HS No. 636525

REPORT NUMBER: 301S-MGA-03-002

SAFETY COMPLIANCE TESTING FOR FMVSS NO. 301S FUEL SYSTEM INTEGRITY – SCHOOL BUSES

2003 Blue Bird All American
School Bus
NHTSA No.: C30900

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

Final Report Date: May 8, 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

Prepared by: _____ Date: May 8, 2003
Chris Novak, Project Technician

Reviewed by: _____ Date: May 8, 2003
Michael Janovicz, Program Manager

FINAL REPORT ACCEPTED BY:

Amanda Prescott

May 23, 2003
Date of Acceptance

Technical Report Documentation Page

1. Report No. 301S-MGA-03-002	*2. Government Accession No.*	*3. Recipient's Catalog No.*	
4. Title and Subtitle Final Report of FMVSS 301S School Bus Compliance Testing of 2003 Blue Bird All American NHTSA No.:C30900		*5. Report Date* May 8, 2003 *6. Performing Organization Code* MGA	
7. Author(s) Chris Novak, Project Technician Michael Janovicz, Project Manager		*8. Performing Organization Report No.* 301S-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-221) 400 Seventh St., S.W. Room 6115 Washington, D.C. 20590		*13. Type of Report and Period Covered* Final Report 4/23/03 – 5/8/03 *14. Sponsoring Agency Code* NVS-220	
15. Supplementary Notes			
16. Abstract A compliance test was conducted on the subject 2003 Blue Bird All American School Bus, NHTSA No. C30900 in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-301-02 for the determination of FMVSS 301S compliance.			
17. Key Words Compliance Testing Safety Engineering FMVSS 301S		*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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Form DOT F1700.7 (8-72)

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SECTION 1

PURPOSE OF COMPLIANCE TEST AND SUMMARY

A fuel system integrity test was conducted on a MY2003 Blue Bird All American School Bus, NHTSA No. C30900, in accordance with the specifications of the Office of Vehicle Safety Compliance (OVSC) Test Procedures TP-301-02 to determine compliance to the requirements of Federal Motor Vehicle Safety Standards (FMVSS) 301S, "Fuel System Integrity - School Buses".

Based on the tests performed, the MY2003 Blue Bird All American School Bus, NHTSA No. C30900 appears to meet the requirements of FMVSS 301S testing.

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

SECTION 2
COMPLIANCE TEST DATA

The following data sheets document the results of testing on the MY2003 Blue Bird All American School Bus, NHTSA No. C30900.

DATA SHEET 1

SCHOOL BUS DATA

GENERAL VEHICLE IDENTIFICATION

School Bus Manufacturer:	Blue Bird	
School Bus Model:	2003 Blue Bird All American	
Build Date:	August 2002	
Incomplete Vehicle Manufactured By:	—	
Build Data for Bus Chassis:	—	
School Bus GVWR (kg):	13511	
School Bus GAWR Front (kg):	4926	
School Bus GAWR Rear (kg):	8585	
School Bus VIN:	1BABNBPA33F210494	
No of Designated Seating Positions (DSP) including Driver:	85	
School Bus NHTSA No.:	C30900	
Bus Body Color:	Yellow	
Engine Displacement	5.9 L	
No of Cylinders:	6	
Fuel Pump Actuation:	Mechanical Pump "ON" with engine	
School Bus Width (mm):	2452	
School Bus Length (mm):	12344	
Bus Unloaded Vehicle Weight (UVW) (kg):	9038	
Bus Occupant Load:	4536 kg – Passenger 68 kg – Driver 4604 kg - Total	
Target Bus Test Weight (SBTW) (kg):	13642	
Actual (SBTW) (kg):	13642	
School Bus Tire Manufacturer:	Michelin	
	Front	Rear
Rec. Cold Tire Inflation Pressure (kpa):	793	793
Tire Size:	11R/22.5	11R/22.5
Load Range:	H	H

DATA SHEET 1 (CONTINUED)

SCHOOL BUS DATA

Test Vehicle: **2003 Blue Bird All American School Bus** NHTSA No.: **C30900**
Test Lab: **MGA Research-Wisconsin Operations** Test Date: **4/23/03**

GENERAL VEHICLE IDENTIFICATION

SCHOOL BUS ATTITUDE

	Units	LF	RF	LR	RR
As Received:	mm	NR	NR	NR	NR
Pre-Test:	mm	1074	1077	1129	1157
Post-Test:	mm	1070	1077	1127	1153

NR=Not Recorded

Weight of Fuel	3.19 kg/liter (7.03 lbs./gallon)
Fuel Tank Capacity (liters/kg):	382 liters/321 kg (101 gallons/710 lbs.)
Tank Test Volume (gallons/kg):	352 liters/295.7 kg (93 gallons/653.8 lbs.)

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	1648	3006		2565	4337	
Right	kg	1560	2824		2451	4289	
Ratio	%	35.5	64.5		36.8	63.2	
Totals	kg	3208	5830	9038	5016	8626	13642

COMMENTS: NONE

Recorded By: Chris Flood

Approved By: Mark Kayser

Date: May 8, 2003

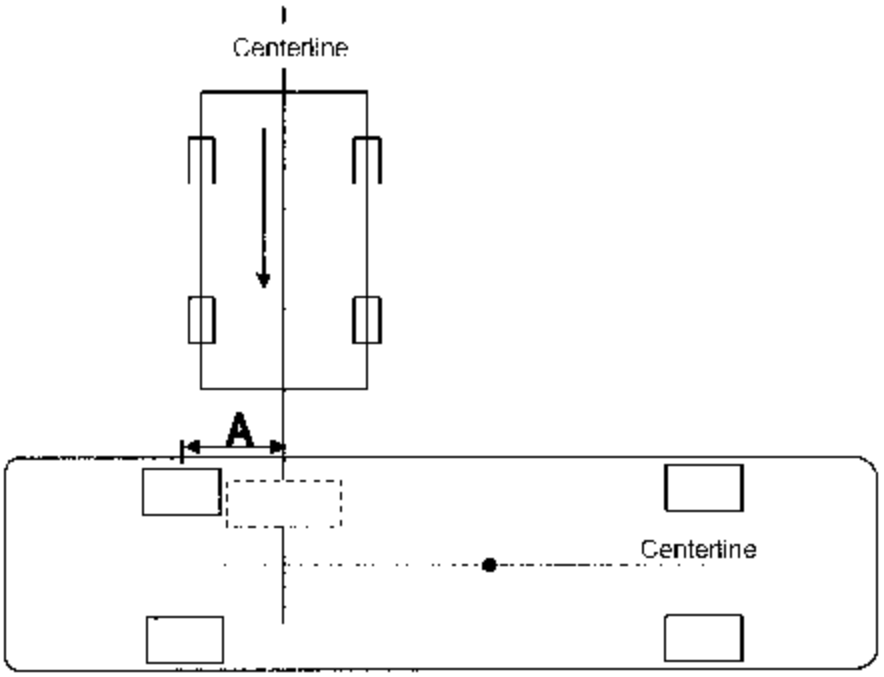
DATA SHEET 2

SCHOOL BUS IMPACT DATA

Test Vehicle:	**2003 Bluebird All American School Bus**	NHTSA No.:	**C30900**
Test Lab:	**MGA Research-Wisconsin Operations**	Test Date:	**4/23/03**

Time of Impact:	9:52 am
Ambient Temperature (°C)	21.1 °C
Barrier Velocity – Speed Trap 1 (kph):	47.5
Barrier Velocity – Speed Trap 2 (kph):	Not Recorded
Barrier Penetration:	918 mm

INDICATE IMPACT POINT BELOW:



Front of Bus

LEGEND: Red dotted line indicates location of fuel tank
Arrow indicates point and angle of barrier impact (C_L of arrow coincides with C_L of monorail).
A = Distance from Front Axle CL to Barrier CL = 730 mm
Impact Point Deviation: 5 mm UP, 2 mm LEFT

DATA SHEET 2 (CONTINUED)

SCHOOL BUS IMPACT DATA

Fuel Spillage Noted.	No
Failure, if applicable:	None

Stoddard Solvent Spillage Measurements

Timeframe	Description	Allowable Spillage	Measured Spilled	Results
$T_0 - T_1$	Time Zero to Cessation of Motion	31 grams (1 ounce)	0	PASS
$T_1 - T_2$	Cessation of Motion to 5 minutes after Cessation of Motion	156 grams (5 ounces)	0	PASS
$T_2 - T_3$	5 Minutes after Cessation of Motion to 30 minutes after Cessation of Motion	31 grams (1 ounce) per minute 933 grams (30 ounces) Total Allowed	0	PASS

ADDITIONAL FAILURE DETAILS: None

Recorded By: _____

Approved By: _____ Date: May 8, 2003

SECTION 4

INSTRUMENTATION AND EQUIPMENT LIST

Test Vehicle: **2003 Bluebird All American School Bus** NHTSA No.: **C30900**
Test Lab: **MGA Research-Wisconsin Operations** Test Date: **4/23/03**

Equipment	Description	Serial No.	Cal. Date	Next Cal. Date
Counter/Timer	DCI	939095	10/25/02	10/25/03
Counter/Timer	DCI	939094	10/25/02	10/25/03
Stop Watch	Cole Parmer	9441010	3/28/03	3/28/04
Vehicle Scales	GSE	212091 & 212092	12/26/02	6/26/03
Tire Pressure Gauge	Dill	MGA06133	10/16/02	10/16/03
Tape Measure	Stanley Powerlock 5M	146	4/9/03	10/9/03
Temp. Indicator	Fluke Probe with Multimeter	944939	10/16/02	10/16/03
Fluke Meter	Fluke	76270715	10/8/02	10/8/03

SECTION 5
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

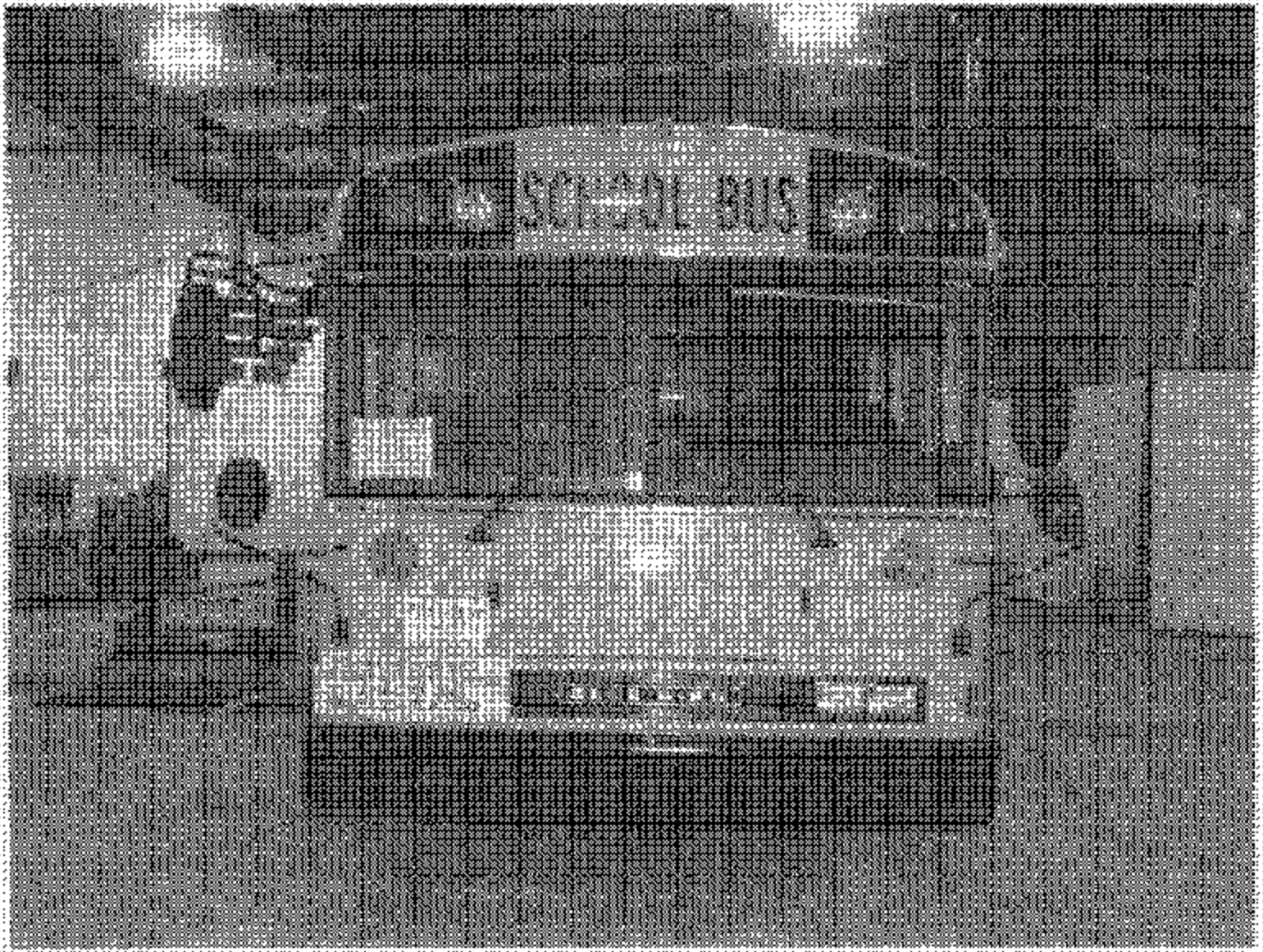
Test Vehicle: 2003 Blue Bird All American

Procedure: FMVSS 301 Side Impact Test

Test Date: April 23, 2003

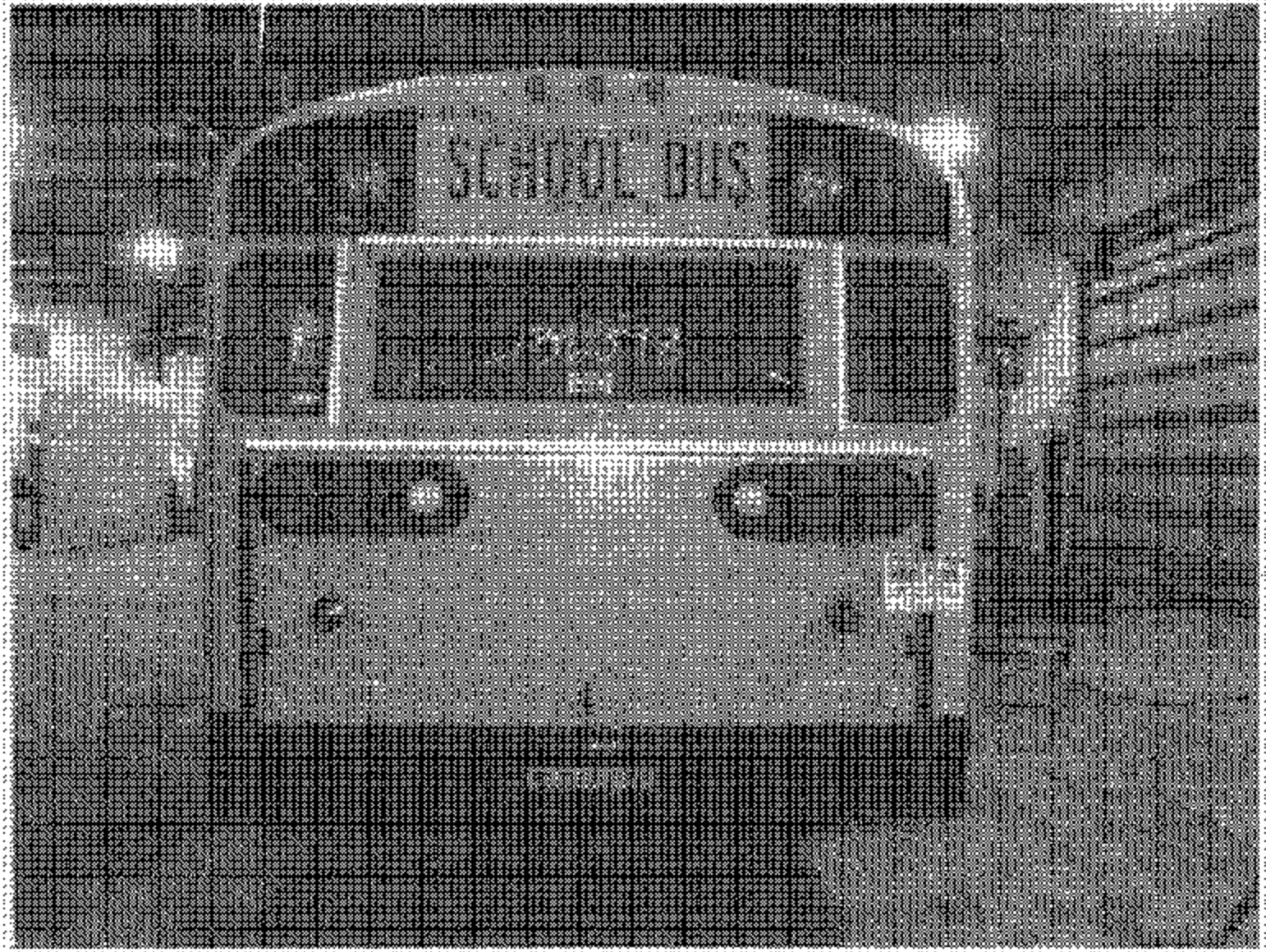
Pre-Test Front View of School Bus

Test Vehicle: 2003 Blue Bird All American
Procedure: FMVSS 301 Side Impact Test
Test Date: April 23, 2003



Post-Test Front View of School Bus

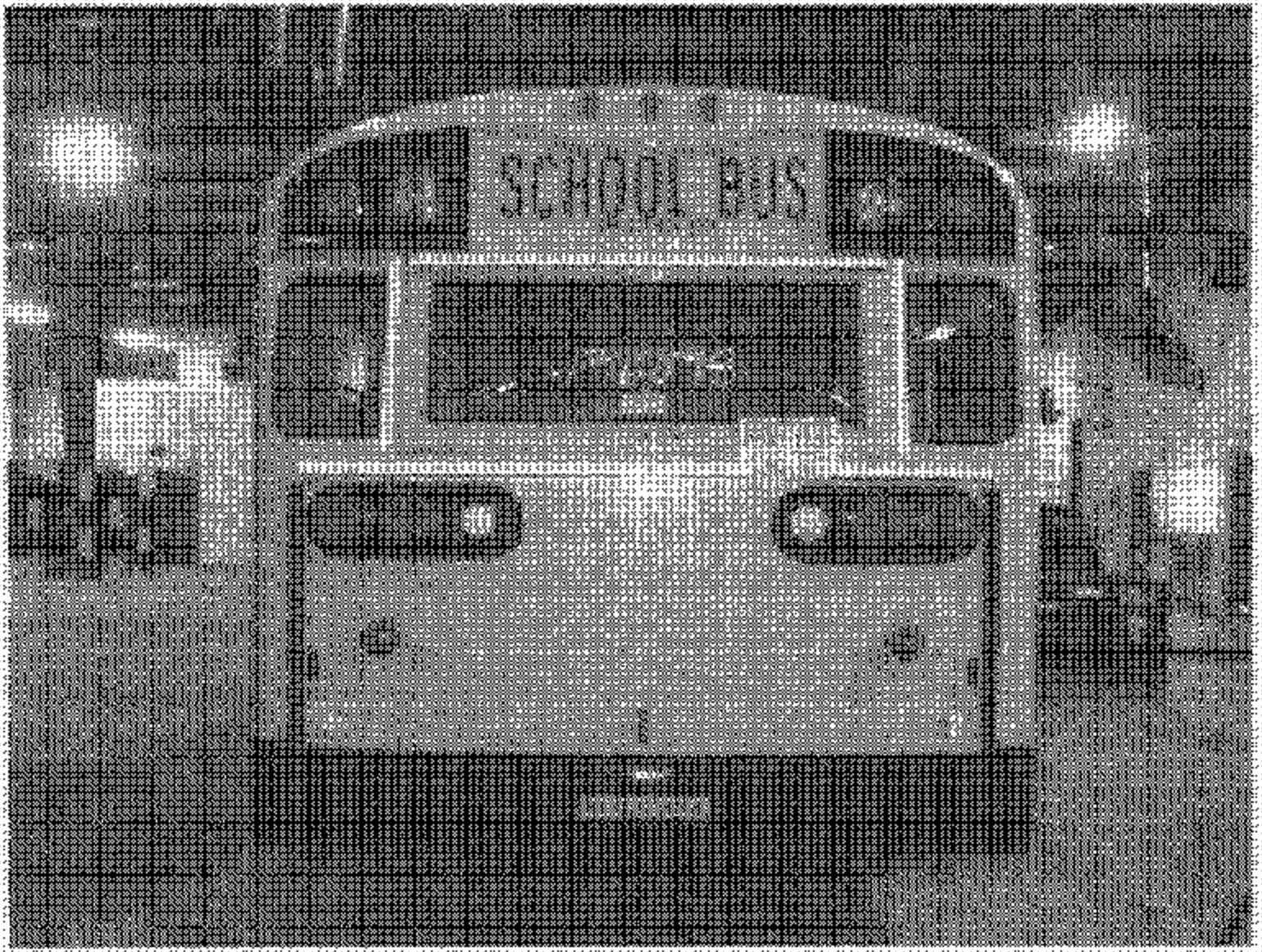
Test Vehicle: 2003 Blue Bird All American
Procedure: FMVSS 301 Side Impact Test Test Date: April 23, 2003



Pre-Test Rear View of School Bus

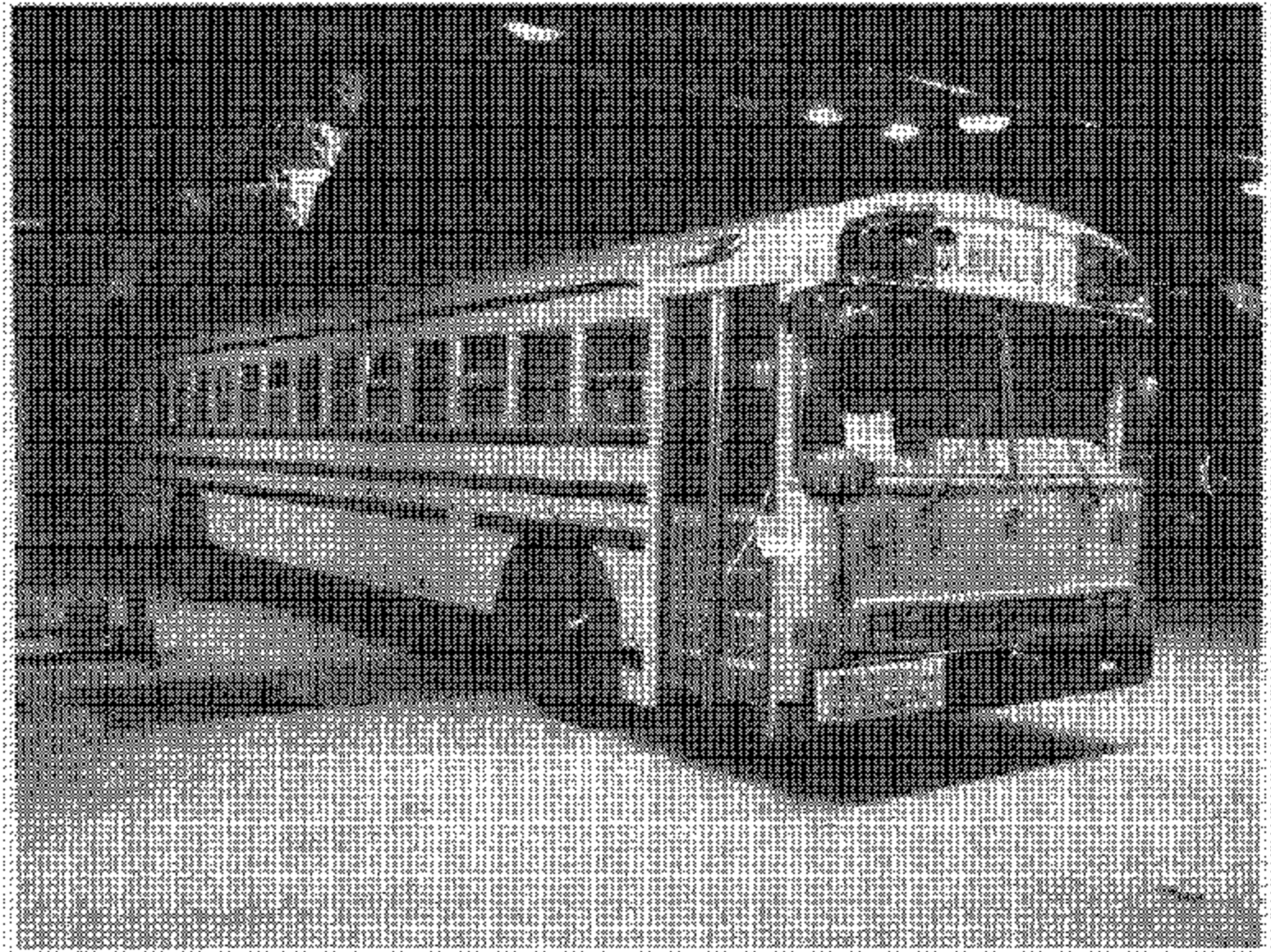
Test Vehicle: 2003 Blue Bird All American

Procedure: FMVSS 301 Side Impact Test Test Date: April 23, 2003



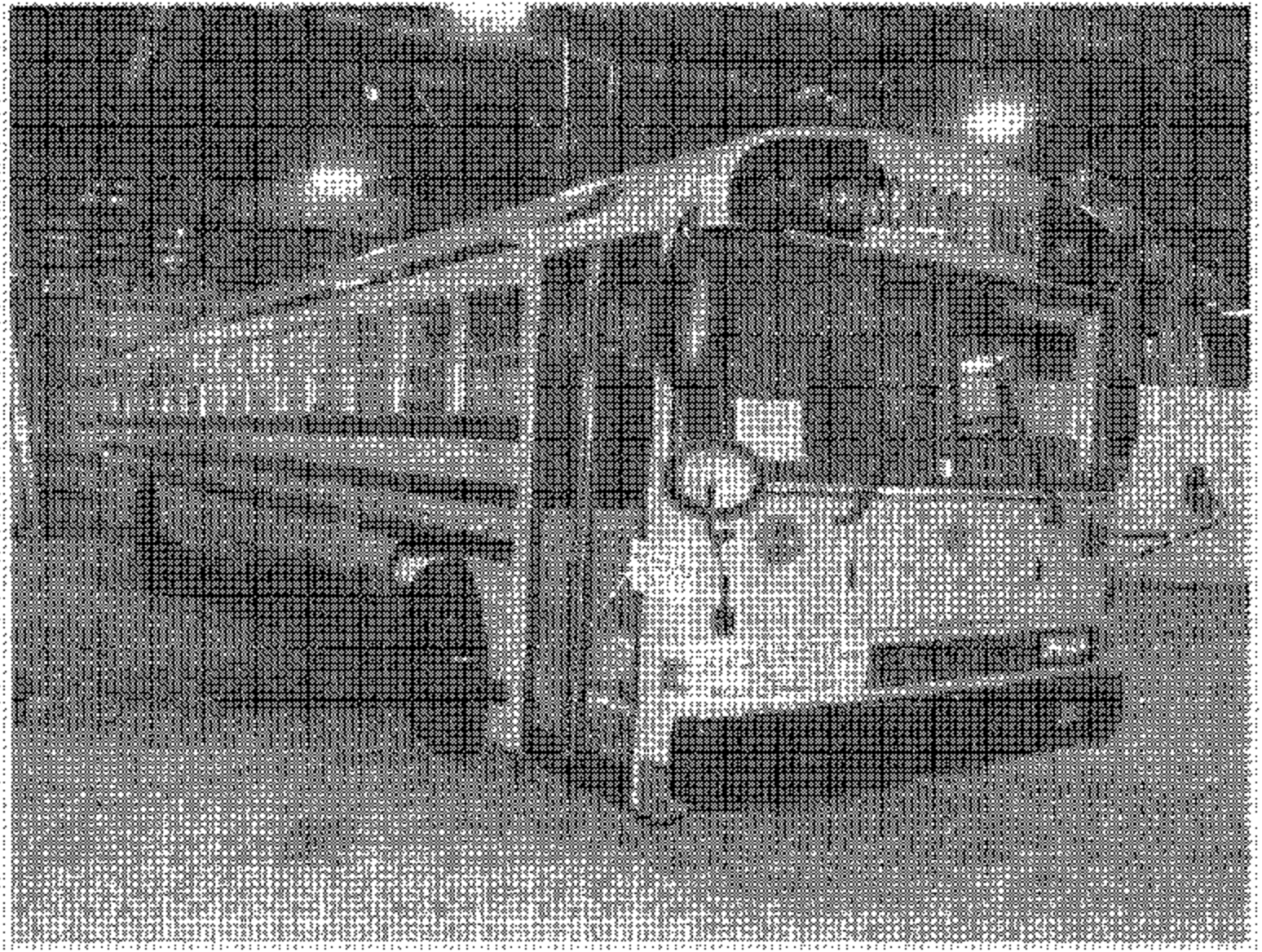
Post-Test Rear View of School Bus

Test Vehicle: 2003 Blue Bird All American
Procedure: FMVSS 301 Side Impact Test Test Date: April 23, 2003



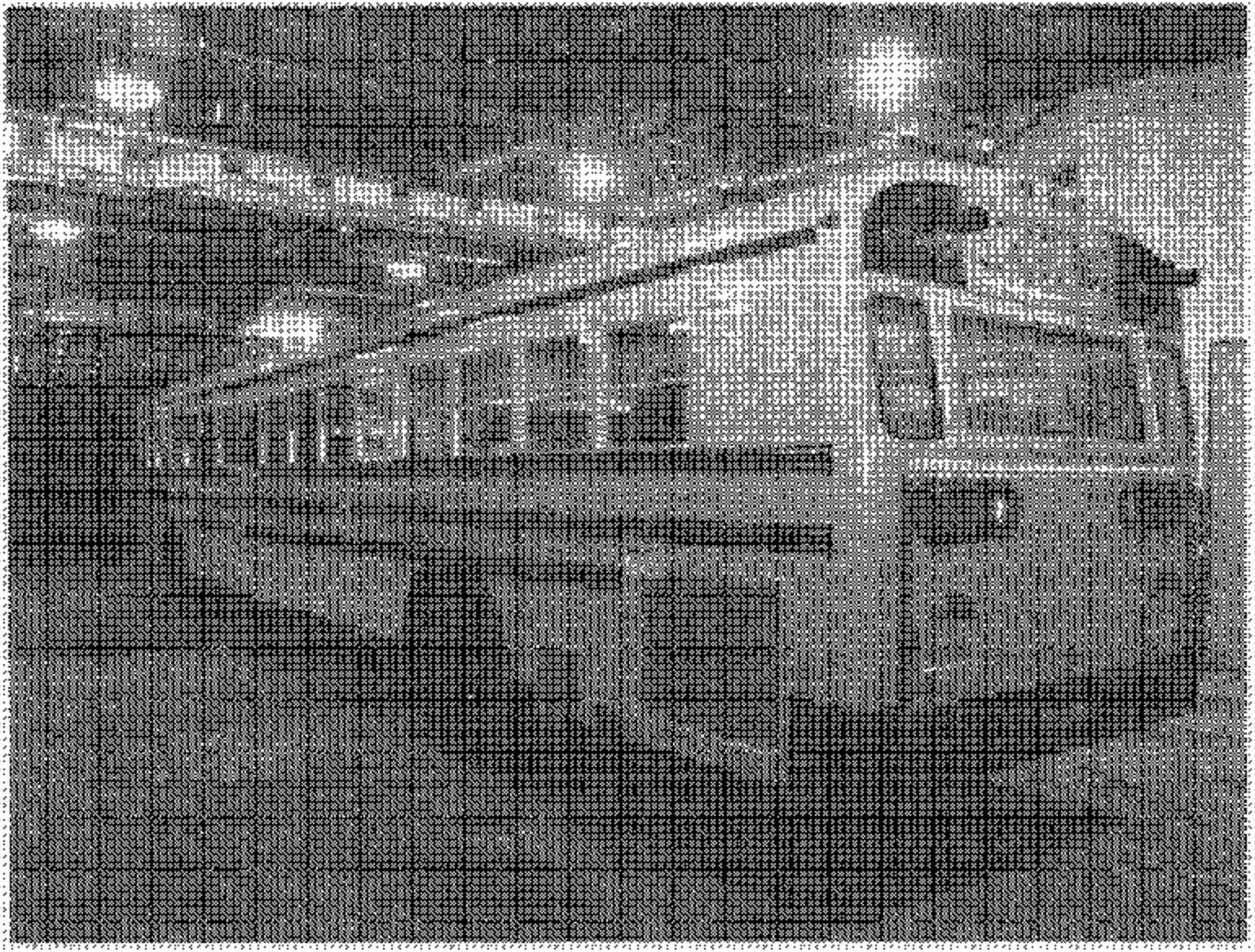
Pre-Test Right Front ¾ View of School Bus

Test Vehicle: 2003 Blue Bird All American
Procedure: FMVSS 301 Side Impact Test Test Date: April 23, 2003



Post Test Right Front ¾ View of Center Bus

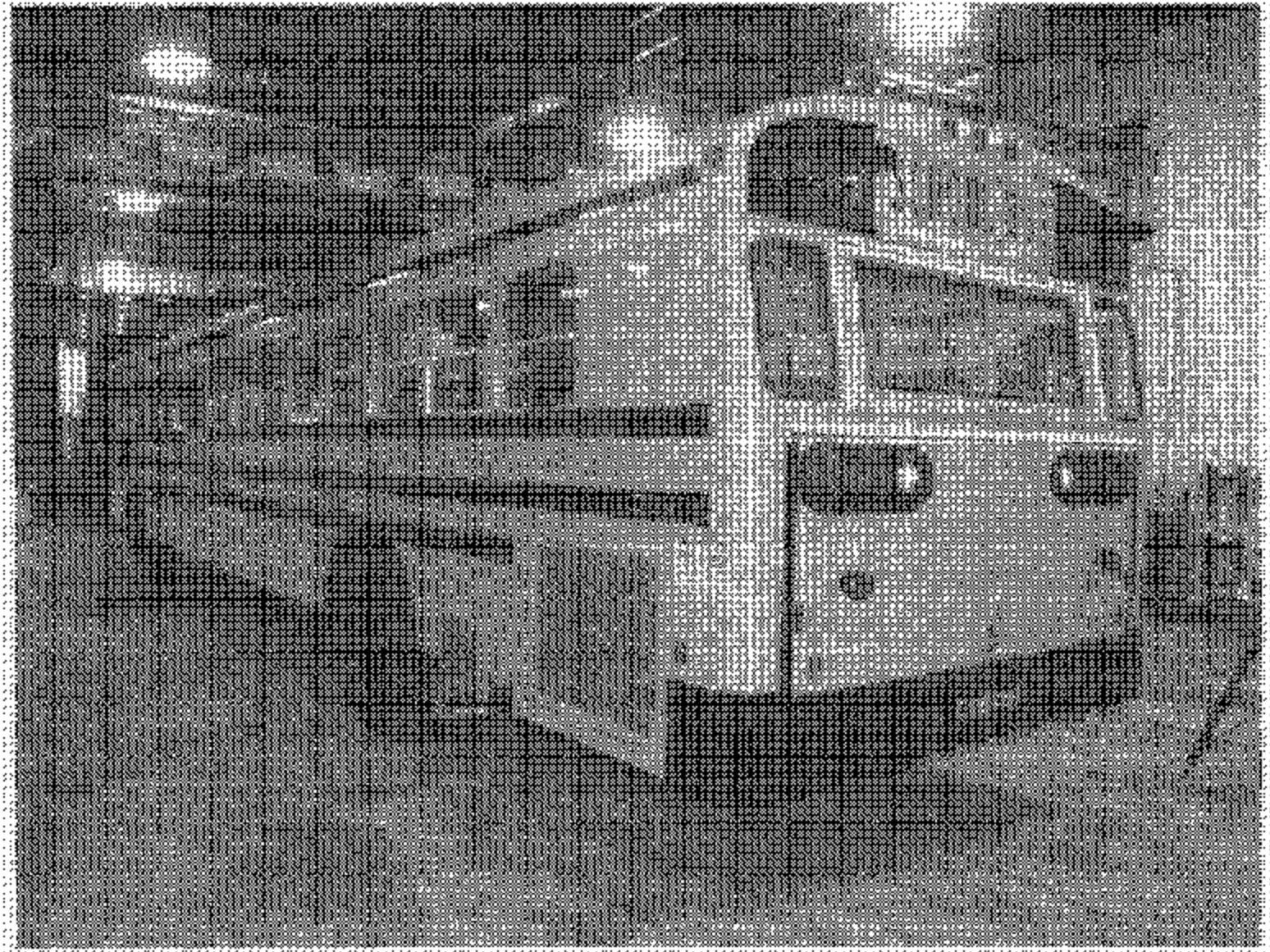
Test Vehicle: 2003 Blue Bird All American
Procedure: FMVSS 301 Side Impact Test
Test Date: April 23, 2003



Pre-Test Left Rear ¾ View of School Bus

Test Vehicle: 2003 Blue Bird All American
Procedure: FMVSS 301 Side Impact Test

Test Date: April 23, 2003



Post-Test Left Rear ¾ View of School Bus

Test Vehicle: **2003 Blue Bird All American**
Procedure: **FMVSS 301 Side Impact Test**

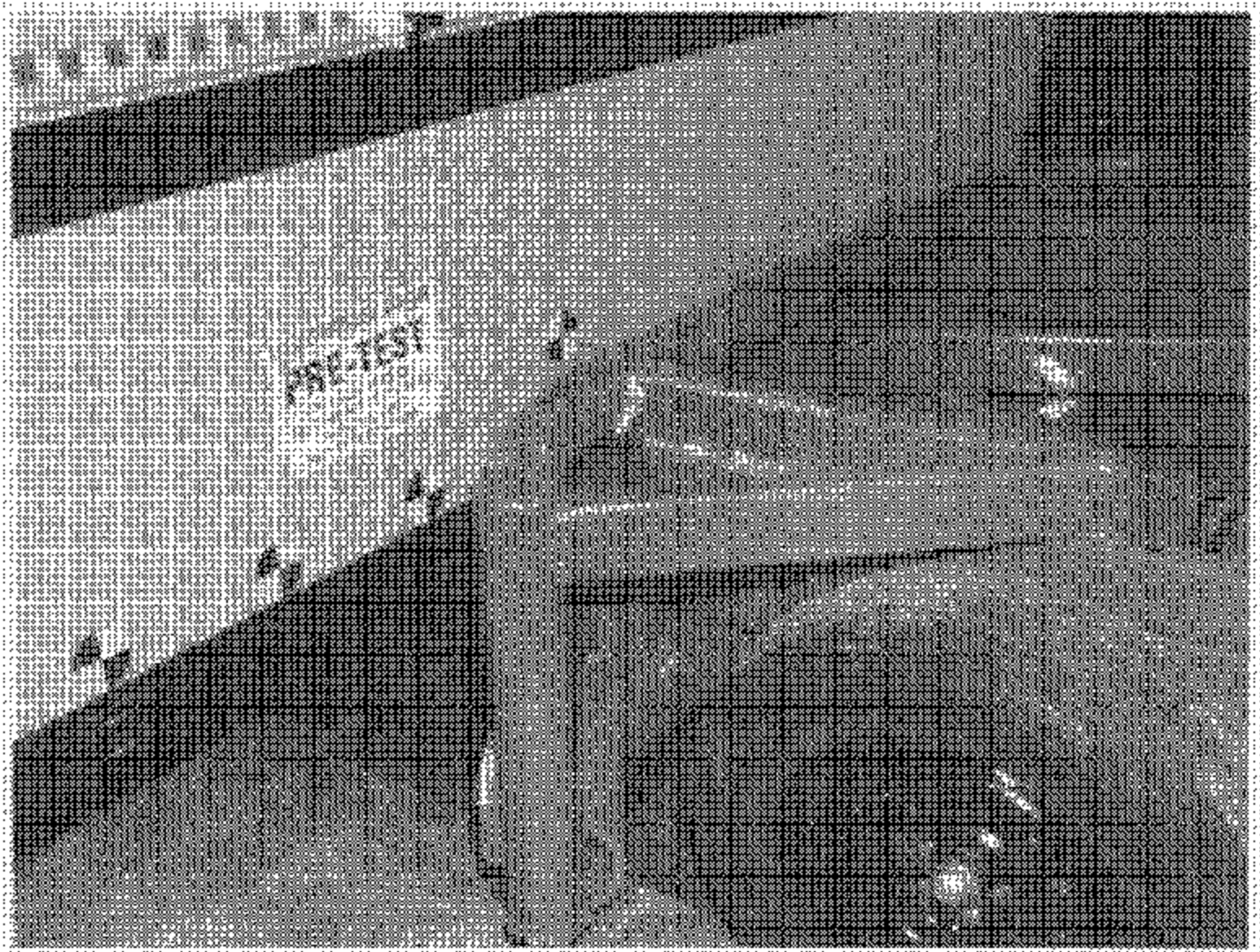
Test Date: **April 23, 2003**

Vehicle Certification and Tire Information Label

Test Vehicle: 2003 Blue Bird All American

Procedure: FMVSS 301 Side Impact Test

Test Date: April 23, 2003

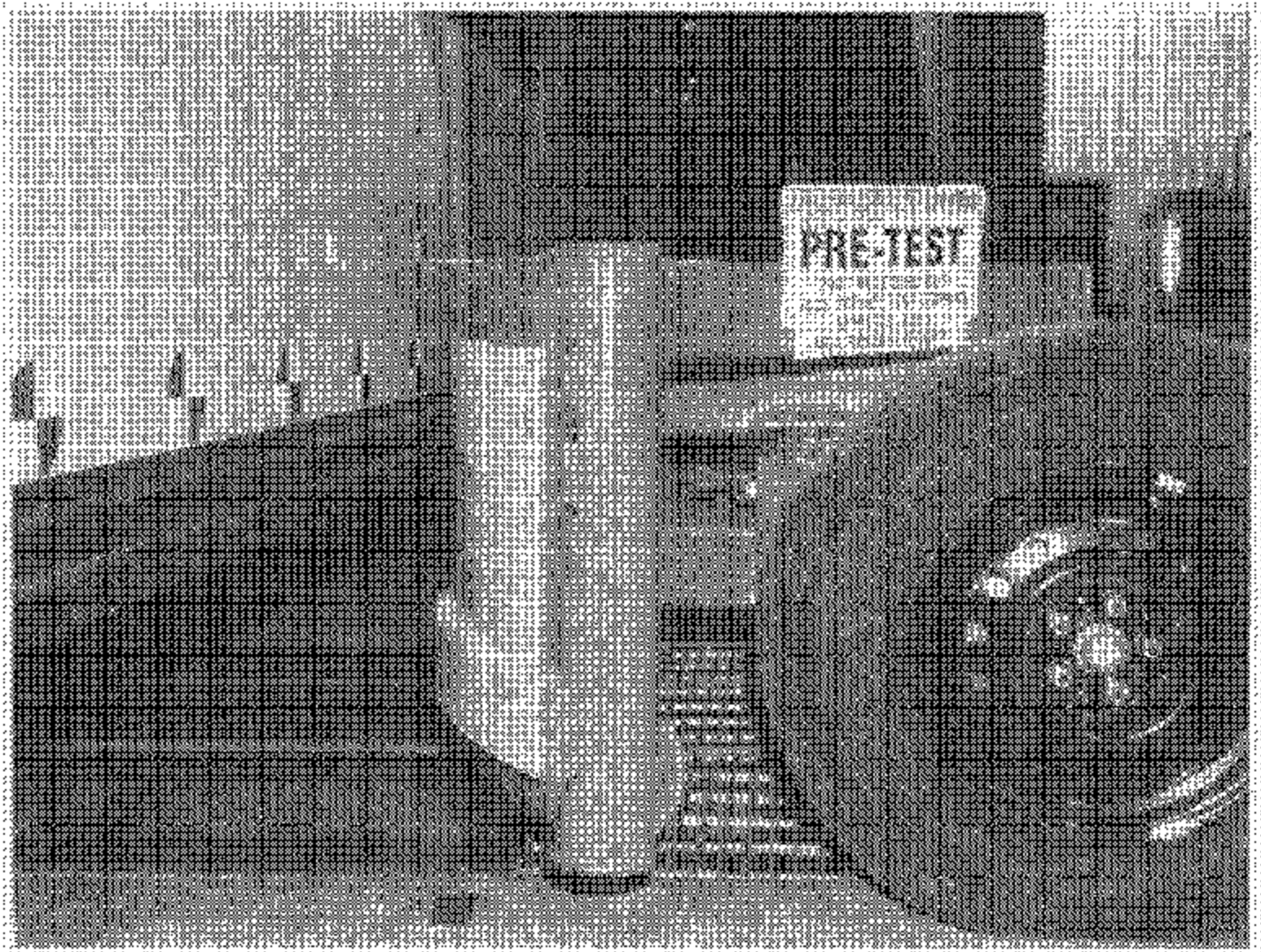


Pre-Test Impact Target

Test Vehicle: 2003 Blue Bird All American
Procedure: FMVSS 301 Side Impact Test Test Date: April 23, 2003

Post-Test of Impact Location

Test Vehicle: 2003 Blue Bird All American
Procedure: FMVSS 301 Side Impact Test Test Date: April 23, 2003

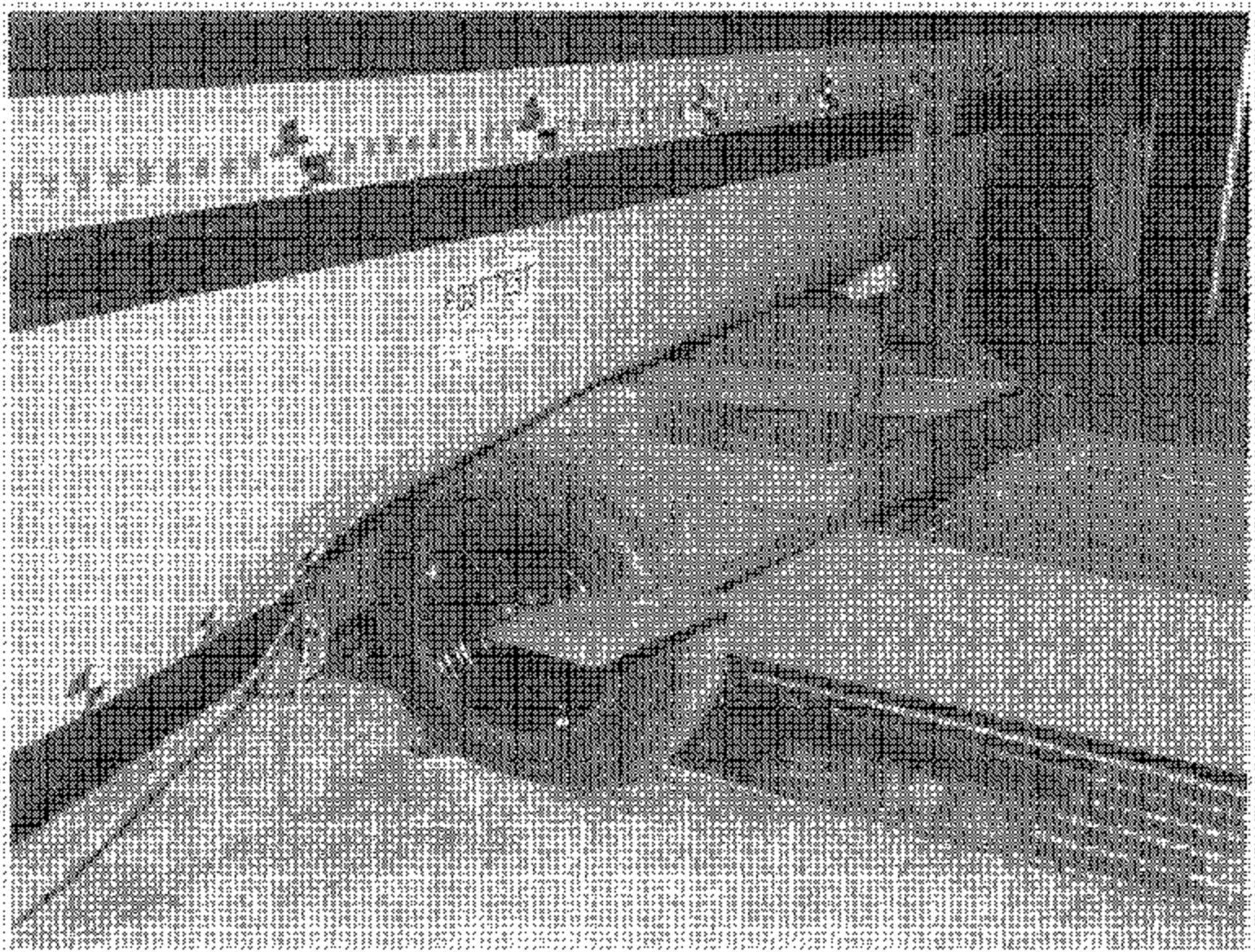


Pre-Test of Barrier (left side)

Test Vehicle: 2003 Blue Bird All American

Procedure: FMVSS 301 Side Impact Test

Test Date: April 28, 2003

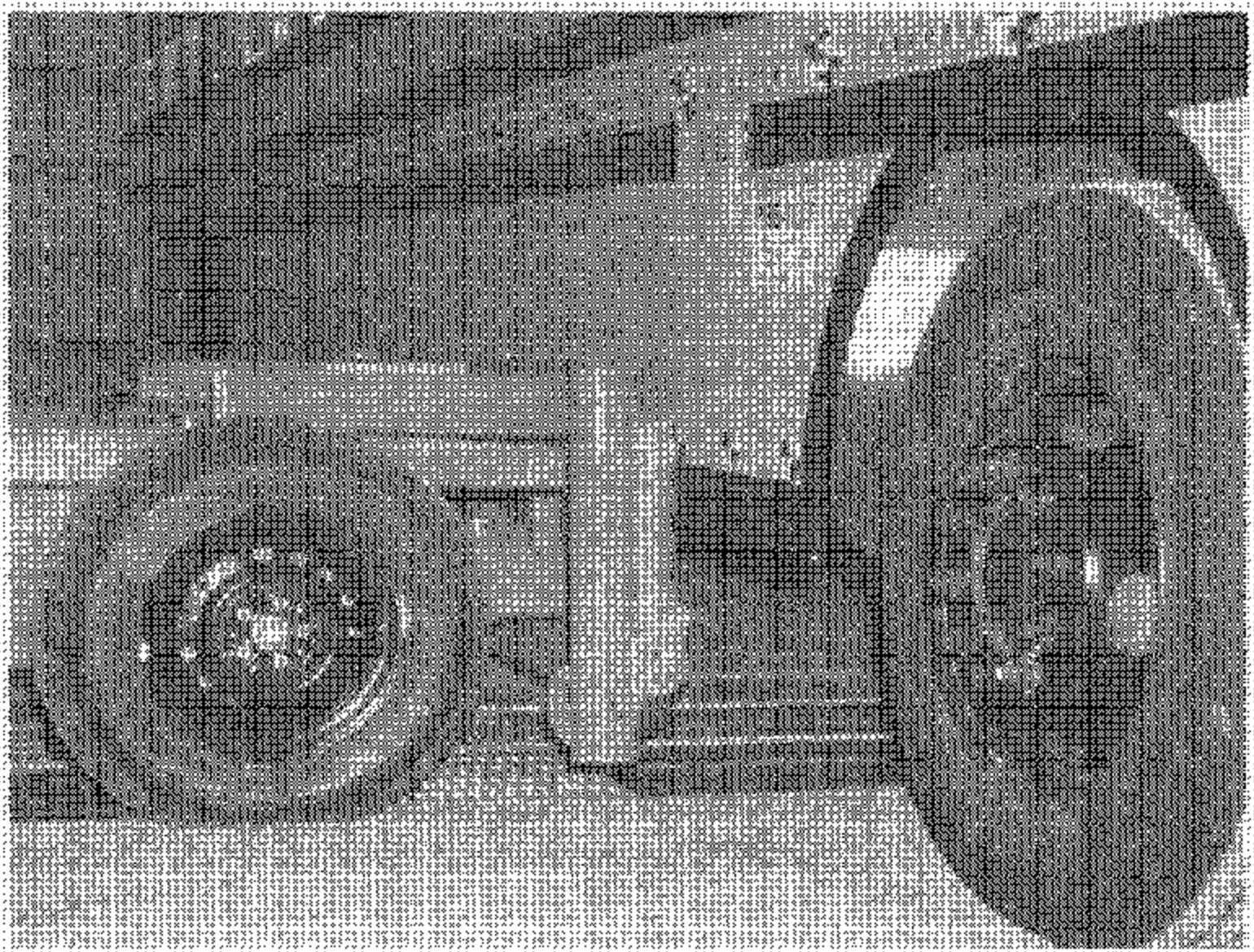


Post-Test of Barrier (left side) Penetration

Test Vehicle: 2003 Blue Bird All American

Procedure: FMVSS 301 Side Impact Test

Test Date: April 23, 2003

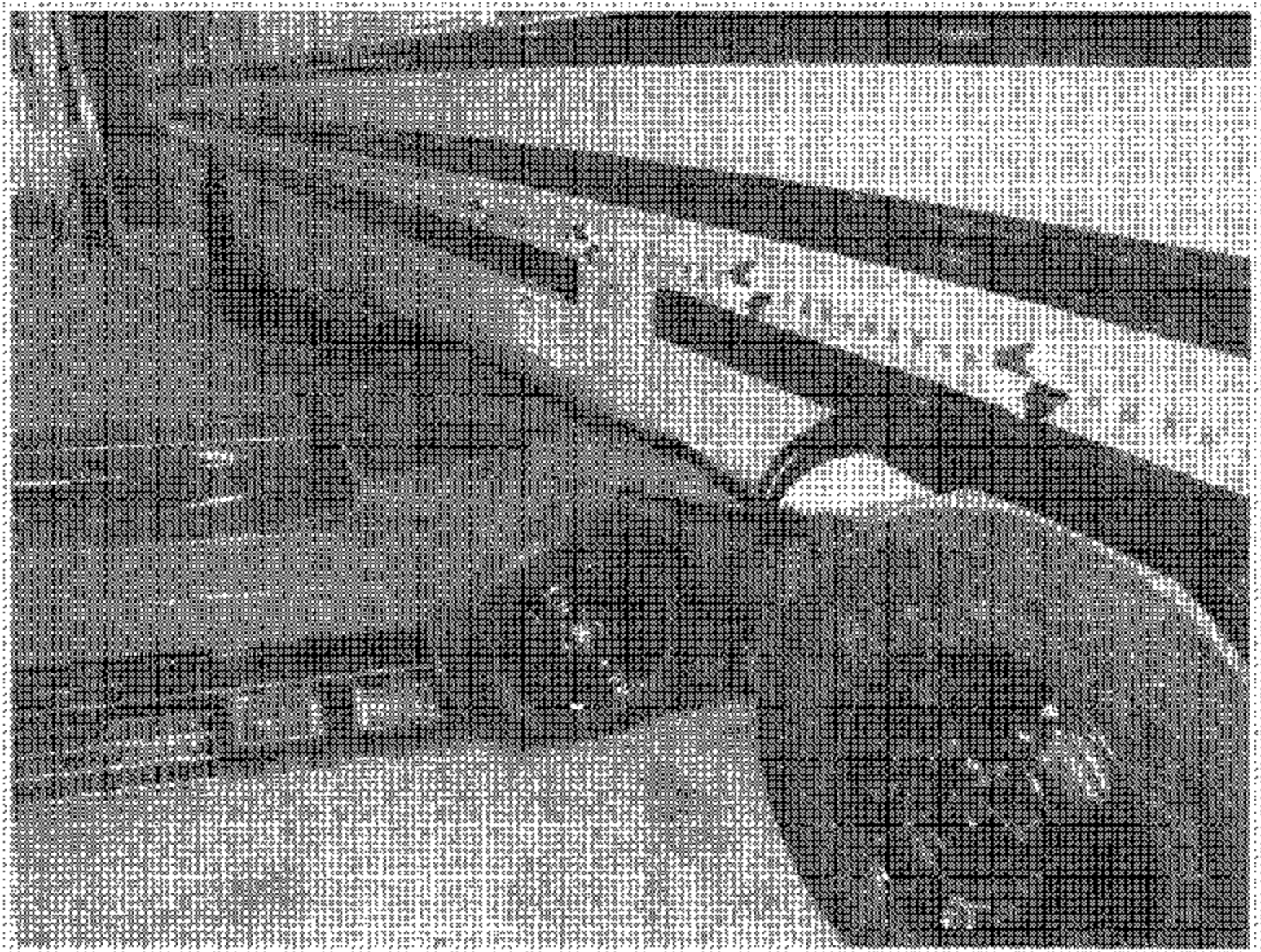


Pre-Test of Barrier (right side)

Test Vehicle: 2005 Blue Bird All American

Procedure: FMVSS 301 Side Impact Test

Test Date: April 23, 2003

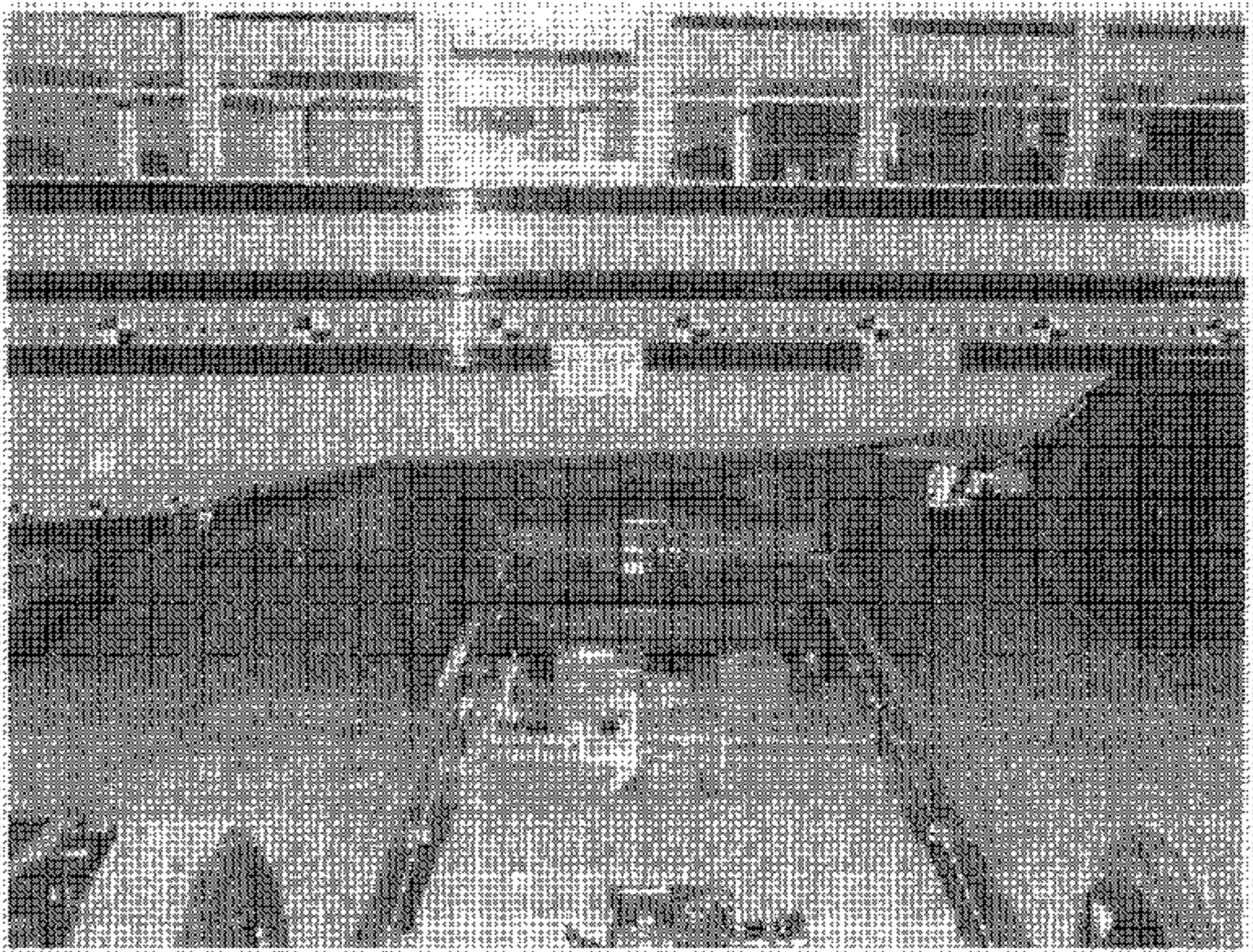


Post Test of Barrier (right side)

Test Vehicle: 2003 Bike Bird All American

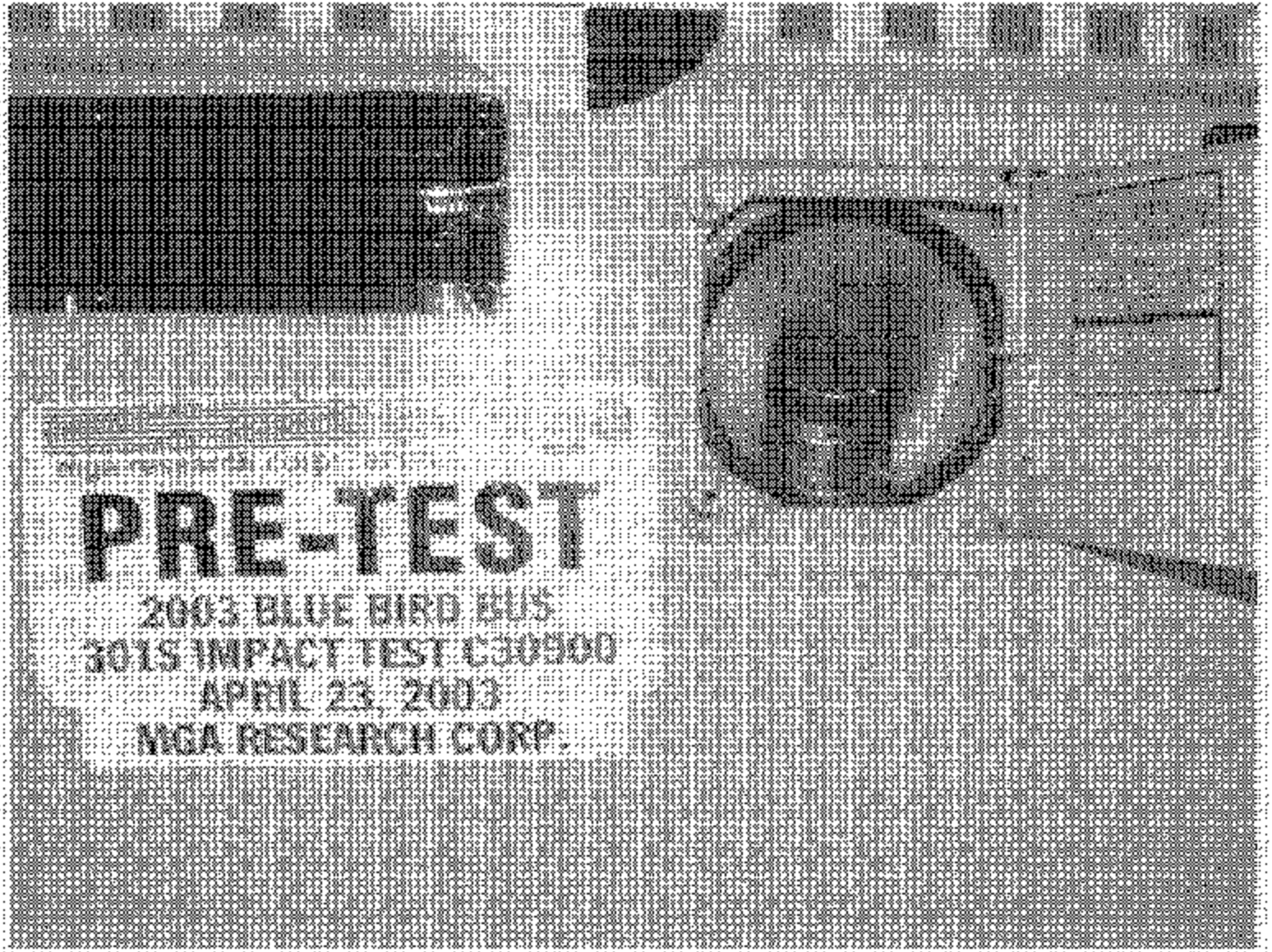
Procedure: FMVSS 301 Side Impact Test

Test Date: April 23, 2003



Post-Test of Barrier Penetration

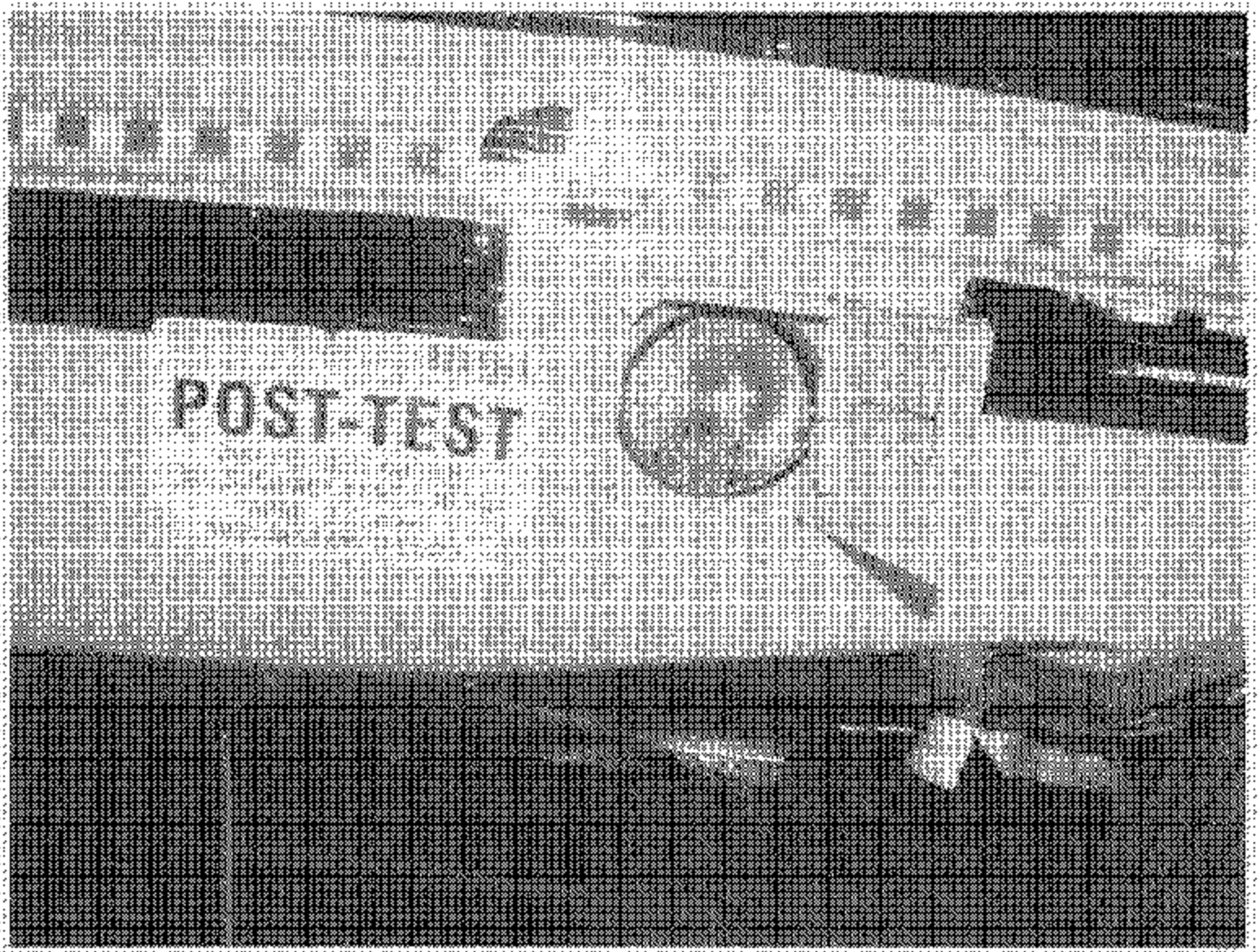
Test Vehicle: 2003 Blue Bird All American
Procedure: FMVSS 301 Side Impact Test
Test Date: April 23, 2003



Pre-Test of Fuel Cap and Tank Cage

Test Vehicle: 2003 Blue Bird All American

Procedure: FMVSS 301 Side Impact Test Test Date: April 23, 2003

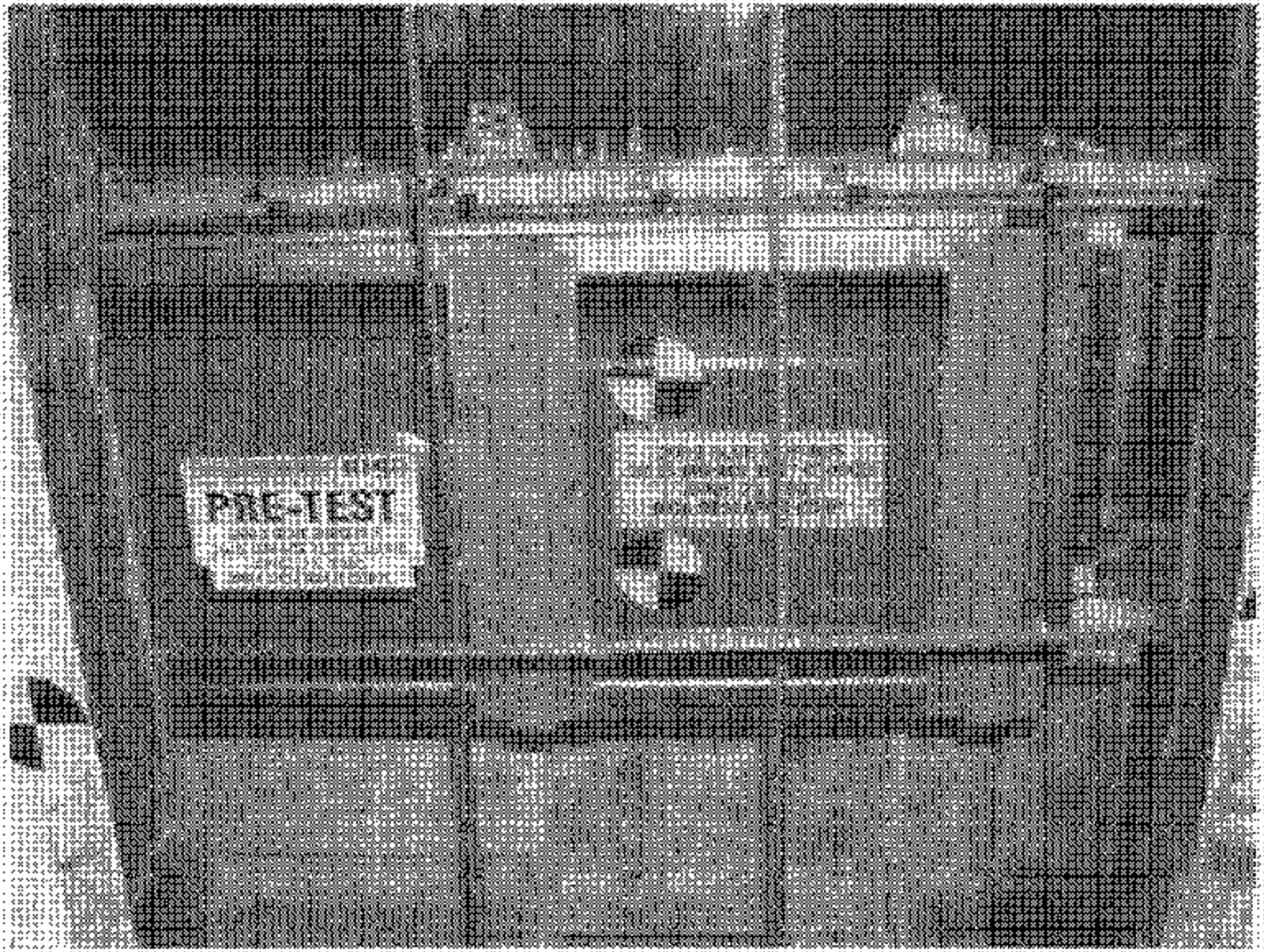


Post-Test of Fuel Cap and Tank Caps

Test Vehicle: 2003 Blue Bird All American

Procedure: FMVSS 301 Side Impact Test

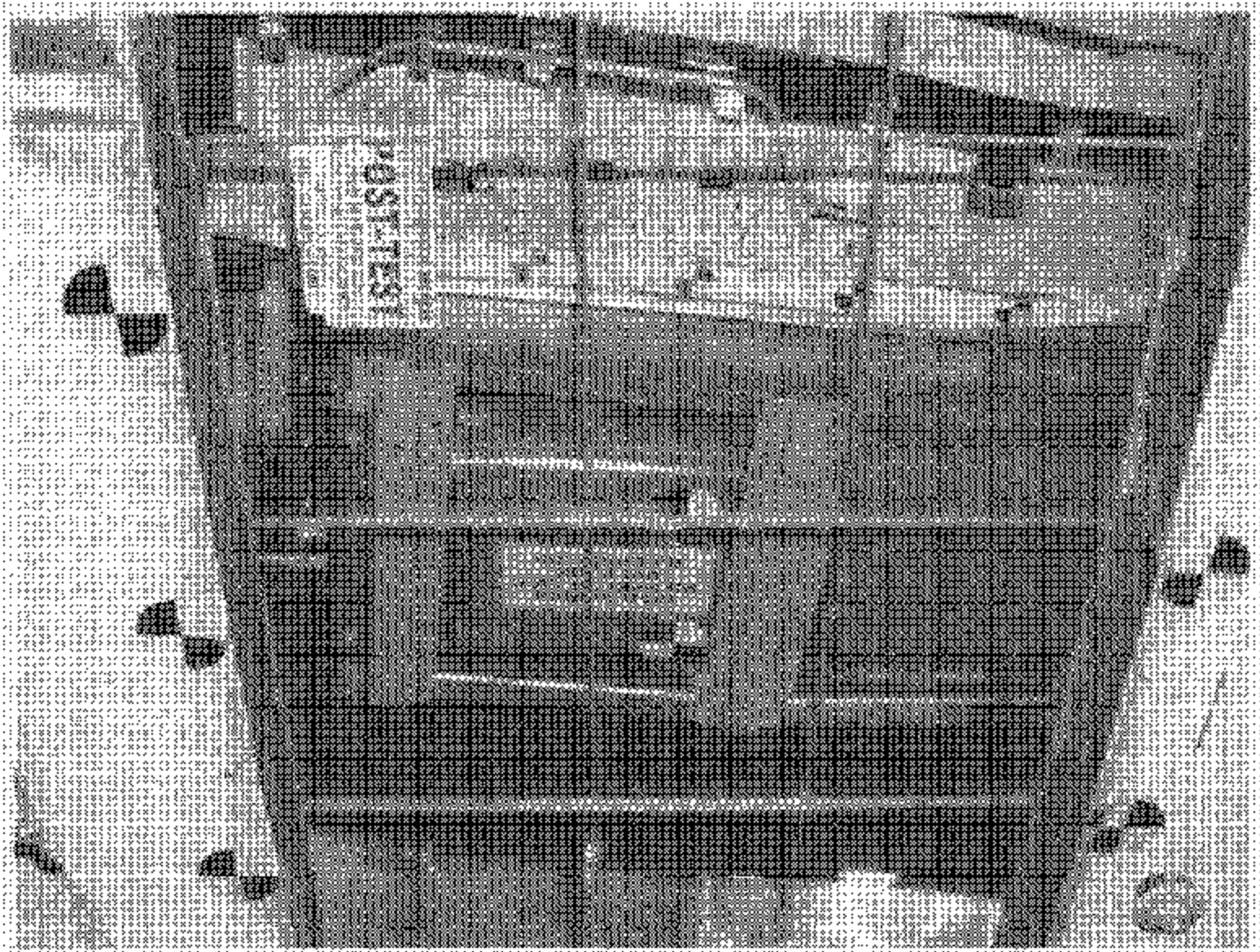
Test Date: April 23, 2003



Pre-Test of Fuel Tank Gage (View #1)

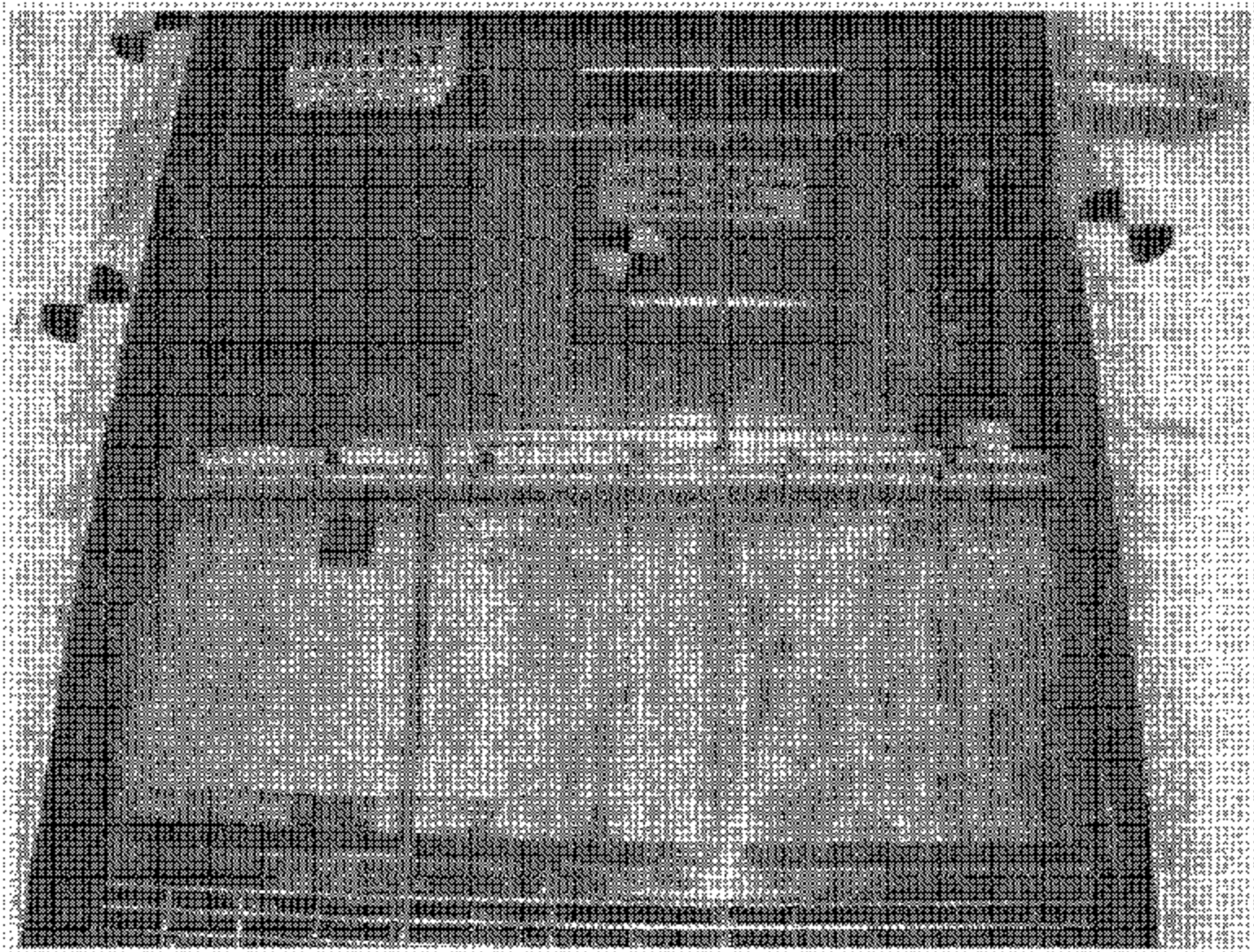
Test Vehicle: 2003 Blue Bird All American

Procedure: FMVSS 301 Side Impact Test Test Date: April 23, 2003



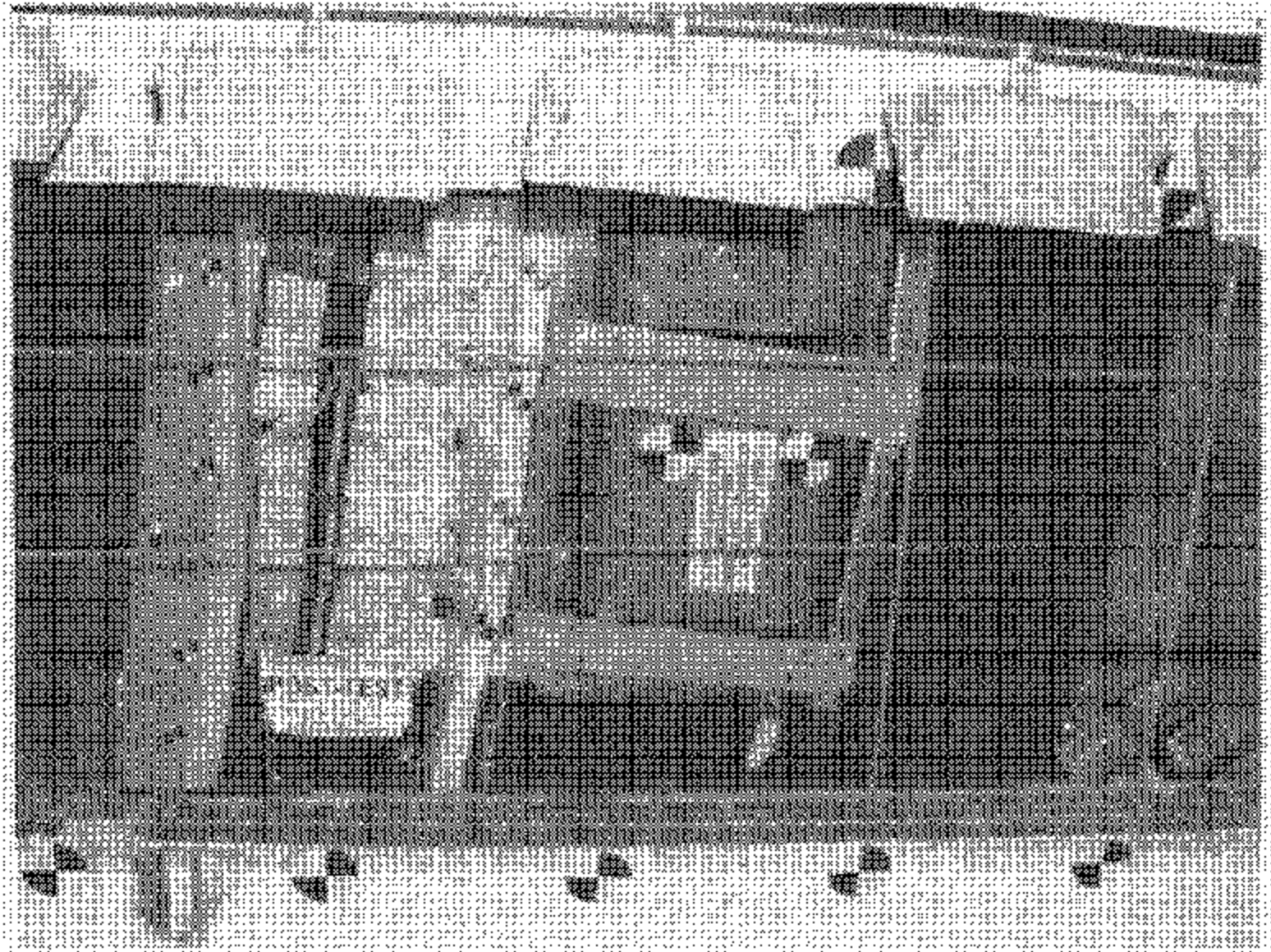
Post-Test of Fuel Tank Cage (View #1)

Test Vehicle: 2003 Blue Bird All American
Procedure: FMVSS 301 Side Impact Test
Test Date: April 23, 2003



Pre-Test of Fuel Tank Cage (View #2)

Test Vehicle: 2003 Blue Bird All American
Procedure: FMVSS 301 Side Impact Test
Test Date: April 23, 2003

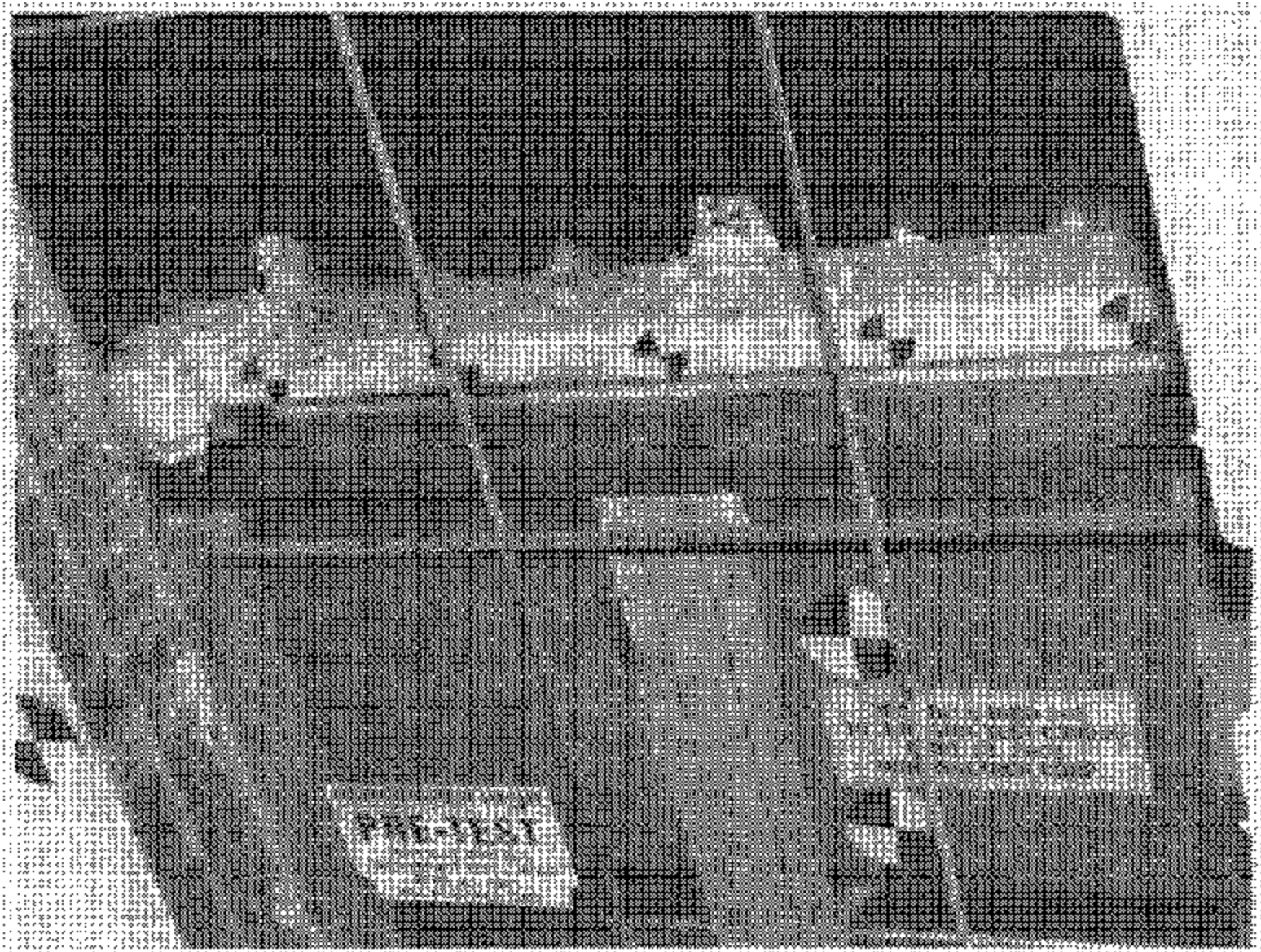


Post-Test of Fuel Tank Cage (View #2)

Test Vehicle: 2003 Blue Bird All American

Procedure: FMVSS 301 Side Impact Test

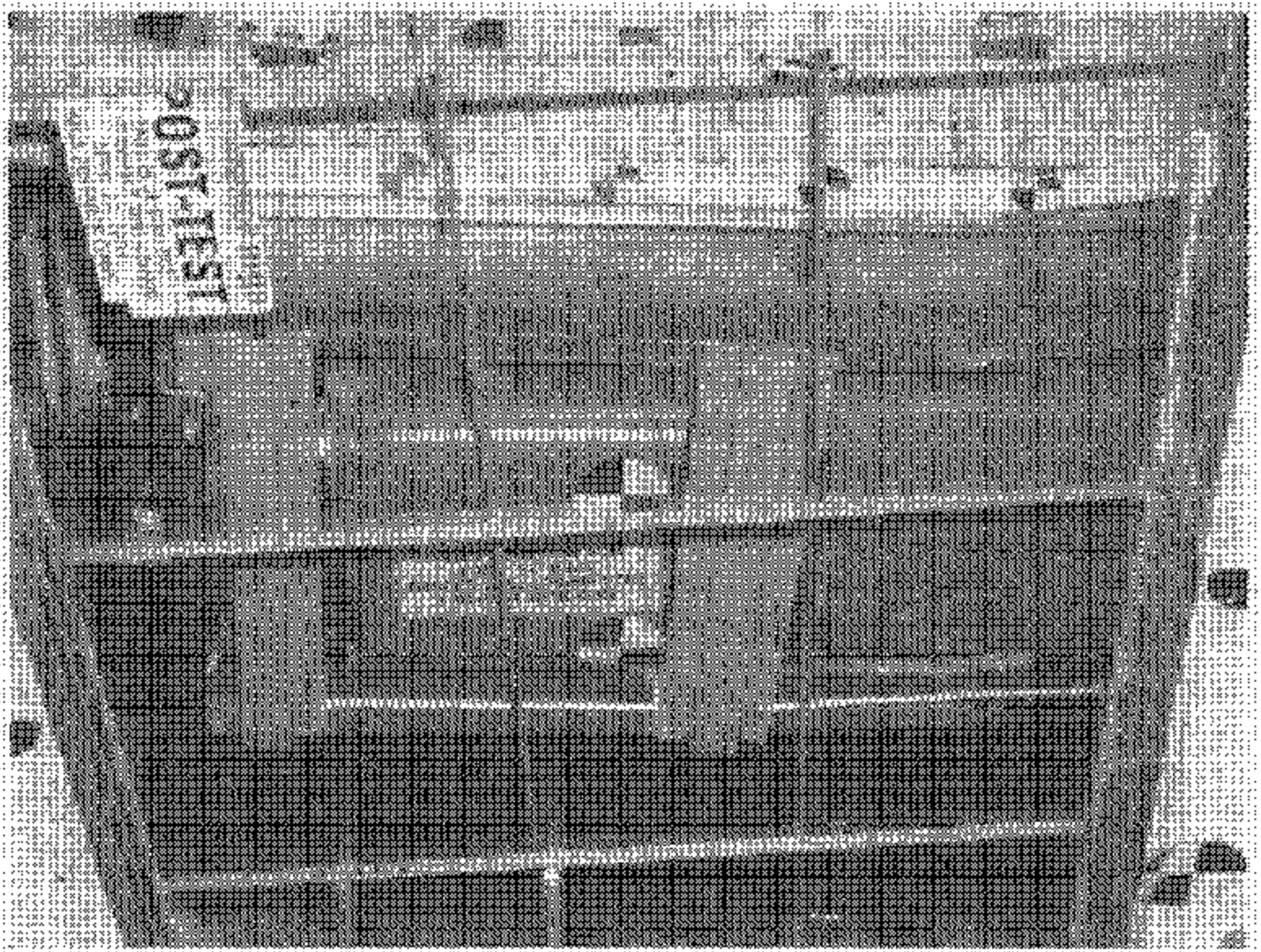
Test Date: April 23, 2003



Pre-Test of Fuel Tank Cage (View #6)

Test Vehicle: 2003 Blue Bird All American

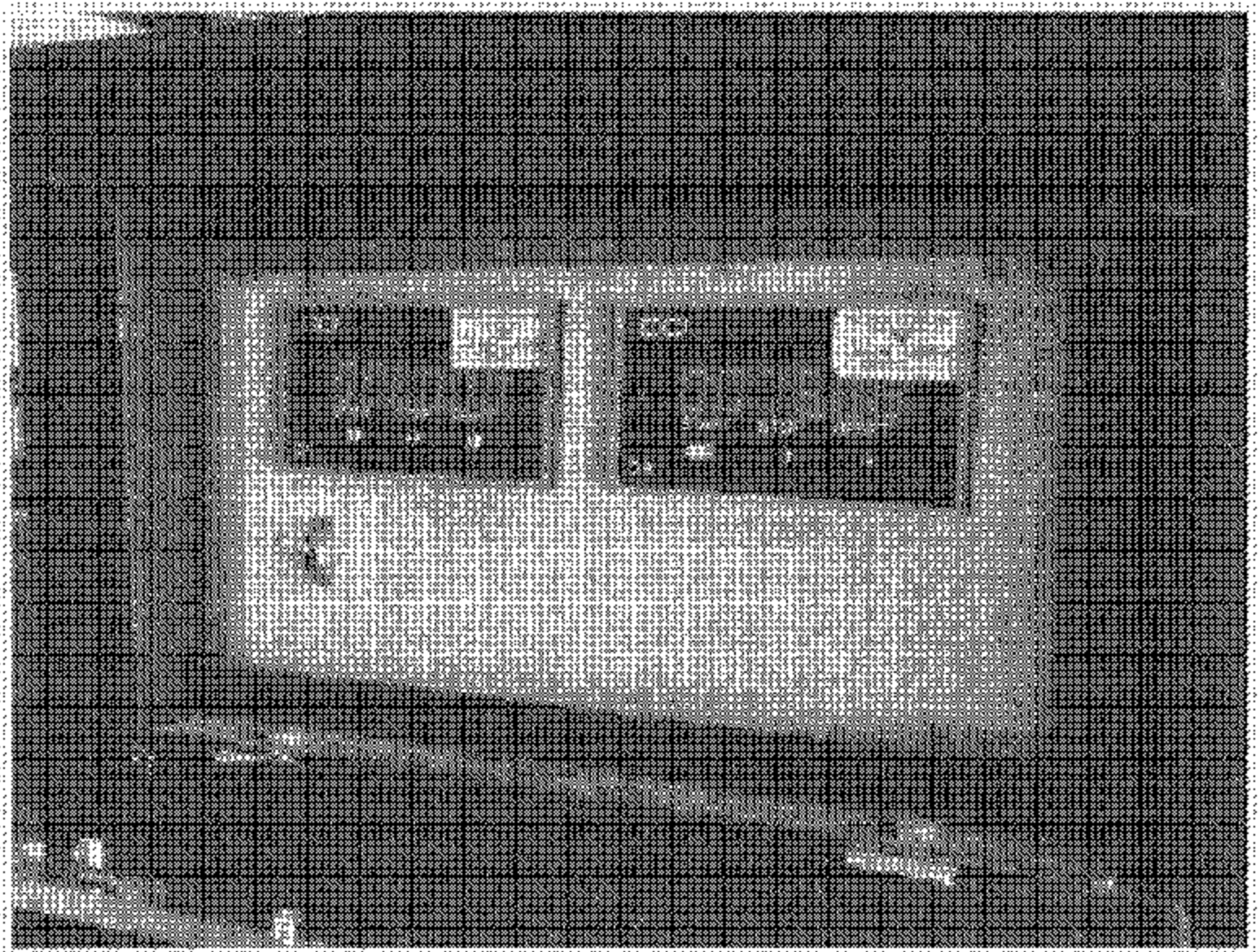
Procedure: FMVSS 301 Side Impact Test Test Date: April 23, 2003



Post-Test of Fuel Tank Cage (View #3)

Test Vehicle: 2003 Blue Bird All American

Procedure: FMVSS 301 Side Impact Test Test Date: April 22, 2003

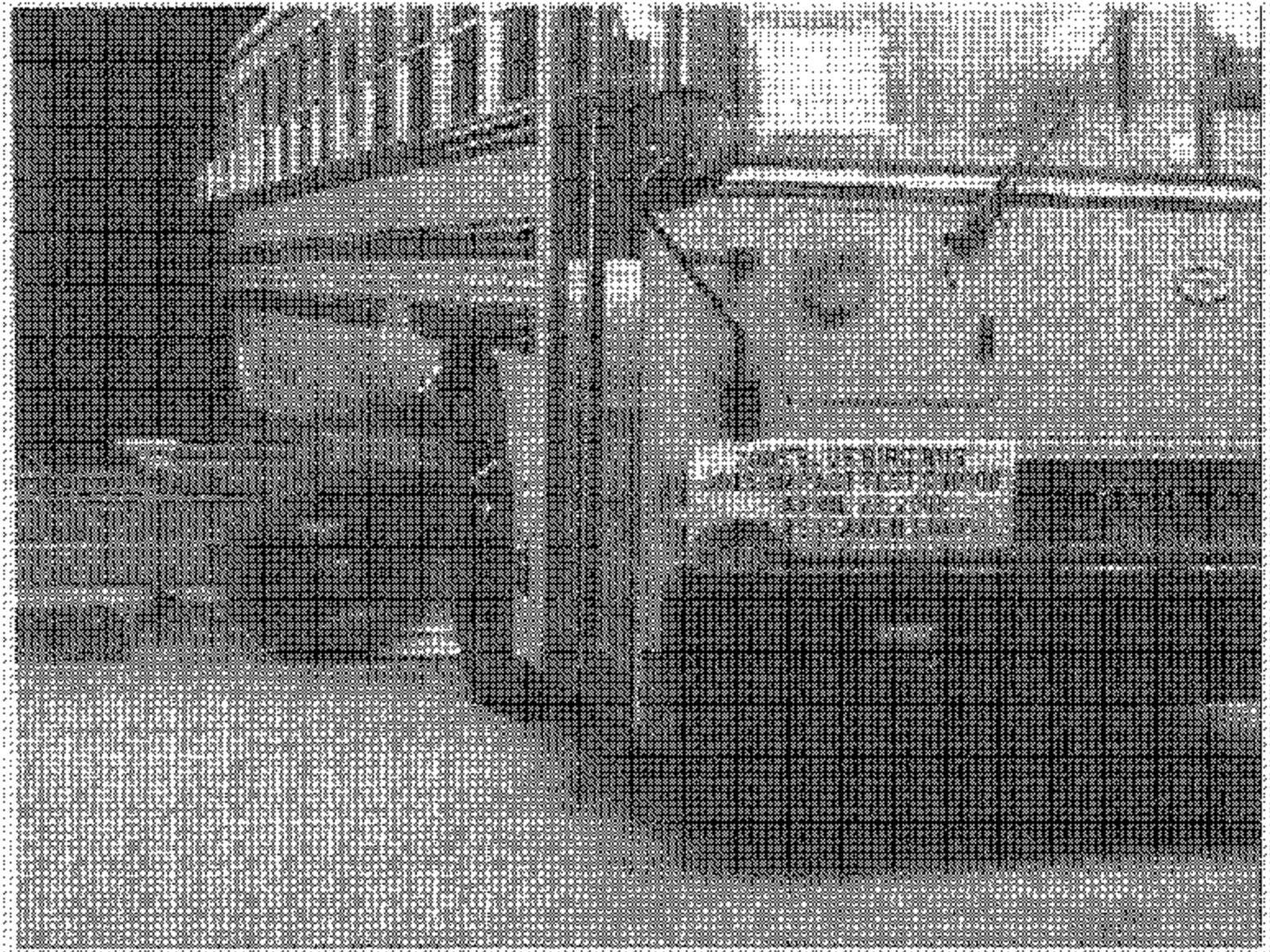


Speed Trap Counter Display

Test Vehicle: 2003 Blue Bird All American

Procedure: FMVSS 301 Side Impact Test

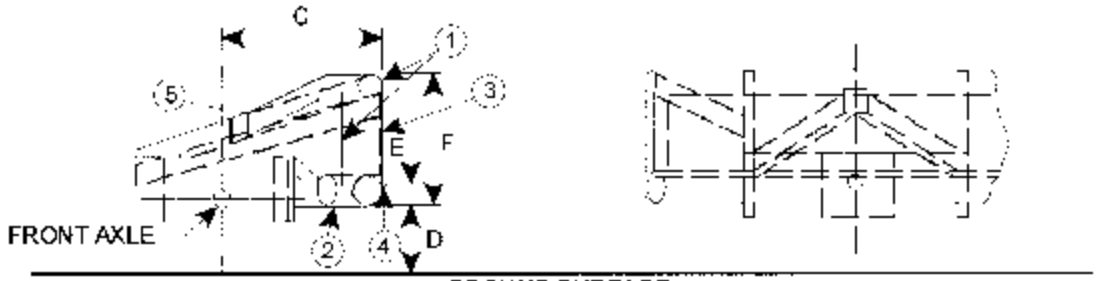
Test Date: April 23, 2003



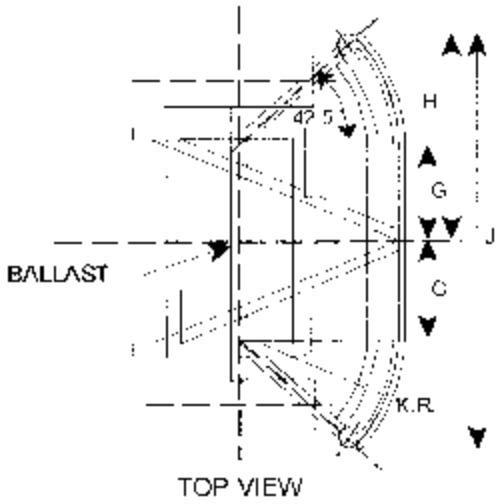
Impact

SECTION 6
BARRIER INFORMATION

CONTOURED IMPACT SURFACE FOR COMMON CARRIAGE



SIDE VIEW FRONT VIEW



TOP VIEW

DIMENSIONS SHOWN IN TABLE ON NEXT PAGE

NOTES:
1. Upper Frame 4.0 in. dia x 0.25 in. wall (102 mm dia x 6 mm wall) Steel Tubing (3 Sides)
2. Lower Frame 6.0 in. dia x 0.50 in. wall (152 mm dia x 13 mm wall) Steel Tubing
3. Face Plate 0.75 in. (19 mm) thick cold rolled steel
4. Leading Edge 1.0 s 4.0 in. (25 x 102 mm) steel band, sharp edges broken
5. All Inner Reinforcements 4.0 x 2.0 x 0.19 in. (102 x 51 x 5 mm) steel tubing

Total Weight = 4,000 ± 50 lbs (1,814.1 ± 22.7 kg)
Weight at each Rear Wheel =
900 ± 25 lbs (408.2 ± 11.3 kg)
Weight at each Front Wheel =
1,100 ± 25 lbs (499.0 ± 11.3 kg)
Moments of Inertia:
I_x = 271 ± 13.6 slug-ft^2 (367 ± 18.4 kg-m^2)
I_z = 3,475 ± 174 slug-ft^2 (4,711 ± 236 kg-m^2)

DIMENSIONS FOR CONTOURED IMPACT SURFACE

LETTER	INCHES	MILLIMETERS
A	54.0	1372
B	15.8	401
C	30.0	762
D	5.25	133
E	3.75	95
F	24.75	629
G	18.0	457
H	39.0	991
J	78.0	1981
K	30.0	762

S.E.A., Inc. VIMF

Vehicle Inertia Mesurement Facility

Test Date 04-01-2003 *Year* 2003 *Project #* MGA *VIMF Test #* 1750
Date Printed 04-01-2003 *Make* MGA *VIN* *Track Width* 1527.8
Model FMVSS 301 *Roof Height* 769.6
Description Bias cart, Tire pressure RF 26 ps., LF, RR, LR 24 psi *Wheel Base* 3044.2

Load

Left Front	*Right Front*	*Front Pressure*
496.3	496.2	0.0
401.7	401.3	0.0
Left Rear	*Right Rear*	*Rear Pressure*

Lateral CG 0 *mm*

Long. CG = 1362 *mm*

Total Weight 1794.4

Tire Description Goodyear Power Steak G78 15

Applied Weights (kg)	*Platform Angle (deg)*	*Motion Relative to Platform (mm)*	*CG Height (mm)*
0.0	0.047	0.000	0.0
197.1	4.982	-0.413	401.0
396.9	7.751	-0.835	401.1
197.1	-4.982	0.464	401.0
396.0	-7.613	0.841	401.0
			401.3

SSF = 1.904

Period (sec)	*Platform Amplitude (deg)*	*Relative Motion (mm)*	*Pitch Inertia (kg-m^2)*
4.978	3.987	0.316	4540
4.978	4.113	0.350	4540
4.978	4.039	0.323	4540
			4540

Period (sec)	*Platform Amplitude (deg)*	*Relative Motion (mm)*	*Yaw Inertia (kg-m^2)*	*Roll/Yaw Product (kg m^2)*
3.266	3.119	0.229	4859	-7
3.268	3.013	0.217	4859	-6
3.265	3.121	0.229	4864	-7
			4859	**-7**

Period (sec)	*Platform Amplitude (deg)*	*Relative Motion (mm)*	*Roll Inertia (kg-m^2)*
1.103	2.795	1.269	383
1.105	2.734	1.184	383
1.105	2.648	1.171	382
			383

SE-1