



**REPORT NUMBER: TWG-MGA-2012-004**

**SIDE AIRBAG OUT-OF-POSITION INJURY  
TECHNICAL WORKING GROUP**

**CHRYSLER GROUP LLC  
2012 CHRYSLER TOWN & COUNTRY MINIVAN  
NHTSA NUMBER: MC0301TWG2**

**TEST DATE: DECEMBER 16, 2011**

**FINAL REPORT DATE: JANUARY 31, 2012**

**FINAL REPORT**

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SIGNATURE APPROVAL PAGE

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\_\_\_\_\_

Date: \_\_\_\_\_

The results presented in this report relate only to the specified test items.

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## **SECTION 1**

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

#### **PURPOSE**

The purpose of this test was to obtain data in a static out-of-position side air bag deployment. These data constitute part of the general consumer information collected by Alpha Technology Associate, Inc.

#### **SUMMARY**

The effects of both a curtain and torso airbag deployment in a 2012 Chrysler Town & Country Minivan with an out-of-position SID-IIs Build Level D were evaluated. The curtain and seat airbags were fired remotely. The test was performed by MGA Research Corporation on December 16, 2011. Pre and post test photographs of the vehicle and dummy can be found in Appendix A.

Three high-speed cameras (1000 fps) were used to document the side airbag deployment event. The following camera locations were used:

- Left Side Through Removed Driver Door
- Front Through Windshield
- Left Side  $\frac{3}{4}$  View Through Windshield

One SID-IIs Build Level D dummy (Serial Number 304) was placed in the right front passenger seat situated in the inboard-facing position per Section 3.3.5.2 according to dummy placement instructions specified in the Recommended Procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags as prepared by the Side Airbag Out-of-Position Injury Technical Working Group (TWG).

The dummy was instrumented with the following instrumentation:

- Head Accelerations
- Upper Neck Load Cell

The 9 channels of data were recorded on an on-board data acquisition system. Appendix B contains the dummy data traces.

The SID-IIs dummy's visible contact points were as follows:

- Curtain airbag to top and right side of head
- Torso bag to right shoulder, right torso, and right pelvis

The SID-1Is dummy was placed in the right front passenger seat sitting upright in the center of the seat facing forward with its arm along the armrest. The arm was rotated horizontally in the forward direction with respect to the dummy. The seat track was adjusted forward. The dummy was slid outboard until the dummy's side contacted the door trim panel or armrest and the CG of the head was centered in the deployment trajectory of the airbag. Masking tape was wrapped around the dummy's neck bracket to hold the dummy in place.

This orientation complies with Section 3.3.5.2 of the TWG Recommended Procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags as defined by Lund, et al and the Technical Working Group First Revision dated July, 2003.

**SECTION 2**  
**OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS**

**DATA SHEET NO. 1**  
**TEST SUMMARY**

|                     | Test Data                   | Description                             |
|---------------------|-----------------------------|-----------------------------------------|
| Seating Position    | P2                          | Right Front Seating Position            |
| Test                | 3.3.5.2*                    | Forward-facing SID-IIs dummy            |
| Curtain Airbag      | Roof-Rail Mounted           | Side Airbag                             |
| Torso Airbag        | Seat Mounted                | Side Airbag                             |
| ATD Type/Serial No. | SID-IIs Build Level D / 304 | 5 <sup>th</sup> Percentile Adult Female |

\* Procedure as defined by Lund, et al and the Technical Working Group dated July, 2003

|                             |   |
|-----------------------------|---|
| Number of Data Channels     | 9 |
| Number of Airbag Channels   | 4 |
| Number of High-Speed Videos | 3 |

| Visible Dummy Contact Points |                                              |
|------------------------------|----------------------------------------------|
| Head Contact                 | Curtain airbag to top and right side of head |
| Right Shoulder Contact       | Torso bag                                    |
| Right Torso Contact          | Torso bag                                    |
| Right Pelvis Contact         | Torso bag                                    |

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

Please note that this vehicle had previously been tested in an  
NCAP Side MDB Impact on September 28, 2011.

**TEST VEHICLE INFORMATION**

|                                                         |                           |
|---------------------------------------------------------|---------------------------|
| Manufacturer                                            | Chrysler                  |
| Model                                                   | Town & Country            |
| Body Style                                              | Minivan                   |
| NHTSA No.                                               | MC0301TWG2                |
| VIN                                                     | 2C4RC1BG1CR116865         |
| Color                                                   | Sapphire Crystal Metallic |
| Delivery Date                                           | 09/14/2011                |
| Odometer Reading (mile)                                 | 101                       |
| Dealer                                                  | Boucher Fleet Group       |
| Transmission                                            | Automatic                 |
| Final Drive                                             | Front                     |
| Number of Cylinders                                     | 6                         |
| Engine Displacement (L)                                 | 3.6                       |
| Engine Placement                                        | Lateral                   |
| Automatic Door Lock (ADL)                               | Yes                       |
| Owners Manual Details<br>Instructions on Disabling ADLs | Yes                       |
| Bucket Seats                                            | Yes                       |

**TEST VEHICLE OPTIONS**

|                                    |     |
|------------------------------------|-----|
| Driver Front Airbag                | Yes |
| Driver Side Curtain Airbag         | Yes |
| Driver Side Torso Airbag           | Yes |
| Rear Passenger Side Curtain Airbag | Yes |
| Rear Passenger Side Torso Airbag   | Yes |
| Force Limiter                      | Yes |
| Pretensioner                       | Yes |
| Power Steering                     | Yes |
| Power Door Locks                   | Yes |
| Tilt Wheel                         | Yes |
| Air Conditioning                   | Yes |
| Anti-lock Brakes                   | Yes |
| Traction Control                   | Yes |
| All Wheel Drive                    | No  |
| Power Seats                        | Yes |

**DATA FROM CERTIFICATION LABEL**

|                     |                    |
|---------------------|--------------------|
| Manufactured By     | Chrysler Group LLC |
| Date of Manufacture | 8-11               |

|                 |       |
|-----------------|-------|
| GVWR (kg)       | 2,745 |
| GAWR Front (kg) | 1,339 |
| GAWR Rear (kg)  | 1,407 |

| Measured Parameter      | Front  | Rear   | Third       | Total |
|-------------------------|--------|--------|-------------|-------|
| Type of Seats           | Bucket | Bucket | Split Bench |       |
| Number of Occupants     | 2      | 2      | 3           | 7     |
| Capacity Wt. (VCW) (kg) |        |        |             | 521   |
| Cargo Wt. (RCLW) (kg)   |        |        |             | 45    |

**DATA SHEET NO. 3**  
**DUMMY POSITIONING IN VEHICLE**

| Measurement                                        |           | Value                       |
|----------------------------------------------------|-----------|-----------------------------|
| Seat Position                                      |           | 2 Detents From Full Forward |
| Seat Height Position                               |           | Non-Adjustable              |
| Placed in Position No. 2                           |           | ---                         |
| Seat Back Angle (at headrest post)                 | SA (°)    | 9.3                         |
| Top of Curtain Airbag Module to Head/Neck Junction | AN (mm)   | 215                         |
| Top of Seat Airbag Module to Head/Neck Junction    | AN (mm)   | 208                         |
| Head CG to Door Window                             | HD (mm)   | 183                         |
| Head to Seat Back Centerline                       | HSC (mm)  | 222                         |
| Chest to Dash                                      | CD (mm)   | 361                         |
| Chest to Seatback                                  | CS (mm)   | 285                         |
| Right Arm to Seat Back Centerline                  | RACL (mm) | 364                         |
| Left Arm to Seat Back Centerline                   | LACL (mm) | ---                         |
| Right Arm to Door Panel                            | RA (mm)   | 22                          |
| Left Arm to B-Post                                 | LA (mm)   | ---                         |
| Knee to Knee                                       | KK (mm)   | 151                         |
| Toe to Toe                                         | TT (mm)   | 105                         |
| Right Knee to Seat Cushion Centerline              | KSCR (mm) | 245                         |
| Left Knee to Seat Cushion Centerline               | KSCL (mm) | 96                          |
| Right Toe to Seat Cushion Centerline               | TSCR (mm) | 235                         |
| Left Toe to Seat Cushion Centerline                | TSCL (mm) | 86                          |
| Nose to Dash                                       | ND (mm)   | 498                         |
| Nose to Headrest                                   | NS (mm)   | 320                         |
| Top of Head to Headliner                           | HH (mm)   | 66                          |

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

**NHTSA No. MC0301TWG2**

|                        |      | MAXIMUM VALUE  |           |         |           |
|------------------------|------|----------------|-----------|---------|-----------|
|                        |      | Position No. 2 |           |         |           |
| DESCRIPTION            | UNIT | MAXIMUM        | TIME (ms) | MINIMUM | TIME (ms) |
| Head X                 | g    | 16.2           | 22.5      | -9.0    | 12.5      |
| Head Y                 | g    | 3.5            | 58.9      | -22.6   | 13.0      |
| Head Z                 | g    | 44.4           | 12.0      | -8.8    | 11.4      |
| Head Resultant         | g    | 46.4           | 12.0      |         |           |
| Upper Neck Fx          | N    | 172.4          | 17.9      | -72.4   | 31.8      |
| Upper Neck Fy          | N    | 78.7           | 181.3     | -174.5  | 100.4     |
| Upper Neck Fz          | N    | 113.3          | 142.6     | -1038.2 | 37.1      |
| Upper Neck F Resultant | N    | 1040.1         | 37.1      |         |           |
| Upper Neck Mx          | Nm   | 25.6           | 18.2      | -17.4   | 77.6      |
| Upper Neck My          | Nm   | 17.6           | 19.1      | -19.8   | 52.7      |
| Upper Neck Mz          | Nm   | 0.8            | 300.0     | -4.6    | 27.1      |
| Upper Neck M Resultant | Nm   | 30.9           | 19.5      |         |           |

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

**NHTSA No. MC0301TWG2**

| ATD position         | HEAD INJURY CRITERIA (HIC) |                          |                          |       |                          |                          |
|----------------------|----------------------------|--------------------------|--------------------------|-------|--------------------------|--------------------------|
|                      | HIC15                      |                          |                          | HIC36 |                          |                          |
|                      | HIC                        | T <sup>1</sup><br>(msec) | T <sup>2</sup><br>(msec) | HIC   | T <sup>1</sup><br>(msec) | T <sup>2</sup><br>(msec) |
| No. 2<br>Right Front | 12.90                      | 11.6                     | 23.8                     | 12.90 | 11.6                     | 23.8                     |

**Position 2 Neck Injury Summary (SID-IIs Build Level D – Out-Of-Position)**

|                                   | Nij  | Time (msec)    | Z Force (N)<br>(CFC 600)               | X Force (N)<br>(CFC 600) | Y Moment (N-m)<br>(CFC 600) |
|-----------------------------------|------|----------------|----------------------------------------|--------------------------|-----------------------------|
| Ntf                               | 0.07 | 167.0          | 64.23                                  | -43.77                   | 8.36                        |
| Nte                               | 0.10 | 121.8          | 0.09                                   | 19.49                    | -6.06                       |
| Ncf                               | 0.29 | 14.9           | -916.07                                | 144.20                   | 10.92                       |
| Nce                               | 0.49 | 50.7           | -807.70                                | -35.34                   | -19.51                      |
| <b>Peak Tension<br/>(CFC1000)</b> |      | <b>113.3 N</b> | <b>Peak Compression<br/>(CFC 1000)</b> |                          | <b>-1038.2 N</b>            |

**Critical Values**

| Nij Intercepts        |                  |                  |         | Peak Limits |        |
|-----------------------|------------------|------------------|---------|-------------|--------|
| Tension (CVt)         | 3880 N           | Extension (mCVe) | 61 N-m  | Tension     | 2070 N |
| Compression (CVc)     | 3880 N           | Flexion (mCVf)   | 155 N-m | Compression | 2520 N |
| <b>Condyle Offset</b> | <b>0.01778 m</b> |                  |         |             |        |

## APPENDIX A PHOTOGRAPHS

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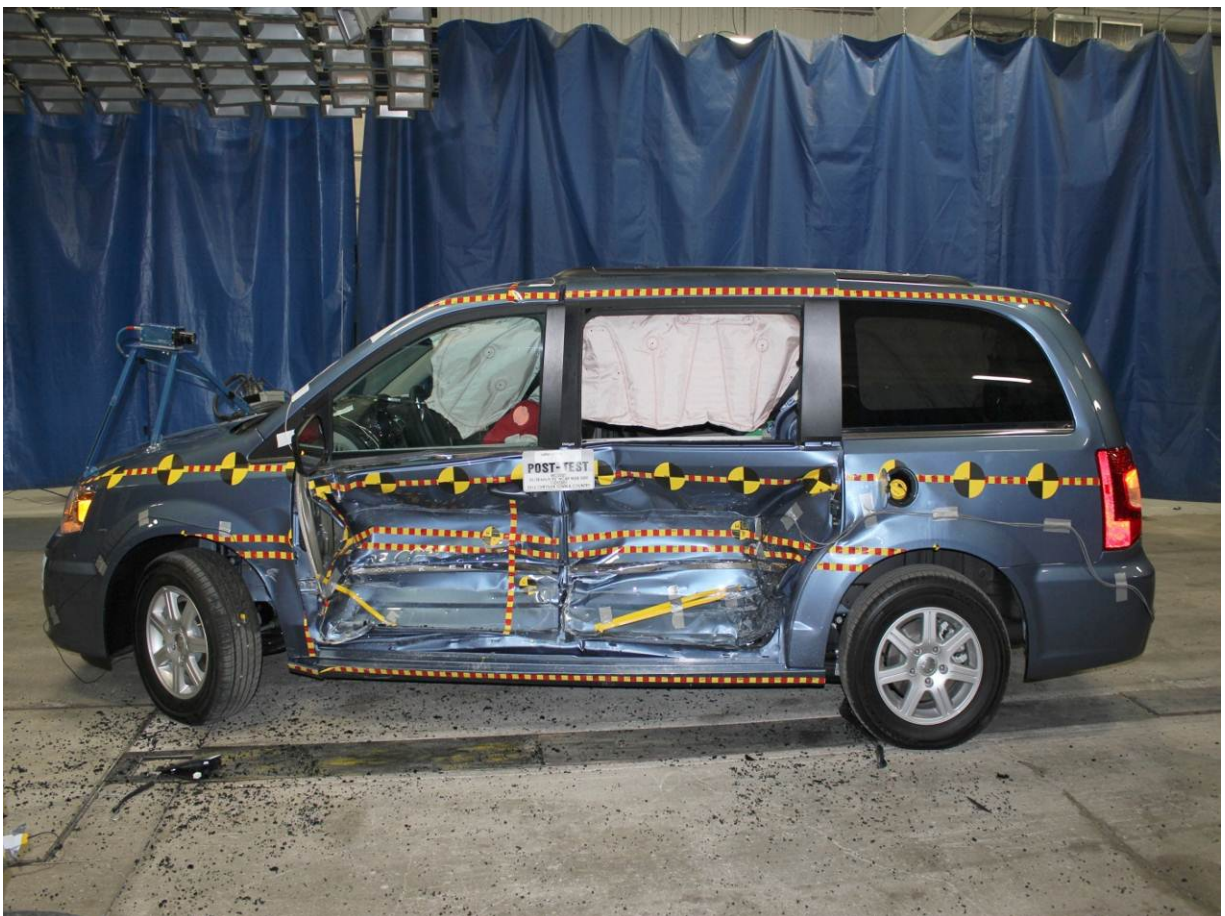
Right ¾ Front View of Vehicle, As Received



Vehicle Certification Placard



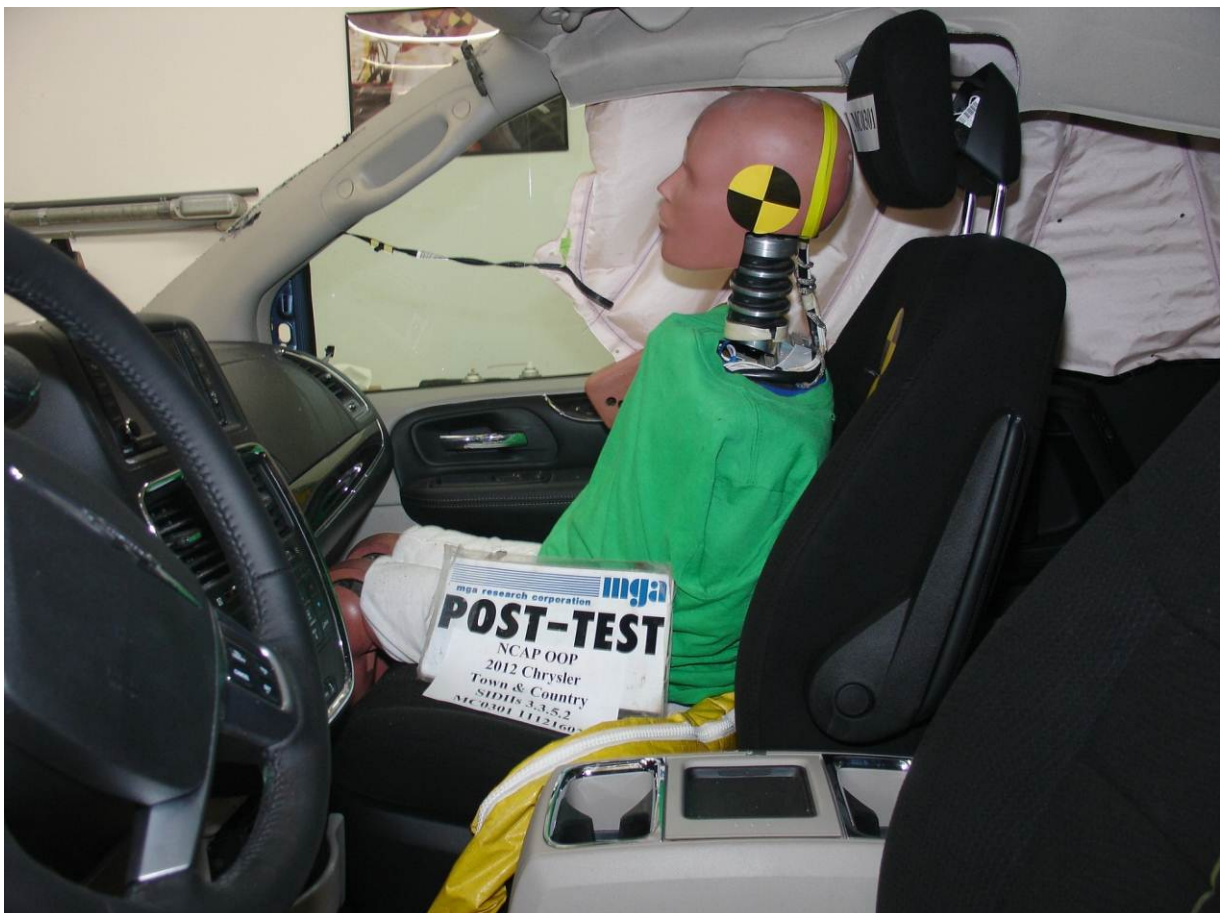
Pre-Test Vehicle Left Side View



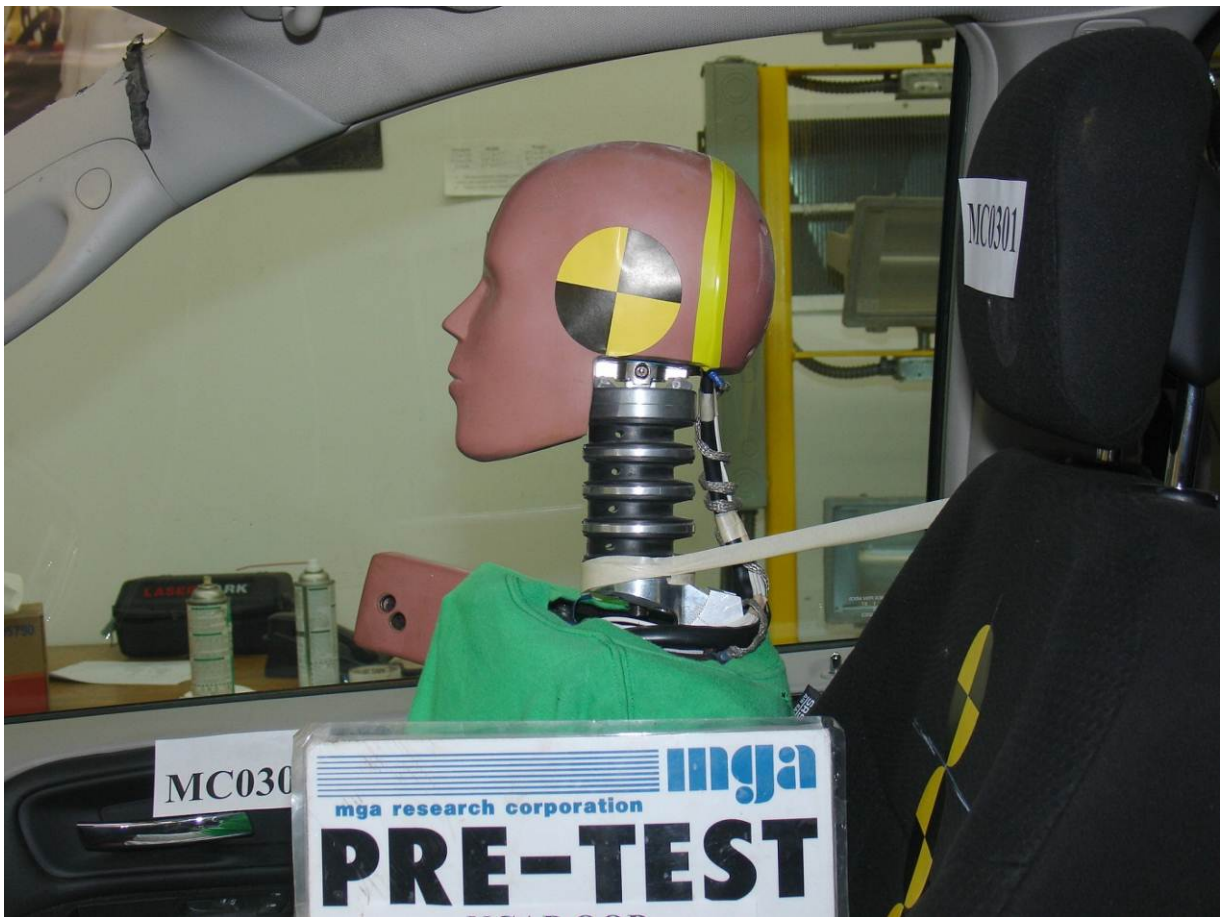
Post-Test Vehicle Left Side View



Pre-Test SID-IIs Dummy Left Side View



Post-Test SID-IIs Dummy Left Side View



Pre-Test SID-IIs Dummy Left Side Closeup View



Post-Test SID-IIs Dummy Left Side Closeup View



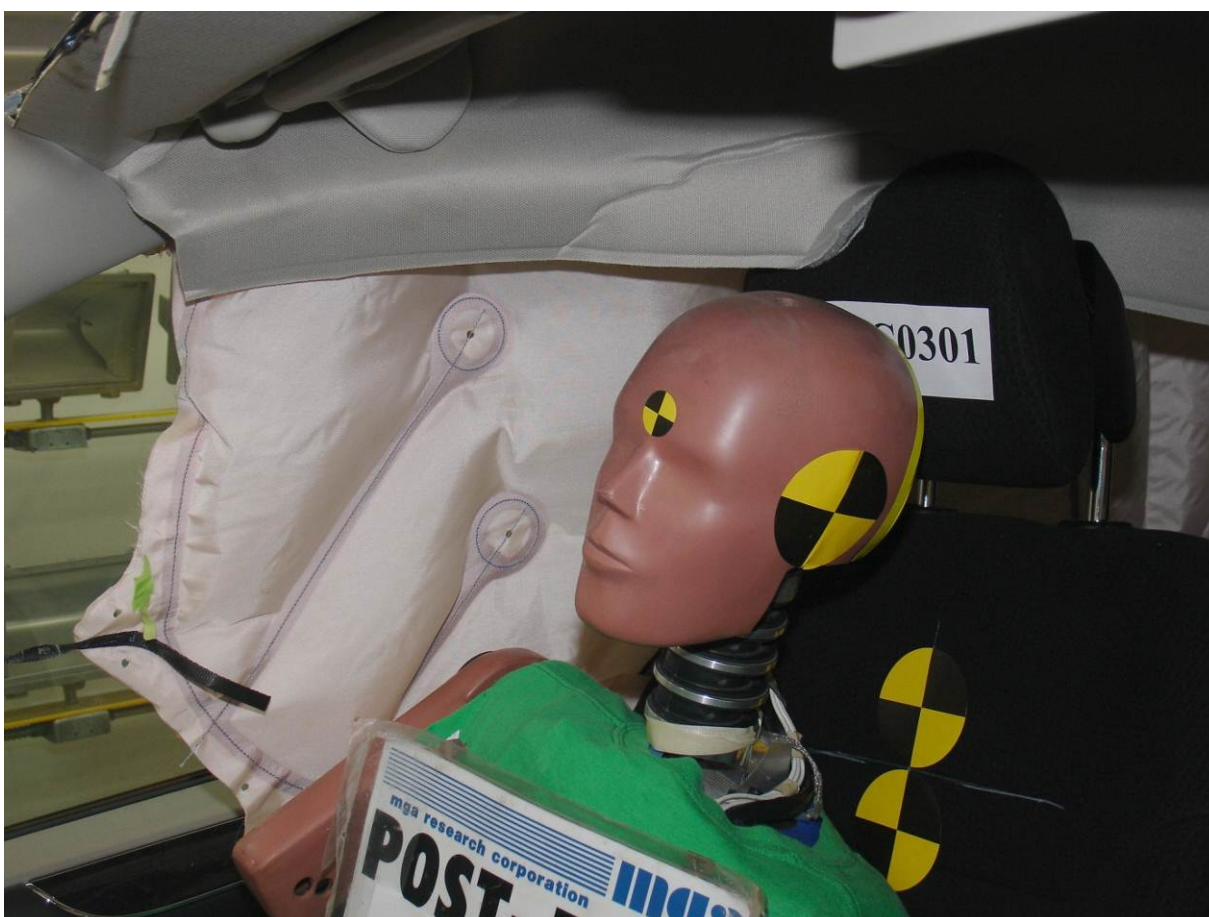
Pre-Test SID-IIs Dummy Left ¾ Front View



Post-Test SID-IIs Dummy Left ¾ Front View



Pre-Test SID-IIs Dummy Left  $\frac{3}{4}$  Front Closeup View



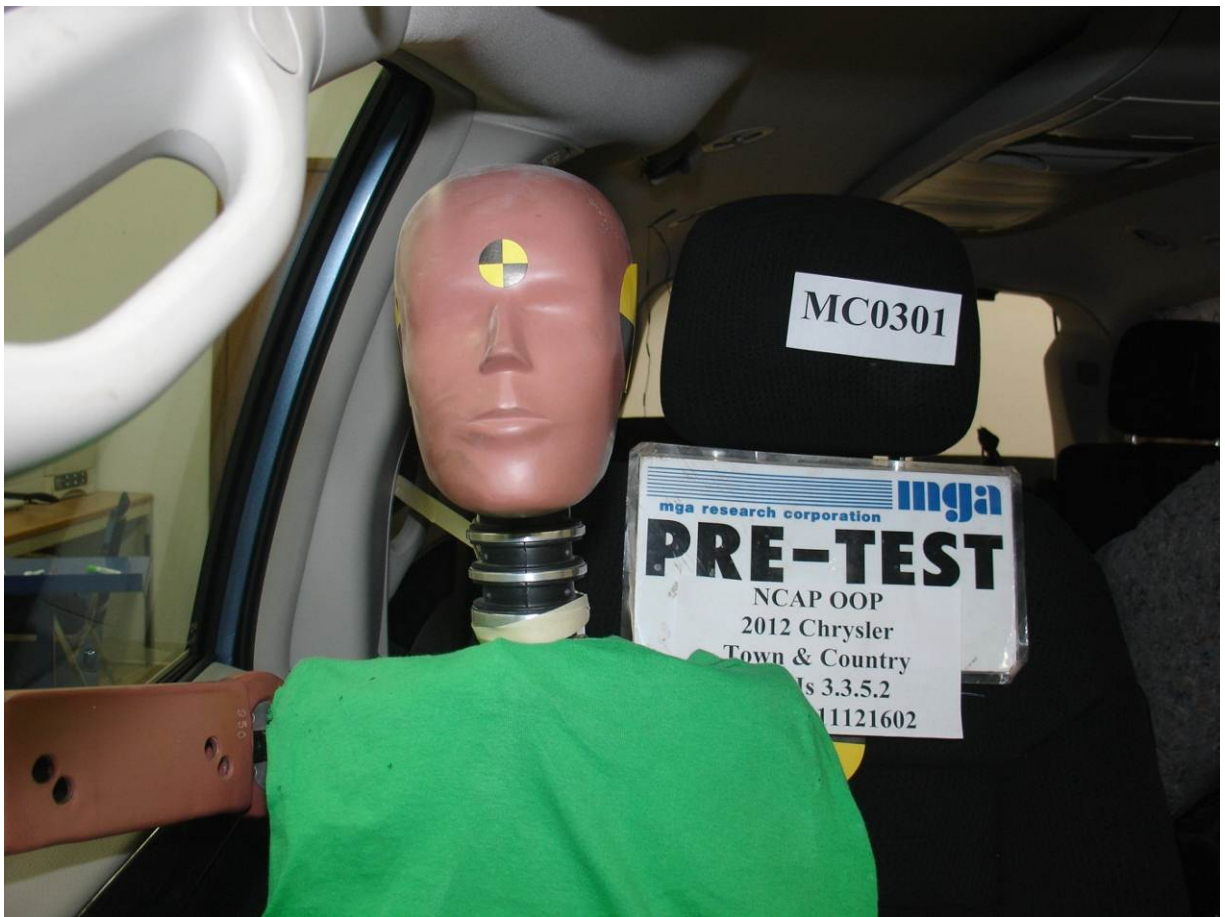
Post-Test SID-IIs Dummy Left  $\frac{3}{4}$  Front Closeup View



Pre-Test SID-IIs Dummy Front View



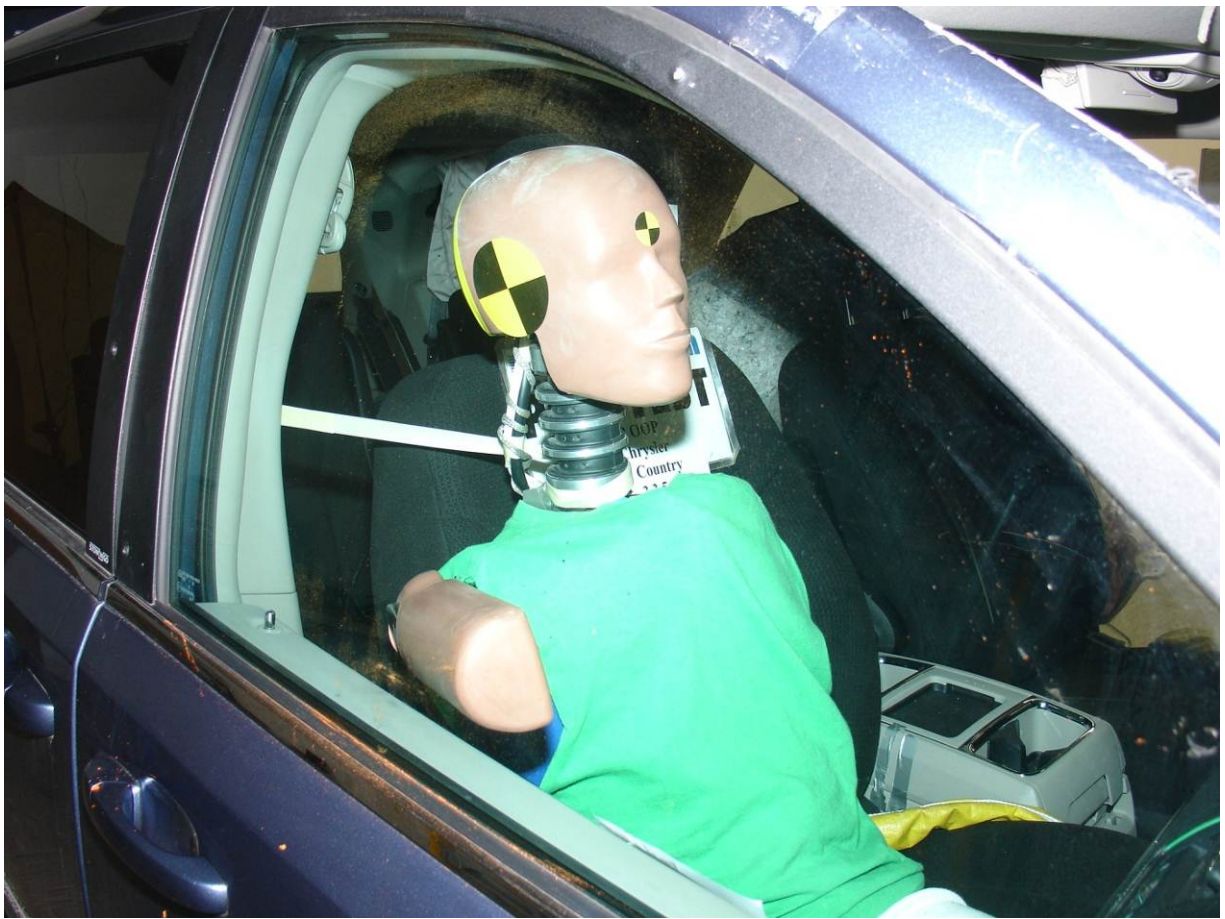
Post-Test SID-IIs Dummy Front View



Pre-Test SID-III Dummy Front Closeup View



Post-Test SID-III Dummy Front Closeup View



Pre-Test SID-IIs Dummy Right ¾ Front View



Post-Test SID-IIs Dummy Right ¾ Front View



Pre-Test SID-IIs Dummy Right Side View



Post-Test SID-IIs Dummy Right Side View



Post-Test SID-IIs Dummy Right Side View (Door Open)



Post-Test Curtain Airbag Left View



Post-Test Curtain Airbag Left ¾ Front View

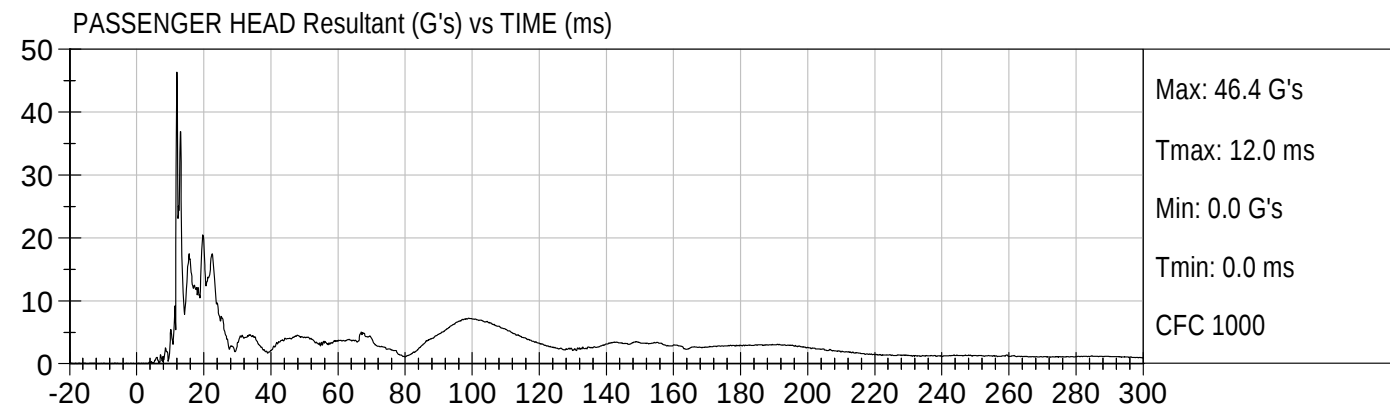
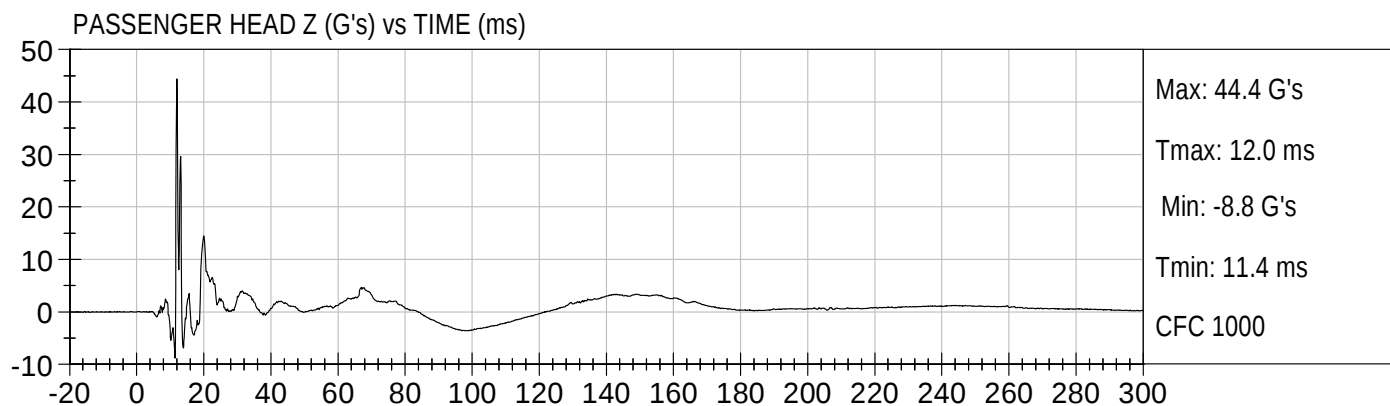
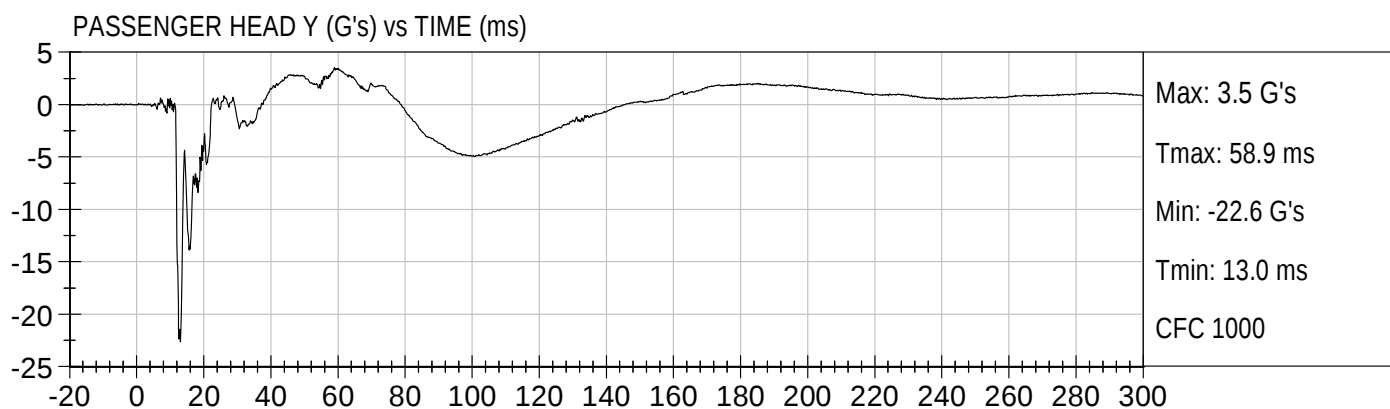
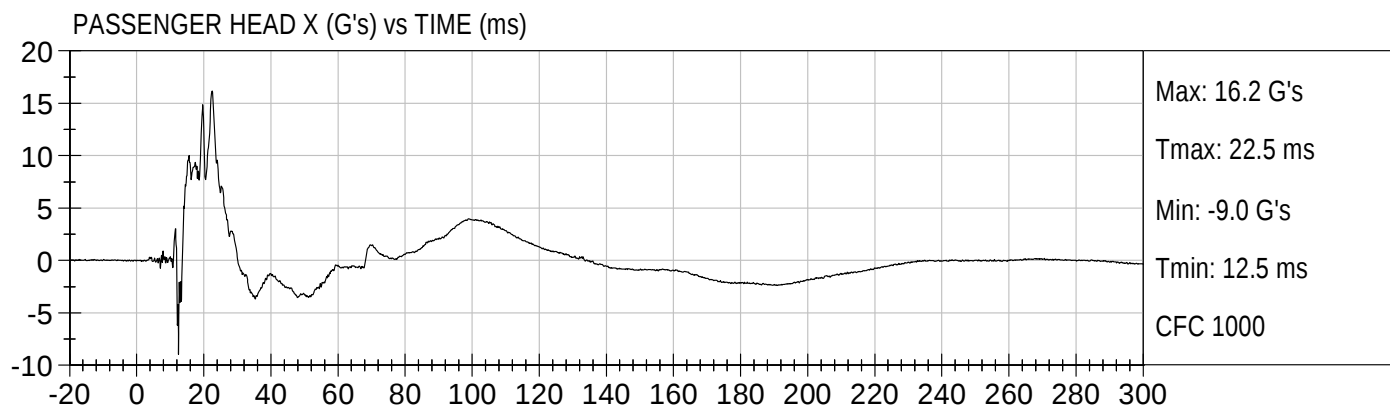


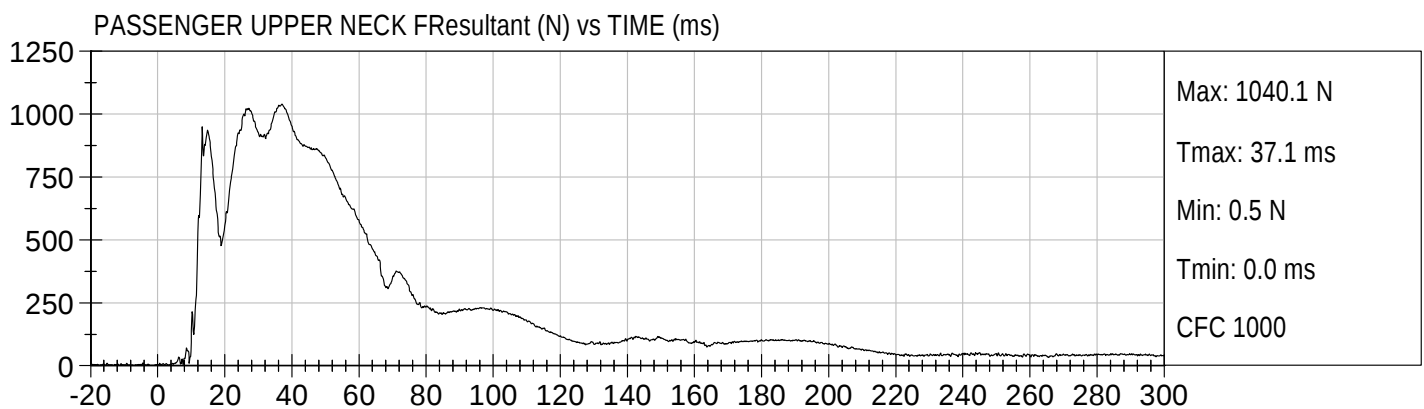
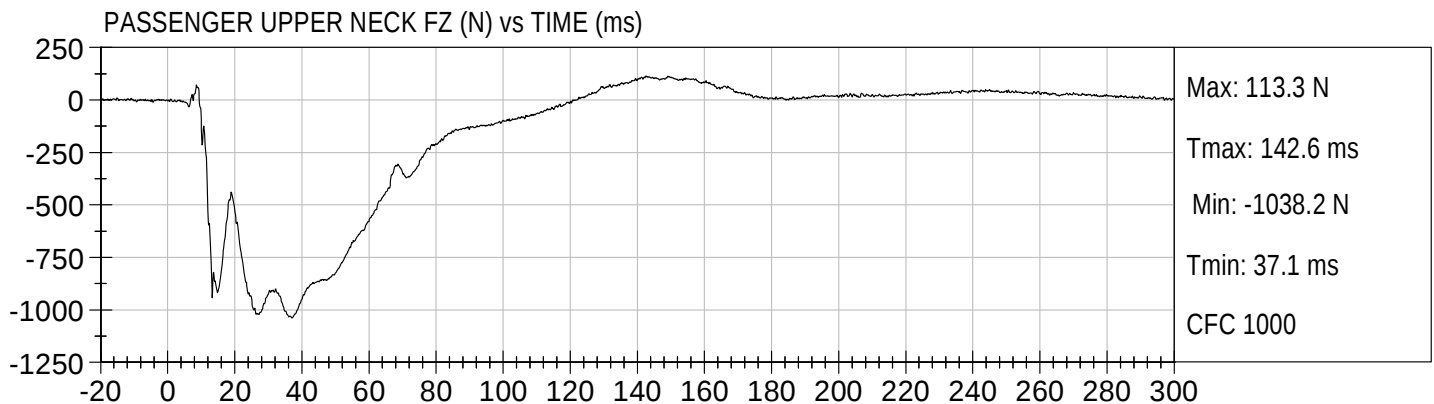
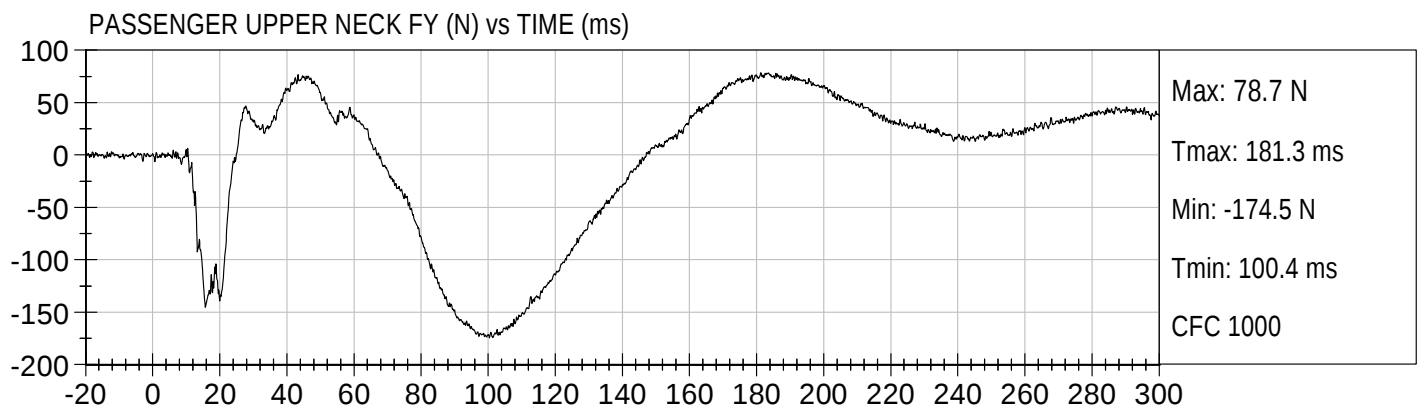
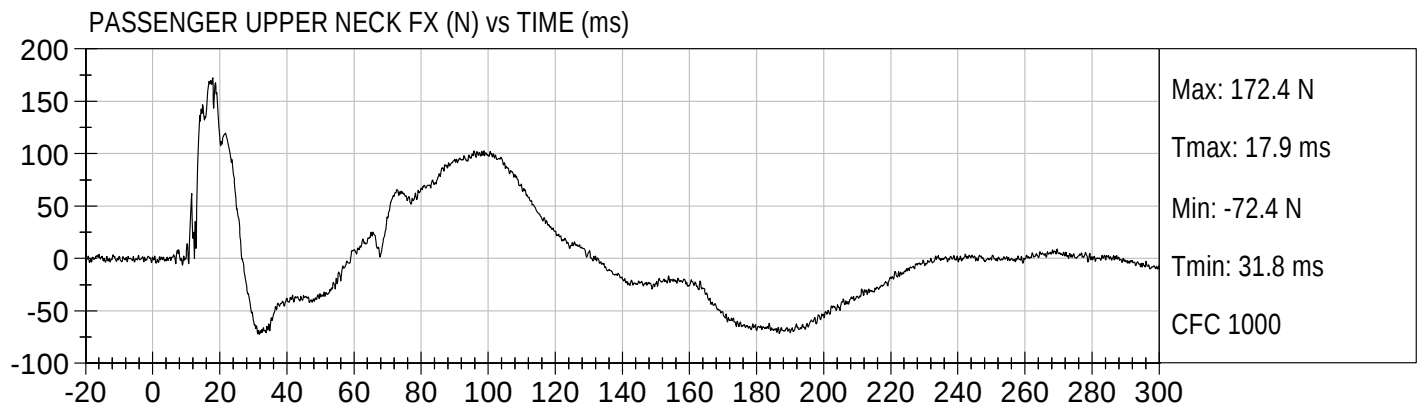
Post-Test Curtain Airbag Front View

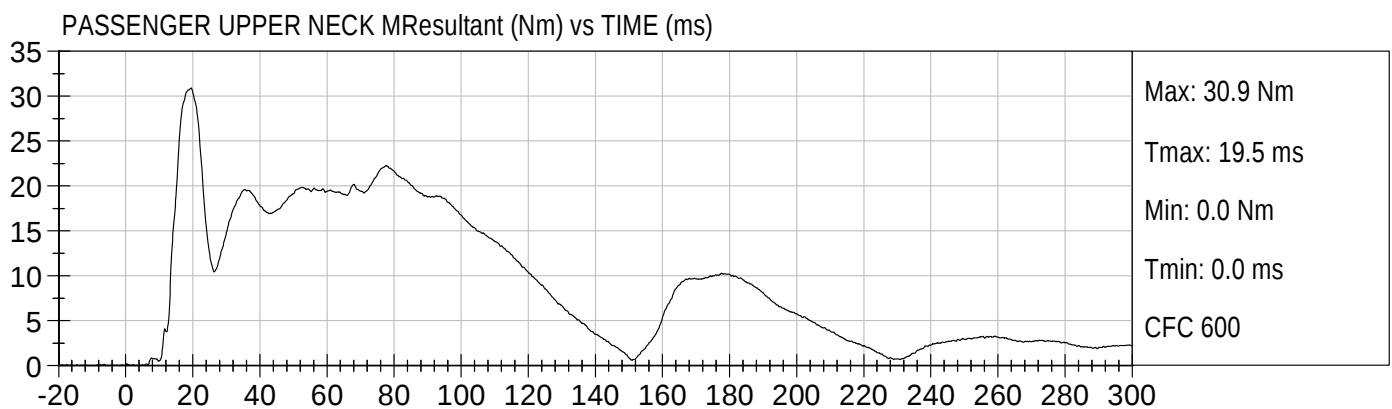
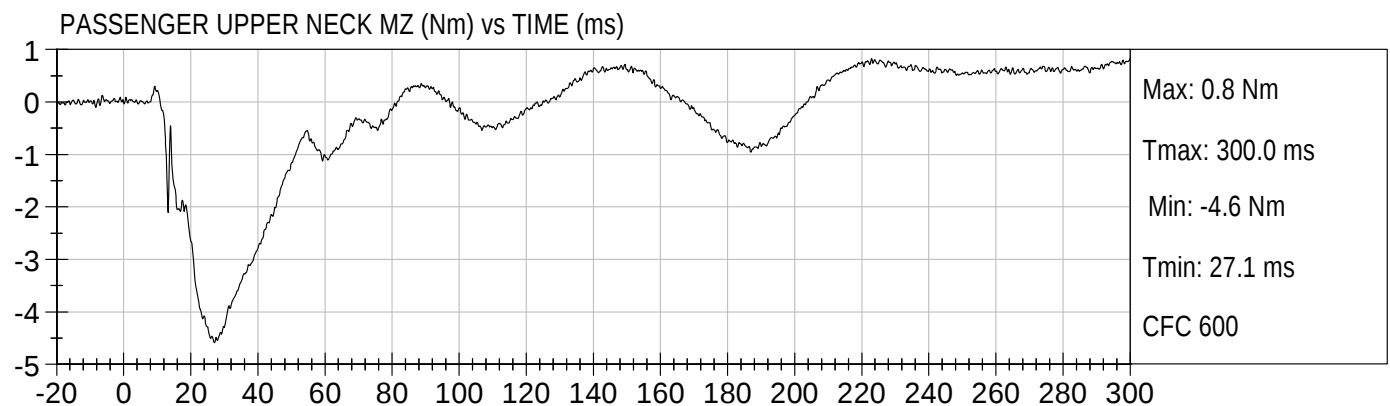
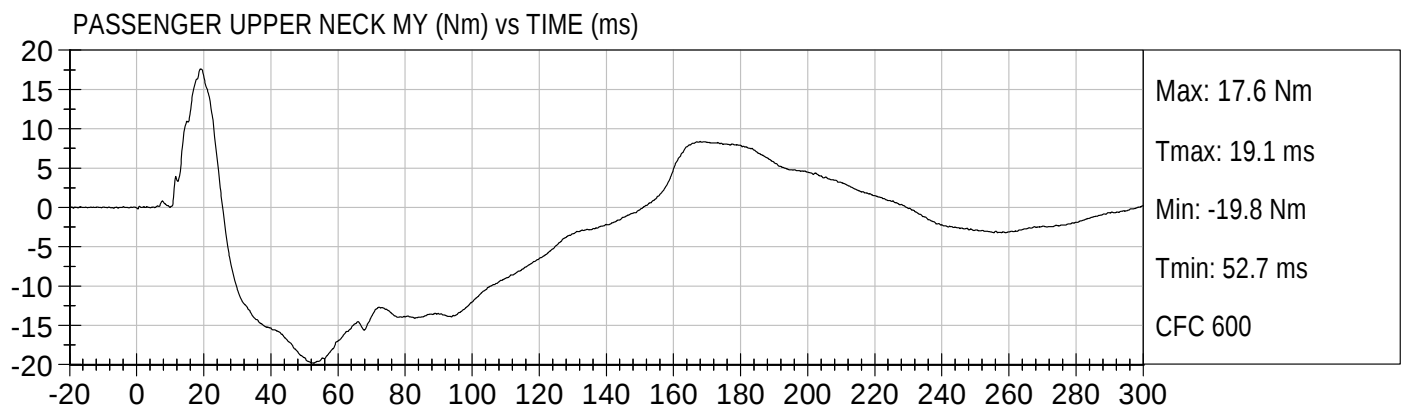
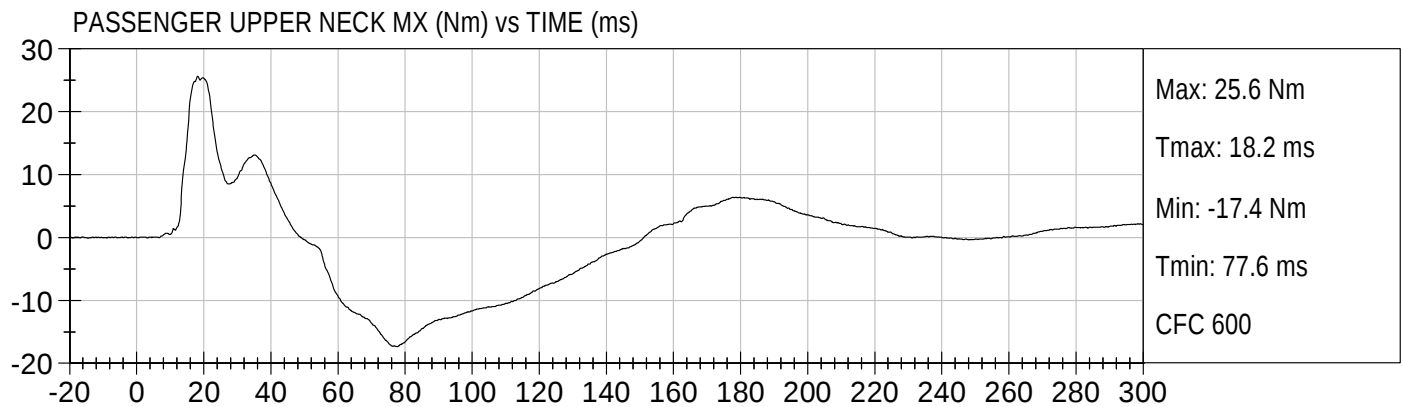
**APPENDIX B**  
**DUMMY RESPONSE DATA TRACES**

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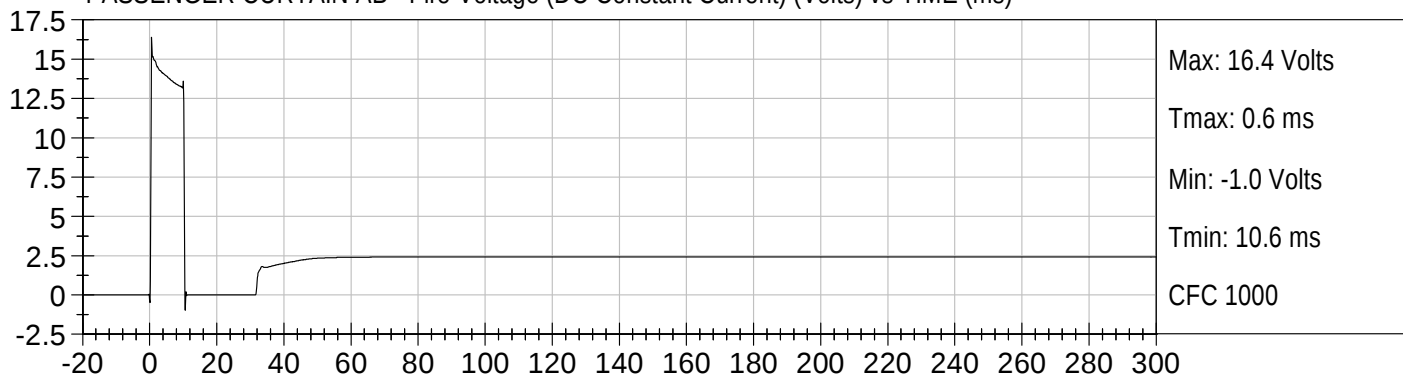




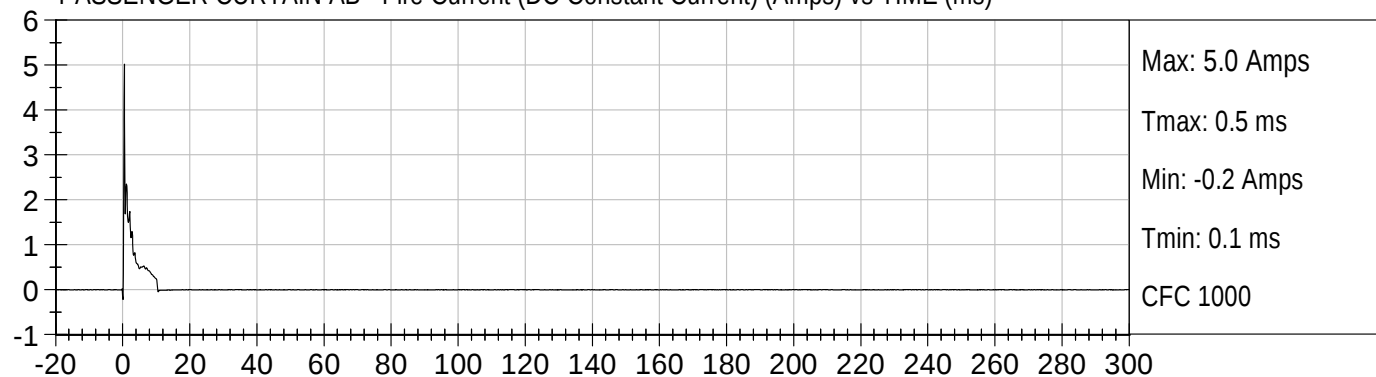




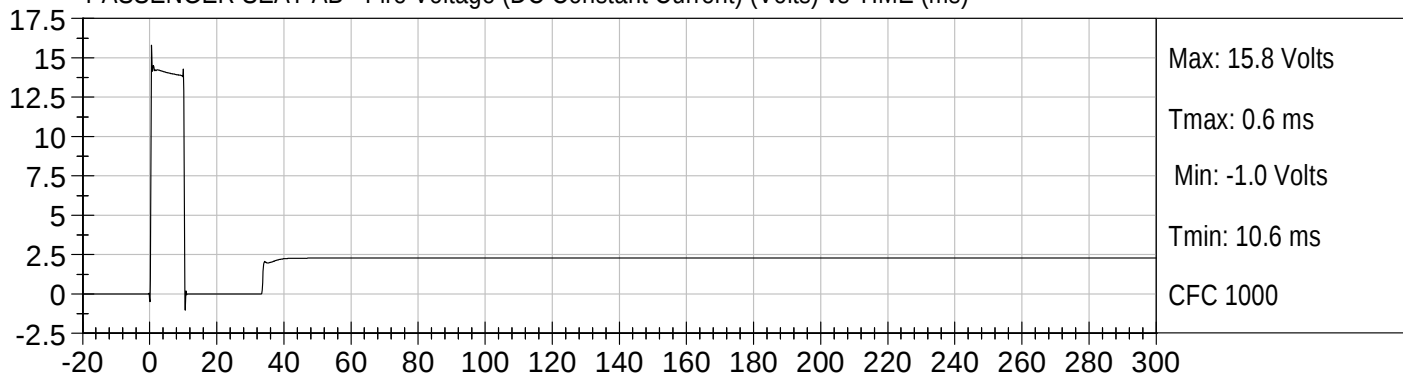
PASSENGER CURTAIN AB - Fire Voltage (DC Constant Current) (Volts) vs TIME (ms)



PASSENGER CURTAIN AB - Fire Current (DC Constant Current) (Amps) vs TIME (ms)



PASSENGER SEAT AB - Fire Voltage (DC Constant Current) (Volts) vs TIME (ms)



PASSENGER SEAT AB - Fire Current (DC Constant Current) (Amps) vs TIME (ms)

