SAFETY COMPLIANCE TESTING FOR
FMVSS NO. 222
SCHOOL BUS PASSENGER SEATING AND CRASH PROTECTION

US BUS CORPORATION
2006 US BUS SCHOOL BUS
NHTSA NO.: C60900

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

FINAL REPORT DATE: JUNE 7, 2007

FINAL REPORT

PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
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Prepared by:  _____________________________  Date:  June 7, 2007
James Hansen, Project Engineer

Reviewed by:  _____________________________  Date:  June 7, 2007
Michael Janovicz, Program Manager

FINAL REPORT ACCEPTED BY:

[Signature]
Date of Acceptance:  June 7, 2007
Compliance tests were conducted on the subject 2006 US BUS School Bus, NHTSA No. C60900, 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.

Test Failure:
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<td>Bus Floor Plan</td>
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<td>10</td>
<td>Laboratory Notice of Test Failure</td>
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SECTION 1
PURPOSE OF COMPLIANCE TEST

Tests were conducted on a 2006 US BUS School Bus, NHTSA No. C60900, 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. DTNH22-02-D-01057.
SECTION 2
TEST DATA SUMMARY

The passenger seating and crash protection tests were conducted during October 2006 through March 2007. All tests were conducted by MGA Research Corporation at the Wisconsin Operations. The test vehicle, 2006 US BUS School Bus, NHTSA No. C60900, did not appear to meet all the requirements of FMVSS 222. The test failures are listed below.

Failure 1
FMVSS Requirement: Paragraph S5.1.4 (c): Seat performance rearward, “The seat shall not deflect by an amount such that any part of the seat moves to within 102 mm of any part of another passenger seat in its originally installed position.”

During the rearward deflection test, the S5 seat back moved to within 102 mm of the seat located directly behind the test seat prior to reaching the energy absorption required by S5.1.4.2. A repeat test on a new seat was performed while limiting the travel of the loading bar. The seat back still moved to within 102 mm of the seat located directly behind the test seat well before the energy absorption requirement was met.

Failure 2
FMVSS Requirement: Paragraph S.5.1: “Apply the force at the onset rate of not more than 22,241 N per second. Attain the 22,241 N force in not more than 30 seconds and maintain it for 10 seconds.”

The force application, for the seat belt assembly anchorages, in the S5 location did not reach the specified force before the failure of the floor and wall mount anchor structure. The force requirement as specified in 49 CFR 571.210 is 22,000 N. The actual force reached 14,602 N before failure of the floor and wall mount anchor structure.

LINEAR AND AREA MEASUREMENTS

Seat to seat/barrier spacing was checked on all seats and found to be 610 mm or less as shown on Data Sheet 1.

The seat back height and front surface area of Seat Nos. 1 and 7 were measured in accordance with Section 12.1 of OVSC TP-222-03. As shown in Data Sheet 2 for Seat Nos. 1 and 7, the seat back area is greater than ninety percent of the seat bench width multiplied by 508.
SECTION 2 (CONTINUED)

TEST DATA SUMMARY

Restraining barriers positions and projected rear surface areas of Barrier Nos. 1 and 7 were measured in accordance with OVSC TP-222-03. The projected perimeter of seats S1 and S7 do not fall completely within the perimeter of the B1 and B7 restraining barrier, respectively. These measurements were recorded for indicant purposes as Paragraphs S5.2, S5.2.1, S5.2.2, and S5.2.3 are not required for Class 2 school buses.

SEAT BACK FORCE/DEFLECTION TEST - FORWARD

Seat Nos. 6 and 7 were tested in accordance with Section 12.4 of OVSC TP-222-03. Seat bench width was determined to be 895 mm for S6 and 900 mm for S7. “W” was calculated to be 2 for S6 and S7. The seating reference point (SRP) was 482 mm above the bus floor. The deflection of the seat back at conclusion of lower loading bar loading at 1557 W N load was 60.8 mm for S6 and 54.4 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 stopped when the maximum deflection of 356 mm was reached. The minimum required area under the force versus deflection curve of the upper loading bar was 452 W or 904 joules for both S6 and S7. As shown on Data Sheet No. 3, Seat Nos. 6 and 7 met the force deflection forward requirements. See Plots 1, 2, 3, and 4.

SEAT BACK FORCE/DEFLECTION TEST - REARWARD

Seat Nos. 5 and 4, tested in the seat 5 location were tested in accordance with Section 12.4 of OVSC TP-222-03. Seat bench width was determined to be 895 mm for S5 and 898 mm for S4. “W” was calculated to be 2 for both S4 and S5. The seating reference point (SRP) was 482 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 14.4 mm/sec for both S4 and S5. The location of the loading bar was 343 mm above the SRP for both seats. The test was stopped when the maximum deflection of the seat back of 254 mm was achieved for S5. The test was stopped when the seat back moved within 102 mm of another seat for S4.
SECTION 2 (CONTINUED)
TEST DATA SUMMARY

The area under the force versus deflection curve of the loading bar was 858 joules for S5 and 674 joules for S4. The minimum required area under the force versus deflection curve of the loading bar was 316 W or 632 joules for both S4 and S5.

KNEE FORM IMPACT ZONE TESTS

Seat No. S2 was tested in accordance with Section 12.7 of OVSC TP-222-03. The mass of the knee form was 4.53 kg. All knee form contact area criteria and impact energy criteria were met for the seat.

HEAD FORM IMPACT ZONE TESTS

Seat No. S2 was tested in accordance with Section 12.6 of OVSC TP-222-03. The mass of the head form was 5.21 kg. All head form contact area criteria was met for the seat. The impact energy criteria and head injury criteria for all impact locations were met.

SEAT BELT ANCHORAGES

Seat belt anchorage for S3, in location S4, was tested in accordance with Appendix A of OVSC TP-222-03. Seat belt anchorages and specially made high strength webbing straps were used to conduct the test. The seat mounting failed before the required load of 22,000 N per belt was achieved. The force application, for the seat belt assembly anchorages, in the S5 location did not reach the specified force before the failure of the floor and wall mount anchor structure. The force requirement as specified in 49 CFR 571.210 is 22,000 N. The actual force reached 14,602 N before failure of the floor and wall mount anchor structure. See Plot 7.
**ADMINISTRATIVE DATA SHEET**

Test Vehicle: **2006 US BUS SCHOOL BUS**
Test Lab: **MGA RESEARCH CORPORATION**

<table>
<thead>
<tr>
<th><strong>Test Date:</strong></th>
<th>9/21/2006</th>
</tr>
</thead>
</table>

| **NHTSA No.:** | **C60900** |

## INCOMPLETE VEHICLE (IF APPLICABLE)

<table>
<thead>
<tr>
<th>Manufacturer:</th>
<th>GENERAL MOTORS CORPORATION</th>
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</thead>
<tbody>
<tr>
<td>Model:</td>
<td>CG33503</td>
</tr>
<tr>
<td>VIN:</td>
<td>1GBHG31V561226021</td>
</tr>
<tr>
<td>Build Date:</td>
<td>03/06</td>
</tr>
<tr>
<td>Certification Date:</td>
<td></td>
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</table>

## COMPLETED VEHICLE (SCHOOL BUS)

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<tbody>
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<td>Make/Model:</td>
<td>GM / US BUS</td>
</tr>
<tr>
<td>VIN:</td>
<td>1GBHG31V561226021</td>
</tr>
<tr>
<td>NHTSA No.:</td>
<td>C60900</td>
</tr>
<tr>
<td>Color:</td>
<td>Yellow</td>
</tr>
<tr>
<td>GVWR:</td>
<td>4,536 kg / 10,000 lbs</td>
</tr>
<tr>
<td>Build Date:</td>
<td>08/06</td>
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<td>Certification Date:</td>
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## DATES

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<tbody>
<tr>
<td>Start of Compliance Test:</td>
<td>10/31/2006</td>
</tr>
<tr>
<td>Completion of Compliance Test:</td>
<td>4/18/2007</td>
</tr>
</tbody>
</table>

**COMPLIANCE TEST:**
All tests were performed in accordance with the references outlined in TP-222-03.

Recorded By: ____________________________

Approved By: ____________________________  DATE: 9/21/2006
**GENERAL TEST DATA SHEET**

**Test Vehicle:** 2006 US BUS SCHOOL BUS  
**Test Lab:** MGA RESEARCH CORPORATION  
**NHTSA No.:** C60900  
**Test Date:** 10/31/2006

### SCHOOL BUS IDENTIFICATION

<table>
<thead>
<tr>
<th>Model Year/Mfr./Make/Model:</th>
<th>2006 / US BUS</th>
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</thead>
<tbody>
<tr>
<td>Passenger Capacity:</td>
<td>(1 Driver, 14 Passengers)</td>
</tr>
<tr>
<td>NHTSA No.:</td>
<td>C60900</td>
</tr>
<tr>
<td>VIN:</td>
<td>1GBHG31V561226021</td>
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<tr>
<td>Conventional or Forward Control:</td>
<td>Conventional</td>
</tr>
<tr>
<td>GVWR (Certification Label) FRONT:</td>
<td>1,860 kg / 4,100 lbs</td>
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<tr>
<td>GVWR (Certification Label) REAR:</td>
<td>3,402 kg / 7,500 lbs</td>
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<td>GVWR (Certification Label) TOTAL:</td>
<td>4,536 kg / 10,000 lbs</td>
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### TEST CONDITIONS

<table>
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<th>Date(s) of Test:</th>
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<tr>
<td>Ambient Temperature (°C):</td>
<td>21</td>
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<tr>
<td>Required Temperature Range:</td>
<td>0°C to 32°C</td>
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### SEAT IDENTIFICATION

<table>
<thead>
<tr>
<th>Seat Manufacturer:</th>
<th>FREEDMAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model Name &amp; Number:</td>
<td></td>
</tr>
</tbody>
</table>

Description of Seats: Seat frames are constructed of 25.4 mm round welded steel tubing. The seat back has .68 mm by 25.4 mm strapping welded between the tubing and is covered with 45 mm poly foam on the back surface and 45 mm molded Styrofoam blocks inset into the outboard knee impact areas. The seat cushion is non-removable and designed into the seat. The seat back and seat cushion are wrapped with .58 mm vinyl.
SECTION 3
COMPLIANCE TEST DATA

The following data sheets document the results of testing on the 2006 US BUS School Bus, NHTSA No. C60900.
# DATA SHEET 1
## SEAT TO SEAT/BARRIER SPACING

**Test Vehicle:** 2006 US BUS SCHOOL BUS  
**NHTSA No.:** C60900  
**Test Lab:** MGA RESEARCH CORPORATION  
**Test Date:** 10/31/2006  

<table>
<thead>
<tr>
<th>SEAT NUMBER</th>
<th>MEASUREMENT OF SPACING FROM SRP FORWARD TO SEAT/BARRIER (mm)</th>
<th>REQMT ≤ 610 MM (≤ 24”)</th>
<th>CLASS 1 BUSES ONLY</th>
<th>PASS/FAIL</th>
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<tbody>
<tr>
<td>1</td>
<td>494</td>
<td></td>
<td></td>
<td>PASS</td>
</tr>
<tr>
<td>2</td>
<td>552</td>
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<tr>
<td>3</td>
<td>542</td>
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<td>PASS</td>
</tr>
<tr>
<td>4</td>
<td>476</td>
<td></td>
<td></td>
<td>PASS</td>
</tr>
<tr>
<td>5</td>
<td>511</td>
<td></td>
<td></td>
<td>PASS</td>
</tr>
<tr>
<td>6</td>
<td>534</td>
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<td></td>
<td>PASS</td>
</tr>
<tr>
<td>7</td>
<td>536</td>
<td></td>
<td></td>
<td>PASS</td>
</tr>
</tbody>
</table>

**COMMENTS:** NONE

**Recorded By:**  
**Approved By:** Michael Jaworski  
**DATE:** 10/31/2006
DATA SHEET 2
SEAT BACK HEIGHT & FRONT SURFACE AREA TEST

Test Vehicle: 2006 US BUS SCHOOL BUS  NHTSA No.: C60900
Test Lab: MGA RESEARCH CORPORATION  Test Date: 10/31/2006

SEAT NUMBER: S1

<table>
<thead>
<tr>
<th></th>
<th>PASS/FAIL</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>Is the seat back height at least 508 mm vertically above the SRP? (S5.1.2)</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 = 380 mm;  Width, b = 438 mm;  Height, c = 218 mm;  Height, d = 290 mm
   Width, e = 380 mm;  Height, f = 218 mm;  Height, g = 290 mm;  Width, h = 450 mm
   Area = (½ (a+b) x c) + (d x b) = 216,182 mm² = Areai
   Area = (½ (e+h) x f) + (h x g) = 220,970 mm² = Areao
   Areai + Areao = 437,152 mm²

3. Measure the seat cushion width - W1 = 900 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.

4. Calculate the following: 0.9 x W1 x 508 mm = 411,480 mm²

<table>
<thead>
<tr>
<th></th>
<th>PASS/FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.</td>
<td>Is item 2 greater than item 4? (S5.1.2)</td>
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</table>

Comments: None

Recorded By: __________________________
Approved By: __________________________  DATE: 10/31/2006
**DATA SHEET 2 (CONTINUED)**

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

| **Test Vehicle:** 2006 US BUS SCHOOL BUS | **NHTSA No.:** C60900 |
| **Test Lab:** MGA RESEARCH CORPORATION | **Test Date:** 10/31/2006 |

**SEAT NUMBER: S7**

<table>
<thead>
<tr>
<th><strong>1.</strong></th>
<th><strong>Is the seat back height at least 508 mm vertically above the SRP? (S5.1.2)</strong></th>
<th><strong>PASS/FAIL</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PASS</strong></td>
<td></td>
<td></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, \(a = 380\) mm; Width, \(b = 445\) mm; Height, \(c = 198\) mm; Height, \(d = 310\) mm
- Width, \(e = 382\) mm; Height, \(f = 198\) mm; Height, \(g = 310\) mm; Width, \(h = 440\) mm

\[
\text{Area} = \left(\frac{1}{2} (a+b) \times c\right) + (d \times b) = 219,625 \text{ mm}^2 = \text{Area}_1
\]

\[
\text{Area} = \left(\frac{1}{2} (e+h) \times f\right) + (h \times g) = 217,778 \text{ mm}^2 = \text{Area}_0
\]

\[
\text{Area}_1 + \text{Area}_0 = 437,403 \text{ mm}^2
\]

3. Measure the seat cushion width - \(W_1 = 900\) 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: \(0.9 \times W_1 \times 508\) mm = \(411,480\) mm²

<table>
<thead>
<tr>
<th><strong>5.</strong></th>
<th><strong>Is item 2 greater than item 4? (S5.1.2)</strong></th>
<th><strong>PASS/FAIL</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PASS</strong></td>
<td></td>
<td></td>
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</tbody>
</table>

Comments: None

Recorded By: ________________________

Approved By: ________________________  DATE: 10/31/2006
DATA SHEET 3
SEAT BACK FORCE DEFLECTION TEST - FORWARD

Test Vehicle: 2006 US BUS SCHOOL BUS
Test Lab: MGA RESEARCH CORPORATION
NHTSA No.: C60900
Test Date: 11/15/2006

SEAT NUMBER: S6

1. Seat Bench Width = 895 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): 482 mm Above Floor, 56 mm forward from the rear seat to frame mounting bolt.

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 = 801 mm
   Seat Back width at SRP = 900 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) = 60.8 mm, at start of upper bar loading 60.8 mm, at end of upper bar loading 60.8 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 = 763 mm. Width of seat back at 406 mm above SRP = 865 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 361 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.
10. Is the seat in its final deflected position within 102 mm of the next seat or barrier?  
   PASS

11. Does the forward force vs. deflection trace of the seat back lie within the corridor? (S5.1.3)  
   PASS

12. Include a deflection vs. time plot for the upper loading bar.
13. The area within the force vs. deflection curve = 1,455 joules
14. 452W = 904 joules (S5.1.3.4)

15. Is item 13 greater than or equal to item 14? (S5.1.3.4)  
   PASS

Comments: None

Recorded By: ____________________________  
Approved By: ___________________________  DATE: 11/15/2006
DATA SHEET 3 (CONTINUED)
SEAT BACK FORCE DEFLECTION TEST - FORWARD

Test Vehicle: 2006 US BUS SCHOOL BUS  NHTSA No.: C60900
Test Lab: MGA RESEARCH CORPORATION  Test Date: 11/15/2006

SEAT NUMBER: S7

1. Seat Bench Width = 900 mm
   \[ W = \frac{\text{Seat Bench Width}}{381} \text{ mm (round to nearest whole number)} \approx 2 \]
   Seat Reference Point (SRP) location is: (Description of location as supplied by the COTR: 482 mm Above Floor, 56 mm forward from the rear seat to frame mounting bolt.

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 = 801 mm
   Seat Back width at SRP = 900 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) = 54.4 mm, at start of upper bar loading 54.4 mm, at end of upper bar loading 54.4 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 = 763 mm. Width of seat back at 406 mm above SRP = 865 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 3 (CONTINUED)

### SEAT BACK FORCE DEFLECTION TEST – FORWARD

<table>
<thead>
<tr>
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<th>2006 US BUS SCHOOL BUS</th>
<th>Test Lab:</th>
<th>MGA RESEARCH CORPORATION</th>
<th>NHTSA No.:</th>
<th>C60900</th>
<th>Test Date:</th>
<th>11/15/2006</th>
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<th></th>
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</thead>
<tbody>
<tr>
<td>10.</td>
<td>Is the seat in its final deflected position within 102 mm of the next seat or barrier?</td>
<td>PASS/FAIL</td>
<td>PASS</td>
</tr>
<tr>
<td>11.</td>
<td>Does the forward force vs. deflection trace of the seat back lie within the corridor? (S5.1.3)</td>
<td>PASS/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 = 1,258 joules

14. $452W = 904$ joules (S5.1.3.4)

15. Is item 13 greater than or equal to item 14? (S5.1.3.4) | PASS/FAIL | PASS |

Comments: None

Recorded By: __________________________

Approved By: __________________________ DATE: 11/15/2006
DATA SHEET 4
SEAT BACK FORCE DEFLECTION TEST – REARWARD

Test Vehicle: 2006 US BUS SCHOOL BUS  NHTSA No.: C60900
Test Lab: MGA RESEARCH CORPORATION  Test Date: 11/16/2006

SEAT NUMBER: S5

1. Seat Bench Width = 895 mm
   \[ W = \frac{(\text{Seat Bench Width})}{381 \text{ mm}} \text{ (round to nearest whole number)} = (2) \]

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 = 762 mm
   Width of seat back at 343 mm above SRP = 868 mm

3. Deflection of seat back at 222 N preload = 19 mm

4. Maximum deflection allowed without moving the seat back to within 102 mm of another seat = approximately 175 mm (maximum allowed = 254 mm) (S5.1.4)

5. Seat back movement rate selected by the test engineer = 14.4 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 256 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>8. Does the force vs. deflection plot lie within the boundaries of Figure 18 (OVSC TP-222-03)?</th>
<th>PASS/FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>___</td>
<td></td>
</tr>
<tr>
<td>X</td>
<td>PASS</td>
</tr>
</tbody>
</table>

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

9. 316W = 632 joules

10. The area within the force vs. deflection curve = 858 joules
DATA SHEET 4 (CONTINUED)
SEAT BACK FORCE DEFLECTION TEST – REARWARD

<table>
<thead>
<tr>
<th>Test Vehicle: 2006 US BUS SCHOOL BUS</th>
<th>NHTSA No.: C60900</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Lab: MGA RESEARCH CORPORATION</td>
<td>Test Date: 11/16/2006</td>
</tr>
</tbody>
</table>

12. Is item 11 greater than or equal to item 10? (S5.1.4.2)  

**PASS/FAIL**  
NA  
(See Comments)

Comments: This seat failed to meet the requirements of S5.1.4.2. The seat back moved to within 102 mm of the seat located directly behind the test seat when the loading bar reached approximately 175 mm of travel. The total energy expended by the loading bar at 175 mm was approximately 577 joules, which is below the 632 joules of energy absorption required by S5.1.4.2. When considering energy returned due to seat recoil, the total energy absorbed by the seat back is less than 577 joules.

Recorded By:______________________________

Approved By:______________________________ DATE: 11/16/2006
DATA SHEET 4 (CONTINUED)
SEAT BACK FORCE DEFLECTION TEST – REARWARD

Test Vehicle: 2006 US BUS SCHOOL BUS  NHTSA No.: C60900
Test Lab: MGA RESEARCH CORPORATION  Test Date: 11/16/2006

SEAT NUMBER: S4, tested in the S5 location

1. Seat Bench Width = 898 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 = 762 mm
   - Width of seat back at 343 mm above SRP = 870 mm

3. Deflection of seat back at 222 N preload = 16 mm

4. Maximum deflection allowed without moving the seat back to within 102 mm of another seat = approximately 163 mm (maximum allowed = 254 mm) (S5.1.4)

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

6. Reason for stopping deflection:
   - \[ X \] Reached deflection determined in Item 4 above (if less than 254 mm)
   - ■ Reached 254 mm maximum allowed deflection
   - ___ 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>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)?</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 = 675 joules
DATA SHEET 4 (CONTINUED)

SEAT BACK FORCE DEFLECTION TEST – REARWARD

Test Vehicle: 2006 US BUS SCHOOL BUS  NHTSA No.: C60900
Test Lab: MGA RESEARCH CORPORATION  Test Date: 11/16/2006

<table>
<thead>
<tr>
<th>12. Is item 11 greater than or equal to item 10? (S5.1.4.2)</th>
<th>PASS/FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>(See Comments)</td>
</tr>
</tbody>
</table>

Comments: This test was performed to verify the results of the S5 rearward deflection test. This seat also failed to meet the requirements of S5.1.4.2. The seat back moved to within 102 mm of the seat located directly behind the test seat when the loading bar reached approximately 163 mm of travel. The total energy expended by the loading bar at 163 mm was approximately 517 joules, which is below the 632 joules of energy absorption required by S5.1.4.2. When considering energy returned due to seat recoil, the total energy absorbed by the seat back is less than 517 joules.

Recorded By: ______________________________

Approved By: ___________________________  DATE: 11/16/2006
DATA SHEET 5
RESTRaining BARRIER POSITION AND PROJECTED REAR SURFACE AREA
(Not REQUIRED FOR CLASS 2 SCHOOL BUSES)

Test Vehicle: 2006 US BUS SCHOOL BUS  NHTSA No.: C60900
Test Lab: MGA RESEARCH CORPORATION  Test Date: 10/31/2006

SEAT NUMBER: B1

1. Measure distance $T$ from SRP of seat immediately aft of barrier in a horizontal longitudinal line forward to barrier. $T = 494$ mm.

2. Is distance $T$ equal to or less than 610 mm? (S5.2)  

3. Measure distance $D$ at top (t) and bottom (b) of barrier.
   \[ D_t = 80 \text{ mm} \quad D_b = 30 \text{ mm} \]

4. Measure distance $C$ at top (t) and bottom (b) of seat.
   \[ C_t = 96 \text{ mm} \quad C_b = 60 \text{ mm} \]

5. Is $D_t$ equal to or less than $C_t$?  

6. Is $D_b$ equal to or less than $C_b$?  

7. Measure distance $E$ at top of barrier and bottom of barrier.
   \[ E_t = 756 \text{ mm} \quad E_b = 889 \text{ mm} \]

8. Measure distance $A$ at top of seat back and bottom of seat.
   \[ A_t = 805 \text{ mm} \quad A_b = 889 \text{ mm} \]

9. Is distance $E_t + D_t$ equal to or greater than distance $A_t + C_t$?  

10. Is distance $E_b + D_b$ equal to or greater than distance $A_b + C_b$?  

11. Measure distance $U$ at inboard (i) and outboard (o) side of barrier.
    \[ U_i = 385 \text{ mm} \quad U_o = 368 \text{ mm} \]

12. Measure distance $V$ at inboard (i) and outboard (o) sides of seat.
    \[ V_i = 310 \text{ mm} \quad V_o = 310 \text{ mm} \]
<table>
<thead>
<tr>
<th></th>
<th>DATA SHEET 5 (CONTINUED)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RESTRAINING BARRIER POSITION AND PROJECTED REAR SURFACE AREA</td>
</tr>
<tr>
<td></td>
<td>(NOT REQUIRED FOR CLASS 2 SCHOOL BUSES)</td>
</tr>
</tbody>
</table>

<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 $V_i$?</td>
<td>FAIL</td>
</tr>
<tr>
<td>14.</td>
<td>Is $U_o$ equal to or less than $V_o$?</td>
<td>FAIL</td>
</tr>
</tbody>
</table>

15. Measure distance $S$ at inboard (I) and outboard (o) side of barrier.  
   $S_i = 738$ mm  
   $S_o = 745$ mm

16. Measure distance $W$ at inboard (i) and outboard (o) sides of seat.  
   $W_i = 770$ mm  
   $W_o = 775$ 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 $W_i + V_i$?</td>
<td>PASS</td>
</tr>
<tr>
<td>18.</td>
<td>Is $S_o + U_o$ equal to or greater than $W_o + V_o$?</td>
<td>PASS</td>
</tr>
</tbody>
</table>

19. Compute area ($W \times A$) = 654,308 mm$^2$  
20. Compute area ($E \times S$) = 609,884 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 ($E \times S$)?</td>
<td>FAIL</td>
</tr>
</tbody>
</table>

Comments: None

Recorded By: ____________________________  
Approved By: ____________________________  DATE: 10/31/2006
## SEAT NUMBER: B7

1. Measure distance T from SRP of seat immediately aft of barrier in a horizontal longitudinal line forward to barrier. \( T = 536 \text{ mm} \).

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Is distance T equal to or less than 610 mm? (S5.2)</td>
<td>PASS/FAIL</td>
<td>PASS</td>
</tr>
</tbody>
</table>

3. Measure distance D at top (t) and bottom (b) of barrier.
   \[ D_t = 85 \text{ mm} \quad D_b = 25 \text{ mm} \]

4. Measure distance C at top (t) and bottom (b) of seat.
   \[ C_t = 90 \text{ mm} \quad C_b = 60 \text{ mm} \]

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Is ( D_t ) equal to or less than ( C_t )?</td>
<td>PASS/FAIL</td>
<td>PASS</td>
</tr>
</tbody>
</table>

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>6. Is ( D_b ) equal to or less than ( C_b )?</td>
<td>PASS/FAIL</td>
<td>PASS</td>
</tr>
</tbody>
</table>

7. Measure distance E at top of barrier and bottom of barrier.
   \[ E_t = 765 \text{ mm} \quad E_b = 895 \text{ mm} \]

8. Measure distance A at top of seat back and bottom of seat.
   \[ A_t = 835 \text{ mm} \quad A_b = 895 \text{ mm} \]

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>9. Is distance ( E_t + D_t ) equal to or greater than distance ( A_t + C_t )?</td>
<td>PASS/FAIL</td>
<td>FAIL</td>
</tr>
</tbody>
</table>

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>10. Is distance ( E_b + D_b ) equal to or greater than distance ( A_b + C_b )</td>
<td>PASS/FAIL</td>
<td>FAIL</td>
</tr>
</tbody>
</table>

11. Measure distance U at inboard (i) and outboard (o) side of barrier.
    \[ U_i = 390 \text{ mm} \quad U_o = 360 \text{ mm} \]

12. Measure distance V at inboard (i) and outboard (o) sides of seat.
    \[ V_i = 305 \text{ mm} \quad V_o = 305 \text{ mm} \]
## DATA SHEET 5 (CONTINUED)

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

*(NOT REQUIRED FOR CLASS 2 SCHOOL BUSES)*

<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 $V_i$?</td>
<td><strong>FAIL</strong></td>
</tr>
<tr>
<td>14.</td>
<td>Is $U_o$ equal to or less than $V_o$?</td>
<td><strong>FAIL</strong></td>
</tr>
<tr>
<td>15.</td>
<td>Measure distance $S$ at inboard (I) and outboard (O) side of barrier.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$S_i = 743$ mm</td>
<td>$S_o = 746$ mm</td>
</tr>
<tr>
<td>16.</td>
<td>Measure distance $W$ at inboard (I) and outboard (O) sides of seat.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$W_i = 775$ mm</td>
<td>$W_o = 775$ mm</td>
</tr>
<tr>
<td>17.</td>
<td>Is $S_i + U_i$ equal to or greater than $W_i + V_i$?</td>
<td><strong>PASS</strong></td>
</tr>
<tr>
<td>18.</td>
<td>Is $S_o + U_o$ equal to or greater than $W_o + V_o$?</td>
<td><strong>PASS</strong></td>
</tr>
<tr>
<td>19.</td>
<td>Compute area $(W \times A) = 670,375$ mm$^2$</td>
<td></td>
</tr>
<tr>
<td>20.</td>
<td>Compute area $(E \times S) = 617,935$ mm$^2$</td>
<td></td>
</tr>
<tr>
<td>21.</td>
<td>Is $(W \times A)$ equal to or less than $(E \times S)$?</td>
<td><strong>FAIL</strong></td>
</tr>
</tbody>
</table>

**Comments:** None

**Recorded By:**

**Approved By:**

**DATE:** 10/31/2006
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:
   - $0^\circ = \text{Parallel With Floor, (+) is Up, (-) is Down}$
   - $X = \text{From Inboard Edge of Seat}$
   - $Y = \text{Measured Vertically from the SRP}$
DATA SHEET 6 (CONTINUED)
HEAD FORM IMPACT CONTACT AREA AND ENERGY REQUIREMENTS

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 &gt; 1935 mm²</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
<td>Y</td>
<td>Angle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H1</td>
<td>742</td>
<td>470</td>
<td>0</td>
<td>1.57</td>
<td>1.49</td>
</tr>
<tr>
<td>H2</td>
<td>641</td>
<td>470</td>
<td>0</td>
<td>1.57</td>
<td>1.50</td>
</tr>
<tr>
<td>H3</td>
<td>541</td>
<td>470</td>
<td>0</td>
<td>1.57</td>
<td>1.38</td>
</tr>
<tr>
<td>H4</td>
<td>370</td>
<td>470</td>
<td>0</td>
<td>1.56</td>
<td>1.60</td>
</tr>
<tr>
<td>H5</td>
<td>742</td>
<td>365</td>
<td>0</td>
<td>1.55</td>
<td>2.11</td>
</tr>
<tr>
<td>H6</td>
<td>641</td>
<td>365</td>
<td>0</td>
<td>1.56</td>
<td>1.40</td>
</tr>
<tr>
<td>H7</td>
<td>541</td>
<td>365</td>
<td>0</td>
<td>1.55</td>
<td>2.00</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: ________________________________

Approved By: ________________________________ DATE: 1/04/2007
SEAT BACK 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
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>Engr Reqd Joules</th>
<th>Column 5 &lt; 1000</th>
<th>Column 6 &gt; 4.5 joules</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X  Y  Angle</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes- Pass</td>
<td>No- Fail</td>
</tr>
<tr>
<td>H8</td>
<td>370 365 0</td>
<td>6.69</td>
<td>6.60</td>
<td>125</td>
<td>5.85</td>
<td>PASS</td>
<td>PASS</td>
</tr>
<tr>
<td>H9</td>
<td>270 470 0</td>
<td>6.69</td>
<td>6.76</td>
<td>94</td>
<td>12.18</td>
<td>PASS</td>
<td>PASS</td>
</tr>
<tr>
<td>H10</td>
<td>170 470 0</td>
<td>6.68</td>
<td>6.35</td>
<td>86</td>
<td>12.83</td>
<td>PASS</td>
<td>PASS</td>
</tr>
<tr>
<td>H11</td>
<td>70 470 0</td>
<td>6.63</td>
<td>6.63</td>
<td>73</td>
<td>18.83</td>
<td>PASS</td>
<td>PASS</td>
</tr>
<tr>
<td>H12</td>
<td>270 365 0</td>
<td>6.69</td>
<td>6.63</td>
<td>97</td>
<td>12.51</td>
<td>PASS</td>
<td>PASS</td>
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<tr>
<td>H13</td>
<td>170 365 0</td>
<td>6.68</td>
<td>6.63</td>
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<td>14.82</td>
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<td>PASS</td>
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<tr>
<td>H14</td>
<td>70 365 0</td>
<td>6.67</td>
<td>6.60</td>
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<td>5.74</td>
<td>PASS</td>
<td>PASS</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: ________________________________ DATE: 1/03/2007
DATA SHEET 7
KNEE FORM IMPACT TEST

Test Vehicle: 2006 US BUS SCHOOL BUS
Test Lab: MGA RESEARCH CORPORATION
NHTSA No.: C60900
Test Date: 1/04/2007

SEAT NUMBER: S2

SEAT BACK 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></td>
<td></td>
</tr>
<tr>
<td>K1</td>
<td>270</td>
<td>246</td>
<td>0</td>
<td>4.86</td>
<td>4.58</td>
<td>5,850</td>
<td>1,158</td>
</tr>
<tr>
<td>K2</td>
<td>170</td>
<td>246</td>
<td>0</td>
<td>4.87</td>
<td>4.76</td>
<td>5,730</td>
<td>1,022</td>
</tr>
<tr>
<td>K3</td>
<td>70</td>
<td>246</td>
<td>0</td>
<td>4.87</td>
<td>4.68</td>
<td>5,100</td>
<td>1,661</td>
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<tr>
<td>K4</td>
<td>270</td>
<td>150</td>
<td>0</td>
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<td>4.47</td>
<td>5,220</td>
<td>993</td>
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<td>K5</td>
<td>170</td>
<td>150</td>
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<td>4.80</td>
<td>4.79</td>
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<td>4.62</td>
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<tr>
<td>K7</td>
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<td>4.69</td>
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<td>1,089</td>
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<tr>
<td>K8</td>
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<td>4.82</td>
<td>4.48</td>
<td></td>
<td>1,614</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: 1/04/2007
DATA SHEET 8
SEAT BELT ASSEMBLY ANCHORAGES

Test Vehicle: **2006 US BUS SCHOOL BUS**  
Test Lab: **MGA RESEARCH CORPORATION**  
NHTSA No.: **C60900**  
Test Date: **3/29/2007**

## SEAT LOCATION: S3 in S4 Location

<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>
<th>Side View Horizontal Load Angle</th>
<th>Plan View From Vehicle Center Line</th>
</tr>
</thead>
<tbody>
<tr>
<td>S3 Left</td>
<td>Left</td>
<td>1</td>
<td>340</td>
<td>75°</td>
<td>10°</td>
<td>0°</td>
<td></td>
</tr>
<tr>
<td>S3 Right</td>
<td>Right</td>
<td>1</td>
<td>340</td>
<td>75°</td>
<td>10°</td>
<td>0°</td>
<td></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 (N)</th>
<th>Actual Max. Test Load (N)</th>
<th>PASS/FAIL</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>S3 Left</td>
<td>Left</td>
<td>22,000</td>
<td>15,047</td>
<td>FAIL</td>
<td></td>
</tr>
<tr>
<td>S3 Right</td>
<td>Right</td>
<td>22,000</td>
<td>14,347</td>
<td>FAIL</td>
<td></td>
</tr>
</tbody>
</table>

Comments: The seat mounting failed before the required load was achieved.

Recorded By: ____________________________

#### DATA SHEET B1 - SEAT BELT CHECK

**Test Vehicle:** 2006 US BUS SCHOOL BUS  
**NHTSA No.:** C60900  
**Test Lab:** MGA RESEARCH CORPORATION  
**Test Date:** 4/25/2007

1. No. of designated seating positions (DSP): 17
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>Seat No.</th>
<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>DSP #1 Inboard</td>
<td>Type 1</td>
<td>Type 1</td>
<td>Type 1</td>
<td>Type 1</td>
<td>Type 1</td>
<td>Type 1</td>
<td>Type 1</td>
<td>Type 1</td>
</tr>
<tr>
<td>DSP #2 Outboard</td>
<td>Type 1</td>
<td>Type 1</td>
<td>Type 1</td>
<td>Type 1</td>
<td>Type 1</td>
<td>Type 1</td>
<td>Type 1</td>
<td>Type 1</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Seat No.</th>
<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>
</table>

4. Single point, push-button, accessible latch release at each passenger DSP (571.208 S7.2(c))  
   - **Pass:** single point push-button  
   - **Fail:** not single point push-button

<table>
<thead>
<tr>
<th>Seat No.</th>
<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>DSP #1 Inboard</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 Outboard</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>
</tbody>
</table>
DATA SHEET B1 (CONTINUED)
SEAT BELT CHECK

Test Vehicle: 2006 US BUS SCHOOL BUS  NHTSA No.: C60900
Test Lab: MGA RESEARCH CORPORATION  Test Date: 4/25/2007

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>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>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>
</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>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>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>
</tbody>
</table>

7. Seat belt fit test dummies

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Serial Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>50% 6-Year old Child</td>
<td>FTSS 153</td>
</tr>
<tr>
<td>5% Adult Female</td>
<td>FTSS 507</td>
</tr>
<tr>
<td>50% Adult Male</td>
<td>FTSS 312</td>
</tr>
<tr>
<td>95% Adult Male</td>
<td>Denton 050</td>
</tr>
</tbody>
</table>
DATA SHEET B1 (CONTINUED)

SEAT BELT CHECK

Test Vehicle: **2006 US BUS SCHOOL BUS**
NHTSA No.: **C60900**
Test Lab: **MGA RESEARCH CORPORATION**
Test Date: **4/25/2007**

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

<table>
<thead>
<tr>
<th>Seat Number</th>
<th>S3</th>
<th>S1</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSP #1</td>
<td>50% C Pass</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>95% AM Pass</td>
<td>Pass</td>
</tr>
<tr>
<td>DSP #2</td>
<td>50% C Pass</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>95% AM Pass</td>
<td>Pass</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Belt Type</th>
<th>2</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>5% AF</th>
<th>Pass</th>
</tr>
</thead>
<tbody>
<tr>
<td>95% AM</td>
<td>Pass</td>
</tr>
</tbody>
</table>

Comments: None

Recorded By: ________________________________

DATA SHEET B2
SEAT BELT WARNING SYSTEM CHECK

Test Vehicle: 2006 US BUS SCHOOL BUS  NHTSA No.: C60900
Test Lab: MGA RESEARCH CORPORATION  Test Date: 4/25/2007

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: 5
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: 0
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: 0
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>Item 8: Stays On</td>
</tr>
<tr>
<td></td>
<td></td>
<td>60 seconds minimum</td>
</tr>
<tr>
<td>S7.3 (a)(2)</td>
<td>Belt latched &amp; key on or start</td>
<td>Item 12: 0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 to 8 seconds</td>
</tr>
<tr>
<td></td>
<td>Belt stowed &amp; key on or start</td>
<td>Item 8: Stays On</td>
</tr>
<tr>
<td></td>
<td></td>
<td>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: None

Recorded By: ____________________________


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## SECTION 5
### INSTRUMENTATION AND EQUIPMENT LIST

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Description</th>
<th>Model/Serial No.</th>
<th>Cal. Date</th>
<th>Next Cal. Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer</td>
<td>HP</td>
<td>Vectra / US03263612</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Test Fixture</td>
<td>MGA</td>
<td>TF2003</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>A/D Interface</td>
<td>Metrabyte</td>
<td>DAS-1802</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Load Cell Interface</td>
<td>1210AF-SK</td>
<td>62736</td>
<td>1/29/07</td>
<td>7/24/07</td>
</tr>
<tr>
<td>Load Cell Interface</td>
<td>1210AF / 137778</td>
<td>11/3/06</td>
<td>5/3/07</td>
<td></td>
</tr>
<tr>
<td>Inclinometer</td>
<td>Pro 360 / Comp Lab</td>
<td>10/4/06</td>
<td>4/4/07</td>
<td></td>
</tr>
<tr>
<td>Steel Tape</td>
<td>Stanley</td>
<td>Powerlock / 278</td>
<td>9/26/06</td>
<td>3/26/07</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-S75</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Planimeter</td>
<td>Sokkia Corp.</td>
<td>Planix5 007319</td>
<td>11/22/06</td>
<td>5/22/07</td>
</tr>
<tr>
<td>Accelerometer</td>
<td>Endevco</td>
<td>7264-2000 / W04807</td>
<td>10/4/06</td>
<td>4/4/07</td>
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<tr>
<td>Linear Motion Transducer</td>
<td>Ametek</td>
<td>P-25A / 1202-19366</td>
<td>10/30/06</td>
<td>4/30/07</td>
</tr>
<tr>
<td>Linear Motion Transducer</td>
<td>Ametek</td>
<td>P25A / 21954</td>
<td>10/30/06</td>
<td>4/30/07</td>
</tr>
</tbody>
</table>

Test Vehicle: **2006 US BUS SCHOOL BUS**  
NHTSA No.: **C60900**  
Test Lab: **MGA RESEARCH CORPORATION**  
Test Date: **10/31/2006**
# SECTION 6

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>36</td>
</tr>
<tr>
<td>2</td>
<td>Right Side View of School Bus</td>
<td>37</td>
</tr>
<tr>
<td>3</td>
<td>¾ Front View From Left Side of School Bus</td>
<td>38</td>
</tr>
<tr>
<td>4</td>
<td>¾ Rear View From Right Side of School Bus</td>
<td>39</td>
</tr>
<tr>
<td>5</td>
<td>Certification Label and Tire Placard</td>
<td>40</td>
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<tr>
<td>6</td>
<td>Vehicle Interior View From Front to Rear</td>
<td>41</td>
</tr>
<tr>
<td>7</td>
<td>Vehicle Interior View From Rear to Front</td>
<td>42</td>
</tr>
<tr>
<td>8</td>
<td>Pre-Test of Seat Back S6 Force Deflection Forward Test</td>
<td>43</td>
</tr>
<tr>
<td>9</td>
<td>Post-Test of Seat Back S6 Force Deflection Forward Test</td>
<td>44</td>
</tr>
<tr>
<td>10</td>
<td>Pre-Test of Seat Back S7 Force Deflection Forward Test</td>
<td>45</td>
</tr>
<tr>
<td>11</td>
<td>Post-Test of Seat Back S7 Force Deflection Forward Test</td>
<td>46</td>
</tr>
<tr>
<td>12</td>
<td>Pre-Test of Seat Back S4 Force Deflection Rearward Test</td>
<td>47</td>
</tr>
<tr>
<td>13</td>
<td>Post-Test of Seat Back S4 Force Deflection Rearward Test</td>
<td>48</td>
</tr>
<tr>
<td>14</td>
<td>Pre-Test of Seat Back S5 Force Deflection Rearward Test</td>
<td>49</td>
</tr>
<tr>
<td>15</td>
<td>Post-Test of Seat Back S5 Force Deflection Rearward Test</td>
<td>50</td>
</tr>
<tr>
<td>16</td>
<td>Post-Test of Head and Knee Impact Locations on Seat S2</td>
<td>51</td>
</tr>
<tr>
<td>17</td>
<td>Pre-Test FMVSS 222 Seat Belt Anchorage S3 (in Location S4)</td>
<td>52</td>
</tr>
<tr>
<td>18</td>
<td>Post-Test FMVSS 222 Seat Belt Anchorage Damage</td>
<td>53</td>
</tr>
<tr>
<td>19</td>
<td>Post-Test FMVSS 222 Seat Belt Anchorage Damage</td>
<td>54</td>
</tr>
<tr>
<td>20</td>
<td>Post-Test FMVSS 222 Seat Belt Anchorage Damage</td>
<td>55</td>
</tr>
</tbody>
</table>
Test Vehicle: 2006 US BUS SCHOOL BUS
Test Lab: MGA RESEARCH CORPORATION
NHTSA No.: C60900
Test Date: 10/31/2006

Left Side View of School Bus
Test Vehicle: 2006 US BUS SCHOOL BUS
Test Lab: MGA RESEARCH CORPORATION
NHTSA No.: C60900
Test Date: 10/31/2006

Right Side View of School Bus
Test Vehicle: 2006 US BUS SCHOOL BUS
Test Lab: MGA RESEARCH CORPORATION
NHTSA No.: C60900
Test Date: 10/31/2006

¾ Front View From Left Side of School Bus
Test Vehicle: 2006 US BUS SCHOOL BUS
Test Lab: MGA RESEARCH CORPORATION
NHTSA No.: C60900
Test Date: 10/31/2006

¾ Rear View From Right Side of School Bus
Test Vehicle: 2006 US BUS SCHOOL BUS
Test Lab: MGA RESEARCH CORPORATION
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Certification Label and Tire Placard
Test Vehicle: 2006 US BUS SCHOOL BUS
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NHTSA No.: C60900
Test Date: 10/31/2006
Test Vehicle: 2006 US BUS SCHOOL BUS
Test Lab: MGA RESEARCH CORPORATION
NHTSA No.: C60900
Test Date: 10/31/2006

Vehicle Interior View From Rear to Front
Test Vehicle: 2006 US BUS SCHOOL BUS
Test Lab: MGA RESEARCH CORPORATION
NHTSA No.: C60900
Test Date: 10/31/2006

Pre-Test of Seat Back S6 Force Deflection Forward Test
Post-Test of Seat Back S6 Force Deflection Forward Test
Pre-Test of Seat Back S7 Force Deflection Forward Test
Test Vehicle: 2006 US BUS SCHOOL BUS
NHTSA No.: C60900
Test Lab: MGA RESEARCH CORPORATION
Test Date: 10/31/2006

Post-Test of Seat Back S7 Force Deflection Forward Test
Pre-Test of Seat Back S4 Force Deflection Rearward Test
Test Vehicle: 2006 US BUS SCHOOL BUS  
NHTSA No.: C60900  
Test Lab: MGA RESEARCH CORPORATION  
Test Date: 10/31/2006

Post-Test of Seat Back S4 Force Deflection Rearward Test
Pre-Test of Seat Back S5 Force Deflection Rearward Test
Test Vehicle: 2006 US BUS SCHOOL BUS
Test Lab: MGA RESEARCH CORPORATION
Test Date: 10/31/2006

Post-Test of Seat Back S5 Force Deflection Rearward Test
Post-Test of Head and Knee Impact Locations on Seat S2
Test Vehicle: 2006 US BUS SCHOOL BUS
Test Lab: MGA RESEARCH CORPORATION
NHTSA No.: C60900
Test Date: 10/31/2006

Pre-Test FMVSS 222 Seat Belt Anchorage S3 (in Location S4)
Test Vehicle: 2006 US BUS SCHOOL BUS
Test Lab: MGA RESEARCH CORPORATION
NHTSA No.: C60900
Test Date: 10/31/2006

Post-Test FMVSS 222 Seat Belt Anchorage Damage
Test Vehicle: 2006 US BUS SCHOOL BUS  
Test Lab: MGA RESEARCH CORPORATION  
NHTSA No.: C60900  
Test Date: 10/31/2006

Post-Test FMVSS 222 Seat Belt Anchorage Damage
## TABLE OF TEST PLOTS

<table>
<thead>
<tr>
<th>No.</th>
<th>Test Description</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Seat Back Forward Deflection Seat S6 (Upper)</td>
<td>57</td>
</tr>
<tr>
<td>2</td>
<td>Seat Back Forward Deflection Seat S6 (Lower)</td>
<td>58</td>
</tr>
<tr>
<td>3</td>
<td>Seat Back Forward Deflection Seat S7 (Upper)</td>
<td>59</td>
</tr>
<tr>
<td>4</td>
<td>Seat Back Forward Deflection Seat S7 (Lower)</td>
<td>60</td>
</tr>
<tr>
<td>5</td>
<td>Seat Back Rearward Deflection S4</td>
<td>61</td>
</tr>
<tr>
<td>6</td>
<td>Seat Back Rearward Deflection S5</td>
<td>62</td>
</tr>
<tr>
<td>7</td>
<td>FMVSS 222 Seat Belt Anchorage</td>
<td>63</td>
</tr>
<tr>
<td>8</td>
<td>H1 Head Form Impact (1.5 m/s)</td>
<td>64</td>
</tr>
<tr>
<td>9</td>
<td>H2 Head Form Impact (1.5 m/s)</td>
<td>65</td>
</tr>
<tr>
<td>10</td>
<td>H3 Head Form Impact (1.5 m/s)</td>
<td>66</td>
</tr>
<tr>
<td>11</td>
<td>H4 Head Form Impact (1.5 m/s)</td>
<td>67</td>
</tr>
<tr>
<td>12</td>
<td>H5 Head Form Impact (1.5 m/s)</td>
<td>68</td>
</tr>
<tr>
<td>13</td>
<td>H6 Head Form Impact (1.5 m/s)</td>
<td>69</td>
</tr>
<tr>
<td>14</td>
<td>H7 Head Form Impact (1.5 m/s)</td>
<td>70</td>
</tr>
<tr>
<td>15</td>
<td>H8 Head Form Impact (6.69 m/s)</td>
<td>71</td>
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<tr>
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<td>H9 Head Form Impact (6.69 m/s)</td>
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</table>
Test Desc: Seat Back Forward Deflection (Upper)  
Component ID: US BUS S6  
Component ID: US BUS S6  
Test Date: 11/15/2006  
NHTSA #: C60900

**FORCE (N) VS DISPLACEMENT (mm)**

- Total Energy: 1,455 J
- Disp Max : 361.6 mm
- Time Max : 29.4 S
- Force Max : 6,483.0 N
- Time Max : 23.2 S

**DISPLACEMENT (mm) VS TIME (SEC)**

- Disp Max : 361.6 mm
- Time Max : 29.4 S

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

- Force Max : 6,483.0 N
- Time Max : 23.2 S
Test Desc: Seat Back Forward Deflection (Lower)
Component ID: US BUS S6
NHTSA #: C60900
Test Date: 11/15/2006

FORCE (N) VS DISPLACEMENT (mm)
- Force Max : 6,107.2 N
- Disp. Max : 73.7 mm
- Disp. End : 60.8 mm
- Time Max : 18.0 S
- Force @ 60 sec : 2,797.4 N

DISPLACEMENT (mm) VS TIME (SEC)

FORCE (N) VS TIME (SEC)
Test Desc: Seat Back Forward Deflection (Upper)  
Component ID: US BUS S7  
NHTSA #: C06900  

Test Date: 11/15/2006  

FORCE (N) VS DISPLACEMENT (mm)

Total Energy: 1,258 J

DISPLACEMENT (mm) VS TIME (SEC)

Disp Max : 355.5 mm  
Time Max : 27.4 S

FORCE (N) VS TIME (SEC)

Force Max : 5,588.6 N  
Time Max : 21.5 S
Test Desc: Seat Back Forward Deflection (Lower)  
Test Date: 11/15/2006  
Component ID: US BUS S7  
NHTSA #: C60900

FORCE (N) VS DISPLACEMENT (mm)

DISPLACEMENT (mm) VS TIME (SEC)

force Max : 6,144.8 N  
Time Max : 18.4 S  
Force @ 60 sec : 1,910.4 N

Disp. Max : 73.7 mm  
Disp. End : 54.4 mm
Test Desc: Seat Back Rearward Deflection
Component ID: US BUS S4
NHTSA #: C60900

Test Date: 11/16/2006

- Total Energy: 674.7 J
- Force Max: 8,022.8 N
- Time Max: 16.4 S
- Disp Max: 227.2 mm
- Time Max: 20.4 S
Test Desc: Seat Back Rearward Deflection
Component ID: US BUS S5
NHTSA #: C60900
Test Date: 11/16/2006

Total Energy: 858.2 J

Force Max: 7,371.5 N
Time Max: 16.3 S
Disp Max: 256.0 mm
Time Max: 24.7 S
Test Desc: FMVSS 222 Seat Belt Anchorage
Component ID: US Bus S3 (in Location S4)
NHTSA No: C60900

Test Date: 3/29/2007

Left Lap Belt Force (N) vs. Time (sec)

Right Belt Force (N) vs. Time (sec)
**Test Desc:** Head Form Impact (1.5 m/s)  
**Test Date:** 1/4/2007  
**Component ID:** US BUS S2, Location H1  
**NHTSA #:** C60900

**HEAD X Acceleration (G's) VS TIME (S)**
- Max: 5.07 G's  
- Tmax: 0.20 S  
- Min: -5.44 G's  
- Tmin: 0.04 S

**VELOCITY X (m/s) VS TIME (S)**
- Max: 1.49 m/s  
- Tmax: -0.01 S  
- Min: -1.04 m/s  
- Tmin: 0.09 S  
- Vel@Imp: 1.487 m/s
Test Desc: Head Form Impact (1.5 m/s)  
Test Date: 1/4/2007  
Component ID: US BUS S2, Location H2  
NHTSA #: C60900

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

- Max: 5.26 G's  
- Tmax: 0.20 S  
- Min: -5.14 G's  
- Tmin: 0.05 S

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

- Max: 1.50 m/s  
- Tmax: -0.01 S  
- Min: -0.96 m/s  
- Tmin: 0.09 S  
- VEL@IMP: 1.498 m/s
Test Desc: Head Form Impact (1.5 m/s)
Component ID: US BUS S2, Location H3
NHTSA #: C60900

Test Date: 1/4/2007

HEAD X Acceleration (G's) VS TIME (S)
Max: 5.09 G's
TMax: 0.21 S
Min: -4.94 G's
TMin: 0.05 S

VEL@IMP: 1.383 m/s

VELOCITY X (m/s) VS TIME (S)
Max: 1.40 m/s
TMax: -0.01 S
Min: -1.29 m/s
TMin: 0.17 S
VEL@IMP: 1.383 m/s
Test Desc: Head Form Impact (1.5 m/s)  
Component ID: US BUS S2, Location H5  
NHTSA #: C60900  

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

Max: 5.34 G's  
TMax: 0.21 S  
Min: -5.07 G's  
TMin: 0.03 S

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

Max: 3.11 m/s  
TMax: 0.36 S  
Min: 0.10 m/s  
TMin: 0.07 S  
VEL@IMP: 2.105 m/s
Test Desc: Head Form Impact (1.5 m/s)  
Component ID: US BUS S2, Location H6  
NHTSA #: C60900

**HEAD X Acceleration (G's) VS TIME (S)**
- Max: 4.99 G's
- TMax: 0.21 S
- Min: -5.50 G's
- Tmin: 0.03 S

**VELOCITY X (m/s) VS TIME (S)**
- Max: 1.41 m/s
- TMax: -0.01 S
- Min: -1.05 m/s
- Tmin: 0.11 S
- VEL@IMP: 1.397 m/s
Test Desc: Head Form Impact (1.5 m/s)  
Component ID: US BUS S2, Location H7  
Test Date: 1/4/2007  
NHTSA #: C60900  

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

Max: 5.21 G's  
TMax: 0.22 S  
Min: -5.02 G's  
TMin: 0.04 S

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

Max: 3.86 m/s  
TMax: 0.76 S  
Min: 0.02 m/s  
TMin: 0.07 S  
VEL@IMP: 2.004m/s
Test Desc: Head Form Impact (6.69 m/s)  
Test Date: 1/3/2007  
Component ID: US BUS S2, Location H8  
NHTSA #: C60900

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

- Max: 37.82 G's
- Tmax: 0.08 S
- Min: -50.70 G's
- Tmin: 0.01 S

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

- Max: 6.64 m/s
- Tmax: -0.00 S
- Min: -2.97 m/s
- Tmin: 0.08 S

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

- Max: 1,933.17 N
- Tmax: 0.08 S
- Min: -2,591.49 N
- Tmin: 0.01 S

**Force (N) vs Time (SEC)**

Energy: 5.85 J
Test Desc: Head Form Impact (6.69 m/s)  Test Date: 1/3/2007
Component ID: US BUS S2, Location H9  NHTSA #: C60900

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

Max: 37.65 G's
TMax: 0.10 S
Min: -44.49 G's
TMin: 0.01 S

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

Max: 6.80 m/s
TMax: -0.00 S
Min: -2.86 m/s
TMin: 0.07 S
VEL@IMP: 6.758 m/s

MAX: 1,924.16 N
TMax: 0.10 S
Min: -2,273.73 N
TMin: 0.01 S

Energy: 12.18 J
Test Desc: Head Form Impact (6.69 m/s)  Test Date: 1/3/2007
Component ID: US BUS S2, Location H10  NHTSA #: C60900

Max: 55.65 G's  Tmax: 0.10 S  Min: -42.75 G's  Tmin: 0.01 S

Max: 6.43 m/s  Tmax: -0.01 S  Min: -3.78 m/s  Tmin: 0.07 S  VEL@IMP: 6.349 m/s

Max: 2,844.32 N  Tmax: 0.10 S  Min: -2,184.84 N  Tmin: 0.01 S

Energy: 12.83 J
Test Desc: Head Form Impact (6.69 m/s)  Test Date: 1/3/2007
Component ID: US BUS S2, Location H11  NHTSA #: C60900

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

Max: 49.91 G's  
TMax: 0.11 S  
Min: -40.91 G's  
TMin: 0.02 S

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

Max: 6.67 m/s  
TMax: -0.01 S  
Min: -2.94 m/s  
TMin: 0.07 S  
VEL@IMP: 6.625 m/s

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

Max: 2,550.96 N  
TMax: 0.11 S  
Min: -2,091.15 N  
TMin: 0.02 S

**FORC (N) VS TIME (SEC)**

Energy: 18.83 J
Test Desc: Head Form Impact (6.69 m/s)  
Test Date: 1/3/2007  
Component ID: US BUS S2, Location H12  
NHTSA #: C60900

HEAD X ACCELERATION (G's) VS TIME (S)  
Hic: 96.81  
Max: 66.03 G's  
TMax: 0.10 S  
Min: -34.34 G's  
TMin: 0.01 S

VELOCITY X (m/s) VS TIME (S)  
Max: 6.67 m/s  
TMax: -0.00 S  
Min: -3.23 m/s  
TMin: 0.07 S  
VEL@IMP: 6.632 m/s

FORCE X (N) VS TIME (S)  
Max: 3,374.96 N  
TMax: 0.10 S  
Min: -1,755.14 N  
TMin: 0.01 S

Energy: 12.51 J
Test Desc: Head Form Impact (6.69 m/s)
Component ID: US BUS S2, Location H13
NHTSA #: C60900

Max: 42.13 G's
TMax: 0.11 S
Min: -46.87 G's
TMin: 0.03 S

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

Max: 6.70 m/s
TMax: -0.01 S
Min: -3.04 m/s
TMin: 0.07 S
VEL@IMP: 6.627 m/s

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

Max: 2,153.18 N
TMax: 0.11 S
Min: -2,395.59 N
TMin: 0.03 S

FORCE X (N) VS TIME (S)

Energy: 14.82 J

FORCE (N) VS TIME (SEC)
Test Desc: Head Form Impact (6.69 m/s)  Test Date: 1/3/2007
Component ID: US BUS S2, Location H14  NHTSA #: C60900

Max: 46.51 G's  Tmax: 0.10 S  Min: -52.56 G's  Tmin: 0.01 S

Max: 6.67 m/s  Tmax: -0.01 S  Min: -3.06 m/s  Tmin: 0.07 S  VEL@IMP: 6.594 m/s

Max: 2,377.18 N  Tmax: 0.10 S  Min: -2,686.47 N  Tmin: 0.01 S

Energy: 5.74 J
Test Desc: Knee Form Impact
Component ID: US BUS S2, Location K1

Test Date: 1/4/2007
NHTSA #: C60900

KNEE X Acceleration (G's) VS TIME (S)
Max: 22.11 G's
TMax: 0.04 s
Min: -26.06 G's
TMin: 0.10 s

VELOCITY X (m/s) VS TIME (S)
Max: 4.61 m/s
TMax: 0.07 s
Min: -2.60 m/s
TMin: 0.20 s
VEL@IMP: 4.58 m/s

FORCE X (N) VS TIME (S)
Max: 982.50 N
TMax: 0.04 s
Min: -1,158.02 N
TMin: 0.10 s
Test Desc: Knee Form Impact  
Component ID: US BUS S2, Location K2  
NHTSA #: C60900  
Test Date: 1/3/2007

- **KNEE X Acceleration (G's) VS TIME (S)**  
  Max: 22.33 G's  
  Tmax: 0.04 s  
  Min: -23.01 G's  
  Tmin: 0.10 s

- **VELOCITY X (m/s) VS TIME (S)**  
  Max: 4.78 m/s  
  Tmax: 0.07 s  
  Min: -2.21 m/s  
  Tmin: 0.16 s  
  Vel@Imp: 4.76 m/s

- **FORCE X (N) VS TIME (S)**  
  Max: 992.45 N  
  Tmax: 0.04 s  
  Min: -1,022.38 N  
  Tmin: 0.10 s
Test Desc: Knee Form Impact  
Component ID: US BUS S2, Location K3  
Test Date: 1/3/2007  
NHTSA #: C60900

KNEE X Acceleration (G's) VS TIME (S)
- Max: 21.92 G's
- Tmax: 0.04 s
- Min: -37.39 G's
- Tmin: 0.09 s

VELOCITY X (m/s) VS TIME (S)
- Max: 4.68 m/s
- Tmax: 0.07 s
- Min: -2.07 m/s
- Tmin: 0.15 s
- Vel@IMP: 4.68 m/s

FORCE X (N) VS TIME (S)
- Max: 974.12 N
- Tmax: 0.04 s
- Min: -1,661.47 N
- Tmin: 0.09 s
Test Desc: Knee Form Impact
Component ID: US BUS S2, Location K4

Test Date: 1/3/2007
NHTSA #: C60900

KNEE X Acceleration (G's) VS TIME (S)
Max: 21.53 G's
TMax: 0.04 s
Min: -22.34 G's
TMin: 0.11 s

VELOCITY X (m/s) VS TIME (S)
Max: 4.52 m/s
TMax: 0.07 s
Min: -3.98 m/s
TMin: 1.13 s
VEL@IMP: 4.47 m/s

FORCE X (N) VS TIME (S)
Max: 956.61 N
TMax: 0.04 s
Min: -992.82 N
TMin: 0.11 s
Test Desc: Knee Form Impact
Component ID: US BUS S2, Location K5
Test Date: 1/3/2007
NHTSA #: C60900

KNEE X Acceleration (G's) VS TIME (S)
Max: 21.83 G's
TMax: 0.04 s
Min: -22.13 G's
TMin: 0.11 s

VELOCITY X (m/s) VS TIME (S)
Max: 4.80 m/s
TMax: 0.07 s
Min: -2.02 m/s
TMin: 0.16 s
VEL@IMP: 4.79 m/s

FORCE X (N) VS TIME (S)
Max: 970.27 N
TMax: 0.04 s
Min: -983.43 N
TMin: 0.11 s
Test Desc: Knee Form Impact
Component ID: US BUS S2, Location K6
Test Date: 1/3/2007
NHTSA #: C60900

KNEE X Acceleration (G's) VS TIME (S)
Max: 21.89 G's
TMax: 0.04 s
Min: -30.33 G's
TMin: 0.09 s

VELOCITY X (m/s) VS TIME (S)
Max: 4.63 m/s
TMax: 0.07 s
Min: -1.88 m/s
TMin: 0.16 s
VEL@IMP: 4.62 m/s

FORCE X (N) VS TIME (S)
Max: 972.78 N
TMax: 0.04 s
Min: -1,347.98 N
TMin: 0.09 s
Test Desc: Knee Form Impact  
Component ID: US BUS S2, Location K7  
Test Date: 1/3/2007  
NHTSA #: C60900

KNEE X Acceleration (G's) VS TIME (S)
Max: 23.78 G's  
TMax: 0.21 s  
Min: -24.50 G's  
TMin: 0.11 s

VELOCITY X (m/s) VS TIME (S)
Max: 4.73 m/s  
TMax: 0.07 s  
Min: -2.17 m/s  
TMin: 0.16 s  
VEL@IMP: 4.69 m/s

FORCE X (N) VS TIME (S)
Max: 1,056.91 N  
TMax: 0.21 s  
Min: -1,088.54 N  
TMin: 0.11 s
Test Desc: Knee Form Impact
Component ID: US BUS S2, Location K8
Test Date: 1/3/2007
NHTSA #: C60900

KNEE X Acceleration (G's) VS TIME (S)
Max: 21.28 G's
TMax: 0.04 s
Min: -36.31 G's
TMin: 0.09 s

VELOCITY X (m/s) VS TIME (S)
Max: 4.51 m/s
TMax: 0.07 s
Min: -1.94 m/s
TMin: 0.21 s
VEL@IMP: 4.48 m/s

FORCE X (N) VS TIME (S)
Max: 945.47 N
TMax: 0.04 s
Min: -1,613.73 N
TMin: 0.09 s
SECTION 8
WELT CONTACT POINTS

Test Vehicle: 2006 US BUS SCHOOL BUS
Test Lab: MGA RESEARCH CORPORATION
NHTSA No.: C60900
Test Date: 2/27/2007

H1 / SEAT S2

H1  US BUS  66.4 cm²
Test Vehicle: 2006 US BUS SCHOOL BUS  
NHTSA No.: C60900  
Test Lab: MGA RESEARCH CORPORATION  
Test Date: 2/27/2007  

H2 / SEAT S2

H2 US BUS 63.1 cm²
SECTION 8 (CONTINUED)
WELT CONTACT POINTS

Test Vehicle: 2006 US BUS SCHOOL BUS
Test Lab: MGA RESEARCH CORPORATION
NHTSA No.: C60900
Test Date: 2/27/2007

H3 / SEAT S2

H3 US BUS 59.6 cm²
Test Vehicle: 2006 US BUS SCHOOL BUS
Test Lab: MGA RESEARCH CORPORATION
NHTSA No.: C60900
Test Date: 2/27/2007

H4 / SEAT S2

H4 US BUS 57.8 cm²
SECTION 8 (CONTINUED)
WELT CONTACT POINTS

Test Vehicle: 2006 US BUS SCHOOL BUS  
NHTSA No.: C60900  
Test Lab: MGA RESEARCH CORPORATION  
Test Date: 2/27/2007

H5 / SEAT S2

H5  US BUS  69.3 cm²
SECTION 8 (CONTINUED)
WELT CONTACT POINTS

Test Vehicle: 2006 US BUS SCHOOL BUS  
Test Lab: MGA RESEARCH CORPORATION  
NHTSA No.: C60900  
Test Date: 2/27/2007

H6 / SEAT S2

H6 US BUS 67.3 cm²
SECTION 8 (CONTINUED)
WELT CONTACT POINTS

Test Vehicle: 2006 US BUS SCHOOL BUS
Test Lab: MGA RESEARCH CORPORATION
NHTSA No.: C60900
Test Date: 2/27/2007

H7 / SEAT S2

H7 US BUS  67.0 cm²
SECTION 8 (CONTINUED)
WELT CONTACT POINTS

Test Vehicle: 2006 US BUS SCHOOL BUS  
Test Lab: MGA RESEARCH CORPORATION  
NHTSA No.: C60900  
Test Date: 2/27/2007

K1 / SEAT S2

K1  US BUS  58.5 cm²
SECTION 8 (CONTINUED)
WELT CONTACT POINTS

Test Vehicle: 2006 US BUS SCHOOL BUS
Test Lab: MGA RESEARCH CORPORATION
NHTSA No.: C60900
Test Date: 2/27/2007

K2 / SEAT S2

K2 US BUS 57.3 cm²
WELT CONTACT POINTS

Test Vehicle: 2006 US BUS SCHOOL BUS
Test Lab: MGA RESEARCH CORPORATION
NHTSA No.: C60900
Test Date: 2/27/2007

K3 / SEAT S2

K3 US BUS 51.0 cm²
SECTION 8 (CONTINUED)
WELT CONTACT POINTS

Test Vehicle: 2006 US BUS SCHOOL BUS
Test Lab: MGA RESEARCH CORPORATION
NHTSA No.: C60900
Test Date: 2/27/2007

K4 / SEAT S2

K4 US BUS  52.2 cm²
LABORATORY NOTICE OF TEST FAILURE TO OVSC

<table>
<thead>
<tr>
<th>Test Procedure:</th>
<th>FMVSS 222</th>
<th>Test Date:</th>
<th>November 16, 2006</th>
</tr>
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<tbody>
<tr>
<td>Test Vehicle:</td>
<td>US Bus</td>
<td>Test Lab:</td>
<td>MGA Research Corp.</td>
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<tr>
<td>NHTSA No.:</td>
<td>C60900</td>
<td>Project Engineer:</td>
<td>Jim Hansen</td>
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<tr>
<td>Contract No.:</td>
<td>DTNH22-02-D-01057</td>
<td>Delivery Order No.:</td>
<td>5</td>
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<td>MFR.:</td>
<td>US Bus</td>
<td>VIN:</td>
<td>1GBHG31V561226021</td>
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<tr>
<td>Build Date:</td>
<td>08/06</td>
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</table>

TEST FAILURE DESCRIPTION

During the rearward deflection test, the S5 seat back moved to within 102 mm of the seat located directly behind the test seat prior to reaching the energy absorption required by S5.1.4.2. A repeat test on a new seat was performed while limiting the travel of the loading bar. The seat back still moved to within 102 mm of the seat located directly behind the test seat well before the energy absorption requirement was met.

FMVSS REQUIREMENTS DESCRIPTION

Paragraph S5.1.4 (c): Seat performance rearward, “The seat shall not deflect by an amount such that any part of the seat moves to within 102 mm of any part of another passenger seat in its originally installed position.”

Remarks: No remarks.

Notification to NHTSA (COTR): Brian Smith

Date: November 16, 2006

By: ___________________
LABORATORY NOTICE OF TEST FAILURE TO OVSC

Test Procedure: FMVSS 222  Test Date: March 29, 2007
NHTSA No.: C60900  Project Engineer: Eric Peschman
Contract No.: DTNH22-02-D-01057  Delivery Order No.: 005
MFR.: US Bus  VIN: 1GBHG31V561226021
Build Date: 8/03/2006

TEST FAILURE DESCRIPTION

The force application, for the seat belt assembly anchorages, in the S5 location did not reach the specified force before the failure of the floor and wall mount anchor structure. The force requirement as specified in 49 CFR 571.210 is 22,000 N. The actual force reached 14,602 N before failure of the floor and wall mount anchor structure.

FMVSS REQUIREMENTS DESCRIPTION

Paragraph S.5.1: “Apply the force at the onset rate of not more than 222,411 N per second. Attain the 22,241 N force in not more than 30 seconds and maintain it for 10 seconds.”

Remarks: No remarks.

Notification to NHTSA (COTR): Lawrence Q. Valvo

Date: March 29, 2007

By: [Signature]