

REPORT NUMBER: 222-MGA-03-004

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

**2003 Liberty Freedom School Bus  
NHTSA No.: C30901**

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



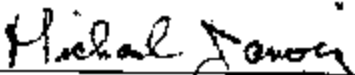
Final Report Date: December 4, 2003

**FINAL REPORT**

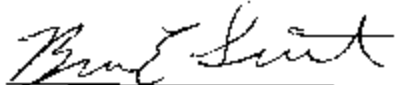
**PREPARED FOR:  
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NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION  
ENFORCEMENT  
OFFICE OF VEHICLE SAFETY COMPLIANCE  
400 SEVENTH STREET, SW, ROOM 6115 (NVS-220)  
WASHINGTON, D.C. 20590**

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Prepared by:  Date: December 4, 2003  
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FINAL REPORT ACCEPTED BY:



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16. Abstract Compliance tests were conducted on the subject 2003 Liberty Freedom School Bus, NHTSA No. C30901 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 Failures: 1) The force application, for the seat belt assembly anchorages, in the S5 location did not reach the specified force of 22,000 N before the failure of the floor and wall mount anchor structure. The actual forces reached 18,318 N and 20,098 N before failure. 2) The impact area on the wall above the passenger side (B8) barrier, designated as location H14 and H15 did not reach the required specified energy of 4.5 joules. The actual energy reached was 1.74 joules at H14 and 2.21 joules at H15. 3) The impact energy criteria, on seat (S1), location H7 and H12 did not reach the specified energy of 4.5 joules. The actual energy reached was 3.9 joules at H7 and 4.4 joules at H12.					
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**SECTION 1**  
**PURPOSE OF COMPLIANCE TEST**

Tests were conducted on a MY 2003 Liberty Freedom School Bus, NHTSA No. C30901, 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 July and August 2003. The test vehicle, MY 2003 Liberty Freedom School Bus, NHTSA No. C30901, did not appear to meet all the requirements of FMVSS 222. All tests were conducted by MGA Research Corporation at the Wisconsin Operations.

### 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 8 were measured in accordance with Section 12.1 of OVSC TP-222-03. As shown in Data Sheet 2 for Seat Nos. 1 and 8, the seat back area is greater than ninety percent of the seat bench width multiplied by 508.

### SEAT CUSHION RETENTION

Seat Nos. S4 and S5 were tested in accordance with Section 12.3 of OVSC TP-222-03. Seat cushion weight was 3.5 kg. The maximum force reached for both seats was 173 N. The lower time limit boundary (t1) was approximately 3 seconds with an approximate load duration of 5 seconds. As shown in Data Sheet 3, the seat cushions tested complied with all requirements.

**SECTION 2 (CONTINUED)**  
**TEST DATA SUMMARY**

SEAT BACK FORCE/DEFLECTION TEST - FORWARD

Seat No. S7 was tested in accordance with Section 12.4 of OVSC TP-222-03. Seat bench width was determined to be 762.5 mm. "W" was calculated to be 2.0. The seating reference point (SRP) was 492 mm above the bus floor. The deflection of the seat back at conclusion of lower loading bar loading at 3114 N position was 65 mm. 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 test was stopped when the maximum deflection curve of the upper loading bar was 1719 joules. The minimum required area under the force versus deflection curve of the upper loading bar was 452 W or 904 joules. As shown on Data Sheet No. 4, Seat No. S7 met the force deflection forward requirements. See Plots 3 and 4.

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 763 mm for Seat No. S3 and 763 mm for Seat No. S6. "W" was calculated to be 2.0. The seating reference point (SRP) was 492 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 10.6 mm/sec for Seat Nos. S3 and S6. The location of the loading bar was 343 mm above the SRP for both Seat Nos. S3 and S6. The test was stopped when the maximum deflection of the seat back of 254 mm was achieved.

**SECTION 2 (CONTINUED)**  
**TEST DATA SUMMARY**

SEAT BACK FORCE/DEFLECTION TEST – REARWARD (CONTINUED)

The area under the force versus deflection curve of the loading bar was 902 joules for Seat No. S3 and 872 joules for Seat No. S6. The minimum required area under the force versus deflection curve of the loading bar was 316 W or 632 joules. As shown in Data Sheet No. 5, the tested area under the force versus deflection curve for the loading bar does comply with the requirements for both Seat Nos. S3 and S6. See Plots 5 and 6.



**SECTION 2 (CONTINUED)**  
**TEST DATA SUMMARY**

**KNEE FORM IMPACT ZONE TESTS**

Seat No. S1 was 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 the seat.

**HEAD FORM IMPACT ZONE TESTS**

Seat No. S1 was tested in accordance with Section 12.6 of OVSC TP-222-03. The mass of the head form was 5.20 kg. All head form contact area criteria was met for the seat. The impact energy criteria of 4.5 joules for locations H7 and H12 were not met. See Plots 17 and 22.

Wall barrier (above and behind front door) on right side of vehicle failed to meet impact energy criteria of 4.5 joules for locations H14 and H15. See Plots 23 and 24.

**SEAT BELT ANCHORAGES**

Seat belt anchorage for seat location S5 was tested in accordance with Appendix A of OVSC TP-222-03. Seat location S5 is located as shown in seating diagram in Section 8.

Seat belt anchorages and specially made high strength webbing straps were used to conduct the test. The seat belt anchor points failed to meet the required load of 22,241 N for each due to failure of seat to bus anchor points at an achieved load of 18,318 N and 20,098 N for the two (2) seating positions being tested. See Plots 33 and 34.

**ADMINISTRATIVE DATA SHEET**

Test Vehicle: **2003 Liberty Freedom School Bus**  
Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C30901**  
Test Date: **7/10/03**

**INCOMPLETE VEHICLE (IF APPLICABLE)**

Manufacturer:	General Motors Corporation
Model:	Express
VIN:	1GBHG39U831110237
Build Date:	10/02
Certification Date:	N/A

**COMPLETED VEHICLE (SCHOOL BUS)**

Manufacturer:	2003 Liberty Bus
Make/Model:	School Bus/Freedom
VIN:	1GBHG39U831110237
NHTSA No.:	C30901
Color:	Yellow
GVWR:	4,335 kg / 9,600 lbs
Build Date:	02/03
Certification Date:	02/03

**DATES**

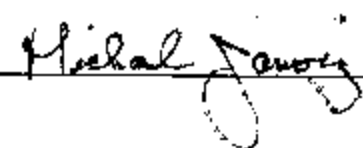
Vehicle Receipt:	June 11, 2003
Start of Compliance Test:	July 7, 2003
Completion of Compliance Test:	August 15, 2003

TEST VEHICLE (SCHOOL BUS) DISPOSITION: **FMVSS 301S Test**

**COMPLIANCE TEST:**

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

Recorded By: 

Approved By: 

DATE: December 4, 2003

## GENERAL TEST DATA SHEET

Test Vehicle: **2003 Liberty Freedom School Bus**  
 Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C30901**  
 Test Date: **7/10/03**

### SCHOOL BUS IDENTIFICATION

Model Year/Mfr./Make/Model:	2003/Liberty/School Bus/Freedom
Wheelbase:	3.94 m
Passenger Capacity:	17 (1 driver, 16 passengers)
NHTSA No.:	C30901
VIN:	1GBHG39U831110237
Conventional or Forward Control:	Forward
GVWR (Certification Label) FRONT:	1951 kg
GVWR (Certification Label) REAR:	2760 kg
GVWR (Certification Label) TOTAL:	4355 kg

### TEST CONDITIONS

Date(s) of Test:	7/7/03 - 8/15/03
Ambient Temperature (°C):	20
Required Temperature Range:	0°C to 32°C

### SEAT IDENTIFICATION

Seat Manufacturer:	C. E. White
Model Name & Number:	[REDACTED]
Description of Seats:	Seat frames are constructed of 25.4 mm round welded steel tubing. The seat back has a .535 mm steel pan welded to the tubing and is covered with 25 mm poly foam on the front surface and 25 mm rebond foam on the outer edges and 35 mm molded Styrofoam blocks inset into the outboard knee impact areas. The seat cushion is constructed of 10 mm particle board with 125 mm tapering to 85 mm poly foam pad. 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 MY2003 Liberty Freedom School Bus, NHTSA No. C30901.

**DATA SHEET 1**  
**SEAT TO SEAT/BARRIER SPACING**

Test Vehicle: **2003 Liberty Freedom School Bus**  
Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C30901**  
Test Date: **7/10/03**

SEAT NUMBER	MEASUREMENT OF SPACING FROM SRP FORWARD TO SEAT/BARRIER (mm)	REQMT $\leq 610$ MM ( $\leq 24"$ ) CLASS 1 BUSES ONLY)
		PASS/FAIL
1	480	PASS
2	485	PASS
3	470	PASS
4	495	PASS
5	460	PASS
6	505	PASS
7	496	PASS
8	480	PASS

COMMENTS: NONE

Recorded By: *John Pabala*

Approved By: *Michael Janicz*

DATE: December 4, 2003

**DATA SHEET 2**  
**SEAT BACK HEIGHT & FRONT SURFACE AREA TEST**

Test Vehicle: **2003 Liberty Freedom School Bus**  
 Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C30901**  
 Test Date: **7/10/03**

**SEAT NUMBER: 58**

		PASS/FAIL
1.	Is the seat back height at least 508 mm vertically above the SRP? (S5.1.2)	<b>PASS</b>

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 = 651 mm; width, b = 745 mm; radius = 110 mm

Area =  $\frac{1}{2}(a+b) \times 508 \text{ mm} = 354,584 \text{ mm}^2 - *5,185.5 \text{ mm}^2 = 349,398.5 \text{ mm}^2$

3. Measure the seat cushion width -- W1 = 762.5 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.

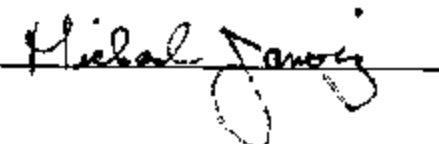
4. Calculate the following:  $0.9 \times W1 \times 508 \text{ mm} = 348,615 \text{ mm}^2$

		PASS/FAIL
5.	Is item 2 greater than item 4? (S5.1.2)	<b>PASS</b>

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.

Recorded By: 

Approved By: 

DATE: December 4, 2003

**DATA SHEET 2 (CONTINUED)**  
**SEAT BACK HEIGHT & FRONT SURFACE AREA TEST**

**SEAT NUMBER: S1**

		PASS/FAIL
1.	Is the seat back height at least 508 mm vertically above the SRP? (S5.1.2)	PASS

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 = 651 mm; width, b = 745 mm; radius = 110 mm

Area =  $\frac{1}{2}(a+b) \times 508 \text{ mm} = 354,584 \text{ mm}^2 - *5,185.5 \text{ mm}^2 = 349,398.5 \text{ mm}^2$

3. Measure the seat cushion width - - W1 = 762.5 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:  $0.9 \times W1 \times 508 \text{ mm} = 348,615 \text{ mm}^2$

		PASS/FAIL
5.	Is item 2 greater than item 4? (S5.1.2)	PASS

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.

Recorded By: \_\_\_\_\_

*John Walsh*

Approved By: \_\_\_\_\_

*Michael Janney*

DATE: December 4, 2003

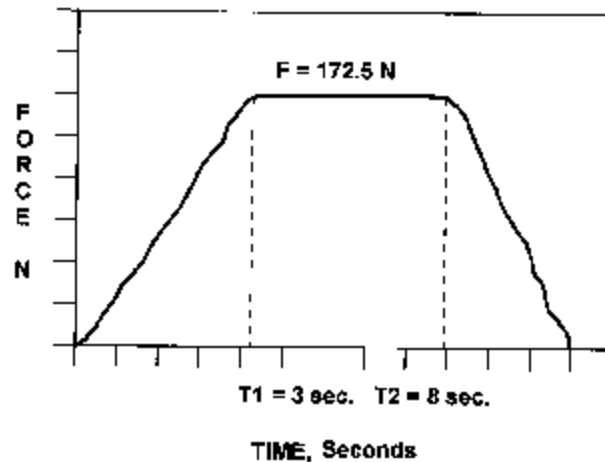
**DATA SHEET 3**  
**SEAT CUSHION RETENTION TEST**

Test Vehicle: **2003 Liberty Freedom School Bus**  
Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C30901**  
Test Date: **7/10/03**

**SEAT NUMBER: S4**

1. Cushion Weight/Mass = 3.5 kg
2. Cushion Weight x 5 = F = 172.5 N (S5.1.5)
3. Complete the following force/time graph:



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

		PASS/FAIL
4.	Did seat cushion separate from the seat structure at any attachment point? (S5.1.5)	PASS

DESCRIBE SEAT CUSHION ATTACHMENTS: 2 half shell clamps on front of seat and 2 pivoting latch on rear.

Comments: NONE

Recorded By: *John Walcott*

Approved By: *Michael Janney*

DATE: December 4, 2003



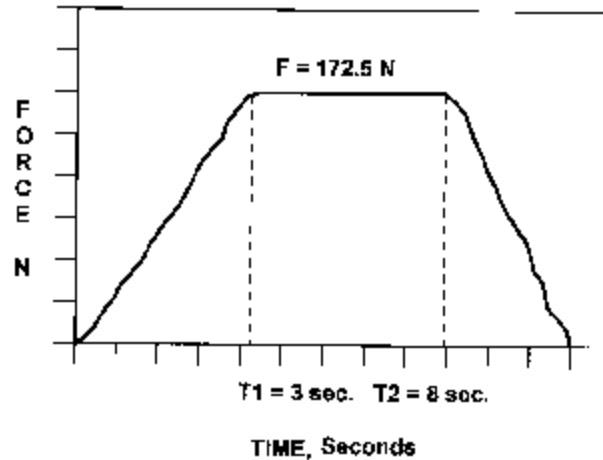
**DATA SHEET 3 (CONTINUED)**  
**SEAT CUSHION RETENTION TEST**

Test Vehicle: **2003 Liberty Freedom School Bus**  
 Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C30901**  
 Test Date: **7/10/03**

**SEAT NUMBER: S5**

4. Cushion Weight/Mass = 3.5 kg
5. Cushion Weight x 5 = F = 172.5 N (S5.1.5)
6. Complete the following force/time graph:



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

		PASS/FAIL
4.	Did seat cushion separate from the seat structure at any attachment point? (S5.1.5)	PASS

DESCRIBE SEAT CUSHION ATTACHMENTS: 2 half shell clamps on front of seat and 2 pivoting latch on rear.

Comments: NONE

Recorded By: *J. P. Rupp*

Approved By: *Michael Janusz*

DATE: December 4, 2003

**DATA SHEET 4**  
**SEAT BACK FORCE DEFLECTION TEST - FORWARD**

Test Vehicle: **2003 Liberty Freedom School Bus**  
Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C30901**  
Test Date: **7/10/03**

**SEAT NUMBER: S7**

1. Seat Bench Width = 762.5 mm  
 $W = (\text{Seat Bench Width})/381 \text{ mm (round to nearest whole number)} = (2)$   
Seat Reference Point (SRP) location is: (Description of location as supplied by the COTR): 492 mm Above Floor, 268.2 mm back from front edge of seat
2. Location of lower loading bar is 10 mm above the SRP.  
(Requirement: Between 102 mm above and 102 mm below the SRP) (S5.1.3.1)  
Length of lower loading bar = 635 mm  
Seat Back width at SRP = 735 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) = 65 mm, at start of upper bar loading 65 mm, at end of upper bar loading NR mm. (NR = Not Recorded)
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/ps
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 = 521 mm Width of seat back at 406 mm above SRP = 623 mm
8. Reason for stopping seat back deflection:  
 Reached deflection determined in Item 6 above (if less than 356 mm)  
 Reached 356 mm maximum allowed deflection (Actual deflection was 349 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**

		PASS/FAIL
11.	Is the seat in its final deflected position within 102 mm of the next seat or barrier?	<b>PASS</b>

		PASS/FAIL
12.	Does the forward force vs. deflection trace of the seat back lie within the corridor? (S5.1.3)	<b>PASS</b>

- 13. Include a deflection vs. time plot for the upper loading bar.
- 14. The area within the force vs. deflection curve = 1720.4 joules
- 15. 452W = 904 joules (S5.1.3.4)

		PASS/FAIL
16.	Is item 14 greater than or equal to item 15? (S5.1.3.4)	<b>PASS</b>

Comments: NONE

Recorded By: *John Walsh*

Approved By: *Michael Janusz*

DATE: December 4, 2003

**DATA SHEET 5**  
**SEAT BACK FORCE DEFLECTION TEST - REARWARD**

Test Vehicle: **2003 Liberty Freedom School Bus**  
 Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C30901**  
 Test Date: **7/10/03**

**SEAT NUMBER: S3**

1. Seat Bench Width = 762.5 mm  
 $W = (\text{Seat Bench Width})/381 \text{ mm (round to nearest whole number)} = (2)$
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 = 571 mm  
 Width of seat back at 343 mm above SRP = 674 mm
3. Deflection of seat back at 222 N preload = Not Recorded
4. Maximum deflection allowed without moving the seat back to within 102 mm of another seat = 255 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)  
 Reached 254 mm maximum allowed deflection (Actual deflection was 251 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.

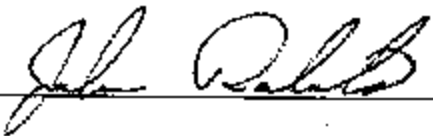
		PASS/FAIL
8.	Does the force vs. deflection plot lie within the boundaries of Figure 18 (OVSC TP-222-03)?	<b>PASS</b>

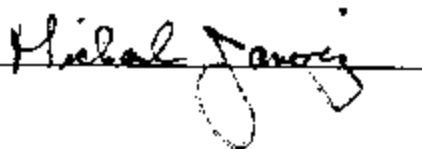
9. Include a deflection vs. time plot for the upper loading bar.
10.  $316W = 632 \text{ joules}$
11. The area within the force vs. deflection curve = 902.4 joules

**DATA SHEET 5 (CONTINUED)**  
**SEAT BACK FORCE DEFLECTION TEST – REARWARD**

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

Comments: Maximum allowed deflection was exceeded.

Recorded By: 

Approved By: 

DATE: December 4, 2003

**DATA SHEET 5 (CONTINUED)**  
**SEAT BACK FORCE DEFLECTION TEST - REARWARD**

Test Vehicle: **2003 Liberty Freedom School Bus**  
 Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C30901**  
 Test Date: **7/10/03**

**SEAT NUMBER: S6**

1. Seat Bench Width = 762.5 mm  
 $W = (\text{Seat Bench Width})/381 \text{ mm (round to nearest whole number)} = (2)$
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 = 571 mm  
 Width of seat back at 343 mm above SRP = 674 mm
3. Deflection of seat back at 222 N preload = Not Recorded
4. Maximum deflection allowed without moving the seat back to within 102 mm of another seat = 255 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)  
 Reached 254 mm maximum allowed deflection (Actual deflection was 251 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.

		PASS/FAIL
8.	Does the force vs. deflection plot lie within the boundaries of Figure 18 (OVSC TP-222-03)?	<b>PASS</b>

9. Include a deflection vs. time plot for the upper loading bar.
10.  $316W = 632 \text{ joules}$
11. The area within the force vs. deflection curve = 873 joules

**DATA SHEET 5 (CONTINUED)**  
**SEAT BACK FORCE DEFLECTION TEST – REARWARD**

		PASS/FAIL
12.	Is item 11 greater than or equal to item 10? (S5.1.4.2)	<b>PASS</b>

Comments: Maximum allowed deflection was exceeded.

Recorded By: *John Rahl*

Approved By: *Michael Janicz*

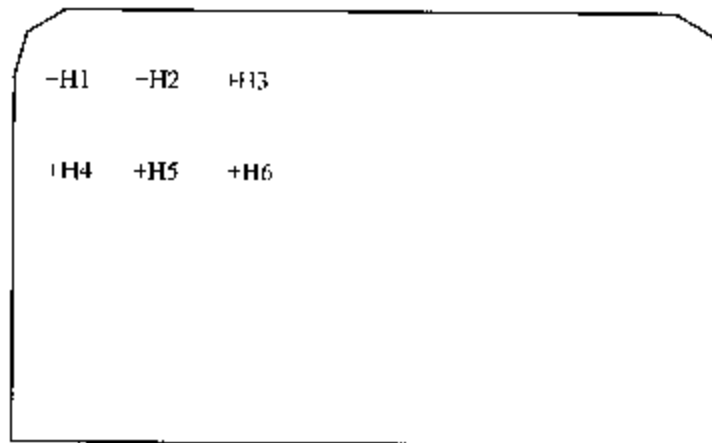
DATE: December 4, 2003

**DATA SHEET 6**  
**HEAD FORM IMPACT CONTACT AREA REQUIREMENT**

Test Vehicle: **2003 Liberty Freedom School Bus**  
Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C30901**  
Test Date: **7/15/03**

**SEAT NUMBER: S1**



**SEAT BACK REAR SURFACE**

**NOTE: SHADED AREA IS NONCONTACTABLE 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, and H6 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 = Up From Top Surface of Floor



**DATA SHEET 6 (CONTINUED)**  
**HEAD FORM IMPACT CONTACT AREA REQUIREMENT**

4. Complete the following table:

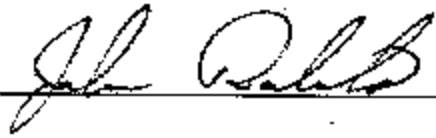
(1) Head Impact & Test #	(2) Location			(3) Speed Trap Impact Velocity** mps	(4)* Derived Velocity mps	(5) Contact Area (CA) mm <sup>2</sup>	(6) CA ≥ 1935 mm <sup>2</sup>		(7)
	X	Y	Angle				Yes- Pass	No- Fail	
H1	515	406	0	1.52	1.76	4650	PASS		
H2	413	406	0	1.52	1.50	4010	PASS		
H3	311	406	0	1.53	1.27	3990	PASS		
H4	515	406	0	1.55	1.31	4689	PASS		
H5	413	330	0	1.56	1.68	2650	PASS		
H6	311	330	0	1.55	1.26	1970	PASS		

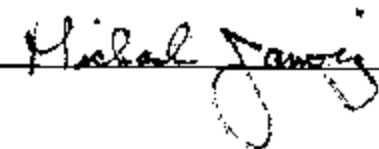
\* Contact Velocity from Item 7 below

\*\* 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: NONE

Recorded By: 

Approved By: 

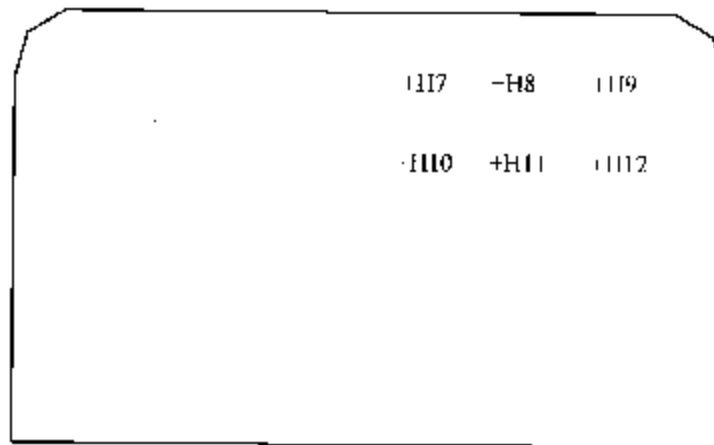
DATE: December 4, 2003

**DATA SHEET 7  
HEAD FORM IMPACT ENERGY REQUIREMENT**

Test Vehicle: **2003 Liberty Freedom School Bus**  
Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C30901**  
Test Date: **7/15/03**

**SEAT NUMBER: S1**



**SEAT BACK REAR SURFACE**

**NOTE: SHADED AREA IS NONCONTACTABLE 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 H7, H8, H9, H10, H11, and H12 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 Longitudinal Centerline of Vehicle  
Y = Up From Top Surface of Floor

**DATA SHEET 7 (CONTINUED)**  
**HEAD FORM IMPACT ENERGY REQUIREMENT**

4. Complete the following table:

(1) Head impact & Test #	(2) Location			(3) Speed Trap Impact Velocity ** mps	(4)* Derived Velocity ** mps	(5) Max HIC	(6) Engy Reqd Joules	(7)		(8)	
	X	Y	Angle					Column 5 < 1000		Column 6 > 4.5 joules	
								Yes- Pass	No- Fail	Yes- Pass	No- Fail
H7	209	330	0	6.84 (b)	6.40	116.4	3.9	X			X
H8	107	330	0	6.66	6.40	110.8	5.0	X		X	
H9	75	330	0	6.63	6.51	107.1	5.8	X		X	
H10	209	406	0	6.57 (a)	6.30	105.1	12.4	X		X	
H11	107	406	0	6.53 (a)	6.19	88.1	14.3	X		X	
H12	75	406	0	6.64	6.48	143.6	4.4	X			X

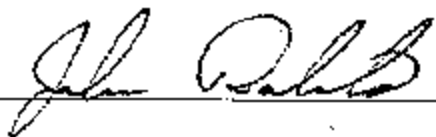
\* Impact velocity from item No. 6 below

\*\* 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) Impact velocity lower than allowed.  
 (b) Impact velocity higher than allowed.

Recorded By: \_\_\_\_\_



Approved By: \_\_\_\_\_



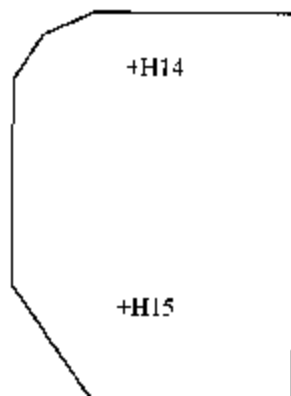
DATE: December 4, 2003

**DATA SHEET 7 (CONTINUED)**  
**HEAD FORM IMPACT ENERGY REQUIREMENT**

Test Vehicle: **2003 Liberty Freedom School Bus**  
Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C30901**  
Test Date: **8/15/03**

**SEAT NUMBER: Barrier Above and Behind Front Door**



**WALL BARRIER REAR SURFACE BEHIND FRONT DOOR**

**NOTE: SHADED AREA IS NONCONTACTABLE 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 and H15 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 Longitudinal Centerline of Vehicle  
Y = Up From Top Surface of Floor

**DATA SHEET 7 (CONTINUED)**  
**HEAD FORM IMPACT ENERGY REQUIREMENT**

4. Complete the following table:

(1) Head impact & Test #	(2) Location			(3) Speed Trap Impact Velocity ** mps	(4)* Derived Velocity ** mps	(5) Max HIC	(6) Engy Reqd Joules	(7) Column 5 < 1000		(8) Column 6 > 4.5 joules	
	X	Y	Angle					Yes- Pass	No- Fail	Yes- Pass	No- Fail
H14	413	983	0	6.69	5.72	657.3	1.74	X			X
H15 (a)	413	876	0	6.65	5.84	704.8	2.21	X			X

\* 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) Impact on plastic rivet

Recorded By:

*John Roberts*

Approved By:

*Michael J. J...*

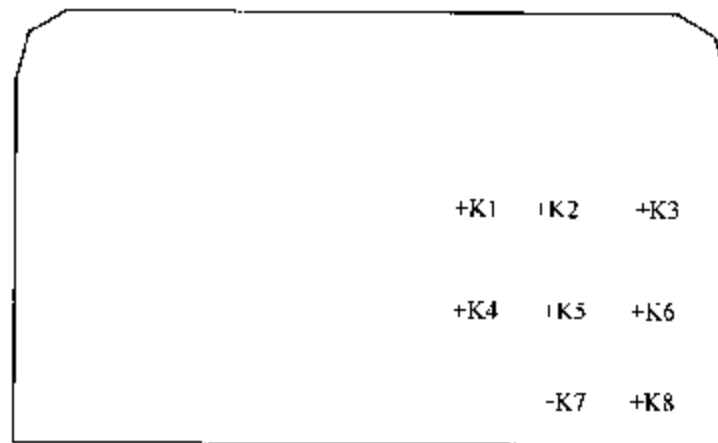
DATE: December 4, 2003

**DATA SHEET 8**  
**KNEE FORM IMPACT TEST**

Test Vehicle: **2003 Liberty Freedom School Bus**  
Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C30901**  
Test Date: **7/15/03**

**SEAT NUMBER: S1**



**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 Longitudinal Centerline of Vehicle  
Y = Up From Top Surface of Floor

**DATA SHEET 8 (CONTINUED)**  
**KNEE FORM IMPACT TEST**

4. Complete the following table:

(1) Knee impact & Test #	(2) Location			(3) Speed Trap Impact Velocity ** mps	(4)* Derived Velocity ** mps	(5) Cont. Area mm <sup>2</sup>	(6) Resist Force (N)	(7) Column 5 > 1935 mm <sup>2</sup>		(8) Column 6 < 2869N	
	X	Y	Angle					Yes- Pass	No- Fail	Yes- Pass	No- Fail
K1	254	100	0	4.83(a)	4.66	3190	1319	X		X	
K2	152	100	0	4.89	4.73	3060	1137	X		X	
K3	50	100	0	4.91	4.81	4079	1719	X		X	
K4	254	50	0	4.91	4.59	3350	1898	X		X	
K5	152	50	0	4.93(b)	4.63	N/A	1185	N/A	N/A	X	
K6	50	50	0	4.86	4.61	N/A	2004	N/A	N/A	X	
K7	152	-50	0	4.86	4.68	N/A	1967	N/A	N/A	X	
K8	50	-50	0	4.90(b)	4.84	N/A	2064	N/A	N/A	X	

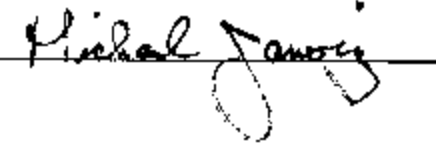
\* Impact velocity from item No. 7 below

\*\* 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) Impact velocity lower than allowed.  
(b) Impact velocity higher than allowed.

Recorded By: 

Approved By: 

DATE: December 4, 2003

**DATA SHEET 9**  
**SEAT BELT ASSEMBLY ANCHORAGES**

Test Vehicle: **2003 Liberty Freedom School Bus**  
Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C30901**  
Test Date: **7/10/03**

**SEAT LOCATION: S5**

		PASS/FAIL
1.	Are all seat belt assembly anchorages designed for forward occupant position?	<b>PASS</b>

Seat Location	Seating Location	Anchor Type	Measured Spacing (mm) *	Measured Angle **	Load Application Angle (degrees)	
					Side View Horizontal Load Angle	Plan View From Vehicle Center Line
S5	Left Inner	1	250	60°	11.2°	1.3°
	Right Outer	1	290	60°	11.2°	1.3°

\* 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°

Seat Location	Seating Location	Required Load (N)	Actual Max. Test Load (N)	Pass/Fail	Comment
S5	Left Inner	22,241	18539.2	Fail	(a)
	Right Outer	22,241	20098.7	Fail	(a)

Comments: (a) Seat pulled out of floor anchor points.

Recorded By: *John Pahl*

Approved By: *Michael Janoy*

DATE: December 4, 2003



**SECTION 4**  
**INSTRUMENTATION AND EQUIPMENT LIST**

Test Vehicle: **2003 Liberty Freedom School Bus**  
Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C30901**  
Test Date: **7/10/03**

Equipment	Description	Model/Serial No.	Cal. Date	Next Cal. Date
Computer	HP	Vectra / US03263612	--	---
Test Fixture	MGA	TF2003	--	--
A/D Interface	Metabyte	DAS-1802	--	---
Load Cell	Interface	1210AF-SK / 61219	2/10/03	8/10/03
Load Cell	Interface	1220 AF / 143280	5/27/03	11/27/03
Inclinometer	Digital Protractor	Pro 360 / Comp Lab	5/20/03	11/20/03
Steel Tape	Stanley	Powerlock / 101	4/9/03	10/9/03
Impact Fixture	MGA	IF2003A	--	--
Camera	Sony	DSC-S75	--	--
Planimeter	Sokkia Corp.	Planix5 007319	3/7/03	9/07/03
Accelerometer	Endevco	7264-2000 / AN7F1	3/20/03	9/20/03
Temp. Recorder	Oregon Scientific	WM-918	2/01/03	2/01/03
Linear Motion Transducer	Ametek	P-25A / 1202- 19366	5/07/03	11/07/03
Linear Motion Transducer	Ametek	P25A / 1102- 19182	5/07/03	11/07/03
Belt Anchor Fixutre	MGA	BAF 2003	--	---

**SECTION 5  
PHOTOGRAPHS**

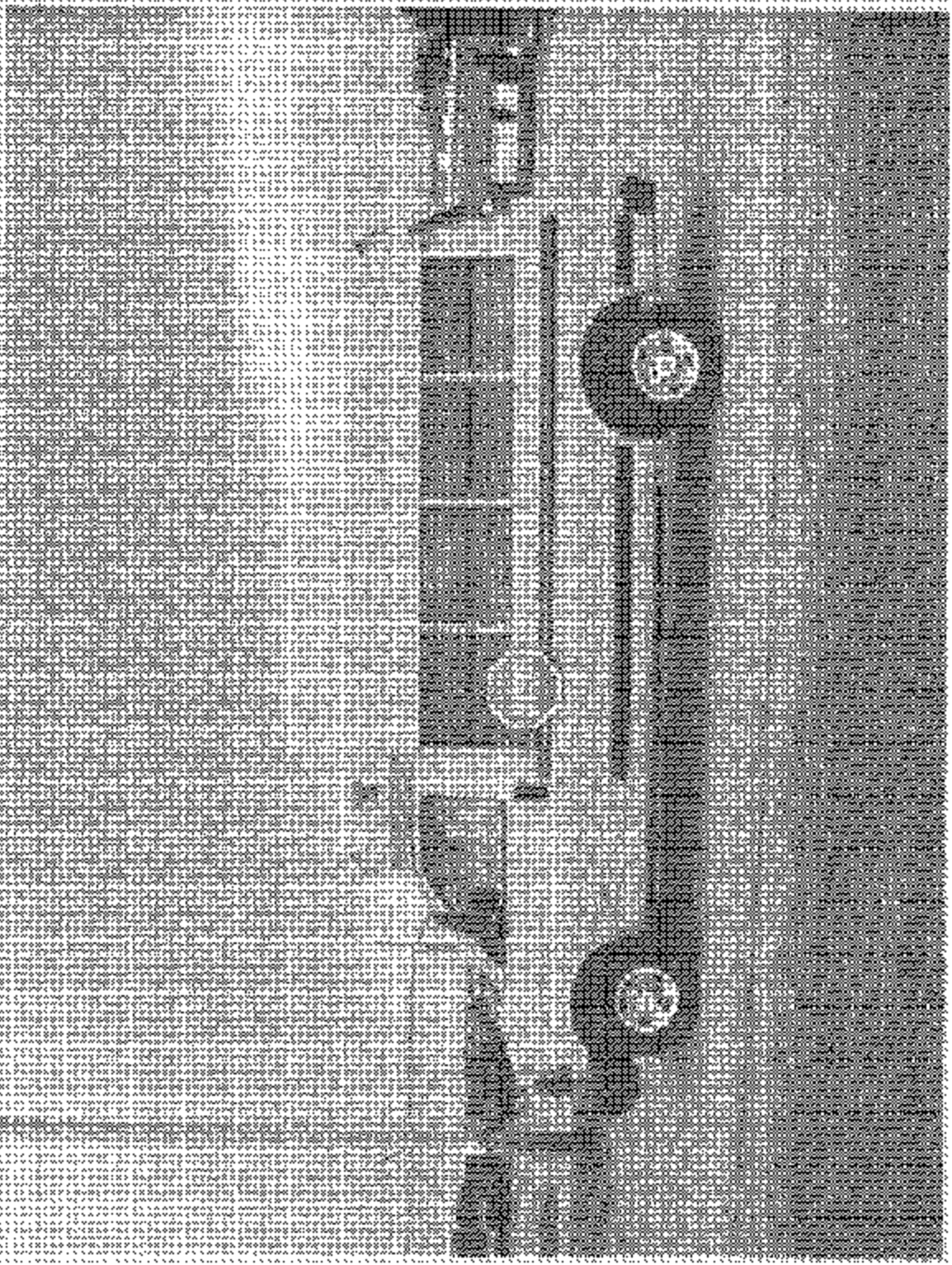
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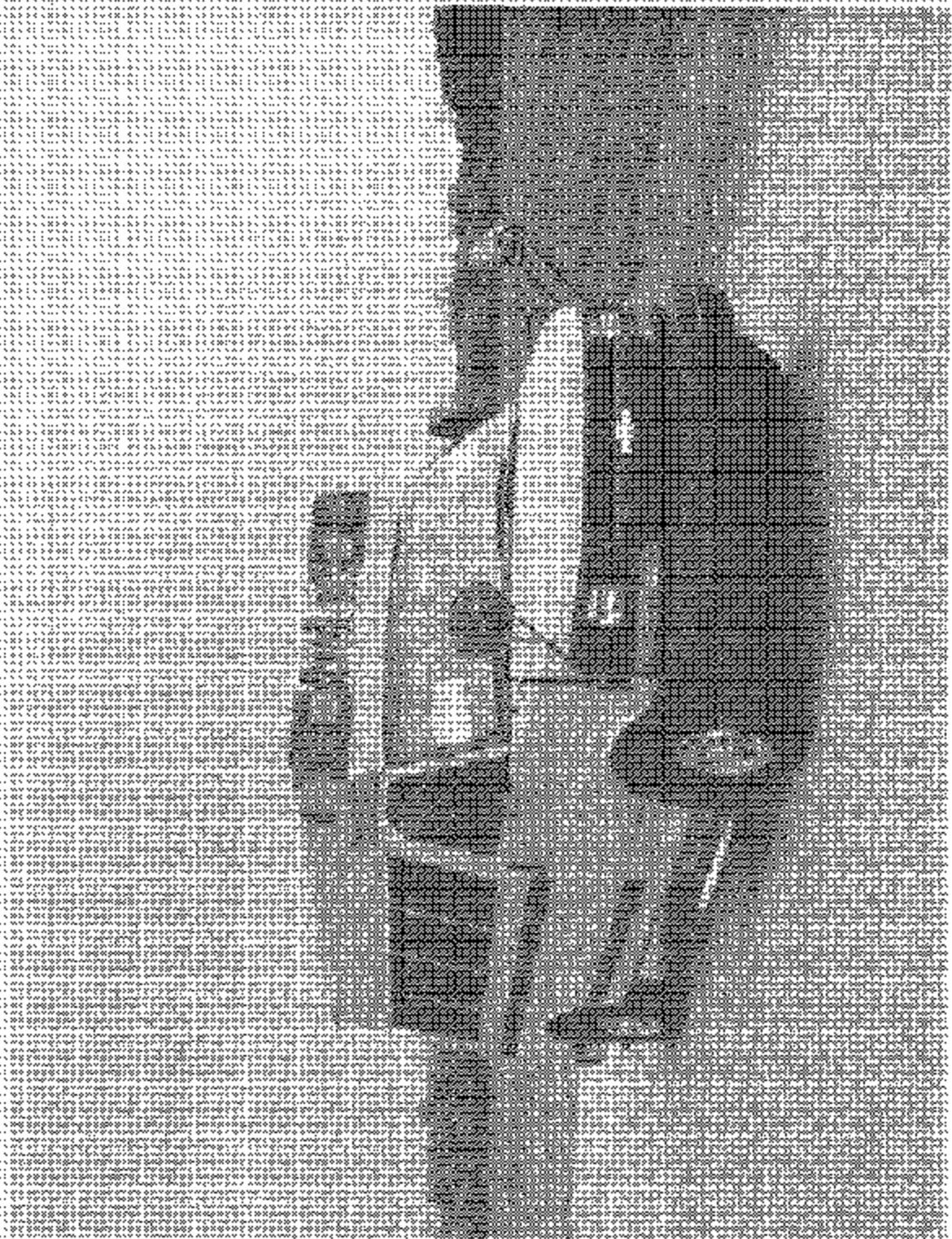
<u>No.</u>		<u>Page No.</u>
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2000 Liberty Freedom School of Bus  
FMPSS 231

2000 Liberty Freedom School of Bus



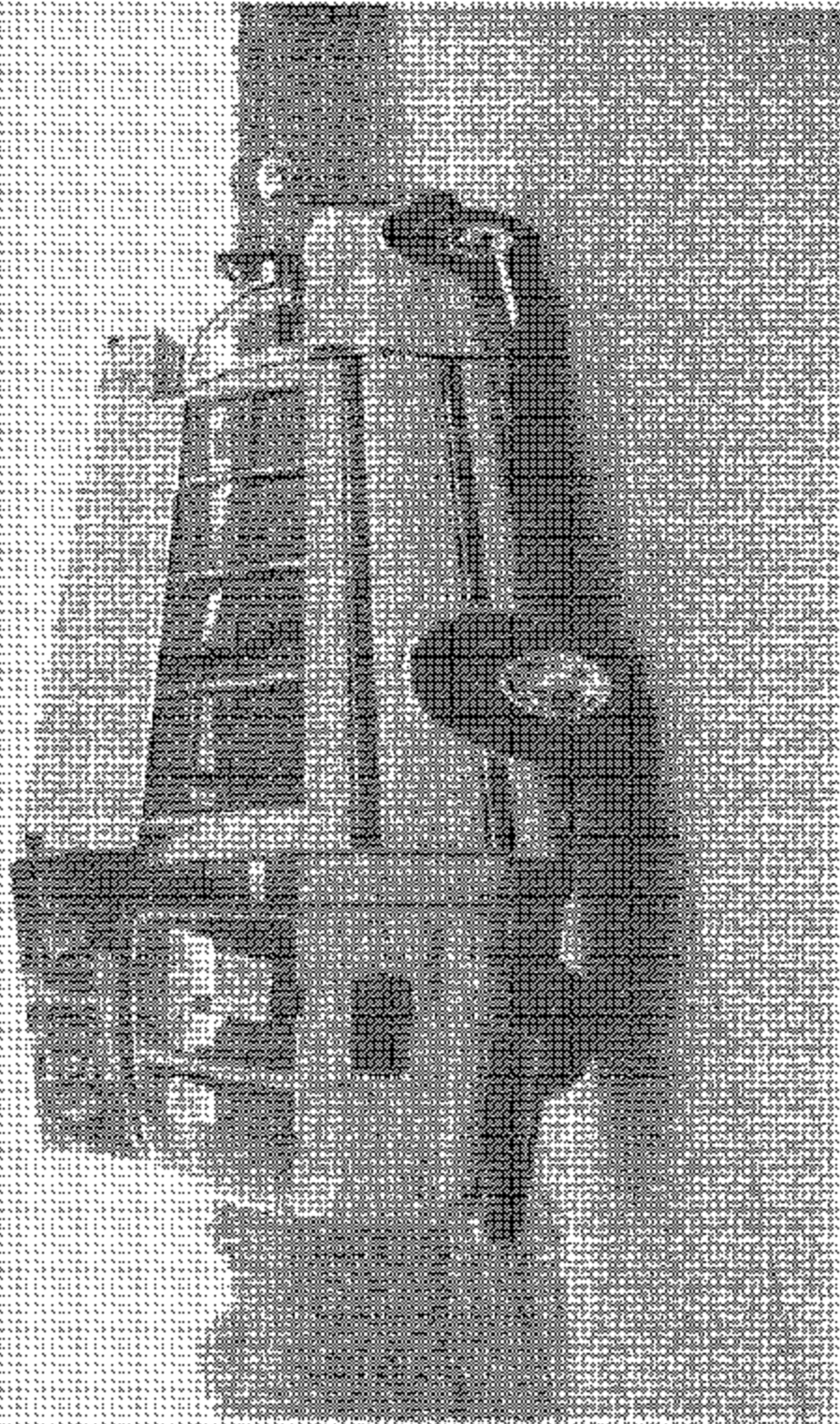
2000 Liberty Freedom School of Bus



2010 Liberty Freedom School Bus

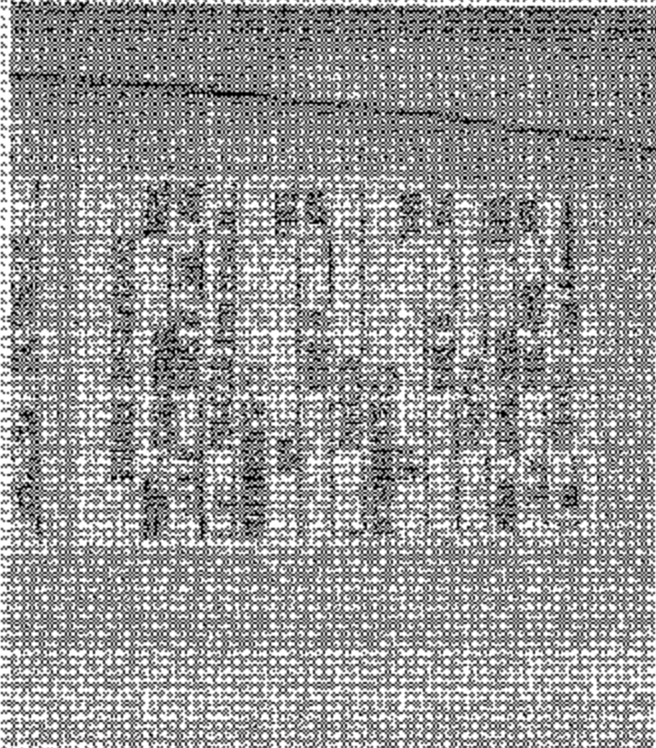
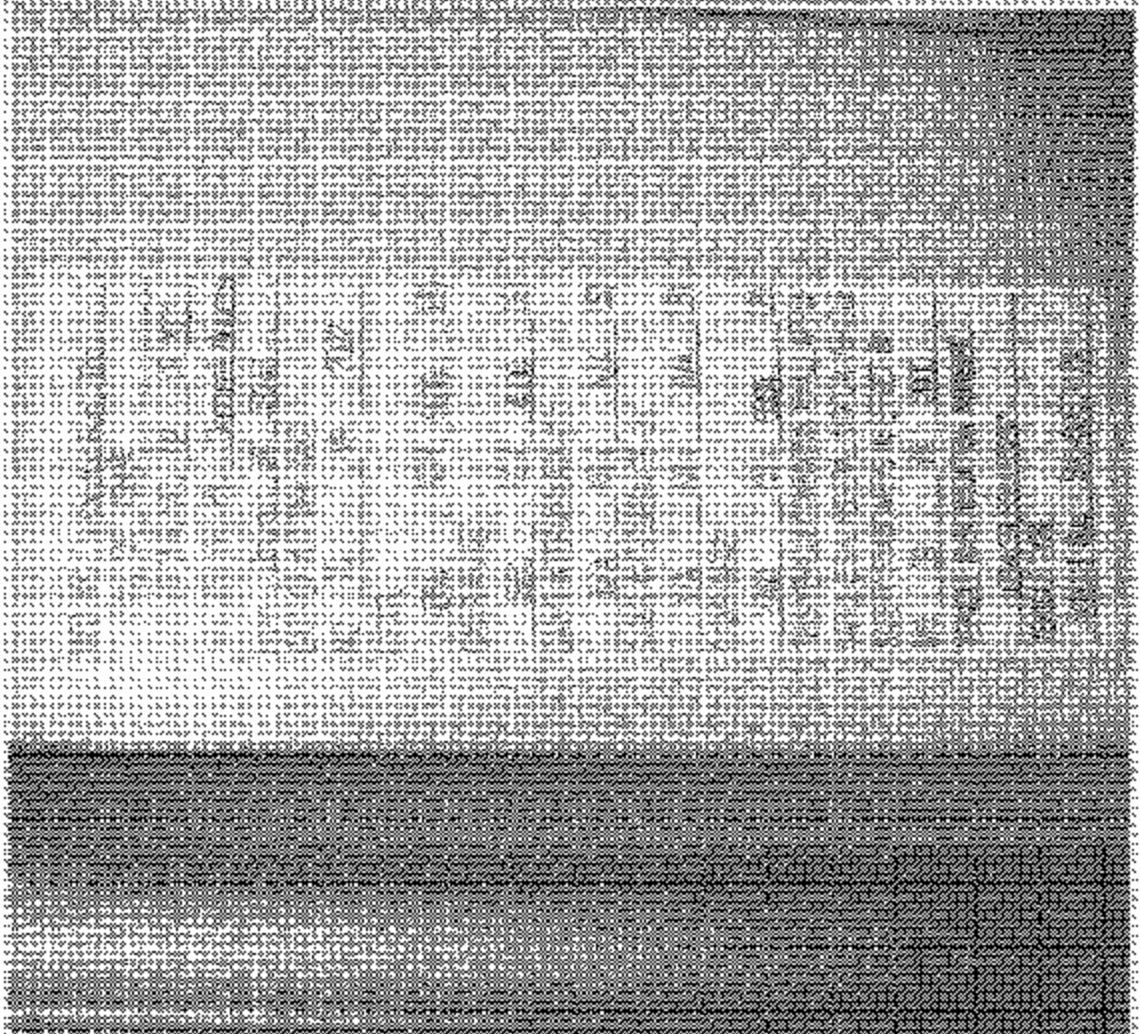
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Test Title: 2003 Liberty Freedom School Bus  
Item ID: 11005222

WYOMING  
WYOMING



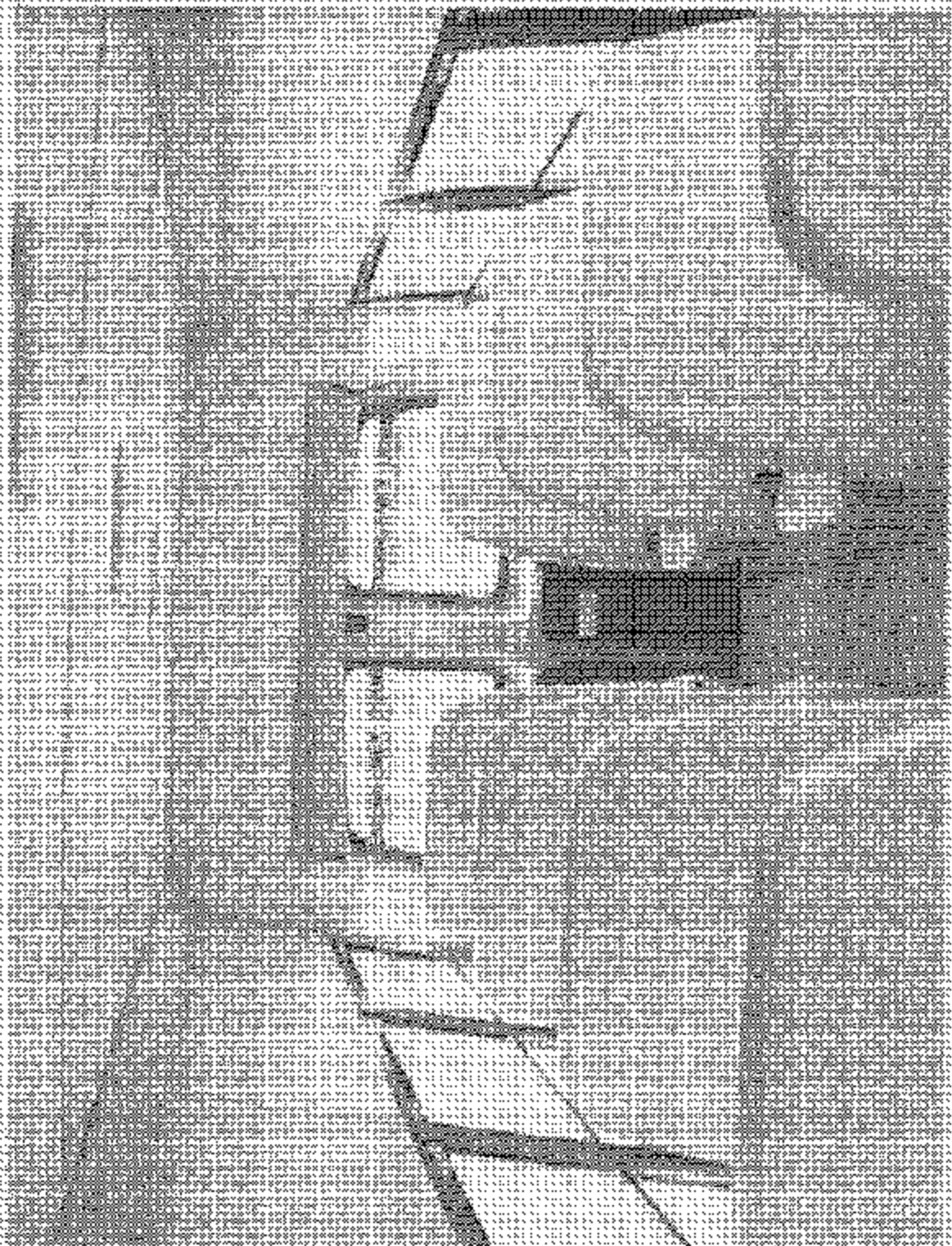
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University: FWVSS 232

NTCA No: 03003



Post Office 2000 Liberty Freedom School Bus  
Plymouth PA 15087  
FMYSS 202

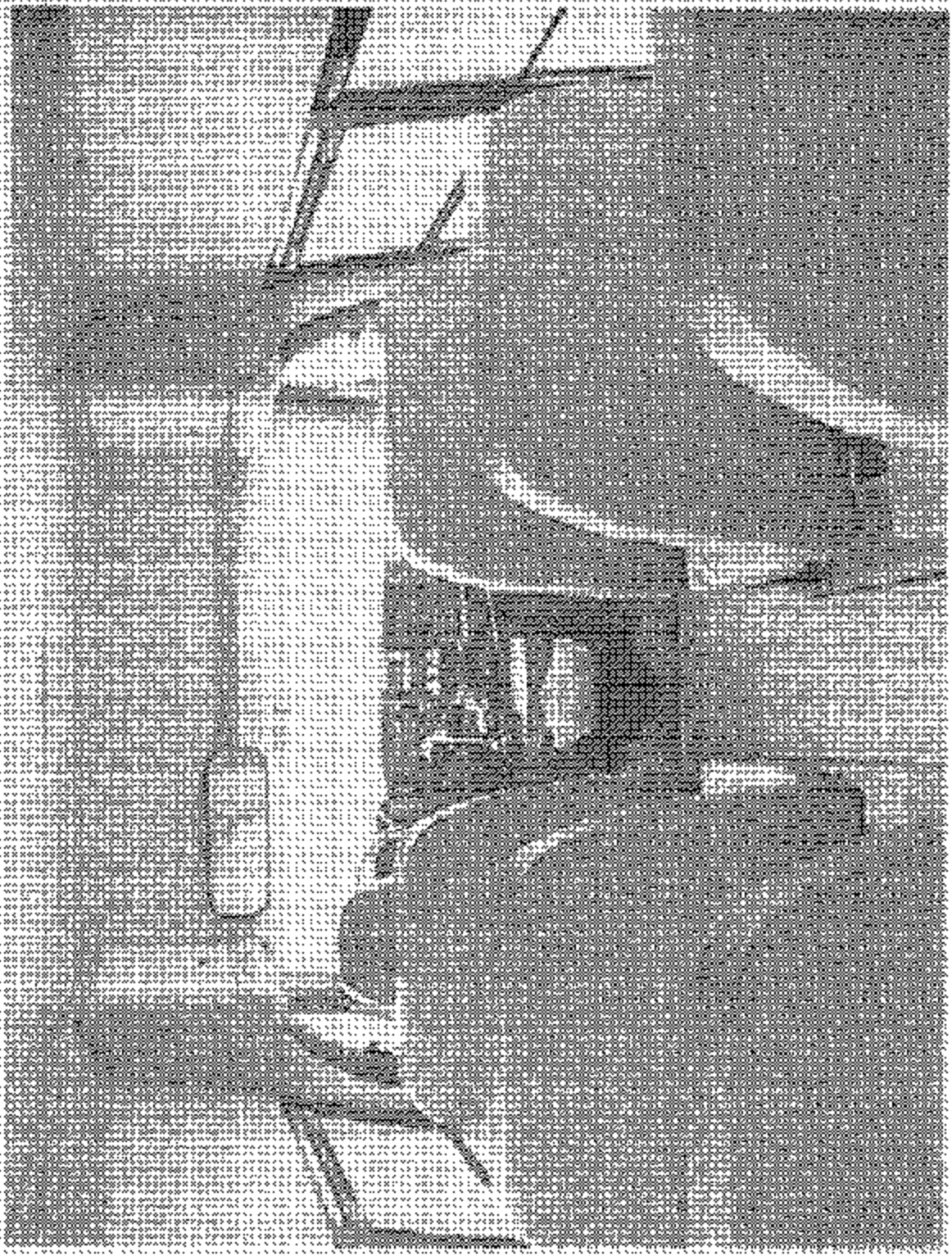
Part No. 05000



© 2000 Liberty Freedom School Bus



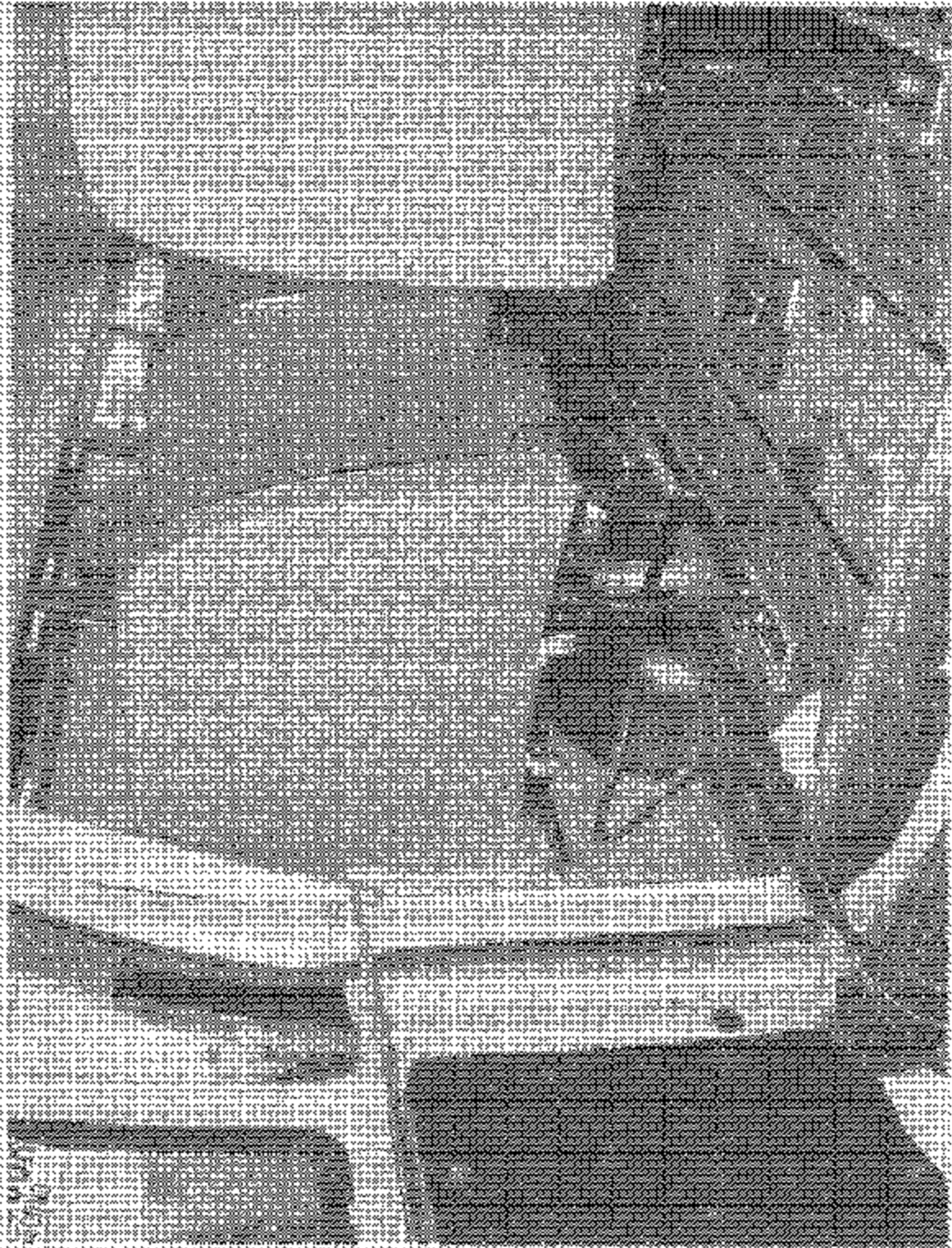
TEST VEHICLE: 2003 Liberty Freedom School Bus  
TRUCK MAKE: FORD  
TRUCK MODEL: C3500



MONITOR VIEW FROM SEAT 1, FPOV

2003 Liberty Freedom School Bus  
FNV5522

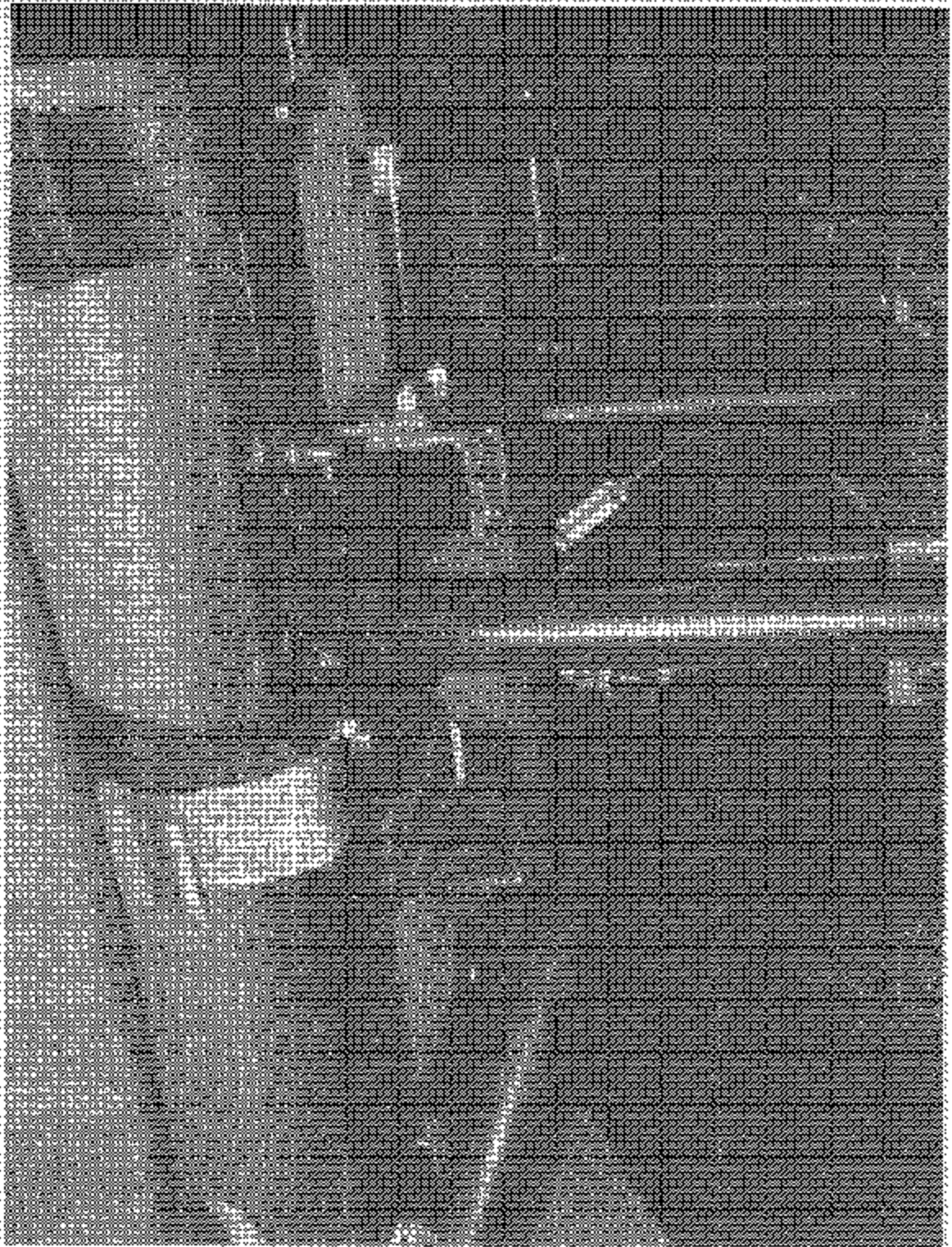
LIBERTY SCHOOL BUS



LIBERTY SCHOOL BUS

Top: AVID 200 Library Freedom School Bus  
Inventory: FVY55 722

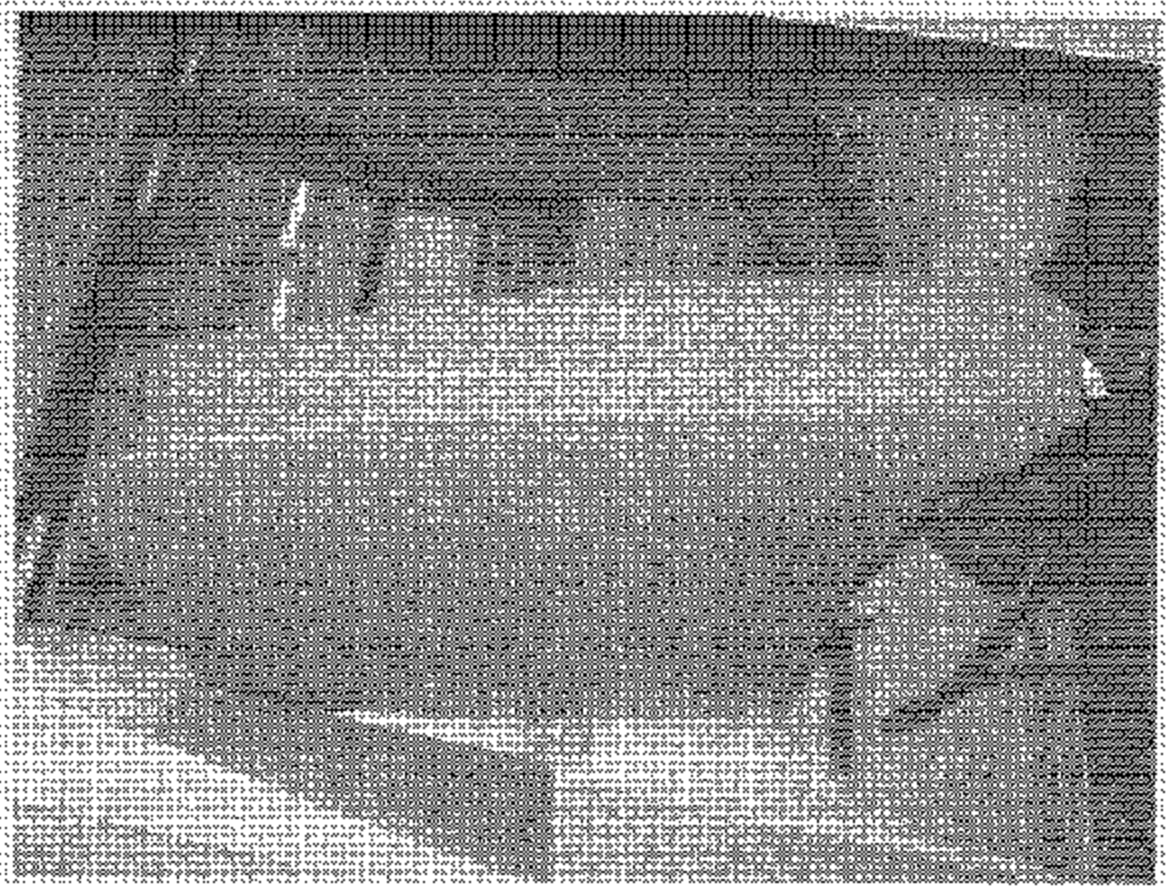
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Inventory: C31003

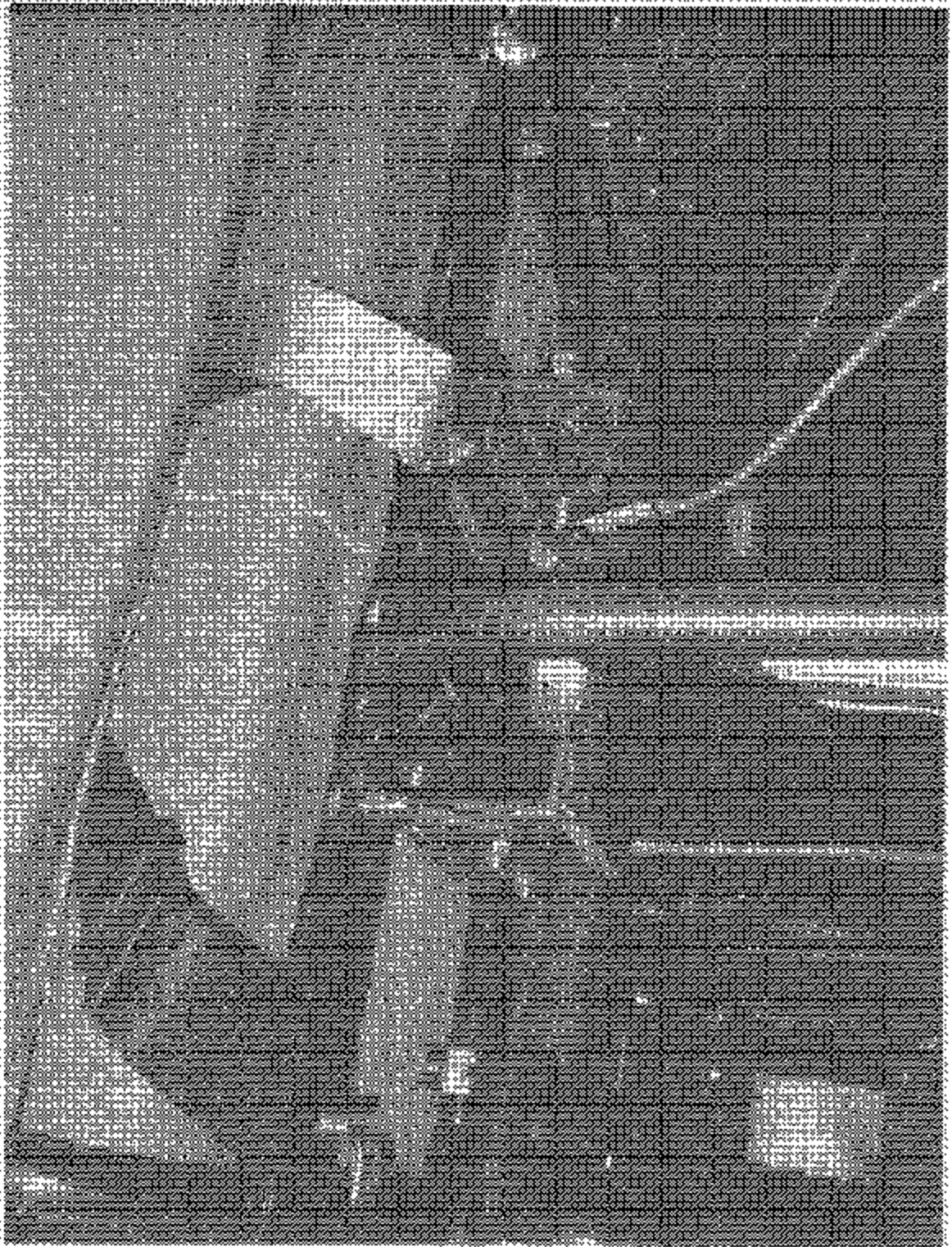
Paul Taylor 2003 Family Freedom Bonus Bus  
Production #WVSS 722

WVSS # CS0001



2005 Liberty Freedom Bus  
FWYS 712

MHYS 010091603



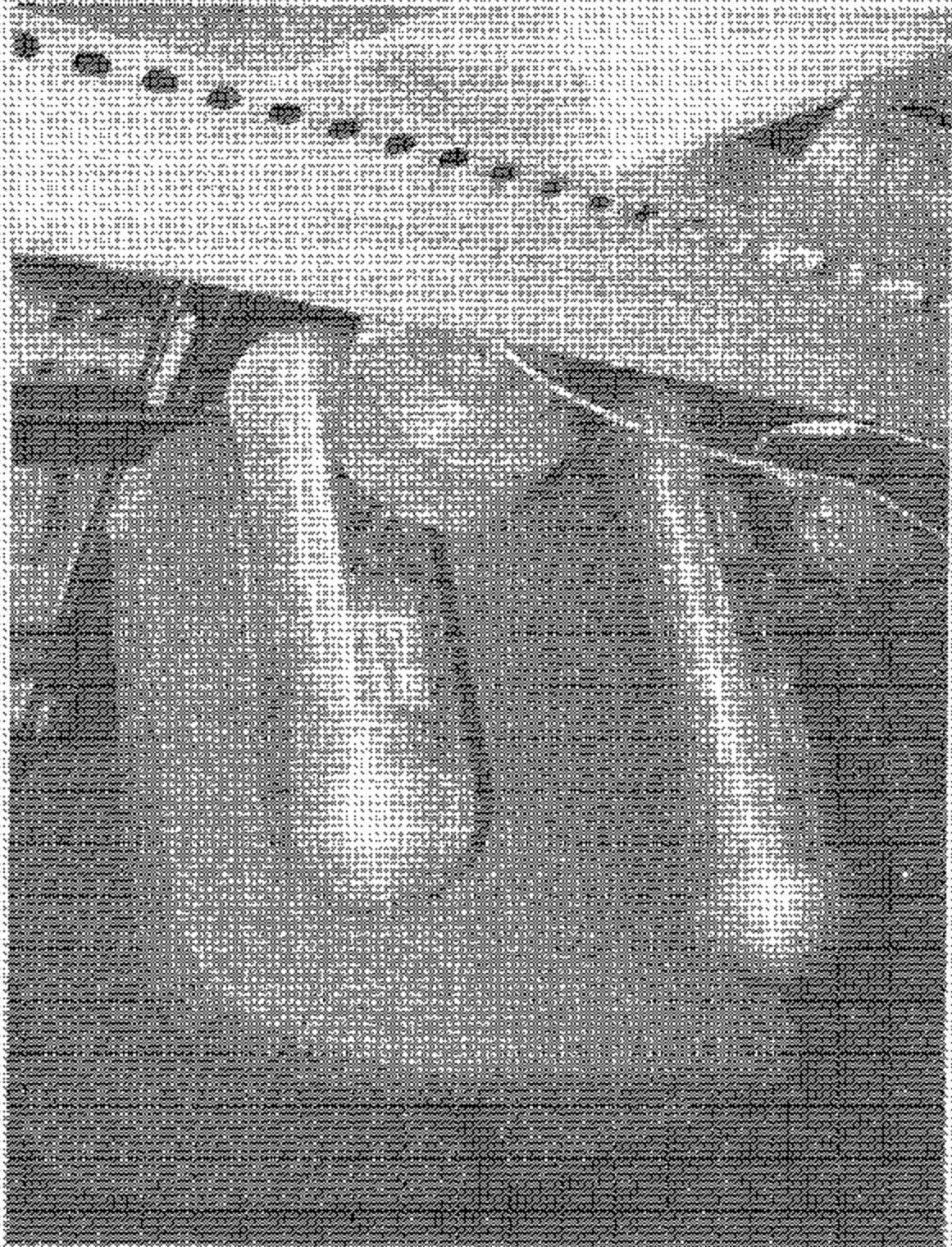
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Procedure 1/1/08 277

NOISE A/C CS0601



2005 Liberty Mission School B15  
Procedure: PMS# 171

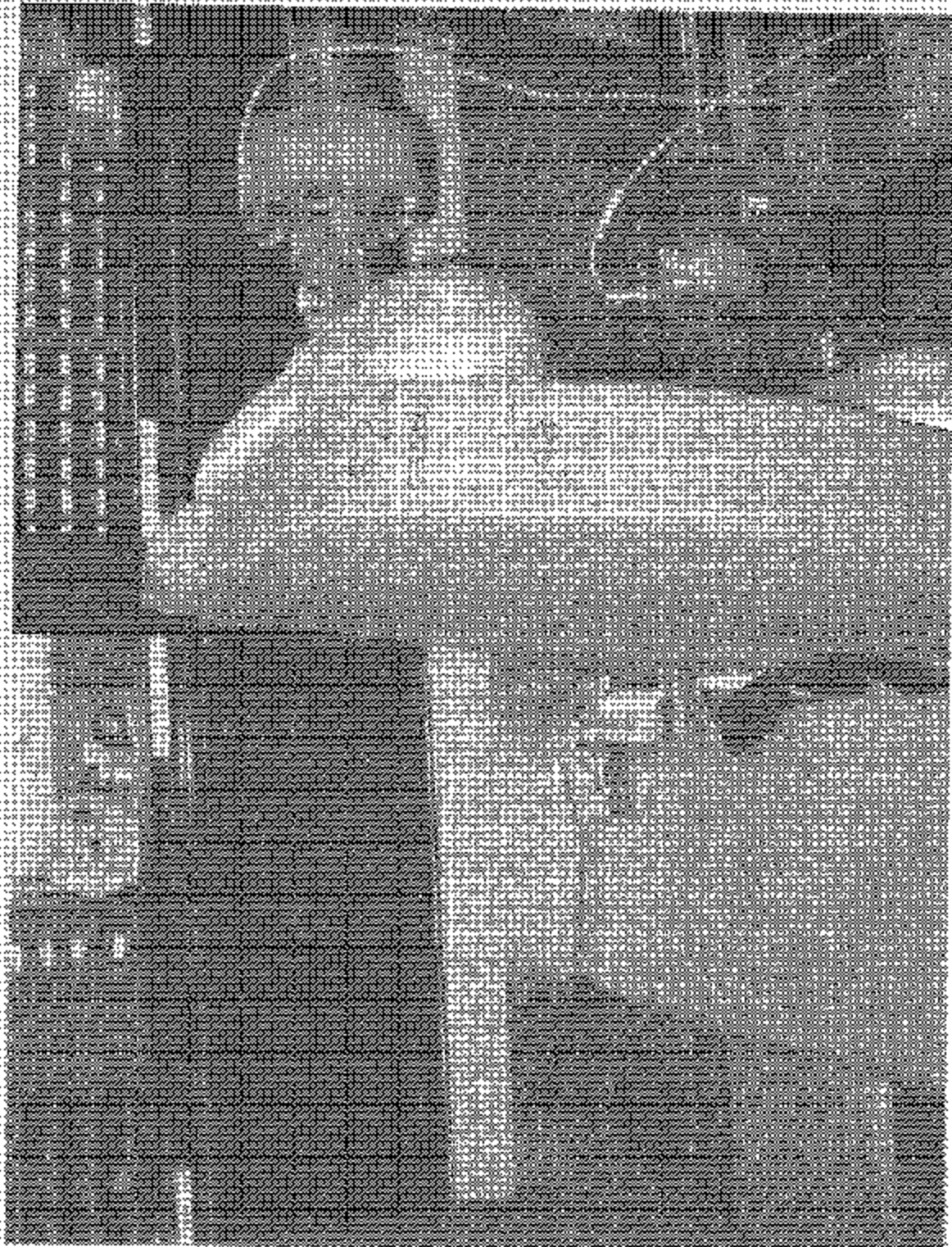
APR 04 11:03 AM '05



2005 Liberty Mission School B15  
Procedure: PMS# 171

10/1/2005 2005 Liberty Township School BUS  
FUNDING SWISS 200

10/1/2005 2005 Liberty Township School BUS



10/1/2005 2005 Liberty Township School BUS



1 of 10  
1001 County 3 road on the foot of  
HMSA 200

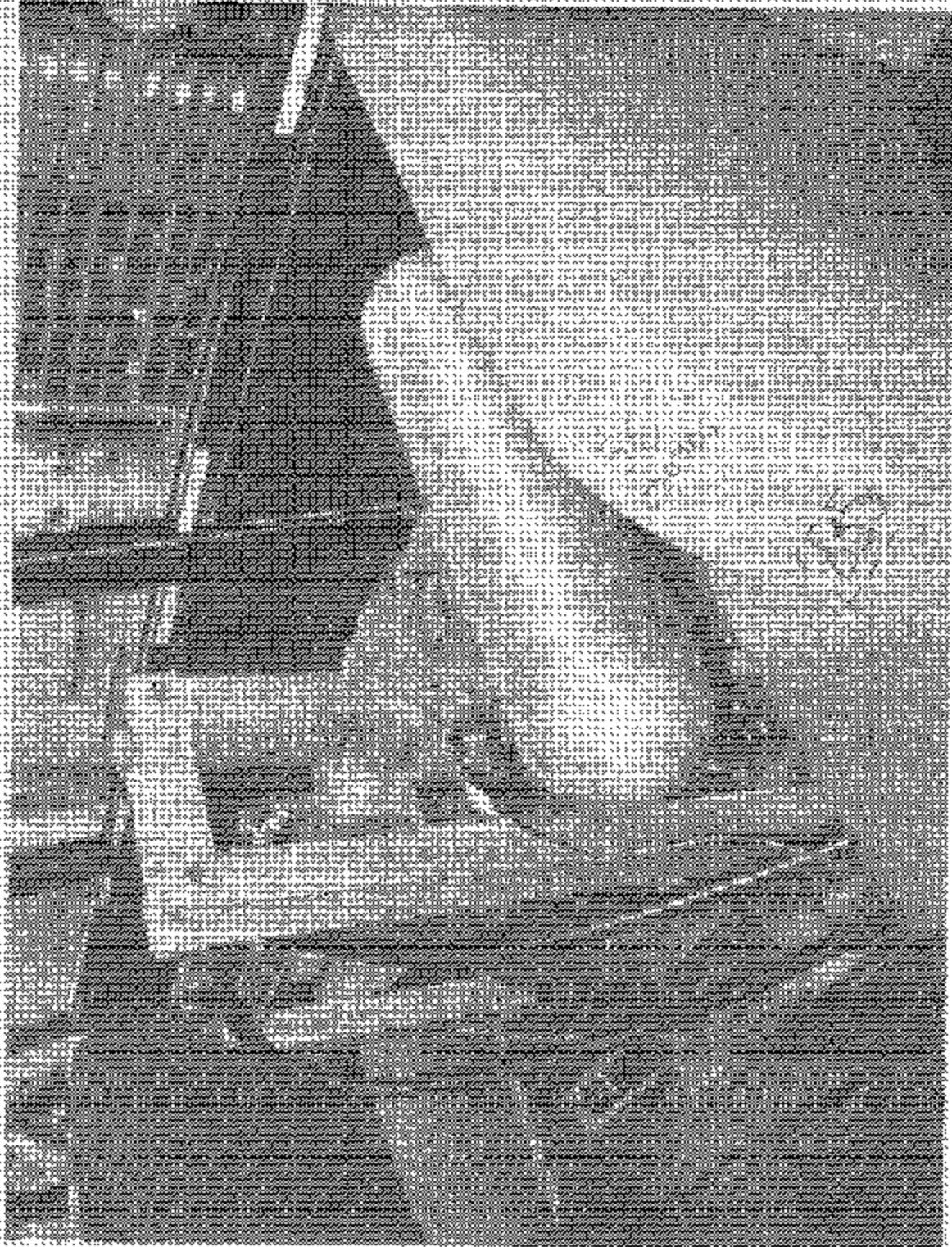
HMSA 200



HMSA 200

SC-10000 2012 Liberty Freedom Survey 2012  
PAGE 24

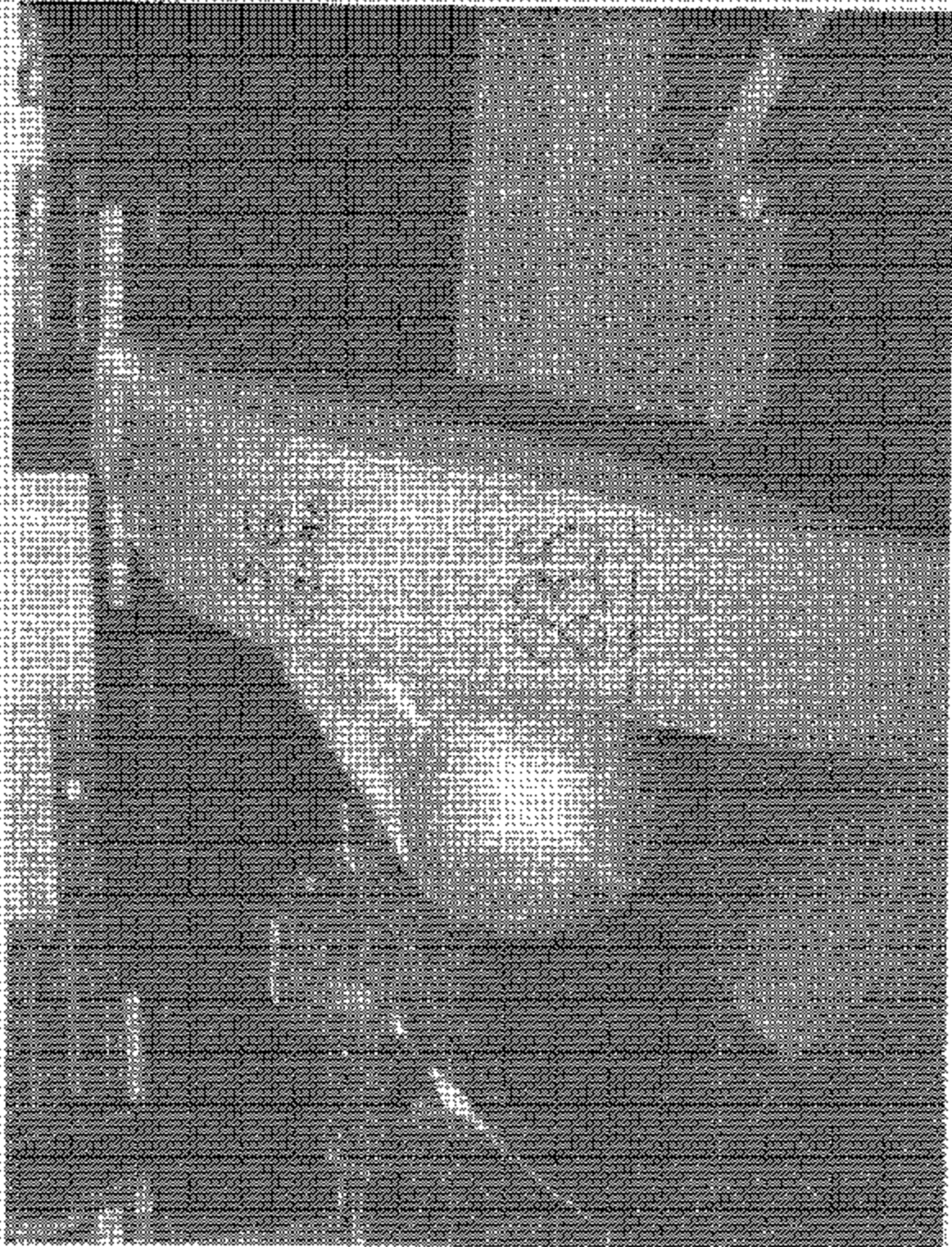
LIBERTY NO. 03001



LIBERTY NO. 03001

Issue Value: 2015 Liberty Freedom School Bus  
F01785 221

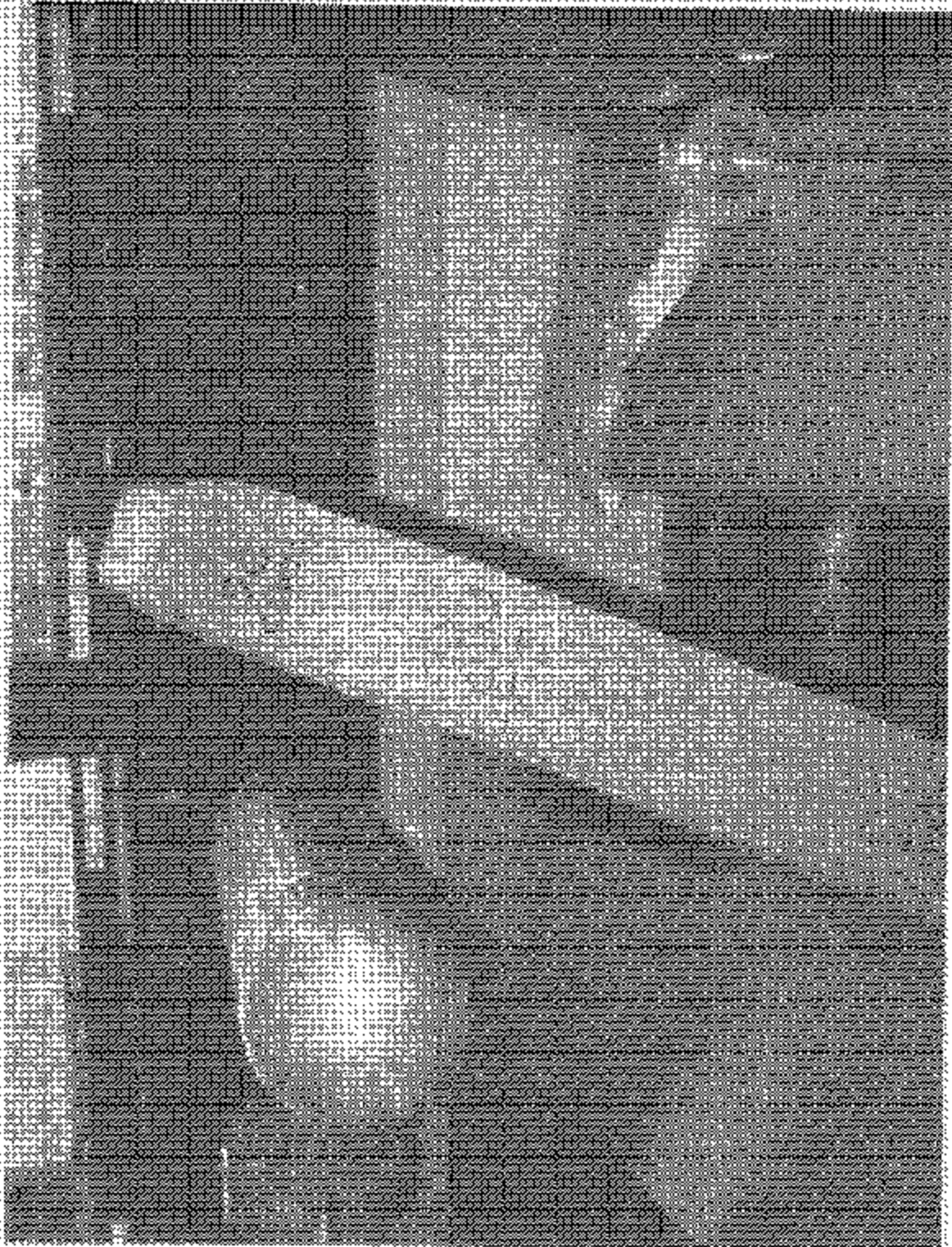
MHFC: NY: 0309X



2015 Liberty Freedom School Bus

2005 Liberty Freedom School Bus  
AMERICAN  
FAVORITE

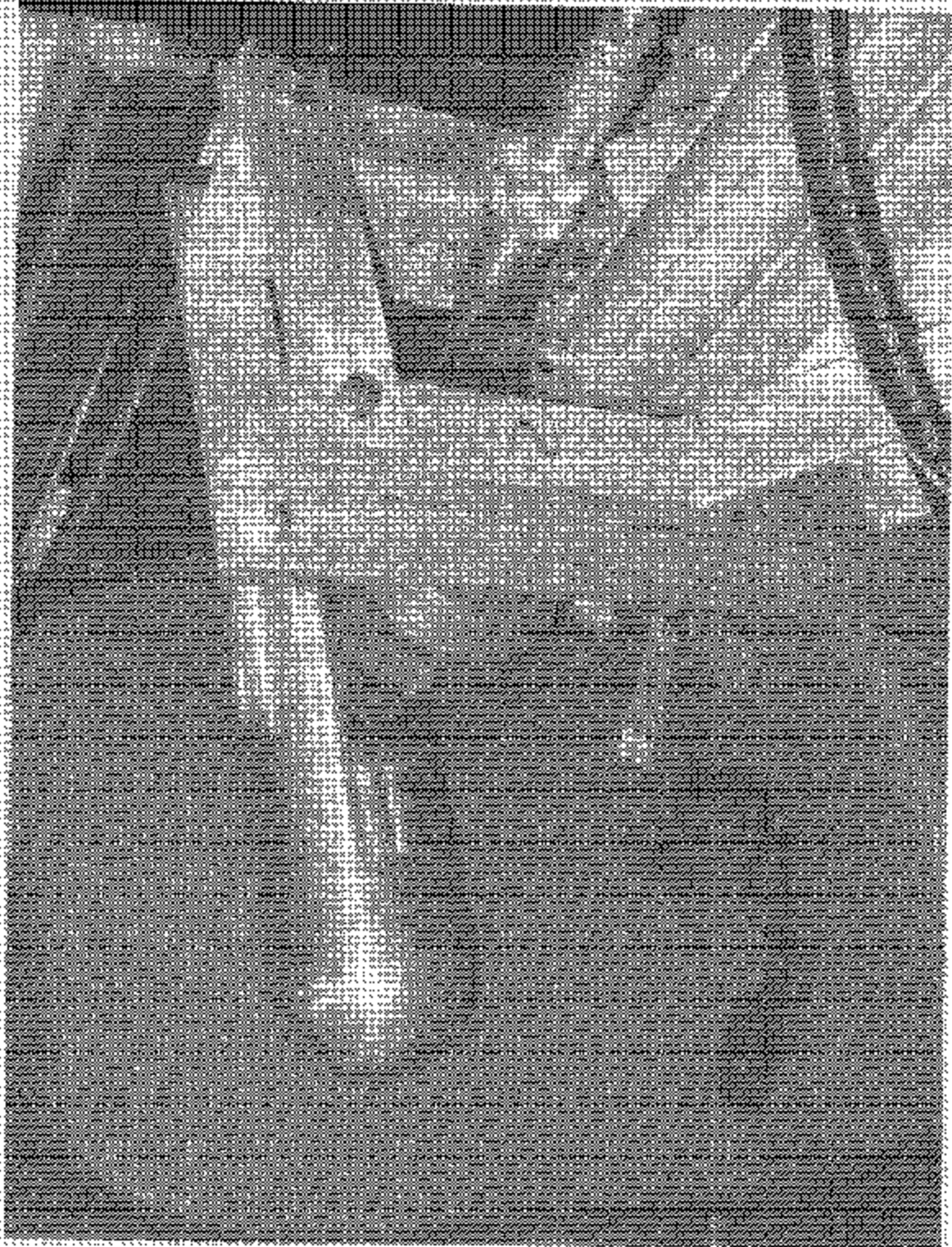
Model No. C3093



2005 Liberty Freedom School Bus  
AMERICAN  
FAVORITE

2001 Liberty Freedom School Bus  
FIN50282

White No. C5490

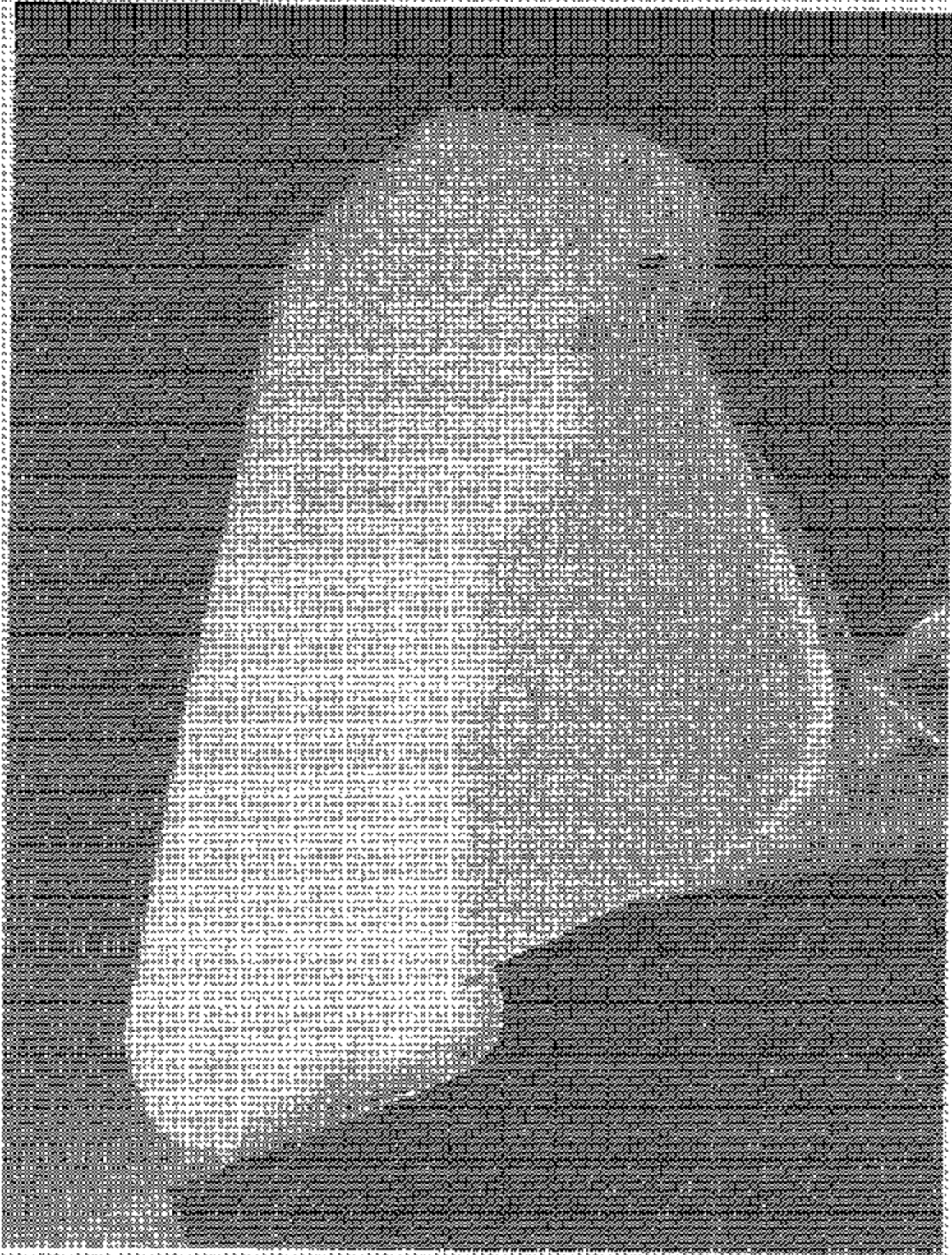


2001 Liberty Freedom School Bus  
FIN50282



Facility: 2005 Liberty Freedom School Bus  
Invoice #: FMVSS 201

MITCA No. 030804



Facility: 2005 Liberty Freedom School Bus

East Valley 2003 Liberty Freedom School Bus  
PHOTO BY: XRAYSS EYE

ARTSA 4.1 030604

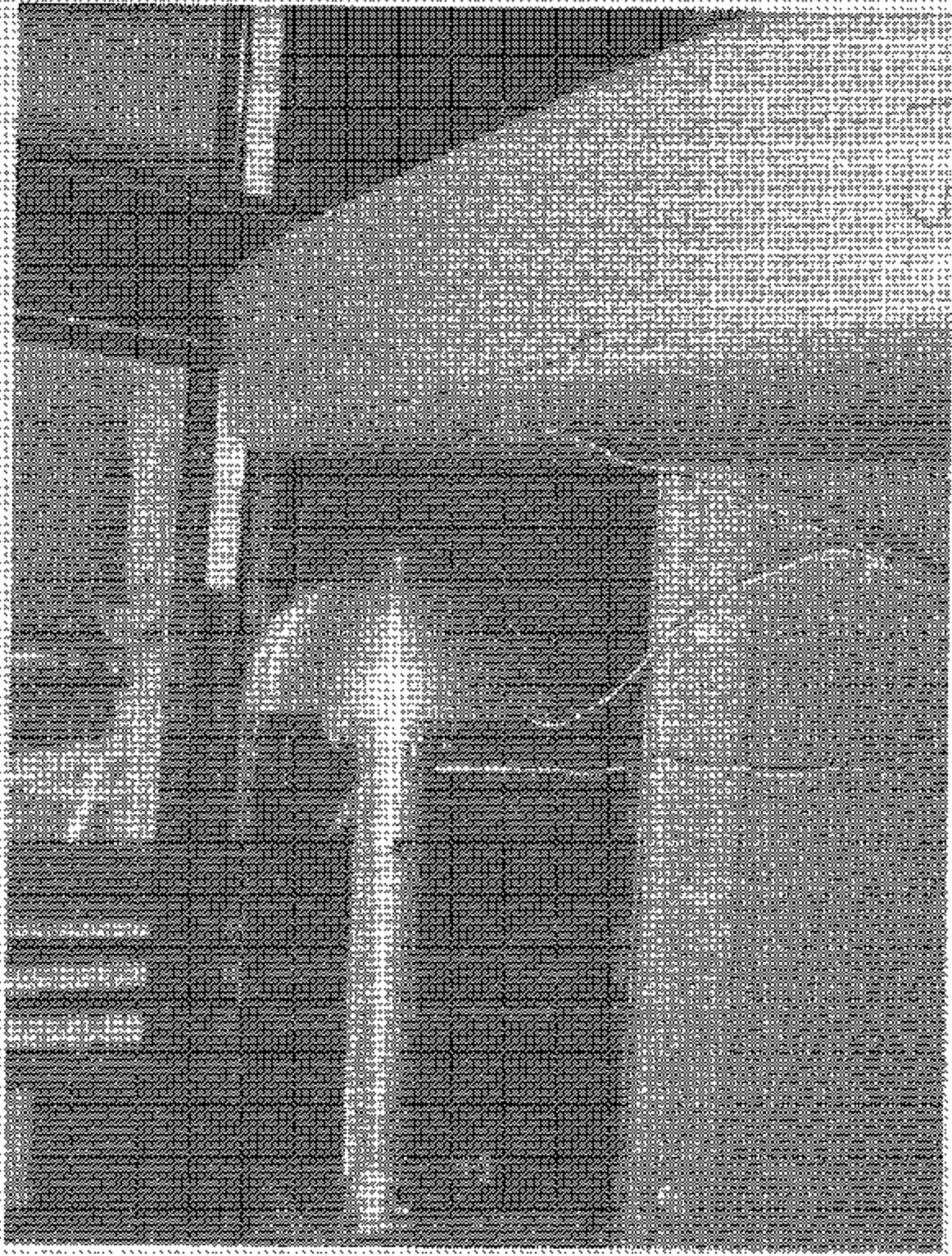
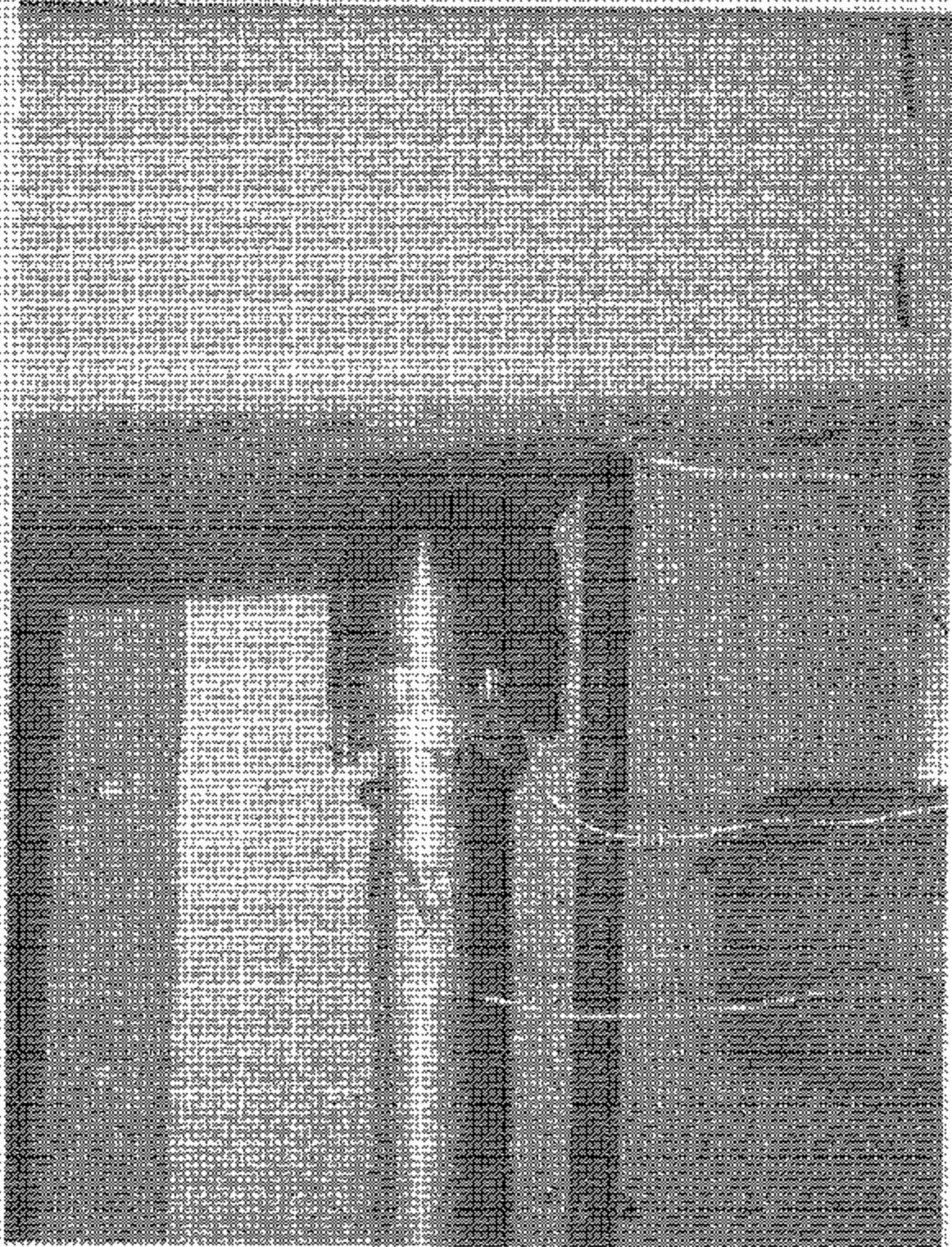


PHOTO BY: XRAYSS EYE



Public Volume  
2002 Liberty Freedom School Bus  
Purchase  
FMVSS 222

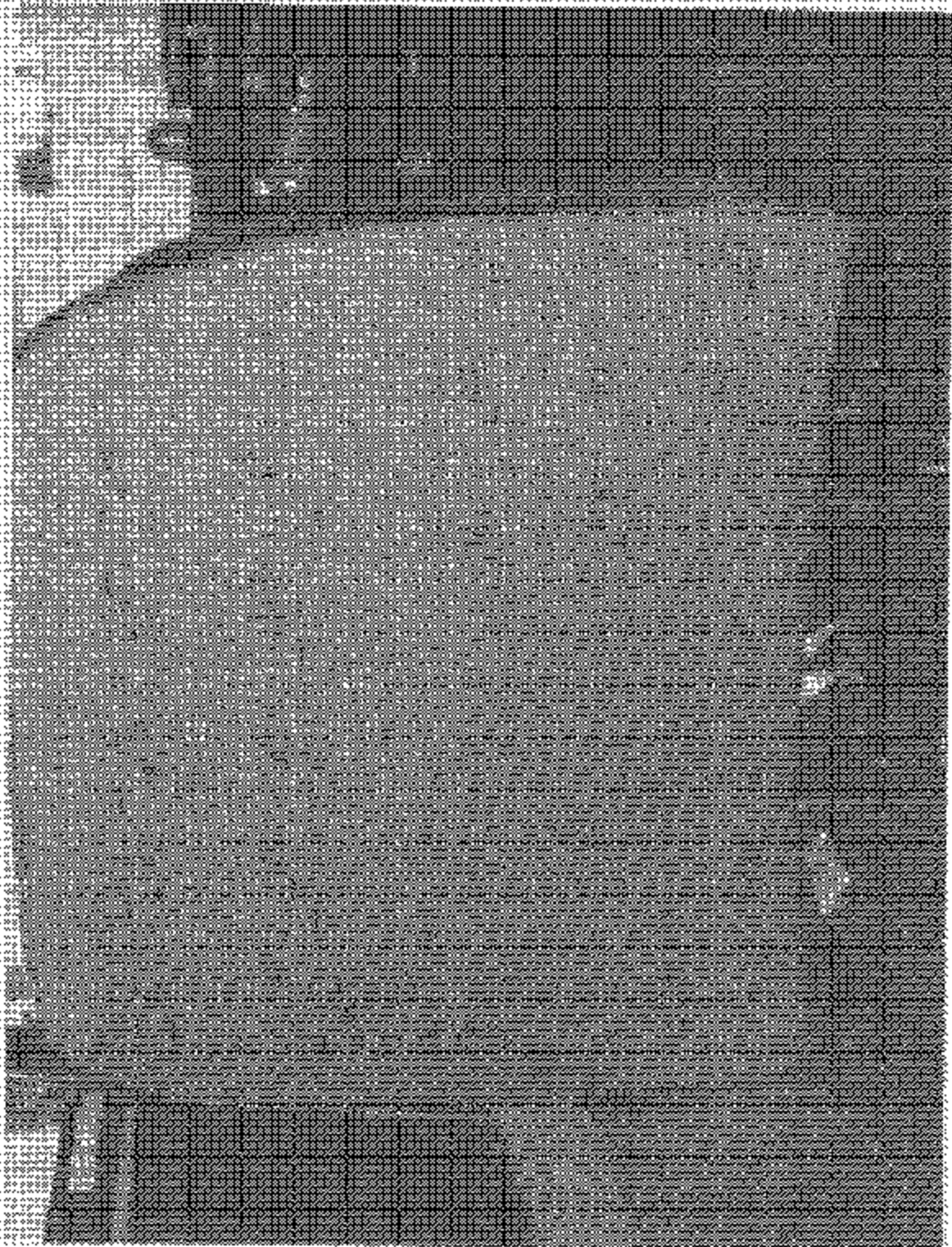
NHTSA No. C30934



Public Volume 2002 Liberty Freedom School Bus

Task Vector 2005 Liberty Freedom School Bus  
P162144 FMVSS 201

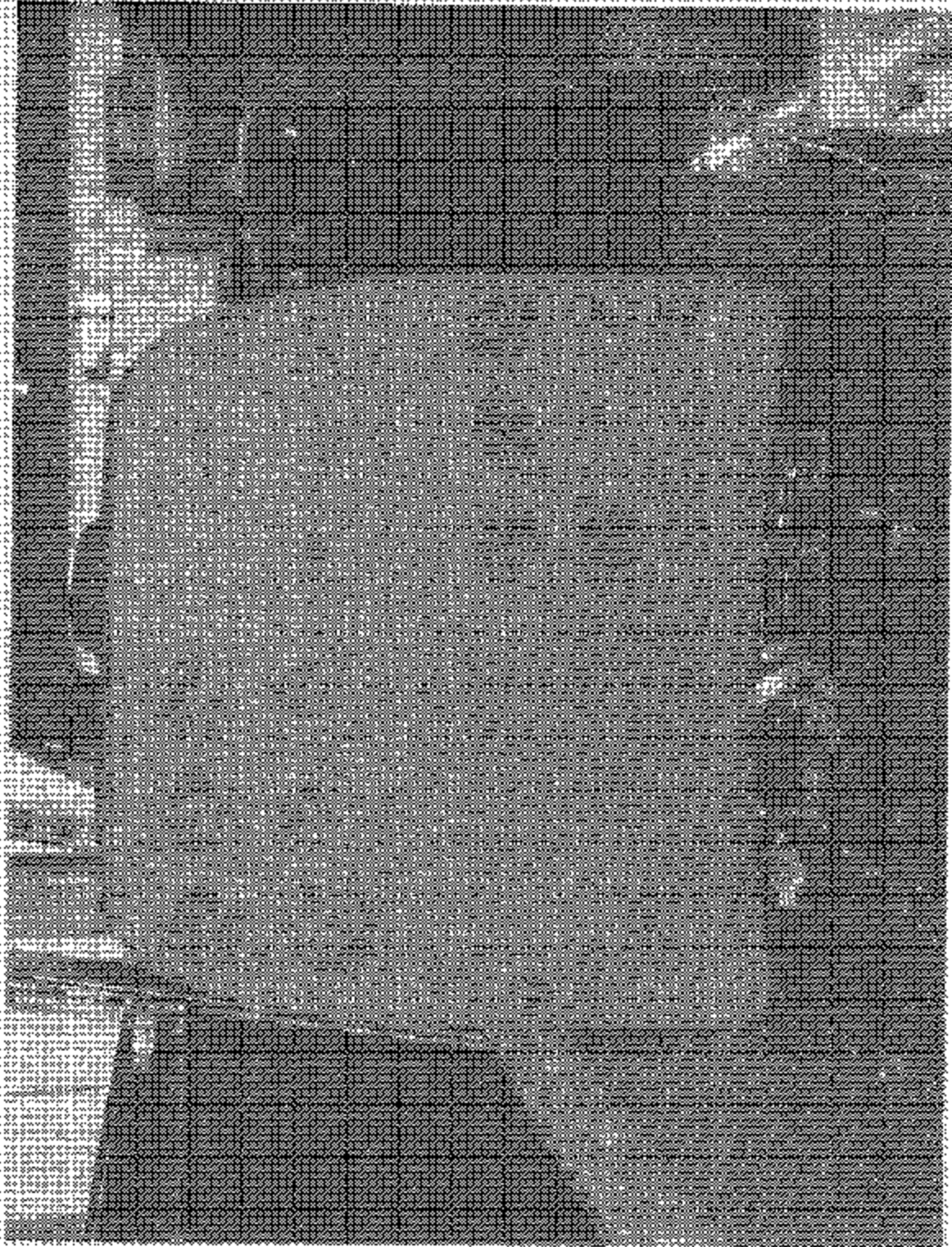
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Task Vector 2005 Liberty Freedom School Bus  
P162144 FMVSS 201

ERIC VALUE  
2025 Liberty Freedom School Bus  
F0155 232

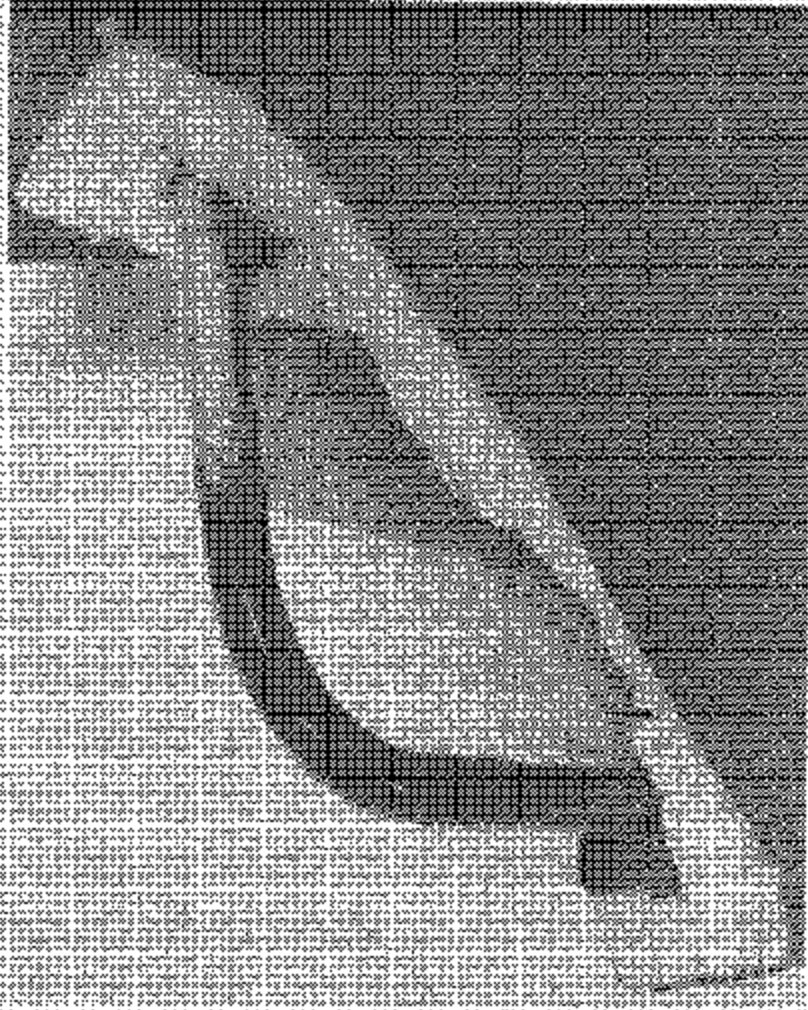
NHIC# NO. C309X



ERIC VALUE  
2025 Liberty Freedom School Bus  
F0155 232

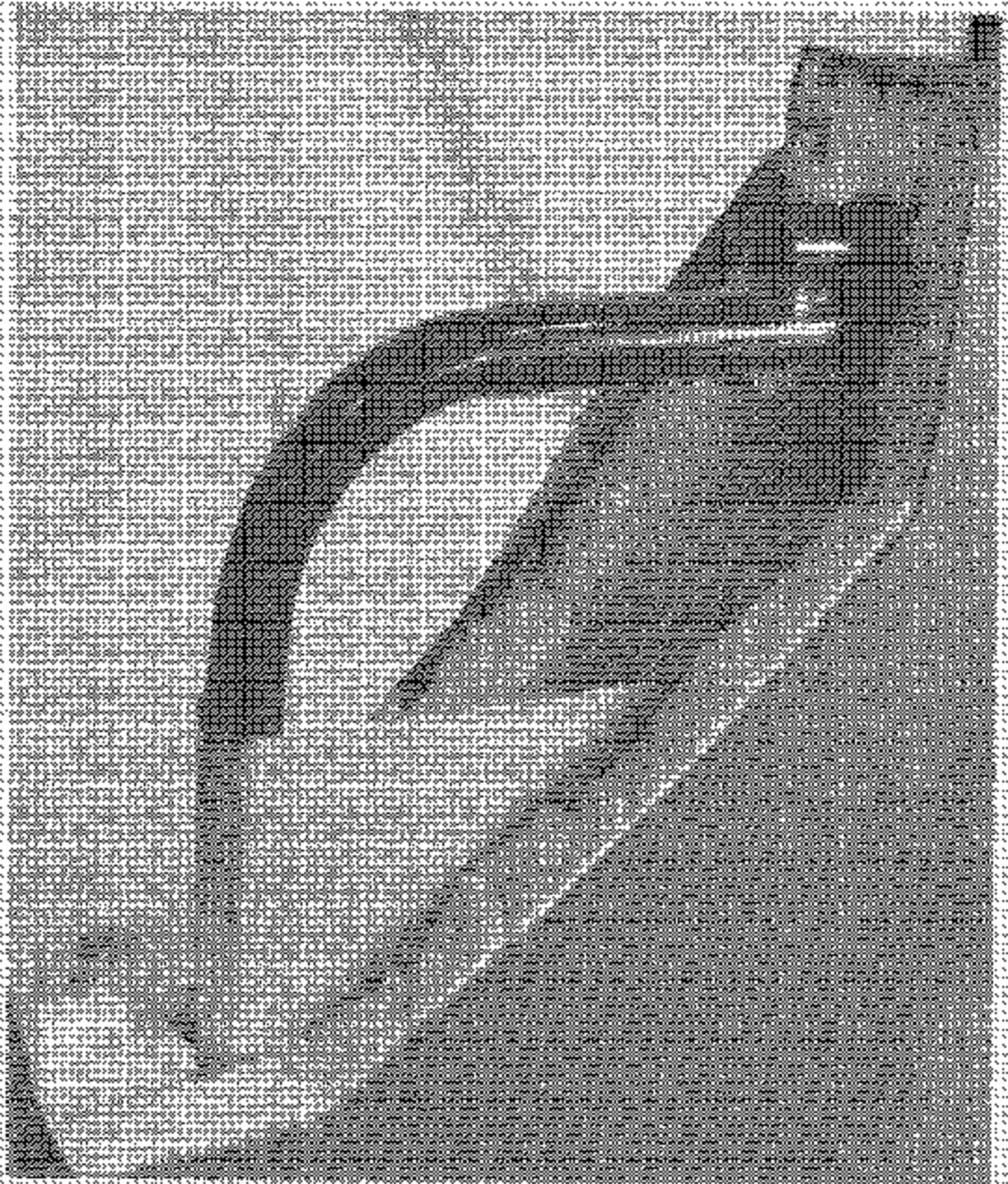
Test Vehicle: 2003 Liberty Extension School Bus  
Procedure: FMVSS 222

Part No: 650901



1601 Valley 2075 Liberty Freedom School Bus  
11/19/24 FMVSS 22

MITSUBISHI 030001

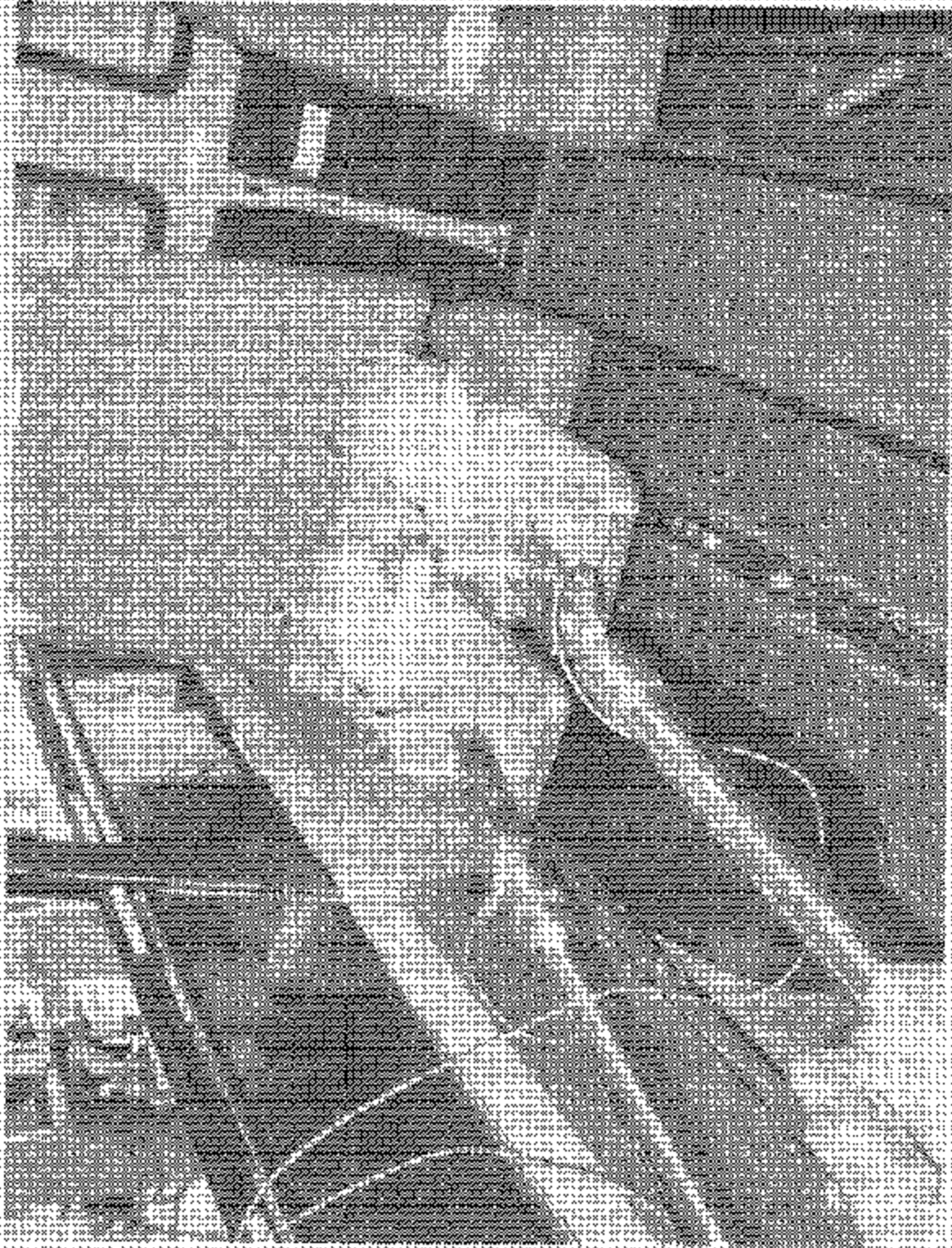


11/19/24 1601 Valley Freedom School Bus

Fac/Vol: 2005 Liberty Freedom School Bus  
#106149

FVVS 222

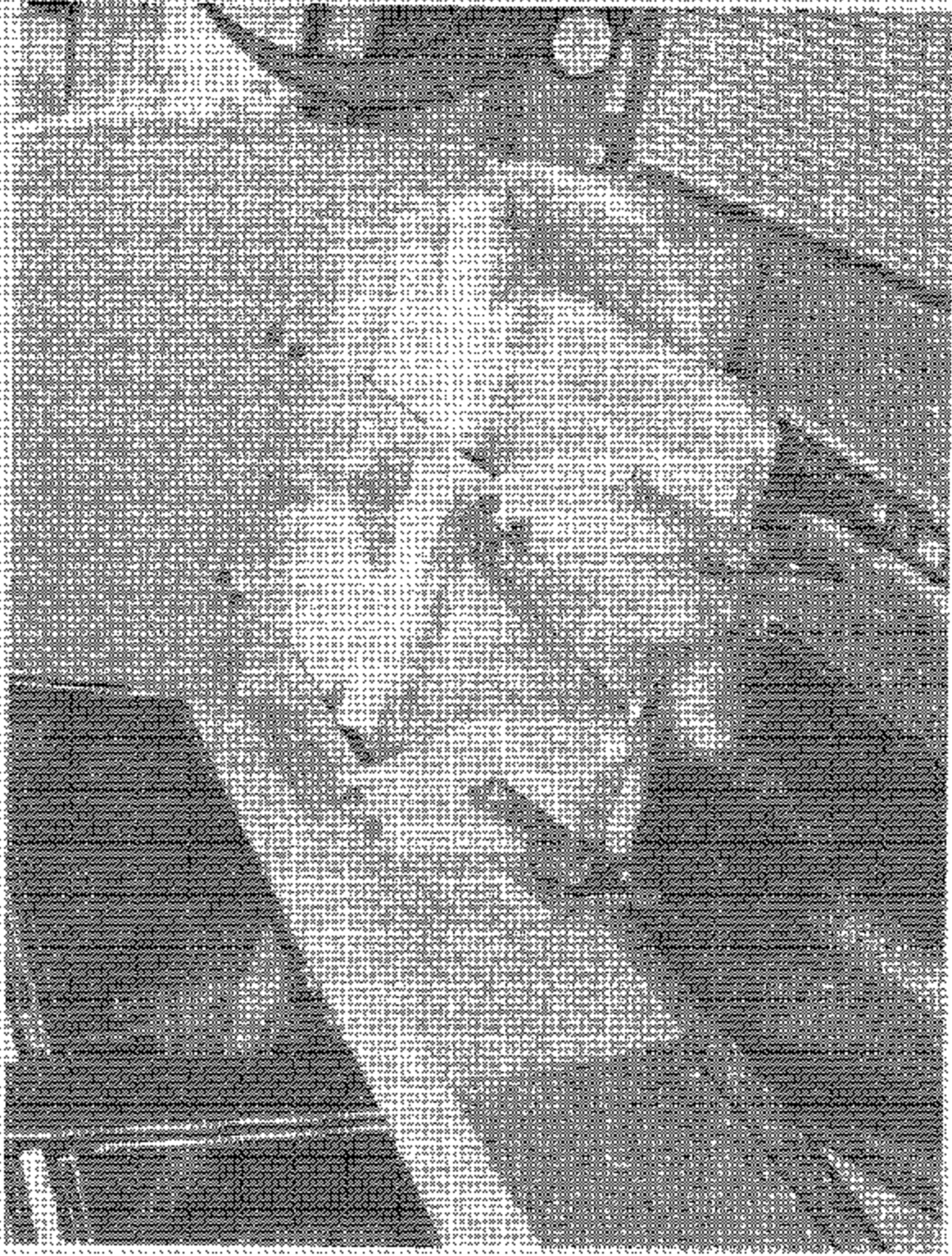
MI 28443 030601



MI 28443 030601

2005 Liberty Freedom School Bus  
17MUS 221

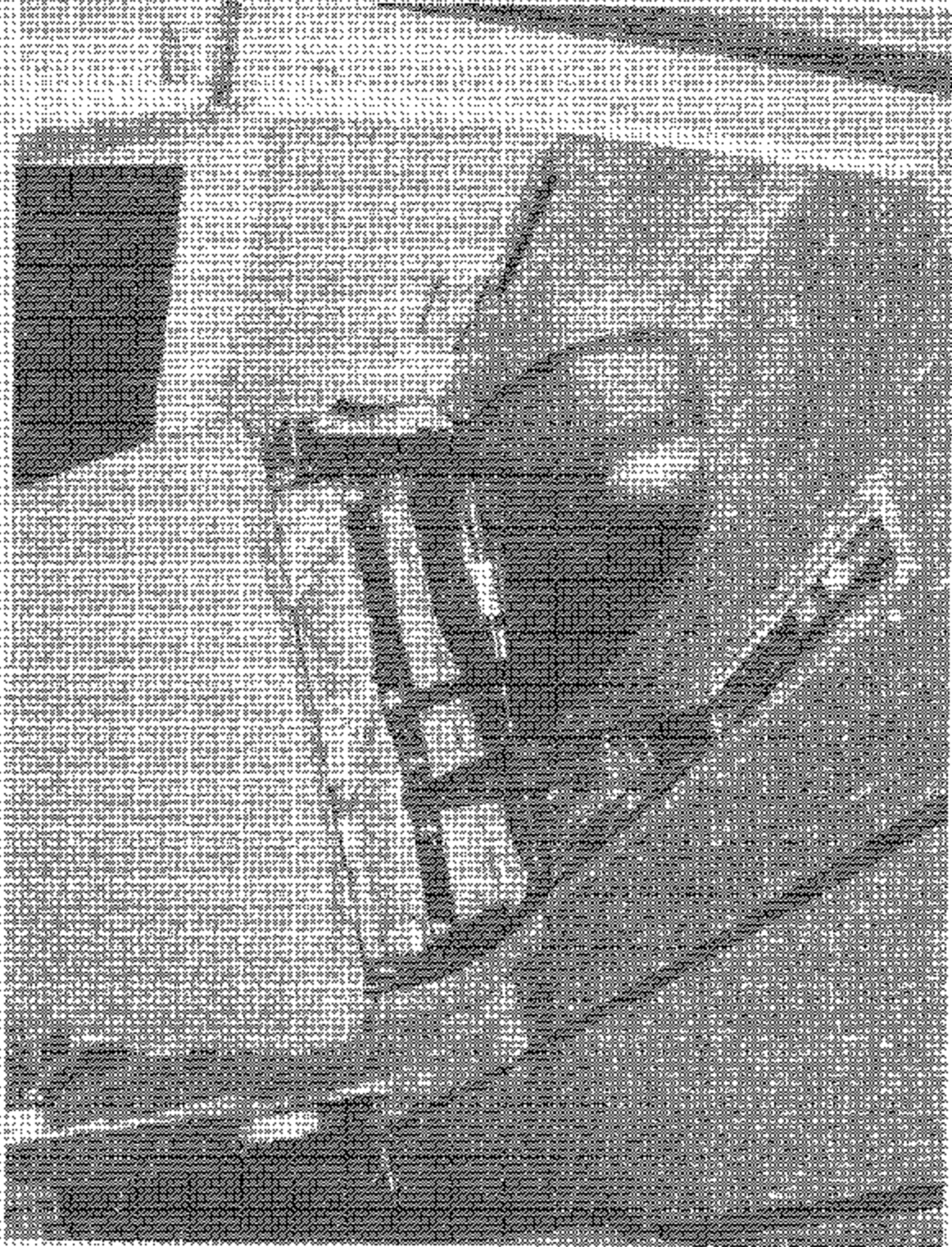
17MUS 221



2005 Liberty Freedom School Bus

2001 Liberty Freedom School Bus  
EUGENE, OR 97402  
FIN500282

WHTSA No. 030901

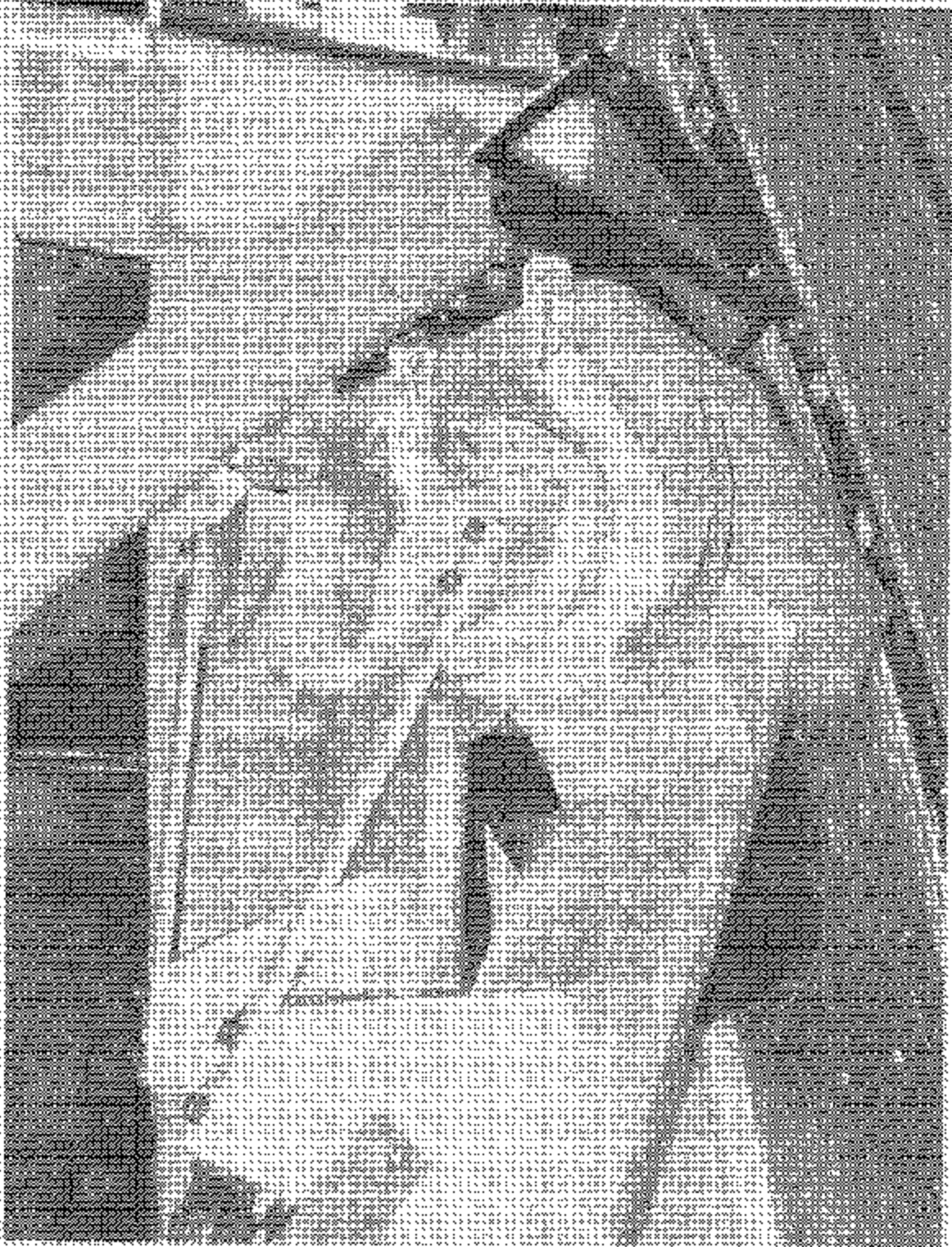


Post-Tensioned Concrete Slab



Test #107 - 2013 Liberty Freedom School Bus  
Providence - F0000212

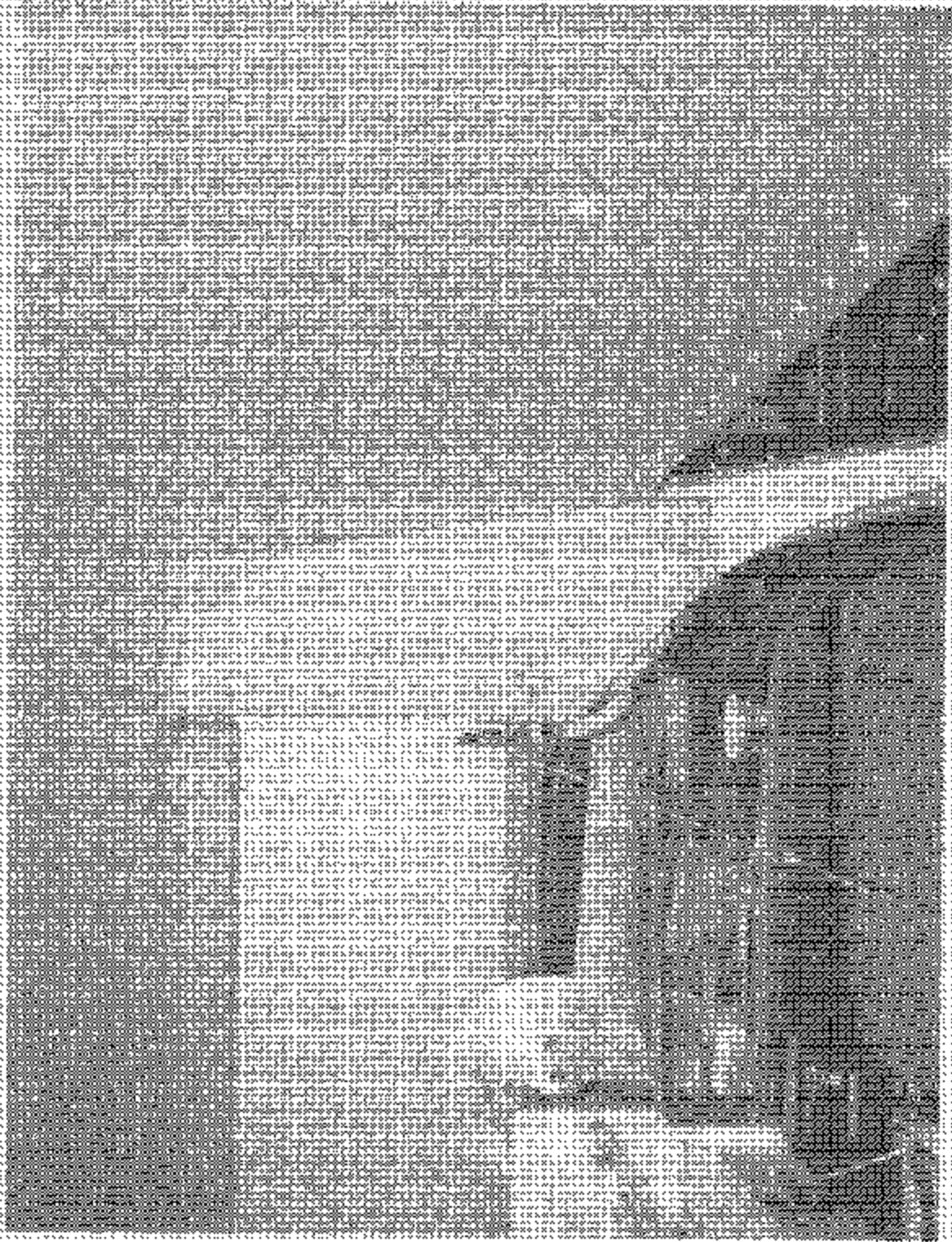
MPFS# 541 - 030004



2013 Liberty Freedom School Bus

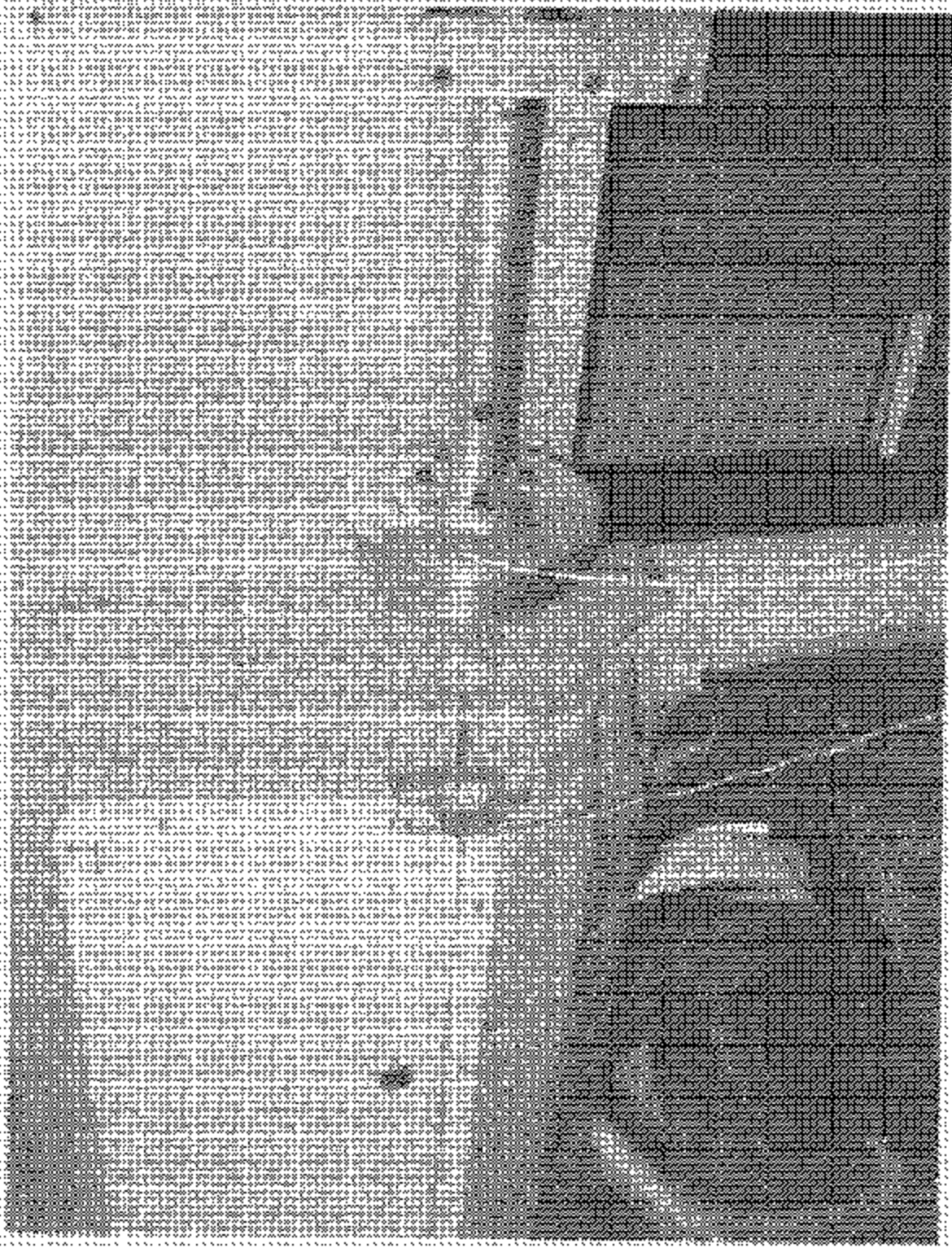
2003 Liberty Freedom School Site  
P.O. Box 114  
Pawnee, WY 82501

01/20/03 01/20/03



Task Order: 2005-010007-000000-Subcontract Bus  
Attachment: PART 5.2.7

Attachment: 00000000



Attachment: 00000000

**SECTION 6  
TEST PLOTS**

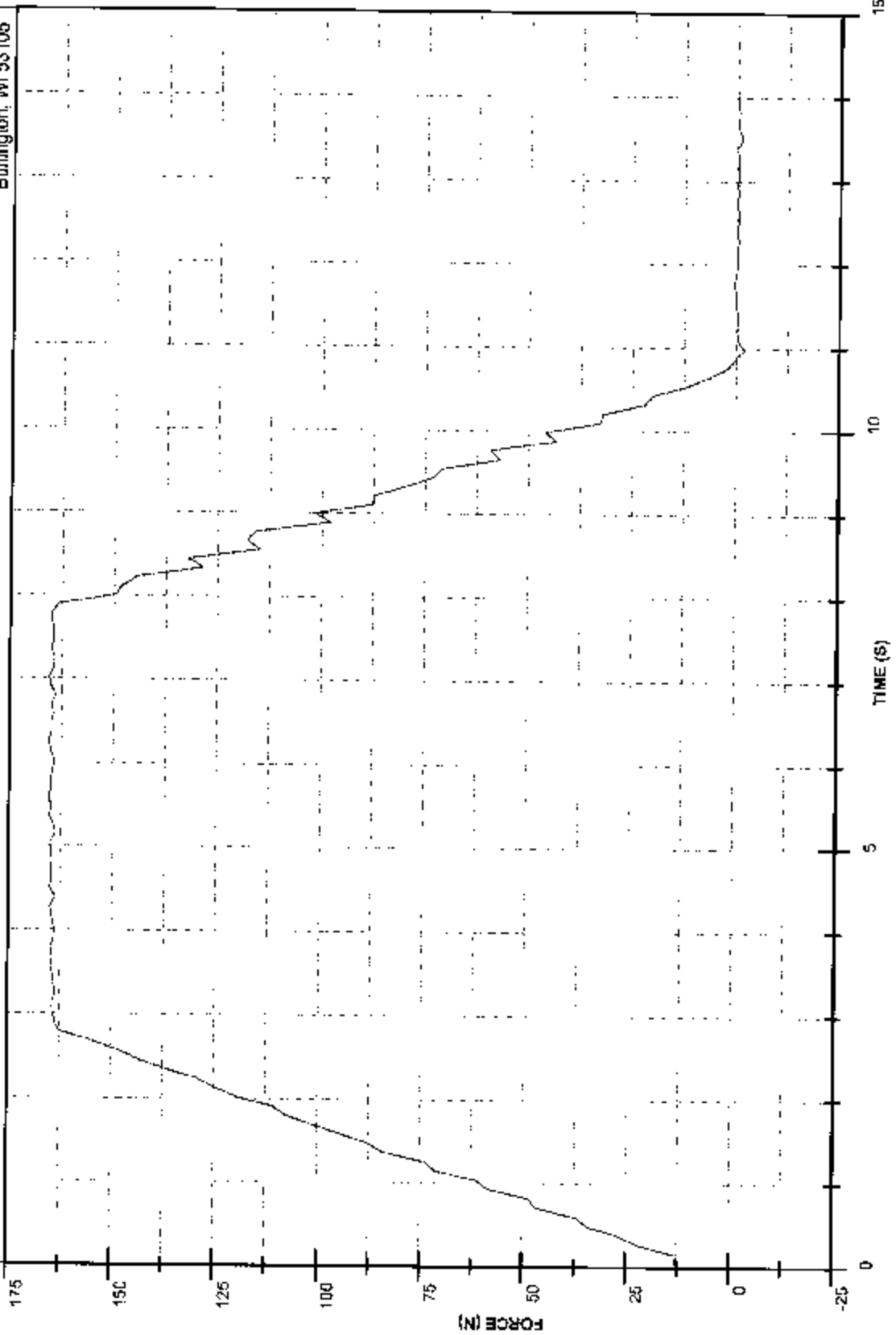
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Test Desc: Seat Cushion Retension S4  
Component ID: Liberty Bus

Test Date: 7-10-03  
NHTSA #: C30901

MGA Research Corp  
5000 Warren Road,  
Burlington, WI 53105



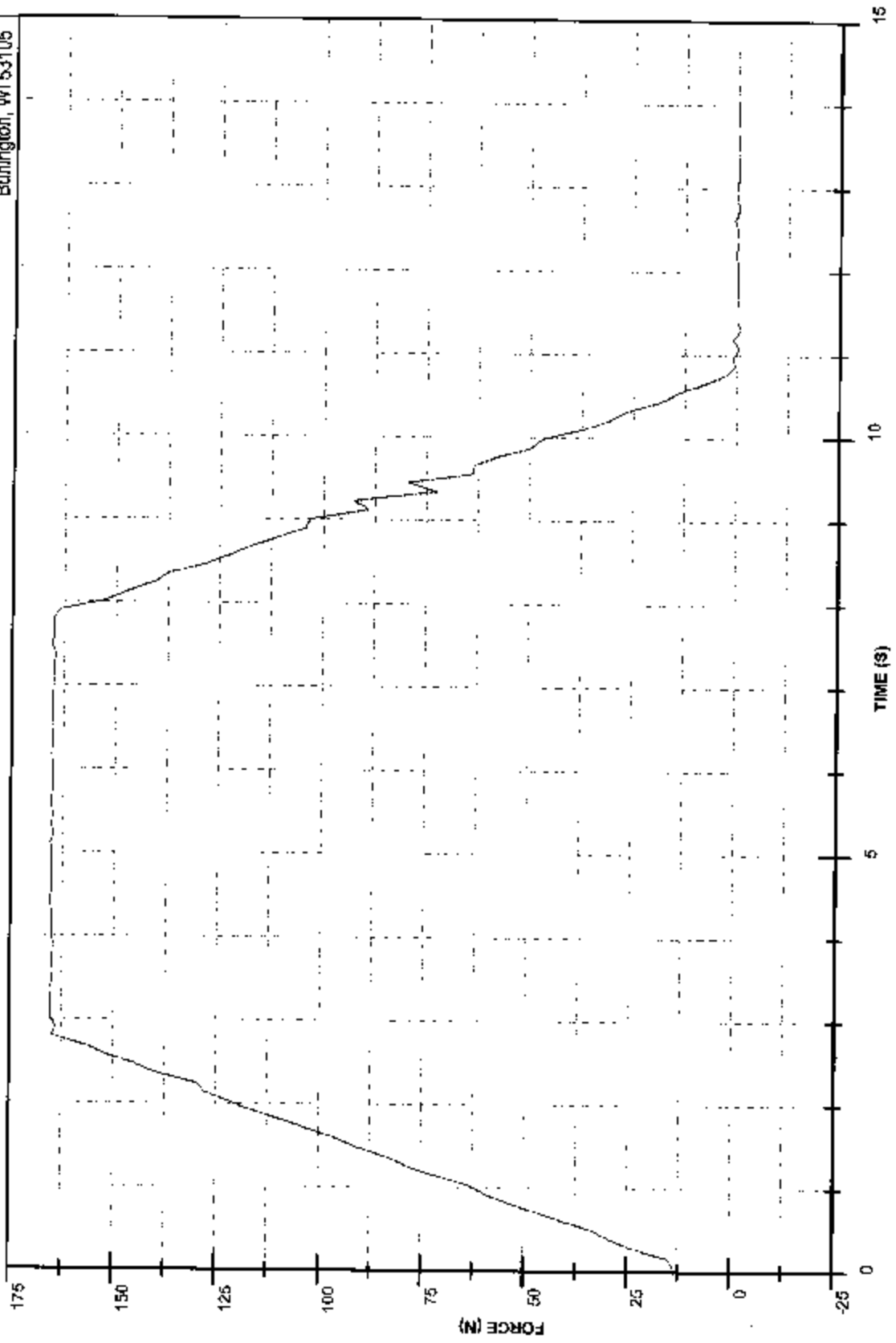
Test Desc: Seat Cushion Retension S5

Test Date: 7-10-03

MGA Research Corp

Component ID: Liberty Bus

5000 Warren Road,  
Burlington, WI 53105

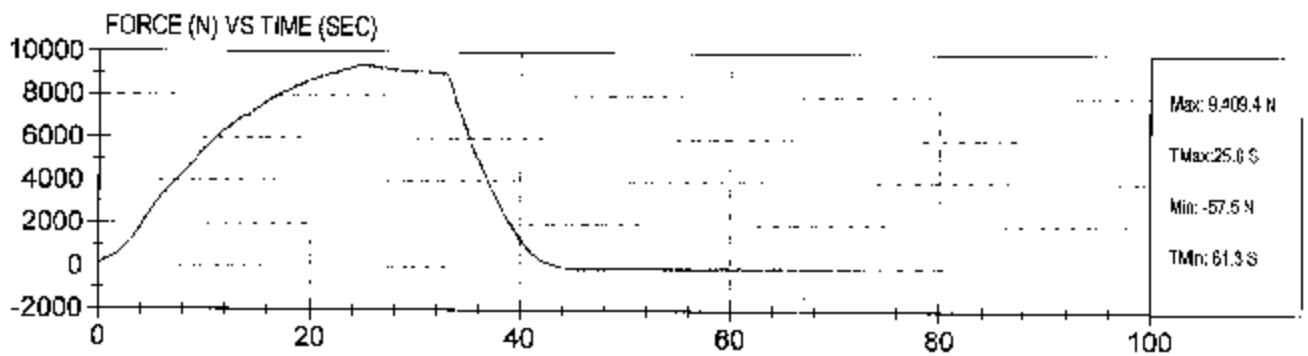
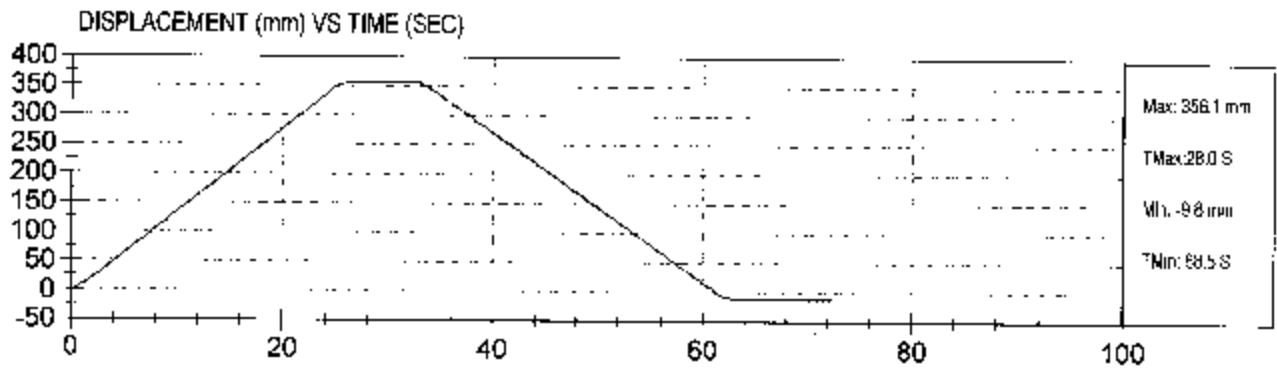
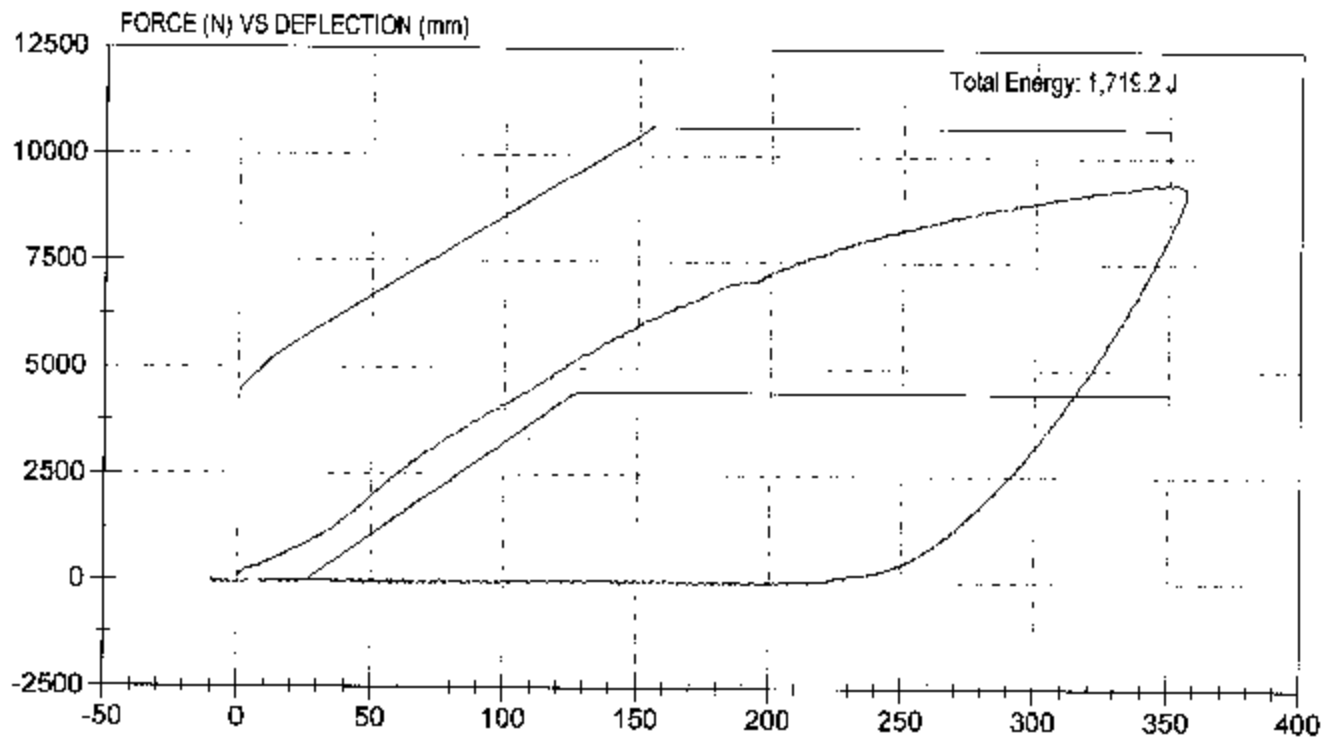




**mga**

Test Desc: S7 Forward Deflection Upper  
Component ID: Liberty Bus

Test Date: 7-10-03  
NHTSA #: C30901

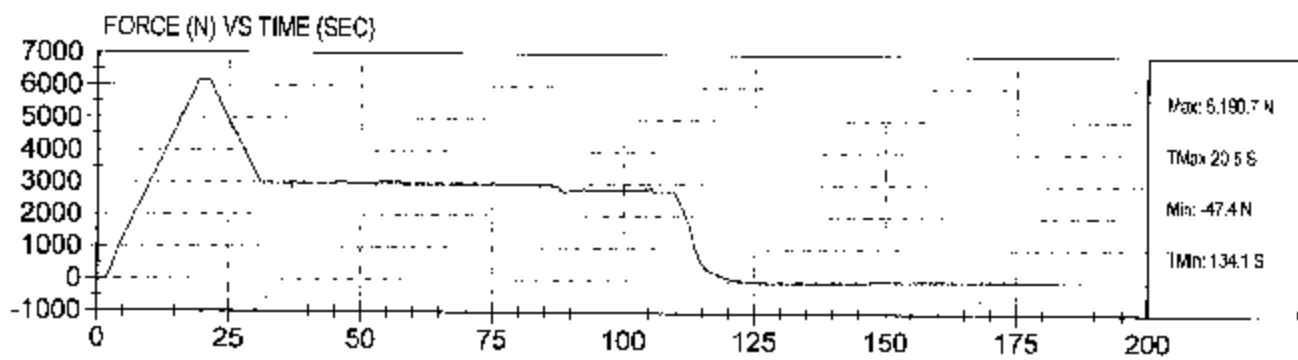
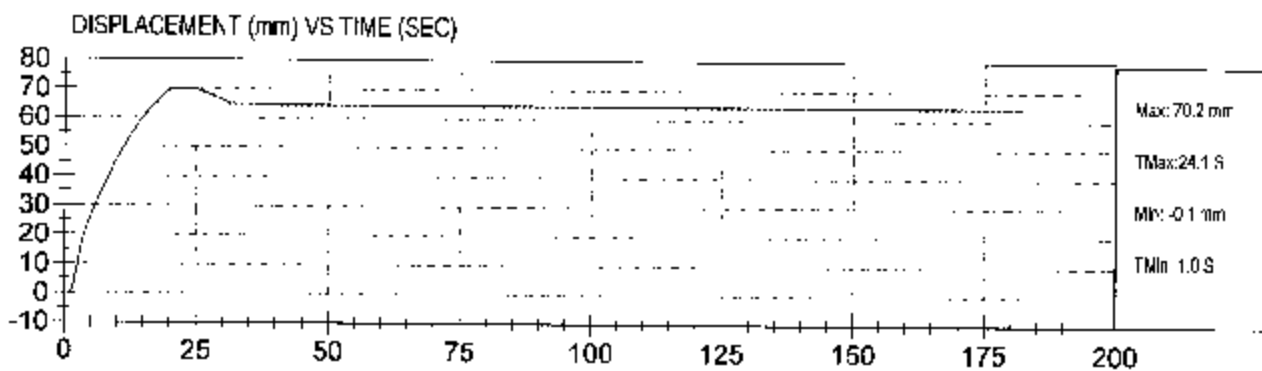
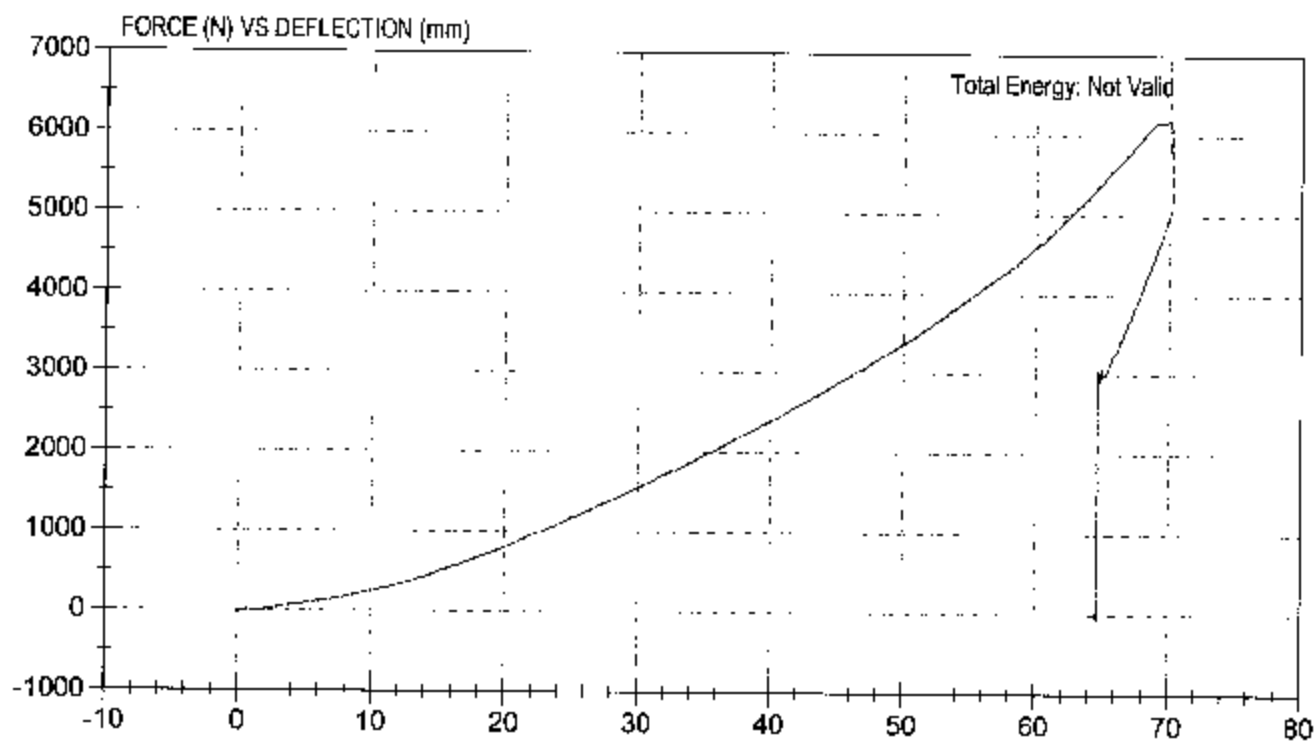




**mga**

Test Desc: S7 Forward Deflection Lower  
Component ID: Liberty Bus

Test Date: 7-10-03  
NHTSA #: C30901



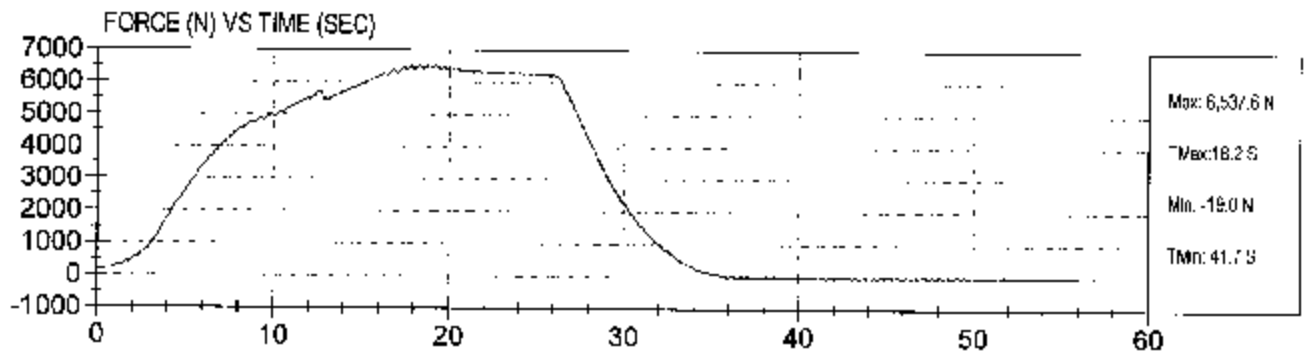
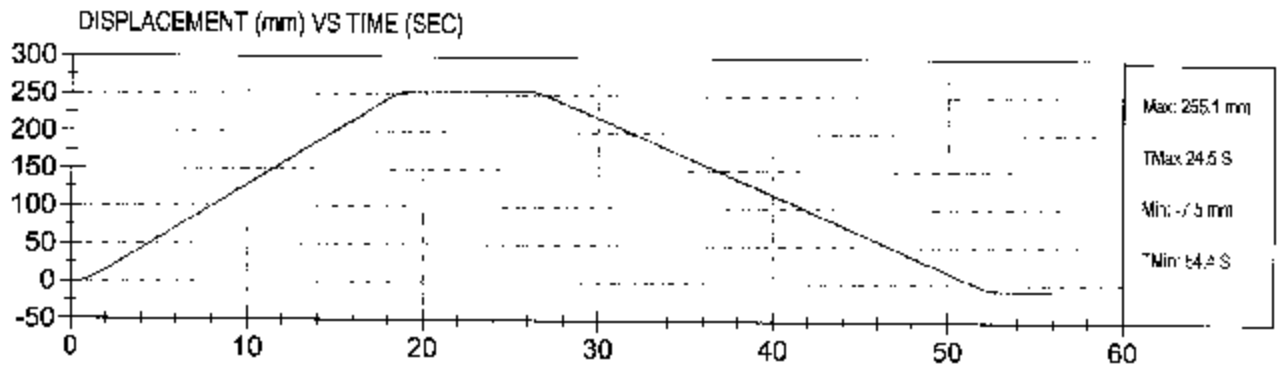
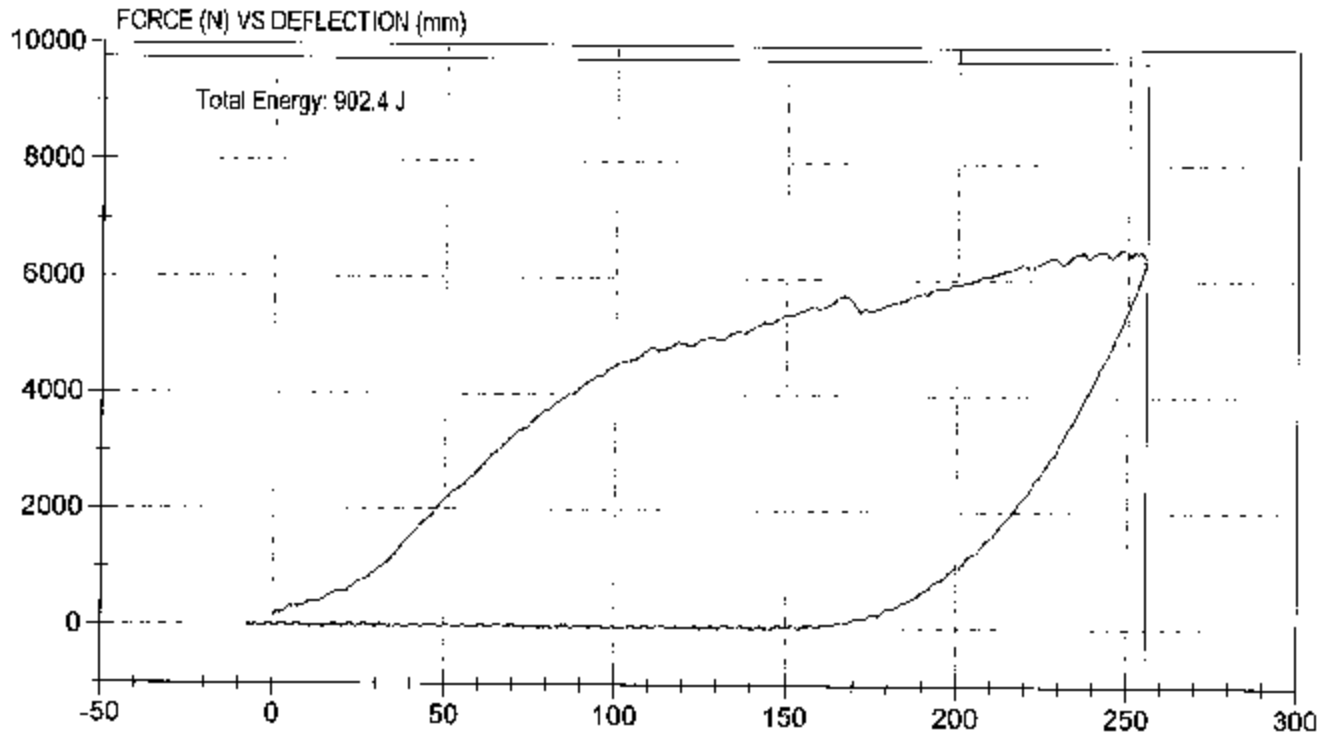




**mga**

Test Desc: S3 Rearward Deflection  
Component ID: Liberty Bus

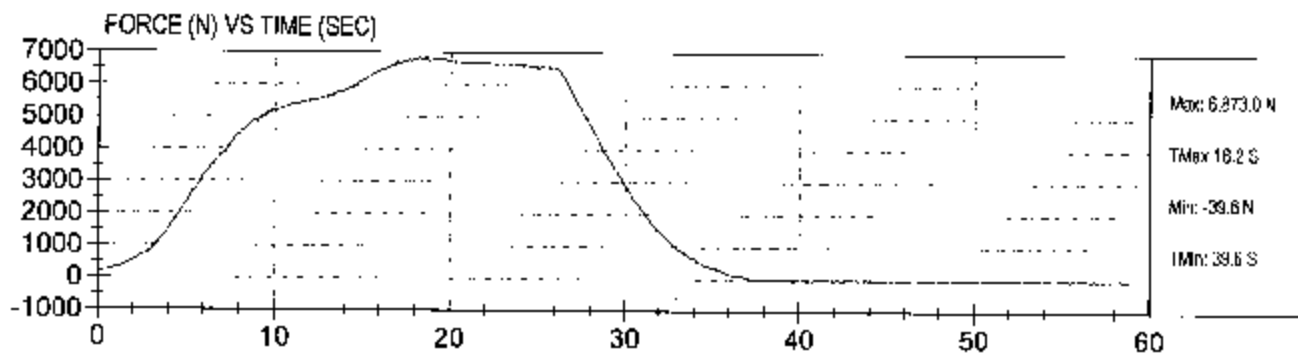
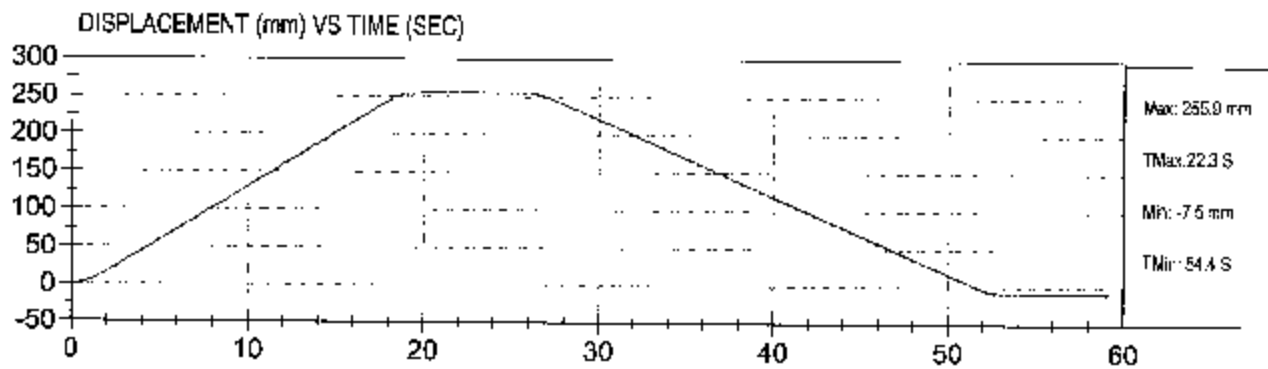
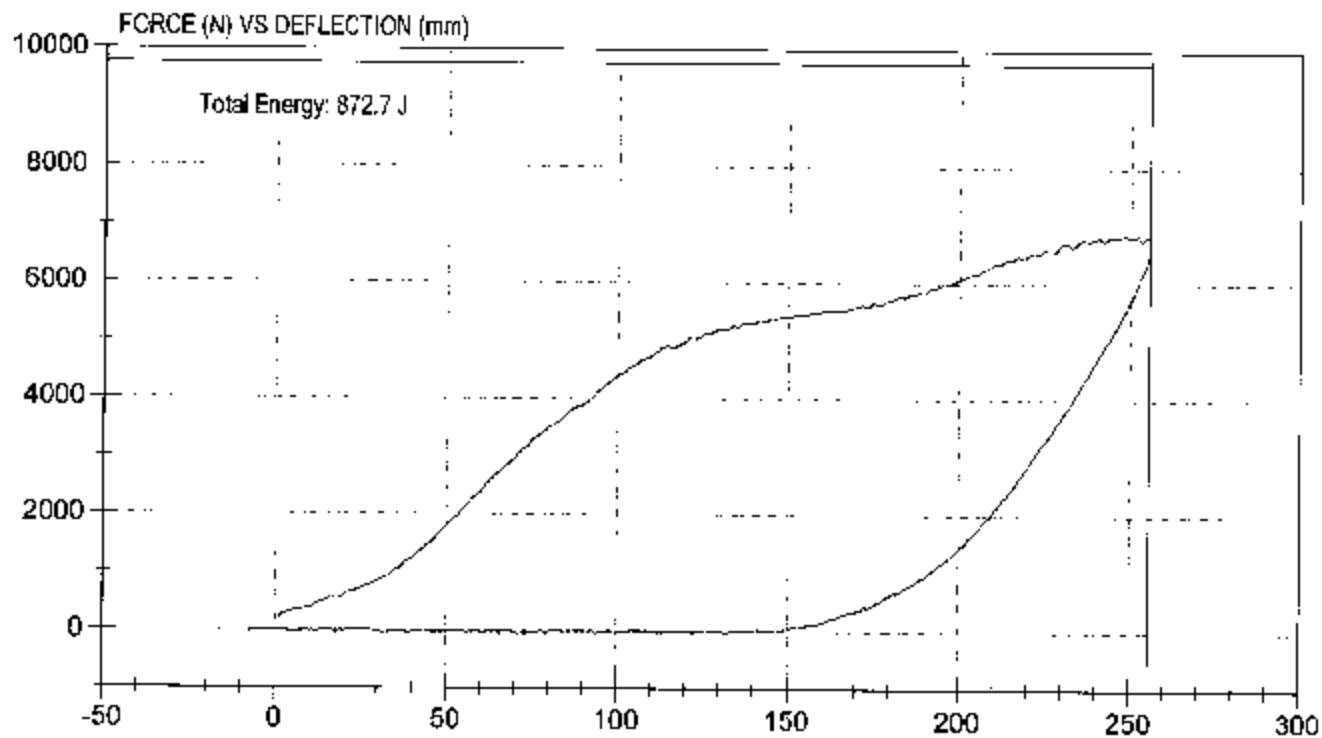
Test Date: 7-10-03  
NHTSA #: C30901





Test Desc: S6 Rearward Deflection  
Component ID: Liberty Bus

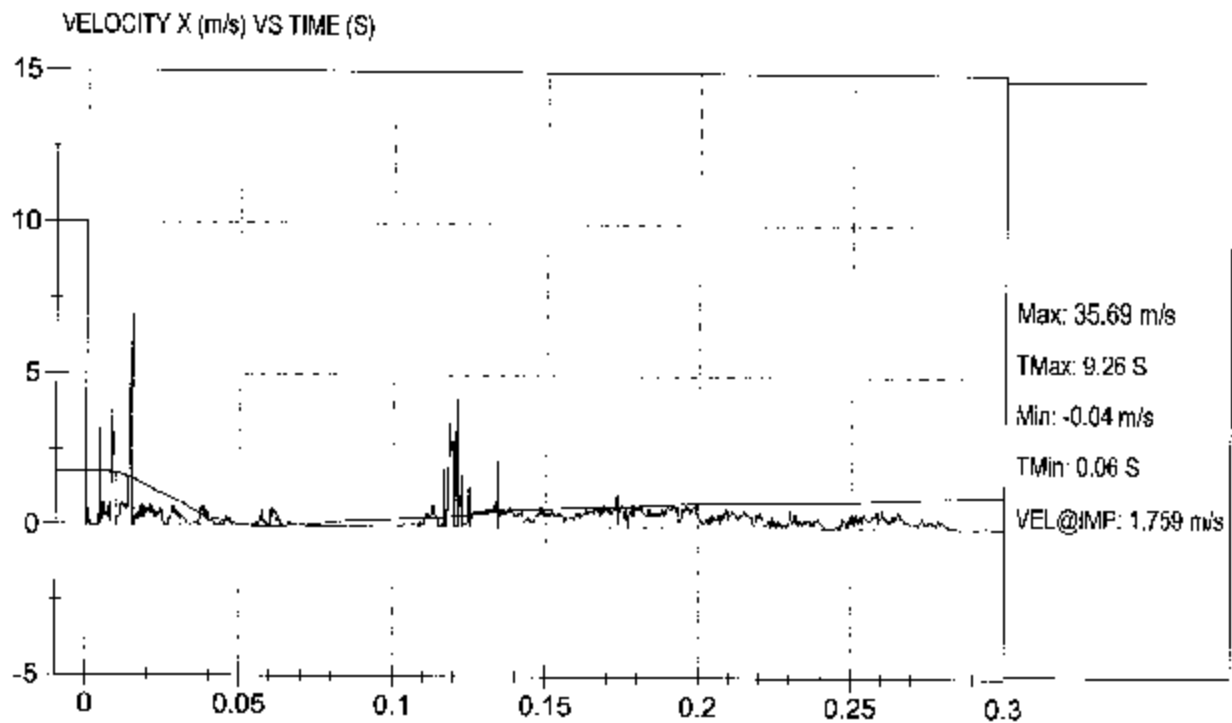
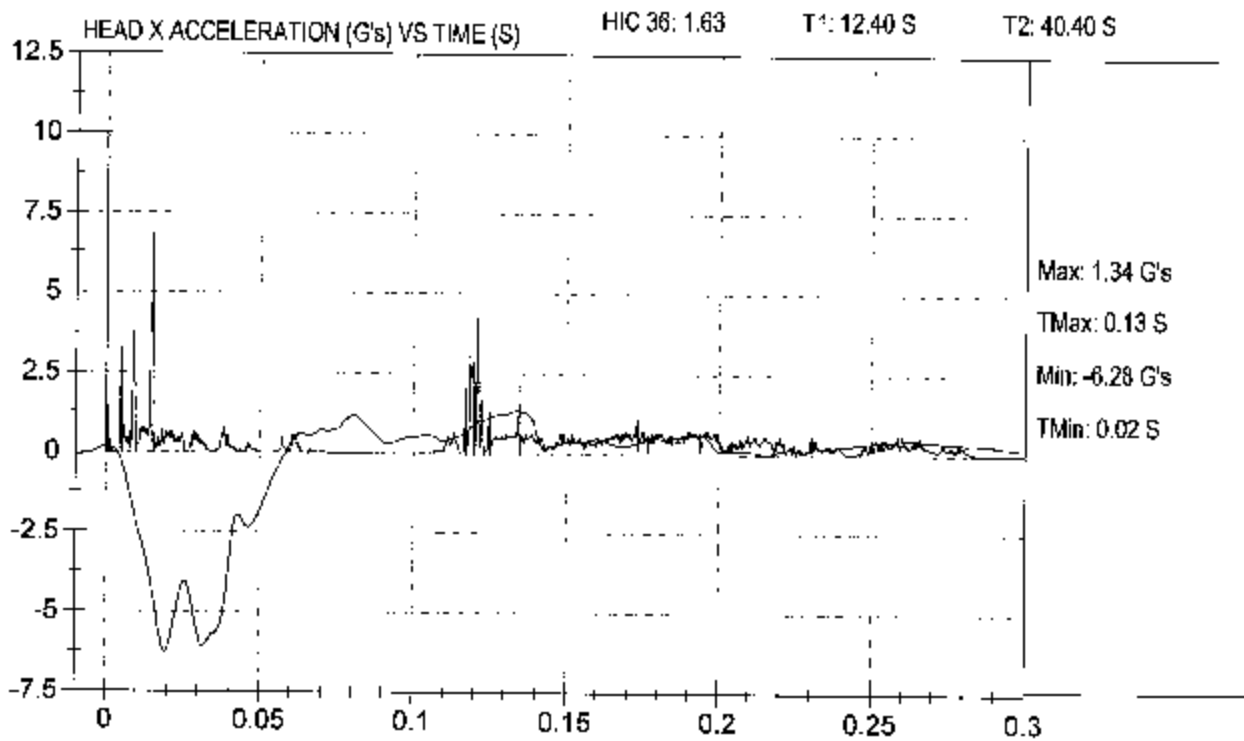
Test Date: 7-10-03  
NHTSA #: C30901





FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)  
Vehicle: Liberty Bus  
NHTSA #: C30901

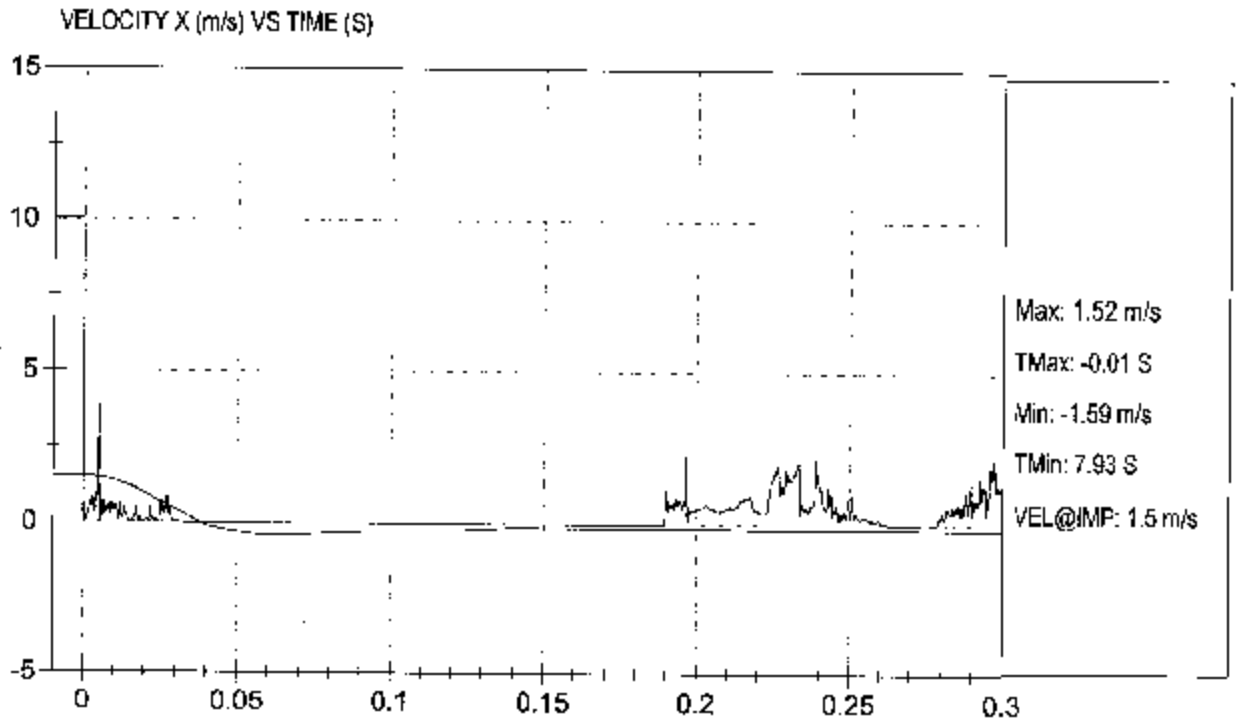
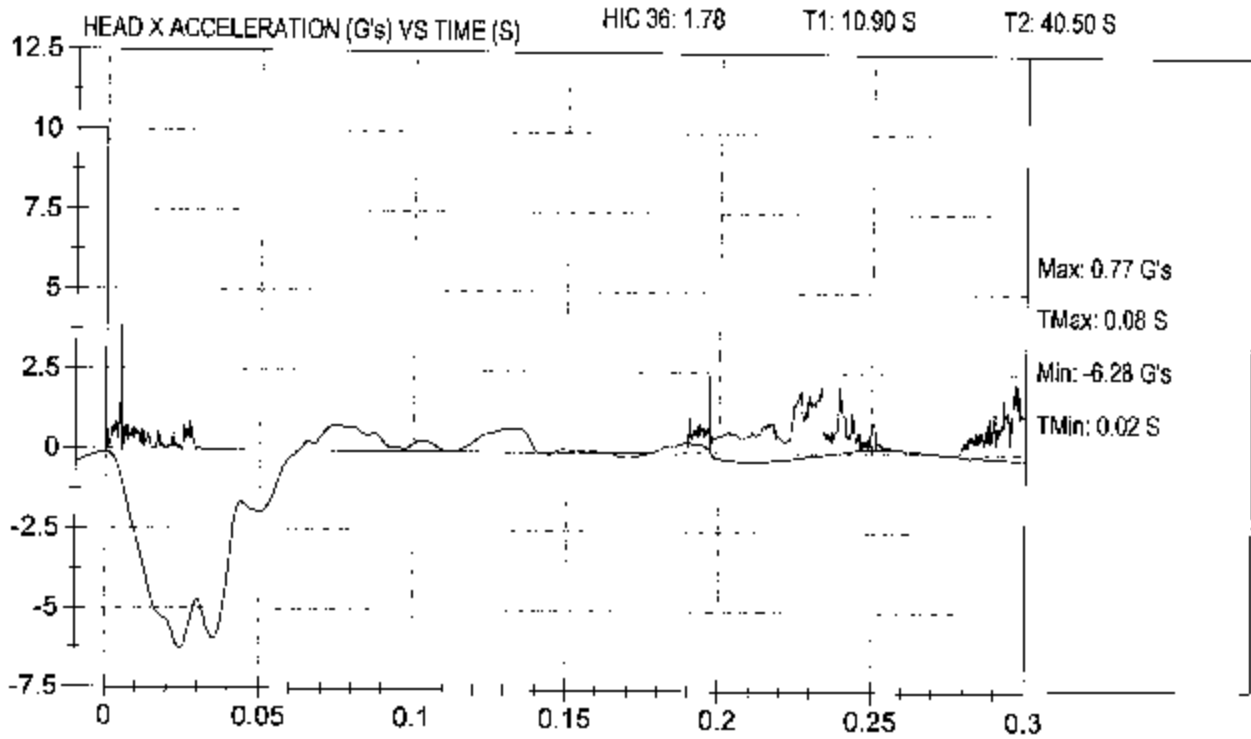
Test Date: 7/14/03  
Location: H1





FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)  
Vehicle: Liberty Bus  
NHTSA #: C30901

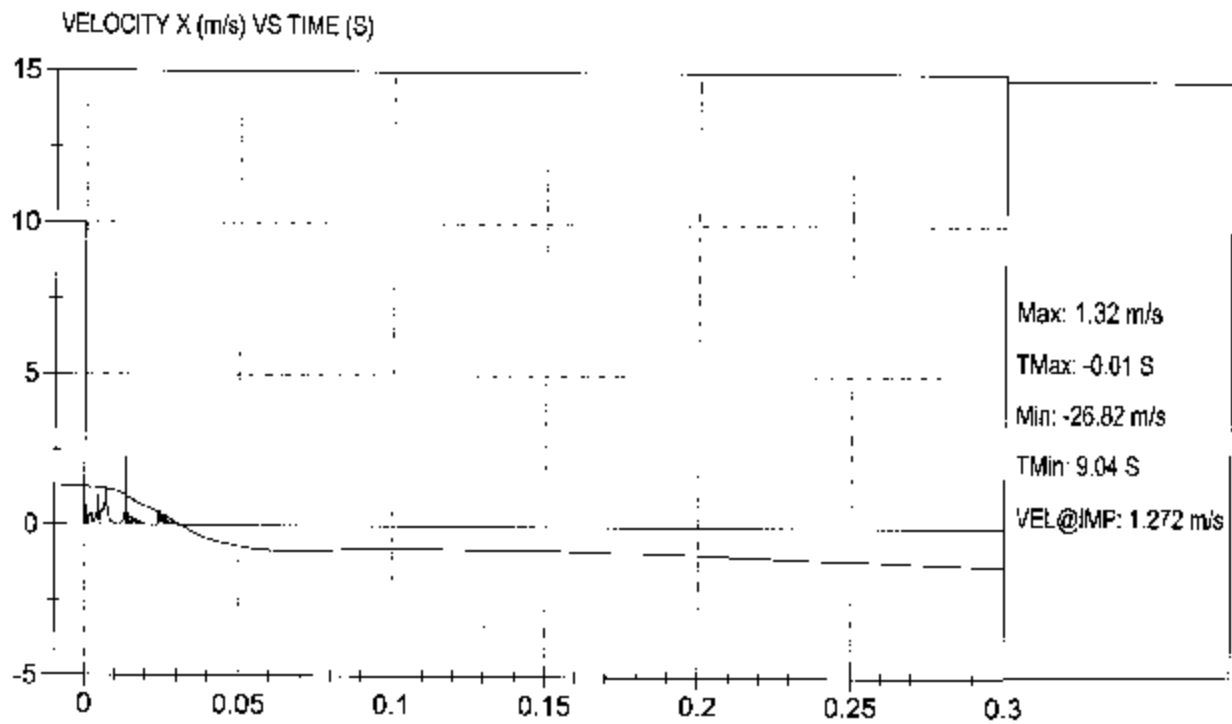
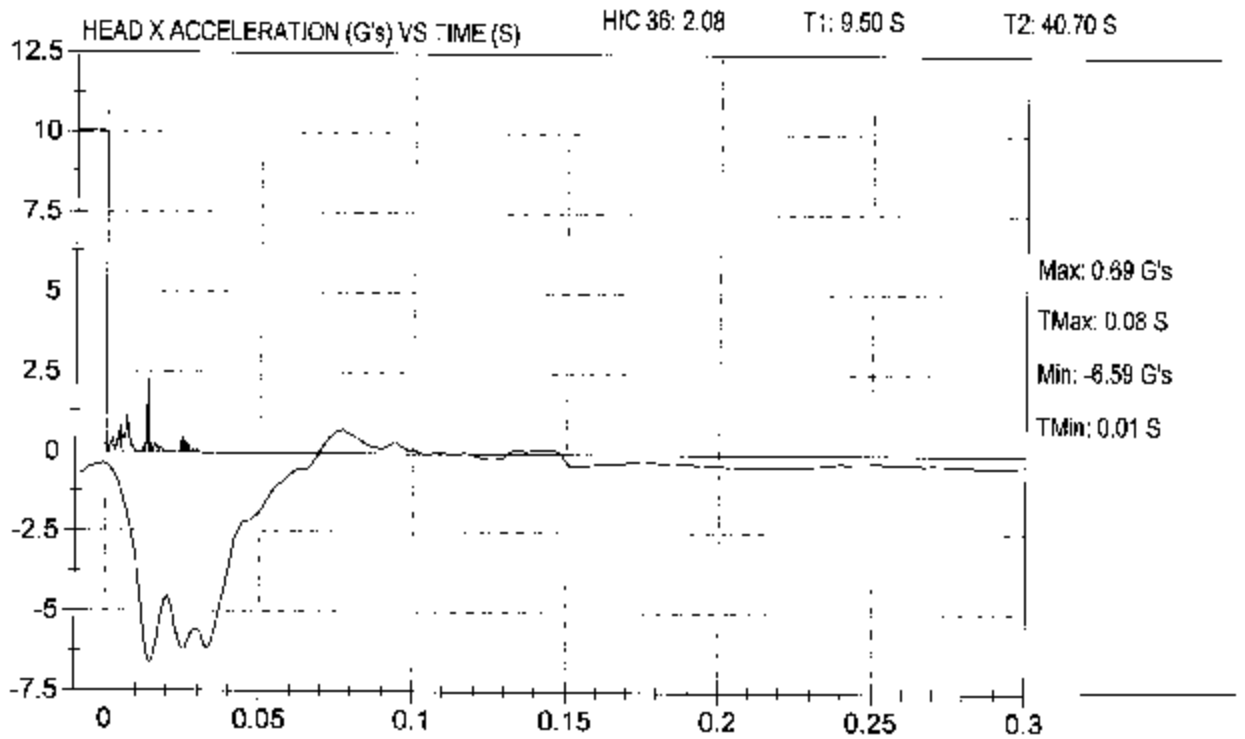
Test Date 7-15-03  
Location: H2





FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)  
Vehicle: Liberty Bus  
NHTSA #: C3C9D1

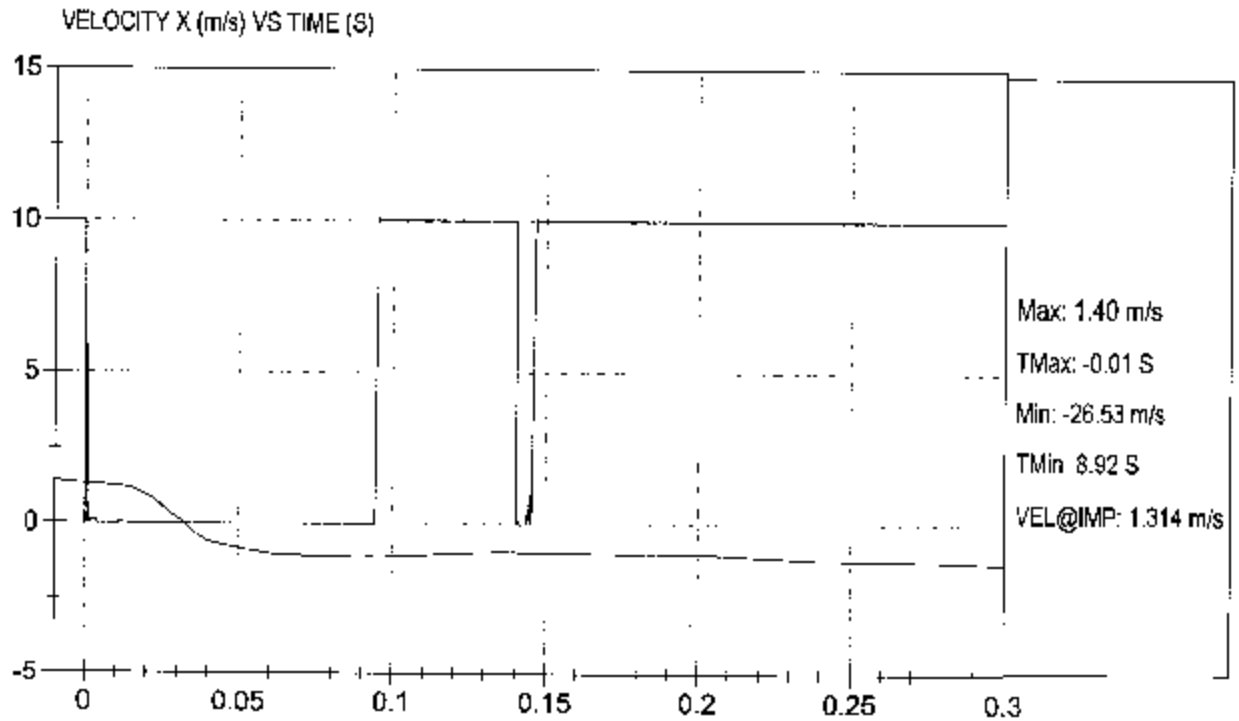
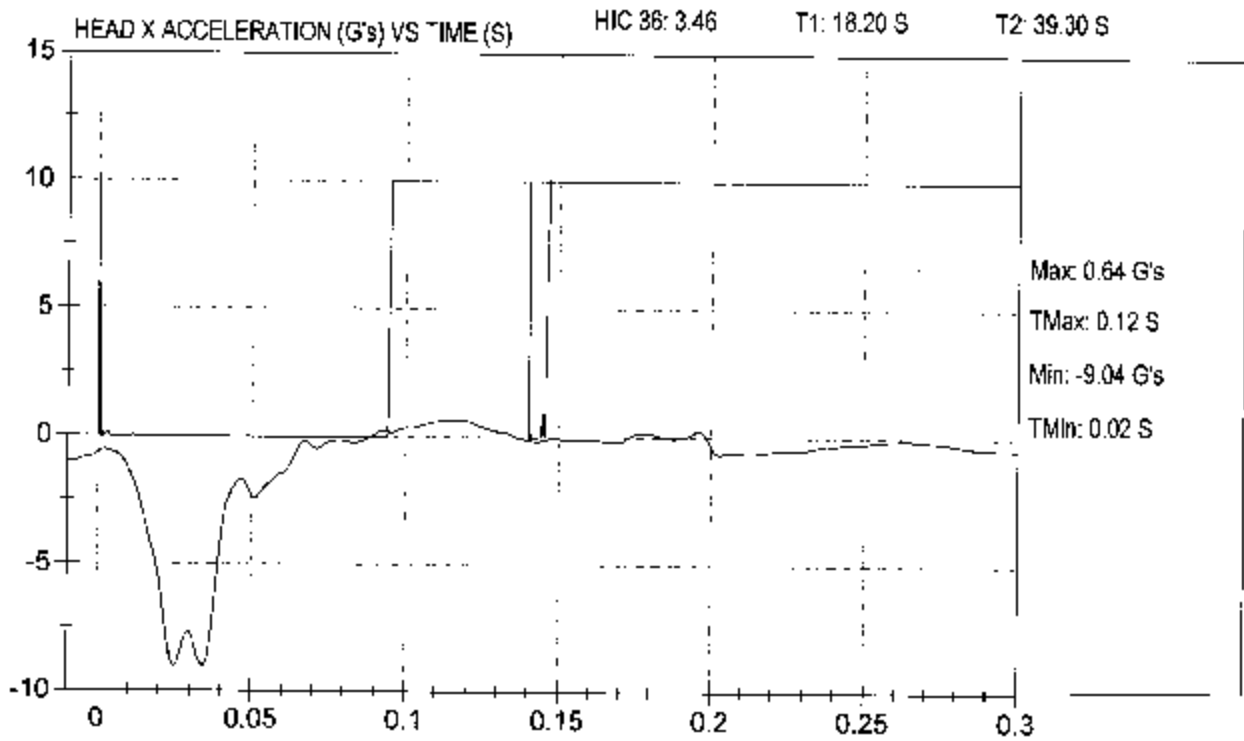
Test Date: 7-15-03  
Location: H3





FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)  
Vehicle: Liberty Bus  
NHTSA #: C3C901

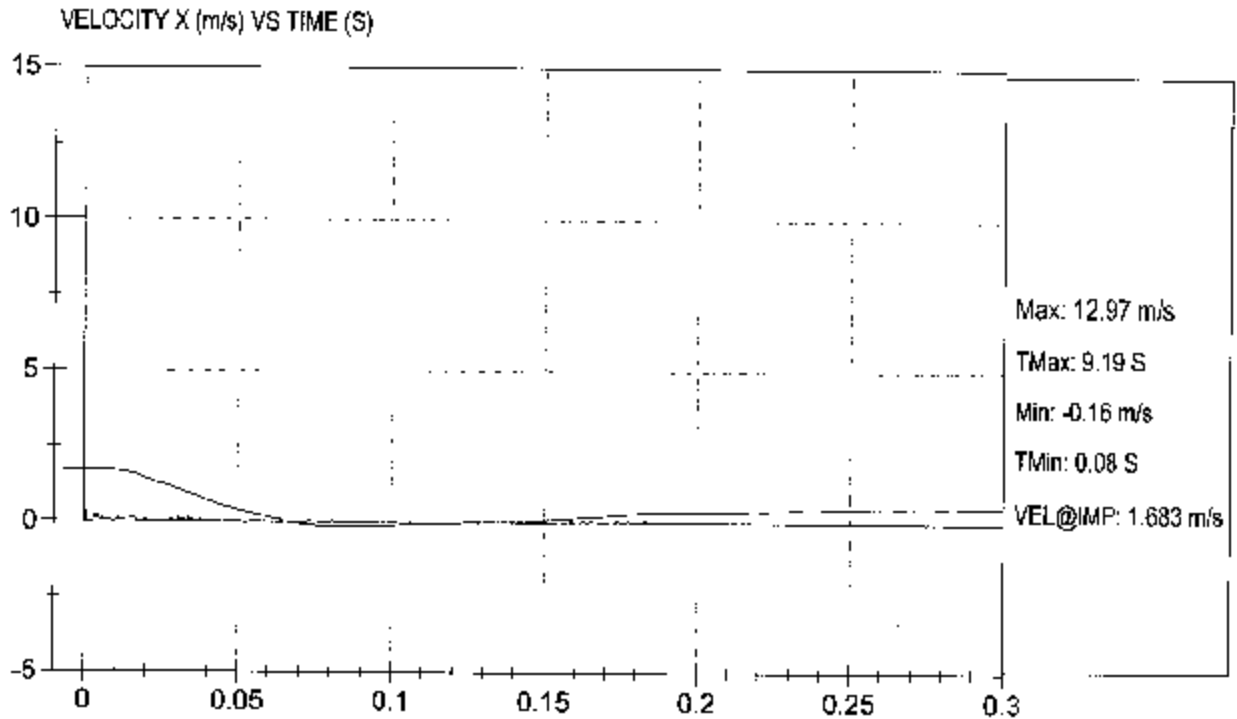
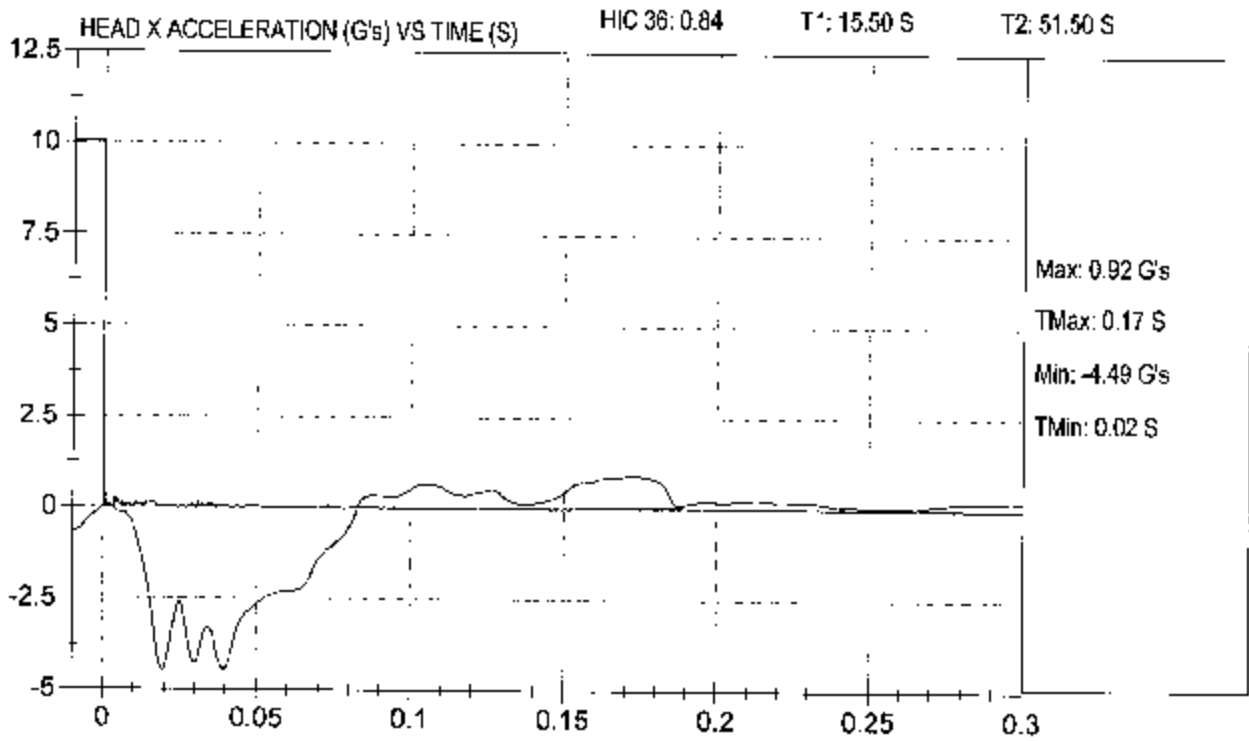
Test Date: 7-15-03  
Location: H4





FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)  
Vehicle: Liberty Bus  
NHTSA #: C30901

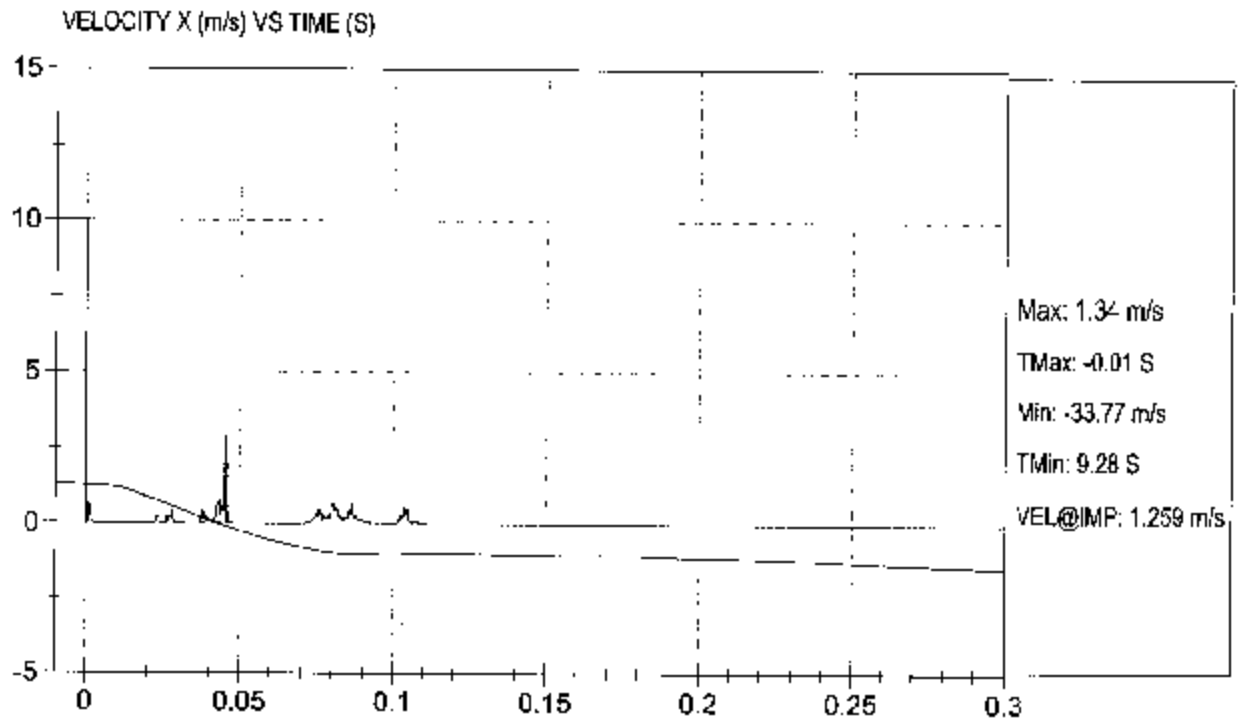
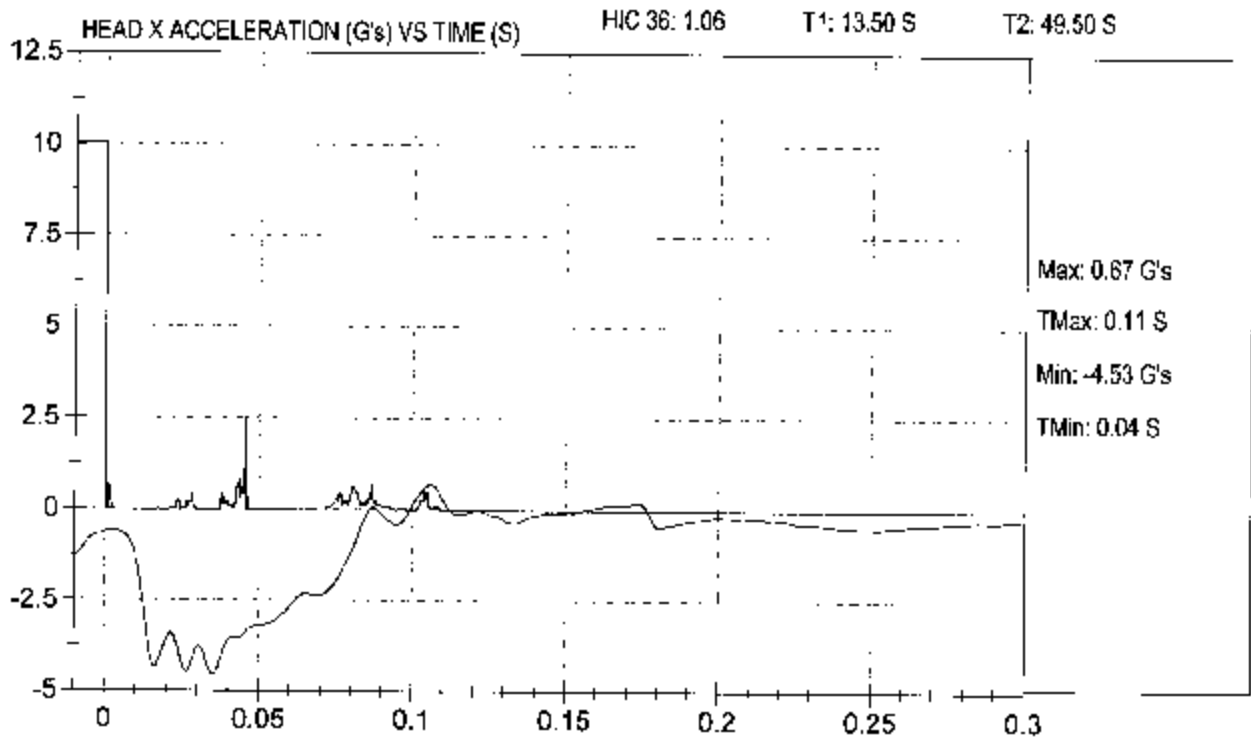
Test Date: 7-15-03  
Location: H5





FMVSS 222 HEAD FORM IMPACTS (1.5 m/s)  
Vehicle: Liberty Bus  
NHTSA #: C30901

Test Date: 7-15-03  
Location: H6

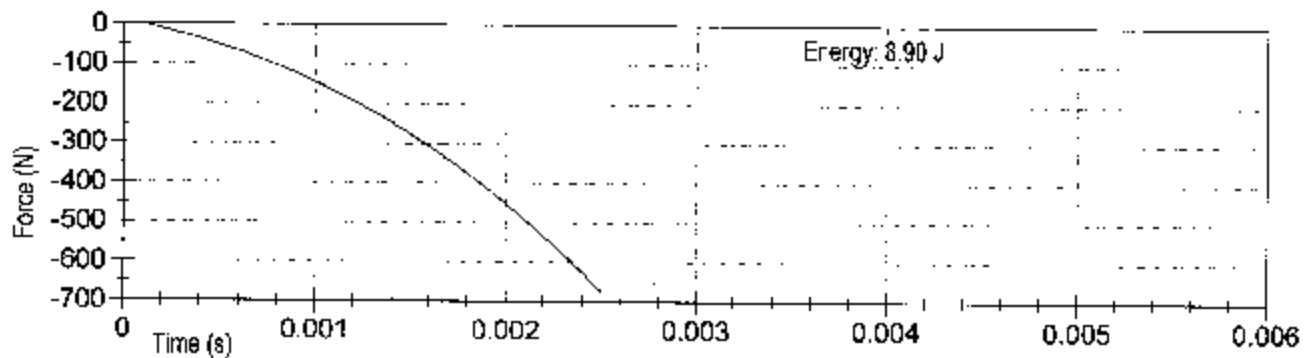
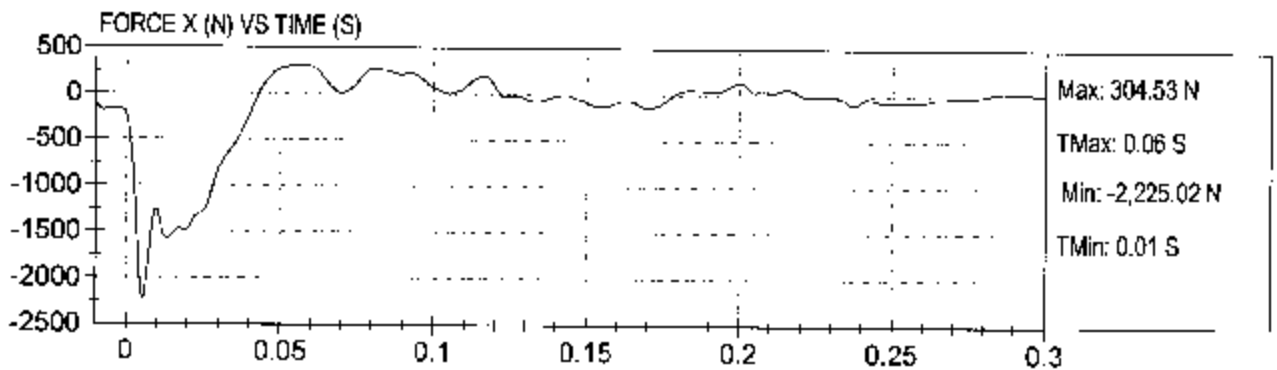
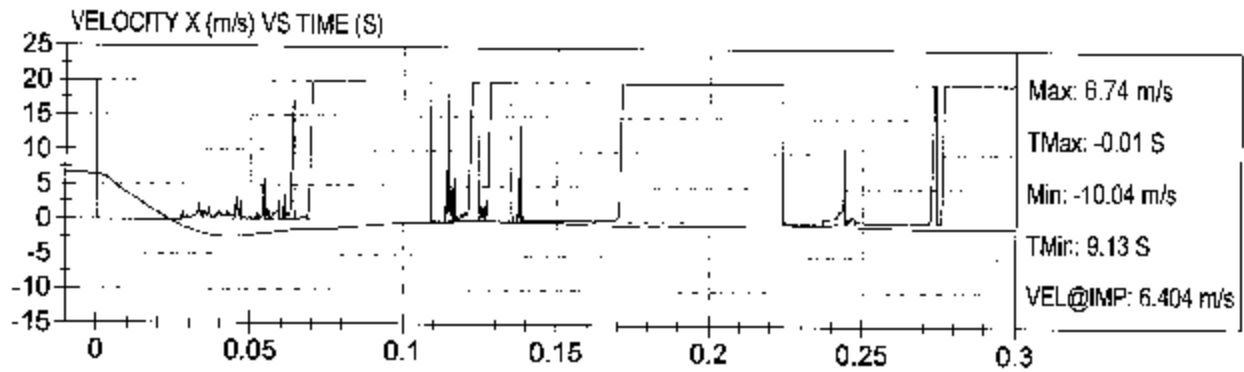
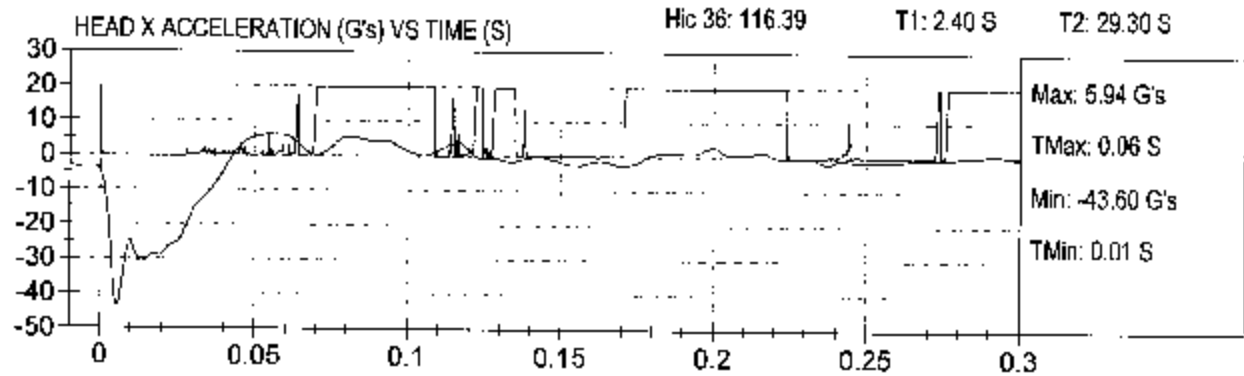






FMVSS 222 HEAD FORM IMPACTS (6.69 m/s)  
Vehicle: Liberty Bus  
NHTSA # C30901

Test Date: 7-15-03  
Location: H7



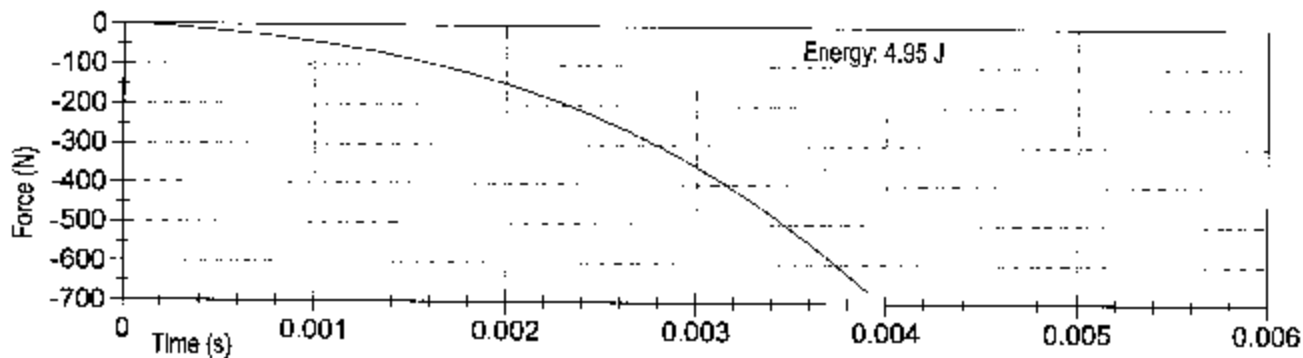
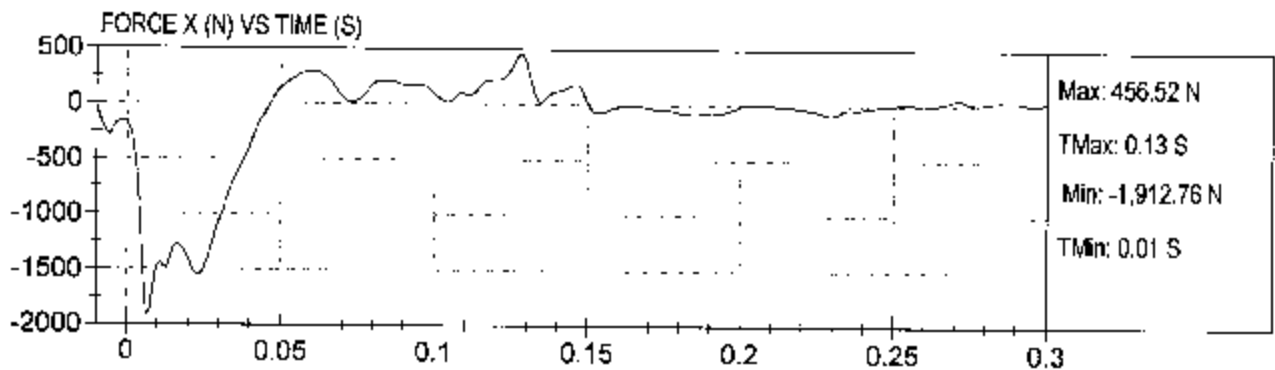
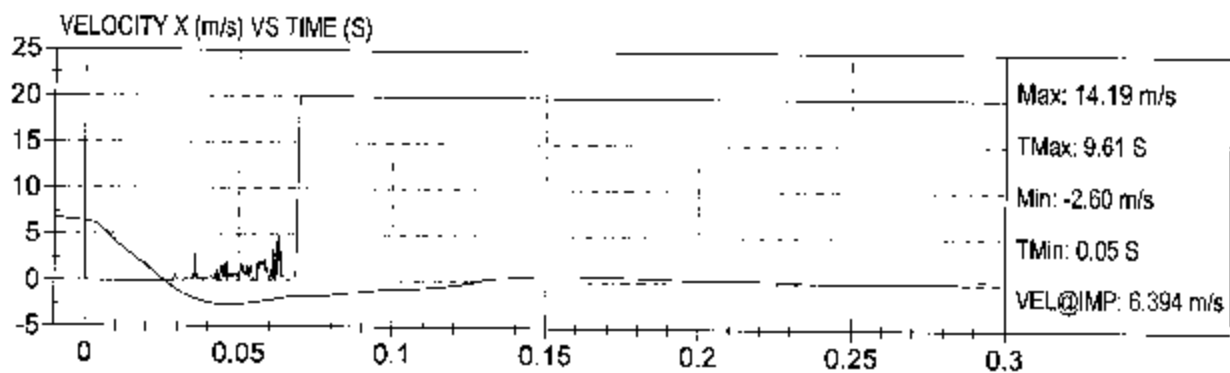
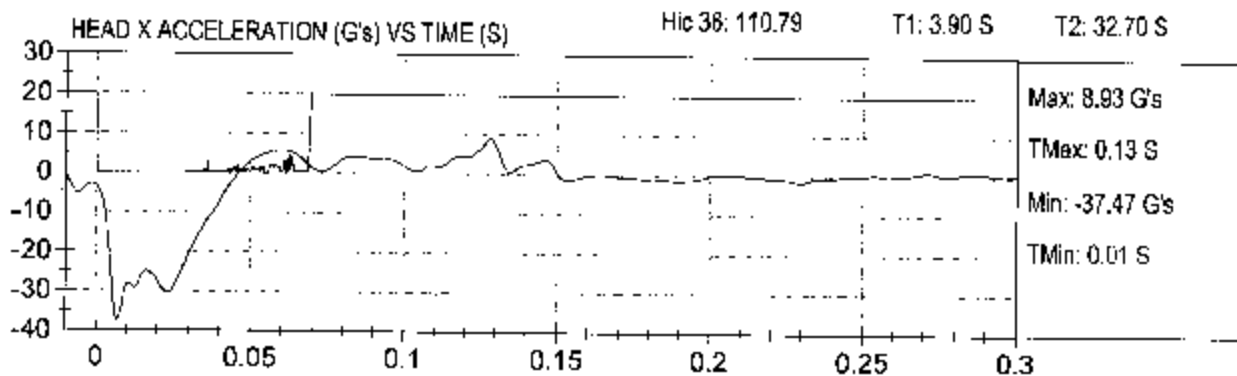


FMVSS 222 HEAD FORM IMPACTS (6.69 m/s)

Vehicle: Liberty Bus  
NHTSA #: C30901

Test Date 7-15-03

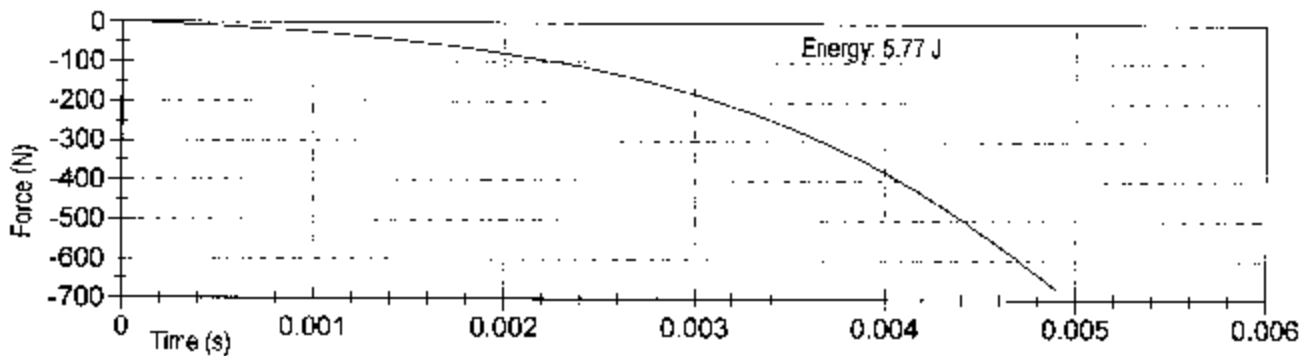
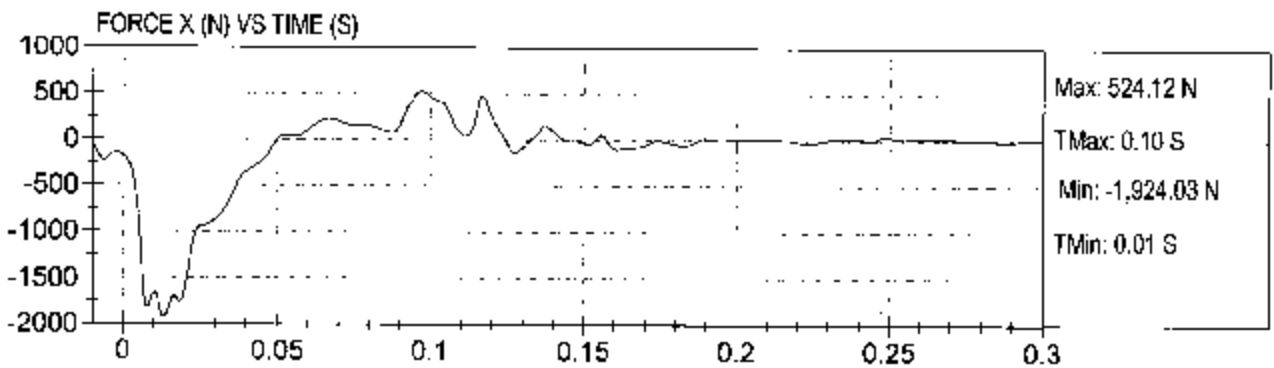
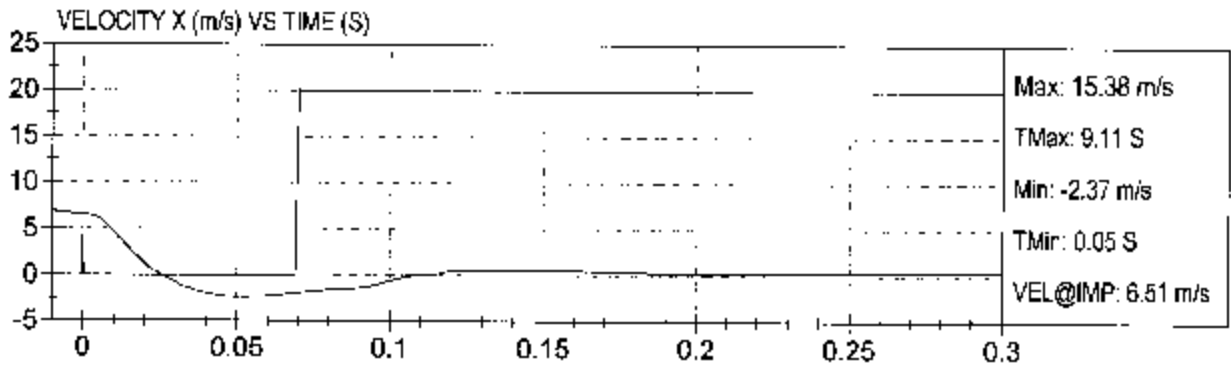
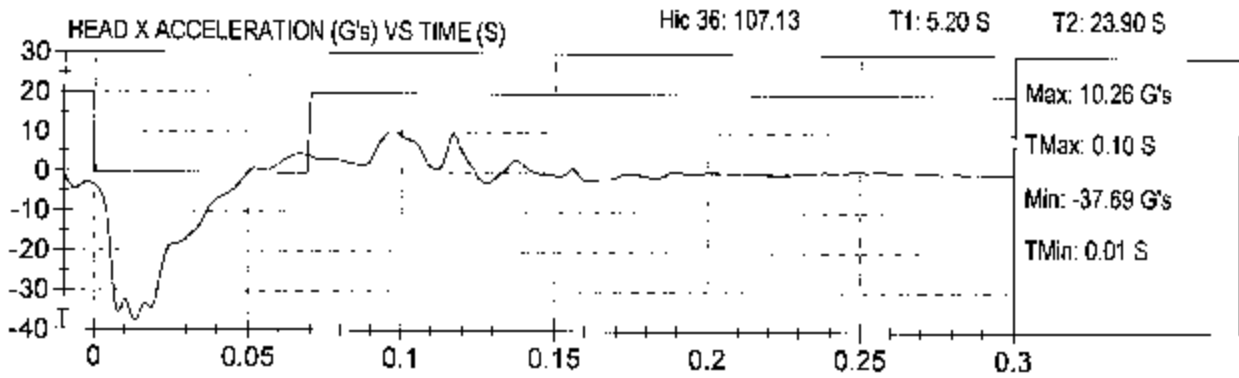
Location: H8





FMVSS 222 HEAD FORM IMPACTS (6.69 m/s)  
Vehicle: Liberty Bus  
NHTSA #: C30901

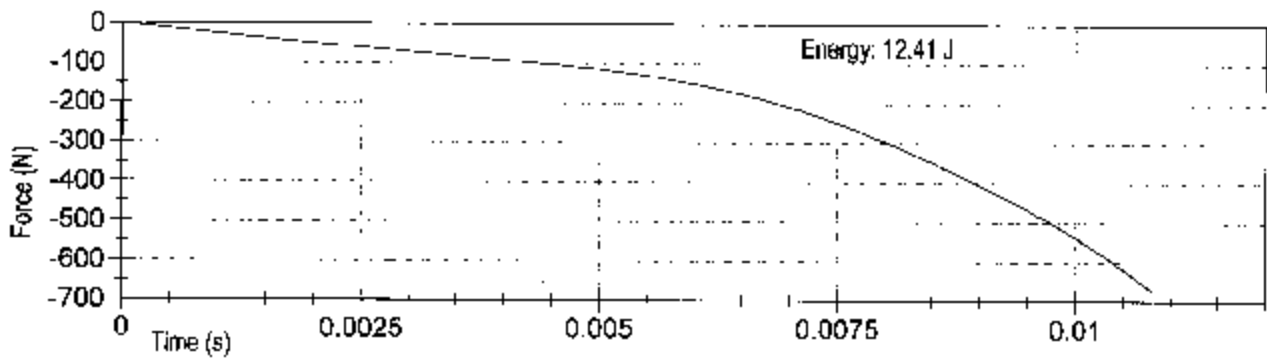
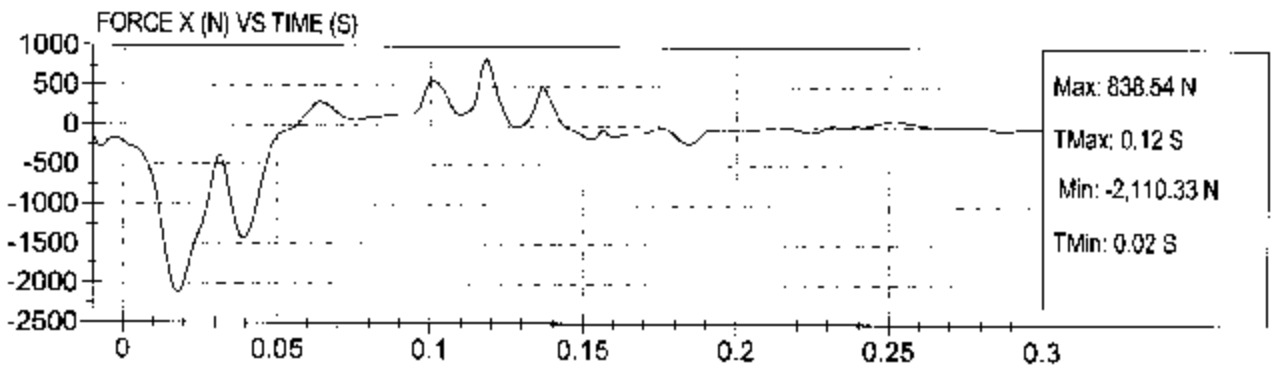
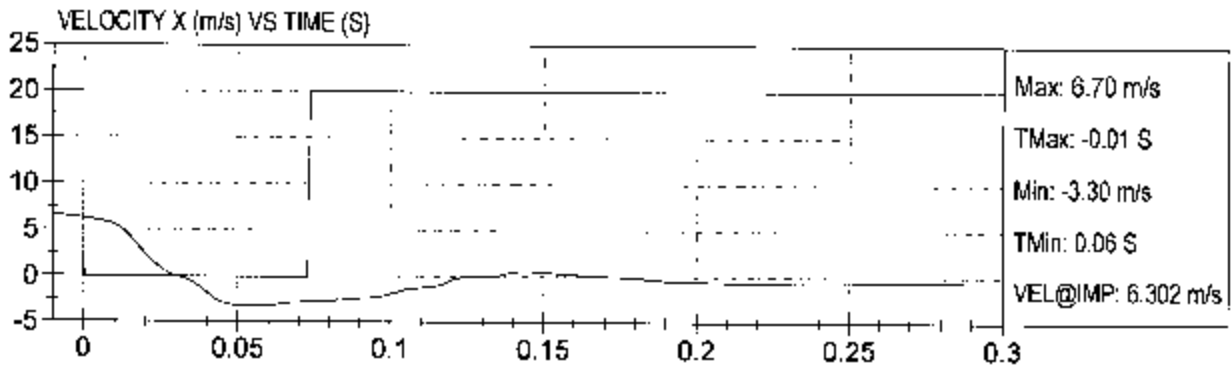
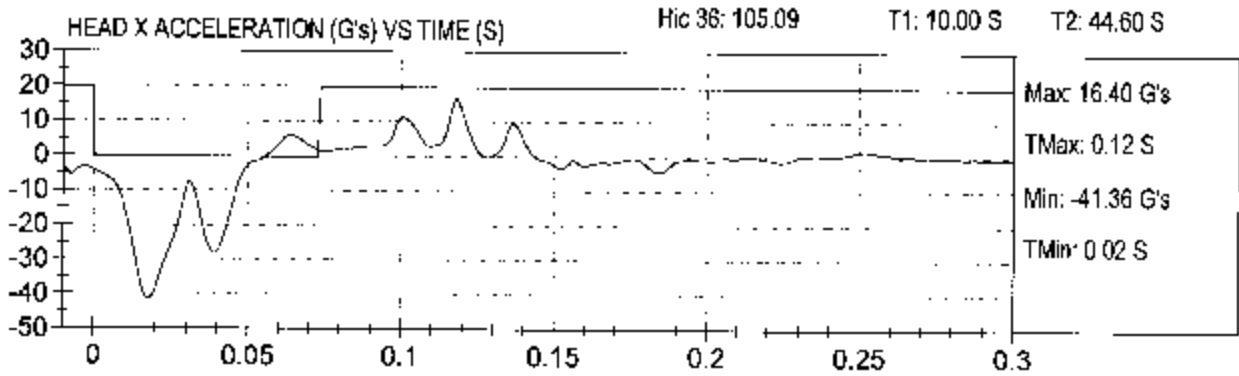
Test Date: 7-15-03  
Location: H9





FMVSS 222 HEAD FORM IMPACTS (6.69 m/s)  
Vehicle: Liberty Bus  
NHTSA #: C30901

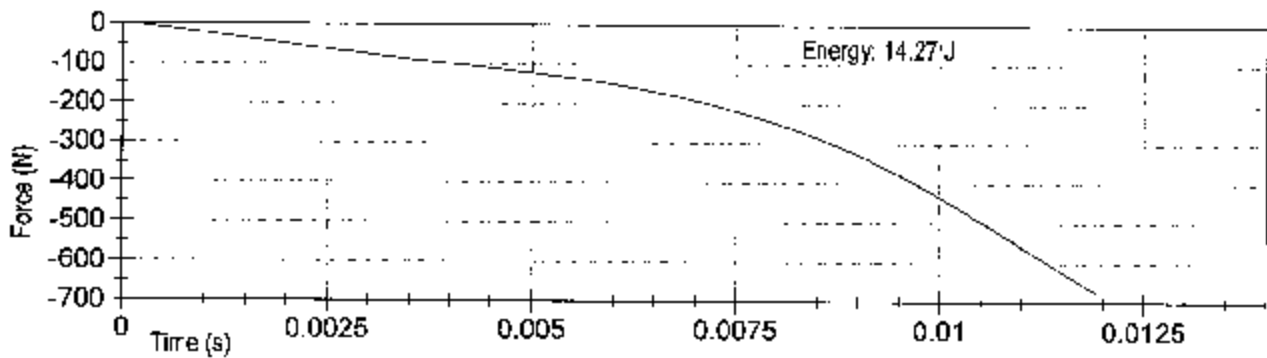
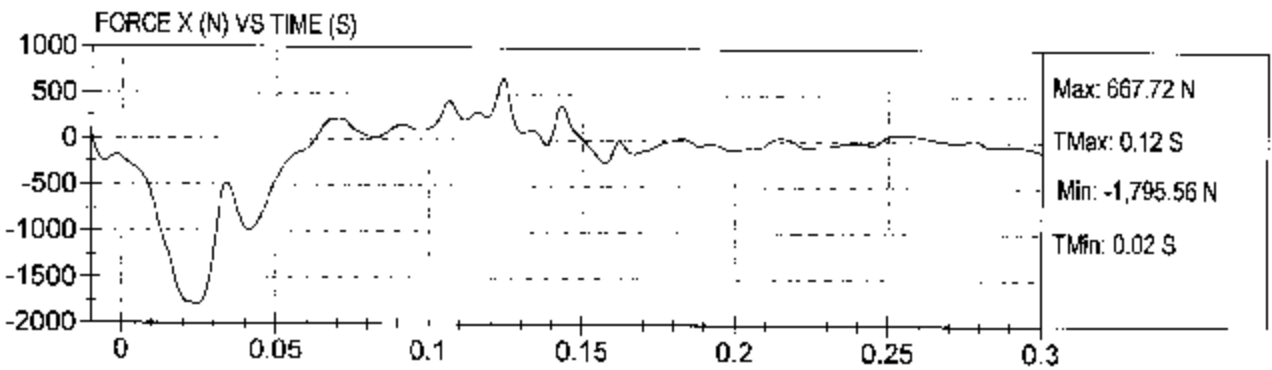
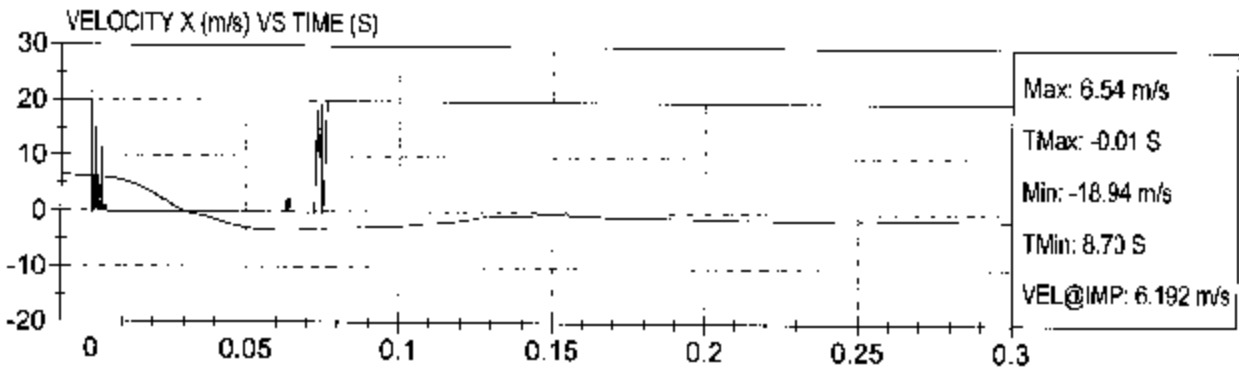
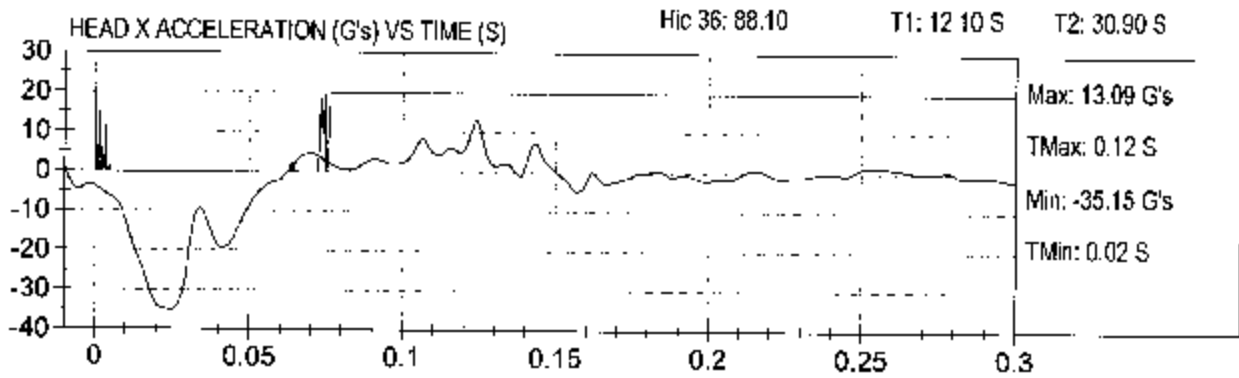
Test Date: 7-15-03  
Location: H10





FMVSS 222 HEAD FORM IMPACTS (6.69 m/s)  
Vehicle: Liberty Bus  
NHTSA # C30901

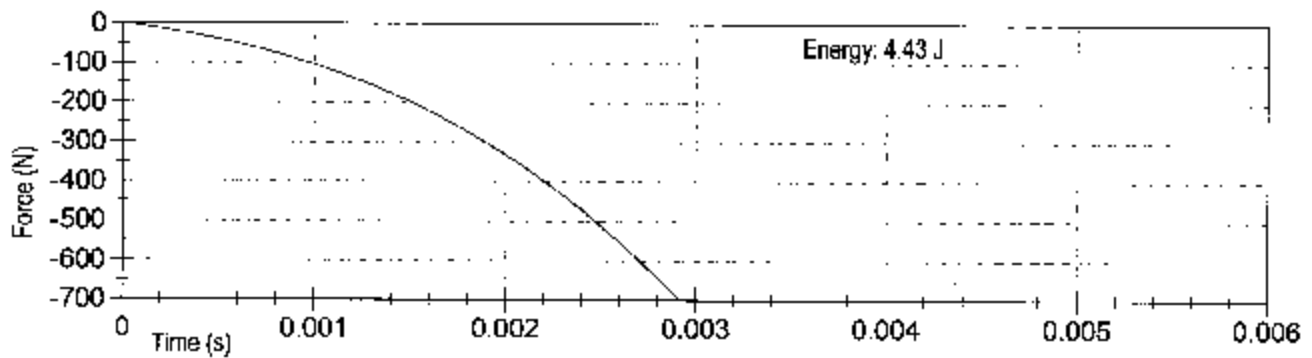
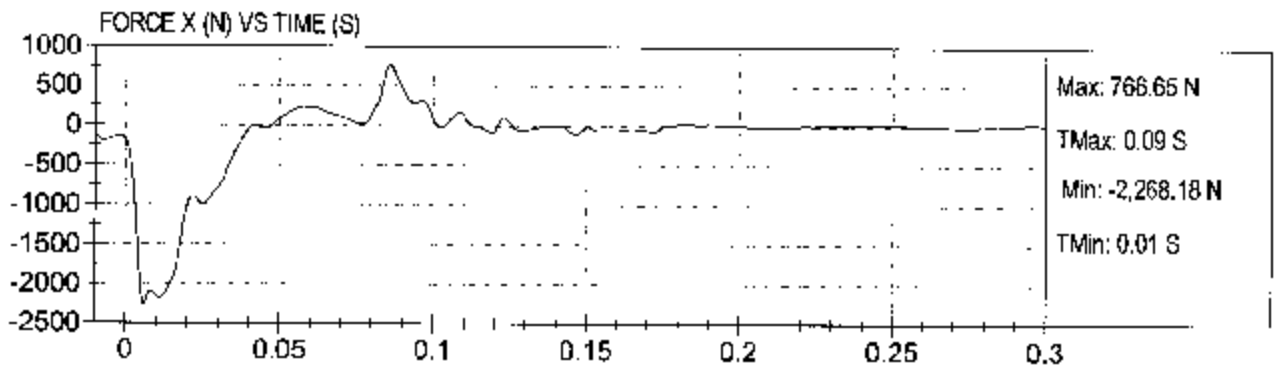
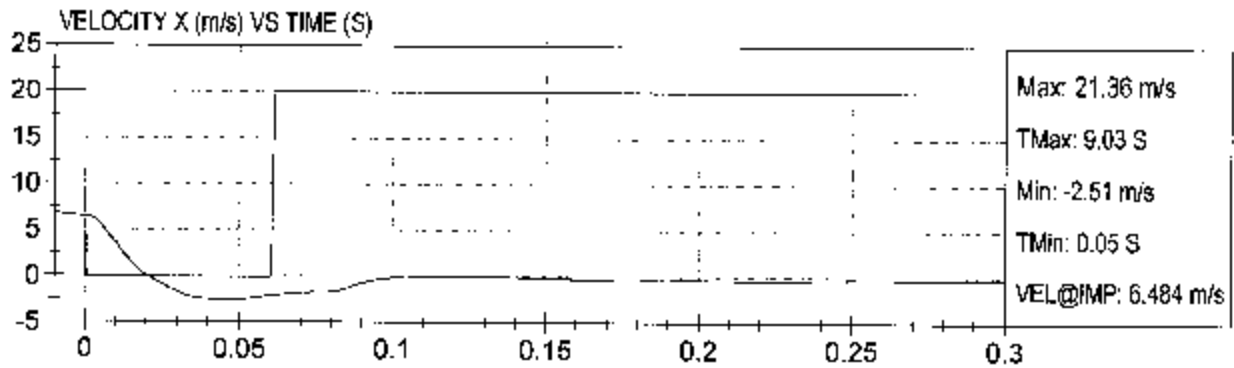
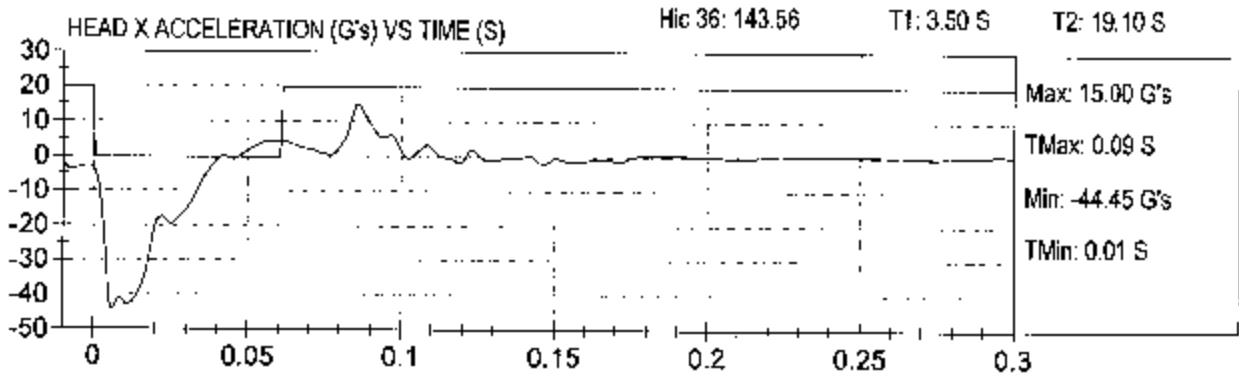
Test Date: 7-15-03  
Location: H11





FMVSS 222 HEAD FORM IMPACTS (6.69 m/s)  
Vehicle: Liberty Bus  
NHTSA #: C30901

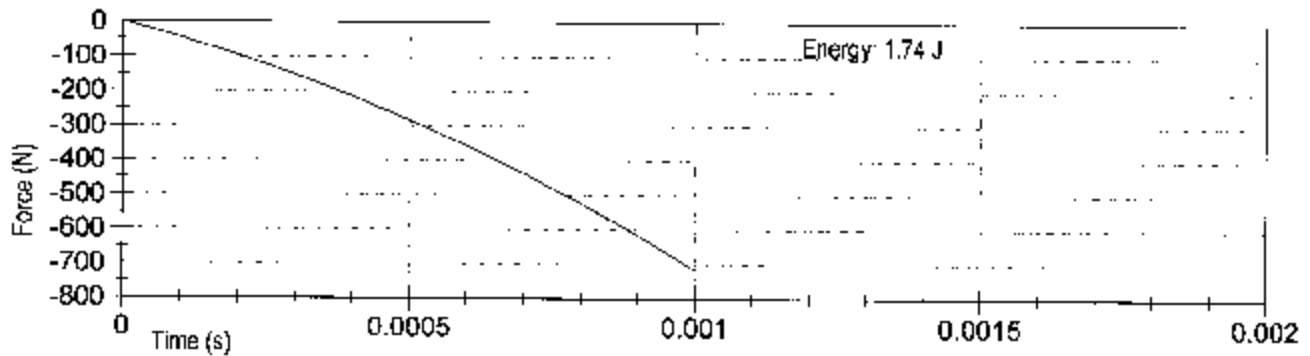
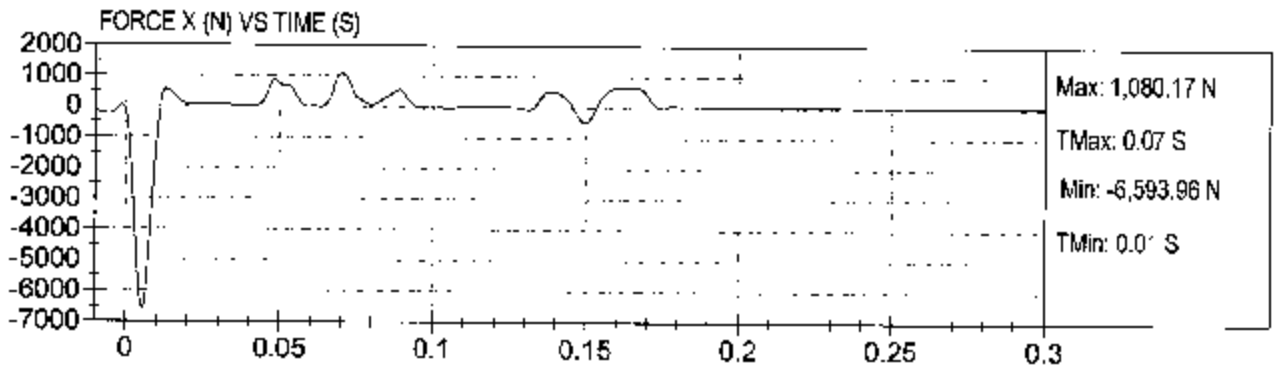
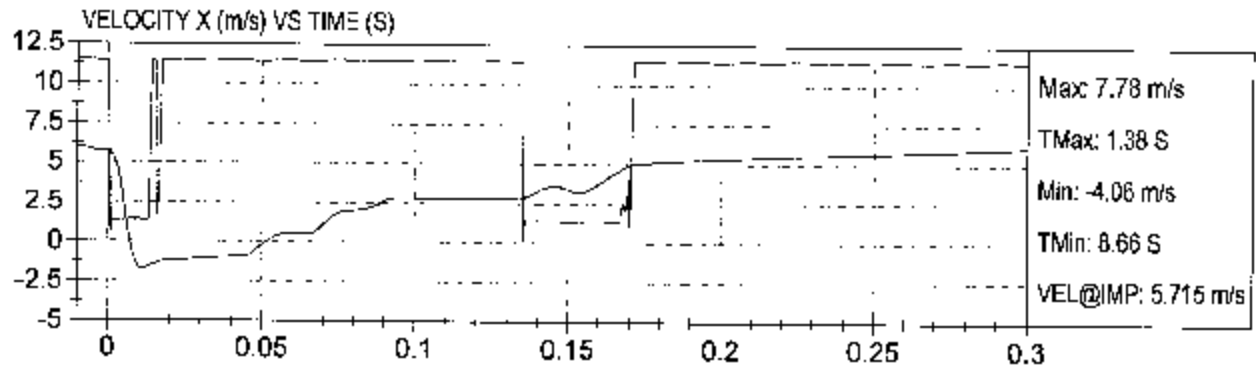
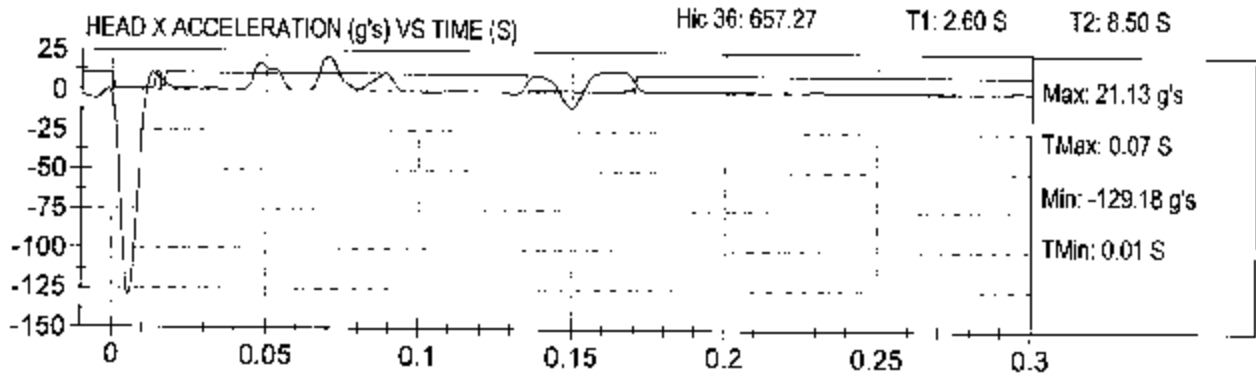
Test Date: 7-15-03  
Location: H12





FMVSS 222 HEAD FORM IMPACTS (6.69 m/s)  
Vehicle: Liberty Bus  
NHTSA #: C30901

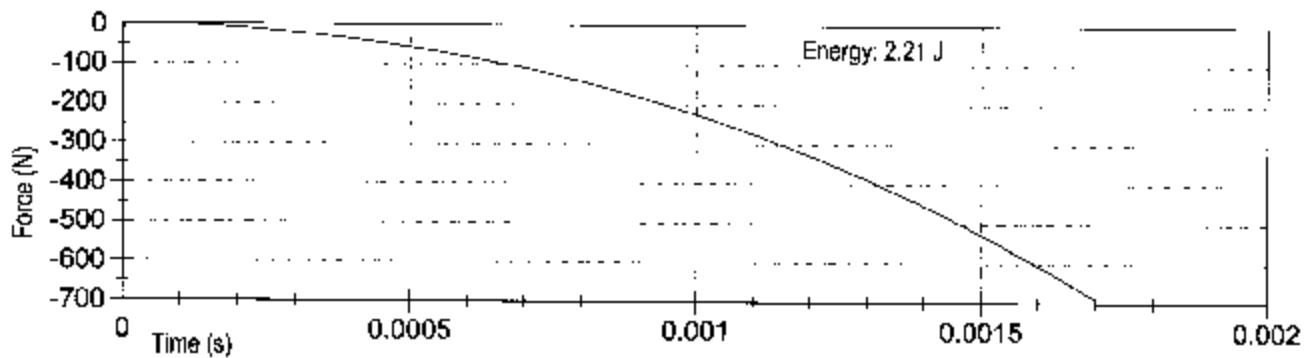
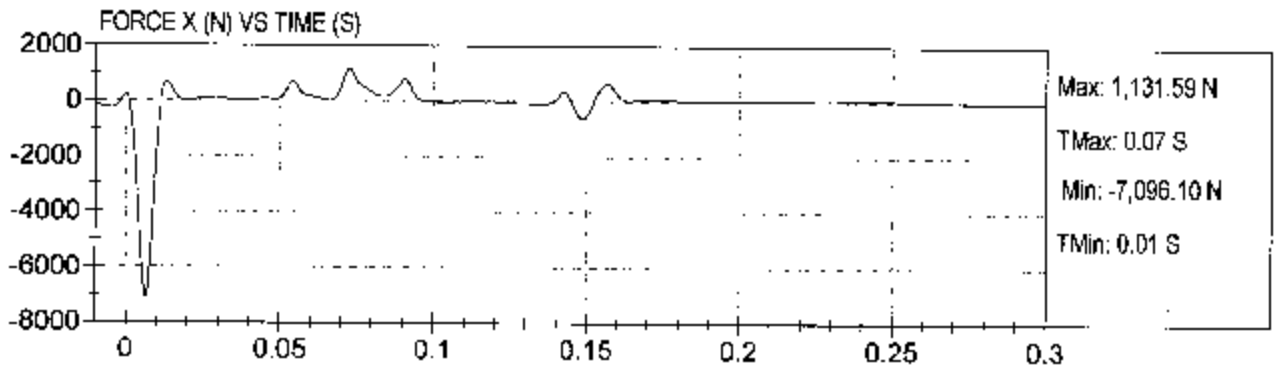
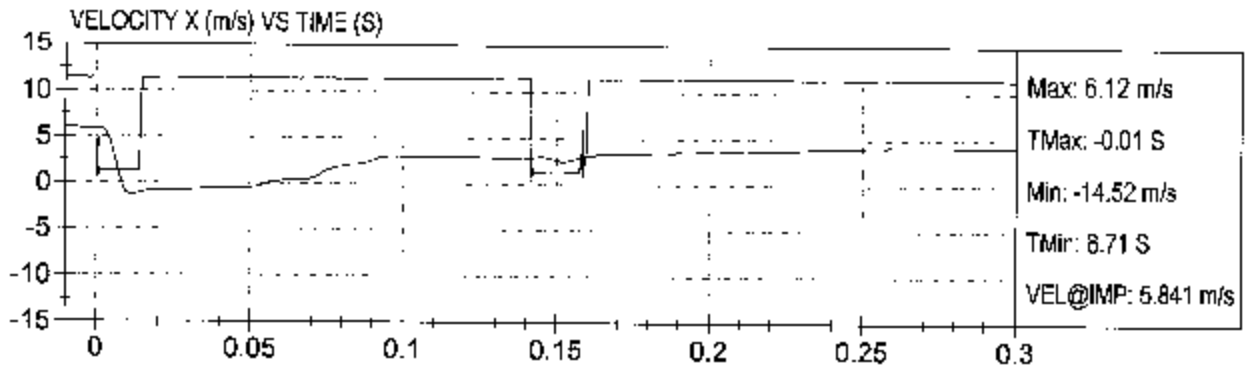
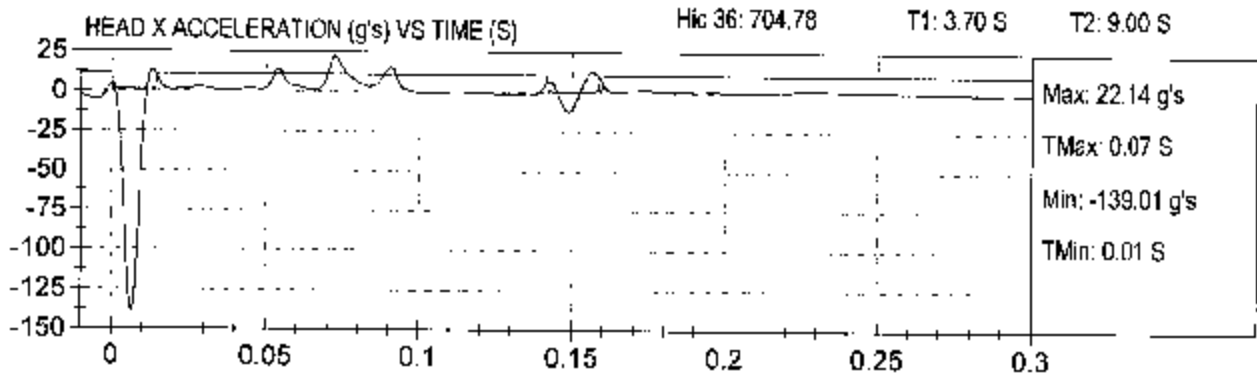
Test Date: 7-15-03  
Location: H14





FMVSS 222 HEAD FORM IMPACTS (6.69 m/s)  
Vehicle: Liberty Bus  
NHTSA #: C3D901

Test Date: 7-15-03  
Location: H15

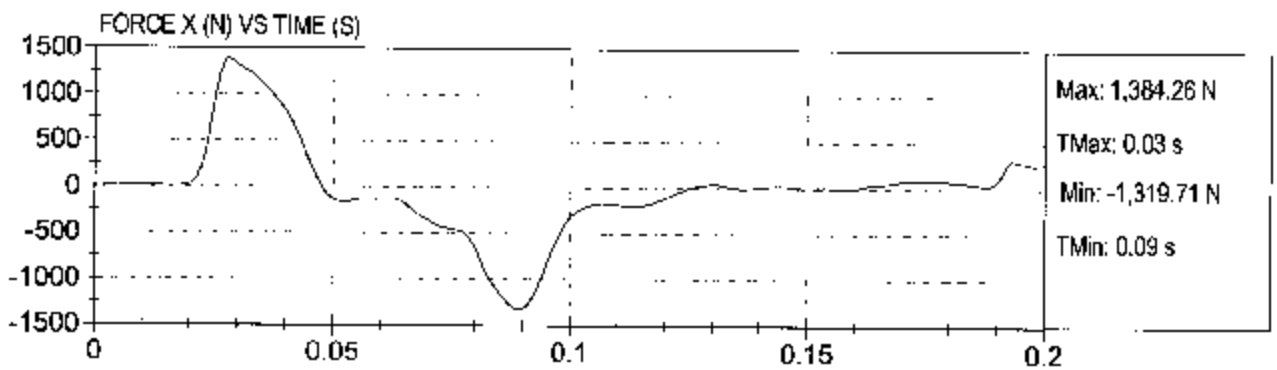
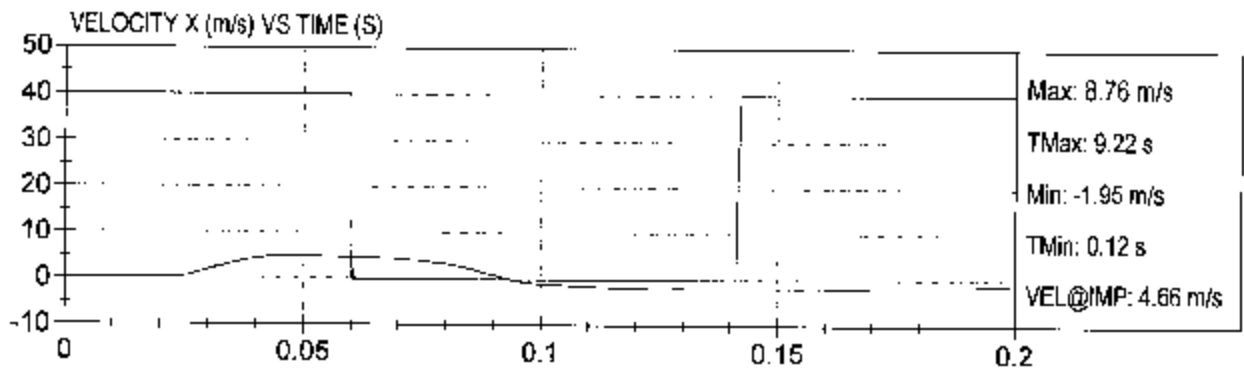
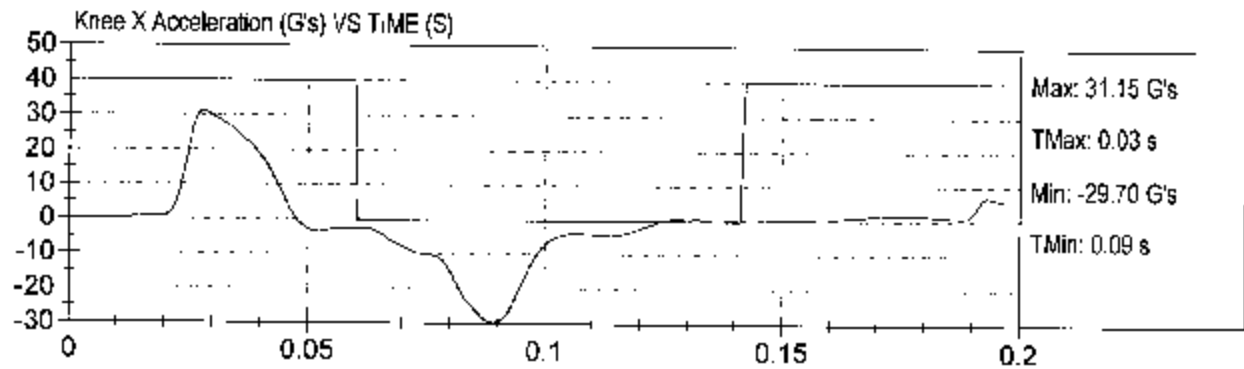






FMVSS 222 KNEE FORM IMPACTS  
Vehicle: Liberty Bus  
NHTSA #: C30901

Test Date: 7-15-03  
Location: K1

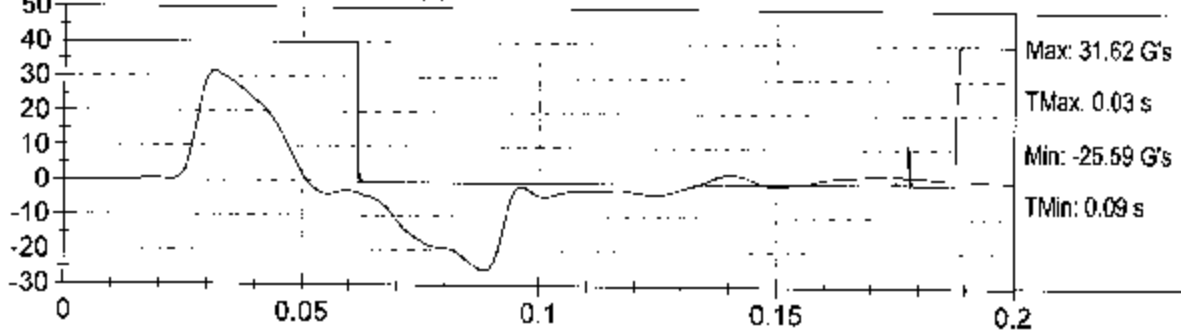




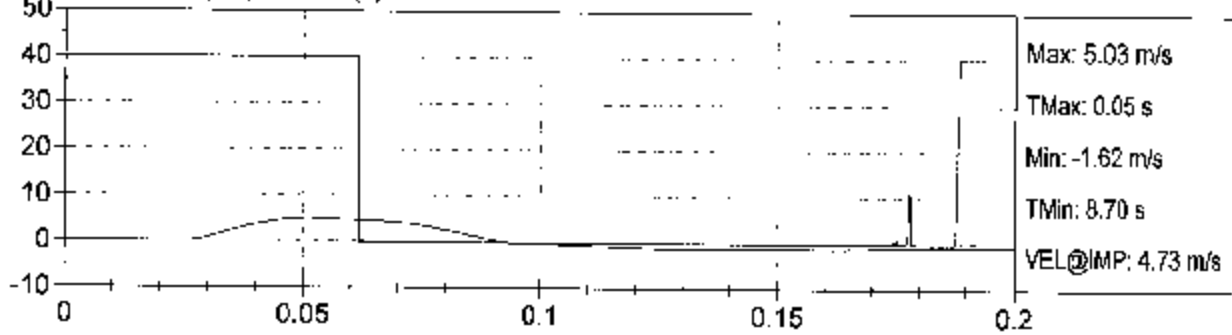
FMVSS 222 KNEE FORM IMPACTS  
Vehicle: Liberty Bus  
NHTSA #: C30901

Test Date: 7-15-03  
Location: K2

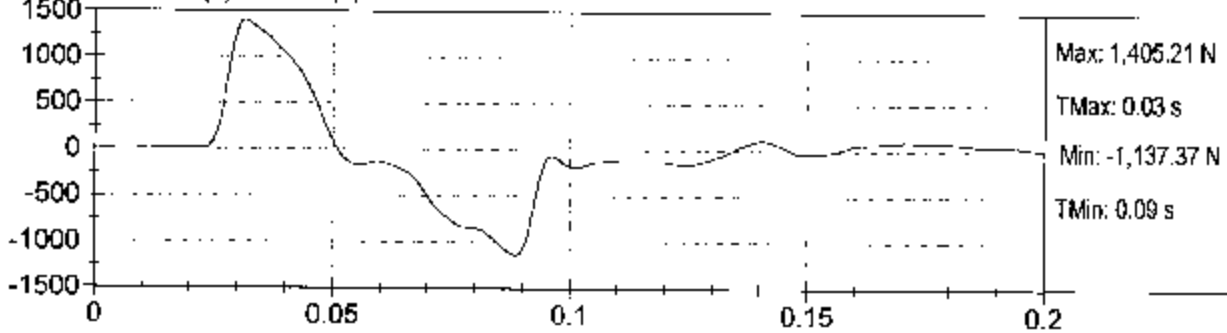
Knee X Acceleration (G's) VS TIME (S)



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



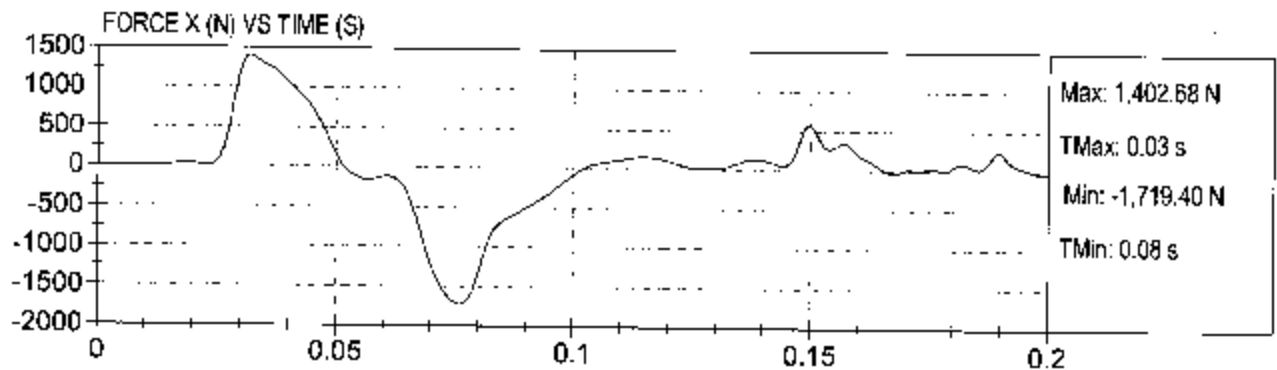
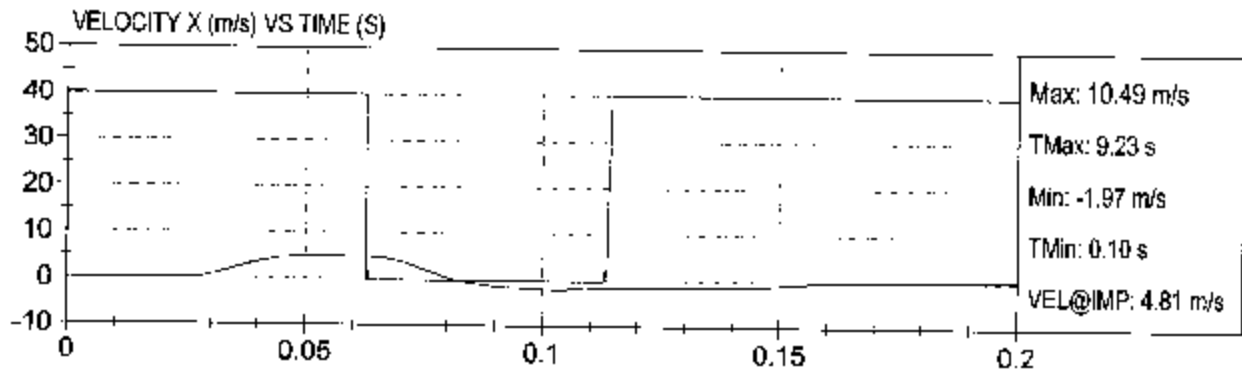
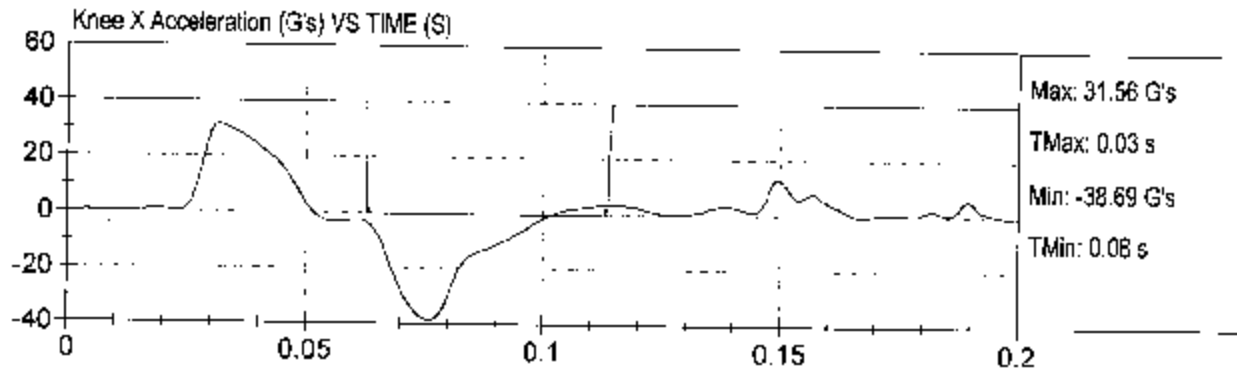
FORCE X (N) VS TIME (S)





FMVSS 222 KNEE FORM IMPACTS  
Vehicle: Liberty Bus  
NHTSA #: C30901

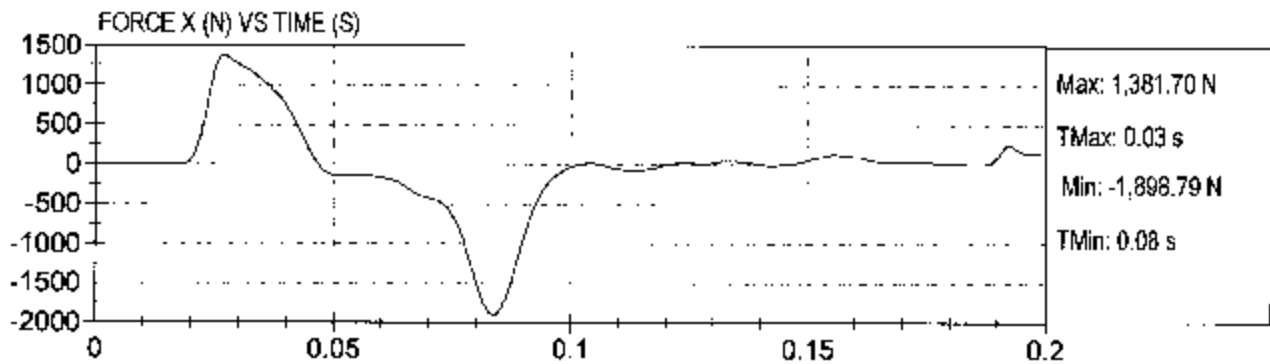
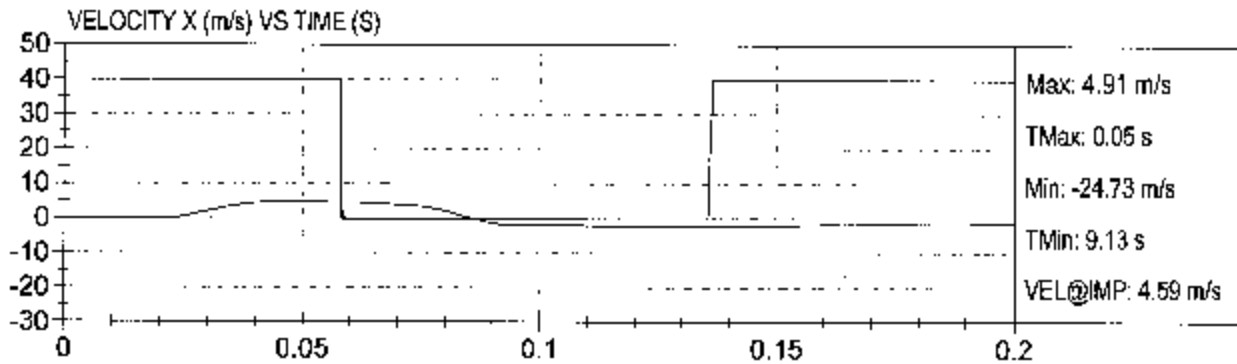
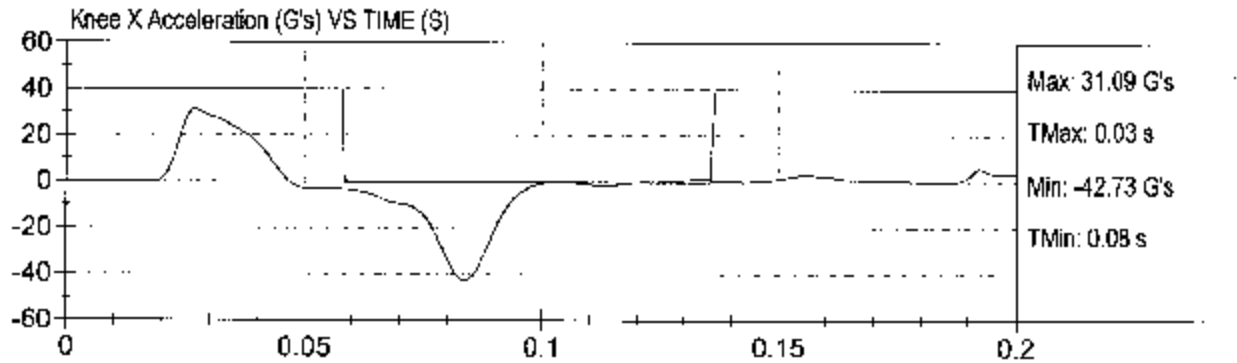
Test Date: 7-15-03  
Location: K3





FMVSS 222 KNEE FORM IMPACTS  
Vehicle: Liberty Bus  
NHTSA #: C30901

Test Date: 7-15-03  
Location: K4

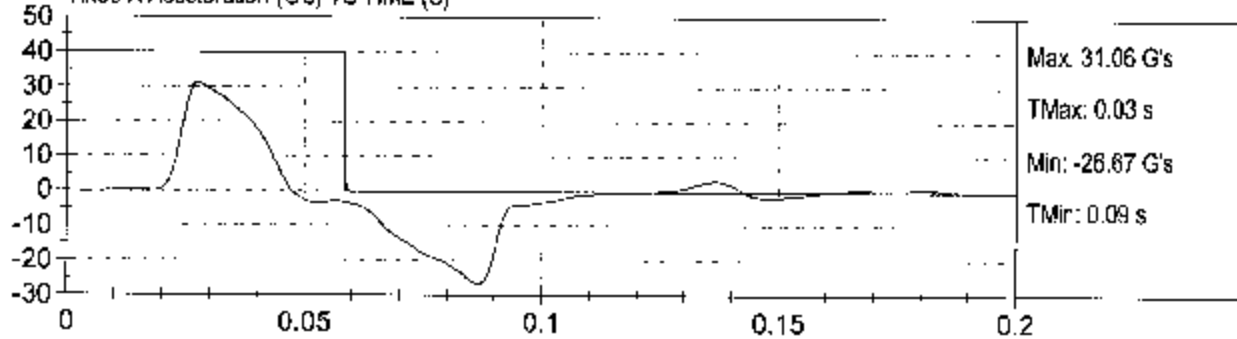




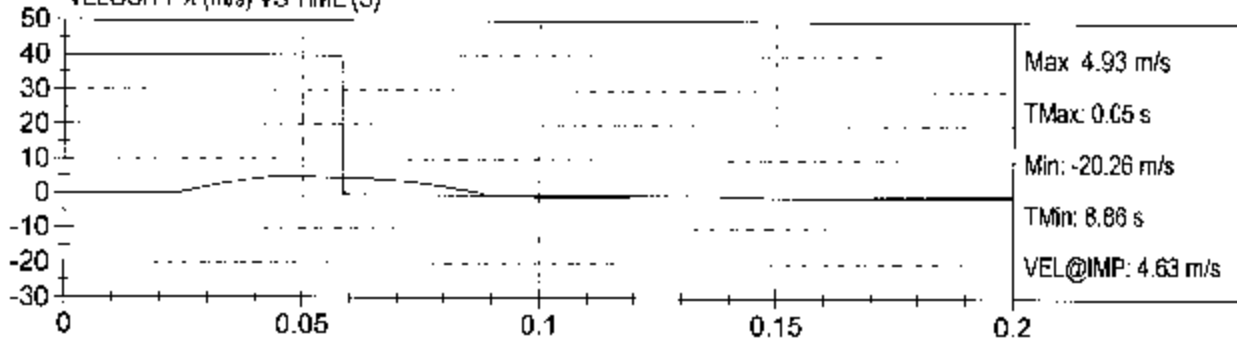
FMVSS 222 KNEE FORM IMPACTS  
Vehicle: Liberty Bus  
NHTSA #: C30901

Test Date: 7-15-03  
Location: K5

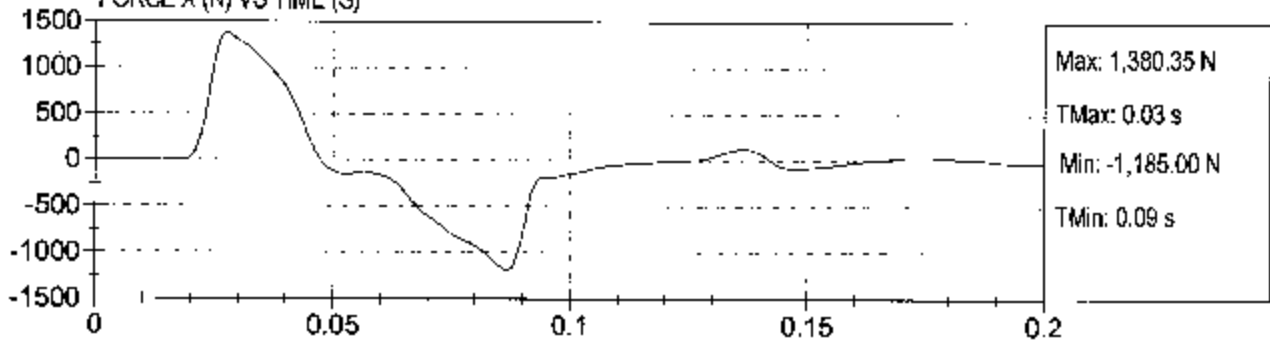
Knee X Acceleration (G's) VS TIME (S)



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



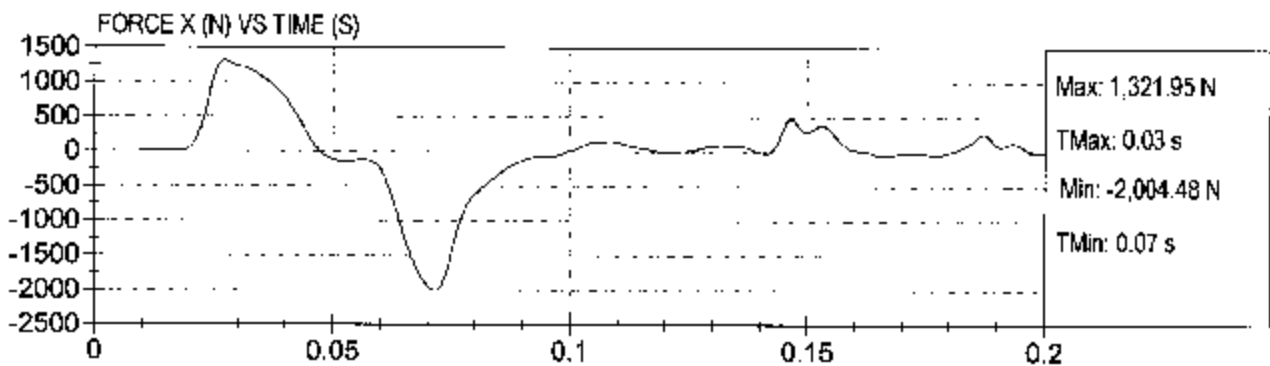
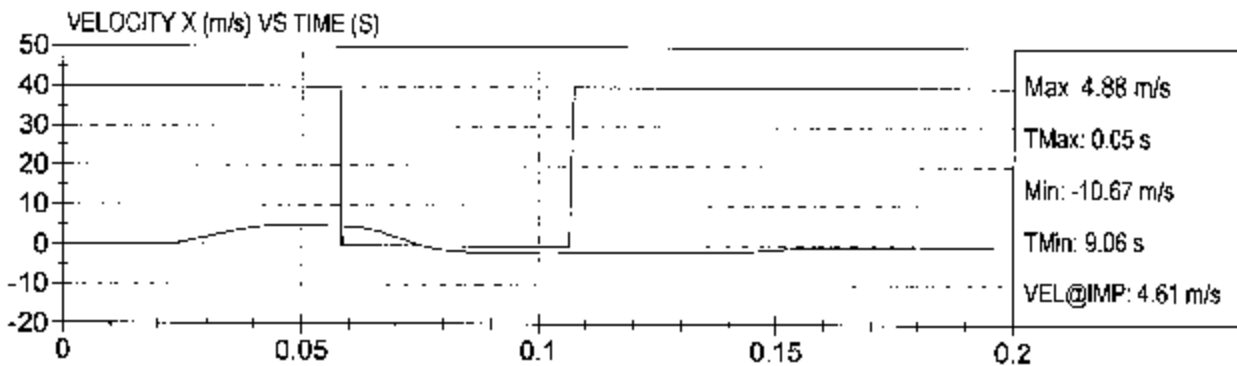
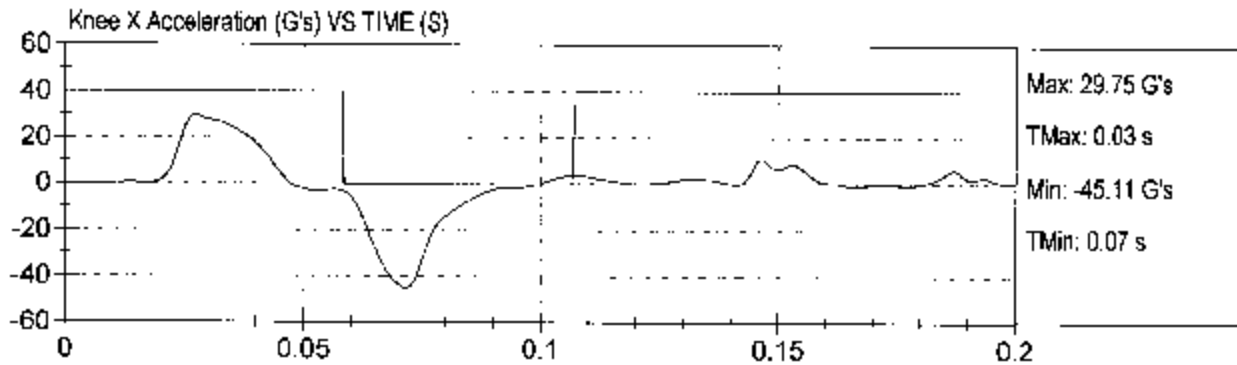
FORCE X (N) VS TIME (S)





FMVSS 222 KNEE FORM IMPACTS  
Vehicle: Liberty Bus  
NHTSA #: C30901

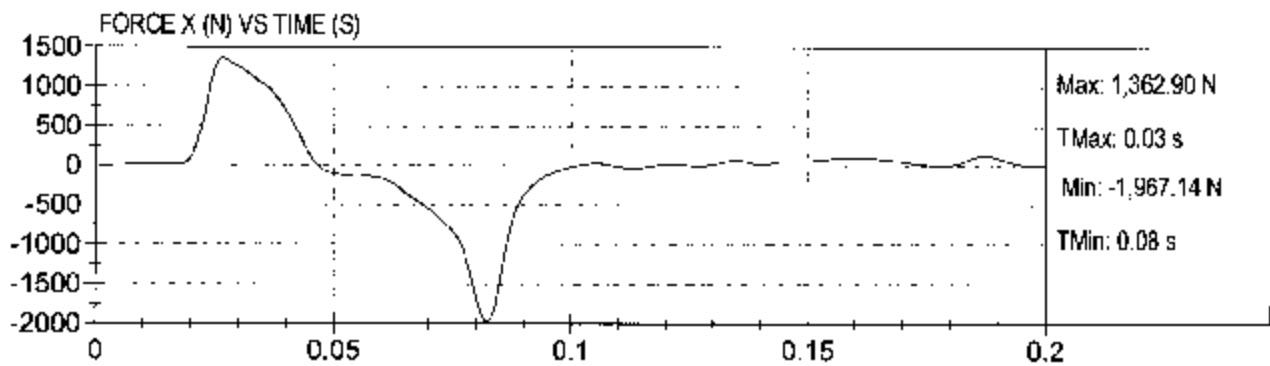
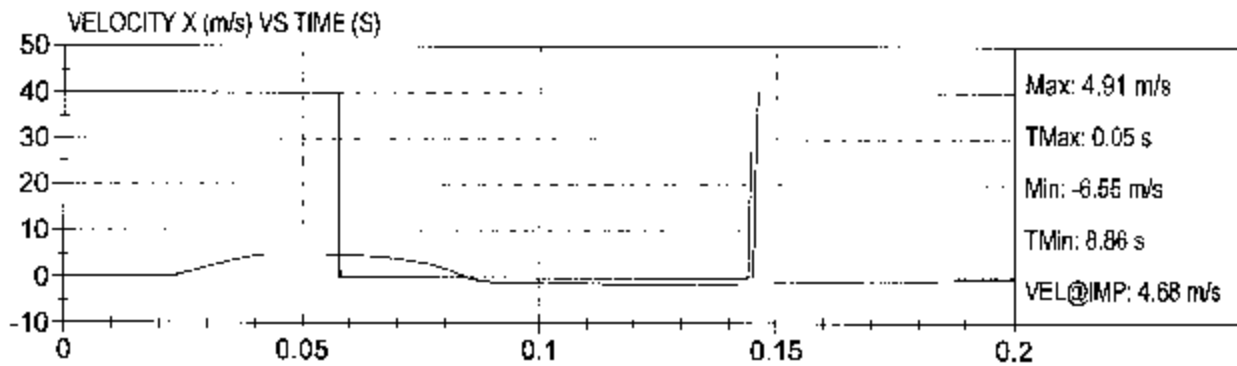
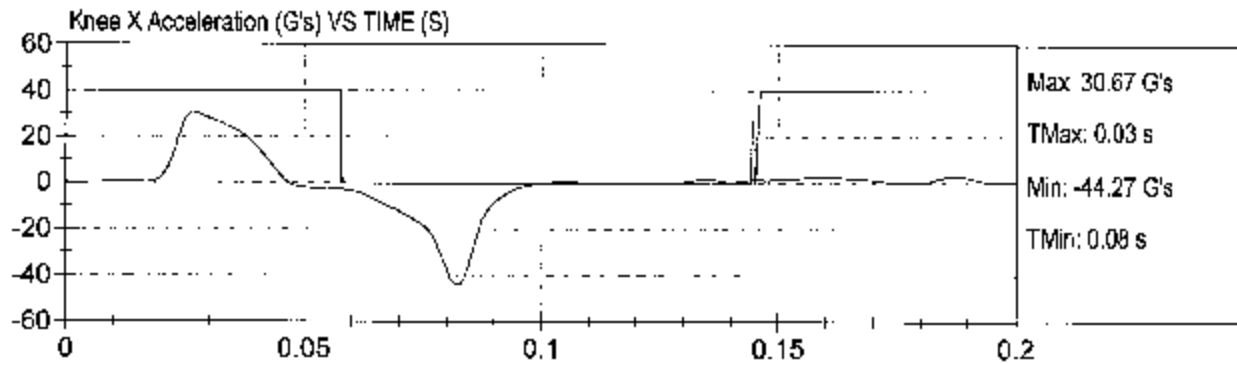
Test Date: 7-15-03  
Location: K6





FMVSS 222 KNEE FORM IMPACTS  
Vehicle: Liberty Bus  
NHTSA #: C30901

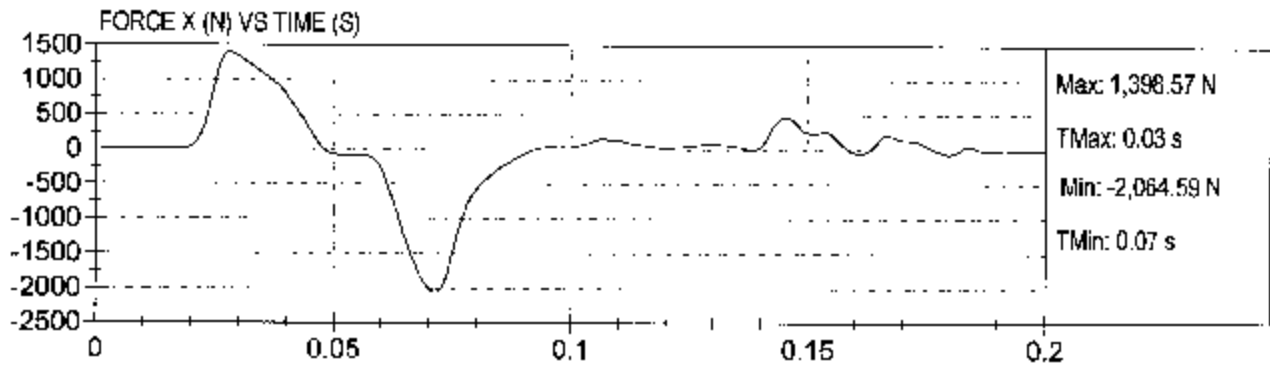
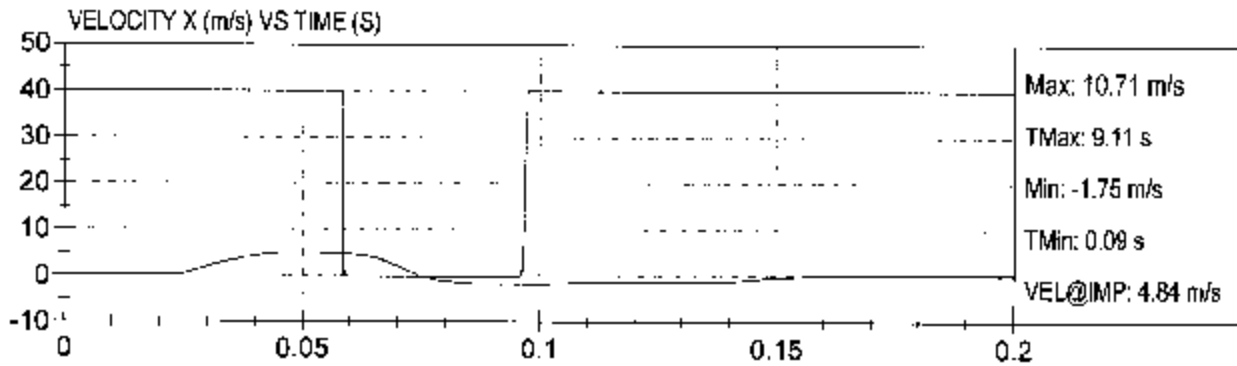
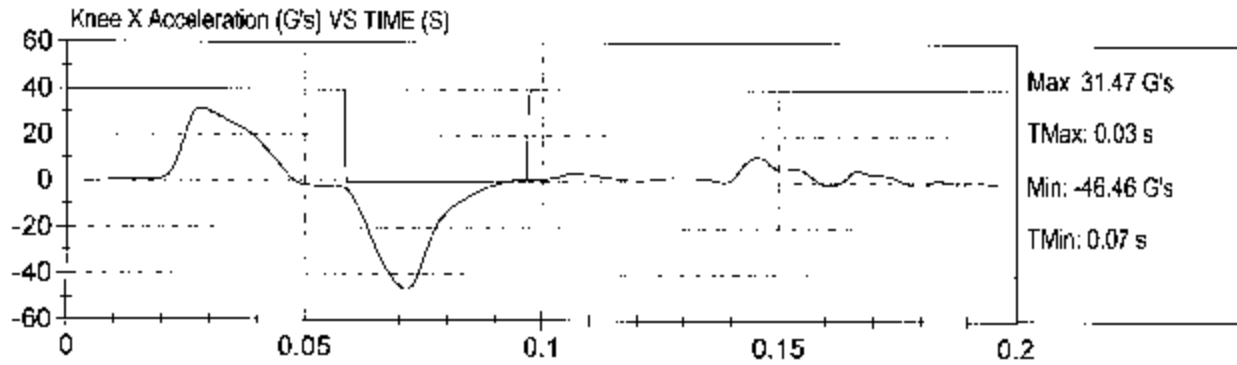
Test Date: 7-15-03  
Location: K7





FMVSS 222 KNEE FORM IMPACTS  
Vehicle: Liberty Bus  
NHTSA #: C30901

Test Date: 7-15-03  
Location: K8

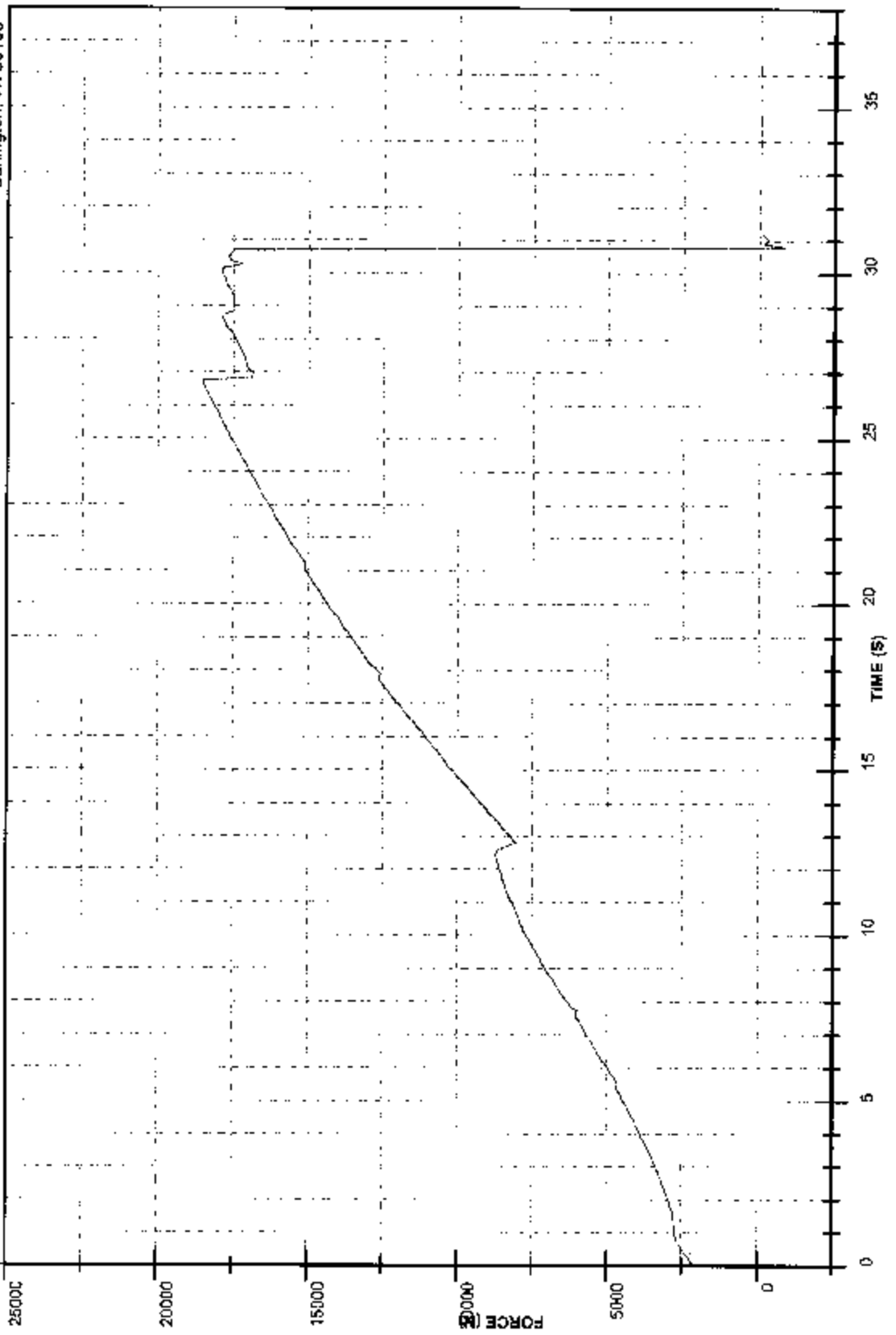




MGA Research Corp  
5000 Warren Road,  
Burlington, WI 53105

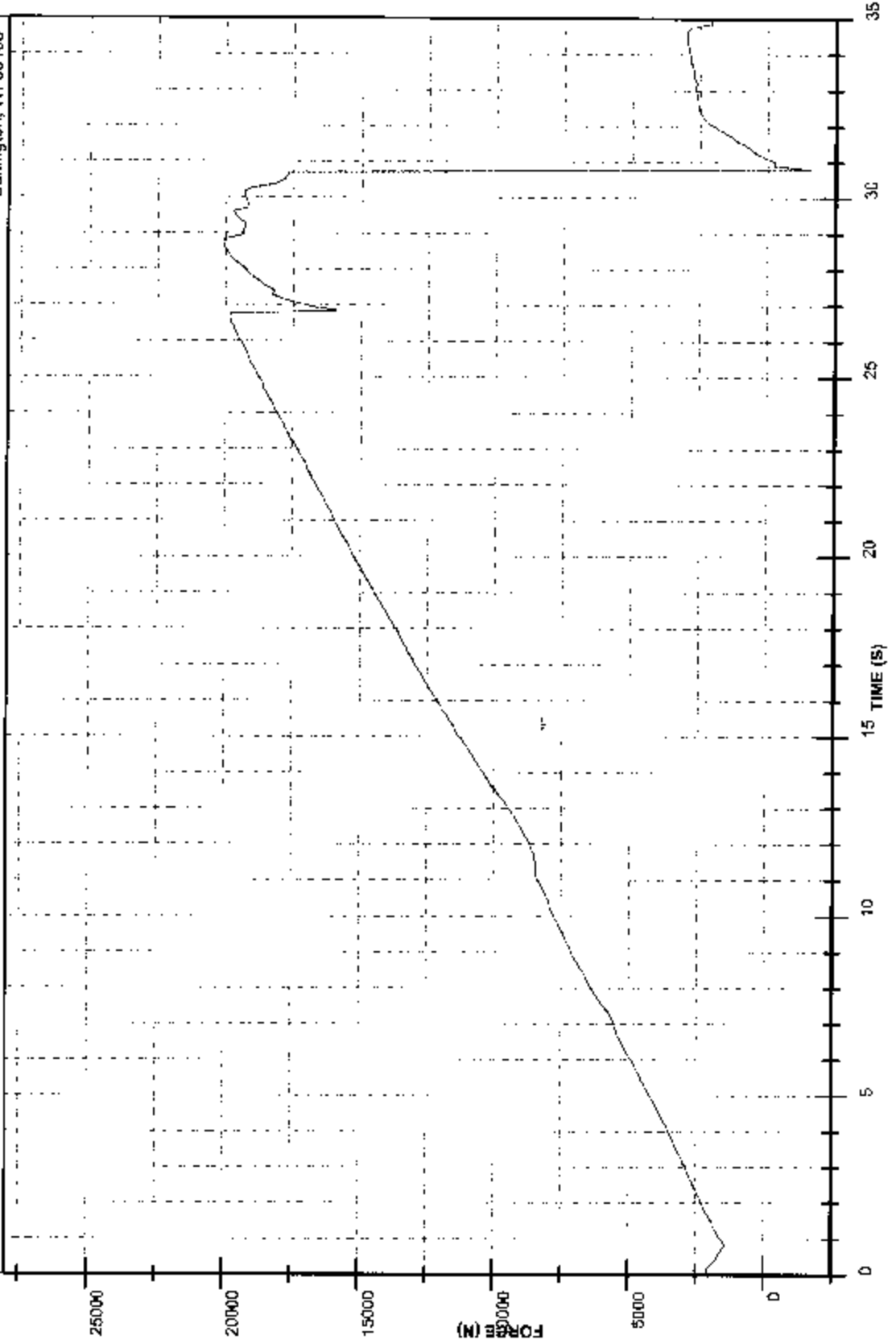
Test Date: 08/15/03  
NHTSA #: C30901

Test Desc: Seat Belt Assy. Anchorage Inboard  
Component ID: Liberty Freedom Bus



MGA Research Corp  
5000 Warren Road,  
Burlington, WI 53105

Test Desc: Seat Belt Assy. Anchorage Outbord  
Test Date: 08/15/03  
Component ID: Liberty Freedom Bus  
NHTSA #: C30901

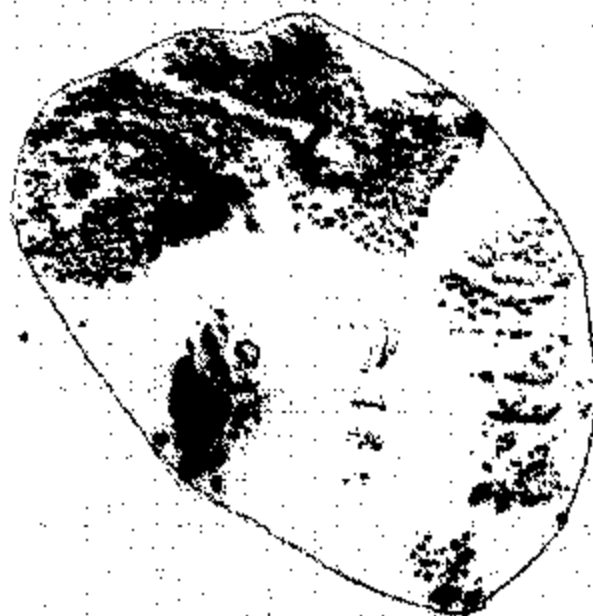


**SECTION 7  
WELT CONTACT POINTS**

Test Vehicle: 2003 Liberty Freedom School Bus  
Procedure: FMVSS 222

NHTSA No.: C30901

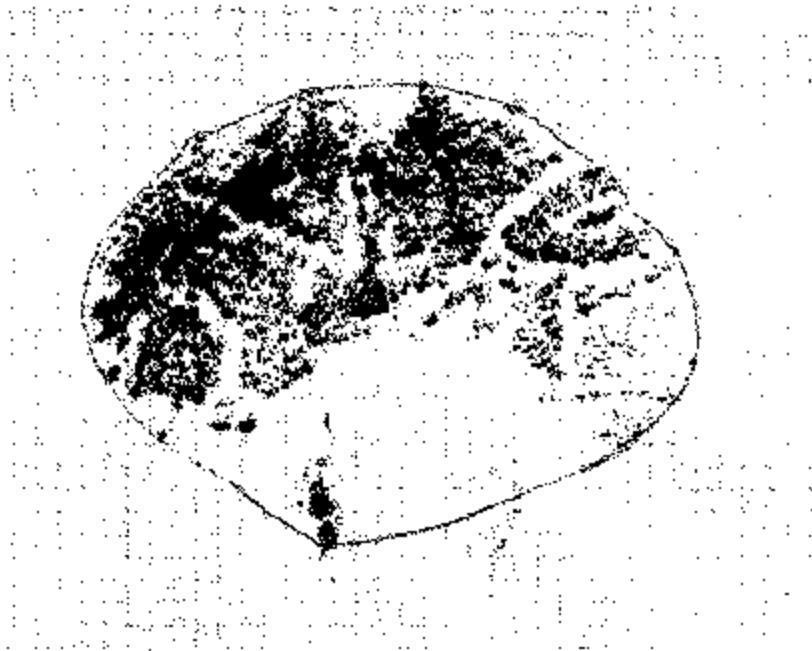
## H1 / Seat S1



Test Vehicle: 2003 Liberty Freedom School Bus  
Procedure: FMVSS 222

NHTSA No.: C30901

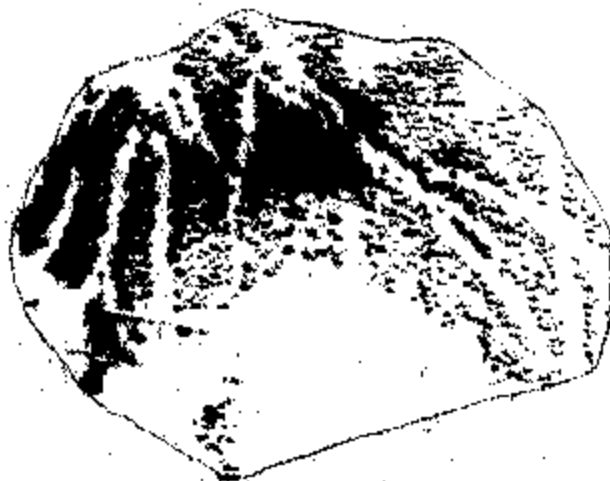
## H2 / Seat S1



Test Vehicle: 2003 Liberty Freedom School Bus  
Procedure: FMVSS 222

NHTSA No.: C30901

## H3 / Seat S1



Test Vehicle: **2003 Liberty Freedom School Bus**  
Procedure: **FMVSS 222**

NHTSA No.: **C30901**

## **H4 / Seat S1**



Test Vehicle: 2003 Liberty Freedom School Bus  
Procedure: FMVSS 222

NHTSA No.: C30901

## H5 / Seat S1





Test Vehicle: 2003 Liberty Freedom School Bus  
Procedure: FMVSS 222

NHTSA No.: C30901

## H6 / Seat S1



Test Vehicle: 2003 Liberty Freedom School Bus  
Procedure: FMVSS 222

NHTSA No.: C30901

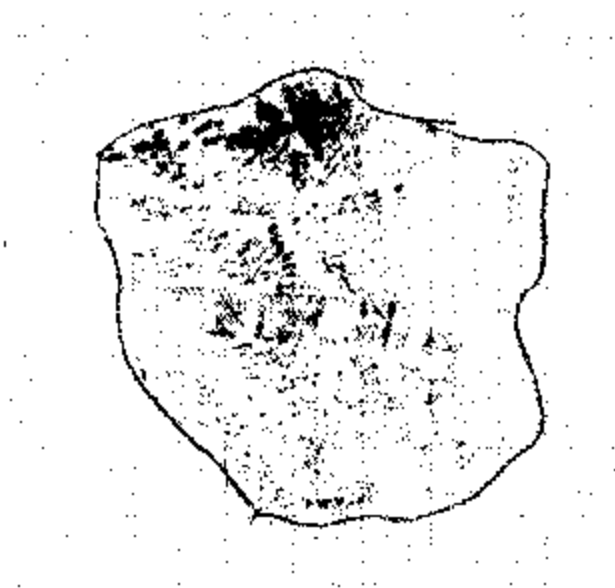
## K1 / Seat S1



Test Vehicle: 2003 Liberty Freedom School Bus  
Procedure: FMVSS 222

NHTSA No.: C30901

## K2 / Seat S1



Test Vehicle: 2003 Liberty Freedom School Bus  
Procedure: FMVSS 222

NHTSA No.: C30901

## K3 / Seat S1



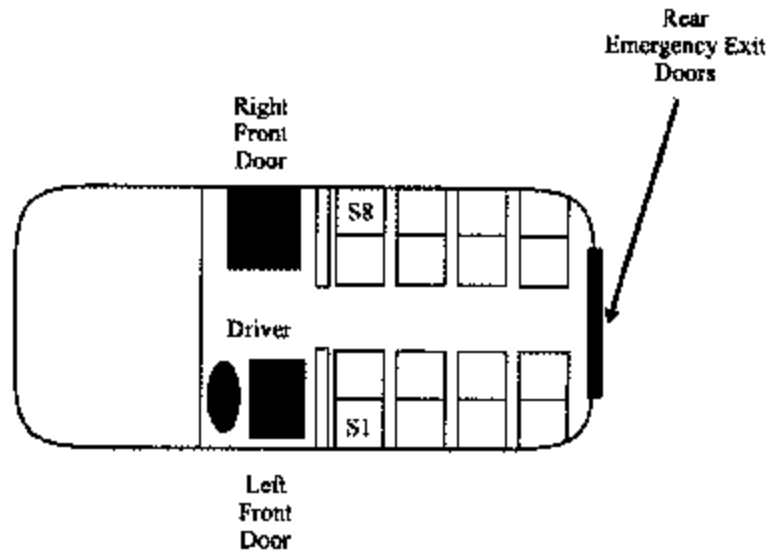
Test Vehicle: **2003 Liberty Freedom School Bus**  
Procedure: **FMVSS 222**

NHTSA No.: **C30901**

## **K4 / Seat S1**



**SECTION 8  
BUS FLOOR PLAN**



**SECTION 9**  
**LABORATORY NOTICE OF TEST FAILURE**



mga research corporation

### LABORATORY NOTICE OF TEST FAILURE TO OVSC

Test Procedure:	FMVSS 222	Test Date:	August 15, 2003
Test Vehicle:	2003 Liberty Freedom	Test Lab:	MGA Research Corp.
NHTSA No.:	C30901	Project Engineer:	Michael Janovicz
Contract No.:	DTNH22-02-D-01057	Delivery Order No.:	Contract
MFR.:	Liberty Bus	VIN:	1GBHG39U831110237
Build Date:	02 / 03		

### 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 20,098.7 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."

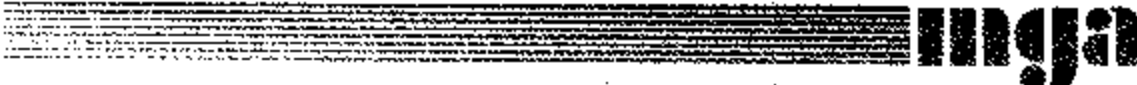
Remarks: No remarks.

Notification to NHTSA (COTR): Amanda Prescott

Date: August 15, 2003

By: Michael Janovicz





mga research corporation

**LABORATORY NOTICE OF TEST FAILURE TO OVSC**

Test Procedure:	FMVSS 222	Test Date:	July 14, 2003
Test Vehicle:	2003 Liberty Freedom	Test Lab:	MGA Research Corp.
NHTSA No.:	C30901	Project Engineer:	Michael Janovicz
Contract No.:	DTNH22-02-D-01057	Delivery Order No.:	Contract
MFR.:	Liberty Bus	VIN:	1GBHG39U831110237
Build Date:	02 / 03		

**TEST FAILURE DESCRIPTION**

The impact area on the wall above the passenger side (B8) barrier, designated as location H14 and H15 did not reach the required specified energy of 4.5 joules. The actual energy reached was 1.74 joules at H14 and 2.21 joules at H15

**FMVSS REQUIREMENTS DESCRIPTION**

49 CFR 571.222 Paragraph S5.3.1.3 Head form force distribution. When any contactable surface of the vehicle within the zones specified in S5.3.1.1 is impacted from any direction at 6.7 m/s by the head form described in S6.6, the energy necessary to deflect the impacted material shall be not less than 4.5 joules before the force level on the head form exceeds 667 N.

Remarks: No remarks.

Notification to NHTSA (COTR): Amanda Prescott

Date: July 15, 2003

By: *Michael Janovicz*



mga research corporation

**LABORATORY NOTICE OF TEST FAILURE TO OVSC**

Test Procedure:	FMVSS 222	Test Date:	July 14, 2003
Test Vehicle:	2003 Liberty Freedom	Test Lab:	MGA Research Corp.
NHTSA No.:	C30901	Project Engineer:	Michael Janovicz
Contract No.:	DTNH22-02-D-01057	Delivery Order No.:	Contract
MFR.:	Liberty Bus	VIN:	1GBHG39U831110237
Build Date:	02 / 03		

**TEST FAILURE DESCRIPTION**

The impact energy criteria, on seat (S1), location H7 and H12 did not reach the specified energy of 4.5 joules. The actual energy reached was 3.9 joules at H7 and 4.4 joules at H12

**FMVSS REQUIREMENTS DESCRIPTION**

49 CFR 571.222 Paragraph S5.3.1.3 Head form force distribution. When any contactable surface of the vehicle within the zones specified in S5.3.1.1 is impacted from any direction at 6.7 m/s by the head form described in S6.6, the energy necessary to deflect the impacted material shall be not less than 4.5 joules before the force level on the head form exceeds 667 N.

**Remarks:** No remarks.

Notification to NHTSA (COTR): Amanda Prescott

Date: July 15, 2003

By: Michael Janovicz