

**REPORT NUMBER: NCAPCHILD-MGA-2005-001**

**NEW CAR ASSESSMENT PROGRAM  
FRONTAL BARRIER IMPACT TEST**

**Evenflo Vanguard 5  
Graco My Cargo**

**NHTSA NUMBER: M50300**

**PREPARED BY:  
MGA RESEARCH CORPORATION  
5000 WARREN ROAD  
BURLINGTON, WI 53105**



**Test Date: August 11, 2004**

**Final Report Date: September 21, 2004**

**FINAL REPORT**

**PREPARED FOR:  
U.S. DEPARTMENT OF TRANSPORTATION  
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION  
RULEMAKING  
OFFICE OF CRASHWORTHINESS STANDARDS  
400 SEVENTH STREET, SW, ROOM 5311  
WASHINGTON, D.C. 20590**

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Prepared by: Shefalika Naik Date: 9/21/04  
Shefalika Naik, Project Engineer

Reviewed by: David Winkelbauer Date: 9/21/04  
David Winkelbauer, Facility Director

FINAL REPORT ACCEPTED BY:

\_\_\_\_\_  
Manager, New Car Assessment Program

\_\_\_\_\_  
Date of Acceptance

\_\_\_\_\_  
COTR, NCAP Frontal Impact Program

\_\_\_\_\_  
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Technical Report Documentation Page

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| 15. Supplementary Notes   |       |   |  |  |           |                         |       |            |            |                              |     |     |      |                              |     |     |      |                                 |     |    |    |
| 16. Abstract<br>The subjects CRS Evenflo Vanguard 5 and Graco My Cargo were tested in conjunction with a Frontal NCAP test in support of research in accordance with the specifications of the Office of Crashworthiness Standards Test Procedure for the determination of CRS crashworthiness. This test was conducted at MGA Research Corporation in Burlington, Wisconsin on August 11, 2004, in conjunction with frontal NCAP.          |       |   |  |  |           |                         |       |            |            |                              |     |     |      |                              |     |     |      |                                 |     |    |    |
| <table border="1"> <thead> <tr> <th>Measurement Description</th> <th>Units</th> <th>Pos. 3 ATD</th> <th>Pos. 4 ATD</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC36)</td> <td>N/A</td> <td>449</td> <td>1444</td> </tr> <tr> <td>Head Injury Criteria (HIC15)</td> <td>N/A</td> <td>249</td> <td>1117</td> </tr> <tr> <td>Max. Thorax Accel. (3msec Clip)</td> <td>G's</td> <td>43</td> <td>43</td> </tr> </tbody> </table> |       |   |  |  |           | Measurement Description | Units | Pos. 3 ATD | Pos. 4 ATD | Head Injury Criteria (HIC36) | N/A | 449 | 1444 | Head Injury Criteria (HIC15) | N/A | 249 | 1117 | Max. Thorax Accel. (3msec Clip) | G's | 43 | 43 |
| Measurement Description   | Units | Pos. 3 ATD  | Pos. 4 ATD   |  |           |                         |       |            |            |                              |     |     |      |                              |     |     |      |                                 |     |    |    |
| Head Injury Criteria (HIC36)  | N/A   | 449   | 1444   |  |           |                         |       |            |            |                              |     |     |      |                              |     |     |      |                                 |     |    |    |
| Head Injury Criteria (HIC15)  | N/A   | 249   | 1117   |  |           |                         |       |            |            |                              |     |     |      |                              |     |     |      |                                 |     |    |    |
| Max. Thorax Accel. (3msec Clip)   | G's   | 43  | 43   |  |           |                         |       |            |            |                              |     |     |      |                              |     |     |      |                                 |     |    |    |
| 17. Key Words<br><br>56.3 km/h NCAP Frontal Barrier Impact Test<br>New Car Assessment Program (NCAP)<br>Evenflo Vanguard 5<br>Graco My Cargo<br>NHTSA No: M50300  |       |   | 18. Distribution Statement<br>Copies of this report are available<br>from:<br>National Highway Traffic Safety<br>Admin., Technical Ref. Division,<br>Room 5108 (NPO-230)<br>400 Seventh Street, S.W.<br>Washington, D.C. 20590 |  |           |                         |       |            |            |                              |     |     |      |                              |     |     |      |                                 |     |    |    |
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## **SECTION 1**

### **PURPOSE AND SUMMARY OF TEST**

#### **PURPOSE**

The purpose of this test was to obtain CRS performance data in a frontal impact NCAP condition.

This 56.3 km/h frontal barrier impact test is part of the Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under contract number DTNH22-01-D-12005.

#### **SUMMARY**

Both child dummies were instrumented with head, chest, and pelvic triaxial accelerometers. In addition, both dummies had six upper axial neck force and moment sensors.

The right rear (Position 3) child dummy (S/N 42) and left rear (Position 4) child dummy (S/N 144) were calibrated previous to this test. Child dummy certification information is found in Appendix C.

The right rear child dummy's HIC36 was 448.5; maximum chest deceleration over 3 msec was 43.4 g's. The left rear child dummy's HIC36 was 1443.6. The maximum chest deceleration over 3 msec was 43.1 g's. Position 3 and Position 4 were forward facing. Position 3 used the vehicle LATCH and top tether for attachments. Position 4 (booster seat) used vehicle seat belts.

#### **TEST NOTES**

The following channels did not collect any valid data:  
LRP Belt Stretch after 48ms

## SECTION 2

### DATA SHEET NO. 1 CRASH TEST SUMMARY

#### TEST DUMMY INFORMATION

| Description             | Position 3 CRS                         | Position 4 CRS              |
|-------------------------|--|-----------------------------|
| Dummy Type / Serial No. | HIII 3 Year Old / 42                   | HIII 6 Year Old / 144       |
| Number of Data Channels | 20                                     | 27                          |
| Restraint System        | Evenflo Vanguard 5<br>(Forward Facing) | Graco My Cargo<br>(Booster) |

#### 16 MM CAMERA COVERAGE

|            |    |
|------------|----|
| High Speed | 16 |
| Real Time  | 1  |
| Total      | 17 |

#### POST TEST DOOR OPENING

| Description           | Driver   | Passenger  |
|-----------------------|--|--|
| Locked/Unlocked Doors | Doors were unlocked  | Doors were unlocked  |
| Front Door Opening    | Door remained closed and latched;<br>Door opened without tools | Door remained closed and latched;<br>Door opened without tools |
| Rear Door Opening     | Door remained closed and latched;<br>Door opened without tools | Door remained closed and latched;<br>Door opened without tools |
| Seat Track Shift (mm) | 0  | 0  |
| Seat Back Failure     | None   | None   |
| Glazing Damage        | The windshield cracked   |  |

#### POST TEST SEAT DATA

| Location         | Seat Movement (mm) | Seat Back Failure |
|------------------|--------------------|-------------------|
| P1 (Left Front)  | 0                  | None              |
| P2 (Right Front) | 0                  | None              |
| P3 (Right Rear)  | 0                  | None              |
| P4 (Left Rear)   | 0                  | None              |

#### VISIBLE DUMMY CONTACT POINTS

| Description         | Position 3 CRS (S/N 42) | Position 4 CRS (S/N 144) |
|---------------------|-------------------------|--------------------------|
| Head Contact        | Back of head to CRS     | Back of head to CRS      |
| Upper Torso Contact | None                    | None                     |
| Lower Torso Contact | None                    | None                     |
| Left Foot Contact   | Passenger seat back     | Driver seat back         |
| Right Foot Contact  | Passenger seat back     | Driver seat back         |

**SECTION 2... (continued)**

**DATA SHEET NO. 2  
CRS PARAMETER DATA**

|                                     |                                     |
|-------------------------------------|-------------------------------------|
| Child Restraint System (Position 3) | Evenflo Vanguard 5 (Forward Facing) |
| Child Restraint System (Position 4) | Graco My Cargo (Forward Facing)     |
| NHTSA No.                           | M50300                              |

**TARGET TEST WEIGHT CALCULATION**

| Measured Parameter                      | Units | Value  |
|---|-------|--------|
| Total Delivered Weight (UVW)            | kg    | 1682.8 |
| Weight of 2 P572E ATDs                  | kg    | 156.0  |
| Rated Cargo/Luggage Weight (RCLW)       | kg    | 52.2   |
| Calculated Vehicle Target Weight (TVTW) | kg    | 1891.0 |

**TEST VEHICLE WEIGHTS**

|        | Units | As Tested (ATW) (Axle) |       |        |
|--------|-------|------------------------|-------|--------|
|        |       | Front                  | Rear  | Total  |
| Left   | kg    | 466.2                  | 480.4 |        |
| Right  | kg    | 450.0                  | 489.4 |        |
| Ratio  | %     | 48.6                   | 51.4  |        |
| Totals | kg    | 916.2                  | 969.8 | 1886.0 |

As tested weight of vehicle includes two 50<sup>th</sup> percentile ATDs, one 3 year old with CRS, one 6 year old with CRS, cargo, equipment and instrumentation.

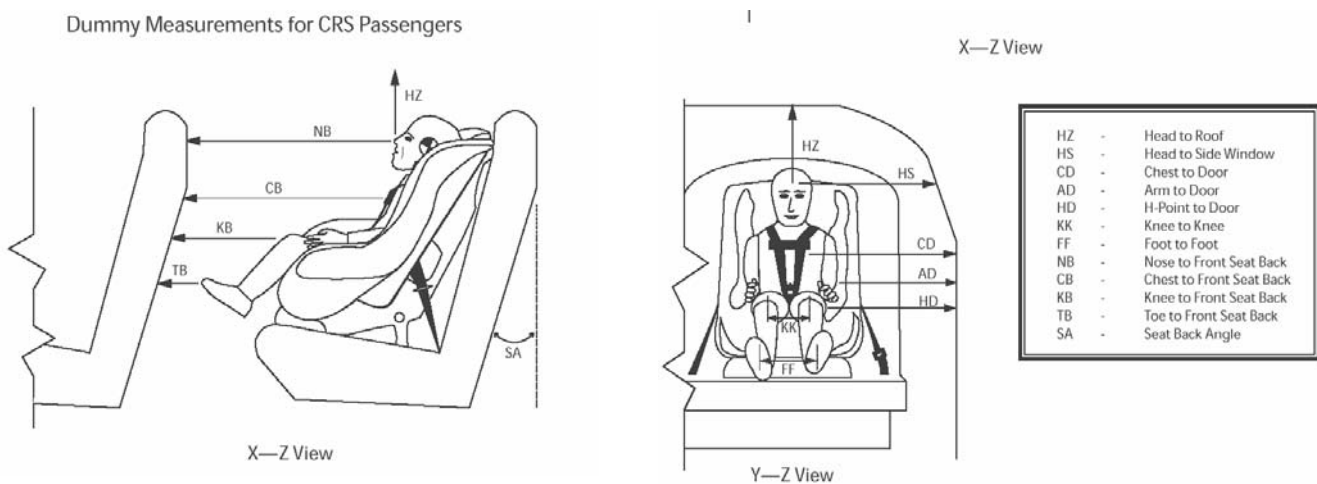
**CHEST CLIP DISPLACEMENT**

|                   | Units | Left | Right |
|-------------------|-------|------|-------|
| Right Child Dummy | mm    | 67   | 74    |
| Left Child Dummy  | mm    |      |       |

**SECTION 2... (continued)**  
**DATA SHEET NO. 3**  
**CHILD DUMMY POSITIONING IN VEHICLE**

|                                     |                                     |
|-------------------------------------|-------------------------------------|
| Child Restraint System (Position 3) | Evenflo Vanguard 5 (Forward Facing) |
| NHTSA No.                           | M50300                              |

Dummy Measurements for CRS Passengers



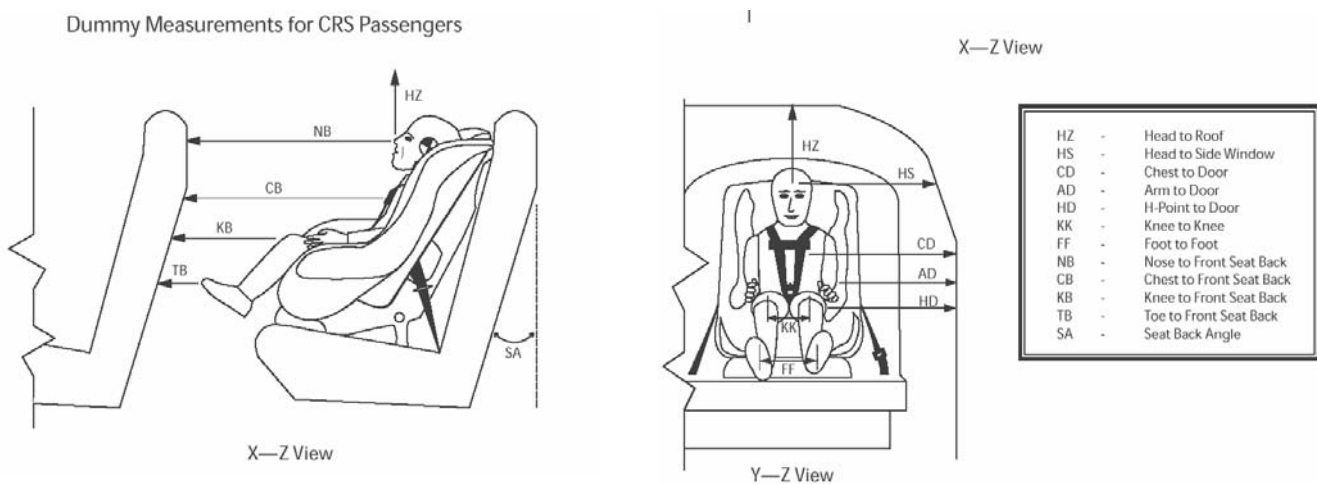
| Measurement | Pre-Test (mm) | Post-Test (mm) |
|-------------|---------------|----------------|
|             | P3 CRS (42)   | P3 CRS (42)    |
| SA (deg)    | 64.0          | 64.0           |
| HS          | 349           | 354            |
| CD          | 387           | 370            |
| AD          | 237           | 258            |
| HD          | 316           | 315            |
| HZ          | 374           | 282            |
| NB          | 557           | 561            |
| CB          | 534           | 535            |
| KK          | 140           | 181            |
| FF          | 132           | 172            |
| KB - LEFT   | 363           | 374            |
| KB - RIGHT  | 366           | 360            |
| TB - LEFT   | 97            | 93             |
| TB - RIGHT  | 95            | 94             |

All dimensions in mm (unless noted)  
P3 – Right Rear Passenger (Forward Facing)

**SECTION 2... (continued)**  
**DATA SHEET NO. 3**  
**CHILD DUMMY POSITIONING IN VEHICLE**

|                                     |                                 |
|-------------------------------------|---------------------------------|
| Child Restraint System (Position 4) | Graco My Cargo (Forward Facing) |
| NHTSA No.                           | M50300                          |

Dummy Measurements for CRS Passengers



| Measurement | Pre-Test (mm) | Post-Test (mm) |
|-------------|---------------|----------------|
|             | P4 CRS (144)  | P4 CRS (144)   |
| SA (deg)    | 64.0          | 64.0           |
| HS          | 322           | 337            |
| CD          | 378           | 325            |
| AD          | 224           | 169            |
| HD          | 227           | 158            |
| HZ          | 373           | 263            |
| NB          | 543           | 546            |
| CB          | 526           | 525            |
| KK          | 145           | 165            |
| FF          | 172           | 188            |
| KB - LEFT   | 270           | 282            |
| KB - RIGHT  | 272           | 318            |
| TB - LEFT   | 95            | 92             |
| TB - RIGHT  | 87            | 85             |

All dimensions in mm (unless noted)  
P4 – Left Rear Passenger (Forward facing)

**DATA SHEET NO. 4  
CHILD DUMMY INJURY CRITERIA VALUES**

|                                     |                    |
|-------------------------------------|--------------------|
| Child Restraint System (Position 3) | Evenflo Vanguard 5 |
| Child Restraint System (Position 4) | Graco My Cargo     |
| NHTSA No.                           | M50300             |

**HEAD PEAK ACCELERATIONS**

| Location  | Axis | Units | Position 3 |      |       |      | Position 4 |      |       |      |
|-----------|------|-------|------------|------|-------|------|------------|------|-------|------|
|           |      |       | Max        | Time | Min   | Time | Max        | Time | Min   | Time |
| Head CG   | X    | G's   | 45.9       | 194  | -37.4 | 109  | 40.7       | 230  | -27.8 | 78   |
| Head CG   | Y    | G's   | 2.8        | 191  | -18.1 | 109  | 1.8        | 254  | -6.7  | 230  |
| Head CG   | Z    | G's   | 46.6       | 81   | -5.9  | 47   | 94.2       | 86   | -3.5  | 49   |
| Resultant | N/A  | G's   | 55.3       | 81   |       |      | 97.4       | 86   |       |      |

**UPPER NECK PEAK FORCES AND MOMENTS**

| Location    | Axis | Units | Position 3 |      |       |      | Position 4 |      |       |      |
|-------------|------|-------|------------|------|-------|------|------------|------|-------|------|
|             |      |       | Max        | Time | Min   | Time | Max        | Time | Min   | Time |
| Neck Force  | X    | N     | 807        | 86   | -76   | 235  | 22         | 261  | -717  | 80   |
| Neck Force  | Y    | N     | 105        | 32   | -44   | 29   | 81         | 254  | -140  | 96   |
| Neck Force  | Z    | N     | 2043       | 86   | -399  | 207  | 3067       | 87   | -589  | 237  |
| Resultant   | N/A  | N     | 2197       | 86   |       |      | 3138       | 87   |       |      |
| Neck Moment | X    | N•m   | 4.7        | 29   | -8.2  | 32   | 11.0       | 61   | -7.7  | 102  |
| Neck Moment | Y    | N•m   | 4.1        | 235  | -18.6 | 205  | 30.6       | 110  | -32.1 | 243  |
| Neck Moment | Z    | N•m   | 1.3        | 57   | -1.6  | 283  | 4.1        | 100  | -4.6  | 274  |
| Resultant   | N/A  | N•m   | 18.6       | 205  |       |      | 32.1       | 243  |       |      |

**CHEST PRIMARY PEAK ACCELERATIONS**

| Location  | Axis | Units | Position 3 |      |       |      | Position 4 |      |       |      |
|-----------|------|-------|------------|------|-------|------|------------|------|-------|------|
|           |      |       | Max        | Time | Min   | Time | Max        | Time | Min   | Time |
| Chest CG  | X    | G's   | 10.1       | 212  | -40.6 | 82   | 7.5        | 167  | -41.2 | 68   |
| Chest CG  | Y    | G's   | 5.0        | 78   | -1.2  | 204  | 10.6       | 87   | -7.8  | 52   |
| Chest CG  | Z    | G's   | 18.8       | 198  | -25.0 | 72   | 24.9       | 91   | -14.0 | 65   |
| Resultant | N/A  | G's   | 44.8       | 76   |       |      | 43.6       | 68   |       |      |

**CHEST PEAK DISPLACEMENTS**

| Location | Axis | Units | Position 3 |      |       |      | Position 4 |      |       |      |
|----------|------|-------|------------|------|-------|------|------------|------|-------|------|
|          |      |       | Max        | Time | Min   | Time | Max        | Time | Min   | Time |
| Chest    | X    | mm    |            |      | -14.9 | 114  |            |      | -22.3 | 94   |

**SECTION 2... (continued)**

**DATA SHEET NO. 4... (continued)  
CHILD DUMMY INJURY CRITERIA VALUES**

|                                     |                    |
|-------------------------------------|--------------------|
| Child Restraint System (Position 3) | Evenflo Vanguard 5 |
| Child Restraint System (Position 4) | Graco My Cargo     |
| NHTSA No.                           | M50300             |

**TETHER FORCE**

| Location           | Axis | Units | Position 3 |      |     |      | Position 4 |      |     |      |
|--------------------|------|-------|------------|------|-----|------|------------|------|-----|------|
|                    |      |       | Max        | Time | Min | Time | Max        | Time | Min | Time |
| Left Tether Force  | N/A  | N     |            |      |     |      |            |      |     |      |
| Right Tether Force | N/A  | N     | 2046       | 79   |     |      |            |      |     |      |
| Left Belt Stretch  | N/A  | mm    |            |      |     |      | *          | *    | *   | *    |

\* No valid data collected after 40ms

**PELVIC PEAK ACCELERATIONS**

| Location  | Axis | Units | Position 3 |      |       |      | Position 4 |      |       |      |
|-----------|------|-------|------------|------|-------|------|------------|------|-------|------|
|           |      |       | Max        | Time | Min   | Time | Max        | Time | Min   | Time |
| Pelvis    | X    | G's   | 11.7       | 142  | -46.0 | 73   | 17.3       | 162  | -40.8 | 57   |
| Pelvis    | Y    | G's   | 1.8        | 193  | -10.3 | 73   | 11.6       | 100  | -7.4  | 54   |
| Pelvis    | Z    | G's   | 17.7       | 197  | -22.5 | 45   | 10.7       | 238  | -30.9 | 65   |
| Resultant | N/A  | G's   | 50.5       | 73   |       |      | 47.7       | 57   |       |      |

**FEMUR FORCES**

| Location    | Axis | Units | Position 3 |      |     |      | Position 4 |      |      |      |
|-------------|------|-------|------------|------|-----|------|------------|------|------|------|
|             |      |       | Max        | Time | Min | Time | Max        | Time | Min  | Time |
| Left Femur  | N/A  | N     |            |      |     |      | 689        | 57   | -164 | 163  |
| Right Femur | N/A  | N     |            |      |     |      | 660        | 80   | -238 | 120  |

**BELT FORCES**

| Location      | Axis | Units | Position 3 |      |     |      | Position 4 |      |     |      |
|---------------|------|-------|------------|------|-----|------|------------|------|-----|------|
|               |      |       | Max        | Time | Min | Time | Max        | Time | Min | Time |
| Shoulder Belt | N/A  | N     |            |      |     |      | 5758       | 88   |     |      |
| Lap Belt      | N/A  | N     |            |      |     |      | 2499       | 57   |     |      |

**SECTION 2... (continued)**  
**DATA SHEET NO. 4... (continued)**  
**CHILD DUMMY INJURY CRITERIA VALUES**

|                                     |                    |
|-------------------------------------|--------------------|
| Child Restraint System (Position 3) | Evenflo Vanguard 5 |
| Child Restraint System (Position 4) | Graco My Cargo     |
| NHTSA No.                           | M50300             |

**HEAD INJURY CRITERIA (HIC36)**

| Location           | HIC    | T <sup>1</sup> (msec) | T <sup>2</sup> (msec) | Average Acceleration (G's) |
|--------------------|--------|-----------------------|-----------------------|----------------------------|
| Position 3 - Right | 448.5  | 68.5                  | 104.5                 | 43.5                       |
| Position 4 – Left  | 1443.6 | 69.1                  | 100.2                 | 73.6                       |

HIC is as defined in FMVSS 208. The maximum time interval from t1 to t2 is 36 milliseconds.

**HEAD INJURY CRITERIA (HIC15)**

| Location           | HIC    | T <sup>1</sup> (msec) | T <sup>2</sup> (msec) | Average Acceleration (G's) |
|--------------------|--------|-----------------------|-----------------------|----------------------------|
| Position 3 - Right | 248.5  | 75.1                  | 90.1                  | 48.7                       |
| Position 4 – Left  | 1116.8 | 77.4                  | 92.4                  | 88.9                       |

HIC is as defined in FMVSS 208. The maximum time interval from t1 to t2 is 15 milliseconds.

**CLIP SUMMARY**

| Location           | CLIP | T <sup>1</sup> (msec) | T <sup>2</sup> (msec) |
|--------------------|------|-----------------------|-----------------------|
| Position 3 - Right | 43.4 | 74.0                  | 77.0                  |
| Position 4 – Left  | 43.1 | 66.3                  | 69.3                  |

The maximum chest resultant acceleration is defined as the maximum acceleration, which exceeds 0.003 seconds in duration.

**SECTION 2... (continued)**

**DATA SHEET NO. 5  
CRS PERFORMANCE DATA**

|                                     |                                     |
|-------------------------------------|-------------------------------------|
| Child Restraint System (Position 3) | Evenflo Vanguard 5 (Forward Facing) |
| Child Restraint System (Position 4) | Graco My Cargo (Forward Facing)     |
| NHTSA No.                           | M50300                              |

**POSITION 3 CRS POST-TEST INSPECTION**

| Location                       | Damage | Remarks |
|--------------------------------|--------|---------|
| Upper Tether Strap             | None   |         |
| Upper Tether Buckle            | None   |         |
| Upper Tether Hook              | None   |         |
| Vehicle Upper Tether Anchor    | None   |         |
| Lower Anchor Strap             | None   |         |
| Lower Anchor Buckle            | None   |         |
| Lower Anchor Hooks             | None   |         |
| Vehicle Lower CRS Anchors      | None   |         |
| Five Point Harness Connections | None   |         |
| Cracks on CRS                  | None   |         |
| Fabric Tears on CRS            | None   |         |
| Vehicle Seat Structure         | None   |         |
| Vehicle Seat Fabric Tears      | None   |         |
| Child Dummy                    | None   |         |

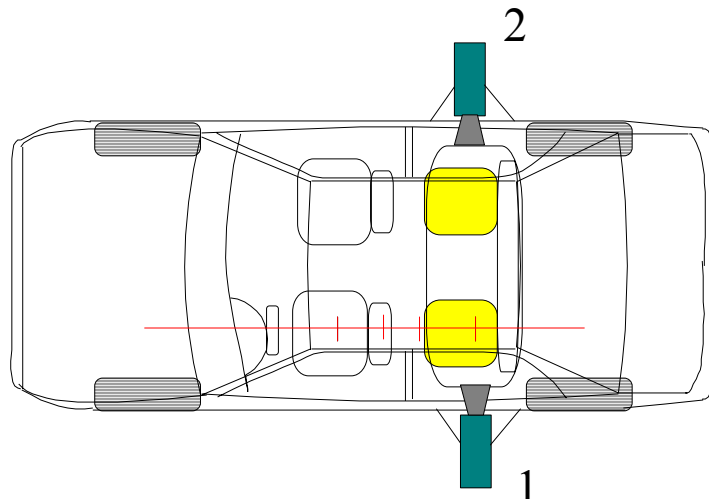
**POSITION 4 CRS POST-TEST INSPECTION**

| Location                       | Damage | Remarks |
|--------------------------------|--------|---------|
| Upper Tether Strap             | None   |         |
| Upper Tether Buckle            | None   |         |
| Upper Tether Hook              | None   |         |
| Vehicle Upper Tether Anchor    | None   |         |
| Lower Anchor Strap             | None   |         |
| Lower Anchor Buckle            | None   |         |
| Lower Anchor Hooks             | None   |         |
| Vehicle Lower CRS Anchors      | None   |         |
| Five Point Harness Connections | None   |         |
| Cracks on CRS                  | None   |         |
| Fabric Tears on CRS            | None   |         |
| Vehicle Seat Structure         | None   |         |
| Vehicle Seat Fabric Tears      | None   |         |
| Child Dummy                    | None   |         |

SECTION 2... (continued)

DATA SHEET NO. 6  
CRS CAMERA DATA

|                                     |                                     |
|-------------------------------------|-------------------------------------|
| Child Restraint System (Position 3) | Evenflo Vanguard 5 (Forward Facing) |
| Child Restraint System (Position 4) | Graco My Cargo (Forward Facing)     |
| NHTSA No.                           | M50300                              |



| No. | Camera View                 | Location (mm) * |   |   | Angle (deg) | Lens (mm) | Speed (fps) |
|-----|-----------------------------|-----------------|---|---|-------------|-----------|-------------|
|     |                             | X               | Y | Z |             |           |             |
| 1   | Left Side CRS Lateral View  |                 |   |   |             | 13        | 503         |
| 2   | Right Side CRS Lateral View |                 |   |   |             | 13        | 503         |

\*COORDINATES:

- +X = forward of impact plane
- +Y = right of monorail centerline
- +Z = above ground level

**APPENDIX A**  
**PHOTOGRAPHS**

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THIS PRODUCT AFTER DE

**Manufactured in 04FEB04**

**Model # 3691261 P1**

Close-up View of Position 3 CRS Label

A-2.



Pre-Test Front View of Position 3 CRS

A-3.



Post-Test Front View of Position 3 CRS

A-4.



Pre-Test Rear View of Position 3 CRS

A-5.



Post-Test Rear View of Position 3 CRS

A-6.



Pre-Test Left Side View of Position 3 CRS

A-7.



Post-Test Left Side View of Position 3 CRS

A-8.



Pre-Test Right Side View of Position 3 CRS

A-9.



Post-Test Right Side View of Position 3 CRS

MODEL **8481LAN**  
Manufactured in 042803 10  
GRACO CHILDREN'S PRODUCTS, INC.  
EXTON, PA 19341 1-888-224-6549  
Made in U.S.A.

PB-25777

A-10.

Close-up View of Position 4 CRS Label

A-11.



Pre-Test Front View of Position 4 CRS

A-12.



Post-Test Front View of Position 4 CRS

A-13.



Pre-Test Rear View of Position 4 CRS

A-14.



Post-Test Rear View of Position 4 CRS



Pre-Test Left Side View of Position 4 CRS

A-16.



Post-Test Left Side View of Position 4 CRS

A-17.



Pre-Test Right Side View of Position 4 CRS

A-18.



Post-Test Right Side View of Position 4 CRS



Pre-Test Position 3 Left Side View



Post-Test Position 3 Left Side View

A-21.



Pre-Test Position 4 Left Side View

A-22.



Post-Test Position 4 Left Side View

A-23.



Pre-Test Position 3 Right Side View

A-24.



Post-Test Position 3 Right Side View



Pre-Test Position 4 Right Side View



Post-Test Position 4 Right Side View



A-27.

Pre-Test Position 3 Rear View



A-28.

Post-Test Position 3 Rear View



A-29.

Pre-Test Position 4 Rear View

A-30.



Post-Test Position 4 Rear View

A-31.



Post-Test ¼ Front View Position 3

A-32.



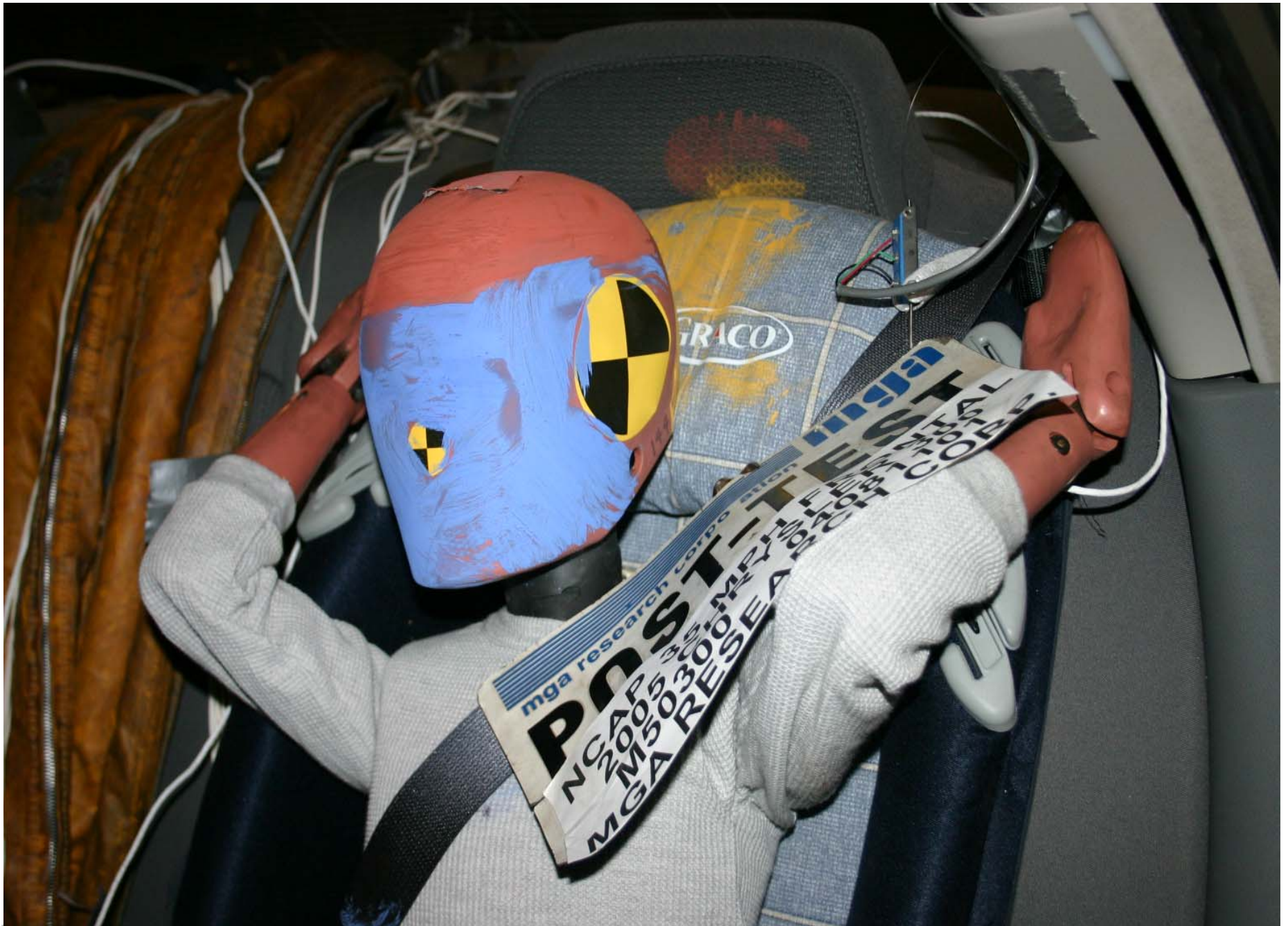
Post-Test ¼ Front View Position 4



Post-Test Position 3 Feet Contact



Post-Test Position 4 Feet Contact



Post-Test Position 4 Head Contact

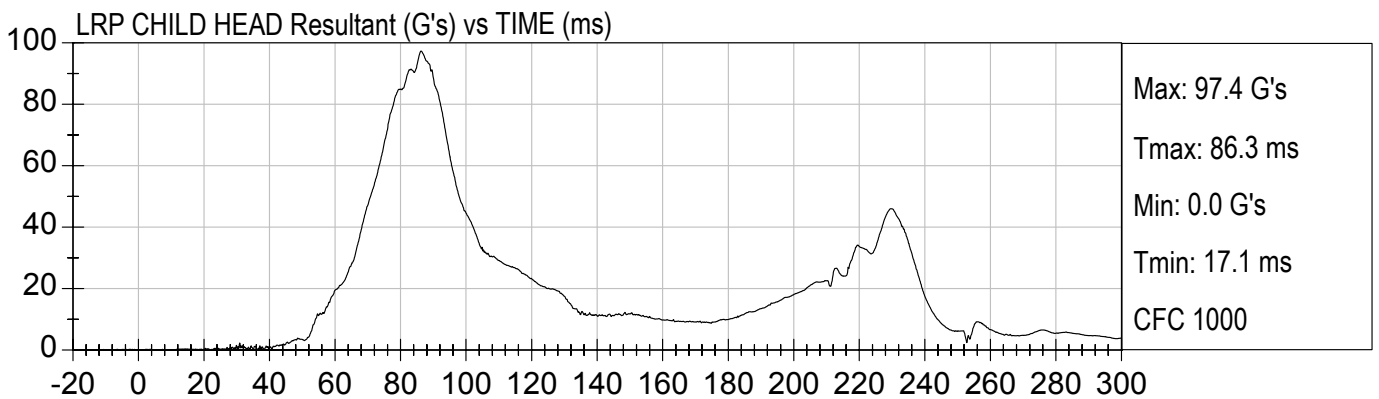
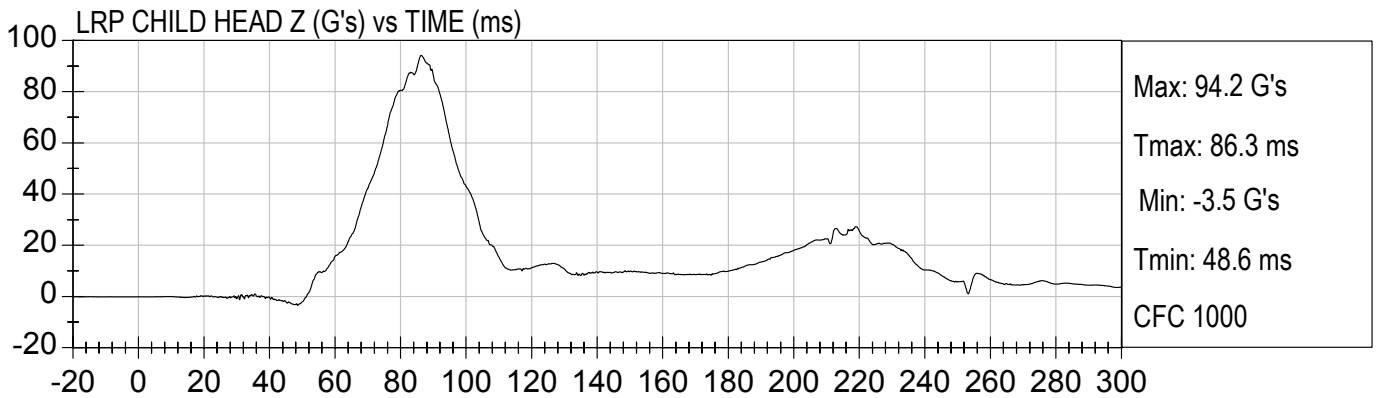
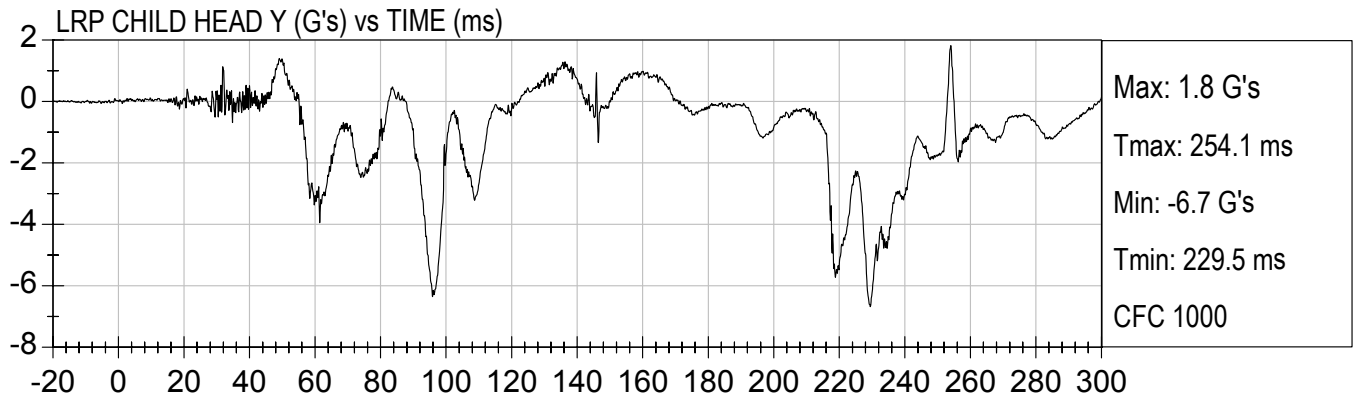
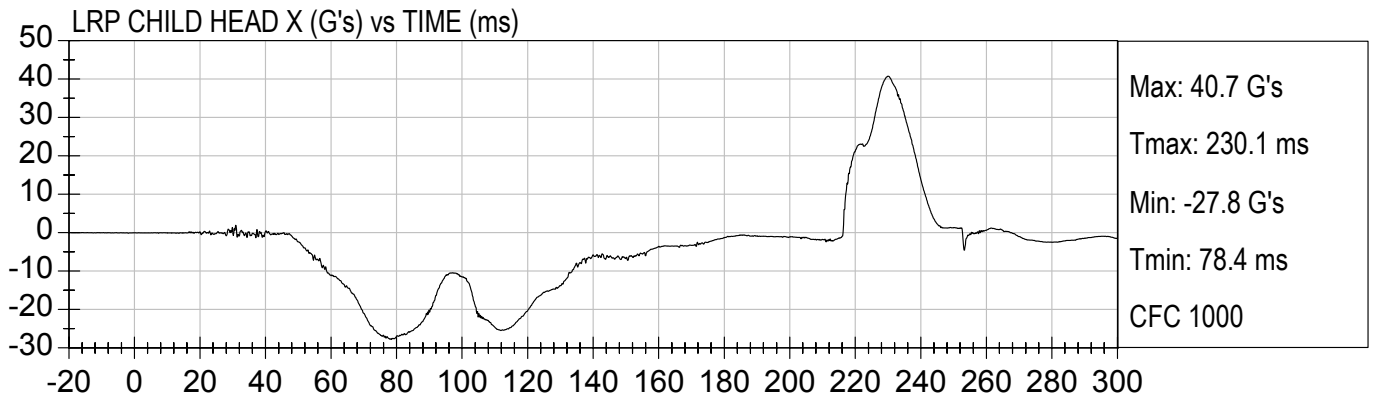
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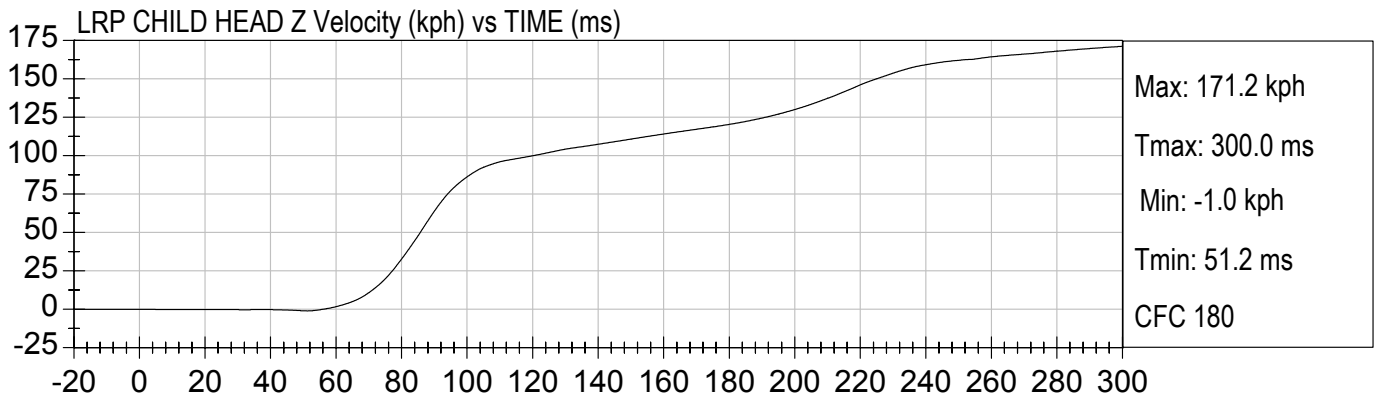
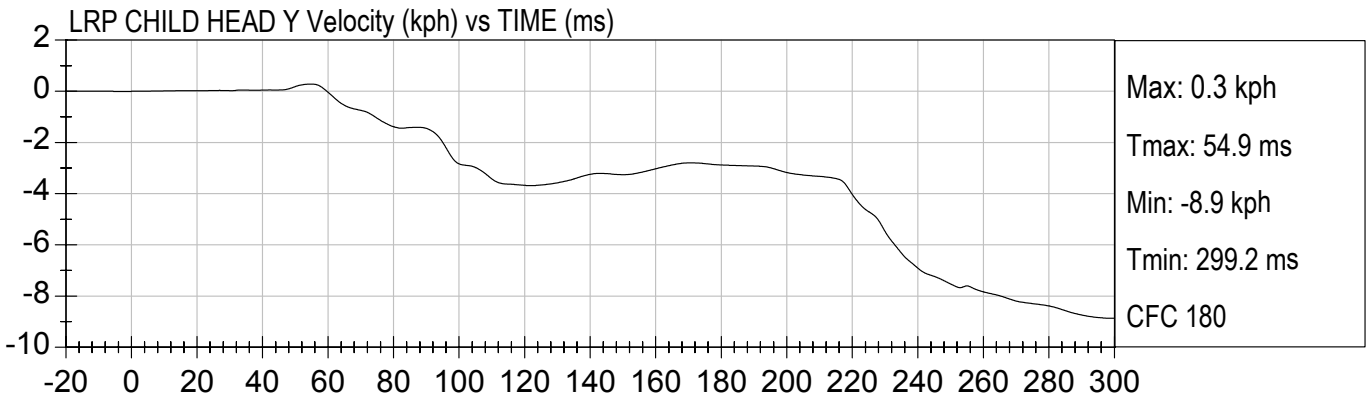
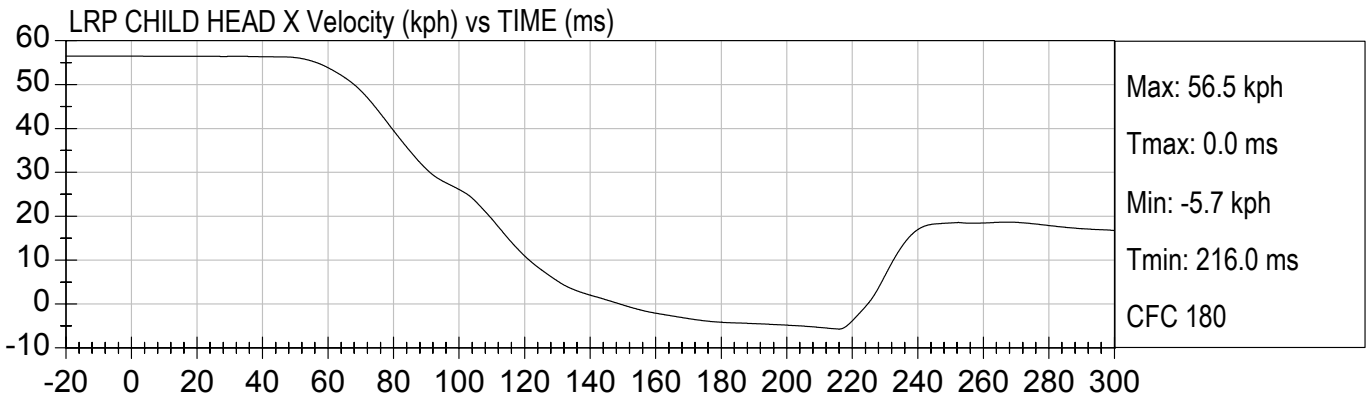
## TABLE OF DATA PLOTS

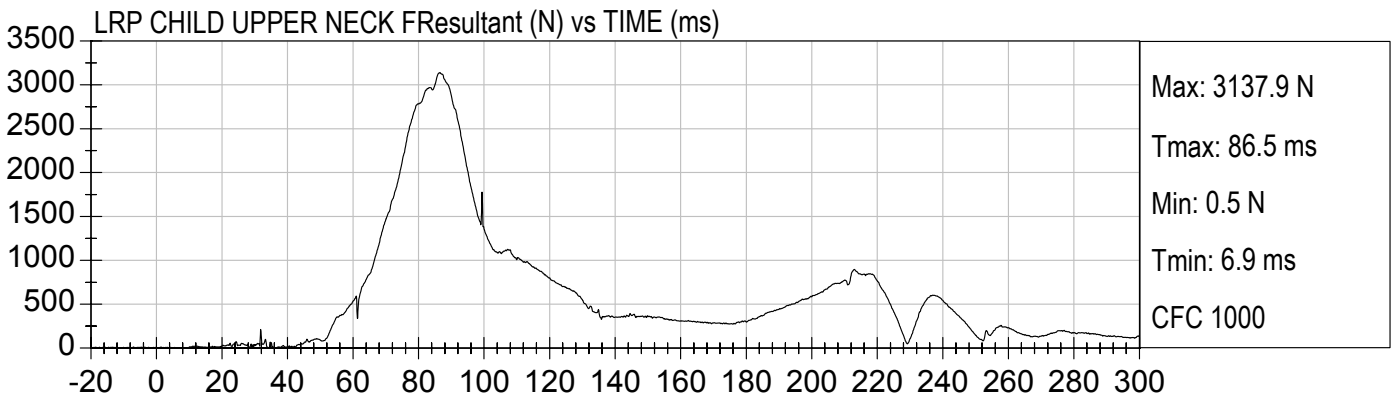
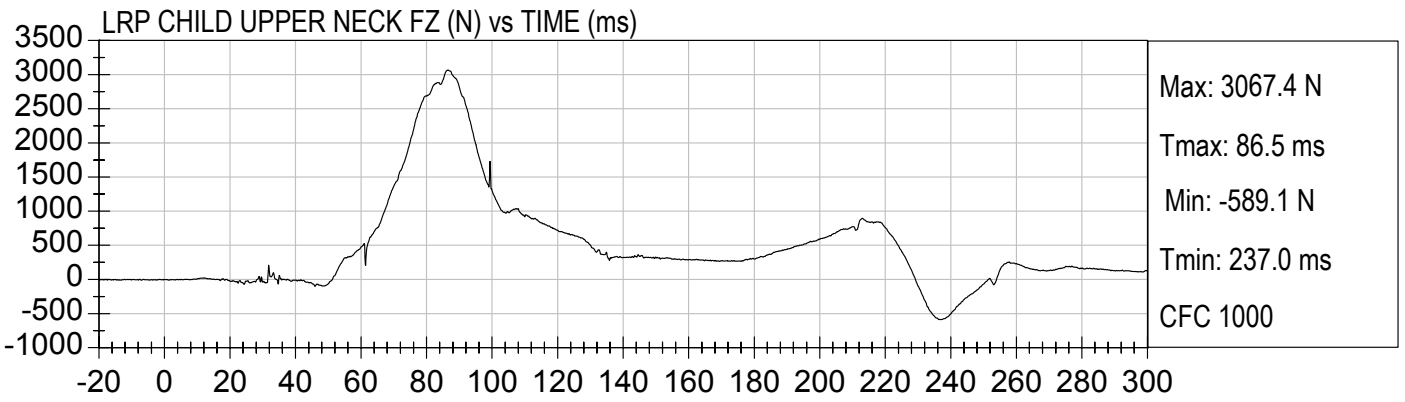
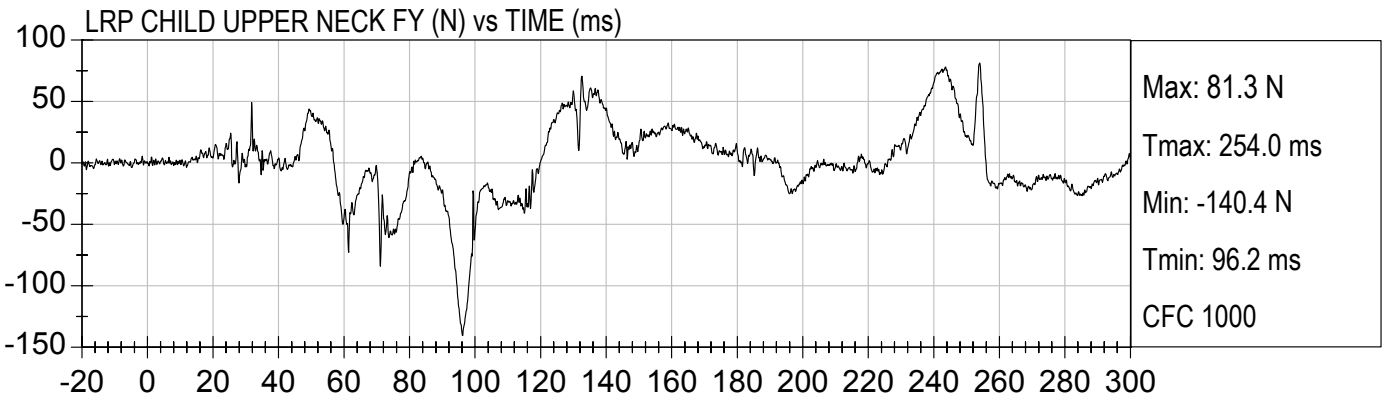
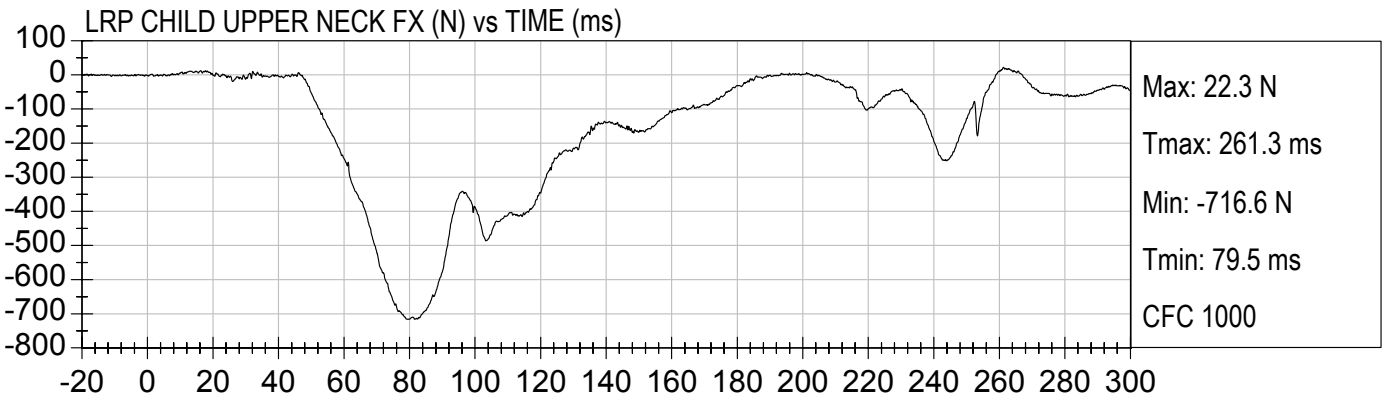
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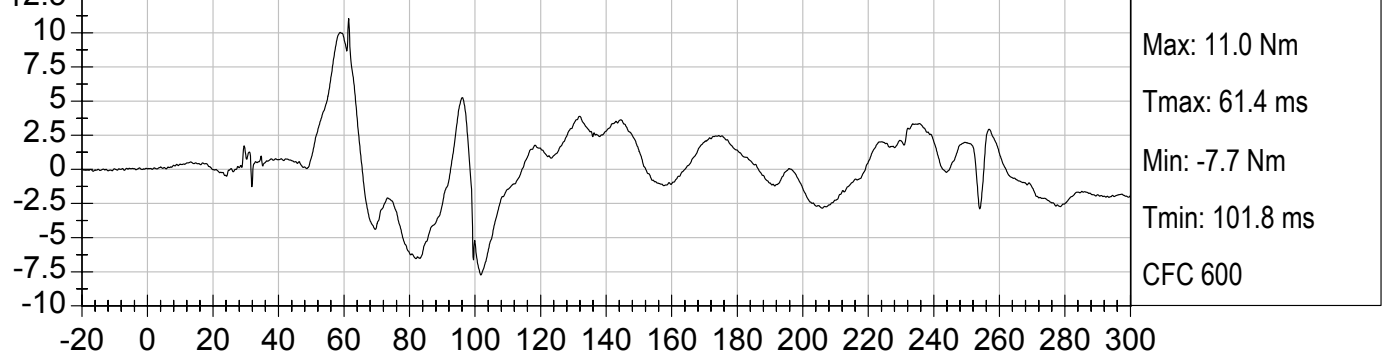




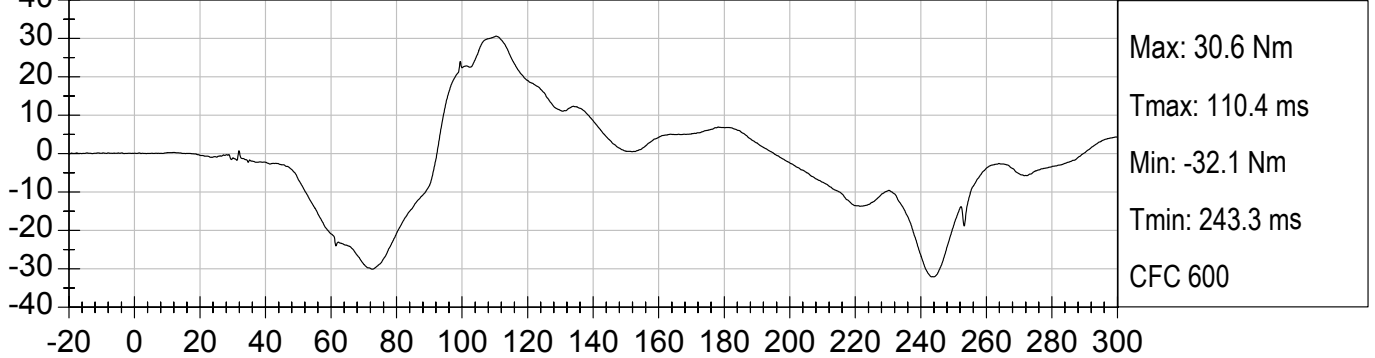




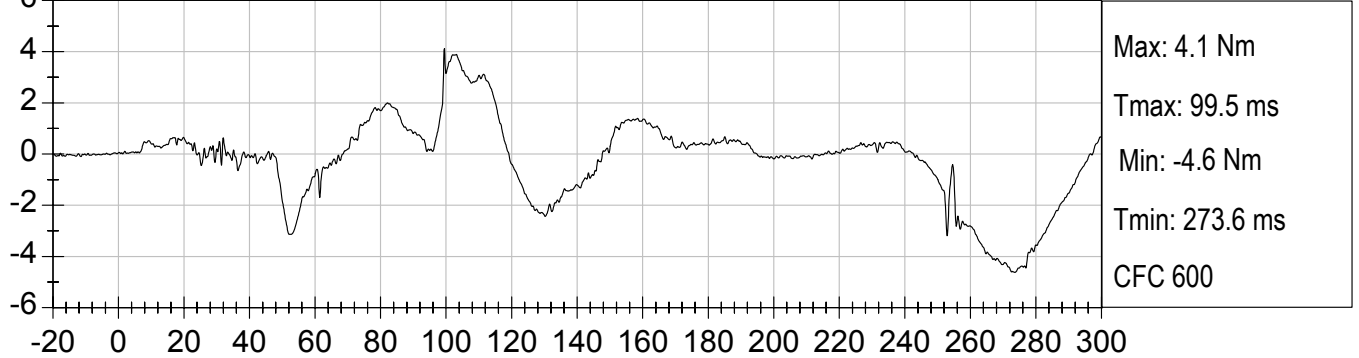
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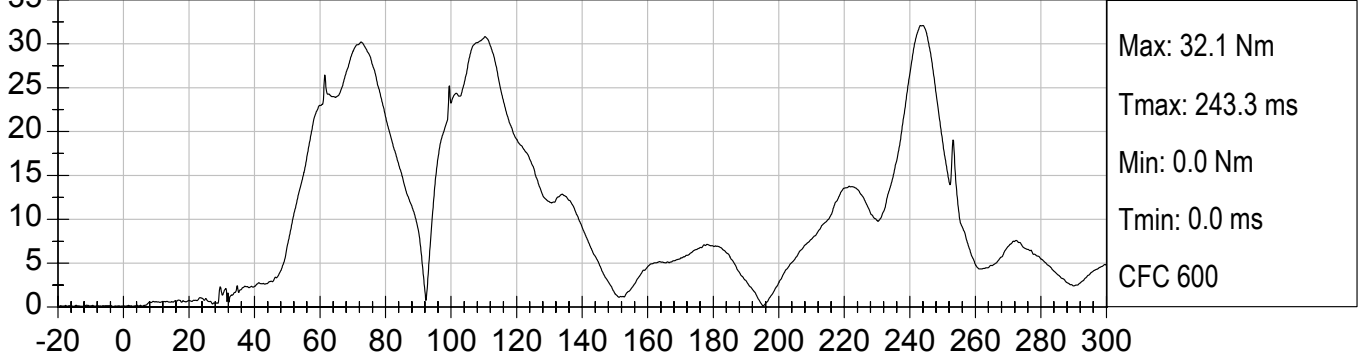
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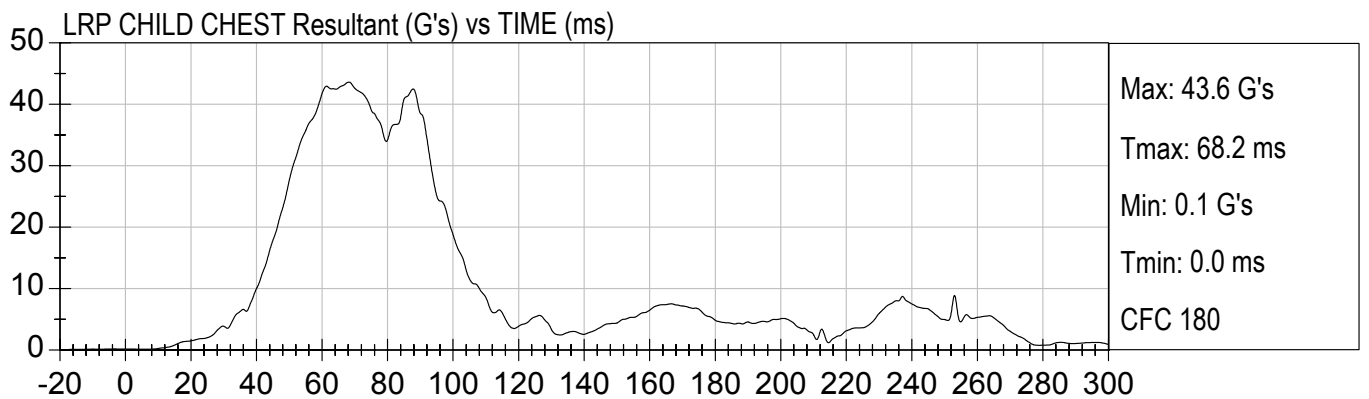
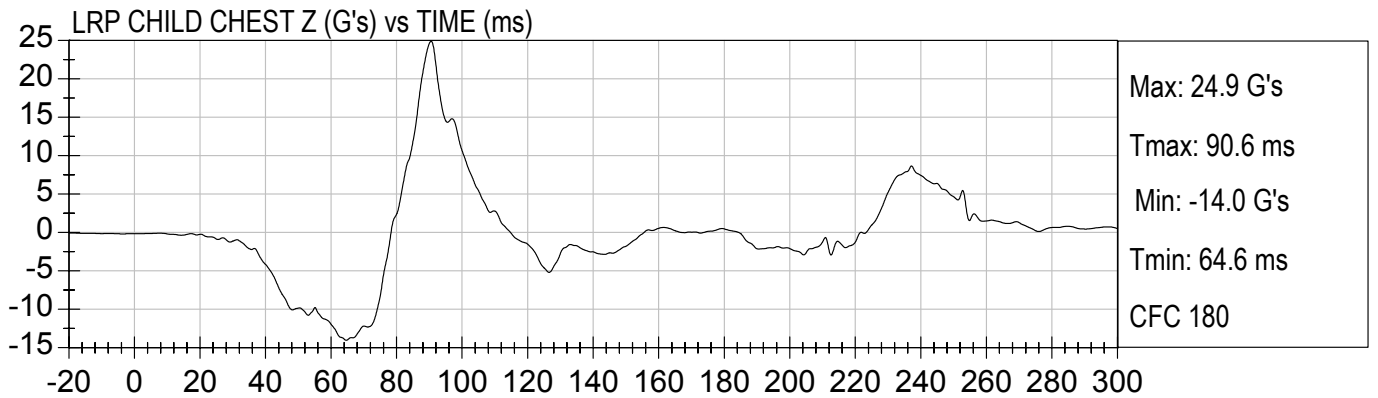
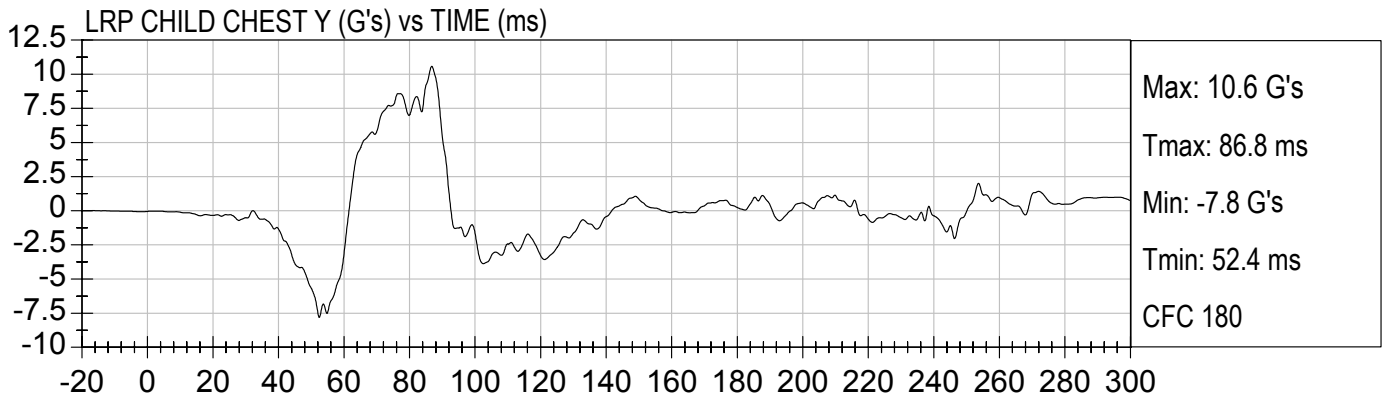
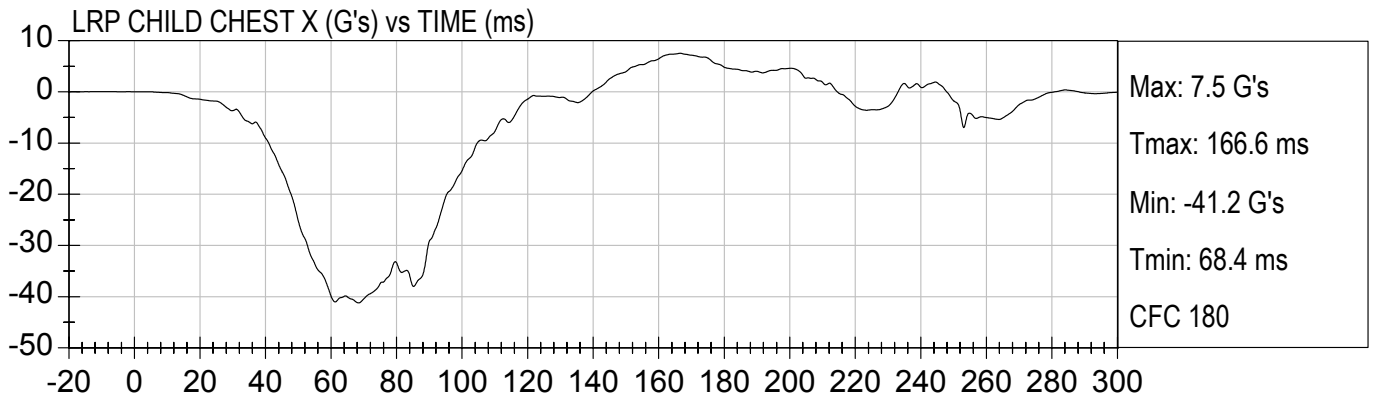


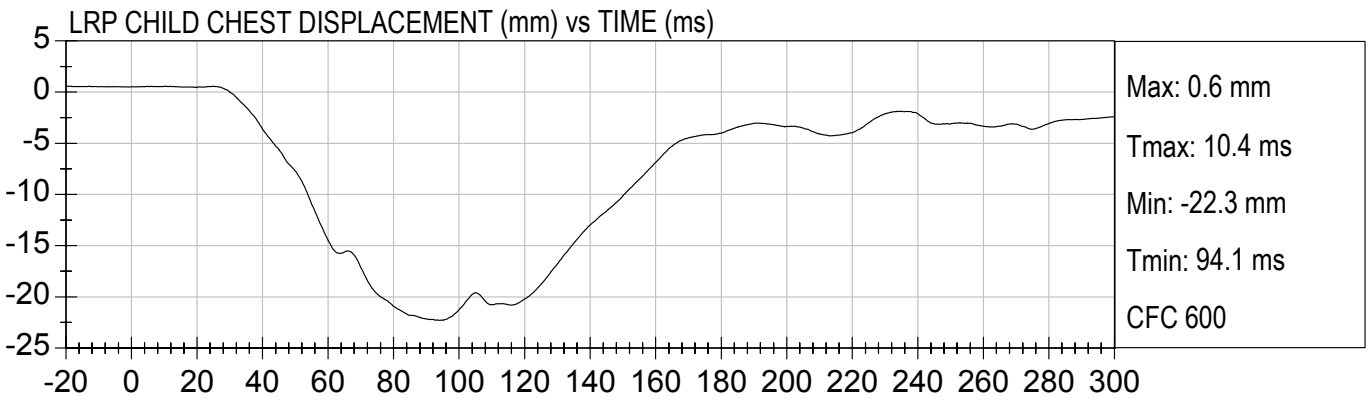
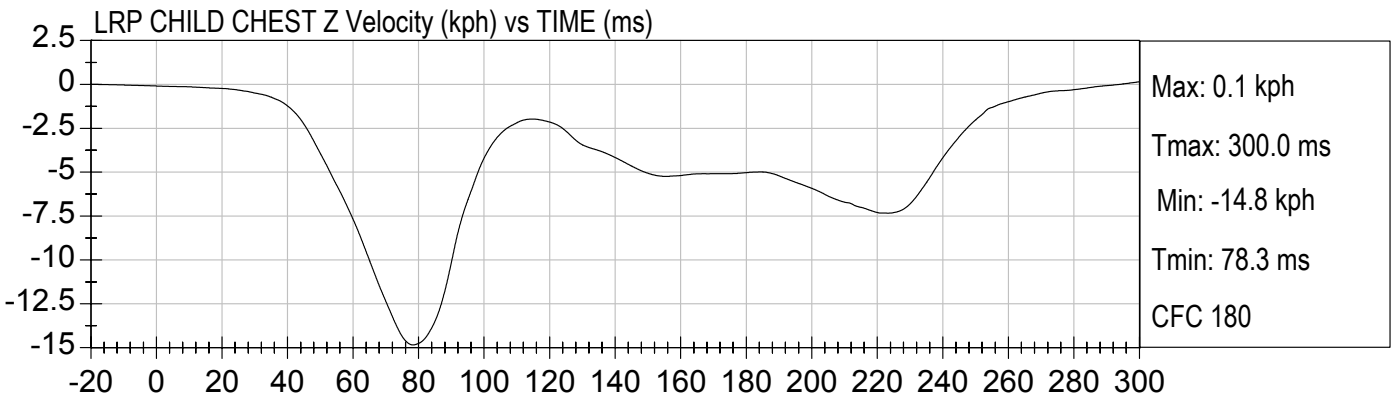
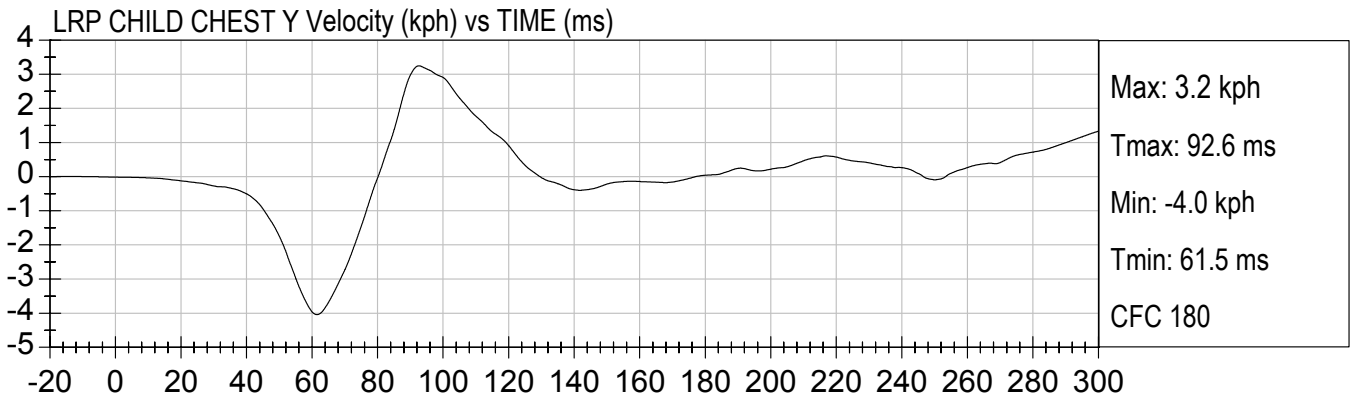
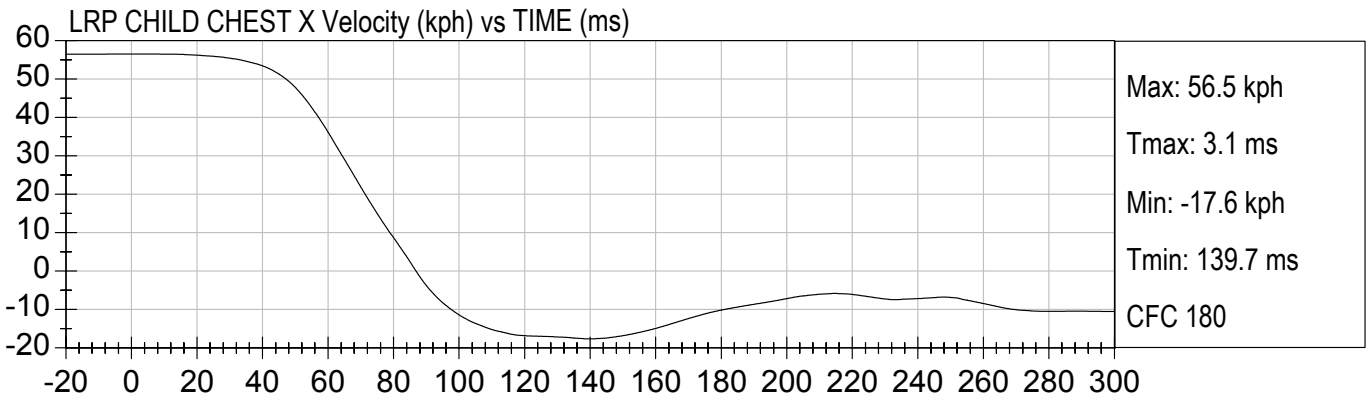
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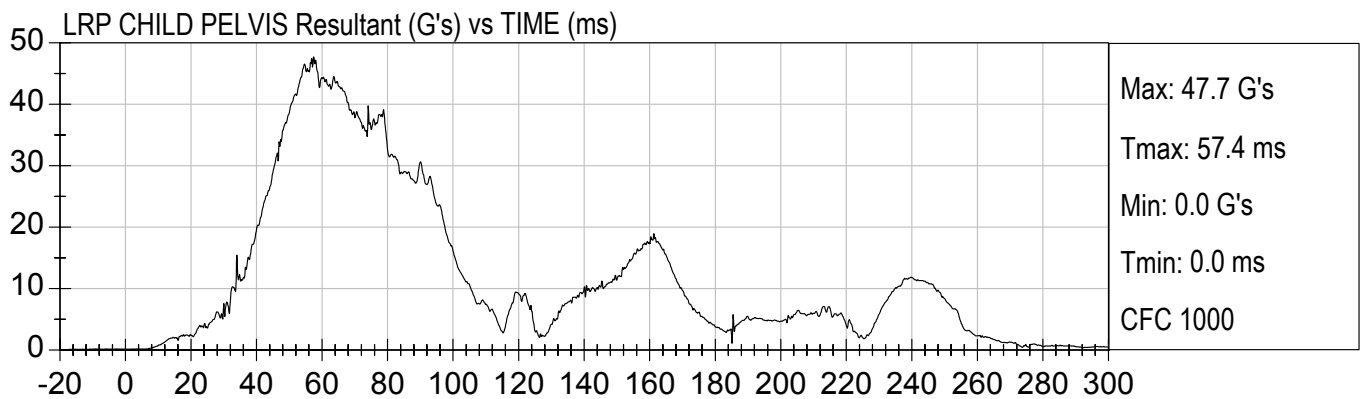
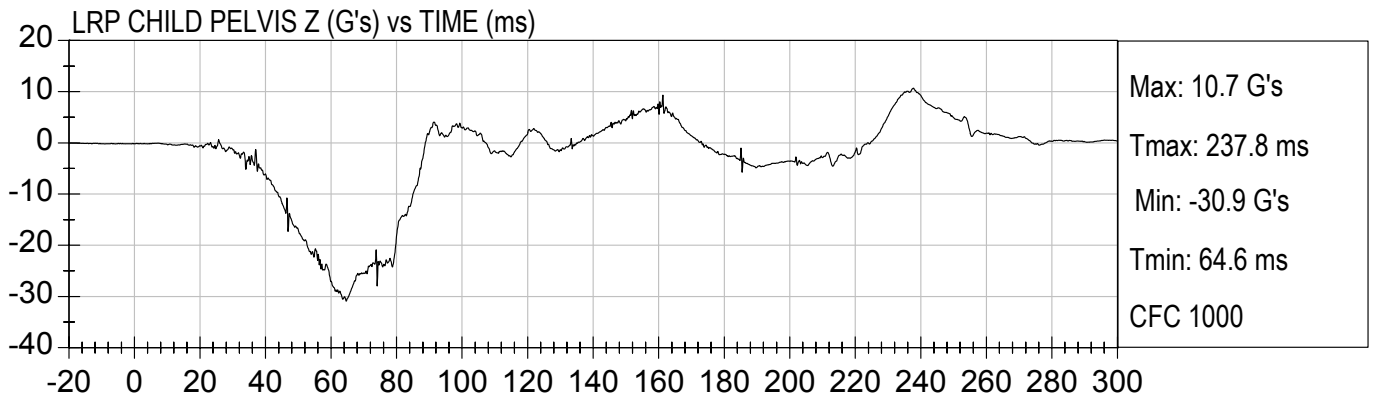
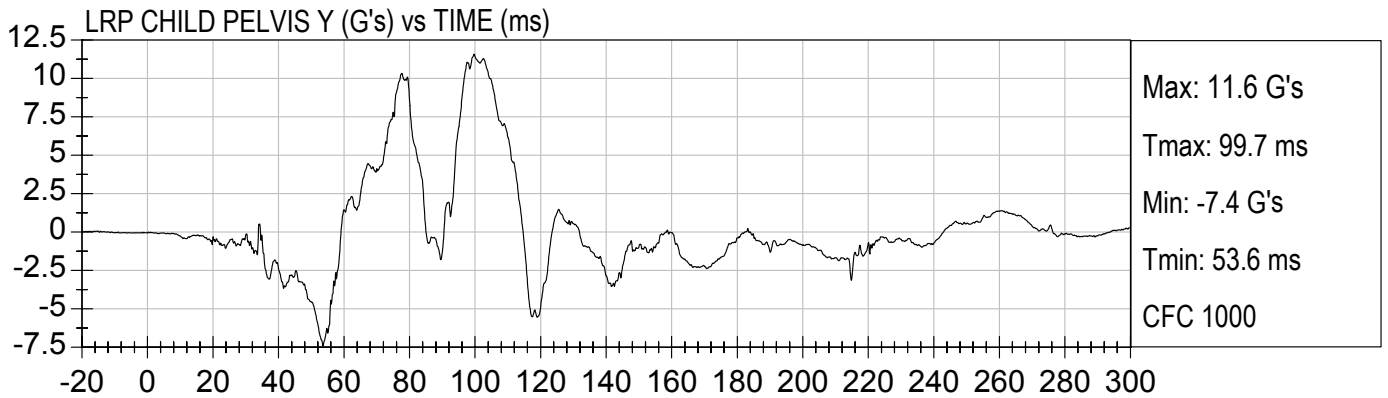
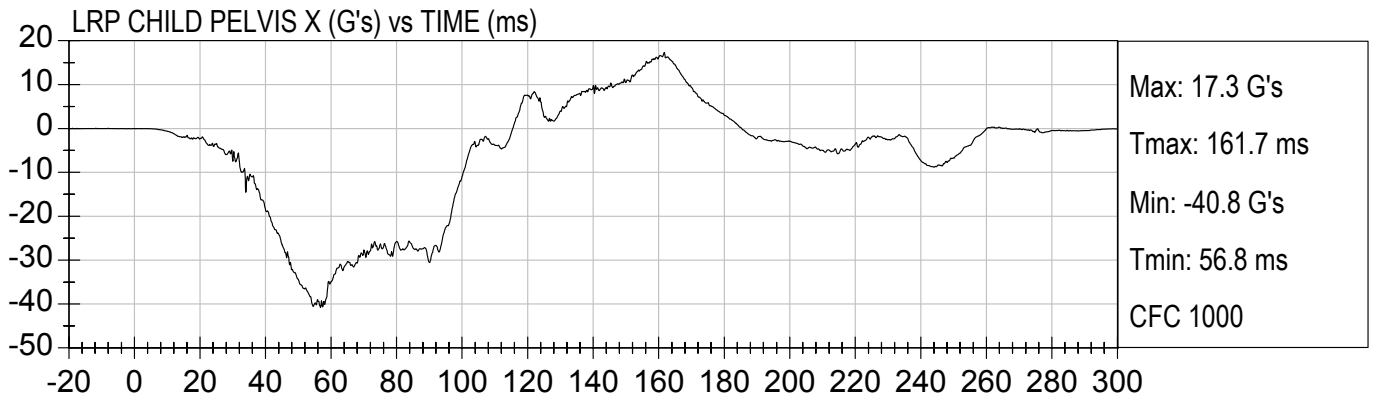


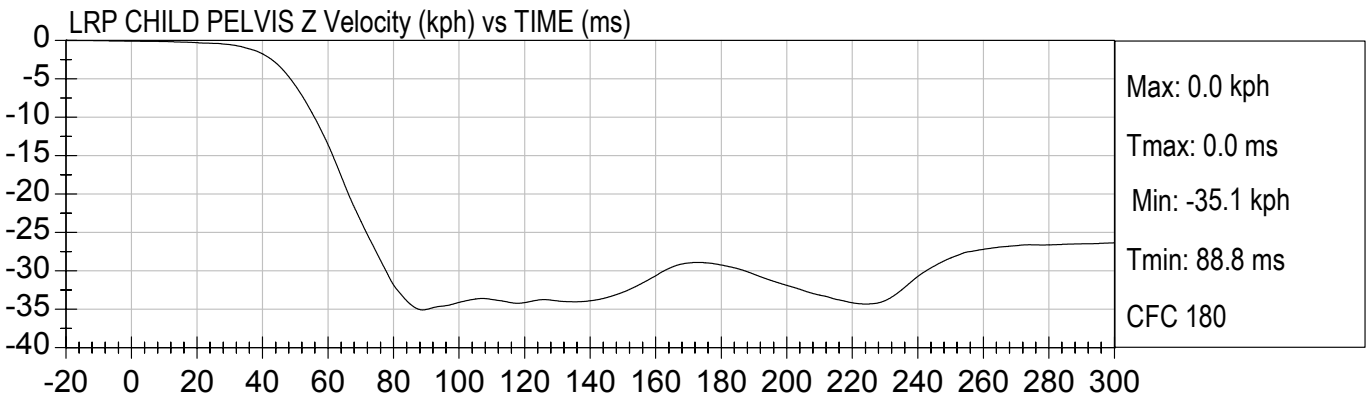
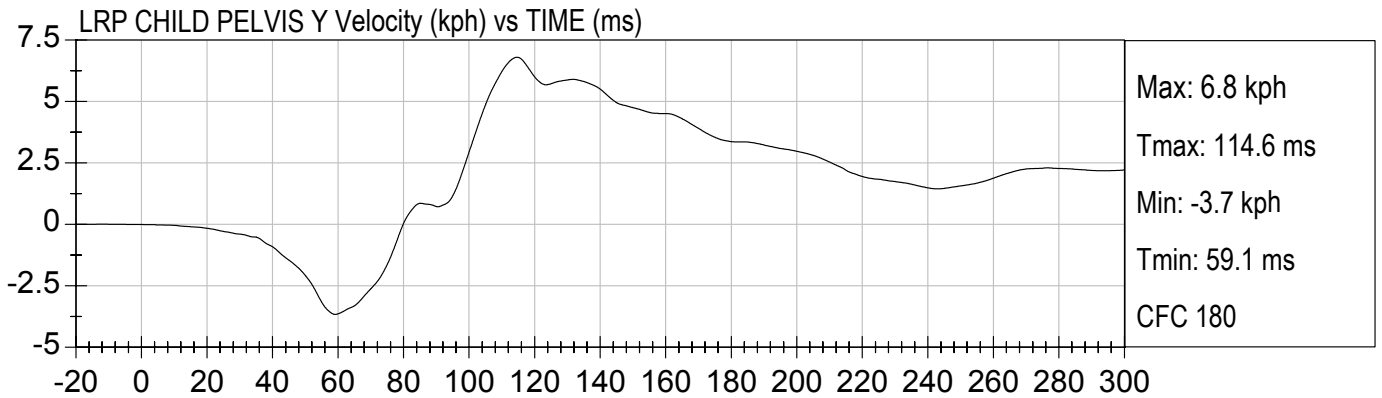
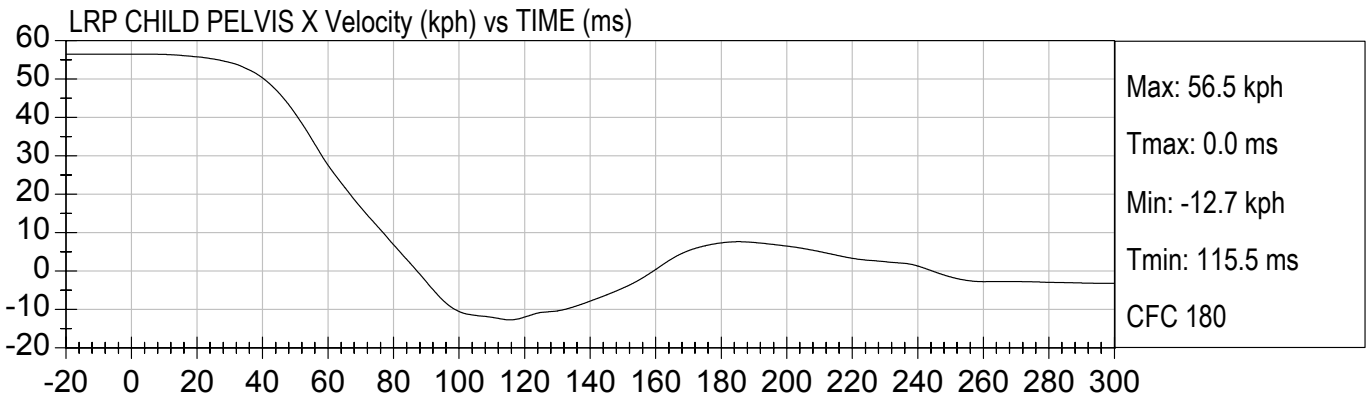
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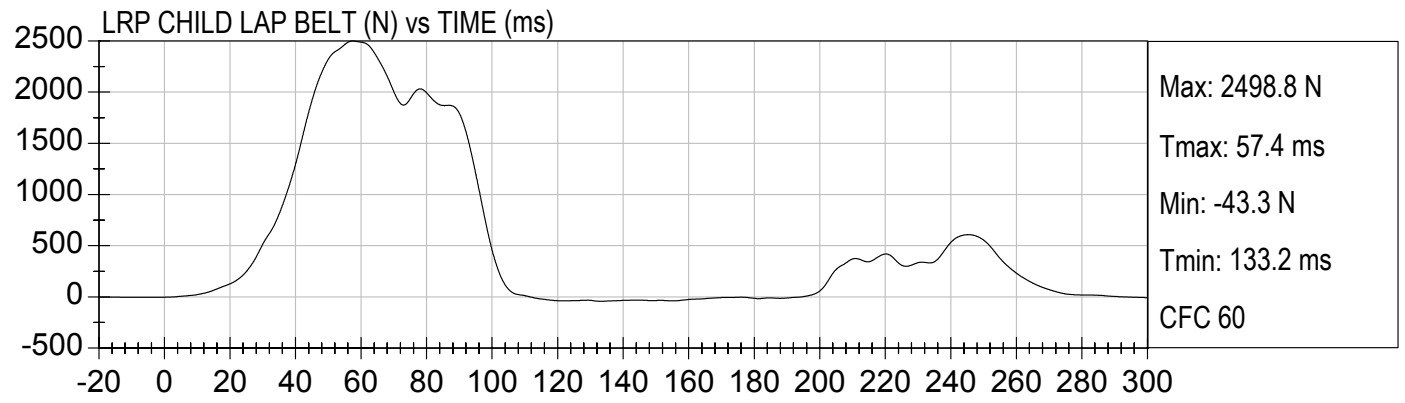
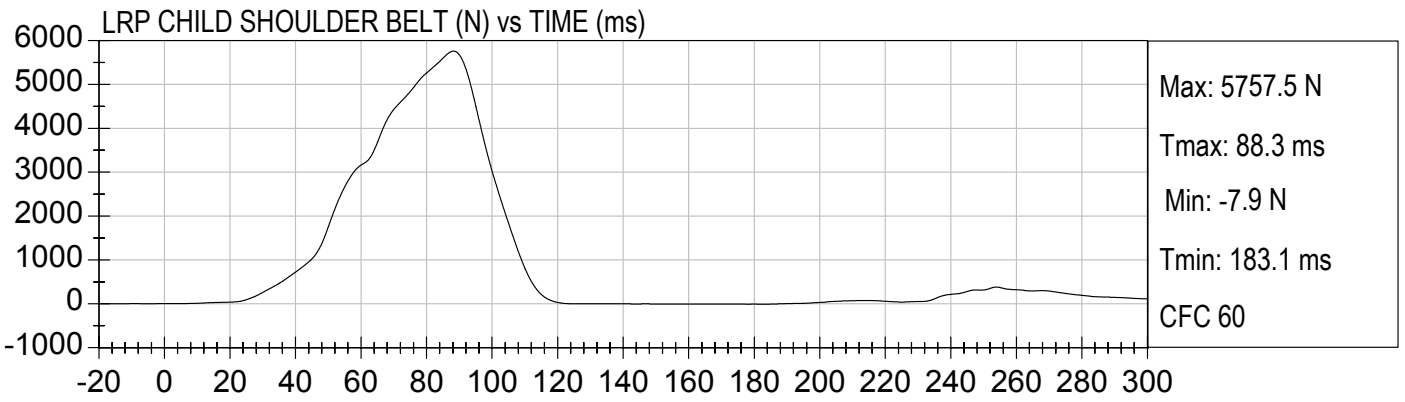
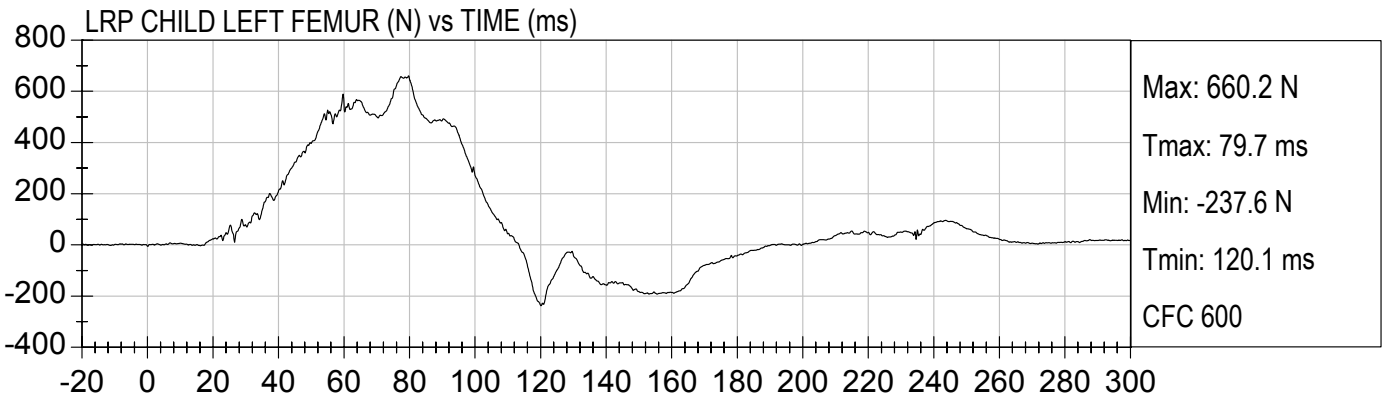
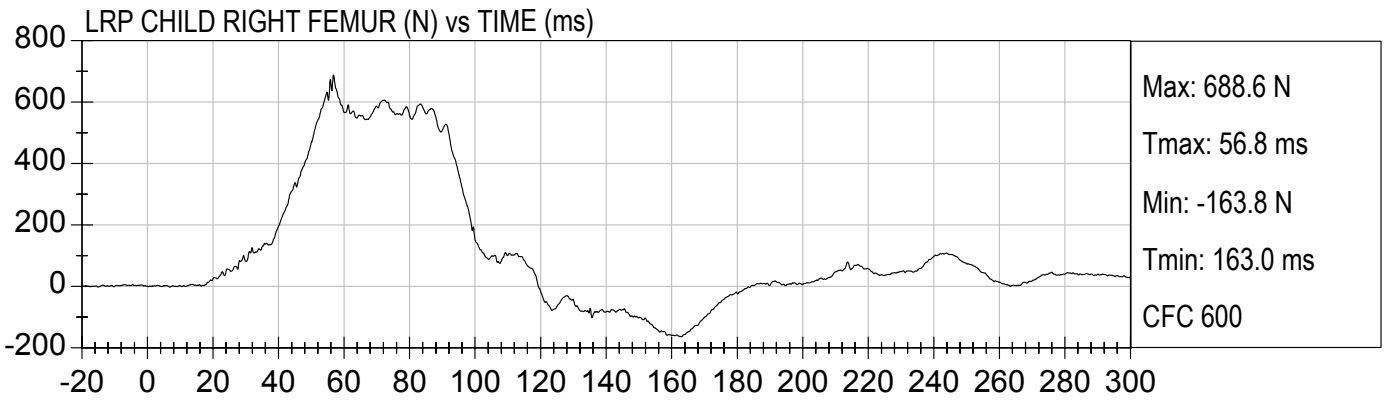


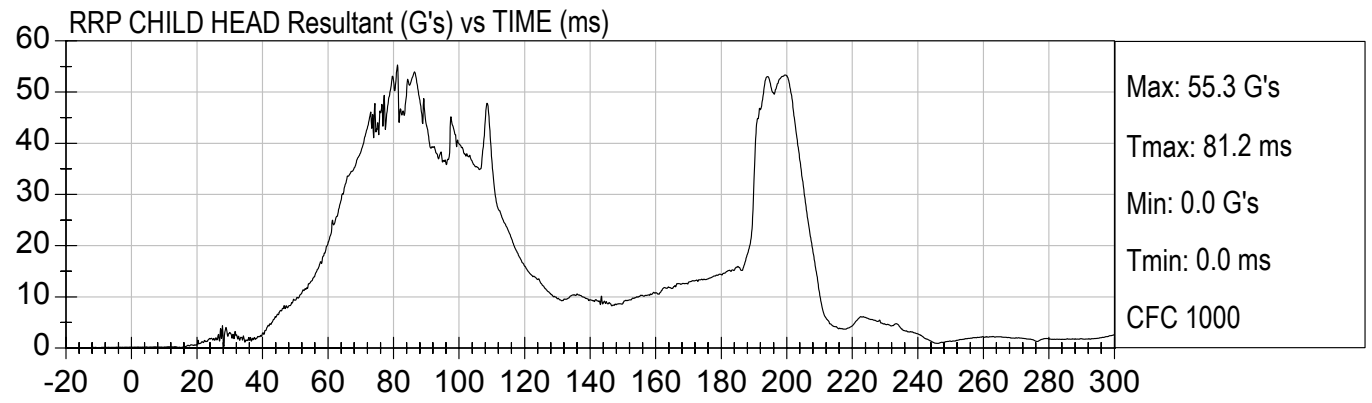
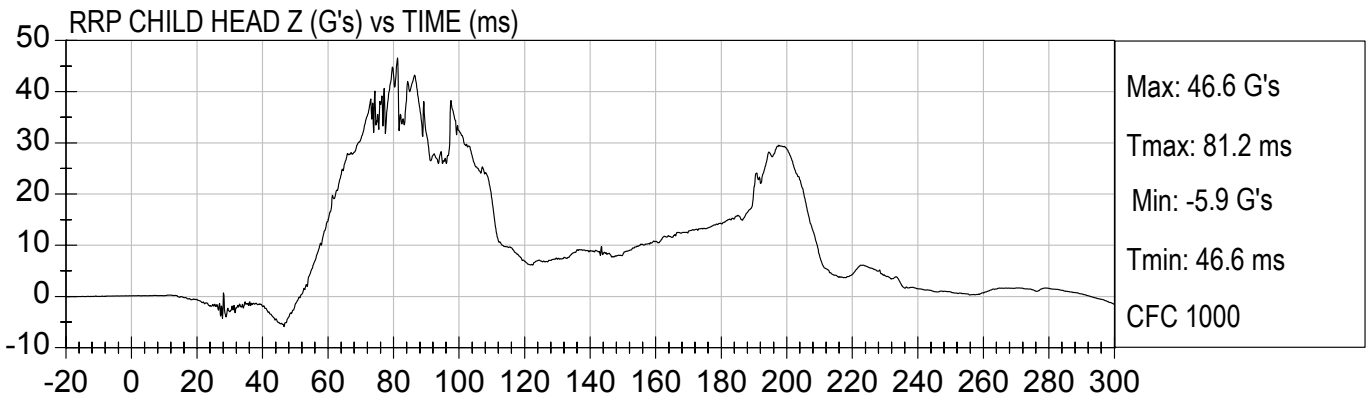
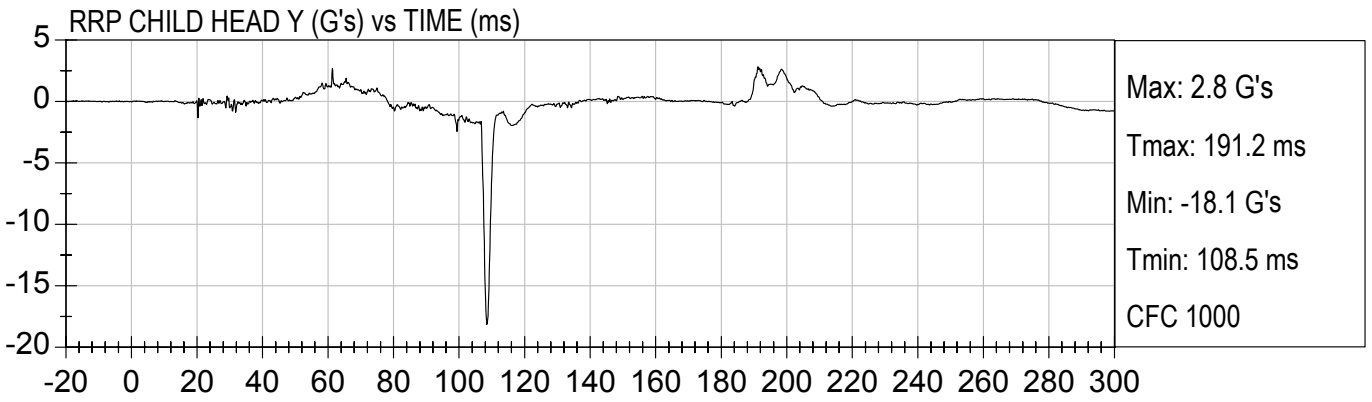
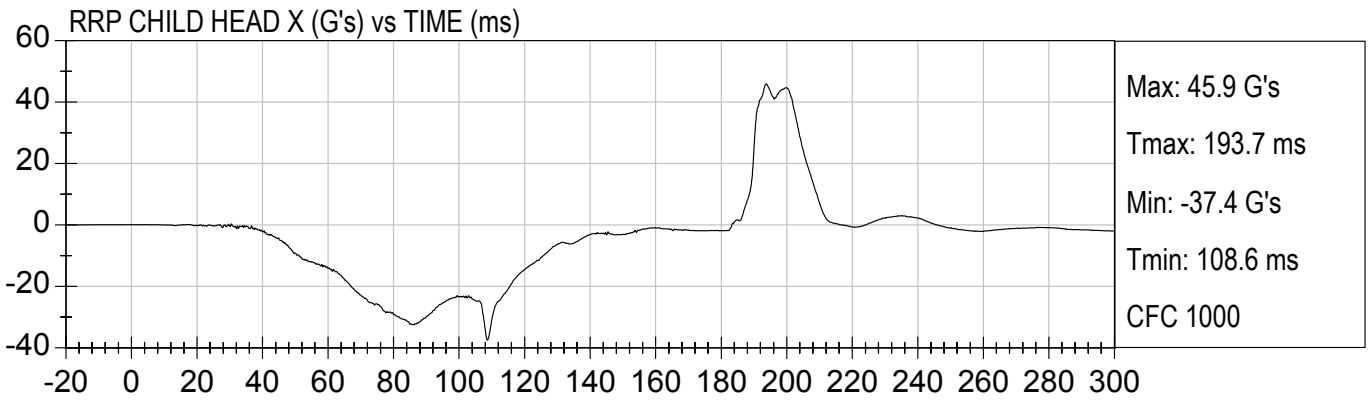


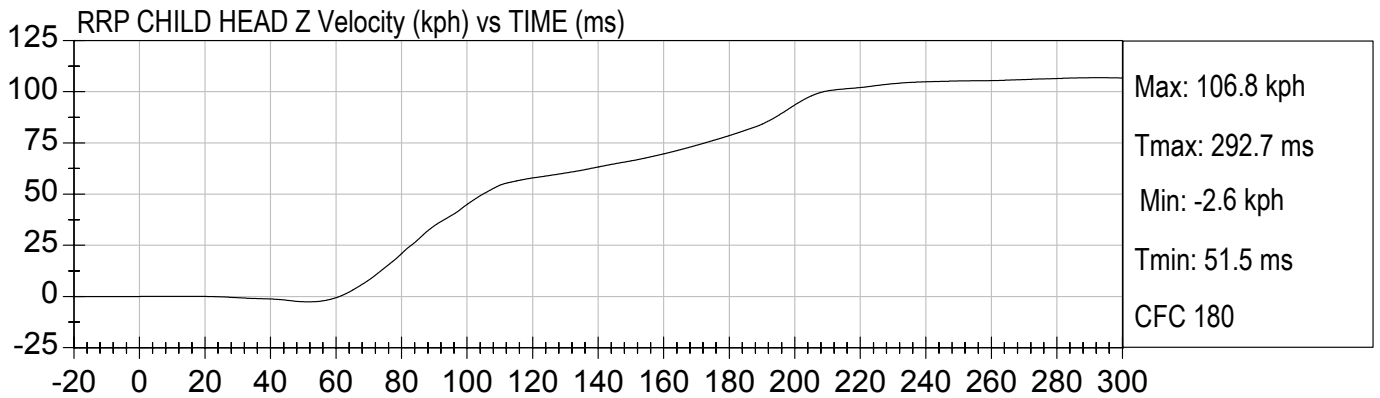
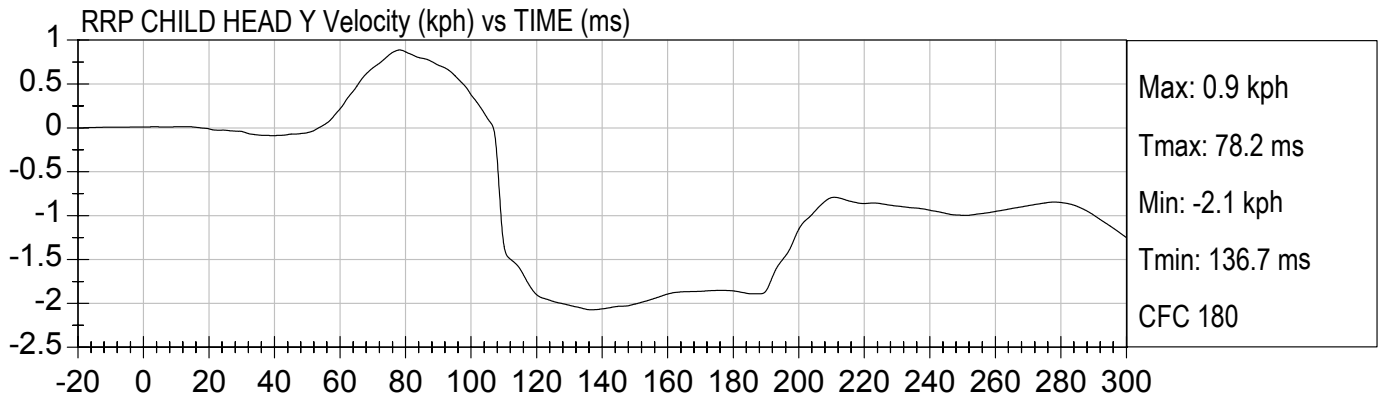
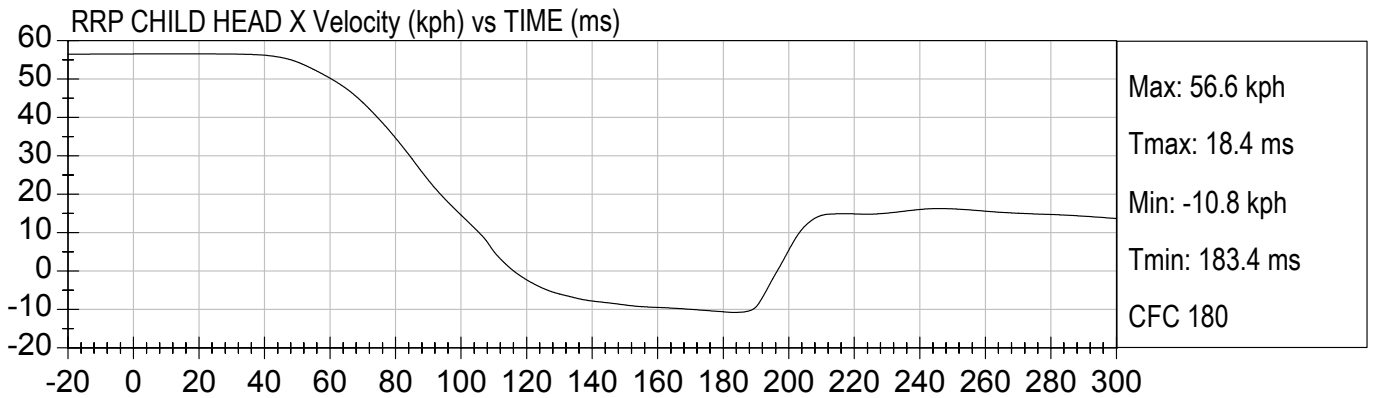


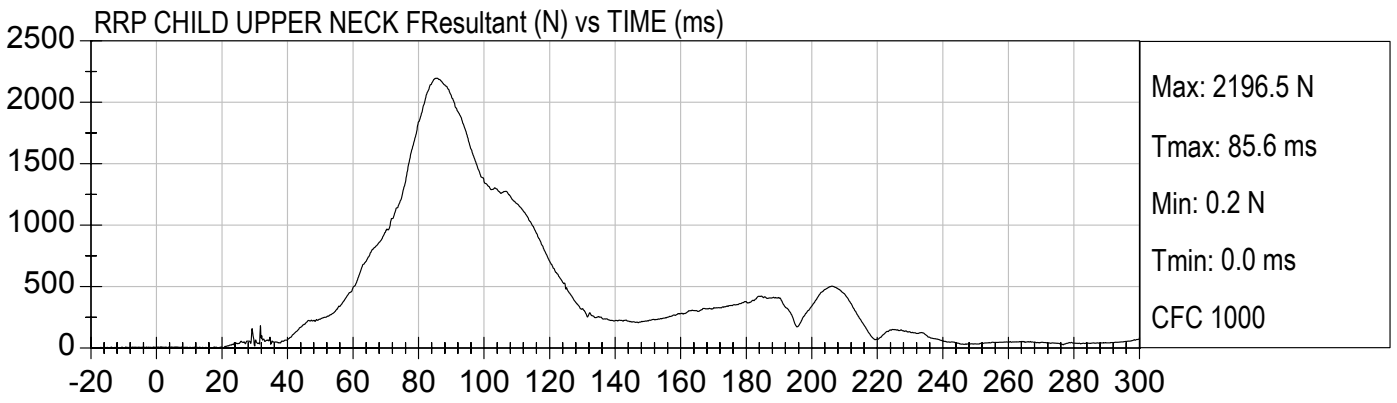
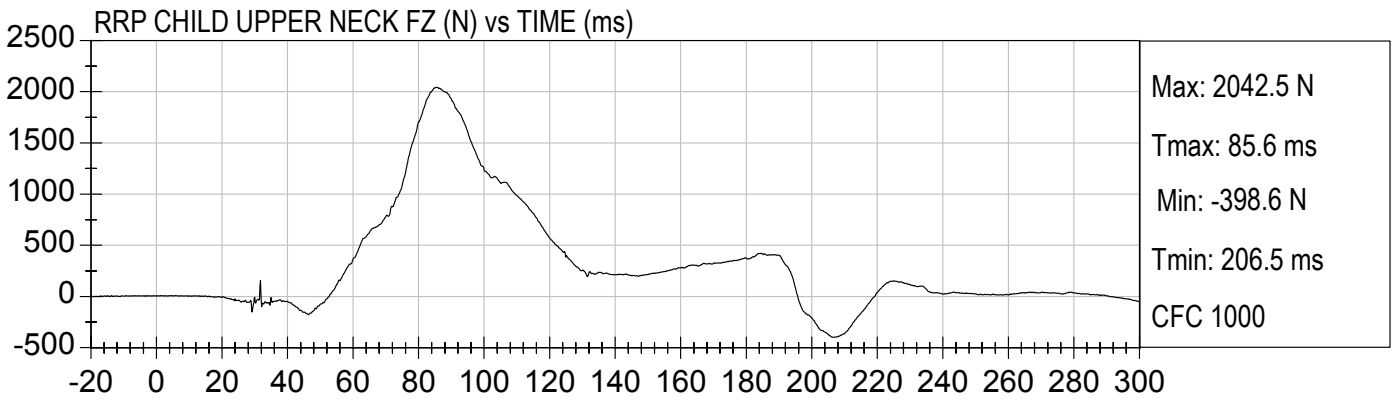
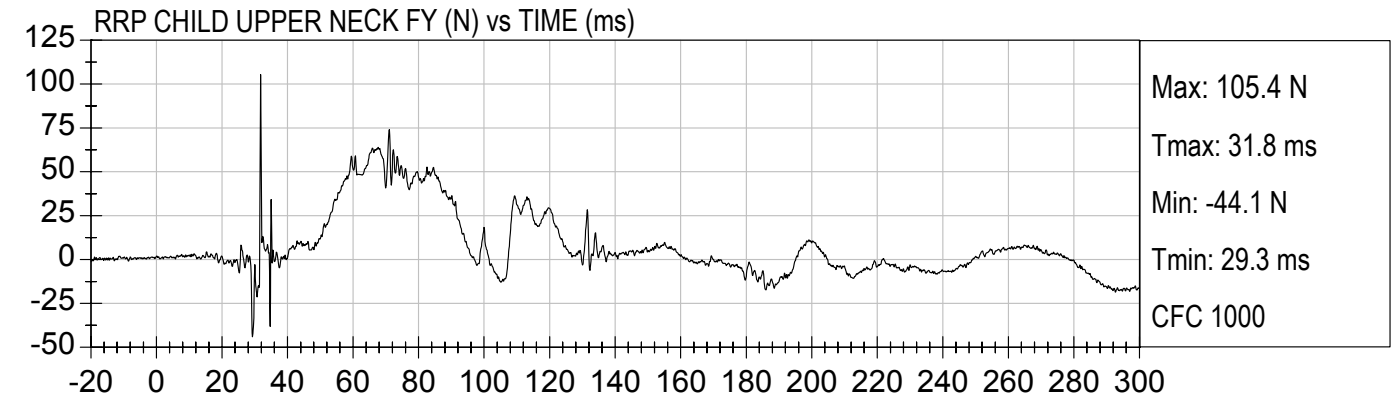
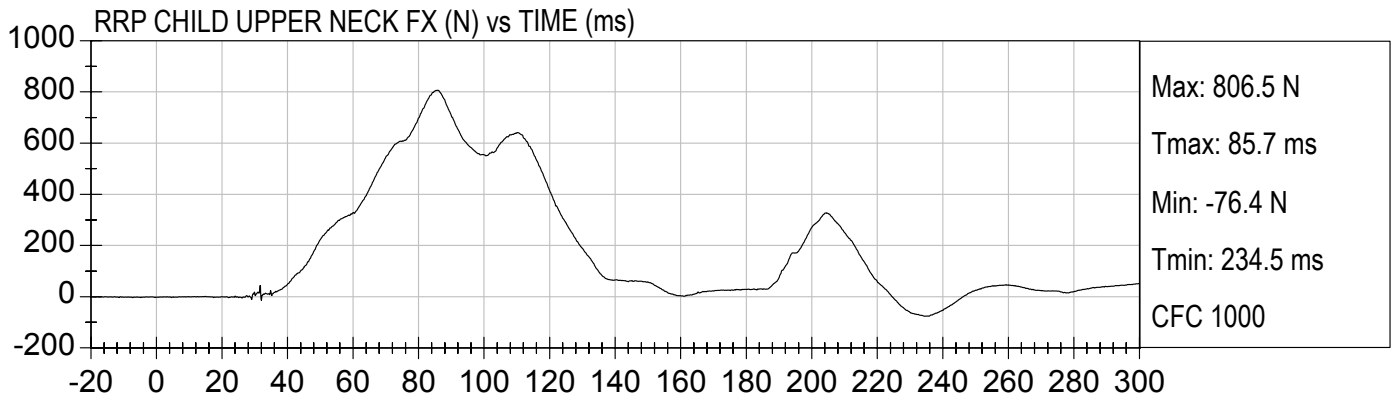


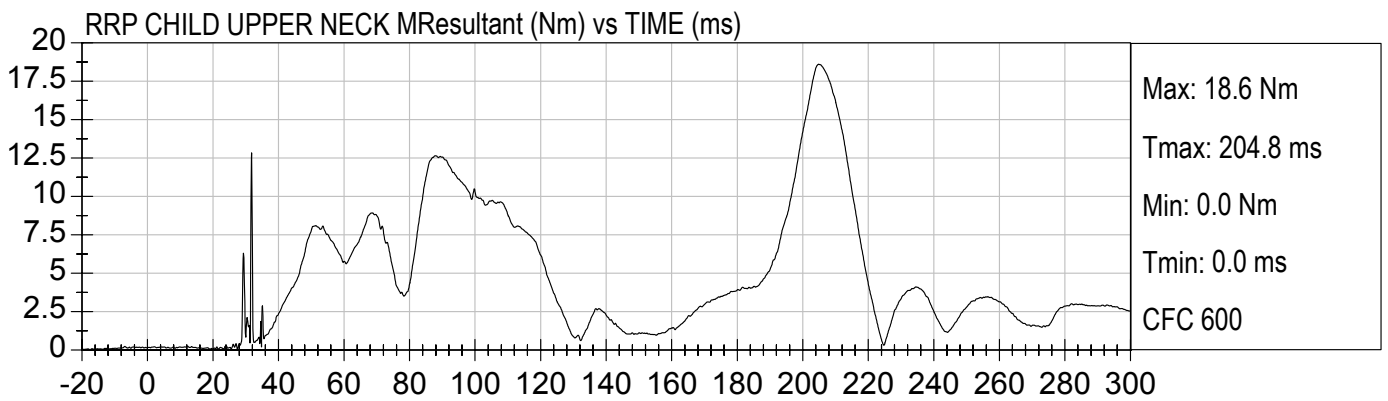
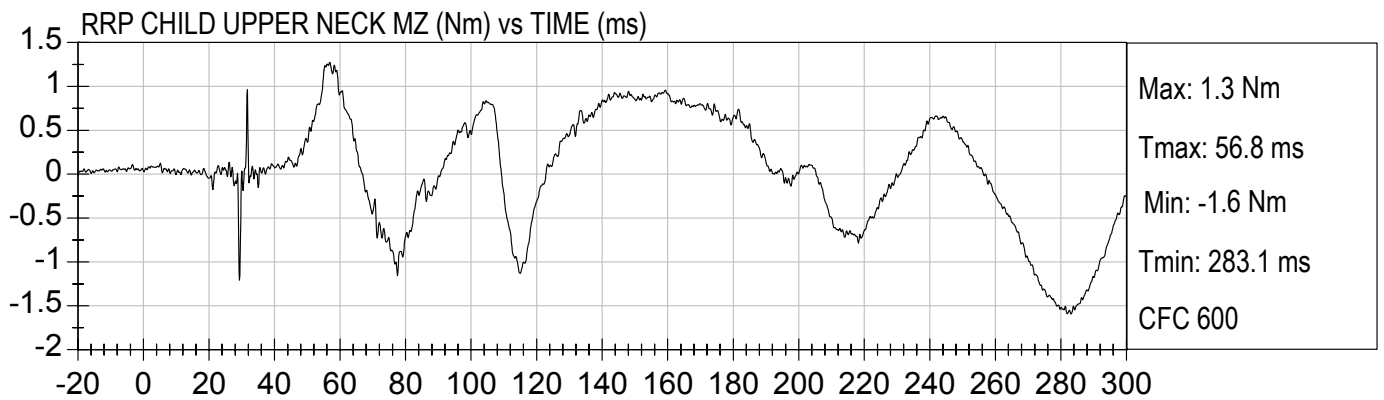
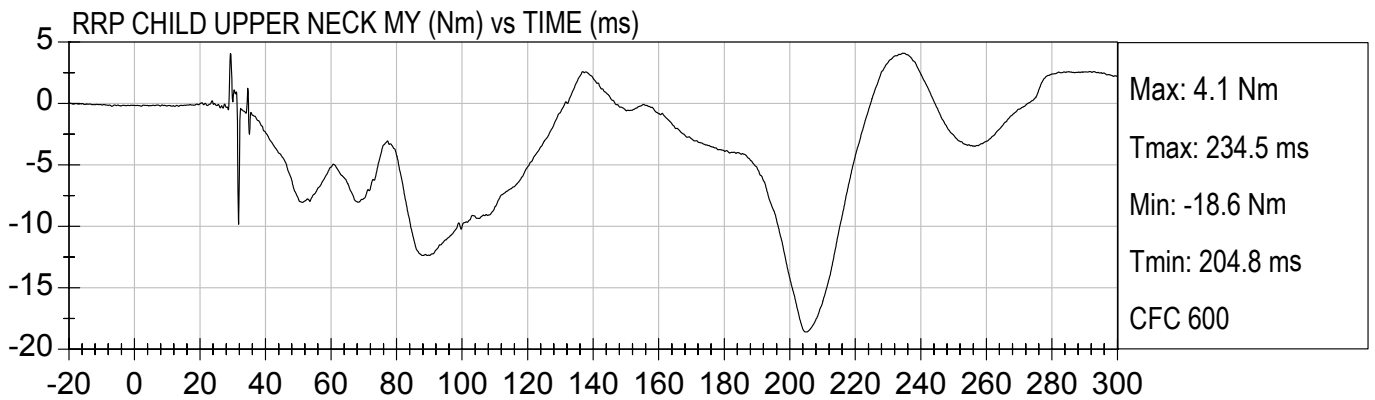
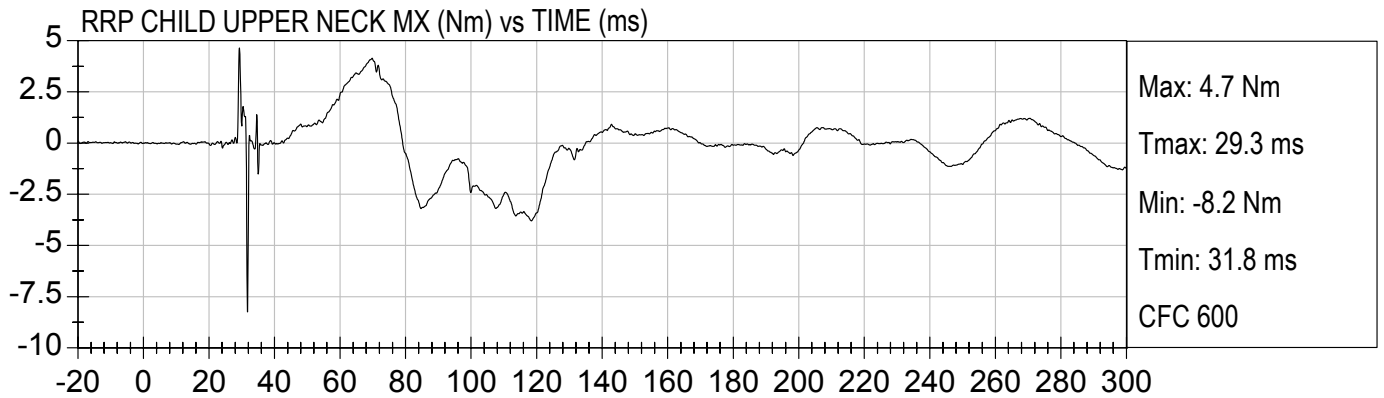


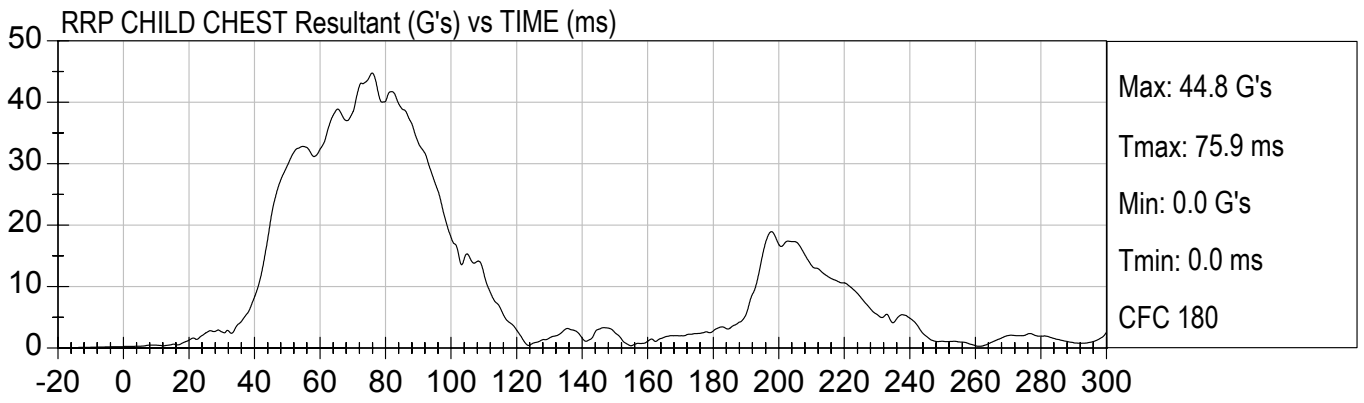
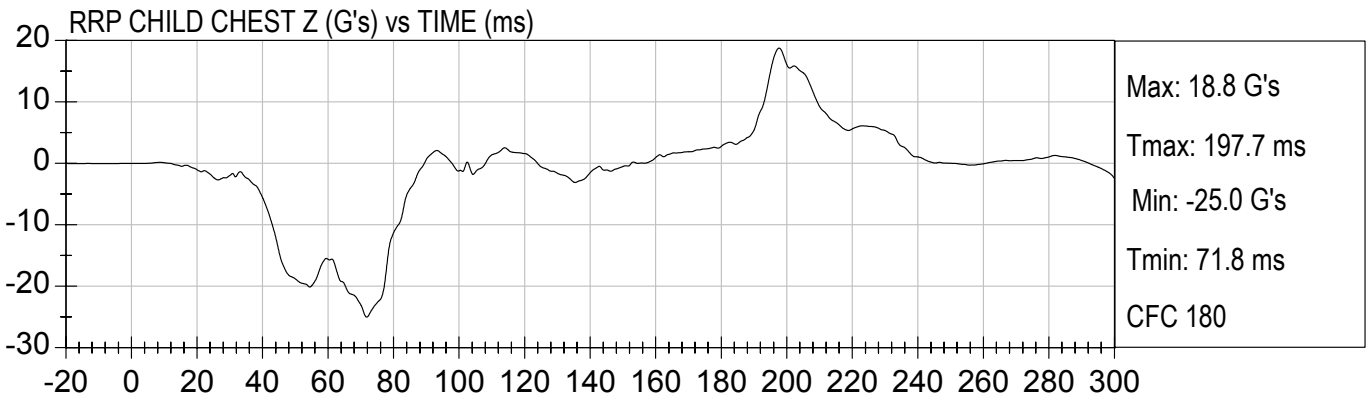
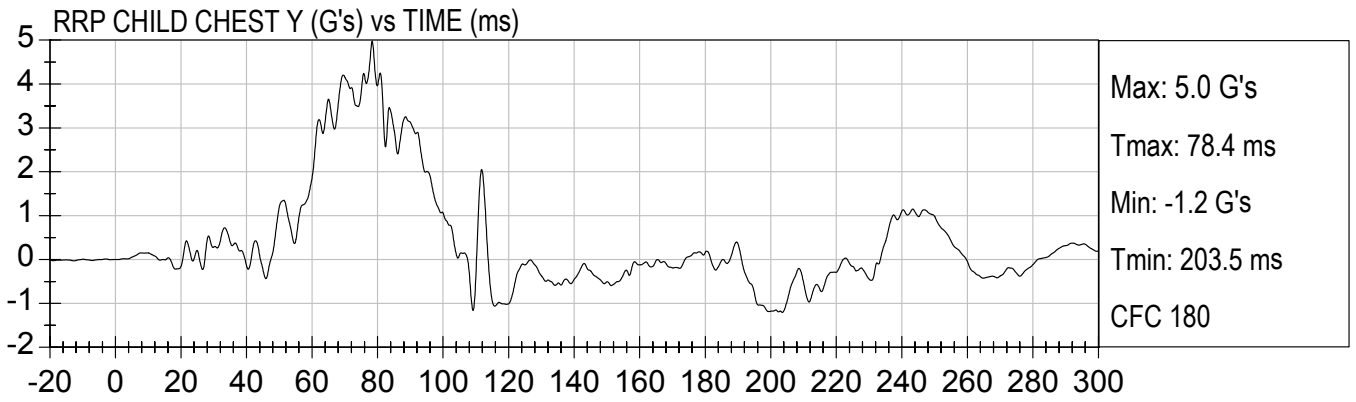
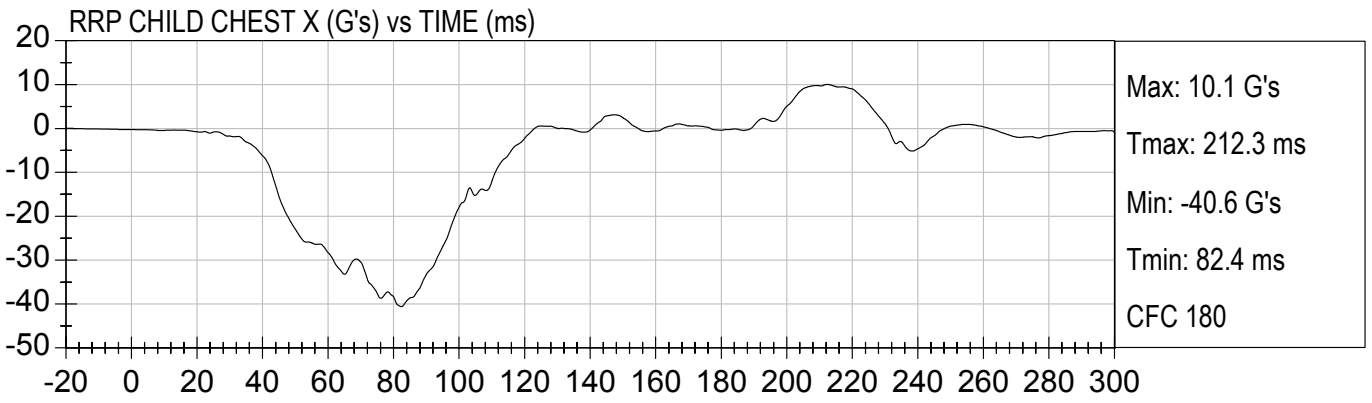


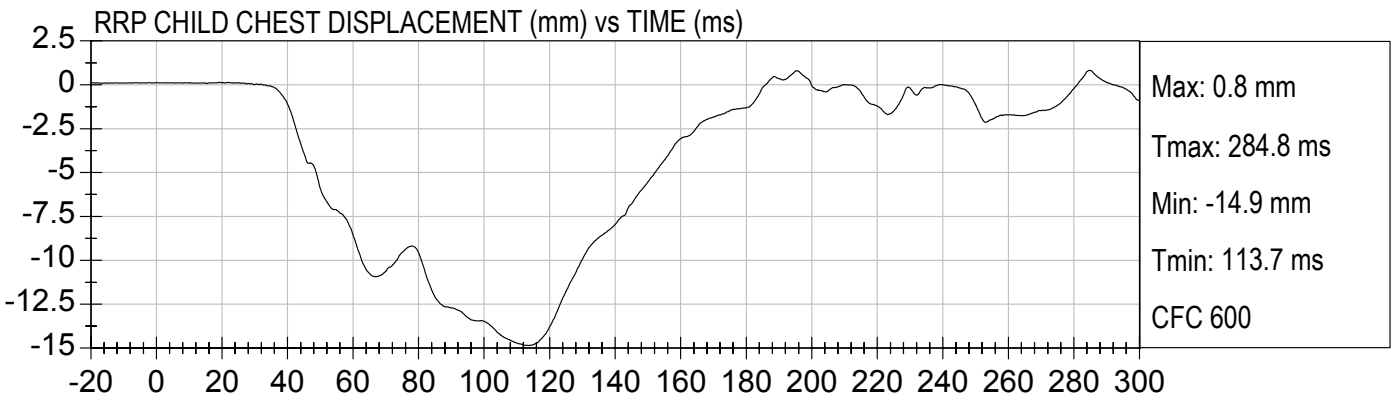
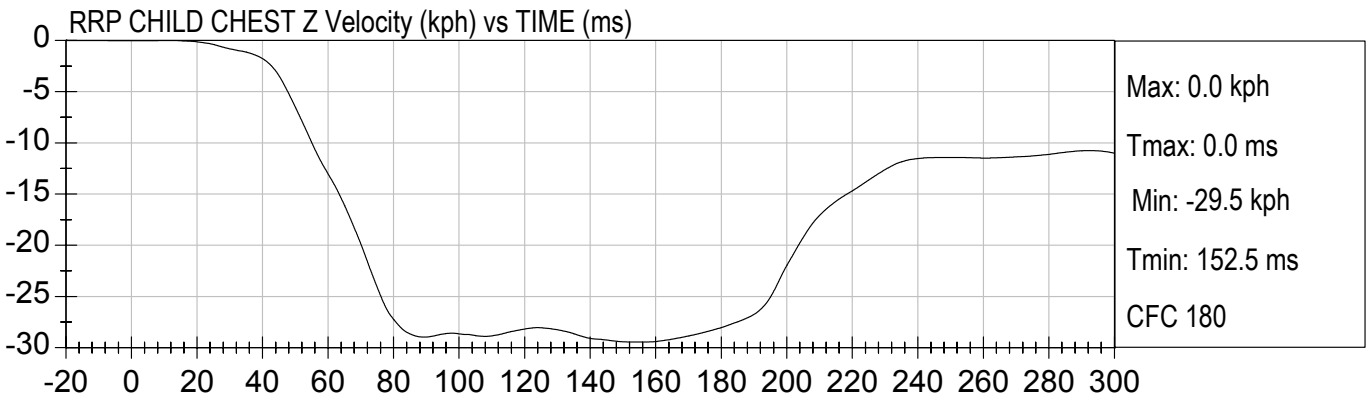
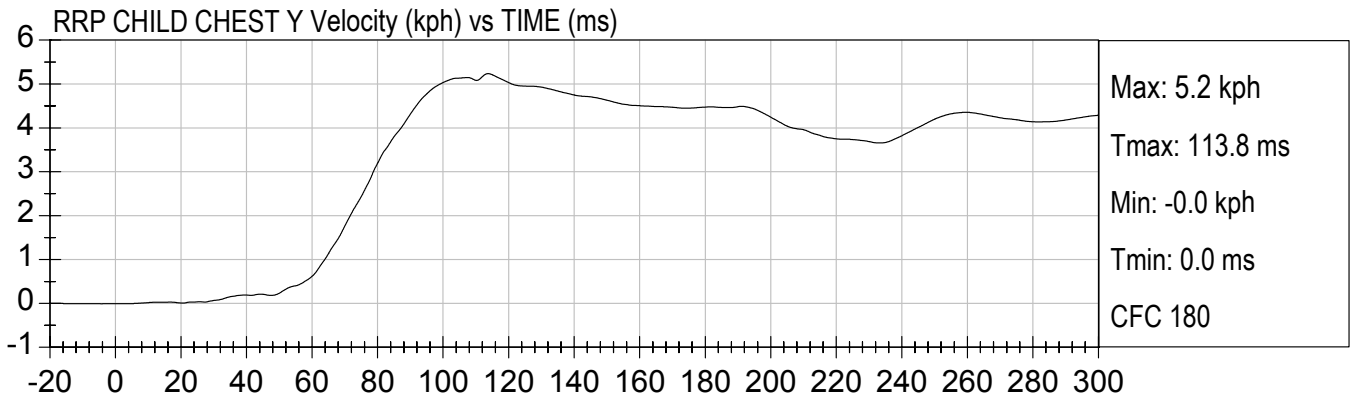
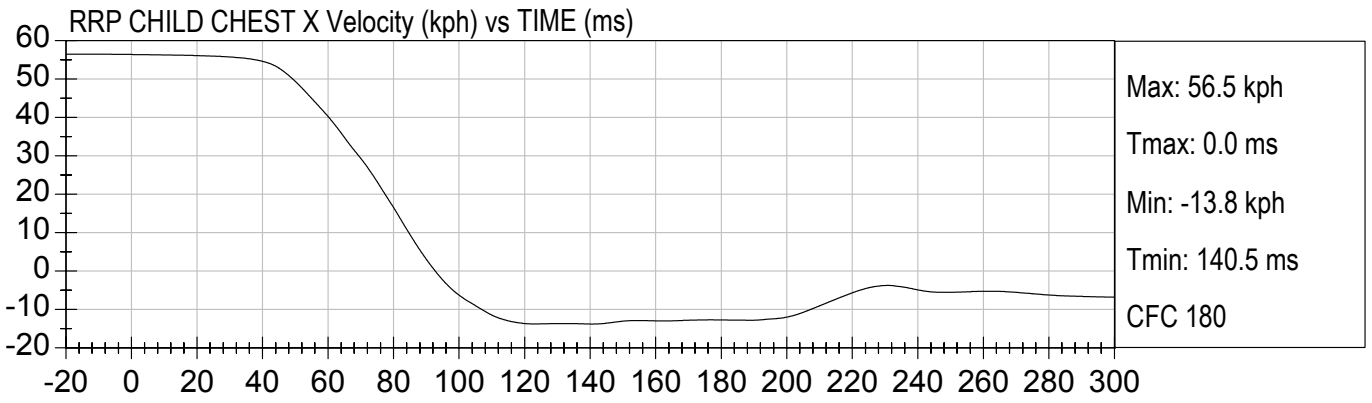


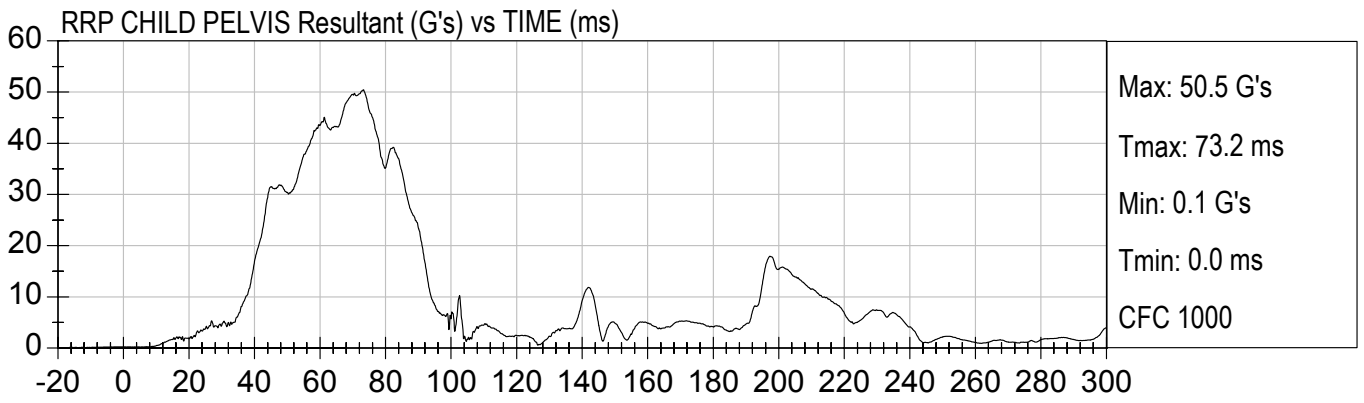
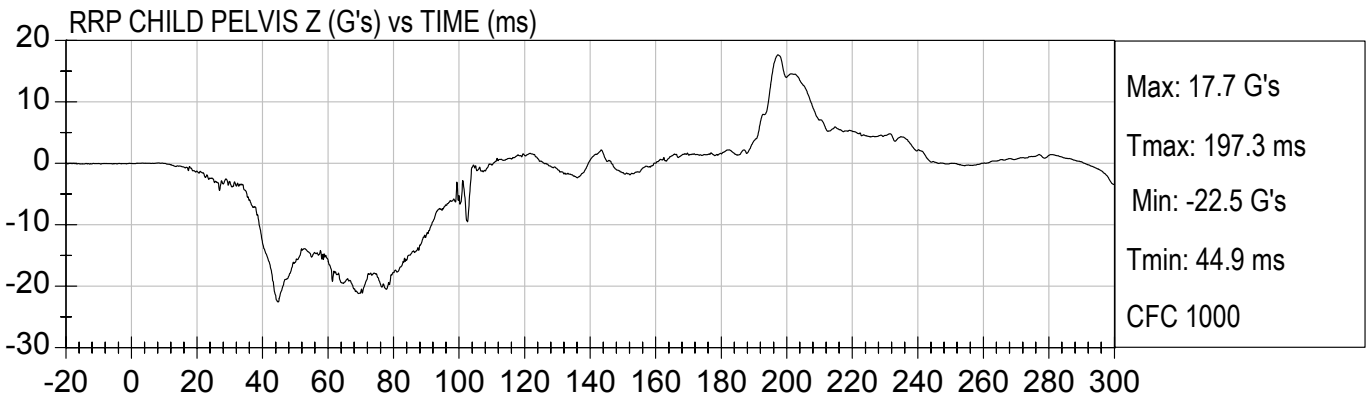
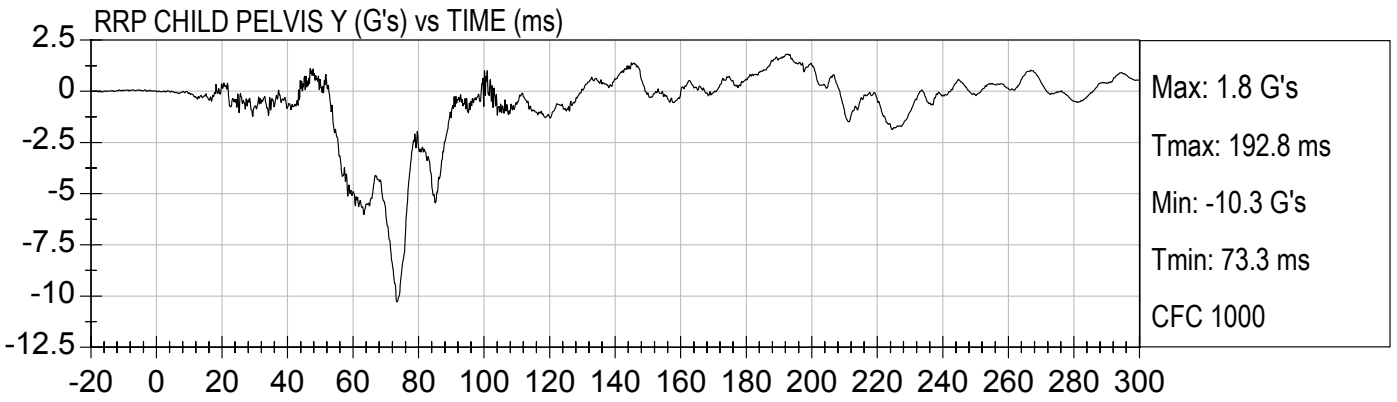
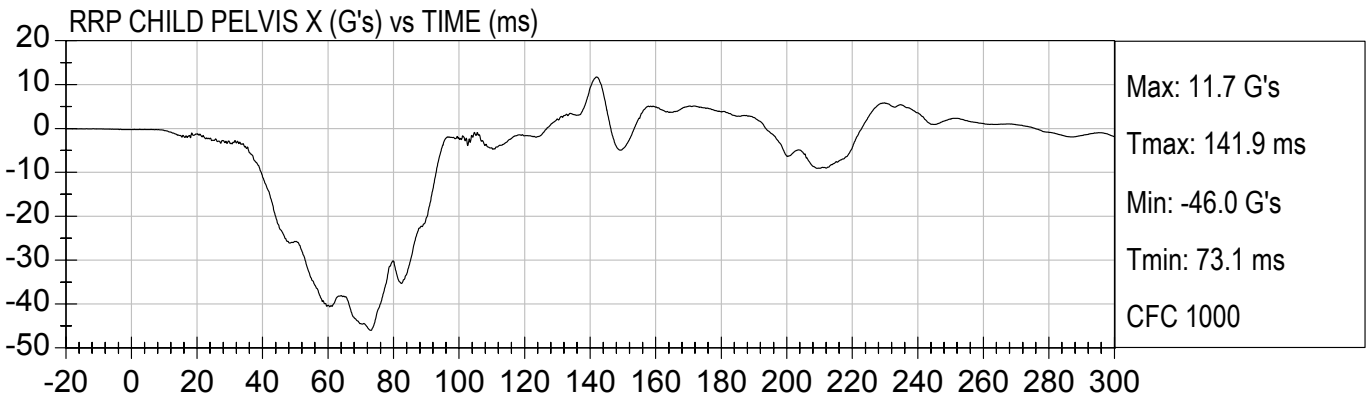


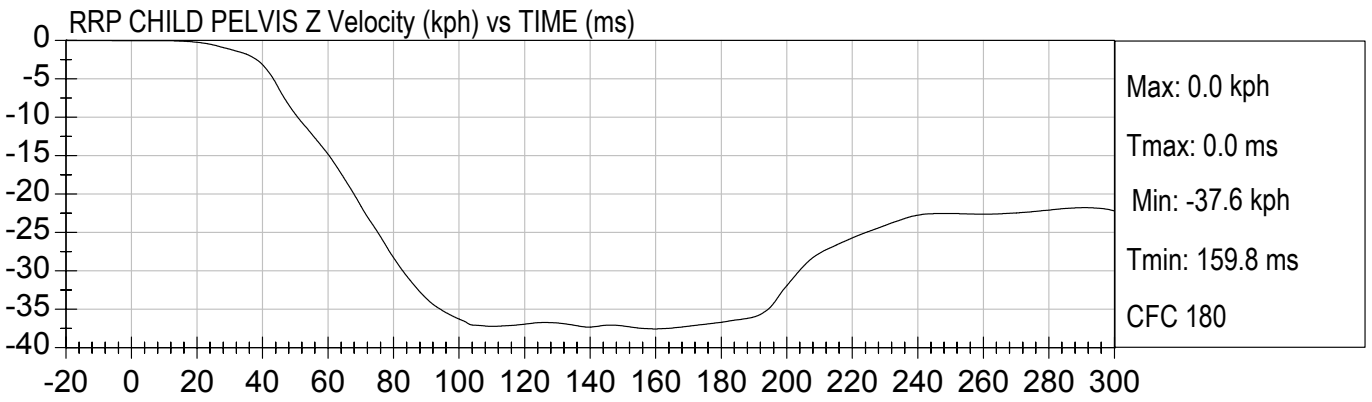
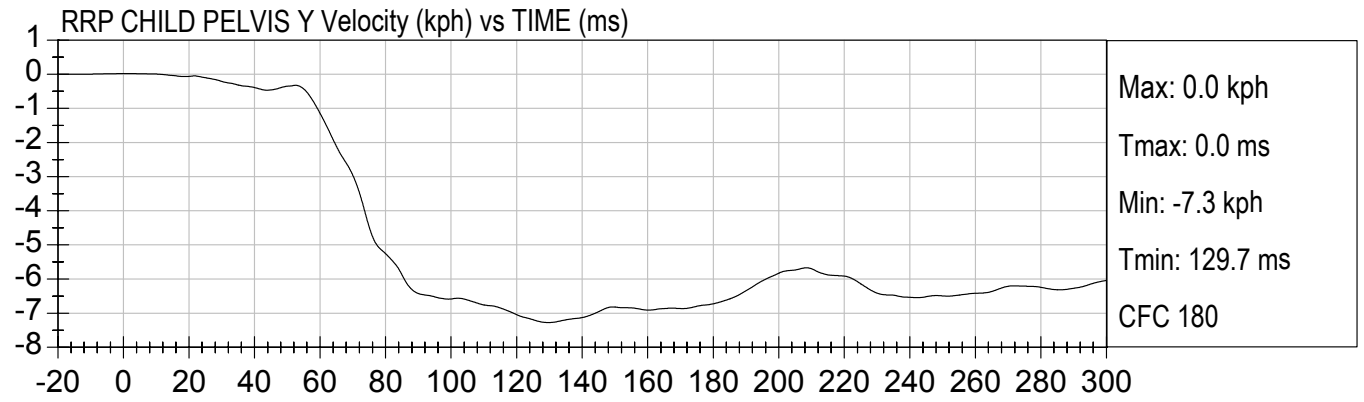
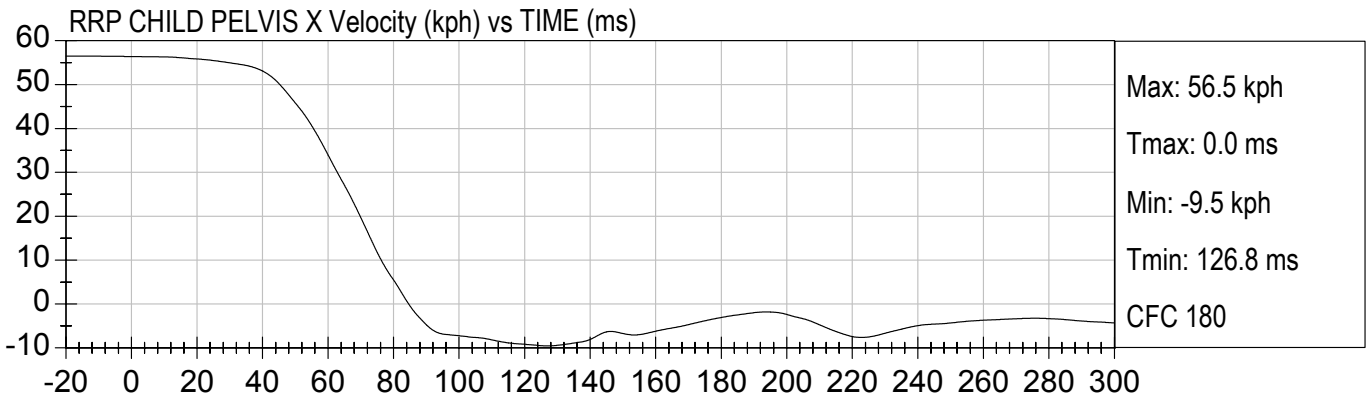


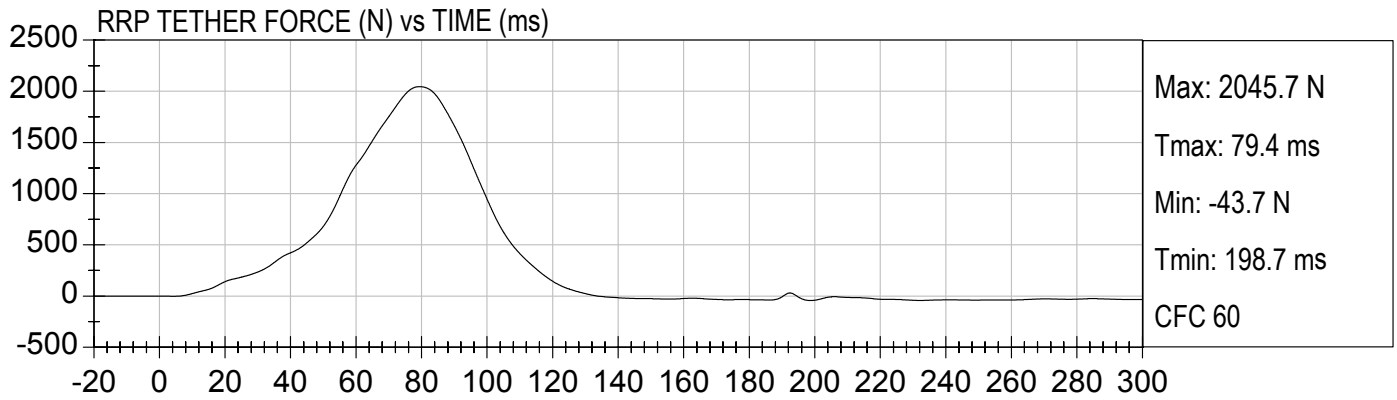
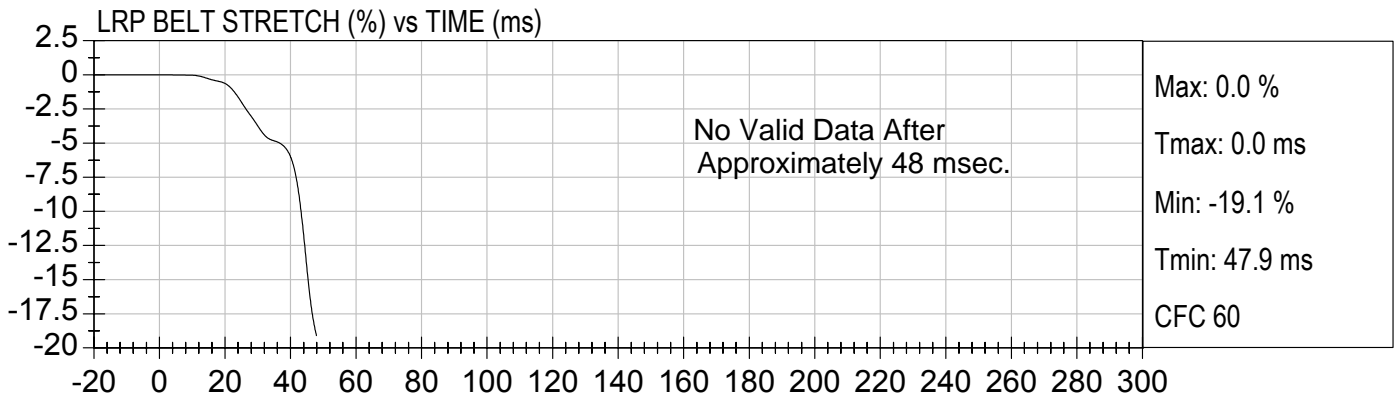


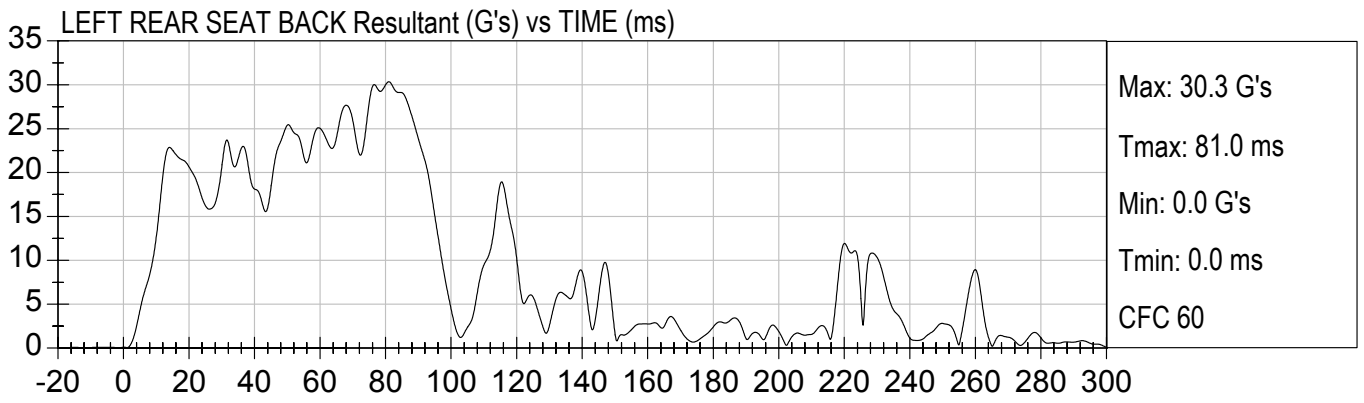
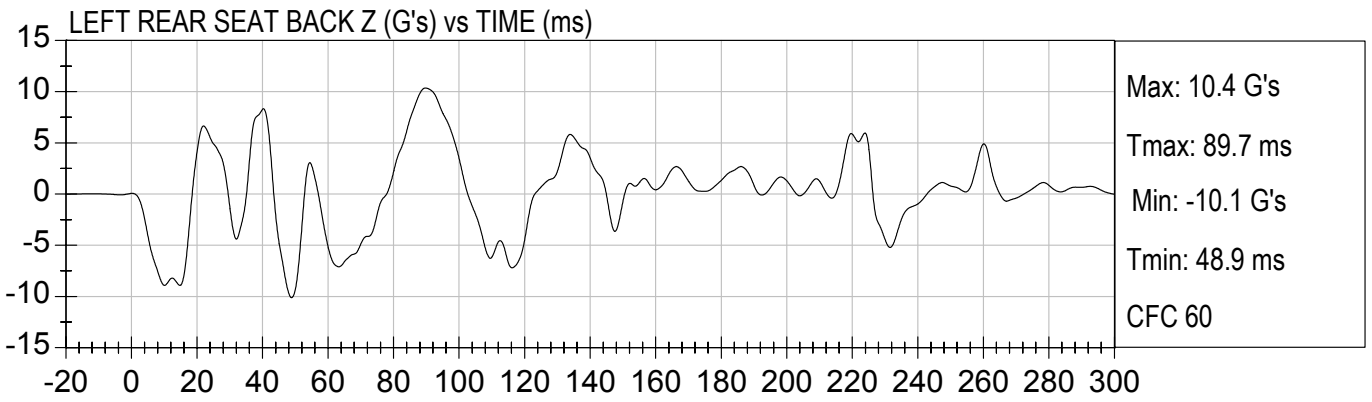
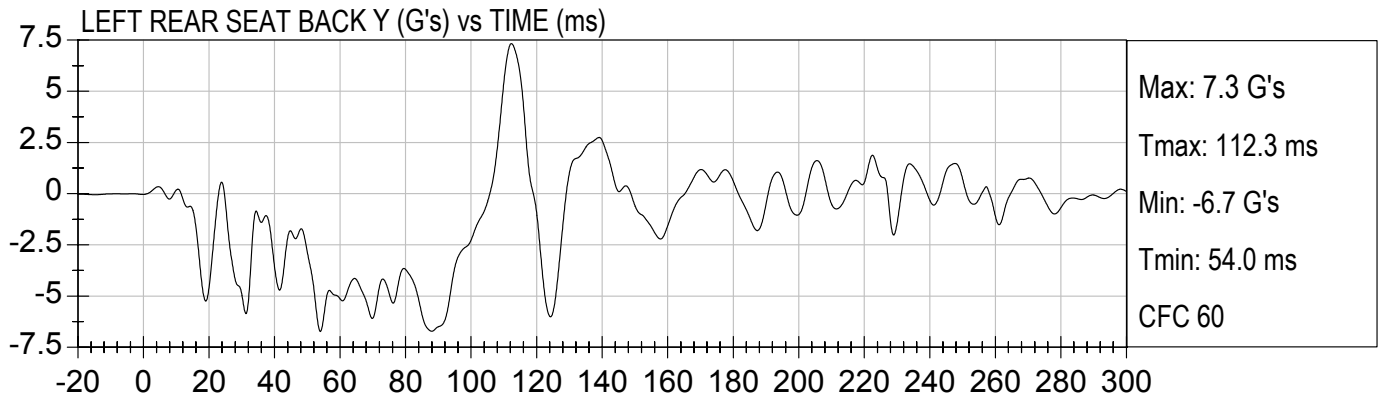
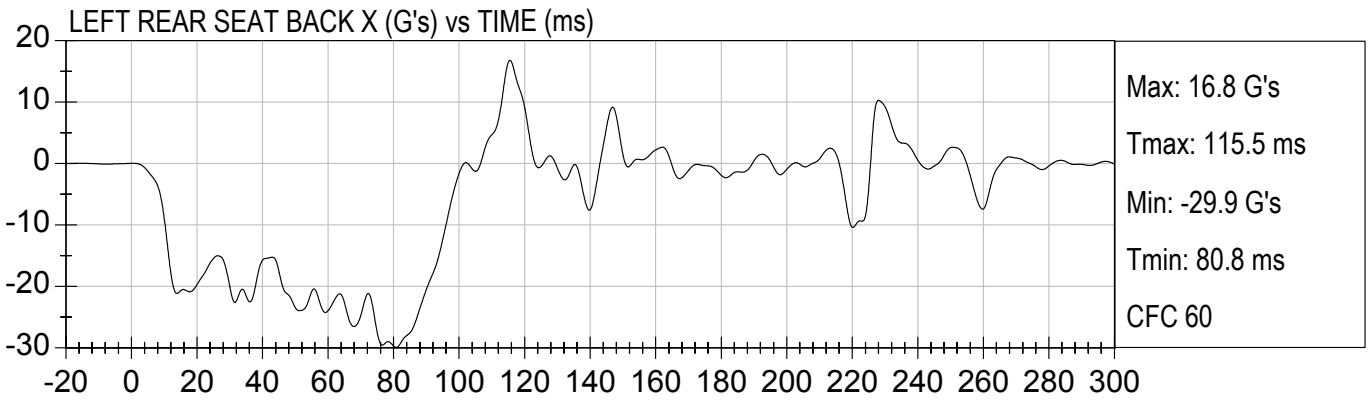


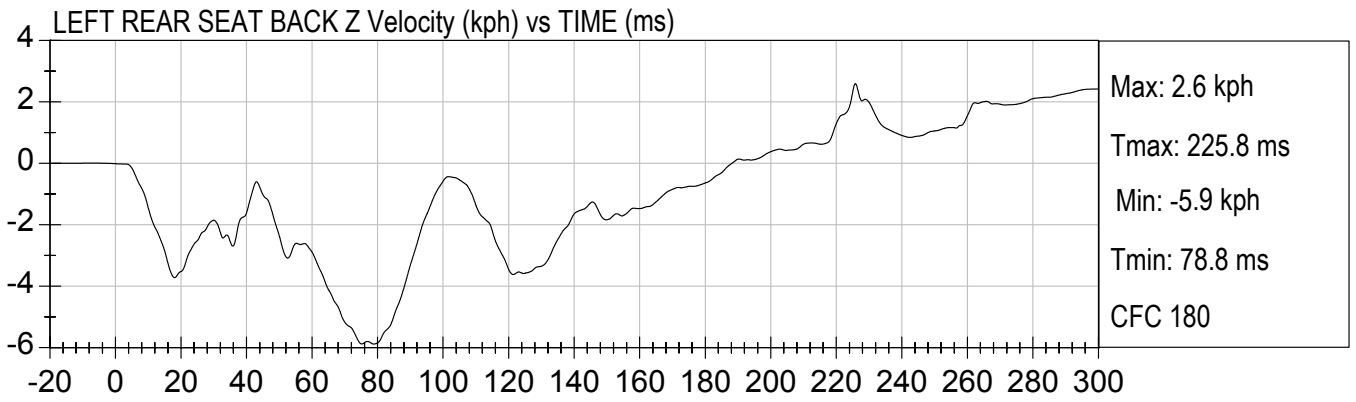
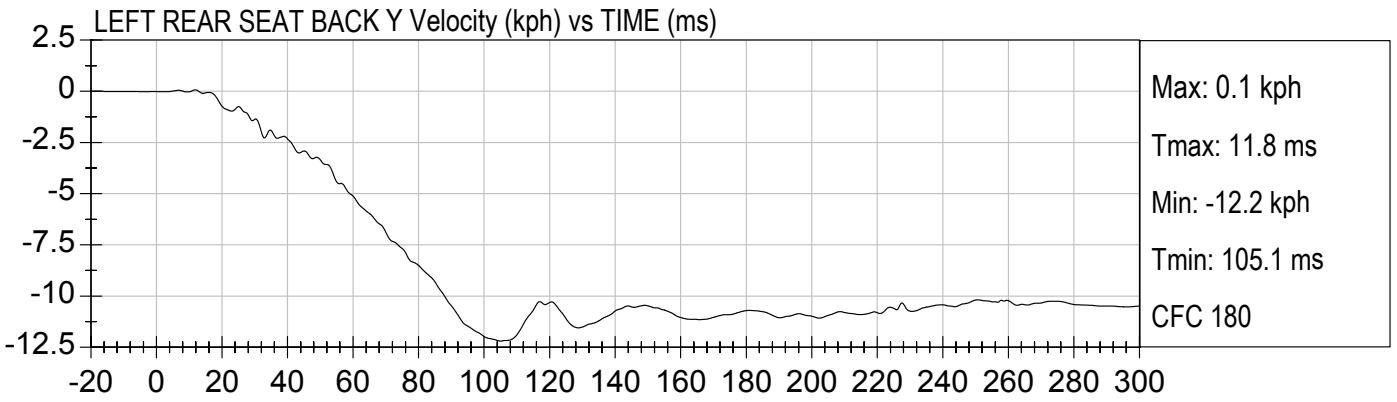
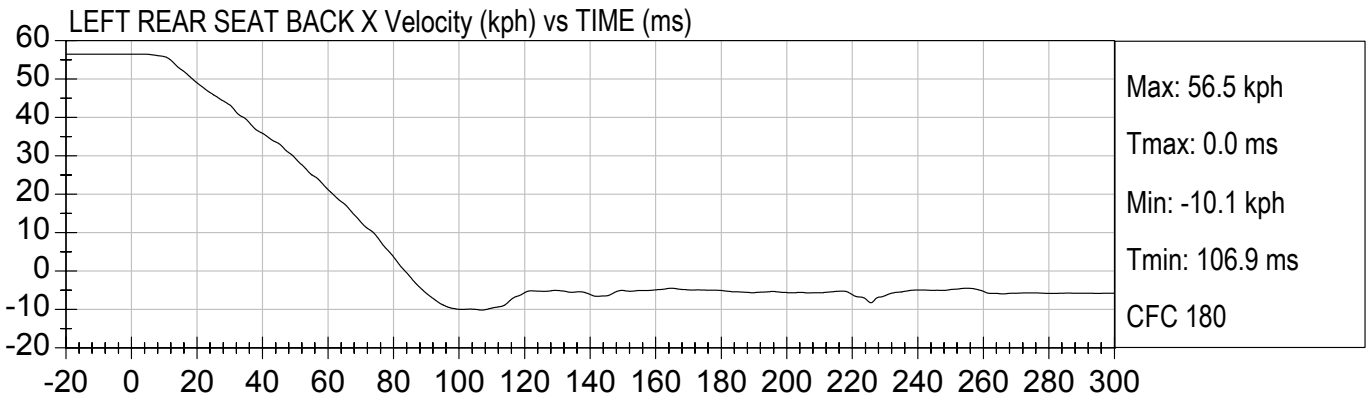


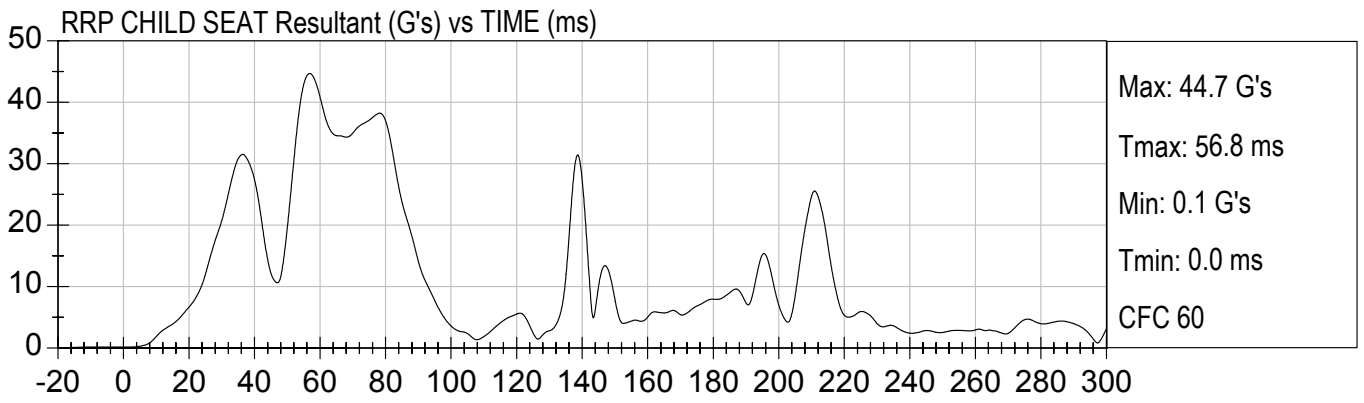
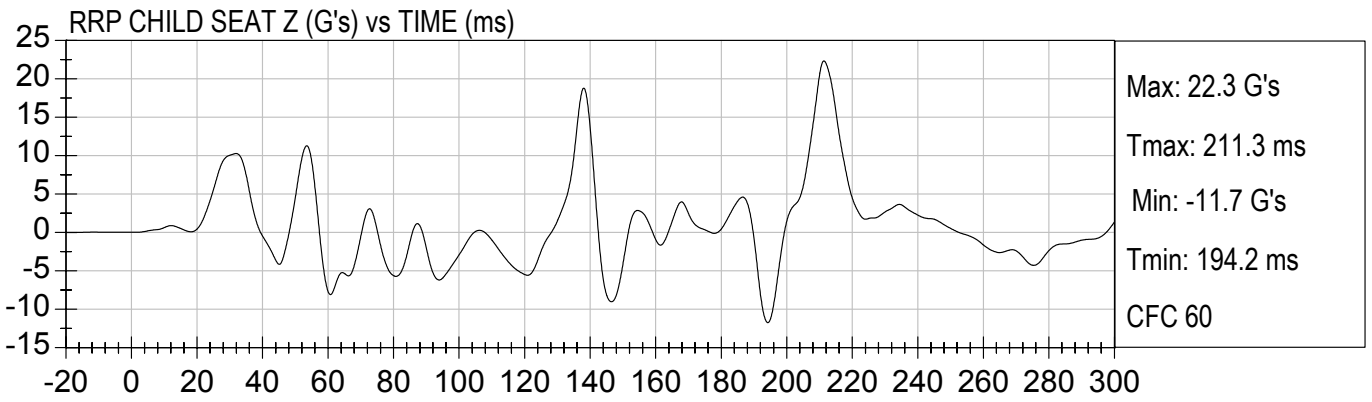
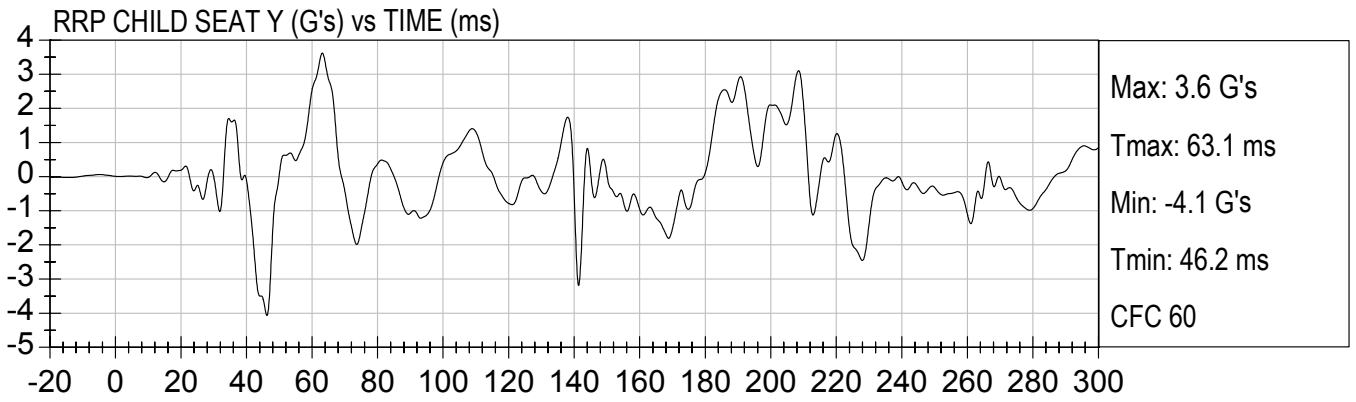
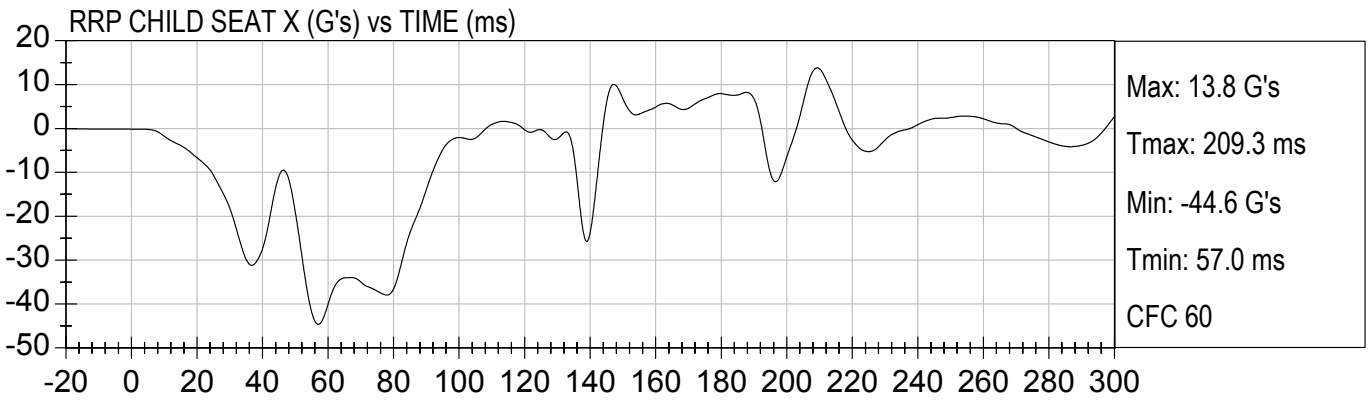


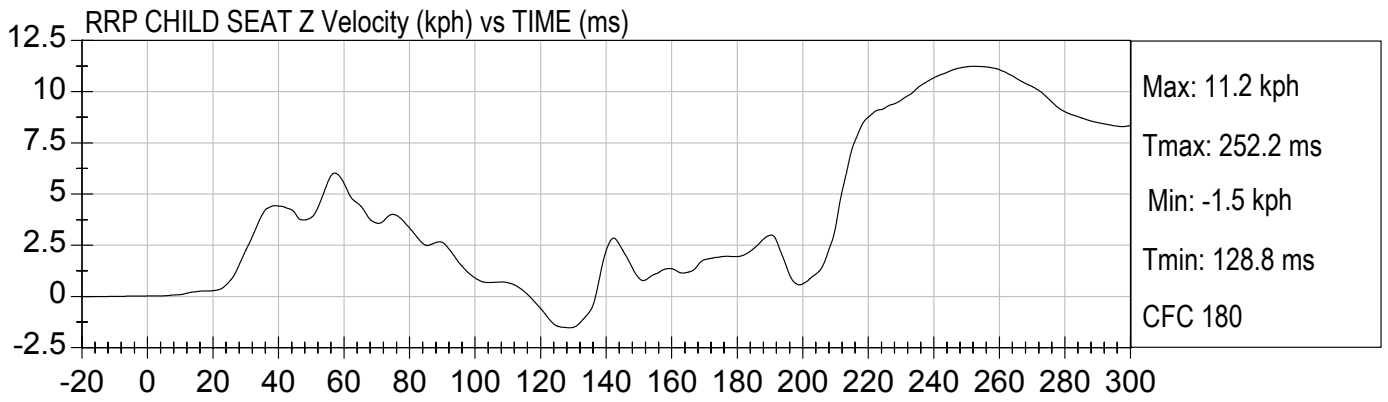
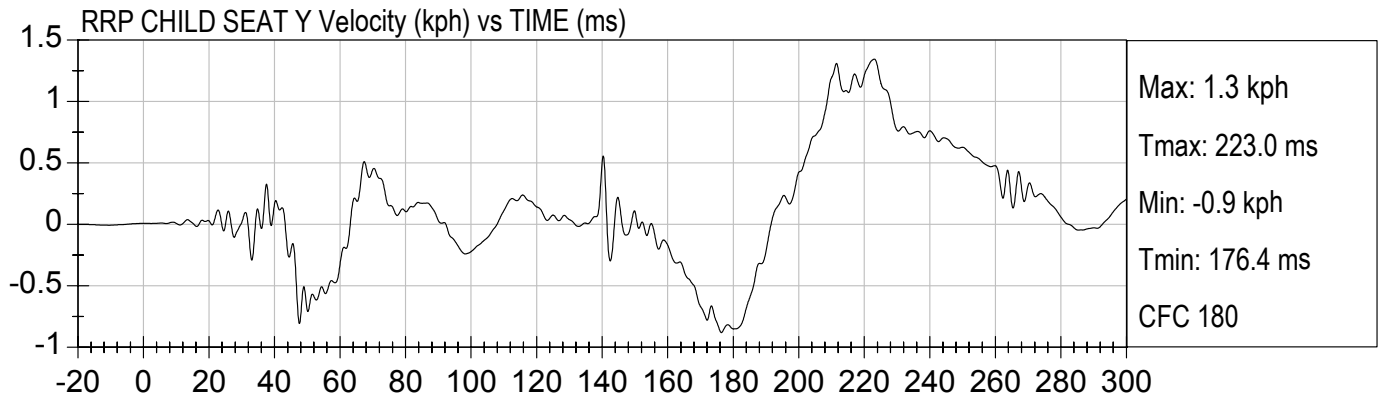
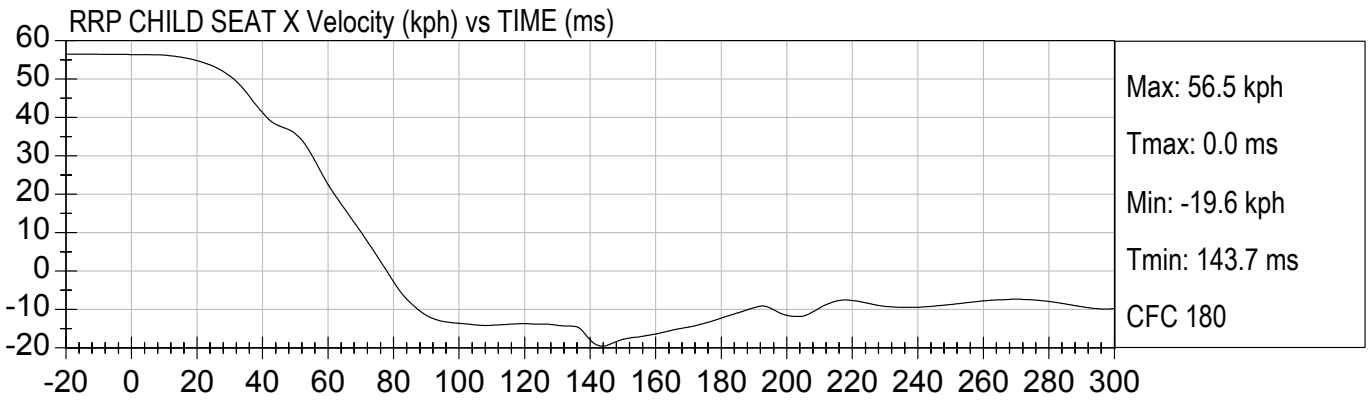


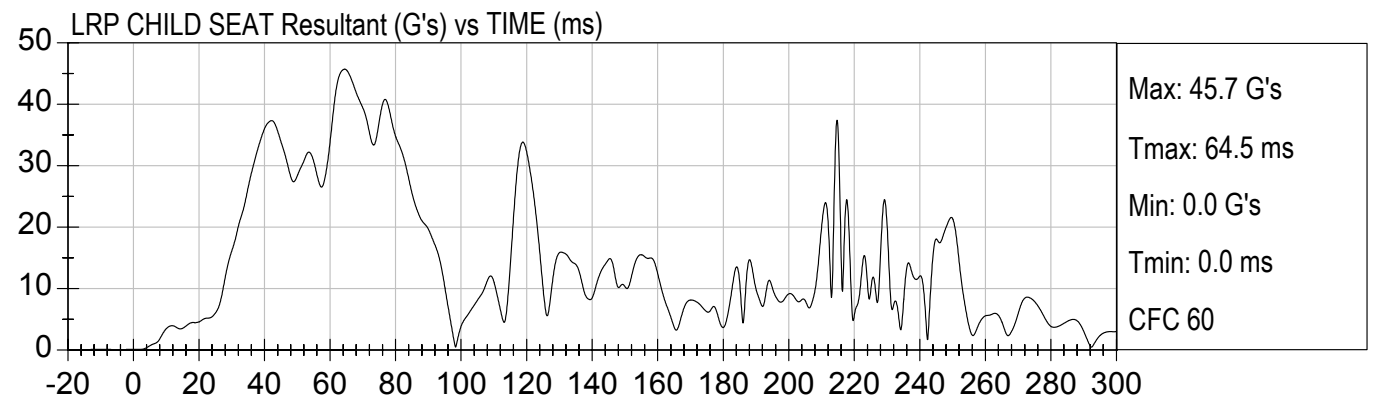
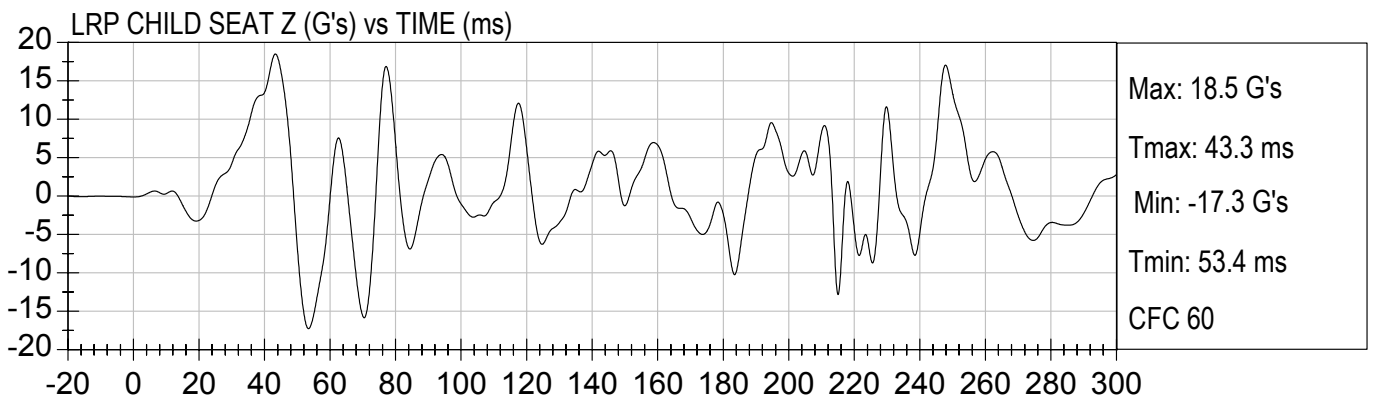
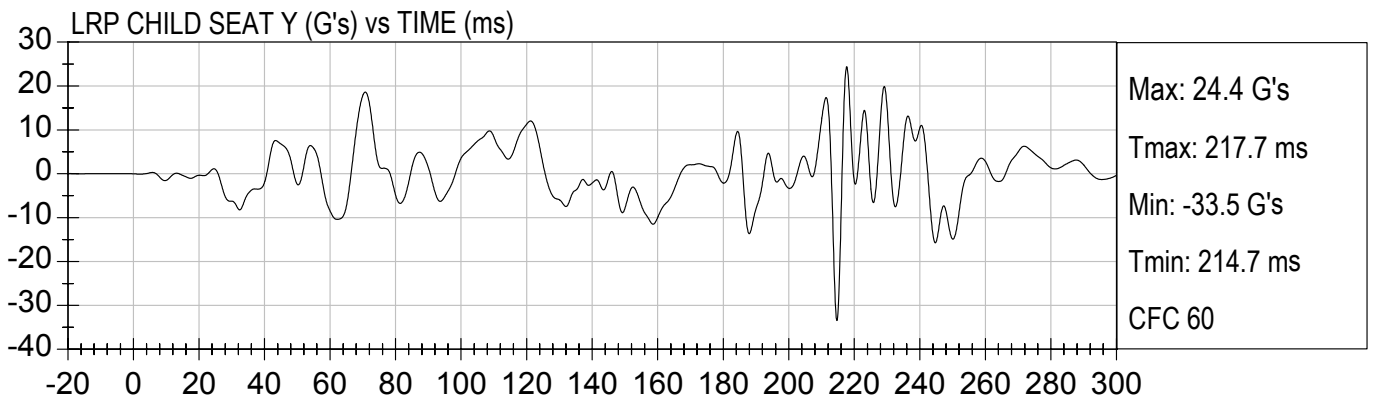
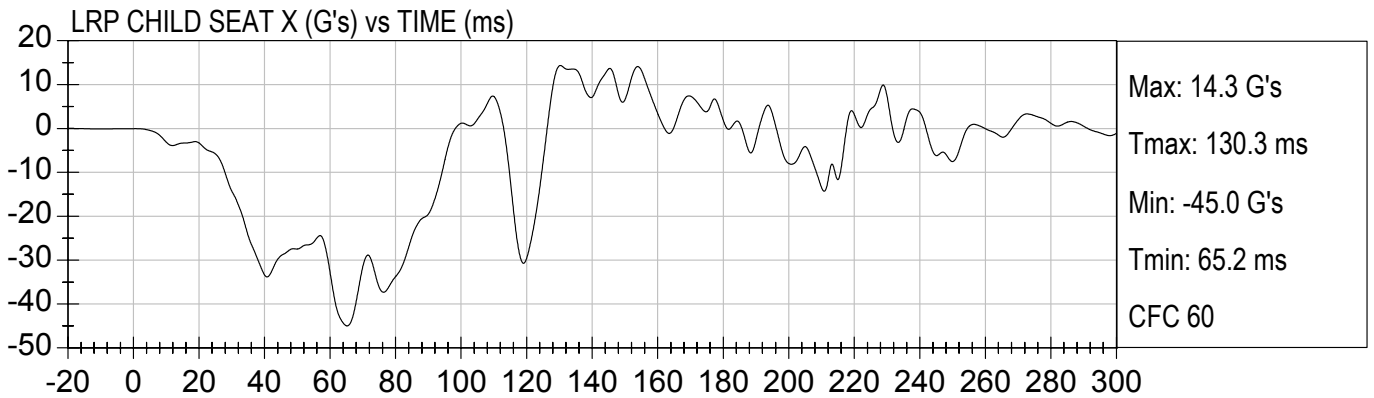


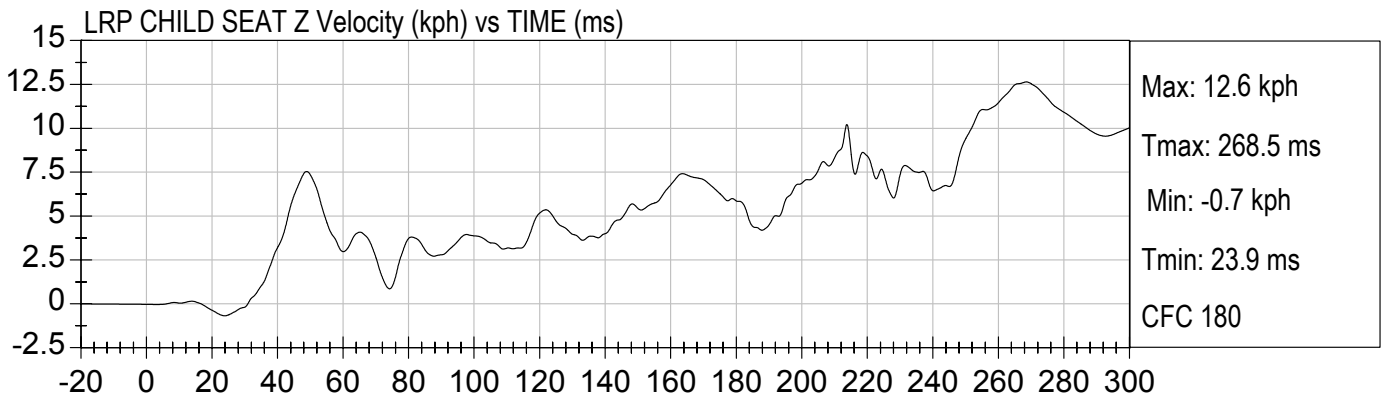
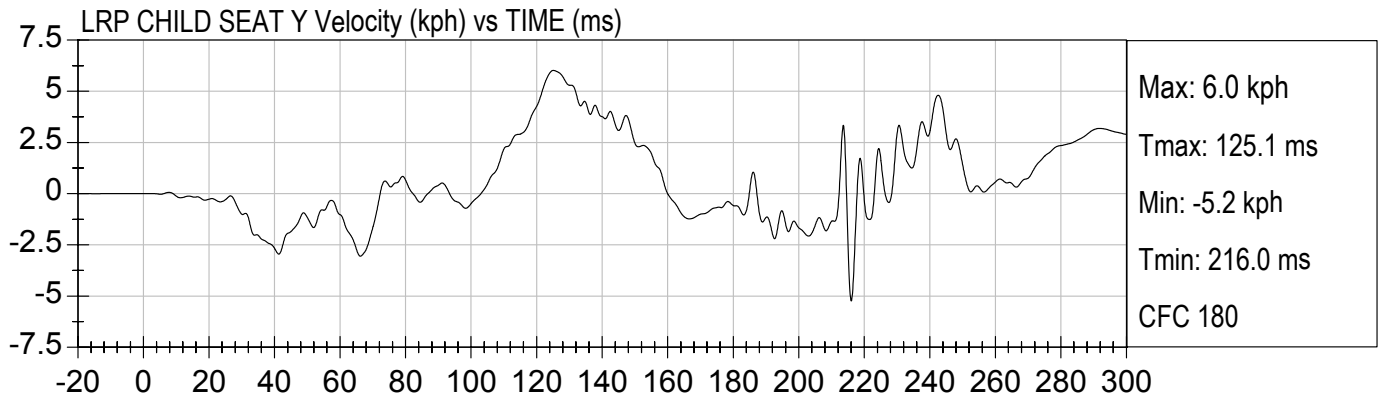
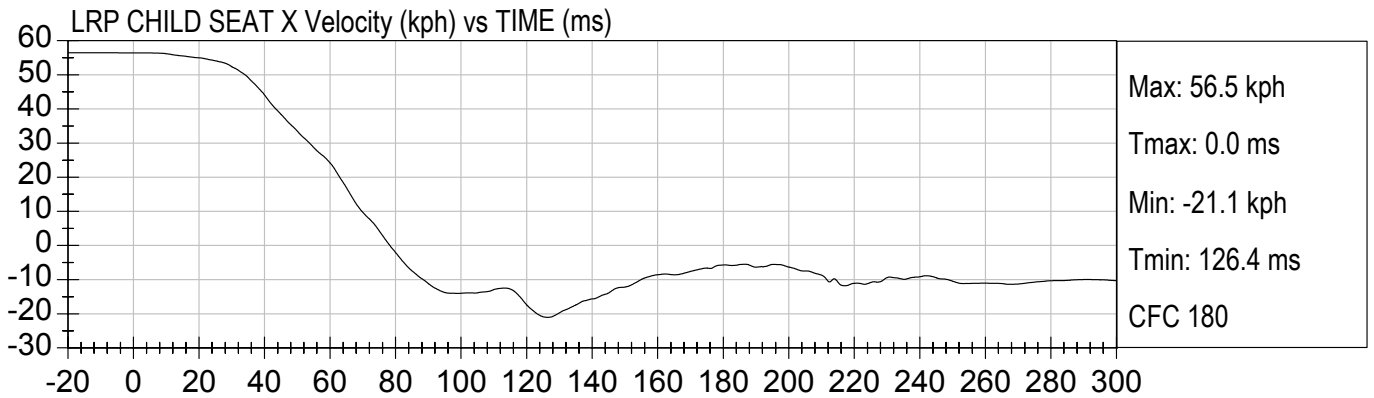












**APPENDIX C**  
**CHILD DUMMY CALIBRATION INFORMATION**

**Hybrid III Calibration Data Sheet**  
**3 Year Old**  
**Head Drop Calibration**

**ATD Serial No:** 042

**Test I.D.:** D041811

| Tested Parameter             | Units  | Specification  | Result | Pass/Fail   |
|------------------------------|--------|----------------|--------|-------------|
| Laboratory Temperature       | deg C  | 18.9 to 25.5   | 21.7   | Pass        |
| Laboratory Relative Humidity | %      | 10 to 70       | 46     | Pass        |
| Peak Resultant Acceleration  | G's    | 250.0 to 280.0 | 268.4  | Pass        |
| Peak Lateral Acceleration    | G's    | <= +/- 15.0    | -11.5  | Pass        |
| Is Acceleration Unimodal?    | Yes/No | < 10% Peak     | Yes    | Pass        |
| <b>Overall Test Results</b>  |        |                |        | <b>Pass</b> |

*Jessica Hall*  
 Laboratory Technician

08/06/2004  
 Test Date

*David Winkelbauer*  
 Approved By



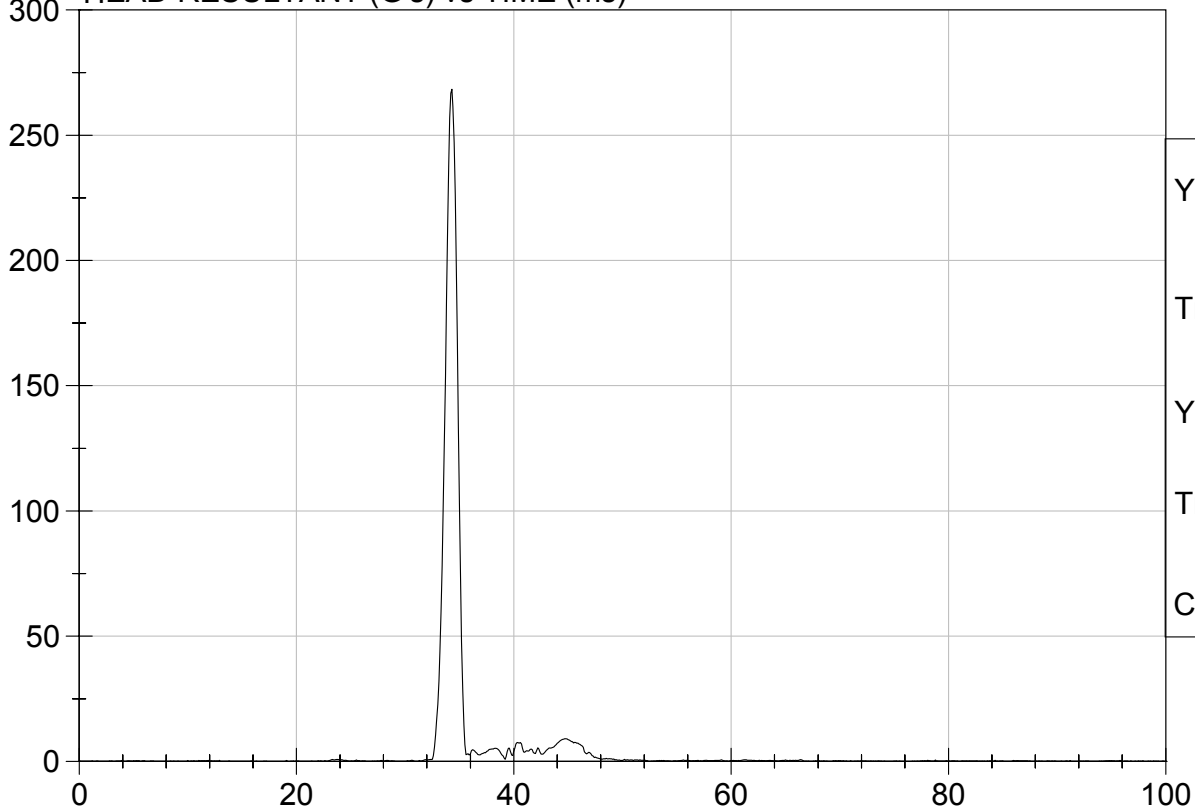
Test Description: Head Drop

Test Date: 08/06/2004

Component: D041811

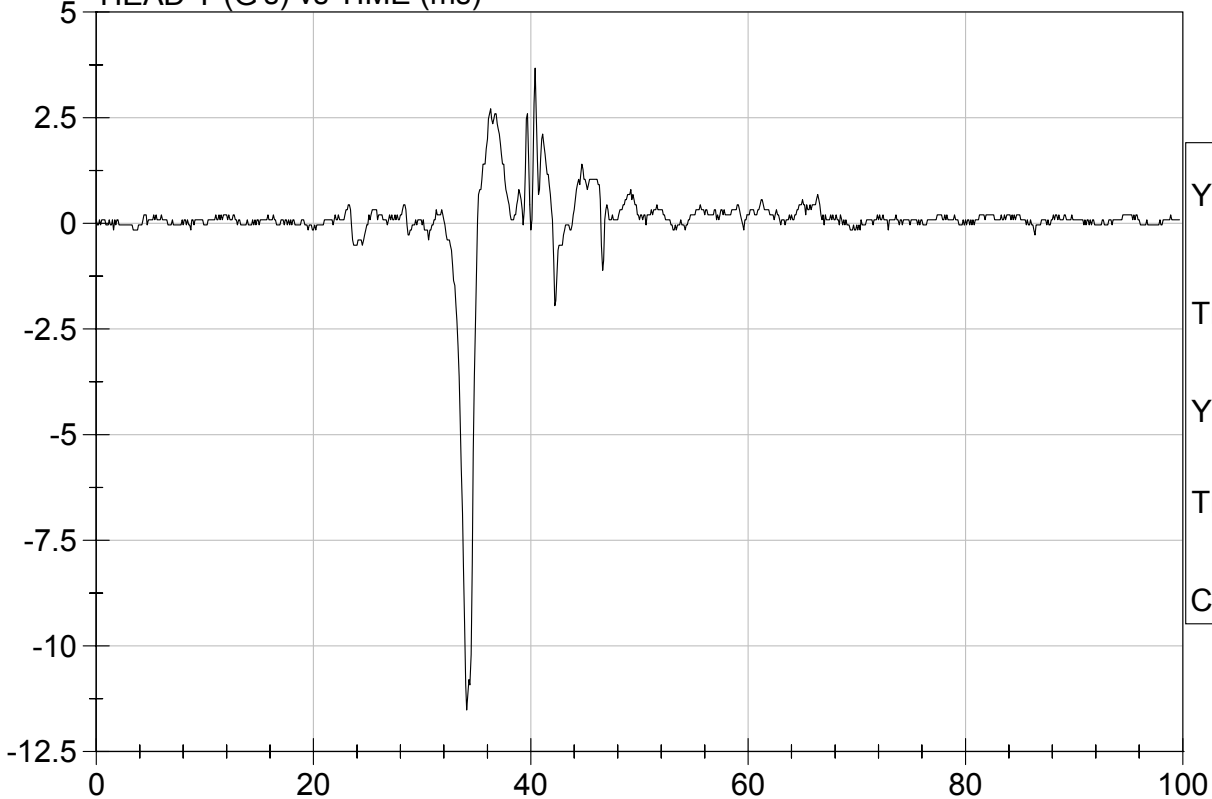
Speed: 0 ft/s, 0.00 m/s

HEAD RESULTANT (G's) vs TIME (ms)



YMax: 268.4 G  
Tmax: 34.3 ms  
YMin: 0.1 G  
Tmin: 0.1 ms  
CFC 1000

HEAD Y (G's) vs TIME (ms)



YMax: 3.7 G  
Tmax: 40.4 ms  
YMin: -11.5 G  
Tmin: 34.1 ms  
CFC 1000

**Hybrid III Calibration Data Sheet**  
**3 Year Old**  
**Neck Flexion Test**

**ATD Serial No:** 042

**Test I.D:** D041812

| Tested Parameter                            |         | Units | Specification | Result | Pass/Fail |
|---|---------|-------|---------------|--------|-----------|
| Laboratory Temperature                      |         | deg C | 20.6 to 22.2  | 21.8   | Pass      |
| Laboratory Relative Humidity                |         | %     | 10 to 70      | 46     | Pass      |
| Pendulum Speed                              |         | m/s   | 5.4 to 5.6    | 5.5    | Pass      |
| Pendulum Deceleration                       | 10 msec | m/s   | 2.0 - 2.7     | 2.3    | Pass      |
|   | 15 msec | m/s   | 3.0 - 4.0     | 3.3    | Pass      |
|   | 20 msec | m/s   | 4.0 - 5.1     | 4.5    | Pass      |
| D Plane Rotation                            |         | deg   | 70 - 82       | 81     | Pass      |
| Peak Moment within Deflection Corridor      |         | Nm    | 42.0 - 53.0   | 43.8   | Pass      |
| Positive Moment - Time Curve Decay to 10 Nm |         | msec  | 60.0 - 80.0   | 71.5   | Pass      |
| Overall Test Results                        |         |       |               |        | Pass      |

Jessica Hall  
 Laboratory Technician

08/06/2004  
 Test Date

David Winkelbauer  
 Approved By

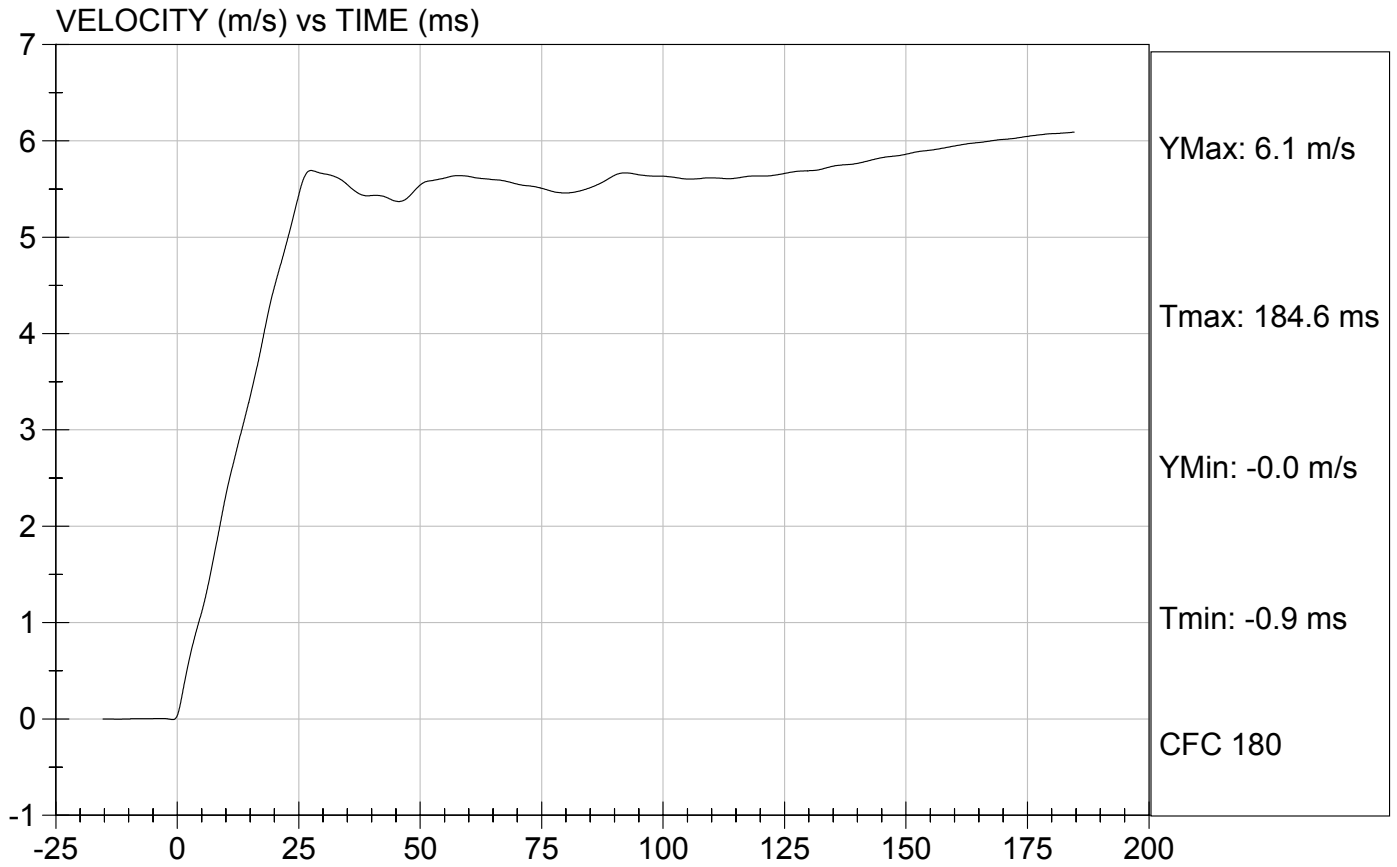


Test Description: Neck Flexion

Test Date: 08/06/2004

Component: D041812

Speed: 17.98 ft/sec, 5.48 m/sec



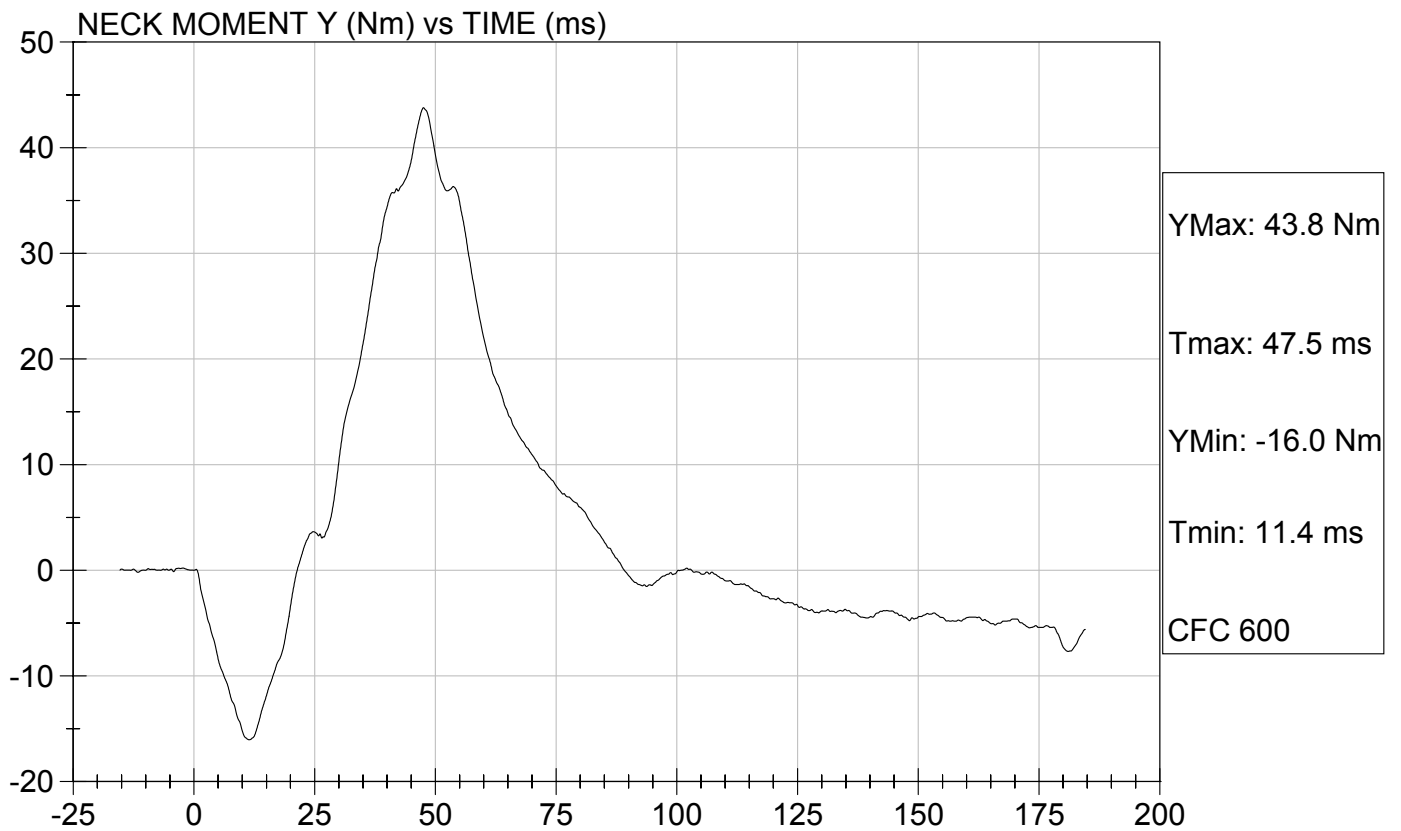
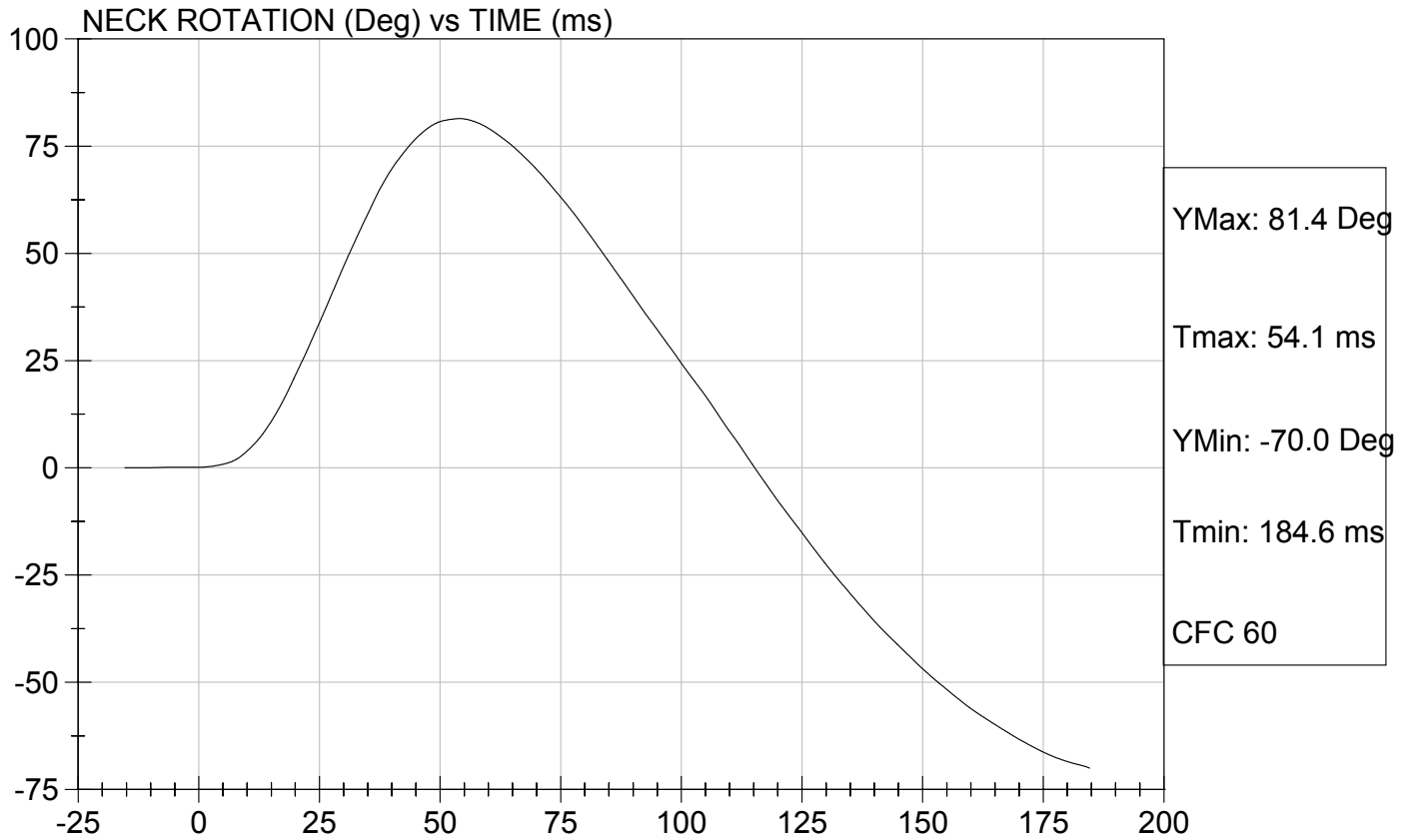


Test Description: Neck Flexion

Test Date: 08/06/2004

Component: D041812

Speed: 17.98 ft/s, 5.48 m/s



**Hybrid III Calibration Data Sheet**  
**3 Year Old**  
**Neck Extension Test**

**ATD Serial No:** 042

**Test I.D:** D041813

| Tested Parameter                             |         | Units | Specification | Result | Pass/Fail |
|--|---------|-------|---------------|--------|-----------|
| Laboratory Temperature                       |         | deg C | 20.6 to 22.2  | 21.9   | Pass      |
| Laboratory Relative Humidity                 |         | %     | 10 to 70      | 44     | Pass      |
| Pendulum Speed                               |         | m/s   | 3.55 to 3.75  | 3.75   | Pass      |
| Pendulum Deceleration                        | 6 msec  | m/s   | 1.0 - 1.4     | 1.3    | Pass      |
|  | 10 msec | m/s   | 1.9 - 2.5     | 2.2    | Pass      |
|  | 14 msec | m/s   | 2.8 - 3.5     | 2.9    | Pass      |
| D Plane Rotation                             |         | deg   | 83 - 93       | 85     | Pass      |
| Peak Moment within Deflection Corridor       |         | Nm    | -53.3 - -43.7 | -45.9  | Pass      |
| Negative Moment - Time Curve Decay to -10 Nm |         | msec  | 60.0 - 80.0   | 69.1   | Pass      |
| Overall Test Results                         |         |       |               |        | Pass      |

*Jessica Hall*  
 Laboratory Technician

08/06/2004  
 Test Date

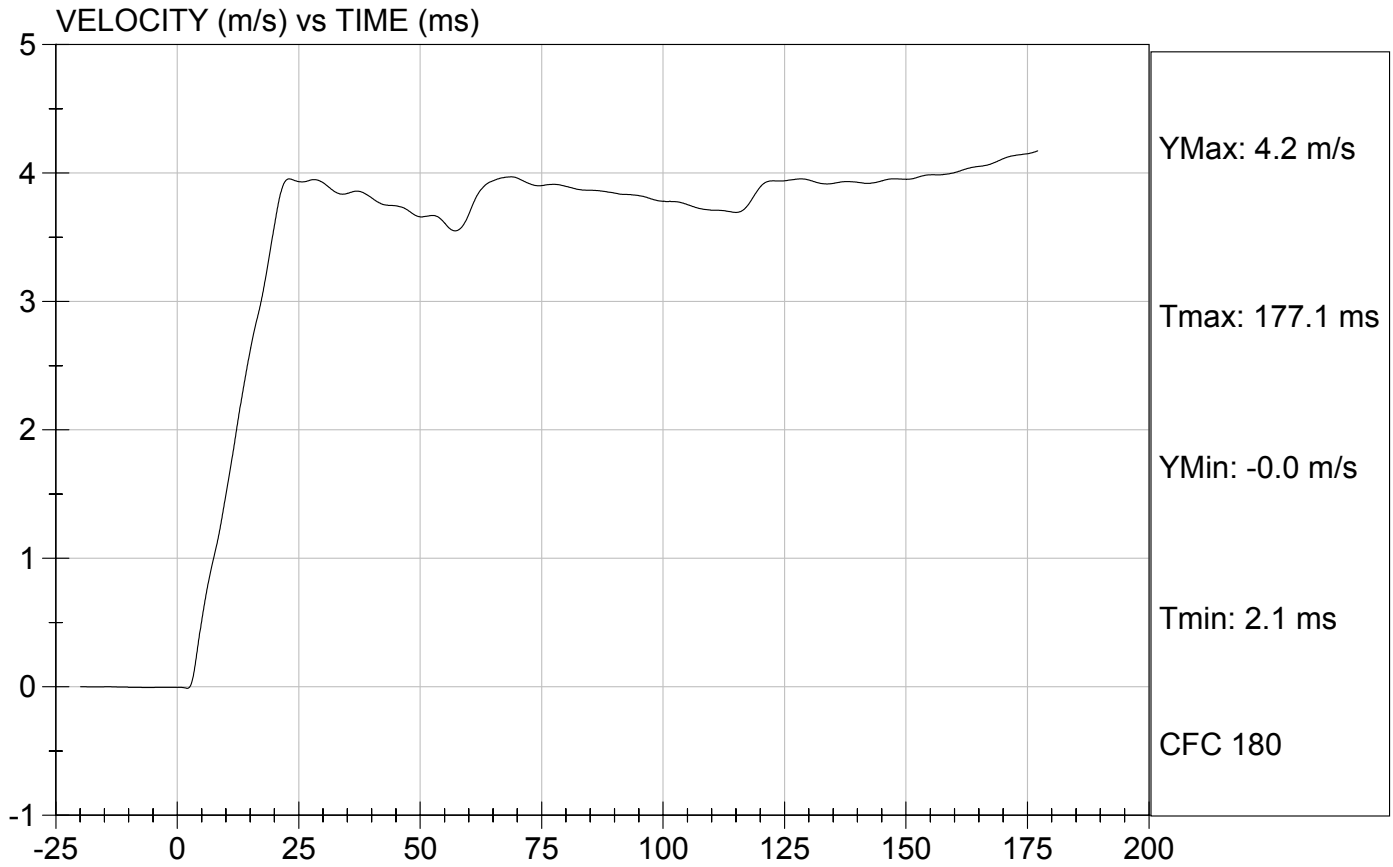
*David Winkelbauer*  
 Approved By



Test Description: Neck Extension Test Date: 08/06/2004

Component: D041813

Speed: 12.29 ft/sec, 3.75 m/sec



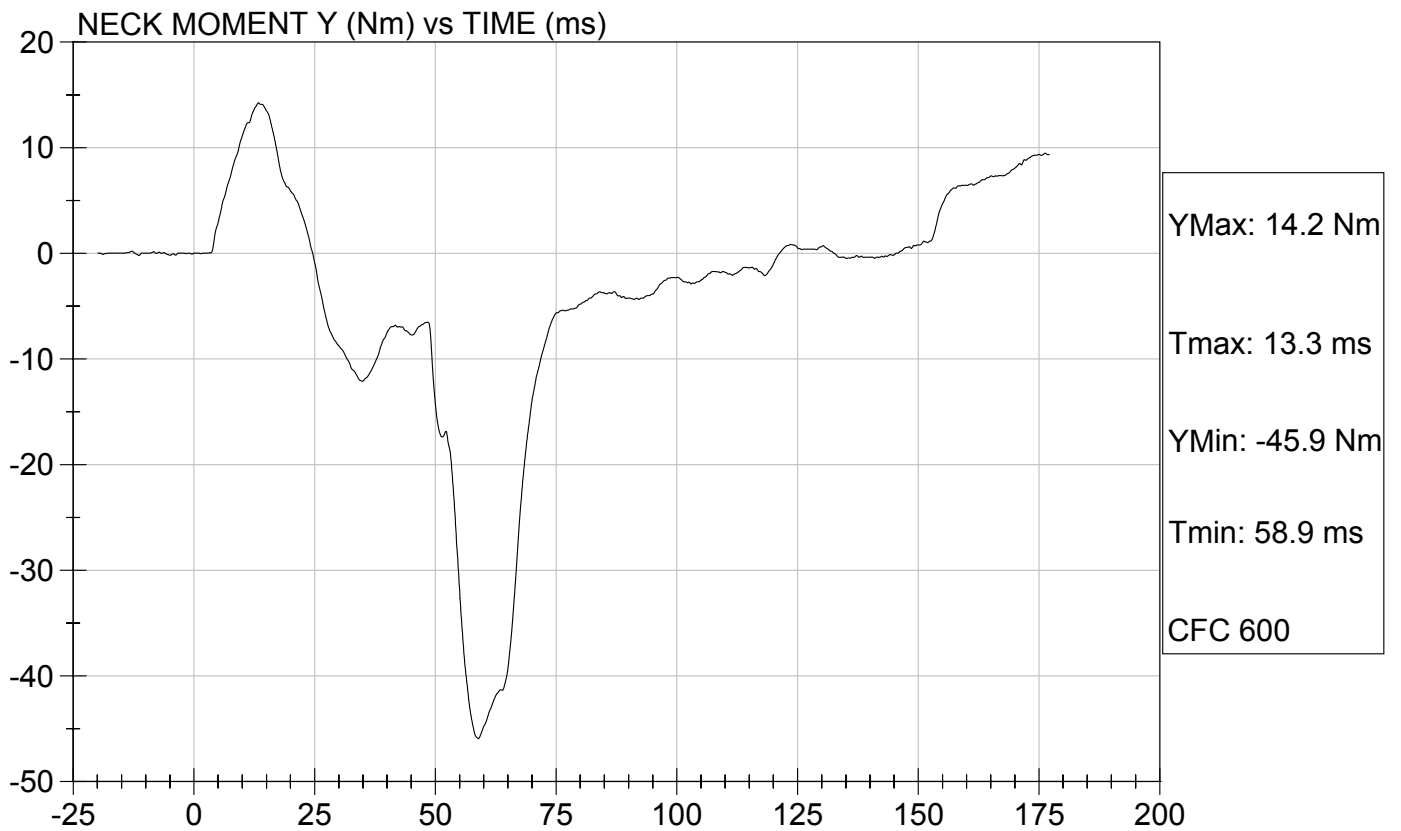
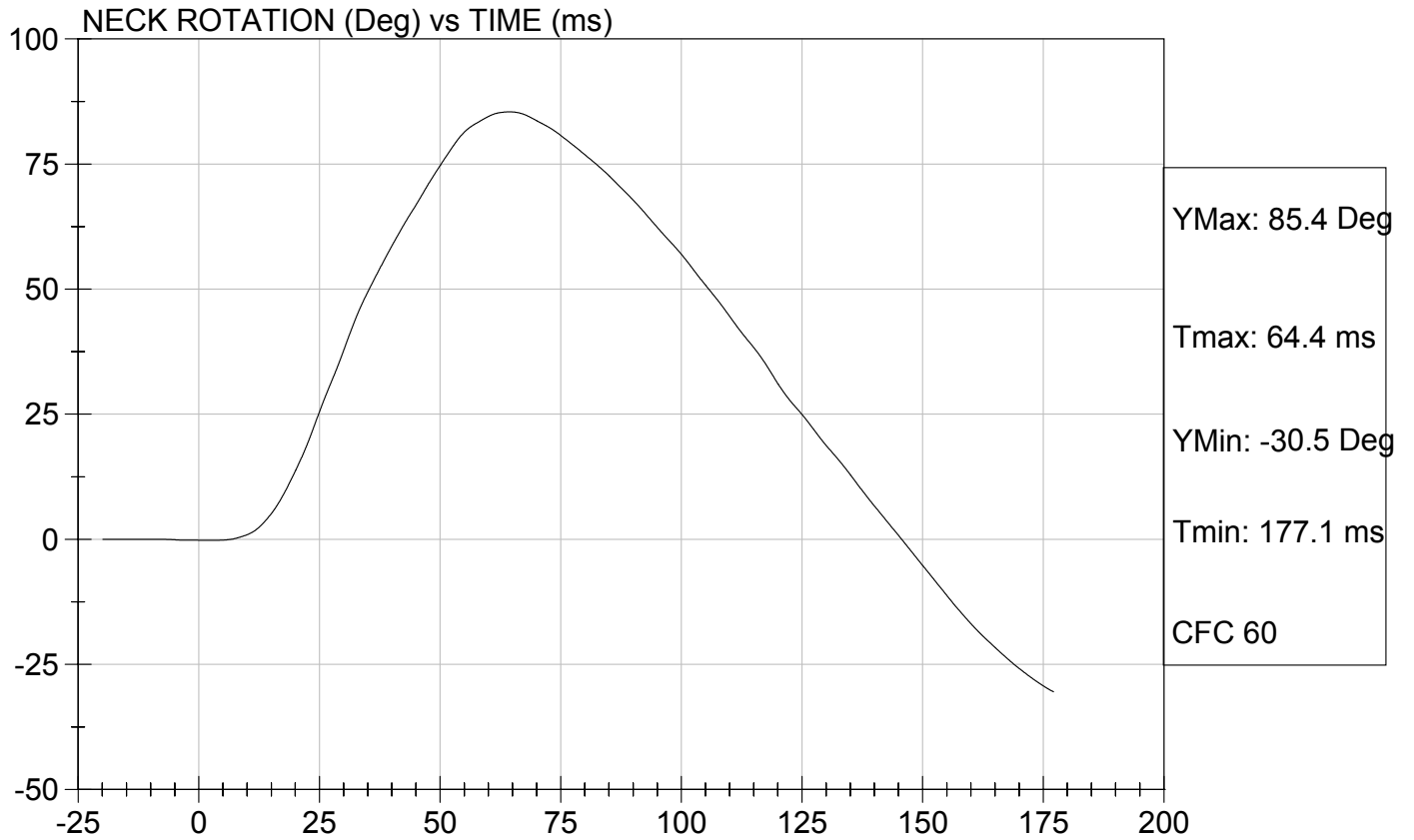


Test Description: Neck Extension

Test Date: 08/06/2004

Component: D041813

Speed: 12.29 ft/s, 3.75 m/s



**Hybrid III Calibration Data Sheet**  
**3 Year Old**  
**Thorax Impact Test**

**ATD Serial No:** 042

**Test I.D:** D041814

| Tested Parameter                     | Units | Specification | Result | Pass/Fail |
|--------------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature               | deg C | 20.6 to 22.2  | 21.1   | Pass      |
| Laboratory Relative Humidity         | %     | 10 to 70      | 43     | Pass      |
| Probe Velocity                       | m/s   | 5.9 to 6.1    | 5.9    | Pass      |
| Peak Deflection                      | mm    | 32 - 38       | 37     | Pass      |
| Peak Force w/in Deflection Corridor  | kN    | 0.68 - 0.81   | 0.74   | Pass      |
| Internal Hysteresis                  | %     | 65 to 85      | 69     | Pass      |
| Max Force 12.5 mm - 32 mm Deflection | kN    | Max 0.86      | 0.48   | Pass      |
| Overall Test Results                 |       |               |        | Pass      |

*Jessica Hall*  
 Laboratory Technician

08/06/2004  
 Test Date

*David Winkelbauer*  
 Approved By

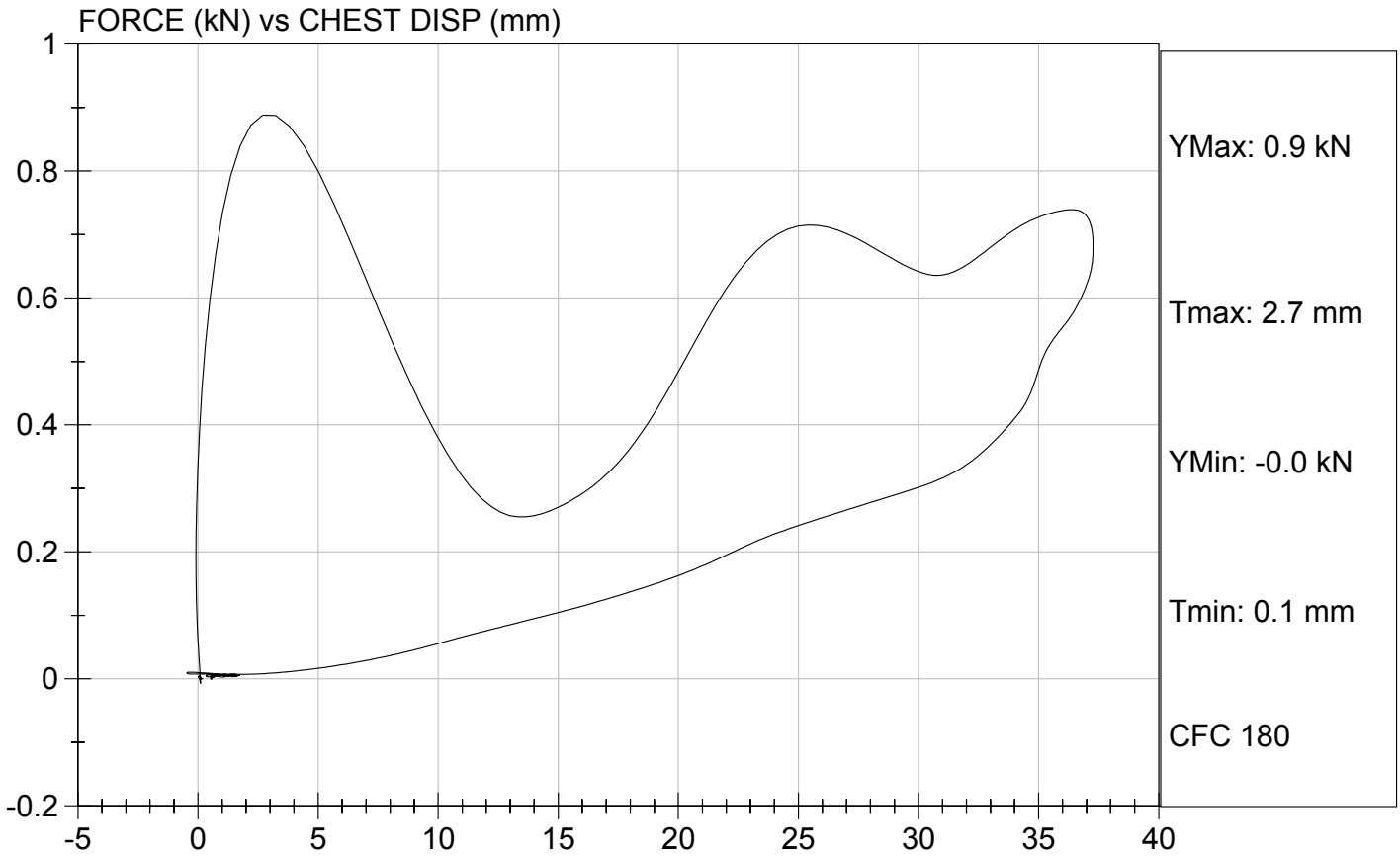


Test Description: Thorax Impact

Test Date: 08/06/2004

Component: D041814

Speed: 19.42 ft/sec, 5.92 m/sec



**Hybrid III Calibration Data Sheet**  
**3 Year Old**  
**Torso Lumbar Flexion**

**ATD Serial No:** 042

**Test I.D.:** D041817

| Tested Parameter             | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature       | deg C | 18.9 to 25.6  | 21.0   | Pass      |
| Laboratory Relative Humidity | %     | 10 to 70      | 42     | Pass      |
| Force At 45 deg.             | N     | 130 - 180     | 172    | Pass      |
| Initial Angle                | deg   | 0 - 15        | 4      | Pass      |
| Return Angle                 | deg   | 0 - 10        | 4      | Pass      |
| Overall Test Results         |       |               |        | Pass      |

Jessica Hall  
Laboratory Technician

08/06/2004  
Test Date

David Winkelbauer  
Approved By

**Transportation Research  
Center Inc.**

**ATD Calibration Report**

**for**

**VRTC**

**HIII 6 Year Old Serial No. 144  
Calibration No. 05**



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

**Transportation Research Center Inc.**  
**572N HIII 6 Year Old Dummy**  
**External Dimensions**  
**Serial No. 144 Calibration No. 05**

| Test Parameter                             | Dimension | Specification    | Results | Pass |
|--|-----------|------------------|---------|------|
| Total Sitting Height                       | A         | 622.3 - 647.7 mm | 643 mm  | Yes  |
| Shoulder Pivot Height                      | B         | 348.0 - 363.2 mm | 358 mm  | Yes  |
| Hip Pivot Height                           | C         | 63.5 - 73.7 mm   | 73 mm   | Yes  |
| Hip Pivot from Backline                    | D         | 88.9 - 99.1 mm   | 98 mm   | Yes  |
| Shoulder Pivot from Backline               | E         | 53.3 - 63.5 mm   | 57 mm   | Yes  |
| Thigh Clearance                            | F         | 88.9 - 104.1 mm  | 95 mm   | Yes  |
| Back of Elbow to Wrist Pivot               | G         | 182.9 - 198.1 mm | 189 mm  | Yes  |
| Head Back to Backline                      | H         | 17.8 - 22.8 mm   | 22 mm   | Yes  |
| Shoulder to Elbow Length                   | I         | 215.9 - 231.1 mm | 225 mm  | Yes  |
| Elbow Rest Height                          | J         | 157.4 - 177.8 mm | 172 mm  | Yes  |
| Buttock to Knee Length                     | K         | 370.8 - 391.2 mm | 375 mm  | Yes  |
| Popliteal Height                           | L         | 269.2 - 289.6 mm | 276 mm  | Yes  |
| Knee to Floor Height                       | M         | 307.4 - 322.6 mm | 313 mm  | Yes  |
| Buttock Popliteal Height                   | N         | 320.0 - 340.4 mm | 332 mm  | Yes  |
| Chest Depth without Jacket                 | O         | 129.6 - 144.8 mm | 138 mm  | Yes  |
| Foot Length                                | P         | 170.2 - 184.6 mm | 175 mm  | Yes  |
| Buttock to Knee Pivot Length               | R         | 342.9 - 363.2 mm | 354 mm  | Yes  |
| Head Breadth                               | S         | 137.1 - 147.3 mm | 139 mm  | Yes  |
| Head Depth                                 | T         | 167.6 - 177.8 mm | 170 mm  | Yes  |
| Hip Breadth                                | U         | 208.3 - 223.5 mm | 215 mm  | Yes  |
| Shoulder Breadth                           | V         | 259.1 - 274.3 mm | 270 mm  | Yes  |
| Foot Breadth                               | W         | 62.3 - 77.5 mm   | 66 mm   | Yes  |
| Head Circumference                         | X         | 510.5 - 530.9 mm | 519 mm  | Yes  |
| Chest Circumference with Jacket            | Y         | 596.9 - 622.3 mm | 613 mm  | Yes  |
| Waist Circumference                        | Z         | 558.8 - 584.2 mm | 571 mm  | Yes  |
| Reference Location for Chest Circumference | AA        | 325.1 - 335.3 mm | 330 mm  | Yes  |
| Reference Location for Waist Circumference | BB        | 153.7 - 163.9 mm | 158 mm  | Yes  |

Technician



Approved





# Transportation Research Center Inc.

572N Head Drop Test


HIII 6 Year Old Serial No. 144 Calibration No. 05 - 3


Test Date 07/23/2004

| Test Parameter                  | Specification  | Test Results | Pass |
|---------------------------------|----------------|--------------|------|
| Temperature                     | 18.9 - 25.6 °C | 21.9 °C      | Yes  |
| Relative Humidity               | 10 - 70 %      | 51 %         | Yes  |
| Peak Resultant Acceleration     | 245 - 300 g    | 299.8 g      | Yes  |
| Peak Lateral Acceleration       | 15 g Max       | 4.9 g        | Yes  |
| Is Acceleration Curve Unimodal? | Yes            | Yes          | Yes  |

Test meets specifications.

Comments:

Technician  
  
\_\_\_\_\_

Approved  
  
\_\_\_\_\_

07.23.2004 16:03:07 614

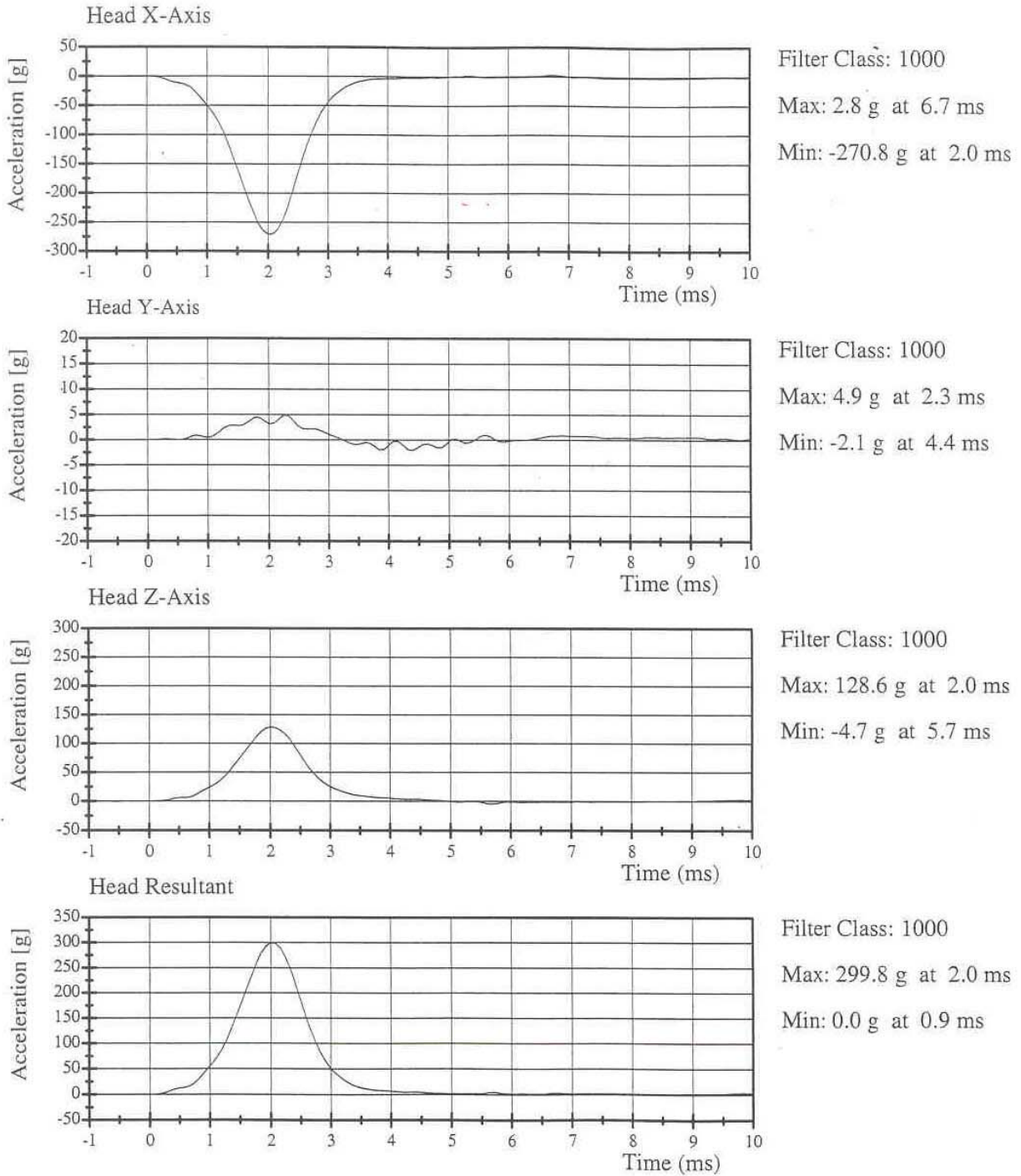


# Transportation Research Center Inc.

572N Head Drop Test

HIII 6 Year Old Serial No. 144 Calibration No. 05 - 3

Test Date 07/23/2004



07.23.2004 16:03:09 614



# Transportation Research Center Inc.

572N Neck Flexion Test - 6 Channel Transducer

HIII 6 Year Old Serial No. 144 Calibration No. 05 - 3

Test Date 07/26/2004

| Test Parameter  | Specification   | Test Results | Pass |
|---|-----------------|--------------|------|
| Temperature   | 20.6 - 22.2 °C  | 21.9 °C      | Yes  |
| Relative Humidity   | 10 - 70 %       | 58 %         | Yes  |
| Impact Velocity   | 4.83 - 5.07 m/s | 5.04 m/s     | Yes  |
| Integrated Pendulum Velocity  |                 |              |      |
| 10 ms   | 1.20 - 1.60 m/s | 1.56 m/s     | Yes  |
| 20 ms   | 2.40 - 3.40 m/s | 3.00 m/s     | Yes  |
| 30 ms   | 3.80 - 5.00 m/s | 4.35 m/s     | Yes  |
| Peak D Plane Rotation   | 74 - 92 °       | 75.9 °       | Yes  |
| Peak Moment About Occipital<br>Condyles<br>(During time interval rotation is<br>within specified corridors) | 27.0 - 33.0 N·m | 30.69 N·m    | Yes  |
| Positive Moment Decay Time<br>To 5 N·m  | 103 - 123 ms    | 111.36 ms    | Yes  |

Test meets specifications.

Comments:

Technician



Approved



07.26.2004 12:55:37 713

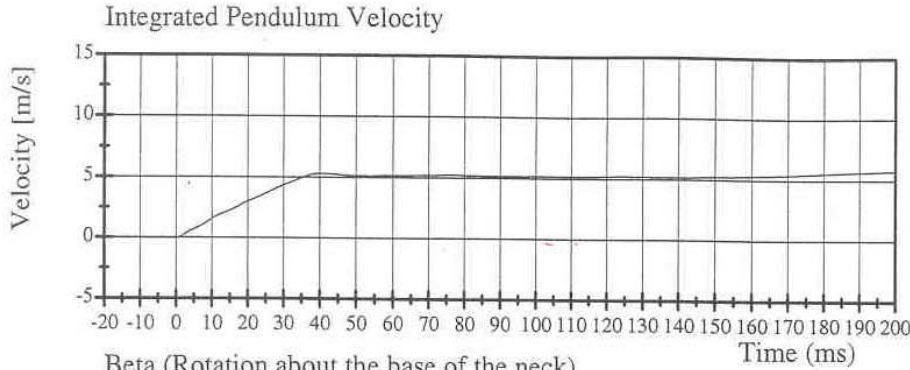


# Transportation Research Center Inc.

572N Neck Flexion Test

HIII 6 Year Old Serial No. 144 Calibration No. 05 - 3

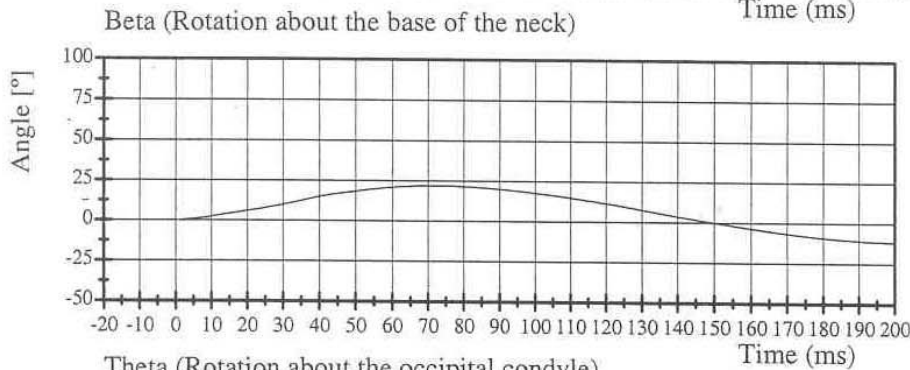
Test Date 07/26/2004



Filter Class: 180

Max: 6.3 m/s at 282.9 ms

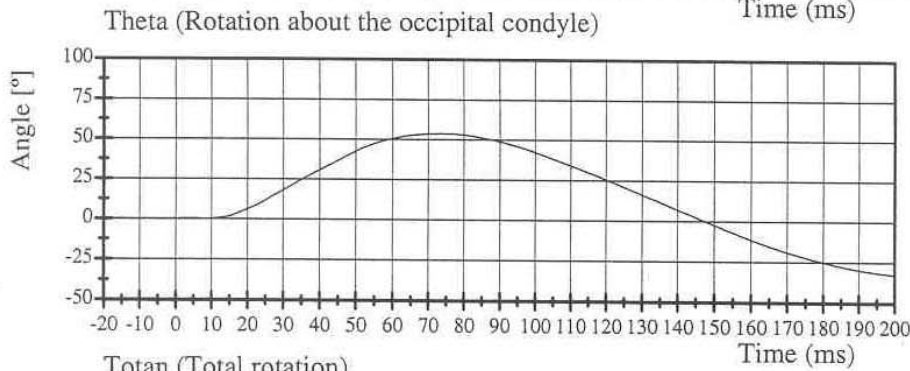
Min: -0.0 m/s at -0.1 ms



Filter Class: 60

Max: 22.1 ° at 71.1 ms

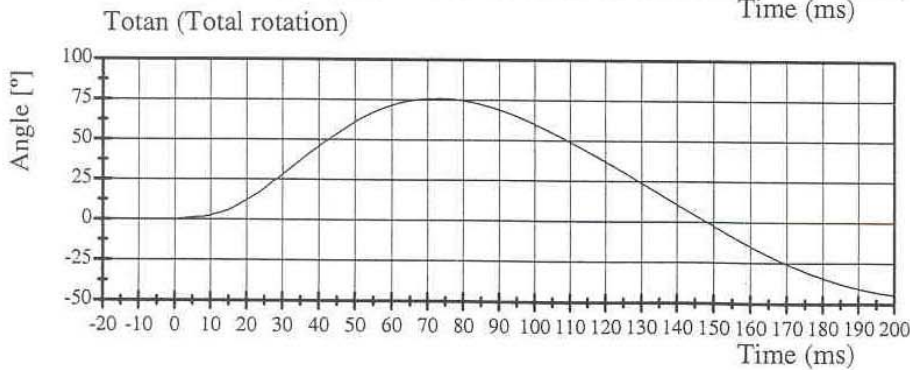
Min: -12.2 ° at 210.6 ms



Filter Class: 60

Max: 53.8 ° at 73.7 ms

Min: -33.9 ° at 213.2 ms



Filter Class: 60

Max: 75.9 ° at 73.4 ms

Min: -46.0 ° at 212.6 ms

07.26.2004 12:55:38 713

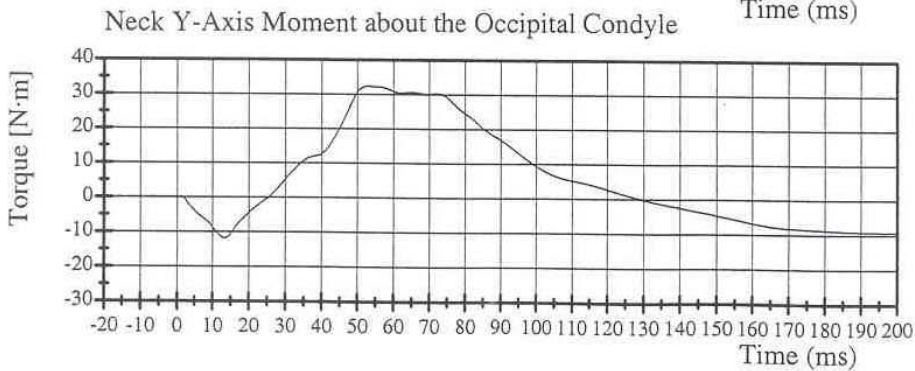
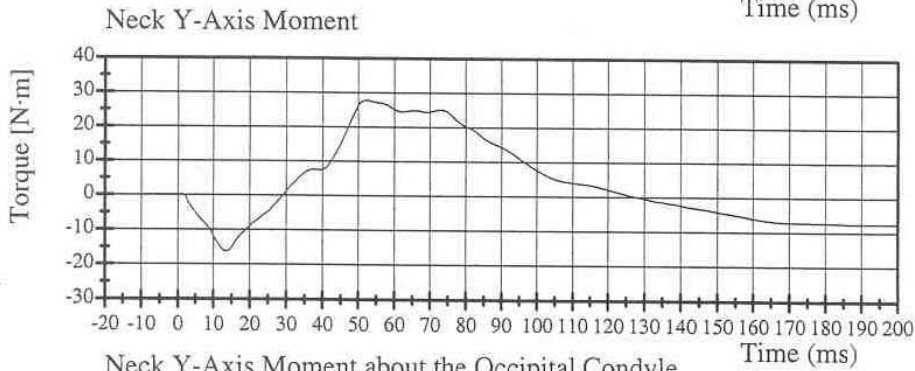
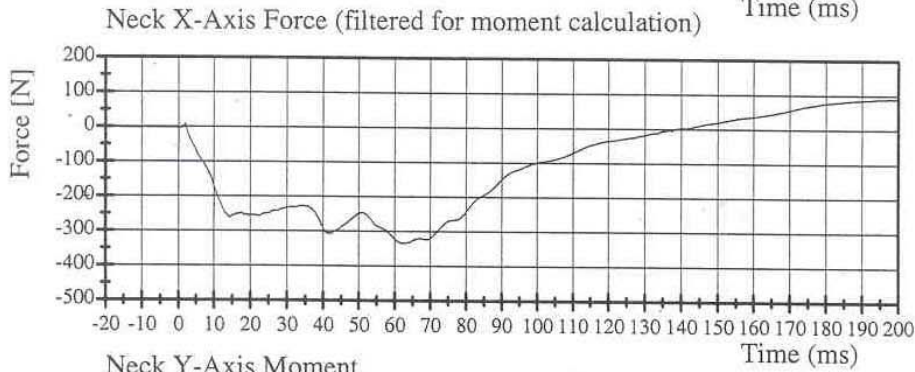
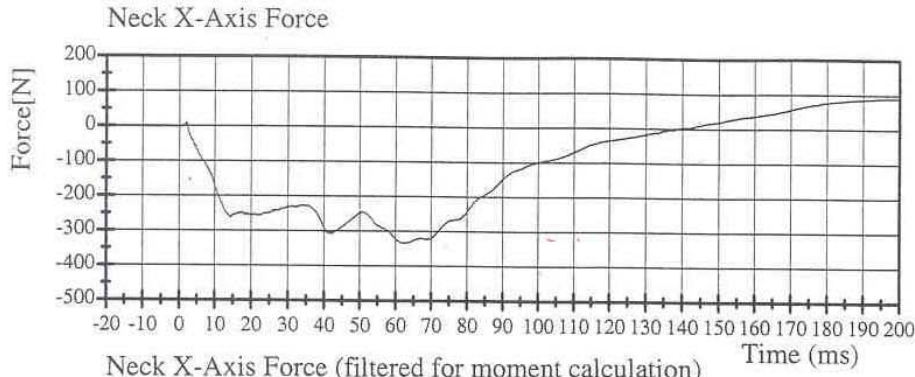


# Transportation Research Center Inc.

572N Neck Flexion Test

HIII 6 Year Old Serial No. 144 Calibration No. 05 - 3

Test Date 07/26/2004



07.26.2004 12:55:39 713



# Transportation Research Center Inc.

572N Neck Extension Test - 6 Channel Transducer

HIII 6 Year Old Serial No. 144 Calibration No. 05 - 5

Test Date 07/26/2004

| Test Parameter  | Specification       | Test Results | Pass |
|---|---------------------|--------------|------|
| Temperature   | 20.6 - 22.2 °C      | 22.0 °C      | Yes  |
| Relative Humidity   | 10 - 70 %           | 57 %         | Yes  |
| Impact Velocity   | 4.18 - 4.42 m/s     | 4.41 m/s     | Yes  |
| Integrated Pendulum Velocity  |                     |              |      |
| 10 ms   | 1.00 - 1.40 m/s     | 1.26 m/s     | Yes  |
| 20 ms   | 2.20 - 3.00 m/s     | 2.36 m/s     | Yes  |
| 30 ms   | 3.20 - 4.20 m/s     | 3.48 m/s     | Yes  |
| Peak D Plane Rotation   | 85 - 103 °          | 90.0 °       | Yes  |
| Peak Moment About Occipital<br>Condyles<br>(During time interval rotation is<br>within specified corridors) | -24.0 - (-19.0) N·m | -22.81 N·m   | Yes  |
| Negative Moment Decay Time<br>To -5 N·m   | 123 - 147 ms        | 134.16 ms    | Yes  |

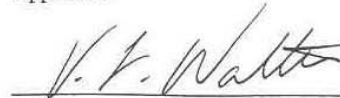
Test meets specifications.

Comments:

Technician



Approved



07.26.2004 16:15:00 829

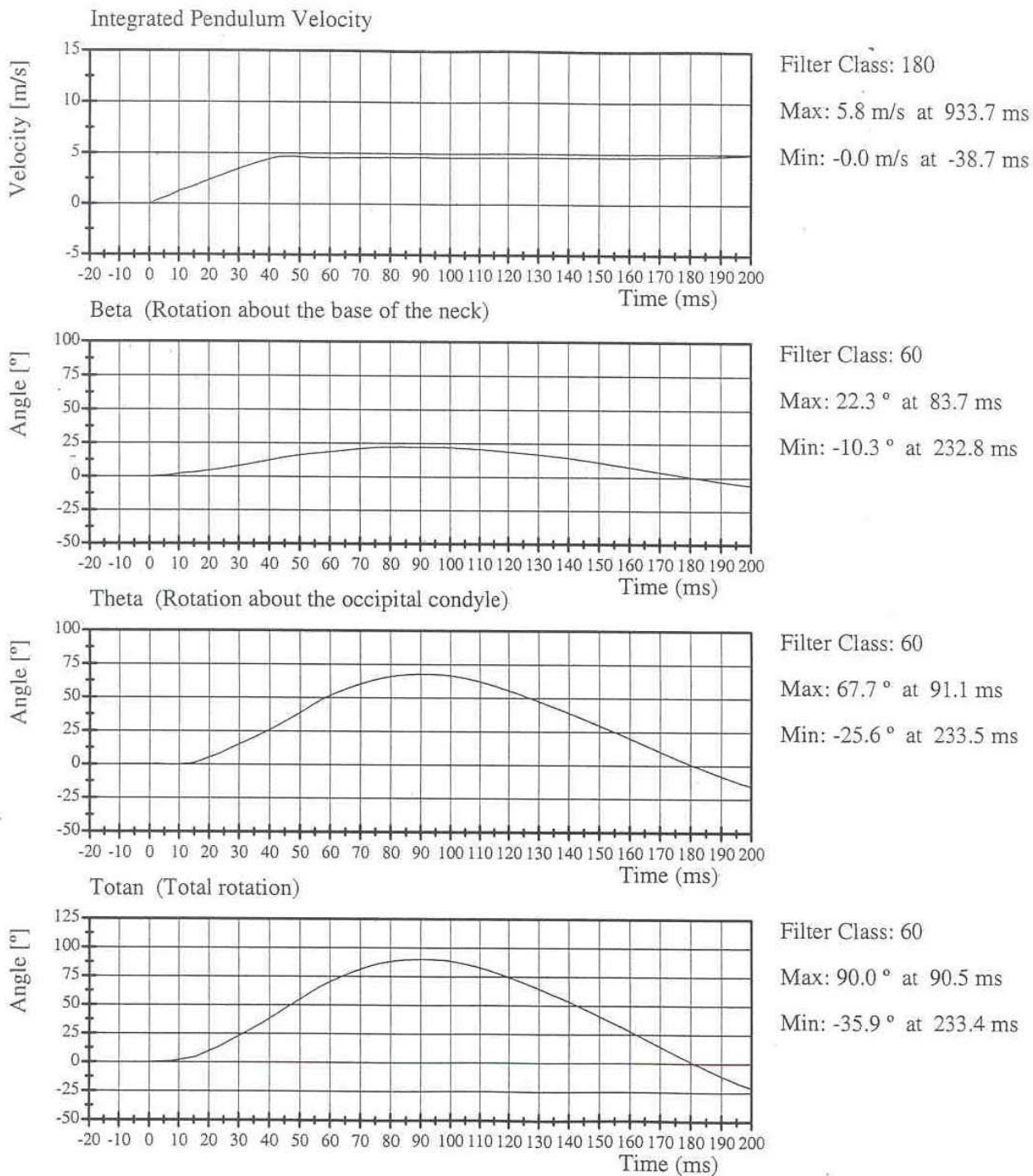


# Transportation Research Center Inc.

572N Neck Extension Test

HIII 6 Year Old Serial No. 144 Calibration No. 05 - 5

Test Date 07/26/2004



07.26.2004 16:15:01 829



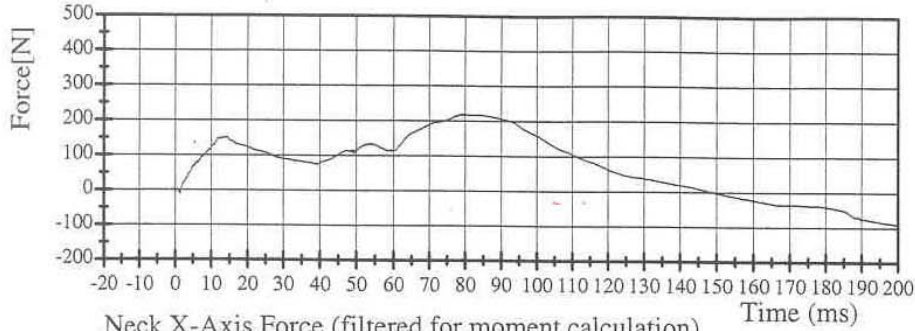
# Transportation Research Center Inc.

572N Neck Extension Test

HIII 6 Year Old Serial No. 144 Calibration No. 05 - 5

Test Date 07/26/2004

Neck X-Axis Force

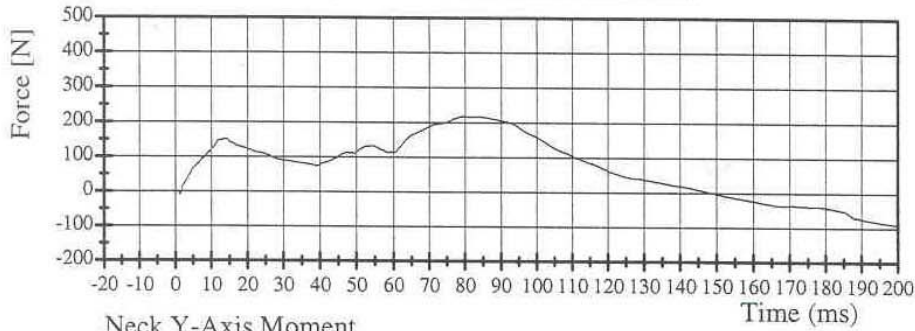


Filter Class: 1000

Max: 219.2 N at 79.5 ms

Min: -112.8 N at 221.4 ms

Neck X-Axis Force (filtered for moment calculation)

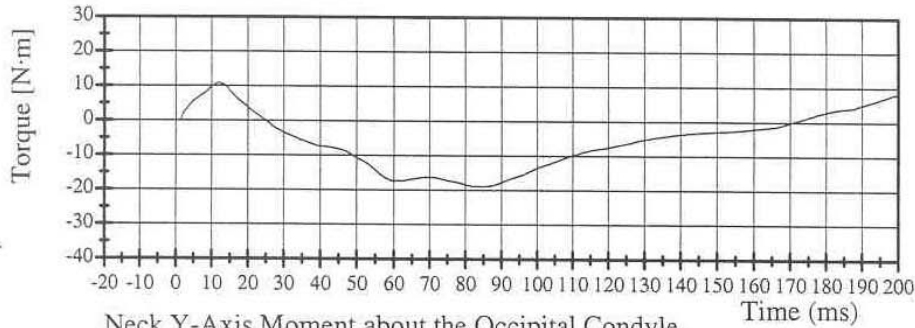


Filter Class: 600

Max: 218.6 N at 79.5 ms

Min: -112.3 N at 221.4 ms

Neck Y-Axis Moment

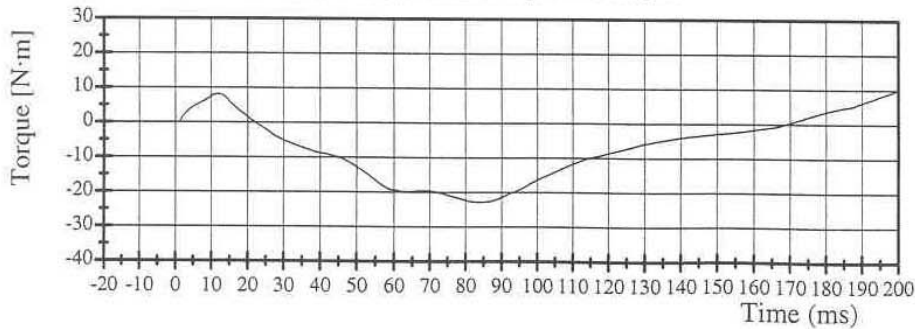


Filter Class: 600

Max: 11.3 N·m at 225.0 ms

Min: -18.9 N·m at 83.9 ms

Neck Y-Axis Moment about the Occipital Condyle



Filter Class: 600

Max: 13.2 N·m at 222.5 ms

Min: -22.8 N·m at 83.9 ms

07.26.2004 16:15:02 829



# Transportation Research Center Inc.

572N Thorax Test

HIII 6 Year Old Serial No. 144 Calibration No. 05 - 2

Test Date 07/29/2004

| Test Parameter   | Specification      | Test Results | Pass |
|--|--------------------|--------------|------|
| Temperature  | 20.6 - 22.2 °C     | 21.4 °C      | Yes  |
| Relative Humidity                                      | 10 - 70 %          | 52 %         | Yes  |
| Pendulum Velocity                                      | 6.59 - 6.83 m/s    | 6.61 m/s     | Yes  |
| Maximum Chest Deflection                               | -46.0 - (-38.0) mm | -46.0 mm     | Yes  |
| Peak Impact Probe Force<br>Within Compression Corridor | 1150 - 1380 N      | 1212 N       | Yes  |
| Internal Hysteresis                                    | 65 - 85 %          | 73 %         | Yes  |
| Maximum Force Between<br>12.5 mm & 38 mm Of Deflection | <= 1500            | 1222         | Yes  |

**Test meets specifications.**

**Comments:**

Technician



Approved



07.29.2004 07:28:15 958

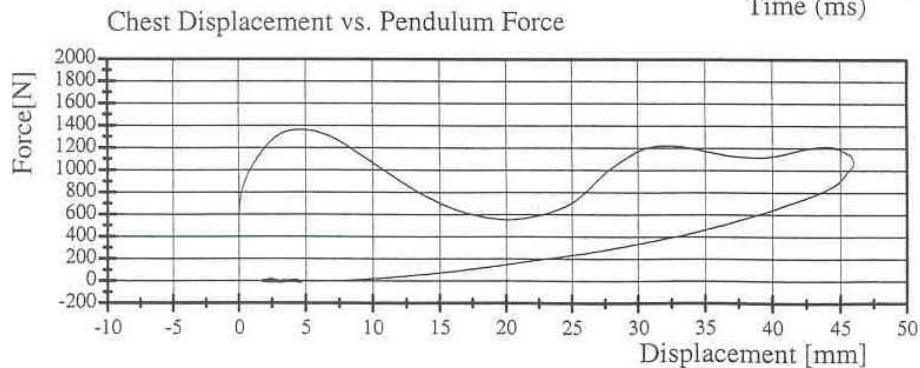
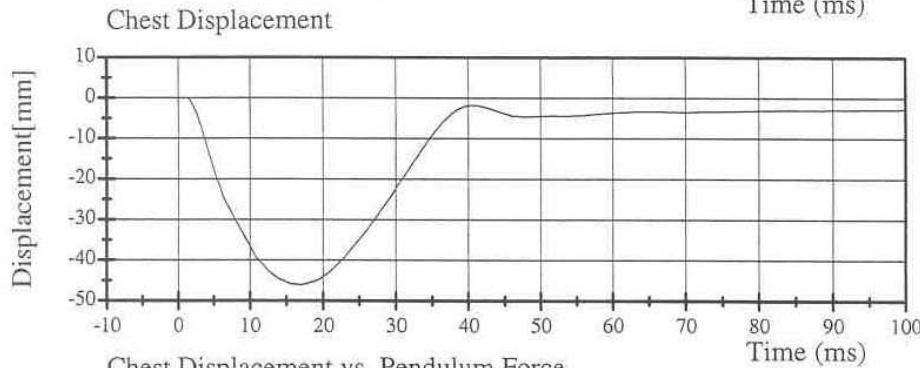
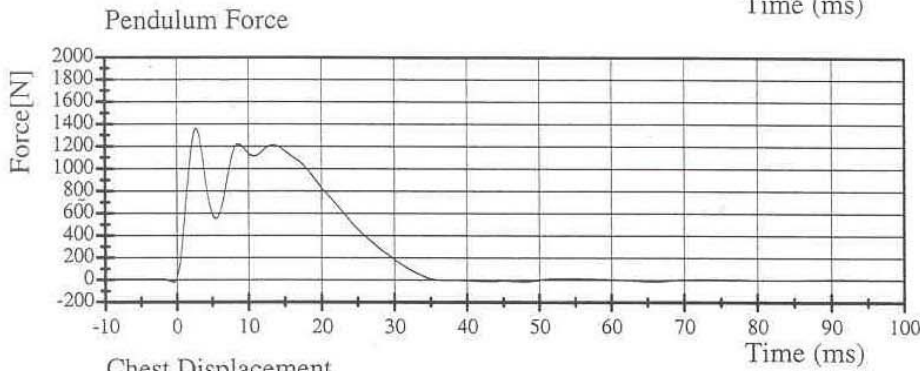
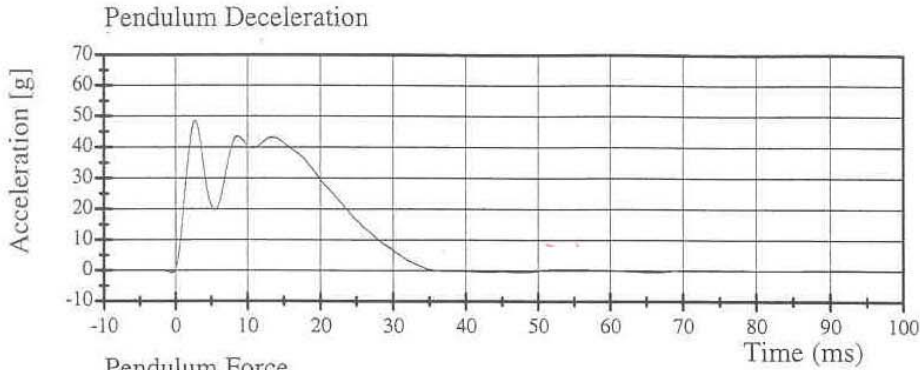


# Transportation Research Center Inc.

572N Thorax Test

HIII 6 Year Old Serial No. 144 Calibration No. 05 - 2

Test Date 07/29/2004



07.29.2004 07:28:16 958



TRANSPORTATION RESEARCH CENTER INC.

TORSO FLEXION TEST

HYBRID III SIX-YEAR-OLD


CAL DATE: 29-Jul-04

TRC, INC. TEST NO: 144C05TF2 572 N SN144 TORSO FLEX CAL 05

| TEST PARAMETER                                      | SPECIFICATION                           | TEST RESULTS |
|---|---|--------------|
| TEMPERATURE   | 20.6 – 22.2 DEG. C                      | 21.3 DEG. C  |
| RELATIVE HUMIDITY                                   | 10 – 70 %                               | 49 %         |
| INITIAL ANGLE OF<br>UNSUPPORTTED DUMMY              | <= 22 DEG.<br>REFERENCED<br>TO VERTICAL | 21.1 DEG.    |
| MAXIMUM FORCE AT 45 DEG.<br>DURING 10 SECOND PERIOD | 147 – 200 N                             | 160.9 N      |
| RETURN ANGLE  |   | 24.6 DEG.    |
| DIFFERENCE BETWEEN RETURN<br>ANGLE & INTIAL ANGLE   | +/- 8 DEG. OF<br>INTIAL ANGLE           | 3.5 DEG.     |
| RATE  | 0.5° - 1.5°/sec                         | 1.03 °/sec   |

TEST MEETS SPECIFICATIONS

TECHNICIAN



# Transportation Research Center Inc.

572N Left Knee Test

HIII 6 Year Old Serial No. 144 Calibration No. 05 - 1

Test Date 07/23/2004

| Test Parameter         | Specification   | Test Results | Pass |
|------------------------|-----------------|--------------|------|
| Temperature            | 18.9 - 25.6 °C  | 21.9 °C      | Yes  |
| Relative Humidity      | 10 - 70 %       | 49 %         | Yes  |
| Pendulum Velocity      | 2.07 - 2.13 m/s | 2.10 m/s     | Yes  |
| Maximum Pendulum Force | 2000 - 3000 N   | 2444 N       | Yes  |

Test meets specifications.

Comments:

Technician



Approved



07.23.2004 15:10:43 1688

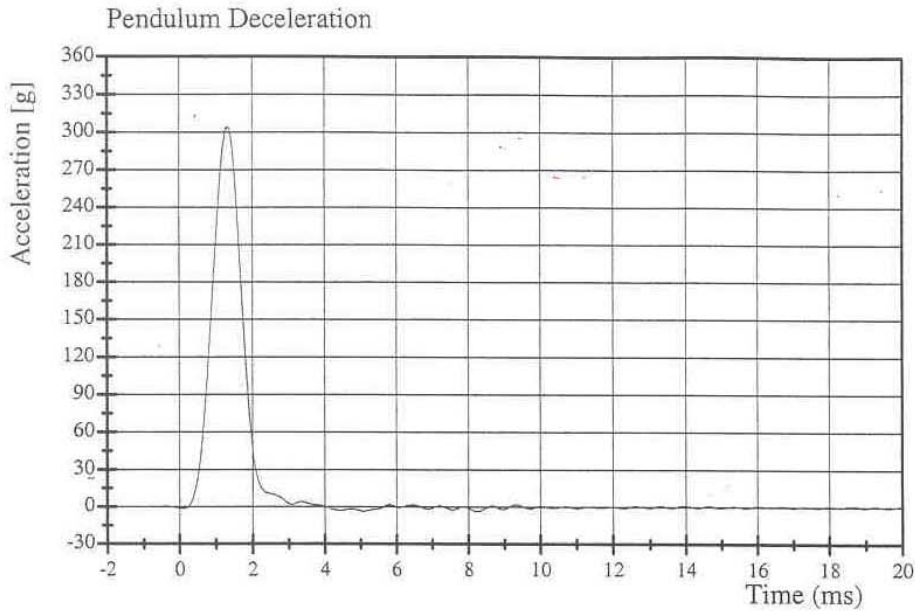


# Transportation Research Center Inc.

572N Left Knee Test

HIII 6 Year Old Serial No. 144 Calibration No. 05 - 1

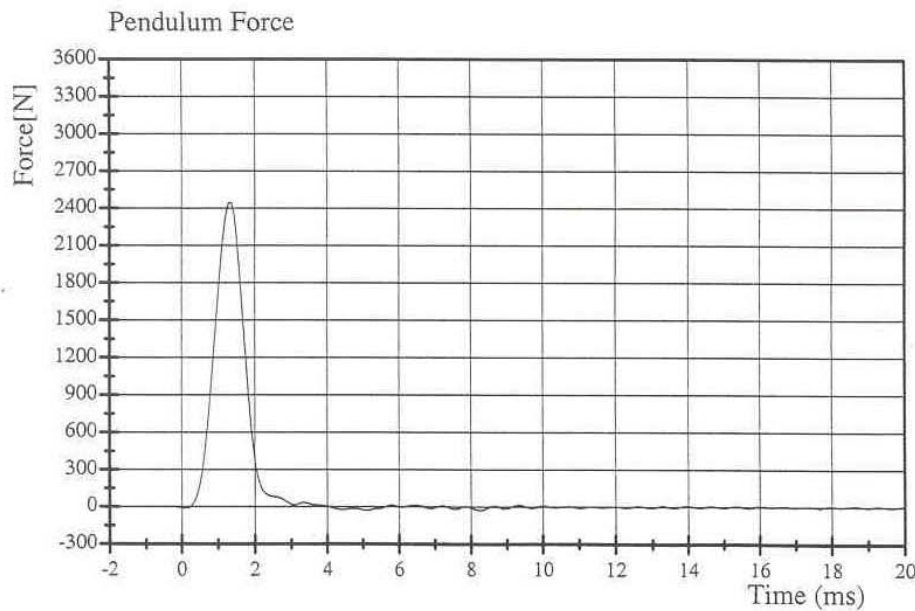
Test Date 07/23/2004



Filter Class: 600

Max: 303.9 g at 1.4 ms

Min: -3.7 g at 8.2 ms



Filter Class: 600

Max: 2444.2 N at 1.4 ms

Min: -30.0 N at 8.2 ms

07.23.2004 15:10:44 1688



# Transportation Research Center Inc.

572N Right Knee Test

HIII 6 Year Old Serial No. 144 Calibration No. 05 - 1

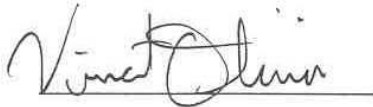
Test Date 07/23/2004

| Test Parameter         | Specification   | Test Results | Pass |
|------------------------|-----------------|--------------|------|
| Temperature            | 18.9 - 25.6 °C  | 21.8 °C      | Yes  |
| Relative Humidity      | 10 - 70 %       | 49 %         | Yes  |
| Pendulum Velocity      | 2.07 - 2.13 m/s | 2.11 m/s     | Yes  |
| Maximum Pendulum Force | 2000 - 3000 N   | 2293 N       | Yes  |

**Test meets specifications.**

Comments:

Technician



Approved



07.23.2004 14:58:07 1683

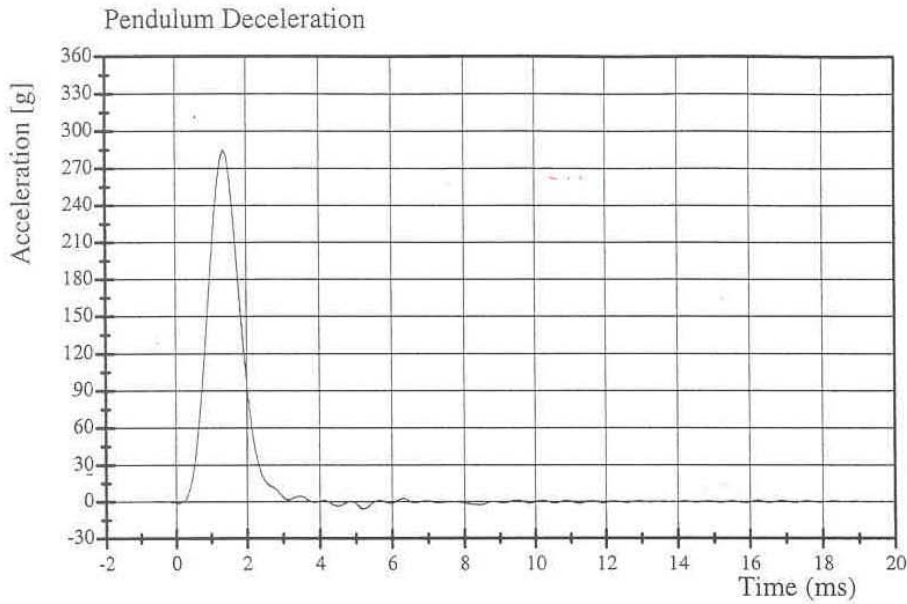


# Transportation Research Center Inc.

572N Right Knee Test

HIII 6 Year Old Serial No. 144 Calibration No. 05 - 1

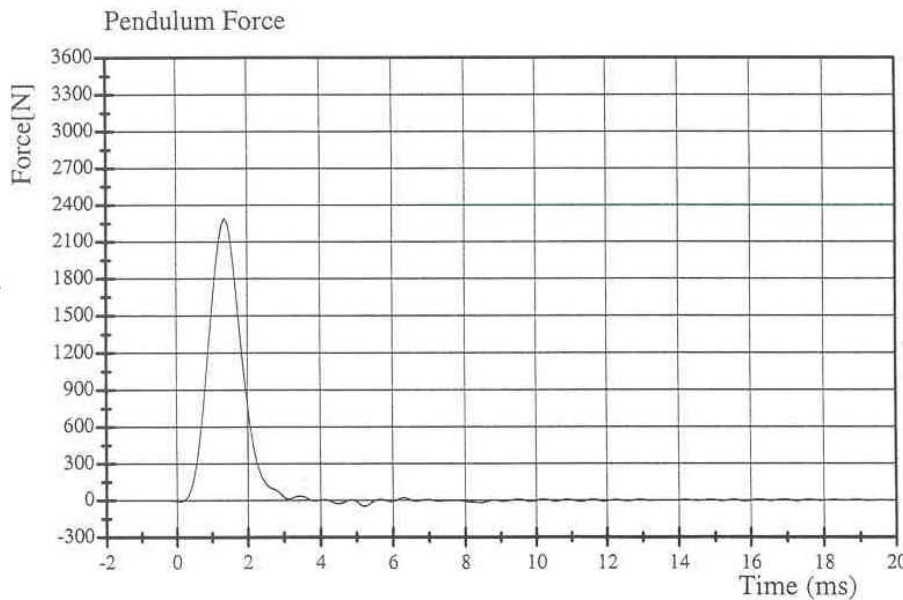
Test Date 07/23/2004



Filter Class: 600

Max: 285.2 g at 1.4 ms

Min: -6.0 g at 5.2 ms



Filter Class: 600

Max: 2293.4 N at 1.4 ms

Min: -48.0 N at 5.2 ms

07.23.2004 14:58:08 1683



**APPENDIX D**

**TEST EQUIPMENT LIST AND CALIBRATION INFORMATION**

**INSTRUMENTS FOR RRP CHILD DUMMY S/N: 042**

|                      | SERIAL NO. | MANUFACTURER | CALIBRATION DATE |
|----------------------|------------|--------------|------------------|
| Head X               | J19338     | Entran       | 8/08/04          |
| Head Y               | J20054     | Entran       | 8/08/04          |
| Head Z               | AJ7M6      | Endevco      | 8/08/04          |
| Upper Neck Load Cell | 208        | FTSS         | 5/13/04          |
| Chest X              | J35562     | Endevco      | 8/08/04          |
| Chest Y              | J23772     | Endevco      | 8/08/04          |
| Chest Z              | AJ509      | Endevco      | 8/08/04          |
| Chest Displacement   | 042        | Servo        | 8/06/04          |
| Pelvis X             | J14668     | Endevco      | 8/08/04          |
| Pelvis Y             | J27457     | Endevco      | 8/08/04          |
| Pelvis Z             | J27523     | Entran       | 8/08/04          |
| Tether Force         | 158        | Denton       | 6/08/04          |

**INSTRUMENTS FOR LRP CHILD DUMMY S/N: 144**

|                      | SERIAL NO. | MANUFACTURER | CALIBRATION DATE |
|----------------------|------------|--------------|------------------|
| Head X               | AJ4P6      | Endevco      | 8/08/04          |
| Head Y               | P17559     | Endevco      | 8/08/04          |
| Head Z               | AAKA2      | Endevco      | 8/08/04          |
| Upper Neck Load Cell | 1626       | Denton       | 7/20/04          |
| Chest X              | AF973      | Endevco      | 8/08/04          |
| Chest Y              | EH75J      | Endevco      | 8/08/04          |
| Chest Z              | ALA71      | Entran       | 8/08/04          |
| Chest Displacement   | 144        | Servo        | 8/09/04          |
| Pelvis X             | J35560     | Endevco      | 8/08/04          |
| Pelvis Y             | ACB45      | Endevco      | 8/08/04          |
| Pelvis Z             | J27467     | Endevco      | 8/08/04          |
| Left Femur           | 125        | Denton       | 7/21/04          |
| Right Femur          | 126        | Denton       | 7/21/04          |
| Lap Belt Force       | 193        | Denton       | 4/12/04          |
| Shoulder Belt Force  | 191        | Denton       | 5/22/04          |
| Lap Belt Stretch     | BD001      | CMC          | 8/11/04          |

### INSTRUMENTS FOR REAR SEAT AND CHILD SEATS

|                       | SERIAL NO. | MANUFACTURER | CALIBRATION DATE |
|-----------------------|------------|--------------|------------------|
| Left Rear Seat Back X | G10-F04    | Entran       | 4/19/04          |
| Left Rear Seat Back Y | K18-D17    | Entran       | 7/02/04          |
| Left Rear Seat Back Z | L17-D29    | Entran       | 7/02/04          |
| RRP Child Seat X      | K07-R22    | Entran       | 6/04/04          |
| RRP Child Seat Y      | H21-J03    | Entran       | 6/04/04          |
| RRP Child Seat Z      | L18-J10    | Entran       | 3/30/04          |
| LRP Child Seat X      | K07-R24    | Entran       | 7/26/04          |
| LRP Child Seat Y      | K18-D13    | Entran       | 7/26/04          |
| LRP Child Seat Z      | K20-J06    | Entran       | 7/26/04          |