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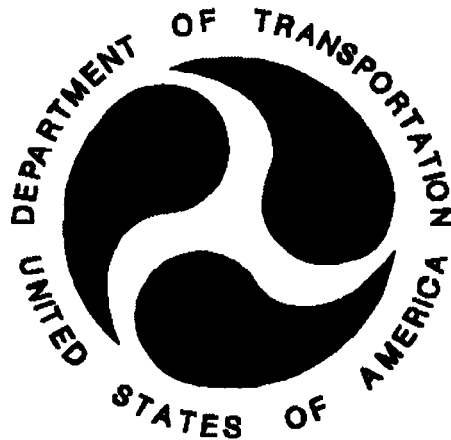
**REPORT NUMBER: 214-CAL-07-02**

**SAFETY COMPLIANCE TESTING FOR FMVSS 214  
SIDE IMPACT PROTECTION  
INDICANT**

**GENERAL MOTOR CORPORATION  
2007 SATURN AURA  
4-DOOR SEDAN**

**NHTSA NUMBER: C70103**

**PREPARED BY:  
CALSPAN CORPORATION  
P.O. BOX 400  
BUFFALO, NEW YORK 14225**



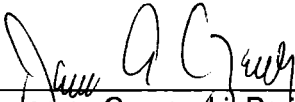
**Test Date: September 13, 2006**

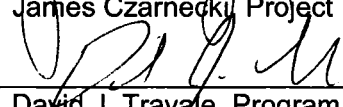
**FINAL REPORT**

**PREPARED FOR:  
U.S. DEPARTMENT OF TRANSPORTATION  
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION  
ENFORCEMENT  
OFFICE OF VEHICLE SAFETY COMPLIANCE  
MAIL CODE: NVS-220  
400 SEVENTH STREET, SW, ROOM 6111  
WASHINGTON, D.C. 20590**

This final test report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, in response to Contract Number DTNH22-02-D-01114.

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Transportation Sciences Center

Date: 10/30/06

Date: 11/2/06

### Technical Report Documentation Page

| 1. Report No.<br>214-CAL-07-02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 2. Government Accession No.                        | 3. Recipient's Catalog No.                                                                                                                                                                                                                                                       |           |  |               |              |                                |       |       |                                |       |       |                                          |       |       |                             |    |    |                        |    |    |     |      |       |
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| 4. Title and Subtitle<br>Final Report of FMVSS 214 Compliance Side Impact Testing of a 2007 Saturn Aura 4-door Sedan<br>NHTSA No.: C70103                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                    | 5. Report Date<br>September 13, 2006                                                                                                                                                                                                                                             |           |  |               |              |                                |       |       |                                |       |       |                                          |       |       |                             |    |    |                        |    |    |     |      |       |
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| 7. Author(s)<br>James Czarnecki, Project Engineer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                    | 8. Performing Organization Report No.<br>8675-F214-32                                                                                                                                                                                                                            |           |  |               |              |                                |       |       |                                |       |       |                                          |       |       |                             |    |    |                        |    |    |     |      |       |
| 9. Performing Organization Name and Address<br>Calspan Corporation Transportation Sciences Center<br>P.O. Box 400<br>Buffalo, New York 14225                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                    | 10. Work Unit No.                                                                                                                                                                                                                                                                |           |  |               |              |                                |       |       |                                |       |       |                                          |       |       |                             |    |    |                        |    |    |     |      |       |
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| 15. Supplementary Notes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                    |                                                                                                                                                                                                                                                                                  |           |  |               |              |                                |       |       |                                |       |       |                                          |       |       |                             |    |    |                        |    |    |     |      |       |
| 16. Abstract<br>A 55/28 km/h 90° Moving Deformable Barrier FMVSS 214 Indicant side impact was conducted on the subject 2007 Saturn Aura 4-door Sedan to obtain new car assessment and research data indicant of FMVSS No. 214D performance. The test was conducted at the Calspan Corporation Transportation Sciences Center in Buffalo, New York, on September 13, 2006. The impact velocity of the Moving Deformable Barrier (MDB) was 62.76 km/h, and the ambient temperature at the struck side (driver side) of the vehicle was 21°C. The target vehicle's maximum post test static crush was 272 mm at level 4. 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;">44.66</td> <td style="text-align: center;">40.97</td> </tr> <tr> <td>Left Lower Rib (LLR) Accel., g</td> <td style="text-align: center;">43.84</td> <td style="text-align: center;">41.24</td> </tr> <tr> <td>Lower Spine (T<sub>12</sub>) Accel., g</td> <td style="text-align: center;">54.64</td> <td style="text-align: center;">60.44</td> </tr> <tr> <td>Thoracic Trauma Index (TTI)</td> <td style="text-align: center;">50</td> <td style="text-align: center;">51</td> </tr> <tr> <td>Pelvis (PEV) Accel., g</td> <td style="text-align: center;">62</td> <td style="text-align: center;">59</td> </tr> <tr> <td>HIC</td> <td style="text-align: center;">72.4</td> <td style="text-align: center;">495.4</td> </tr> </tbody> </table> |                                                    |                                                                                                                                                                                                                                                                                  |           |  | <u>DRIVER</u> | <u>PASS.</u> | Left Upper Rib (LUR) Accel., g | 44.66 | 40.97 | Left Lower Rib (LLR) Accel., g | 43.84 | 41.24 | Lower Spine (T <sub>12</sub> ) Accel., g | 54.64 | 60.44 | Thoracic Trauma Index (TTI) | 50 | 51 | Pelvis (PEV) Accel., g | 62 | 59 | HIC | 72.4 | 495.4 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <u>DRIVER</u>                                      | <u>PASS.</u>                                                                                                                                                                                                                                                                     |           |  |               |              |                                |       |       |                                |       |       |                                          |       |       |                             |    |    |                        |    |    |     |      |       |
| Left Upper Rib (LUR) Accel., g                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 44.66                                              | 40.97                                                                                                                                                                                                                                                                            |           |  |               |              |                                |       |       |                                |       |       |                                          |       |       |                             |    |    |                        |    |    |     |      |       |
| Left Lower Rib (LLR) Accel., g                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 43.84                                              | 41.24                                                                                                                                                                                                                                                                            |           |  |               |              |                                |       |       |                                |       |       |                                          |       |       |                             |    |    |                        |    |    |     |      |       |
| Lower Spine (T <sub>12</sub> ) Accel., g                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 54.64                                              | 60.44                                                                                                                                                                                                                                                                            |           |  |               |              |                                |       |       |                                |       |       |                                          |       |       |                             |    |    |                        |    |    |     |      |       |
| Thoracic Trauma Index (TTI)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 50                                                 | 51                                                                                                                                                                                                                                                                               |           |  |               |              |                                |       |       |                                |       |       |                                          |       |       |                             |    |    |                        |    |    |     |      |       |
| Pelvis (PEV) Accel., g                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 62                                                 | 59                                                                                                                                                                                                                                                                               |           |  |               |              |                                |       |       |                                |       |       |                                          |       |       |                             |    |    |                        |    |    |     |      |       |
| HIC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 72.4                                               | 495.4                                                                                                                                                                                                                                                                            |           |  |               |              |                                |       |       |                                |       |       |                                          |       |       |                             |    |    |                        |    |    |     |      |       |
| 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. Key Words<br>Compliance Testing<br>Side Impact Protection<br>FMVSS 214<br>Side Impact Dummy (SID)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                    | 18. Distribution Statement<br><u>Copies of this report are available from:</u><br>National Highway Traffic Safety Administration<br>Technical Reference Division (TIS)<br>Room 5108 (NPO-230)<br>400 Seventh St., S.W.<br>Washington, D.C. 20590<br>Telephone No. (202) 366-4946 |           |  |               |              |                                |       |       |                                |       |       |                                          |       |       |                             |    |    |                        |    |    |     |      |       |
| 19. Security Class. (of this report)<br>Unclassified                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 20. Security Class. (of this page)<br>Unclassified | 21. No. of Pages<br>121                                                                                                                                                                                                                                                          | 22. Price |  |               |              |                                |       |       |                                |       |       |                                          |       |       |                             |    |    |                        |    |    |     |      |       |

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**SECTION 1**  
**PURPOSE AND TEST PROCEDURE**

**PURPOSE**

This side impact test is part of the FMVSS 214 Side Impact Protection Compliance Test Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-02-D-01114. The purpose of this indicant test was to evaluate side impact protection in a 2007 Saturn Aura 4-door Sedan when tested at the New Car Assessment Program (NCAP) target test velocity of 62.0 kph, which is 8 kph faster than the target velocity required by the Office of Vehicle Safety Compliance's Laboratory Test Procedure (TP-214D-06, dated July 26, 2001).

## **SECTION 2**

### **SUMMARY OF FMVSS 214 INDICANT SIDE IMPACT TEST**

This Side Impact Protection Indicant Test was performed at the New Car Assessment Program (NCAP) target test velocity of 62.0 kph, which is 8 kph faster than the target velocity required by the Office of Vehicle Safety Compliance's Laboratory Test Procedure (TP-214D-06, dated July 26, 2001).

A model year 2007 Saturn Aura 4-door Sedan 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 62.76 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 1832 kg and the test weight of the MDB was 1362.5 kg. The test was conducted at the Calspan Corporation Transportation Sciences Center on September 13, 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/HIII's were placed in the driver (P1) and left rear passenger (P4) designated seating positions according to instructions specified in the Laboratory Test Procedure for New Car Assessment Program Side Impact Testing dated July 1997. 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-one (21) structural accelerometers and the MDB was instrumented with five (5) accelerometers.

## **2.2 GENERAL COMMENTS**

The test vehicle sustained a maximum static crush of 272 mm at level 4, 1350 mm rearward of the left vertical impact point. The driver and passenger SID/HIII's, Serial Nos. 270 and 269 respectively, were calibrated just prior to this test.

Test data and observations are presented in this section of the report. Appendix A contains the still photograph prints. Appendix B contains the driver and passenger SID/HIII's, vehicle, and MDB response data traces. Appendix C contains the SID/HIII's configuration and performance verification data. Appendix D contains the test equipment information.

The occupant data is summarized below:

| ATD position | HIC(36) | T <sub>1</sub> | T <sub>2</sub> | TTI (G's) | Peak Pelvis (G's) |
|--------------|---------|----------------|----------------|-----------|-------------------|
| Driver       | 72.4    | 25.1           | 61.1           | 50        | 62                |
| Passenger    | 495.4   | 53.4           | 65.0           | 51        | 59                |

#### **SUPPLEMENTAL RESTRAINT INFORMATION**

| Restraint Type                     | Left Front (Driver) |          | Left Rear (Passenger) |          |
|------------------------------------|---------------------|----------|-----------------------|----------|
|                                    | Installed           | Deployed | Installed             | Deployed |
| Front Airbag                       | Yes                 | No       | NA                    | NA       |
| Side Torso Airbag                  | Yes                 | Yes      | NA                    | NA       |
| Side Head/Torso Combination Airbag | NA                  | NA       | NA                    | NA       |
| Curtain Airbag                     | Yes                 | Yes      | Yes                   | Yes      |

The test instrumentation data listed in Appendix B can be found on the NHTSA website:  
[www.nhtsa.dot.gov](http://www.nhtsa.dot.gov).

**DATA SHEET NO. 1****GENERAL TEST AND VEHICLE PARAMETER DATA**

|               |                                       |            |                           |
|---------------|---------------------------------------|------------|---------------------------|
| Test Vehicle: | <u>2007 Saturn Aura</u>               | NHTSA No.  | <u>C70103</u>             |
| Test Program: | <u>FMVSS 214 Indicant Side Impact</u> | Test Date: | <u>September 13, 2006</u> |

**TEST VEHICLE INFORMATION AND VEHICLE OPTIONS**

|                       |                           |                                                          |     |
|-----------------------|---------------------------|----------------------------------------------------------|-----|
| Make                  | General Motor Corporation | Driver Front Airbag                                      | Yes |
| Model                 | Aura                      | Driver Side Curtain Airbag                               | Yes |
| Body Style            | 4-door Sedan              | Driver Side Torso Airbag                                 | Yes |
| NHTSA No.             | C70103                    | Driver Pretensioners                                     | Yes |
| VIN                   | 1G8ZS57N57F131832         | Driver Load Limiters                                     | Yes |
| Color                 | GOLD                      | Driver Power Seats                                       | Yes |
| Engine Disp.(L)       | 3.5                       | Rear Pass. Side Curtain Airbag                           | Yes |
| Engine Cylinders      | 6                         | Rear Pass. Side Torso Airbag                             | No  |
| Engine Placement      | Lateral                   | Rear Pass. Pretensioners                                 | No  |
| Transmission Type     | Automatic                 | Rear Pass. Load Limiters                                 | No  |
| Transmission Speeds   | 4                         | Rear Pass. Power Seats                                   | NA  |
| Final Drive           | Front/                    | Tilt Wheel                                               | Yes |
| Air Conditioning      | Yes                       | Anti-lock Brakes                                         | Yes |
| Power Steering        | Yes                       | Traction Control                                         | Yes |
| Power Brakes          | Yes                       | Power Windows                                            | Yes |
| Delivery Date         | 09/08/06                  | Power Door Locks                                         | Yes |
| Odometer Reading (km) | 68                        | Automatic Door Locks (ADL)                               | Yes |
| Dealer                | SATURN OF CLARENCE        | Owner's Manual Details<br>Instructions on Disabling ADLs | Yes |

**DATA FROM CERTIFICATION LABEL**

|                     |                           |                 |      |
|---------------------|---------------------------|-----------------|------|
| Manufactured By     | General Motor Corporation | GVWR (kg)       | 2047 |
| Date of Manufacture | 08/06                     | GAWR Front (kg) | 1092 |
|                     |                           | GAWR Rear (kg)  | 955  |

**VEHICLE CAPACITY DATA**

| Measured Parameter      | Front   | Rear  | Third | Total |
|-------------------------|---------|-------|-------|-------|
| Type of Seats           | Bucket/ | Bench |       |       |
| Number Of Occupants     | 2       | 3     |       | 5     |
| Capacity Wt. (VCW) (kg) |         |       |       | 412   |
| Cargo Wt. (RCLW) (kg)   |         |       |       | 71.8  |

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

|               |                                |            |                    |
|---------------|--------------------------------|------------|--------------------|
| Test Vehicle: | 2007 Saturn Aura               | NHTSA No.  | C70103             |
| Test Program: | FMVSS 214 Indicant Side Impact | Test Date: | September 13, 2006 |

**TEST VEHICLE WEIGHTS**

|        | Units | As Delivered (UVW) (Axle) |       |        | Fully Loaded (Axle) |       |        | As Tested (ATW) (Axle) |       |        |
|--------|-------|---------------------------|-------|--------|---------------------|-------|--------|------------------------|-------|--------|
|        |       | Front                     | Rear  | Total  | Front               | Rear  | Total  | Front                  | Rear  | Total  |
| Left   | kg    | 490.5                     | 313.5 |        | 542.0               | 420.0 |        | 538                    | 410   |        |
| Right  | kg    | 498.0                     | 302.0 |        | 505.5               | 373.0 |        | 508                    | 376   |        |
| Ratio  | %     | 61.6                      | 38.4  |        | 56.9                | 43.1  |        | 57.1                   | 42.9  |        |
| Totals | kg    | 988.5                     | 615.5 | 1604.0 | 1047.5              | 793.0 | 1840.5 | 1046.0                 | 786.0 | 1832.0 |

**TARGET TEST WEIGHT CALCULATION**

| Measured Parameter                      | Units | Value  |
|-----------------------------------------|-------|--------|
| Total Delivered Weight (UVW)            | kg    | 1604   |
| Weight of 2 P572E ATDs (81.2 kg each)   | kg    | 162.4  |
| Rated Cargo/Luggage Weight (RCLW)       | kg    | 71.8   |
| Calculated Vehicle Target Weight (TVTW) | kg    | 1838.2 |

\* Actual As Tested Weight (ATW) will be TVTW -4.5/-9.1 kg

Weight of Ballast (including instrumentation package and cameras): 65.6 kg

**TEST VEHICLE ATTITUDES**

|              | Units | LF  | RF  | LR  | RR  |
|--------------|-------|-----|-----|-----|-----|
| As Delivered | mm    | 720 | 731 | 716 | 741 |
| Fully Loaded | mm    | 700 | 690 | 710 | 708 |
| As Tested    | mm    | 708 | 697 | 711 | 708 |

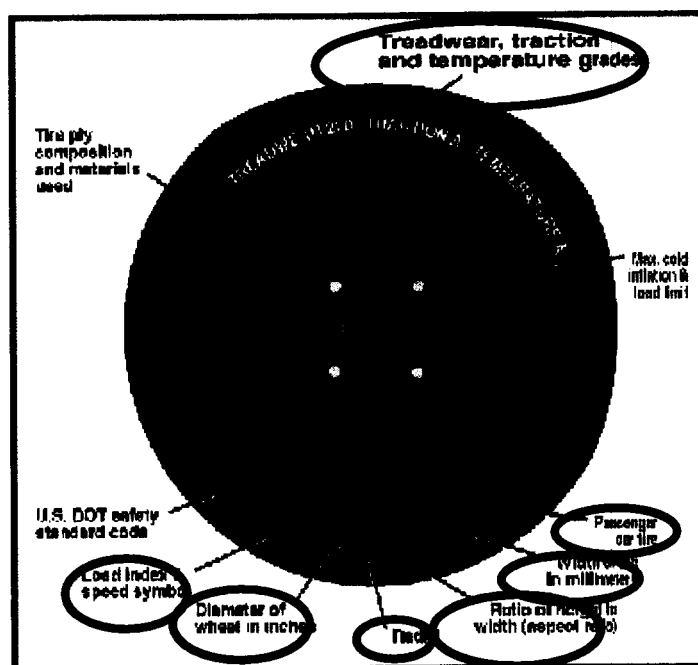
**TEST VEHICLE VERTICAL IMPACT LINE AND CG**

| Measurement Description               | Units | Value   |
|---------------------------------------|-------|---------|
| Test Vehicle Wheel Base               | mm    | 2860    |
| Target Impact Point Aft of Front Axle | mm    | 490     |
| Actual Impact Point Aft of Front Axle | mm    |         |
| As Tested CG (aft of front axle)      | mm    | 1227.05 |

## DATA SHEET NO. 2

### TEST VEHICLE TIRE INFORMATION

|                                                                                              |                                                                 |
|----------------------------------------------------------------------------------------------|-----------------------------------------------------------------|
| Test Vehicle: <u>2007 Saturn Aura</u><br>Test Program: <u>FMVSS 214 Indicant Side Impact</u> | NHTSA No. <u>C70103</u><br>Test Date: <u>September 13, 2006</u> |
|----------------------------------------------------------------------------------------------|-----------------------------------------------------------------|



### DATA FROM TIRE PLACARD

| Measured Parameter                      | Front        | Rear         |
|-----------------------------------------|--------------|--------------|
| Maximum Tire Pressure (kPa)             | 300          | 300          |
| Cold / Test Pressure (kPa)              | 210          | 210          |
| Recommended Tire Size                   | P225/50R17S  | P225/50R17S  |
| Tire Size on Vehicle                    | P225/50R17   | P225/50R17   |
| Tire Manufacturer                       | HANKOOK      | HANKOOK      |
| Tire Name                               | OPTIMO H725A | OPTIMO H725A |
| Tire Type                               | P            | P            |
| Tire Width (mm)                         | 225          | 225          |
| Ratio of Height to Width (aspect ratio) | 50           | 50           |
| Radial                                  | YES          | YES          |
| Wheel Diameter                          | 17           | 17           |
| Load Index & Speed Symbol               | 93S          | 93S          |
| Treadwear                               | 340          | 340          |
| Traction Grade                          | A            | A            |
| Temperature Grade                       | A            | A            |

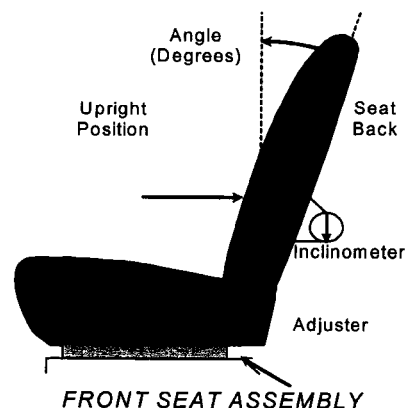
## DATA SHEET NO. 3

### TEST VEHICLE INFORMATION

|               |                                |            |                    |
|---------------|--------------------------------|------------|--------------------|
| Test Vehicle: | 2007 Saturn Aura               | NHTSA No.  | C70103             |
| Test Program: | FMVSS 214 Indicant Side Impact | Test Date: | September 13, 2006 |

#### NORMAL DESIGN RIDING POSITION

The driver and passenger seat back is positioned to the manufacturer's designated angle.

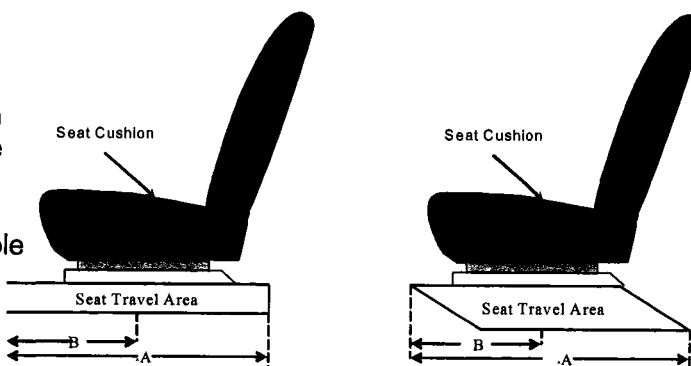


#### SEAT BACK POSITION

|                                                  | Driver Seat | Rear Seat      |
|--------------------------------------------------|-------------|----------------|
| Test Detent (forward-most detent defined as 0)   | Detent 6    | Not Adjustable |
| Angle (deg. from forward-most locking position)  | 19          | Not Adjustable |
| Alternative Measurements to Verify Test Position | NA          | NA             |

#### SEAT FORE/AFT POSITIONS

The total seat travel was measured from forward most position to rearmost position irrespective of vertical seat height in those positions. The seat was set at the longitudinal mid position with vertical adjustment at the lowest position obtainable for both the driver and passenger.



#### SEAT FORE/AFT POSITION

|                                                | Driver Seat | Rear Seat      |
|------------------------------------------------|-------------|----------------|
| Total Fore/Aft Travel (A) (mm)                 | 270         | Not Adjustable |
| Test Position (B) (mm)                         | 135         | Not Adjustable |
| Test Detent (forward-most detent defined as 0) | 10          | Not Adjustable |
| Total Number of Detents (including 0)          | 20          | Not Adjustable |

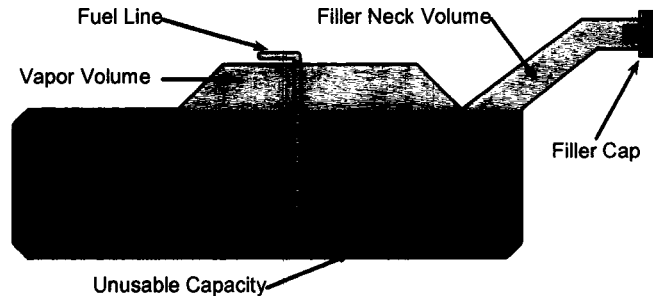
## DATA SHEET NO. 3 (CONTINUED)

### TEST VEHICLE INFORMATION

Test Vehicle: 2007 Saturn Aura NHTSA No. C70103  
Test Program: FMVSS 214 Indicant Side Impact Test Date: September 13, 2006

#### FUEL SYSTEM INFORMATION

The test vehicle is equipped with an electric fuel pump. The fuel pump operates for approximately two seconds after the ignition is placed in the "ON" position, after which the fuel pump automatically shuts off. The fuel filler door is located on the left rear fender. The standard fuel tank occupies the area under the rear seat.



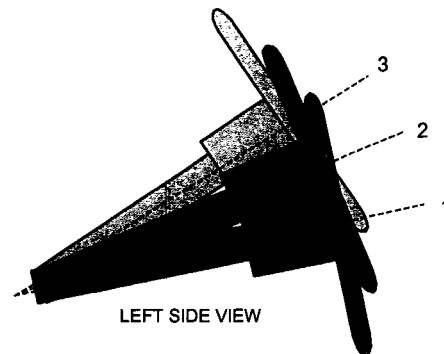
VEHICLE FUEL TANK ASSEMBLY

#### FUEL TANK CAPACITY

|                                                               | Liters |
|---------------------------------------------------------------|--------|
| Usable Capacity of "Standard" Fuel Tank                       | 61.3   |
| Usable Capacity of "Optional" Fuel Tank                       | -      |
| Stoddard Used For Test (92%-94% of Fuel Tank Usable Capacity) | 57.38  |

#### 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

#### STEERING COLUMN POSITION

|                                   | Fore/Aft Position (mm) | Tilt (degrees) | Tilt (detent) |
|-----------------------------------|------------------------|----------------|---------------|
| Lowermost Position No. 1          | NA                     | 67.4           | NA            |
| Geometric Center Position No. 2 * | NA                     | 69.4           | NA            |
| Uppermost Position No. 3          | NA                     | 71.4           | NA            |

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

Test Vehicle: 2007 Saturn Aura

NHTSA No. C70103

Test Program: FMVSS 214 Indicant Side Impact

Test Date: September 13, 2006

**MDB SPECIFICATIONS**

| Measurement Description                    | Length (mm) |
|--------------------------------------------|-------------|
| Overall Width of Framework Carriage        | 1250        |
| Overall Length Including Honeycomb Face    | 4120        |
| Wheel base of Framework Carriage           | 2590        |
| Tread of Framework Carriage (front & rear) | 1875        |
| C.G. Location aft of Front Axle            | 1104        |

**MDB WEIGHTS**

|        | Units | Front Axle | Rear Axle | Total  |
|--------|-------|------------|-----------|--------|
| Left   | kg    | 409.5      | 281.5     |        |
| Right  | kg    | 372.5      | 299.0     |        |
| Ratio  | %     | 57.4       | 42.6      |        |
| Totals | kg    | 782.0      | 580.5     | 1362.5 |

**MDB SPEED AND IMPACT ANGLE DATA**

| Measured Parameter              | Units | Requirement  | Value |
|---------------------------------|-------|--------------|-------|
| Trap No. 1 Velocity (Primary)   | km/h  | 61.1 to 62.7 | 62.7  |
| Trap No. 2 Velocity (Redundant) | km/h  | 61.1 to 62.7 | 62.7  |

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

| Measured Parameter | Units | Requirement | Value      |
|--------------------|-------|-------------|------------|
| Horizontal Offset  | mm    | +/- 50      | 0 mm       |
| Vertical Offset    | mm    | +/-20       | 2 mm below |

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

|                                                     |                                      |
|-----------------------------------------------------|--------------------------------------|
| Test Vehicle: <u>2007 Saturn Aura</u>               | NHTSA No. <u>C70103</u>              |
| Test Program: <u>FMVSS 214 Indicant Side Impact</u> | Test Date: <u>September 13, 2006</u> |

**TEST DUMMY INFORMATION AND CONTACT POINTS**

| Description             | Front Seat SID/HIII | Rear Seat SID/HIII         |
|-------------------------|---------------------|----------------------------|
| Dummy Type / Serial No. | SID/HIII / 270      | SID/HIII / 269             |
| Head Contact            | SIDE CURTAIN        | SIDE CURTAIN               |
| Upper Torso Contact     | TORSO AIRBAG        | UPPER DOOR TRIM            |
| Lower Torso Contact     | TORSO BAG/ ARM REST | LOWER DOOR TRIM / ARM REST |
| Left Knee Contact       | DOOR TRIM           | DOOR TRIM                  |
| Right Knee Contact      | LEFT KNEE           | LEFT KNEE                  |

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

| Description             | Front                                                          | Rear                                                           |
|-------------------------|----------------------------------------------------------------|----------------------------------------------------------------|
| Locked/Unlocked Doors   | Doors were locked                                              | Doors were locked                                              |
| 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                 | Left Rear Passenger Window Broke |
| Other Notable Effects         | None                             |

**SUPPLEMENTAL RESTRAINT INFORMATION**

| Restraint Type                     | Left Front (Driver) |          | Left Rear (Passenger) |          |
|------------------------------------|---------------------|----------|-----------------------|----------|
|                                    | Installed           | Deployed | Installed             | Deployed |
| Front Airbag                       | Yes                 | No       | NA                    | NA       |
| Side Torso Airbag                  | Yes                 | Yes      | NA                    | NA       |
| Side Head/Torso Combination Airbag | NA                  | NA       | NA                    | NA       |
| Curtain Airbag                     | Yes                 | Yes      | Yes                   | Yes      |

# DATA SHEET NO. 6

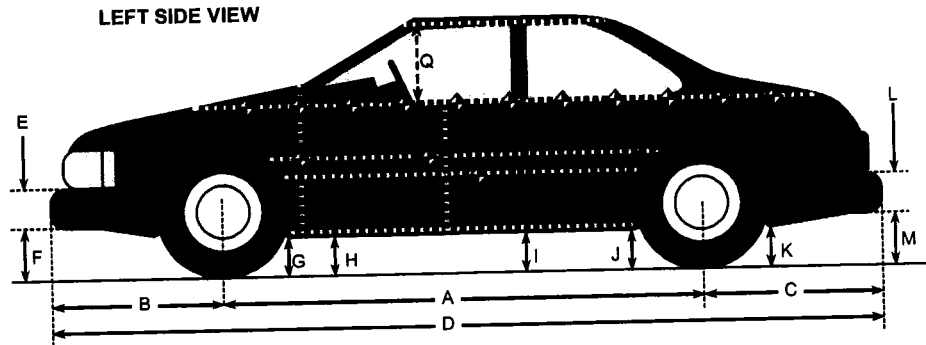
## VEHICLE PRE-TEST AND POST-TEST MEASUREMENTS

Test Vehicle: 2007 Saturn Aura

NHTSA No. C70103

Test Program: FMVSS 214 Indicant Side Impact

Test Date: September 13, 2006



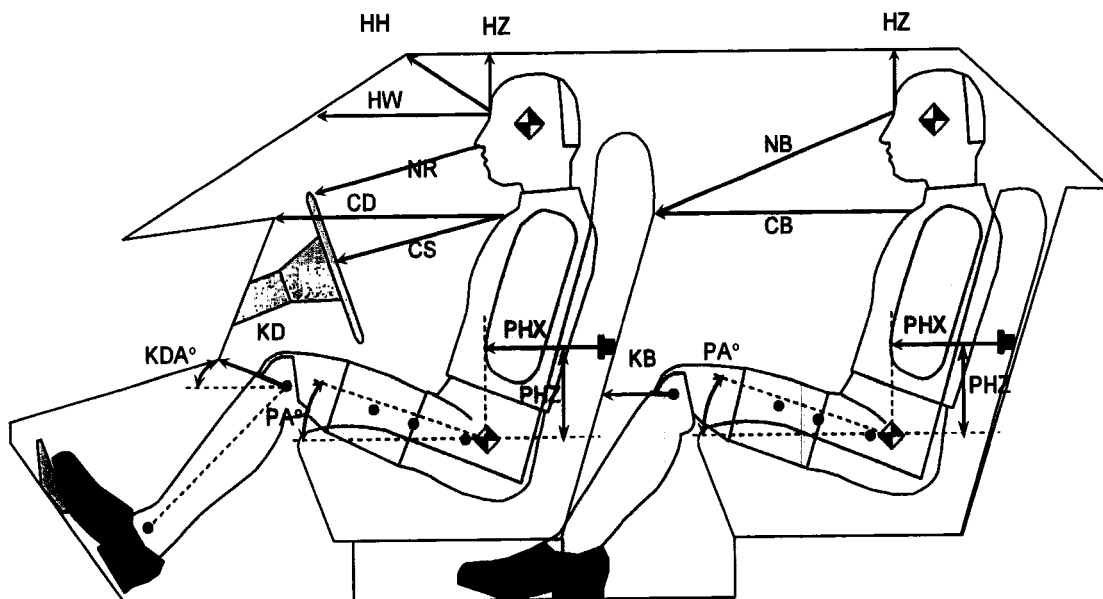
All Measurements in mm

| Code | Measurement Description                | Pre-Test (delivered) | Pre-Test (as tested) | Post-Test (as tested) | Difference |
|------|----------------------------------------|----------------------|----------------------|-----------------------|------------|
| A    | Wheelbase                              | 2860                 | 2860                 | 2852                  | 8          |
| B    | Front Axle to FSOV                     | 971                  | 971                  | 961                   | 10         |
| C    | Rear Axle to RSOV                      | 1011                 | 1011                 | 1041                  | -30        |
| D    | Total Length at Centerline             | 4838                 | 4838                 | 4852                  | -14        |
| E    | Front Bumper Thickness                 | 140                  | 140                  | 140                   | 0          |
| F    | Front Bumper Bottom to Ground          | 375                  | 371                  | 380                   | -9         |
| G    | Sill Height at Front Wheel Well        | 186                  | 169                  | 174                   | -5         |
| H    | Sill Height at Front Door Leading Edge | 188                  | 171                  | 174                   | -3         |
| I    | Sill Height at "B" Pillar              | 220                  | 195                  | 190                   | 5          |
| J1   | Sill Height at Rear Wheel Well         | 208                  | 174                  | 201                   | -27        |
| J2   | Pinch Weld Height at Rear Wheel Well   | 210                  | 176                  | 205                   | -29        |
| K    | Sill Height Aft of Rear Wheel Well     | 275                  | 238                  | 241                   | -3         |
| L    | Rear Bumper Thickness                  | 255                  | 255                  | 255                   | 0          |
| M    | Rear Bumper Bottom to Ground           | 457                  | 410                  | 440                   | -30        |
| N    | Sill Height to Window Bottom Sill      | 704                  | 704                  | 631                   | 73         |
| O    | Front Door Leading Edge to Impact CL   | 888                  | 888                  | 824                   | 64         |
| P    | Rear Door Trailing Edge to Impact CL   | 1198                 | 1198                 | 1141                  | 57         |
| Q    | Front Window Opening                   | 423                  | 423                  | 405                   | 18         |
| R    | Right Side Length                      | 4691                 | 4691                 | 4689                  | 2          |
| S    | Left Side Length                       | 4690                 | 4690                 | 4681                  | 9          |
| T    | Vehicle Width at "B" Post              | 1754                 | 1754                 | 1751                  | 3          |

# DATA SHEET NO. 7

## SID/HII LONGITUDINAL CLEARANCE DIMENSIONS

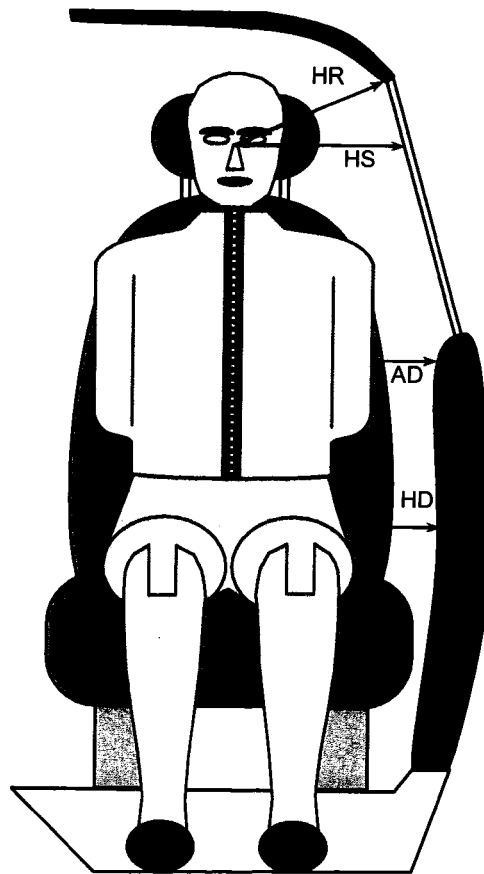
|               |                                |            |                    |
|---------------|--------------------------------|------------|--------------------|
| Test Vehicle: | 2007 Saturn Aura               | NHTSA No.  | C70103             |
| Test Program: | FMVSS 214 Indicant Side Impact | Test Date: | September 13, 2006 |



| Driver Code | Pass. Code | Measurement Description        | Driver S/N 270 |          | Passenger S/N 269 |          |
|-------------|------------|--------------------------------|----------------|----------|-------------------|----------|
|             |            |                                | Length(mm)     | Angle(°) | Length(mm)        | Angle(°) |
| HH          |            | Head to Header                 | 412            |          |                   |          |
| HW          |            | Head to Windshield             | 711            |          |                   |          |
| HZ          | HZ         | Head to Roof                   | 173            |          | 143               |          |
| NR          | NB         | Nose to Rim/Nose to Seatback   | 476            |          | 649               |          |
| CD          | CB         | Chest to Dash or Seatback      | 590            |          | 576               |          |
| CS          |            | Chest to Steering Wheel        | 404            |          |                   |          |
| KDL         | KBL        | Left Knee to Dash or Seatback  | 193            | 38       | 213               | 21       |
| KDR         | KBR        | Right Knee to Dash or Seatback | 172            | 43       | 219               | 14       |
| PA          | PA         | Pelvic Angle                   |                | 23.2     |                   | 24.5     |
| PHX         | PHX        | H-Point to Striker (X-Axis)    | 185            |          | 286               |          |
| PHZ         | PHZ        | H-Point to Striker (Z-Axis)    | 153            |          | 292               |          |

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

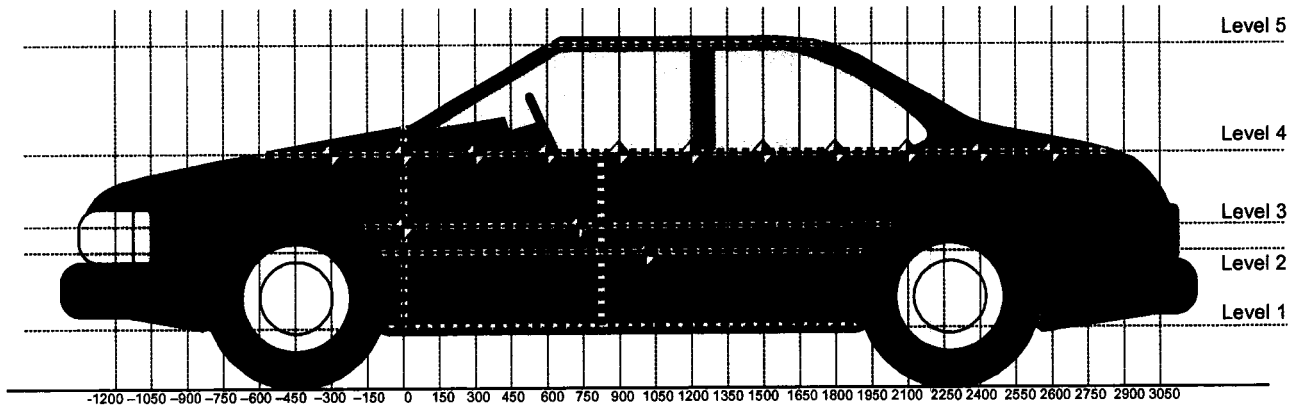
|               |                                |            |                    |
|---------------|--------------------------------|------------|--------------------|
| Test Vehicle: | 2007 Saturn Aura               | NHTSA No.  | C70103             |
| Test Program: | FMVSS 214 Indicant Side Impact | Test Date: | September 13, 2006 |

*FRONT VIEW OF DUMMY*

| Code            | Measurement Description          | Units | Driver<br>S/N 270 | Passenger<br>S/N 269 |
|-----------------|----------------------------------|-------|-------------------|----------------------|
| HR              | Head to Side Header              | mm    | 191               | 246                  |
| HS              | Head to Side Window              | mm    | 316               | 356                  |
| AD <sub>1</sub> | Arm to Door (at upper rib level) | mm    | 123               | 121                  |
| AD <sub>2</sub> | Arm to Door (at lower rib level) | mm    | 111               | 117                  |
| HD              | H-Point to Door                  | mm    | 139               | 165                  |

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

|                                                     |                                      |
|-----------------------------------------------------|--------------------------------------|
| Test Vehicle: <u>2007 Saturn Aura</u>               | NHTSA No. <u>C70103</u>              |
| Test Program: <u>FMVSS 214 Indicant Side Impact</u> | Test Date: <u>September 13, 2006</u> |



All Measurements Shown in mm

**LEFT SIDE VIEW**

Measurements are taken with vehicle in the as tested condition.  
Measurements along the vertical 750 mm.  
All measurements below in mm.

| Level | Measurement Description | Maximum Exterior Static Crush | Height Above Ground | Distance From Impact |
|-------|-------------------------|-------------------------------|---------------------|----------------------|
| 1     | Sill Top                | 32                            | 224                 | 150                  |
| 2     | Occupant H-Point        | 244                           | 471                 | 900                  |
| 3     | Mid Door                | 245                           | 607                 | 1500                 |
| 4     | Window Sill             | 272                           | 833                 | 1350                 |
| 5     | Window                  | 39                            | 1345                | 1050                 |
|       | Maximum Penetration     | 272                           |                     |                      |

# DATA SHEET NO. 10

## VEHICLE EXTERIOR CRUSH PROFILES

Test Vehicle: 2007 Saturn Aura

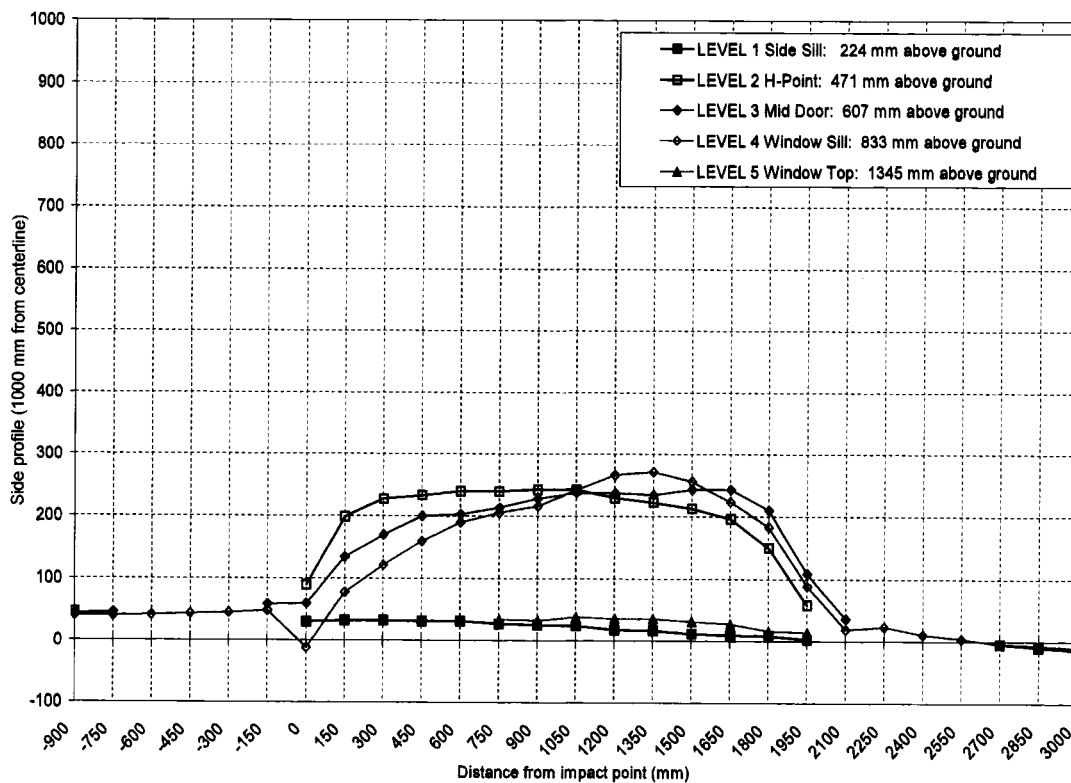
NHTSA No. C70103

Test Program: FMVSS 214 Indicant Side Impact

Test Date: September 13, 2006

NOTE: All dimensions are in millimeters with a tolerance of  $\pm 3$  mm

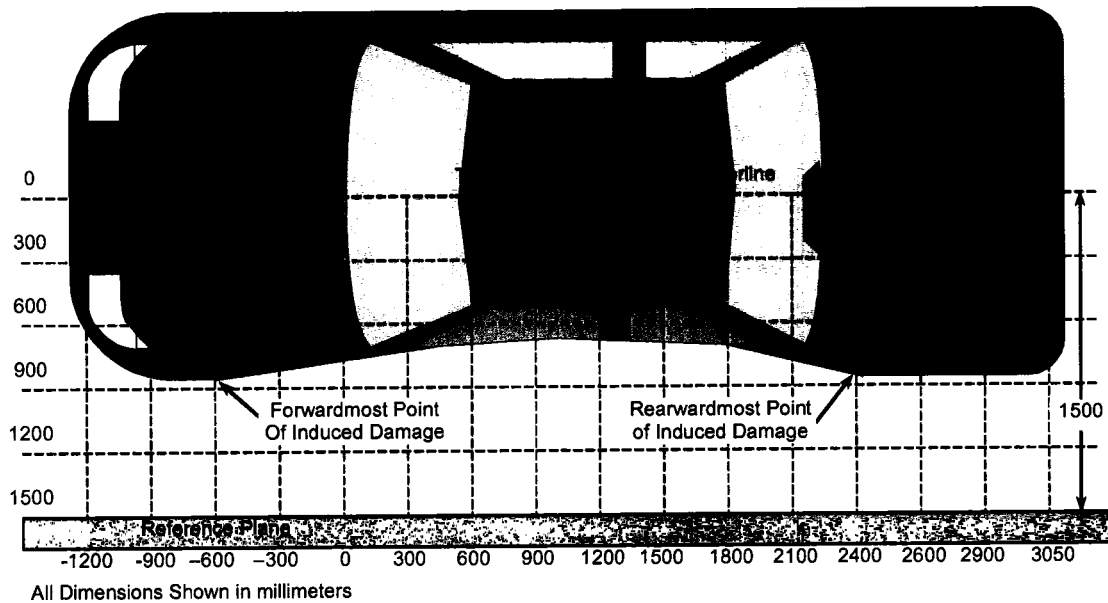
|                        |             |       | DISTANCE IN MILLIMETERS (mm) FROM IMPACT POINT |      |      |      |      |      |     |     |     |     |     |     |     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |
|------------------------|-------------|-------|------------------------------------------------|------|------|------|------|------|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|
| LEVEL                  | HEIGHT (mm) |       | -900                                           | -750 | -600 | -450 | -300 | -150 |     | 150 | 300 | 450 | 600 | 750 | 900 | 1050 | 1200 | 1350 | 1500 | 1650 | 1800 | 1950 | 2100 | 2250 | 2400 | 2550 | 2700 | 2850 | 3000 |     |
| LEVEL 1<br>SIDE SILL   | 224         | PRE   | -                                              | -    | -    | -    | -    | -    |     | 150 | 150 | 149 | 148 | 149 | 149 | 149  | 151  | 151  | 155  | 154  | 151  | 151  | -    | -    | -    | -    | -    | -    | -    |     |
|                        |             | POST  | -                                              | -    | -    | -    | -    | -    |     | 182 | 182 | 180 | 179 | 176 | 174 | 173  | 169  | 168  | 167  | 164  | 160  | 154  | -    | -    | -    | -    | -    | -    |      |     |
|                        |             | CRUSH | N/A                                            | N/A  | N/A  | N/A  | N/A  | N/A  |     | 32  | 32  | 31  | 31  | 27  | 25  | 24   | 18   | 17   | 12   | 10   | 9    | 3    | N/A  | N/A  | N/A  | N/A  | N/A  | N/A  | N/A  |     |
| LEVEL 2<br>H POINT     | 471         | PRE   | 162                                            | -    | -    | -    | -    | -    |     | 120 | 120 | 120 | 120 | 120 | 120 | 121  | 122  | 123  | 124  | 126  | 128  | 127  | -    | -    | -    | -    | 147  | 184  | 209  |     |
|                        |             | POST  | 208                                            | -    | -    | -    | -    | -    |     | 319 | 348 | 354 | 361 | 361 | 364 | 365  | 352  | 346  | 337  | 323  | 279  | 186  | -    | -    | -    | -    | 143  | 175  | 195  |     |
|                        |             | CRUSH | 46                                             | N/A  | N/A  | N/A  | N/A  | N/A  |     | 199 | 228 | 234 | 241 | 241 | 244 | 244  | 230  | 223  | 213  | 197  | 151  | 59   | N/A  | N/A  | N/A  | N/A  | -4   | -9   | -14  |     |
| LEVEL 3<br>MD DOOR     | 607         | PRE   | 164                                            | 125  | -    | -    | -    | 110  |     | 111 | 111 | 111 | 111 | 111 | 111 | 111  | 113  | 114  | 116  | 118  | 117  | 125  | 116  | -    | -    | -    | 154  | 181  | 205  |     |
|                        |             | POST  | 208                                            | 171  | -    | -    | -    | 169  |     | 246 | 282 | 311 | 314 | 325 | 340 | 350  | 352  | 350  | 361  | 363  | 328  | 235  | 153  | -    | -    | -    | 151  | 172  | 191  |     |
|                        |             | CRUSH | 44                                             | 46   | N/A  | N/A  | N/A  | 59   |     | 135 | 171 | 200 | 203 | 214 | 229 | 239  | 239  | 236  | 245  | 245  | 211  | 110  | 37   | N/A  | N/A  | N/A  | -3   | -9   | -14  |     |
| LEVEL 4<br>WINDOW SILL | 833         | PRE   | 273                                            | 221  | 194  | 174  | 161  | 151  |     | 138 | 135 | 131 | 128 | 126 | 97  | 123  | 124  | 125  | 126  | 128  | 131  | 136  | 139  | 146  | 154  | 164  | 178  | 196  | 220  |     |
|                        |             | POST  | 313                                            | 261  | 235  | 217  | 206  | 199  |     | 216 | 256 | 291 | 318 | 331 | 313 | 366  | 391  | 397  | 383  | 352  | 315  | 225  | 158  | 169  | 165  | 168  | 174  | 189  | 209  |     |
|                        |             | CRUSH | 40                                             | 40   | 41   | 43   | 45   | 48   |     | 78  | 121 | 160 | 190 | 205 | 216 | 243  | 267  | 272  | 257  | 224  | 184  | 89   | 19   | 23   | 11   | 4    | -4   | -7   | -11  |     |
| LEVEL 5<br>WINDOW TOP  | 1345        | PRE   | -                                              | -    | -    | -    | -    | -    |     | -   | -   | -   | -   | 403 | 399 | 400  | 400  | 401  | 404  | 406  | 418  | 442  | -    | -    | -    | -    | -    | -    | -    |     |
|                        |             | POST  | -                                              | -    | -    | -    | -    | -    |     | -   | -   | -   | -   | 437 | 432 | 439  | 436  | 437  | 436  | 434  | 435  | 457  | -    | -    | -    | -    | -    | -    | -    |     |
|                        |             | CRUSH | N/A                                            | N/A  | N/A  | N/A  | N/A  | N/A  | N/A | N/A | N/A | N/A | N/A | N/A | 34  | 33   | 39   | 36   | 36   | 32   | 28   | 17   | 15   | N/A  | N/A  | N/A  | N/A  | N/A  | N/A  | N/A |



## DATA SHEET NO. 11

### VEHICLE DAMAGE PROFILE DISTANCES

|                                                                                              |                                                                 |
|----------------------------------------------------------------------------------------------|-----------------------------------------------------------------|
| Test Vehicle: <u>2007 Saturn Aura</u><br>Test Program: <u>FMVSS 214 Indicant Side Impact</u> | NHTSA No. <u>C70103</u><br>Test Date: <u>September 13, 2006</u> |
|----------------------------------------------------------------------------------------------|-----------------------------------------------------------------|



**TOP VIEW**

### DAMAGE PROFILE DISTANCES

| DPD    | Distance from Impact Point in mm | Level | Pre-Test (mm) | Post-Test (mm) | Max Static Crush (mm) |
|--------|----------------------------------|-------|---------------|----------------|-----------------------|
| 1 (LR) | 2200                             | 833   | 144           | 165            | 21                    |
| 2      | 1730                             | 607   | 117           | 344            | 227                   |
| 3      | 1260                             | 833   | 124           | 393            | 269                   |
| 4      | 790                              | 471   | 120           | 362            | 242                   |
| 5      | 320                              | 471   | 120           | 349            | 229                   |
| 6 (LF) | -150                             | 607   | 110           | 169            | 59                    |

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

# DATA SHEET NO. 12

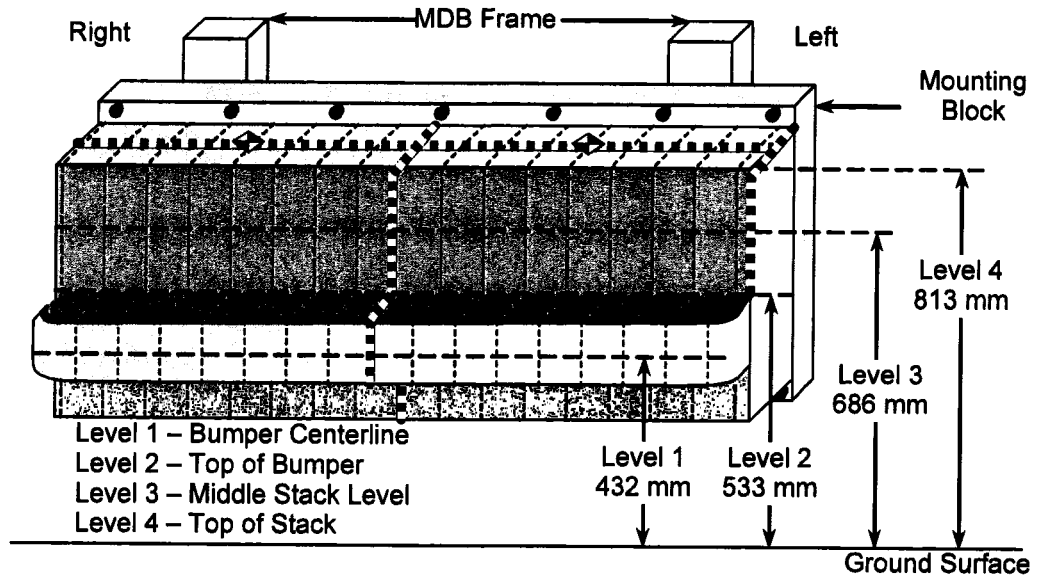
## DEFORMABLE BARRIER HONEYCOMB FACE STATIC CRUSH

Test Vehicle: 2007 Saturn Aura

NHTSA No. C70103

Test Program: FMVSS 214 Indicant Side Impact

Test Date: September 13, 2006



NOTE: All dimensions are in millimeters with a tolerance of  $\pm 3$  mm

|                          |                    |       | DISTANCE RIGHT OF CENTER (mm) |     |     |     |     |     |     |     |     |     |     | DISTANCE LEFT OF CENTER (mm) |     |     |     |     |     |  |  |  |  |
|--------------------------|--------------------|-------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------------------------------|-----|-----|-----|-----|-----|--|--|--|--|
| LEVEL                    | HEIGHT AT CL (mm)* |       | 800                           | 700 | 600 | 500 | 400 | 300 | 200 | 100 | 0   | 100 | 200 | 300                          | 400 | 500 | 600 | 700 | 800 |  |  |  |  |
| LEVEL 4<br>TOP<br>STACK  | 813                | PRE   | 619                           | 619 | 619 | 619 | 619 | 619 | 619 | 619 | 619 | 619 | 619 | 619                          | 619 | 619 | 619 | 619 | 619 |  |  |  |  |
|                          |                    | POST  | 680                           | 643 | 618 | 619 | 621 | 629 | 648 | 640 | 619 | 651 | 654 | 662                          | 669 | 676 | 698 | 723 | 752 |  |  |  |  |
|                          |                    | CRUSH | 61                            | 24  | -1  | 0   | 2   | 10  | 29  | 21  | 619 | 32  | 35  | 43                           | 50  | 57  | 79  | 104 | 133 |  |  |  |  |
| LEVEL 3<br>MID<br>LEVEL  | 686                | PRE   | 619                           | 619 | 619 | 619 | 619 | 619 | 619 | 619 | 619 | 619 | 619 | 619                          | 619 | 619 | 619 | 619 | 619 |  |  |  |  |
|                          |                    | POST  | 668                           | 645 | 642 | 642 | 644 | 648 | 660 | 655 | 619 | 640 | 641 | 642                          | 649 | 661 | 677 | 701 | 733 |  |  |  |  |
|                          |                    | CRUSH | 49                            | 26  | 23  | 23  | 25  | 29  | 41  | 36  | 619 | 21  | 22  | 23                           | 30  | 42  | 58  | 82  | 114 |  |  |  |  |
| LEVEL 2<br>TOP<br>BUMPER | 533                | PRE   | 619                           | 619 | 619 | 619 | 619 | 619 | 619 | 619 | 619 | 619 | 619 | 619                          | 619 | 619 | 619 | 619 | 619 |  |  |  |  |
|                          |                    | POST  | 764                           | 759 | 752 | 745 | 740 | 736 | 730 | 732 | 619 | 721 | 717 | 714                          | 712 | 706 | 706 | 705 | 718 |  |  |  |  |
|                          |                    | CRUSH | 145                           | 140 | 133 | 126 | 121 | 117 | 111 | 113 | 619 | 102 | 98  | 95                           | 93  | 87  | 87  | 86  | 99  |  |  |  |  |
| LEVEL 1<br>MID<br>BUMPER | 432                | PRE   | 535                           | 519 | 518 | 518 | 518 | 518 | 518 | 518 | 518 | 518 | 518 | 518                          | 518 | 518 | 518 | 519 | 535 |  |  |  |  |
|                          |                    | POST  | 703                           | 679 | 665 | 659 | 656 | 665 | 672 | 666 | 518 | 660 | 655 | 651                          | 648 | 645 | 642 | 641 | 653 |  |  |  |  |
|                          |                    | CRUSH | 168                           | 160 | 147 | 141 | 138 | 147 | 154 | 148 | 518 | 142 | 137 | 133                          | 130 | 127 | 124 | 122 | 118 |  |  |  |  |

\*Heights measured above ground level.

# DATA SHEET NO. 13

## VEHICLE ACCELEROMETER LOCATIONS

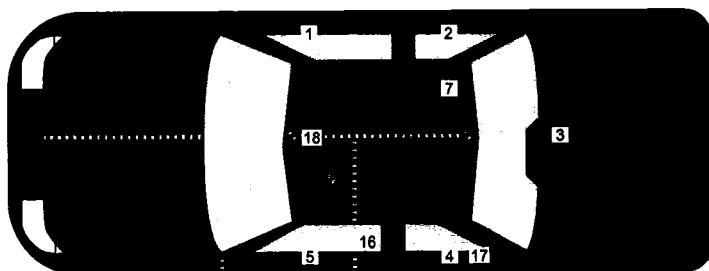
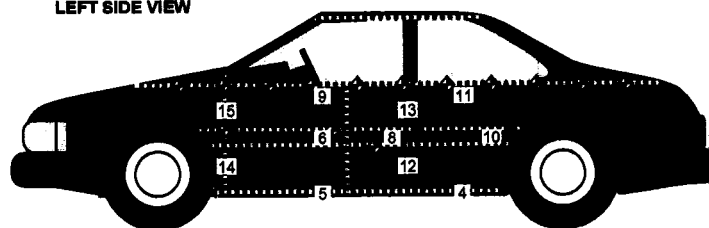
Test Vehicle: 2007 Saturn Aura

NHTSA No. C70103

Test Program: FMVSS 214 Indicant Side Impact

Test Date: September 13, 2006

LEFT SIDE VIEW



| Loc. No. | Accelerometer Location       | Measurements (mm) |      |      |
|----------|------------------------------|-------------------|------|------|
|          |                              | X                 | Y    | Z    |
| 1        | Right Sill at Front Seat     | 3199              | 676  | -526 |
| 2        | Right Sill at Rear Seat      | 2248              | 673  | -542 |
| 3        | Rear Floorpan Above Axle     | 903               | -161 | -238 |
| 4        | Left Sill at Rear Door       | 2234              | -671 | -558 |
| 5        | Left Sill at Front Door      | 3225              | -672 | -541 |
| 6        | Left Front Door C/L **       | -                 | -    | -    |
| 7        | Rear Occupant Compartment    | 2107              | -460 | -608 |
| 8        | Left Front Door Mid-Rear**   | -                 | -    | -    |
| 9        | Left Front Door Upper C/L**  | -                 | -    | -    |
| 10       | Left Rear Door Mid-Rear**    | -                 | -    | -    |
| 11       | Left Rear Door Upper C/L**   | -                 | -    | -    |
| 12       | Left Lower B-Post            | 2243              | -679 | -422 |
| 13       | Left Middle B-Post           | 2212              | -681 | -194 |
| 14       | Left Lower A-Post            | 3290              | -644 | -466 |
| 15       | Left Middle A-Post           | 3315              | -672 | 158  |
| 16       | Front Seat Track             | 2404              | -571 | -523 |
| 17       | Rear Seat Track or Structure | 1224              | -587 | -215 |
| 18       | Vehicle CG                   | 2642              | -9   | -387 |

Reference Points X - Test Vehicle Rear Bumper (+ forward)

Y - Test Vehicle Centerline (+ to right)

Z - Ground Plane (+ down)

\*\* Accelerometer was not requested by the COTR.

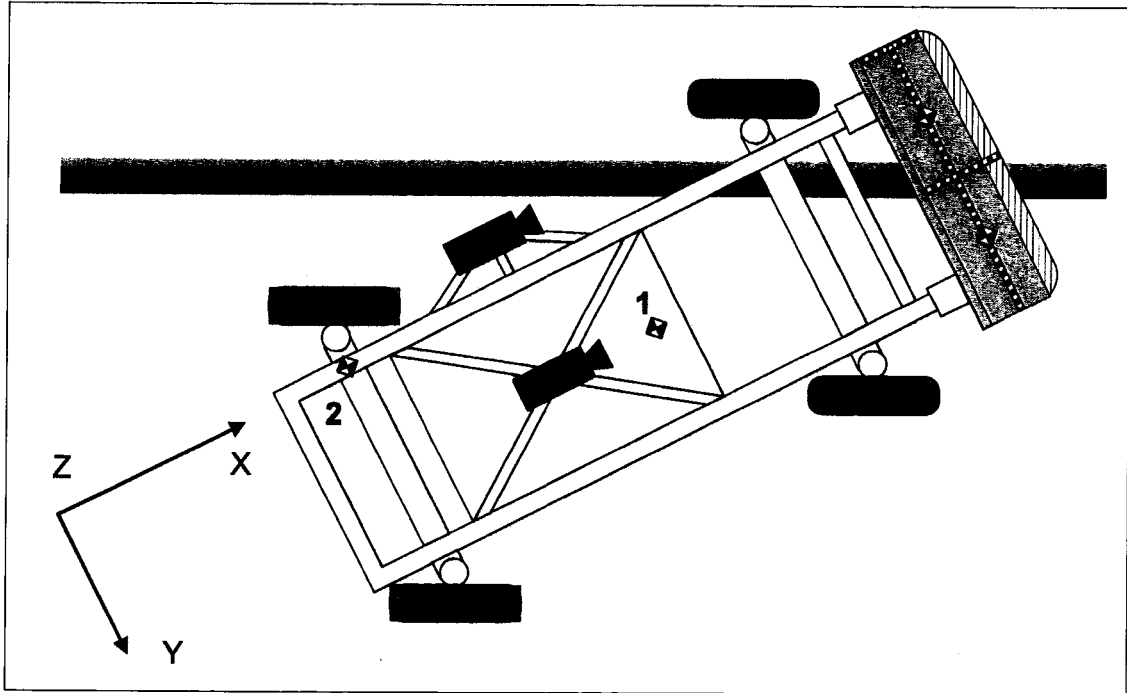
**DATA SHEET NO. 14****MDB ACCELEROMETER LOCATIONS**

Test Vehicle: 2007 Saturn Aura

NHTSA No. C70103

Test Program: FMVSS 214 Indicant Side Impact

Test Date: September 13, 2006



| Loc. No. | Accelerometer Location | Measurements (mm) |      |      |
|----------|------------------------|-------------------|------|------|
|          |                        | X                 | Y    | Z    |
| 1        | MDB CG                 | 1859              | 0    | -330 |
| 2        | MDB Rear               | 386               | -660 | -660 |

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

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

Test Vehicle: 2007 Saturn Aura NHTSA No. C70103  
Test Program: FMVSS 214 Indicant Side Impact Test Date: September 13, 2006

|    | Elements                              | Pre-Test (mm) |
|----|---------------------------------------|---------------|
| 1  | Total Length                          | 4838          |
| 2  | Total Width                           | 1754          |
| 3  | Bumper Top Height                     | 510           |
| 4  | Bumper Bottom Height                  | 381           |
| 5  | Longitudinal Member Top Height        | 565           |
| 6  | Distance between Longitudinal Members | 1058          |
| 7  | Longitudinal Member Width             | 95            |
| 8  | Engine Top Height                     | 880           |
| 9  | Engine Bottom Height                  | 211           |
| 10 | Engine and gearbox width              | 675           |
| 11 | Front bumper-engine distance          | 529           |
| 12 | Front shock absorber fixing height    | 863           |
| 13 | Bonnet leading edge height            | 728           |
| 14 | Front shock absorber fixing width     | 1136          |
| 15 | Front bumper – front axle distance    | 971           |
| 16 | Front axle – a pillar distance        | 491           |
| 17 | A-pillar – B-pillar distance          | 1087          |
| 18 | B-Pillar – rear axle distance         | 1275          |
| 19 | B-pillar – C-pillar distance          | 1154          |
| 20 | Roof sill bottom height               | 1310          |
| 21 | Roof sill top height                  | 1407          |
| 22 | Floor sill bottom height              | 258           |
| 23 | Floor sill top height                 | 354           |

# DATA SHEET NO. 16

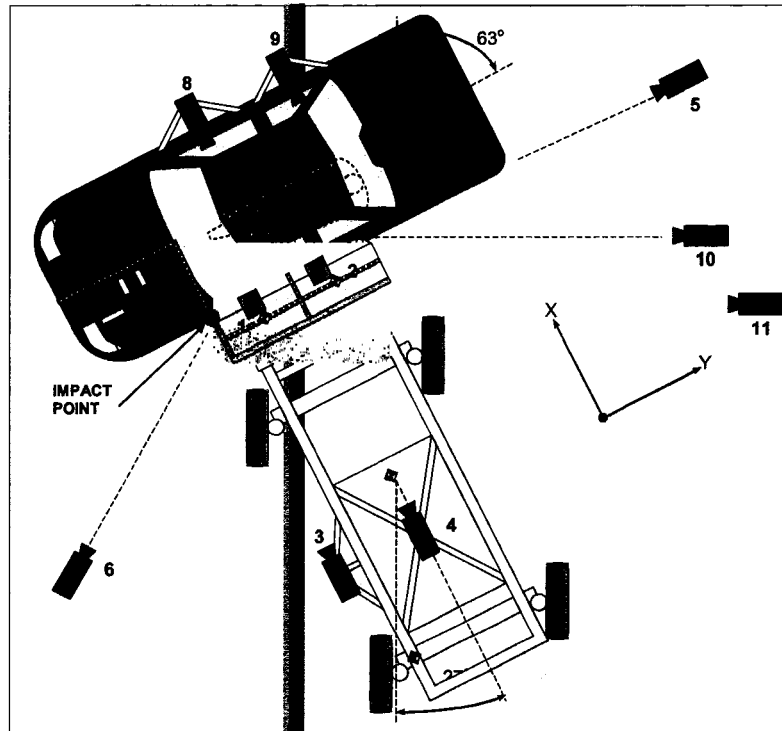
## HIGH SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2007 Saturn Aura

NHTSA No. C70103

Test Program: FMVSS 214 Indicant Side Impact

Test Date: September 13, 2006



| No. | Camera View                           | Location (mm) |       |       | Angle (deg) | Lens (mm) | Film Speed (fps) |
|-----|---------------------------------------|---------------|-------|-------|-------------|-----------|------------------|
|     |                                       | X             | Y     | Z     |             |           |                  |
| 1   | Overhead Close-up                     | 72            | 812   | -4880 | -90         | 8         | 500              |
| 2   | Overhead Overall                      | 195           | 855   | -4880 | -90         | 28        | 500              |
| 3   | MDB Onboard, Impact Point Close-up    | -1470         | 0     | -847  | 0           | 13        | 500              |
| 4   | MDB Onboard, Centerline of Impact     | -1140         | 838   | -1587 | -17         | 7.5       | 500              |
| 5   | Right Side, Ground Level, Overall     | 296           | 10133 | -1084 | -3.6        | 50        | 500              |
| 6   | Left Side, Ground Level, Overall      | -2166         | 1833  | -1016 | -6.0        | 28        | 500              |
| 7   | Vehicle Onboard Front SID/HIII, Front | 526           | -575  | -1203 | -6.5        | 25        | 1000             |
| 8   | Vehicle Onboard Front SID/HIII, Side  | 1618          | 1680  | -1023 | -6.2        | 12.5      | 1000             |
| 9   | Vehicle Onboard Rear SID/HIII, Side   | 1548          | 1642  | -1040 | -11.0       | 12.5      | 1000             |
| 10  | Secondary Impact Point                | -             | -     | -     | -           | 25        | 500              |
| 11  | Real Time Coverage                    |               |       |       |             |           | 30               |

Reference Points

X - Impact Line

Y - MDB Left Edge Impact Point

Z - Ground Plane

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

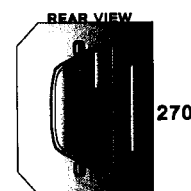
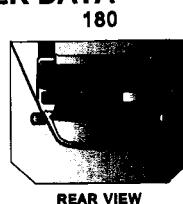
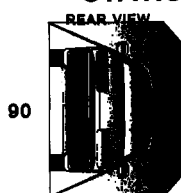
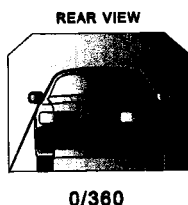
Test Vehicle: 2007 Saturn Aura NHTSA No. C70103  
 Test Program: FMVSS 214 Indicant Side Impact Test Date: September 13, 2006

**FUEL SYSTEM INTEGRITY POST IMPACT DATA**

| Time Interval                       | FMVSS 301 Maximum Allowable Spillage | Spillage (g) |
|-------------------------------------|--------------------------------------|--------------|
| Impact Until Motion Ceases          | 28 g                                 | 0            |
| First Five Minutes Following Impact | 142 g                                | 0            |
| Next 25 Minutes                     | 28 g / 1 minute                      | 0            |

|                      |      |
|----------------------|------|
| Spillage Location(s) | None |
|----------------------|------|

**STATIC ROLLOVER DATA**



| Rollover Stage | Rotation Time (spec. 1 -3 min) |         |    |         | FMVSS 301 Hold Time |         | Total Time |         |    |         | Next Whole Minute Interval |         |
|----------------|--------------------------------|---------|----|---------|---------------------|---------|------------|---------|----|---------|----------------------------|---------|
| 0° - 90°       | 1                              | minutes | 9  | seconds | 5                   | minutes | 6          | minutes | 9  | seconds | 7                          | minutes |
| 90° - 180°     | 1                              | minutes | 12 | seconds | 5                   | minutes | 6          | minutes | 12 | seconds | 7                          | minutes |
| 180°-270°      | 1                              | minutes | 15 | seconds | 5                   | minutes | 6          | minutes | 15 | seconds | 7                          | minutes |
| 270°-360°      | 1                              | minutes | 10 | seconds | 5                   | minutes | 6          | minutes | 10 | seconds | 7                          | minutes |

| Rollover Stage                                   | Spillage (g)                        |                      |                      |                                    |
|--------------------------------------------------|-------------------------------------|----------------------|----------------------|------------------------------------|
|                                                  | First 5 min. from onset of rotation | 6 <sup>th</sup> min. | 7 <sup>th</sup> min. | 8 <sup>th</sup> min. (if required) |
| 0° - 90°                                         | 0                                   | 0                    | 0                    | 0                                  |
| 90° - 180°                                       | 0                                   | 0                    | 0                    | 0                                  |
| 180°-270°                                        | 0                                   | 0                    | 0                    | 0                                  |
| 270°-360°                                        | 0                                   | 0                    | 0                    | 0                                  |
| FMVSS 301 Maximum Allowable (for each 90° stage) | 142                                 | 28                   | 28                   | 28                                 |

| Rollover Stage | Spillage Location(s) |
|----------------|----------------------|
| 0° - 90°       | None                 |
| 90° - 180°     | None                 |
| 180°-270°      | None                 |
| 270°-360°      | None                 |

**APPENDIX A**  
**PHOTOGRAPHS**

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**Figure A-1: As Received Left Front  $\frac{3}{4}$  View**



**Figure A-2: As Received Right Rear  $\frac{3}{4}$  View**

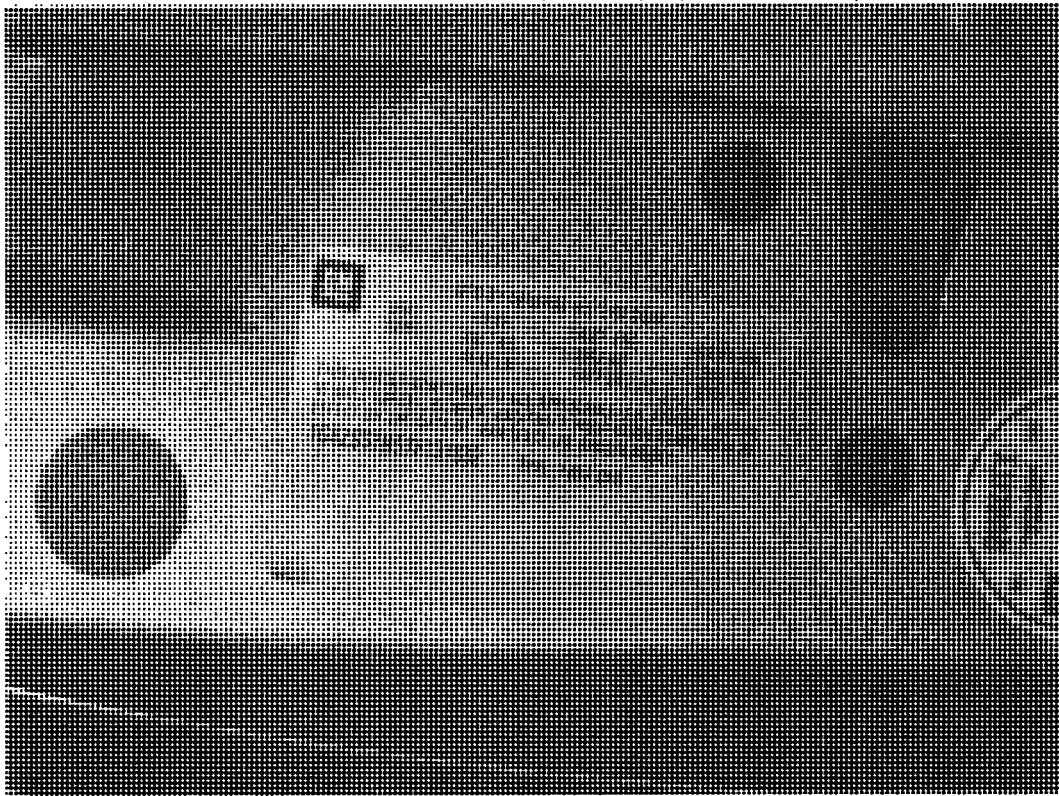


Figure A-3: Vehicle Certification Label

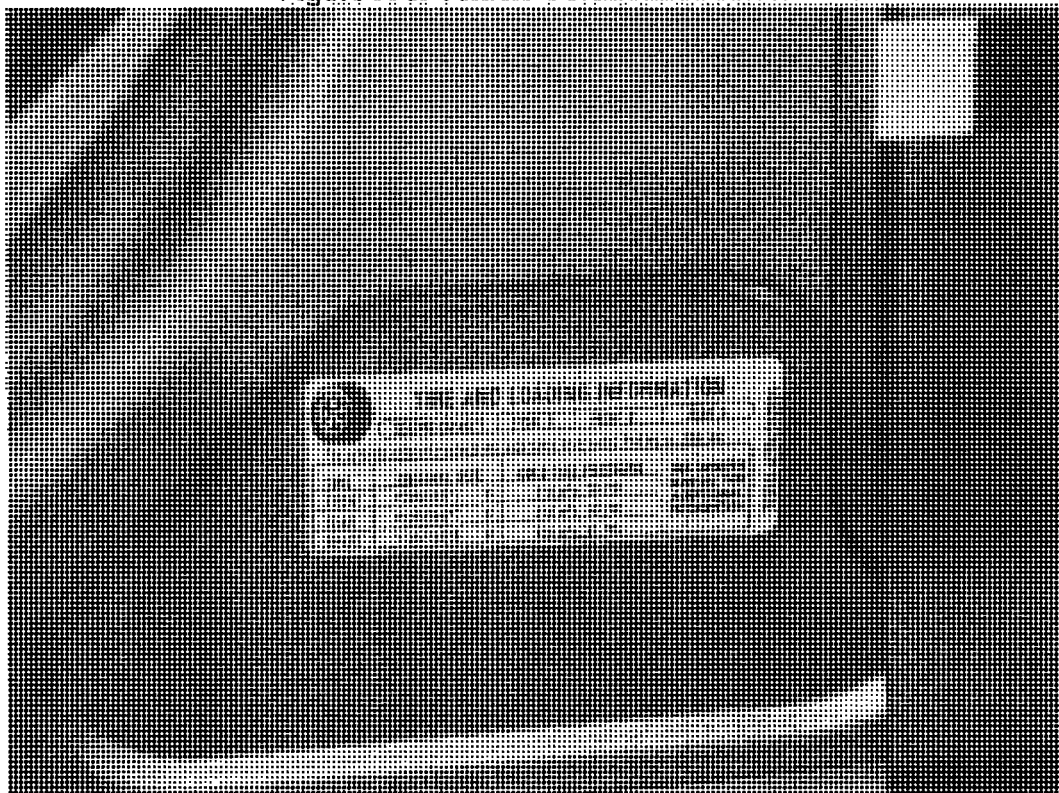


Figure A-4: Vehicle Tire Placard Label

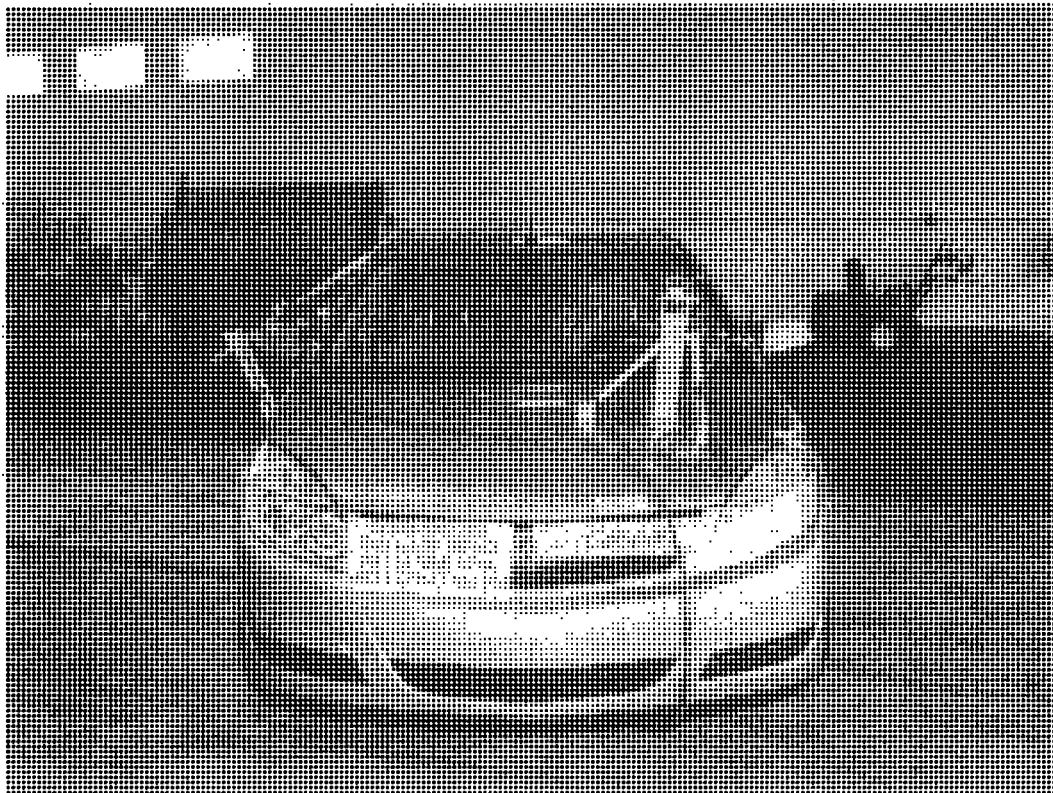


Figure A-5: Pre-Test Front View

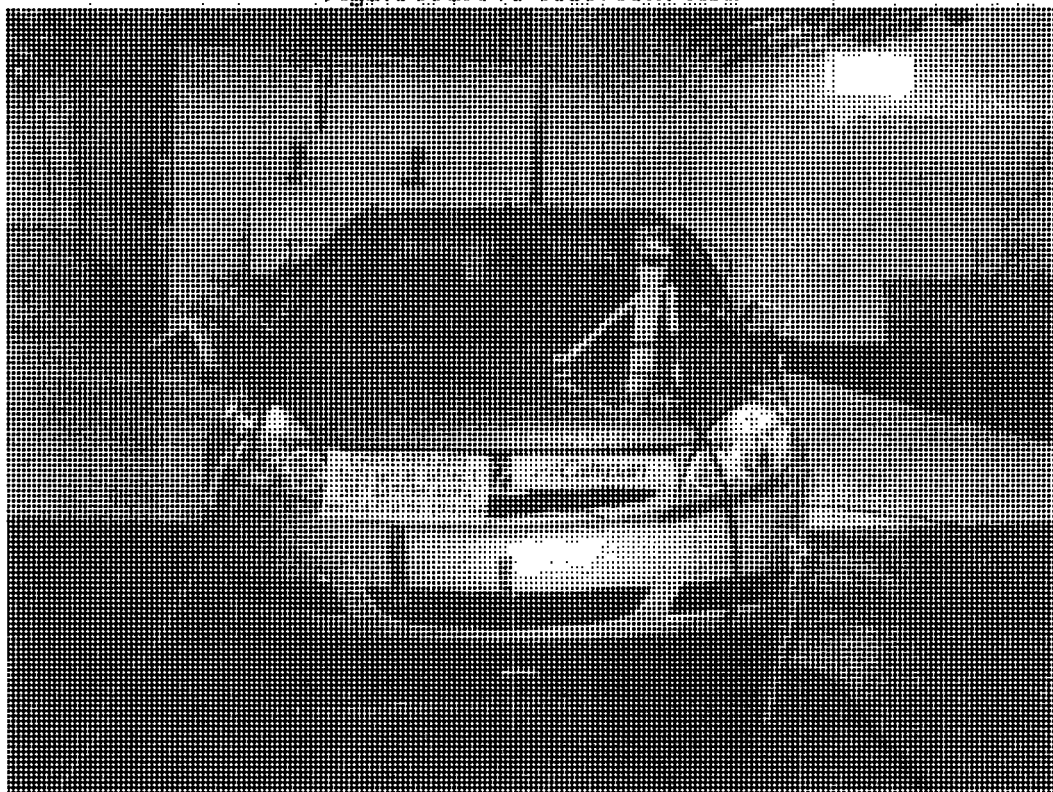


Figure A-6: Post-Test Front View

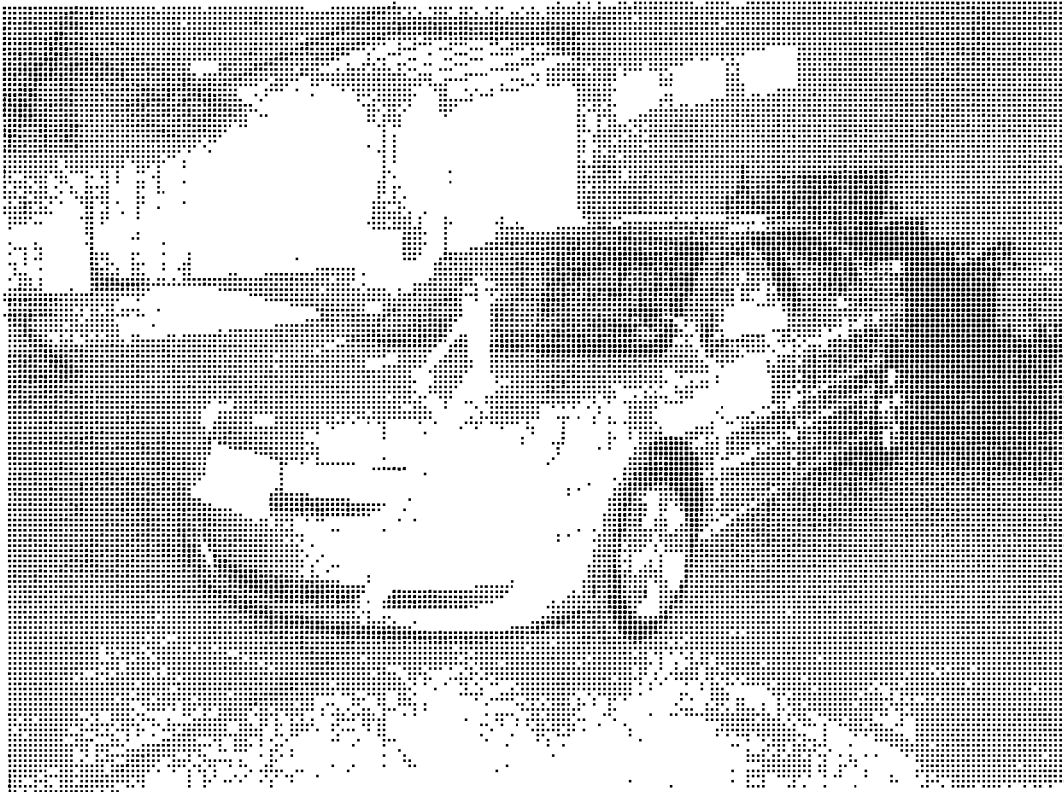


Figure A-7: Fuel Line Fuel Line View

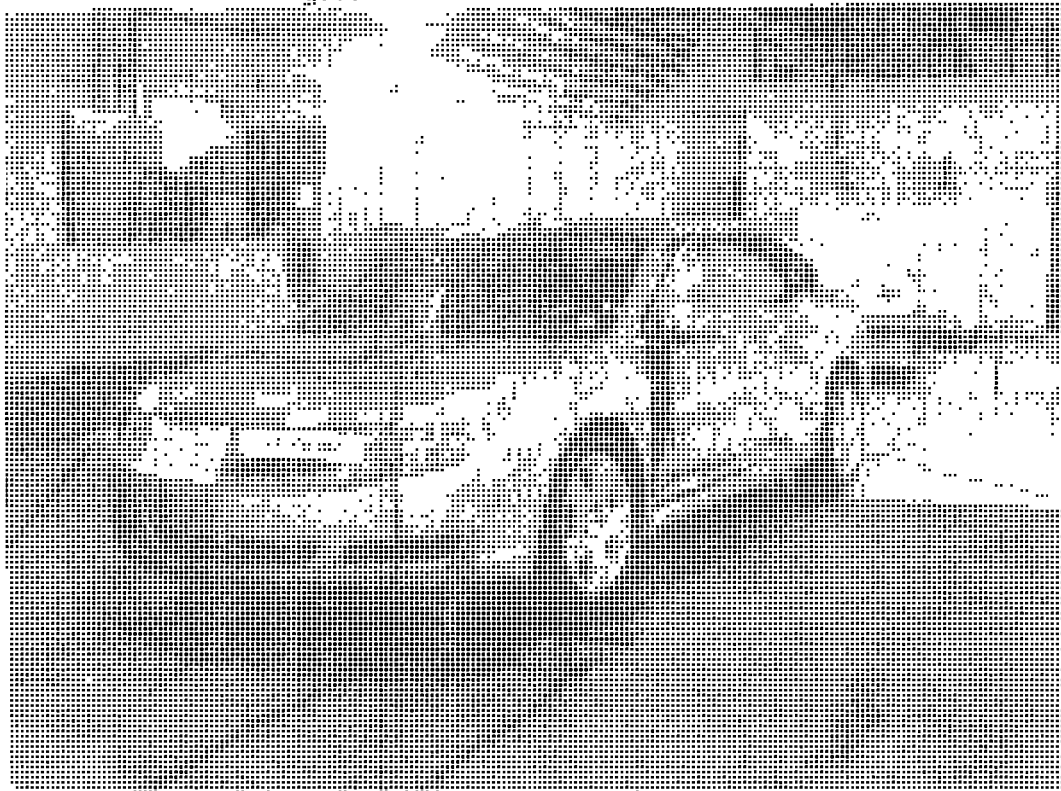


Figure A-8: Fuel Line Fuel Line View

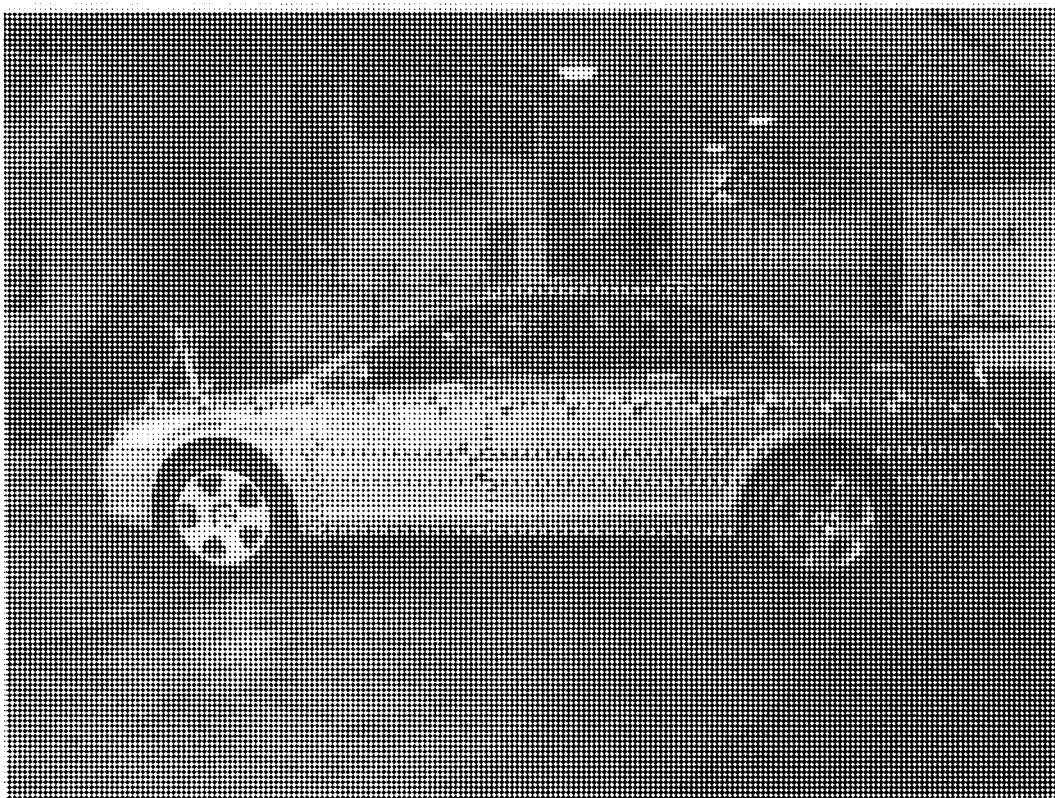


Figure A-9: Pre-Test Left Side View

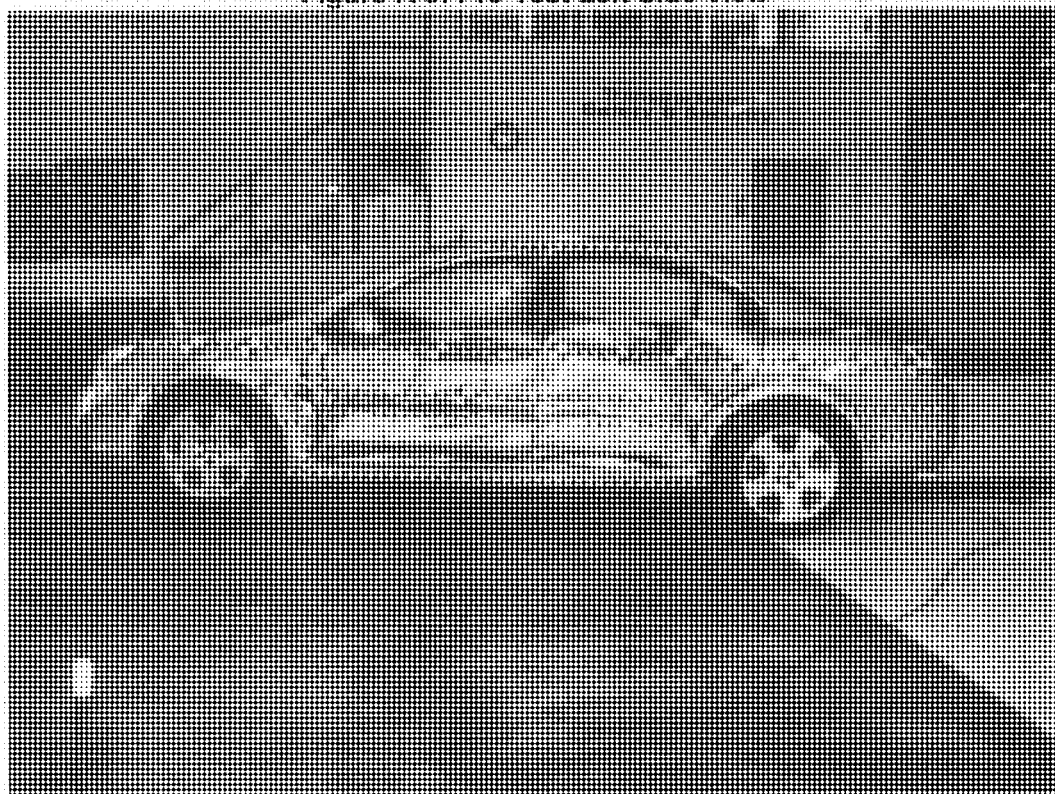


Figure A-10: Post-Test Left Side View

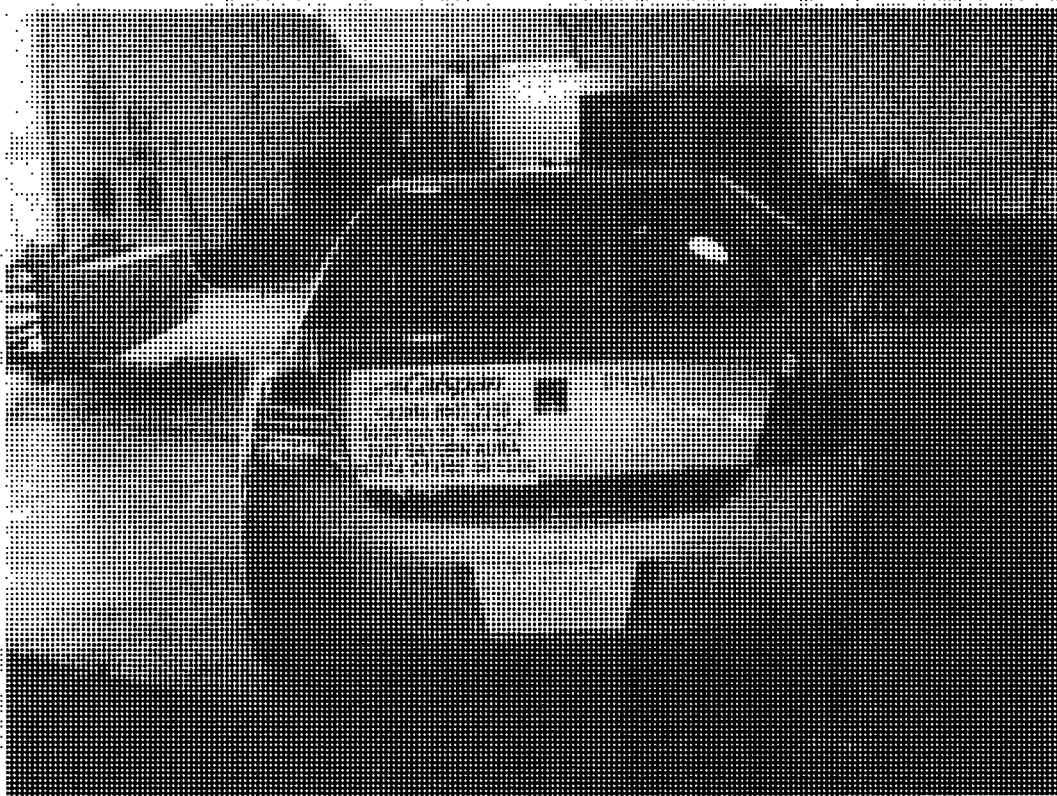


Figure A-13: Pre-Test Rear View

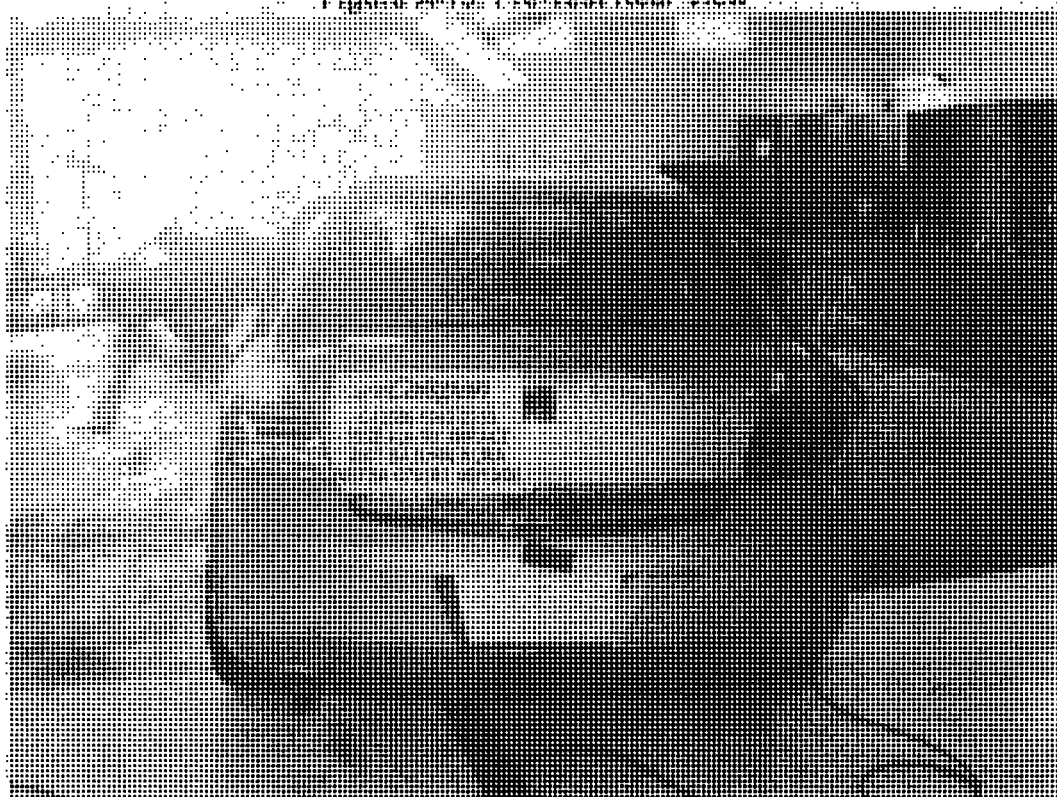


Figure A-14: Post-Test Rear View

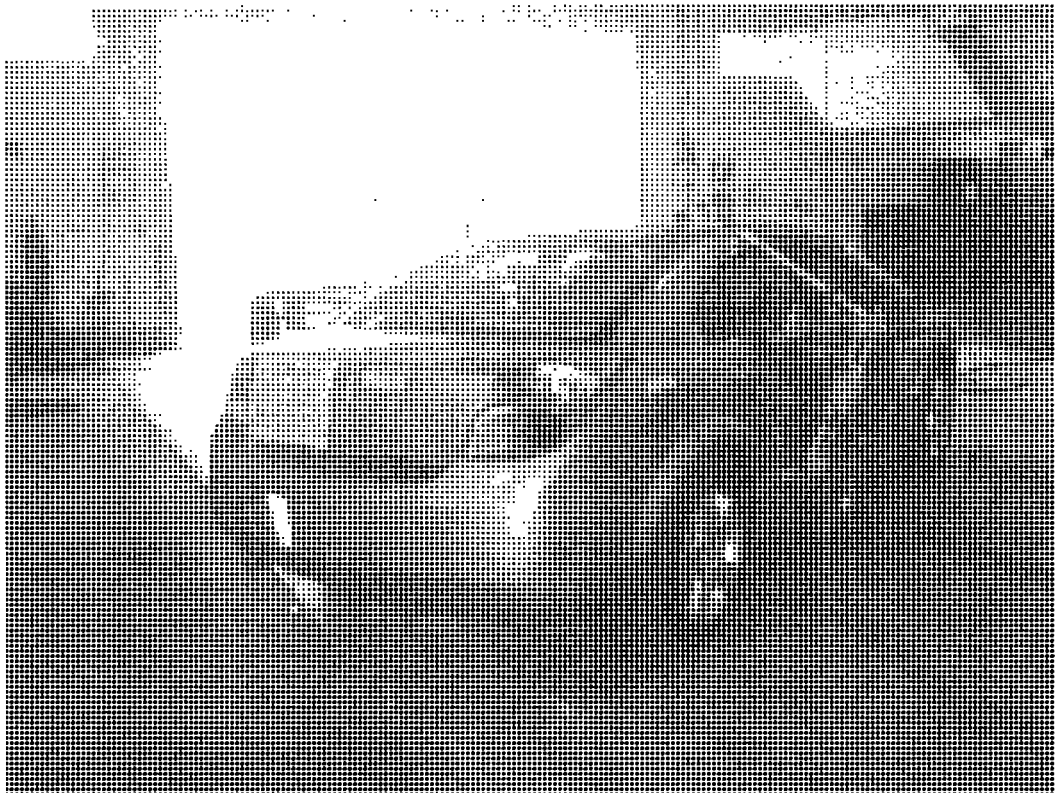


Figure A-15: Pre-Test Right Rear 3/4 View

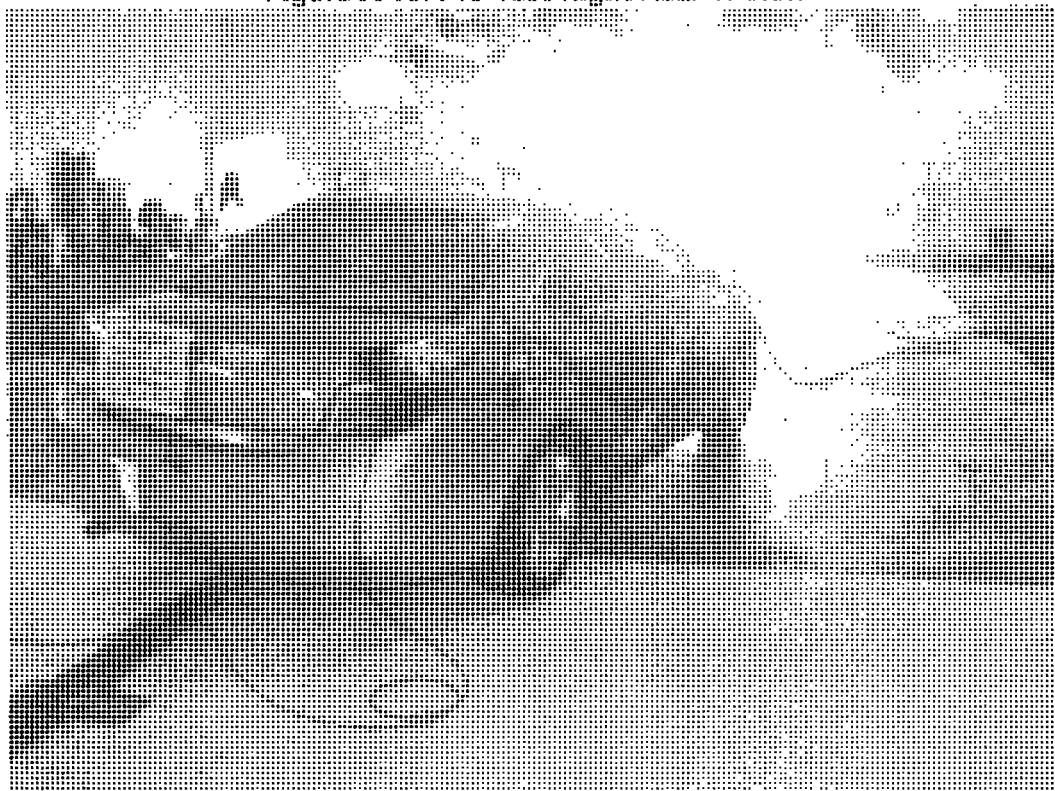


Figure A-16: Post-Test Right Rear 3/4 View

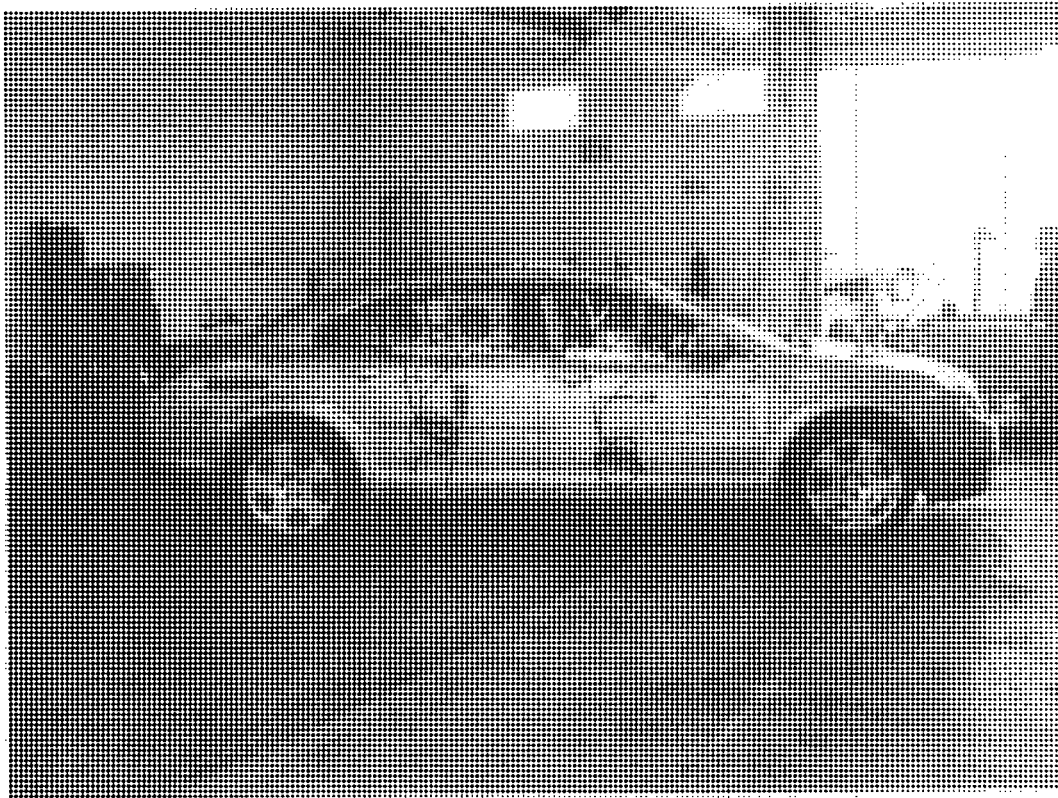


Figure A-17: Pre-Test Right Side View

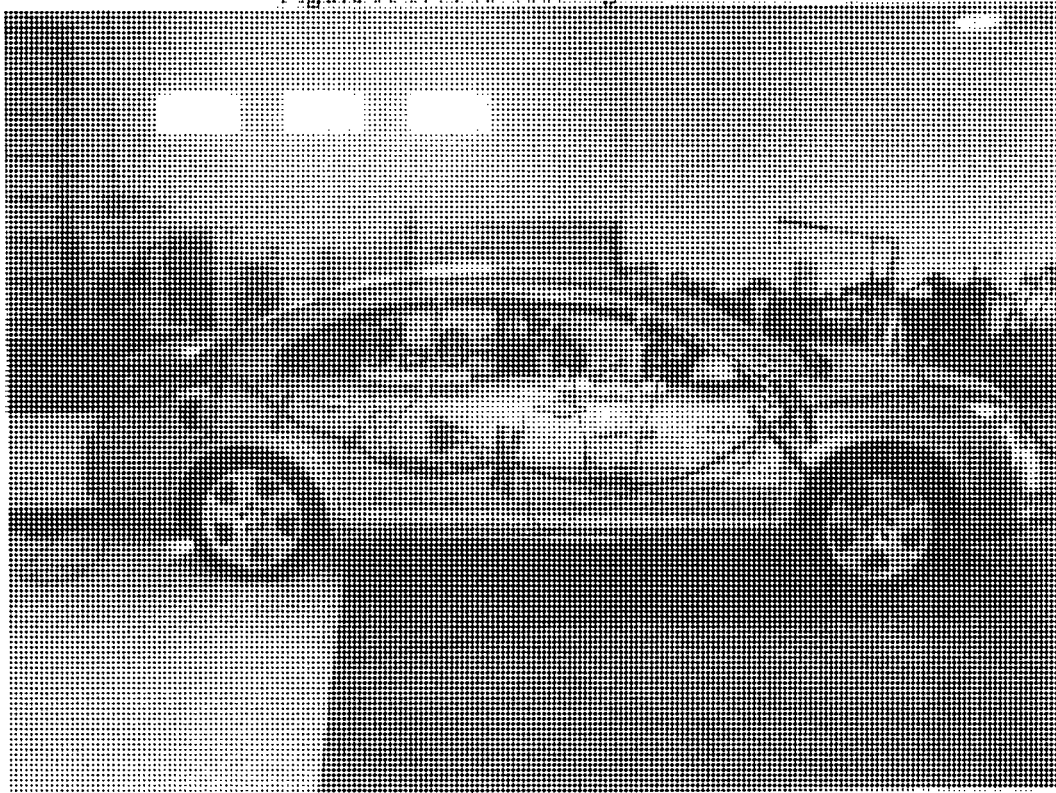


Figure A-18: Post-Test Right Side View

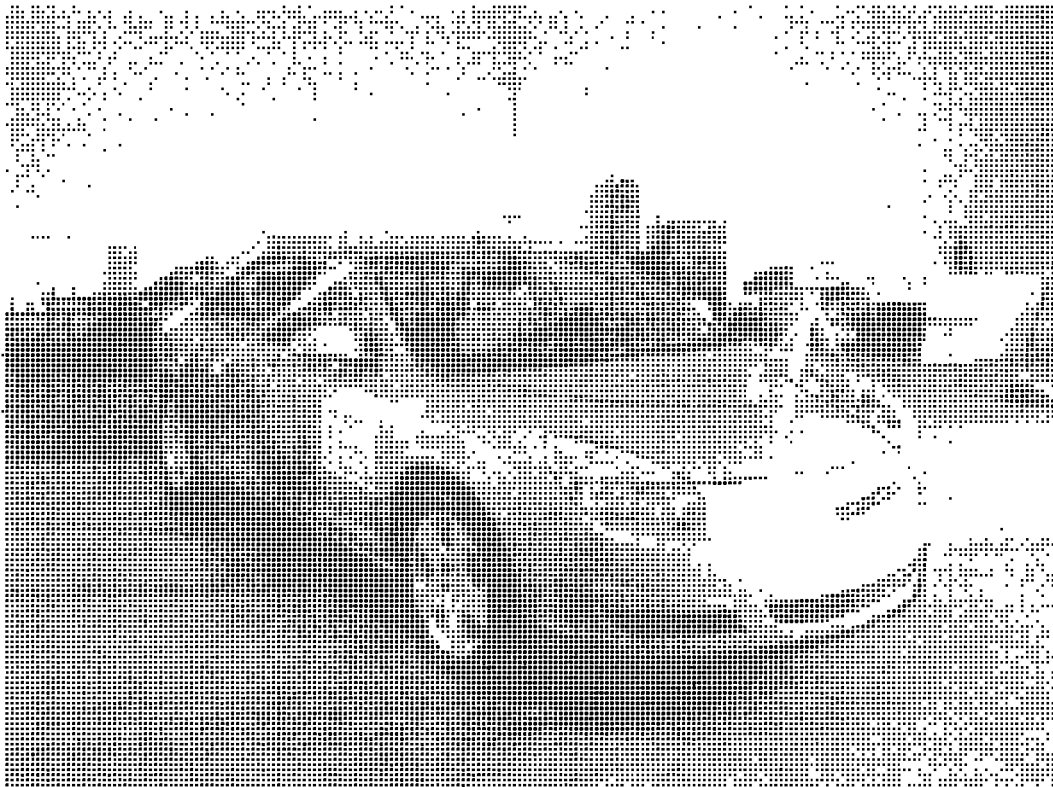


Figure A-18: Pre-Test Right Front View

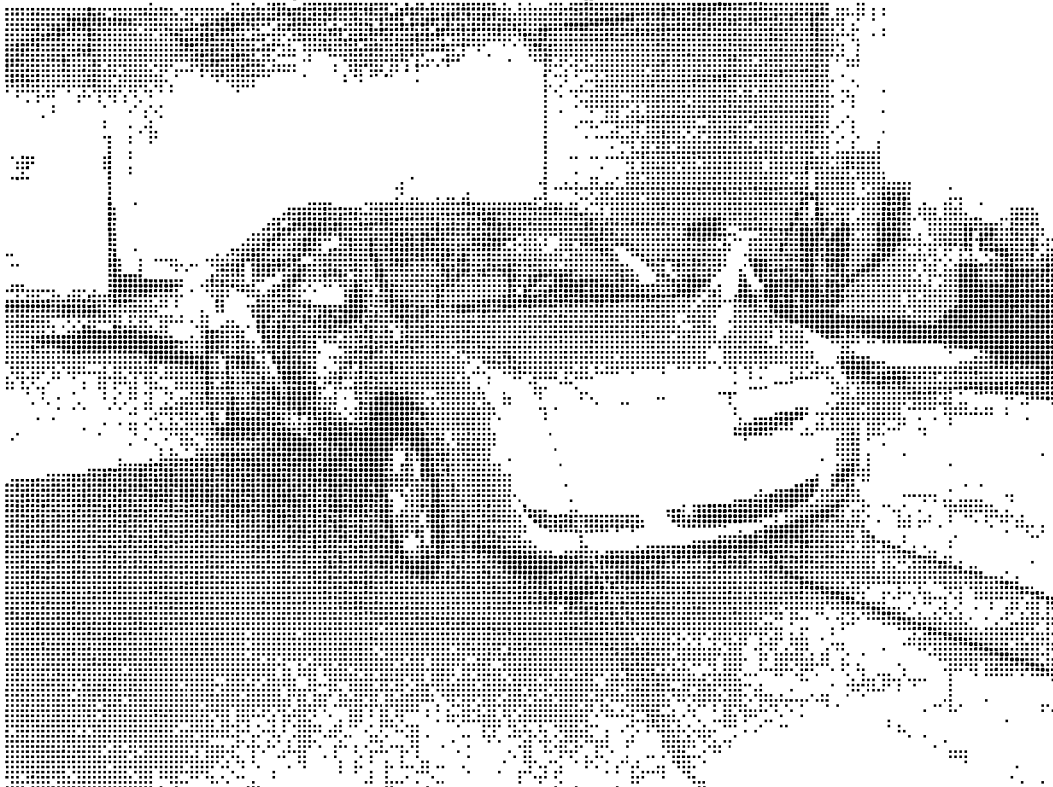


Figure A-23: Post-Test Right Front View

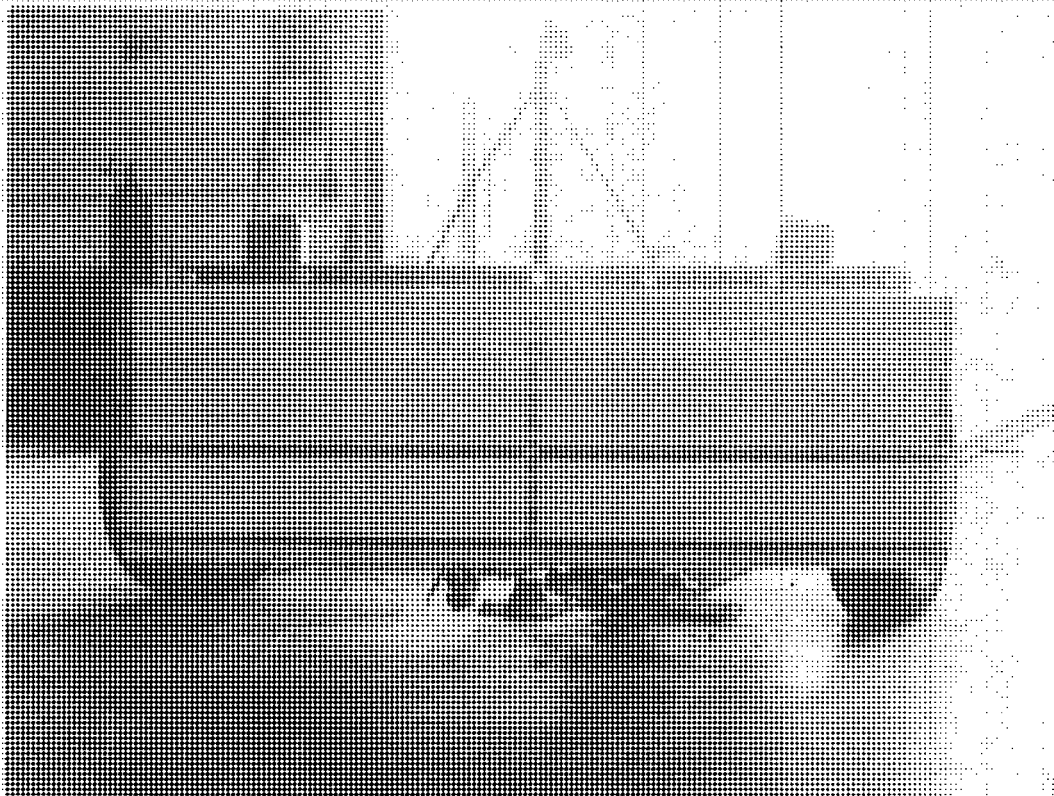


Figure A-21: Pre-Test Frontal View of MDB Impactor Face

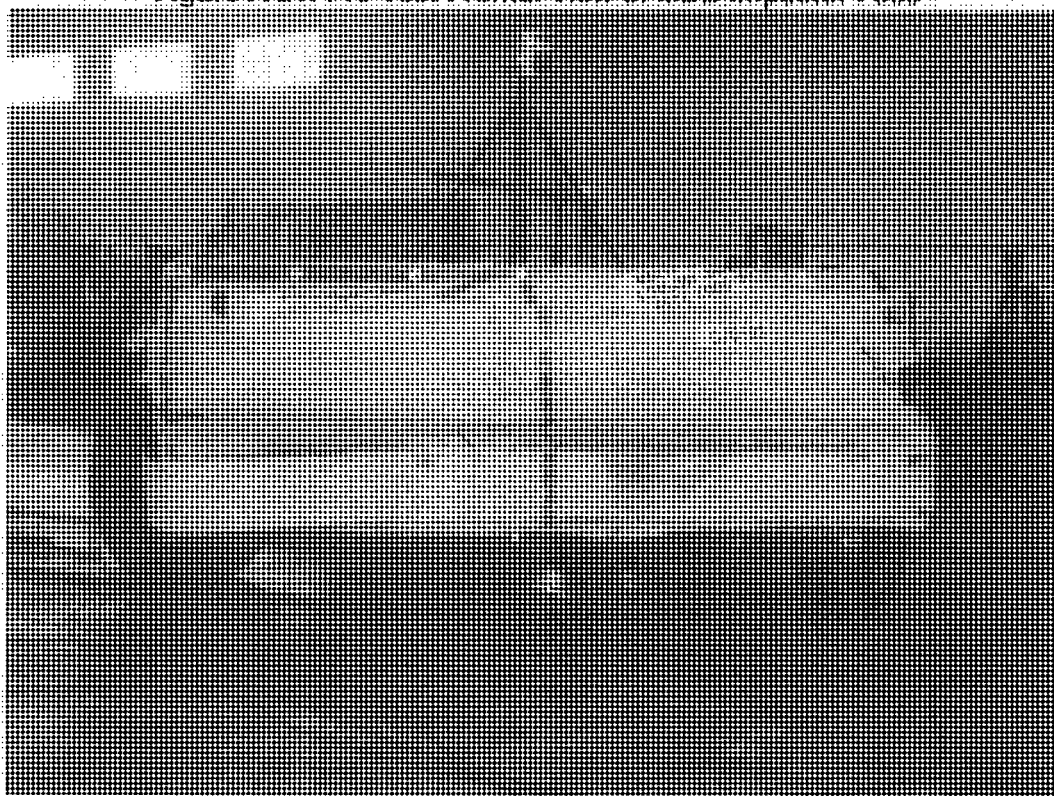


Figure A-22: Post-Test Frontal View of MDB Impactor Face

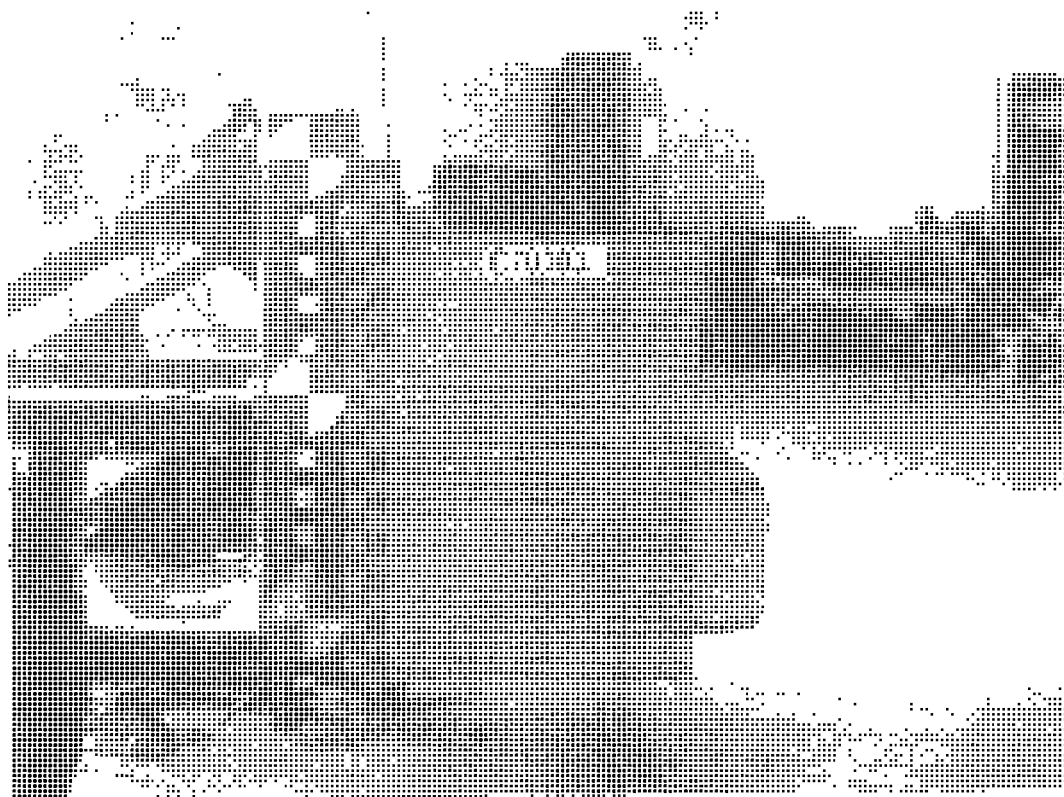


Figure A-22 Post-Test LCH Dam View - IMDB Inspector's View

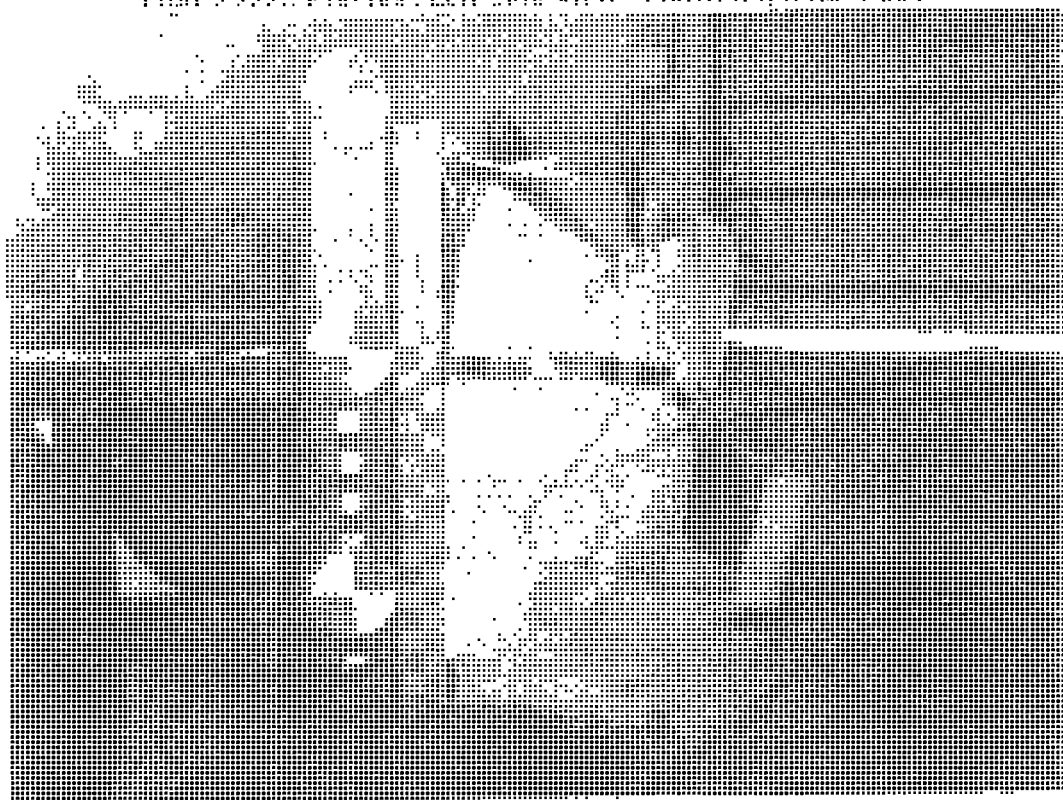


Figure A-23 Post-Test IMDB View of MDC Inside Face

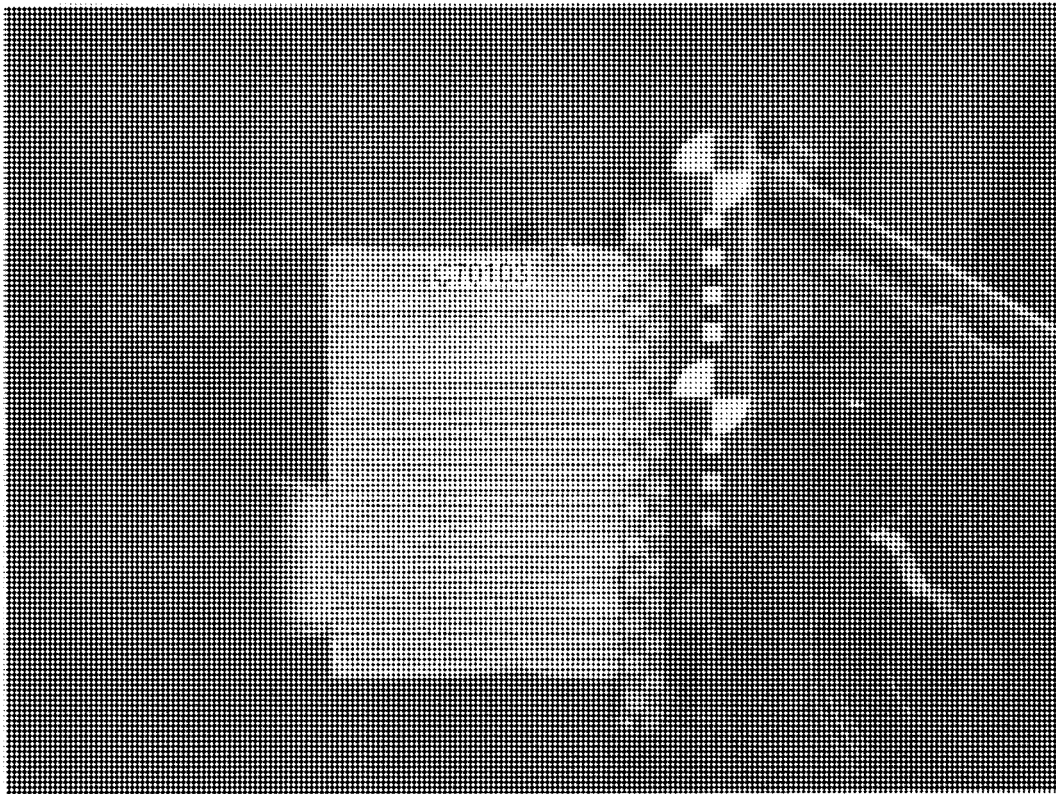


Figure A-25: Pre-Test Right Side View of MDB Impactor Face



Figure A-26: Post-Test Right Side View of MDB Impactor Face



Figure A-27: Pre-Test Top View of MDB Impactor Face

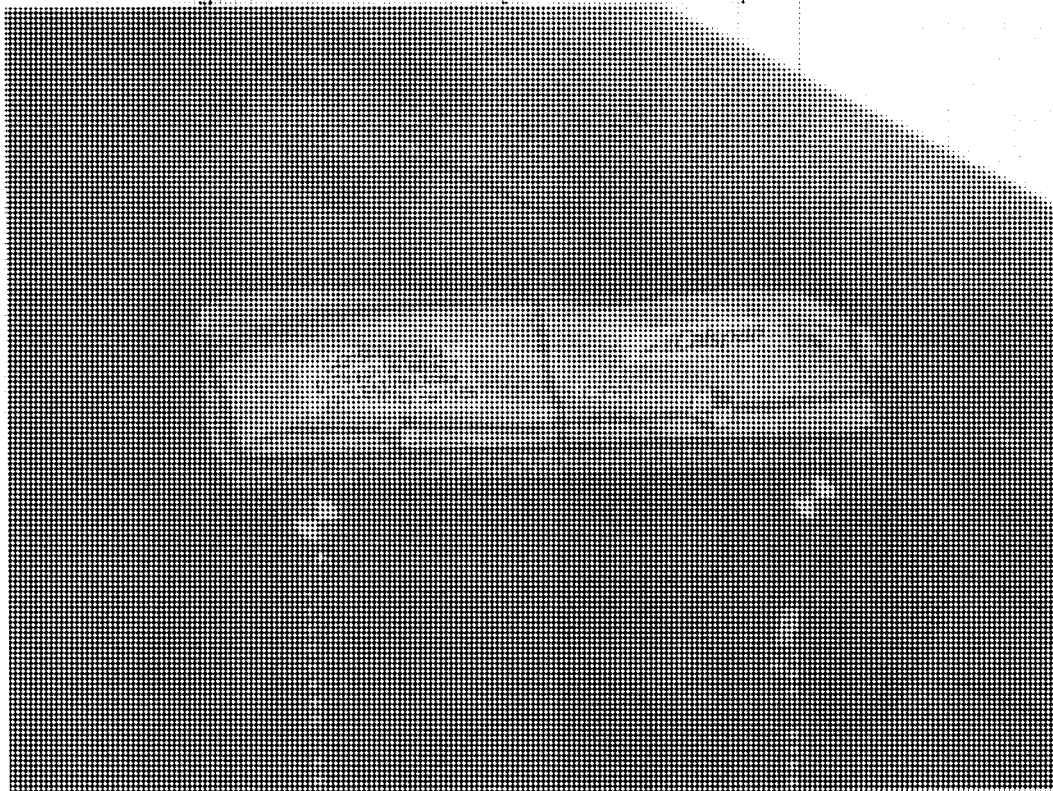


Figure A-28: Post-Test Top View of MDB Impactor Face

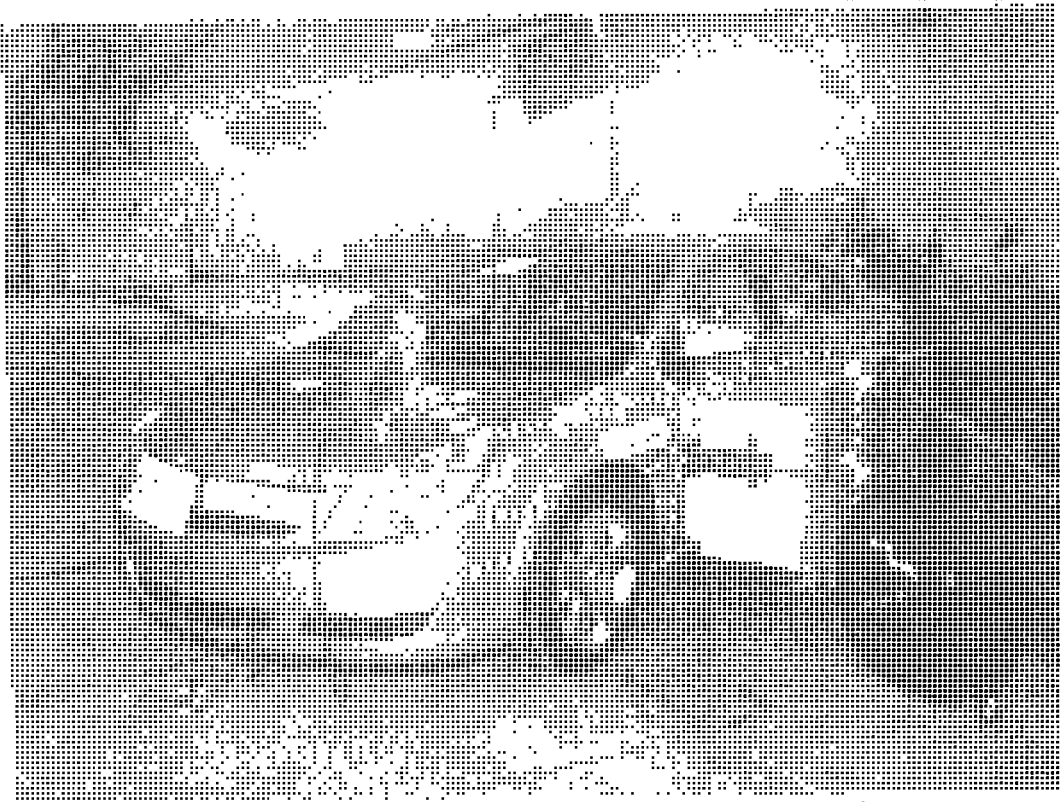


Figure A-23: Photo of the View of Aligned VDS and VDS-1

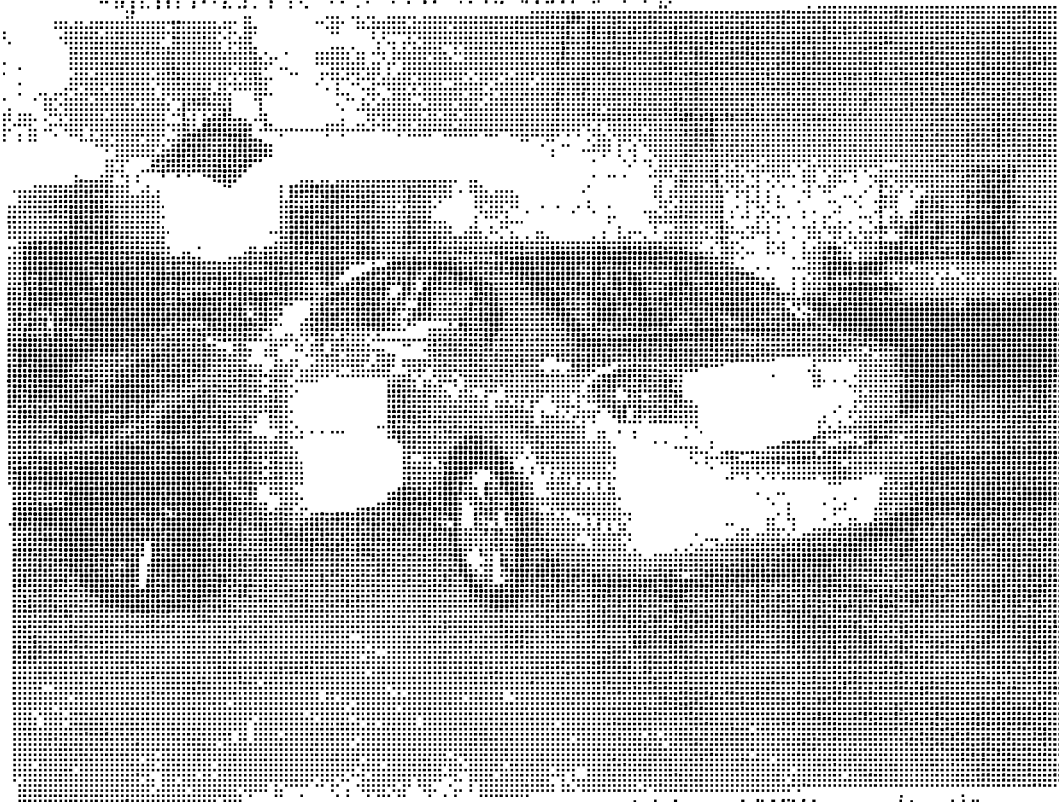


Figure A-24: Photo of the View of Aligned VDS and VDS-1



Figure A-31: Pre-Test Overhead View of Aligned MDB and Vehicle

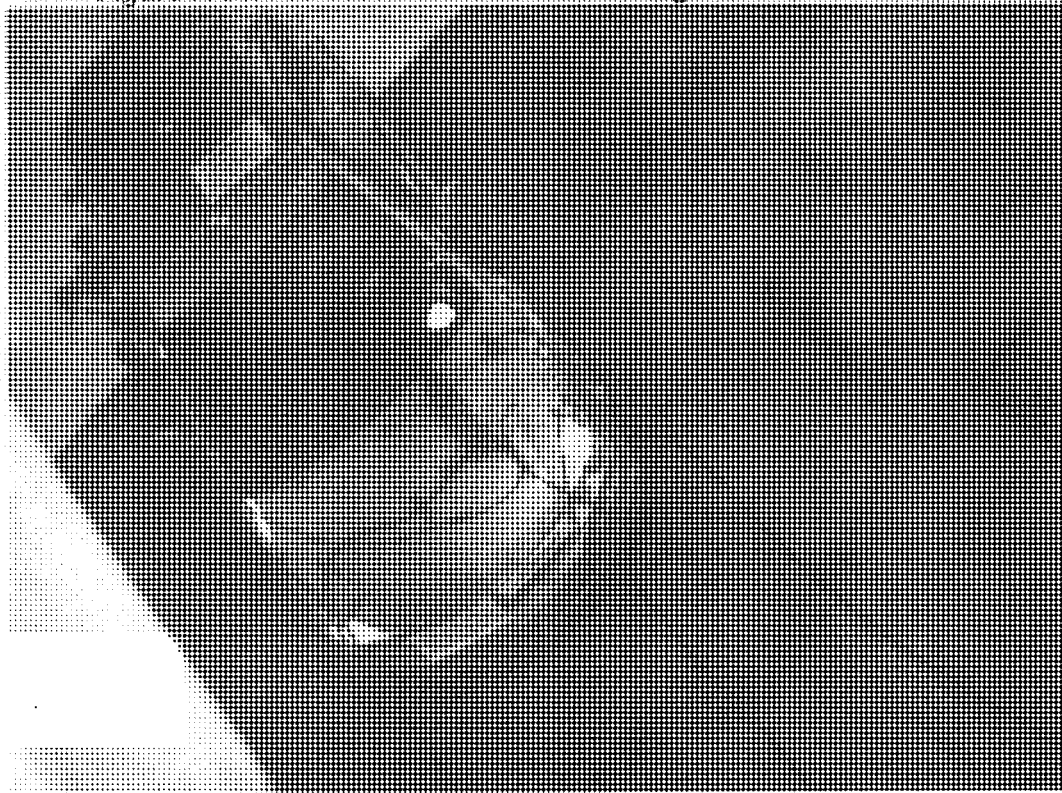


Figure A-32: Post-Test Overhead View of MDB and Vehicle

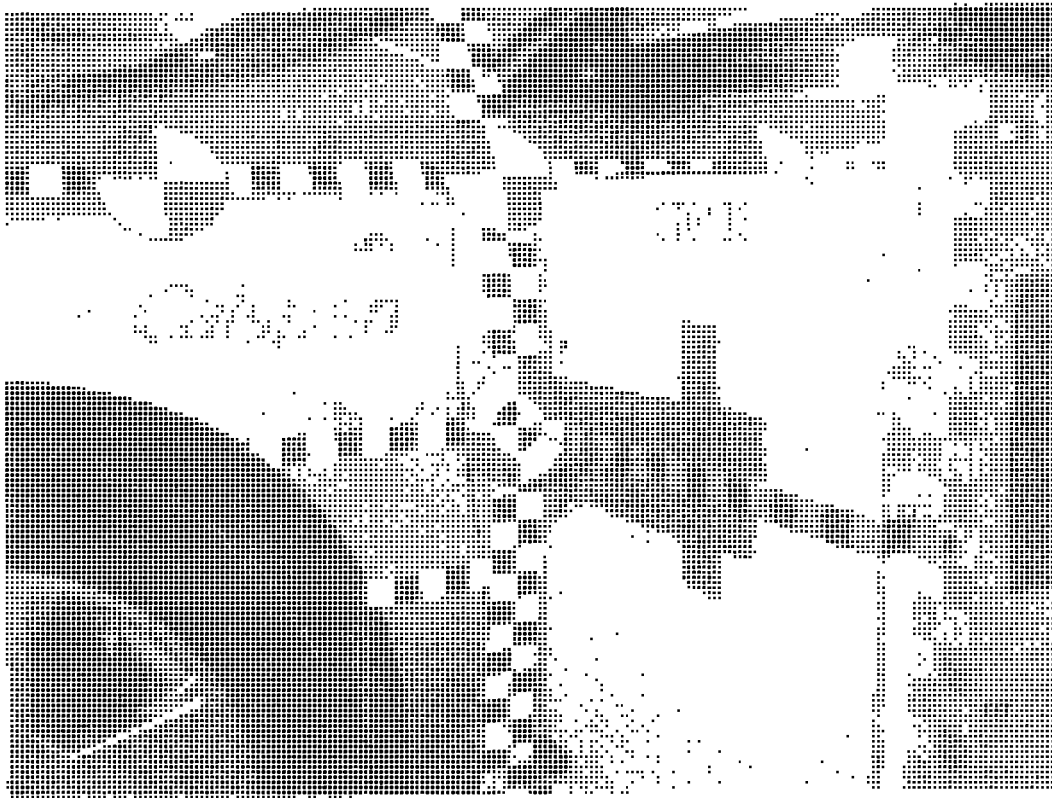


Figure A-33: Pre-Test Close-Up View of Impact Point Target



Figure A-34: Post-Test Close-Up View of Impact Point Target



Figure A-35: Pre-Test Right Occupant Compartment View of Driver



Figure A-36: Post-Test Right Occupant Compartment View of Driver

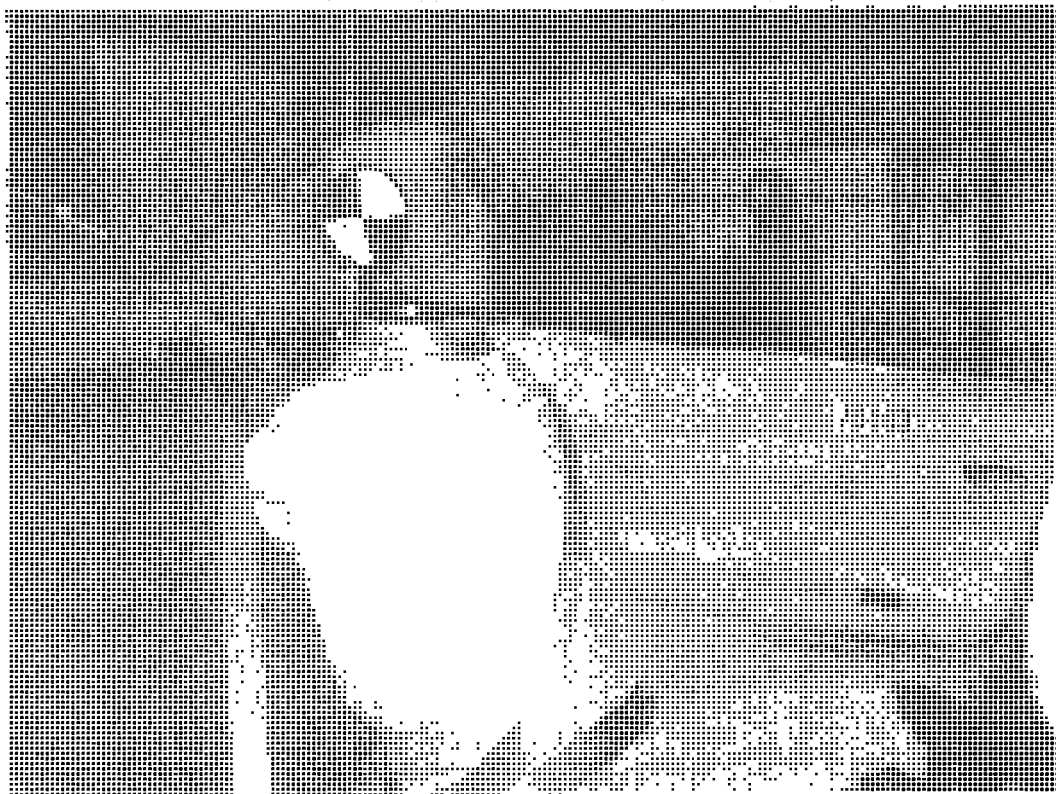
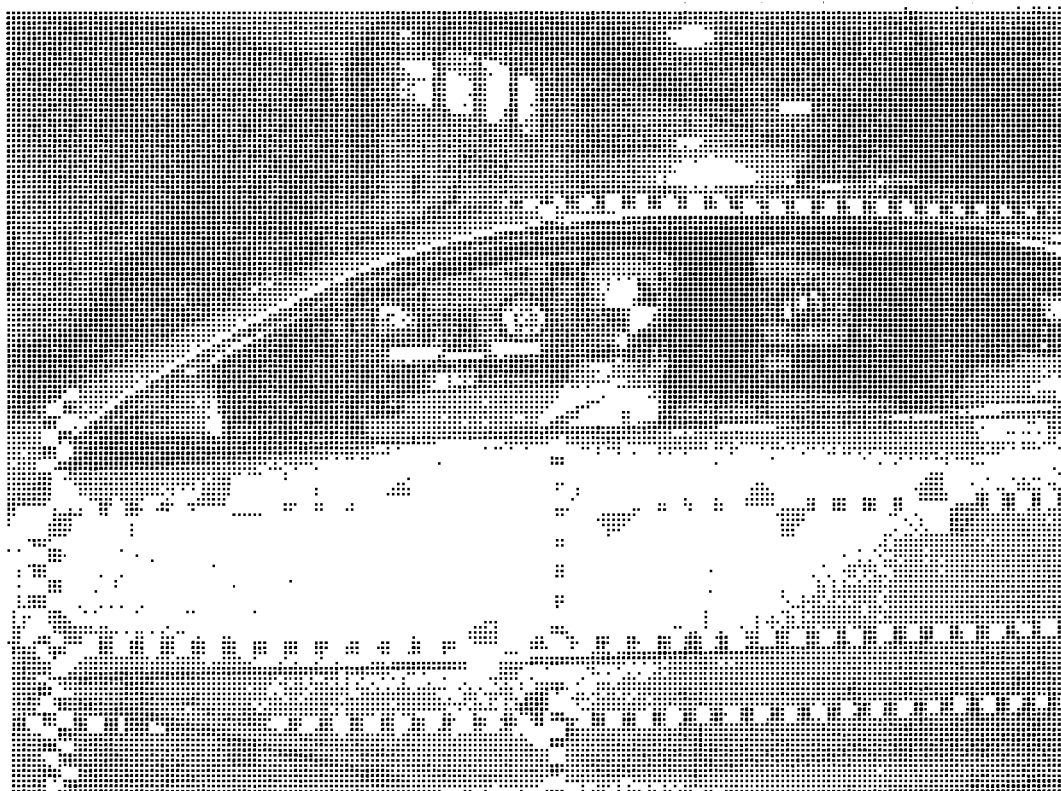


Figure A-37: Pre-Test Right Occupant Compartment View of Passenger



Figure A-38: Post-Test Right Occupant Compartment View of Passenger



Page 2 of 39 "Pre" and Last Occupied. Copyrighted material

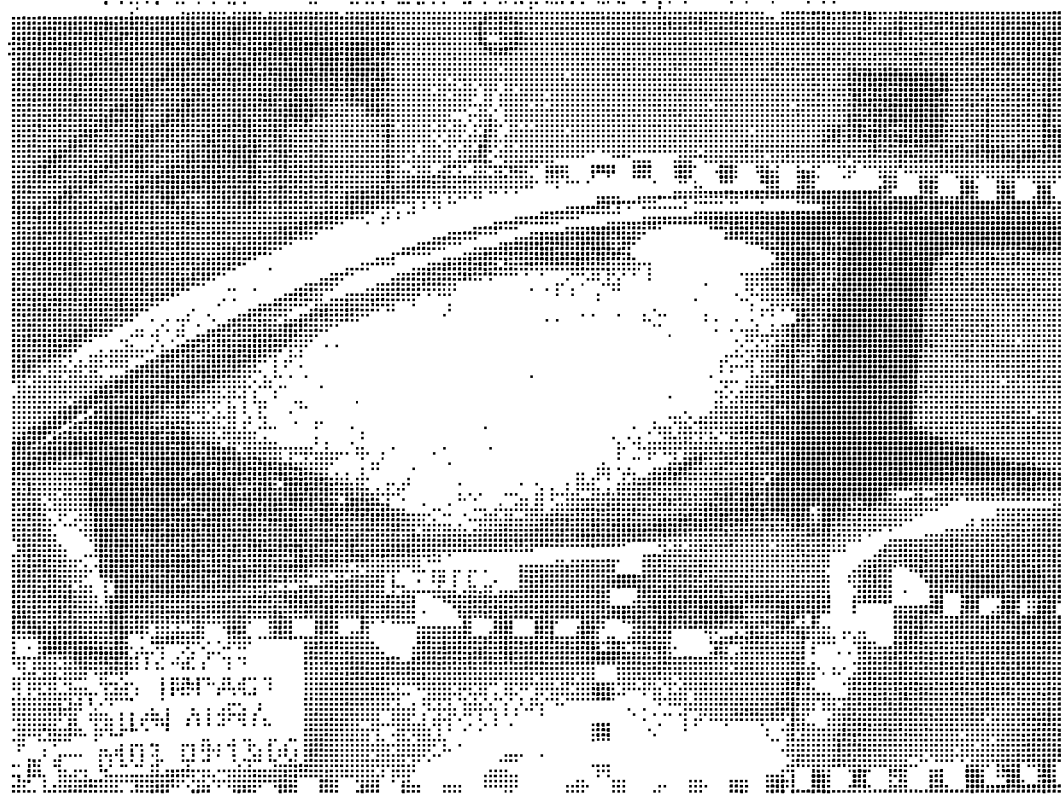


Figure A-60: Post-Test Left Occupant Compartment View of Driver



Figure A-41: Post-Test View from Driver's View of Passenger

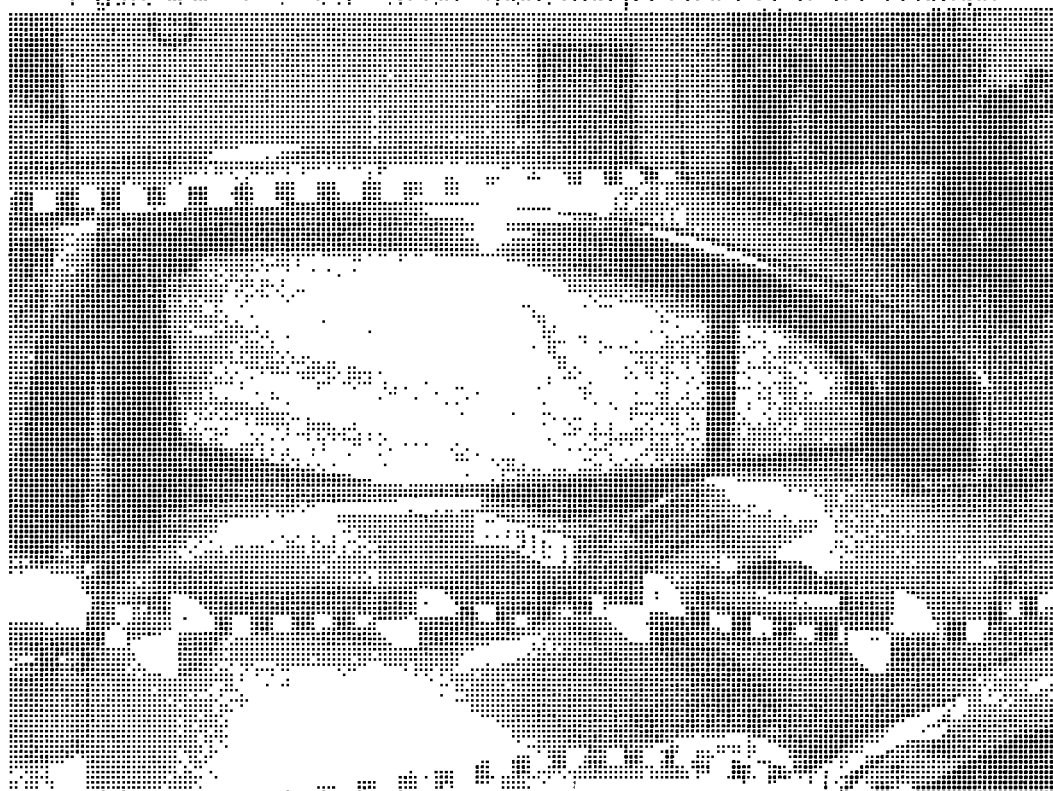


Figure A-42: Post-Test Left Occupant View of Passenger

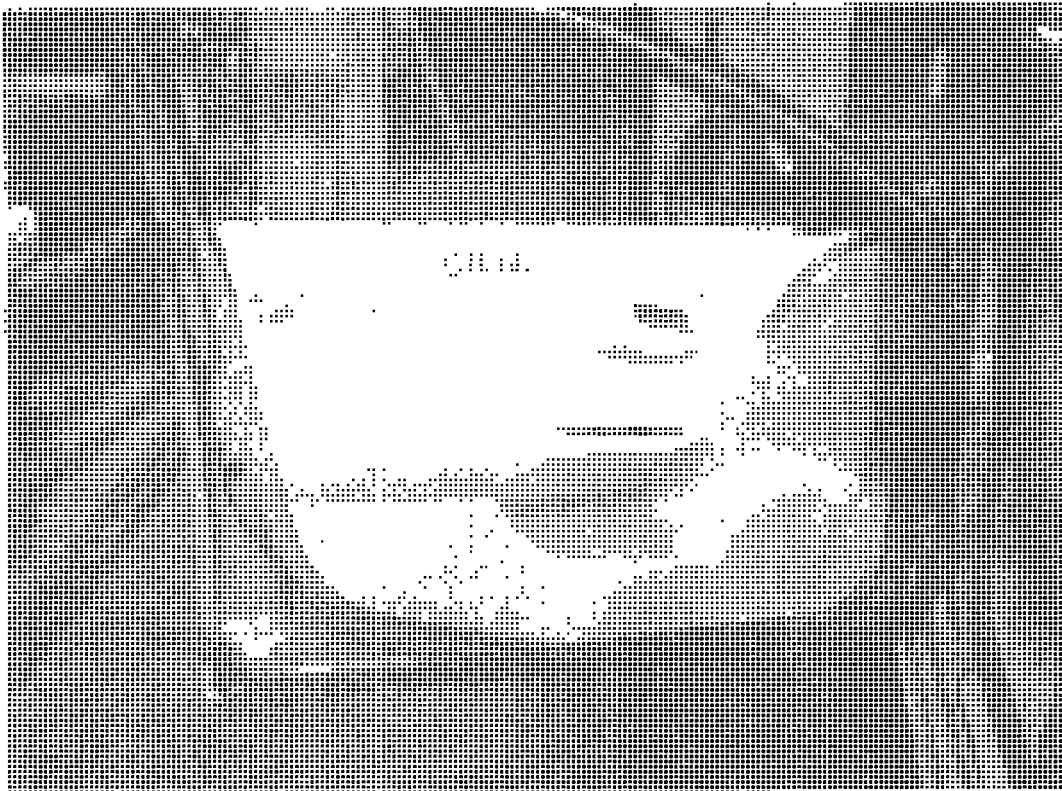


Figure A-43: Plan and Elevation View of a structure



Figure A-44: Plan and Elevation View of a structure

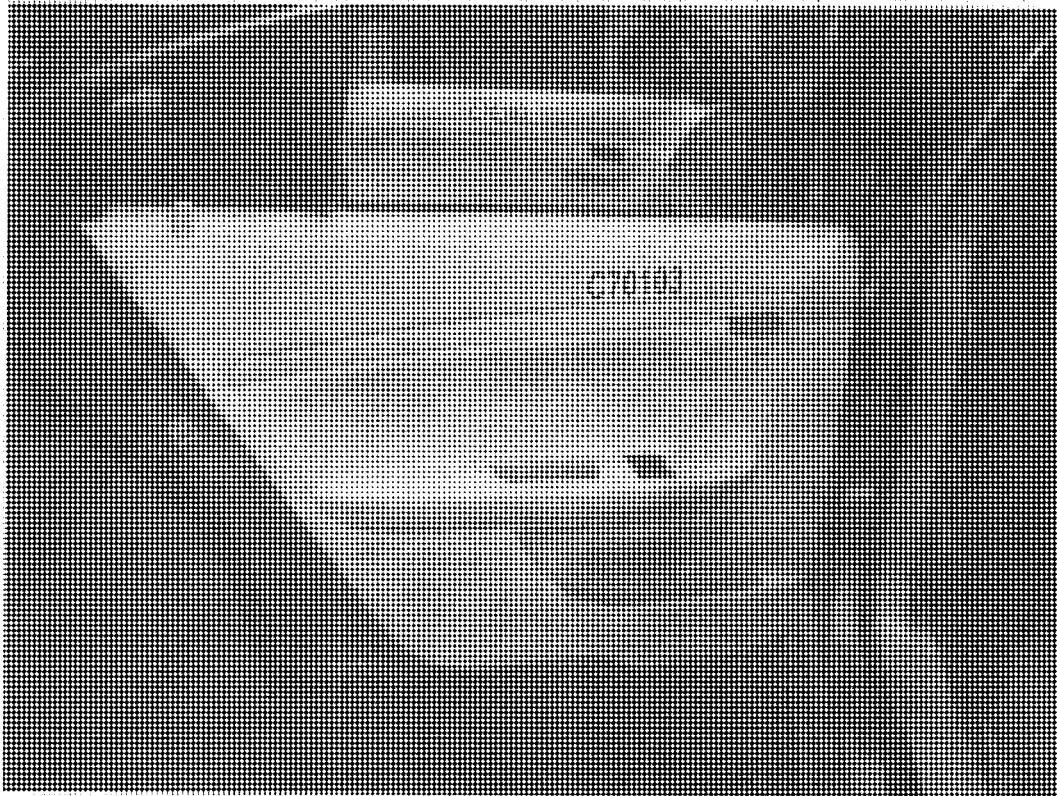


Figure A-45: Pre-Test Left Rear Interior Trim



Figure A-46: Post-Test Left Rear Interior Trim



Figure A-47: Pre-Test Left Front 3/4 View of Left Side Doors

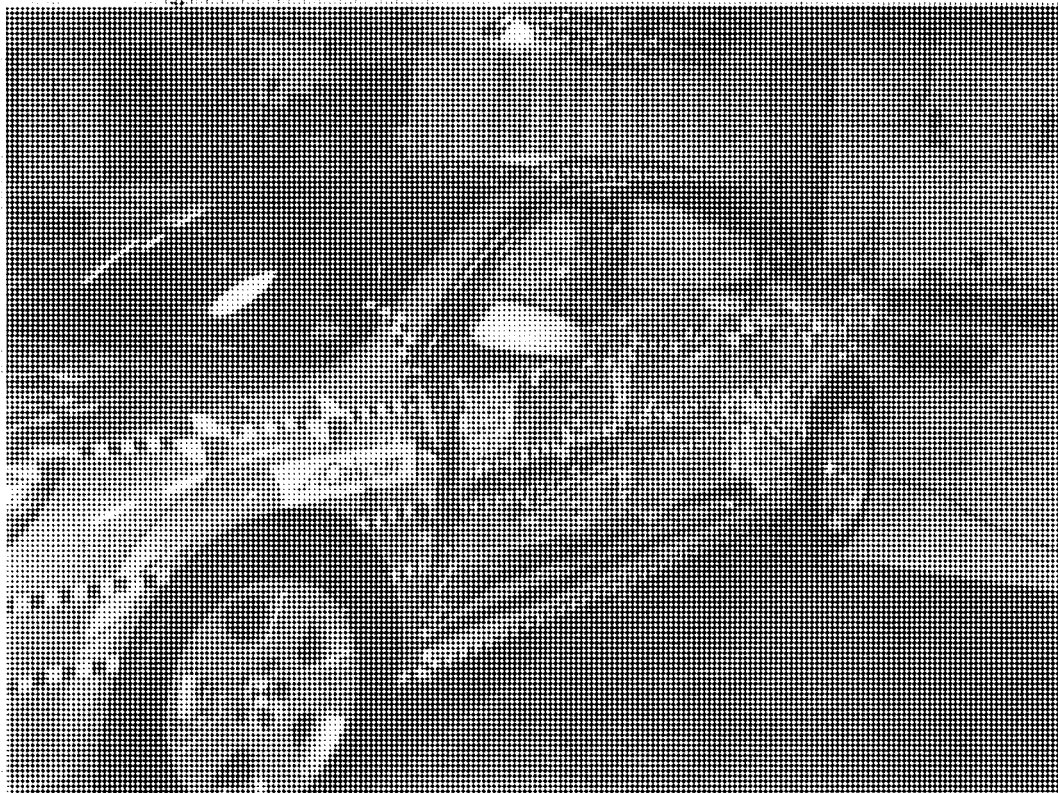


Figure A-48: Post-Test Left Front 3/4 View of Left Side Doors

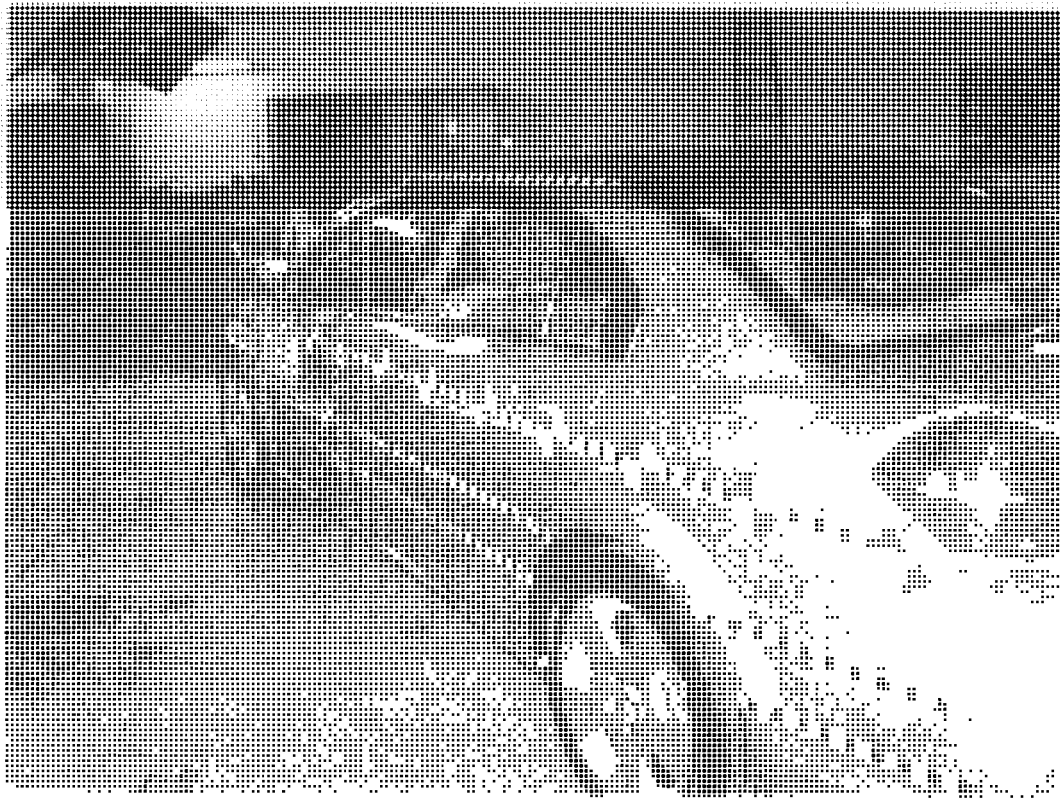


Figure A-45: Close-Up View of Left Side Door

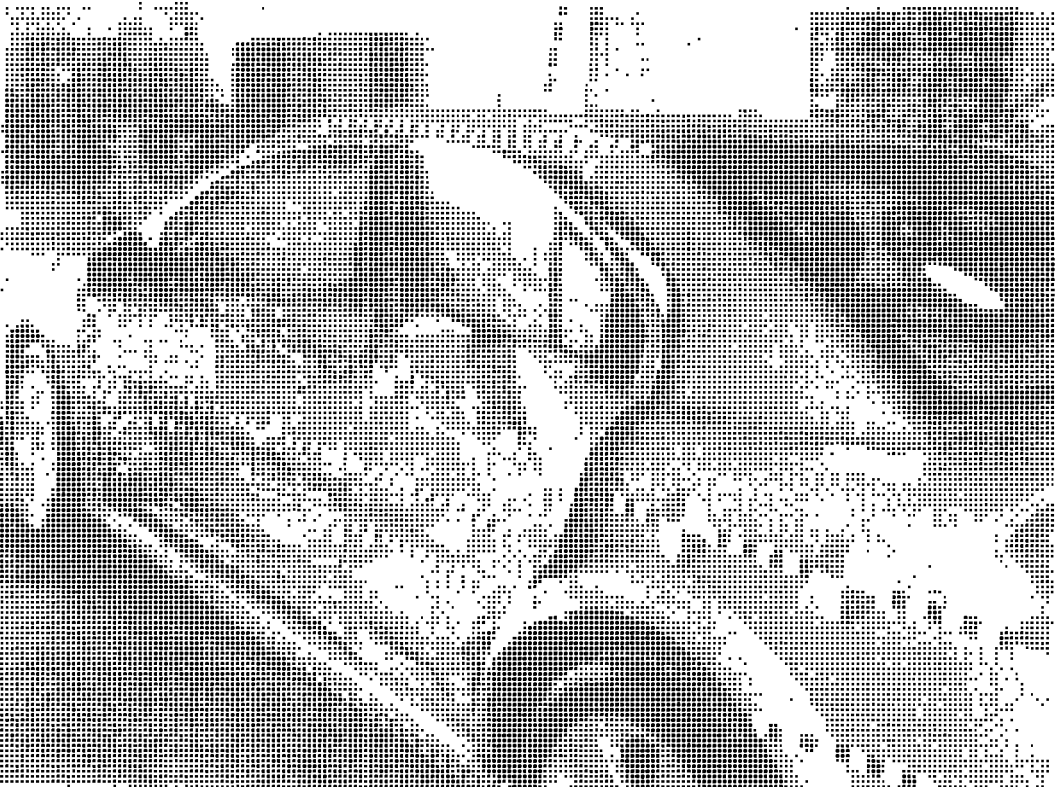


Figure A-46: Close-Up View of Left Side Door

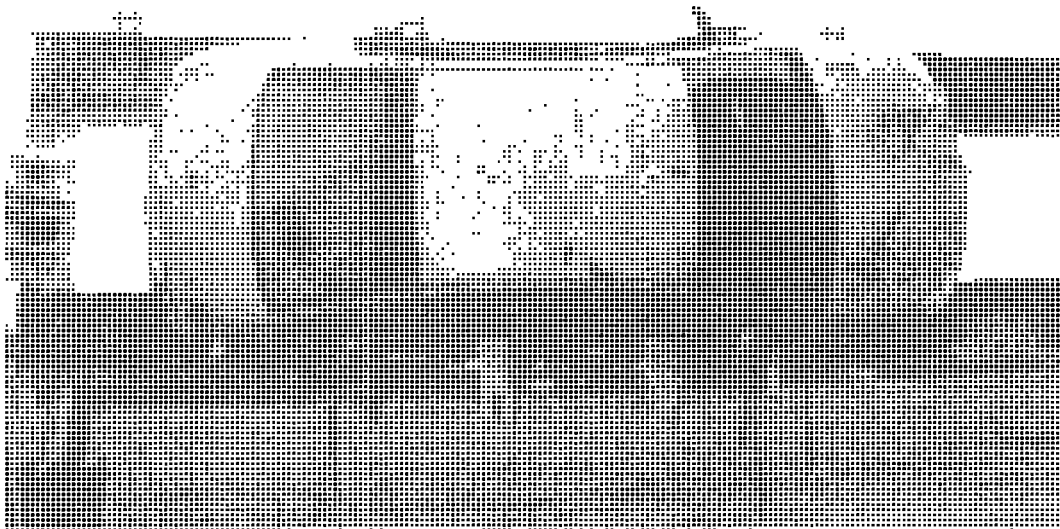


Figure 4-51: Roll Over 93 Degrees

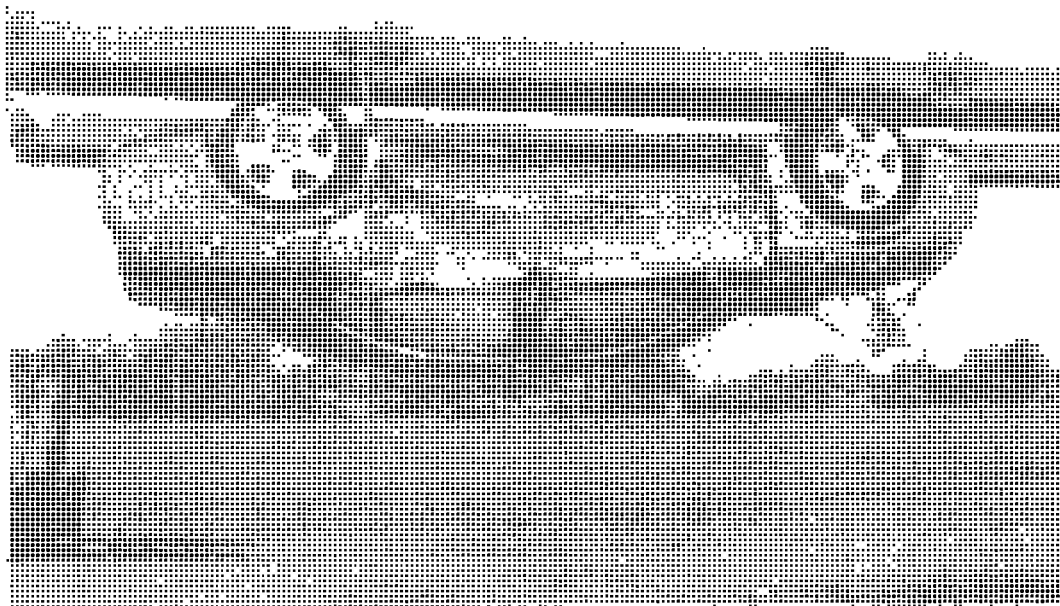


Figure 4-52: Roll Over 93 Degrees

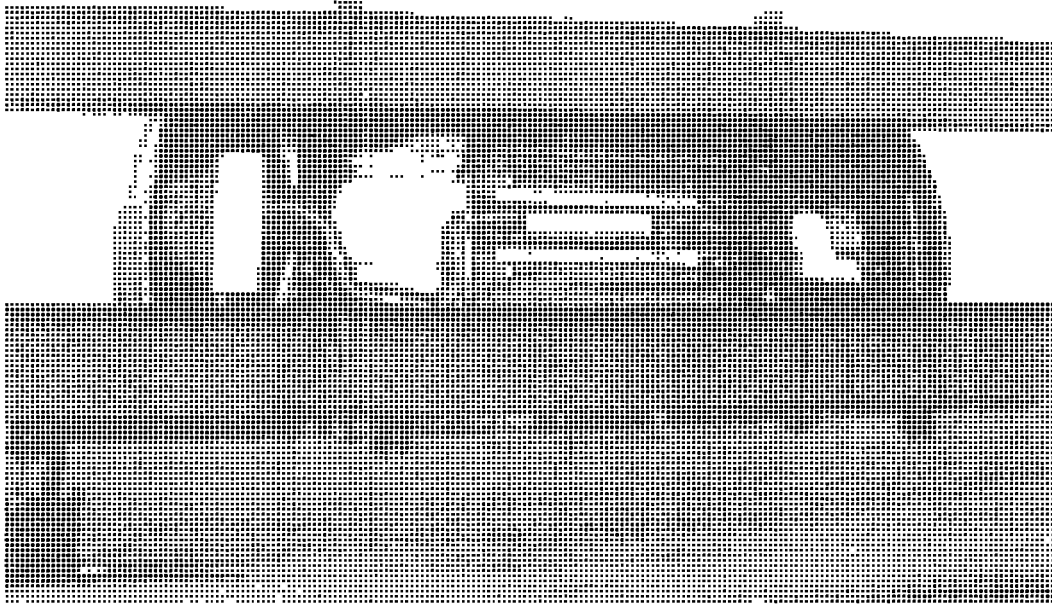


Figure A-31. Polyflex 273 Degrees

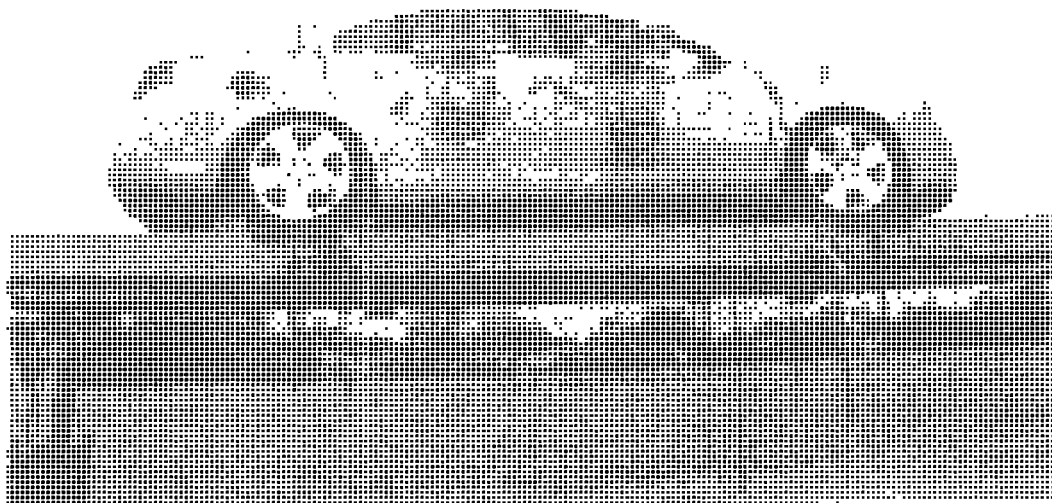


Figure A-32. Recovery 366 Degrees

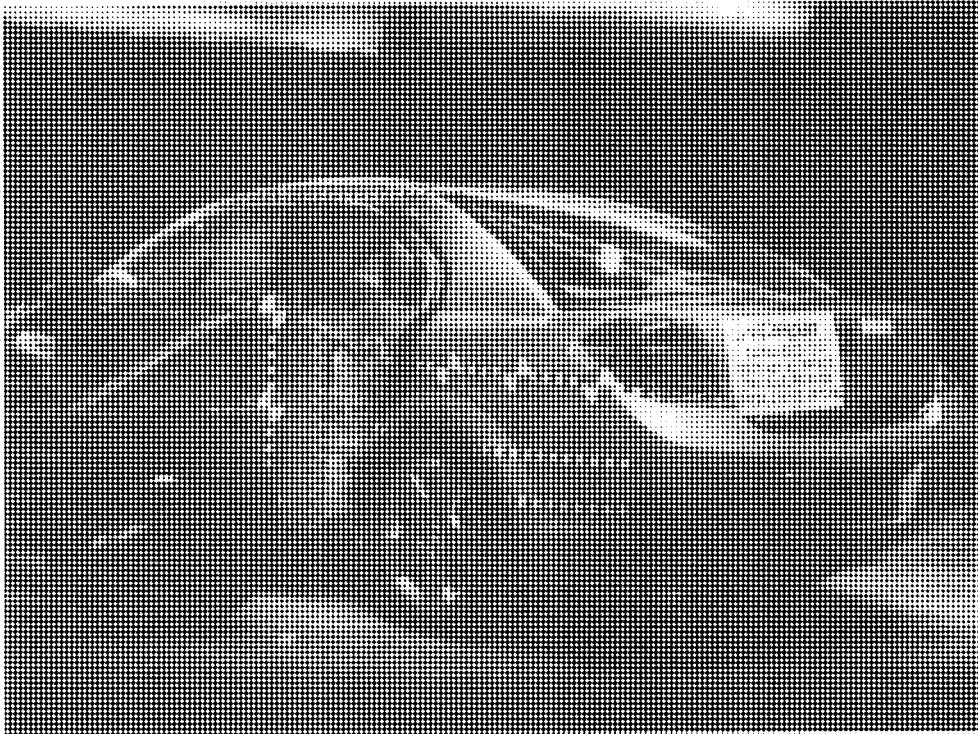


Figure A-55: Impact Photo

**APPENDIX B**  
**SID/HIII, VEHICLE AND MDB RESPONSE DATA**  
**(SAE sign convention)**

**DATA CHANNEL FILTER CLASS SUMMARY**

| Data Type                | SAE Filter Class |
|--------------------------|------------------|
| Dummy Head Accelerations | CFC 1000         |
| Rib Accelerations        | FIR 100          |
| Spine Accelerations      | FIR 100          |
| Pelvis Accelerations     | FIR 100          |

**DATA CHANNEL TITLE KEY**

| Prefix                                            | Suffix                         |
|---------------------------------------------------|--------------------------------|
| V1 = Vehicle 1 (Moving Barrier)                   | Ax = Acceleration, X-direction |
| V2 = Vehicle 2 (Test Vehicle)                     | Ay = Acceleration, Y-direction |
| P1 = Left Front Seating Position (Driver)         | Az = Acceleration, Z-direction |
| P4 = Left Second Row Seating Position (Passenger) | Fx = Force, X-direction        |
| A1-A18 = Accelerometer Location Number            | Fy = Force, Y-direction        |
|                                                   | Fz = Force, Z-direction        |
|                                                   | Mx = Moment about X            |
|                                                   | My = Moment about Y            |
|                                                   | Mz = Moment about Z            |

# TABLE OF DATA PLOTS

| PLOT | PLOT NAME[UNITS, CHANNEL FILTER CLASS] | PAGE |
|------|----------------------------------------|------|
| 1    | V2P1 Head Ax [g, CFC_1000]             | B-5  |
| 2    | V2P1 Head Ay [g, CFC_1000]             | B-5  |
| 3    | V2P1 Head Az [g, CFC_1000]             | B-5  |
| 4    | V2P1 Head Ar [g, CFC_1000]             | B-5  |
| 5    | V1P1 Upper Rib Ay [g, FIR_100]         | B-6  |
| 6    | V1P1 Lower Rib Ay [g, FIR_100]         | B-6  |
| 7    | V1P1 Lower Spine Ay [g, FIR_100]       | B-6  |
| 8    | V1P1 Pelvic Ay [g, FIR_100]            | B-6  |
| 9    | V2P4 Head Ax [g, CFC_1000]             | B-7  |
| 10   | V2P4 Head Ay [g, CFC_1000]             | B-7  |
| 11   | V2P4 Head Az [g, CFC_1000]             | B-7  |
| 12   | V2P4 Head Ar [g, CFC_1000]             | B-7  |
| 13   | V1P4 Upper Rib Ay [g, FIR_100]         | B-8  |
| 14   | V1P4 Lower Rib Ay [g, FIR_100]         | B-8  |
| 15   | V1P4 Lower Spine Ay [g, FIR_100]       | B-8  |
| 16   | V1P4 Pelvic Ay [g, FIR_100]            | B-8  |

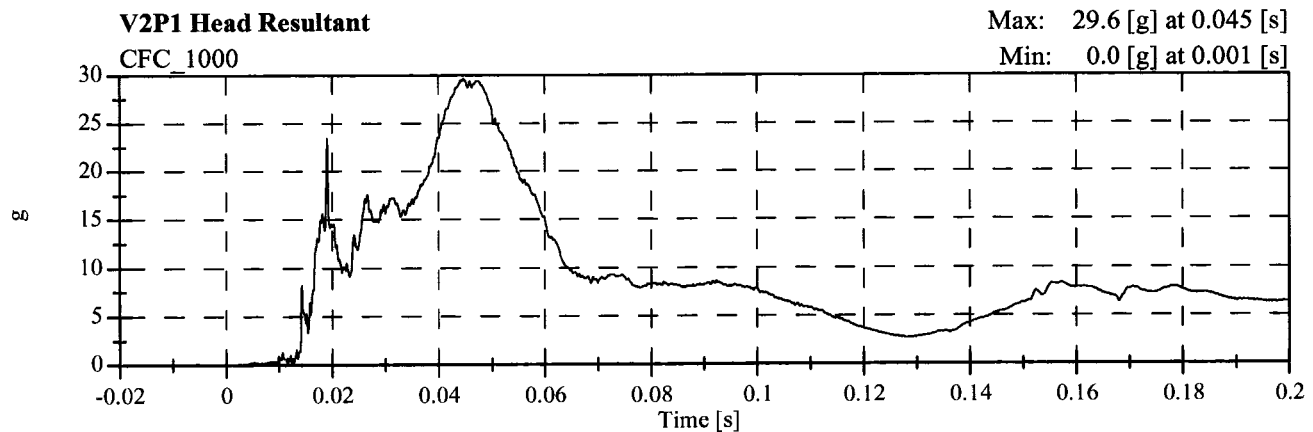
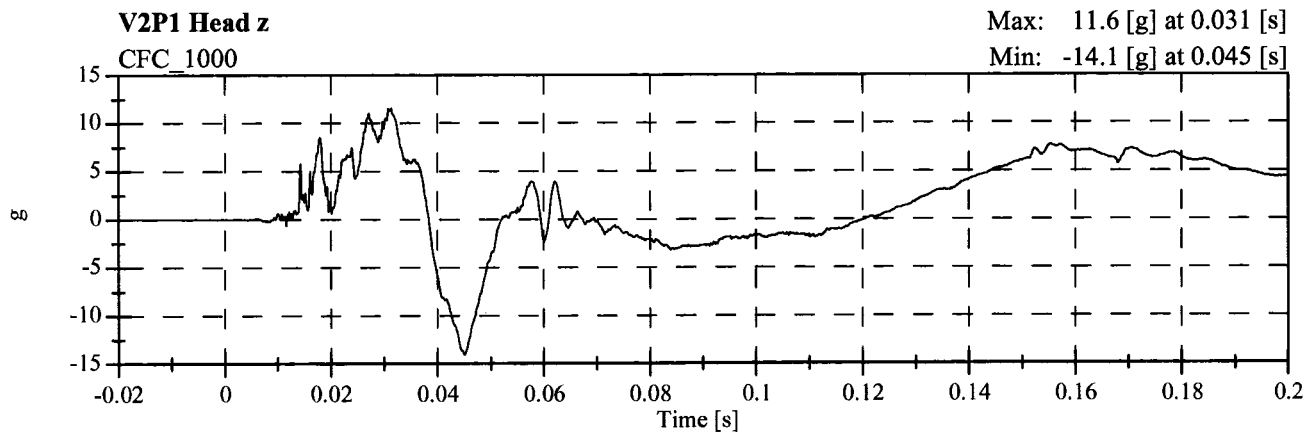
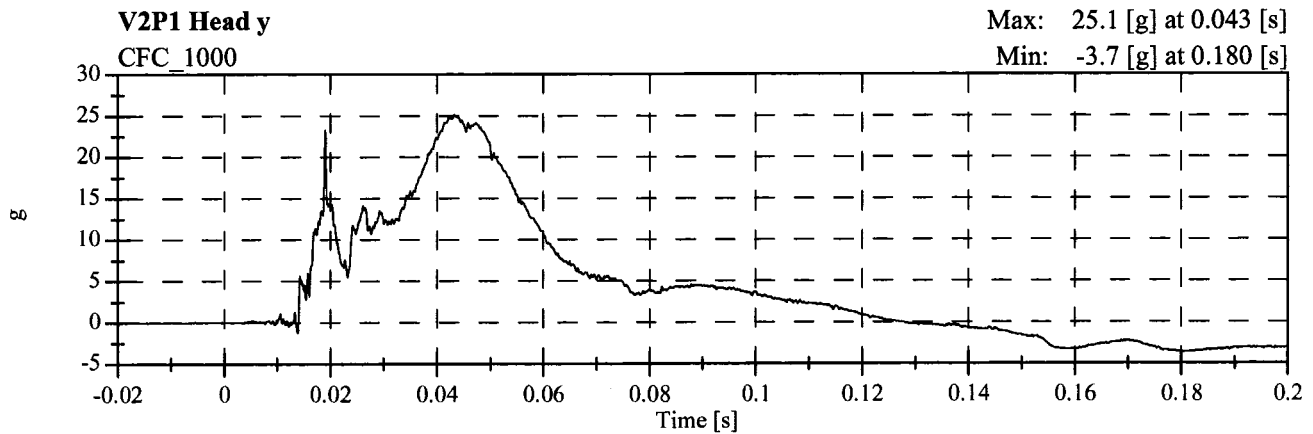
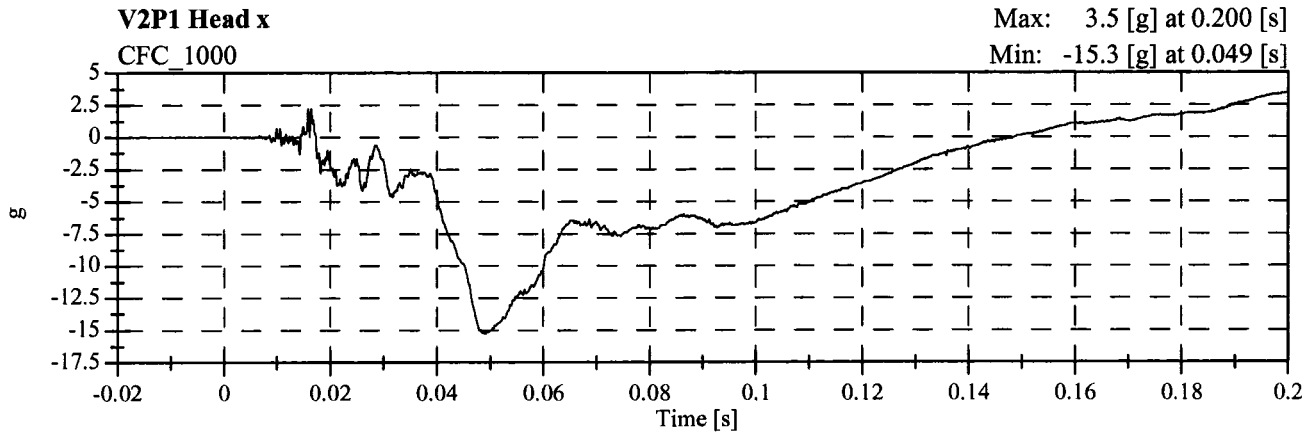
The following dummy, vehicle and load cell response data can be found in the research and development section of the NHTSA website at: [www.nhtsa.dot.gov](http://www.nhtsa.dot.gov)

|                               |                                   |
|-------------------------------|-----------------------------------|
| V2P1 Head Ax                  | V2A1 Right Front Sill Ax          |
| V2P1 Head Ay                  | V2A1 Right Front Sill Ay          |
| V2P1 Head Az                  | V2A1 Right Front Sill Az          |
| V2P1 Upper Neck Fx            | V2A2 Right Rear Sill Ax           |
| V2P1 Upper Neck Fy            | V2A2 Right Rear Sill Ay           |
| V2P1 Upper Neck Fz            | V2A2 Right Rear Sill Az           |
| V2P1 Upper Neck Mx            | V2A3 Rear Floorpan Ax             |
| V2P1 Upper Neck My            | V2A3 Rear Floorpan Ay             |
| V2P1 Upper Neck Mz            | V2A3 Rear Floorplan Az            |
| V2P1 Upper Rib Ay             | V2A4 Left Rear Sill Ay            |
| V2P1 Upper Rib Redundant Ay   | V2A5 Left Front Sill Ay           |
| V2P1 Lower Rib Ay             | V2A6 Left Front Door C/L Ay       |
| V2P1 Lower Rib Redundant Ay   | V2A7 Right Rear Compartment Ay    |
| V2P1 Lower Spine Ay           | V2A8 Left Front Door Midrear Ay   |
| V2P1 Lower Spine Redundant Ay | V2A9 Left Front Door Upper C/L Ay |
| V2P1 Pelvic Ay                | V2A10 Left Rear Door Midrear Ay   |
| V2P1 Pelvic Redundant Ay      | V2A11 Left Rear Door Upper C/L Ay |
| V2P4 Head Ax                  | V2A12 Left Lower B Post Ay        |
| V2P4 Head Ay                  | V2A13 Left Mid B Post Ay          |
| V2P4 Head Az                  | V2A14 Left Lower A Post Ay        |
| V2P4 Upper Neck Fx            | V2A15 Left Mid A Post Ay          |
| V2P4 Upper Neck Fy            | V2A16 Front Seat Track Ay         |
| V2P4 Upper Neck Fz            | V2A17 Rear Seat Track Ay          |
| V2P4 Upper Neck Mx            | V2A18 Target CG Ax                |
| V2P4 Upper Neck My            | V2A18 Target CG Ay                |
| V2P4 Upper Neck Mz            | V2A18 Target CG Az                |
| V2P4 Upper Rib Ay             | V1 Moving Barrier CG Ax           |
| V2P4 Upper Rib Redundant Ay   | V1 Moving Barrier CG Ay           |
| V2P4 Lower Rib Ay             | V1 Moving Barrier CG Az           |
| V2P4 Lower Rib Redundant Ay   | V1 Moving Barrier Left Rail Ax    |
| V2P4 Lower Spine Ay           | V1 Moving Barrier Left Rail Ay    |
| V2P4 Lower Spine Redundant Ay |                                   |
| V2P4 Pelvic Ay                |                                   |
| V2P4 Pelvic Redundant Ay      |                                   |

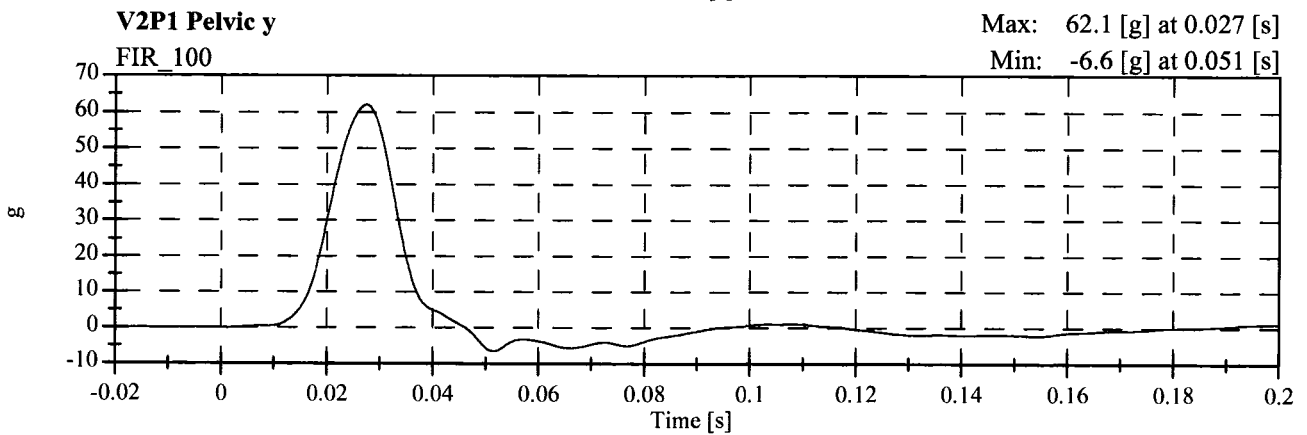
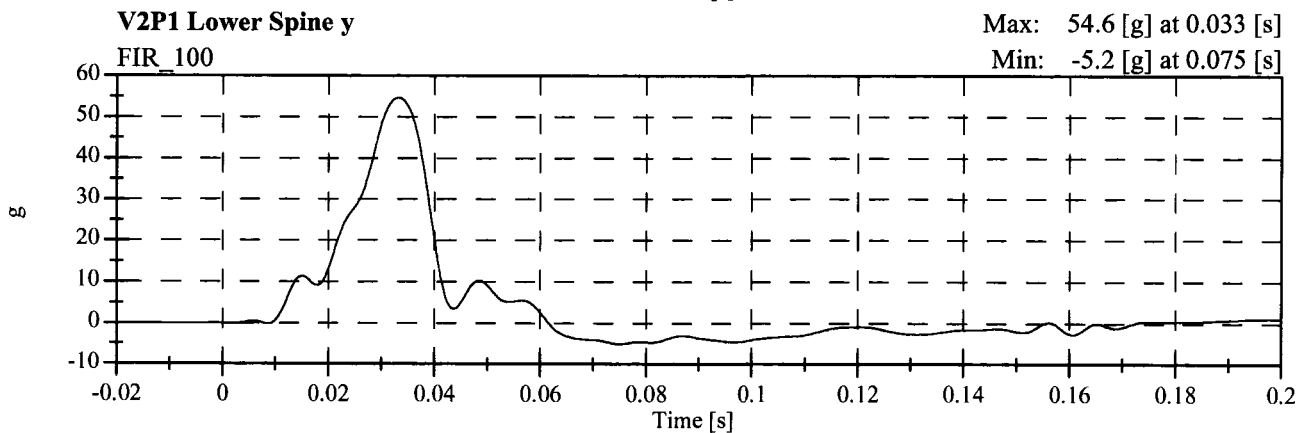
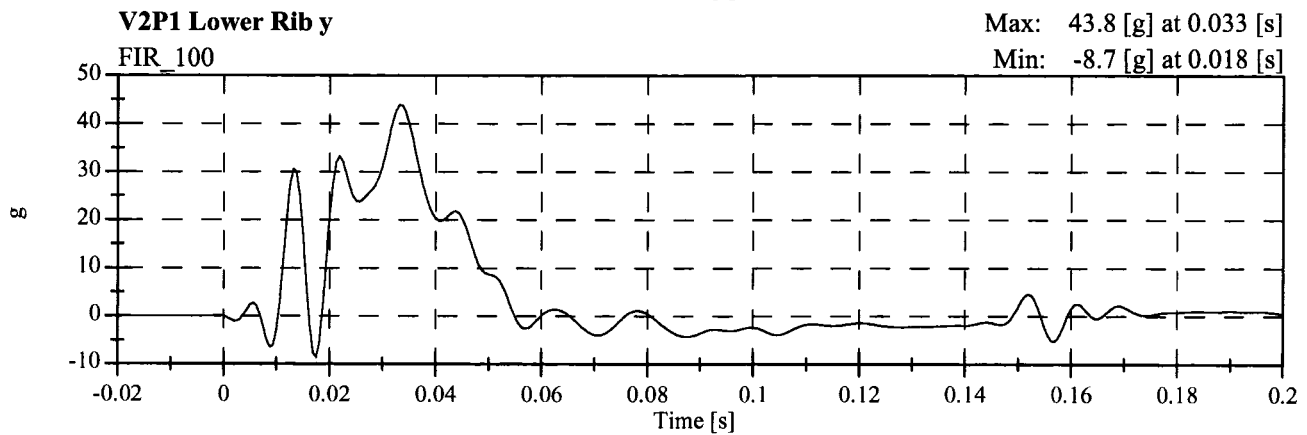
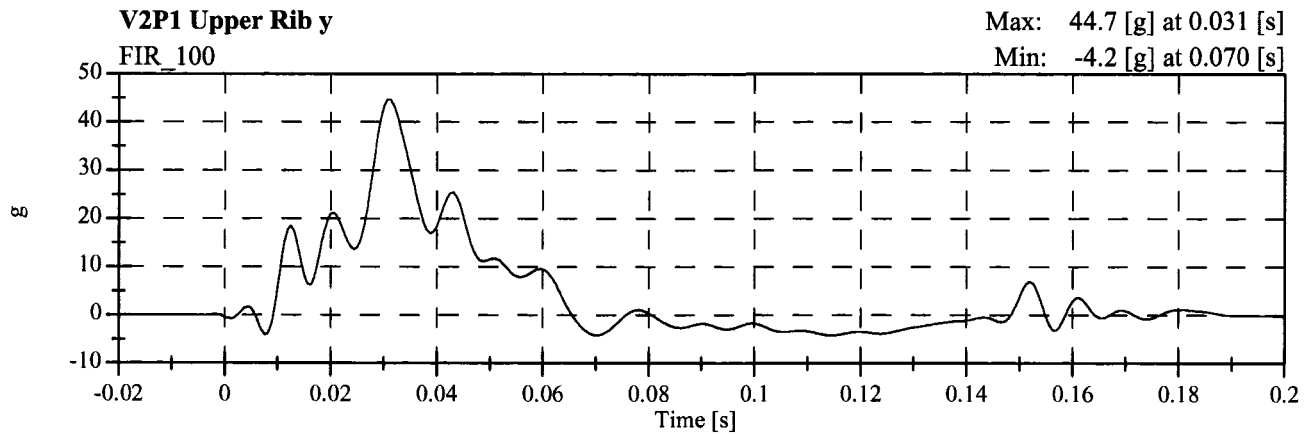
#### TEST NOTES

The following channel anomalies occurred:  
NONE

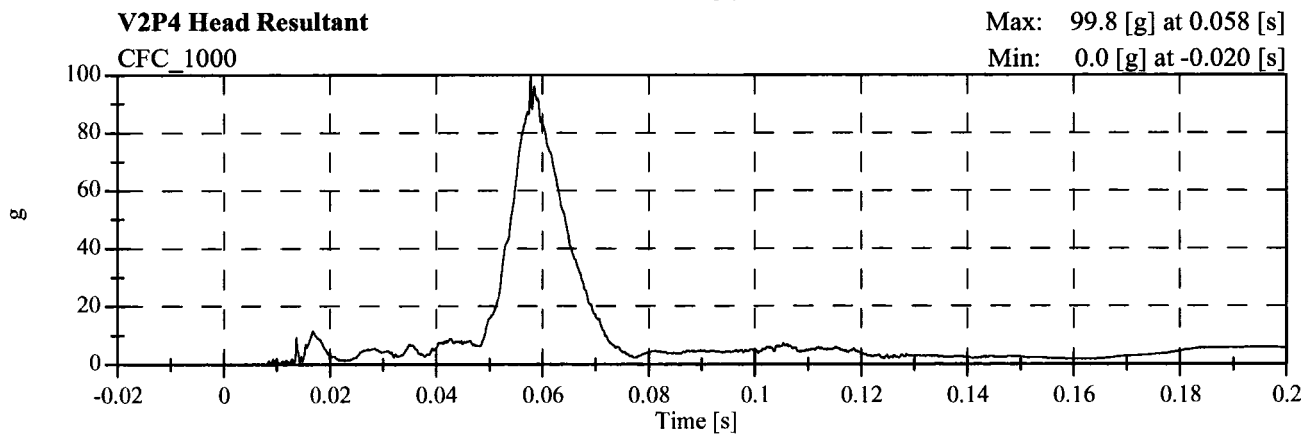
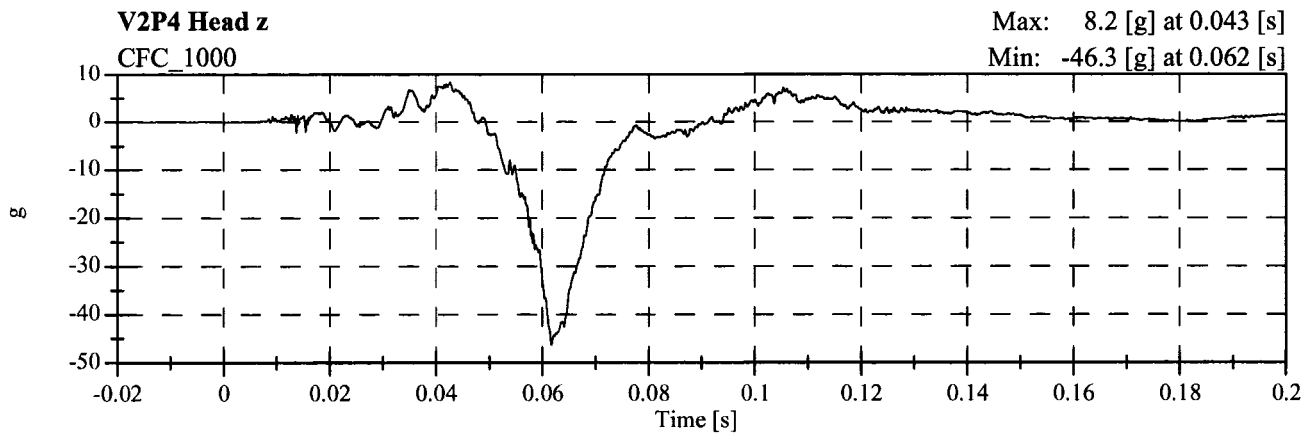
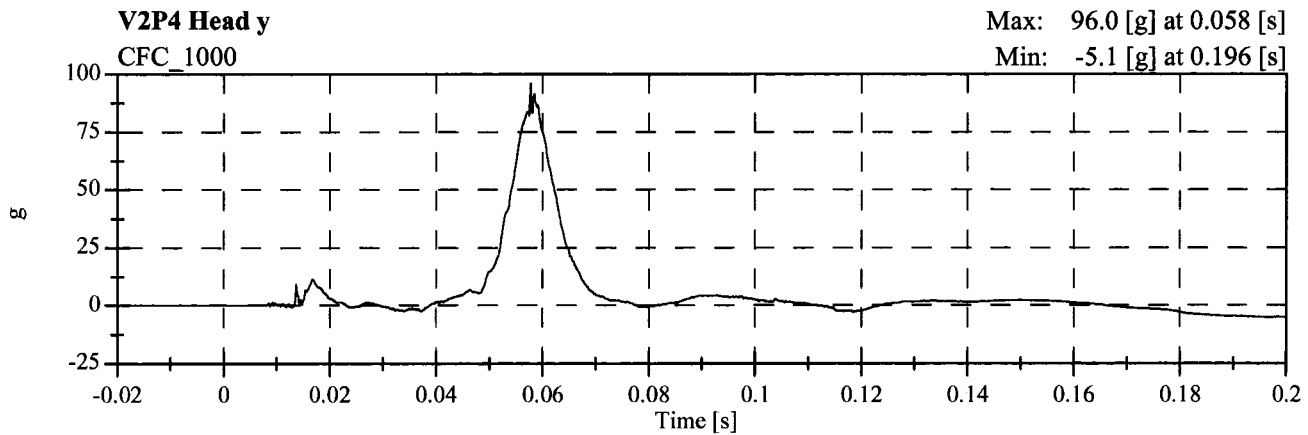
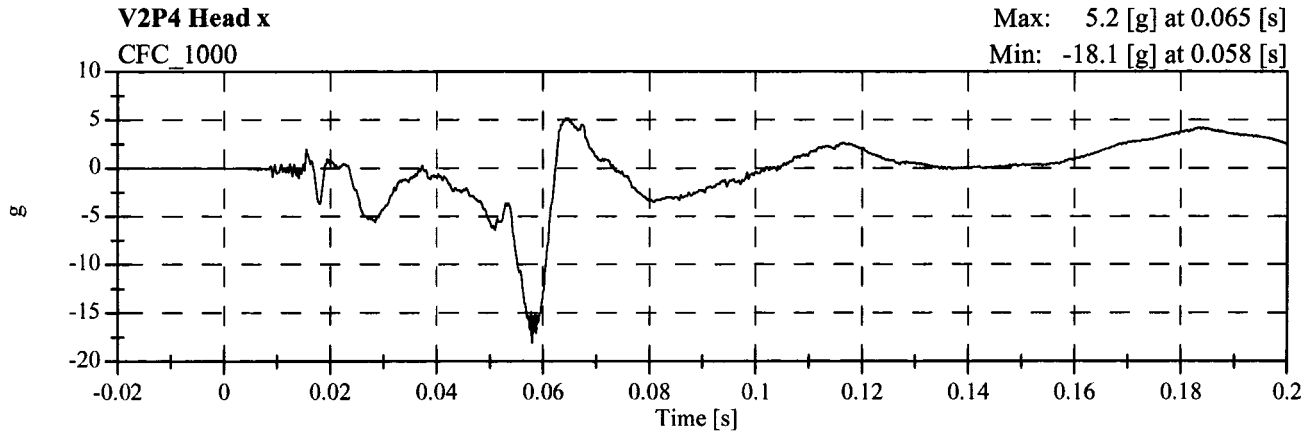
**2007 NHTSA 214D Indicant Test - 2007 Saturn Aura  
C70103 - September 13, 2006**



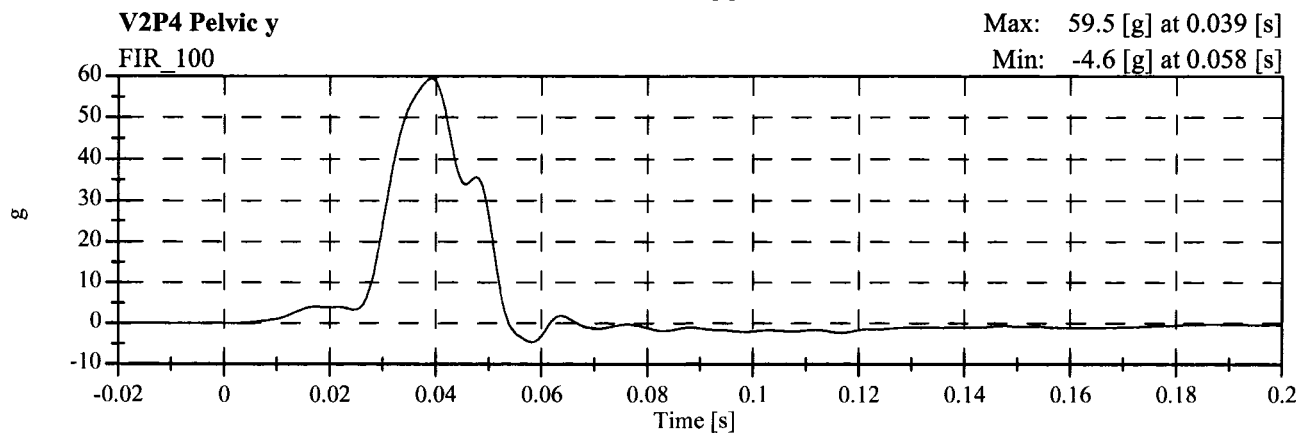
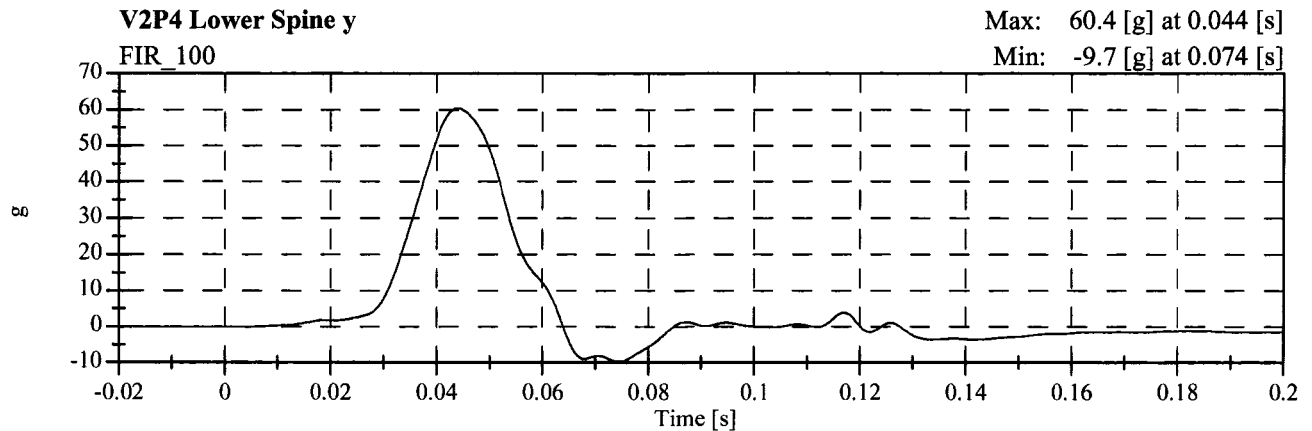
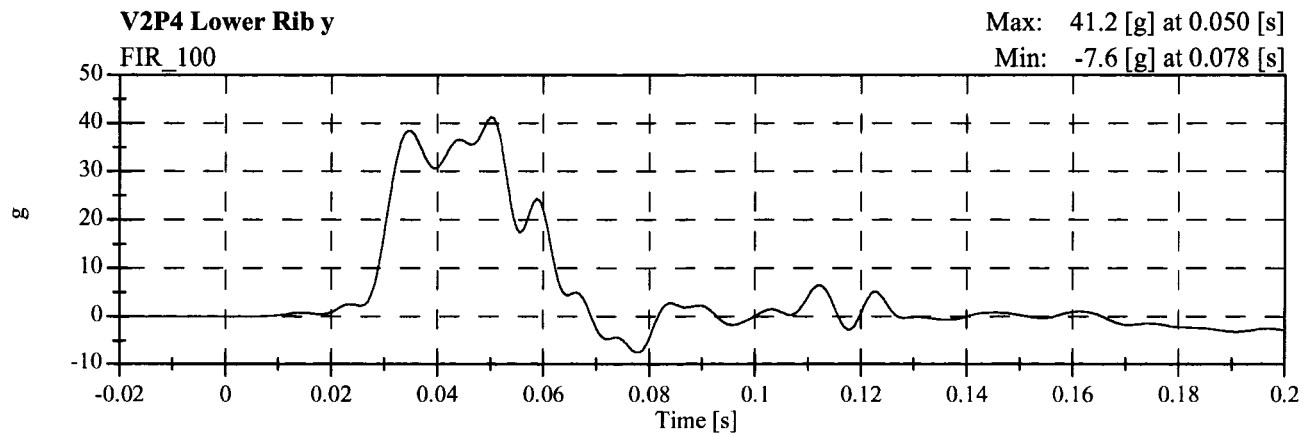
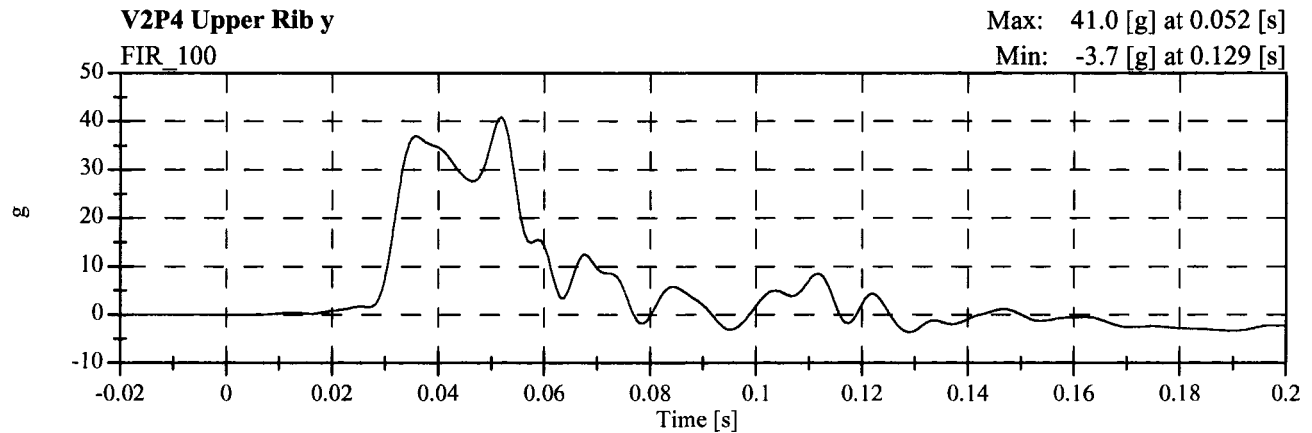
**2007 NHTSA 214D Indicant Test - 2007 Saturn Aura  
C70103 - September 13, 2006**



**2007 NHTSA 214D Indicant Test - 2007 Saturn Aura  
C70103 - September 13, 2006**



**2007 NHTSA 214D Indicant Test - 2007 Saturn Aura  
C70103 - September 13, 2006**



**APPENDIX C**

**DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA**

**SUMMARY**  
**SID H3 PRE & POST TEST CALIBRATION**

**CONFIGURED FOR LEFT SIDE IMPACT**

Date: JULY 2006 / SEPTEMBER 2006

Sequential Test Number:

2

Laboratory Technician:

B. Swiecicki

| TEST PARAMETER                     | SPECIFICATION | SID H3 NO.: 270 |           | SID H3 NO.: 269 |           |
|------------------------------------|---------------|-----------------|-----------|-----------------|-----------|
|                                    |               | PRE TEST        | POST TEST | PRE TEST        | POST TEST |
| SH- Seated Height (mm)             | 889 - 909     | 899             | 904       | 899             | 909       |
| RH- Rib Height (mm)                | 501 - 521     | 505             | 510       | 508             | 513       |
| HP- Hip Pivot Height (mm)          | 99 ref.       | 99              | 99        | 99              | 99        |
| RD- Rib from Back Line (mm)        | 229 - 241     | 234             | 236       | 234             | 241       |
| KV- Knee Pivot from Back Line (mm) | 511 - 526     | 516             | 513       | 516             | 521       |
| SW- Knee Pivot to Floor (mm)       | 490 - 505     | 495             | 499       | 495             | 493       |
| HW- Hip Width (mm)                 | 356 - 391     | 381             | 358       | 378             | 363       |
| <b>THORAX IMPACTS</b>              |               |                 |           |                 |           |
| TEMPERATURE (° C)                  | 18.9 - 25.5   | 21.1            | 21.7      | 21.1            | 21.1      |
| RELATIVE HUMIDITY (%)              | 10 - 70       | 50.0            | 44.0      | 50.0            | 50.0      |
| PROBE SPEED (m/s)                  | 4.27 - 4.33   | 4.27            | 4.30      | 4.33            | 4.33      |
| UPPER RIB (g's)                    | 37 - 46       | 42.57           | 38.67     | 45.62           | 41.22     |
| LOWER RIB (g's)                    | 37 - 46       | 42.28           | 37.55     | 45.12           | 40.58     |
| LOWER SPINE (g's)                  | 15 - 22       | 21.24           | 19.81     | 21.55           | 18.77     |
| <b>PELVIS IMPACT</b>               |               |                 |           |                 |           |
| TEMPERATURE (° C)                  | 18.9 - 25.5   | 21.1            | 21.1      | 21.1            | 21.1      |
| RELATIVE HUMIDITY (%)              | 10 - 70       | 50.0            | 50.0      | 50.0            | 50.0      |
| PROBE SPEED (m/s)                  | 4.27 - 4.33   | 4.30            | 4.32      | 4.30            | 4.27      |
| PELVIS (g's)                       | 40 - 60       | 42.97           | 48.49     | 41.41           | 54.47     |

**REMARKS:** None

**CALIBRATION TEST RESULTS**

**PRE-TEST**

**SID H3 NO.: 270**

**CONFIGURED FOR LEFT SIDE IMPACT**

**CALIBRATION TEST RESULTS SUMMARY  
PRE-TEST**

**CONFIGURED FOR LEFT SIDE IMPACT**

SID H3 Serial No.: 270 Sequential Test Number: 1  
Date: JULY 2006 Laboratory Technician: B. Swiecicki

| TEST                         | COMMENTS                 |
|------------------------------|--------------------------|
| EXTERNAL DIMENSIONS          | Passed all requirements. |
| THORACIC SHOCK ABSORBER TEST | Passed all requirements. |
| LATERAL THORAX IMPACT TEST   | Passed all requirements. |
| LATERAL PELVIS IMPACT TEST   | Passed all requirements. |
| HEAD DROP TEST*              | Passed all requirements. |
| LATERAL NECK BEND TEST*      | Passed all requirements. |
| ABDOMINAL COMPRESSION TEST*  | Passed all requirements. |
| LUMBAR FLEXION TEST*         | Passed all requirements. |

\* Test not required for SID certification.

**REMARKS:** None

**EXTERNAL DIMENSIONS  
PRE-TEST**

**CONFIGURED FOR LEFT SIDE IMPACT**

SID H3 Serial No.: 270 Sequential Test Number: 1  
Date: JULY 2006 Laboratory Technician: B. Swiecicki

| TEST PARAMETER                     | SPECIFICATION | TEST RESULTS |
|------------------------------------|---------------|--------------|
| SH- Seated Height (mm)             | 889 – 909     | 899          |
| RH- Rib Height (mm)                | 502 – 520     | 505          |
| HP- Hip Pivot Height (mm)          | 99 ref.       | 99           |
| RD- Rib from Back Line (mm)        | 229 – 241     | 234          |
| KH- Knee Pivot from Back Line (mm) | 511 – 526     | 516          |
| KV- Knee Pivot to Floor (mm)       | 490 – 505     | 495          |
| HW- Hip Width (mm)                 | 356 - 391     | 381          |

**REMARKS:** None

# Shock Impact - Low ( 3.05 m/s )

## PRE TEST

### CONFIGURED FOR LEFT SIDE IMPACT

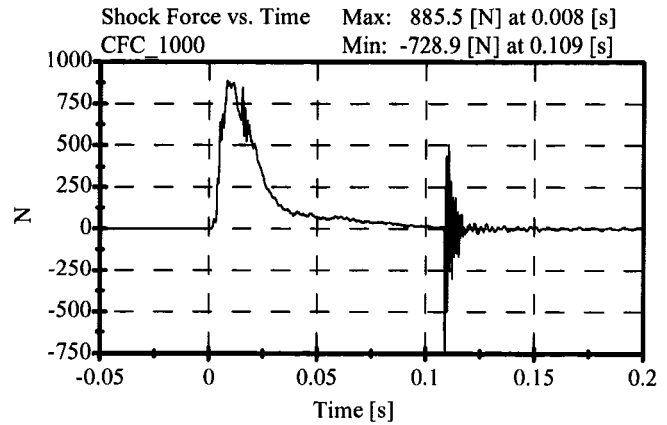
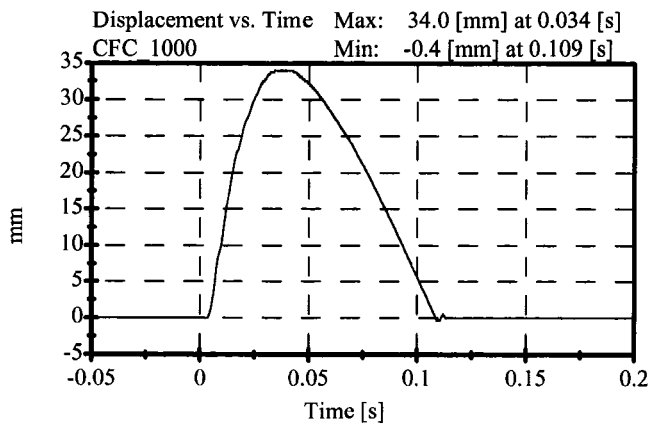
ATD Serial No: 270

Date: 09-29-05

Sequential Test Number: 1 File: 270SL1 09-29-05

Laboratory Technician: B. Swiecicki

| <u>TEST PARAMETER</u>  | <u>SPECIFICATION</u> | <u>TEST RESULTS</u> | <u>STATUS</u> |
|------------------------|----------------------|---------------------|---------------|
| Lab Temperature:       | 18.9-25.5 C          | 21.1 C              | Passed        |
| Lab Humidity:          | 10-70 %              | 37.00 %             | Passed        |
| Displacement:          | 30.00-35.00 mm       | 34.00 mm            | Passed        |
| Maximum Force:         | 836.00-1125.00 N     | 885.47 N            | Passed        |
| Impact Test Velocity:  | 3.05 m/s             |                     |               |
| Damper Identification: | 270                  |                     |               |
| Damper Setting:        | 5                    |                     |               |



# Shock - Med ( 4.27 m/s )

## PRE TEST

### CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 270

Date: 09-29-05

Sequential Test Number: 1 File: 270SM1 09-29-05

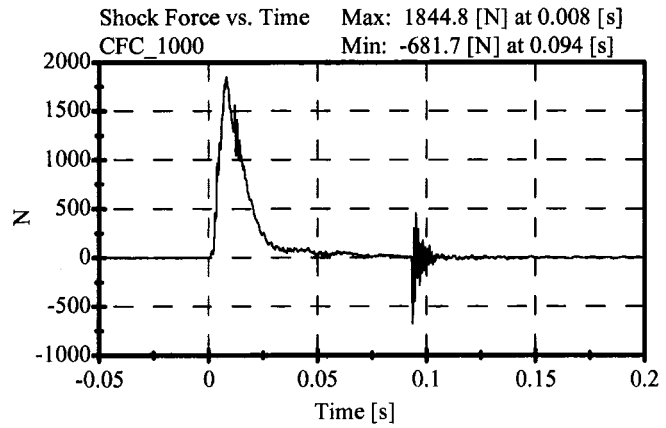
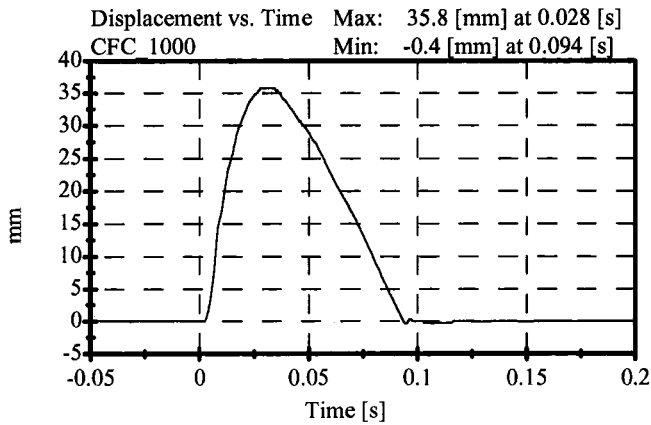
Laboratory Technician: B. Swiecicki

| TEST PARAMETER   | SPECIFICATION     | TEST RESULTS | STATUS |
|------------------|-------------------|--------------|--------|
| Lab Temperature: | 18.9-25.5 C       | 21.1 C       | Passed |
| Lab Humidity:    | 10-70 %           | 37.00 %      | Passed |
| Displacement:    | 32.00-37.00 mm    | 35.76 mm     | Passed |
| Maximum Force:   | 1730.00-2099.00 N | 1844.81 N    | Passed |

Impact Test Velocity: 4.27 m/s

Damper Identification: 270

Damper Setting: 5

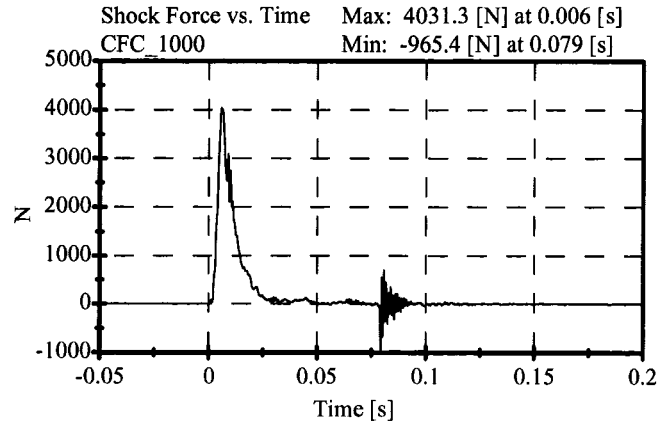
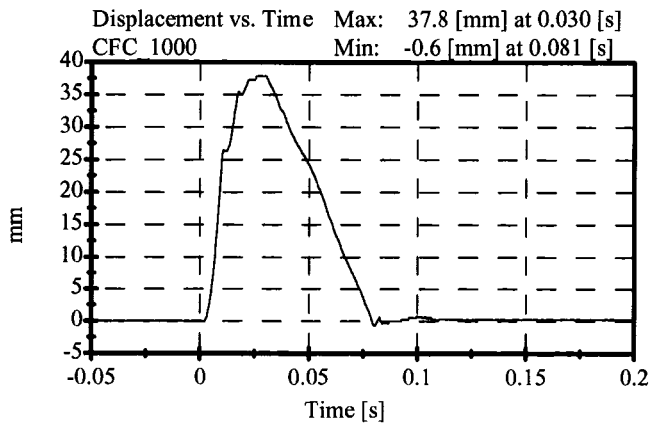


**Shock Impact - high ( 6.10 m/s )**  
**PRE TEST**  
**CONFIGURED FOR LEFT SIDE IMPACT**

ATD Serial No: 270  
Date: 09-29-05

Sequential Test Number: 1 File: 270SH 09-29-05  
Laboratory Technician: B. Swiecicki

| <u>TEST PARAMETER</u>  | <u>SPECIFICATION</u> | <u>TEST RESULTS</u> | <u>STATUS</u> |
|------------------------|----------------------|---------------------|---------------|
| Lab Temperature:       | 18.9-25.5 C          | 21.1 C              | Passed        |
| Lab Humidity:          | 10-70 %              | 37.00 %             | Passed        |
| Displacement:          | 33.00-40.00 mm       | 37.82 mm            | Passed        |
| Maximum Force:         | 3741.00-4448.00 N    | 4031.26 N           | Passed        |
| Impact Test Velocity:  | 6.10 m/s             |                     |               |
| Damper Identification: | 270                  |                     |               |
| Damper Setting:        | 5                    |                     |               |



# SID Thorax Test Test S/N:270

## Pre-Test

### CONFIGURED FOR LEFT SIDE IMPACT

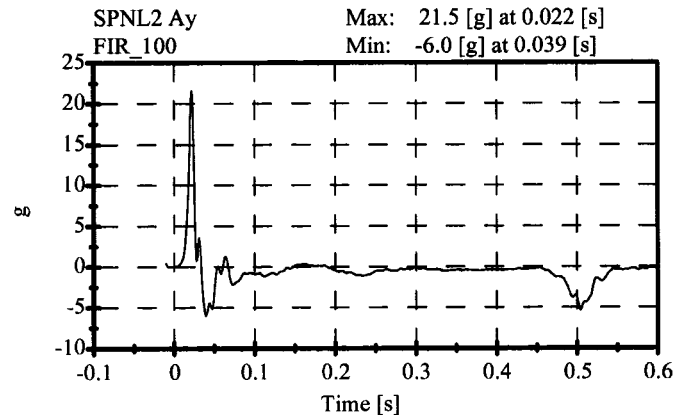
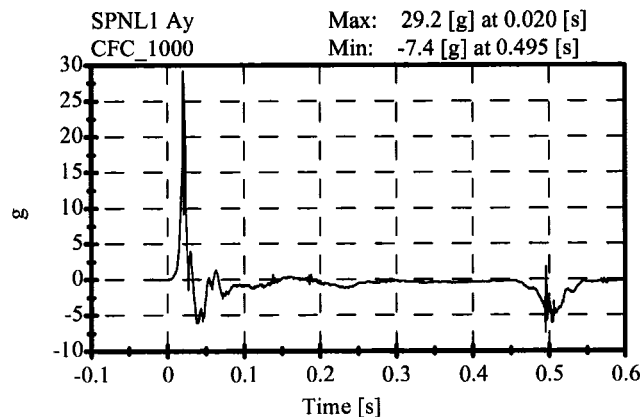
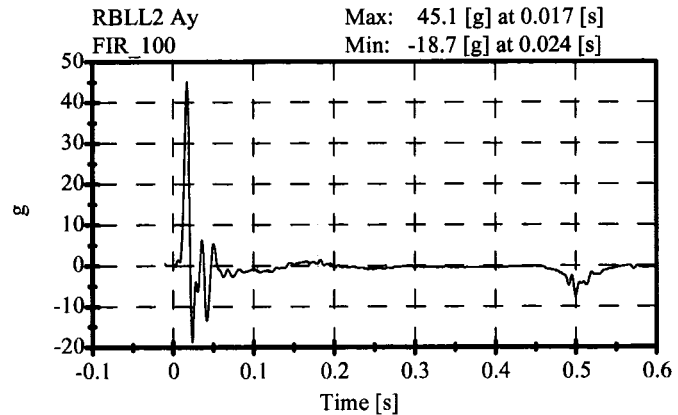
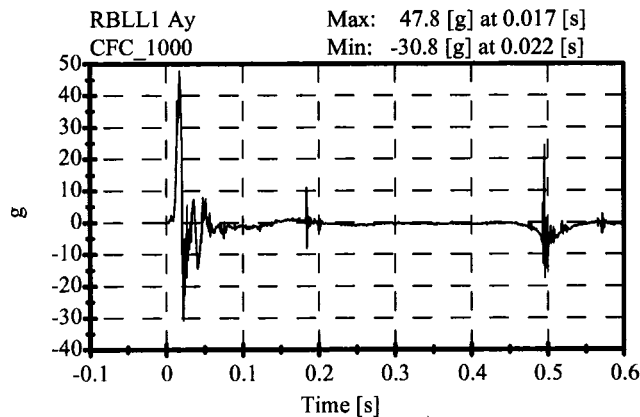
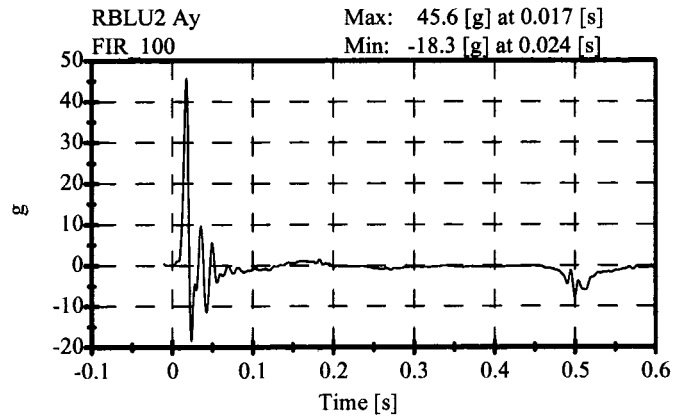
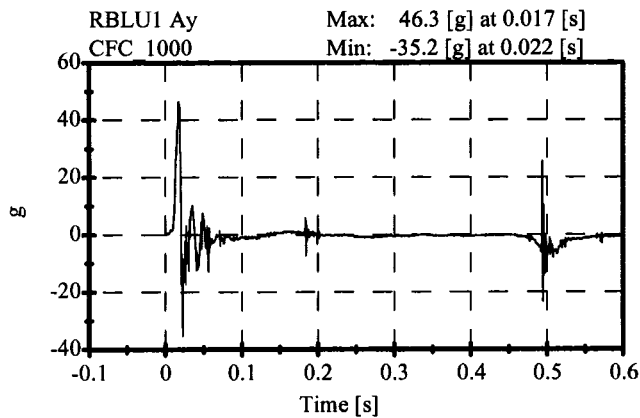
ATD Serial No: 270

Date: July 21, 2006

Sequential Test Number: 1 File: test1

Laboratory Technician: B. Swiecicki

| TEST PARAMETER            | SPECIFICATION  | TEST RESULTS | STATUS |
|---------------------------|----------------|--------------|--------|
| Lab Temperature:          | 18.9-25.5 C    | 21.1 C       | Passed |
| Lab Humidity:             | 10-70 %        | 50.00 %      | Passed |
| Probe Velocity:           | 4.27- 4.33 m/s | 4.33 m/s     | Passed |
| Upper Rib Acceleration:   | 37.00-46.00 g  | 45.62 g      | Passed |
| Lower Rib Acceleration:   | 37.00-46.00 g  | 45.12 g      | Passed |
| Lower Spine Acceleration: | 15.00-22.00 g  | 21.55 g      | Passed |



# SID Pelvic Test S/N:270

## Pre-Test

### CONFIGURED FOR LEFT SIDE IMPACT

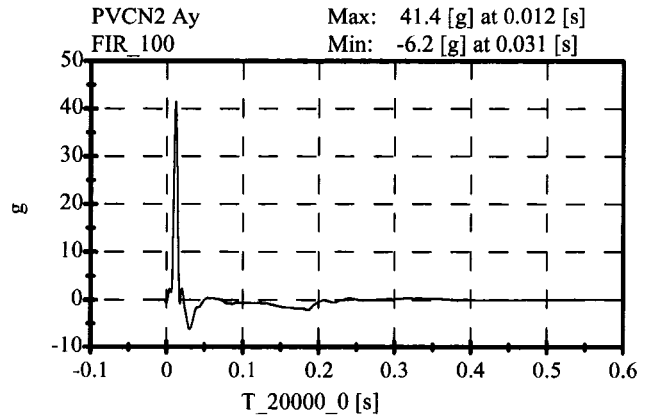
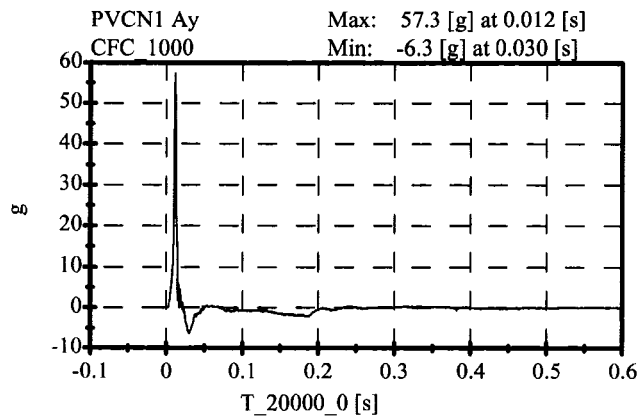
ATD Serial No: 270

Date: July 21, 2006

Sequential Test Number: 1 File: test1

Laboratory Technician: B. Swiecicki

| TEST PARAMETER         | SPECIFICATION  | TEST RESULTS | STATUS |
|------------------------|----------------|--------------|--------|
| Lab Temperature:       | 18.9-25.5 C    | 21.1 C       | Passed |
| Lab Humidity:          | 10-70 %        | 30.00 %      | Passed |
| Probe Velocity:        | 4.27- 4.33 m/s | 4.30 m/s     | Passed |
| Pelvis Y Acceleration: | 40.00-60.00 g  | 41.41 g      | Passed |
| Time Above 20 Gs       | 3.0-7.0 ms     | 5.3 ms       | Passed |



# SID HYIII Head Drop Test S/N:270

## Pre-Test

### CONFIGURED FOR LEFT SIDE IMPACT

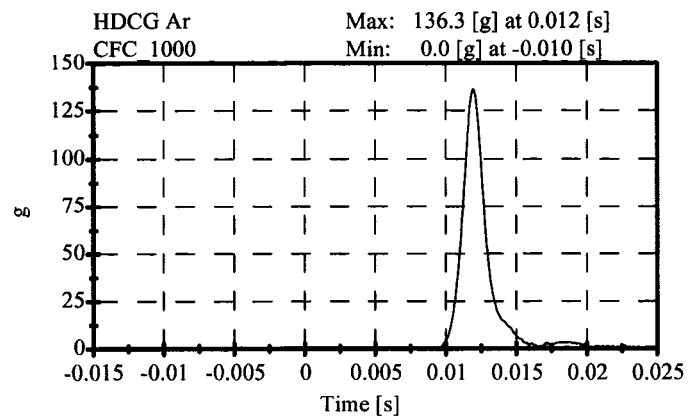
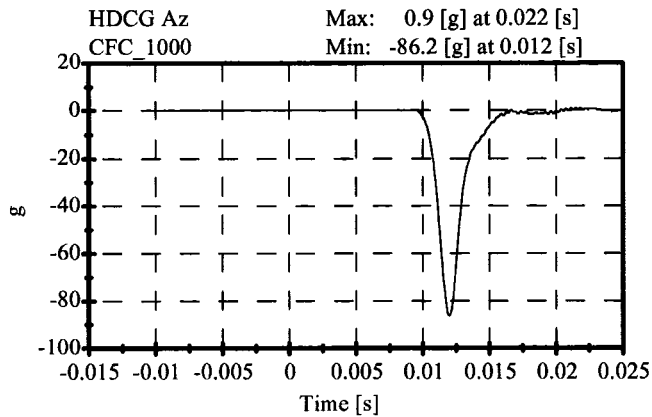
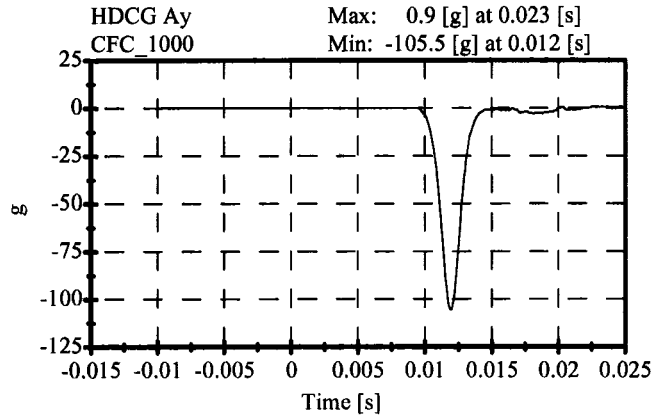
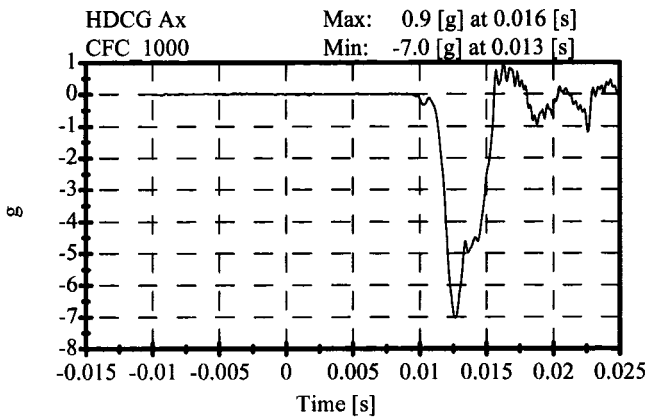
ATD Serial No: 270

Date: July 18, 2006

Sequential Test Number: 1 File: 1001

Laboratory Technician: B. Swiecicki

| TEST PARAMETER          | SPECIFICATION | TEST RESULTS | STATUS |
|-------------------------|---------------|--------------|--------|
| Lab Temperature:        | 18.9-25.6 C   | 21.1 C       | Passed |
| Lab Humidity:           | 10-70 %       | 50.00 %      | Passed |
| Peak Resultant Accel.:  | 120-150 Gs    | 136.29 Gs    | Passed |
| Peak Lateral Accel.:    | 15 Gs Max     | 0.94 Gs      | Passed |
| Curve PerCent NonModal: | < 15%         | 2.42 %       | Passed |



**SID Head Neck Test 1 S/N:270****Pre-Test****CONFIGURED FOR LEFT SIDE IMPACT**

ATD Serial No: 270

Sequential Test Number: 1 File: tst1

Date: July 21, 2006

Laboratory Technician: B. Swiecicki

| <u>TEST PARAMETER</u>                                           | <u>SPECIFICATION</u> | <u>TEST RESULTS</u> | <u>STATUS</u> |
|-----------------------------------------------------------------|----------------------|---------------------|---------------|
| Lab Temperature:                                                | 20.6-22.2 C          | 21.1 C              | Passed        |
| Lab Humidity:                                                   | 10-70 %              | 50.00 %             | Passed        |
| Impact Velocity:                                                | 6.89- 7.13 m/s       | 7.01 m/s            | Passed        |
| PENDULUM DELTA V                                                |                      |                     |               |
| Delta V at 10 ms:                                               | 1.96- 2.55 m/s       | 2.32 m/s            | Passed        |
| Delta V at 20 ms:                                               | 4.12- 5.10 m/s       | 4.73 m/s            | Passed        |
| Delta V at 30 ms:                                               | 5.73- 7.01 m/s       | 6.84 m/s            | Passed        |
| Delta V between 40-70 ms:                                       | 6.27- 7.64 m/s       | 7.62 m/s            | Passed        |
| D PLANE ROTATION                                                |                      |                     |               |
| Maximum Rotation:                                               | 66.0-82.0 Deg        | 67.68 Deg           | Passed        |
| Rotation Angle Decay:                                           | 58.0-67.0 ms         | 60.05 ms            | Passed        |
| MOMENT ABOUT THE OCCIPITAL CONDYLE                              |                      |                     |               |
| Max Occipital Moment:                                           | 73.00- 88.00 N-m     | 86.02 N-m           | Passed        |
| Occipital Moment Decay:                                         | 49.0-64.0 ms         | 55.05 ms            | Passed        |
| HEAD ROTATION TIME WITH RESPECT TO THE OCCIPITAL CONDYLE MOMENT |                      |                     |               |
| Moment to Rotation Peak:                                        | 2.0-16.0 ms          | 10.30 ms            | Passed        |

# SID Head Neck Test 1 S/N:270

## Pre-Test

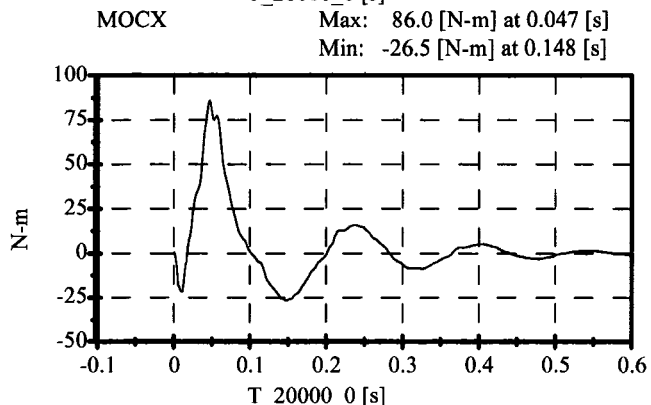
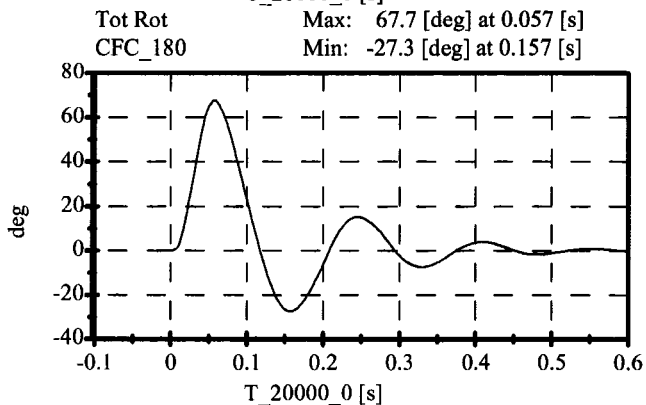
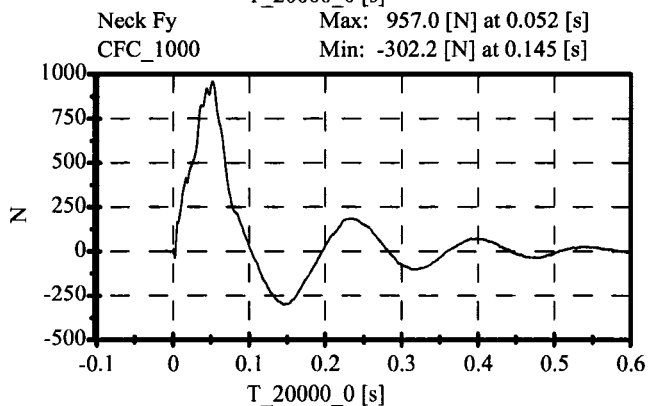
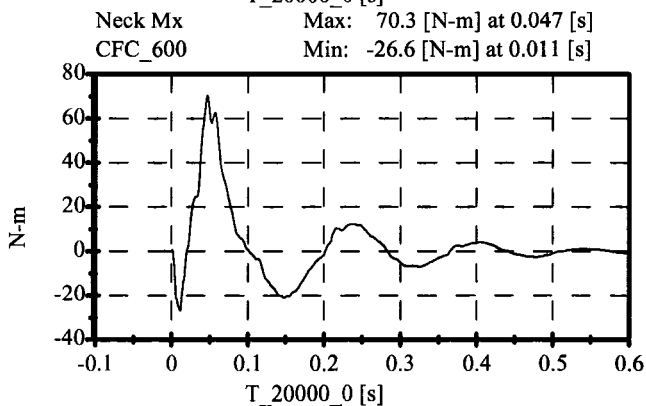
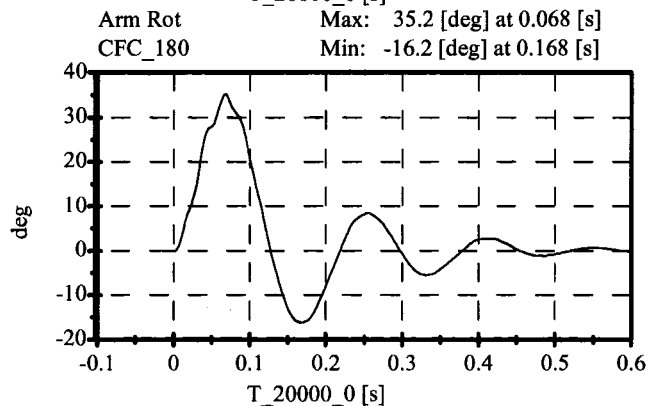
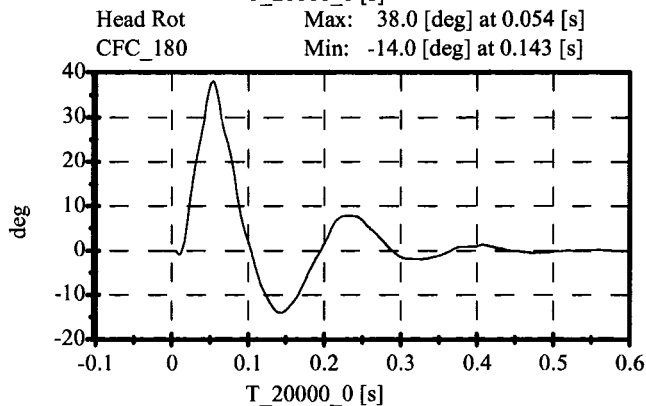
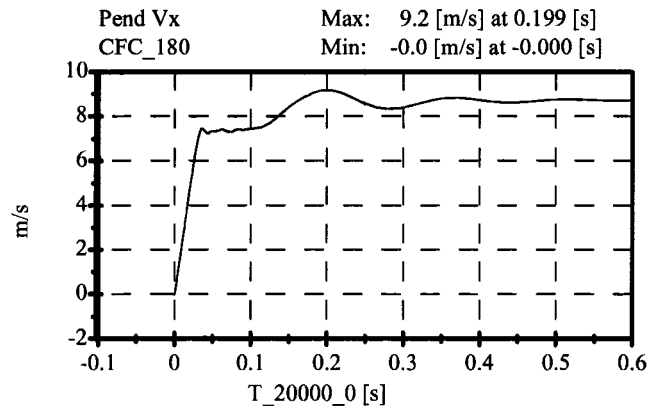
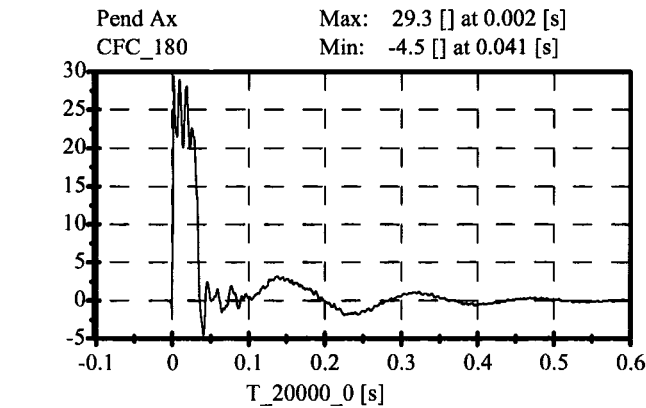
### CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 270

Date: July 21, 2006

Sequential Test Number: 1 File: tst1

Laboratory Technician: B. Swiecicki



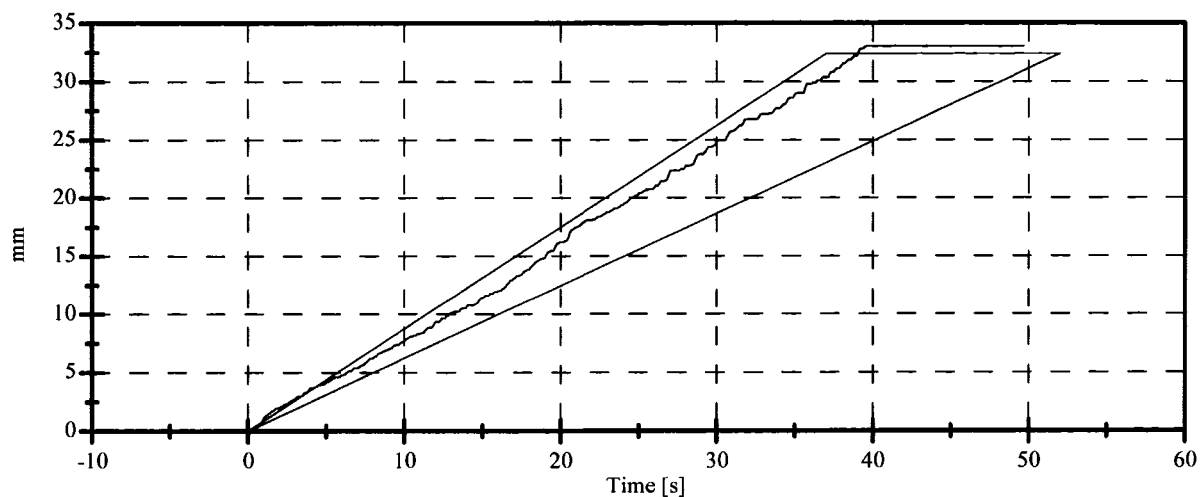
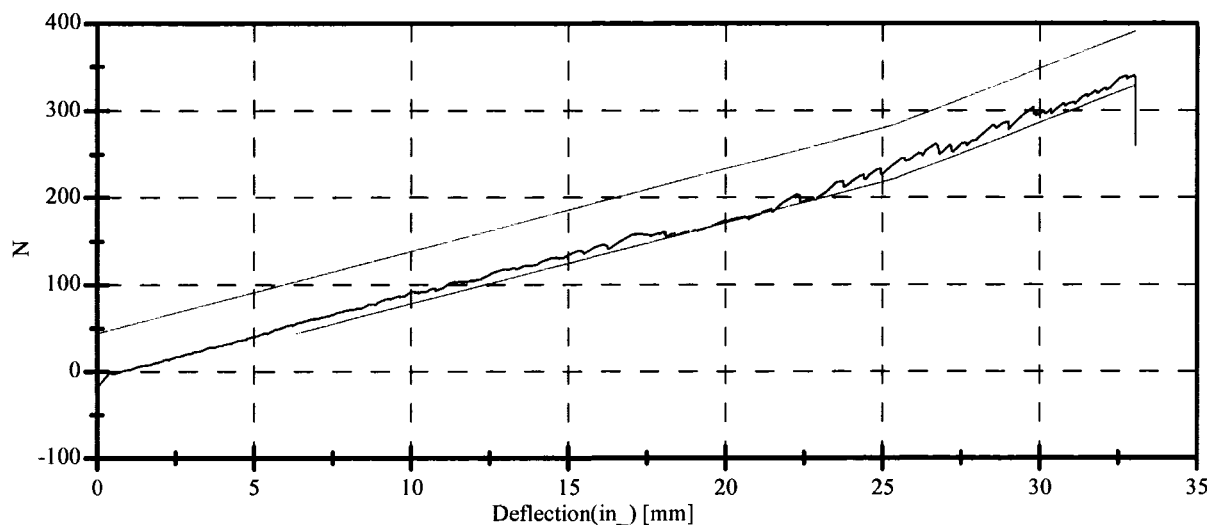
**SID Abdominal  
Pre-Test  
CONFIGURED FOR LEFT SIDE IMPACT**

ATD Serial No: 270  
Date: July 24, 2006

Sequential Test Number: 1 File: abdominal test 3 270test6  
Laboratory Technician: B. Swiecicki

| <u>TEST PARAMETER</u> | <u>SPECIFICATION</u> | <u>TEST RESULTS</u> | <u>STATUS</u> |
|-----------------------|----------------------|---------------------|---------------|
| Lab Temperature:      | 18.9-25.5 C          | 21.1 C              | Passed        |
| Lab Humidity:         | 10-70 %              | 50.00 %             | Passed        |
| Force at 12.95 mm :   | 104.00-162.00 N      | 117.90 N            | Passed        |
| Force at 19.05 mm :   | 162.98-220.99 N      | 162.99 N            | Passed        |
| Force at 25.40 mm :   | 221.97-280.02 N      | 235.73 N            | Passed        |
| Force at 33.02 mm :   | 324.99-391.00 N      | 338.28 N            | Passed        |

**ABDOMINAL COMPRESSION TEST**



## SID 270 LUMBAR SPINE BEND TEST

### Pre-Test

### CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 270

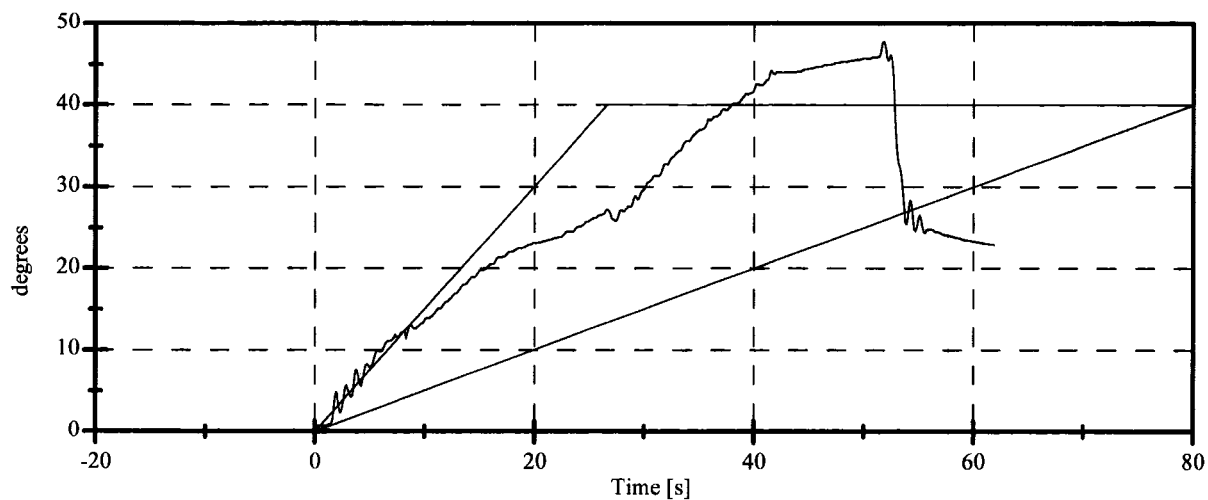
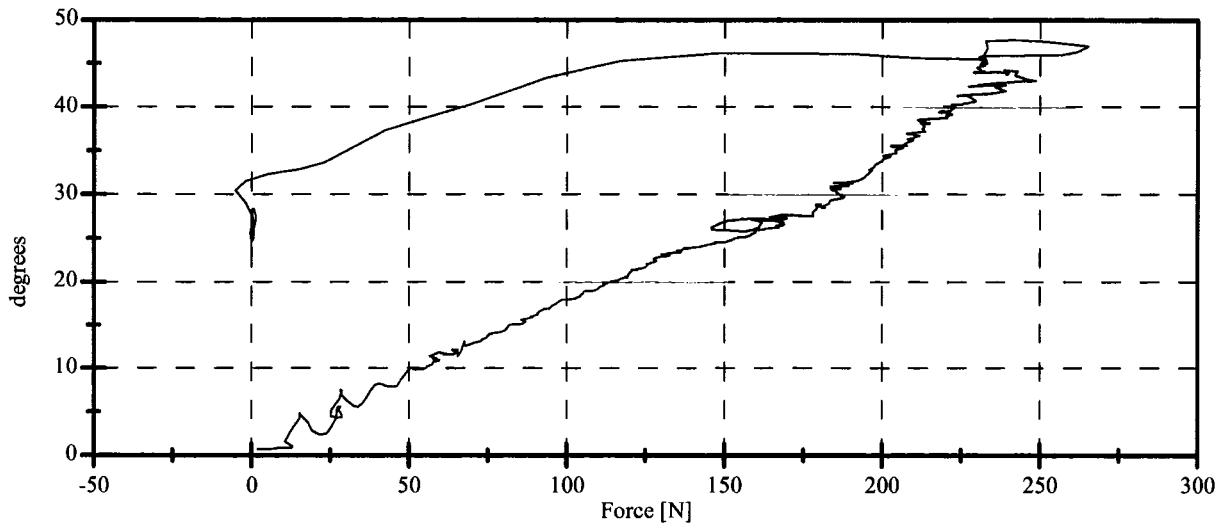
Date: Julyu 24, 2006

Sequential Test Number: 1 File: spine bend 270test1

Laboratory Technician: B. Swiecicki

| <u>TEST PARAMETER</u> | <u>SPECIFICATION</u> | <u>TEST RESULTS</u> | <u>STATUS</u> |
|-----------------------|----------------------|---------------------|---------------|
| Lab Temperature:      | 18.9-25.5 C          | 21.1 C              | Passed        |
| Lab Humidity:         | 10-70 %              | 50.00 %             | Passed        |
| Force at 0 Deg:       | 0.00-26.69 N         | 1.96 N              | Passed        |
| Force at 20 Deg:      | 97.86-151.24 N       | 114.26 N            | Passed        |
| Force at 30 Deg:      | 151.24-204.62 N      | 186.86 N            | Passed        |
| Force at 40 Deg:      | 204.62-258.00 N      | 219.77 N            | Passed        |
| Return Angle          | 12 Deg Max           | 8.53 deg            | Passed        |

## LUMBAR SPINE FLEXION TEST



**PRE-TEST DUMMY INSPECTION LIST**  
**CONFIGURED FOR LEFT SIDE IMPACT**

SID H3 Serial No.: 270 Sequential Test Number: 1  
 Date: JULY 2006 Laboratory Technician: B. Swiecicki

| PART         | ITEMS CHECKED                                  | COMMENTS |
|--------------|------------------------------------------------|----------|
| SKIN         | VISUAL INSPECTION                              | OK       |
| HEAD         | VISUAL, BALLAST, ACCELEROMETER MOUNT           | OK       |
| NECK         | VISUAL, CABLE TORQUE                           | OK       |
| SPINE BOX    | VISUAL, BALLAST, WELDMENT, ACCELEROMETER MOUNT | OK       |
| RIB CAGE     | VISUAL, MEASURE, STIFFENERS                    | OK       |
| STERNUM      | VISUAL                                         | OK       |
| LUMBAR SPINE | VISUAL                                         | OK       |
| ABDOMEN      | VISUAL                                         | OK       |
| PELVIS       | VISUAL, PALPATE, ACCELEROMETER MOUNT           | OK       |
| UPPER LEGS   | VISUAL                                         | OK       |
| KNEES        | VISUAL, STOPS, INSERTS                         | OK       |
| LOWER LEGS   | VISUAL, RANGE OF MOTION                        | OK       |
| ANKLES       | VISUAL, RANGE OF MOTION                        | OK       |
| FEET         | VISUAL, RANGE OF MOTION                        | OK       |
| JOINTS       | 1 TO 2 g RANGE                                 | OK       |
| OTHER        | NONE                                           | -        |

**REMARKS:** None

**CALIBRATION TEST RESULTS**

**PRE-TEST**

**SID H3 NO.: 269**

**CONFIGURED FOR LEFT SIDE IMPACT**

**CALIBRATION TEST RESULTS SUMMARY  
PRE-TEST**

**CONFIGURED FOR LEFT SIDE IMPACT**

SID H3 Serial No.: 269 Sequential Test Number: 1  
Date: JULY 2006 Laboratory Technician: B. Swiecicki

| TEST                         | COMMENTS                 |
|------------------------------|--------------------------|
| EXTERNAL DIMENSIONS          | Passed all requirements. |
| THORACIC SHOCK ABSORBER TEST | Passed all requirements. |
| LATERAL THORAX IMPACT TEST   | Passed all requirements. |
| LATERAL PELVIS IMPACT TEST   | Passed all requirements. |
| HEAD DROP TEST*              | Passed all requirements. |
| LATERAL NECK BEND TEST*      | Passed all requirements. |
| ABDOMINAL COMPRESSION TEST*  | Passed all requirements. |
| LUMBAR FLEXION TEST*         | Passed all requirements. |

\* Test not required for SID certification.

**REMARKS:** None

**EXTERNAL DIMENSIONS  
PRE-TEST**

**CONFIGURED FOR LEFT SIDE IMPACT**

SID H3 Serial No.: 269 Sequential Test Number: 1  
Date: JULY 2006 Laboratory Technician: B. Swiecicki

| TEST PARAMETER                     | SPECIFICATION | TEST RESULTS |
|------------------------------------|---------------|--------------|
| SH- Seated Height (mm)             | 889 - 909     | 899          |
| RH- Rib Height (mm)                | 502 - 520     | 508          |
| HP- Hip Pivot Height (mm)          | 99 ref.       | 99           |
| RD- Rib from Back Line (mm)        | 229 - 241     | 234          |
| KH- Knee Pivot from Back Line (mm) | 511 - 526     | 516          |
| KV- Knee Pivot to Floor (mm)       | 490 - 505     | 495          |
| HW- Hip Width (mm)                 | 356 - 391     | 378          |

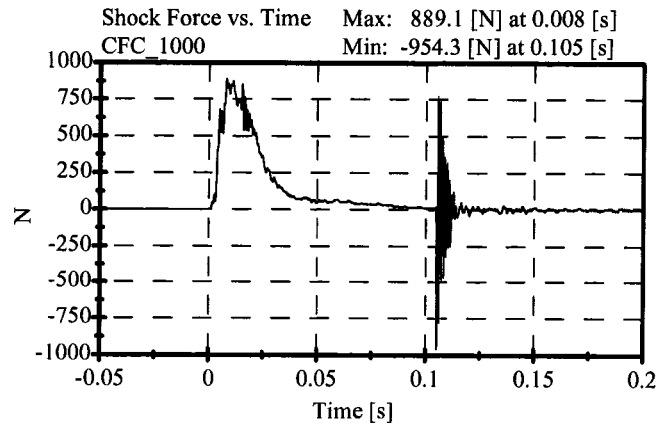
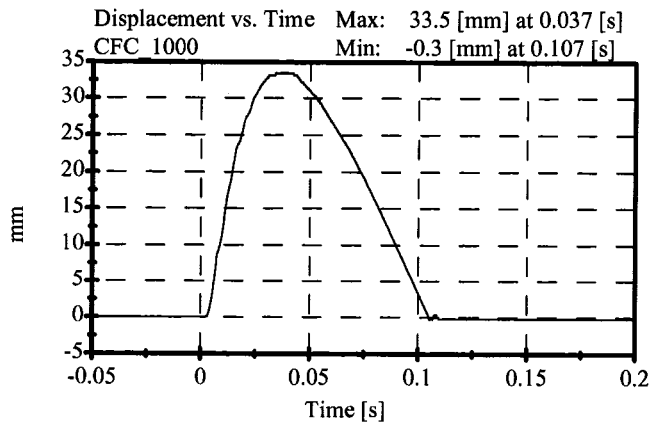
**REMARKS:** None

**Shock Impact - low ( 3.05 m/s )**  
**PRE TEST**  
**CONFIGURED FOR LEFT SIDE IMPACT**

ATD Serial No: 269  
Date: 09-29-05

Sequential Test Number: 1 File: 269SL6 09-29-05  
Laboratory Technician: B. Swiecicki

| <u>TEST PARAMETER</u>  | <u>SPECIFICATION</u> | <u>TEST RESULTS</u> | <u>STATUS</u> |
|------------------------|----------------------|---------------------|---------------|
| Lab Temperature:       | 18.9-25.5 C          | 21.1 C              | Passed        |
| Lab Humidity:          | 10-70 %              | 37.00 %             | Passed        |
| Displacement:          | 30.00-35.00 mm       | 33.51 mm            | Passed        |
| Maximum Force:         | 836.00-1125.00 N     | 889.08 N            | Passed        |
| Impact Test Velocity:  | 3.05 m/s             |                     |               |
| Damper Identification: | 269                  |                     |               |
| Damper Setting:        | 5                    |                     |               |



# Shock Impact - med ( 4.27 m/s )

## PRE TEST

### CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 269

Date: 09-29-05

Sequential Test Number: 1 File: 269SM 09-29-05

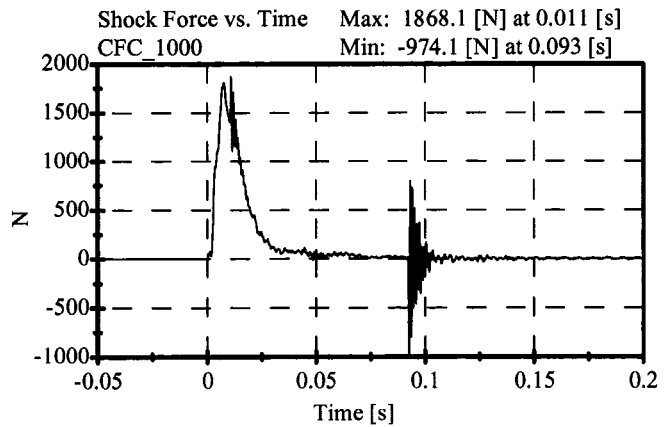
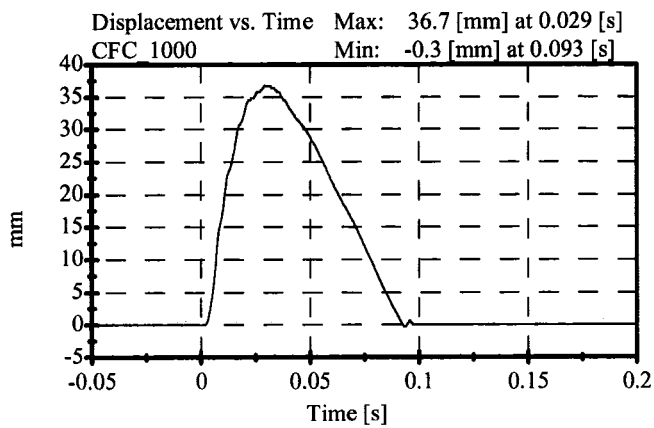
Laboratory Technician: B. Swiecicki

| TEST PARAMETER   | SPECIFICATION     | TEST RESULTS | STATUS |
|------------------|-------------------|--------------|--------|
| Lab Temperature: | 18.9-25.5 C       | 21.1 C       | Passed |
| Lab Humidity:    | 10-70 %           | 37.00 %      | Passed |
| Displacement:    | 32.00-37.00 mm    | 36.68 mm     | Passed |
| Maximum Force:   | 1730.00-2099.00 N | 1868.14 N    | Passed |

Impact Test Velocity: 4.27 m/s

Damper Identification: 269

Damper Setting: 5



# Shock Impact - high ( 6.10 m/s )

## PRE TEST

### CONFIGURED FOR LEFT SIDE IMPACT

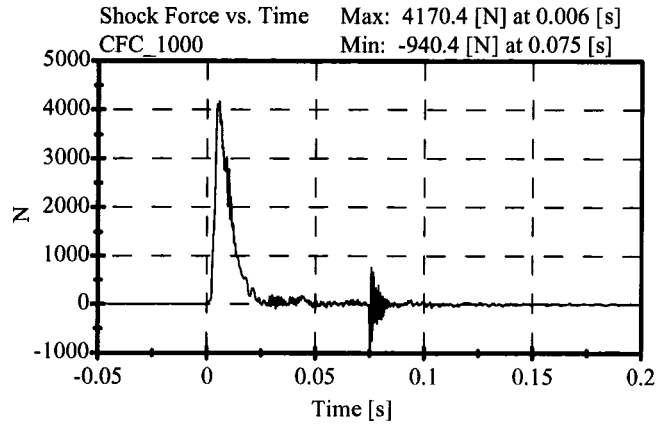
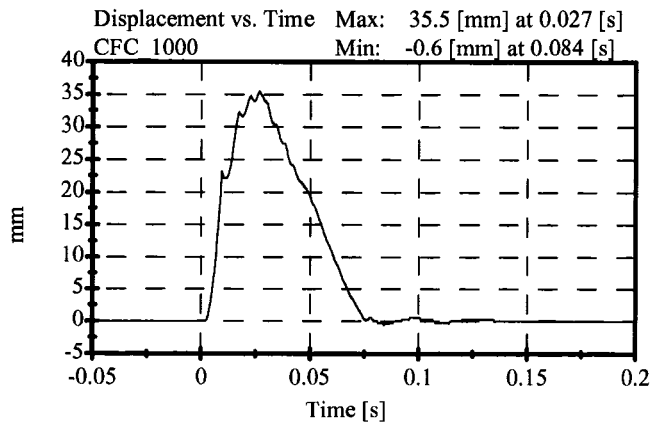
ATD Serial No: 269

Date: 09-29-05

Sequential Test Number: 1 File: 269SH2 09-29-05

Laboratory Technician: B. Swiecicki

| <u>TEST PARAMETER</u>  | <u>SPECIFICATION</u> | <u>TEST RESULTS</u> | <u>STATUS</u> |
|------------------------|----------------------|---------------------|---------------|
| Lab Temperature:       | 18.9-25.5 C          | 21.1 C              | Passed        |
| Lab Humidity:          | 10-70 %              | 36.00 %             | Passed        |
| Displacement:          | 33.00-40.00 mm       | 35.46 mm            | Passed        |
| Maximum Force:         | 3741.00-4448.00 N    | 4170.44 N           | Passed        |
| Impact Test Velocity:  | 6.10 m/s             |                     |               |
| Damper Identification: | 269                  |                     |               |
| Damper Setting:        | 5                    |                     |               |



# SID Thorax Test S/N:269

## Pre-Test

### CONFIGURED FOR LEFT SIDE IMPACT

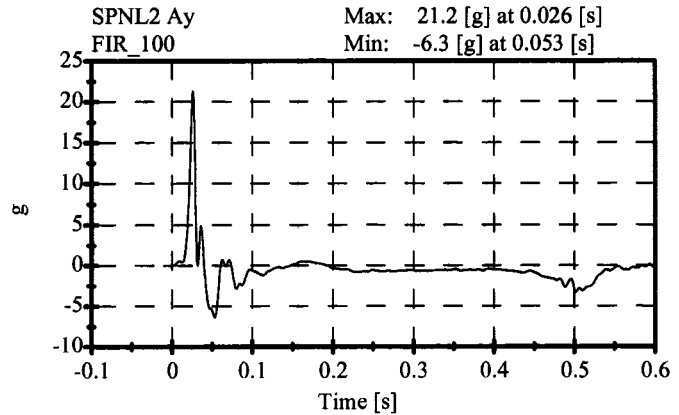
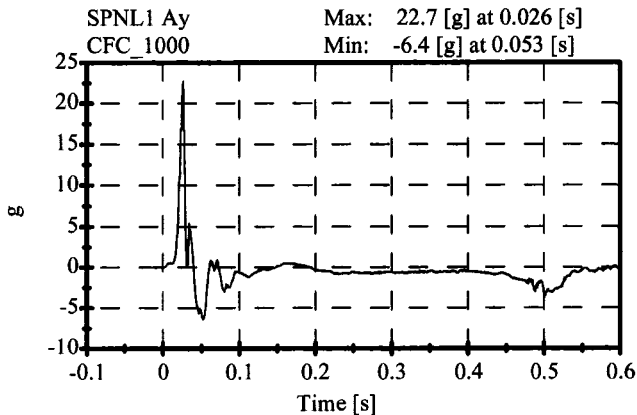
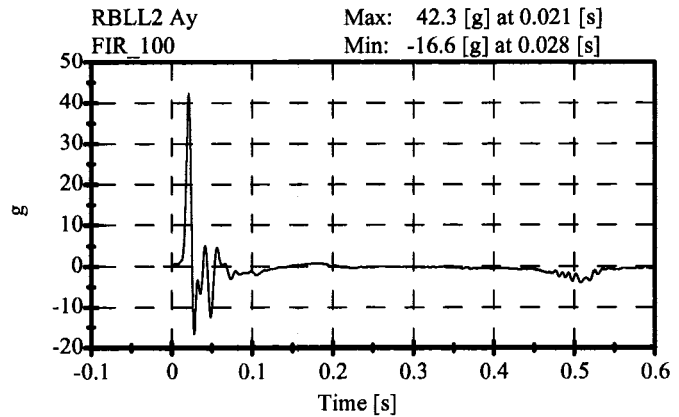
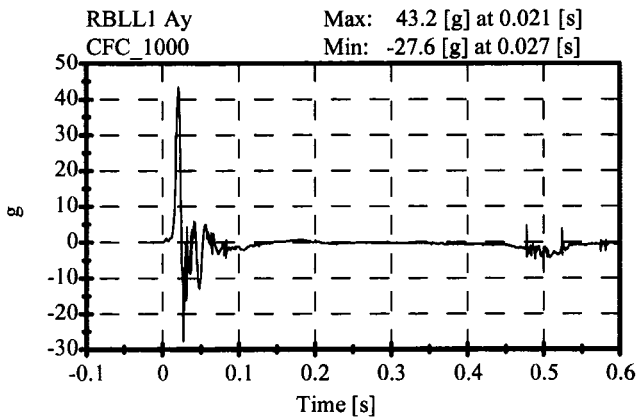
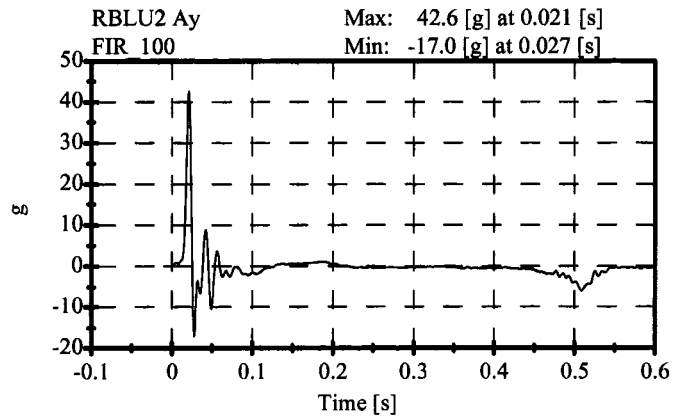
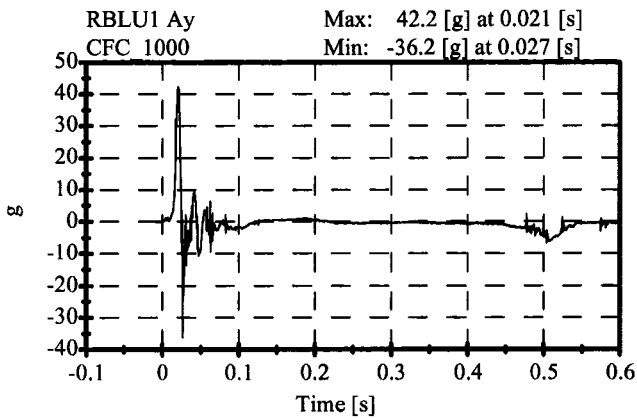
ATD Serial No: 269

Date: July 24, 2006

Sequential Test Number: 1 File: test1

Laboratory Technician: B. Swiecicki

| TEST PARAMETER            | SPECIFICATION  | TEST RESULTS | STATUS |
|---------------------------|----------------|--------------|--------|
| Lab Temperature:          | 18.9-25.5 C    | 21.1 C       | Passed |
| Lab Humidity:             | 10-70 %        | 50.00 %      | Passed |
| Probe Velocity:           | 4.27- 4.33 m/s | 4.27 m/s     | Passed |
| Upper Rib Acceleration:   | 37.00-46.00 g  | 42.57 g      | Passed |
| Lower Rib Acceleration:   | 37.00-46.00 g  | 42.28 g      | Passed |
| Lower Spine Acceleration: | 15.00-22.00 g  | 21.24 g      | Passed |



**SID Pelvic Test S/N:269****Pre-Test****CONFIGURED FOR LEFT SIDE IMPACT**

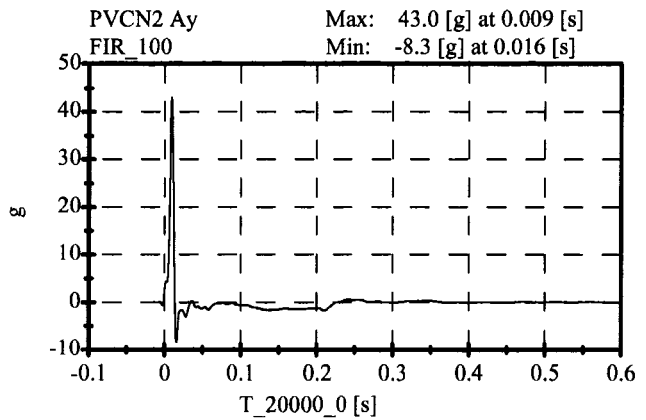
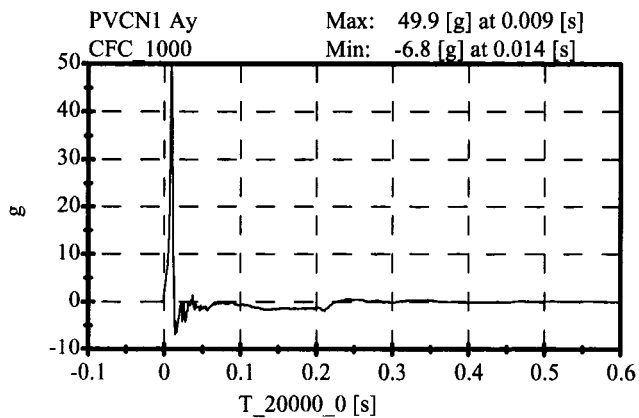
ATD Serial No: 269

Date: July 24, 2006

Sequential Test Number: 1 File: test1

Laboratory Technician: B. Swiecicki

| <u>TEST PARAMETER</u>  | <u>SPECIFICATION</u> | <u>TEST RESULTS</u> | <u>STATUS</u> |
|------------------------|----------------------|---------------------|---------------|
| Lab Temperature:       | 18.9-25.5 C          | 21.1 C              | Passed        |
| Lab Humidity:          | 10-70 %              | 50.00 %             | Passed        |
| Probe Velocity:        | 4.27- 4.33 m/s       | 4.30 m/s            | Passed        |
| Pelvis Y Acceleration: | 40.00-60.00 g        | 42.97 g             | Passed        |
| Time Above 20 Gs       | 3.0-7.0 ms           | 5.5 ms              | Passed        |



# SID HYIII Head Drop Test S/N:269

## Pre-Test

### CONFIGURED FOR LEFT SIDE IMPACT

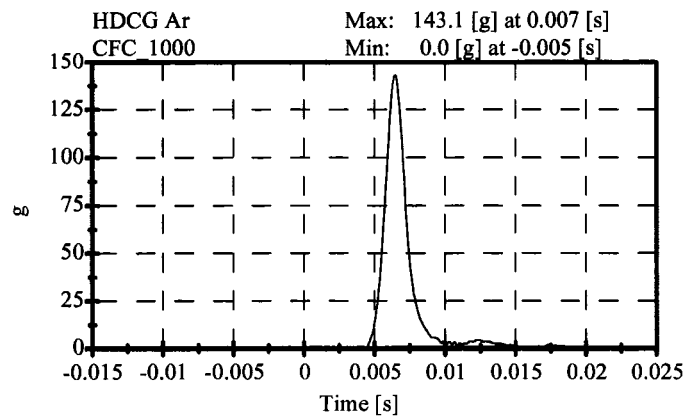
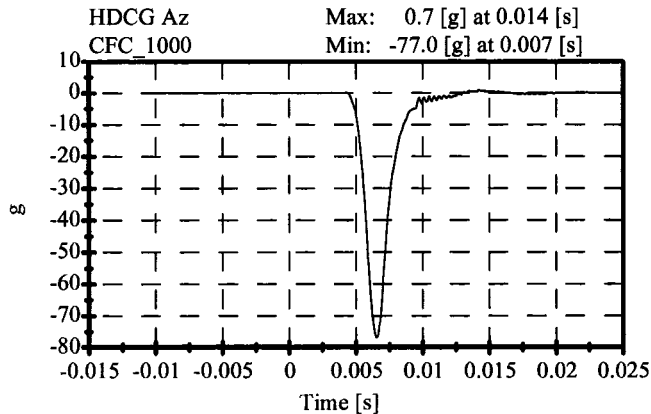
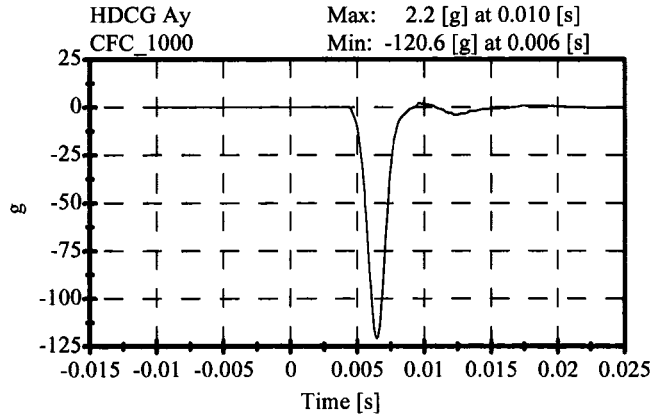
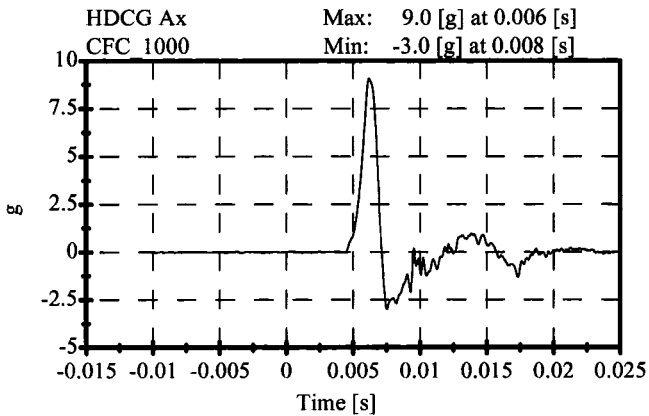
ATD Serial No: 269

Date: July 19, 2006

Sequential Test Number: 1 File: 1001

Laboratory Technician: B. Swiecicki

| TEST PARAMETER          | SPECIFICATION | TEST RESULTS | STATUS |
|-------------------------|---------------|--------------|--------|
| Lab Temperature:        | 18.9-25.6 C   | 21.1 C       | Passed |
| Lab Humidity:           | 10-70 %       | 50.00 %      | Passed |
| Peak Resultant Accel.:  | 120-150 Gs    | 143.11 Gs    | Passed |
| Peak Lateral Accel.:    | 15 Gs Max     | 9.04 Gs      | Passed |
| Curve PerCent NonModal: | < 15%         | 2.91 %       | Passed |



**SID Head Neck Test 1 S/N:269****Pre-Test****CONFIGURED FOR LEFT SIDE IMPACT**

ATD Serial No: 269

Date: July 19, 2006

Sequential Test Number: 1 File: tst1

Laboratory Technician: B. Swiecicki

| <u>TEST PARAMETER</u>                                           | <u>SPECIFICATION</u> | <u>TEST RESULTS</u> | <u>STATUS</u> |
|-----------------------------------------------------------------|----------------------|---------------------|---------------|
| Lab Temperature:                                                | 20.6-22.2 C          | 21.1 C              | Passed        |
| Lab Humidity:                                                   | 10-70 %              | 50.00 %             | Passed        |
| Impact Velocity:                                                | 6.89- 7.13 m/s       | 6.92 m/s            | Passed        |
| PENDULUM DELTA V                                                |                      |                     |               |
| Delta V at 10 ms:                                               | 1.96- 2.55 m/s       | 2.20 m/s            | Passed        |
| Delta V at 20 ms:                                               | 4.12- 5.10 m/s       | 4.64 m/s            | Passed        |
| Delta V at 30 ms:                                               | 5.73- 7.01 m/s       | 6.68 m/s            | Passed        |
| Delta V between 40-70 ms:                                       | 6.27- 7.64 m/s       | 7.41 m/s            | Passed        |
| D PLANE ROTATION                                                |                      |                     |               |
| Maximum Rotation:                                               | 66.0-82.0 Deg        | 66.35 Deg           | Passed        |
| Rotation Angle Decay:                                           | 58.0-67.0 ms         | 62.65 ms            | Passed        |
| MOMENT ABOUT THE OCCIPITAL CONDYLE                              |                      |                     |               |
| Max Occipital Moment:                                           | 73.00- 88.00 N-m     | 77.71 N-m           | Passed        |
| Occipital Moment Decay:                                         | 49.0-64.0 ms         | 58.35 ms            | Passed        |
| HEAD ROTATION TIME WITH RESPECT TO THE OCCIPITAL CONDYLE MOMENT |                      |                     |               |
| Moment to Rotation Peak:                                        | 2.0-16.0 ms          | 12.55 ms            | Passed        |

# SID Head Neck Test 1 S/N:269

## Pre-Test

### CONFIGURED FOR LEFT SIDE IMPACT

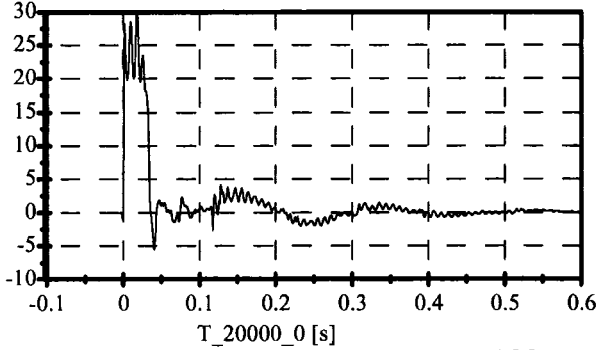
ATD Serial No: 269

Date: July 19, 2006

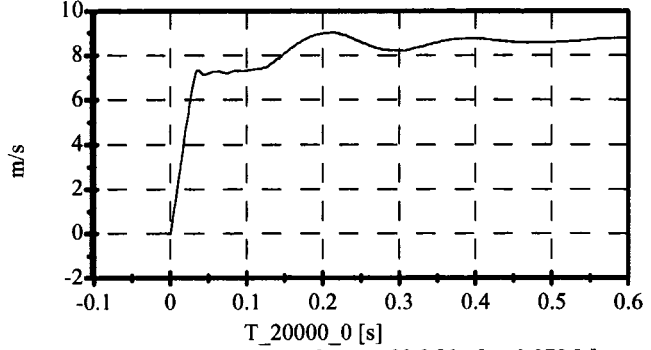
Sequential Test Number: 1 File: tst1

Laboratory Technician: B. Swiecicki

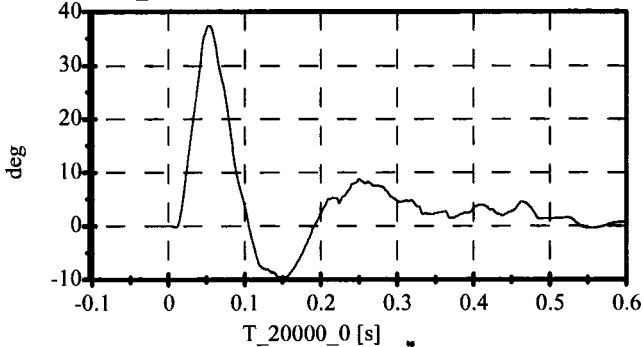
Pend Ax  
CFC\_180  
Max: 29.7 [ ] at 0.018 [s]  
Min: -5.5 [ ] at 0.041 [s]



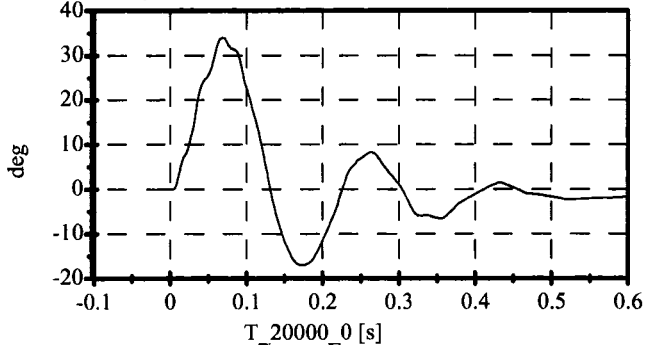
Pend Vx  
CFC\_180  
Max: 9.0 [m/s] at 0.212 [s]  
Min: -0.0 [m/s] at -0.000 [s]



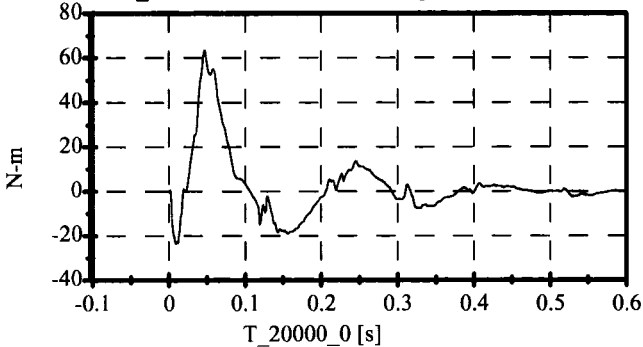
Head Rot  
CFC\_180  
Max: 37.5 [deg] at 0.053 [s]  
Min: -9.6 [deg] at 0.148 [s]



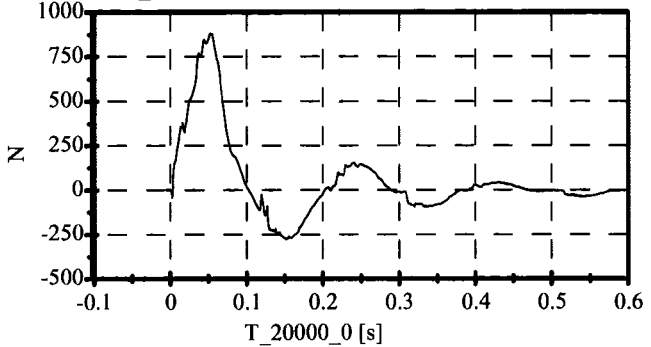
Arm Rot  
CFC\_180  
Max: 33.9 [deg] at 0.070 [s]  
Min: -17.1 [deg] at 0.172 [s]



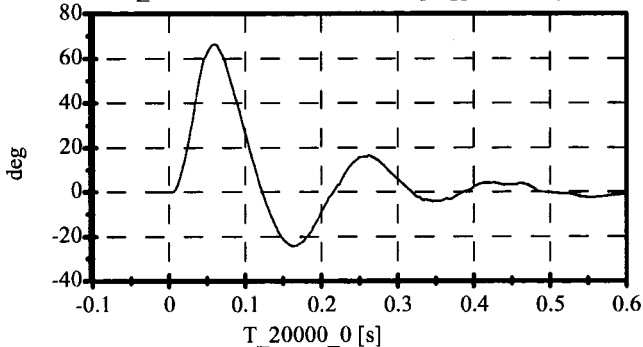
Neck Mx  
CFC\_600  
Max: 63.1 [N-m] at 0.047 [s]  
Min: -23.4 [N-m] at 0.009 [s]



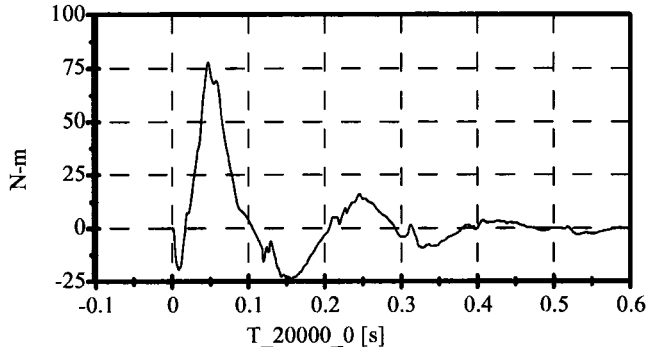
Neck Fy  
CFC\_1000  
Max: 882.0 [N] at 0.052 [s]  
Min: -279.0 [N] at 0.152 [s]



Tot Rot  
CFC\_180  
Max: 66.3 [deg] at 0.060 [s]  
Min: -24.3 [deg] at 0.162 [s]



MOCX  
Max: 77.7 [N-m] at 0.047 [s]  
Min: -23.9 [N-m] at 0.156 [s]



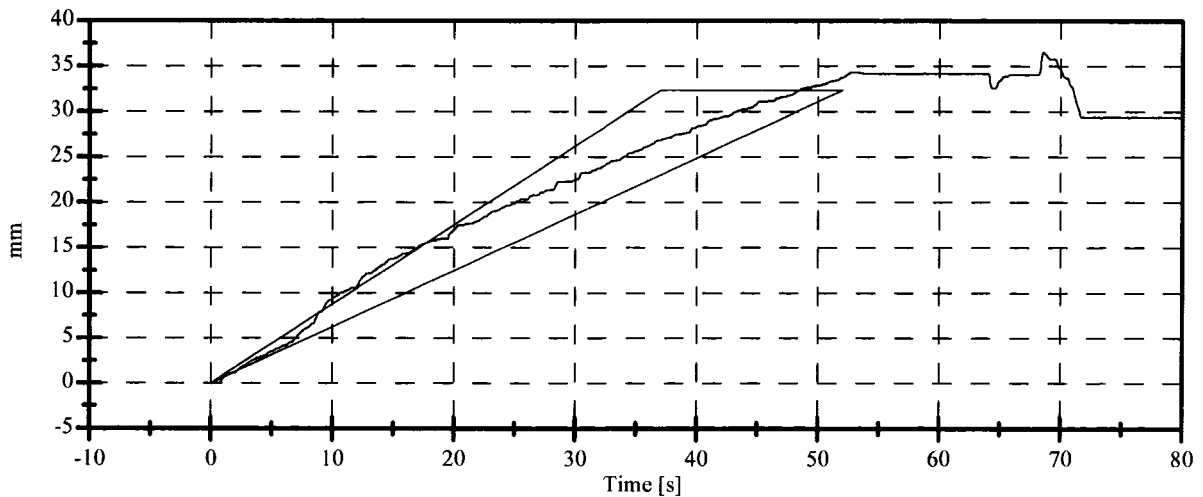
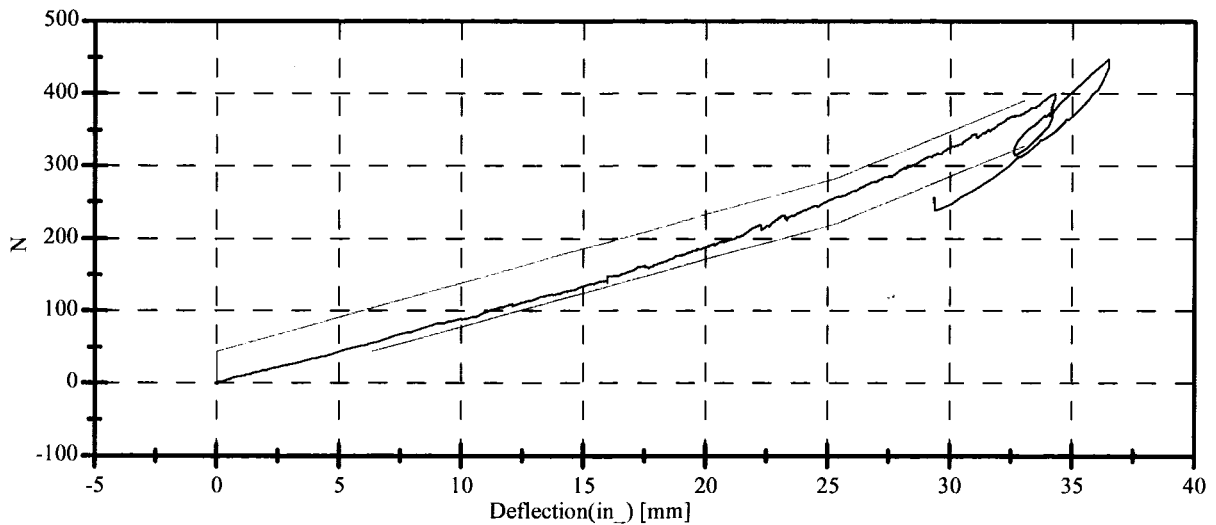
**SID Abdominal Test**  
**Pre-Test**  
**CONFIGURED FOR LEFT SIDE IMPACT**

ATD Serial No: 269  
Date: July 24, 2006

Sequential Test Number: 1 File: abdominal test 2 269test6  
Laboratory Technician: B. Swiecicki

| <u>TEST PARAMETER</u> | <u>SPECIFICATION</u> | <u>TEST RESULTS</u> | <u>STATUS</u> |
|-----------------------|----------------------|---------------------|---------------|
| Lab Temperature:      | 18.9-25.5 C          | 21.1 C              | Passed        |
| Lab Humidity:         | 10-70 %              | 50.00 %             | Passed        |
| Force at 12.95 mm :   | 104.00-162.00 N      | 115.34 N            | Passed        |
| Force at 19.05 mm :   | 162.98-220.99 N      | 176.60 N            | Passed        |
| Force at 25.40 mm :   | 221.97-280.02 N      | 257.80 N            | Passed        |
| Force at 33.02 mm :   | 324.99-391.00 N      | 373.43 N            | Passed        |

**ABDOMINAL COMPRESSION TEST**



## Sid Lumbar Test

### Pre-Test

#### CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 269

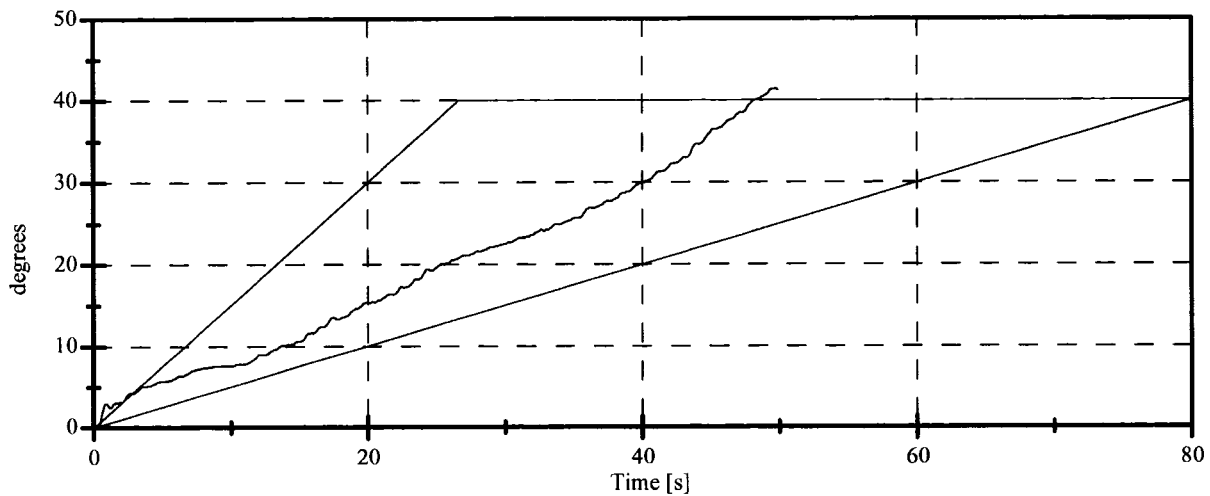
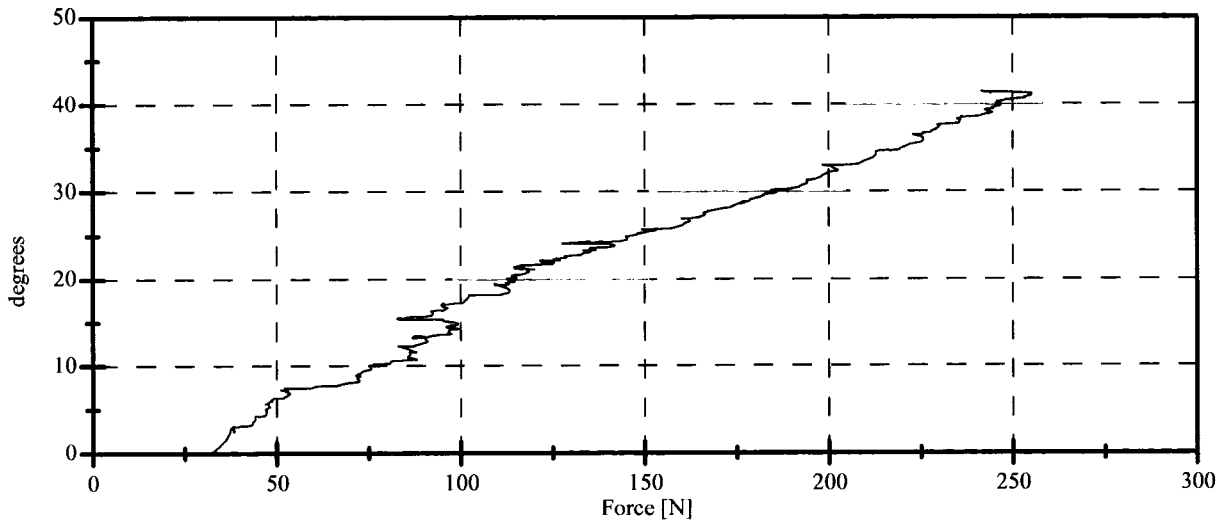
Date: 7-28-2006

Sequential Test Number: 1 File: SID 269 Lumbar test

Laboratory Technician: B. Swiecicki

| <u>TEST PARAMETER</u> | <u>SPECIFICATION</u> | <u>TEST RESULTS</u> | <u>STATUS</u> |
|-----------------------|----------------------|---------------------|---------------|
| Lab Temperature:      | 18.9-25.5 C          | 21.1 C              | Passed        |
| Lab Humidity:         | 10-70 %              | 50.00 %             | Passed        |
| Force at 0 Deg:       | 0.00-26.69 N         | 20.24 N             | Passed        |
| Force at 20 Deg:      | 97.86-151.24 N       | 112.43 N            | Passed        |
| Force at 30 Deg:      | 151.24-204.62 N      | 185.29 N            | Passed        |
| Force at 40 Deg:      | 204.62-258.00 N      | 245.36 N            | Passed        |
| Return Angle          | 12 Deg Max           | 6.13 deg            | Passed        |

### LUMBAR SPINE FLEXION TEST



**PRE-TEST DUMMY INSPECTION LIST**  
**CONFIGURED FOR LEFT SIDE IMPACT**

SID H3 Serial No.: 269 Sequential Test Number: 1  
 Date: JULY 2006 Laboratory Technician: B. Swiecicki

| PART         | ITEMS CHECKED                                  | COMMENTS |
|--------------|------------------------------------------------|----------|
| SKIN         | VISUAL INSPECTION                              | OK       |
| HEAD         | VISUAL, BALLAST, ACCELEROMETER MOUNT           | OK       |
| NECK         | VISUAL, CABLE TORQUE                           | OK       |
| SPINE BOX    | VISUAL, BALLAST, WELDMENT, ACCELEROMETER MOUNT | OK       |
| RIB CAGE     | VISUAL, MEASURE, STIFFENERS                    | OK       |
| STERNUM      | VISUAL                                         | OK       |
| LUMBAR SPINE | VISUAL                                         | OK       |
| ABDOMEN      | VISUAL                                         | OK       |
| PELVIS       | VISUAL, PALPATE, ACCELEROMETER MOUNT           | OK       |
| UPPER LEGS   | VISUAL                                         | OK       |
| KNEES        | VISUAL, STOPS, INSERTS                         | OK       |
| LOWER LEGS   | VISUAL, RANGE OF MOTION                        | OK       |
| ANKLES       | VISUAL, RANGE OF MOTION                        | OK       |
| FEET         | VISUAL, RANGE OF MOTION                        | OK       |
| JOINTS       | 1 TO 2 g RANGE                                 | OK       |
| OTHER        | NONE                                           | -        |

**REMARKS:** None

**CALIBRATION TEST RESULTS**

**POST TEST**

**SID H3 NO.: 270**

**CONFIGURED FOR LEFT SIDE IMPACT**

**CALIBRATION TEST RESULTS SUMMARY  
POST TEST**

**CONFIGURED FOR LEFT SIDE IMPACT**

SID H3 Serial No.: 270 Sequential Test Number: 2  
Date: SEPTEMBER 2006 Laboratory Technician: B. Swiecicki

| TEST                        | COMMENTS                 |
|-----------------------------|--------------------------|
| EXTERNAL DIMENSIONS         | Passed all requirements. |
| LATERAL THORAX IMPACT TEST  | Passed all requirements. |
| LATERAL PELVIS IMPACT TEST  | Passed all requirements. |
| HEAD DROP TEST*             | Passed all requirements. |
| LATERAL NECK BEND TEST*     | Passed all requirements. |
| ABDOMINAL COMPRESSION TEST* | Passed all requirements. |
| LUMBAR FLEXION TEST*        | Passed all requirements. |

\* Test not required for SID certification.

**REMARKS:** None

**EXTERNAL DIMENSIONS  
POST TEST**

**CONFIGURED FOR LEFT SIDE IMPACT**

SID H3 Serial No.: 270 Sequential Test Number: 2  
Date: SEPTEMBER 2006 Laboratory Technician: B. Swiecicki

| TEST PARAMETER                     | SPECIFICATION | TEST RESULTS |
|------------------------------------|---------------|--------------|
| SH- Seated Height (mm)             | 889 - 909     | 904          |
| RH- Rib Height (mm)                | 502 - 520     | 510          |
| HP- Hip Pivot Height (mm)          | 99 ref.       | 99           |
| RD- Rib from Back Line (mm)        | 229 - 241     | 236          |
| KH- Knee Pivot from Back Line (mm) | 511 - 526     | 513          |
| KV- Knee Pivot to Floor (mm)       | 490 - 505     | 499          |
| HW- Hip Width (mm)                 | 356 - 391     | 358          |

**REMARKS:** None

# SID Thorax Test S/N:270

## Post-Test

### CONFIGURED FOR LEFT SIDE IMPACT

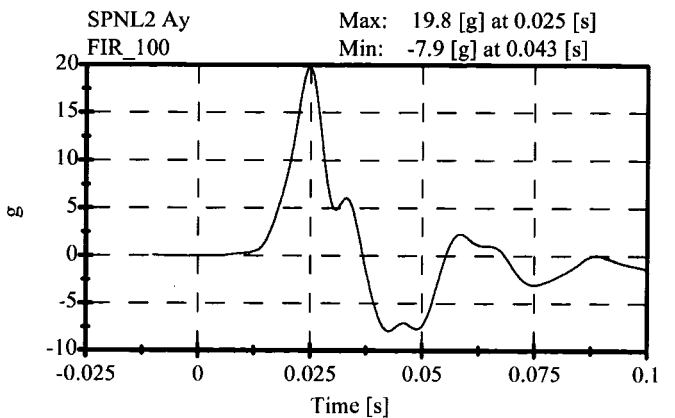
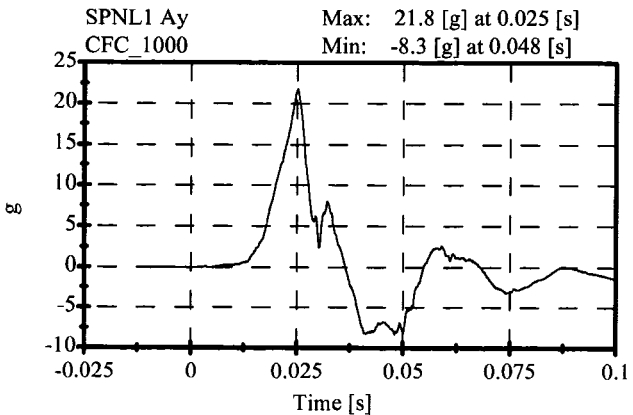
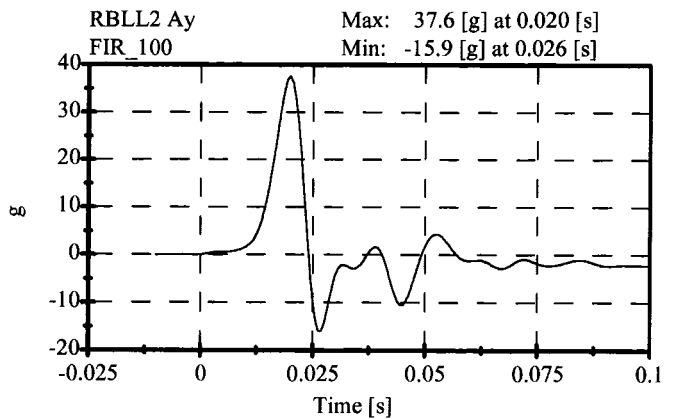
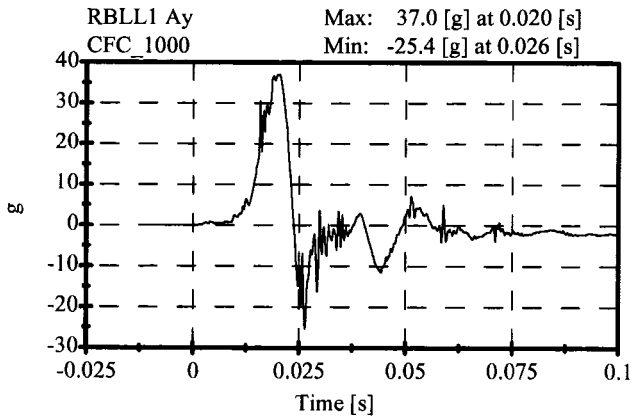
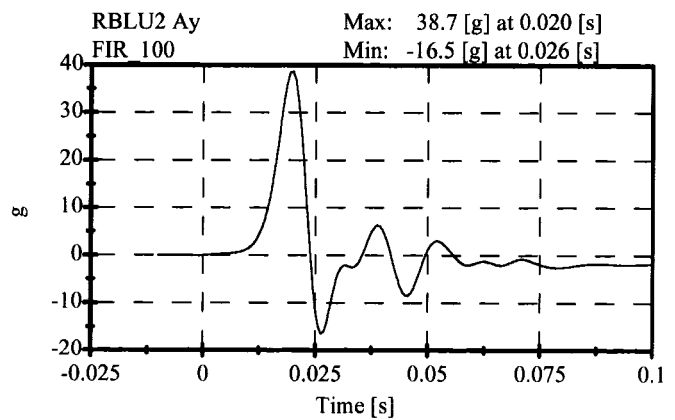
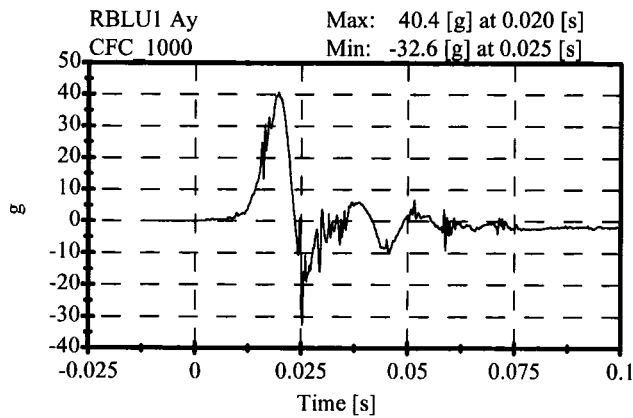
ATD Serial No: 270

Date: September 20, 2006

Sequential Test Number: 1 File: 270T

Laboratory Technician: B. Swiecicki

| TEST PARAMETER            | SPECIFICATION  | TEST RESULTS | STATUS |
|---------------------------|----------------|--------------|--------|
| Lab Temperature:          | 18.9-25.5 C    | 21.7 C       | Passed |
| Lab Humidity:             | 10-70 %        | 44.00 %      | Passed |
| Probe Velocity:           | 4.27- 4.33 m/s | 4.30 m/s     | Passed |
| Upper Rib Acceleration:   | 37.00-46.00 g  | 38.67 g      | Passed |
| Lower Rib Acceleration:   | 37.00-46.00 g  | 37.55 g      | Passed |
| Lower Spine Acceleration: | 15.00-22.00 g  | 19.81 g      | Passed |



**SID Pelvis Test S/N:270****Post-Test****CONFIGURED FOR LEFT SIDE IMPACT**

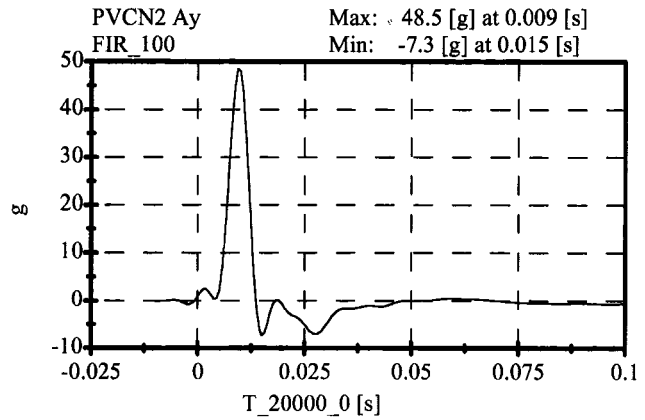
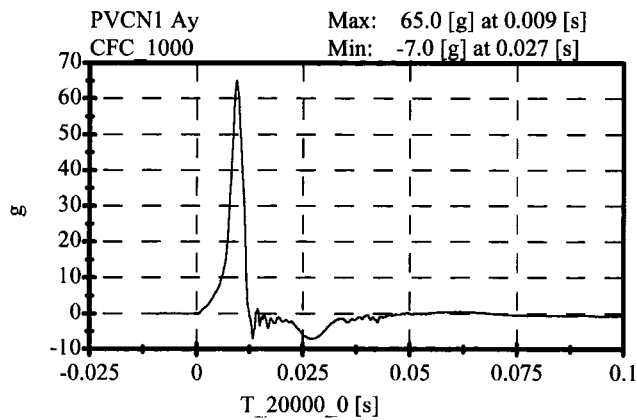
ATD Serial No: 270

Date: September 19, 2006

Sequential Test Number: 1 File: 270T

Laboratory Technician: B. Swiecicki

| <u>TEST PARAMETER</u>  | <u>SPECIFICATION</u> | <u>TEST RESULTS</u> | <u>STATUS</u> |
|------------------------|----------------------|---------------------|---------------|
| Lab Temperature:       | 18.9-25.5 C          | 21.1 C              | Passed        |
| Lab Humidity:          | 10-70 %              | 50.00 %             | Passed        |
| Probe Velocity:        | 4.27- 4.33 m/s       | 4.32 m/s            | Passed        |
| Pelvis Y Acceleration: | 40.00-60.00 g        | 48.49 g             | Passed        |
| Time Above 20 Gs       | 3.0-7.0 ms           | 5.3 ms              | Passed        |

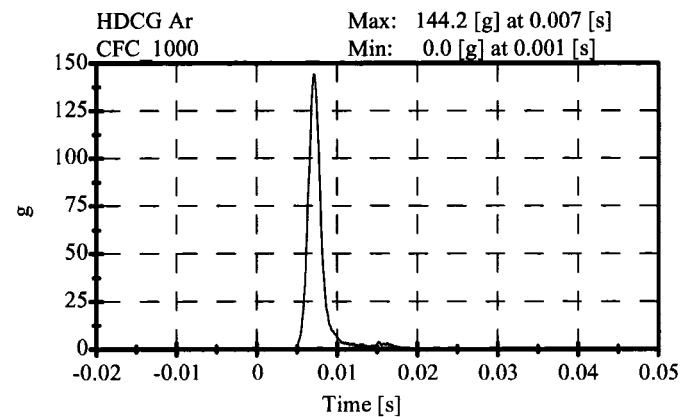
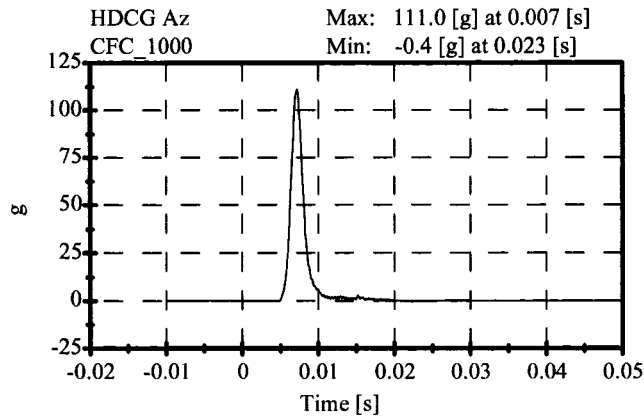
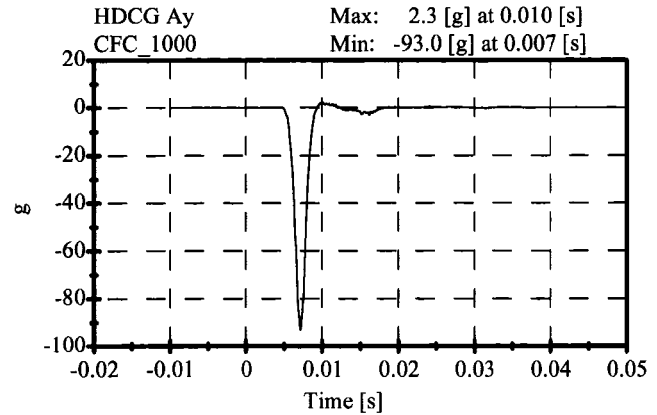
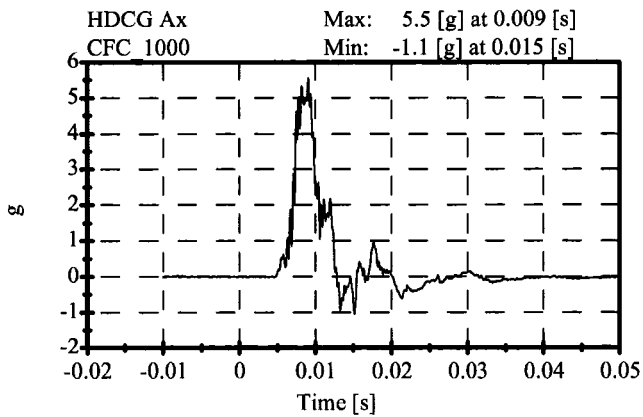


**SID HYIII Head Drop Test S/N:270**  
**Post-Test**  
**CONFIGURED FOR LEFT SIDE IMPACT**

ATD Serial No: 270  
Date: September 15, 2006

Sequential Test Number: 1 File: 270H  
Laboratory Technician: B. Swiecicki

| <u>TEST PARAMETER</u>   | <u>SPECIFICATION</u> | <u>TEST RESULTS</u> | <u>STATUS</u> |
|-------------------------|----------------------|---------------------|---------------|
| Lab Temperature:        | 18.9-25.6 C          | 21.1 C              | Passed        |
| Lab Humidity:           | 10-70 %              | 33.00 %             | Passed        |
| Peak Resultant Accel.:  | 120-150 Gs           | 144.16 Gs           | Passed        |
| Peak Lateral Accel.:    | 15 Gs Max            | 5.55 Gs             | Passed        |
| Curve PerCent NonModal: | < 15%                | 2.64 %              | Passed        |



**SID Head Neck Test S/N:270****Post-Test****CONFIGURED FOR LEFT SIDE IMPACT**

ATD Serial No: 270  
Date: September 18, 2006

Sequential Test Number: 1 File: 270N  
Laboratory Technician: B. Swiecicki

| <u>TEST PARAMETER</u>                                           | <u>SPECIFICATION</u> | <u>TEST RESULTS</u> | <u>STATUS</u> |
|-----------------------------------------------------------------|----------------------|---------------------|---------------|
| Lab Temperature:                                                | 20.6-22.2 C          | 21.1 C              | Passed        |
| Lab Humidity:                                                   | 10-70 %              | 50.00 %             | Passed        |
| Impact Velocity:                                                | 6.89- 7.13 m/s       | 6.92 m/s            | Passed        |
| PENDULUM DELTA V                                                |                      |                     |               |
| Delta V at 10 ms:                                               | 1.96- 2.55 m/s       | 2.37 m/s            | Passed        |
| Delta V at 20 ms:                                               | 4.12- 5.10 m/s       | 4.80 m/s            | Passed        |
| Delta V at 30 ms:                                               | 5.73- 7.01 m/s       | 6.76 m/s            | Passed        |
| Delta V between 40-70 ms:                                       | 6.27- 7.64 m/s       | 6.99 m/s            | Passed        |
| D PLANE ROTATION                                                |                      |                     |               |
| Maximum Rotation:                                               | 66.0-82.0 Deg        | 71.96 Deg           | Passed        |
| Rotation Angle Decay:                                           | 58.0-67.0 ms         | 60.40 ms            | Passed        |
| MOMENT ABOUT THE OCCIPITAL CONDYLE                              |                      |                     |               |
| Max Occipital Moment:                                           | 73.00- 88.00 N-m     | 80.31 N-m           | Passed        |
| Occipital Moment Decay:                                         | 49.0-64.0 ms         | 56.95 ms            | Passed        |
| HEAD ROTATION TIME WITH RESPECT TO THE OCCIPITAL CONDYLE MOMENT |                      |                     |               |
| Moment to Rotation Peak:                                        | 2.0-16.0 ms          | 12.90 ms            | Passed        |

# SID Head Neck Test S/N:270

## Post-Test

### CONFIGURED FOR LEFT SIDE IMPACT

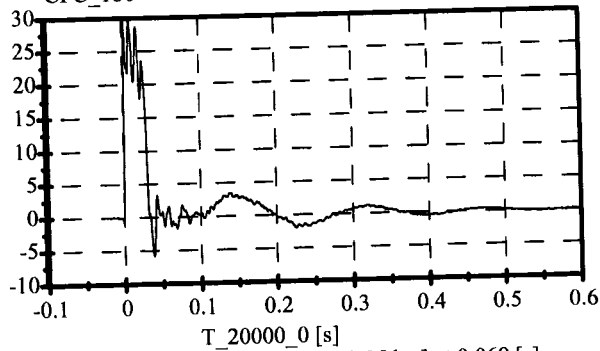
ATD Serial No: 270

Date: September 18, 2006

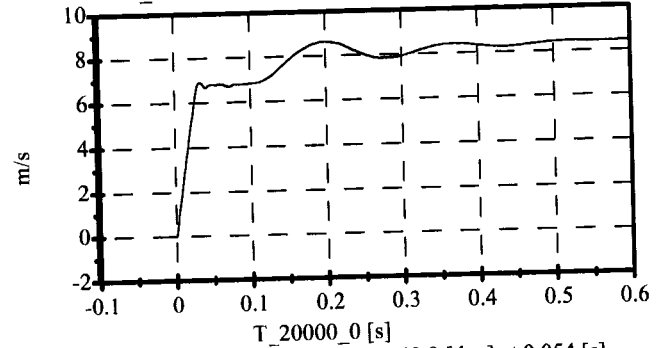
Sequential Test Number: 1 File: 270N

Laboratory Technician: B. Swiecicki

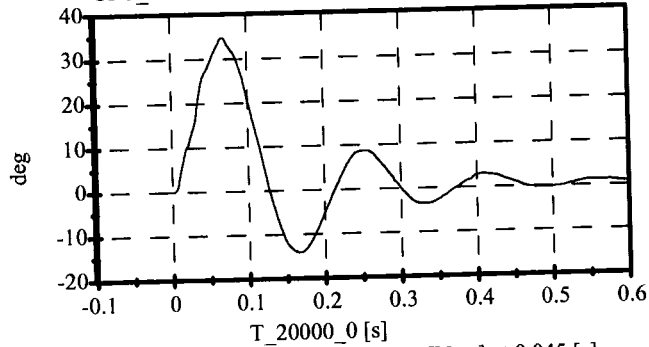
Pend Ax  
CFC\_180  
Max: 29.7 [ ] at 0.002 [s]  
Min: -5.8 [ ] at 0.038 [s]



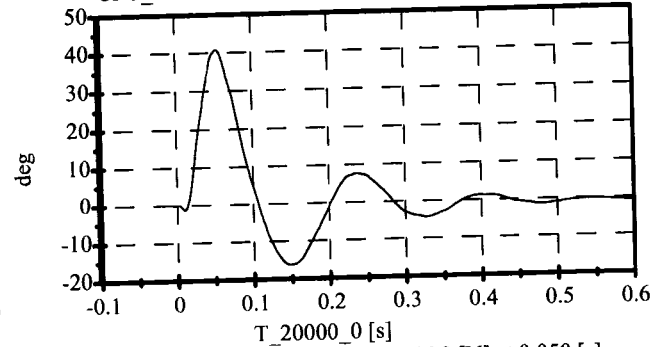
Pend Vx  
CFC\_180  
Max: 8.6 [m/s] at 0.200 [s]  
Min: -0.0 [m/s] at -0.000 [s]



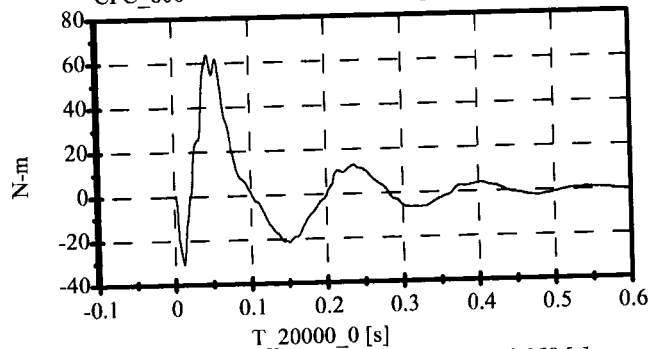
Head Rot  
CFC\_180  
Max: 34.6 [deg] at 0.069 [s]  
Min: -14.1 [deg] at 0.167 [s]



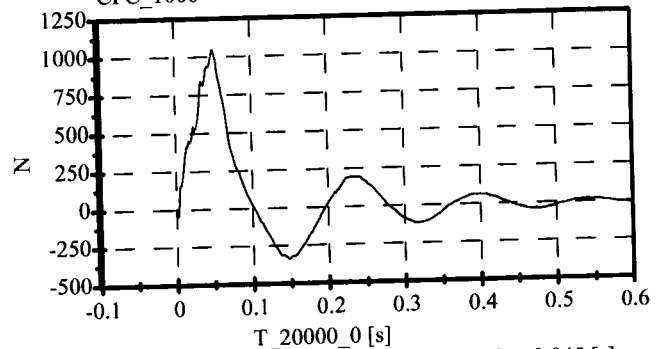
Arm Rot  
CFC\_180  
Max: 40.8 [deg] at 0.054 [s]  
Min: -16.1 [deg] at 0.147 [s]



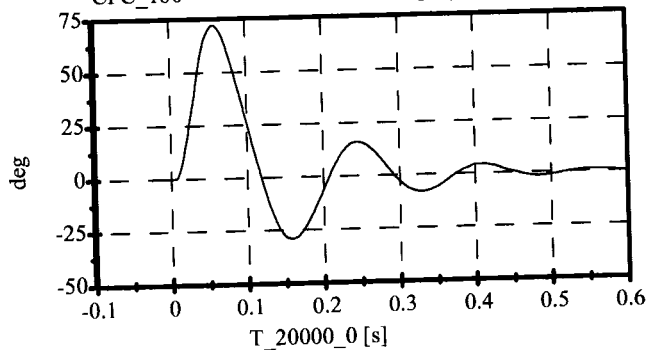
Neck Mx  
CFC\_600  
Max: 63.6 [N-m] at 0.045 [s]  
Min: -30.8 [N-m] at 0.012 [s]



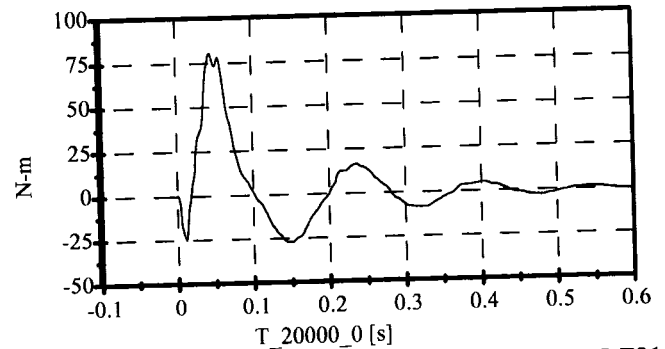
Neck Fy  
CFC\_1000  
Max: 1046.3 [N] at 0.050 [s]  
Min: -336.9 [N] at 0.147 [s]



Tot Rot  
CFC\_180  
Max: 72.0 [deg] at 0.058 [s]  
Min: -29.1 [deg] at 0.158 [s]



MOCX  
Max: 80.3 [N-m] at 0.045 [s]  
Min: -27.2 [N-m] at 0.151 [s]



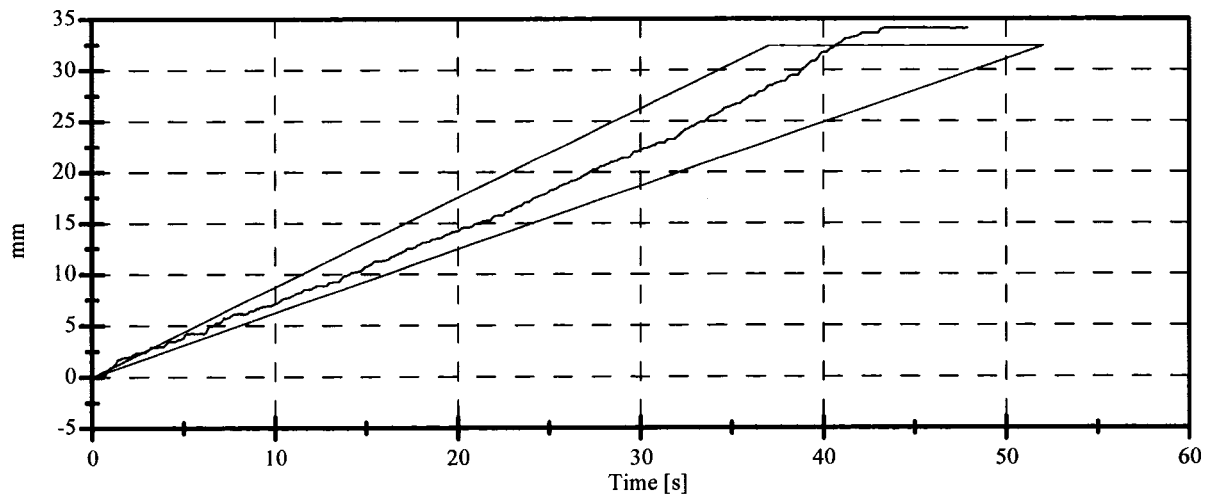
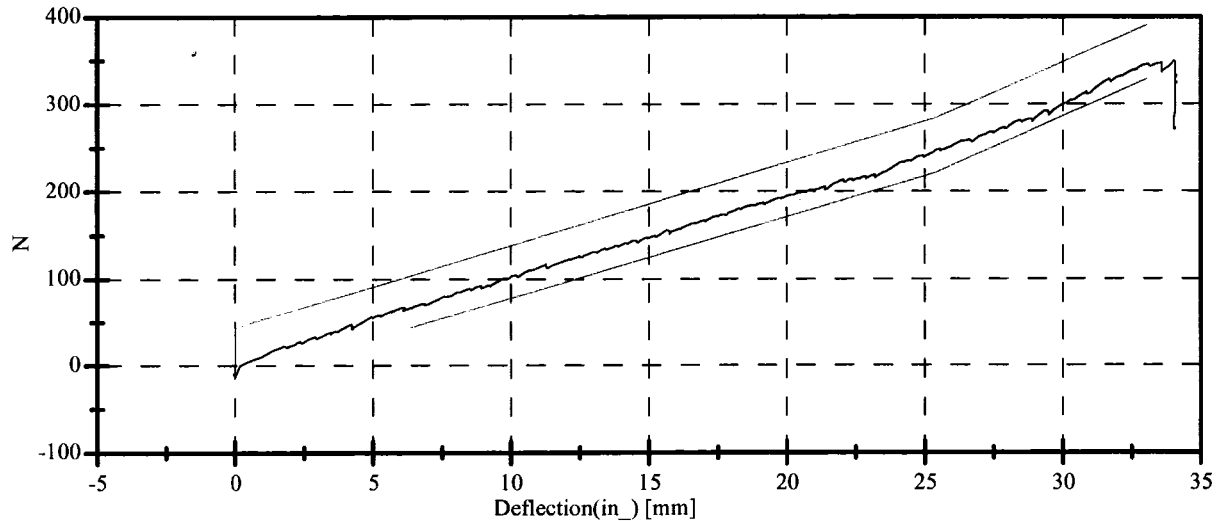
**Abdomen Test**  
**Pre-Test**  
**CONFIGURED FOR LEFT SIDE IMPACT**

ATD Serial No: 270  
Date: 09-18-06

Sequential Test Number: 1 File: 270 AB 09-18-06 test1  
Laboratory Technician: B. Swiecicki

| <u>TEST PARAMETER</u> | <u>SPECIFICATION</u> | <u>TEST RESULTS</u> | <u>STATUS</u> |
|-----------------------|----------------------|---------------------|---------------|
| Lab Temperature:      | 18.9-25.5 C          | 22.2 C              | Passed        |
| Lab Humidity:         | 10-70 %              | 54.00 %             | Passed        |
| Force at 12.95 mm :   | 104.00-162.00 N      | 130.57 N            | Passed        |
| Force at 19.05 mm :   | 162.98-220.99 N      | 186.39 N            | Passed        |
| Force at 25.40 mm :   | 221.97-280.02 N      | 248.01 N            | Passed        |
| Force at 33.02 mm :   | 324.99-391.00 N      | 344.79 N            | Passed        |

**ABDOMINAL COMPRESSION TEST**



## Spine Test

### Post-Test

#### CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 270

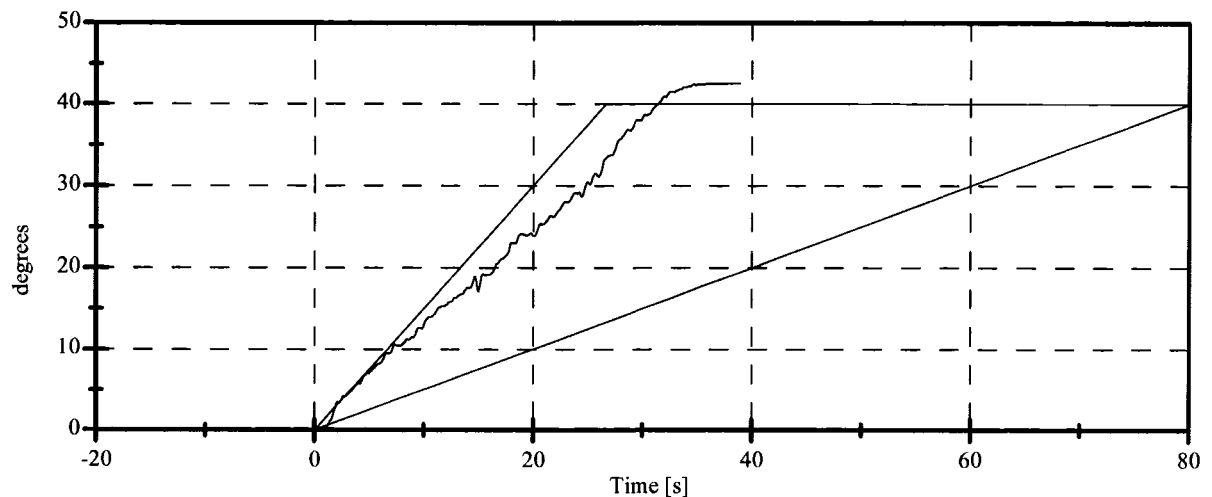
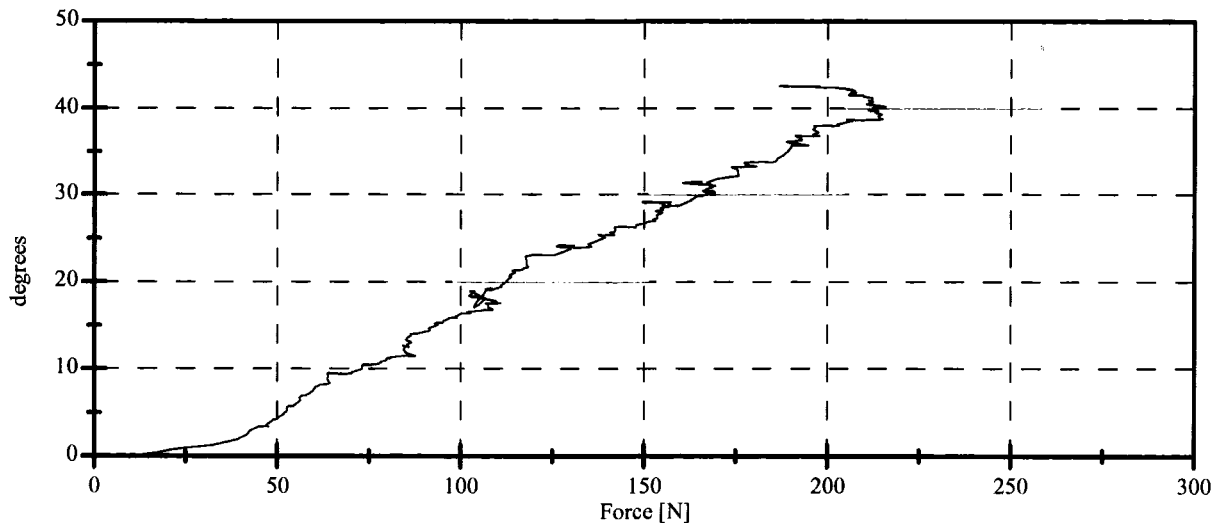
Date: 09-18-06

Sequential Test Number: 1 File: 270 spine 09-18-06 test1

Laboratory Technician: B. Swiecicki

| <u>TEST PARAMETER</u> | <u>SPECIFICATION</u> | <u>TEST RESULTS</u> | <u>STATUS</u> |
|-----------------------|----------------------|---------------------|---------------|
| Lab Temperature:      | 18.9-25.5 C          | 22.8 C              | Passed        |
| Lab Humidity:         | 10-70 %              | 54.00 %             | Passed        |
| Force at 0 Deg:       | 0.00-26.69 N         | 1.96 N              | Passed        |
| Force at 20 Deg:      | 97.86-151.24 N       | 112.43 N            | Passed        |
| Force at 30 Deg       | 151.24-204.62 N      | 169.36 N            | Passed        |
| Force at 40 Deg       | 204.62-258.00 N      | 211.67 N            | Passed        |
| Return Angle          | 12 Deg Max           | 2.75 deg            | Passed        |

#### LUMBAR SPINE FLEXION TEST



**POST TEST DUMMY INSPECTION LIST**  
**CONFIGURED FOR LEFT SIDE IMPACT**

SID H3 Serial No.: 270  
 Date: SEPTEMBER 2006

Sequential Test Number: 2  
 Laboratory Technician: B. Swiecicki

| PART         | ITEMS CHECKED                                  | COMMENTS |
|--------------|------------------------------------------------|----------|
| SKIN         | VISUAL INSPECTION                              | OK       |
| HEAD         | VISUAL, BALLAST, ACCELEROMETER MOUNT           | OK       |
| NECK         | VISUAL, CABLE TORQUE                           | OK       |
| SPINE BOX    | VISUAL, BALLAST, WELDMENT, ACCELEROMETER MOUNT | OK       |
| RIB CAGE     | VISUAL, MEASURE, STIFFENERS                    | OK       |
| STERNUM      | VISUAL                                         | OK       |
| LUMBAR SPINE | VISUAL                                         | OK       |
| ABDOMEN      | VISUAL                                         | OK       |
| PELVIS       | VISUAL, PALPATE, ACCELEROMETER MOUNT           | OK       |
| UPPER LEGS   | VISUAL                                         | OK       |
| KNEES        | VISUAL, STOPS, INSERTS                         | OK       |
| LOWER LEGS   | VISUAL, RANGE OF MOTION                        | OK       |
| ANKLES       | VISUAL, RANGE OF MOTION                        | OK       |
| FEET         | VISUAL, RANGE OF MOTION                        | OK       |
| JOINTS       | 1 TO 2 g RANGE                                 | OK       |
| OTHER        | NONE                                           | -        |

**REMARKS:** None

**CALIBRATION TEST RESULTS**

**POST TEST**

**SID H3 NO.: 269**

**CONFIGURED FOR LEFT SIDE IMPACT**

**CALIBRATION TEST RESULTS SUMMARY  
POST TEST**

**CONFIGURED FOR LEFT SIDE IMPACT**

SID H3 Serial No.: 269 Sequential Test Number: 2  
Date: SEPTEMBER 2006 Laboratory Technician: B. Swiecicki

| TEST                        | COMMENTS                 |
|-----------------------------|--------------------------|
| EXTERNAL DIMENSIONS         | Passed all requirements. |
| LATERAL THORAX IMPACT TEST  | Passed all requirements. |
| LATERAL PELVIS IMPACT TEST  | Passed all requirements. |
| HEAD DROP TEST*             | Passed all requirements. |
| LATERAL NECK BEND TEST*     | Passed all requirements. |
| ABDOMINAL COMPRESSION TEST* | Passed all requirements. |
| LUMBAR FLEXION TEST*        | Passed all requirements. |

\* Test not required for SID certification.

**REMARKS:** None

**EXTERNAL DIMENSIONS  
POST TEST**

**CONFIGURED FOR LEFT SIDE IMPACT**

SID H3 Serial No.: 269 Sequential Test Number: 2  
Date: SEPTEMBER 2006 Laboratory Technician: B. Swiecicki

| TEST PARAMETER                     | SPECIFICATION | TEST RESULTS |
|------------------------------------|---------------|--------------|
| SH- Seated Height (mm)             | 889 - 909     | 909          |
| RH- Rib Height (mm)                | 502 - 520     | 513          |
| HP- Hip Pivot Height (mm)          | 99 ref.       | 99           |
| RD- Rib from Back Line (mm)        | 229 - 241     | 241          |
| KH- Knee Pivot from Back Line (mm) | 511 - 526     | 521          |
| KV- Knee Pivot to Floor (mm)       | 490 - 505     | 493          |
| HW- Hip Width (mm)                 | 356 - 391     | 363          |

**REMARKS:** None

# SID Thorax Test S/N:269

## Post-Test

### CONFIGURED FOR LEFT SIDE IMPACT

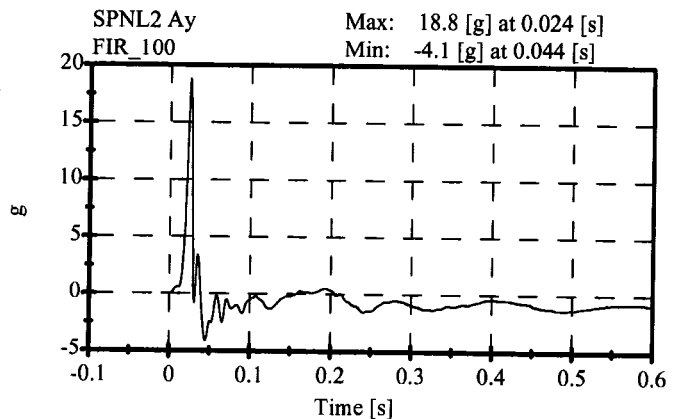
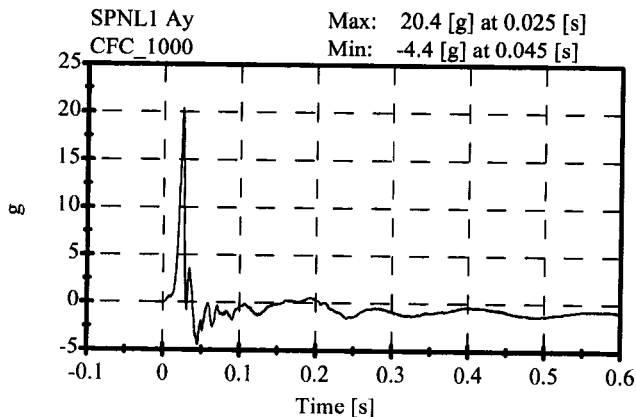
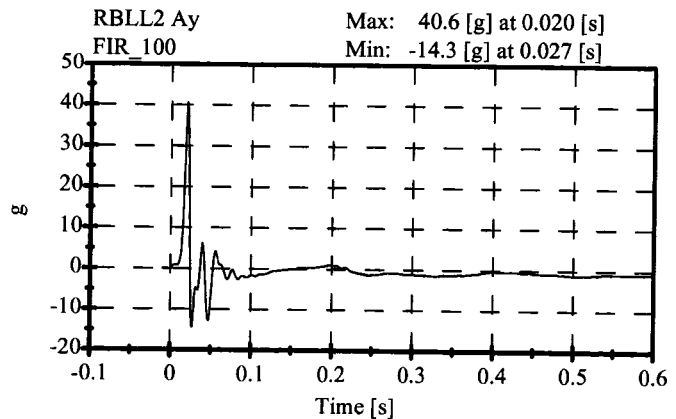
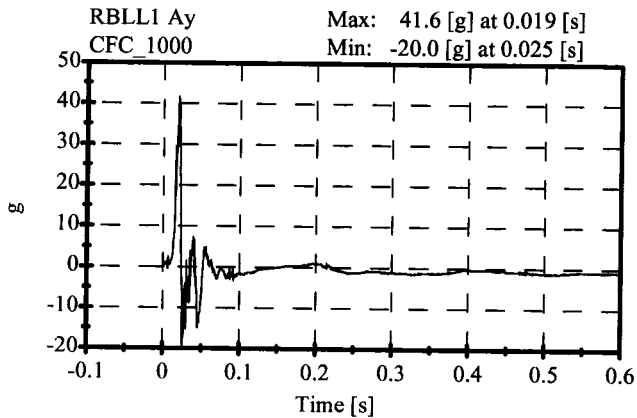
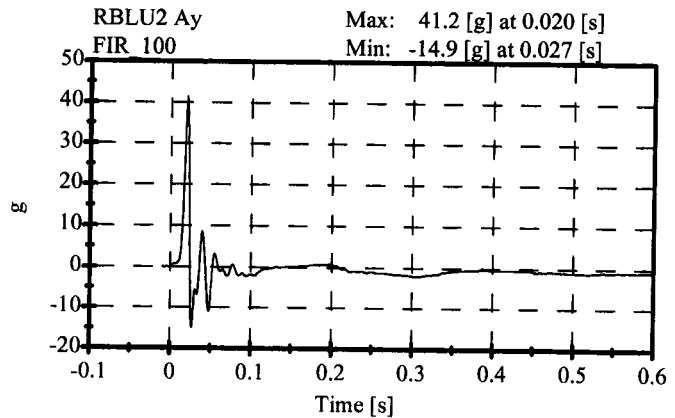
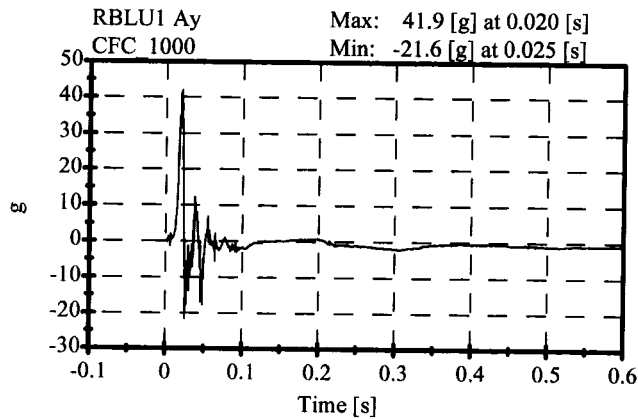
ATD Serial No: 269

Date: September 19, 2006

Sequential Test Number: 1 File: test1

Laboratory Technician: B. Swiecicki

| TEST PARAMETER            | SPECIFICATION  | TEST RESULTS | STATUS |
|---------------------------|----------------|--------------|--------|
| Lab Temperature:          | 18.9-25.5 C    | 21.1 C       | Passed |
| Lab Humidity:             | 10-70 %        | 50.00 %      | Passed |
| Probe Velocity:           | 4.27- 4.33 m/s | 4.33 m/s     | Passed |
| Upper Rib Acceleration:   | 37.00-46.00 g  | 41.22 g      | Passed |
| Lower Rib Acceleration:   | 37.00-46.00 g  | 40.58 g      | Passed |
| Lower Spine Acceleration: | 15.00-22.00 g  | 18.77 g      | Passed |

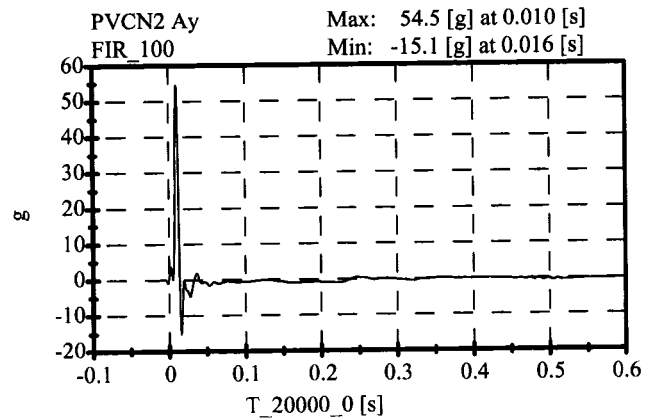
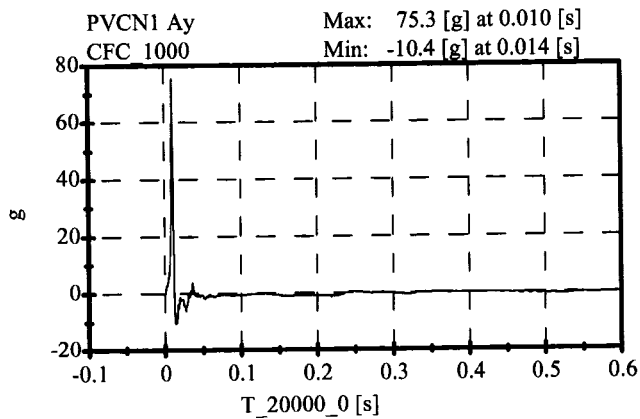


**SID Pelvis Test S/N:269****Post-Test****CONFIGURED FOR LEFT SIDE IMPACT**

ATD Serial No: 269  
Date: September 19, 2006

Sequential Test Number: 1 File: 905T  
Laboratory Technician: B. Swiecicki

| <u>TEST PARAMETER</u>  | <u>SPECIFICATION</u> | <u>TEST RESULTS</u> | <u>STATUS</u> |
|------------------------|----------------------|---------------------|---------------|
| Lab Temperature:       | 18.9-25.5 C          | 21.1 C              | Passed        |
| Lab Humidity:          | 10-70 %              | 50.00 %             | Passed        |
| Probe Velocity:        | 4.27- 4.33 m/s       | 4.27 m/s            | Passed        |
| Pelvis Y Acceleration: | 40.00-60.00 g        | 54.47 g             | Passed        |
| Time Above 20 Gs       | 3.0-7.0 ms           | 5.4 ms              | Passed        |



# SID HYIII Head Drop Test S/N:269

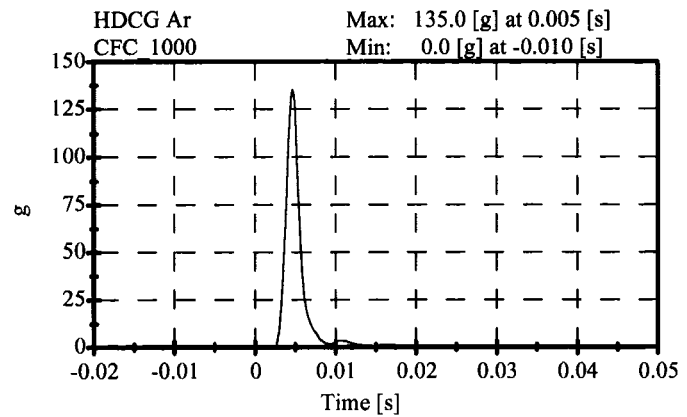
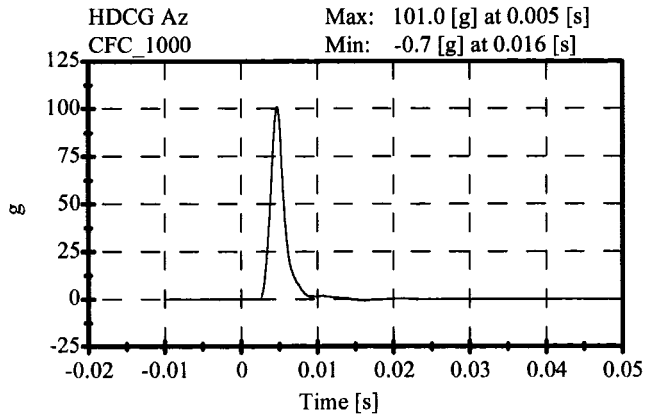
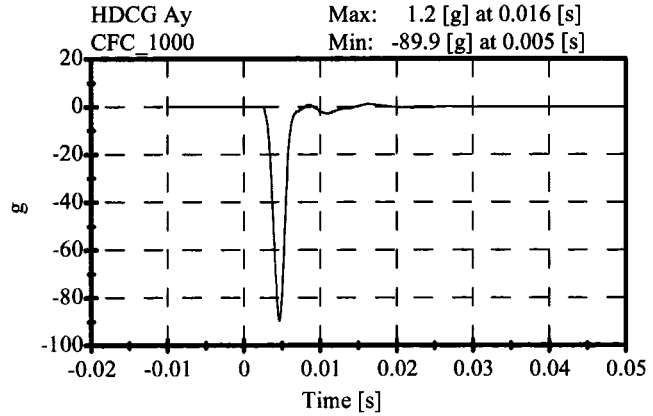
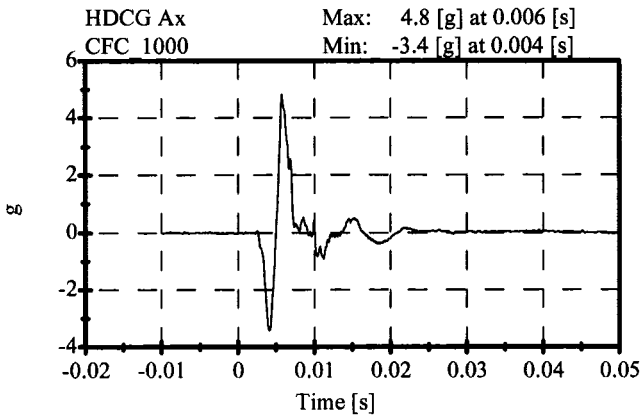
## Post-Test

### CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 269  
Date: September 15, 2006

Sequential Test Number: 1 File: 269H  
Laboratory Technician: B. Swiecicki

| TEST PARAMETER          | SPECIFICATION | TEST RESULTS | STATUS |
|-------------------------|---------------|--------------|--------|
| Lab Temperature:        | 18.9-25.6 C   | 21.1 C       | Passed |
| Lab Humidity:           | 10-70 %       | 50.00 %      | Passed |
| Peak Resultant Accel.:  | 120-150 Gs    | 135.02 Gs    | Passed |
| Peak Lateral Accel.:    | 15 Gs Max     | 4.82 Gs      | Passed |
| Curve PerCent NonModal: | < 15%         | 2.54 %       | Passed |



**SID Head Neck Test S/N:269****Post-Test****CONFIGURED FOR LEFT SIDE IMPACT**

ATD Serial No: 269

Sequential Test Number: 1 File: 905N

Date: September 15, 2006

Laboratory Technician: B. Swiecicki

| <u>TEST PARAMETER</u>                                           | <u>SPECIFICATION</u> | <u>TEST RESULTS</u> | <u>STATUS</u> |
|-----------------------------------------------------------------|----------------------|---------------------|---------------|
| Lab Temperature:                                                | 20.6-22.2 C          | 21.1 C              | Passed        |
| Lab Humidity:                                                   | 10-70 %              | 50.00 %             | Passed        |
| Impact Velocity:                                                | 6.89- 7.13 m/s       | 7.00 m/s            | Passed        |
| PENDULUM DELTA V                                                |                      |                     |               |
| Delta V at 10 ms:                                               | 1.96- 2.55 m/s       | 2.12 m/s            | Passed        |
| Delta V at 20 ms:                                               | 4.12- 5.10 m/s       | 4.38 m/s            | Passed        |
| Delta V at 30 ms:                                               | 5.73- 7.01 m/s       | 6.30 m/s            | Passed        |
| Delta V between 40-70 ms:                                       | 6.27- 7.64 m/s       | 7.14 m/s            | Passed        |
| D PLANE ROTATION                                                |                      |                     |               |
| Maximum Rotation:                                               | 66.0-82.0 Deg        | 73.13 Deg           | Passed        |
| Rotation Angle Decay:                                           | 58.0-67.0 ms         | 62.90 ms            | Passed        |
| MOMENT ABOUT THE OCCIPITAL CONDYLE                              |                      |                     |               |
| Max Occipital Moment:                                           | 73.00- 88.00 N-m     | 78.96 N-m           | Passed        |
| Occipital Moment Decay:                                         | 49.0-64.0 ms         | 59.65 ms            | Passed        |
| HEAD ROTATION TIME WITH RESPECT TO THE OCCIPITAL CONDYLE MOMENT |                      |                     |               |
| Moment to Rotation Peak:                                        | 2.0-16.0 ms          | 9.55 ms             | Passed        |

# SID Head Neck Test S/N:269

## Post-Test

### CONFIGURED FOR LEFT SIDE IMPACT

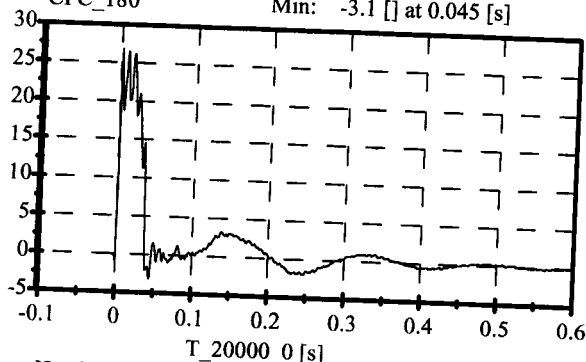
ATD Serial No: 269

Date: September 15, 2006

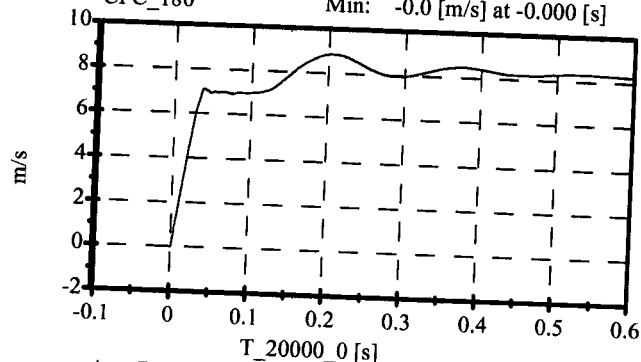
Sequential Test Number: 1 File: 905N

Laboratory Technician: B. Swiecicki

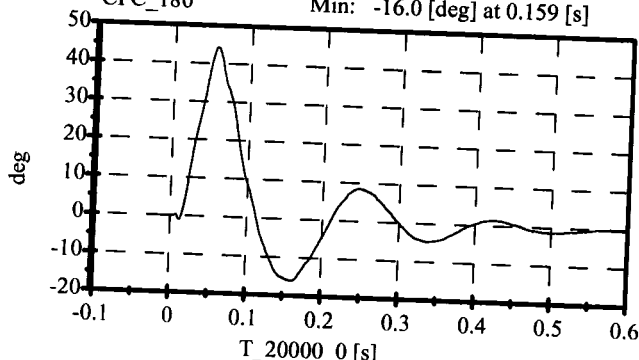
Pend Ax  
CFC\_180  
Max: 26.8 [ ] at 0.002 [s]  
Min: -3.1 [ ] at 0.045 [s]



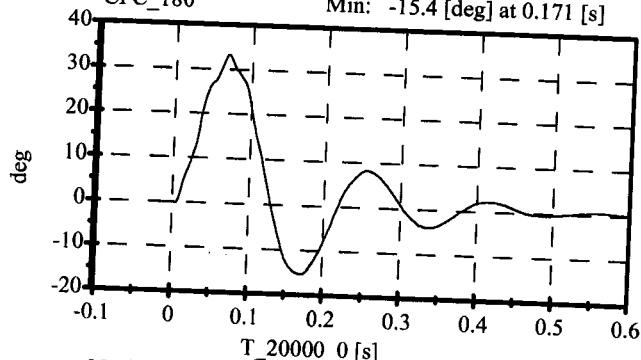
Pend Vx  
CFC\_180  
Max: 8.8 [m/s] at 0.207 [s]  
Min: -0.0 [m/s] at -0.000 [s]



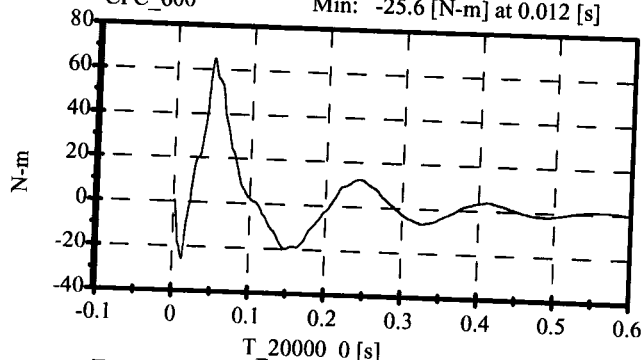
Head Rot  
CFC\_180  
Max: 44.1 [deg] at 0.056 [s]  
Min: -16.0 [deg] at 0.159 [s]



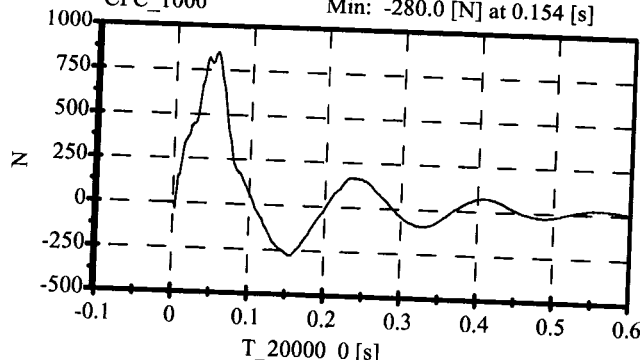
Arm Rot  
CFC\_180  
Max: 33.4 [deg] at 0.069 [s]  
Min: -15.4 [deg] at 0.171 [s]



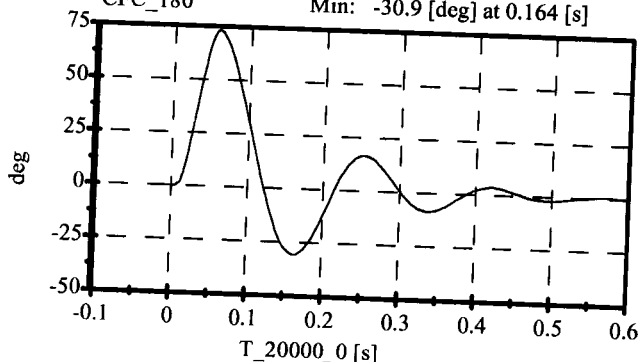
Neck Mx  
CFC\_600  
Max: 64.9 [N-m] at 0.049 [s]  
Min: -25.6 [N-m] at 0.012 [s]



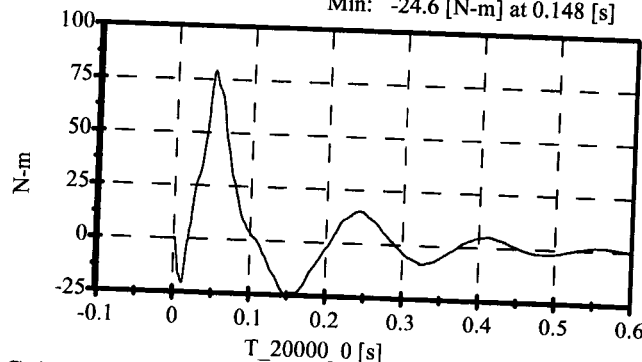
Neck Fy  
CFC\_1000  
Max: 852.3 [N] at 0.055 [s]  
Min: -280.0 [N] at 0.154 [s]



Tot Rot  
CFC\_180  
Max: 73.1 [deg] at 0.058 [s]  
Min: -30.9 [deg] at 0.164 [s]



MOCX  
Max: 79.0 [N-m] at 0.049 [s]  
Min: -24.6 [N-m] at 0.148 [s]



## Abdomen Test

### Post-Test

#### CONFIGURED FOR LEFT SIDE IMPACT

ATD Serial No: 269

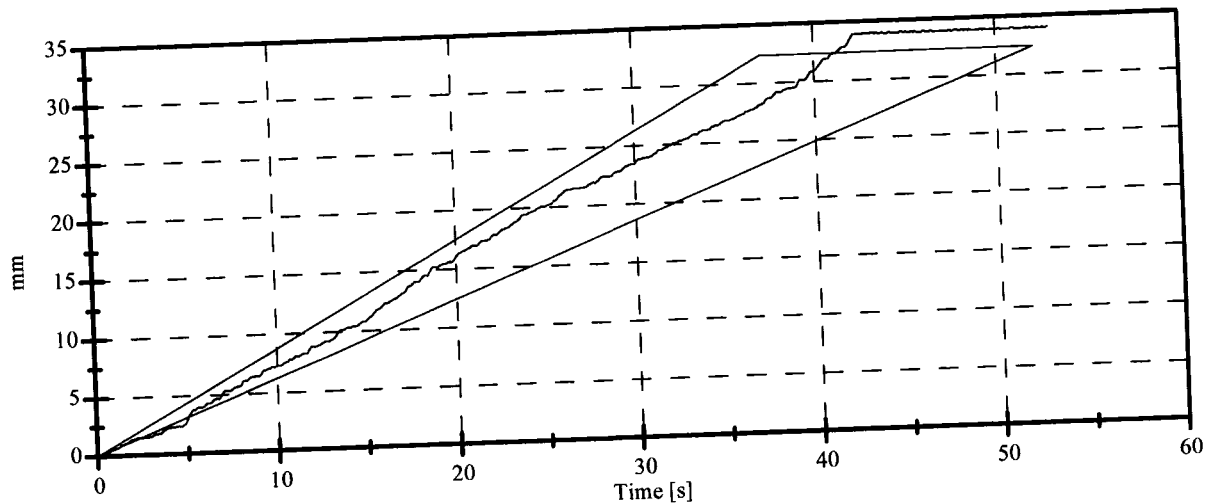
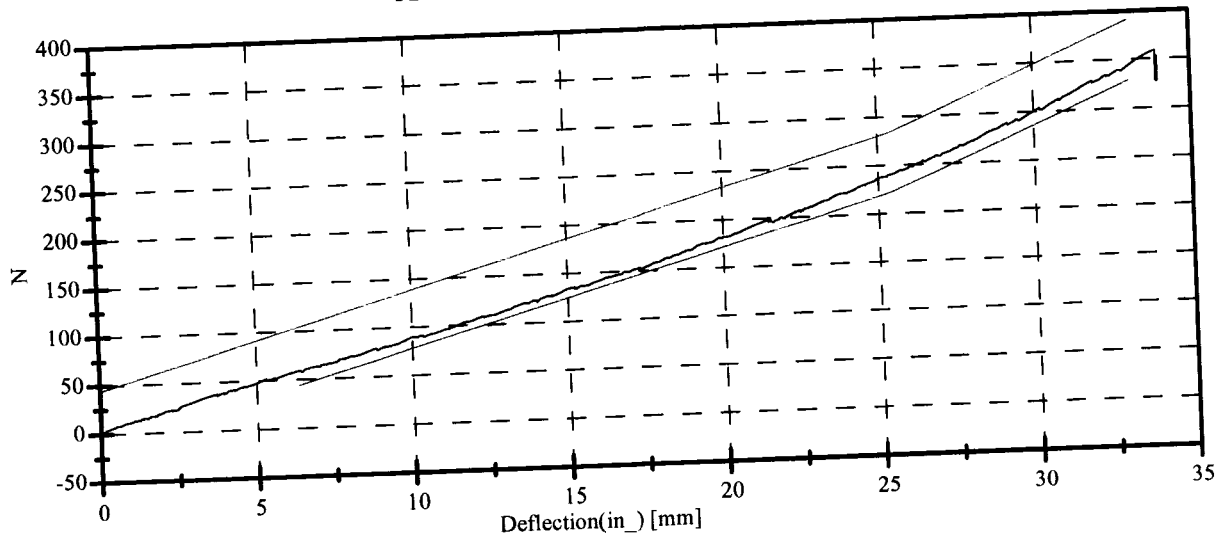
Date: 09-18-06

Sequential Test Number: 1 File: 269 AB 09-18-06 test1

Laboratory Technician: B. Swiecicki

| <u>TEST PARAMETER</u> | <u>SPECIFICATION</u> | <u>TEST RESULTS</u> | <u>STATUS</u> |
|-----------------------|----------------------|---------------------|---------------|
| Lab Temperature:      | 18.9-25.5 C          | 22.2 C              | Passed        |
| Lab Humidity:         | 10-70 %              | 54.00 %             | Passed        |
| Force at 12.95 mm :   | 104.00-162.00 N      | 113.89 N            | Passed        |
| Force at 19.05 mm :   | 162.98-220.99 N      | 169.71 N            | Passed        |
| Force at 25.40 mm :   | 221.97-280.02 N      | 240.04 N            | Passed        |
| Force at 33.02 mm :   | 324.99-391.00 N      | 341.17 N            | Passed        |

#### ABDOMINAL COMPRESSION TEST



**Spine Test  
Post-Test**

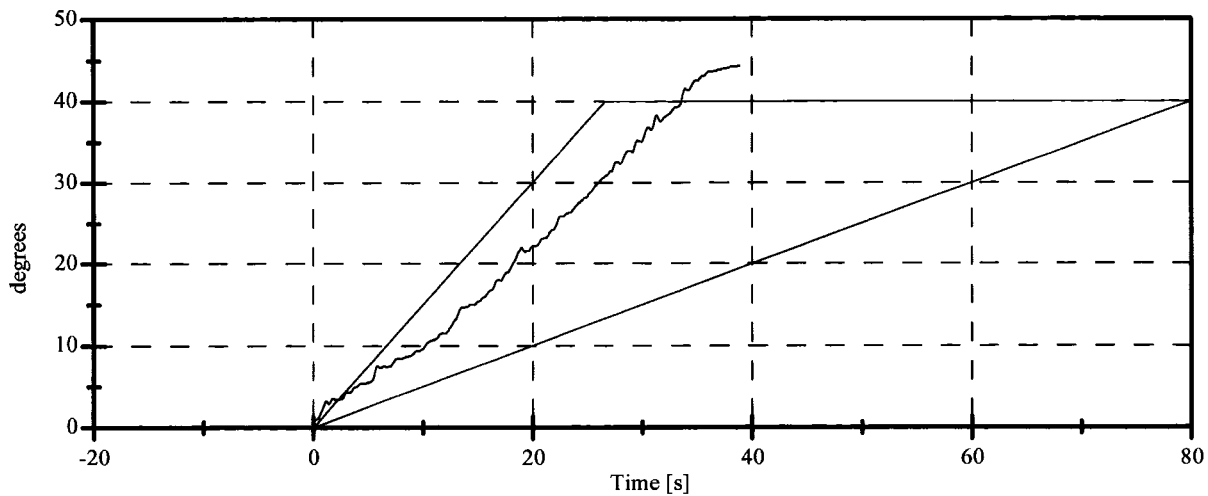
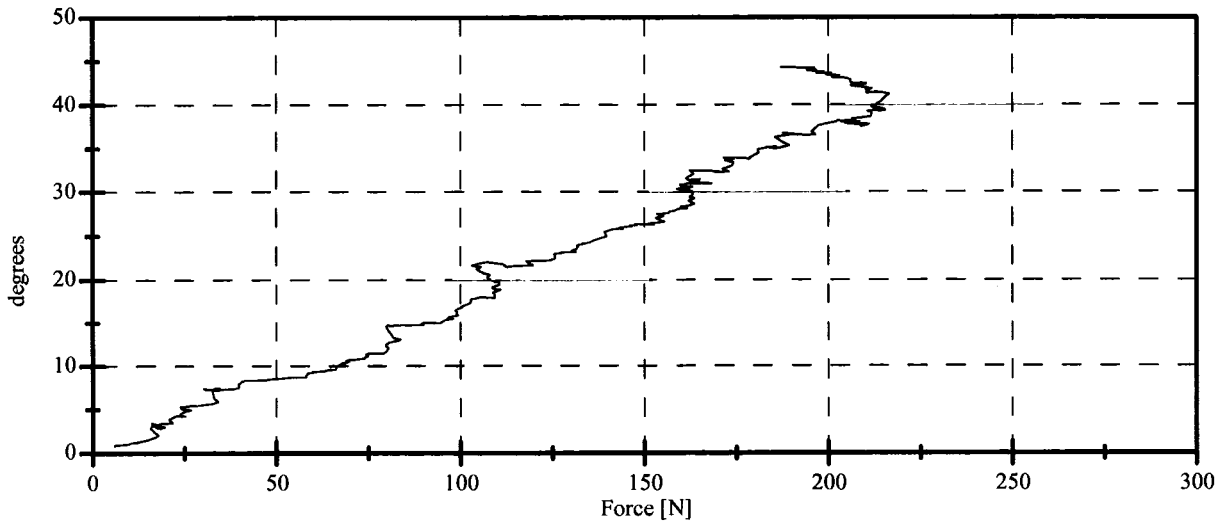
**CONFIGURED FOR LEFT SIDE IMPACT**

ATD Serial No: 269  
Date: 09-18-06

Sequential Test Number: 1    File: 269 spine 09-18-06 test1  
Laboratory Technician: B. Swiecicki

| <u>TEST PARAMETER</u> | <u>SPECIFICATION</u> | <u>TEST RESULTS</u> | <u>STATUS</u> |
|-----------------------|----------------------|---------------------|---------------|
| Lab Temperature:      | 18.9-25.5 C          | 22.2 C              | Passed        |
| Lab Humidity:         | 10-70 %              | 55.00 %             | Passed        |
| Force at 0 Deg:       | 0.00-26.69 N         | 5.88 N              | Passed        |
| Force at 20 Deg:      | 97.86-151.24 N       | 108.25 N            | Passed        |
| Force at 30 Deg:      | 151.24-204.62 N      | 163.36 N            | Passed        |
| Force at 40 Deg:      | 204.62-258.00 N      | 211.67 N            | Passed        |
| Return Angle          | 12 Deg Max           | 2.71 deg            | Passed        |

**LUMBAR SPINE FLEXION TEST**



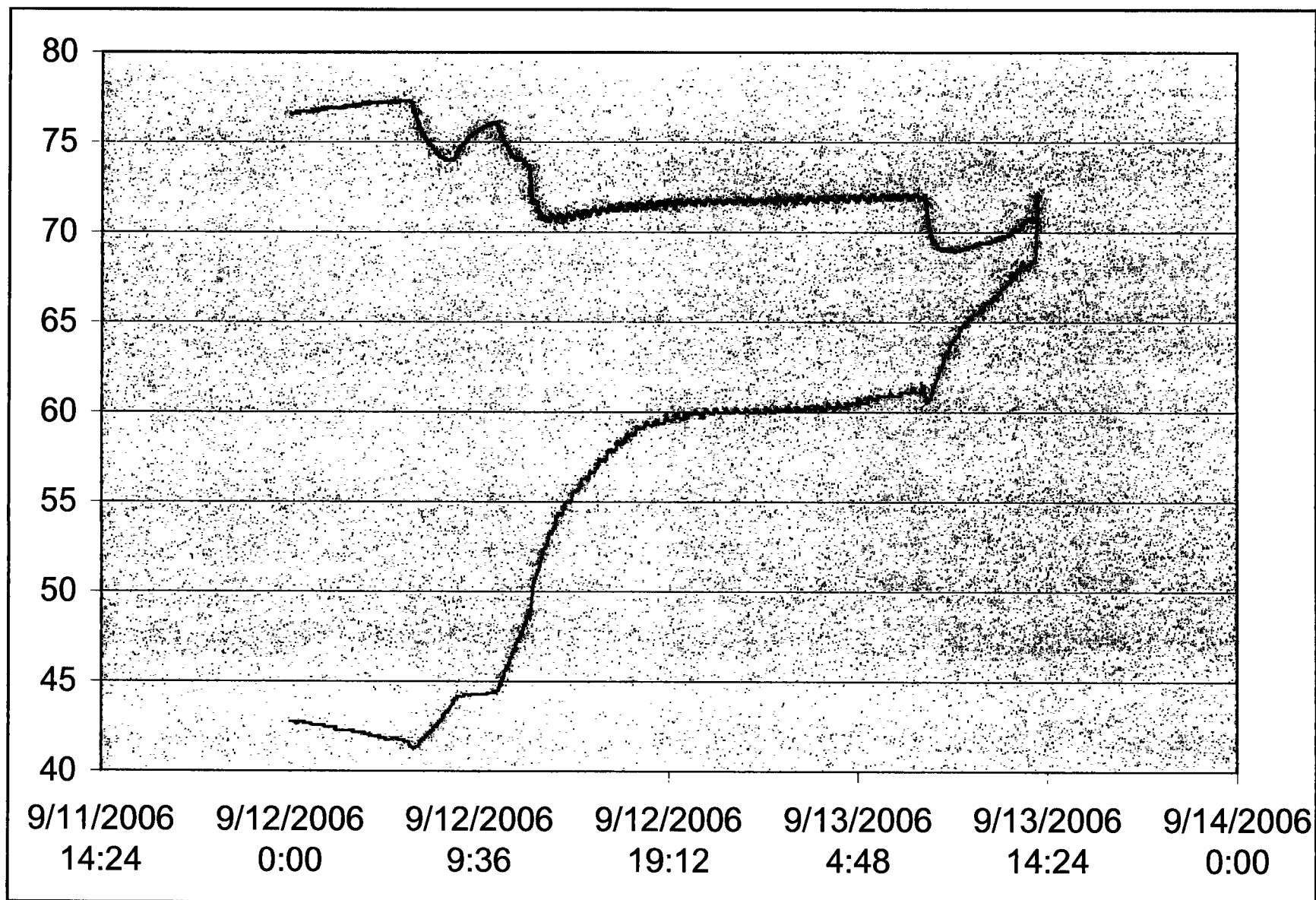
**POST TEST DUMMY INSPECTION LIST**  
**CONFIGURED FOR LEFT SIDE IMPACT**

SID H3 Serial No.: 269 Sequential Test Number: 2  
 Date: SEPTEMBER 2006 Laboratory Technician: B. Swiecicki

| PART         | ITEMS CHECKED                                  | COMMENTS |
|--------------|------------------------------------------------|----------|
| SKIN         | VISUAL INSPECTION                              | OK       |
| HEAD         | VISUAL, BALLAST, ACCELEROMETER MOUNT           | OK       |
| NECK         | VISUAL, CABLE TORQUE                           | OK       |
| SPINE BOX    | VISUAL, BALLAST, WELDMENT, ACCELEROMETER MOUNT | OK       |
| RIB CAGE     | VISUAL, MEASURE, STIFFENERS                    | OK       |
| STERNUM      | VISUAL                                         | OK       |
| LUMBAR SPINE | VISUAL                                         | OK       |
| ABDOMEN      | VISUAL                                         | OK       |
| PELVIS       | VISUAL, PALPATE, ACCELEROMETER MOUNT           | OK       |
| UPPER LEGS   | VISUAL                                         | OK       |
| KNEES        | VISUAL, STOPS, INSERTS                         | OK       |
| LOWER LEGS   | VISUAL, RANGE OF MOTION                        | OK       |
| ANKLES       | VISUAL, RANGE OF MOTION                        | OK       |
| FEET         | VISUAL, RANGE OF MOTION                        | OK       |
| JOINTS       | 1 TO 2 g RANGE                                 | OK       |
| OTHER        | NONE                                           | -        |

**REMARKS:** None

## TEMPERATURE TRACE



**APPENDIX D**

**TEST EQUIPMENT AND CALIBRATION INFORMATION**

# TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

## SID/HIII INSTRUMENTATION

|                       | FRONT SID/HIII NO.: 270 |              |                  |
|-----------------------|-------------------------|--------------|------------------|
|                       | SERIAL NUMBER           | MANUFACTURER | CALIBRATION DATE |
| HEAD AX               | AC-P35812               | ENDEVCO      | 8/28/2006        |
| HEAD AY               | AC-P18739               | ENDEVCO      | 8/28/2006        |
| HEAD AZ               | AC-P19212               | ENDEVCO      | 8/28/2006        |
| UPPER NECK FX         | LC-1629Fx               | DENTON       | 8/28/2006        |
| UPPER NECK FY         | LC-1629Fy               | DENTON       | 8/28/2006        |
| UPPER NECK FZ         | LC-1629Fz               | DENTON       | 8/28/2006        |
| UPPER NECK MX         | LC-1629Mx               | DENTON       | 8/28/2006        |
| UPPER NECK MY         | LC-1629My               | DENTON       | 8/28/2006        |
| UPPER NECK MZ         | LC-1629Mz               | DENTON       | 8/28/2006        |
| UPPER RIB             | AC-P18558               | ENDEVCO      | 8/28/2006        |
| LOWER RIB             | AC-P18537               | ENDEVCO      | 8/28/2006        |
| LOWER SPINE           | AC-P18639               | ENDEVCO      | 9/8/2006         |
| PELVIS                | AC-P21171               | ENDEVCO      | 9/8/2006         |
| UPPER RIB REDUNDANT   | AC-P18516               | ENDEVCO      | 9/8/2006         |
| LOWER RIB REDUNDANT   | AC-P19222               | ENDEVCO      | 9/8/2006         |
| LOWER SPINE REDUNDANT | AC-P18663               | ENDEVCO      | 9/8/2006         |
| PELVIS REDUNDANT      | AC-P22639               | ENDEVCO      | 9/8/2006         |

|                       | REAR SID/HIII NO.: 269 |              |                  |
|-----------------------|------------------------|--------------|------------------|
|                       | SERIAL NUMBER          | MANUFACTURER | CALIBRATION DATE |
| HEAD AX               | AC-P22943              | ENDEVCO      | 8/30/2006        |
| HEAD AY               | AC-P17236              | ENDEVCO      | 8/30/2006        |
| HEAD AZ               | AC-P23164              | ENDEVCO      | 8/30/2006        |
| UPPER NECK FX         | LC-442Fx               | DENTON       | 8/30/2006        |
| UPPER NECK FY         | LC-442Fy               | DENTON       | 8/30/2006        |
| UPPER NECK FZ         | LC-442Fz               | DENTON       | 8/30/2006        |
| UPPER NECK MX         | LC-442Mx               | DENTON       | 8/30/2006        |
| UPPER NECK MY         | LC-442My               | DENTON       | 8/30/2006        |
| UPPER NECK MZ         | LC-442Mz               | DENTON       | 8/30/2006        |
| UPPER RIB             | AC-P39731              | ENDEVCO      | 8/30/2006        |
| LOWER RIB             | AC-P38896              | ENDEVCO      | 8/30/2006        |
| LOWER SPINE           | AC-P38188              | ENDEVCO      | 9/8/2006         |
| PELVIS                | AC-P38132              | ENDEVCO      | 9/8/2006         |
| UPPER RIB REDUNDANT   | AC-P39740              | ENDEVCO      | 9/8/2006         |
| LOWER RIB REDUNDANT   | AC-P35786              | ENDEVCO      | 9/8/2006         |
| LOWER SPINE REDUNDANT | AC-P38216              | ENDEVCO      | 9/8/2006         |
| PELVIS REDUNDANT      | AC-P35757              | ENDEVCO      | 9/8/2006         |

REMARKS: None

# TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

## VEHICLE AND MDB INSTRUMENTATION

|                                    | VEHICLE AND MDB INSTRUMENTS |              |                  |
|------------------------------------|-----------------------------|--------------|------------------|
|                                    | SERIAL NUMBER               | MANUFACTURER | CALIBRATION DATE |
| RIGHT FRONT SILL (X)               | AC-P17242                   | ENDEVCO      | 7/18/2006        |
| RIGHT FRONT SILL (Y)               | AC-J31059                   | ENDEVCO      | 7/5/2006         |
| RIGHT FRONT SILL (Z)               | AC-P23174                   | ENDEVCO      | 6/28/2006        |
| RIGHT REAR SILL (X)                | AC-P23993                   | ENDEVCO      | 7/19/2006        |
| RIGHT REAR SILL (Y)                | AC-P23999                   | ENDEVCO      | 7/19/2006        |
| RIGHT REAR SILL (Z)                | AC-P23939                   | ENDEVCO      | 7/19/2006        |
| REAR FLOORPAN ABOVE AXLE (X)       | AC-P19111                   | ENDEVCO      | 7/7/2006         |
| REAR FLOORPAN ABOVE AXLE (Y)       | AC-P23161                   | ENDEVCO      | 7/19/2006        |
| REAR FLOORPAN ABOVE AXLE (Z)       | AC-P24011                   | ENDEVCO      | 7/7/2006         |
| LEFT REAR SILL (Y)                 | AC-P26266                   | ENDEVCO      | 8/7/2006         |
| LEFT FRONT SILL (Y)                | AC-P18743                   | ENDEVCO      | 6/28/2006        |
| LEFT FRONT DOOR CENTERLINE (Y)     | -                           | -            | -                |
| RIGHT REAR SEAT OCCUPANT COMP. (Y) | AC-X33                      | ICS          | 4/5/2006         |
| MID REAR OF LEFT FRONT DOOR (Y)    | -                           | -            | -                |
| LEFT FRONT DOOR UPPER C/L (Y)      | -                           | -            | -                |
| MID REAR OF LEFT REAR DOOR (Y)     | -                           | -            | -                |
| LEFT REAR DOOR UPPER C/L (Y)       | -                           | -            | -                |
| LOWER LEFT B- PILLAR (Y)           | AC-J33071                   | ENDEVCO      | 7/22/2006        |
| MIDDLE LEFT B-PILLAR (Y)           | AC-P16616                   | ENDEVCO      | 7/5/2006         |
| LOWER LEFT A-PILLAR (Y)            | AC-P35789                   | ENDEVCO      | 7/18/2006        |
| UPPER LEFT A-PILLAR (Y)            | AC-P16591                   | ENDEVCO      | 7/18/2006        |
| FRONT SEAT TRACK (Y)               | AC-P35803                   | ENDEVCO      | 7/18/2006        |
| REAR SEAT TRACK (Y)                | AC-P17141                   | ENDEVCO      | 7/18/2006        |
| VEHICLE CG (X)                     | AC-P18628                   | ENDEVCO      | 7/6/2006         |
| VEHICLE CG (Y)                     | AC-P18718                   | ENDEVCO      | 7/6/2006         |
| VEHICLE CG (Z)                     | AC-P23976                   | ENDEVCO      | 7/5/2006         |
| MDB CG (X)                         | AC-C16433                   | ENDEVCO      | 27-Jun-06        |
| MDB CG (Y)                         | AC-C16416                   | ENDEVCO      | 27-Jun-06        |
| MDB CG (Z)                         | AC-C16499                   | ENDEVCO      | 27-Jun-06        |
| MDB REAR FRAME MEMBER (X)          | AC-C14948                   | ENDEVCO      | 27-Jun-06        |
| MDB REAR FRAME MEMBER (Y)          | AC-C16680                   | ENDEVCO      | 27-Jun-06        |

REMARKS: None