

REPORT NUMBER 207-GTL-05-001

**FMVSS NO. 207  
INDICANT TEST**

**TOYOTA MOTOR MANUFACTURING,  
KENTUCKY, INC.  
2005 TOYOTA AVALON, PASSENGER CAR  
NHTSA NO. C55104**

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



JUNE 24, 2005

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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16. Abstract Inducant tests were conducted on the subject 2005 Toyota Avalon passenger car in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-207-09 for the determination of FMVSS 207 compliance. Test failures identified were as follows: NONE		
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## SECTION 1

### INTRODUCTION

#### 1.0 PURPOSE OF INDICANT TEST

A 2005 Toyota Avalon 4-door passenger car was subjected to the following tests to determine the effects of the newly developed FMVSS 207/210 force application devices (FAD) (a.k.a. Tommy (FAD 1) and Tommy Jr (FAD 2) as compared to the current FMVSS 207/210 seat belt body blocks.

#### 1.1 TEST VEHICLE

The test vehicle was a 2005 Toyota Avalon 4-door passenger car. Nomenclature applicable to the test vehicle are:

- A. Vehicle Identification Number: 4T1BK36B75U024613
- B. NHTSA No.: C55104
- C. Manufacturer: TOYOTA MOTOR MANUFACTURING, KENTUCKY, INC.
- D. Manufacture Date: 03/05

#### 1.2 TEST DATE

The test vehicle was subjected to testing on June 13, 2005.

## SECTION 2 TEST PROCEDURE AND SUMMARY OF RESULTS

### 2.0 GENERAL

The 2005 Toyota Avalon 4-door passenger car, NHTSA No. C55104, was subjected to testing on June 13, 2005.

### 2.1 TEST PROCEDURE

#### FAD Positioning Procedure:

1. Place seat in full rearward and full downward position.
2. Set seatback angle per manufacturers recommendation.
3. Identify and mark the centerline of the seat and seat back for each seating position.
4. Place the FAD so the midsagittal plane of the FAD contains the centerline for both the seat and back support of the seat. (Centerline of Body aligns with the centerline of the seat)
5. Rotate torso forward.
6. Push on pelvis parallel to surface of seating surface so the back of the pelvis is solidly against the seat back.
7. Rotate the torso up against the seatback while holding the pelvis in place.
8. Push on torso at center of gravity, perpendicular to the seat back with a force of 40 pounds.
9. Attach seatbelt and position the seatbelt so lap belt is over the FAD's hips and the shoulder strap over the torso (chest).
10. If seatbelts need to be replaced with wire rope, install ratchet-type-belt tensioner on B-pillar between D-Ring and retractor and remove excess belt from the retractor. If a second retractor is installed on the lap belt, install a second ratchet type-belt tensioner between the FAD and the lap belt retractor.
11. Attach one actuator to the torso pull yoke and one to the pelvis eyelet.

#### Pull Test Procedure:

1. Connect load cells and actuators to the FAD's so they pull in a plane that is inclined  $10^{\circ} \pm 4^{\circ}$  above the horizontal. The applied load shall be parallel to the vehicle's centerline  $\pm 3^{\circ}$ . Also connect the standard test blocks in accordance with FMVSS 207/210 compliance testing.
2. Take pre-test photographs.
3. Ramp to holding load within 30 seconds.
4. Take photographs
5. Hold the maximum force for a period of not less than ten seconds.
6. Take post test photographs.

## SECTION 2 Continued

### Test Configuration for Toyota Avalon 5 Passenger Sedan:

1. LF FAD1
2. RF Standard Blocks
3. LR Standard Blocks
4. CR FAD2
5. RR FAD1

## 2.2 SUMMARY OF RESULTS

The test results are provided in Section 3, Test Data.

## SECTION 3 TEST DATA

### 3.0 DATA

The following items were noted during the conduct of these tests.

1. The new FMVSS 207/210 FAD (Tommy Blocks) are much easier to position and set for lap and shoulder belts than the current FMVSS 207/210 body blocks.
2. The current FMVSS 207/210 shoulder belt body block wants to slide down and rest on top of the lower body block. This is no longer a problem with the new FMVSS 207/210 FAD (Tommy Blocks).
3. The new FMVSS 207/210 FAD (Tommy Blocks) appear to be more "seat belt friendly" than the current FMVSS 207/210 body blocks. ie: A remote chance of breakage of the lap belt buckle due to bending around the corner of the current FMVSS 207/210 lap belt body block and less pay-out of shoulder belt during the test due to the torso being connected to the lap on the new FMVSS 207/210 FAD (Tommy Blocks).
4. Using existing body block, pay-out of seat belt webbing due to load limiters causes hydraulic test load application cylinders to bottom-out and test cannot be completed without resetting and starting the test over again. The resetting of the hydraulic test load application cylinders was not necessary using the new proposed FMVSS 207/210 FAD (Tommy Blocks).
5. This vehicle appears to meet the requirements of FMVSS 210 when tested with current FMVSS 207/210 body blocks and the proposed FMVSS 207/210 FAD force application device (a.k.a.) Tommy (FAD 1) and Tommy Jr. (FAD 2).



**DATA SHEET 1**  
**LAP AND SHOULDER BELT ASSEMBLY ANCHORAGE LOADING**

VEHICLE MAKE/MODEL/BODY STYLE: 2005 TOYOTA AVALON PASSENGER CAR

VEHICLE NHTSA NO.: C55104 ; VIN: 4T1BK36B75U024613

LABORATORY: GENERAL TESTING LABORATORIES

TEST DATE: 06/13/05

OBSERVERS: G. Farrand, J. Latane

SEAT	BELT ASSEMBLY TESTED	MAXIMUM LOAD REQUIREMENT	APPLIED LOAD
FRONT GTL TEST #5305	Left Lap	3000 lbs, -10, -50	2972
	Left Shoulder	3000 lbs, -10, -50	2972
	Right Lap	3000 lbs, -10, -50	2977
	Right Shoulder	3000 lbs, -10, -50	2980
REAR GTL TEST #5306	Left Lap	3000 lbs, -10, -50	2975
	Left Shoulder	3000 lbs, -10, -50	2972
	Right Lap	3000 lbs, -10, -50	2979
	Right Shoulder	3000 lbs, -10, -50	2977
	Center Lap	3000 lbs, -10, -50	2972
	Center Shoulder	3000 lbs, -10, -50	2972

REMARKS:

RECORDED BY: *G. Farrand*

DATE: 06/13/05

APPROVED BY: *P. Messich*

**DATA SHEET 2**  
**SEAT BELT ASSEMBLY LOAD ANGLE MEASUREMENT**

VEHICLE MAKE/MODEL/BODY STYLE: 2005 TOYOTA AVALON PASSENGER CAR

VEHICLE NHTSA NO.: C55104 ; VIN: 4T1BK38B75U024613

LABORATORY: GENERAL TESTING LABORATORIES

TEST DATE: 06/13/05

OBSERVERS: G. Farrand, J. Latane

TYPE	ANGLE MEASURED	ANGLE REFERENCE	ANGLE AT 10% LOAD (degrees)					
			LEFT DSP		CENTER DSP		RIGHT DSP	
			FRT	RR	FRT	RR	FRT	RR
LAP BELT	Load Application Angle (degrees)	From Side View Horizontal 10 ± 4	11°	8°	N/A	8°	11°	8°
		From Plan View Vehicle Centerline 0 ± 3	0°	0°	N/A	0°	0°	0°
SHOULDER BELT	Load Application Angle (degrees)	From Side View Horizontal 10 ± 4	12°	9°	N/A	9°	12°	9°
		From Plan View Vehicle Centerline 0 ± 3	0°	0°	N/A	0°	11°	0°

REMARKS:

RECORDED BY: G. Farrand

DATE: 06/13/05

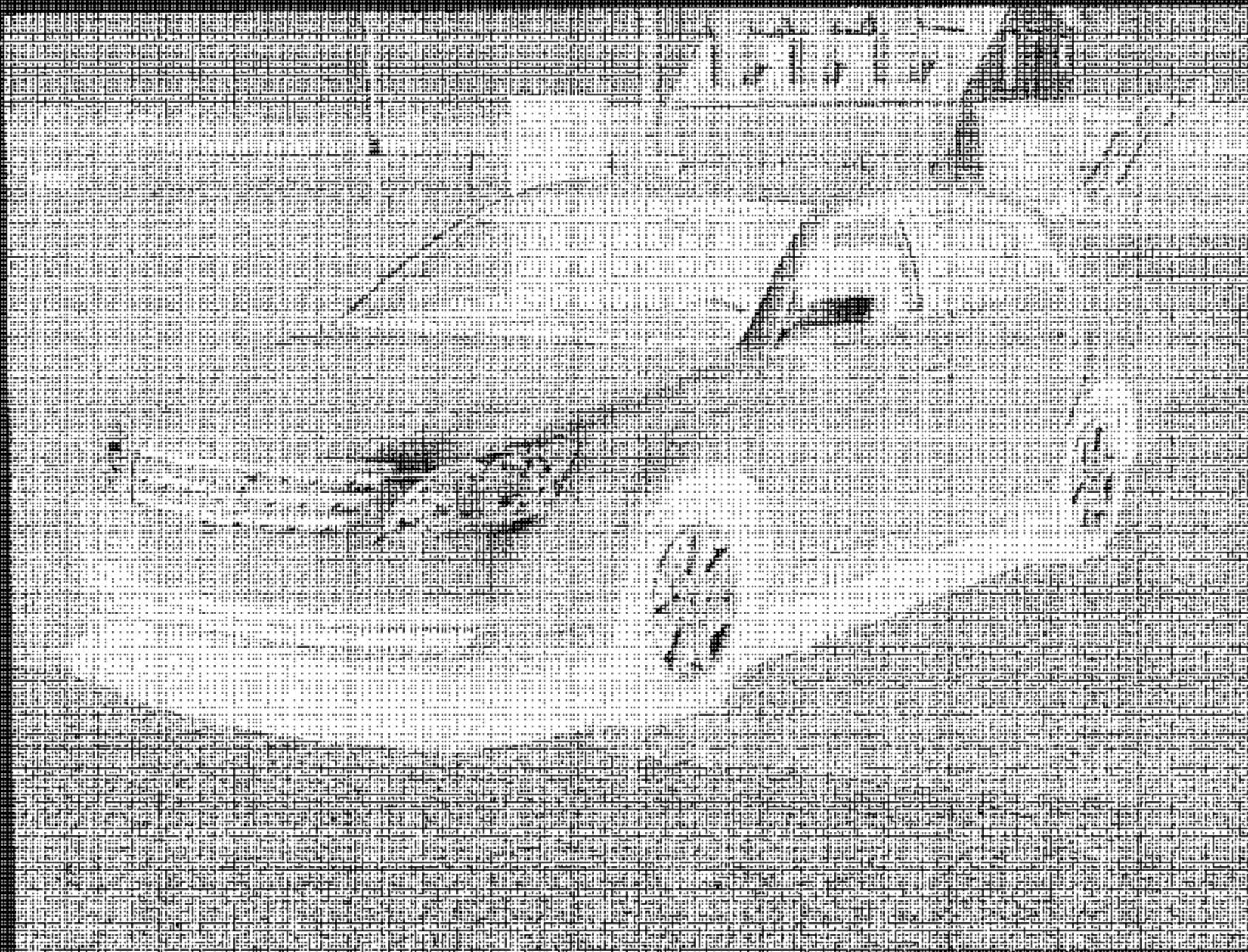
APPROVED BY: D. Music

SECTION 4  
INSTRUMENTATION AND EQUIPMENT LIST

TABLE 1 - INSTRUMENTATION & EQUIPMENT LIST

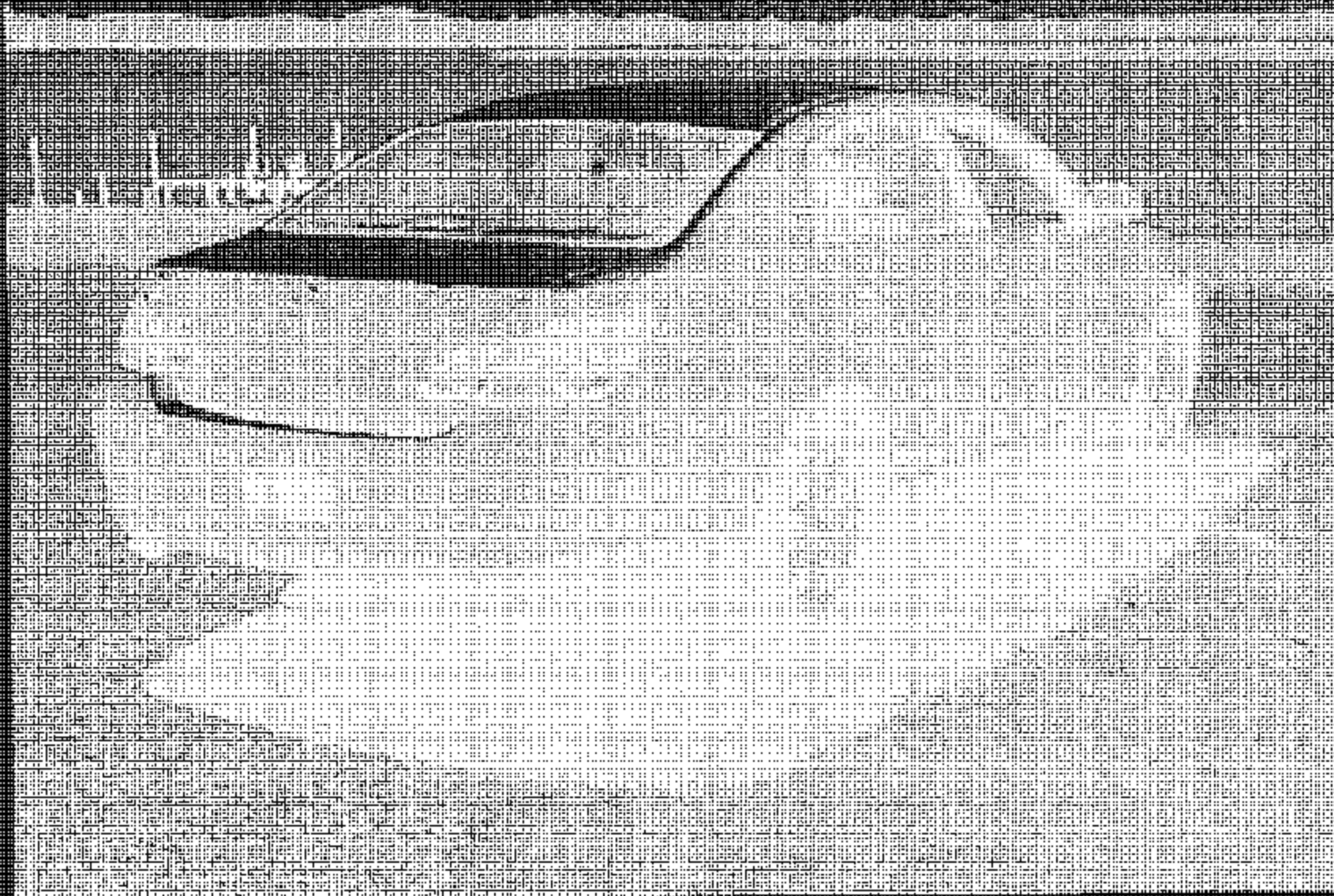
EQUIPMENT	DESCRIPTION	MODEL/ SERIAL NO.	CAL. DATE	NEXT CAL. DATE
COMPUTER	AT&T	486DX286	N/A	N/A
TEST FIXTURE	GTL	N/A	BEFORE USE	BEFORE USE
SIGNAL CONDITIONER	METRABYTE	EXP-RES	BEFORE USE	BEFORE USE
LOAD CELL	REVERE	46021	01/05	01/06
LOAD CELL	REVERE	46022	01/05	01/06
LOAD CELL	REVERE	46023	01/05	01/06
LOAD CELL	REVERE	46024	01/05	01/06
LOAD CELL	REVERE	46025	01/05	01/06
LOAD CELL	REVERE	44243	01/05	01/06

SECTION 5  
PHOTOGRAPHS



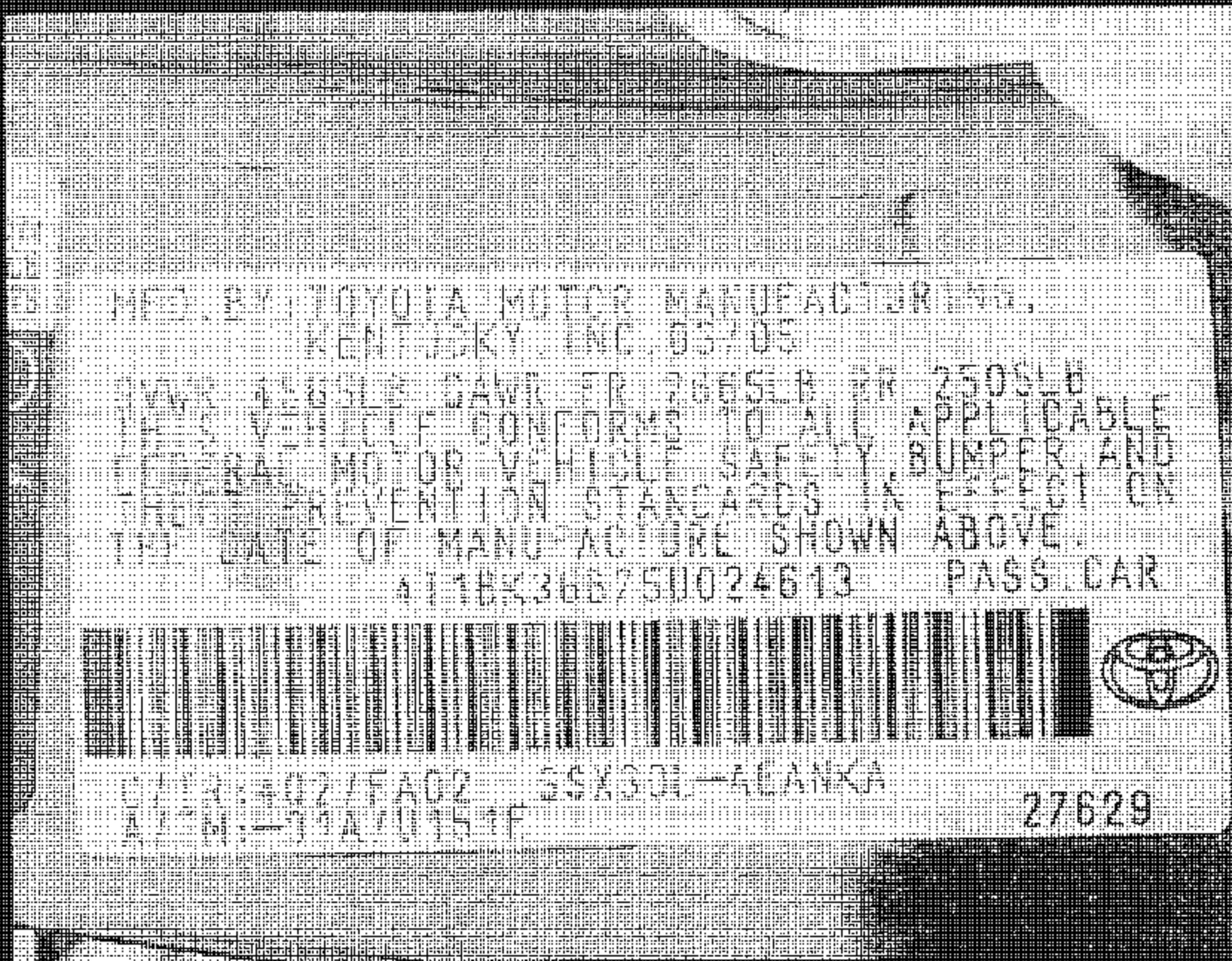
2005 TOYOTA AVALON  
NHTSA NO C65104  
FMVSS NO. 210

FIGURE 5.1  
¾ FRONTAL LEFT SIDE VIEW OF VEHICLE



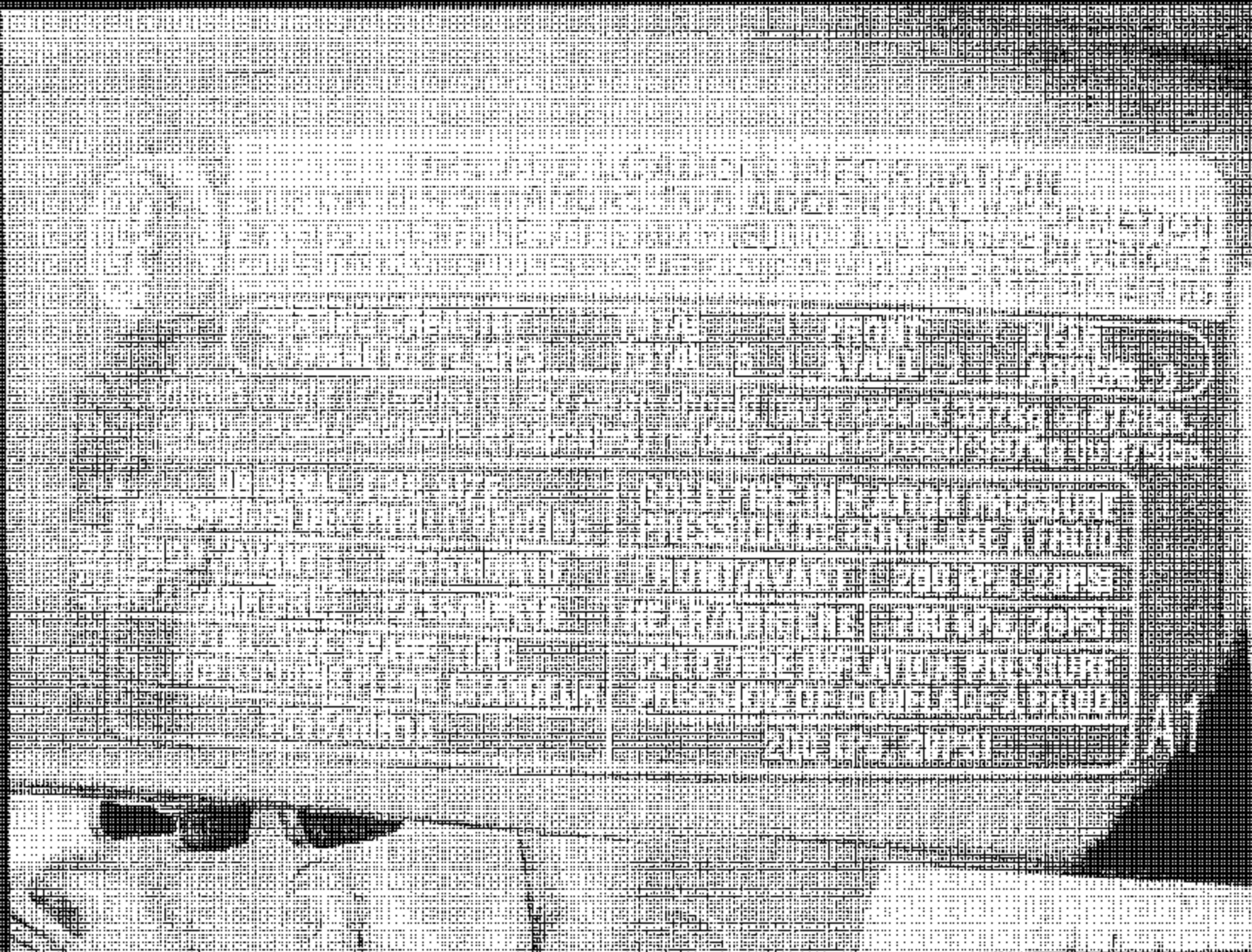
2015 TOYOTA AVALON  
NHTSA NO. C56104  
FMVSS NO. 210

FIGURE 52  
¾ REAR RIGHT SIDE VIEW OF VEHICLE



2005 TOYOTA AVALON  
NHTSA NO. C55104  
FMVSS NO. 210

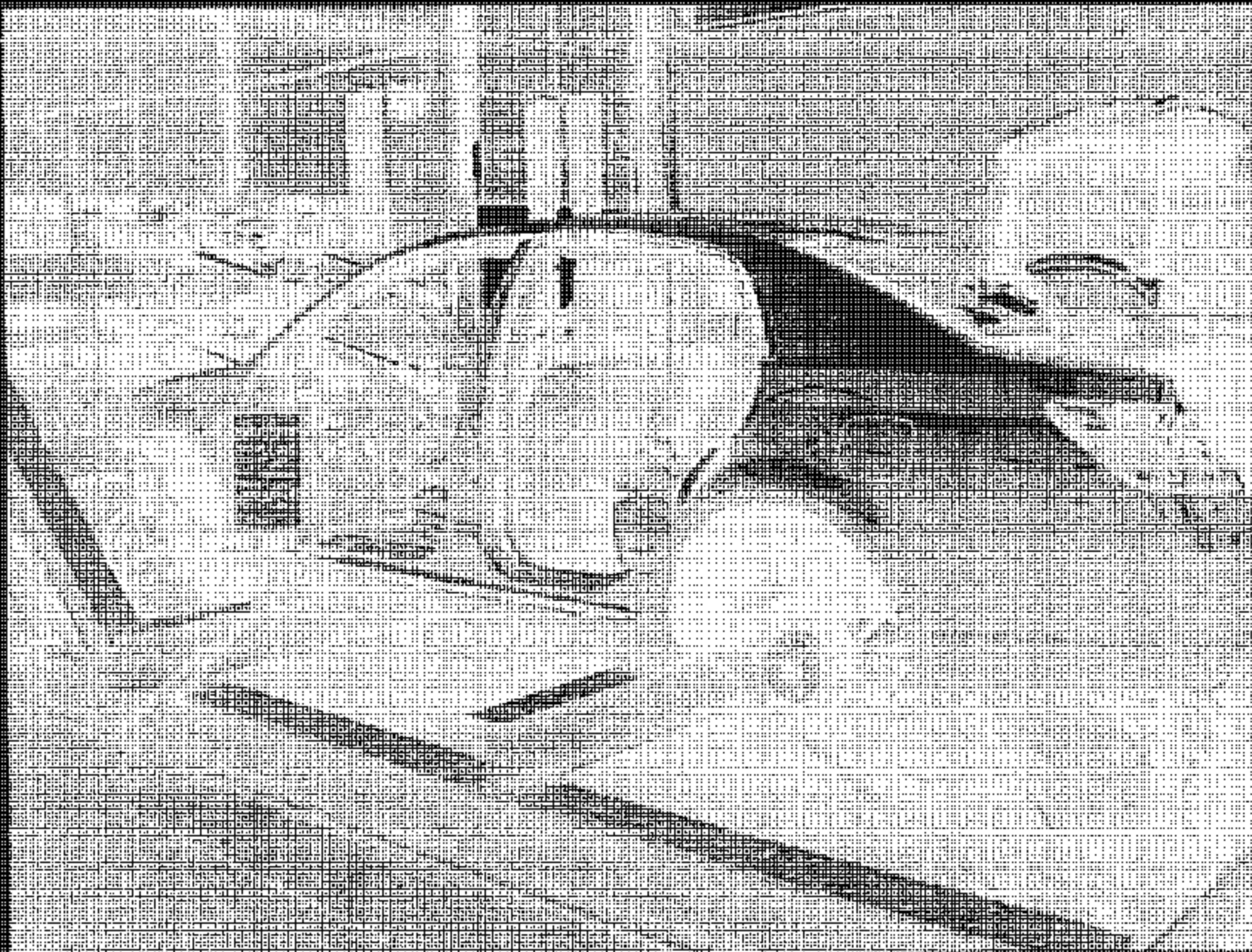
FIGURE 5.3  
VEHICLE CERTIFICATION LABEL



2005 TOYOTA AVALON  
NHTSA NO. C55104  
FMVSS NO 210

FIGURE 5.4  
VEHICLE TIRE INFORMATION LABEL





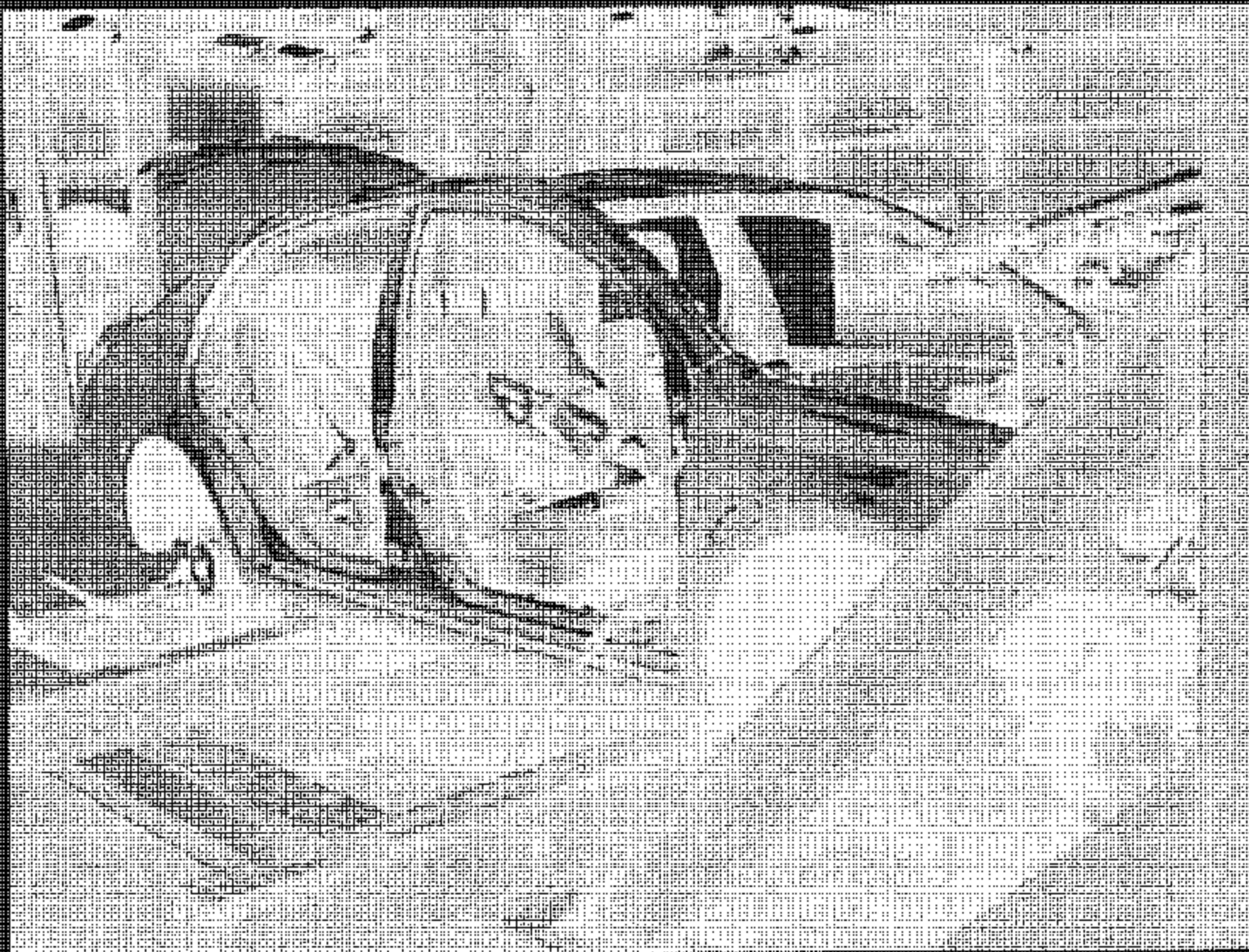
2005 TOYOTA AVALON  
NHTSA NO. C35104  
FMVSS NO. 210

FIGURE 5.5  
¾ LEFT REAR VIEW OF VEHICLE IN TEST RIG



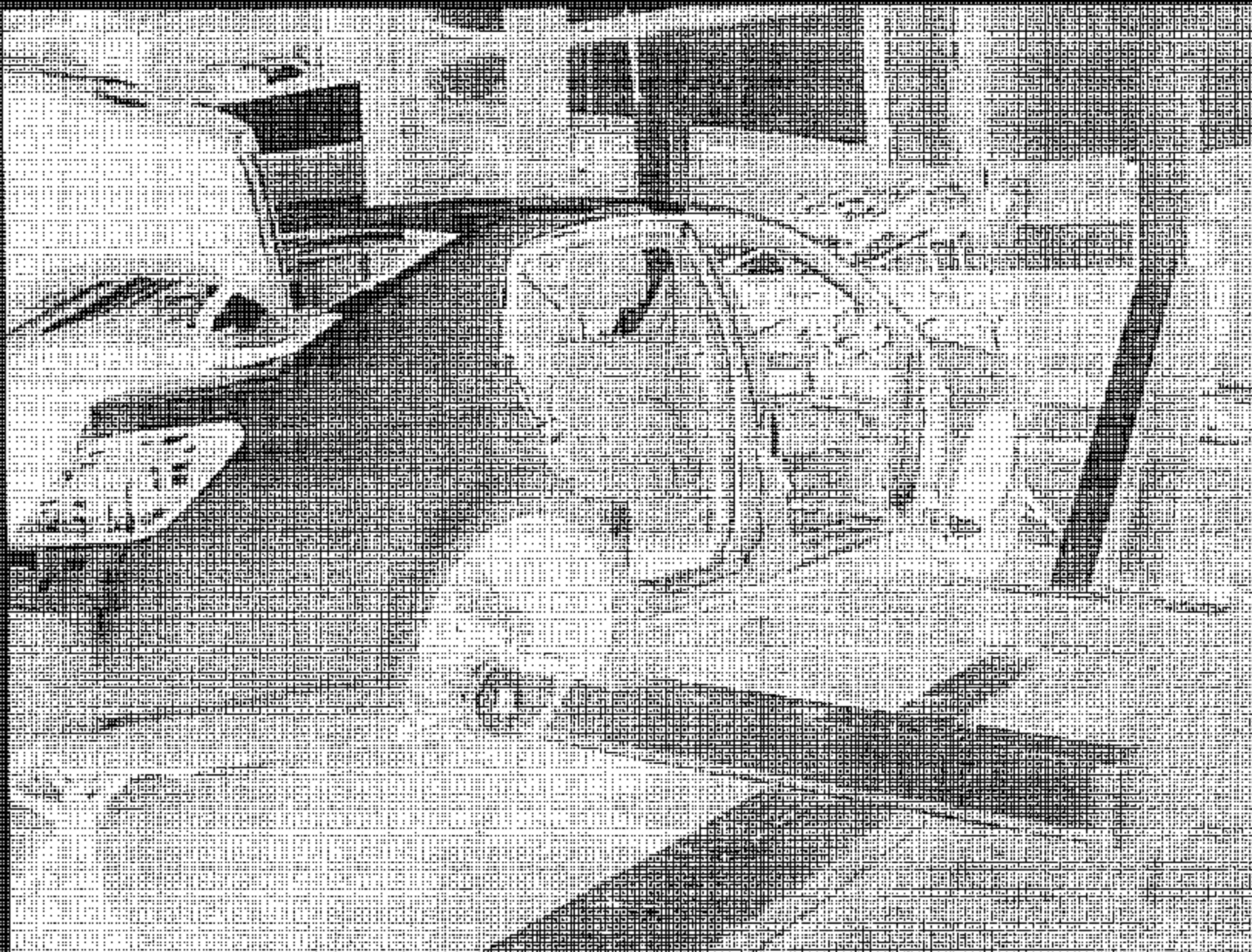
2005 TOYOTA AVALON  
NHTSA NO. C55104  
FMVSS NO. 210

FIGURE 58  
3/4 LEFT FRONT VIEW OF VEHICLE IN TEST RIG



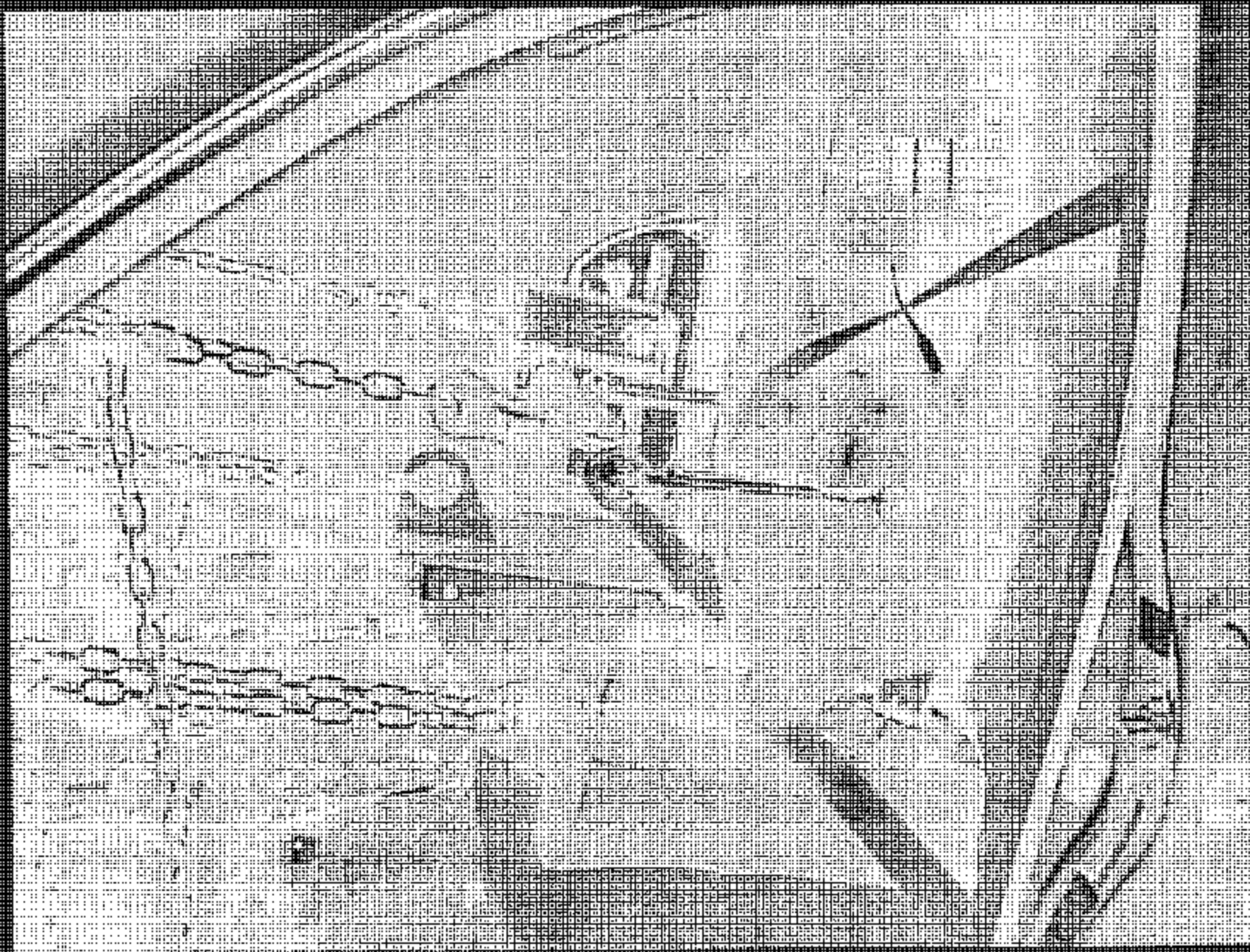
2005 TOYOTA AVALON  
NHTSA NO. C55104  
FMVSS NO. 210

FIGURE 3.7  
1/4 RIGHT FRONT VIEW OF VEHICLE IN TEST RIG



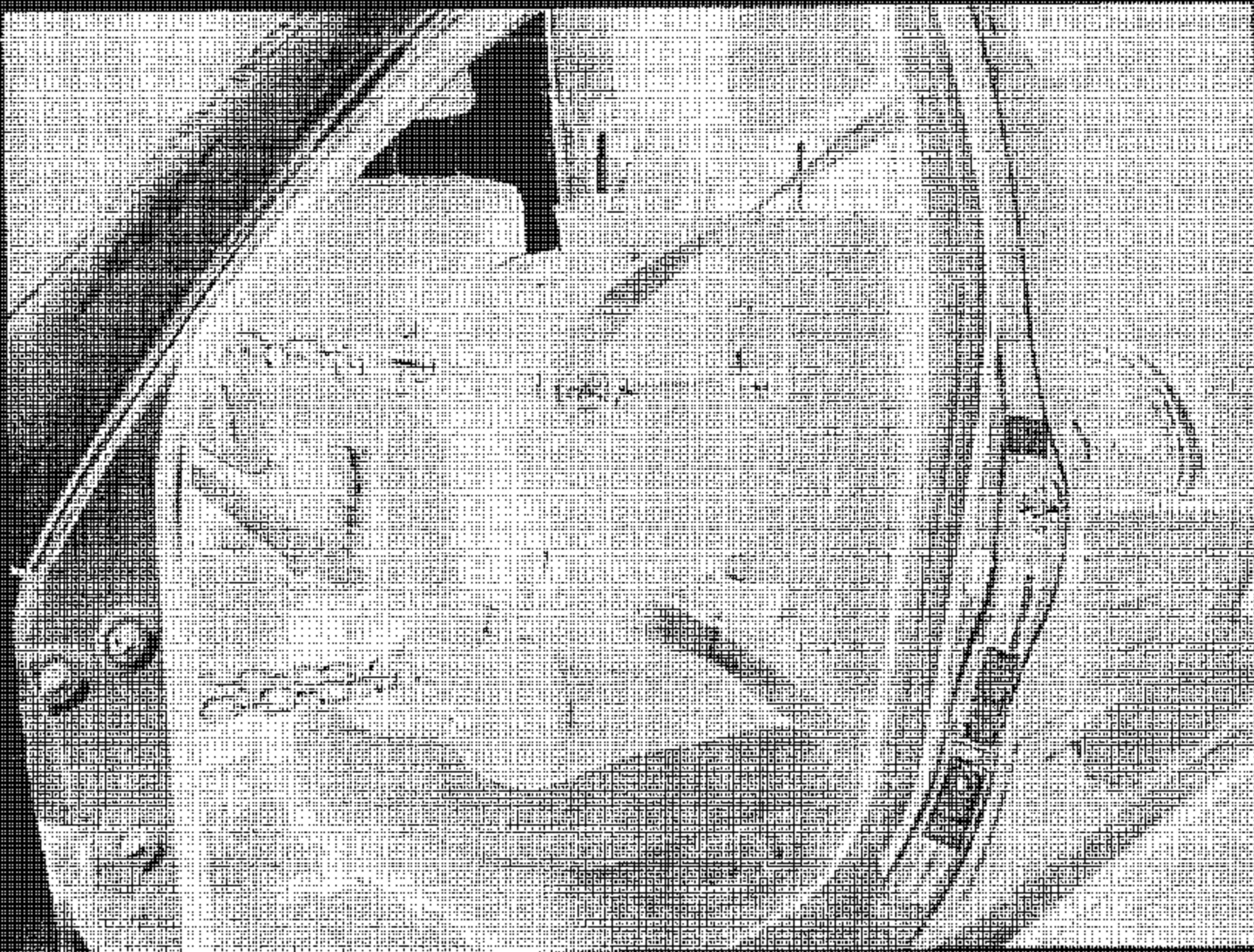
2005 TOYOTA AVALON  
NHTSA NO. C5510-  
FMVSS NO. 210

FIGURE 5.3  
1/4 RIGHT REAR VIEW OF VEHICLE IN TEST RIG



2015 TOYOTA AVALON  
NHTSA NO. C55104  
FMVSS NO. 210

FIGURE 5.0  
PRE-TEST ROW 1, LEFT SIDE VIEW



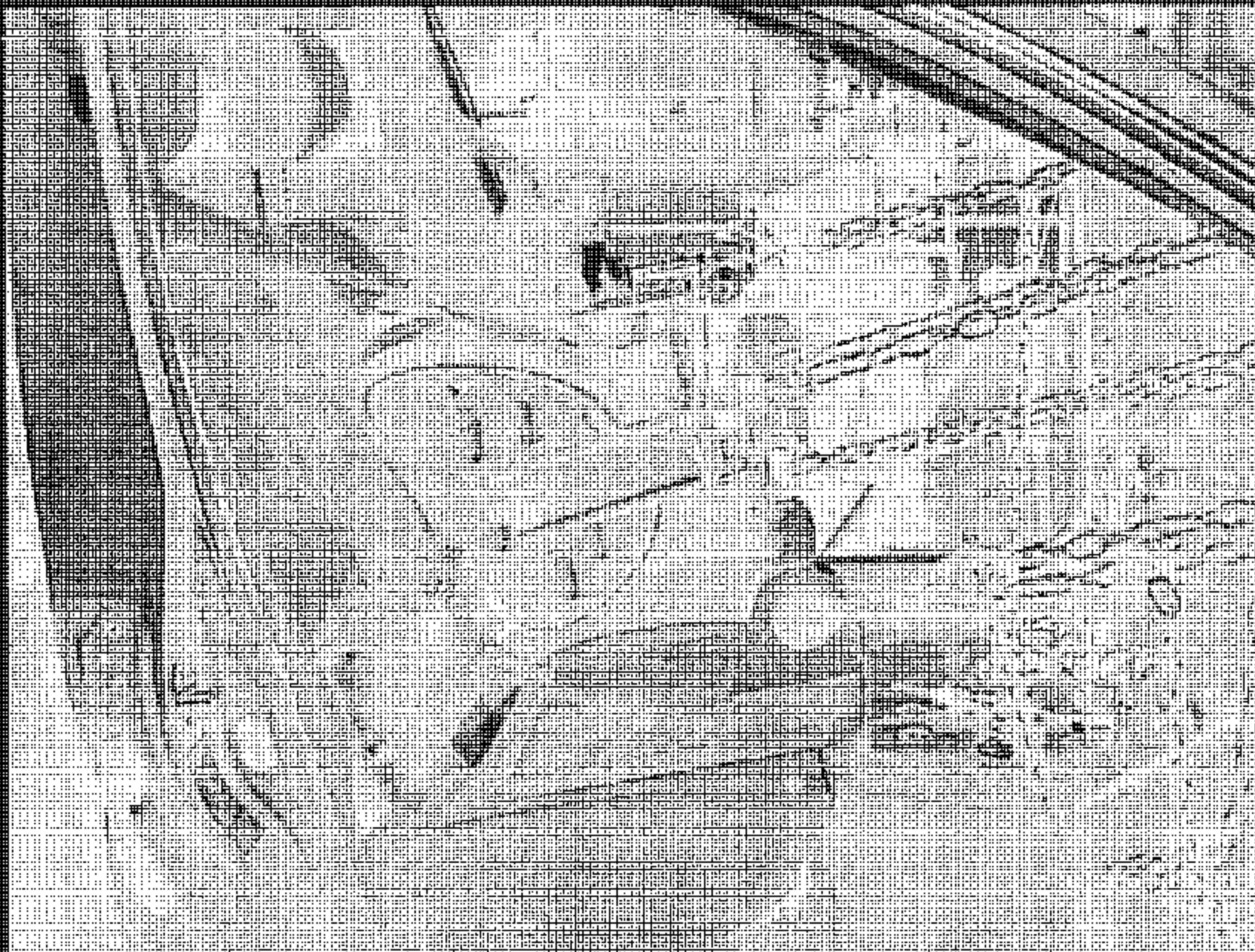
2015 TOYOTA AVALON  
NHTSA NO. C55104  
FMVSS NO. 210

FIGURE 5.10  
PRE-TEST ROW 1, ¾ LEFT FRONT VIEW



2005 TOYOTA AVALON  
NHTSA NO. C55104  
FMVSS NO. 210

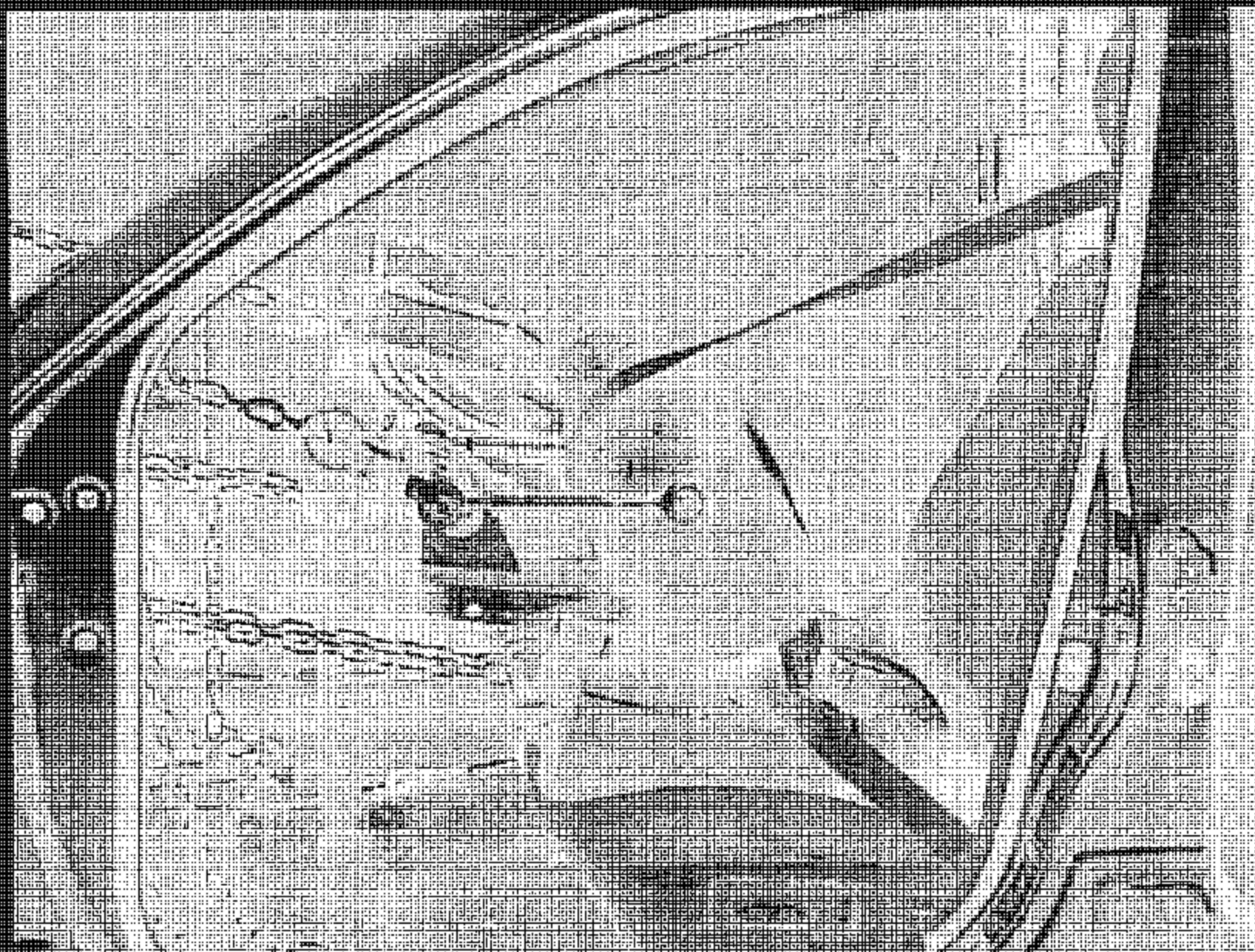
FIGURE 5.11  
PRE-TEST ROW 1, ¼ RIGHT FRONT VIEW



2005 TOYOTA AVALON  
NHTSA NO. C55104  
FMVSS NO. 210

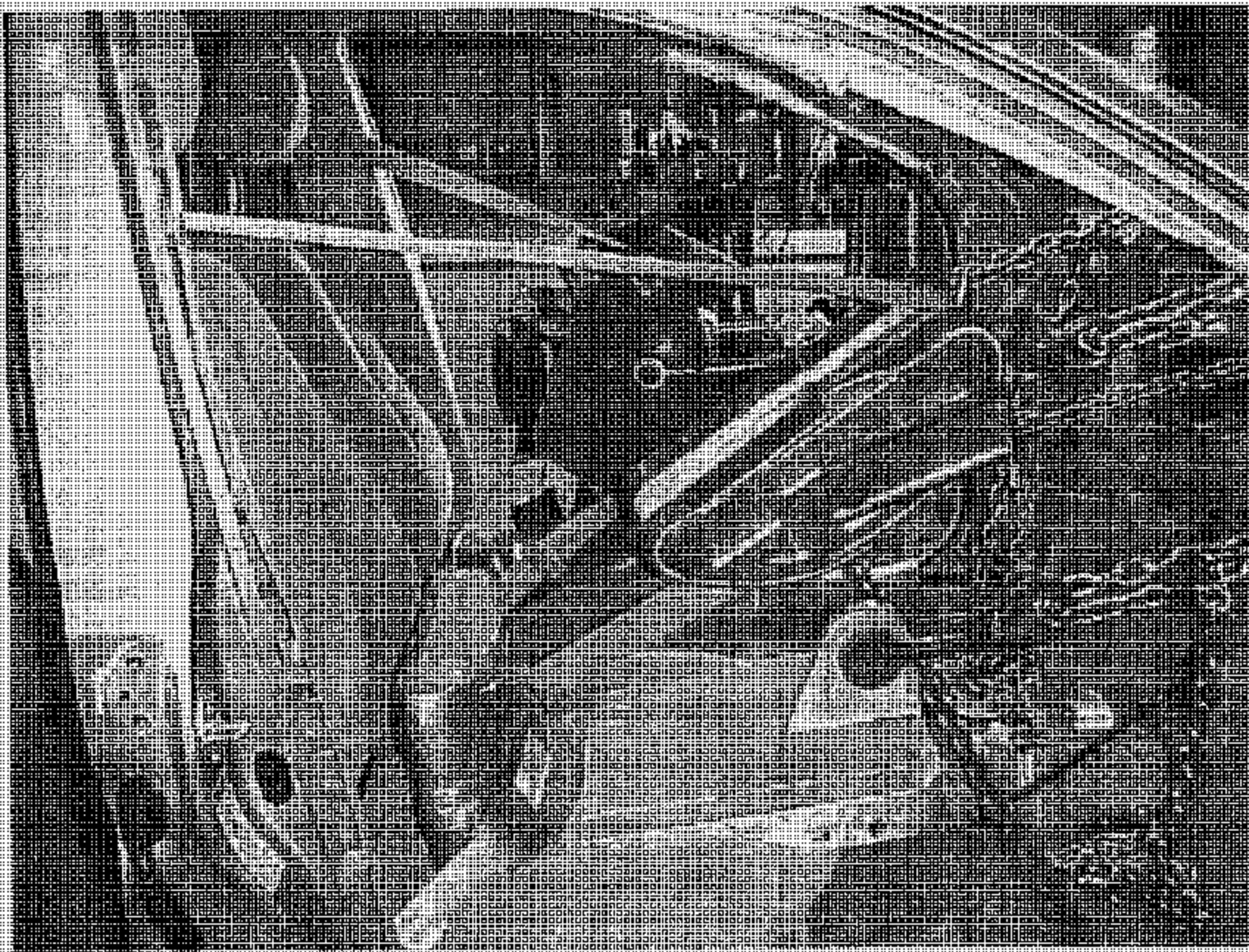
FIGURE 5.12  
PRE-TEST ROW 1 RIGHT SIDE VIEW





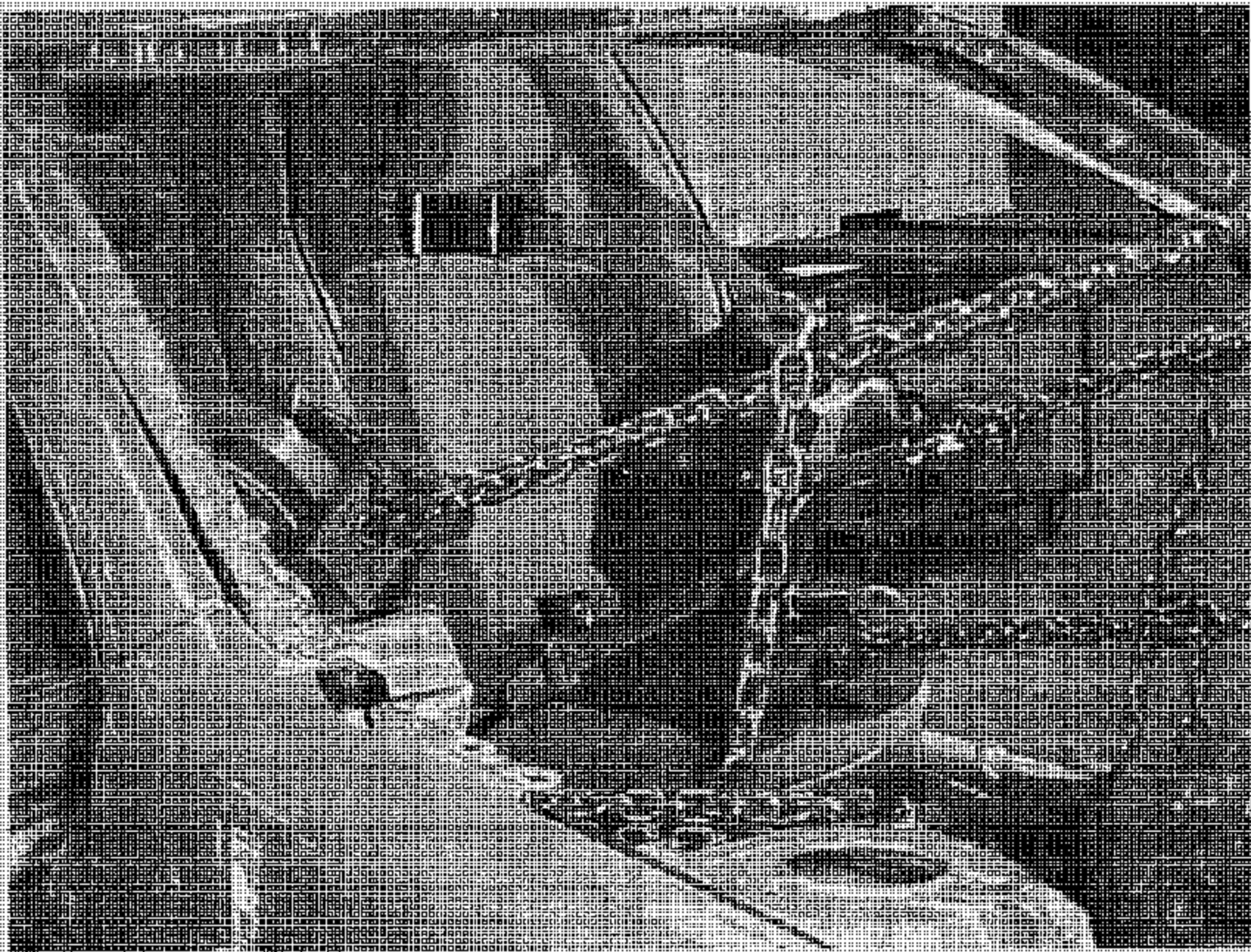
2005 TOYOTA AVALON  
NHTSA NO. 056104  
FMVSS NO. 210

FIGURE 5-13  
FULL LOAD ROW 1, LEFT SIDE VIEW



2005 TOYOTA AVALON  
NHTSA NO. C55104  
FMVSS NO. 210

FIGURE 5.14  
FULL LOAD ROW 3, RIGHT SIDE VIEW



2005 TOYOTA AVALON  
NHTSA NO. C55104  
FMVSS NO. 210

FIGURE 5.15  
FULL LOAD ROW 1, 3/4 RIGHT FRONT VIEW



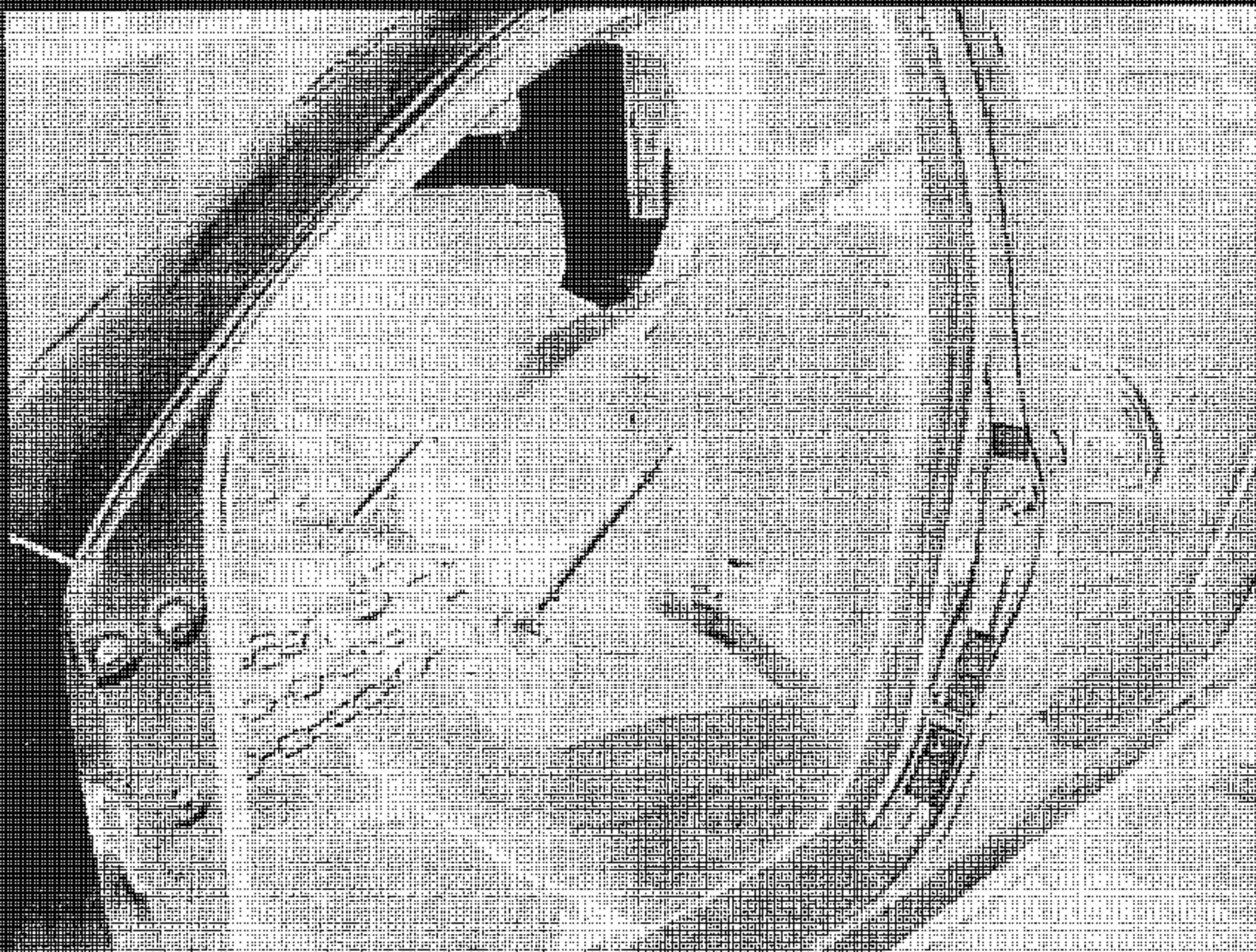
2005 TOYOTA AVALON  
NHTSA NO. C85104  
FMVSS NO. 210

FIGURE 5.16  
FULL LOAD ROW 1, ¼ LEFT FRONT VIEW



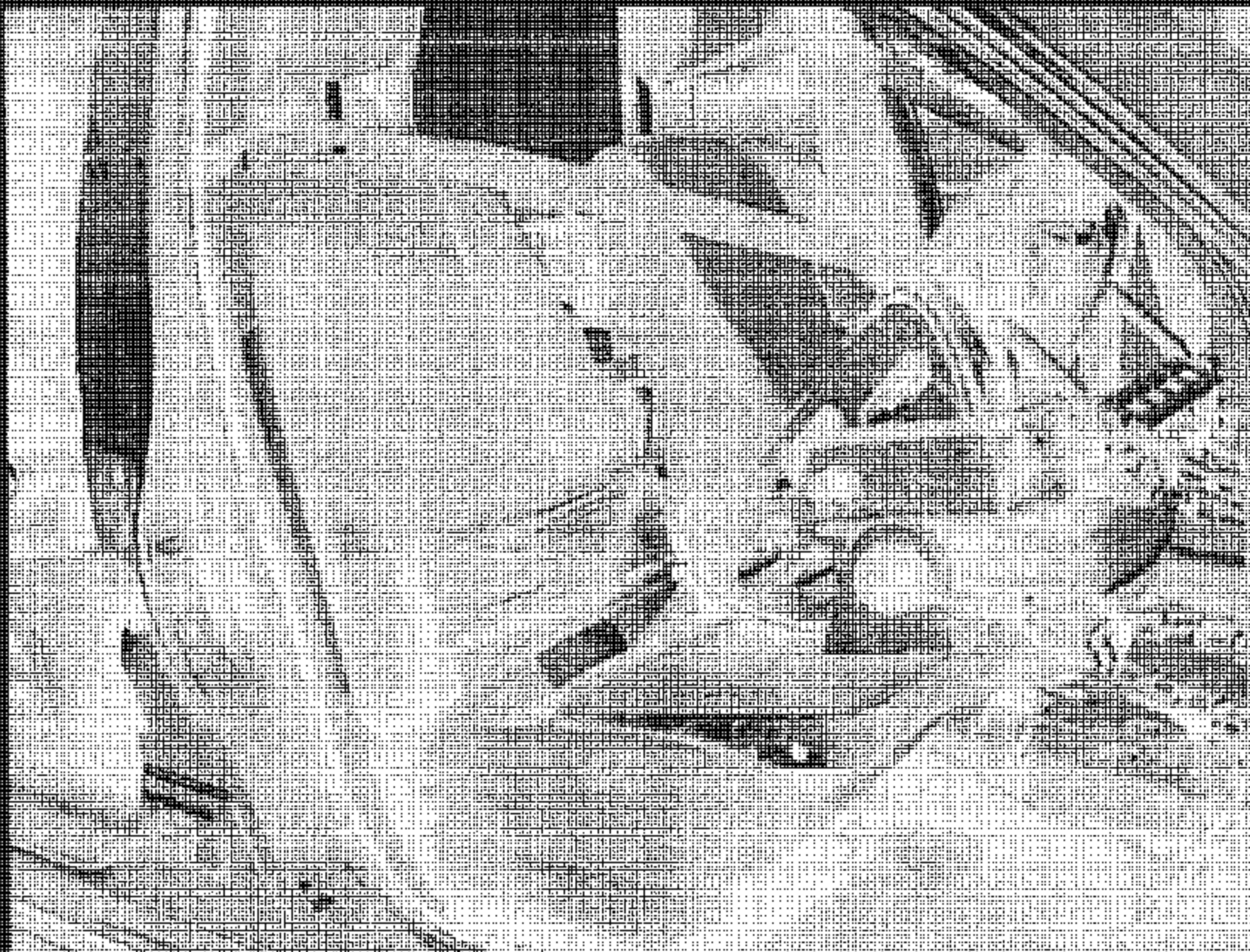
2005 TOYOTA AVALON  
NHTSA NO. C65104  
FMVSS NO. 210

FIGURE 3.17  
POST TEST ROW 1, LEFT SIDE VIEW



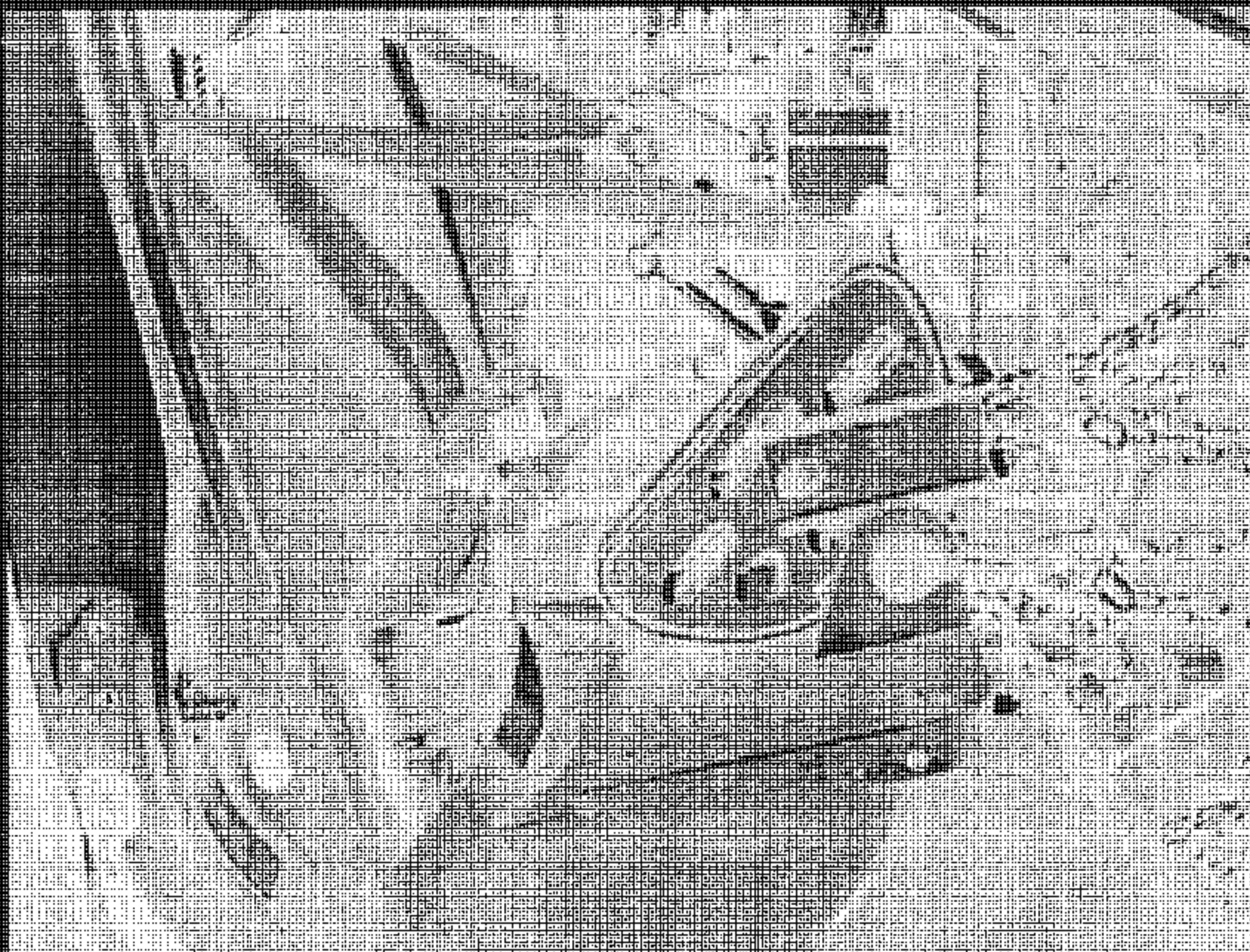
2005 TOYOTA AVALON  
NHTSA NO. 056104  
FMVSS NO. 210

FIGURE 5.18  
POST TEST ROW 1, 3/4 LEFT FRONT VIEW



2005 TOYOTA AVALON  
NHTSA NO. C55104  
FMVSS NO. 210

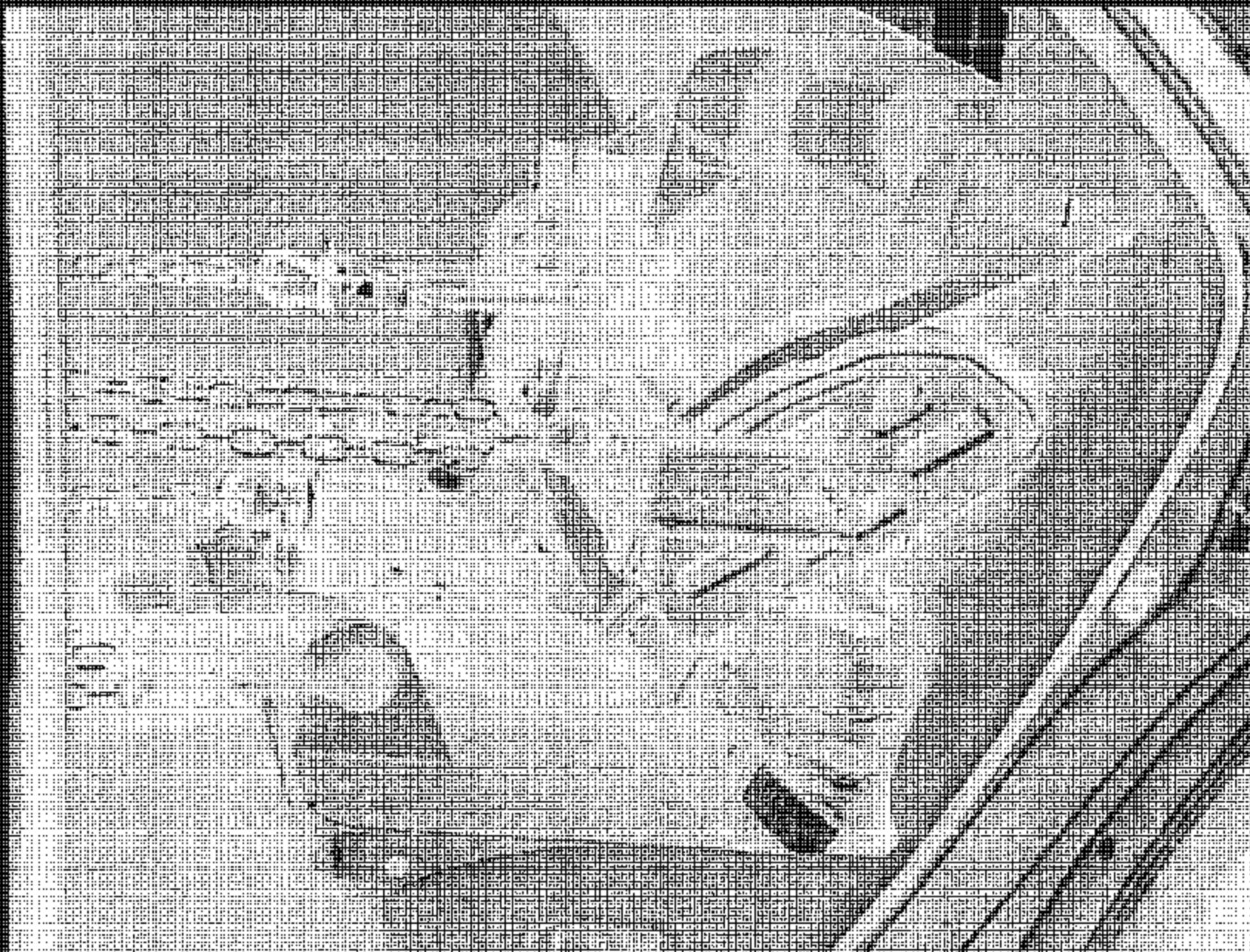
FIGURE 5.10  
POST TEST ROW 1, ¼ RIGHT FRONT VIEW



2006 TOYOTA AVALON  
NHTSA NO. C56104  
FMVSS NO. 210

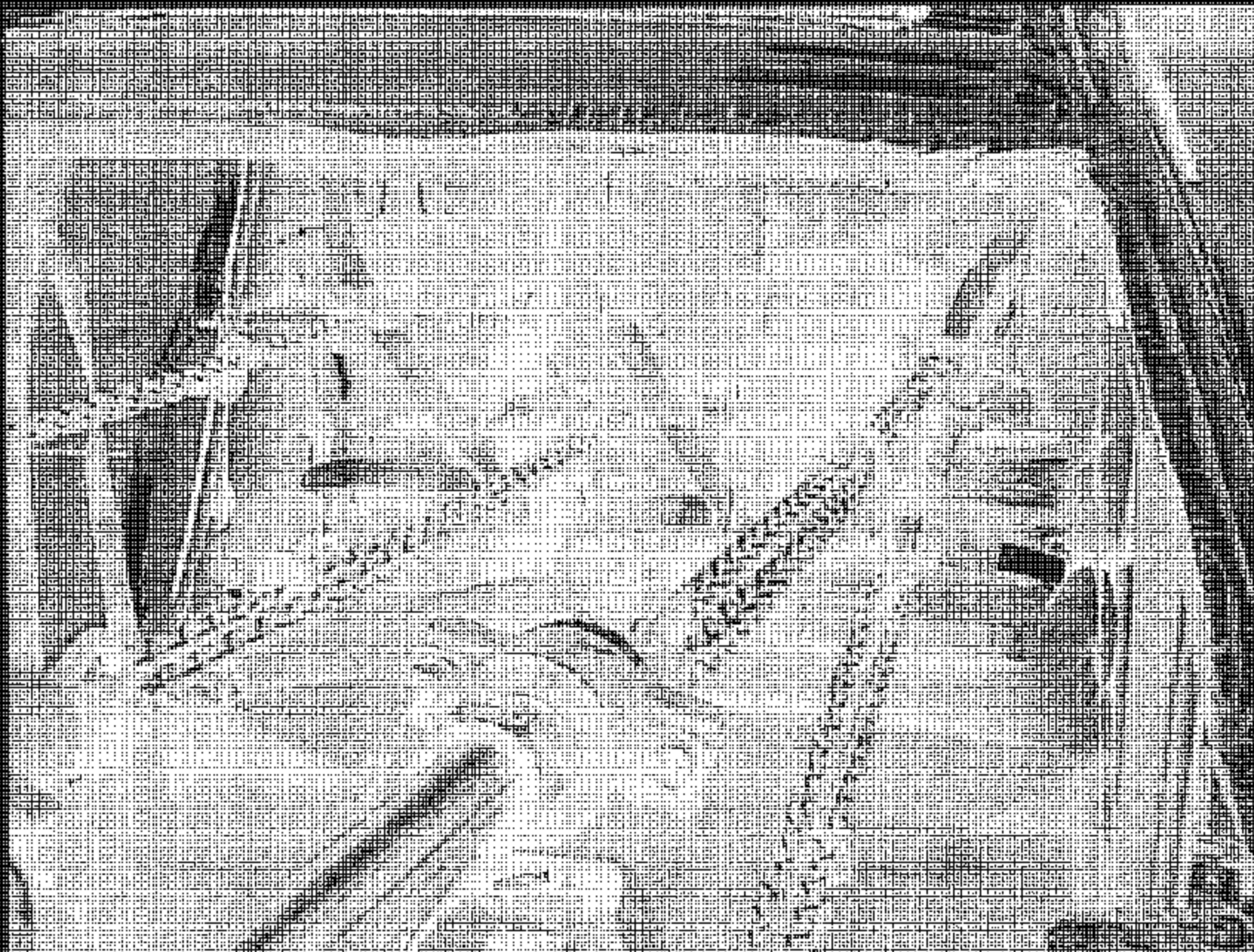
FIGURE 5.20  
POST TEST ROW 1, RIGHT SIDE VIEW





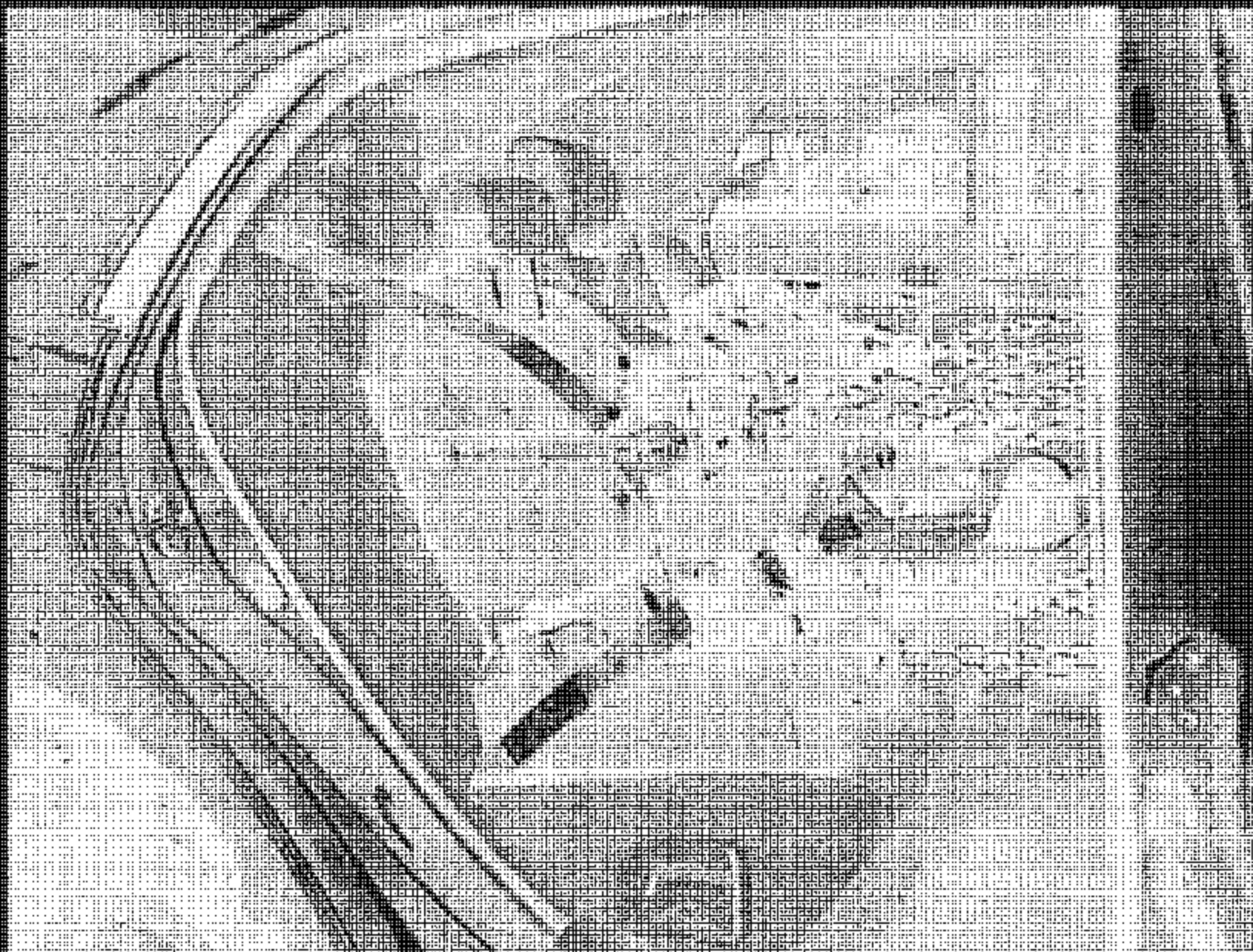
2005 TOYOTA AVALON  
NHTSA NO. C55104  
FMVSS NO. 210

FIGURE 5.21  
PRE-TEST ROW 2, LEFT SIDE VIEW



2006 TOYOTA AVALON  
NHTSA NO. C55104  
FAVSS NO. 210

FIGURE 5.22  
PRE-TEST ROW 2, FRONT VIEW



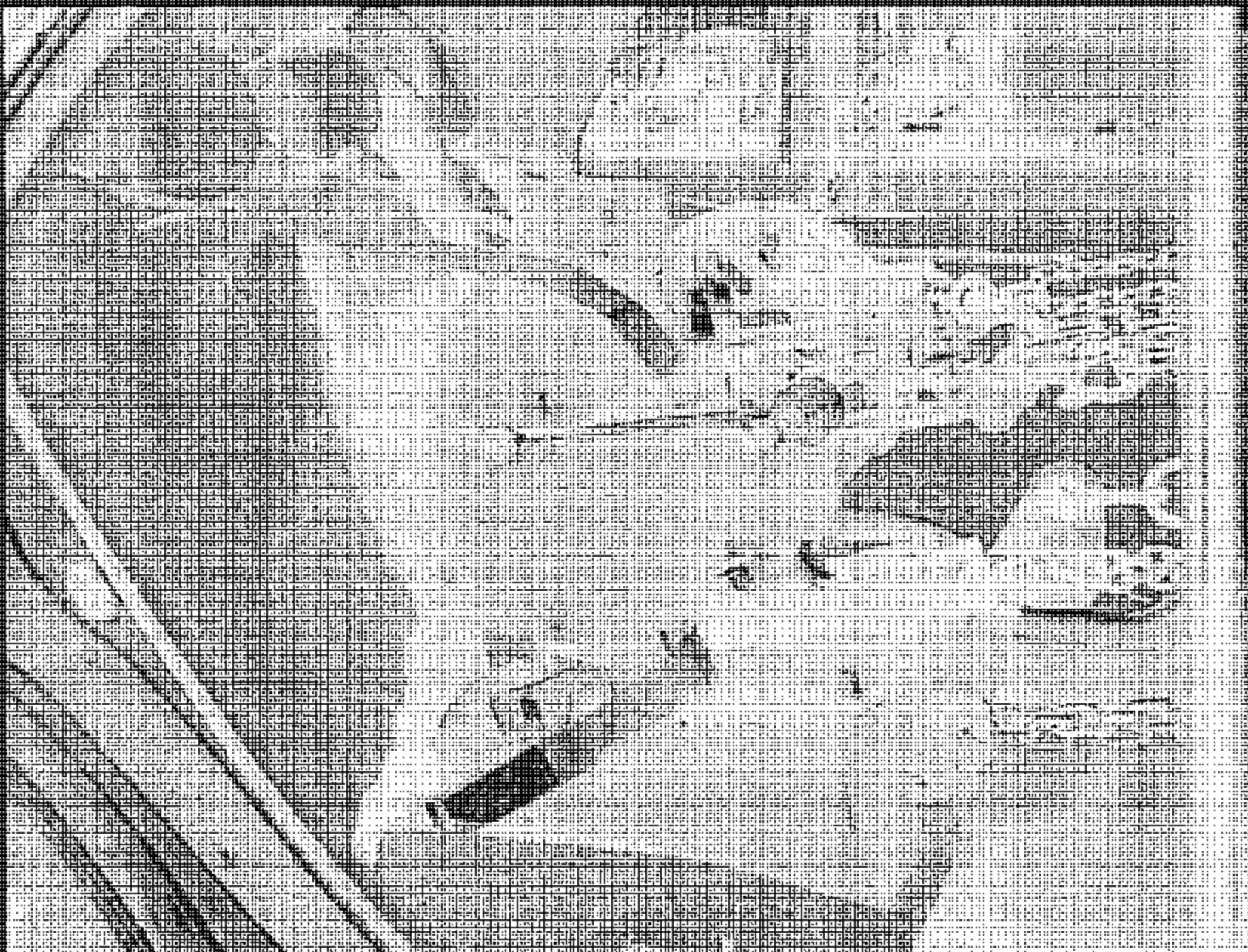
2005 TOYOTA AVALON  
NHTSA NO. C55104  
FMVSS NO. 210

FIGURE 5.23  
PRE-TEST ROW 2, RIGHT SIDE VIEW



2005 TOYOTA AVALON  
NHTSA NO. C55104  
FMVSS NO. 210

FIGURE 3.24  
FULL LOAD ROW 2, LEFT SIDE VIEW



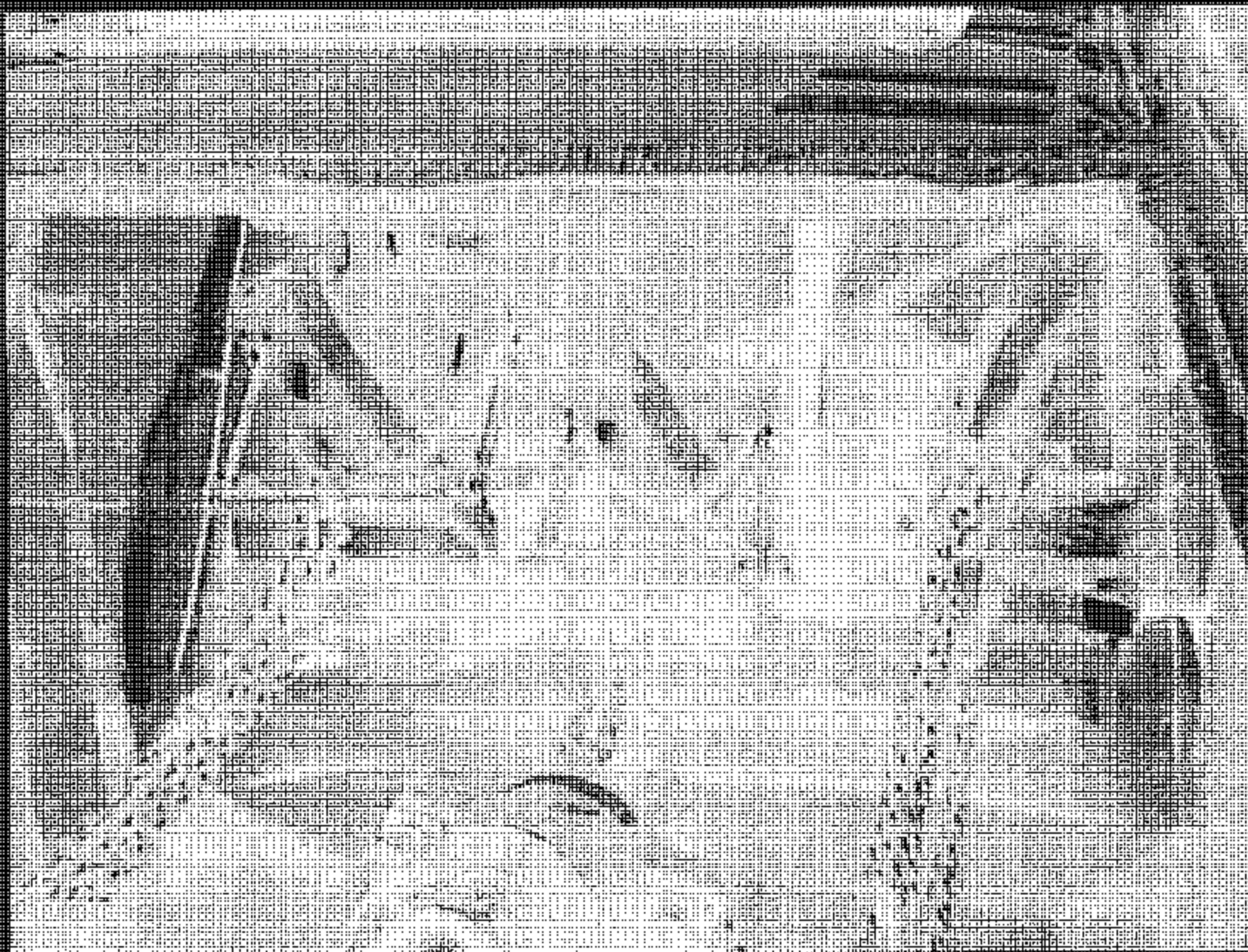
2005 TOYOTA AVALON  
NHTSA NO. C655104  
FMVSS NO. 210

FIGURE 5.25  
FULL LOAD ROW 2, RIGHT SIDE VIEW



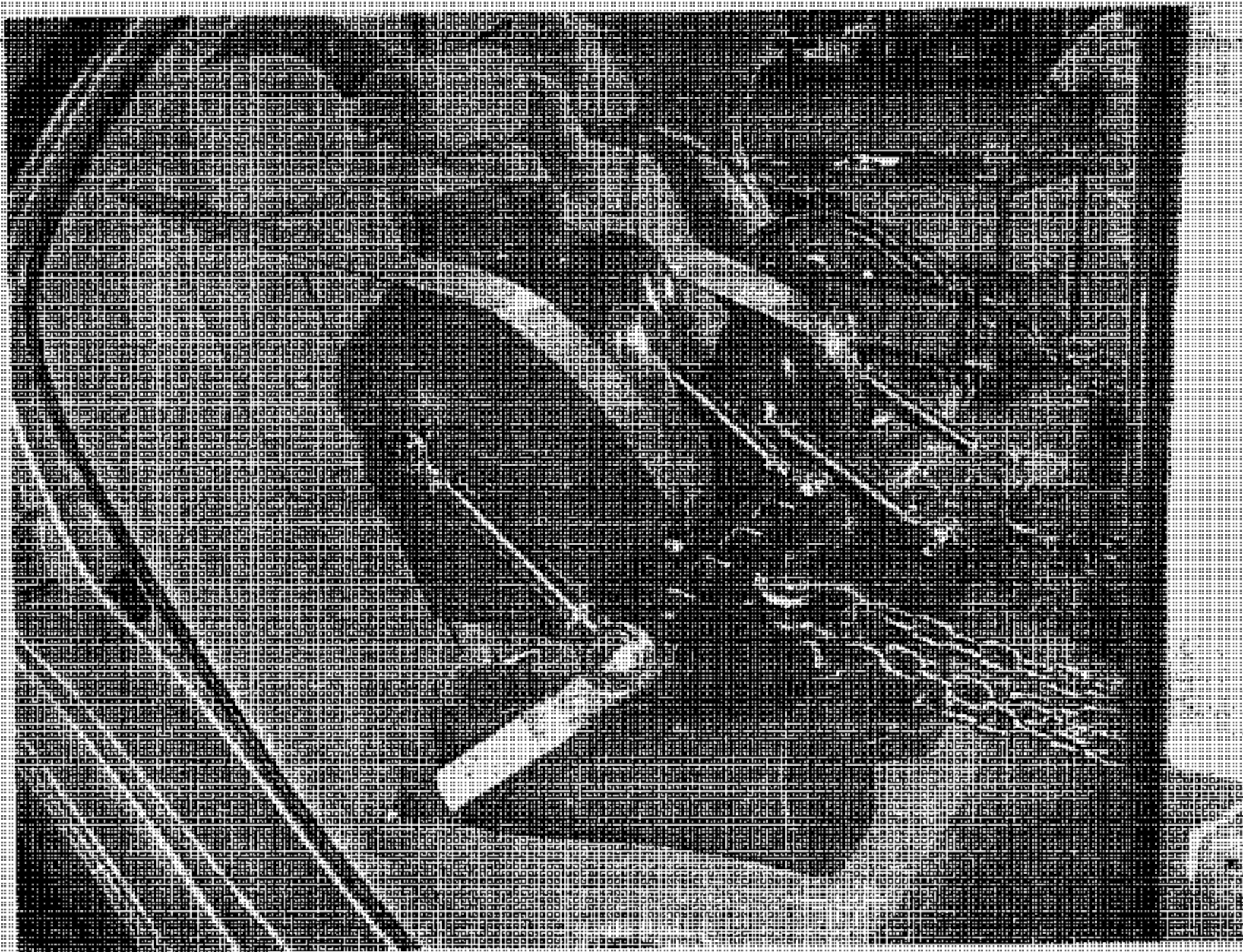
2005 TOYOTA AVALON  
NHTSA NO. 035104  
FMVSS NO. 210

FIGURE 5.26  
POST TEST ROW 2, LEFT SIDE VIEW



2005 TOYOTA AVALON  
NHTSA NO. C55104  
FMVSS NO. 210

FIGURE 5.27  
POST TEST ROW 2, FRONT VIEW



2005 TOYOTA AVALON  
NHTSA NO. C55104  
FMVSS NO. 210

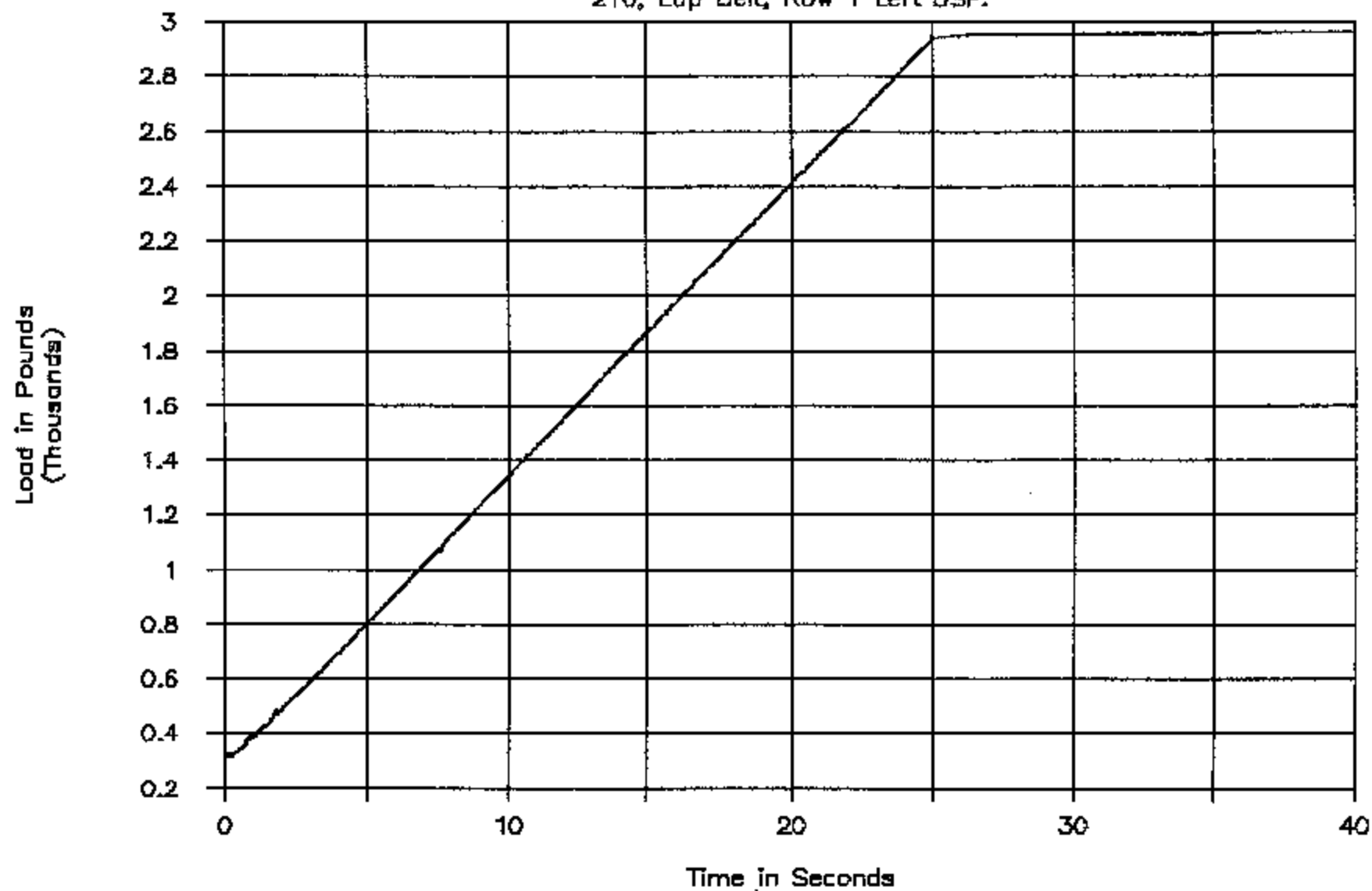
FIGURE 5-23  
POST TEST ROW 2, RIGHT SIDE VIEW



SECTION 6  
TEST PLOTS

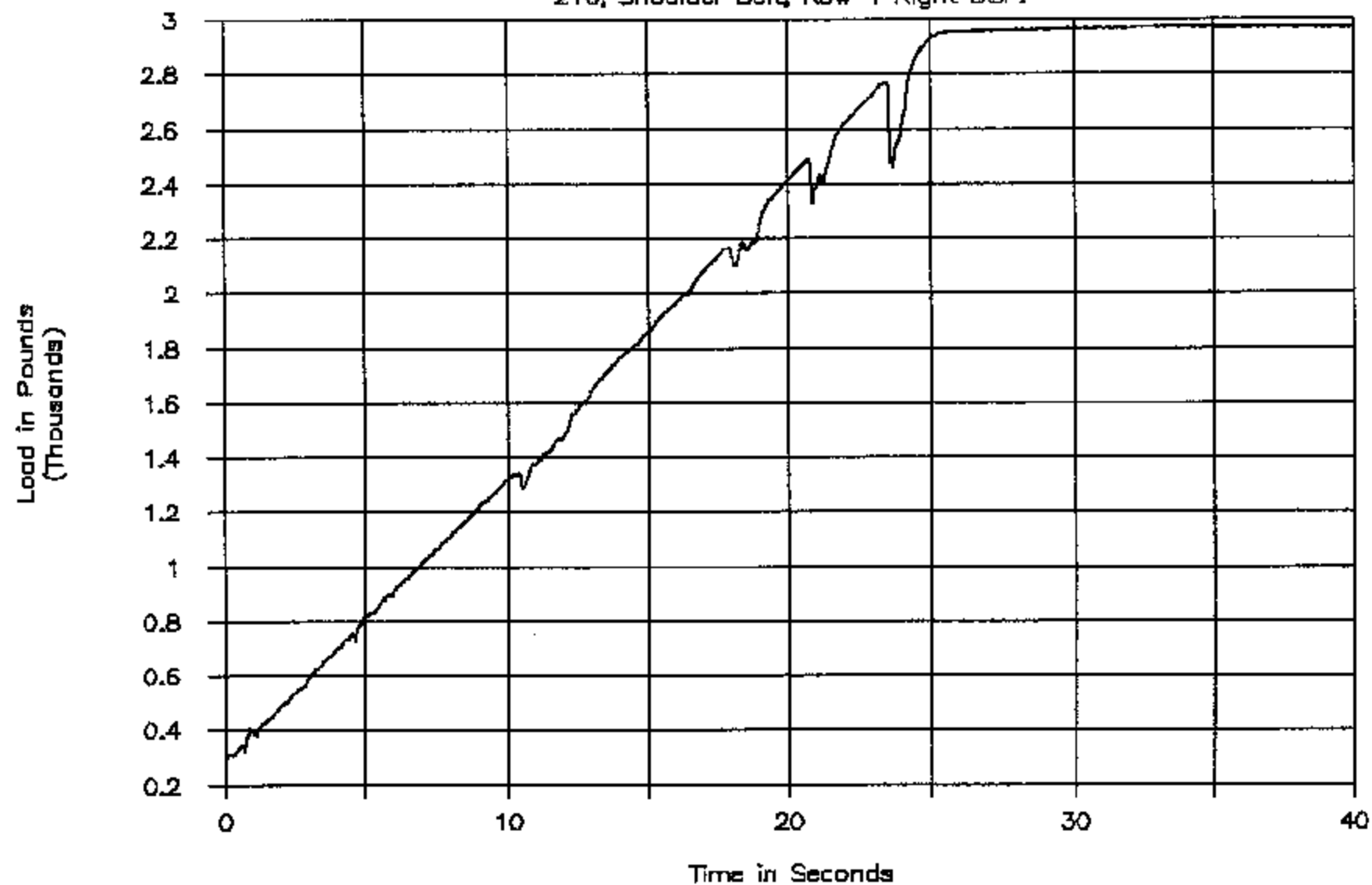
GTL 5305, NHTSA C55104

210, Lap Belt, Row 1 Left DSP.



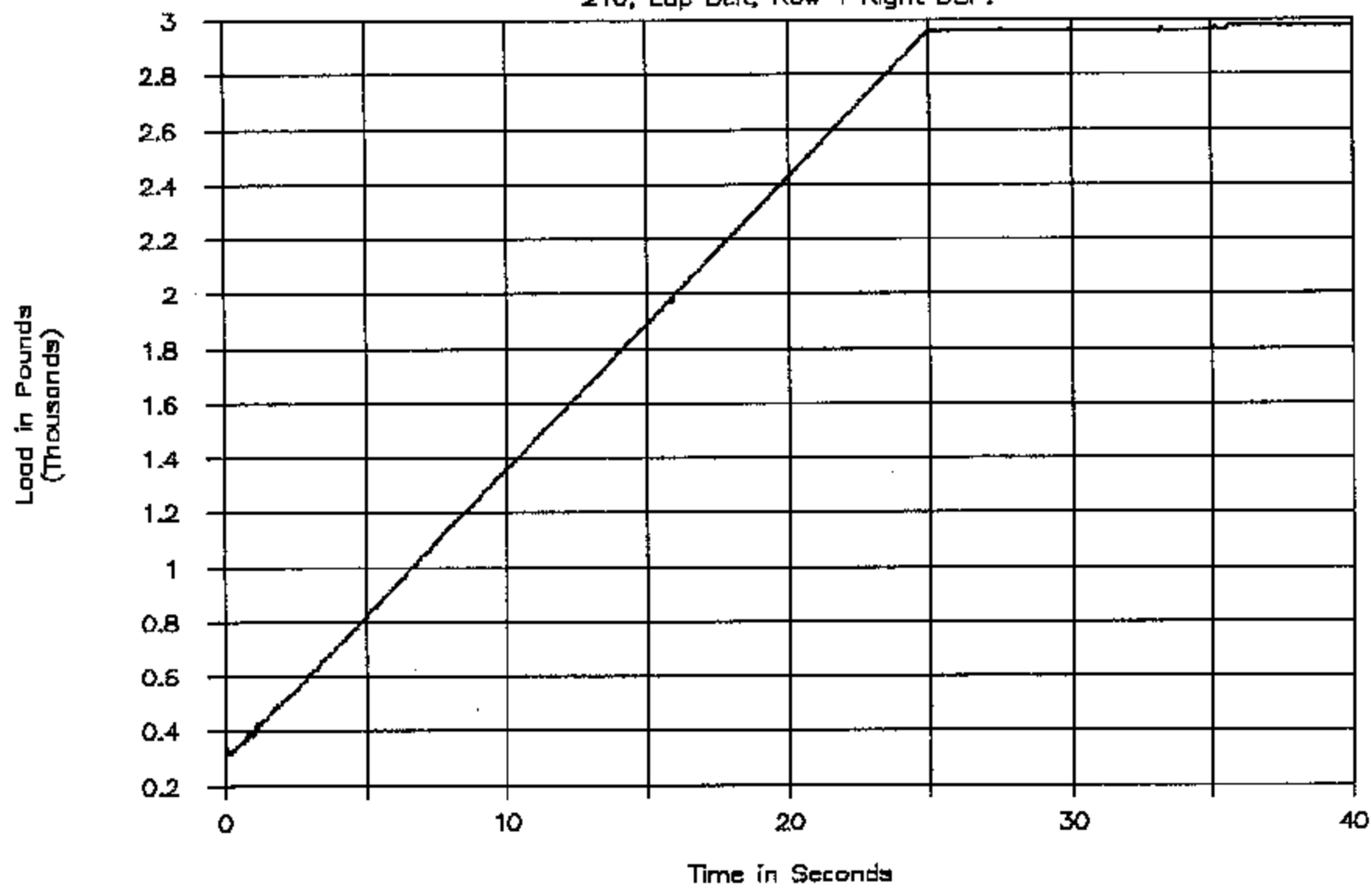
GTL 5305, NHTSA C55104

210, Shoulder Belt, Row 1 Right DSP.



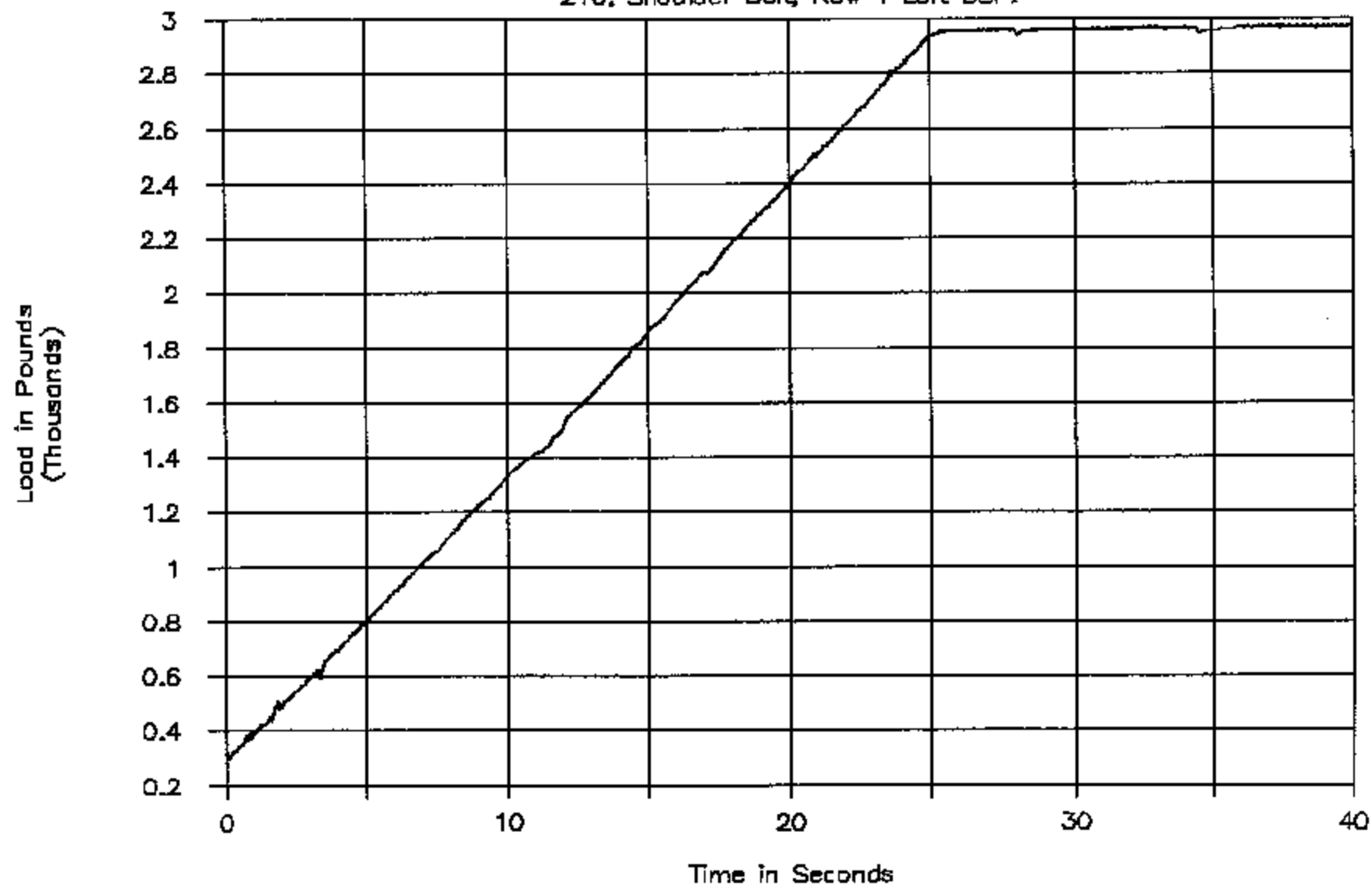
GTL 5305, NHTSA C55104

210, Lap Belt, Row 1 Right DSP.



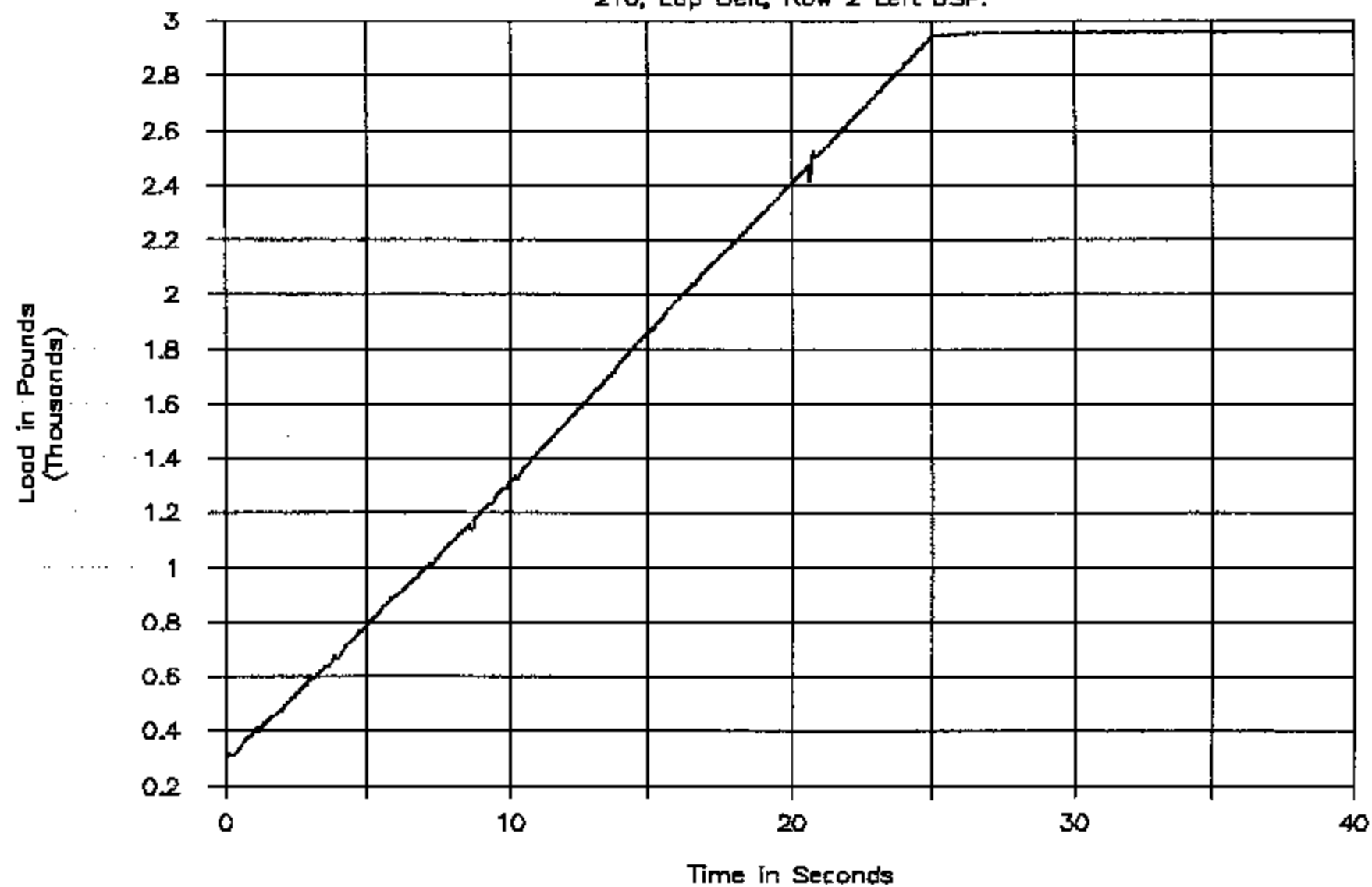
GTL 5305, NHTSA C55104

210, Shoulder Belt, Row 1 Left DSP.



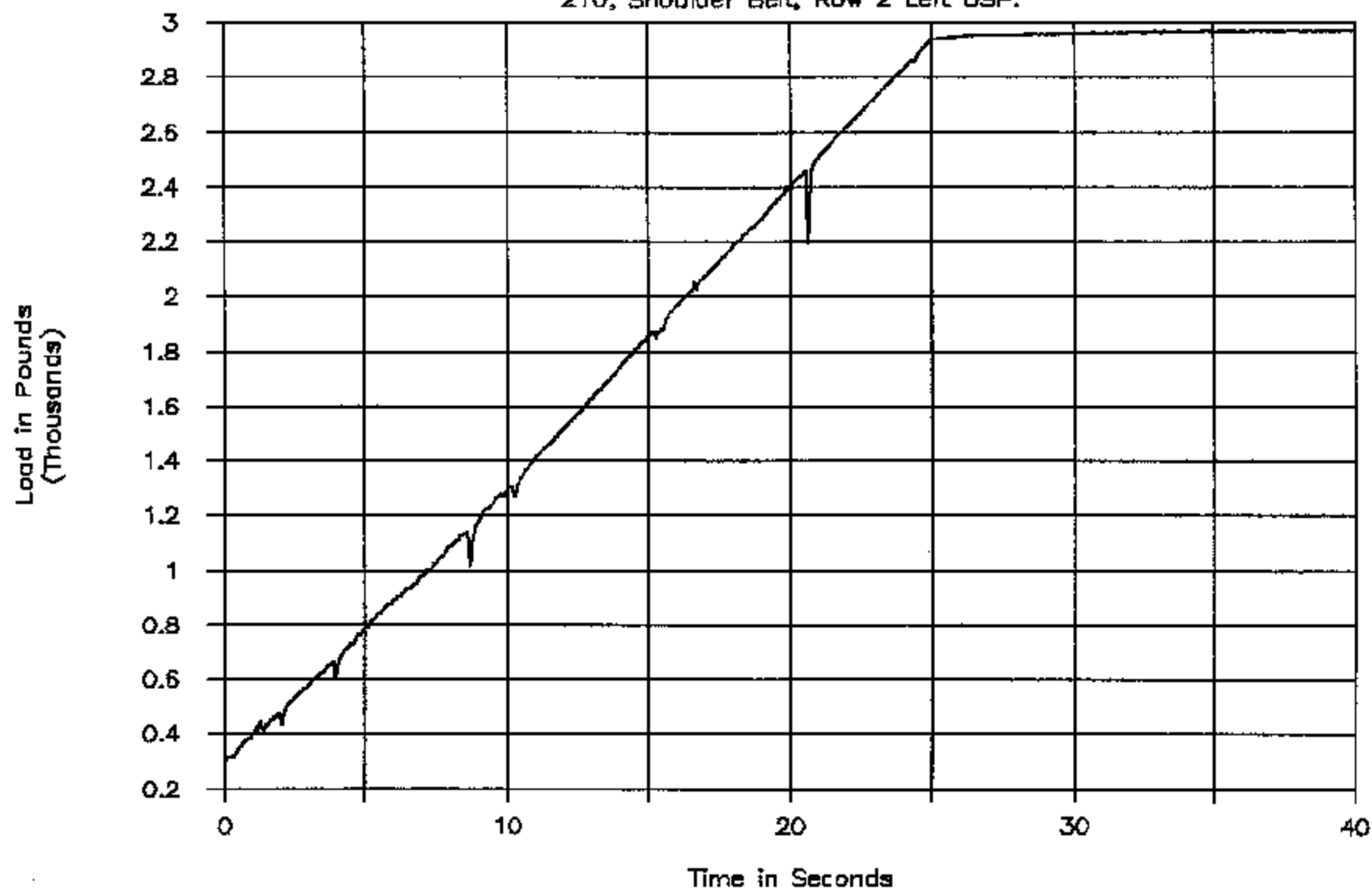
GTL 5306, NHTSA C55104

210, Lap Belt, Row 2 Left DSP.



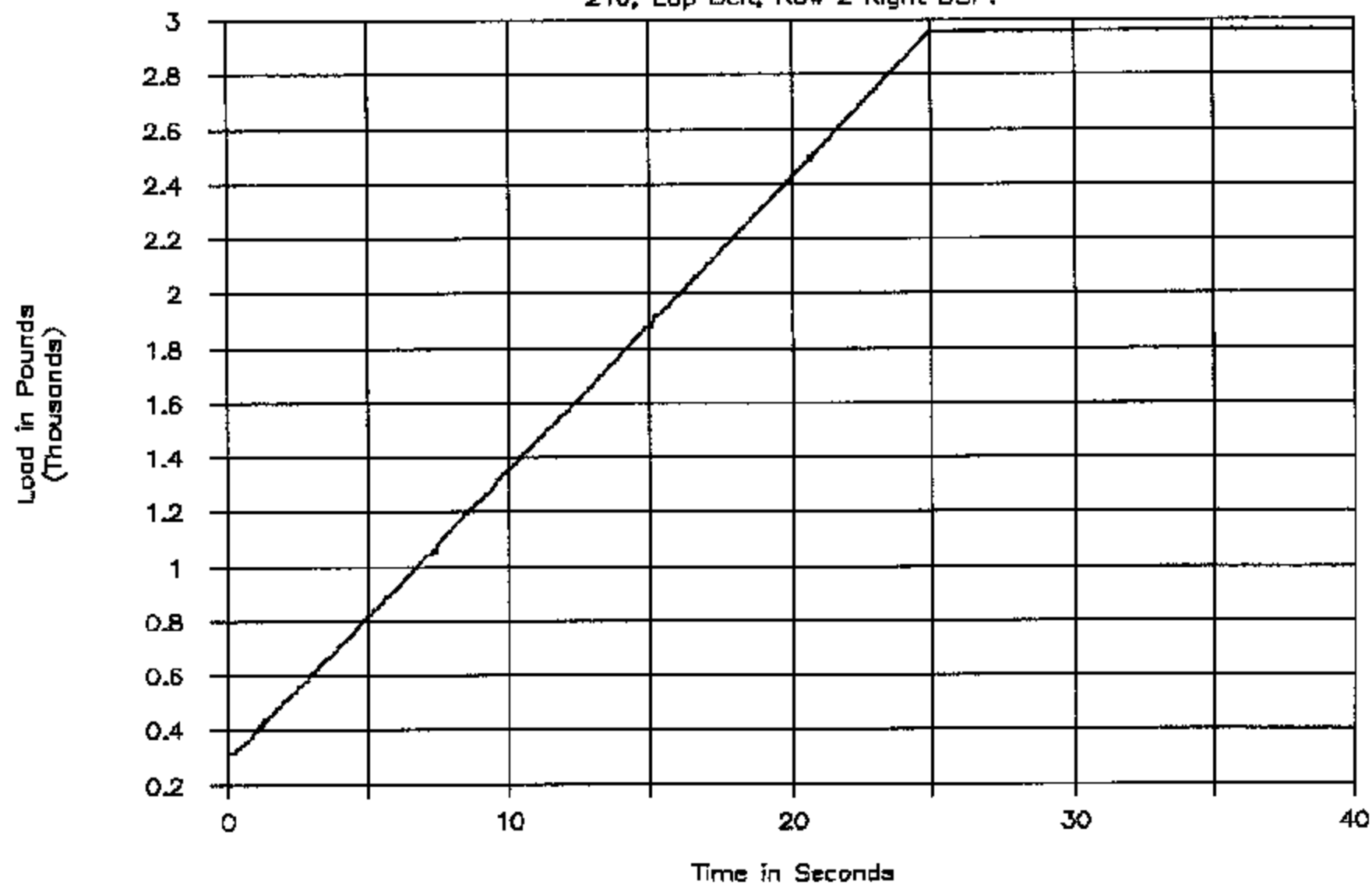
GTL 5306, NHTSA C55104

210, Shoulder Belt, Row 2 Left DSP.



GTL 5306, NHTSA C55104

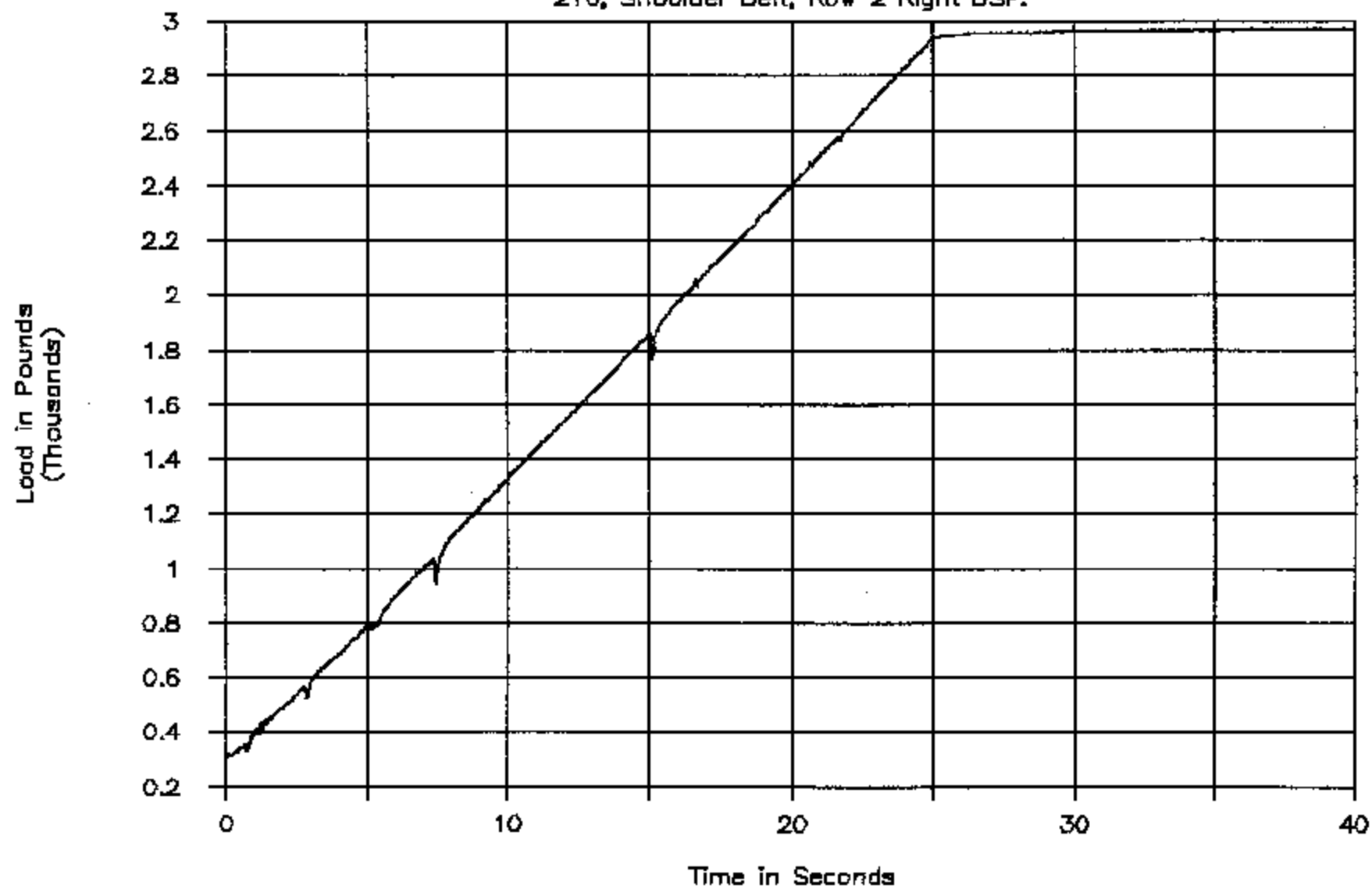
210, Lap Belt, Row 2 Right DSP.





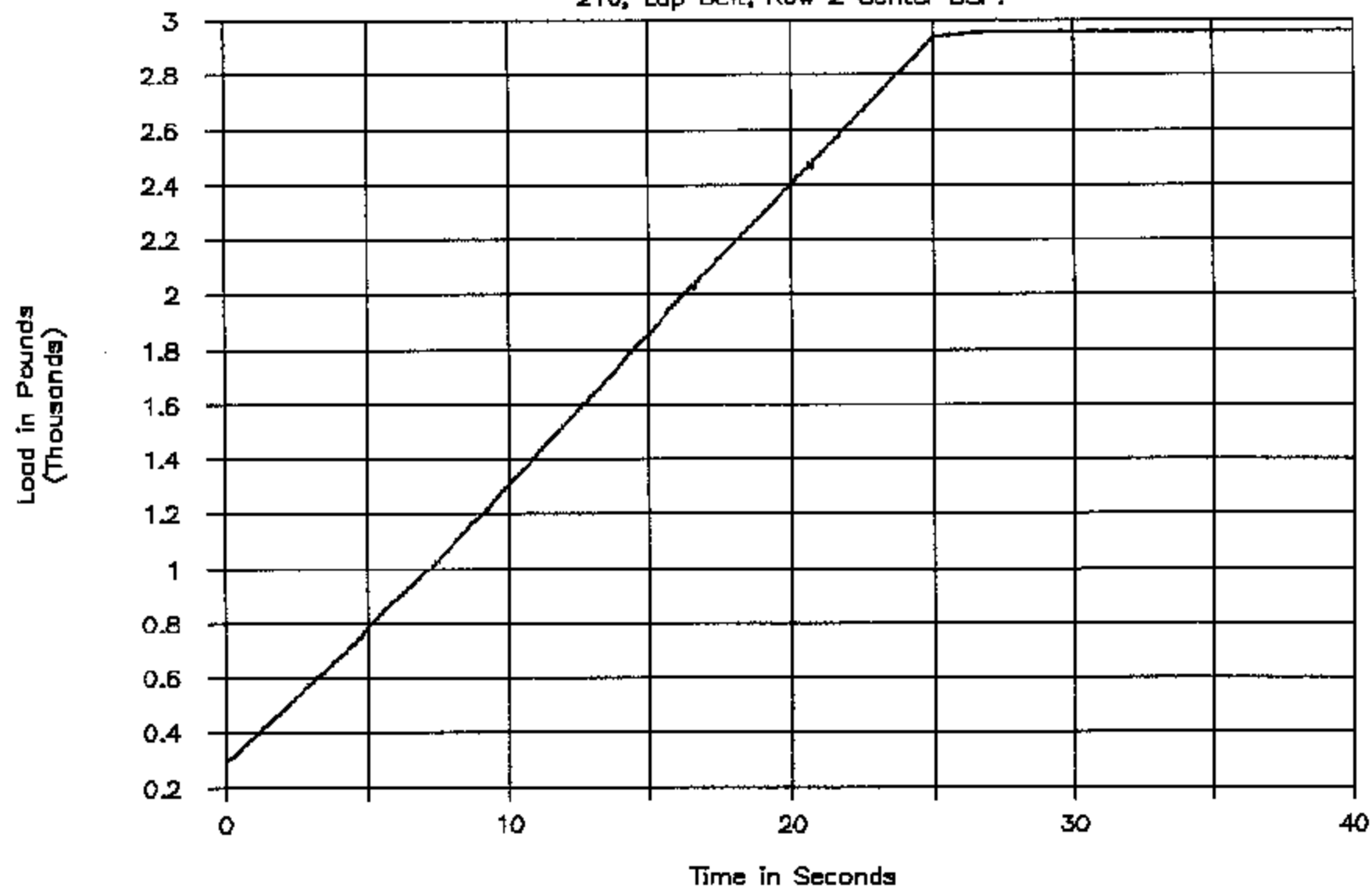
GTL 5306, NHTSA C55104

210, Shoulder Belt, Row 2 Right DSP.



GTL 5306, NHTSA C55104

210, Lap Belt, Row 2 Center DSP.



GTL 5306, NHTSA C55104

210, Shoulder Belt, Row 2 Center DSP.

