**REPORT NUMBER: 214-CAL-08-04**

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

## TOYOTA MOTOR MANUFACTURING
## 2009 TOYOTA MATRIX
## 4-DOOR HATCHBACK

**NHTSA NUMBER: C95101**

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

**Test Date: February 21, 2008**

**FINAL REPORT**

**PREPARED FOR:**
**U.S. DEPARTMENT OF TRANSPORTATION**
**NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION**
**ENFORCEMENT**
**OFFICE OF VEHICLE SAFETY COMPLIANCE**
**MAIL CODE: NVS-220, WEST BUILDING 4TH FLOOR**
**1200 NEW JERSEY AVENUE, SE**
**WASHINGTON, DC 20590**

This final test report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, in response to Contract Number DTNH22-07-D-00064.



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**Technical Report Documentation Page**

| | | |
|---|---|---|
| *1. Report No.*<br>214-CAL-08-04 | *2. Government Accession No.* | *3. Recipient's Catalog No.* |
| *4. Title and Subtitle*<br>Final Report of FMVSS 214 Compliance Side Impact Testing of a 2009 Toyota Matrix 4-Door Hatchback<br>NHTSA No.: C95101 | | *5. Report Date*<br>February 21, 2008<br>*6. Performing Organization Code*<br>CAL |
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| *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.*<br>*11. Contract or Grant No.*<br>DTNH22-07-D-00064 |
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15. *Supplementary Notes*

*16. Abstract*

A 55/28 km/h 90° Moving Deformable Barrier FMVSS 214 Indicant side impact was conducted on the subject 2009 Toyota Matrix 4-Door Hatchback 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 February 21, 2008. The impact velocity of the Moving Deformable Barrier (MDB) was 61.8 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 209 mm at level 2. The test vehicle's occupant performance is as follows:

| | DRIVER | PASS. |
|---|---|---|
| Left Upper Rib (LUR) Accel., g | 30.6 | 65.9 |
| Left Lower Rib (LLR) Accel., g | 34.6 | 57.6 |
| Lower Spine ($T_{12}$) Accel., g | 40.1 | 54.1 |
| Thoracic Trauma Index (TTI) | 37 | 60 |
| Pelvis (PEV) Accel., g | 59 | 51 |
| HIC | 204.9 | 183.6 |

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>Copies of this report are available from:<br>NHTSA Technical Information Services<br>National Highway Traffic Safety Admin.<br>1200 New Jersey Avenue, SE<br>Washington, DC 20590 |

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Form DOT F1700.7 (8-72)

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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. DTNH22-07-D-00064. The purpose of this indicant test was to evaluate side impact protection in a 2009 Toyota Matrix 4-Door Hatchback 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-08, dated December 15, 2006).

## 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-08, dated December 15, 2006).

A model year 2009 Toyota Matrix 4-Door Hatchback 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 61.8 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 1487.0 kg and the test weight of the MDB was 1362.5 kg. The test was conducted at the Calspan Corporation Transportation Sciences Center on February 21, 2008.

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 209 mm at level 2, 900 mm rearward of the left vertical impact point. The driver and passenger SID/HIII's, Serial Nos. 906 and 905 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) | $T_1$ | $T_2$ | TTI (G's) | Peak Pelvis (G's) |
|---|---|---|---|---|---|
| Driver | 204.9 | 35.7 | 67.0 | 37 | 59 |
| Passenger | 183.6 | 34.5 | 70.5 | 60 | 51 |

**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.

## DATA SHEET NO. 1

## GENERAL TEST AND VEHICLE PARAMETER DATA

| | | | |
|---|---|---|---|
| Test Vehicle: | 2009 Toyota Matrix 4-Door Hatchback | NHTSA No. | C95101 |
| Test Program: | FMVSS 214 Indicant Side Impact | Test Date: | February 21, 2008 |

### TEST VEHICLE INFORMATION AND VEHICLE OPTIONS

| | | | |
|---|---|---|---|
| Make | Toyota Motor Manufacturing | Driver Front Airbag | Yes |
| Model | Matrix | Driver Side Curtain Airbag | Yes |
| Body Style | 4-Door Hatchback | Driver Side Torso Airbag | Yes |
| NHTSA No. | C95101 | Driver Pretensioners | Yes |
| VIN | 2T1KU40E39C004997 | Driver Load Limiters | Yes |
| Color | Blue | Driver Power Seats | No |
| Engine Disp.(L) | 1.8 | Rear Pass. Side Curtain Airbag | Yes |
| Engine Cylinders | 4 | 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 | No |
| Power Brakes | Yes | Power Windows | Yes |
| Delivery Date | 2/11/08 | Power Door Locks | Yes |
| Odometer Reading (km) | 10 | Automatic Door Locks (ADL) | Yes |
| Dealer | West Herr Toyota | Owner's Manual Details Instructions on Disabling ADLs | Yes |

### DATA FROM CERTIFICATION LABEL

| | | | |
|---|---|---|---|
| Manufactured By | Toyota Motor Manufacturing | GVWR (kg) | 1751 |
| | | GAWR Front (kg) | 930 |
| Date of Manufacture | 1/08 | GAWR Rear (kg) | 839 |

### VEHICLE CAPACITY DATA

| Measured Parameter | Front | Rear | Third | Total |
|---|---|---|---|---|
| Type of Seats | Bucket | Split Bench | | |
| Number Of Occupants | 2 | 3 | | 5 |
| Capacity Wt. (VCW) (kg) | | | | 385 |
| Cargo Wt. (RCLW) (kg) | | | | 44.8 |

## DATA SHEET NO. 1 (continued)

## GENERAL TEST AND VEHICLE PARAMETER DATA

| | | | |
|---|---|---|---|
| Test Vehicle: | 2009 Toyota Matrix 4-Door Hatchback | NHTSA No. | C95101 |
| Test Program: | FMVSS 214 Indicant Side Impact | Test Date: | February 21, 2008 |

### 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 | 411.0 | 246.0 | | 460.0 | 328.5 | | 449.5 | 328.5 | |
| Right | kg | 368.0 | 265.0 | | 389.0 | 320.0 | | 389.0 | 320.0 | |
| Ratio | % | 60.4 | 39.6 | | 56.7 | 43.3 | | 56.4 | 43.6 | |
| Totals | kg | 779.0 | 511.0 | 1290.0 | 849.0 | 648.5 | 1497.5 | 838.5 | 648.5 | 1487.0 |

### TARGET TEST WEIGHT CALCULATION

| Measured Parameter | Units | Value |
|---|---|---|
| Total Delivered Weight (UVW) | kg | 1290.0 |
| Weight of 2 P572M ATDs (81.2 kg each) | kg | 162.4 |
| Rated Cargo/Luggage Weight (RCLW) | kg | 44.8 |
| Calculated Vehicle Target Weight (TVTW) | kg | 1497.2 |

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

Weight of Ballast (including instrumentation package and cameras): 34.6 kg

### TEST VEHICLE ATTITUDES

| | Units | LF | RF | LR | RR |
|---|---|---|---|---|---|
| As Delivered | mm | 715 | 716 | 721 | 724 |
| Fully Loaded | mm | 703 | 712 | 686 | 696 |
| As Tested | mm | 704 | 712 | 691 | 696 |

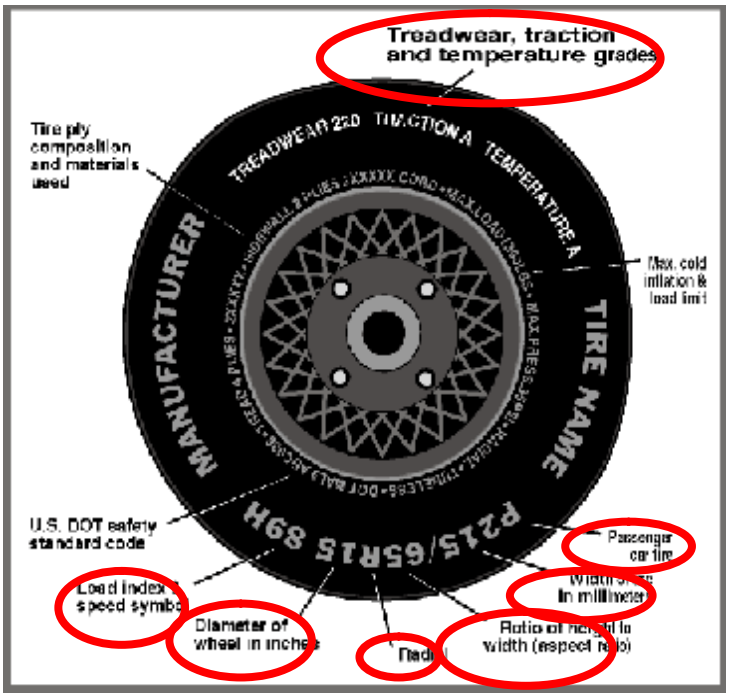
### TEST VEHICLE VERTICAL IMPACT LINE AND CG

| Measurement Description | Units | Value |
|---|---|---|
| Test Vehicle Wheel Base | mm | 2601 |
| Target Impact Point Aft of Front Axle | mm | 361 |
| Actual Impact Point Aft of Front Axle | mm | 368 |
| As Tested CG (aft of front axle) | mm | 1134.33 |

**DATA SHEET NO. 2**

**TEST VEHICLE TIRE INFORMATION**

| | | | |
|---|---|---|---|
| Test Vehicle: | 2009 Toyota Matrix 4-Door Hatchback | NHTSA No. | C95101 |
| Test Program: | FMVSS 214 Indicant Side Impact | Test Date: | February 21, 2008 |




**DATA FROM TIRE PLACARD**

| Measured Parameter | Front | Rear |
|---|---|---|
| Maximum Tire Pressure (kPa) | 350 kPa | 350 kPa |
| Cold / Test Pressure (kPa) | 220 kPa | 220 kPa |
| Recommended Tire Size | P205/55R16 | P205/55R16 |
| Tire Size on Vehicle | P205/55R16 | P205/55R16 |
| Tire Manufacturer | Goodyear | Goodyear |
| Tire Name | Eagle RS-A | Eagle RS-A |
| Tire Type | Passenger | Passenger |
| Tire Width (mm) | 205 | 205 |
| Ratio of Height to Width (aspect ratio) | 55 | 55 |
| Radial | Yes | Yes |
| Wheel Diameter | 16 | 16 |
| Load Index & Speed Symbol | 89H | 89H |
| Treadwear | 260 | 260 |
| Traction Grade | A | A |
| Temperature Grade | A | A |

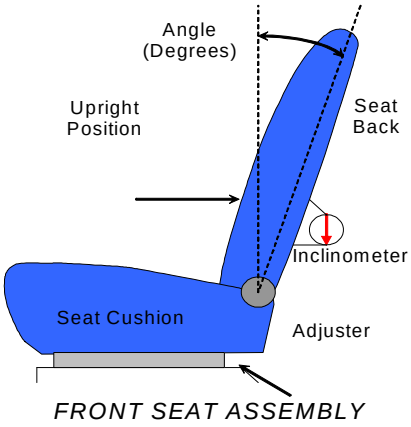
## DATA SHEET NO. 3

## TEST VEHICLE INFORMATION

| | | | |
|---|---|---|---|
| Test Vehicle: | 2009 Toyota Matrix 4-Door Hatchback | NHTSA No. | C95101 |
| Test Program: | FMVSS 214 Indicant Side Impact | Test Date: | February 21, 2008 |

### NORMAL DESIGN RIDING POSITION

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



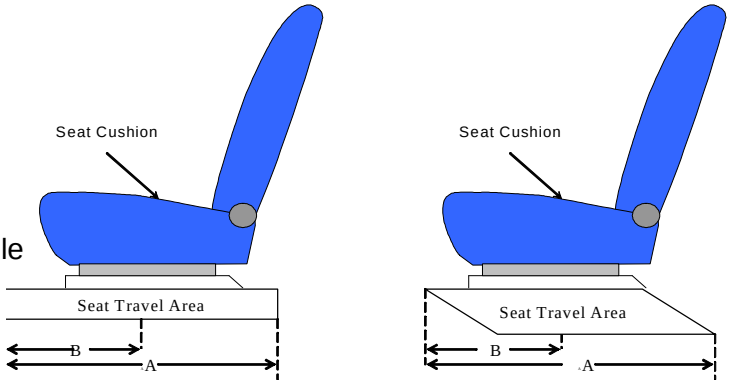

*FRONT SEAT ASSEMBLY*

### SEAT BACK POSITION

| | Driver Seat | Rear Seat |
|---|---|---|
| Test Detent (forward-most detent defined as 0) | 3 | Not Adjustable |
| Angle (deg. from forward-most locking position) | 6.0 | Not Adjustable |
| Alternative Measurements to Verify Test Position | Head restraint post 0.8° back from vertical | 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) | 274 | N/A |
| Test Position (B) (mm) | 137 | N/A |
| Test Detent (forward-most detent defined as 0) | 7 | N/A |
| Total Number of Detents (including 0) | 16 | N/A |

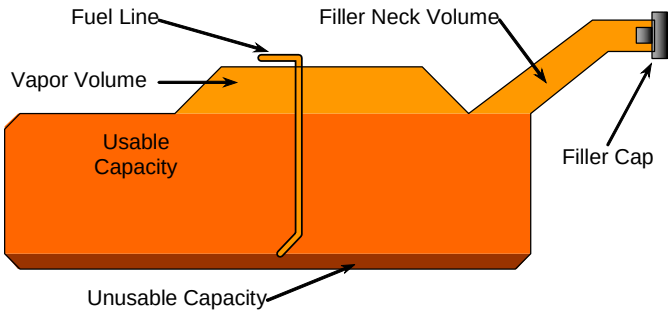
## DATA SHEET NO. 3 (CONTINUED)

## TEST VEHICLE INFORMATION

| | | | |
|---|---|---|---|
| Test Vehicle: | 2009 Toyota Matrix 4-Door Hatchback | NHTSA No. | C95101 |
| Test Program: | FMVSS 214 Indicant Side Impact | Test Date: | February 21, 2008 |

### 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.



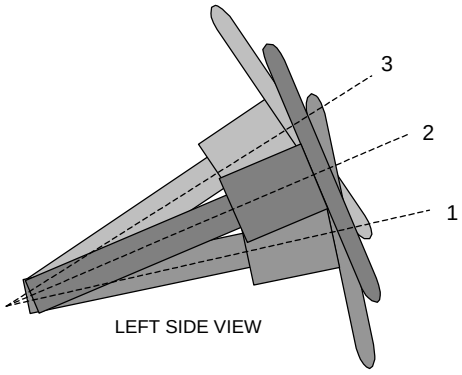

*VEHICLE FUEL TANK ASSEMBLY*

### FUEL TANK CAPACITY

| | Liters |
|---|---|
| Usable Capacity of "Standard" Fuel Tank | 50 |
| Usable Capacity of "Optional" Fuel Tank | - |
| Stoddard Used For Test (92%-94% of Fuel Tank Usable Capacity) | 46 |

### 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 | 64.2 | N/A |
| Geometric Center Position No. 2 * | NA | 62.8 | N/A |
| Uppermost Position No. 3 | NA | 61.3 | NA |

## DATA SHEET NO. 4

## MOVING DEFORMABLE BARRIER (MDB) SUMMARY OF RESULTS

| | | | |
|---|---|---|---|
| Test Vehicle: | 2009 Toyota Matrix 4-Door Hatchback | NHTSA No. | C95101 |
| Test Program: | FMVSS 214 Indicant Side Impact | Test Date: | February 21, 2008 |

### 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 | 61.8 |
| Trap No. 2 Velocity (Redundant) | km/h | 61.1 to 62.7 | 61.7 |
| Impact angle with respect to impactor | º | 88.5º to 91.5º | 89.9 |

### POST TEST OBSERVATIONS

### MDB LEFT EDGE IMPACT POINT DATA

| Measured Parameter | Units | Requirement | Value |
|---|---|---|---|
| Horizontal Offset | mm | +/- 50 | 7 mm rearward |
| Vertical Offset | mm | +/-20 | 10 mm above |

## DATA SHEET NO. 5

## POST TEST OBSERVATIONS

| | | | |
|---|---|---|---|
| Test Vehicle: | 2009 Toyota Matrix 4-Door Hatchback | NHTSA No. | C95101 |
| Test Program: | FMVSS 214 Indicant Side Impact | Test Date: | February 21, 2008 |

### TEST DUMMY INFORMATION AND CONTACT POINTS

| Description | Front Seat SID/HIII | Rear Seat SID/HIII |
|---|---|---|
| Dummy Type / Serial No. | SID/HIII / 906 | SID/HIII / 905 |
| Head Contact | Side Curtain Airbag | Side Curtain Airbag |
| Upper Torso Contact | Torso Airbag/Upper Door | Upper Door Trim |
| Lower Torso Contact | Torso Airbag | Door Trim/Arm Rest |
| Left Knee Contact | Door Trim | Door Trim |
| Right Knee Contact | No Contact | No Contact |

### POST TEST DOOR OPENING AND SEAT TRACK INFORMATION

| Description | Front | Rear |
|---|---|---|
| Locked/Unlocked Doors | Doors were unlocked | Doors were unlocked |
| Left Side Door Opening | Door remained closed and latched | Door remained closed and latched |
| Right Side Door Opening | Door remained closed and latched; Door opened without tools | Door remained closed and latched; 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 |

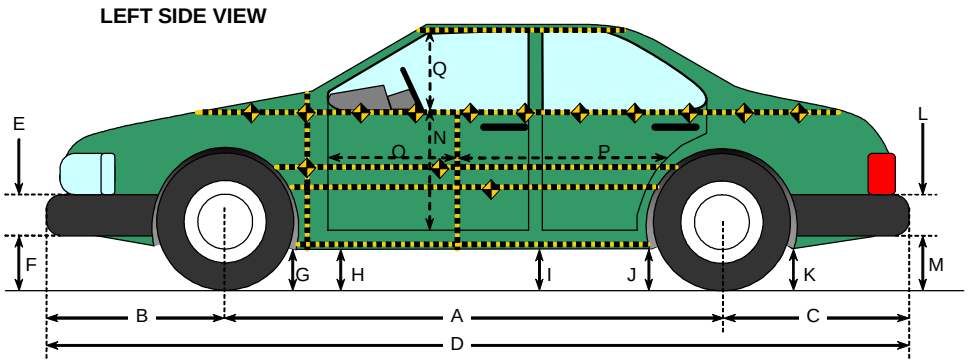
### SUPPLEMENTAL RESTRAINT INFORMATION

| 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: | 2009 Toyota Matrix 4-Door Hatchback | NHTSA No. | C95101 |
| Test Program: | FMVSS 214 Indicant Side Impact | Test Date: | February 21, 2008 |



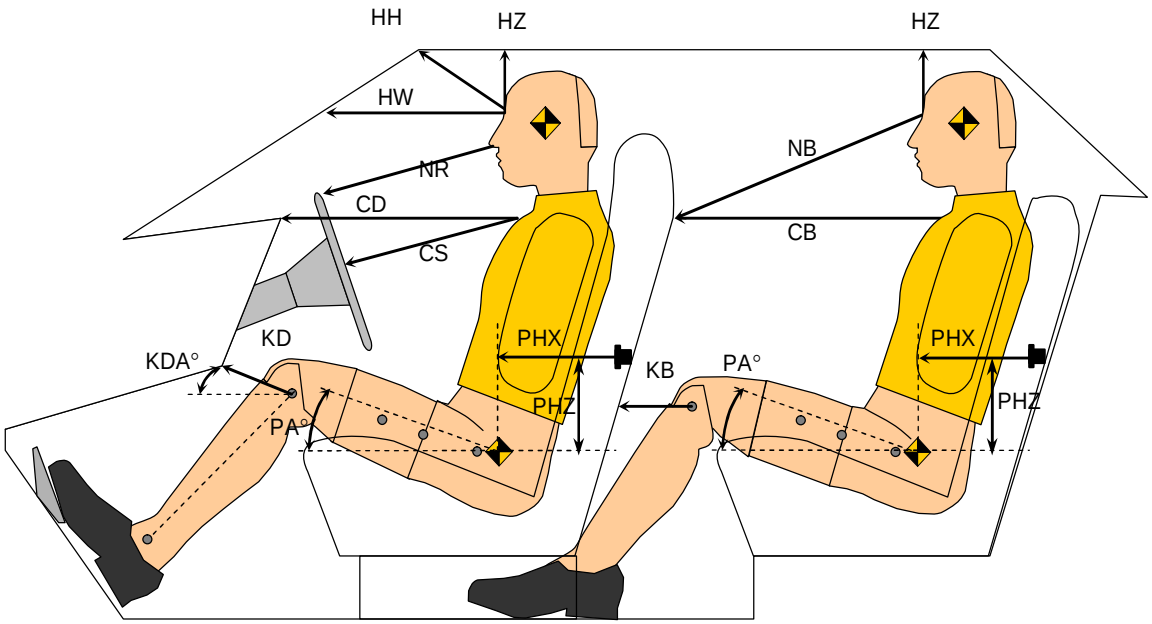

All Measurements in mm

| Code | Measurement Description | Pre-Test (delivered) | Pre-Test (as tested) | Post-Test (as tested) | Difference |
|---|---|---|---|---|---|
| A | Wheelbase | 2601 | 2601 | 2599 | 2 |
| B | Front Axle to FSOV | 923 | 923 | 938 | -15 |
| C | Rear Axle to RSOV | 840 | 840 | 829 | 11 |
| D | Total Length at Centerline | 4364 | 4364 | 4366 | -2 |
| E | Front Bumper Thickness | 120 | 120 | 120 | 0 |
| F | Front Bumper Bottom to Ground | 444 | 446 | 446 | 0 |
| G | Sill Height at Front Wheel Well | 201 | 184 | 200 | -16 |
| H | Sill Height at Front Door Leading Edge | 202 | 185 | 212 | -27 |
| I | Sill Height at "B" Pillar | 210 | 184 | 261 | -77 |
| J1 | Sill Height at Rear Wheel Well | 208 | 178 | 198 | -20 |
| J2 | Pinch Weld Height at Rear Wheel Well | 212 | 182 | 245 | -63 |
| K | Sill Height Aft of Rear Wheel Well | 274 | 235 | 240 | -5 |
| L | Rear Bumper Thickness | 316 | 316 | 315 | 1 |
| M | Rear Bumper Bottom to Ground | 317 | 280 | 277 | 3 |
| N | Sill Height to Window Bottom Sill | 784 | 784 | 702 | 82 |
| O | Front Door Leading Edge to Impact CL | 788 | 788 | 771 | 17 |
| P | Rear Door Trailing Edge to Impact CL | 1164 | 1164 | 1145 | 19 |
| Q | Front Window Opening | 437 | 437 | 453 | -16 |
| R | Right Side Length | 4240 | 4240 | 4244 | -4 |
| S | Left Side Length | 4236 | 4236 | 4238 | -2 |
| T | Vehicle Width at "B" Post | 1725 | 1725 | 1601 | 124 |

## DATA SHEET NO. 7

## SID/HIII LONGITUDINAL CLEARANCE DIMENSIONS

| | | | |
|---|---|---|---|
| Test Vehicle: | 2009 Toyota Matrix 4-Door Hatchback | NHTSA No. | C95101 |
| Test Program: | FMVSS 214 Indicant Side Impact | Test Date: | February 21, 2008 |

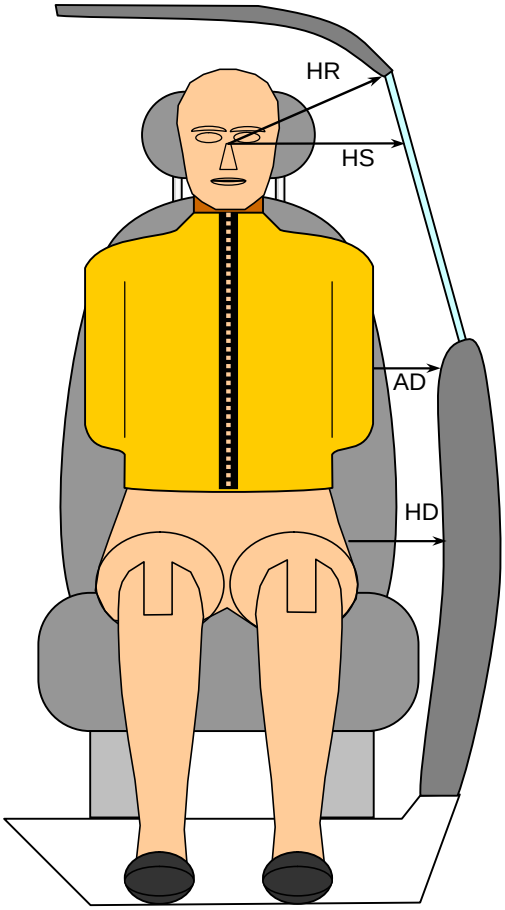



| Driver Code | Pass. Code | Measurement Description | Driver S/N 906 | | Passenger S/N 905 | |
|---|---|---|---|---|---|---|
| | | | Length(mm) | Angle(°) | Length(mm) | Angle(°) |
| HH | | Head to Header | 342 | | | |
| HW | | Head to Windshield | 673 | | | |
| HZ | HZ | Head to Roof | 215 | | 185 | |
| NR | NB | Nose to Rim/Nose to Seatback | 423 | | 631 | |
| CD | CB | Chest to Dash or Seatback | 541 | | 538 | |
| CS | | Chest to Steering Wheel | 283 | | | |
| KDL | KBL | Left Knee to Dash or Seatback | 145 | 23 | 213 | 28 |
| KDR | KBR | Right Knee to Dash or Seatback | 111 | 30 | 212 | 29 |
| PA | PA | Pelvic Angle | | 23.4 | | 23.1 |
| PHX | PHX | H-Point to Striker (X-Axis) | 211 | | 287 | |
| PHZ | PHZ | H-Point to Striker (Z-Axis) | 242 | | 332 | |

**DATA SHEET NO. 8**

**SID/HIII LATERAL CLEARANCE DIMENSIONS**

| | | | |
|---|---|---|---|
| Test Vehicle: | 2009 Toyota Matrix 4-Door Hatchback | NHTSA No. | C95101 |
| Test Program: | FMVSS 214 Indicant Side Impact | Test Date: | February 21, 2008 |



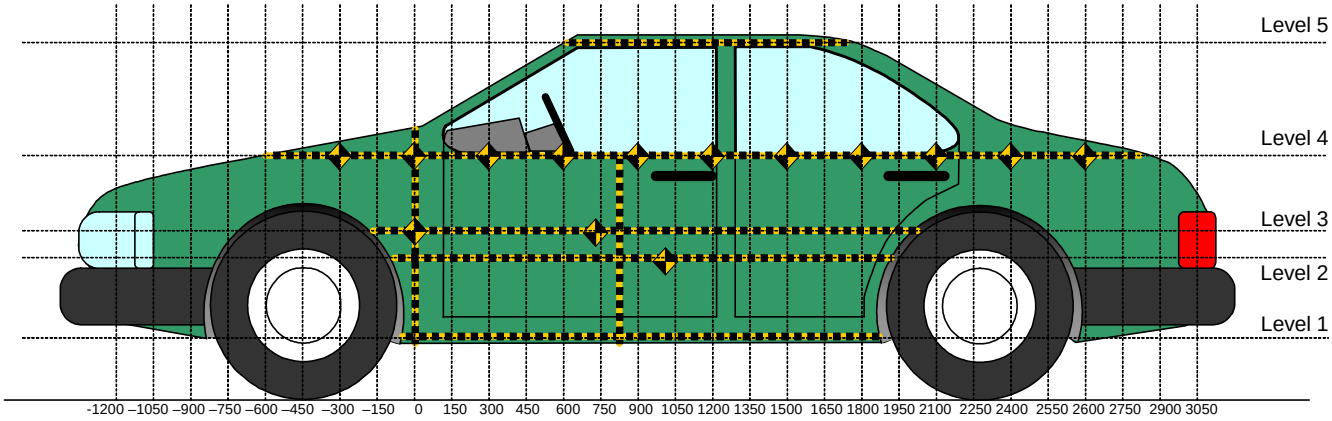

*FRONT VIEW OF DUMMY*

| Code | Measurement Description | Units | Driver S/N 906 | Passenger S/N 905 |
|---|---|---|---|---|
| HR | Head to Side Header | mm | 187 | 205 |
| HS | Head to Side Window | mm | 305 | 322 |
| $AD_1$ | Arm to Door (at upper rib level) | mm | 107 | 117 |
| $AD_2$ | Arm to Door (at lower rib level) | mm | 79 | 107 |
| HD | H-Point to Door | mm | 145 | 171 |

## DATA SHEET NO. 9

## VEHICLE SIDE MEASUREMENTS

| | | | |
|---|---|---|---|
| Test Vehicle: | 2009 Toyota Matrix 4-Door Hatchback | NHTSA No. | C95101 |
| Test Program: | FMVSS 214 Indicant Side Impact | Test Date: | February 21, 2008 |




All Measurements Shown in mm

**LEFT SIDE VIEW**

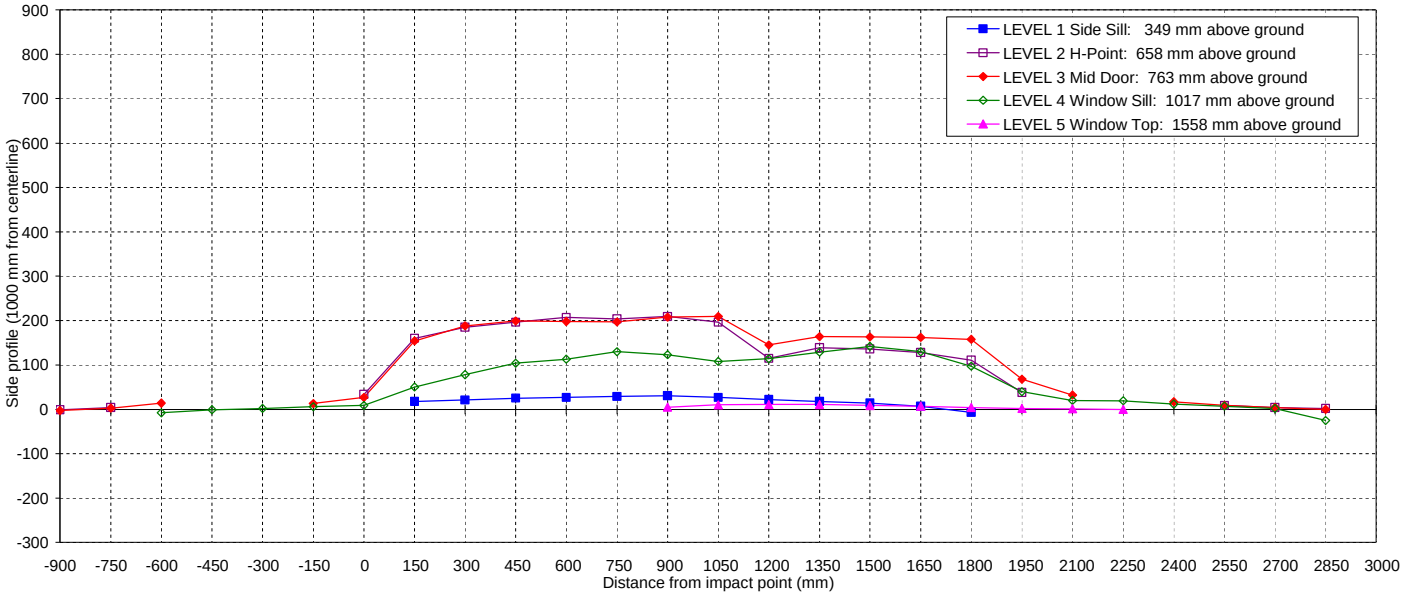
Measurements are taken with vehicle in the as tested condition.
Measurements along the vertical 750 mm.
All measurements below in mm.

| Level | Measurement Description | Maximum Exterior Static Crush | Height Above Ground | Distance From Impact |
|---|---|---|---|---|
| 1 | Sill Top | 31 | 349 | 900 |
| 2 | Occupant H-Point | 209 | 658 | 900 |
| 3 | Mid Door | 209 | 763 | 1050 |
| 4 | Window Sill | 142 | 1017 | 1500 |
| 5 | Window | 11 | 1558 | 1200 |
| | Maximum Penetration | 209 | | |

## DATA SHEET NO. 10

## VEHICLE EXTERIOR CRUSH PROFILES

| | | | |
|---|---|---|---|
| Test Vehicle: | 2009 Toyota Matrix 4-Door Hatchback | NHTSA No. | C95101 |
| Test Program: | FMVSS 214 Indicant Side Impact | Test Date: | February 21, 2008 |



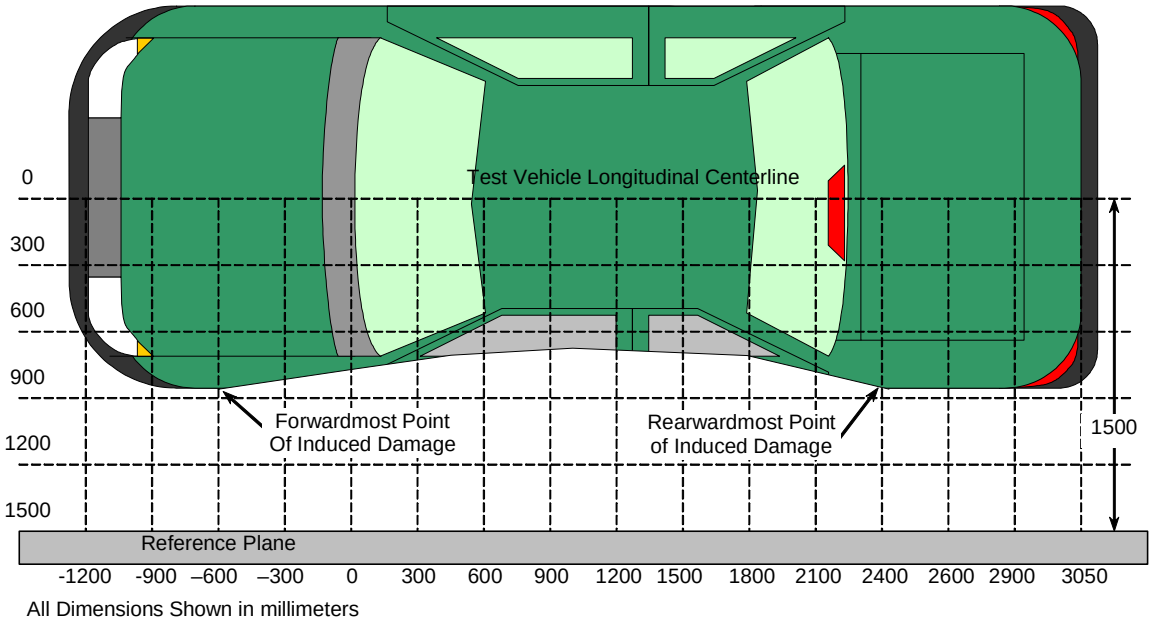

NOTE: All dimensions are in millimeters with a tolerance of ±3 mm

| | | | DISTANCE IN MILLIMETERS (mm) FROM IMPACT POINT | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LEVEL | HEIGHT (mm) | | -900 | -750 | -600 | -450 | -300 | -150 | 0 | 150 | 300 | 450 | 600 | 750 | 900 | 1050 | 1200 | 1350 | 1500 | 1650 | 1800 | 1950 | 2100 | 2250 | 2400 | 2550 | 2700 | 2850 | 3000 |
| LEVEL 1 SIDE SILL | 349 | PRE | -- | -- | -- | -- | -- | -- | -- | 162 | 163 | 161 | 159 | 158 | 157 | 156 | 154 | 152 | 151 | 148 | 141 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | POST | -- | -- | -- | -- | -- | -- | -- | 180 | 184 | 186 | 186 | 187 | 188 | 183 | 176 | 170 | 165 | 155 | 134 | -- | -- | -- | -- | -- | -- | -- | -- |
| | | CRUSH | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 18 | 21 | 25 | 27 | 29 | 31 | 27 | 22 | 18 | 14 | 7 | -7 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| LEVEL 2 H POINT | 658 | PRE | 170 | 135 | -- | -- | -- | -- | 119 | 135 | 142 | 143 | 143 | 144 | 144 | 145 | 147 | 147 | 146 | 142 | 129 | 118 | -- | -- | -- | 133 | 158 | 195 | -- |
| | | POST | 169 | 139 | -- | -- | -- | -- | 153 | 295 | 327 | 339 | 350 | 348 | 353 | 341 | 262 | 286 | 282 | 270 | 240 | 156 | -- | -- | -- | 142 | 162 | 197 | -- |
| | | CRUSH | -1 | 4 | N/A | N/A | N/A | N/A | 34 | 160 | 185 | 196 | 207 | 204 | 209 | 196 | 115 | 139 | 136 | 128 | 111 | 38 | N/A | N/A | N/A | 9 | 4 | 2 | N/A |
| LEVEL 3 MID DOOR | 763 | PRE | 194 | 148 | 124 | -- | -- | 115 | 120 | 135 | 138 | 138 | 138 | 138 | 138 | 138 | 139 | 140 | 140 | 138 | 130 | 117 | 115 | -- | 122 | 138 | 169 | 213 | -- |
| | | POST | 191 | 151 | 138 | -- | -- | 128 | 147 | 289 | 326 | 337 | 336 | 335 | 346 | 347 | 284 | 304 | 303 | 300 | 288 | 185 | 147 | -- | 139 | 147 | 173 | 213 | -- |
| | | CRUSH | -3 | 3 | 14 | N/A | N/A | 13 | 27 | 154 | 188 | 199 | 198 | 197 | 208 | 209 | 145 | 164 | 163 | 162 | 158 | 68 | 32 | N/A | 17 | 9 | 4 | 0 | N/A |
| LEVEL 4 WINDOW SILL | 1017 | PRE | -- | -- | 272 | 194 | 173 | 177 | 186 | 189 | 188 | 184 | 178 | 174 | 171 | 166 | 165 | 163 | 163 | 163 | 161 | 162 | 153 | 154 | 163 | 182 | 204 | 261 | -- |
| | | POST | -- | -- | 264 | 193 | 175 | 183 | 195 | 239 | 266 | 288 | 291 | 304 | 294 | 274 | 279 | 292 | 305 | 293 | 258 | 202 | 173 | 173 | 175 | 189 | 206 | 236 | -- |
| | | CRUSH | N/A | N/A | -8 | -1 | 2 | 6 | 9 | 50 | 78 | 104 | 113 | 130 | 123 | 108 | 114 | 129 | 142 | 130 | 97 | 40 | 20 | 19 | 12 | 7 | 2 | -25 | N/A |
| LEVEL 5 WINDOW TOP | 1558 | PRE | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 413 | 407 | 406 | 406 | 409 | 415 | 424 | 437 | 460 | 508 | -- | -- | -- | -- | -- |
| | | POST | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 418 | 417 | 417 | 417 | 418 | 422 | 428 | 439 | 461 | 508 | -- | -- | -- | -- | -- |
| | | 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 | 5 | 10 | 11 | 11 | 9 | 7 | 4 | 2 | 1 | 0 | N/A | N/A | N/A | N/A | N/A |

## DATA SHEET NO. 11

## VEHICLE DAMAGE PROFILE DISTANCES

| | | | |
|---|---|---|---|
| Test Vehicle: | 2009 Toyota Matrix 4-Door Hatchback | NHTSA No. | C95101 |
| Test Program: | FMVSS 214 Indicant Side Impact | Test Date: | February 21, 2008 |




**TOP VIEW**

### DAMAGE PROFILE DISTANCES

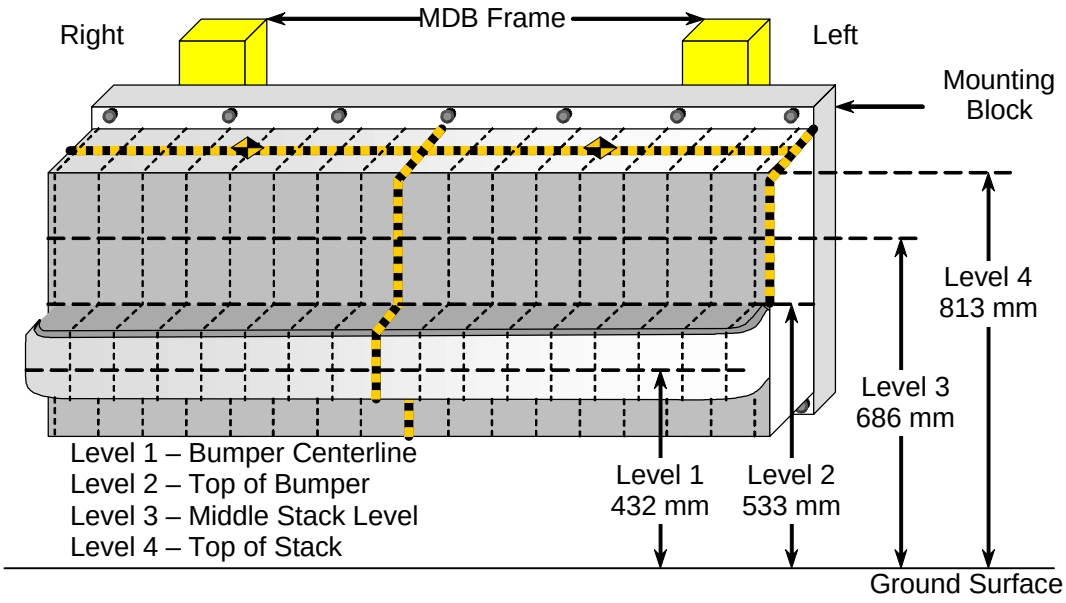
| DPD | Distance from Impact Point in mm | Level | Pre-Test (mm) | Post-Test (mm) | Max Static Crush (mm) |
|---|---|---|---|---|---|
| 1 (LR) | 2600 | 658 | 141 | 149 | 8 |
| 2 | 2040 | 763 | 116 | 162 | 46 |
| 3 | 1480 | 763 | 140 | 303 | 163 |
| 4 | 920 | 763 | 138 | 346 | 208 |
| 5 | 360 | 763 | 138 | 330 | 192 |
| 6 (LF) | -200 | 1017 | 176 | 180 | 4 |

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: | 2009 Toyota Matrix 4-Door Hatchback | NHTSA No. | C95101 |
| Test Program: | FMVSS 214 Indicant Side Impact | Test Date: | February 21, 2008 |




NOTE: All dimensions are in millimeters with a tolerance of ±3 mm

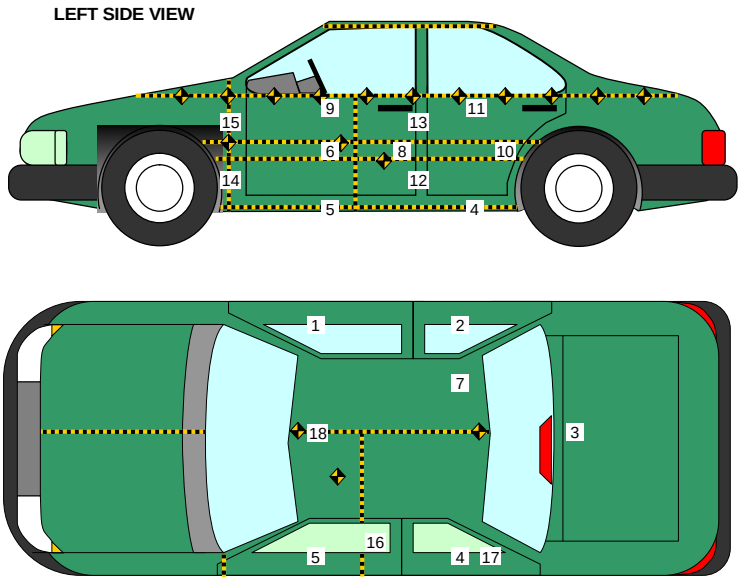
| LEVEL | HEIGHT AT CL (mm)* | | DISTANCE RIGHT OF CENTER (mm) | | | | | | | | | DISTANCE LEFT OF CENTER (mm) | | | | | | | | LEVEL | HEIGHT AT CL (mm)* | MAX CRUSH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | -800 | -700 | -600 | -500 | -400 | -300 | -200 | -100 | 0 | 100 | 200 | 300 | 400 | 500 | 600 | 700 | 800 | | | |
| LEVEL 4 | | PRE | 411 | 412 | 412 | 412 | 412 | 412 | 413 | 413 | 413 | 413 | 413 | 413 | 413 | 413 | 413 | 413 | 412 | LEVEL 4 | | |
| TOP | 811 | POST | 335 | 362 | 380 | 387 | 389 | 375 | 339 | 345 | 366 | 374 | 381 | 377 | 379 | 367 | 347 | 324 | 286 | TOP | 811 | 126 |
| STACK | | CRUSH | 76 | 50 | 32 | 25 | 23 | 37 | 74 | 68 | 47 | 39 | 32 | 36 | 34 | 46 | 66 | 89 | 126 | STACK | | |
| LEVEL 3 | | PRE | 411 | 411 | 412 | 412 | 412 | 412 | 412 | 412 | 413 | 412 | 412 | 412 | 412 | 412 | 412 | 412 | 412 | LEVEL 3 | | |
| MID | 682 | POST | 374 | 391 | 401 | 402 | 399 | 393 | 377 | 369 | 396 | 402 | 403 | 401 | 394 | 390 | 376 | 363 | 316 | MID | 682 | 96 |
| LEVEL | | CRUSH | 37 | 20 | 11 | 10 | 13 | 19 | 35 | 43 | 17 | 10 | 9 | 11 | 18 | 22 | 36 | 49 | 96 | LEVEL | | |
| LEVEL 2 | | PRE | 411 | 412 | 412 | 412 | 412 | 412 | 412 | 412 | 413 | 412 | 412 | 412 | 412 | 412 | 412 | 412 | 412 | LEVEL 2 | | |
| TOP | 542 | POST | 309 | 318 | 325 | 328 | 332 | 337 | 341 | 345 | 348 | 348 | 352 | 355 | 357 | 356 | 347 | 331 | 316 | TOP | 542 | 102 |
| BUMPER | | CRUSH | 102 | 94 | 87 | 84 | 80 | 75 | 71 | 67 | 65 | 64 | 60 | 57 | 55 | 56 | 65 | 81 | 96 | BUMPER | | |
| LEVEL 1 | | PRE | 501 | 513 | 513 | 513 | 513 | 513 | 513 | 514 | 514 | 514 | 514 | 514 | 514 | 514 | 514 | 514 | 505 | LEVEL 1 | | |
| MID | 430 | POST | 318 | 339 | 355 | 366 | 371 | 374 | 377 | 382 | 387 | 392 | 396 | 399 | 402 | 402 | 400 | 391 | 372 | MID | 430 | 183 |
| BUMPER | | CRUSH | 183 | 174 | 158 | 147 | 142 | 139 | 136 | 132 | 127 | 122 | 118 | 115 | 112 | 112 | 114 | 123 | 133 | BUMPER | | |

*Heights measured above ground level.

## DATA SHEET NO. 13

## VEHICLE ACCELEROMETER LOCATIONS

| | | | |
|---|---|---|---|
| Test Vehicle: | 2009 Toyota Matrix 4-Door Hatchback | NHTSA No. | C95101 |
| Test Program: | FMVSS 214 Indicant Side Impact | Test Date: | February 21, 2008 |




| Loc. No. | Accelerometer Location | Measurements (mm) | | |
|---|---|---|---|---|
| | | X | Y | Z |
| 1 | Right Sill at Front Seat | 2703 | 655 | -398 |
| 2 | Right Sill at Rear Seat | 1823 | 659 | -397 |
| 3 | Rear Floorpan Above Axle | 1070 | -3 | -596 |
| 4 | Left Sill at Rear Door | 1817 | -651 | -378 |
| 5 | Left Sill at Front Door | 2663 | -652 | -395 |
| 6 | Left Front Door C/L** | - | - | - |
| 7 | Rear Occupant Compartment | 1865 | 443 | -311 |
| 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 | 2021 | -651 | -469 |
| 13 | Left Middle B-Post | 1918 | -637 | -1121 |
| 14 | Left Lower A-Post | 3013 | -583 | -584 |
| 15 | Left Middle A-Post | 2923 | -629 | -1206 |
| 16 | Front Seat Track | 2094 | -542 | -440 |
| 17 | Rear Seat Track or Structure | 1000 | -440 | -629 |
| 18 | Vehicle CG | 2327 | 19 | -567 |

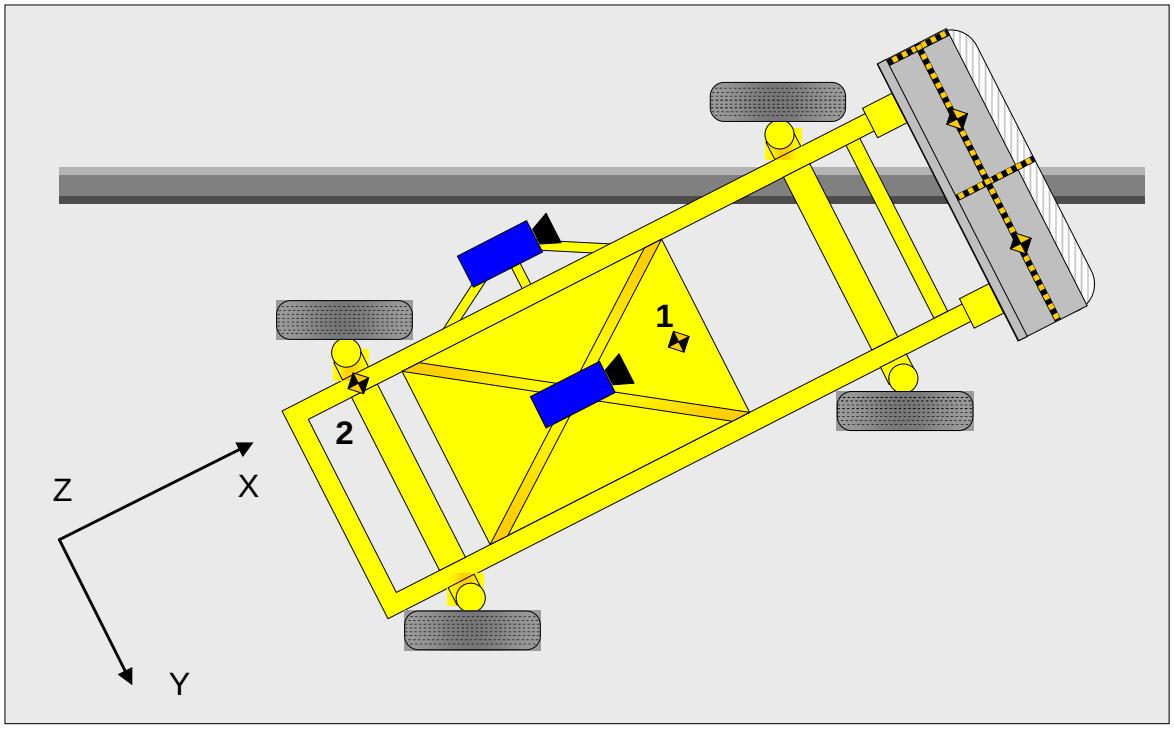
Reference Points X - Test Vehicle Rear Bumper (+ forward)
Y - Test Vehicle Centerline (+ to right)
Z - Ground Plane (+ down)

** Accelerometer was not requested by the COTR.

## DATA SHEET NO. 14

## MDB ACCELEROMETER LOCATIONS

| | | | |
|---|---|---|---|
| Test Vehicle: | 2009 Toyota Matrix 4-Door Hatchback | NHTSA No. | C95101 |
| Test Program: | FMVSS 214 Indicant Side Impact | Test Date: | February 21, 2008 |




| 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**

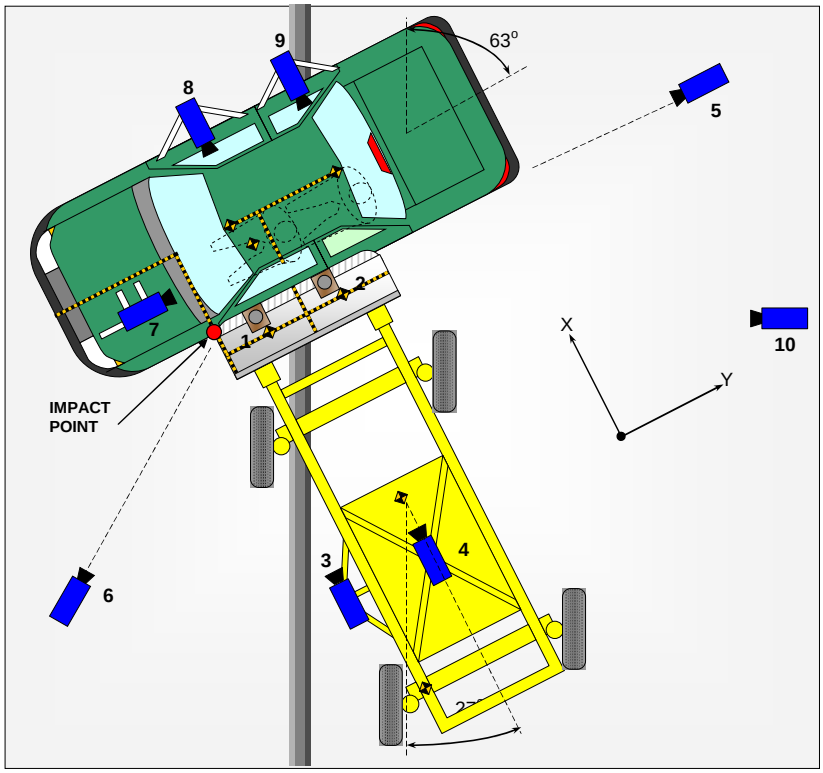
| | | | |
|---|---|---|---|
| Test Vehicle: | 2009 Toyota Matrix 4-Door Hatchback | NHTSA No. | C95101 |
| Test Program: | FMVSS 214 Indicant Side Impact | Test Date: | February 21, 2008 |

| | Elements | Pre-Test (mm) |
|---|---|---|
| 1 | Total Length | 4364 |
| 2 | Total Width | 1725 |
| 3 | Bumper Top Height | 677 |
| 4 | Bumper Bottom Height | 562 |
| 5 | Longitudinal Member Top Height | 658 |
| 6 | Distance between Longitudinal Members | 1092 |
| 7 | Longitudinal Member Width | 87 |
| 8 | Engine Top Height | 987 |
| 9 | Engine Bottom Height | 330 |
| 10 | Engine and gearbox width | 466 |
| 11 | Front bumper-engine distance | 4364 |
| 12 | Front shock absorber fixing height | 616 |
| 13 | Bonnet leading edge height | 816 |
| 14 | Front shock absorber fixing width | 0 |
| 15 | Front bumper – front axle distance | 923 |
| 16 | Front axle – a pillar distance | 409 |
| 17 | A-pillar – B-pillar distance | 1069 |
| 18 | B-Pillar – rear axle distance | 1123 |
| 19 | B-pillar – C-pillar distance | 1018 |
| 20 | Roof sill bottom height | 1484 |
| 21 | Roof sill top height | 1569 |
| 22 | Floor sill bottom height | 358 |
| 23 | Floor sill top height | 451 |

## DATA SHEET NO. 16

## HIGH SPEED CAMERA LOCATIONS AND DATA

| | | | |
|---|---|---|---|
| Test Vehicle: | 2009 Toyota Matrix 4-Door Hatchback | NHTSA No. | C95101 |
| Test Program: | FMVSS 214 Indicant Side Impact | Test Date: | February 21, 2008 |




| 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 | 210 | 11450 | 970 | -2 | 50 | 500 |
| 6 | Left Side, Ground Level, Overall | -2065 | -1995 | 955 | -5 | 28 | 500 |
| 7 | Vehicle Onboard Front SID/HIII, Front | 475 | 360 | 1345 | -6 | 25 | 1000 |
| 8 | Vehicle Onboard Front SID/HIII, Side | 1485 | 822 | 1095 | -6 | 12.5 | 1000 |
| 9 | Vehicle Onboard Rear SID/HIII, Side | 1444 | 1650 | 1160 | -7 | 12.5 | 1000 |
| 10 | 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**

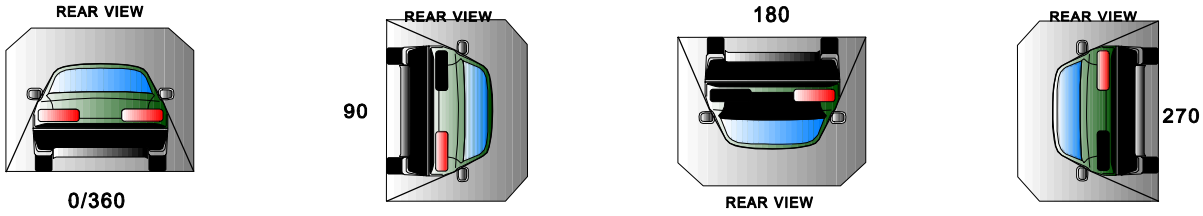
| | | | |
|---|---|---|---|
| Test Vehicle: | 2009 Toyota Matrix 4-Door Hatchback | NHTSA No. | C95101 |
| Test Program: | FMVSS 214 Indicant Side Impact | Test Date: | February 21, 2008 |

## 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 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0º - 90º | 1 | minutes | 17 | seconds | 5 | minutes | 6 | minutes | 17 | seconds | 7 | minutes |
| 90º - 180º | 1 | minutes | 05 | seconds | 5 | minutes | 6 | minutes | 5 | seconds | 7 | minutes |
| 180º-270º | 1 | minutes | 00 | seconds | 5 | minutes | 6 | minutes | 0 | seconds | 7 | minutes |
| 270º-360º | 1 | minutes | 12 | seconds | 5 | minutes | 6 | minutes | 12 | seconds | 7 | minutes |

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

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

# APPENDIX A

# PHOTOGRAPHS

**TABLE OF PHOTOGRAPHS**

**TABLE OF PHOTOGRAPHS (continued)**

**Figure A-1: As Received Left Front ¾ View**

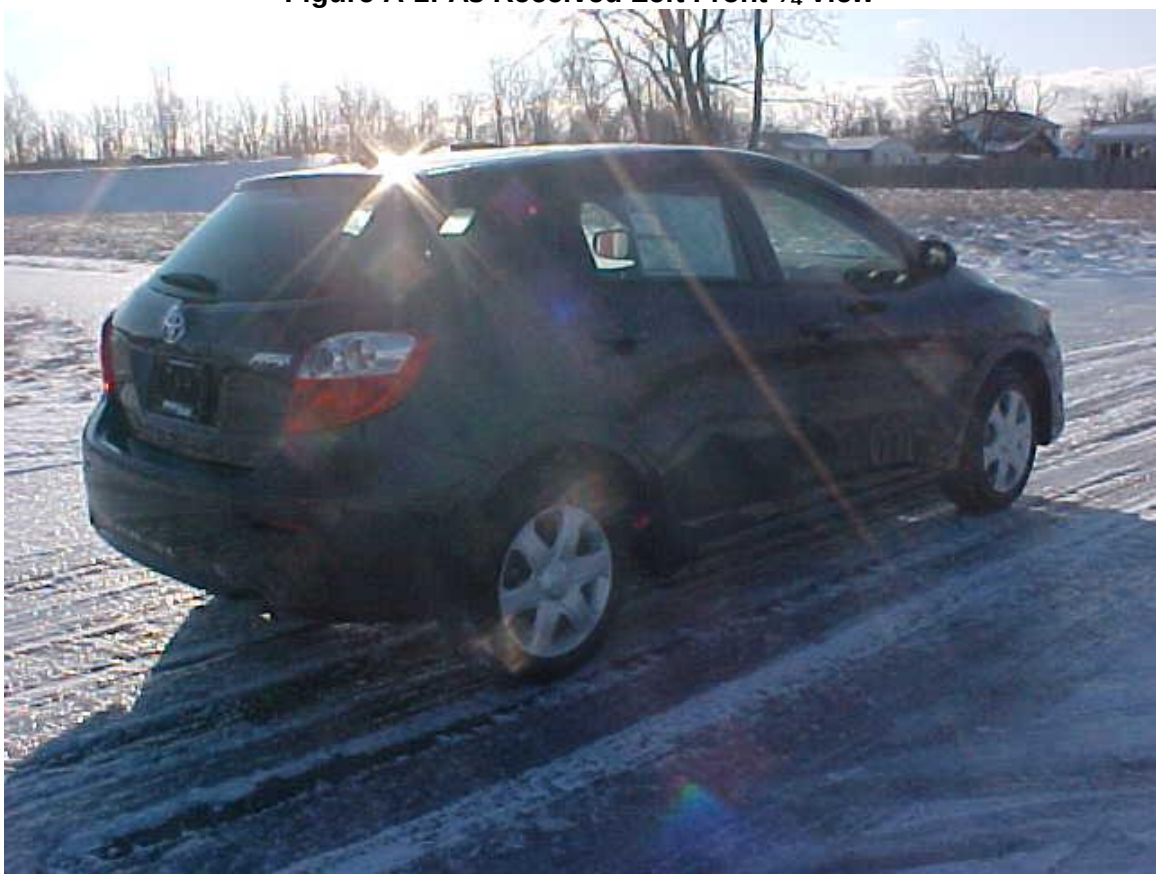


**Figure A-2: As Received Right Rear ¾ View**


**Figure A-3: Vehicle Certification Label**

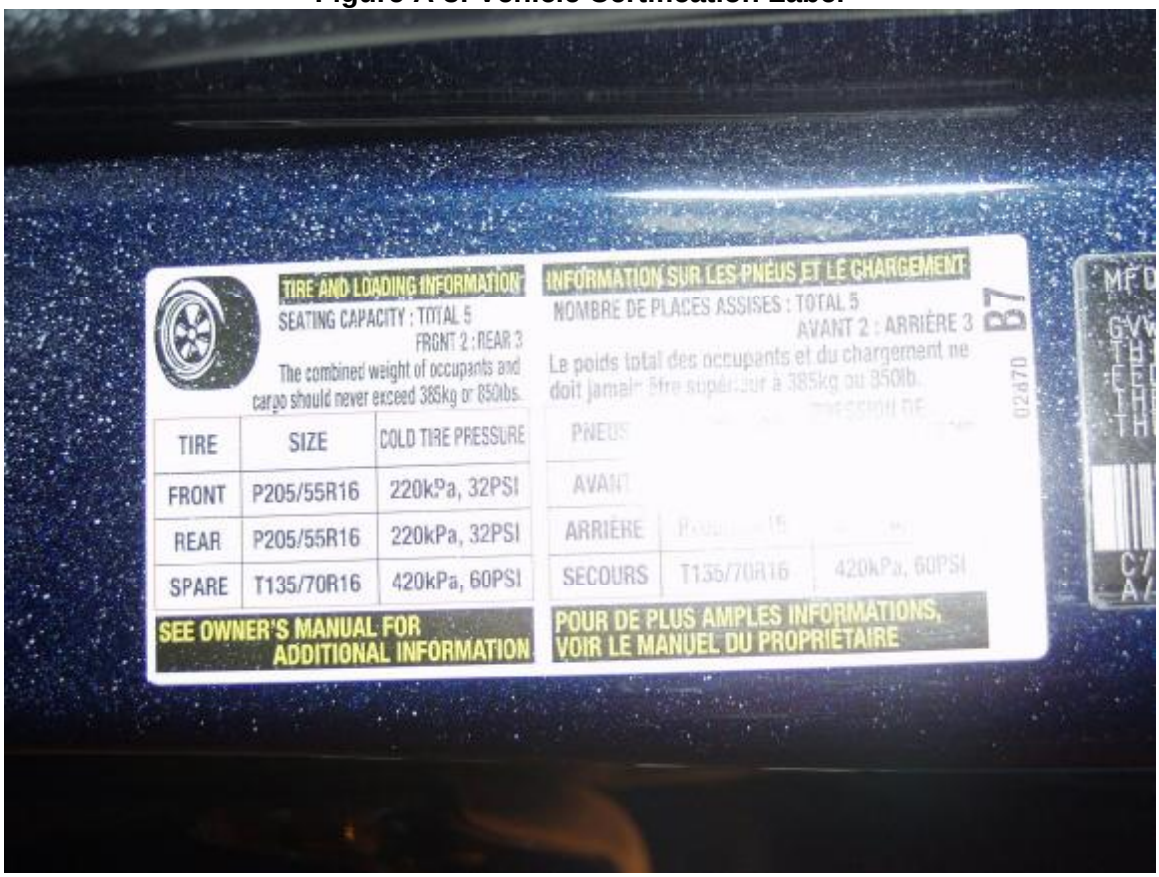



**Figure A-4: Vehicle Tire Placard Label**


**Figure A-5: Pre-Test Front View**


**Figure A-6: Post-Test Front View**


**Figure A-7: Pre-Test Left Front ¾ View**


**Figure A-8: Post-Test Left Front ¾ View**

**Figure A-9: Pre-Test Left Side View**

**Figure A-10: Post-Test Left Side View**


**Figure A-11: Pre-Test Left Rear ¾ View**


**Figure A-12: Post-Test Left Rear ¾ View**


**Figure A-13: Pre-Test Rear View**


**Figure A-14: Post-Test Rear View**

**Figure A-15: Pre-Test Right Rear ¾ View**


**Figure A-16: Post-Test Right Rear ¾ View**

**Figure A-17: Pre-Test Right Side View**

**Figure A-18: Post-Test Right Side View**


**Figure A-19: Pre-Test Right Front ¾ View**


**Figure A-20: Post-Test Right Front ¾ 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-23:Pre-Test Left Side View of MDB Impactor Face**


**Figure A-24: Post-Test Left Side View of MDB Impactor 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-29: Pre-Test Left Side View of Aligned MDB and Vehicle**


**Figure A-30: Pre-Test Right Side View of Aligned MDB and Vehicle**

**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**

Not Available

**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**


**Figure A-39: Pre-Test Left Occupant Compartment View of Driver**


**Figure A-40: Post-Test Left Occupant Compartment View of Driver**

**Figure A-41: Pre-Test Left Occupant Compartment View of Passenger**


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


**Figure A-43: Pre-Test Left Front Interior Trim**


**Figure A-44: Post-Test Left Front Interior Trim**


**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 ¾ View of Left Side Doors**


**Figure A-48: Post-Test Left Front ¾ View of Left Side Doors**


**Figure A-49: Pre-Test Left Rear ¾ View of Left Side Doors**


**Figure A-50: Post-Test Left Rear ¾ View of Left Side Doors**


**Figure A-51: Rollover 90 Degrees**


**Figure A-52: Rollover 180 Degrees**

**Figure A-53: Rollover 270 Degrees**

**Figure A-54: Rollover 360 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

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

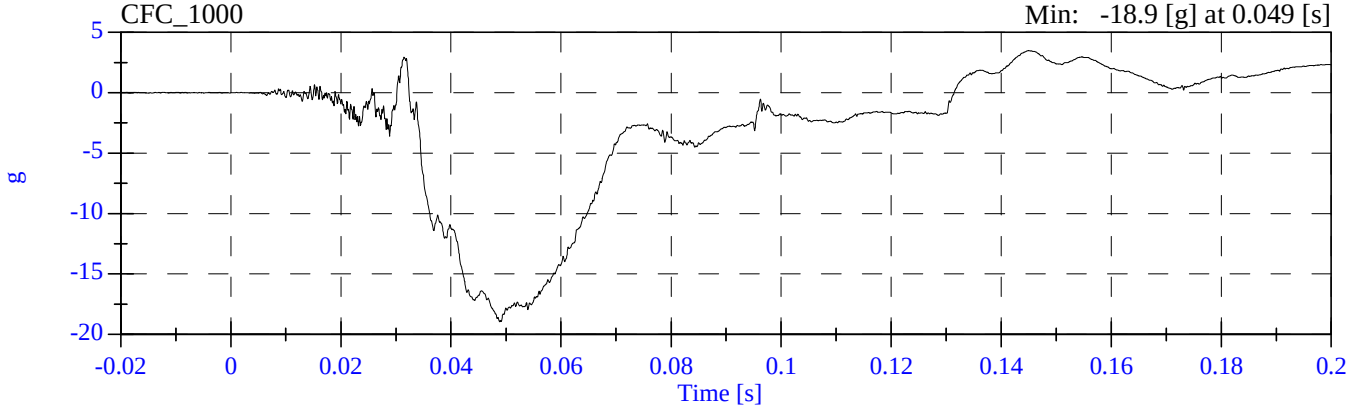
V2P1 Head Ax
V2P1 Head Ay
V2P1 Head Az
V2P1 Head Redundant Ax
V2P1 Head Redundant Ay
V2P1 Head Redundant Az
V2P1 Upper Neck Fx
V2P1 Upper Neck Fy
V2P1 Upper Neck Fz
V2P1 Upper Neck Mx
V2P1 Upper Neck My
V2P1 Upper Neck Mz
V2P1 Upper Rib Ay
V2P1 Upper Rib Redundant Ay
V2P1 Lower Rib Ay
V2P1 Lower Rib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

**TEST NOTES**

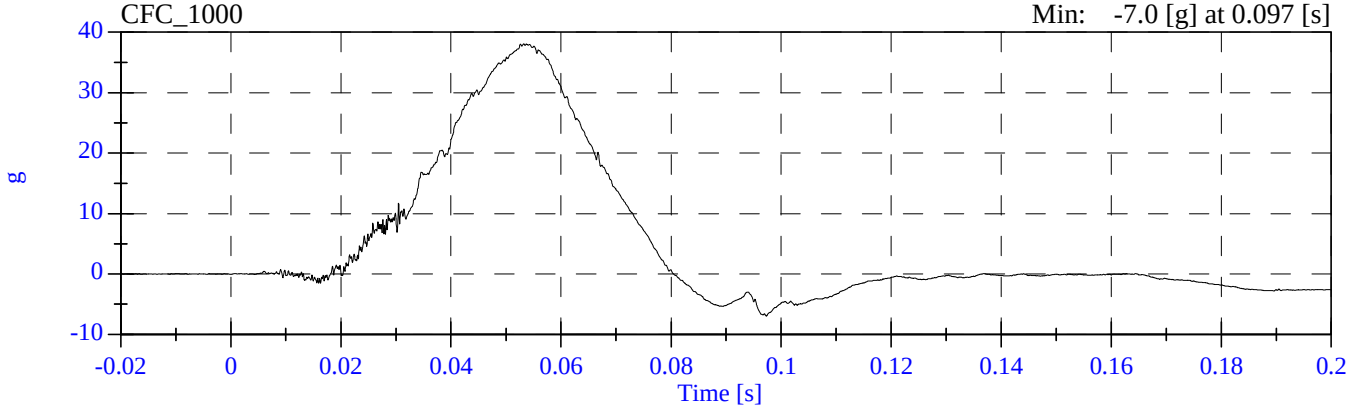
The following channel anomalies occurred:

# FMVSS 214i Test 4  2009 Toyota Matrix
# C95101 - February 21, 2008

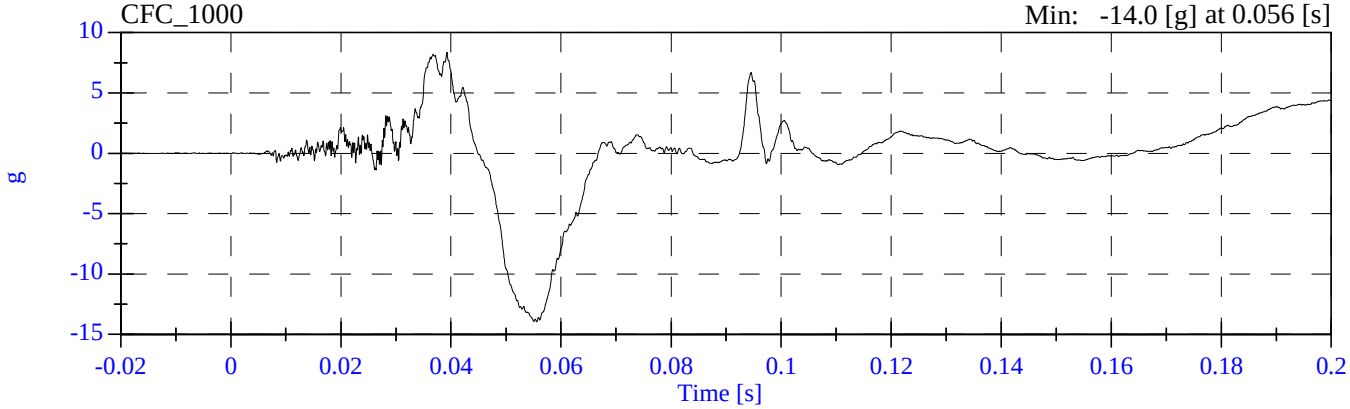
**V2P1 Head x**
CFC_1000
Max: 3.5 [g] at 0.145 [s]
Min: -18.9 [g] at 0.049 [s]



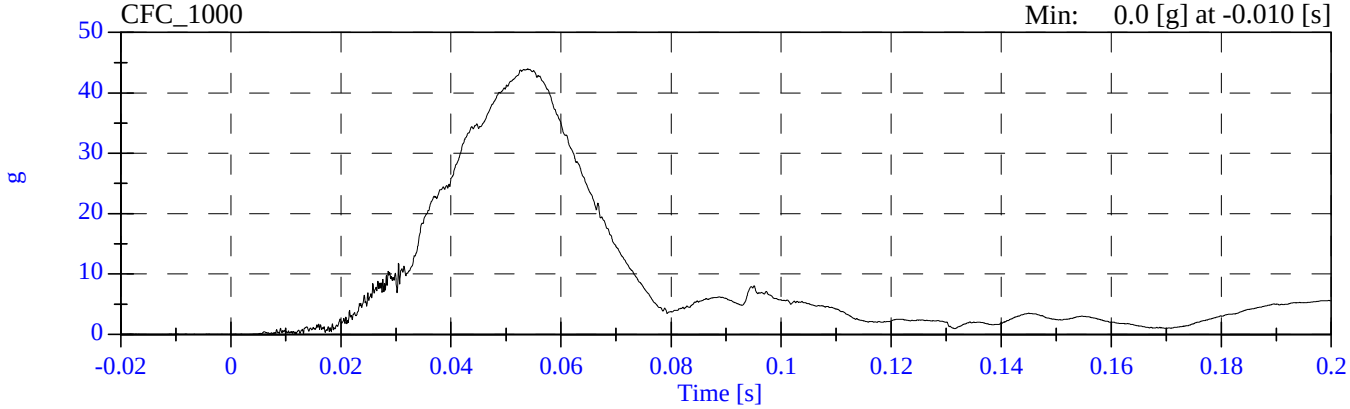

**V2P1 Head y**
CFC_1000
Max: 38.1 [g] at 0.053 [s]
Min: -7.0 [g] at 0.097 [s]




**V2P1 Head z**
CFC_1000
Max: 8.4 [g] at 0.039 [s]
Min: -14.0 [g] at 0.056 [s]

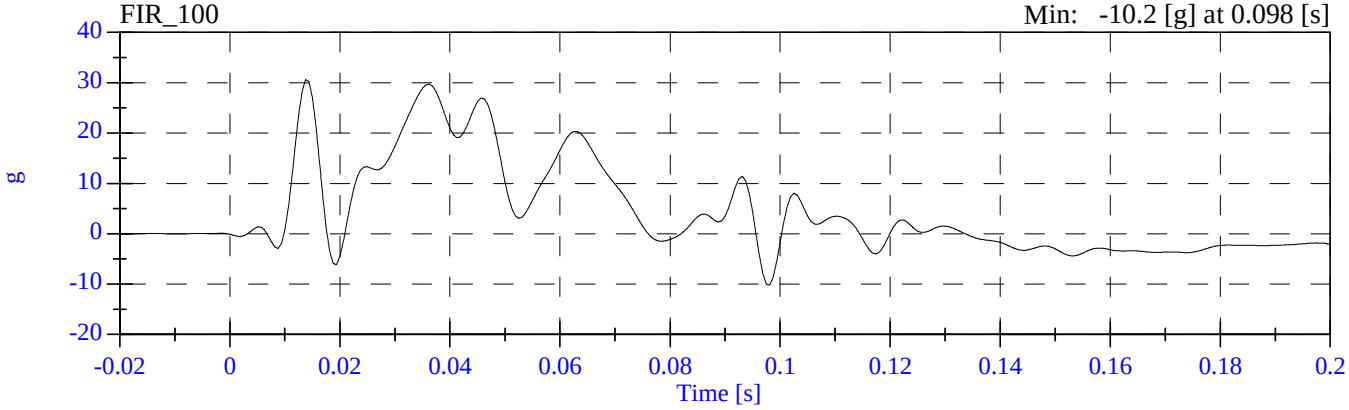



**V2P1 Head Resultant**
CFC_1000
Max: 44.0 [g] at 0.054 [s]
Min: 0.0 [g] at -0.010 [s]

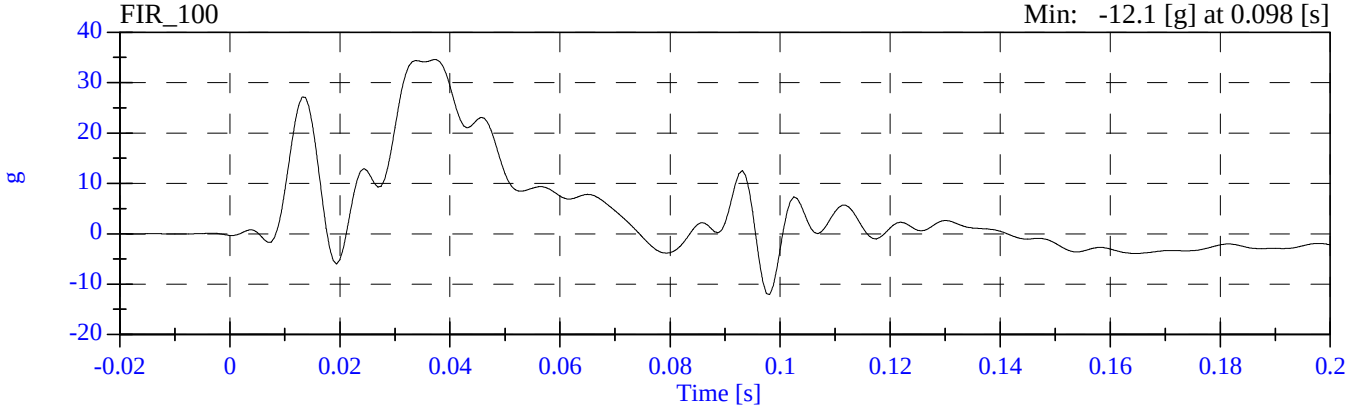


# FMVSS 214i Test 4 2009 Toyota Matrix
# C95101 - February 21, 2008

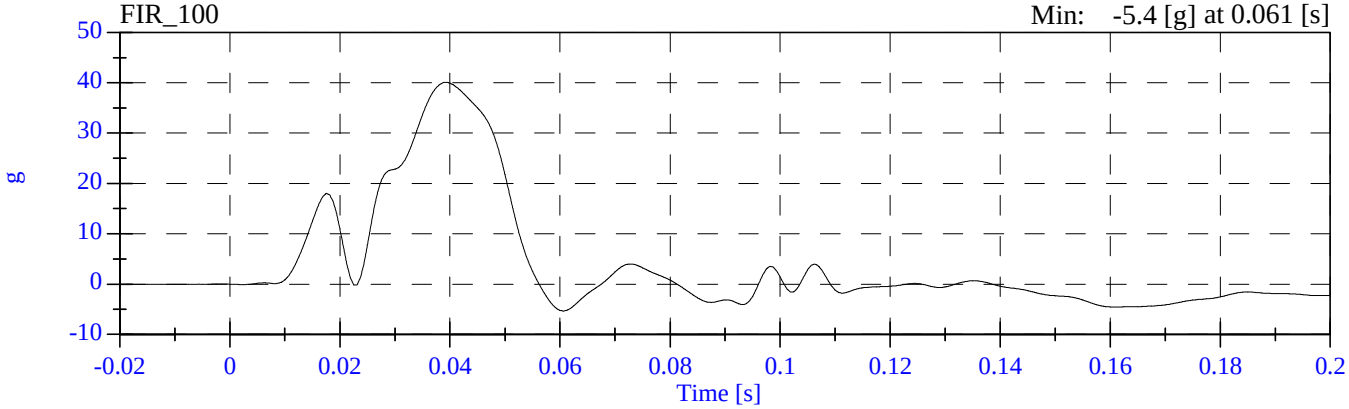
**V2P1 Upper Rib y**
FIR_100
Max: 30.6 [g] at 0.014 [s]
Min: -10.2 [g] at 0.098 [s]



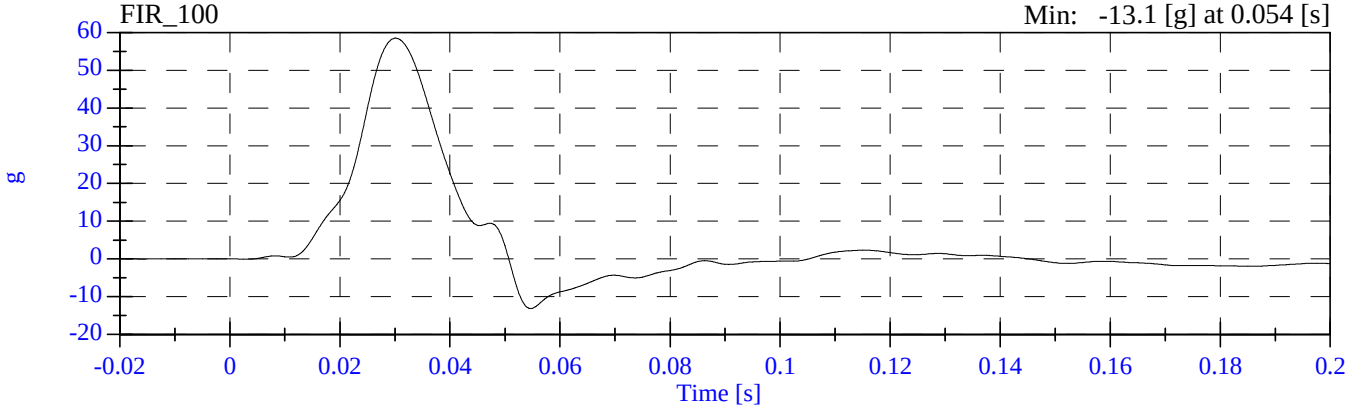

**V2P1 Lower Rib y**
FIR_100
Max: 34.6 [g] at 0.037 [s]
Min: -12.1 [g] at 0.098 [s]




**V2P1 Lower Spine y**
FIR_100
Max: 40.1 [g] at 0.039 [s]
Min: -5.4 [g] at 0.061 [s]

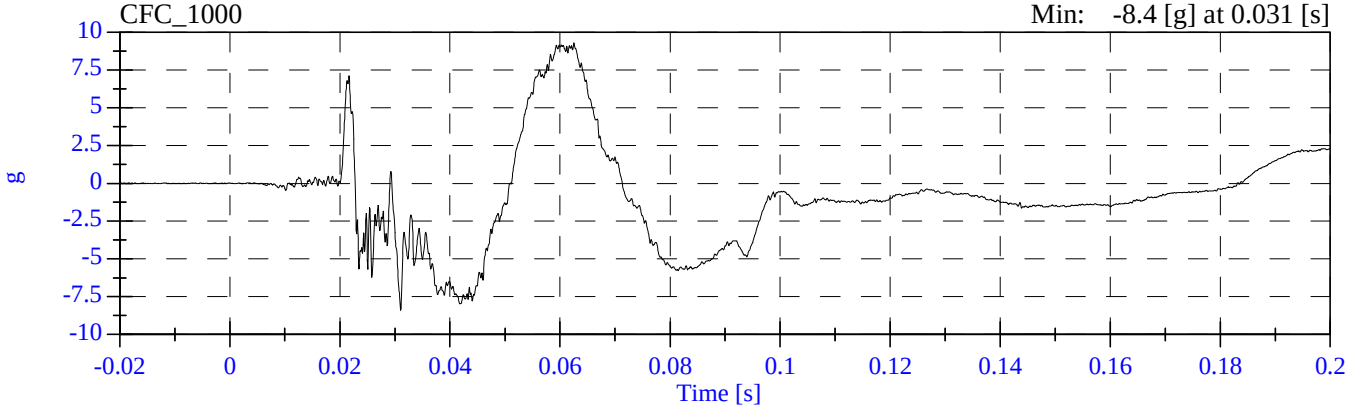



**V2P1 Pelvic y**
FIR_100
Max: 58.5 [g] at 0.030 [s]
Min: -13.1 [g] at 0.054 [s]

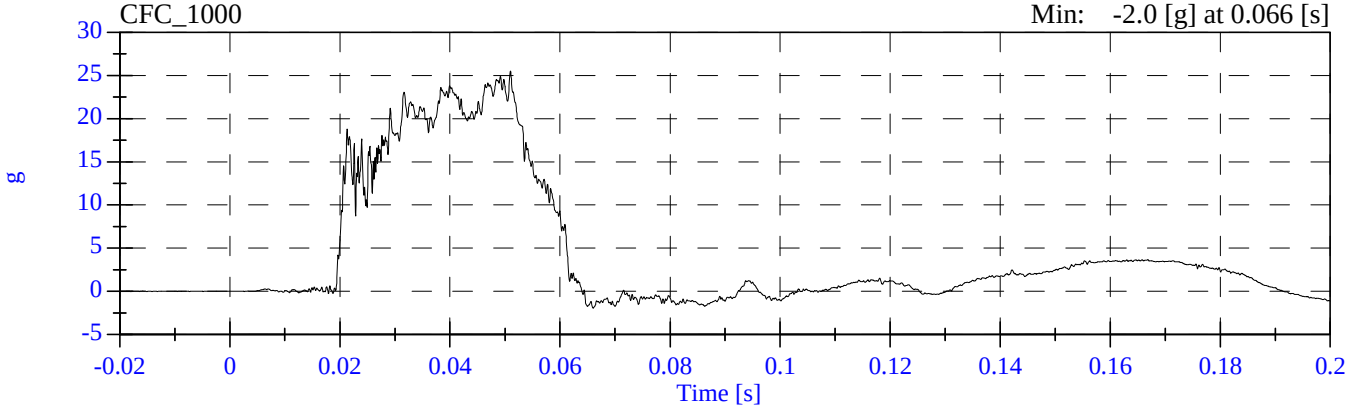


# FMVSS 214i Test 4 2009 Toyota Matrix
# C95101 - February 21, 2008

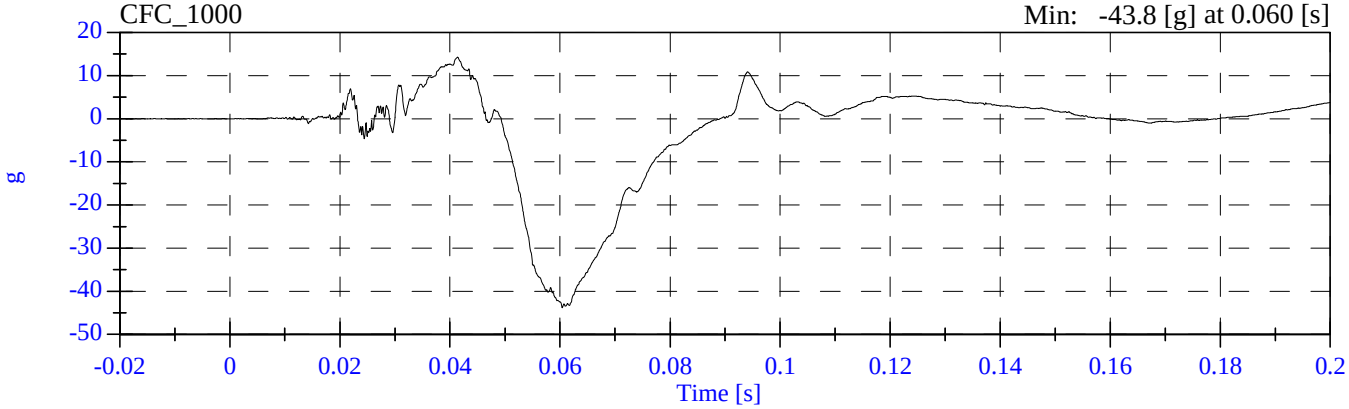
**V2P4 Head x**
CFC_1000
Max: 9.3 [g] at 0.063 [s]
Min: -8.4 [g] at 0.031 [s]



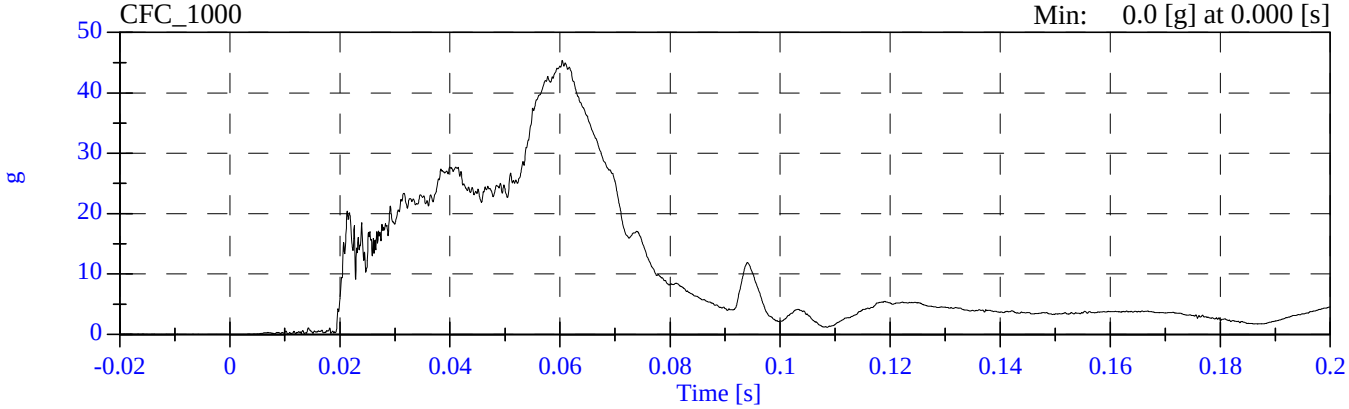

**V2P4 Head y**
CFC_1000
Max: 25.5 [g] at 0.051 [s]
Min: -2.0 [g] at 0.066 [s]




**V2P4 Head z**
CFC_1000
Max: 14.3 [g] at 0.041 [s]
Min: -43.8 [g] at 0.060 [s]

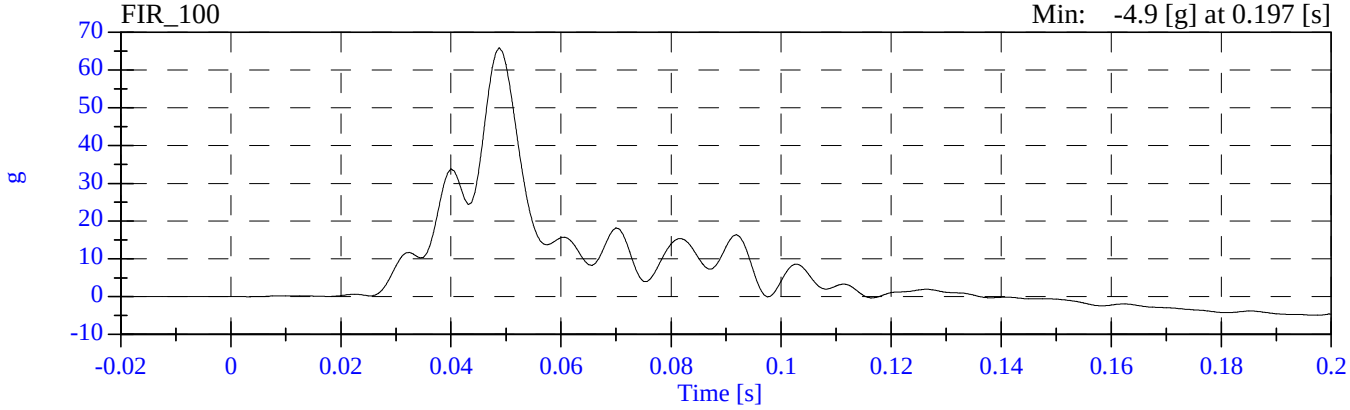



**V2P4 Head Resultant**
CFC_1000
Max: 45.4 [g] at 0.060 [s]
Min: 0.0 [g] at 0.000 [s]

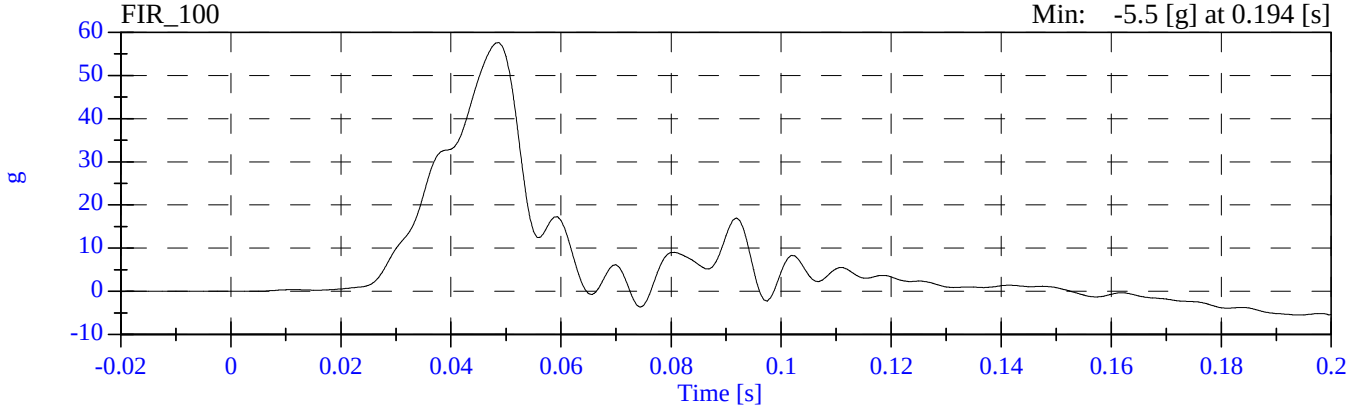


# FMVSS 214i Test 4 2009 Toyota Matrix
# C95101 - February 21, 2008

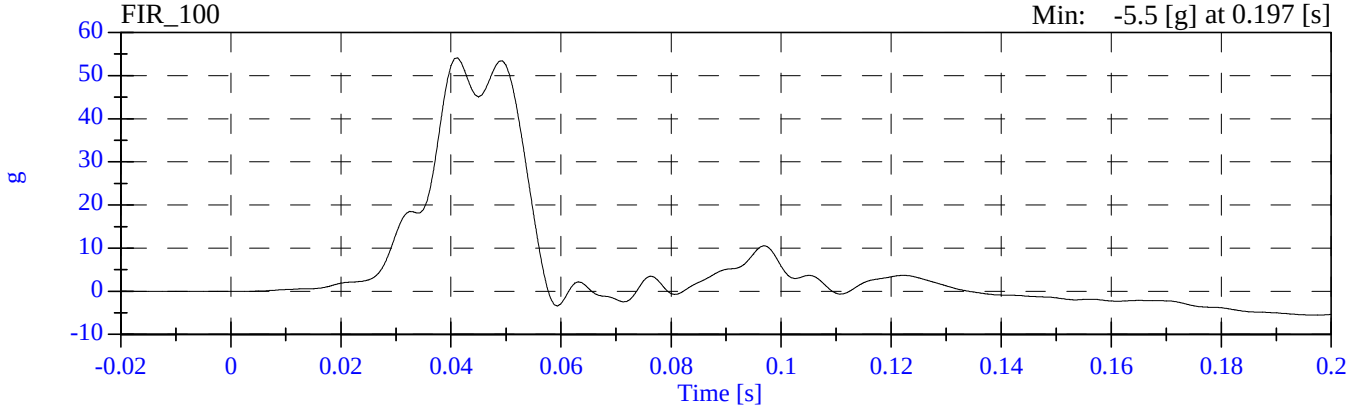
**V2P4 Upper Rib y**
FIR_100
Max: 65.9 [g] at 0.049 [s]
Min: -4.9 [g] at 0.197 [s]



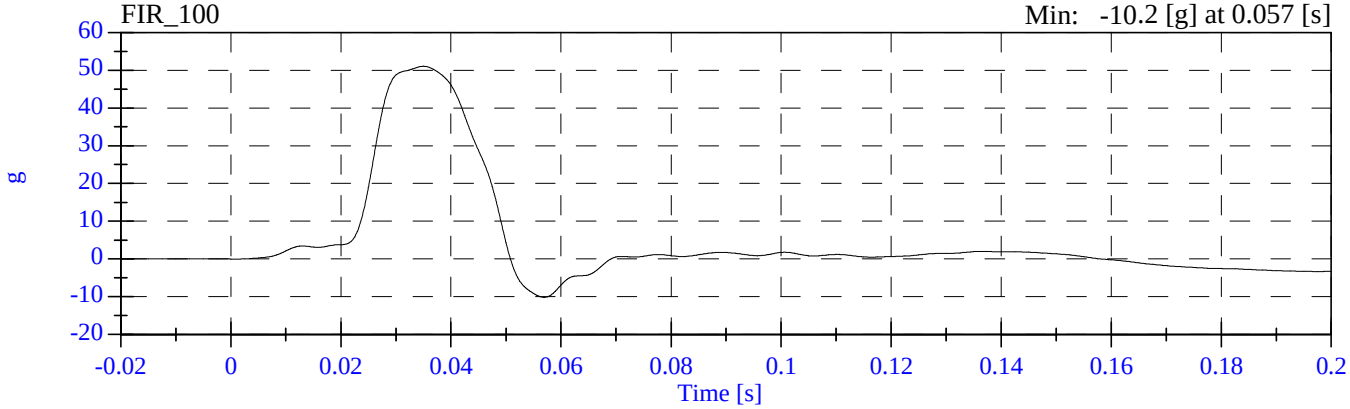

**V2P4 Lower Rib y**
FIR_100
Max: 57.6 [g] at 0.049 [s]
Min: -5.5 [g] at 0.194 [s]




**V2P4 Lower Spine y**
FIR_100
Max: 54.1 [g] at 0.041 [s]
Min: -5.5 [g] at 0.197 [s]




**V2P4 Pelvic y**
FIR_100
Max: 51.1 [g] at 0.035 [s]
Min: -10.2 [g] at 0.057 [s]



# APPENDIX C

# DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

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

**CONFIGURED FOR LEFT SIDE IMPACT**

Date: February 12, 2008 Sequential Test Number: 1
Laboratory Technician: B. Swiecicki

| TEST PARAMETER | SPECIFICATION | SID H3 NO.: 906 | | SID H3 NO.: 905 | |
|---|---|---|---|---|---|
| | | PRE TEST | POST TEST | PRE TEST | POST TEST |
| SH- Seated Height (mm) | 889 - 909 | 902 | 902 | 902 | 902 |
| RH- Rib Height (mm) | 501 - 521 | 511 | 511 | 513 | 513 |
| HP- Hip Pivot Height (mm) | 99 ref. | 99 | 99 | 99 | 99 |
| RD- Rib from Back Line (mm) | 229 - 241 | 239 | 239 | 239 | 239 |
| KV- Knee Pivot from Back Line (mm) | 511 - 526 | 518 | 518 | 521 | 521 |
| SW- Knee Pivot to Floor (mm) | 490 - 505 | 493 | 493 | 493 | 493 |
| HW- Hip Width (mm) | 356 - 391 | 386 | 386 | 381 | 381 |
| **THORAX IMPACTS** | | | | | |
| TEMPERATURE (• C) | 18.9 - 25.5 | 21.1 | 21.1 | 21.1 | 21.1 |
| RELATIVE. HUMIDITY (%) | 10 -70 | 33 | 33 | 33 | 33 |
| PROBE SPEED (m/s) | 4.27 - 4.33 | 4.29 | 4.29 | 4.29 | 4.27 |
| UPPER RIB (g's) | 37 - 46 | 37.21 | 43.45 | 45.31 | 44.67 |
| LOWER RIB (g's) | 37 - 46 | 37.91 | 41.71 | 44.34 | 41.38 |
| LOWER SPINE (g's) | 15 -22 | 19.82 | 21.58 | 21.48 | 20.94 |
| **PELVIS IMPACT** | | | | | |
| TEMPERATURE (• C) | 18.9 - 25.5 | 21.1 | 21.1 | 21.1 | 21.1 |
| RELATIVE HUMIDITY (%) | 10 - 70 | 33 | 33 | 33 | 33 |
| PROBE SPEED (m/s) | 4.27 - 4.33 | 4.29 | 4.29 | 4.27 | 427 |
| PELVIS (g's) | 40 -60 | 52.47 | 59.19 | 44.27 | 44.96 |

**REMARKS:** None

**CALIBRATION TEST RESULTS**

**PRE-TEST**

**SID H3 NO.:** 906

**CONFIGURED FOR LEFT SIDE IMPACT**

**CALIBRATION TEST RESULTS SUMMARY**
**PRE-TEST**

**CONFIGURED FOR LEFT SIDE IMPACT**

SID H3 Serial No.: 906 Sequential Test Number: 1
Date: February 12, 2008 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.: 906 Sequential Test Number: 1
Date: February 12, 2008 Laboratory Technician: B. Swiecicki

| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|---|---|---|
| SH- Seated Height (mm) | 889 – 909 | 902 |
| RH- Rib Height (mm) | 502 – 520 | 511 |
| HP- Hip Pivot Height (mm) | 99 ref. | 99 |
| RD- Rib from Back Line (mm) | 229 – 241 | 239 |
| KH- Knee Pivot from Back Line (mm) | 511 – 526 | 518 |
| KV- Knee Pivot to Floor (mm) | 490 – 505 | 493 |
| HW- Hip Width (mm) | 356 - 391 | 386 |

**REMARKS:** None

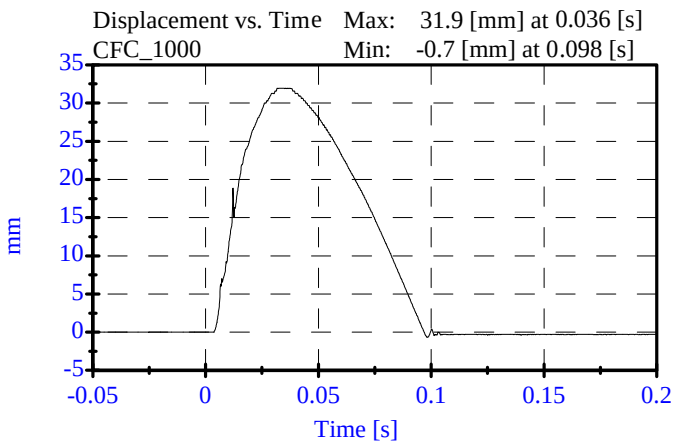
**Shock Impact Low ( 3.05 m/s )**
**PRE TEST**

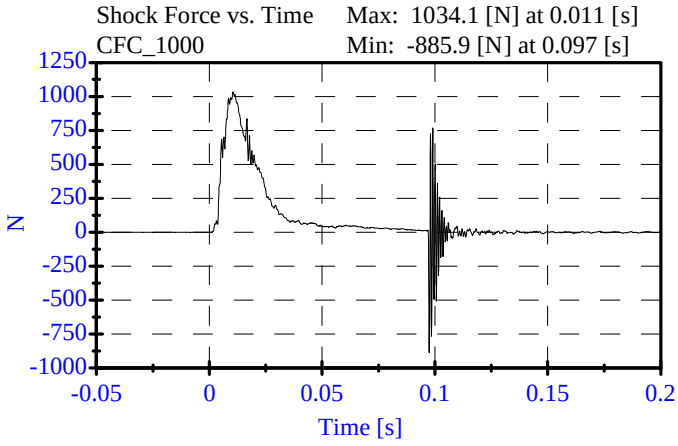
**CONFIGURED FOR LEFT SIDE IMPACT**

ATD Serial No: 906 Sequential Test Number: 1 File: 906SL 08-1-07
Date: 08-01-07 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 % | 36.00 % | Passed |
| Displacement: | 30.00-35.00 mm | 31.95 mm | Passed |
| Maximum Force: | 836.00-1125.00 N | 1034.07 N | Passed |

Impact Test Velocity: 3.05 m/s
Damper Identification: 906
Damper Setting: 5



**Shock Impact Med ( 4.27 m/s )**

**PRE TEST**

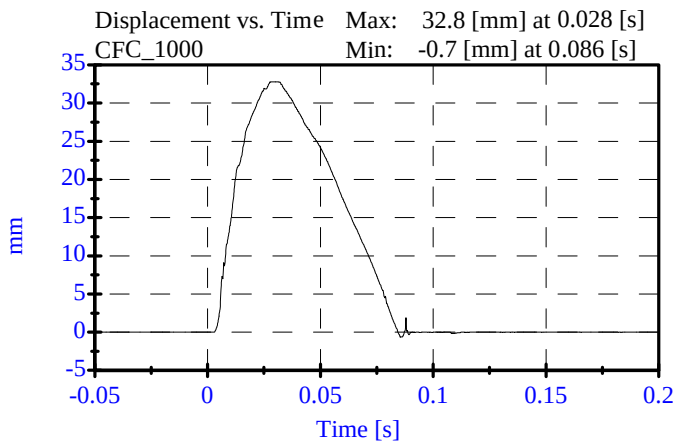
**CONFIGURED FOR LEFT SIDE IMPACT**

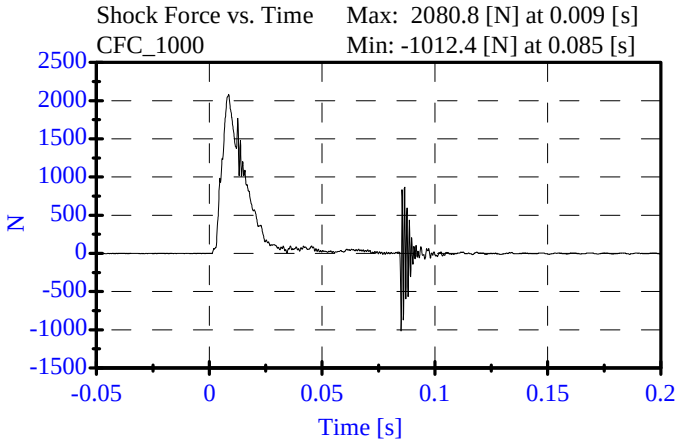
ATD Serial No: 906 Sequential Test Number: 1 File: 906SM 08-1-07

Date: 08-01-07 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 % | 36.00 % | Passed |
| Displacement: | 32.00-37.00 mm | 32.78 mm | Passed |
| Maximum Force: | 1730.00-2099.00 N | 2080.78 N | Passed |

Impact Test Velocity: 4.27 m/s
Damper Identification: 906
Damper Setting: 5



**Shock Impact high ( 6.10 m/s )**

**PRE TEST**

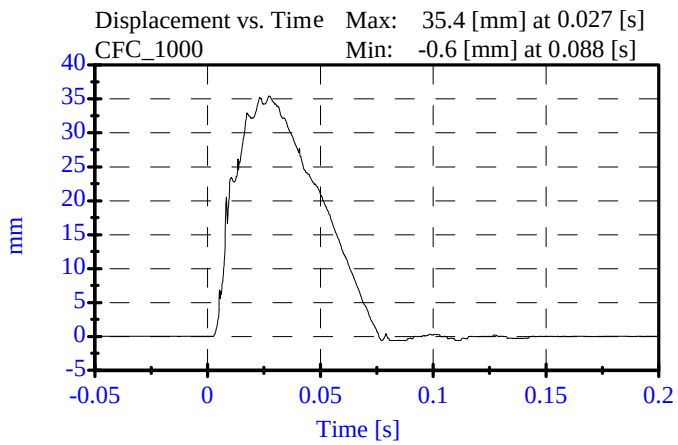
**CONFIGURED FOR LEFT SIDE IMPACT**

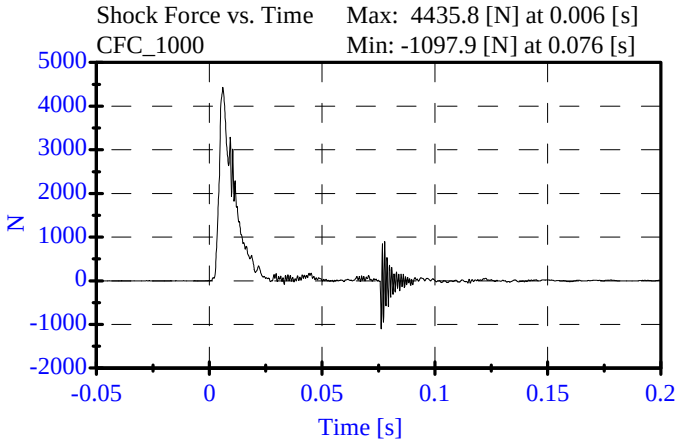
ATD Serial No: 906 Sequential Test Number: 1 File: 906SH 08-1-07

Date: 08-01-07 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 % | 36.00 % | Passed |
| Displacement: | 33.00-40.00 mm | 35.42 mm | Passed |
| Maximum Force: | 3741.00-4448.00 N | 4435.77 N | Passed |

Impact Test Velocity: 6.10 m/s
Damper Identification: 906
Damper Setting: 5



**Thorax Impact Test**

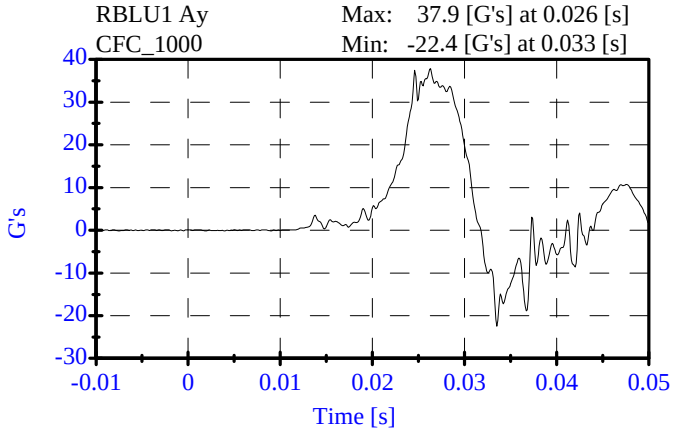
**Pre-Test**

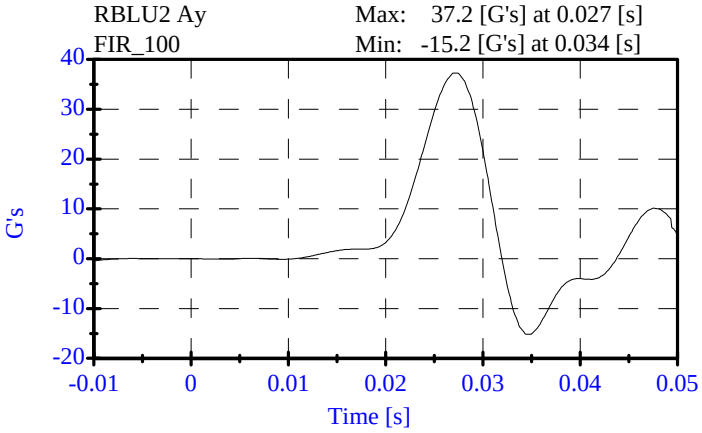
**CONFIGURED FOR LEFT SIDE IMPACT**

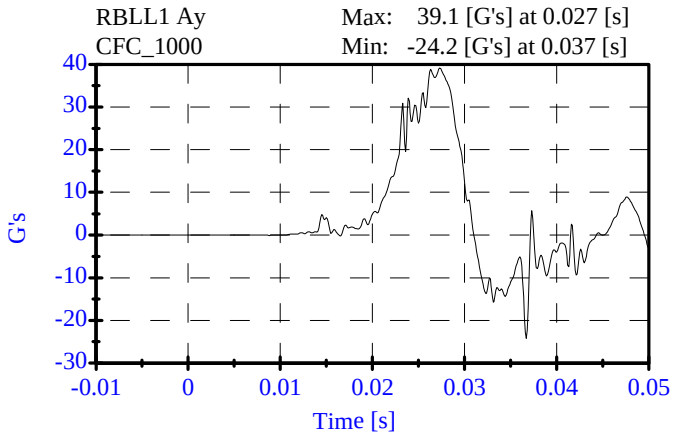
ATD Serial No: 906 Sequential Test Number: 1 File: 906T1 02-11-08

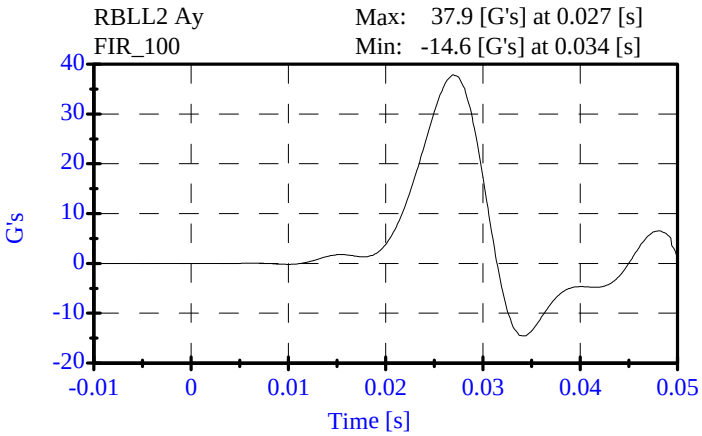
Date: 02-11-08 Laboratory Technician: B. Swiecicki

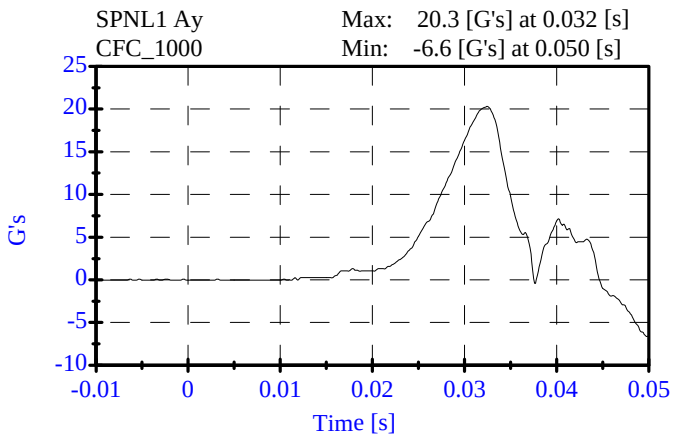
| TEST PARAMETER | SPECIFICATION | TEST RESULTS | STATUS |
|---|---|---|---|
| Lab Temperature: | 18.9-25.5 C | 21.1 C | Passed |
| Lab Humidity: | 10-70 % | 33.00 % | Passed |
| Probe Velocity: | 4.27- 4.33 m/s | 4.29 m/s | Passed |
| Upper Rib Acceleration: | 37.00-46.00 G's | 37.21 G's | Passed |
| Lower Rib Acceleration: | 37.00-46.00 G's | 37.91 G's | Passed |
| Lower Spine Acceleration: | 15.00-22.00 G's | 19.82 G's | Passed |

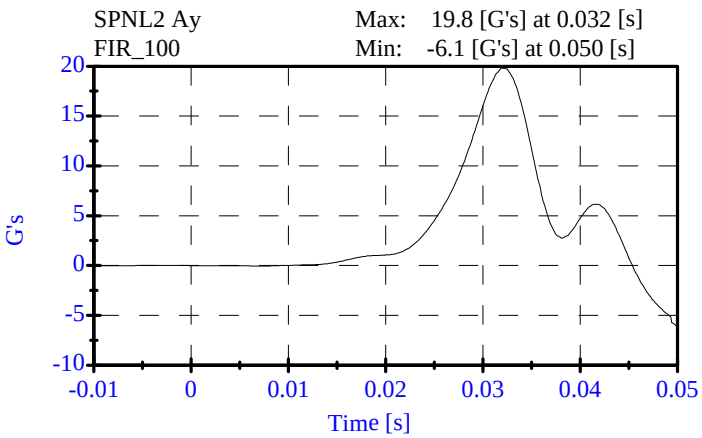


**Pelvis Impact Test**

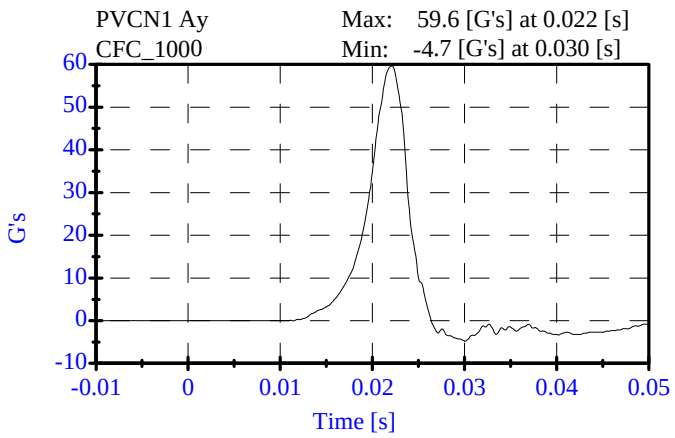
**Pre-Test**

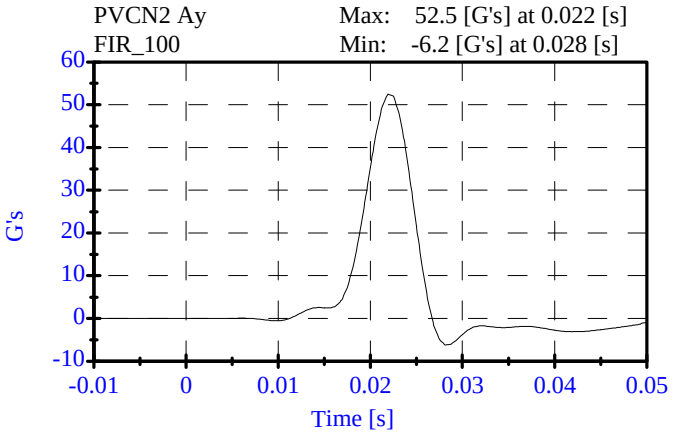
**CONFIGURED FOR LEFT SIDE IMPACT**

ATD Serial No: 906 Sequential Test Number: 1 File: 906P 02-11-08

Date: 02-11-08 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 % | 33.00 % | Passed |
| Probe Velocity: | 4.27- 4.33 m/s | 4.29 m/s | Passed |
| Pelvis Y Acceleration: | 40.00-60.00 G's | 52.47 G's | Passed |
| Time Above 20 Gs | 3.0-7.0 ms | 6.3 ms | Passed |



**Head Drop Test**

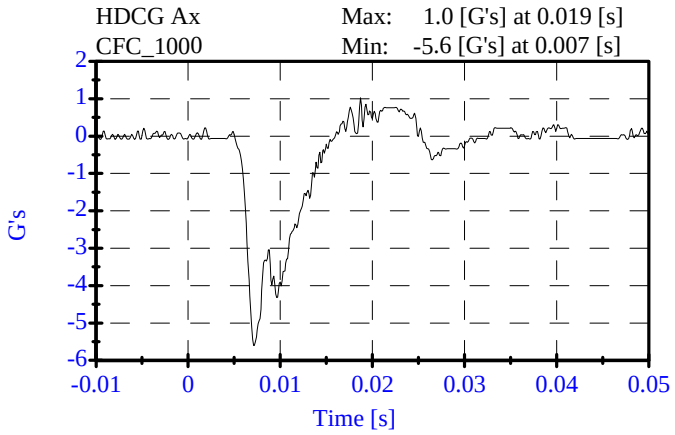
**Pre-Test**

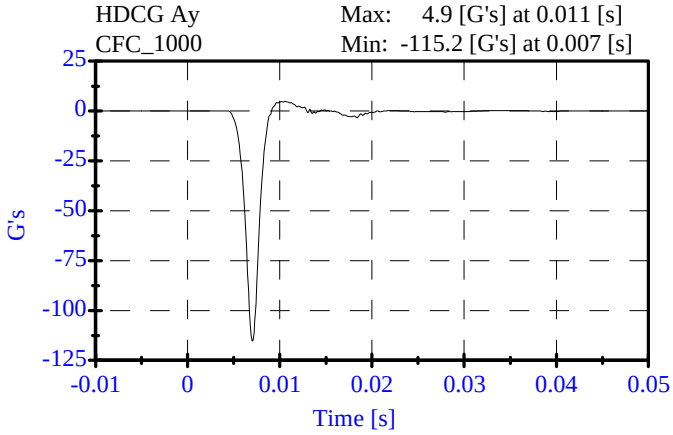
**CONFIGURED FOR LEFT SIDE IMPACT**

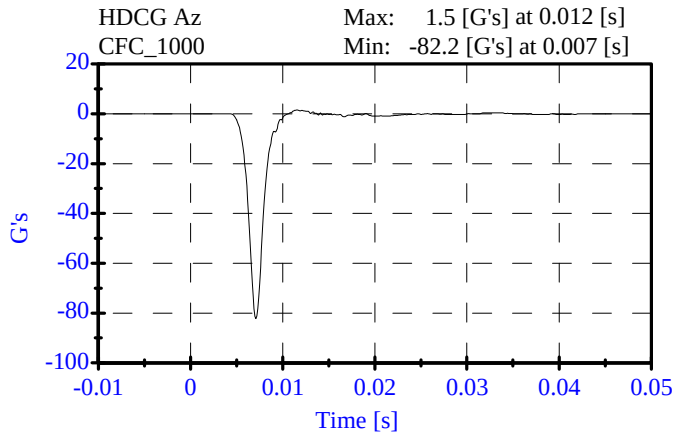
ATD Serial No: 906 Sequential Test Number: 1 File: 906H 02-07-08

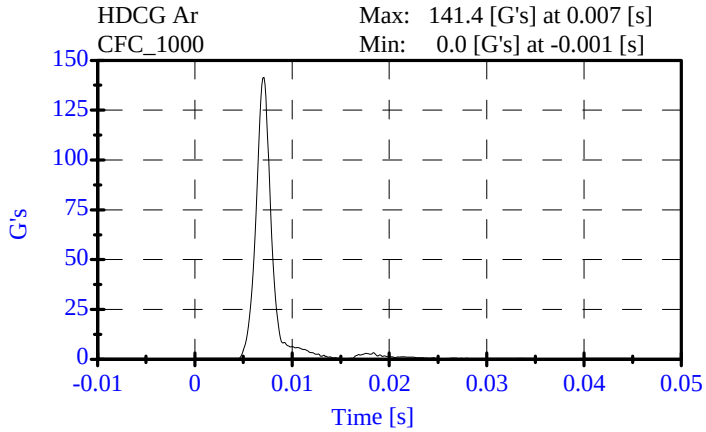
Date: 02-07-08 Laboratory Technician: B. Swiecicki

| TEST PARAMETER | SPECIFICATION | TEST RESULTS | STATUS |
|---|---|---|---|
| Lab Temperature: | 18.9-25.6 C | 21.1 C | Passed |
| Lab Humidity: | 10-70 % | 33.00 % | Passed |
| Peak Resultant Accel.: | 120-150 Gs | 141.36 Gs | Passed |
| Peak Lateral Accel.: | 15 Gs Max | 1.02 Gs | Passed |
| Curve PerCent NonModal: | < 15% | 5.99 % | Passed |



**Neck Test**

**Pre-Test**

**CONFIGURED FOR LEFT SIDE IMPACT**

ATD Serial No: 906 Sequential Test Number: 1 File: 906N 02-07-08

Date: 02-08-08 Laboratory Technician: B. Swiecicki

| TEST PARAMETER | SPECIFICATION | TEST RESULTS | STATUS |
|---|---|---|---|
| Lab Temperature: | 20.6-22.2 C | 21.1 C | Passed |
| Lab Humidity: | 10-70 % | 33.00 % | 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 | 2.08 m/s | Passed |
| Delta V at 20 ms: | 4.12- 5.10 m/s | 4.14 m/s | Passed |
| Delta V at 30 ms: | 5.73- 7.01 m/s | 5.84 m/s | Passed |
| Delta V between 40-70 ms: | 6.27- 7.64 m/s | 7.13 m/s | Passed |
| D PLANE ROTATION | | | |
| Maximum Rotation: | 66.0-82.0 Deg | 68.58 Deg | Passed |
| Rotation Angle Decay: | 58.0-67.0 ms | 59.00 ms | Passed |
| MOMENT ABOUT THE OCCIPITAL CONDYLE | | | |
| Max Occipital Moment: | 73.00- 88.00 N-m | 81.33 N-m | Passed |
| Occiptal Moment Decay: | 49.0-64.0 ms | 53.30 ms | Passed |
| HEAD ROTATION TIME WITH RESPECT TO THE OCCIPITAL CONDYLE MOMENT | | | |
| Moment to Rotation Peak: | 2.0-16.0 ms | 5.10 ms | Passed |

**Neck Test**

**Pre-Test**

**CONFIGURED FOR LEFT SIDE IMPACT**

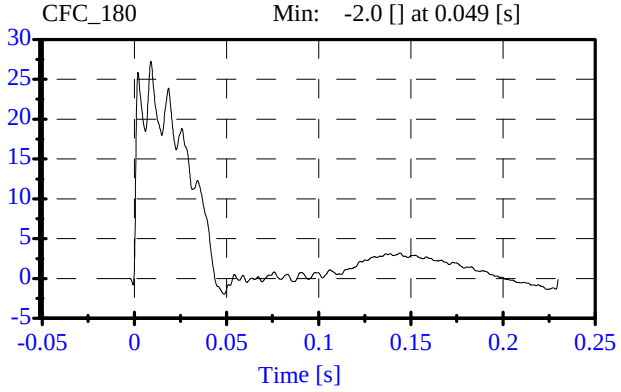
ATD Serial No: 906

Sequential Test Number: 1 File: 906N 02-07-08

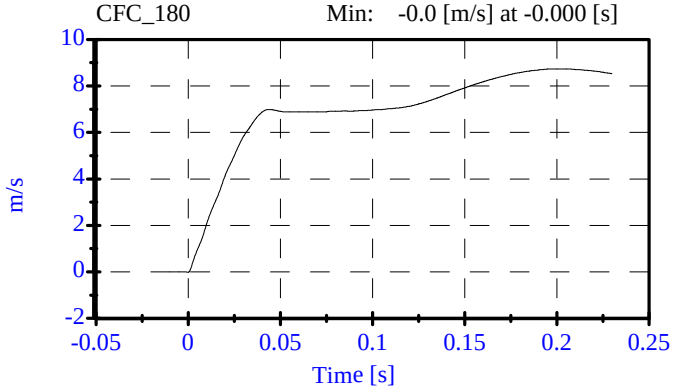
Date: 02-08-08

Laboratory Technician: B. Swiecicki

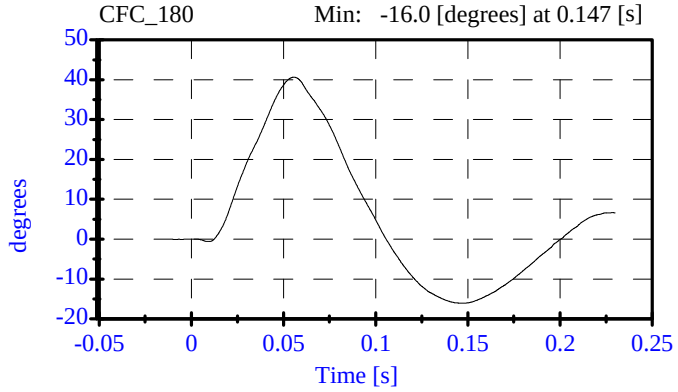
Pend Ax
CFC_180
Max: 27.3 [] at 0.009 [s]
Min: -2.0 [] at 0.049 [s]



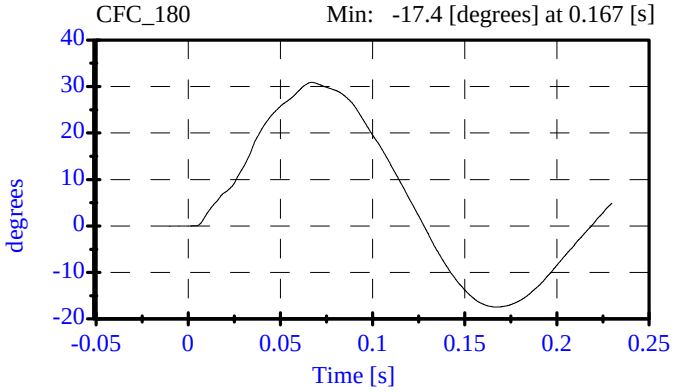

Pend Vx
CFC_180
Max: 8.7 [m/s] at 0.201 [s]
Min: -0.0 [m/s] at -0.000 [s]



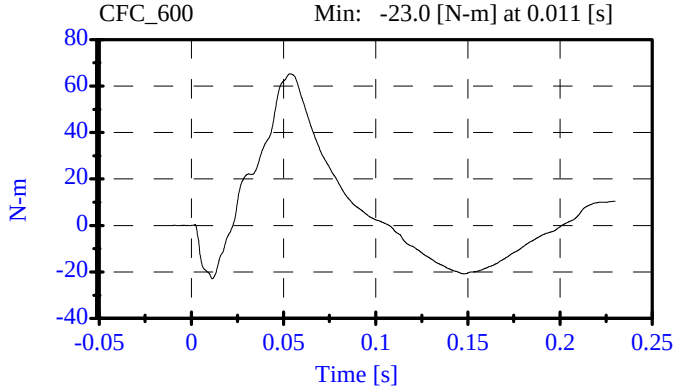

Head Rot
CFC_180
Max: 40.6 [degrees] at 0.056 [s]
Min: -16.0 [degrees] at 0.147 [s]



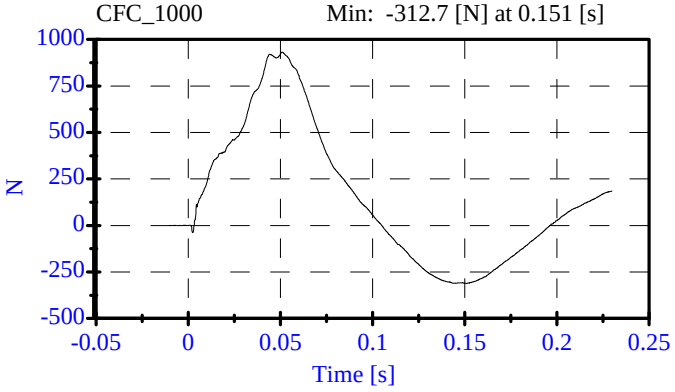

Arm Rot
CFC_180
Max: 30.9 [degrees] at 0.067 [s]
Min: -17.4 [degrees] at 0.167 [s]



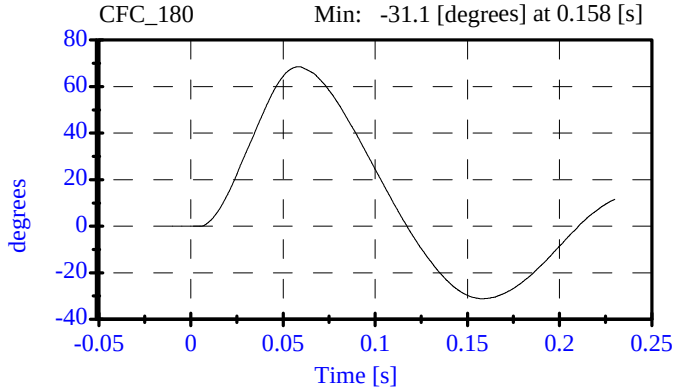

Neck Mx
CFC_600
Max: 65.1 [N-m] at 0.054 [s]
Min: -23.0 [N-m] at 0.011 [s]



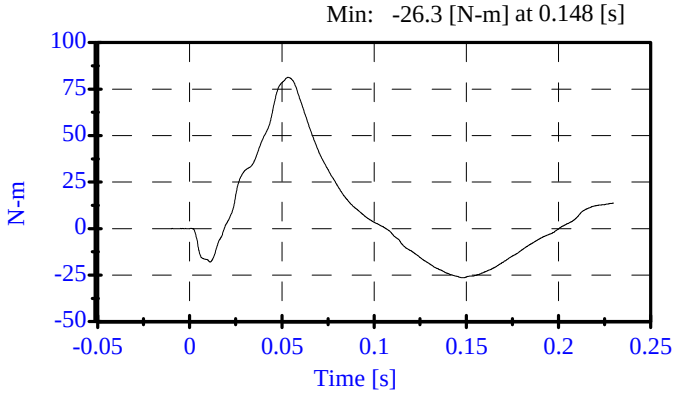

Neck Fy
CFC_1000
Max: 931.8 [N] at 0.051 [s]
Min: -312.7 [N] at 0.151 [s]




Tot Rot
CFC_180
Max: 68.6 [degrees] at 0.058 [s]
Min: -31.1 [degrees] at 0.158 [s]




MOCX
Max: 81.3 [N-m] at 0.053 [s]
Min: -26.3 [N-m] at 0.148 [s]



**Abdomen Compression Test**

**Pre-Test**

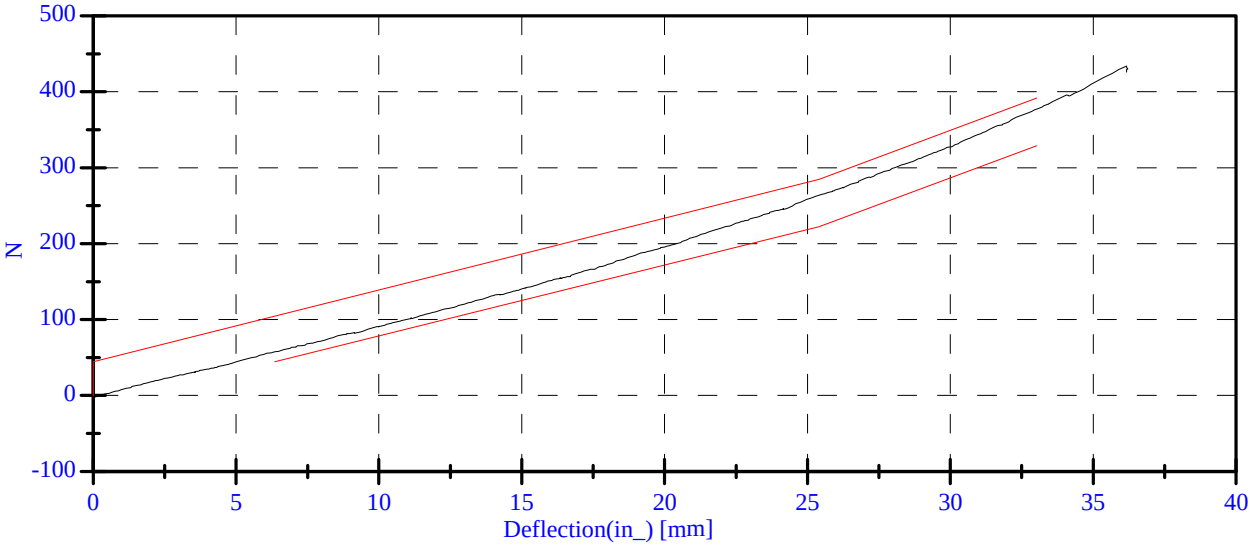
**CONFIGURED FOR LEFT SIDE IMPACT**

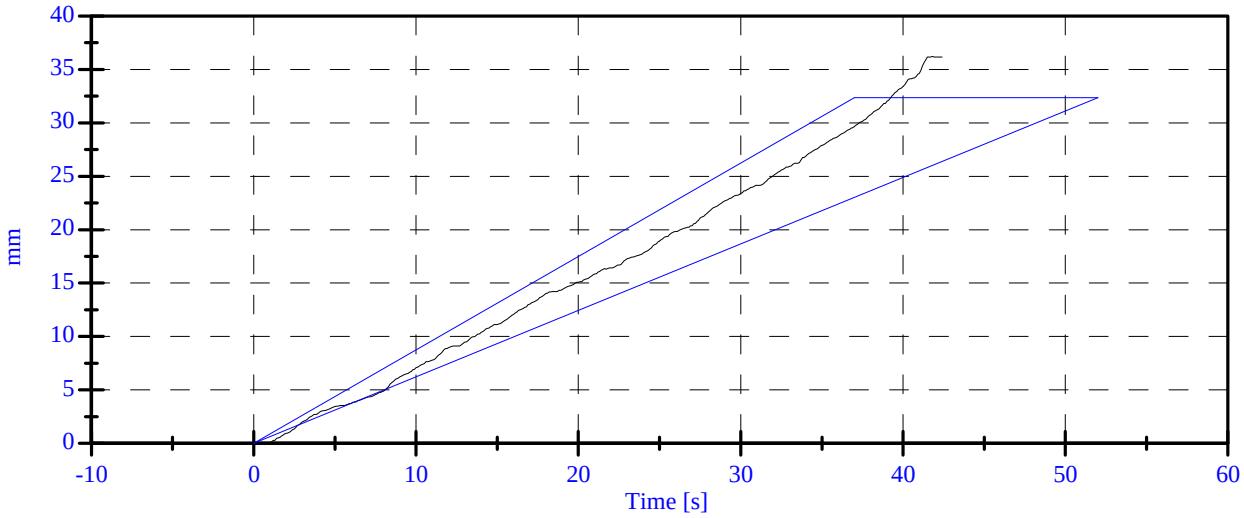
ATD Serial No: 906 Sequential Test Number: 1 File: 906 Ab 02-12-08

Date: 02-12-08 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 % | 33.00 % | Passed |
| Force at 12.95 mm : | 104.00-162.00 N | 120.51 N | Passed |
| Force at 19.05 mm : | 162.98-220.99 N | 186.12 N | Passed |
| Force at 25.40 mm : | 221.97-280.02 N | 263.69 N | Passed |
| Force at 33.02 mm : | 324.99-391.00 N | 376.42 N | Passed |

## ABDOMINAL COMPRESSION TEST



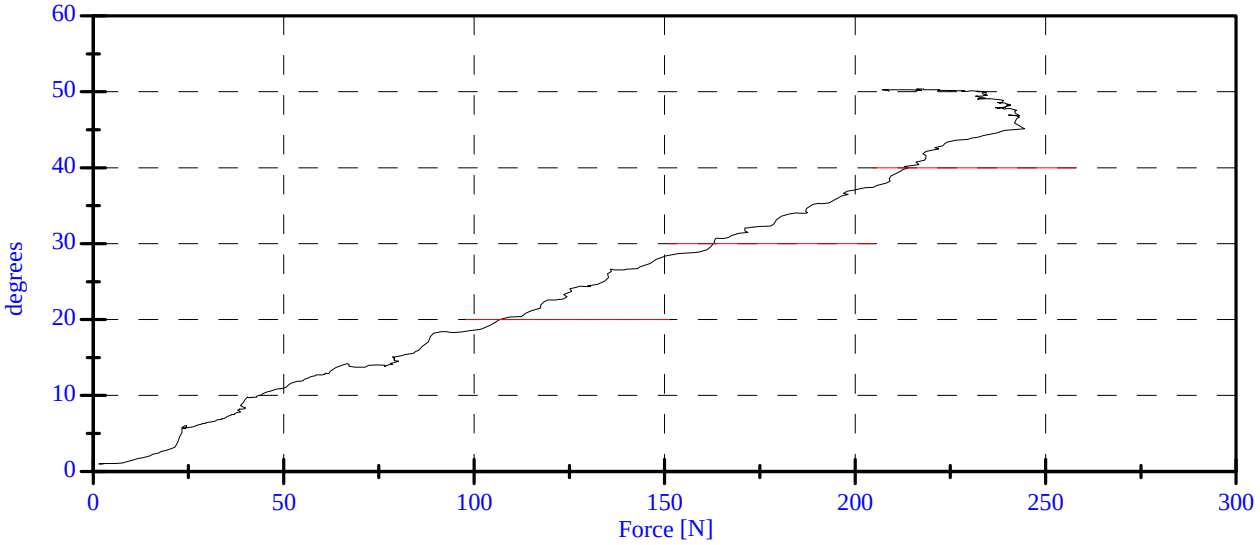
**Lumbar Spine Test**
**Pre-Test**

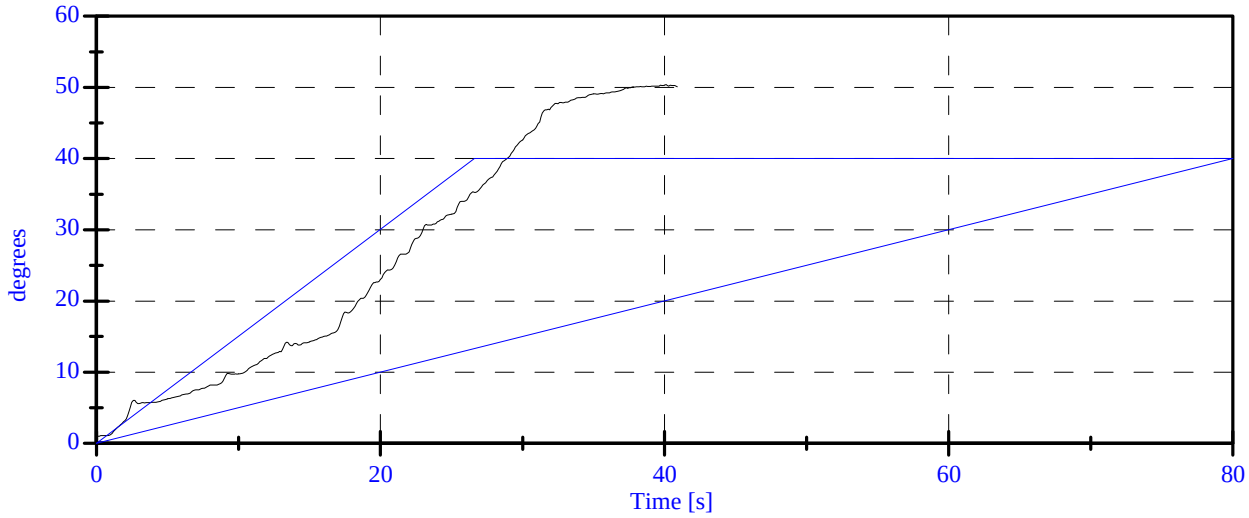
**CONFIGURED FOR LEFT SIDE IMPACT**

ATD Serial No: 906 Sequential Test Number: 1 File: 906 Spine 02-11-08
Date: 02-11-08 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 % | 33.00 % | Passed |
| Force at 0 Deg: | 0.00-26.69 N | 2.61 N | Passed |
| Force at 20 Deg: | 97.86-151.24 N | 106.55 N | Passed |
| Force at 30 Deg | 151.24-204.62 N | 162.96 N | Passed |
| Force at 40 Deg | 204.62-258.00 N | 213.88 N | Passed |
| Return Angle | 12 Deg Max | 0.40 deg | Passed |

## LUMBAR SPINE FLEXION TEST



**PRE-TEST DUMMY INSPECTION LIST**

**CONFIGURED FOR LEFT SIDE IMPACT**

SID H3 Serial No.: 906 Sequential Test Number: 1
Date: February 12, 2008 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.:** 905

**CONFIGURED FOR LEFT SIDE IMPACT**

**CALIBRATION TEST RESULTS SUMMARY**
**PRE-TEST**

**CONFIGURED FOR LEFT SIDE IMPACT**

SID H3 Serial No.: 905 Sequential Test Number: 1
Date: February 12, 2008 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.: 905 Sequential Test Number: 1
Date: February 12, 2008 Laboratory Technician: B. Swiecicki

| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|---|---|---|
| SH- Seated Height (mm) | 889 - 909 | 902 |
| RH- Rib Height (mm) | 502 - 520 | 513 |
| HP- Hip Pivot Height (mm) | 99 ref. | 99 |
| RD- Rib from Back Line (mm) | 229 - 241 | 239 |
| 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 | 381 |

**REMARKS:** None

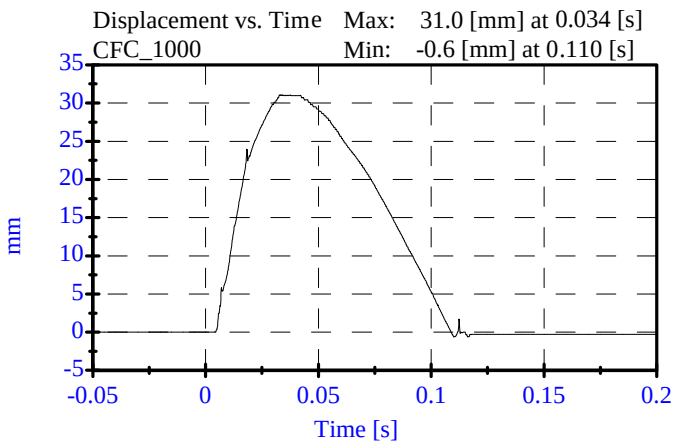
**Shock Impact Low ( 3.05 m/s )**
**PRE TEST**

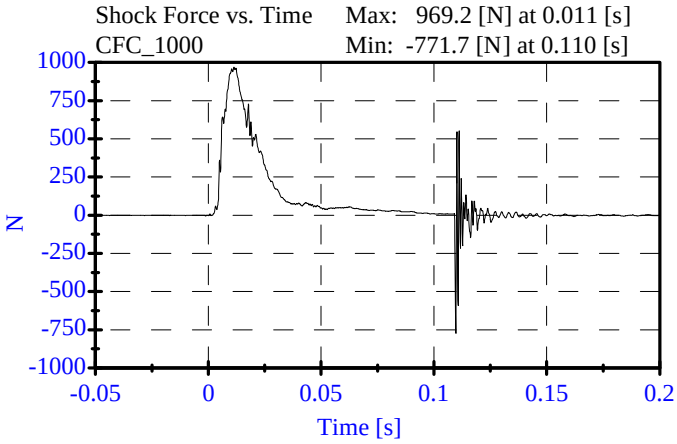
**CONFIGURED FOR LEFT SIDE IMPACT**

ATD Serial No: 905 Sequential Test Number: 1 File: 905SL 08-1-07
Date: 08-01-07 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 % | 36.00 % | Passed |
| Displacement: | 30.00-35.00 mm | 31.05 mm | Passed |
| Maximum Force: | 836.00-1125.00 N | 969.22 N | Passed |

Impact Test Velocity: 3.05 m/s
Damper Identification: 905
Damper Setting: 5



**Shock Impact Med ( 4.27 m/s )**

**PRE TEST**

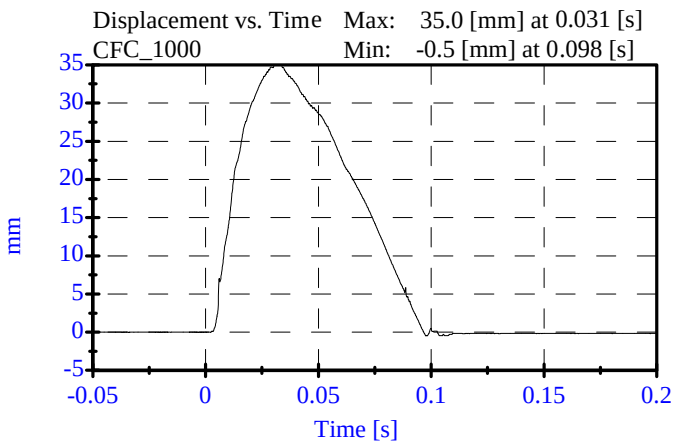
**CONFIGURED FOR LEFT SIDE IMPACT**

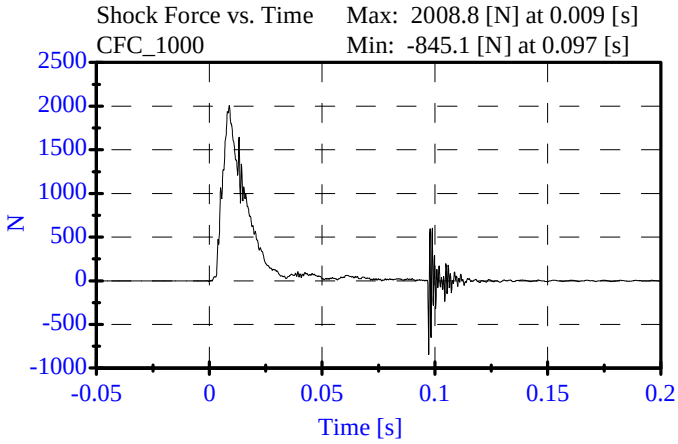
ATD Serial No: 905 Sequential Test Number: 1 File: 905SM 08-1-07

Date: 08-01-07 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 % | 36.00 % | Passed |
| Displacement: | 32.00-37.00 mm | 34.98 mm | Passed |
| Maximum Force: | 1730.00-2099.00 N | 2008.82 N | Passed |

Impact Test Velocity: 4.27 m/s
Damper Identification: 905
Damper Setting: 5



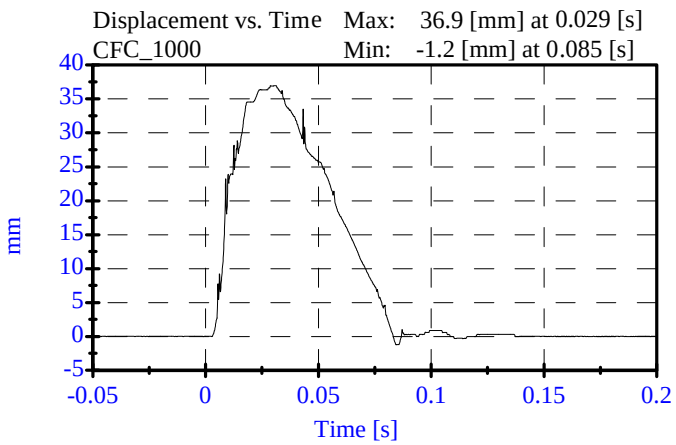
**Shock Impact High ( 6.10 m/s )**
**PRE TEST**

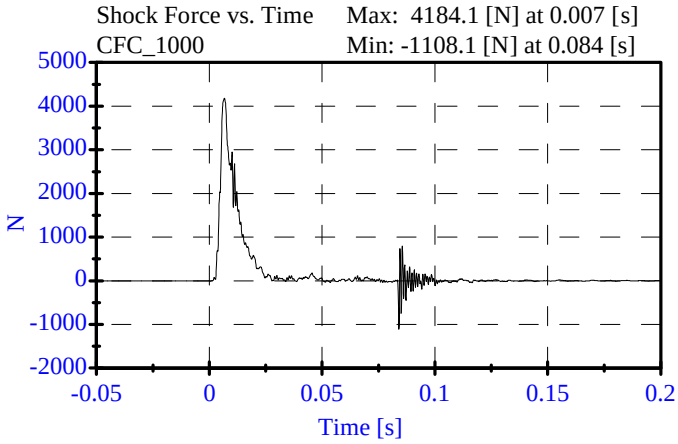
**CONFIGURED FOR LEFT SIDE IMPACT**

ATD Serial No: 905 Sequential Test Number: 1 File: 905SH 08-1-07
Date: 08-01-07 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 % | 36.00 % | Passed |
| Displacement: | 33.00-40.00 mm | 36.94 mm | Passed |
| Maximum Force: | 3741.00-4448.00 N | 4184.07 N | Passed |

Impact Test Velocity: 6.10 m/s
Damper Identification: 905
Damper Setting: 5



**Thorax Impact Test**

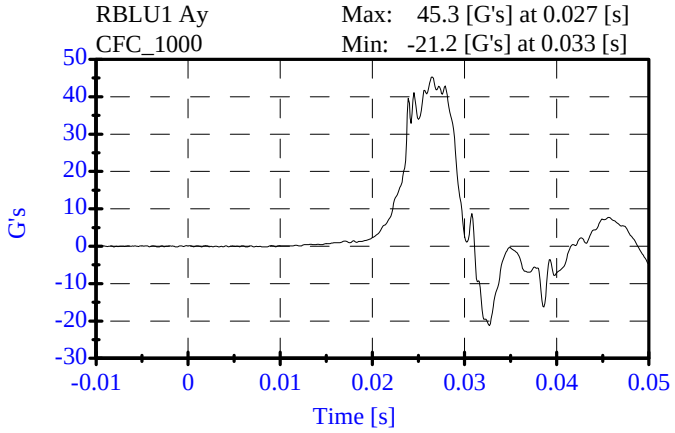
**Pre-Test**

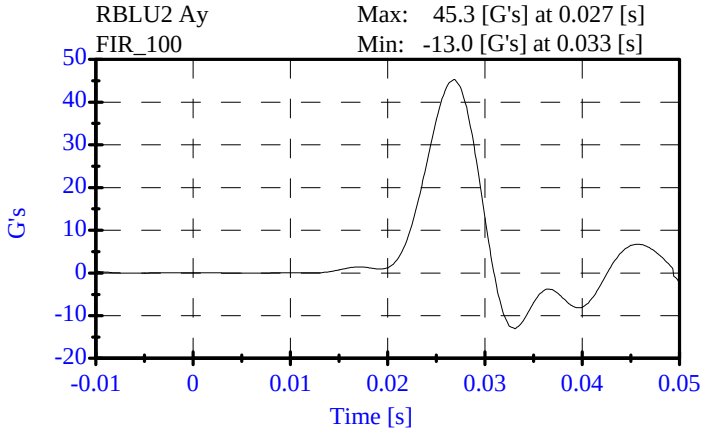
**CONFIGURED FOR LEFT SIDE IMPACT**

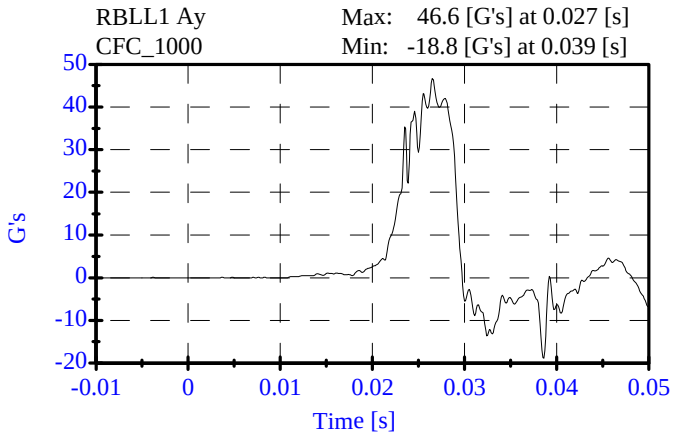
ATD Serial No: 905 Sequential Test Number: 1 File: 905T 02-11-08

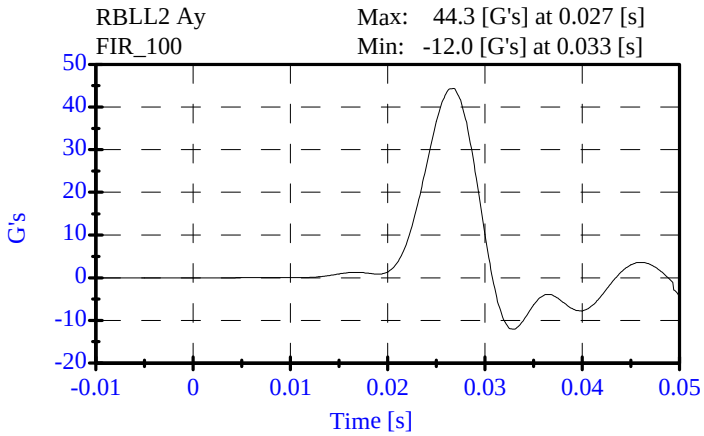
Date: 02-11-08 Laboratory Technician: B. Swiecicki

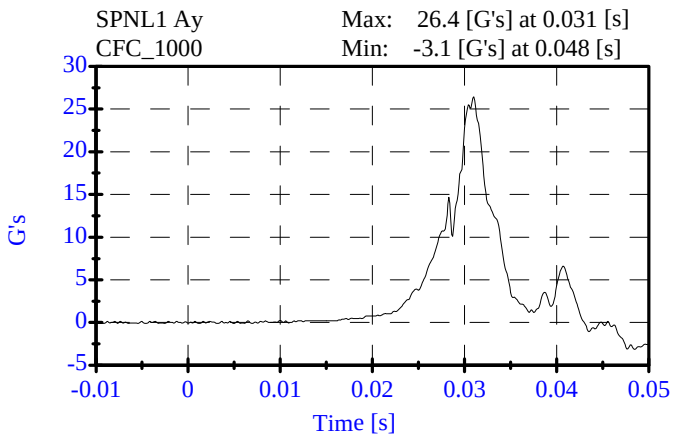
| TEST PARAMETER | SPECIFICATION | TEST RESULTS | STATUS |
|---|---|---|---|
| Lab Temperature: | 18.9-25.5 C | 21.1 C | Passed |
| Lab Humidity: | 10-70 % | 33.00 % | Passed |
| Probe Velocity: | 4.27- 4.33 m/s | 4.29 m/s | Passed |
| Upper Rib Acceleration: | 37.00-46.00 G's | 45.31 G's | Passed |
| Lower Rib Acceleration: | 37.00-46.00 G's | 44.34 G's | Passed |
| Lower Spine Acceleration: | 15.00-22.00 G's | 21.48 G's | Passed |

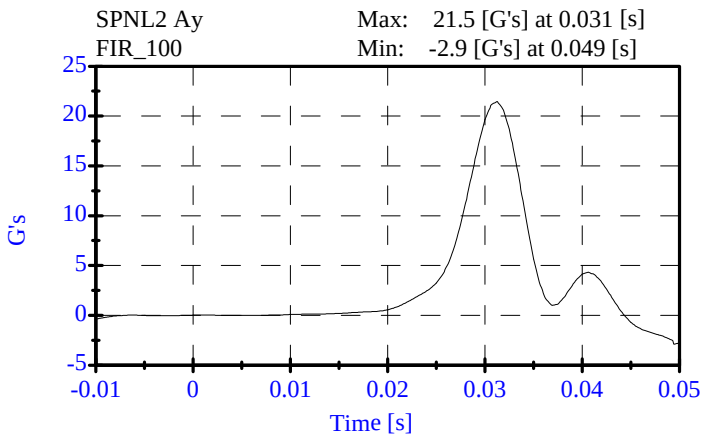


**Pelvis Impact Test**

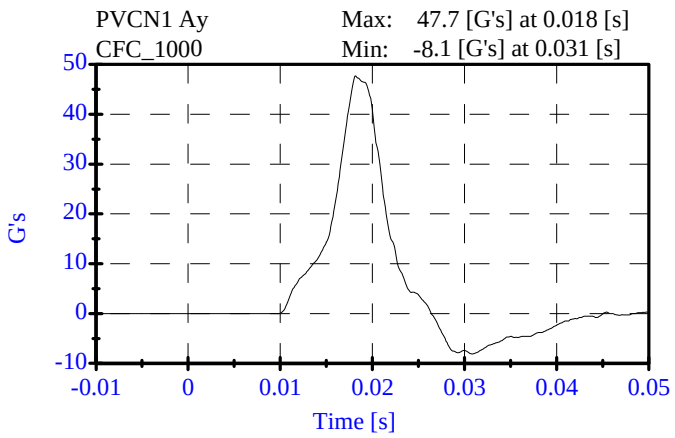
**Pre-Test**

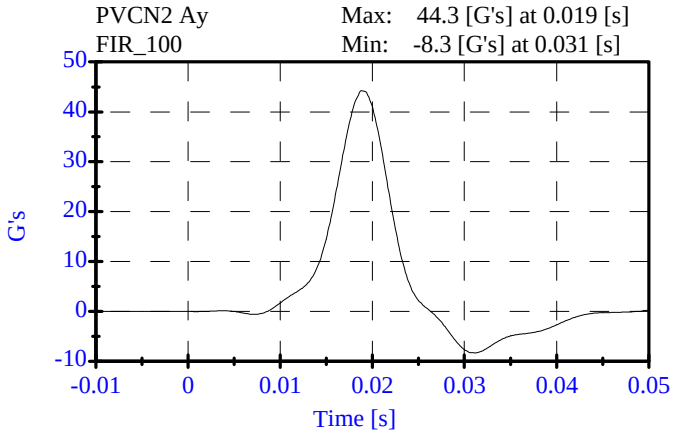
**CONFIGURED FOR LEFT SIDE IMPACT**

ATD Serial No: 905 Sequential Test Number: 1 File: 905P 02-11-08

Date: 02-11-08 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 % | 33.00 % | Passed |
| Probe Velocity: | 4.27- 4.33 m/s | 4.27 m/s | Passed |
| Pelvis Y Acceleration: | 40.00-60.00 G's | 44.27 G's | Passed |
| Time Above 20 Gs | 3.0-7.0 ms | 6.5 ms | Passed |



**Head Drop Test**

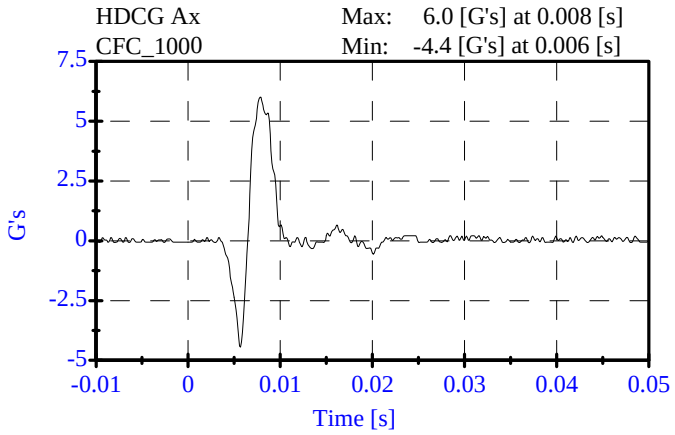
**Pre-Test**

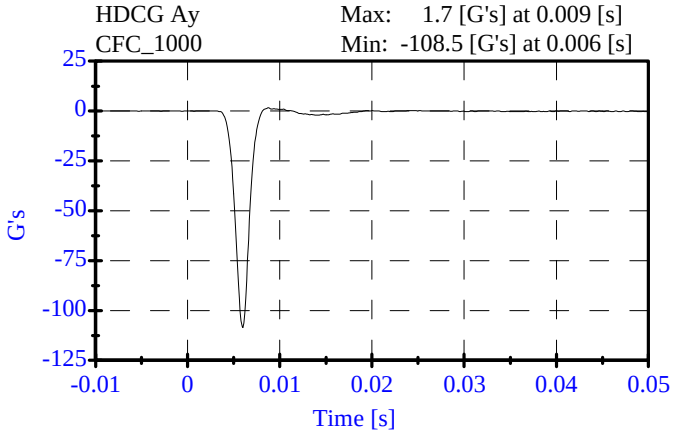
**CONFIGURED FOR LEFT SIDE IMPACT**

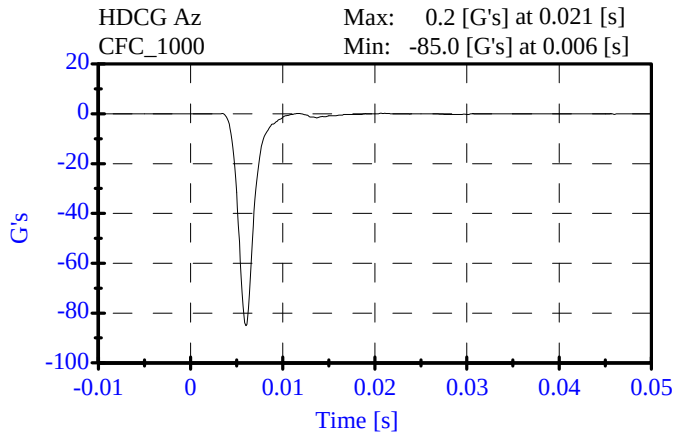
ATD Serial No: 905 Sequential Test Number: 1 File: 905H 02-07-08

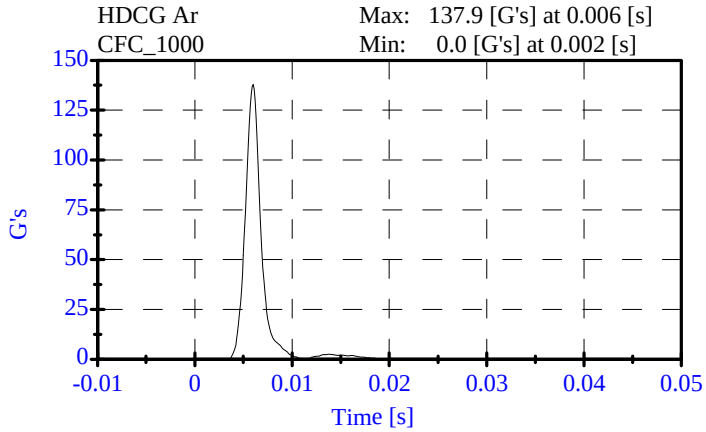
Date: 02-07-08 Laboratory Technician: B. Swiecicki

| TEST PARAMETER | SPECIFICATION | TEST RESULTS | STATUS |
|---|---|---|---|
| Lab Temperature: | 18.9-25.6 C | 21.1 C | Passed |
| Lab Humidity: | 10-70 % | 33.00 % | Passed |
| Peak Resultant Accel.: | 120-150 Gs | 137.87 Gs | Passed |
| Peak Lateral Accel.: | 15 Gs Max | 6.00 Gs | Passed |
| Curve PerCent NonModal: | < 15% | 1.88 % | Passed |



**Neck Test**

**Pre-Test**

**CONFIGURED FOR LEFT SIDE IMPACT**

ATD Serial No: 905 Sequential Test Number: 1 File: 905N7 02-07-08

Date: 02-08-08 Laboratory Technician: B. Swiecicki

| TEST PARAMETER | SPECIFICATION | TEST RESULTS | STATUS |
|---|---|---|---|
| Lab Temperature: | 20.6-22.2 C | 21.1 C | Passed |
| Lab Humidity: | 10-70 % | 33.00 % | 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 | 2.10 m/s | Passed |
| Delta V at 20 ms: | 4.12- 5.10 m/s | 4.33 m/s | Passed |
| Delta V at 30 ms: | 5.73- 7.01 m/s | 6.10 m/s | Passed |
| Delta V between 40-70 ms: | 6.27- 7.64 m/s | 6.98 m/s | Passed |
| D PLANE ROTATION | | | |
| Maximum Rotation: | 66.0-82.0 Deg | 70.95 Deg | Passed |
| Rotation Angle Decay: | 58.0-67.0 ms | 60.10 ms | Passed |
| MOMENT ABOUT THE OCCIPITAL CONDYLE | | | |
| Max Occipital Moment: | 73.00- 88.00 N-m | 87.09 N-m | Passed |
| Occiptal Moment Decay: | 49.0-64.0 ms | 54.40 ms | Passed |
| HEAD ROTATION TIME WITH RESPECT TO THE OCCIPITAL CONDYLE MOMENT | | | |
| Moment to Rotation Peak: | 2.0-16.0 ms | 7.50 ms | Passed |

**Neck Test**

**Pre-Test**

**CONFIGURED FOR LEFT SIDE IMPACT**

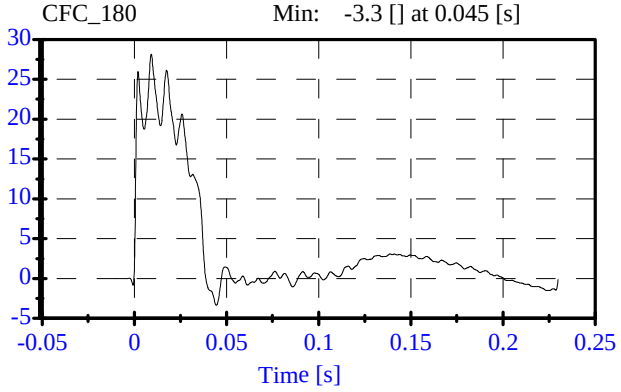
ATD Serial No: 905

Sequential Test Number: 1 File: 905N7 02-07-08

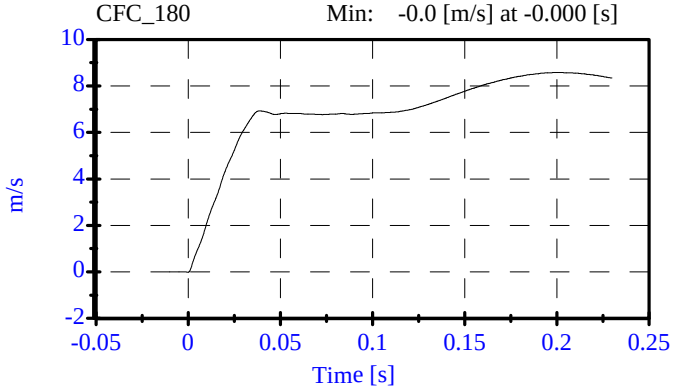
Date: 02-08-08

Laboratory Technician: B. Swiecicki

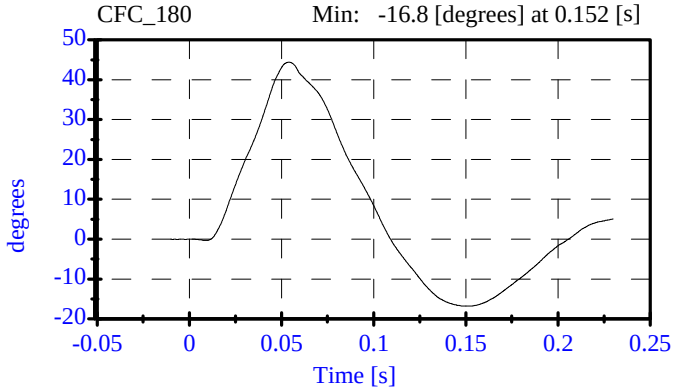
Pend Ax Max: 28.2 [] at 0.009 [s]
CFC_180 Min: -3.3 [] at 0.045 [s]



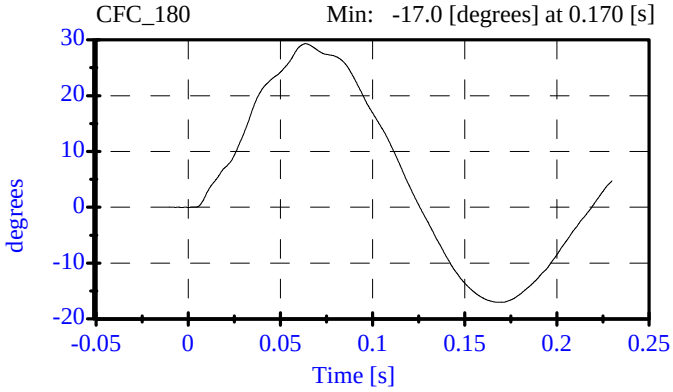

Pend Vx Max: 8.6 [m/s] at 0.200 [s]
CFC_180 Min: -0.0 [m/s] at -0.000 [s]



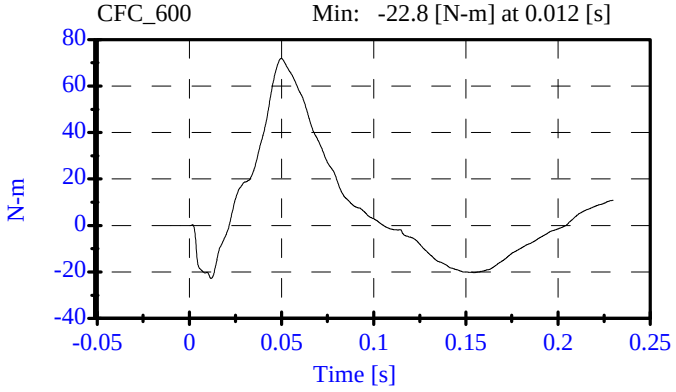

Head Rot Max: 44.4 [degrees] at 0.054 [s]
CFC_180 Min: -16.8 [degrees] at 0.152 [s]



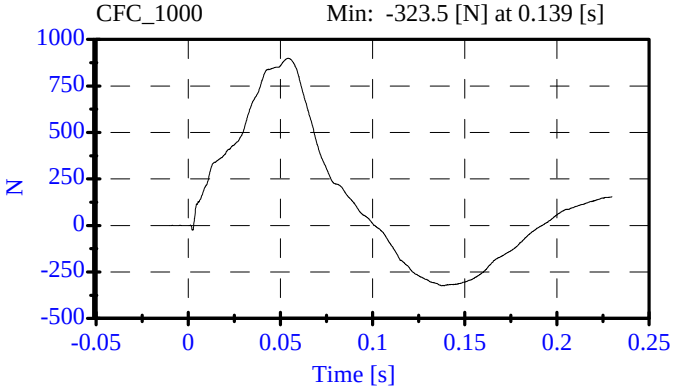

Arm Rot Max: 29.3 [degrees] at 0.064 [s]
CFC_180 Min: -17.0 [degrees] at 0.170 [s]



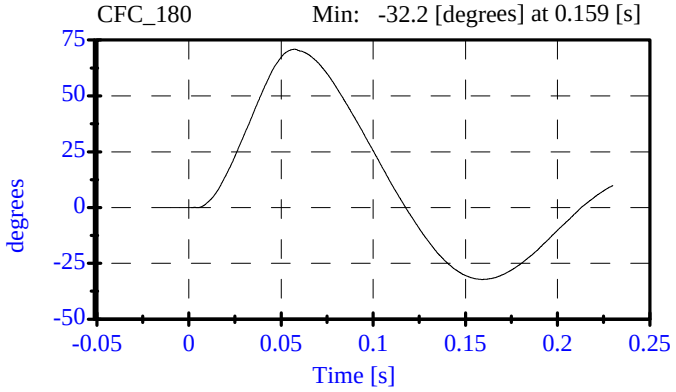

Neck Mx Max: 71.8 [N-m] at 0.050 [s]
CFC_600 Min: -22.8 [N-m] at 0.012 [s]



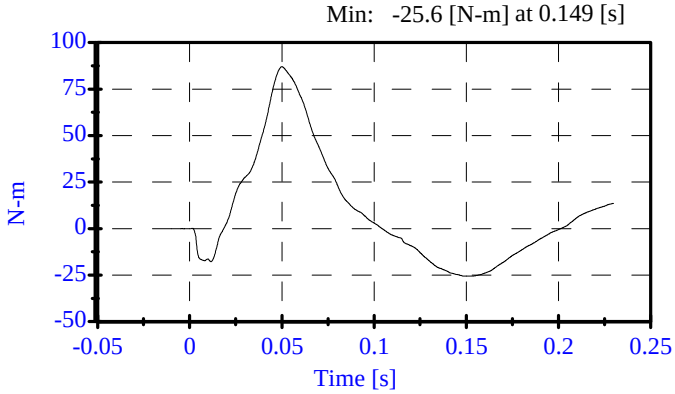

Neck Fy Max: 898.9 [N] at 0.054 [s]
CFC_1000 Min: -323.5 [N] at 0.139 [s]




Tot Rot Max: 70.9 [degrees] at 0.057 [s]
CFC_180 Min: -32.2 [degrees] at 0.159 [s]




MOCX Max: 87.1 [N-m] at 0.050 [s]
Min: -25.6 [N-m] at 0.149 [s]



**Abdomen Compression Test**

**Pre-Test**

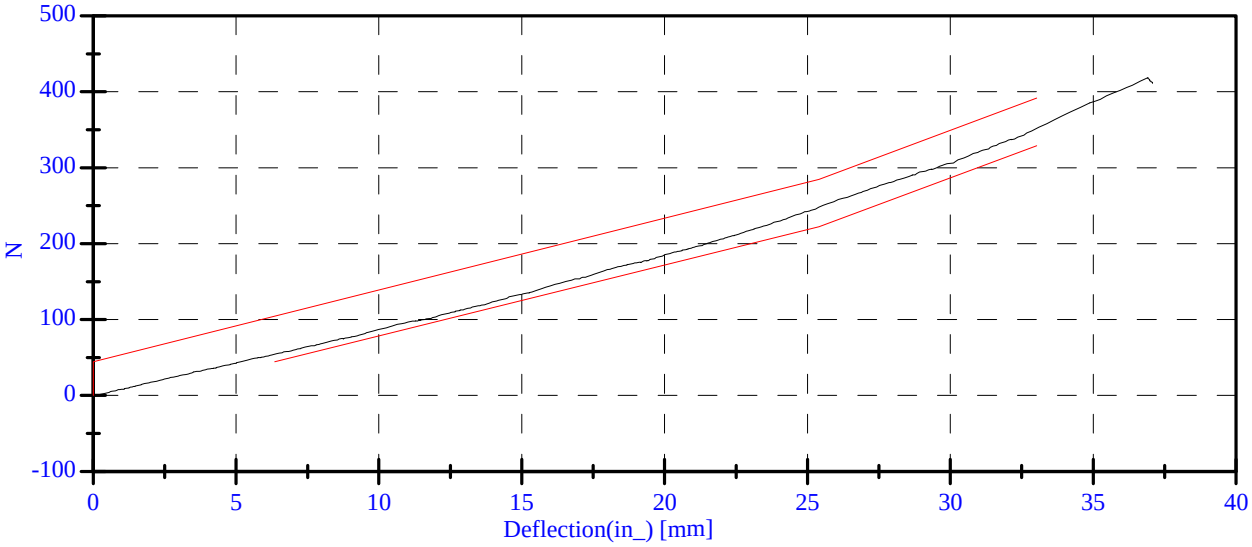
**CONFIGURED FOR LEFT SIDE IMPACT**

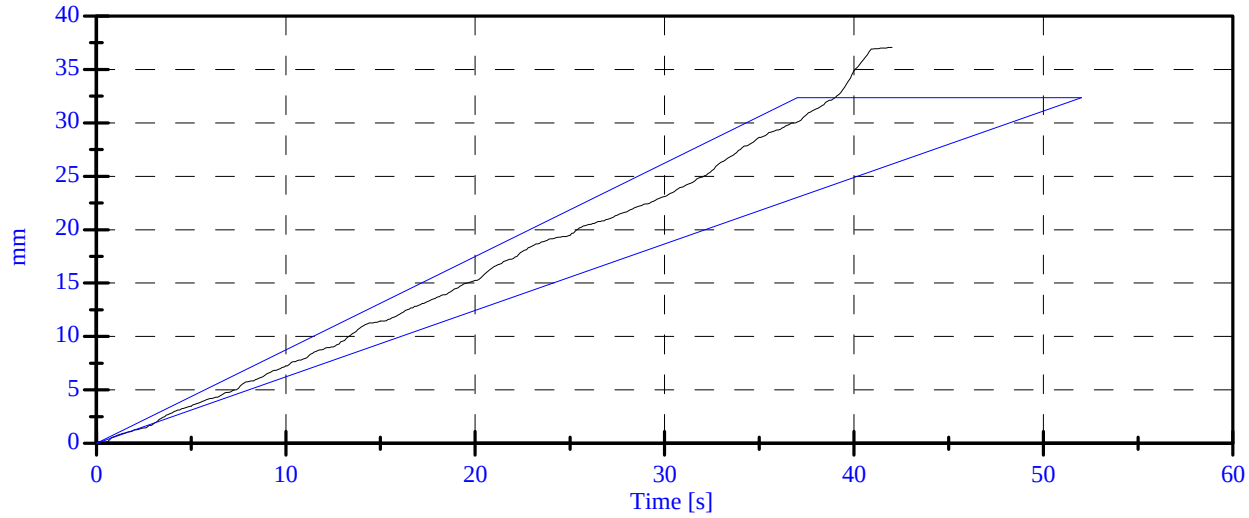
ATD Serial No: 905 Sequential Test Number: 1 File: 905 Ab 02-12-08

Date: 02-12-08 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 % | 33.00 % | Passed |
| Force at 12.95 mm : | 104.00-162.00 N | 112.90 N | Passed |
| Force at 19.05 mm : | 162.98-220.99 N | 174.88 N | Passed |
| Force at 25.40 mm : | 221.97-280.02 N | 248.10 N | Passed |
| Force at 33.02 mm : | 324.99-391.00 N | 353.22 N | Passed |

## ABDOMINAL COMPRESSION TEST



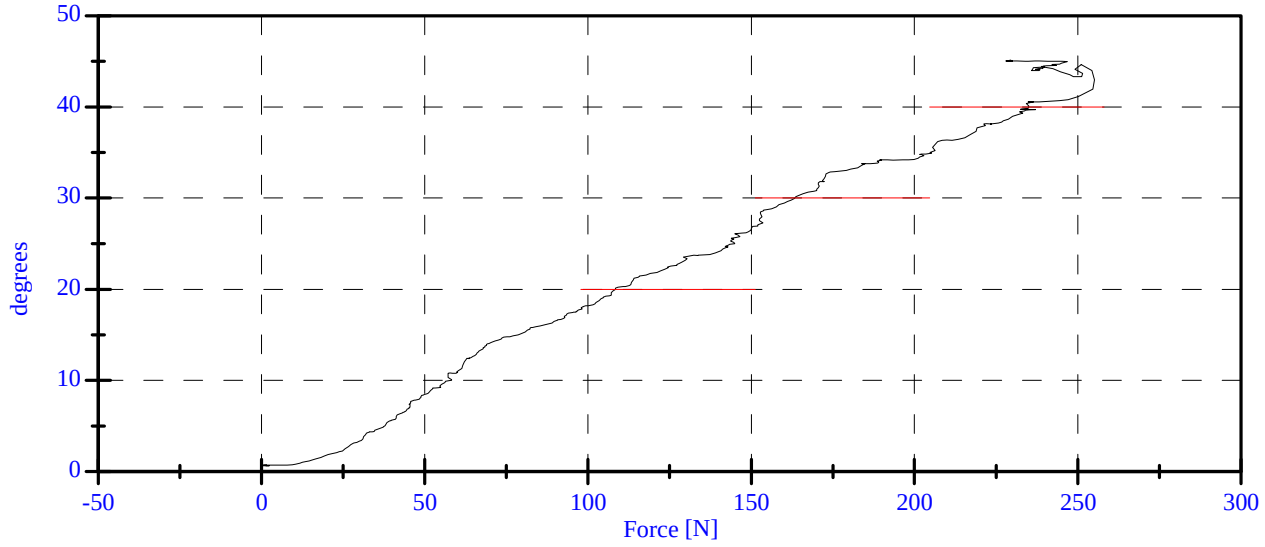
**Lumbar Spine Test**
**Pre-Test**

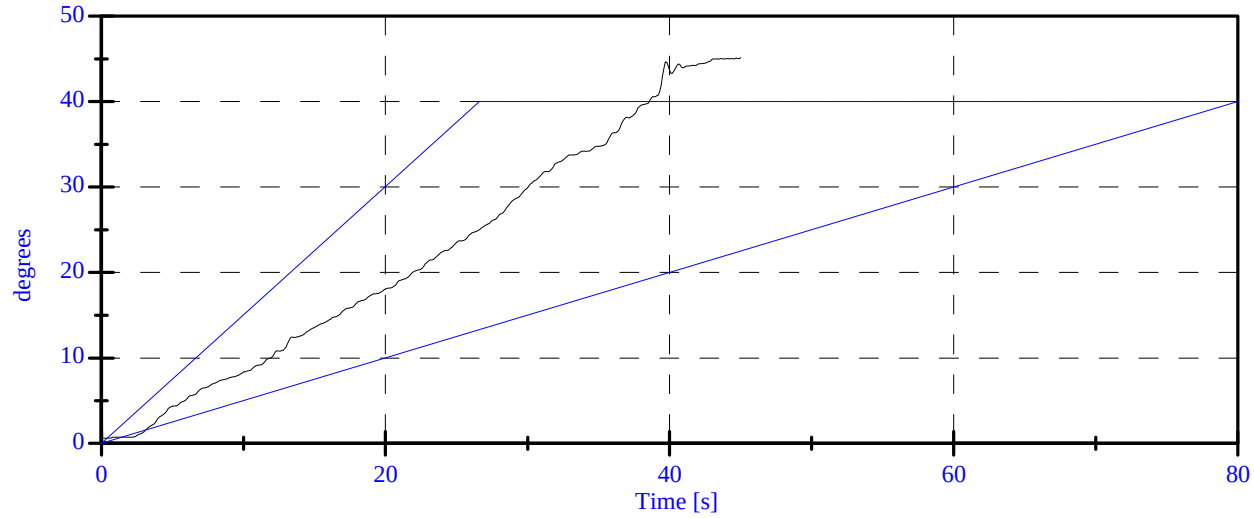
**CONFIGURED FOR LEFT SIDE IMPACT**

ATD Serial No: 905 Sequential Test Number: 1 File: 905 Spine 02-11-08
Date: 02-12-08 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 % | 33.00 % | Passed |
| Force at 0 Deg: | 0.00-26.69 N | 0.26 N | Passed |
| Force at 20 Deg: | 97.86-151.24 N | 108.38 N | Passed |
| Force at 30 Deg | 151.24-204.62 N | 163.22 N | Passed |
| Force at 40 Deg | 204.62-258.00 N | 235.04 N | Passed |
| Return Angle | 12 Deg Max | 9.46 deg | Passed |

## LUMBAR SPINE FLEXION TEST



**PRE-TEST DUMMY INSPECTION LIST**

**CONFIGURED FOR LEFT SIDE IMPACT**

SID H3 Serial No.: 905 Sequential Test Number: 1
Date: February 12, 2008 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.:** 906

**CONFIGURED FOR LEFT SIDE IMPACT**

**CALIBRATION TEST RESULTS SUMMARY**
**POST TEST**

**CONFIGURED FOR LEFT SIDE IMPACT**

SID H3 Serial No.: 906 Sequential Test Number: 1
Date: February 28, 2008 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.: 906 Sequential Test Number: 1
Date: February 28, 2008 Laboratory Technician: B. Swiecicki

| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|---|---|---|
| SH- Seated Height (mm) | 889 - 909 | 902 |
| RH- Rib Height (mm) | 502 - 520 | 511 |
| HP- Hip Pivot Height (mm) | 99 ref. | 99 |
| RD- Rib from Back Line (mm) | 229 - 241 | 239 |
| KH- Knee Pivot from Back Line (mm) | 511 - 526 | 518 |
| KV- Knee Pivot to Floor (mm) | 490 - 505 | 493 |
| HW- Hip Width (mm) | 356 - 391 | 386 |

**REMARKS:** None

**Thorax Impact**

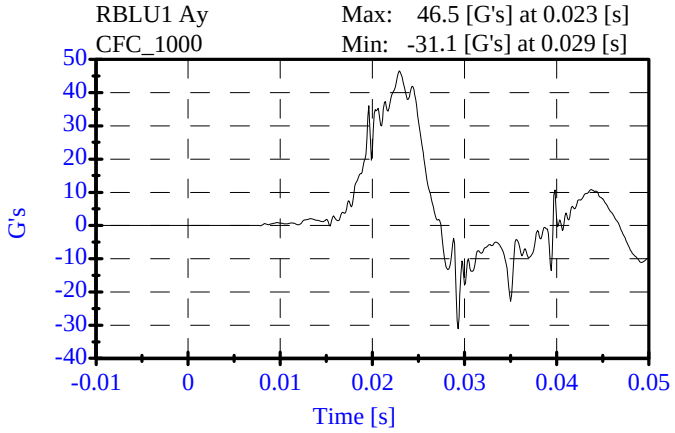
**Post-Test**

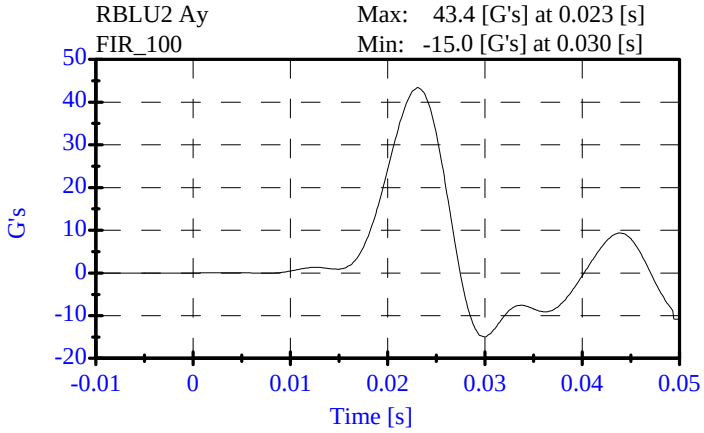
**CONFIGURED FOR LEFT SIDE IMPACT**

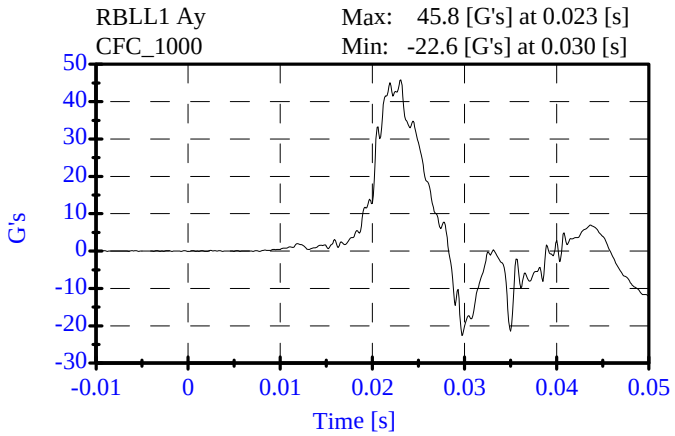
ATD Serial No: 906 Sequential Test Number: 1 File: 906T 02-28-08

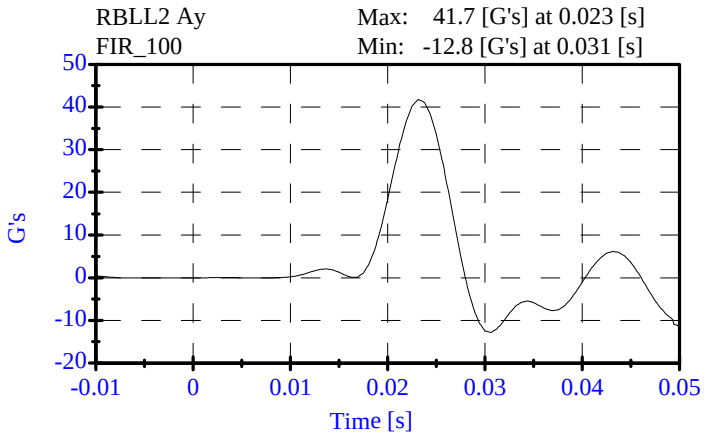
Date: 02-28-08 Laboratory Technician: B. Swiecicki

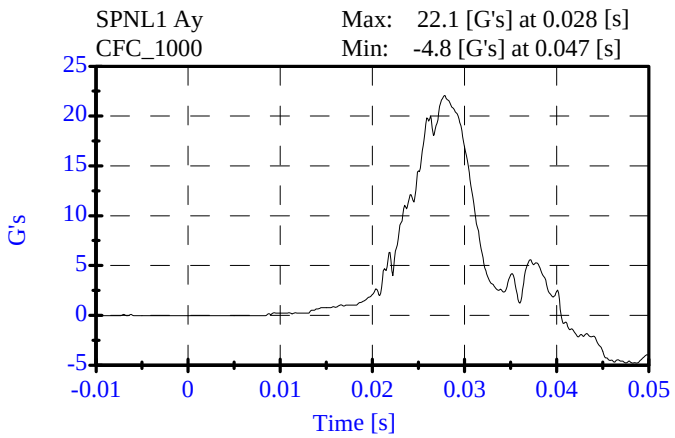
| TEST PARAMETER | SPECIFICATION | TEST RESULTS | STATUS |
|---|---|---|---|
| Lab Temperature: | 18.9-25.5 C | 21.1 C | Passed |
| Lab Humidity: | 10-70 % | 33.00 % | Passed |
| Probe Velocity: | 4.27- 4.33 m/s | 4.29 m/s | Passed |
| Upper Rib Acceleration: | 37.00-46.00 G's | 43.45 G's | Passed |
| Lower Rib Acceleration: | 37.00-46.00 G's | 41.71 G's | Passed |
| Lower Spine Acceleration: | 15.00-22.00 G's | 21.58 G's | Passed |

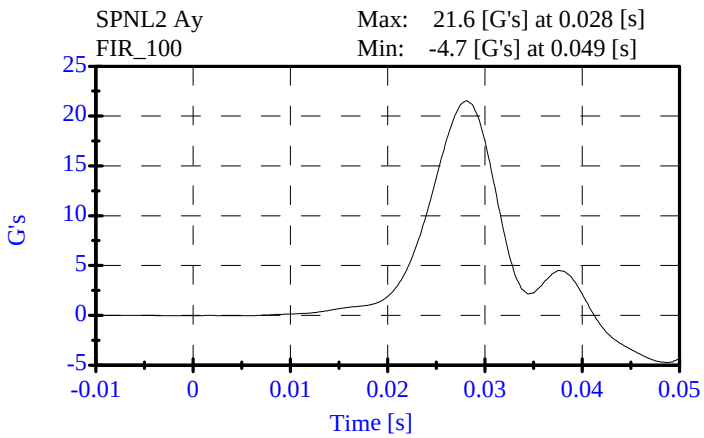


**Pelvis Impact Test**

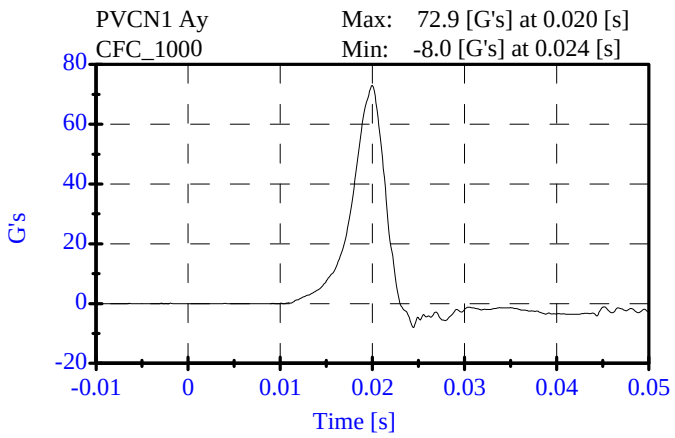
**Post-Test**

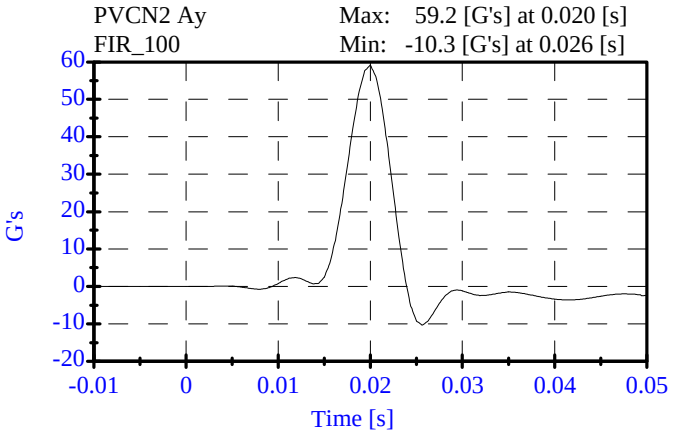
**CONFIGURED FOR LEFT SIDE IMPACT**

ATD Serial No: 905 Sequential Test Number: 1 File: 906P 02-28-08

Date: 02-28-08 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 % | 33.00 % | Passed |
| Probe Velocity: | 4.27- 4.33 m/s | 4.28 m/s | Passed |
| Pelvis Y Acceleration: | 40.00-60.00 G's | 59.19 G's | Passed |
| Time Above 20 Gs | 3.0-7.0 ms | 6.0 ms | Passed |



**Head Drop Test**

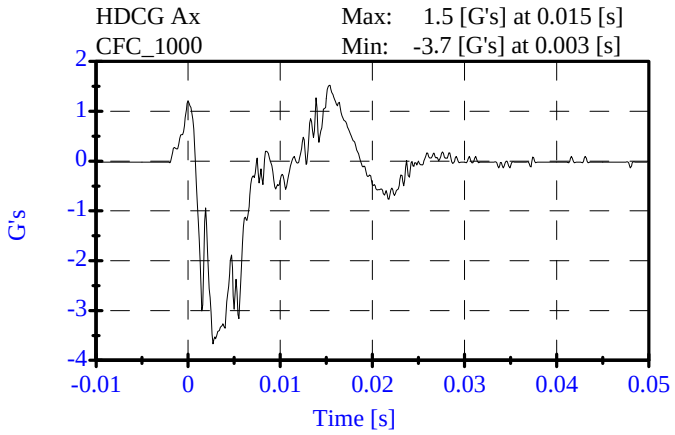
**Post-Test**

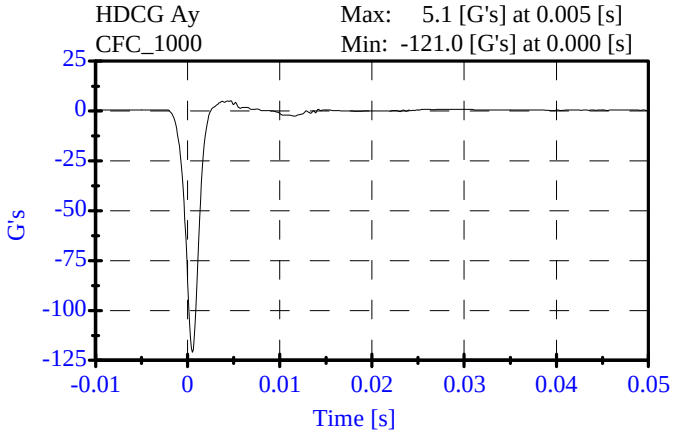
**CONFIGURED FOR LEFT SIDE IMPACT**

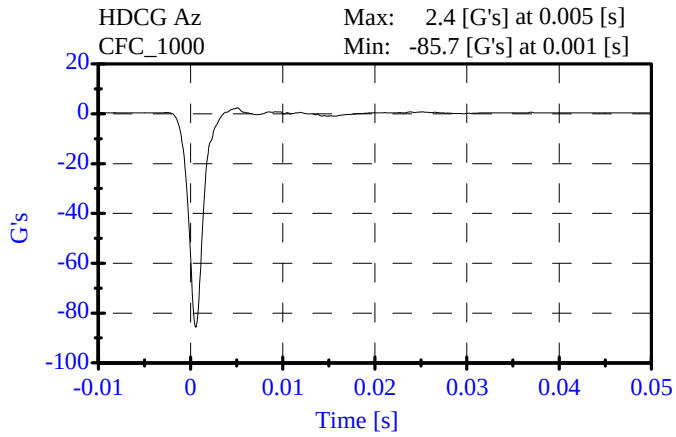
ATD Serial No: 906 Sequential Test Number: 1 File: 906H 02-25-08

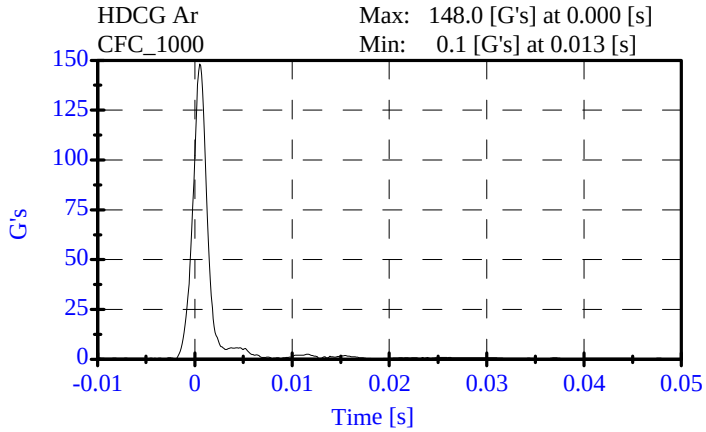
Date: 02-25-08 Laboratory Technician: B. Swiecicki

| TEST PARAMETER | SPECIFICATION | TEST RESULTS | STATUS |
|---|---|---|---|
| Lab Temperature: | 18.9-25.6 C | 21.1 C | Passed |
| Lab Humidity: | 10-70 % | 33.00 % | Passed |
| Peak Resultant Accel.: | 120-150 Gs | 148.03 Gs | Passed |
| Peak Lateral Accel.: | 15 Gs Max | 1.52 Gs | Passed |
| Curve PerCent NonModal: | < 15% | 3.98 % | Passed |



**Neck Test**

**Post-Test**

**CONFIGURED FOR LEFT SIDE IMPACT**

ATD Serial No: 906 Sequential Test Number: 1 File: 906N4 02-25-08

Date: 02-26-08 Laboratory Technician: B. Swiecicki

| TEST PARAMETER | SPECIFICATION | TEST RESULTS | STATUS |
|---|---|---|---|
| Lab Temperature: | 20.6-22.2 C | 21.1 C | Passed |
| Lab Humidity: | 10-70 % | 33.00 % | 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 | 2.38 m/s | Passed |
| Delta V at 20 ms: | 4.12- 5.10 m/s | 4.72 m/s | Passed |
| Delta V at 30 ms: | 5.73- 7.01 m/s | 6.72 m/s | Passed |
| Delta V between 40-70 ms: | 6.27- 7.64 m/s | 7.05 m/s | Passed |
| D PLANE ROTATION | | | |
| Maximum Rotation: | 66.0-82.0 Deg | 71.34 Deg | Passed |
| Rotation Angle Decay: | 58.0-67.0 ms | 58.80 ms | Passed |
| MOMENT ABOUT THE OCCIPITAL CONDYLE | | | |
| Max Occipital Moment: | 73.00- 88.00 N-m | 76.42 N-m | Passed |
| Occiptal Moment Decay: | 49.0-64.0 ms | 60.10 ms | Passed |
| HEAD ROTATION TIME WITH RESPECT TO THE OCCIPITAL CONDYLE MOMENT | | | |
| Moment to Rotation Peak: | 2.0-16.0 ms | 9.20 ms | Passed |

**Neck Test**

**Post-Test**

**CONFIGURED FOR LEFT SIDE IMPACT**

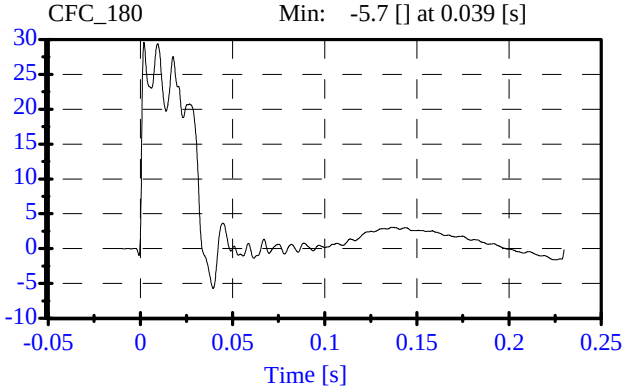
ATD Serial No: 906

Sequential Test Number: 1 File: 906N4 02-25-08

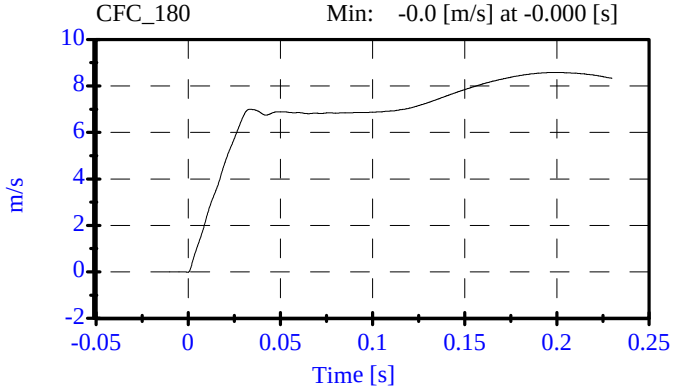
Date: 02-26-08

Laboratory Technician: B. Swiecicki

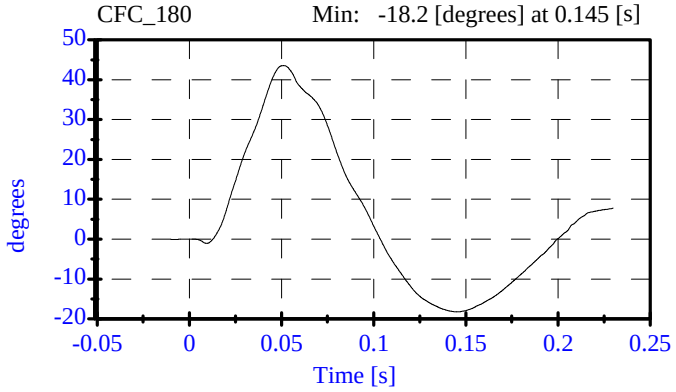
Pend Ax
CFC_180
Max: 29.6 [] at 0.002 [s]
Min: -5.7 [] at 0.039 [s]



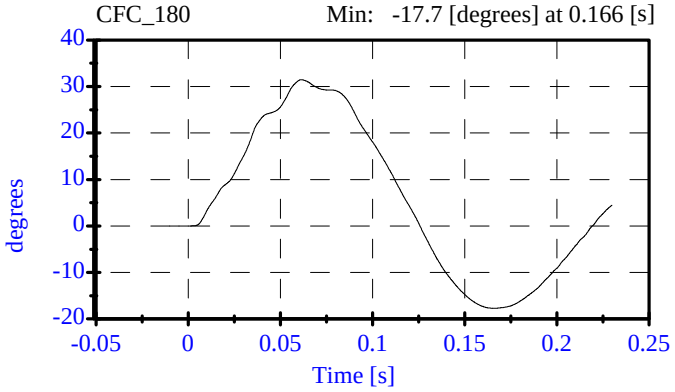

Pend Vx
CFC_180
Max: 8.6 [m/s] at 0.198 [s]
Min: -0.0 [m/s] at -0.000 [s]



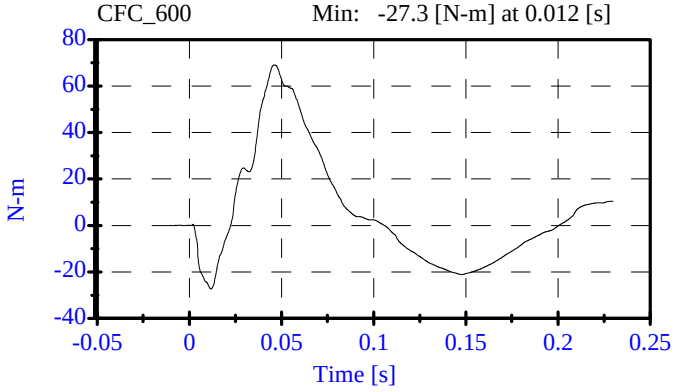

Head Rot
CFC_180
Max: 43.6 [degrees] at 0.051 [s]
Min: -18.2 [degrees] at 0.145 [s]



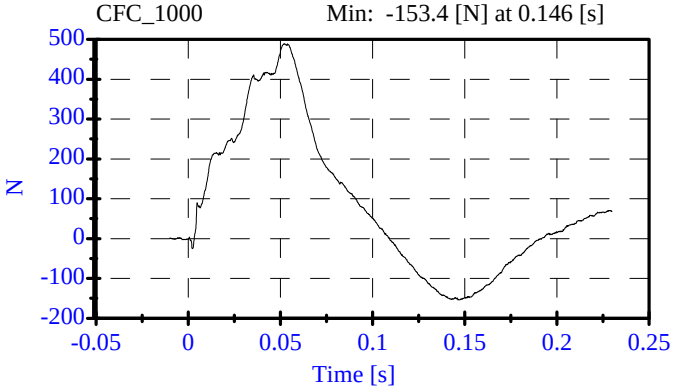

Arm Rot
CFC_180
Max: 31.4 [degrees] at 0.061 [s]
Min: -17.7 [degrees] at 0.166 [s]



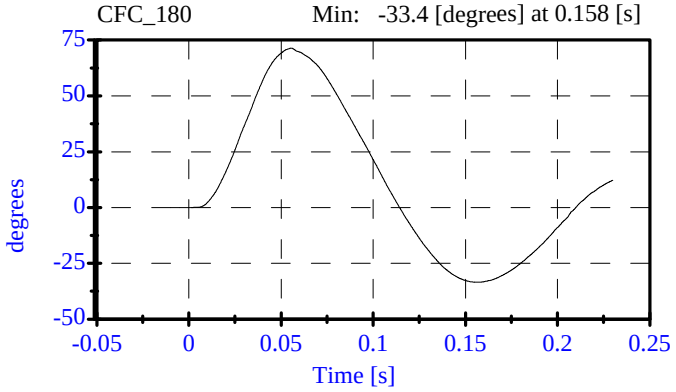

Neck Mx
CFC_600
Max: 69.0 [N-m] at 0.046 [s]
Min: -27.3 [N-m] at 0.012 [s]



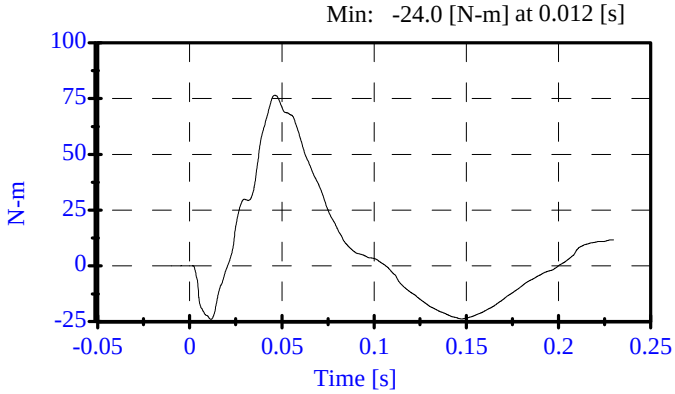

Neck Fy
CFC_1000
Max: 489.2 [N] at 0.052 [s]
Min: -153.4 [N] at 0.146 [s]




Tot Rot
CFC_180
Max: 71.3 [degrees] at 0.055 [s]
Min: -33.4 [degrees] at 0.158 [s]




MOCX
Max: 76.4 [N-m] at 0.046 [s]
Min: -24.0 [N-m] at 0.012 [s]



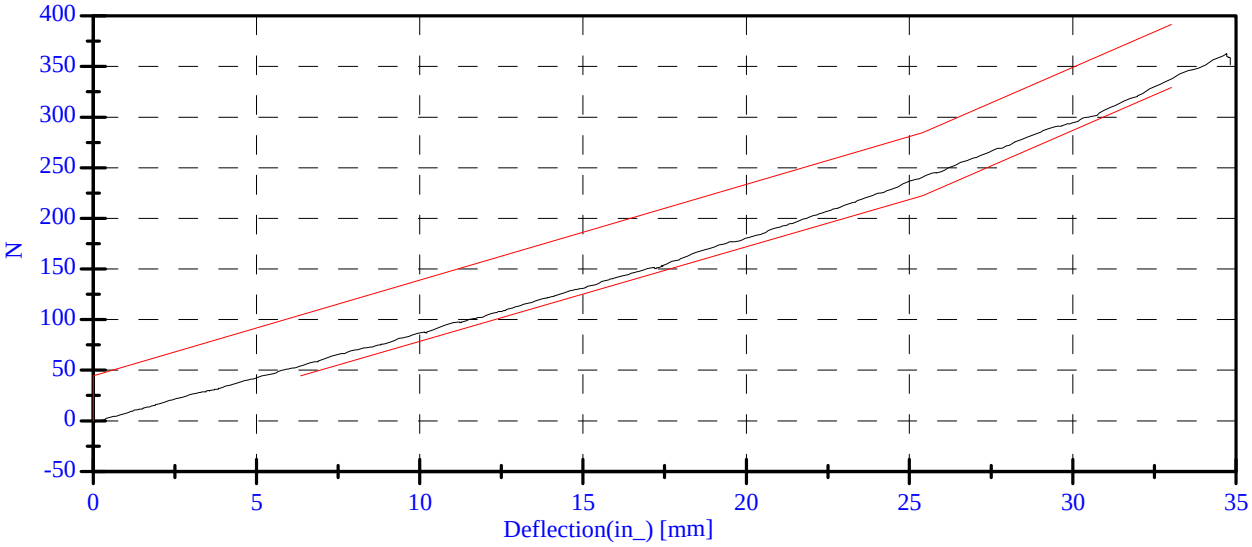
**Abdominal Compression Test**
**Post-Test**

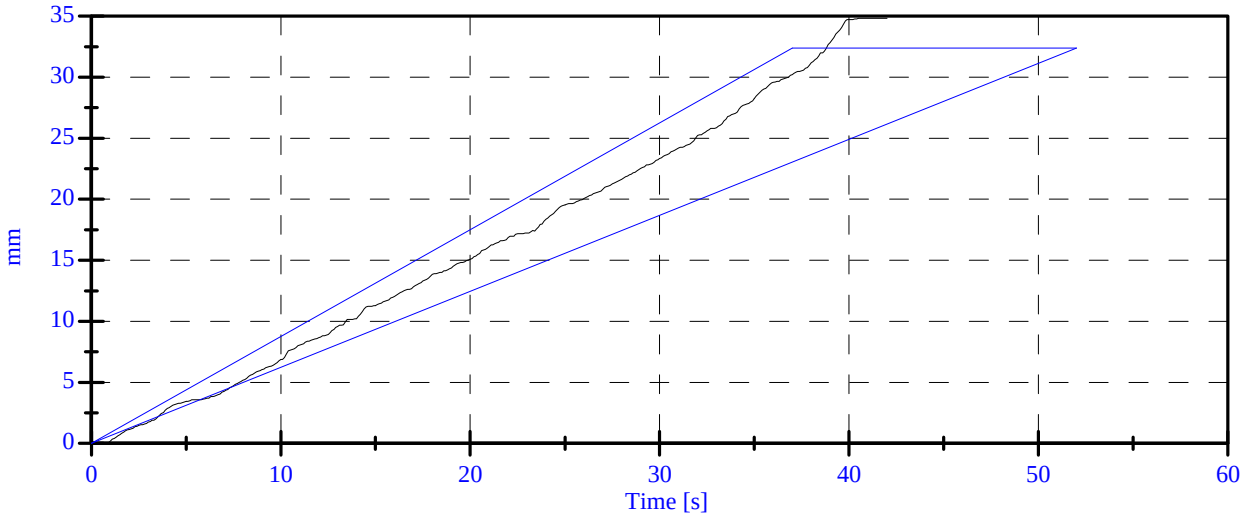
**CONFIGURED FOR LEFT SIDE IMPACT**

ATD Serial No: 906 Sequential Test Number: 1 File: 906 Ab 02-28-08
Date: 02-28-08 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 % | 33.00 % | Passed |
| Force at 12.95 mm : | 104.00-162.00 N | 112.90 N | Passed |
| Force at 19.05 mm : | 162.98-220.99 N | 171.62 N | Passed |
| Force at 25.40 mm : | 221.97-280.02 N | 240.49 N | Passed |
| Force at 33.02 mm : | 324.99-391.00 N | 338.00 N | Passed |

## ABDOMINAL COMPRESSION TEST



**Lumbar Spine Test**
**Post-Test**

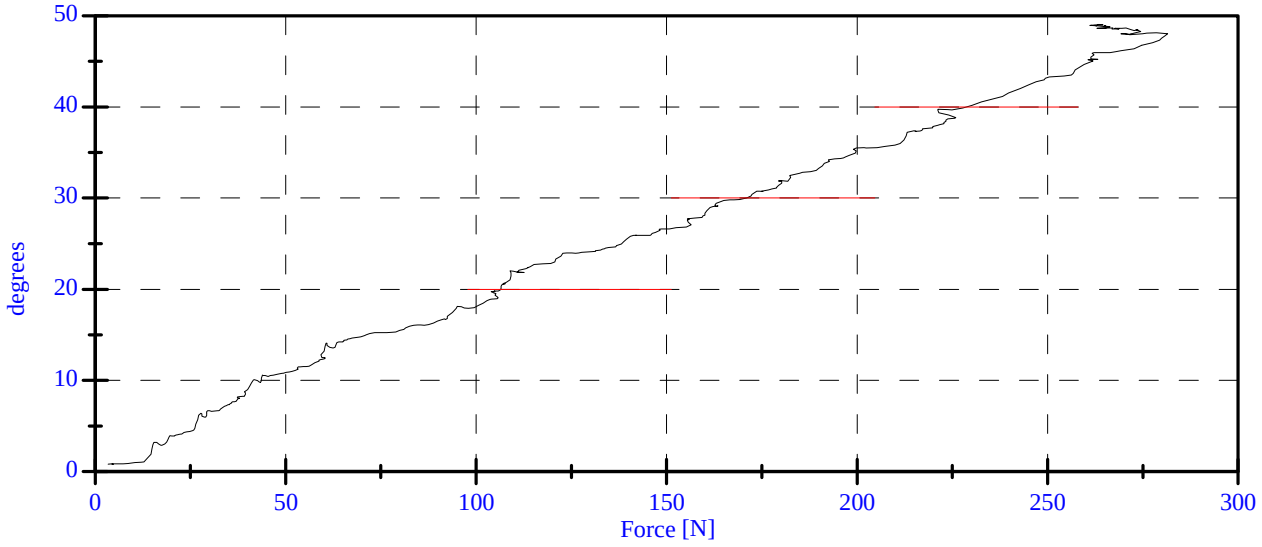
**CONFIGURED FOR LEFT SIDE IMPACT**

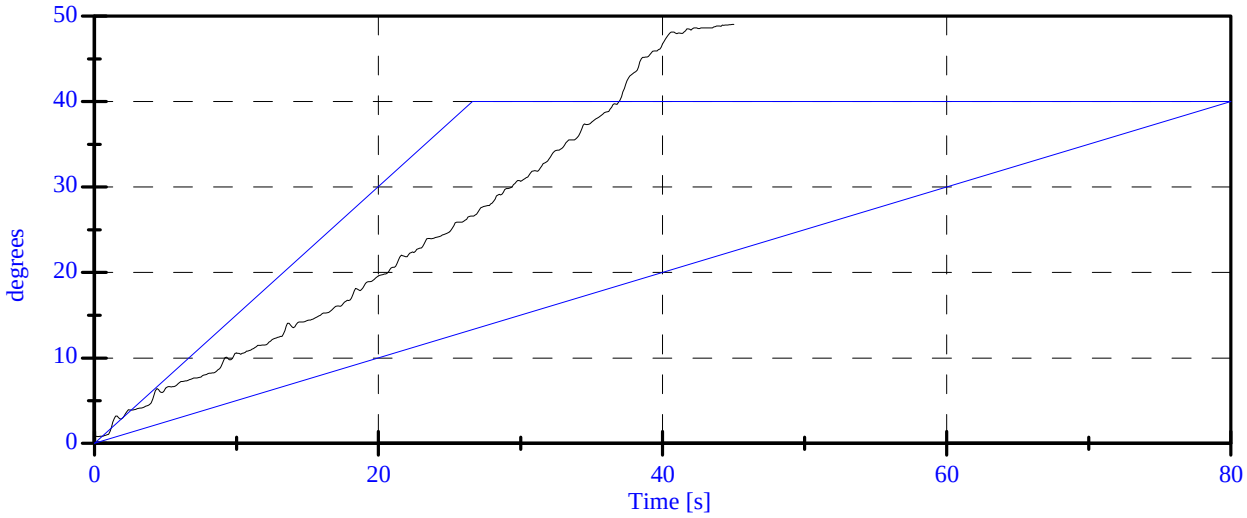
ATD Serial No: 906
Date: 02-28-08

Sequential Test Number: 1 File: 906 Spine 02-28-08
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 % | 33.00 % | Passed |
| Force at 0 Deg: | 0.00-26.69 N | 3.39 N | Passed |
| Force at 20 Deg: | 97.86-151.24 N | 106.55 N | Passed |
| Force at 30 Deg | 151.24-204.62 N | 171.05 N | Passed |
| Force at 40 Deg | 204.62-258.00 N | 227.72 N | Passed |
| Return Angle | 12 Deg Max | 8.00 deg | Passed |

## LUMBAR SPINE FLEXION TEST



**POST TEST DUMMY INSPECTION LIST**

**CONFIGURED FOR LEFT SIDE IMPACT**

SID H3 Serial No.: 906 Sequential Test Number: 1
Date: February 28, 2008 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.:** 905

**CONFIGURED FOR LEFT SIDE IMPACT**

**CALIBRATION TEST RESULTS SUMMARY**
**POST TEST**

**CONFIGURED FOR LEFT SIDE IMPACT**

SID H3 Serial No.: 905 Sequential Test Number: 1
Date: February 28, 2008 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.: 905 Sequential Test Number: 1
Date: February 28, 2008 Laboratory Technician: B. Swiecicki

| TEST PARAMETER | SPECIFICATION | TEST RESULTS |
|---|---|---|
| SH- Seated Height (mm) | 889 - 909 | 902 |
| RH- Rib Height (mm) | 502 - 520 | 513 |
| HP- Hip Pivot Height (mm) | 99 ref. | 99 |
| RD- Rib from Back Line (mm) | 229 - 241 | 239 |
| 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 | 381 |

**REMARKS:** None

**Thorax Impact Test**

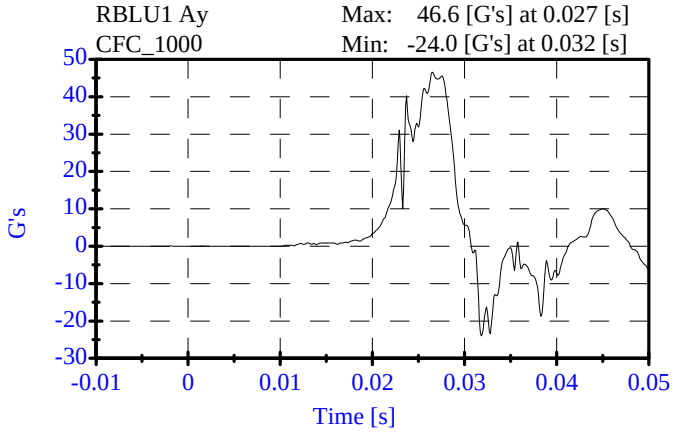
**Post-Test**

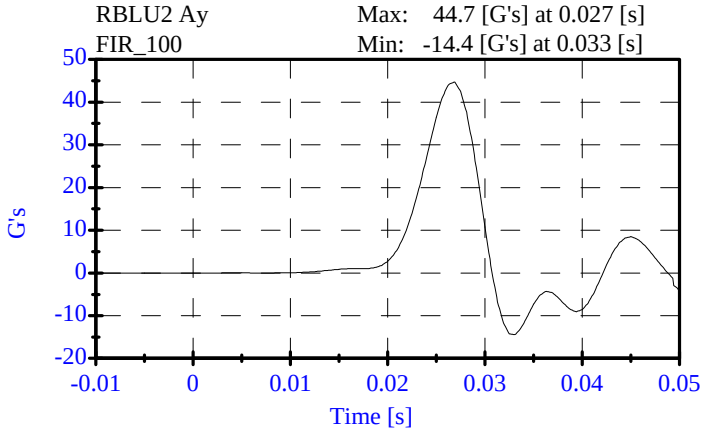
**CONFIGURED FOR LEFT SIDE IMPACT**

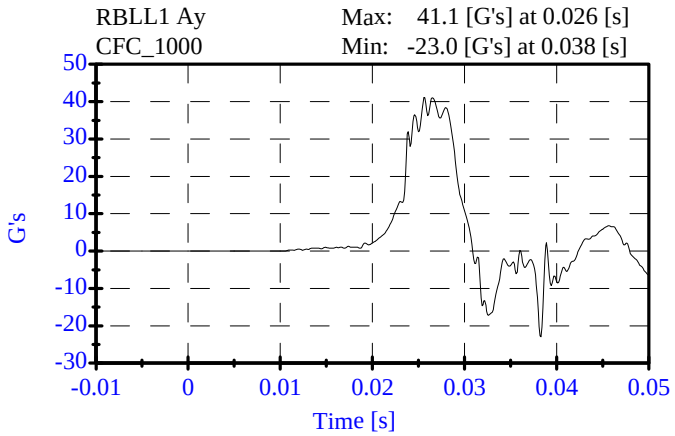
ATD Serial No: 905 Sequential Test Number: 1 File: 905T1 02-27-08

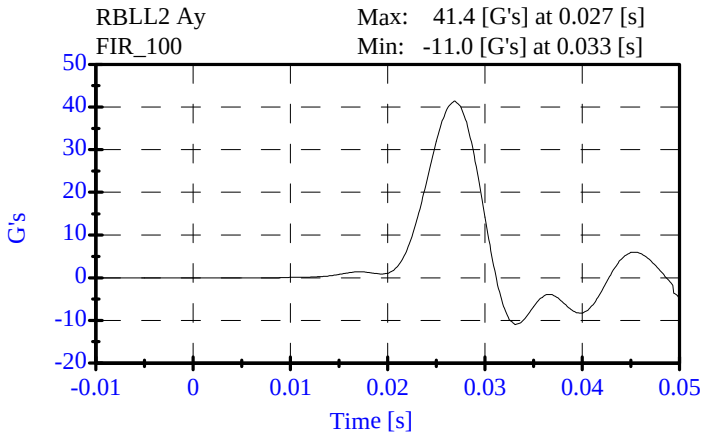
Date: 02-28-08 Laboratory Technician: B. Swiecicki

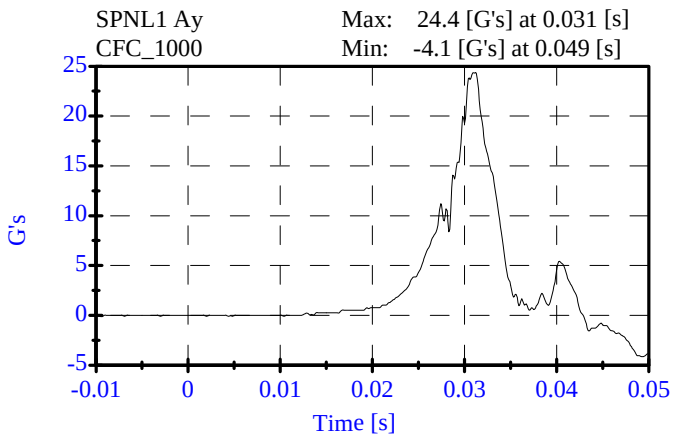
| TEST PARAMETER | SPECIFICATION | TEST RESULTS | STATUS |
|---|---|---|---|
| Lab Temperature: | 18.9-25.5 C | 21.1 C | Passed |
| Lab Humidity: | 10-70 % | 33.00 % | Passed |
| Probe Velocity: | 4.27- 4.33 m/s | 4.27 m/s | Passed |
| Upper Rib Acceleration: | 37.00-46.00 G's | 44.67 G's | Passed |
| Lower Rib Acceleration: | 37.00-46.00 G's | 41.38 G's | Passed |
| Lower Spine Acceleration: | 15.00-22.00 G's | 20.94 G's | Passed |

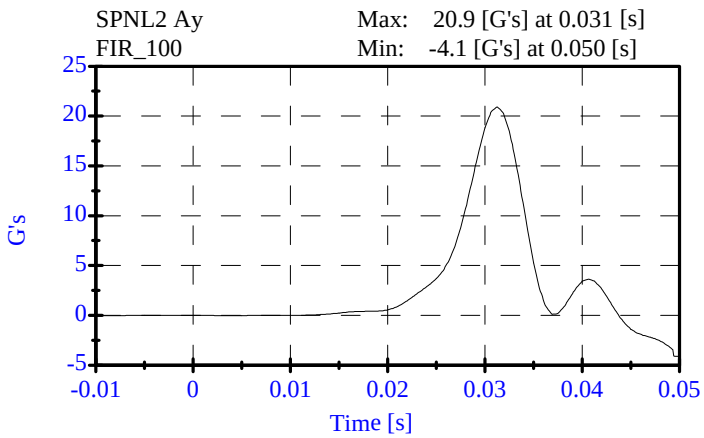


**Pelvis Impact Test**

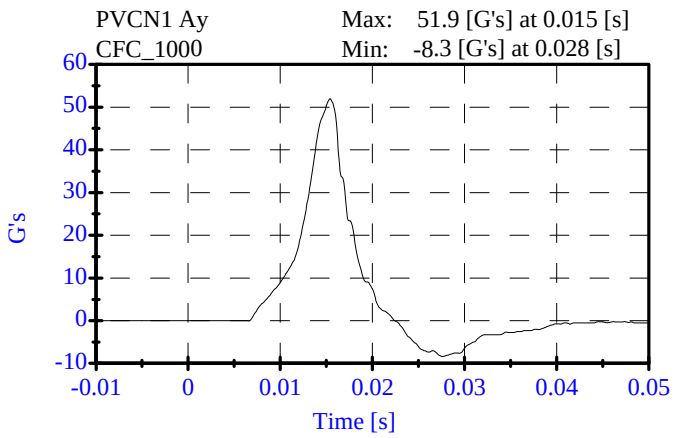
**Post-Test**

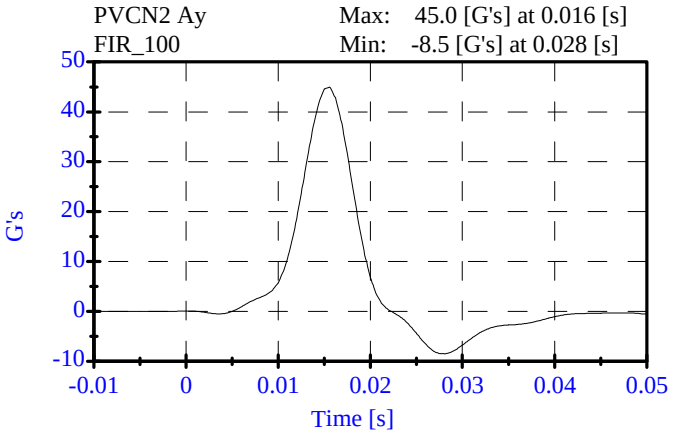
**CONFIGURED FOR LEFT SIDE IMPACT**

ATD Serial No: 905 Sequential Test Number: 1 File: 905P 02-27-08

Date: 02-27-08 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 % | 33.00 % | Passed |
| Probe Velocity: | 4.27- 4.33 m/s | 4.27 m/s | Passed |
| Pelvis Y Acceleration: | 40.00-60.00 G's | 44.96 G's | Passed |
| Time Above 20 Gs | 3.0-7.0 ms | 6.4 ms | Passed |



**Head Drop Test**

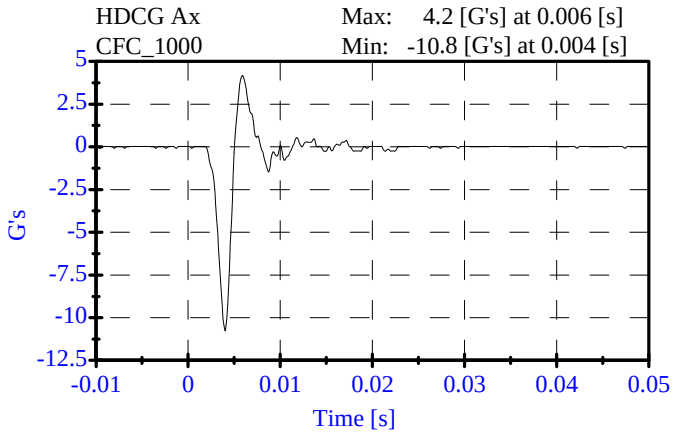
**Post-Test**

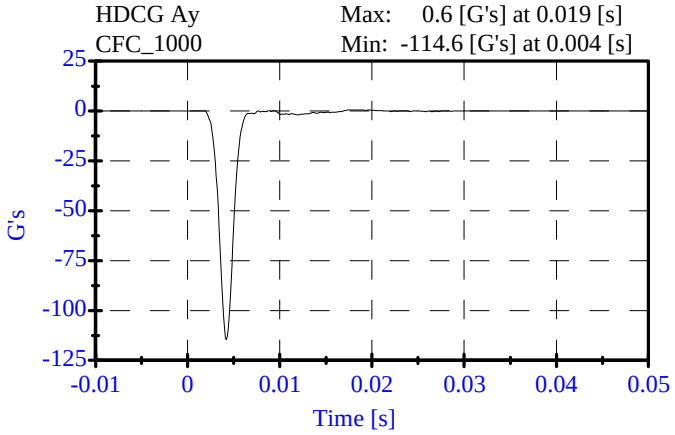
**CONFIGURED FOR LEFT SIDE IMPACT**

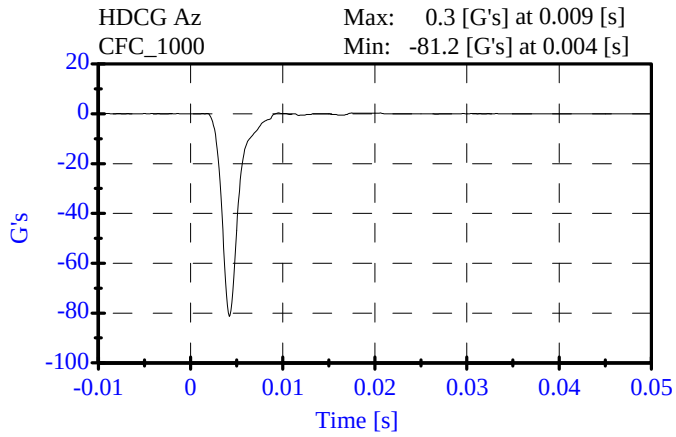
ATD Serial No: 905 Sequential Test Number: 1 File: 905H 02-25-08

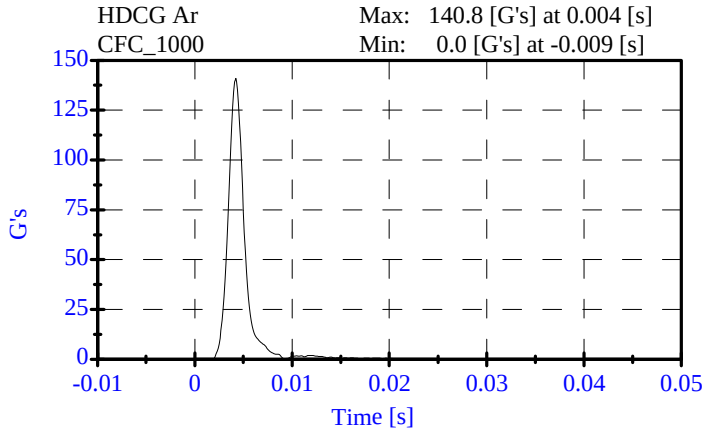
Date: 02-25-08 Laboratory Technician: B. Swiecicki

| TEST PARAMETER | SPECIFICATION | TEST RESULTS | STATUS |
|---|---|---|---|
| Lab Temperature: | 18.9-25.6 C | 21.1 C | Passed |
| Lab Humidity: | 10-70 % | 33.00 % | Passed |
| Peak Resultant Accel.: | 120-150 Gs | 140.84 Gs | Passed |
| Peak Lateral Accel.: | 15 Gs Max | 4.17 Gs | Passed |
| Curve PerCent NonModal: | < 15% | 1.84 % | Passed |



**Neck Test**

**Post-Test**

**CONFIGURED FOR LEFT SIDE IMPACT**

ATD Serial No: 905 Sequential Test Number: 1 File: 905N 02-25-08

Date: 02-25-08 Laboratory Technician: B. Swiecicki

| TEST PARAMETER | SPECIFICATION | TEST RESULTS | STATUS |
|---|---|---|---|
| Lab Temperature: | 20.6-22.2 C | 21.1 C | Passed |
| Lab Humidity: | 10-70 % | 33.00 % | 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 | 2.19 m/s | Passed |
| Delta V at 20 ms: | 4.12- 5.10 m/s | 4.46 m/s | Passed |
| Delta V at 30 ms: | 5.73- 7.01 m/s | 6.29 m/s | Passed |
| Delta V between 40-70 ms: | 6.27- 7.64 m/s | 7.00 m/s | Passed |
| D PLANE ROTATION | | | |
| Maximum Rotation: | 66.0-82.0 Deg | 70.16 Deg | Passed |
| Rotation Angle Decay: | 58.0-67.0 ms | 60.90 ms | Passed |
| MOMENT ABOUT THE OCCIPITAL CONDYLE | | | |
| Max Occipital Moment: | 73.00- 88.00 N-m | 79.91 N-m | Passed |
| Occiptal Moment Decay: | 49.0-64.0 ms | 58.00 ms | Passed |
| HEAD ROTATION TIME WITH RESPECT TO THE OCCIPITAL CONDYLE MOMENT | | | |
| Moment to Rotation Peak: | 2.0-16.0 ms | 8.10 ms | Passed |

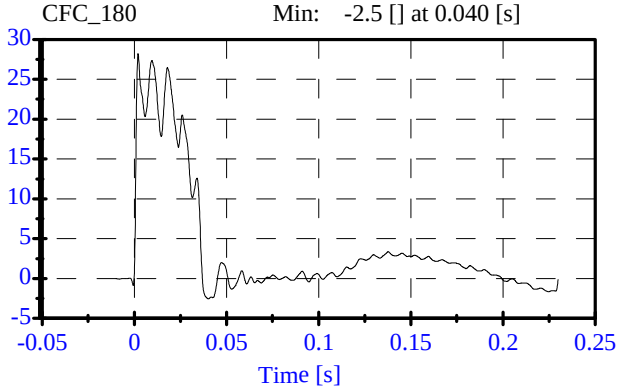
**Neck Test**
**Post-Test**

**CONFIGURED FOR LEFT SIDE IMPACT**

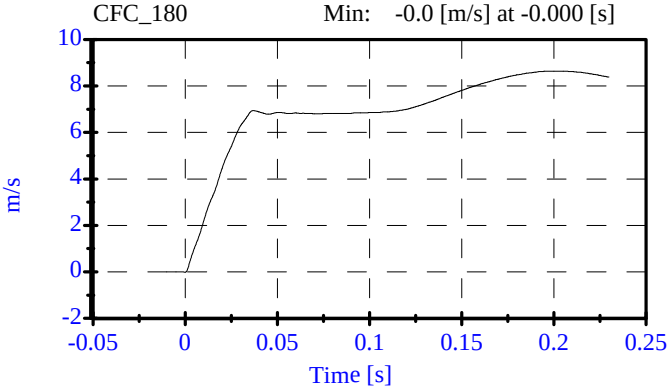
ATD Serial No: 905
Date: 02-25-08

Sequential Test Number: 1 File: 905N 02-25-08
Laboratory Technician: B. Swiecicki

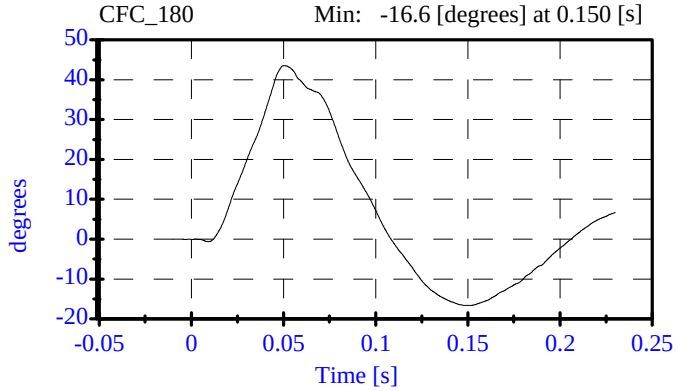
Pend Ax
CFC_180
Max: 28.2 [] at 0.002 [s]
Min: -2.5 [] at 0.040 [s]



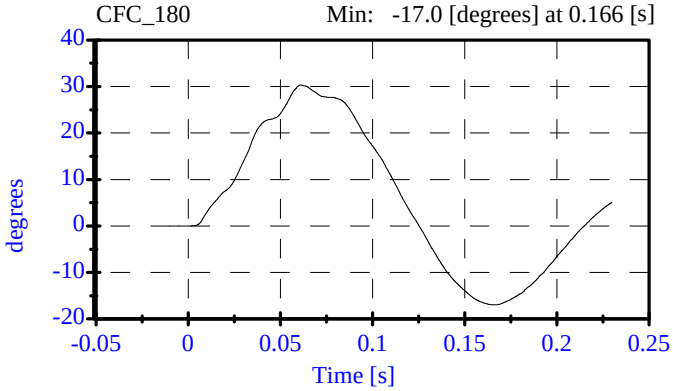

Pend Vx
CFC_180
Max: 8.6 [m/s] at 0.199 [s]
Min: -0.0 [m/s] at -0.000 [s]



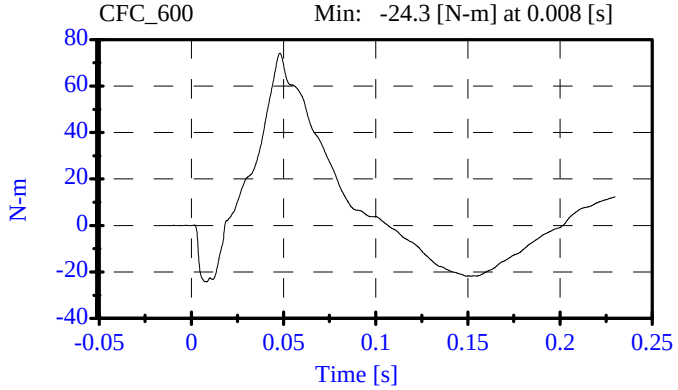

Head Rot
CFC_180
Max: 43.6 [degrees] at 0.050 [s]
Min: -16.6 [degrees] at 0.150 [s]



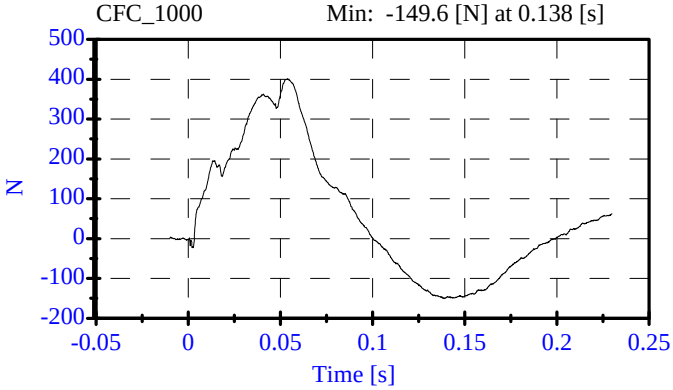

Arm Rot
CFC_180
Max: 30.3 [degrees] at 0.061 [s]
Min: -17.0 [degrees] at 0.166 [s]



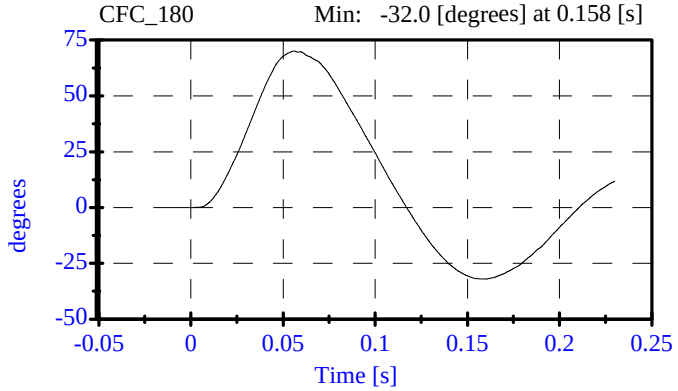

Neck Mx
CFC_600
Max: 74.1 [N-m] at 0.048 [s]
Min: -24.3 [N-m] at 0.008 [s]



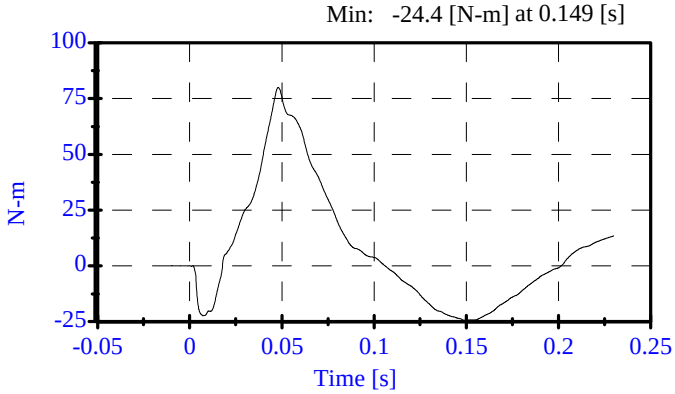

Neck Fy
CFC_1000
Max: 401.2 [N] at 0.054 [s]
Min: -149.6 [N] at 0.138 [s]




Tot Rot
CFC_180
Max: 70.2 [degrees] at 0.056 [s]
Min: -32.0 [degrees] at 0.158 [s]




MOCX
Max: 79.9 [N-m] at 0.048 [s]
Min: -24.4 [N-m] at 0.149 [s]



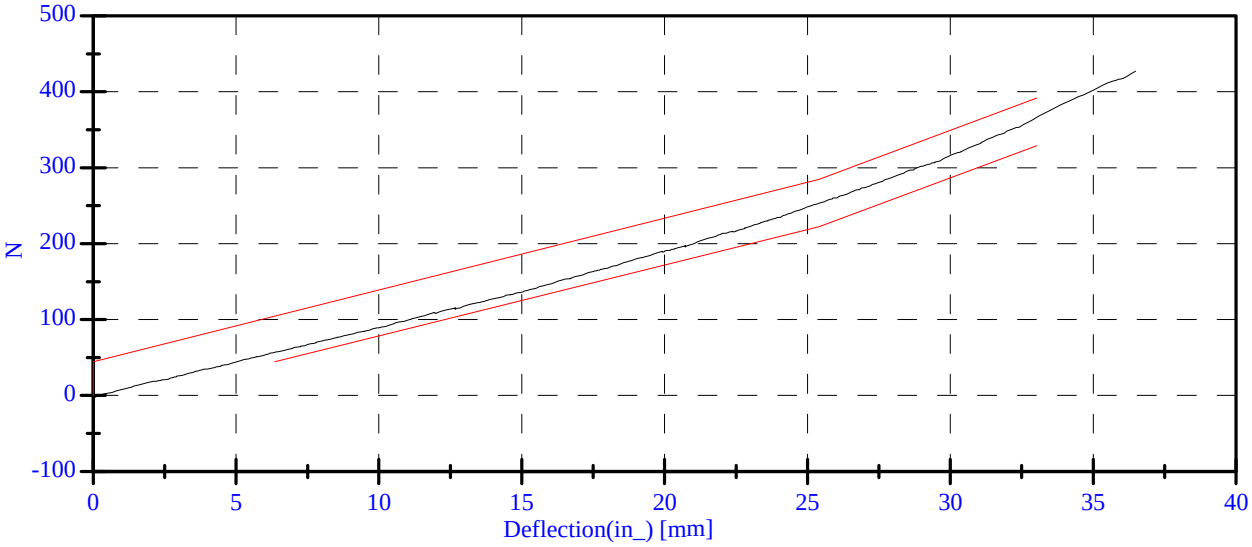
**Abdominal Compression Test**
**Post-Test**

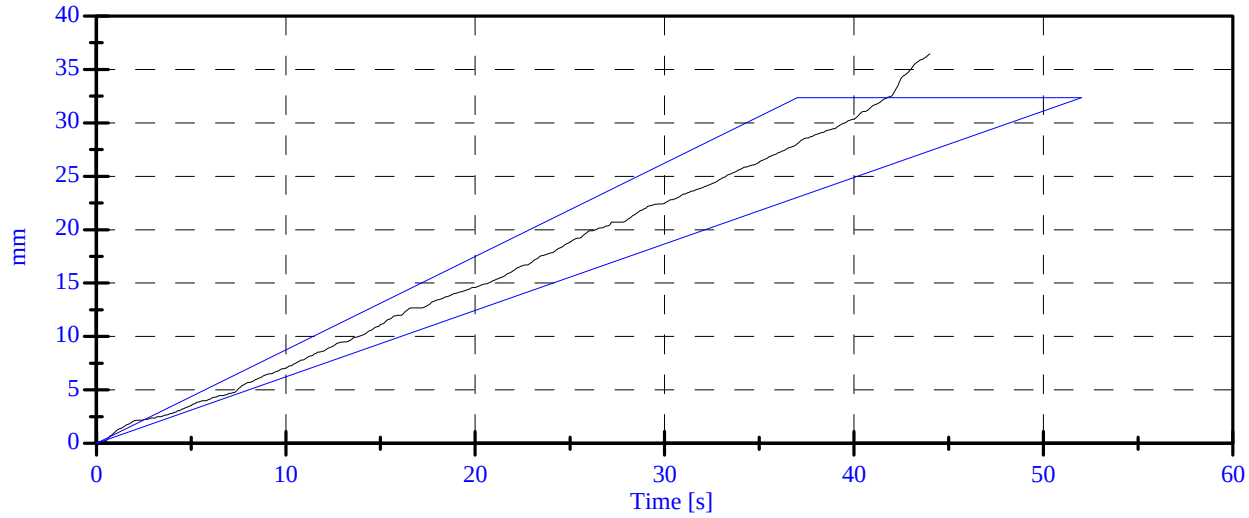
**CONFIGURED FOR LEFT SIDE IMPACT**

ATD Serial No: 905 Sequential Test Number: 1 File: 905 Ab 02-28-08
Date: 02-28-08 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 % | 33.00 % | Passed |
| Force at 12.95 mm : | 104.00-162.00 N | 117.25 N | Passed |
| Force at 19.05 mm : | 162.98-220.99 N | 180.68 N | Passed |
| Force at 25.40 mm : | 221.97-280.02 N | 253.18 N | Passed |
| Force at 33.02 mm : | 324.99-391.00 N | 368.08 N | Passed |

## ABDOMINAL COMPRESSION TEST



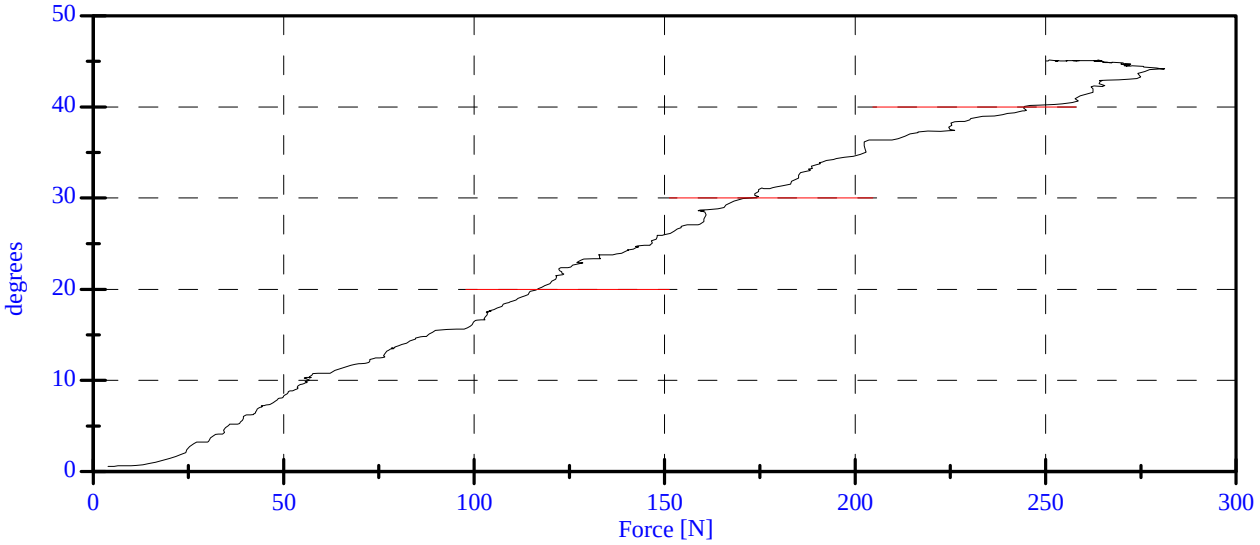
**Lumbar Spine Test**
**Post-Test**

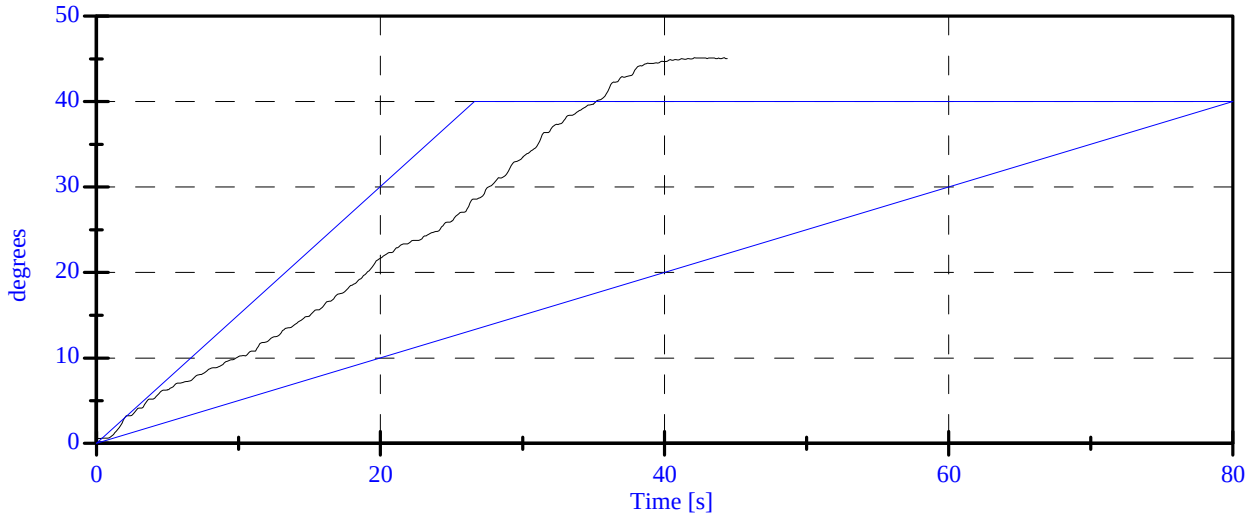
**CONFIGURED FOR LEFT SIDE IMPACT**

ATD Serial No: 905 Sequential Test Number: 1 File: 905 Spine 02-28-08
Date: 02-28-08 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 % | 33.00 % | Passed |
| Force at 0 Deg: | 0.00-26.69 N | 3.92 N | Passed |
| Force at 20 Deg: | 97.86-151.24 N | 117.00 N | Passed |
| Force at 30 Deg | 151.24-204.62 N | 172.62 N | Passed |
| Force at 40 Deg | 204.62-258.00 N | 244.44 N | Passed |
| Return Angle | 12 Deg Max | 7.77 deg | Passed |

## LUMBAR SPINE FLEXION TEST



**POST TEST DUMMY INSPECTION LIST**

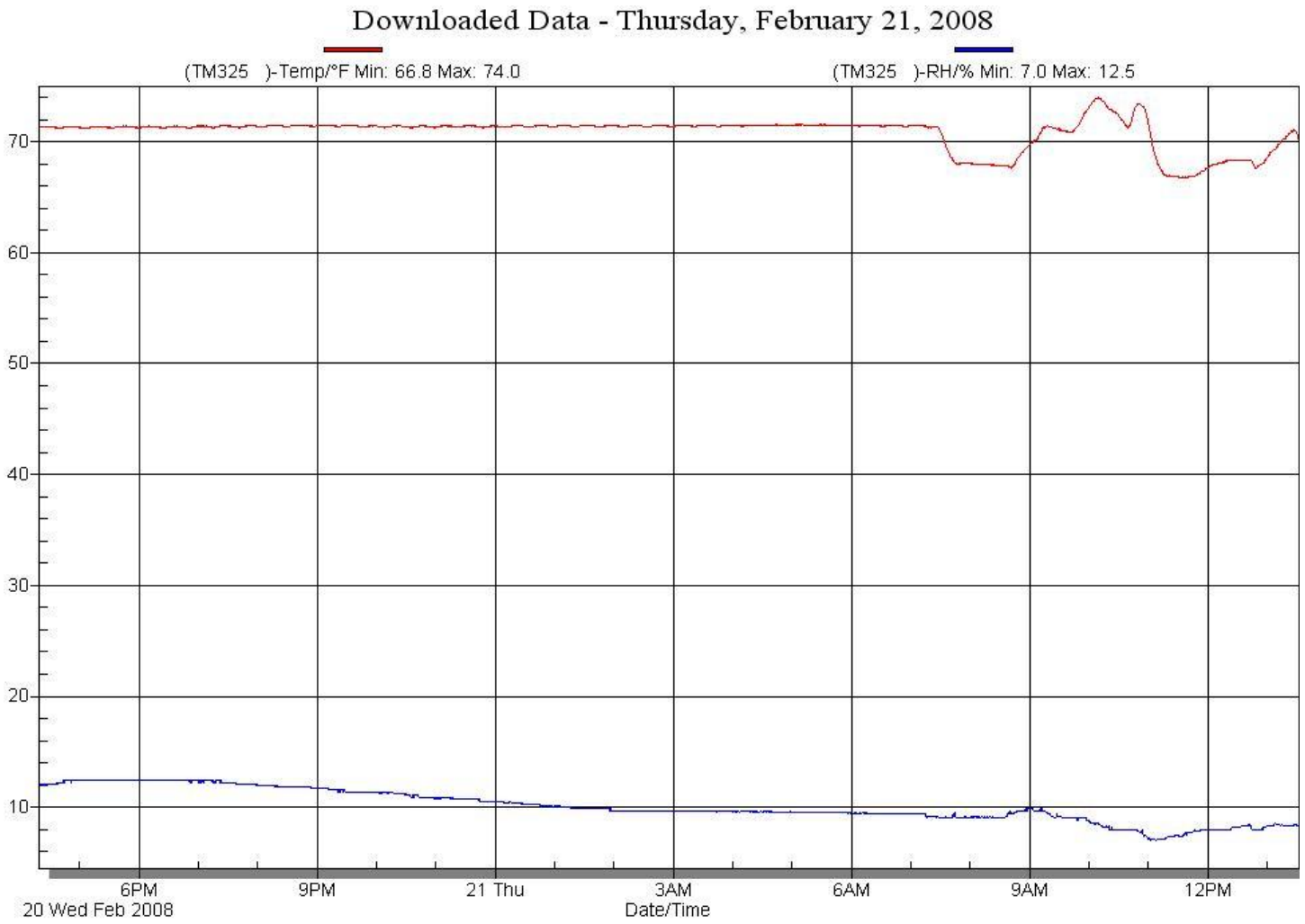
**CONFIGURED FOR LEFT SIDE IMPACT**

SID H3 Serial No.: 905 Sequential Test Number: 1
Date: February 28, 2008 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.: 906 | | |
|---|---|---|---|
| | SERIAL NUMBER | MANUFACTURER | CALIBRATION DATE |
| HEAD AX | AC-P35764 | ENDEVCO | 24-Jan-08 |
| HEAD AY | AC-P39736 | ENDEVCO | 24-Jan-08 |
| HEAD AZ | AC-P39729 | ENDEVCO | 24-Jan-08 |
| HEAD AX REDUNDANT | AC-P52255 | ENDEVCO | 17-Jan-08 |
| HEAD AY REDUNDANT | AC-P52398 | ENDEVCO | 18-Jan-08 |
| HEAD AZ REDUNDANT | AC-P52405 | ENDEVCO | 18-Jan-08 |
| UPPER NECK FX | LC-798Fx | DENTON | 12-Jul-07 |
| UPPER NECK FY | LC-798Fy | DENTON | 12-Jul-07 |
| UPPER NECK FZ | LC-798Fz | DENTON | 12-Jul-07 |
| UPPER NECK MX | LC-798Mx | DENTON | 12-Jul-07 |
| UPPER NECK MY | LC-798My | DENTON | 12-Jul-07 |
| UPPER NECK MZ | LC-798Mz | DENTON | 12-Jul-07 |
| UPPER RIB | AC-P39575 | ENDEVCO | 24-Jan-08 |
| LOWER RIB | AC-P16866 | ENDEVCO | 24-Jan-08 |
| LOWER SPINE | AC-P16645 | ENDEVCO | 25-Jan-08 |
| PELVIS | AC-P23139 | ENDEVCO | 24-Jan-08 |
| UPPER RIB REDUNDANT | AC-P15526 | ENDEVCO | 24-Jan-08 |
| LOWER RIB REDUNDANT | AC-P16656 | ENDEVCO | 24-Jan-08 |
| LOWER SPINE REDUNDANT | AC-P19343 | ENDEVCO | 24-Jan-08 |
| PELVIS REDUNDANT | AC-P17539 | ENDEVCO | 24-Jan-08 |

| | REAR SID/HIII NO.: 905 | | |
|---|---|---|---|
| | SERIAL NUMBER | MANUFACTURER | CALIBRATION DATE |
| HEAD AX | AC-P21373 | ENDEVCO | 24-Jan-08 |
| HEAD AY | AC-P23128 | ENDEVCO | 24-Jan-08 |
| HEAD AZ | AC-P21297 | ENDEVCO | 24-Jan-08 |
| HEAD AX REDUNDANT | AC-P52388 | ENDEVCO | 17-Jan-08 |
| HEAD AY REDUNDANT | AC-P52389 | ENDEVCO | 18-Jan-08 |
| HEAD AZ REDUNDANT | AC-P52415 | ENDEVCO | 18-Jan-08 |
| UPPER NECK FX | LC-1626Fx | DENTON | 13-Jul-07 |
| UPPER NECK FY | LC-1626Fy | DENTON | 13-Jul-07 |
| UPPER NECK FZ | LC-1626Fz | DENTON | 13-Jul-07 |
| UPPER NECK MX | LC-1626Mx | DENTON | 13-Jul-07 |
| UPPER NECK MY | LC-1626My | DENTON | 13-Jul-07 |
| UPPER NECK MZ | LC-1626Mz | DENTON | 13-Jul-07 |
| UPPER RIB | AC-P15736 | ENDEVCO | 24-Jan-08 |
| LOWER RIB | AC-P16289 | ENDEVCO | 24-Jan-08 |
| LOWER SPINE | AC-P52394 | ENDEVCO | 17-Jan-08 |
| PELVIS | AC-P35804 | ENDEVCO | 24-Jan-08 |
| UPPER RIB REDUNDANT | AC-P16593 | ENDEVCO | 24-Jan-08 |
| LOWER RIB REDUNDANT | AC-P23142 | ENDEVCO | 24-Jan-08 |
| LOWER SPINE REDUNDANT | AC-P52413 | ENDEVCO | 17-Jan-08 |
| PELVIS REDUNDANT | AC-P17242 | ENDEVCO | 24-Jan-08 |

**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-P32464 | ENDEVCO | 06-Sep-07 |
| RIGHT FRONT SILL (Y) | AC-P32139 | ENDEVCO | 01-Feb-08 |
| RIGHT FRONT SILL (Z) | AC-P32455 | ENDEVCO | 01-Feb-08 |
| RIGHT REAR SILL (X) | AC-P16625 | ENDEVCO | 25-Jan-08 |
| RIGHT REAR SILL (Y) | AC-P23957 | ENDEVCO | 25-Jan-08 |
| RIGHT REAR SILL (Z) | AC-P19216 | ENDEVCO | 25-Jan-08 |
| REAR FLOORPAN ABOVE AXLE (X) | AC-P17285 | ENDEVCO | 28-Jan-08 |
| REAR FLOORPAN ABOVE AXLE (Y) | AC-P17283 | ENDEVCO | 28-Jan-08 |
| REAR FLOORPAN ABOVE AXLE (Z) | AC-P14393 | ENDEVCO | 28-Jan-08 |
| LEFT REAR SILL (Y) | AC-P23904 | ENDEVCO | 07-Nov-07 |
| LEFT FRONT SILL (Y) | AC-J32832 | ENDEVCO | 06-Feb-08 |
| RIGHT REAR SEAT OCCUPANT COMP. (Y) | AC-P24145 | ENDEVCO | 08-Nov-07 |
| LOWER LEFT B- PILLAR (Y) | AC-P21135 | ENDEVCO | 03-Oct-07 |
| MIDDLE LEFT B-PILLAR (Y) | AC-P18948 | ENDEVCO | 01-Feb-08 |
| LOWER LEFT A-PILLAR (Y) | AC-P23926 | ENDEVCO | 01-Feb-08 |
| UPPER LEFT A-PILLAR (Y) | AC-P18785 | ENDEVCO | 01-Feb-08 |
| FRONT SEAT TRACK (Y) | AC-P39731 | ENDEVCO | 07-Feb-08 |
| REAR SEAT TRACK (Y) | AC-P23288 | ENDEVCO | 28-Jan-08 |
| VEHICLE CG (X) | AC-P23134 | ENDEVCO | 14-Nov-07 |
| VEHICLE CG (Y) | AC-P18792 | ENDEVCO | 14-Nov-07 |
| VEHICLE CG (Z) | AC-P17535 | ENDEVCO | 14-Nov-07 |
| MDB CG (X) | AC-C15007 | ENDEVCO | 12-Sep-07 |
| MDB CG (Y) | AC-C16416 | ENDEVCO | 12-Sep-07 |
| MDB CG (Z) | AC-C16499 | ENDEVCO | 12-Sep-07 |
| MDB REAR FRAME MEMBER (X) | AC-C14948 | ENDEVCO | 12-Sep-07 |
| MDB REAR FRAME MEMBER (Y) | AC-C16680 | ENDEVCO | 12-Sep-07 |

**REMARKS:** None