HS No. 637163

REPORT NUMBER 216-GTL-04-001

SAFETY COMPLIANCE TESTING FOR FMVSS NO. 216 ROOF CRUSH RESISTANCE

HONDA OF AMERICA MFG., INC.
2004 HONDA ELEMENT, MPV
NHTSA NO. C45300

GENERAL TESTING LABORATORIES, INC.
1623 LEEDSTOWN ROAD
COLONIAL BEACH, VIRGINIA 22443

MAY 26, 2004

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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Approval Date: 5/26/04

FINAL REPORT ACCEPTANCE BY OVSC:

Accepted By: Amanda Prescott

Acceptance Date: 6/2/04

Technical Report Documentation Page

1. Report No. 216-GTL-04-001	2. Government Accession No. N/A	3. Recipient's Catalog No. N/A
4. Title and Subtitle Final Report of FMVSS 216 Compliance Testing of 2004 HONDA ELEMENT, MPV NHTSA No. C45300		5. Report Date May 26, 2004 6. Performing Organ. Code GTL
7. Author(s) Grant Farrand, Project Engineer Debbie Messick, Project Manager		8. Performing Organ. Rep# GTL-DOT-04-216-001
9. Performing Organization Name and Address General Testing Laboratories, Inc. 1623 Leedstown Road Colonial Beach, Va 22443		10. Work Unit No. (TRAIS) N/A 11. Contract or Grant No. DTNH22-01-C-11025
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Admin. Enforcement Office of Vehicle Safety Compliance (NVS-220) 400 7th Street, S.W., Room 6111 Washington, DC 20590		13. Type of Report and Period Covered Final Test Report May 17, 2004 14. Sponsoring Agency Code NVS-221
15. Supplementary Notes		
16. Abstract Compliance tests were conducted on the subject, 2004 Honda Element MPV in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-216-05 for the determination of FMVSS 216 compliance. The mounting procedure deviates from Test Procedure No. TP-216-05. Test failures identified were as follows: NONE		
17. Key Words Compliance Testing Safety Engineering FMVSS 216	18. Distribution Statement Copies of this report are available from NHTSA Technical Reference Div., Rm. 5108 (NPO-230) 400 7th St., S.W. Washington, DC 20590 Telephone No. (202) 366-4946	
19. Security Classif. (of this report) UNCLASSIFIED	21. No. of Pages 61	22. Price
20. Security Classif. (of this page) UNCLASSIFIED		

Form DOT F 1700.7 (8-72)

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SECTION 1

PURPOSE OF COMPLIANCE TEST

1.0 PURPOSE OF COMPLIANCE TEST

A 2004 Honda Element MPV was subjected to Federal Motor Vehicle Safety Standard (FMVSS) No. 216 testing to determine if the vehicle was in compliance with the requirements of the standard. The purpose of this standard is to reduce deaths and injuries due to the crushing of the roof into the occupant compartment in rollover crashes.

1.1 The test vehicle was a 2004 Honda Element MPV. Nomenclature applicable to the test vehicle are:

A. Vehicle Identification Number: 5J6YH28254L000085

B. NHTSA No.: C45300

C. Manufacturer: HONDA OF AMERICA MFG., INC.

D. Manufacture Date: 12/03

1.2 TEST DATE

The test vehicle was subjected to FMVSS No. 216 testing on May 17, 2004.

SECTION 2

COMPLIANCE TEST RESULTS SUMMARY

2.0 TEST RESULTS

All tests were conducted in accordance with NHTSA, Office of Vehicle Safety Compliance (OVSC) Laboratory Procedure, TP-216-05 and General Testing Laboratories Procedure, TP-216-05B with the following modifications requested by the COTR:

1) The vehicle was rigidly mounted in the test fixture by welding vertical supports to the vehicle jack points to prevent any vehicle movement. Chains were not used in an effort to reduce and/or eliminate "pre-stressing" of the vehicle due to the tightening of chains.

2) Dial gauges were placed at the vehicle corners and at the passenger door to track overall vehicle motion and the ability of the alternate tie-down procedure to restrict motion of the vehicle.

3) A 50th percentile male hybrid III ATD Dummy was placed in the driver's seat per the 208 test procedure with an electrical contact strip on its head and a mating contact strip on the headliner of the vehicle. This contact strip was monitored during the test to determine if the dummy head would contact the headliner.

4) Performed the roof crush test to a loading ram displacement of 230 mm.

The data for this portion of the test can be found on Data Sheet 6.

Based on the test performed, the 2004 Honda Element appears to meet the requirements of FMVSS 216.

SECTION 3

COMPLIANCE TEST DATA

3.0 TEST RESULTS

The following data sheets document the results of testing on the 2004 Honda Element.

DATA SHEET 1
FMVSS 216
SUMMARY OF RESULTS

VEH. MOD YR/MAKE/MODEL/BODY: 2004 HONDA ELEMENT MPV
VEH. NHTSA NO: C45300; VIN: 5J6YH28254L000085
VEH. BUILD DATE: 12/03 ; TEST DATE: MAY 17, 2004
TEST LABORATORY: GENERAL TESTING LABORATORIES
OBSERVERS: GRANT FARRAND, JIMMY LATANE, AMANDA PRESCOTT

A. VISUAL INSPECTION OF TEST VEHICLE

Upon receipt, inspect vehicle for completeness, function, and discrepancies or damage which might influence the testing.

RESULTS:

B. VEHICLE DATA

(1) Vehicle type as shown on certification label: MPV
(2) Vehicle UVW as recorded on Data Table 2: 1576.1 kg

C. STATIC LOAD TEST OF DRIVER SIDE OF ROOF

Minimum roof crush resistance required by FMVSS 216 for the vehicle tested:

MCCR as recorded on Data Table 2: 23,168 N

	PASS	FAIL
Maximum roof crush resistance measured during test was 69,389 N at 224.9 mm	X	

D. POST TEST VISUAL INSPECTION

Roof metal is raised upward approximately 5" in center of roof and pushed down approximately over driver's head. Driver's roof rail has been flattened from "C" pillar forward to about center of the "A" pillar. Windshield and driver door glass are shattered.

RESULTS:

REMARKS:

RECORDED BY: _____ DATE: 05/17/04

APPROVED BY: _____

DATA SHEET 2
FMVSS 216
RECEIVING INSPECTION

VEH. MOD YR/MAKE/MODEL/BODY: 2004 HONDA ELEMENT MPV
VEH. NHTSA NO: C45300; VIN: 5J6YH28254L000085
VEH. BUILD DATE: 12/03 ; TEST DATE: MAY 17, 2004
TEST LABORATORY: GENERAL TESTING LABORATORIES
OBSERVERS: GRANT FARRAND, JIMMY LATANE, AMANDA PRESCOTT

Upon receipt, the vehicle will be examined visually for completeness, function, and damage. The roof and supporting structures such as the doors and windows should be checked for proper operation and any discrepencies which may influence the testing. The vehicle will be weighed and the minimum roof crush resistance determined.

RESULTS:

(1) Unloaded Vehicle Weight (UVW)

Left Front	432.7	kg	Left Rear	370.5	kg
Right Front	429.1	kg	Right Rear	343.8	kg
Front Axle	861.8	kg	Rear Axle	714.3	kg

TOTAL UVW 1576.1 kg

(2) Vehicle type as shown on vehicle certification label: MPV

(3) Minimum Roof Crush Resistance (MCRR):

Passenger Car:

UVW x 1.5 x 9.8 = N/A N
MCRR = N/A N (UVW x 1.5 x 9.8 or 22,241 N whichever is less)

MPV, Truck or Bus:

MCRR = UVW x 1.5 x 9.8 = 23,168 N

(4) Other Comments:

REMARKS:

RECORDED BY: G. Farrand DATE: 05/17/04

APPROVED BY: D. Mesich

DATA SHEET 3
FMVSS 216
PRE-TEST PREPARATION

VEH. MOD YR/MAKE/MODEL/BODY: 2004 HONDA ELEMENT MPV
VEH. NHTSA NO: C45300; VIN: 5J6YH28254L000085
VEH. BUILD DATE: 12/03 ; TEST DATE: MAY 17, 2004
TEST LABORATORY: GENERAL TESTING LABORATORIES
OBSERVERS: GRANT FARRAND, JIMMY LATANE, AMANDA PRESCOTT

Prior to testing, the following will be accomplished:

A. Secure any convertible top, movable or removable roof structure in their weather tight positions OK

B. Close all windows OK

C. Close and lock all doors OK

D. State Side of Roof Tested Driver

E. Measure the lateral angle of the test device at sufficient points to determine that it has a 25 degree (plus zero degree, minus one degree) angle 25°

F. Measure the longitudinal angle of the loading device at sufficient points to determine that is has a 5 degree (plus zero minutes, minus 20 minutes) 5°

G. The test device will initially contact the roof at 533 mm aft of windshield

H. If the test device was relocated based on the requirements of Chapter 12.3 paragraph F, describe where the test device will initially contact the roof as relocated N/A

I. Ambient temperature 51 mm from the vehicle roof in the immediate area of the test device: 25.6 degrees C.

REMARKS:

RECORDED BY: G. Farrand DATE: 05/17/04

APPROVED BY: D. Musick

DATA SHEET 4
FMVSS 216

VEH. MOD YR/MAKE/MODEL/BODY: 2004 HONDA ELEMENT MPV
VEH. NHTSA NO: C45300; VIN: 5J6YH28254L000085
VEH. BUILD DATE: 12/03 ; TEST DATE: MAY 17, 2004
TEST LABORATORY: GENERAL TESTING LABORATORIES
OBSERVERS: GRANT FARRAND, JIMMY LATANE, AMANDA PRESCOTT

RESULTS: Plots of load versus displacement and time versus displacement showed that:

(1) The maximum roof crush resistance was 69,389 N at 224.9 mm
(2) The rate of loading was 5.08 mm/sec (.2 in/sec)
(3) The required roof crush resistance of 23,168 N was at 39.6 mm

REMARKS:

RECORDED BY: _____ DATE: 05/17/04

APPROVED BY: _____

DATA SHEET 5
FMVSS 216
POST TEST VISUAL INSPECTION

VEH. MOD YR/MAKE/MODEL/BODY: 2004 HONDA ELEMENT MPV
VEH. NHTSA NO: C45300; VIN: 5J6YH28254L000085
VEH. BUILD DATE: 12/03 ; TEST DATE: MAY 17, 2004
TEST LABORATORY: GENERAL TESTING LABORATORIES
OBSERVERS: GRANT FARRAND, JIMMY LATANE, AMANDA PRESCOTT

Upon completion of testing, a detailed visual inspection of the vehicle shall be made. Describe all damage and deformation that occurred during the test.

RESULTS: Roof metal is raised upward approximately 5" in center of roof and pushed down approximately 6" over driver's head. Driver's roof rail has been flattened from "C" pillar forward to about center of the "A" pillar. Windshield and driver door glass are shattered.

RECORDED BY: _____ DATE: 05/17/04

APPROVED BY: _____

DATA SHEET 6
FMVSS 216 MODIFIED PORTION POST TEST

VEH. MOD YR/MAKE/MODEL/BODY: 2004 HONDA ELEMENT MPV
VEH. NHTSA NO: C45300; VIN: 5J6YH28254L000085
VEH. BUILD DATE: 12/03 ; TEST DATE: MAY 17, 2004
TEST LABORATORY: GENERAL TESTING LABORATORIES
OBSERVERS: GRANT FARRAND, JIMMY LATANE, AMANDA PRESCOTT

Maximum Load Applied = 69,389 N @ 224.9 mm
Maximum Displacement = 225.8 mm @ 69,389 N

Left Front Dial Indicator Displacement = .51 mm
Right Front Dial Indicator Displacement = 3.3 mm
Left Rear Dial Indicator Displacement = 20.1 mm
Right Rear Dial Indicator Displacement = 27.7 mm
Right Door Sill Dial Indicator Displacement = 16.0 mm

NOTES:
Pre-Test dummy had 9.0 inches from top of head to headliner and 11.5 inches transverse from side of head to "B" pillar.
No contact between the dummy head and the vehicle headliner was observed during the test.

RECORDED BY: _____ DATE: 05/17/04

APPROVED BY: _____

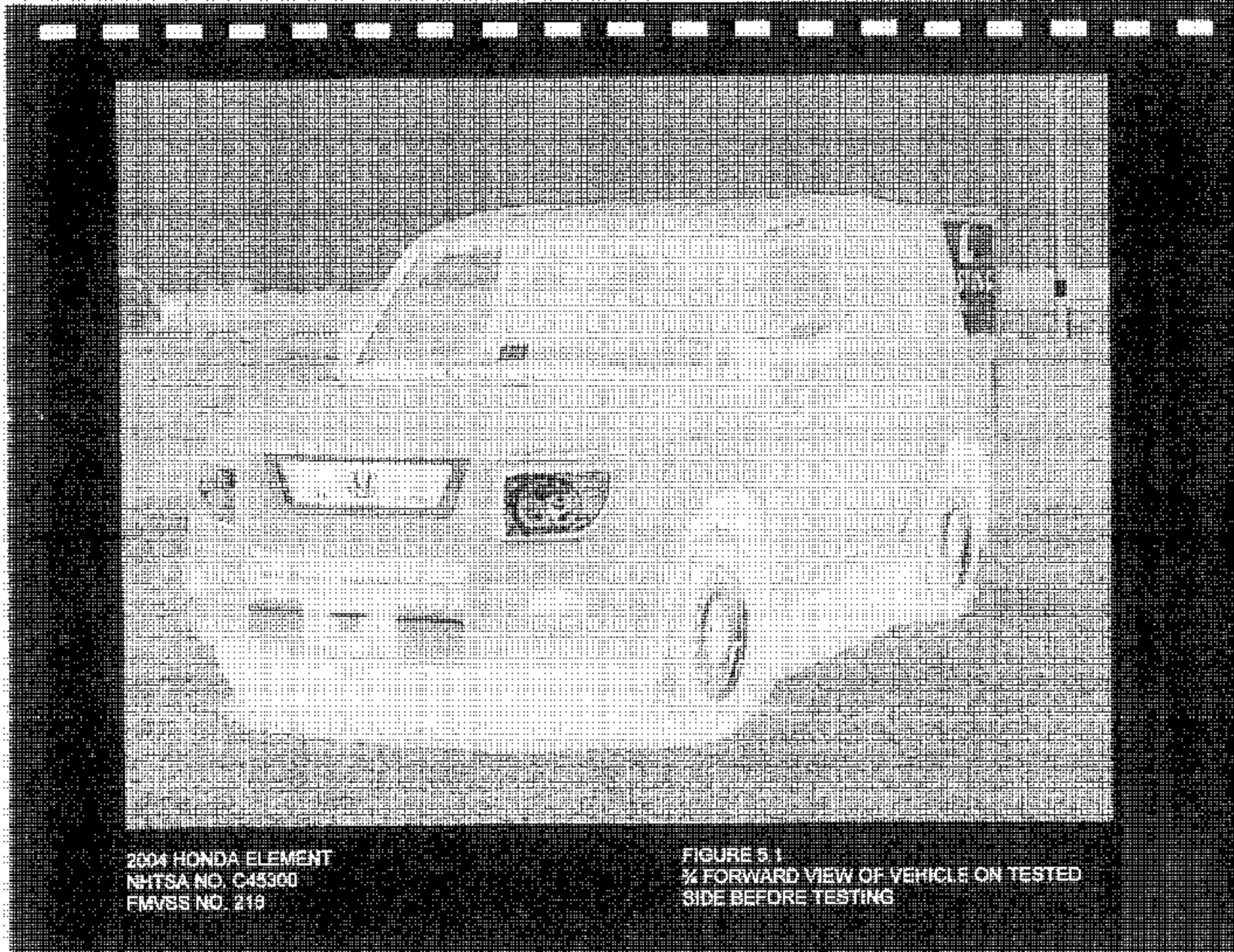
SECTION 4
INSTRUMENTATION AND EQUIPMENT LIST

TABLE 1 - INSTRUMENTATION & EQUIPMENT LIST

EQUIPMENT	DESCRIPTION	MODEL/ SERIAL NO.	CAL. DATE	NEXT CAL. DATE
COMPUTER	AT&T	486D66	BEFORE USE	BEFORE USE
TEST FIXTURE	GTL	N/A	N/A	N/A
A/D INTERFACE	METRABYTE	DAS-16(F)	BEFORE USE	BEFORE USE
SIGNAL CONDITIONER	METRABYTE	EXP-RES	BEFORE USE	BEFORE USE
LOAD CELL	REVERE	544351	11/03	11/04
DIAL INDICATOR	MITUTOYO	2424-10	BEFORE USE	BEFORE USE
LINEAR POTENTIOMETER	SERVO SYSTEMS	20/69	BEFORE USE	BEFORE USE
LINEAR POTENTIOMETER	SERVO SYSTEMS	20/70	BEFORE USE	BEFORE USE
LINEAR POTENTIOMETER	SERVO SYSTEMS	20/72	BEFORE USE	BEFORE USE
LINEAR POTENTIOMETER	ELECTRIC ASSOC. INC.	11A4A6	BEFORE USE	BEFORE USE

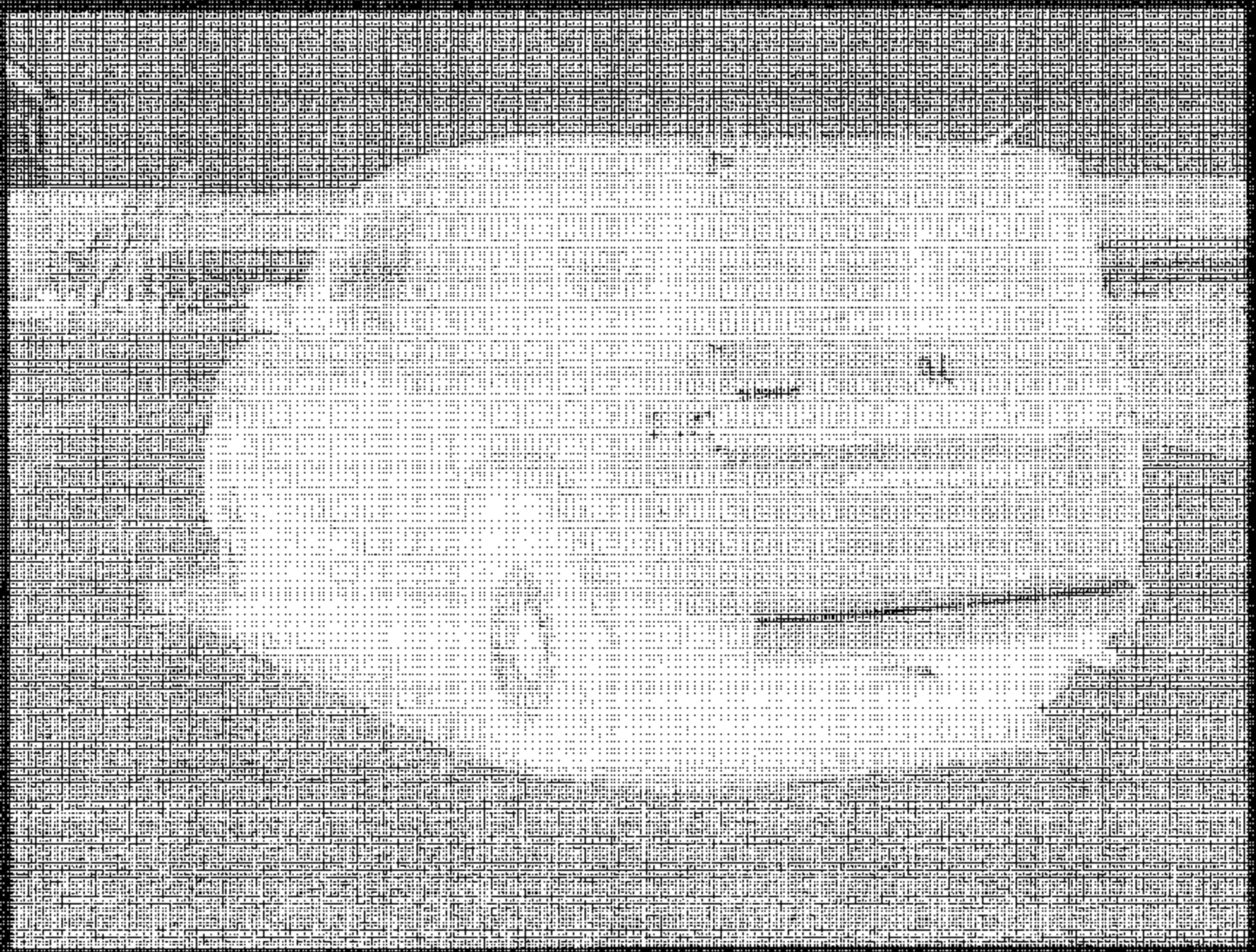
SECTION 5

PHOTOGRAPHS



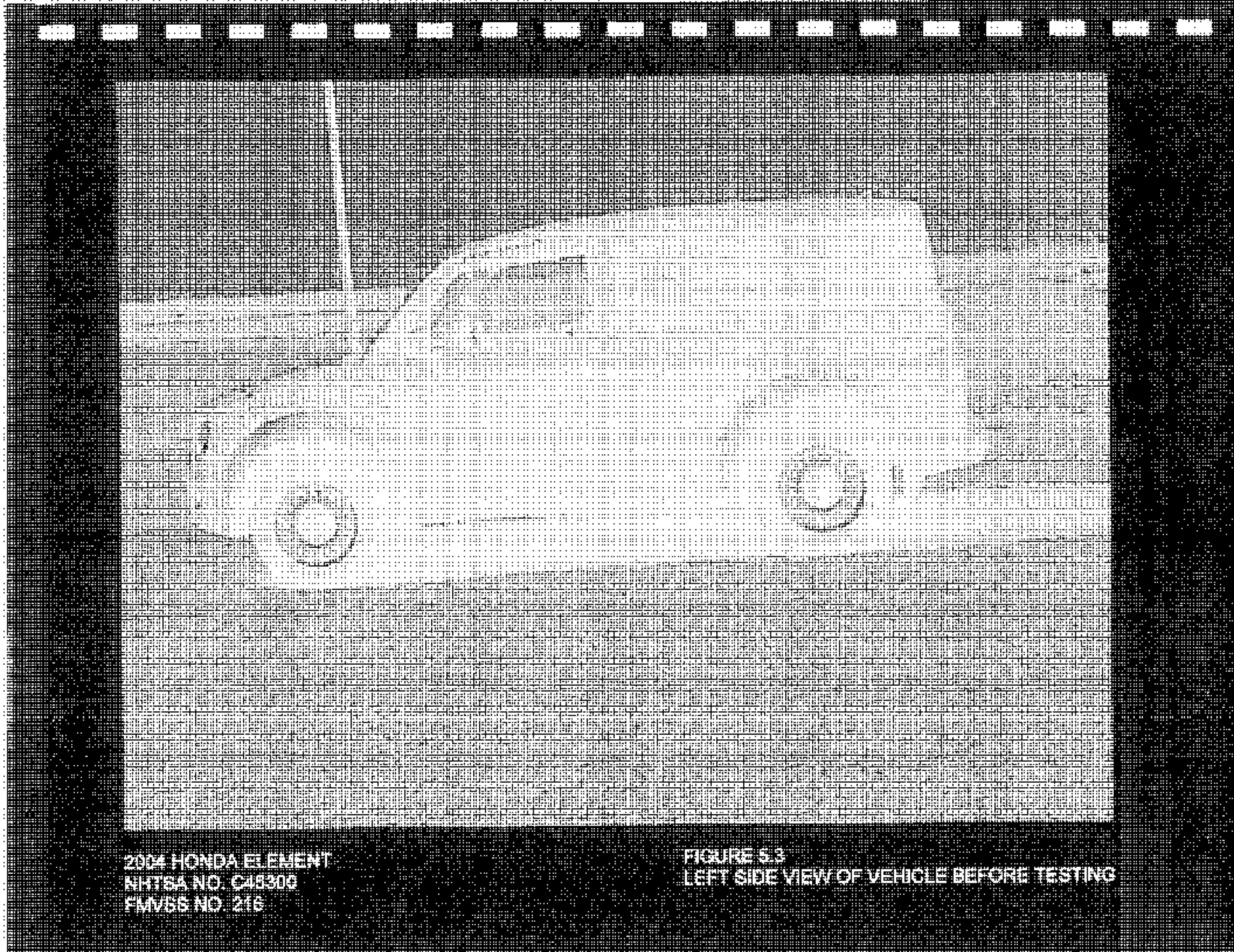
2004 HONDA ELEMENT
NHTSA NO. C45300
FMVSS NO. 216

FIGURE 5.1
¾ FORWARD VIEW OF VEHICLE ON TESTED SIDE BEFORE TESTING



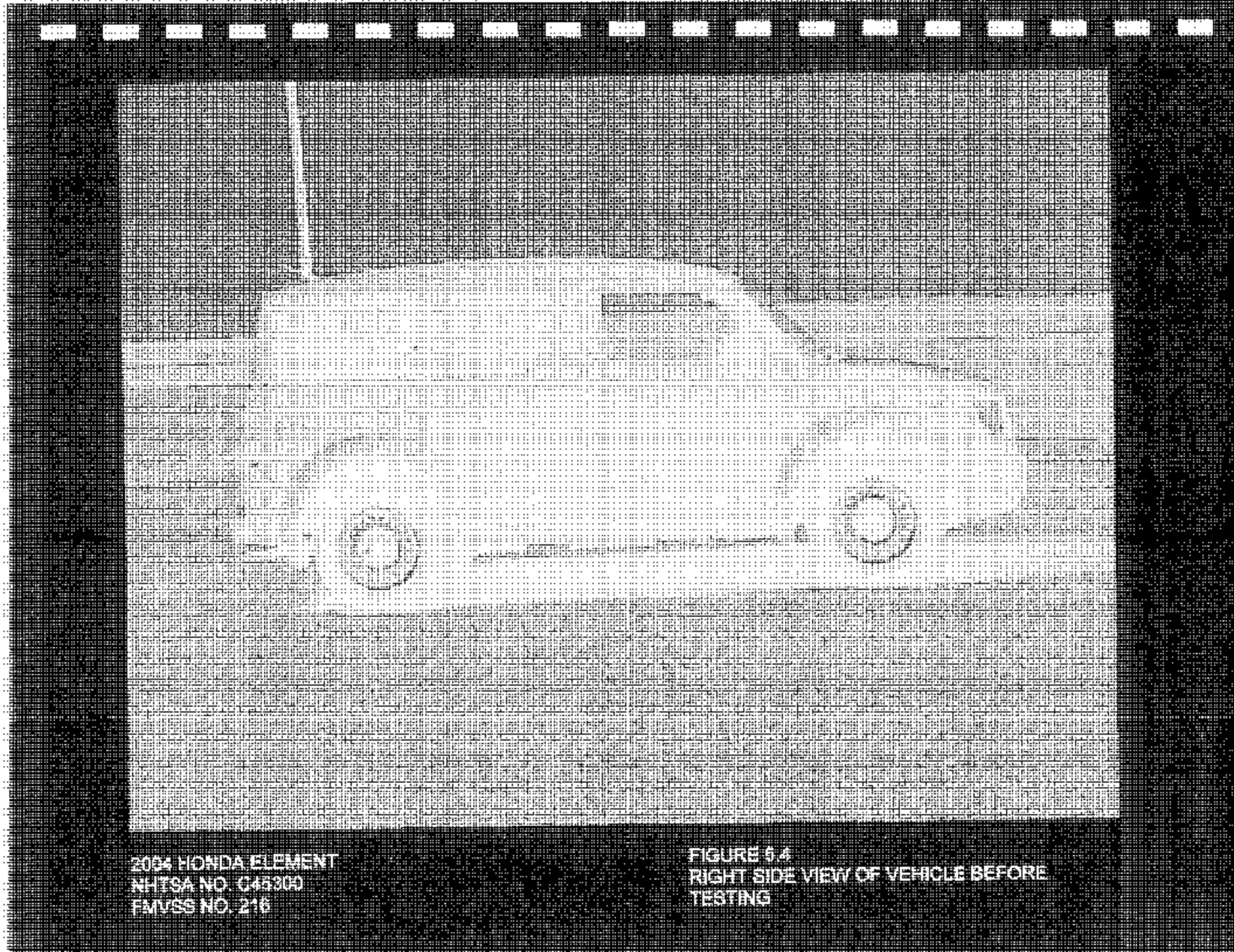
2004 HONDA ELEMENT
NHTSA NO. C46300
FMVSS NO. 216

FIGURE 3-2
¾ REARWARD VIEW OF VEHICLE ON TESTED SIDE BEFORE TESTING



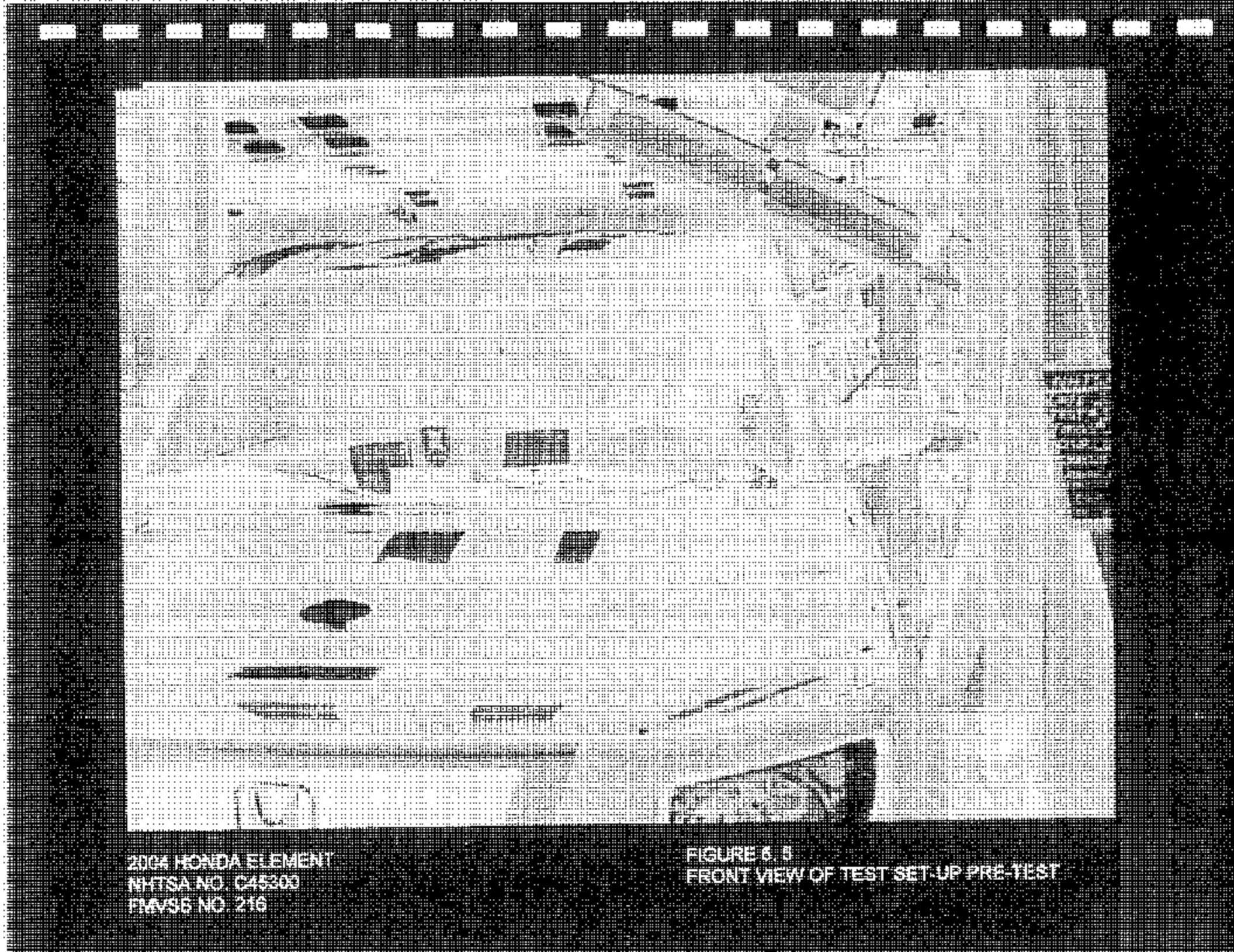
2004 HONDA ELEMENT
NHTSA NO. C#8309
FMVSS NO. 216

FIGURE 5.3
LEFT SIDE VIEW OF VEHICLE BEFORE TESTING



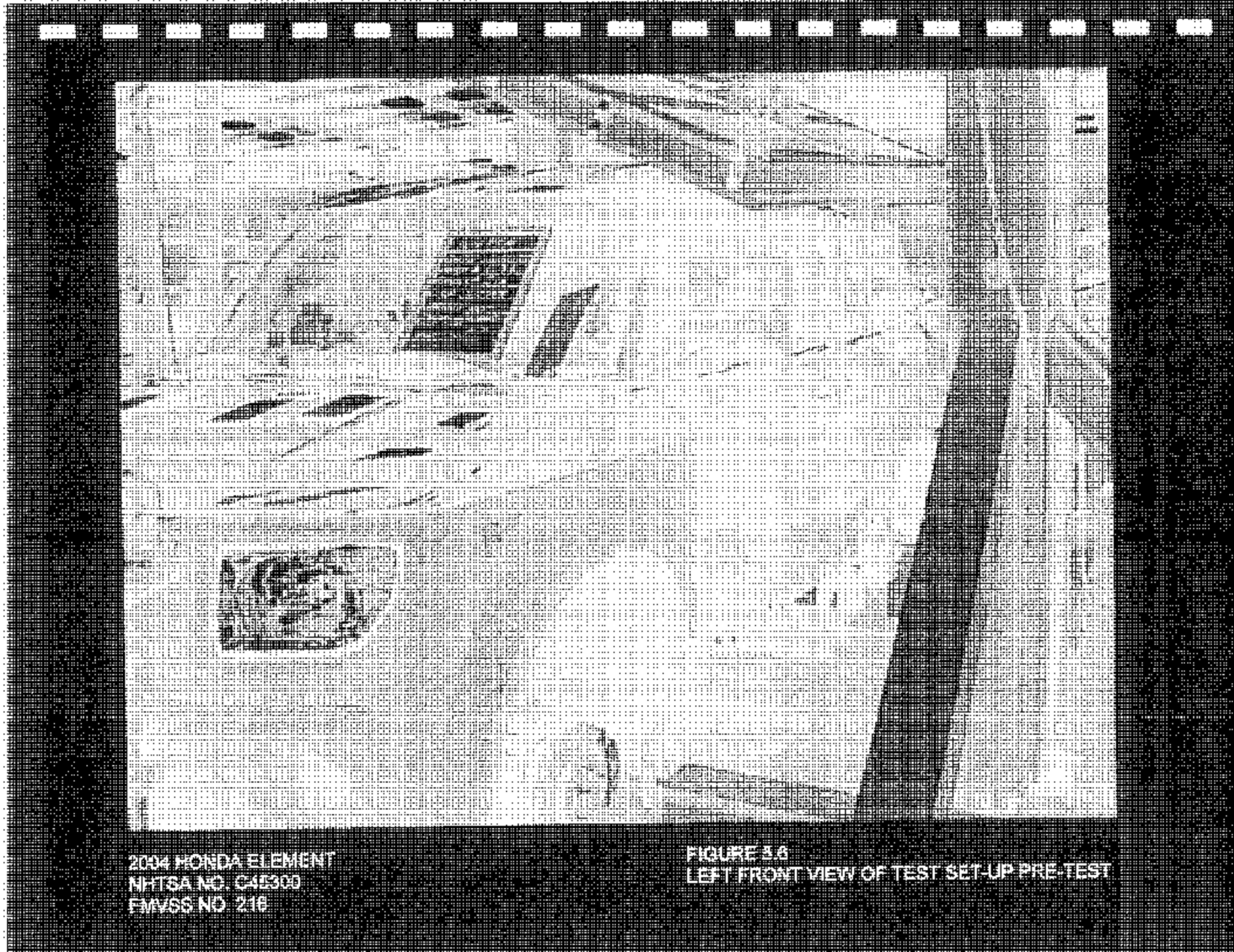
2004 HONDA ELEMENT
NHTSA NO. C45304
FMVSS NO. 216

FIGURE 5.4
RIGHT SIDE VIEW OF VEHICLE BEFORE TESTING



2004 HONDA ELEMENT
NHTSA NO. C45300
FMVSS NO. 216

FIGURE 6. 8
FRONT VIEW OF TEST SET-UP PRE-TEST

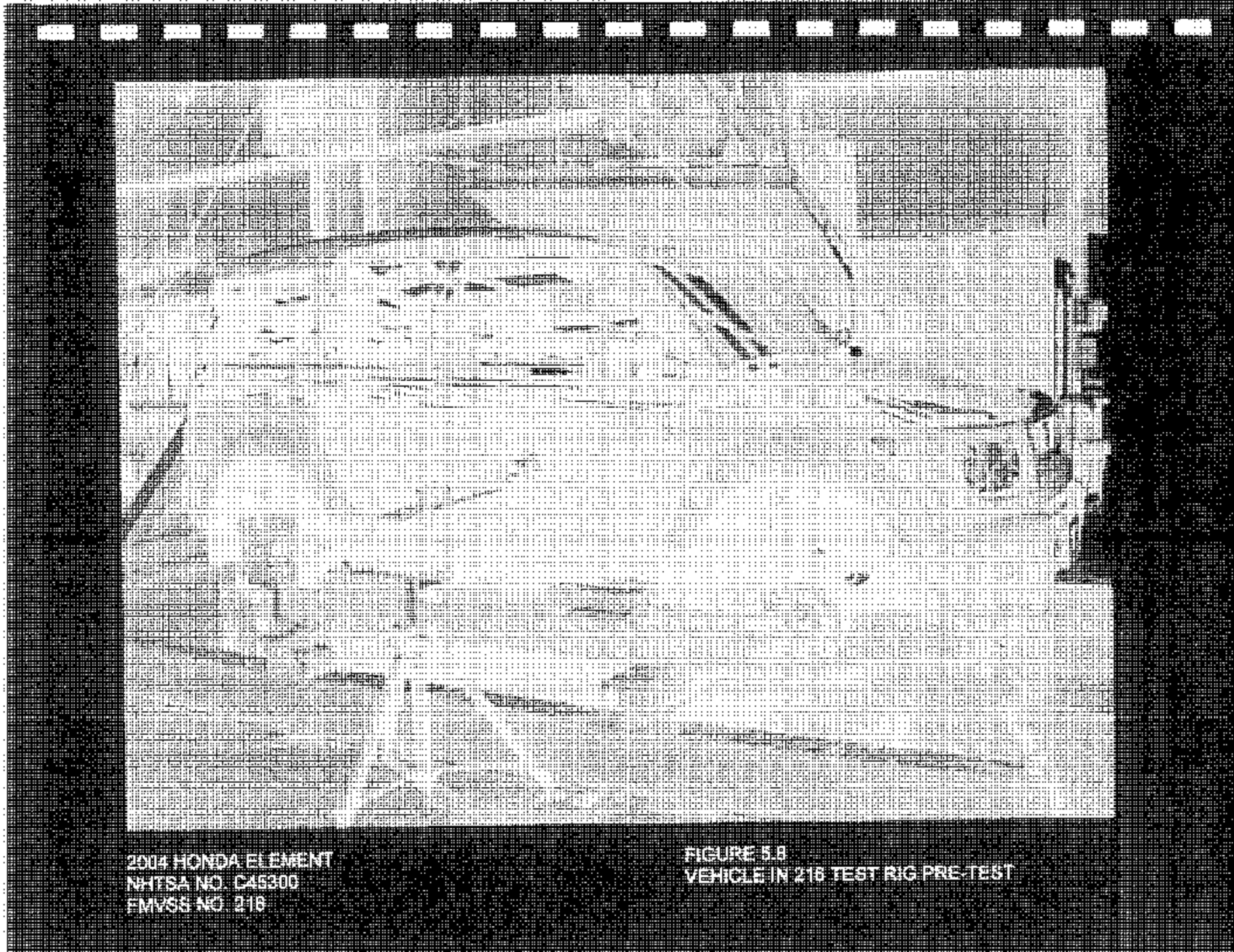


2004 HONDA ELEMENT
NHTSA NO. C41300
FMVSS NO. 216

FIGURE 3.6
LEFT FRONT VIEW OF TEST SET-UP PRE-TEST

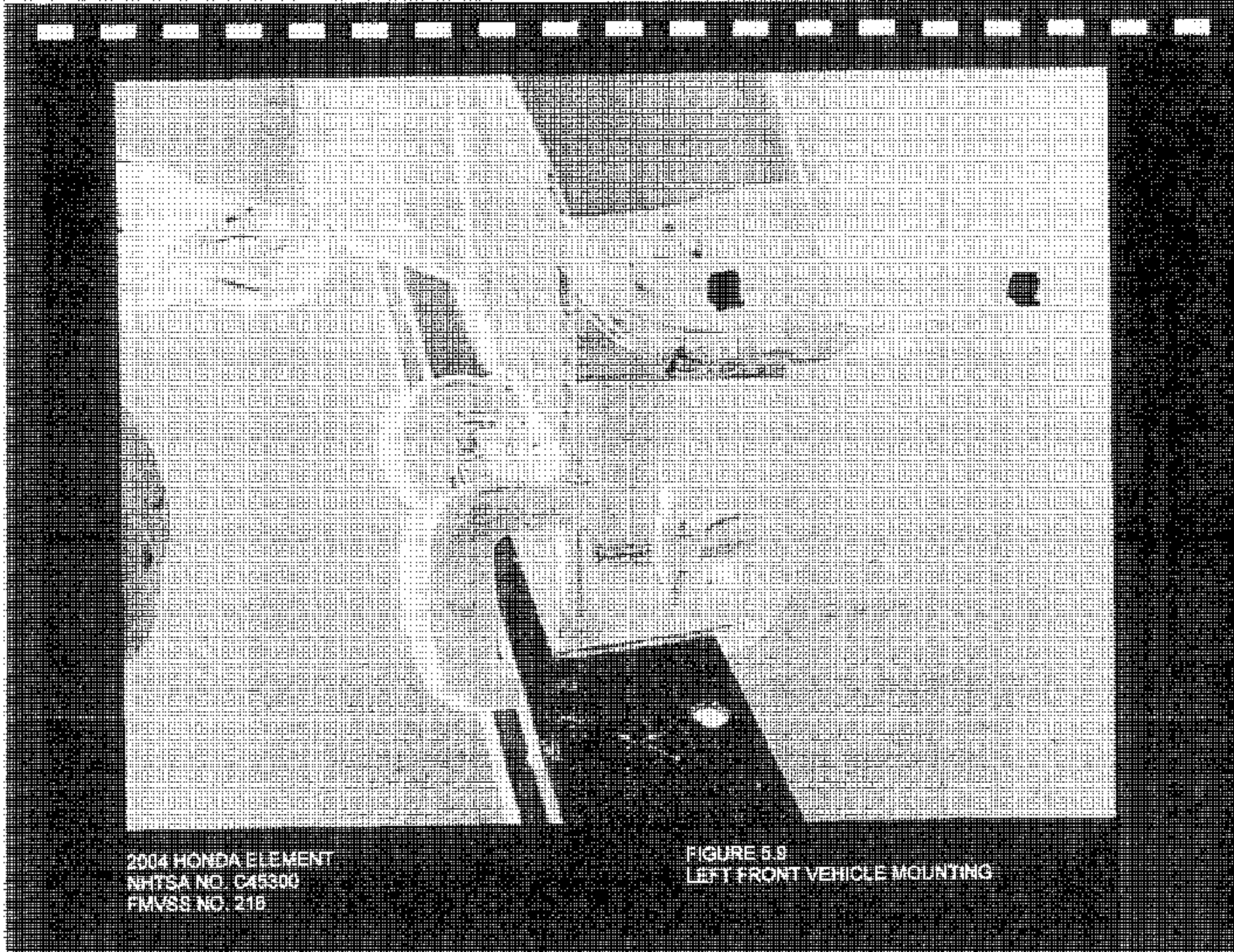
2004 HONDA ELEMENT
NHTSA NO. C45300
FMVSS NO. 216

FIGURE 6.7
LEFT REAR VIEW OF TEST SET-UP PRE-TEST



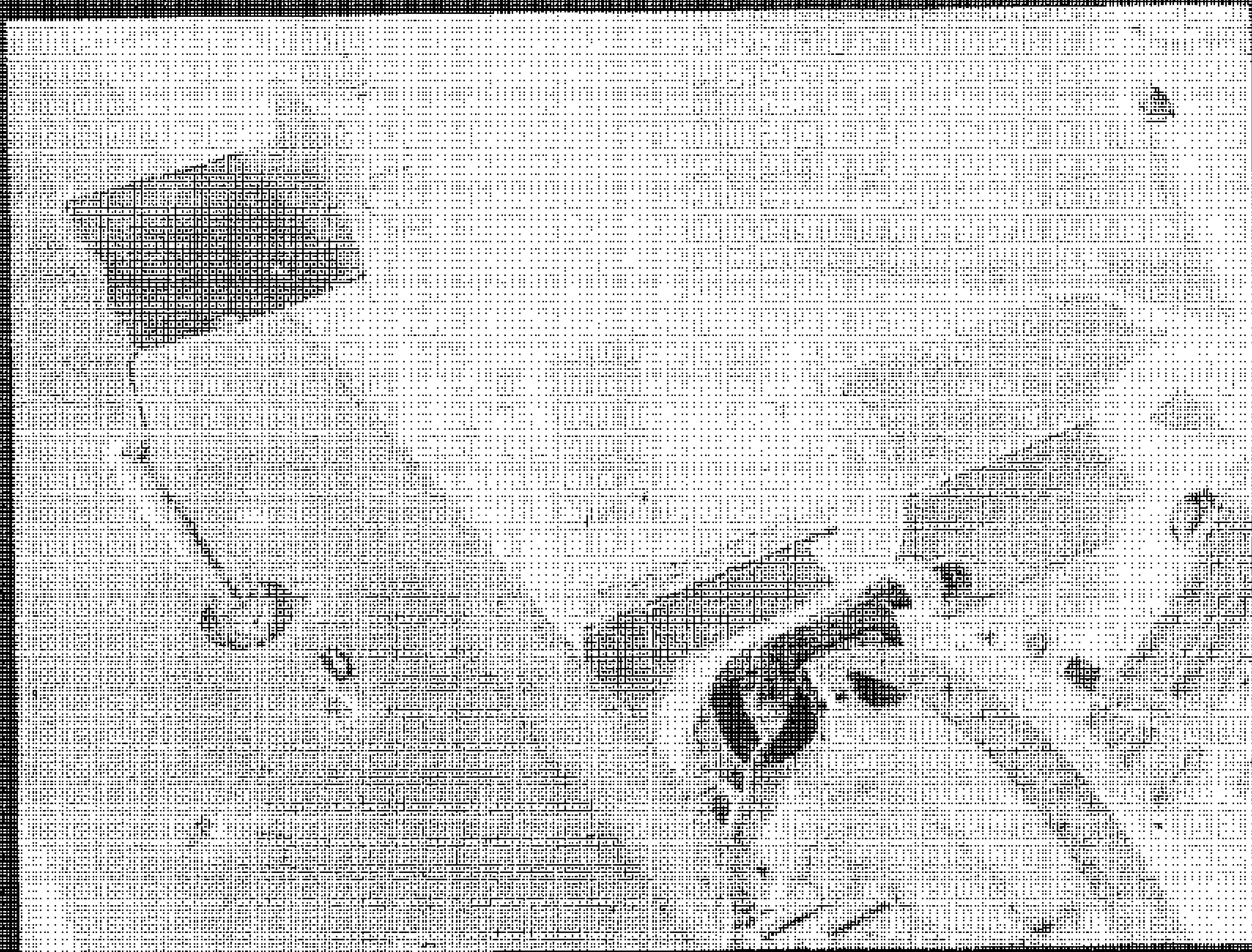
2004 HONDA ELEMENT
NHTSA NO. C45300
FMVSS NO. 216

FIGURE 5.8
VEHICLE IN 216 TEST RIG PRE-TEST



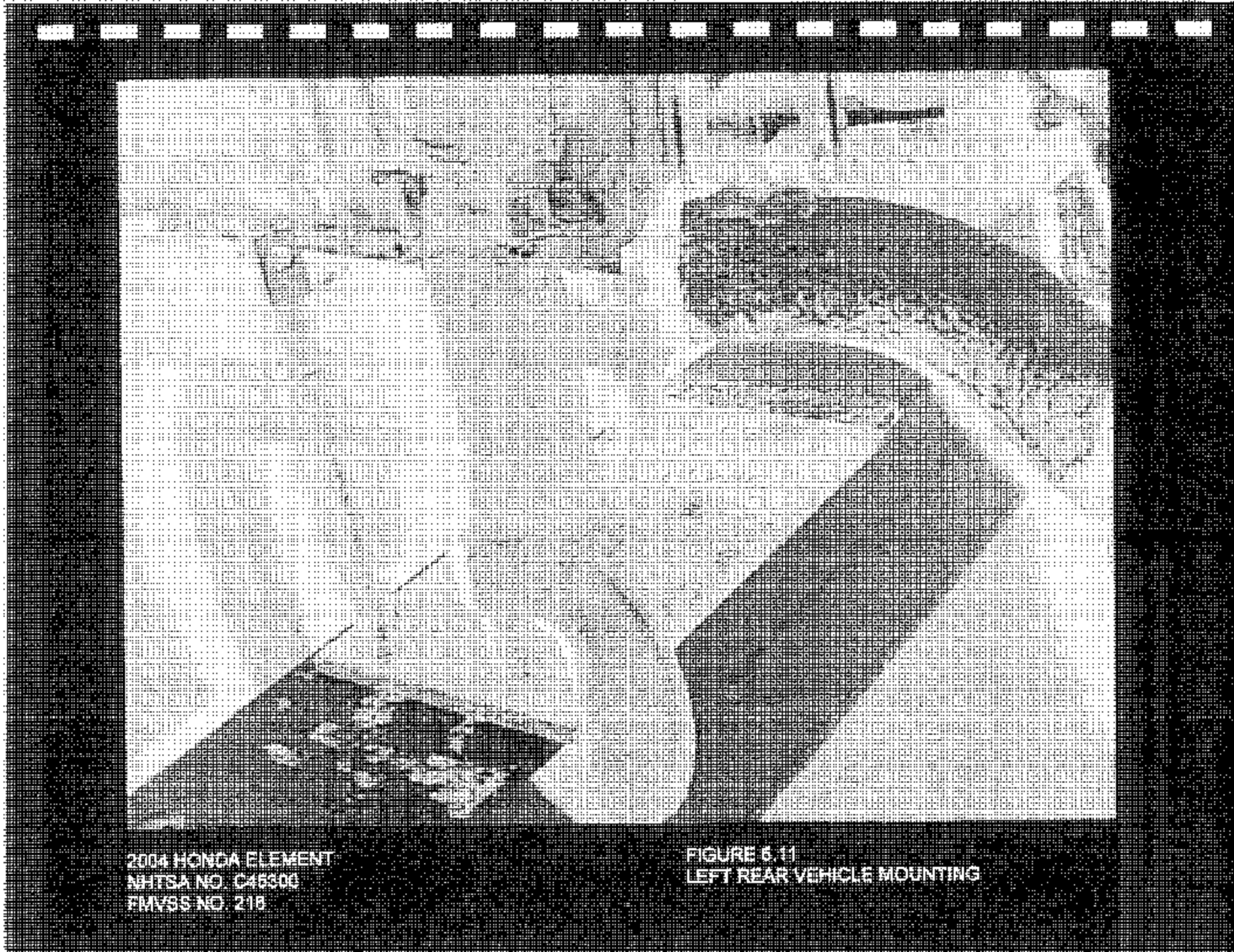
2004 HONDA ELEMENT
NHTSA NO. C45300
FMVSS NO. 216

FIGURE 5.9
LEFT FRONT VEHICLE MOUNTING



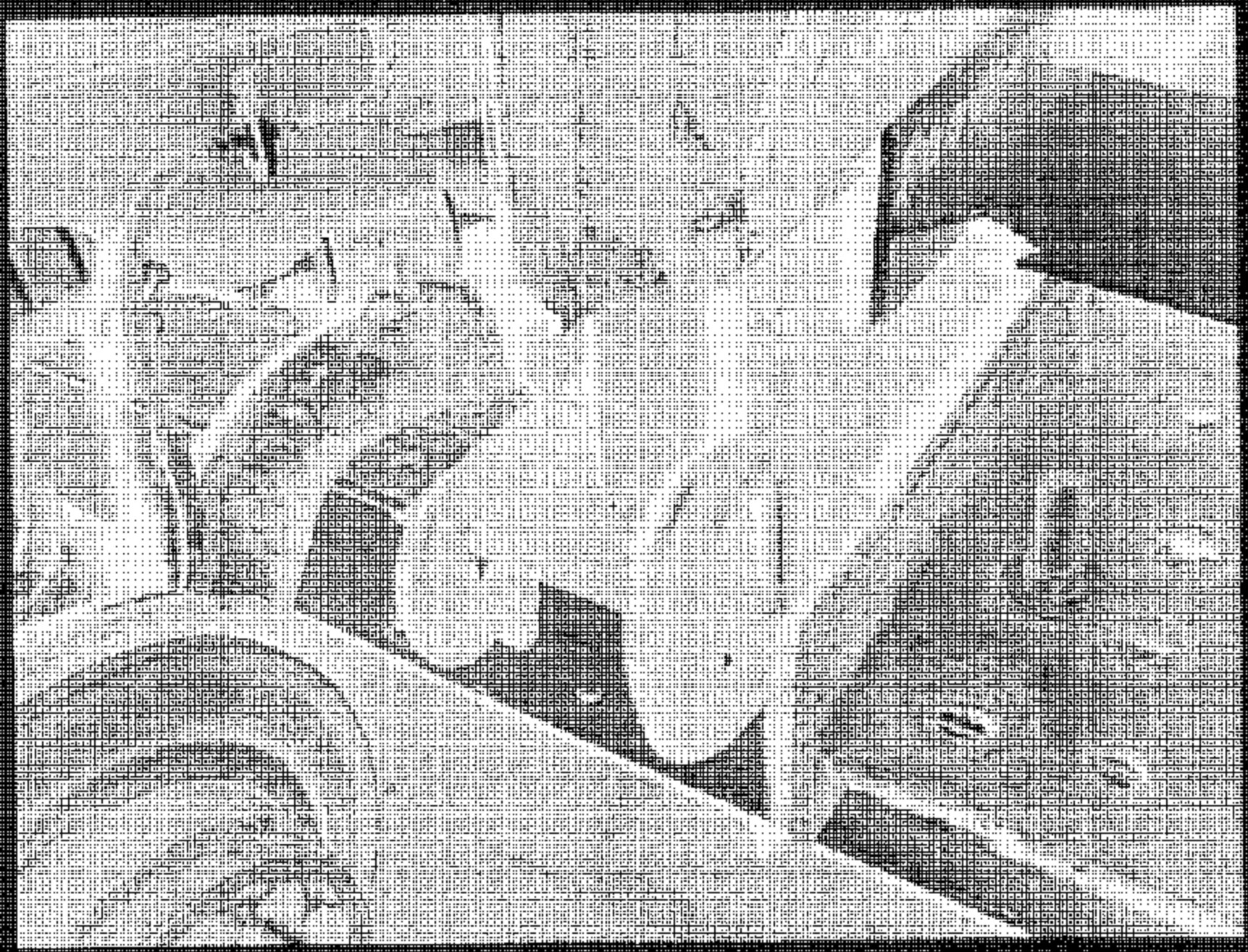
2004 HONDA ELEMENT
NHTSA NO. C45300
FMVSS NO. 218

FIGURE 5.10
RIGHT FRONT VEHICLE MOUNTING



2004 HONDA ELEMENT
NHTSA NO. C46300
FMVSS NO. 216

FIGURE 6.11
LEFT REAR VEHICLE MOUNTING



2004 HONDA ELEMENT
NHTSA NO. 045300
FMVSS NO. 216

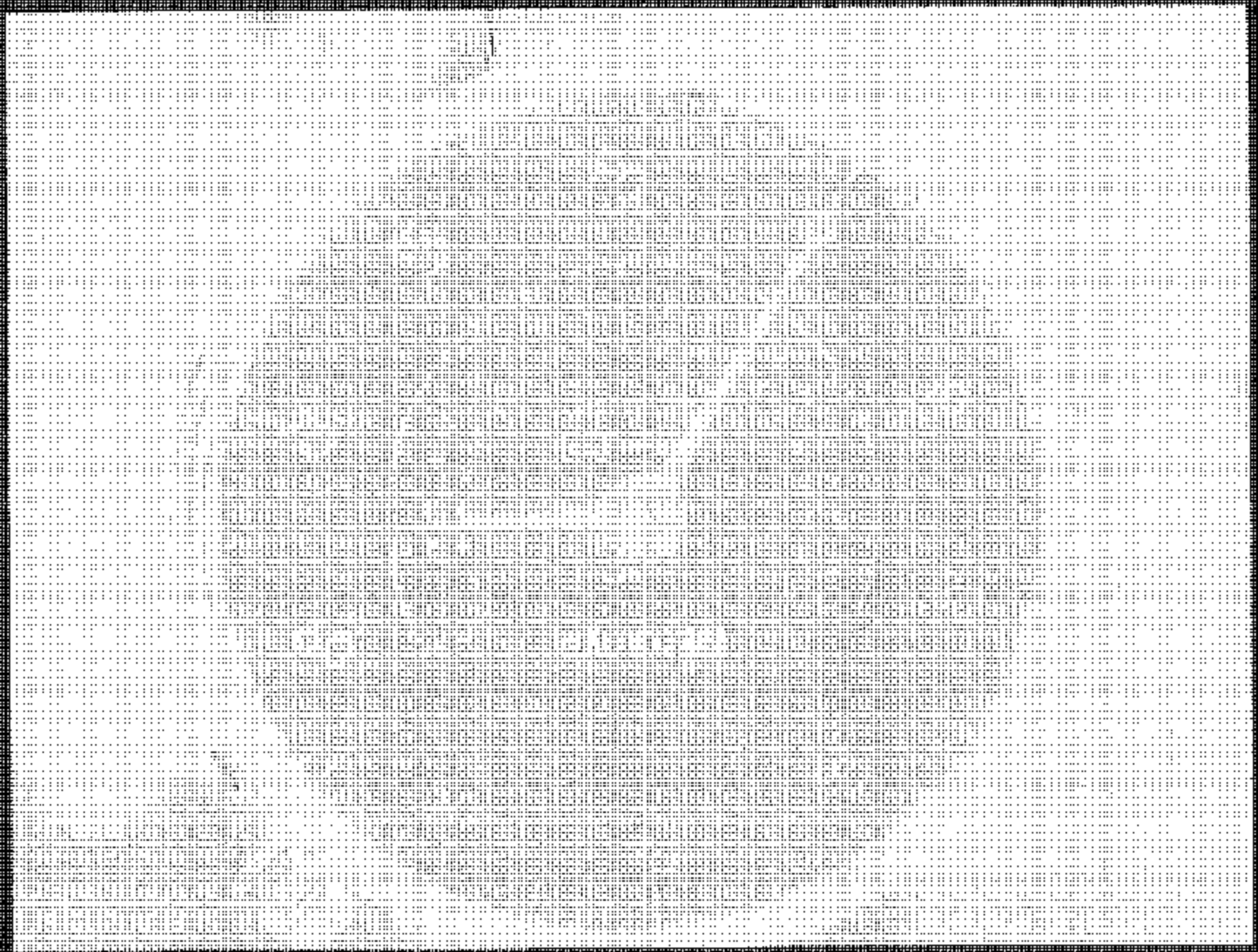
FIGURE 6.12
RIGHT REAR VEHICLE MOUNTING

2004 HONDA ELEMENT
NHTSA NO. C45300
FMVSS NO. 216

FIGURE 5.13
LEFT FRONT DISPLACEMENT PRE-TEST

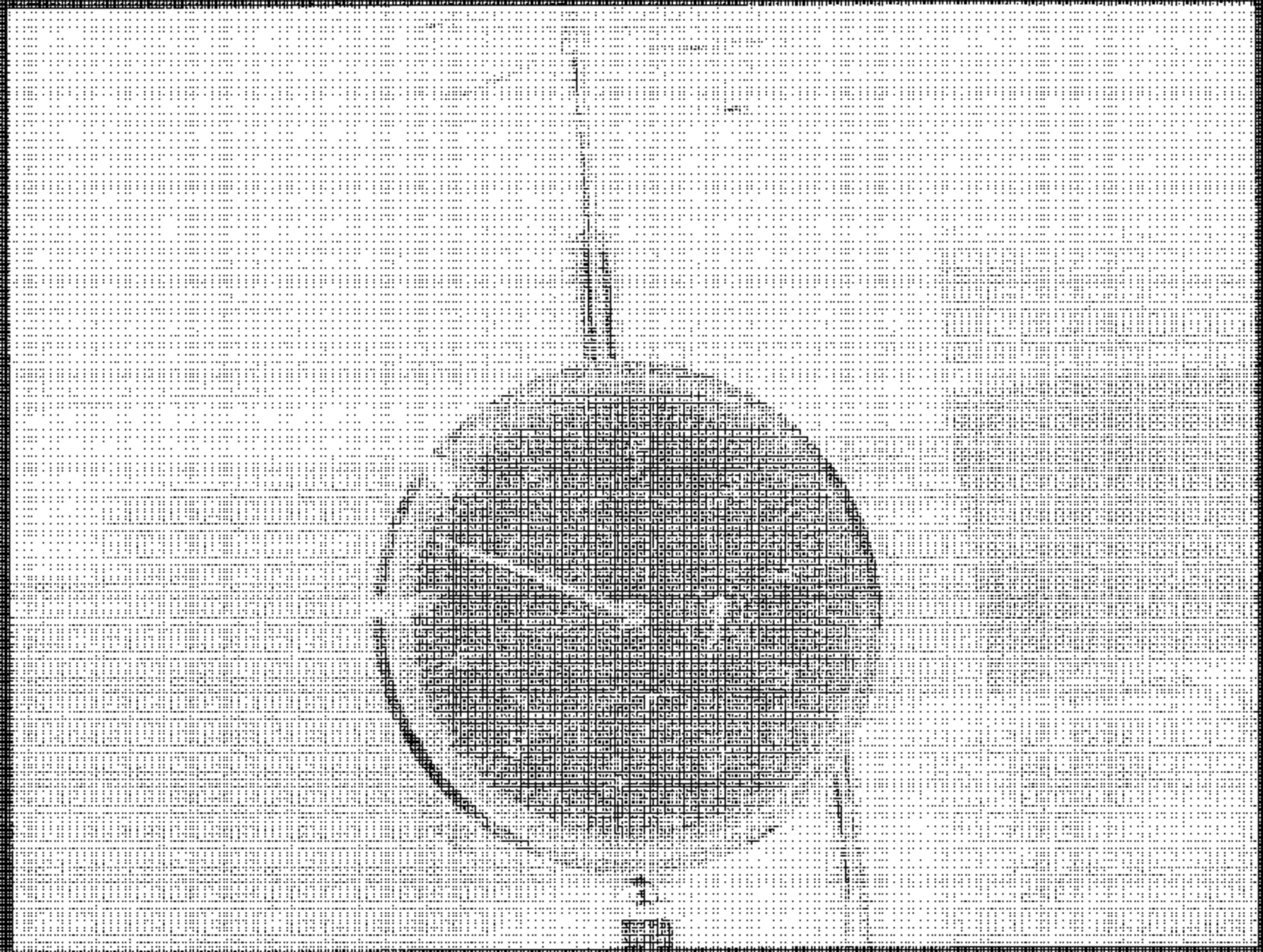
2004 HONDA ELEMENT
NHTSA NO. C46309
FMVSS NO. 216

FIGURE 5.14
RIGHT FRONT DISPLACEMENT PRE-TEST



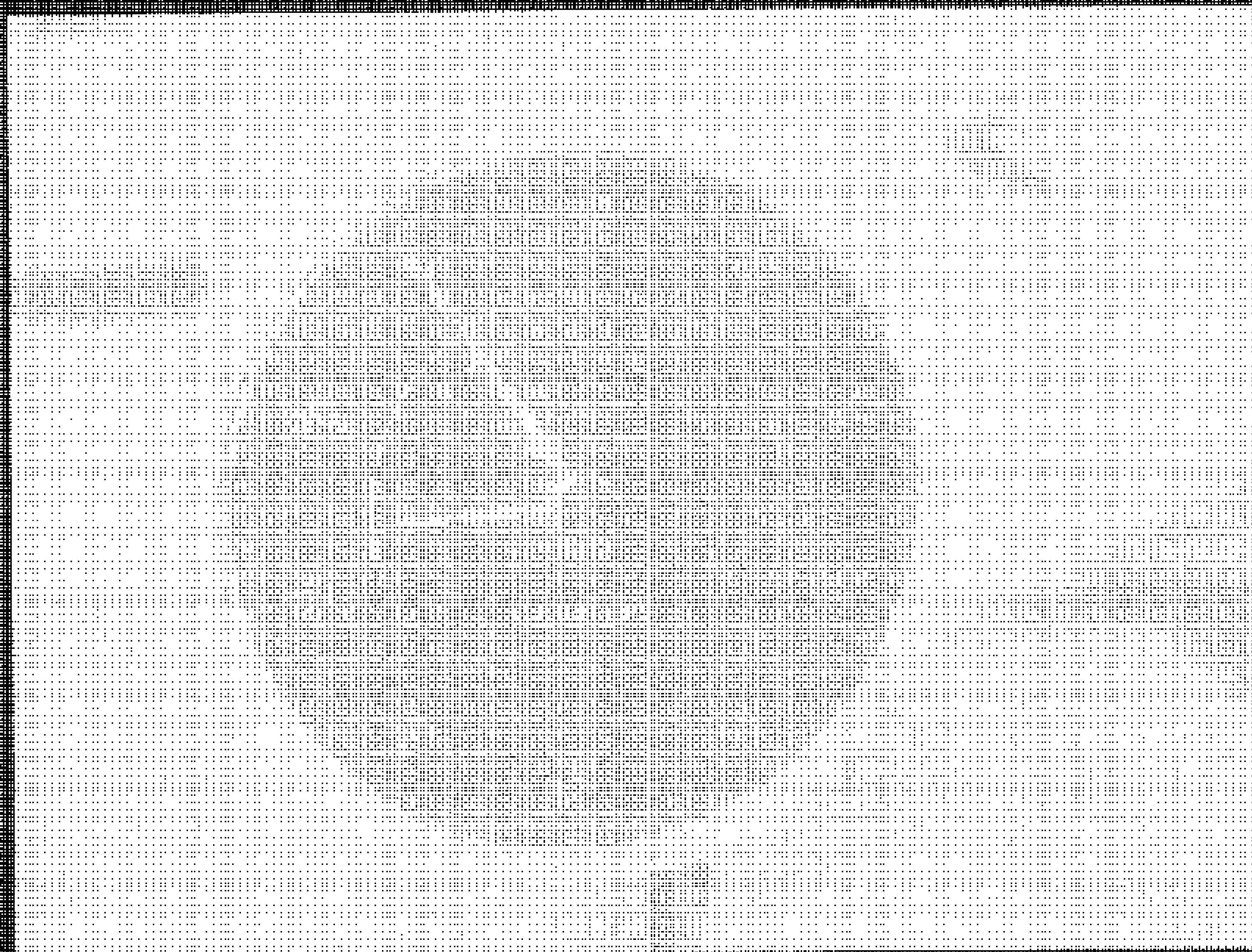
2004 HONDA ELEMENT
NHTSA NO. C45300
FMVSS NO. 216

FIGURE 5.15
RIGHT REAR DISPLACEMENT PRE-TEST



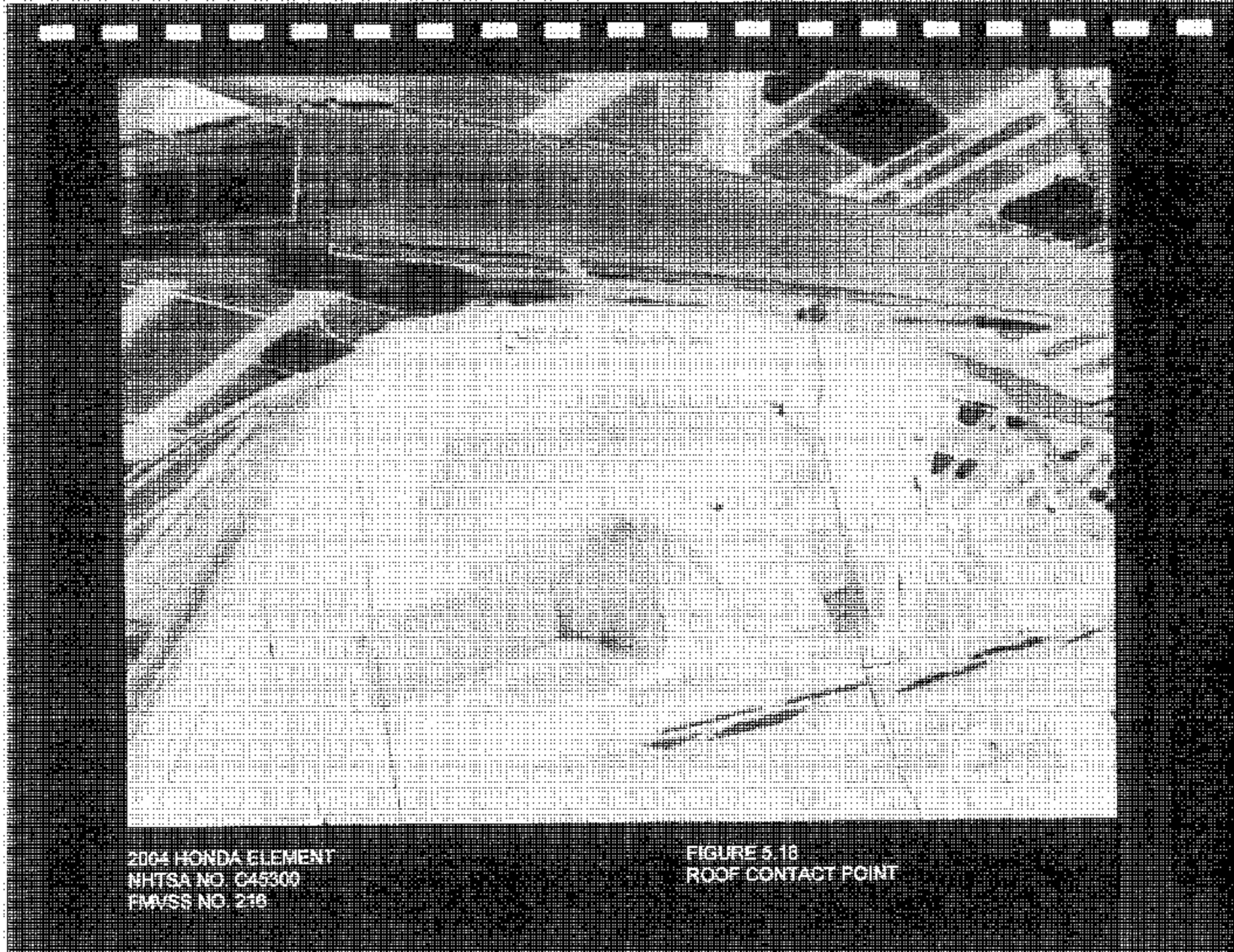
2004 HONDA ELEMENT
NHTSA NO. C45300
FMVSS NO. 216

FIGURE 5.16
PASSENGER DOOR DISPLACEMENT PRE-TEST



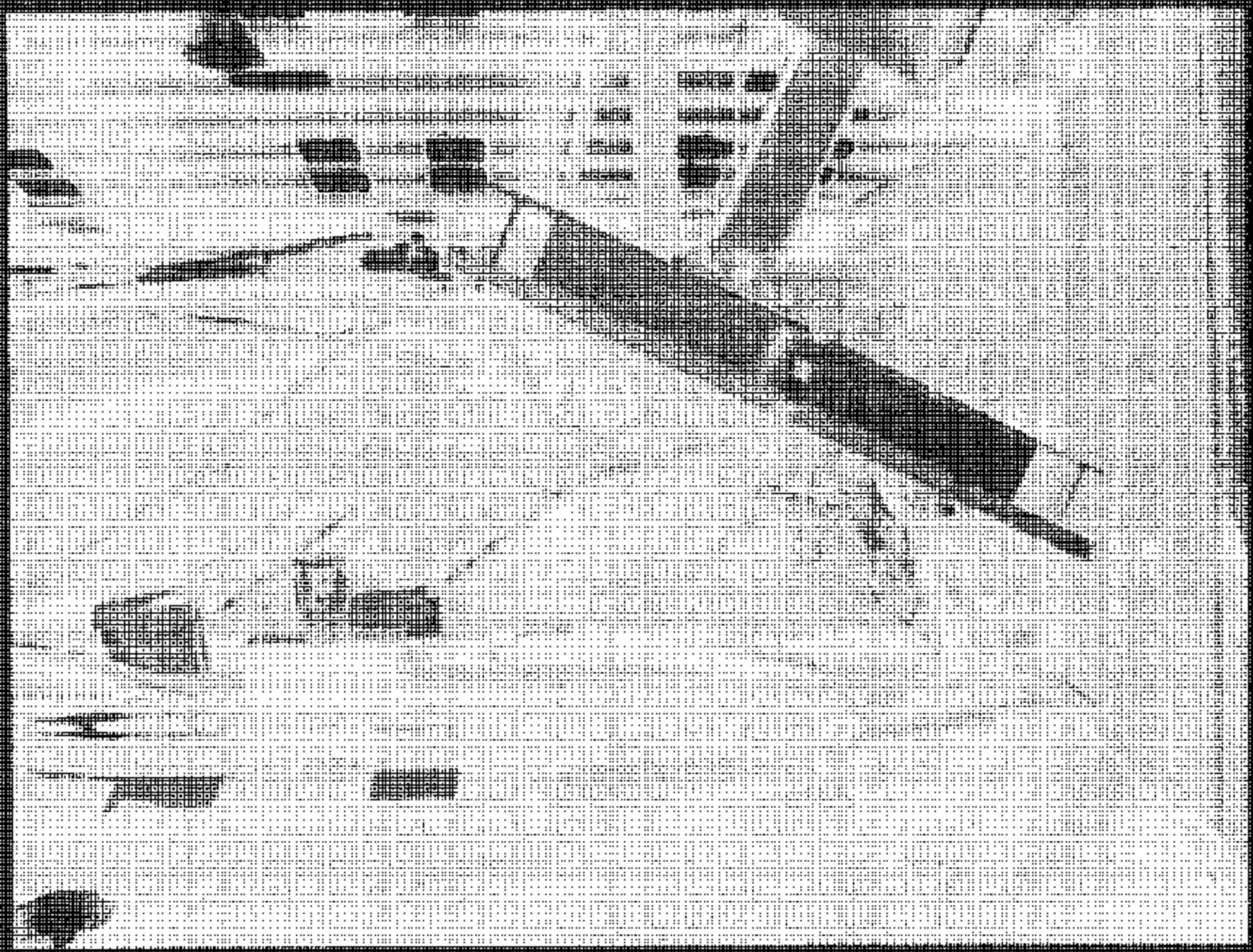
2004 HONDA ELEMENT
NHTSA NO. C45300
FMVSS NO. 216

FIGURE 5.17
LEFT REAR DISPLACEMENT PRE-TEST



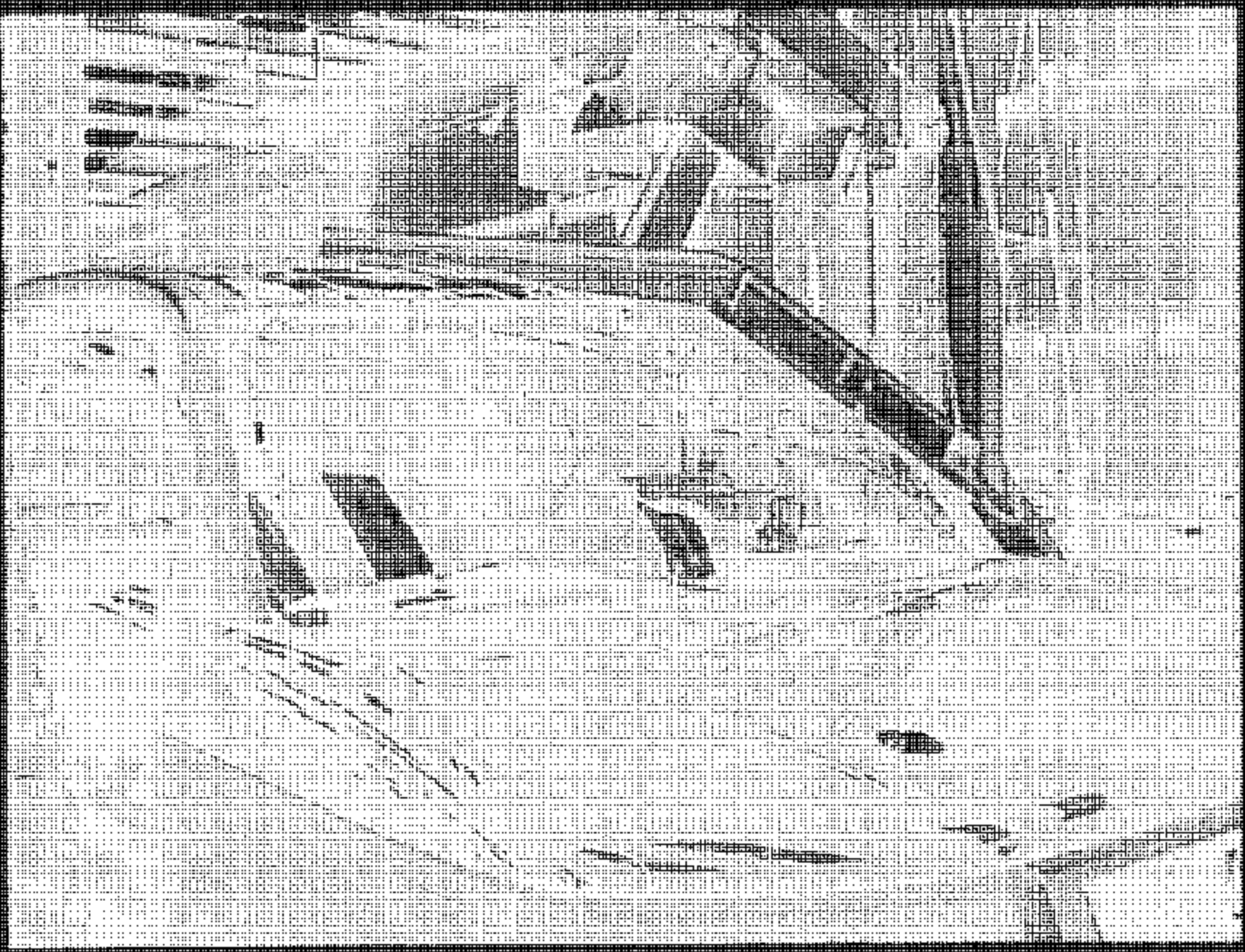
2004 HONDA ELEMENT
NHTSA NO. C45300
FMVSS NO. 216

FIGURE 5.18
ROOF CONTACT POINT



2004 HONDA ELEMENT
NHTSA NO. C45300
FMVSS NO. 216

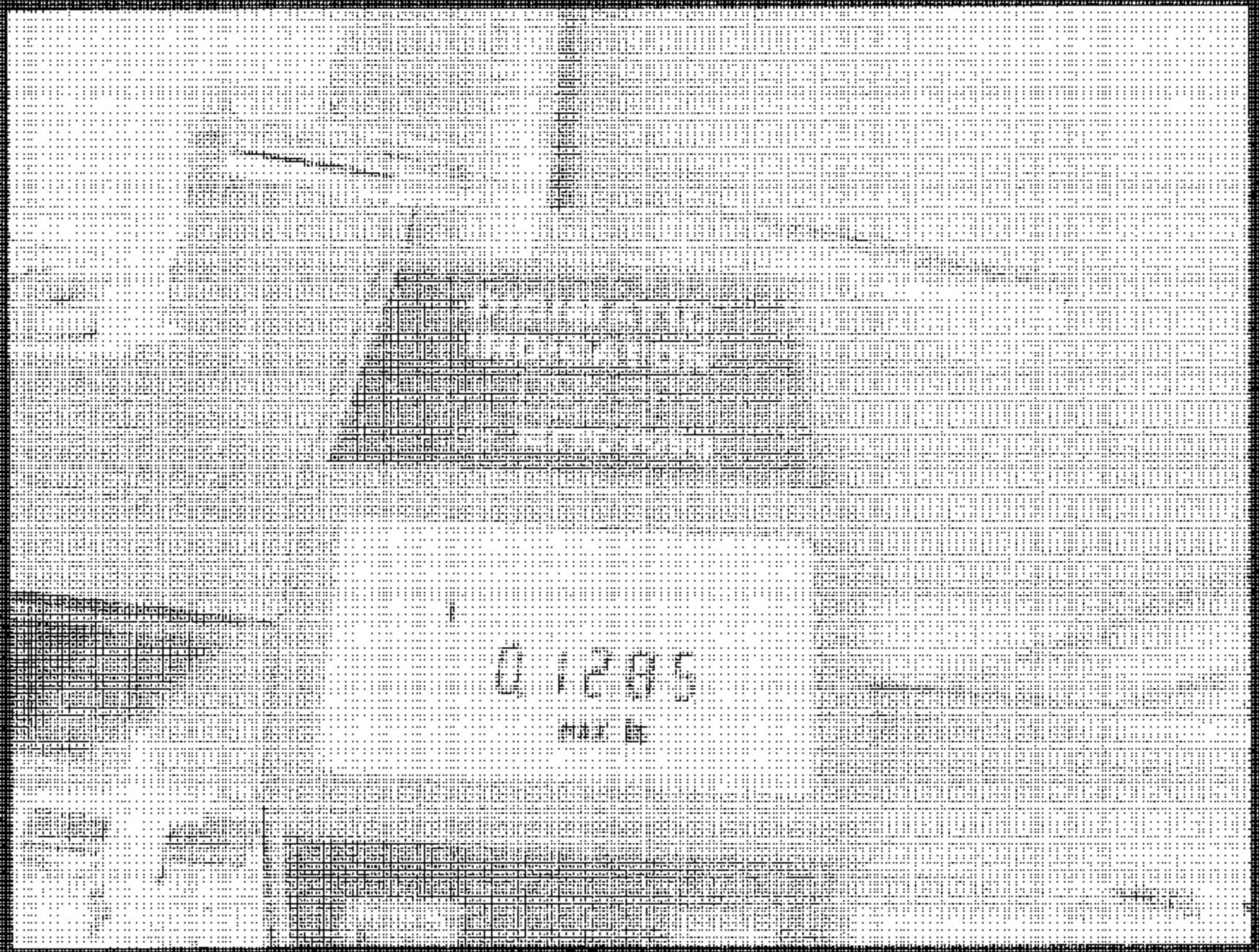
FIGURE 6.19
FRONT VIEW AT FULL LOAD



2004 HONDA ELEMENT
NHTSA NO. C45300
FMVSS NO. 216

FIGURE 5-10
RIGHT FRONT VIEW AT FULL LOAD

FIGURE 21
LEFT FRONT VIEW ATTEMPT LOAD
2012 HONDA ELEMENT
NISSAN QASHQAI
NISSAN 370Z

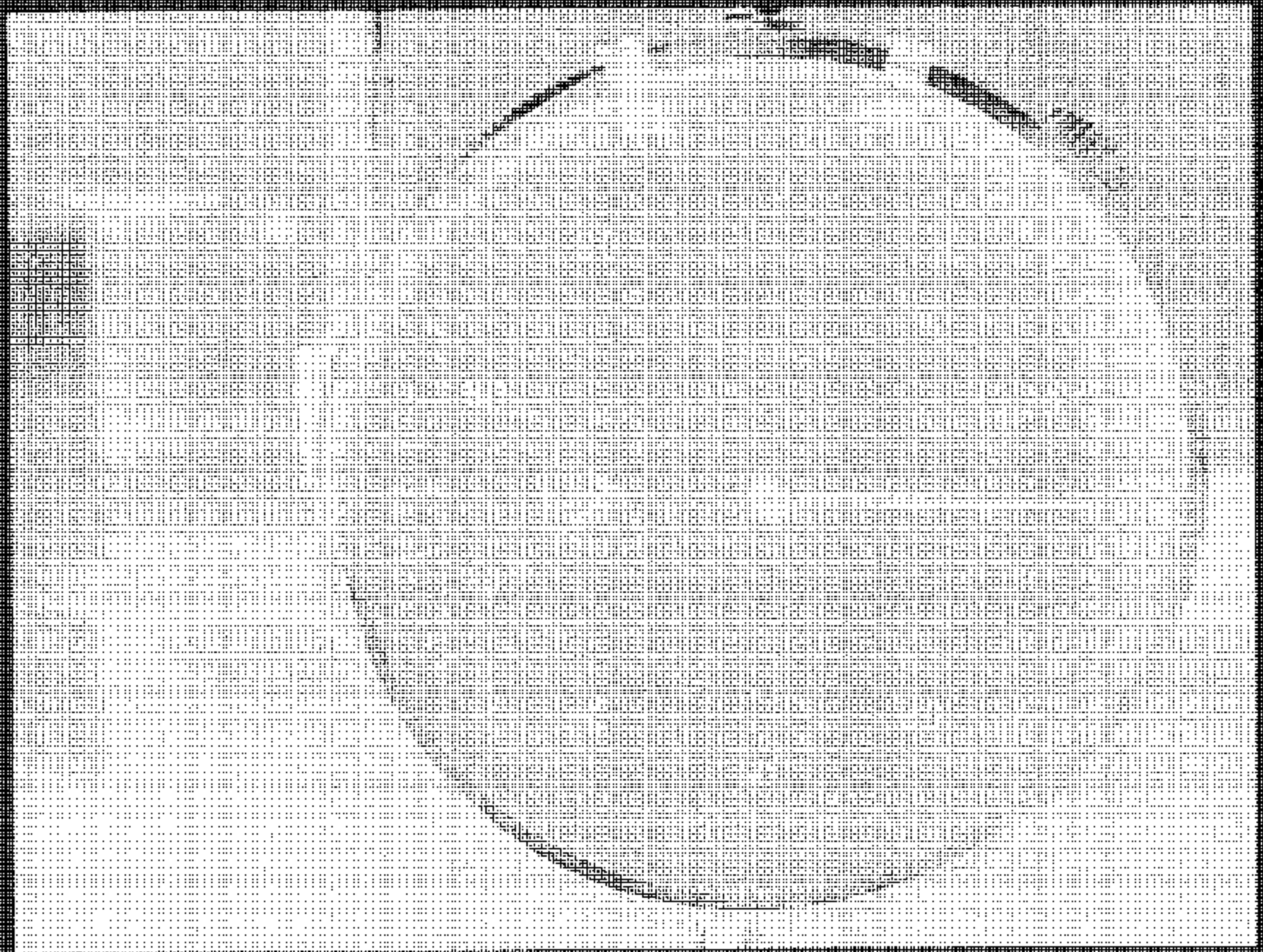


2004 HONDA ELEMENT
NHTSA NO. C45300
FMVSS NO. 216

FIGURE 5.22
RIGHT FRONT DISPLACEMENT AT FULL LOAD
(INCHES)

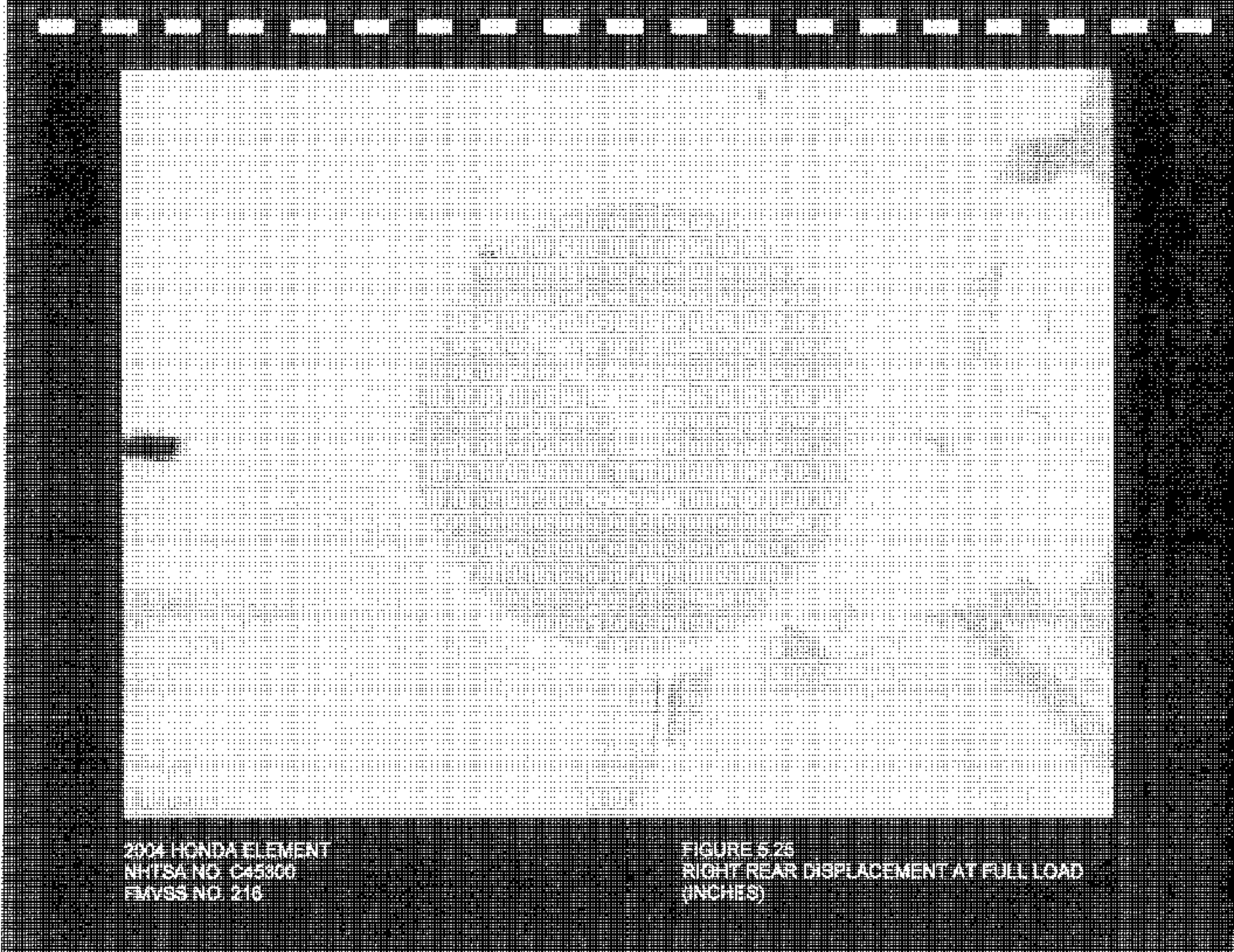
2004 HONDA ELEMENT
NHTSA NO. C45300
FMVSS NO. 216

FIGURE 5.23
LEFT FRONT DISPLACEMENT AT FULL LOAD
(INCHES)



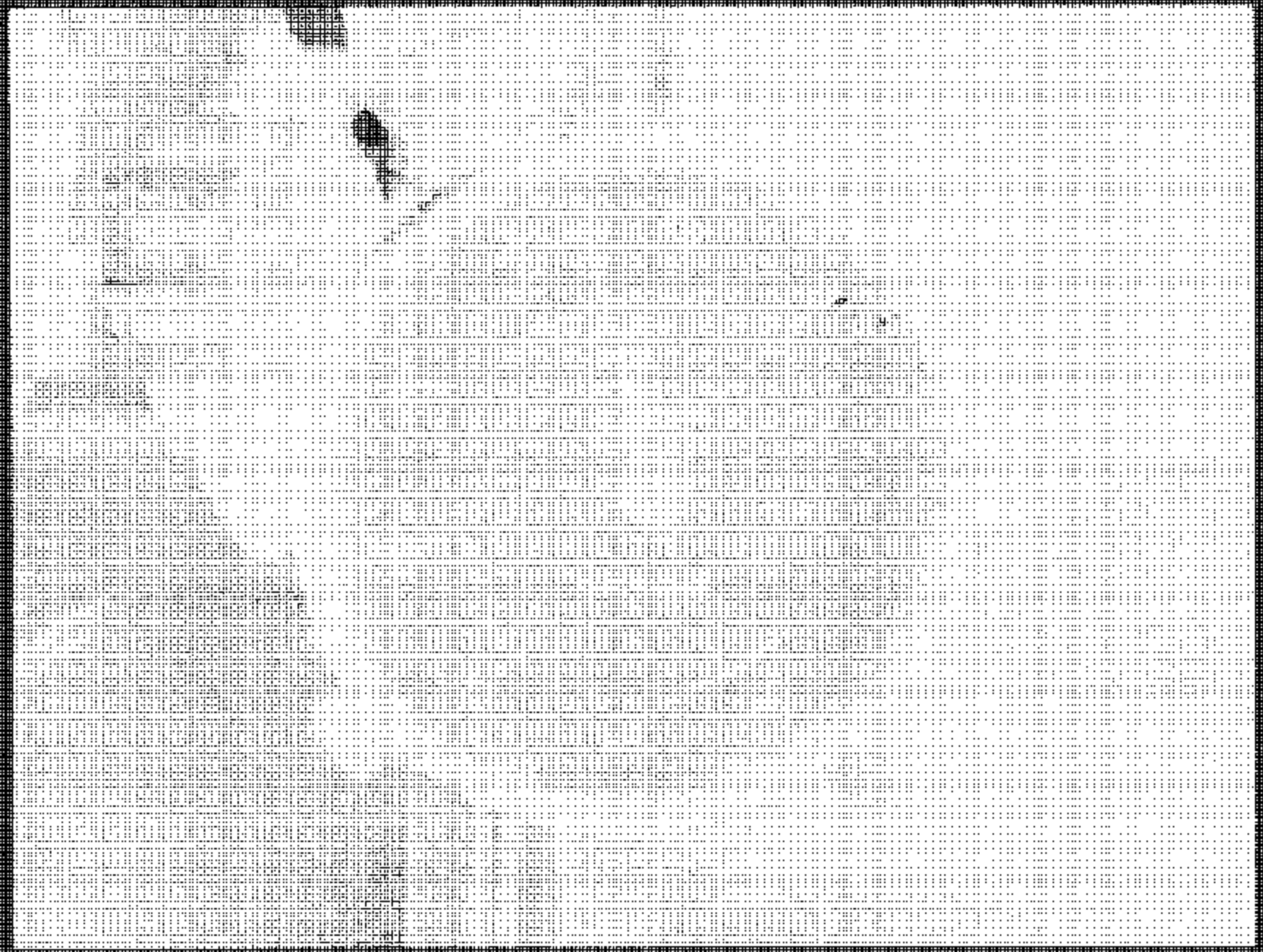
2004 HONDA ELEMENT
NHTSA NO. C45300
FMVSS NO. 216

FIGURE 4.24
PASSENGER DOOR DISPLACEMENT AT FULL LOAD (INCHES)



2004 HONDA ELEMENT
NHTSA NO. C45300
FMVSS NO. 216

FIGURE 5.26
RIGHT REAR DISPLACEMENT AT FULL LOAD
(INCHES)



2004 HONDA ELEMENT
NHTSA NO. C44306
FMVSS NO. 216

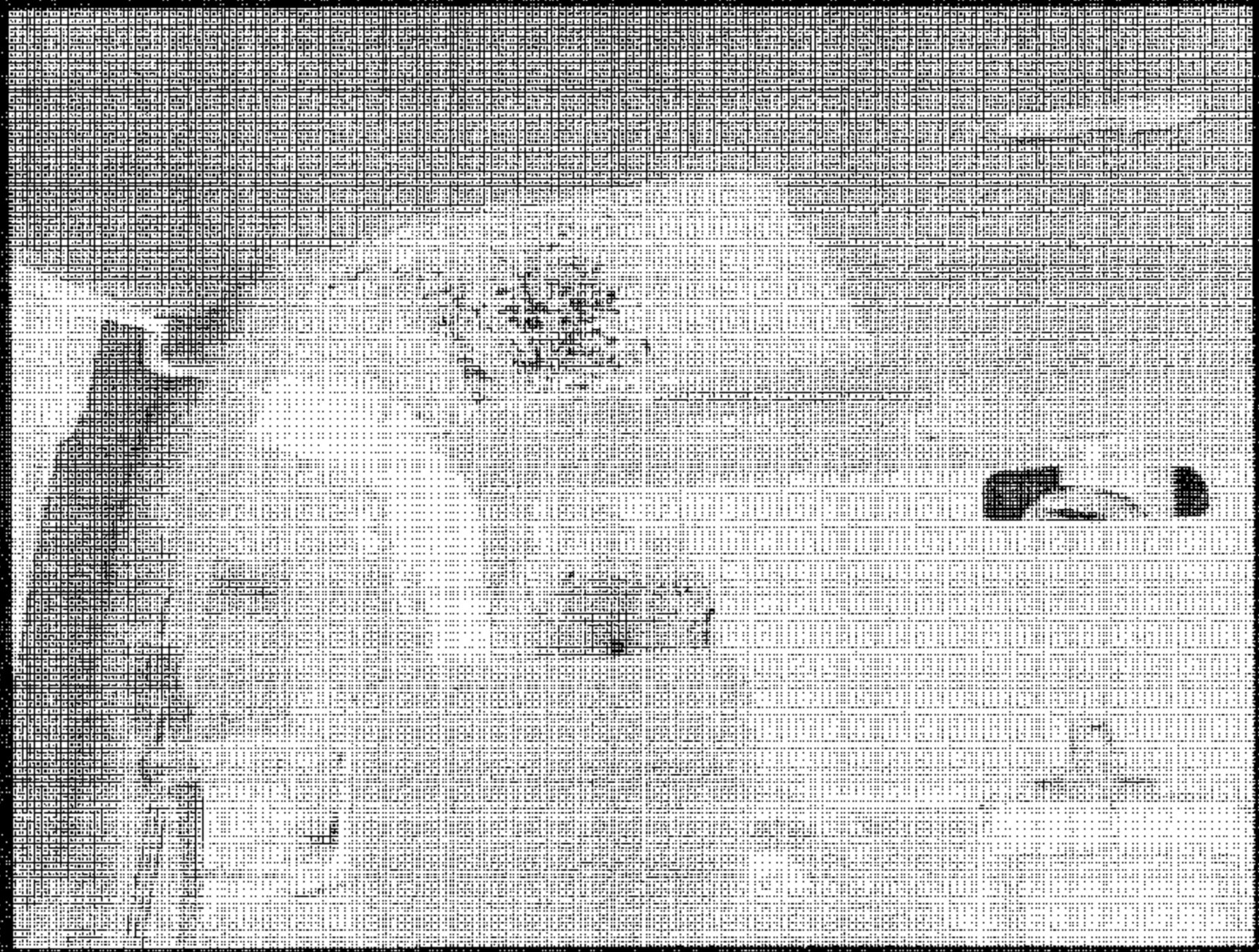
FIGURE 5.26
LEFT REAR DISPLACEMENT AT FULL LOAD
(INCHES)

2004 HONDA ELEMENT
NHTSA NO. C46300
FMVSS NO. 216

FIGURE 6-27
LEFT FRONT VIEW AFTER REMOVAL OF PLATE

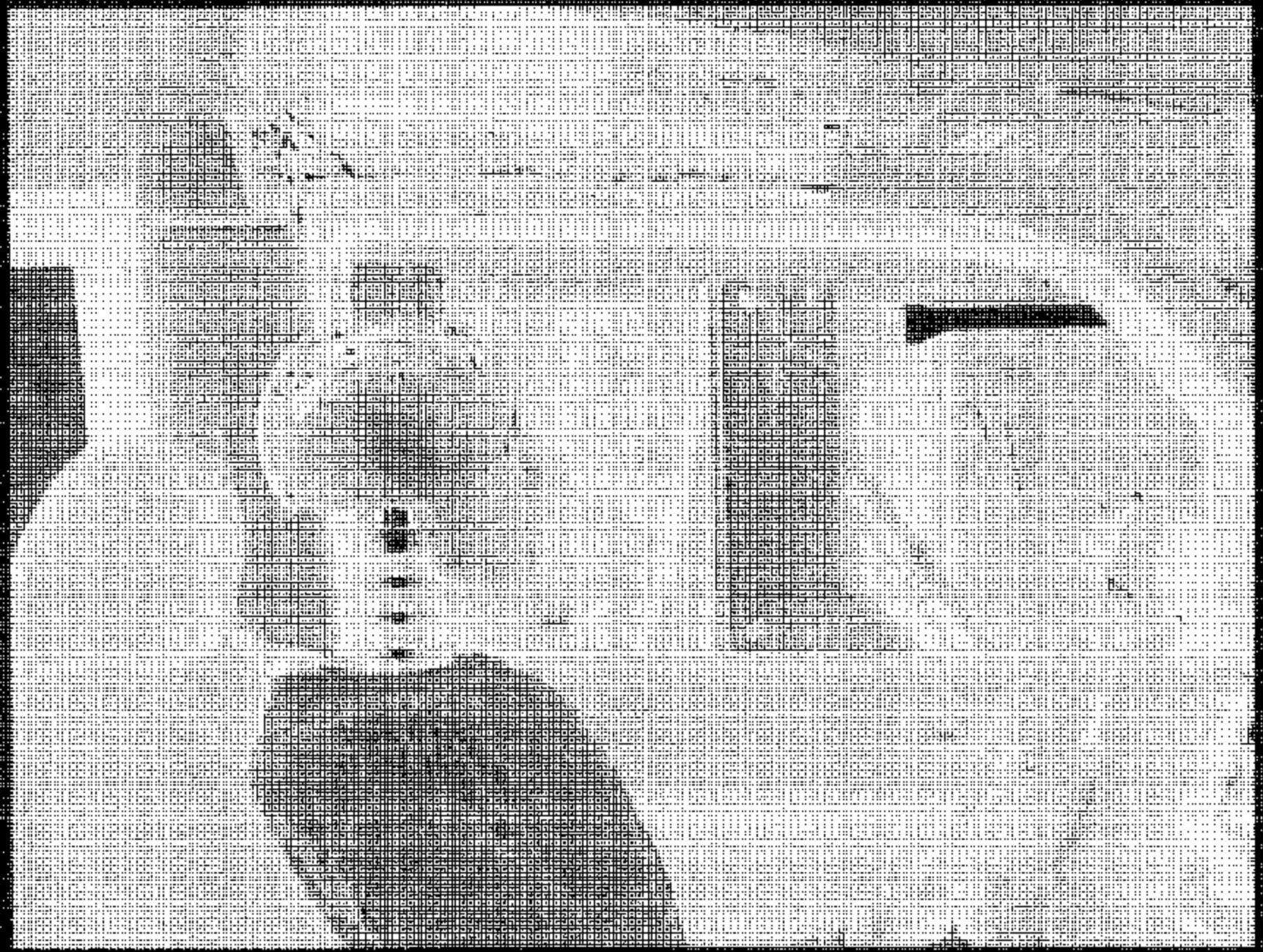
2004 HONDA ELEMENT
NHTSA NO. C45300
FMVSS NO. 216

FIGURE 5.28
LEFT FRONT CLOSE-UP VIEW AFTER REMOVAL OF PLATE



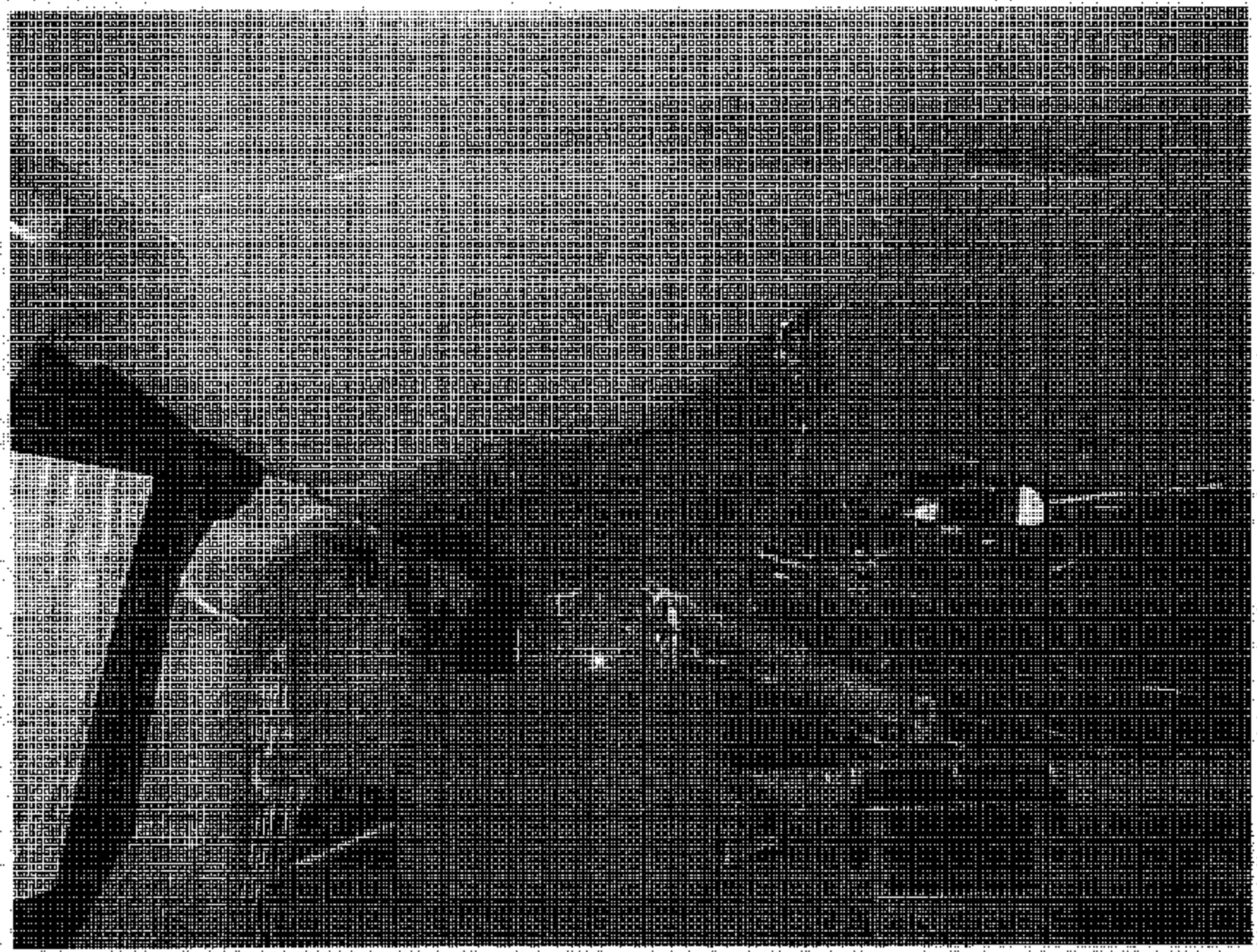
2004 HONDA ELEMENT
NHTSA NO. C45309
FMVSS NO. 219

FIGURE 5.29
PRE-TEST INTERIOR VIEW FROM REAR



2004 HONDA ELEMENT
NHTSA NO. C45300
FMVSS NO. 216

FIGURE 5.30
PRE-TEST INTERIOR VIEW FROM SIDE



2004 HONDA ELEMENT
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FMVSS NO. 216

FIGURE 5.31
POST TEST INTERIOR VIEW FROM REAR

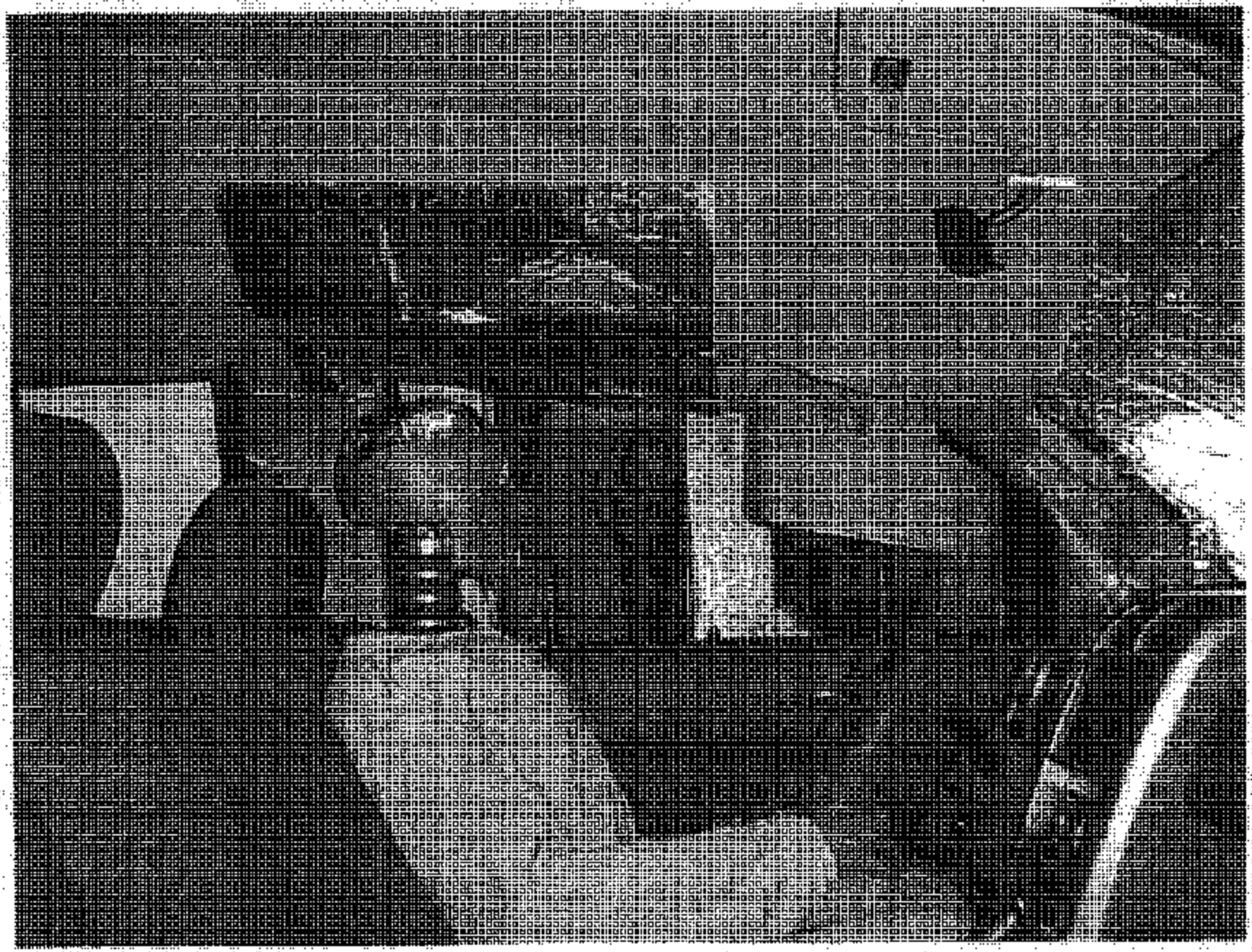

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FIGURE 5.32
POST TEST INTERIOR VIEW FROM SIDE

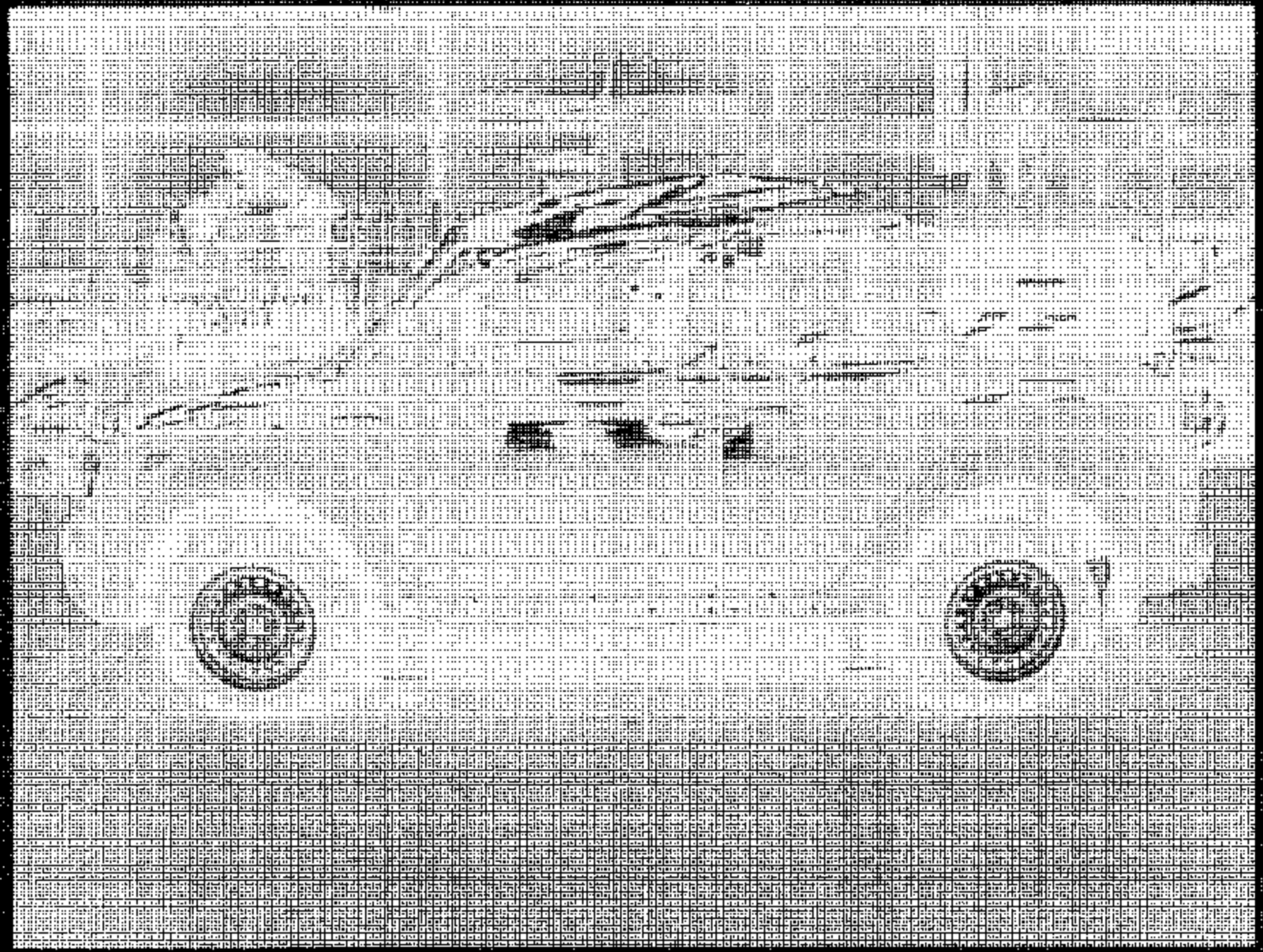

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FIGURE 5.33
LEFT SIDE VIEW POST TEST

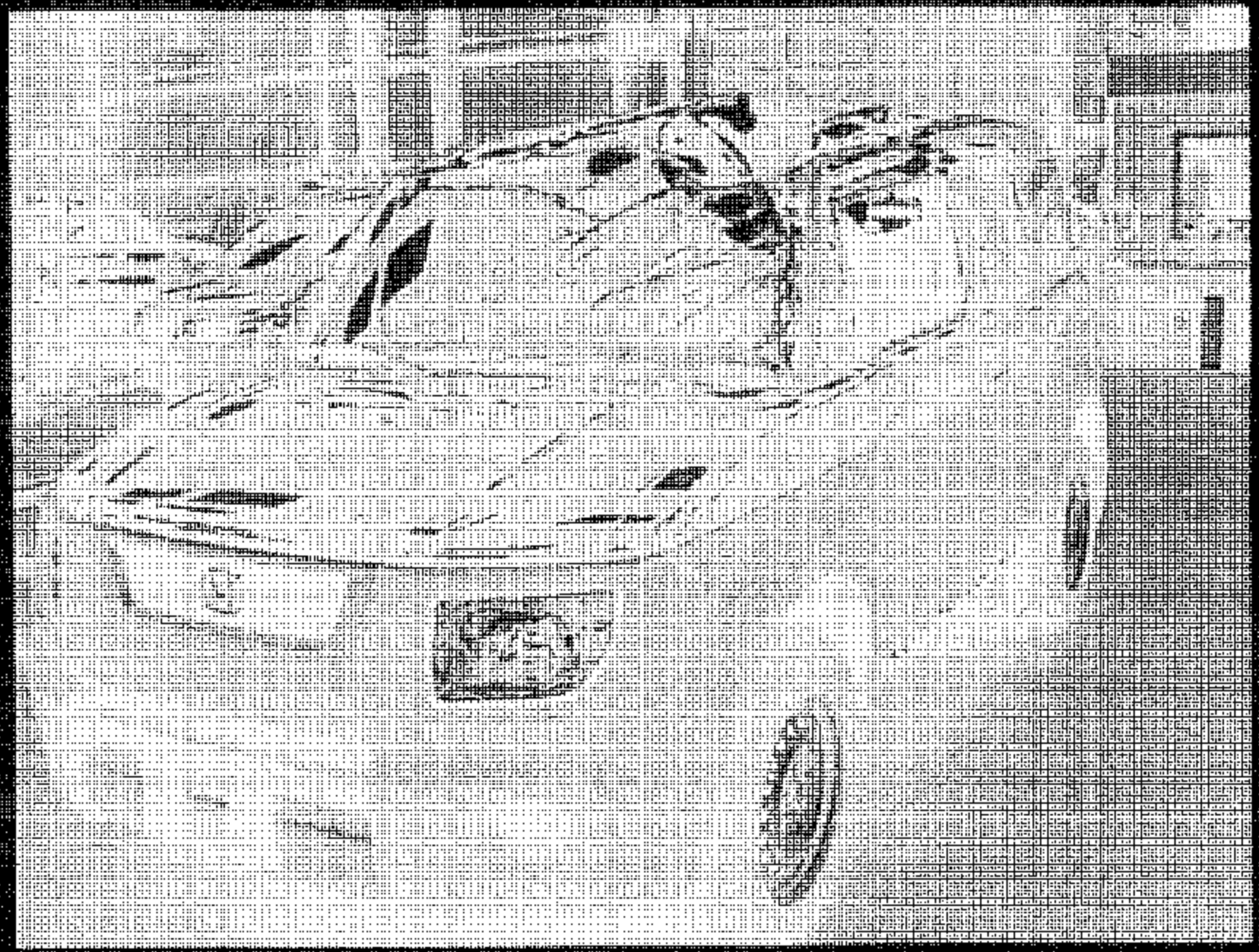

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FIGURE 5.34
3/4 LEFT FRONT VIEW POST TEST

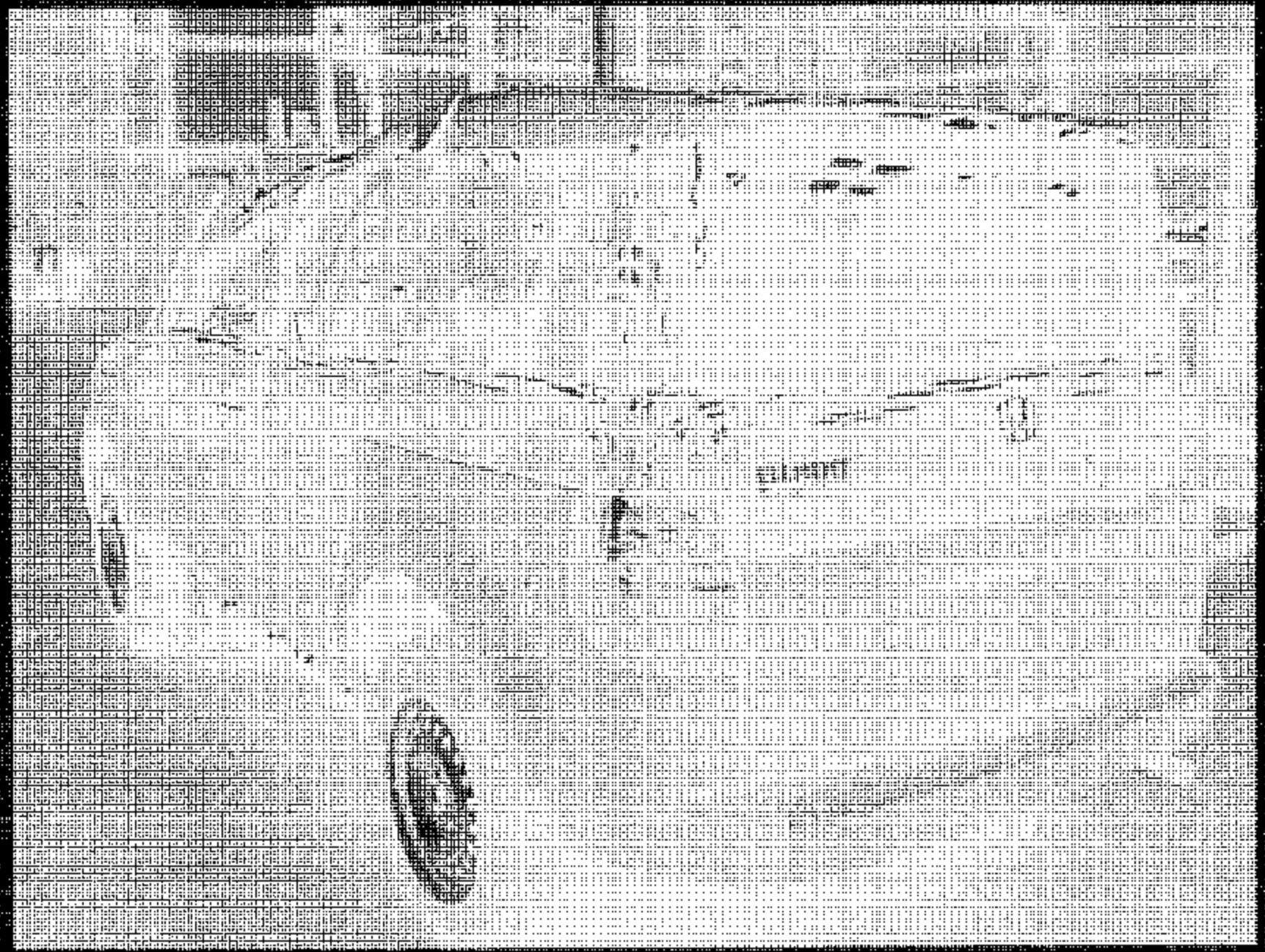

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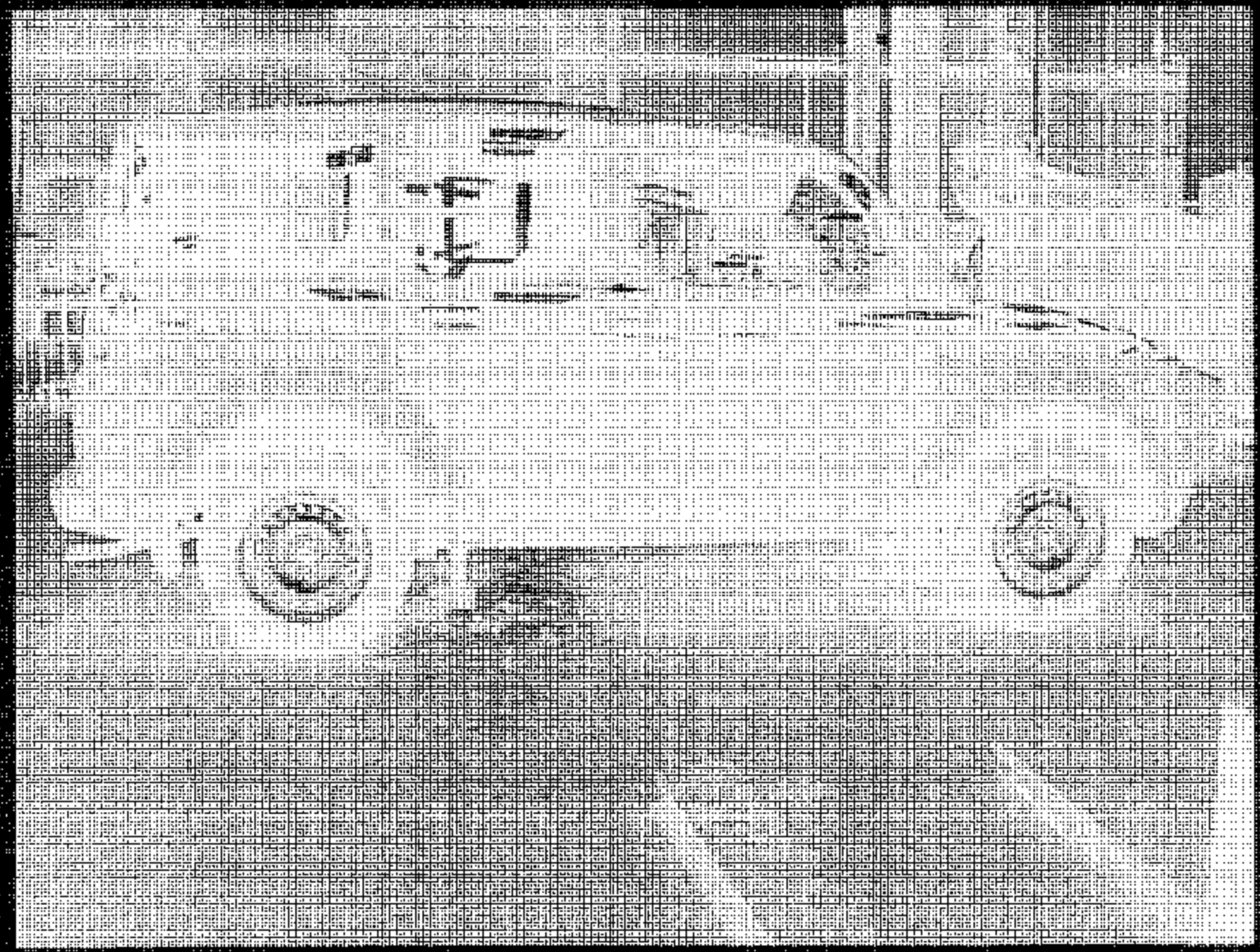
FIGURE 5.35
¾ LEFT REAR VIEW POST TEST



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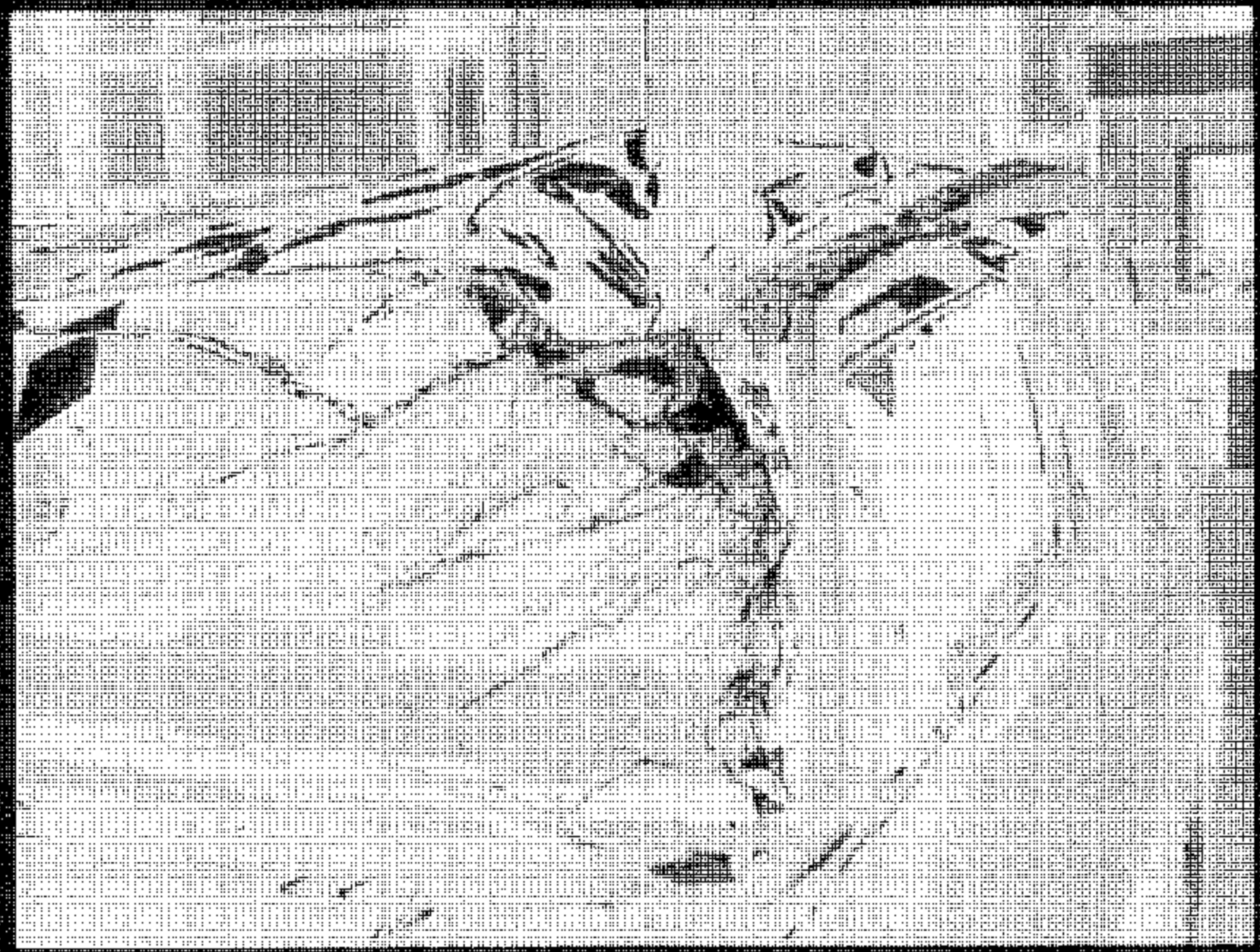
NHTSA NO. C45300
FMVSS NO. 216

FIGURE 5.38
RIGHT SIDE VIEW POST TEST



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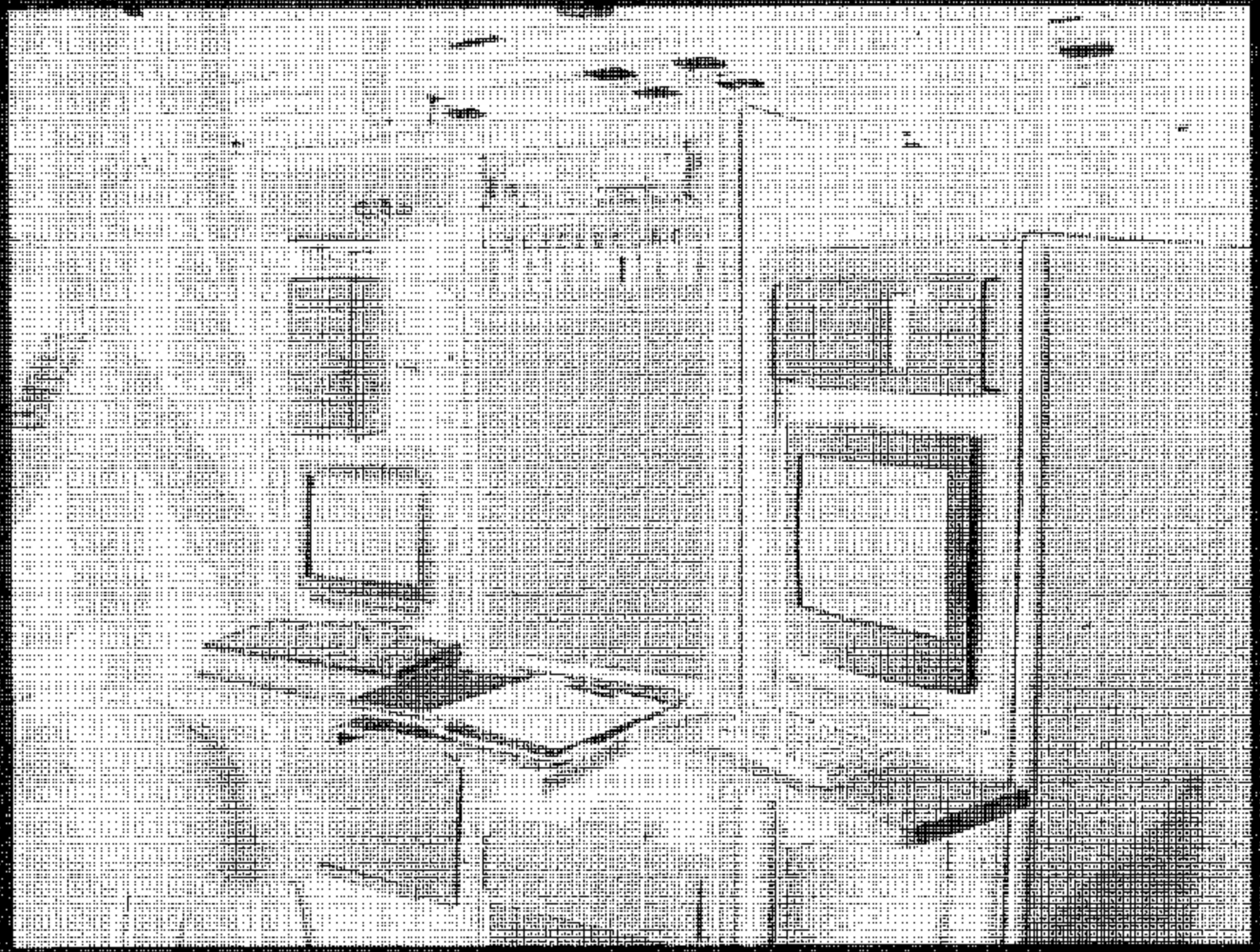
NHTSA NO. C45300
FMVSS NO. 216

FIGURE 5.37
ROOF CLOSE-UP POST TEST



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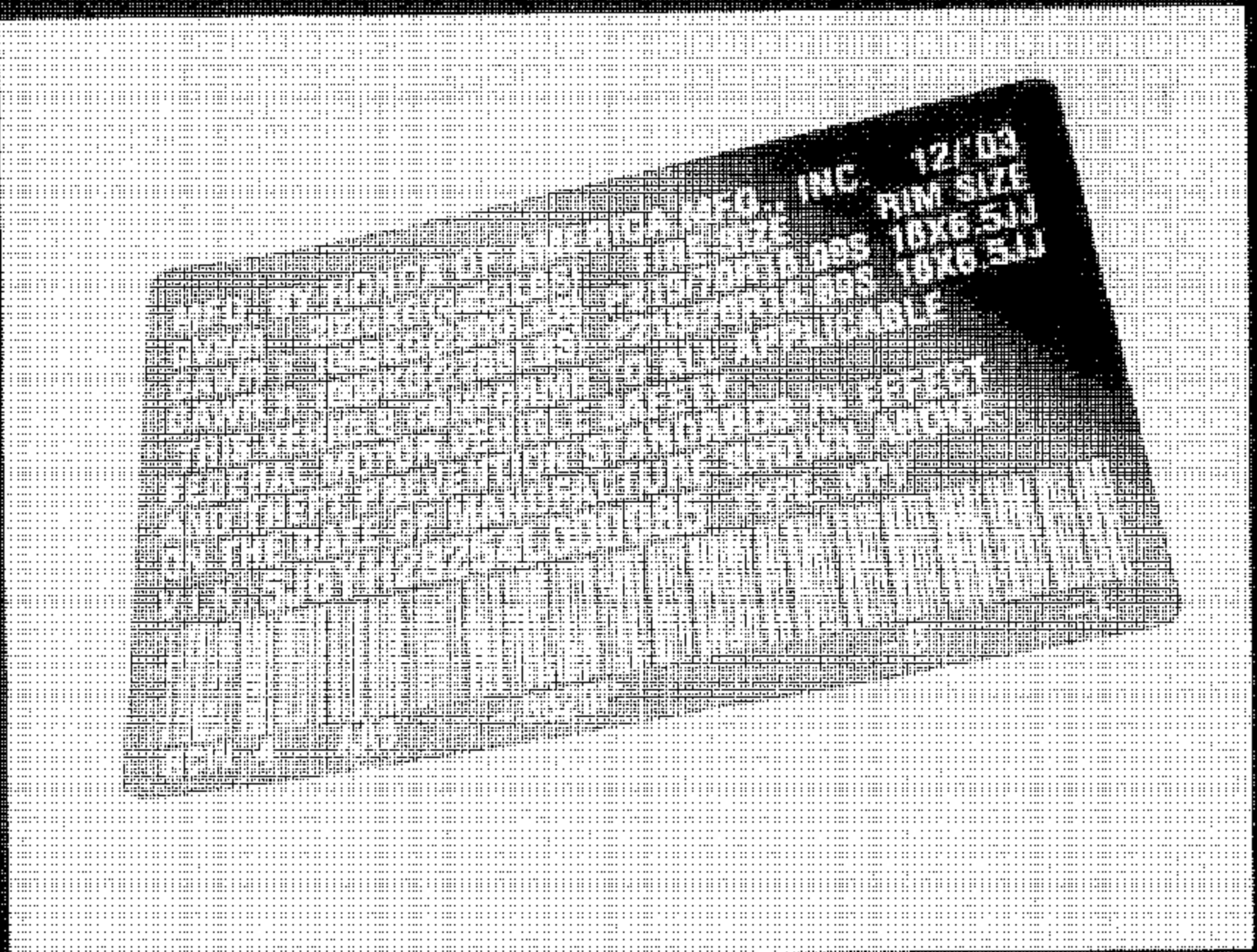
NHTSA NO. C46300
FMVSS NO. 216

FIGURE 5.38
216 INSTRUMENTATION SET-UP



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NHTSA NO. C45300
FMVSS NO. 216

FIGURE 5.39
CLOSE-UP VIEW OF VEHICLE CERTIFICATION LABEL

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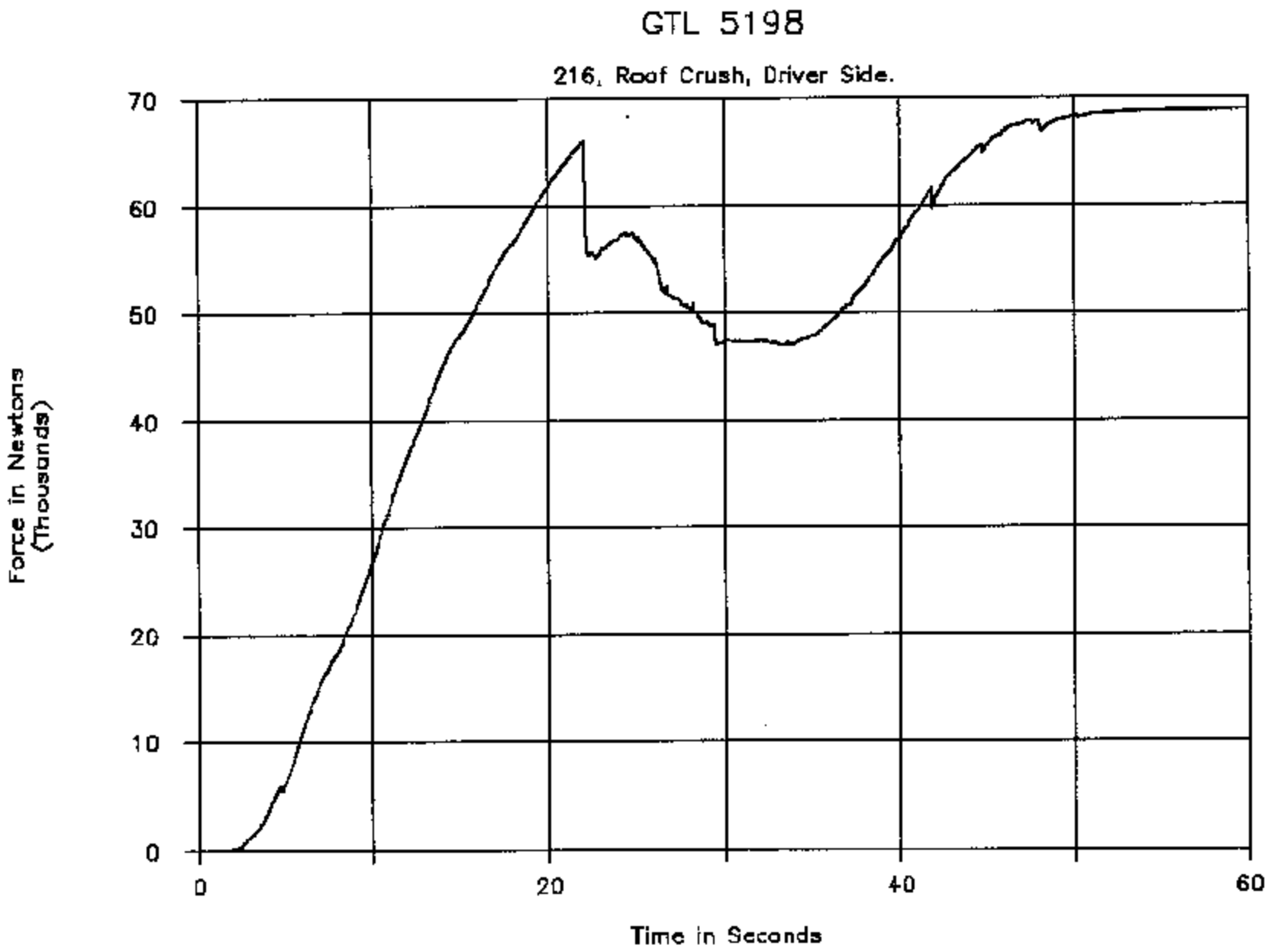
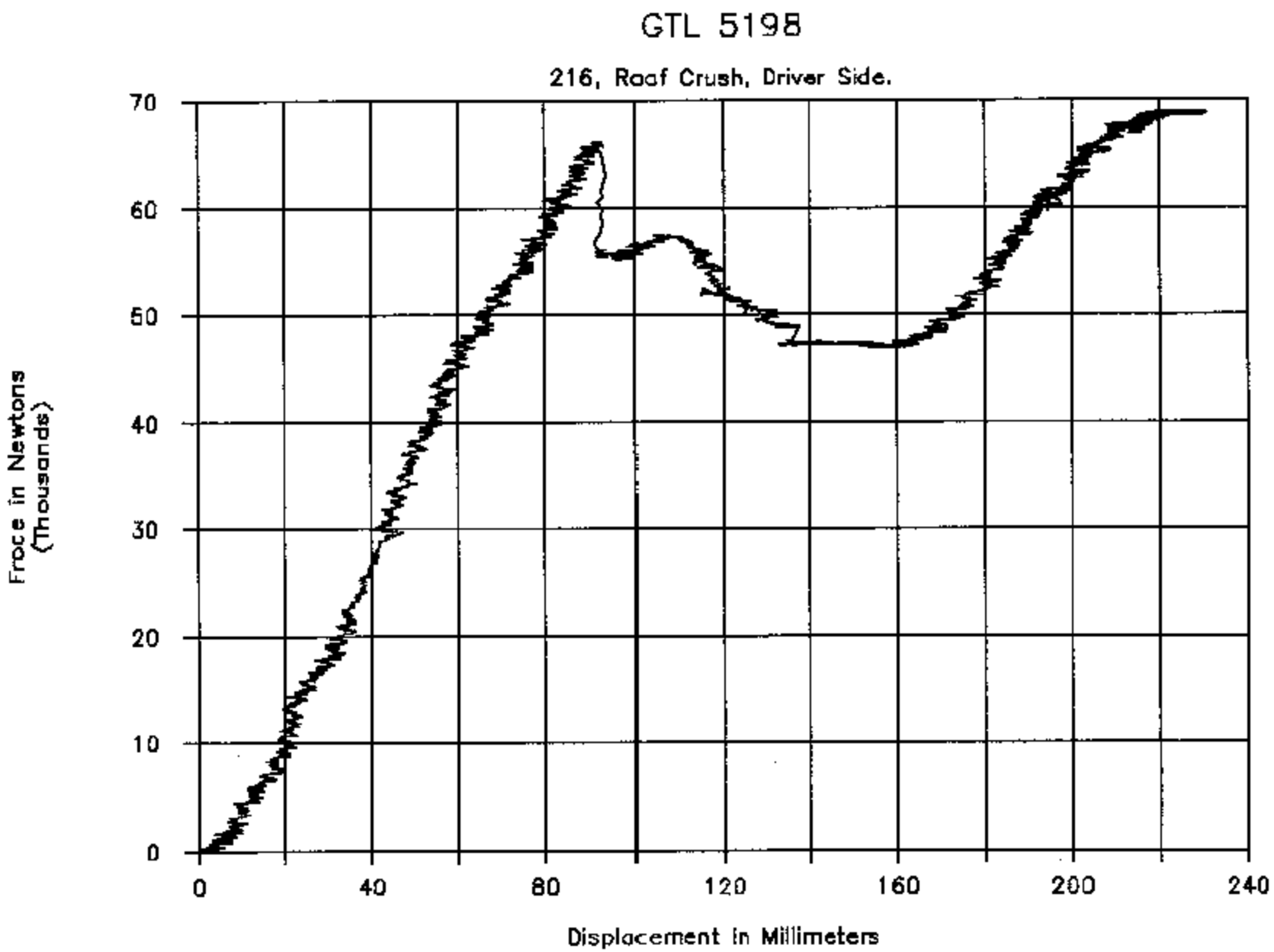
NHTSA NO. C46304
FMVSS NO. 216

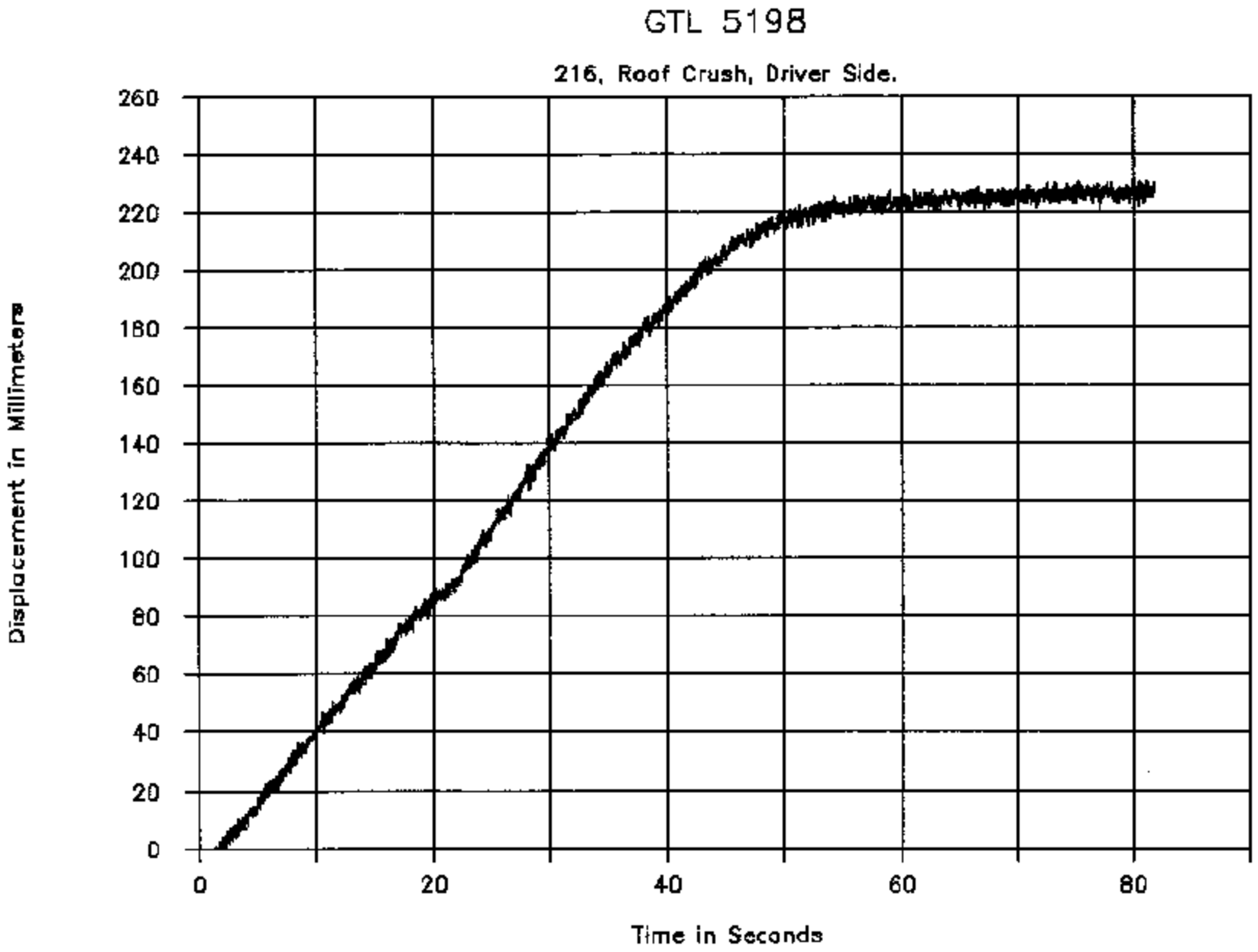
FIGURE 5.40
CLOSE-UP VIEW OF VEHICLE TIRE
INFORMATION LABEL

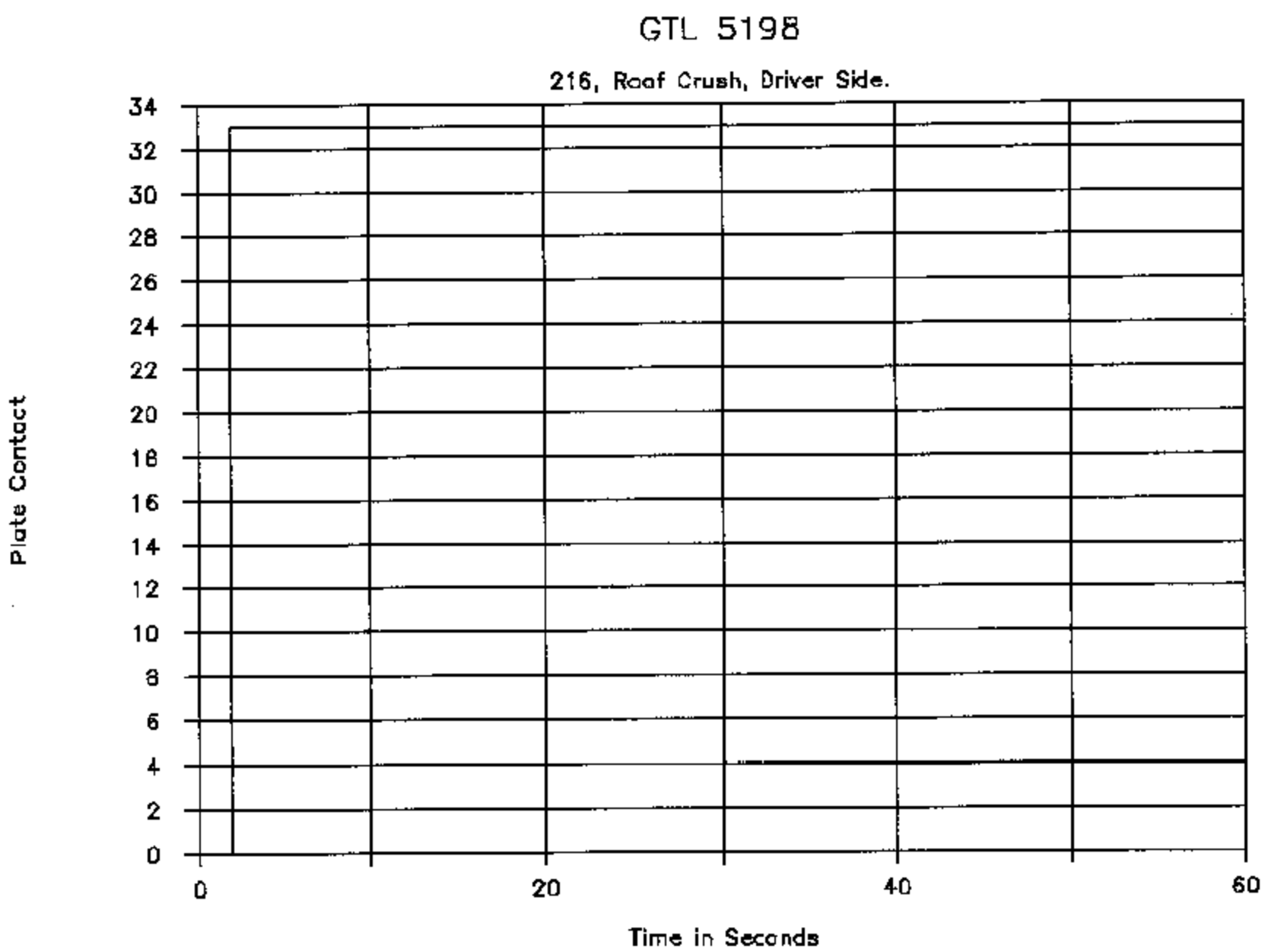
SECTION 6

TEST PLOTS


GTL 5198
216, Roof Crush, Driver Side.
70
60
50
40
30
20
10
0
Force in Newtons
(Thousands)
0
20
40
60
Time in Seconds


GTL 5198
216, Roof Crush, Driver Side.
Froce in Newtons (Thousands)
70
60
50
40
30
20
10
0
0
40
80
120
160
200
240
Displacement in Millimeters


GTL 5198
216, Roof Crush, Driver Side.
Displacement in Millimeters
260
240
220
200
180
160
140
120
100
80
60
40
20
0
0
20
40
60
80
Time in Seconds


GTL 5198
216, Roof Crush, Driver Side.
Plate Contact
34
32
30
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
0
20
40
60
Time in Seconds