

**REPORT NUMBER: SNCAPP-MGA-2009-014**

**VALIDATION  
SIDE IMPACT POLE TEST**

**TOYOTA MOTOR MANUFACTURING NORTHERN KENTUCKY, INC.  
2010 TOYOTA CAMRY LE 4-DR SEDAN  
NHTSA NUMBER: MA5114**

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



**Test Date: June 5, 2009**

**Report Date: September 18, 2009**

**FINAL REPORT**

**PREPARED FOR:  
U.S. DEPARTMENT OF TRANSPORTATION  
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION  
OFFICE OF CRASHWORTHINESS STANDARDS  
MAIL CODE: NVS-111  
1200 NEW JERSEY AVENUE, SE, ROOM W43-410  
WASHINGTON, D.C. 20590**

This final test report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, in response to Contract Number DTNH22-03-D-12005.

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Approved by:   
Joe Fleck, Project Engineer

Approval Date: September 18, 2009

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 Documentation Page

| <b>1. Report No.</b><br>SNCAPP-MGA-2009-014                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>2. Government Accession No.</b>                          | <b>3. Recipient's Catalog No.</b>                                                                                                                                                                                     |                  |                         |                      |  |  |       |           |        |                                           |     |      |     |                                    |    |    |    |                                            |   |      |      |
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| <b>4. Title and Subtitle</b><br>Final Report of Validation<br>Side Impact Pole Testing of 2010 Toyota Camry LE 4-Dr Sedan<br>NHTSA No.: MA5114                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                             | <b>5. Report Date</b><br>September 18, 2009                                                                                                                                                                           |                  |                         |                      |  |  |       |           |        |                                           |     |      |     |                                    |    |    |    |                                            |   |      |      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                             | <b>6. Performing Organization Code</b><br>MGA                                                                                                                                                                         |                  |                         |                      |  |  |       |           |        |                                           |     |      |     |                                    |    |    |    |                                            |   |      |      |
| <b>7. Author(s)</b><br>Donna Janovicz, Project Manager<br>Joe Fleck, Project Engineer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                             | <b>8. Performing Organization Report No.</b><br>SNCAPP-MGA-2009-014                                                                                                                                                   |                  |                         |                      |  |  |       |           |        |                                           |     |      |     |                                    |    |    |    |                                            |   |      |      |
| <b>9. Performing Organization Name and Address</b><br>MGA Research Corporation<br>5000 Warren Road<br>Burlington, WI 53105                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                             | <b>10. Work Unit No.</b>                                                                                                                                                                                              |                  |                         |                      |  |  |       |           |        |                                           |     |      |     |                                    |    |    |    |                                            |   |      |      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                             | <b>11. Contract or Grant No.</b><br>DTNH22-03-D-12005                                                                                                                                                                 |                  |                         |                      |  |  |       |           |        |                                           |     |      |     |                                    |    |    |    |                                            |   |      |      |
| <b>12. Sponsoring Agency Name and Address</b><br>U.S. Department of Transportation<br>National Highway Traffic Safety Administration<br>Office of Crashworthiness Standards (NVS-111)<br>1200 New Jersey Ave, SE, Room W43-410<br>Washington, DC 20590                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                             | <b>13. Type of Report and Period Covered:</b> Final Test Report<br>6/05/2009 to 9/18/2009                                                                                                                             |                  |                         |                      |  |  |       |           |        |                                           |     |      |     |                                    |    |    |    |                                            |   |      |      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                             | <b>14. Sponsoring Agency Code</b><br>NVS-111                                                                                                                                                                          |                  |                         |                      |  |  |       |           |        |                                           |     |      |     |                                    |    |    |    |                                            |   |      |      |
| <b>15. Supplementary Notes</b><br>Validation Testing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                             |                                                                                                                                                                                                                       |                  |                         |                      |  |  |       |           |        |                                           |     |      |     |                                    |    |    |    |                                            |   |      |      |
| <b>16. Abstract</b><br><p>A 31.2 km/h (19.5 mph), 75° oblique impact Side Validation Test was conducted on the subject 2010 Toyota Camry LE 4-Dr Sedan in accordance with the specifications of the Office of Crashworthiness Standards Side NCAP Pole Laboratory Test Procedure for the generation of consumer information on vehicle side pole crash protection. The test was conducted at MGA Research Corporation, in Burlington, Wisconsin, on June 5, 2009.</p> <p>The impact velocity was 31.4 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle at the time of impact was 21°C. The test vehicle post-test maximum crush was 398 mm at level 3. The test vehicle's occupant performance was as follows:</p> <table border="1" style="margin: 10px auto; border-collapse: collapse; text-align: center;"> <thead> <tr> <th rowspan="2" style="text-align: left;">Measurement Description</th> <th colspan="3">Driver ATD (SID-IIs)</th> </tr> <tr> <th>Units</th> <th>Threshold</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td style="text-align: left;">Head Injury Criteria (HIC<sub>36</sub>)</td> <td>N/A</td> <td>1000</td> <td style="background-color: yellow;">693</td> </tr> <tr> <td style="text-align: left;">Resultant Lower Spine Acceleration</td> <td>Gs</td> <td>82</td> <td style="background-color: yellow;">60</td> </tr> <tr> <td style="text-align: left;">Combined Acetabular and Iliac Pelvic Force</td> <td>N</td> <td>5525</td> <td style="background-color: yellow;">5636</td> </tr> </tbody> </table> <p>The two doors on the struck side of the vehicle did not separate from the body at the hinges or latches and the opposite doors did not open during the side impact event.</p> |                                                             |                                                                                                                                                                                                                       |                  | Measurement Description | Driver ATD (SID-IIs) |  |  | Units | Threshold | Result | Head Injury Criteria (HIC <sub>36</sub> ) | N/A | 1000 | 693 | Resultant Lower Spine Acceleration | Gs | 82 | 60 | Combined Acetabular and Iliac Pelvic Force | N | 5525 | 5636 |
| Measurement Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Driver ATD (SID-IIs)                                        |                                                                                                                                                                                                                       |                  |                         |                      |  |  |       |           |        |                                           |     |      |     |                                    |    |    |    |                                            |   |      |      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Units                                                       | Threshold                                                                                                                                                                                                             | Result           |                         |                      |  |  |       |           |        |                                           |     |      |     |                                    |    |    |    |                                            |   |      |      |
| Head Injury Criteria (HIC <sub>36</sub> )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | N/A                                                         | 1000                                                                                                                                                                                                                  | 693              |                         |                      |  |  |       |           |        |                                           |     |      |     |                                    |    |    |    |                                            |   |      |      |
| Resultant Lower Spine Acceleration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Gs                                                          | 82                                                                                                                                                                                                                    | 60               |                         |                      |  |  |       |           |        |                                           |     |      |     |                                    |    |    |    |                                            |   |      |      |
| Combined Acetabular and Iliac Pelvic Force                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | N                                                           | 5525                                                                                                                                                                                                                  | 5636             |                         |                      |  |  |       |           |        |                                           |     |      |     |                                    |    |    |    |                                            |   |      |      |
| <b>17. Key Words</b><br>Validation<br>Side Impact<br>Pole<br>Part 572V<br>SID-IIs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                             | <b>18. Distribution Statement</b><br>Copies of this report are available from:<br>National Highway Traffic Safety Administration<br>Technical Reference Division<br>1200 New Jersey Ave, SE<br>Washington, D.C. 20590 |                  |                         |                      |  |  |       |           |        |                                           |     |      |     |                                    |    |    |    |                                            |   |      |      |
| <b>19. Security Classif. (of this report)</b><br>Unclassified                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>20. Security Classif. (of this page)</b><br>Unclassified | <b>21. No. of Pages</b><br>125                                                                                                                                                                                        | <b>22. Price</b> |                         |                      |  |  |       |           |        |                                           |     |      |     |                                    |    |    |    |                                            |   |      |      |

Form DOT F1700.7 (8-72)

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## **SECTION 1**

### **TEST PURPOSE AND PROCEDURE**

This Side Impact Test is part of the FY 2009 Side Impact Validation Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-03-D-12005. The purpose of this test is to generate comparative side impact performance in a 2010 Toyota Camry LE 4-Dr Sedan. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Laboratory Side NCAP Pole Laboratory Test Procedure, dated April 2009.

## SECTION 2

### SUMMARY OF TEST RESULTS

A rigid pole side impact test was conducted on a 2010 Toyota Camry LE 4-Dr Sedan. The subject vehicle was towed into the rigid pole at an angle of 75° and a velocity of 31.4 km/h. The test was conducted by MGA Research Corporation in Burlington, Wisconsin, on June 5, 2009. Pre-test and post-test photographs of the test vehicle and Side Impact Dummy (SID-IIs) are included in Appendix A of this report.

One Part 572V (SID-IIs) dummy was placed in the driver designated seating position according to instructions specified in the OCWS Side NCAP Pole Laboratory Test Procedure, dated April, 2009. Camera locations and other pertinent camera information are included in this report.

The Part 572V (SID-IIs) dummy was instrumented accordingly:

- Head CG Triaxial Accelerometers
- Upper Neck Load Cells
- Shoulder Displacement Transducer
- Chest Upper, Middle, and Lower Rib Displacement Transducers
- Abdomen Upper and Lower Rib Displacement Transducers
- Iliac Load Cell
- Acetabulum Load Cell
- Lower Spine Triaxial Accelerometers

Appendix B contains the vehicle and dummy response data. Dummy configuration and performance verification data can be found in Appendix C of this report.

The following table summarizes the results of the test:

**DUMMY INJURY VALUES**

| Dummy                                     | HIC (36ms) | Resultant Lower Spine Acceleration | Pelvic Force (N) |      |
|-------------------------------------------|------------|------------------------------------|------------------|------|
| SID-IIs 5 <sup>th</sup> Percentile Female | 693        | 60                                 | Iliac Wing       | 2807 |
|                                           |            |                                    | Acetabular       | 2831 |
|                                           |            |                                    | Sum              | 5636 |

**SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION**

| Restraint Type                     | Left Front Driver (P1) |          | Left Rear Passenger (P4) |          |
|------------------------------------|------------------------|----------|--------------------------|----------|
|                                    | Installed              | Operated | Installed                | Operated |
| Frontal Airbag                     | Yes                    | No       |                          |          |
| Knee Airbag                        | Yes                    | No       |                          |          |
| Side Torso Airbag                  | Yes                    | Yes      | No                       |          |
| Combination Head/Torso Side Airbag | No                     |          | No                       |          |
| Curtain/Tube Side Airbag           | Yes                    | Yes      | Yes                      | Yes      |
| Seat Belt Pretensioner             | Yes                    | Yes      | No                       |          |
| Seat Belt Load Limiter             | Yes                    | No       | No                       |          |

The test data can be found on the NHTSA website at [www.nhtsa.dot.gov](http://www.nhtsa.dot.gov)

### **GENERAL COMMENTS**

The driver side curtain airbag was not monitored.

The vehicle struck the velocity trap prior to impact. The test speed was determined from the cable speed.

MGA does not endorse or certify products. The manufacturer's name appears solely for identification purposes.

**SECTION 3**  
**OCCUPANT AND VEHICLE INFORMATION**

## DATA SHEET NO. 1

### GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2010 Toyota Camry LE 4-Dr Sedan  
 Test Program: Validation Side Impact Pole

NHTSA No. MA5114  
 Test Date: 6/05/2009

### TEST VEHICLE INFORMATION AND OPTIONS

|                                                                            |                    |                          |     |
|----------------------------------------------------------------------------|--------------------|--------------------------|-----|
| NHTSA No.                                                                  | MA5114             | Anti-Lock Brakes         | Yes |
| Model Year                                                                 | 2010               | All Wheel Drive          | No  |
| Make                                                                       | Toyota             | Power Steering           | Yes |
| Model                                                                      | Camry              | Driver Front Airbag      | Yes |
| Body Style                                                                 | Sedan              | Driver Side Airbag       | Yes |
| VIN                                                                        | 4T4BF3EK9AR024876  | Driver Head/Torso Airbag | No  |
| Body Color                                                                 | Classic Silver Met | Driver Curtain Airbag    | Yes |
| Delivery Date                                                              | 6/02/2009          | Driver Knee Bag          | Yes |
| Odometer (km/mi)                                                           | 126 / 78           | LR Pass. Front Airbag    | No  |
| Dealer                                                                     | Jack Safto Toyota  | LR Pass. Side Airbag     | No  |
| Transmission                                                               | Automatic          | LR Pass. Head Airbag     | No  |
| Final Drive                                                                | Front              | LR Pass. Curtain Airbag  | Yes |
| Type/No. Cylinders                                                         | 4                  | LR Pass. Knee Bag        | No  |
| Engine Displacement (L)                                                    | 2.5                | Pretensioners            | Yes |
| Engine Placement                                                           | Lateral            | Load Limiters            | Yes |
| Roof Rack                                                                  | No                 | Air Conditioning         | Yes |
| Sunroof/T-Top                                                              | No                 | AM/FM CD                 | Yes |
| Tinted Glass                                                               | No                 | Tilt Wheel               | Yes |
| Traction Control                                                           | Yes                | Automatic Door Locks     | Yes |
| Power Brakes                                                               | Yes                | Power Windows            | Yes |
| Front Disc                                                                 | Yes                | Power Seats              | Yes |
| Rear Disc                                                                  | Yes                | Other:                   |     |
| Does owner's manual provide instructions to turn off automatic door locks? | Yes                |                          |     |

### DATA FROM CERTIFICATION LABEL

|                     |                                                    |                 |      |
|---------------------|----------------------------------------------------|-----------------|------|
| Manufactured By     | Toyota Motor Manufacturing Northern Kentucky, Inc. | GVWR (kg)       | 1970 |
| Date of Manufacture | 05/09                                              | GAWR Front (kg) | 1210 |
|                     |                                                    | GAWR Rear (kg)  | 1070 |

### VEHICLE SEATING AND WEIGHT CAPACITY DATA

| Measured Parameter                         | Front | Rear | Third | Total |       |
|--------------------------------------------|-------|------|-------|-------|-------|
| Designated Seating Capacity (DSC)          | 2     | 3    |       | 5     | (A)   |
| Vehicle Capacity Weight (VCW) (kg)         |       |      |       | 410   | (B)   |
| DSC x 68.04 kg                             |       |      |       | 340   | (A-B) |
| Rated Cargo and Luggage Weight (RCLW) (kg) |       |      |       | 70    |       |

### VEHICLE SEAT TYPE

| Seating Location        | Type of Seat Pan |       |             |           | Type of Seat Back |                        |       |
|-------------------------|------------------|-------|-------------|-----------|-------------------|------------------------|-------|
|                         | Bucket           | Bench | Split Bench | Contoured | Fixed             | Adjustable<br>w/ Lever | Power |
| Front Seat              | X                |       |             |           |                   |                        | X     |
| Rear or Second Row Seat | X                |       |             |           | X                 |                        |       |
| Third Row Seat          |                  |       |             |           |                   |                        |       |

## DATA SHEET NO. 1 (continued)

### GENERAL TEST AND VEHICLE PARAMETER DATA

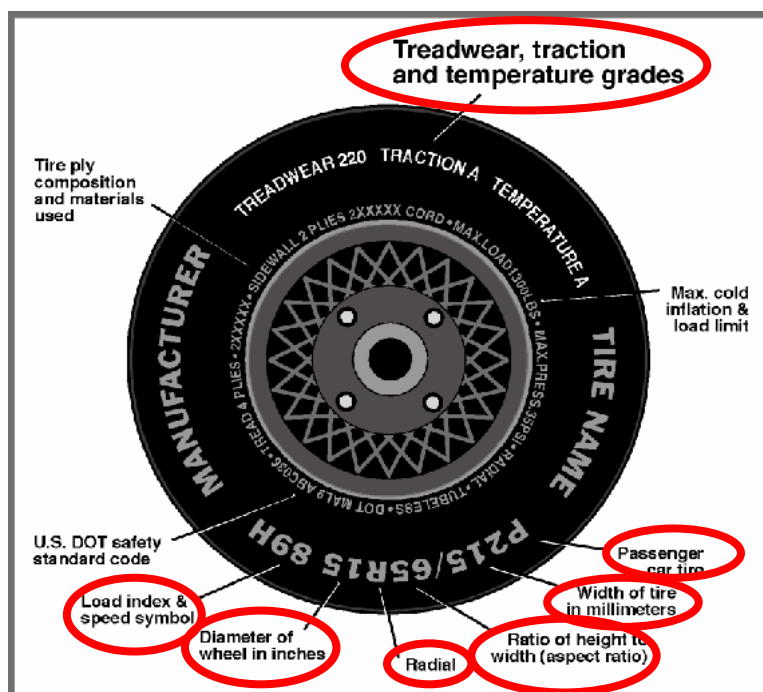
Test Vehicle: 2010 Toyota Camry LE 4-Dr Sedan

NHTSA No. MA5114

Test Program: Validation Side Impact Pole

Test Date: 6/05/2009

### VEHICLE TIRE INFORMATION



| Measured Parameter          | Front         | Rear          |
|-----------------------------|---------------|---------------|
| Maximum Tire Pressure (kPa) | 350           | 350           |
| Cold Pressure (kPa)         | 230           | 230           |
| Recommended Tire Size       | P215/60R16    | P215/60R16    |
| Tire Size on Vehicle        | P215/60R16    | P215/60R16    |
| Tire Model                  | Bridgestone   | Bridgestone   |
| Tire Manufacturer           | Turanza       | Turanza       |
| Treadwear                   | 260           | 260           |
| Traction                    | A             | A             |
| Temperature Grades          | A             | A             |
| Tire Plies Sidewall         | 1             | 1             |
| Tire Plies Body             | 2             | 2             |
| Load Index & Speed Symbol   | 94V           | 94V           |
| Tire Material               | Rubber        | Rubber        |
| DOT Safety Code Right       | OBX8 PM2 1609 | OBX8 PM2 1609 |
| DOT Safety Code Left        | OBX8 PM2 1609 | OBX8 PM2 1609 |

## DATA SHEET NO. 1 (continued)

### GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2010 Toyota Camry LE 4-Dr Sedan

NHTSA No. MA5114

Test Program: Validation Side Impact Pole

Test Date: 6/05/2009

### TEST VEHICLE AXLE WEIGHTS

|        | Units | As Delivered (UVW) |       |        | As Tested (ATW) |       |        | Fully Loaded |       |        |
|--------|-------|--------------------|-------|--------|-----------------|-------|--------|--------------|-------|--------|
|        |       | Front              | Rear  | Total  | Front           | Rear  | Total  | Front        | Rear  | Total  |
| Left   | kg    | 450.0              | 305.3 |        | 477.2           | 333.4 |        | 469.0        | 360.2 |        |
| Right  | kg    | 455.8              | 291.6 |        | 481.3           | 323.4 |        | 459.9        | 333.8 |        |
| Ratio  | %     | 60.3               | 39.7  |        | 59.3            | 40.7  |        | 57.2         | 42.8  |        |
| Totals | kg    | 905.8              | 596.9 | 1502.7 | 958.5           | 656.8 | 1615.3 | 928.9        | 694.0 | 1622.9 |

### TARGET TEST WEIGHT CALCULATION

| Measured Parameter                                | Units | Value  |         |
|---------------------------------------------------|-------|--------|---------|
| Total As Delivered Weight (UVW)                   | kg    | 1502.7 | (A)     |
| Actual Weight of 1 P572V ATD (SID-IIs) Dummy Used | kg    | 52.2   | (B)     |
| Rated Cargo/Luggage Weight (RCLW)                 | kg    | 70     | (C)     |
| Calculated Vehicle Target Weight (TVTW)           | kg    | 1624.9 | (A+B+C) |

### TEST VEHICLE ATTITUDES AND CG

|                                                                | Units | As Delivered | As Tested | Fully Loaded |
|----------------------------------------------------------------|-------|--------------|-----------|--------------|
| Driver Door Sill Angle (front-to-rear)*                        | deg   | -0.8         | -0.8      | -0.4         |
| Front Passenger Sill Angle (front-to-rear)*                    | deg   | -0.7         | -0.7      | -0.4         |
| Front Bumper Angle (left-to-right)**                           | deg   | 0.1          | 0.1       | 0.0          |
| Rear Bumper Angle (left-to-right)**                            | deg   | 0.1          | -0.2      | -0.3         |
| Vehicle CG (Aft of Front Axle)                                 | mm    | 1100         | 1126      | 1185         |
| Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline) | mm    | 4            | 3         | 17           |

\*Front up is positive    \*\* Left up is positive

### GENERAL VEHICLE TEST DATA

| Measurement Description              | Units | Value |
|--------------------------------------|-------|-------|
| Weight of Ballast in Cargo Area      | kg    | 0     |
| Weight of Vehicle Components Removed | kg    | 20.4  |

Vehicle components removed to make target vehicle test weight: Right rear tail light, spare tire, jack, tools, spare tire cover, right front mirror, right rear speaker.

### TEST VEHICLE VERTICAL IMPACT LINE DATA

| Measurement Parameter                              | Units | Value |
|----------------------------------------------------|-------|-------|
| Vertical Impact Reference Line (Aft of Front Axle) | mm    | 1087  |
| Actual Impact Point (Aft of Front Axle)            | mm    | 1077  |
| Impact Point Difference                            | mm    | 10    |

## DATA SHEET NO. 2

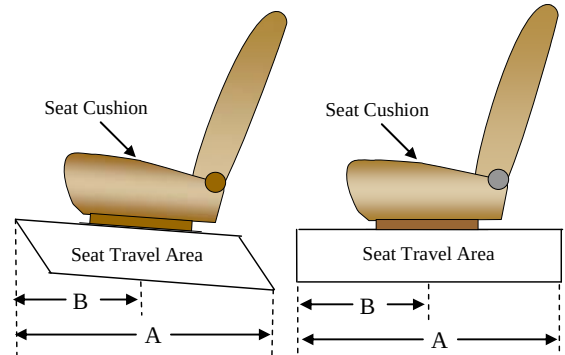
### SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT, AND FUEL SYSTEMS DATA

Test Vehicle: 2010 Toyota Camry LE 4-Dr Sedan  
 Test Program: Validation Side Impact Pole

NHTSA No. MA5114  
 Test Date: 6/05/2009

#### SEAT FORE/AFT POSITIONS

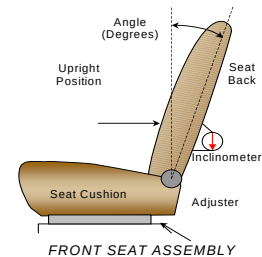
The driver seat was a power fore/aft adjustment with a power angle adjustable seat. The seat travel was set as specified in Appendix B of the TP dated April 2009. The right front passenger manual seat was set to match the driver seat. The rear passenger seats' were non-adjustable.



| SEAT FORE/AFT POSITIONING   | Total Fore/Aft Travel (mm) | Placed in Detent # or Position (mm) |
|-----------------------------|----------------------------|-------------------------------------|
| Driver Seat                 | 255 mm                     | 0 mm (full forward)                 |
| Front Passenger Seat        | 18 detents                 | 0 detent (full forward)             |
| Rear Seat – Struck Side     | Fixed                      |                                     |
| Rear Seat – Non-Struck Side | Fixed                      |                                     |

#### SEAT BACK ANGLE POSITION

The seat back was set as specified in Appendix B of the TP dated April 2009. The seat back angle measurement was made relative to the rocker sill at the headrest post.



| SEAT BACK ANGLE                                | Degrees | Detents |
|------------------------------------------------|---------|---------|
| Driver Seat Back Angle with Seated Dummy       | -7.1    |         |
| Front Passenger Seat Back Angle                | -7.0    |         |
| Struck Side Rear Seat Back Angle               | Fixed   |         |
| Non-Struck Side Rear Passenger Seat Back Angle | Fixed   |         |

#### SEAT BELT UPPER ANCHORAGE

The driver and passenger seat belt upper anchorages were set in the lowermost position.

| SEAT BELT UPPER ANCHORAGE POSITIONING | Total # of Positions | Placed in Position # |
|---------------------------------------|----------------------|----------------------|
| Driver Seat                           | 4 detents            | 3 (uppermost as 0)   |
| Front Passenger Seat                  | 4 detents            | 3 (uppermost as 0)   |

## DATA SHEET NO. 2 (CONTINUED)

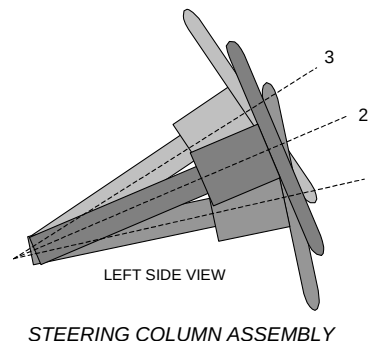
### SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT, AND FUEL SYSTEMS DATA

Test Vehicle: 2010 Toyota Camry LE 4-Dr Sedan  
 Test Program: Validation Side Impact Pole

NHTSA No. MA5114  
 Test Date: 6/05/2009

#### STEERING COLUMN ADJUSTMENT

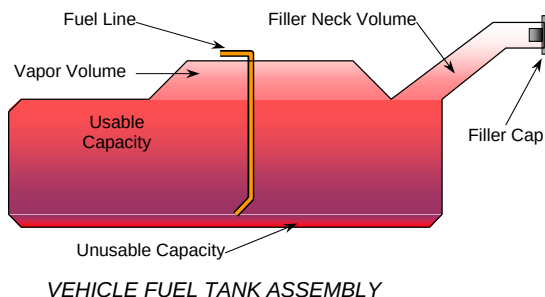
Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when moved through its full range of motion. An aluminum plate is placed across the rim of the steering wheel, an inclinometer is placed on the plate and the angle is measured.



#### STEERING COLUMN POSITIONING

|                                   | Degrees | Fore/Aft Position (mm) |
|-----------------------------------|---------|------------------------|
| Lowermost - Position 1            | 62.3    | 130 mm                 |
| Geometric Center – Position 2     | 64.1    | 150 mm                 |
| Uppermost – Position 3            | 65.9    | 170 mm                 |
| Telescoping Steering Wheel Travel | 3.6     | 40 mm                  |
| Test Position                     | 64.1    | 150 mm                 |

Describe the fuel pump type, its behavior, and the location of the fuel filler pipe. The test vehicle is equipped with an electric fuel pump. The fuel pump is activated when the ignition is turned on. The fuel pipe is on the left side.



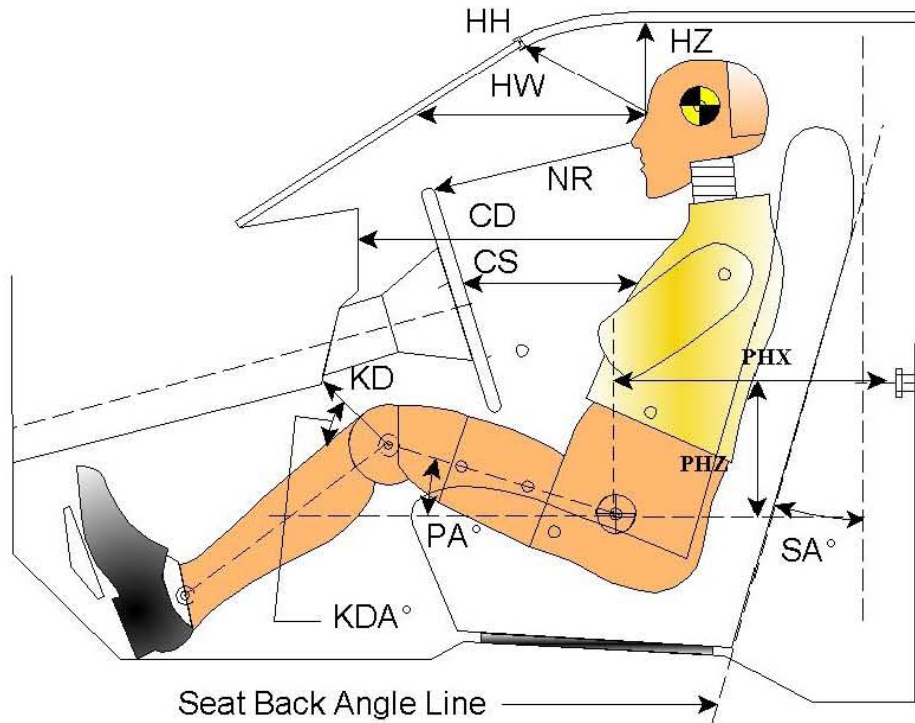
#### FUEL CAPACITY DATA

|                                                                 | Liters       |
|-----------------------------------------------------------------|--------------|
| Usable Capacity of "Standard" Tank                              | 70.0         |
| Usable Capacity of "Optional" Tank                              |              |
| Usable Capacity of Standard Tank as Specified in Owner's Manual | 70.0         |
| Usable Capacity of Optional Tank as Specified in Owner's Manual |              |
| 92-94% of Usable Capacity                                       | 64.4 to 65.8 |
| Actual Amount of Solvent Used                                   | 65.1         |
| 1/3 of Usable Capacity                                          | 23.3         |

**.DATA SHEET NO. 3**  
**DUMMY LONGITUDINAL CLEARANCE DIMENSIONS**

Test Vehicle: 2010 Toyota Camry LE 4-Dr Sedan  
 Test Program: Validation Side Impact Pole

NHTSA No. MA5114  
 Test Date: 6/05/2009

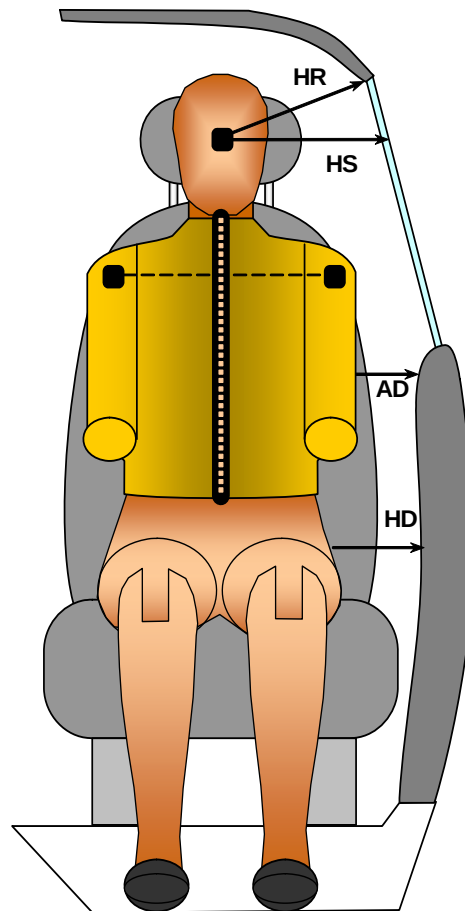


| Code      | Measurement Description     | Driver S/N 296 |           |
|-----------|-----------------------------|----------------|-----------|
|           |                             | Length (mm)    | Angle (°) |
| HH        | Head to Header              | 231            |           |
| HW        | Head to Windshield          | 531            |           |
| HZ        | Head to Roof                | 148            |           |
| NR        | Nose to Rim                 | 230            |           |
| CD        | Chest to Dash               | 392            |           |
| CS        | Chest to Steering Wheel     | 163            |           |
| KDL/KDAL° | Left Knee to Dash           | 97             | 40.2      |
| KDR/KDAR° | Right Knee to Dash          | 71             | 34.2      |
| PA°       | Pelvic Angle                |                | 19.4      |
| PHX       | H-Point to Striker (X-Axis) | 370            |           |
| PHZ       | H-Point to Striker (Z-Axis) | 229            |           |
| SA°       | Seat Back Angle             |                | -7.1      |

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

Test Vehicle: 2010 Toyota Camry LE 4-Dr Sedan  
Test Program: Validation Side Impact Pole

NHTSA No. MA5114  
Test Date: 6/05/2009



*FRONT VIEW OF DUMMY*

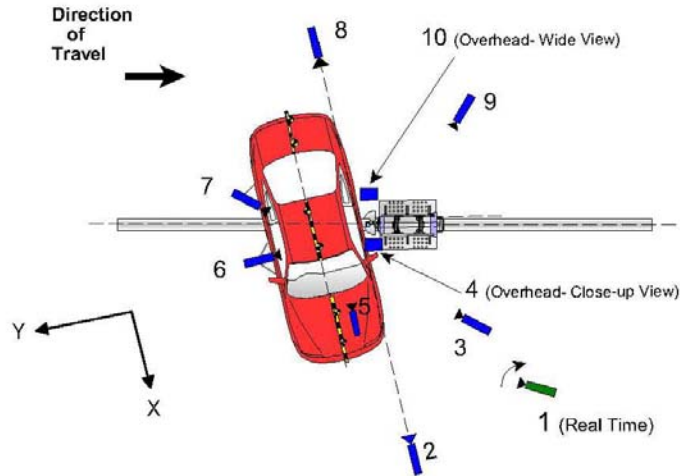
| Code | Measurement Description | Length (mm) |
|------|-------------------------|-------------|
| HR   | Head to Side Header     | 211         |
| HS   | Head to Side Window     | 331         |
| AD   | Arm to Door             | 94          |
| HD   | H-Point to Door         | 232         |

## DATA SHEET NO. 5

### CAMERA LOCATIONS AND DATA

Test Vehicle: 2010 Toyota Camry LE 4-Dr Sedan  
 Test Program: Validation Side Impact Pole

NHTSA No. MA5114  
 Test Date: 6/05/2009



Reference: From Point of Impact for X and Y; from Ground for Z):  
 +X = Forward of Impact, + Y = Right of Impact, +Z = Down

| Camera No. | View                     | Coordinates (mm) |       |       | Lens (mm) | Film Speed (fps) |
|------------|--------------------------|------------------|-------|-------|-----------|------------------|
|            |                          | X*               | Y*    | Z*    |           |                  |
| 1          | Real-Time                |                  |       |       | 13        | 24               |
| 2          | Front Ground Level       | 5540             | -1560 | -1715 | 24        | 1000             |
| 3          | Impact Side 45° Forward  | 3245             | -2570 | -1810 | 20        | 1000             |
| 4          | Overhead Closeup         | 0                | -70   | -4520 | 50        | 1000             |
| 5          | Onboard – Driver Front   |                  |       |       | 12.5      | 1000             |
| 6          | Onboard – Driver Side    |                  |       |       | 8         | 1000             |
| 7          | Onboard – Driver Rear    |                  |       |       | 8         | 1000             |
| 8          | Rear Ground Level        | -5950            | 1510  | -1810 | 24        | 1000             |
| 9          | Impact Side 45° Rearward | -3565            | -2755 | -1785 | 20        | 1000             |
| 10         | Overhead Side            | 0                | -580  | -4890 | 14        | 1000             |

\* All measurements accurate to  $\pm 6$  mm

Note: Vehicle was at a 15° angle to the rigid pole.

### INSTRUMENTATION

|                            | Number of Channels |
|----------------------------|--------------------|
| Driver Dummy               | 23                 |
| Vehicle Structure          | 21                 |
| Pole Load Cells            | 0                  |
| Contact Switches           | 3                  |
| Airbag Timing              | 1                  |
| Total No. of Data Channels | 48                 |

## DATA SHEET NO. 6

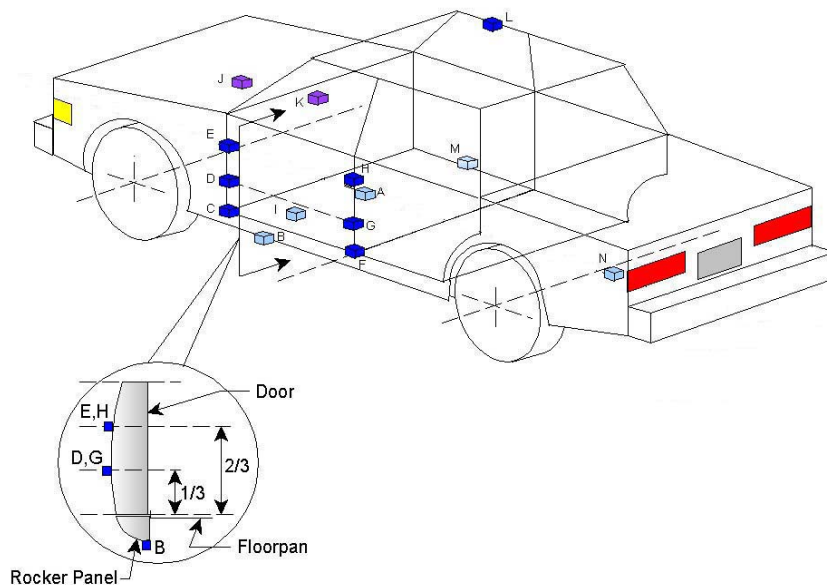
### VEHICLE ACCELEROMETER DATA

Test Vehicle: 2010 Toyota Camry LE 4-Dr Sedan

NHTSA No. MA5114

Test Program: Validation Side Impact Pole

Test Date: 6/05/2009



|   | Accelerometer Location |                  |      |       |
|---|------------------------|------------------|------|-------|
|   | ID                     | Coordinates (mm) |      |       |
|   |                        | X                | Y    | Z     |
| A | Vehicle CG             | 2168             | -15  | -320  |
|   | Vehicle CG Sensor      | 2168             | 25   | -320  |
| B | Left Floor Sill        | 3102             | -737 | -218  |
| C | A Pillar Sill          | 3366             | -740 | -216  |
| D | A Pillar Low           | 3297             | -726 | -562  |
| E | A Pillar Mid           | 3334             | -810 | -776  |
| F | B Pillar Sill          | 2193             | -735 | -236  |
| G | B Pillar Low           | 2399             | -733 | -431  |
| H | B Pillar Mid           | 2304             | -731 | -764  |
| I | Driver Seat            | 2588             | -515 | -395  |
| L | Engine Top             | 4046             | 0    | -850  |
| J | Firewall               | 3601             | 50   | -784  |
| K | Right Roof             | 2348             | 550  | -1464 |
| M | Right Floor Sill       | 2376             | 735  | -223  |
| N | Rear Floorpan          | 966              | 0    | -506  |

Reference: From Point of Impact for X and Y; from Ground for Z):

+X = Forward of Vehicle, + Y = Right of Vehicle, +Z = Down

**DATA SHEET NO. 7**  
**RIGID POLE LOAD CELL DATA**

Test Vehicle: 2010 Toyota Camry LE 4-Dr Sedan  
Test Program: Validation Side Impact Pole

NHTSA No. MA5114  
Test Date: 6/05/2009



254 mm Diameter Rigid Pole

The pole was not instrumented.

| Load Cell Locations |                        |
|---------------------|------------------------|
| ID                  | Height From Ground (m) |
| 1                   |                        |
| 2                   |                        |
| 3                   |                        |
| 4                   |                        |
| 5                   |                        |
| 6                   |                        |
| 7                   |                        |
| 8                   |                        |

## DATA SHEET NO. 8

### POST-TEST OBSERVATIONS

Test Vehicle: 2010 Toyota Camry LE 4-Dr Sedan

NHTSA No. MA5114

Test Program: Validation Side Impact Pole

Test Date: 6/05/2009

### TEST DUMMY INFORMATION AND CONTACT

| Description             | Driver Dummy             |
|-------------------------|--------------------------|
| Dummy Type / Serial No. | SID-IIs / 296            |
| Head Contact            | Curtain Airbag, Headrest |
| Upper Torso Contact     | Side Airbag, Door Panel  |
| Lower Torso Contact     | Door Panel               |
| Left Knee Contact       | Door Panel               |
| Right Knee Contact      | Left Knee                |

### POST TEST DOOR OPENING AND SEAT TRACK INFORMATION

| Description           | Front                           | Rear                            |
|-----------------------|---------------------------------|---------------------------------|
| Left Side Doors       | Remained closed and jammed shut | Remained closed and jammed shut |
| Right Side Doors      | Remained closed and operational | Remained closed and operational |
| Hatch and Other Doors | Remained closed and operational | Remained closed and operational |
| Seat Movement         | 0                               | 0                               |
| Seat Back Failure     | None                            | None                            |

### POST-TEST STRUCTURAL OBSERVATIONS

| Critical Areas of Performance | Observations and Conclusions |
|-------------------------------|------------------------------|
| Pillar Performance            | No Separation                |
| Sill Separation               | None                         |
| Windshield Damage             | Cracked                      |
| Window Damage                 | Left Front Window Broke      |
| Other Notable Effects         | None                         |

### SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

| Restraint Type                     | Left Front Driver (P1) |          | Left Rear Passenger (P4) |          |
|------------------------------------|------------------------|----------|--------------------------|----------|
|                                    | Installed              | Operated | Installed                | Operated |
| Frontal Airbag                     | Yes                    | No       |                          |          |
| Knee Airbag                        | Yes                    | No       |                          |          |
| Side Torso Airbag                  | Yes                    | Yes      | No                       |          |
| Combination Head/Torso Side Airbag | No                     |          | No                       |          |
| Curtain/Tube Side Airbag           | Yes                    | Yes      | Yes                      | Yes      |
| Seat Belt Pretensioner             | Yes                    | Yes      | No                       |          |
| Seat Belt Load Limiter             | Yes                    | No       | No                       |          |

### VEHICLE SPEED AND IMPACT DATA

| Measured Parameter                                    | Units | Requirement  | Value |
|-------------------------------------------------------|-------|--------------|-------|
| Horizontal Offset from Vertical Impact Reference Line | mm    | +/- 38       | -10   |
| Trap No. 1 Velocity (Primary)                         | km/h  | 30.4 to 32.0 | 31.4  |
| Trap No. 2 Velocity (Redundant)                       | km/h  | 30.4 to 32.0 |       |

## DATA SHEET NO. 9

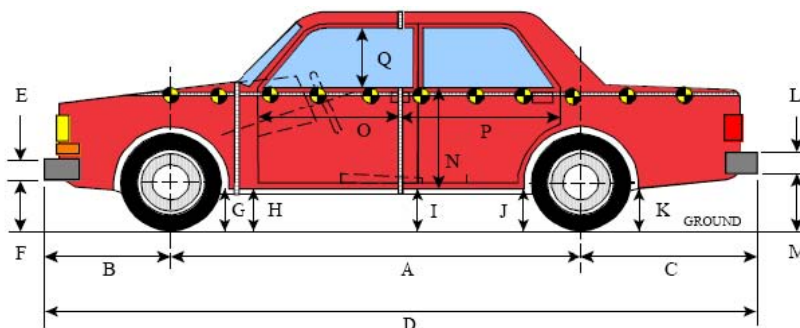
### VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2010 Toyota Camry LE 4-Dr Sedan

NHTSA No. MA5114

Test Program: Validation Side Impact Pole

Test Date: 6/05/2009



#### LEFT SIDE VIEW

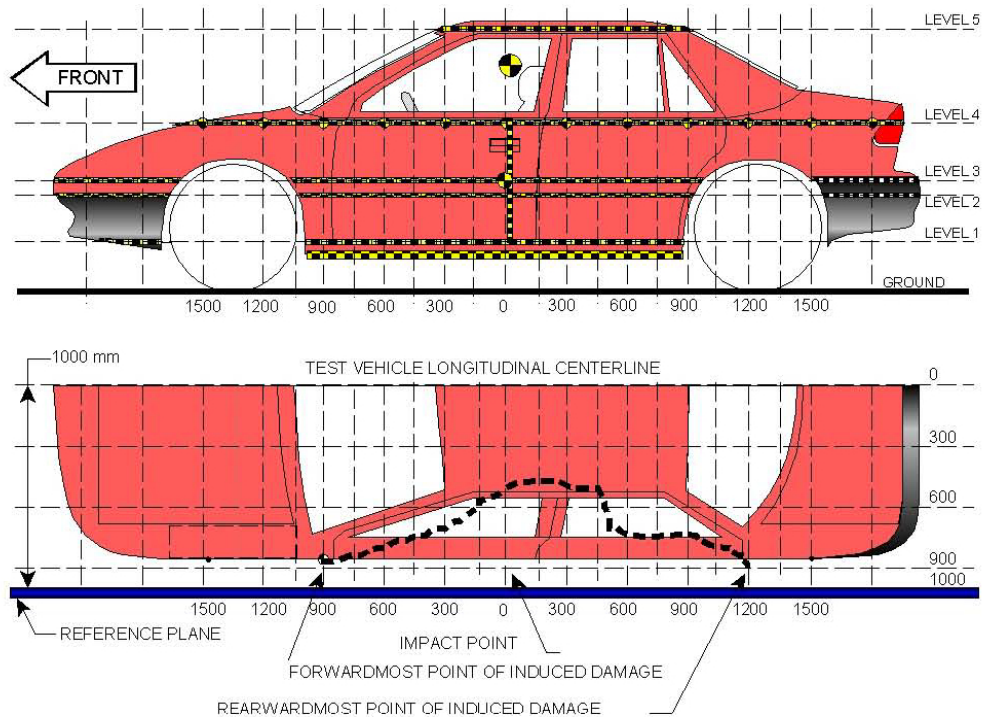
All MEASUREMENTS IN (mm) WITH TOLERANCE OF  $\pm 3$ mm

| Code | Measurement Description                | Pre-Test (mm) | Post-Test (mm) | Difference (mm) |
|------|----------------------------------------|---------------|----------------|-----------------|
| A    | Wheelbase                              | 2770          | 2641           | 129             |
| B    | Front Axle to FSOV                     | 944           | 915            | 29              |
| C    | Rear Axle to RSOV                      | 1090          | 1208           | -118            |
| D1   | Total Vehicle Length at Left Side      | 3674          | 3536           | 138             |
| D2   | Total Vehicle Length at Centerline     | 4804          | 4764           | 40              |
| D3   | Total Vehicle Length at Right Side     | 3674          | 3690           | -16             |
| E    | Front Bumper Thickness                 | 141           | 141            | 0               |
| F    | Front Bumper Bottom to Ground          | 382           | 421            | -39             |
| G    | Sill Height at Front Wheel Well        | 183           | 116            | 67              |
| H    | Sill Height at Front Door Leading Edge | 191           | 201            | -10             |
| I    | Sill Height at B Pillar                | 206           | 221            | -15             |
| J1   | Sill Height at Rear Wheel Well         | 203           | 231            | -28             |
| J2   | Pinch Weld Height at Rear Wheel Well   | 210           | 236            | -26             |
| K    | Sill Height Aft of Rear Wheel Well     | 251           | 261            | -10             |
| L    | Rear Bumper Thickness                  | 146           | 146            | 0               |
| M    | Rear Bumper Bottom to Ground           | 449           | 440            | 9               |
| N    | Sill Height to Window Bottom Sill      | 735           | 732            | 3               |
| O    | Front Door Leading Edge to Impact CL   | 652           | 656            | -4              |
| P    | Rear Door Trailing Edge to Impact CL   | 1407          | 1416           | -9              |
| Q    | Front Window Opening                   | 368           | 327            | 41              |
| R    | Right Side Length                      | 3674          | 3690           | -16             |
| S    | Left Side Length                       | 3674          | 3536           | 138             |
| T    | Vehicle Width at B Post                | 1818          | 1719           | 99              |

**DATA SHEET NO. 10**  
**VEHICLE EXTERIOR CRUSH MEASUREMENTS**

Test Vehicle: 2010 Toyota Camry LE 4-Dr Sedan  
 Test Program: Validation Side Impact Pole

NHTSA No. MA5114  
 Test Date: 6/05/2009



| Level | Measurement Description | Height Above Ground (mm) |
|-------|-------------------------|--------------------------|
| 1     | Sill Top                | 302                      |
| 2     | Occupant H-Point        | 566                      |
| 3     | Mid-Door                | 646                      |
| 4     | Window Sill             | 971                      |
| 5     | Window Top              | 1385                     |

NOTE: The above measurements are taken along the vertical impact reference line.  
 Vehicle measurements forward of the vertical impact reference line are negative.

# DATA SHEET NO. 10 (CONTINUED)

## VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2010 Toyota Camry LE 4-Dr Sedan  
Test Program: Validation Side Impact Pole

NHTSA No. MA5114  
Test Date: 6/05/2009

|       | Pre-Test |     |     |     |     | Post-Test |     |     |     |     | Difference |     |     |     |     |
|-------|----------|-----|-----|-----|-----|-----------|-----|-----|-----|-----|------------|-----|-----|-----|-----|
|       | 1        | 2   | 3   | 4   | 5   | 1         | 2   | 3   | 4   | 5   | 1          | 2   | 3   | 4   | 5   |
| -1500 |          |     |     | 325 |     |           |     |     | 329 |     |            |     |     | 4   |     |
| -1350 |          |     |     | 307 |     |           |     |     | 314 |     |            |     |     | 7   |     |
| -1200 |          |     |     | 295 |     |           |     |     | 301 |     |            |     |     | 6   |     |
| -1050 |          |     |     | 295 |     |           |     |     | 297 |     |            |     |     | 2   |     |
| -900  |          |     |     | 290 |     |           |     |     | 297 |     |            |     |     | 7   |     |
| -825  |          |     | 191 | 290 |     |           |     | 212 | 298 |     |            |     | 21  | 8   |     |
| -750  |          | 195 | 194 | 288 |     |           | 212 | 210 | 298 |     |            | 17  | 16  | 10  |     |
| -675  | 213      | 197 | 200 | 287 |     | 238       | 207 | 211 | 296 |     | 25         | 10  | 11  | 9   |     |
| -600  | 217      | 201 | 203 | 288 |     | 282       | 232 | 239 | 297 |     | 65         | 31  | 36  | 9   |     |
| -525  | 220      | 201 | 202 | 288 |     | 317       | 272 | 266 | 322 |     | 97         | 71  | 64  | 34  |     |
| -450  | 222      | 200 | 200 | 285 |     | 349       | 312 | 306 | 347 |     | 127        | 112 | 106 | 62  |     |
| -375  | 223      | 199 | 199 | 285 |     | 383       | 356 | 350 | 379 |     | 160        | 157 | 151 | 94  |     |
| -300  | 224      | 199 | 198 | 281 |     | 418       | 403 | 393 | 420 |     | 194        | 204 | 195 | 139 |     |
| -225  | 224      | 198 | 196 | 280 |     | 454       | 455 | 442 | 466 |     | 230        | 257 | 246 | 186 |     |
| -150  | 223      | 196 | 195 | 279 |     | 498       | 504 | 496 | 514 |     | 275        | 308 | 301 | 235 |     |
| -75   | 222      | 196 | 194 | 277 |     | 564       | 548 | 545 | 560 |     | 342        | 352 | 351 | 283 |     |
| 0     | 221      | 195 | 194 | 277 | 513 | 587       | 592 | 592 | 595 | 642 | 366        | 397 | 398 | 318 | 129 |
| 75    | 221      | 195 | 193 | 275 | 507 | 579       | 591 | 591 | 593 | 622 | 358        | 396 | 398 | 318 | 115 |
| 150   | 221      | 195 | 193 | 275 | 504 | 534       | 545 | 555 | 551 | 598 | 313        | 350 | 362 | 276 | 94  |
| 225   | 220      | 196 | 193 | 275 | 501 | 473       | 496 | 498 | 505 | 577 | 253        | 300 | 305 | 230 | 76  |
| 300   | 220      | 196 | 192 | 274 | 500 | 423       | 446 | 439 | 462 | 561 | 203        | 250 | 247 | 188 | 61  |
| 375   | 221      | 197 | 193 | 274 | 498 | 379       | 377 | 382 | 411 | 542 | 158        | 180 | 189 | 137 | 44  |
| 450   | 222      | 196 | 193 | 275 | 499 | 333       | 319 | 322 | 362 | 529 | 111        | 123 | 129 | 87  | 30  |
| 525   | 223      | 197 | 194 | 276 | 500 | 294       | 287 | 279 | 346 | 518 | 71         | 90  | 85  | 70  | 18  |
| 600   | 225      | 198 | 194 | 276 | 499 | 303       | 275 | 270 | 339 | 508 | 78         | 77  | 76  | 63  | 9   |
| 675   | 225      | 200 | 196 | 278 | 502 | 295       | 267 | 262 | 332 | 504 | 70         | 67  | 66  | 54  | 2   |
| 750   | 228      | 201 | 197 | 279 | 504 | 277       | 256 | 252 | 326 | 500 | 49         | 55  | 55  | 47  | -4  |
| 825   | 230      | 202 | 198 | 281 | 507 | 272       | 252 | 246 | 322 | 505 | 42         | 50  | 48  | 41  | -2  |
| 900   | 232      | 205 | 200 | 282 | 512 | 264       | 245 | 244 | 320 | 513 | 32         | 40  | 44  | 38  | 1   |
| 1050  | 233      | 210 | 203 | 285 | 522 | 244       | 232 | 229 | 309 | 516 | 11         | 22  | 26  | 24  | -6  |
| 1200  | 226      | 212 | 207 | 290 | 534 | 193       | 216 | 214 | 300 | 527 | -33        | 4   | 7   | 10  | -7  |
| 1350  |          | 197 | 199 | 297 | 554 |           | 229 | 235 | 341 | 589 |            | 32  | 36  | 44  | 35  |
| 1500  |          |     | 190 | 305 |     |           |     | 227 | 339 |     |            |     | 37  | 34  |     |
| 1650  |          |     |     | 311 |     |           |     |     | 352 |     |            |     |     | 41  |     |
| 1800  |          |     |     | 324 |     |           |     |     | 356 |     |            |     |     | 32  |     |
| 1950  |          |     |     | 339 |     |           |     |     | 366 |     |            |     |     | 27  |     |
| 2100  |          |     |     | 351 |     |           |     |     | 373 |     |            |     |     | 22  |     |
| 2250  |          |     |     | 370 |     |           |     |     | 386 |     |            |     |     | 16  |     |
| 2400  |          |     |     | 392 |     |           |     |     | 401 |     |            |     |     | 9   |     |

**DATA SHEET NO. 10 (CONTINUED)****VEHICLE EXTERIOR CRUSH MEASUREMENTS**

Test Vehicle: 2010 Toyota Camry LE 4-Dr Sedan  
Test Program: Validation Side Impact Pole

NHTSA No. MA5114  
Test Date: 6/05/2009

**MAXIMUM CRUSH DATA**

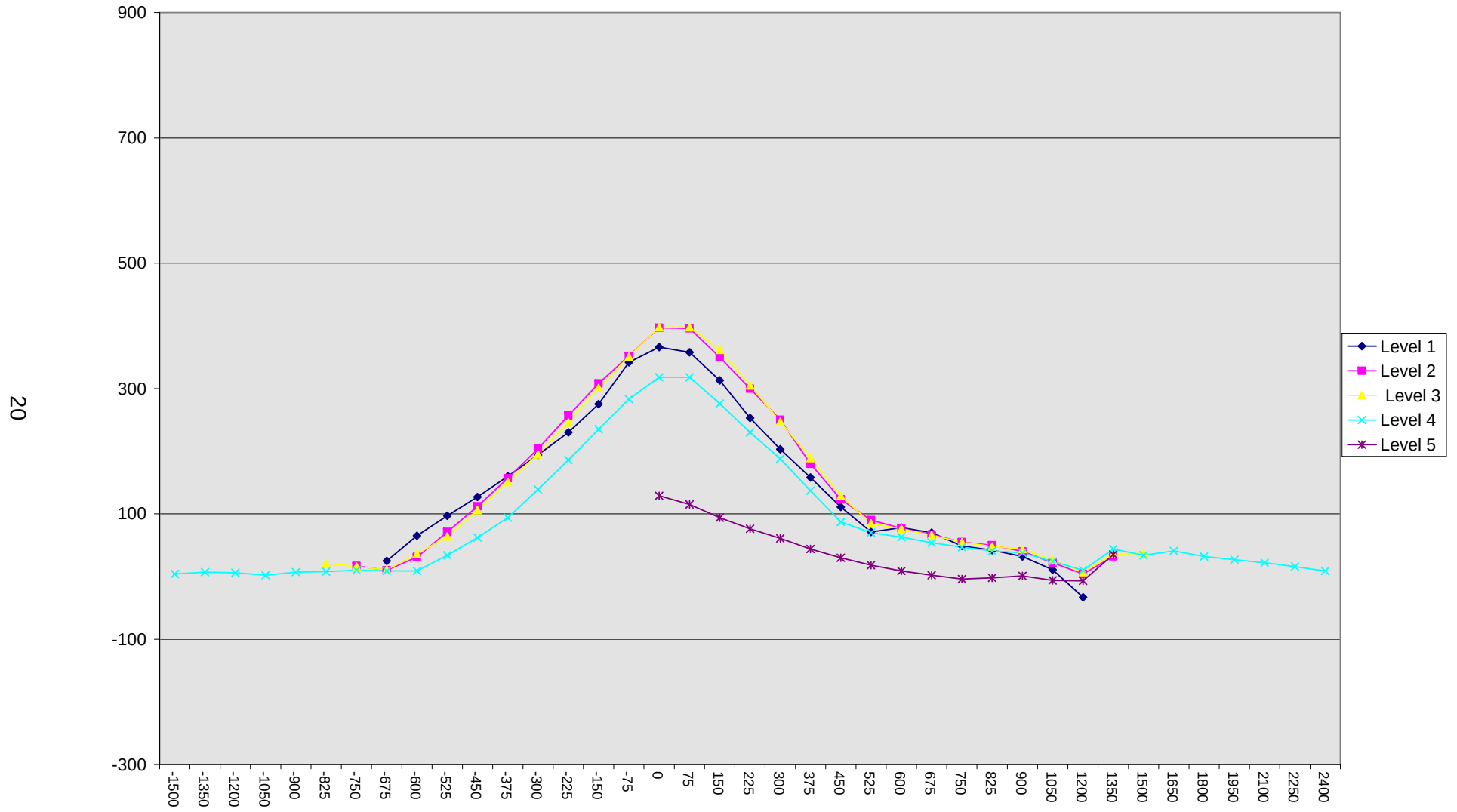
|                           | Level 1 | Level 2 | Level 3 | Level 4 | Level 5 |
|---------------------------|---------|---------|---------|---------|---------|
| Maximum Crush (mm)        | 366     | 397     | 398     | 318     | 129     |
| Distance From Impact (mm) | 0       | 0       | 75      | 0       | 0       |

Note: Pre-test measurements are taken when the vehicle is in the "As Tested" weight condition. Vehicle measurements forward of the vertical impact reference line are negative. The crush profile grid is established prior to test based on an estimated impact point. The final distance to impact is determined after the final dummy positioning and the pole is aligned with the center of gravity of the dummy's head.

**DATA SHEET NO. 10 (CONTINUED)**  
**VEHICLE EXTERIOR CRUSH MEASUREMENTS**

Test Vehicle: 2010 Toyota Camry LE 4-Dr Sedan  
Test Program: Validation Side Impact Pole

NHTSA No. MA5114  
Test Date: 6/05/2009

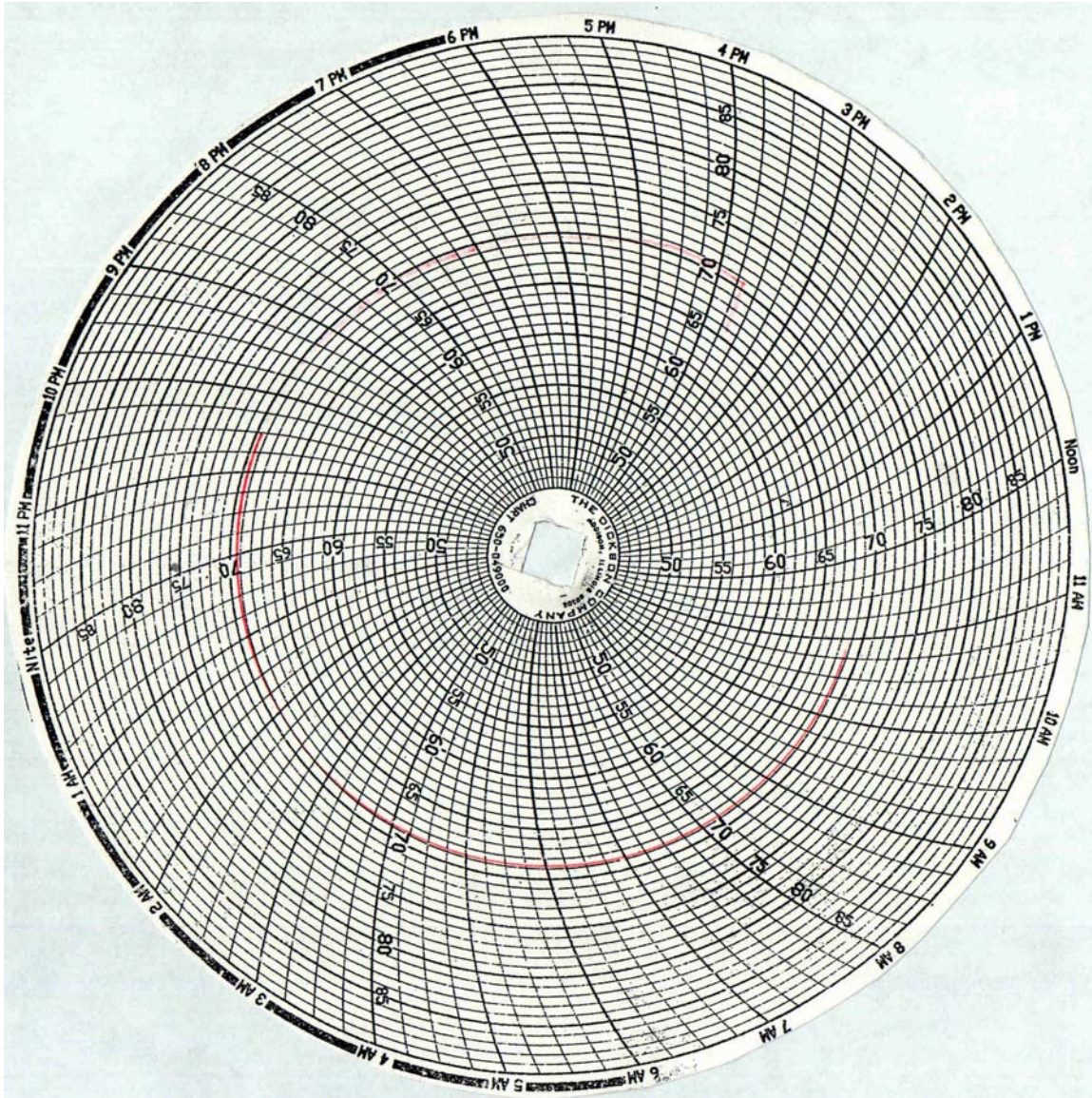


## DATA SHEET NO. 11

### DUMMY/VEHICLE TEMPERATURE STABILIZATION DATA

Test Vehicle: 2010 Toyota Camry LE 4-Dr Sedan  
Test Program: Validation Side Impact Pole

NHTSA No. MA5114  
Test Date: 6/05/2009



**APPENDIX A**  
**PHOTOGRAPHS**

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As Delivered Right Front  $\frac{3}{4}$  View of Test Vehicle



As Delivered Left Rear  $\frac{3}{4}$  View of Test Vehicle



Pre-Test Frontal View of Test Vehicle



Post-Test Frontal View of Test Vehicle



Pre-Test Left Front  $\frac{3}{4}$  View of Test Vehicle



Post-Test Left Front  $\frac{3}{4}$  View of Test Vehicle



Pre-Test Left Side View of Test Vehicle



Post-Test Left Side View of Test Vehicle



Pre-Test Left Rear  $\frac{3}{4}$  View of Test Vehicle



Post-Test Left Rear  $\frac{3}{4}$  View of Test Vehicle



Pre-Test Rear View of Test Vehicle



Post-Test Rear View of Test Vehicle



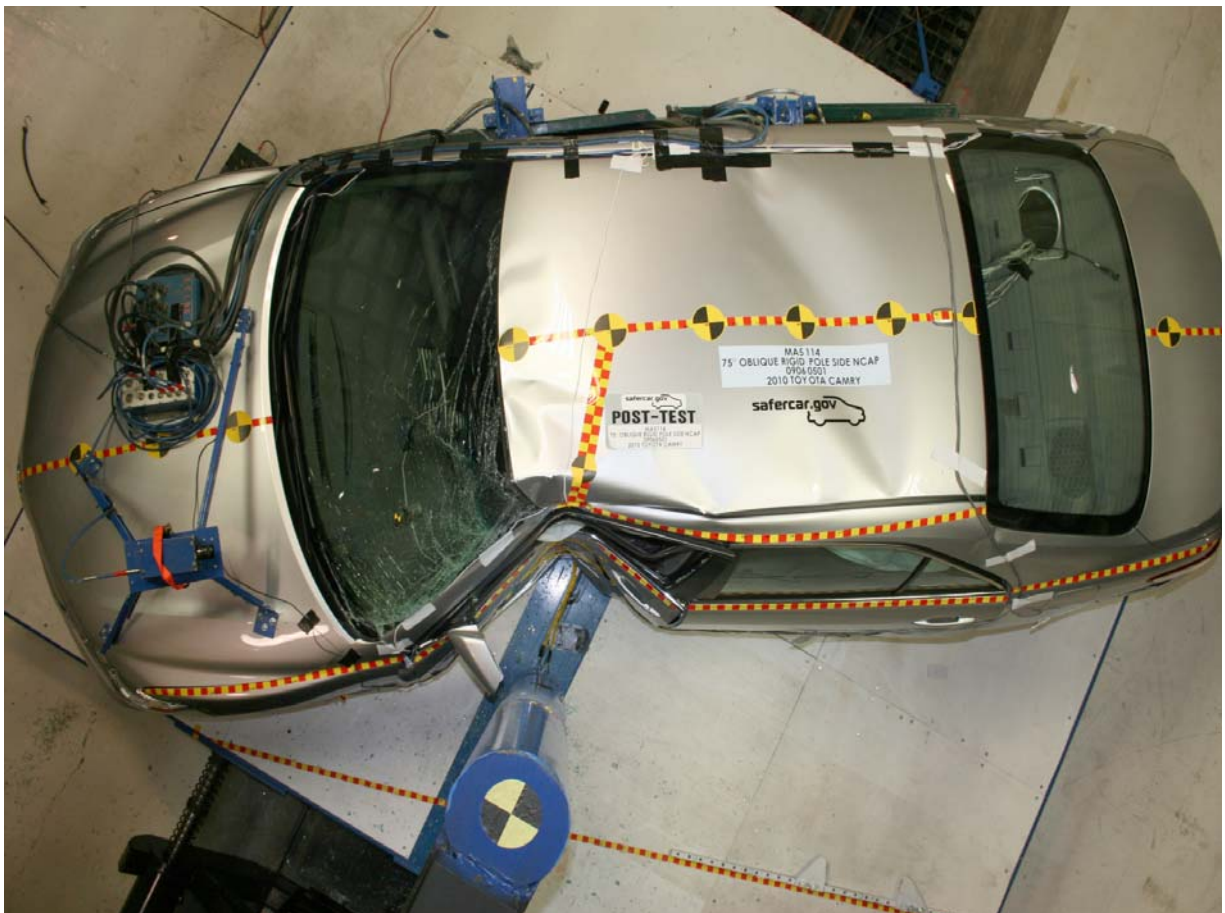
Pre-Test Right Side View of Test Vehicle



Post-Test Right Side View of Test Vehicle



Pre-Test Overhead View of Test Vehicle and Pole



Post-Test Overhead View of Test Vehicle and Pole



Pre-Test Left Side View of Pole Positioned Against Side of Vehicle at Ideal Impact Point



Pre-Test Right Side View of Pole Positioned Against Side of Vehicle at Ideal Impact Point



Pre-Test Close-Up View of Impact Point Target



Post-Test Close-Up View of Impact Point Target Showing Impact Location



Pre-Test Front Close-Up View of Dummy (through front window)



Post-Test Front Close-Up View of Dummy (through front window)



Pre-Test Left Side View of Dummy Showing Belts, Chalking, and Contact Switches (Door Open)



Pre-Test Left Side View of Dummy Shoulder and Door Top View



Post-Test Left Side View of Dummy Shoulder and Door Top View

NO PHOTOGRAPH AVAILABLE

Pre-Test Frontal View of Seat Back Prior to Dummy Positioning



Pre-Test Frontal View of Dummy Head and Shoulders in Relation to Head Restraint

NO PHOTOGRAPH AVAILABLE

Pre-Test Frontal View of Seat Pan Prior to Dummy Positioning (showing centerline)



Pre-Test Overhead View of Dummy Thighs on Seat Pan

NO PHOTOGRAPH AVAILABLE

Pre-Test View of Dummy's Neck Showing Position of Adjustable Neck Bracket

NO PHOTOGRAPH AVAILABLE

Pre-Test View of Dummy's Head Showing Dummy's Head is Level



Pre-Test Placement of Dummy's Feet

NO PHOTOGRAPH AVAILABLE

Pre-Test View of Belt Anchorage for Dummy to Show Position



Pre-Test Left Side View of Steering Wheel to Show Position



Pre-Test View of Parking Brake



Pre-Test Close-Up Left Side View of Driver Seat Track Showing Test Position



Pre-Test Close-Up Left Side View of Driver Seat Back Showing Test Position

NO PHOTOGRAPH AVAILABLE

Pre-Test Close-Up View of Driver Seat Back or Head Restraint Showing Seat Back Test Position



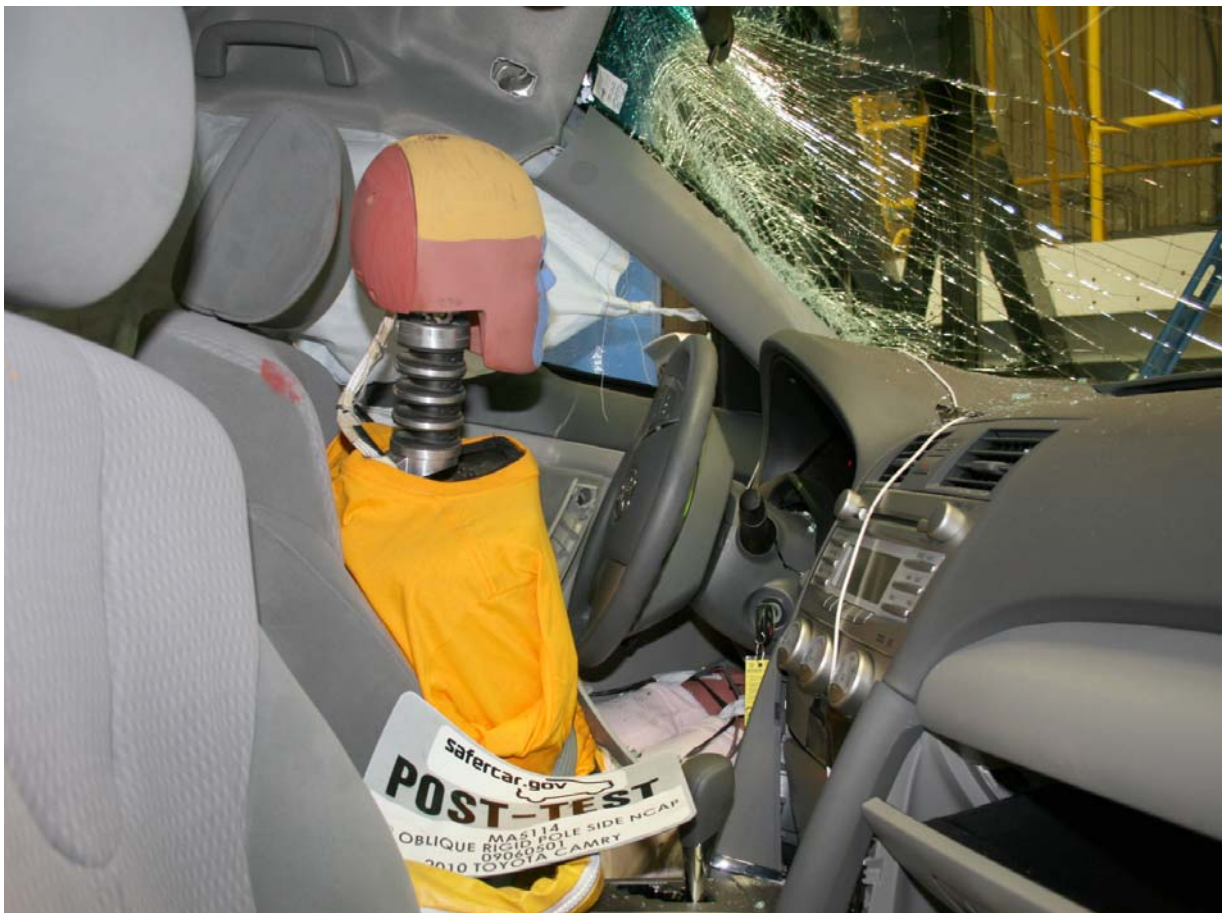
Pre-Test Dummy and Door Clearance View



Post-Test Dummy and Door Clearance View



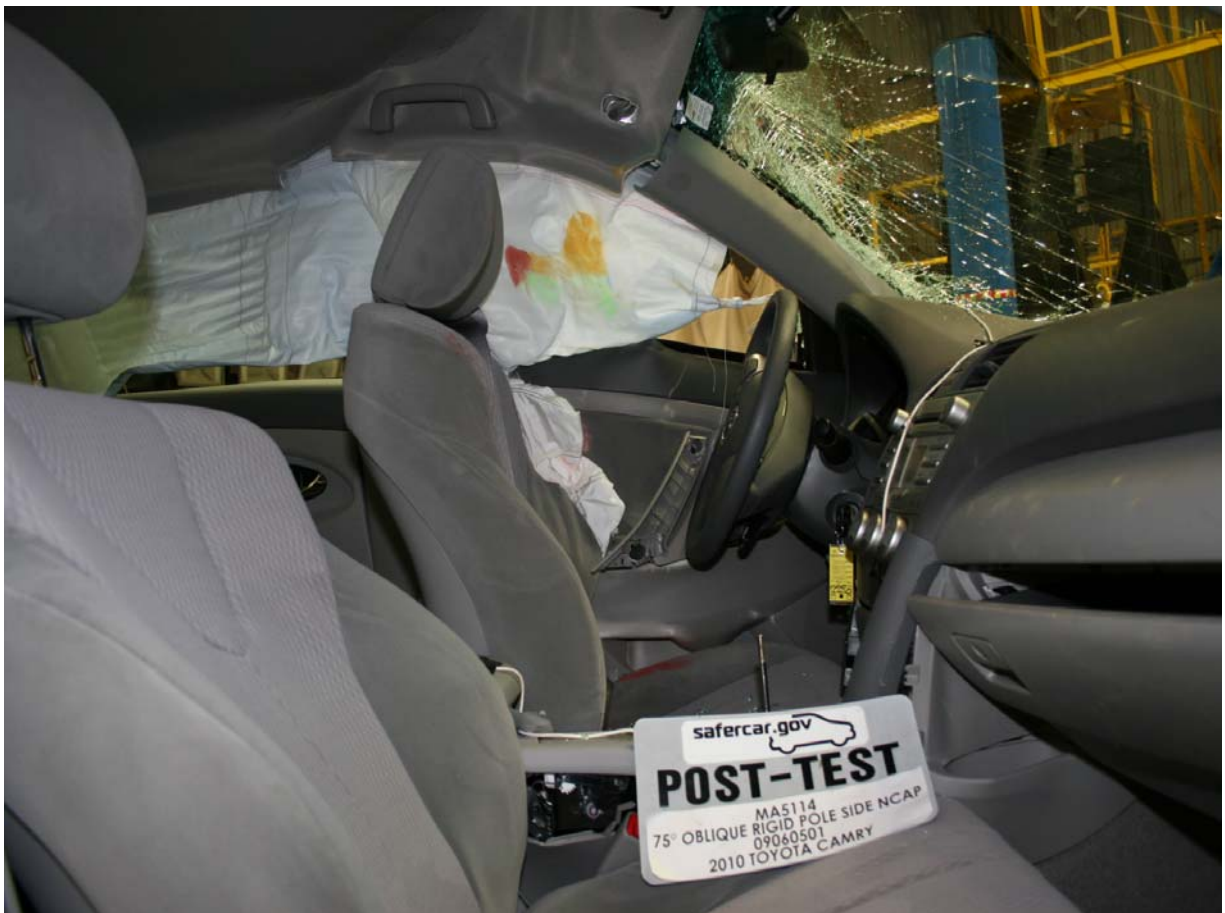
Pre-Test Right Side View of Dummy and Front Seat Occupant Compartment



Post-Test Right Side View of Dummy and Front Seat Occupant Compartment



Pre-Test Inner Door Panel View



Post-Test Inner Door Panel View Showing Dummy Contact Location



Post-Test Dummy Close-Up Head Contact with Vehicle View, if applicable



Post-Test Dummy Close-Up Head Contact with Side Airbag View, if applicable



Post-Test Dummy Close-Up Torso Contact with Vehicle Interior View, if applicable

NO PHOTOGRAPH AVAILABLE

Post-Test Dummy Close-Up Torso Contact with Side Airbag View, if applicable



Post-Test Dummy Close-Up Pelvis Contact View, if applicable

NO PHOTOGRAPH AVAILABLE

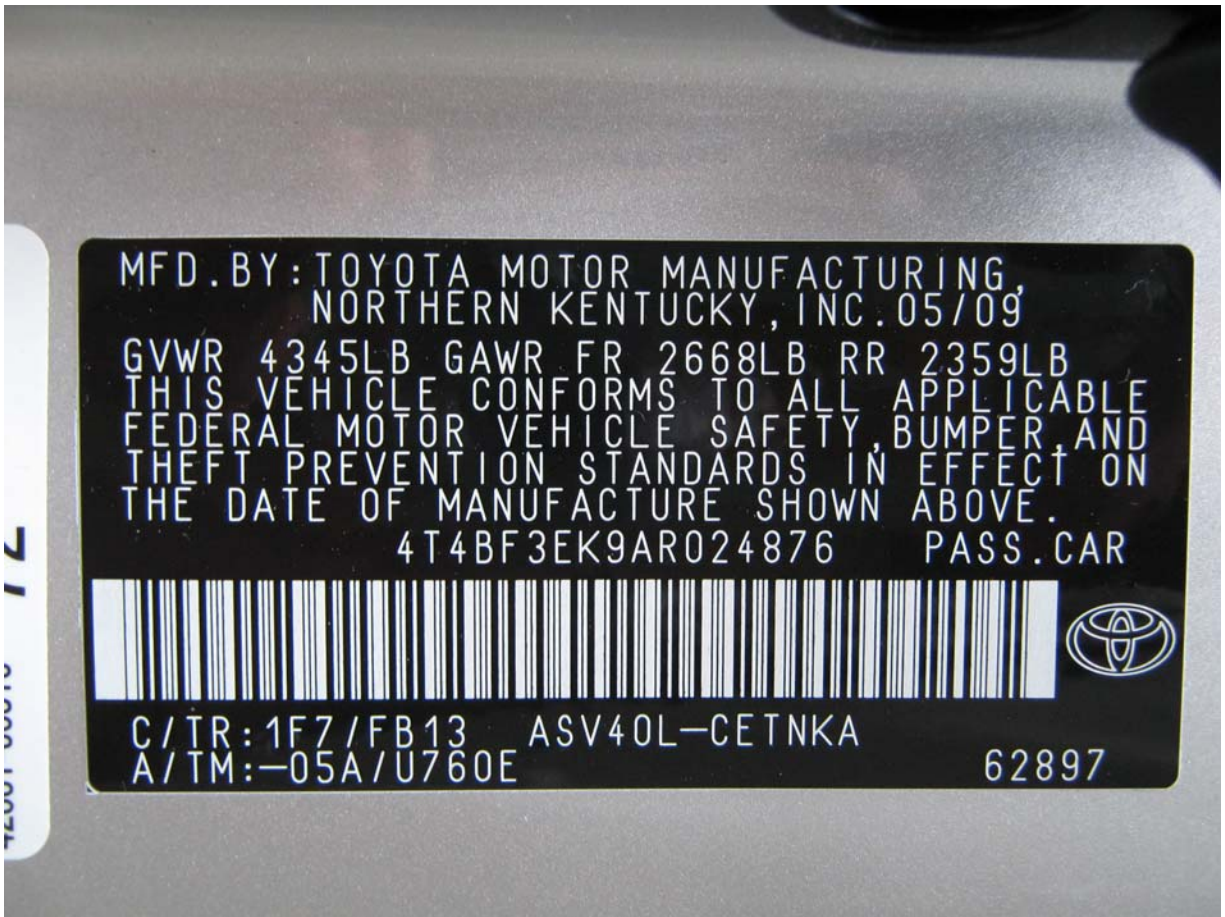
Post-Test Dummy Close-Up Pelvis Contact with Side Airbag View, if applicable



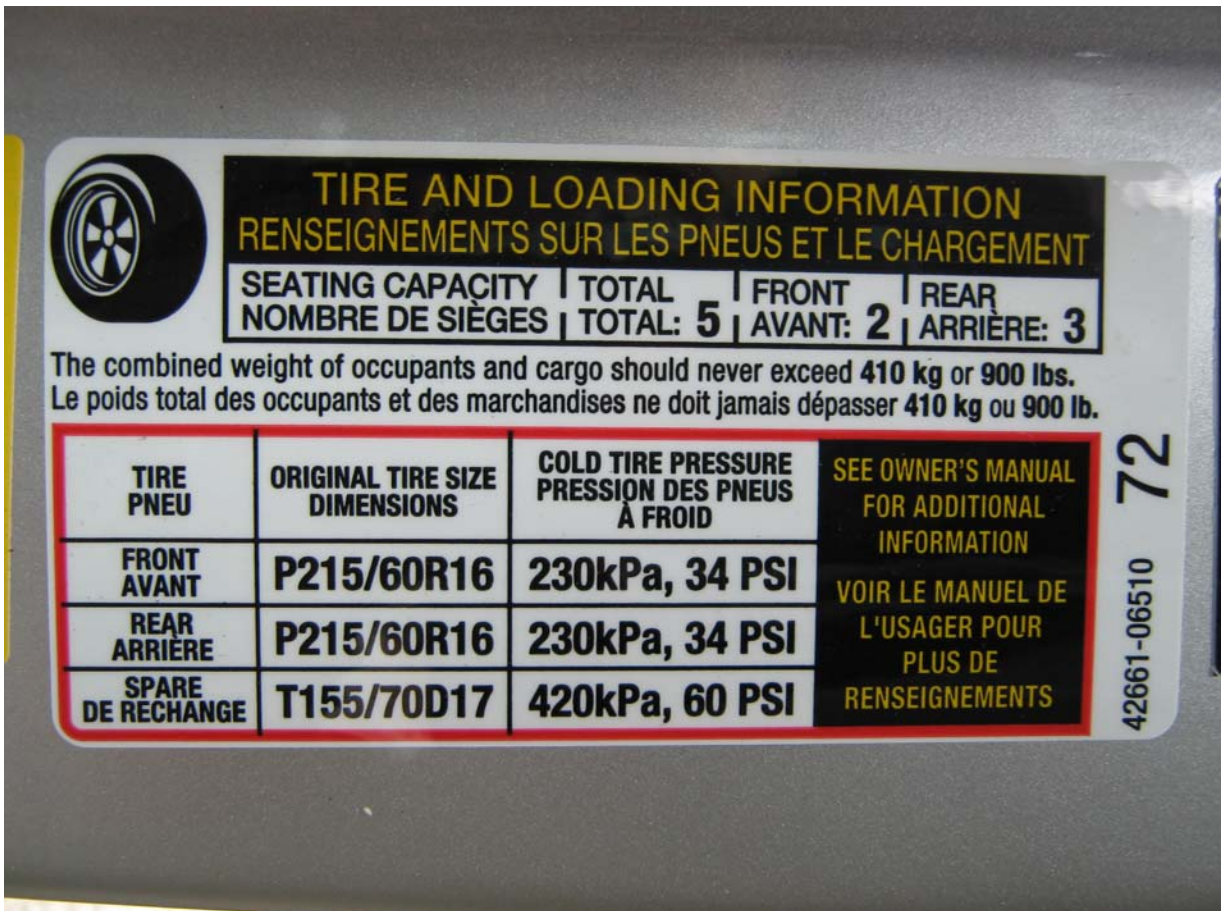
Pre-Test View of Fuel Filler Cap or Fuel Filler Neck



Post-Test View of Fuel Filler Cap or Fuel Filler Neck



Close-Up View of Vehicle's Certification Label



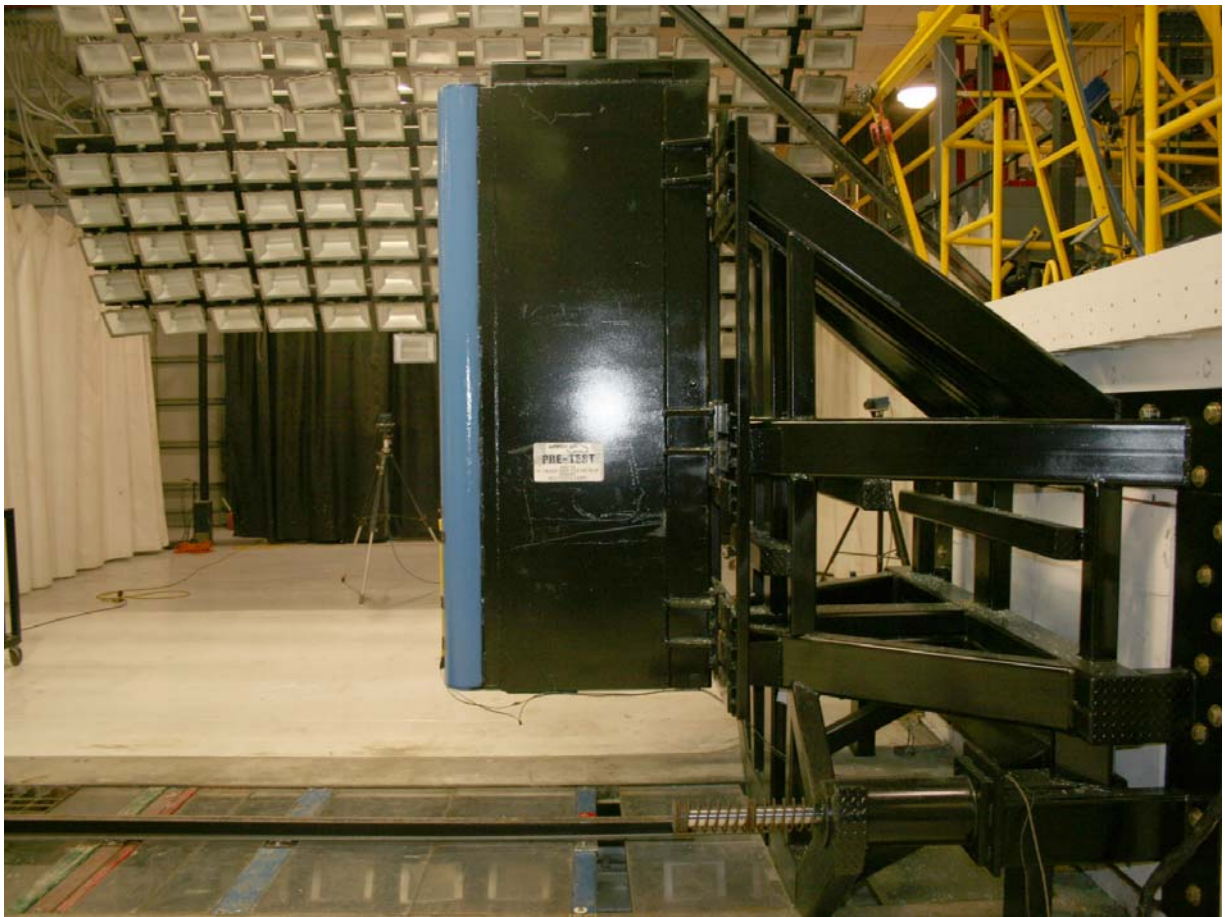
Close-Up View of Vehicle's Tire Information Placard of Label



Pre-Test Pole Barrier Front View



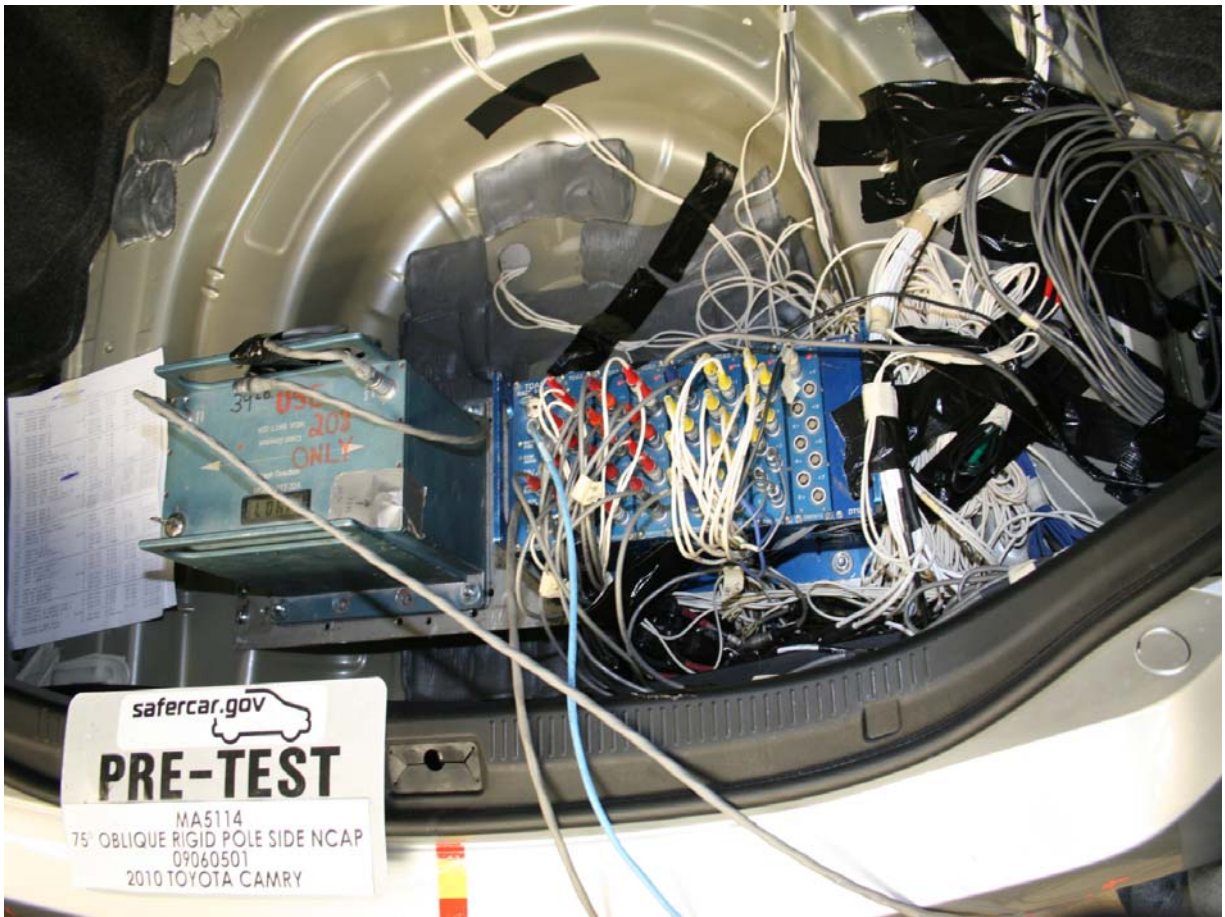
Post-Test Pole Barrier Front View



Pre-Test Pole Barrier Side View



Post-Test Pole Barrier Side View



Pre-Test Ballast View

NO PHOTOGRAPH AVAILABLE

Post-Test Primary and Redundant Speed Trap Read-Out

NO STATIC ROLLOVER PERFORMED

FMVSS No. 301/305 Rollover 0 Degrees

NO STATIC ROLLOVER PERFORMED

FMVSS No. 301/305 Rollover 90 Degrees

NO STATIC ROLLOVER PERFORMED

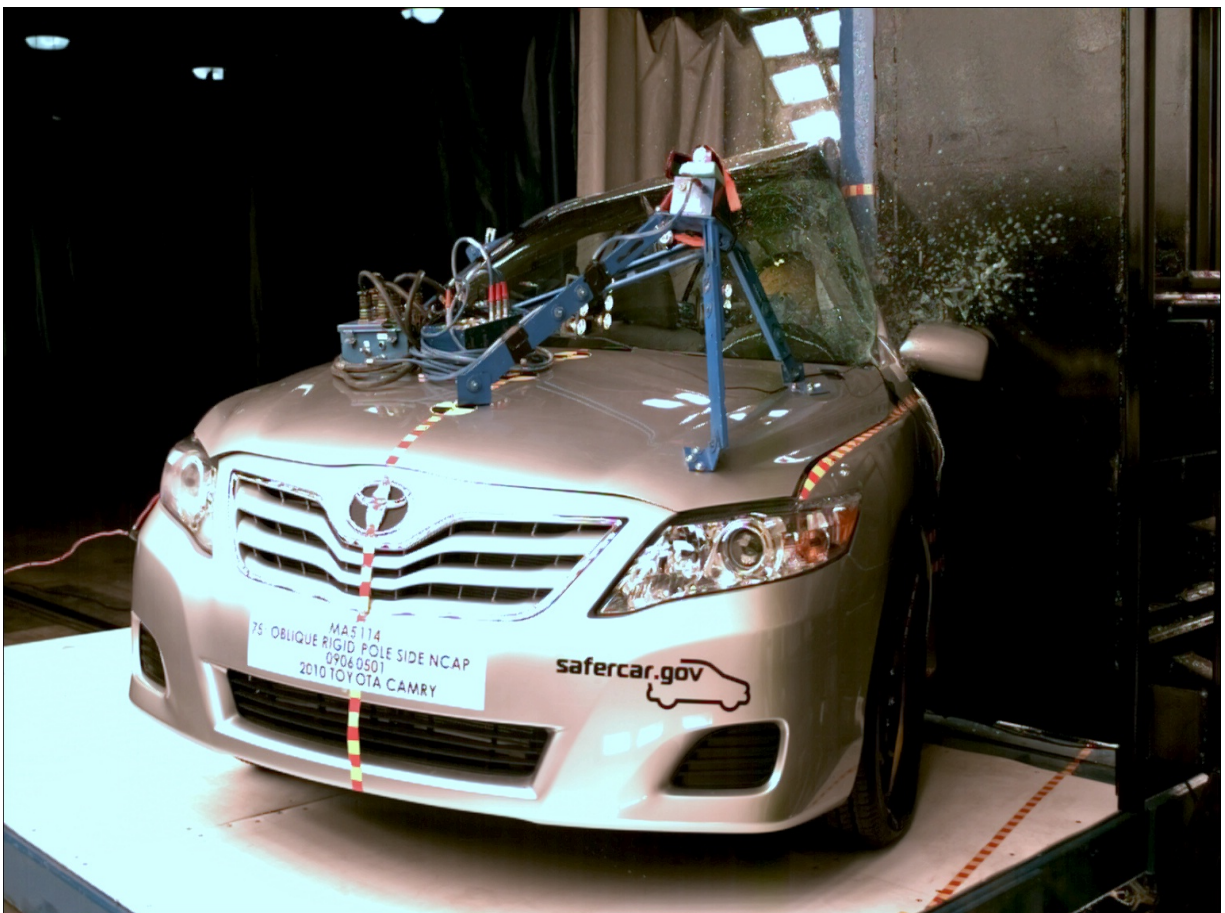
FMVSS No. 301/305 Rollover 180 Degrees

NO STATIC ROLLOVER PERFORMED

FMVSS No. 301/305 Rollover 270 Degrees

NO STATIC ROLLOVER PERFORMED

FMVSS No. 301/305 Rollover 360 Degrees



Impact Event (Impact Side)



moving forward

DESC: CAMRY 4-DOOR LE SEDAN

VIN: 4T4BF3EK9AR024876

YR/MDL: 2010/2552A

CLR: CLASSIC SILVER MET/FB13

PORT/PLANT: LF (01F7113)

RAILHEAD:

#### GOVERNMENT SAFETY RATINGS

**Frontal** Driver ★★★★★

**Crash** Passenger ★★★★★

Star ratings based on the risk of injury in a frontal impact. Frontal ratings should ONLY be compared to other vehicles of similar size and weight.

**Side** Front seat ★★★★★

**Crash** Rear seat ★★★★★

Star ratings based on the risk of injury in a side impact.

**Rollover** ★★★★★

Star ratings based on the risk of rollover in a single vehicle crash.

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

Source: National Highway Traffic Safety Administration (NHTSA).

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

## EPA Fuel Economy Estimates

CITY MPG

22

Expected range for most drivers 18 to 26 MPG

HIGHWAY MPG

32

Expected range for most drivers 27 to 37 MPG

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

26

0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360 380 400 420 440 460 480 500 520 540 560 580 600 620 640 660 680 700 720 740 760 780 800 820 840 860 880 900 920 940 960 980 1000

All Midsize Cars



See the FREE Fuel Economy Guide at dealers or [www.fueleconomy.gov](http://www.fueleconomy.gov)

#### STANDARD EQUIPMENT

##### MECHANICAL & PERFORMANCE

- 2.5L 4CY DOHC 16V w/ Dual VVT-1
- 16" Steel Wheels w/ P215/60R16 Tires
- Power Assisted Rack & Pinion Steering
- 17" Wheel Disc Brakes
- SAFETY: 3 Year/50,000 Mile Warranty

##### Star Safety System Includes:

- Vehicle Stability Control w/ Traction Control
- Brake Force Distrib & Brake Assist
- Dr & Fr Pass Advanced Front Airbags (SRS)
- Dr & Fr Pass Seat Mounted Side Airbags
- Driver's Knee Airbag
- LATCH (Lwr Anchor & Tethers for Children) for Outboard Rear Seating Positions Only
- Tire Pressure Monitor System
- EXTERIOR: Multi-Reflector Projector-Beam Headlamps w/ Auto On/Off Feature
- Daytime Running Lights with Off Switch
- Outside Mirrors w/ Turn Indicators
- COMFORT & CONVENIENCE: Air Conditioner with Filter
- AM/FM/CD Player w/ Satellite Capability, 60/40 Split Rear Folding Seat
- Cruise Control
- Power Windows w/ 4 Door Auto Up/Down
- Power Door Locks w/ Anti-Lockout Feature
- In-Wheel Locks w/ Tire Pressure Monitor
- Power Driver's Seat w/ Lumbar Support
- Tilt/Telescopic Adj Steering Wheel
- Steering Wheel Audio Controls
- 17" Power Windows w/ Auto Up/Down
- Center Console Armrest w/ Dual Storage
- Outside Temp Gauge and Digital Clock
- Rear Window Defogger
- Rain Sensing Wiper Indicator
- Courtesy Lamp
- \*\*Full Tank of Gas\*\*

MANUFACTURER'S SUGGESTED RETAIL PRICE \$21,900.00

#### OPTIONAL EQUIPMENT

FE 50 State Emissions 200.00

CF. Carpet/Trunk Mat Set

DELIVERY PROCESSING AND HANDLING FEE 750.00

TOTAL \$22,850.00

The New Vehicle Limited Warranty provides 3-year/50,000 mile basic coverage, 5-year/100,000 mile powertrain coverage, and 10-year/100,000 mile corrosion coverage. Actual mileage may vary. For details, see dealer's copy of the warranty. An extended service contract may be available for this vehicle. Manufacturer's suggested retail price includes manufacturer's recommended pre-delivery service. Gasoline, maintenance, and accessories are not included in the manufacturer's suggested retail price.

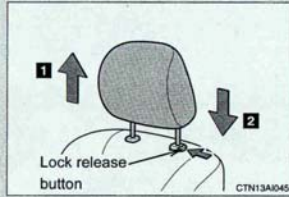
Dealer Name / Address: 48012  
20445 WEST CAPITOL DRIVE  
BROOKFIELD WIS53008

Ship to:



**Head restraints**

Head restraints are provided for all seats.

**1 Up**

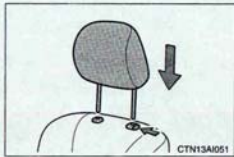
Pull the head restraints up.

**2 Down**

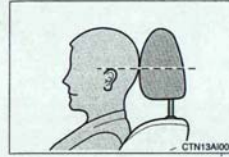
Push the head restraint down while pushing the lock release button.

**■ Removing the head restraints**

Pull the head restraint up while pushing the lock release button.

**■ Installing the head restraints**

Align the head restraint with the installation holes and push it down while pressing the lock release button.

**■ Adjusting the height of the head restraints**

Make sure that the head restraints are adjusted so that the center of the head restraint is closest to the top of your ears.

**■ Adjusting the rear center seat head restraint**

Always raise the head restraint one level from the stowed position when using.

**⚠ CAUTION****■ Head restraint precautions**

Observe the following precautions regarding the head restraints. Failure to do so may result in death or serious injury.

- Use the head restraints designed for each respective seat.
- Adjust the head restraints to the correct position at all times.
- After adjusting the head restraints, push down on them and make sure they are locked in position.
- Do not drive with the head restraints removed.

## **APPENDIX B**

### **VEHICLE AND DUMMY RESPONSE DATA PLOTS**

## TABLE OF DATA PLOTS

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| Figure No. 2.  | Driver Head Acceleration (Y) Primary vs. Time          | B-1             |
| Figure No. 3.  | Driver Head Acceleration (Z) Primary vs. Time          | B-1             |
| Figure No. 4.  | Driver Head Resultant Primary Acceleration vs. Time    | B-1             |
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| Figure No. 6.  | Driver Lower Spine T12 Acceleration (Y) vs. Time       | B-2             |
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| Figure No. 10. | Driver Acetabulum Force on Impact Side (Y) vs. Time    | B-3             |
| Figure No. 11. | Driver Total Pelvis Force on Impact Side (Y) vs. Time  | B-3             |

**The following dummy and vehicle response data can be found in the R&D section of the NHTSA website at [www.nhtsa.dot.gov](http://www.nhtsa.dot.gov)**

Driver Head Acceleration (X) Redundant

Driver Head Acceleration (Y) Redundant

Driver Head Acceleration (Z) Redundant

Driver Upper Neck Force (X)

Driver Upper Neck Force (Y)

Driver Upper Neck Force (Z)

Driver Upper Neck Moment About X

Driver Upper Neck Moment About Y

Driver Upper Neck Moment About Z

Driver Shoulder Deflection (Y)

Driver Upper Thorax Rib Deflection (Y)

Driver Middle Thorax Rib Deflection (Y)

Driver Lower Thorax Rib Deflection (Y)

Driver Upper Abdomen Rib Deflection (Y)

Driver Lower Abdomen Rib Deflection (Y)

Driver Shoulder Contact Switch

Driver Torso Contact Switch

Driver Pelvis Contact Switch

Vehicle CG Acceleration (X)

Vehicle CG Acceleration (Y)

Vehicle CG Acceleration (Z)

Vehicle CG Angular Rate About X (Roll)

Vehicle CG Angular Rate About Y (Pitch)

Vehicle CG Angular Rate About Z (Yaw)

Left Floor Sill Acceleration (Y)

Left A-Pillar Sill Acceleration (Y)

Left Lower A-Pillar Acceleration (Y)

Left Mid A-Pillar Acceleration (Y)

Left B-Pillar Sill Acceleration (Y)

Left Lower B-Pillar Acceleration (Y)

Left Mid B-Pillar Acceleration (Y)

Driver Seat Track at Dummy H-Point Acceleration (Y)

Engine Top Acceleration (X)

Engine Top Acceleration (Y)

Firewall Center Acceleration (Y)

Right Roof at Vertical Impact Reference Line Acceleration (Y)

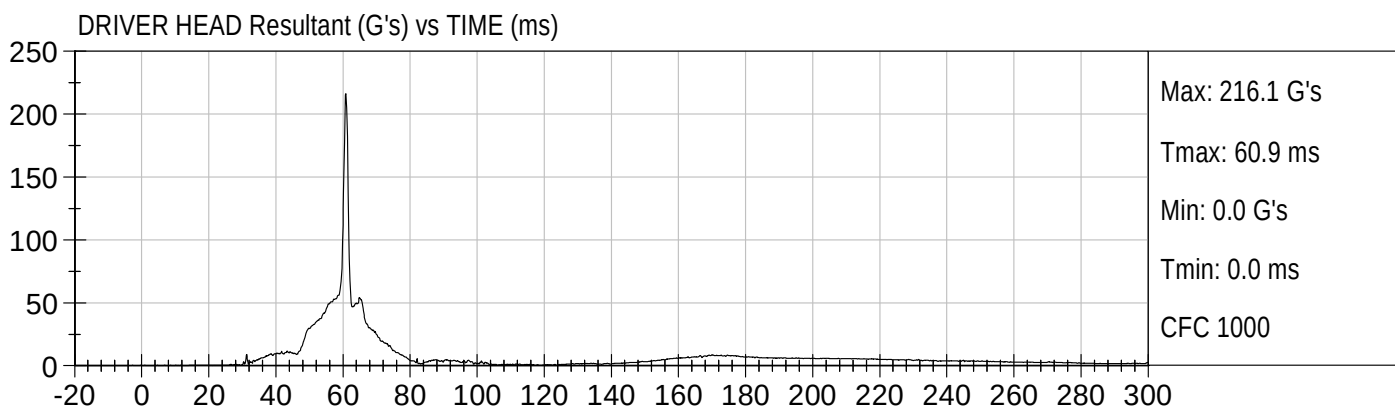
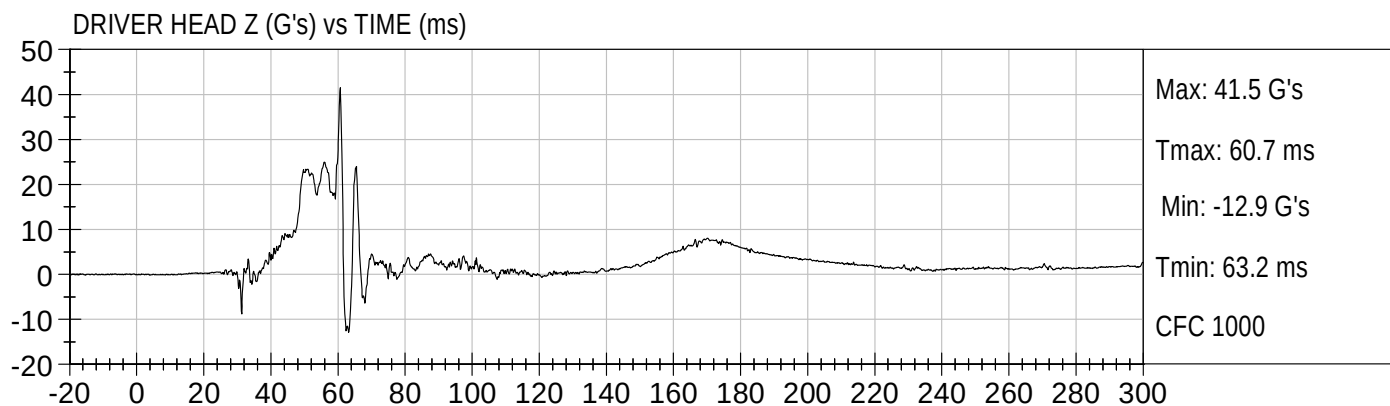
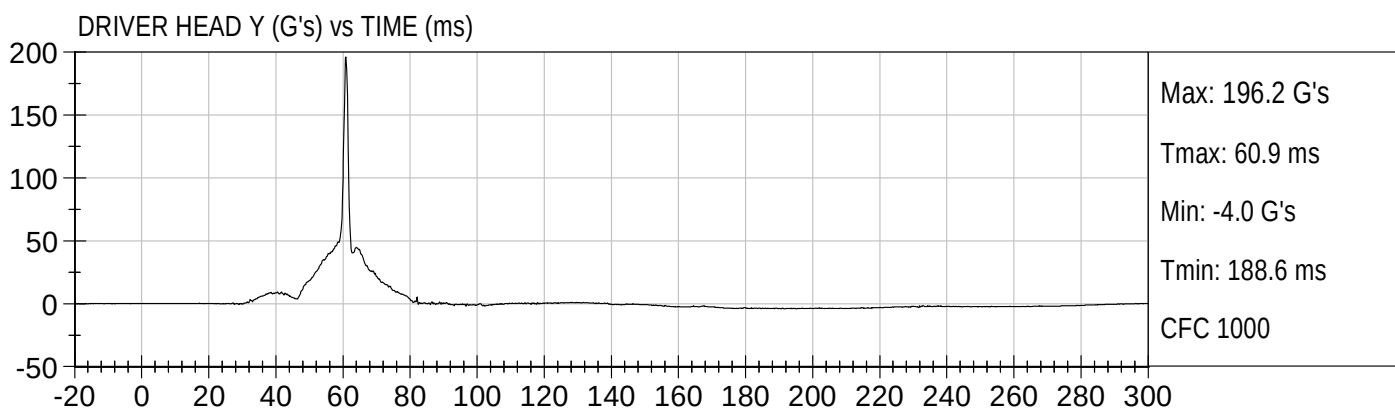
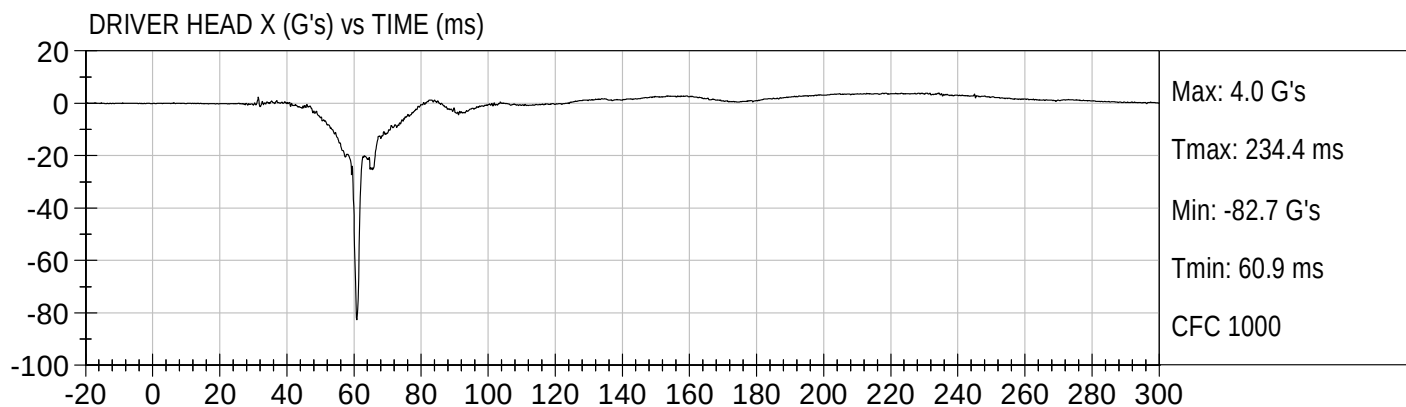
Right Sill at Vertical Impact Reference Line Acceleration (Y)

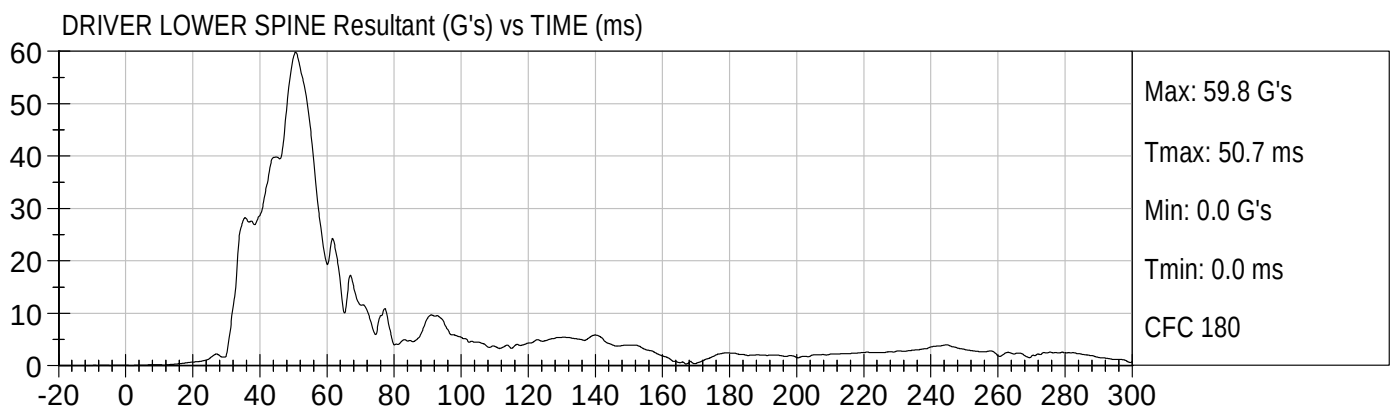
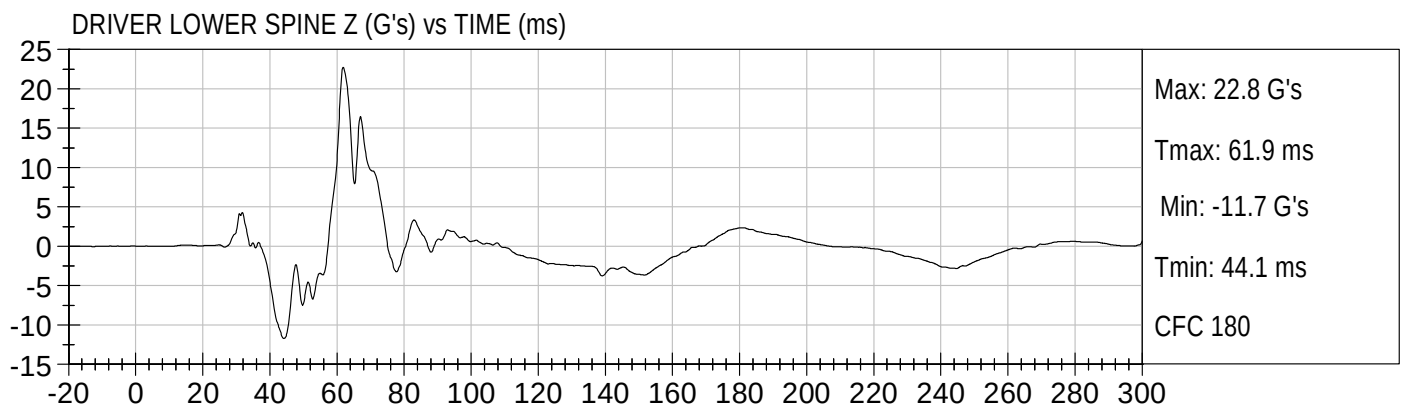
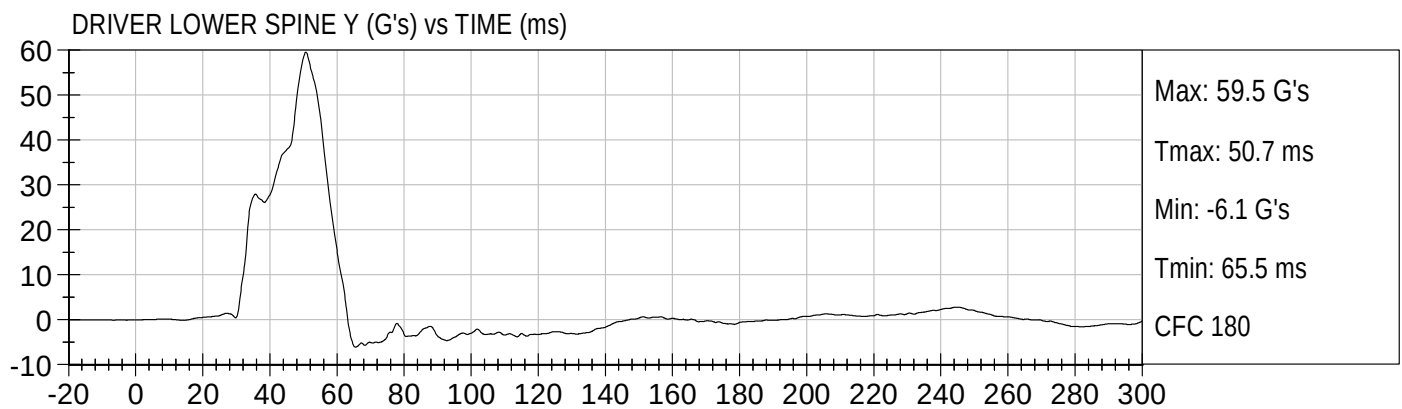
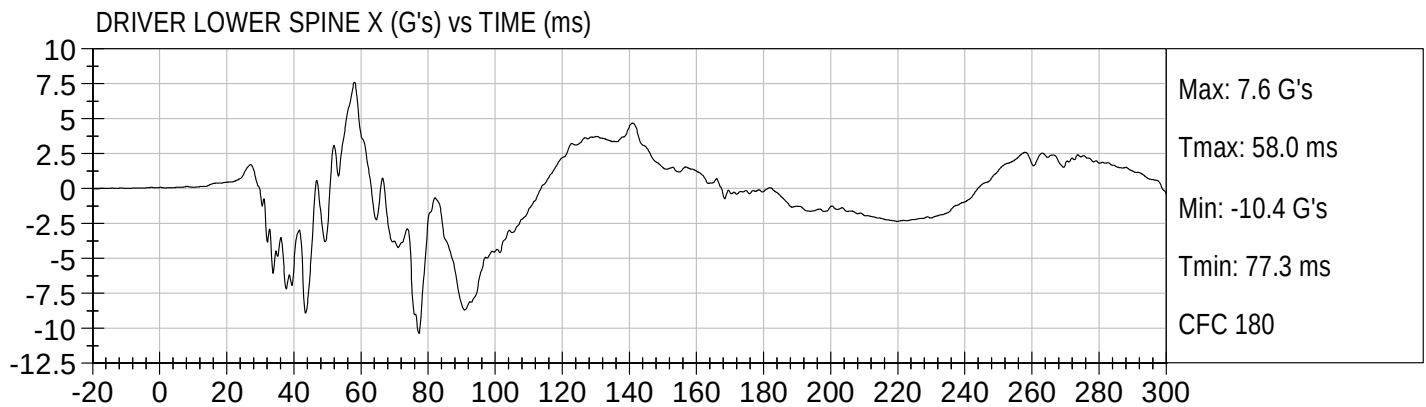
Rear Floorpan Behind Rear Axle at Centerline Acceleration (X)

Rear Floorpan Behind Rear Axle at Centerline Acceleration (Y)

Driver Side Airbag Timing

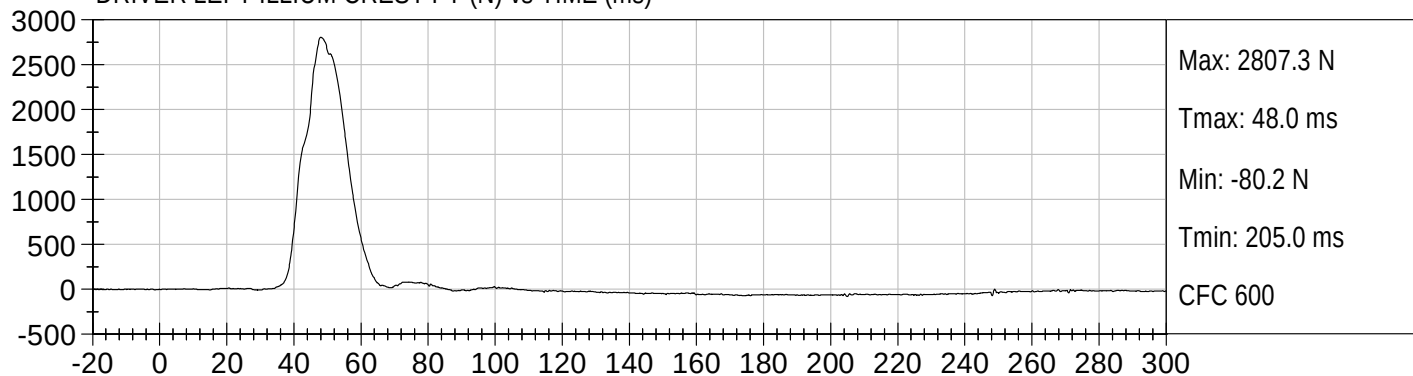
Driver Side Curtain Airbag Timing



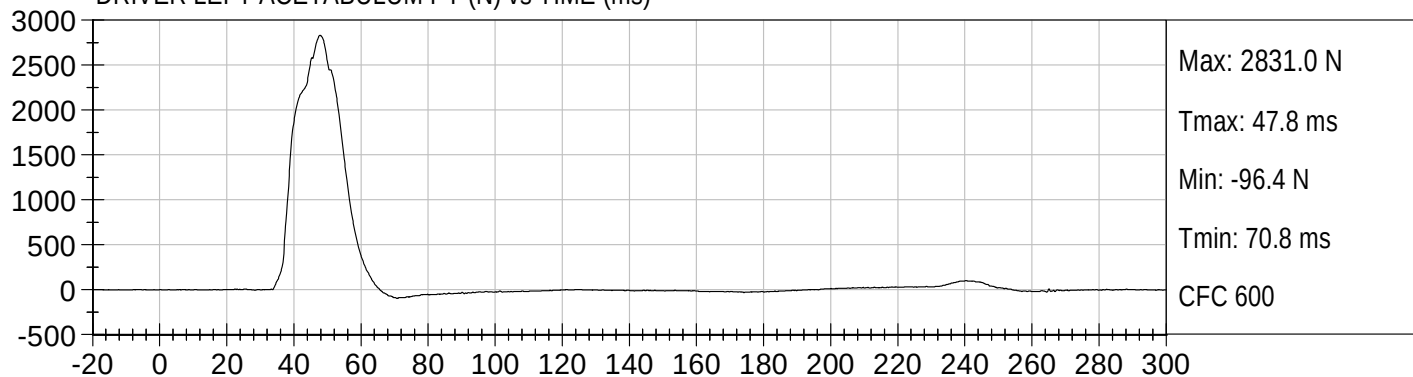




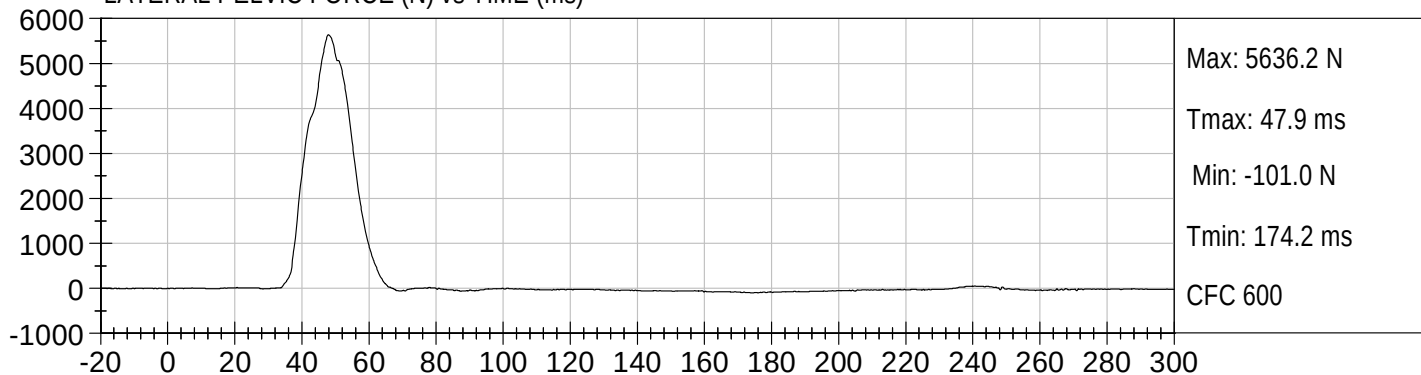
DRIVER LEFT ILLIUM CREST FY (N) vs TIME (ms)



DRIVER LEFT ACETABULUM FY (N) vs TIME (ms)



LATERAL PELVIC FORCE (N) vs TIME (ms)



## **APPENDIX C**

### **DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA**

**MGA RESEARCH CORPORATION**  
**HEAD DROP TEST**  
**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 296

**Test ID:** D091401

| 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      | 29                   | Pass      |
| Peak Resultant Acceleration  | G's   | 115 to 137    | 120                  | Pass      |
| Peak Lateral Acceleration    | G's   | +/- 15        | 3.9                  | Pass      |
| Unimodal                     | N/A   | <15%          | Yes                  | Pass      |
|                              |       |               | Overall Test Results | Pass      |

Jessica Hall  
Laboratory Technician

6/3/09  
Test Date

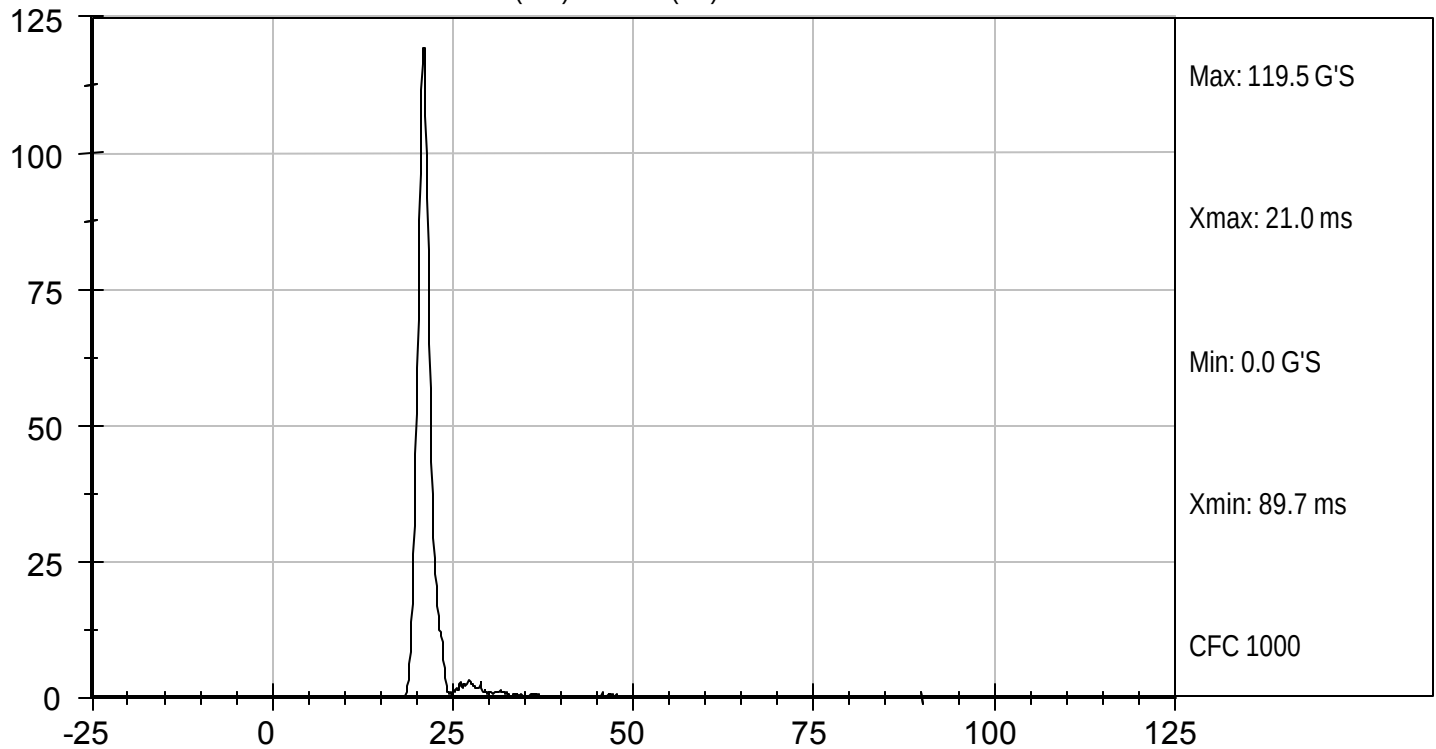
David Winkelbauer  
Approved By



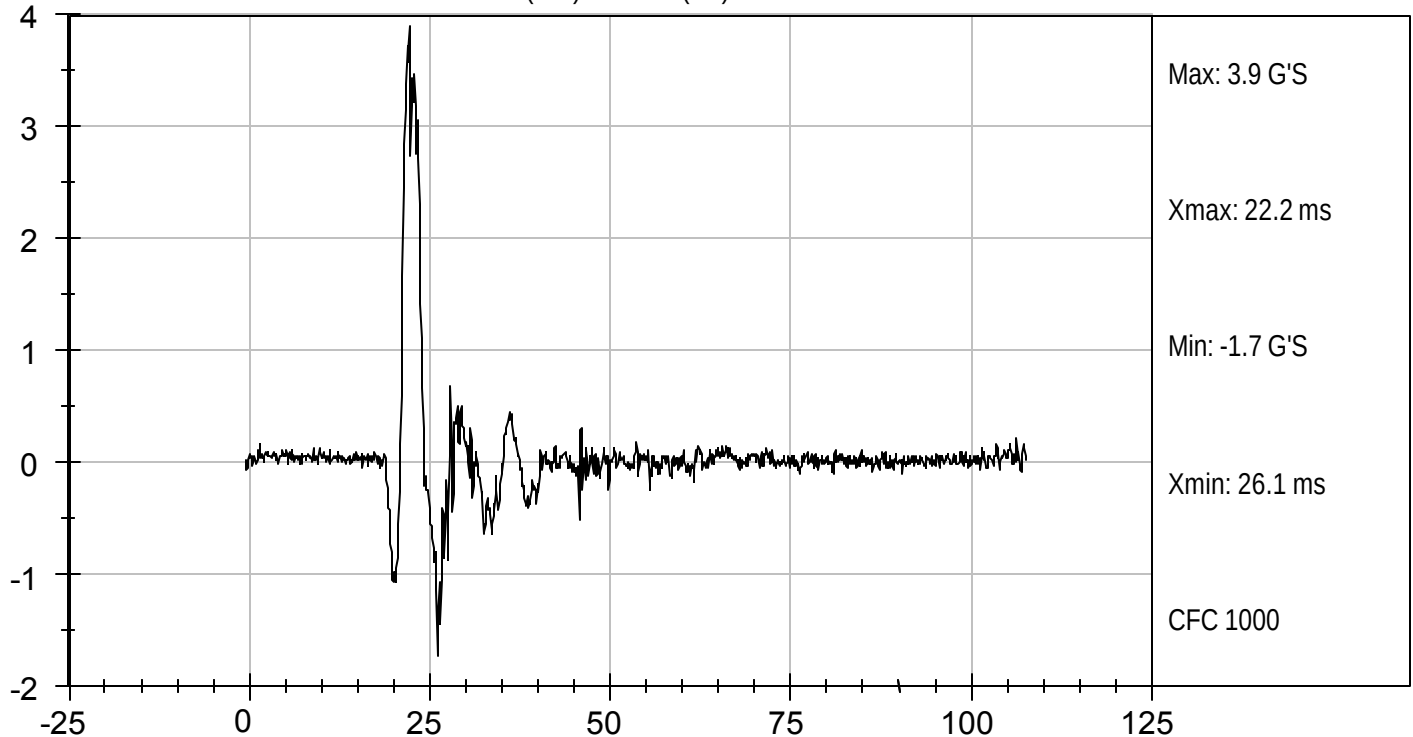
Test Desc: Head Drop  
Component ID: D091401

Test Date: 6/3/09  
Velocity: 0 ft/s, 0 m/s

PEAK RESULTANT ACCELERATION (G'S) vs TIME (ms)



PEAK LONGITUDINAL ACCELERATION (G'S) vs TIME (ms)

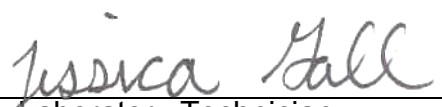


**MGA RESEARCH CORPORATION**  
**LATERAL NECK PENDULUM TEST**  
**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 296

**Test I.D:** D091402

| Tested Parameter                                          |             | Units | Specification | Result | Pass/Fail |
|-----------------------------------------------------------|-------------|-------|---------------|--------|-----------|
| Temperature                                               |             | deg C | 20.6 to 22.2  | 20.6   | Pass      |
| Humidity                                                  |             | %     | 10 to 70      | 30     | Pass      |
| Impact Velocity                                           |             | m/s   | 5.51 to 5.63  | 5.58   | Pass      |
| Delta Velocity                                            | 10 msec     | m/s   | 2.20 to 2.80  | 2.67   | Pass      |
|                                                           | 15 msec     | m/s   | 3.30 to 4.10  | 3.80   | Pass      |
|                                                           | 20 msec     | m/s   | 4.40 to 5.40  | 5.07   | Pass      |
|                                                           | 25 msec     | m/s   | 5.40 to 6.10  | 5.71   | Pass      |
|                                                           | 25-100 msec | m/s   | 5.50 to 6.20  | 5.71   | Pass      |
| Maximum D-Plane Rotation                                  |             | deg   | 71 to 81      | 71     | Pass      |
| Time of Maximum D-Plane Rotation                          |             | msec  | 50 to 70      | 59     | Pass      |
| Maximum Occipital Condyle Moment during Rotation Interval |             | Nm    | -44 to -36    | -44    | Pass      |
| Time of Moment Decay to 0 Nm                              |             | msec  | 102 to 126    | 113    | Pass      |
| Overall Test Results                                      |             |       |               |        | Pass      |

  
 Laboratory Technician

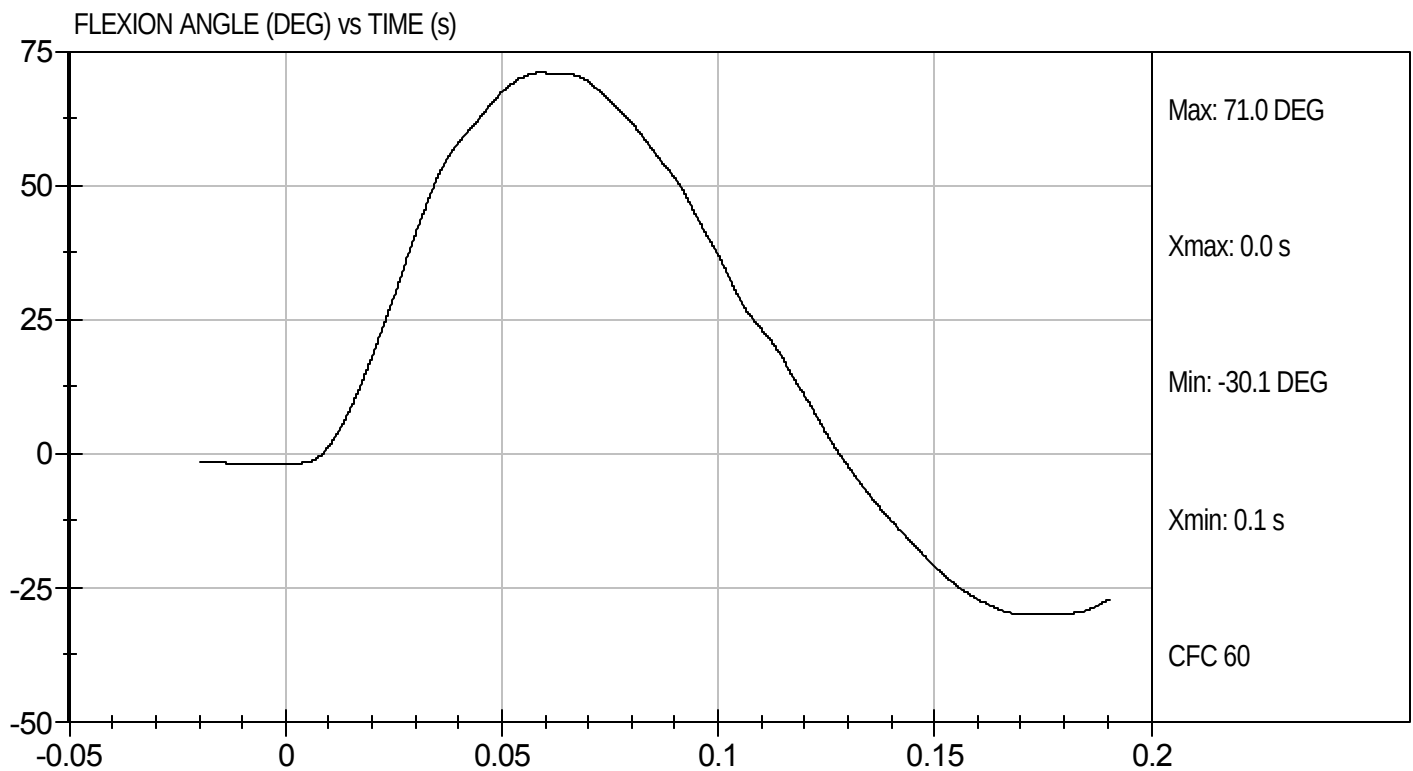
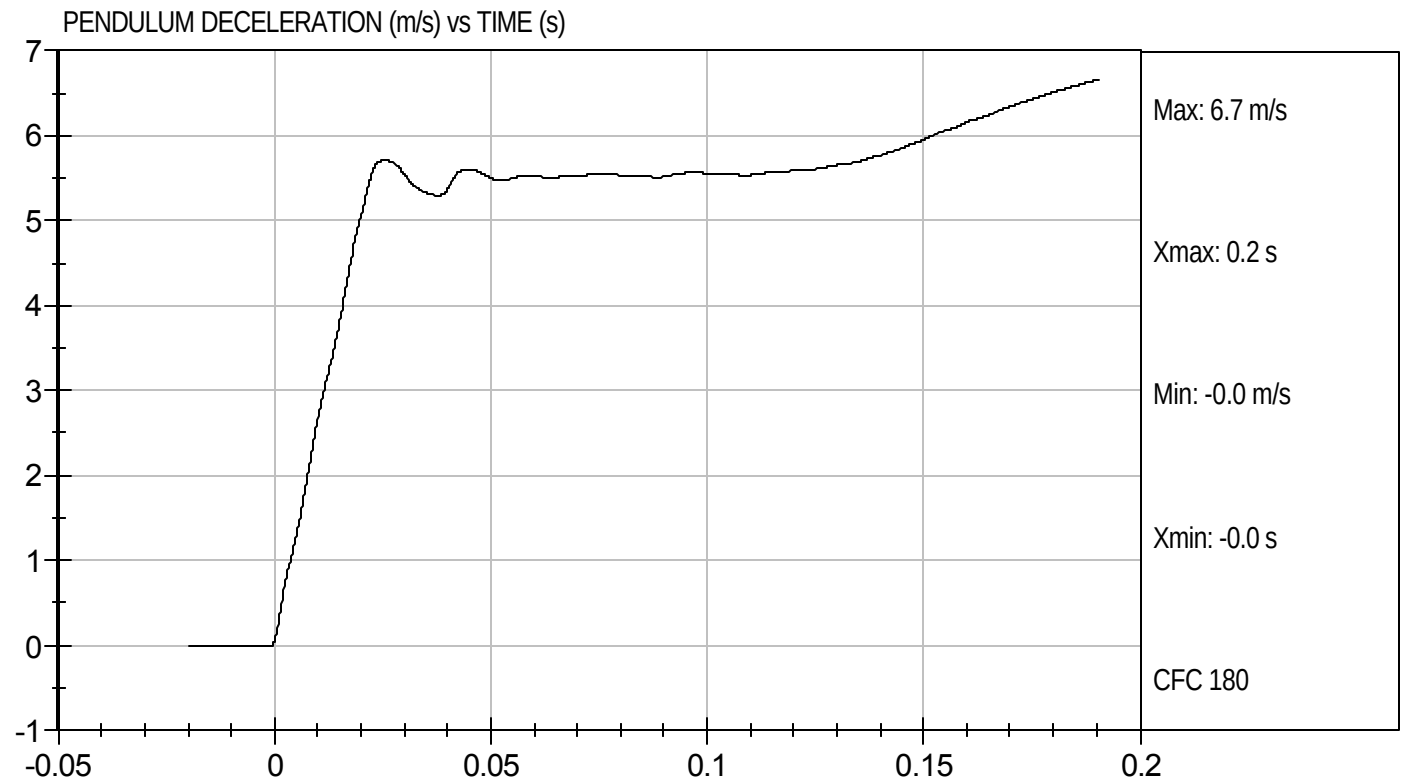
6/3/09  
 Test Date

  
 Approved By



Test Desc: Neck Bending  
Component ID: D091402

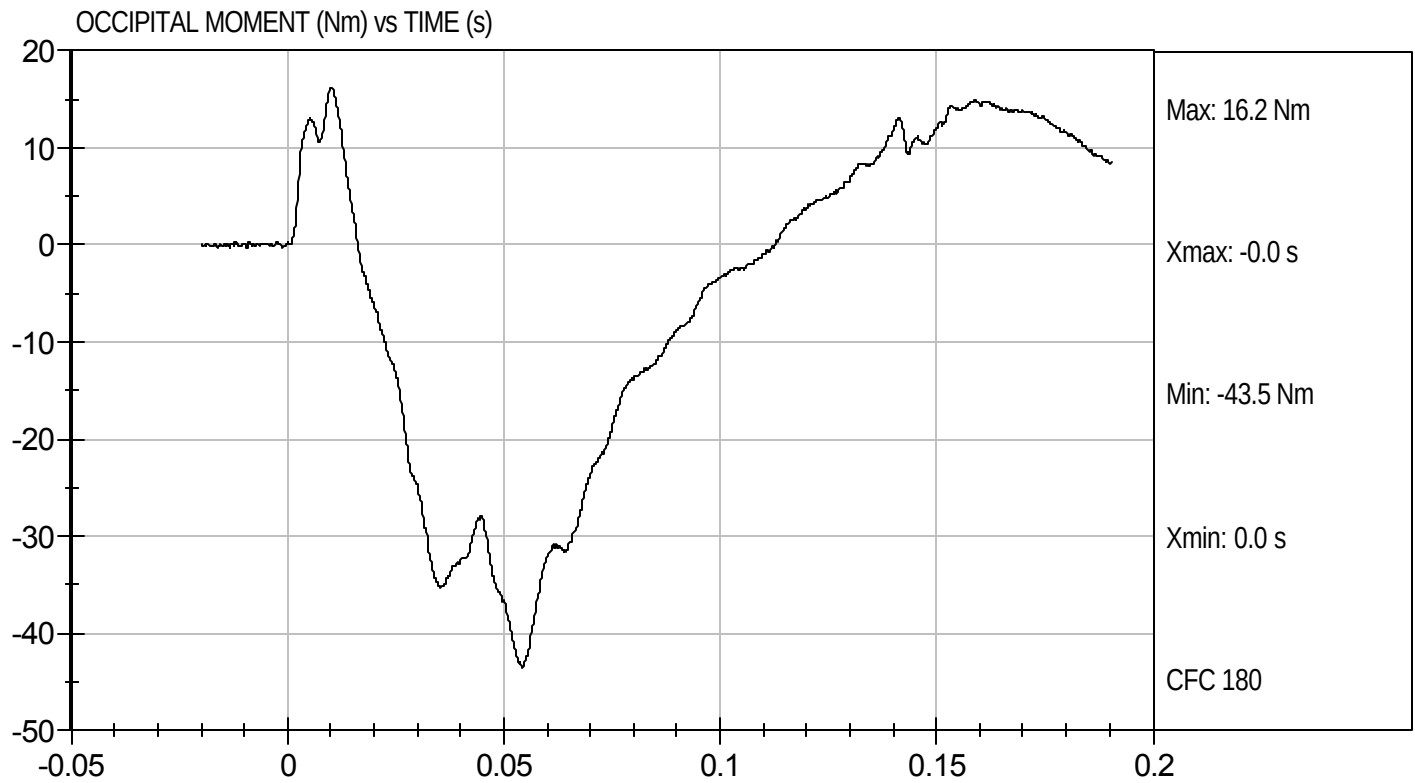
Test Date: 6/3/09  
Velocity: 18.32 ft/s, 5.58 m/s





Test Desc: Neck Bending  
Component ID: D091402

Test Date: 6/3/09  
Velocity: 18.32 ft/s, 5.58 m/s



**MGA RESEARCH CORPORATION**  
**SHOULDER IMPACT TEST**  
**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 296

**Test ID:** D091403

| Tested Parameter                | Units | Specification | Result | Pass/Fail |
|---------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature          | deg C | 20.6 to 22.2  | 20.7   | Pass      |
| Laboratory Relative Humidity    | %     | 10 to 70      | 29     | Pass      |
| Impact Velocity                 | m/s   | 4.20 to 4.40  | 4.30   | Pass      |
| Maximum Probe Acceleration      | G's   | 13 to 18      | 15     | Pass      |
| Shoulder Displacement           | mm    | 28 to 37      | 31     | Pass      |
| Upper Spine (T1) Y Acceleration | G's   | 17 to 22      | 19     | Pass      |
| Overall Test Results            |       |               |        | Pass      |

  
Laboratory Technician

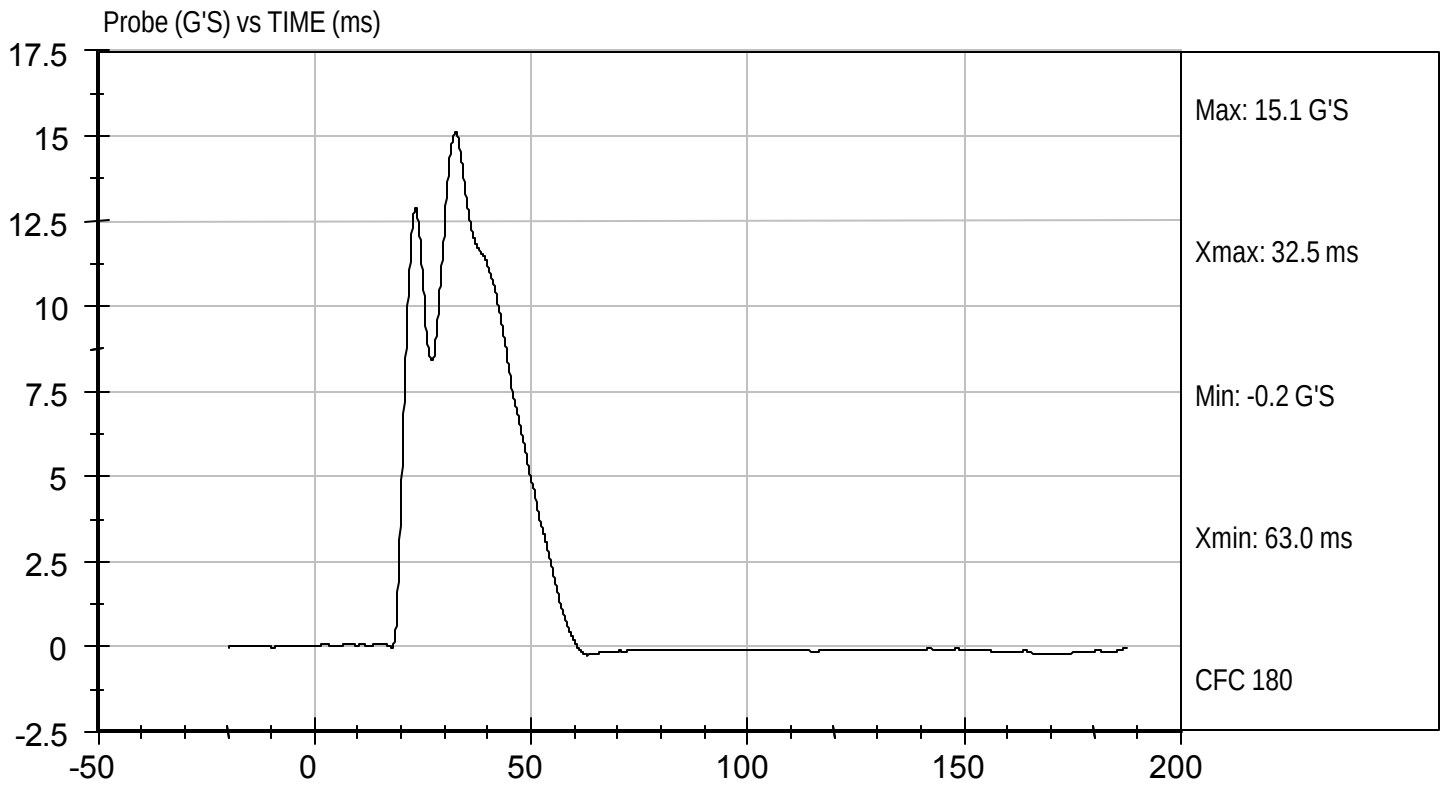
6/3/09  
Test Date

  
Approved By



Test Desc: Shoulder Impact  
Component ID: D091403

Test Date: 6/3/09  
Velocity: 14.1 ft/s, 4.30 m/s

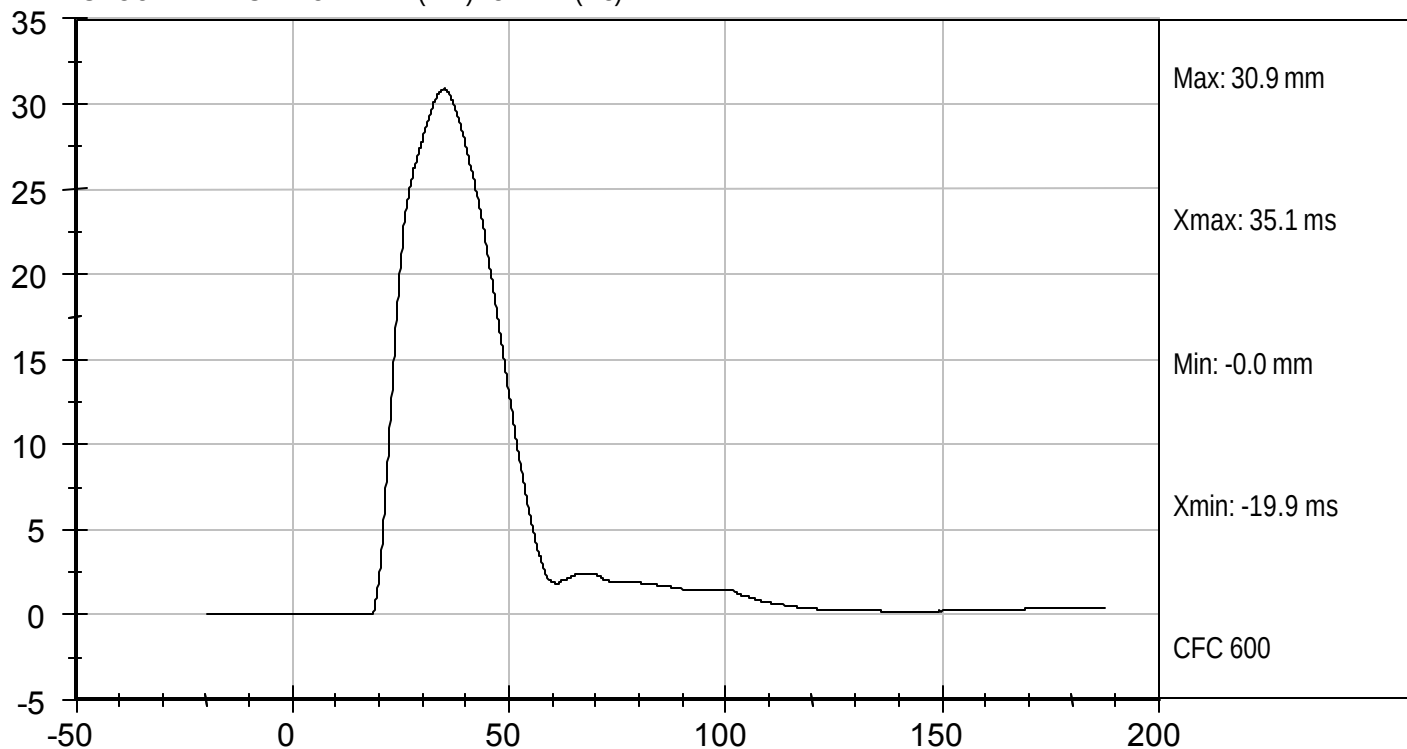




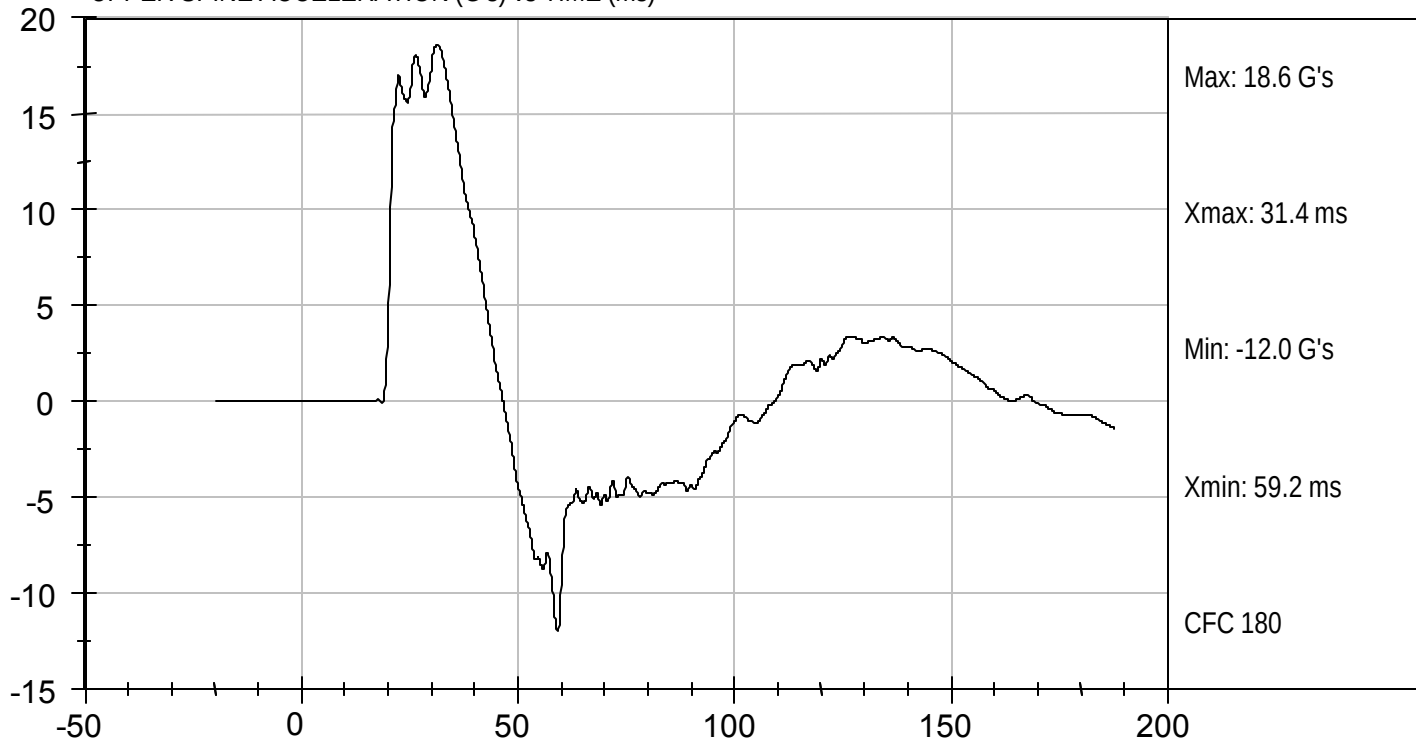
Test Desc: Shoulder Impact  
Component ID: D091403

Test Date: 6/3/09  
Velocity: 14.1 ft/s, 4.30 m/s

SHOULDER DISPLACEMENT (mm) vs TIME (ms)



UPPER SPINE ACCELERATION (G's) vs TIME (ms)



**MGA RESEARCH CORPORATION**  
**THORAX (WITH ARM) IMPACT TEST**  
**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 296

**Test I.D:** D091404

| Tested Parameter                 | Units | Specification | Result | Pass/Fail |
|----------------------------------|-------|---------------|--------|-----------|
| Temperature                      | deg C | 20.6 to 22.2  | 20.7   | Pass      |
| Humidity                         | %     | 10 to 70      | 29     | Pass      |
| Impact Velocity                  | m/s   | 6.60 to 6.80  | 6.68   | Pass      |
| Peak Impactor Acceleration       | G's   | 30 to 36      | 33     | Pass      |
| Shoulder Displacement            | mm    | 31 to 40      | 37     | Pass      |
| Upper Rib Displacement           | mm    | 25 to 32      | 28     | Pass      |
| Middle Rib Displacement          | mm    | 30 to 36      | 31     | Pass      |
| Lower Rib Displacement           | mm    | 32 to 38      | 33     | Pass      |
| Upper Spine (T1) Y Acceleration  | G's   | 34 to 43      | 37     | Pass      |
| Lower Spine (T12) Y Acceleration | G's   | 29 to 37      | 36     | Pass      |
| Overall Test Results             |       |               | Pass   |           |

  
Laboratory Technician

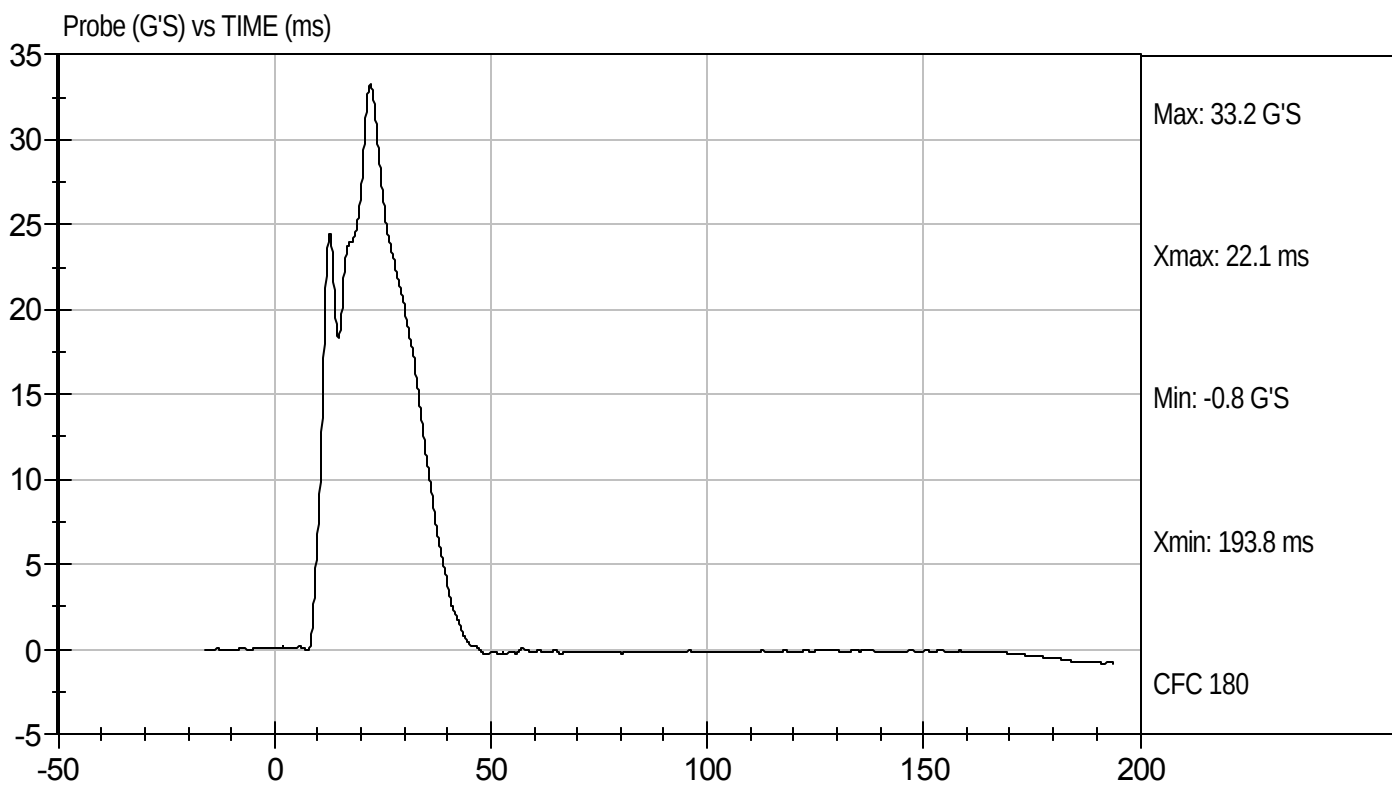
6/3/09  
Test Date

  
Approved By



Test Desc: Thorax With Arm  
Component ID: D091404

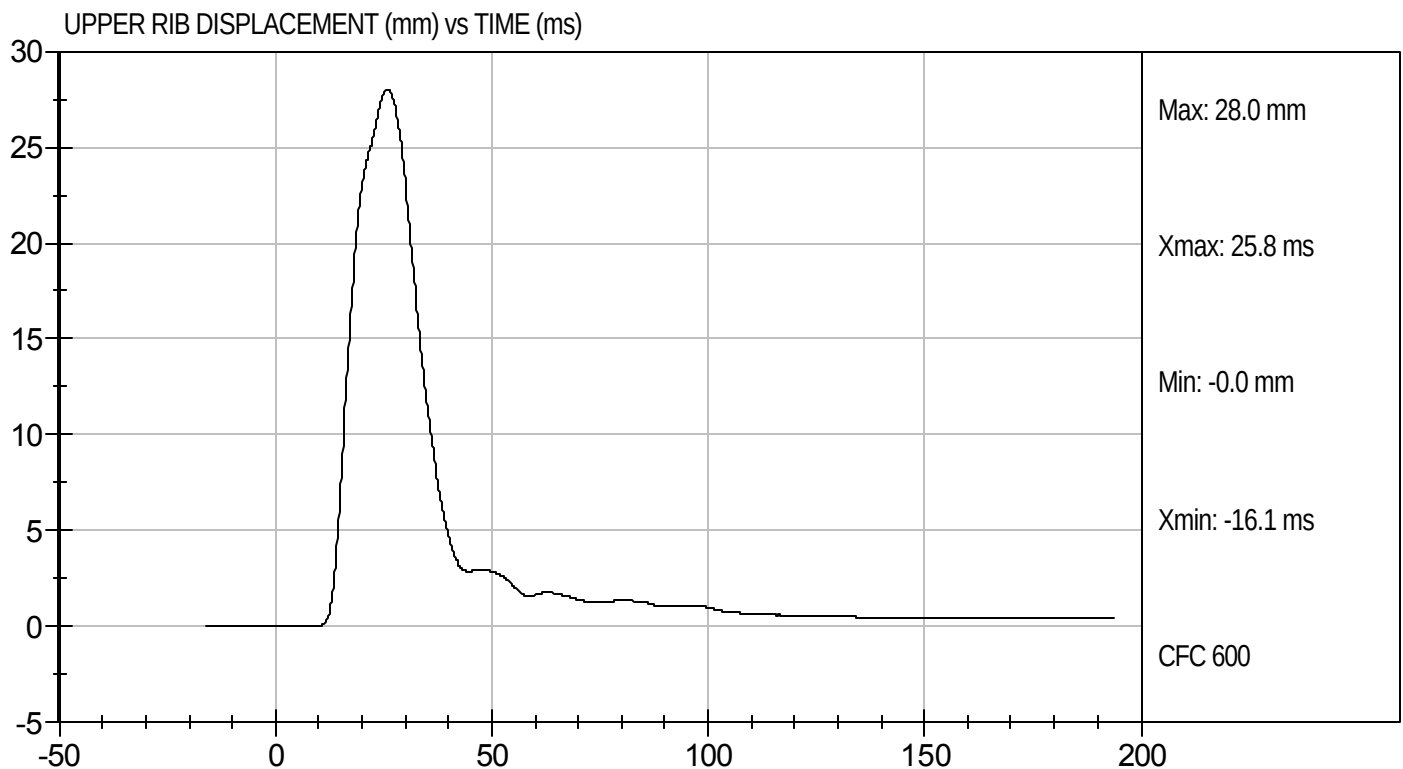
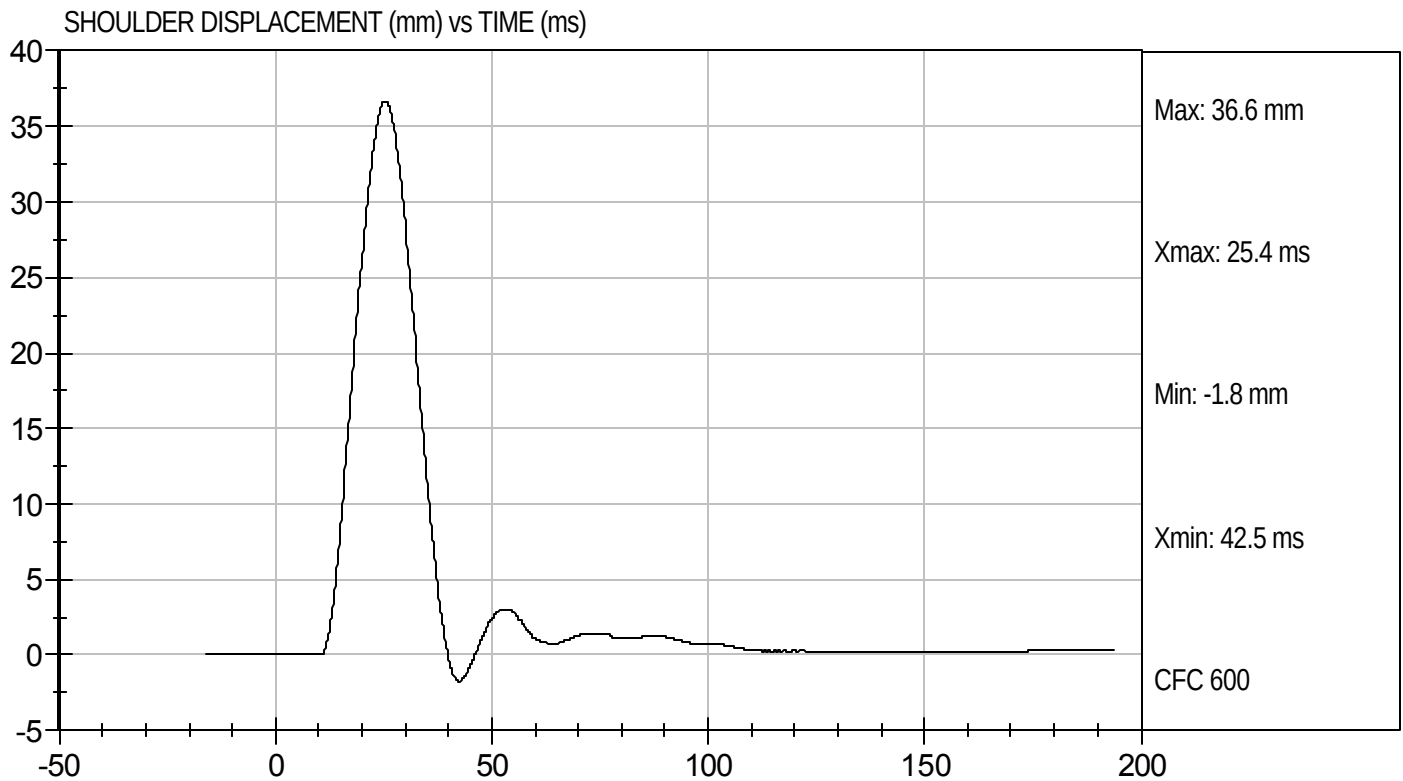
Test Date: 6/3/09  
Velocity: 21.9 ft/s, 6.68 m/s





Test Desc: Thorax With Arm  
Component ID: D091404

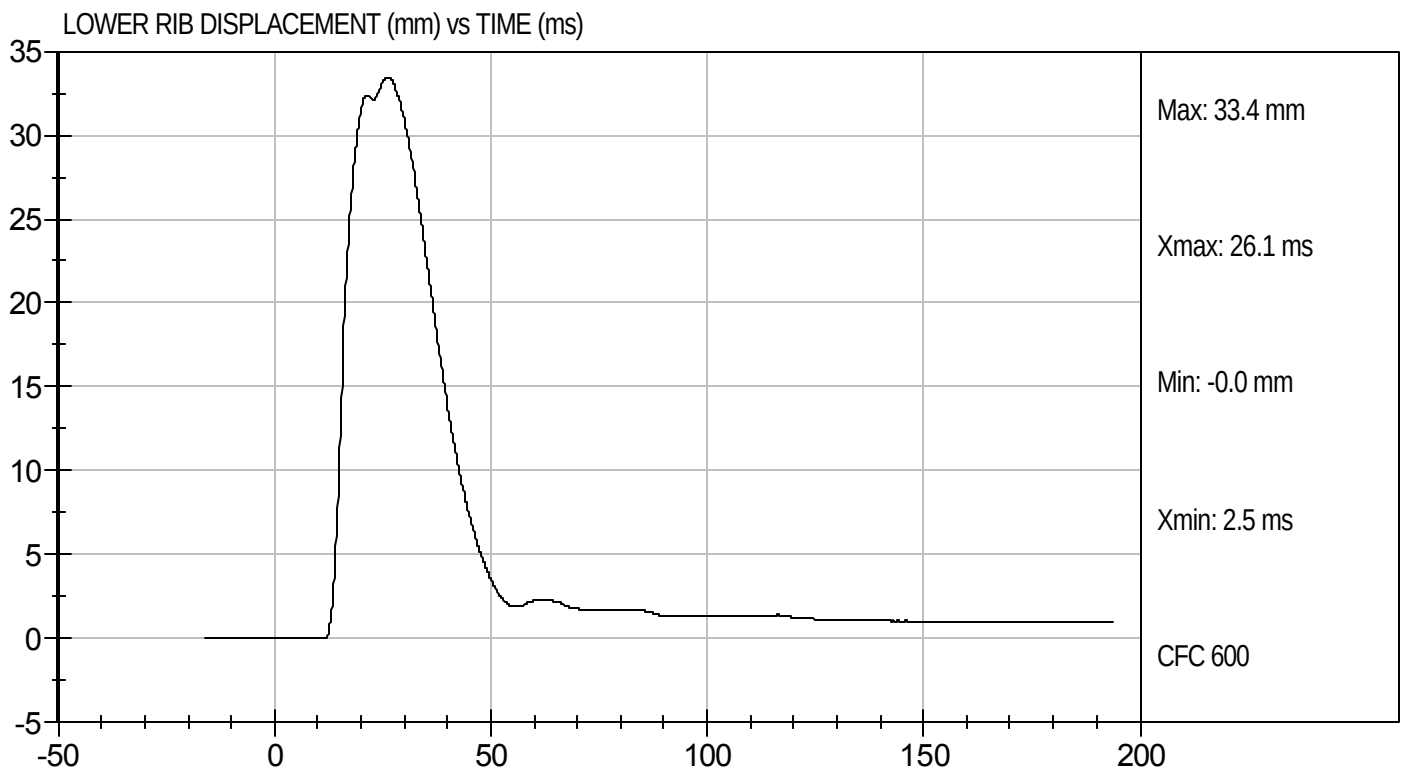
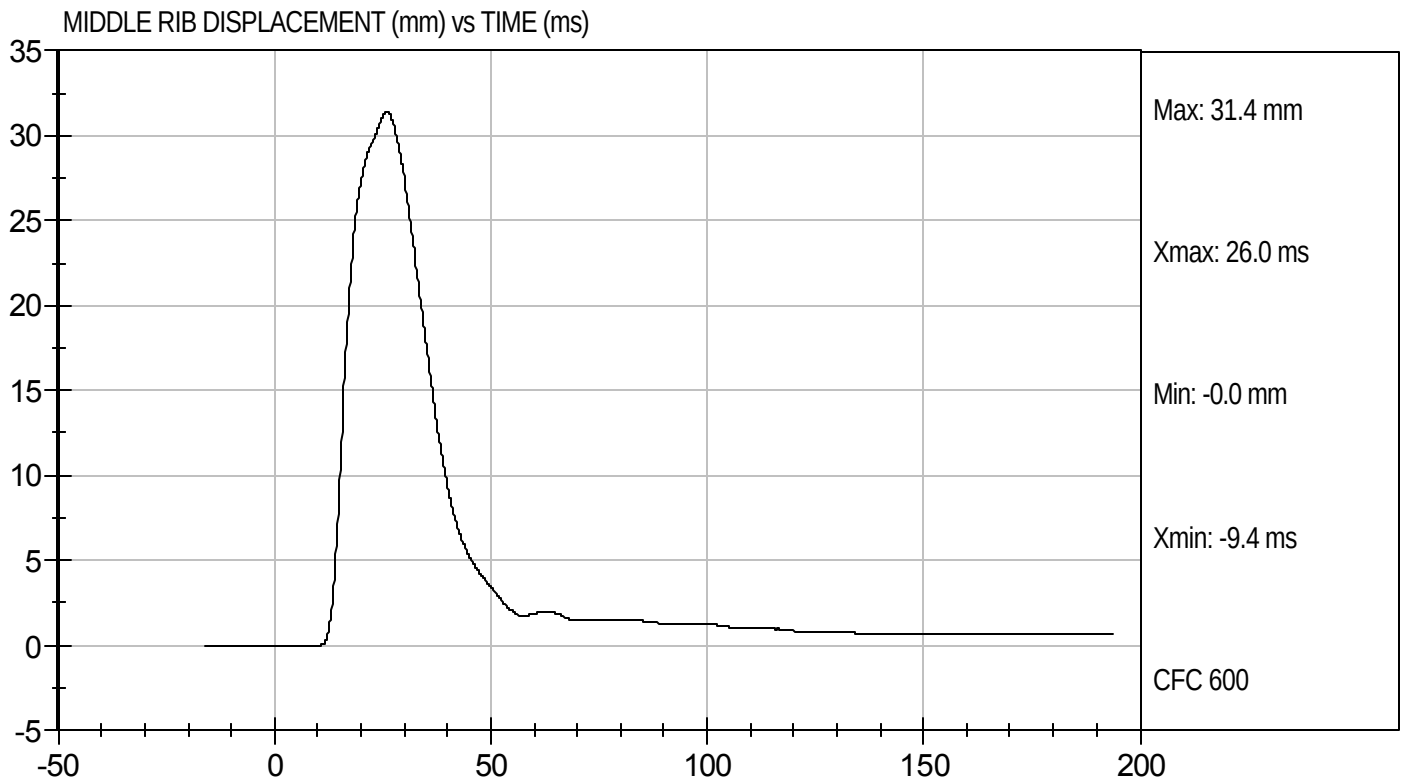
Test Date: 6/3/09  
Velocity: 21.9 ft/s, 6.68 m/s





Test Desc: Thorax With Arm  
Component ID: D091404

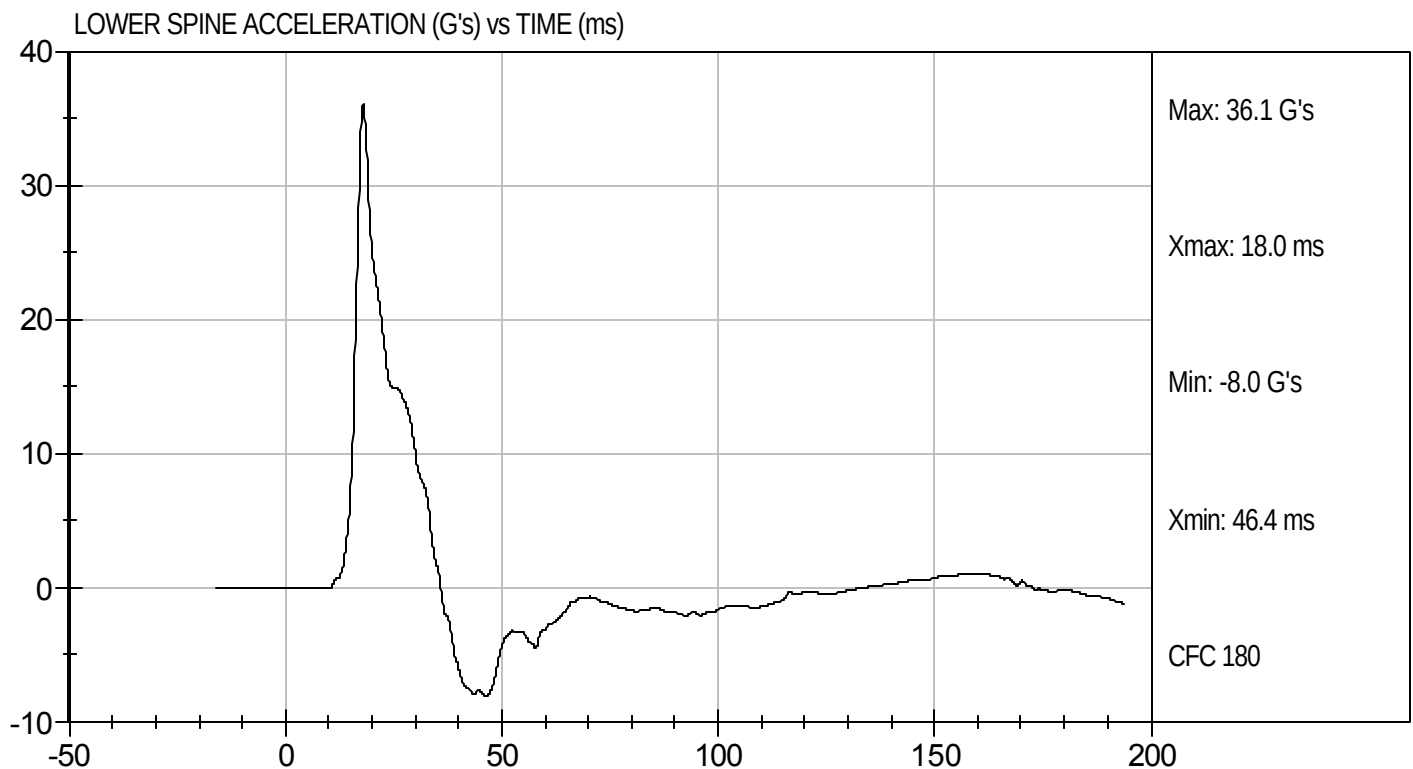
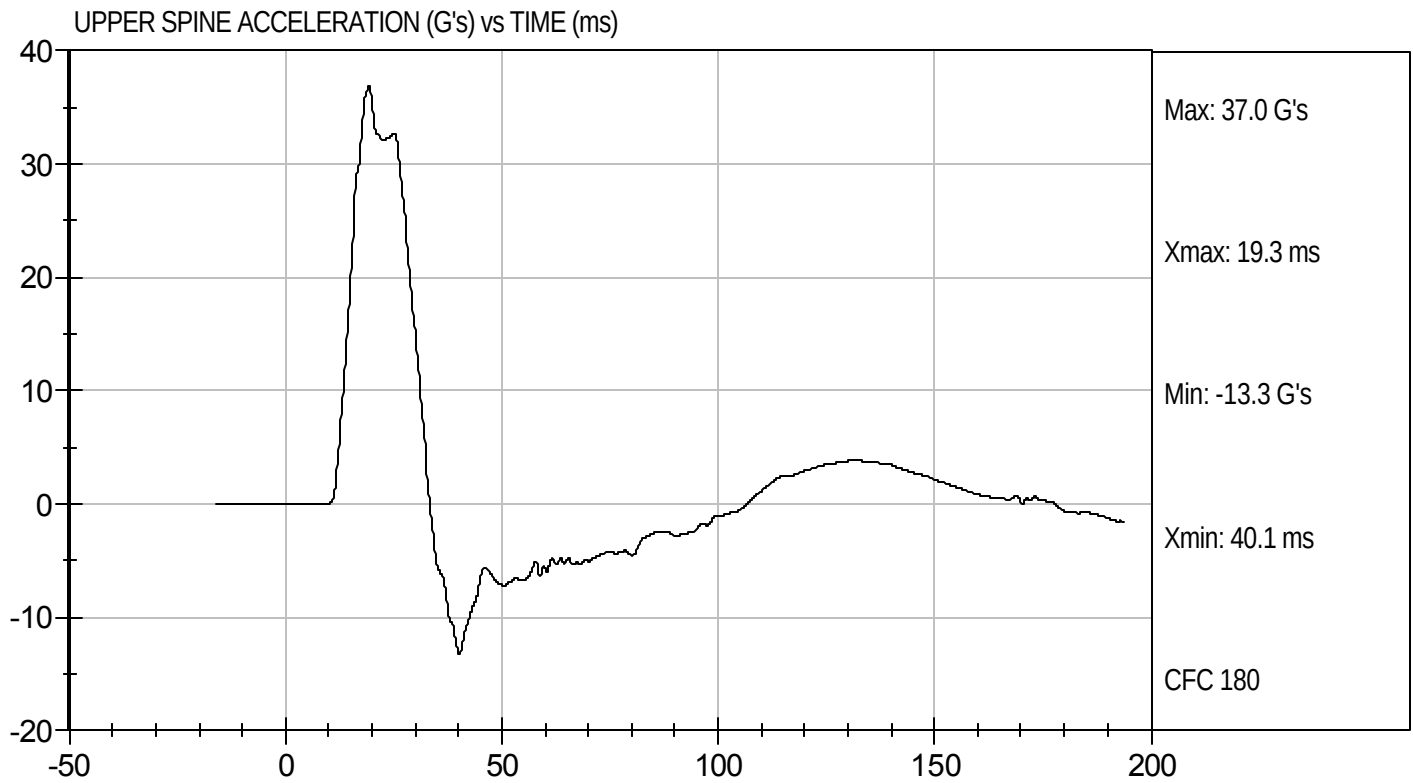
Test Date: 6/3/09  
Velocity: 21.9 ft/s, 6.68 m/s





Test Desc: Thorax With Arm  
Component ID: D091404

Test Date: 6/3/09  
Velocity: 21.9 ft/s, 6.68 m/s



**MGA RESEARCH CORPORATION**  
**THORAX (WITHOUT ARM) IMPACT TEST**  
**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 296

**Test I.D:** D091405

| Tested Parameter                 | Units | Specification | Result | Pass/Fail |
|----------------------------------|-------|---------------|--------|-----------|
| Temperature                      | deg C | 20.6 to 22.2  | 20.7   | Pass      |
| Humidity                         | %     | 10 to 70      | 29     | Pass      |
| Impact Velocity                  | m/s   | 4.20 to 4.40  | 4.27   | Pass      |
| Peak Impactor Force              | G's   | 14 to 18      | 15     | Pass      |
| Upper Rib Displacement           | mm    | 32 to 40      | 39     | Pass      |
| Middle Rib Displacement          | mm    | 39 to 45      | 42     | Pass      |
| Lower Rib Displacement           | mm    | 35 to 43      | 38     | Pass      |
| Upper Spine (T1) Y Acceleration  | G's   | 13 to 17      | 15     | Pass      |
| Lower Spine (T12) Y Acceleration | G's   | 7 to 11       | 9      | Pass      |
| Overall Test Results             |       |               |        | Pass      |

Jessica Hall  
Laboratory Technician

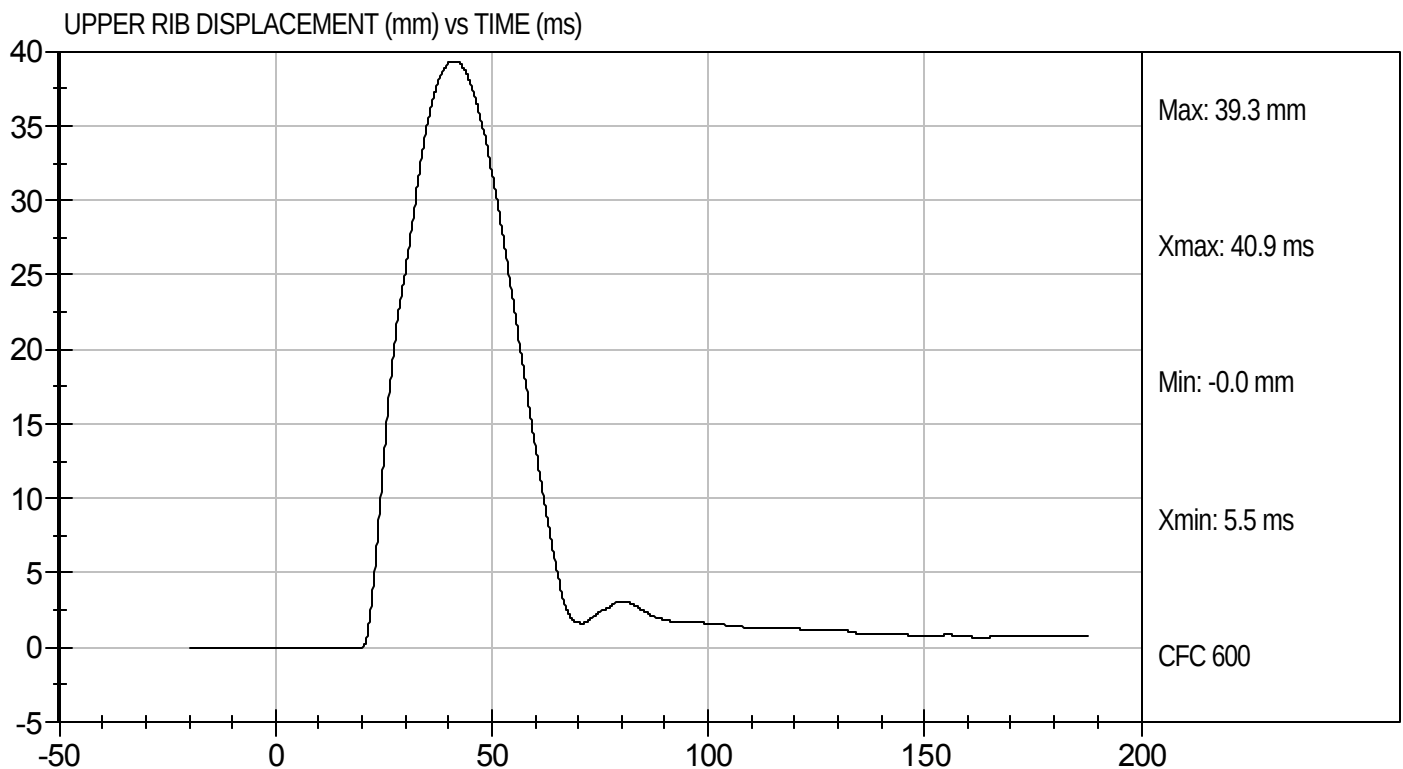
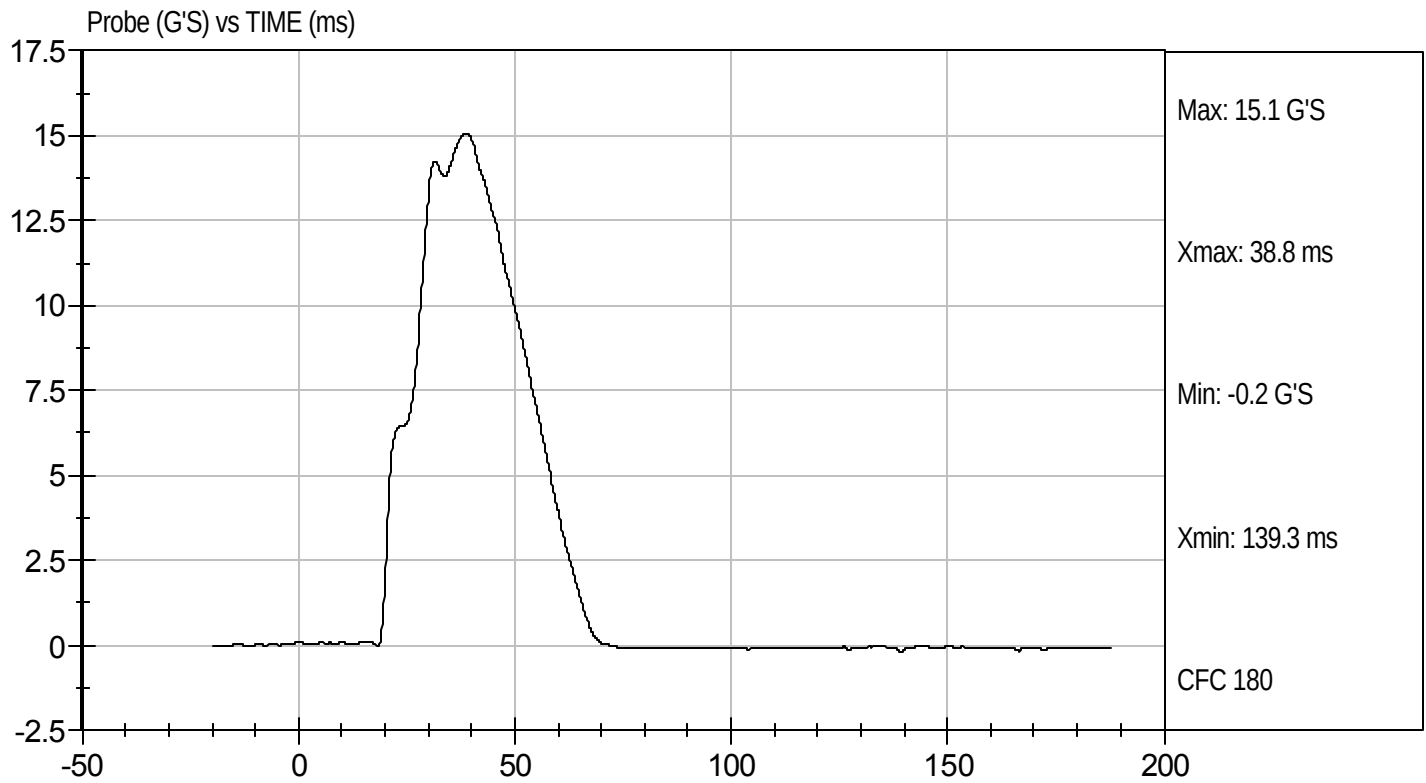
6/3/09  
Test Date

David Winkelbauer  
Approved By



Test Desc: Thorax Without Arm  
Component ID: D091405

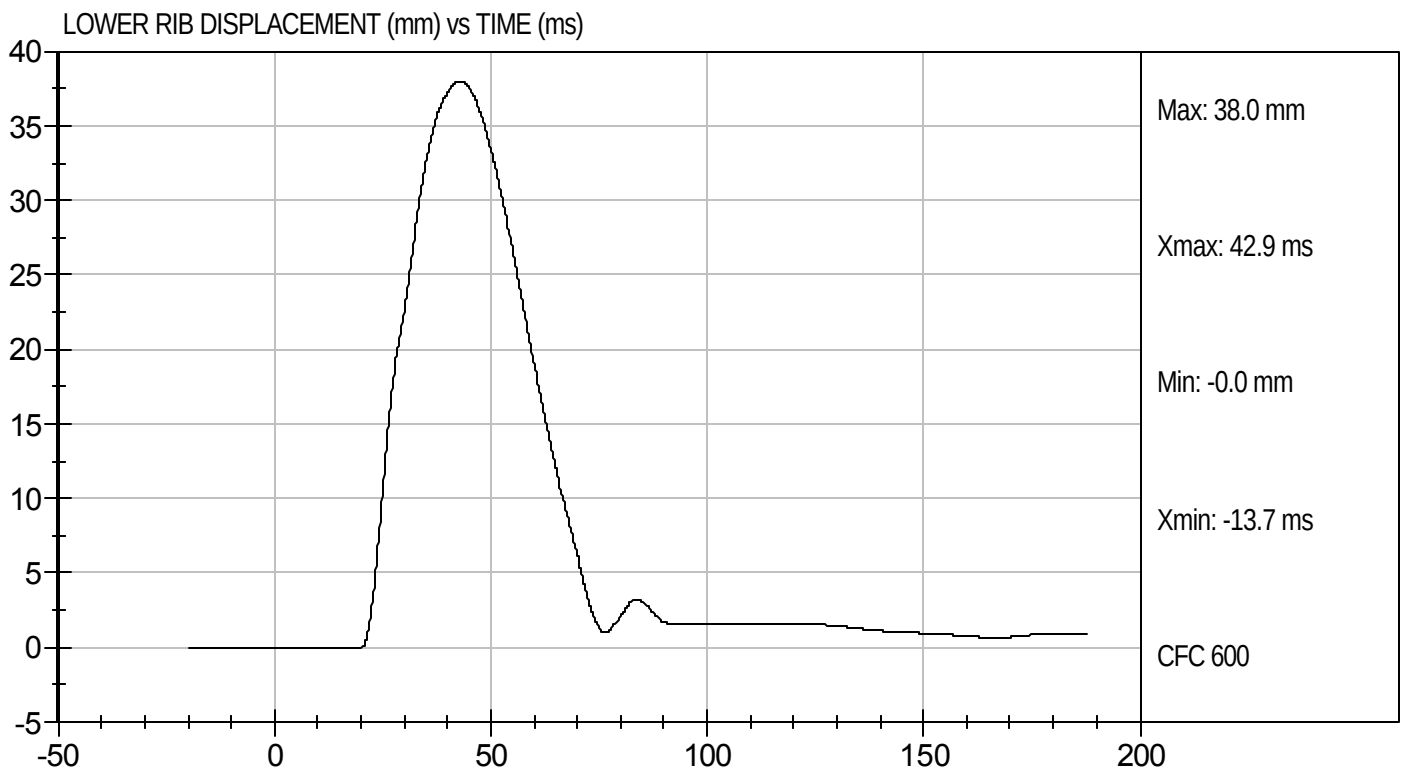
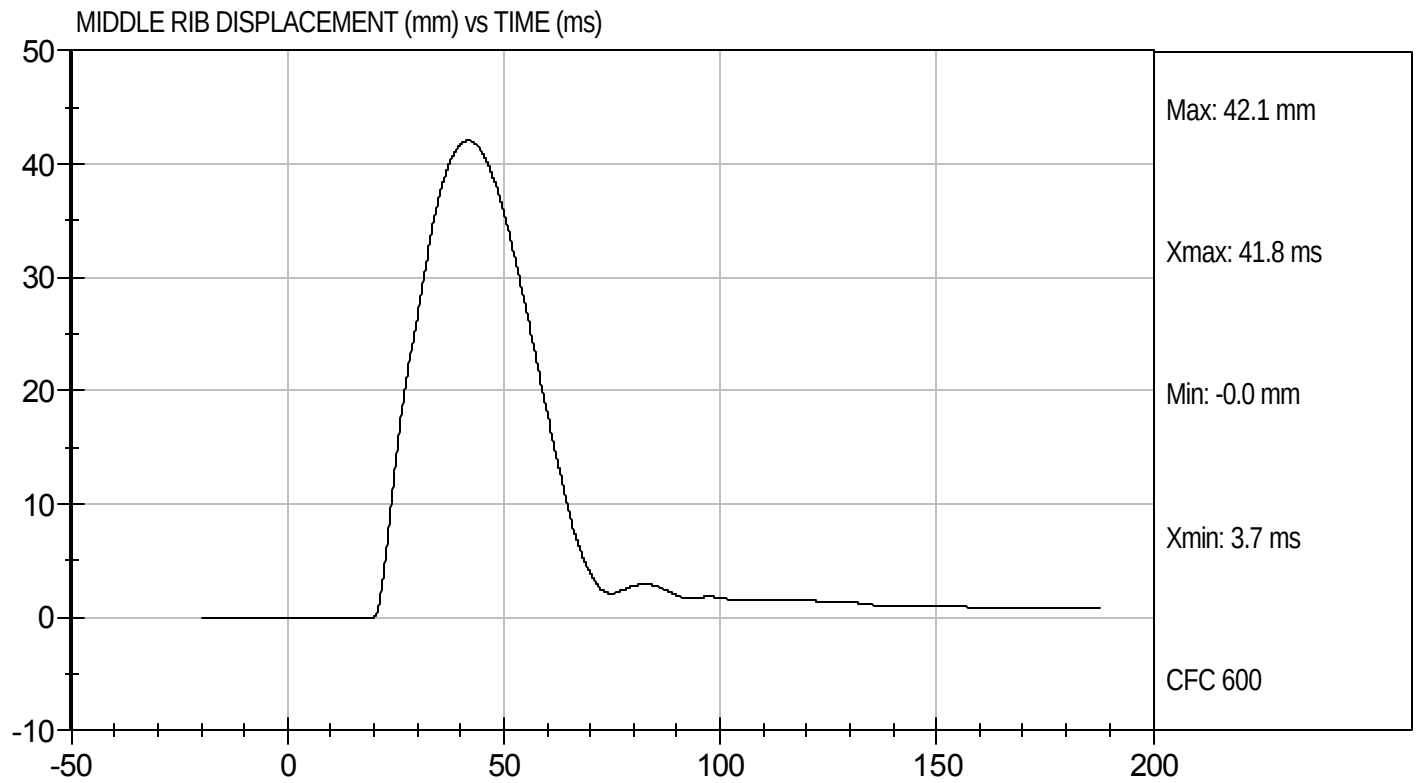
Test Date: 6/3/09  
Velocity: 14.0 ft/s, 4.27 m/s





Test Desc: Thorax Without Arm  
Component ID: D091405

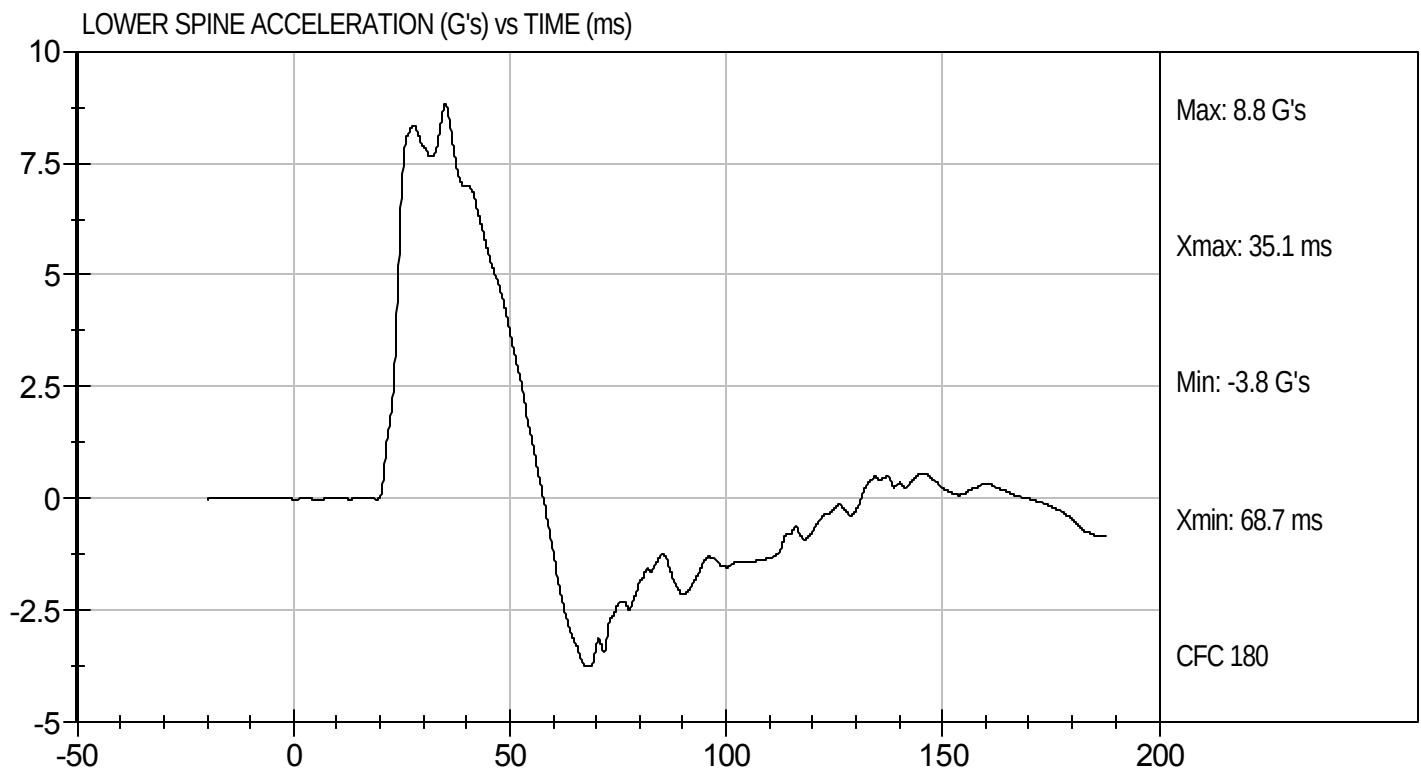
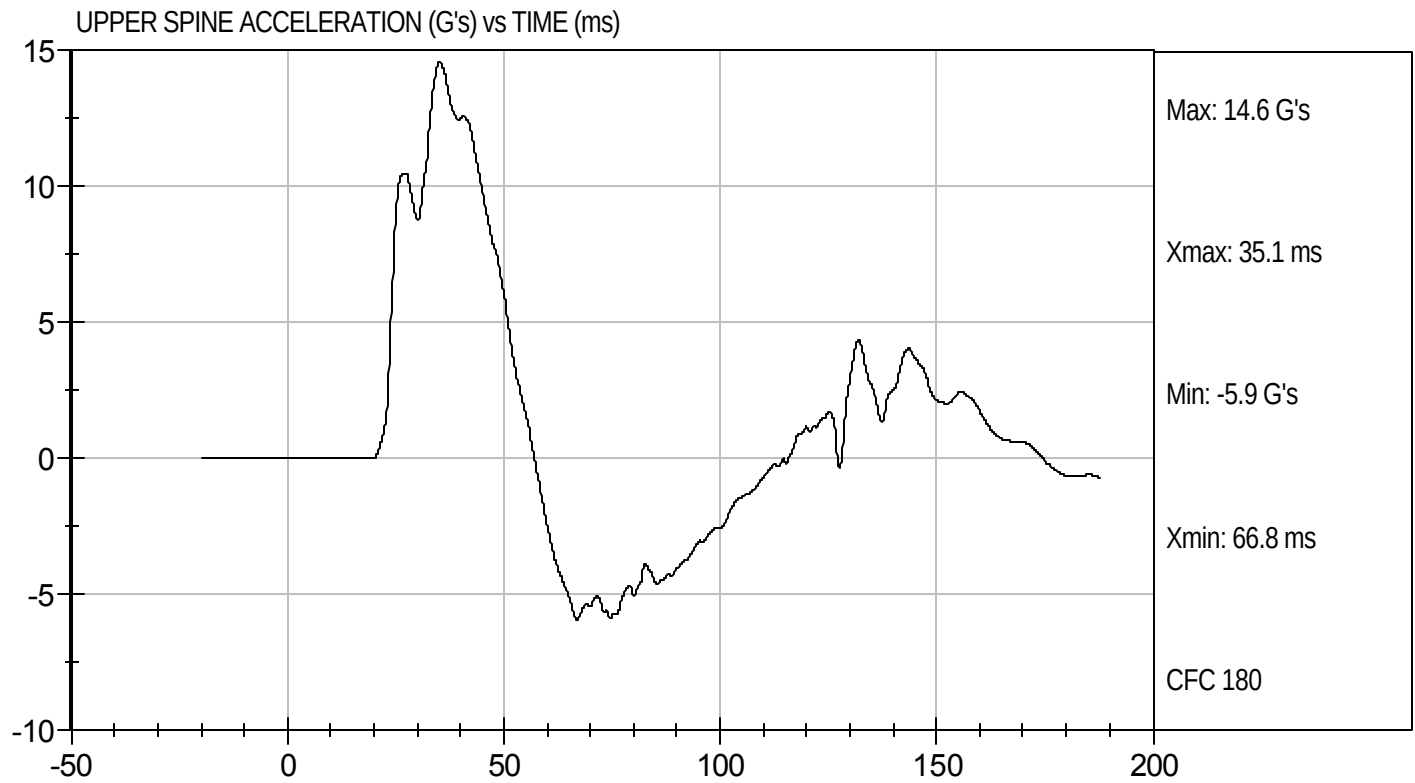
Test Date: 6/3/09  
Velocity: 14.0 ft/s, 4.27 m/s





Test Desc: Thorax Without Arm  
Component ID: D091405

Test Date: 6/3/09  
Velocity: 14.0 ft/s, 4.27 m/s



**MGA RESEARCH CORPORATION**  
**ABDOMINAL IMPACT TEST**  
**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 296

**Test I.D:** D091406

| Tested Parameter                 | Units | Specification | Result | Pass/Fail |
|----------------------------------|-------|---------------|--------|-----------|
| Temperature                      | deg C | 20.6 to 22.2  | 20.6   | Pass      |
| Humidity                         | %     | 10 to 70      | 29     | Pass      |
| Impact Velocity                  | m/s   | 4.20 to 4.40  | 4.30   | Pass      |
| Peak Impactor Acceleration       | G's   | 12 to 16      | 14     | Pass      |
| Upper Rib Displacement           | mm    | 36 to 47      | 39     | Pass      |
| Lower Rib Displacement           | mm    | 33 to 44      | 38     | Pass      |
| Lower Spine (T12) Y Acceleration | G's   | 9 to 14       | 12     | Pass      |
| Overall Test Results             |       |               |        | Pass      |

  
Laboratory Technician

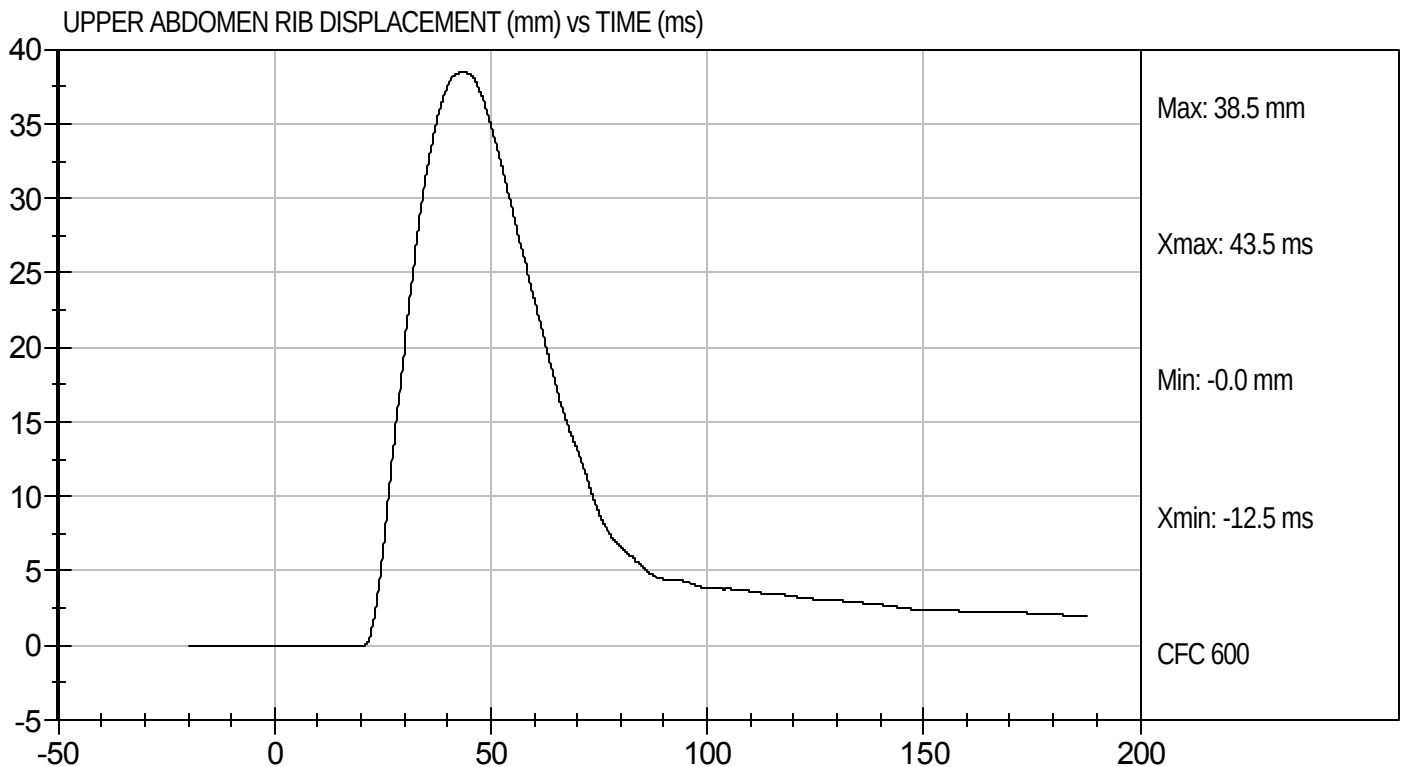
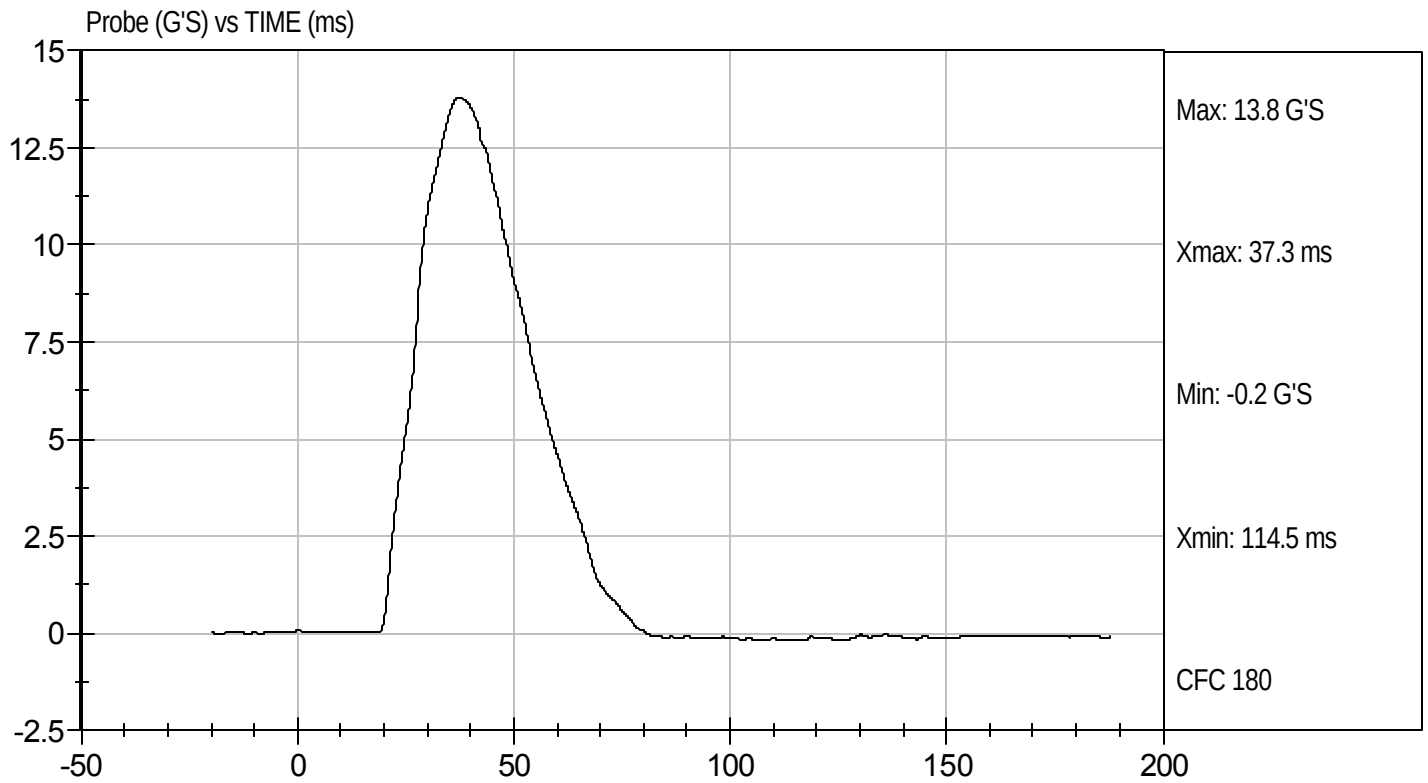
6/3/09  
Test Date

  
Approved By



Test Desc: Abdomen Impact  
Component ID: D091406

Test Date: 6/3/09  
Velocity: 14.1 ft/s, 4.30 m/s

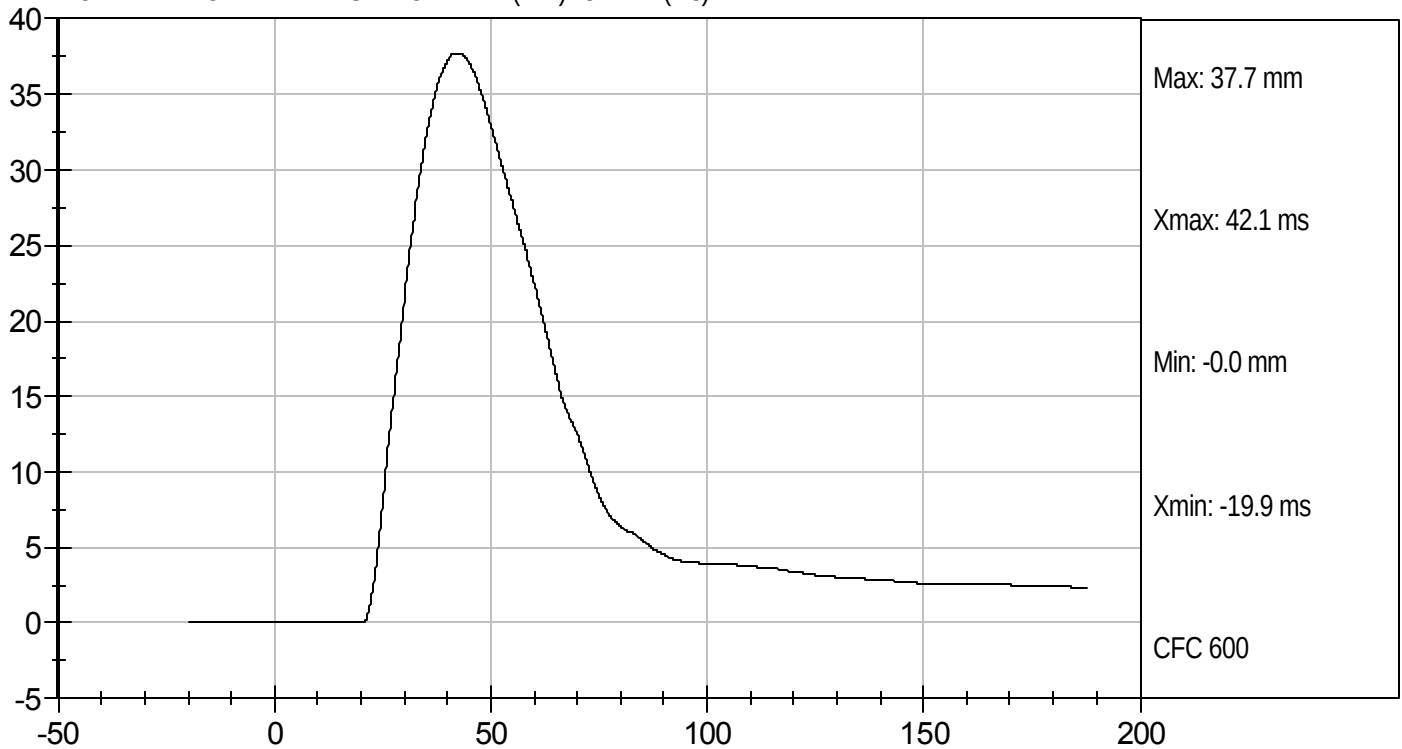




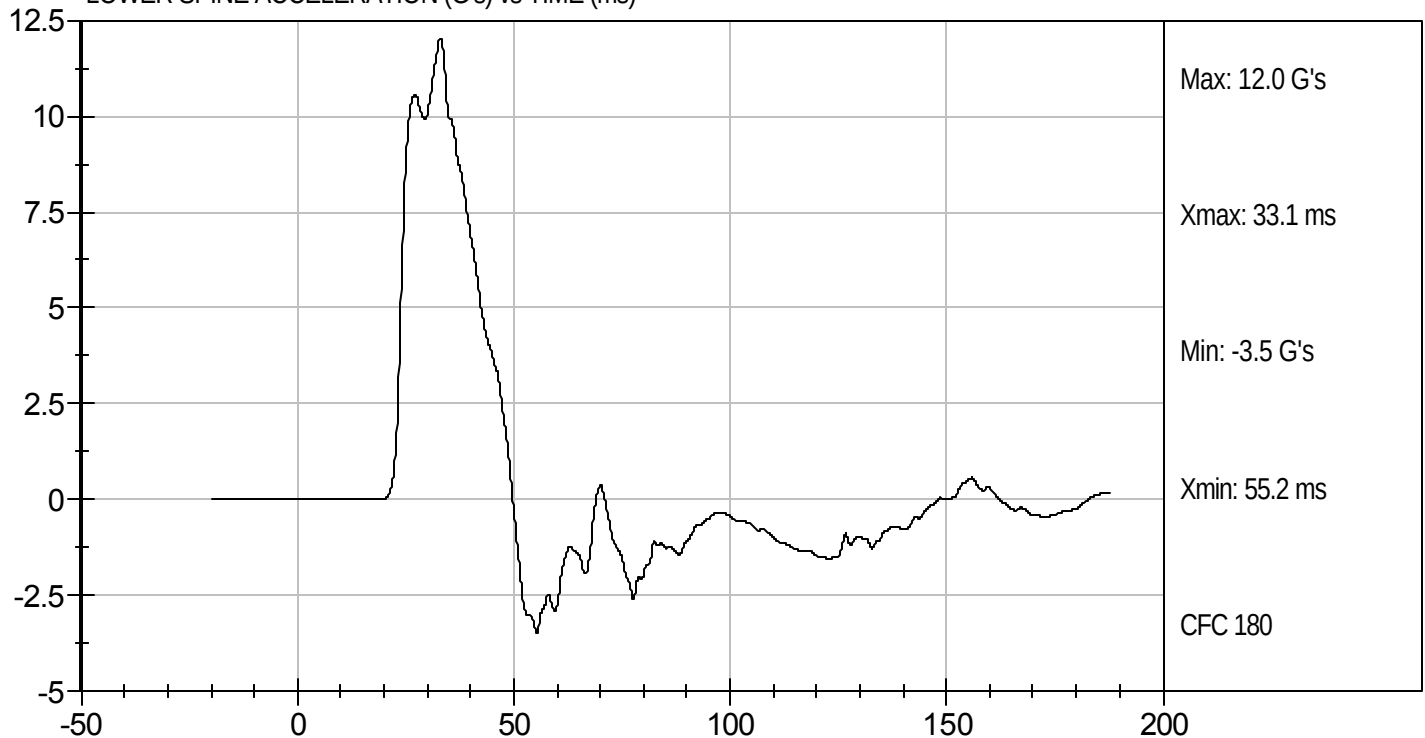
Test Desc: Abdomen Impact  
Component ID: D091406

Test Date: 6/3/09  
Velocity: 14.1 ft/s, 4.30 m/s

LOWER ABDOMEN RIB DISPLACEMENT (mm) vs TIME (ms)



LOWER SPINE ACCELERATION (G's) vs TIME (ms)



**MGA RESEARCH CORPORATION**  
**PELVIS IMPACT TEST**  
**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 296

**Test I.D:** D091407

| Tested Parameter                 | Units | Specification | Result | Pass/Fail |
|----------------------------------|-------|---------------|--------|-----------|
| Temperature                      | deg C | 20.6 to 22.2  | 20.7   | Pass      |
| Humidity                         | %     | 10 to 70      | 30     | Pass      |
| Impact Velocity                  | m/s   | 6.60 to 6.80  | 6.77   | Pass      |
| Peak Impactor Acceleration       | G's   | 38 to 47      | 43     | Pass      |
| Pelvis Y Acceleration after 6 ms | G's   | 34 to 42      | 38     | Pass      |
| Peak Acetabulum Force            | N     | 3600 to 4300  | 3928   | Pass      |
| Overall Test Results             |       |               |        | Pass      |

  
Laboratory Technician

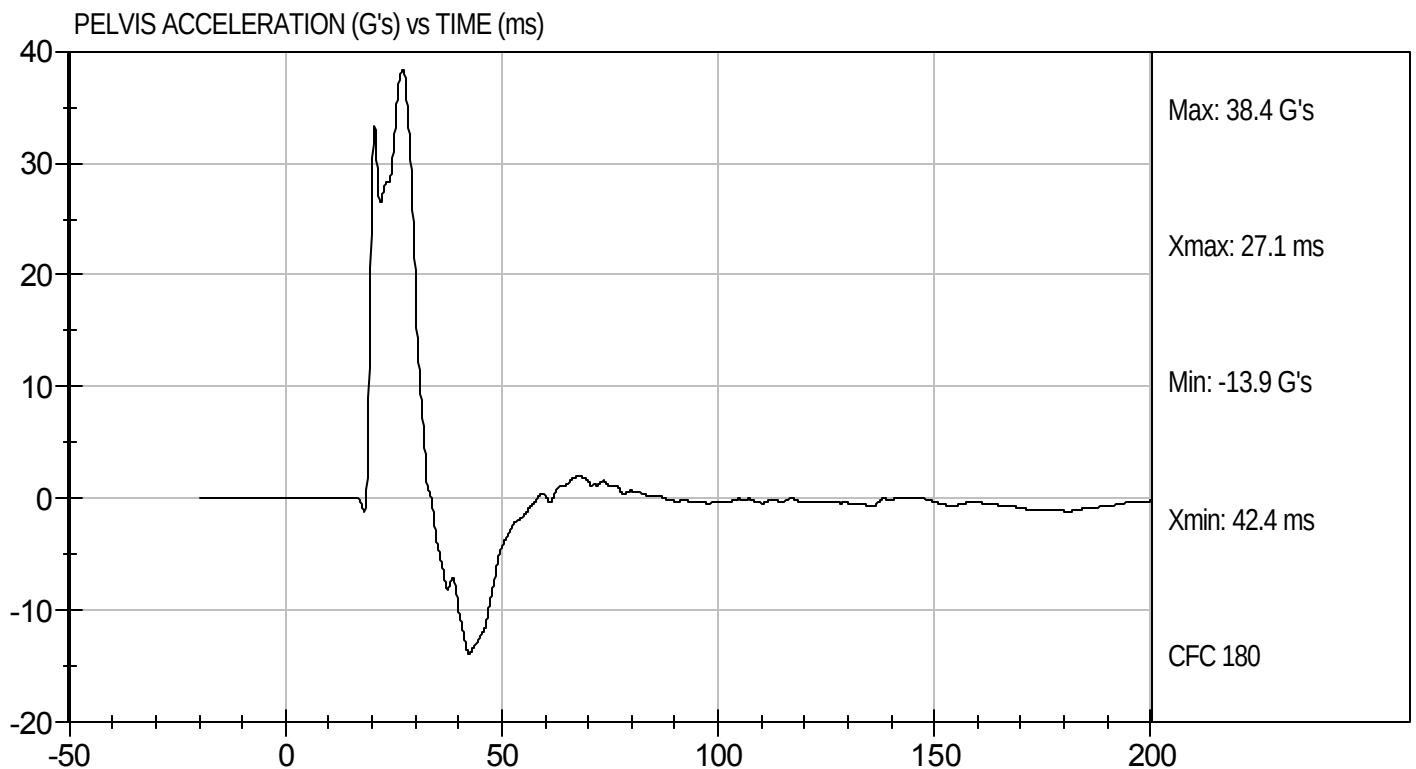
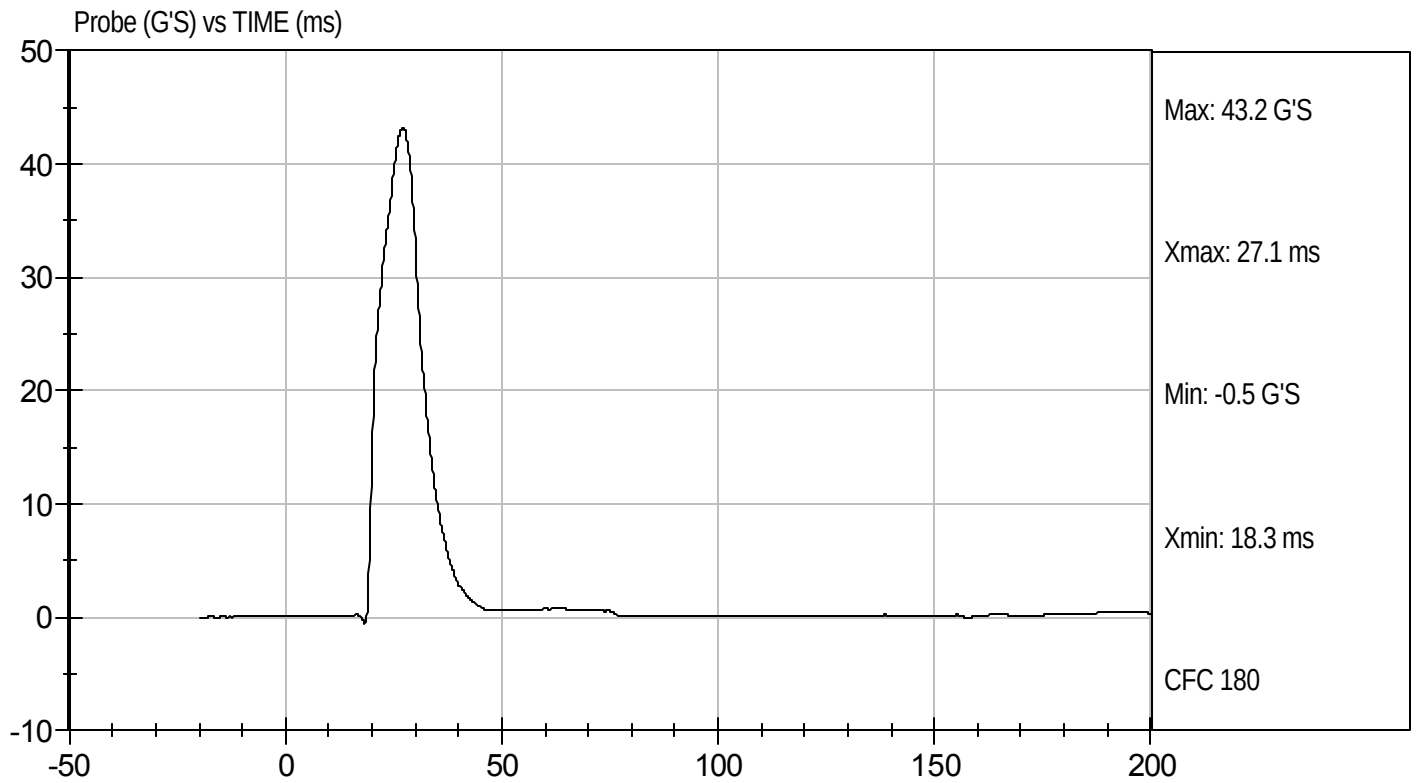
6/3/09  
Test Date

  
Approved By



Test Desc: Pelvis Impact  
Component ID: D091407

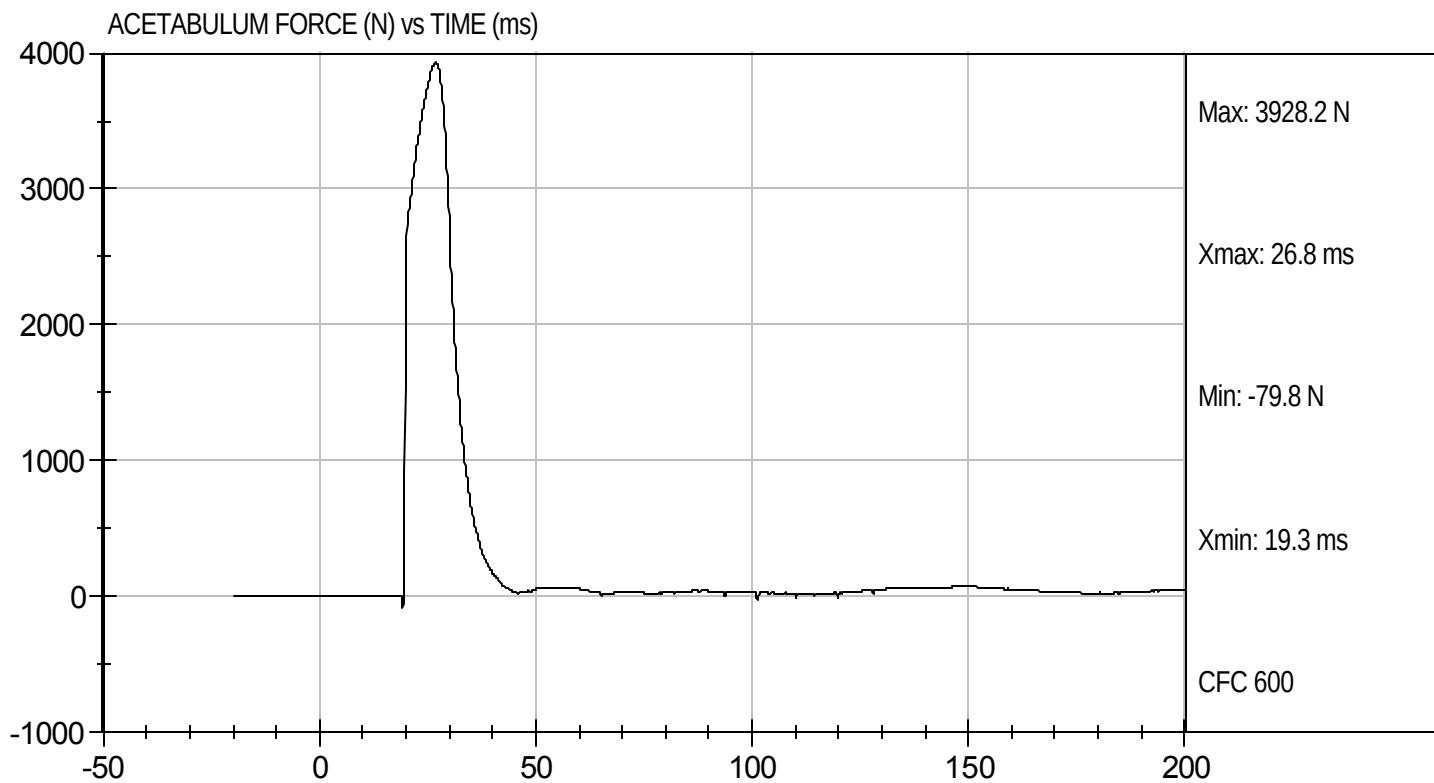
Test Date: 6/3/09  
Velocity: 22.2 ft/s, 6.77 m/s





Test Desc: Pelvis Impact  
Component ID: D091407

Test Date: 6/3/09  
Velocity: 22.2 ft/s, 6.77 m/s

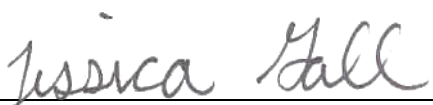


**MGA RESEARCH CORPORATION**  
**ILIAC IMPACT TEST**  
**SID-IIIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 296

**Test I.D:** D091408

| Tested Parameter           | Units | Specification | Result | Pass/Fail |
|----------------------------|-------|---------------|--------|-----------|
| Temperature                | deg C | 20.6 to 22.2  | 20.7   | Pass      |
| Humidity                   | %     | 10 to 70      | 29     | Pass      |
| Impact Velocity            | m/s   | 4.20 to 4.40  | 4.33   | Pass      |
| Peak Impactor Acceleration | G's   | 36 to 45      | 39     | Pass      |
| Pelvis Y Acceleration      | G's   | 28 to 39      | 35     | Pass      |
| Peak Pelvis Iliac Force    | N     | 4100 to 5100  | 4706   | Pass      |
| Overall Test Results       |       |               | Pass   |           |

  
Laboratory Technician

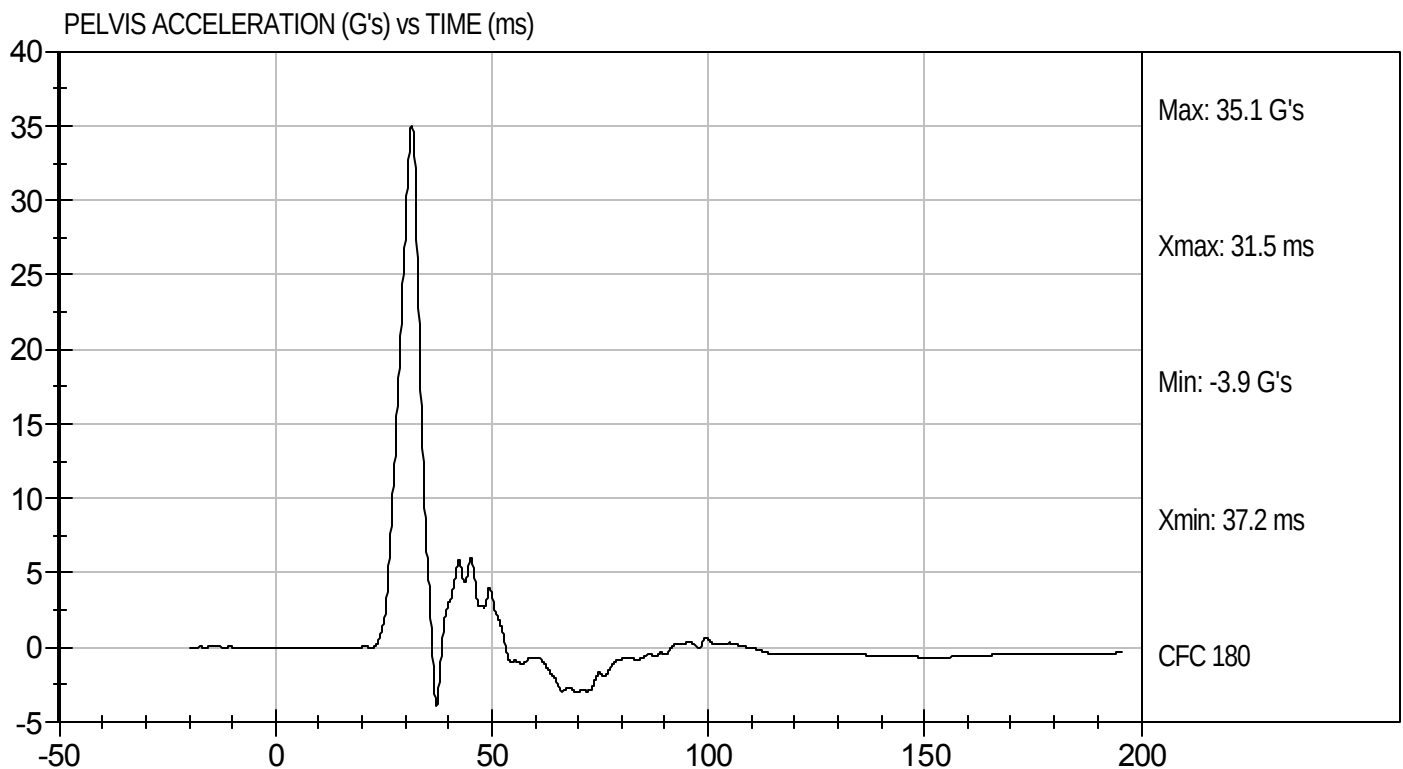
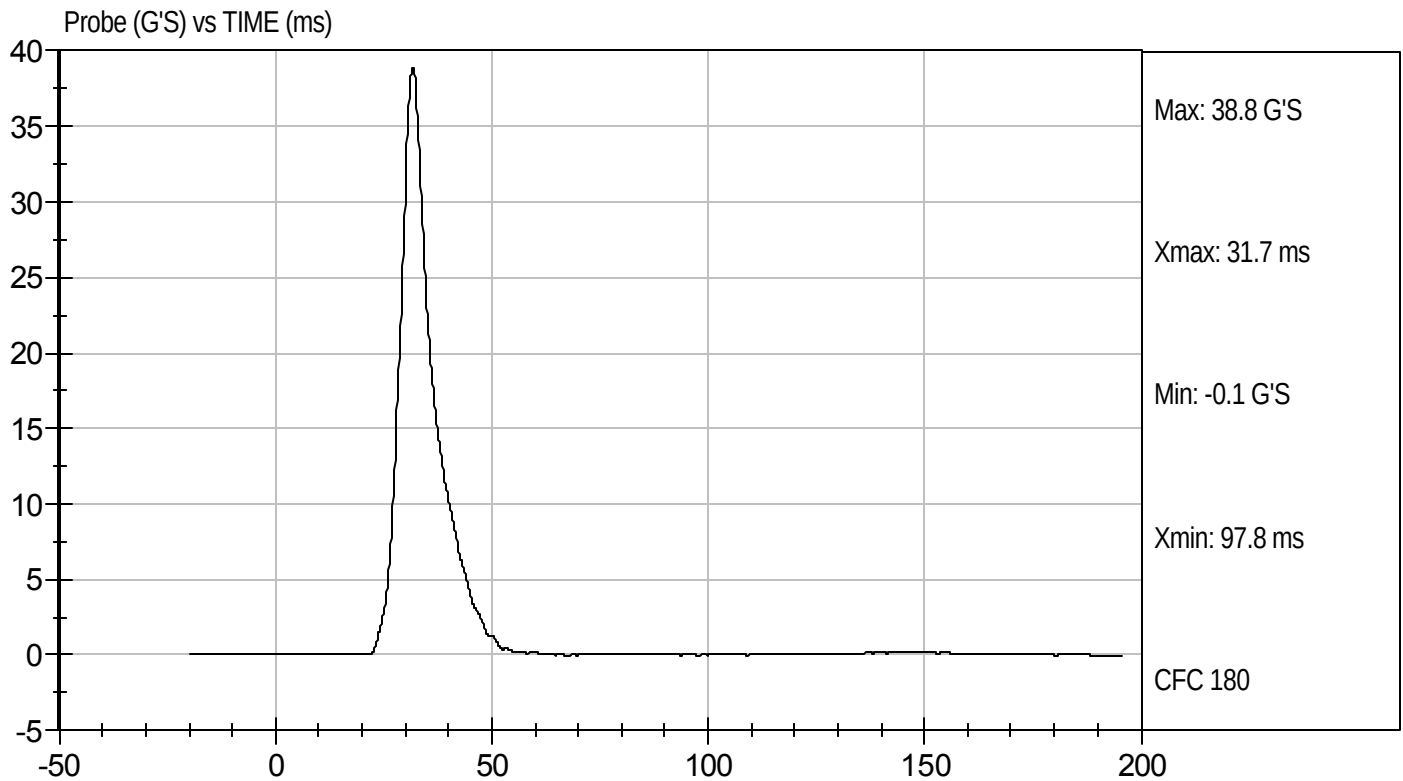
6/3/09  
Test Date

  
Approved By



Test Desc: Iliac Impact  
Component ID: D091408

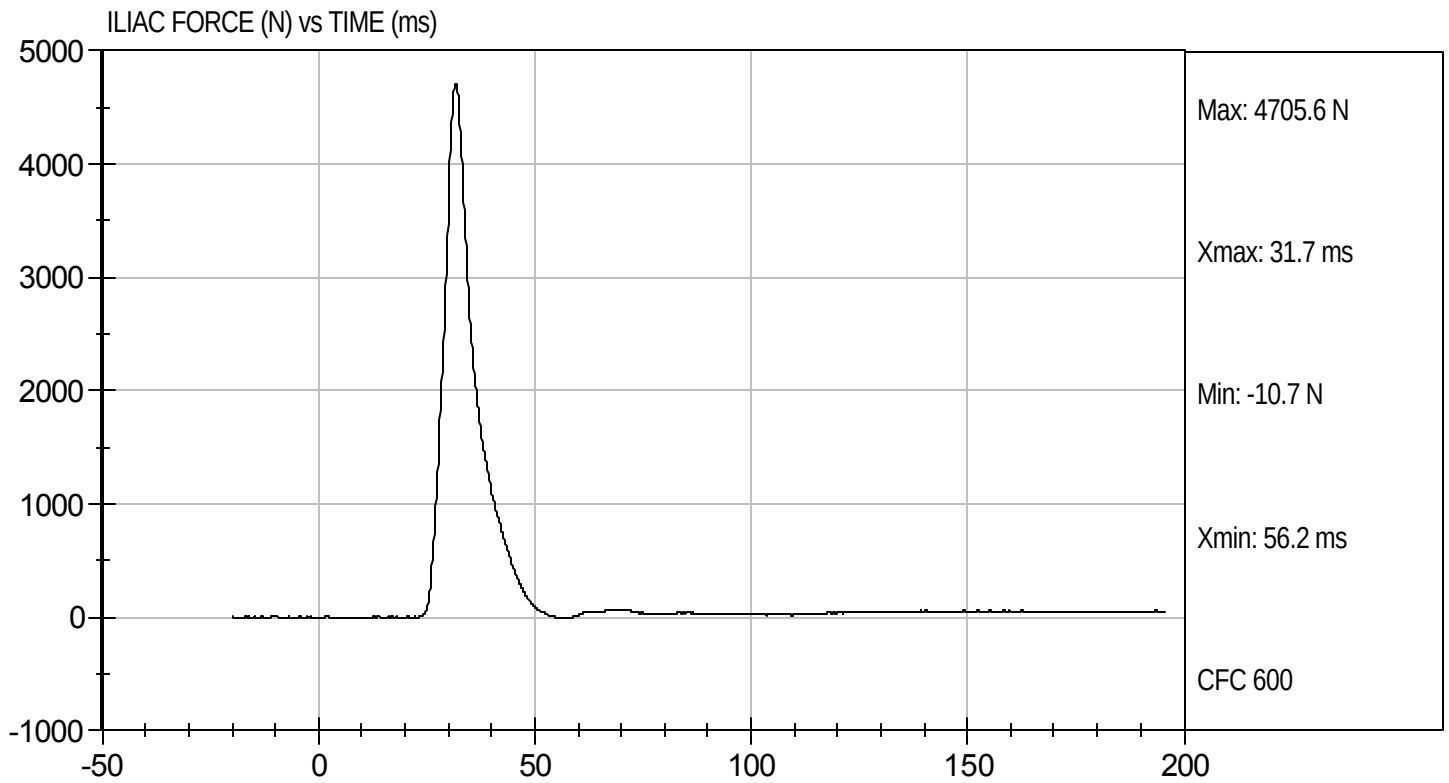
Test Date: 6/3/09  
Velocity: 14.2 ft/s, 4.33 m/s





Test Desc: Iliac Impact  
Component ID: D091408

Test Date: 6/3/09  
Velocity: 14.2 ft/s, 4.33 m/s



**MGA RESEARCH CORPORATION**  
**HEAD DROP TEST**  
**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 296

**Test ID:** D091421

| Tested Parameter             | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature       | deg C | 20.6 to 22.2  | 21.0   | Pass      |
| Laboratory Relative Humidity | %     | 10 to 70      | 37     | Pass      |
| Peak Resultant Acceleration  | G's   | 115 to 137    | 118    | Pass      |
| Peak Lateral Acceleration    | G's   | +/- 15        | -9.8   | Pass      |
| Unimodal                     | N/A   | <15%          | Yes    | Pass      |
| Overall Test Results         |       |               |        | Pass      |

  
\_\_\_\_\_  
Laboratory Technician

6/5/09  
Test Date

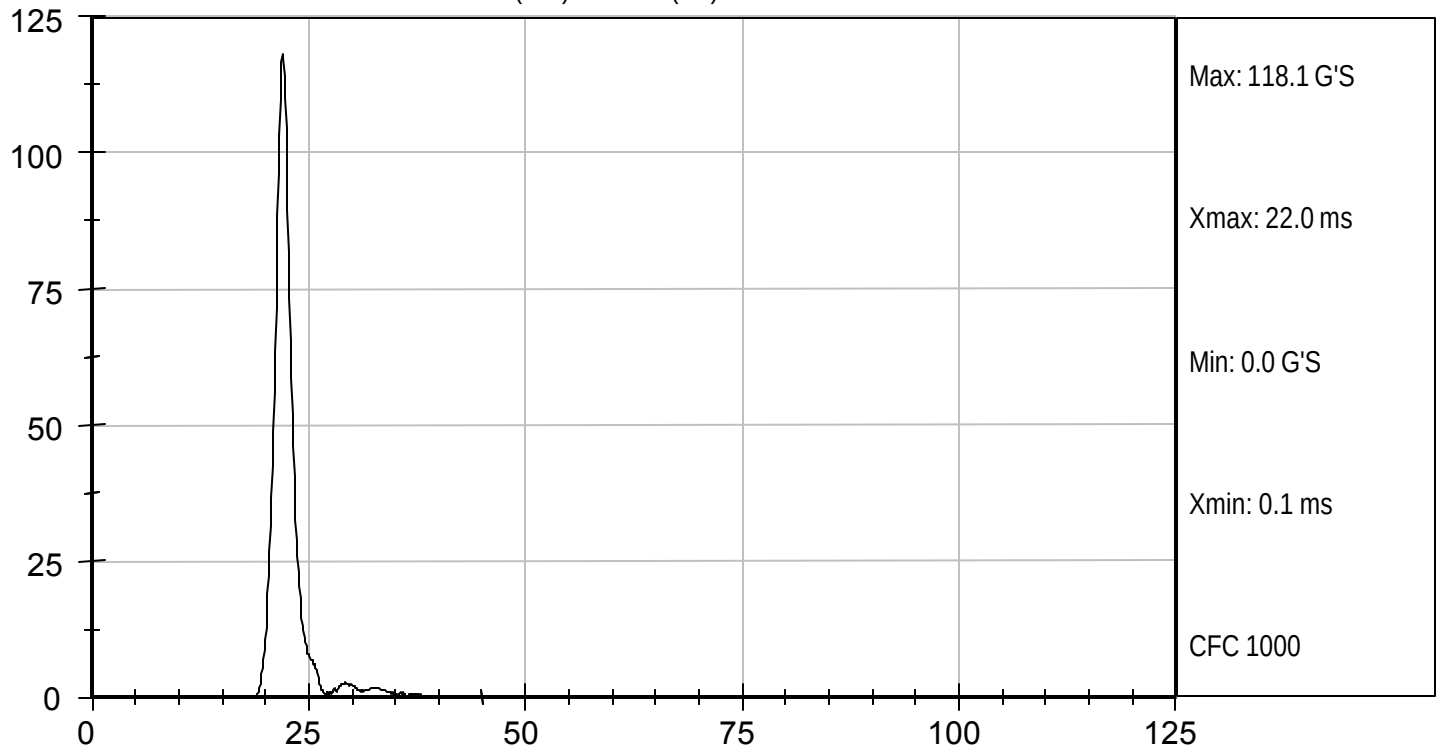
  
\_\_\_\_\_  
Approved By



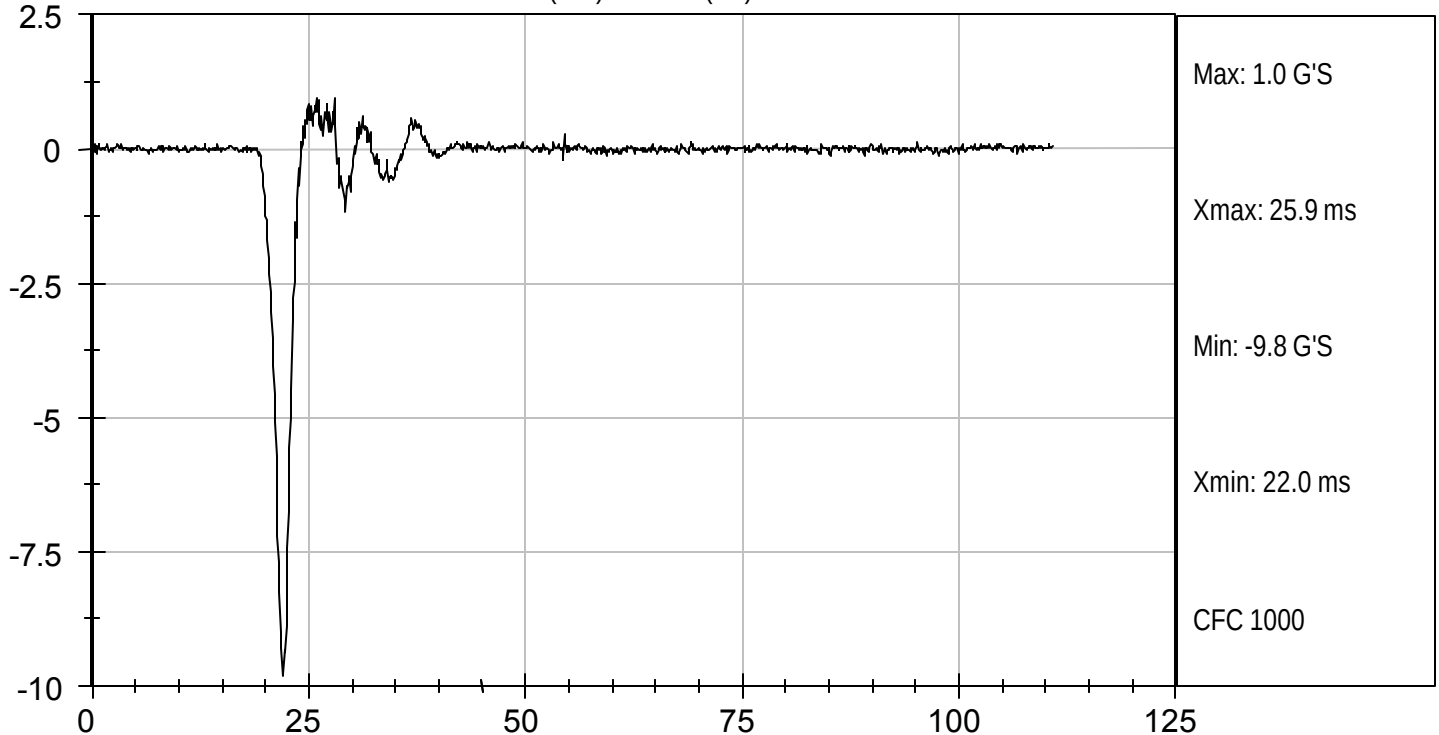
Test Desc: Head Drop  
Component ID: D091421

Test Date: 6/5/09  
Velocity: 0 ft/s, 0 m/s

PEAK RESULTANT ACCELERATION (G'S) vs TIME (ms)



PEAK LONGITUDINAL ACCELERATION (G'S) vs TIME (ms)

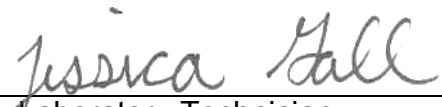


**MGA RESEARCH CORPORATION**  
**LATERAL NECK PENDULUM TEST**  
**SID-IIs BUILD LEVEL D DUMMY**

ATD Serial No: 296

Test I.D: D091422

| Tested Parameter                                          |             | Units | Specification | Result | Pass/Fail |
|-----------------------------------------------------------|-------------|-------|---------------|--------|-----------|
| Temperature                                               |             | deg C | 20.6 to 22.2  | 21.0   | Pass      |
| Humidity                                                  |             | %     | 10 to 70      | 36     | Pass      |
| Impact Velocity                                           |             | m/s   | 5.51 to 5.63  | 5.58   | Pass      |
| Delta Velocity                                            | 10 msec     | m/s   | 2.20 to 2.80  | 2.57   | Pass      |
|                                                           | 15 msec     | m/s   | 3.30 to 4.10  | 3.74   | Pass      |
|                                                           | 20 msec     | m/s   | 4.40 to 5.40  | 5.06   | Pass      |
|                                                           | 25 msec     | m/s   | 5.40 to 6.10  | 5.66   | Pass      |
|                                                           | 25-100 msec | m/s   | 5.50 to 6.20  | 5.66   | Pass      |
| Maximum D-Plane Rotation                                  |             | deg   | 71 to 81      | 72     | Pass      |
| Time of Maximum D-Plane Rotation                          |             | msec  | 50 to 70      | 66     | Pass      |
| Maximum Occipital Condyle Moment during Rotation Interval |             | Nm    | -44 to -36    | -43    | Pass      |
| Time of Moment Decay to 0 Nm                              |             | msec  | 102 to 126    | 113    | Pass      |
| Overall Test Results                                      |             |       |               |        | Pass      |

  
 Laboratory Technician

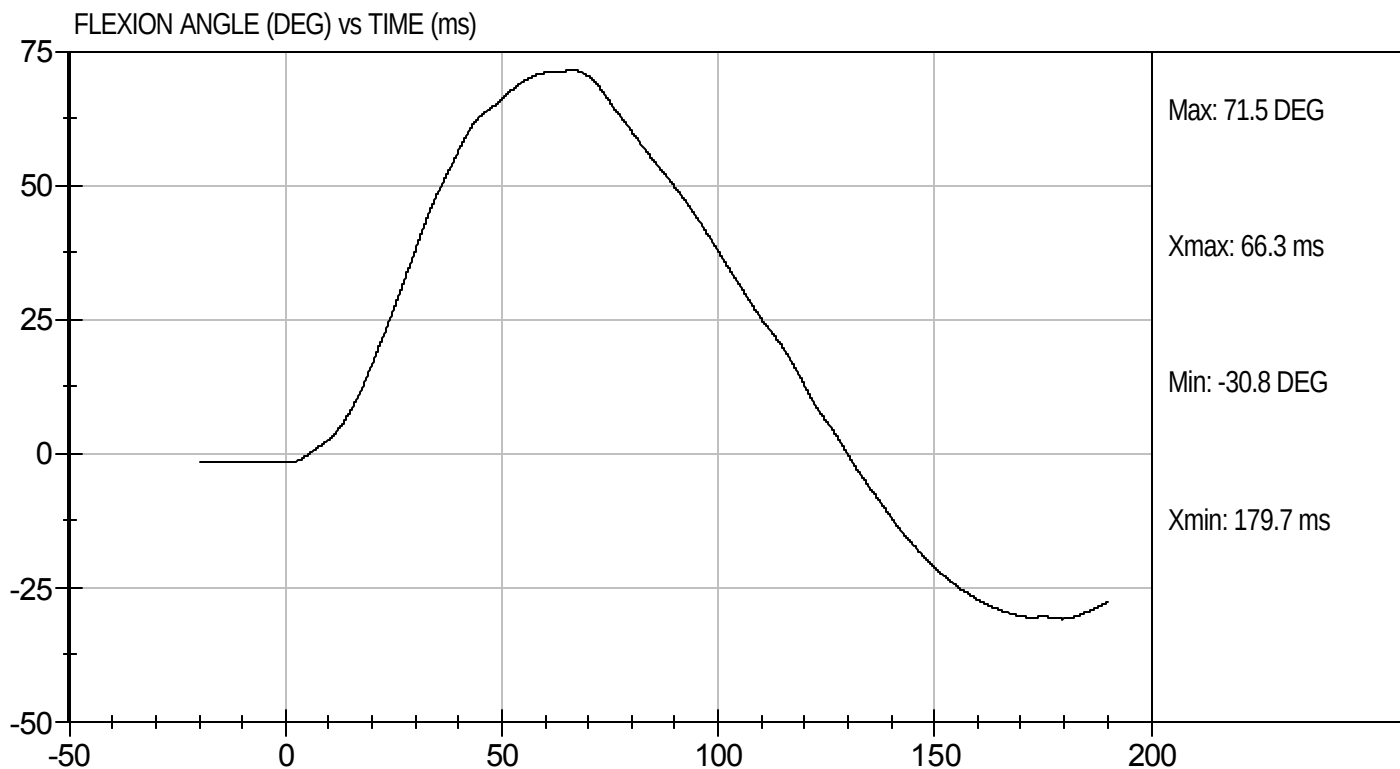
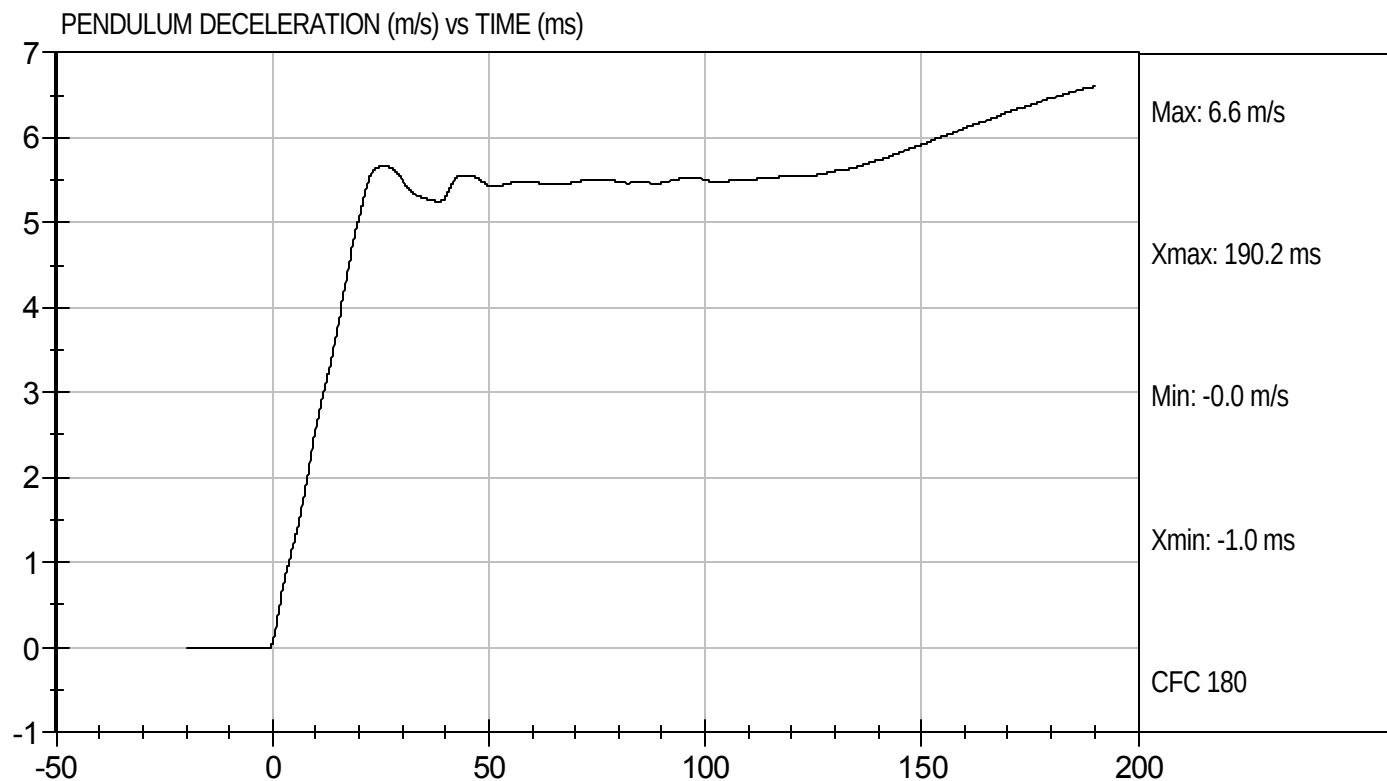
6/5/09  
 Test Date

  
 Approved By



Test Desc: Neck Bending  
Component ID: D091422

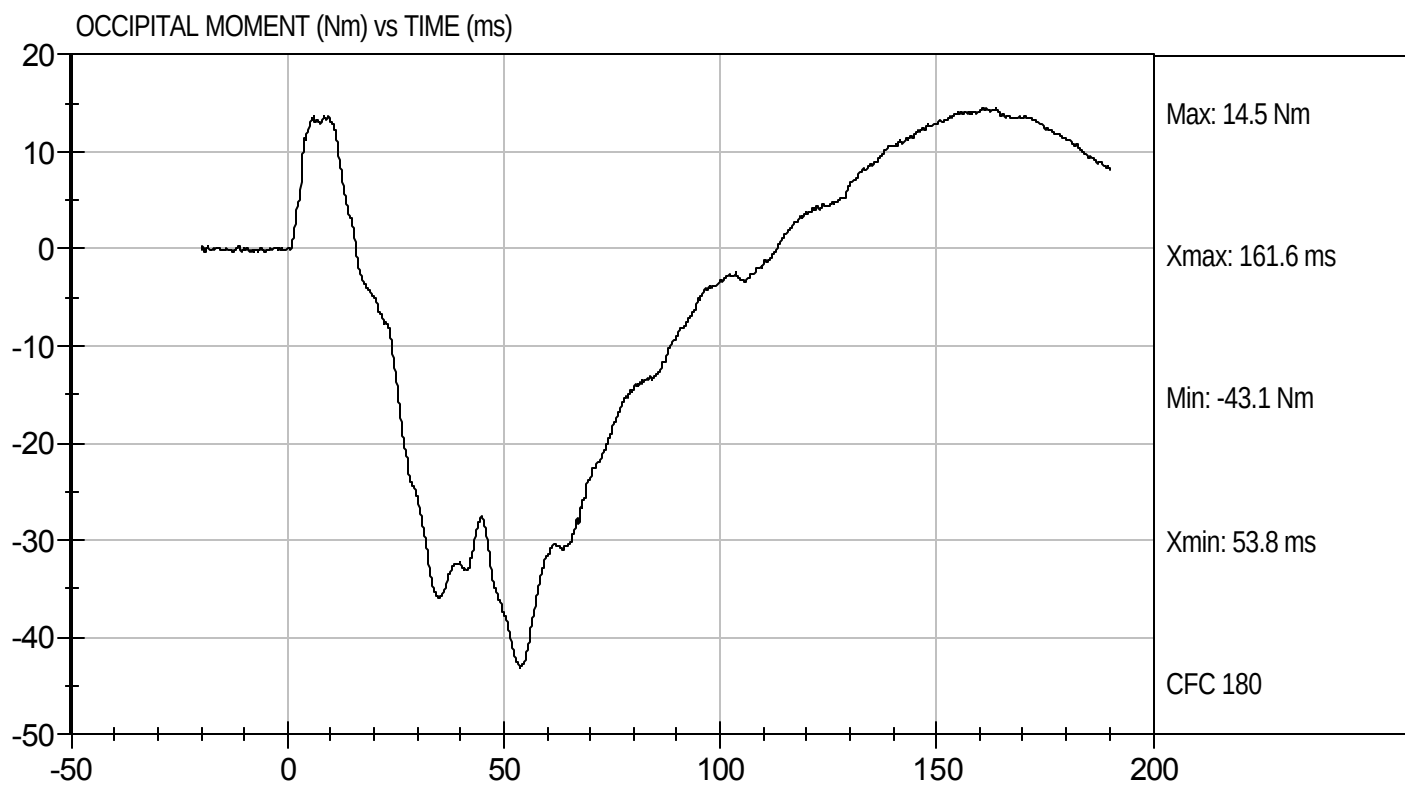
Test Date: 6/5/09  
Velocity: 18.32 ft/s, 5.58 m/s





Test Desc: Neck Bending  
Component ID: D091422

Test Date: 6/5/09  
Velocity: 18.32 ft/s, 5.58 m/s

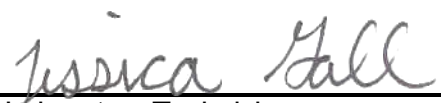


**MGA RESEARCH CORPORATION**  
**SHOULDER IMPACT TEST**  
**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 296

**Test ID:** D091423

| Tested Parameter                | Units | Specification | Result | Pass/Fail |
|---------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature          | deg C | 20.6 to 22.2  | 21.2   | Pass      |
| Laboratory Relative Humidity    | %     | 10 to 70      | 36     | Pass      |
| Impact Velocity                 | m/s   | 4.20 to 4.40  | 4.21   | Pass      |
| Maximum Probe Acceleration      | G's   | 13 to 18      | 15     | Pass      |
| Shoulder Displacement           | mm    | 28 to 37      | 32     | Pass      |
| Upper Spine (T1) Y Acceleration | G's   | 17 to 22      | 18     | Pass      |
| Overall Test Results            |       |               |        | Pass      |

  
Laboratory Technician

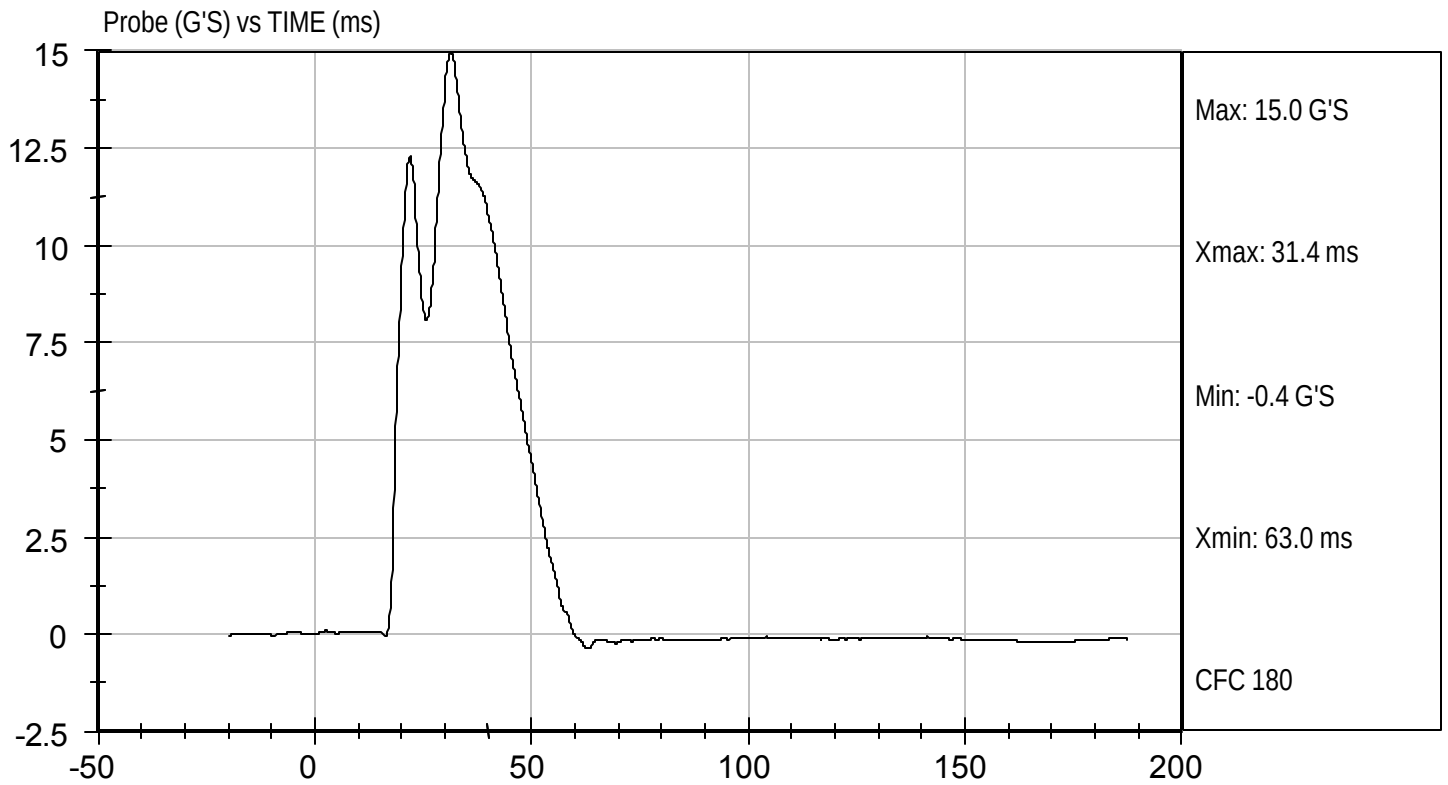
6/5/09  
Test Date

  
Approved By



Test Desc: Shoulder Impact  
Component ID: D091423

Test Date: 6/5/09  
Velocity: 13.8 ft/s, 4.21 m/s

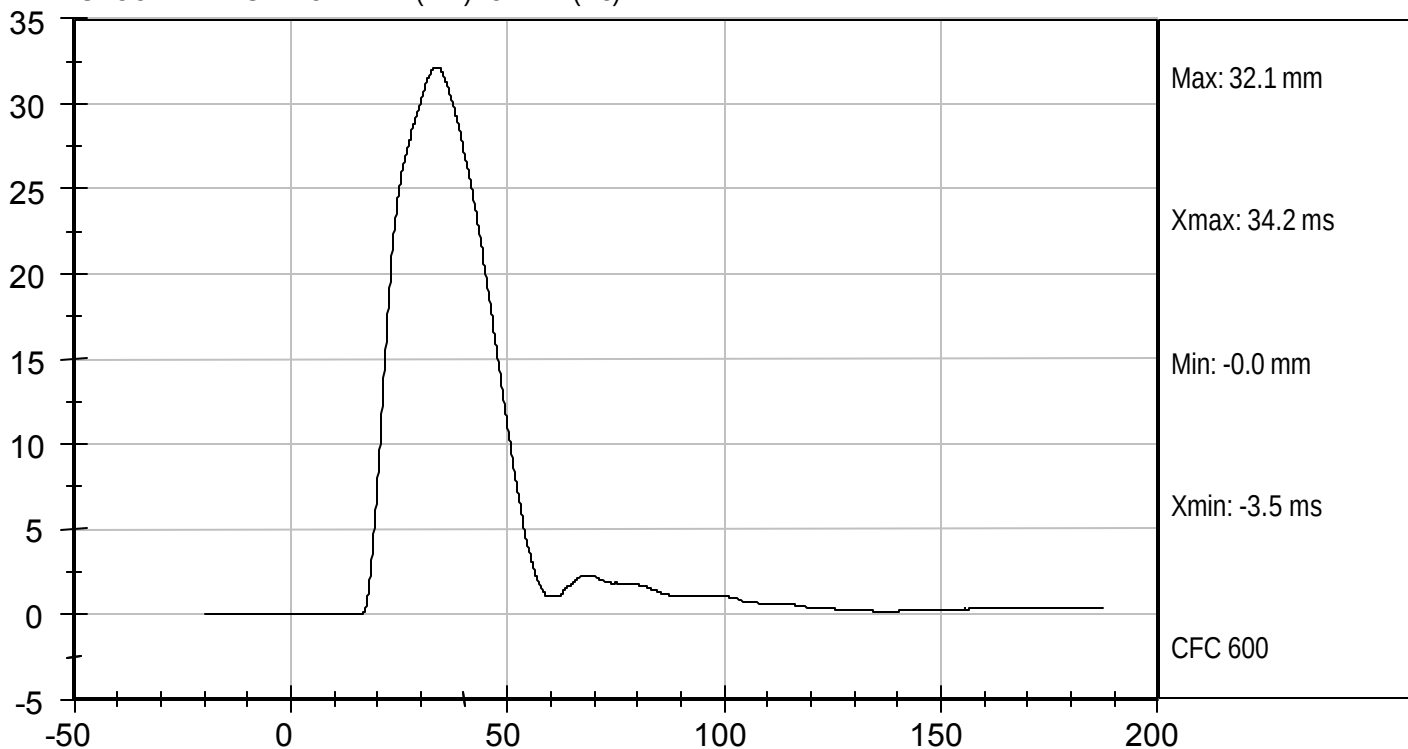




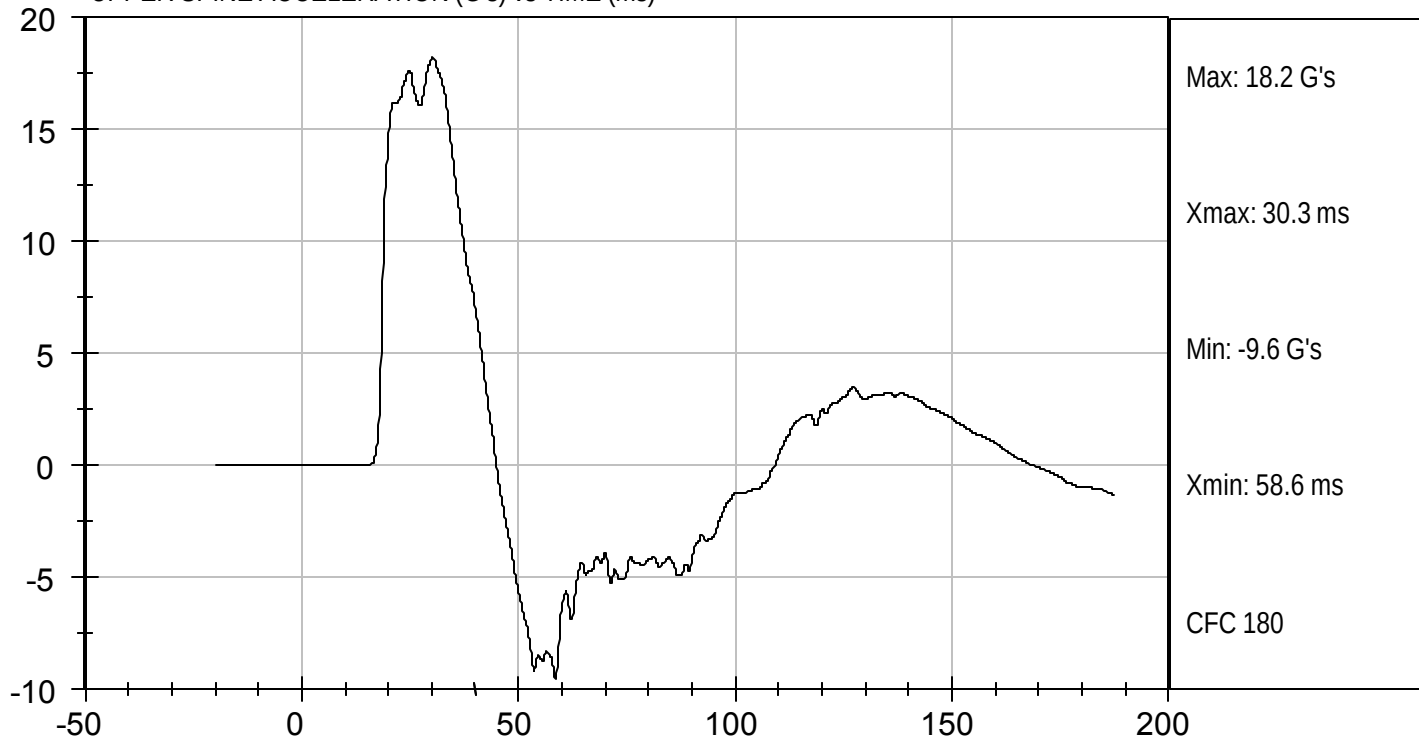
Test Desc: Shoulder Impact  
Component ID: D091423

Test Date: 6/5/09  
Velocity: 13.8 ft/s, 4.21 m/s

SHOULDER DISPLACEMENT (mm) vs TIME (ms)



UPPER SPINE ACCELERATION (G's) vs TIME (ms)



**MGA RESEARCH CORPORATION**  
**THORAX (WITH ARM) IMPACT TEST**  
**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 296

**Test I.D:** D091424

| Tested Parameter                 | Units | Specification | Result | Pass/Fail |
|----------------------------------|-------|---------------|--------|-----------|
| Temperature                      | deg C | 20.6 to 22.2  | 21.2   | Pass      |
| Humidity                         | %     | 10 to 70      | 36     | Pass      |
| Impact Velocity                  | m/s   | 6.60 to 6.80  | 6.68   | Pass      |
| Peak Impactor Acceleration       | G's   | 30 to 36      | 32     | Pass      |
| Shoulder Displacement            | mm    | 31 to 40      | 35     | Pass      |
| Upper Rib Displacement           | mm    | 25 to 32      | 27     | Pass      |
| Middle Rib Displacement          | mm    | 30 to 36      | 32     | Pass      |
| Lower Rib Displacement           | mm    | 32 to 38      | 34     | Pass      |
| Upper Spine (T1) Y Acceleration  | G's   | 34 to 43      | 37     | Pass      |
| Lower Spine (T12) Y Acceleration | G's   | 29 to 37      | 32     | Pass      |
| Overall Test Results             |       |               | Pass   |           |

  
Laboratory Technician

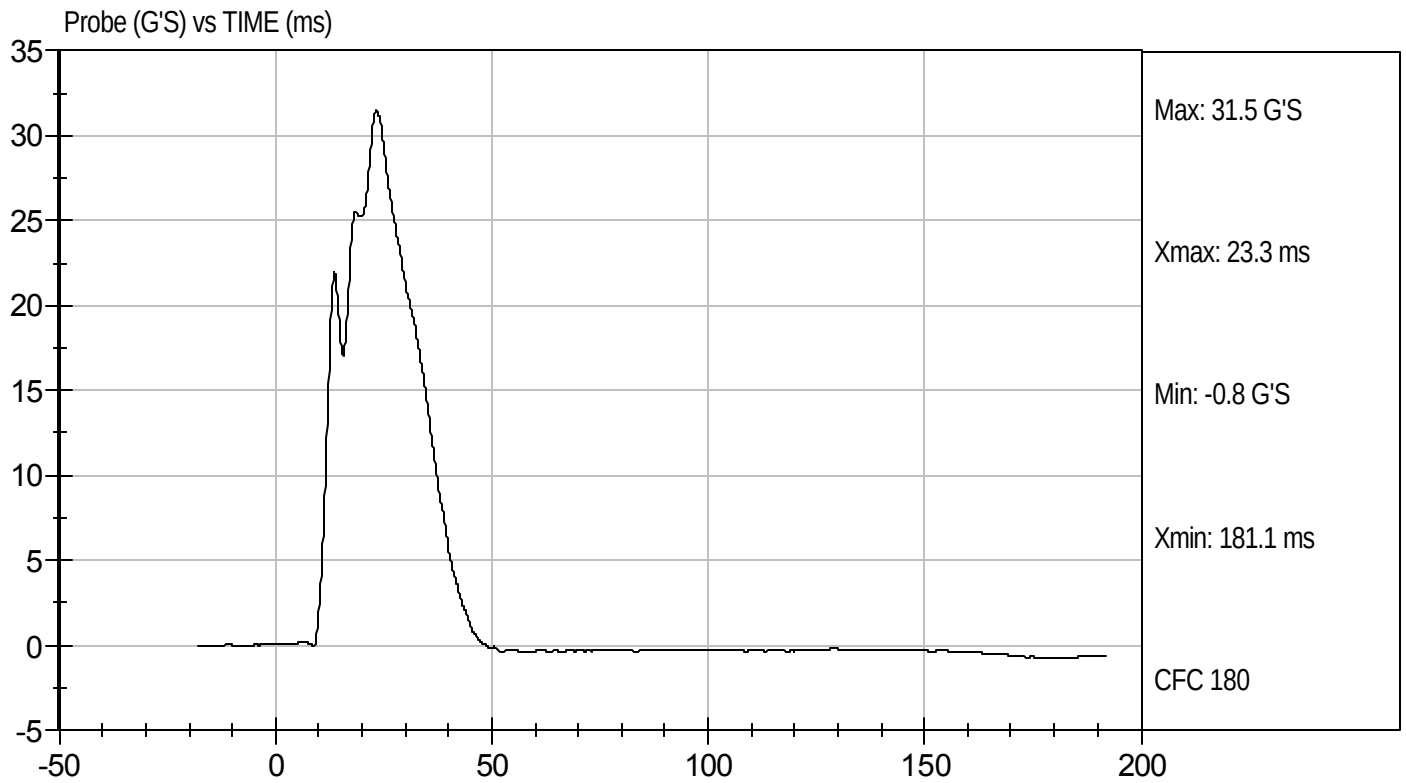
6/5/09  
Test Date

  
Approved By



Test Desc: Thorax Impact  
Component ID: D091424

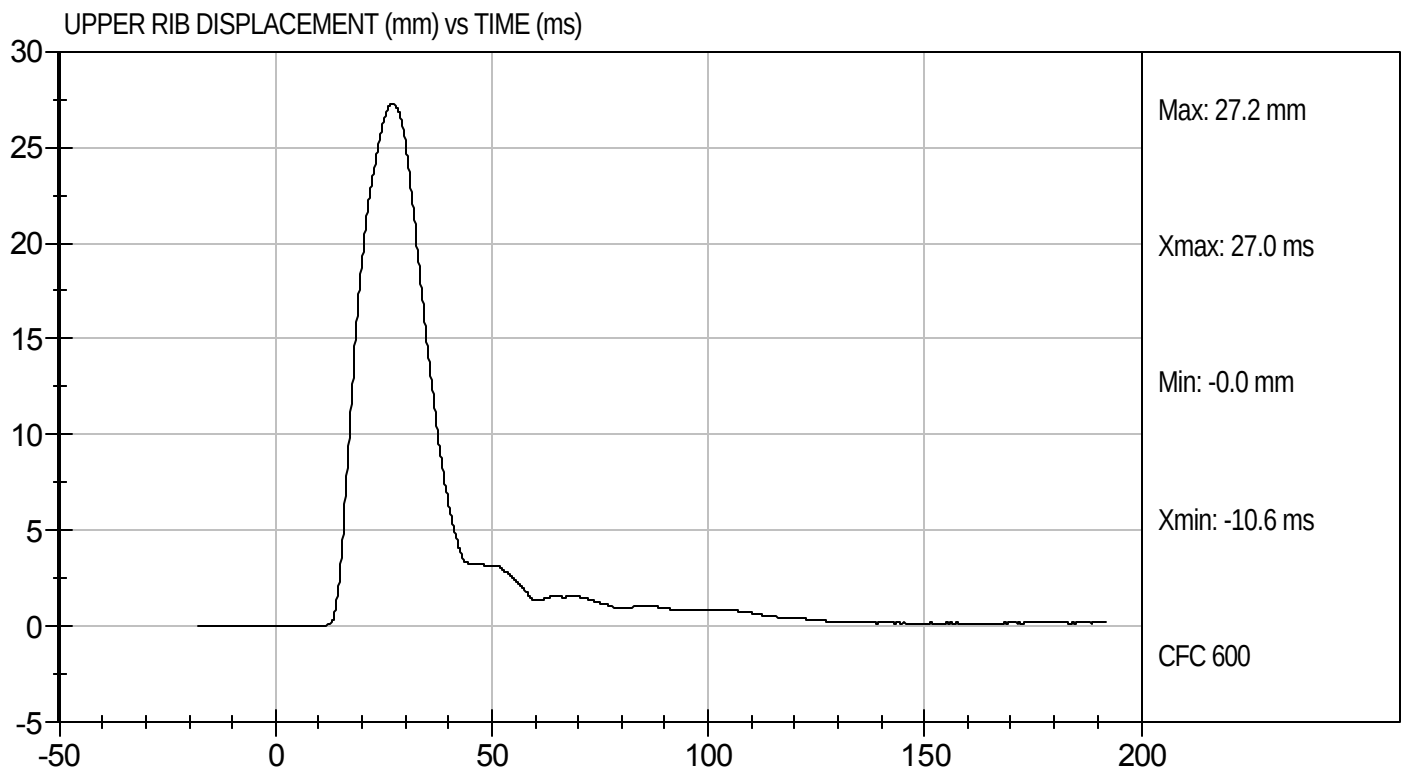
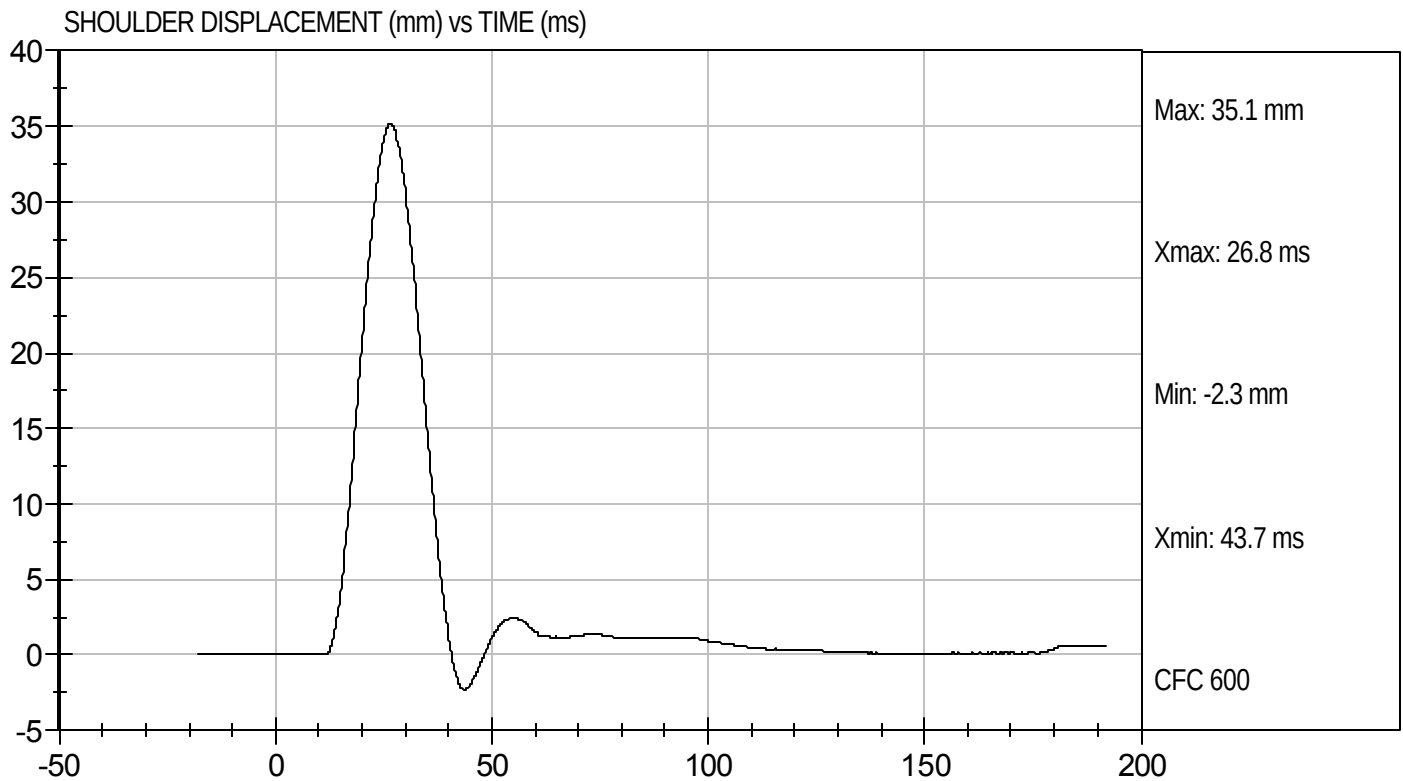
Test Date: 6/5/09  
Velocity: 21.9 ft/s, 6.68 m/s





Test Desc: Thorax Impact  
Component ID: D091424

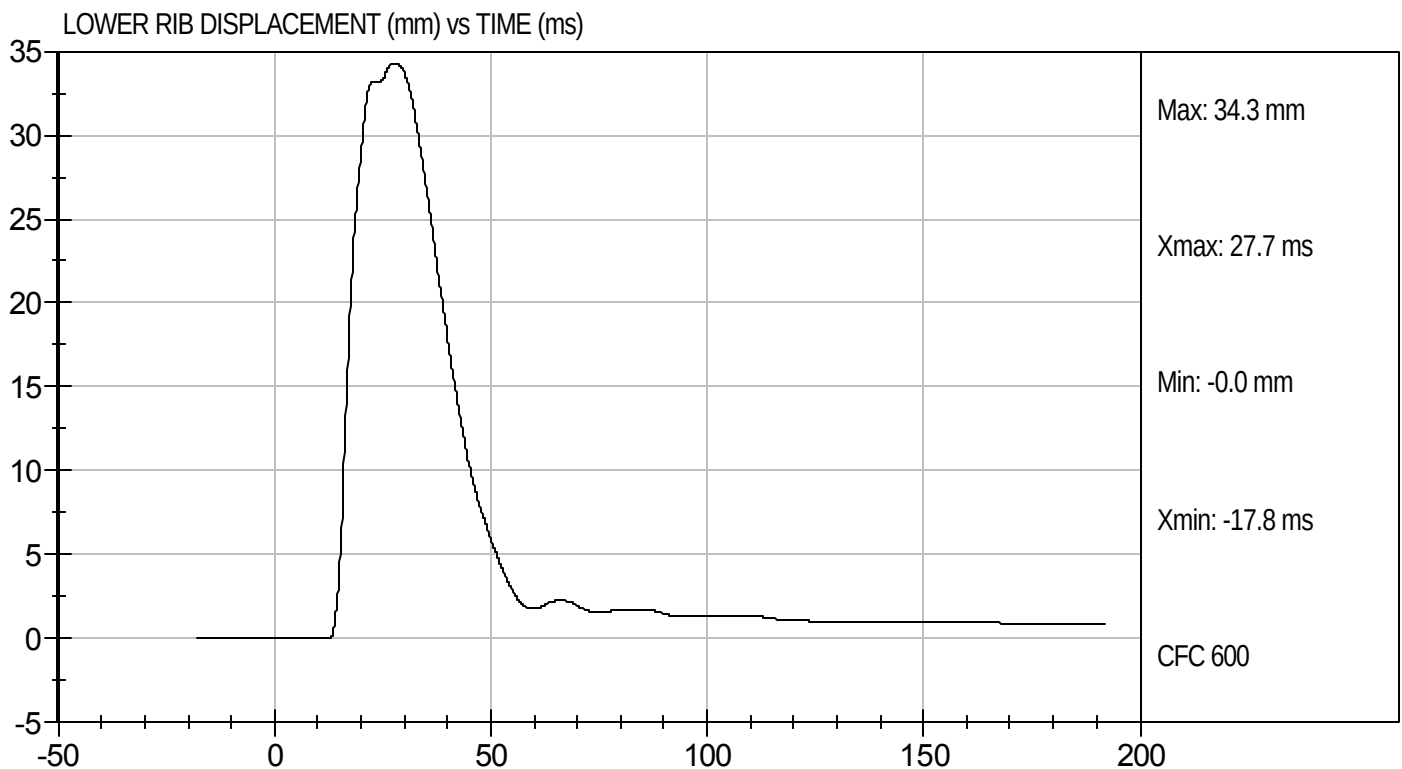
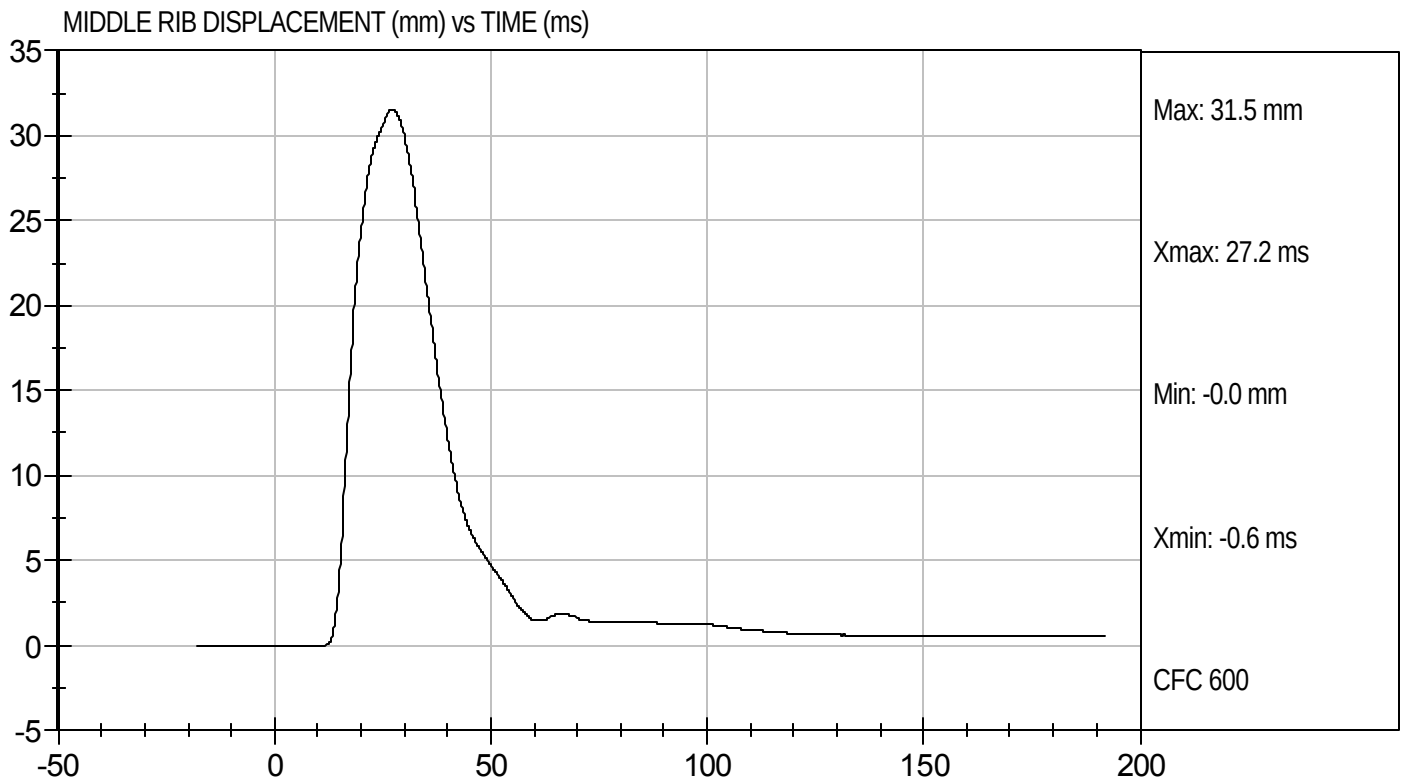
Test Date: 6/5/09  
Velocity: 21.9 ft/s, 6.68 m/s





Test Desc: Thorax Impact  
Component ID: D091424

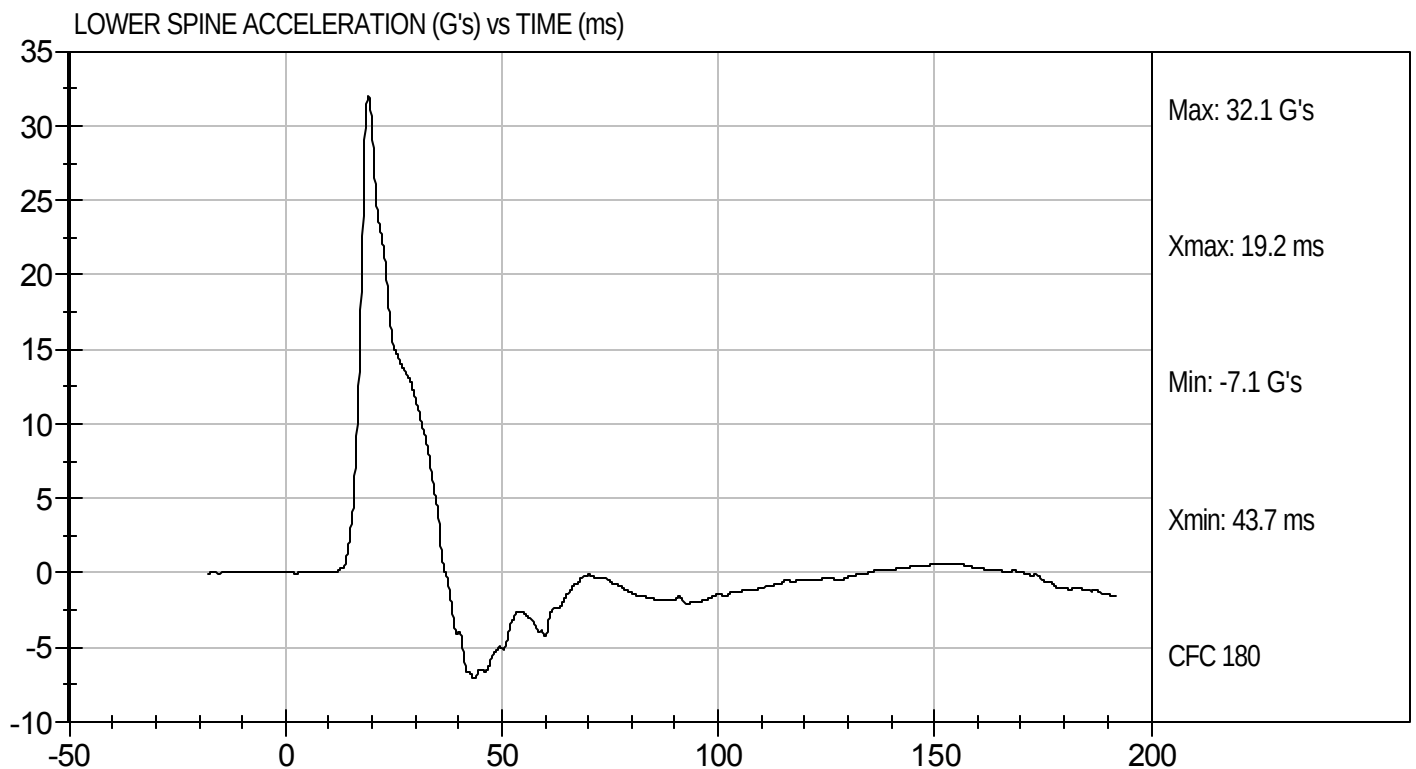
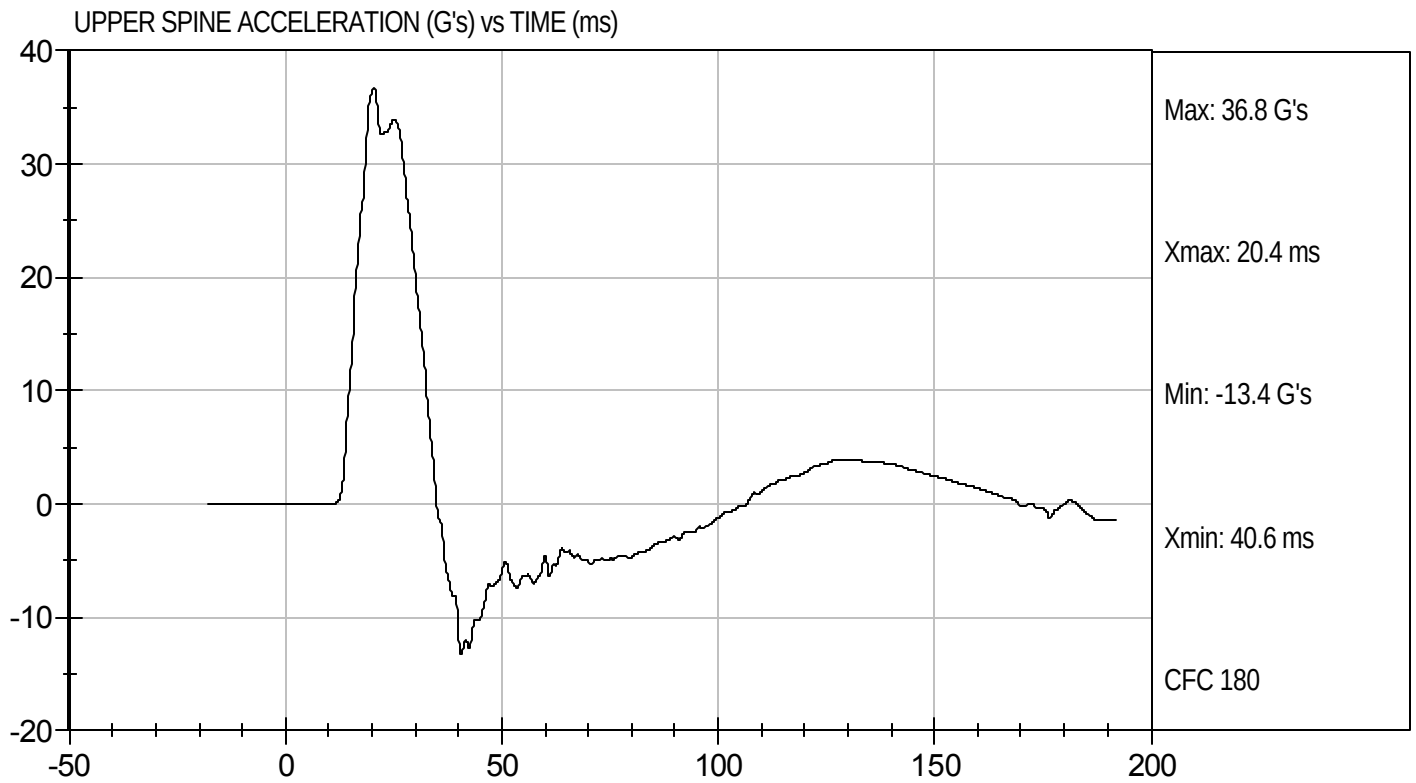
Test Date: 6/5/09  
Velocity: 21.9 ft/s, 6.68 m/s





Test Desc: Thorax Impact  
Component ID: D091424

Test Date: 6/5/09  
Velocity: 21.9 ft/s, 6.68 m/s

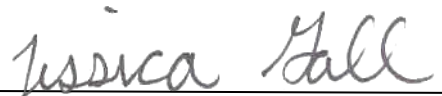


**MGA RESEARCH CORPORATION**  
**THORAX (WITHOUT ARM) IMPACT TEST**  
**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 296

**Test I.D:** D091425

| Tested Parameter                 | Units | Specification | Result | Pass/Fail |
|----------------------------------|-------|---------------|--------|-----------|
| Temperature                      | deg C | 20.6 to 22.2  | 21.3   | Pass      |
| Humidity                         | %     | 10 to 70      | 35     | Pass      |
| Impact Velocity                  | m/s   | 4.20 to 4.40  | 4.21   | Pass      |
| Peak Impactor Force              | G's   | 14 to 18      | 16     | Pass      |
| Upper Rib Displacement           | mm    | 32 to 40      | 34     | Pass      |
| Middle Rib Displacement          | mm    | 39 to 45      | 41     | Pass      |
| Lower Rib Displacement           | mm    | 35 to 43      | 41     | Pass      |
| Upper Spine (T1) Y Acceleration  | G's   | 13 to 17      | 14     | Pass      |
| Lower Spine (T12) Y Acceleration | G's   | 7 to 11       | 11     | Pass      |
| Overall Test Results             |       |               | Pass   |           |

  
Laboratory Technician

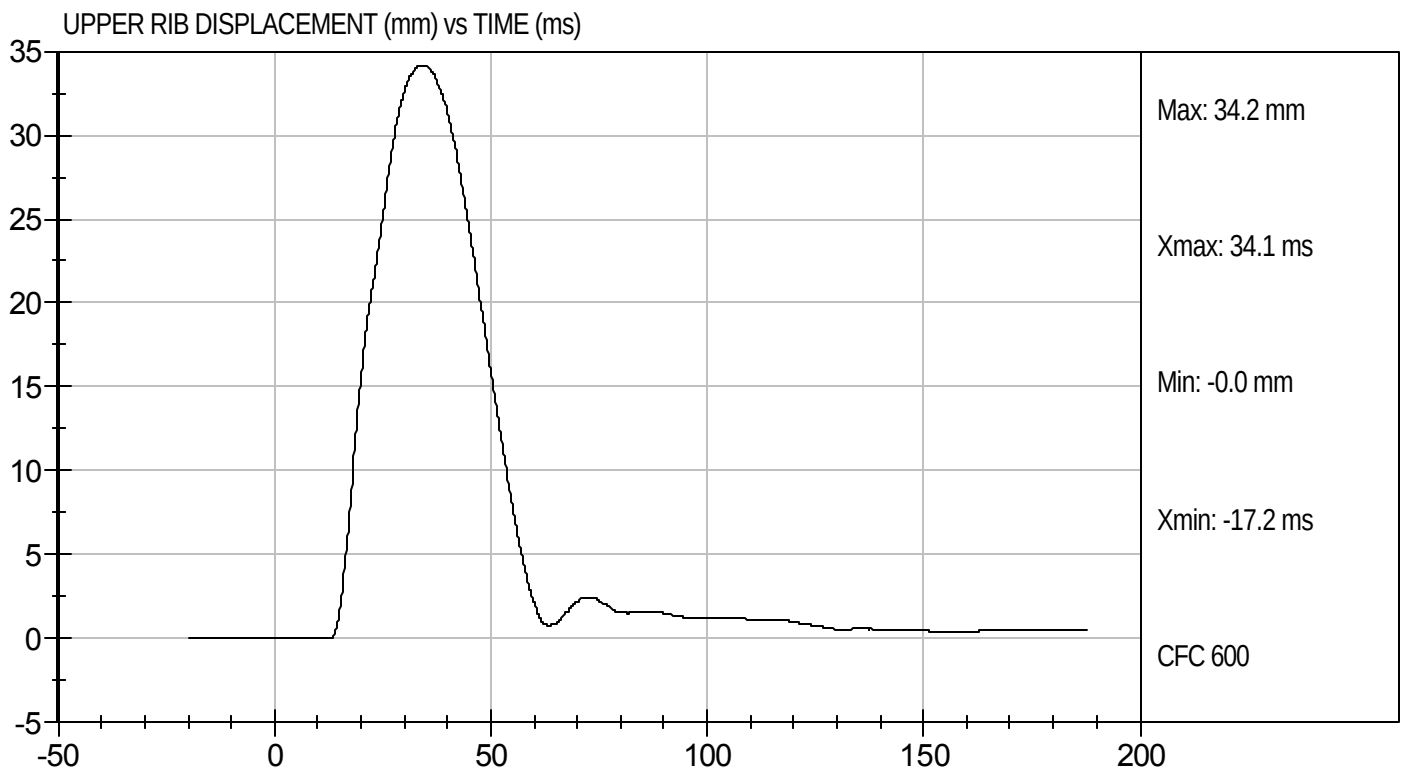
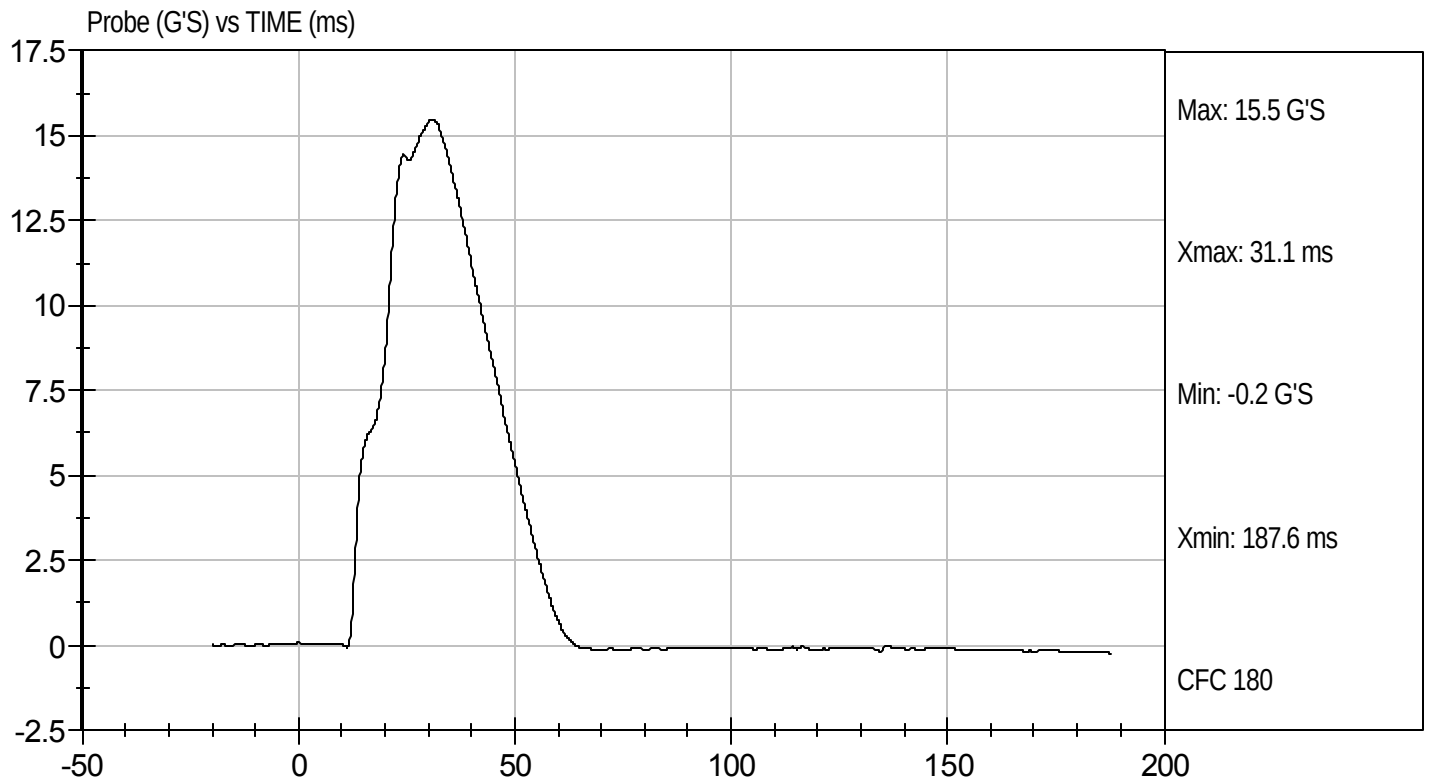
6/5/09  
Test Date

  
Approved By



Test Desc: Thorax Impact  
Component ID: D091425

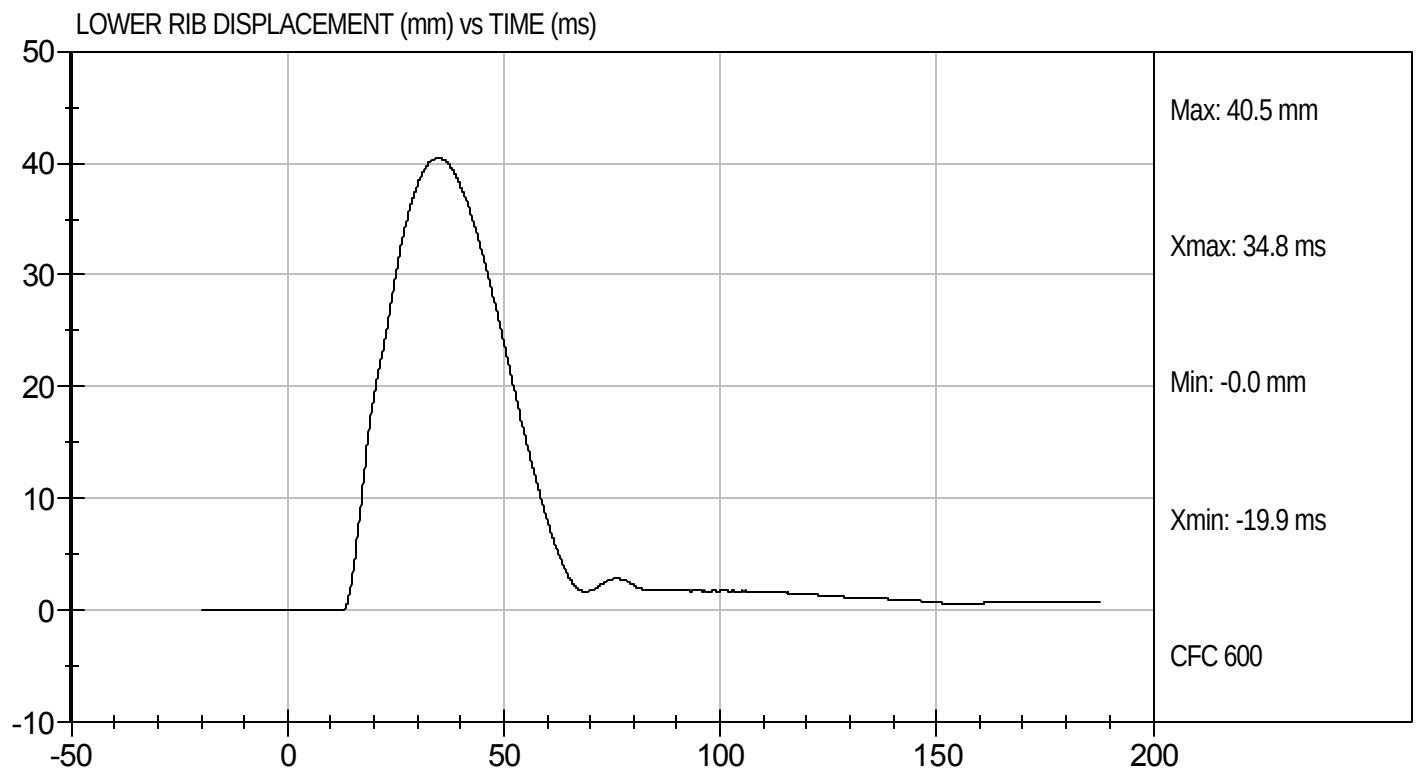
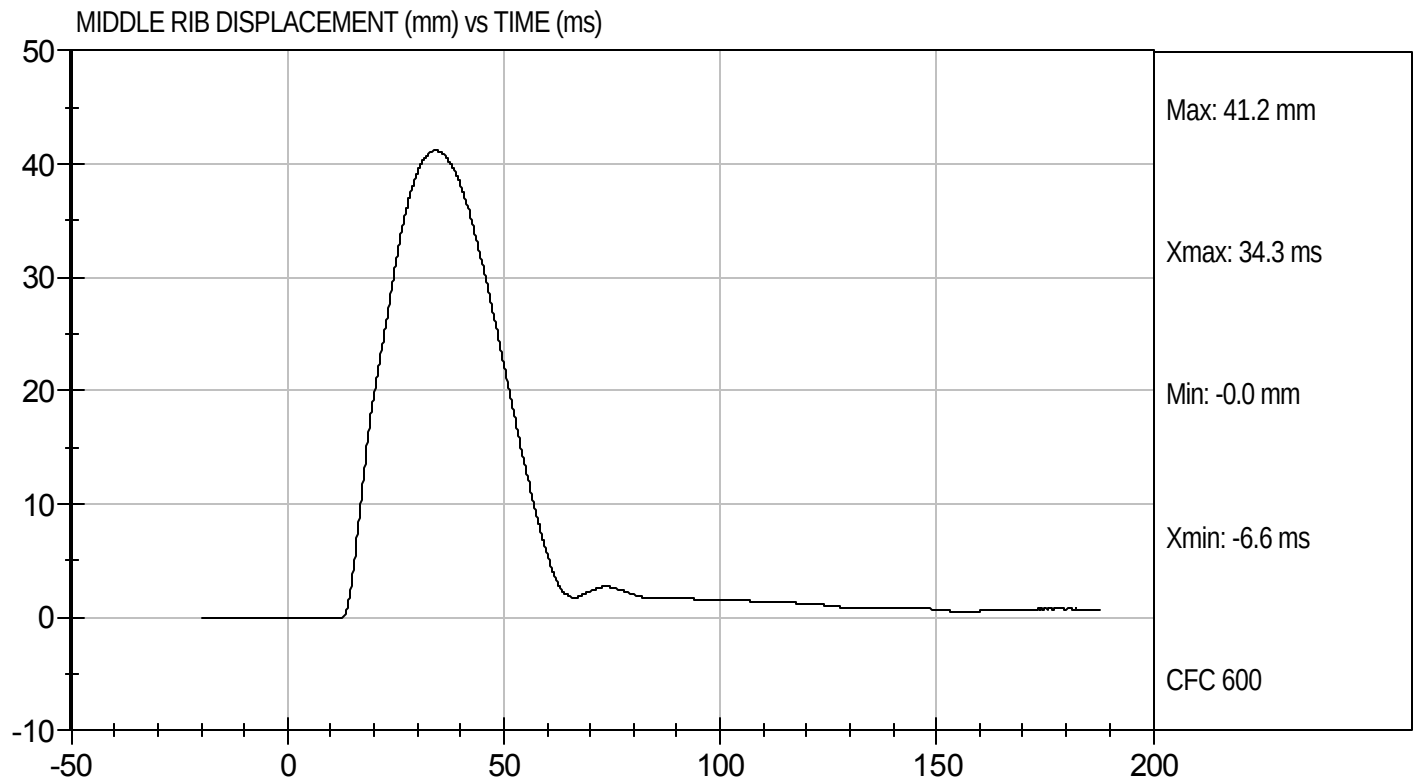
Test Date: 6/5/09  
Velocity: 13.8 ft/s, 4.21 m/s





Test Desc: Thorax Impact  
Component ID: D091425

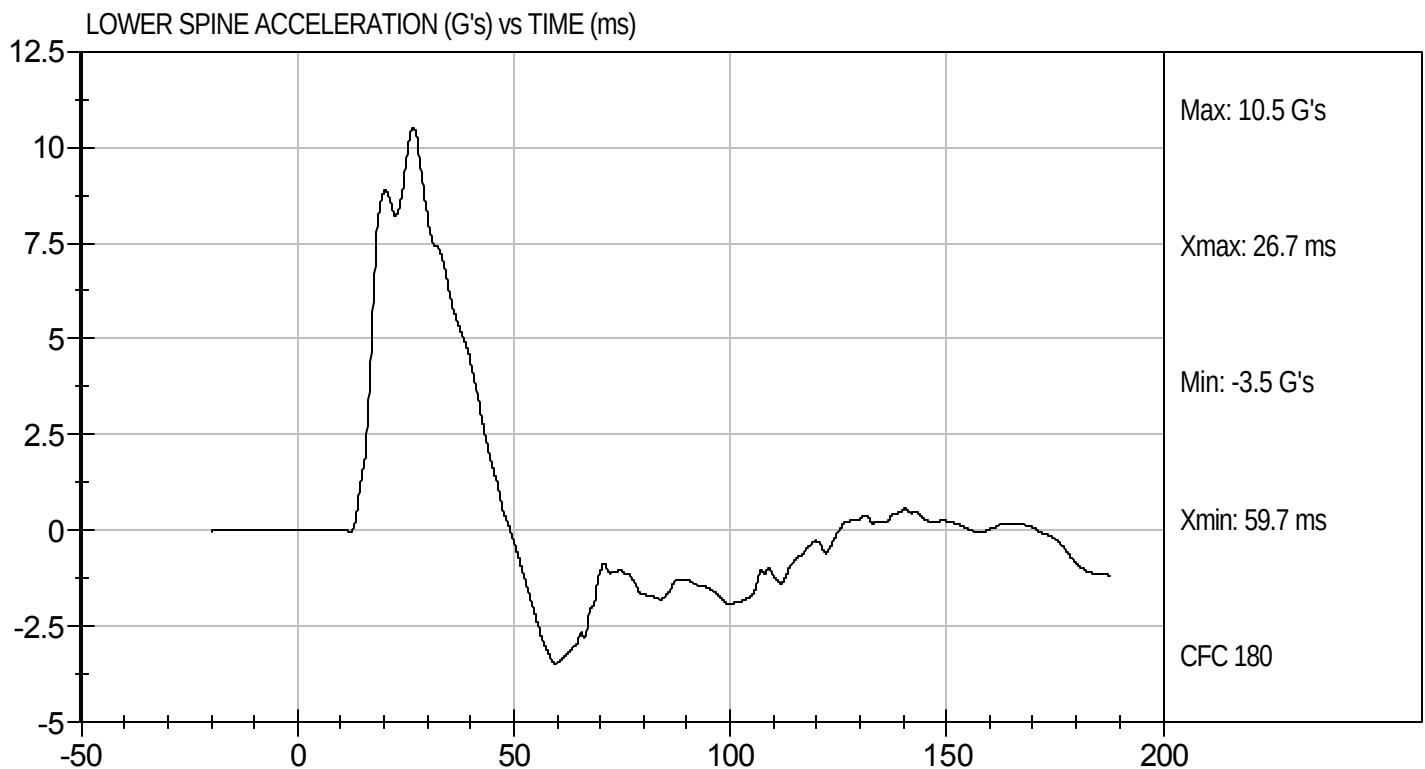
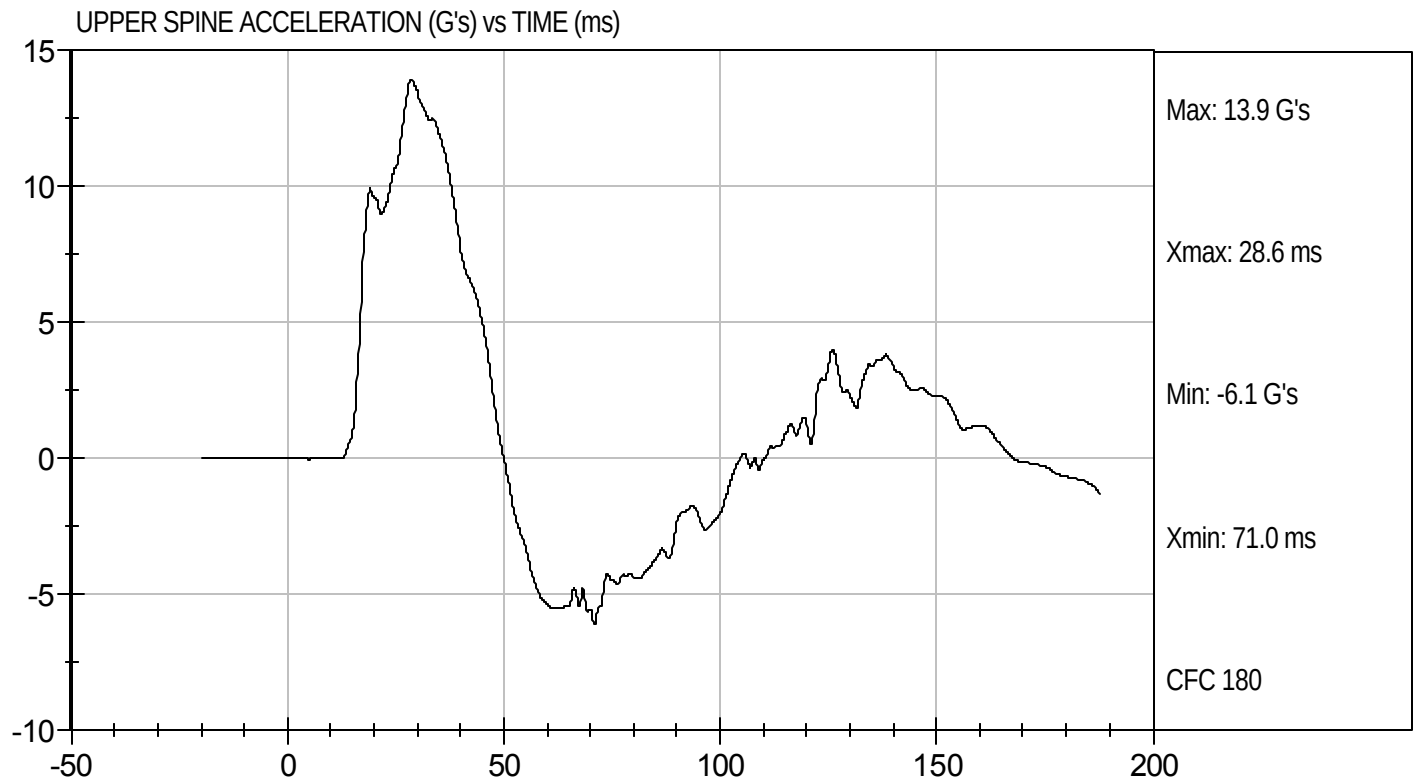
Test Date: 6/5/09  
Velocity: 13.8 ft/s, 4.21 m/s





Test Desc: Thorax Impact  
Component ID: D091425

Test Date: 6/5/09  
Velocity: 13.8 ft/s, 4.21 m/s

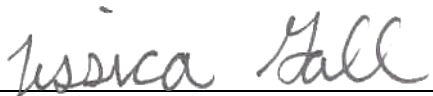


**MGA RESEARCH CORPORATION**  
**ABDOMINAL IMPACT TEST**  
**SID-II's BUILD LEVEL D DUMMY**

**ATD Serial No:** 296

**Test I.D:** D091426

| Tested Parameter                 | Units | Specification | Result               | Pass/Fail |
|----------------------------------|-------|---------------|----------------------|-----------|
| Temperature                      | deg C | 20.6 to 22.2  | 21.3                 | Pass      |
| Humidity                         | %     | 10 to 70      | 35                   | Pass      |
| Impact Velocity                  | m/s   | 4.20 to 4.40  | 4.30                 | Pass      |
| Peak Impactor Acceleration       | G's   | 12 to 16      | 14                   | Pass      |
| Upper Rib Displacement           | mm    | 36 to 47      | 42                   | Pass      |
| Lower Rib Displacement           | mm    | 33 to 44      | 38                   | Pass      |
| Lower Spine (T12) Y Acceleration | G's   | 9 to 14       | 11                   | Pass      |
|                                  |       |               | Overall Test Results | Pass      |

  
Laboratory Technician

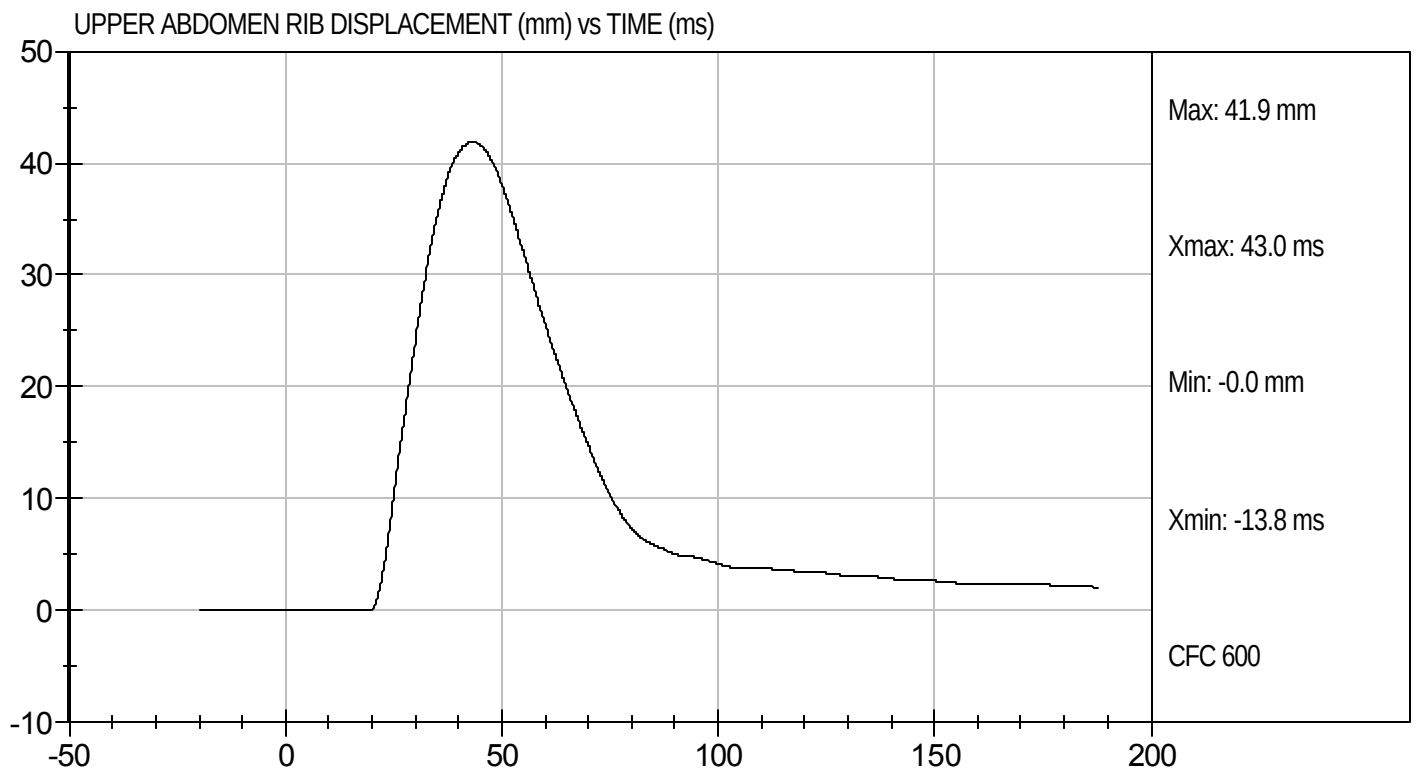
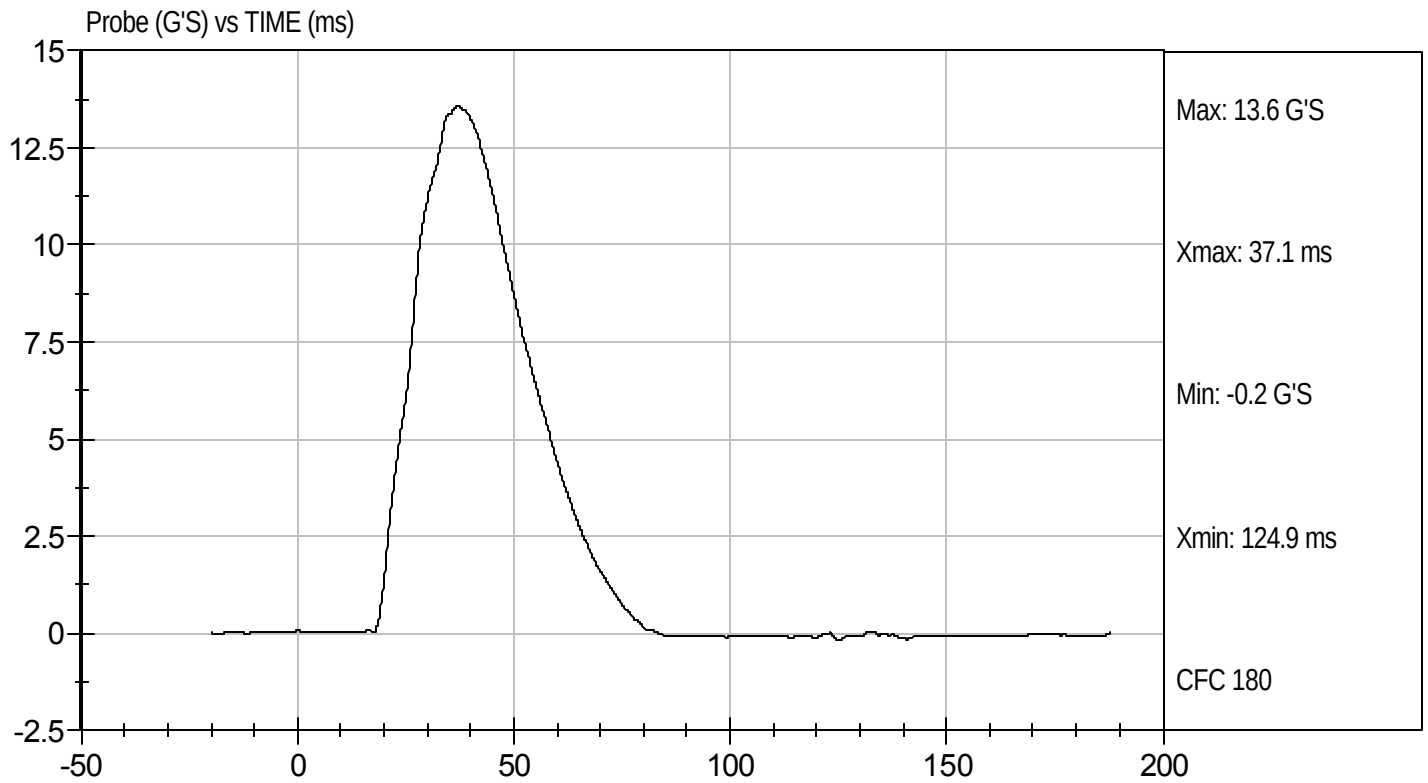
6/5/09  
Test Date

  
Approved By



Test Desc: Abdomen Impact  
Component ID: D091426

Test Date: 6/5/09  
Velocity: 14.1 ft/s, 4.30 m/s

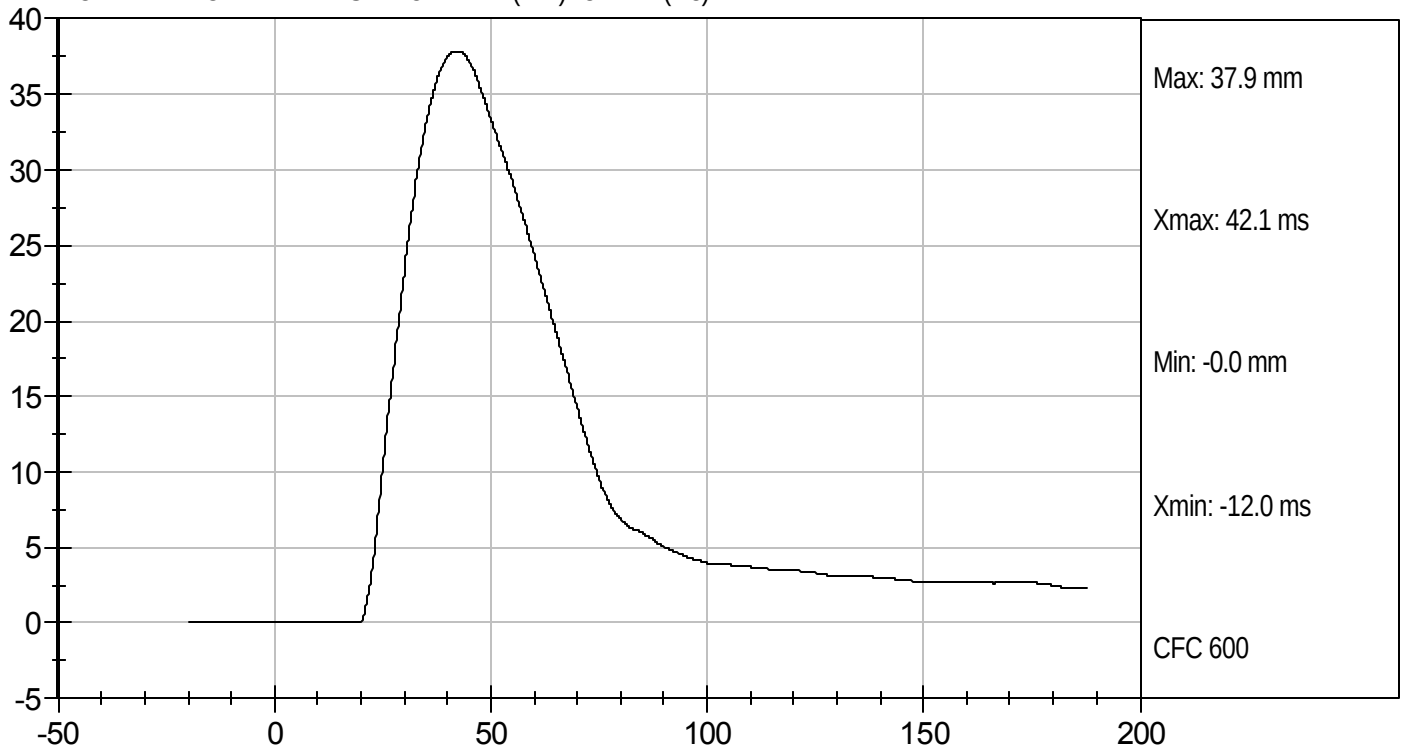




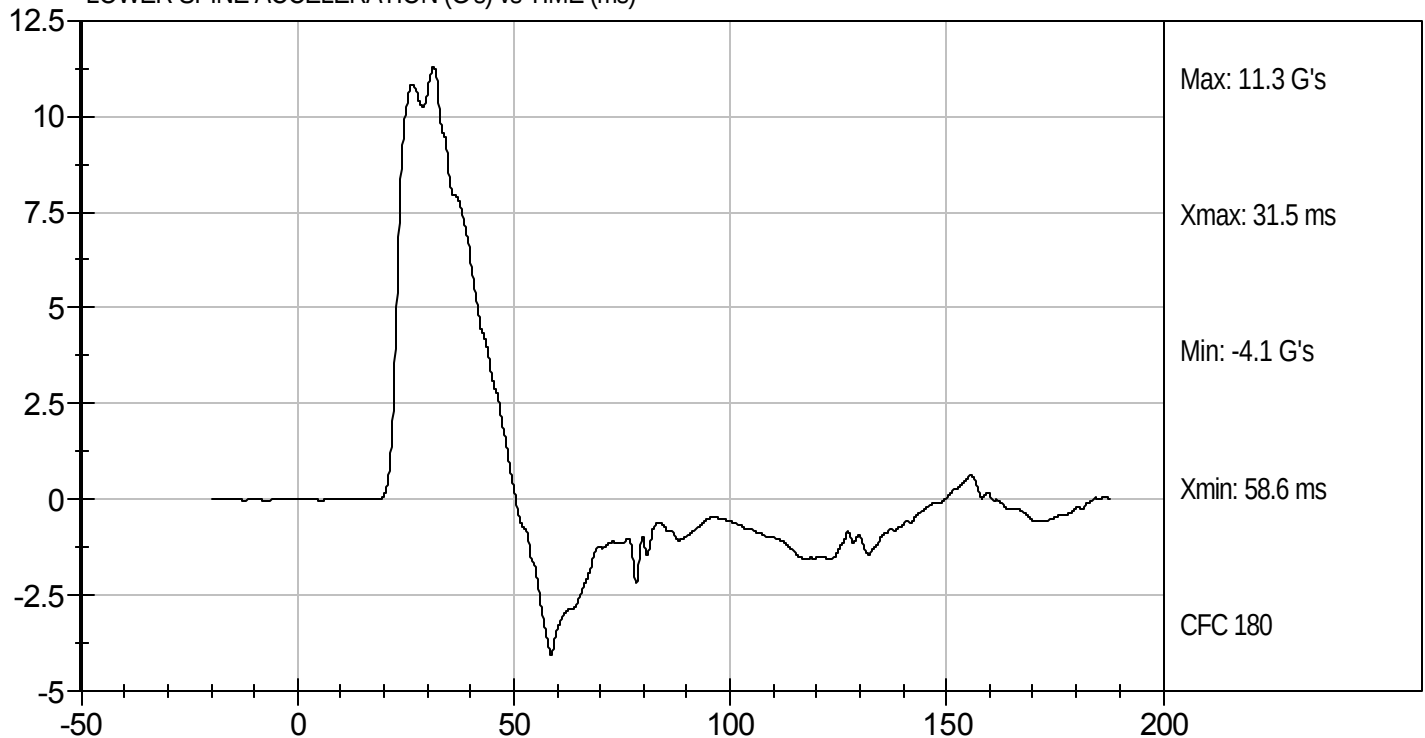
Test Desc: Abdomen Impact  
Component ID: D091426

Test Date: 6/5/09  
Velocity: 14.1 ft/s, 4.30 m/s

LOWER ABDOMEN RIB DISPLACEMENT (mm) vs TIME (ms)



LOWER SPINE ACCELERATION (G's) vs TIME (ms)



**MGA RESEARCH CORPORATION**  
**PELVIS IMPACT TEST**  
**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 296

**Test I.D:** D091427

| Tested Parameter                 | Units | Specification | Result | Pass/Fail |
|----------------------------------|-------|---------------|--------|-----------|
| Temperature                      | deg C | 20.6 to 22.2  | 21.2   | Pass      |
| Humidity                         | %     | 10 to 70      | 36     | Pass      |
| Impact Velocity                  | m/s   | 6.60 to 6.80  | 6.77   | Pass      |
| Peak Impactor Acceleration       | G's   | 38 to 47      | 43     | Pass      |
| Pelvis Y Acceleration after 6 ms | G's   | 34 to 42      | 38     | Pass      |
| Peak Acetabulum Force            | N     | 3600 to 4300  | 4157   | Pass      |
| Overall Test Results             |       |               | Pass   |           |

Jessica Hall  
Laboratory Technician

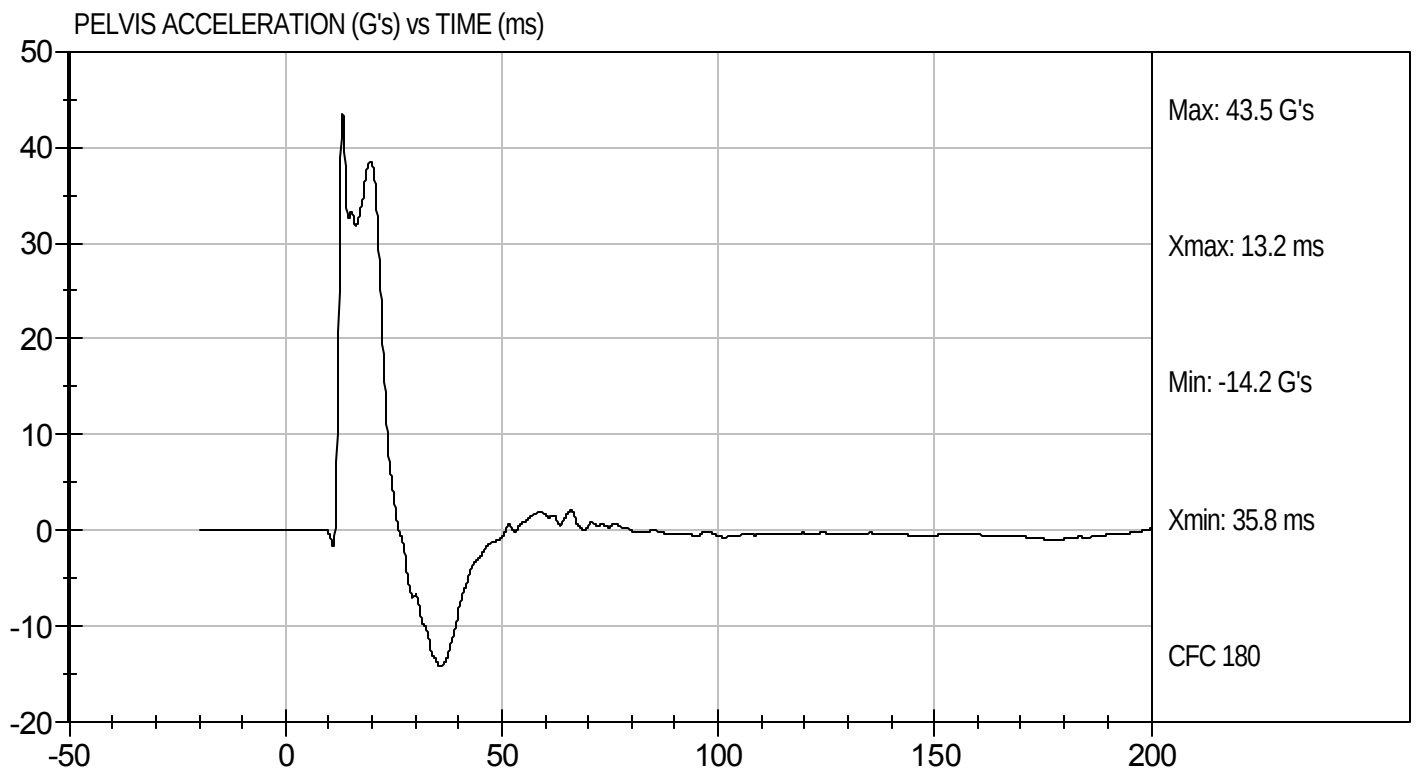
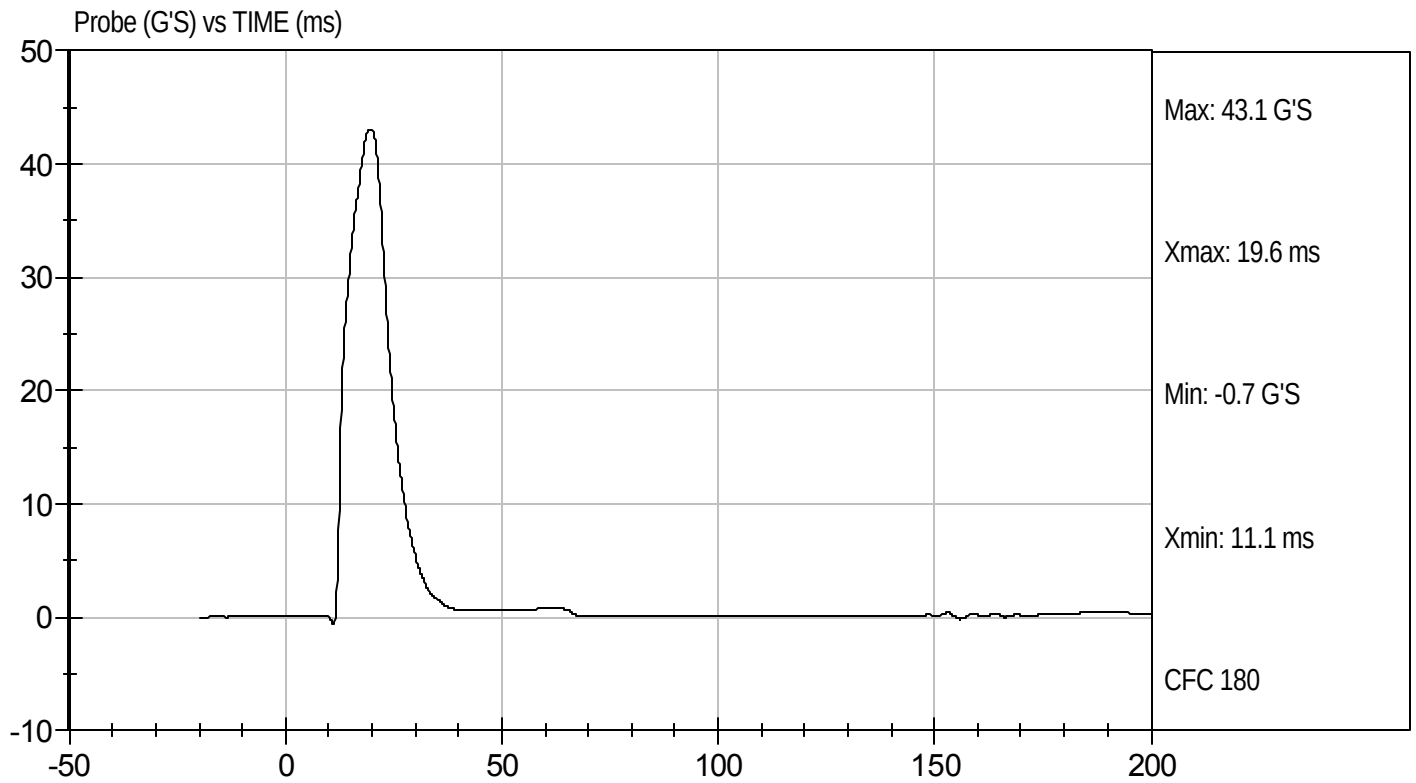
6/5/09  
Test Date

David Winkelbauer  
Approved By



Test Desc: Pelvis Impact  
Component ID: D091427

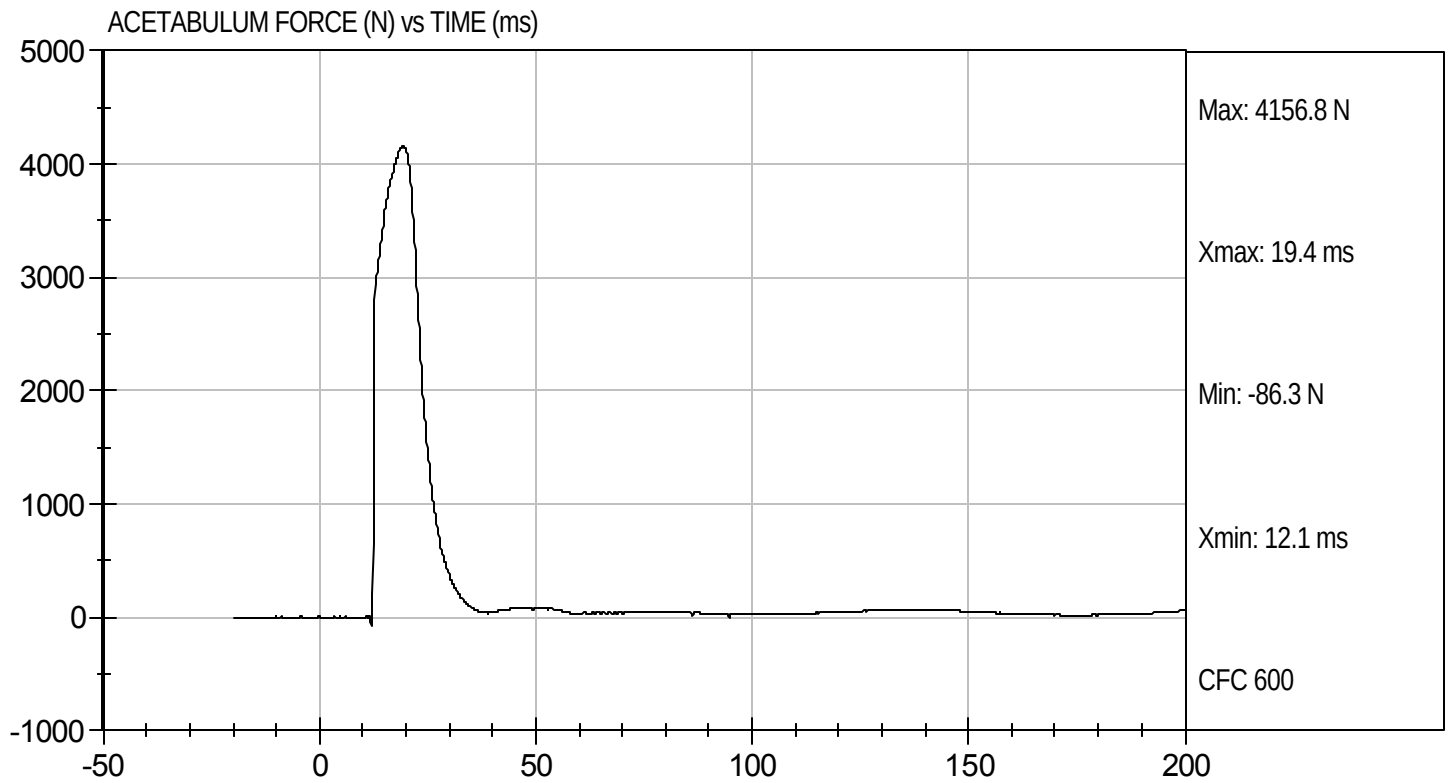
Test Date: 6/5/09  
Velocity: 22.2 ft/s, 6.77 m/s





Test Desc: Pelvis Impact  
Component ID: D091427

Test Date: 6/5/09  
Velocity: 22.2 ft/s, 6.77 m/s



**MGA RESEARCH CORPORATION**  
**ILIAC IMPACT TEST**  
**SID-II's BUILD LEVEL D DUMMY**

**ATD Serial No:** 296

**Test I.D:** D091428

| Tested Parameter           | Units | Specification | Result | Pass/Fail |
|----------------------------|-------|---------------|--------|-----------|
| Temperature                | deg C | 20.6 to 22.2  | 21.2   | Pass      |
| Humidity                   | %     | 10 to 70      | 36     | Pass      |
| Impact Velocity            | m/s   | 4.20 to 4.40  | 4.30   | Pass      |
| Peak Impactor Acceleration | G's   | 36 to 45      | 39     | Pass      |
| Pelvis Y Acceleration      | G's   | 28 to 39      | 34     | Pass      |
| Peak Pelvis Iliac Force    | N     | 4100 to 5100  | 4656   | Pass      |
| Overall Test Results       |       |               | Pass   |           |

  
Laboratory Technician

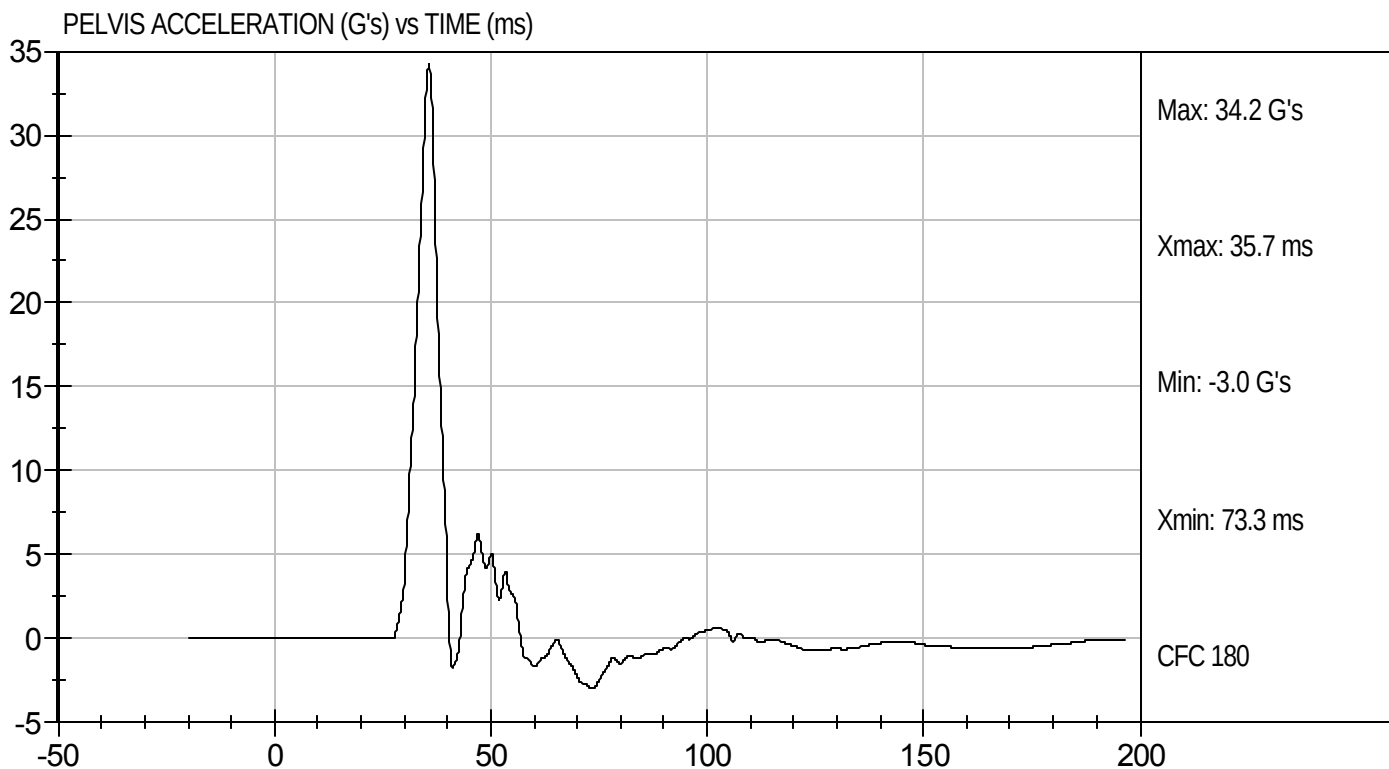
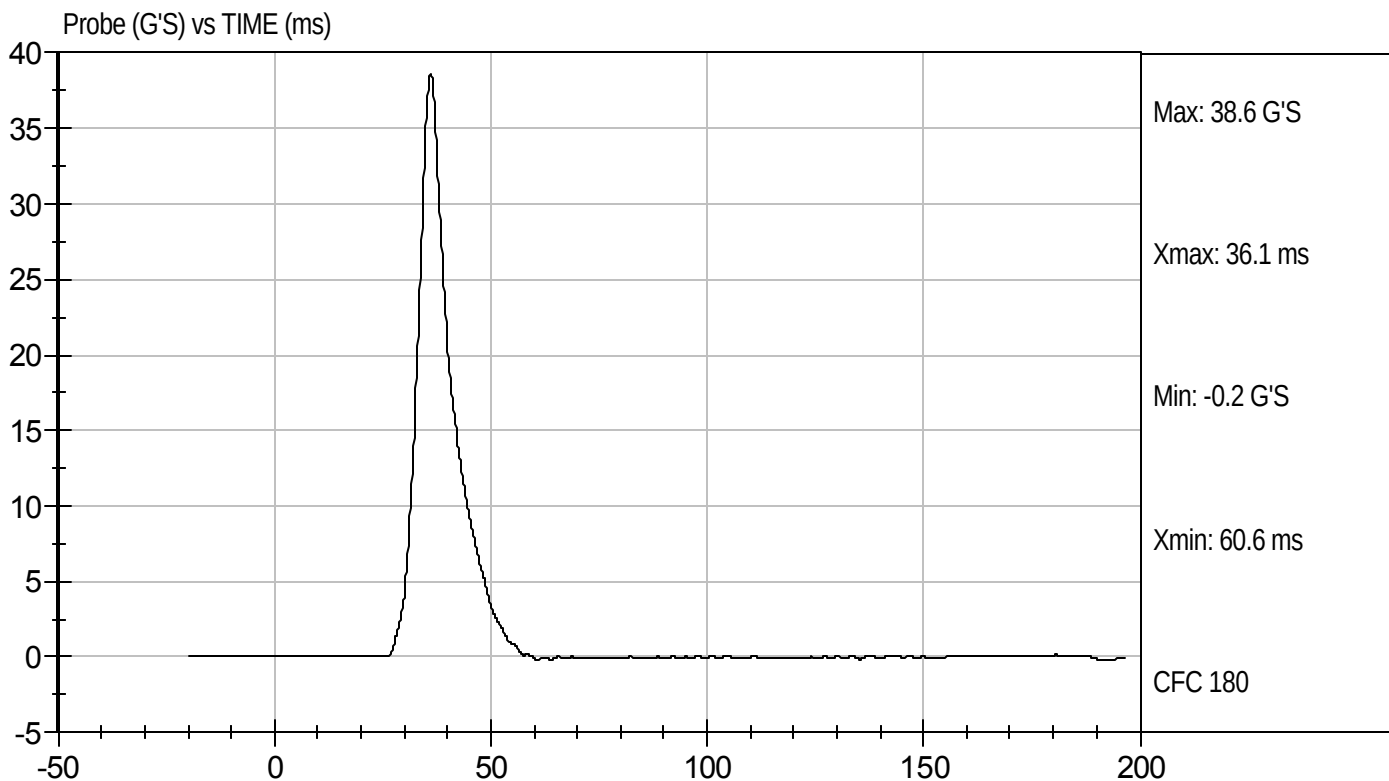
6/5/09  
Test Date

  
Approved By



Test Desc: Iliac Impact  
Component ID: D091428

Test Date: 6/5/09  
Velocity: 14.12 ft/s, 4.30 m/s





Test Desc: Iliac Impact  
Component ID: D091428

Test Date: 6/5/09  
Velocity: 14.12 ft/s, 4.30 m/s

