This publication is distributed by the U.S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration. The United States Government assumes no liability for its contents or use thereof. If trade or manufacturers' names or products are mentioned it is only because they are considered essential to the object of the publication and should not be construed as an endorsement. The United States Government does not endorse products or manufacturers.

Prepared by: Eric Peschman, Project Engineer
Date: December 1, 2009

Reviewed by: Michael Janovitz, Program Manager
Date: December 1, 2009

FINAL REPORT ACCEPTED BY:

Date of Acceptance
December 01, 2009
Compliance tests were conducted on the subject 2009 Thomas Minotour School Bus, NHTSA No.: C90901, in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-222-03 for the determination of FMVSS 222 compliance.

Data Sheet 7 is omitted from this report as the barrier deflection requirements are not applicable to school buses with a GVWR ≤ 10,000 lbs.

Test Failure: None
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Purpose of Compliance Test</th>
<th>Page No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Test Data Summary</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Compliance Test Data</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Data Sheet 1 – Seat to Seat/Barrier Spacing</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Data Sheet 2 – Seat Back Height &amp; Front Surface Area Test</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Data Sheet 3 – Seat Cushion Retention Test</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Data Sheet 4 – Seat Back Force Deflection Test - Forward</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Data Sheet 5 – Seat Back Force Deflection Test - Rearward</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>Data Sheet 6 – Restraining Barrier Position and Projected Rear Surface Area</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Data Sheet 8 – Head Form Impact Contact Area Requirement</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>Data Sheet 9 – Head Form Impact Energy Requirement</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>Data Sheet 10 – Knee Form Impact Test</td>
<td>41</td>
</tr>
<tr>
<td></td>
<td>Data Sheet 11 – Seat Belt Assembly Anchorages</td>
<td>49</td>
</tr>
<tr>
<td></td>
<td>Data Sheet B1 - Seat Belt Check</td>
<td>50</td>
</tr>
<tr>
<td>4</td>
<td>Instrumentation and Equipment List</td>
<td>54</td>
</tr>
<tr>
<td>5</td>
<td>Photographs</td>
<td>55</td>
</tr>
<tr>
<td>6</td>
<td>Test Plots</td>
<td>83</td>
</tr>
<tr>
<td>7</td>
<td>Welt Contact Points</td>
<td>171</td>
</tr>
<tr>
<td>8</td>
<td>Bus Floor Plan</td>
<td>209</td>
</tr>
</tbody>
</table>
SECTION 1
PURPOSE OF COMPLIANCE TEST

Tests were conducted on a 2009 Thomas Minotour School Bus, NHTSA No.: C90901, in accordance with the specifications of the Office of Vehicle Safety Compliance (OVSC) Test Procedures TP-222-03 to determine compliance to the requirements of Federal Motor Vehicle Safety Standards (FMVSS) 222, “School Bus Passenger Seating and Crash Protection”.

This program is sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No.: DTNH22-08-D-00075.
SECTION 2
TEST DATA SUMMARY

The passenger seating and crash protection tests were conducted during November 21, 2008 through June 9, 2009. All tests were conducted by MGA Research Corporation at the Wisconsin Operations. The test vehicle, 2009 Thomas Minotour School Bus, NHTSA No.: C90901, appear to meet all the requirements of FMVSS 222.

LINEAR AND AREA MEASUREMENTS
Seat to seat/barrier spacing was checked on all seats and found to be 561 mm or less as shown on Data Sheet No. 1.

The seat back height and front surface area of Seat Nos. S1 and S8 were measured in accordance with Section 12.1 of OVSC TP-222-03. As shown in Data Sheet No. 2 for S1 and S8, the seat back area is greater than ninety percent of the seat bench width multiplied by 508.

The restraining barrier position and projected rear surface area of Barrier Nos. B1 and B8 were measured in accordance with OVSC TP-222-03. As shown in Data Sheet No. 6 for B1 and B8, the projected perimeters of the seats fall completely within the perimeters of the restraining barriers.

SEAT CUSHION RETENTION
Seat Nos. S3 and S5 were tested in accordance with Section 12.3 of OVSC TP-222-03. Seat cushion weight was 5.03 kg for S3 and 3.36 kg for S5. The maximum force reached for S3 was 255 N. The lower time limit boundary (t1) was approximately 2.0 seconds with approximate load duration of 8.0 seconds for S3. The maximum force reached for S5 was 171 N. The lower time limit boundary (t1) was approximately 4.0 seconds with approximate load duration of 10.0 seconds for S5. As shown in Data Sheet No. 3, the seat cushions tested complied with all requirements.
SECTION 2 (CONTINUED)
TEST DATA SUMMARY

SEAT BACK FORCE/DEFLECTION TEST - FORWARD
Seat Nos. S2 and S7 were tested in accordance with Section 12.4 of OVSC TP-222-03. Seat bench width was determined to be 979 mm for S2 and 650 mm for S7. “W” was calculated to be 3 for S2 and 2 for S7. The seating reference point (SRP) was 470 mm above the bus floor. The deflection of the seat back at conclusion of lower loading bar loading at 1557 W N load was 98 mm for S2 and 58 mm for S7. The allowable maximum deflection without moving the seat back to within 102 mm of another seat or restraining barrier was 356 mm. The stroke rate of the upper loading bar was determined by the test engineer to be 14.4 mm/sec. The location of the upper loading bar was 406 mm above the SRP. The tests were concluded when the maximum deflection of 356 mm was reached in which S2 absorbed 1629 joules and S7 absorbed 1639 joules. As shown on Data Sheet No. 4, S2 and S7 met the force deflection forward requirements.

SEAT BACK FORCE/DEFLECTION TEST - REARWARD
Seat Nos. S3 and S6 were tested in accordance with Section 12.4 of OVSC TP-222-03. Seat bench width was determined to be 979 mm for S3 and 650 mm for S6. “W” was calculated to be 3 for S3 and 2 for S6. The seating reference point (SRP) was 470 mm above the bus floor. The allowable maximum deflection without moving the seat back to within 102 mm of another seat or restraining barrier was 254 mm. The stroke rate of the upper loading bar was determined by the test engineer to be 9.1 mm/sec for both S3 and S6. The location of the loading bar was 343 mm above the SRP. The test was stopped when the maximum deflection of the seat back of 254 mm was achieved.

The area under the force versus deflection curve of the loading bar was 1,055 joules for S3 and 1,143 joules for S6. The minimum required area under the force versus deflection curve of the loading bar was 316 W or 948 joules for S3 and 632 joules for S6. As shown on Data Sheet No. 5, S3 and S6 met the force deflection rearward requirements.

KNEE FORM IMPACT ZONE TESTS
Seat Nos. S1, S4, and S8 and Barrier Nos. B1 and B8 were tested in accordance with Section 12.7 of OVSC TP-222-03. The mass of the knee form was 4.52 kg. All knee form contact area criteria and impact energy criteria were met for all the seats and both barriers. Data from these tests are presented in Data Sheet No. 10.
SECTION 2 (CONTINUED)
TEST DATA SUMMARY

HEAD FORM IMPACT ZONE TESTS
Seat Nos. S1, S4, and S8 and Barrier Nos. B1 and B8 were tested in accordance with Section 12.6 of OVSC TP-222-03. The mass of the head form was 5.20 kg. The head form contact area, impact energy, and head injury criteria was met for these seats and barriers. Data from these tests are presented in Data Sheet Nos. 8 and 9.

SEAT BELT ANCHORAGES
Seat belt anchorages for Seat No. S4 were tested in accordance with Appendix A of OVSC TP-222-03. S4 is located as shown in Section 8, Bus Floor Plan. Data from this test are presented in Data Sheet No. 11.
## INCOMPLETE VEHICLE (IF APPLICABLE)

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>General Motor Corporation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model:</td>
<td>G33503</td>
</tr>
<tr>
<td>VIN:</td>
<td>1GBHG31C181210142</td>
</tr>
<tr>
<td>Build Date:</td>
<td>06/08</td>
</tr>
<tr>
<td>Certification Date:</td>
<td>06/08</td>
</tr>
</tbody>
</table>

## COMPLETED VEHICLE (SCHOOL BUS)

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Thomas Built Buses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make/Model:</td>
<td>Minotour</td>
</tr>
<tr>
<td>VIN:</td>
<td>1GBHG31C181210142</td>
</tr>
<tr>
<td>NHTSA No.:</td>
<td>C90901</td>
</tr>
<tr>
<td>Color:</td>
<td>Yellow</td>
</tr>
<tr>
<td>GVWR:</td>
<td>4,356 kg / 9,600 lbs</td>
</tr>
<tr>
<td>Build Date:</td>
<td>06/08</td>
</tr>
<tr>
<td>Certification Date:</td>
<td>07/08</td>
</tr>
</tbody>
</table>

### DATES

| Vehicle Receipt:       | 08/19/08                 |
| Start of Compliance Test: | 11/21/2008          |
| Completion of Compliance Test: | 06/09/2009      |

### COMPLIANCE TEST:

All tests were performed in accordance with the references outlined in TP-222-03.

Recorded By: 

Approved By: Michael Javorzi

Date: 11/19/2009
## GENERAL TEST DATA SHEET

**Test Vehicle:** 2009 THOMAS MINOTOUR SCHOOL BUS  
**NHTSA No.:** C90901  
**Test Lab:** MGA RESEARCH CORPORATION  
**Test Dates:** 11/21/08 – 06/09/09

### SCHOOL BUS IDENTIFICATION

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model Year/Mfr./Make/Model:</td>
<td>2009/Thomas Minotour</td>
</tr>
<tr>
<td>Passenger Capacity:</td>
<td>(1 Driver, 20 Passengers)</td>
</tr>
<tr>
<td>NHTSA No.:</td>
<td>C90901</td>
</tr>
<tr>
<td>VIN:</td>
<td>1GBHG31C181210142</td>
</tr>
<tr>
<td>Conventional or Forward Control:</td>
<td>Conventional</td>
</tr>
<tr>
<td>GAWR (Certification Label) FRONT:</td>
<td>1,860 kg / 4,100 lbs</td>
</tr>
<tr>
<td>GAWR (Certification Label) REAR:</td>
<td>2,760 kg / 6,084 lbs</td>
</tr>
<tr>
<td>GVWR (Certification Label) TOTAL:</td>
<td>4,356 kg / 9,600 lbs</td>
</tr>
</tbody>
</table>

### TEST CONDITIONS

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date(s) of Test:</td>
<td>11/21/2008 – 06/09/2009</td>
</tr>
<tr>
<td>Ambient Temperature (°C):</td>
<td>21</td>
</tr>
<tr>
<td>Required Temperature Range:</td>
<td>0°C to 32°C</td>
</tr>
</tbody>
</table>

### SEAT IDENTIFICATION

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seat Manufacturer:</td>
<td>Thomas Built Buses</td>
</tr>
<tr>
<td>Model Name &amp; Number:</td>
<td></td>
</tr>
<tr>
<td>Description of Seats:</td>
<td>Seat frames are constructed of 1 inch rounded welded steel tubing. The seat back has a 22 gauge (0.03 inches) steel pan welded to the tubing and is covered with 12 mm of soft foam. The outer main uprights of the seat back frame are covered by 46 mm Styrofoam and 10 mm of thick soft foam. The seat cushion is constructed of 12 mm plywood and foam pad. The seat back and cushion are wrapped with 0.5 mm of vinyl.</td>
</tr>
</tbody>
</table>
The following data sheets document the results of testing on the 2009 Thomas Minotour School Bus, NHTSA No. C90901.
# DATA SHEET 1
## SEAT TO SEAT/BARRIER SPACING

**Test Vehicle:** 2009 THOMAS MINOTOUR SCHOOL BUS  
**NHTSA No.:** C90901  
**Test Lab:** MGA RESEARCH CORPORATION  
**Test Dates:** 11/21/08 – 06/09/09

<table>
<thead>
<tr>
<th>SEAT NUMBER</th>
<th>MEASUREMENT OF SPACING FROM SRP FORWARD TO SEAT/BARRIER (mm)</th>
<th>REQMT ≤ 610 MM (≤ 24”) CLASS 1 BUSES ONLY</th>
<th>PASS/FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>513</td>
<td></td>
<td>PASS</td>
</tr>
<tr>
<td>S2</td>
<td>536</td>
<td></td>
<td>PASS</td>
</tr>
<tr>
<td>S3</td>
<td>537</td>
<td></td>
<td>PASS</td>
</tr>
<tr>
<td>S4</td>
<td>521</td>
<td></td>
<td>PASS</td>
</tr>
<tr>
<td>S5</td>
<td>547</td>
<td></td>
<td>PASS</td>
</tr>
<tr>
<td>S6</td>
<td>552</td>
<td></td>
<td>PASS</td>
</tr>
<tr>
<td>S7</td>
<td>556</td>
<td></td>
<td>PASS</td>
</tr>
<tr>
<td>S8</td>
<td>561</td>
<td></td>
<td>PASS</td>
</tr>
</tbody>
</table>

**COMMENTS:** SRP 134mm from seat back.

**Recorded By:**  
**Approved By:**  
**Date:** 11/25/2008
DATA SHEET 2
SEAT BACK HEIGHT & FRONT SURFACE AREA TEST

Test Vehicle: 2009 THOMAS MINOTOUR SCHOOL BUS  NHTSA No.: C90901
Test Lab: MGA RESEARCH CORPORATION  Test Dates: 11/21/08 – 06/09/09

SEAT NUMBER: S1

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>PASS/FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Is the seat back height at least 508 mm vertically above the SRP? (S5.1.2) Yes – Pass; No – Fail</td>
<td>PASS</td>
</tr>
<tr>
<td>2.</td>
<td>Measure the seat back front projected area in a vertical plane bound by horizontal planes through the SRP and 508 mm above the SRP according to the following procedure: Width, a = 871 mm; width, b = 920 mm; Area = ½ (a+b) x 508 mm = 454,914 mm² – * 3,920 mm² = 450,994 mm²</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Measure the seat cushion width - W1 = 980 mm If the seat cushion is not rectangular, measure the cushion at the forward most edge and the rearward most edge, average the widths, and use the average width as W1.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Calculate the following: 0.9 x 980 x 508 mm = 448,056 mm²</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Is item 2 greater than item 4? (S5.1.2) Yes – Pass; No – Fail</td>
<td>PASS</td>
</tr>
</tbody>
</table>

NOTE: For a seat back or a seat cushion that has a nonsymmetrical shape or has a large radius at the corner, the above described measuring method must be modified as required to obtain accurate area measurements.

COMMENTS: * Denotes area outside of radius. 28 X 140

Recorded By: 
Approved By: Michael January  Date: 11/21/2008
**DATA SHEET 2**

**SEAT BACK HEIGHT & FRONT SURFACE AREA TEST**

<table>
<thead>
<tr>
<th>Test Vehicle:</th>
<th>2009 THOMAS MINOTOUR SCHOOL BUS</th>
<th>NHTSA No.:</th>
<th>C90901</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Lab:</td>
<td>MGA RESEARCH CORPORATION</td>
<td>Test Dates:</td>
<td>11/21/08 – 06/09/09</td>
</tr>
</tbody>
</table>

**SEAT NUMBER: S8**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>PASS/FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Is the seat back height at least 508 mm vertically above the SRP? <em>(S5.1.2)</em> Yes – Pass; No – Fail</td>
<td>PASS</td>
</tr>
</tbody>
</table>

2. Measure the seat back front projected area in a vertical plane bound by horizontal planes through the SRP and 508 mm above the SRP according to the following procedure:
   - Width, \( a = 569 \text{ mm} \);
   - width, \( b = 614 \text{ mm} \);
   - Area = \( \frac{1}{2} (a+b) \times 508 \text{ mm} = 300,482 \text{ mm}^2 - *7,399 \text{ mm}^2 = 293,083 \text{ mm}^2 \)

3. Measure the seat cushion width - \( W_1 = 635 \text{ mm} \)
   - If the seat cushion is not rectangular, measure the cushion at the forward most edge and the rearward most edge, average the widths, and use the average width as \( W_1 \).

4. Calculate the following: \( 0.9 \times 635 \times 508 \text{ mm} = 290,322 \text{ mm}^2 \)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>PASS/FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.</td>
<td>Is item 2 greater than item 4? <em>(S5.1.2)</em> Yes – Pass; No – Fail</td>
<td>PASS</td>
</tr>
</tbody>
</table>

**NOTE:** For a seat back or a seat cushion that has a nonsymmetrical shape or has a large radius at the corner, the above described measuring method must be modified as required to obtain accurate area measurements.

**COMMENTS:** * Denotes area outside of radius. 49 X 151.

**Recorded By:**

**Approved By:**  

**Date:** 11/21/2008
1. Cushion Weight/Mass = 5.03 kg
2. Cushion Weight x 5 = F = 255 N (S5.1.5)
3. Complete the following force/time graph:

<table>
<thead>
<tr>
<th>TIME, SECONDS</th>
<th>FORCE N</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1 = 2 sec.</td>
<td></td>
</tr>
<tr>
<td>T2 = 8 sec.</td>
<td></td>
</tr>
</tbody>
</table>

F must be 5 x Cushion Weight; t1 and t2 must be according to the following expressions: T1=>1 sec., <5 sec., t2 = t1 + 5 sec., + 0 sec. and -0.10 sec.

4. Did seat cushion separate from the seat structure at any attachment point? (S5.1.5) Yes – Fail; No – Pass
   PASS

DESCRIBE SEAT CUSHION ATTACHMENTS: Two half shell clamps on the front of the seat cushion and one pivoting latch on rear.

COMMENTS: None
1. Cushion Weight/Mass = 3.36 kg
2. Cushion Weight x 5 = F = 165 N (S5.1.5)
3. Complete the following force/time graph:

\[ F = 165 \text{ N} \]
\[ T1 = 4 \text{ sec.} \quad T2 = 10 \text{ sec.} \]

4. Did seat cushion separate from the seat structure at any attachment point? (S5.1.5) Yes – Fail; No – Pass

\[ \text{PASS} \]

DESCRIBE SEAT CUSHION ATTACHMENTS: Two half shell clamps on the front of the seat cushion and one pivoting latch on rear.

COMMENTS: None

Recorded By: [Signature]

Approved By: [Signature]  Date: 02/26/2009
DATA SHEET 4
SEAT BACK FORCE DEFLECTION TEST - FORWARD

Test Vehicle: 2009 THOMAS MINOTOUR SCHOOL BUS  
NHTSA No.: C90901
Test Lab: MGA RESEARCH CORPORATION  
Test Dates: 11/21/08 – 06/09/09

SEAT NUMBER: S2

1. Seat Bench Width = 979 mm  
   \[ W = (\text{Seat Bench Width})/381 \text{ mm} \]  
   (round to nearest whole number) = (3)  
   Seat Reference Point (SRP) location is: (Description of location as supplied by the  
   COTR): 470 mm Above Floor.

2. Location of lower loading bar is 0 mm above the SRP.  
   (Requirement: Between 102 mm above and 102 mm below the SRP) (S5.1.3.1)  
   Length of lower loading bar = 828 mm  
   Seat Back width at SRP = 930 mm

3. Include x-y plot of Force vs. Time for the lower loading bar.

4. Deflection of the seat back at conclusion of lower bar loading (1557 W Newtons  
   position) = 98 mm.

5. Maximum deflection allowed without moving the seat back to within 102 mm of  
   another seat or restraining barrier = 356 mm (must be 356 mm or less) (S5.1.3)

6. Seat back movement rate selected by the test engineer = 14.4 mm/sec

7. Location of upper loading bar is in a horizontal plane 406 mm above the SRP.  
   (Requirement: 406 mm) (S5.1.3.3). Length of upper loading bar = 768 mm.  Width of  
   seat back at 406 mm above SRP = 876 mm.

8. Reason for stopping seat back deflection:  
   ___ Reached deflection determined in Item 6 above (if less than 356 mm)  
   _X_ Reached 356 mm maximum allowed deflection (Actual deflection was 356 mm)  
   ___ Separation was about to occur

9. Include the x-y plot of force vs. deflection for the upper loading bar with boundaries  
   of Figure 14 (OVSC TP-222-3) superimposed.
### DATA SHEET 4 (CONTINUED)
#### SEAT BACK FORCE DEFLECTION TEST – FORWARD

<table>
<thead>
<tr>
<th></th>
<th>PASS/FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>10. Is the seat in its final deflected position within 102 mm of the next seat or barrier? Yes – Fail; No – Pass</td>
<td>PASS</td>
</tr>
<tr>
<td>11. Does the forward force vs. deflection trace of the seat back lie within the corridor? (S5.1.3) Yes – Pass; No – Fail</td>
<td>PASS</td>
</tr>
</tbody>
</table>

12. Include a deflection vs. time plot for the upper loading bar.
13. The area within the force vs. deflection curve = 1,629 joules
14. 452W = 1,356 joules (S5.1.3.4)

<table>
<thead>
<tr>
<th></th>
<th>PASS/FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>15. Is item 13 greater than or equal to item 14? (S5.1.3.4) Yes – Pass; No – Fail</td>
<td>PASS</td>
</tr>
</tbody>
</table>

**COMMENTS:** None

**Recorded By:**

**Approved By:**

Date: 01/06/2009
DATA SHEET 4
SEAT BACK FORCE DEFLECTION TEST - FORWARD

Test Vehicle: 2009 THOMAS MINOTOUR SCHOOL BUS  NHTSA No.: C90901
Test Lab: MGA RESEARCH CORPORATION  Test Dates: 11/21/08 – 06/09/09

SEAT NUMBER: S7

1. Seat Bench Width = 650 mm
   \[ W = \frac{\text{Seat Bench Width}}{381 \text{ mm}} \text{ (round to nearest whole number)} = (2) \]
   Seat Reference Point (SRP) location is: (Description of location as supplied by the COTR): 470 mm Above Floor.

2. Location of lower loading bar is 0 mm above the SRP.
   (Requirement: Between 102 mm above and 102 mm below the SRP) (S5.1.3.1)
   Length of lower loading bar = 454 mm
   Seat Back width at SRP = 555 mm

3. Include x-y plot of Force vs. Time for the lower loading bar.

4. Deflection of the seat back at conclusion of lower bar loading (1557 W Newtons position) = 58 mm.

5. Maximum deflection allowed without moving the seat back to within 102 mm of another seat or restraining barrier = 356 mm (must be 356 mm of less) (S5.1.3)

6. Seat back movement rate selected by the test engineer = 14.4 mm/sec

7. Location of upper loading bar is in a horizontal plane 406 mm above the SRP.
   (Requirement: 406 mm) (S5.1.3.3). Length of upper loading bar = 544 mm. Width of seat back at 406 mm above SRP = 644 mm.

8. Reason for stopping seat back deflection:
   ____ Reached deflection determined in Item 6 above (if less than 356 mm)
   X     Reached 356 mm maximum allowed deflection (Actual deflection was 358 mm)
   ____ Separation was about to occur

9. Include the x-y plot of force vs. deflection for the upper loading bar with boundaries of Figure 14 (OVSC TP-222-3) superimposed.
### DATA SHEET 4 (CONTINUED)

#### SEAT BACK FORCE DEFLECTION TEST – FORWARD

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>PASS/FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.</td>
<td>Is the seat in its final deflected position within 102 mm of the next seat or barrier? Yes – Fail; No – Pass</td>
<td>PASS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>PASS/FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.</td>
<td>Does the forward force vs. deflection trace of the seat back lie within the corridor? (S5.1.3) Yes – Pass; No – Fail</td>
<td>PASS</td>
</tr>
</tbody>
</table>

15. Include a deflection vs. time plot for the upper loading bar.

16. The area within the force vs. deflection curve = 1,629 joules

17. 452W = 1,356 joules (S5.1.3.4)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>PASS/FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.</td>
<td>Is item 13 greater than or equal to item 14? (S5.1.3.4) Yes – Pass; No – Fail</td>
<td>PASS</td>
</tr>
</tbody>
</table>

**COMMENTS:** None

**Recorded By:**

*Signature*

**Approved By:** Michael Savoy  
**Date:** 01/09/2009
SEAT NUMBER: S3

1. Seat Bench Width = 979 mm
   \[ W = \frac{\text{Seat Bench Width}}{381} \text{ mm (round to nearest whole number)} = (3) \]

2. Location of the loading bar is in a horizontal plane 343 mm above the SRP of the test seat. (Requirement: 343 mm above the SRP) (S5.1.4.1)
   Length of loading bar = 762 mm
   Width of seat back at 343 mm above SRP = 865 mm

3. Deflection of seat back at 222 N preload = 32 mm

4. Maximum deflection allowed without moving the seat back to within 102 mm of another seat = 254 mm (maximum allowed = 254 mm) (S5.1.4)

5. Seat back movement rate selected by the test engineer = 9.1 mm/sec

6. Reason for stopping deflection:
   ___ Reached deflection determined in Item 4 above (if less than 254 mm)
   ___ Reached 254 mm maximum allowed deflection (Actual deflection was 255 mm)
   ___ Separation was about to occur

7. Include the x-y plot of force vs. deflection for the loading bar with boundaries of Figure 18 (OVSC TP-222-3) superimposed.

8. Does the force vs. deflection plot lie within the boundaries of Figure 18? (OVSC TP-222-03) Yes – Pass; No – Fail
   **PASS**

9. Include a deflection vs. time plot for the upper loading bar.

10. 316W = 948 joules

11. The area within the force vs. deflection curve = 1,055 joules

12. Is item 11 greater than or equal to item 10? (S5.1.4.2) Yes – Pass; No – Fail
   **PASS**

COMMENTS: None

Recorded By: ____________________________

Approved By: ____________________________ Date: 02/27/2009
DATA SHEET 5
SEAT BACK FORCE DEFLECTION TEST – REARWARD

Test Vehicle: 2009 THOMAS MINOTOUR SCHOOL BUS  
NHTSA No.: C90901  
Test Lab: MGA RESEARCH CORPORATION  
Test Dates: 11/21/08 – 06/09/09

SEAT NUMBER: S6

1. Seat Bench Width = 650 mm  
   \[ W = \frac{\text{Seat Bench Width}}{381} \text{ mm (round to nearest whole number)} = (2) \]
2. Location of the loading bar is in a horizontal plane 343 mm above the SRP of the test seat. (Requirement: 343 mm above the SRP) (S5.1.4.1)  
   Length of loading bar = 540 mm  
   Width of seat back at 343 mm above SRP = 640 mm  
3. Deflection of seat back at 222 N preload = 36 mm  
4. Maximum deflection allowed without moving the seat back to within 102 mm of another seat = 254 mm (maximum allowed = 254 mm) (S5.1.4)  
5. Seat back movement rate selected by the test engineer = 9.1 mm/sec  
6. Reason for stopping deflection:  
   ___ Reached deflection determined in Item 4 above (if less than 254 mm)  
   \_X_ Reached 254 mm maximum allowed deflection (Actual deflection was 255 mm)  
   ___ Separation was about to occur  
7. Include the x-y plot of force vs. deflection for the loading bar with boundaries of Figure 18 (OVSC TP-222-3) superimposed.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>PASS/FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.</td>
<td>Does the force vs. deflection plot lie within the boundaries of Figure 18? (OVSC TP-222-03) Yes – Pass; No – Fail</td>
<td>PASS</td>
</tr>
</tbody>
</table>

9. Include a deflection vs. time plot for the upper loading bar.
10. 316W = 632 joules  
11. The area within the force vs. deflection curve = 1,143 joules

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>PASS/FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.</td>
<td>Is item 11 greater than or equal to item 10? (S5.1.4.2) Yes – Pass; No – Fail</td>
<td>PASS</td>
</tr>
</tbody>
</table>

COMMENTS: None

Recorded By:  
Approved By:  
Date: 02/27/2009
**DATA SHEET 6**  
**RESTRAINING BARRIER POSITION AND PROJECTED REAR SURFACE AREA**

**Test Vehicle:** 2009 THOMAS MINOTOUR SCHOOL BUS  
NHTSA No.: C90901  
**Test Lab:** MGA RESEARCH CORPORATION  
Test Dates: 11/21/08 – 06/09/09

**BARRIER NUMBER: B1**

1. Measure distance T from SRP of seat immediately aft of barrier in a horizontal longitudinal line forward to barrier.  
   \[ T = 513 \text{ mm} \]

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>PASS/FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 2. | Is distance T equal to or less than 610 mm?  
   (S5.2) Yes – Pass; No – Fail | PASS |

3. Measure distance D at top (t) and bottom (b) of barrier.  
   \[ D_t = 230 \text{ mm} \quad D_b = 2 \text{ mm} \]

4. Measure distance C at top (t) and bottom (b) of seat back.  
   \[ C_t = 230 \text{ mm} \quad C_b = 2 \text{ mm} \]

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>PASS/FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Is ( D_t ) equal to or less than ( C_t )? Yes – Pass; No – Fail</td>
<td>PASS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>PASS/FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.</td>
<td>Is ( D_b ) equal to or less than ( C_b )? Yes – Pass; No – Fail</td>
<td>PASS</td>
</tr>
</tbody>
</table>

7. Measure distance E at top of barrier and bottom of barrier.  
   \[ E_t = 520 \text{ mm} \quad E_b = 970 \text{ mm} \]

8. Measure distance A at top of seat back and bottom of seat.  
   \[ A_t = 520 \text{ mm} \quad A_b = 955 \text{ mm} \]

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>PASS/FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 8. | Is distance \( E_t + D_t \) equal to or greater than distance \( A_t + C_t \)?  
   Yes – Pass; No – Fail | PASS |

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>PASS/FAIL</th>
</tr>
</thead>
</table>
| 9. | Is distance \( E_b + D_b \) equal to or greater than distance \( A_b + C_b \)?  
   Yes – Pass; No – Fail | PASS |

11. Measure distance U at inboard (i) and outboard (o) side of barrier.  
   \[ U_i = 308 \text{ mm} \quad U_o = 298 \text{ mm} \]

12. Measure distance V at inboard (i) and outboard (o) sides of seat.  
   \[ V_i = 319 \text{ mm} \quad V_o = 310 \text{ mm} \]
### DATA SHEET 6 (CONTINUED)

**RESTRAINING BARRIER POSITION AND PROJECTED REAR SURFACE AREA**

<table>
<thead>
<tr>
<th></th>
<th>PASS/FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>13. Is $U_i$ equal to or less than $V_i$? Yes – Pass; No – Fail</td>
<td><strong>PASS</strong></td>
</tr>
<tr>
<td>14. Is $U_o$ equal to or less than $V_o$? Yes – Pass; No – Fail</td>
<td><strong>PASS</strong></td>
</tr>
<tr>
<td>15. Measure distance $S$ at inboard ($I$) and outboard ($O$) side of barrier.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$S_i = 727$ mm</td>
</tr>
<tr>
<td>16. Measure distance $W$ at inboard ($I$) and outboard ($O$) sides of seat.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$W_i = 711$ mm</td>
</tr>
<tr>
<td>17. Is $S_i + U_i$ equal to or greater than $W_i + V_i$? Yes – Pass; No – Fail</td>
<td><strong>PASS</strong></td>
</tr>
<tr>
<td>18. Is $S_o + U_o$ equal to or greater than $W_o + V_o$? Yes – Pass; No – Fail</td>
<td><strong>PASS</strong></td>
</tr>
<tr>
<td>19. Compute area $(W \times A) = 522,150$ mm$^2$</td>
<td></td>
</tr>
<tr>
<td>20. Compute area $(E \times S) = 545,340$ mm$^2$</td>
<td></td>
</tr>
<tr>
<td>21. Is $(W \times A)$ equal to or less than $(E \times S)$? Yes – Pass; No – Fail</td>
<td><strong>PASS</strong></td>
</tr>
</tbody>
</table>

**COMMENTS:** $W$, $A$, $E$, & $S$ were calculated as the averages of $W_i + W_o$, $A_i + A_o$, $E_i + E_o$, and $S_i + S_o$, respectively.

**Recorded By:** [Signature]

**Approved By:** [Signature]  
**Date:** 11/25/2008
## DATA SHEET 6
RESTRAINING BARRIER POSITION AND PROJECTED REAR SURFACE AREA

Test Vehicle: 2009 THOMAS MINOTOUR SCHOOL BUS  
Test Lab: MGA RESEARCH CORPORATION  
NHTSA No.: C90901  
Test Dates: 11/21/08 – 06/09/09

BARRIER NUMBER: B8

1. Measure distance T from SRP of seat immediately aft of barrier in a horizontal longitudinal line forward to barrier.  \( T = 561 \).

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>PASS/FAIL</th>
</tr>
</thead>
</table>
| 2. | Is distance T equal to or less than 610 mm?  
(S5.2) Yes – Pass; No – Fail | PASS |

3. Measure distance D at top (t) and bottom (b) of barrier.  
\( D_t = 196 \text{ mm} \) \( D_b = 5 \text{ mm} \)

4. Measure distance C at top (t) and bottom (b) of seat back.  
\( C_t = 196 \text{ mm} \) \( C_b = 12 \text{ mm} \)

5. Is \( D_t \) equal to or less than \( C_t \)? Yes – Pass; No – Fail  
PASS

6. Is \( D_b \) equal to or less than \( C_b \)? Yes – Pass; No – Fail  
PASS

7. Measure distance E at top of barrier and bottom of barrier.  
\( E_t = 253 \text{ mm} \) \( E_b = 635 \text{ mm} \)

8. Measure distance A at top of seat back and bottom of seat.  
\( A_t = 253 \text{ mm} \) \( A_b = 628 \text{ mm} \)

9. Is distance \( E_t + D_t \) equal to or greater than distance \( A_t + C_t \)?  
Yes – Pass; No – Fail  
PASS

10. Is distance \( E_b + D_b \) equal to or greater than distance \( A_b + C_b \)?  
Yes – Pass; No – Fail  
PASS

11. Measure distance U at inboard (i) and outboard (o) side of barrier.  
\( U_i = 295 \text{ mm} \) \( U_o = 299 \text{ mm} \)

12. Measure distance V at inboard (i) and outboard (o) sides of seat.  
\( V_i = 317 \text{ mm} \) \( V_o = 320 \text{ mm} \)
## DATA SHEET 6 (CONTINUED)

### RESTRAINING BARRIER POSITION AND PROJECTED REAR SURFACE AREA

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>PASS/FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.</td>
<td>Is $U_i$ equal to or less than $V_i$? Yes – Pass; No – Fail</td>
<td>PASS</td>
</tr>
<tr>
<td>14.</td>
<td>Is $U_o$ equal to or less than $V_o$? Yes – Pass; No – Fail</td>
<td>PASS</td>
</tr>
</tbody>
</table>

15. Measure distance $S$ at inboard ($I$) and outboard ($O$) side of barrier.
   - $S_I = 749$ mm
   - $S_O = 745$ mm

16. Measure distance $W$ at inboard ($I$) and outboard ($O$) sides of seat.
   - $W_I = 708$ mm
   - $W_O = 705$ mm

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>PASS/FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.</td>
<td>Is $S_I + U_I$ equal to or greater than $W_I + V_I$? Yes – Pass; No – Fail</td>
<td>PASS</td>
</tr>
<tr>
<td>18.</td>
<td>Is $S_O + U_O$ equal to or greater than $W_O + V_O$? Yes – Pass; No – Fail</td>
<td>PASS</td>
</tr>
</tbody>
</table>

19. Compute area $(W \times A) = 311,213.25$ mm$^2$

20. Compute area $(E \times S) = 331,668$ mm$^2$

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>PASS/FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>21.</td>
<td>Is $(W \times A)$ equal to or less than $(E \times S)$? Yes – Pass; No – Fail</td>
<td>PASS</td>
</tr>
</tbody>
</table>

**COMMENTS:** $W$, $A$, $E$, & $S$ were calculated as the averages of $W_I + W_O$, $A_I + A_O$, $E_I + E_O$, and $S_I + S_O$, respectively.

**Recorded By:**

**Approved By:**

**Date:** 11/25/2008
1. Locate x-y reference point on sketch above for head form impact locations. (Label the positive and negative directions, if applicable)

2. Identify head form impact location on sketch by placing H8, H9, H10, H11, H12, and H13 in the appropriate location.

3. Define and mark on graphic above, the plane of reference for head form impact angle:
   - $0^\circ$ = Parallel with Floor, (+) is Up, (-) is Down
   - $X$ = From Inboard Edge of Seat
   - $Y$ = Measured Vertically from the SRP
4. Complete the following table:

<table>
<thead>
<tr>
<th>(1) Head Impact &amp; Test #</th>
<th>(2) Location (a)</th>
<th>(3) Speed Trap Impact Velocity** mps</th>
<th>(4)* Derived Velocity mps</th>
<th>(5) Contact Area (CA) mm²</th>
<th>(6) CA ≥ 1935 mm²</th>
<th>(7) Yes-Pass</th>
<th>No-Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td>H8</td>
<td>-430 307 0</td>
<td>1.52</td>
<td>1.38</td>
<td>2,523</td>
<td>PASS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H9</td>
<td>-335 406 0</td>
<td>1.60</td>
<td>1.12</td>
<td>2,960</td>
<td>PASS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H10</td>
<td>-234 406 0</td>
<td>1.58</td>
<td>1.02</td>
<td>3,420</td>
<td>PASS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H11</td>
<td>-133 406 0</td>
<td>1.52</td>
<td>0.72</td>
<td>2,350</td>
<td>PASS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H12</td>
<td>-330 307 0</td>
<td>1.63</td>
<td>0.65</td>
<td>2,760</td>
<td>PASS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H13</td>
<td>-230 309 0</td>
<td>1.54</td>
<td>0.34</td>
<td>4,340</td>
<td>PASS</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Contact Velocity from Item 7 below
** Velocity Range = 1.52 mps, +0.08, -0 mps

5. Attach Contact Area Prints.
6. Attach acceleration versus time plots for each impact.
7. Integrate the acceleration versus time plots and attach plots of the results that show velocity versus time.

Comments: (a) All measurements are referenced to the point where the horizontal plane through the SRP intersects the vertical line tangent to the inboard edge at the seat.

Recorded By: [Signature]

Approved By: [Signature] Date: 01/20/2009
DATA SHEET 8
HEAD FORM IMPACT CONTACT AREA REQUIREMENT

Test Vehicle: 2009 THOMAS MINOTOUR SCHOOL BUS  NHTSA No.: C90901
Test Lab: MGA RESEARCH CORPORATION  Test Dates: 11/21/08 – 06/09/09

SEAT NUMBER: S4

REAR SURFACE

1. Locate x-y reference point on sketch above for head form impact locations. (Label the positive and negative directions, if applicable)
2. Identify head form impact location on sketch by placing H14 in the appropriate location.
3. Define and mark on graphic above, the plane of reference for head form impact angle:
   0° = Parallel with Floor, (+) is Up, (-) is Down
   X = From Inboard Edge of Seat
   Y = Measured Vertically from the SRP
4. Complete the following table:

| Head Impact & Test # | Location (a) | Speed Trap Impact Velocity** mps | Derived Velocity mps | Contact Area (CA) mm² | CA ≥ 1935 mm² | Yes-Pass | No-Fail |
|----------------------|--------------|----------------------------------|----------------------|-----------------------|----------------|----------|
| H14                  | -130         | 1.55                             | 1.62                 | 3,680                 | PASS           |          |

* Contact Velocity from Item 7 below

** Velocity Range = 1.52 mps, +0.08, -0 mps

5. Attach Contact Area Prints.

6. Attach acceleration versus time plots for each impact.

7. Integrate the acceleration versus time plots and attach plots of the results that show velocity versus time.

Comments: (a) All measurements are referenced to the point where the horizontal plane through the SRP intersects the vertical line tangent to the inboard edge at the seat.

Recorded By: [Signature]

Approved By: [Signature] Date: 01/20/2009
REAR SURFACE

1. Locate x-y reference point on sketch above for head form impact locations. (Label the positive and negative directions, if applicable)

2. Identify head form impact location on sketch by placing H1, H2, H3, and H4 in the appropriate location.

3. Define and mark on graphic above, the plane of reference for head form impact angle:
   - $0^\circ = $ Parallel with Floor, (+) is Up, (-) is Down
   - X = From Inboard Edge of Seat
   - Y = Measured Vertically from the SRP
### HEAD FORM IMPACT CONTACT AREA REQUIREMENT

4. Complete the following table:

<table>
<thead>
<tr>
<th>Head Impact &amp; Test #</th>
<th>Location (a)</th>
<th>Speed Trap Impact Velocity** mps</th>
<th>Derived Velocity mps</th>
<th>Contact Area (CA) mm²</th>
<th>CA ≥ 1935 mm²</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>96 410 0</td>
<td>1.55</td>
<td>1.13</td>
<td>3,780</td>
<td>PASS</td>
</tr>
<tr>
<td>H2</td>
<td>196 416 0</td>
<td>1.54</td>
<td>0.71</td>
<td>4,530</td>
<td>PASS</td>
</tr>
<tr>
<td>H3</td>
<td>95 314 0</td>
<td>1.56</td>
<td>1.20</td>
<td>2,400</td>
<td>PASS</td>
</tr>
<tr>
<td>H4</td>
<td>196 320 0</td>
<td>1.58</td>
<td>2.24</td>
<td>4,970</td>
<td>PASS</td>
</tr>
</tbody>
</table>

* Contact Velocity from Item 7 below

** Velocity Range = 1.52 mps, +0.08, -0 mps

5. Attach Contact Area Prints.

6. Attach acceleration versus time plots for each impact.

7. Integrate the acceleration versus time plots and attach plots of the results that show velocity versus time.

Comments: (a) All measurements are referenced to the point where the horizontal plane through the SRP intersects the vertical line tangent to the inboard edge at the seat.

Recorded By: [Signature]

Approved By: [Signature]  Date: 01/20/2009
DATA SHEET 8
HEAD FORM IMPACT CONTACT AREA REQUIREMENT

Test Vehicle: 2009 THOMAS MINOTOUR SCHOOL BUS
Test Lab: MGA RESEARCH CORPORATION

NHTSA No.: C90901
Test Dates: 11/21/08 – 06/09/09

BARRIER NUMBER: B1

REAR SURFACE

1. Locate x-y reference point on sketch above for head form impact locations. (Label the positive and negative directions, if applicable)

2. Identify head form impact location on sketch by placing H1, H2, H3, H4, H5, H6, and H7 in the appropriate location.

3. Define and mark on graphic above, the plane of reference for head form impact angle:
   0° = Parallel with Floor, (+) is Up, (-) is Down
   X = From Inboard Edge of Seat
   Y = Measured Vertically from the SRP
4. Complete the following table:

<table>
<thead>
<tr>
<th>Head Impact &amp; Test #</th>
<th>Location (a)</th>
<th>Speed Trap Impact Velocity** mps</th>
<th>Derived Velocity mps</th>
<th>Contact Area (CA) mm²</th>
<th>CA ≥ 1935 mm²</th>
<th>Yes-Pass</th>
<th>No-Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
<td>Y</td>
<td>Angle</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H1</td>
<td>-745</td>
<td>452</td>
<td>0</td>
<td>1.60</td>
<td>1.40</td>
<td>3,200</td>
<td>PASS</td>
</tr>
<tr>
<td>H2</td>
<td>-644</td>
<td>455</td>
<td>0</td>
<td>1.59</td>
<td>1.53</td>
<td>3,040</td>
<td>PASS</td>
</tr>
<tr>
<td>H3</td>
<td>-544</td>
<td>460</td>
<td>0</td>
<td>1.60</td>
<td>1.66</td>
<td>3,290</td>
<td>PASS</td>
</tr>
<tr>
<td>H4</td>
<td>-440</td>
<td>465</td>
<td>0</td>
<td>1.59</td>
<td>1.03</td>
<td>2,870</td>
<td>PASS</td>
</tr>
<tr>
<td>H5</td>
<td>-790</td>
<td>329</td>
<td>0</td>
<td>1.60</td>
<td>1.45</td>
<td>3,100</td>
<td>PASS</td>
</tr>
<tr>
<td>H6</td>
<td>-665</td>
<td>332</td>
<td>0</td>
<td>1.60</td>
<td>1.48</td>
<td>3,470</td>
<td>PASS</td>
</tr>
<tr>
<td>H7</td>
<td>-567</td>
<td>332</td>
<td>0</td>
<td>1.60</td>
<td>1.89</td>
<td>3,070</td>
<td>PASS</td>
</tr>
</tbody>
</table>

* Contact Velocity from Item 7 below
** Velocity Range = 1.52 mps, +0.08, -0 mps

5. Attach Contact Area Prints.
6. Attach acceleration versus time plots for each impact.
7. Integrate the acceleration versus time plots and attach plots of the results that show velocity versus time.

Comments: (a) All measurements are referenced to the point where the horizontal plane through the SRP intersects the vertical line tangent to the inboard edge at the barrier.

Recorded By: ____________________________

Approved By: ____________________________ Date: 01/20/2009
DATA SHEET 8
HEAD FORM IMPACT CONTACT AREA REQUIREMENT

Test Vehicle: 2009 THOMAS MINOTOUR SCHOOL BUS  NHTSA No.: C90901
Test Lab: MGA RESEARCH CORPORATION  Test Dates: 11/21/08 – 06/09/09

BARRIER NUMBER: B8

REAR SURFACE

1. Locate x-y reference point on sketch above for head form impact locations. (Label the positive and negative directions, if applicable)

2. Identify head form impact location on sketch by placing H2, H4, H5, and H7 in the appropriate location.

3. Define and mark on graphic above, the plane of reference for head form impact angle:
   
   0° = Parallel with Floor, (+) is Up, (-) is Down
   
   X = From Inboard Edge of Seat
   
   Y = Measured Vertically from the SRP
4. Complete the following table:

<table>
<thead>
<tr>
<th>Head Impact &amp; Test #</th>
<th>Location (a)</th>
<th>Speed Trap Impact Velocity** mps</th>
<th>Derived Velocity mps</th>
<th>Contact Area (CA) mm²</th>
<th>CA ≥ 1935 mm²</th>
<th>Yes-Pass</th>
<th>No-Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
<td>Y</td>
<td>Angle</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H2</td>
<td>198</td>
<td>479</td>
<td>0</td>
<td>1.59</td>
<td>1.20</td>
<td>2,780</td>
<td>PASS</td>
</tr>
<tr>
<td>H4</td>
<td>404</td>
<td>482</td>
<td>0</td>
<td>1.58</td>
<td>1.58</td>
<td>3,610</td>
<td>PASS</td>
</tr>
<tr>
<td>H5</td>
<td>119</td>
<td>370</td>
<td>0</td>
<td>1.60</td>
<td>2.01</td>
<td>3,460</td>
<td>PASS</td>
</tr>
<tr>
<td>H7</td>
<td>326</td>
<td>373</td>
<td>0</td>
<td>1.59</td>
<td>1.71</td>
<td>3,990</td>
<td>PASS</td>
</tr>
</tbody>
</table>

* Contact Velocity from Item 7 below
** Velocity Range = 1.52 mps, +0.08, -0 mps

5. Attach Contact Area Prints.
6. Attach acceleration versus time plots for each impact.
7. Integrate the acceleration versus time plots and attach plots of the results that show velocity versus time.

Comments: (a) All measurements are referenced to the point where the horizontal plane through the SRP intersects the vertical line tangent to the inboard edge at the barrier.

Recorded By: [Signature]

Approved By: [Signature] Date: 01/20/2009
1. Locate x-y reference point on sketch above for head form impact locations. (Label the positive and negative directions, if applicable)

2. Identify head form impact location on sketch by placing H1, H2, H3, H4, H5, H6, and H7 in the appropriate location.

3. Define and mark on graphic above, the plane of reference for head form impact angle:
   
   - $0^\circ$ = Parallel with Floor, (+) is Up, (-) is Down
   - X = From Inboard Edge of Seat
   - Y = Measured Vertically from the SRP
DATA SHEET 9 (CONTINUED)
HEAD FORM IMPACT ENERGY REQUIREMENT

4. Complete the following table:

<table>
<thead>
<tr>
<th>Head impact &amp; Test #</th>
<th>Location (a)</th>
<th>Speed Trap Impact Velocity ** mps</th>
<th>Derived Velocity ** mps</th>
<th>Max HIC</th>
<th>Energy Req’d Joules</th>
<th>Column 5 &lt; 1000</th>
<th>Column 6 &gt; 4.5 joules</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
<td>Y</td>
<td>Angle</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H1</td>
<td>-737</td>
<td>470</td>
<td>0</td>
<td>6.69</td>
<td>6.81</td>
<td>170</td>
<td>5.13</td>
</tr>
<tr>
<td>H2</td>
<td>-733</td>
<td>371</td>
<td>0</td>
<td>6.68</td>
<td>6.40</td>
<td>165</td>
<td>7.90</td>
</tr>
<tr>
<td>H3</td>
<td>-635</td>
<td>472</td>
<td>0</td>
<td>6.66</td>
<td>6.77</td>
<td>161</td>
<td>7.80</td>
</tr>
<tr>
<td>H4</td>
<td>-639</td>
<td>471</td>
<td>0</td>
<td>6.68</td>
<td>6.87</td>
<td>146</td>
<td>10.91</td>
</tr>
<tr>
<td>H5</td>
<td>-537</td>
<td>476</td>
<td>0</td>
<td>6.69</td>
<td>6.83</td>
<td>148</td>
<td>7.70</td>
</tr>
<tr>
<td>H6</td>
<td>-533</td>
<td>373</td>
<td>0</td>
<td>6.69</td>
<td>6.80</td>
<td>124</td>
<td>14.15</td>
</tr>
<tr>
<td>H7</td>
<td>-436</td>
<td>477</td>
<td>0</td>
<td>6.63</td>
<td>6.88</td>
<td>131</td>
<td>4.63</td>
</tr>
</tbody>
</table>

* Impact velocity from item No. 6 below
** Impact velocity range = 6.69 mps, +0, -0.08 mps

5. Attach acceleration versus time plots for each impact.

6. Integrate the acceleration versus time plots and attach plots of the results that show velocity versus time.

Comments: (a) All measurements are referenced to the point where the horizontal plane through the SRP intersects the vertical line tangent to the inboard edge at the seat.

Recorded By: [Signature]

Approved By: [Signature] Date: 06/05/2009
REAR SURFACE

1. Locate x-y reference point on sketch above for head form impact locations. (Label the positive and negative directions, if applicable)
2. Identify head form impact location on sketch by placing H5, H6, H7, and H8 in the appropriate location.
3. Define and mark on graphic above, the plane of reference for head form impact angle:
   - 0° = Parallel with Floor, (+) is Up, (-) is Down
   - X = From Inboard Edge of Seat
   - Y = Measured Vertically from the SRP
4. Complete the following table:

<table>
<thead>
<tr>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)*</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
<th>(8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head impact &amp; Test #</td>
<td>Location (a)</td>
<td>Speed Trap Impact Velocity ** mps</td>
<td>Derived Velocity ** mps</td>
<td>Max HIC</td>
<td>Energy Req’d Joules</td>
<td>Column 5 &lt; 1000</td>
<td>Column 6 &gt; 4.5 joules</td>
</tr>
<tr>
<td></td>
<td>X</td>
<td>Y</td>
<td>Angle</td>
<td></td>
<td></td>
<td>Yes-Pass</td>
<td>No-Fail</td>
</tr>
<tr>
<td>H5</td>
<td>267</td>
<td>475</td>
<td>0</td>
<td>6.69</td>
<td>6.74</td>
<td>193</td>
<td>7.32</td>
</tr>
<tr>
<td>H6</td>
<td>359</td>
<td>424</td>
<td>0</td>
<td>6.70</td>
<td>6.61</td>
<td>175</td>
<td>6.28</td>
</tr>
<tr>
<td>H7</td>
<td>281</td>
<td>368</td>
<td>0</td>
<td>6.62</td>
<td>6.20</td>
<td>155</td>
<td>10.53</td>
</tr>
<tr>
<td>H8</td>
<td>390</td>
<td>320</td>
<td>0</td>
<td>6.69</td>
<td>6.37</td>
<td>175</td>
<td>12.83</td>
</tr>
</tbody>
</table>

* Impact velocity from item No. 6 below
** Impact velocity range = 6.69 mps, +0, -0.08 mps

5. Attach acceleration versus time plots for each impact.

6. Integrate the acceleration versus time plots and attach plots of the results that show velocity versus time.

Comments: (a) All measurements are referenced to the point where the horizontal plane through the SRP intersects the vertical line tangent to the inboard edge at the seat.

Recorded By: 

Approved By: Michael Janczy 

Date: 06/05/2009
DATA SHEET 9
HEAD FORM IMPACT ENERGY REQUIREMENT

Test Vehicle: 2009 THOMAS MINOTOUR SCHOOL BUS  NHTSA No.: C90901
Test Lab: MGA RESEARCH CORPORATION  Test Dates: 11/21/08 – 06/09/09

BARRIER NUMBER: B1

REAR SURFACE

1. Locate x-y reference point on sketch above for head form impact locations. (Label the positive and negative directions, if applicable)
2. Identify head form impact location on sketch by placing H8, H9, H10, H11, H12, H13, and H14 in the appropriate location.
3. Define and mark on graphic above, the plane of reference for head form impact angle:
   0° = Parallel with Floor, (+) is Up, (-) is Down
   X = From Inboard Edge of Seat
   Y = Measured Vertically from the SRP
DATA SHEET 9 (CONTINUED)
HEAD FORM IMPACT ENERGY REQUIREMENT

4. Complete the following table:

<table>
<thead>
<tr>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)*</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
<th>(8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head impact &amp; Test #</td>
<td>Location (a)</td>
<td>Speed Trap Impact Velocity ** mps</td>
<td>Derived Velocity ** mps</td>
<td>Max HIC</td>
<td>Energy Req’d Joules</td>
<td>Column 5 &lt; 1000</td>
<td>Column 6 &gt; 4.5 joules</td>
</tr>
<tr>
<td></td>
<td>X</td>
<td>Y</td>
<td>Angle</td>
<td></td>
<td></td>
<td>Yes-</td>
<td>No-</td>
</tr>
<tr>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>------</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td>H8</td>
<td>-338</td>
<td>465</td>
<td>0</td>
<td>6.68</td>
<td>6.45</td>
<td>142</td>
<td>6.59</td>
</tr>
<tr>
<td>H9</td>
<td>-234</td>
<td>466</td>
<td>0</td>
<td>6.63</td>
<td>6.63</td>
<td>110</td>
<td>6.14</td>
</tr>
<tr>
<td>H10</td>
<td>-133</td>
<td>468</td>
<td>0</td>
<td>6.80</td>
<td>6.83</td>
<td>92</td>
<td>6.46</td>
</tr>
<tr>
<td>H11</td>
<td>-132</td>
<td>321</td>
<td>0</td>
<td>6.62</td>
<td>6.69</td>
<td>164</td>
<td>8.49</td>
</tr>
<tr>
<td>H12</td>
<td>-259</td>
<td>327</td>
<td>0</td>
<td>6.62</td>
<td>6.62</td>
<td>143</td>
<td>10.96</td>
</tr>
<tr>
<td>H13</td>
<td>-363</td>
<td>327</td>
<td>0</td>
<td>6.40</td>
<td>6.53</td>
<td>78</td>
<td>15.66</td>
</tr>
<tr>
<td>H14</td>
<td>-466</td>
<td>328</td>
<td>0</td>
<td>6.22</td>
<td>6.49</td>
<td>67</td>
<td>15.33</td>
</tr>
</tbody>
</table>

* Impact velocity from item No. 6 below
** Impact velocity range = 6.69 mps, +0, -0.08 mps

5. Attach acceleration versus time plots for each impact.

6. Integrate the acceleration versus time plots and attach plots of the results that show velocity versus time.

Comments: (a) All measurements are referenced to the point where the horizontal plane through the SRP intersects the vertical line tangent to the inboard edge at the barrier.

Recorded By: [Signature]

Approved By: [Signature] Date: 06/05/2009
DATA SHEET 9
HEAD FORM IMPACT ENERGY REQUIREMENT

Test Vehicle: 2009 THOMAS MINOTOUR SCHOOL BUS
NHTSA No.: C90901
Test Lab: MGA RESEARCH CORPORATION
Test Dates: 11/21/08 – 06/09/09

BARRIER NUMBER: B8

1. Locate x-y reference point on sketch above for head form impact locations. (Label the positive and negative directions, if applicable)
2. Identify head form impact location on sketch by placing H1, H3, H6, and H8 in the appropriate location.
3. Define and mark on graphic above, the plane of reference for head form impact angle:
   - $0^\circ$ = Parallel with Floor, (+) is Up, (-) is Down
   - $X$ = From Inboard Edge of Seat
   - $Y$ = Measured Vertically from the SRP
4. Complete the following table:

<table>
<thead>
<tr>
<th>Head impact &amp; Test #</th>
<th>Location (a)</th>
<th>Speed Trap Impact Velocity ** mps</th>
<th>Derived Velocity ** mps</th>
<th>Max HIC</th>
<th>Energy Req’d Joules</th>
<th>Column 5 &lt; 1000</th>
<th>Column 6 &gt; 4.5 joules</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
<td>Y</td>
<td>Angle</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H1</td>
<td>108</td>
<td>480</td>
<td>0</td>
<td>6.61</td>
<td>6.62</td>
<td>107</td>
<td>7.21</td>
</tr>
<tr>
<td>H3</td>
<td>310</td>
<td>481</td>
<td>0</td>
<td>6.69</td>
<td>6.70</td>
<td>119</td>
<td>6.09</td>
</tr>
<tr>
<td>H6</td>
<td>220</td>
<td>374</td>
<td>0</td>
<td>6.70</td>
<td>6.50</td>
<td>134</td>
<td>11.14</td>
</tr>
<tr>
<td>H8</td>
<td>428</td>
<td>376</td>
<td>0</td>
<td>6.63</td>
<td>6.70</td>
<td>191</td>
<td>9.03</td>
</tr>
</tbody>
</table>

* Impact velocity from item No. 6 below

** Impact velocity range = 6.69 mps, +0, -0.08 mps

5. Attach acceleration versus time plots for each impact.

6. Integrate the acceleration versus time plots and attach plots of the results that show velocity versus time.

Comments: (a) All measurements are referenced to the point where the horizontal plane through the SRP intersects the vertical line tangent to the inboard edge at the barrier.

Recorded By: [Signature]

Approved By: [Signature] Date: 06/05/2009
REAR SURFACE

1. Locate x-y reference point on sketch above for knee form impact locations. (Label the positive and negative directions, if applicable)
2. Identify knee form impact location on sketch by placing K1, K2, K3, K4, K5, K6, K7, and K8 in the appropriate location.
3. Define the plane of reference for knee form impact angle:
   - $0^\circ$ = Parallel with Floor, (+) is Up, (-) is Down
   - $X$ = From Inboard Edge of the Seat
   - $Y$ = Measured Vertically from the SRP
DATA SHEET 10 (CONTINUED)
KNEE FORM IMPACT TEST

4. Complete the following table:

<table>
<thead>
<tr>
<th>Knee impact &amp; Test #</th>
<th>Location (a)</th>
<th>Speed Trap Impact Velocity ** mps</th>
<th>Derived Velocity ** mps</th>
<th>Cont. Area mm²</th>
<th>Resist Force (N)</th>
<th>Column 5 &gt; 1935 mm²</th>
<th>Column 6 &lt; 2669N</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
<td>Y</td>
<td>Angle</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K1</td>
<td>-414</td>
<td>197</td>
<td>0</td>
<td>4.90</td>
<td>5.22</td>
<td>2760</td>
<td>1855</td>
</tr>
<tr>
<td>K2</td>
<td>-515</td>
<td>197</td>
<td>0</td>
<td>4.86</td>
<td>4.89</td>
<td>3020</td>
<td>1558</td>
</tr>
<tr>
<td>K3</td>
<td>-617</td>
<td>197</td>
<td>0</td>
<td>4.92</td>
<td>5.22</td>
<td>2530</td>
<td>1594</td>
</tr>
<tr>
<td>K4</td>
<td>-109</td>
<td>208</td>
<td>0</td>
<td>4.94</td>
<td>4.84</td>
<td>3460</td>
<td>1570</td>
</tr>
<tr>
<td>K5</td>
<td>-387</td>
<td>100</td>
<td>0</td>
<td>4.94</td>
<td>5.04</td>
<td></td>
<td>1828</td>
</tr>
<tr>
<td>K6</td>
<td>-284</td>
<td>100</td>
<td>0</td>
<td>4.94</td>
<td>4.90</td>
<td></td>
<td>1956</td>
</tr>
<tr>
<td>K7</td>
<td>-183</td>
<td>102</td>
<td>0</td>
<td>4.93</td>
<td>4.62</td>
<td></td>
<td>1458</td>
</tr>
<tr>
<td>K8</td>
<td>-83</td>
<td>106</td>
<td>0</td>
<td>4.94</td>
<td>5.00</td>
<td></td>
<td>2272</td>
</tr>
</tbody>
</table>

* Impact velocity from item No. 7 below
** Impact velocity range = 4.86 mps, +0.08, -0 mps for contact area, +0, -0.08 mps for force

5. Attach Contact Area Prints for K1, K2, K3 and K4.
6. Attach acceleration versus time plots for each impact.
7. Integrate the acceleration versus time plots and attach plots of the results that show velocity versus time for each impact K1 through K8.
8. Attach force vs. time plots for K5, K6, K7 and K8.

Comments: (a) All measurements are referenced to the point where the horizontal plane through the SRP intersects the vertical line tangent to the inboard edge at the seat.

Recorded By: __________________________  Approved By: __________________________  Date: 06/05/2009
KNEE FORM IMPACT TEST

Test Vehicle: 2009 THOMAS MINOTOUR SCHOOL BUS
NHTSA No.: C90901
Test Lab: MGA RESEARCH CORPORATION
Test Dates: 11/21/08 – 06/09/09
SEAT NUMBER: S8

REAR SURFACE

1. Locate x-y reference point on sketch above for knee form impact locations. (Label the positive and negative directions, if applicable)
2. Identify knee form impact location on sketch by placing K1, K2, K3, K4, K5, K6, K7, and K8 in the appropriate location.
3. Define the plane of reference for knee form impact angle:
   0° = Parallel with Floor, (+) is Up, (-) is Down
   X = From Inboard Edge of the Seat
   Y = Measured Vertically from the SRP
4. Complete the following table:

<table>
<thead>
<tr>
<th>Knee impact &amp; Test #</th>
<th>Location (a)</th>
<th>Speed Trap Impact Velocity ** mps</th>
<th>Derived Velocity ** mps</th>
<th>Cont. Area mm²</th>
<th>Resist Force (N)</th>
<th>Column 5 &gt; 1935 mm²</th>
<th>Column 6 &lt; 2669N</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
<td>Y</td>
<td>Angle</td>
<td></td>
<td></td>
<td>Yes-Pass</td>
<td>No-Fail</td>
</tr>
<tr>
<td>K1</td>
<td>110</td>
<td>256</td>
<td>0</td>
<td>4.91</td>
<td>4.87</td>
<td>3420</td>
<td>1757</td>
</tr>
<tr>
<td>K2</td>
<td>230</td>
<td>230</td>
<td>0</td>
<td>4.86</td>
<td>4.94</td>
<td>3120</td>
<td>1293</td>
</tr>
<tr>
<td>K3</td>
<td>63</td>
<td>36</td>
<td>0</td>
<td>4.94</td>
<td>4.81</td>
<td>3150</td>
<td>2000</td>
</tr>
<tr>
<td>K4</td>
<td>231</td>
<td>129</td>
<td>0</td>
<td>4.86</td>
<td>4.50</td>
<td>3230</td>
<td>2060</td>
</tr>
<tr>
<td>K5</td>
<td>350</td>
<td>129</td>
<td>0</td>
<td>4.86</td>
<td>4.87</td>
<td></td>
<td>2230</td>
</tr>
<tr>
<td>K6</td>
<td>116</td>
<td>129</td>
<td>0</td>
<td>4.90</td>
<td>4.64</td>
<td></td>
<td>1514</td>
</tr>
<tr>
<td>K7</td>
<td>235</td>
<td>29</td>
<td>0</td>
<td>4.92</td>
<td>4.61</td>
<td></td>
<td>1677</td>
</tr>
<tr>
<td>K8</td>
<td>355</td>
<td>29</td>
<td>0</td>
<td>4.86</td>
<td>4.56</td>
<td></td>
<td>1664</td>
</tr>
</tbody>
</table>

* Impact velocity from item No. 7 below

** Impact velocity range = 4.86 mps, +0.08, -0 mps for contact area, +0, -0.08 mps for force

5. Attach Contact Area Prints for K1, K2, K3 and K4.
6. Attach acceleration versus time plots for each impact.
7. Integrate the acceleration versus time plots and attach plots of the results that show velocity versus time for each impact K1 through K8.
8. Attach force vs. time plots for K5, K6, K7 and K8.

Comments: (a) All measurements are referenced to the point where the horizontal plane through the SRP intersects the vertical line tangent to the inboard edge at the seat.

Recorded By: [Signature]

Approved By: [Signature] Date: 06/05/2009
BARRIER NUMBER: B1

REAR SURFACE

1. Locate x-y reference point on sketch above for knee form impact locations. (Label the positive and negative directions, if applicable)
2. Identify knee form impact location on sketch by placing K1, K2, K3, K4, K5, K6, K7, and K8 in the appropriate location.
3. Define the plane of reference for knee form impact angle:
   - $0^\circ$ = Parallel with Floor, (+) is Up, (-) is Down
   - X = From Inboard Edge of the Seat
   - Y = Measured Vertically from the SRP
4. Complete the following table:

<table>
<thead>
<tr>
<th>Knee impact &amp; Test #</th>
<th>Location (a)</th>
<th>Speed Trap Impact Velocity ** mps</th>
<th>Derived Velocity ** mps</th>
<th>Cont. Area mm²</th>
<th>Resist Force (N)</th>
<th>Column 5 &gt; 1935 mm²</th>
<th>Column 6 &lt; 2669N</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
<td>Y</td>
<td>Angle</td>
<td></td>
<td></td>
<td>Yes-Pass</td>
<td>No-Fail</td>
</tr>
<tr>
<td>K1</td>
<td>-99</td>
<td>268</td>
<td>0</td>
<td>4.86</td>
<td>4.78</td>
<td>1941</td>
<td></td>
</tr>
<tr>
<td>K2</td>
<td>-204</td>
<td>269</td>
<td>0</td>
<td>4.87</td>
<td>4.91</td>
<td>1476</td>
<td></td>
</tr>
<tr>
<td>K3</td>
<td>-99</td>
<td>163</td>
<td>0</td>
<td>4.87</td>
<td>4.92</td>
<td>3520</td>
<td>1854</td>
</tr>
<tr>
<td>K4</td>
<td>-200</td>
<td>165</td>
<td>0</td>
<td>4.87</td>
<td>5.03</td>
<td>1539</td>
<td></td>
</tr>
<tr>
<td>K5</td>
<td>-304</td>
<td>164</td>
<td>0</td>
<td>4.86</td>
<td>5.04</td>
<td>1310</td>
<td></td>
</tr>
<tr>
<td>K6</td>
<td>-68</td>
<td>8</td>
<td>0</td>
<td>4.87</td>
<td>4.88</td>
<td>3200</td>
<td>2152</td>
</tr>
<tr>
<td>K7</td>
<td>-168</td>
<td>10</td>
<td>0</td>
<td>4.86</td>
<td>4.92</td>
<td>4320</td>
<td>1499</td>
</tr>
<tr>
<td>K8</td>
<td>-272</td>
<td>15</td>
<td>0</td>
<td>4.95</td>
<td>5.09</td>
<td>2570</td>
<td>2171</td>
</tr>
</tbody>
</table>

* Impact velocity from item No. 7 below

** Impact velocity range = 4.86 mps, +0.08, -0 mps for contact area, +0, -0.08 mps for force

5. Attach Contact Area Prints for K1, K2, K3 and K4.
6. Attach acceleration versus time plots for each impact.
7. Integrate the acceleration versus time plots and attach plots of the results that show velocity versus time for each impact K1 through K8.
8. Attach force vs. time plots for K5, K6, K7 and K8.

Comments: (a) All measurements are referenced to the point where the horizontal plane through the SRP intersects the vertical line tangent to the inboard edge at the barrier.

(b) Impact locations K3, K6, K7 and K8 were used to evaluate the kneeform contact area requirements and K1, K2, K4 and K5 were used to evaluate the resistive force requirements.

Recorded By: 

Approved By: Michael Javine Date: 06/05/2009
DATA SHEET 10
KNEE FORM IMPACT TEST

Test Vehicle: 2009 THOMAS MINOTOUR SCHOOL BUS
Test Lab: MGA RESEARCH CORPORATION
NHTSA No.: C90901
Test Dates: 11/21/08 – 06/09/09

BARRIER NUMBER: B8

REAR SURFACE

9. Locate x-y reference point on sketch above for knee form impact locations. (Label the positive and negative directions, if applicable)

10. Identify knee form impact location on sketch by placing K1, K2, K3, K4, K5, K6, K7, and K8 in the appropriate location.

11. Define the plane of reference for knee form impact angle:
   0° = Parallel with Floor, (+) is Up, (-) is Down
   X = From Inboard Edge of the Seat
   Y = Measured Vertically from the SRP
DATA SHEET 10 (CONTINUED)
KNEE FORM IMPACT TEST

12. Complete the following table:

<table>
<thead>
<tr>
<th>Knee impact &amp; Test #</th>
<th>Location (a)</th>
<th>Speed Trap Impact Velocity ** mps</th>
<th>Derived Velocity ** mps</th>
<th>Cont. Area mm²</th>
<th>Resist Force (N)</th>
<th>Column 5 &gt; 1935 mm²</th>
<th>Column 6 &lt; 2669N</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
<td>Y</td>
<td>Angle</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K1</td>
<td>94</td>
<td>270</td>
<td>0</td>
<td>4.90</td>
<td>4.92</td>
<td>3790</td>
<td>1807</td>
</tr>
<tr>
<td>K2</td>
<td>212</td>
<td>280</td>
<td>0</td>
<td>4.89</td>
<td>4.90</td>
<td>2970</td>
<td>2307</td>
</tr>
<tr>
<td>K3</td>
<td>321</td>
<td>284</td>
<td>0</td>
<td>4.85</td>
<td>5.00</td>
<td>3060</td>
<td>1645</td>
</tr>
<tr>
<td>K4</td>
<td>95</td>
<td>166</td>
<td>0</td>
<td>5.16</td>
<td>5.10</td>
<td>3720</td>
<td>1822</td>
</tr>
<tr>
<td>K5</td>
<td>105</td>
<td>59</td>
<td>0</td>
<td>4.89</td>
<td>5.15</td>
<td></td>
<td>2055</td>
</tr>
<tr>
<td>K6</td>
<td>444</td>
<td>71</td>
<td>0</td>
<td>4.90</td>
<td>5.09</td>
<td></td>
<td>2024</td>
</tr>
<tr>
<td>K7</td>
<td>230</td>
<td>70</td>
<td>0</td>
<td>4.90</td>
<td>5.01</td>
<td></td>
<td>1919</td>
</tr>
<tr>
<td>K8</td>
<td>337</td>
<td>66</td>
<td>0</td>
<td>4.91</td>
<td>4.87</td>
<td></td>
<td>1813</td>
</tr>
</tbody>
</table>

* Impact velocity from item No. 7 below
** Impact velocity range = 4.86 mps, +0.08, -0 mps for contact area, +0, -0.08 mps for force

14. Attach acceleration versus time plots for each impact.
15. Integrate the acceleration versus time plots and attach plots of the results that show velocity versus time for each impact K1 through K8.
16. Attach force vs. time plots for K5, K6, K7 and K8.

Comments: (a) All measurements are referenced to the point where the horizontal plane through the SRP intersects the vertical line tangent to the inboard edge at the barrier.

Recorded By: [Signature]
Approved By: [Signature] Date: 06/05/2009
**DATA SHEET 11**

**SEAT BELT ASSEMBLY ANCHORAGES**

<table>
<thead>
<tr>
<th>Test Vehicle:</th>
<th>2009 THOMAS MINOTOUR SCHOOL BUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>NHTSA No.:</td>
<td>C90901</td>
</tr>
<tr>
<td>Test Lab:</td>
<td>MGA RESEARCH CORPORATION</td>
</tr>
<tr>
<td>Test Dates:</td>
<td>11/21/08 – 06/09/09</td>
</tr>
</tbody>
</table>

**SEAT LOCATION: S4**

<table>
<thead>
<tr>
<th>Seat Location</th>
<th>Seating Location</th>
<th>Anchor Type</th>
<th>Measured Spacing (mm) *</th>
<th>Measured Angle **</th>
<th>Load Application Angle (degrees)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Side View Horizontal Load Angle</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Plan View From Vehicle Center Line</td>
</tr>
<tr>
<td>S4</td>
<td>Left</td>
<td>1</td>
<td>187</td>
<td>74.8°</td>
<td>12.5°</td>
</tr>
<tr>
<td></td>
<td>Right</td>
<td>1</td>
<td>188</td>
<td>74.4°</td>
<td>12.4°</td>
</tr>
</tbody>
</table>

*The spacing for an individual seat belt assembly anchorage shall be at least 165mm apart as measured between the vertical center lines of the bolt holes.** Specified angle range above horizontal to be 20° to 75°.

<table>
<thead>
<tr>
<th>Seat Location</th>
<th>Seating Location</th>
<th>Required Load (Newtons)</th>
<th>Actual Max. Test Load (Newtons)</th>
<th>Pass/Fail</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>S4</td>
<td>Left</td>
<td>22,000</td>
<td>21,954</td>
<td>PASS</td>
<td>NONE</td>
</tr>
<tr>
<td></td>
<td>Right</td>
<td>22,000</td>
<td>22,001</td>
<td>PASS</td>
<td>NONE</td>
</tr>
</tbody>
</table>

**COMMENTS:** None

Recorded By: [Signature]

Approved By: [Signature] Date: 03/16/2009
**DATA SHEET B1**
**SEAT BELT CHECK**

Test Vehicle: **2009 THOMAS MINOTOUR SCHOOL BUS**  
NHTSA No.: **C90901**

Test Lab: **MGA RESEARCH CORPORATION**  
Test Dates: **11/21/08 – 06/09/09**

1. No. of designated seating positions (DSP): 16, plus driver

2. Type of seat belt at each passenger DSP (571.208 S4.1.2.1, S4.1.2.2, S4.1.2.3)

<table>
<thead>
<tr>
<th>Belt Type (Type 1 or 2 Required)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seat No.</td>
</tr>
<tr>
<td>DSP #1 Inboard</td>
</tr>
<tr>
<td>DSP #2 Outboard</td>
</tr>
<tr>
<td>DSP #3 Outboard</td>
</tr>
</tbody>
</table>

3. Type of retractor at each passenger DSP: (571.208 S7.1.1.2)

<table>
<thead>
<tr>
<th>Retractor Type (Manual, ALR, ELR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seat No.</td>
</tr>
</tbody>
</table>

4. Single point, push-button, accessible latch release at each passenger DSP  
(571.208 S7.2(c))

<table>
<thead>
<tr>
<th>Single point push-button</th>
<th>Fail: not single point push-button</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seat No.</td>
<td>S1</td>
</tr>
<tr>
<td>DSP #1 Inboard</td>
<td>PASS</td>
</tr>
<tr>
<td>DSP #2 Outboard</td>
<td>PASS</td>
</tr>
<tr>
<td>DSP #3 Outboard</td>
<td>PASS</td>
</tr>
</tbody>
</table>
5. Latch plate and buckle must not pass through conduit or guide between seat cushion and seat back at each passenger DSP. (571.208 S7.4.6)
Pass: latch plate and/or buckle will not fit through conduit or guide
Fail: latch plate and/or buckle will fit through conduit or guide

<table>
<thead>
<tr>
<th>Seat No.</th>
<th>S1</th>
<th>S2</th>
<th>S3</th>
<th>S4</th>
<th>S5</th>
<th>S6</th>
<th>S7</th>
<th>S8</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSP #1</td>
<td>PASS</td>
<td>PASS</td>
<td>PASS</td>
<td>PASS</td>
<td>PASS</td>
<td>PASS</td>
<td>PASS</td>
<td>PASS</td>
</tr>
<tr>
<td>DSP #2</td>
<td>PASS</td>
<td>PASS</td>
<td>PASS</td>
<td>PASS</td>
<td>PASS</td>
<td>PASS</td>
<td>PASS</td>
<td>PASS</td>
</tr>
<tr>
<td>DSP #3</td>
<td>PASS</td>
<td>PASS</td>
<td>PASS</td>
<td>PASS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6. Either the latch plate, buckle, or webbing must stay on top or above the seat when the seat belt is unbuckled and the remaining two parts must stay accessible at each passenger DSP. (571.208 S7.4.6)
Pass: the seat belt meets the above requirements
Fail: the seat belt does not meet the above requirements

<table>
<thead>
<tr>
<th>Seat No.</th>
<th>S1</th>
<th>S2</th>
<th>S3</th>
<th>S4</th>
<th>S5</th>
<th>S6</th>
<th>S7</th>
<th>S8</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSP #1</td>
<td>PASS</td>
<td>PASS</td>
<td>PASS</td>
<td>PASS</td>
<td>PASS</td>
<td>PASS</td>
<td>PASS</td>
<td>PASS</td>
</tr>
<tr>
<td>DSP #2</td>
<td>PASS</td>
<td>PASS</td>
<td>PASS</td>
<td>PASS</td>
<td>PASS</td>
<td>PASS</td>
<td>PASS</td>
<td>PASS</td>
</tr>
<tr>
<td>DSP #3</td>
<td>PASS</td>
<td>PASS</td>
<td>PASS</td>
<td>PASS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7. Seat belt fit test dummies

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Serial Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.1 50% 6-Year old Child</td>
<td>FTSS 111</td>
</tr>
<tr>
<td>7.2 5% Adult Female</td>
<td>FTSS 511</td>
</tr>
<tr>
<td>7.3 50% Adult Male</td>
<td>FTSS 312</td>
</tr>
<tr>
<td>7.4 95% Adult Male</td>
<td>Denton 9566</td>
</tr>
</tbody>
</table>
DATA SHEET B1 (CONTINUED)
SEAT BELT CHECK

8. Seat belt must fit persons whose dimensions range from those of a 50th percentile 6-year old child to those of a 95th percentile adult male. (571.208 S7.1.1)
  Two seats checked
  Pass: snug fitting seat belt Fail: loose fitting seat belt

<table>
<thead>
<tr>
<th>Seat No.</th>
<th>S4</th>
<th>S5</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSP #1</td>
<td>PASS</td>
<td>PASS</td>
</tr>
<tr>
<td>50% C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>95% AM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DSP #2</td>
<td>PASS</td>
<td>PASS</td>
</tr>
<tr>
<td>50% C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>95% AM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DSP #3</td>
<td>PASS</td>
<td></td>
</tr>
<tr>
<td>50% C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>95% AM</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9. Driver’s Seat (Not part of FMVSS 222)

<table>
<thead>
<tr>
<th>Belt Type</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automatic Restraint</td>
<td>No</td>
</tr>
<tr>
<td>Type of Automatic Restraint (if applicable)</td>
<td></td>
</tr>
</tbody>
</table>

Pass: snug fitting seat belt Fail: loose fitting seat belt

<table>
<thead>
<tr>
<th>%</th>
<th>PASS</th>
</tr>
</thead>
<tbody>
<tr>
<td>5% AF</td>
<td></td>
</tr>
<tr>
<td>95% AM</td>
<td>PASS</td>
</tr>
</tbody>
</table>

COMMENTS: None

Recorded By: [Signature]

Approved By: [Signature]  DATE: 6/09/2009
DATA SHEET B2
SEAT BELT WARNING SYSTEM CHECK

Test Vehicle: 2009 THOMAS MINOTOUR SCHOOL BUS  NHTSA No.: C90901
Test Lab: MGA RESEARCH CORPORATION     Test Dates: 11/21/08 – 06/09/09

1. The occupant is in the driver’s seat.
2. The seat belt is in the stowed position.
3. The key is in the “on” or “start” position.
4. The time duration of the audible signal beginning with key “on” or “start” is
   Seconds: N/A
5. The occupant is in the driver’s seat.
6. The seat belt is in the stowed position.
7. The key is in the “on” or “start” position.
8. The time duration of the warning light beginning with key “on” or “start” is
   Seconds: N/A
9. The occupant is in the driver’s seat.
10. The seat belt is in the latched position and with at least 4 inches of belt webbing extended.
11. The key is in the “on” or “start” position.
12. The time duration of the warning light beginning with key “on” or “start” is
    Seconds: N/A
13. Complete the following table with the data from 4, 8, and 12 to determine which option is used.
14. Record exactly the wording of the visual seat belt warning system:

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Warning light specification</th>
<th>Audible signal specification*</th>
</tr>
</thead>
<tbody>
<tr>
<td>S7.3(a)(1)</td>
<td>Belt stowed &amp; key on or start</td>
<td>N/A 60 seconds minimum</td>
</tr>
<tr>
<td>S7.3(a)(2)</td>
<td>Belt latched &amp; key on or start</td>
<td>N/A Passive Belts Not Required</td>
</tr>
<tr>
<td></td>
<td>Belt stowed &amp; key on or start</td>
<td>N/A 4 to 8 seconds</td>
</tr>
</tbody>
</table>

* 49 USCS @ 30124 does NOT allow an audible signal to operate for more than 8 seconds.
A voluntary audible signal after the 4 to 8 second required signal may be provided. It must be differentiated from the required signal (5/25/2001 legal interpretation to Longacre and Associates).

COMMENTS: The seat belt warning system was not functional due to prior destructive testing and could not be assessed.

Recorded By: ________________________
Approved By: ________________________  DATE: 6/09/2009
<table>
<thead>
<tr>
<th>Equipment</th>
<th>Description</th>
<th>Model/Serial No.</th>
<th>Cal. Date</th>
<th>Cal. Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load Cell</td>
<td>Interface</td>
<td>1210AF-5K / 62736</td>
<td>10/28/08</td>
<td>04/28/09</td>
</tr>
<tr>
<td>Load Cell</td>
<td>Interface</td>
<td>1210AF-5K / 62736</td>
<td>05/14/09</td>
<td>11/14/09</td>
</tr>
<tr>
<td>Load Cell</td>
<td>Interface</td>
<td>1210AF-300-B / 278321</td>
<td>11/13/08</td>
<td>05/13/08</td>
</tr>
<tr>
<td>Load Cell</td>
<td>PCB</td>
<td>1315-101-01A / 634-10K</td>
<td>03/24/09</td>
<td>09/24/09</td>
</tr>
<tr>
<td>Load Cell</td>
<td>PCB</td>
<td>1315-101-01A / 671</td>
<td>03/24/09</td>
<td>09/24/09</td>
</tr>
<tr>
<td>String Pot.</td>
<td>Ametek</td>
<td>P-40A-HT / 21954</td>
<td>08/25/08</td>
<td>02/25/09</td>
</tr>
<tr>
<td>String Pot.</td>
<td>Ametek</td>
<td>P-30A / 18389</td>
<td>08/25/08</td>
<td>02/25/09</td>
</tr>
<tr>
<td>String Pot.</td>
<td>Ametek</td>
<td>P-30A / 18389</td>
<td>05/26/09</td>
<td>11/26/09</td>
</tr>
<tr>
<td>Load Cell</td>
<td>Interface</td>
<td>1210AF-25K-B / 137778</td>
<td>10/23/08</td>
<td>04/23/09</td>
</tr>
<tr>
<td>Load Cell</td>
<td>Interface</td>
<td>1210AF-25K-B / 137778</td>
<td>05/08/09</td>
<td>11/08/09</td>
</tr>
<tr>
<td>Inclinometer</td>
<td>Digital Protractor</td>
<td>Pro 360 / Comp Lab / 001</td>
<td>Daily</td>
<td>Daily</td>
</tr>
<tr>
<td>Steel Tape</td>
<td>Stanley</td>
<td>Powerlock / 551</td>
<td>08/19/08</td>
<td>08/19/09</td>
</tr>
<tr>
<td>Impact Fixture</td>
<td>MGA</td>
<td>IF2003A</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Camera</td>
<td>Sony</td>
<td>DSC-575</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Planimeter</td>
<td>Sokkia Corp.</td>
<td>Planix5 007319</td>
<td>Daily</td>
<td>Daily</td>
</tr>
<tr>
<td>Accelerometer</td>
<td>Entran</td>
<td>G30-N08</td>
<td>11/13/08</td>
<td>05/13/09</td>
</tr>
<tr>
<td>Accelerometer</td>
<td>Entran</td>
<td>G30-N08</td>
<td>05/15/09</td>
<td>11/15/09</td>
</tr>
<tr>
<td>Accelerometer</td>
<td>Entran</td>
<td>EGCS-S425-2000 / W04807</td>
<td>10/03/08</td>
<td>04/03/09</td>
</tr>
<tr>
<td>Accelerometer</td>
<td>Entran</td>
<td>EGCS-S425-2000 / W04807</td>
<td>05/05/09</td>
<td>11/05/09</td>
</tr>
</tbody>
</table>
# SECTION 5

## PHOTOGRAPHS

### TABLE OF PHOTOGRAPHS

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Left Side View of School Bus</td>
<td>56</td>
</tr>
<tr>
<td>2</td>
<td>Right Side View of School Bus</td>
<td>57</td>
</tr>
<tr>
<td>3</td>
<td>¾ Front View From Left Side of School Bus</td>
<td>58</td>
</tr>
<tr>
<td>4</td>
<td>¾ Front View From Right Side of School Bus</td>
<td>59</td>
</tr>
<tr>
<td>5</td>
<td>¾ Rear View From Left Side of School Bus</td>
<td>60</td>
</tr>
<tr>
<td>6</td>
<td>¾ Rear View From Right Side of School Bus</td>
<td>61</td>
</tr>
<tr>
<td>7</td>
<td>Certification Label</td>
<td>62</td>
</tr>
<tr>
<td>8</td>
<td>Tire Placard</td>
<td>63</td>
</tr>
<tr>
<td>9</td>
<td>Vehicle Interior View From Front to Rear</td>
<td>64</td>
</tr>
<tr>
<td>10</td>
<td>Vehicle Interior View From Rear to Front</td>
<td>65</td>
</tr>
<tr>
<td>11</td>
<td>Pre-Test of Seat Cushion Retention Set Up on Seat S3</td>
<td>66</td>
</tr>
<tr>
<td>12</td>
<td>Pre-Test of Seat Cushion Retention Set Up on Seat S5</td>
<td>67</td>
</tr>
<tr>
<td>13</td>
<td>Pre-Test of Seat Back S2 Force Deflection Forward Test</td>
<td>68</td>
</tr>
<tr>
<td>14</td>
<td>Post-Test of Seat Back S2 Force Deflection Forward Test</td>
<td>69</td>
</tr>
<tr>
<td>15</td>
<td>Pre-Test of Seat Back S7 Force Deflection Forward Test</td>
<td>70</td>
</tr>
<tr>
<td>16</td>
<td>Post-Test of Seat Back S7 Force Deflection Forward Test</td>
<td>71</td>
</tr>
<tr>
<td>17</td>
<td>Pre-Test of Seat Back S3 Force Deflection Rearward Test</td>
<td>72</td>
</tr>
<tr>
<td>18</td>
<td>Post-Test of Seat Back S3 Force Deflection Rearward Test</td>
<td>73</td>
</tr>
<tr>
<td>19</td>
<td>Pre-Test of Seat Back S6 Force Deflection Rearward Test</td>
<td>74</td>
</tr>
<tr>
<td>20</td>
<td>Post-Test of Seat Back S6 Force Deflection Rearward Test</td>
<td>75</td>
</tr>
<tr>
<td>21</td>
<td>Post-Test of Head and Knee Impact Locations on Seat S1</td>
<td>76</td>
</tr>
<tr>
<td>22</td>
<td>Post-Test of Head and Knee Impact Locations on Seat S4</td>
<td>77</td>
</tr>
<tr>
<td>23</td>
<td>Post-Test of Head and Knee Impact Locations on Seat S8</td>
<td>78</td>
</tr>
<tr>
<td>24</td>
<td>Post-Test of Head and Knee Impact Locations on Barrier B1</td>
<td>79</td>
</tr>
<tr>
<td>25</td>
<td>Post-Test of Head and Knee Impact Locations on Barrier B8</td>
<td>80</td>
</tr>
<tr>
<td>26</td>
<td>Pre-Test of Seat S4 210 Test</td>
<td>81</td>
</tr>
<tr>
<td>27</td>
<td>Post-Test of Seat S4 210 Test</td>
<td>82</td>
</tr>
</tbody>
</table>
Test Vehicle:
2009 Thomas Minotour School Bus

NHTSA No.:
C90901

Procedure:
FMVSS 222

Test Dates:
11/21/09 – 6/09/09

Left Side View of School Bus
Test Vehicle:
2009 Thomas Minotour School Bus

NHTSA No.:
C90901

Test Dates:
11/21/09 – 6/09/09

Procedure:
FMVSS 222

Right Side View of School Bus
Test Vehicle: 2009 Thomas Minotour School Bus
NHTSA No.: C90901
Test Dates: 11/21/09 – 6/09/09

Procedure: FMVSS 222

Front View From Left Side of School Bus
<table>
<thead>
<tr>
<th>Test Vehicle:</th>
<th>2009 Thomas Minotour School Bus</th>
</tr>
</thead>
<tbody>
<tr>
<td>NHTSA No.:</td>
<td>C90901</td>
</tr>
<tr>
<td>Procedure:</td>
<td>FMVSS 222</td>
</tr>
<tr>
<td>Test Dates:</td>
<td>11/21/09 – 6/09/09</td>
</tr>
</tbody>
</table>

¾ Front View From Right Side of School Bus
Test Vehicle: 2009 Thomas Minotour School Bus
NHTSA No.: C90901
Procedure: FMVSS 222
Test Dates: 11/21/09 – 6/09/09

¼ Rear View From Left Side of School Bus
<table>
<thead>
<tr>
<th>Test Vehicle:</th>
<th>2009 Thomas Minotour School Bus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedure:</td>
<td>FMVSS 222</td>
</tr>
<tr>
<td>NHTSA No.:</td>
<td>C90901</td>
</tr>
<tr>
<td>Test Dates:</td>
<td>11/21/09 – 6/09/09</td>
</tr>
</tbody>
</table>

¾ Rear View From Right Side of School Bus
Test Vehicle: 2009 Thomas Minotour School Bus  
NHTSA No.: C90901  
Procedure: FMVSS 222  
Test Dates: 11/21/09 – 6/09/09
<table>
<thead>
<tr>
<th>Test Vehicle:</th>
<th>2009 Thomas Minotour School Bus</th>
</tr>
</thead>
<tbody>
<tr>
<td>NHTSA No.:</td>
<td>C90901</td>
</tr>
<tr>
<td>Procedure:</td>
<td>FMVSS 222</td>
</tr>
<tr>
<td>Test Dates:</td>
<td>11/21/09 – 6/09/09</td>
</tr>
</tbody>
</table>

Vehicle Interior View From Front to Rear
Test Vehicle: 2009 Thomas Minotour School Bus

NHTSA No.: C90901

Test Dates: 11/21/09 – 6/09/09

Pre-Test of Seat Cushion Retention Set Up on Seat S3
<table>
<thead>
<tr>
<th>Test Vehicle:</th>
<th>2009 Thomas Minotour School Bus</th>
<th>NHTSA No.:</th>
<th>C90901</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedure:</td>
<td>FMVSS 222</td>
<td>Test Dates:</td>
<td>11/21/09 – 6/09/09</td>
</tr>
</tbody>
</table>

Pre-Test of Seat Cushion Retention Set Up on Seat S5
Test Vehicle:
2009 Thomas Minotour School Bus

NHTSA No.:
C90901

Procedure:
FMVSS 222

Test Dates:
11/21/09 – 6/09/09

Pre-Test of Seat Back S2 Force Deflection Forward Test
Test Vehicle: 2009 Thomas Minotour School Bus
NHTSA No.: C90901

Procedure: FMVSS 222

Test Dates: 11/21/09 – 6/09/09

Post-Test of Seat Back S2 Force Deflection Forward Test
Test Vehicle: 2009 Thomas Minotour School Bus
NHTSA No.: C90901
Test Dates: 11/21/09 – 6/09/09

Procedure: FMVSS 222

Pre-Test of Seat Back S7 Force Deflection Forward Test
<table>
<thead>
<tr>
<th>Test Vehicle:</th>
<th>2009 Thomas Minotour School Bus</th>
<th>NHTSA No.:</th>
<th>C90901</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedure:</td>
<td>FMVSS 222</td>
<td>Test Dates:</td>
<td>11/21/09 – 6/09/09</td>
</tr>
</tbody>
</table>

Post-Test of Seat Back S7 Force Deflection Forward Test
Pre-Test of Seat Back S3 Force Deflection Rearward Test
Test Vehicle: 2009 Thomas Minotour School Bus
NHTSA No.: C90901
Procedure: FMVSS 222
Test Dates: 11/21/09 – 6/09/09

Post-Test of Seat Back S3 Force Deflection Rearward Test
Pre-Test of Seat Back S6 Force Deflection Rearward Test
Test Vehicle: 2009 Thomas Minotour School Bus
NHTSA No.: C90901
Test Dates: 11/21/09 – 6/09/09
Procedure: FMVSS 222

Post-Test of Seat Back S6 Force Deflection Rearward Test
<table>
<thead>
<tr>
<th>Test Vehicle:</th>
<th>2009 Thomas Minotour School Bus</th>
<th>NHTSA No.:</th>
<th>C90901</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedure:</td>
<td>FMVSS 222</td>
<td>Test Dates:</td>
<td>11/21/09 – 6/09/09</td>
</tr>
</tbody>
</table>

Post-Test of Head and Knee Impact Locations on Seat S1
Post-Test of Head and Knee Impact Locations on Seat S4
Post-Test of Head and Knee Impact Locations on Seat S8
Post-Test of Head and Knee Impact Locations on Barrier B1
Post-Test of Head and Knee Impact Locations on Barrier B8
Test Vehicle:
2009 Thomas Minotour School Bus

NHTSA No.:
C90901

Test Dates:
11/21/09 – 6/09/09

Procedure:
FMVSS 222

Pre-Test of Seat S4 210 Test
Test Vehicle: 2009 Thomas Minotour School Bus
NHTSA No.: C90901
Procedure: FMVSS 222
Test Dates: 11/21/09 – 6/09/09

Post-Test of Seat S4 210 Test
# SECTION 6

## TEST PLOTS

### TABLE OF TEST PLOTS

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Seat Cushion Retention Seat S3</td>
<td>85</td>
</tr>
<tr>
<td>2</td>
<td>Seat Cushion Retention Seat S5</td>
<td>85</td>
</tr>
<tr>
<td>3</td>
<td>Seat Back Forward Deflection Seat S2 (Lower)</td>
<td>86</td>
</tr>
<tr>
<td>4</td>
<td>Seat Back Forward Deflection Seat S2 (Upper)</td>
<td>87</td>
</tr>
<tr>
<td>5</td>
<td>Seat Back Forward Deflection Seat S7 (Lower)</td>
<td>89</td>
</tr>
<tr>
<td>6</td>
<td>Seat Back Forward Deflection Seat S7 (Upper)</td>
<td>90</td>
</tr>
<tr>
<td>7</td>
<td>Seat Back Rearward Deflection S3</td>
<td>92</td>
</tr>
<tr>
<td>8</td>
<td>Seat Back Rearward Deflection S6</td>
<td>93</td>
</tr>
<tr>
<td>9</td>
<td>H8 Head Form Impact (1.5 m/s) S1</td>
<td>95</td>
</tr>
<tr>
<td>10</td>
<td>H9 Head Form Impact (1.5 m/s) S1</td>
<td>96</td>
</tr>
<tr>
<td>11</td>
<td>H10 Head Form Impact (1.5 m/s) S1</td>
<td>97</td>
</tr>
<tr>
<td>12</td>
<td>H11 Head Form Impact (1.5 m/s) S1</td>
<td>98</td>
</tr>
<tr>
<td>13</td>
<td>H12 Head Form Impact (1.5 m/s) S1</td>
<td>99</td>
</tr>
<tr>
<td>14</td>
<td>H13 Head Form Impact (1.5 m/s) S1</td>
<td>100</td>
</tr>
<tr>
<td>15</td>
<td>H14 Head Form Impact (1.5 m/s) S4</td>
<td>101</td>
</tr>
<tr>
<td>16</td>
<td>H1 Head Form Impact (1.5 m/s) S8</td>
<td>102</td>
</tr>
<tr>
<td>17</td>
<td>H2 Head Form Impact (1.5 m/s) S8</td>
<td>103</td>
</tr>
<tr>
<td>18</td>
<td>H3 Head Form Impact (1.5 m/s) S8</td>
<td>104</td>
</tr>
<tr>
<td>19</td>
<td>H4 Head Form Impact (1.5 m/s) S8</td>
<td>105</td>
</tr>
<tr>
<td>20</td>
<td>H1 Head Form Impact (1.5 m/s) B1</td>
<td>106</td>
</tr>
<tr>
<td>21</td>
<td>H2 Head Form Impact (1.5 m/s) B1</td>
<td>107</td>
</tr>
<tr>
<td>22</td>
<td>H3 Head Form Impact (1.5 m/s) B1</td>
<td>108</td>
</tr>
<tr>
<td>23</td>
<td>H4 Head Form Impact (1.5 m/s) B1</td>
<td>109</td>
</tr>
<tr>
<td>24</td>
<td>H5 Head Form Impact (1.5 m/s) B1</td>
<td>110</td>
</tr>
<tr>
<td>25</td>
<td>H6 Head Form Impact (1.5 m/s) B1</td>
<td>111</td>
</tr>
<tr>
<td>26</td>
<td>H7 Head Form Impact (1.5 m/s) B1</td>
<td>112</td>
</tr>
<tr>
<td>27</td>
<td>H2 Head Form Impact (1.5 m/s) B8</td>
<td>113</td>
</tr>
<tr>
<td>28</td>
<td>H4 Head Form Impact (1.5 m/s) B8</td>
<td>114</td>
</tr>
<tr>
<td>29</td>
<td>H5 Head Form Impact (1.5 m/s) B8</td>
<td>115</td>
</tr>
<tr>
<td>30</td>
<td>H7 Head Form Impact (1.5 m/s) B8</td>
<td>116</td>
</tr>
<tr>
<td>31</td>
<td>H1 Head Form Impact (6.69 m/s) S1</td>
<td>117</td>
</tr>
<tr>
<td>32</td>
<td>H2 Head Form Impact (6.69 m/s) S1</td>
<td>118</td>
</tr>
<tr>
<td>33</td>
<td>H3 Head Form Impact (6.69 m/s) S1</td>
<td>119</td>
</tr>
<tr>
<td>34</td>
<td>H4 Head Form Impact (6.69 m/s) S1</td>
<td>120</td>
</tr>
<tr>
<td>35</td>
<td>H5 Head Form Impact (6.69 m/s) S1</td>
<td>121</td>
</tr>
<tr>
<td>36</td>
<td>H6 Head Form Impact (6.69 m/s) S1</td>
<td>122</td>
</tr>
<tr>
<td>37</td>
<td>H7 Head Form Impact (6.69 m/s) S1</td>
<td>123</td>
</tr>
<tr>
<td>38</td>
<td>H5 Head Form Impact (6.69 m/s) S8</td>
<td>124</td>
</tr>
<tr>
<td>39</td>
<td>H6 Head Form Impact (6.69 m/s) S8</td>
<td>125</td>
</tr>
<tr>
<td>40</td>
<td>H7 Head Form Impact (6.69 m/s) S8</td>
<td>126</td>
</tr>
<tr>
<td>41</td>
<td>H8 Head Form Impact (6.69 m/s) S8</td>
<td>127</td>
</tr>
</tbody>
</table>
### TABLE OF TEST PLOTS (CONTINUED)

<table>
<thead>
<tr>
<th>No.</th>
<th>Test Description</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>42</td>
<td>H8 Head Form Impact (6.69 m/s) B1</td>
<td>128</td>
</tr>
<tr>
<td>43</td>
<td>H9 Head Form Impact (6.69 m/s) B1</td>
<td>129</td>
</tr>
<tr>
<td>44</td>
<td>H10 Head Form Impact (6.69 m/s) B1</td>
<td>130</td>
</tr>
<tr>
<td>45</td>
<td>H11 Head Form Impact (6.69 m/s) B1</td>
<td>131</td>
</tr>
<tr>
<td>46</td>
<td>H12 Head Form Impact (6.69 m/s) B1</td>
<td>132</td>
</tr>
<tr>
<td>47</td>
<td>H13 Head Form Impact (6.69 m/s) B1</td>
<td>133</td>
</tr>
<tr>
<td>48</td>
<td>H14 Head Form Impact (6.69 m/s) B1</td>
<td>134</td>
</tr>
<tr>
<td>49</td>
<td>H1 Head Form Impact (6.69 m/s) B8</td>
<td>135</td>
</tr>
<tr>
<td>50</td>
<td>H3 Head Form Impact (6.69 m/s) B8</td>
<td>136</td>
</tr>
<tr>
<td>51</td>
<td>H6 Head Form Impact (6.69 m/s) B8</td>
<td>137</td>
</tr>
<tr>
<td>52</td>
<td>H8 Head Form Impact (6.69 m/s) B8</td>
<td>138</td>
</tr>
<tr>
<td>53</td>
<td>K1 Knee Form Impact S1</td>
<td>139</td>
</tr>
<tr>
<td>54</td>
<td>K2 Knee Form Impact S1</td>
<td>140</td>
</tr>
<tr>
<td>55</td>
<td>K3 Knee Form Impact S1</td>
<td>141</td>
</tr>
<tr>
<td>56</td>
<td>K4 Knee Form Impact S1</td>
<td>142</td>
</tr>
<tr>
<td>57</td>
<td>K5 Knee Form Impact S1</td>
<td>143</td>
</tr>
<tr>
<td>58</td>
<td>K6 Knee Form Impact S1</td>
<td>144</td>
</tr>
<tr>
<td>59</td>
<td>K7 Knee Form Impact S1</td>
<td>145</td>
</tr>
<tr>
<td>60</td>
<td>K8 Knee Form Impact S1</td>
<td>146</td>
</tr>
<tr>
<td>61</td>
<td>K1 Knee Form Impact S8</td>
<td>147</td>
</tr>
<tr>
<td>62</td>
<td>K2 Knee Form Impact S8</td>
<td>148</td>
</tr>
<tr>
<td>63</td>
<td>K3 Knee Form Impact S8</td>
<td>149</td>
</tr>
<tr>
<td>64</td>
<td>K4 Knee Form Impact S8</td>
<td>150</td>
</tr>
<tr>
<td>65</td>
<td>K5 Knee Form Impact S8</td>
<td>151</td>
</tr>
<tr>
<td>66</td>
<td>K6 Knee Form Impact S8</td>
<td>152</td>
</tr>
<tr>
<td>67</td>
<td>K7 Knee Form Impact S8</td>
<td>153</td>
</tr>
<tr>
<td>68</td>
<td>K8 Knee Form Impact S8</td>
<td>154</td>
</tr>
<tr>
<td>69</td>
<td>K1 Knee Form Impact B1</td>
<td>155</td>
</tr>
<tr>
<td>70</td>
<td>K2 Knee Form Impact B1</td>
<td>156</td>
</tr>
<tr>
<td>71</td>
<td>K3 Knee Form Impact B1</td>
<td>157</td>
</tr>
<tr>
<td>72</td>
<td>K4 Knee Form Impact B1</td>
<td>158</td>
</tr>
<tr>
<td>73</td>
<td>K5 Knee Form Impact B1</td>
<td>159</td>
</tr>
<tr>
<td>74</td>
<td>K6 Knee Form Impact B1</td>
<td>160</td>
</tr>
<tr>
<td>75</td>
<td>K7 Knee Form Impact B1</td>
<td>161</td>
</tr>
<tr>
<td>76</td>
<td>K8 Knee Form Impact B1</td>
<td>162</td>
</tr>
<tr>
<td>77</td>
<td>K1 Knee Form Impact B8</td>
<td>163</td>
</tr>
<tr>
<td>78</td>
<td>K2 Knee Form Impact B8</td>
<td>164</td>
</tr>
<tr>
<td>79</td>
<td>K3 Knee Form Impact B8</td>
<td>165</td>
</tr>
<tr>
<td>80</td>
<td>K4 Knee Form Impact B8</td>
<td>166</td>
</tr>
<tr>
<td>81</td>
<td>K5 Knee Form Impact B8</td>
<td>167</td>
</tr>
<tr>
<td>82</td>
<td>K6 Knee Form Impact B8</td>
<td>168</td>
</tr>
<tr>
<td>83</td>
<td>K7 Knee Form Impact B8</td>
<td>169</td>
</tr>
<tr>
<td>84</td>
<td>K8 Knee Form Impact B8</td>
<td>170</td>
</tr>
</tbody>
</table>
Seat Back Forward Deflection Seat S2 (Lower)

Force (N) vs Time (sec)

Maximum: 9351 N @ 23.1 sec
Minimum: 4 N @ 0.3 sec

Displacement (mm) vs Time (sec)

Maximum: 105 mm @ 25.3 sec
Minimum: 1 mm @ 0.6 sec
Seat Back Forward Deflection Seat S7 (Lower)

Max Value: 6235 N @ 65 mm
Min Value: 41 N @ 0 mm

Seat Back Forward Deflection Seat S7 (Upper)

Max Value: 6836 N @ 15.5 sec
Min Value: -12 N @ 44.4 sec
Displacement (mm) vs Time (sec)

Maximum: 355 mm @ 26.0 sec  Minimum: 0 mm @ 0.0 sec

Force (N) vs Displacement (mm)

Maximum: 6836 N @ 221 mm  Minimum: -12 N @ 159 mm
Seat Back Rearward Deflection S3

Seat Back Rearward Deflection S6

Force (N) vs Displacement (mm)

Maximum: 7592 N @ 210 mm  Minimum: -54 N @ 81 mm
FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)  Test Date: 1-21-2009
Component ID: Thomas Minotour  NHTSA #: C90901
Location: S1 H8

HEAD X Acceleration (G's) VS TIME (S)

Max: 0.63 G's
TMax: 0.00 S
Min: -7.15 G's
TMin: 0.03 S

VELOCITY X (m/s) VS TIME (S)

Max: 1.40 m/s
TMax: -0.01 S
Min: -1.18 m/s
TMin: 0.14 S
VEL@IMP: 1.378 m/s
FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)

Component ID: Thomas Minotour
Location: S1 H9

Test Date: 1-21-2009
NHTSA #: C90901

HEAD X Acceleration (G's) VS TIME (S)

Max: 0.11 G's  
TMax: 0.16 S  
Min: -5.81 G's  
TMin: 0.06 S

VELOCITY X (m/s) VS TIME (S)

Max: 1.16 m/s  
TMax: -0.01 S  
Min: -1.87 m/s  
TMin: 0.22 S  
VEL@IMP: 1.115m/s
HEAD X Acceleration (G's) VS TIME (S)

Max: 0.69 G's
TMax: -0.01 S
Min: -7.39 G's
TMin: 0.03 S

HIC 36: 2.82  T1: 17.40 S  T2: 53.40 S

VELOCITY X (m/s) VS TIME (S)

Max: 1.09 m/s
TMax: -0.01 S
Min: -1.93 m/s
TMin: 0.13 S
VEL@IMP: 1.021 m/s
FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)

Test Date: 1-20-2009
Component ID: Thomas Minotour
Location: S1 H11
NHTSA #: C90901

HEAD X Acceleration (G's) VS TIME (S)

- Max: -0.15 G's
- Tmax: -0.00 S
- Min: -8.70 G's
- Tmin: 0.02 S

HIC 36: 3.93
T1: 9.20 S
T2: 45.20 S

VELOCITY X (m/s) VS TIME (S)

- Max: 0.82 m/s
- Tmax: -0.01 S
- Min: -2.73 m/s
- Tmin: 0.12 S
- Vel@Imp: 0.721 m/s
FMVSS 222 HEAD FORM IMPACTS (1.5 m/s) Test Date: 1-20-2009
Component ID: Thomas Minotour
Location: S1 H12

HEAD X Acceleration (G's) VS TIME (S)
Max: 0.06 G's
TMax: -0.00 S
Min: -9.80 G's
TMin: 0.02 S
HIC 36: 4.66 T1: 8.80 S T2: 39.60 S

VELOCITY X (m/s) VS TIME (S)
Max: 0.72 m/s
TMax: -0.01 S
Min: -2.82 m/s
TMin: 0.13 S
VEL@IMP: 0.65m/s
FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)  
Test Date: 1-20-2009
Component ID: Thomas Minotour
Location: S1 H13

HEAD X Acceleration (G's) VS TIME (S)
Max: -0.43 G's
TMax: 0.00 S
Min: -7.73 G's
TMin: 0.04 S

VELOCITY X (m/s) VS TIME (S)
Max: 0.45 m/s
TMax: -0.01 S
Min: -4.02 m/s
TMin: 0.19 S
VEL@IMP: 0.342 m/s
FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)
Component ID: Thomas Minotour
Location: S4 H14

Test Date: 4-4-2009
NHTSA #: C90901

Head X Acceleration (G's) VS TIME (S)

HIC: 2.35
T1: 16.30 S
T2: 51.70 S

Max: 0.66 G's
TMax: -0.01 S
Min: -7.05 G's
TMin: 0.03 S

Velocity X (m/s) VS TIME (S)

Max: 1.62 m/s
TMax: 0.00 S
Min: -0.82 m/s
TMin: 0.07 S
VEL@IMP: 1.623 m/s
FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)

Test Date: 1-26-2009
Component ID: Thomas Minotour
Location: S8 H1

Component ID: Thomas Minotour
NHTSA #: C90901

HEAD X Acceleration (G's) VS TIME (S)

Max: 0.05 G's
TMax: 0.09 S
Min: -7.66 G's
TMin: 0.04 S

HIC 36: 3.75
T1: 14.30 S
T2: 50.30 S

VELOCITY X (m/s) VS TIME (S)

Max: 1.18 m/s
TMax: -0.01 S
Min: -1.91 m/s
TMin: 0.13 S
VEL@IMP: 1.13m/s
FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)
Test Date: 1-26-2009
Component ID: Thomas Minotour
Location: S8 H4

Component ID: Thomas Minotour
NHTSA #: C90901

HEAD X Acceleration (G's) VS TIME (S)
Max: 1.29 G's
TMax: 0.00 S
Min: -6.63 G's
TMin: 0.05 S

VEL@IMP: 2.238 m/s
HIC 36: 1.86
T1: 31.20 S
T2: 62.50 S

VELOCITY X (m/s) VS TIME (S)
Max: 2.29 m/s
TMax: 0.02 S
Min: 0.29 m/s
TMin: 0.08 S
VEL@IMP: 2.238 m/s
FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)

Test Date: 2-19-2009
Component ID: Thomas Minotour
Location: B1 H1
NHTSA #: C90901

HEAD X Acceleration (G's) VS TIME (S)

HIC 36: 4.98  T1: 9.80 S  T2: 39.60 S

Max: 0.53 G's
TMax: 0.13 S
Min: -9.60 G's
TMin: 0.03 S

VELOCITY X (m/s) VS TIME (S)

Max: 1.44 m/s
TMax: -0.01 S
Min: -1.69 m/s
TMin: 0.13 S
VEL@IMP: 1.397m/s
FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)
Component ID: Thomas Minotour
Location: B1 H2

Test Date: 2-19-2009
NHTSA #: C90901

HEAD X Acceleration (G's) VS TIME (S)

Max: 0.60 G's
TMax: 0.14 S
Min: -8.60 G's
TMin: 0.02 S

HIC 36: 3.83
T1: 9.70 S
T2: 41.10 S

VELOCity X (m/s) VS TIME (S)

Max: 1.55 m/s
TMax: -0.01 S
Min: -1.34 m/s
TMin: 0.13 S
VEL@IMP: 1.532m/s
FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)
Test Date: 2-19-2009
Component ID: Thomas Minotour
Location: B1 H3

Component ID: Thomas Minotour
Location: B1 H3

HIC 36: 3.34  T1: 9.90 S  T2: 42.70 S

Max: 0.31 G's  Tmax: 0.11 S  Min: -8.50 G's  Tmin: 0.02 S

Max: 1.68 m/s  Tmax: -0.01 S  Min: -1.17 m/s  Tmin: 0.08 S  VEL@IMP: 1.663m/s
FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)

Test Date: 2-19-2009
Component ID: Thomas Minotour
Location: B1 H4

NHTSA #: C90901

HEAD X Acceleration (G's) VS TIME (S)

Max: 0.08 G's
TMax: 0.14 S
Min: -9.31 G's
TMin: 0.02 S

HIC 36: 3.78
T1: 10.40 S
T2: 46.40 S

VELOCITY X (m/s) VS TIME (S)

Max: 1.11 m/s
TMax: -0.01 S
Min: -2.57 m/s
TMin: 0.14 S
VEL@IMP: 1.027m/s
FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)  
Test Date: 2-19-2009  
Component ID: Thomas Minotour  
Location: B1 H5  
NHTSA #: C90901

**HEAD X Acceleration (G's) VS TIME (S)**

- Max: 0.75 G's  
- Tmax: 0.16 S  
- Min: -9.48 G's  
- Tmin: 0.03 S

**VELOCITY X (m/s) VS TIME (S)**

- Max: 1.47 m/s  
- Tmax: -0.01 S  
- Min: -1.34 m/s  
- Tmin: 0.16 S  
- Vel@Imp: 1.454 m/s
FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)
Component ID: Thomas Minotour
Location: B1 H6
Test Date: 2-19-2009
NHTSA #: C90901

HEAD X Acceleration (G's) VS TIME (S)

Max: 0.16 G's
TMax: 0.12 S
Min: -7.77 G's
TMin: 0.04 S

VELOCITY X (m/s) VS TIME (S)

Max: 1.50 m/s
TMax: -0.01 S
Min: -1.58 m/s
TMin: 0.20 S
VEL@IMP: 1.478m/s
FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)
Component ID: Thomas Minotour
Location: B1 H7

Test Date: 2-19-2009
NHTSA #: C90901

HEAD X Acceleration (G's) VS TIME (S)

- HIC 36: 2.36
- T1: 27.10 S
- T2: 63.10 S

Max: 0.61 G's
TMax: 0.12 S
Min: -6.61 G's
TMin: 0.04 S

VELOCITY X (m/s) VS TIME (S)

- Max: 1.90 m/s
- TMax: -0.00 S
- Min: -0.78 m/s
- TMin: 0.10 S
- VEL@IMP: 1.894 m/s
FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)  
Component ID: Thomas Minotour  
Location: B8 H2  

Test Date: 2-12-2009  
NHTSA #: C90901

**HEAD X Acceleration (G's) VS TIME (S)**  
Max: 0.36 G's  
TMax: 0.09 S  
Min: -8.12 G's  
TMin: 0.02 S

**VELOCITY X (m/s) VS TIME (S)**  
Max: 1.23 m/s  
TMax: -0.01 S  
Min: -1.73 m/s  
TMin: 0.09 S  
VEL@IMP: 1.202m/s
FMVSS 222 HEAD FORM IMPACTS (1.5 m/s) Test Date: 2-12-2009
Component ID: Thomas Minotour
Location: B8 H4
NHTSA #: C90901

HEAD X Acceleration (G's) VS TIME (S) HIC 36: 3.37 T1: 9.60 S T2: 45.60 S
Max: 0.38 G's
TMax: 0.15 S
Min: -8.10 G's
TMin: 0.02 S

VELOCITY X (m/s) VS TIME (S)
Max: 1.61 m/s
TMax: -0.01 S
Min: -1.23 m/s
TMin: 0.07 S
VEL@IMP: 1.584m/s
FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)
Test Date: 2-12-2009
Component ID: Thomas Minotour
Location: B8 H5

Component ID: Thomas Minotour
NHTSA #: C90901

HEAD X Acceleration (G's) VS TIME (S)
Max: 1.20 G's
TMax: 0.13 S
Min: -7.77 G's
TMin: 0.02 S
HIC 36: 2.60
T1: 12.00 S
T2: 48.00 S

VELOCITY X (m/s) VS TIME (S)
Max: 2.01 m/s
TMax: 0.00 S
Min: -0.59 m/s
TMin: 0.07 S
VEL@IMP: 2.009 m/s
FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)  
Component ID: Thomas Minotour  
Location: B8 H7  
Test Date: 2-12-2009  
NHTSA #: C90901

HEAD X Acceleration (G's) VS TIME (S)

- Max: 0.54 G's
- Tmax: 0.10 S
- Min: -7.68 G's
- Tmin: 0.04 S

VELOCITY X (m/s) VS TIME (S)

- Max: 1.72 m/s
- Tmax: -0.01 S
- Min: -1.00 m/s
- Tmin: 0.08 S
- Vel@IMP: 1.712m/s
HEAD FORM IMPACT (6.69 m/s)  
Test Date: 1-20-2009  
Component ID: Thomas Minotour  
Location: S1 H1  
NHTSA#: C90901

**HEAD X ACCELERATION (G's) VS TIME (S)**

- Max: 13.99 G's
- Tmax: -0.01 S
- Min: -61.61 G's
- Tmin: 0.01 S

**VELOCITY X (m/s) VS TIME (S)**

- Max: 6.83 m/s
- Tmax: -0.00 S
- Min: -2.78 m/s
- Tmin: 0.05 S
- Vel@Imp: 6.809 m/s

**FORCE X (N) VS TIME (S)**

- Max: 715.08 N
- Tmax: -0.01 S
- Min: -3,149.08 N
- Tmin: 0.01 S

**FORCE (N) VS TIME (SEC)**

- Energy: 5.13 J
HEAD FORM IMPACT (6.69 m/s)  
Test Date: 1-20-2009  
Location: S1 H2  
NHTSA#: C90901  
Component ID: Thomas Minotour

**HEAD X ACCELERATION (G's) VS TIME (S)**  
Hic: 164.72  
T1: 6.70 ms  
T2: 29.70 ms  
Max: 5.09 G's  
TMax: -0.01 S  
Min: -43.84 G's  
TMin: 0.02 S

**VELOCITY X (m/s) VS TIME (S)**  
Max: 6.46 m/s  
TMax: -0.01 S  
Min: -3.41 m/s  
TMin: 0.05 S  
VEL@IMP: 6.404 m/s

**FORCE X (N) VS TIME (S)**  
Max: 260.28 N  
TMax: -0.01 S  
Min: -2,240.56 N  
TMin: 0.02 S

**ENERGY VS TIME (SEC)**  
Energy: 7.90 J
HEAD FORM IMPACT (6.69 m/s)

Test Date: 1-20-2009
Component ID: Thomas Minotour
Location: S1 H3
NHTSA#: C90901

HEAD X ACCELERATION (G's) VS TIME (S)

Max: 5.03 G's  
TMax: -0.01 S  
Min: -71.31 G's  
TMin: 0.01 S

VELOCITY X (m/s) VS TIME (S)

Max: 6.81 m/s  
TMax: -0.01 S  
Min: -2.97 m/s  
TMin: 0.05 S  
VEL@IMP: 6.77 m/s

FORCE X (N) VS TIME (S)

Max: 257.24 N  
TMax: -0.01 S  
Min: -3,644.76 N  
TMin: 0.01 S

FORCE (N) VS TIME (SEC)

Energy: 7.80 J

Hic: 161.21  
T1: 3.90 ms  
T2: 26.50 ms
HEAD FORM IMPACT (6.69 m/s) Test Date: 1-20-2009
Component ID: Thomas Minotour
Location: S1 H4
NHTSA#: C90901

Max: 4.90 G's
TMax: -0.01 S
Min: -50.69 G's
TMin: 0.01 S

Max: 6.87 m/s
TMax: -0.01 S
Min: -2.72 m/s
TMin: 0.05 S
VEL@IMP: 6.865 m/s

Max: 250.22 N
TMax: -0.01 S
Min: -2,590.69 N
TMin: 0.01 S

Energy: 10.91 J
HEAD FORM IMPACT (6.69 m/s) Test Date: 1-20-2009
Component ID: Thomas Minotour
Location: S1 H5
NHTSA#: C90901

Max: 4.08 G's
TMax: -0.01 S
Min: -73.85 G's
TMin: 0.01 S

Max: 6.84 m/s
TMax: -0.01 S
Min: -2.99 m/s
TMin: 0.05 S
VEL@IMP: 6.827 m/s

Max: 208.46 N
TMax: -0.01 S
Min: -3,774.69 N
TMin: 0.01 S

Energy: 7.70 J
HEAD FORM IMPACT (6.69 m/s) Test Date: 1-20-2009
Component ID: Thomas Minotour
Location: S1 H6

NHTSA#: C90901

Max: 9.05 G's
TMax: -0.01 S
Min: -50.96 G's
TMin: 0.01 S

Max: 6.82 m/s
TMax: -0.01 S
Min: -2.68 m/s
TMin: 0.06 S
VEL@IMP: 6.796 m/s

Max: 462.67 N
TMax: -0.01 S
Min: -2,604.49 N
TMin: 0.01 S

Energy: 14.15 J
HEAD FORM IMPACT (6.69 m/s) Test Date: 1-21-2009
Component ID: Thomas Minotour
Location: S1 H7
NHTSA #: C90901

HEAD X ACCELERATION (G's) VS TIME (S)

Max: 4.75 G's
TMax: -0.01 S
Min: -70.00 G's
TMin: 0.01 S
Hic: 130.75
T1: 4.40 ms
T2: 34.60 ms

VELOCITY X (m/s) VS TIME (S)

Max: 6.90 m/s
TMax: -0.01 S
Min: -2.86 m/s
TMin: 0.05 S
VEL@IMP: 6.881 m/s

FORCE X (N) VS TIME (S)

Max: 242.72 N
TMax: -0.01 S
Min: -3,577.87 N
TMin: 0.01 S

Energy: 4.63 J
HEAD FORM IMPACT (6.69 m/s)  
Component ID: Thomas Minotour  
Location: S8 H5  
NHTSA#: C90901  

Test Date: 1-26-2009  

**HEAD X ACCELERATION (G's) VS TIME (S)**  
Max: 7.33 G's  
TMax: -0.01 S  
Min: -70.86 G's  
TMin: 0.01 S

**VELOCITY X (m/s) VS TIME (S)**  
Max: 6.77 m/s  
TMax: -0.01 S  
Min: -3.74 m/s  
TMin: 0.04 S  
VEL@IMP: 6.735 m/s

**FORCE X (N) VS TIME (S)**  
Max: 374.68 N  
TMax: -0.01 S  
Min: -3,621.47 N  
TMin: 0.01 S

**FORCE (N) VS TIME (SEC)**  
Energy: 7.32 J
HEAD FORM IMPACT (6.69 m/s) Test Date: 1-26-2009
Component ID: Thomas Minotour
Location: S8 H6
NHTSA#: C90901

**HEAD X ACCELERATION (G's) VS TIME (S)**

- Max: 9.52 G's
- Tmax: -0.01 S
- Min: -49.45 G's
- Tmin: 0.01 S

**VELOCITY X (m/s) VS TIME (S)**

- Max: 6.65 m/s
- Tmax: -0.00 S
- Min: -3.97 m/s
- Tmin: 0.05 S

VEL@IMP: 6.612 m/s

**FORCE X (N) VS TIME (S)**

- Max: 486.47 N
- Tmax: -0.01 S
- Min: -2,527.63 N
- Tmin: 0.01 S

Energy: 6.28 J
HEAD FORM IMPACT (6.69 m/s)  
Test Date: 1-26-2009  
Component ID: Thomas Minotour  
Location: S8 H7  
NHTSA#: C90901

HEAD X ACCELERATION (G's) VS TIME (S)  
Hic: 155.44  
T1: 8.90 ms  
T2: 39.60 ms  
Max: 11.23 G’s  
TMax: -0.01 S  
Min: -44.70 G’s  
TMin: 0.02 S

VELOCITY X (m/s) VS TIME (S)  
Max: 6.26 m/s  
TMax: -0.01 S  
Min: -4.33 m/s  
TMin: 0.05 S  
VEL@IMP: 6.2 m/s

FORCE X (N) VS TIME (S)  
Max: 573.82 N  
TMax: -0.01 S  
Min: -2,284.87 N  
TMin: 0.02 S

ENERGY: 10.53 J
HEAD FORM IMPACT (6.69 m/s) Test Date: 1-26-2009
Component ID: Thomas Minotour
Location: S8 H8
NHTSA#: C90901

HEAD X ACCELERATION (G's) VS TIME (S)  Hic: 175.09  T1: 11.20 ms  T2: 26.60 ms
Max: 10.99 G's
TMax: -0.01 S
Min: -54.31 G's
TMin: 0.02 S

VELOCITY X (m/s) VS TIME (S)  Hic: 175.09  T1: 11.20 ms  T2: 26.60 ms
Max: 6.43 m/s
TMax: -0.01 S
Min: -3.79 m/s
TMin: 0.05 S
VEL@IMP: 6.365 m/s

FORCE X (N) VS TIME (S)  Hic: 175.09  T1: 11.20 ms  T2: 26.60 ms
Max: 561.58 N
TMax: -0.01 S
Min: -2,776.03 N
TMin: 0.02 S

Energy: 12.83 J
HEAD FORM IMPACT (6.69 m/s) Test Date: 2-23-2009
Component ID: Thomas Minotour
Location: B1 H8
NHTSA#: C90901

Max: 2.62 G's
TMax: 0.07 S
Min: -68.03 G's
TMin: 0.01 S

Max: 6.56 m/s
TMax: -0.01 S
Min: -3.25 m/s
TMin: 0.06 S
VEL@IMP: 6.446 m/s

Max: 134.06 N
TMax: 0.07 S
Min: -3,476.90 N
TMin: 0.01 S

Energy: 6.59 J
HEAD FORM IMPACT (6.69 m/s) Test Date: 2-23-2009
Component ID: Thomas Minotour
Location: B1 H9
NHTSA#: C90901

HEAD X ACCELERATION (G's) VS TIME (S)

Max: 3.50 G's
TMax: 0.07 S
Min: -62.70 G's
TMin: 0.01 S

VELOCITY X (m/s) VS TIME (S)

Max: 6.74 m/s
TMax: -0.01 S
Min: -3.01 m/s
TMin: 0.06 S
VEL@IMP: 6.63 m/s

FORCE X (N) VS TIME (S)

Max: 179.06 N
TMax: 0.07 S
Min: -3,204.73 N
TMin: 0.01 S

Energy: 6.14 J
HEAD FORM IMPACT (6.69 m/s)  
Test Date: 2-23-2009 
Component ID: Thomas Minotour 
Location: B1 H10 
NHTSA#: C90901 

HEAD X ACCELERATION (G's) VS TIME (S)  
Max: 2.81 G's  
TMax: 0.07 S  
Min: -56.75 G's  
TMin: 0.01 S  

VELOCITY X (m/s) VS TIME (S)  
Max: 6.94 m/s  
TMax: 0.07 S  
Min: -3.20 m/s  
TMin: 0.01 S  
VEL@IMP: 6.825 m/s  

FORCE X (N) VS TIME (S)  
Max: 143.63 N  
TMax: 0.07 S  
Min: -2,900.50 N  
TMin: 0.01 S  

Energy: 6.46 J
HEAD FORM IMPACT (6.69 m/s)  Test Date: 2-23-2009
Component ID: Thomas Minotour
NHTSA#: C90901
Location: B1 H12

Max: 4.41 G's
TMax: 0.07 S
Min: -51.08 G's
TMin: 0.02 S

Max: 6.72 m/s
TMax: -0.01 S
Min: -3.20 m/s
TMin: 0.07 S
VEL@IMP: 6.623 m/s

Max: 225.30 N
TMax: 0.07 S
Min: -2,610.93 N
TMin: 0.02 S

Energy: 10.96 J
HEAD FORM IMPACT (6.69 m/s) Test Date: 2-23-2009
Component ID: Thomas Minotour Location: B1 H13
NHTSA#: C90901

Max: 10.35 G's
TMax: -0.01 S
Min: -33.87 G's
TMin: 0.02 S

Max: 6.57 m/s
TMax: -0.01 S
Min: -3.50 m/s
TMin: 0.07 S
VEL@IMP: 6.531 m/s

Max: 528.78 N
TMax: -0.01 S
Min: -1,731.03 N
TMin: 0.02 S

Energy: 15.66 J
HEAD FORM IMPACT (6.69 m/s)  
Test Date: 2-23-2009  
Component ID: Thomas Minotour  
Location: B1 H14  
NHTSA#: C90901

**HEAD X ACCELERATION (G's) VS TIME (S)**

Max: 9.05 G's  
TMax: -0.01 S  
Min: -30.86 G's  
TMin: 0.02 S

**VELOCITY X (m/s) VS TIME (S)**

Max: 6.51 m/s  
TMax: -0.01 S  
Min: -2.99 m/s  
TMin: 0.07 S  
VEL@IMP: 6.494 m/s

**FORCE X (N) VS TIME (S)**

Max: 462.64 N  
TMax: -0.01 S  
Min: -1,577.20 N  
TMin: 0.02 S

**FORCE (N) VS TIME (SEC)**

Energy: 15.33 J
HEAD FORM IMPACT (6.69 m/s)  
Test Date: 2-12-2009  
Component ID: Thomas Minotour  
Location: B8 H3  
NHTSA#: C90901

**Head X Acceleration (G's) vs Time (S)**
- Max: 3.55 G's
- Tmax: 0.06 S
- Min: -70.87 G's
- Tmin: 0.01 S

**Velocity X (m/s) vs Time (S)**
- Max: 6.76 m/s
- Tmax: -0.01 S
- Min: -3.09 m/s
- Tmin: 0.05 S
- Vel@Imp: 6.697 m/s

**Force X (N) vs Time (S)**
- Max: 181.31 N
- Tmax: 0.06 S
- Min: -3,622.10 N
- Tmin: 0.01 S

**Energy**
- 6.09 J
**HEAD FORM IMPACT (6.69 m/s)**

**Test Date:** 2-18-2009  
**Location:** B8 H6  
**NHTSA#:** C90901

**Component ID:** Thomas Minotour

**Max:** 68.48 G’s  
**TMax:** 0.08 S  
**Min:** -61.74 G’s  
**TMin:** 0.01 S

**HEAD X ACCELERATION (G’s) VS TIME (S)**

Max: 6.57 m/s  
TMax: -0.01 S  
Min: -3.82 m/s  
TMin: 0.05 S  
VEL@IMP: 6.502 m/s

**FORCE X (N) VS TIME (S)**

Max: 3,500.03 N  
TMax: 0.08 S  
Min: -3,155.44 N  
TMin: 0.01 S

**ENERGY:** 11.14 J

**FORCE (N) VS TIME (SEC)**
HEAD FORM IMPACT (6.69 m/s)  Test Date: 2-17-2009
Component ID: Thomas Minotour
Location: B8 H8
NHTSA#: C90901

**HEAD X ACCELERATION (G's) VS TIME (S)**

Max: 46.77 G's
TMax: 0.08 S
Min: -54.61 G's
TMin: 0.01 S

**VELOCITY X (m/s) VS TIME (S)**

Max: 6.75 m/s
TMax: -0.01 S
Min: -2.44 m/s
TMin: 0.06 S
VEL@IMP: 6.696 m/s

**FORCE X (N) VS TIME (S)**

Max: 2,390.45 N
TMax: 0.08 S
Min: -2,791.14 N
TMin: 0.01 S

**FORCE (N) VS TIME (SEC)**

Energy: 9.03 J
FMVSS 222 KNEE FORM IMPACTS
Component ID: Thomas Minotour
Location: S1 K1
Test Date: 1-27-2009
NHTSA #: C90901

KNEE X Acceleration (G's) VS TIME (S)
Max: 26.11 G's
TMax: 0.04 s
Min: -41.74 G's
TMin: 0.11 s

VELOCITY X (m/s) VS TIME (S)
Max: 5.25 m/s
TMax: 0.07 s
Min: -1.64 m/s
TMin: 0.15 s
VEL@IMP: 5.22 m/s

FORCE X (N) VS TIME (S)
Max: 1,160.44 N
TMax: 0.04 s
Min: -1,855.02 N
TMin: 0.11 s
FMVSS 222 KNEE FORM IMPACTS
Component ID: Thomas Minotour
Location: S1 K2
Test Date: 1-27-2009
NHTSA #: C90901

KNEE X Acceleration (G's) VS TIME (S)
Max: 26.49 G's
TMax: 0.04 s
Min: -35.07 G's
TMin: 0.11 s

VELOCITY X (m/s) VS TIME (S)
Max: 4.94 m/s
TMax: 0.06 s
Min: -2.38 m/s
TMin: 0.16 s
VEL@IMP: 4.89 m/s

FORCE X (N) VS TIME (S)
Max: 1,177.35 N
TMax: 0.04 s
Min: -1,558.31 N
TMin: 0.11 s
FMVSS 222 KNEE FORM IMPACTS
Component ID: Thomas Minotour
Location: S1 K3
Test Date: 1-27-2009
NHTSA #: C90901

KNEE X Acceleration (G's) VS TIME (S)
Max: 26.73 G's
TMax: 0.10 s
Min: -35.87 G's
TMin: 0.16 s

VELOCITY X (m/s) VS TIME (S)
Max: 5.23 m/s
TMax: 0.13 s
Min: -1.91 m/s
TMin: 0.20 s
VEL@IMP: 5.22 m/s

FORCE X (N) VS TIME (S)
Max: 1,188.03 N
TMax: 0.10 s
Min: -1,593.93 N
TMin: 0.16 s
**FMVSS 222 KNEE FORM IMPACTS**

Component ID: Thomas Minotour  
Location: S1 K4  
NHTSA #: C90901

**Test Date:** 1-20-2009

### KNEE X Acceleration (G's) VS TIME (S)

- **Max:** 25.26 G's  
  - **TMax:** 0.04 s  
  - **Min:** -35.33 G's  
  - **TMin:** 0.09 s

### VELOCITY X (m/s) VS TIME (S)

- **Max:** 4.90 m/s  
  - **TMax:** 0.06 s  
  - **Min:** -2.30 m/s  
  - **TMin:** 0.15 s  
  - **VEL@IMP:** 4.84 m/s

### FORCE X (N) VS TIME (S)

- **Max:** 1,122.51 N  
  - **TMax:** 0.04 s  
  - **Min:** -1,569.94 N  
  - **TMin:** 0.09 s
FMVSS 222 KNEE FORM IMPACTS
Component ID: Thomas Minotour
Location: S1 K5

Test Date: 1-20-2009
NHTSA #: C90901

KNEE X Acceleration (G's) VS TIME (S)
Max: 25.65 G's
TMax: 0.04 s
Min: -41.13 G's
TMin: 0.10 s

VELOCITY X (m/s) VS TIME (S)
Max: 5.07 m/s
TMax: 0.06 s
Min: -2.05 m/s
TMin: 0.14 s
VEL@IMP: 5.04 m/s

FORCE X (N) VS TIME (S)
Max: 1,139.75 N
TMax: 0.04 s
Min: -1,827.84 N
TMin: 0.10 s
FMVSS 222 KNEE FORM IMPACTS

Component: Thomas Minotour
Location: S1 K6

Test Date: 1-20-2009
NHTSA #: C90901

KNEE X Acceleration (G's) VS TIME (S)

Max: 26.21 G's
TMax: 0.04 s
Min: -44.03 G's
TMin: 0.10 s

VELOCITY X (m/s) VS TIME (S)

Max: 4.95 m/s
TMax: 0.06 s
Min: -2.35 m/s
TMin: 0.15 s
VEL@IMP: 4.9 m/s

FORCE X (N) VS TIME (S)

Max: 1,164.57 N
TMax: 0.04 s
Min: -1,956.45 N
TMin: 0.10 s
FMVSS 222 KNEE FORM IMPACTS
Component ID: Thomas Minotour
Location: S1 K7
Test Date: 1-20-2009
NHTSA #: C90901

KNEE X Acceleration (G's) VS TIME (S)
Max: 27.45 G's
TMax: 0.04 s
Min: -32.81 G's
TMin: 0.10 s

VELOCITY X (m/s) VS TIME (S)
Max: 4.69 m/s
TMax: 0.07 s
Min: -2.87 m/s
TMin: 0.17 s
VEL@IMP: 4.62 m/s

FORCE X (N) VS TIME (S)
Max: 1,219.97 N
TMax: 0.04 s
Min: -1,457.88 N
TMin: 0.10 s
FMVSS 222 KNEE FORM IMPACTS
Component ID: Thomas Minotour
Location: S1 K8

Test Date: 1-20-2009
NHTSA #: C90901

KNEE X Acceleration (G's) VS TIME (S)

Max: 26.04 G's
TMax: 0.04 s
Min: -51.12 G's
TMin: 0.09 s

VELOCITY X (m/s) VS TIME (S)

Max: 5.02 m/s
TMax: 0.07 s
Min: -1.80 m/s
TMin: 0.12 s
VEL@IMP: 5 m/s

FORCE X (N) VS TIME (S)

Max: 1,157.11 N
TMax: 0.04 s
Min: -2,271.56 N
TMin: 0.09 s
FMVSS 222 KNEE FORM IMPACTS
Component ID: Thomas Minotour
Location: S8 K1
Test Date: 1-26-2009
NHTSA #: C90901

KNEE X Acceleration (G's) VS TIME (S)
Max: 25.96 G's
TMax: 0.03 s
Min: -39.54 G's
TMin: 0.09 s

VELOCITY X (m/s) VS TIME (S)
Max: 4.87 m/s
TMax: 0.07 s
Min: -2.26 m/s
TMin: 0.12 s
VEL@IMP: 4.87 m/s

FORCE X (N) VS TIME (S)
Max: 1,153.78 N
TMax: 0.03 s
Min: -1,757.22 N
TMin: 0.09 s
FMVSS 222 KNEE FORM IMPACTS
Component ID: Thomas Minotour
Location: S8 K2
Test Date: 1-26-2009
NHTSA #: C90901

KNEE X Acceleration (G's) VS TIME (S)

Max: 24.90 G's
TMax: 0.03 s
Min: -29.10 G's
TMin: 0.10 s

VELOCITY X (m/s) VS TIME (S)

Max: 4.94 m/s
TMax: 0.08 s
Min: -2.05 m/s
TMin: 0.14 s
VEL@IMP: 4.94 m/s

FORCE X (N) VS TIME (S)

Max: 1,106.64 N
TMax: 0.03 s
Min: -1,293.31 N
TMin: 0.10 s
FMVSS 222 KNEE FORM IMPACTS
Component ID: Thomas Minotour
Location: S8 K3
Test Date: 1-26-2009
NHTSA #: C90901

KNEE X Acceleration (G's) VS TIME (S)
Max: 25.37 G's
TMax: 0.04 s
Min: -45.00 G's
TMin: 0.09 s

VELOCITY X (m/s) VS TIME (S)
Max: 4.85 m/s
TMax: 0.07 s
Min: -2.06 m/s
TMin: 0.12 s
VEL@IMP: 4.81 m/s

FORCE X (N) VS TIME (S)
Max: 1,127.60 N
TMax: 0.04 s
Min: -1,999.99 N
TMin: 0.09 s
FMVSS 222 KNEE FORM IMPACTS
Component ID: Thomas Minotour
Location: S8 K4

Test Date: 1-26-2009
NHTSA #: C90901

KNEE X Acceleration (G's) VS TIME (S)
Max: 26.07 G's
TMax: 0.04 s
Min: -46.36 G's
TMin: 0.11 s

VELOCITY X (m/s) VS TIME (S)
Max: 4.57 m/s
TMax: 0.07 s
Min: -2.63 m/s
TMin: 0.18 s
VEL@IMP: 4.5 m/s

FORCE X (N) VS TIME (S)
Max: 1,158.42 N
TMax: 0.04 s
Min: -2,060.36 N
TMin: 0.11 s
FMVSS 222 KNEE FORM IMPACTS
Component ID: Thomas Minotour
Location: S8 K5
Test Date: 1-26-2009
NHTSA #: C90901

KNEE X Acceleration (G's) VS TIME (S)
Max: 25.18 G's
TMax: 0.04 s
Min: -50.17 G's
TMin: 0.11 s

VELOCITY X (m/s) VS TIME (S)
Max: 4.88 m/s
TMax: 0.08 s
Min: -2.21 m/s
TMin: 0.14 s
VEL@IMP: 4.87 m/s

FORCE X (N) VS TIME (S)
Max: 1,118.89 N
TMax: 0.04 s
Min: -2,229.65 N
TMin: 0.11 s
FMVSS 222 KNEE FORM IMPACTS

Component ID: Thomas Minotour
Location: S8 K6

Test Date: 1-26-2009
NHTSA #: C90901

KNEE X Acceleration (G's) VS TIME (S)
Max: 26.26 G's
TMax: 0.04 s
Min: -34.07 G's
TMin: 0.09 s

VELOCITY X (m/s) VS TIME (S)
Max: 4.67 m/s
TMax: 0.07 s
Min: -2.50 m/s
TMin: 0.13 s
VEL@IMP: 4.64 m/s

FORCE X (N) VS TIME (S)
Max: 1,167.15 N
TMax: 0.04 s
Min: -1,513.94 N
TMin: 0.09 s
FMVSS 222 KNEE FORM IMPACTS

Component ID: Thomas Minotour
Location: S8 K7

Test Date: 1-26-2009
NHTSA #: C90901

KNEE X Acceleration (G's) VS TIME (S)
- Max: 25.27 G's
- Tmax: 0.03 s
- Min: -37.74 G's
- Tmin: 0.10 s

VELOCITY X (m/s) VS TIME (S)
- Max: 4.69 m/s
- Tmax: 0.07 s
- Min: -2.88 m/s
- Tmin: 0.20 s
- VEL@IMP: 4.61 m/s

FORCE X (N) VS TIME (S)
- Max: 1,123.17 N
- Tmax: 0.03 s
- Min: -1,677.21 N
- Tmin: 0.10 s
FMVSS 222 KNEE FORM IMPACTS
Component ID: Thomas Minotour
Location: S8 K8
Test Date: 1-26-2009
NHTSA #: C90901

KNEE X Acceleration (G's) VS TIME (S)
Max: 25.32 G's
TMax: 0.04 s
Min: -37.45 G's
TMin: 0.11 s

VELOCITY X (m/s) VS TIME (S)
Max: 4.63 m/s
TMax: 0.07 s
Min: -2.75 m/s
TMin: 0.15 s
VEL@IMP: 4.56 m/s

FORCE X (N) VS TIME (S)
Max: 1,125.09 N
TMax: 0.04 s
Min: -1,664.17 N
TMin: 0.11 s
FMVSS 222 KNEE FORM IMPACTS
Component ID: Thomas Minotour
Location: B1 K1
Test Date: 2-20-2009
NHTSA #: C90901

KNEE X Acceleration (G's) VS TIME (S)
Max: 29.71 G's
TMax: 0.04 s
Min: -43.68 G's
TMin: 0.09 s

VELOCITY X (m/s) VS TIME (S)
Max: 4.81 m/s
TMax: 0.07 s
Min: -2.30 m/s
TMin: 0.14 s
VEL@IMP: 4.78 m/s

FORCE X (N) VS TIME (S)
Max: 1,320.15 N
TMax: 0.04 s
Min: -1,941.21 N
TMin: 0.09 s
FMVSS 222 KNEE FORM IMPACTS
Component ID: Thomas Minotour
Location: B1 K3

Test Date: 2-20-2009
NHTSA #: C90901

KNEE X Acceleration (G's) VS TIME (S)

Max: 32.12 G's
TMax: 0.04 s
Min: -41.73 G's
TMin: 0.09 s

VELOCITY X (m/s) VS TIME (S)

Max: 4.95 m/s
TMax: 0.07 s
Min: -1.75 m/s
TMin: 0.12 s
VEL@IMP: 4.92 m/s

FORCE X (N) VS TIME (S)

Max: 1,427.23 N
TMax: 0.04 s
Min: -1,854.48 N
TMin: 0.09 s
FMVSS 222 KNEE FORM IMPACTS
Component ID: Thomas Minotour
Location: B1 K4

Test Date: 2-20-2009
NHTSA #: C90901

KNEE X Acceleration (G's) VS TIME (S)
Max: 28.52 G's
TMax: 0.04 s
Min: -34.64 G's
TMin: 0.10 s

VELOCITY X (m/s) VS TIME (S)
Max: 5.04 m/s
TMax: 0.07 s
Min: -1.79 m/s
TMin: 0.15 s
VEL@IMP: 5.03 m/s

FORCE X (N) VS TIME (S)
Max: 1,267.21 N
TMax: 0.04 s
Min: -1,539.37 N
TMin: 0.10 s
FMVSS 222 KNEE FORM IMPACTS
Component ID: Thomas Minotour
Location: B1 K5
Test Date: 2-20-2009
NHTSA #: C90901

KNEE X Acceleration (G's) VS TIME (S)
Max: 35.51 G's
TMax: 0.04 s
Min: -29.48 G's
TMin: 0.10 s

VELOCITY X (m/s) VS TIME (S)
Max: 5.05 m/s
TMax: 0.07 s
Min: -2.20 m/s
TMin: 0.16 s
VEL@IMP: 5.04 m/s

FORCE X (N) VS TIME (S)
Max: 1,578.23 N
TMax: 0.04 s
Min: -1,310.01 N
TMin: 0.10 s
FMVSS 222 KNEE FORM IMPACTS
Component ID: Thomas Minotour
Location: B1 K6
NHTSA #: C90901

Test Date: 2-20-2009

KNEE X Acceleration (G's) VS TIME (S)
Max: 26.99 G's
TMax: 0.04 s
Min: -48.43 G's
TMin: 0.09 s

 VELOCITY X (m/s) VS TIME (S)
Max: 4.93 m/s
TMax: 0.07 s
Min: -2.02 m/s
TMin: 0.12 s
VEL@IMP: 4.88 m/s

FORCE X (N) VS TIME (S)
Max: 1,199.31 N
TMax: 0.04 s
Min: -2,152.02 N
TMin: 0.09 s
FMVSS 222 KNEE FORM IMPACTS
Component ID: Thomas Minotour
Location: B1 K7
Test Date: 2-20-2009
NHTSA #: C90901

KNEE X Acceleration (G's) VS TIME (S)
Max: 27.29 G's
TMax: 0.04 s
Min: -33.74 G's
TMin: 0.10 s

VELOCITY X (m/s) VS TIME (S)
Max: 4.95 m/s
TMax: 0.07 s
Min: -2.03 m/s
TMin: 0.15 s
VEL@IMP: 4.92 m/s

FORCE X (N) VS TIME (S)
Max: 1,212.94 N
TMax: 0.04 s
Min: -1,499.46 N
TMin: 0.10 s
FMVSS 222 KNEE FORM IMPACTS
Component ID: Thomas Minotour
Location: B1 K8

Test Date: 2-20-2009
NHTSA #: C90901

KNEE X Acceleration (G's) VS TIME (S)
Max: 26.56 G's
TMax: 0.04 s
Min: -48.86 G's
TMin: 0.11 s

VELOCITY X (m/s) VS TIME (S)
Max: 5.15 m/s
TMax: 0.06 s
Min: -2.25 m/s
TMin: 0.14 s
VEL@IMP: 5.09 m/s

FORCE X (N) VS TIME (S)
Max: 1,180.26 N
TMax: 0.04 s
Min: -2,171.34 N
TMin: 0.11 s
FMVSS 222 KNEE FORM IMPACTS
Component ID: Thomas Minotour
Location: B8 K1

Test Date: 2-21-2009
NHTSA #: C90901
FMVSS 222 KNEE FORM IMPACTS
Component ID: Thomas Minotour
Location: B8 K2

Test Date: 2-11-2009
NHTSA #: C90901

KNEE Acceleration (G's) VS TIME (S)
Max: 28.29 G's
TMax: 0.03 s
Min: -51.92 G's
TMin: 0.11 s

VELOCITY X (m/s) VS TIME (S)
Max: 4.94 m/s
TMax: 0.06 s
Min: -2.46 m/s
TMin: 0.15 s
VEL@IMP: 4.9 m/s

FORCE X (N) VS TIME (S)
Max: 1,257.06 N
TMax: 0.03 s
Min: -2,307.20 N
TMin: 0.11 s
FMVSS 222 KNEE FORM IMPACTS
Component ID: Thomas Minotour
Location: B8 K3
Test Date: 2-11-2009
NHTSA #: C90901

KNEE X Acceleration (G’s) VS TIME (S)
Max: 30.64 G’s
TMax: 0.04 s
Min: -37.01 G’s
TMin: 0.10 s

VELOCITY X (m/s) VS TIME (S)
Max: 5.02 m/s
TMax: 0.07 s
Min: -2.24 m/s
TMin: 0.15 s
VEL@IMP: 5 m/s

FORCE X (N) VS TIME (S)
Max: 1,361.57 N
TMax: 0.04 s
Min: -1,644.71 N
TMin: 0.10 s
FMVSS 222 KNEE FORM IMPACTS
Component ID: Thomas Minotour
Location: B8 K4

Test Date: 2-11-2009
NHTSA #: C90901

KNEE X Acceleration (G's) VS TIME (S)
Max: 29.43 G's
TMax: 0.04 s
Min: -41.01 G's
TMin: 0.09 s

VELOCITY X (m/s) VS TIME (S)
Max: 5.11 m/s
TMax: 0.07 s
Min: -1.81 m/s
TMin: 0.13 s
VEL@IMP: 5.1 m/s

FORCE X (N) VS TIME (S)
Max: 1,307.77 N
TMax: 0.04 s
Min: -1,822.35 N
TMin: 0.09 s
FMVSS 222 KNEE FORM IMPACTS
Component ID: Thomas Minotour
Location: B8 K5
Test Date: 2-11-2009
NHTSA #: C90901

KNEE X Acceleration (G's) VS TIME (S)
Max: 29.87 G's
TMax: 0.04 s
Min: -46.24 G's
TMin: 0.09 s

VELOCITY X (m/s) VS TIME (S)
Max: 5.15 m/s
TMax: 0.07 s
Min: -1.72 m/s
TMin: 0.11 s
VEL@IMP: 5.15 m/s

FORCE X (N) VS TIME (S)
Max: 1,327.27 N
TMax: 0.04 s
Min: -2,054.91 N
TMin: 0.09 s
FMVSS 222 KNEE FORM IMPACTS
Component ID: Thomas Minotour
Location: B8 K6

Test Date: 2-11-2009
NHTSA #: C90901

KNEE X Acceleration (G's) VS TIME (S)
Max: 33.03 G's
TMax: 0.04 s
Min: -45.54 G's
TMin: 0.10 s

VELOCITY X (m/s) VS TIME (S)
Max: 5.12 m/s
TMax: 0.07 s
Min: -1.97 m/s
TMin: 0.13 s
VEL@IMP: 5.09 m/s

FORCE X (N) VS TIME (S)
Max: 1,467.80 N
TMax: 0.04 s
Min: -2,023.87 N
TMin: 0.10 s
FMVSS 222 KNEE FORM IMPACTS
Component ID: Thomas Minotour
Location: B8 K7
Test Date: 2-11-2009
NHTSA #: C90901

KNEE X Acceleration (G's) VS TIME (S)
Max: 29.33 G's
TMax: 0.04 s
Min: -43.19 G's
TMin: 0.11 s

VELOCITY X (m/s) VS TIME (S)
Max: 5.04 m/s
TMax: 0.07 s
Min: -2.13 m/s
TMin: 0.15 s
VEL@IMP: 5.01 m/s

FORCE X (N) VS TIME (S)
Max: 1,303.19 N
TMax: 0.04 s
Min: -1,919.19 N
TMin: 0.11 s
FMVSS 222 KNEE FORM IMPACTS
Component ID: Thomas Minotour
Location: B8 K8
Test Date: 2-11-2009
NHTSA #: C90901

**KNEE X Acceleration (G's) VS TIME (S)**
- Max: 28.51 G's
- Tmax: 0.04 s
- Min: -40.79 G's
- Tmin: 0.11 s

**VELOCITY X (m/s) VS TIME (S)**
- Max: 4.93 m/s
- Tmax: 0.07 s
- Min: -0.01 m/s
- Tmin: 0.01 s
- VEL@IMP: 4.87 m/s

**FORCE X (N) VS TIME (S)**
- Max: 1,266.96 N
- Tmax: 0.04 s
- Min: -1,812.58 N
- Tmin: 0.11 s
SECTION 7
WELT CONTACT POINTS

H8 / SEAT S1

H8 Thomas Minotour 25.23 cm²
SECTION 7 (CONTINUED)
WELT CONTACT POINTS

H9 / SEAT S1

H9 Thomas Minotour 29.6 cm²
SECTION 7 (CONTINUED)
WELT CONTACT POINTS

H10 / SEAT S1

H10 Thomas Minotour 34.2 cm²
SECTION 7 (CONTINUED)
WELT CONTACT POINTS

H11 / SEAT S1

H11 Thomas Minotour 23.5 cm²
SECTION 7 (CONTINUED)
WELT CONTACT POINTS

H12 / SEAT S1

H12 Thomas Minotour 27.6 cm$^2$
SECTION 7 (CONTINUED)
WELT CONTACT POINTS

H13 / SEAT S1

H13 Thomas Minotour 43.4 cm²
SECTION 7 (CONTINUED)
WELT CONTACT POINTS

H14 / SEAT S4

H14 Thomas Minotour 36.8 cm²
SECTION 7 (CONTINUED)
WELT CONTACT POINTS

H1 / SEAT S8

H1 Thomas Minotour 37.8 cm$^2$
SECTION 7 (CONTINUED)
WELT CONTACT POINTS

H2 / SEAT S8

H2 Thomas Minotour 45.3 cm²
H3 / SEAT S8

H3 Thomas Minotour 24.0 cm²
SECTION 7 (CONTINUED)
WELT CONTACT POINTS

H4 / SEAT S8

H4 Thomas Minotour 49.7 cm²
SECTION 7 (CONTINUED)
WELT CONTACT POINTS

H1 / BARRIER B1

H1 Thomas Minotour 32.0 cm²
SECTION 7 (CONTINUED)
WELT CONTACT POINTS

H2 / BARRIER B1

H2 Thomas Minotour 30.4 cm²
SECTION 7 (CONTINUED)
WELT CONTACT POINTS

H3 / BARRIER B1

H3 Thomas Minotour 32.9 cm²
SECTION 7 (CONTINUED)
WELT CONTACT POINTS

H4 / BARRIER B1

H4 Thomas Minotour 28.7 cm²
SECTION 7 (CONTINUED)
WELT CONTACT POINTS

H5 / BARRIER B1

H5 Thomas Minotour 31.0 cm²
SECTION 7 (CONTINUED)
WELT CONTACT POINTS

H6 / BARRIER B1

H6 Thomas Minotour 34.7 cm²
SECTION 7 (CONTINUED)
WELT CONTACT POINTS

H7 / BARRIER B1

H7 Thomas Minotour 30.7 cm²
SECTION 7 (CONTINUED)
WELT CONTACT POINTS

H2 / BARRIER B8

H2 Thomas Minotour 27.8 cm²
SECTION 7 (CONTINUED)
WELT CONTACT POINTS

H4 / BARRIER B8

H4 Thomas Minotour 36.1 cm²
H5 / BARRIER B8

H5 Thomas Minotour 34.6 cm²
SECTION 7 (CONTINUED)
WELT CONTACT POINTS

H7 / BARRIER B8

H7 Thomas Minotour 39.9 cm²
SECTION 7 (CONTINUED)
WELT CONTACT POINTS

K1 / SEAT S1

K1 Thomas Minotour 27.6 cm²
SECTION 7 (CONTINUED)
WELT CONTACT POINTS

K2 / SEAT S1

K2 Thomas Minotour 30.2 cm²
SECTION 7 (CONTINUED)
WELT CONTACT POINTS

K3 / SEAT S1

K3 Thomas Minotour 25.3 cm²
K4 / SEAT S1

K4 Thomas Minotour 34.6 cm²
SECTION 7 (CONTINUED)
WELT CONTACT POINTS

K1 / SEAT S8

K1 Thomas Minotour 34.2 cm²
SECTION 7 (CONTINUED)
WELT CONTACT POINTS

K2 / SEAT S8

K2 Thomas Minotour 31.2 cm²
SECTION 7 (CONTINUED)
WELT CONTACT POINTS

K3 / SEAT S8

K3 Thomas Minotour 31.5 cm²
SECTION 7 (CONTINUED)
WELT CONTACT POINTS

K4 / SEAT S8

K4 Thomas Minotour 32.3 cm²
SECTION 7 (CONTINUED)
WELT CONTACT POINTS

K3 / BARRIER B1

K3 Thomas Minotour 35.2 cm²
SECTION 7 (CONTINUED)
WELT CONTACT POINTS

K6 / BARRIER B1

K6 Thomas Minotour 32.0 cm$^2$
SECTION 7 (CONTINUED)
WELT CONTACT POINTS

K7 / BARRIER B1

K7 Thomas Minotour 43.2 cm²
SECTION 7 (CONTINUED)
WELT CONTACT POINTS

K8 / BARRIER B1

K8 Thomas Minotour 25.7 cm²
SECTION 7 (CONTINUED)
WELT CONTACT POINTS
K1 / BARRIER B8

K1 Thomas Minotour 37.9 cm²
SECTION 7 (CONTINUED)
WELT CONTACT POINTS

K2 / BARRIER B8

K2 Thomas Minotour 29.7 cm$^2$
SECTION 7 (CONTINUED)
WELT CONTACT POINTS

K3 / BARRIER B8

K3 Thomas Minotour 30.6 cm²
SECTION 7 (CONTINUED)
WELT CONTACT POINTS

K4 / BARRIER B8

K4 Thomas Minotour 37.2 cm²
SECTION 8
BUS FLOOR PLAN

Rear Emergency Exit Door

S4 S3 S2 S1 B1

S5 S6 S7 S8 B8

Driver

RF Door