

REPORT NUMBER: 217-MGA-03-003

**SAFETY COMPLIANCE TESTING FOR
FMVSS NO. 217
SCHOOL BUS EMERGENCY EXITS AND WINDOW
RETENTION AND RELEASE**

**Mid Bus Inc.
2003 Mid Bus Guide School Bus
NHTSA No.: C30903**

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





Final Report Date: July 24, 2003

FINAL REPORT

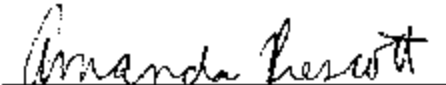
**PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
400 SEVENTH STREET, SW, ROOM 6111 (NVS-220)
WASHINGTON, D.C. 20590**

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Prepared by:  Date: July 24, 2003
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Reviewed by:  Date: July 24, 2003
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FINAL REPORT ACCEPTED BY:



8/26/2003
Date of Acceptance

Technical Report Documentation Page

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16. Abstract Compliance tests were conducted on the subject 2003 Mid Bus Guide School Bus, NHTSA No. C30903 in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-217-06 for the determination of FMVSS 217 compliance. Test failures were as follows: 1. The forces to unlatch the rear emergency exit door from the exterior of the bus exceeded the high force requirements for the emergency exit door.			
17. Key Words Compliance Testing Safety Engineering FMVSS 217		18. Distribution Statement Copies of this report are available from: NHTSA Technical Information Services (TIS) Room 5108, (NPO-230) 400 Seventh Street, S.W. Washington, D.C. 20590 (202) 366-4946	
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SECTION 1
PURPOSE OF COMPLIANCE TEST

Tests were conducted on a MY2003 Mid Bus Guide School Bus, NHTSA No. C30903, in accordance with the specifications of the Office of Vehicle Safety Compliance (OVSC) Test Procedures TP-217-06 to determine compliance to the requirements of Federal Motor Vehicle Safety Standards (FMVSS) 217, "School Bus Emergency Exits and Window Retention and Release".

This program is sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-02-D-01057.

SECTION 2
TEST DATA SUMMARY

Based on the tests performed, the MY2003 Mid Bus Guide School Bus, NHTSA No. C30903 did not appear to meet all of the requirements of FMVSS 217. See Data Sheet 1 for Test Summary on the following page.

**DATA SHEET 1
TEST SUMMARY**

GENERAL VEHICLE IDENTIFICATION

Model Year/Make/Model:	2003 / Mid Bus / Guide	
NHTSA No.:	C30903	
GVWR:	5,443 kg	
Build Date for Bus Chassis:	9/02	
VIN:	1GBJG31U431110295	
Chassis VIN:	1GBJG31U431110295	
Seating Capacity:	25 + 1 W/C + Driver	
Type of Bus:	Type C	
Tire Pressure from tire placard (at capacity):	Front: 450 kPa	Rear: 450 kPa
Odometer Reading:	1735 km	

	PASS/FAIL
S5.1 WINDOW RETENTION	PASS
S5.2 PROVISION OF EMERGENCY EXITS	PASS
Meets minimum exit provisions	PASS
Meets all other exit requirements	PASS
Meets requirements for additional exits	PASS
S5.2.3.1.A EMERGENCY EXIT DOOR OPERATIONAL REQUIREMENTS	PASS
S5.3 EMERGENCY EXIT RELEASE	FAIL
Forces to unlatch the emergency exits	FAIL
Forces to open the emergency exits	PASS
S5.4 EMERGENCY EXIT OPENING	PASS
S5.5 EMERGENCY EXIT LABELING AND IDENTIFICATION	PASS
S5.5 TAPE REFLECTIVITY (49CFR 571.131)	NOT TESTED

COMMENTS: NONE

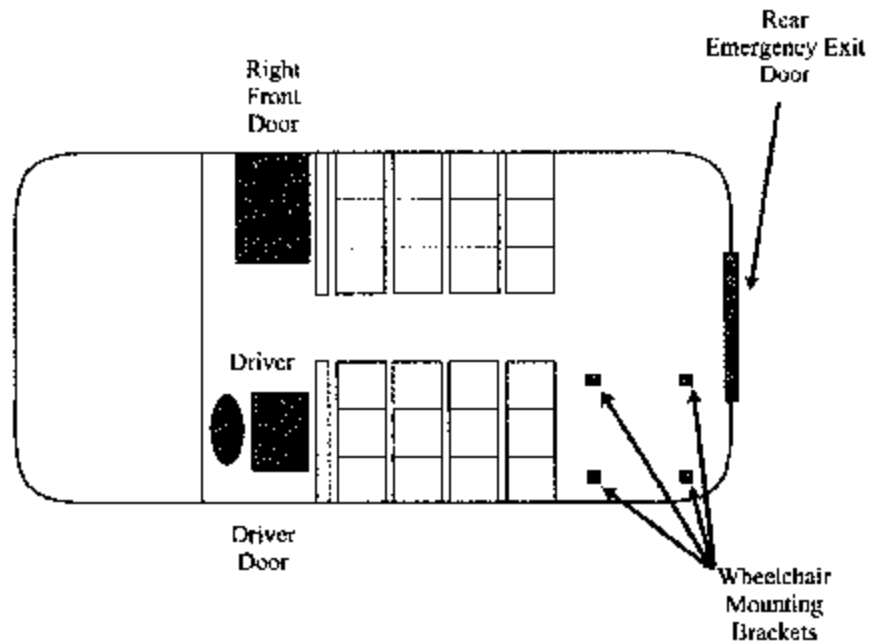
SECTION 3
COMPLIANCE TEST DATA

The following data sheets document the results of testing on the Mid Bus Guide School Bus,
NHTSA No. C30903.

DATA SHEET 2
PROVISION OF EMERGENCY EXITS

Test Vehicle: **2003 Mid Bus Guide School Bus**
Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C30903**
Test Date: **6/02/03**



		Height (mm)	Width (mm)
1	Rear Exit Door	1135	925

Seating Capacity: 29 (Including Driver)

	PASS/FAIL
Bus meets minimum emergency exit provision, based upon Table 1	PASS


Comments: NONE

DATA SHEET 2 (CONTINUED)
PROVISION OF EMERGENCY EXITS

		PASS/FAIL
1	Rear Emergency Door – opens outward and is hinged on the right side (either side, if the bus has a GVWR of 10,000 pounds or less)	PASS
2	Side Emergency Door – hinged on its forward side. No more than one side emergency exit door is located, in whole or in part, within the same post and roof bow panel space.	N/A
3	Rear Push Out Window – provides a minimum opening clearance 41 cm high and 122 cm wide (16" x 48")	N/A
4	Roof Exit – is hinged on its forward side, and operable from both the inside and outside the vehicle	N/A
5	There is an even number of side emergency exit windows on each side of bus.	N/A
6	The bus is not equipped with both sliding and push-out windows, (except for buses equipped with rear push out emergency exit windows).	N/A
7	A right side emergency exit door	N/A

COMMENTS: NONE

Recorded By: 

Approved By: 

Date: 6/02/03

**DATA SHEET 3
EMERGENCY EXIT DOOR OPERATIONAL REQUIREMENTS**

Test Vehicle: **2003 Mid Bus Guide School Bus**
 Test Lab: **MGA Research-Wisconsin Operations**


NHTSA No.: **C30903**
 Test Date: **6/02/03**

		PASS/FAIL
1	The engine starting system does NOT operate if any Emergency Exit is LOCKED	N/A ⁽¹⁾
2	All Emergency Door and Roof Exits can be released by one person (from inside and outside of bus)	PASS ⁽²⁾
3	When the Release Mechanism is NOT in the closed position and the vehicle ignition is in the "ON" position, there is a continuous warning sound audible at the Driver's DSP and in the vicinity of the Emergency Door(s) having the unclosed mechanism.	PASS
4	Emergency exit release mechanism does not use remote controls or central power systems	PASS

COMMENTS:

- ⁽¹⁾ The only emergency exit is the rear door and it cannot be locked.
- ⁽²⁾ The only emergency exit is the rear door.

Recorded By: 

Approved By: 

Date: **6/02/03**

SHEET 4A
EMERGENCY EXIT IDENTIFICATION AND LABELING

Test Vehicle: **2003 Mid Bus Guide School Bus**
Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C30903**
Test Date: **6/02/03**

EMERGENCY EXIT LABELING - INTERIOR

Exit Location	Rear Door
Exit Description	Emergency Door
Letter Height (cm)	5.0
Background Color	White
Location Inside	Above Door
Pass/Fail	PASS

OPERATING INSTRUCTIONS - INTERIOR

Exit Location	Rear Door
Instructions	Lift Handle Push Door Out
Letter Height (cm)	2.0
Letter Color	Red
Background Color	White
Distance From Release (cm)	2.0
Reflective Tape Color	N/A
Reflective Tape Width	N/A

COMMENTS: NONE

Recorded By: 

Approved By: 

Date: **6/02/03**

**DATA SHEET 4B
EMERGENCY EXIT IDENTIFICATION AND LABELING**

Test Vehicle: **2003 Mid Bus Guide School Bus**
Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C30903**
Test Date: **6/02/03**

EMERGENCY EXIT LABELING - EXTERIOR

Exit Location	Rear Door
Exit Description	Emergency Door
Letter Height (cm)	5.0
Background Color	Yellow
Location Inside	Above Door
Pass/Fail	PASS

OPERATING INSTRUCTIONS - EXTERIOR

Exit Location	Rear Door
Instructions	None
Letter Height (cm)	---
Letter Color	--
Background Color	--
Distance From Release (cm)	---
Reflective Tape Color	Yellow
Reflective Tape Width	2.5 cm

COMMENTS: NONE

Recorded By: _____

Approved By: _____

Date: 6/02/03

**DATA SHEET 4 (CONTINUED)
EMERGENCY EXIT IDENTIFICATION AND LABELING**


Test Vehicle: **2003 Mid Bus Guide School Bus**
Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C30903**
Test Date: **6/02/03**

		PASS/FAIL
1	Each required Emergency Exit is labeled with the words "Emergency Exit" or "Emergency Door" as appropriate in letters at least 5 cm high (2") of a color that contrasts with its background.	PASS
2	Emergency Doors – The designation "Emergency Exit" or "Emergency Door" is located at the top of, or directly above the exit door on both inside and outside surfaces of the bus.	PASS
3	Roof Exits – The designation for roof exits is located on an inside surface of the exit, or within 30 cm (11.8") of the roof exit opening.	N/A
4	Emergency Window Exits – The designation is located at the top of, or directly above, or at the bottom of the emergency window exit on both the inside and outside surfaces of the bus.	N/A
5	Exit Operating Instructions indicate all motions required to unlatch and open the exit, in letters at least 1 cm (.39") high and of a color that contrast with its background and shall be located within 15 cm (5.9") of the release mechanism on the inside surface of the bus.	PASS
6	Each required Emergency Exit opening is outlined around its perimeter with a 2.5 cm (1") wide retroreflective tape of red, white, or yellow color.	PASS

COMMENTS:

Recorded By: _____

Approved By:  _____

Date: **6/02/03**

**DATA SHEET 5
TAPE RELECTIVITY TEST**

Test Vehicle: **2003 Mid Bus Guide School Bus**
 Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C30903**
 Test Date: **6/02/03**

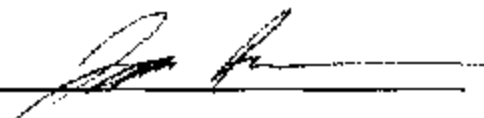
- _____ Color of retroreflective tape (white, red, or yellow)
- _____ Glass bead retroreflective element material – Fill in Part A
- _____ Prismatic retroreflective element material – Fill in Part B

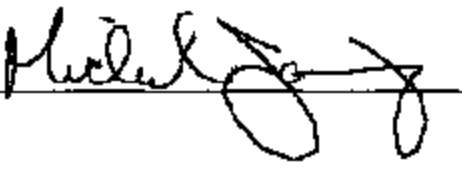
**SPECIFIC INTENSITY PER UNIT AREA
(Candela Per Foot Candle Per Square Foot)**

Observation Angle	Entrance Angle	Min. Reqd. Intensity	Recorded Intensity	Pass/Fail
Part A – Glass Bead				
Part B - Prismatic				

This section of tape passes the REFLECTIVITY requirement. Yes ___ No ___

COMMENTS: NOT TESTED

Recorded By: 

Approved By: 

Date: **6/02/03**

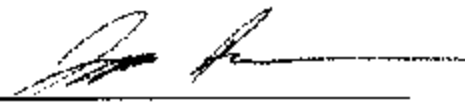
**DATA SHEET 6A
FORCE TESTS TO UNLATCH THE EMERGENCY EXITS - INTERIOR**


Test Vehicle: **2003 Mid Bus Guide School Bus**
 Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C30903**
 Test Date: **6/02/03**

Exit Location	Exit Description	High/Low Force Area	Maximum Force Requirement Newtons	Actual Force Measured (N)	Motion(s) required to Release Exit	Actual Motion(s) to Release Exit	PASS/FAIL
Rear Door	Door Exit	High	178	1. 68.5	Rotary	Rotate Handle Upward Clockwise	PASS
				2. 64.0			
				3. 69.0			
				Average: 67.2			

COMMENTS: NONE

Recorded By: 

Approved By: 

Date: **6/02/03**

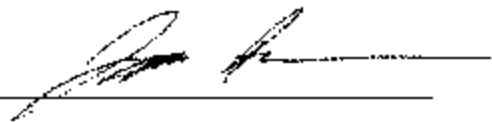
DATA SHEET 6B
FORCE TESTS TO UNLATCH THE EMERGENCY EXITS - EXTERIOR


Test Vehicle: **2003 Mid Bus Guide School Bus**
 Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C30903**
 Test Date: **6/02/03**

Exit Location	Exit Description	High/Low Force Area	Maximum Force Requirement Newtons	Actual Force Measured (N)	Motion(s) required to Release Exit	Actual Motion(s) to Release Exit	PASS/FAIL
Rear Door	Door Exit	High	178	1. 243.0	Rotary	Pull Handle Upward Counter Clockwise	FAIL
				2. 239.5			
				3. 219.0			
				Average: 233.8			

COMMENTS: NONE

Recorded By: 

Approved By: 

Date: **6/02/03**

DATA SHEET 7A
FORCE TESTS TO OPEN THE EMERGENCY EXITS - INTERIOR



Test Vehicle: **2003 Mid Bus Guide School Bus**
 Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C30903**
 Test Date: **6/02/03**

Exit Location	Exit Description	High/Low Force Area	Maximum Force Requirement Newtons	Actual Force Measured (N)				Motion(s) required to Open Exit	Actual Motion(s) to Open Exit	Passage of Ellipsoid or Parallelepiped	PASS/FAIL
				1.	2.	3.	Average:				
Rear Door	Door Exit	High	178	20.0	15.0	18.0	17.7	Straight and Perpendicular to the undisturbed exit surface	Straight Outward Push	114x61x30 Parallelepiped	PASS

Describe in the comments section if more than one force and motion are required to unlatch the exit.

COMMENTS: NONE

Recorded By: 
 Approved By:  Date: 6/02/03



DATA SHEET 7B
FORCE TESTS TO OPEN THE EMERGENCY EXITS - EXTERIOR

Test Vehicle: **2003 Mid Bus Guide School Bus** NHTSA No.: **C30903**
 Test Lab: **MGA Research-Wisconsin Operations** Test Date: **6/02/03**

Exit Location	Exit Description	High/Low Force Area	Maximum Force Requirement Newtons	Actual Force Measured (N)			Motion(s) required to Open Exit	Actual Motion(s) to Open Exit	Passage of Ellipsoid or Parallelepiped	PASS/FAIL
				1.	2.	3.				
Rear Door	Door Exit	High	178	1. 19.0	2. 18.0	3. 18.5	Straight and Perpendicular to the undisturbed exit surface	Straight Outward Pull	114x61x30 Parallelepiped	PASS
				Average: 18.5						

Describe in the comments section if more than one force and motion are required to unlatch the exit.

COMMENTS: NONE

Recorded By:  _____ Date: **6/02/03**
 Approved By:  _____

**DATA SHEET 8
EMERGENCY EXIT EXTENSION**

Test Vehicle: **2003 Mid Bus Guide School Bus**
 Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C30903**
 Test Date: **6/02/03**

		PASS/FAIL
1	Exit(s) can be extended by a single person.	PASS
2	Each emergency exit door is equipped with a positive door opening device that meets the requirements (outlined in Section S5.4.1 (3) of FMVSS 217).	PASS
3	There is a 30 cm (11.81") wide clear aisle space for each side emergency door exit.	N/A
4	There is no seat or barrier which extend past the side door opening	N/A
5	For flip-up seat adjacent to the side emergency door exit it automatically assumes and retain a vertical position when not in use, so that no portion of the seat bottom is within the 30 cm (11.81") aisle clearance space	N/A
6	There is no obstruction of door latch mechanism for the rear emergency door.	PASS

COMMENTS: NONE

Recorded By: _____

Approved By: _____

Date: 6/02/03

**DATA SHEET 9
WINDOW RETENTION TEST**

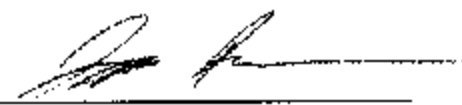
Test Vehicle: **2003 Mid Bus Guide School Bus**
 Test Lab: **MGA Research-Wisconsin Operations**


NHTSA No.: **C30903**
 Test Date: **6/26/03**

1	Test Window Identification:	Left Side 5 th Window -- Top Glazing ⁽¹⁾
2	Provide a detailed description of the window such as fixed, push out, single or double glazed, horizontal or vertical sliding, etc.	Vertical Sliding
3	Provide the horizontal and vertical glazing dimensions for each panel.	608 mm x 312 mm
4	Did the window pass the retention requirements? Describe how the window structure and glazing withstood the force per the PASS/FAIL criteria:	Glazing Shattered at 158 kg - PASS
5	Did the window pass the force tests to unlatch and open the exit after the completion of the retention test?	N/A

COMMENTS:

⁽¹⁾ There were no emergency exit windows in this vehicle.

Recorded By: 

Approved By: 

Date: **6/02/03**

**DATA SHEET 9 (CONTINUED)
WINDOW RETENTION TEST**

Test Vehicle: **2003 Mid Bus Guide School Bus**
Test Lab: **MGA Research-Wisconsin Operations**


NHTSA No.: **C30903**
Test Date: **6/26/03**

1	Test Window Identification:	Right Side 5 th Window – Top Glazing ⁽¹⁾
2	Provide a detailed description of the window such as fixed, push out, single or double glazed, horizontal or vertical sliding, etc.	Vertical Sliding
3	Provide the horizontal and vertical glazing dimensions for each panel.	608 mm x 312 mm
4	Did the window pass the retention requirements? Describe how the window structure and glazing withstood the force per the PASS/FAIL criteria:	Glazing Shattered at 153 kg - PASS
5	Did the window pass the force tests to unlatch and open the exit after the completion of the retention test?	N/A

COMMENTS:

⁽¹⁾ There were no emergency exit windows in this vehicle.

Recorded By: 

Approved By: 

Date: 6/02/03

**SECTION 4
INSTRUMENTATION AND EQUIPMENT LIST**

Test Vehicle: **2003 Mid Bus Guide School Bus**
 Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C30903**
 Test Date: **6/02/03**

Equipment	Description	Model/Serial No.	Cal. Date	Next Cal. Date
Computer	HP	Vectra / US03263612	---	---
Head Form	MGA	217	5/4/03	11/4/03
A/D Interface	Metabyte	DAS-1802	---	---
Sphere	MGA	Sphere - 1A	5/4/03	11/4/03
Load Cell	Interface	1210AF / 61219	6/16/03	12/16/03
Inclinometer	Digital Protractor	Pro 360 / Comp Lab	5/20/03	11/20/03
Linear Potentiometer	Ametek	P-25A / 112- 19182	5/7/03	11/7/03
Scale	GEI	Metric / 1	1/6/03	7/6/03
Steel Tape	Stanley	Powerlock / 148	5/30/03	11/30/03
Camera	Sony	DSC-S75	---	---
Ellipsoid	MGA	ELLIP - 1A	5/4/03	11/4/03
Parallelepiped	MGA	PARA - 1A	5/4/03	11/4/03
Force Gauge	Chatillon	DFGS-R-ND / F31754	12/13/02	6/13/03
Temp. Recorder	Dickson	TR320 / 03039010	2/1/03	8/1/03

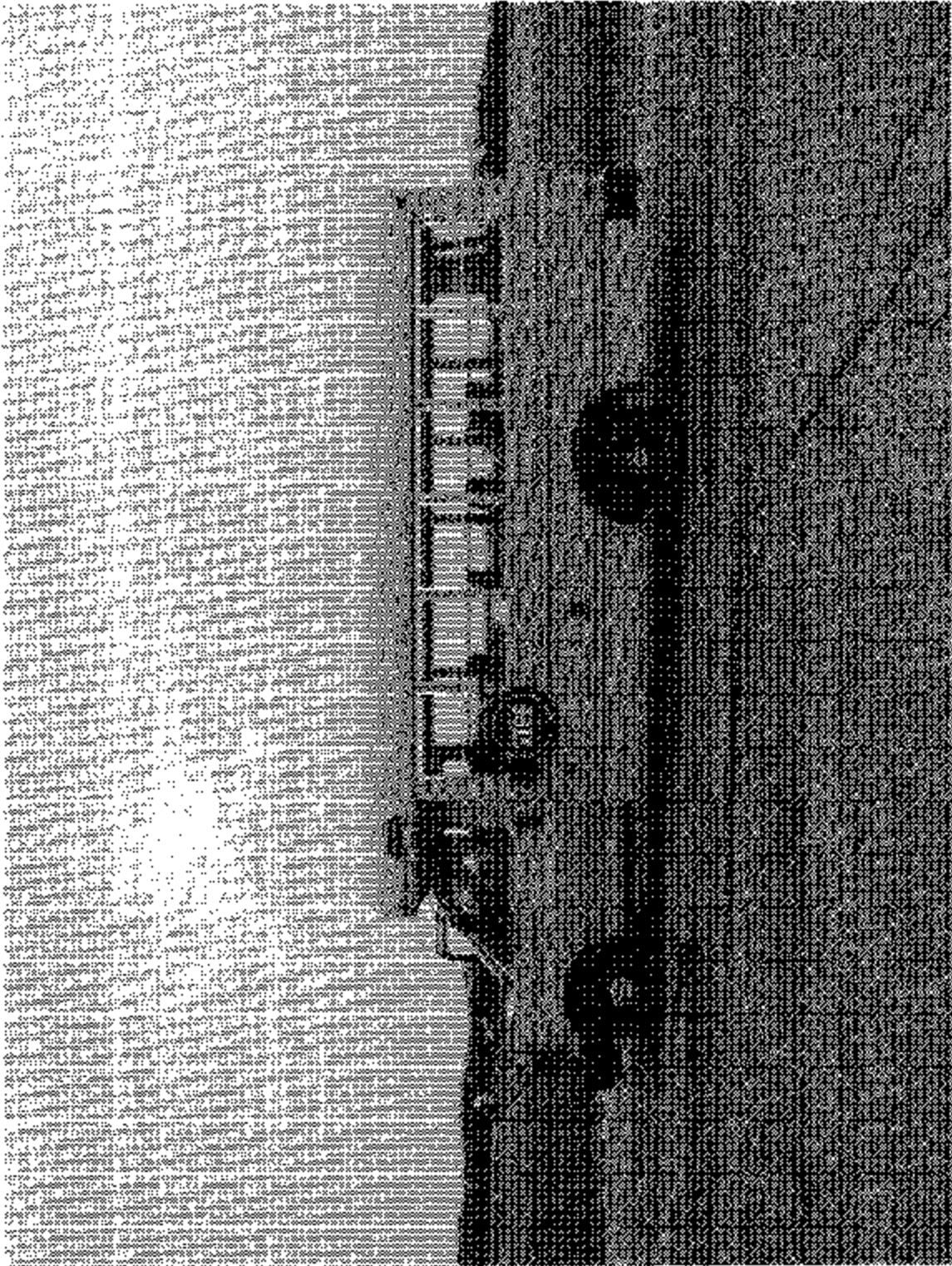
**SECTION 5
PHOTOGRAPHS**

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Test Vehicle: 2003 Mid Bus Guide School Bus
Procedure: FMVSS 217

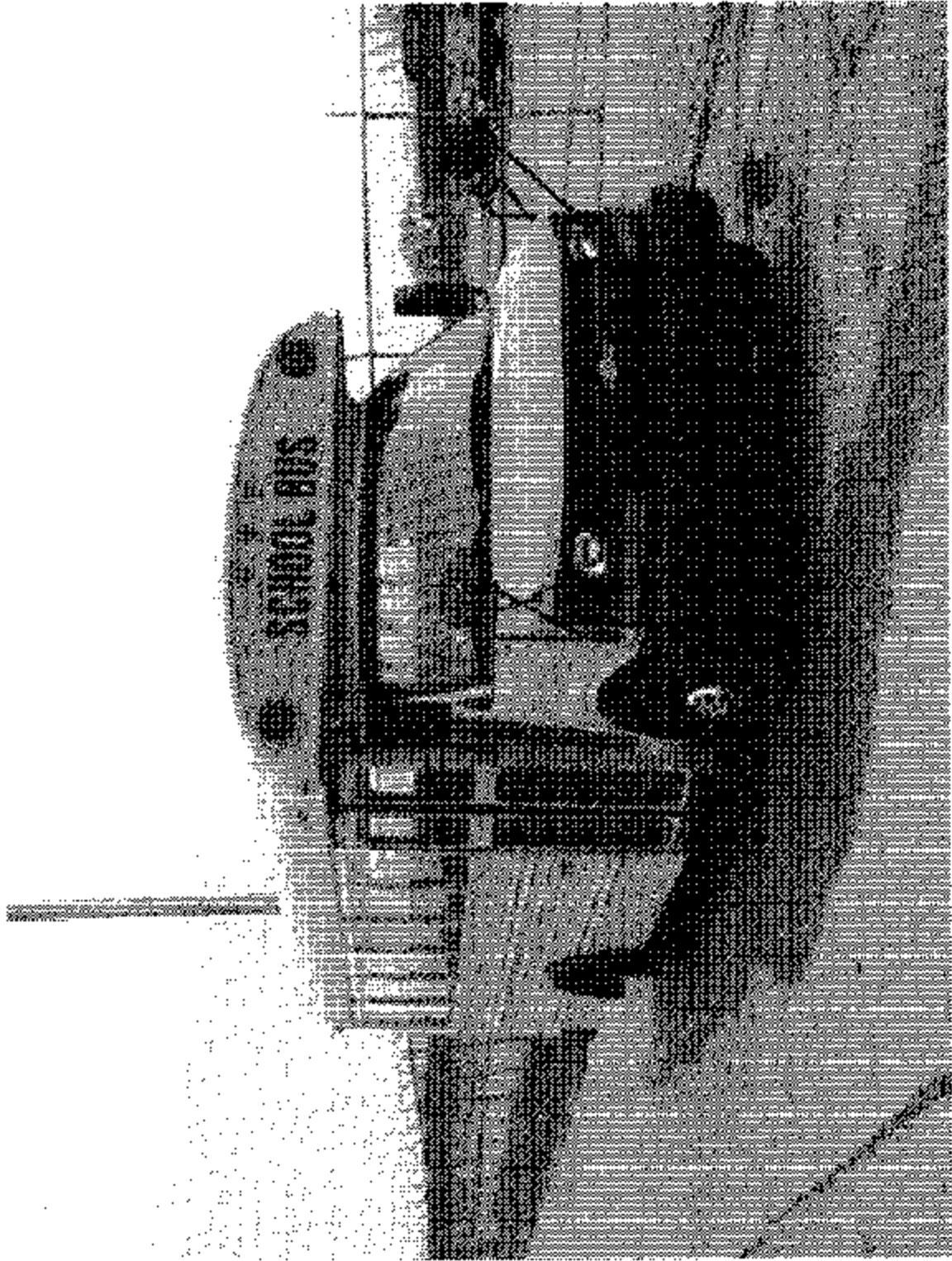
NHTSA No.: C30903



Exterior Left Side View of School Bus

Test Vehicle: 2003 Mid Bus Guide School Bus
Procedure: FMVSS 217

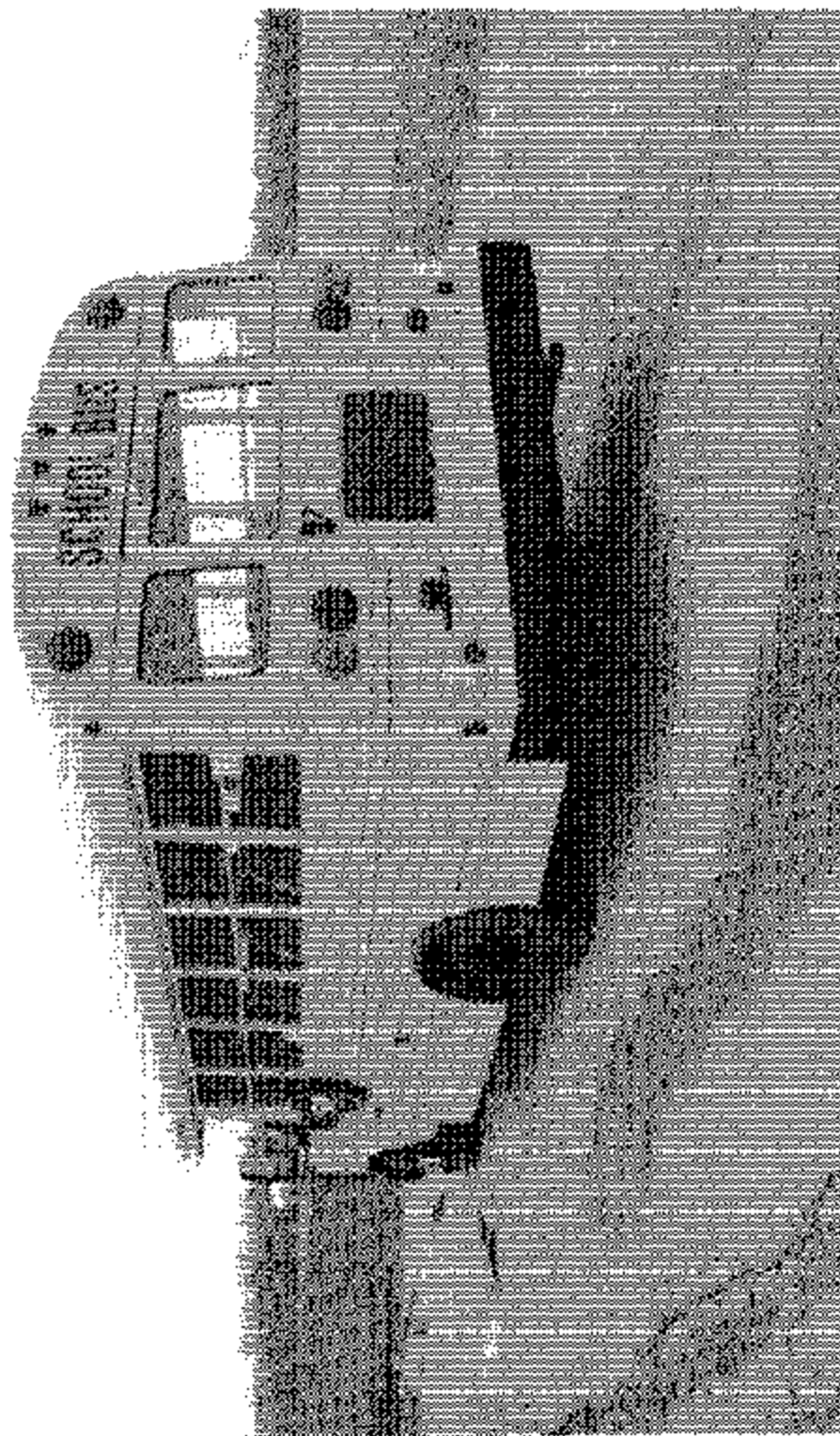
NHTSA No.: C30903



Exterior Right Front ¼ View of School Bus

Test Vehicle: 2003 Mid Bus Guide School Bus
Procedure: FMVSS 217

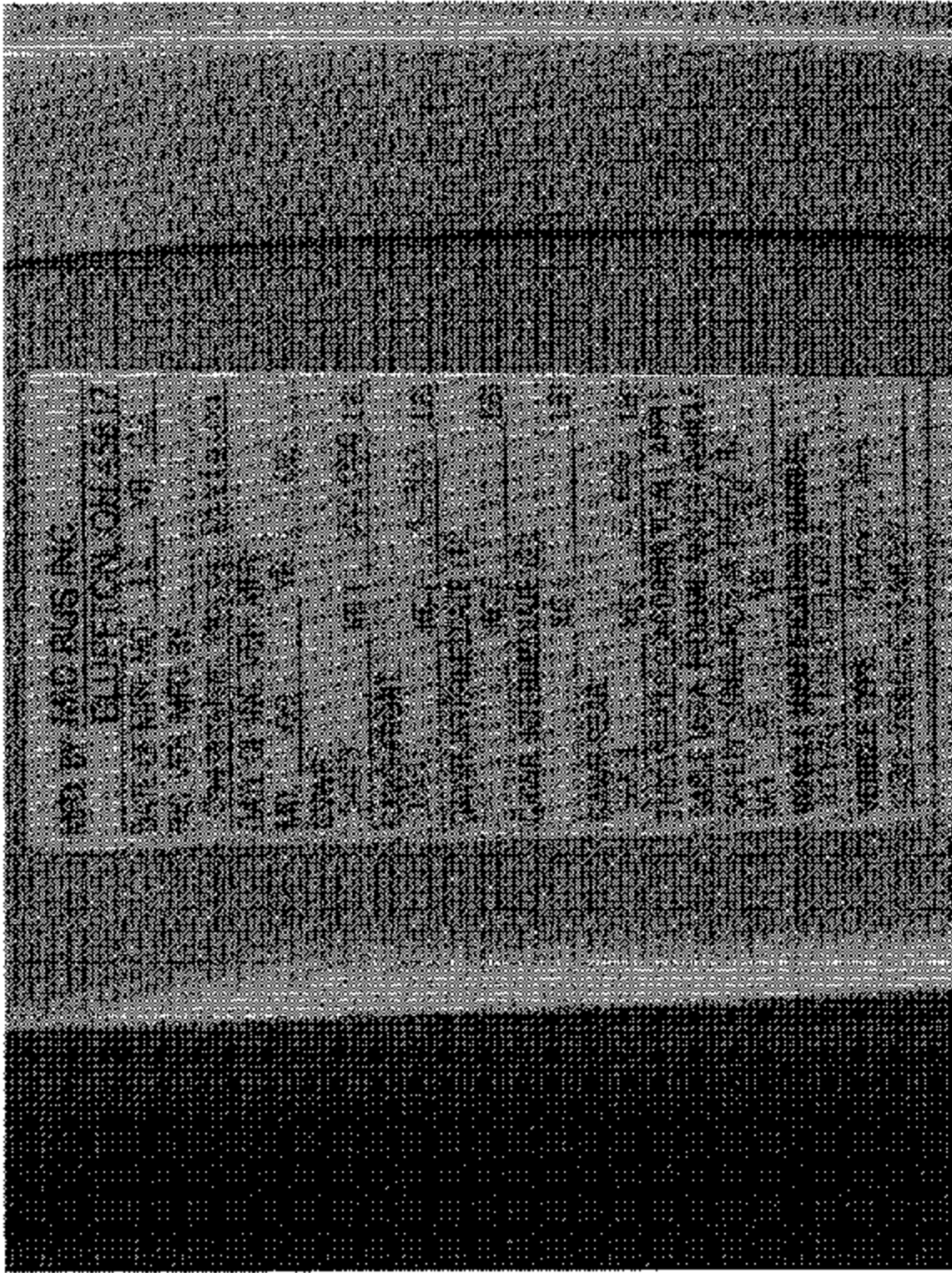
NHTSA No.: C30593



Exterior Left Rear 1/4 View of School Bus

Test Vehicle: 2003 Mid Bus Guide School Bus
Procedure: FMVSS 217

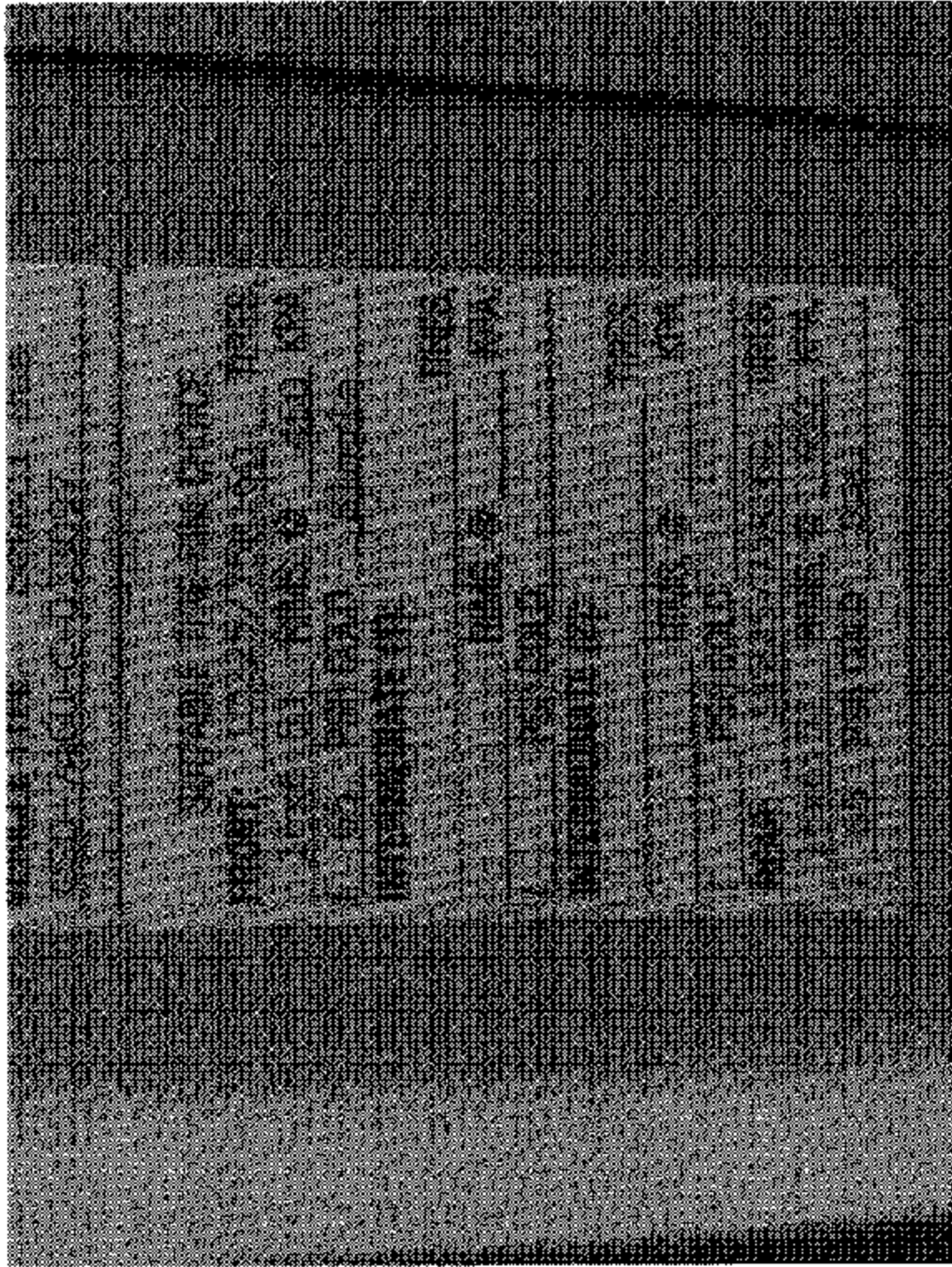
NHTSA No.: C38903



Vehicle Certification

Test Vehicle: 2003 Mid Bus Guide School Bus
Procedure: FMVSS 217

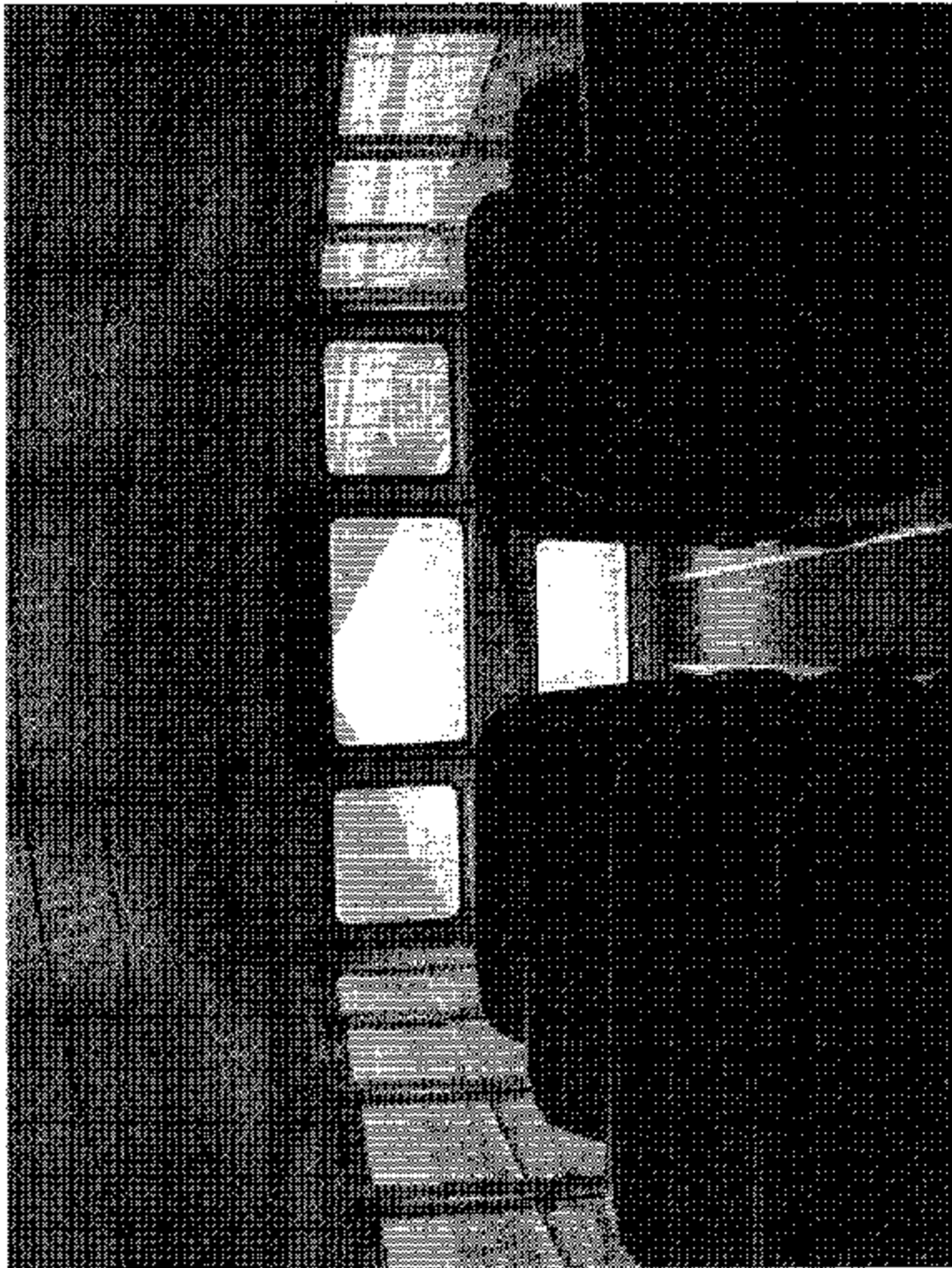
NHTSA No.: C30903



Tire Placard

Test Vehicle: 2003 Mid Bus Guide School Bus
Procedure: FMVSS 217

NHTSA No.: C30903



Interior Front to Rear View Depicting Seating Arrangement

Test Vehicle: 2003 Mid Bus Guide School Bus
Procedure: FMVSS 217

NHTSA No: C30903



Interior Rear to Front View Depicting Seating Arrangement

Test Vehicle: 2003 Mid Bus Guide School Bus
Procedure: FMVSS 217

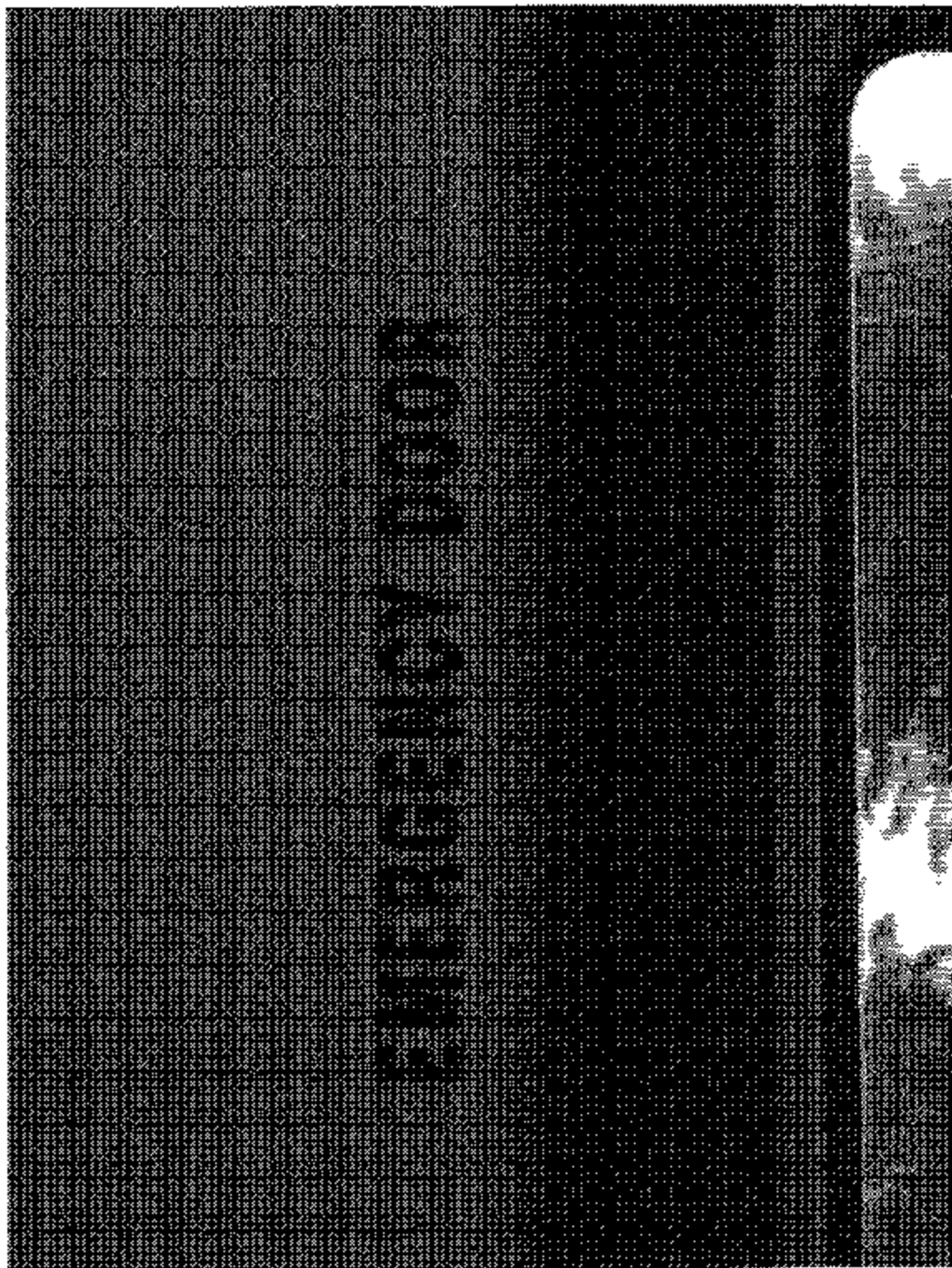
NHTSA No.: C30903



Rear Exit Door Identification (Outside View)

Test Vehicle: 2003 Mid Bus Guide School Bus
Procedure: FMVSS 217

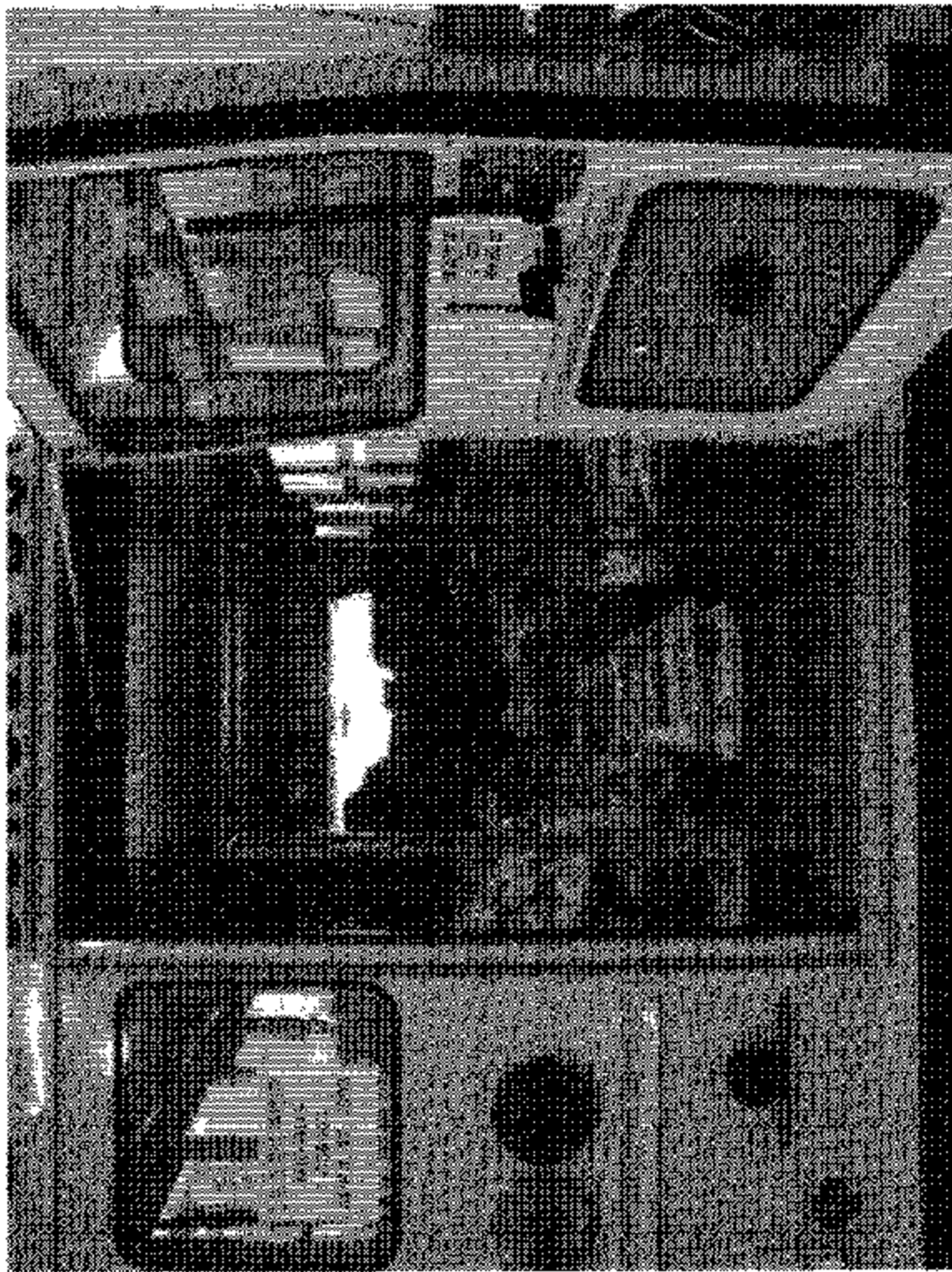
NHTSA No.: C30903



Rear Exit Door Identification (Inside View)

Test Vehicle: 2003 Mid Bus Guide School Bus
Procedure: FMVSS 217

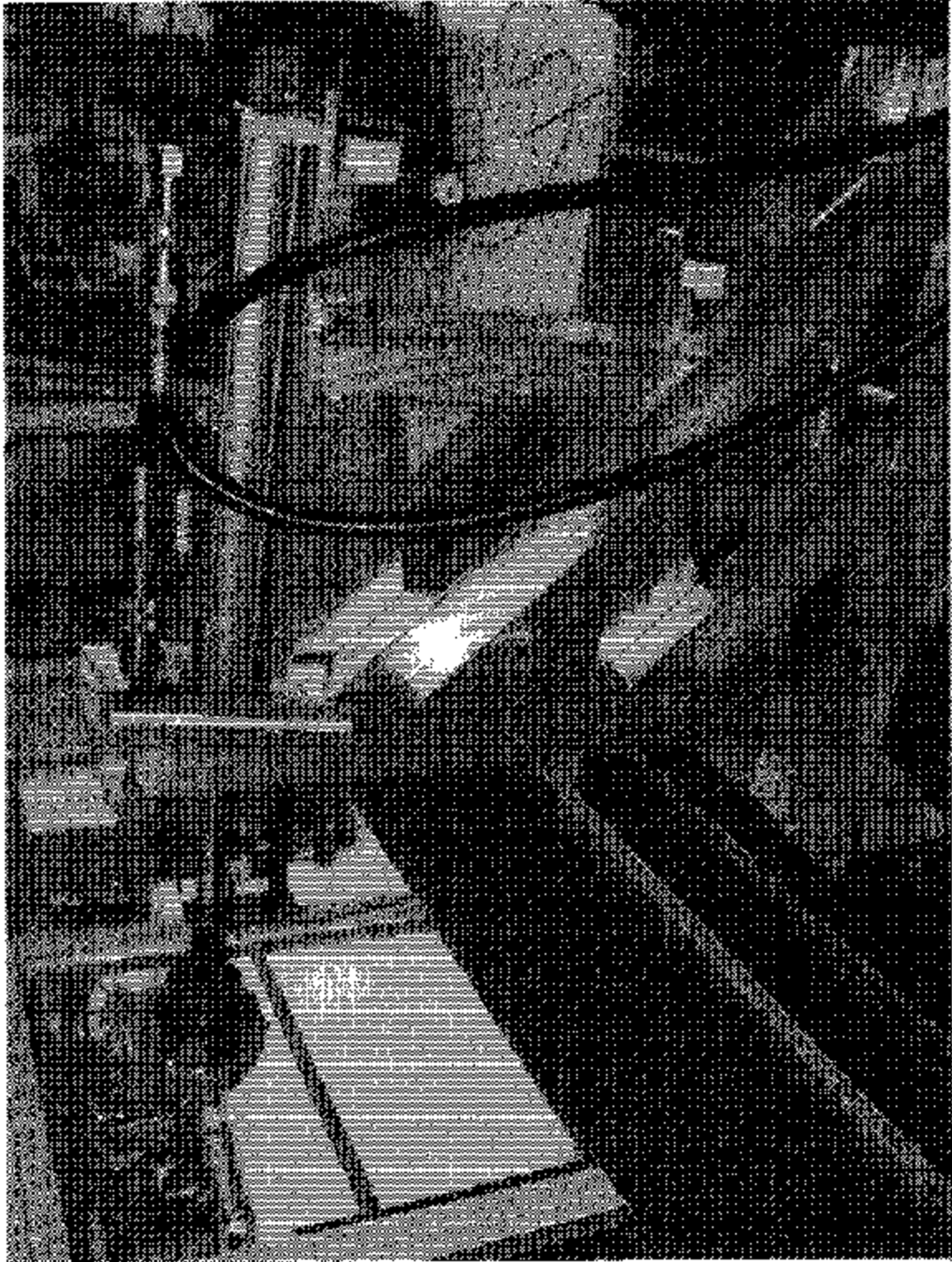
NHTSA No.: C30903



Rear Door Emergency Exit Parallelepiped Clearance

Test Vehicle: 2003 Mid Bus Guide School Bus
Procedure: FMVSS 217

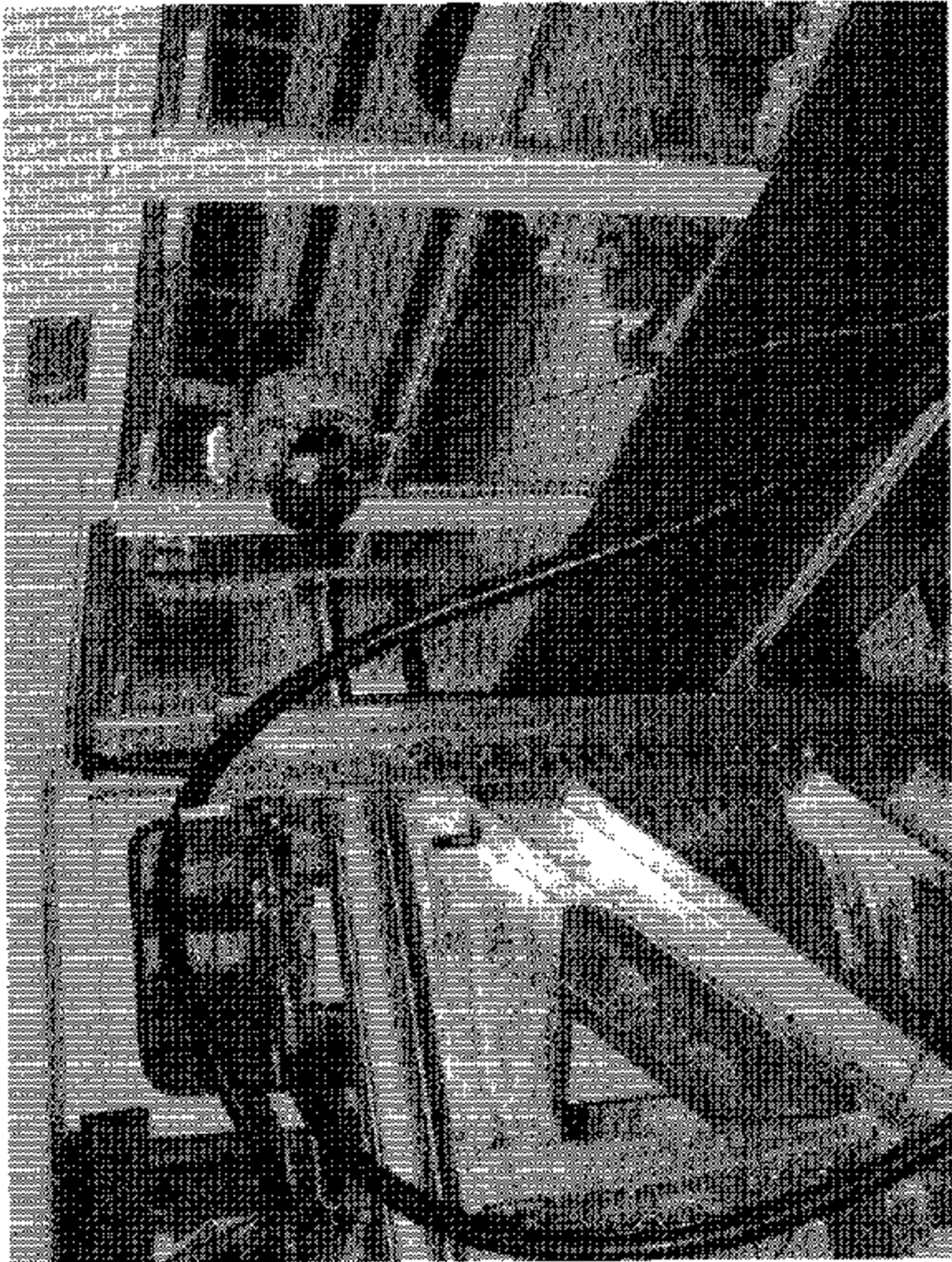
NHTSA No.: C30903



Loading Fixture

Test Vehicle: 2003 Mid Bus Guide School Bus
Procedure: FMVSS 217

NHTSA No.: C30903



Retention Test of Left Rear Window (Pre-Test)

Test Vehicle: 2003 Mid Bus Guide School Bus
Procedure: FMVSS 217

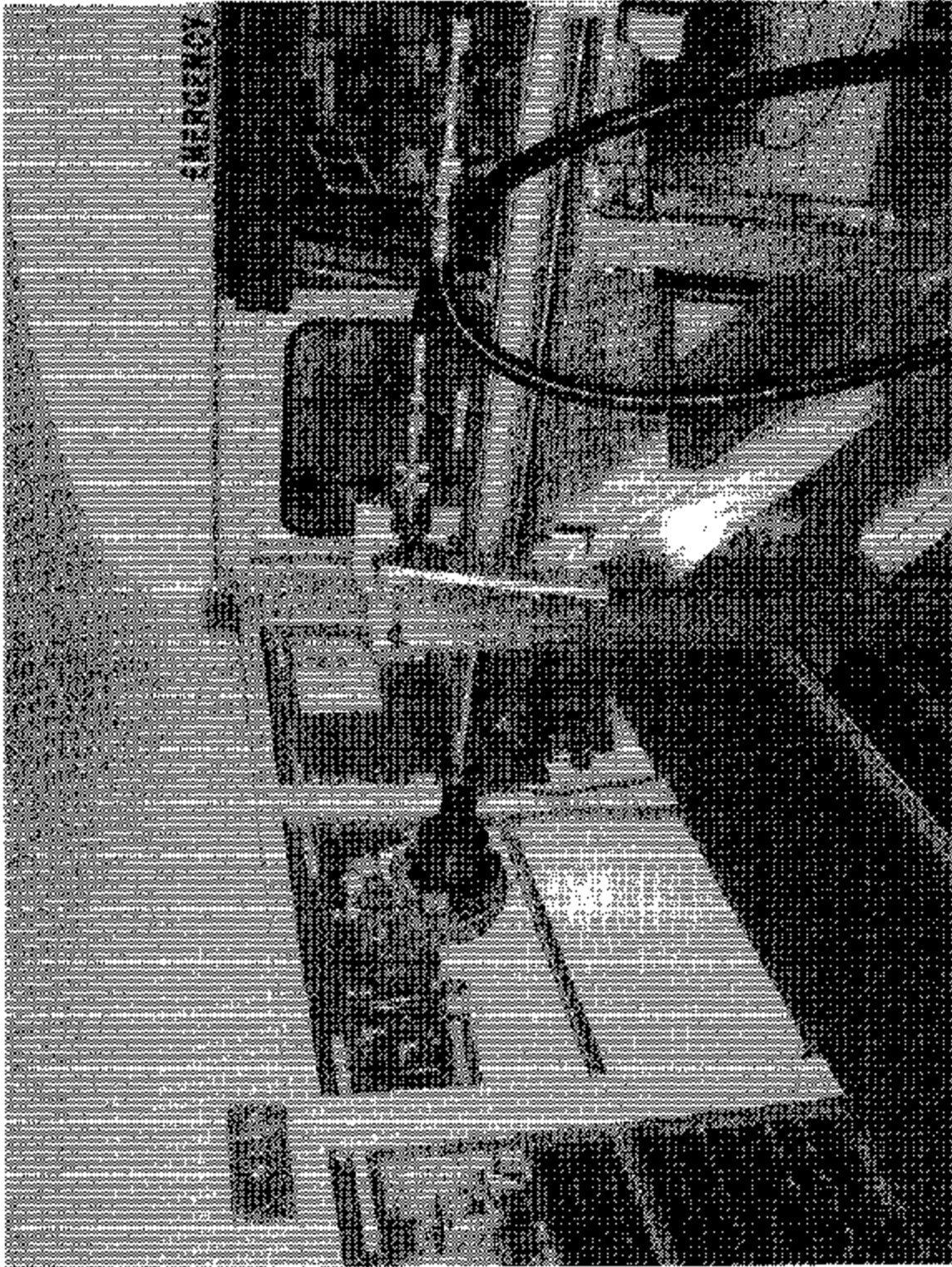
NHTSA No.: C30903



Retention Test of Left Rear Window (Post-Test)

Test Vehicle: 2003 Mid Bus Guide School Bus
Procedure: FMVSS 217

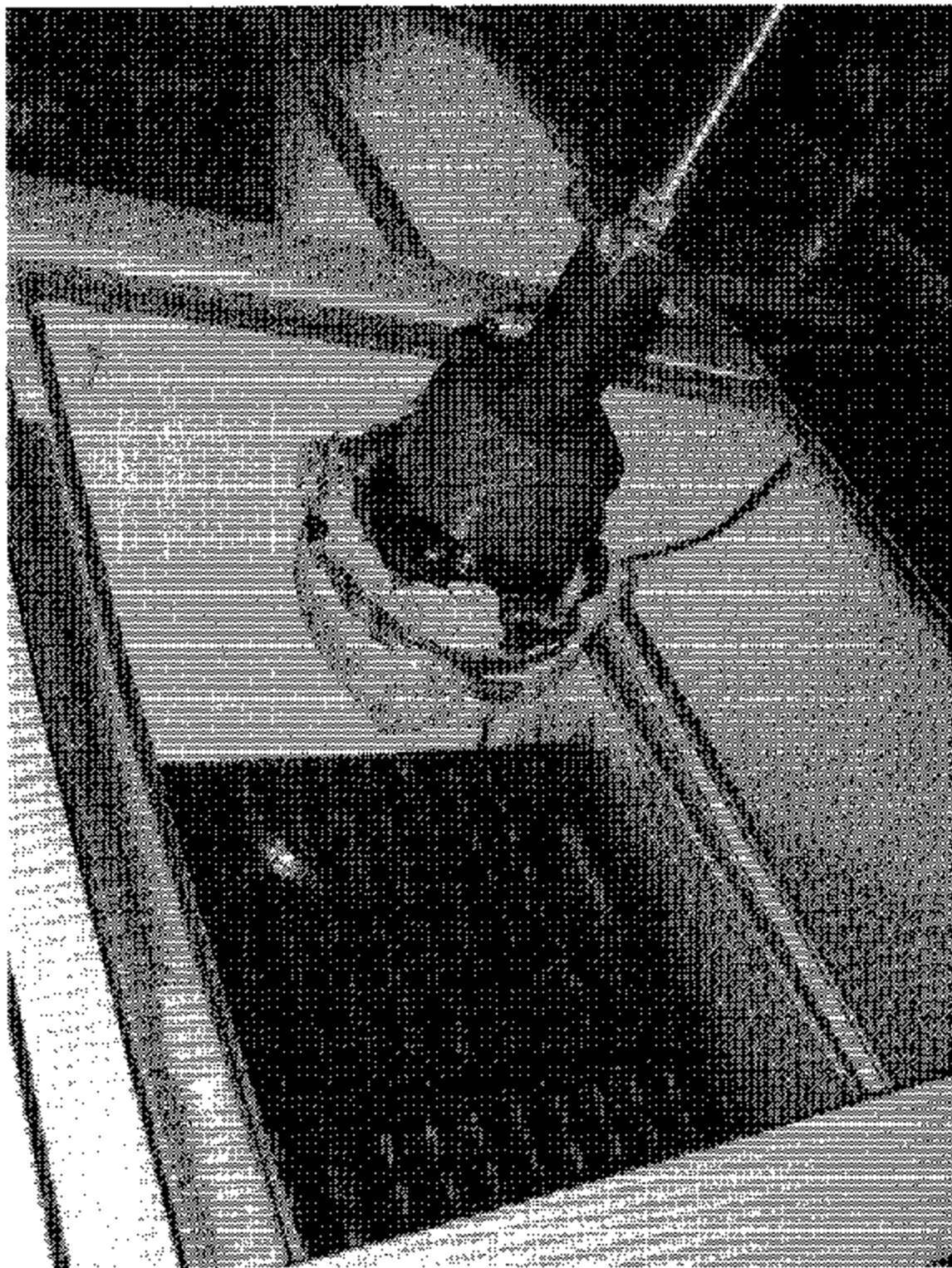
NHTSA No.: C309D3



Retention Test of Right Rear Window (Pre-Test)

Test Vehicle: 2003 Mid Bus Guide School Bus
Procedure: FMVSS 217

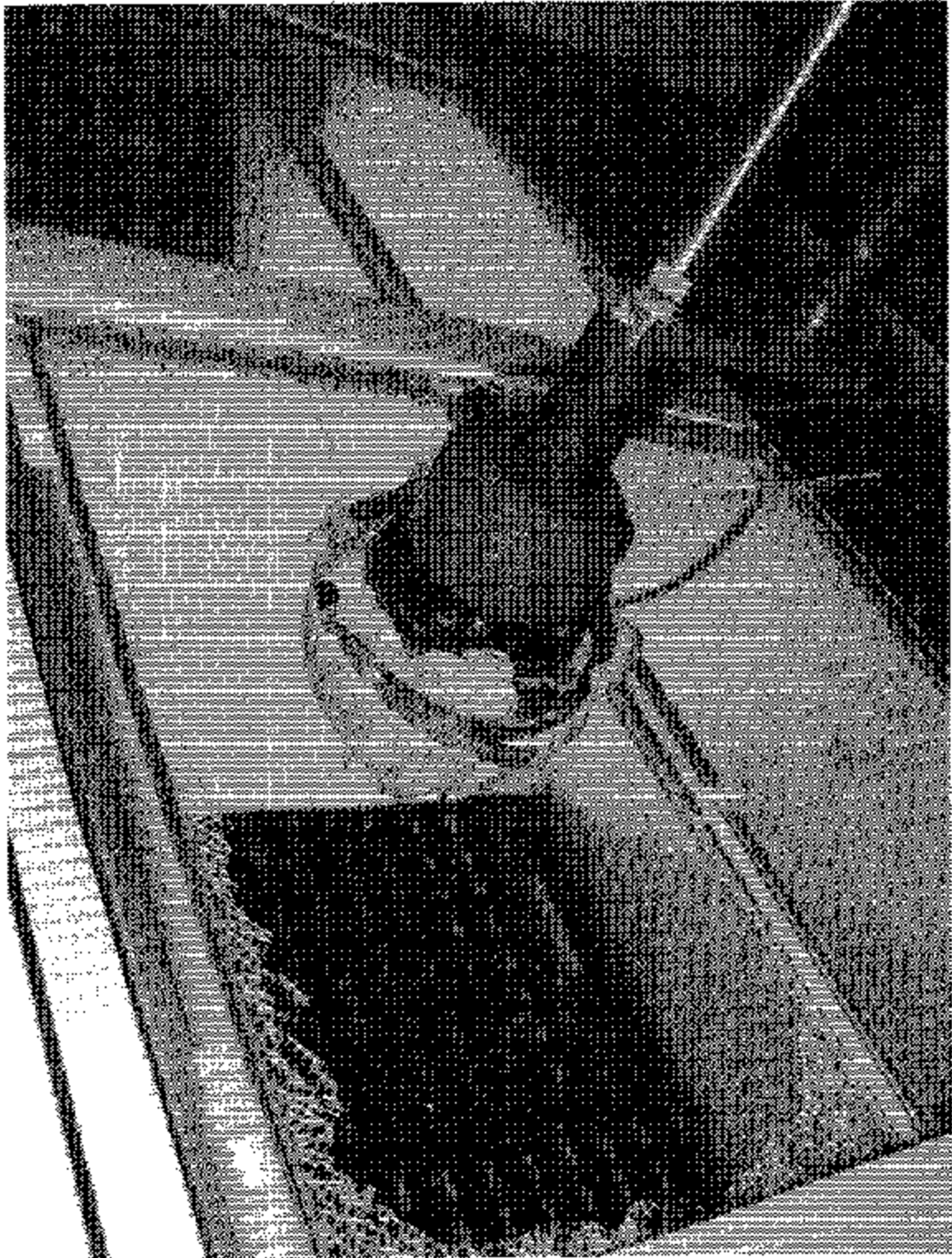
NHTSA No.: C30903



Retention Test of Right Rear Window (In Progress)

Test Vehicle: 2003 Mid Bus Guide School Bus
Procedure: FMVSS 217

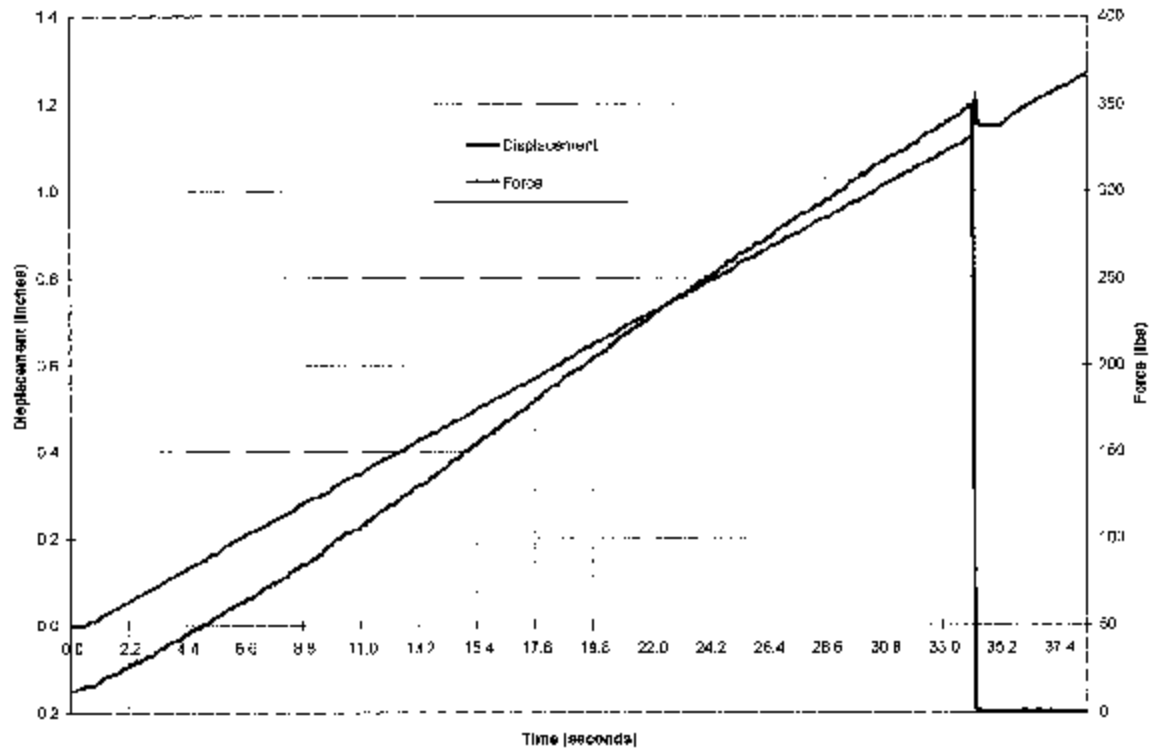
NHTSA No.: C30903



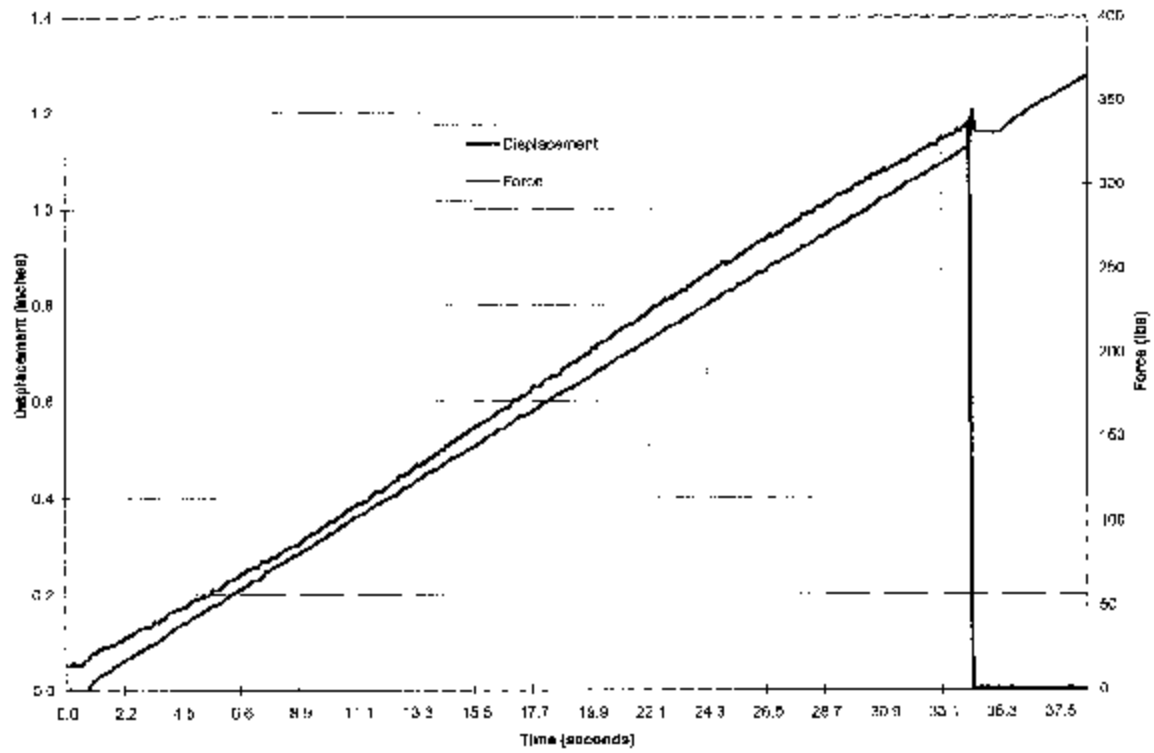
Retention Test of Right Rear Window (Post-Test)

**SECTION 6
TEST PLOTS**

FMVSS 217 NHTSA No: C30903
Mid Bus Guide Left Side Fifth Window - Upper Pane



FMVSS 217 NHTSA No: G30903
Mid Bus Guide Right Side Fifth Window - Upper Pane



**SECTION 7
LABORATORY NOTICE OF TEST FAILURE**

LABORATORY NOTICE OF TEST FAILURE TO OVSC

Test Procedure:	FMVSS 217	Test Date:	June 10, 2003
Test Vehicle:	2003 Mid Bus Guide	Test Lab:	MGA Research Corp.
NHTSA No.:	C30903	Project Engineer:	Michael Janovicz
Contract No.:	DTNH22-02-D-01057	Delivery Order No.:	Contract
MFR.:	Mid Bus Inc.	VIN:	1GBJG31U431110295
Build Date:	09/02		

TEST FAILURE DESCRIPTION

Prior to performing the window retention testing, the average force of 234 N exerted to open the rear emergency exit from the exterior exceeds the 178 N limit as defined by FMVSS 217 "Bus Emergency Exits and Window Retention and Release".

FMVSS REQUIREMENTS DESCRIPTION

Paragraph S.5.3.3.c: "The magnitude of the force shall be not more than 178 N"

Remarks: No remarks.

Notification to NHTSA (COTR): Amanda Prescott

Date: June 17, 2003

By: 