HSNO 637300

REPORT NUMBER 104-GTL-04-003

SAFETY COMPLIANCE TESTING FOR FMVSS NO. 104 WINDSHIELD WIPING AND WASHING SYSTEMS

GM DAEWOO AUTO & TECHNOLOGY COMPANY
REPUBLIC OF KOREA
2004 CHEVROLET AVEO, PASSENGER CAR
NHTSA NO. C40110

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

JULY 30, 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
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Approved By:

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15. Supplementary Notes		
16. Abstract Compliance tests were conducted on the subject 2004 Chevrolet Aveo Passenger Car in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-104-08 for the determination of FMVSS 104 compliance. Test failures identified were as follows: NONE		
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SECTION 1

PURPOSE OF COMPLIANCE TEST

1.0 PURPOSE OF COMPLIANCE TEST

A 2004 Chevrolet Aveo Passenger Car was subjected to Federal Motor Vehicle Safety Standard (FMVSS) No. 104 testing to determine if the vehicle was in compliance with the requirements of the standard. All tests were conducted in accordance with NHTSA, Office of Vehicle Safety Compliance (OVSC) Laboratory Procedure, TP-104-08 dated 26 June 1996 and General Testing Laboratories, Inc. (GTL) Test Procedure, TP-104-08A dated 4 April 1997.

1.1 The test vehicle was a 2004 Chevrolet Aveo Passenger Car. Nomenclature applicable to the test vehicle are:

A. Vehicle Identification Number: KL1TJ62684B158294

B. NHTSA No.: C40110

C. Manufacturer: GM DAEWOO AUTO & TECHNOLOGY COMPANY

D. Manufacture Date: 12/03

1.2 TEST DATE

The test vehicle was subjected to FMVSS No. 104 testing on July 14, 2004.

SECTION 2

COMPLIANCE TEST PROCEDURE AND SUMMARY OF RESULTS

2.0 GENERAL

The 2004 Chevrolet Aveo 4-door passenger car, NHTSA No. C40110 was subjected to FMVSS No. 104 tests on July 14, 2004. The selected portions of FMVSS No. 104 tests used were as amplified in the following subparagraphs. The test vehicle was positioned in the test system with three water spray nozzles suspended in line with the center of the longitudinal axis of the windshield and horizontal left/right center of the windshield to provide an even distribution of spray to the entire windshield. The height of the nozzles was approximately 22 inches above the glazing surface.

2.1 WIPER FREQUENCY TEST

The wiper frequency test was performed with the engine operating and with a minimum of 50 cubic inches per minute of water from the spray nozzles. The wiper frequency was measured at the low and high wiper speed settings with the engine operating at idle RPM and 2,000 RPM.

2.2 WIPED AREA TEST

The test was conducted with the windshield wiper system operating at the high speed setting, engine at idle RPM and the spray nozzles spraying water at a minimum of 50 cubic inches per minute. The wiper blade wipe pattern was outlined on the glazing surface and then transferred to a windshield pattern. The wiped area was determined for areas A, B and C from the windshield pattern.

2.3 CAPABILITY TEST

The windshield glazing surface was coated with a mixture of water and fine grade test dust. Within 15 seconds following application of the water-dust mixture, the windshield wiper and washing system was activated in the high speed mode for ten complete cycles. The vehicle's engine was operating at idle RPM. The cleared areas of the windshield were marked on the inside windshield surface. After ten complete cycles the system was deactivated and the wiped area transferred to a windshield pattern.

The glazing surface was cleaned and dried. The water dust mixture was re-applied and the test repeated.

The windshield patterns were used subsequently to determine the cleared area percentages.

2.4 SUMMARY OF RESULTS

Based on the test performed, the test vehicle's windshield wiping and washing system appears to meet the requirements of FMVSS 104.

SECTION 3

COMPLIANCE TEST DATA

3.0 TEST RESULTS

The following data sheets document the results of testing on the 2004 Chevrolet Aveo.

SUMMARY OF DATA
FMVSS 104, WINDSHIELD WIPING AND WASHING SYSTEMS

VEH. MOD YR/MAKE/MODEL/BODY: 2004 CHEVROLET AVEO PASSENGER CAR
VEH. NHTSA NO: C40110; VIN: KL1TJ62684B158294
VEH. BUILD DATE: 12/03 TEST DATE: JULY 14, 2004
TEST LABORATORY: GENERAL TESTING LABORATORIES
OBSERVERS: GRANT FARRAND, JIMMY LATANE

WIPER TYPE: 2 SPEED ELECTRIC WITH DELAY

WASHER TYPE: ELECTRIC HIGH PRESSURE PUMP

WINDSHIELD AREAS: A = 1015.7 in^2 B = 731.1 in^2 C = 220.4 in^2

MANUFACTURER'S WINDSHIELD PATTERN USED: Yes X No

ACCESSIBILITY:

(1)	Washer Control Accessible:	Yes X	No
(2)	Wiper Control Accessible:	Yes X	No
(3)	Washer Reservoir Filler Accessible:	Yes X	No

DESCRIBE UNUSUAL FEATURES OF WIPING AND WASHING SYSTEMS:

PERFORMANCE:

TEST	PASS	FAIL
WIPER FREQUENCY	X	
WIPED AREA	X	
WASHER CAPABILITY	X	

RECORDED BY: _____ DATE: 07/16/04

APPROVED BY: _____

FREQUENCY TEST DATA
FMVSS 104 – WINDSHIELD WIPER SYSTEM

VEH. MOD YR/MAKE/MODEL/BODY: 2004 CHEVROLET AVEO PASSENGER CAR
VEH. NHTSA NO: C40110; VIN: KL1TJ62684B158294
VEH. BUILD DATE: 12/03 ; TEST DATE: JULY 14, 2004
TEST LABORATORY: GENERAL TESTING LABORATORIES
OBSERVERS: GRANT FARRAND, JIMMY LATANE

Water Hardness: 7.0 grains/gallon (12 max.); Date Certified: 02/23/04

Water Spray Flow Rate: 70.7 in^3/min. (specified range = 50 to 100 in^3/min.)

Ambient Air Temp.: 88 °F (50-100°F); Water Temp.: 74 °F (100°F max.)

Manufacturer's Recommended Engine Idle Speed: 825 rpm

RUN 1, MAXIMUM WIPER FREQUENCY TEST:

TIME	ENGINE SPEED	TOTAL CYCLES	AVG. CYCLES/MIN. (45 MINIMUM)
1ST 3 minutes	825 (idle ± 50 rpm)	209	69.6
2nd 3 minutes	2000 (2000 rpm ± 50 rpm)	216	72

Frequency at least 45 cycles/minute regardless of engine speed: Yes X No ___

RUN 2, LOWER WIPER FREQUENCY TEST:

TIME	ENGINE SPEED	TOTAL CYCLES	AVG. CYCLES/MIN. (45 MINIMUM)
1ST 3 minutes	825 (idle ± 50 rpm)	130	43.3
2nd 3 minutes	2000 (2000 rpm ± 50 rpm)	131	43.6

Highest and lower frequency differ by at least 15 cycles/minute, and lower frequency is at least 20 cycles/minute regardless of engine speed: Yes X No ___

REMARKS:

RECORDED BY: _____ DATE: 07/14/04

APPROVED BY: _____

WIPED AREA TEST DATA
FMVSS 104 – WINDSHIELD WIPER SYSTEM

VEH. MOD YR/MAKE/MODEL/BODY: 2004 CHEVROLET AVEO PASSENGER CAR
VEH. NHTSA NO: C40110; VIN: KL1TJ62684B158294
VEH. BUILD DATE: 12/03 ; TEST DATE: JULY 14, 2004
TEST LABORATORY: GENERAL TESTING LABORATORIES
OBSERVERS: GRANT FARRAND, JIMMY LATANE

Air Temperature in test area = 88 °F (specified range of 50 to 100°F)

Air Velocity at windshield = .2 mph (specified range of 0 to 1 mph)

Engine speed = 825 rpm (manufacturer's recommended idle ± 50 rpm)

Temperature of water spray = 74 °F (100° F maximum)

Water spray flow rate = 70.7 in^3/min. (specified range of 50 to 100 in^3/min.)

Windshield wiper frequency = 45 cycles/min. (45 cpm minimum)

TEST RESULTS:

PERCENT WIPED				
WINDSHIELD AREA	ACTUAL	REQUIRED	PASS	FAIL
A	92.9%	80%	X	
B	95.7%	94%	X	
C	100%	99%	X	

REMARKS:

RECORDED BY: _____ DATE: 07/16/04

APPROVED BY: _____

CAPABILITY TEST DATA
FMVSS 104 – WINDSHIELD WASHER SYSTEM

VEH. MOD YR/MAKE/MODEL/BODY: 2004 CHEVROLET AVEO PASSENGER CAR
VEH. NHTSA NO: C40110; VIN: KL1TJ62684B158294
VEH. BUILD DATE: 12/03 ; TEST DATE: JULY 14, 2004
TEST LABORATORY: GENERAL TESTING LABORATORIES
OBSERVERS: GRANT FARRAND, JIMMY LATANE

Air Temperature in test area = 88 °F (specified range of 70 to 80°F)

Washer reservoir fluid temperature = 75 °F (specified range of 70 to 80°F)

Air Velocity at windshield = .2 mph (specified range of 0 to 1 mph)

Engine speed = 825 rpm (manufacturer's recommended idle ± 50 rpm)

Number of windshield washer nozzles on the vehicle = 2 nozzles with 2 spray holes in each

Windshield washer system activation coordinated with components of the wiper system:
Yes X No

TEST RESULTS:

CLEARED AREA PERCENTAGES						
WINDSHIELD AREA	TEST 1	TEST 2	AVG	REQ'D*	PASS	FAIL
A	93.9	93.5	93.7	75%	X	
B	95.1	95.3	95.2	75%	X	
C	100	100	100	75%	X	

*NOTE FOR REFERENCE ONLY: SAE 942b, revised Jul72, recommends capability to clear 80% of the total wash area and 90% of the wash area included in AREA C.

REMARKS:

RECORDED BY: _____ DATE: 07/16/04

APPROVED BY: D. Musick

SECTION 4
INSTRUMENTATION AND EQUIPMENT LIST

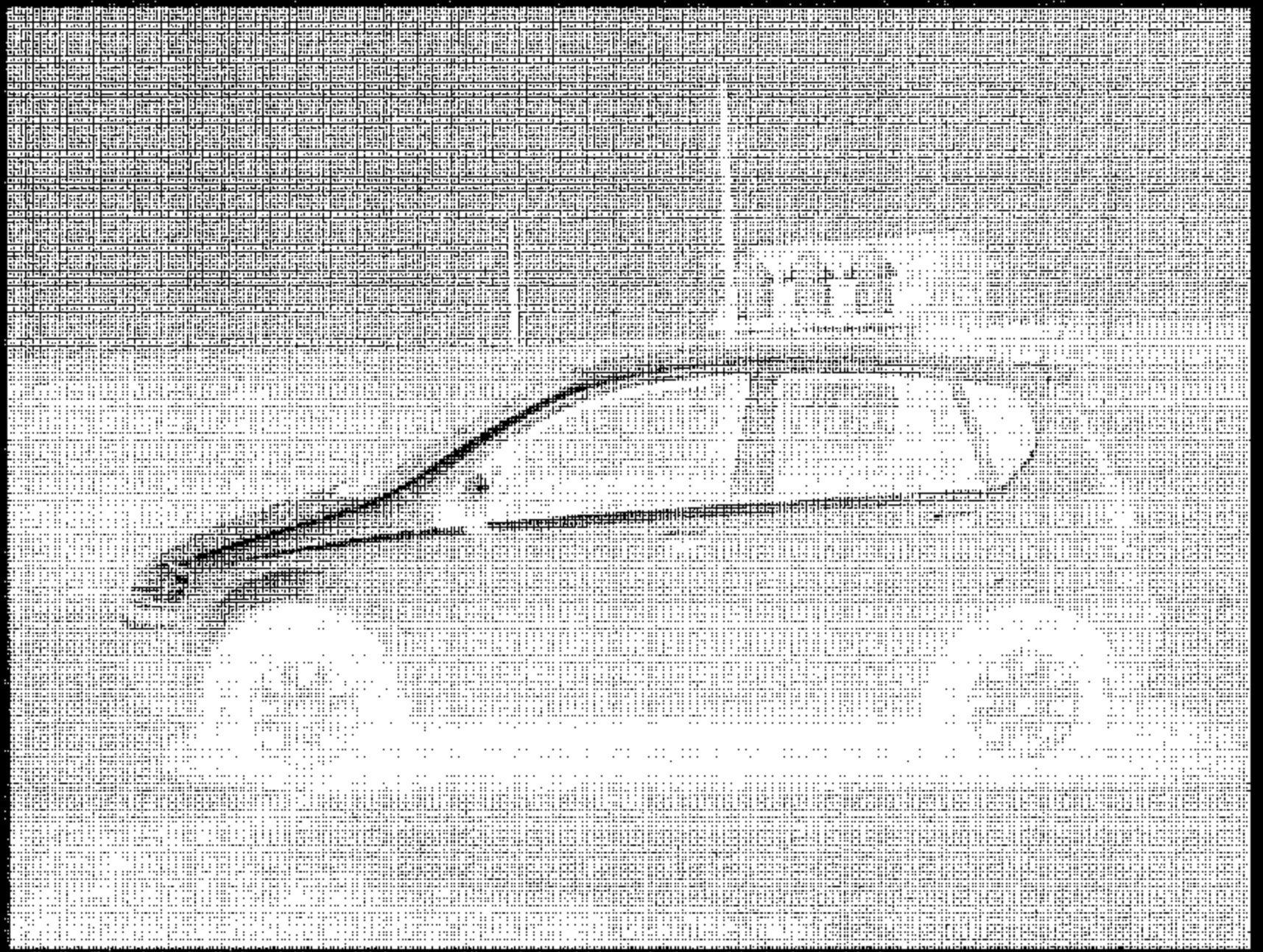
TABLE 1 - INSTRUMENTATION & EQUIPMENT LIST

EQUIPMENT	DESCRIPTION	MODEL/ SERIAL NO.	CAL. DATE	NEXT CAL. DATE
TIMER	ACCU-SPLIT	ACT2	07/04	07/05
TEMPERATURE READOUT	OMEGA	43P	03/04	03/05
TEMPERATURE RECORDER	OMEGA	CT91	03/04	03/05
SPRAY SYSTEM	GTL	N/A	BEFORE USE	BEFORE USE
ANEMOMETER	HASTINGS	RM-1, 46	05/04	06/06
CYCLE COUNTER	GTL	GTL	BEFORE USE	BEFORE USE
SOFT WATER	N/A	N/A	02/04	02/05
TACHOMETER	MONARCH	ACT-3	07/04	07/05
TEST DUST	AC	GM FINE	CALIBRATED DUST	CALIBRATED BY VENDOR*
EVENT RECORDER	COMPUTER	GEO1	BEFORE USE	BEFORE USE

*AC Inspection #503, Batch #1943, Measured with particle size roller analyzer.

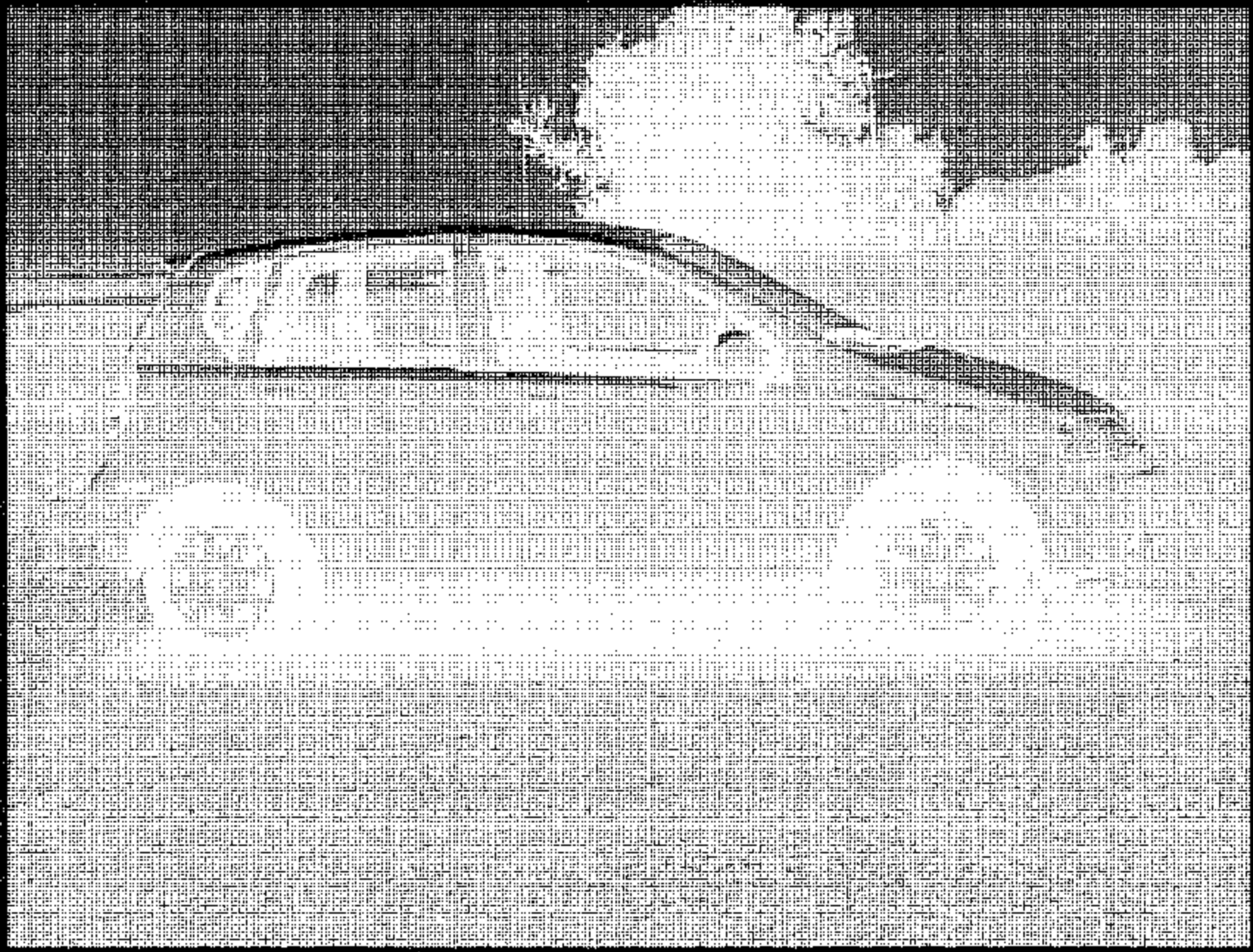
SECTION 5

PHOTOGRAPHS



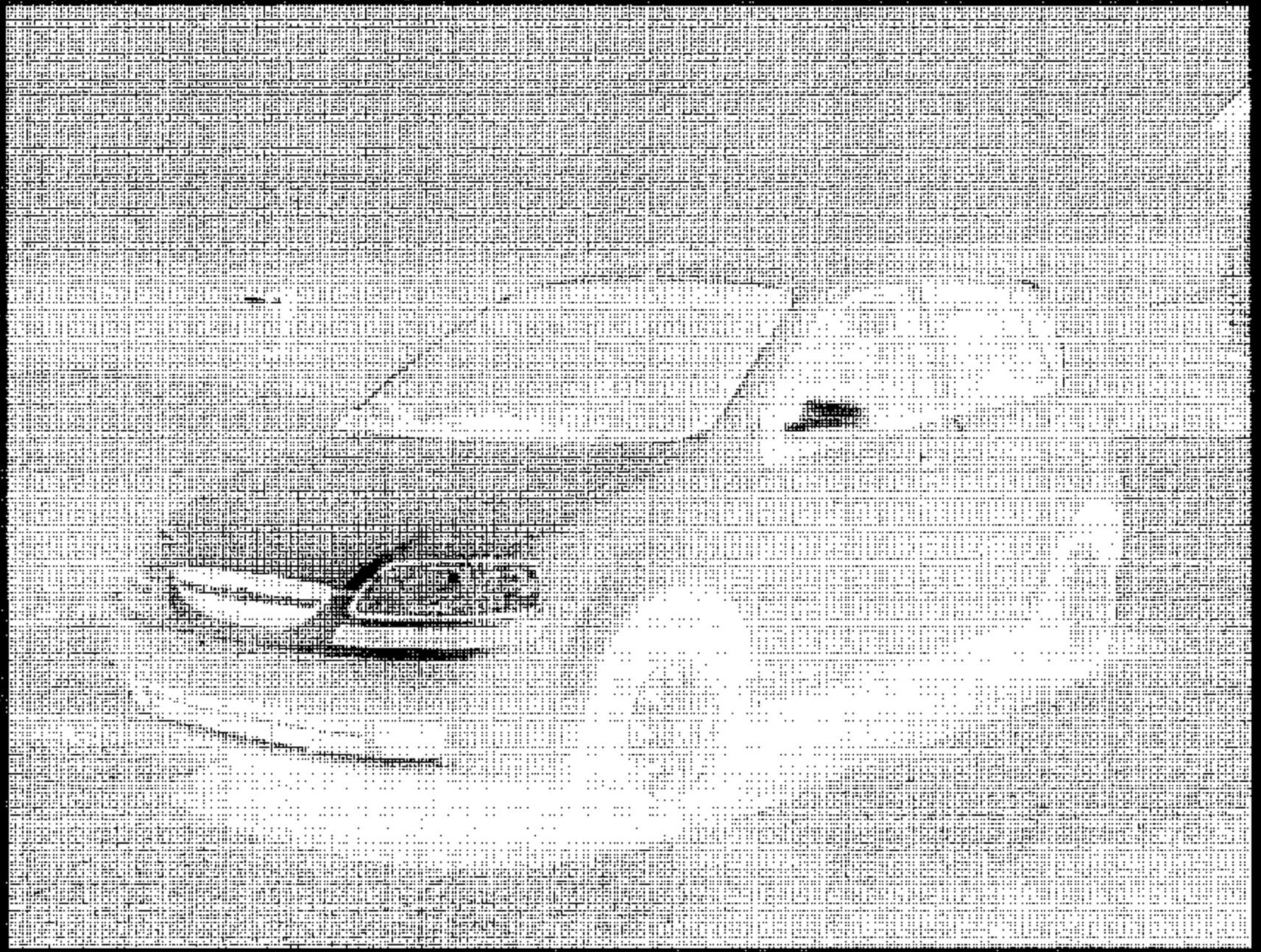
2004 CHEVROLET AVEO
NHTSA NO. C40110
FMVSS NO. 104

FIGURE 5.1
LEFT SIDE VIEW OF VEHICLE



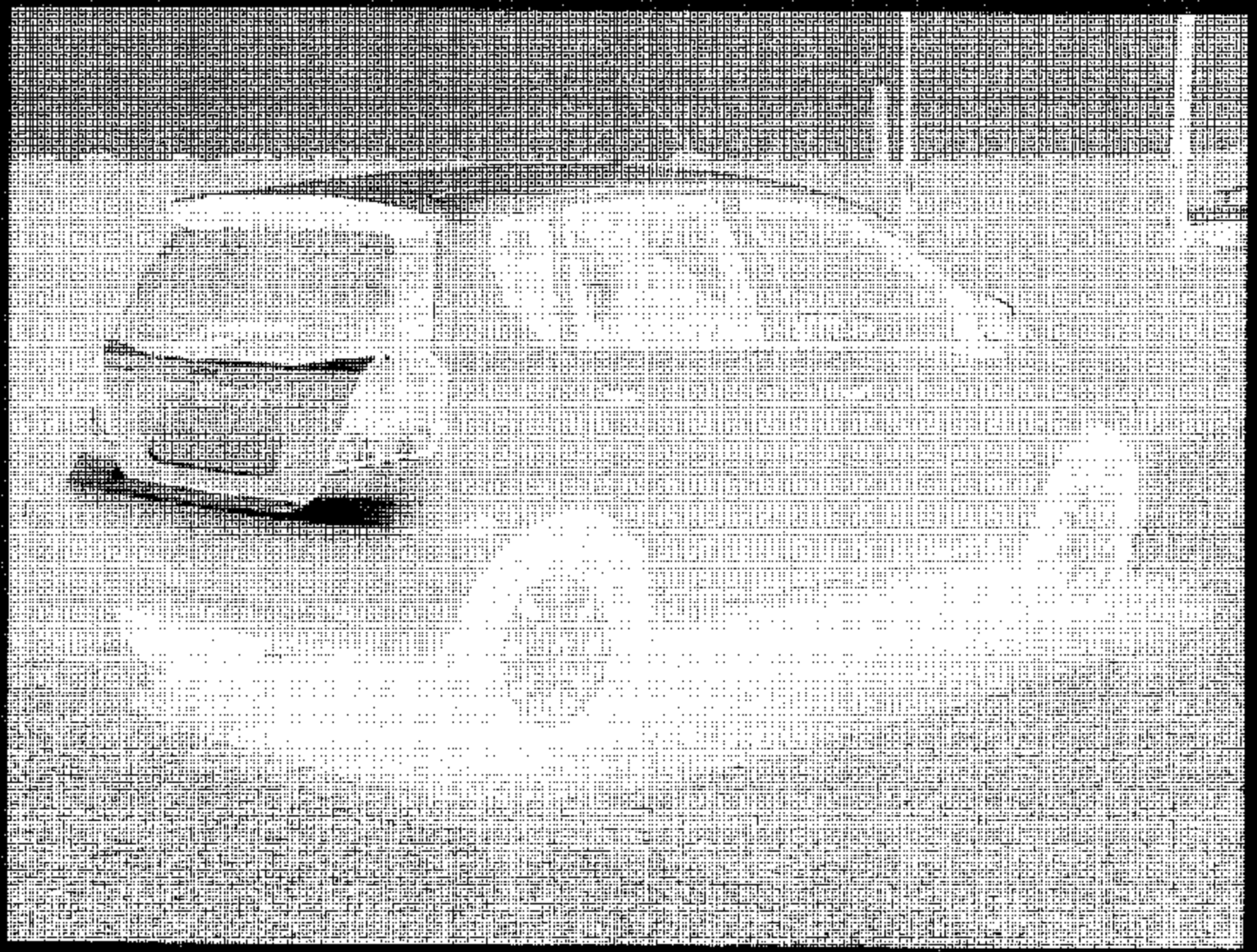
2004 CHEVROLET AVEO
NHTSA NO. C40110
FMVSS NO. 104

FIGURE 5.2
RIGHT SIDE VIEW OF VEHICLE



2004 CHEVROLET AVEO
NHTSA NO. C40110
FMVSS NO. 104

FIGURE 6.3
¾ FRONTAL VIEW FROM LEFT SIDE OF VEHICLE



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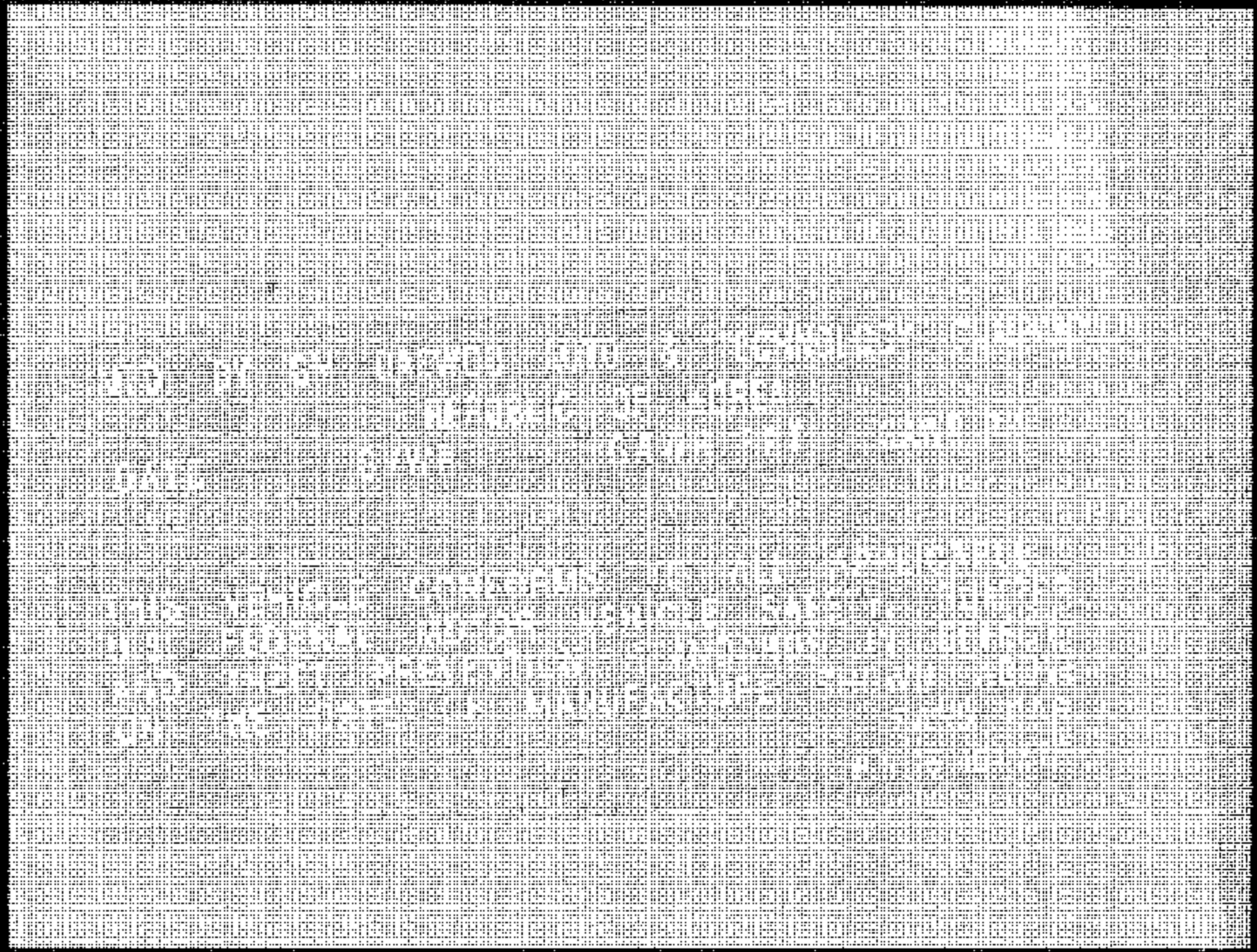
NHTSA NO. C40110
FMVSS NO. 104

FIGURE 5.4
¾ REAR VIEW FROM RIGHT SIDE OF VEHICLE



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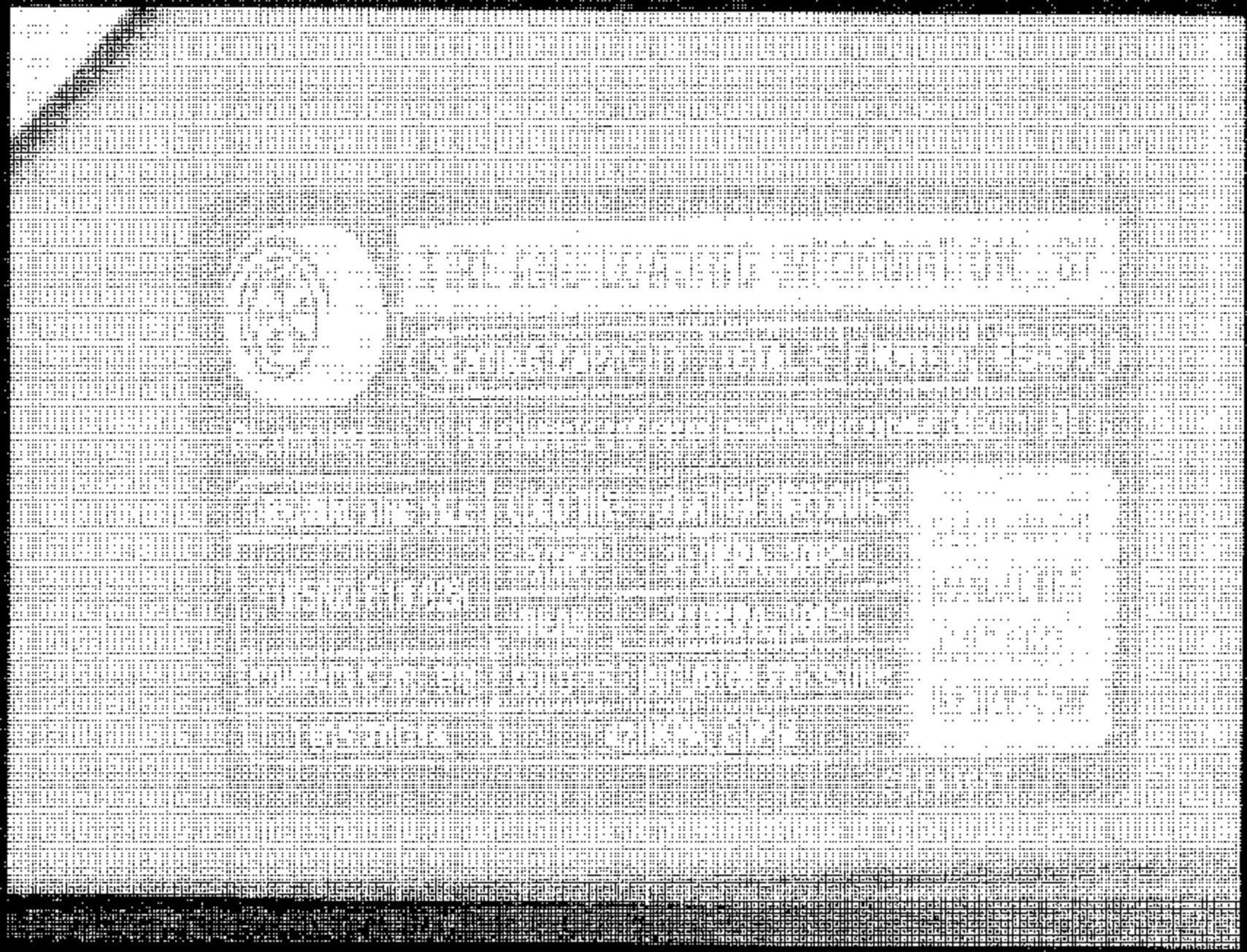
NHTSA NO. C40110
FMVSS NO. 104

FIGURE 5.5
VEHICLE CERTIFICATION LABEL



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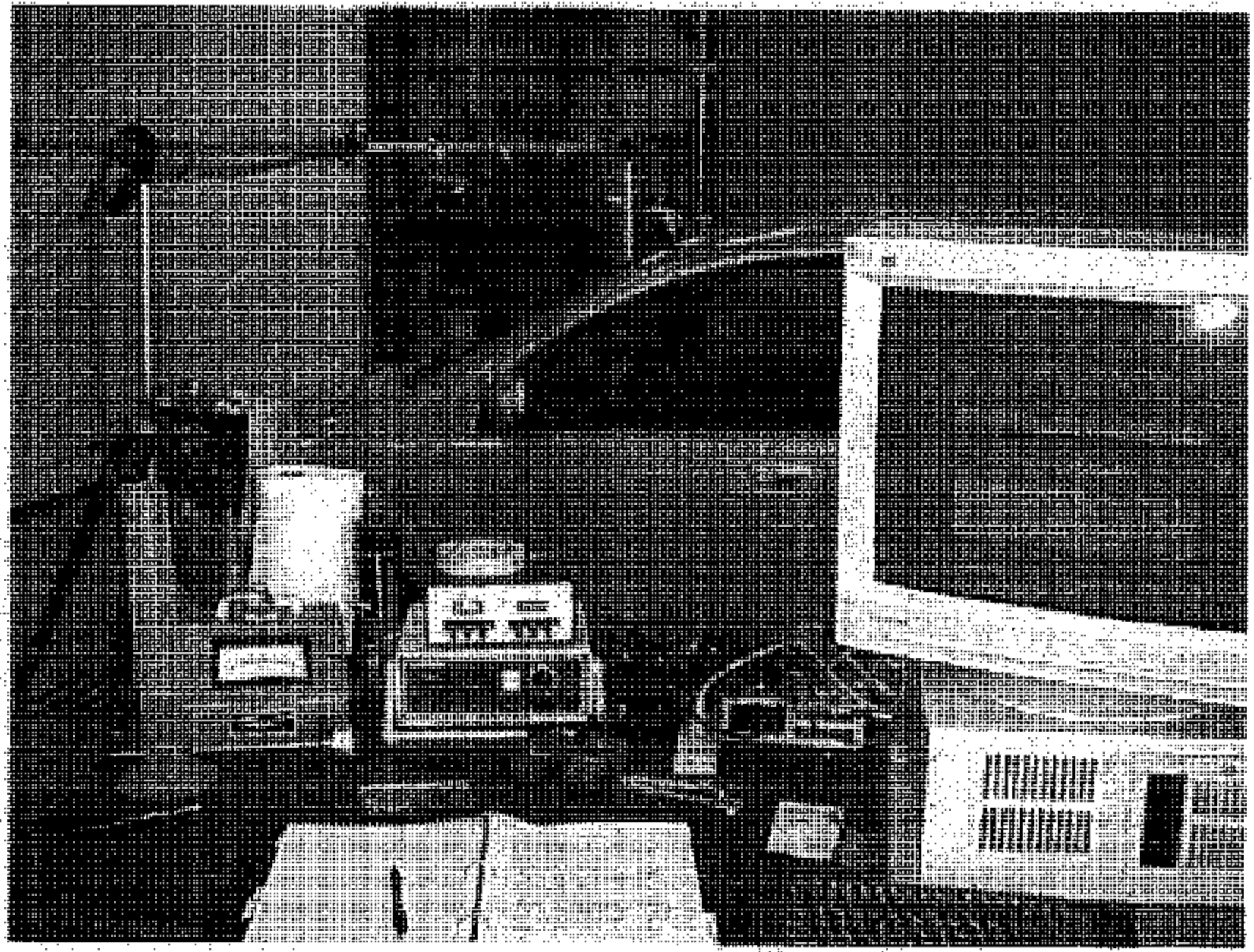
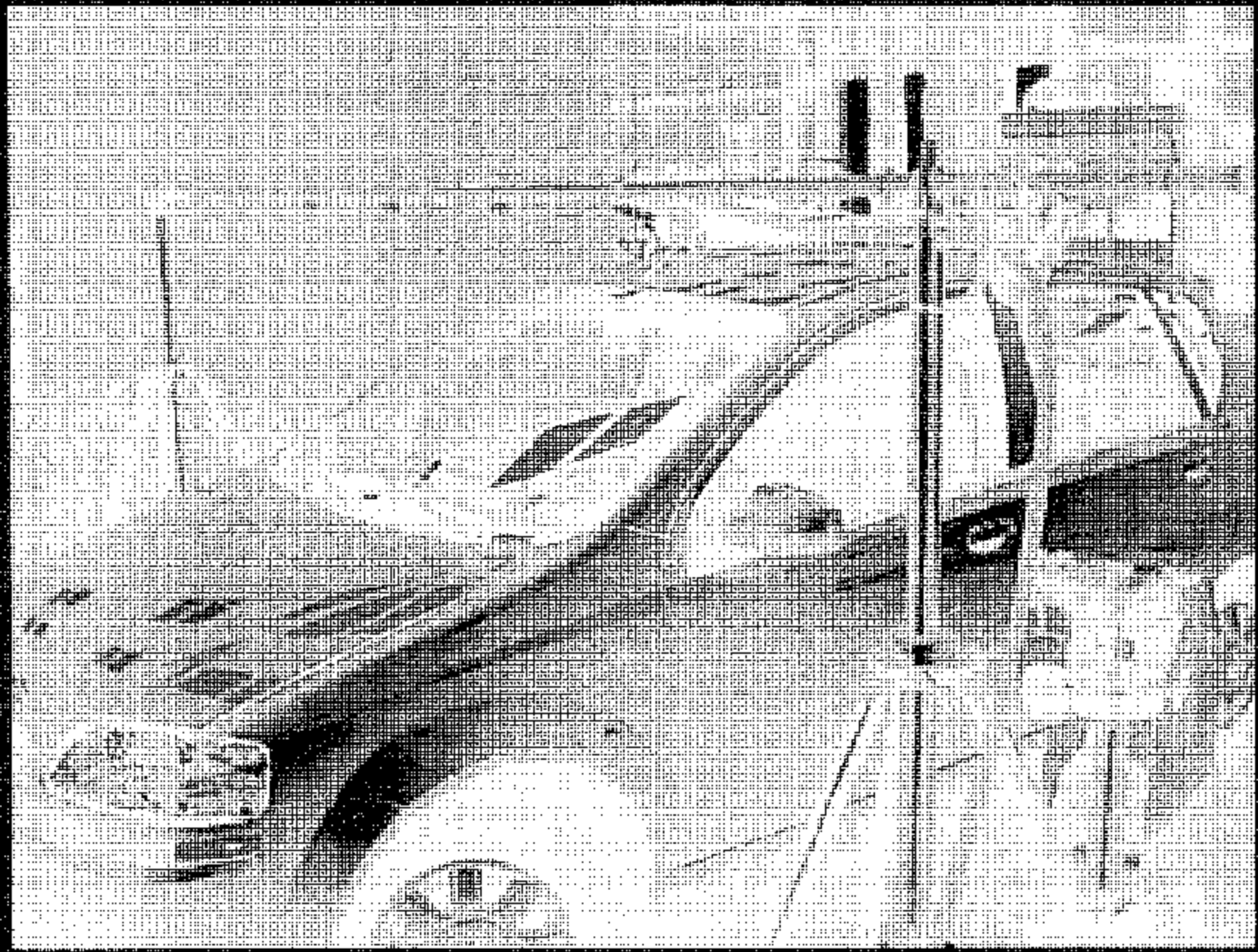
NHTSA NO. C40110
FMVSS NO. 104

FIGURE 5.6
VEHICLE TIRE INFORMATION LABEL



2004 CHEVROLET AVEO
NHTSA NO. C40110
FMVSS NO. 104

FIGURE 5.7
INSTRUMENTATION SET-UP



2004 CHEVROLET AVEO
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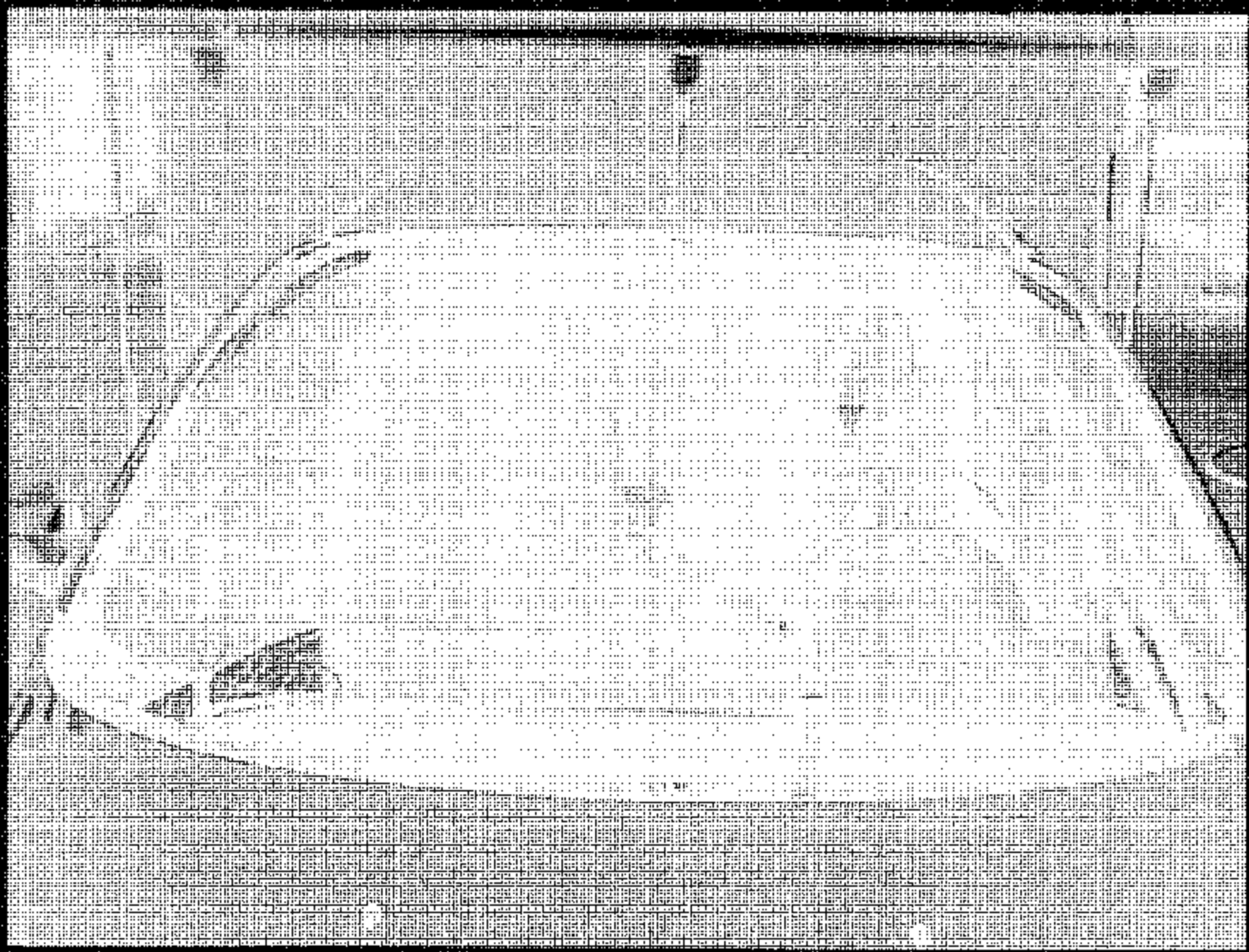
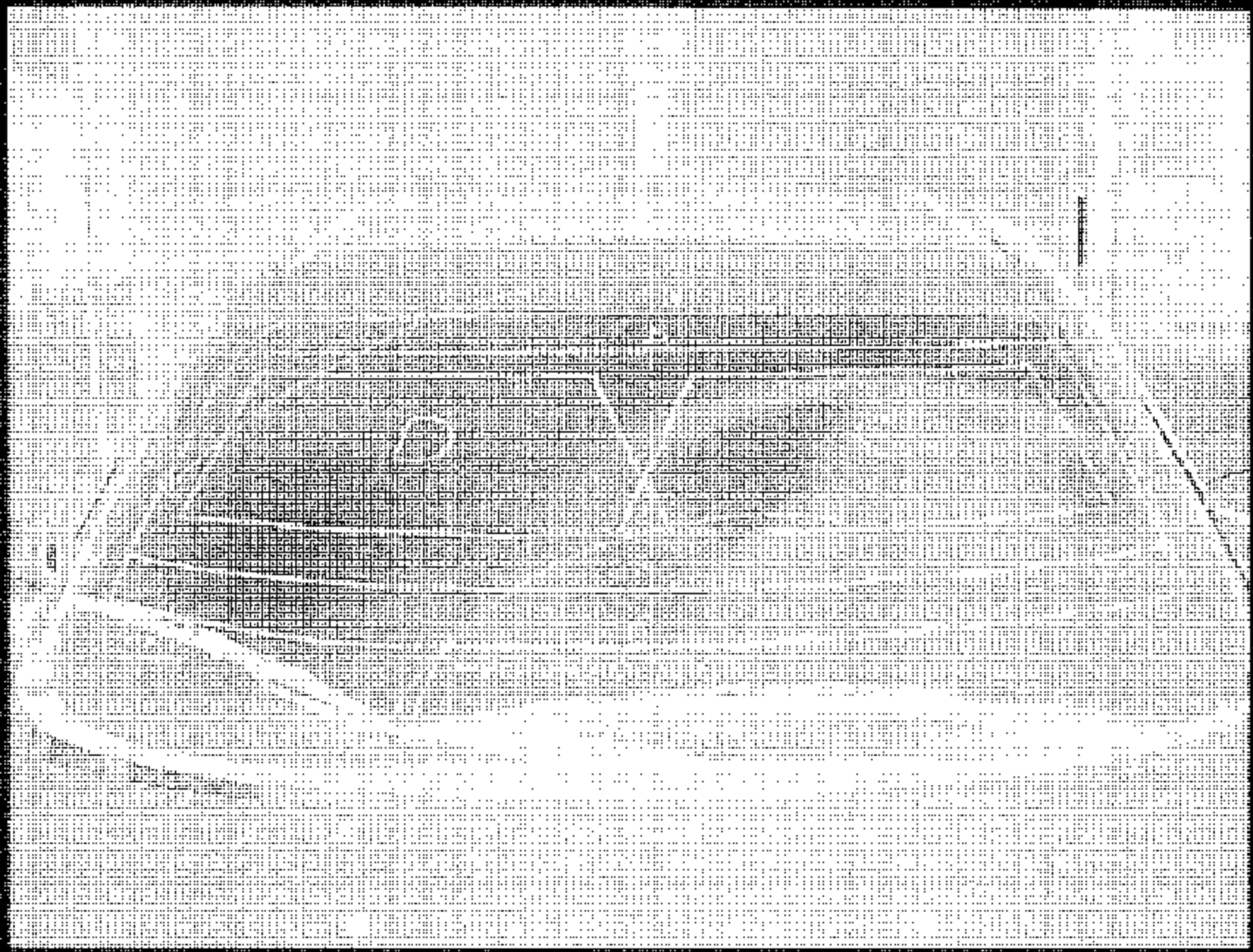
FMVSS NO. 104

FIGURE 6.8
EQUIPMENT SET-UP



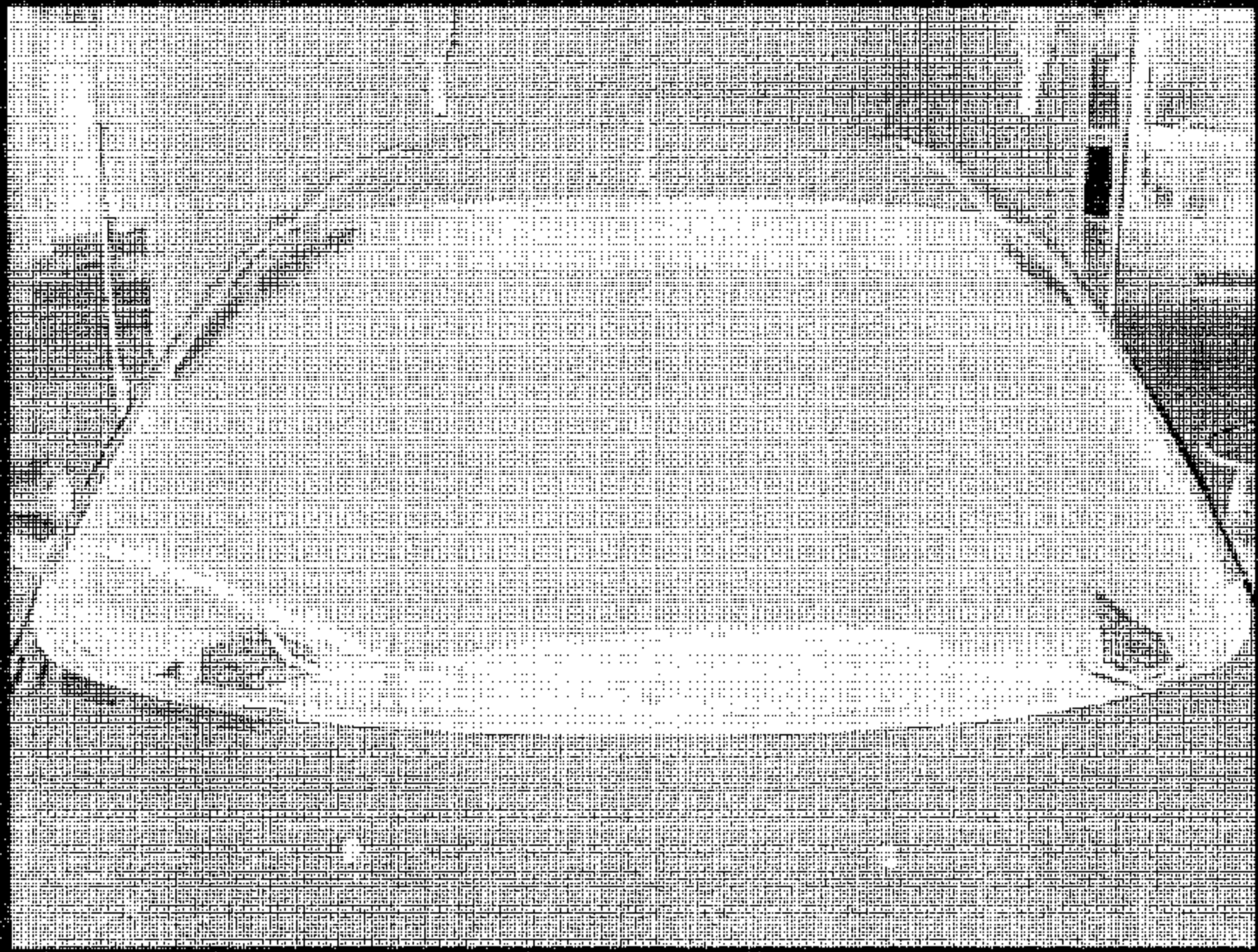
2004 CHEVROLET AVEO
NHTSA NO. C40110
FMVSS NO. 104

FIGURE 5.9
WIPED AREA TEST



2004 CHEVROLET AVEO
NHTSA NO. C40110
FMVSS NO. 104

FIGURE 5.10
WIPED AREA TEST PATTERN



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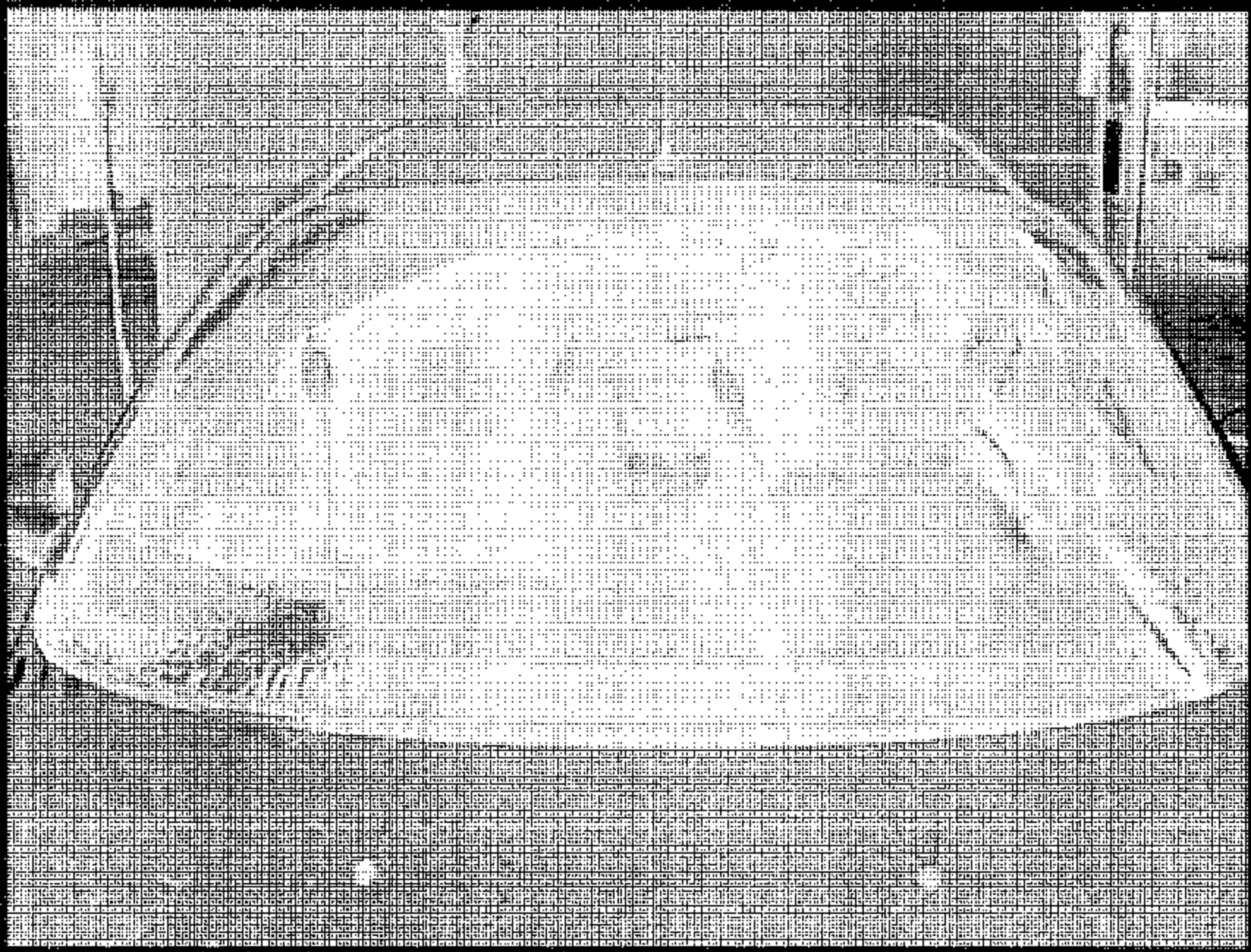
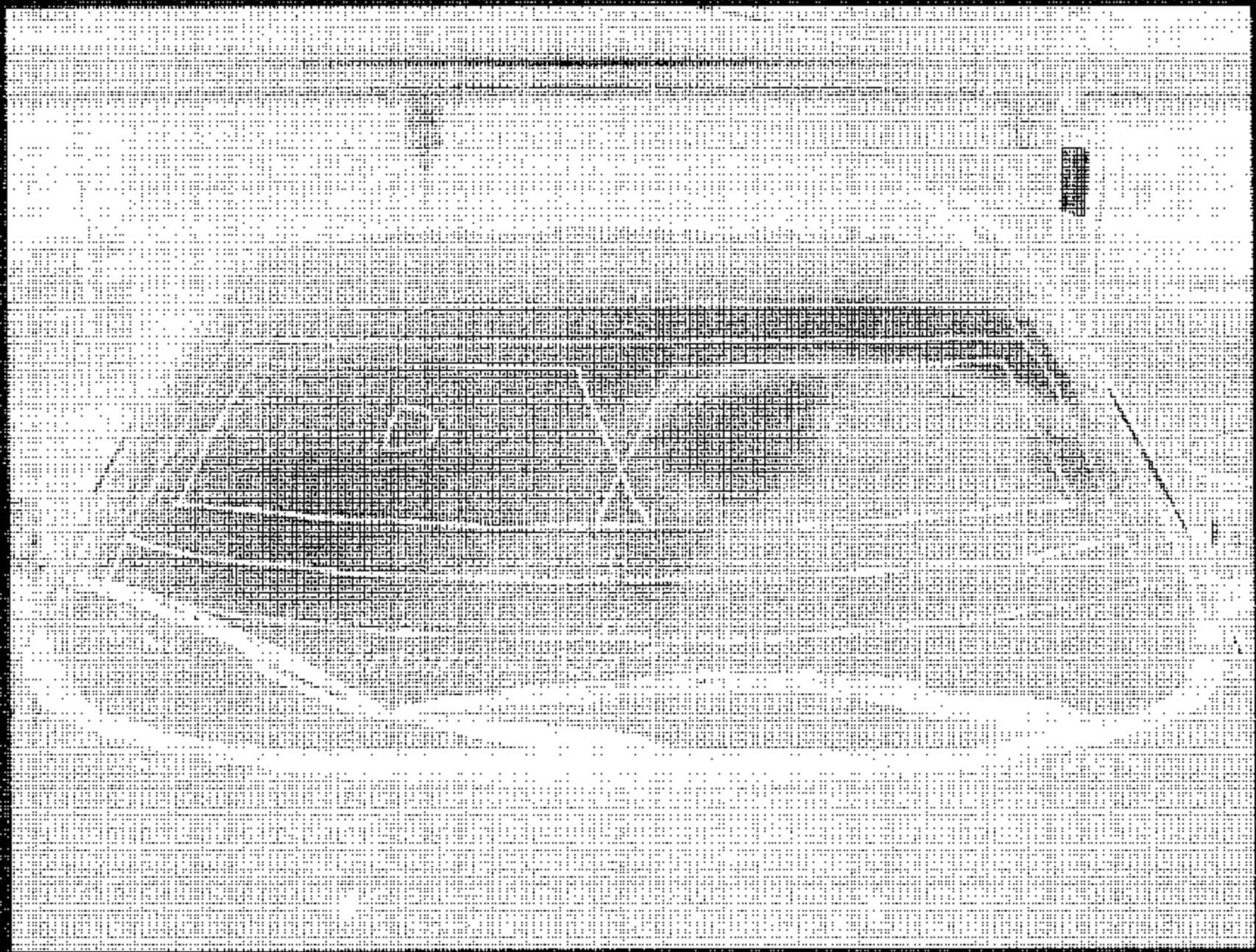
NHTSA NO. C40110
FMVSS NO. 104

FIGURE 5.11
CAPABILITY TEST #1 – PRE-COATED WINDSHIELD



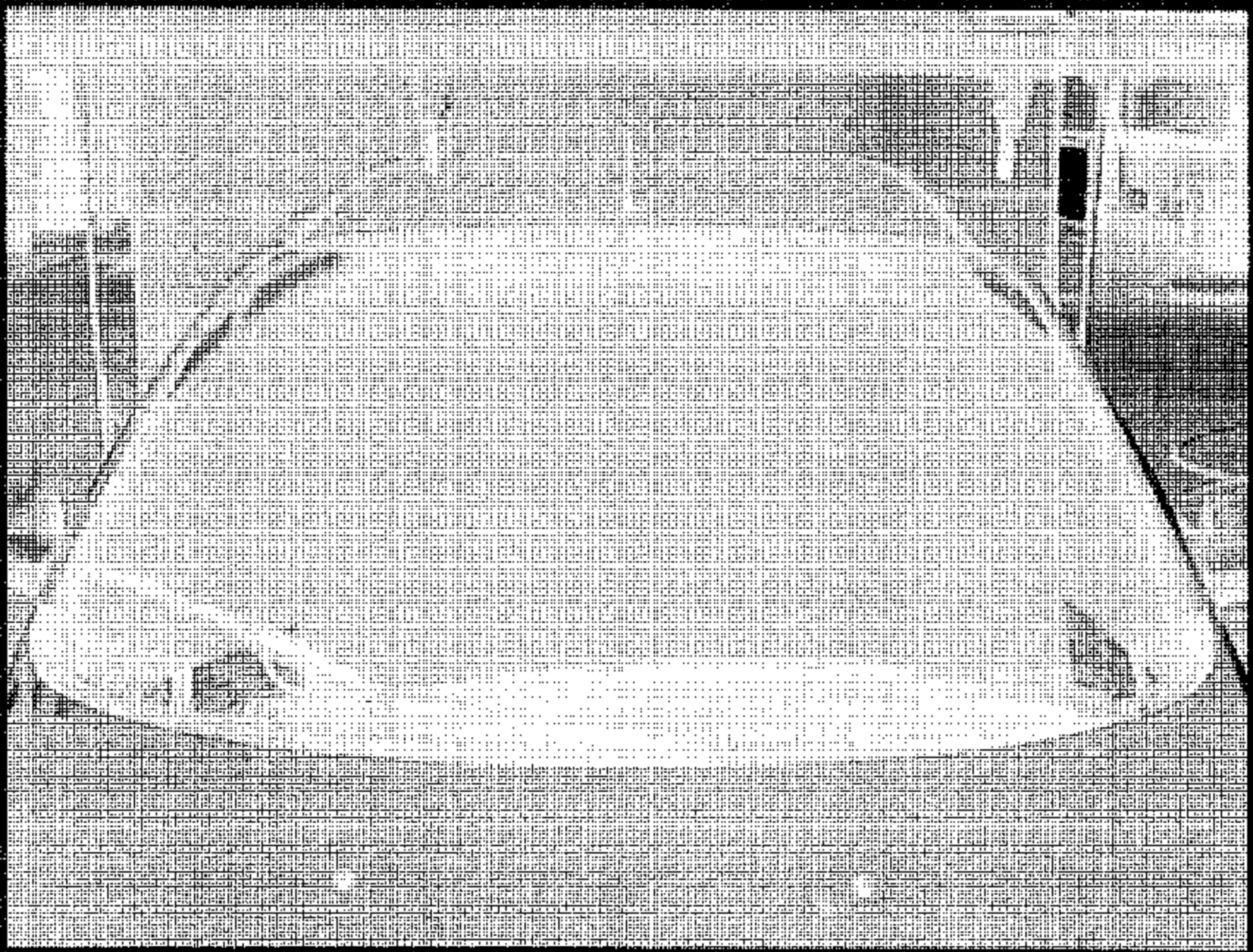
2004 CHEVROLET AVEO
NHTSA NO. C40110
FMVSS NO. 104

FIGURE 5.12
CAPABILITY TEST #1 – IN PROGRESS



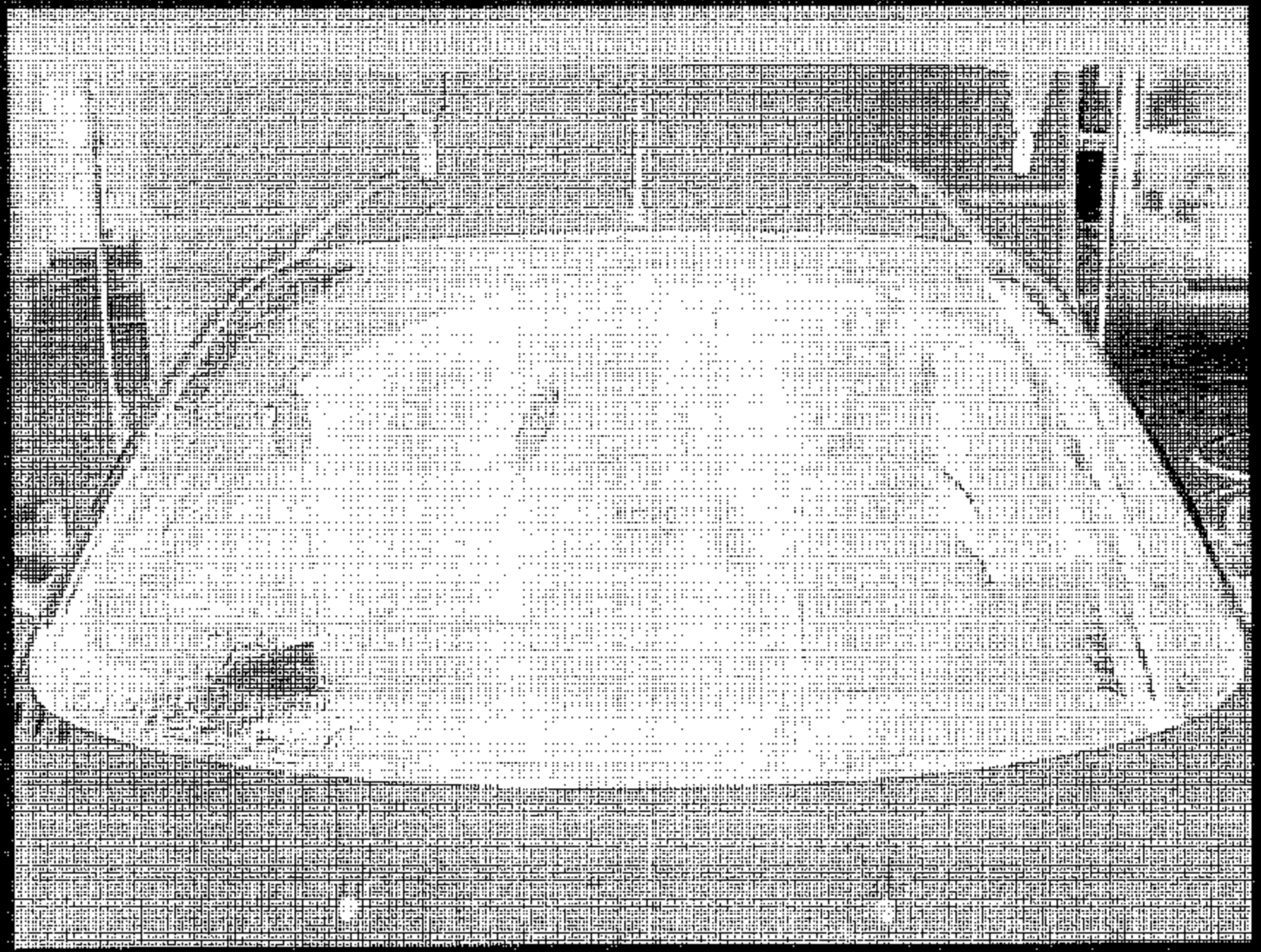
2004 CHEVROLET AVEO
NHTSA NO. C40110
FMVSS NO. 104

FIGURE 5.13
CAPABILITY TEST #1 - PATTERN



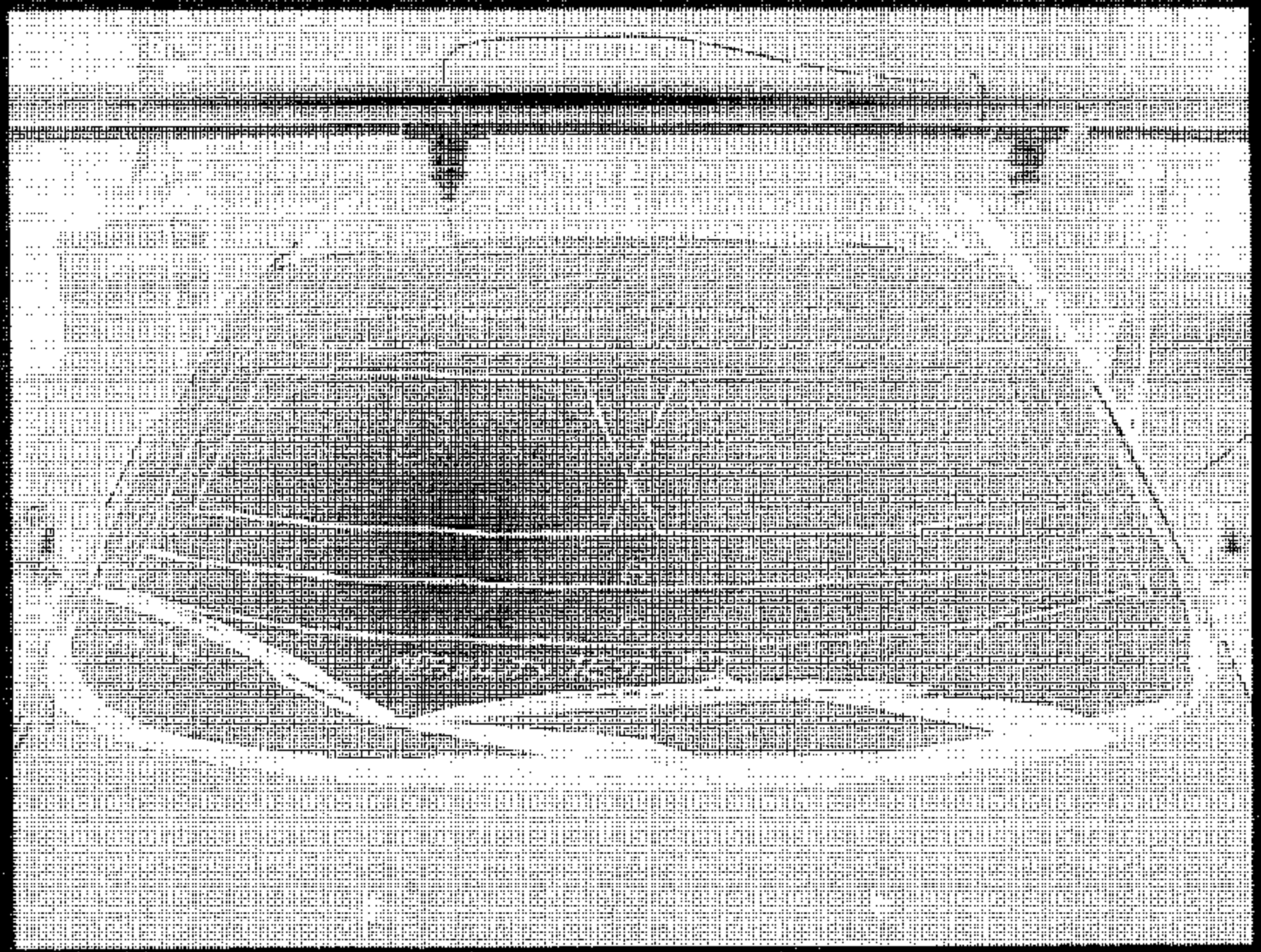
2004 CHEVROLET AVEO
NHTSA NO. C40110
FMVSS NO. 104

FIGURE 5.14
CAPABILITY TEST #2 -- PRE-COATED WINDSHIELD



2004 CHEVROLET AVEO
NHTSA NO. C40110
FMVSS NO. 104

FIGURE 5.15
CAPABILITY TEST #2 – IN PROGRESS



2004 CHEVROLET AVEO
NHTSA NO. C40110
FMVSS NO. 104

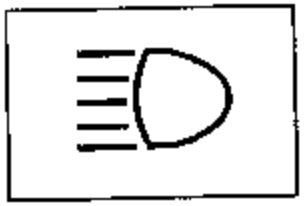
FIGURE 5.16
CAPABILITY TEST #2 - PATTERN

SECTION 6

OWNER'S MANUAL INFORMATION

Headlamp High/Low-Beam Changer

To change the headlamps from low beam to high beam, push the turn signal/multifunction lever away from you.



When the high beams are on, this light on the instrument panel cluster also will be on if the ignition is turned to ON.

To change the headlamps from high beam to low beam, pull the turn signal lever toward you.

Flash-to-Pass Feature

This feature lets you use your high-beam headlamps to signal a driver in front of you that you want to pass.

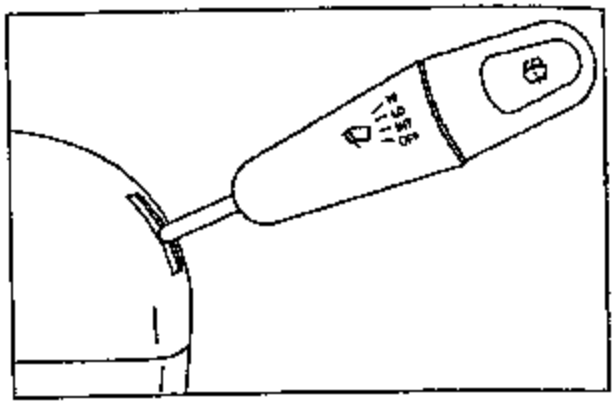
To use it, pull the turn signal/multifunction lever toward you until the high-beam headlamps come on, then release the lever to turn them off.

Fog Lamps

If your vehicle has this feature, use your fog lamps for better visibility in foggy or misty conditions. See "Fog Lamps" under *Exterior Lamps on page 3-8* for further information.

Windshield Wiper Lever

Windshield Wipers



Sedan shown, Hatchback similar

Use this lever located on the right side of the steering wheel to operate the windshield wipers. The ignition must be turned to ON to operate the windshield wipers.

HI (High Speed): Move the lever to this position for wiping at high speed.

LO (Low Speed): Move the lever to this position for steady wiping at low speed.

INT (Intermittent): Move the lever to this position to choose a delayed wiping cycle.

OFF: Move the lever to this position to turn off the windshield wipers.

Misting Function

Move the lever toward the INT position for a single wiping cycle. Hold it there until the windshield wipers start; then let go. The windshield wipers will stop after one wipe. If you want more wipes, hold the band toward INT longer.

Remember that damaged wiper blades may prevent you from seeing well enough to drive safely. To avoid damage, be sure to clear ice and snow from the wiper blades before using them.

If they are frozen to the windshield, carefully loosen or thaw them. If your blades do become damaged, get new blades or blade inserts.

Heavy snow or ice can overload your wiper motor. A circuit breaker will stop the motor until it cools. Clear away snow or ice to prevent an overload.

Windshield Washer

To wash your windshield, pull the windshield wiper/washer lever toward you with the ignition turned to ON.

⚠ CAUTION:

In freezing weather, do not use your washer until the windshield is warmed. Otherwise the washer fluid can form ice on the windshield, blocking your vision.

When you release the lever, the washers will stop, but the wipers will continue to wipe for several cycles and will either stop or will resume at the speed you were using before.

Rear Window Washer/Wiper

Your vehicle may have a rear window washer/wiper. Operate the rear window washer/wiper system by pushing the windshield wiper/washer lever away from you. The wiper operates continuously when the lever is in the first position. Washer fluid sprays onto the rear window and the wiper operates continuously when the lever is pushed to the second position.