

**REPORT NUMBER: NCAPSIDE-MGA-2006-013**

**NEW CAR ASSESSMENT PROGRAM  
SIDE IMPACT TEST**

**DAIMLERCHRYSLER CORPORATION  
2006 JEEP GRAND CHEROKEE LAREDO  
NHTSA NUMBER: M60303**

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



**Test Date: August 28, 2006**

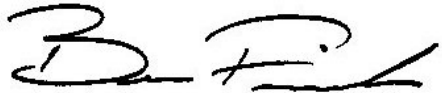
**Report Date: September 15, 2006**

**FINAL REPORT**

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

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Date: 9/15/06

### Technical Report Documentation Page

| 1. <i>Report No.</i><br>NCAPSIDE-MGA-2006-013                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 2. <i>Government Accession No.</i>                          | 3. <i>Recipient's Catalog No.</i>                                                                                                                                                                                               |                  |  |               |              |                                |      |      |                                |      |      |                                          |      |      |                             |    |    |                        |      |      |     |    |    |
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| 4. <i>Title and Subtitle</i><br>Final Report of New Car Assessment Program<br>Side Impact Testing of 2006 Jeep Grand Cherokee Laredo<br>NHTSA No.: M60303                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                             | 5. <i>Report Date</i><br>September 15, 2006                                                                                                                                                                                     |                  |  |               |              |                                |      |      |                                |      |      |                                          |      |      |                             |    |    |                        |      |      |     |    |    |
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| 7. <i>Author(s)</i><br>Ben Fischer, Project Engineer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                             | 8. <i>Performing Organization Report No.</i><br>NCAPSIDE-MGA-2006-013                                                                                                                                                           |                  |  |               |              |                                |      |      |                                |      |      |                                          |      |      |                             |    |    |                        |      |      |     |    |    |
| 9. <i>Performing Organization Name and Address</i><br>MGA Research Corporation<br>5000 Warren Road<br>Burlington, WI 53105                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                             | 10. <i>Work Unit No.</i>                                                                                                                                                                                                        |                  |  |               |              |                                |      |      |                                |      |      |                                          |      |      |                             |    |    |                        |      |      |     |    |    |
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| 15. <i>Supplementary Notes</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                             |                                                                                                                                                                                                                                 |                  |  |               |              |                                |      |      |                                |      |      |                                          |      |      |                             |    |    |                        |      |      |     |    |    |
| 16. <i>Abstract</i><br>A 55/28 km/h 90° Moving Deformable Barrier NCAP side impact was conducted on the subject 2006 Jeep Grand Cherokee Laredo to obtain new car assessment and research data indicant of FMVSS No. 214D performance. The test was conducted at MGA Research Corporation, in Burlington, Wisconsin, on August 28, 2006. The impact velocity of the Moving Deformable Barrier (MDB) was 62.0 km/h, and the ambient temperature at the struck side (drivers) of the vehicle was 21°C. The target vehicle's maximum post test static crush was 315 mm at level 3. The test vehicle's occupant performance is as follows: <table style="margin-left: auto; margin-right: auto; border: none;"> <thead> <tr> <th></th> <th style="text-align: center;"><u>DRIVER</u></th> <th style="text-align: center;"><u>PASS.</u></th> </tr> </thead> <tbody> <tr> <td>Left Upper Rib (LUR) Accel., g</td> <td style="text-align: center;">36.7</td> <td style="text-align: center;">27.8</td> </tr> <tr> <td>Left Lower Rib (LLR) Accel., g</td> <td style="text-align: center;">45.1</td> <td style="text-align: center;">39.0</td> </tr> <tr> <td>Lower Spine (T<sub>12</sub>) Accel., g</td> <td style="text-align: center;">53.7</td> <td style="text-align: center;">30.5</td> </tr> <tr> <td>Thoracic Trauma Index (TTI)</td> <td style="text-align: center;">49</td> <td style="text-align: center;">35</td> </tr> <tr> <td>Pelvis (PEV) Accel., g</td> <td style="text-align: center;">59.3</td> <td style="text-align: center;">53.2</td> </tr> <tr> <td>HIC</td> <td style="text-align: center;">80</td> <td style="text-align: center;">68</td> </tr> </tbody> </table> |                                                             |                                                                                                                                                                                                                                 |                  |  | <u>DRIVER</u> | <u>PASS.</u> | Left Upper Rib (LUR) Accel., g | 36.7 | 27.8 | Left Lower Rib (LLR) Accel., g | 45.1 | 39.0 | Lower Spine (T <sub>12</sub> ) Accel., g | 53.7 | 30.5 | Thoracic Trauma Index (TTI) | 49 | 35 | Pelvis (PEV) Accel., g | 59.3 | 53.2 | HIC | 80 | 68 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <u>DRIVER</u>                                               | <u>PASS.</u>                                                                                                                                                                                                                    |                  |  |               |              |                                |      |      |                                |      |      |                                          |      |      |                             |    |    |                        |      |      |     |    |    |
| Left Upper Rib (LUR) Accel., g                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 36.7                                                        | 27.8                                                                                                                                                                                                                            |                  |  |               |              |                                |      |      |                                |      |      |                                          |      |      |                             |    |    |                        |      |      |     |    |    |
| Left Lower Rib (LLR) Accel., g                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 45.1                                                        | 39.0                                                                                                                                                                                                                            |                  |  |               |              |                                |      |      |                                |      |      |                                          |      |      |                             |    |    |                        |      |      |     |    |    |
| Lower Spine (T <sub>12</sub> ) Accel., g                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 53.7                                                        | 30.5                                                                                                                                                                                                                            |                  |  |               |              |                                |      |      |                                |      |      |                                          |      |      |                             |    |    |                        |      |      |     |    |    |
| Thoracic Trauma Index (TTI)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 49                                                          | 35                                                                                                                                                                                                                              |                  |  |               |              |                                |      |      |                                |      |      |                                          |      |      |                             |    |    |                        |      |      |     |    |    |
| Pelvis (PEV) Accel., g                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 59.3                                                        | 53.2                                                                                                                                                                                                                            |                  |  |               |              |                                |      |      |                                |      |      |                                          |      |      |                             |    |    |                        |      |      |     |    |    |
| HIC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 80                                                          | 68                                                                                                                                                                                                                              |                  |  |               |              |                                |      |      |                                |      |      |                                          |      |      |                             |    |    |                        |      |      |     |    |    |
| The 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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                             |                                                                                                                                                                                                                                 |                  |  |               |              |                                |      |      |                                |      |      |                                          |      |      |                             |    |    |                        |      |      |     |    |    |
| 17. <i>Key Words</i><br>New Car Assessment Program (NCAP)<br>Side Impact<br>Side Impact Hybrid III Dummy (SID/HIII)<br>Occupant Side Impact Protection                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                             | 18. <i>Distribution Statement</i><br>Copies of this report are available from:<br>National Highway Traffic Safety Adm.<br>Technical Ref. Division,<br>Room 5108 (NPO-230)<br>400 Seventh Street, S.W.<br>Washington, D.C. 20590 |                  |  |               |              |                                |      |      |                                |      |      |                                          |      |      |                             |    |    |                        |      |      |     |    |    |
| 19. <i>Security Classif. (of this report)</i><br>Unclassified                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 20. <i>Security Classif. (of this page)</i><br>Unclassified | 21. <i>No. of Pages</i><br><br>140                                                                                                                                                                                              | 22. <i>Price</i> |  |               |              |                                |      |      |                                |      |      |                                          |      |      |                             |    |    |                        |      |      |     |    |    |

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## **SECTION 1**

### **PURPOSE AND TEST PROCEDURE**

#### **PURPOSE**

This side impact test was conducted as part of the FY' 2006 test program sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-03-D-12005. The purpose of this test was to evaluate side impact protection in a 2006 Jeep Grand Cherokee Laredo manufactured by DaimlerChrysler Corporation.

#### **TEST PROCEDURE**

The side impact test was conducted in accordance with the Laboratory Test Procedure for New Car Assessment Program Side Impact Testing dated November 2002 and the corresponding MGA Research Corporation Test Procedure MGA-NHTSA5. The procedures for receiving, inspection, testing, and reporting of test results are described in the test procedures and are not repeated in this report.

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

## **SECTION 2**

### **SUMMARY OF NCAP SIDE IMPACT TEST**

A model year 2006 Jeep Grand Cherokee Laredo was impacted on the left (driver's) side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 62.0 km/h. The specified impact velocity range is from 61.1 to 62.7 km/h. The test (target) vehicle was stationary and positioned 63° to the line of forward motion. The weight of the vehicle as tested was 2323.3 kg and the test weight of the MDB was 1360.8 kg. The test was conducted at MGA Research Corporation in Burlington, Wisconsin, on August 28, 2006.

One (1) real-time motion picture camera and nine (9) high-speed motion picture cameras were used to document the impact event. The pre-test and post-test conditions were recorded by one (1) real-time motion picture camera. Camera locations and pertinent camera information are documented in the data sheets. Pre- and post-test photographs of the vehicle and Side Impact Dummies (SID/HIIIs) can be found in Appendix A. Two 50th percentile adult male SID/HIIIs were placed in the driver and left rear passenger designated seating positions according to instructions specified in the Laboratory Test Procedure for New Car Assessment Program Side Impact Testing dated November 2002. Each SID/HIII was instrumented in the following locations:

- Left Upper Rib (LUR) uni-axial accelerometer (Y-axis primary and redundant)
- Left Lower Rib (LLR) uni-axial accelerometer (Y-axis primary and redundant)
- Lower Thoracic Spine (T12) uni-axial accelerometer (Y-axis primary and redundant)
- Pelvic (PEV) section uni-axial accelerometer (Y-axis primary and redundant)
- Head Center of Gravity (CG) tri-axial accelerometers (X, Y and Z axes primary and redundant)
- Upper Neck load cell (Fx, Fy, Fz, Mx, My, Mz)

The test vehicle was instrumented with twenty (20) structural accelerometers and the MDB was instrumented with six (6) accelerometers and two (2) contact switches on the bumper to compare left side to right side bumper impact timing. All data channels were recorded with a fully self contained on-board DTS TDAS Pro Data Acquisition System. The data was digitally sampled at 10,000 samples per second and processed per Appendix V of the Test Procedure.

## **2.2 GENERAL COMMENTS**

The test vehicle sustained a maximum static crush of 315 mm at level 3, 1650 mm rearward of the left vertical impact point. The driver and passenger SID/HIIIs, Serial Nos. 272 and 904 respectively, were calibrated just prior to this test.

Appendix A contains the still photograph prints. Appendix B contains the SID/HIII response data traces. Appendix C contains the dummy calibration data.

The occupant data is summarized below:

| ATD position | HIC | T <sup>1</sup> | T <sup>2</sup> | TTI (G's) | Peak Pelvis (G's) |
|--------------|-----|----------------|----------------|-----------|-------------------|
| Driver       | 80  | 49.5           | 70.8           | 49        | 59.3              |
| Passenger    | 68  | 50.8           | 86.8           | 35        | 53.2              |

#### SUPPLEMENTAL RESTRAINT INFORMATION

| Restraint Information | Left Front (Driver) |          | Left Rear (Passenger) |          |
|-----------------------|---------------------|----------|-----------------------|----------|
|                       | Installed           | Deployed | Installed             | Deployed |
| Front Airbag          | Yes                 | No       | None                  |          |
| Side Torso Airbag     | None                |          | None                  |          |
| Head Airbag           | None                |          | None                  |          |
| Curtain Airbag        | Yes                 | Yes      | Yes                   | Yes      |

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

#### TEST NOTES

No valid data was collected for the following:

Passenger Lower Rib Yr after 55 msec.

The driver door had a 230 mm opening at the door/window top.

The rear passenger door had a 212 mm opening at the door/window top.

**DATA SHEET NO. 1****GENERAL TEST AND VEHICLE PARAMETER DATA**Test Vehicle: 2006 Jeep Grand Cherokee LaredoNHTSA No. M60303Test Program: NCAP Side ImpactTest Date: 8/28/2006**TEST VEHICLE INFORMATION**

|                                                          |                       |
|----------------------------------------------------------|-----------------------|
| Make                                                     | Jeep                  |
| Model                                                    | Grand Cherokee Laredo |
| Body Style                                               | MPV                   |
| NHTSA No.                                                | M60303                |
| VIN                                                      | 1J8GR48K26C130511     |
| Color                                                    | Bright Silver Met.    |
| Delivery Date                                            | 8/16/06               |
| Odometer Reading (mile)                                  | 215                   |
| Dealer                                                   | Walton on Dempster    |
| Transmission                                             | Automatic             |
| Final Drive                                              | 4WD                   |
| Number of Cylinders                                      | 6                     |
| Engine Displacement (L)                                  | 3.7                   |
| Engine Placement                                         | Longitudinal          |
| Automatic Door Locks (ADL)                               | No                    |
| Owner's Manual Details<br>Instructions on Disabling ADLs | N/A                   |

**TEST VEHICLE OPTIONS**

|                                    |     |
|------------------------------------|-----|
| Driver Front Airbag                | Yes |
| Driver Side Curtain Airbag         | Yes |
| Driver Side Torso Airbag           | No  |
| Rear Passenger Side/Curtain Airbag | Yes |
| Rear Passenger Side Torso Airbag   | No  |
| Power Steering                     | Yes |
| Power Door Locks                   | Yes |
| Tilt Wheel                         | Yes |
| Anti-lock Brakes                   | Yes |
| Traction Control                   | Yes |
| All Wheel Drive                    | Yes |
| Power Seats                        | Yes |
| Pretensioners                      | Yes |
| Load Limiters                      | Yes |
| Bucket Seats                       | Yes |

**DATA FROM CERTIFICATION LABEL**

|                     |                             |
|---------------------|-----------------------------|
| Manufactured By     | DaimlerChrysler Corporation |
| Date of Manufacture | 08/05                       |

|                 |      |
|-----------------|------|
| GVWR (kg)       | 2677 |
| GAWR Front (kg) | 1339 |
| GAWR Rear (kg)  | 1452 |

| Measured Parameter      | Front  | Rear  | Third | Total |
|-------------------------|--------|-------|-------|-------|
| Type of Seats           | Bucket | Bench |       |       |
| Number Of Occupants     | 2      | 3     |       | 5     |
| Capacity Wt. (VCW) (kg) |        |       |       | 498   |
| Cargo Wt. (RCLW) (kg)   |        |       |       | 158   |

**DATA SHEET NO. 1 (continued)****GENERAL TEST AND VEHICLE PARAMETER DATA**Test Vehicle: 2006 Jeep Grand Cherokee LaredoNHTSA No. M60303Test Program: NCAP Side ImpactTest Date: 8/28/2006**TEST VEHICLE WEIGHTS**

|        | Units | As Delivered (UVW) (Axle) |       |        | As Tested (ATW) (Axle) |        |        |
|--------|-------|---------------------------|-------|--------|------------------------|--------|--------|
|        |       | Front                     | Rear  | Total  | Front                  | Rear   | Total  |
| Left   | kg    | 571.5                     | 489.4 |        | 616.9                  | 631.0  |        |
| Right  | kg    | 504.9                     | 466.8 |        | 497.1                  | 578.3  |        |
| Ratio  | %     | 53.0                      | 47.0  |        | 47.9                   | 52.1   |        |
| Totals | kg    | 1076.4                    | 956.2 | 2032.6 | 1114.0                 | 1209.3 | 2323.3 |

**TARGET TEST WEIGHT CALCULATION**

| Measured Parameter                      | Units | Value  |
|-----------------------------------------|-------|--------|
| Total Delivered Weight (UVW)            | kg    | 2032.6 |
| Weight of 2 P572M ATDs                  | kg    | 161.5  |
| Rated Cargo/Luggage Weight (RCLW)       | kg    | 136.1  |
| Calculated Vehicle Target Weight (TVTW) | kg    | 2330.2 |

\* Actual As Tested Weight (ATW) will be TVTW -5/-10 kg

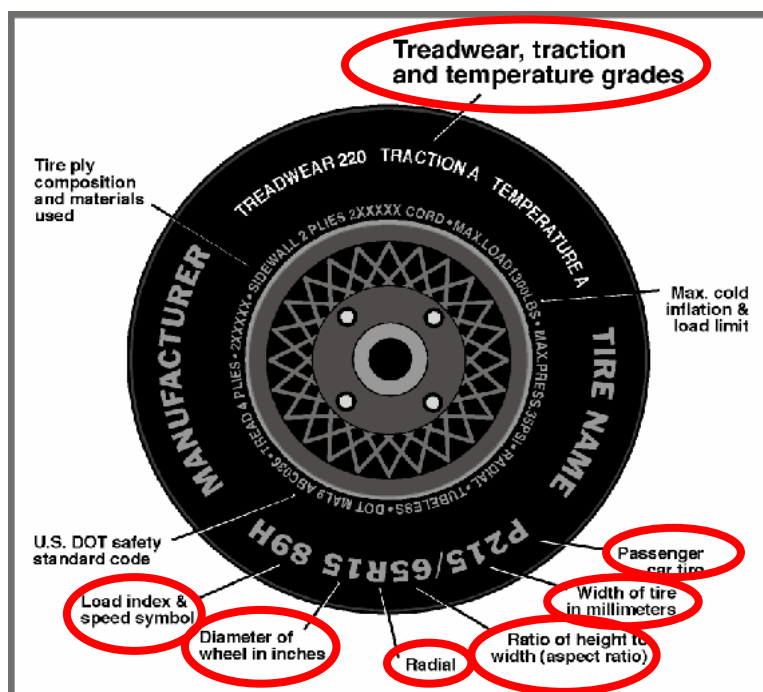
Weight of Ballast in Cargo Area: 70.3 kg**TEST VEHICLE ATTITUDES AND CG**

|              | Units | LF  | RF  | LR  | RR  | CG (aft of front axle) |
|--------------|-------|-----|-----|-----|-----|------------------------|
| As Delivered | mm    | 817 | 825 | 833 | 838 | 1305                   |
| As Tested    | mm    | 814 | 825 | 792 | 799 | 1444                   |
| Fully Loaded | mm    | 810 | 825 | 786 | 797 |                        |

**TEST VEHICLE VERTICAL IMPACT LINE DATA**

| Measurement Description               | Units | Value |
|---------------------------------------|-------|-------|
| Test Vehicle Wheel Base               | mm    | 2775  |
| Target Impact Point Aft of Front Axle | mm    | 448   |
| Actual Impact Point Aft of Front Axle | mm    | 445   |

**DATA SHEET NO. 2**  
**TEST VEHICLE TIRE INFORMATION**



**DATA FROM TIRE PLACARD**

| Measured Parameter                      | Front       | Rear        |
|-----------------------------------------|-------------|-------------|
| Maximum Tire Pressure (kPa)             | 300         | 300         |
| Cold / Test Pressure (kPa)              | 228         | 228         |
| Recommended Tire Size                   | P235/65R17  | P235/65R17  |
| Tire Size on Vehicle                    | P235/65R17  | P235/65R17  |
| Tire Manufacturer                       | Goodyear    | Goodyear    |
| Tire Name                               | Wrangler HP | Wrangler HP |
| Tire Type                               | P           | P           |
| Tire Width (mm)                         | 235         | 235         |
| Ratio of Height to Width (aspect ratio) | 65          | 65          |
| Radial                                  | R           | R           |
| Wheel Diameter                          | 17          | 17          |
| Load Index & Speed Symbol               | 103S        | 103S        |
| Treadwear                               | 340         | 340         |
| Traction Grade                          | A           | A           |
| Temperature Grade                       | B           | B           |

# **DATA SHEET NO. 3** **TEST VEHICLE INFORMATION**

Test Vehicle: 2006 Jeep Grand Cherokee Laredo  
 Test Program: NCAP Side Impact

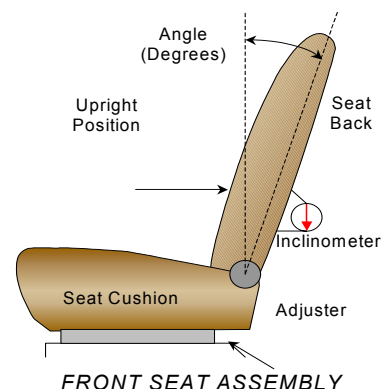
NHTSA No. M60303  
 Test Date: 8/28/2006

## **NORMAL DESIGN RIDING POSITION**

The driver and passenger seat back is positioned to the manufacturer's designated angle. The procedure is as follows: Remove trim from rear of seat back to expose upper and lower seat back crossmembers. Measure angle from upper to lower crossmembers. Set seat back to 18 degrees.

Driver seat back angle: 7.0° from headrest post

Passenger seat back angle: non adjustable

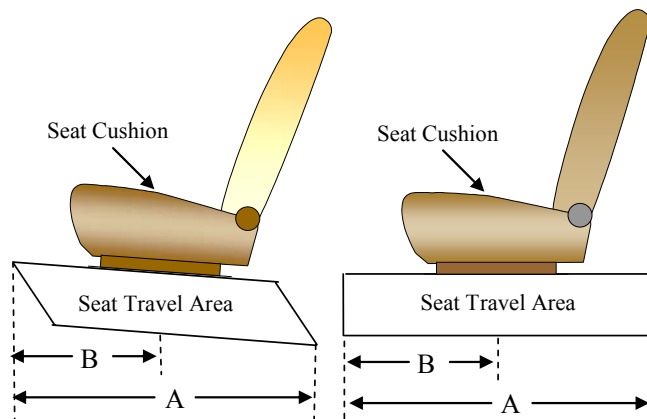


## **SEAT FORE/AFT POSITIONS**

Forward-most measurements and rearward-most measurements should be taken from the bottom of the seat cushion (including the plastic base if applicable).

**SEAT FORE/AFT POSITIONS**

|             | Total Fore/Aft Travel | Placed in position # |
|-------------|-----------------------|----------------------|
| Driver Seat | 300 mm                | 150 mm               |
| Rear Seat   | non adjustable        | non adjustable       |



## DATA SHEET NO. 3 (CONTINUED)

### TEST VEHICLE INFORMATION

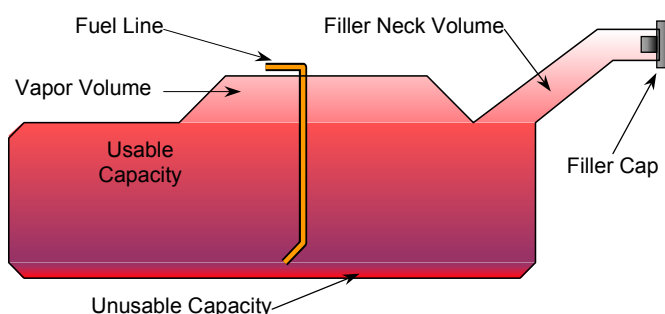
Test Vehicle: 2006 Jeep Grand Cherokee Laredo  
Test Program: NCAP Side Impact

NHTSA No. M60303  
Test Date: 8/28/2006

### FUEL TANK CAPACITY

|                                    | Liters      |
|------------------------------------|-------------|
| Usable Capacity of "Standard Tank" | 77.6        |
| Usable Capacity of "Optional" Tank |             |
| 92-94% of Usable Capacity          | 71.4 – 72.9 |
| Actual Amount of Solvent used      | 72.3        |
| 1/3 of Usable Capacity             | 25.9        |

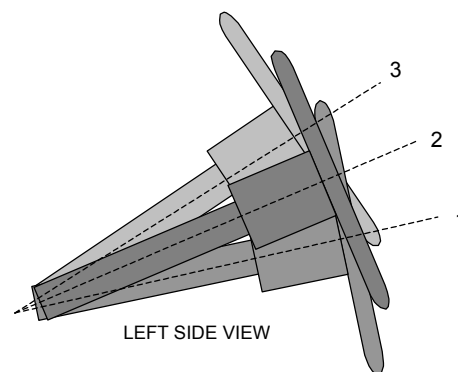
The vehicle is equipped with electric fuel pump.  
The fuel pump is activated when the ignition is turned on.



VEHICLE FUEL TANK ASSEMBLY

### 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 ASSEMBLY

|                                 | Fore/Aft (mm) | Degrees |
|---------------------------------|---------------|---------|
| Lowermost position No. 1        |               | 17.8    |
| Geometric center position No. 2 |               | 21.0    |
| Uppermost position No. 3        |               | 24.3    |

**DATA SHEET NO. 4**  
**MOVING DEFORMABLE BARRIER (MDB) SUMMARY OF RESULTS**

Test Vehicle: 2006 Jeep Grand Cherokee Laredo  
 Test Program: NCAP Side Impact

NHTSA No. M60303  
 Test Date: 8/28/2006

**MDB SPECIFICATIONS**

| Measurement Description                 | Length (mm) |
|-----------------------------------------|-------------|
| Overall Width of Framework Carriage     | 1252        |
| Overall Length Including Honeycomb Face | 4115        |
| Wheel base of Framework Carriage        | 2588        |
| C.G. Location aft of Front Axle         | 1101        |

**MDB WEIGHTS**

|        | Units | Front Axle | Rear Axle | Total  |
|--------|-------|------------|-----------|--------|
| Left   | kg    | 473.5      | 219.5     |        |
| Right  | kg    | 308.3      | 359.5     |        |
| Ratio  | %     | 57.5       | 42.5      |        |
| Totals | kg    | 781.8      | 579.0     | 1360.8 |

**SPEED AND IMPACT ANGLE DATA**

| Measured Parameter              | Units   | Requirement  | Value |
|---------------------------------|---------|--------------|-------|
| Trap No. 1 Velocity (Primary)   | km/h    | 61.1 to 62.7 | 62.0  |
| Trap No. 2 Velocity (Redundant) | km/h    | 61.1 to 62.7 | 62.3  |
| MDB CL to Target Vehicle CL     | degrees | 88.5 to 91.5 | 89.9  |

**POST TEST OBSERVATIONS**  
**MDB LEFT EDGE IMPACT POINT DATA**

| Measured Parameter | Units | Requirement | Value  |
|--------------------|-------|-------------|--------|
| Horizontal Offset  | mm    | +/- 50      | 3 left |
| Vertical Offset    | mm    | +/-20       | 2 up   |

**DATA SHEET NO. 5****POST TEST OBSERVATIONS**

Test Vehicle: 2006 Jeep Grand Cherokee Laredo  
 Test Program: NCAP Side Impact

NHTSA No. M60303  
 Test Date: 8/28/2006

**TEST DUMMY INFORMATION AND CONTACT POINTS**

| Description             | Front Seat SID/HIII      | Rear Seat SID/HIII       |
|-------------------------|--------------------------|--------------------------|
| Dummy Type / Serial No. | SID HIII / 272           | SID HIII / 904           |
| Head Contact            | CAB, Headliner, Headrest | CAB, Headliner, Headrest |
| Upper Torso Contact     | Door Panel               | Door Panel               |
| Lower Torso Contact     | Door Panel               | Door Panel               |
| Left Knee Contact       | Door Panel               | Door Panel               |
| Right Knee Contact      | Left Knee                | Left Knee                |

**POST TEST DOOR OPENING AND SEAT TRACK INFORMATION**

| Description             | Front                                                          | Rear                                                           |
|-------------------------|----------------------------------------------------------------|----------------------------------------------------------------|
| Locked/Unlocked Doors   | Doors were unlocked                                            | Doors were unlocked                                            |
| Left Side Door Opening  | Door remained closed and latched                               | Door remained closed and latched                               |
| Right Side Door Opening | Door remained closed and latched;<br>Door opened without tools | Door remained closed and latched;<br>Door opened without tools |
| 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             | None                                                                                                                         |
| Window Damage                 | None                                                                                                                         |
| Other Notable Effects         | Driver door had a 230 mm opening at the door/window top.<br>Rear passenger door had a 212 mm opening at the door/window top. |

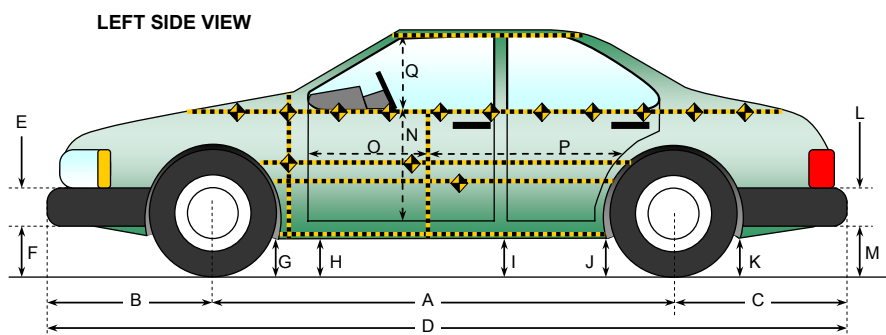
**SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION**

| Restraint Type         | Occupant Location 01 |           | Occupant Location 04 |           |
|------------------------|----------------------|-----------|----------------------|-----------|
|                        | Installed            | Operation | Installed            | Operation |
| Front Airbag           | Yes                  | No        | None                 |           |
| Side Torso Airbag      | None                 |           | None                 |           |
| Head Airbag            | None                 |           | None                 |           |
| Curtain Airbag         | Yes                  | Yes       | Yes                  | Yes       |
| Seat Belt Pretensioner | Yes                  |           | None                 |           |
| Seat Belt Load Limiter | Yes                  |           | None                 |           |

**DATA SHEET NO. 6**  
**VEHICLE PRE-TEST AND POST-TEST MEASUREMENTS**

Test Vehicle: 2006 Jeep Grand Cherokee Laredo  
 Test Program: NCAP Side Impact

NHTSA No. M60303  
 Test Date: 8/28/2006



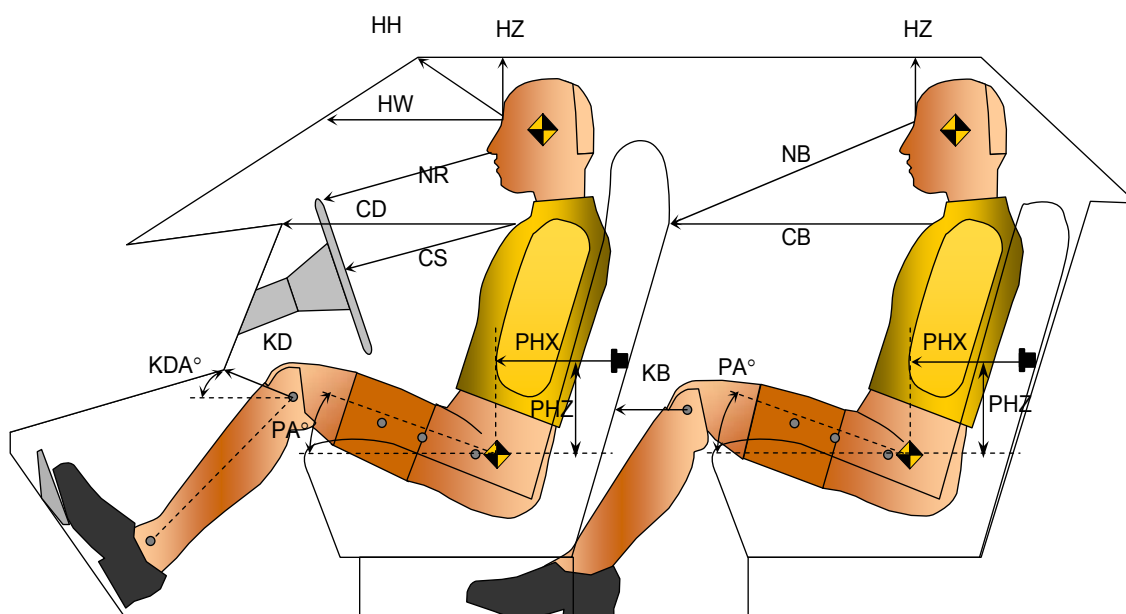
All Measurements in mm

| Code | Measurement Description                | Pre-Test | Post-Test | Difference |
|------|----------------------------------------|----------|-----------|------------|
| A    | Wheelbase                              | 2775     | 2773      | 2          |
| B    | Front Axle to FSOV                     | 854      | 844       | 10         |
| C    | Rear Axle to RSOV                      | 1077     | 1074      | 3          |
| D    | Total Length at Centerline             | 4706     | 4691      | 15         |
| E    | Front Bumper Thickness                 | 160      | 160       | 0          |
| F    | Front Bumper Bottom to Ground          | 259      | 268       | -9         |
| G    | Sill Height at Front Wheel Well        | 287      | 288       | -1         |
| H    | Sill Height at Front Door Leading Edge | 289      | 302       | -13        |
| I    | Sill Height at "B" Pillar              | 289      | 303       | -14        |
| J1   | Sill Height at Rear Wheel Well         | 281      | 306       | -25        |
| J2   | Pinch Weld Height at Rear Wheel Well   | 283      | 316       | -33        |
| K    | Sill Height Aft of Rear Wheel Well     | 351      | 314       | 37         |
| L    | Rear Bumper Thickness                  | 132      | 132       | 0          |
| M    | Rear Bumper Bottom to Ground           | 288      | 331       | -43        |
| N    | Sill Height to Window Bottom Sill      | 718      | 630       | 88         |
| O    | Front Door Leading Edge to Impact CL   | 718      | 717       | 1          |
| P    | Rear Door Trailing Edge to Impact CL   | 1356     | 1260      | 96         |
| Q    | Front Window Opening                   | 430      | 427       | 3          |
| R    | Right Side Length                      | 3925     | 3928      | -3         |
| S    | Left Side Length                       | 3915     | 3886      | 29         |
| T    | Vehicle Width at "B" Post              | 1961     | 1629      | 332        |

**DATA SHEET NO. 7**  
**SID/HII LONGITUDINAL CLEARANCE DIMENSIONS**

Test Vehicle: 2006 Jeep Grand Cherokee Laredo  
 Test Program: NCAP Side Impact

NHTSA No. M60303  
 Test Date: 8/28/2006

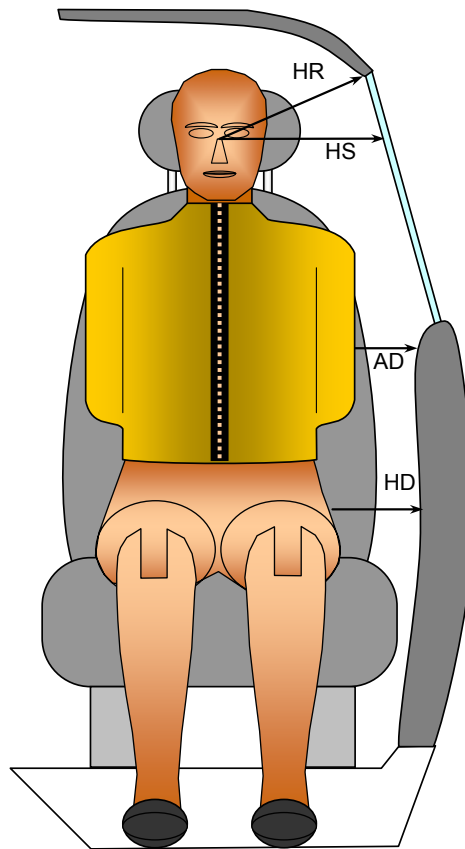


| Driver Code | Pass. Code | Measurement Description        | Driver S/N 272 |          | Passenger S/N 904 |          |
|-------------|------------|--------------------------------|----------------|----------|-------------------|----------|
|             |            |                                | Length(mm)     | Angle(°) | Length(mm)        | Angle(°) |
| HH          |            | Head to Header                 | 468            |          |                   |          |
| HW          |            | Head to Windshield             | 618            |          |                   |          |
| HZ          | HZ         | Head to Roof                   | 163            |          | 184               |          |
| NR          | NB         | Nose to Rim/Nose to Seatback   | 439            |          | 590               |          |
| CD          | CB         | Chest to Dash or Seatback      | 568            |          | 532               |          |
| CS          |            | Chest to Steering Wheel        | 342            |          |                   |          |
| KDL         | KBL        | Left Knee to Dash or Seatback  | 163            | 27.2     | 192               | 26.3     |
| KDR         | KBR        | Right Knee to Dash or Seatback | 153            | 26.2     | 199               | 28.6     |
| PA          | PA         | Pelvic Angle                   |                | 23.7     |                   | 23.9     |
| PHX         | PHX        | H-Point to Striker (X-Axis)    | 172            |          | 219               |          |
| PHZ         | PHZ        | H-Point to Striker (Z-Axis)    | 78             |          | 232               |          |

**DATA SHEET NO. 8**  
**SID/HIII LATERAL CLEARANCE DIMENSIONS**

Test Vehicle: 2006 Jeep Grand Cherokee Laredo  
 Test Program: NCAP Side Impact

NHTSA No. M60303  
 Test Date: 8/28/2006



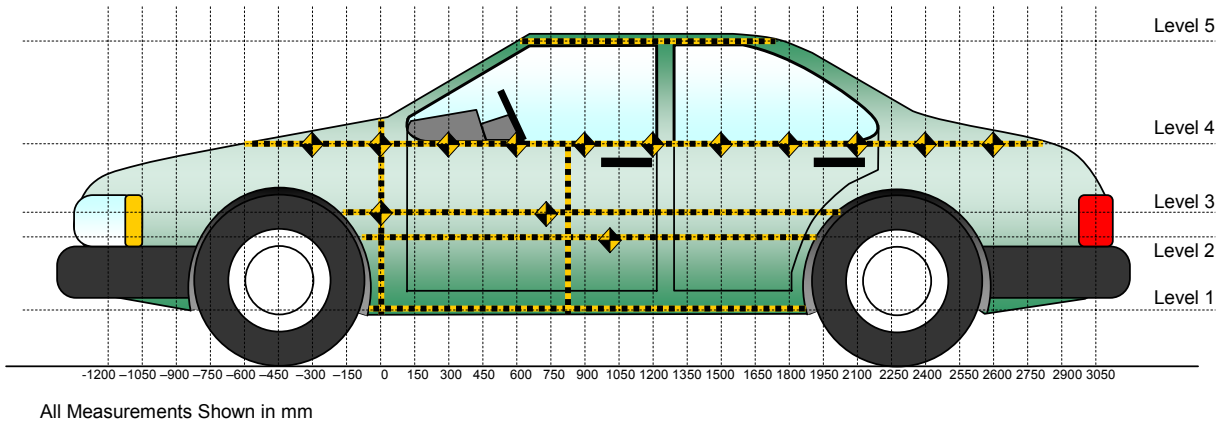
*FRONT VIEW OF DUMMY*

| Code | Measurement Description | Units | Driver<br>S/N 272 | Passenger<br>S/N 904 |
|------|-------------------------|-------|-------------------|----------------------|
| HR   | Head to Side Header     | mm    | 177               | 180                  |
| HS   | Head to Side Window     | mm    | 347               | 340                  |
| AD   | Arm to Door             | mm    | 79                | 98                   |
| HD   | H-Point to Door         | mm    | 132               | 165                  |

# **DATA SHEET NO. 9** **VEHICLE SIDE MEASUREMENTS**

Test Vehicle: 2006 Jeep Grand Cherokee Laredo  
 Test Program: NCAP Side Impact

NHTSA No. M60303  
 Test Date: 8/28/2006



**LEFT SIDE VIEW**

Measurements are taken with vehicle in the as tested condition.  
 Measurements along the vertical 800 mm.  
 All measurements below in mm.

| Level | Measurement Description | Maximum Exterior Static Crush | Distance From Impact | Height Above Ground |
|-------|-------------------------|-------------------------------|----------------------|---------------------|
| 5     | Window                  | 38                            | 2100                 | 1574                |
| 4     | Window Sill             | 161                           | 1350                 | 1086                |
| 3     | Mid Door                | 315                           | 1650                 | 754                 |
| 2     | Occupant H-Point        | 306                           | 1350                 | 726                 |
| 1     | Sill Top                | 212                           | 1200                 | 402                 |
|       | Maximum Penetration     | 315                           |                      |                     |

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

Test Vehicle: 2006 Jeep Grand Cherokee Laredo  
 Test Program: NCAP Side Impact

NHTSA No. M60303  
 Test Date: 8/28/2006

|      | Pre-Test |     |     |     |     | Post-Test |     |     |     |     | Difference |     |     |     |      |
|------|----------|-----|-----|-----|-----|-----------|-----|-----|-----|-----|------------|-----|-----|-----|------|
|      | 1        | 2   | 3   | 4   | 5   | 1         | 2   | 3   | 4   | 5   | 1          | 2   | 3   | 4   | 5    |
| -900 |          |     |     | 303 |     |           |     |     | 312 |     |            |     |     | 9   |      |
| -750 |          |     |     | 280 |     |           |     |     | 293 |     |            |     |     | 13  |      |
| -600 |          |     |     | 264 |     |           |     |     | 285 |     |            |     |     | 21  |      |
| -450 |          |     |     | 253 |     |           |     |     | 280 |     |            |     |     | 27  |      |
| -300 |          |     |     | 244 |     |           |     |     | 284 |     |            |     |     | 40  |      |
| -150 |          |     |     | 237 |     |           |     |     | 291 |     |            |     |     | 54  |      |
| 0    |          | 175 | 168 | 231 |     |           | 256 | 196 | 297 |     |            | 81  | 28  | 66  |      |
| 150  | 203      | 197 | 178 | 228 |     | 306       | 393 | 246 | 211 |     | 103        | 196 | 68  | -17 |      |
| 300  | 227      | 196 | 196 | 225 |     | 386       | 423 | 386 | 227 |     | 159        | 227 | 190 | 2   |      |
| 450  | 226      | 194 | 195 | 222 |     | 397       | 434 | 407 | 242 |     | 171        | 240 | 212 | 20  |      |
| 600  | 226      | 191 | 193 | 219 |     | 408       | 446 | 420 | 258 |     | 182        | 255 | 227 | 39  |      |
| 750  | 225      | 189 | 190 | 220 | 387 | 413       | 458 | 430 | 273 | 182 | 188        | 269 | 240 | 53  | -205 |
| 900  | 223      | 188 | 188 | 217 | 375 | 417       | 468 | 443 | 294 | 190 | 194        | 280 | 255 | 77  | -185 |
| 1050 | 223      | 187 | 187 | 217 | 375 | 422       | 473 | 453 | 323 | 211 | 199        | 286 | 266 | 106 | -164 |
| 1200 | 223      | 186 | 186 | 216 | 374 | 435       | 467 | 458 | 356 | 237 | 212        | 281 | 272 | 140 | -137 |
| 1350 | 223      | 187 | 185 | 218 | 373 | 432       | 493 | 463 | 379 | 305 | 209        | 306 | 278 | 161 | -68  |
| 1500 | 226      | 187 | 185 | 219 | 375 | 434       | 490 | 497 | 350 | 286 | 208        | 303 | 312 | 131 | -89  |
| 1650 | 227      | 189 | 186 | 221 | 376 | 429       | 493 | 501 | 326 | 267 | 202        | 304 | 315 | 105 | -109 |
| 1800 | 203      | 189 | 187 | 222 | 378 | 399       | 460 | 494 | 301 | 250 | 196        | 271 | 307 | 79  | -128 |
| 1950 |          | 165 | 187 | 226 | 381 |           | 338 | 465 | 279 | 232 |            | 173 | 278 | 53  | -149 |
| 2100 |          |     | 165 | 228 | 383 |           |     | 347 | 263 | 421 |            |     | 182 | 35  | 38   |
| 2250 |          |     | 164 | 233 | 386 |           |     | 275 | 290 | 423 |            |     | 111 | 57  | 37   |
| 2400 |          |     |     | 238 | 391 |           |     |     | 285 | 425 |            |     |     | 47  | 34   |
| 2550 |          |     |     | 244 | 396 |           |     |     | 283 | 428 |            |     |     | 39  | 32   |
| 2700 |          |     |     | 249 | 405 |           |     |     | 281 | 434 |            |     |     | 32  | 29   |
| 2850 |          |     |     | 257 | 443 |           |     |     | 280 | 467 |            |     |     | 23  | 24   |
| 3000 |          |     |     | 265 |     |           |     |     | 284 |     |            |     |     | 19  |      |

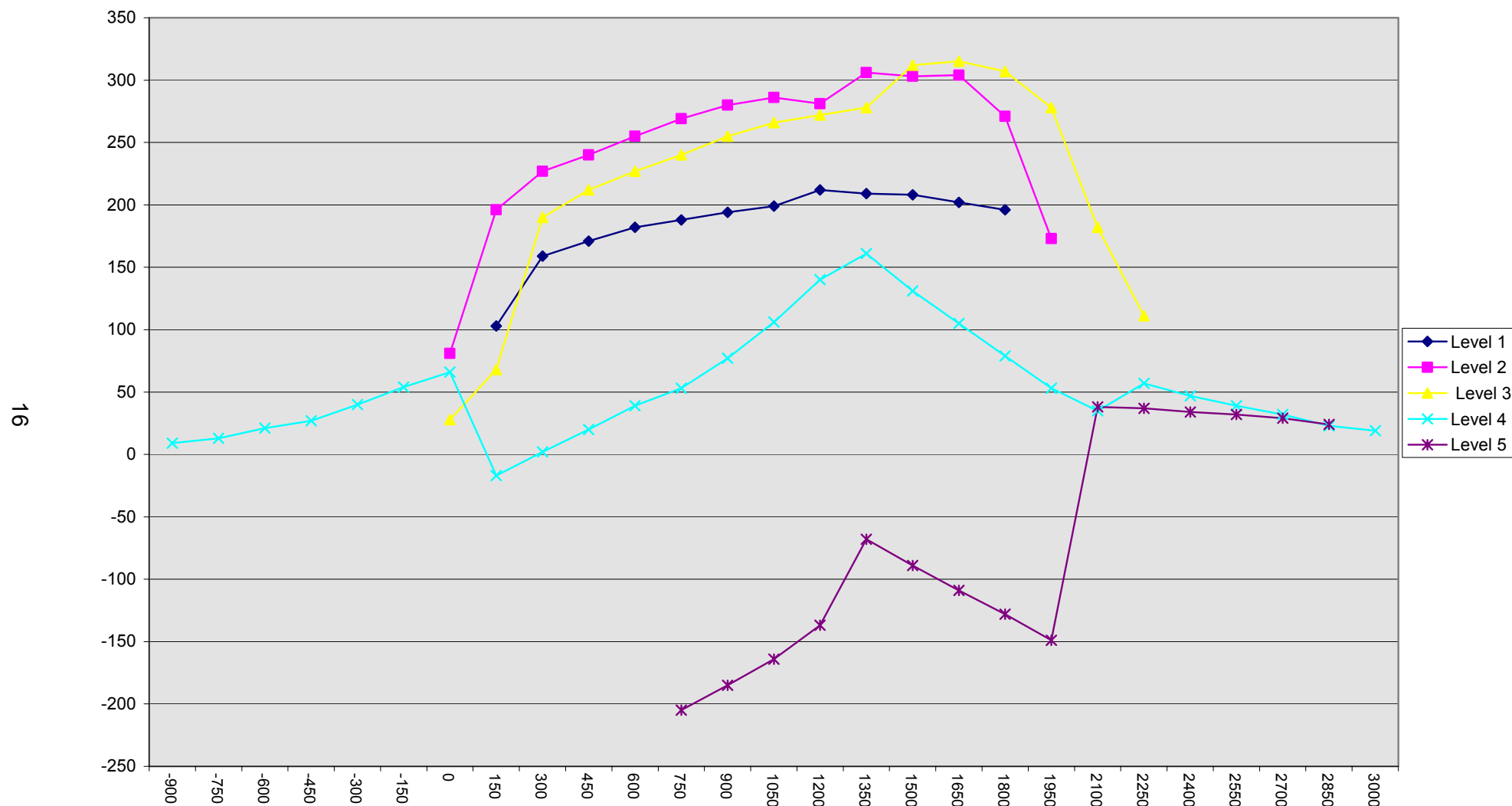
Reference plane is parallel to test vehicle longitudinal centerline.

Given dimensions = Reference plane to car body

DATA SHEET NO. 10... (continued)  
VEHICLE EXTERIOR CRUSH PROFILES

Test Vehicle: 2006 Jeep Grand Cherokee Laredo  
Test Program: NCAP Side Impact

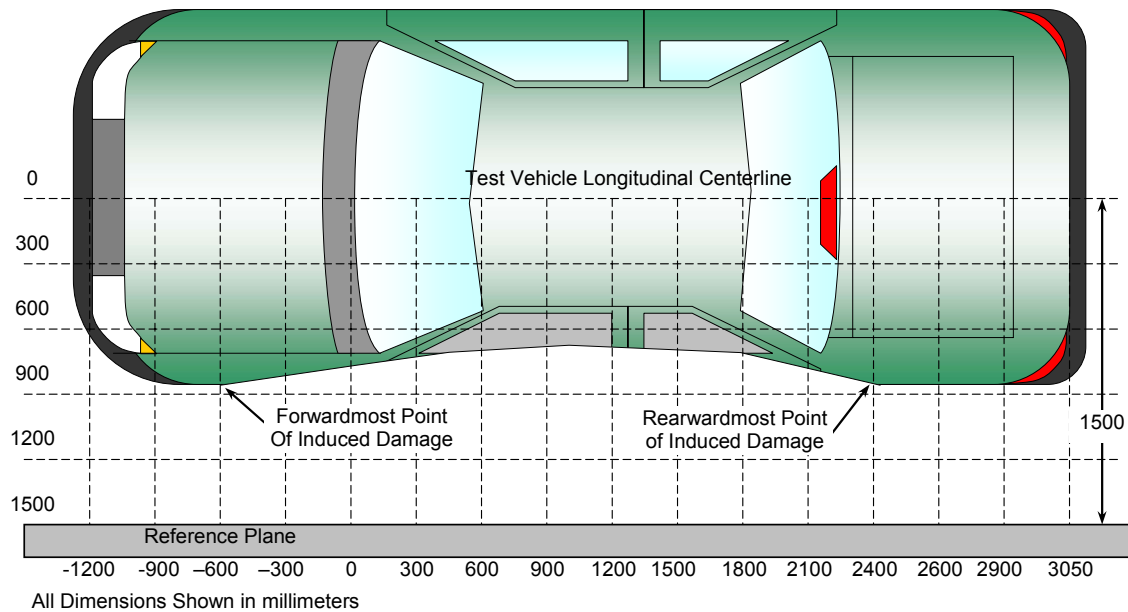
NHTSA No. M60303  
Test Date: 8/28/2006



**DATA SHEET NO. 11**  
**VEHICLE DAMAGE PROFILE DISTANCES**

Test Vehicle: 2006 Jeep Grand Cherokee Laredo  
 Test Program: NCAP Side Impact

NHTSA No. M60303  
 Test Date: 8/28/2006



**TOP VIEW**

**DAMAGE PROFILE DISTANCES**

| DPD | Distance from Impact Point in mm | Level | Pre-Test (mm) | Post-Test (mm) | Max Static Crush (mm) |
|-----|----------------------------------|-------|---------------|----------------|-----------------------|
| 1   | 3000                             | 4     | 265           | 284            | 19                    |
| 2   | 2222                             | 4     | 231           | 292            | 61                    |
| 3   | 1400                             | 3     | 185           | 520            | 335                   |
| 4   | 625                              | 2     | 190           | 474            | 284                   |
| 5   | -135                             | 4     | 236           | 320            | 84                    |
| 6   | -900                             | 4     | 303           | 312            | 9                     |

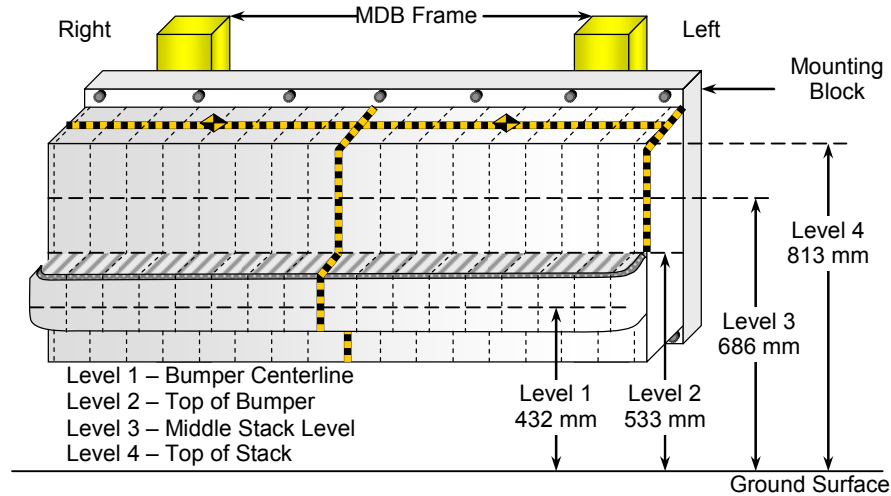
Reference plane is parallel to test vehicle longitudinal centerline.  
 Given dimensions = Reference plane to car body.

## DATA SHEET NO. 12

### DEFORMABLE BARRIER HONEYCOMB FACE STATIC CRUSH

Test Vehicle: 2006 Jeep Grand Cherokee Laredo  
 Test Program: NCAP Side Impact

NHTSA No. M60303  
 Test Date: 8/28/2006



### DEFORMABLE BARRIER STATIC CRUSH

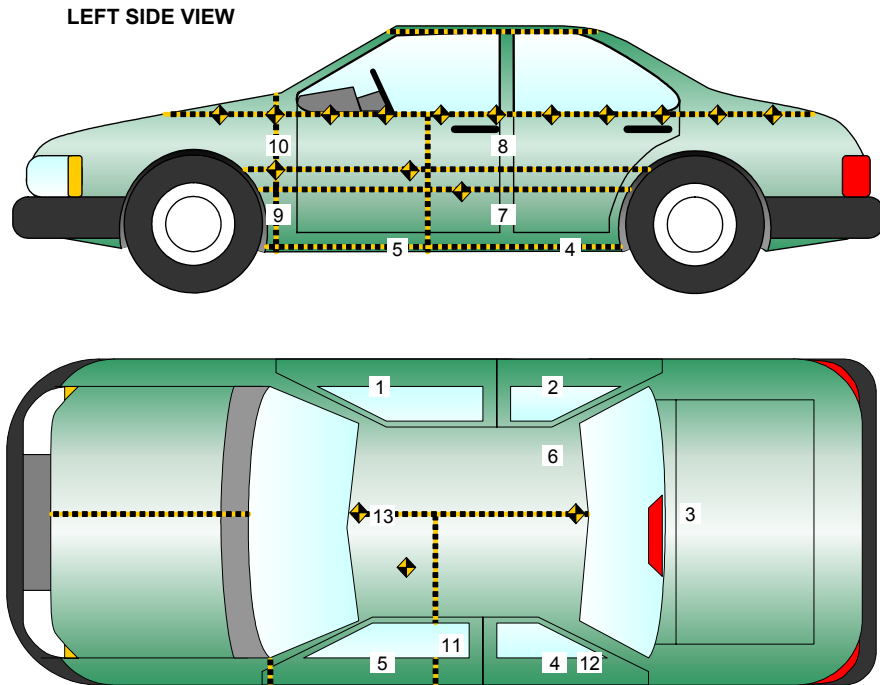
| Stack Level | Distance Right of Center |     |     |     |     |     |     |     | C <sub>L</sub> | Distance Left of Center |     |     |     |     |     |     |     |
|-------------|--------------------------|-----|-----|-----|-----|-----|-----|-----|----------------|-------------------------|-----|-----|-----|-----|-----|-----|-----|
|             | 800                      | 700 | 600 | 500 | 400 | 300 | 200 | 100 |                | 100                     | 200 | 300 | 400 | 500 | 600 | 700 | 800 |
| 1           | 184                      | 172 | 165 | 164 | 165 | 164 | 167 | 169 | 168            | 169                     | 171 | 174 | 176 | 176 | 186 | 189 | 195 |
| 2           | 109                      | 95  | 94  | 91  | 85  | 92  | 95  | 94  | 95             | 96                      | 96  | 97  | 97  | 97  | 100 | 101 | 99  |
| 3           | 66                       | 41  | 25  | 18  | 24  | 24  | 25  | 18  | 19             | 19                      | 19  | 23  | 30  | 39  | 53  | 71  | 100 |
| 4           | 65                       | 41  | 25  | 3   | 5   | 18  | 38  | 45  | 49             | 55                      | 61  | 68  | 79  | 90  | 110 | 133 | 159 |

All Dimensions in mm

**DATA SHEET NO. 13**  
**VEHICLE ACCELEROMETER LOCATIONS**

Test Vehicle: 2006 Jeep Grand Cherokee Laredo  
 Test Program: NCAP Side Impact

NHTSA No. M60303  
 Test Date: 8/28/2006



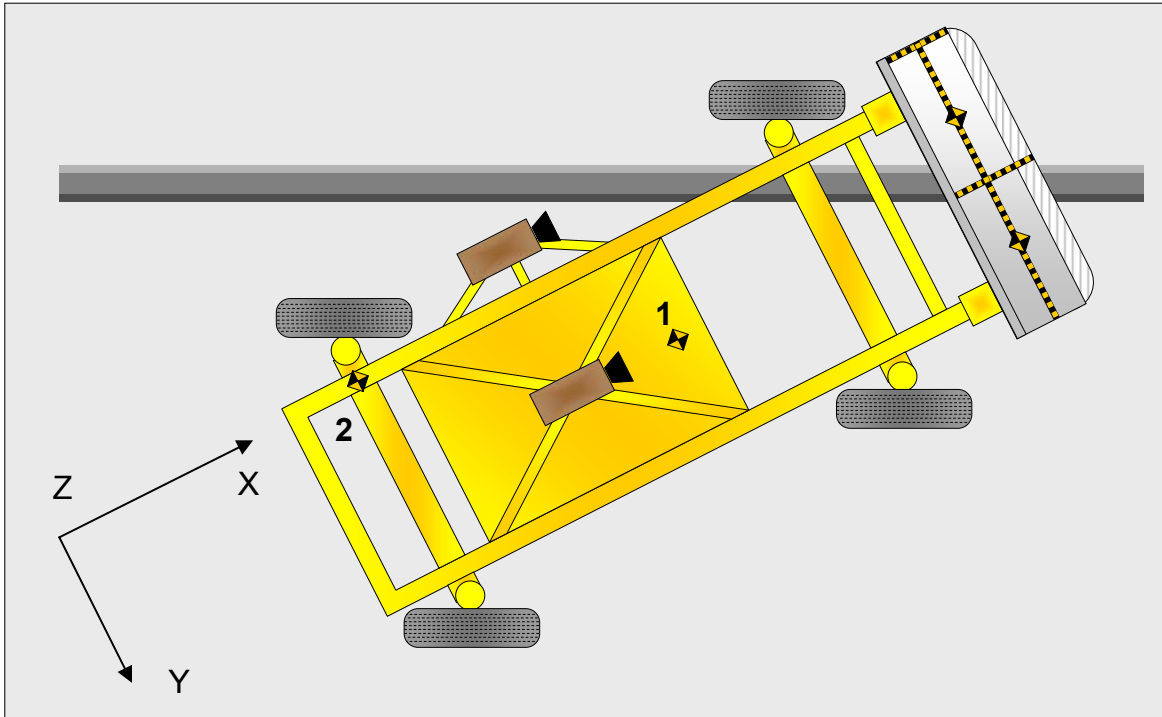
| Loc. No. | Accelerometer Location       | Measurements (mm) |      |      |
|----------|------------------------------|-------------------|------|------|
|          |                              | X                 | Y    | Z    |
| 1        | Right Sill at Front Seat     | 2784              | 752  | 327  |
| 2        | Right Sill at Rear Seat      | 1821              | 752  | 325  |
| 3        | Rear Floorpan Above Axle     | 981               | 56   | 698  |
| 4        | Left Sill at Rear Door       | 1813              | -752 | 321  |
| 5        | Left Sill at Front Door      | 2778              | -752 | 324  |
| 6        | Rear Occupant Compartment    | 1903              | 363  | 455  |
| 7        | Left Lower B-Post            | 2120              | -743 | 535  |
| 8        | Left Middle B-Post           | 2127              | -738 | 1012 |
| 9        | Left Lower A-Post            | 3204              | -752 | 531  |
| 10       | Left Middle A-Post           | 3218              | -804 | 1070 |
| 11       | Front Seat Track             |                   |      |      |
| 12       | Rear Seat Track or Structure |                   |      |      |
| 13       | Vehicle CG                   | 2489              | -25  | 695  |

Reference Points    X - Test Vehicle Rear Bumper (+ forward)  
                              Y - Test Vehicle Centerline (+ to right)  
                              Z - Ground Plane (+ down)

**DATA SHEET NO. 14**  
**MDB ACCELEROMETER LOCATIONS**

Test Vehicle: 2006 Jeep Grand Cherokee Laredo  
 Test Program: NCAP Side Impact

NHTSA No. M60303  
 Test Date: 8/28/2006



| Loc. No. | Accelerometer Location | Measurements (mm) |      |      |
|----------|------------------------|-------------------|------|------|
|          |                        | X                 | Y    | Z    |
| 1        | MDB CG                 | -1092             | 0    | -483 |
| 2        | MDB Rear               | -2591             | -625 | -622 |

Reference Points    X - MDB Front Axle (+ forward)  
                              Y - MDB Centerline (+ to right)  
                              Z - Ground Plane (+ down)

**DATA SHEET NO. 15**  
**VEHICLE STRUCTURAL MEASUREMENTS**

Test Vehicle: 2006 Jeep Grand Cherokee Laredo  
Test Program: NCAP Side Impact

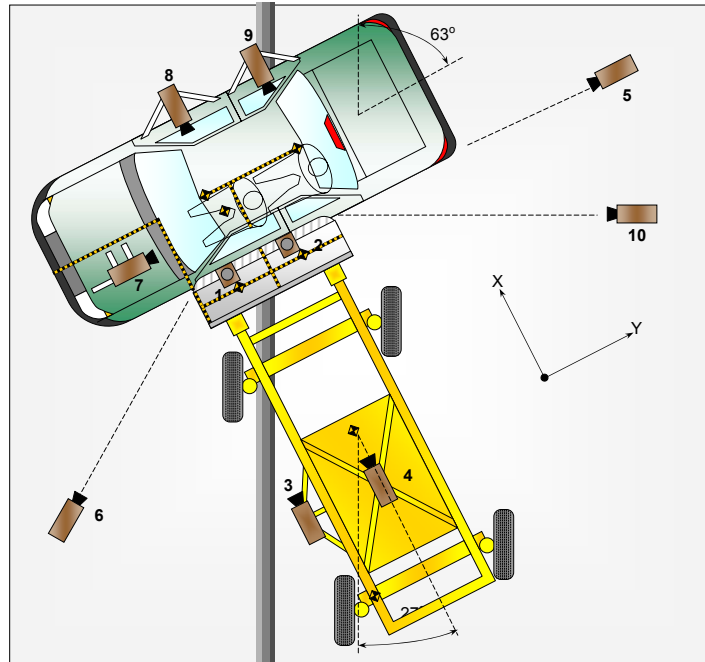
NHTSA No. M60303  
Test Date: 8/28/2006

|    | Elements                              | Pre-Test (mm) |
|----|---------------------------------------|---------------|
| 1  | Total Length                          | 4706          |
| 2  | Total Width                           | 1961          |
| 3  | Bumper Top Height                     | 697           |
| 4  | Bumper Bottom Height                  | 532           |
| 5  | Longitudinal Member Top Height        | 653           |
| 6  | Distance between Longitudinal Members | 870           |
| 7  | Longitudinal Member Width             | 75            |
| 8  | Engine Top Height                     | 998           |
| 9  | Engine Bottom Height                  | 224           |
| 10 | Engine and gearbox width              | 672           |
| 11 | Front bumper-engine distance          | 679           |
| 12 | Front shock absorber fixing height    | 953           |
| 13 | Bonnet leading edge height            | 984           |
| 14 | Front shock absorber fixing width     | 934           |
| 15 | Front bumper – front axle distance    | 861           |
| 16 | Front axle – a pillar distance        | 506           |
| 17 | A-pillar – B-pillar distance          | 1025          |
| 18 | B-Pillar – rear axle distance         | 1101          |
| 19 | B-pillar – C-pillar distance          | 935           |
| 20 | Roof sill bottom height               | 1559          |
| 21 | Roof sill top height                  | 1643          |
| 22 | Floor sill bottom height              | 313           |
| 23 | Floor sill top height                 | 413           |

**DATA SHEET NO. 16**  
**HIGH SPEED CAMERA LOCATIONS AND DATA**

Test Vehicle: 2006 Jeep Grand Cherokee Laredo  
 Test Program: NCAP Side Impact

NHTSA No. M60303  
 Test Date: 8/28/2006



| No. | Camera View                           | Location (mm) |       |      | Lens (mm) | Film Speed (fps) |
|-----|---------------------------------------|---------------|-------|------|-----------|------------------|
|     |                                       | X             | Y     | Z    |           |                  |
| 1   | Overhead Close-up                     | 770           | 0     | 4840 | 50        | 1000             |
| 2   | Overhead Overall                      | -670          | 1065  | 4840 | 14        | 1000             |
| 3   | MDB Onboard, Impact Point Close-up    |               |       |      | 50        | 1000             |
| 4   | MDB Onboard, Centerline of Impact     |               |       |      | 25        | 1000             |
| 5   | Right Side, Ground Level, Overall     | -2125         | 6360  | 1210 | 24        | 1000             |
| 6   | Left Side, Ground Level, Overall      | 1995          | -4250 | 1230 | 24        | 1000             |
| 7   | Vehicle Onboard Front SID/HIII, Front |               |       |      | 12.5      | 1000             |
| 8   | Vehicle Onboard Front SID/HIII, Side  |               |       |      | 10        | 1000             |
| 9   | Vehicle Onboard Rear SID/HIII, Side   |               |       |      | 8.5       | 1000             |
| 10  | Real Time Coverage                    |               |       |      | 13        | 24               |

Reference Points X - Impact Line  
 Y - MDB Left Edge Impact Point  
 Z - Ground Plane

**DATA SHEET NO. 17**  
**SUMMARY OF FMVSS 301 DATA**

Test Vehicle: 2006 Jeep Grand Cherokee Laredo  
 Test Program: NCAP Side Impact

NHTSA No. M60303  
 Test Date: 8/28/2006

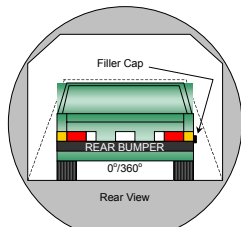
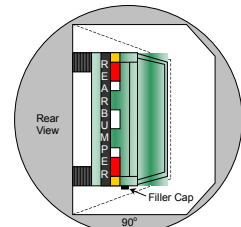
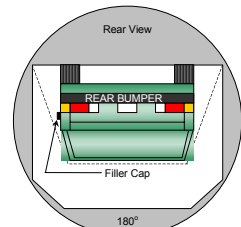
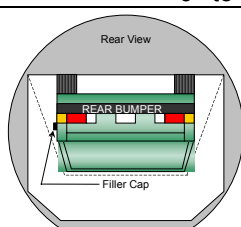
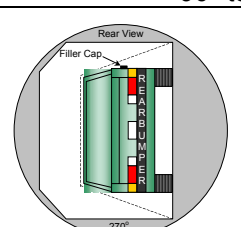
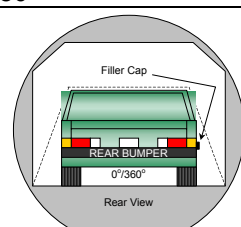
**FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA**

Temperature at Time of Impact: 21° C      Test Time: 12:18 pm

**Stoddard Solvent Spillage Measurements**

- A. From impact until vehicle motion ceases: 0 oz.  
 (Maximum Allowable = 1 ounce)
- B. For the 5 minute period after motion ceases: None  
 (Maximum allowable = 5 ounces)
- C. For the following 25 minutes: None  
 (Maximum allowable = 1 oz./minute)
- D. Spillage Details: None

**FMVSS 301 STATIC ROLLOVER DATA**

|                                                                                     |                                                                                     |                                                                                      |                                                                                                                                                                                                                                                    |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  |  |  | <p>1. The specified fixture rollover rate for each 90° of rotation is 60 to 180 seconds.</p> <p>2. The position hold time at each position is 300 seconds (minimum).</p> <p>3. Details of Stoddard Solvent spillage locations:<br/><b>None</b></p> |
| <p>0° to 90°      90° to 180°</p>                                                   |                                                                                     |                                                                                      |                                                                                                                                                                                                                                                    |
|  |  |  |                                                                                                                                                                                                                                                    |
| <p>180° to 270°      270° to 360°</p>                                               |                                                                                     |                                                                                      |                                                                                                                                                                                                                                                    |

| Test Phase   | Rotation Time (sec.) | Hold Time (sec.) | Spillage Collection Time (min) | Spillage (oz.) |
|--------------|----------------------|------------------|--------------------------------|----------------|
| 0° to 90°    | 119                  | 300              | First 5                        | 0              |
| 90° to 180°  | 115                  | 300              | First 5                        | 0              |
| 180° to 270° | 118                  | 300              | First 5                        | 0              |
| 270° to 360° | 115                  | 300              | First 5                        | 0              |

**APPENDIX A**  
**PHOTOGRAPHS**

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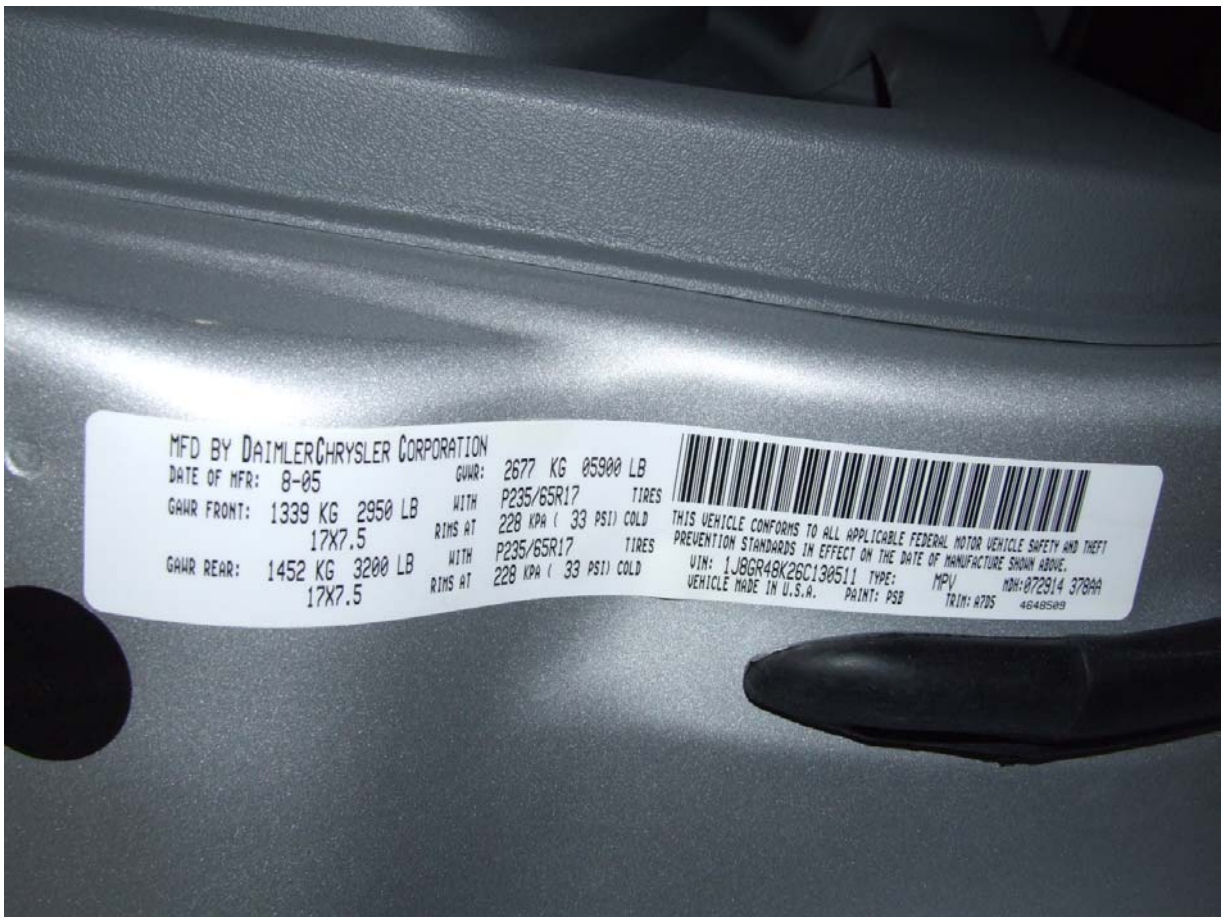
|                                                               | <u>Page No.</u> |
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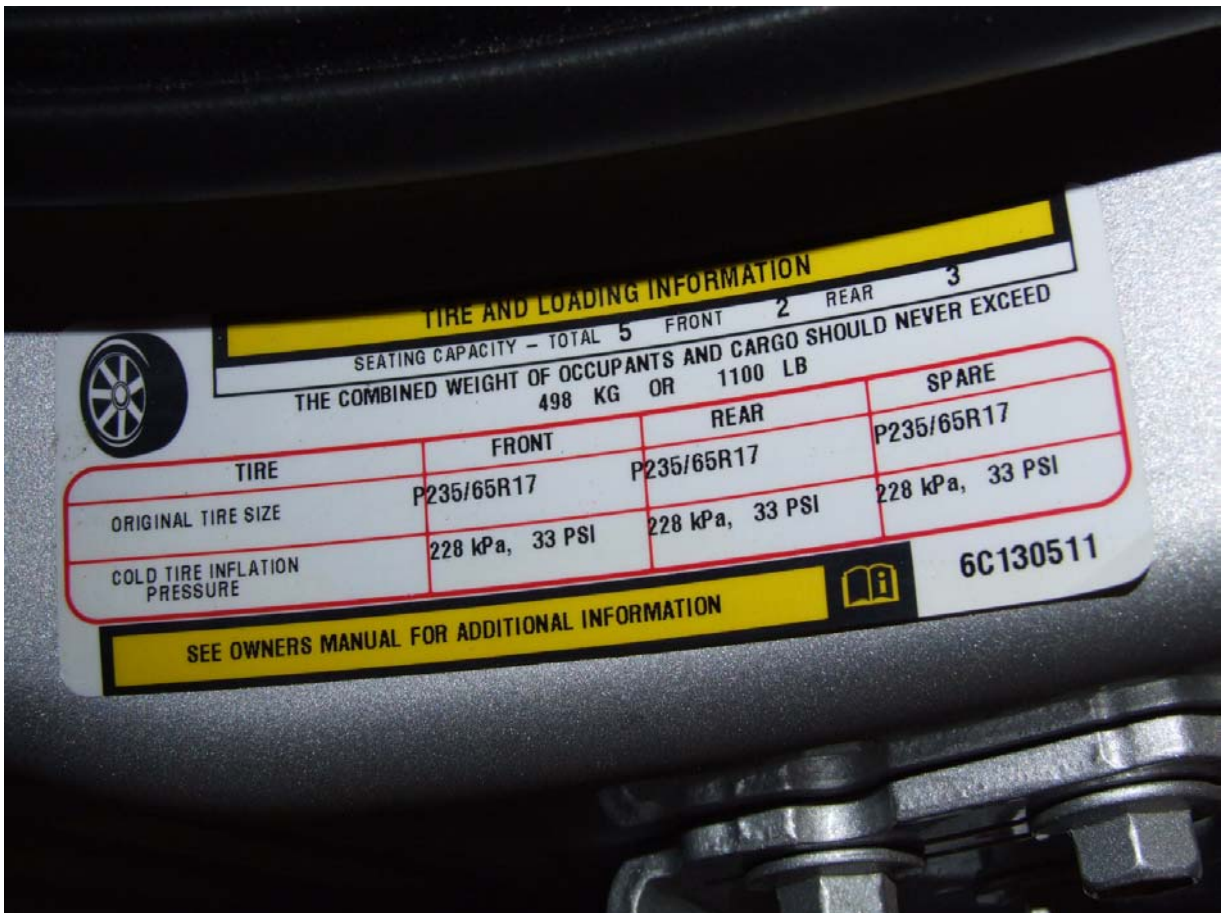
Left Front  $\frac{3}{4}$  View, As Received



Right Rear  $\frac{3}{4}$  View, As Received



Manufacturer's Label



Tire Placard



Pre-Test Front View



Post-Test Front View



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



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



Pre-Test Left Side View



Post-Test Left Side View



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



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



Pre-Test Rear View



Post-Test Rear View



Pre-Test Right Rear  $\frac{3}{4}$  View



Post-Test Right Rear  $\frac{3}{4}$  View



Pre-Test Right Side View



Post-Test Right Side View



Pre-Test Right Front  $\frac{3}{4}$  View



Post-Test Right Front  $\frac{3}{4}$  View



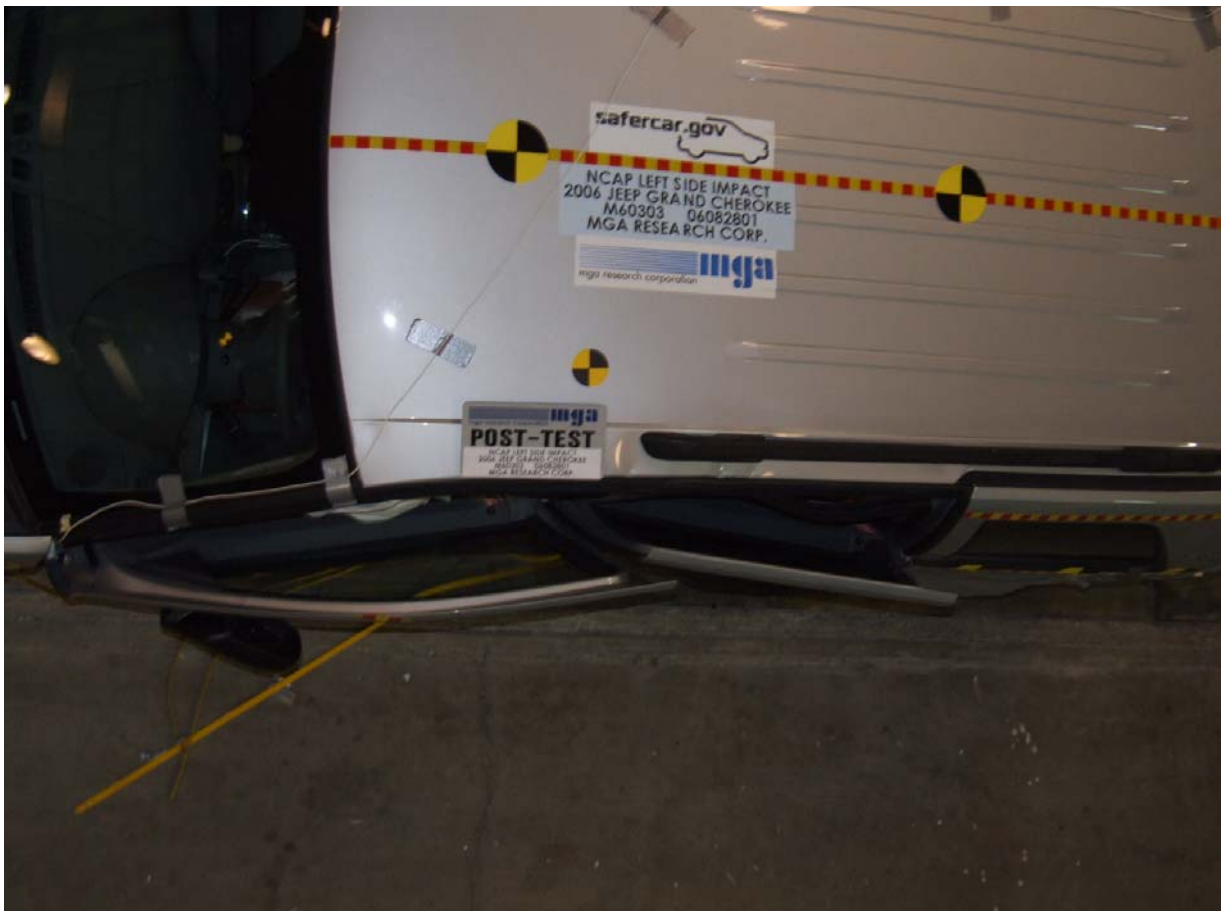
Pre-Test Overhead View



Post-Test Overhead View



Pre-Test Overhead Close-up View



Post-Test Overhead Close-up View



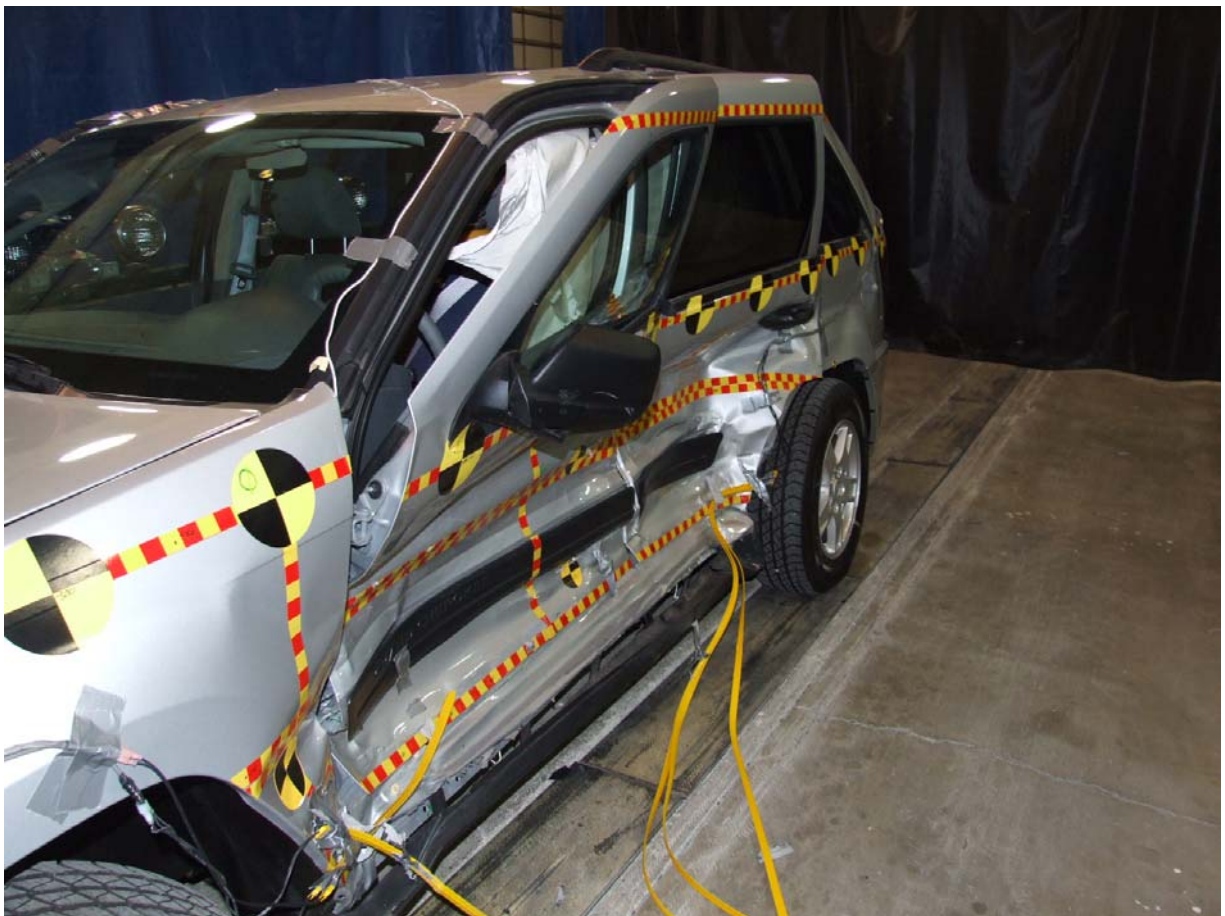
Pre-Test Left Impact Point



Post-Test Left Impact Point



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



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



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



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



Pre-Test Left Side Impact Close-up



Post-Test Left Side Impact Close-up



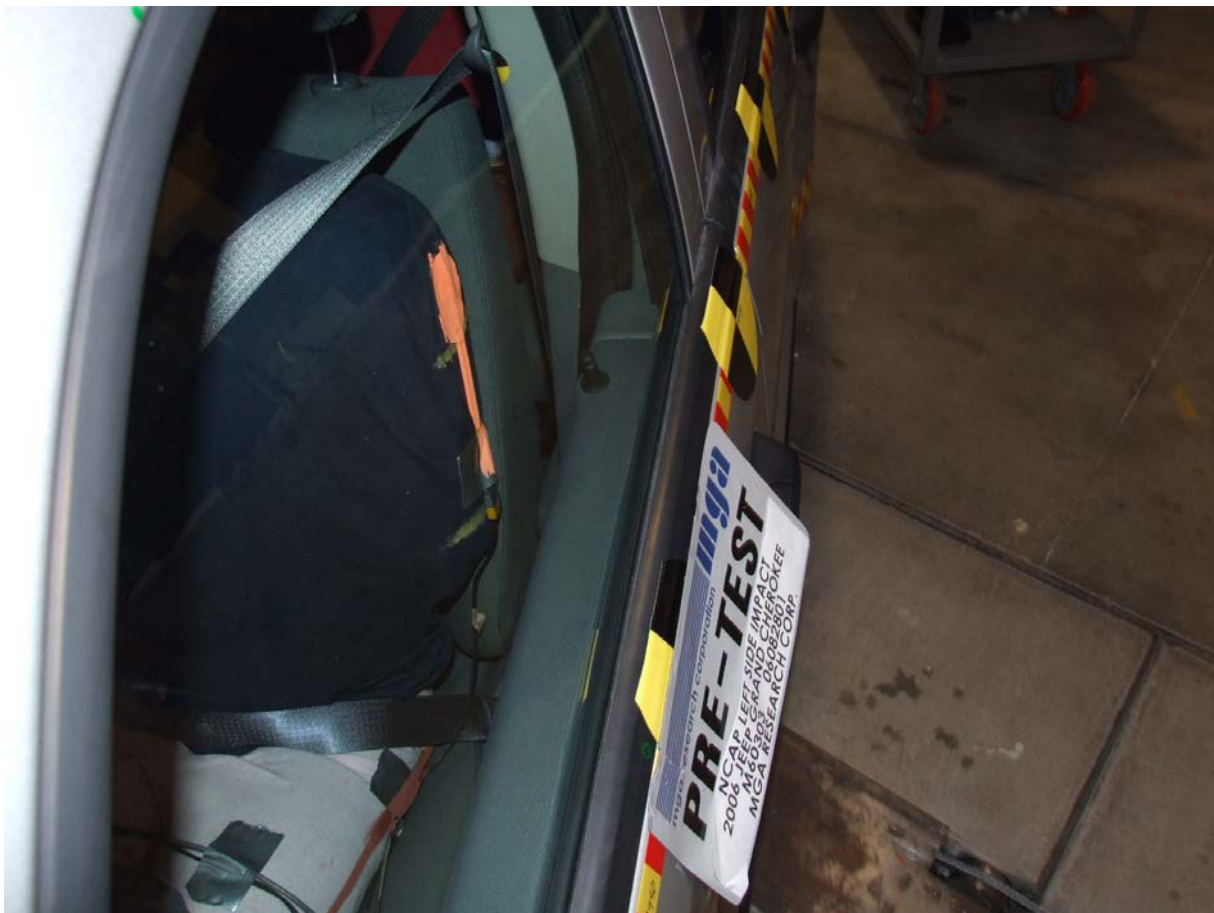
Pre-Test Driver Dummy (Door Open)



Pre-Test Driver Dummy (Through Window)



Post-Test Driver Dummy (Through Window)



Pre-Test Driver Dummy Clearance From Door



Pre-Test Driver Dummy Right Side View



Post-Test Driver Dummy Right Side View



Pre-Test Passenger Dummy (Door Open)



Pre-Test Passenger Dummy (Through Window)



Post-Test Passenger Dummy (Through Window)



Pre-Test Passenger Dummy Clearance From Door



Pre-Test Passenger Dummy Right Side View



Post-Test Passenger Dummy Right Side View



Pre-Test Front View of Deformable Barrier



Post-Test Front View of Deformable Barrier



Pre-Test Top View of Deformable Barrier



Post-Test Top View of Deformable Barrier



Pre-Test Right Side View of Deformable Barrier



Post-Test Right Side View of Deformable Barrier



Pre-Test Left Side View of Deformable Barrier



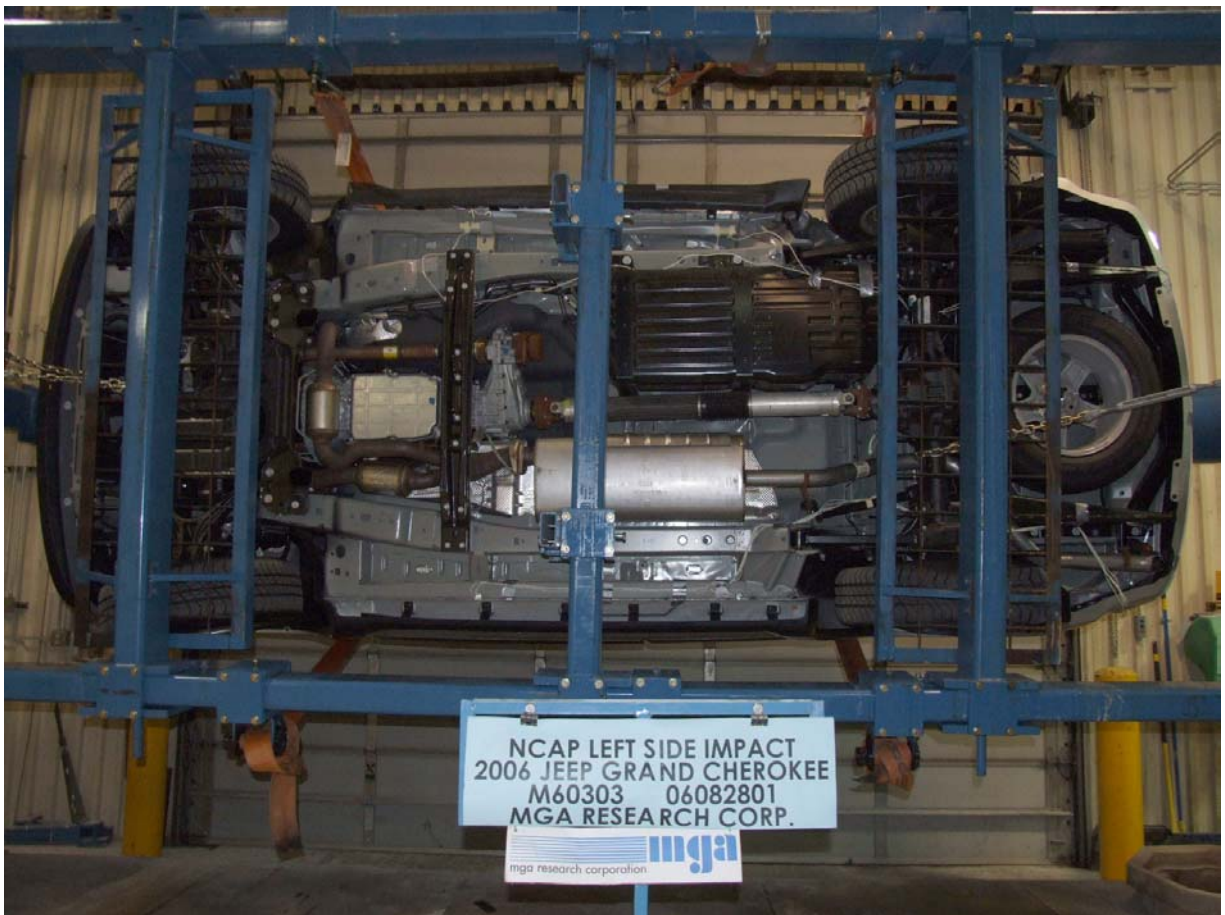
Post-Test Left Side View of Deformable Barrier



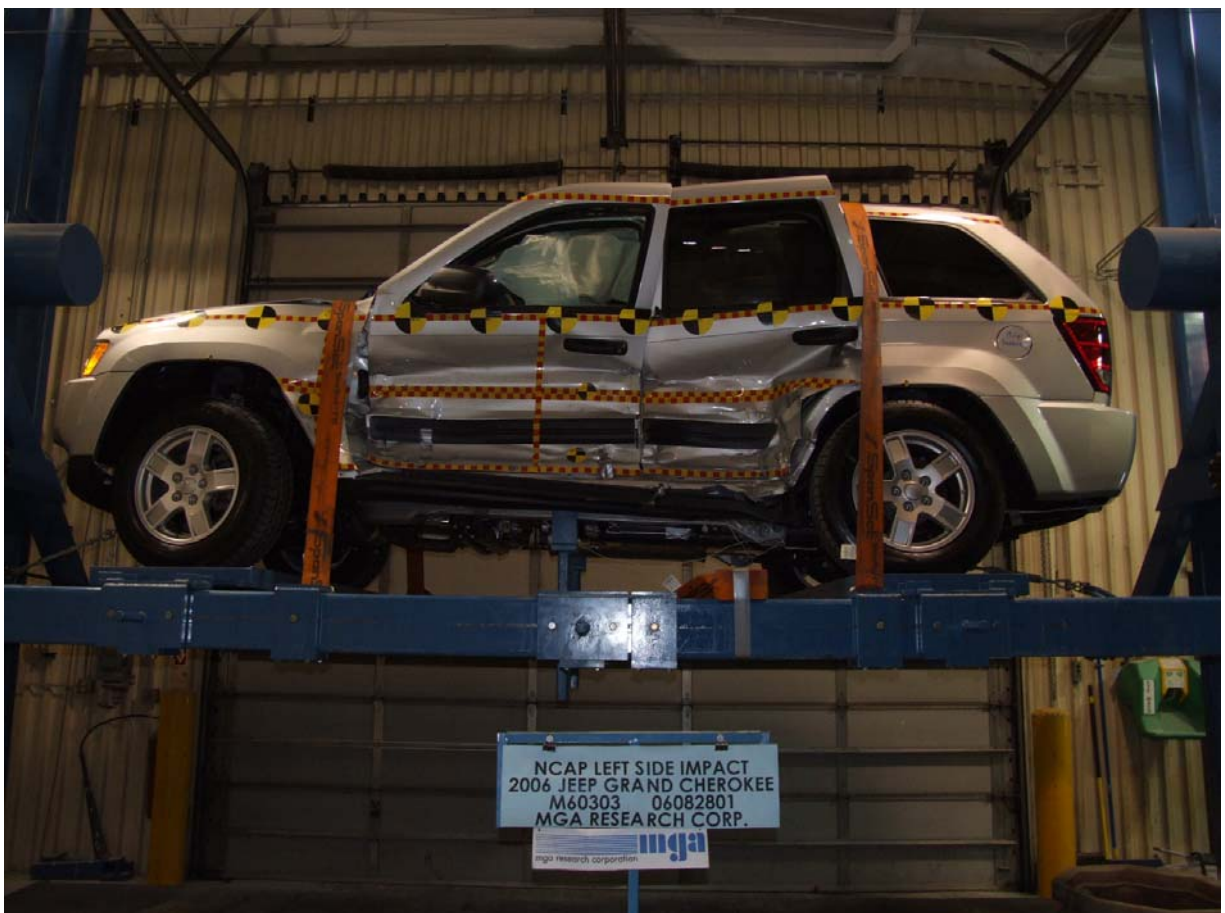
Vehicle on Rollover Device (90 Degrees)



Vehicle on Rollover Device (180 Degrees)



Vehicle on Rollover Device (270 Degrees)



Vehicle on Rollover Device (360 Degrees)



100,00 ms • 28 Aug 2006 12:15 • T0: 21 • 1,000 fps • Frame: 121

Vehicle Impact



Post-Test Driver Dummy Head Contact



Post-Test Driver Dummy Torso Contact



Post-Test Driver Dummy Contact



Post-Test Passenger Dummy Head Contact



Post-Test Passenger Dummy Torso Contact



Post-Test Passenger Dummy Contact

## **APPENDIX B**

### **SID/HIII RESPONSE DATA TRACES**

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| Figure No. 15. | Passenger Pelvis Y Acceleration vs. Time      | B-4 |
| Figure No. 16. | Passenger Pelvis Y Velocity vs. Time          | B-4 |

**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 X Primary

Driver Head Y Primary

Driver Head Z Primary

Driver Head X Redundant

Driver Head Y Redundant

Driver Head Z Redundant

Driver Upper Neck Force X

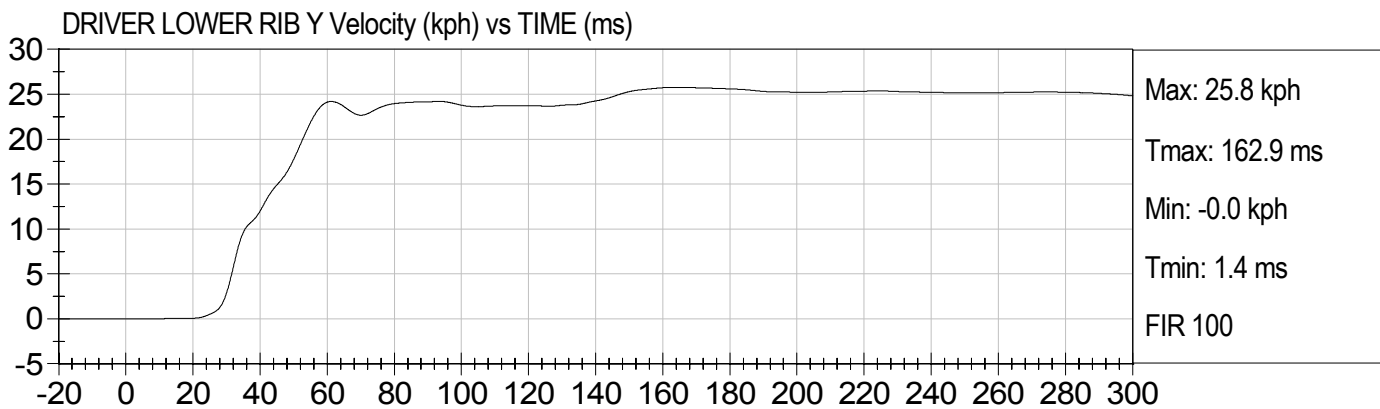
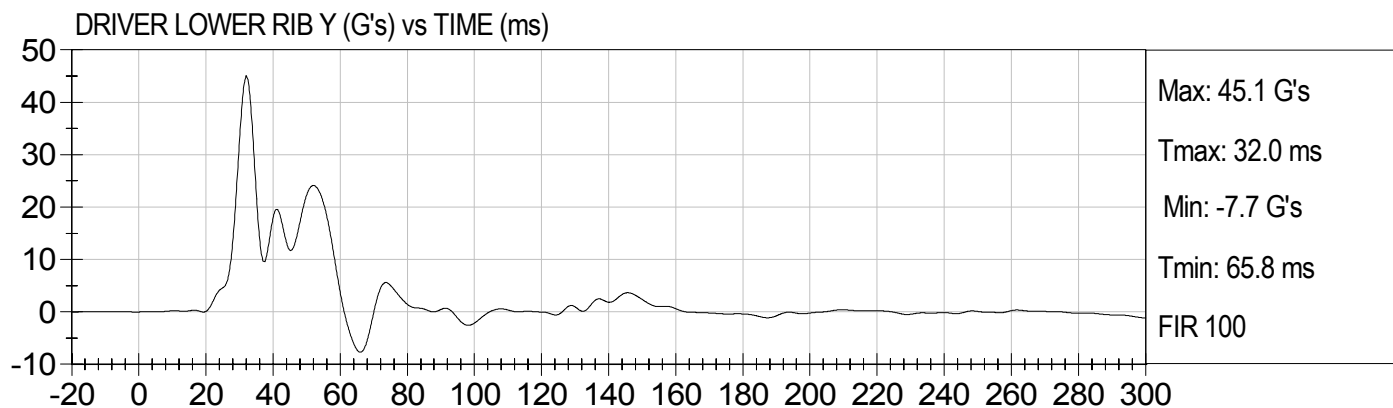
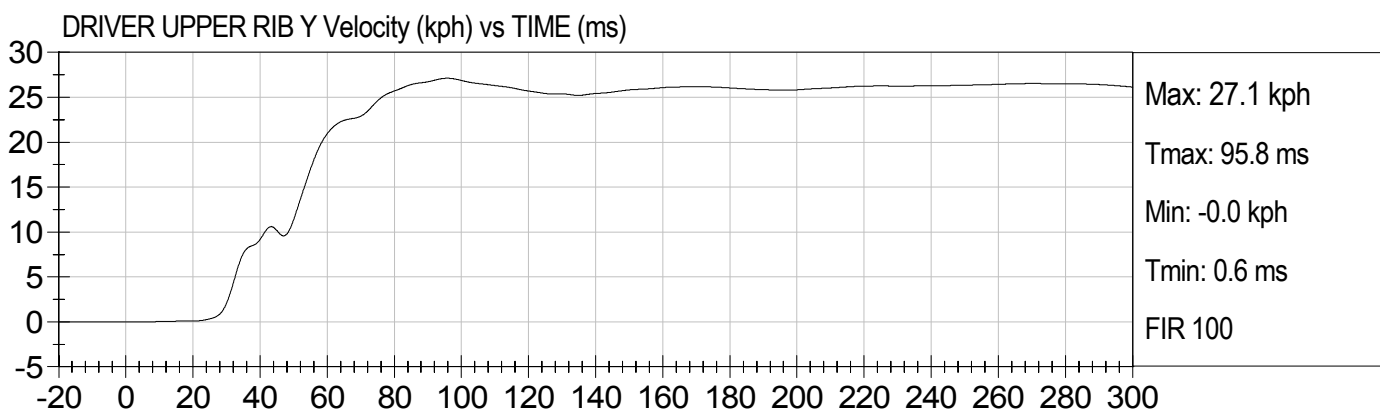
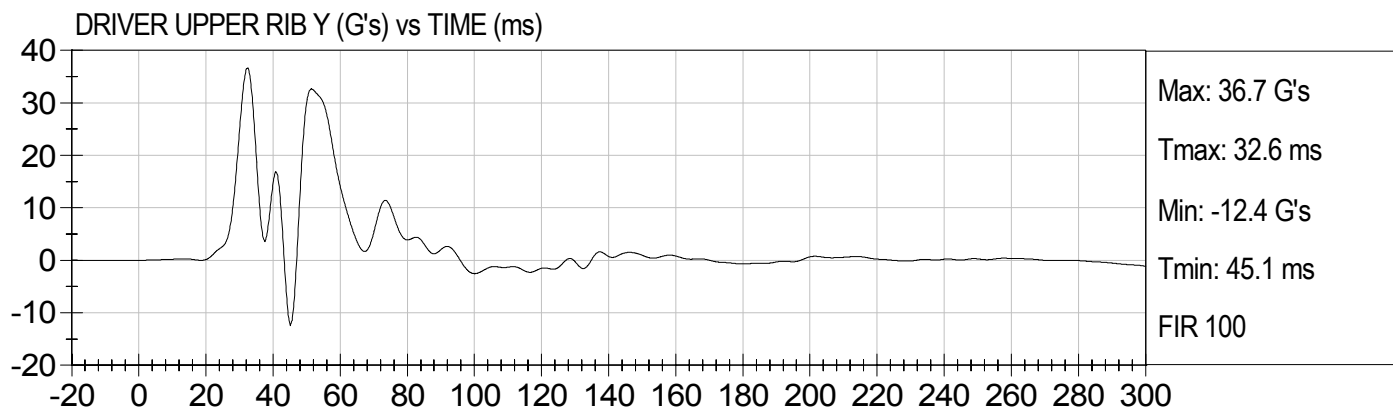
Driver Upper Neck Force Y

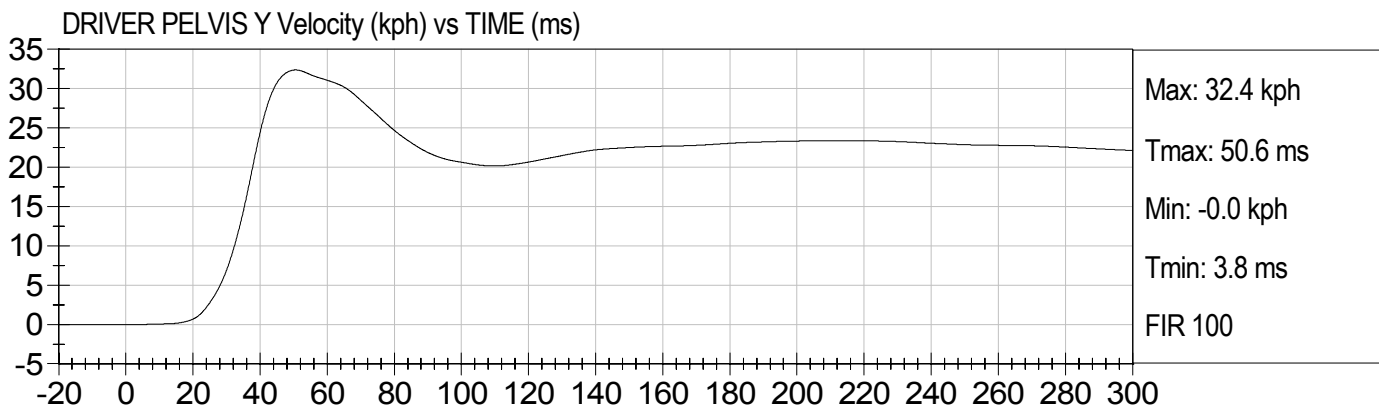
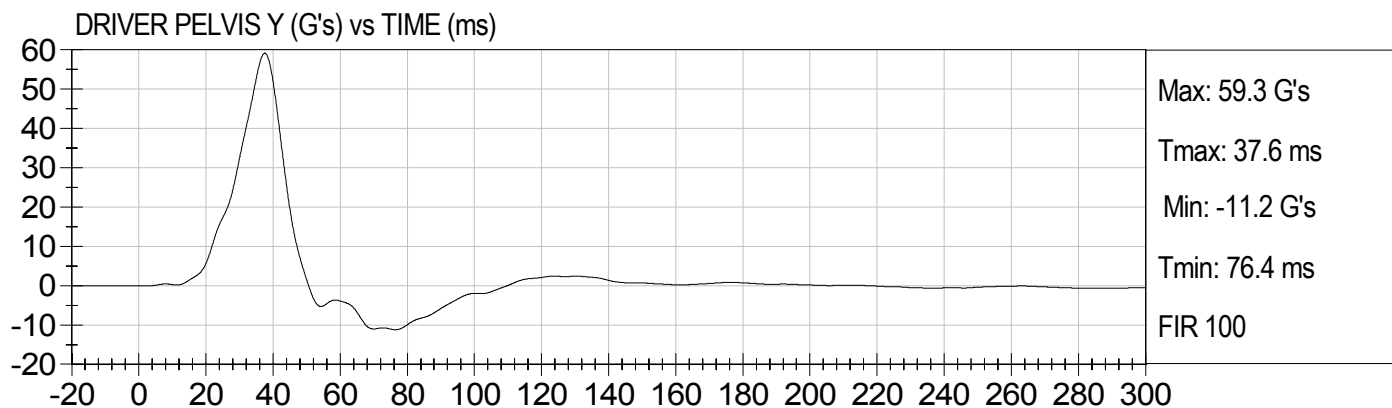
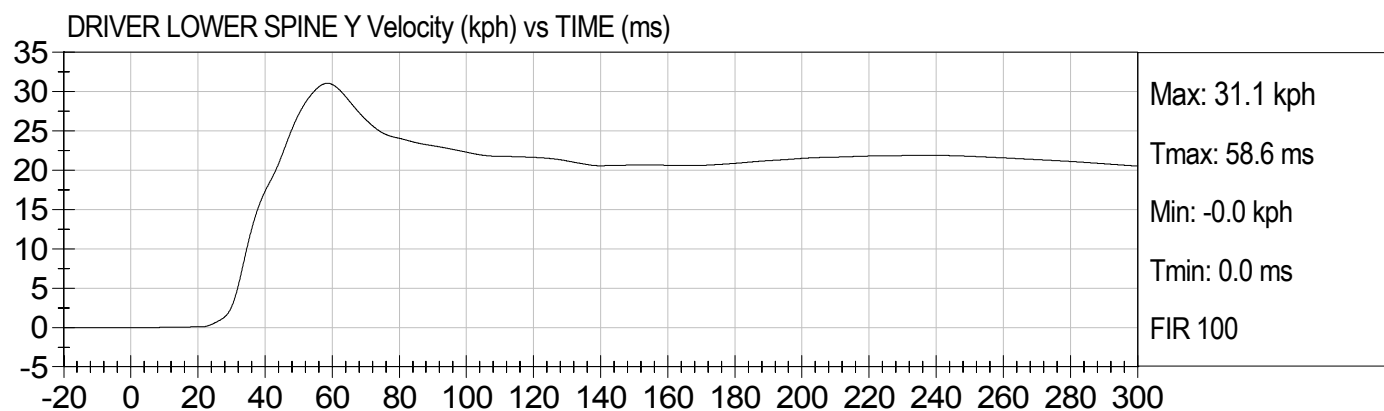
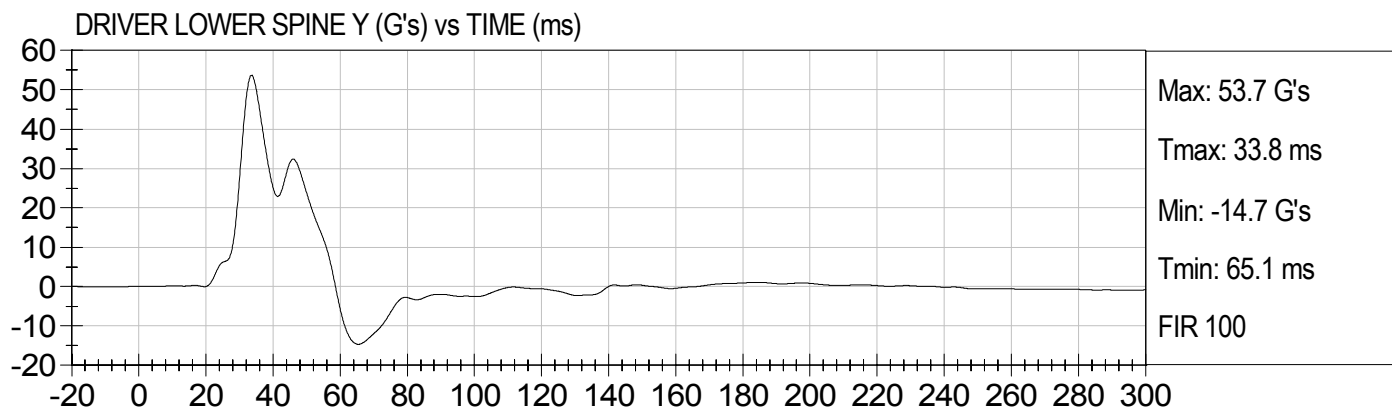
Driver Upper Neck Force Z

Driver Upper Neck Moment X

Driver Upper Neck Moment Y  
Driver Upper Neck Moment Z  
Driver Upper Rib Redundant Y  
Driver Lower Rib Redundant Y  
Driver Lower Spine Redundant Y  
Driver Pelvis Redundant Y  
Driver Thorax Contact  
Driver Pelvis Contact  
Passenger Head X Primary  
Passenger Head Y Primary  
Passenger Head Z Primary  
Passenger Head X Redundant  
Passenger Head Y Redundant  
Passenger Head Z Redundant  
Passenger Upper Neck Force X  
Passenger Upper Neck Force Y  
Passenger Upper Neck Force Z  
Passenger Upper Neck Moment X  
Passenger Upper Neck Moment Y  
Passenger Upper Neck Moment Z  
Passenger Upper Rib Redundant Y  
Passenger Lower Rib Redundant Y  
Passenger Lower Spine Redundant Y  
Passenger Pelvis Redundant Y  
Passenger Thorax Contact  
Passenger Pelvis Contact  
Vehicle Right Sill at Front Seat X  
Vehicle Right Sill at Front Seat Y  
Vehicle Right Sill at Front Seat Z  
Vehicle Right Sill at Rear Seat X  
Vehicle Right Sill at Rear Seat Y  
Vehicle Right Sill at Rear Seat Z

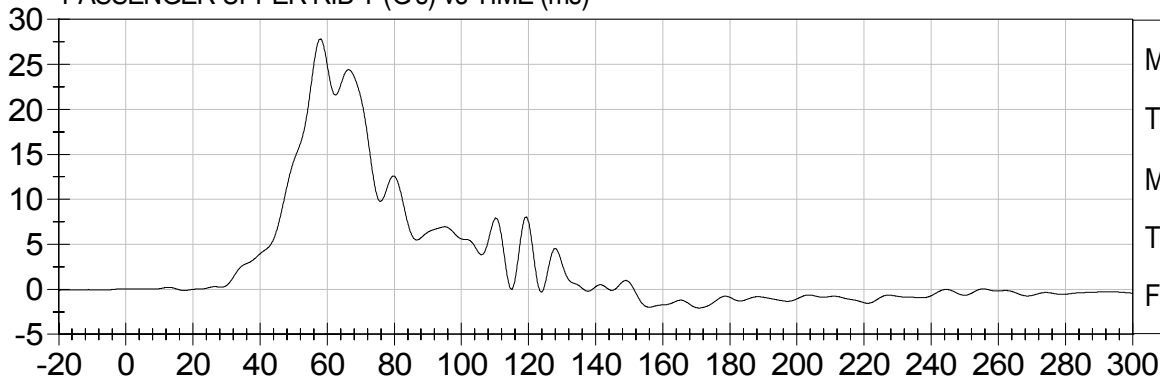
Vehicle Rear Floor Above Axle X  
Vehicle Rear Floor Above Axle Y  
Vehicle Rear Floor Above Axle Z  
Vehicle Left Sill at Rear Door Y  
Vehicle Left Sill at Front Door Y  
Vehicle Right Rear Occupant Compartment  
Vehicle B-Post Lower Y  
Vehicle B-Post Middle Y  
Vehicle A-Post Lower Y  
Vehicle A-Post Middle Y  
Vehicle Left Front Seat Track  
Vehicle CG X  
Vehicle CG Y  
Vehicle CG Z  
MDB CG X  
MDB CG Y  
MDB CG Z  
MDB Rear X  
MDB Rear Y  
MDB Rear Z  
MDB Left Bumper Contact  
MDB Right Bumper Contact





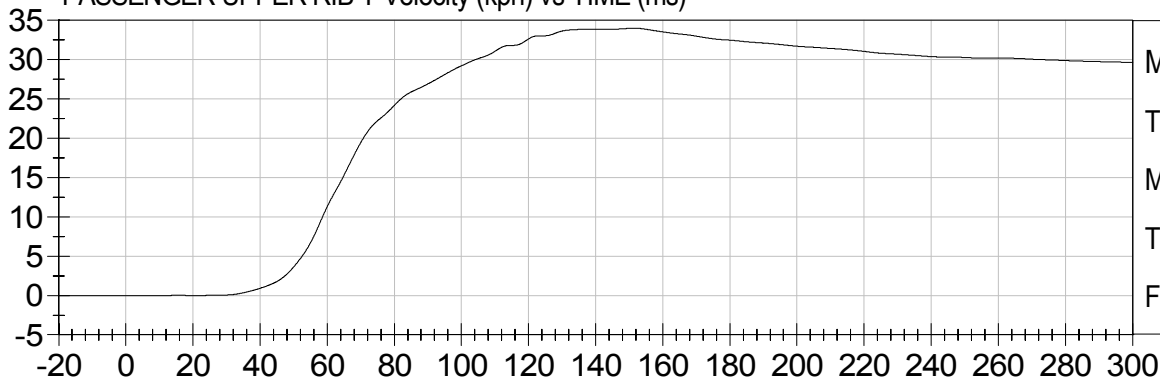


PASSENGER UPPER RIB Y (G's) vs TIME (ms)



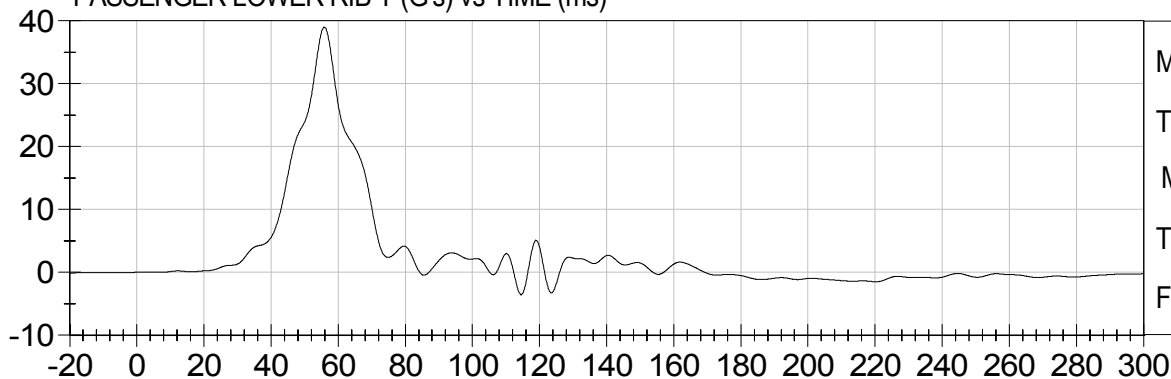
Max: 27.8 G's  
Tmax: 58.2 ms  
Min: -2.1 G's  
Tmin: 170.7 ms  
FIR 100

PASSENGER UPPER RIB Y Velocity (kph) vs TIME (ms)



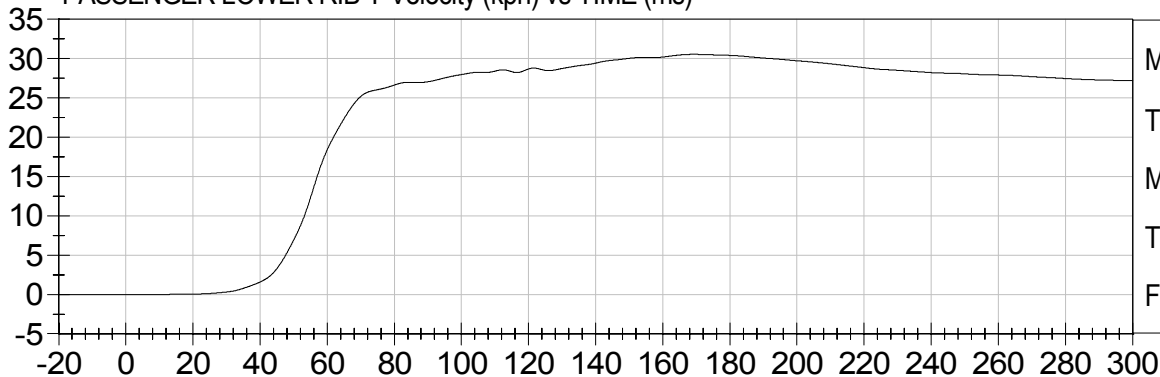
Max: 34.0 kph  
Tmax: 151.4 ms  
Min: -0.0 kph  
Tmin: 0.0 ms  
FIR 100

PASSENGER LOWER RIB Y (G's) vs TIME (ms)



Max: 39.0 G's  
Tmax: 55.7 ms  
Min: -3.6 G's  
Tmin: 114.5 ms  
FIR 100

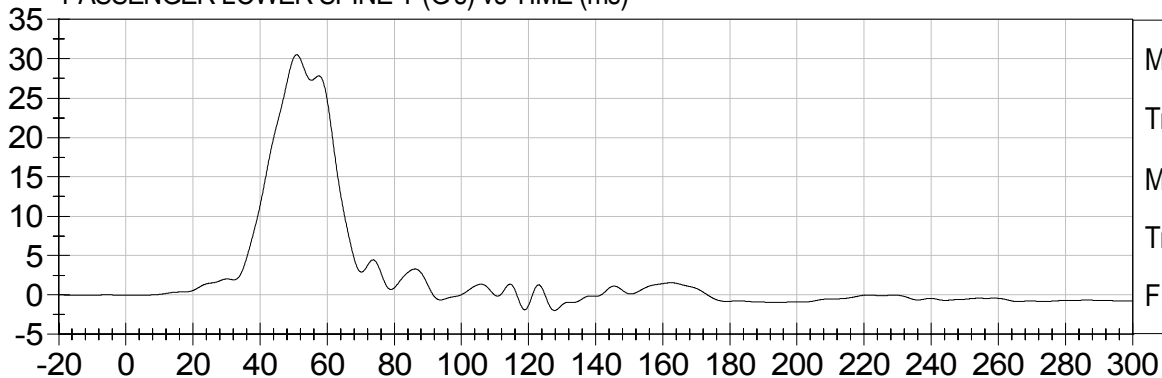
PASSENGER LOWER RIB Y Velocity (kph) vs TIME (ms)



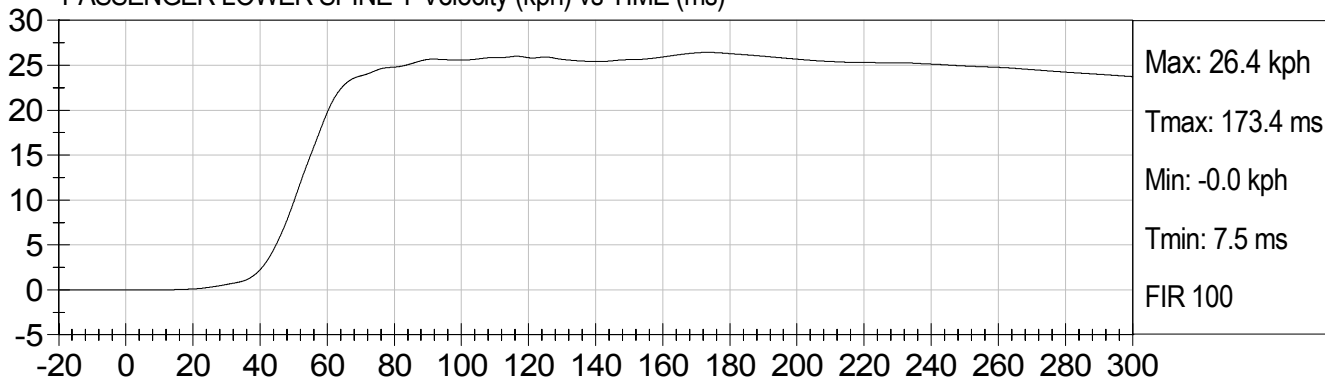
Max: 30.5 kph  
Tmax: 169.3 ms  
Min: -0.0 kph  
Tmin: 0.0 ms  
FIR 100



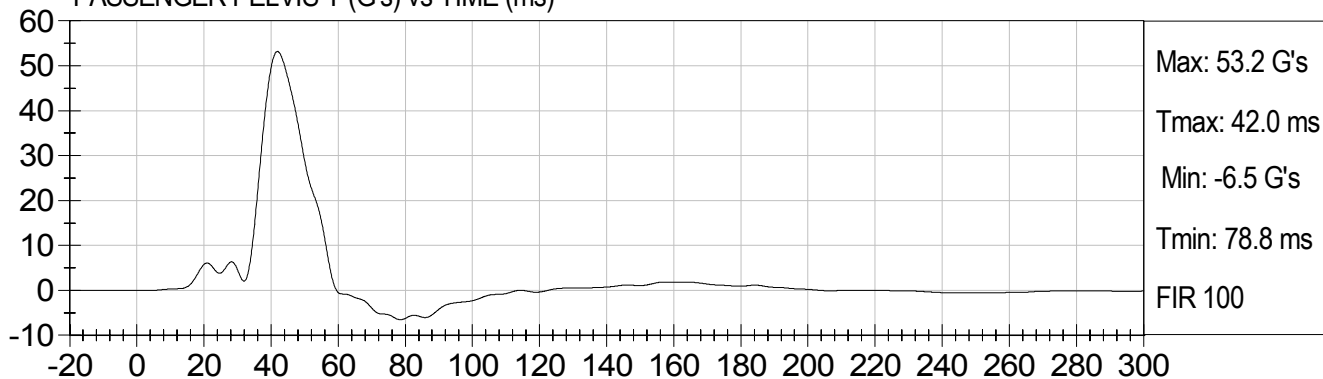
PASSENGER LOWER SPINE Y (G's) vs TIME (ms)



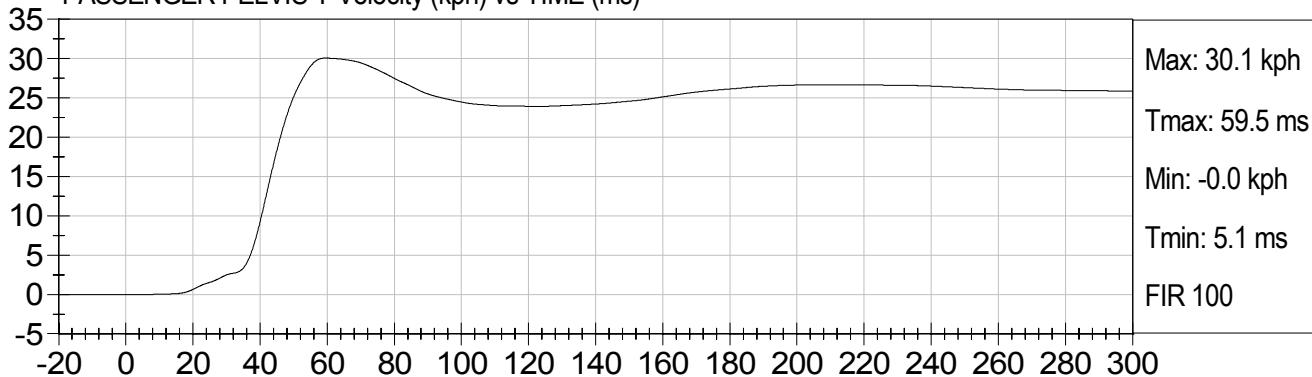
PASSENGER LOWER SPINE Y Velocity (kph) vs TIME (ms)



PASSENGER PELVIS Y (G's) vs TIME (ms)



PASSENGER PELVIS Y Velocity (kph) vs TIME (ms)



**APPENDIX C**  
**DUMMY CALIBRATION DATA**

CERTIFICATION DATA

Dummy Serial Number: 272

## Calibration Test Results Summary

Dummy Serial Number: 272

### Pre-Test Calibration

|                             |                                                       |
|-----------------------------|-------------------------------------------------------|
| External Dimensions:        | The dummy passed all external dimension requirements. |
| Head Drop Test:             | The head passed all drop test requirements.           |
| Neck Pendulum Test:         | The neck passed all pendulum test requirements.       |
| Thorax Impact Test:         | The thorax passed all impact test requirements.       |
| Pelvic Impact Test:         | The pelvis passed all impact test requirements.       |
| Abdominal Compression Test: | The abdomen passed all compression test requirements. |
| Lumbar Flexion Test:        | The lumbar passed all flexion test requirements.      |

**SID Calibration Data Sheet**  
**Side Impact Dummy**  
**External Measurements**

**ATD Serial No:** 272

**Test I.D:** D06154

| Tested Parameter             | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|---------------|--------|-----------|
| SH - Seated Height           | mm    | 889 - 909     | 907    | Pass      |
| RH - Rib Height              | mm    | 501 - 521     | 520    | Pass      |
| HP - Hip Pivot Height        | mm    | 99 ref.       | 99     | Pass      |
| RD - Rib from Back Line      | mm    | 229 - 241     | 230    | Pass      |
| KV - Knee Pivot to Back Line | mm    | 511 - 526     | 525    | Pass      |
| SW - Knee Pivot to Floor     | mm    | 490 - 505     | 495    | Pass      |
| HW - Hip Width               | mm    | 356 - 391     | 358    | Pass      |
| Overall Test Results         |       |               | Pass   |           |

Jessica Hall  
Laboratory Technician

David Winkelbauer  
Approved By

05/31/2006

Test Date

**SID Calibration Data Sheet**  
**Side Impact Dummy**  
**Head Drop Calibration (Lateral)**

**ATD Serial No:** 272

**Test I.D:** D061541

| Tested Parameter              | Units  | Specification | Result | Pass/Fail |
|-------------------------------|--------|---------------|--------|-----------|
| Laboratory Temperature        | deg C  | 18.9 to 25.5  | 21.4   | Pass      |
| Laboratory Relative Humidity  | %      | 10 to 70      | 41     | Pass      |
| Peak Resultant Acceleration   | G's    | 120 to 150    | 137    | Pass      |
| Is Resultant Curve Unimodal?  | Yes/No | 15% of peak   | Yes    | Pass      |
| Peak Longitudnal Acceleration | G's    | +/- 15        | 8      | Pass      |
| Overall Test Results          |        |               |        | Pass      |

  
Laboratory Technician

  
Approved By

05/31/2006  
Test Date



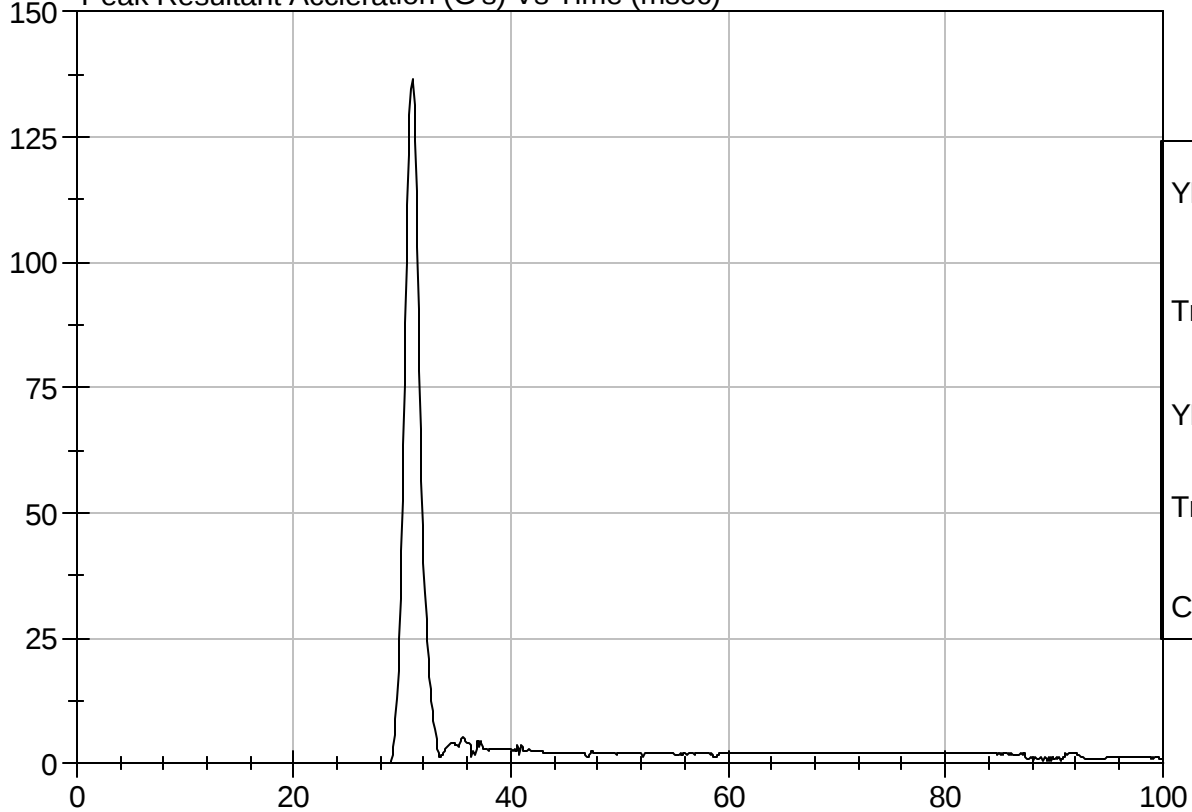
Test Description: Head Drop

Test Date: 05/31/2006

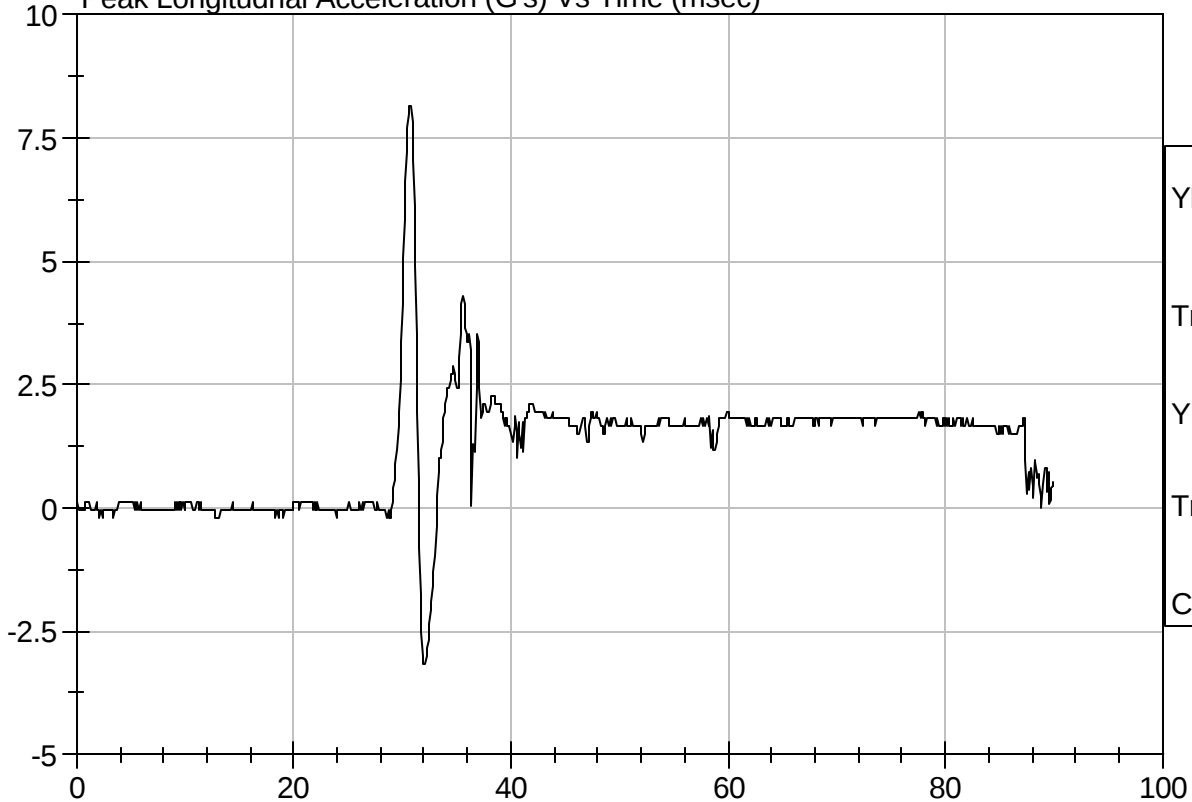
Component: D061541

Speed: 0 ft/s, 0.00 m/s

Peak Resultant Acceleration (G's) Vs Time (msec)



Peak Longitudnal Acceleration (G's) Vs Time (msec)



**SID Calibration Data Sheet**  
**Side Impact Dummy**  
**Thorax Impact Test**

**ATD Serial No:** 272

**Test I.D:** D061542

| Tested Parameter             | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature       | deg C | 18.9 - 25.5   | 21.7   | Pass      |
| Laboratory Relative Humidity | %     | 10 to 70      | 56     | Pass      |
| Probe Velocity               | m/s   | 4.22 - 4.31   | 4.24   | Pass      |
| Upper Rib                    | G's   | 37 - 46       | 40     | Pass      |
| Lower Rib                    | G's   | 37 - 46       | 41     | Pass      |
| Lower Spine                  | G's   | 15 - 22       | 18     | Pass      |
| Overall Test Results         |       |               |        | Pass      |

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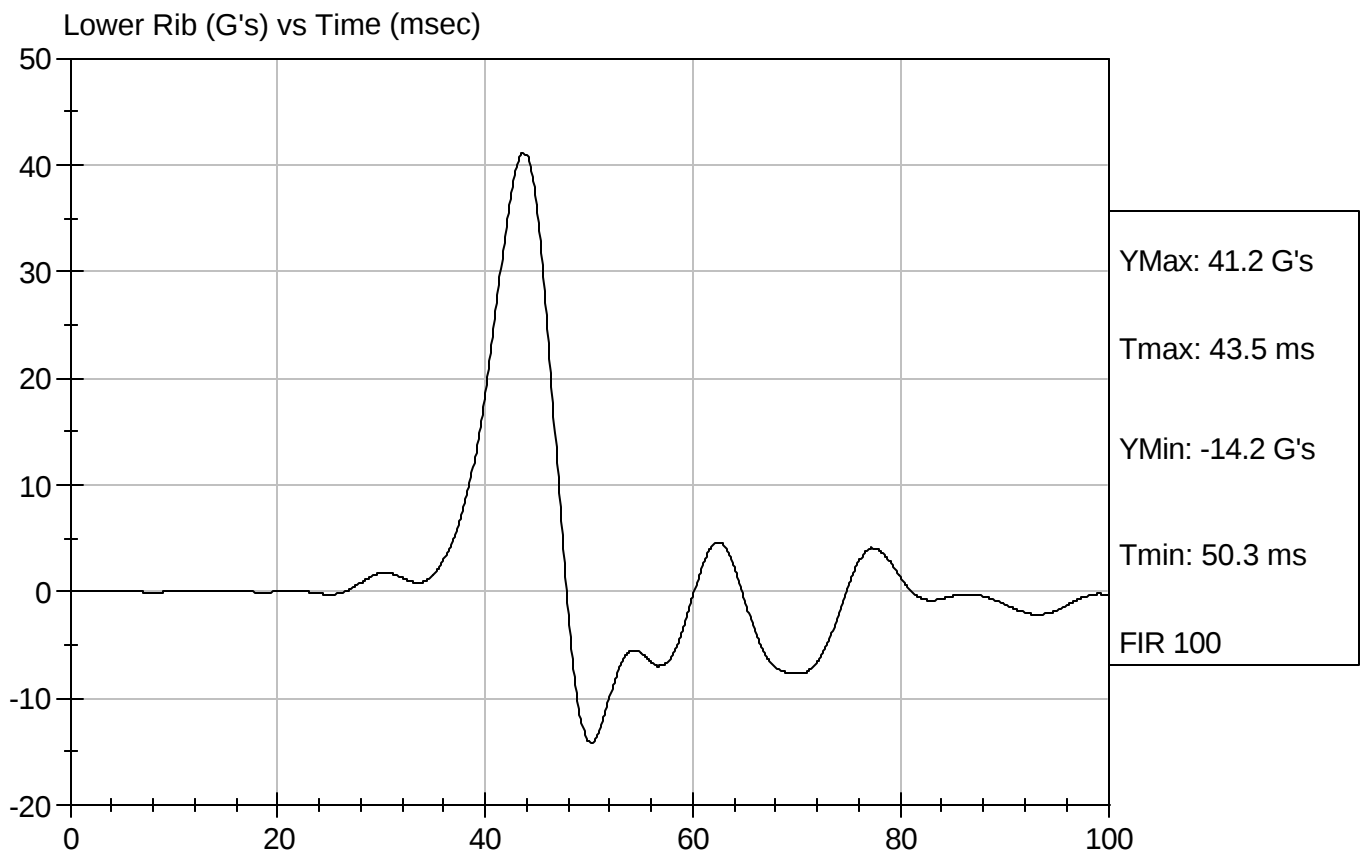
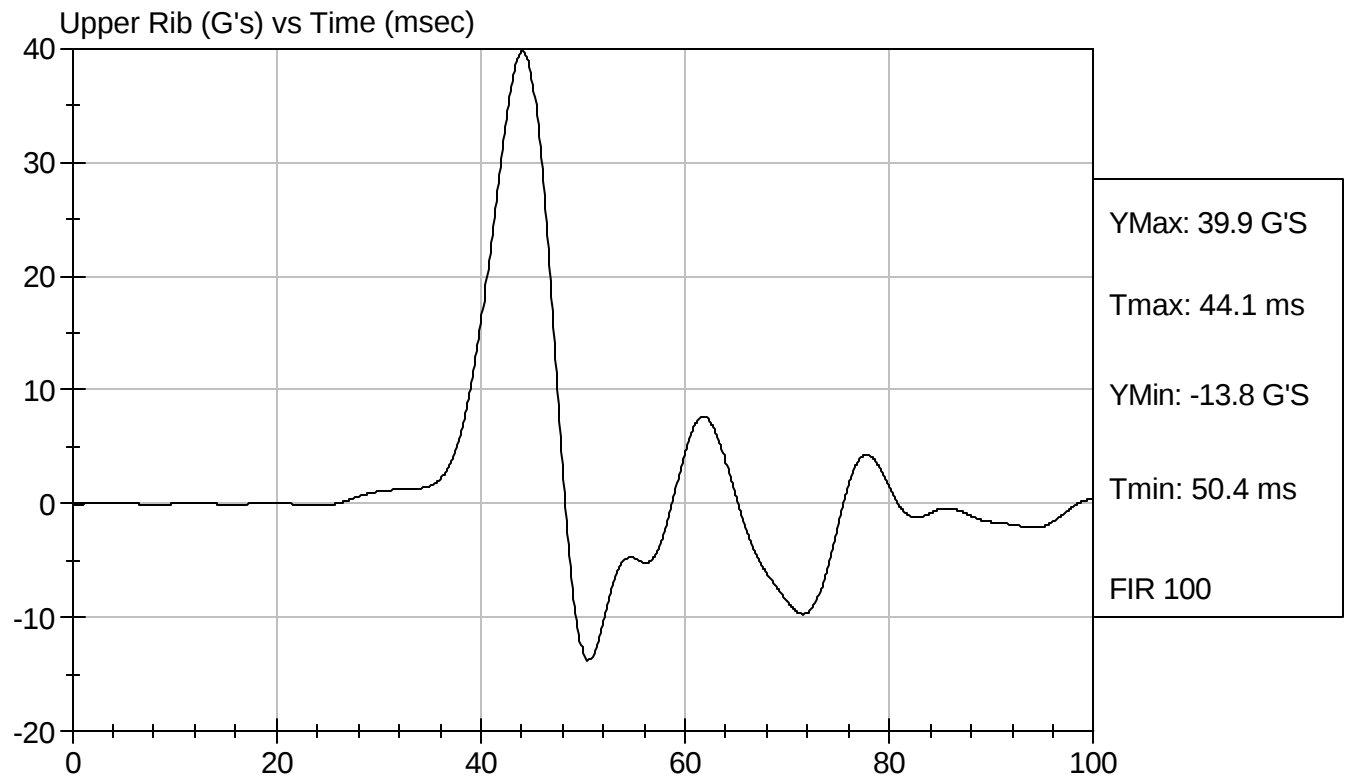
David Winkelbauer  
Approved By

05/31/2006  
Test Date



Test Desc: Thorax Impact  
Component ID: D061542

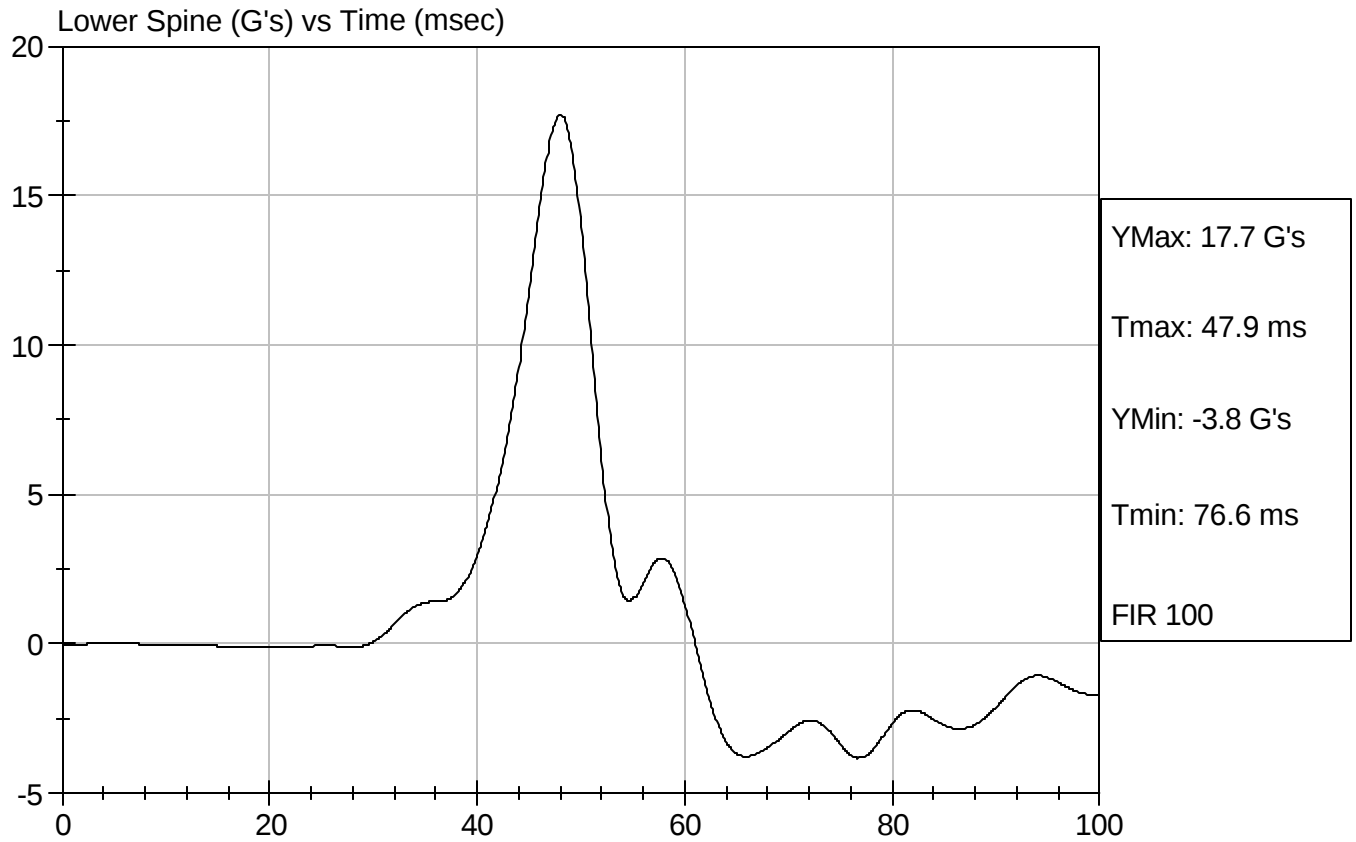
Test Date: 05/31/2006  
Speed: 13.92 ft/sec, 4.24 m/sec





Test Desc: Thorax Impact  
Component ID: D061542

Test Date: 05/31/2006  
Speed: 13.92 ft/sec, 4.24 m/sec



**SID Calibration Data Sheet**  
**Side Impact Dummy**  
**Pelvis Impact Test**

**ATD Serial No:** 272

**Test I.D:** D061543

| Tested Parameter             | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature       | deg C | 18.9 to 25.5  | 21.7   | Pass      |
| Laboratory Relative Humidity | %     | 10 to 70      | 56     | Pass      |
| Probe Velocity               | m/s   | 4.27 - 4.33   | 4.32   | Pass      |
| Pelvis Acceleration          | G's   | 40 - 60       | 42     | Pass      |
| Overall Test Results         |       |               | Pass   |           |

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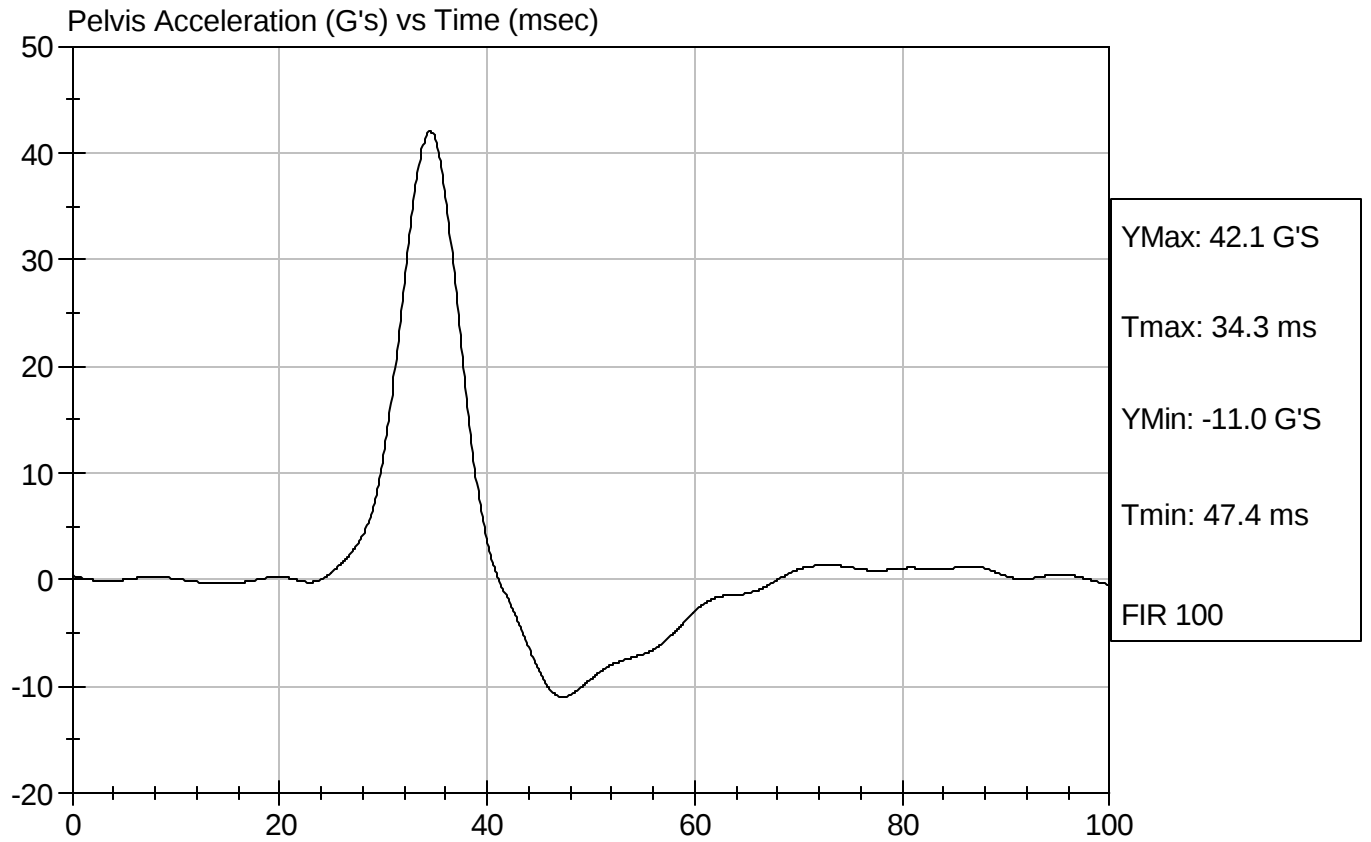
David Winkelbauer  
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05/31/2006  
Test Date



Test Desc: Pelvis Impact  
Component ID: D061543

Test Date: 05/31/2006  
Speed: 14.18 ft/sec, 4.32 m/sec



**SID Calibration Data Sheet**  
**Side Impact Dummy**  
**Abdominal Compression Calibration (Pre-Load = 10 lbs)**

**ATD Serial No:** 272

**Test I.D:** D061544

| Tested Parameter             | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature       | deg C | 18.9 - 25.5   | 23.1   | Pass      |
| Laboratory Relative Humidity | %     | 10 to 70      | 41     | Pass      |
| Force At 12.7 mm             | N     | 104 -162      | 141    | Pass      |
| Force At 19 mm               | N     | 163 - 222     | 191    | Pass      |
| Force At 25.4 mm             | N     | 222 - 280     | 256    | Pass      |
| Force At 33 mm               | N     | 325 - 391     | 350    | Pass      |
| Overall Test Results         |       |               |        | Pass      |

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05/31/2006  
Test Date

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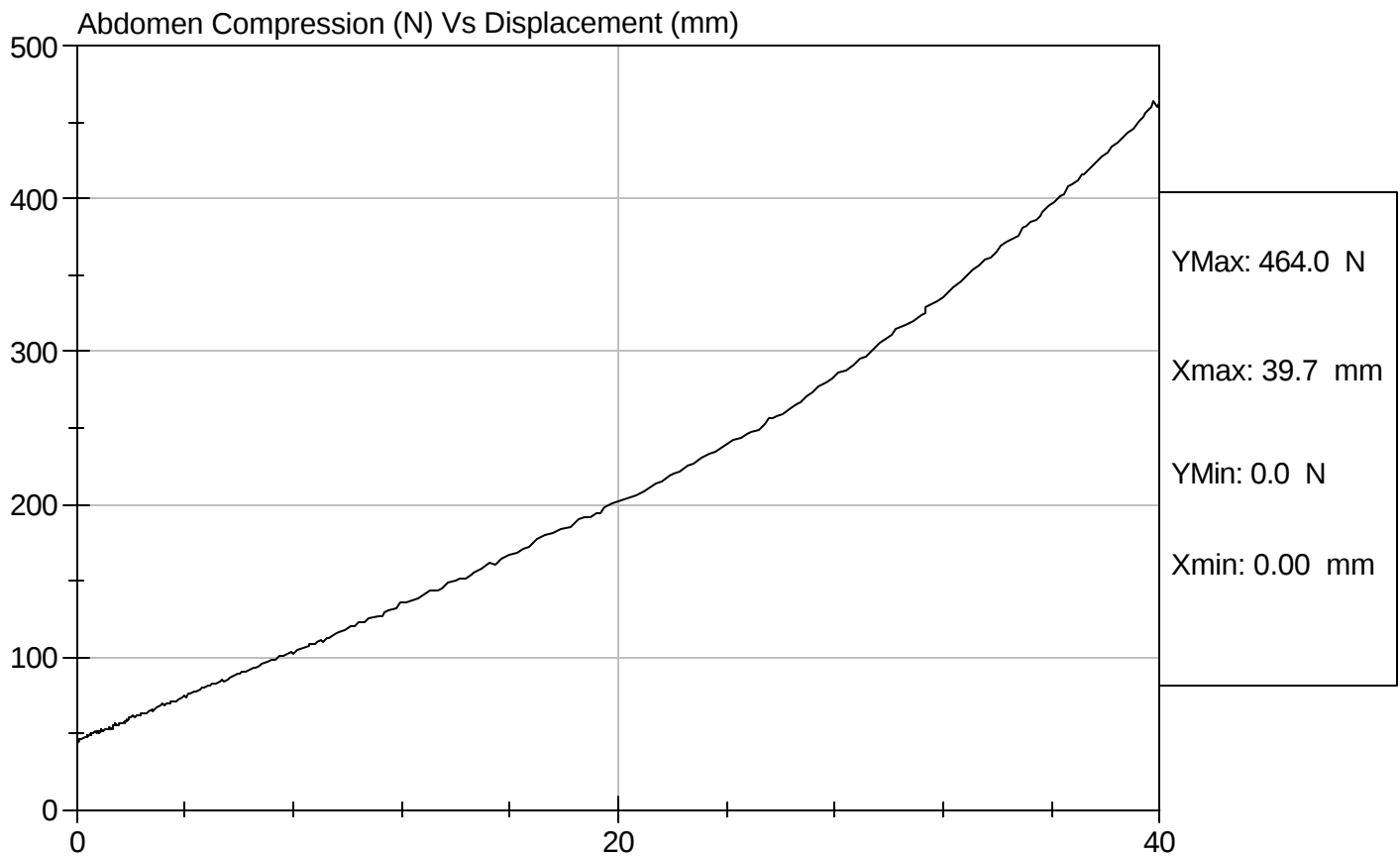


Test Description: Abdomen Compression

Test Date: 05/31/2006

Component: D061544

Speed: 0 ft/sec, 0 m/sec



**SID Calibration Data Sheet**  
**Side Impact Dummy**  
**Lumbar Flexion Calibration**

**ATD Serial No:** 272

**Test I.D:** D061545

| Tested Parameter             | Units | Specification | Result               | Pass/Fail |
|------------------------------|-------|---------------|----------------------|-----------|
| Laboratory Temperature       | deg C | 18.9 - 25.5   | 23.0                 | Pass      |
| Laboratory Relative Humidity | %     | 10 to 70      | 40                   | Pass      |
| Force At 0 deg               | N     | 0 - 26.7      | 0.0                  | Pass      |
| Force At 20 deg              | N     | 97.9 - 151.2  | 105.5                | Pass      |
| Force At 30 deg              | N     | 151.2 - 204.6 | 179.9                | Pass      |
| Force At 40 deg              | N     | 204.6 - 258.0 | 237.7                | Pass      |
| Return Angle                 | Deg   | 12 Maximum    | 3                    | Pass      |
|                              |       |               | Overall Test Results | Pass      |

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05/31/2006  
Test Date

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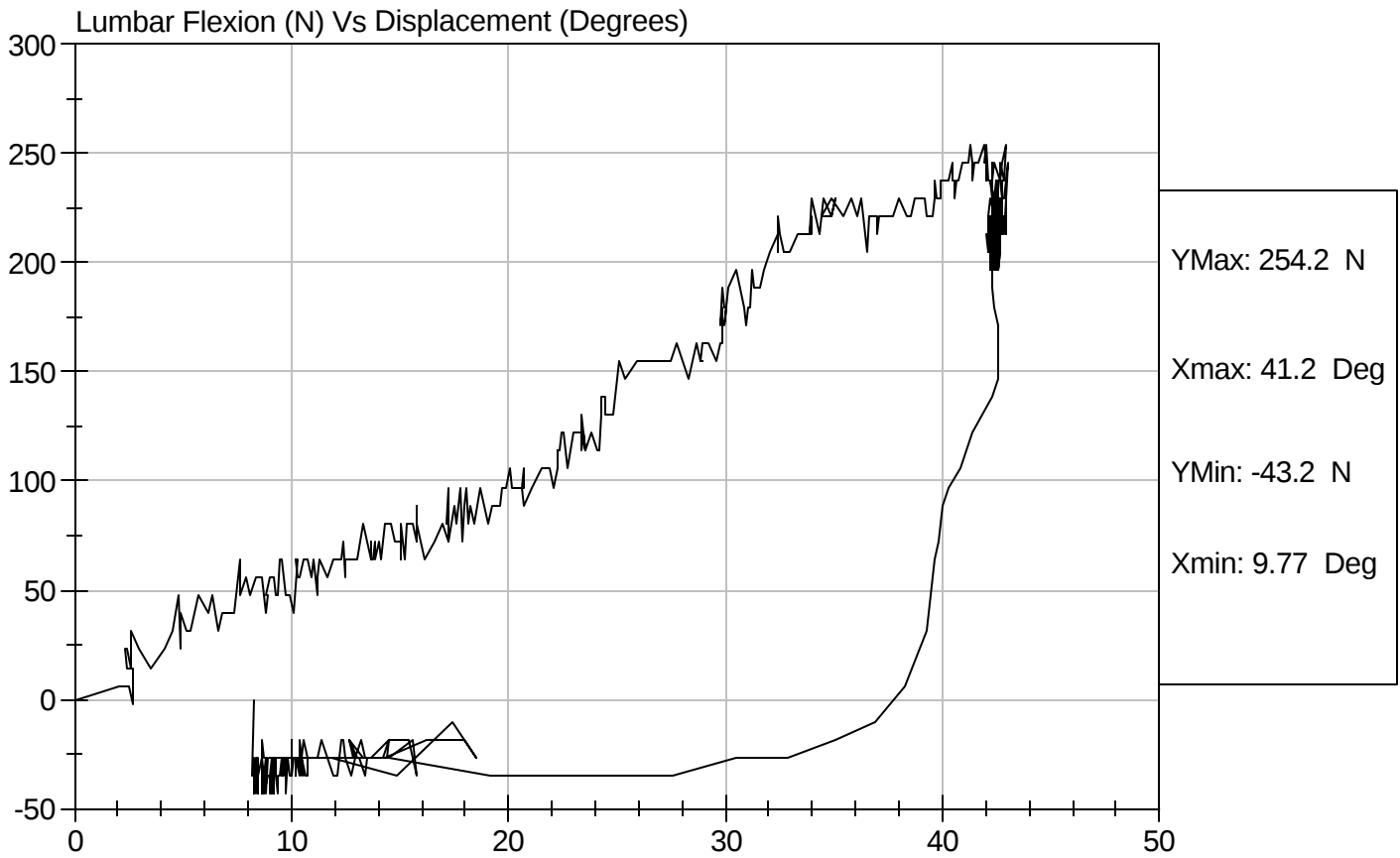


Test Description: Lumbar Flexion

Test Date: 05/31/2006

Component: D061545

Speed: 0 ft/sec, 0 m/sec



**SID Calibration Data Sheet**  
**Side Impact Dummy (SID)**  
**Neck Pendulum Test**

**ATD Serial No:** 272

**Test I.D:** D061549

| Tested Parameter                        |               | Units | Specification | Result | Pass/Fail |
|-----------------------------------------|---------------|-------|---------------|--------|-----------|
| Laboratory Temperature                  |               | deg C | 20.6 to 22.2  | 22.1   | Pass      |
| Laboratory Relative Humidity            |               | %     | 10 to 70      | 40     | Pass      |
| Impact Velocity                         |               | m/s   | 6.89 to 7.13  | 7.05   | Pass      |
| Pendulum Deceleration                   | 10 msec       | m/s   | 1.96 to 2.55  | 2.24   | Pass      |
|                                         | 20 msec       | m/s   | 4.12 to 5.10  | 4.53   | Pass      |
|                                         | 30 msec       | m/s   | 5.73 to 7.01  | 6.26   | Pass      |
|                                         | 40 to 70 msec | m/s   | 6.27 to 7.64  | 7.31   | Pass      |
| Midsagittal Plane Max Rotation          |               | deg   | 66 to 82      | 71     | Pass      |
| Head Rotation Peak to Zero - Decay Time |               | msec  | 58 to 67      | 59     | Pass      |
| Max. Mx at Occipital Condyles           |               | Nm    | 73 to 88      | 80     | Pass      |
| Mx Peak To Zero - Decay Time            |               | msec  | 49 to 64      | 55     | Pass      |
| Mx Peak to Max. Head Rotation           |               | msec  | 2 to 16       | 8      | Pass      |

  
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05/31/2006

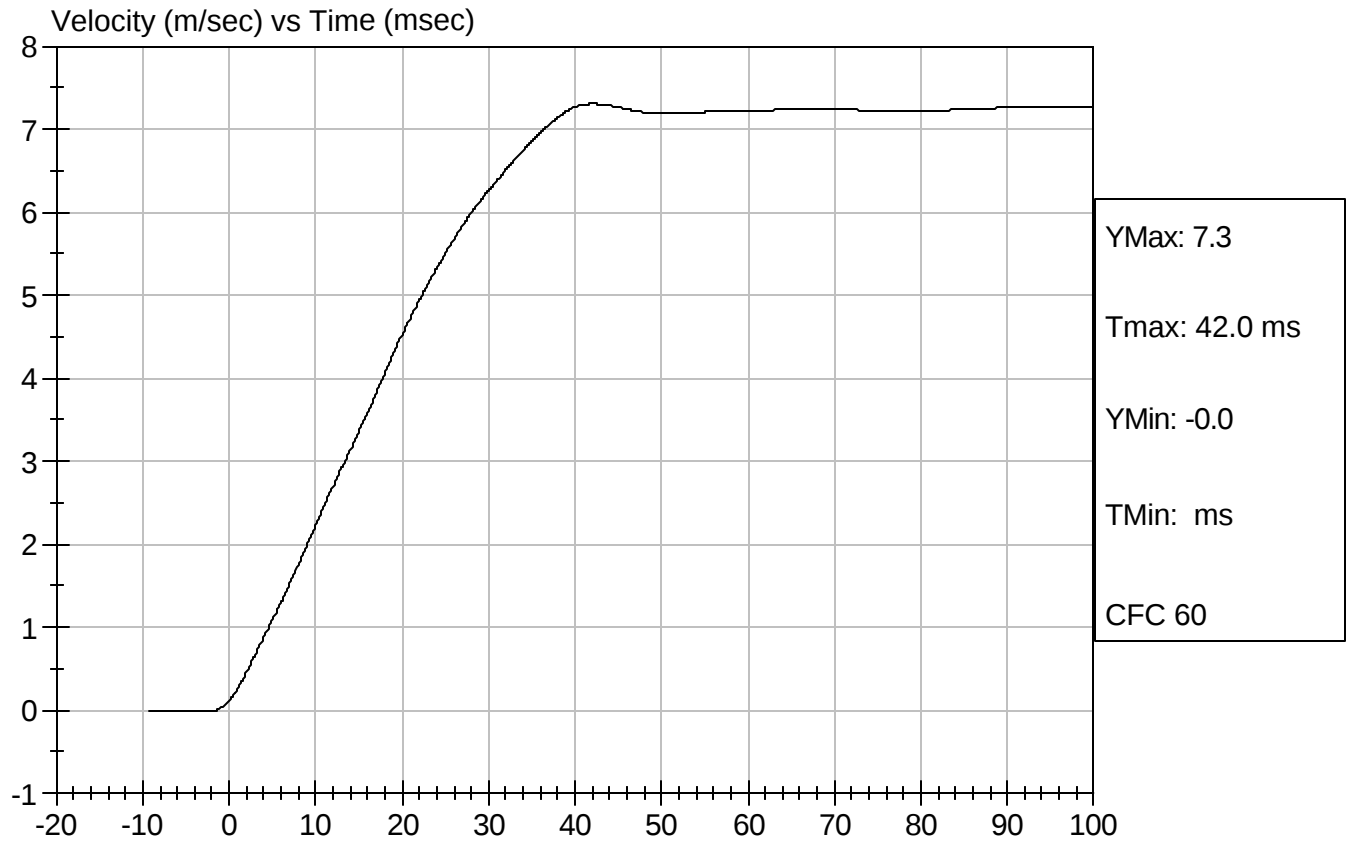
Test Date

  
 Approved By



Test Desc: Neck Bending  
Component ID: D061549

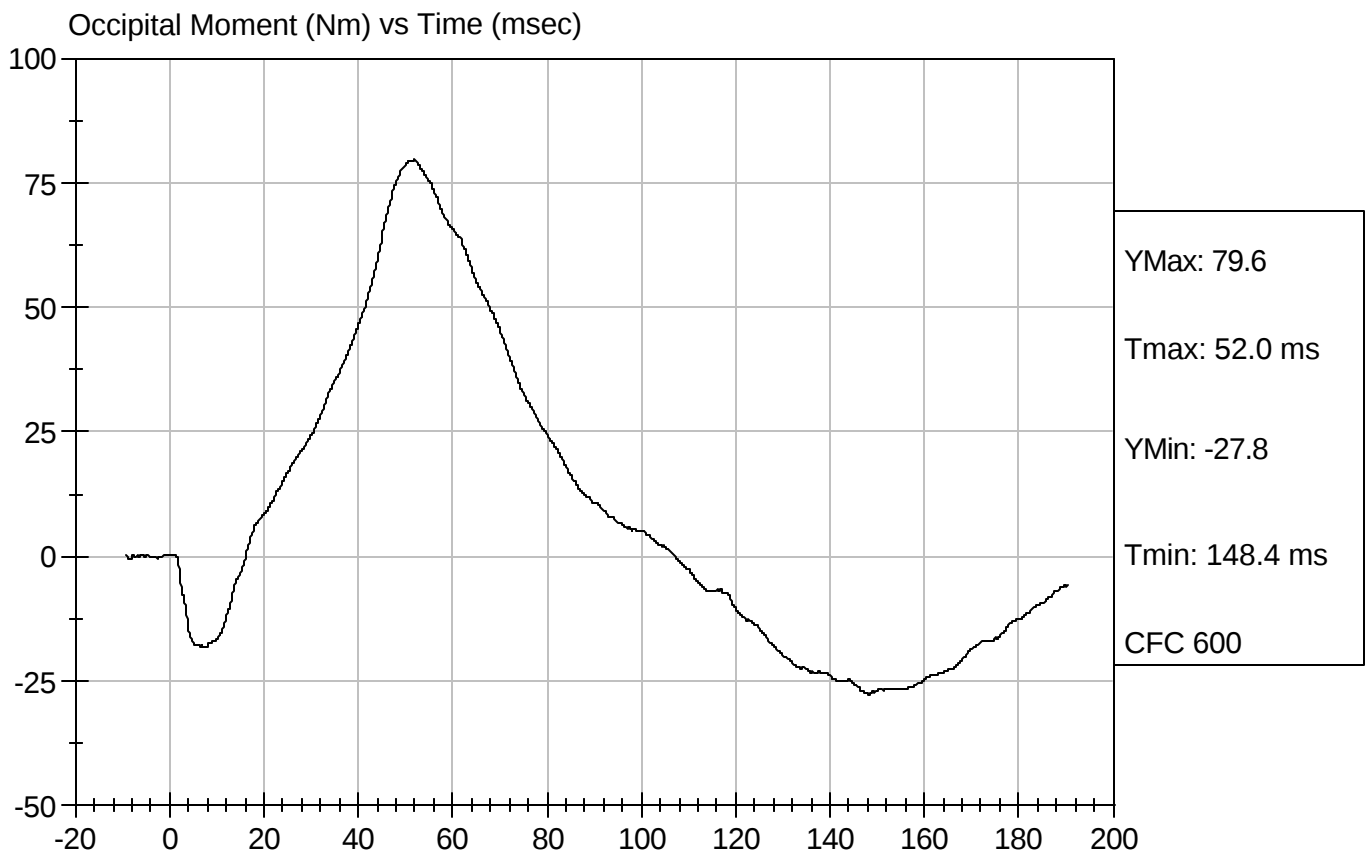
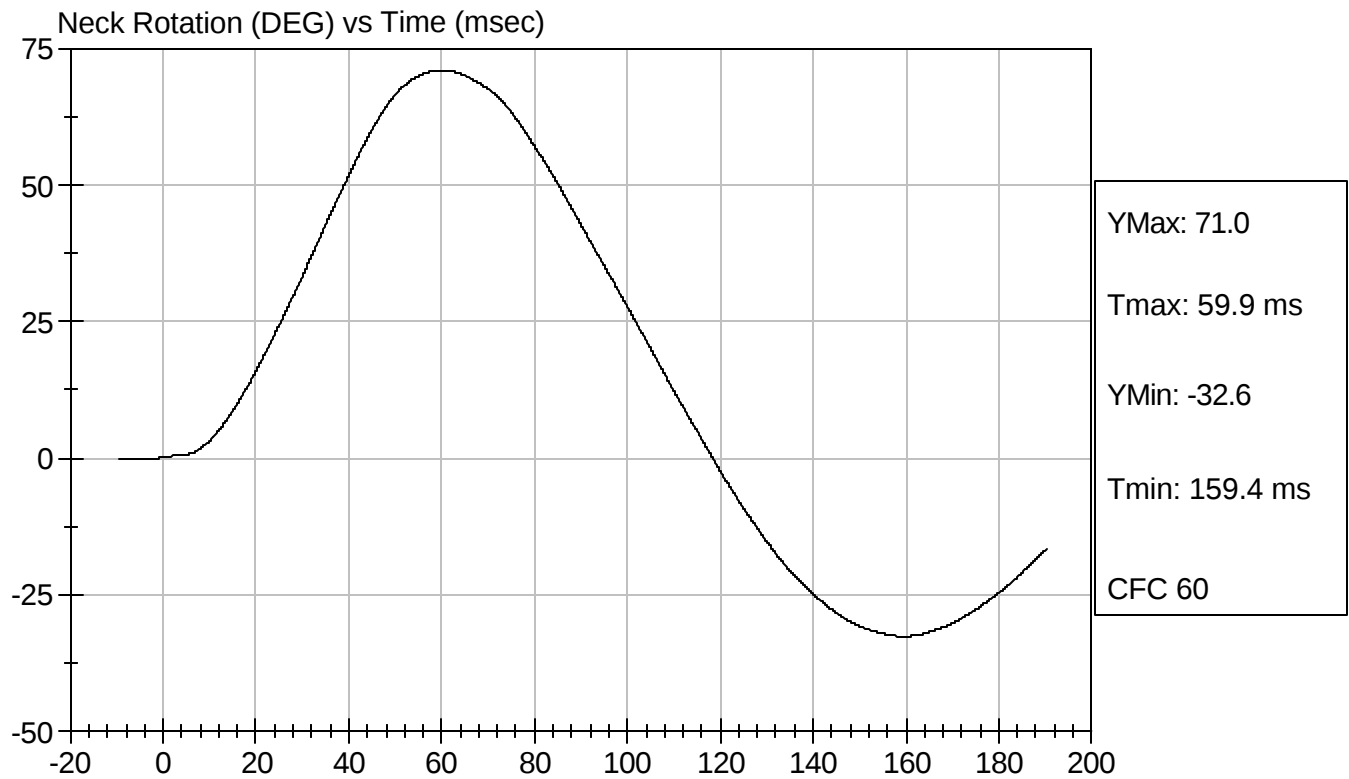
Test Date: 05/31/2006  
Speed: 23.12 ft/sec, 7.05 m/sec





Test Desc: Neck Bending  
Component ID: D061549

Test Date: 05/31/2006  
Speed: 23.12 ft/sec, 7.05 m/sec



## Calibration Test Results Summary

Dummy Serial Number: 272

### Post-Test Calibration

|                             |                                                       |
|-----------------------------|-------------------------------------------------------|
| External Dimensions:        | The dummy passed all external dimension requirements. |
| Head Drop Test:             | The head passed all drop test requirements.           |
| Neck Pendulum Test:         | The neck passed all pendulum test requirements.       |
| Thorax Impact Test:         | The thorax passed all impact test requirements.       |
| Pelvic Impact Test:         | The pelvis passed all impact test requirements.       |
| Abdominal Compression Test: | The abdomen passed all compression test requirements. |
| Lumbar Flexion Test:        | The lumbar passed all flexion test requirements.      |

**SID Calibration Data Sheet**  
**Side Impact Dummy**  
**Head Drop Calibration (Lateral)**

**ATD Serial No:** 272

**Test I.D:** D062631

| Tested Parameter              | Units  | Specification | Result | Pass/Fail |
|-------------------------------|--------|---------------|--------|-----------|
| Laboratory Temperature        | deg C  | 18.9 to 25.5  | 21.7   | Pass      |
| Laboratory Relative Humidity  | %      | 10 to 70      | 46     | Pass      |
| Peak Resultant Acceleration   | G's    | 120 to 150    | 150    | Pass      |
| Is Resultant Curve Unimodal?  | Yes/No | 15% of peak   | Yes    | Pass      |
| Peak Longitudnal Acceleration | G's    | +/- 15        | -12.6  | Pass      |
| Overall Test Results          |        |               |        | Pass      |

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08/29/2006  
Test Date



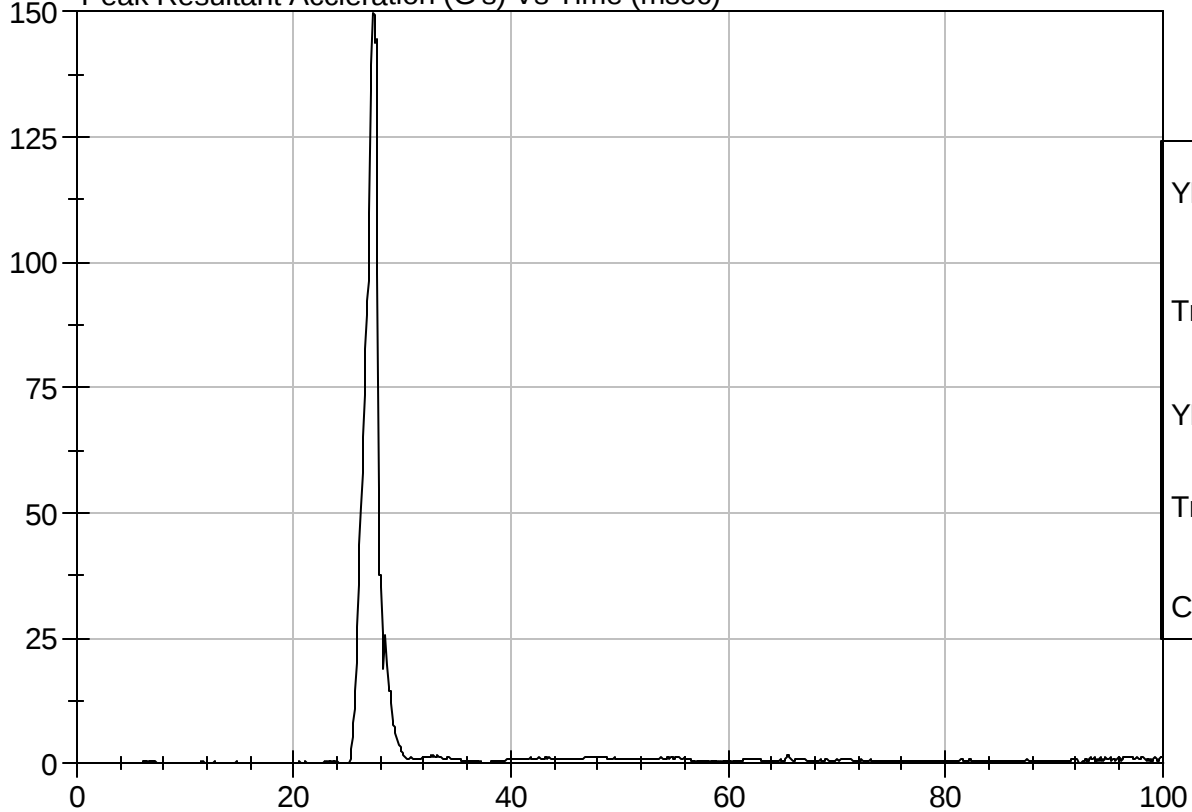
Test Description: Head Drop

Test Date: 08/29/2006

Component: D062631

Speed: 0 ft/s, 0.00 m/s

Peak Resultant Acceleration (G's) Vs Time (msec)



YMax: 150.0 G

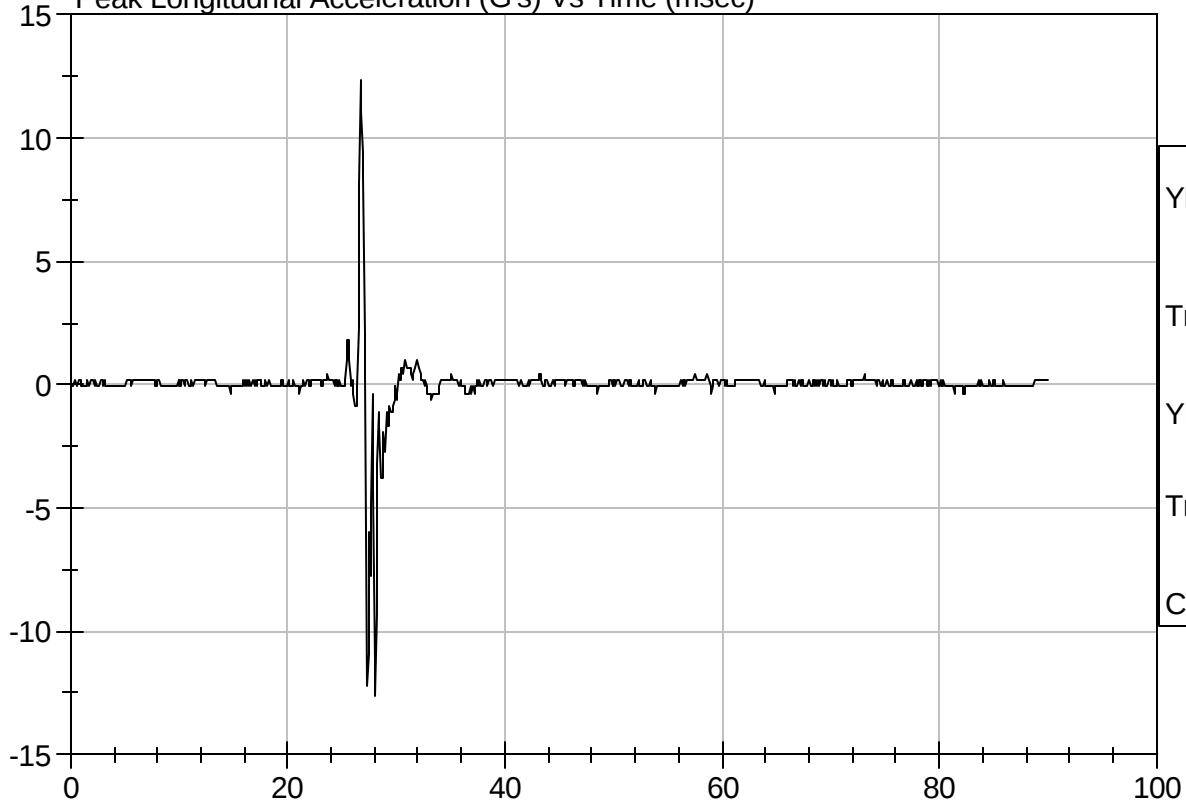
Tmax: 27.3 ms

YMin: 0.1 G

Tmin: -0.3 ms

CFC 1000

Peak Longitudnal Acceleration (G's) Vs Time (msec)



YMax: 12.4 G

Tmax: 26.7 ms

YMin: -12.6 G

Tmin: 28.1 ms

CFC 1000

**SID Calibration Data Sheet**  
**Side Impact Dummy**  
**Thorax Impact Test**

**ATD Serial No:** 272

**Test I.D:** D062632

| Tested Parameter             | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature       | deg C | 18.9 - 25.5   | 21.8   | Pass      |
| Laboratory Relative Humidity | %     | 10 to 70      | 47     | Pass      |
| Probe Velocity               | m/s   | 4.22 - 4.31   | 4.31   | Pass      |
| Upper Rib                    | G's   | 37 - 46       | 43     | Pass      |
| Lower Rib                    | G's   | 37 - 46       | 41     | Pass      |
| Lower Spine                  | G's   | 15 - 22       | 20     | Pass      |
| Overall Test Results         |       |               |        | Pass      |

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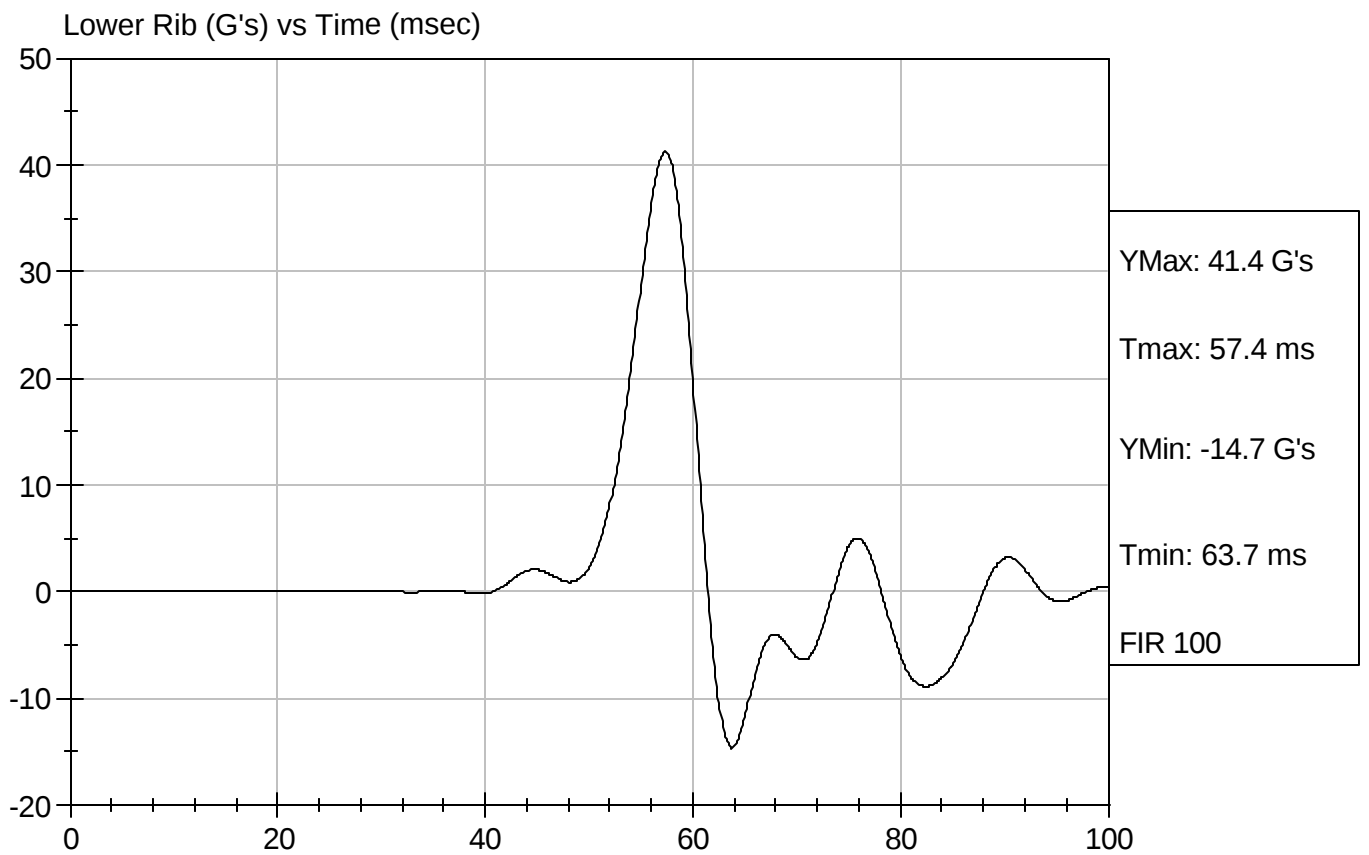
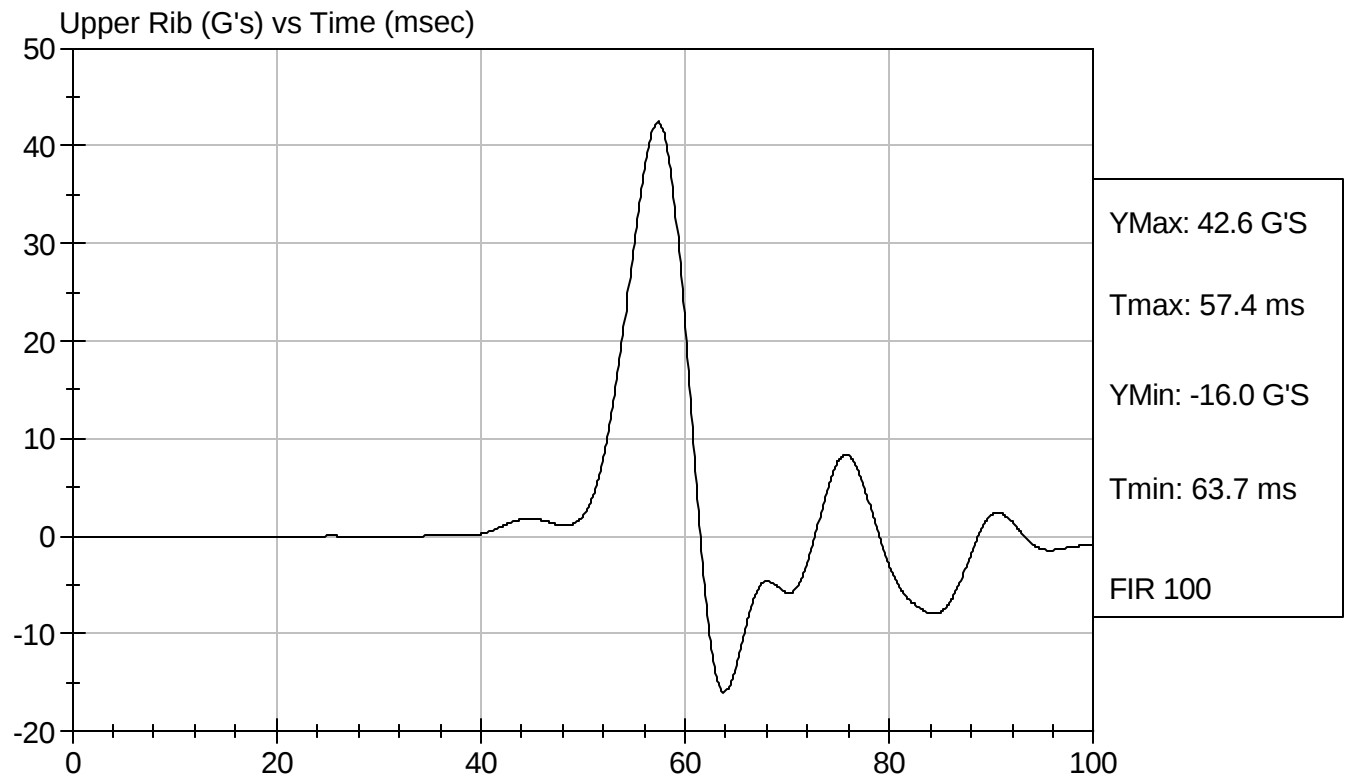
David Winkelbauer  
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08/30/2006  
Test Date



Test Desc: Thorax Impact  
Component ID: D062632

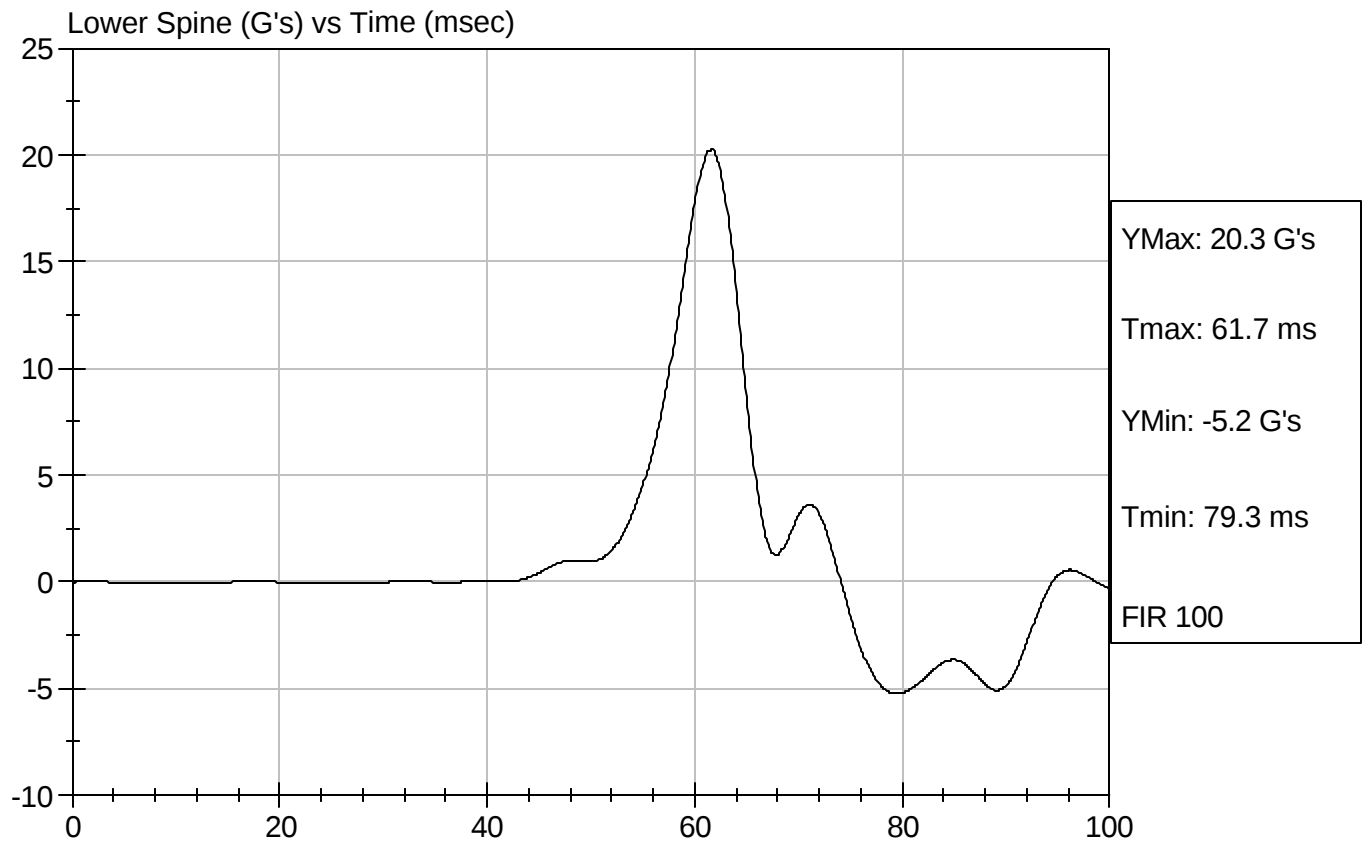
Test Date: 08/30/2006  
Speed: 14.13 ft/sec, 4.31 m/sec





Test Desc: Thorax Impact  
Component ID: D062632

Test Date: 08/30/2006  
Speed: 14.13 ft/sec, 4.31 m/sec



**SID Calibration Data Sheet**  
**Side Impact Dummy**  
**Pelvis Impact Test**

**ATD Serial No:** 272

**Test I.D:** D062633

| Tested Parameter             | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature       | deg C | 18.9 to 25.5  | 21.3   | Pass      |
| Laboratory Relative Humidity | %     | 10 to 70      | 47     | Pass      |
| Probe Velocity               | m/s   | 4.27 - 4.33   | 4.29   | Pass      |
| Pelvis Acceleration          | G's   | 40 - 60       | 44     | Pass      |
| Overall Test Results         |       |               | Pass   |           |

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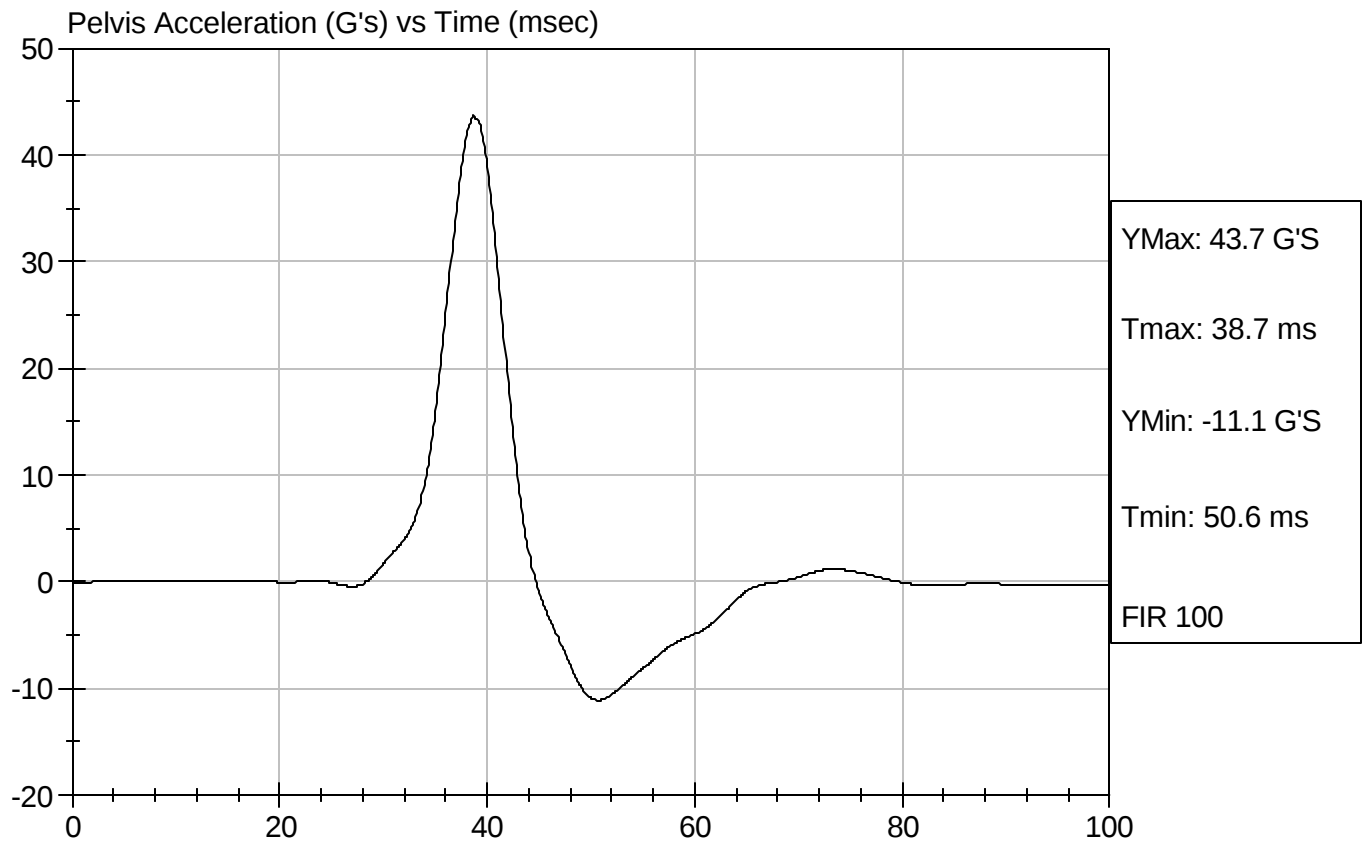
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08/30/2006  
Test Date



Test Desc: Pelvis Impact  
Component ID: D062633

Test Date: 08/30/2006  
Speed: 14.08 ft/sec, 4.29 m/sec



**SID Calibration Data Sheet**  
**Side Impact Dummy**  
**Abdominal Compression Calibration (Pre-Load = 10 lbs)**

**ATD Serial No:** 272

**Test I.D:** D062634

| Tested Parameter             | Units | Specification | Result               | Pass/Fail |
|------------------------------|-------|---------------|----------------------|-----------|
| Laboratory Temperature       | deg C | 18.9 - 25.5   | 21.4                 | Pass      |
| Laboratory Relative Humidity | %     | 10 to 70      | 42                   | Pass      |
| Force At 12.7 mm             | N     | 104 -162      | 137                  | Pass      |
| Force At 19 mm               | N     | 163 - 222     | 191                  | Pass      |
| Force At 25.4 mm             | N     | 222 - 280     | 257                  | Pass      |
| Force At 33 mm               | N     | 325 - 391     | 355                  | Pass      |
|                              |       |               | Overall Test Results | Pass      |

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08/29/2006  
Test Date

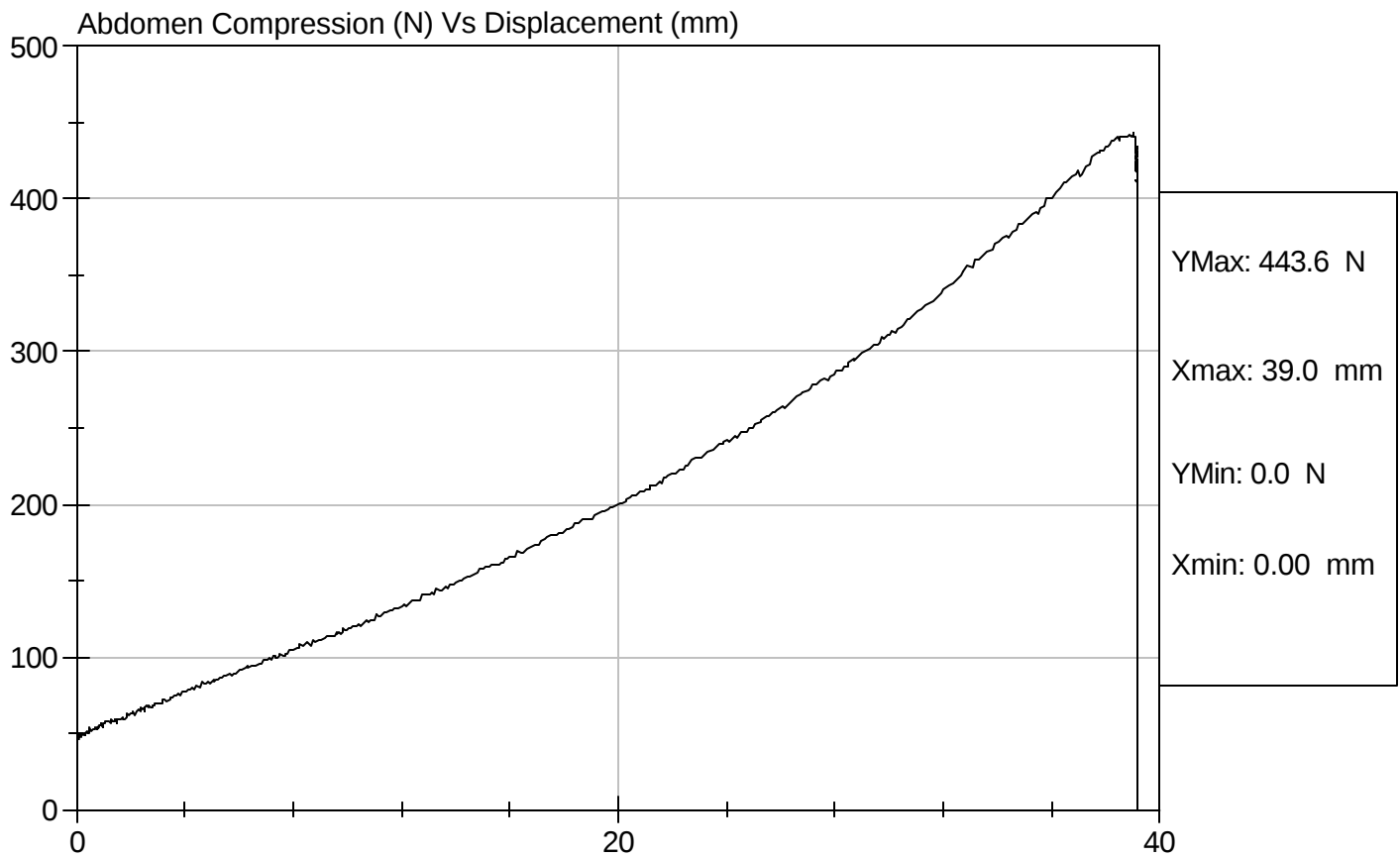


Test Description: Abdomen Compression

Test Date: 08/29/2006

Component: D062634

Speed: 0 ft/sec, 0 m/sec



**SID Calibration Data Sheet**  
**Side Impact Dummy**  
**Lumbar Flexion Calibration**

**ATD Serial No:** 272

**Test I.D:** D062635

| Tested Parameter             | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature       | deg C | 18.9 - 25.5   | 21.6   | Pass      |
| Laboratory Relative Humidity | %     | 10 to 70      | 43     | Pass      |
| Force At 0 deg               | N     | 0 - 26.7      | 0.0    | Pass      |
| Force At 20 deg              | N     | 97.9 - 151.2  | 132.0  | Pass      |
| Force At 30 deg              | N     | 151.2 - 204.6 | 164.0  | Pass      |
| Force At 40 deg              | N     | 204.6 - 258.0 | 212.1  | Pass      |
| Return Angle                 | Deg   | 12 Maximum    | 0      | Pass      |
| Overall Test Results         |       |               | Pass   |           |

  
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Approved By

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Test Date

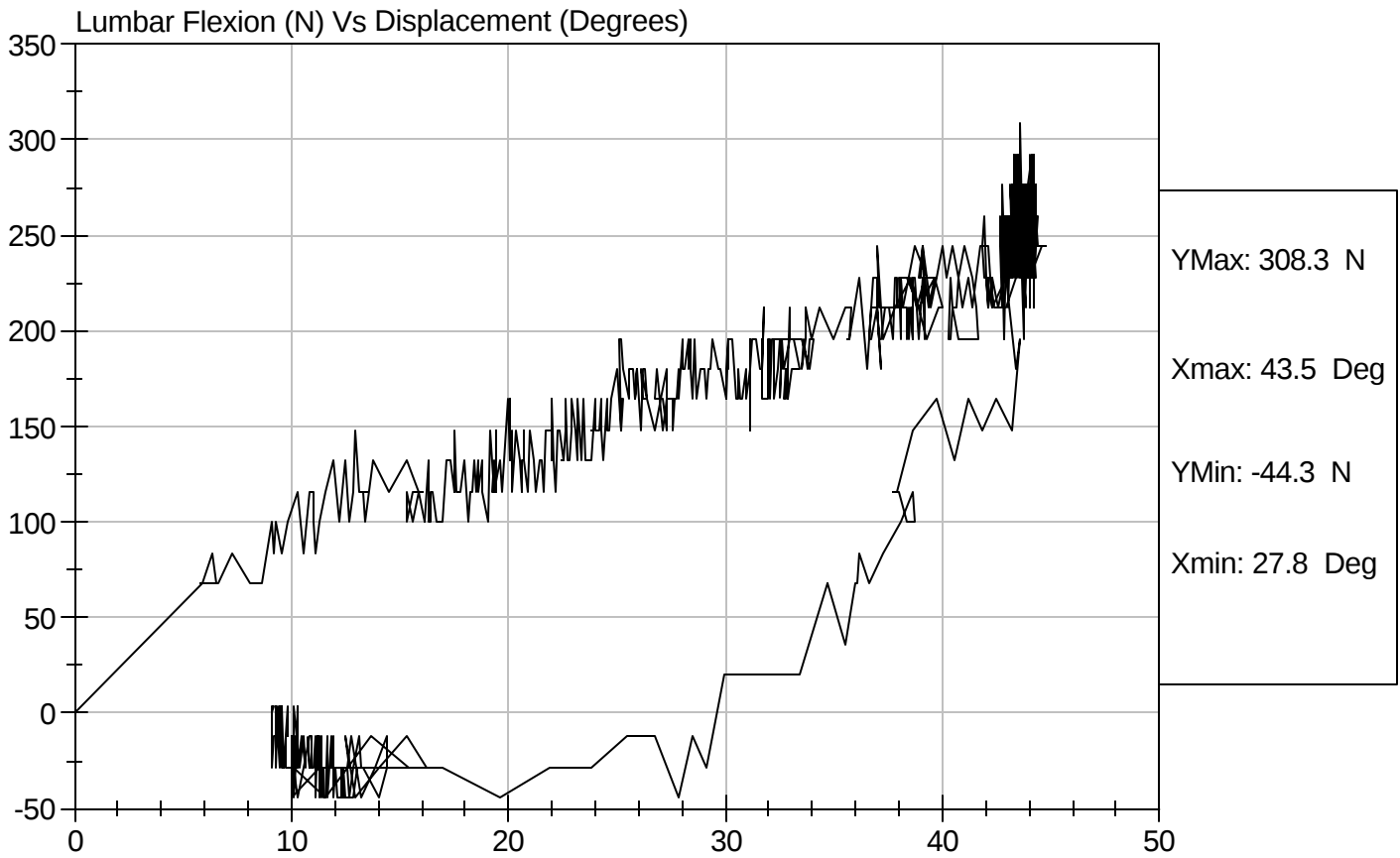


Test Description: Lumbar Flexion

Test Date: 08/29/2006

Component: D062635

Speed: 0 ft/sec, 0 m/sec



**SID Calibration Data Sheet**  
**Side Impact Dummy (SID)**  
**Neck Pendulum Test**

**ATD Serial No:** 272

**Test I.D:** D062639

| Tested Parameter                        |               | Units | Specification | Result | Pass/Fail |
|-----------------------------------------|---------------|-------|---------------|--------|-----------|
| Laboratory Temperature                  |               | deg C | 20.6 to 22.2  | 21.4   | Pass      |
| Laboratory Relative Humidity            |               | %     | 10 to 70      | 43     | Pass      |
| Impact Velocity                         |               | m/s   | 6.89 to 7.13  | 7.01   | Pass      |
| Pendulum Deceleration                   | 10 msec       | m/s   | 1.96 to 2.55  | 2.34   | Pass      |
|                                         | 20 msec       | m/s   | 4.12 to 5.10  | 4.58   | Pass      |
|                                         | 30 msec       | m/s   | 5.73 to 7.01  | 6.33   | Pass      |
|                                         | 40 to 70 msec | m/s   | 6.27 to 7.64  | 7.22   | Pass      |
| Midsagittal Plane Max Rotation          |               | deg   | 66 to 82      | 71     | Pass      |
| Head Rotation Peak to Zero - Decay Time |               | msec  | 58 to 67      | 60     | Pass      |
| Max. Mx at Occipital Condyles           |               | Nm    | 73 to 88      | 78     | Pass      |
| Mx Peak To Zero - Decay Time            |               | msec  | 49 to 64      | 58     | Pass      |
| Mx Peak to Max. Head Rotation           |               | msec  | 2 to 16       | 9      | Pass      |

  
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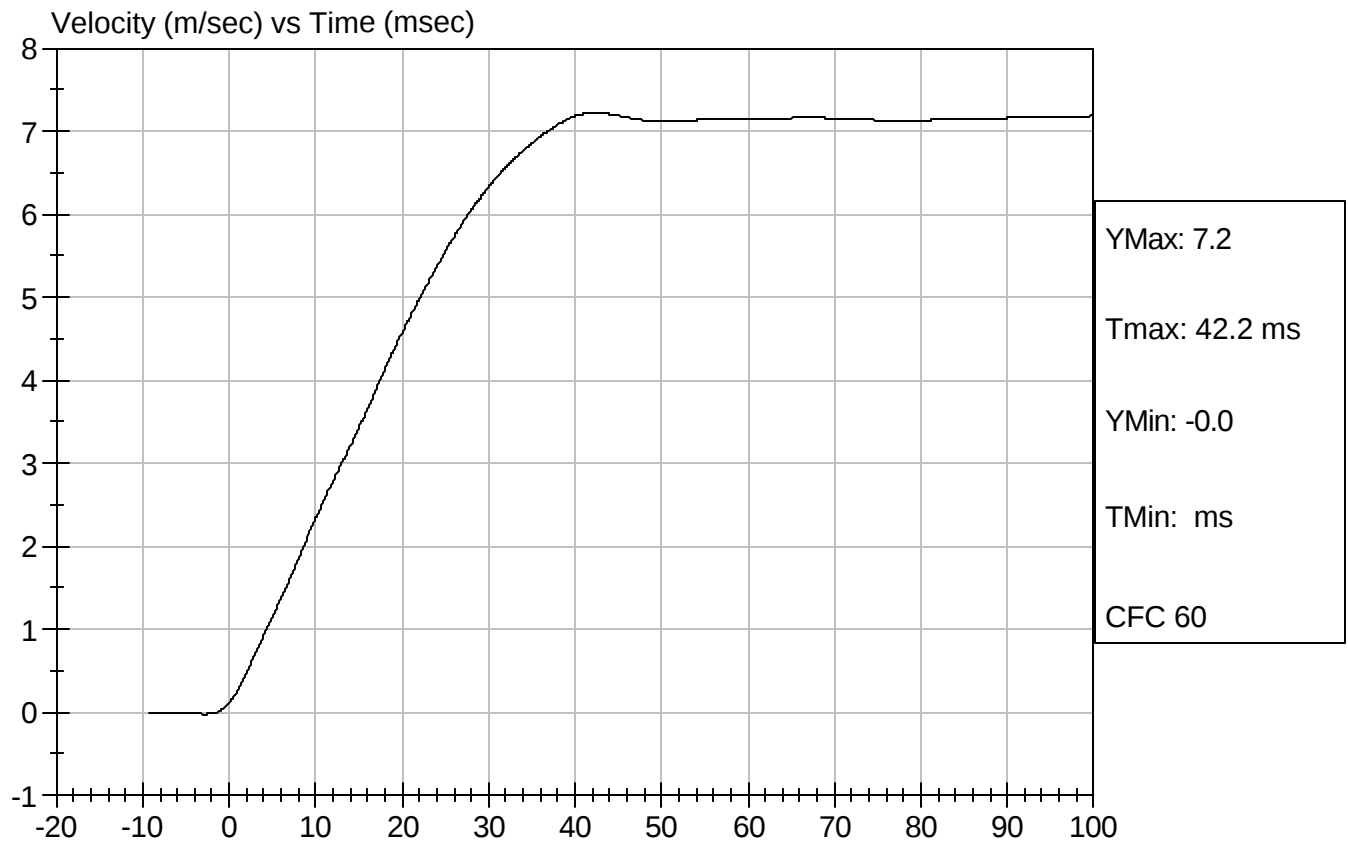
Test Date

  
 Approved By



Test Desc: Neck Bending  
Component ID: D062639

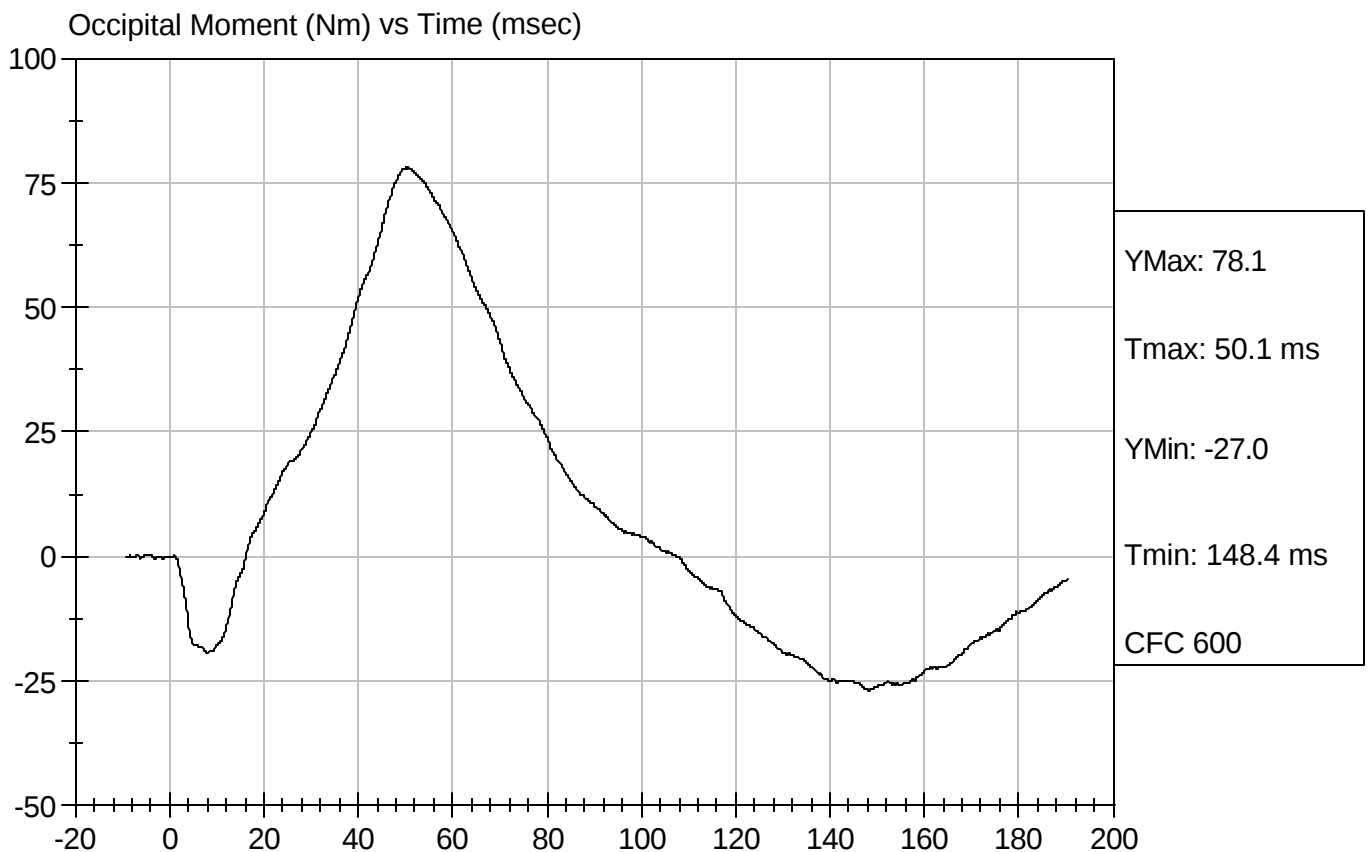
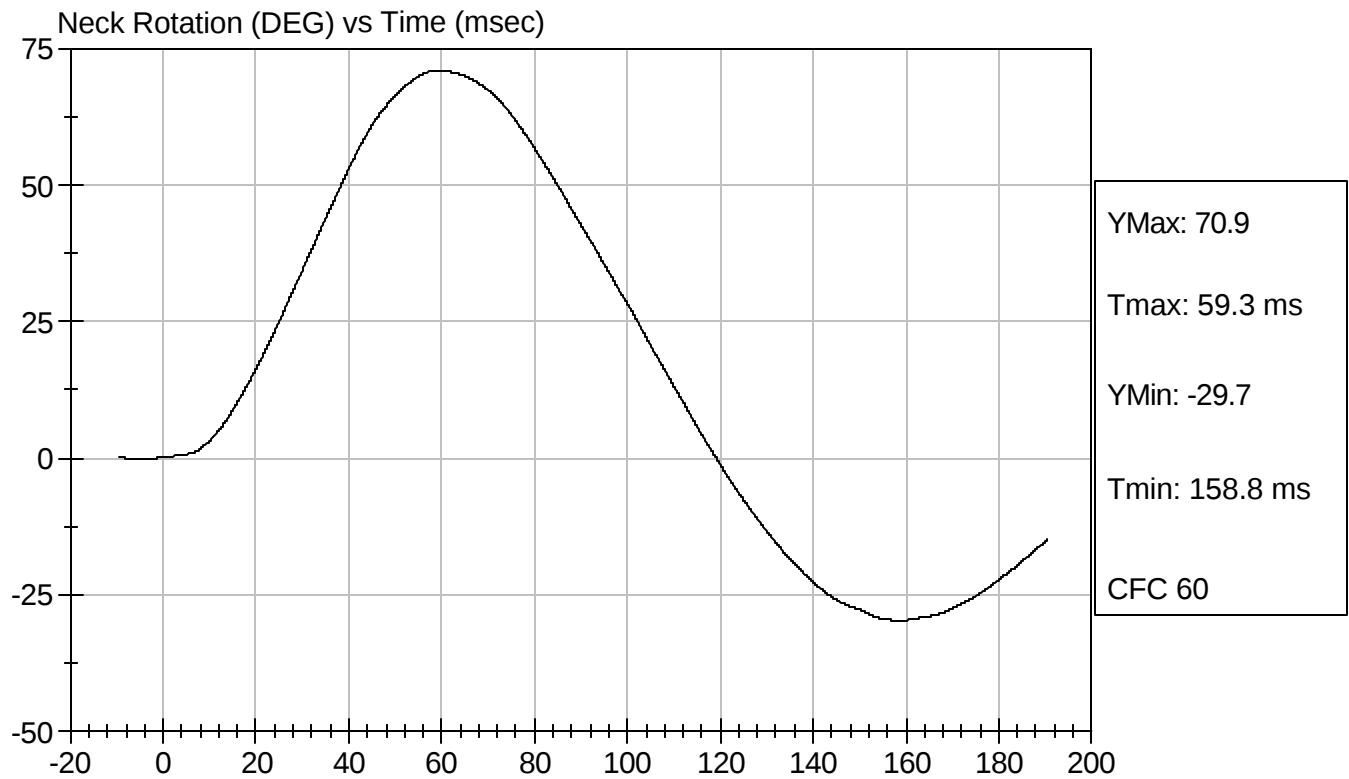
Test Date: 08/29/2006  
Speed: 22.99 ft/sec, 7.01 m/sec





Test Desc: Neck Bending  
Component ID: D062639

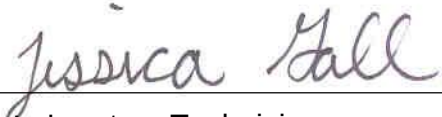
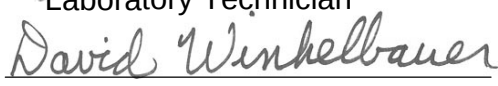
Test Date: 08/29/2006  
Speed: 22.99 ft/sec, 7.01 m/sec



**SID Calibration Data Sheet**  
**Side Impact Dummy**  
**Inspection Checklist**

**ATD Serial No:** 272

| Test Part    | Items Checked                        | Result |
|--------------|--------------------------------------|--------|
| Skin         | Visual inspection                    | Pass   |
| Head         | Visual, ballast, accelerometer mount | Pass   |
| Neck         | Visual                               | Pass   |
| Spine Box    | Visual, ballast, accelerometer mount | Pass   |
| Rib Cage     | Visual, measure                      | Pass   |
| Sternum      | Visual                               | Pass   |
| Lumbar Spine | Visual                               | Pass   |
| Abdomen      | Visual                               | Pass   |
| Pelvis       | Visual, palpate, accelerometer mount | Pass   |
| Upper Legs   | Visual                               | Pass   |
| Knees        | Visual                               | Pass   |
| Lower Legs   | Visual, range of motion              | Pass   |
| Ankles       | Visual, range of motion              | Pass   |
| Feet         | Visual, range of motion              | Pass   |
| Joints       | 1 to 2 g range                       | Pass   |
| Other        |                                      | Pass   |

  
Laboratory Technician  
  
Approved By

08/30/2006

Test Date

CERTIFICATION DATA

Dummy Serial Number: 904

## Calibration Test Results Summary

Dummy Serial Number: 904

### Pre-Test Calibration

|                             |                                                       |
|-----------------------------|-------------------------------------------------------|
| External Dimensions:        | The dummy passed all external dimension requirements. |
| Head Drop Test:             | The head passed all drop test requirements.           |
| Neck Pendulum Test:         | The neck passed all pendulum test requirements.       |
| Thorax Impact Test:         | The thorax passed all impact test requirements.       |
| Pelvic Impact Test:         | The pelvis passed all impact test requirements.       |
| Abdominal Compression Test: | The abdomen passed all compression test requirements. |
| Lumbar Flexion Test:        | The lumbar passed all flexion test requirements.      |

**SID Calibration Data Sheet**  
**Side Impact Dummy**  
**External Measurements**

**ATD Serial No:** 904

**Test I.D:** D06155

| Tested Parameter             | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|---------------|--------|-----------|
| SH - Seated Height           | mm    | 889 - 909     | 906    | Pass      |
| RH - Rib Height              | mm    | 501 - 521     | 508    | Pass      |
| HP - Hip Pivot Height        | mm    | 99 ref.       | 99     | Pass      |
| RD - Rib from Back Line      | mm    | 229 - 241     | 240    | Pass      |
| KV - Knee Pivot to Back Line | mm    | 511 - 526     | 523    | Pass      |
| SW - Knee Pivot to Floor     | mm    | 490 - 505     | 496    | Pass      |
| HW - Hip Width               | mm    | 356 - 391     | 360    | Pass      |
| Overall Test Results         |       |               | Pass   |           |

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Laboratory Technician

David Winkelbauer  
Approved By

05/31/2006

Test Date

**SID Calibration Data Sheet**  
**Side Impact Dummy**  
**Head Drop Calibration (Lateral)**

**ATD Serial No:** 904

**Test I.D:** D061551

| Tested Parameter              | Units  | Specification | Result | Pass/Fail |
|-------------------------------|--------|---------------|--------|-----------|
| Laboratory Temperature        | deg C  | 18.9 to 25.5  | 23.0   | Pass      |
| Laboratory Relative Humidity  | %      | 10 to 70      | 40     | Pass      |
| Peak Resultant Acceleration   | G's    | 120 to 150    | 133    | Pass      |
| Is Resultant Curve Unimodal?  | Yes/No | 15% of peak   | Yes    | Pass      |
| Peak Longitudnal Acceleration | G's    | +/- 15        | -9     | Pass      |
| Overall Test Results          |        |               |        | Pass      |

Jessica Hall  
Laboratory Technician

David Winkelbauer  
Approved By

05/31/2006  
Test Date



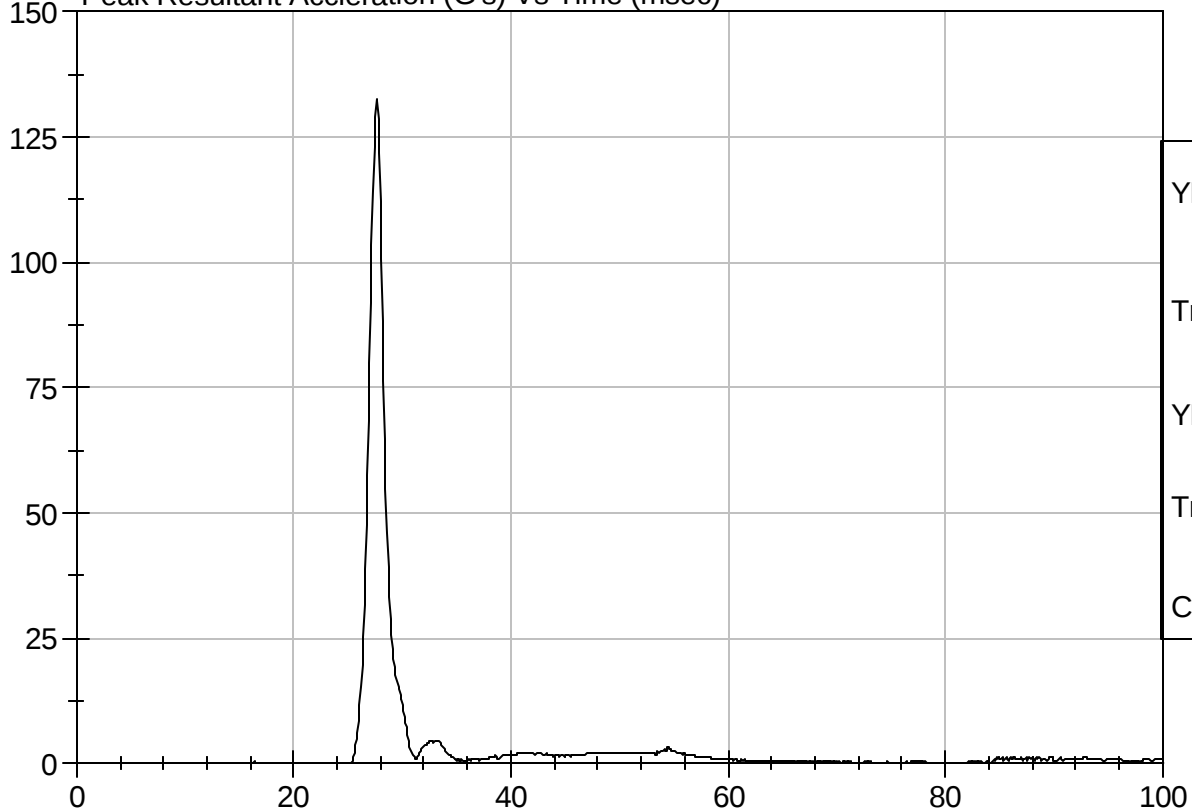
Test Description: Head Drop

Test Date: 05/31/2006

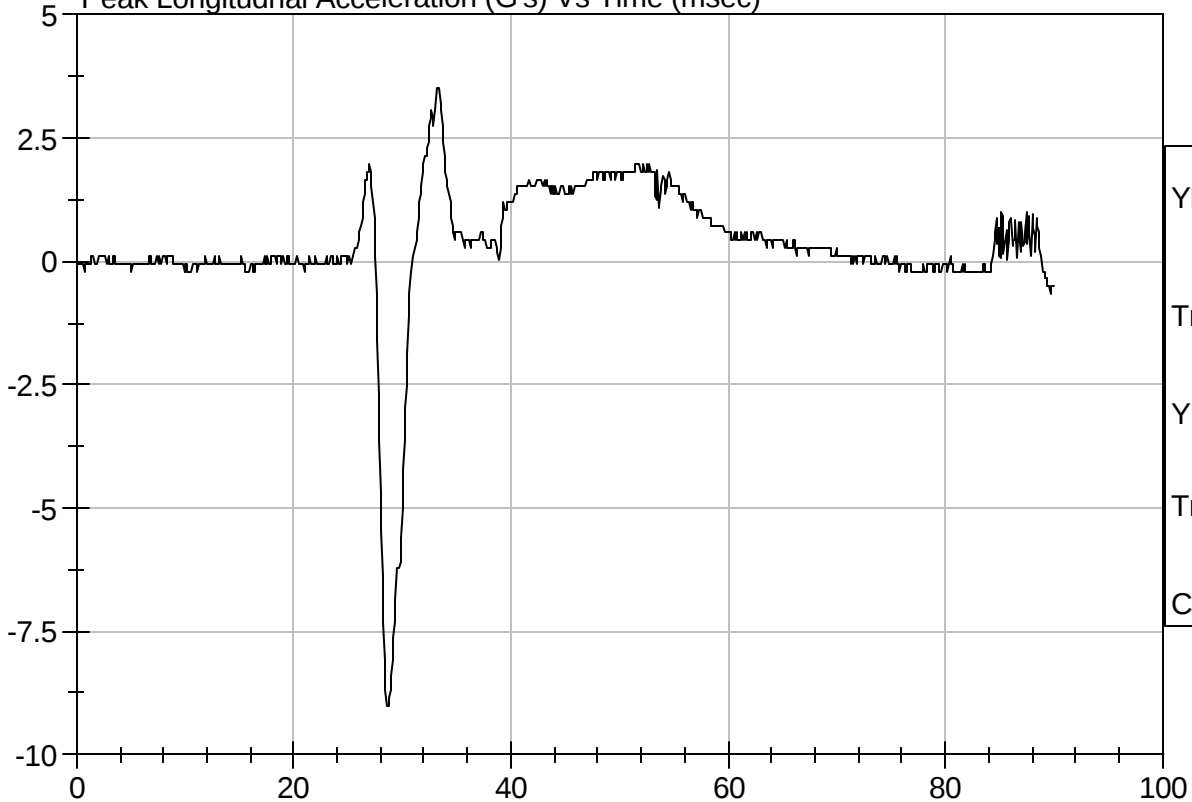
Component: D061551

Speed: 0 ft/s, 0.00 m/s

Peak Resultant Acceleration (G's) Vs Time (msec)



Peak Longitudnal Acceleration (G's) Vs Time (msec)



**SID Calibration Data Sheet**  
**Side Impact Dummy**  
**Thorax Impact Test**

**ATD Serial No:** 904

**Test I.D:** D061552

| Tested Parameter             | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature       | deg C | 18.9 - 25.5   | 21.7   | Pass      |
| Laboratory Relative Humidity | %     | 10 to 70      | 55     | Pass      |
| Probe Velocity               | m/s   | 4.22 - 4.31   | 4.28   | Pass      |
| Upper Rib                    | G's   | 37 - 46       | 40     | Pass      |
| Lower Rib                    | G's   | 37 - 46       | 39     | Pass      |
| Lower Spine                  | G's   | 15 - 22       | 22     | Pass      |
| Overall Test Results         |       |               |        | Pass      |

Jessica Hall  
Laboratory Technician

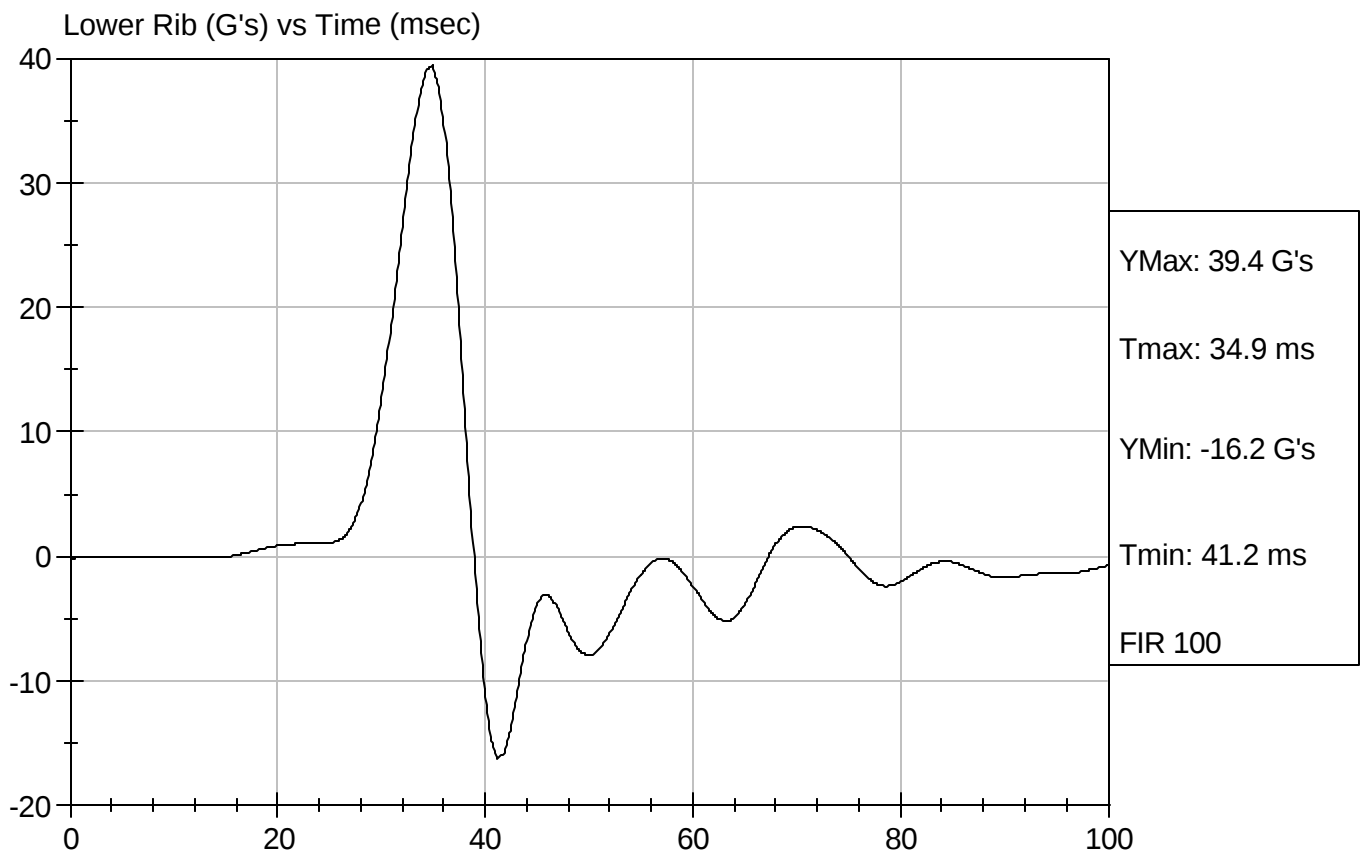
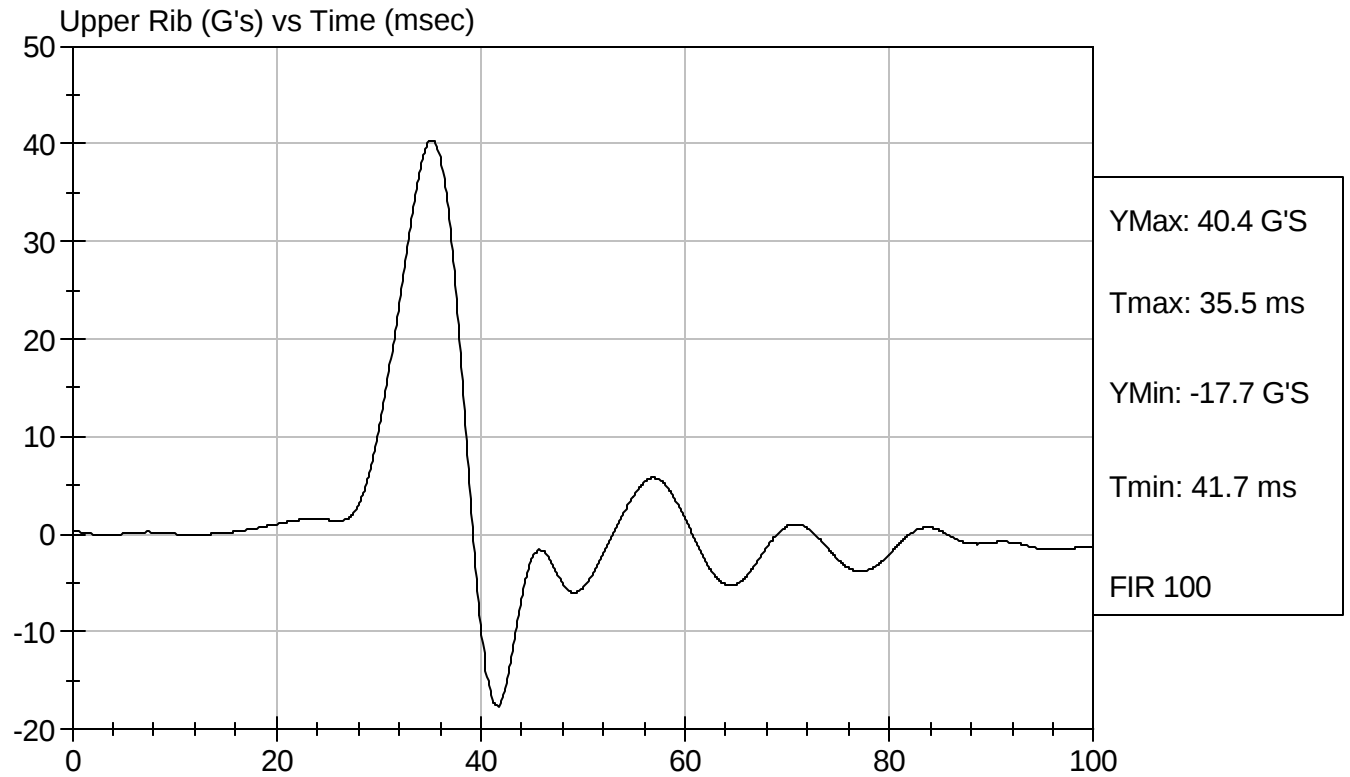
David Winkelbauer  
Approved By

05/31/2006  
Test Date



Test Desc: Thorax Impact  
Component ID: D061552

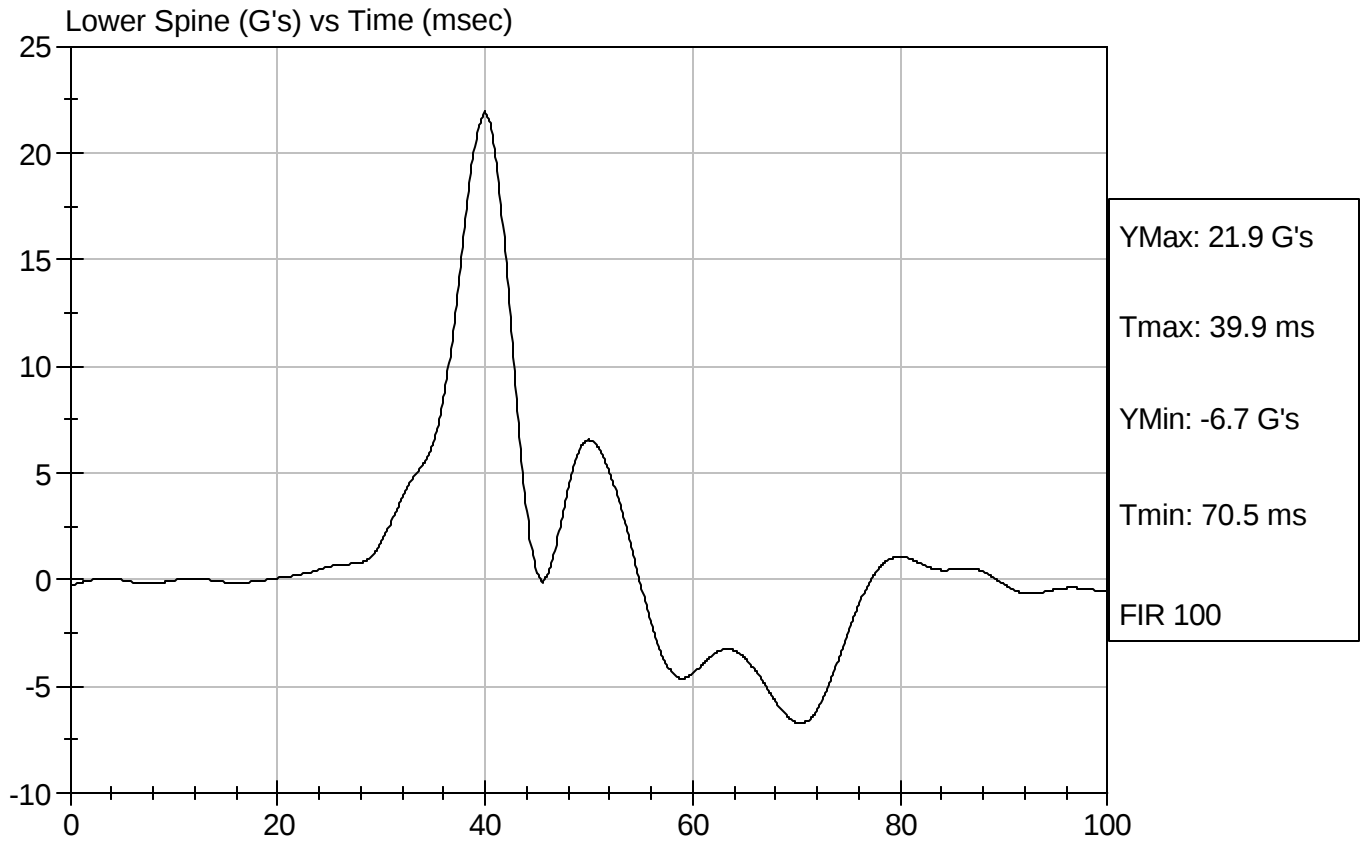
Test Date: 05/31/2006  
Speed: 14.03 ft/sec, 4.28 m/sec





Test Desc: Thorax Impact  
Component ID: D061552

Test Date: 05/31/2006  
Speed: 14.03 ft/sec, 4.28 m/sec



**SID Calibration Data Sheet**  
**Side Impact Dummy**  
**Pelvis Impact Test**

**ATD Serial No:** 904

**Test I.D:** D061553

| Tested Parameter             | Units | Specification | Result               | Pass/Fail |
|------------------------------|-------|---------------|----------------------|-----------|
| Laboratory Temperature       | deg C | 18.9 to 25.5  | 21.9                 | Pass      |
| Laboratory Relative Humidity | %     | 10 to 70      | 52                   | Pass      |
| Probe Velocity               | m/s   | 4.27 - 4.33   | 4.31                 | Pass      |
| Pelvis Acceleration          | G's   | 40 - 60       | 45                   | Pass      |
|                              |       |               | Overall Test Results | Pass      |

Jessica Gall  
Laboratory Technician

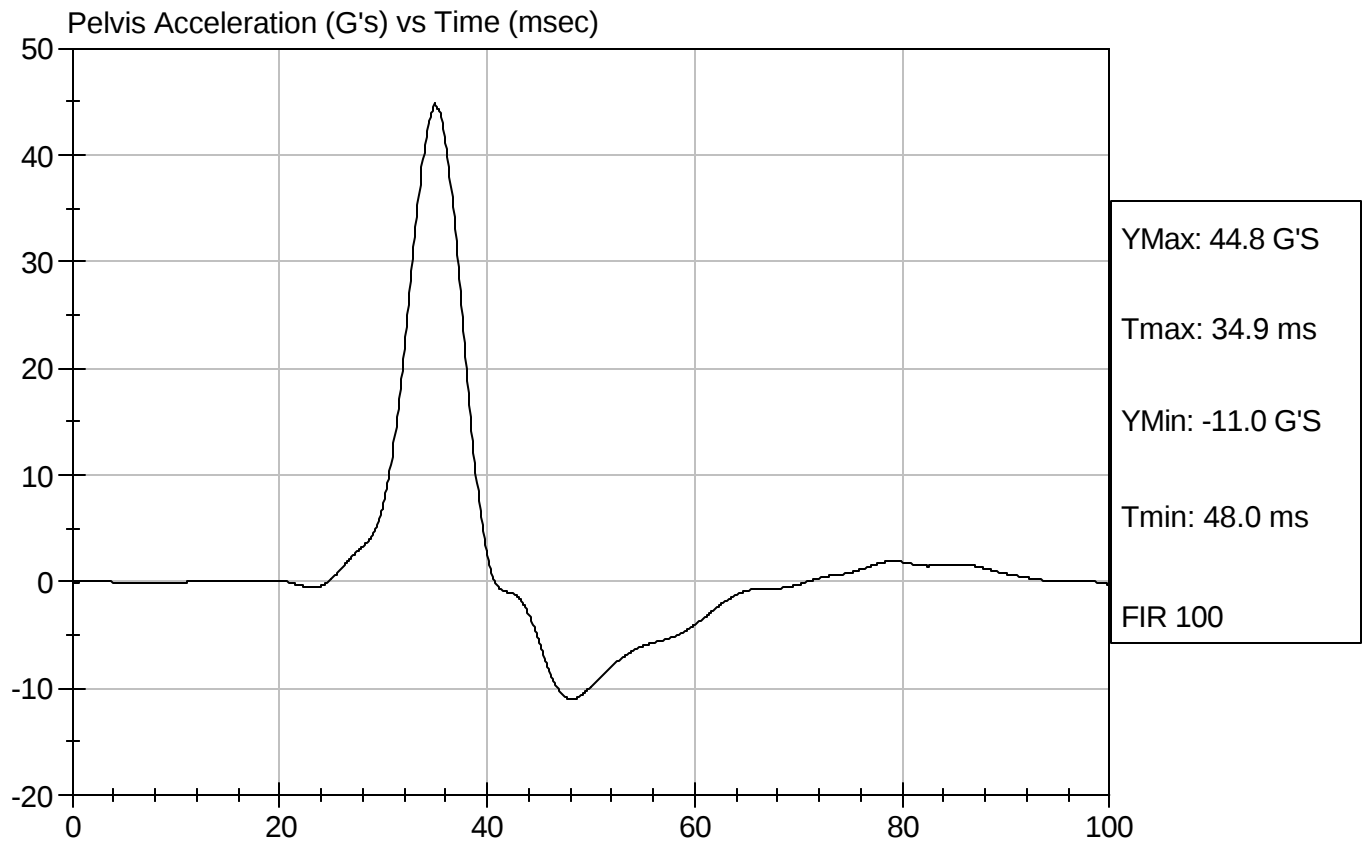
David Winkelbauer  
Approved By

05/31/2006  
Test Date



Test Desc: Pelvis Impact  
Component ID: D061553

Test Date: 05/31/2006  
Speed: 14.13 ft/sec, 4.31 m/sec



**SID Calibration Data Sheet**  
**Side Impact Dummy**  
**Abdominal Compression Calibration (Pre-Load = 10 lbs)**

**ATD Serial No:** 904

**Test I.D:** D061554

| Tested Parameter             | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature       | deg C | 18.9 - 25.5   | 23.1   | Pass      |
| Laboratory Relative Humidity | %     | 10 to 70      | 41     | Pass      |
| Force At 12.7 mm             | N     | 104 -162      | 138    | Pass      |
| Force At 19 mm               | N     | 163 - 222     | 186    | Pass      |
| Force At 25.4 mm             | N     | 222 - 280     | 250    | Pass      |
| Force At 33 mm               | N     | 325 - 391     | 338    | Pass      |
| Overall Test Results         |       |               |        | Pass      |

  
Laboratory Technician

05/31/2006  
Test Date

  
Approved By

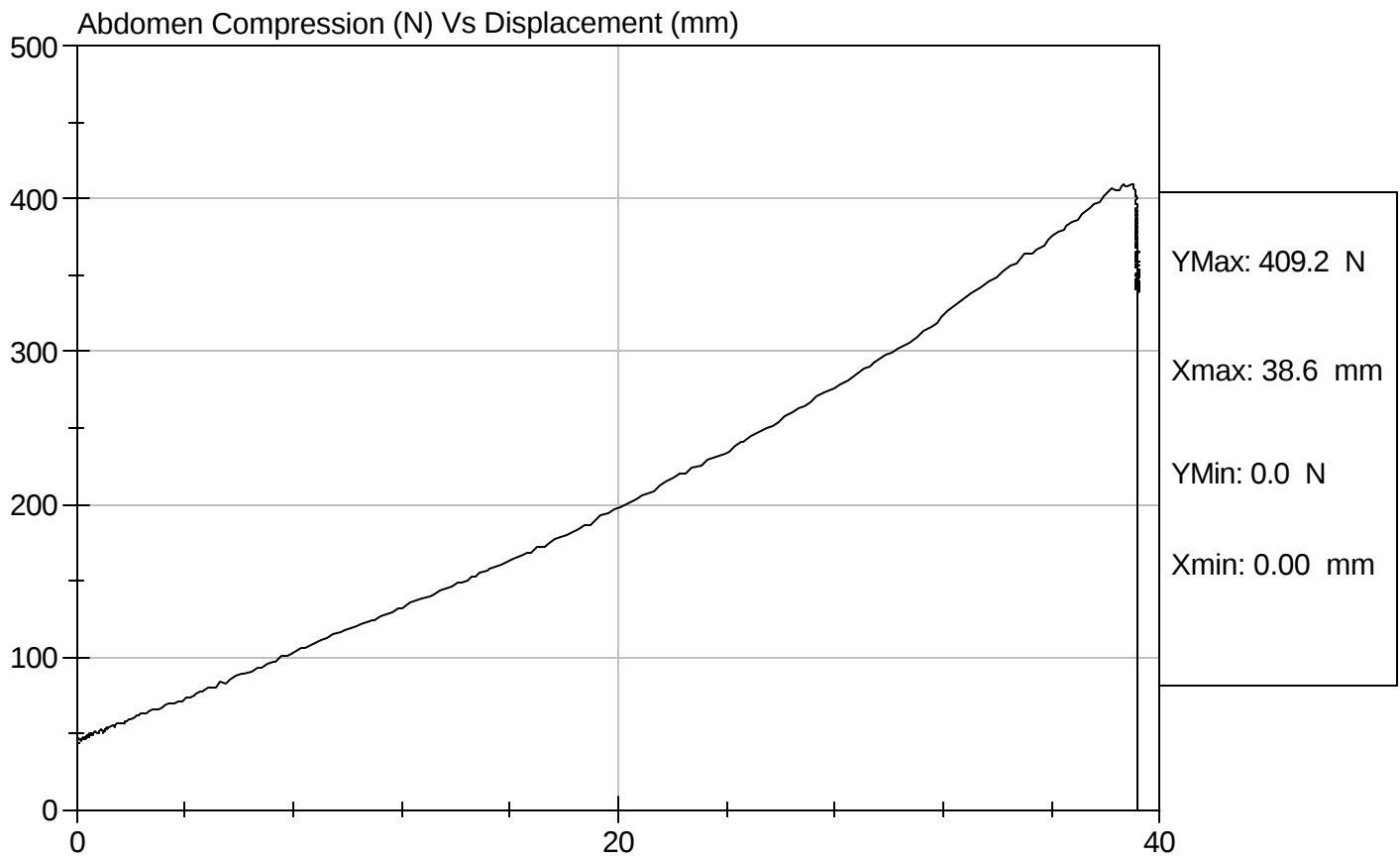


Test Description: Abdomen Compression

Test Date: 05/31/2006

Component: D061554

Speed: 0 ft/sec, 0 m/sec



**SID Calibration Data Sheet**  
**Side Impact Dummy**  
**Lumbar Flexion Calibration**

**ATD Serial No:** 904

**Test I.D:** D061555

| Tested Parameter             | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature       | deg C | 18.9 - 25.5   | 22.7   | Pass      |
| Laboratory Relative Humidity | %     | 10 to 70      | 40     | Pass      |
| Force At 0 deg               | N     | 0 - 26.7      | 0.0    | Pass      |
| Force At 20 deg              | N     | 97.9 - 151.2  | 143.8  | Pass      |
| Force At 30 deg              | N     | 151.2 - 204.6 | 185.2  | Pass      |
| Force At 40 deg              | N     | 204.6 - 258.0 | 243.0  | Pass      |
| Return Angle                 | Deg   | 12 Maximum    | 6      | Pass      |
| Overall Test Results         |       |               | Pass   |           |

  
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Approved By

05/31/2006  
Test Date

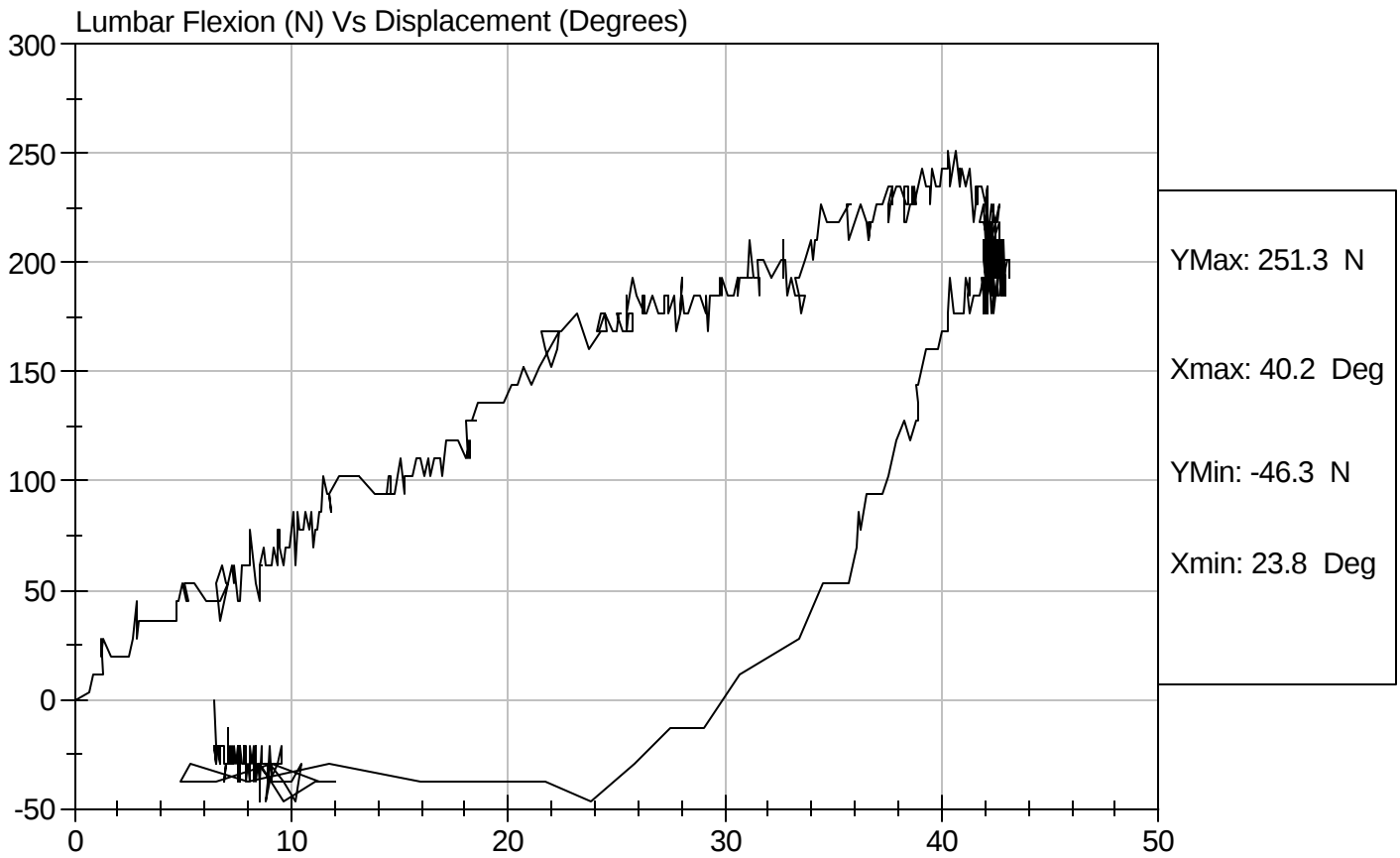


Test Description: Lumbar Flexion

Test Date: 05/31/2006

Component: D061555

Speed: 0 ft/sec, 0 m/sec



**SID Calibration Data Sheet**  
**Side Impact Dummy (SID)**  
**Neck Pendulum Test**

**ATD Serial No:** 904

**Test I.D:** D061559

| Tested Parameter                        |               | Units | Specification | Result | Pass/Fail |
|-----------------------------------------|---------------|-------|---------------|--------|-----------|
| Laboratory Temperature                  |               | deg C | 20.6 to 22.2  | 22.1   | Pass      |
| Laboratory Relative Humidity            |               | %     | 10 to 70      | 40     | Pass      |
| Impact Velocity                         |               | m/s   | 6.89 to 7.13  | 7.08   | Pass      |
| Pendulum Deceleration                   | 10 msec       | m/s   | 1.96 to 2.55  | 2.38   | Pass      |
|                                         | 20 msec       | m/s   | 4.12 to 5.10  | 4.63   | Pass      |
|                                         | 30 msec       | m/s   | 5.73 to 7.01  | 6.30   | Pass      |
|                                         | 40 to 70 msec | m/s   | 6.27 to 7.64  | 7.26   | Pass      |
| Midsagittal Plane Max Rotation          |               | deg   | 66 to 82      | 74     | Pass      |
| Head Rotation Peak to Zero - Decay Time |               | msec  | 58 to 67      | 58     | Pass      |
| Max. Mx at Occipital Condyles           |               | Nm    | 73 to 88      | 81     | Pass      |
| Mx Peak To Zero - Decay Time            |               | msec  | 49 to 64      | 56     | Pass      |
| Mx Peak to Max. Head Rotation           |               | msec  | 2 to 16       | 11     | Pass      |

  
 Laboratory Technician

05/31/2006

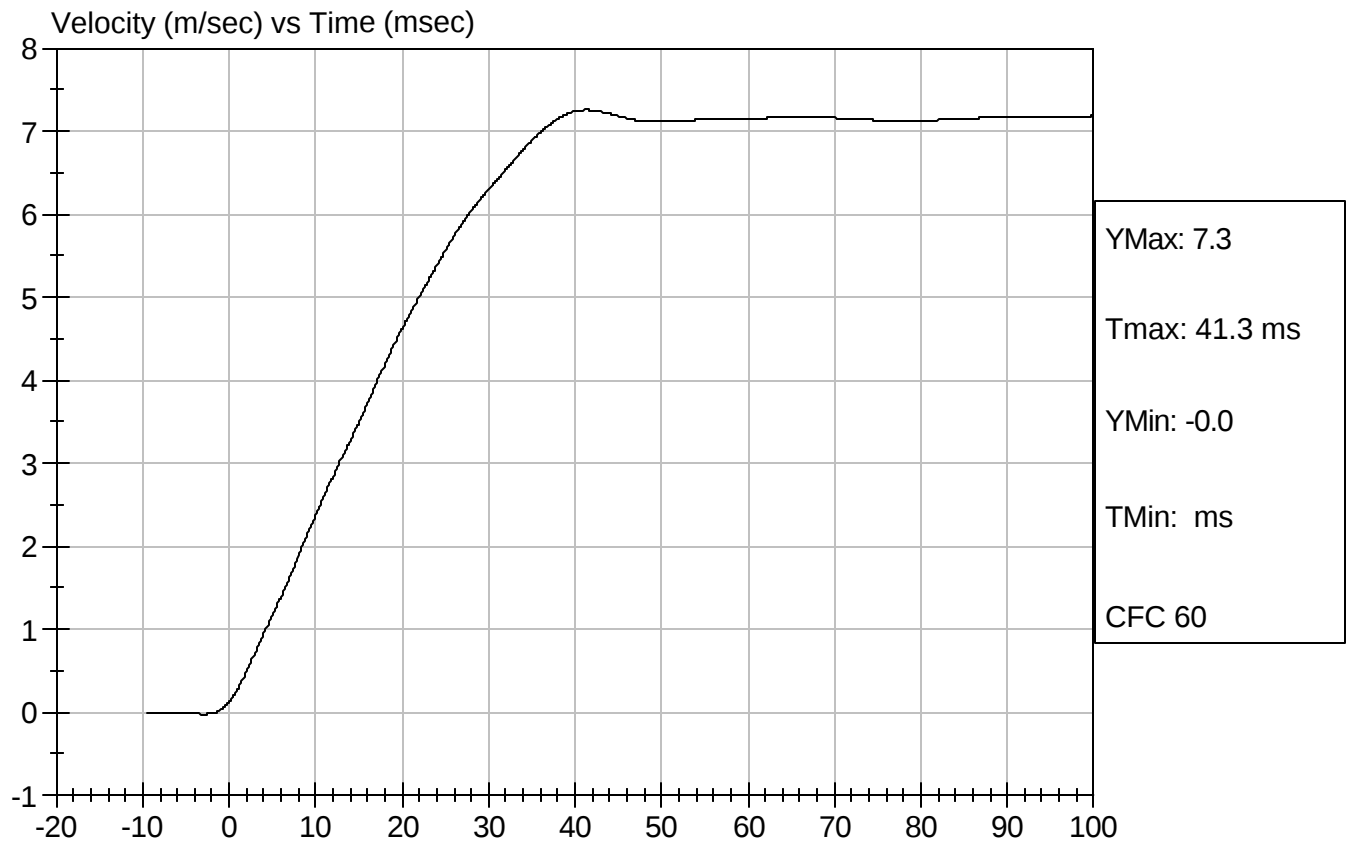
Test Date

  
 Approved By



Test Desc: Neck Bending  
Component ID: D061559

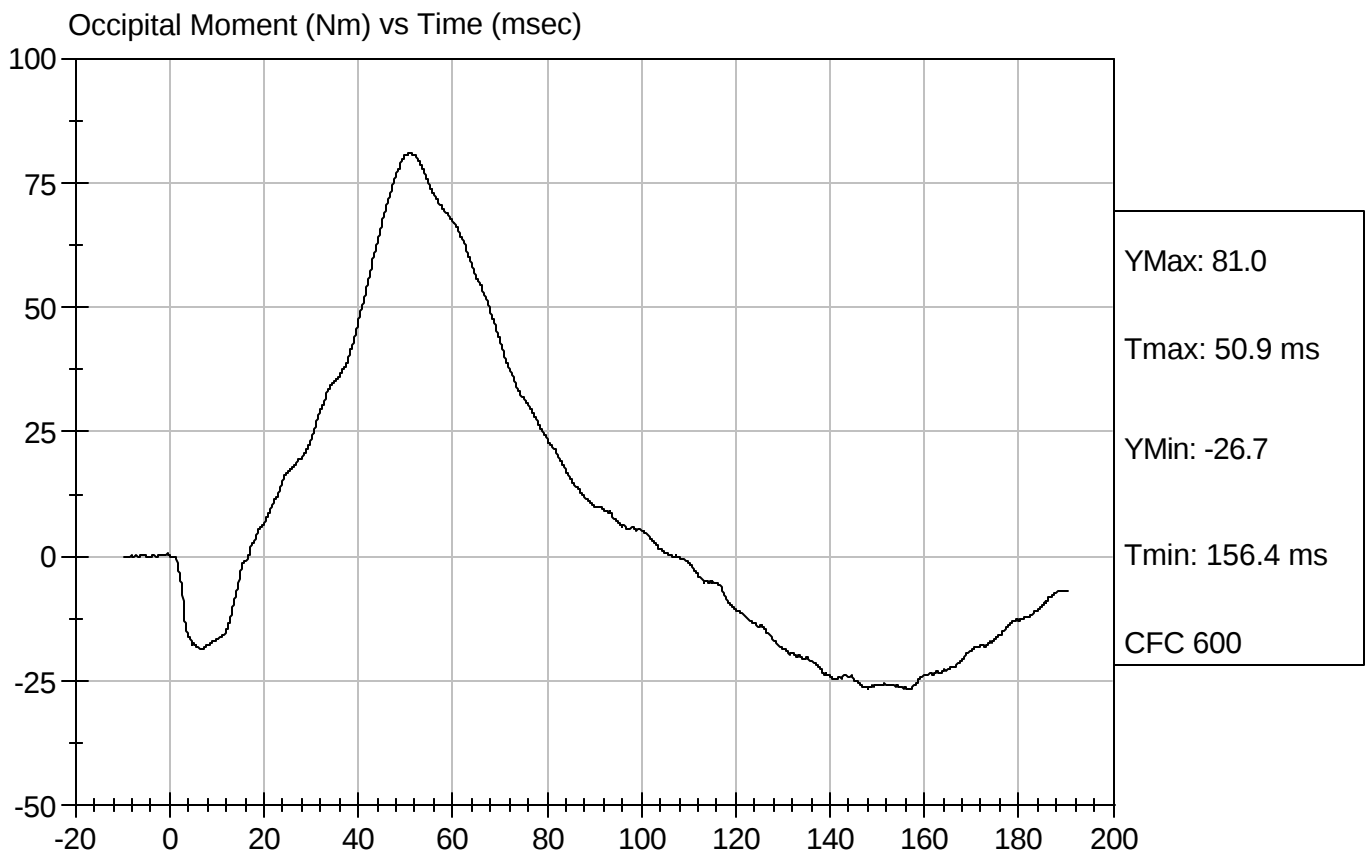
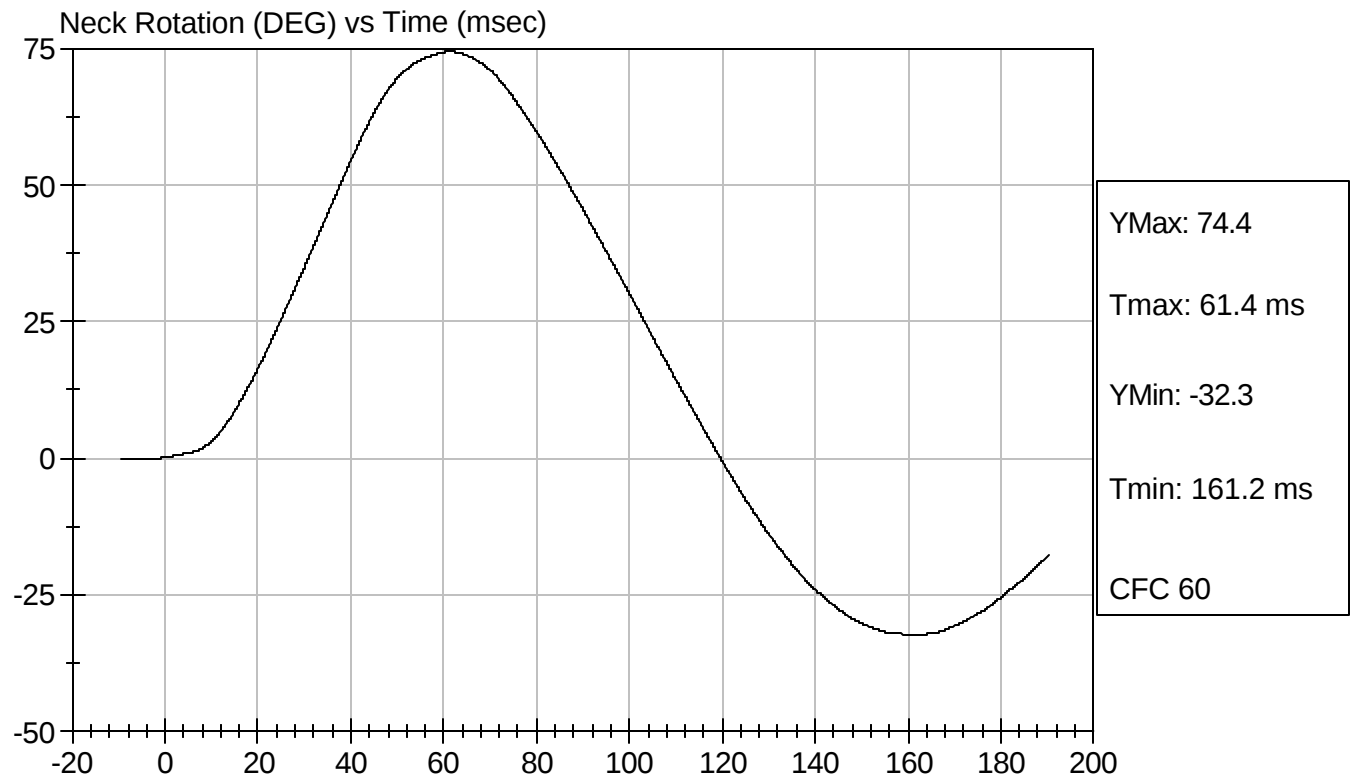
Test Date: 05/31/2006  
Speed: 23.22 ft/sec, 7.08 m/sec





Test Desc: Neck Bending  
Component ID: D061559

Test Date: 05/31/2006  
Speed: 23.22 ft/sec, 7.08 m/sec



## Calibration Test Results Summary

Dummy Serial Number: 904

### Post-Test Calibration

|                             |                                                       |
|-----------------------------|-------------------------------------------------------|
| External Dimensions:        | The dummy passed all external dimension requirements. |
| Head Drop Test:             | The head passed all drop test requirements.           |
| Neck Pendulum Test:         | The neck passed all pendulum test requirements.       |
| Thorax Impact Test:         | The thorax passed all impact test requirements.       |
| Pelvic Impact Test:         | The pelvis passed all impact test requirements.       |
| Abdominal Compression Test: | The abdomen passed all compression test requirements. |
| Lumbar Flexion Test:        | The lumbar passed all flexion test requirements.      |

**SID Calibration Data Sheet**  
**Side Impact Dummy**  
**Head Drop Calibration (Lateral)**

**ATD Serial No:** 904

**Test I.D:** D062641

| Tested Parameter              | Units  | Specification | Result | Pass/Fail |
|-------------------------------|--------|---------------|--------|-----------|
| Laboratory Temperature        | deg C  | 18.9 to 25.5  | 21.9   | Pass      |
| Laboratory Relative Humidity  | %      | 10 to 70      | 50     | Pass      |
| Peak Resultant Acceleration   | G's    | 120 to 150    | 138    | Pass      |
| Is Resultant Curve Unimodal?  | Yes/No | 15% of peak   | Yes    | Pass      |
| Peak Longitudnal Acceleration | G's    | +/- 15        | -8.0   | Pass      |
| Overall Test Results          |        |               |        | Pass      |

Jessica Hall  
Laboratory Technician

08/29/2006

Test Date

David Winkelbauer  
Approved By



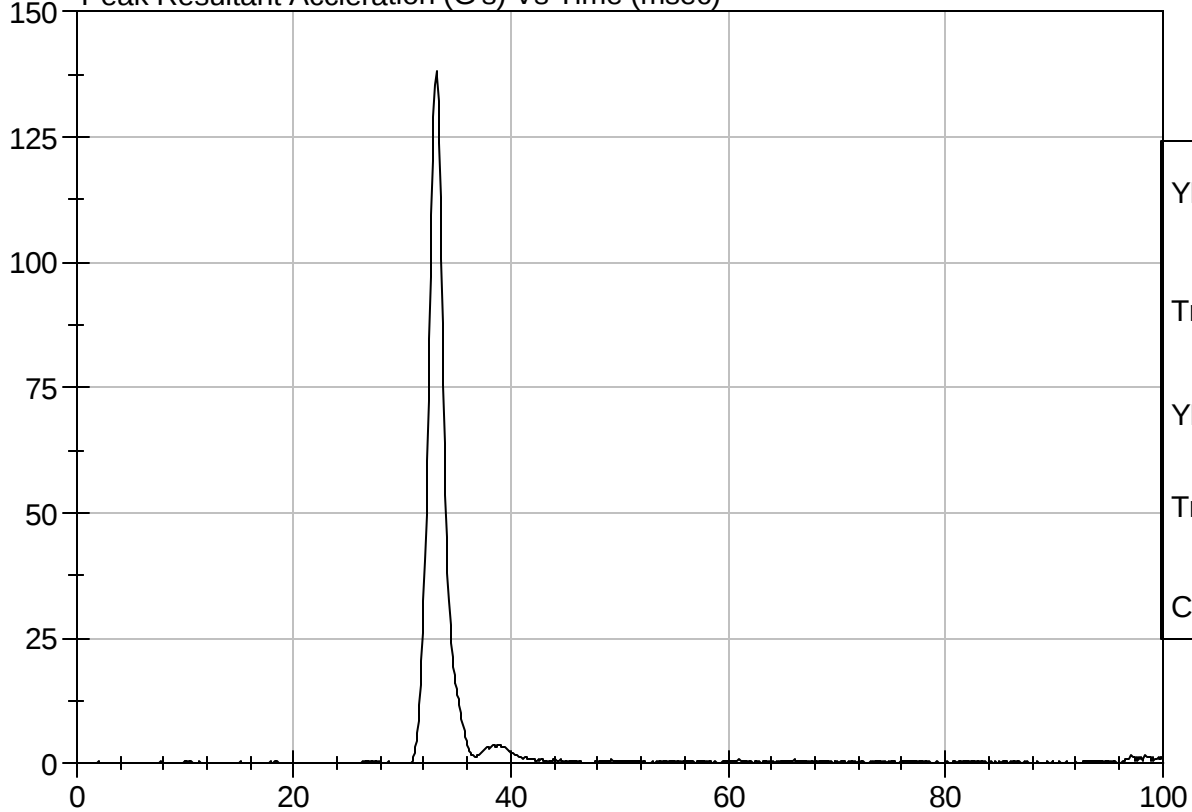
Test Description: Head Drop

Test Date: 08/29/2006

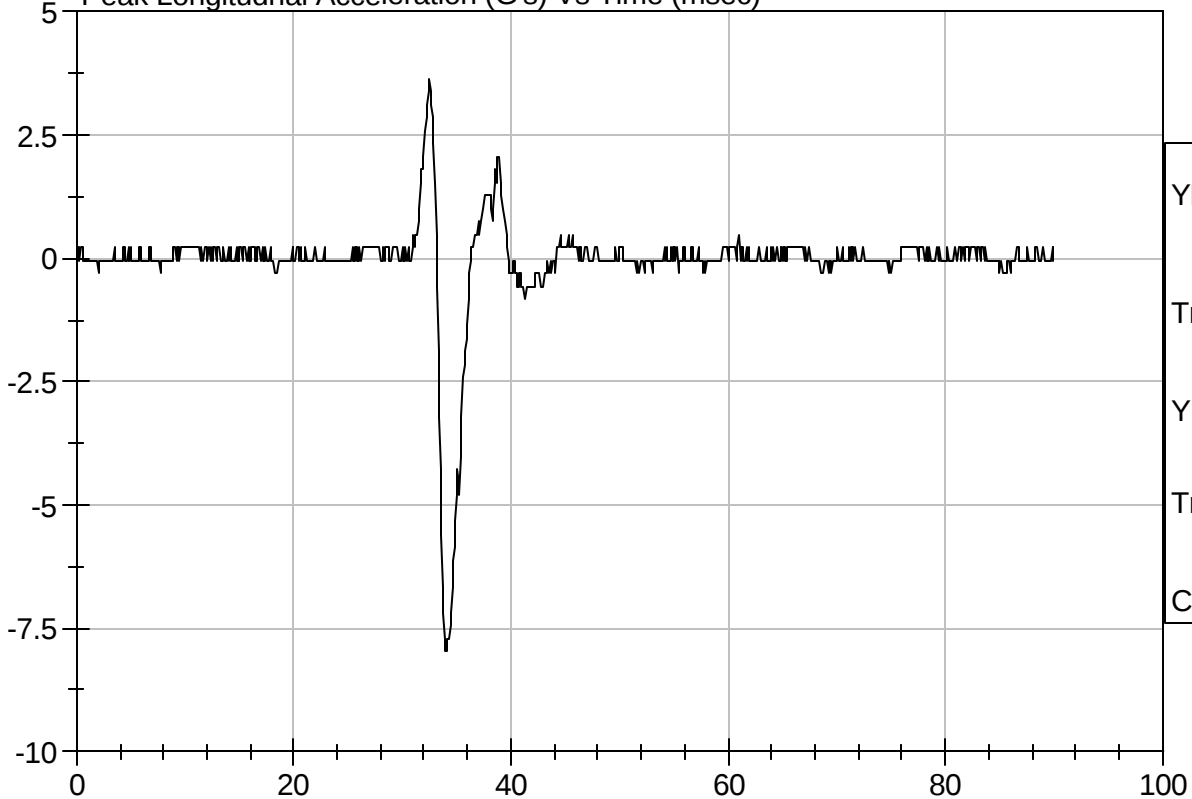
Component: D062641

Speed: 0 ft/s, 0.00 m/s

Peak Resultant Acceleration (G's) Vs Time (msec)



Peak Longitudnal Acceleration (G's) Vs Time (msec)



**SID Calibration Data Sheet**  
**Side Impact Dummy**  
**Thorax Impact Test**

**ATD Serial No:** 904

**Test I.D:** D062642

| Tested Parameter             | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature       | deg C | 18.9 - 25.5   | 21.7   | Pass      |
| Laboratory Relative Humidity | %     | 10 to 70      | 47     | Pass      |
| Probe Velocity               | m/s   | 4.22 - 4.31   | 4.30   | Pass      |
| Upper Rib                    | G's   | 37 - 46       | 43     | Pass      |
| Lower Rib                    | G's   | 37 - 46       | 41     | Pass      |
| Lower Spine                  | G's   | 15 - 22       | 22     | Pass      |
| Overall Test Results         |       |               |        | Pass      |

  
\_\_\_\_\_  
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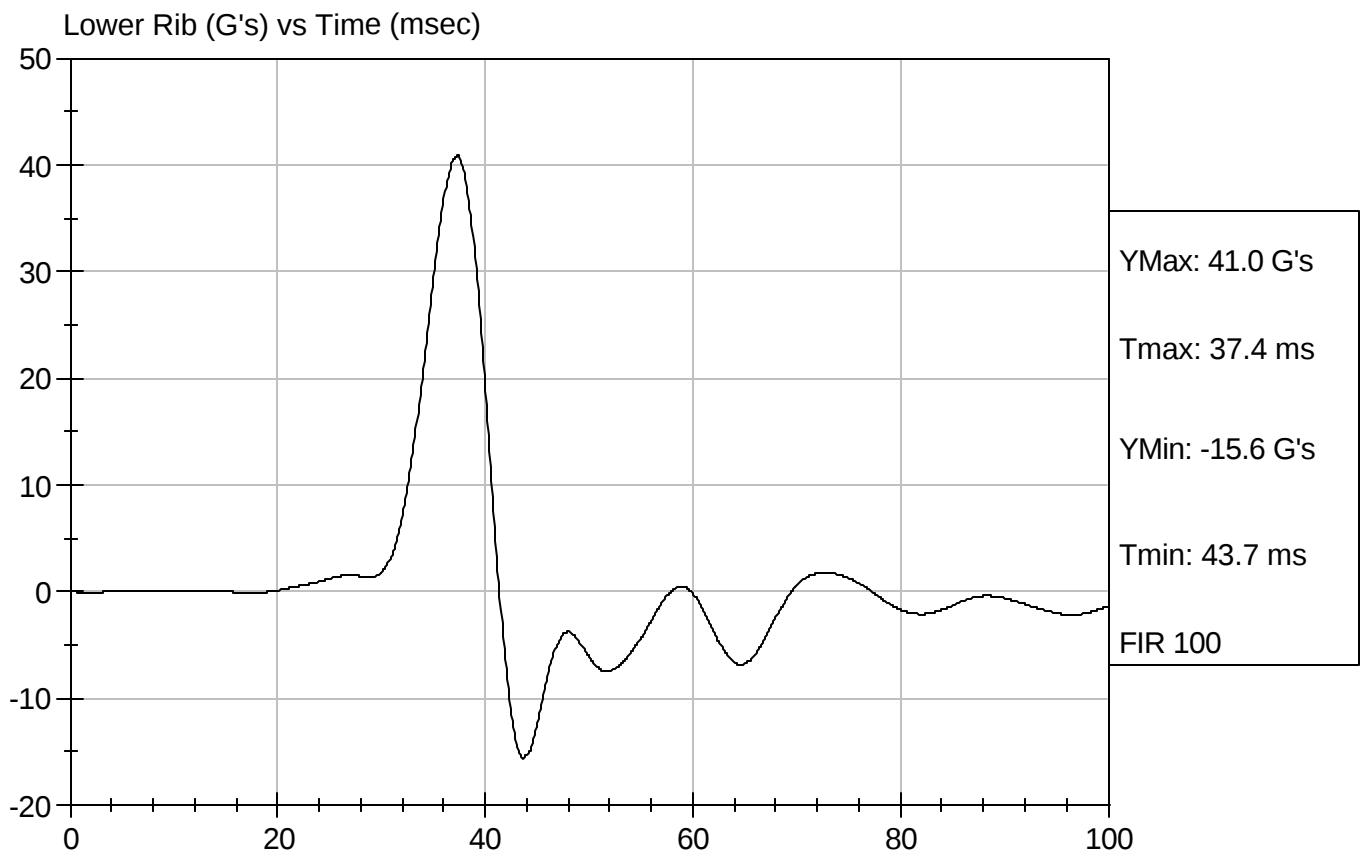
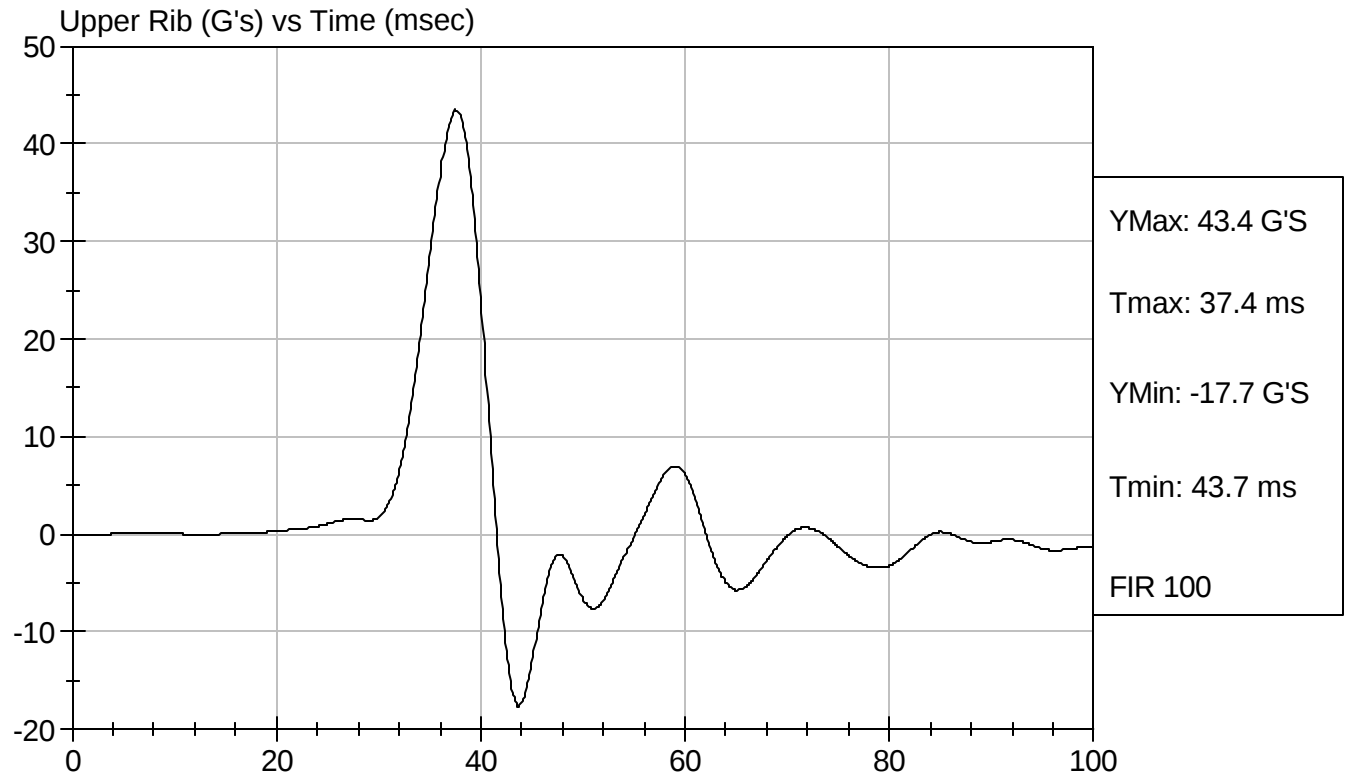
08/30/2006  
Test Date

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



Test Desc: Thorax Impact  
Component ID: D062642

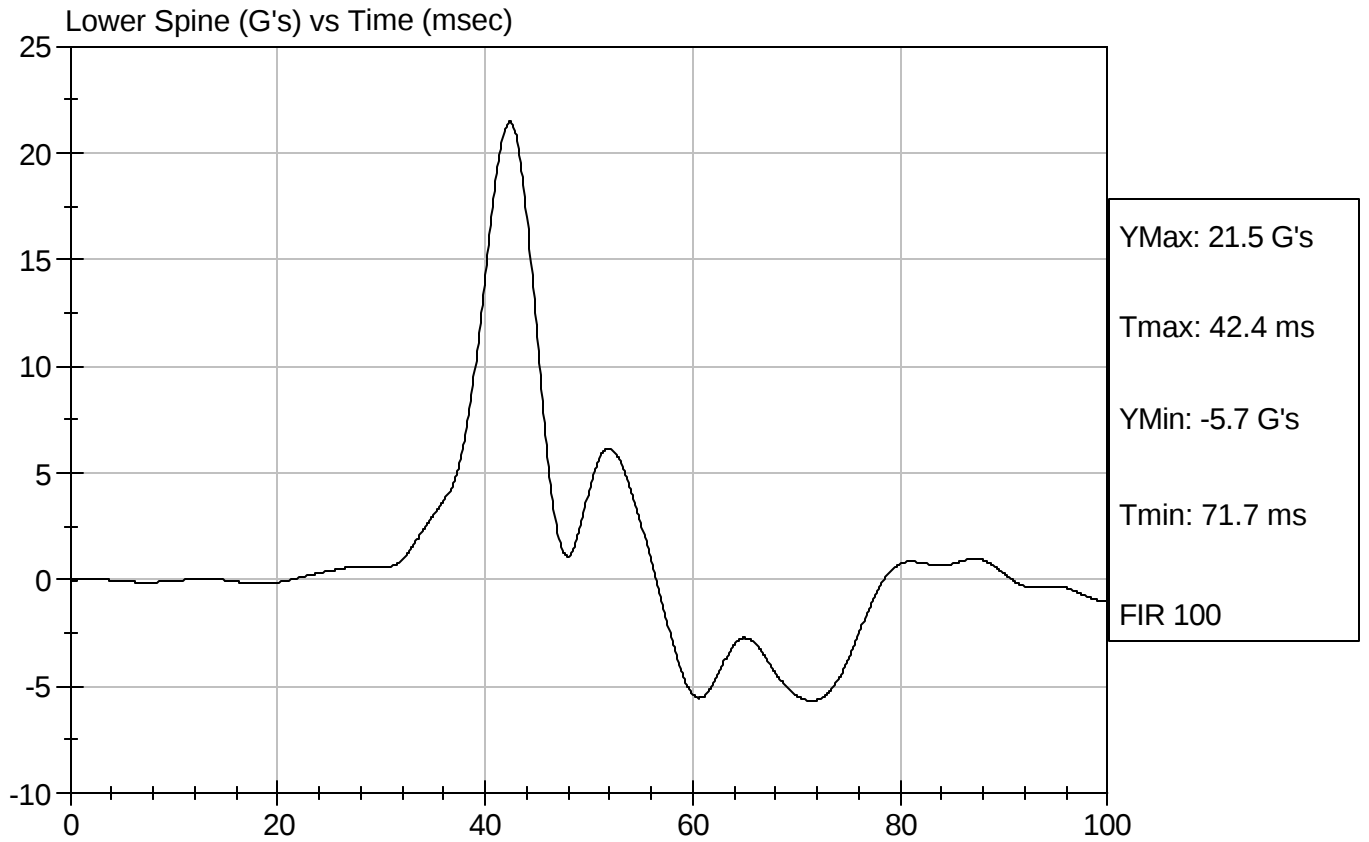
Test Date: 08/30/2006  
Speed: 14.12 ft/sec, 4.30 m/sec





Test Desc: Thorax Impact  
Component ID: D062642

Test Date: 08/30/2006  
Speed: 14.12 ft/sec, 4.30 m/sec



**SID Calibration Data Sheet**  
**Side Impact Dummy**  
**Pelvis Impact Test**

**ATD Serial No:** 904

**Test I.D:** D062643

| Tested Parameter             | Units | Specification | Result               | Pass/Fail |
|------------------------------|-------|---------------|----------------------|-----------|
| Laboratory Temperature       | deg C | 18.9 to 25.5  | 21.7                 | Pass      |
| Laboratory Relative Humidity | %     | 10 to 70      | 47                   | Pass      |
| Probe Velocity               | m/s   | 4.27 - 4.33   | 4.28                 | Pass      |
| Pelvis Acceleration          | G's   | 40 - 60       | 46                   | Pass      |
|                              |       |               | Overall Test Results | Pass      |

Jessica Hall  
Laboratory Technician

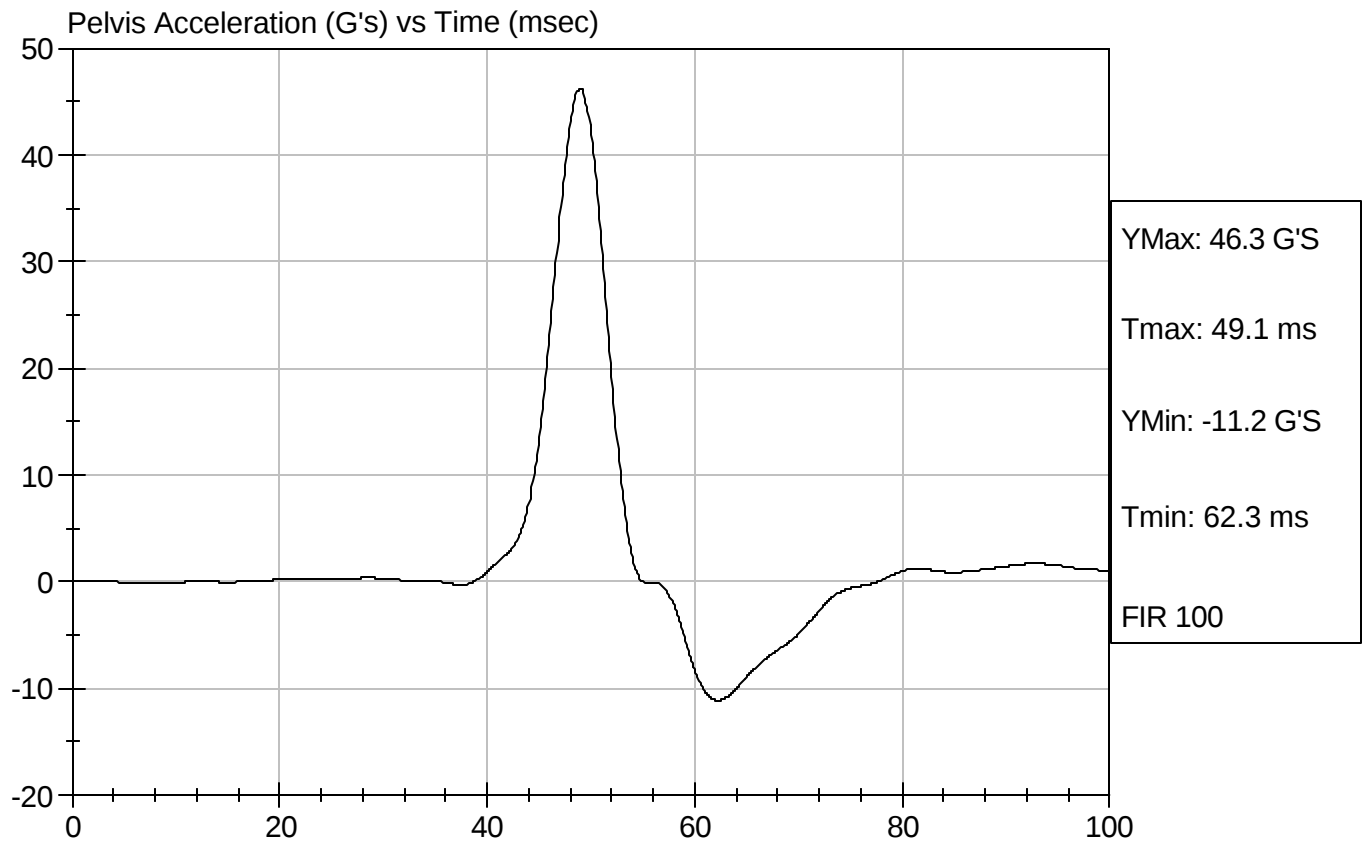
David Winkelbauer  
Approved By

08/30/2006  
Test Date



Test Desc: Pelvis Impact  
Component ID: D062643

Test Date: 08/30/2006  
Speed: 14.04 ft/sec, 4.28 m/sec



**SID Calibration Data Sheet**  
**Side Impact Dummy**  
**Abdominal Compression Calibration (Pre-Load = 10 lbs)**

**ATD Serial No:** 904

**Test I.D:** D062644

| Tested Parameter             | Units | Specification | Result               | Pass/Fail |
|------------------------------|-------|---------------|----------------------|-----------|
| Laboratory Temperature       | deg C | 18.9 - 25.5   | 21.4                 | Pass      |
| Laboratory Relative Humidity | %     | 10 to 70      | 42                   | Pass      |
| Force At 12.7 mm             | N     | 104 -162      | 134                  | Pass      |
| Force At 19 mm               | N     | 163 - 222     | 188                  | Pass      |
| Force At 25.4 mm             | N     | 222 - 280     | 251                  | Pass      |
| Force At 33 mm               | N     | 325 - 391     | 347                  | Pass      |
|                              |       |               | Overall Test Results | Pass      |

  
Laboratory Technician

08/29/2006  
Test Date

  
Approved By

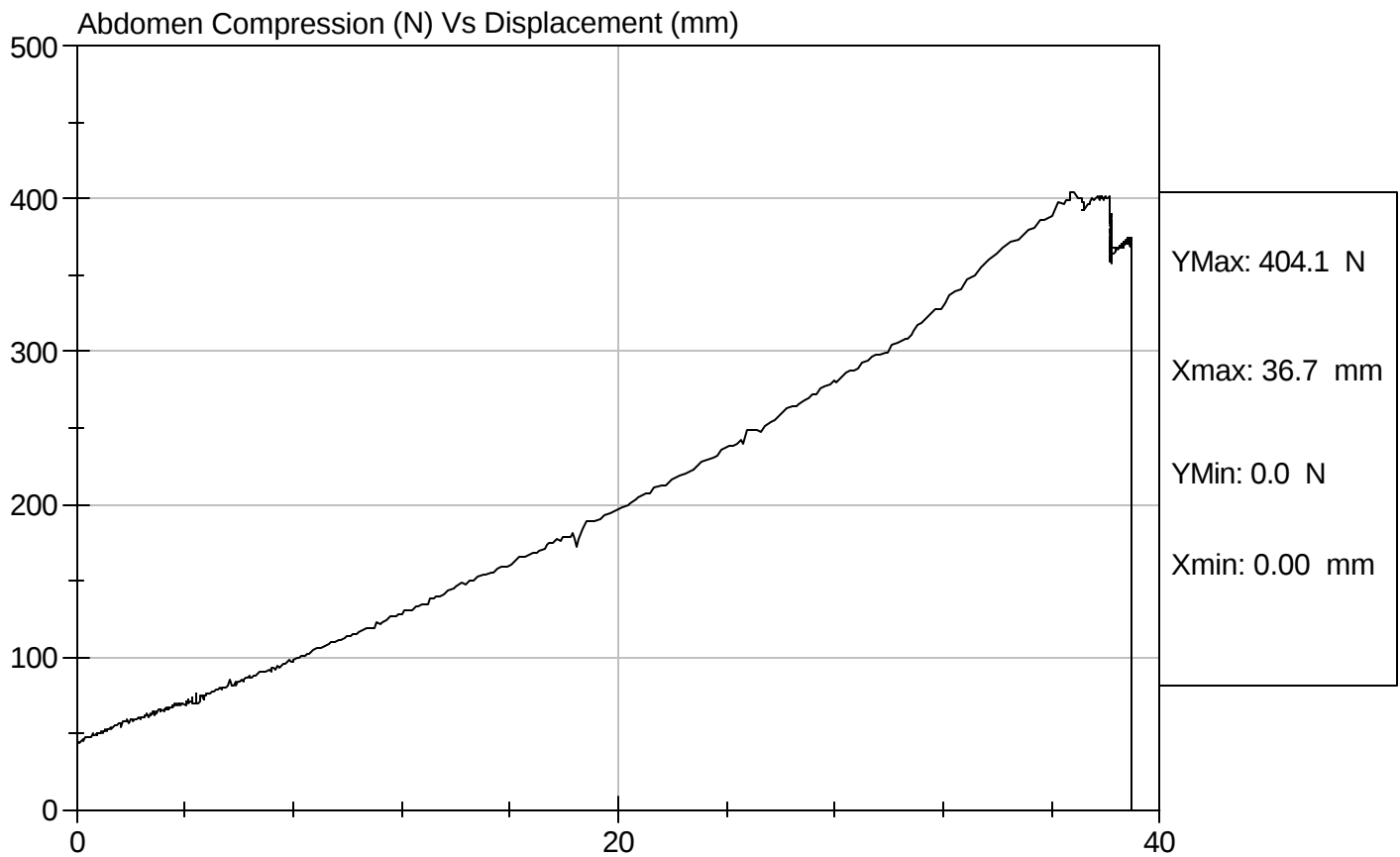


Test Description: Abdomen Compression

Test Date: 08/29/2006

Component: D062644

Speed: 0 ft/sec, 0 m/sec



**SID Calibration Data Sheet**  
**Side Impact Dummy**  
**Lumbar Flexion Calibration**

**ATD Serial No:** 904

**Test I.D:** D062645

| Tested Parameter             | Units | Specification | Result               | Pass/Fail |
|------------------------------|-------|---------------|----------------------|-----------|
| Laboratory Temperature       | deg C | 18.9 - 25.5   | 21.6                 | Pass      |
| Laboratory Relative Humidity | %     | 10 to 70      | 43                   | Pass      |
| Force At 0 deg               | N     | 0 - 26.7      | 0.0                  | Pass      |
| Force At 20 deg              | N     | 97.9 - 151.2  | 121.4                | Pass      |
| Force At 30 deg              | N     | 151.2 - 204.6 | 185.5                | Pass      |
| Force At 40 deg              | N     | 204.6 - 258.0 | 217.6                | Pass      |
| Return Angle                 | Deg   | 12 Maximum    | 3                    | Pass      |
|                              |       |               | Overall Test Results | Pass      |

  
Laboratory Technician

  
Approved By

08/29/2006

Test Date

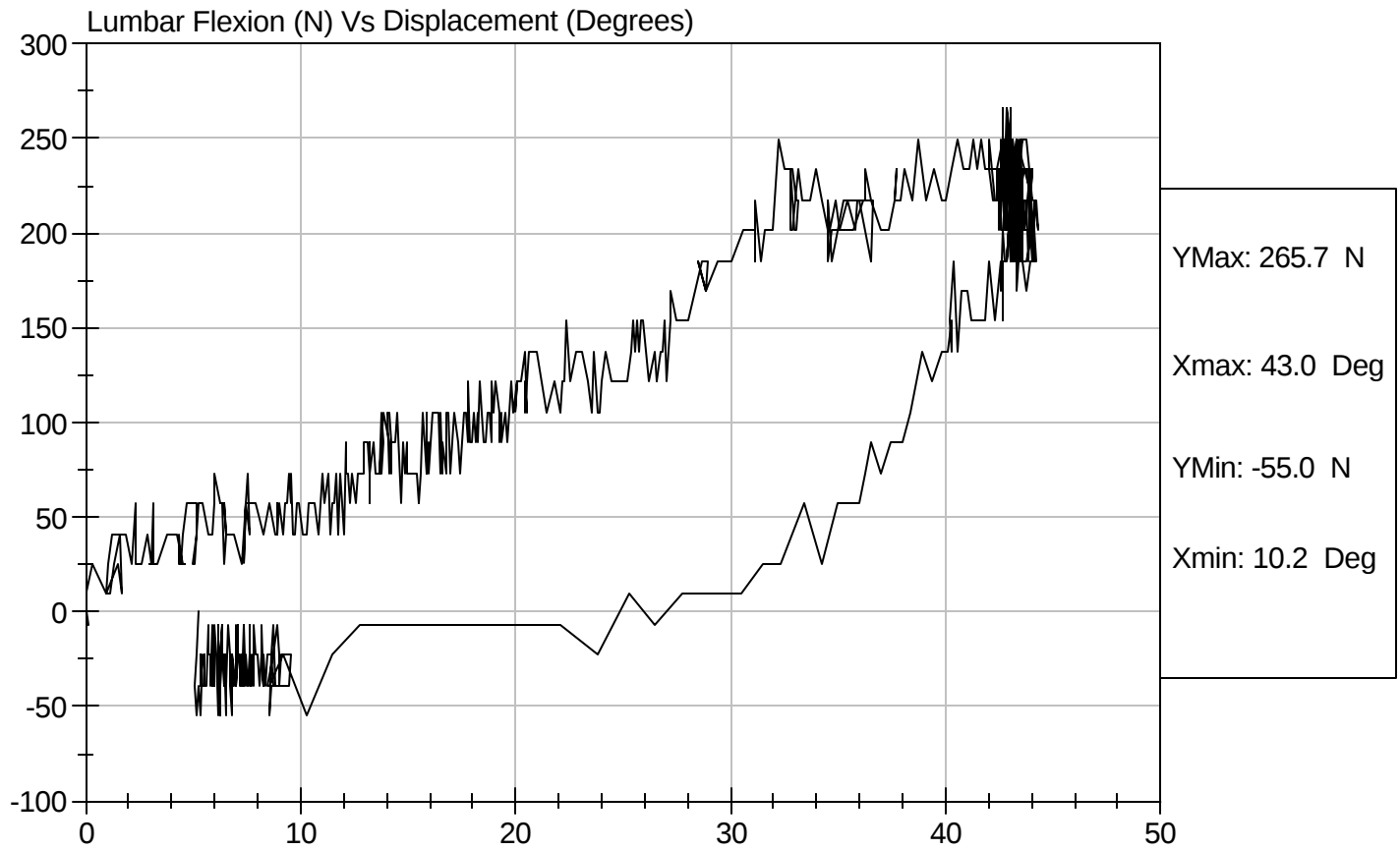


Test Description: Lumbar Flexion

Test Date: 08/29/2006

Component: D062645

Speed: 0 ft/sec, 0 m/sec



**SID Calibration Data Sheet**  
**Side Impact Dummy (SID)**  
**Neck Pendulum Test**

**ATD Serial No:** 904

**Test I.D:** D062649

| Tested Parameter                        |               | Units | Specification | Result | Pass/Fail |
|-----------------------------------------|---------------|-------|---------------|--------|-----------|
| Laboratory Temperature                  |               | deg C | 20.6 to 22.2  | 21.6   | Pass      |
| Laboratory Relative Humidity            |               | %     | 10 to 70      | 43     | Pass      |
| Impact Velocity                         |               | m/s   | 6.89 to 7.13  | 7.02   | Pass      |
| Pendulum Deceleration                   | 10 msec       | m/s   | 1.96 to 2.55  | 2.27   | Pass      |
|                                         | 20 msec       | m/s   | 4.12 to 5.10  | 4.43   | Pass      |
|                                         | 30 msec       | m/s   | 5.73 to 7.01  | 6.08   | Pass      |
|                                         | 40 to 70 msec | m/s   | 6.27 to 7.64  | 7.18   | Pass      |
| Midsagittal Plane Max Rotation          |               | deg   | 66 to 82      | 71     | Pass      |
| Head Rotation Peak to Zero - Decay Time |               | msec  | 58 to 67      | 58     | Pass      |
| Max. Mx at Occipital Condyles           |               | Nm    | 73 to 88      | 78     | Pass      |
| Mx Peak To Zero - Decay Time            |               | msec  | 49 to 64      | 53     | Pass      |
| Mx Peak to Max. Head Rotation           |               | msec  | 2 to 16       | 8      | Pass      |

  
 Laboratory Technician

08/29/2006

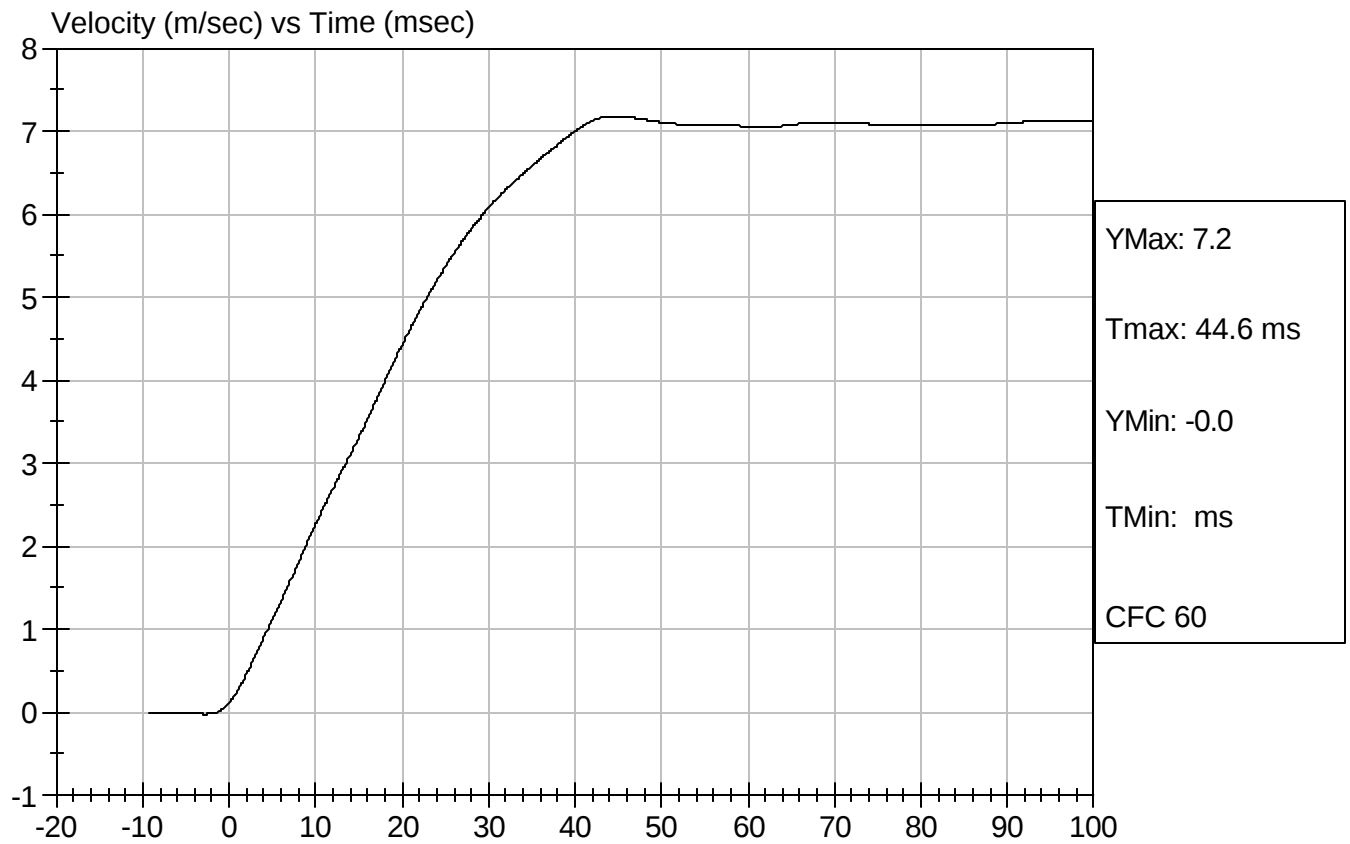
Test Date

  
 Approved By



Test Desc: Neck Bending  
Component ID: D062649

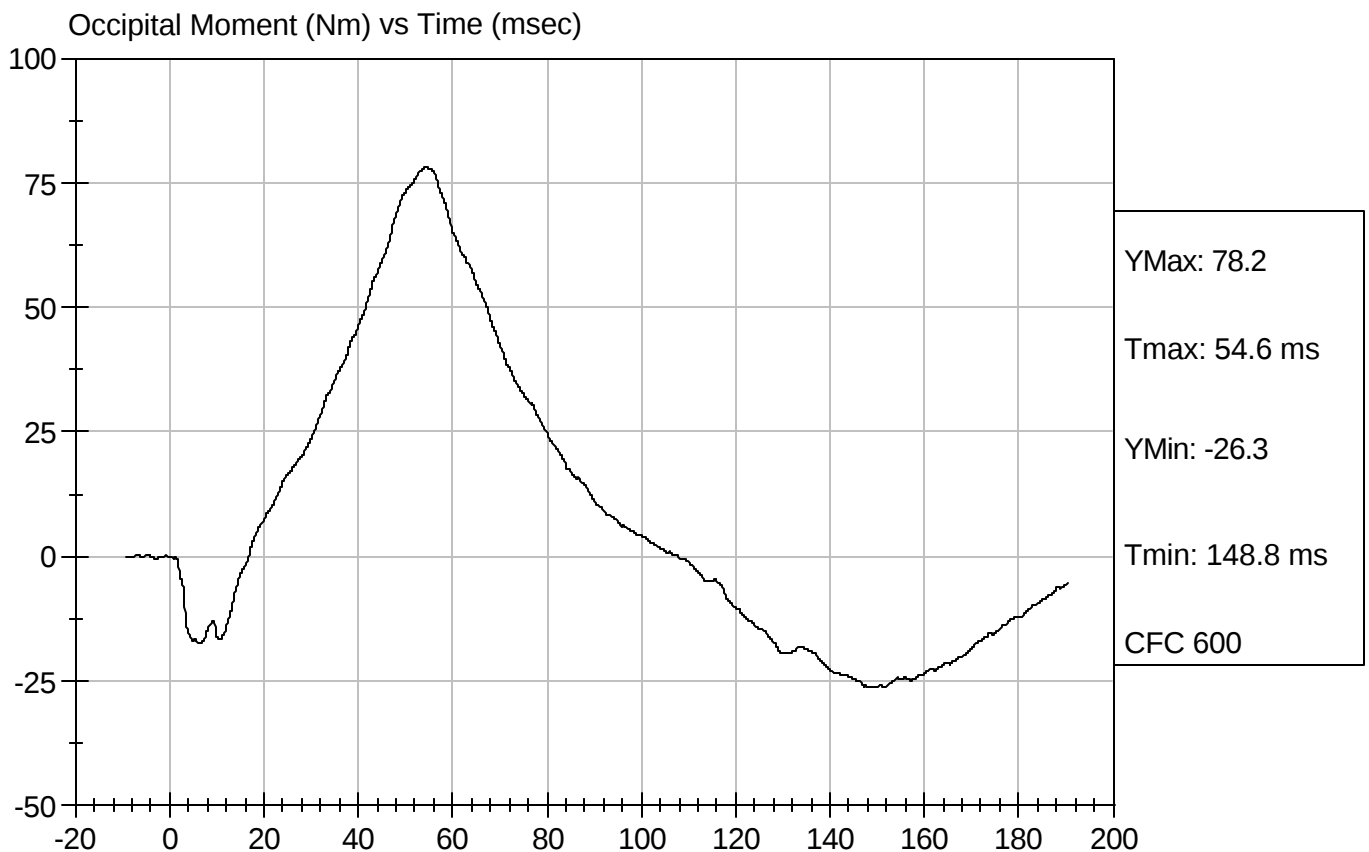
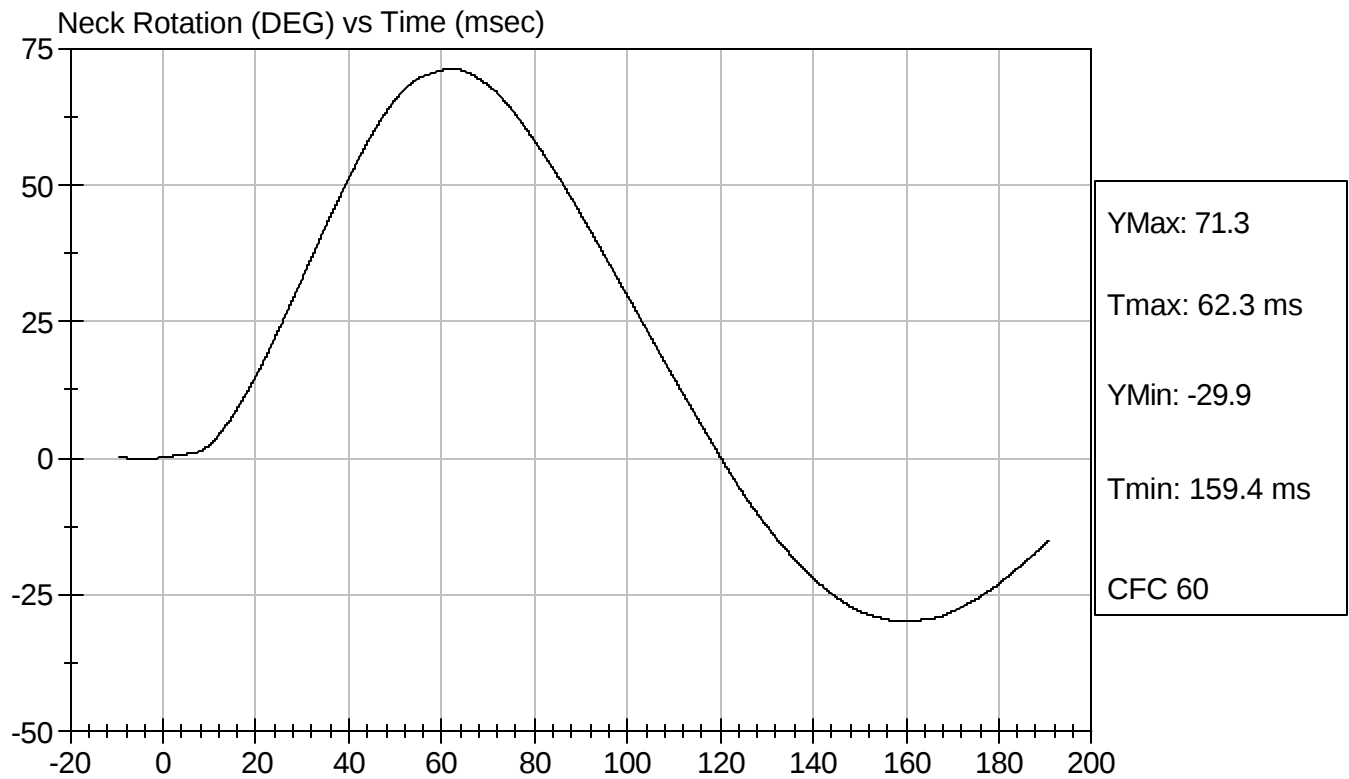
Test Date: 08/29/2006  
Speed: 23.04 ft/sec, 7.02 m/sec





Test Desc: Neck Bending  
Component ID: D062649

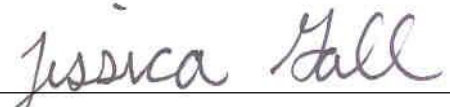
Test Date: 08/29/2006  
Speed: 23.04 ft/sec, 7.02 m/sec



**SID Calibration Data Sheet**  
**Side Impact Dummy**  
**Inspection Checklist**

**ATD Serial No:** 904

| Test Part    | Items Checked                        | Result |
|--------------|--------------------------------------|--------|
| Skin         | Visual inspection                    | Pass   |
| Head         | Visual, ballast, accelerometer mount | Pass   |
| Neck         | Visual                               | Pass   |
| Spine Box    | Visual, ballast, accelerometer mount | Pass   |
| Rib Cage     | Visual, measure                      | Pass   |
| Sternum      | Visual                               | Pass   |
| Lumbar Spine | Visual                               | Pass   |
| Abdomen      | Visual                               | Pass   |
| Pelvis       | Visual, palpate, accelerometer mount | Pass   |
| Upper Legs   | Visual                               | Pass   |
| Knees        | Visual                               | Pass   |
| Lower Legs   | Visual, range of motion              | Pass   |
| Ankles       | Visual, range of motion              | Pass   |
| Feet         | Visual, range of motion              | Pass   |
| Joints       | 1 to 2 g range                       | Pass   |
| Other        |                                      | Pass   |

  
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Approved By

08/30/2006

Test Date