

REPORT NUMBER: 217-MGA-05-001

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

**Les Enterprises Michel Corbell Inc.
2004 Corbell 30 Passenger School Bus
NHTSA No.: C40902**

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



Final Report Date: June 13, 2005

FINAL REPORT

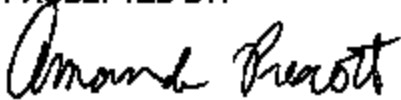
**PREPARED FOR:
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NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
400 SEVENTH STREET, SW, ROOM 6116 (NVS-224)
WASHINGTON, D.C. 20590**

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Prepared by:  Date: June 13, 2005
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FINAL REPORT ACCEPTED BY:



6/20/05
Date of Acceptance

Technical Report Documentation Page

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16. Abstract Compliance tests were conducted on the subject 2004 Corbell 30 Passenger School Bus, NHTSA No. C40902 in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-217-08 for the determination of FMVSS 217 compliance. Test failures were as follows: None					
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SECTION 1
PURPOSE OF COMPLIANCE TEST

Tests were conducted on a MY2004 Corbeil 30 Passenger School Bus, NHTSA No. C40902, 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 MY2004 Corbeil 30 Passenger School Bus, NHTSA No. C40902 did appear to meet 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:	2004/ Corbeil/ School Bus	
NHTSA No.:	C40902	
GVWR:	14,050 lb	
Build Date for Bus Chassis:	05/04	
VIN:	1FDXE45P14HA89660	
Chassis VIN:	1FDXE45P14HA89660	
Seating Capacity:	(1 driver, 30 passengers)	
Type of Bus:	School Bus	
Tire Pressure from tire placard (at capacity):	Front: 85 kPa	Rear: 80 kPa
Odometer Reading:	912 miles	

	PASS/FAIL
§5.1 WINDOW RETENTION	PASS
§5.2 PROVISION OF EMERGENCY EXITS	PASS
Meets minimum exit provisions	PASS
Meets all other exit requirements	PASS
Meets requirements for additional exits	PASS
§5.2.3.1.A EMERGENCY EXIT DOOR OPERATIONAL REQUIREMENTS	PASS
§5.3 EMERGENCY EXIT RELEASE	PASS
Forces to unlatch the emergency exits	PASS
Forces to open the emergency exits	PASS
§5.4 EMERGENCY EXIT OPENING	PASS
§5.5 EMERGENCY EXIT LABELING AND IDENTIFICATION	PASS
§5.5 TAPE REFLECTIVITY (49CFR 571.131)	NOT TESTED

COMMENTS: NONE

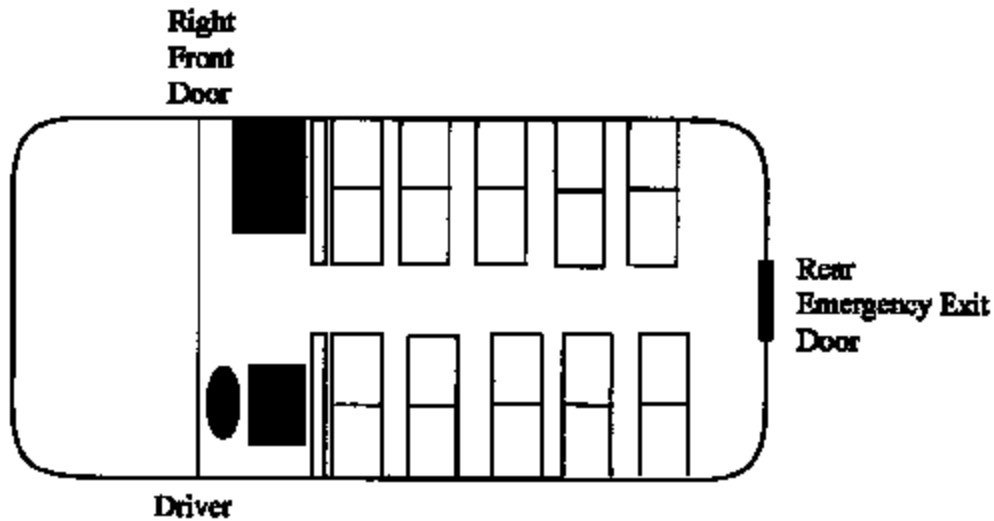
SECTION 3
COMPLIANCE TEST DATA

The following data sheets document the results of testing on the 2004 Corbeil 30 Passenger School Bus, NHTSA No. C40902.

DATA SHEET 2
PROVISION OF EMERGENCY EXITS

Test Vehicle: 2004 Corbell 30 Passenger School Bus
Test Lab: MGA Research-Wisconsin Operations

NHTSA No.: C40902
Test Date: 05/27/05



		Height (mm)	Width (mm)
1	Rear Exit Door	1372	865

Seating Capacity: 31 (Including Driver)

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

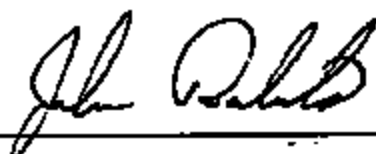
Comments: NONE

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, if any, is located as near as practicable to the midpoint of the passenger compartment.	N/A

COMMENTS: NONE

Recorded By: _____



Approved By: _____



Date: 05/27/05

DATA SHEET 3
EMERGENCY EXIT DOOR OPERATIONAL REQUIREMENTS

Test Vehicle: **2004 Corbell 30 Passenger School Bus**
Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C40902**
Test Date: **06/27/05**

		PASS/FAIL
1	The engine starting system does NOT operate if any Emergency Exit is LOCKED	PASS
2	All Emergency Door and Roof Exits can be released by one person (from inside and outside of bus)	PASS
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:

Recorded By:

Approved By:

Date: 05/27/05

SHEET 4A
EMERGENCY EXIT IDENTIFICATION AND LABELING

Test Vehicle: 2004 Corbell 30 Passenger School Bus
Test Lab: MGA Research-Wisconsin Operations

NHTSA No.: C40802
Test Date: 05/27/05

EMERGENCY EXIT LABELING - INTERIOR

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

OPERATING INSTRUCTIONS - INTERIOR

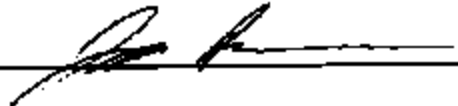
Exit Location	Rear Door
Instructions	To Open Lift Handle and Push Out
Letter Height (cm)	1.25
Letter Color	Black
Background Color	White
Distance From Release (cm)	15.5
Reflective Tape Color	N/A
Reflective Tape Width	3.7
Pass/Fail	PASS

COMMENTS: NONE

Recorded By: _____



Approved By: _____



Date: 05/27/05

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

Test Vehicle: 2004 Corbell 30 Passenger School Bus
Test Lab: MGA Research-Wisconsin Operations

NHTSA No.: C40902
Test Date: 05/27/05


EMERGENCY EXIT LABELING - EXTERIOR

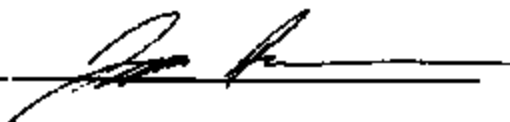
Exit Location	Rear Door
Exit Description	Emergency Door
Letter Height (cm)	5.0
Background Color	Yellow
Location Outside	Top of Door
Pass/Fail	PASS

OPERATING INSTRUCTIONS - EXTERIOR

Exit Location	Rear Door
Instructions	Arrow
Letter Height (cm)	—
Letter Color	Black
Background Color	Yellow
Distance From Release (cm)	1
Reflective Tape Color	Yellow
Reflective Tape Width	3.7 cm
Pass/Fail	PASS

COMMENTS: NONE

Recorded By: 

Approved By: 

Date: 05/27/05

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

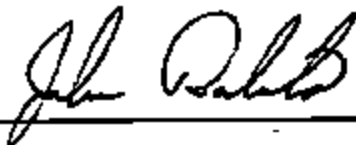
Test Vehicle: **2004 Corbell 30 Passenger School Bus**
Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C40902**
Test Date: **05/27/05**

		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: 05/27/05

**DATA SHEET 5
TAPE RELECTIVITY TEST**

Test Vehicle: **2004 Corbell 30 Passenger School Bus**
 Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C40902**
 Test Date: **05/27/05**

- _____ 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. Req'd. 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: _____

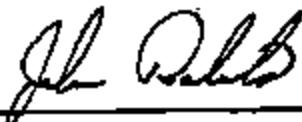
**DATA SHEET 6A
FORCE TESTS TO UNLATCH THE EMERGENCY EXITS - INTERIOR**

Test Vehicle: **2004 Corbell 30 Passenger School Bus**
 Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C40902**
 Test Date: **05/27/05**

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 Exit Door	Emergency Door	High	178	1. 28.4	Straight	Lift Handle Push it Out	PASS
				2. 27.9			
				3. 29.6			
				Average: 28.6			

COMMENTS: NONE

Recorded By: 

Approved By: 

Date: 05/27/05

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

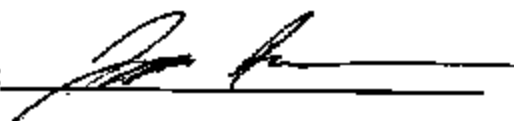
Test Vehicle: **2004 Corbell 30 Passenger School Bus**
 Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C40902**
 Test Date: **05/27/05**

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	Emergency Door	High	178	1. 70.3	Rotary	Counter Clockwise 90° Turn	PASS
				2. 78.0			
				3. 82.4			
				Average: 76.9			

COMMENTS: NONE

Recorded By: 

Approved By: 

Date: 05/27/05

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

Test Vehicle: **2004 Corbell 30 Passenger School Bus**
 Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C40902**
 Test Date: **05/27/05**

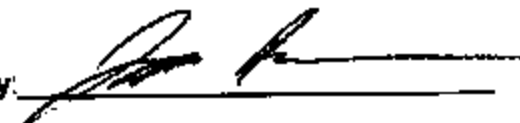
Exit Location	Exit Description	High/Low Force Area	Maximum Force Requirement Newtons	Actual Force Measured (N)	Motion(s) required to Open Exit	Actual Motion(s) to Open Exit	Passage of Ellipsoid or Parallelepiped	PASS/FAIL
Rear Exit	Emergency Door	High	178	1. 19.0	Straight	Push Out	114x61x30 Parallelepiped	PASS
				2. 19.0				
				3. 17.0				
				Average: 18.3				

14

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: 05/27/05

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

Test Vehicle: **2004 Corbell 30 Passenger School Bus**
 Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C40902**
 Test Date: **05/27/05**

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
Rear Exit	Emergency Door	High	178	1. 24.3	Straight	Pull Out	114x61x30 Parallelepiped	PASS
				2. 25.9				
				3. 38.9				
				Average: 29.8				

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: 05/27/05

**DATA SHEET 8
EMERGENCY EXIT EXTENSION**

Test Vehicle: 2004 Corbell 30 Passenger School Bus
Test Lab: MGA Research-Wisconsin Operations

NHTSA No.: C40902
Test Date: 05/27/05

		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 ext.	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: 05/27/05

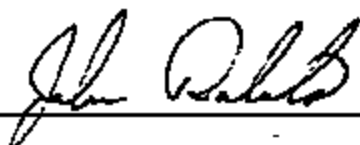
**DATA SHEET 9
WINDOW RETENTION TEST**

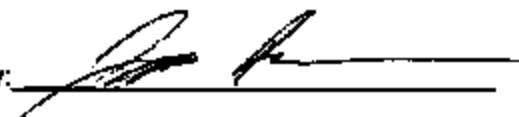
Test Vehicle: **2004 Corbeil 30 Passenger School Bus**
 Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C40902**
 Test Date: **05/27/05**

1	Test Window Identification:	Left Side Window 2
2	Provide a detailed description of the window such as fixed, push out, single or double glazed, horizontal or vertical sliding, etc.	Vertical Sliding Not Emergency Exit
3	Provide the horizontal and vertical glazing dimensions for each panel.	29 3/8" W x 9 3/4" H
4	Did the window pass the retention requirements? Describe how the window structure and glazing withstood the force per the PASS/FAIL criteria:	Max Displacement was Reached 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:

Recorded By: 

Approved By: 

Date: 05/27/05

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

Test Vehicle: **2004 Corbell 30 Passenger School Bus**
Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C40902**
Test Date: **05/27/05**

1	Test Window Identification:	Rear Door Top Window		
2	Provide a detailed description of the window such as fixed, push out, single or double glazed, horizontal or vertical sliding, etc.	Fixed		
3	Provide the horizontal and vertical glazing dimensions for each panel.	18" H X 27.5 W		
4	Did the window pass the retention requirements? Describe how the window structure and glazing withstood the force per the PASS/FAIL criteria:	Broken Glazing PASS		
5	Did the window pass the force tests to unlatch and open the exit after the completion of the retention test?	Unlatch Force Measured (N)	Open Force Measured (N)	Pass/ Fail
		1. 28.7	1. 30.3	PASS
		2. 25.8	2. 27.4	PASS
		3. 27.5	3. 27.8	PASS

COMMENTS:

Recorded By: _____

John P. [Signature]

Approved By: _____

[Signature]

Date: 05/27/05

**SECTION 4
INSTRUMENTATION AND EQUIPMENT LIST**

Test Vehicle: **2004 Corbell 30 Passenger School Bus**
 Test Lab: **MGA Research-Wisconsin Operations**

NHTSA No.: **C40902**
 Test Date: **05/27/05**

Equipment	Description	Model/Serial No.	Cal. Date	Next Cal. Date
Head Form	MGA	217	When Used	When Used
A/D Interface	Metabyte	DAS-1802	--	--
Sphere	MGA	Sphere - 1A	When Used	When Used
Load Cell	Interface	1210AF-137751	03/09/05	09/09/05
Inclinometer	Digital Protractor	Pro 360 / Comp Lab	02/18/05	08/18/05
Linear Potentiometer	Ametek	P40A/0504-21782	05/23/05	11/23/05
Digital Calipers	Mitutoyd	CD-6" ca/ 0441288	04/01/05	10/01/05
Steel Tape	Stanley	Powerlock / 232	02/03/05	08/03/05
Camera	Sony	DSC-S75	--	--
Ellipsoid	MGA	ELLIP - 1A	When Used	When Used
Parallelepiped	MGA	PARA - 1A	When Used	When Used
Force Gauge	Dillon	AFG/DMLC	05/19/05	11/19/05

**SECTION 5
PHOTOGRAPHS**

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Test Vehicle: 2004 Corbell 30 Passenger School Bus
Procedure: FMVSS 217

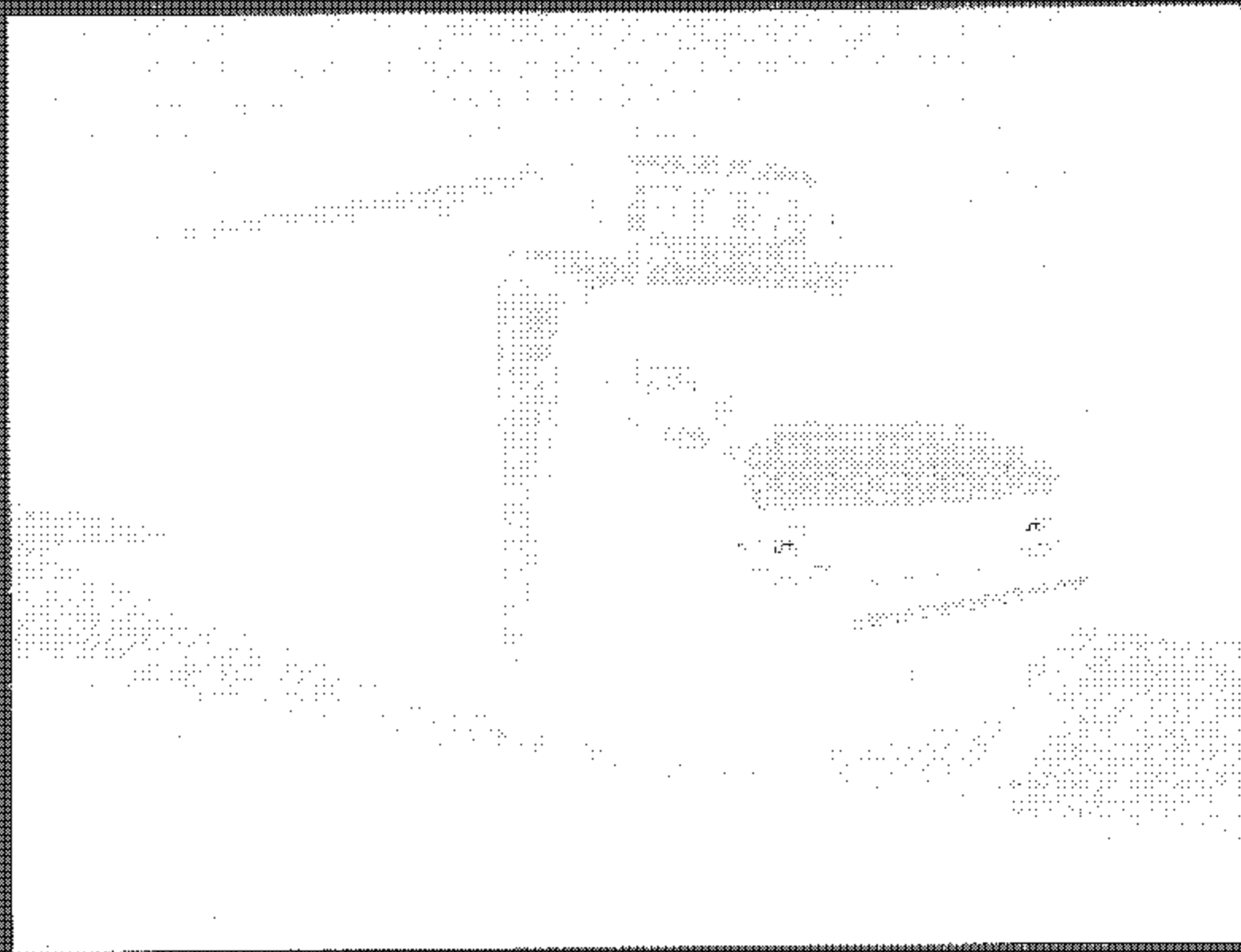
NHTSA No.: C410902



Exterior Left Side View of School Bus

Test Vehicle: 2004 Corbell 38 Passenger School Bus
Procedure: FMVSS 217

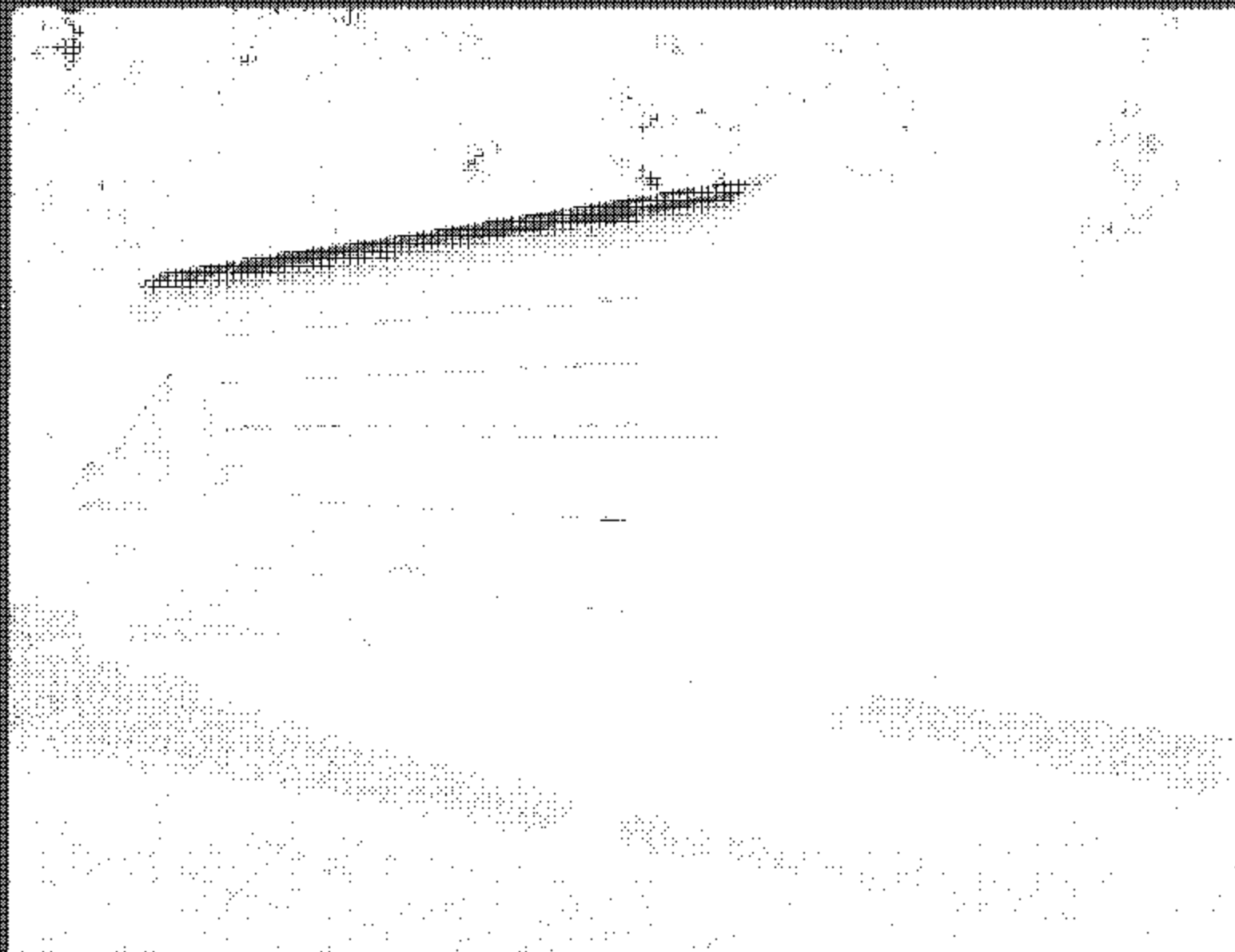
NHTSA No.: C410902



Exterior Right Front View of School Bus

Test Vehicle: 2004 Corbell 30 Passenger School Bus
Procedure: FMVSS 217

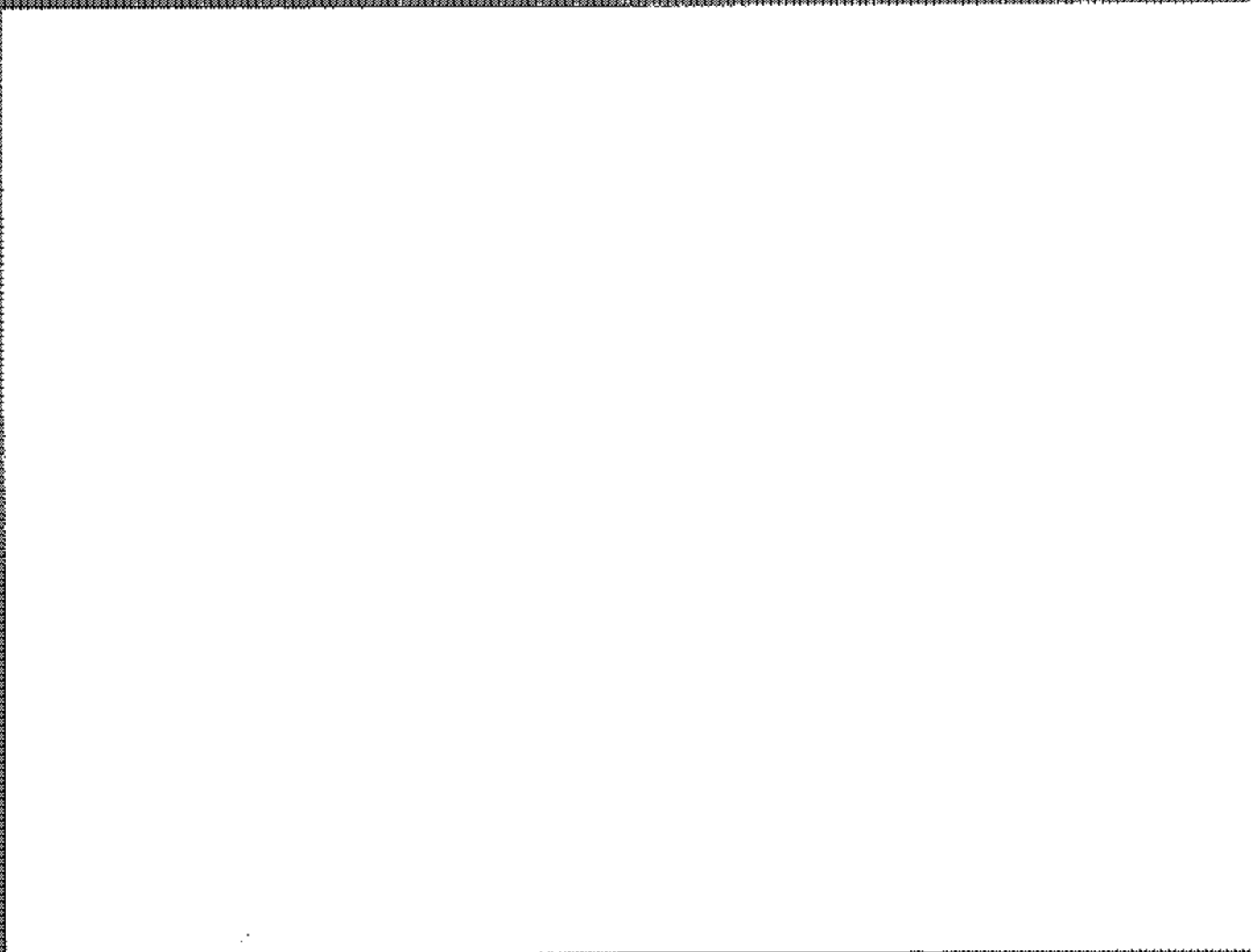
NHTSA No.: C40902



Exterior Left Rear 1/4 View of School Bus

Test Vehicle: 2004 Corbett 20 Passenger School Bus
Procedure: FMVSS 217

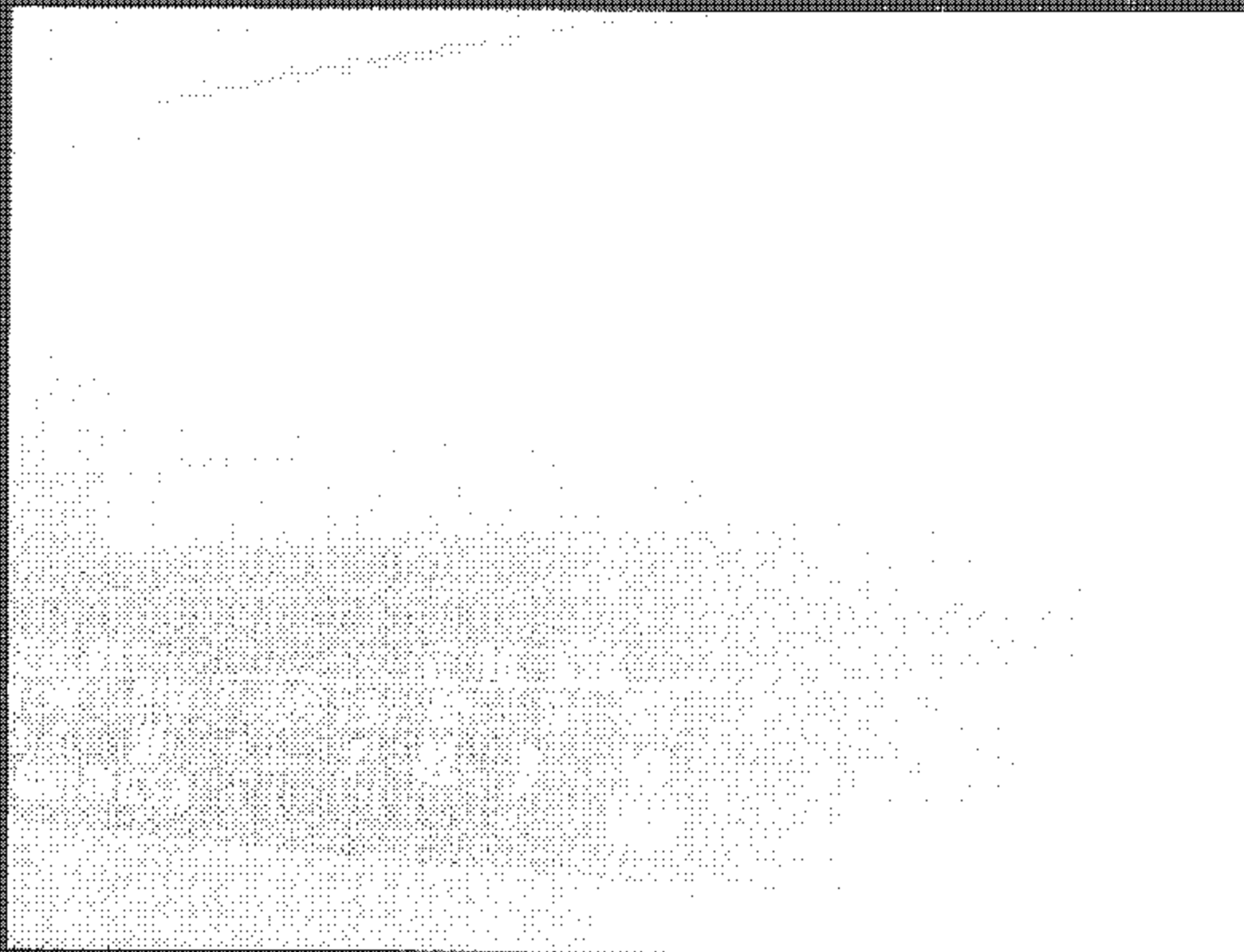
NETSA No.: C48902



Vehicle Certification

Test Vehicle: 2004 Corbus 30 Passenger School Bus
Procedure: FMVSS 217

NHTSA No.: CA10902



Tire Placard

Test Vehicle: 2004 Corbell 30 Passenger School Bus
Procedure: FMVSS 217

KHPSA No.: C30902

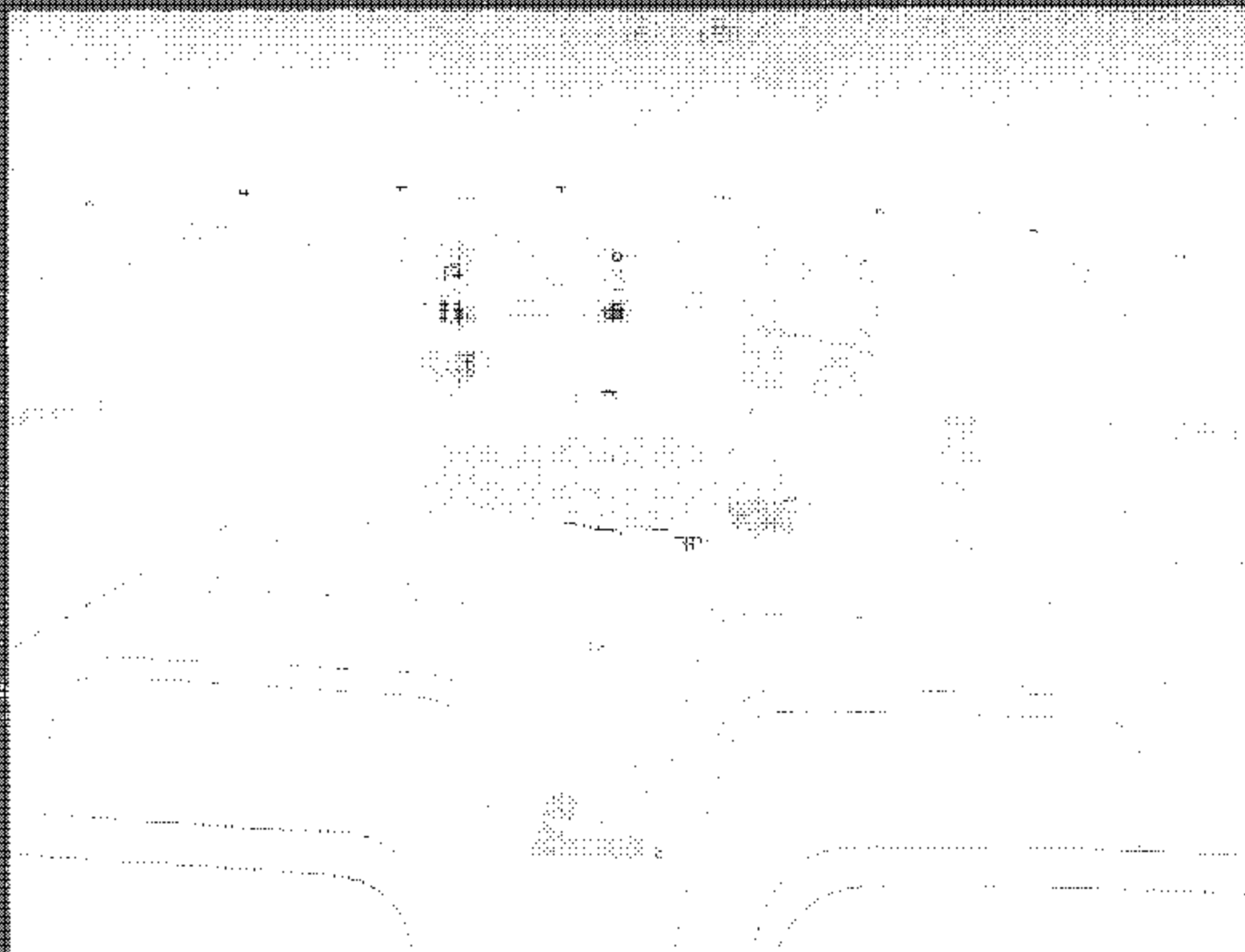


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Interior Front to Rear View Depicting Seating Arrangement

Test Vehicle: 2004 Corolla 38 Passenger School Bus
Procedure: FMVSS 257

NHTSA No.: C40902

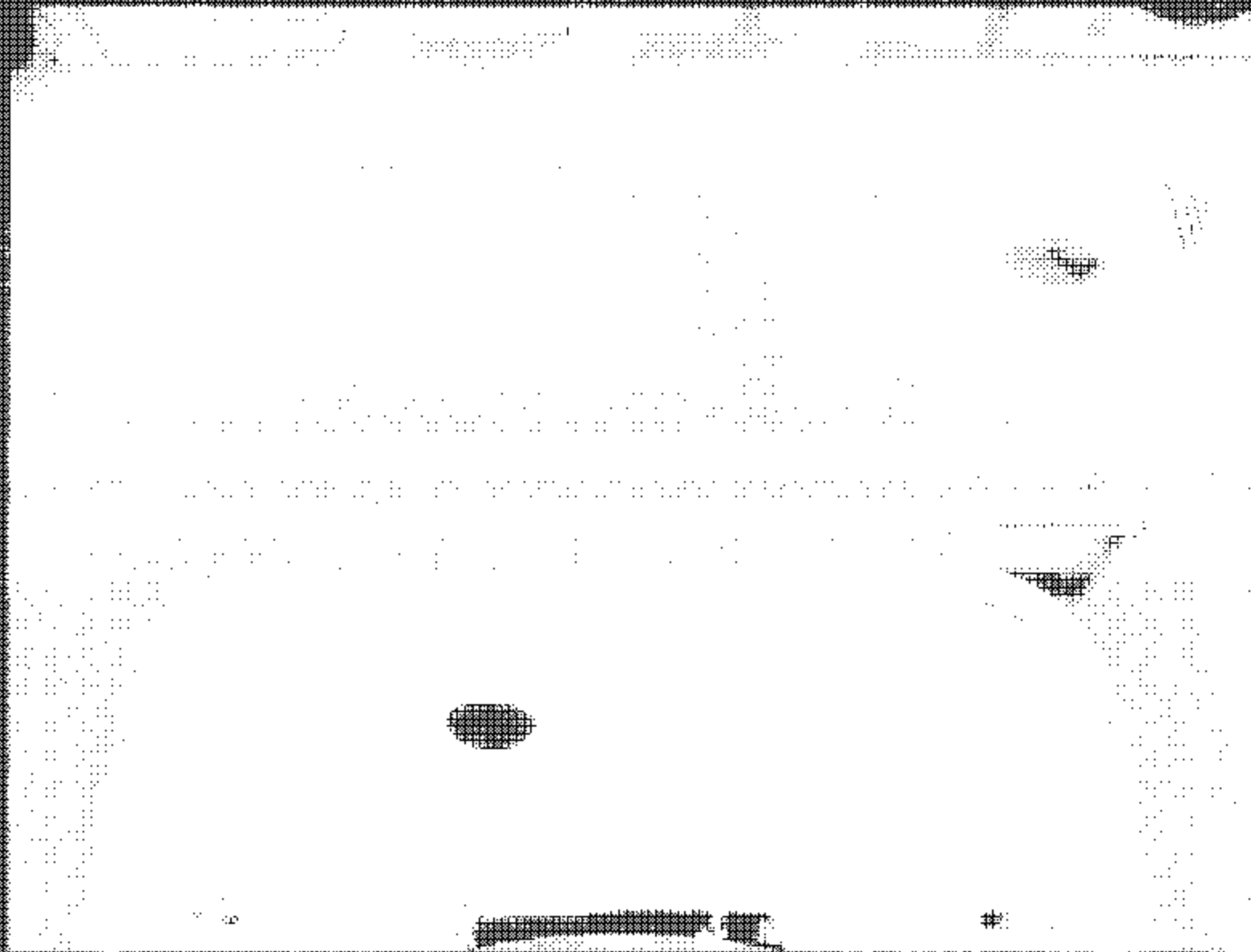


Interior Rear to Front View Deploying Seating Arrangement

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Test Vehicle: 2004 Corbell 30 Passenger School Bus
Procedure: FMVSS 217

NHTSA No.: 040982

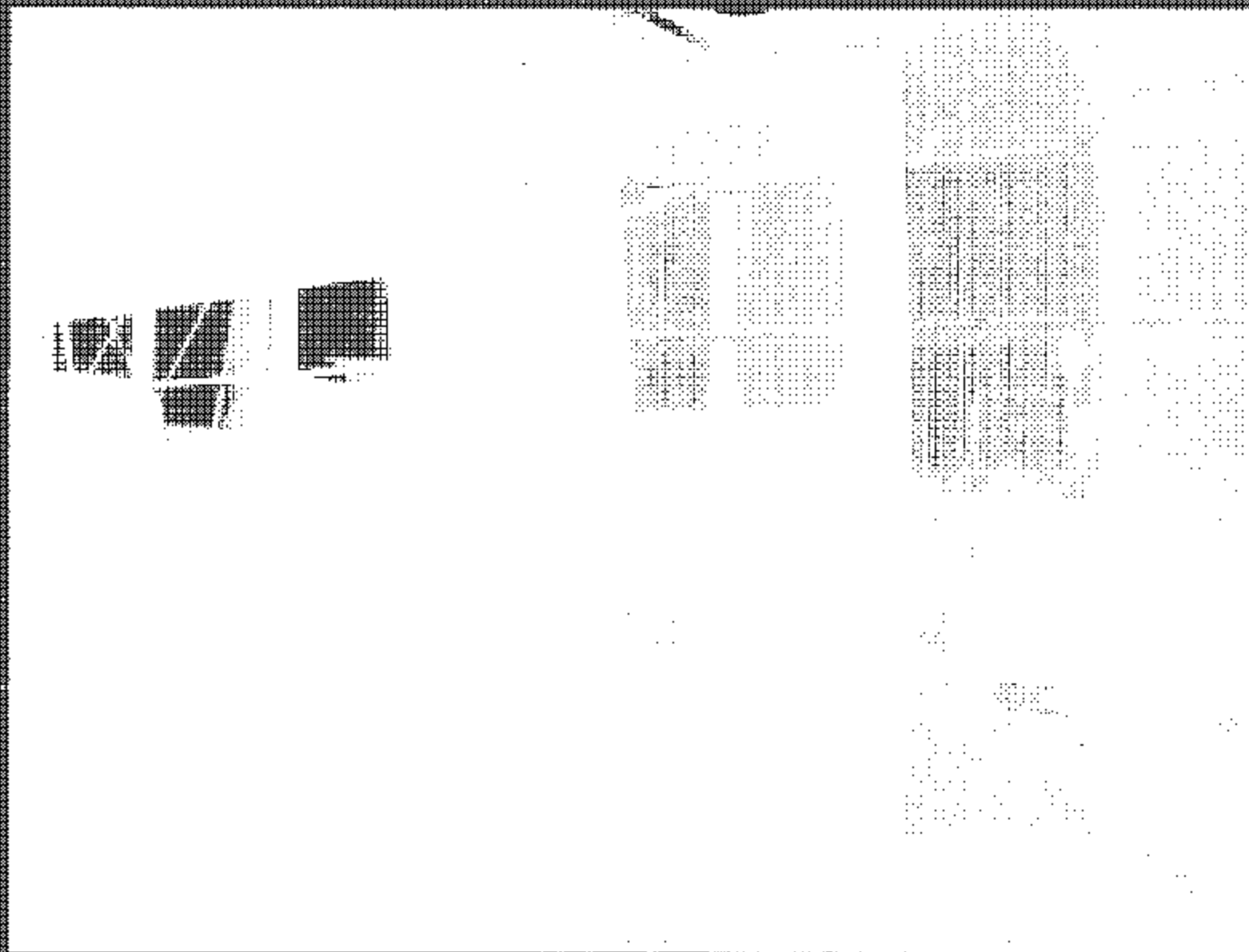


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Rear Exit Door Identification (Outside View)

Test Vehicle: 2004 Corbett 30 Passenger School Bus
Procedure: FMVSS 217

NHTSA No.: C40902

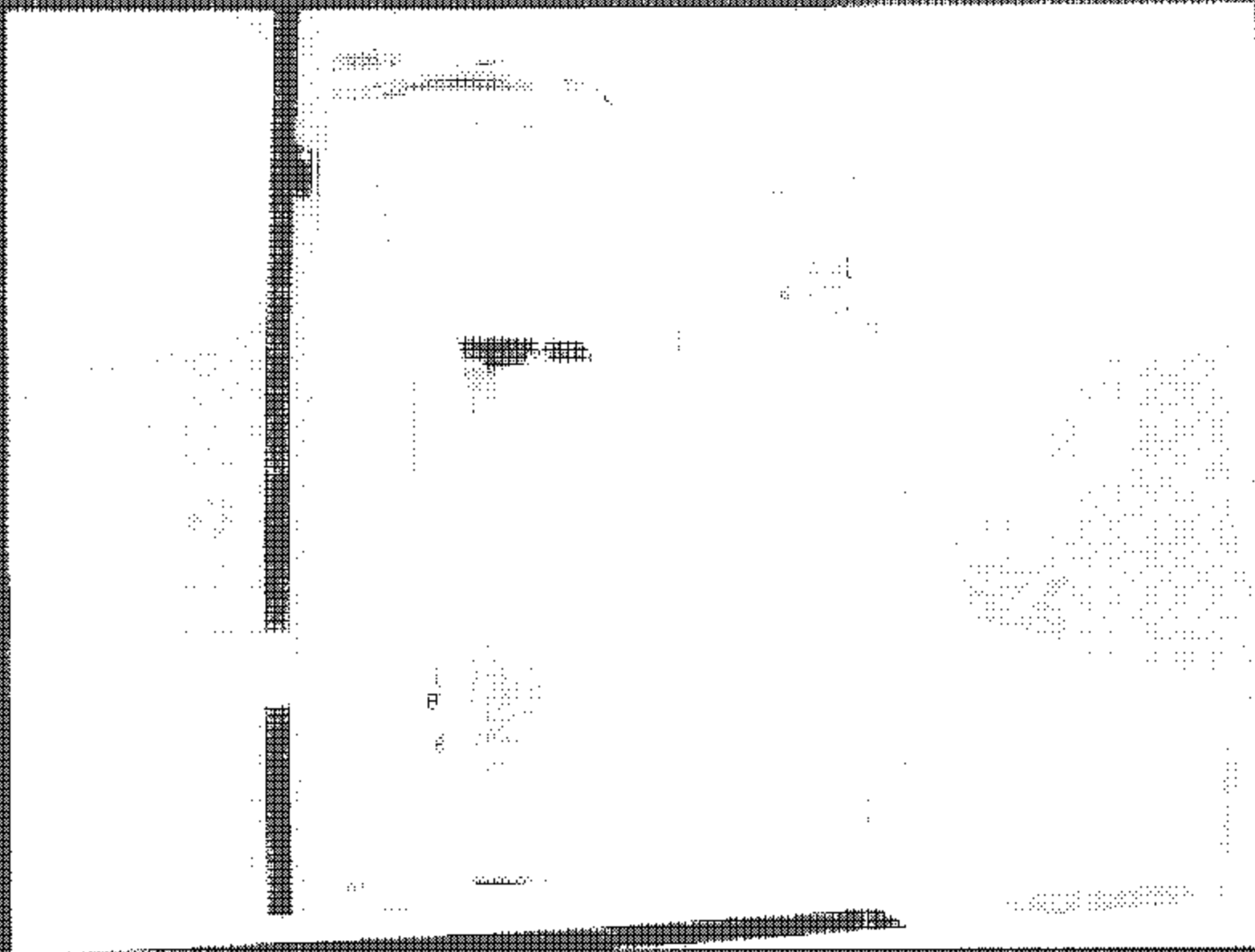


Rear Exit Door Identification (Inside View)

Test Vehicle:
Procedure:

2004 Corbell 30 Passenger School Bus
FMVSS 217

NHTSA No.: 038902

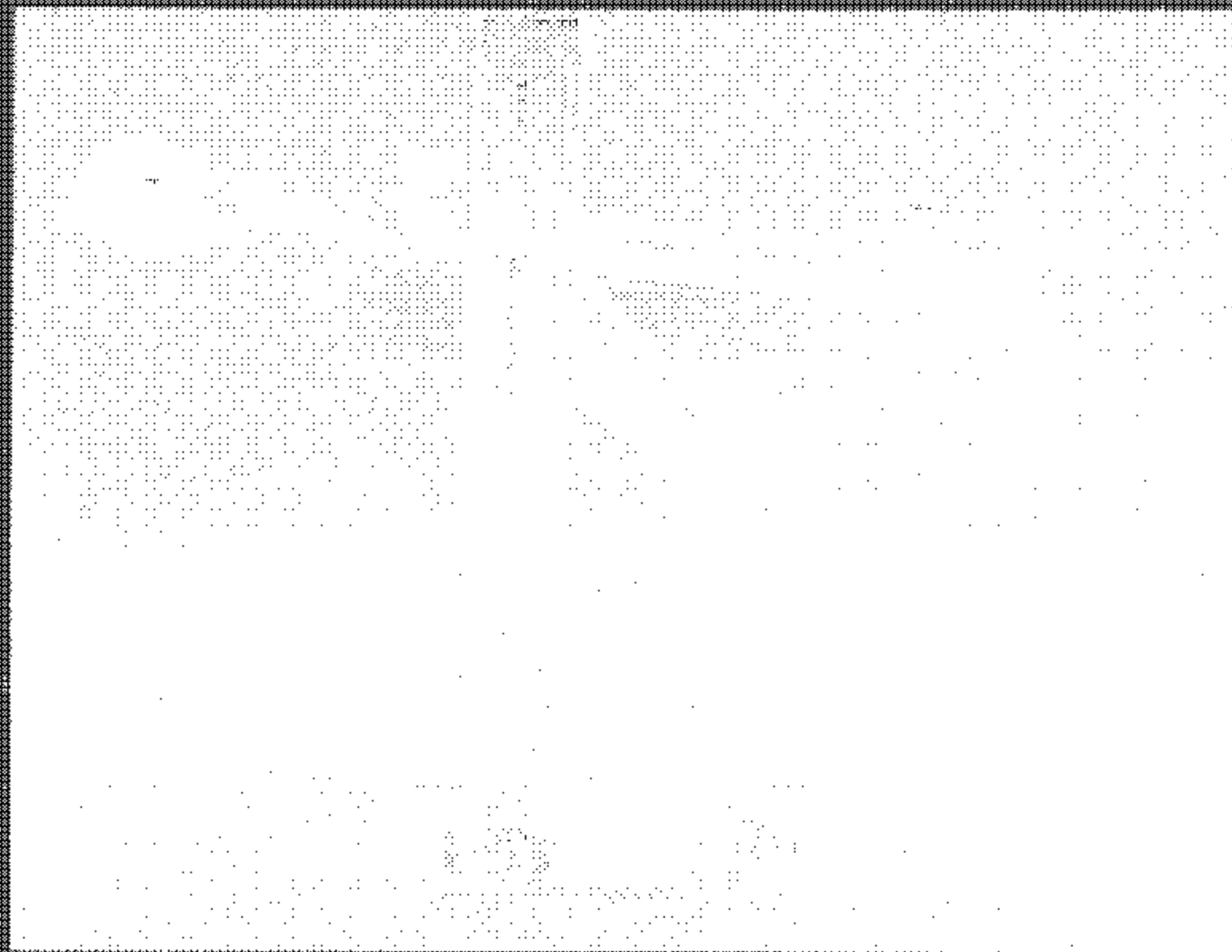


05

Rear Door Emergency Exit Parallelepiped Clearance

Test Vehicle: 2004 Corbeil 30 Passenger School Bus
Procedure: FMVSS 217

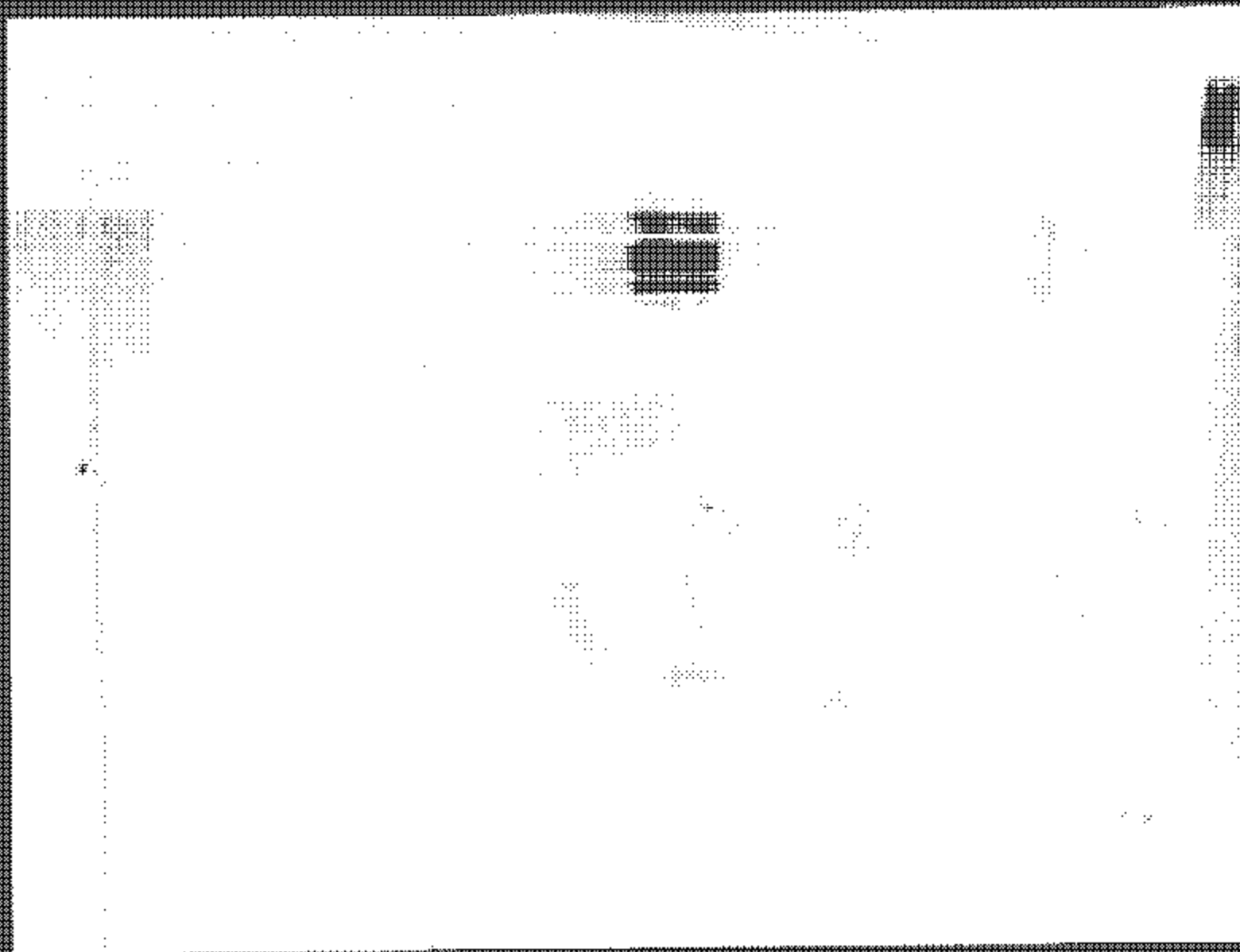
NHTSA No.: C40902



Loading Fixture

Test Vehicle: 2004 Corolla 38 Passenger School Bus
Procedure: FMVSS 217

NHTSA No.: C40802

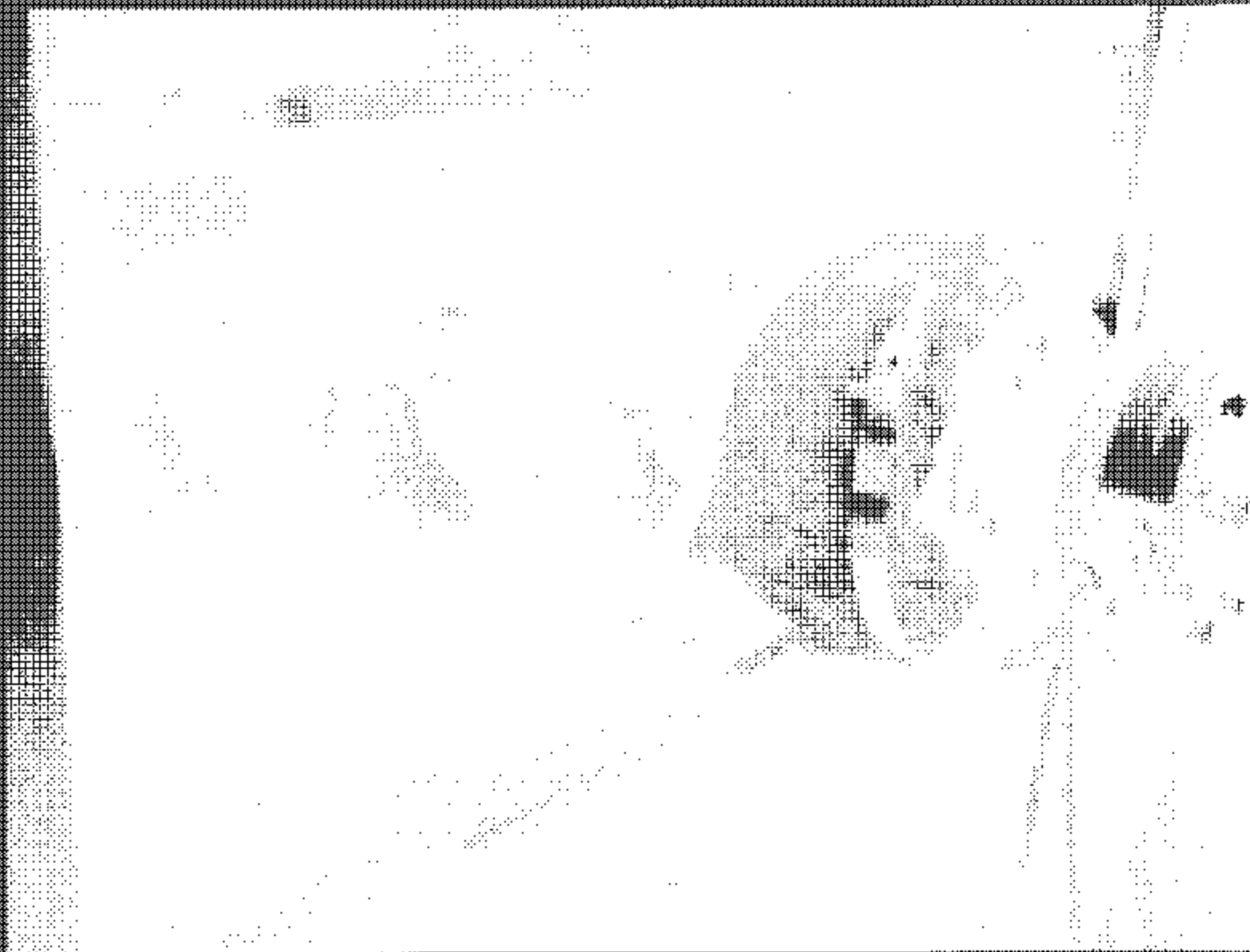


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Retention Test of Left Side Window (Pre-Test)

Test Vehicle: 2004 Chevrolet 36 Passenger School Bus
Procedure: FMVSS 217

NHTSA No: C46002



Retention Test of Left Side Window (Post-Test)

Test Vehicle: 2004 Corbett 50 Passenger School Bus
Procedure: FMVSS 217

NHTSA No.: D48902



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Retention Test of Rear Door Window (Pre-Test)

Test Vehicle: 2004 Chevrolet 20 Passenger School Bus
Procedure: FMVSS 217

NHTSA No.: C46902



Retention Test of Rear Door Window (Post-Test)

**SECTION 8
TEST PLOTS**

