

REPORT NUMBER: 220-MGA-03-002

**SAFETY COMPLIANCE TESTING FOR
FMVSS NO. 220
SCHOOL BUS ROLLOVER PROTECTION**

**2003 American Transportation Corporation
IC3S530 School Bus
NHTSA No.: C30902**

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



Final Report Date: October 23, 2003

FINAL REPORT

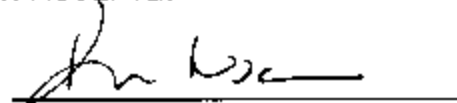
**PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
400 SEVENTH STREET, SW, ROOM 6115 (NVS-220)
WASHINGTON, D.C. 20590**

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FINAL REPORT ACCEPTED BY:



10.23.2003
Date of Acceptance

File 10.23.03

Technical Report Documentation Page

1. Report No. 220-MGA-03-002		2. Government Accession No.		3. Recipient's Catalog No.	
4. Title and Subtitle Final Report of FMVSS 220 Compliance Testing of 2003 American Transportation Corp IC3S530 School Bus NHTSA No.:C30902				5. Report Date October 23, 2003	
				6. Performing Organization Code MGA	
7. Author(s) James Hansen, Project Technician Michael Janovicz, Project Manager				8. Performing Organization Report No. 220-MGA-03-002	
9. Performing Organization Name and Address MGA Research Corporation 5000 Warren Road Burlington, WI 53105				10. Work Unit No.	
				11. Contract or Grant No. DTNH22-02-D-01057	
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Enforcement Office of Vehicle Safety Compliance (NVS-220) 400 Seventh St., S.W. Room 6115 Washington, D.C. 20590				13. Type of Report and Period Covered Final Report August 13- October 23, 2003	
				14. Sponsoring Agency Code NVS-220	
15. Supplementary Notes					
16. Abstract Compliance tests were conducted on the subject 2003 American Transportation Corp IC3S530 School Bus, NHTSA No. C30902 in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-220-02 for the determination of FMVSS 220 compliance. FAILURES: NONE					
17. Key Words Compliance Testing Safety Engineering FMVSS 220				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	
19. Security Classif. (of this report) Unclassified		20. Security Classif. (of this page) Unclassified		21. No. of Pages 52	22. Price

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SECTION 1
PURPOSE OF COMPLIANCE TEST

Tests were conducted on a MY2003 American Transportation Corp IC3S530 School Bus, NHTSA No. C30902, in accordance with the specifications of the Office of Vehicle Safety Compliance (OVSC) Test Procedure, TP-220-02, to determine compliance to the requirements of Federal Motor Vehicle Safety Standards (FMVSS) 220, "School Bus Rollover 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

Based on the tests performed, the MY2003 American Transportation Corp IC3S530 School Bus, NHTSA No. C30902 appears to meet the requirements of FMVSS 220. The ambient temperature during testing was 25.6° C.

TEST RESULTS

S4.a	The downward vertical movement of any point on the application plate shall not exceed 130 mm.	PASS
S4.b	Each emergency exit shall be capable of:	
	Unlatching per FMVSS 217	PASS
	Opening per FMVSS 217	PASS

**DATA SHEET 1
VEHICLE INFORMATION**

Contract No.:	DTNH22-02-D-01057
Laboratory Name:	MGA Research Corporation

INCOMPLETE VEHICLE (if applicable)	
Manufacturer:	
Model:	
VIN:	
Build Date:	
Certification Date:	

COMPLETED VEHICLE (SCHOOL BUS)	
Manufacturer:	American Transportation Corporation
Make/Model:	School Bus/IC3S530
VIN:	4DRBRABN73B955119
NHTSA No.:	C30902
Color:	Yellow
GVWR (kg/lb):	12,474 kg / 27,500 lbs
Build Date:	10/02
Certification Date:	10/02

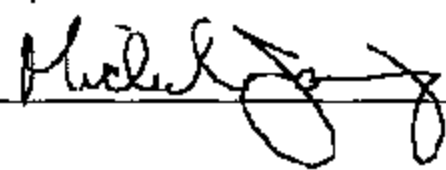
DATES	
Vehicle Receipt:	November 4, 2002
Start of Compliance Test:	August 13, 2003
Completion of Compliance Test:	August 13, 2003

COMPLIANCE TEST:

All tests were performed in accordance with the references outlined in: TP-220-02.

COMMENTS: NONE

Recorded By: 

Approved By: 

Date: October 23, 2003

DATA SHEET 1 (CONTINUED)

VEHICLE INFORMATION

SCHOOL BUS UNLOADED VEHICLE WEIGHT (UVW)

Units	LF	RF	LR	RR	TOTAL
kg	1583	1542	2032	2152	7309

SCHOOL BUS ROOF AND APPLICATION PLATE DATA

Dimensions	School Bus Roof	Calculated Roof Plate	Actual Roof Plate
Length (mm):	9296	8991	9144 ⁽²⁾
Width (mm):	2380	914	914

Notes:

- (1) The vehicle was centered laterally and longitudinally under the roof load application plate.
- (2) The actual roof plate length was 153 mm longer than calculated length.

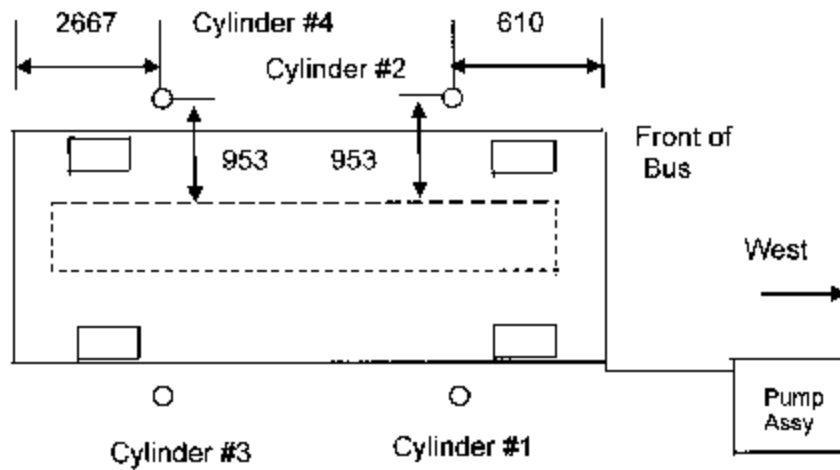
School Bus Has: Rigid Frame; Unibody

Components Removed From Vehicle Before Testing: Front and rear emergency roof latches.

DATA SHEET 1 (CONTINUED)
VEHICLE INFORMATION


LINEAR DISPLACEMENT TRANSDUCER LOCATION (inches)

Description	LF	RF	LR	RR
From closest corner of load application plate (mm)	610	610	2667	2667
From closest outside edge of load application plate (mm)	953	953	953	953



COMMENTS: NONE

Recorded By: 

Approved By: 

Date: October 23, 2003

SECTION 3
COMPLIANCE TEST DATA

The following data sheets document the results of testing on the 2003 American Transportation Corp IC3S530 School Bus, NHTSA No. C30902.

DATA SHEET 2
FORCE APPLICATION AND DEFLECTION INFORMATION

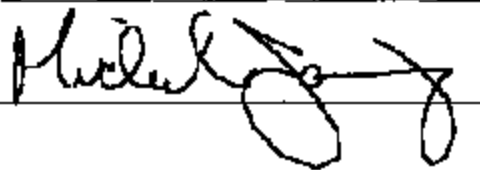
Test Vehicle: **2003 American Transportation Corp IC3S530 School Bus** NHTSA No.: **C30902**
 Test Lab: **MGA Research-Wisconsin Operations** Test Date: **8/13/03**

Unloaded Delivered Weight (UDW): (kg)	7,309 kg
Calculated Test Load = 1.5 * UDW	10,964 kg
Range of Test Load (-1% to -3%)	10,636 kg to 10,854 kg
Maximum Deflection at Full Load:	119.9 mm

		Pre-Load (227 kg)	Max. Load		PASS/FAIL
		Deflection (mm)	Deflection (mm)	Load (kg)	
Cylinder	1	0	116	2754	PASS
	2	0	73	2751	PASS
	3	0	71	2745	PASS
	4	0	39	2745	PASS
Total Load				10,995 kg	
Average Deflection			74.9 mm		
Backup Measurement	1	0	68.0		
	2	0	66.0		
	3	0	20.0		
	4	0	17.0		

COMMENTS: 1) Backup measurements taken at four most outboard and longitudinal locations on the bus. Primary cylinder deflections were measured at the locations identified in the diagram on page 5. Maximum deflection allowed = 130 mm

Recorded By: 

Approved By: 

Date: October 23, 2003

**DATA SHEET 3
FORCE AND OPENING AREA TEST OF EMERGENCY EXITS**

Test Vehicle: **2003 American Transportation Corp IC3S530 School Bus**
 Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C30902**
 Test Date: **8/13/03**

	PASS/FAIL
Can all exits be manually released and extended by a single person without tools, remove controls, and without the engine running?	PASS

NOTE: BEFORE, DURING & AFTER, refer to the point in time in relation to the load applied to the load application plate on the school bus roof.

					PASS/FAIL
BEFORE LOAD:	X	Yes		No	PASS
DURING LOAD:	X	Yes		No	PASS
AFTER LOAD:	X	Yes		No	PASS

Is emergency exit door releasable from outside the school bus?					PASS/FAIL
BEFORE LOAD:	X	Yes		No	PASS
DURING LOAD:	X	Yes		No	PASS
AFTER LOAD:	X	Yes		No	PASS

DATA SHEET 4

FORCE AND OPENING AREA TEST OF EMERGENCY EXITS (INTERIOR)

Test Vehicle: 2003 American Transportation Corp IC3S530 School Bus NHTSA No.: C30902
 Test Lab: MGA Research-Wisconsin Operations Test Date: 8/13/03

FORCE TEST TO UNLATCH THE EMERGENCY EXITS:

Exit Location	Maximum Force	Actual Before (N)	PASS/FAIL	Actual During (N)	PASS/FAIL	Actual After (N)	PASS/FAIL	Type of Motion
Left Front Exit Window	89 N	1. 22.5	PASS	1. 22.0	PASS	1. 20.0	PASS	Rotary
		2. 18.5		2. 21.0		2. 25.5		
		3. 20.0		3. 18.5		3. 26.0		
		Average: 20.3		Average: 20.0		Average: 22.2		
Right Front Exit Window	89 N	1. 13.0	PASS	1. 14.5	PASS	1. 11.0	PASS	Rotary
		2. 13.5		2. 15.0		2. 9.5		
		3. 16.5		3. 14.0		3. 10.5		
		Average: 14.3		Average: 14.5		Average: 10.3		
Left Rear Exit Window	89 N	1. 9.0	PASS	1. 6.0	PASS	1. 6.0	PASS	Rotary
		2. 8.0		2. 7.5		2. 5.0		
		3. 11.0		3. 7.5		3. 8.0		
		Average: 9.3		Average: 7.0		Average: 6.3		
Right Rear Exit Window	89 N	1. 32.0	PASS	1. 11.0	PASS	1. 11.0	PASS	Rotary
		2. 31.0		2. 10.0		2. 12.0		
		3. 28.5		3. 9.0		3. 12.0		
		Average: 30.5		Average: 10.0		Average: 11.7		
Rear Exit Door	178 N	1. 54.0	PASS	1. 21.0	PASS	1. 25.5	PASS	Rotary
		2. 49.0		2. 22.5		2. 33.0		
		3. 52.5		3. 23.0		3. 20.0		
		Average: 51.8		Average: 22.2		Average: 26.2		

Note: The "Actual Before" test results were obtained from the FMSSS 217 performed on this vehicle.
 The "Actual During" and "Actual After" test results were obtained during the FMVSS 220 testing.

DATA SHEET 4 (CONTINUED)
FORCE AND OPENING AREA TEST OF EMERGENCY EXITS (INTERIOR)

Test Vehicle: 2003 American Transportation Corp IC3S530 School Bus NHTSA No.: C30902
 Test Lab: MGA Research-Wisconsin Operations Test Date: 8/13/03

FORCE TESTS TO OPEN THE EMERGENCY EXITS

Exit Location	Maximum Force	Actual Before (N)	PASS/FAIL	Actual During (N)	PASS/FAIL	Actual After (N)	PASS/FAIL	Motion Required to Open Exit
Left Front Exit Window	178 N	1. 22.5	PASS	1. 18.0	PASS	1. 12.0	PASS	Straight and perpendicular to the undisturbed exit surface
		2. 23.5		2. 13.0		2. 11.0		
		3. 23.5		3. 14.0		3. 13.0		
		Average: 23.2		Average: 15.0		Average: 12.0		
Right Front Exit Window	178 N	1. 22.0	PASS	1. 51.0	PASS	1. 15.5	PASS	Straight and perpendicular to the undisturbed exit surface
		2. 24.5		2. 47.5		2. 19.0		
		3. 22.0		3. 48.0		3. 16.5		
		Average: 22.8		Average: 48.8		Average: 17.0		
Left Rear Exit Window	178 N	1. 46.0	PASS	1. 36.5	PASS	1. 27.5	PASS	Straight and perpendicular to the undisturbed exit surface
		2. 38.5		2. 33.5		2. 24.5		
		3. 48.0		3. 25.0		3. 22.5		
		Average: 41.2		Average: 31.7		Average: 24.8		
Right Rear Exit Window	178 N	1. 47.5	PASS	1. 31.0	PASS	1. 23.5	PASS	Straight and perpendicular to the undisturbed exit surface
		2. 45.5		2. 33.0		2. 25.5		
		3. 44.0		3. 35.5		3. 22.5		
		Average: 45.7		Average: 33.2		Average: 23.8		
Rear Exit Door	178 N	1. 24.5	PASS	1. 16.0	PASS	1. 23.0	PASS	Straight and perpendicular to the undisturbed exit surface
		2. 22.5		2. 15.0		2. 19.0		
		3. 22.5		3. 14.5		3. 20.0		
		Average: 23.2		Average: 15.2		Average: 20.7		

Note: The "Actual Before" test results were obtained from the FMSSS 217 performed on this vehicle.
 The "Actual During" and "Actual After" test results were obtained during the FMVSS 220 testing.

DATA SHEET 5
FORCE AND OPENING AREA TEST OF EMERGENCY EXITS (EXTERIOR)

Test Vehicle: 2003 American Transportation Corp IC3S530 School Bus
 Test Lab: MGA Research-Wisconsin Operations
 NHTSA No.: C30902
 Test Date: 8/13/03

FORCE TEST TO UNLATCH THE EMERGENCY EXITS:

Exit Location	Maximum Force	Actual Before (N)		PASS/FAIL	Actual During (N)		PASS/FAIL	Actual After (N)		PASS/FAIL	Type of Motion
		1.	2.		1.	2.		3.	1.		
Left Front Exit Window	N/A	1.	--	N/A	1.	--	N/A	1.	--	N/A	N/A
		2.	--		2.	--		2.	--		
		3.	--		3.	--		3.	--		
		Average:	--		Average:	--		Average:	--		
Right Front Exit Window	N/A	1.	--	N/A	1.	--	N/A	1.	--	N/A	N/A
		2.	--		2.	--		2.	--		
		3.	--		3.	--		3.	--		
		Average:	--		Average:	--		Average:	--		
Left Rear Exit Window	N/A	1.	--	N/A	1.	--	N/A	1.	--	N/A	N/A
		2.	--		2.	--		2.	--		
		3.	--		3.	--		3.	--		
		Average:	--		Average:	--		Average:	--		
Right Rear Exit Window	N/A	1.	--	N/A	1.	--	N/A	1.	--	N/A	N/A
		2.	--		2.	--		2.	--		
		3.	--		3.	--		3.	--		
		Average:	--		Average:	--		Average:	--		
Rear Exit Door	178 N	1.	160.5	PASS	1.	79.0	PASS	1.	74.0	PASS	Rotary
		2.	136.0		2.	76.0		2.	72.0		
		3.	140.5		3.	74.0		3.	66.0		
		Average:	145.7		Average:	76.3		Average:	70.7		

Note: The "Actual Before" test results were obtained from the FMSSS 217 performed on this vehicle.
 The "Actual During" and "Actual After" test results were obtained during the FMVSS 220 testing.

DATA SHEET 5 (CONTINUED)
FORCE AND OPENING AREA TEST OF EMERGENCY EXITS (EXTERIOR)

Test Vehicle: 2003 American Transportation Corp IC35530 School Bus NHTSA No.: C30902
 Test Lab: MGA Research-Wisconsin Operations Test Date: 8/13/03

FORCE TESTS TO OPEN THE EMERGENCY EXITS

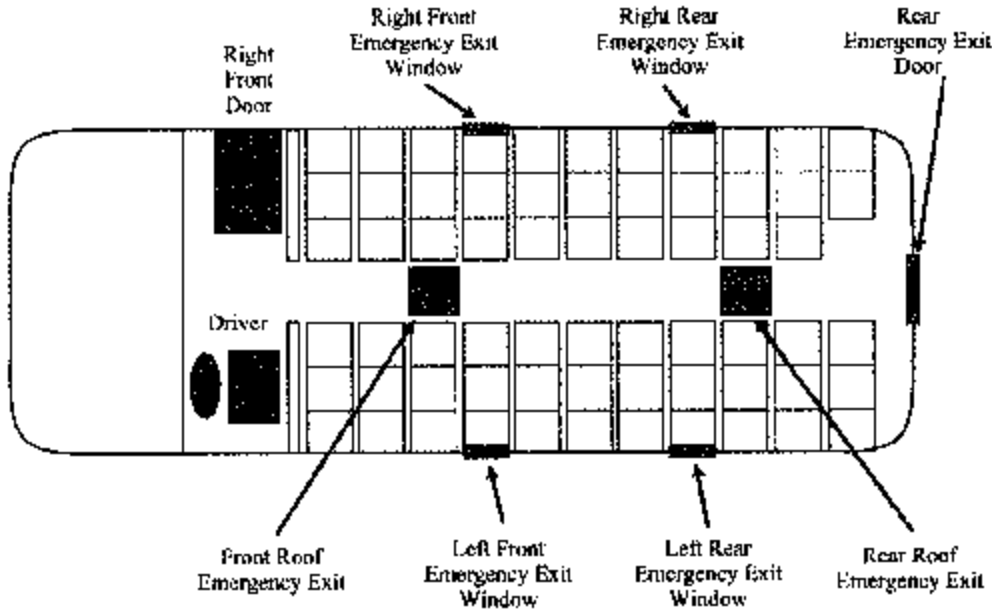
Exit Location	Maximum Force	Actual Before (N)				PASS/FAIL	Actual During (N)				PASS/FAIL	Actual After (N)				PASS/FAIL	Motion Required to Open Exit
		1.	2.	3.	Average: --		1.	2.	3.	Average: --		1.	2.	3.	Average: --		
Left Front Exit Window	N/A	1.	--			N/A	1.	--			N/A	1.	--			N/A	N/A
		2.	--				2.	--				2.	--				
		3.	--				3.	--				3.	--				
		Average: --					Average: --					Average: --					
Right Front Exit Window	N/A	1.	--			N/A	1.	--			N/A	1.	--			N/A	N/A
		2.	--				2.	--				2.	--				
		3.	--				3.	--				3.	--				
		Average: --					Average: --					Average: --					
Left Rear Exit Window	N/A	1.	--			N/A	1.	--			N/A	1.	--			N/A	N/A
		2.	--				2.	--				2.	--				
		3.	--				3.	--				3.	--				
		Average: --					Average: --					Average: --					
Right Rear Exit Window	N/A	1.	--			N/A	1.	--			N/A	1.	--			N/A	N/A
		2.	--				2.	--				2.	--				
		3.	--				3.	--				3.	--				
		Average: --					Average: --					Average: --					
Rear Exit Door	178 N	1.	26.5			PASS	1.	17.5			PASS	1.	21.0			PASS	Straight outward pull
		2.	28.5				2.	17.5				2.	24.0				
		3.	25.0				3.	16.0				3.	24.0				
		Average: 26.7					Average: 17.0					Average: 23.0					

Note: The "Actual Before" test results were obtained from the FMSSS 217 performed on this vehicle.
 The "Actual During" and "Actual After" test results were obtained during the FMVSS 220 testing.

**DATA SHEET 6
EMERGENCY EXIT MEASUREMENTS**

Test Vehicle: **2003 American Transportation Corp IC3S530 School Bus**
 Test Lab: **MGA Research-Wisconsin Operations**

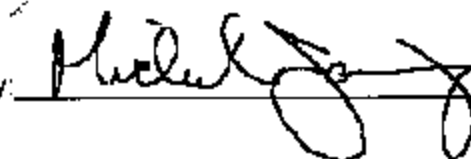
NHTSA No.: **C30902**
 Test Date: **8/13/03**



		Height (mm)	Width (mm)	Passage of Ellipsoid or Parallelepiped	PASS/FAIL
1	Left Front Exit Window	485	595	Ellipsoid	PASS
2	Left Rear Exit Window	485	595	Ellipsoid	PASS
3	Right Front Exit Window	485	595	Ellipsoid	PASS
4	Right Rear Exit Window	485	595	Ellipsoid	PASS
5	Rear Exit Door	1313	920	114 x 61 x 30 Parallelepiped	PASS
6	Roof Exit - Front	513	565	N/A	N/A
7	Roof Exit - Rear	513	565	N/A	N/A

COMMENTS: NONE

Recorded By: 

Approved By: 

Date: October 23, 2003

**SECTION 4
INSTRUMENTATION AND EQUIPMENT LIST**

Test Vehicle: **2003 American Transportation Corp IC3S530 School Bus**
 Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C30902**
 Test Date: **8/13/03**

Equipment	Description	Model/Serial No.	Cal. Date	Next Cal. Date
Computer	HP	Vectra / US03283612	--	--
Steel Tape	Stanley	Powerlock / 148	5/30/03	11/30/03
Scale	GSE	PRO-WEIGH 84 212091/212082	6/9/03	12/9/03
Cylinder #1 Load Cell	Interface	137782	5/1/03	11/1/03
Cylinder #1 Displacement Pot.	Patriot	20850	7/21/03	1/21/04
Cylinder #2 Load Cell	Interface	137781	5/1/03	11/1/03
Cylinder #2 Displacement Pot.	Interface	1202-19388	7/21/03	1/21/04
Cylinder #3 Load Cell	Interface	137778	5/1/03	11/1/03
Cylinder #3 Displacement Pot.	Interface	1102-19181	7/21/03	1/21/04
Cylinder #4 Load Cell	Interface	137783	5/1/03	11/1/03
Cylinder #4 Displacement Pot.	Interface	1202-19364	7/21/03	1/21/04
Ellipsoid	MGA	ELLIP - 1A	12/4/02	12/4/03
Parallelepiped	MGA	PARA - 1A	12/4/02	12/4/03
Force Gauge	CHATILLON	DFGS-R-ND/ F31754	6/17/03	12/17/03
Temperature Recorder	DICKSON	TR320 S/N: 03039010	2/2003	2/2004

**SECTION 5
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Test Vehicle: 2003 ATC IC3S630 School Bus
Procedure: FMVSS 230

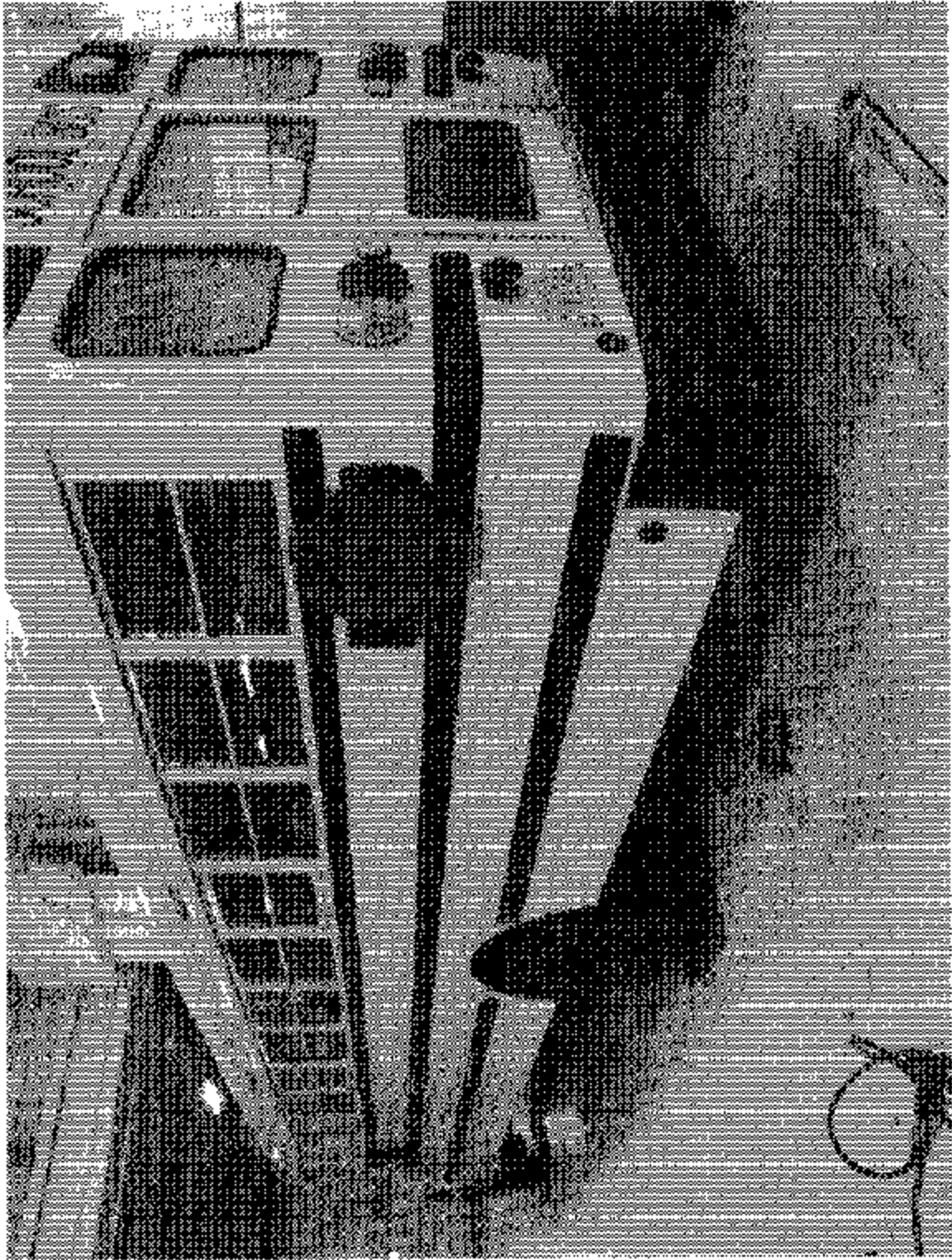
NHTSA No.: C30902



School Bus Front Axle Being Weighed

Test Vehicle: 2003 ATC IC3S530 School Bus
Procedure: FMVSS 220

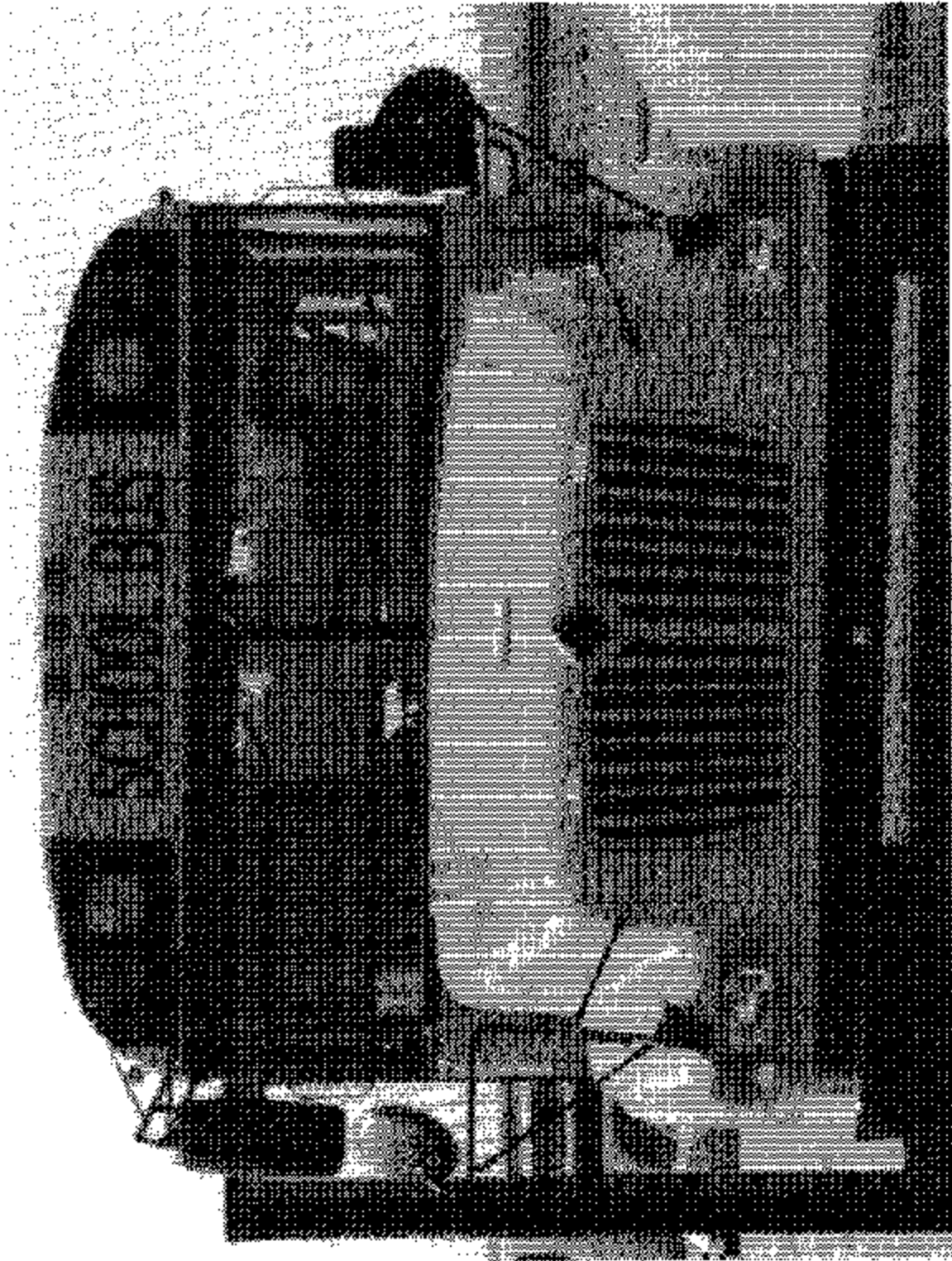
NHTSA No.: C30902



School Bus Rear Axle Being Weighed

Test Vehicle: 2003 ATC IC39530 School Bus
Procedure: FMVSS 220

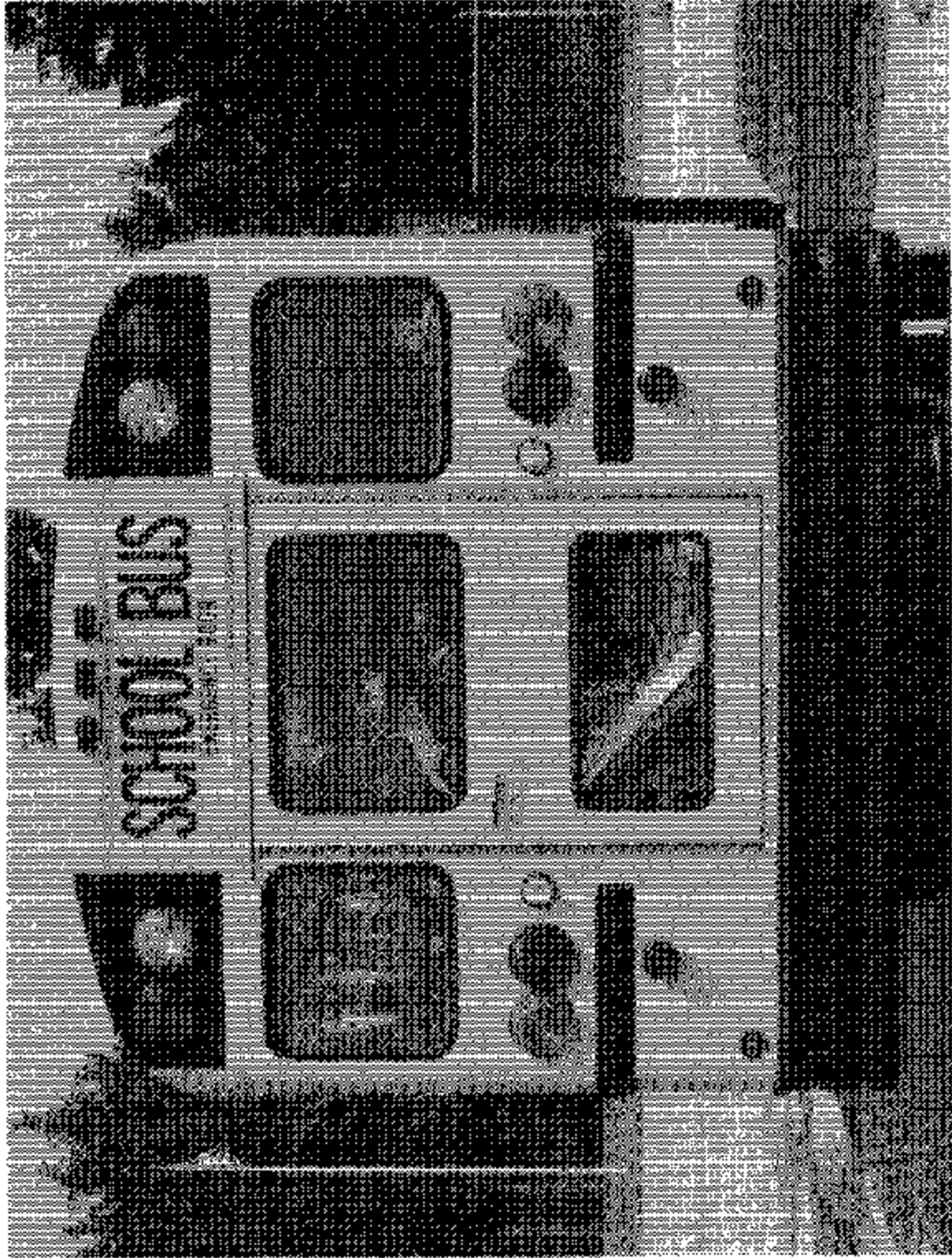
NHTSA No.: C30902



Frontal View of School Bus After Testing

Test Vehicle: 2003 ATC IC35630 School Bus
Procedure: FMVSS 220

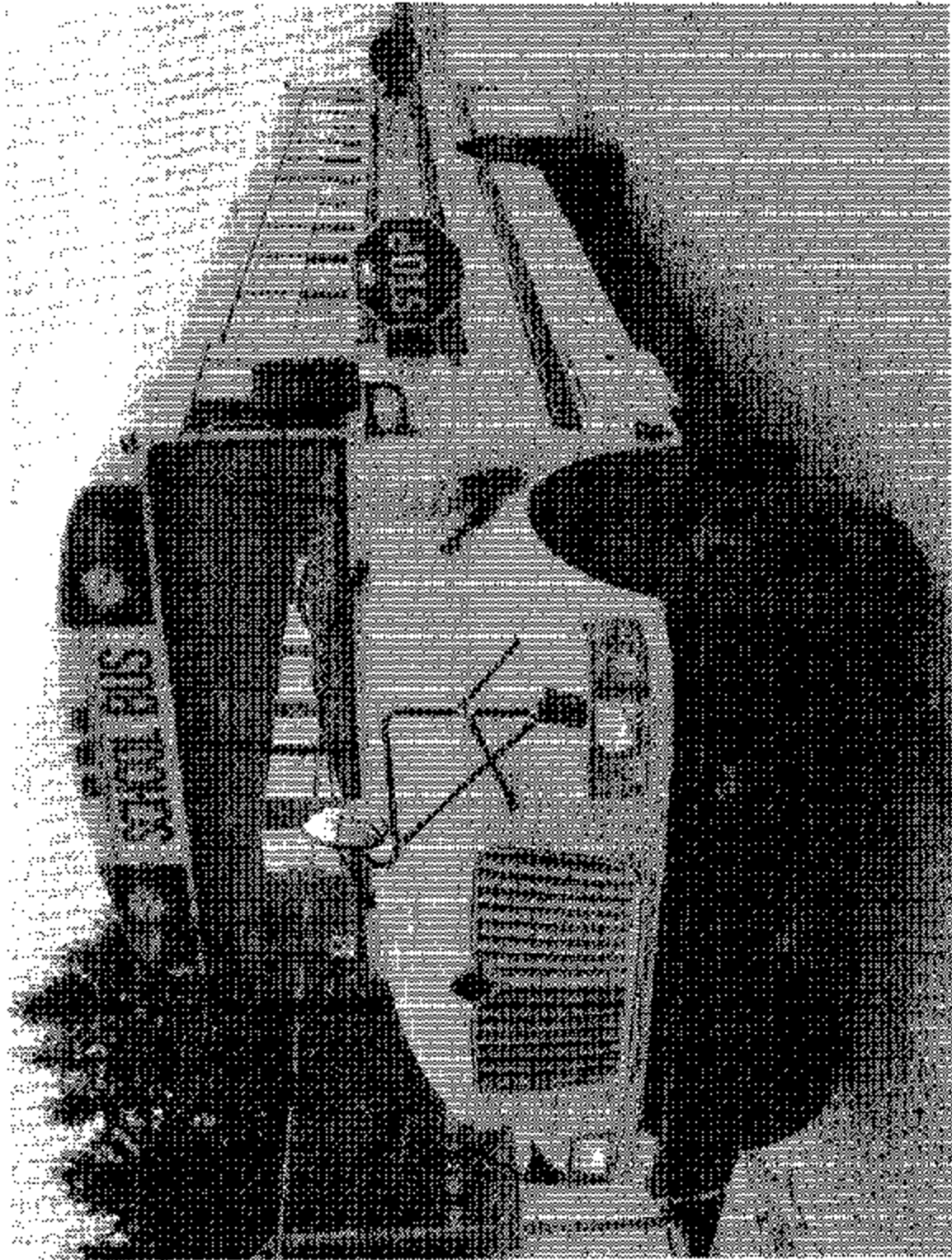
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Rear View of School Bus After Testing

Test Vehicle: 2000 ATC IC3S530 School Bus
Procedure: FMVSS 220

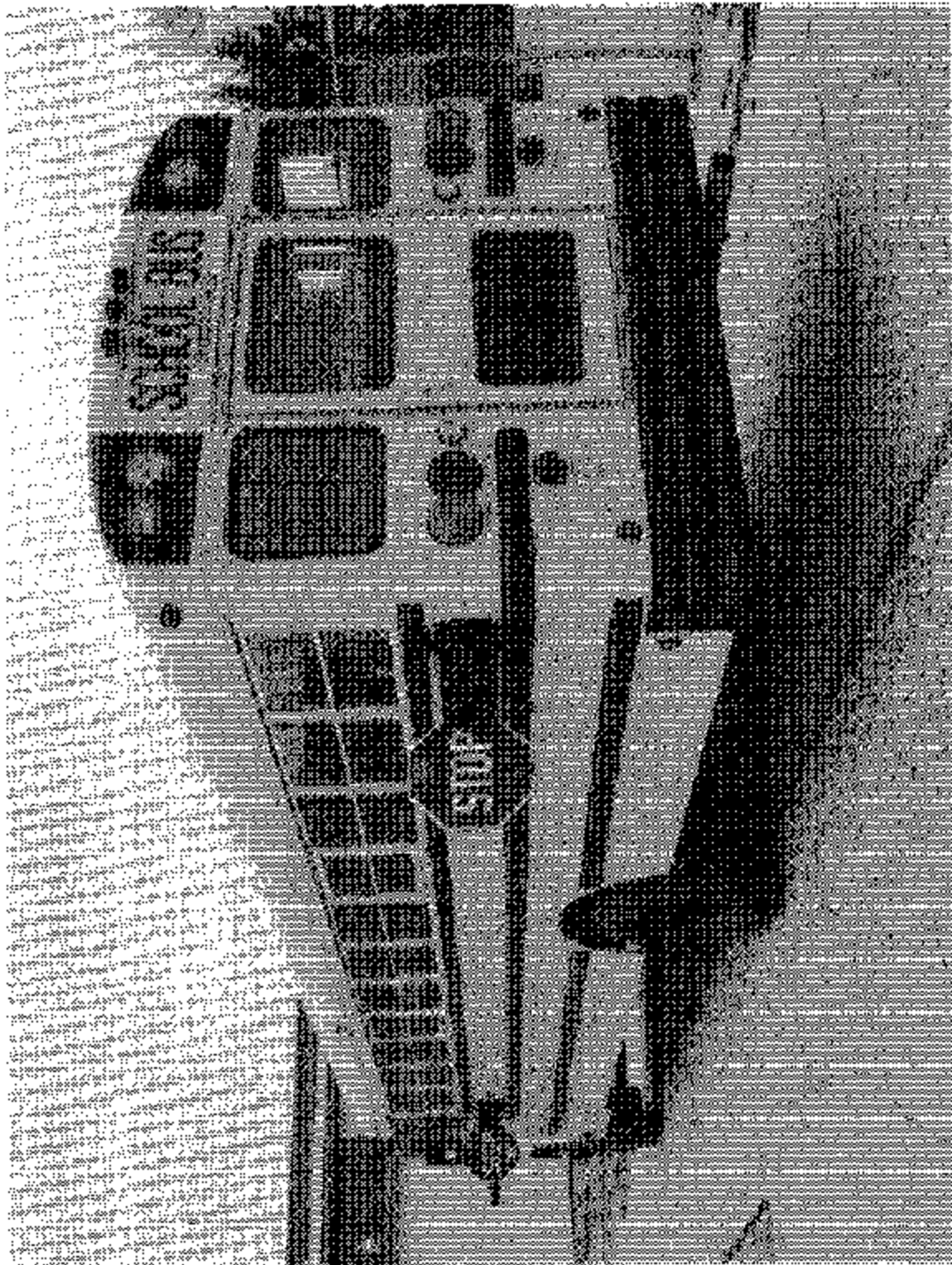
NH SA No.: C30502



¼ Left Front of School Bus Before Testing

Test Vehicle: 2003 ATC IC3S530 School Bus
Procedure: FMVSS 220

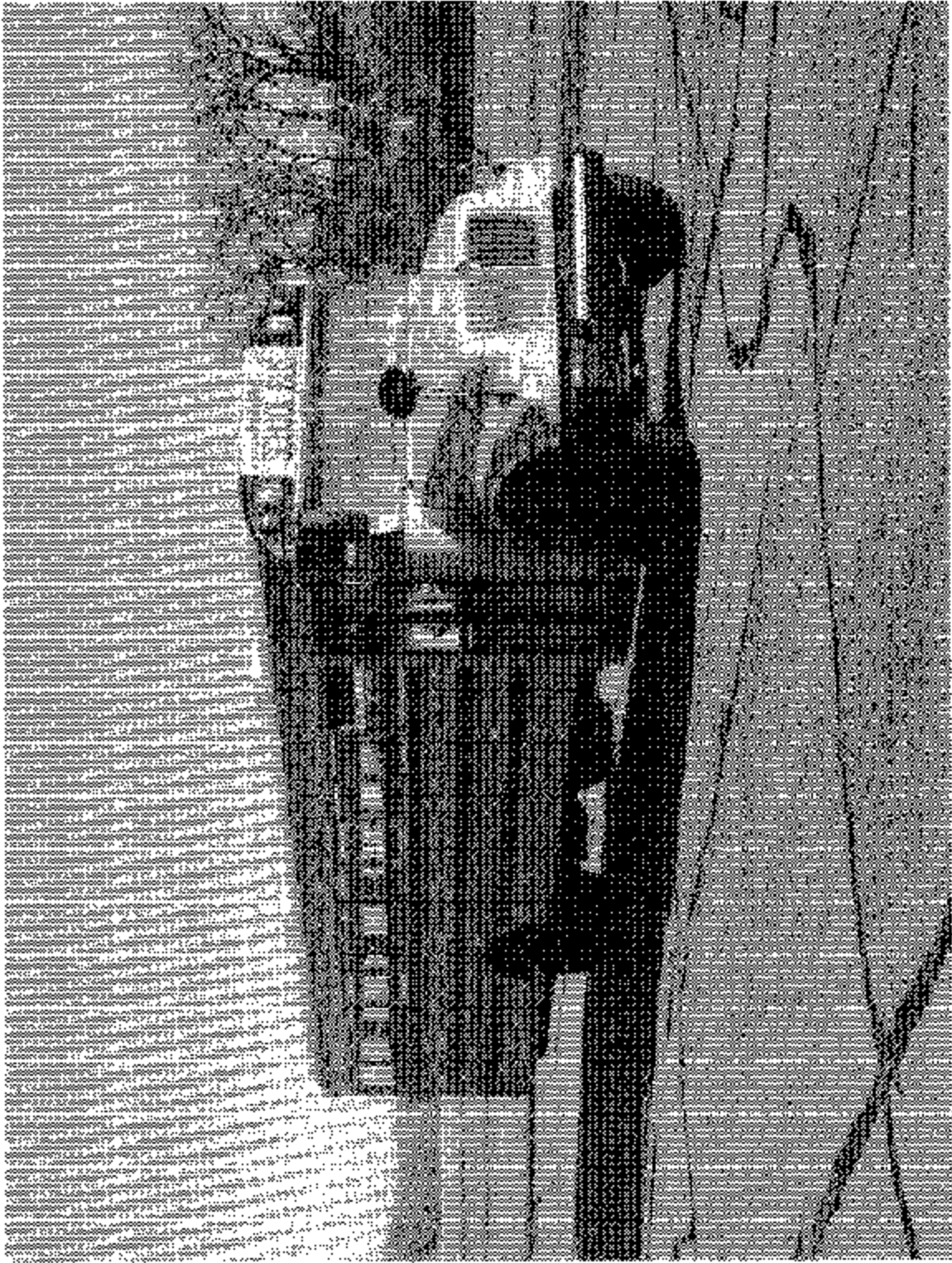
NHTSA No.: C30802



¾ Left Rear of School Bus Before Testing

Test Vehicle: 2003 ATC IC3S530 School Bus
Procedure: FMVSS 220

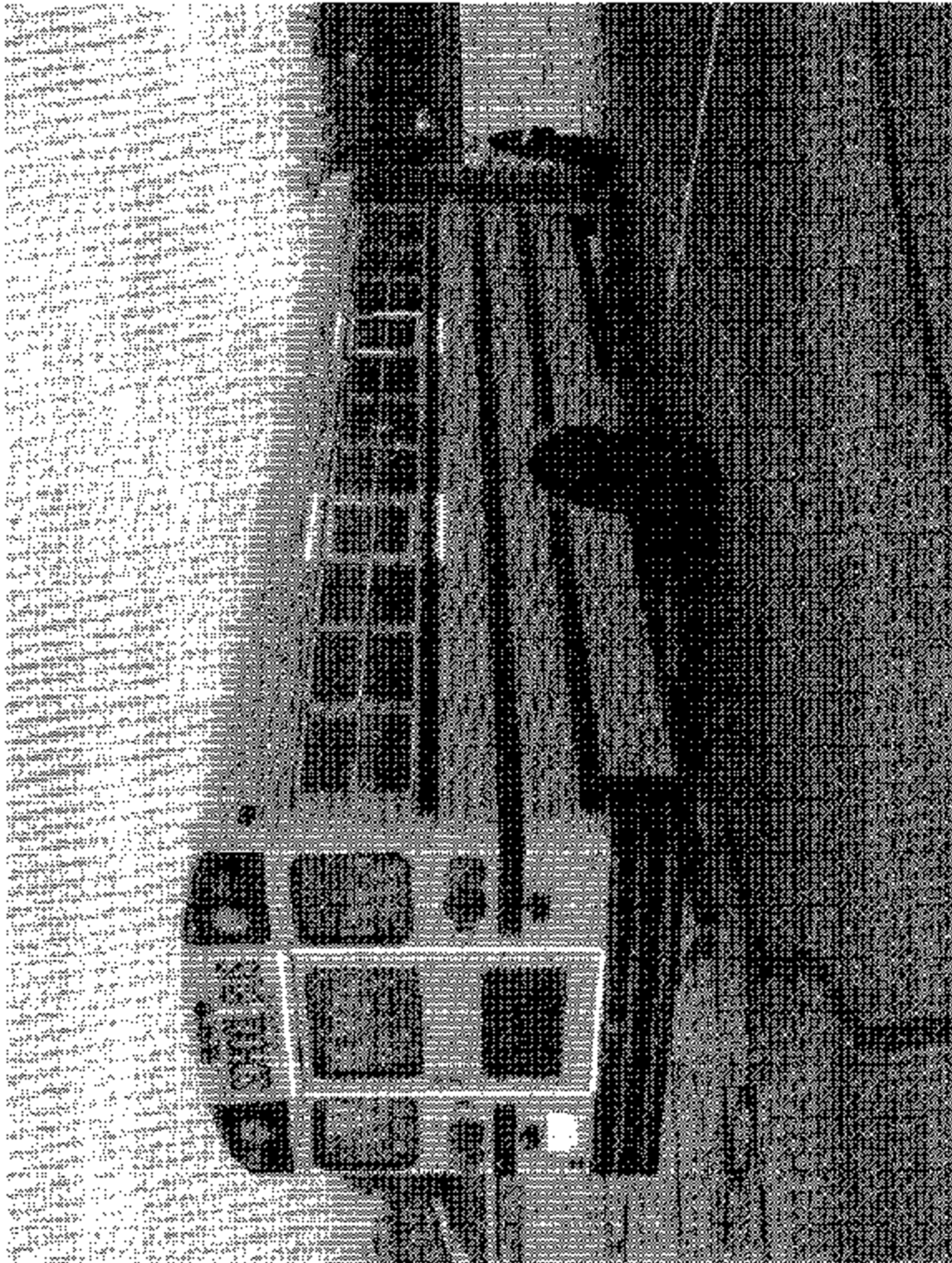
NHTSA No.: C30902



¾ Right Front of School Bus Before Testing

Test Vehicle: 2003 ATC IC38530 School Bus
Procedure: FMVSS 220

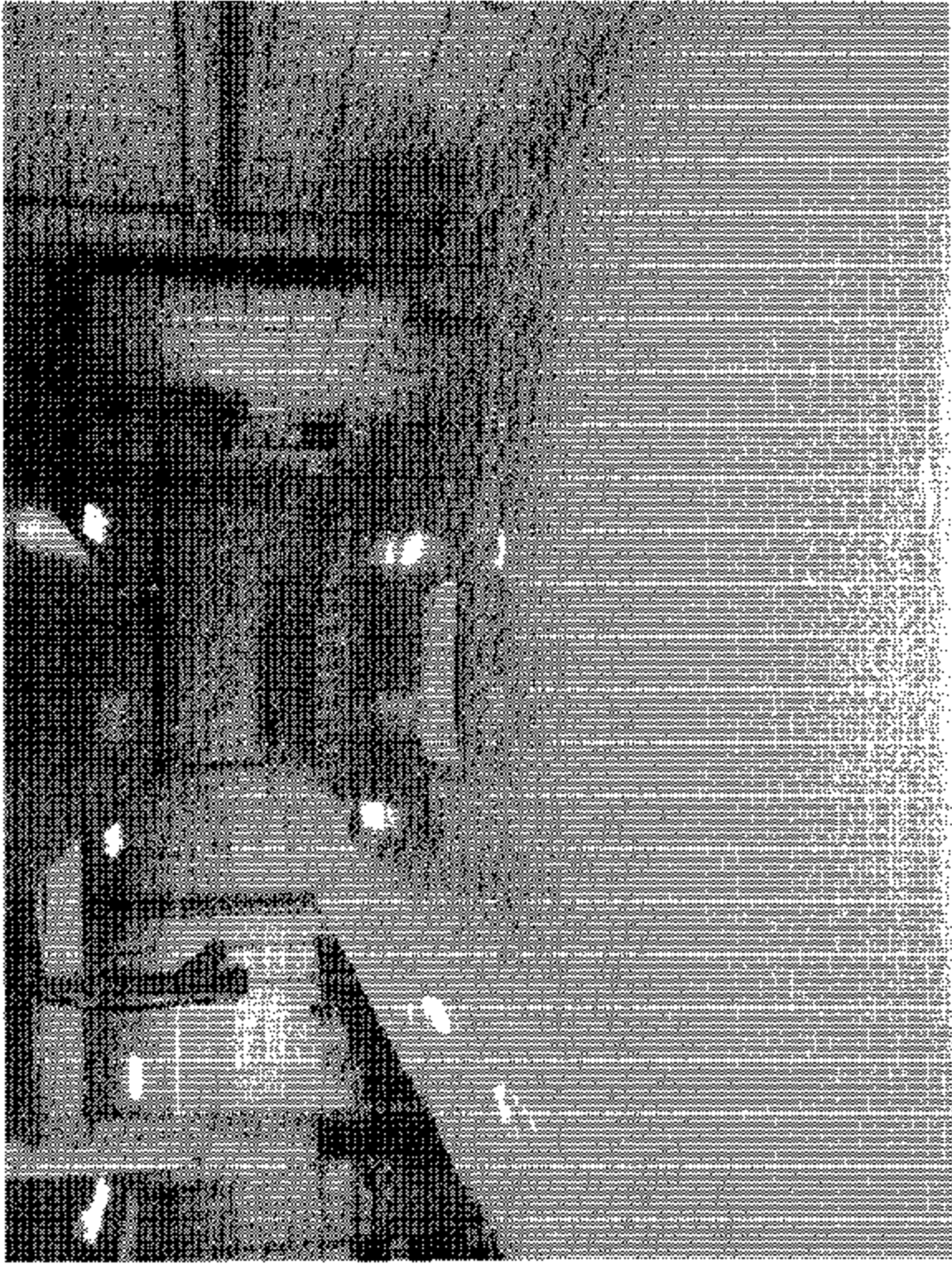
NHTSA No.: C40902



3/4 Right Rear of School Bus Before Testing

Test Vehicle: 2003 ATC IC3S530 School Bus
Procedure: FMVSS 230

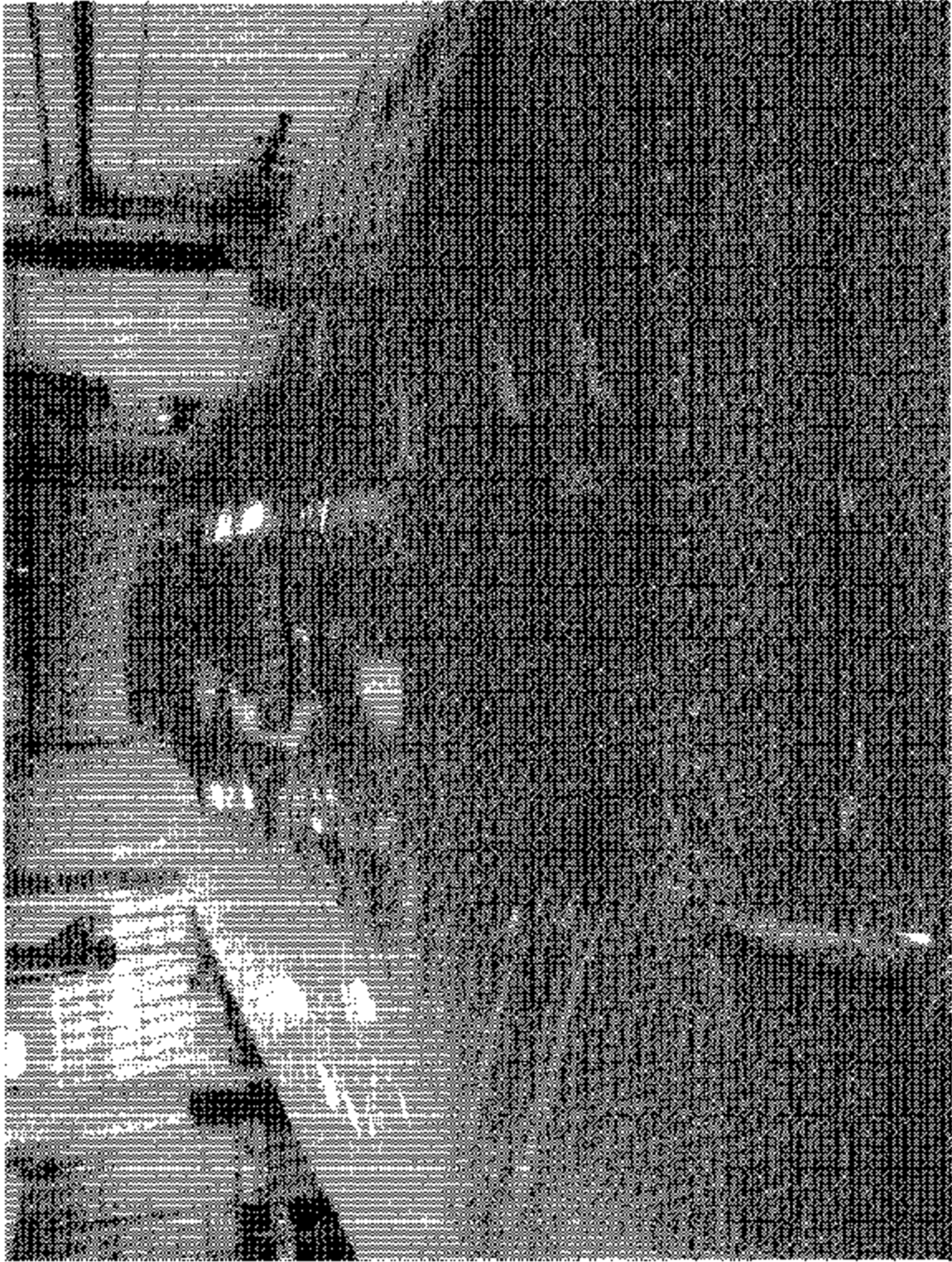
NHTSA No.: C30902



View of Bus Roof From Front Before Testing

Test Vehicle: 2003 A TC IC35530 School Bus
Procedure: FMVSS 220

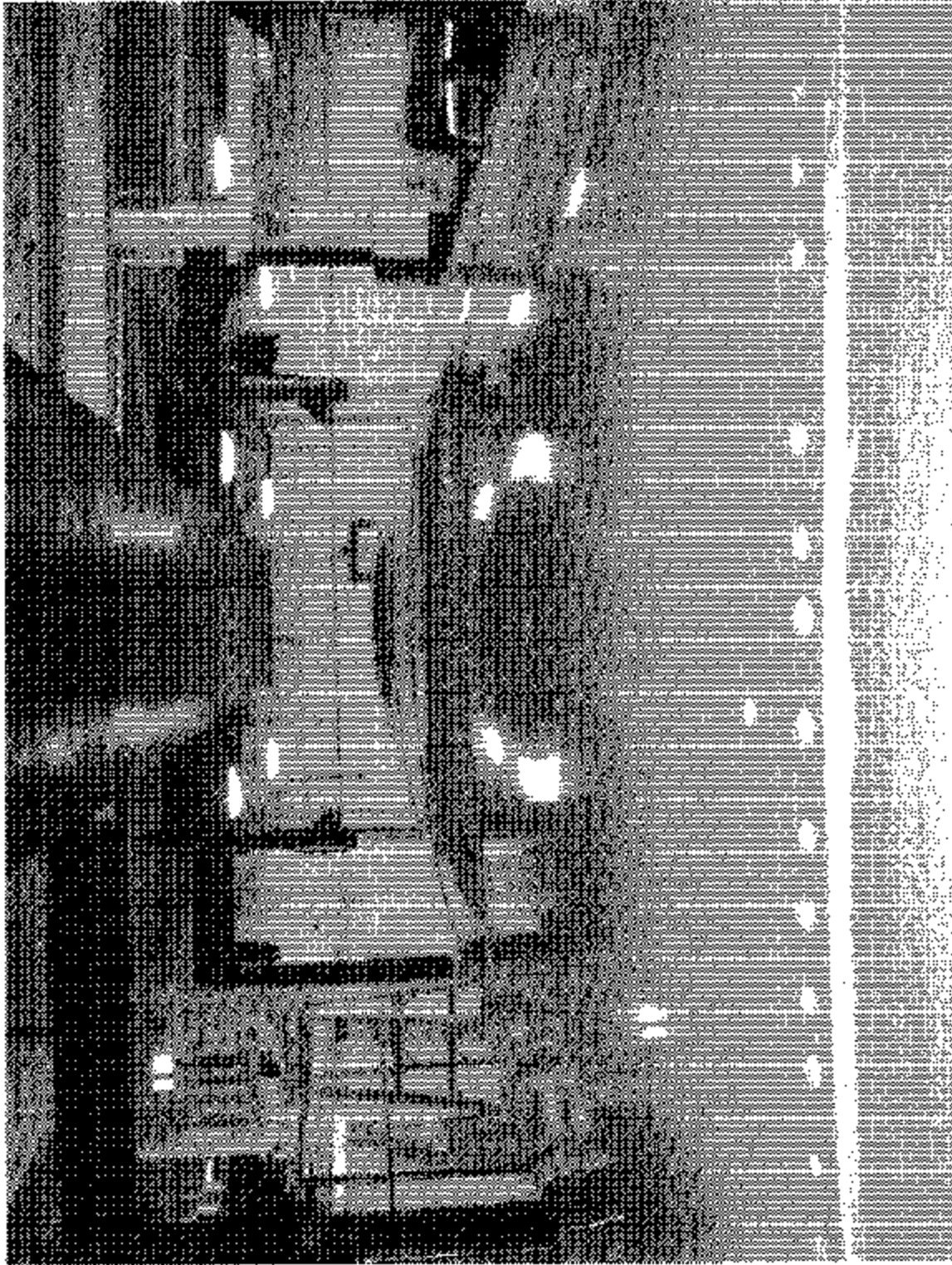
NHTSA No.: C39902



View of Bus Roof From Front After Testing

Test Vehicle: 2003 ATC IC38530 School Bus
Procedure: FMVSS 220

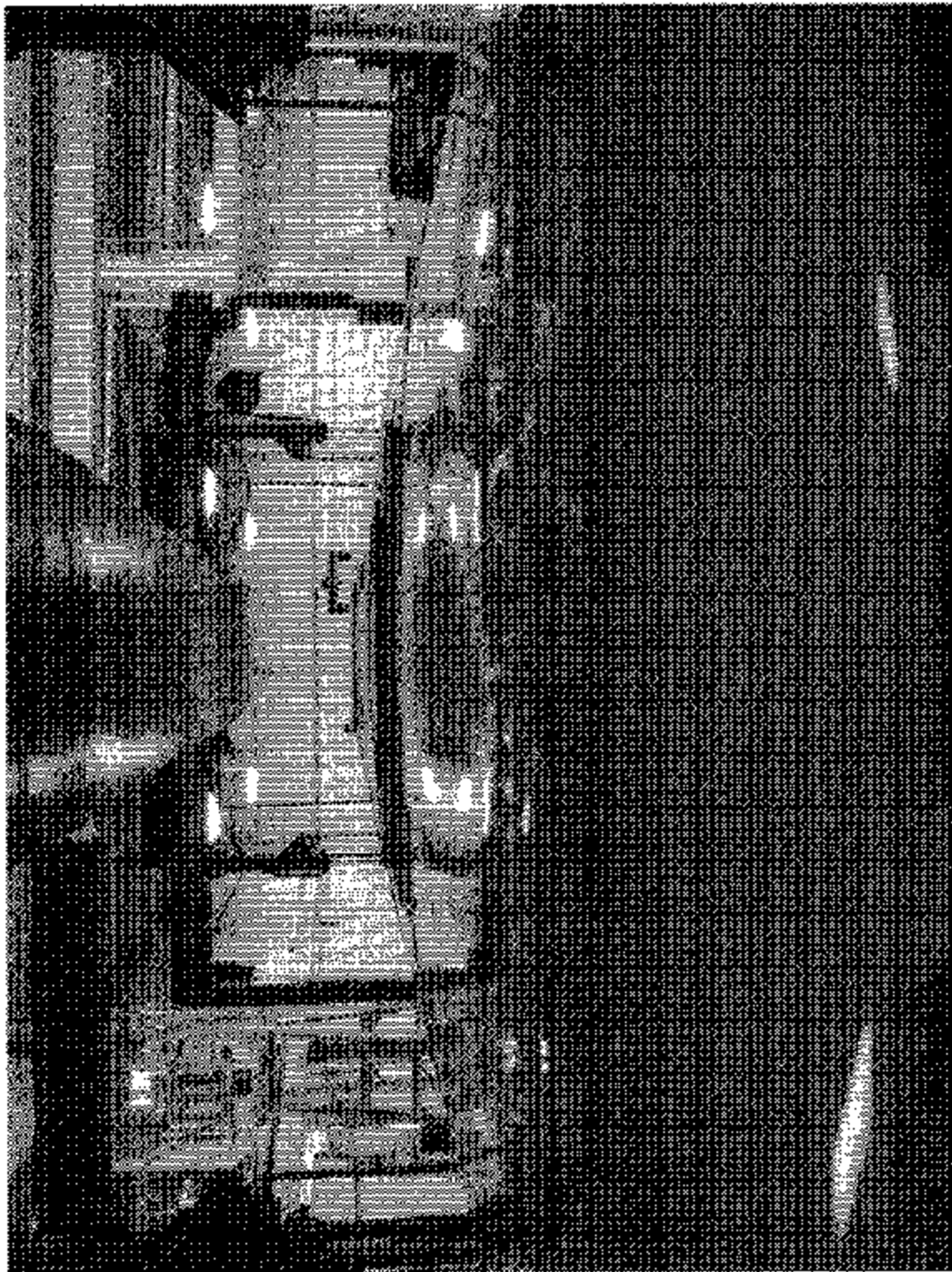
NHTSA No.: C30602



View of Bus Roof From Rear Before Testing

Test Vehicle: 2003 ATC IC35530 School Bus
Procedure: FMVSS 220

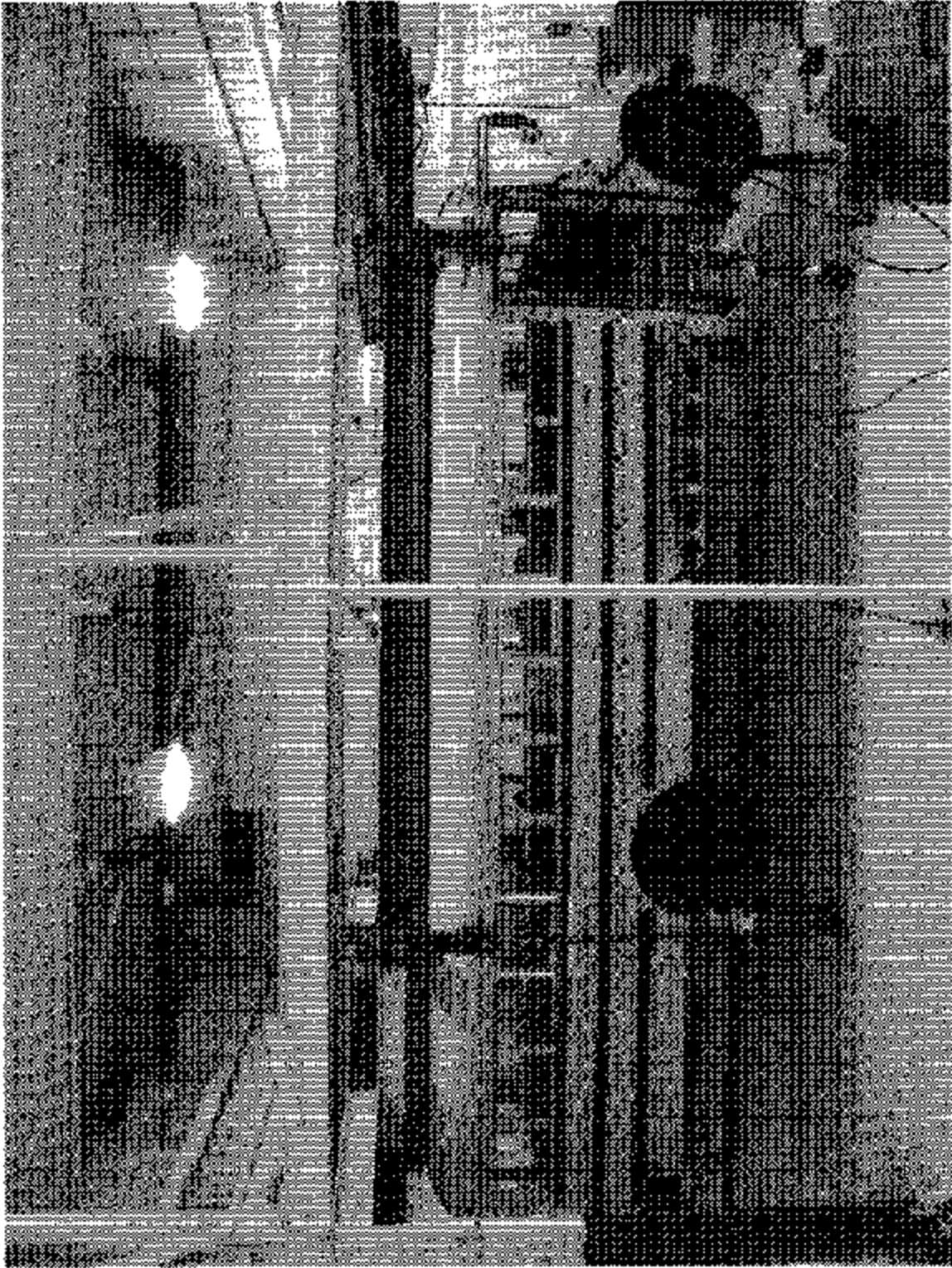
NHTSA No.: C39902



View of Bus Roof From Rear After Testing

Test Vehicle: 2003 ATC IC38530 School Bus
Procedure: FMVSS 220

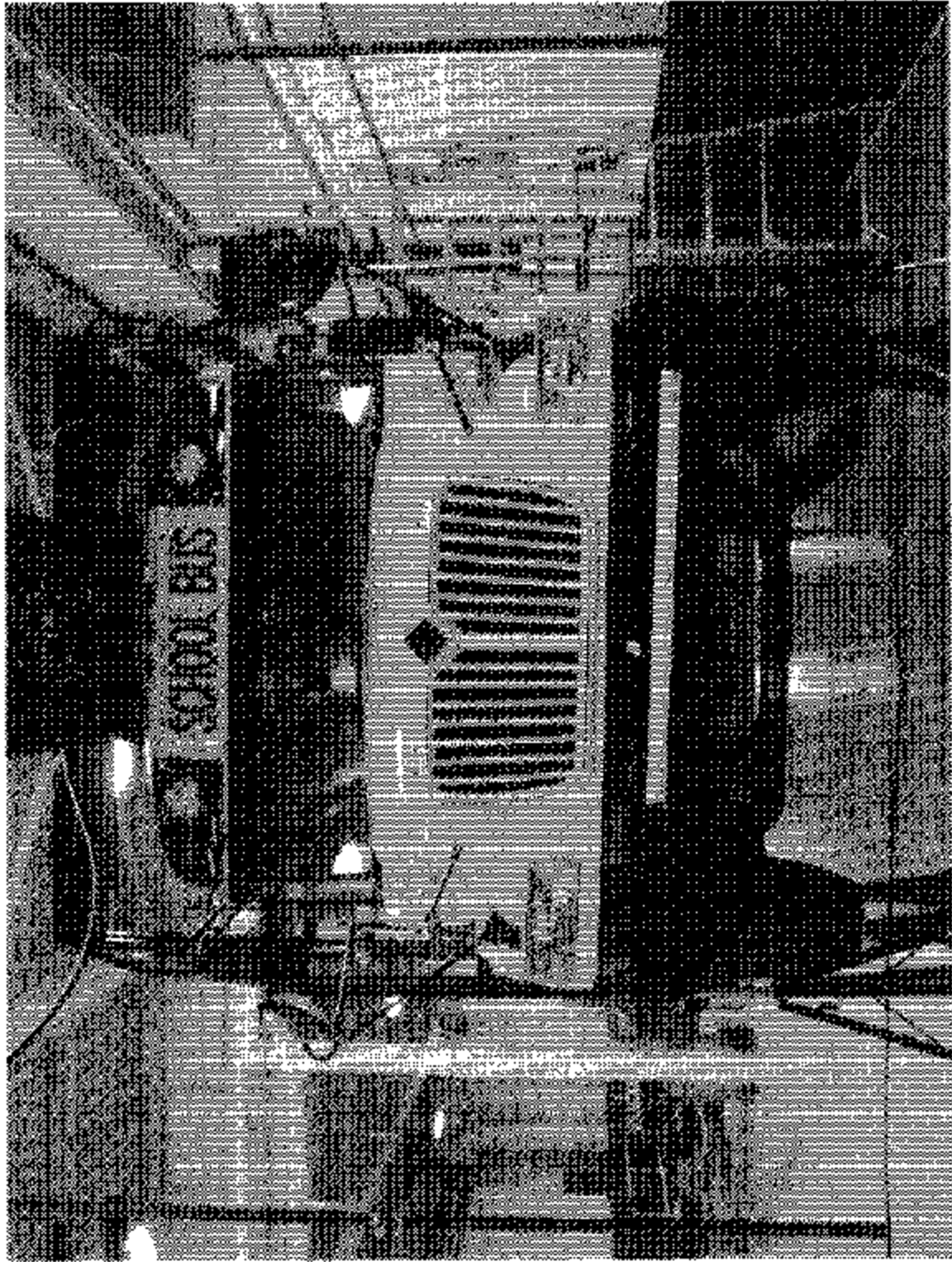
NHTSA No.: C30902



Loading Device Placed Against Bus Roof At Start of Test

Test Vehicle: 2003 ATC IC3S530 School Bus
Procedure: FMVSS 220

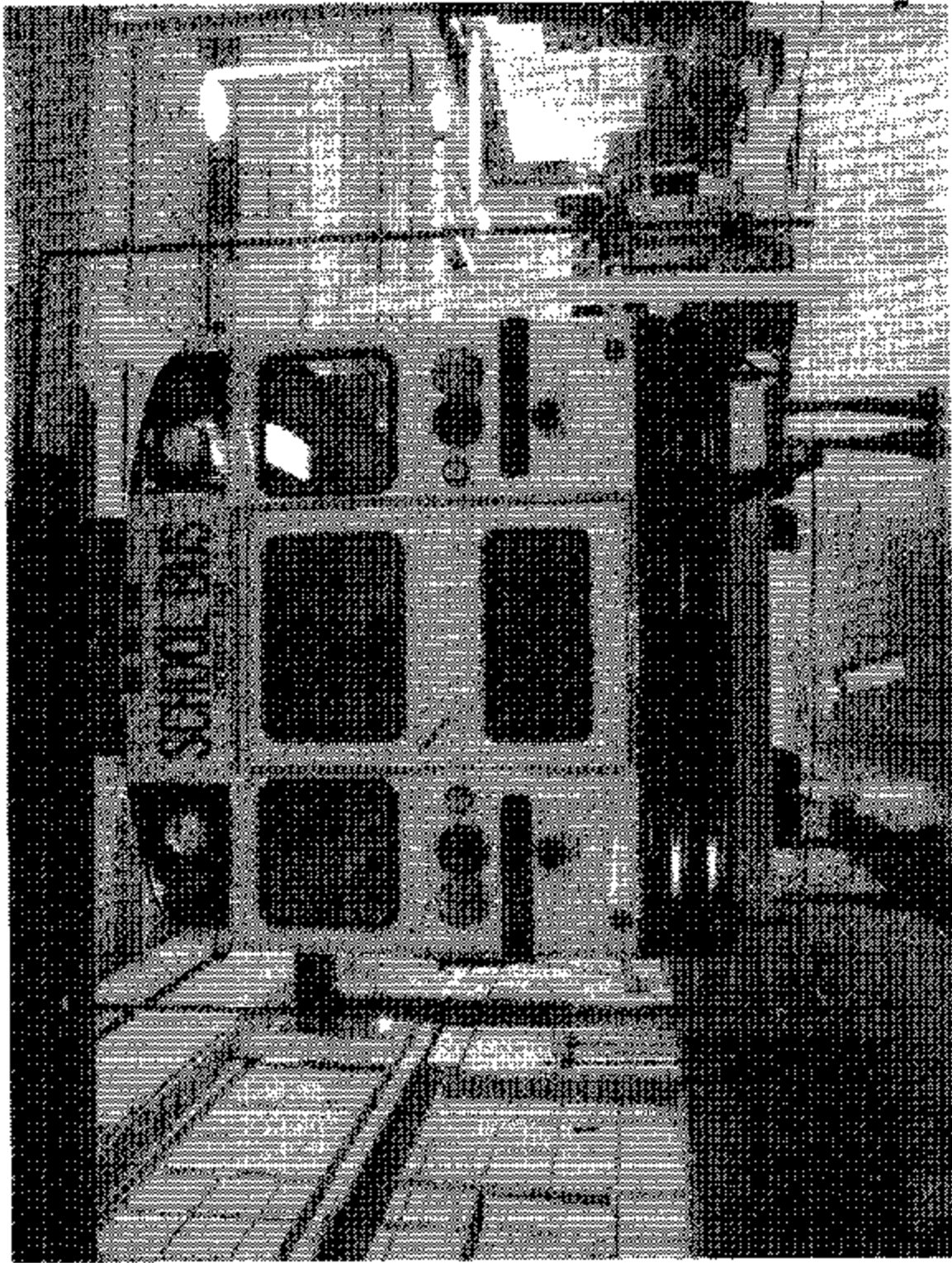
NHTSA No.: C30902



Loading Device Placed Against Bus Roof at Maximum Load (Front View)

Test Vehicle: 2003 ATC IC3S530 School Bus
Procedure: FMVSS 220

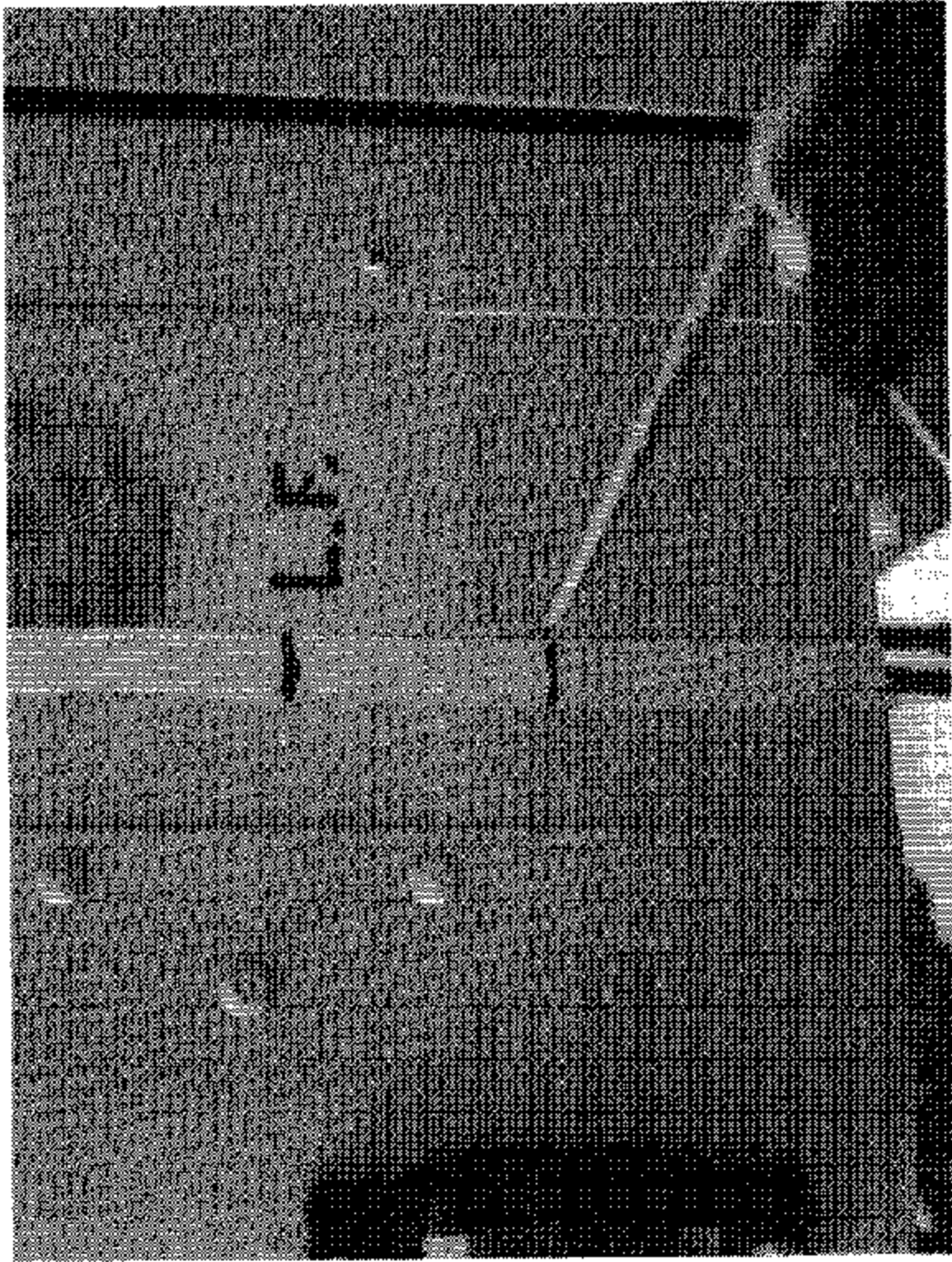
NHTSA No.: C30902



Loading Device Placed Against Bus Roof at Maximum Load (Rear View)

Test Vehicle: 2003 ATC IC35530 School Bus
Procedure: FMVSS 220

NHTSA No.: C30902



Back-up Roof Deflection Measuring Device at LF Corner of Bus at Full Load

Test Vehicle: 2003 ATC IC3S530 School Bus
Procedure: FMVSS 220

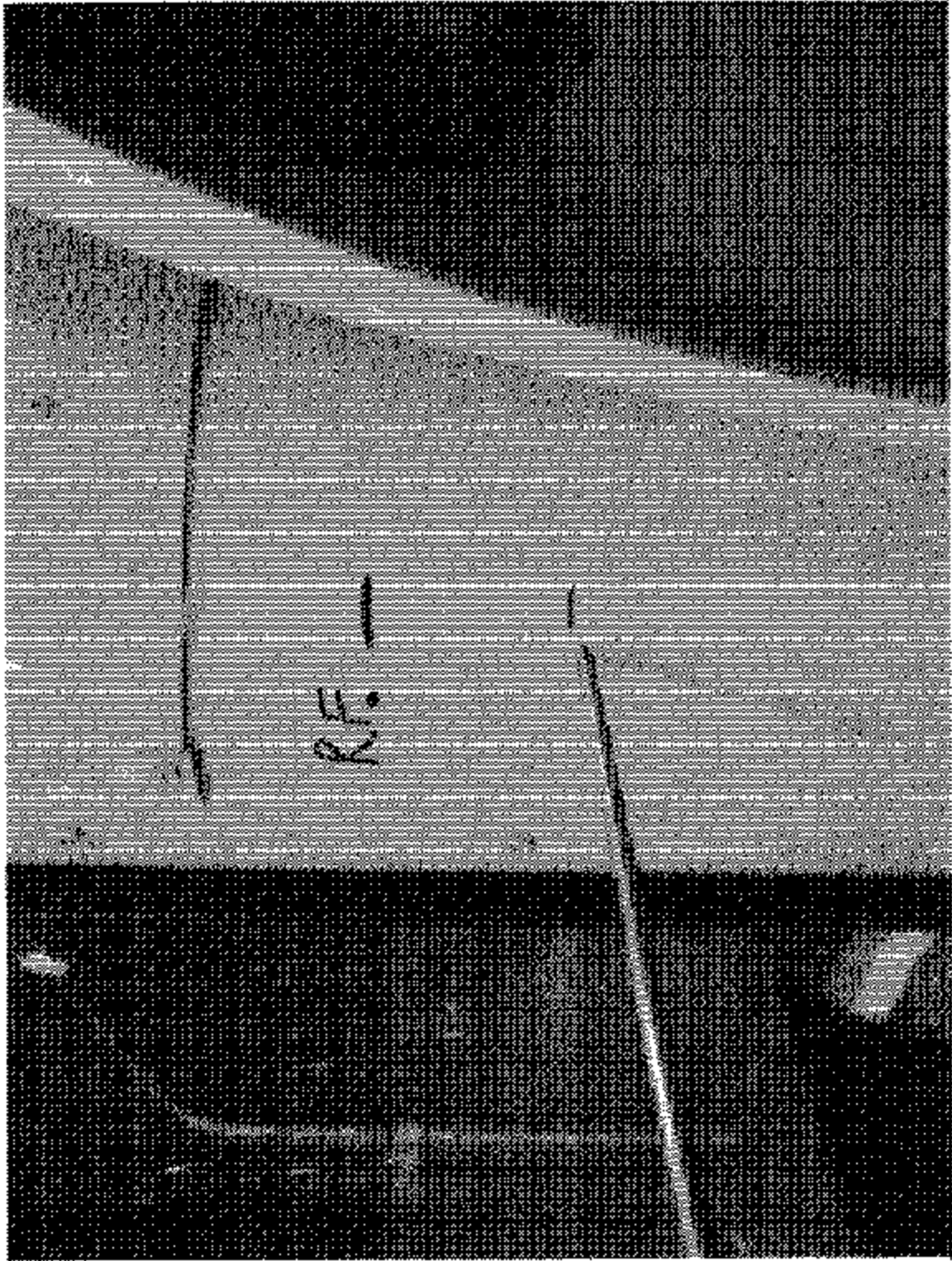
NHTSA No.: C30902



Back-up Roof Deflection Measuring Device at L.R. Corner of Bus at Full Load

Test Vehicle: 2003 ATC IC3S530 School Bus
Procedure: FMVSS 220

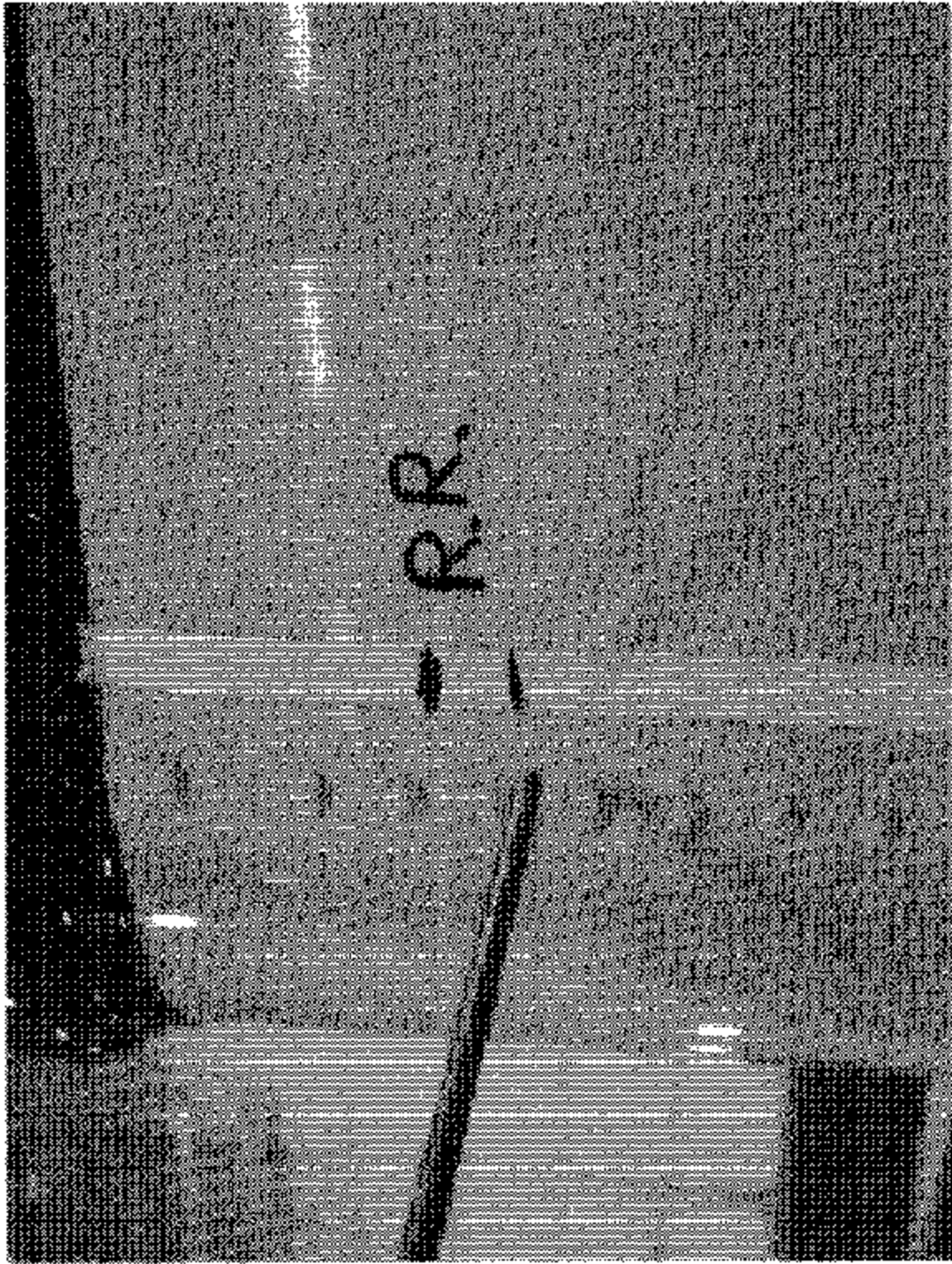
NHTSA No.: C39902



Back-up Roof Deflection Measuring Device at RF Corner of Bus at Full Load

Test Vehicle: 2003 A/C IC38530 School Bus
Procedure: FMVSS 220

NHTSA No.: C30902



Back-up Roof Deflection Measuring Device at RR Corner of Bus at Full Load

Test Vehicle: 2003 ATC IC35S530 School Bus
Procedure: FMVSS 220

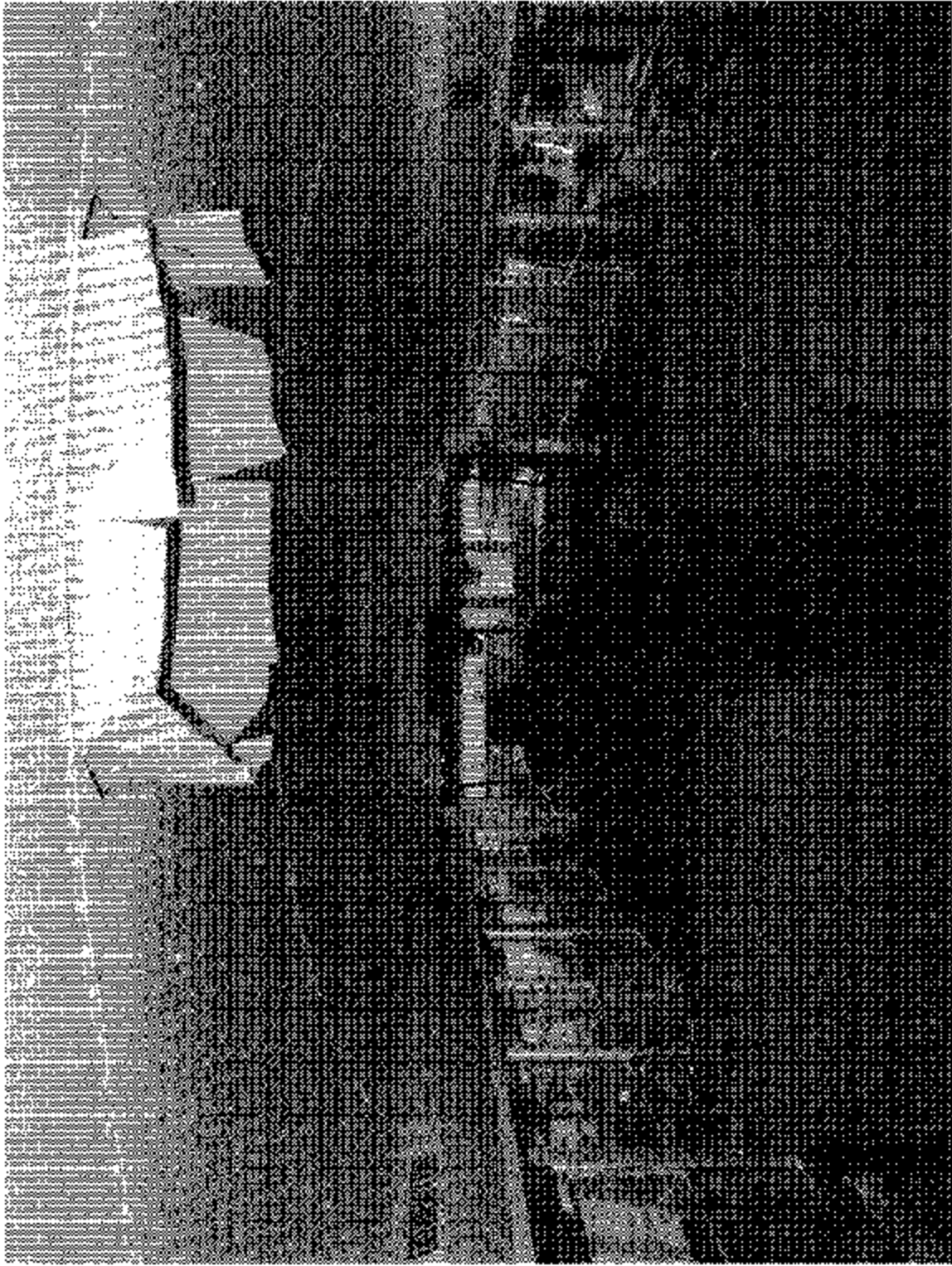
NHTSA No.: C30902



Photo of Actual Instrumentation Setup

Test Vehicle: 2003 ATC IC35530 School Bus
Procedure: FMVSS 220

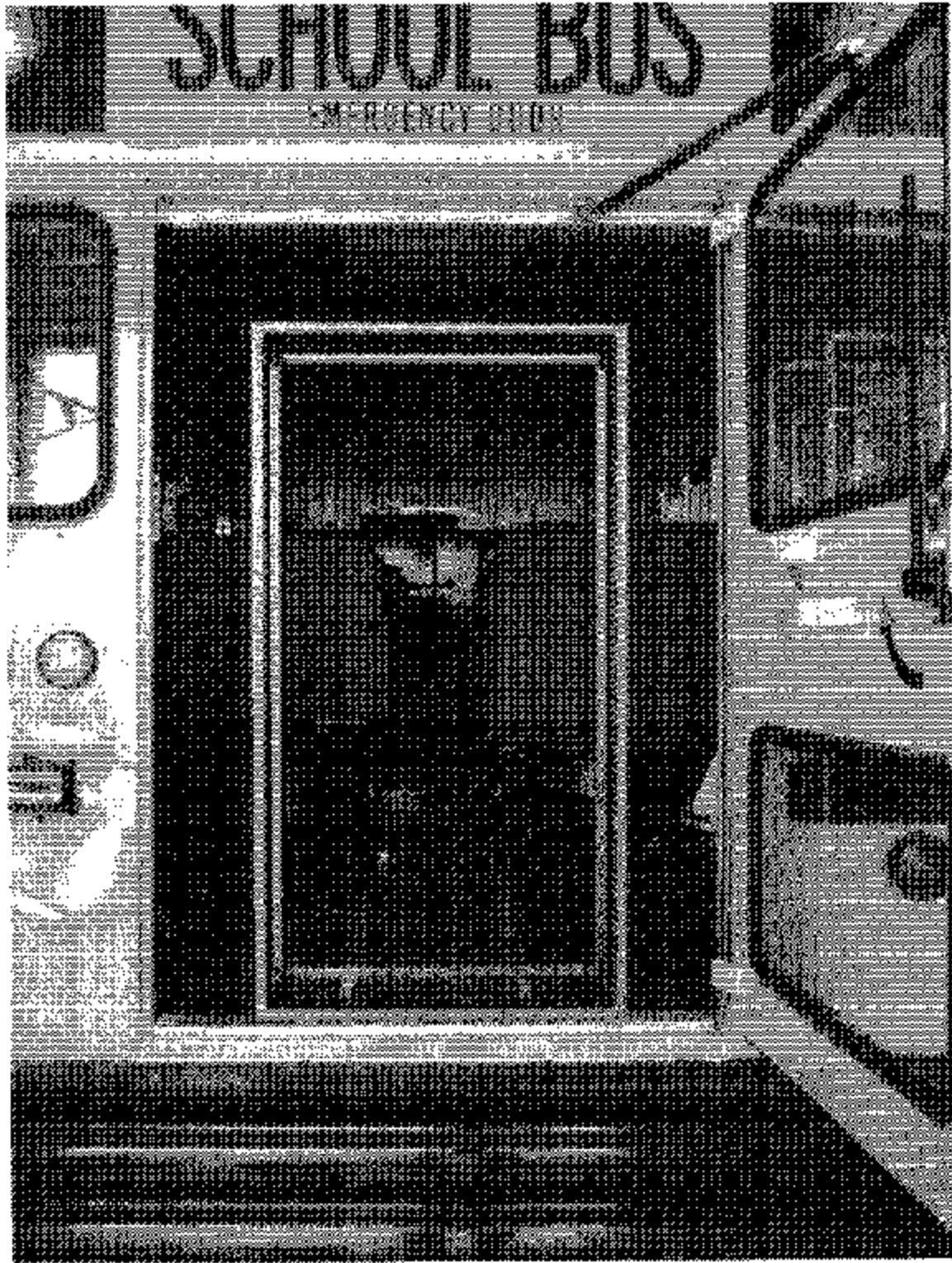
NHTSA No.: C30902



Roof, After Removal of Loading Device, Viewed From Bus Interior

Test Vehicle: 2003 ATC IC35S530 School Bus
Procedure: FMVSS 220

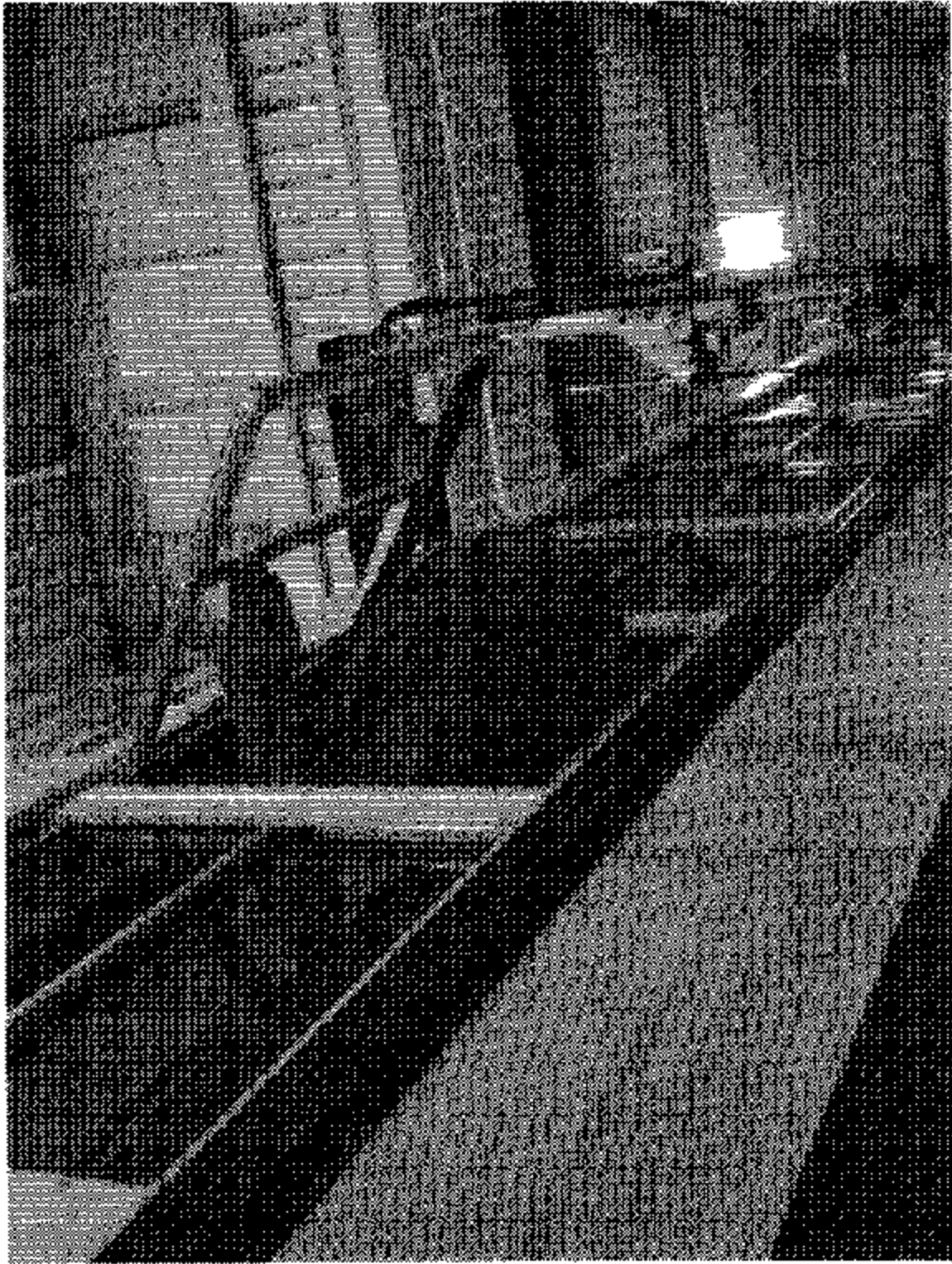
NHTSA No.: C36902



Exit Opened After Roof Loading is Attained with Parallelepiped in Place

Test Vehicle: 2009 ATC IC39S530 School Bus
Procedure: FMVSS 220

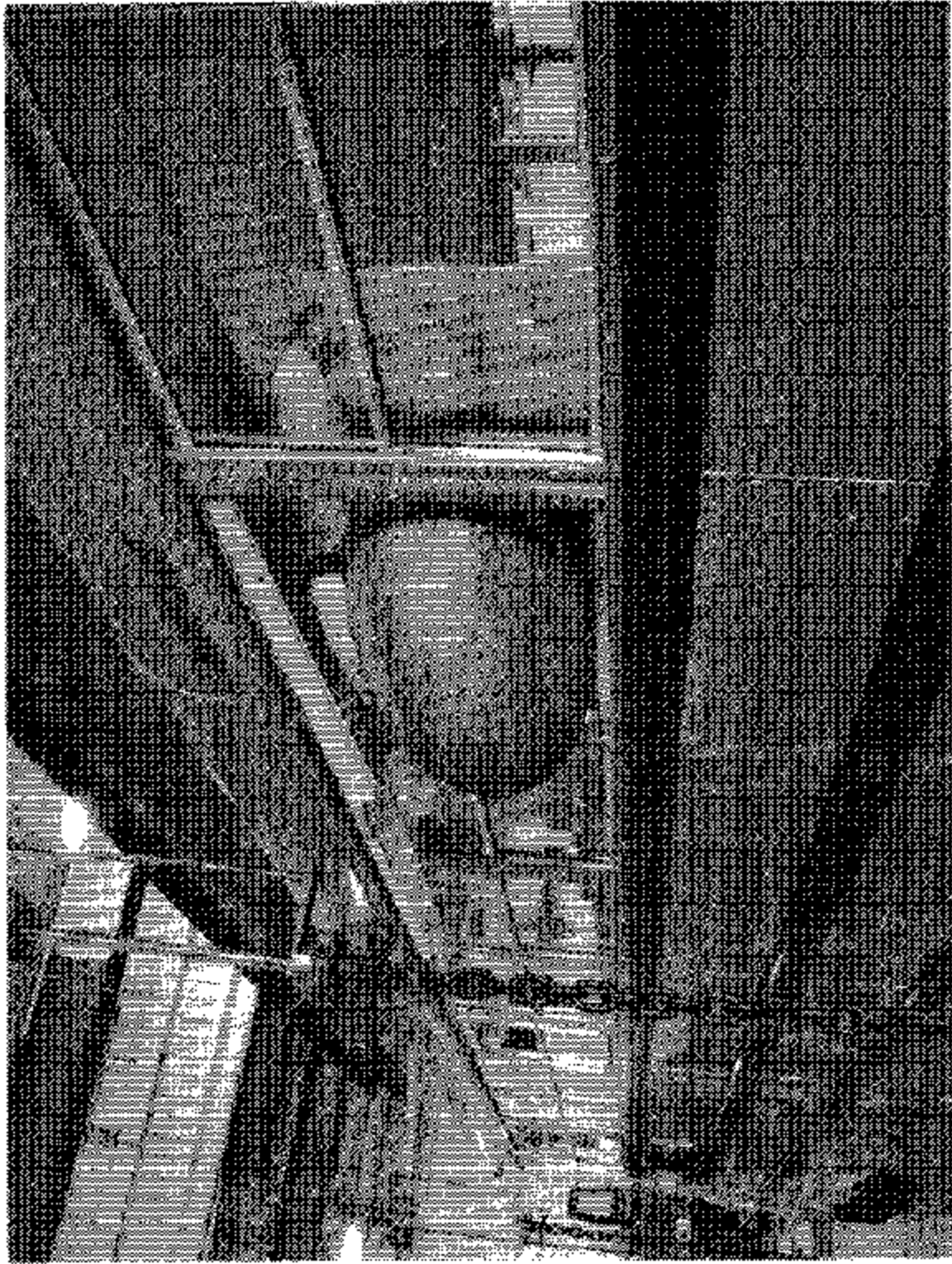
NHTSA No.: C30902



LF Exit Opened After Roof Loading is Attained with Measuring Device in Place

Test Vehicle: 2003 ATC IC3S530 School Bus
Procedure: FMVSS 220

NHTSA No.: C30902



LR Exit Opened After Roof Loading is Attained with Measuring Device in Place

Test Vehicle: 2003 ATC IC3S530 School Bus
Procedure: FMVSS 220

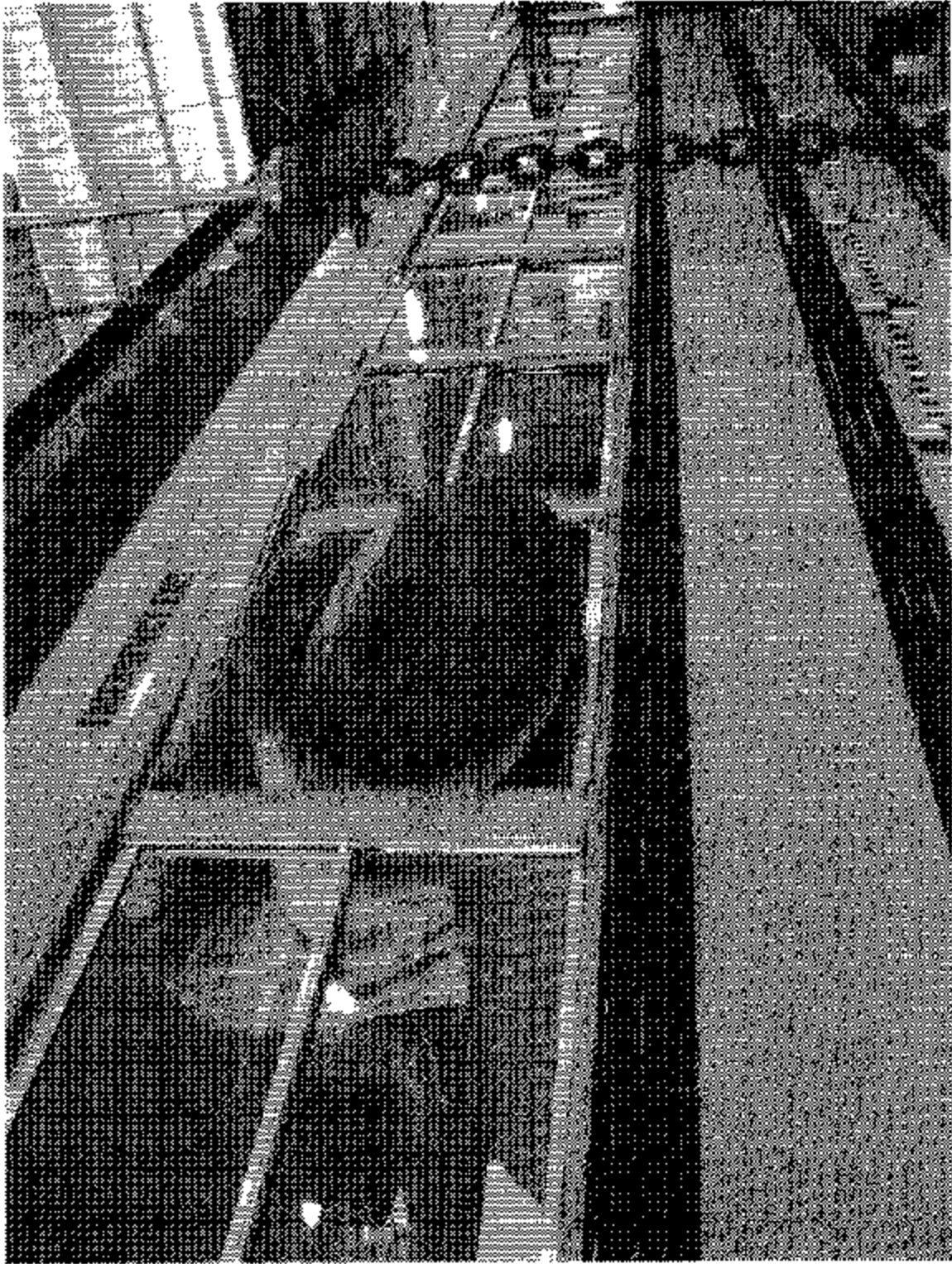
NHTSA No.: C30902



RF Exit Opened After Roof Loading is Attained with Measuring Device in Place

Test Vehicle: 2003 ATC IC39530 School Bus
Procedure: FMVSS 220

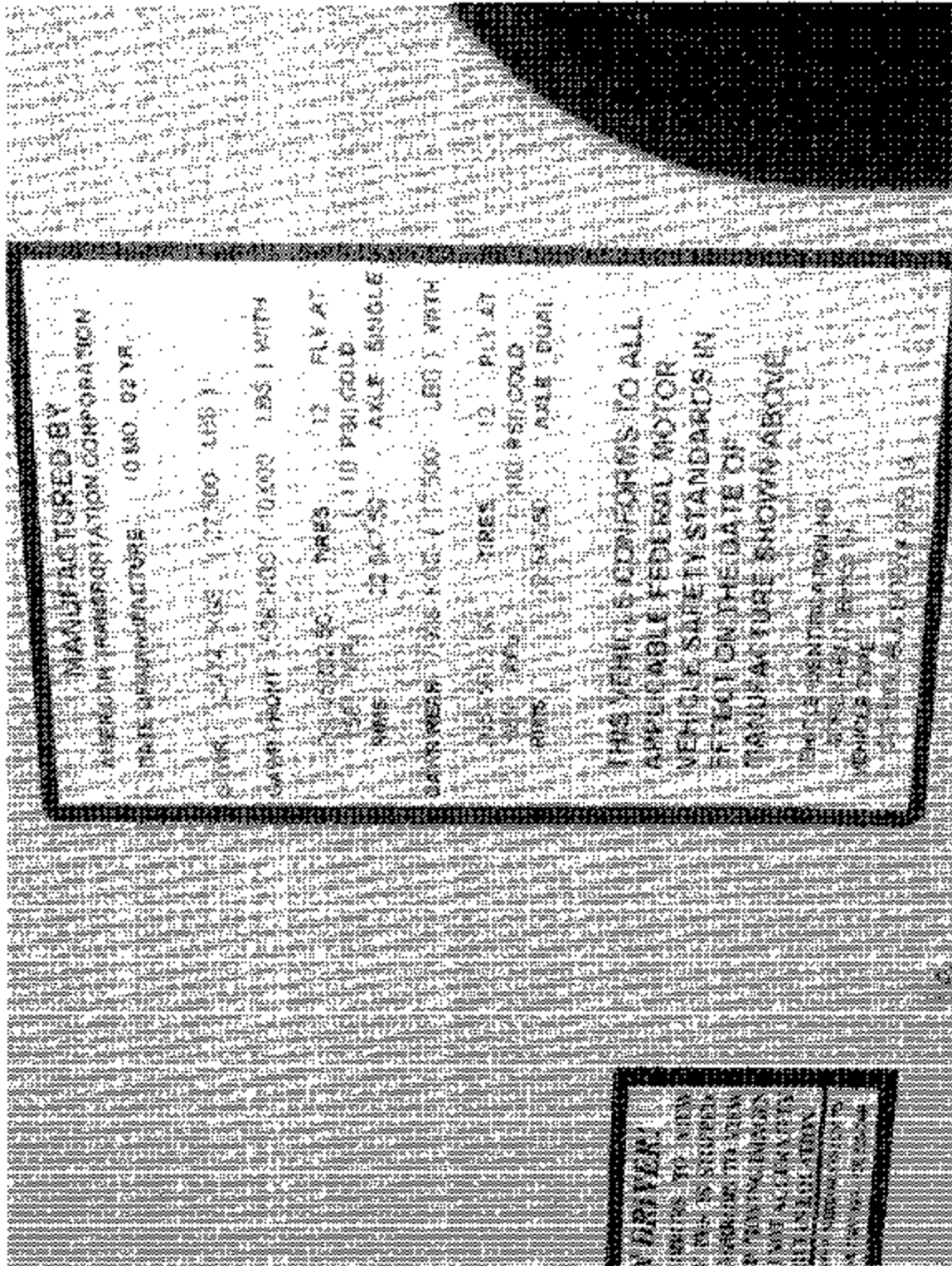
NHTSA No.: C30902



RR Exit Opened After Roof Loading is Attained with Measuring Device in Place

Test Vehicle: 2003 ATC IC38530 School Bus
 Procedure: FMVSS 220

NHTSA No.: C38902



Close-up View of School Bus Certification Label

Test Vehicle: 2003 ATC IC38530 School Bus
Procedure: FMVSS 220

NHTSA No.: C30902



Close-up of Manufacturer Serial Number

**SECTION 6
TEST PLOTS**

