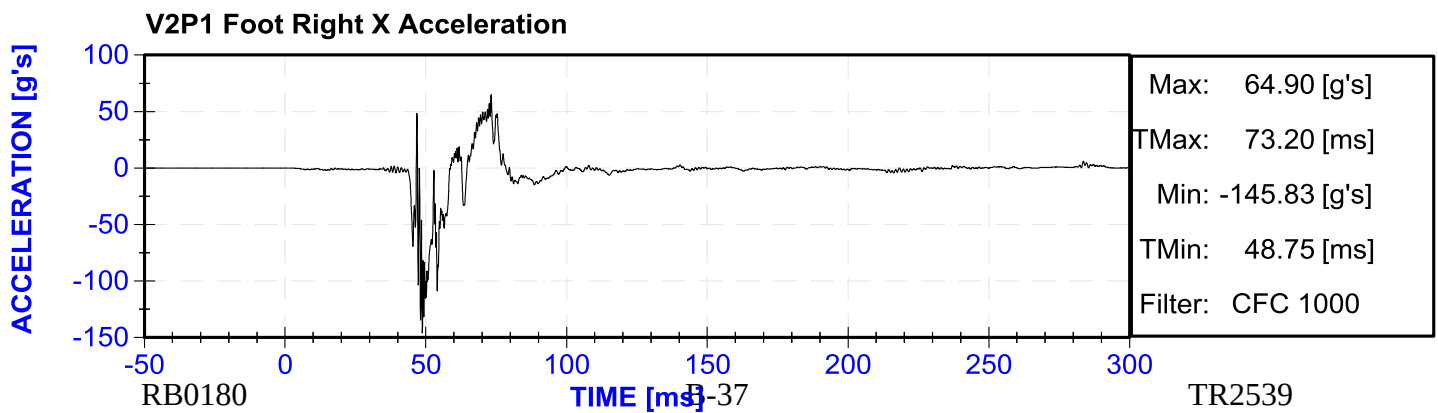
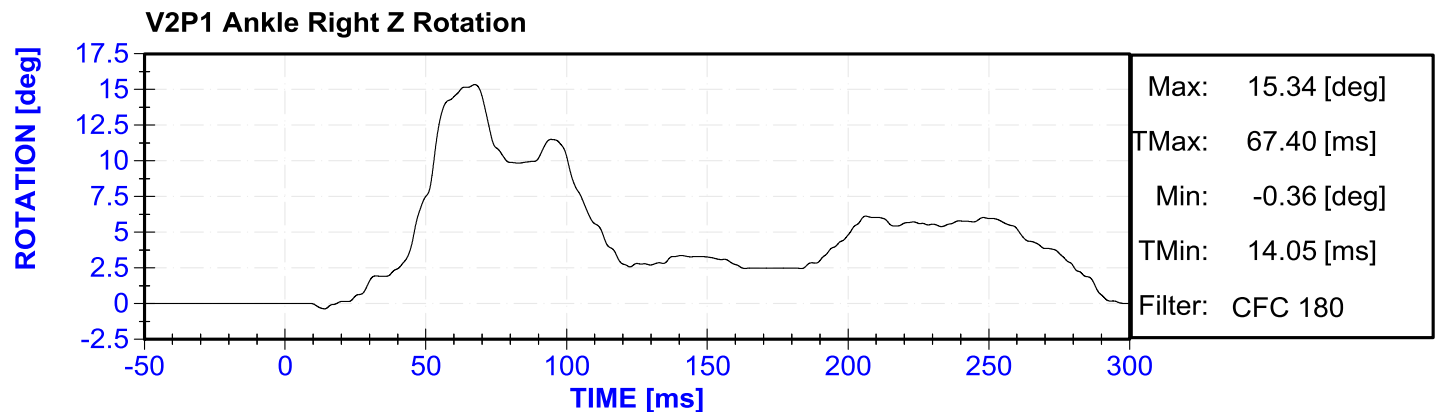
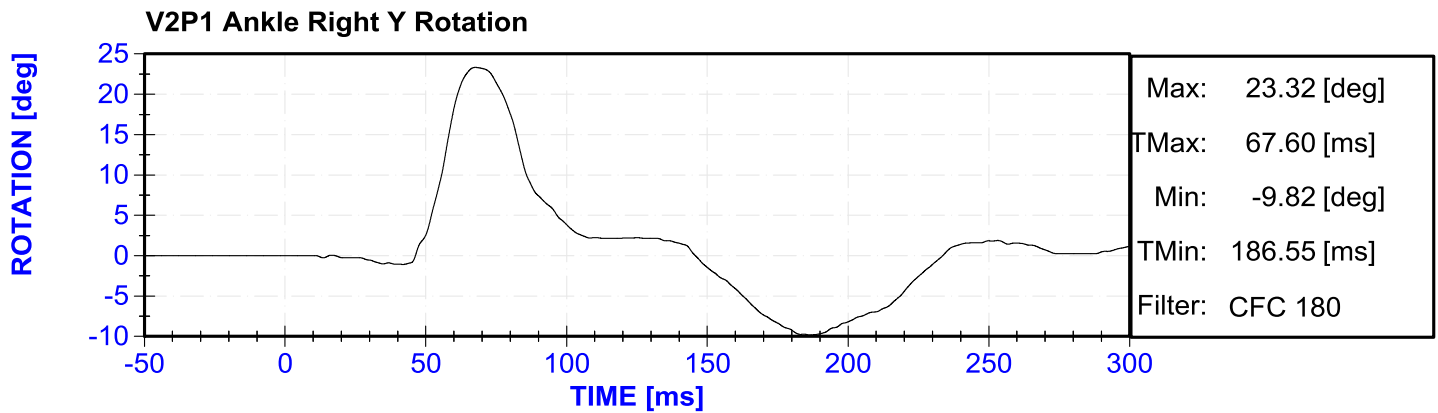
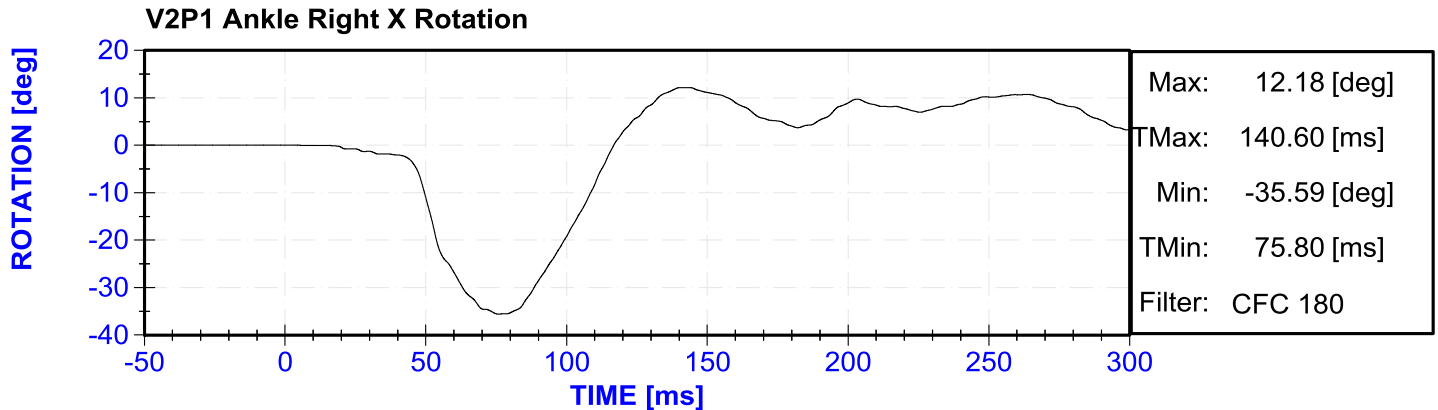
V2P1 Upper Tibia Right Y Moment

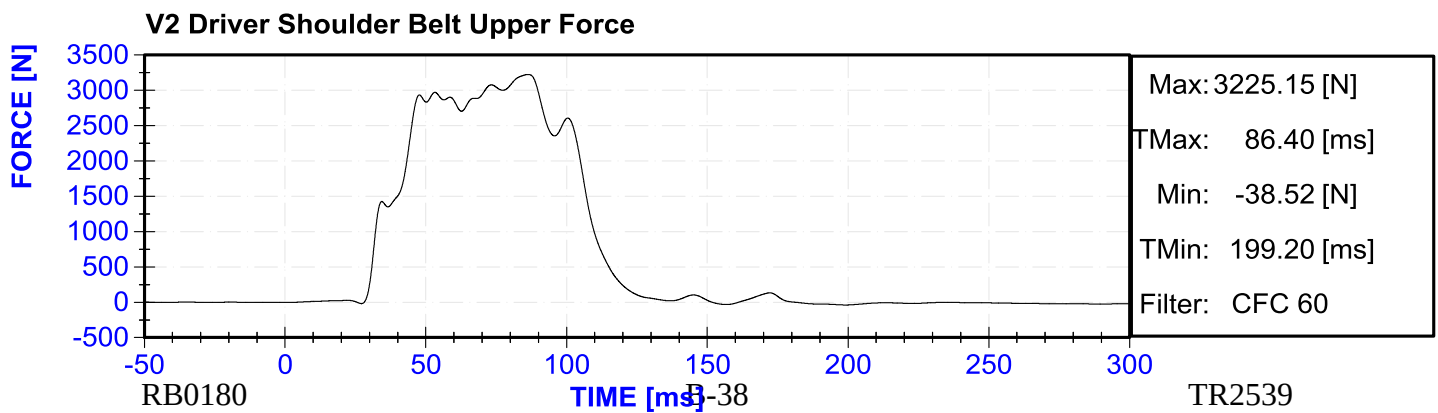
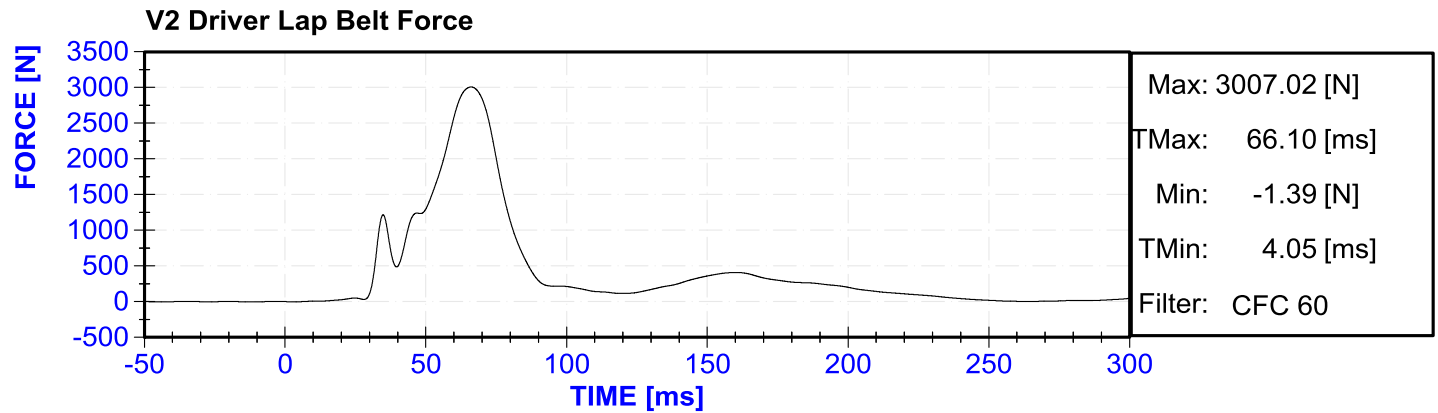
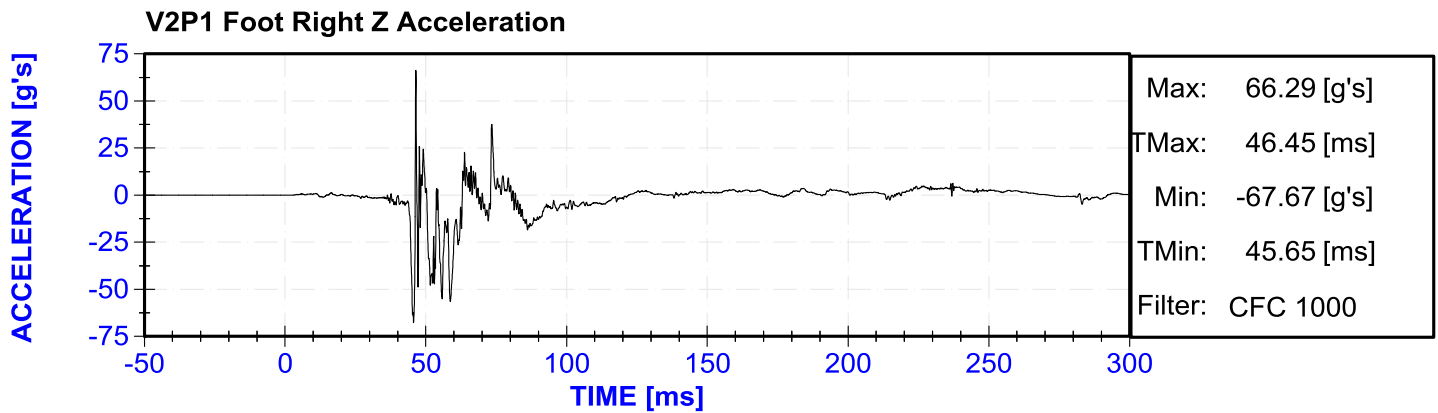
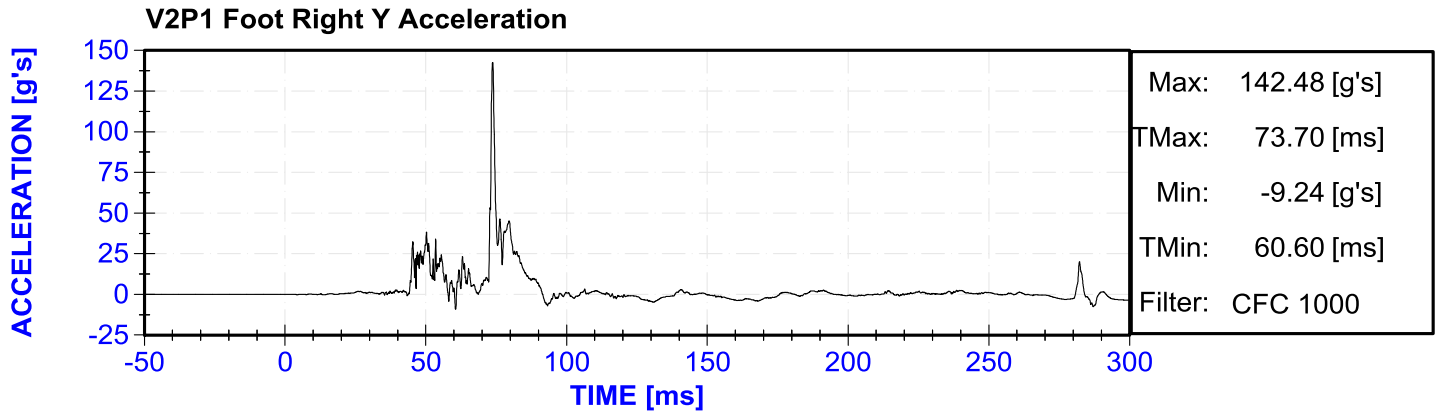


V2P1 Lower Tibia Right X Force

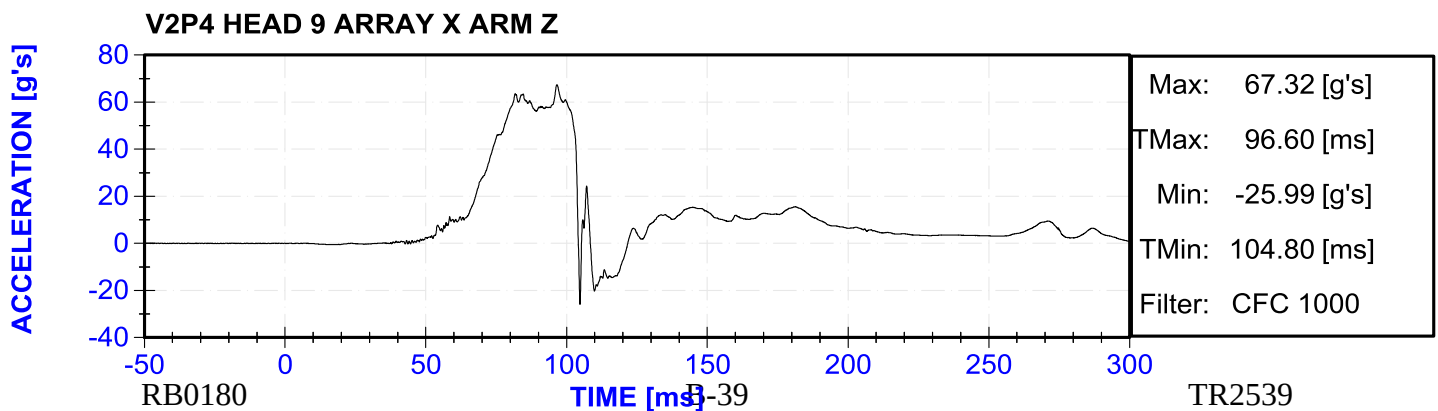
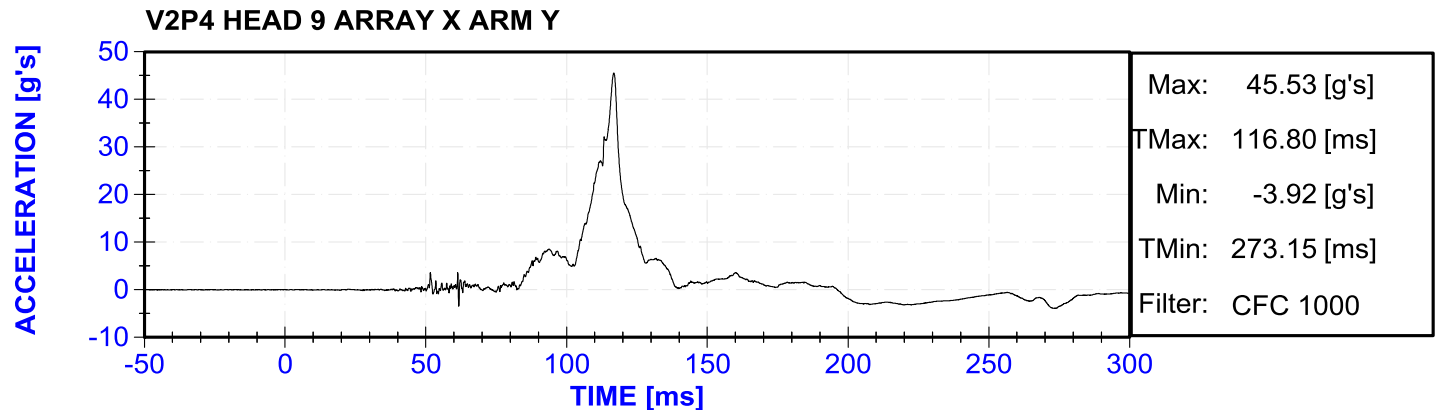
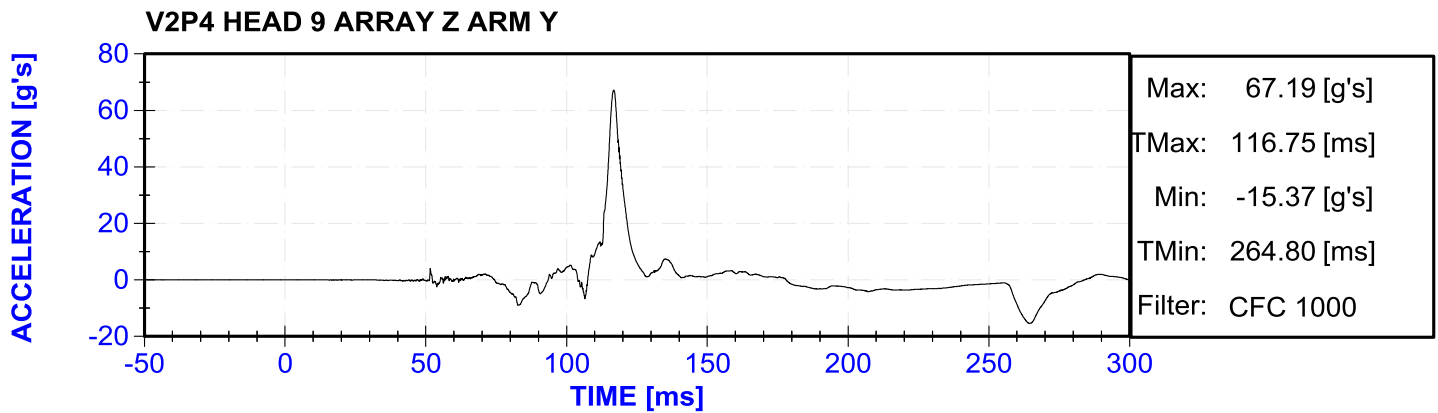
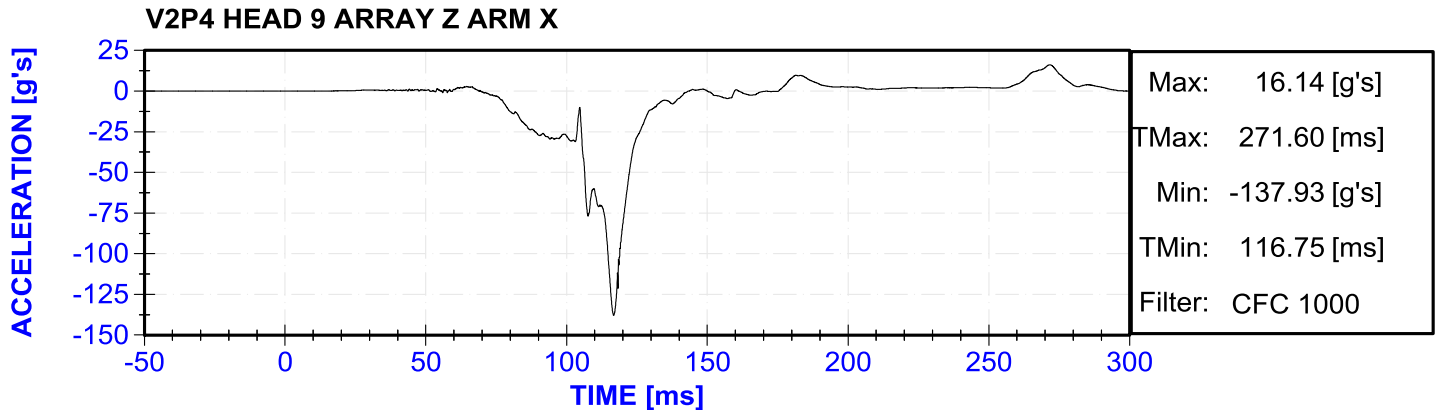


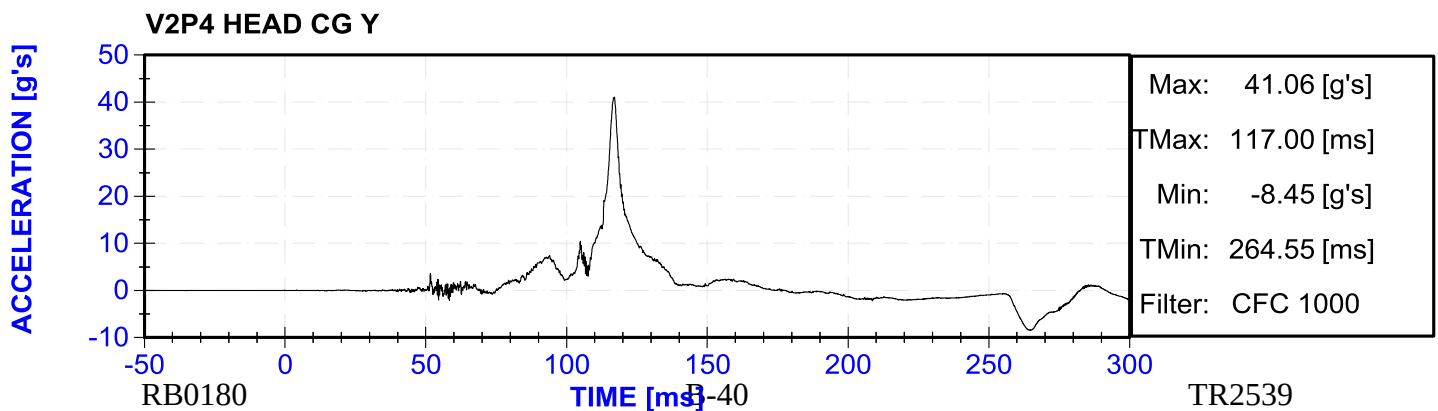
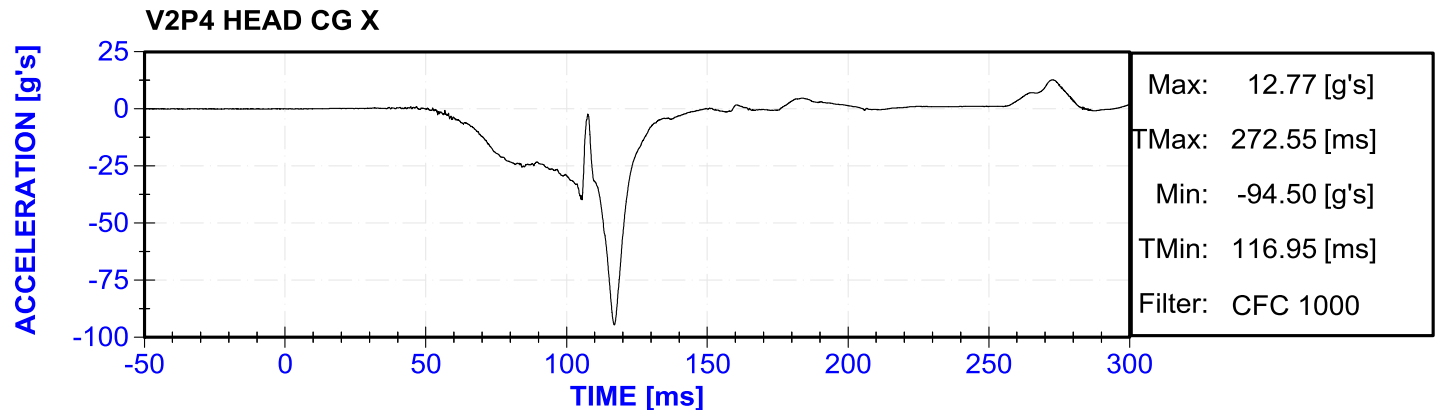
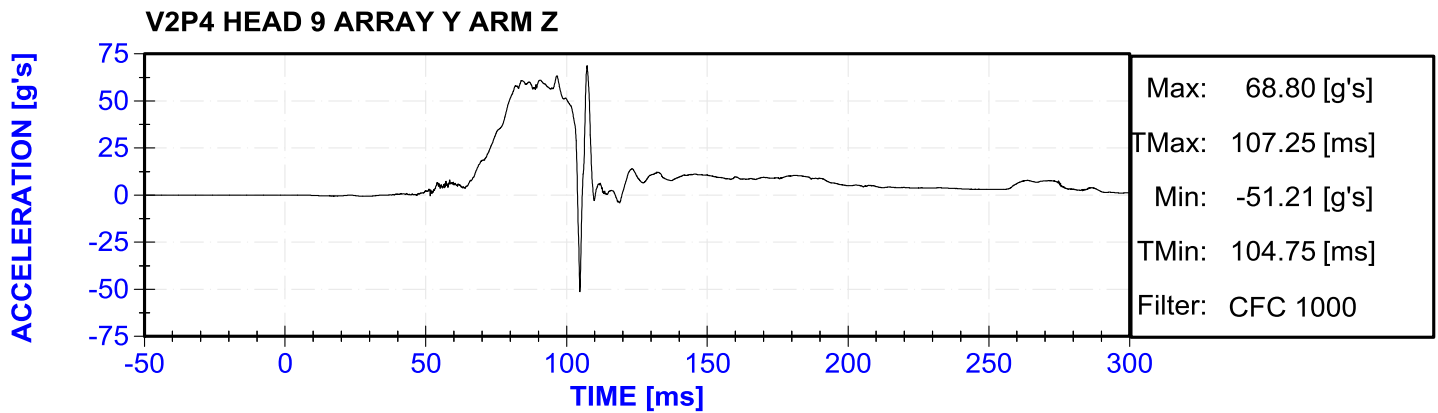
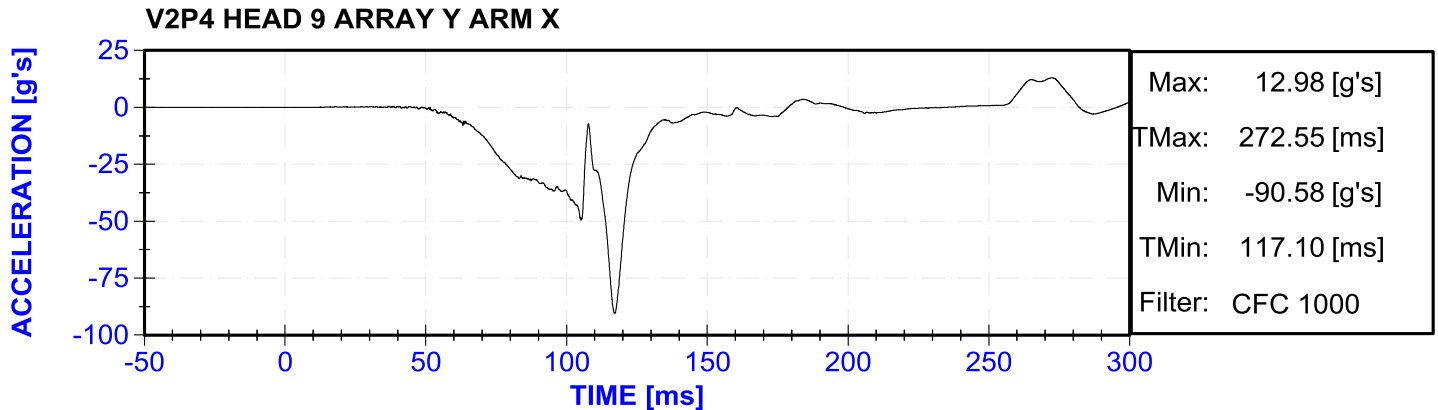


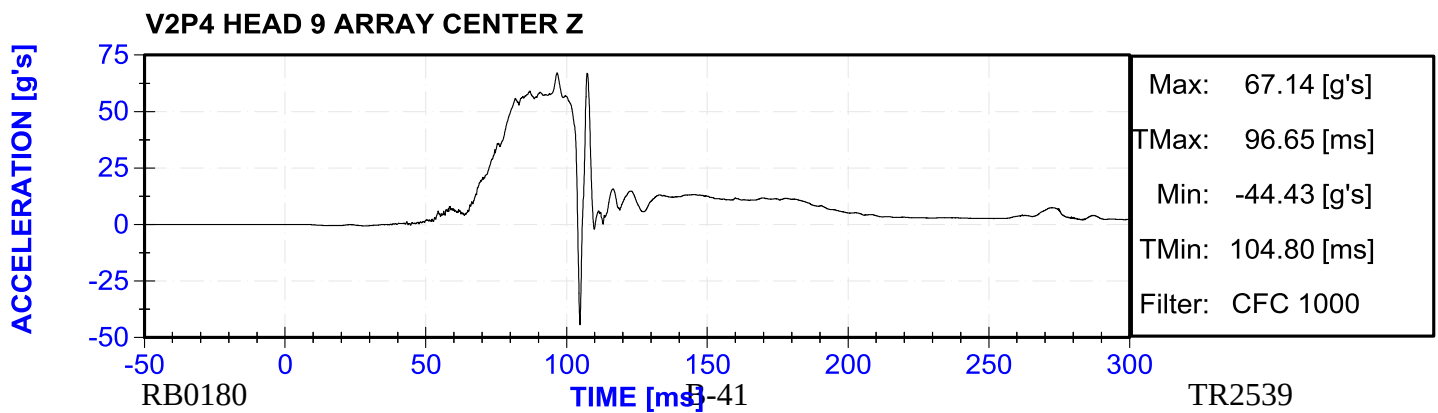
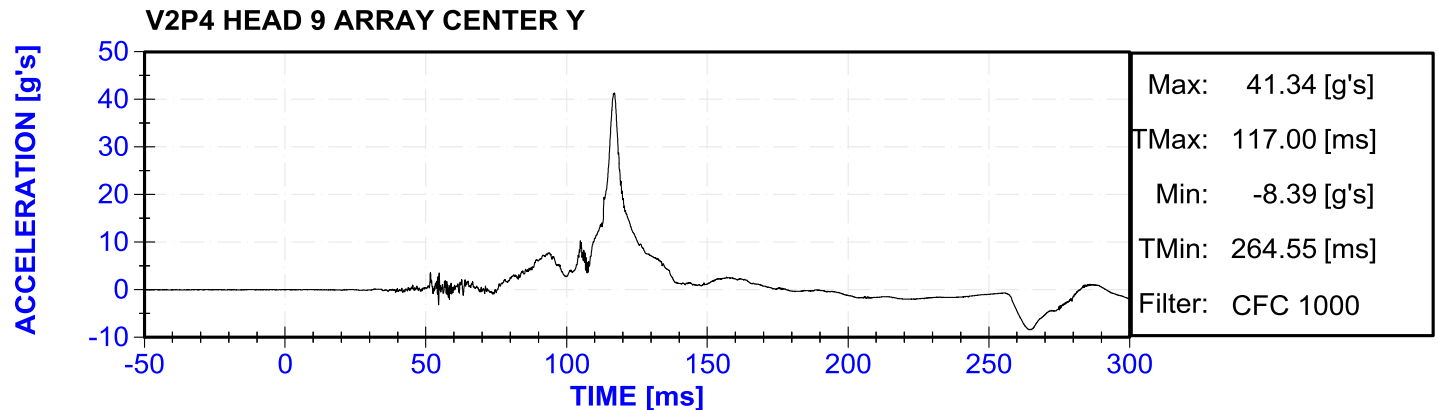
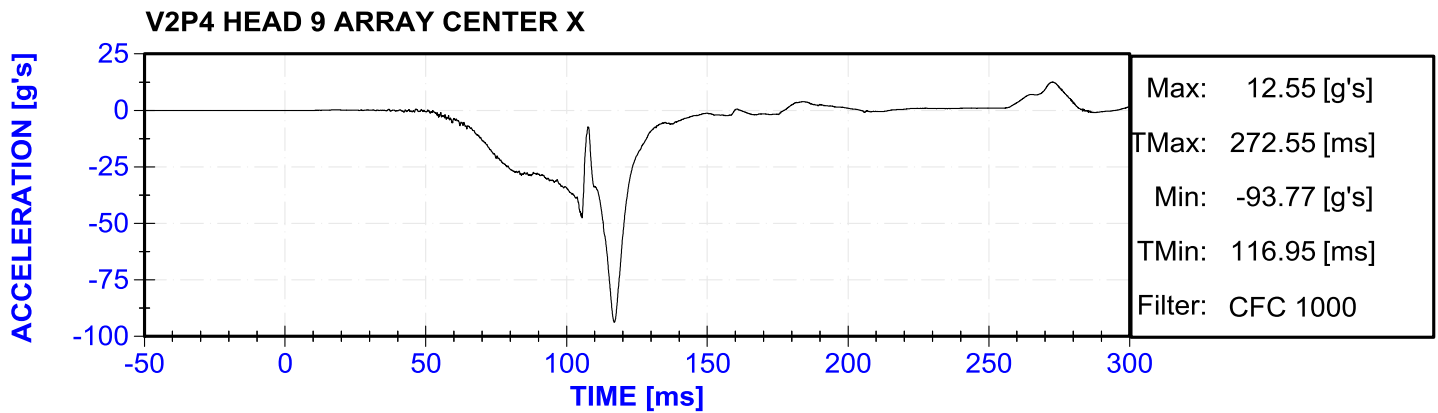
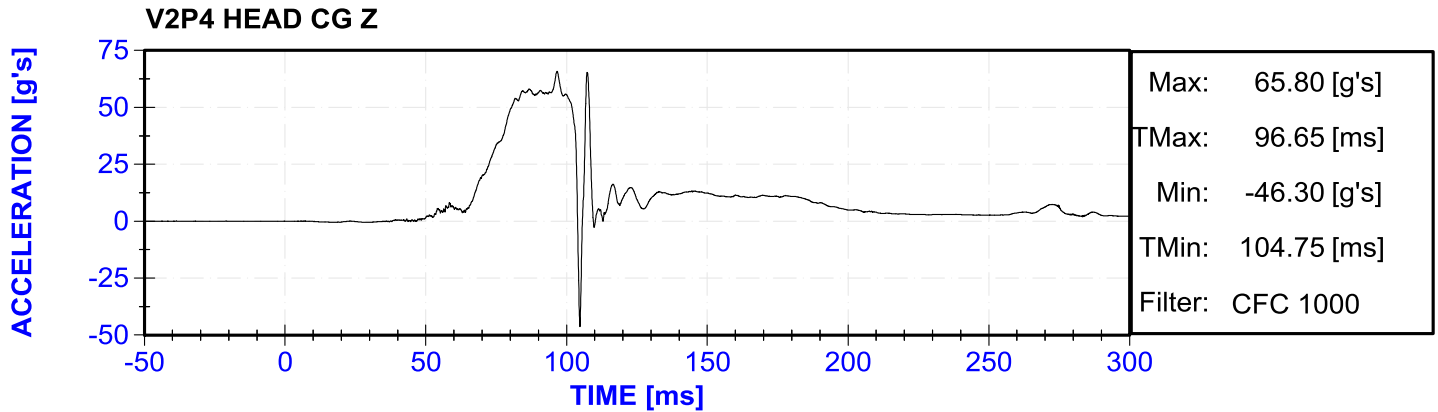


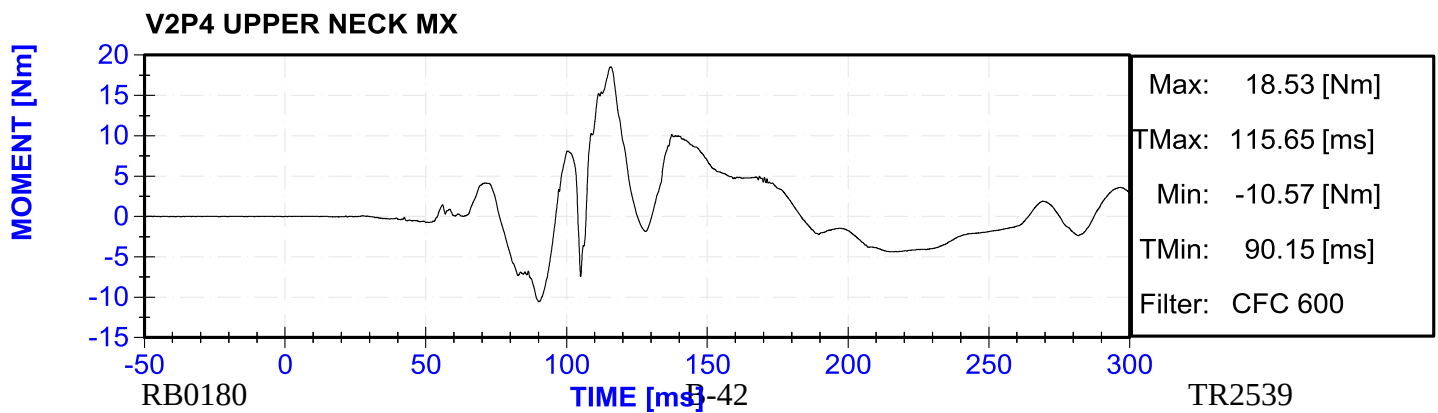
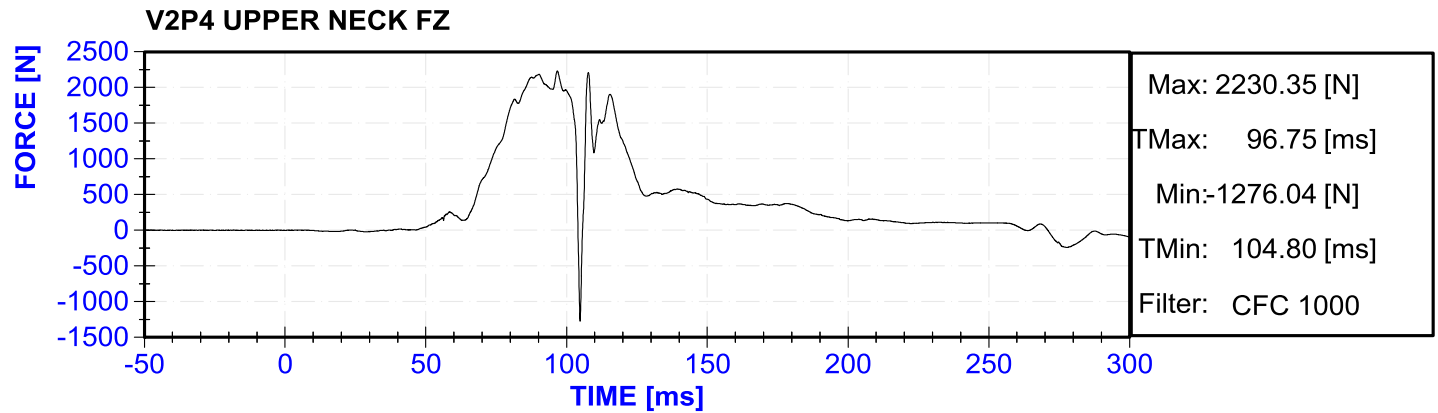
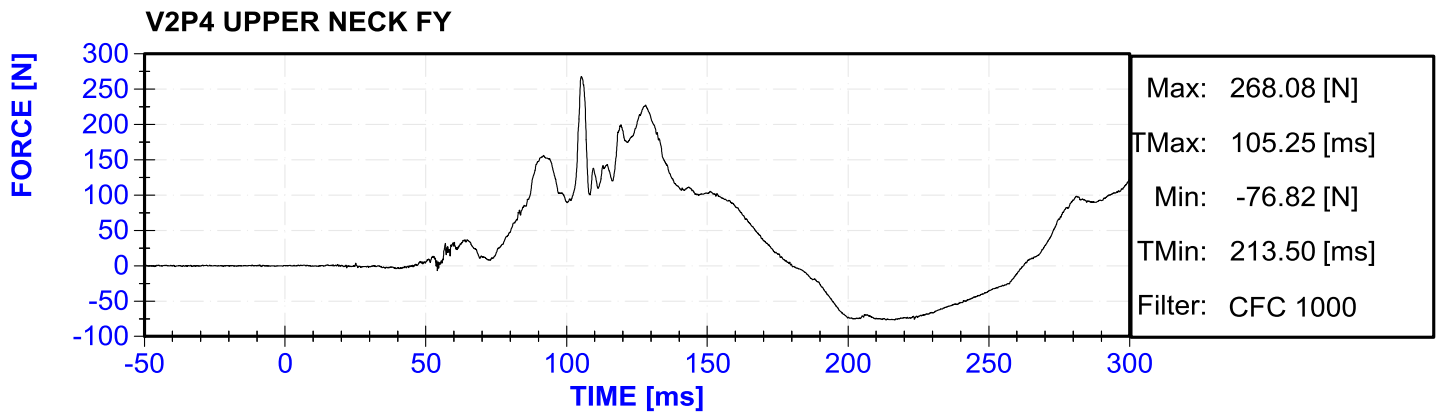
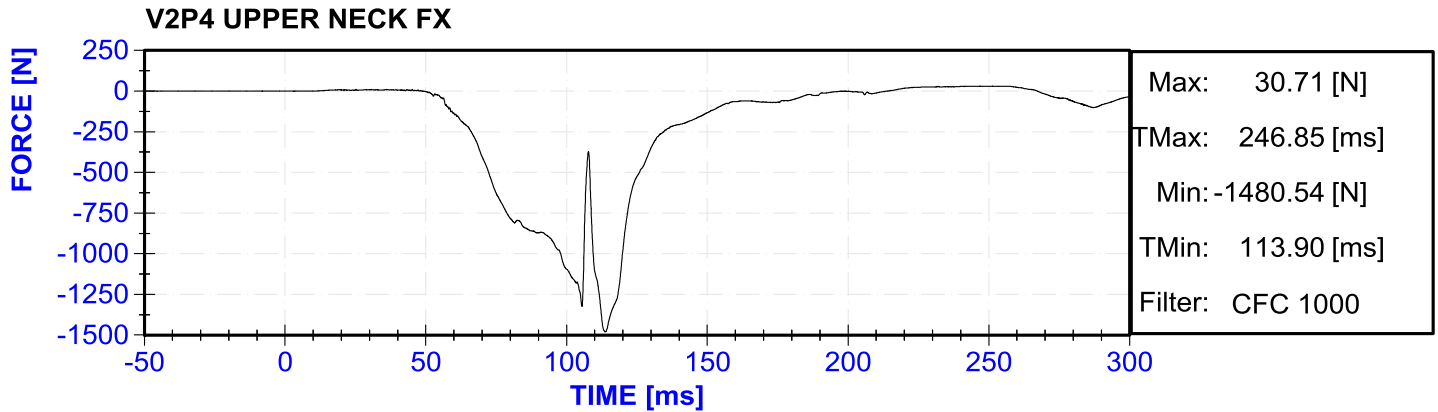




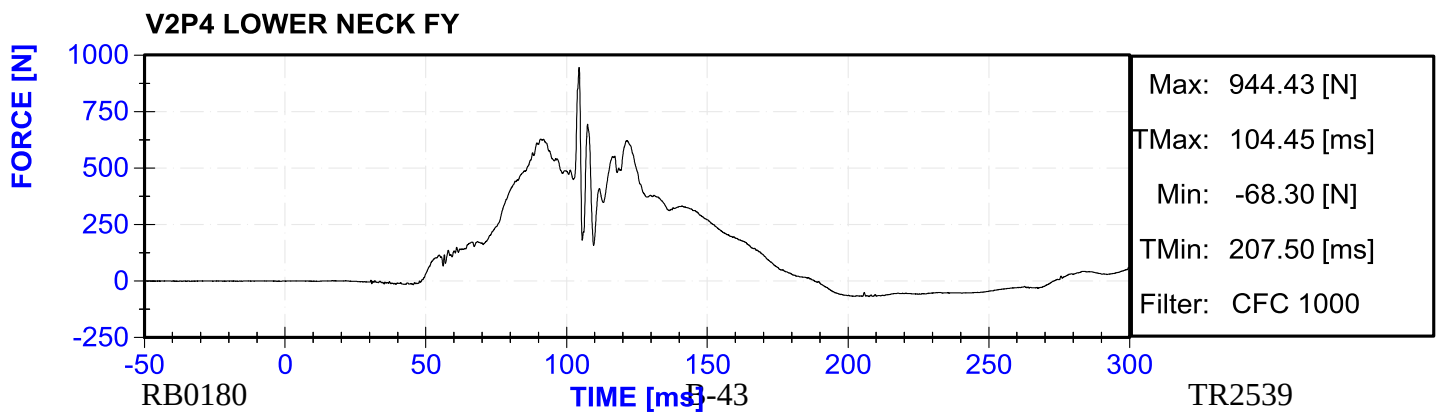
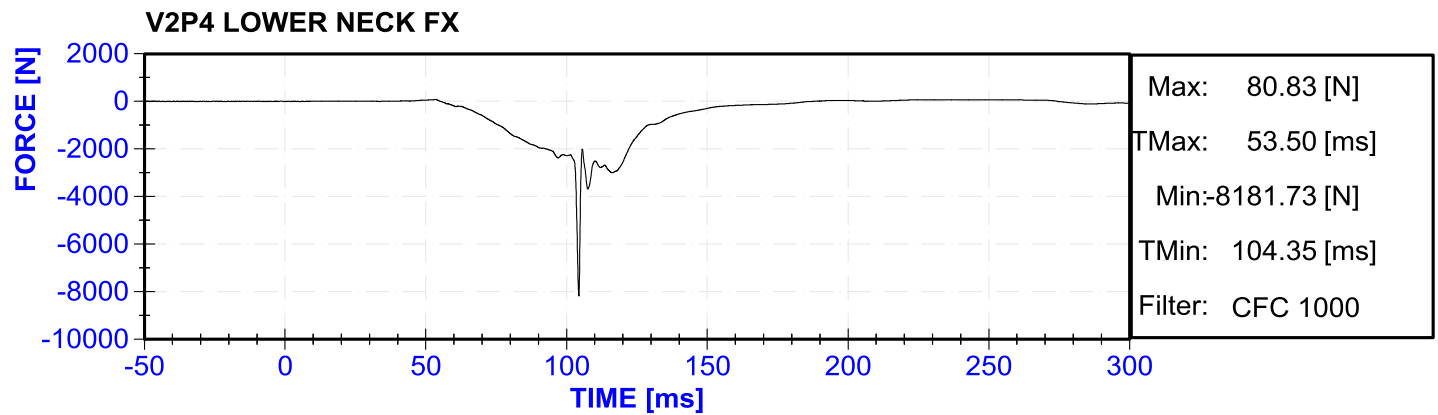
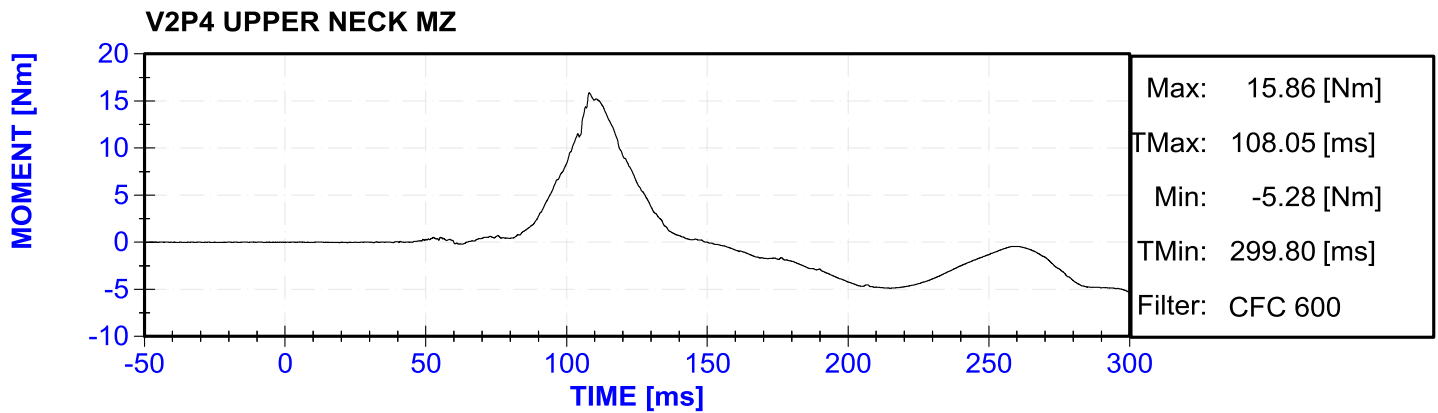
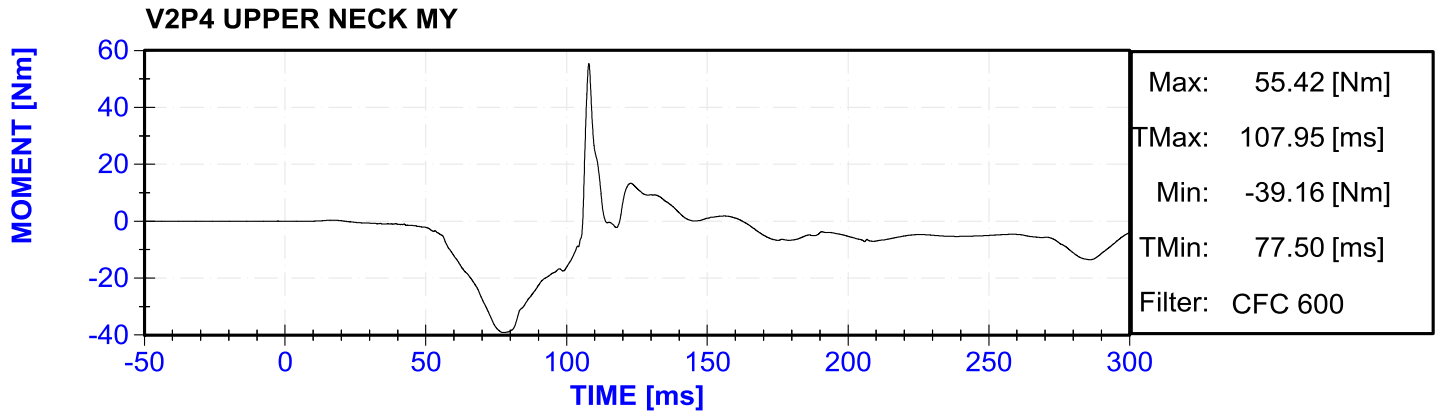


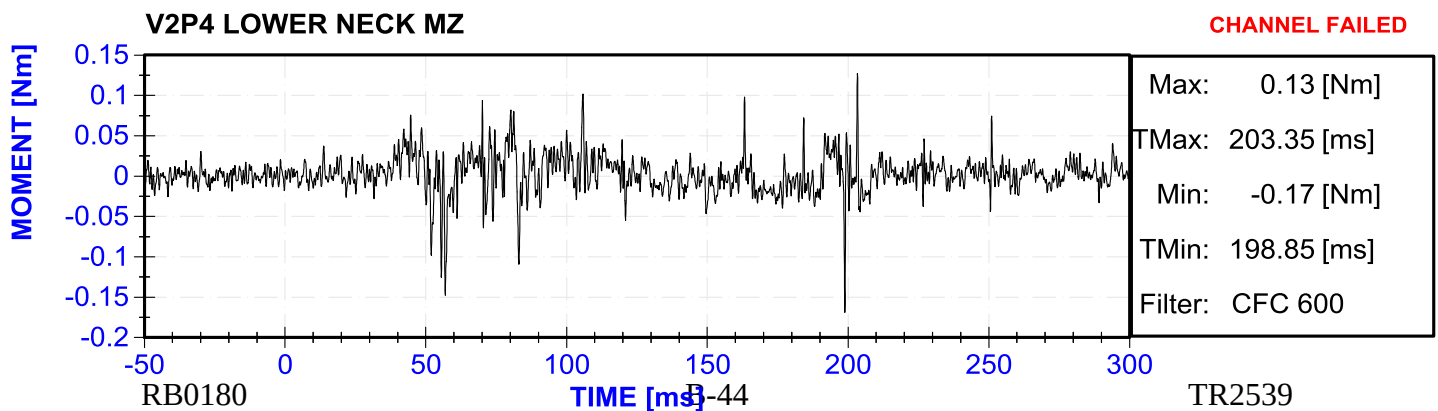
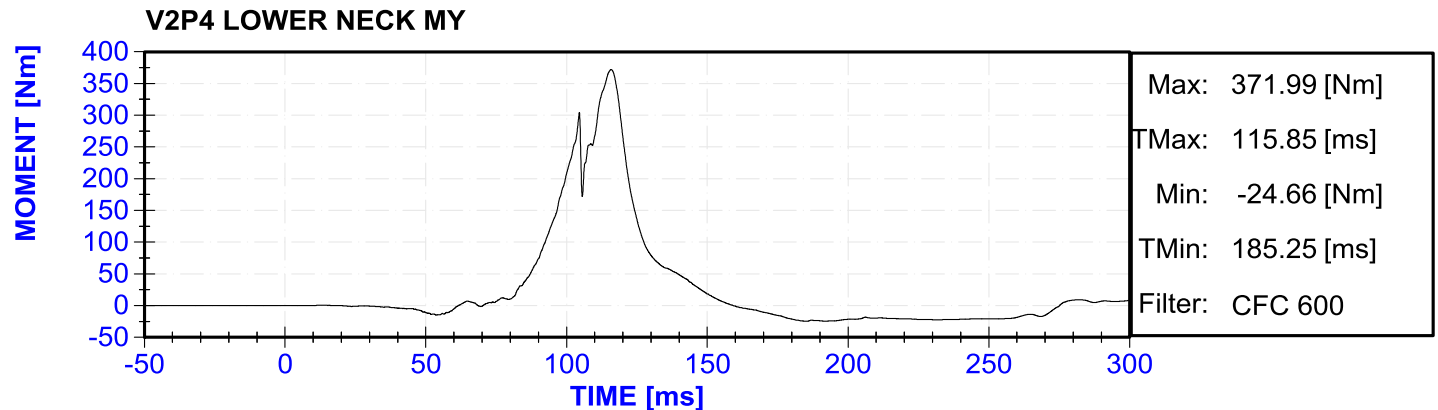
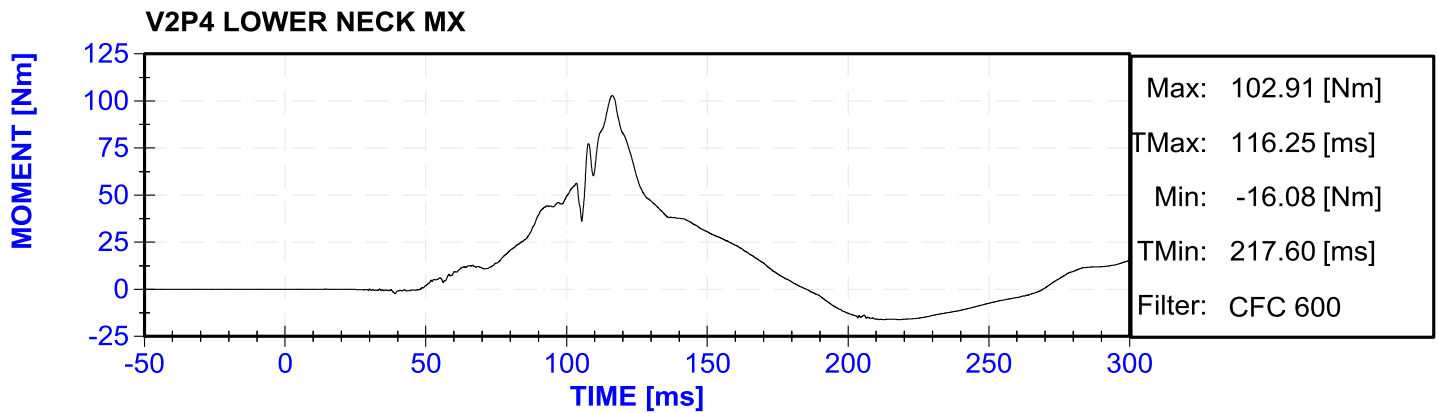
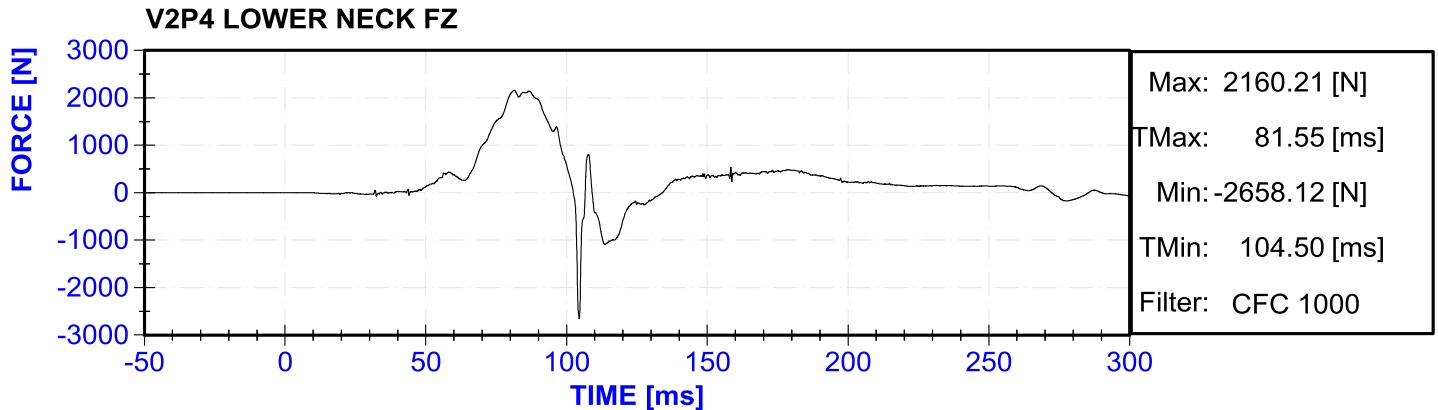


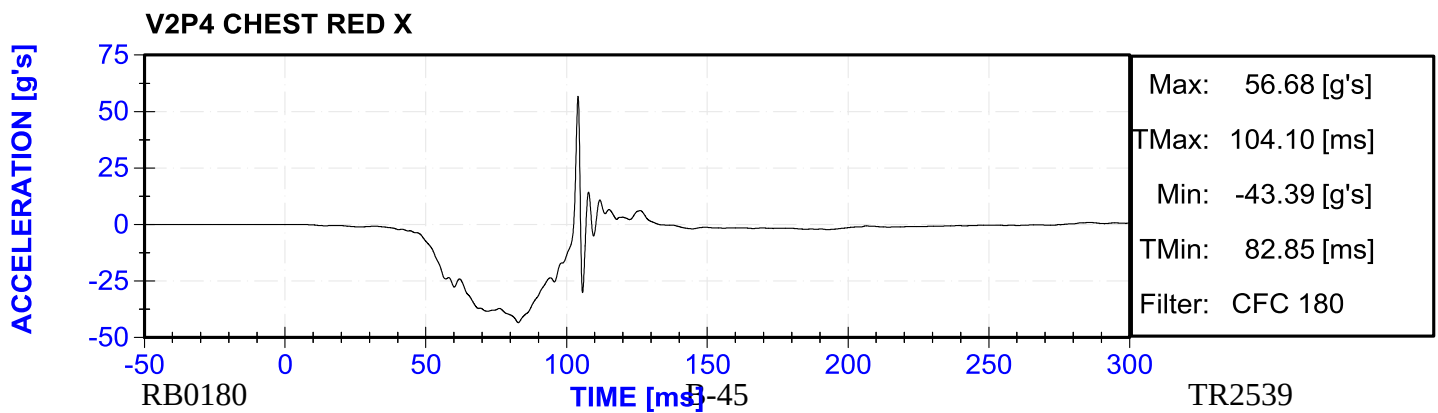
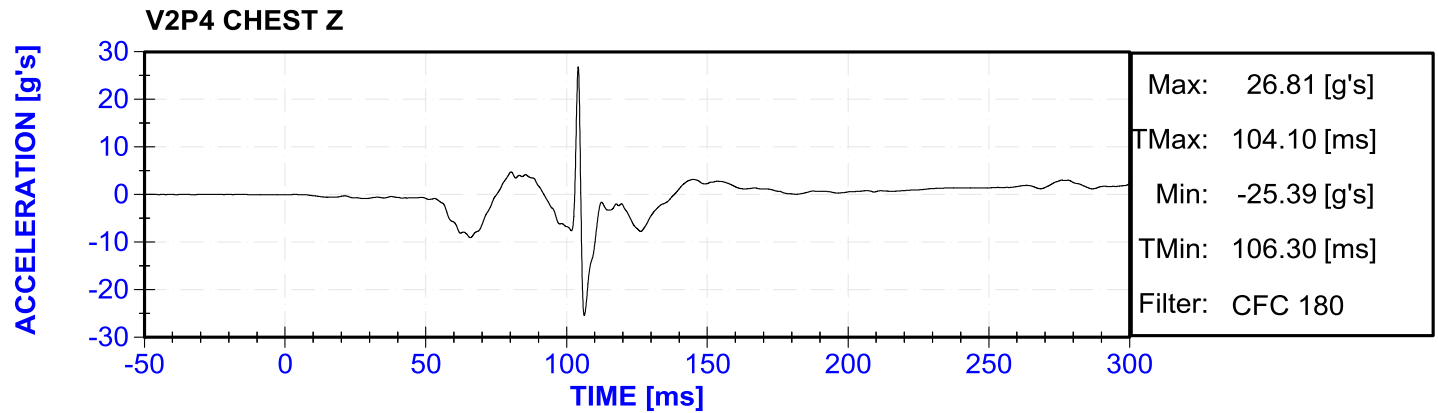
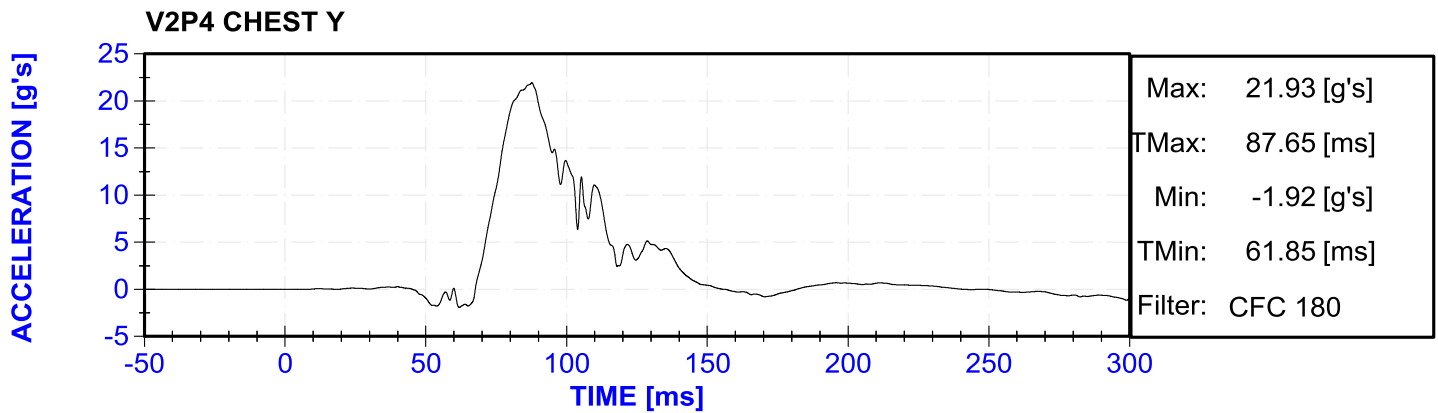
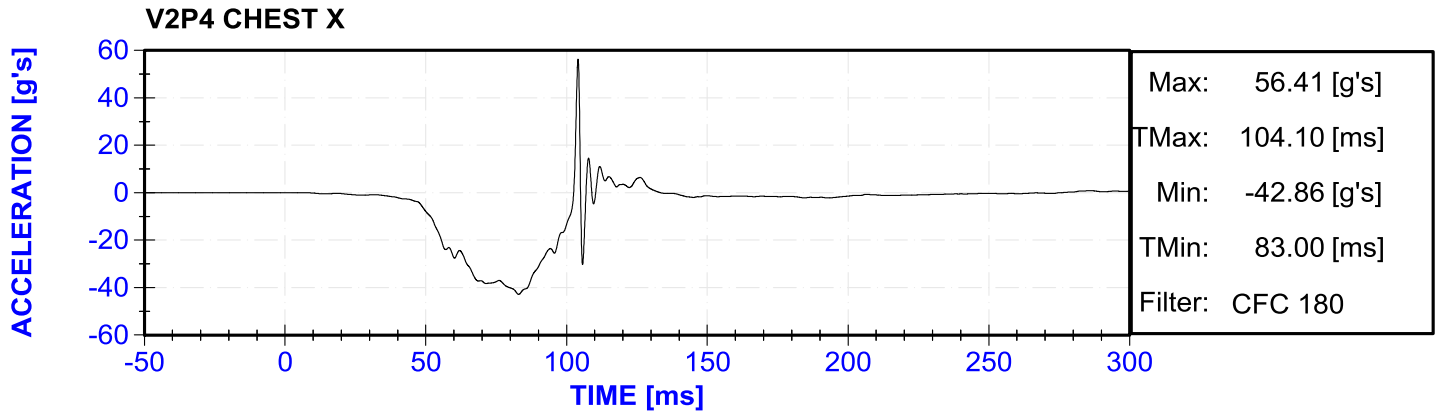


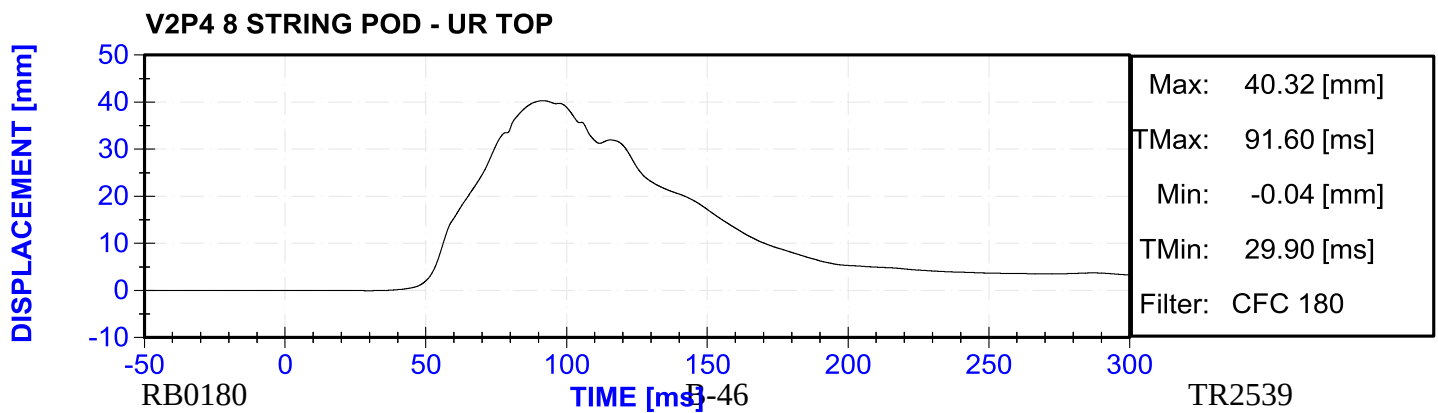
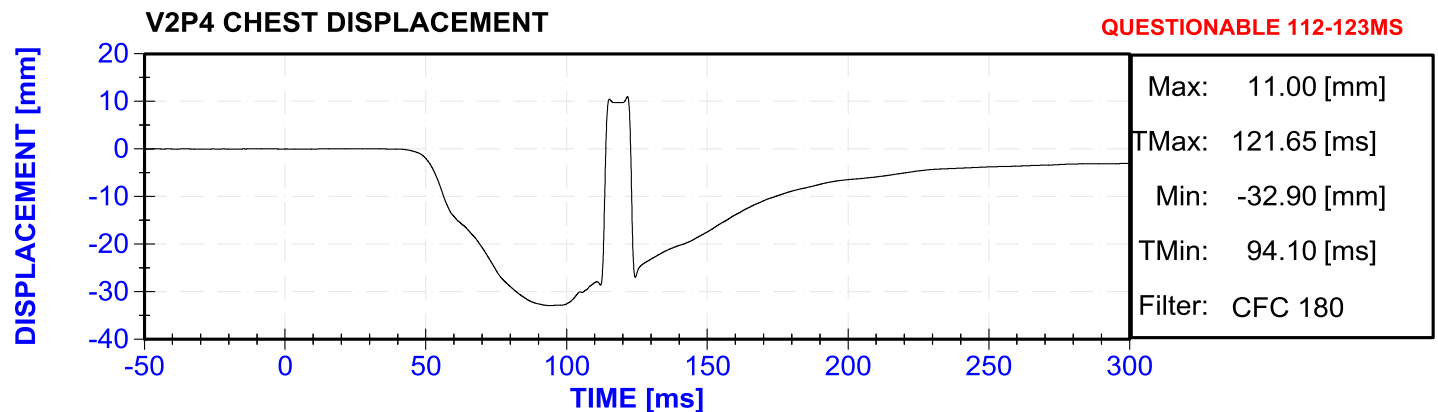
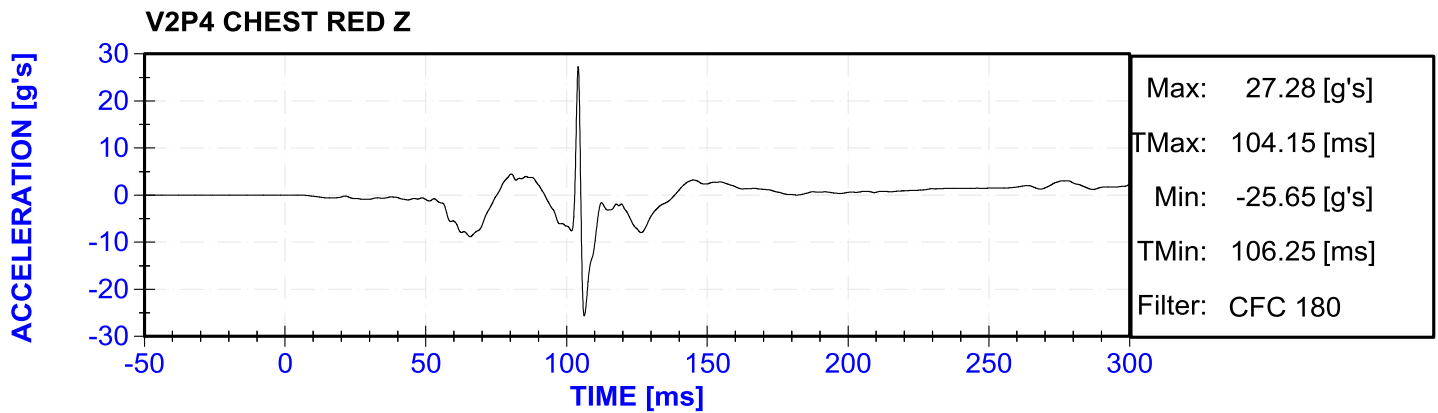
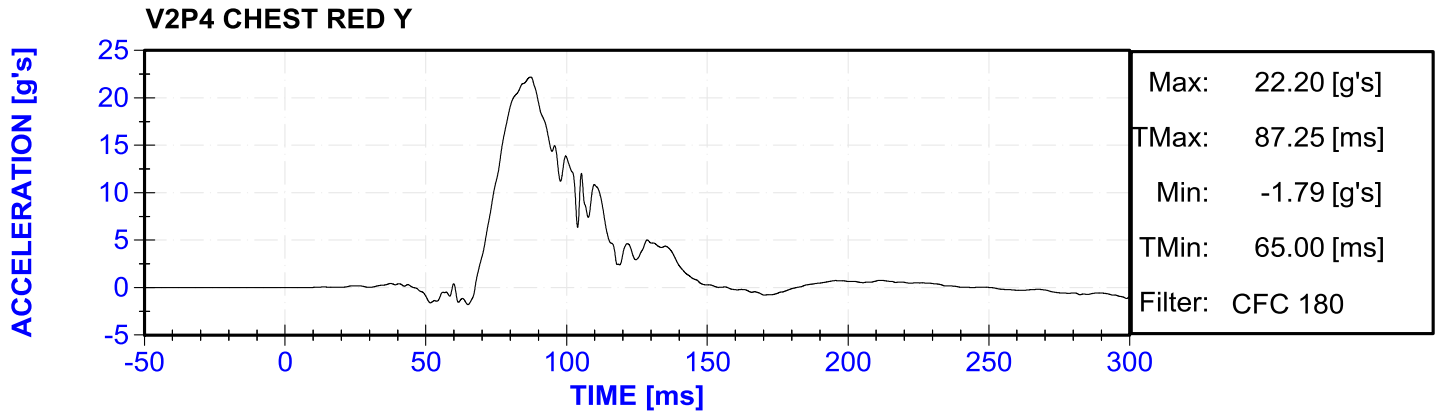






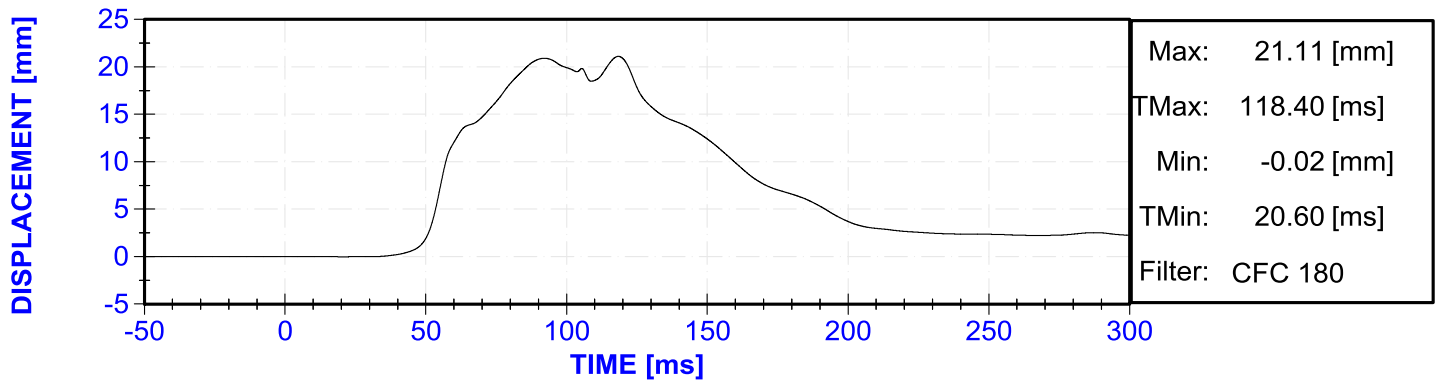




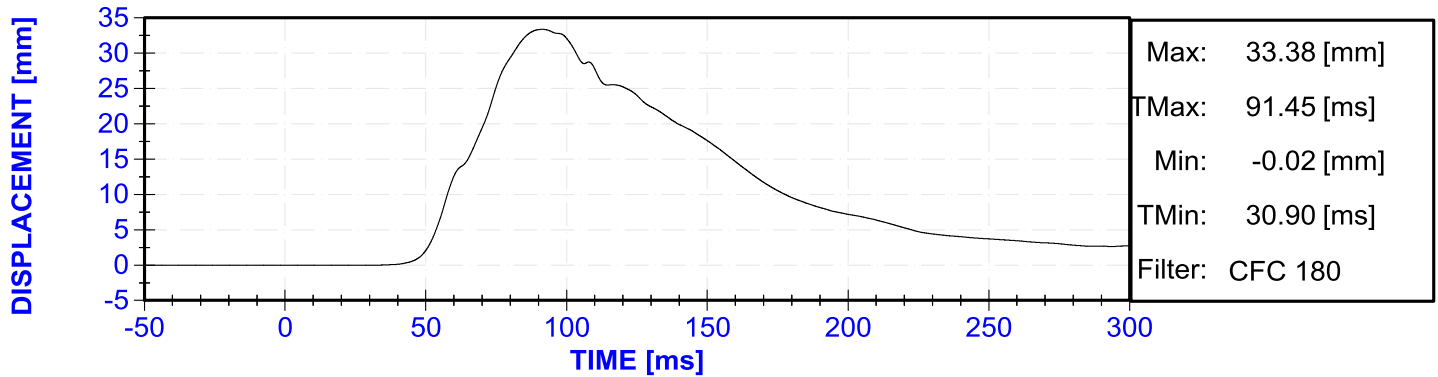




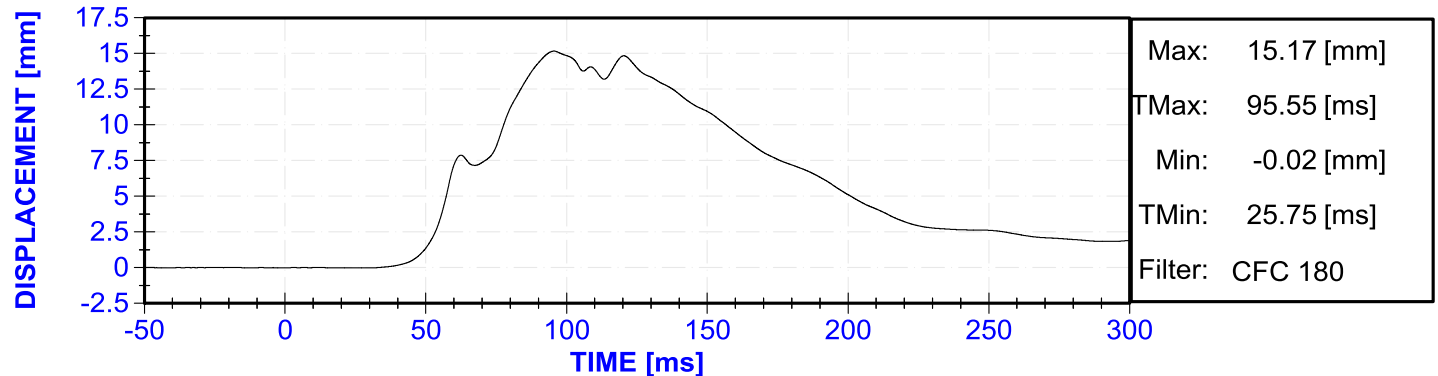
V2P4 8 STRING POD - UR MID



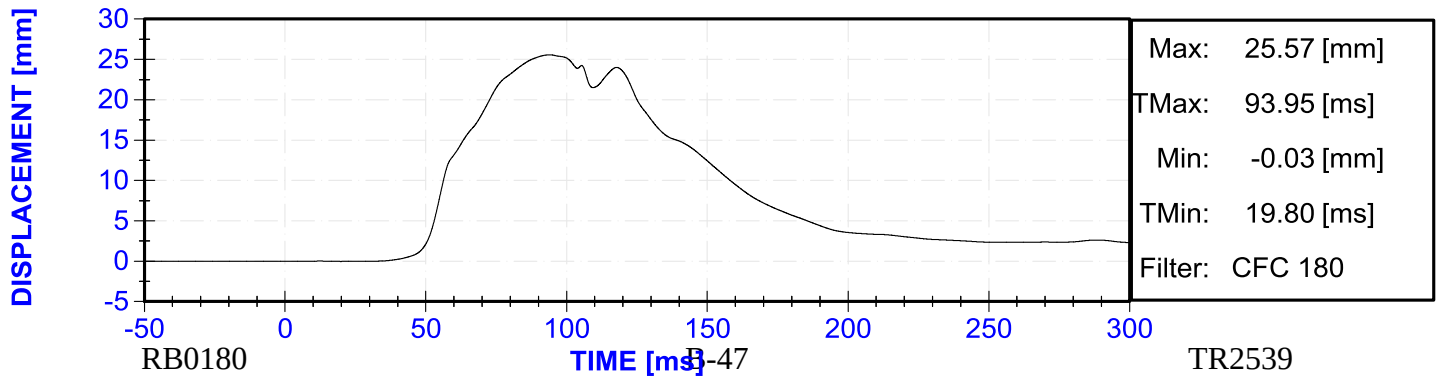
V2P4 8 STRING POD - LR MID



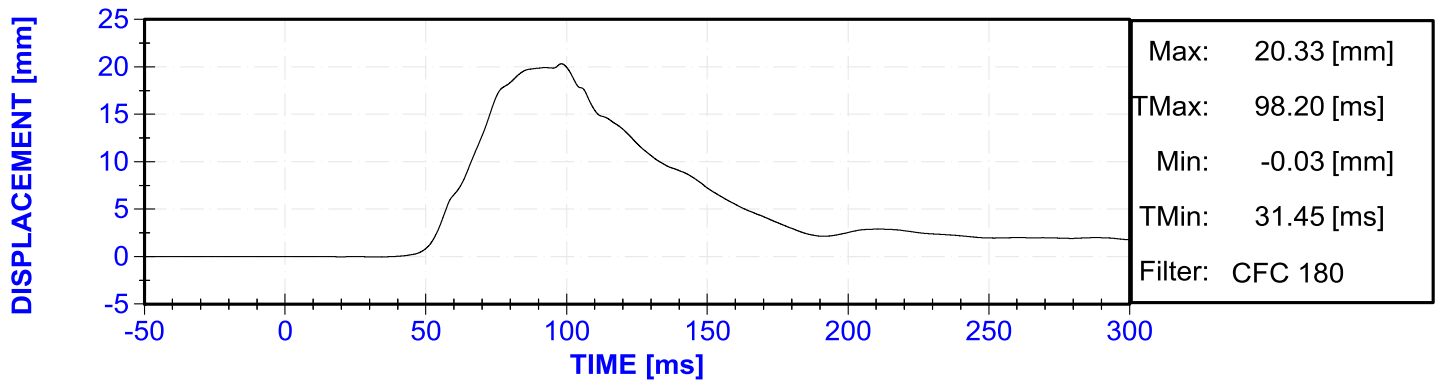
V2P4 8 STRING POD - LR BOTTOM



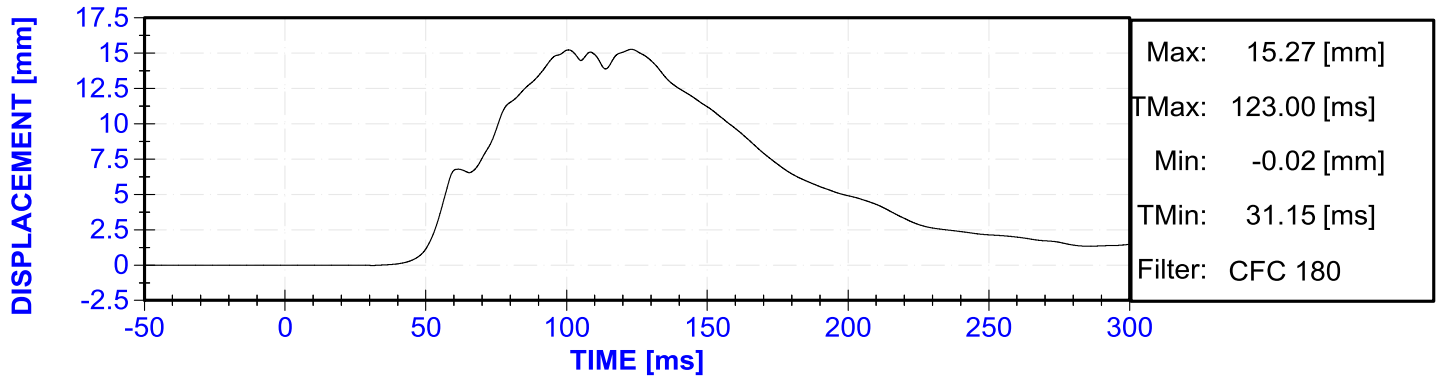
V2P4 8 STRING POD - UL TOP



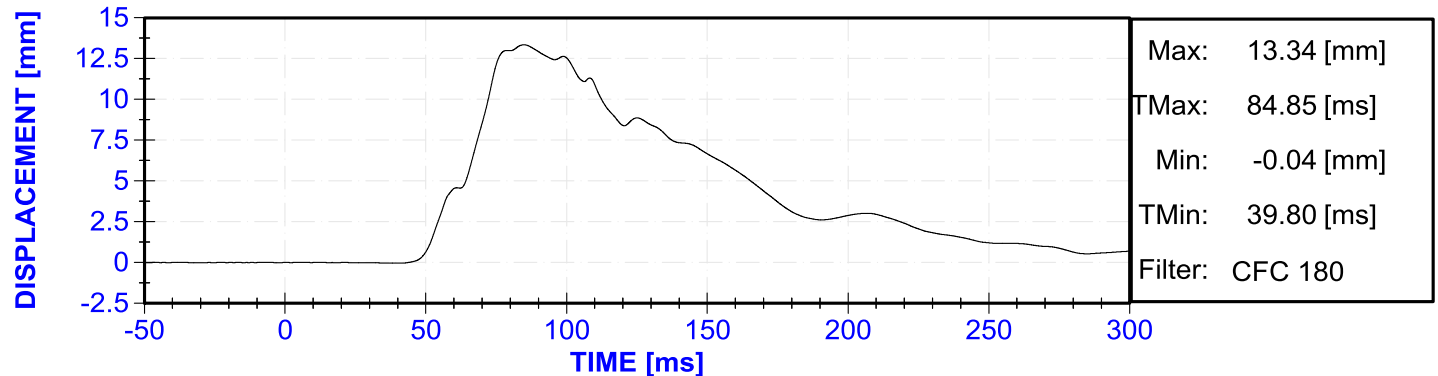
V2P4 8 STRING POD - UL MID



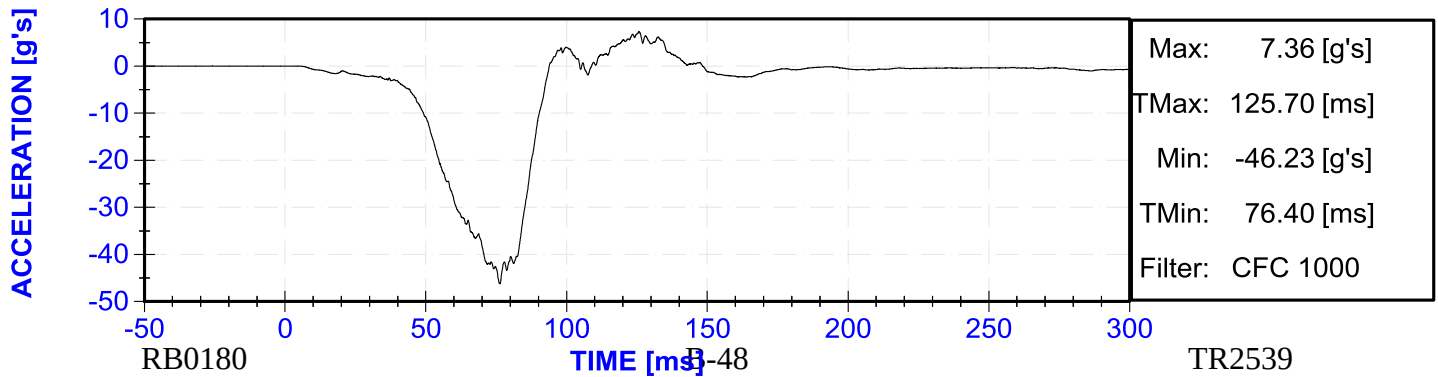
V2P4 8 STRING POD - LL MID

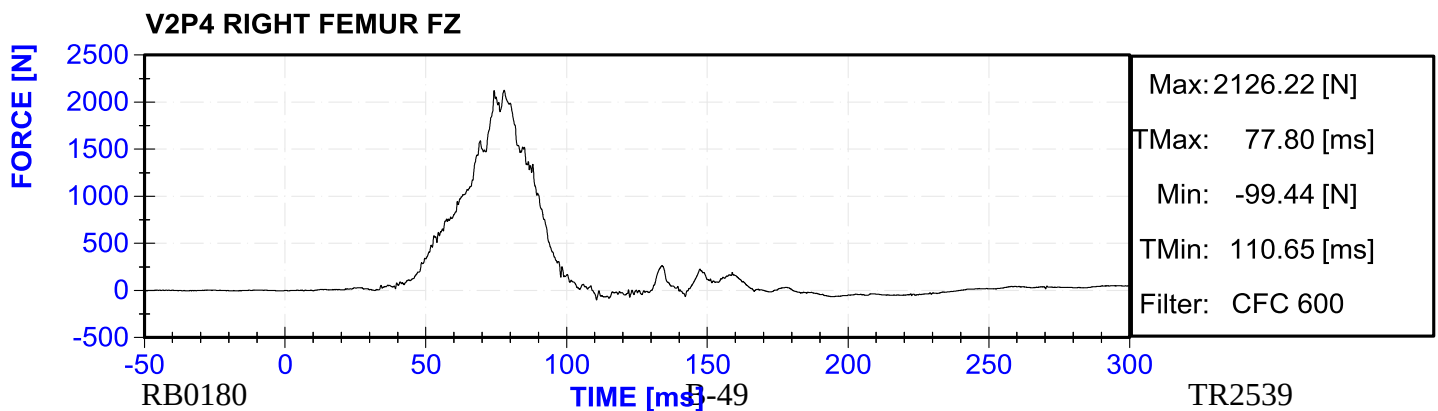
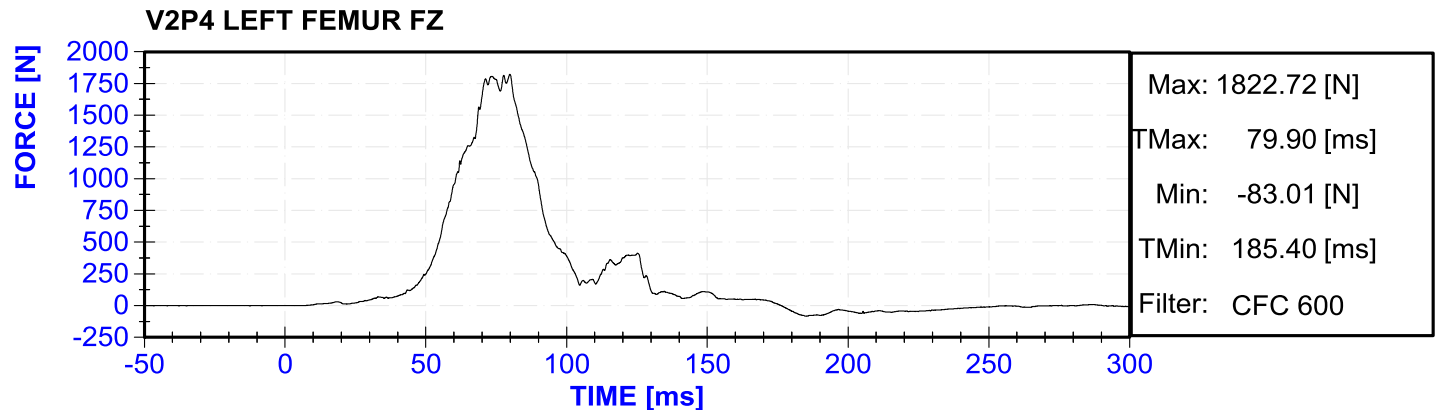
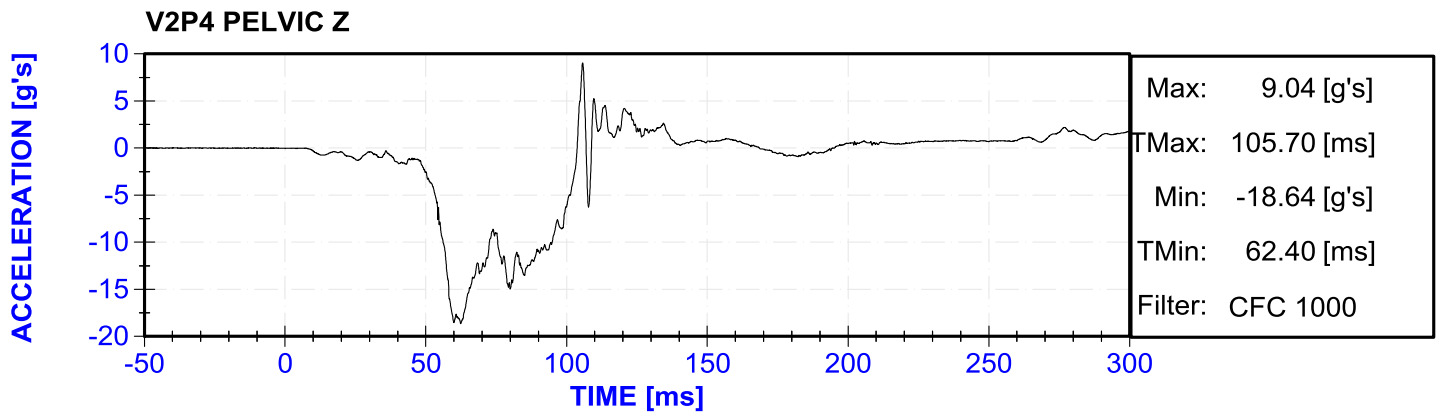
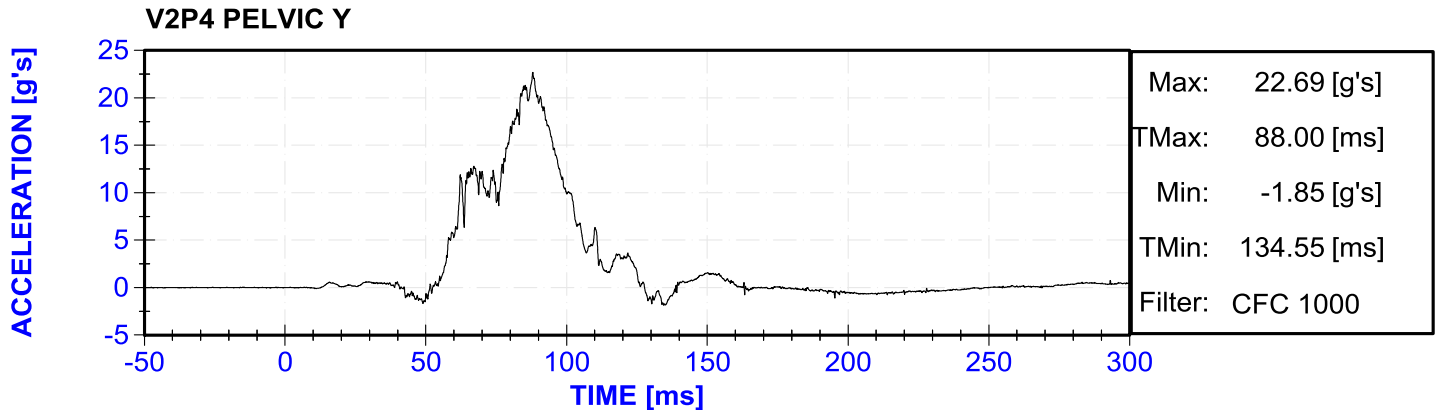


V2P4 8 STRING POD - LL BOTTOM

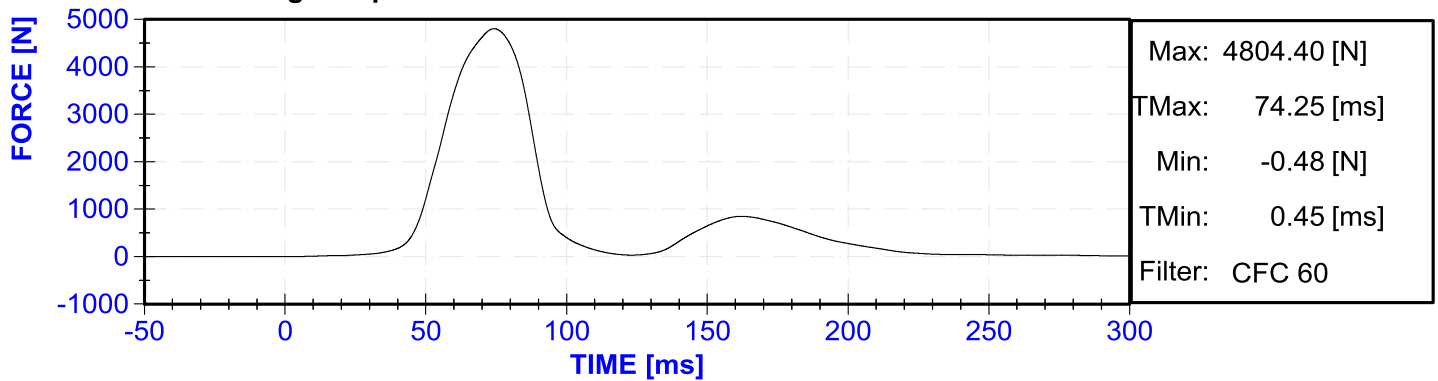


V2P4 PELVIC X

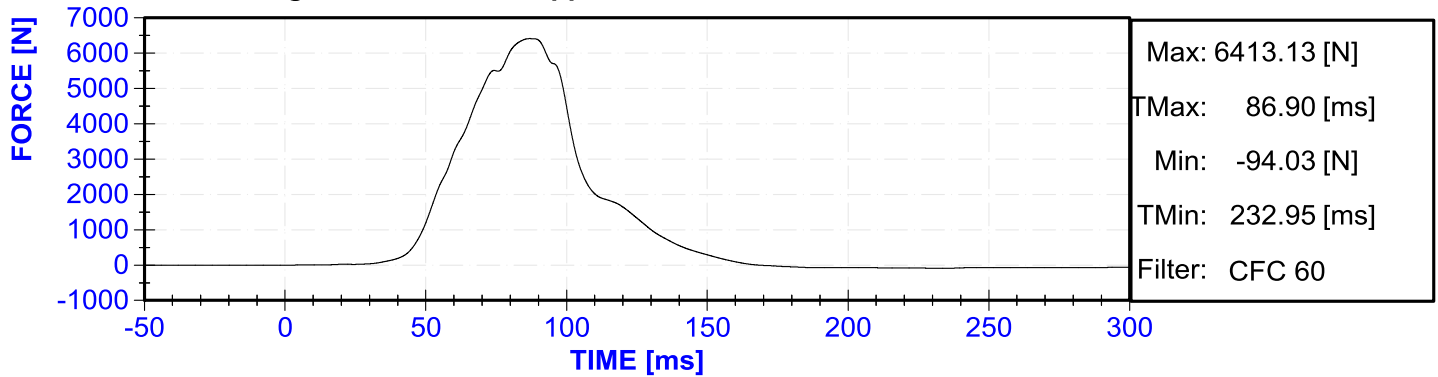




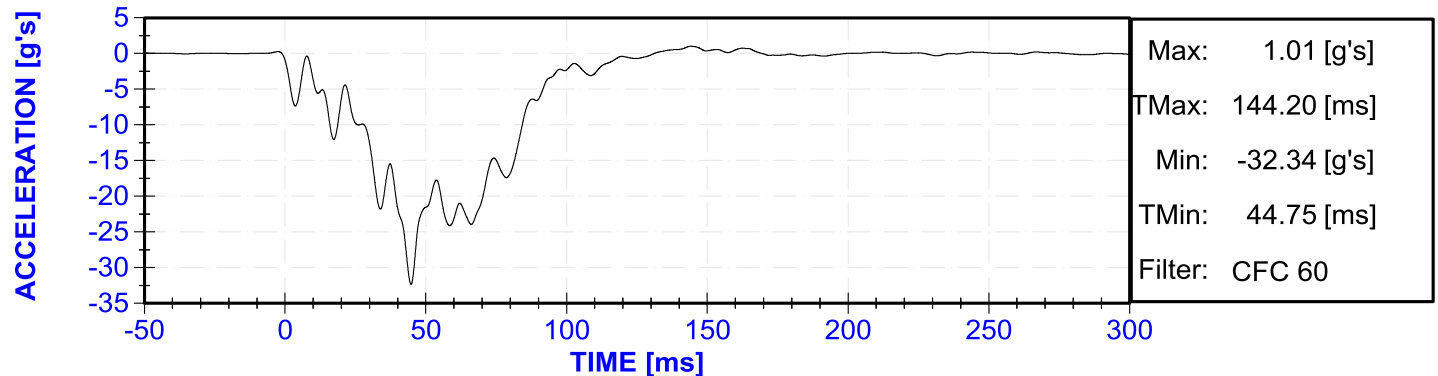
V2 Passenger Lap Belt Force



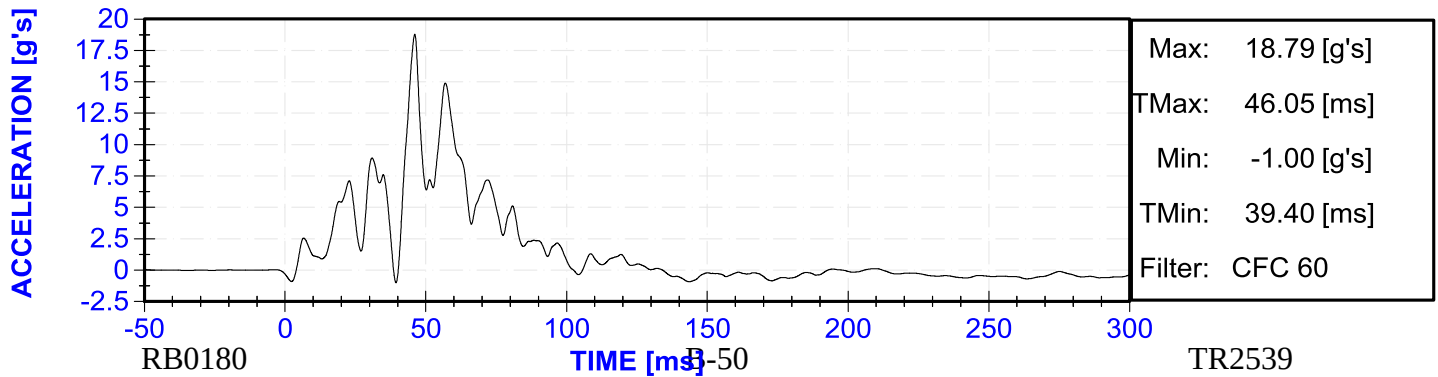
V2 Passenger Shoulder Belt Upper Force



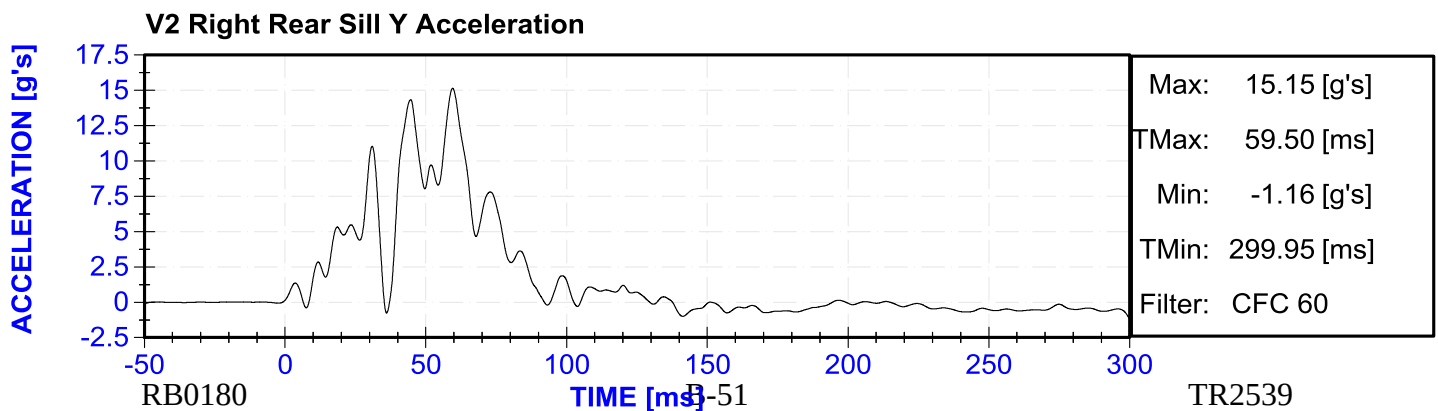
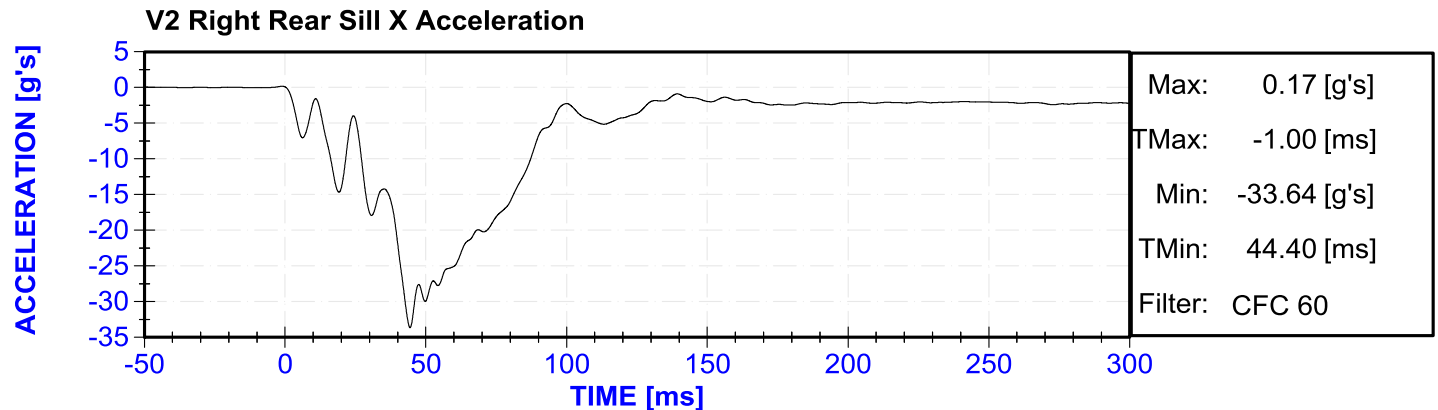
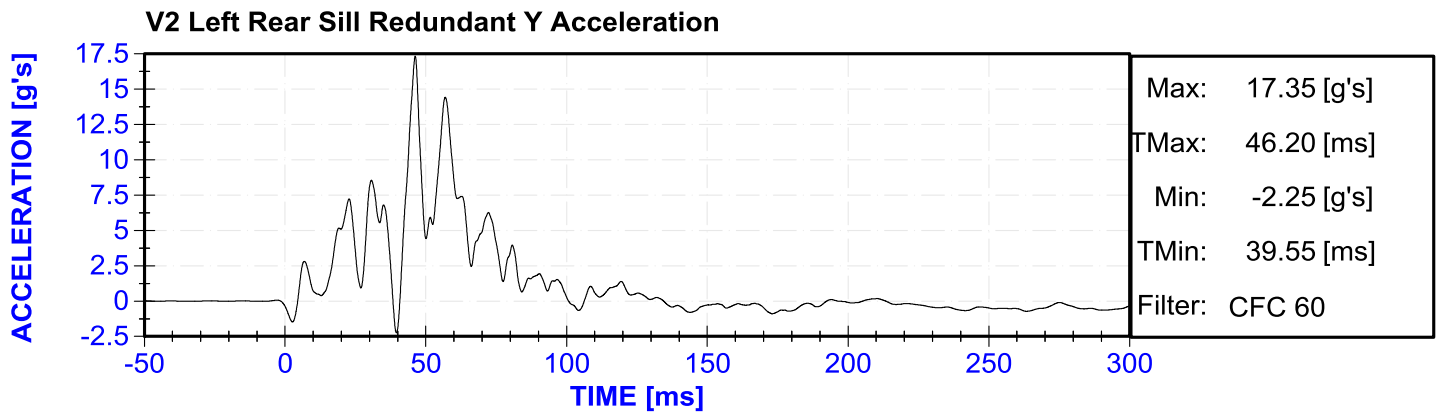
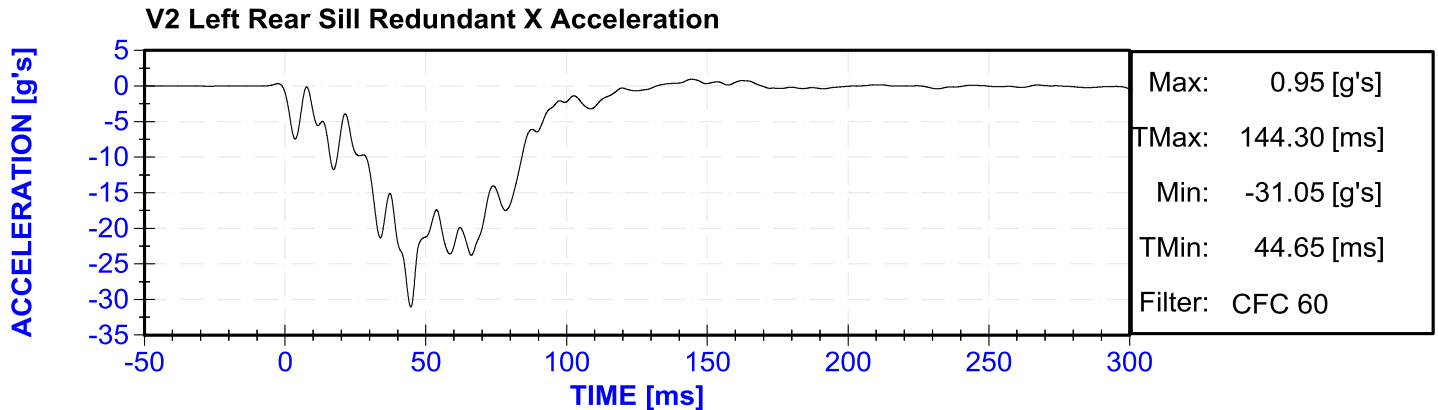
V2 Left Rear Sill X Acceleration

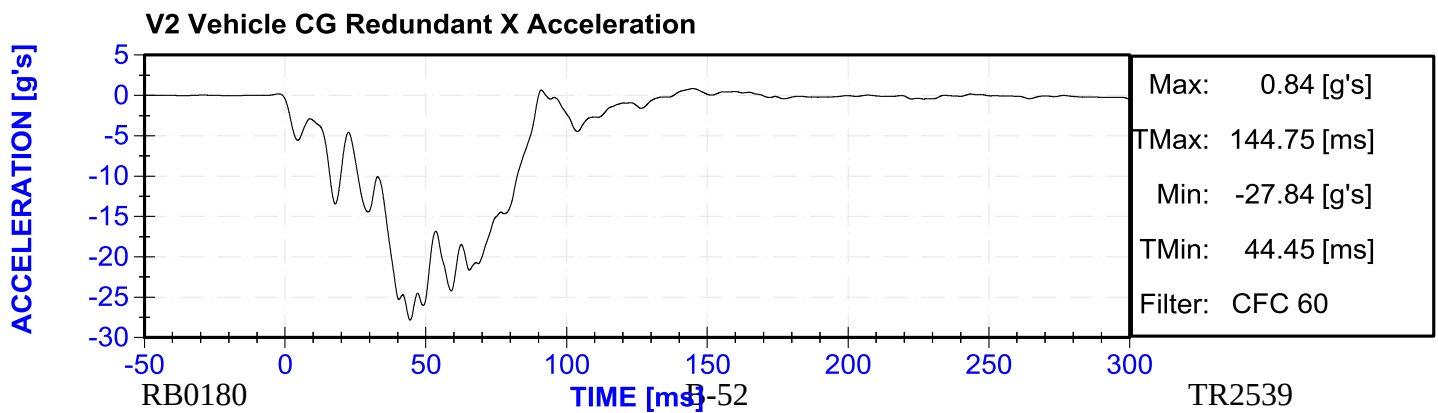
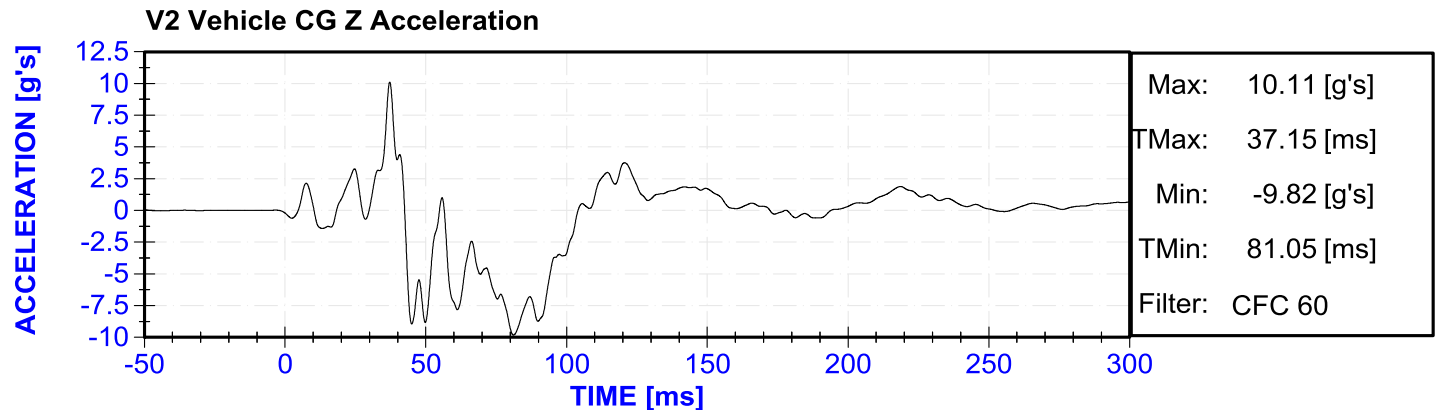
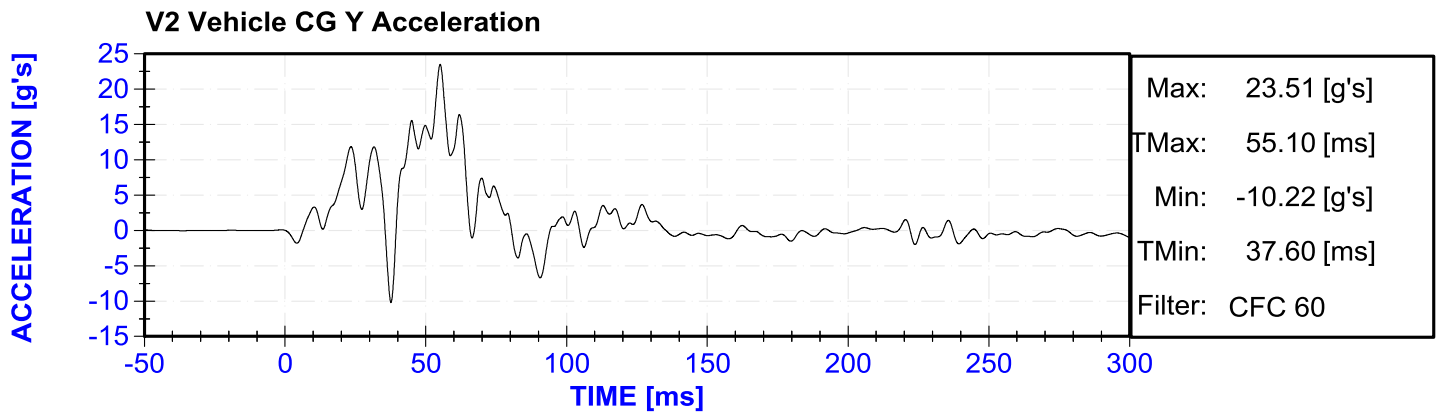
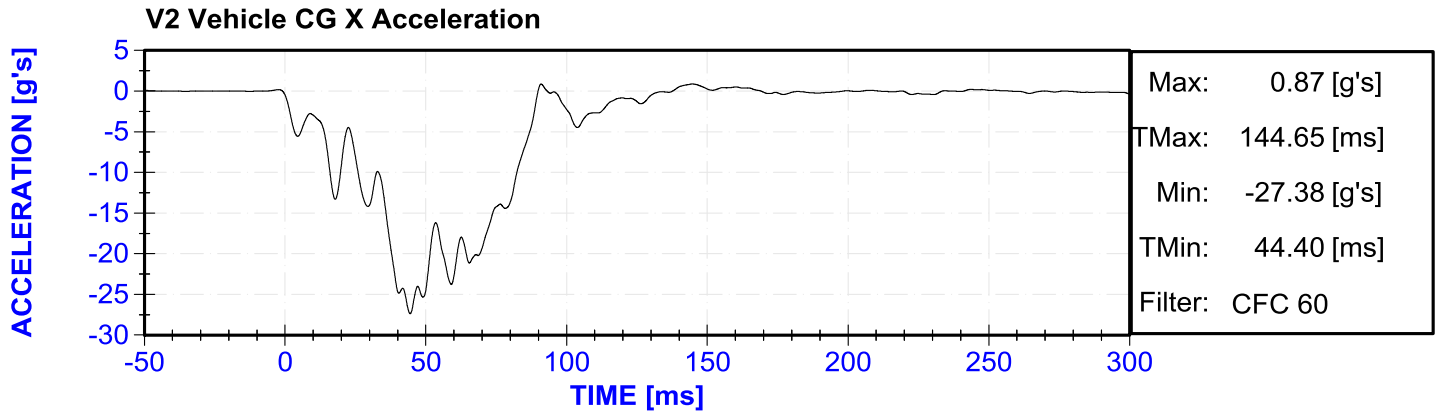


V2 Left Rear Sill Y Acceleration

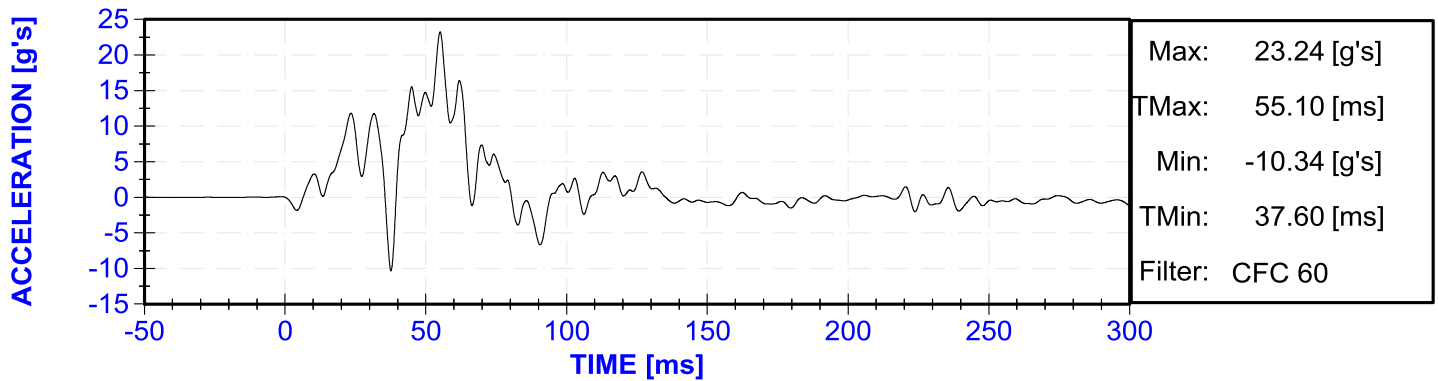




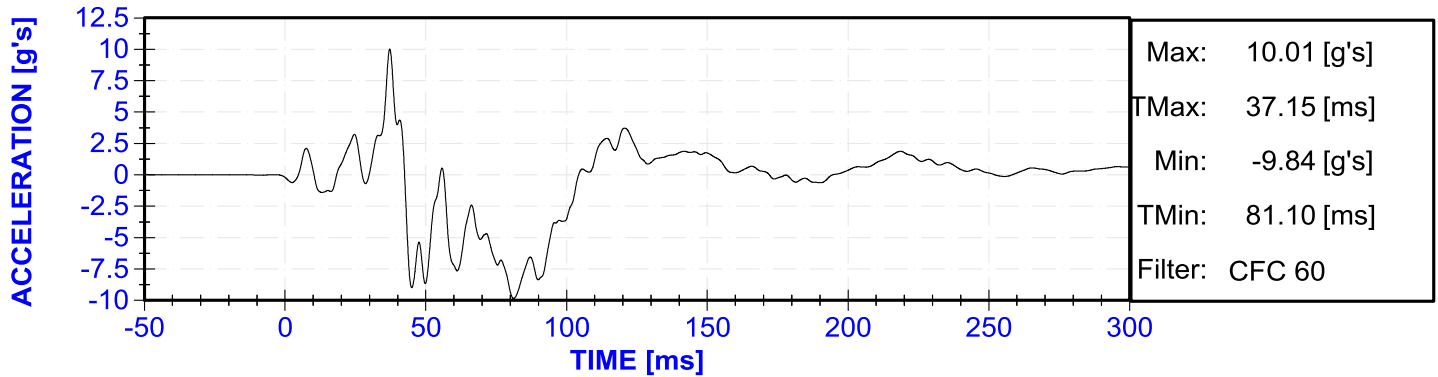




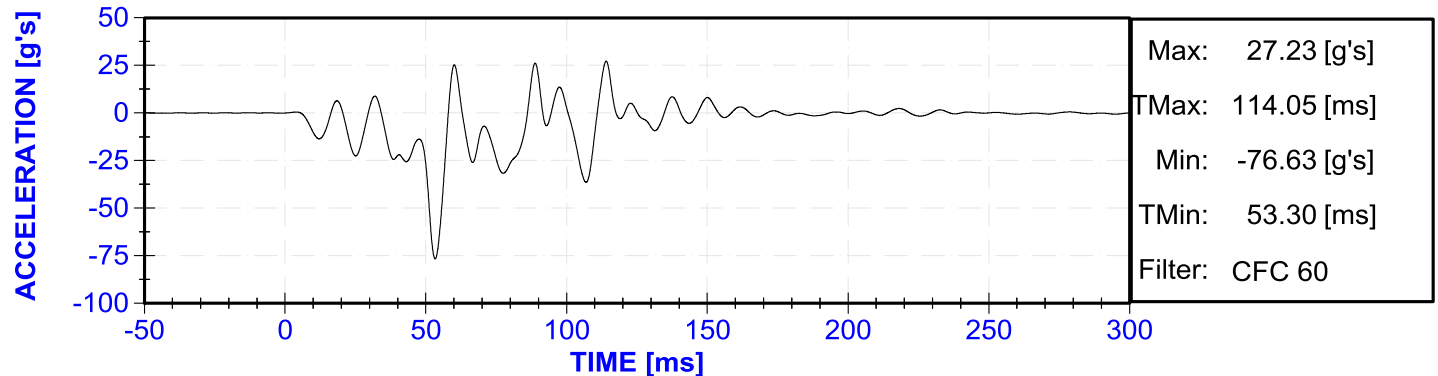
V2 Vehicle CG Redundant Y Acceleration



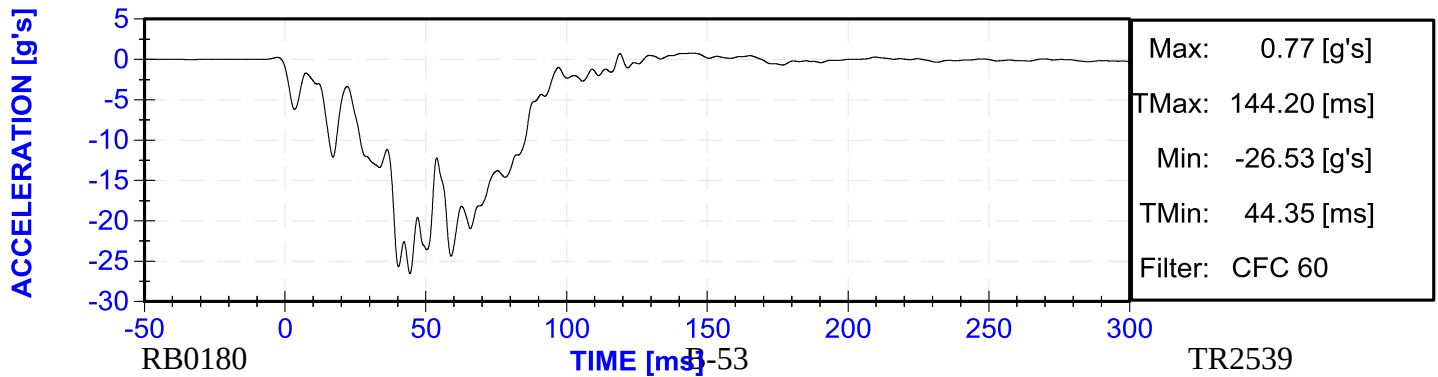
V2 Vehicle CG Redundant Z Acceleration



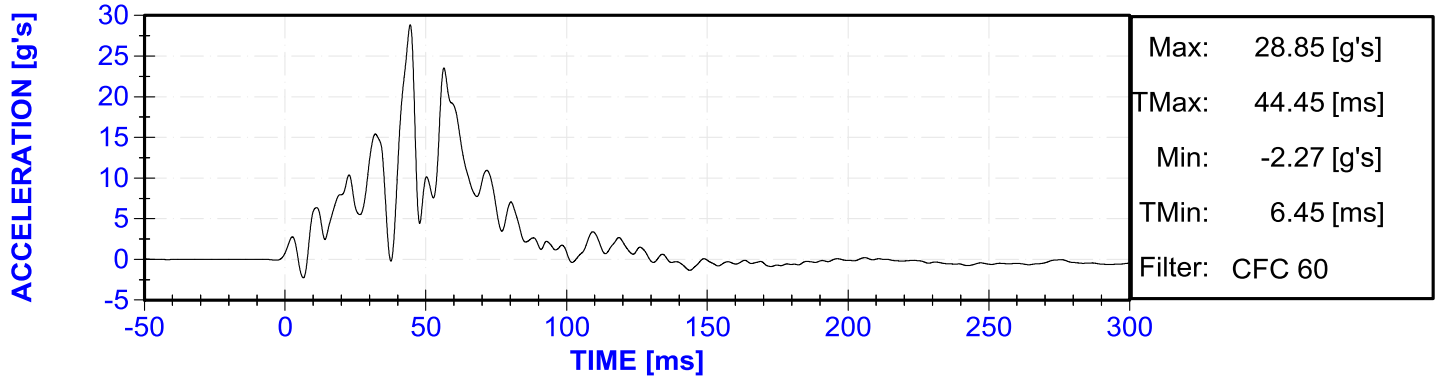
V2 Instrument Panel X Acceleration



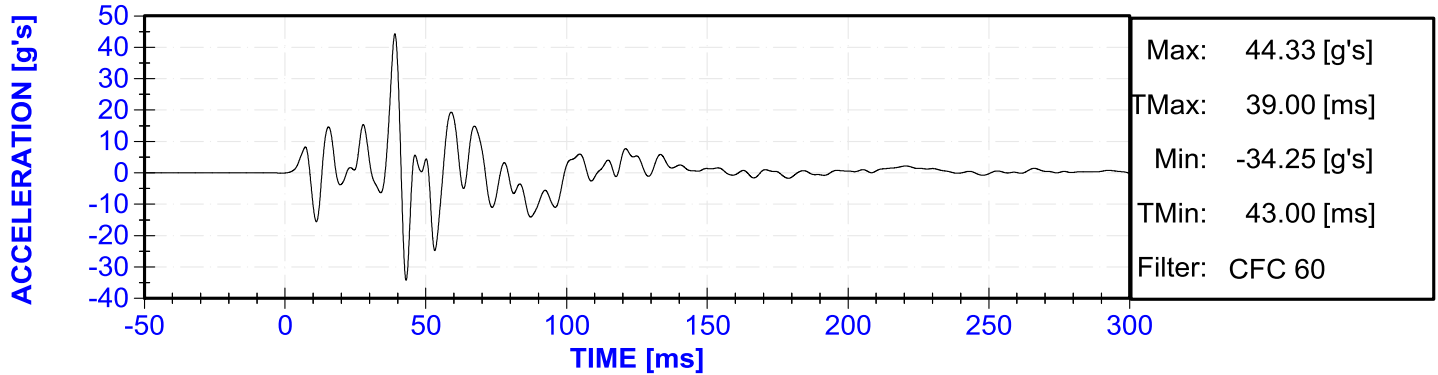
V2 Driver Seat Track X Acceleration



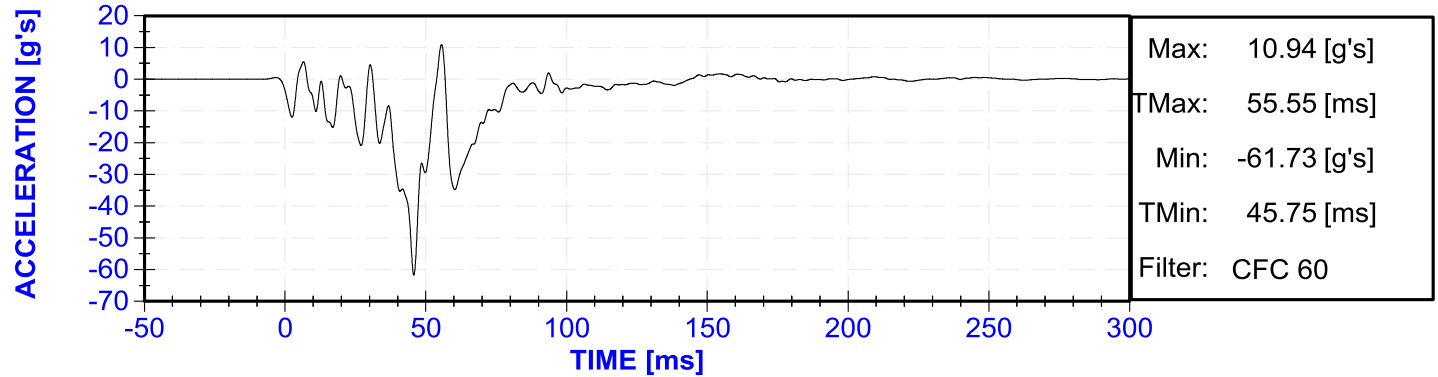
V2 Driver Seat Track Y Acceleration



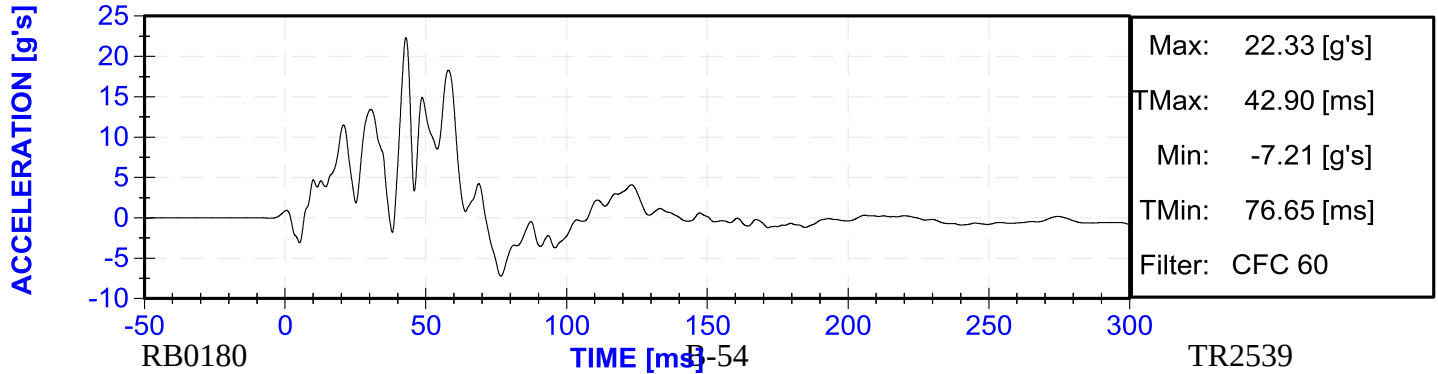
V2 Driver Seat Track Z Acceleration



V2 Driver Floor Pan X Acceleration

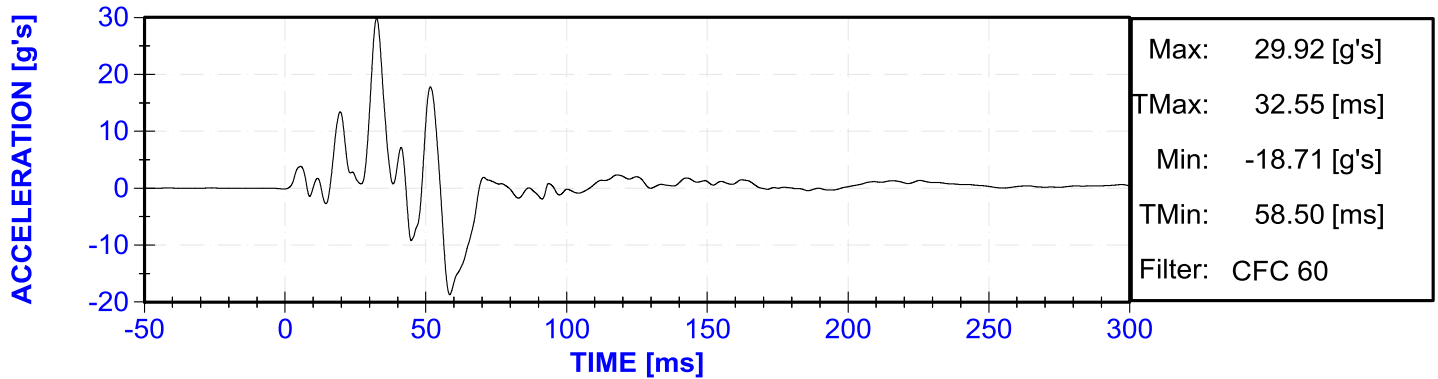


V2 Driver Floor Pan Y Acceleration

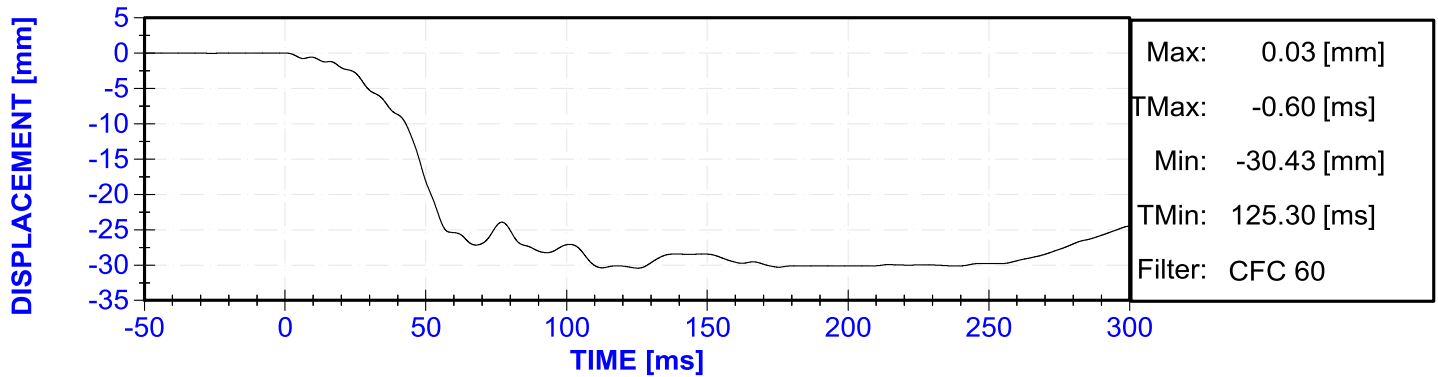




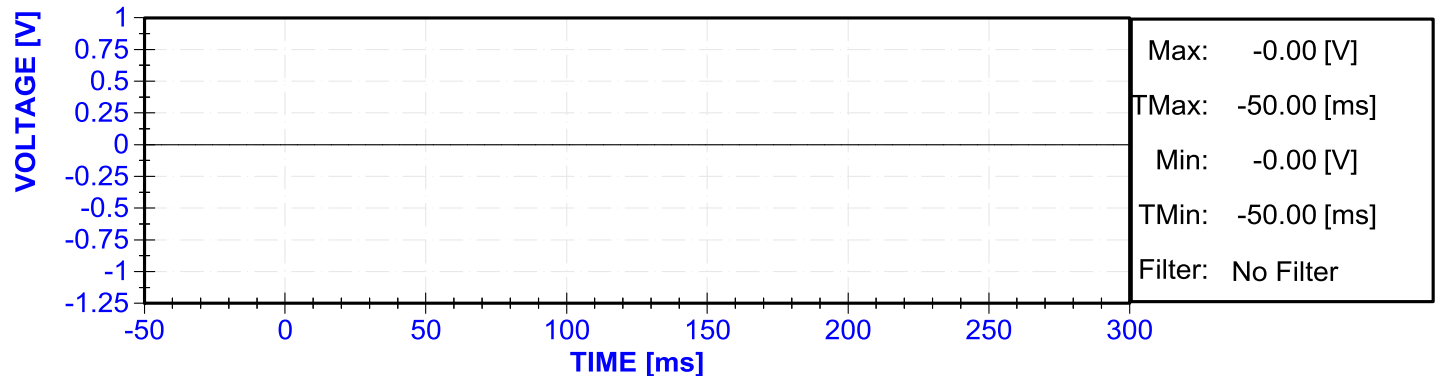
V2 Driver Floor Pan Z Acceleration



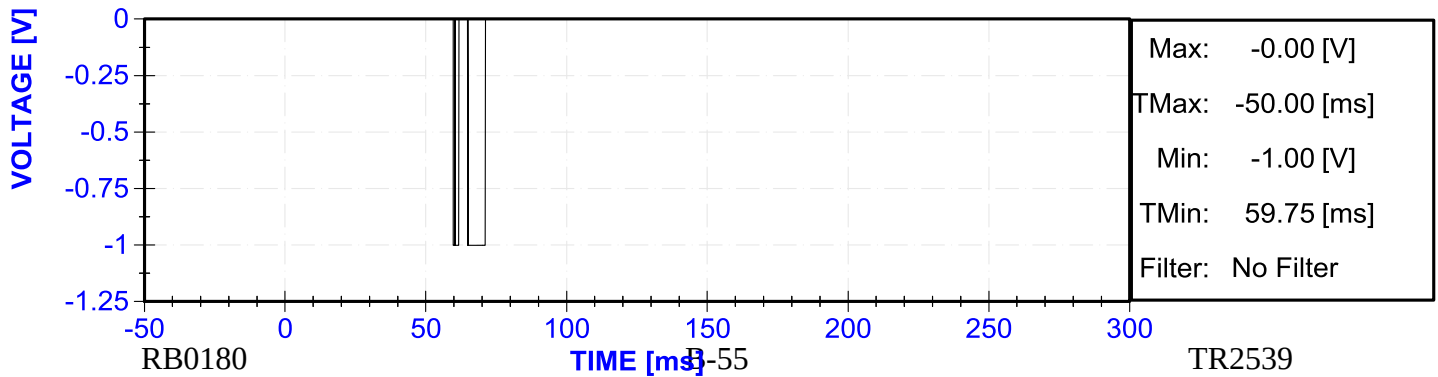
V2 Driver Floor Pan X Deflection

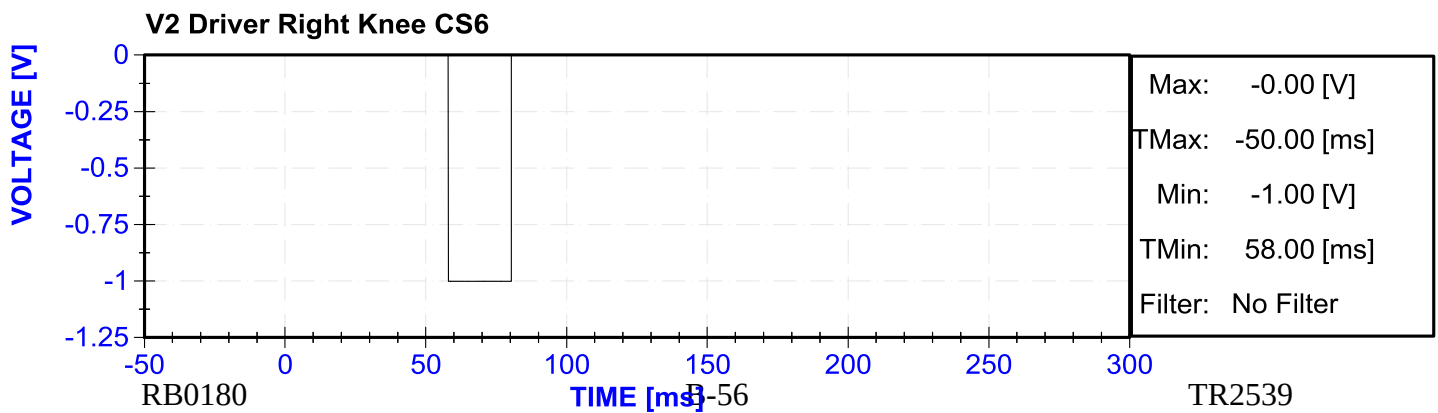
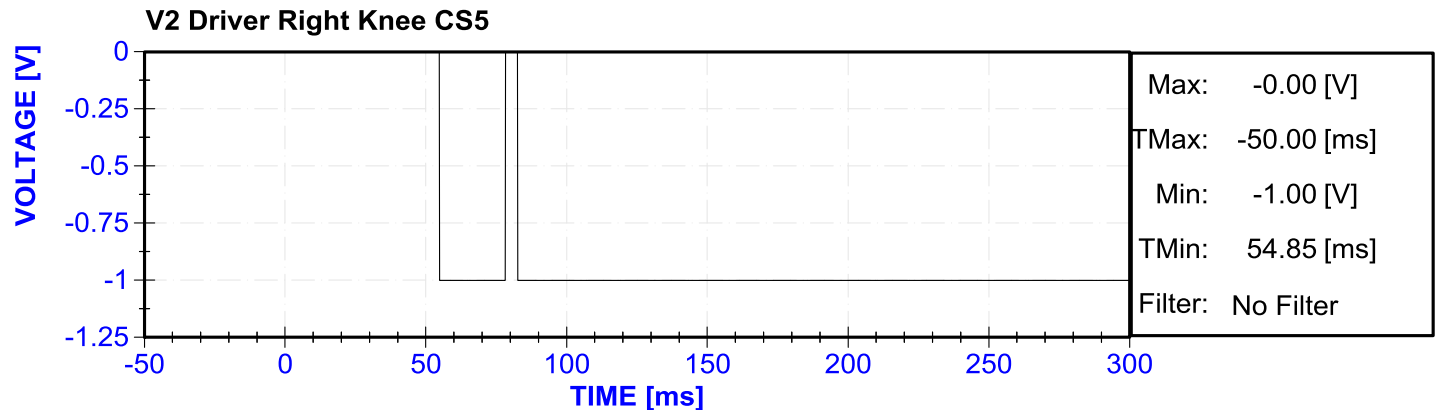
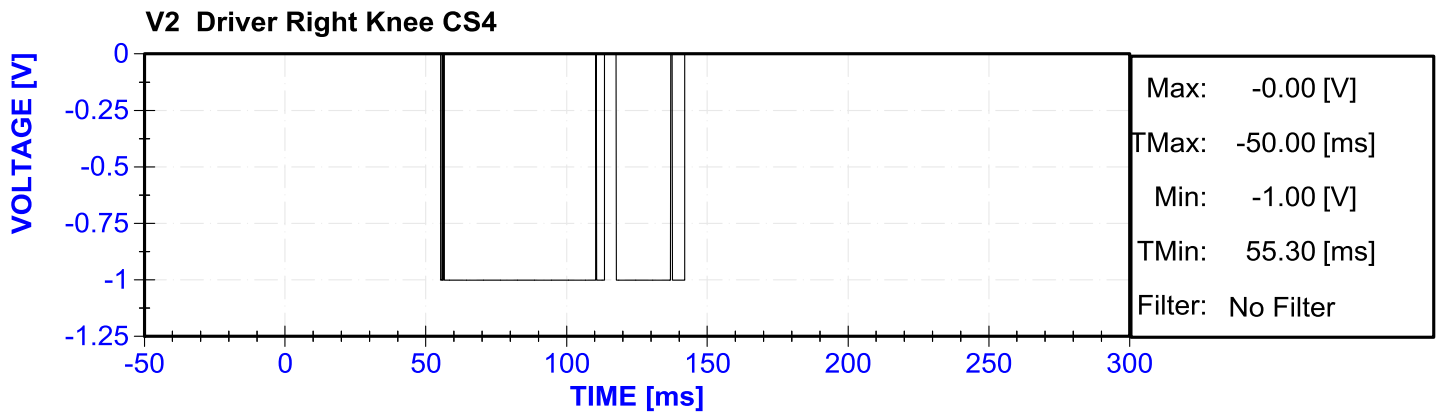
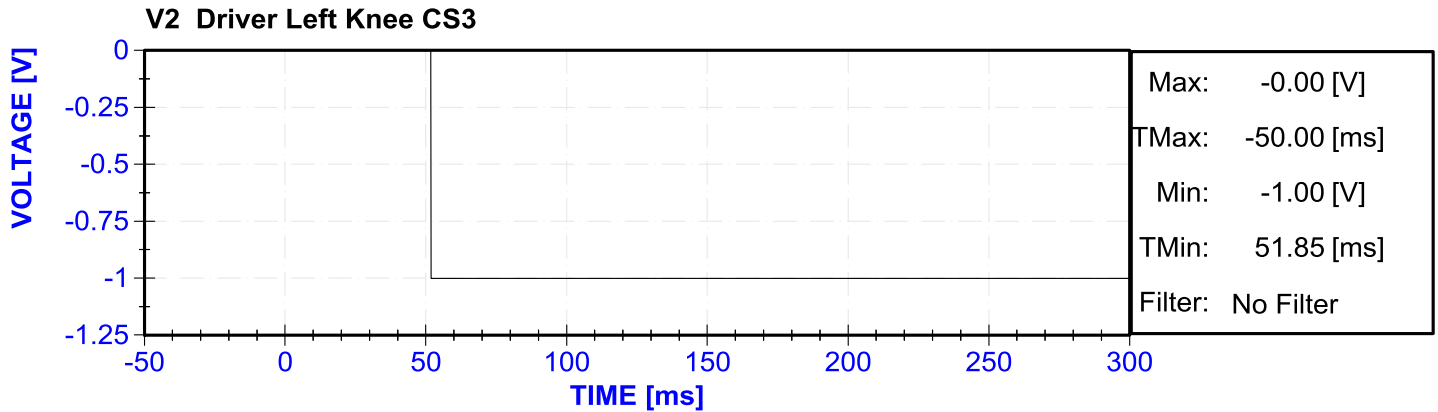


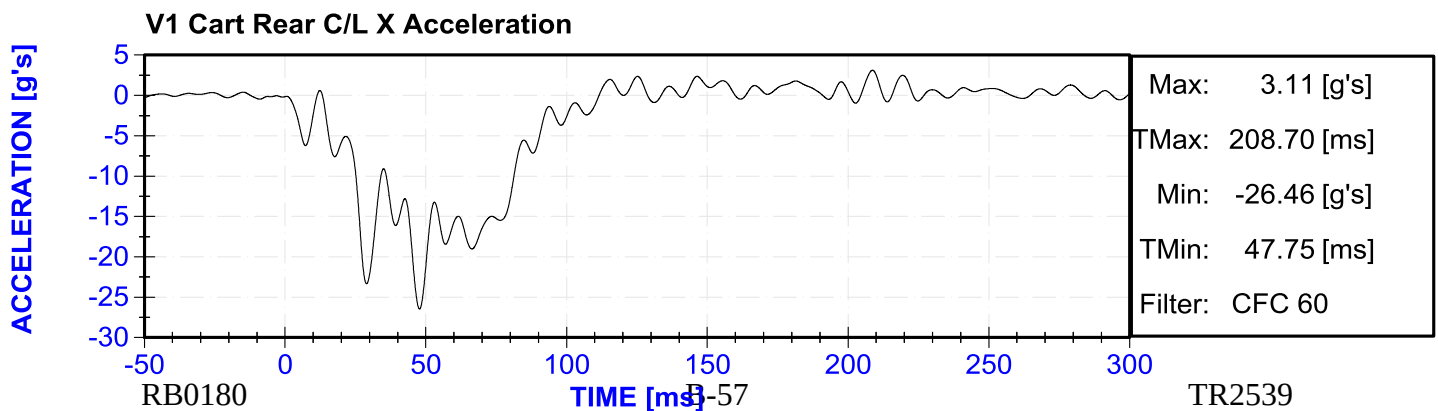
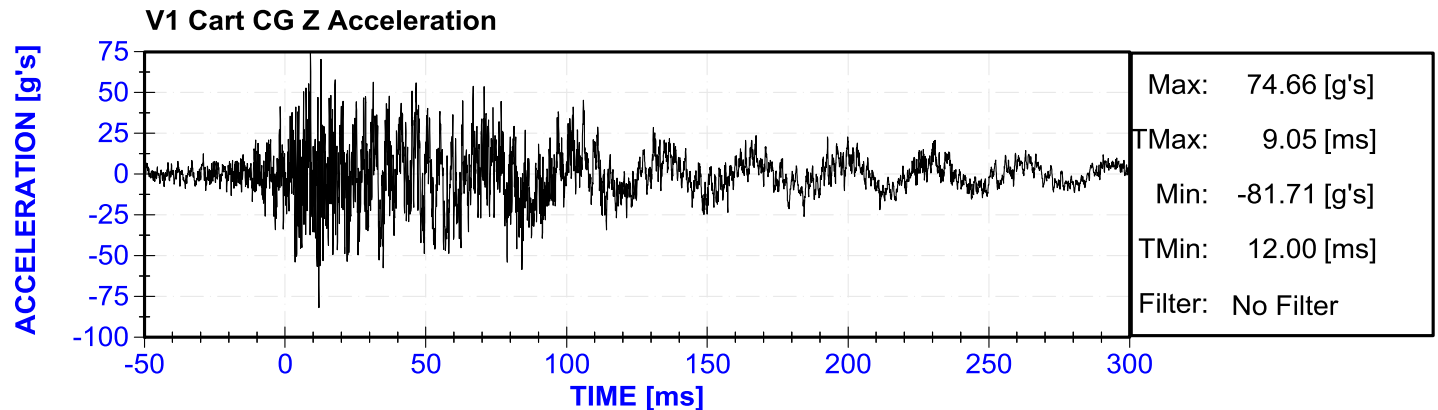
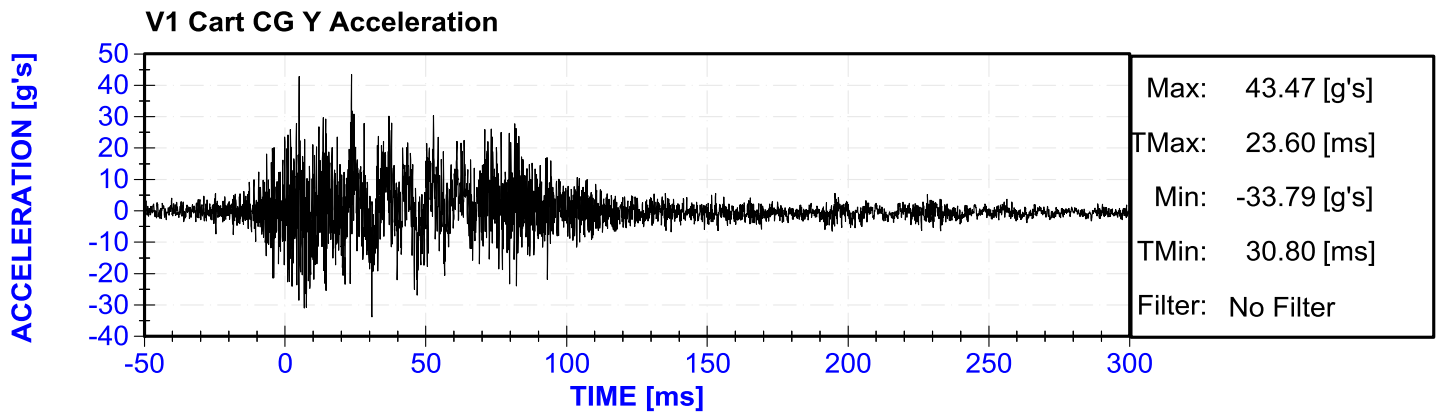
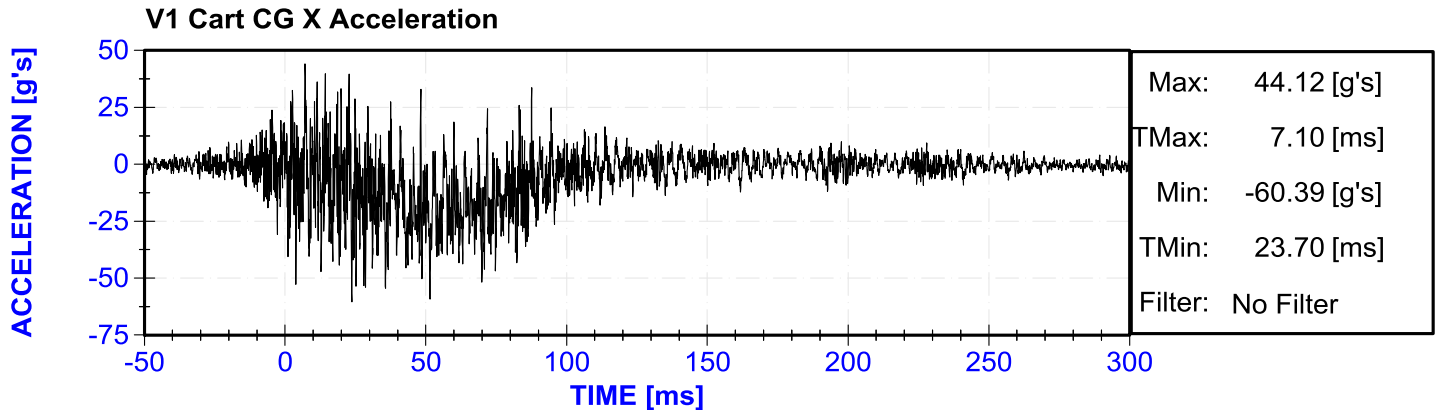
V2 Driver Left Knee CS1

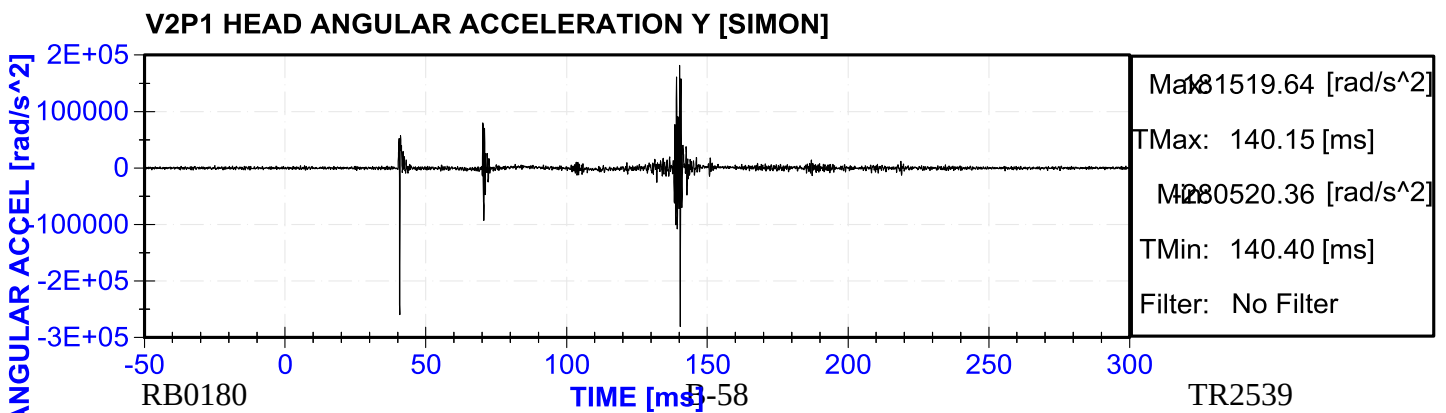
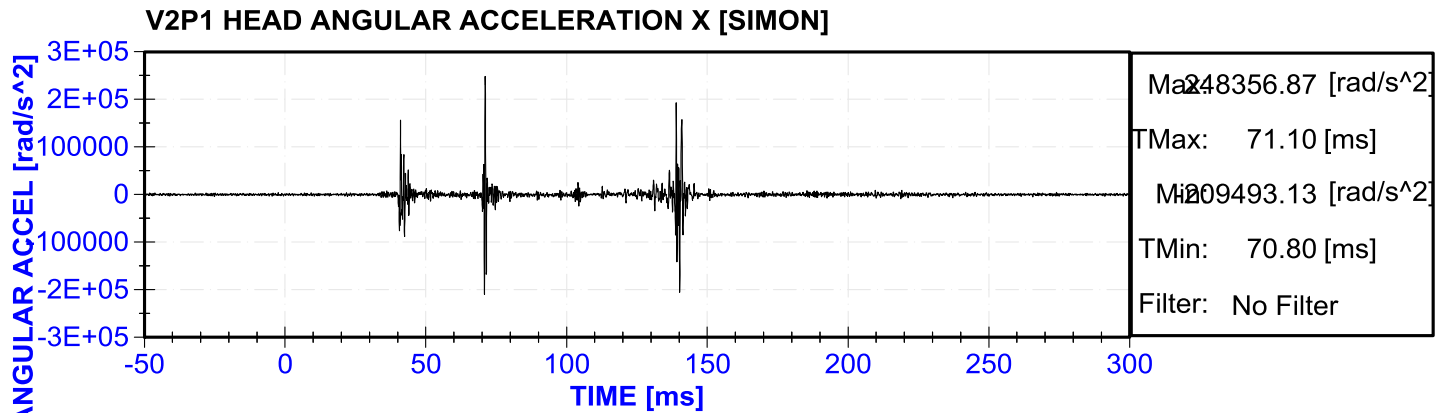
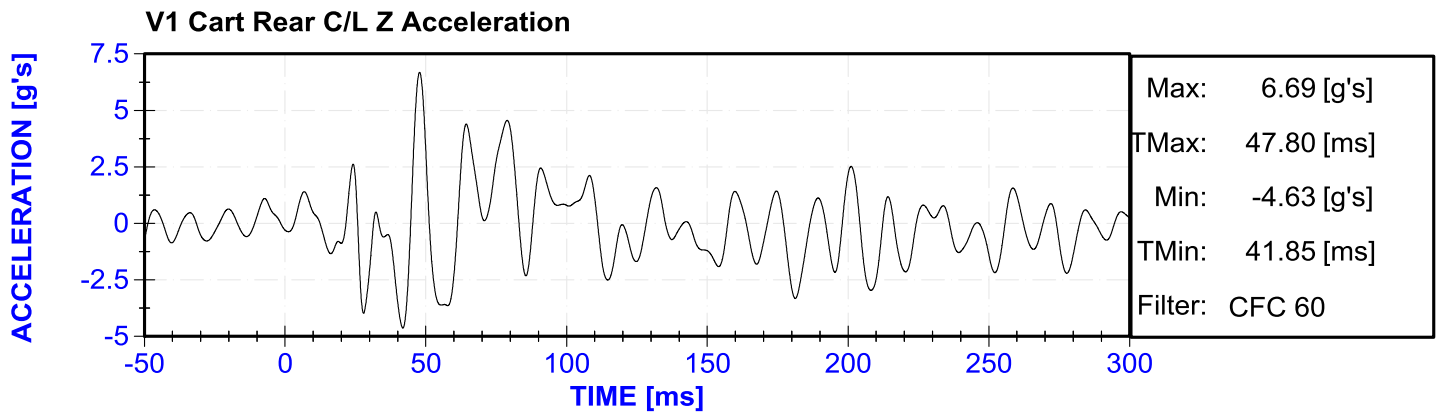
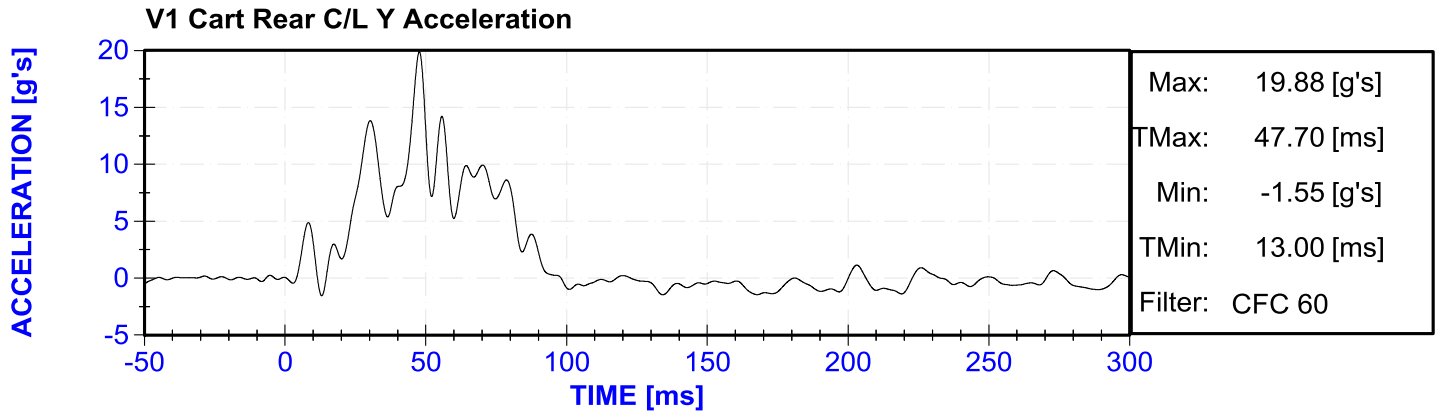


V2 Driver Left Knee CS2



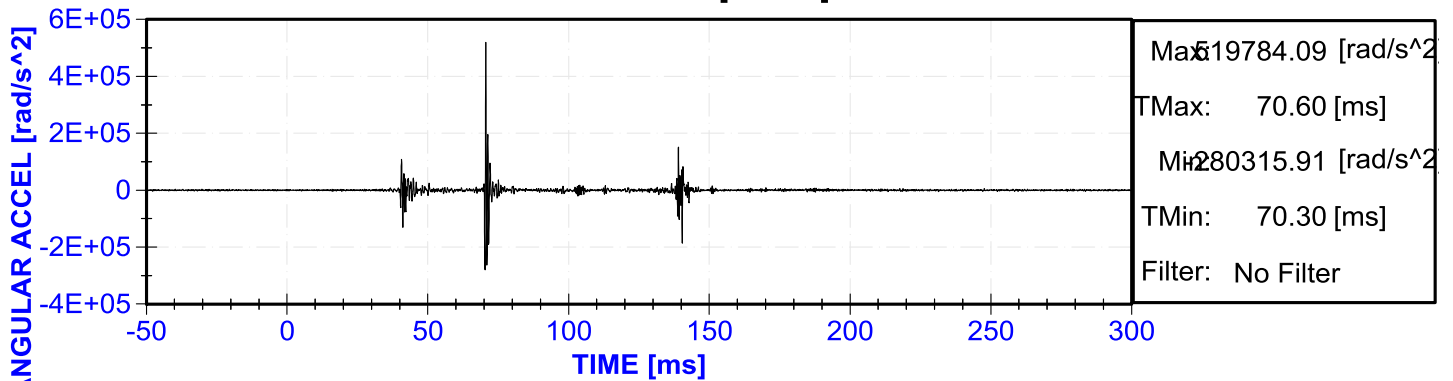




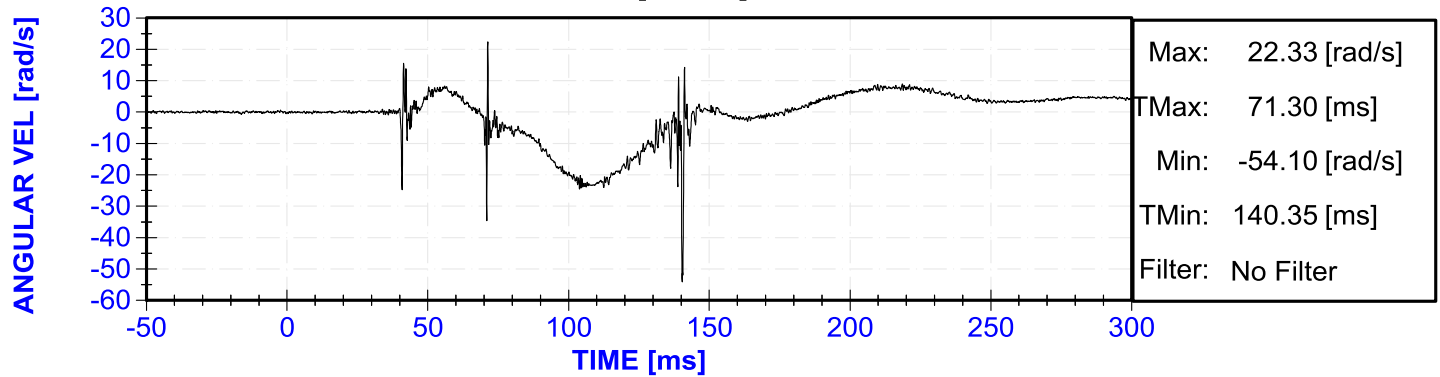




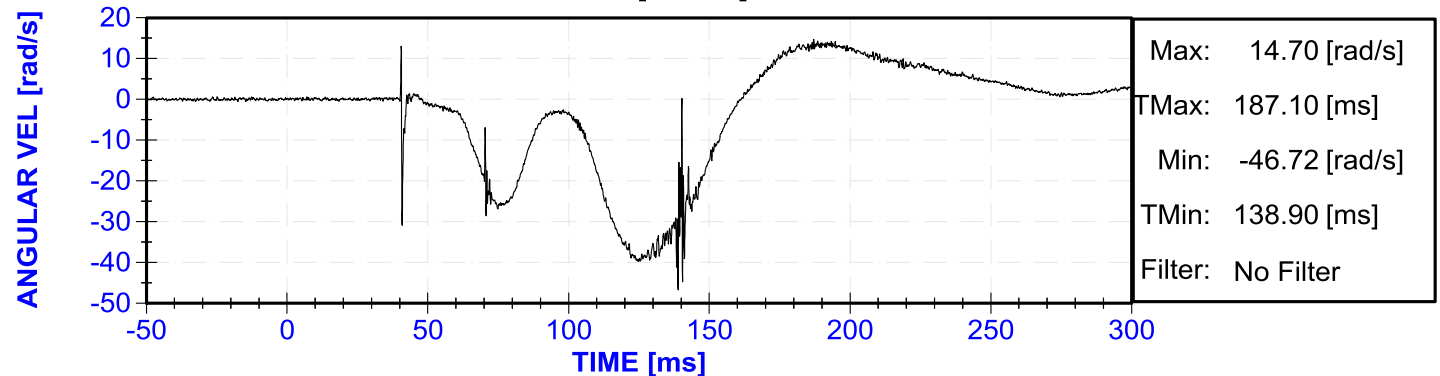
**V2P1 HEAD ANGULAR ACCELERATION Z [SIMON]**



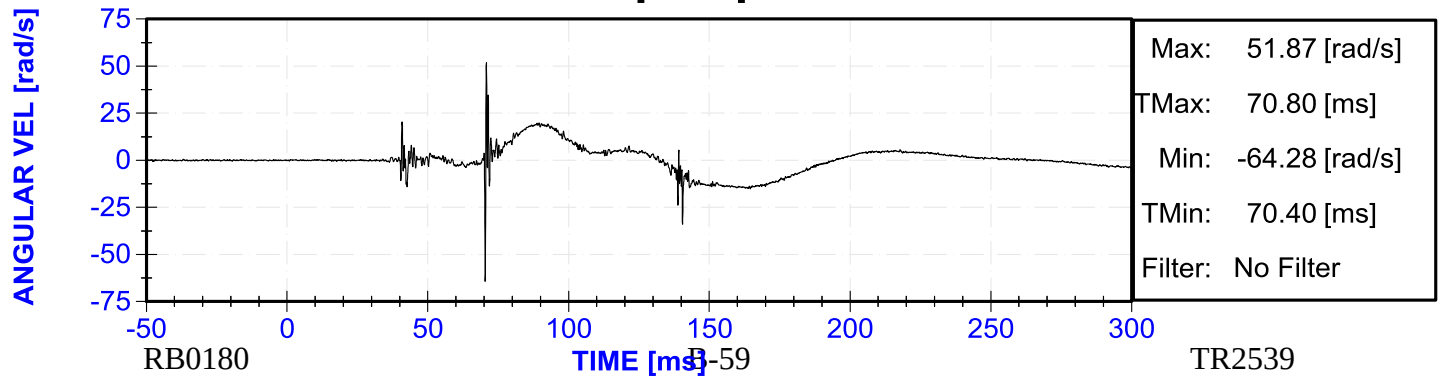
**V2P1 HEAD ANGULAR VELOCITY X [SIMON]**

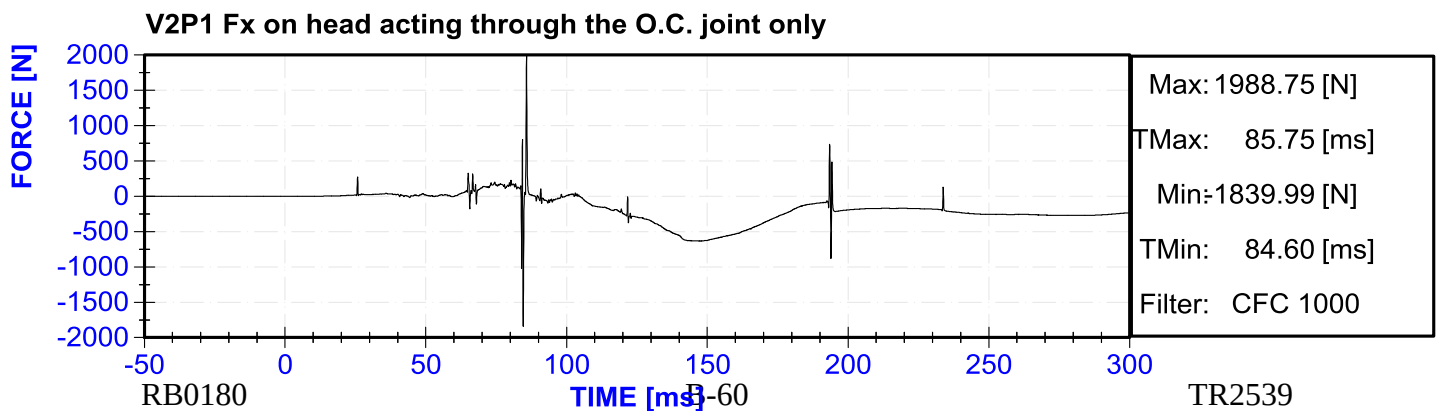
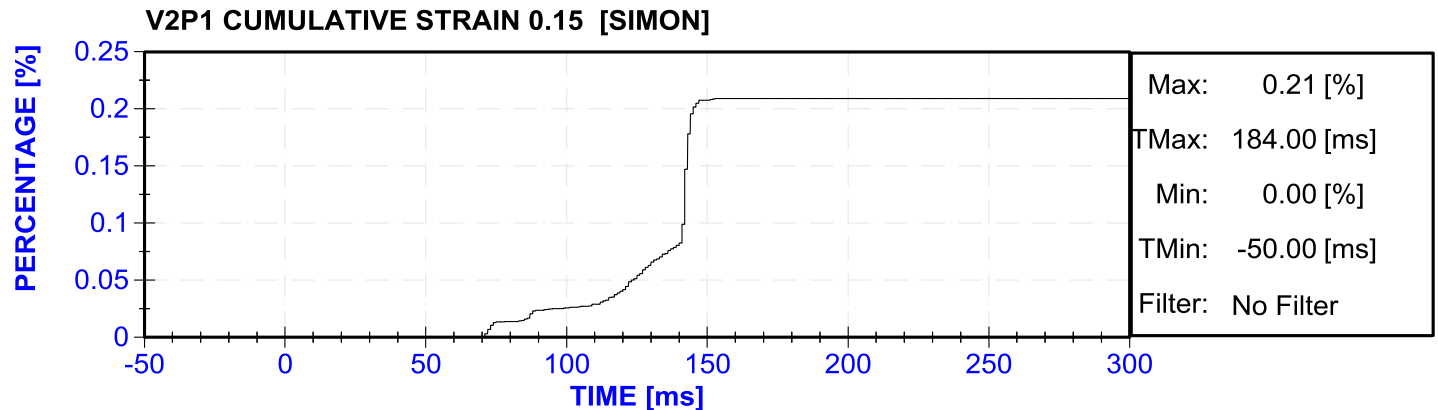
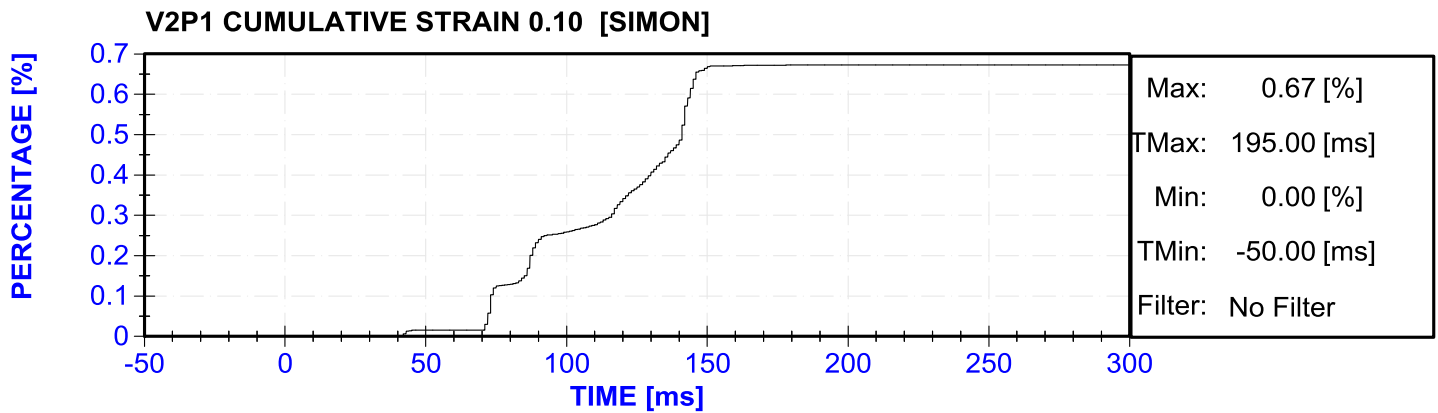
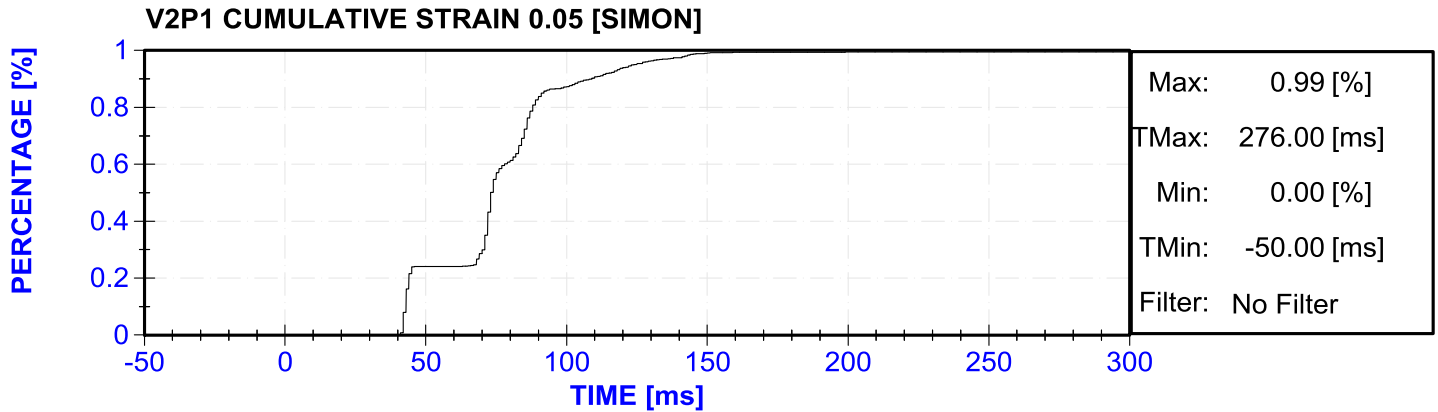


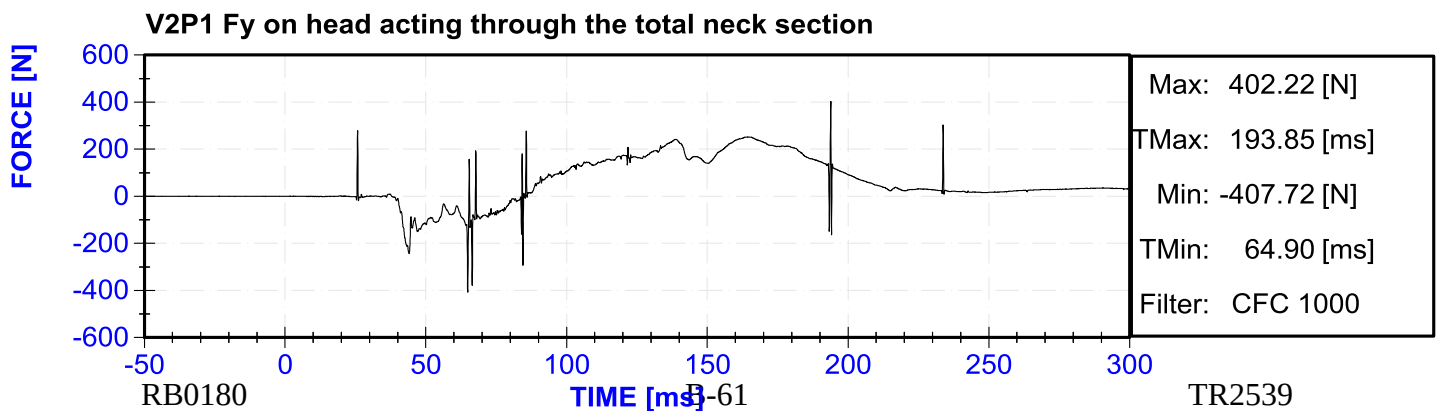
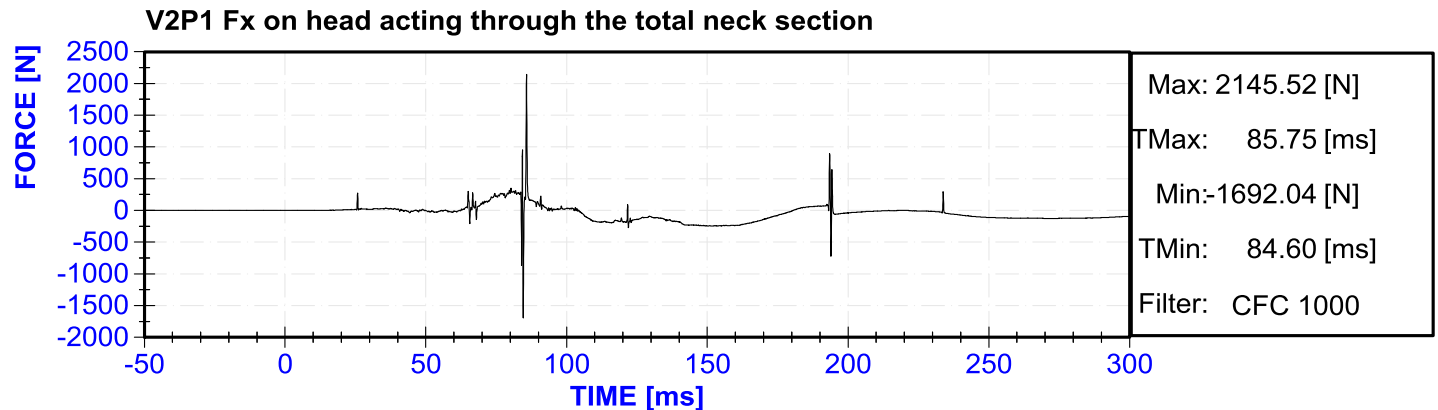
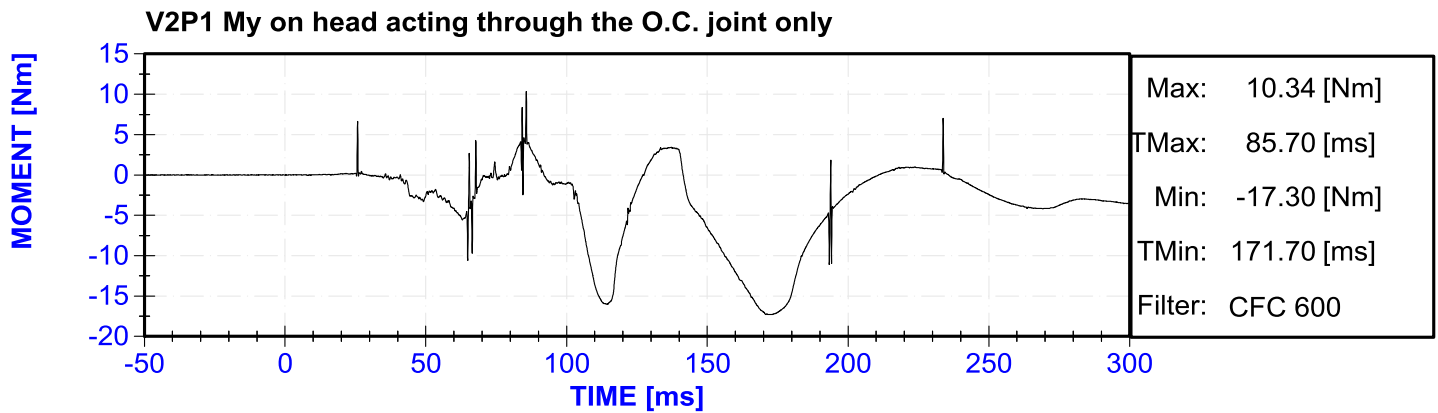
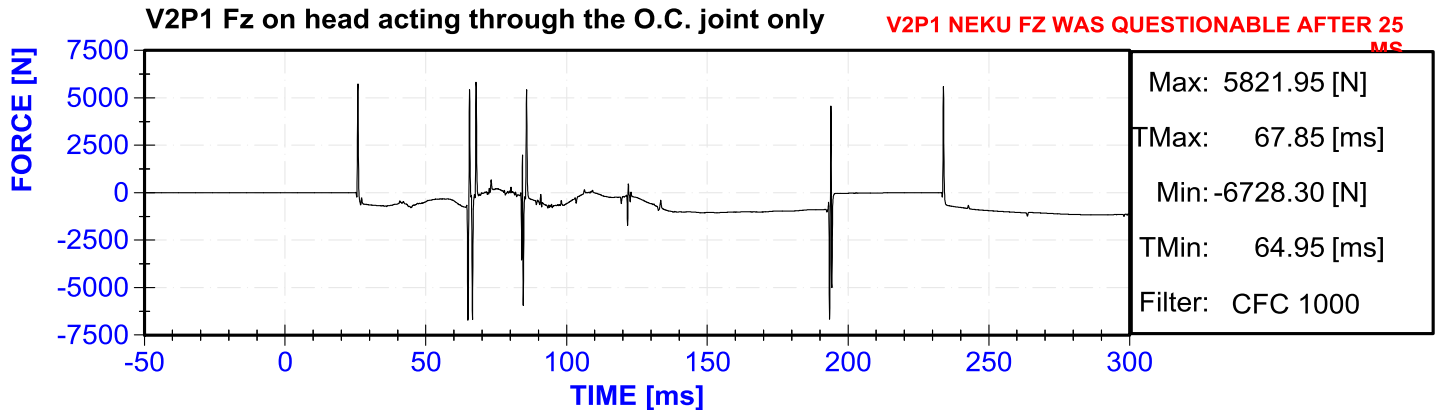
**V2P1 HEAD ANGULAR VELOCITY Y [SIMON]**

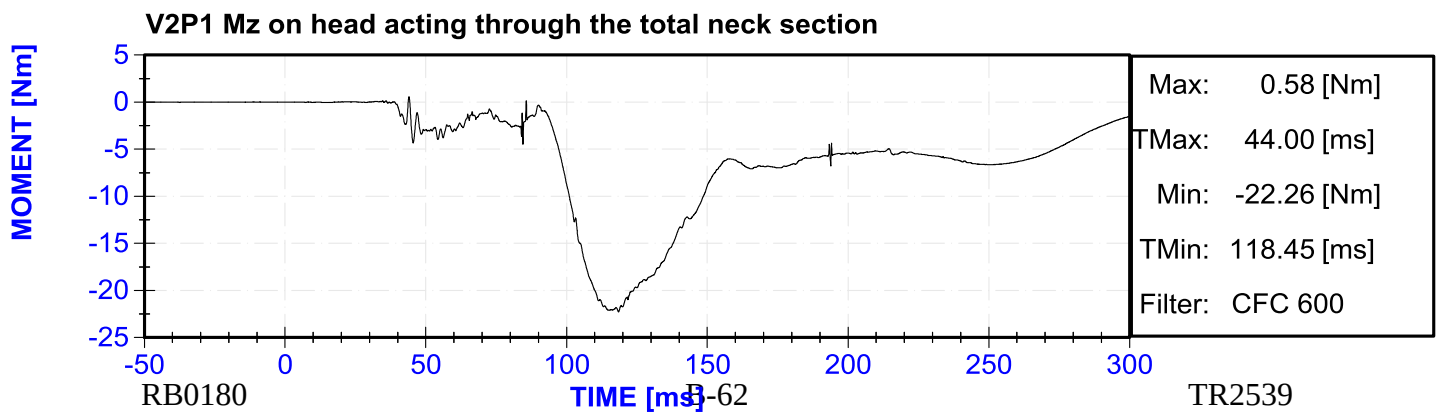
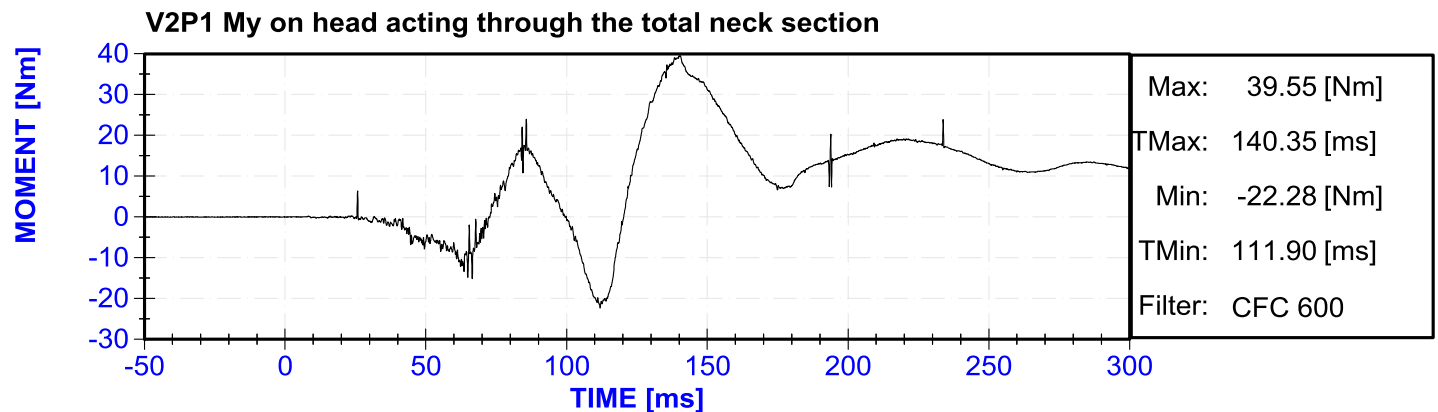
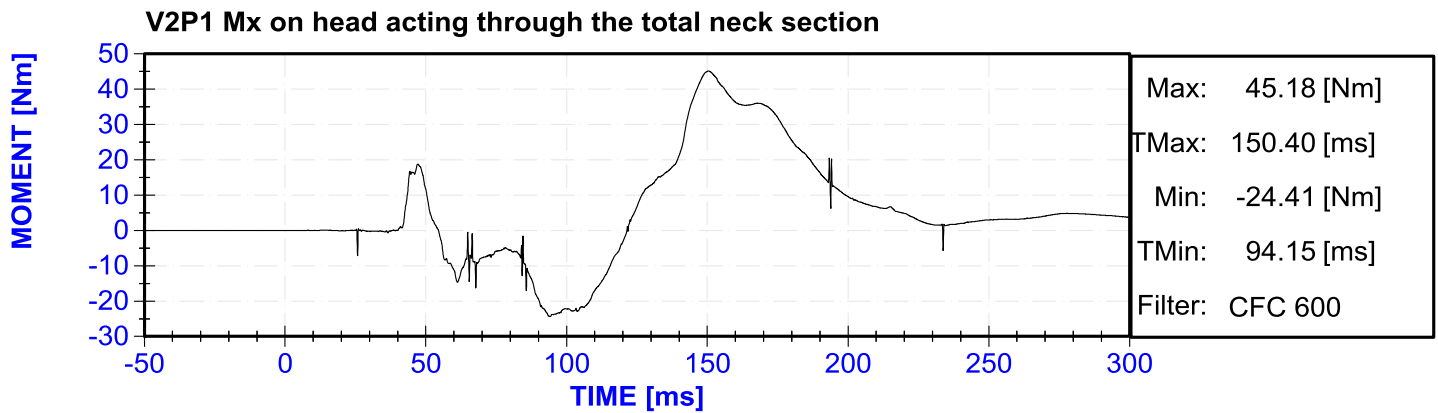
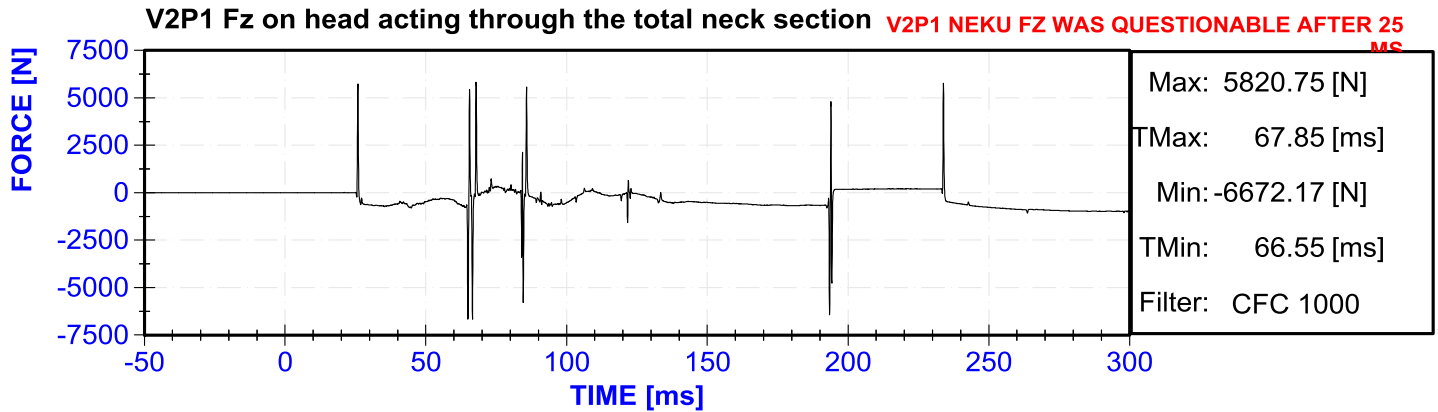


**V2P1 HEAD ANGULAR VELOCITY Z [SIMON]**

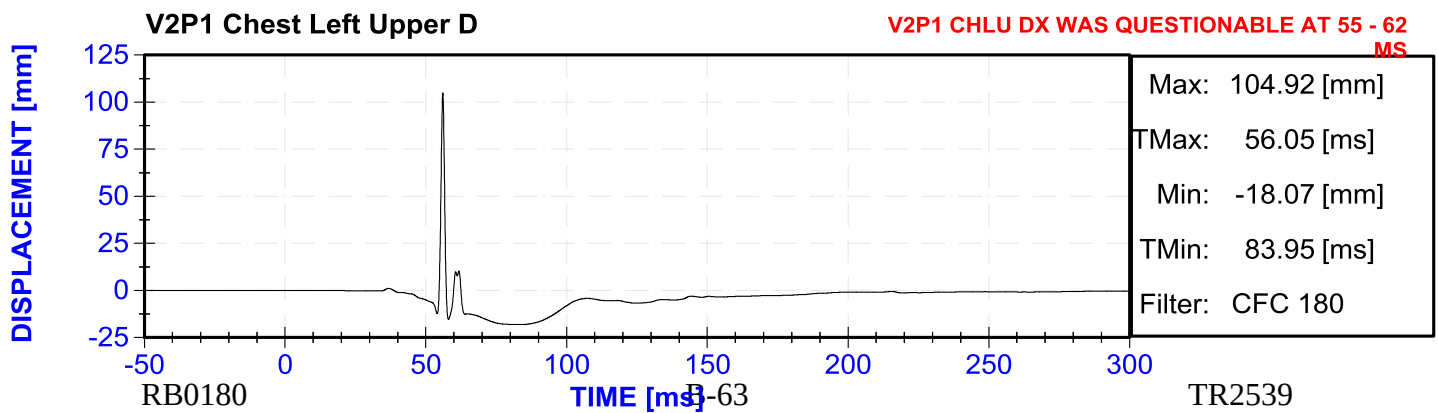
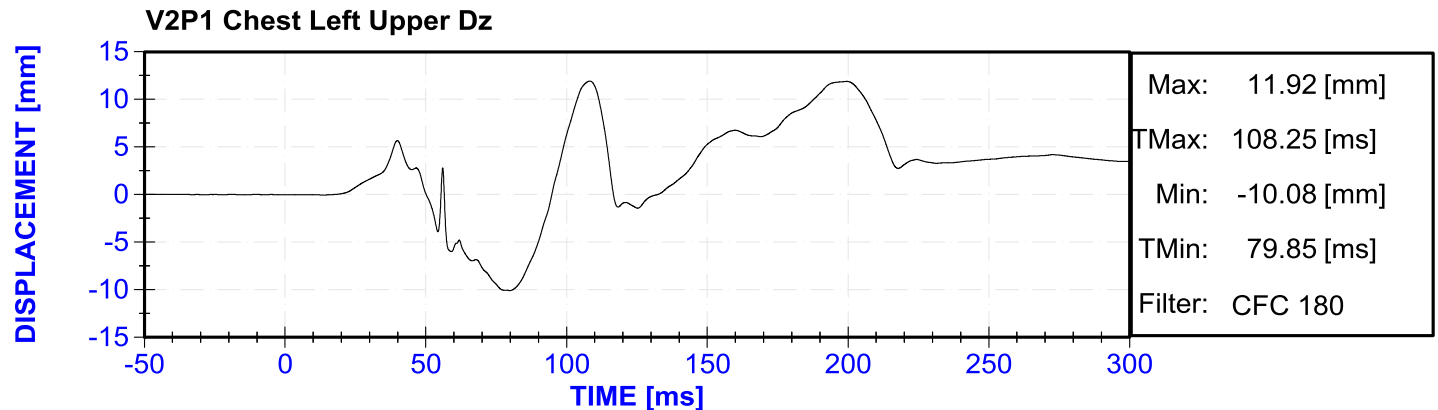
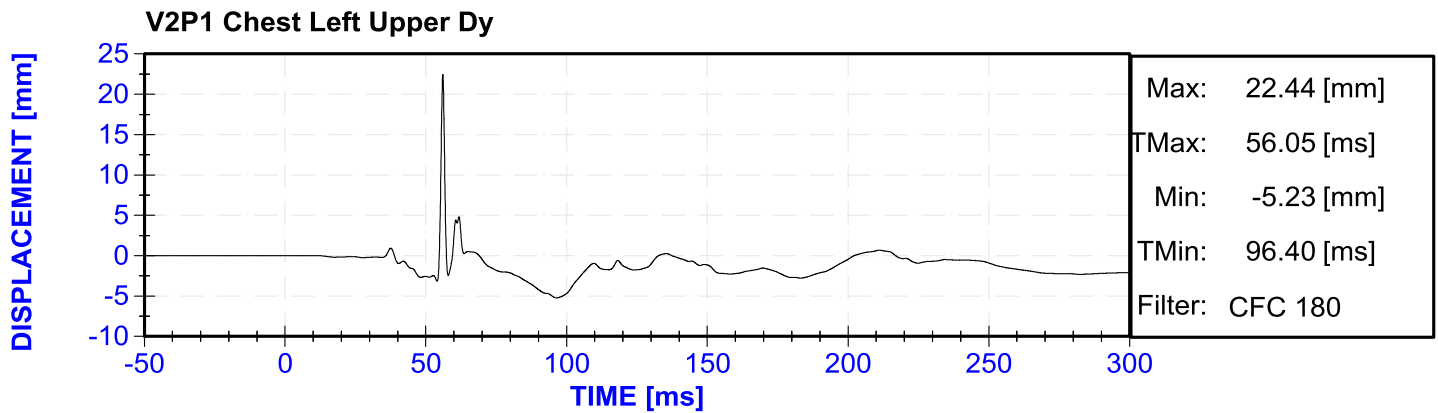
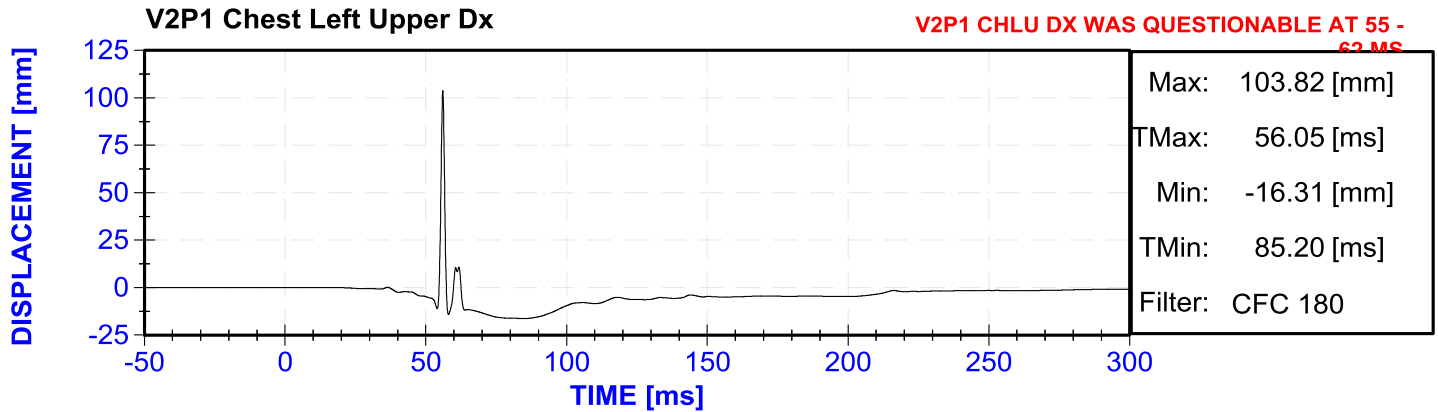


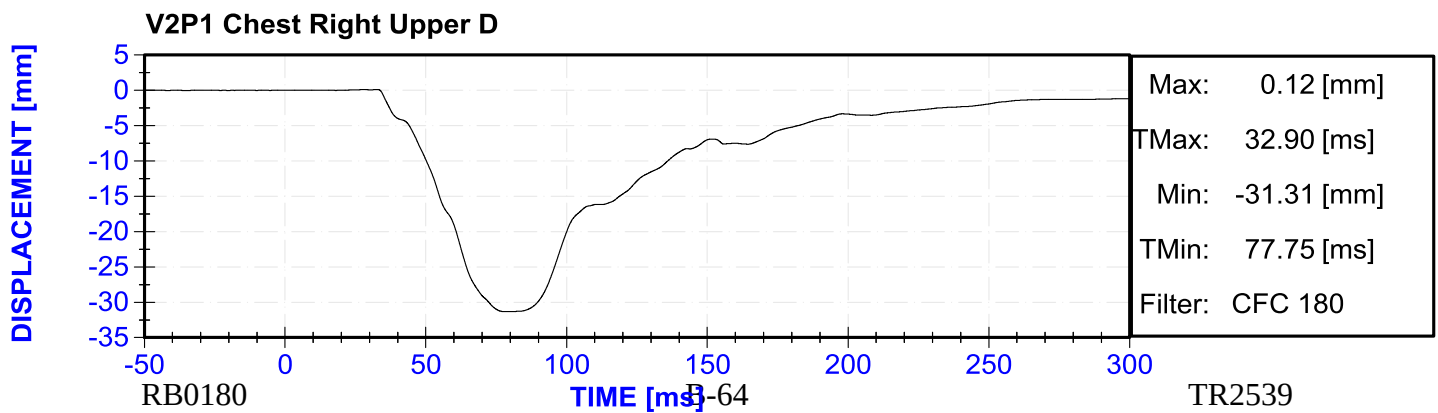
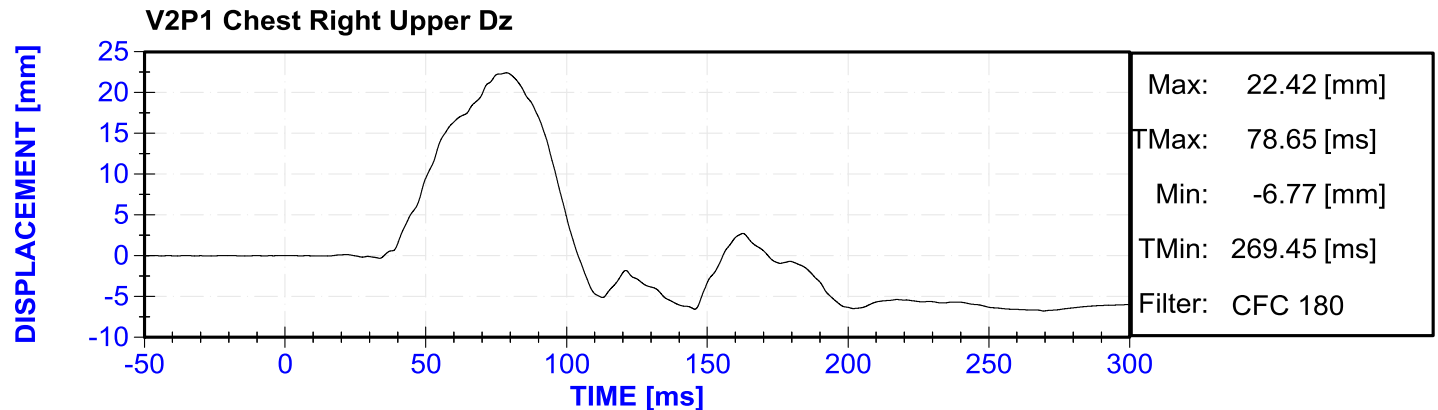
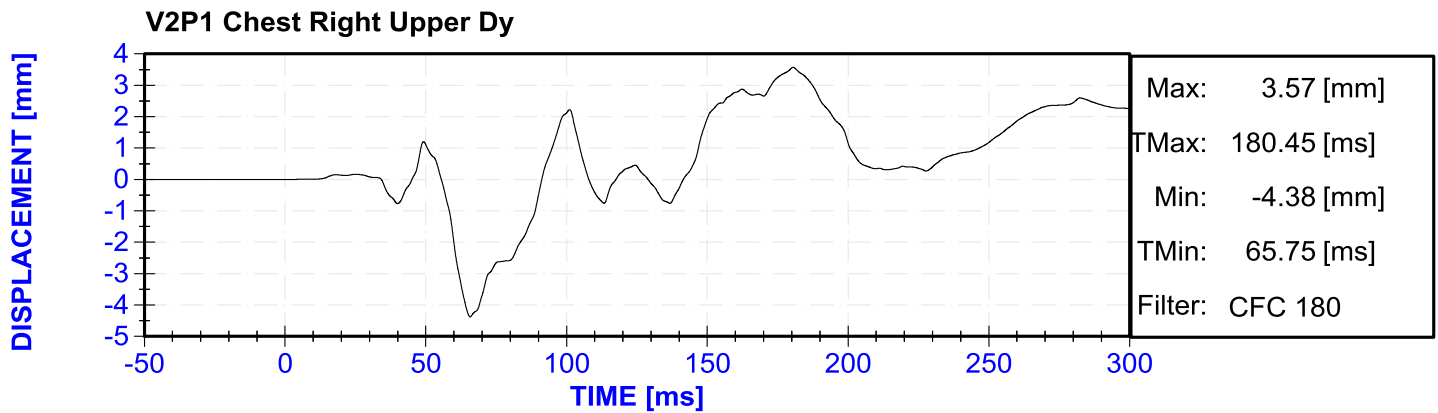
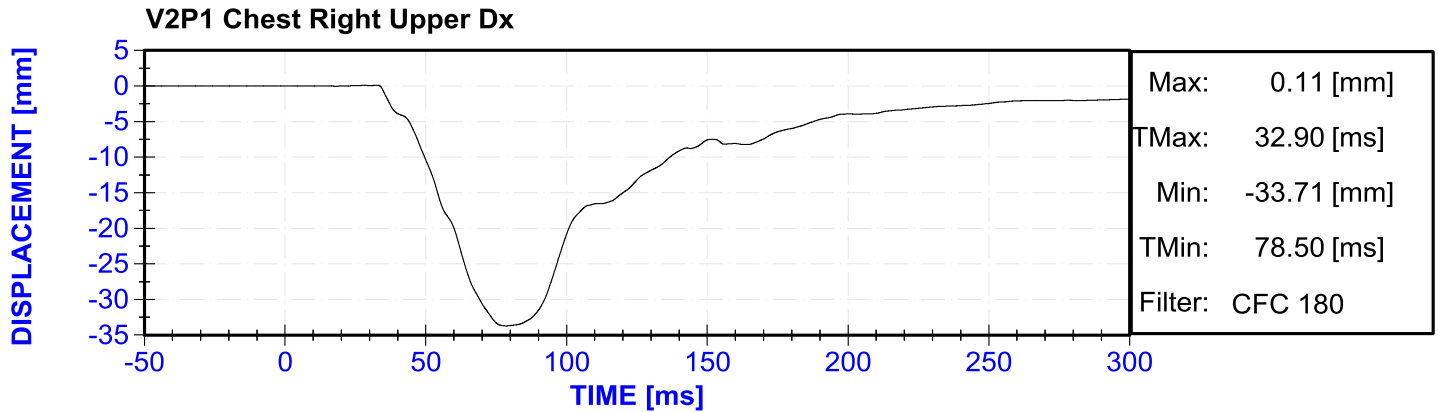


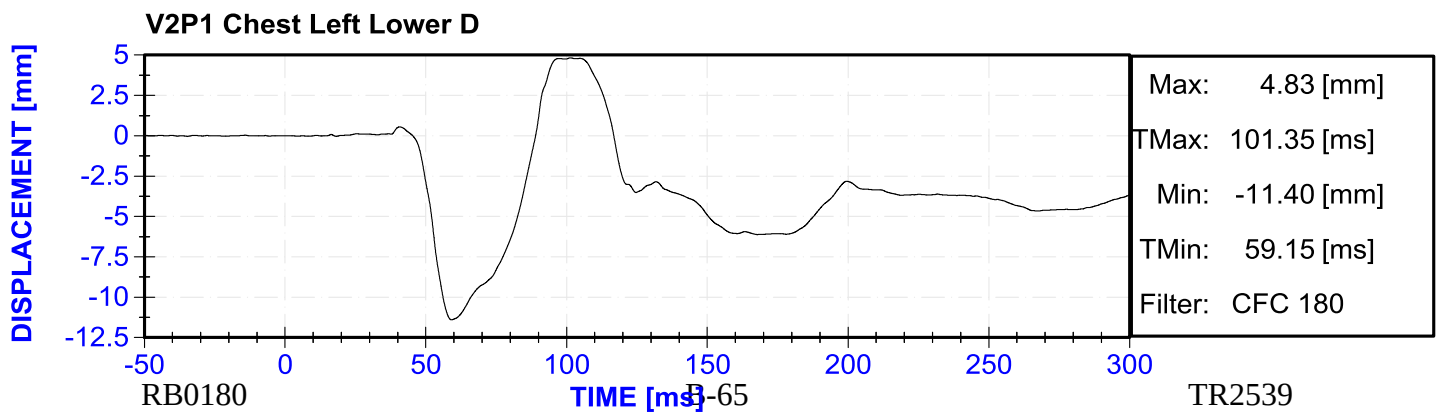
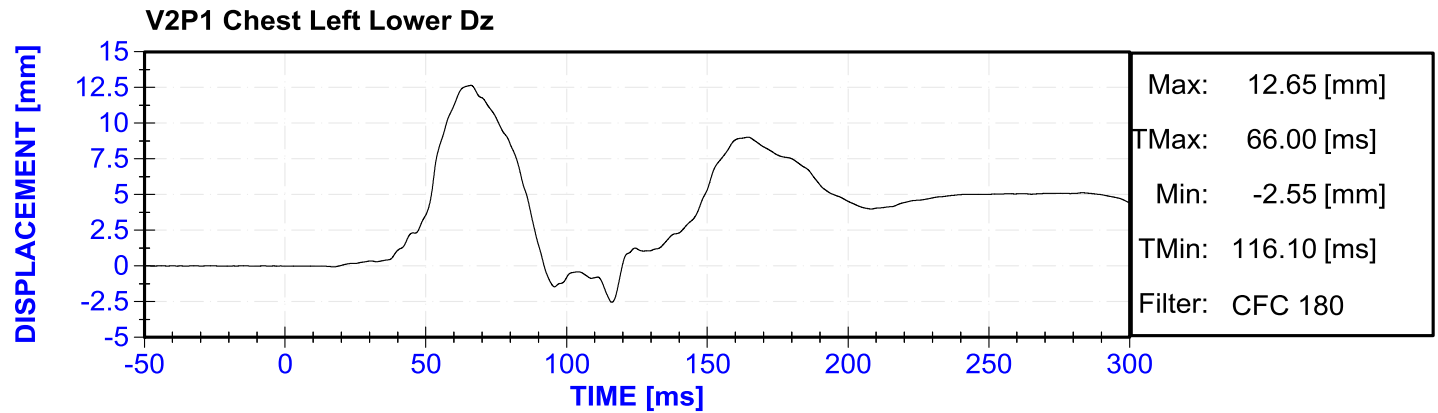
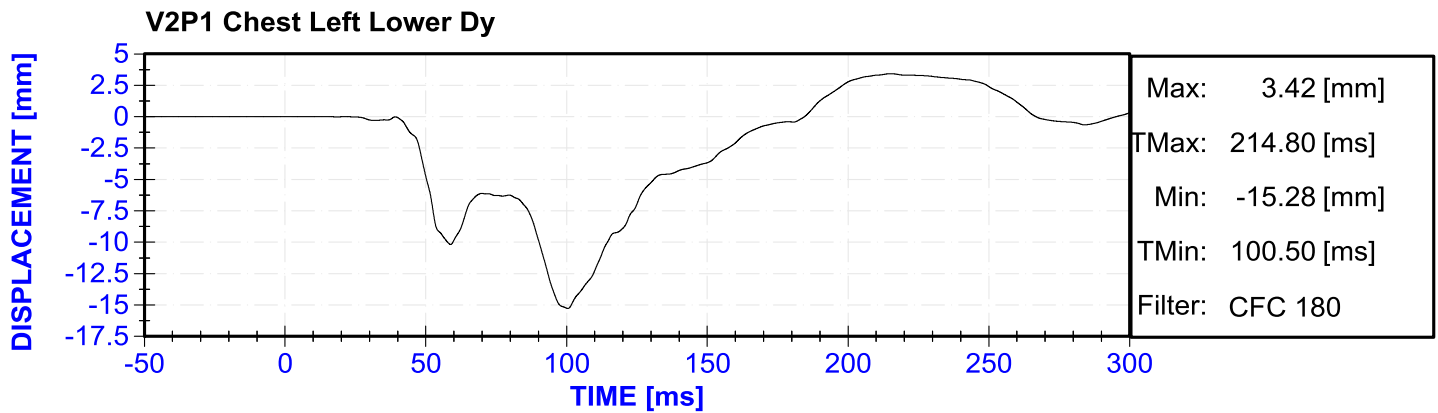
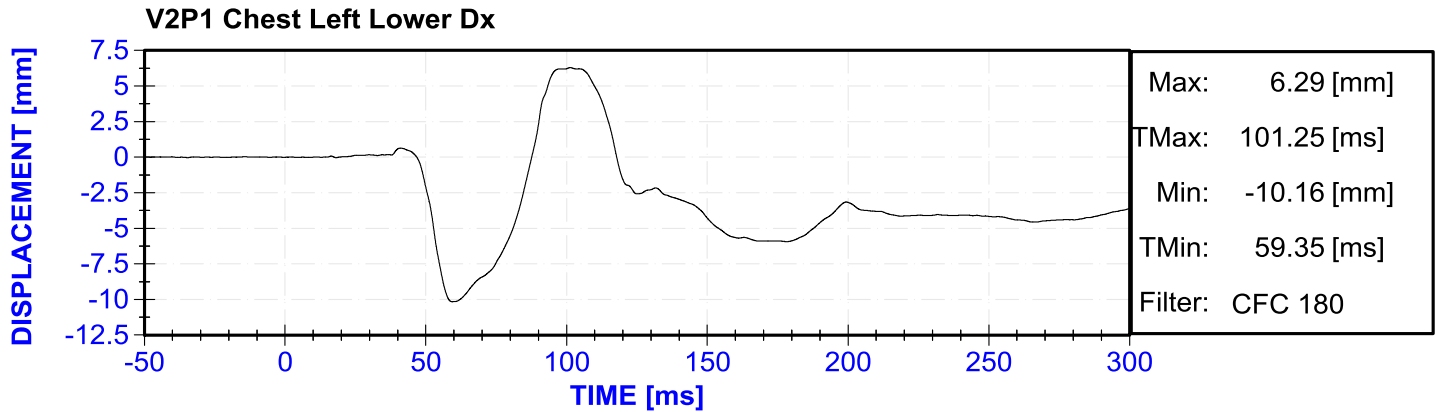


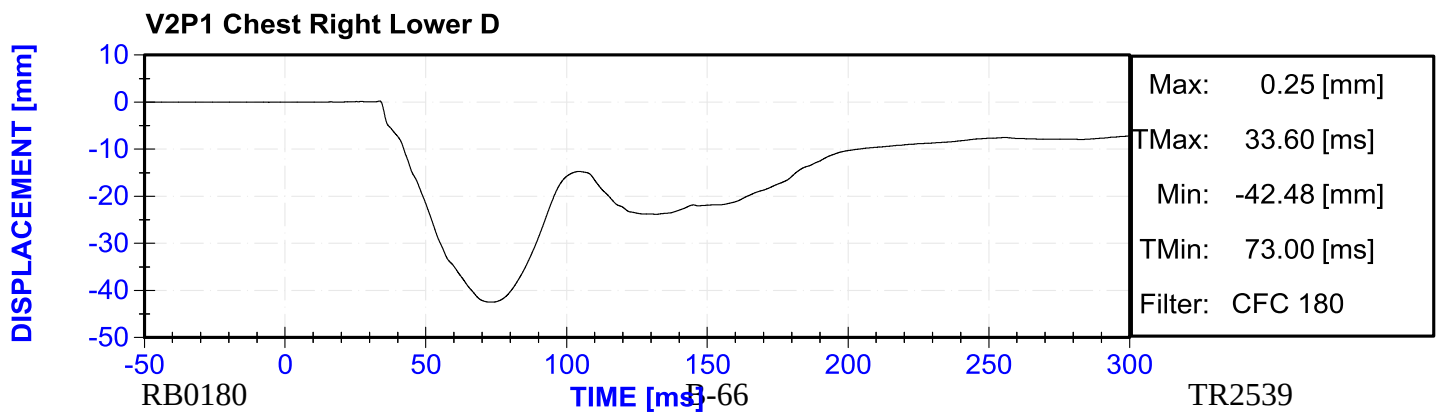
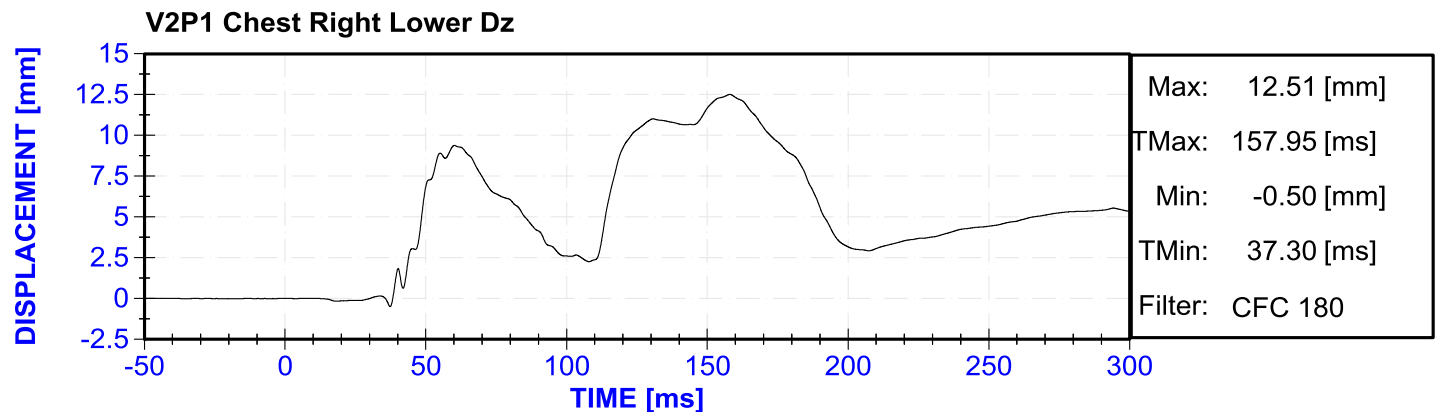
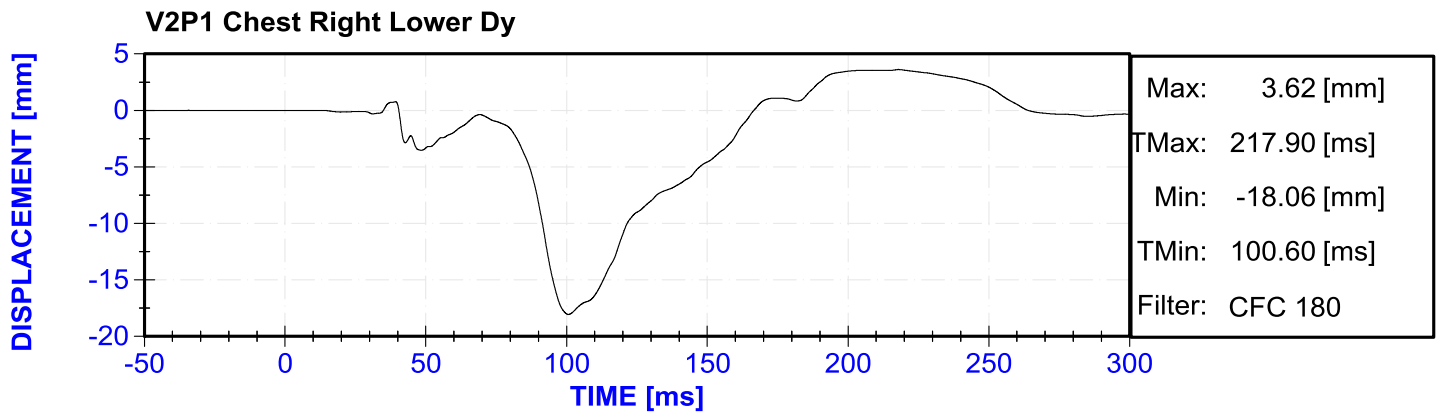
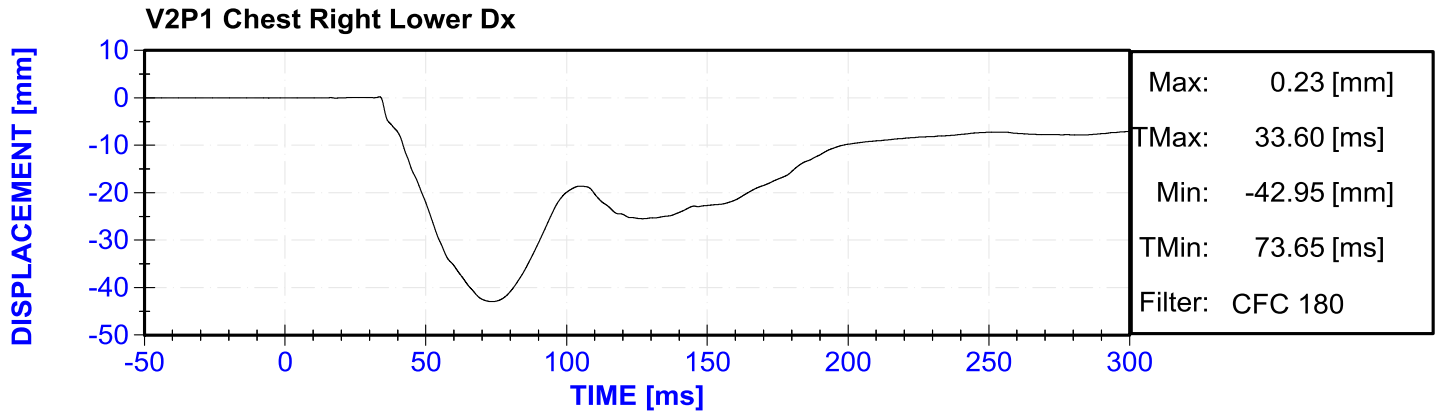




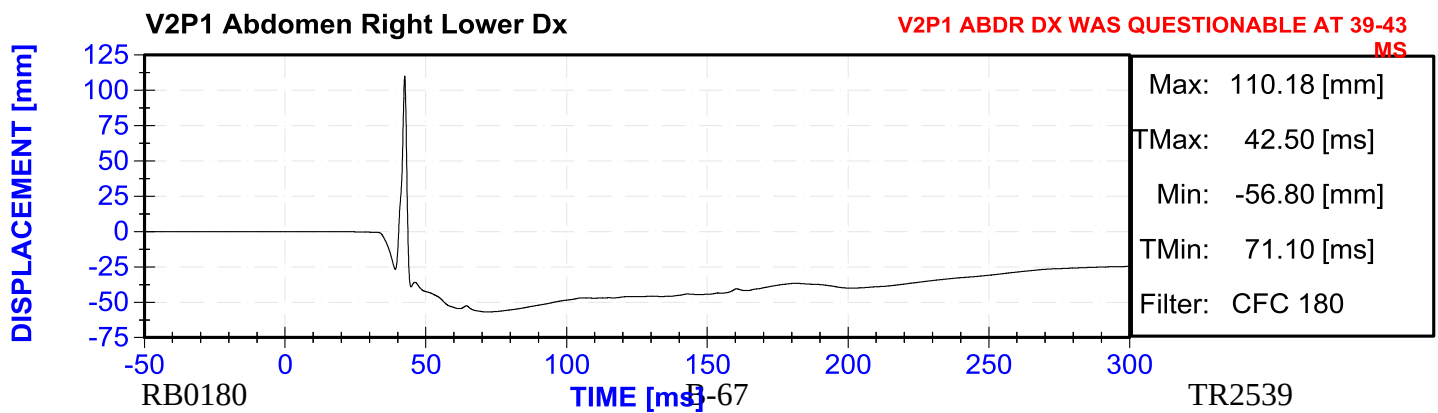
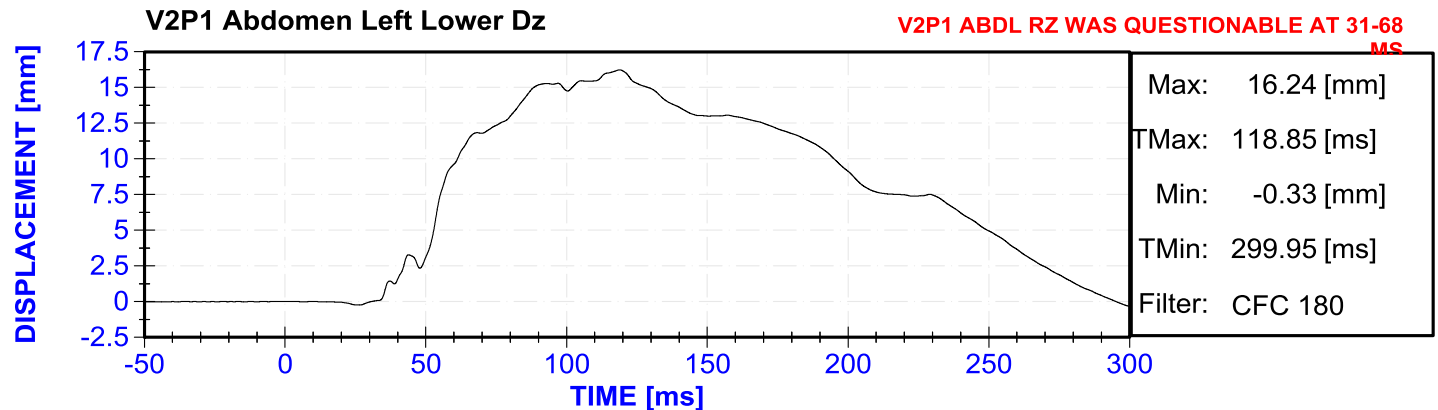
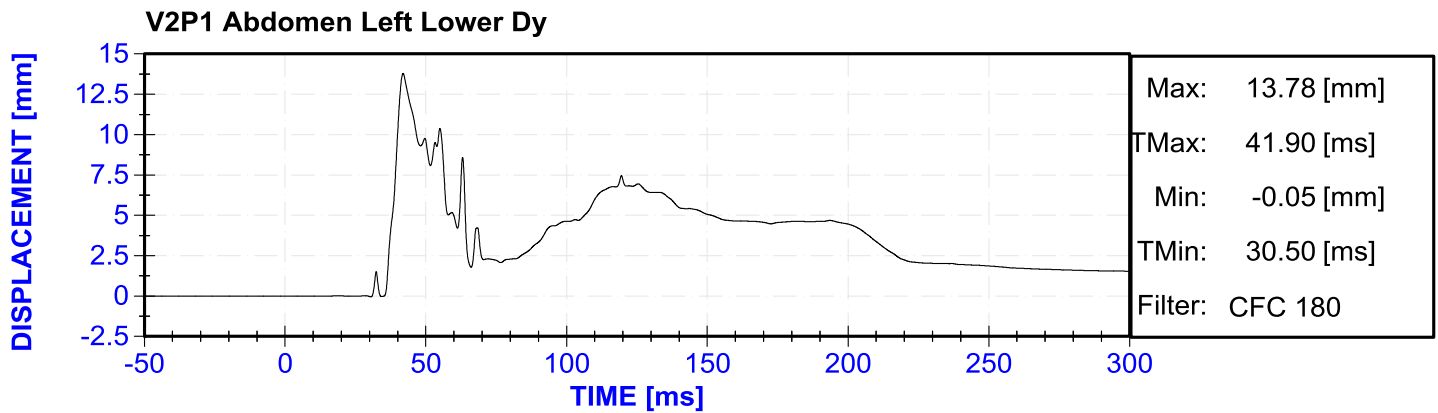
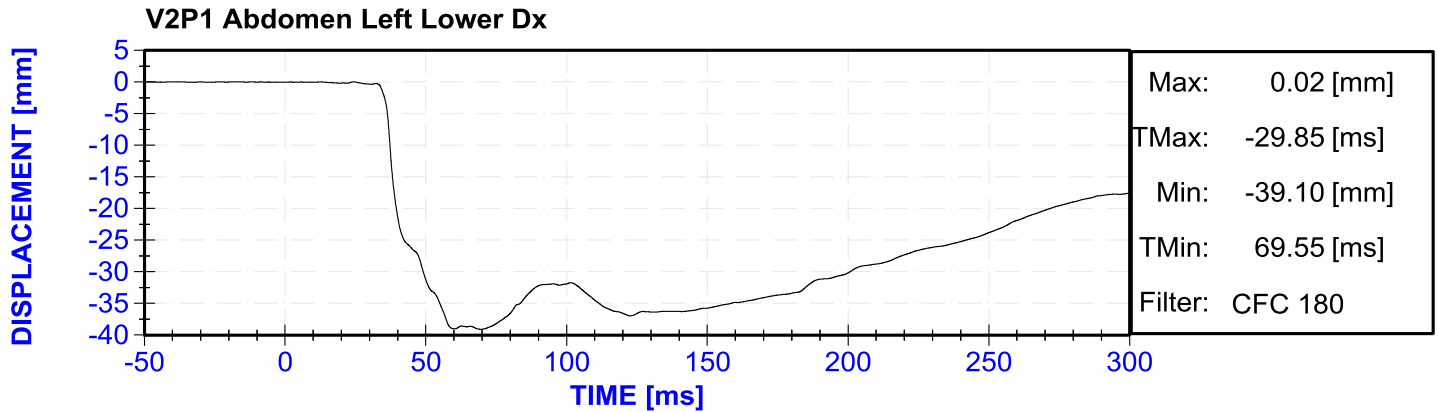


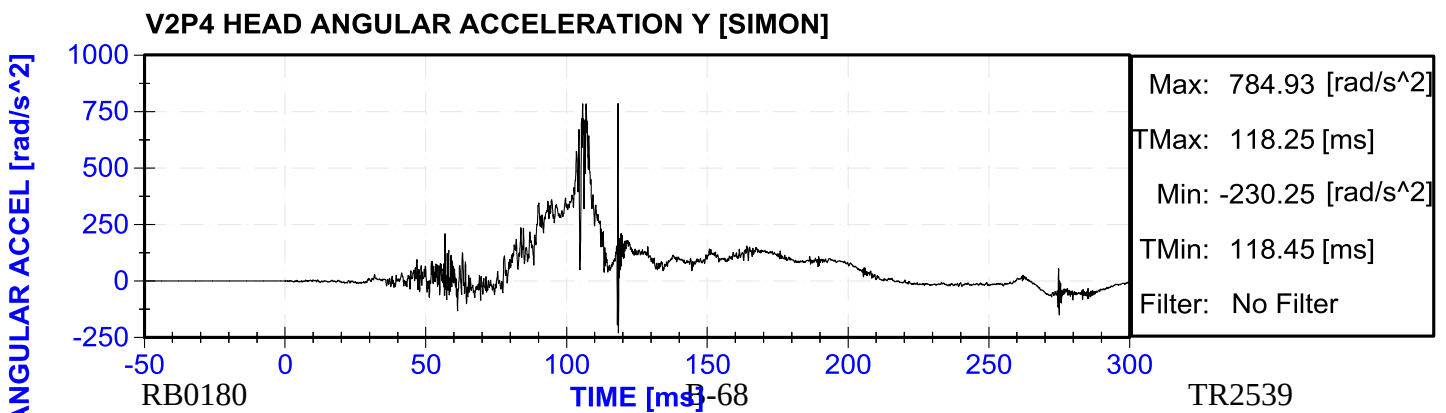
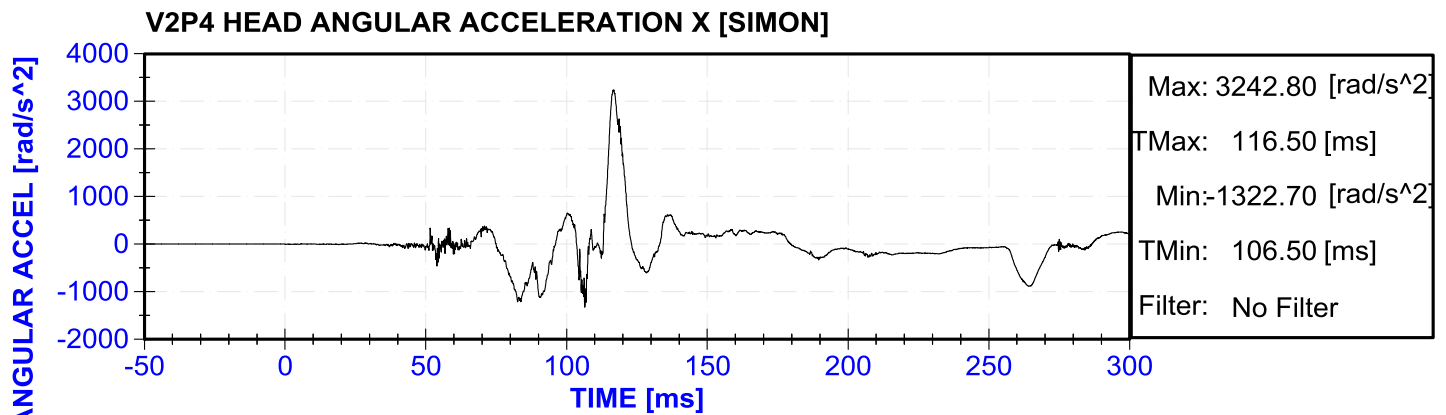
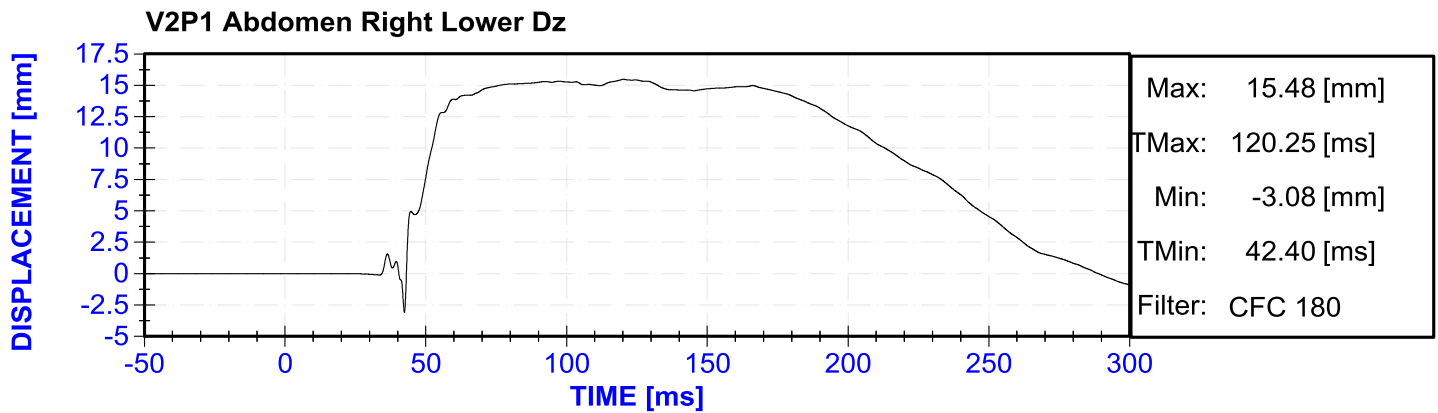
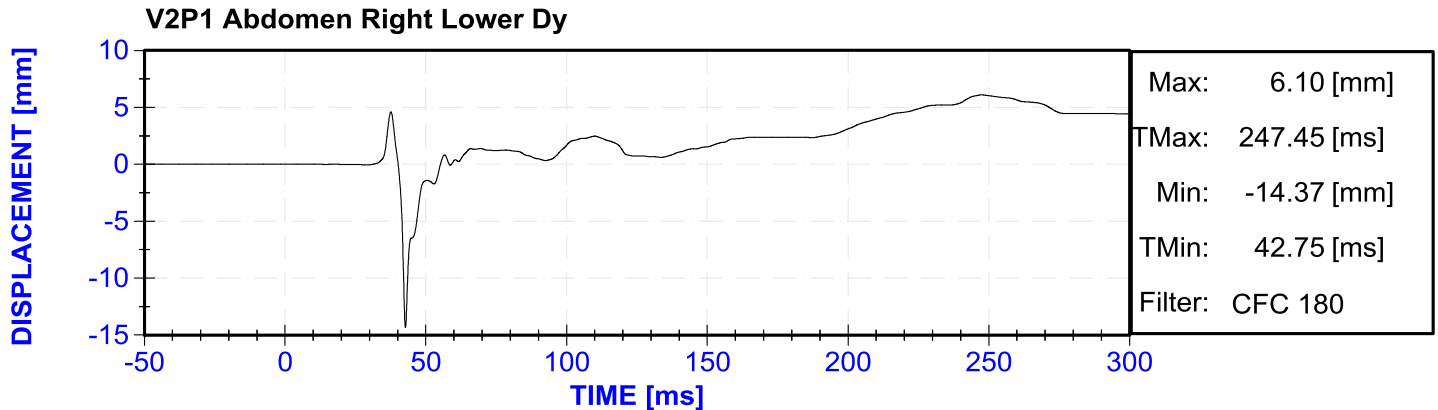




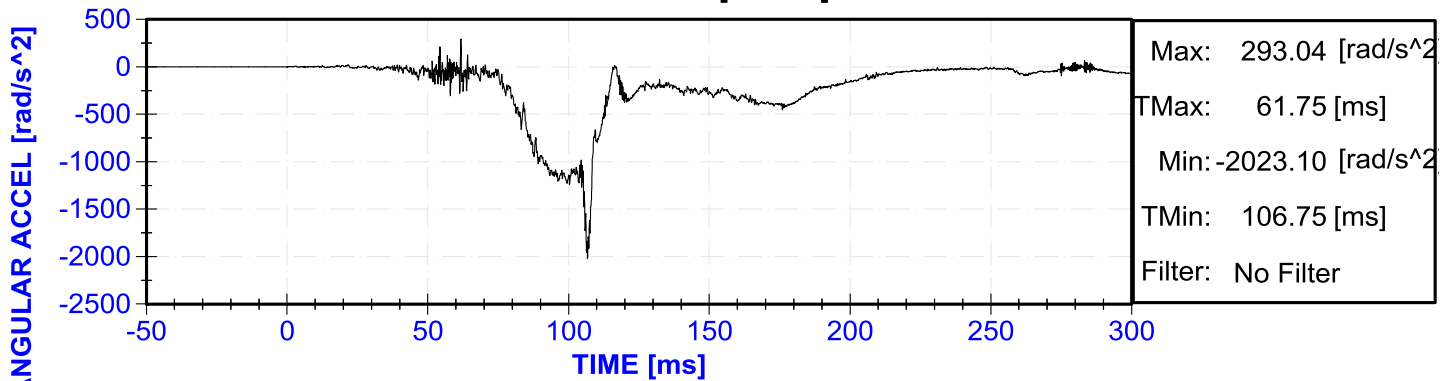




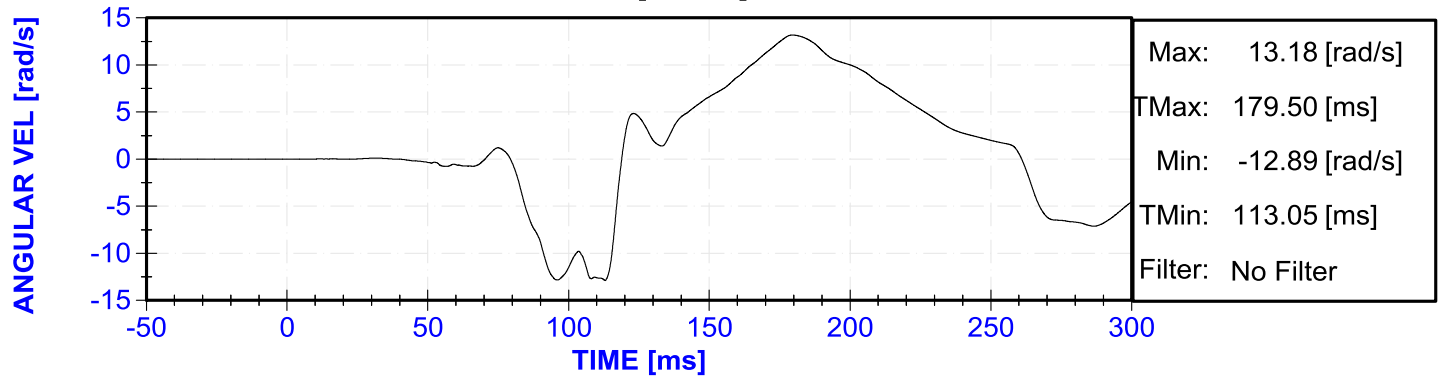




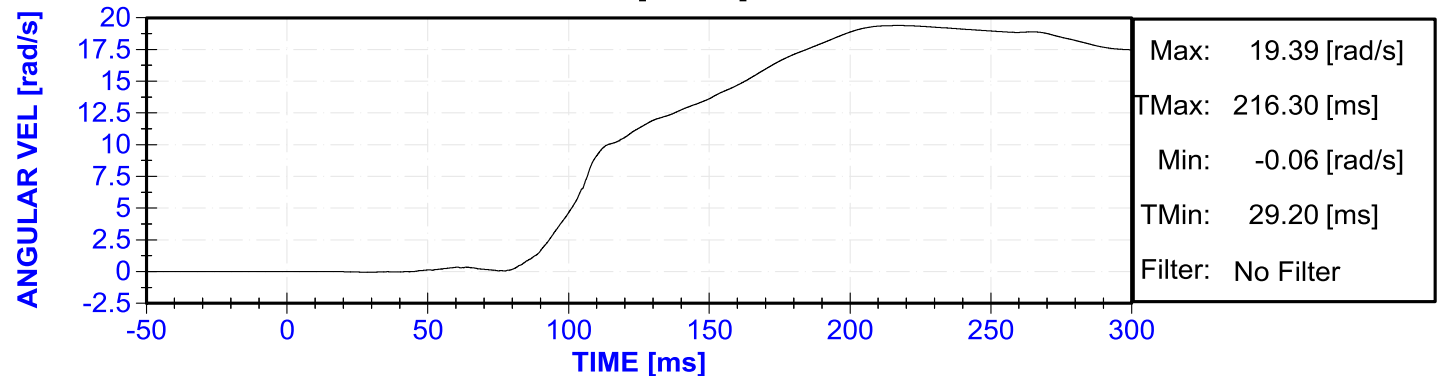
**V2P4 HEAD ANGULAR ACCELERATION Z [SIMON]**



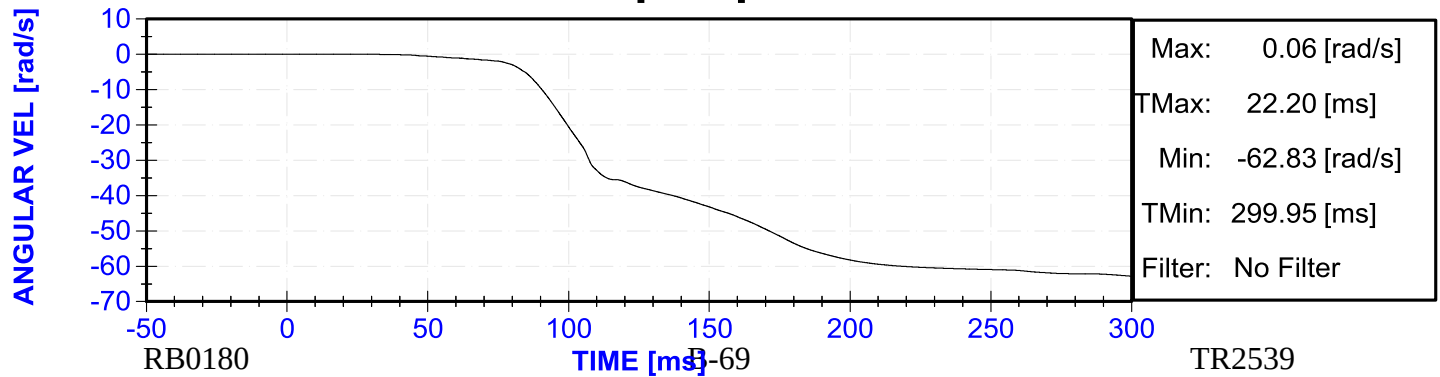
**V2P4 HEAD ANGULAR VELOCITY X [SIMON]**

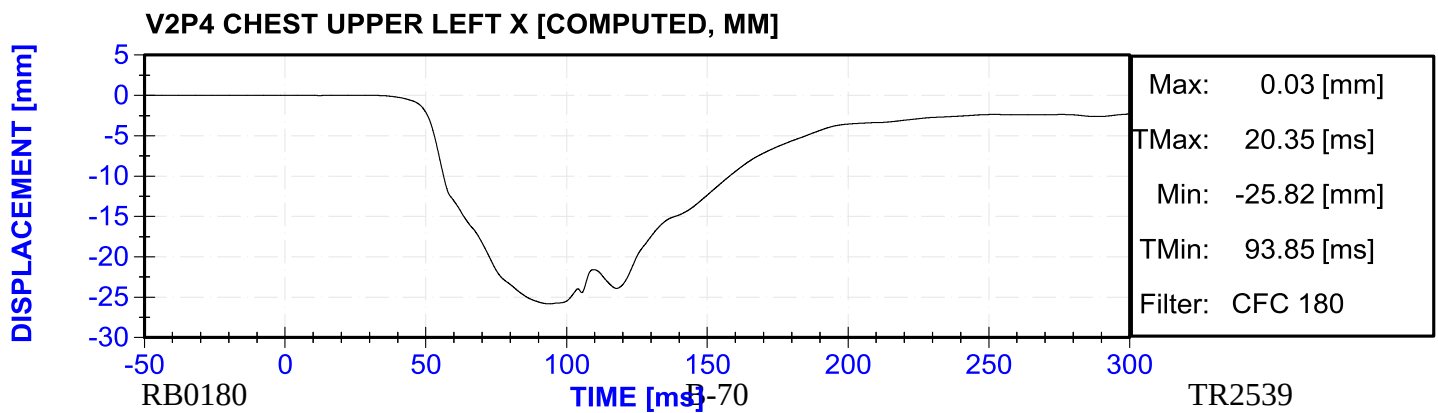
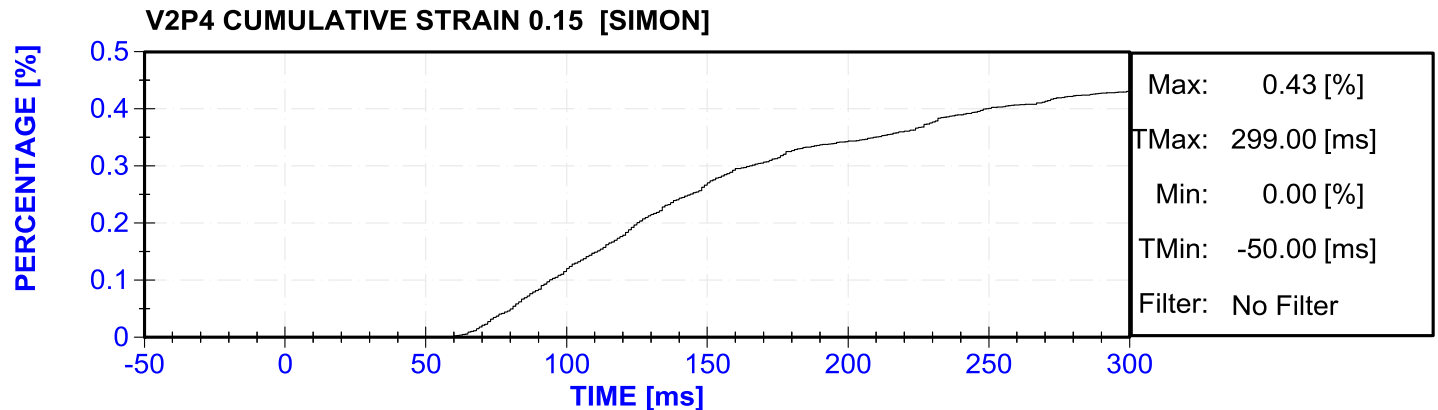
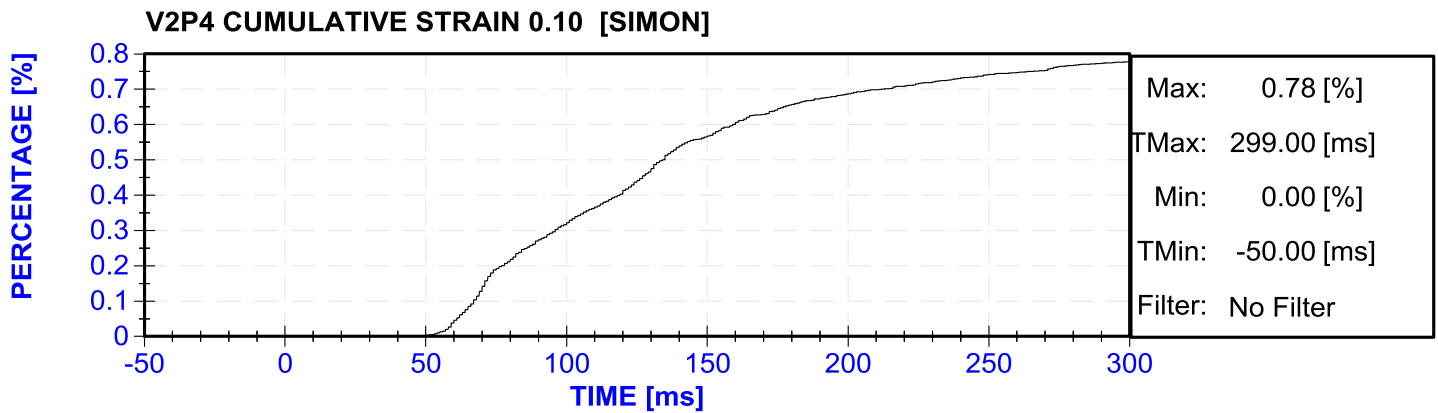
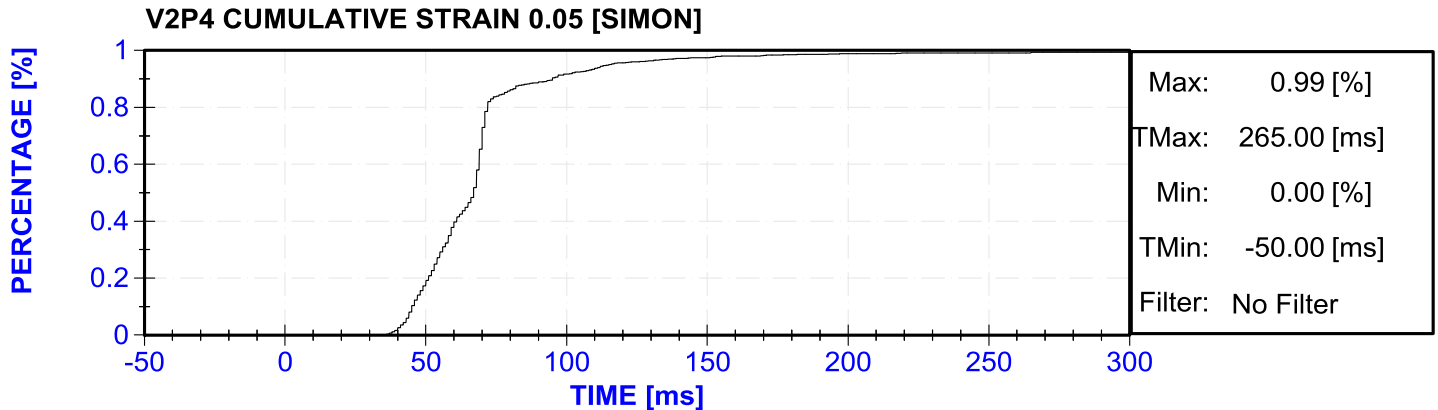


**V2P4 HEAD ANGULAR VELOCITY Y [SIMON]**

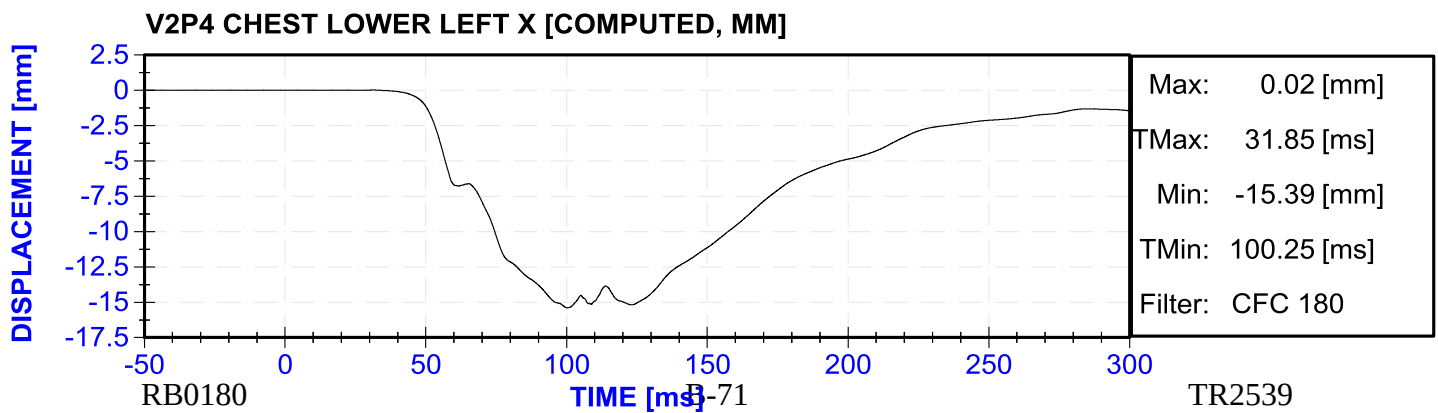
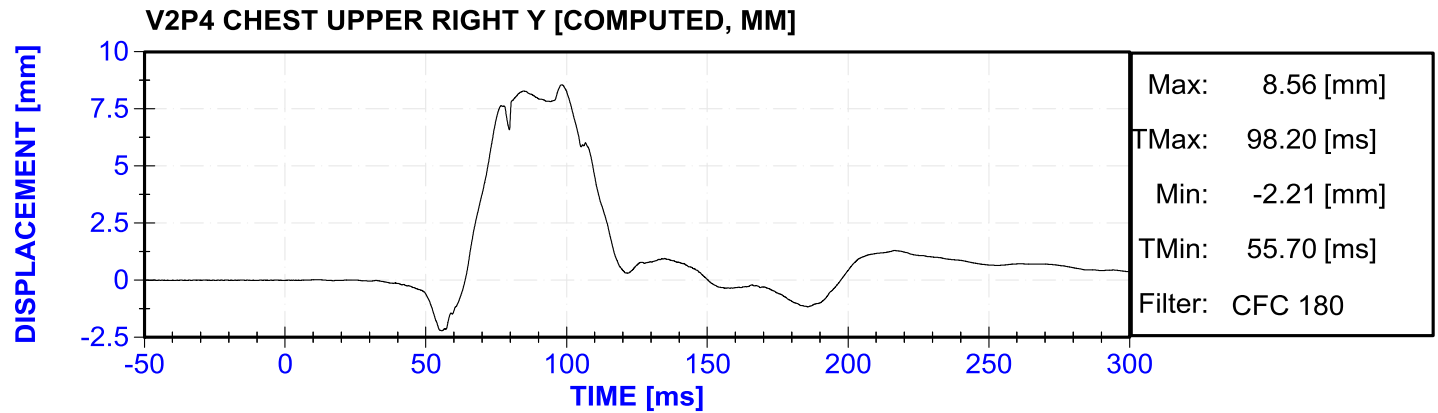
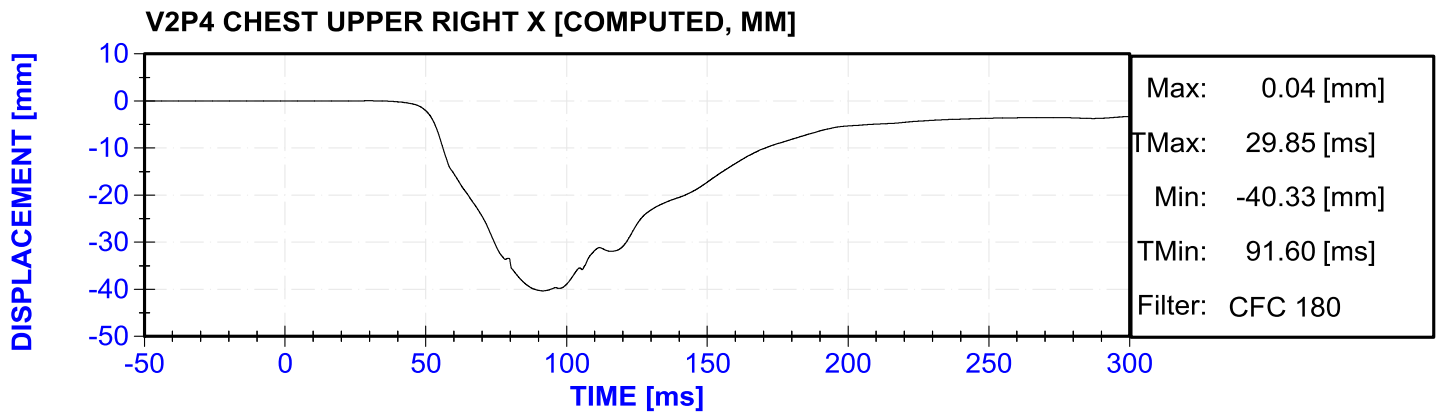
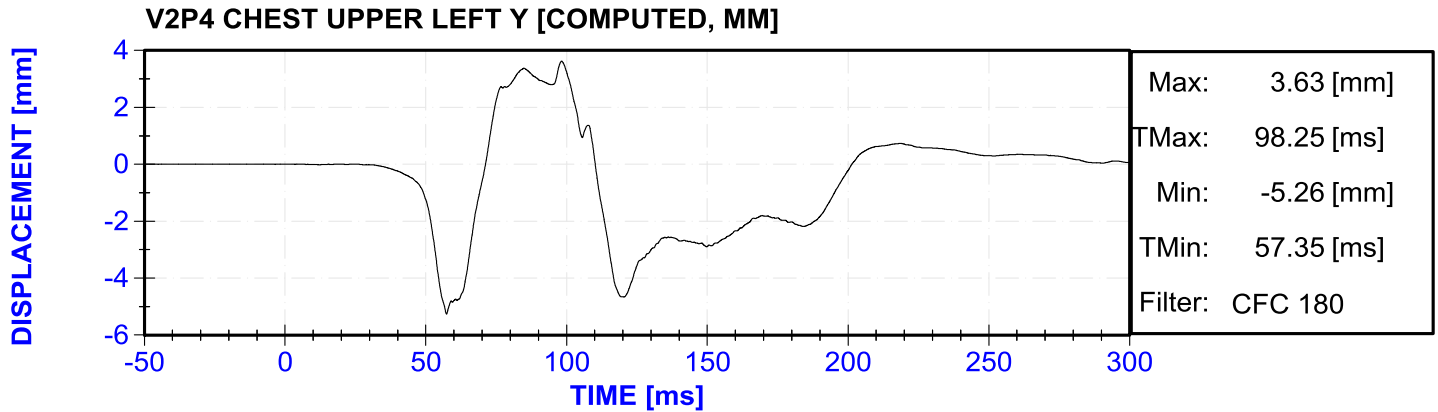


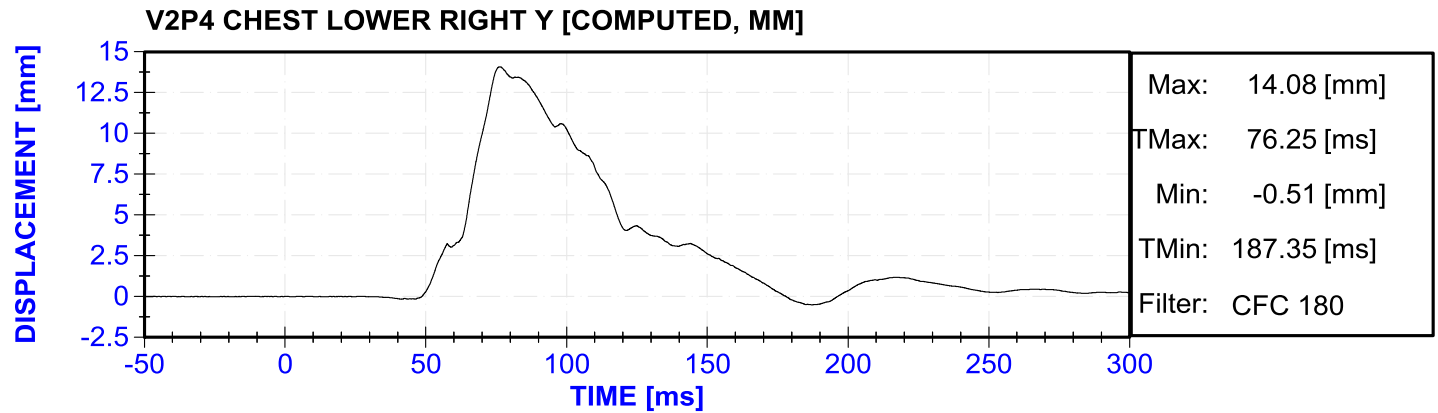
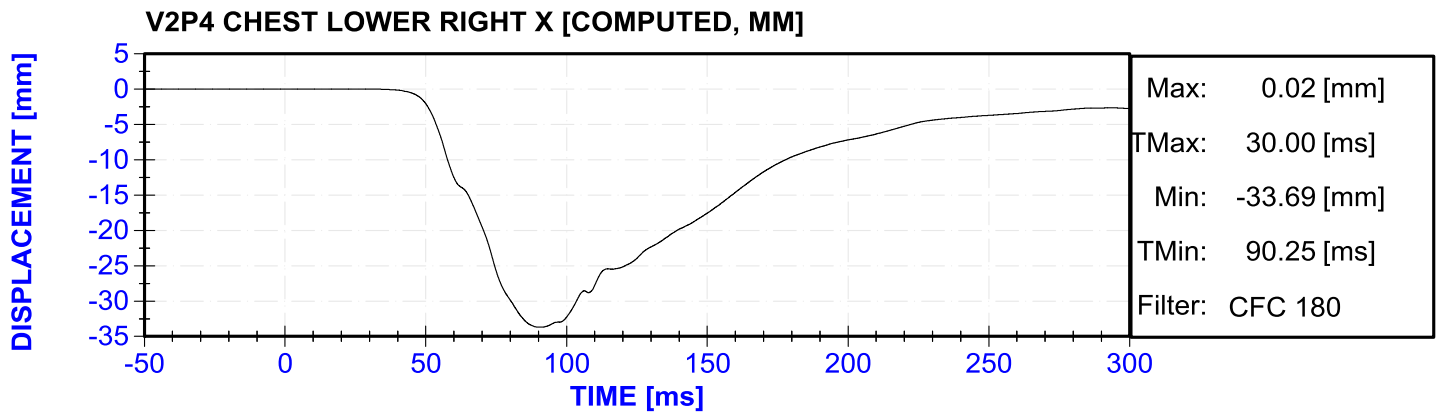
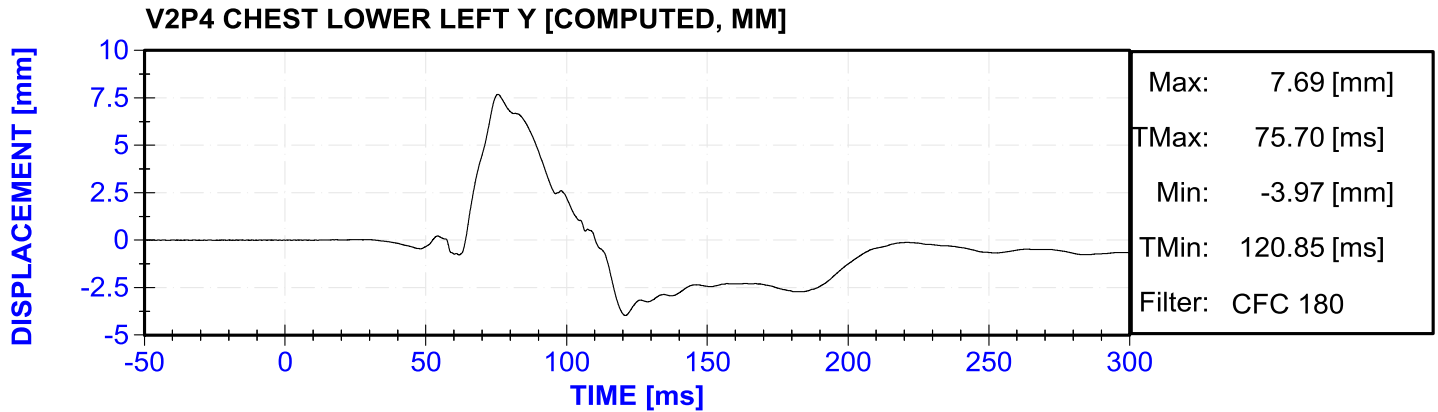
**V2P4 HEAD ANGULAR VELOCITY Z [SIMON]**











## **APPENDIX C**

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

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| Table 2          | THOR 6 File Set                       | C-3  |
| Table 3          | THOR Dummy Initial Set-Up Information | C-3  |
| 4                | THOR Post Inspection Checklist        | C-4  |
|                  |                                       |      |
|                  |                                       |      |
|                  |                                       |      |
|                  |                                       |      |
|                  |                                       |      |
|                  |                                       |      |
|                  |                                       |      |
|                  |                                       |      |



**Table 1 – Dummy Information**

| TYPE       | DESCRIPTION            | SERIAL NUMBER |
|------------|------------------------|---------------|
| THOR       | 50 <sup>TH</sup> Male  | 0007          |
| Hybrid III | 5 <sup>th</sup> Female | 070           |

**Table 2 – THOR6 Set File**

| LFTX                     | LFTY                     | LFTZ                     | RFTX                      | RFTY                      | RFTZ                      |
|--------------------------|--------------------------|--------------------------|---------------------------|---------------------------|---------------------------|
| Left Ankle X<br>Rotation | Left Ankle Y<br>Rotation | Left Ankle Z<br>Rotation | Right Ankle X<br>Rotation | Right Ankle X<br>Rotation | Right Ankle X<br>Rotation |
| 3.98577                  | 13.869                   | -34.481                  | 0.30868                   | 10.848                    | -58.84                    |

**Table 3 - THOR Dummy Initial SetUp Information**

| THOR – NT<br>S/N: 0007 |                      |     |          |           |           |       |           |         | Sensitivit<br>y (JARI) | Sensitivit<br>y<br>(GESAC) | Setup Angle<br>(GESAC) |
|------------------------|----------------------|-----|----------|-----------|-----------|-------|-----------|---------|------------------------|----------------------------|------------------------|
| Sensor                 | Description/<br>Axis | MFG | Capacity | Unit<br>1 | Unit<br>2 | Range | Direction | CF<br>C | V/Unit -1              | V/Unit-1                   | Degrees                |
| NKCRP                  | Upper Right<br>Base  |     |          |           |           |       |           |         |                        |                            |                        |
| Thorax<br>CRUX         | Upper Right<br>Mid   |     |          |           |           |       |           |         |                        |                            |                        |
| Thorax<br>CRUX         | Upper Right<br>Elbow |     |          |           |           |       |           |         |                        |                            |                        |
| Thorax<br>CRUX         | Upper Left<br>Base   |     |          |           |           |       |           |         |                        |                            |                        |
| Thorax<br>CRUX         | Upper Left<br>Mid    |     |          |           |           |       |           |         |                        |                            |                        |
| Thorax<br>CRUX         | Upper Left<br>Elbow  |     |          |           |           |       |           |         |                        |                            |                        |
| Thorax<br>CRUX         | Lower Right<br>Base  |     |          |           |           |       |           |         |                        |                            |                        |
| Thorax<br>CRUX         | Lower Right<br>Mid   |     |          |           |           |       |           |         |                        |                            |                        |
| Thorax<br>CRUX         | Lower Right<br>Elbow |     |          |           |           |       |           |         |                        |                            |                        |
| Thorax<br>CRUX         | Lower Left<br>Base   |     |          |           |           |       |           |         |                        |                            |                        |
| Thorax<br>CRUX         | Lower Left<br>Mid    |     |          |           |           |       |           |         |                        |                            |                        |
| Thorax<br>CRUX         | Lower left<br>Elbow  |     |          |           |           |       |           |         |                        |                            |                        |
| Thorax<br>CRUX         | Right<br>Abdomen X   |     |          |           |           |       |           |         |                        |                            |                        |
| DGSP                   | Right<br>Abdomen Y   |     |          |           |           |       |           |         |                        |                            |                        |
| DGSP                   | Right<br>Abdomen Z   |     |          |           |           |       |           |         |                        |                            |                        |
| DGSP                   | Left<br>Abdomen X    |     |          |           |           |       |           |         |                        |                            |                        |
| DGSP                   | Left<br>Abdomen Y    |     |          |           |           |       |           |         |                        |                            |                        |
| DGSP                   | Left<br>Abdomen Z    |     |          |           |           |       |           |         |                        |                            |                        |
| DGSP                   | Upper Right<br>Base  |     |          |           |           |       |           |         |                        |                            |                        |

## PRE-TEST

### THOR Inspection Checklist

|                                                                                                                                                                                                               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Date: September 22, 2011                                                                                                                                                                                      |
| NHTSA Representative: James Saunders                                                                                                                                                                          |
| Witness(es):                                                                                                                                                                                                  |
| Inspection type (circle one): <input checked="" type="radio"/> PRE <input type="radio"/> POST                                                                                                                 |
| Dummy S/N: 007                                                                                                                                                                                                |
| Dummy Description: THOR                                                                                                                                                                                       |
| Date of last Certification or Inspection: 9/22/2011                                                                                                                                                           |
| <u>Tests conducted since last full certification or inspection:</u><br><br>RB0179 Buick Lacrosse                                                                                                              |
| <u>Known errors in data channels (no data, clipping, unexpected drops):</u> <ul style="list-style-type: none"><li>• 3005</li><li>• 3010</li><li>• 3015</li><li>• 4001</li><li>• 4029</li><li>• 5020</li></ul> |
| <u>Physical evidence of damage:</u><br><br>                                                                                                                                                                   |
| <u>Anecdotal evidence of damage:</u><br><br>                                                                                                                                                                  |
| <u>Equipment delivered to Borrower:</u><br><br>                                                                                                                                                               |

| HEAD                                                         |                                                                                                                                                                                                                                            |
|--------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input checked="" type="radio"/> Y / <input type="radio"/> N | Rear head cap mounts securely to head                                                                                                                                                                                                      |
| <input checked="" type="radio"/> Y / <input type="radio"/> N | Head skin fits securely over skull                                                                                                                                                                                                         |
| Y / <input checked="" type="radio"/> N                       | Head skin shows no sign of tears or damage <ul style="list-style-type: none"> <li>Gouge left side of the forehead</li> </ul>                                                                                                               |
| <input checked="" type="radio"/> Y / <input type="radio"/> N | Interior components of skull cavity (ballast, accelerometer mount, accelerometers) securely attached                                                                                                                                       |
| Y / <input checked="" type="radio"/> N                       | Head securely mounted to OC joint <ul style="list-style-type: none"> <li>OC Joint wobbles, otherwise firmly attached</li> </ul>                                                                                                            |
| OTHER                                                        |                                                                                                                                                                                                                                            |
| NECK                                                         |                                                                                                                                                                                                                                            |
| <input checked="" type="radio"/> Y / <input type="radio"/> N | Neck cables slide freely through holes in neck plates                                                                                                                                                                                      |
| <input checked="" type="radio"/> Y / <input type="radio"/> N | Neck cables show no sign of fraying, broken strands, or kinking                                                                                                                                                                            |
| Y / <input checked="" type="radio"/> N                       | No evidence of debonding between neck pucks and plates<br>If N – indicate which interface (where plate/puck 1 attach to upper neck load cell): <ul style="list-style-type: none"> <li>Debonding between pecks 4-5, rear surface</li> </ul> |
| Y / <input checked="" type="radio"/> N                       | No evidence of debonding or permanent compression in neck soft stop assemblies <ul style="list-style-type: none"> <li>Front soft stop debonding</li> </ul>                                                                                 |
| <input checked="" type="radio"/> Y / <input type="radio"/> N | Neck securely attached to upper neck load cell                                                                                                                                                                                             |
| <input checked="" type="radio"/> Y / <input type="radio"/> N | Neck securely attached to lower neck load cell                                                                                                                                                                                             |
| <input checked="" type="radio"/> Y / <input type="radio"/> N | Neck pitch change joint mechanism mating teeth are engaged                                                                                                                                                                                 |
| OTHER                                                        |                                                                                                                                                                                                                                            |

| SPINE                                                        |                                                                             |
|--------------------------------------------------------------|-----------------------------------------------------------------------------|
| <input checked="" type="radio"/> Y / <input type="radio"/> N | No evidence of debonding between thoracic spine flex joint and metal plates |



|                                        |                                                                                                                                                                                  |
|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Y / N                                  | No evidence of debonding between lumbar spine flex joint and metal plates                                                                                                        |
| <input checked="" type="radio"/> Y / N | Lumbar spine pitch change joint mechanism mating teeth are engaged                                                                                                               |
| OTHER                                  |                                                                                                                                                                                  |
| SHOULDER                               |                                                                                                                                                                                  |
| Y <input checked="" type="radio"/> N   | Urethane shoulder pads show no evidence of contact <ul style="list-style-type: none"> <li>Scuffing on both pads</li> </ul>                                                       |
| <input checked="" type="radio"/> Y / N | Clavicles securely attached to sternum and shoulder                                                                                                                              |
| Y <input checked="" type="radio"/> N   | No evidence of debonding, tearing, or permanent compression of posterior soft stops <ul style="list-style-type: none"> <li>Left Shoulder soft stop slightly debonding</li> </ul> |
| OTHER                                  |                                                                                                                                                                                  |
| THORAX                                 |                                                                                                                                                                                  |
| Y <input checked="" type="radio"/> N   | No evidence of contact at top, bottom, or interior faces of rib damping material <ul style="list-style-type: none"> <li>Contact on interior of rib #4, both sides</li> </ul>     |
| <input checked="" type="radio"/> Y / N | No evidence of debonding between rib damping material and ribs                                                                                                                   |
| <input checked="" type="radio"/> Y / N | CRUX anterior arms securely attached to anterior ribs                                                                                                                            |
| <input checked="" type="radio"/> Y / N | CRUX posterior arms securely attached to double gimbals, spine                                                                                                                   |
| <input checked="" type="radio"/> Y / N | Urethane bib is securely attached to ribs with no sign of tearing or washer penetration                                                                                          |
| <input checked="" type="radio"/> Y / N | Ribs securely attached to posterior spine                                                                                                                                        |
| Y <input checked="" type="radio"/> N   | Rib stiffeners show no evidence of bending (no gaps between ribs and stiffeners) <ul style="list-style-type: none"> <li>Right side rib #5</li> <li>Left rib #7</li> </ul>        |
| OTHER                                  |                                                                                                                                                                                  |

|                                        |                                                                                                                                                                      |
|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ABDOMEN                                |                                                                                                                                                                      |
| Y <input checked="" type="radio"/> N   | No evidence of tearing, cuts, or broken stitches in upper abdomen bag and zipper <ul style="list-style-type: none"> <li>Small tear in the top left corner</li> </ul> |
| <input checked="" type="radio"/> Y / N | Upper abdomen insert securely attached to spine                                                                                                                      |





|                                        |                                                                                                                                                                          |
|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                        |                                                                                                                                                                          |
| Y / N                                  | Upper abdomen insert shows no evidence of permanent set                                                                                                                  |
| Y / <input checked="" type="radio"/> N | No evidence of tearing, cuts, or broken stitches in lower abdomen bag and zipper <ul style="list-style-type: none"> <li>Broken stitches on the top right side</li> </ul> |
| <input checked="" type="radio"/> / N   | Lower abdomen insert securely attached to spine                                                                                                                          |
| <input checked="" type="radio"/> / N   | Lower abdomen insert shows no evidence of permanent set                                                                                                                  |
| OTHER                                  |                                                                                                                                                                          |
| PELVIS                                 |                                                                                                                                                                          |
| <input checked="" type="radio"/> / N   | Pelvis flesh fits securely over pelvis bones                                                                                                                             |
| <input checked="" type="radio"/> / N   | H-point tool fits securely into hole on both sides of pelvis                                                                                                             |
| OTHER                                  |                                                                                                                                                                          |
| FEMUR                                  |                                                                                                                                                                          |
| <input checked="" type="radio"/> / N   | Acetabular load cells firmly attached                                                                                                                                    |
| <input checked="" type="radio"/> / N   | Femur load cells firmly attached                                                                                                                                         |
| <input checked="" type="radio"/> / N   | No evidence of deformation of knee slider bump stop                                                                                                                      |
| Y / <input checked="" type="radio"/> N | No cuts, tears, or scuffing of knee flesh <ul style="list-style-type: none"> <li>Both knees show cuts and scuffs, loose fitting</li> </ul>                               |
| OTHER                                  |                                                                                                                                                                          |

|                                      |                                                      |
|--------------------------------------|------------------------------------------------------|
| LOWER EXTREMITY (LX)                 |                                                      |
| <input checked="" type="radio"/> / N | Rotational potentiometers in ankle securely attached |
| <input checked="" type="radio"/> / N | Achilles tendon provides resistance to dorsiflexion  |

|                                        |                                                                                                                                                              |
|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Y / N                                  | No evidence of debonding, tearing, or permanent compression of ankle soft stops                                                                              |
| OTHER                                  | Using intermediate tibia "bone" from LX-104                                                                                                                  |
| JACKET                                 |                                                                                                                                                              |
| <input checked="" type="radio"/> Y / N | Rib stiffeners show no sign of permanent deformation                                                                                                         |
| Y / <input checked="" type="radio"/> N | No evidence of tears or holes in jacket fabric, velcro, or zippers <ul style="list-style-type: none"> <li>Tearing of stitches around front collar</li> </ul> |
| OTHER                                  |                                                                                                                                                              |

## POST-TEST

### THOR Inspection Checklist

|                                                                                                                                   |                                                                 |
|-----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|
| Date: September 26, 2011                                                                                                          |                                                                 |
| NHTSA Representative: James Saunders                                                                                              |                                                                 |
| Witness(es):                                                                                                                      |                                                                 |
| Inspection type (circle one):                                                                                                     | PRE <input type="radio"/> POST <input checked="" type="radio"/> |
| Dummy S/N: 007                                                                                                                    |                                                                 |
| Dummy Description: THOR                                                                                                           |                                                                 |
| Date of last Certification or Inspection: 9/26/2011                                                                               |                                                                 |
| <u>Tests conducted since last full certification or inspection:</u>                                                               |                                                                 |
| RB0180 Buick Lacrosse                                                                                                             |                                                                 |
| <u>Known errors in data channels (no data, clipping, unexpected drops):</u>                                                       |                                                                 |
| <ul style="list-style-type: none"><li>• 3005</li><li>• 3010</li><li>• 3015</li><li>• 4001</li><li>• 4029</li><li>• 5020</li></ul> |                                                                 |
| <u>Physical evidence of damage:</u>                                                                                               |                                                                 |
| <br><br><br><br>                                                                                                                  |                                                                 |
| <u>Anecdotal evidence of damage:</u>                                                                                              |                                                                 |
| <br><br><br><br>                                                                                                                  |                                                                 |
| <u>Equipment delivered to Borrower:</u>                                                                                           |                                                                 |
| <br><br><br><br>                                                                                                                  |                                                                 |

| HEAD                                                         |                                                                                                                                                                                                                                            |
|--------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input checked="" type="radio"/> Y / <input type="radio"/> N | Rear head cap mounts securely to head                                                                                                                                                                                                      |
| <input checked="" type="radio"/> Y / <input type="radio"/> N | Head skin fits securely over skull                                                                                                                                                                                                         |
| Y / <input checked="" type="radio"/> N                       | Head skin shows no sign of tears or damage <ul style="list-style-type: none"> <li>Gouge left side of the forehead</li> </ul>                                                                                                               |
| <input checked="" type="radio"/> Y / <input type="radio"/> N | Interior components of skull cavity (ballast, accelerometer mount, accelerometers) securely attached                                                                                                                                       |
| Y / <input checked="" type="radio"/> N                       | Head securely mounted to OC joint <ul style="list-style-type: none"> <li>OC Joint wobbles, otherwise firmly attached</li> </ul>                                                                                                            |
| OTHER                                                        |                                                                                                                                                                                                                                            |
| NECK                                                         |                                                                                                                                                                                                                                            |
| <input checked="" type="radio"/> Y / <input type="radio"/> N | Neck cables slide freely through holes in neck plates                                                                                                                                                                                      |
| <input checked="" type="radio"/> Y / <input type="radio"/> N | Neck cables show no sign of fraying, broken strands, or kinking                                                                                                                                                                            |
| Y / <input checked="" type="radio"/> N                       | No evidence of debonding between neck pucks and plates<br>If N – indicate which interface (where plate/puck 1 attach to upper neck load cell): <ul style="list-style-type: none"> <li>Debonding between pecks 4-5, rear surface</li> </ul> |
| Y / <input checked="" type="radio"/> N                       | No evidence of debonding or permanent compression in neck soft stop assemblies <ul style="list-style-type: none"> <li>Front soft stop debonding</li> </ul>                                                                                 |
| <input checked="" type="radio"/> Y / <input type="radio"/> N | Neck securely attached to upper neck load cell                                                                                                                                                                                             |
| <input checked="" type="radio"/> Y / <input type="radio"/> N | Neck securely attached to lower neck load cell                                                                                                                                                                                             |
| <input checked="" type="radio"/> Y / <input type="radio"/> N | Neck pitch change joint mechanism mating teeth are engaged                                                                                                                                                                                 |
| OTHER                                                        |                                                                                                                                                                                                                                            |

| SPINE                                                        |                                                                             |
|--------------------------------------------------------------|-----------------------------------------------------------------------------|
| <input checked="" type="radio"/> Y / <input type="radio"/> N | No evidence of debonding between thoracic spine flex joint and metal plates |





|                                        |                                                                                                                                                                                  |
|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Y / N                                  | No evidence of debonding between lumbar spine flex joint and metal plates                                                                                                        |
| <input checked="" type="radio"/> Y / N | Lumbar spine pitch change joint mechanism mating teeth are engaged                                                                                                               |
| OTHER                                  |                                                                                                                                                                                  |
| SHOULDER                               |                                                                                                                                                                                  |
| Y <input checked="" type="radio"/> N   | Urethane shoulder pads show no evidence of contact <ul style="list-style-type: none"> <li>Scuffing on both pads</li> </ul>                                                       |
| <input checked="" type="radio"/> Y / N | Clavicles securely attached to sternum and shoulder                                                                                                                              |
| Y <input checked="" type="radio"/> N   | No evidence of debonding, tearing, or permanent compression of posterior soft stops <ul style="list-style-type: none"> <li>Left Shoulder soft stop slightly debonding</li> </ul> |
| OTHER                                  |                                                                                                                                                                                  |
| THORAX                                 |                                                                                                                                                                                  |
| Y <input checked="" type="radio"/> N   | No evidence of contact at top, bottom, or interior faces of rib damping material <ul style="list-style-type: none"> <li>Contact on interior of rib #4, both sides</li> </ul>     |
| <input checked="" type="radio"/> Y / N | No evidence of debonding between rib damping material and ribs                                                                                                                   |
| <input checked="" type="radio"/> Y / N | CRUX anterior arms securely attached to anterior ribs                                                                                                                            |
| <input checked="" type="radio"/> Y / N | CRUX posterior arms securely attached to double gimbals, spine                                                                                                                   |
| <input checked="" type="radio"/> Y / N | Urethane bib is securely attached to ribs with no sign of tearing or washer penetration                                                                                          |
| <input checked="" type="radio"/> Y / N | Ribs securely attached to posterior spine                                                                                                                                        |
| Y <input checked="" type="radio"/> N   | Rib stiffeners show no evidence of bending (no gaps between ribs and stiffeners) <ul style="list-style-type: none"> <li>Right side rib #5</li> <li>Left rib #7</li> </ul>        |
| OTHER                                  |                                                                                                                                                                                  |

|                                        |                                                                                                                                                                      |
|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ABDOMEN                                |                                                                                                                                                                      |
| Y <input checked="" type="radio"/> N   | No evidence of tearing, cuts, or broken stitches in upper abdomen bag and zipper <ul style="list-style-type: none"> <li>Small tear in the top left corner</li> </ul> |
| <input checked="" type="radio"/> Y / N | Upper abdomen insert securely attached to spine                                                                                                                      |



|                                        |                                                                                                                                                                          |
|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                        |                                                                                                                                                                          |
| Y / N                                  | Upper abdomen insert shows no evidence of permanent set                                                                                                                  |
| Y / <input checked="" type="radio"/> N | No evidence of tearing, cuts, or broken stitches in lower abdomen bag and zipper <ul style="list-style-type: none"> <li>Broken stitches on the top right side</li> </ul> |
| <input checked="" type="radio"/> / N   | Lower abdomen insert securely attached to spine                                                                                                                          |
| <input checked="" type="radio"/> / N   | Lower abdomen insert shows no evidence of permanent set                                                                                                                  |
| OTHER                                  |                                                                                                                                                                          |
| PELVIS                                 |                                                                                                                                                                          |
| <input checked="" type="radio"/> / N   | Pelvis flesh fits securely over pelvis bones                                                                                                                             |
| <input checked="" type="radio"/> / N   | H-point tool fits securely into hole on both sides of pelvis                                                                                                             |
| OTHER                                  |                                                                                                                                                                          |
| FEMUR                                  |                                                                                                                                                                          |
| <input checked="" type="radio"/> / N   | Acetabular load cells firmly attached                                                                                                                                    |
| <input checked="" type="radio"/> / N   | Femur load cells firmly attached                                                                                                                                         |
| <input checked="" type="radio"/> / N   | No evidence of deformation of knee slider bump stop                                                                                                                      |
| Y / <input checked="" type="radio"/> N | No cuts, tears, or scuffing of knee flesh <ul style="list-style-type: none"> <li>Both knees show cuts and scuffs, loose fitting</li> </ul>                               |
| OTHER                                  |                                                                                                                                                                          |

|                                      |                                                      |
|--------------------------------------|------------------------------------------------------|
| LOWER EXTREMITY (LX)                 |                                                      |
| <input checked="" type="radio"/> / N | Rotational potentiometers in ankle securely attached |
| <input checked="" type="radio"/> / N | Achilles tendon provides resistance to dorsiflexion  |

|                                        |                                                                                                                                                                |
|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Y / N                                  | No evidence of debonding, tearing, or permanent compression of ankle soft stops                                                                                |
| OTHER                                  |                                                                                                                                                                |
| JACKET                                 |                                                                                                                                                                |
| <input checked="" type="radio"/> Y / N | Rib stiffeners show no sign of permanent deformation                                                                                                           |
| Y / <input checked="" type="radio"/> N | No evidence of tears or holes in jacket fabric, velcro, or zippers <ul style="list-style-type: none"> <li>• Tearing of stitches around front collar</li> </ul> |
| OTHER                                  |                                                                                                                                                                |

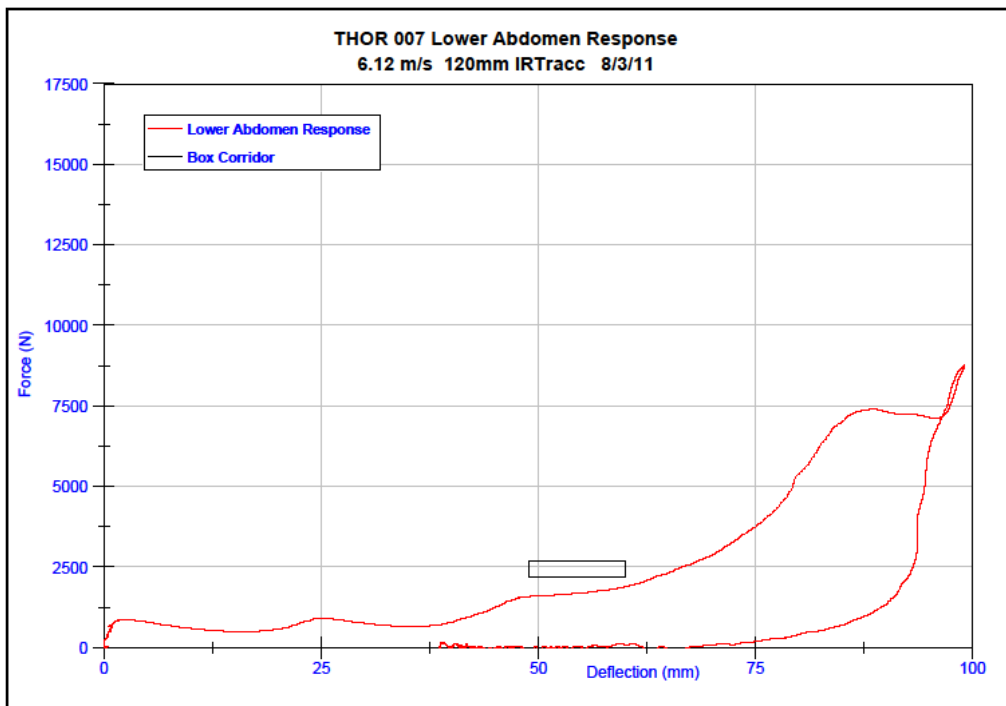
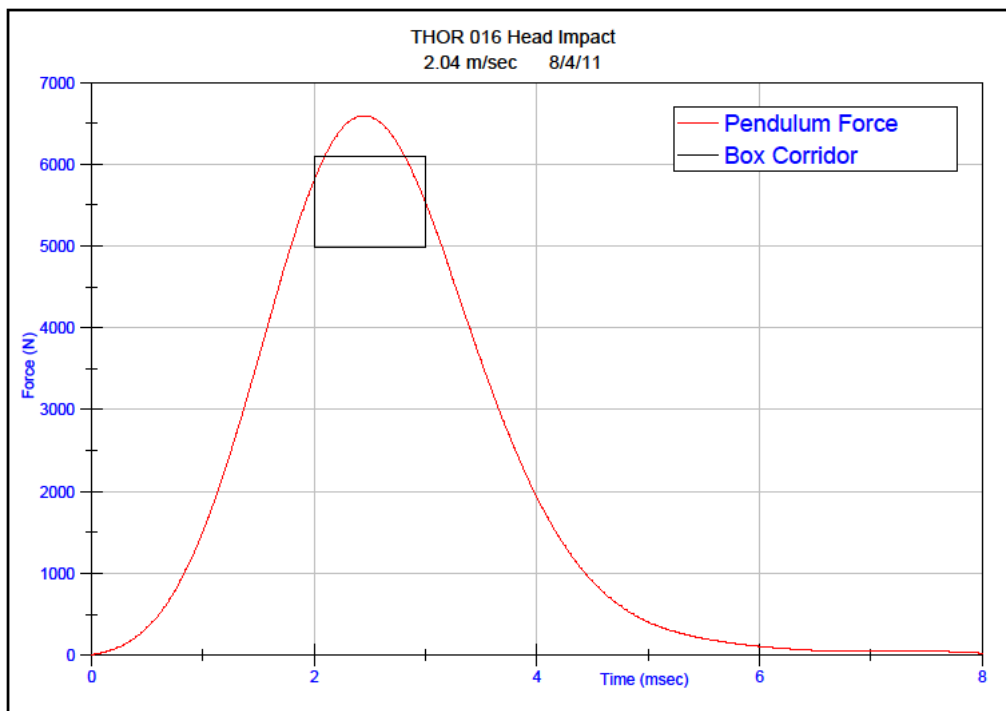
## Dummy Calibration Plots

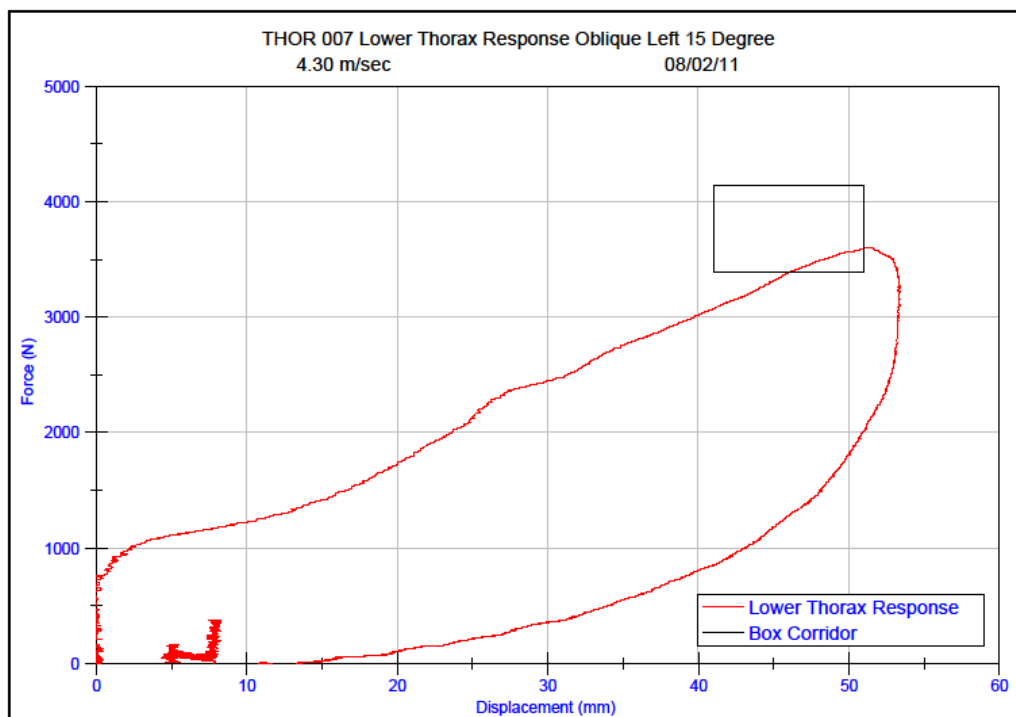
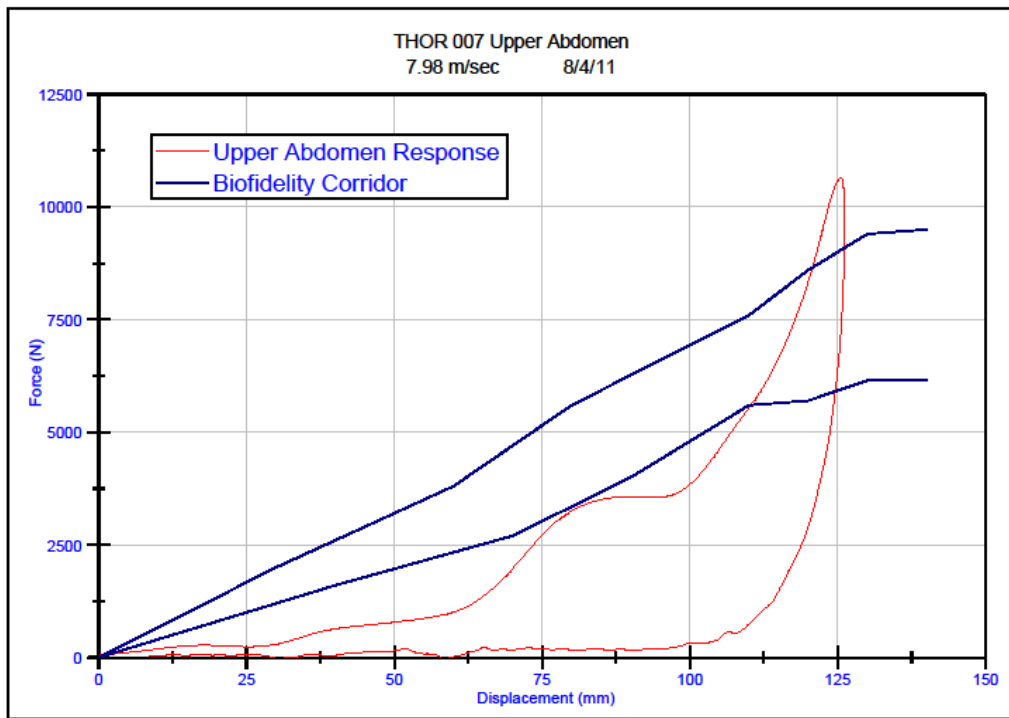
RB0180

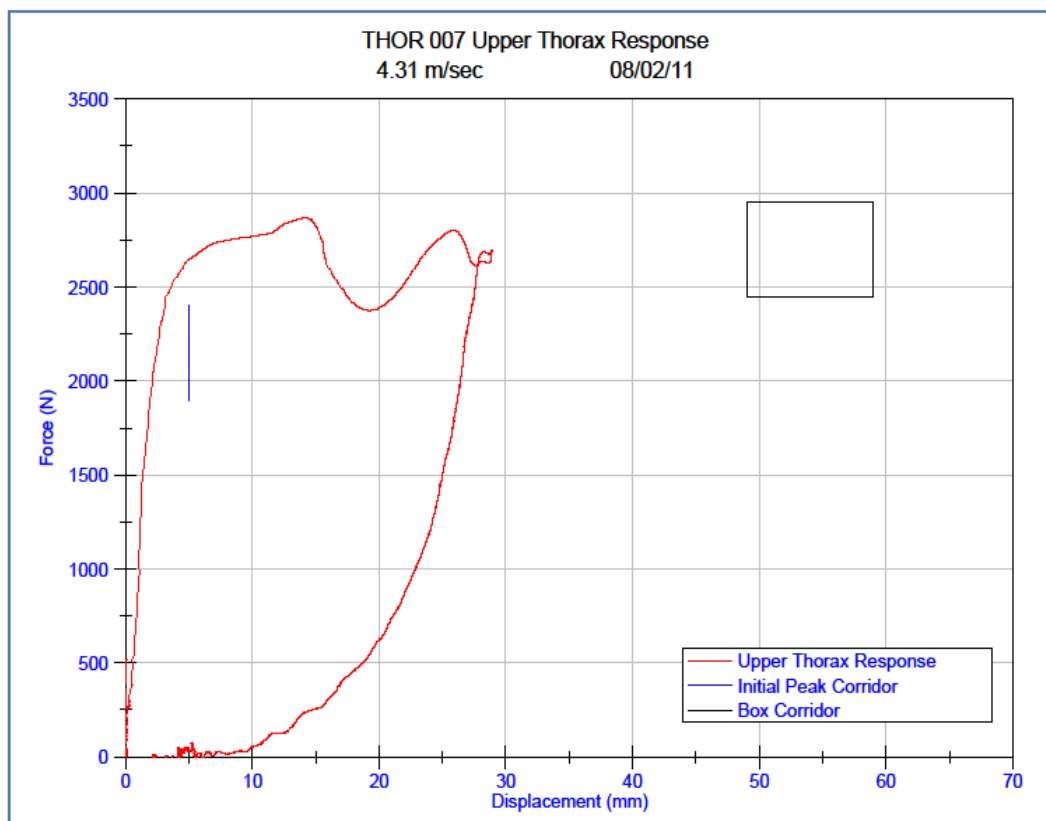
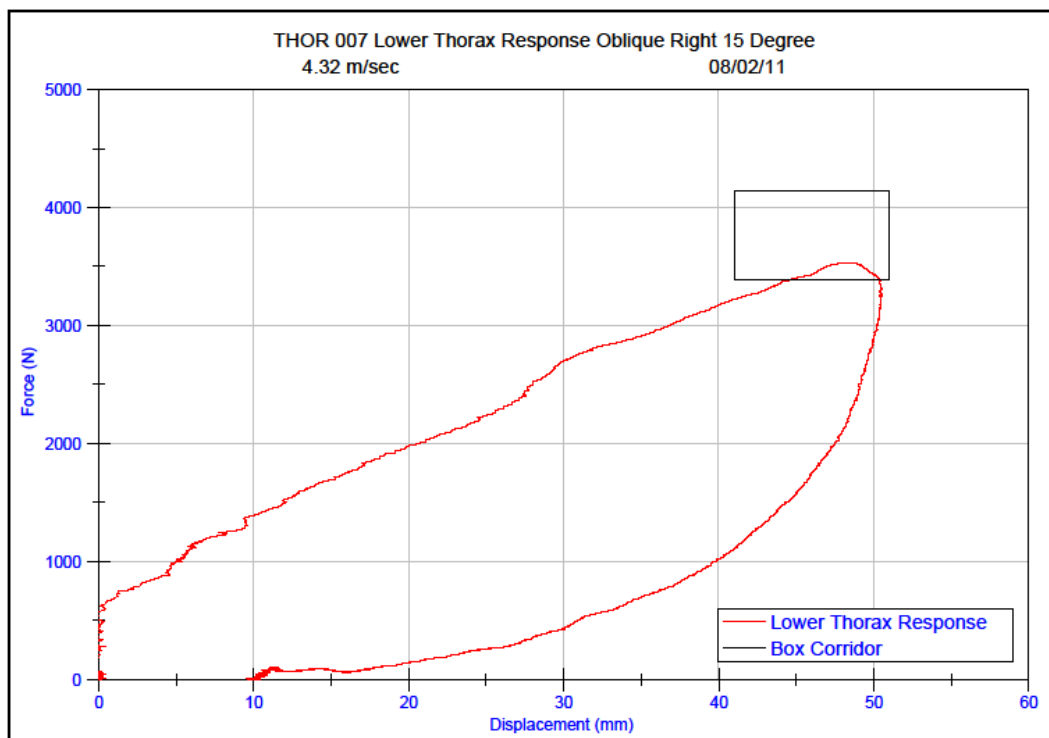
C-14

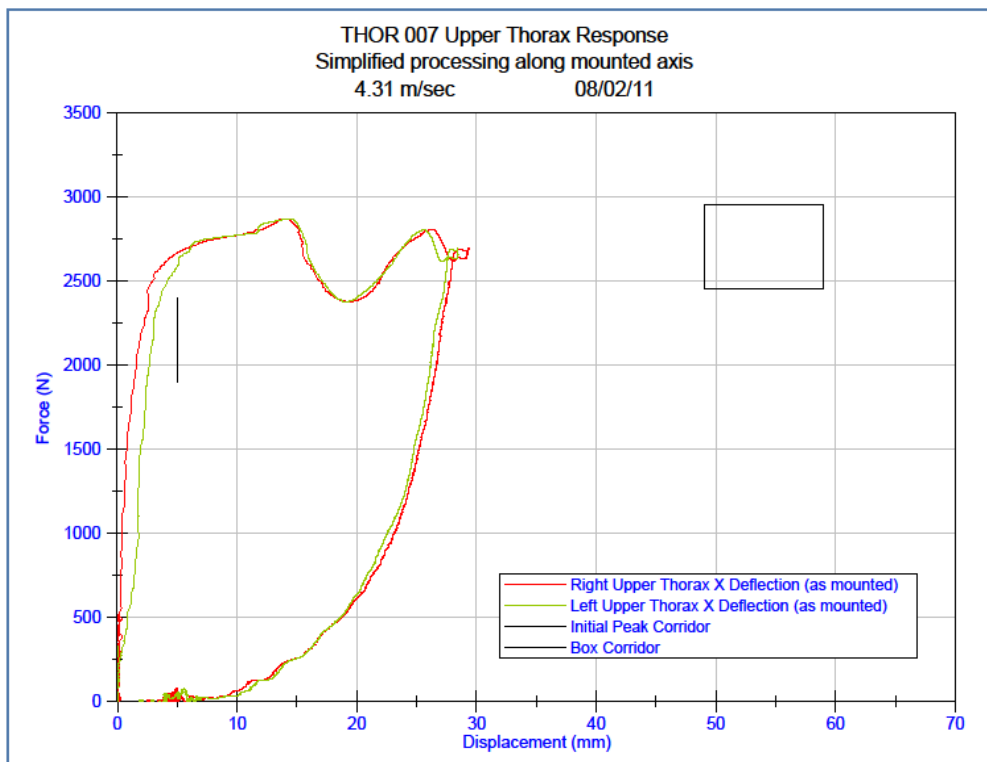
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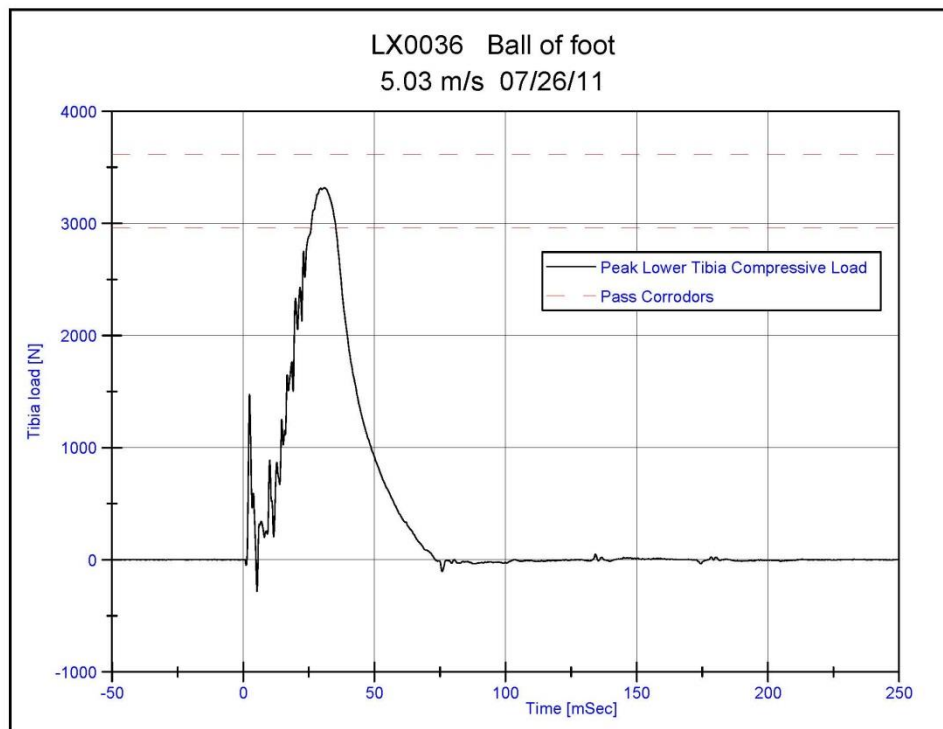


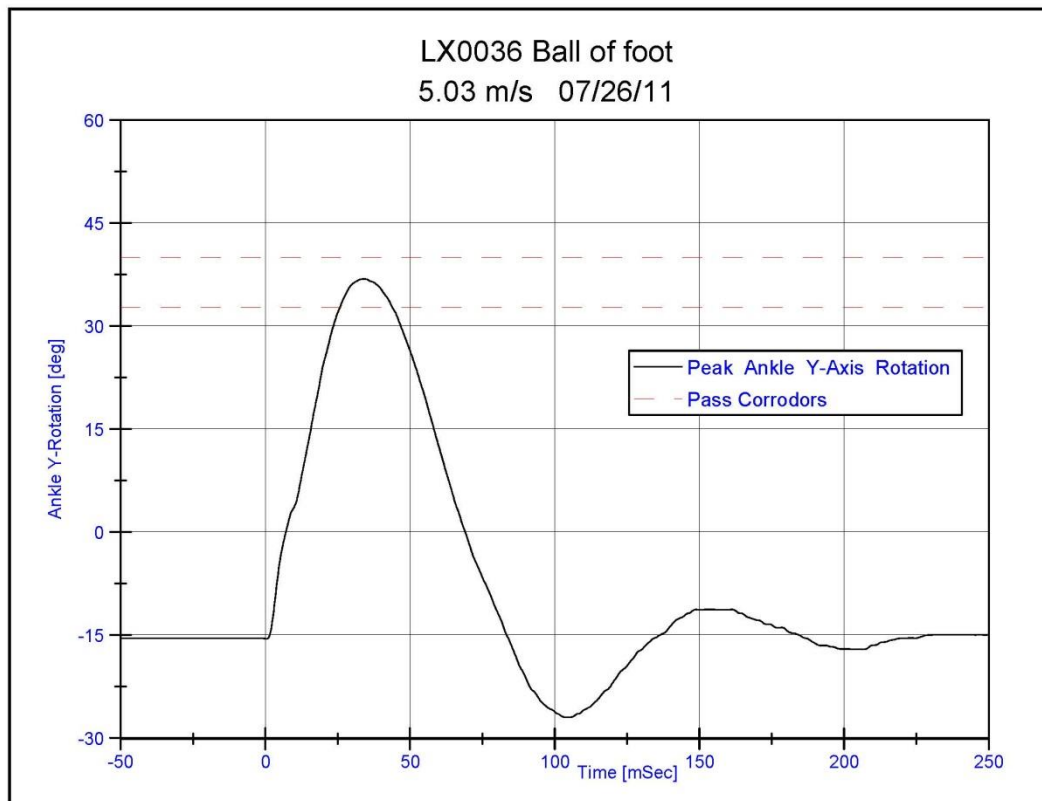
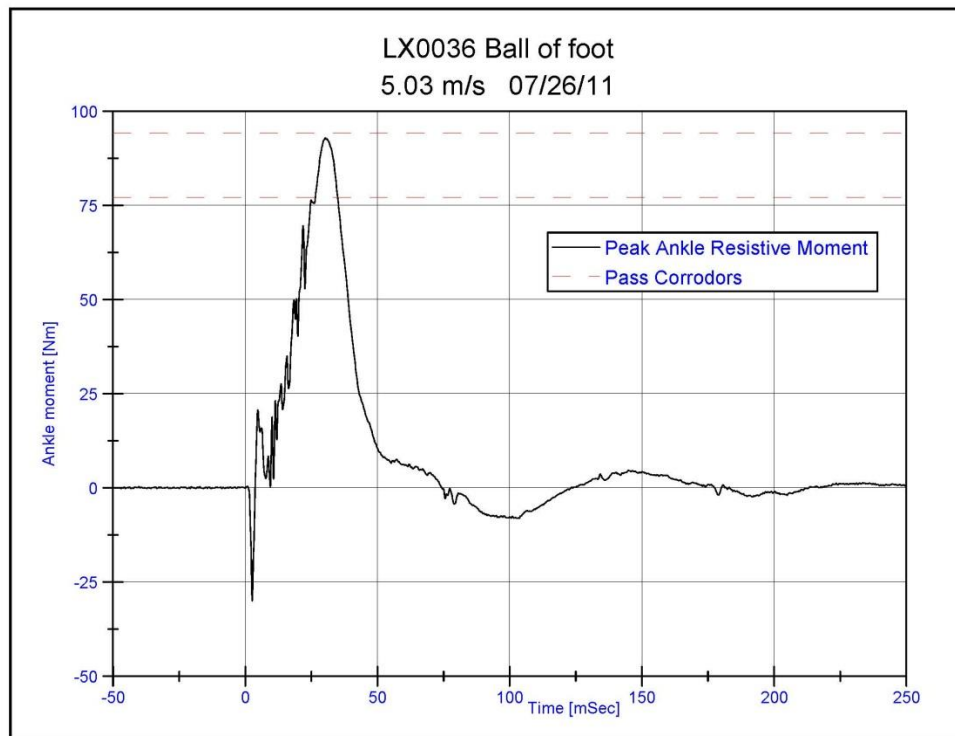




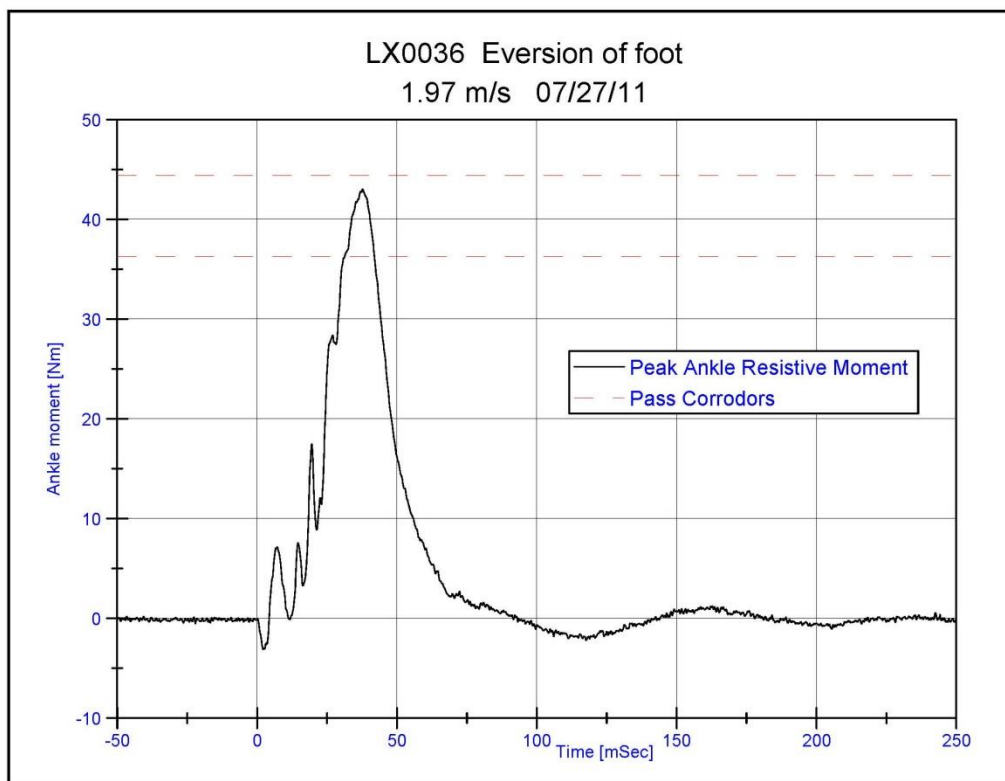
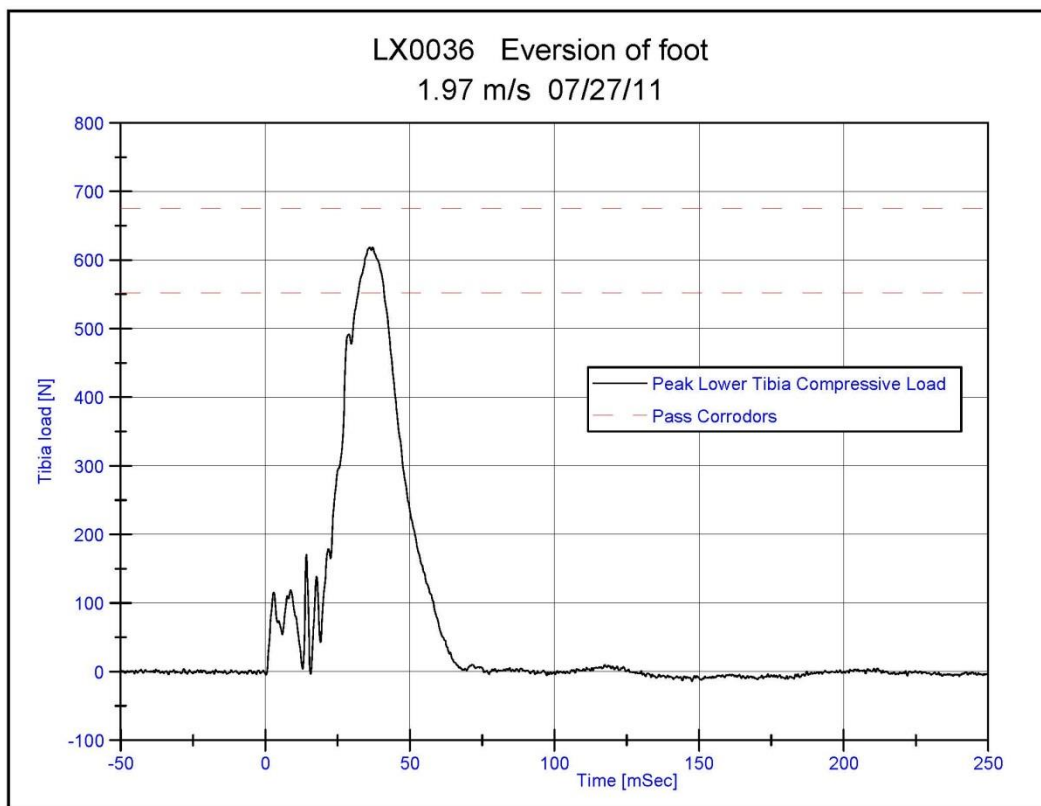


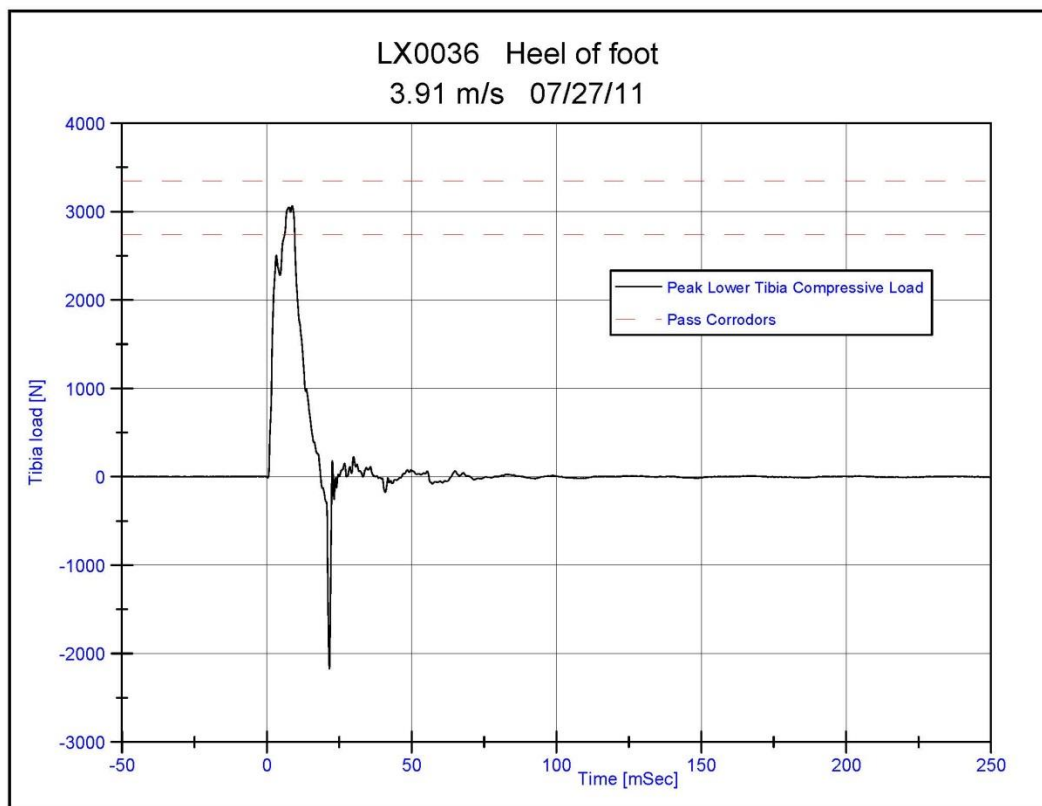
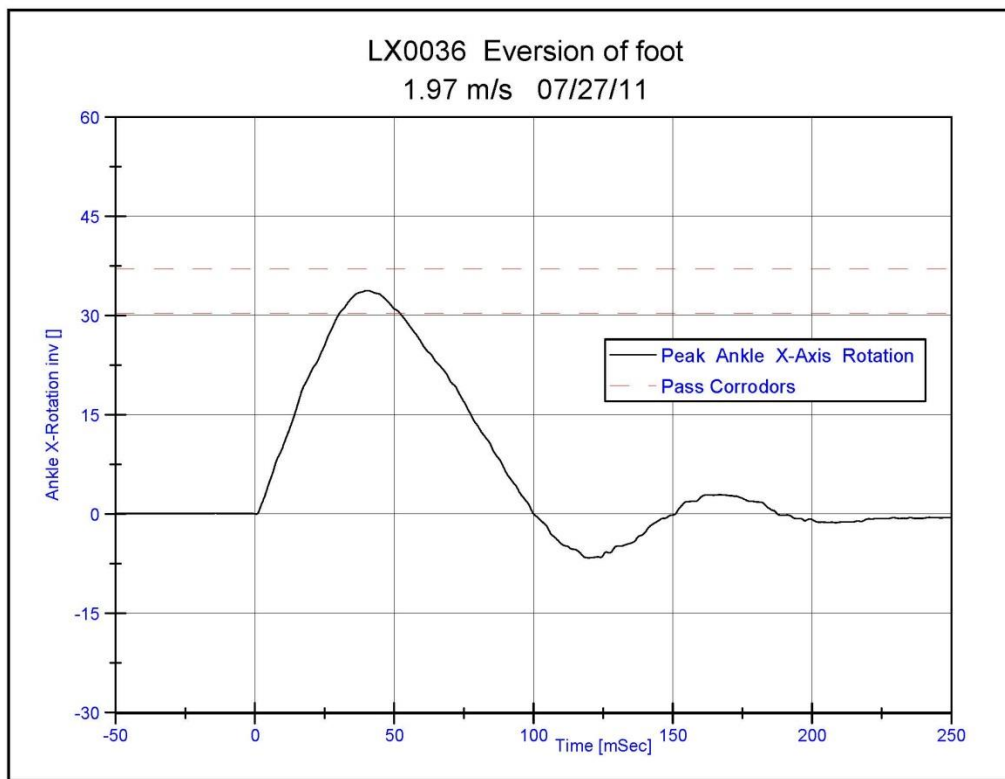
LEG S/N: LX036/ LX037

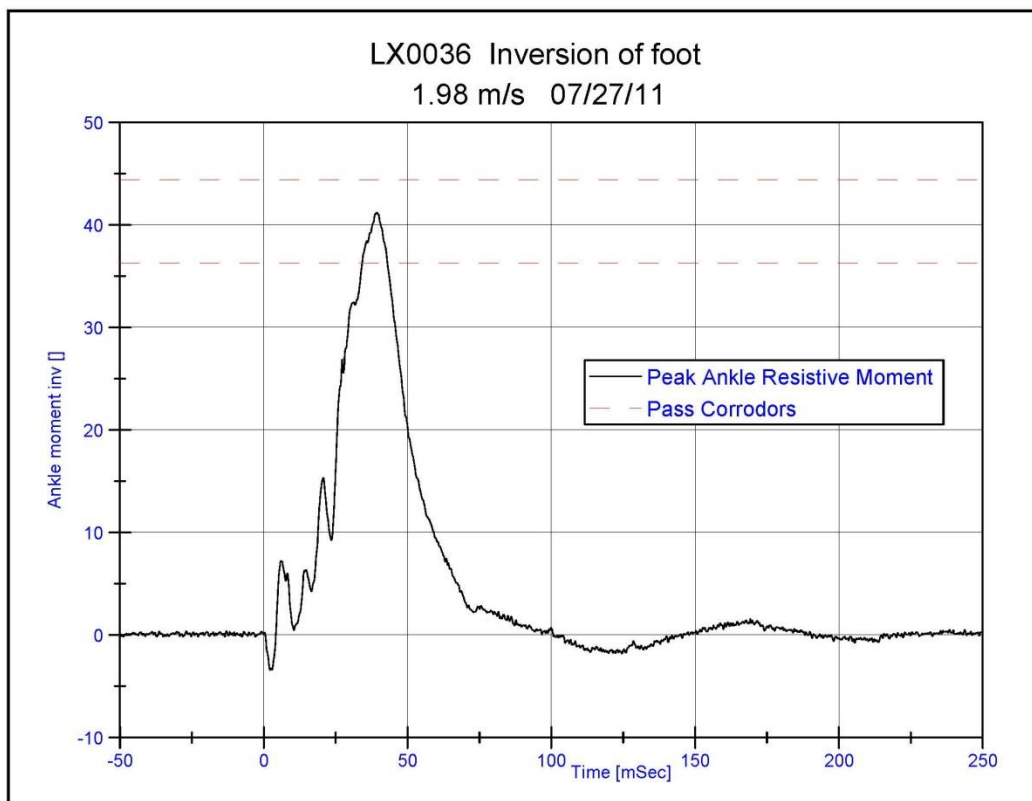
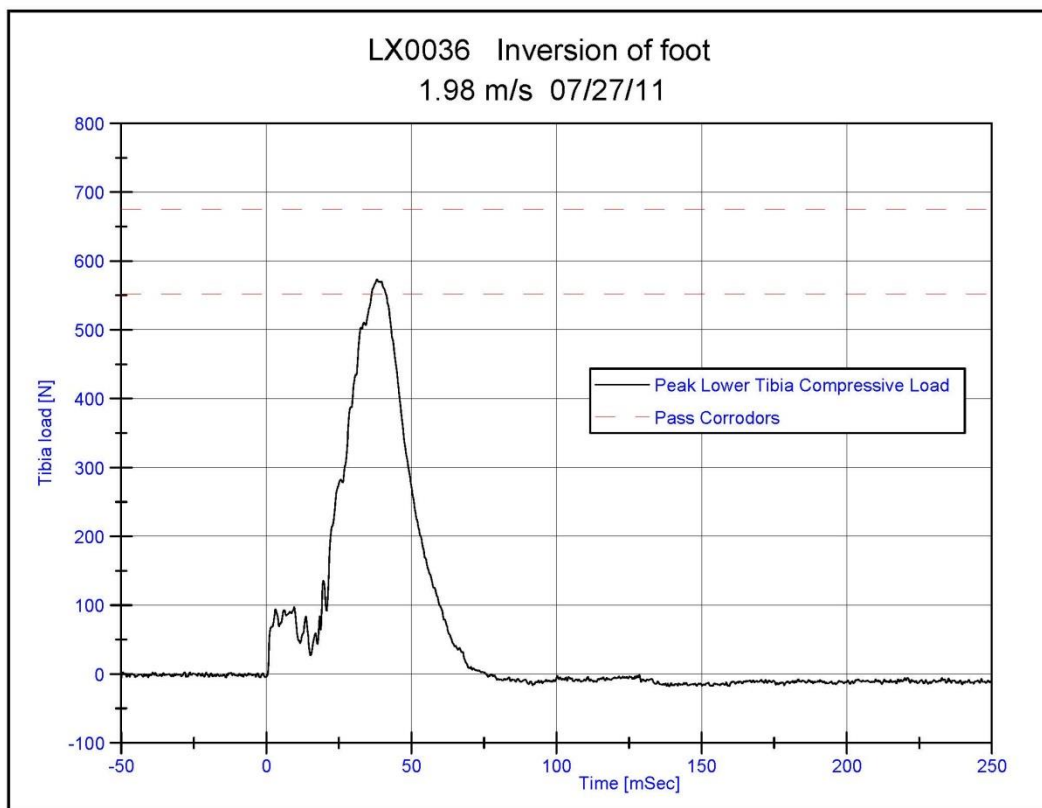


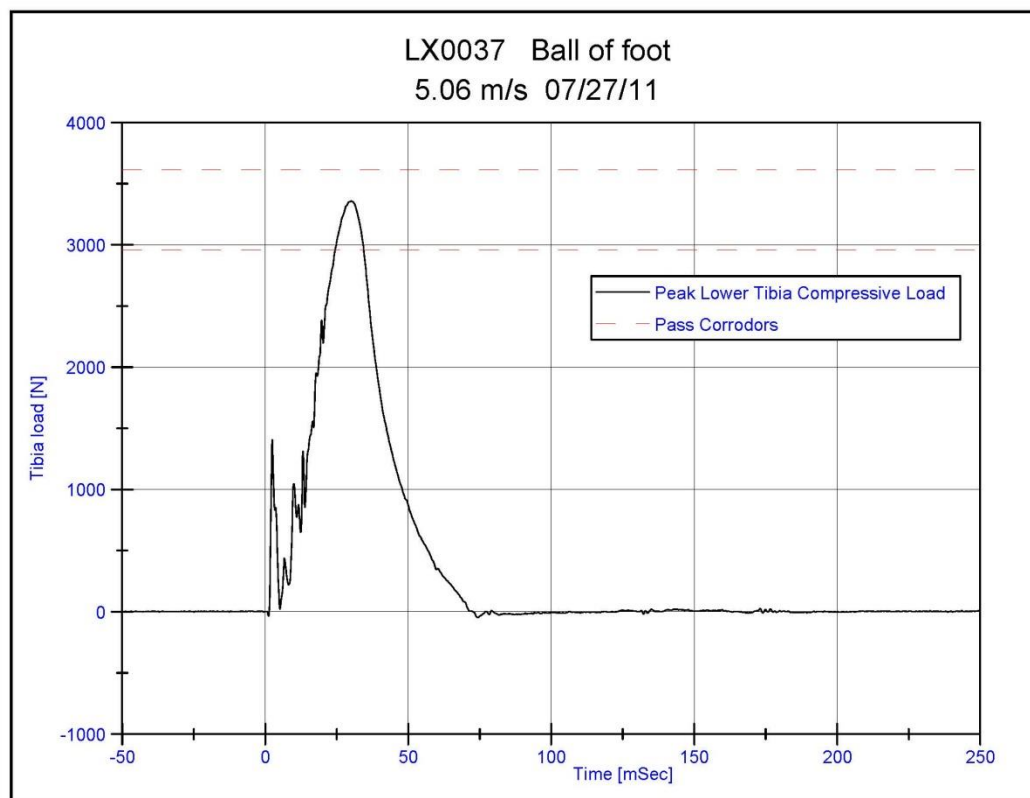
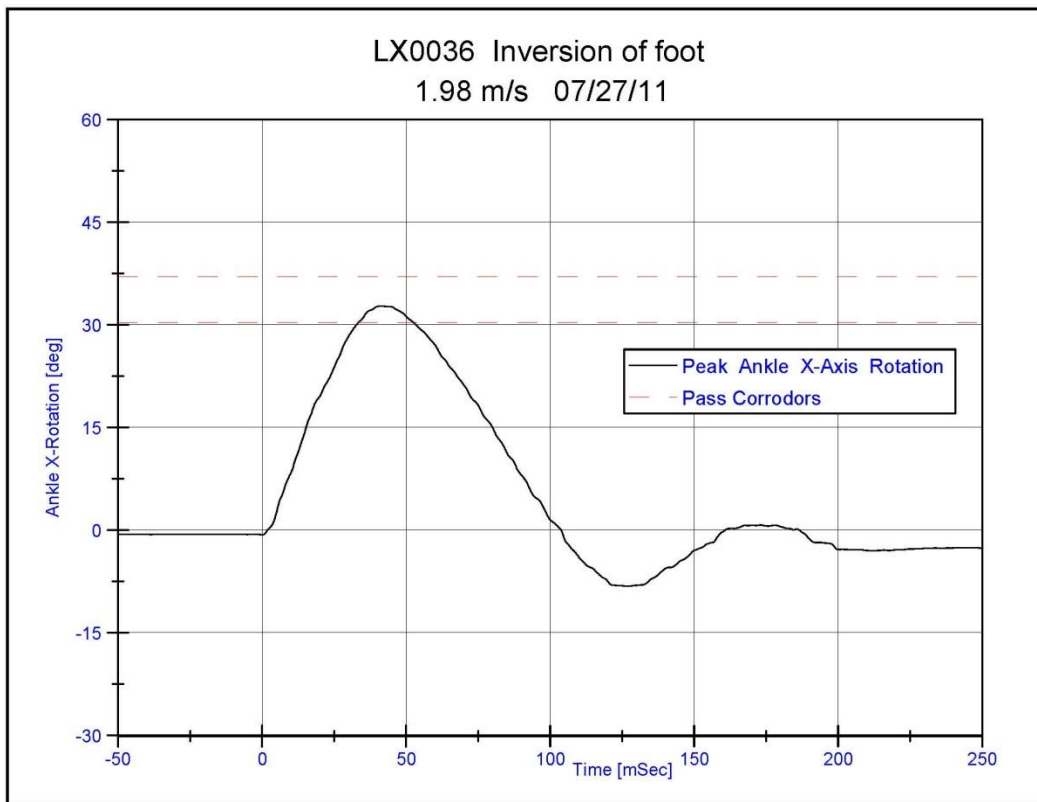


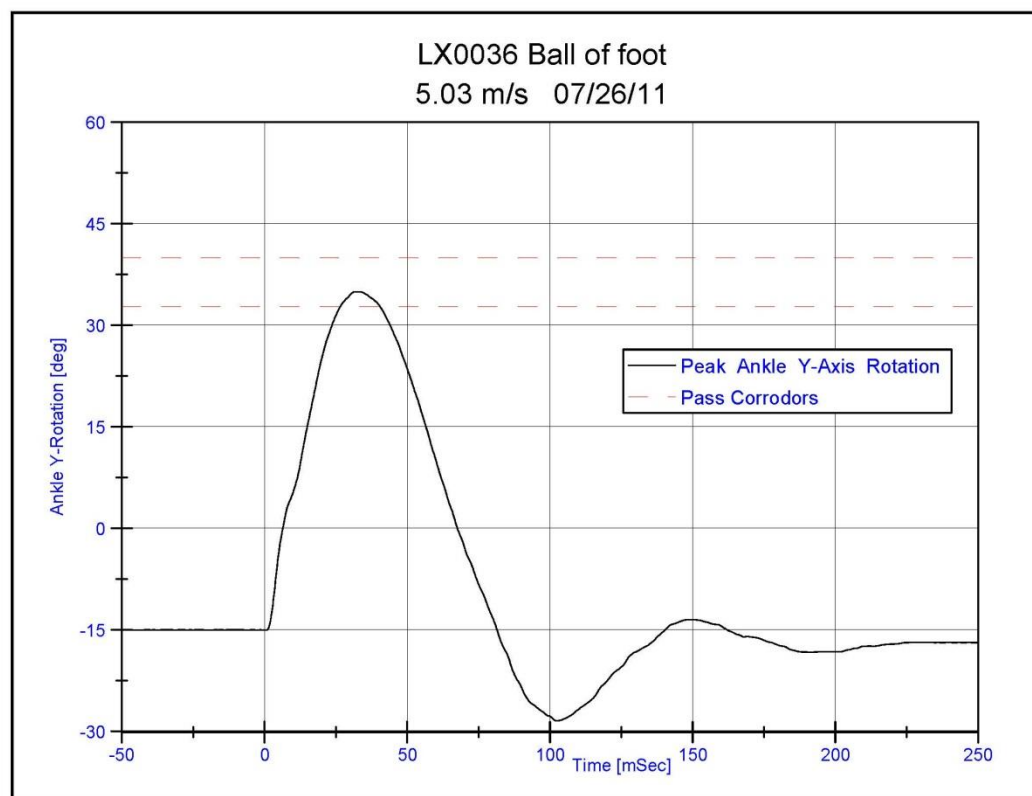
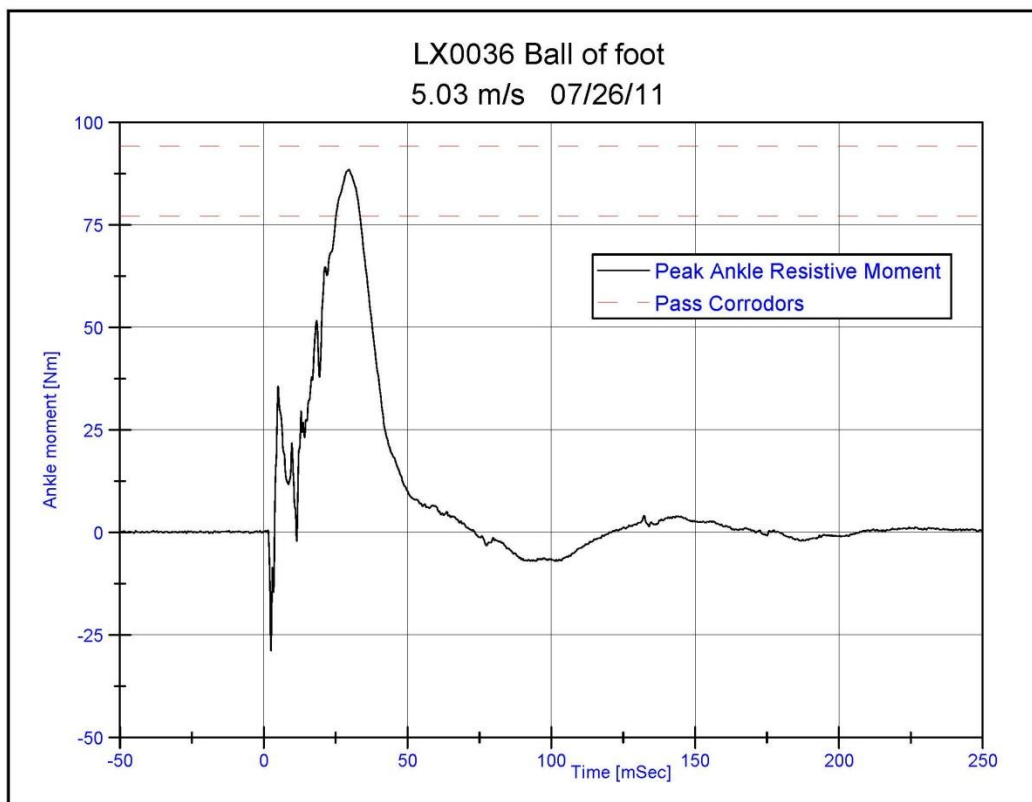




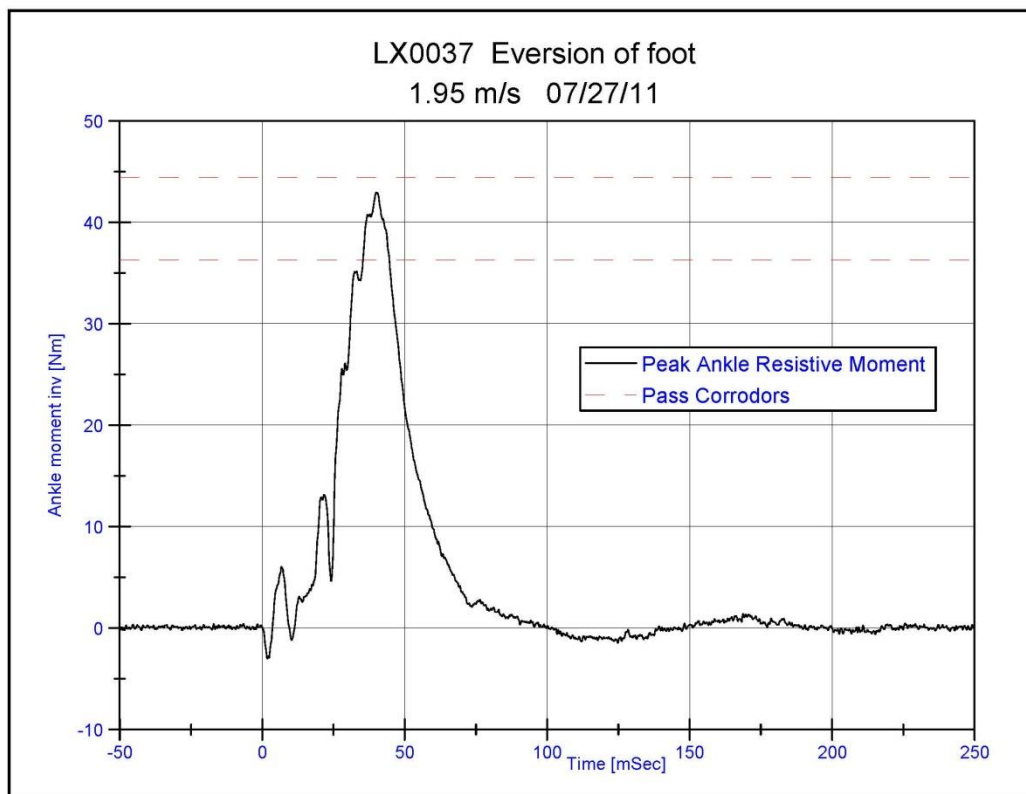
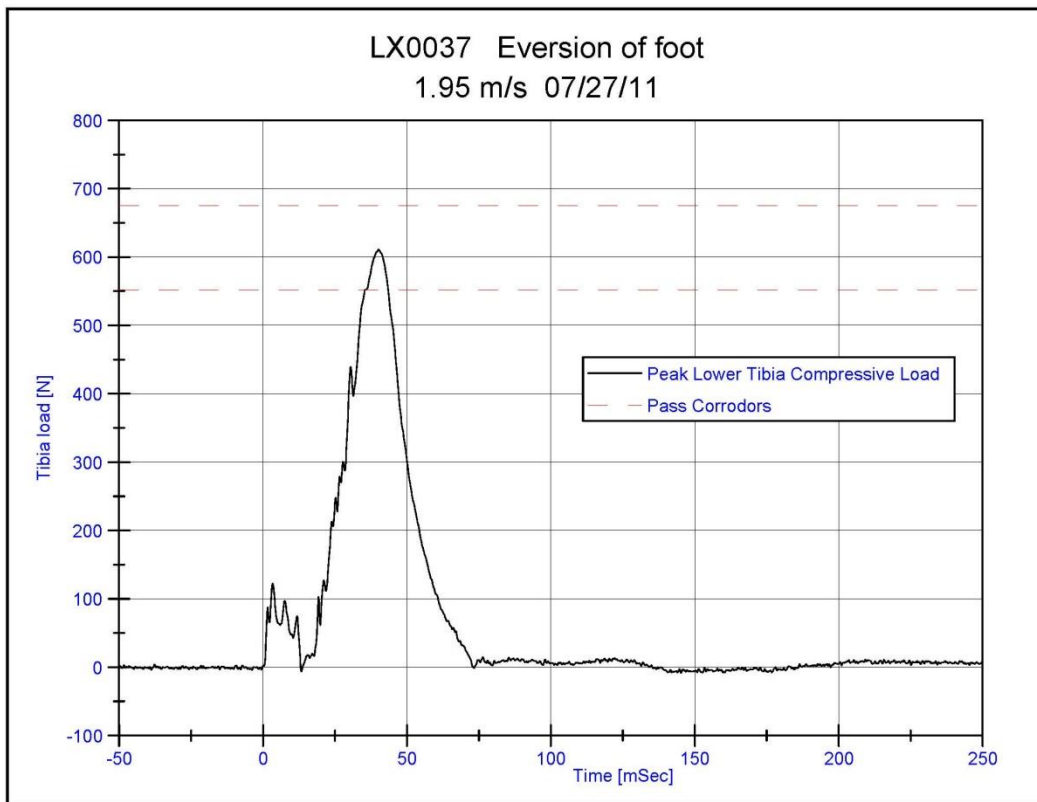


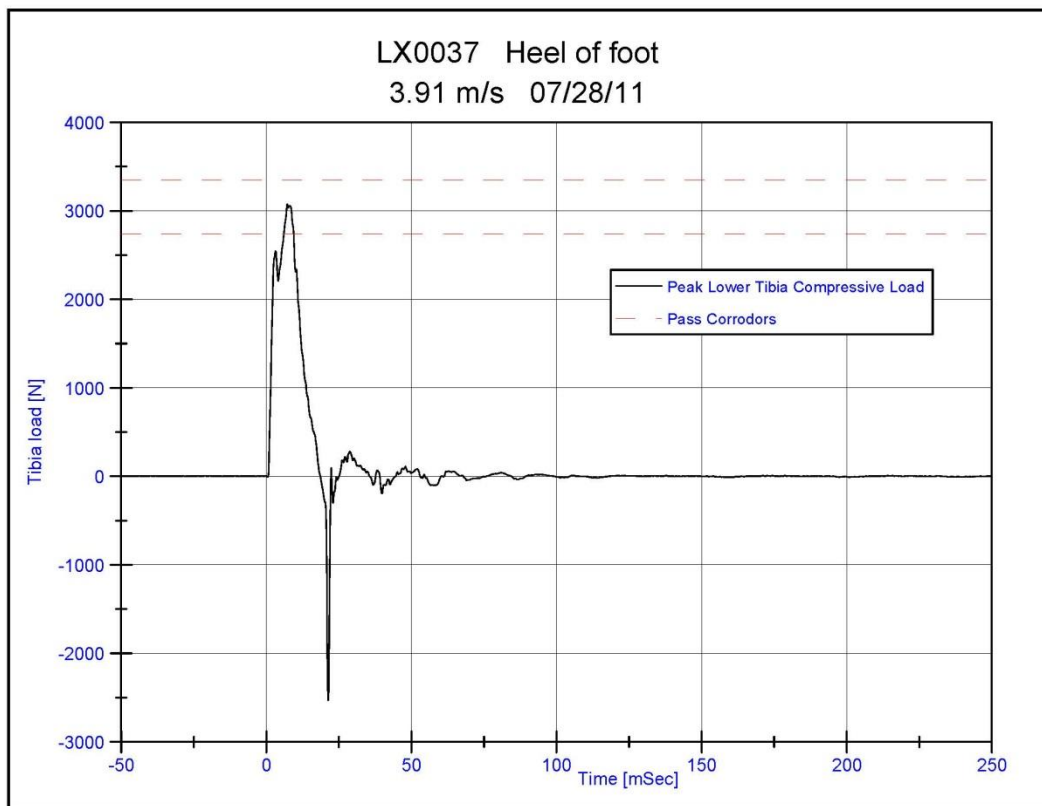
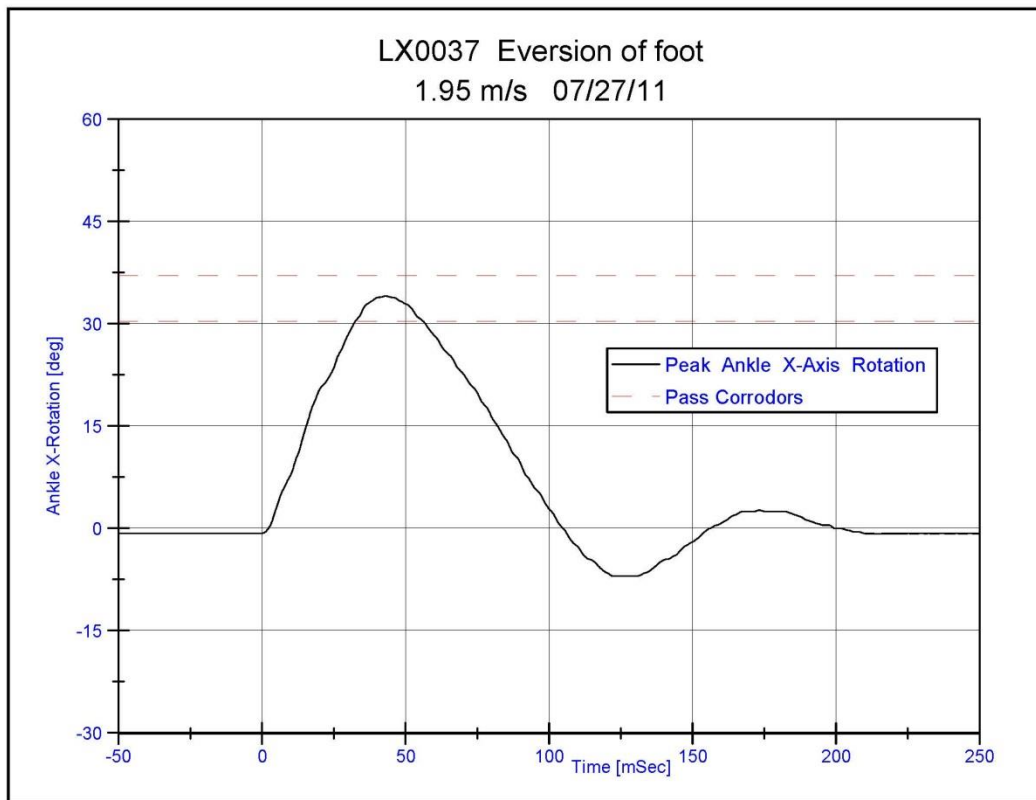


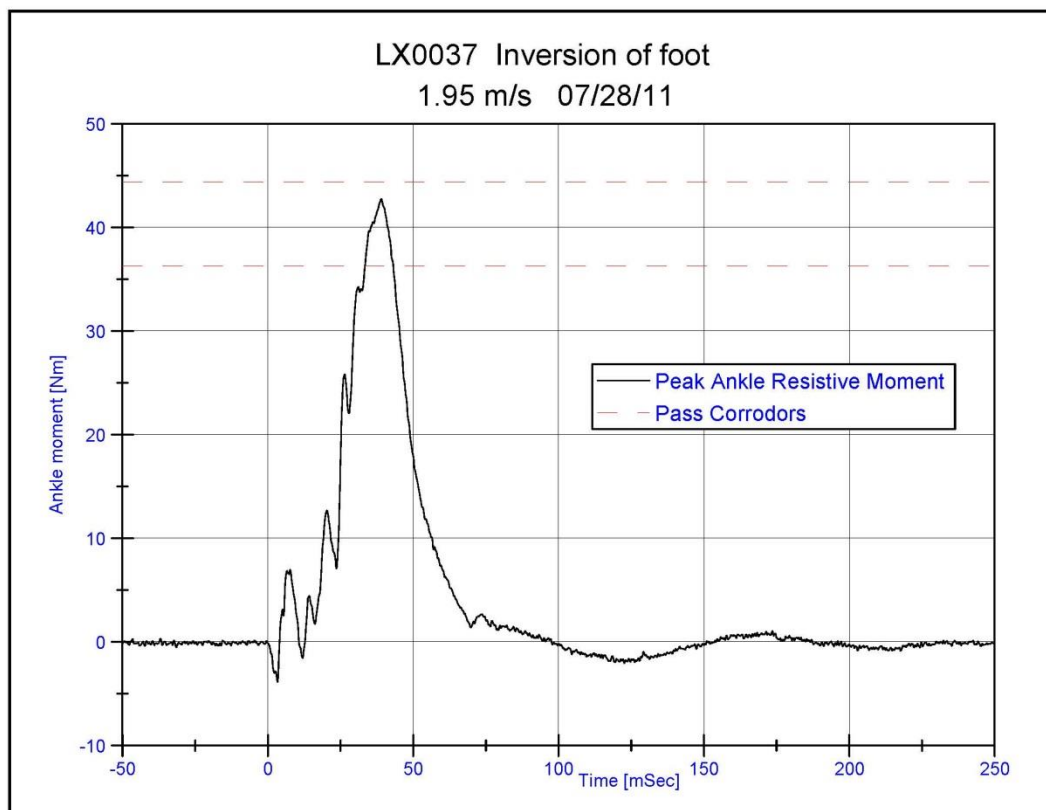
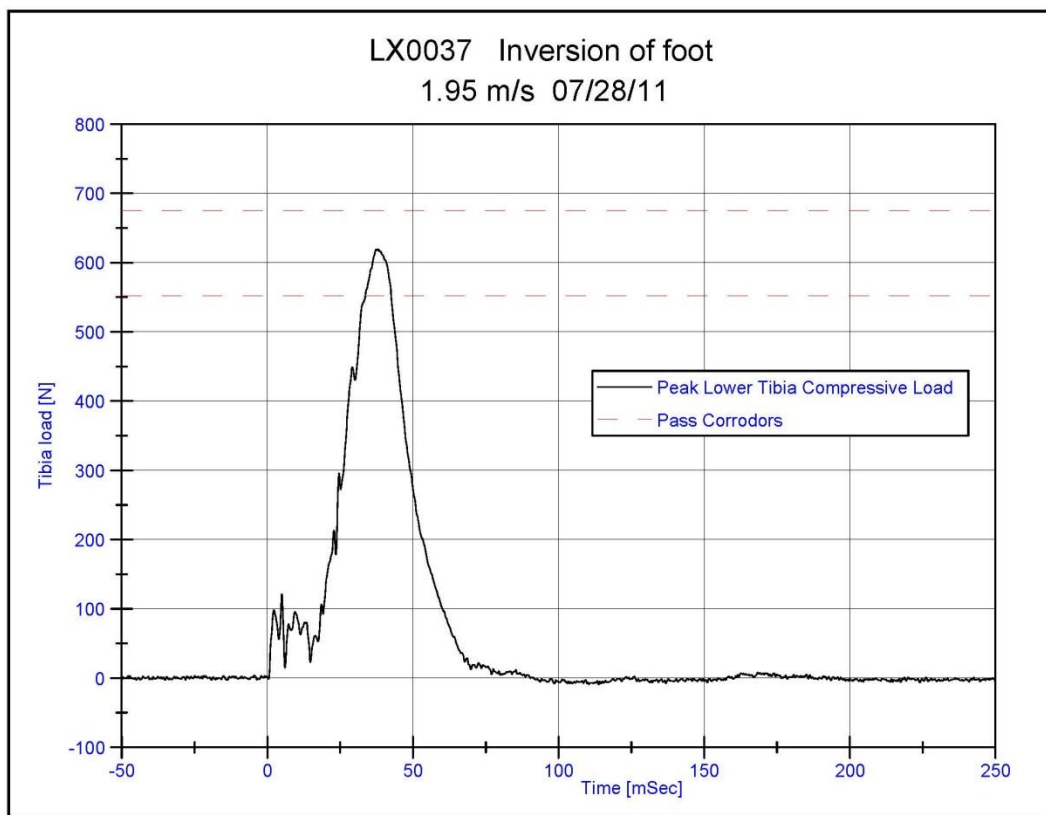


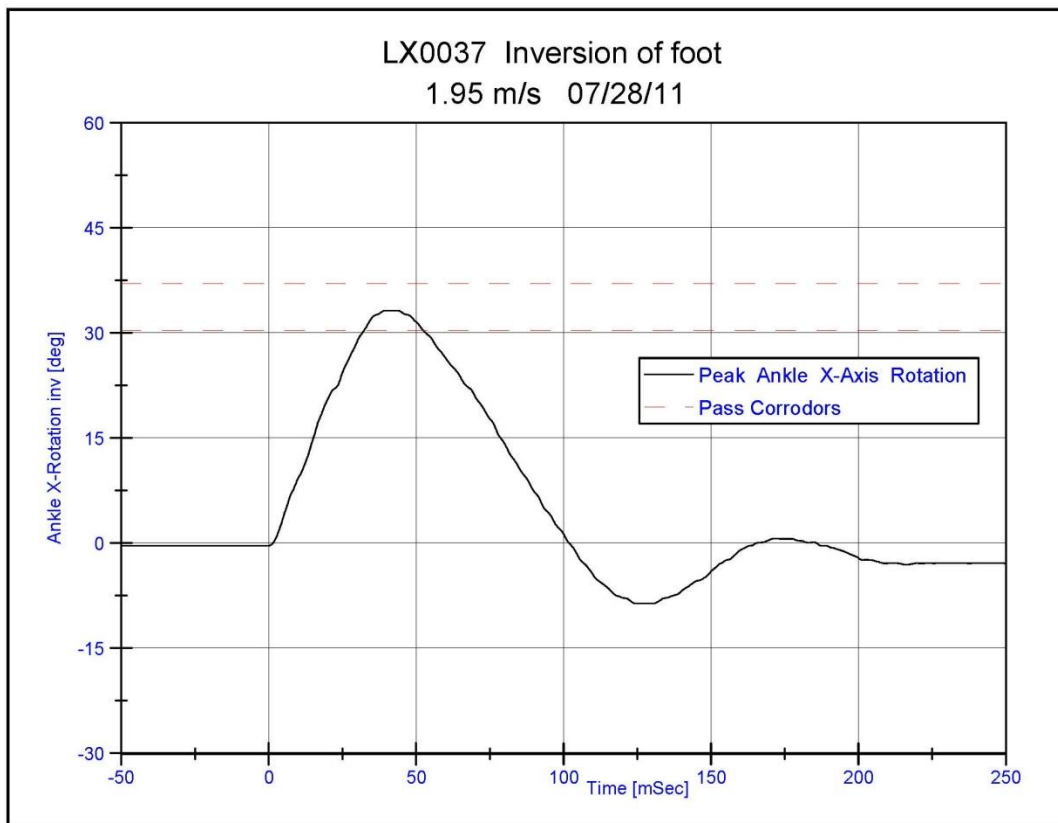












APPENDIX D

ADDITIONAL MEASUREMENTS & DATA CALCULATIONS

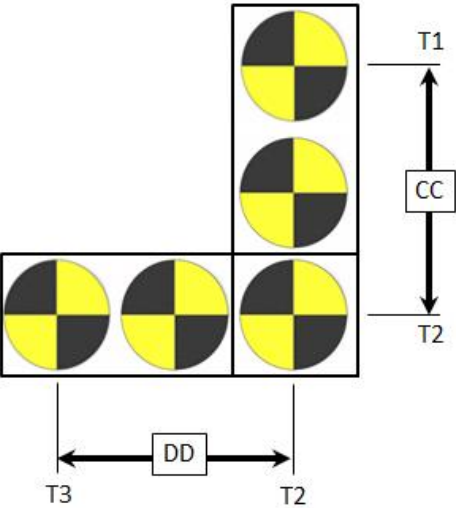
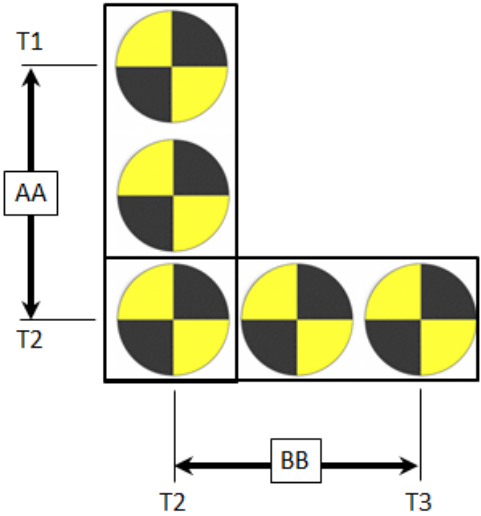
ADDITIONAL TARGETS

Overhead Reference Targets:

|               |            |    |
|---------------|------------|----|
| AA (T1 to T2) | <u>236</u> | mm |
| BB (T2 to T3) | <u>235</u> | mm |

Ground Reference Targets:

|               |            |    |
|---------------|------------|----|
| CC (T1 to T2) | <u>235</u> | mm |
| DD (T2 to T3) | <u>235</u> | mm |





## **APPENDIX E**

### **POSITIONING PROCEDURE FOR REAR SEAT PART 572O 5<sup>TH</sup> FEMALE ATD**

The rear seat 5<sup>th</sup> female was positioned using a combination of the FMVSS 214D side impact and FMVSS 208 seating procedures.

The lateral seat centerline was determined by following the FMVSS 214D seating procedures for the rear seat.. Once the Part 572O 5<sup>th</sup> female dummy was located on the lateral centerline, the dummy was positioned following FMVSS 208 as if would be if it were in the front seating position. The legs would be positioned at the 120 degree angle and the pelvis would be pushed back against the seatback until the calves contacted the seat cushion. If the seatback was adjustable, the seatback would be raised to level the head. The 5<sup>th</sup> female dummy used in this test series had a lower neck transducer which prevented using the neck bracket as an adjustment to level the head.

**APPENDIX F**

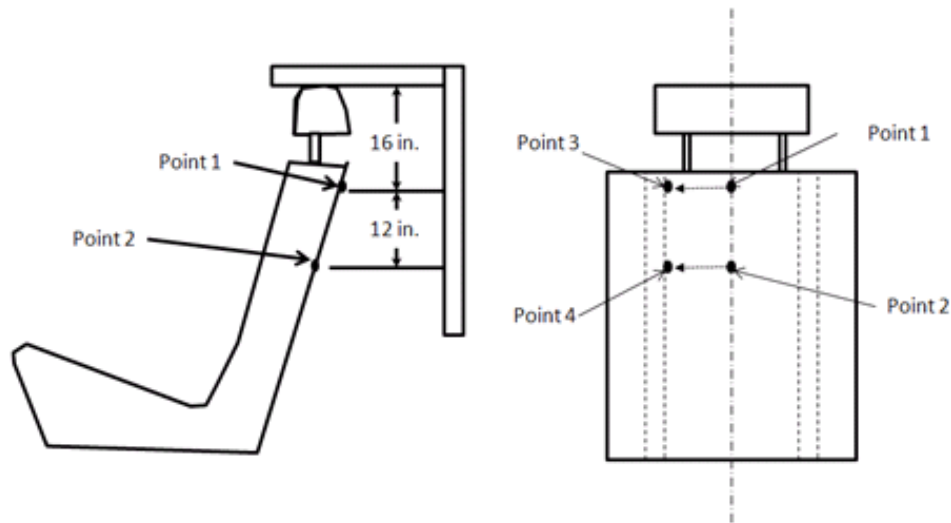
**CMM MEASUREMENT PROCEDURES**

## SECTION F.1

### SEAT BACK MEASUREMENT PROCEDURE

The following procedure was used in obtaining the required seat back measurements, please see the below diagram for additional clarification:

1. Measure Points 3 and 4 on the using the following method after positioning the dummy and head restraint:
2. Place a level at the center of the head restraint and make sure it is level to the horizontal
3. Measure down 16 inches from the bottom of the level in the vertical direction
4. Project a line in the longitudinal direction until contact with seat and mark point 1 with a marker
5. Project another line in the longitudinal direction until contact with seat and mark point 2 with a marker
6. Push on the seat fabric at point 1 and determine if there is any structure. Do not push in the longitudinal direction more than an inch
7. If no structure found push on the seat cloth and move in the lateral direction toward the outboard of the seat until seat structure is found
8. Cut a slit in the seat fabric
9. Mark Point 3 at the begin on the structure and measure the point
10. Perform the same procedure to determine Point 4 using Point 2



## SECTION F.2

### DOOR SILL INTRUSION MEASUREMENT PROCEDURE

The following procedure was conducted in order to obtain the required door sill intrusion measurements for this test. Please see the below picture for further clarifications:

1. Put steering wheel in center position. Create a horizontal plane (plane 1) that passes through the center of the steering wheel.
2. Point 1: Mark the sheet metal at the intersection of plane 1 and the outer edge of rubber part of the door sill running down the A-pillar.
3. Point 22: Mark the sheet metal at the intersection of plane 1 and the outer edge of rubber part of the door sill running down the B-pillar.
4. Mark 20 evenly spaced points between points 1 and 22 along the outer edge of the rubber door sill on the sheet metal. (A tape measure can be used to mark these points).
5. Mark 20 evenly spaced points between points 22 and 1 along the outer edge of the rubber door sill on the sheet metal. (A tape measure can be used to mark these points).
6. Measure points using CMM
7. Record in the appropriate data sheet and calculate the difference by subtracting the post-test minus the pre-test. A picture with the points labeled shall be included on the data sheet. All points shall be visible in the pictures.
8. Repeat on the passenger door.



## SECTION F.3

### VEHICLE EXTERIOR CRUSH PROFILE PROCEDURE

1. Expose the bumper beam and level the vehicle such that all attitudes are within 5 mm.
2. Cross section A-A is defined as a horizontal plane passing through the center of the front bumper beam at the centerline of the vehicle (Figure F.3.1). Record the height of this plane (d1) and take enough points at this height to create an exterior cross-section of the vehicle.
3. Perform the same procedure for cross-section B-B. Cross section B-B is defined as a plane passing through the top the upper radiator support.
4. Post-test put the vehicle back to its original coordinate system (Figure F.3.2). Take enough points at the height of d1 and d2 to create a post-test cross-section A-A and B-B. There can be more points measured posttest than pre-test (Figure F.3.3). Record these points in the appropriate data sheet.

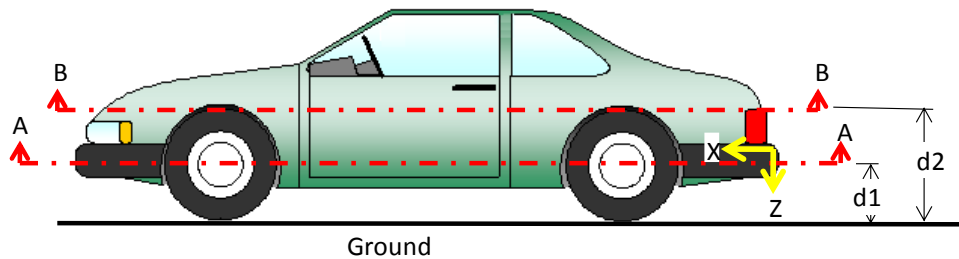


Figure F.3.1 - Pre-Test Cross-Sections

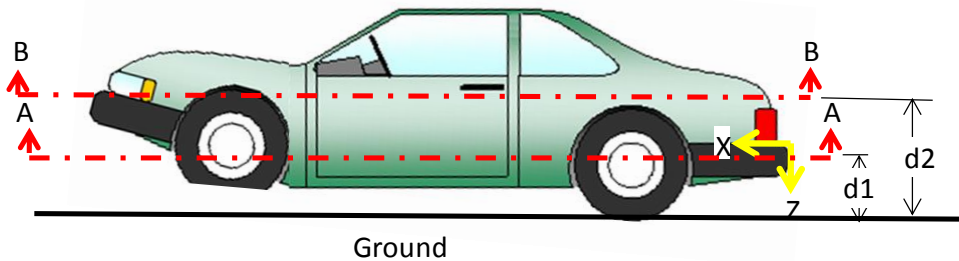


Figure F.3.2 - Post-Test Cross-Sections

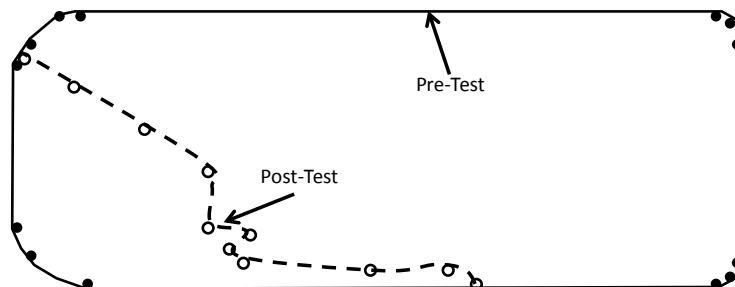


Figure F.3.3 - Plot of Cross-Section



## SECTION F.4

### DASH PROFILE MEASUREMENT PROCEDURE

The following procedure was used in order to obtain the dash profile measurements required for this test. Please see the diagram on the following page for further clarifications:

1. Left Plane: create a vertical plane that is parallel to the longitudinal axis of the vehicle and is located 150mm to the left of the center of the steering wheel (Figure 31).
2. Left Line: create a line on the IP/Knee Bolster at the intersection of the Left Plane and the IP/KneeBolster
3. L1: create a point on the dash that is located on the Left Line and is 450 mm above the floorboard (with floor mats removed). Note this is the Left IP point for the IP5 file and IP Left in DATA SHEET NO.13 (CONTINUED) - VEHICLE INTRUSION MEASUREMENTS.
4. Lt1: From L1 move up the Left Line 50 mm
5. Lt2: From Lt1 move up the Left Line 50 mm
6. Ltn: Mark points at 50 mm increments along Left Line until the window sill is reached.
7. Lb1: From L1 move down the Left Line 50 mm
8. Lb2: From Lb1 move down the Left Line 50 mm
9. Lbn: Mark points at 50 mm increments along Left Line until the bottom of the IP/Knee Bolster is reached.
10. Right Plane: create a vertical plane that is parallel to the longitudinal axis of the vehicle and is located 150mm to the right of the center of the steering wheel (Figure 31).
11. Right Line: create a line on the IP/Knee Bolster at the intersection of the Right Plane and the IP/KneeBolster
12. R1: create a point on the dash that is located on the Right Line and is 450 mm above the floorboard (with floor mats removed). Note this is the Right IP point for the IP5 file and IP Right in DATA SHEET NO.13 (CONTINUED) - VEHICLE INTRUSION MEASUREMENTS.
13. Rt1: From R1 move up the Right Line 50 mm
14. Rt2: From Rt1 move up the Right Line 50 mm
15. Rtn: Mark points at 50 mm increments along Right Line until the window sill is reached.
16. Rb1: From R1 move down the Right Line 50 mm
17. Rb2: From Rb1 move down the Right Line 50 mm
18. Rbn: Mark points at 50 mm increments along Right Line until the bottom of the IP/Knee Bolster is reached.

19. If dash panel or knee bolster loosens or breaks away in the crash, the post-test measurements are taken by pressing and holding the panel against the underlying structure. Record in the appropriate data sheet and calculate the difference by subtracting the post-test minus the pre-test. A picture with the points labeled shall be included on the data sheet. All points shall be visible in the picture.

