

FINAL REPORT NUMBER 225-MGA-04-001

SAFETY COMPLIANCE TESTING FOR FMVSS 225
"Child Restraint Anchorage Systems"

GENERAL MOTORS CORPORATION
2004 CHEVROLET ASTRO
NHTSA No. C40108

MGA RESEARCH CORPORATION
446 Executive Drive
Troy, Michigan 48083



Test Dates: September 20-21, 2004
Report Date: September 24, 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-221)
WASHINGTON, D.C. 20590

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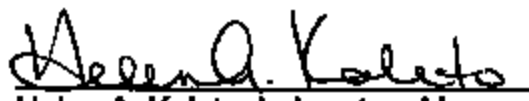
Prepared By:



Melanie Schick, Project Engineer

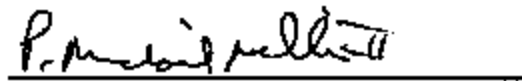


Brad Reaume, Test Personnel



Helen A. Kaleto, Laboratory Manager

Approved By:



Approval Date:

10/13/04

FINAL REPORT ACCEPTANCE BY OVSC:

Accepted By:



Acceptance Date:

10/19/04

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16. Abstract Compliance testing was conducted on the subject 2004 Chevrolet Astro, NHTSA No. C40108, in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-225T & 225L for the determination of FMVSS 225 compliance. The tests were conducted at MGA Research Corporation in Troy, Michigan on September 20-21, 2004. Test failures identified were as follows: NONE The data recorded indicates that the 2004 Chevrolet Astro tested appears to comply with the requirements for FMVSS 225, set forth by the National Highway Traffic Safety Administration.			
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1.0 PURPOSE AND PROCEDURE

PURPOSE

The child restraint anchorage testing results presented in this report are part of the Federal Motor Vehicle Safety Standard (FMVSS) No. 225 compliance test program conducted for the National Highway Traffic Safety Administration (NHTSA) by MGA Research Corporation (MGA) under Contract No. DTNH22-02-D-11043. The purpose of the testing was to determine if the subject vehicle, a 2004 Chevrolet Astro, NHTSA No. C40108 meets the performance requirements of FMVSS No. 225, "Child Restraint Anchorage Systems."

PROCEDURE

This testing was conducted in accordance with NHTSA's Office of Vehicle Safety Compliance (OVSC) Laboratory Test Procedures, TP-225T (5/3/01) and TP-225L (6/11/01), and MGA's Laboratory Test Procedure, MGATP225GOV (3/20/03).

The front occupant compartment consisted of two (2) adjustable outboard bucket seats and the rear occupant compartment consisted of a 2nd row and 3rd row three-passenger bench seat. Each 2nd row outboard seating position was equipped with a child restraint anchorage system (one tether and two lower anchors). The 3rd row right occupant seating position was equipped with a tether anchorage. The center-to-center spacing between the 2nd row outboard lower anchorages was approximately 710 mm. Each 2nd row outboard occupant seating position was tested with the SFADII fixture, and the 3rd row right occupant seating position was tested with the SFADI fixture.

2.0 COMPLIANCE TEST AND DATA SUMMARY

TEST SUMMARY

The testing was conducted at MGA, Troy, Michigan on September 20-21, 2004.

Based on the test results, the 2004 Chevrolet Astro appears to comply with the performance requirements of FMVSS No. 225 for these tests.

The SFADII at the 2nd row left occupant seating position sustained a maximum force of 5,378 N and held the required load for 3 seconds. The total displacement from point "X" on the SFADII for the 2nd row left occupant seating position was 58 mm. The SFADII at the 2nd row right occupant seating position sustained a maximum force of 5,145 N and held the required load for 3 seconds. The total displacement from point "X" on the SFADII for the 2nd row right occupant seating position was 61 mm. The SFADI at the 3rd row right occupant seating position sustained a maximum force of 10,113 N and held the required load for 3 seconds.

DATA SUMMARY

Strength and displacement summary data are provided below, and data for the configuration and the location of each child restraint anchorage system are provided in Section 5.0. Photographs are found in Section 6.0 and test plots are found in Section 7.0.

Table 1. Summary Data for Strength and Displacement

MGA Test #	Fixture Type	Test Configuration	Seating Position	Max. Load (N)	Displacement (mm)
SC4421	SFAD II	Lower - Lateral Right	2 nd Row Left	5,378	58
			2 nd Row Right	5,145	61
SC4422	SFAD I	Top Tether - Forward	3 rd Row Right	10,113	N/A

N/ A indicates that the displacement criteria does not apply to this test.

3.0 TEST VEHICLE INFORMATION

Table 2. General Test and Vehicle Parameter Data

VEH. MOD YR/MAKE/MODEL/BODY	2004 Chevrolet Astro
VEH. NHTSA NO.	C40108
VIN	1GNDM19X84B104278
COLOR	Grey
VEH. BUILD DATE	09/03
TEST DATES	September 20-21, 2004
TEST LABORATORY	MGA Research Corporation
OBSERVERS	Melanie Schick, Brad Reaume, Kenney Godfrey

GENERAL INFORMATION:

DATA FROM VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured By: General Motors Corporation

Date of Manufacture: 09/03; VIN: 1GNDM19X84B104278

GVWR: 2676 kg; GAWR FRONT: 1270 kg

GAWR REAR: 1406 kg

DATA FROM TIRE PLACARD:

Tire Pressure with Maximum Capacity Vehicle Load:

FRONT: 260 kPa REAR: 260 kPa

Recommended Tire Size: P215/70R16 Load Range: 623 kg

Recommended Cold Tire Pressure:

FRONT: 260 kPa REAR: 260 kPa

Size of Tire on Test Vehicle: P215/70R16

Type of Spare Tire: Standard: T155/80D18

VEHICLE CAPACITY DATA:

Type of Front Seats: Bench ; Bucket X; Split Bench

Number of Occupants: Front 2; 2nd Row 3; 3rd Row 3; TOTAL 8

4.0 TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

MGA Research Corporation 446 Executive Drive Troy, Michigan 48063	
Test Equipment Used for Testing	Calibration Due Date
MGA Hydraulic Test Frame	N/A
Two (2) Load Cell 3,000 lb Capability	S/N 249 (10/26/04), S/N 125 (10/26/04)
Two (2) String Potentiometer	Calibrated at each use (S/N 20420, 20757)
Hydraulic Pump	N/A
MGA CRF Fixture	N/A
MGA SFAD2	N/A
MGA 2-Dimensional Template	N/A
Linear Scale	S/N 358 (12/17/04)
MGA Data Acquisition System	N/A
One (1) Hydraulic Cylinder	N/A
Digital Calipers	S/N MGA00121 (8/23/05)
Force Gauge	S/N MGA00058 (10/30/04)
Inclinometer (Digital)	S/N MGA00046 (8/23/05)

5.0 DATA

Table 3. Child Restraint Tether Anchorage Configuration (Data Sheet 1)

Seating Position		Permit the attachment of a tether hook	Accessible without the need for any tool other than a screwdriver or coin	Ready for use without the need for any tools	Scaled to prevent the entry of exhaust fumes
Front Row		N/A	N/A	N/A	N/A
Second Row	LH	Yes	Yes	Yes	Yes
	Ctr.	N/A	N/A	N/A	N/A
	RH	Yes	Yes	Yes	Yes
Third Row	LH	N/A	N/A	N/A	N/A
	Ctr.	N/A	N/A	N/A	N/A
	RH	Yes	Yes	Yes	Yes

Note: AS DETERMINED USING THE PROCEDURES SPECIFIED IN TP-225L & 225T.

REMARKS: NONE.

Table 4. Child Restraint Lower Anchorage Configuration (Data Sheet 2)

OBSERVED LOWER ANCHORAGE CONFIGURATION	SEAT POSITION				
		FRONT ROW	SECOND ROW		THIRD ROW
			I/B	O/B	
Above anchorage, permanently marked with a circle not less than 13 mm in Dia.; and whose color contrasts with its background; and its center is not less than 50 mm and not more than 75 mm above the bar, and in the vertical longitudinal plane that passes through the center of the bar.	LH	N/A	No		N/A
	Ctr		N/A		
	RH		No		
Each of the bars is visible, without the compression of the seat cushion or seat back, when the bar is viewed, in a vertical longitudinal plane passing through the center of the bar, along a line marking an upward 30 degree angle with a horizontal plane.	LH	N/A	Yes		N/A
	Ctr				
	RH				
Diameter of the bar (mm)	LH	N/A	5.92	5.97	N/A
	Ctr		N/A		
	RH		5.96	6.00	
Inspect if the bars are straight, horizontal and transverse	LH	N/A	Yes		N/A
	Ctr		N/A		
	RH		Yes		
Optional Marking: At least one anchorage bar (when deployed for use, if storable anchorages), one guidance fixture, or one seat marking is visible.	LH	N/A	N/A		N/A
	Ctr				
	RH				
Optional Marking: If guidance fixtures are used, the fixture(s) must be installed.	LH	N/A	N/A		N/A
	Ctr				
	RH				
Measure the distance between Point "Z" of the CRF and the center of the anchorage bar (mm)	LH	N/A	41		N/A
	Ctr		N/A		
	RH		42		
Measure the distance between the SRP to the center of the anchorage bar (mm)	LH	N/A	188		N/A
	Ctr		N/A		
	RH		188		

Table 4. Child Restraint Lower Anchorage Configuration (Data Sheet 2) (continued)

OBSERVED LOWER ANCHORAGE CONFIGURATION	SEAT POSITION				
		FRONT ROW	SECOND ROW		THIRD ROW
			I/B	O/B	
Inspect if the centroidal longitudinal axes are collinear within 5 degrees	LH	N/A	Yes		N/A
	Ctr		N/A		
	RH		Yes		
Inspect if the inside surface of the bar that is straight and horizontal section of the bars, and determine they are not less than 25 mm, but not more than 40 mm in length (mm).	LH	N/A	33	33	N/A
	Ctr		N/A		
	RH		33	33	
Inspect if the bars can be connected to, over their entire inside length by the connectors of child restraint system.	LH	N/A	Yes		N/A
	Ctr		N/A		
	RH		Yes		
Measure the distance between the center of the length of one bar to the center of the length of the other bar. The requirement is 280 mm $\pm$ 1 mm (mm).	LH	N/A	280		N/A
	Ctr		N/A		
	RH		280		
Inspect if the bars are an integral and permanent part of the vehicle.	LH	N/A	Yes		N/A
	Ctr		N/A		
	RH		Yes		
Inspect if the bars are rigidly attached to the vehicle. If feasible, hold the bar firmly with two fingers and gently pull.	LH	N/A	Yes		N/A
	Ctr		N/A		
	RH		Yes		

PITCH, YAW, & ROLL INFORMATION

SEAT POSITION	PITCH (deg)	YAW (deg)	ROLL (deg)
2 nd Row Left	12	No Data	1
2 nd Row Right	11	No Data	0
3 rd Row Right	N/A	N/A	N/A

N/A indicates that there were no lower anchors in the 3rd row right occupant seating position.

Note: AS DETERMINED USING THE PROCEDURES SPECIFIED IN TP-225L & 225T.

REMARKS: NONE

Table 5. Tether Location and Dimensional Measurements (Data Sheet 3)

SEAT POSITION FOR TETHER		TETHER ANCHORAGE LOCATION Located in the required zone?
Front Row	LH	N/A
	Cr.	
	RH	
Second Row	LH	Yes
	Cr.	N/A
	RH	Yes
Third Row	LH	N/A
	Cr.	N/A
	RH	Yes

Note: AS DETERMINED USING THE PROCEDURES SPECIFIED IN TP-225L & 225T.

REMARKS: NONE

Table 6. Anchorage Static Loading and Displacement (Data Sheet 5)

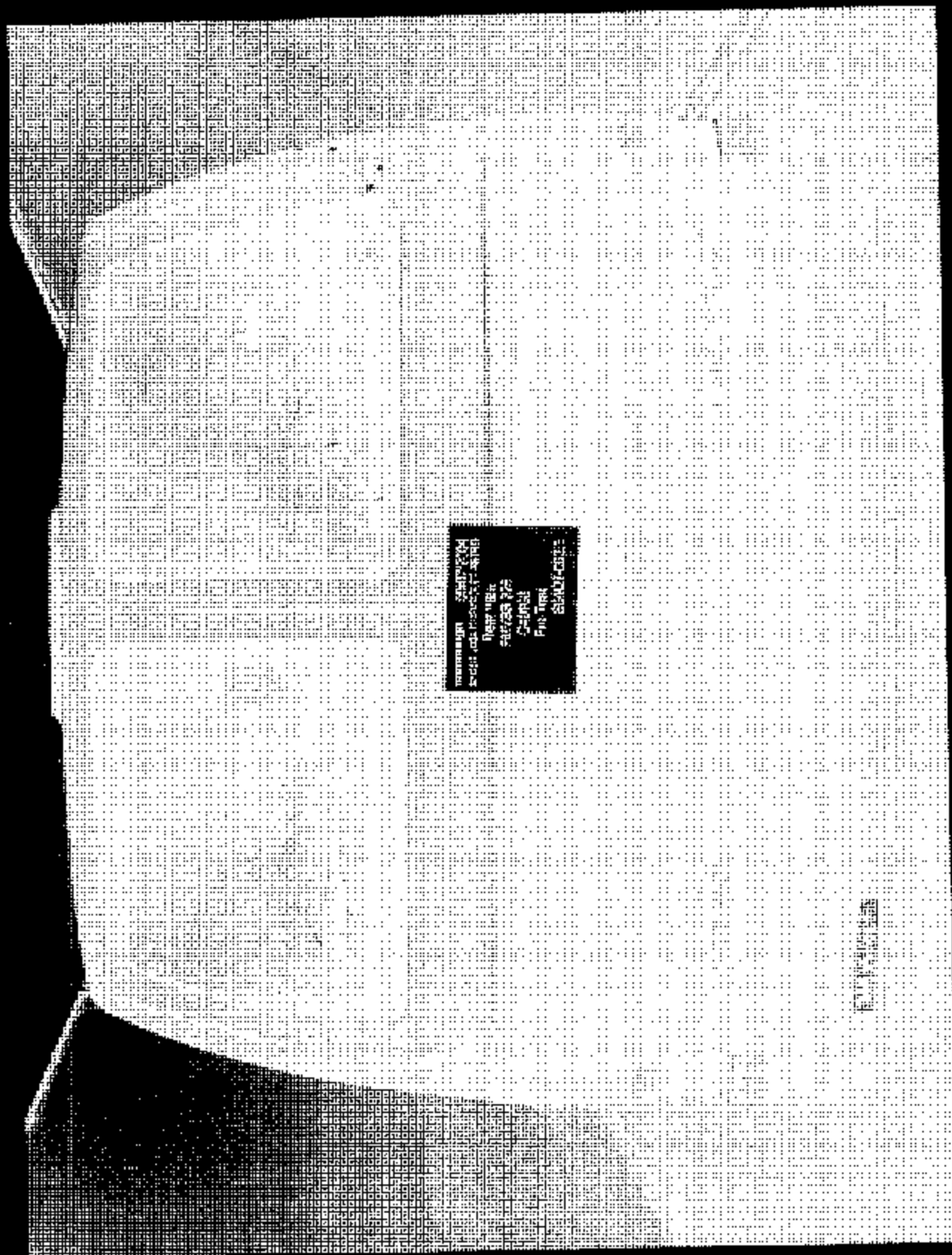
SEAT POSITION		Seat, Seat Back, & Head Restraint Positions			Angle (deg)	Initial Location (mm)	Onset Rate (N/sec.)	Force Applied (N)	Max. Load (N)	Final Location (mm)	Horizontal Displ. (mm)
		Seat	Seat Back	Is There a H/R?							
Front Row	LH	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Cr.										
	RH										
Second Row	LH	Fixed	Fixed	Yes	0	9	2,475	4,950	5,378*	70	58
	Cr.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	RH	Fixed	Fixed	Yes	0	14	2,475	4,950	5,145*	71	61
Third Row	LH	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Cr.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	RH	Fixed	Fixed	Yes	5	105	369	9,950	10,113*	269	164

Note: (1) AS DETERMINED USING THE PROCEDURES SPECIFIED IN TP-225L & 225T.

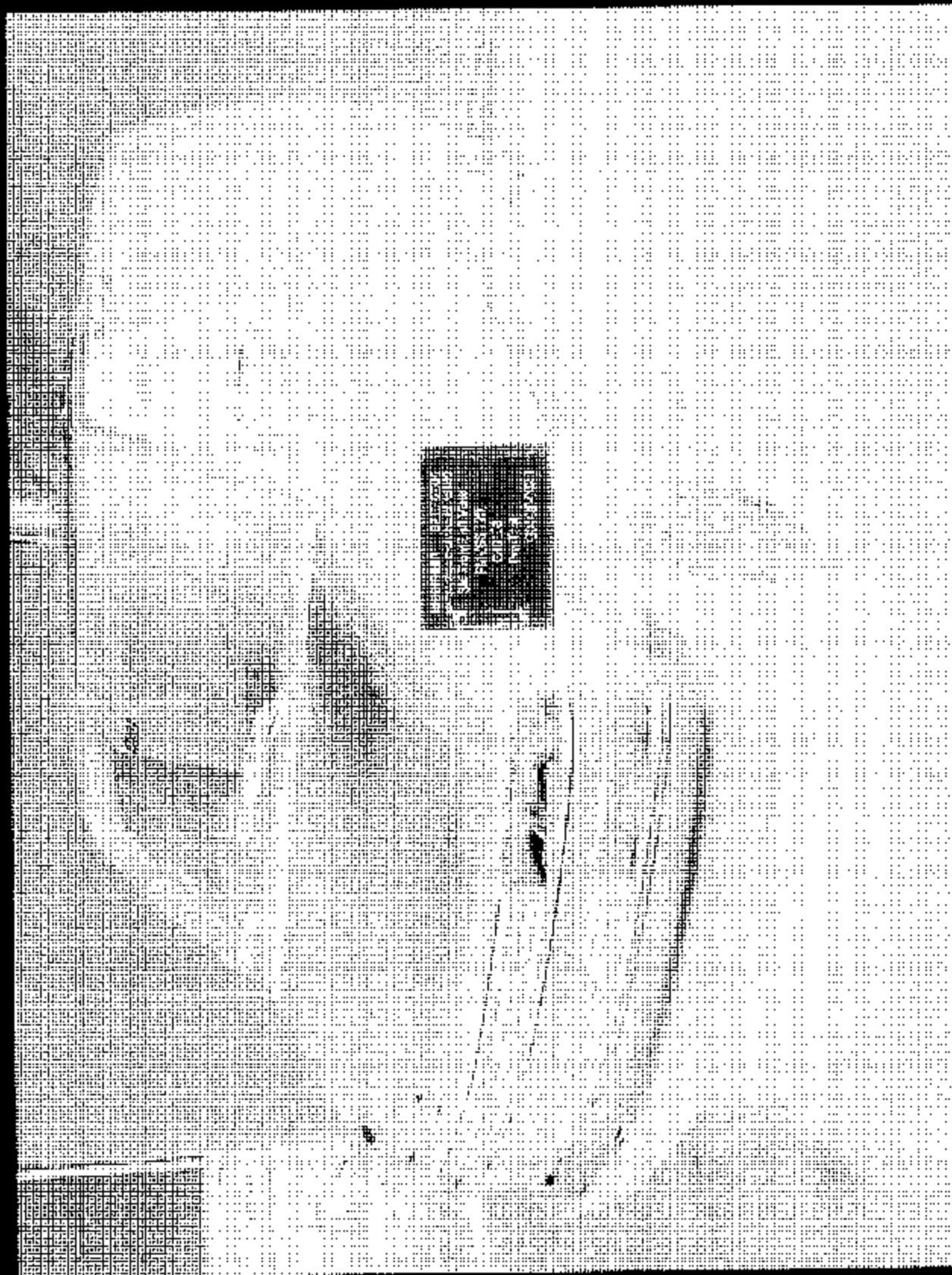
REMARKS: *Applied force exceeded the force specified in the test procedure.

6.0 PHOTOGRAPHS

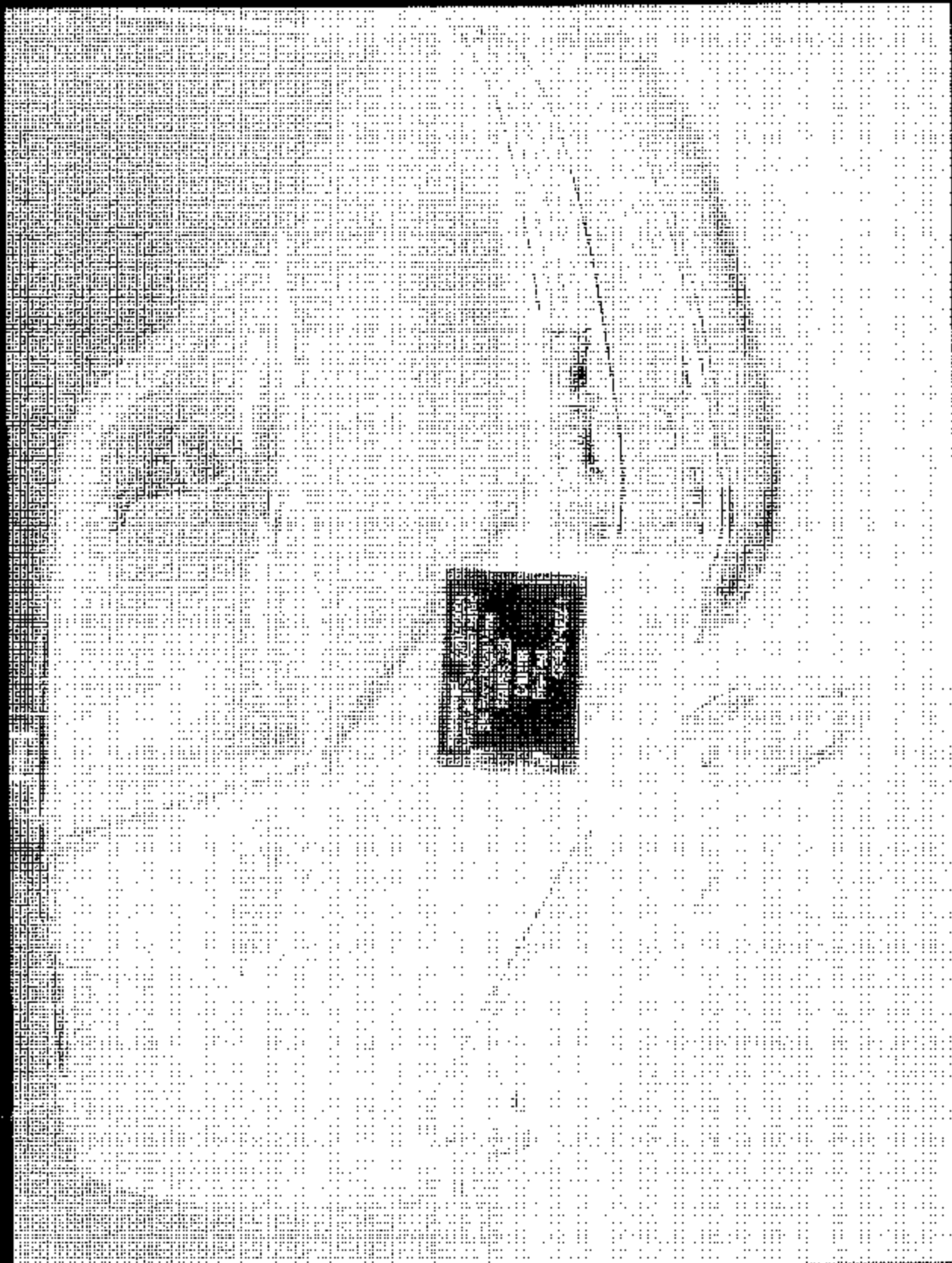
6.1 Full rear view



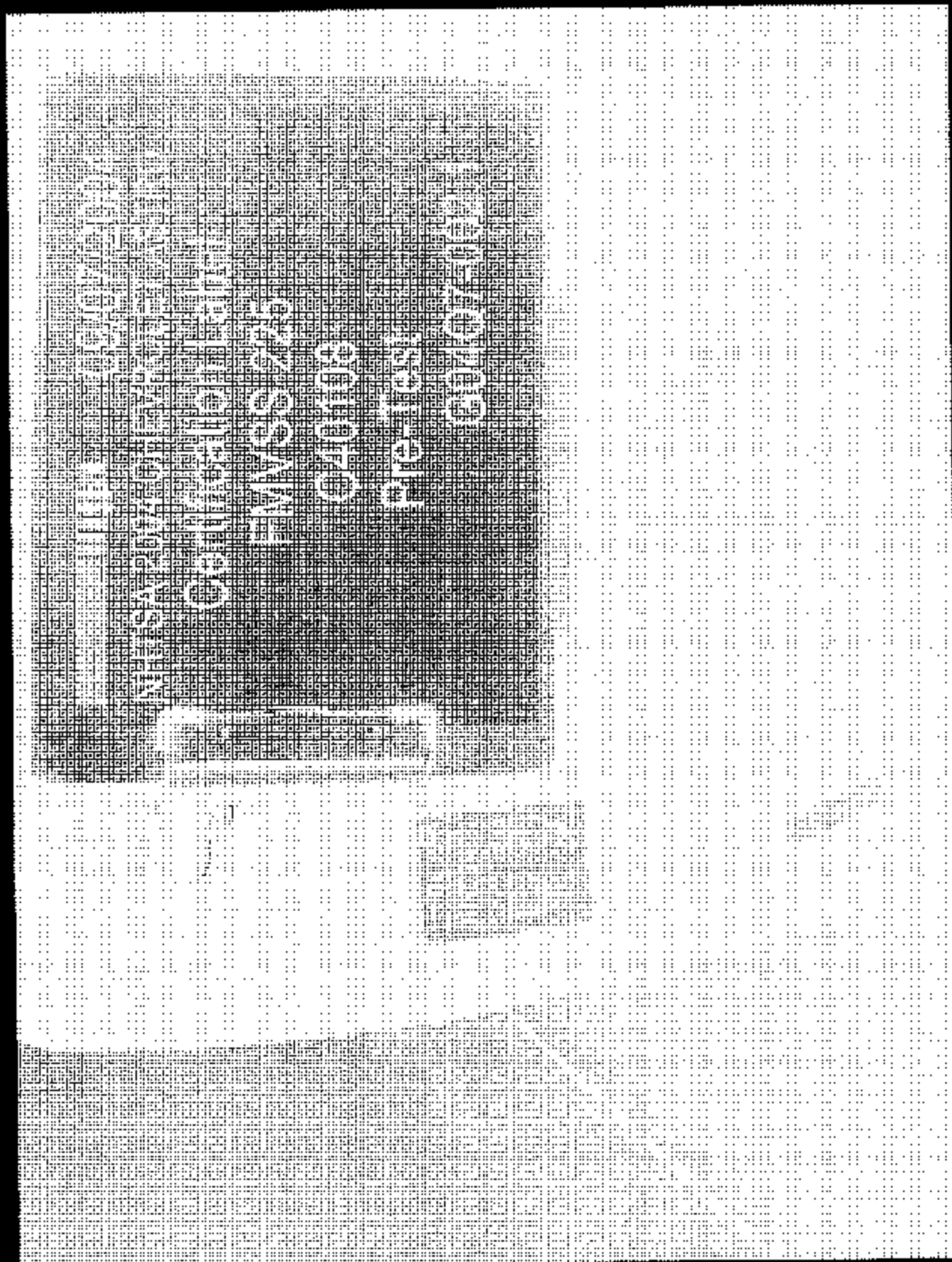
- 6.2 ¾ Front view
6.2.1 ¾ Front left view



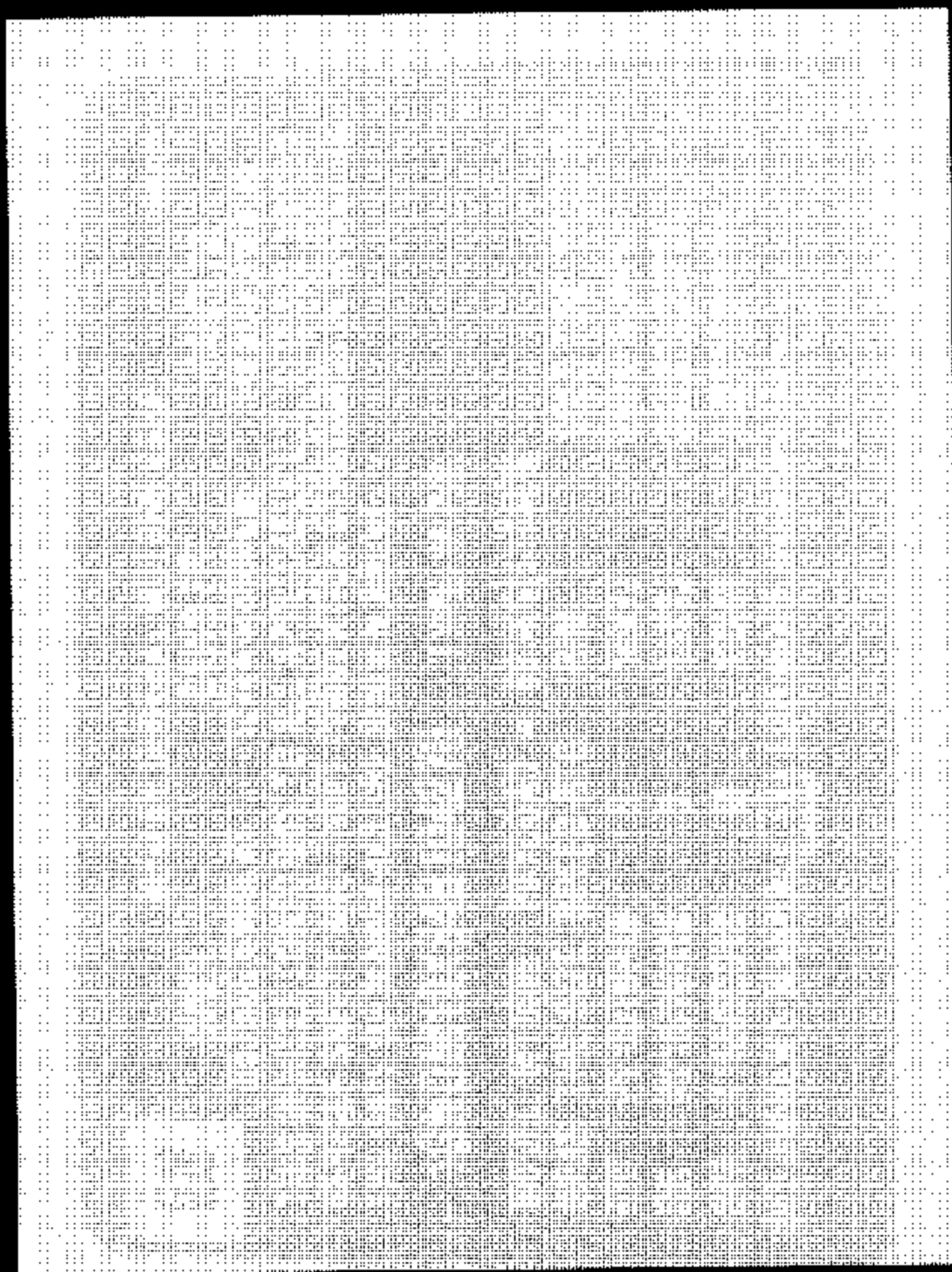
6.2.2 ¾ Front right view



6.3 Test vehicle's certification label
6.3.1 Certification label



6.3.2 Certification label

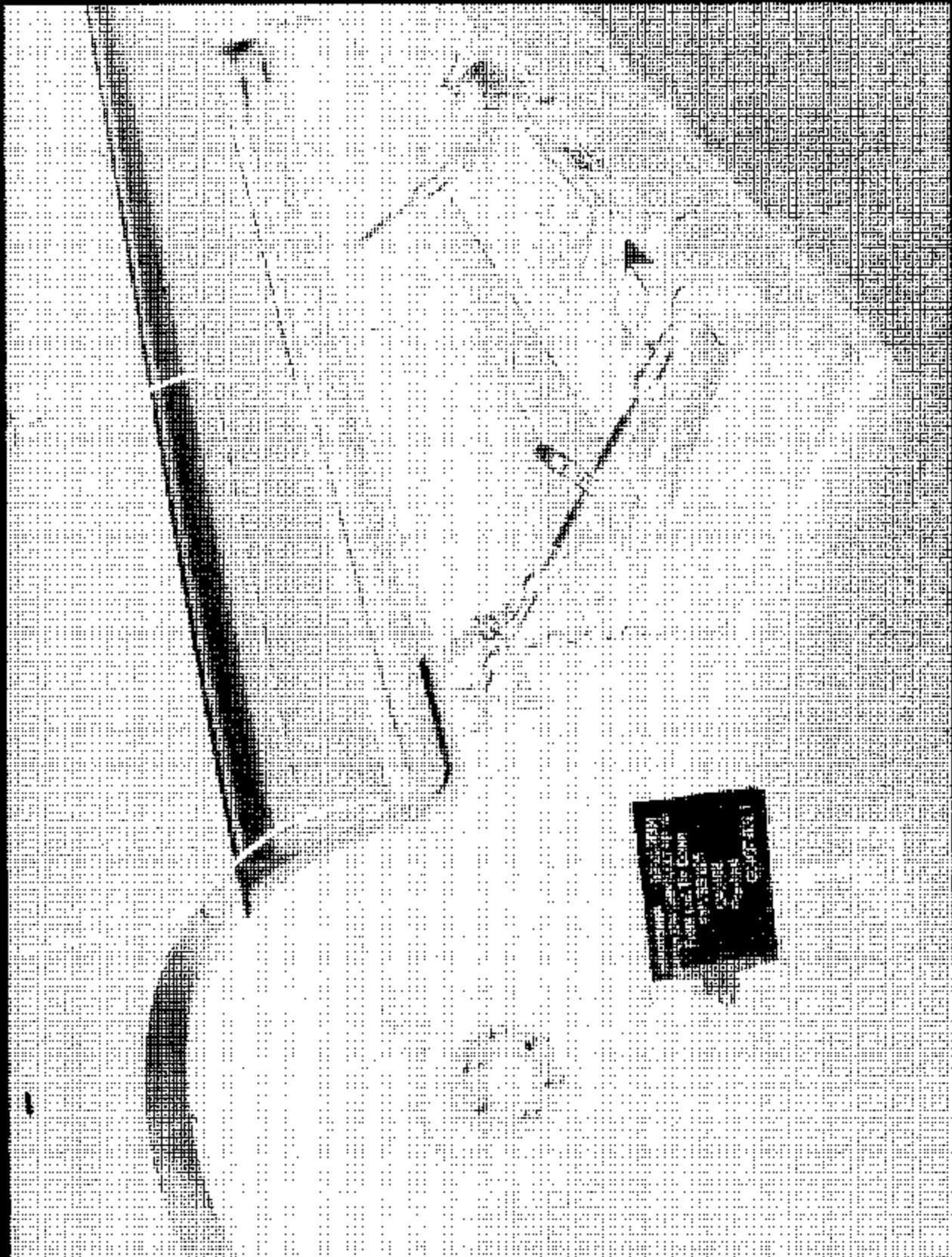


6.4 Vehicle tie down at each tie down location

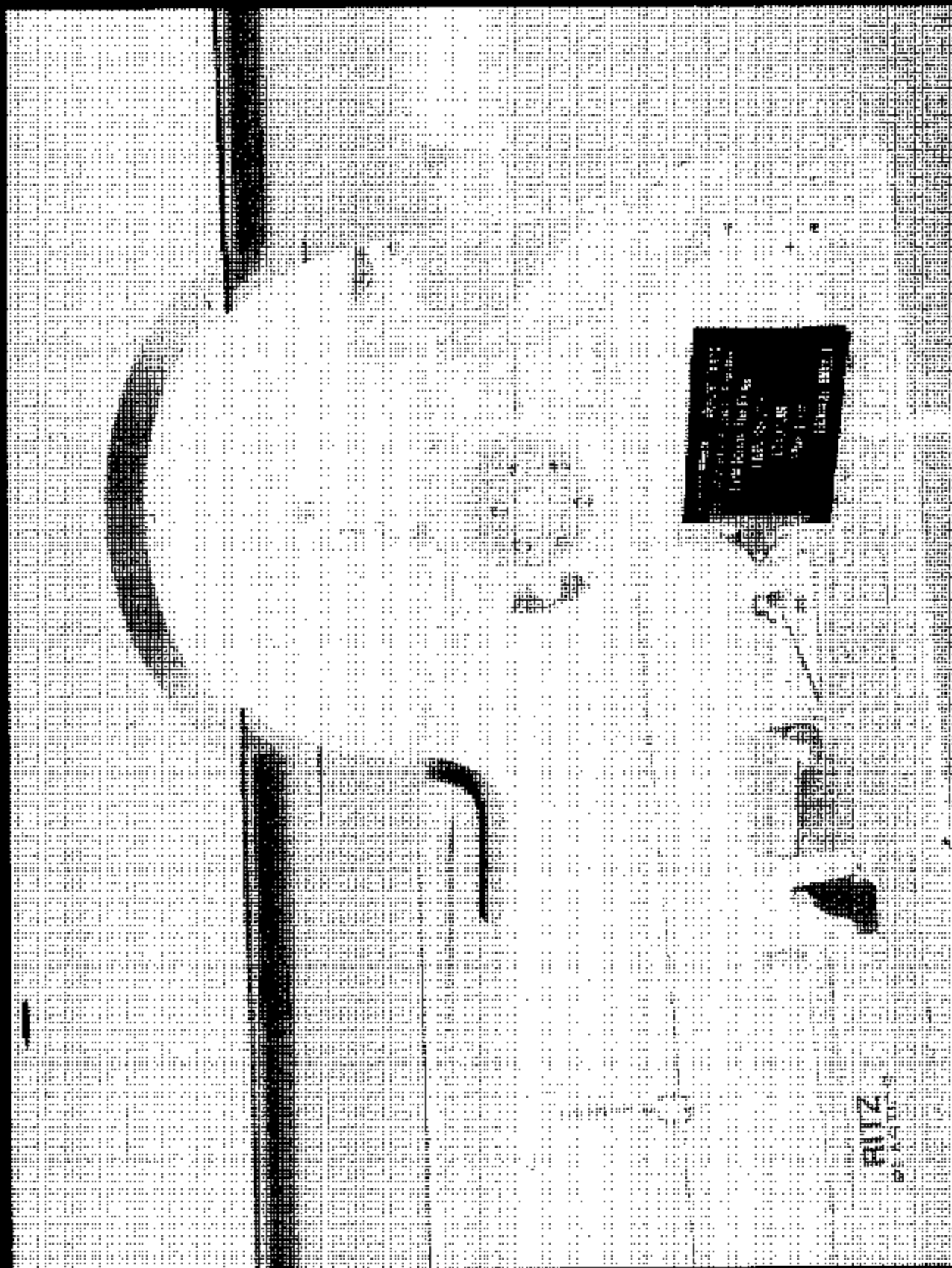
6.4.1 Front tie down under vehicle test 1 of 2



6.4.2 Left front tie down test 1 of 2



6.4.3 Left rear tie down test 1 of 2



6.4.4 Right front tie down test 1 of 2



6.4.5 Right rear tie down test 1 of 2



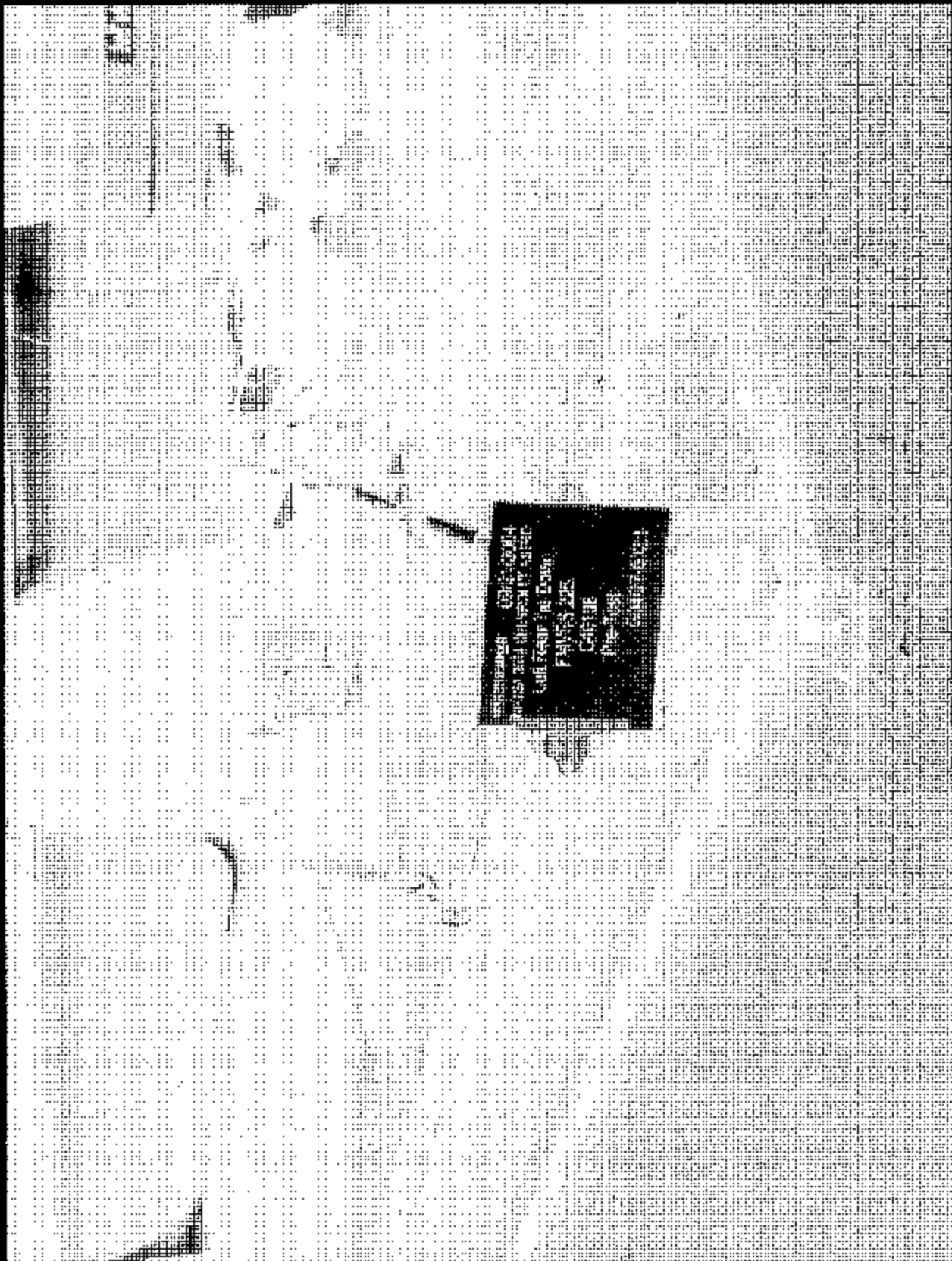
6.4.6 Front tie down under vehicle test 2 of 2



6.4.7 Left front tie down test 2 of 2



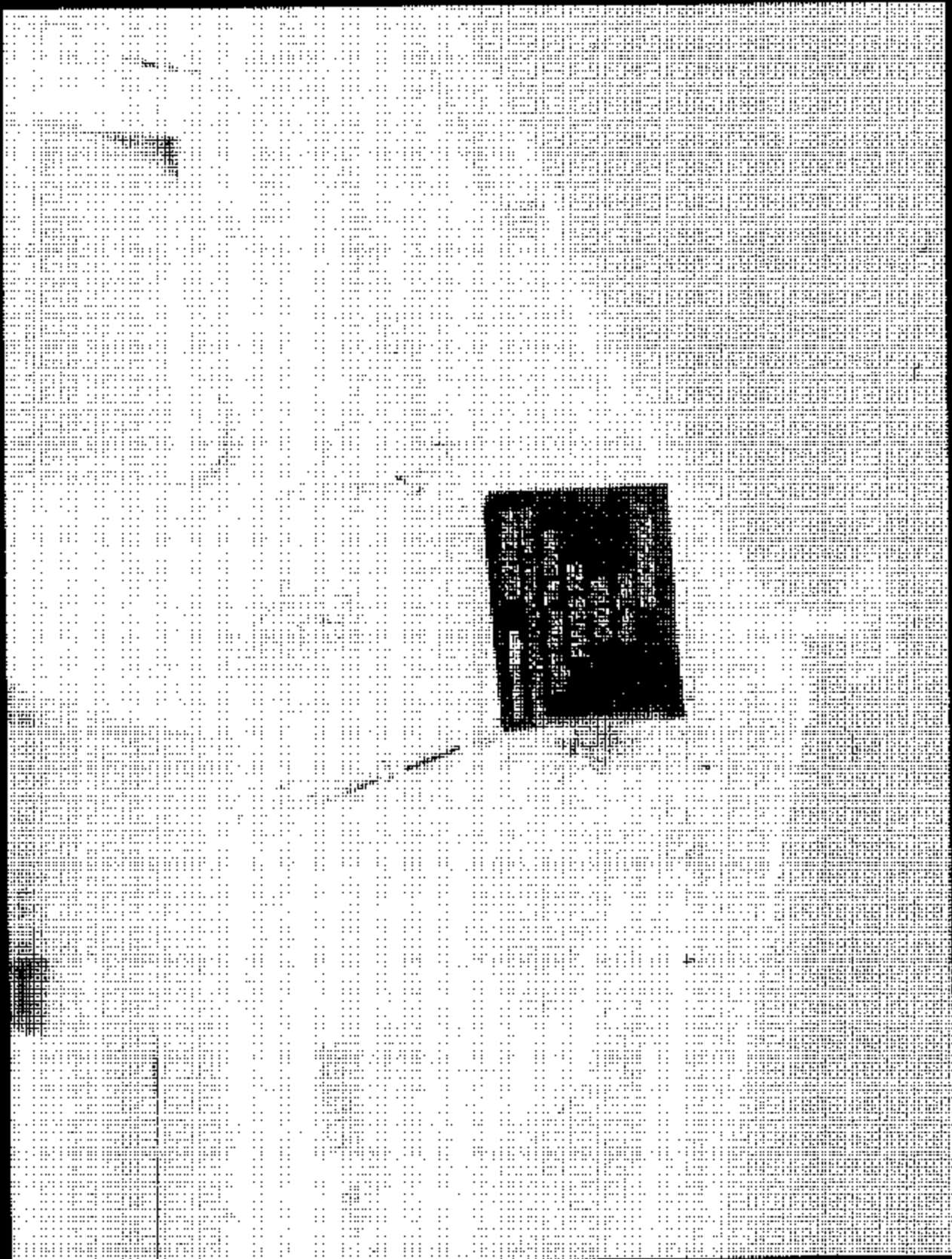
6.4.8 Left rear tie down test 2 of 2



6.4.9 Right front tie down test 2 of 2

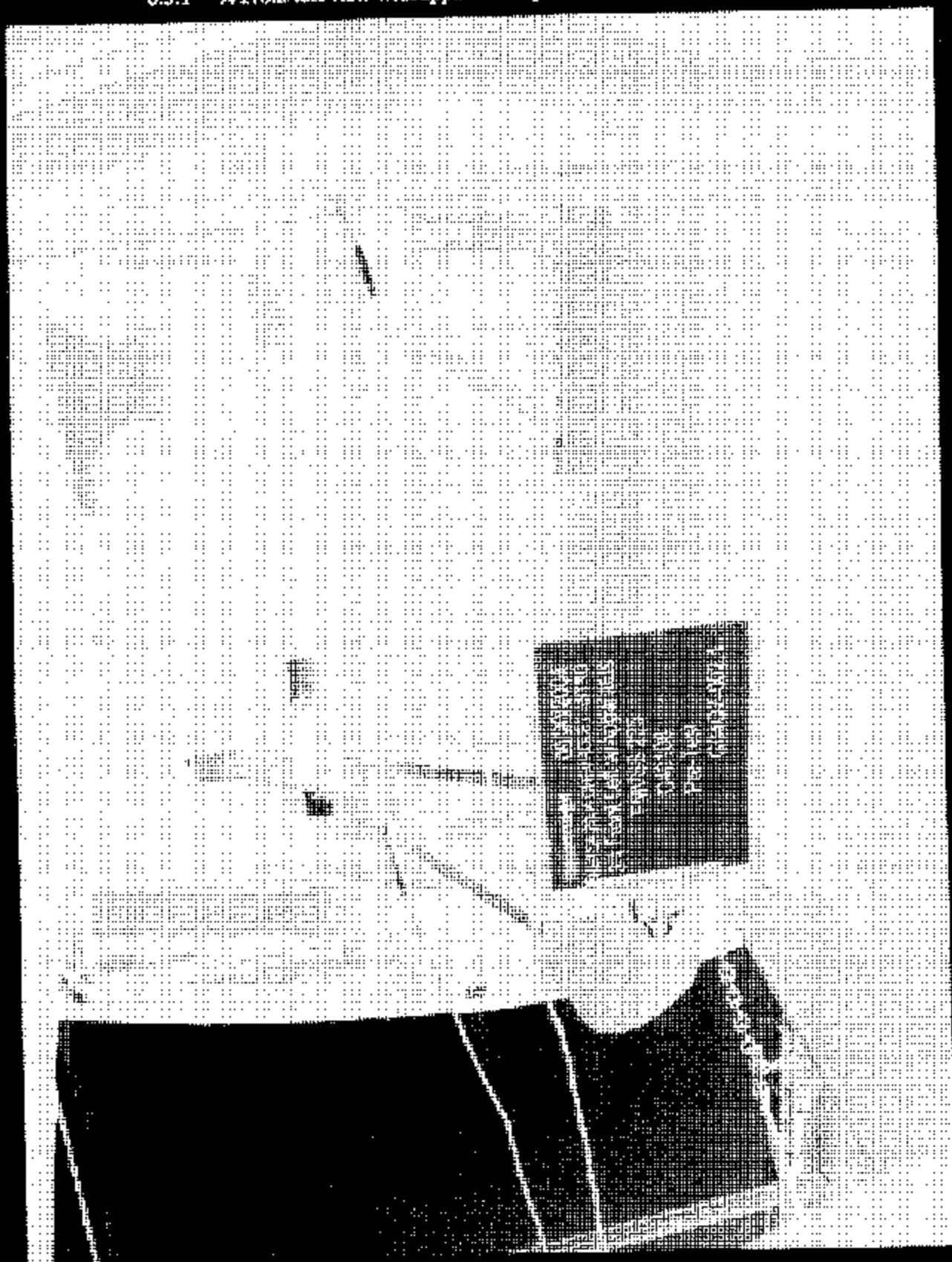


6.4.10 Right rear tie down test 2 of 2

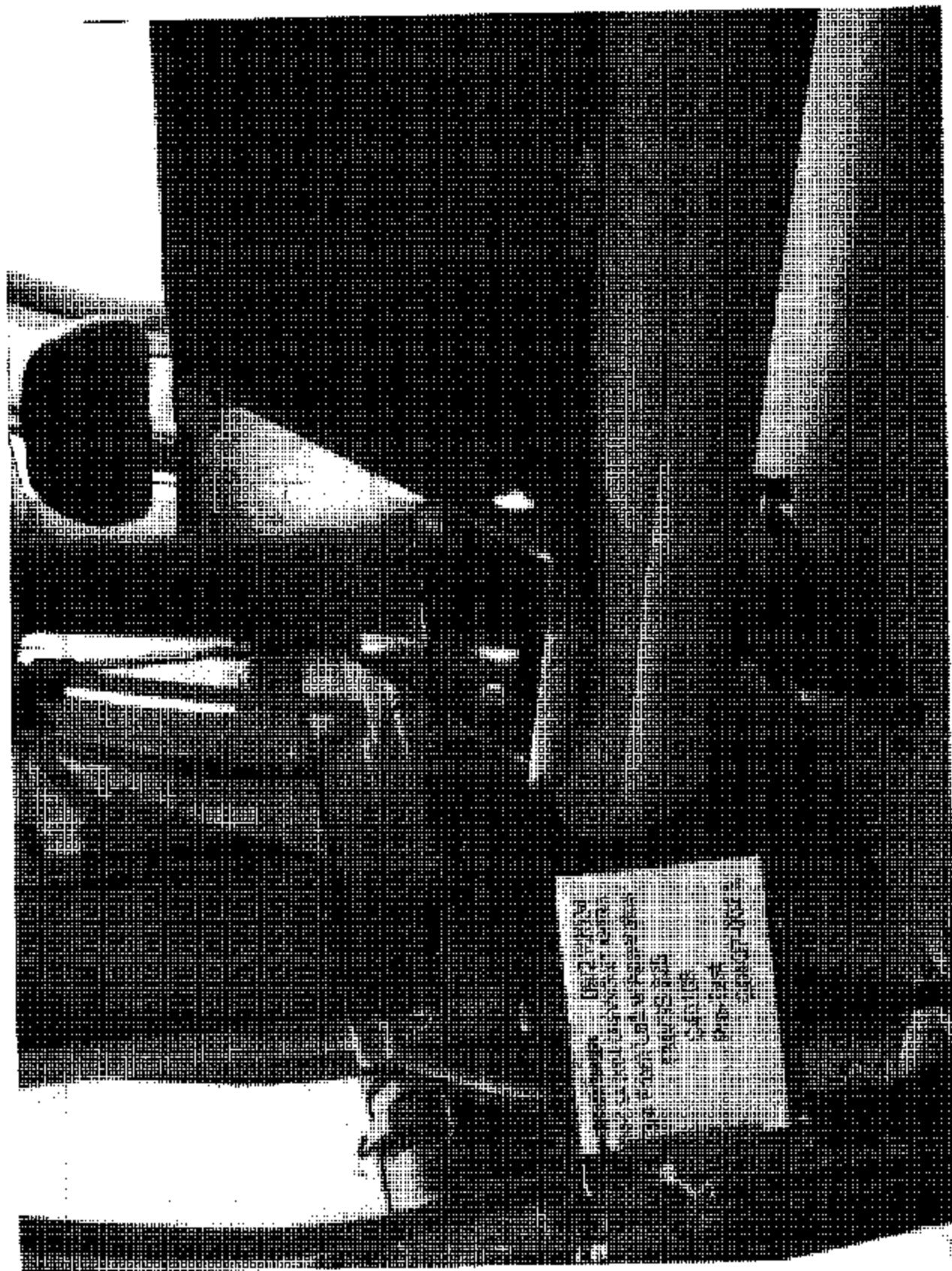


6.5 ¼ Front left view with apparatus in place

6.5.1 ¼ Front left view with apparatus in place test 1 of 2

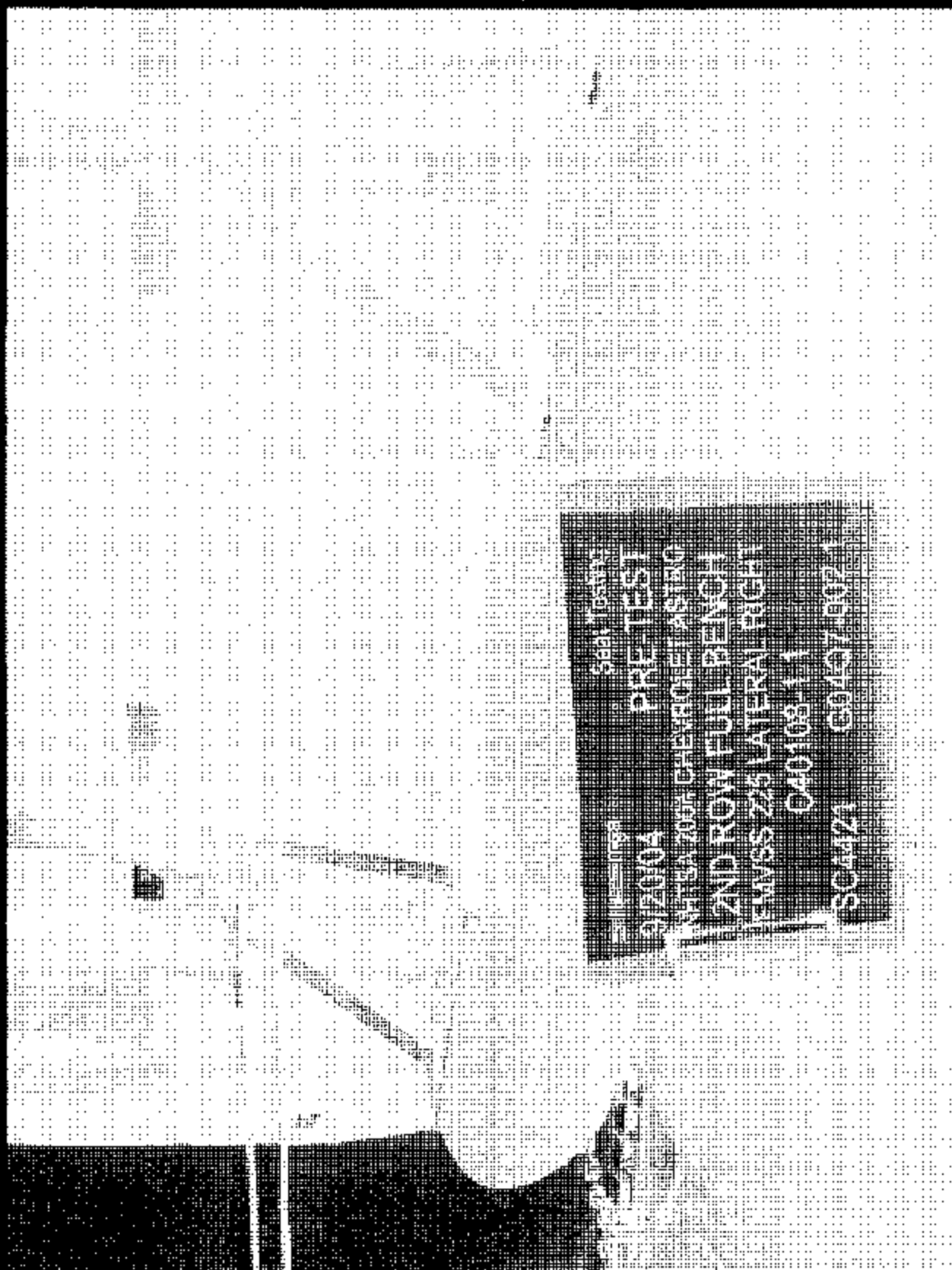


6.5.2 ¼ Front left view with apparatus in place test 2 of 2

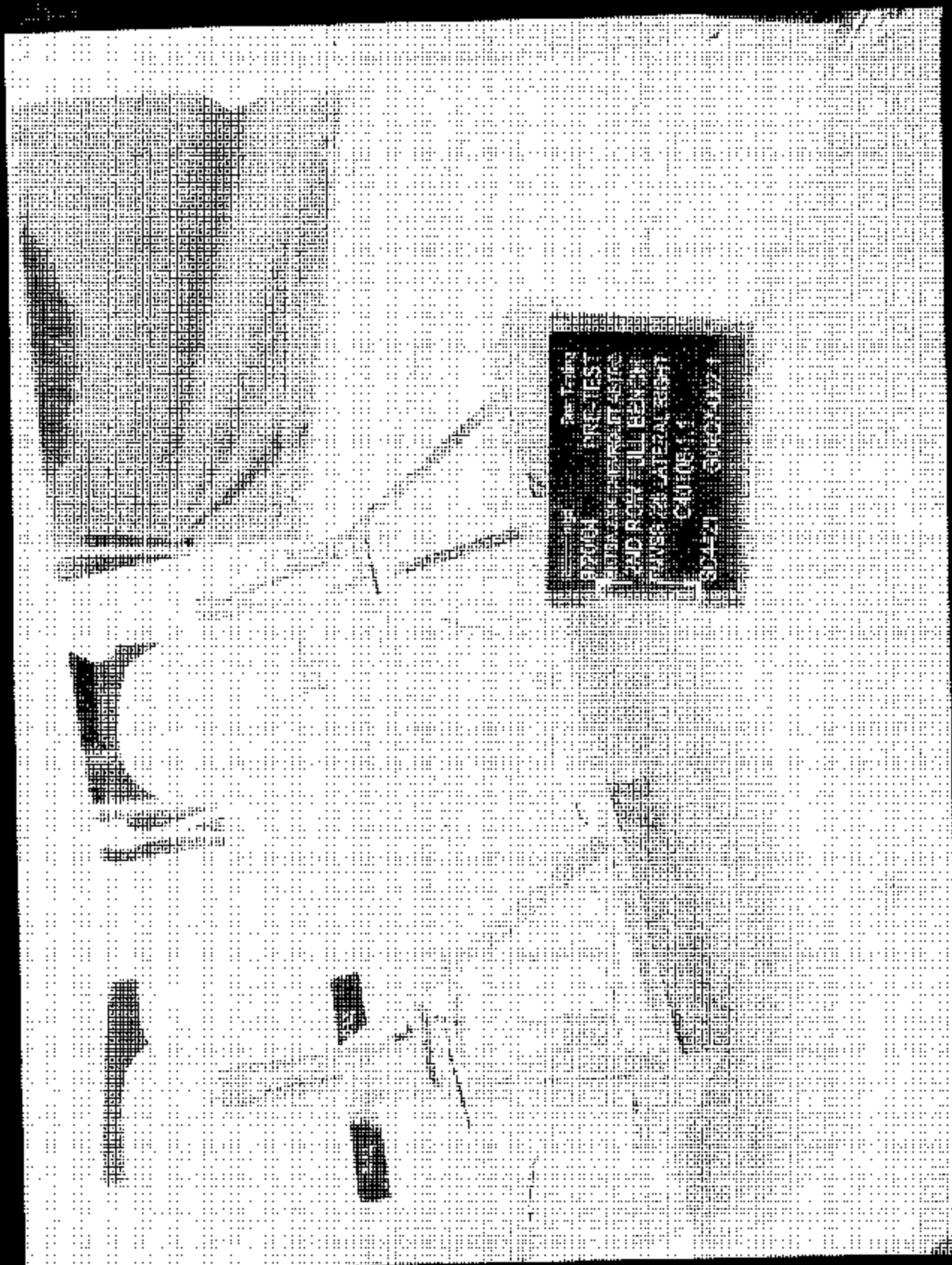


6.6 Pre-test views of each child restraint anchorage system installed in the vehicle

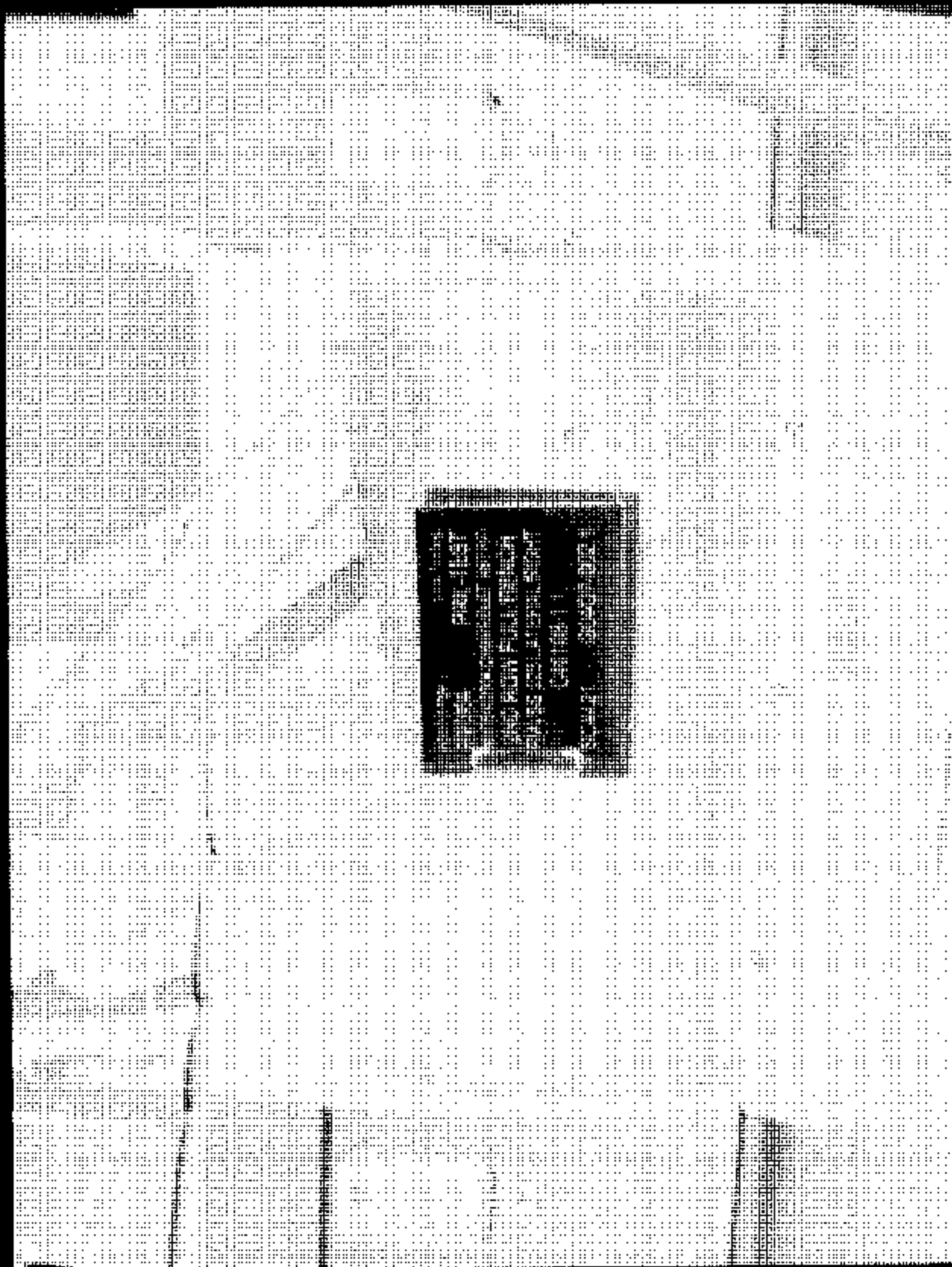
6.6.1 Pre-test photo #1 of SFADH test 1 of 2



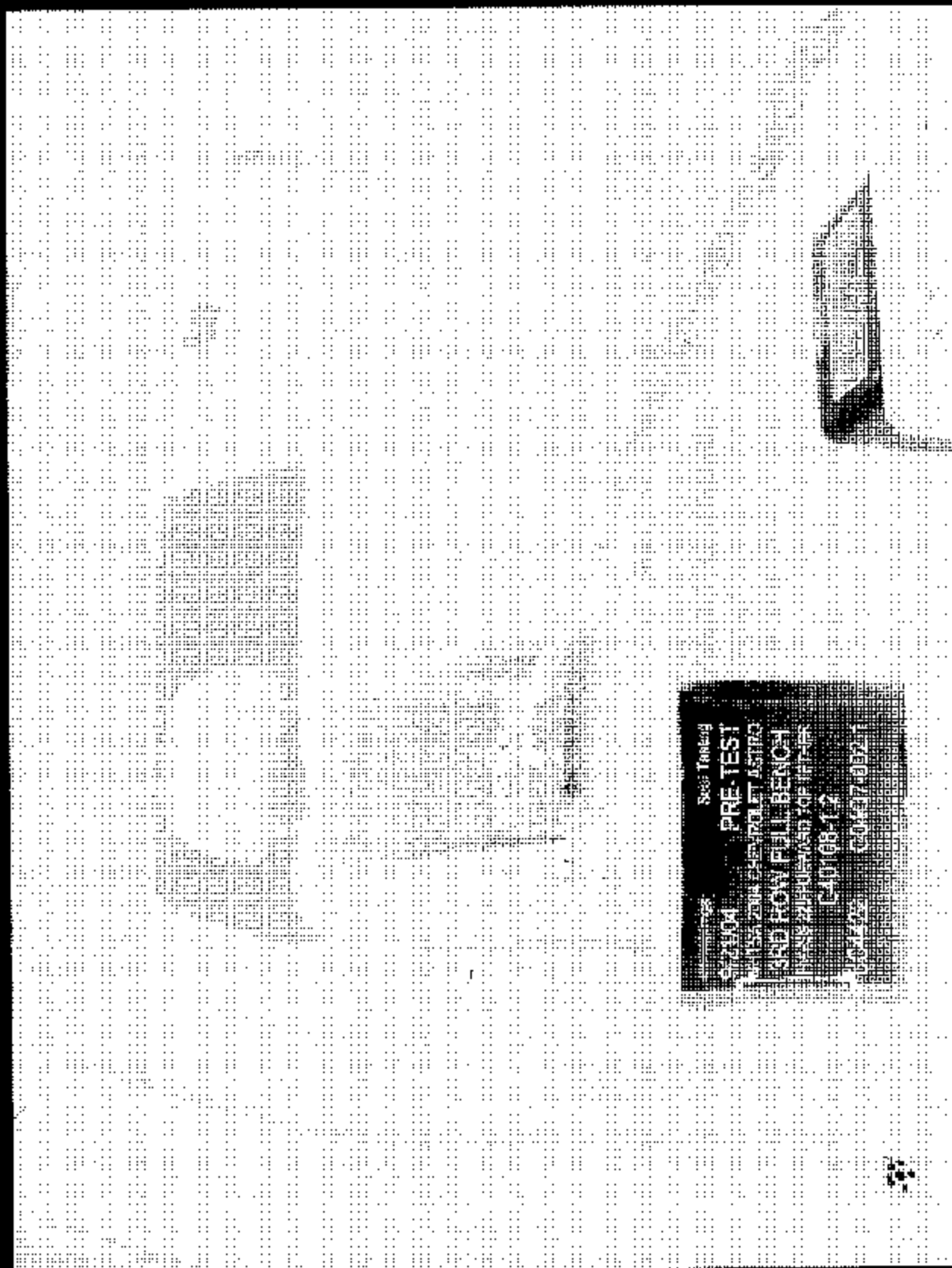
6.6.2 Pre-test photo #2 of SFADII test 1 of 2



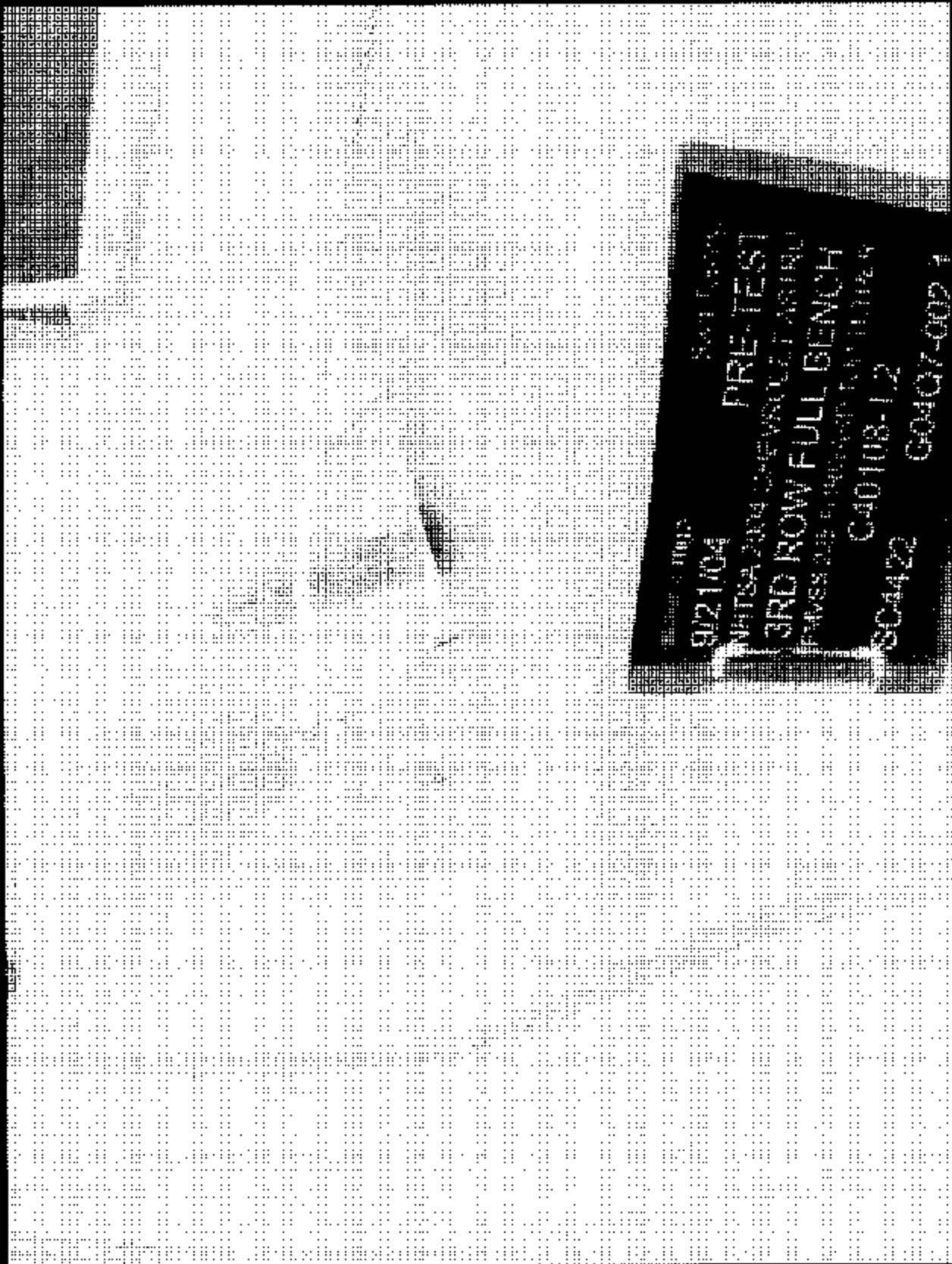
6.6.3 Pre-test photo #3 of SFADII test 1 of 2



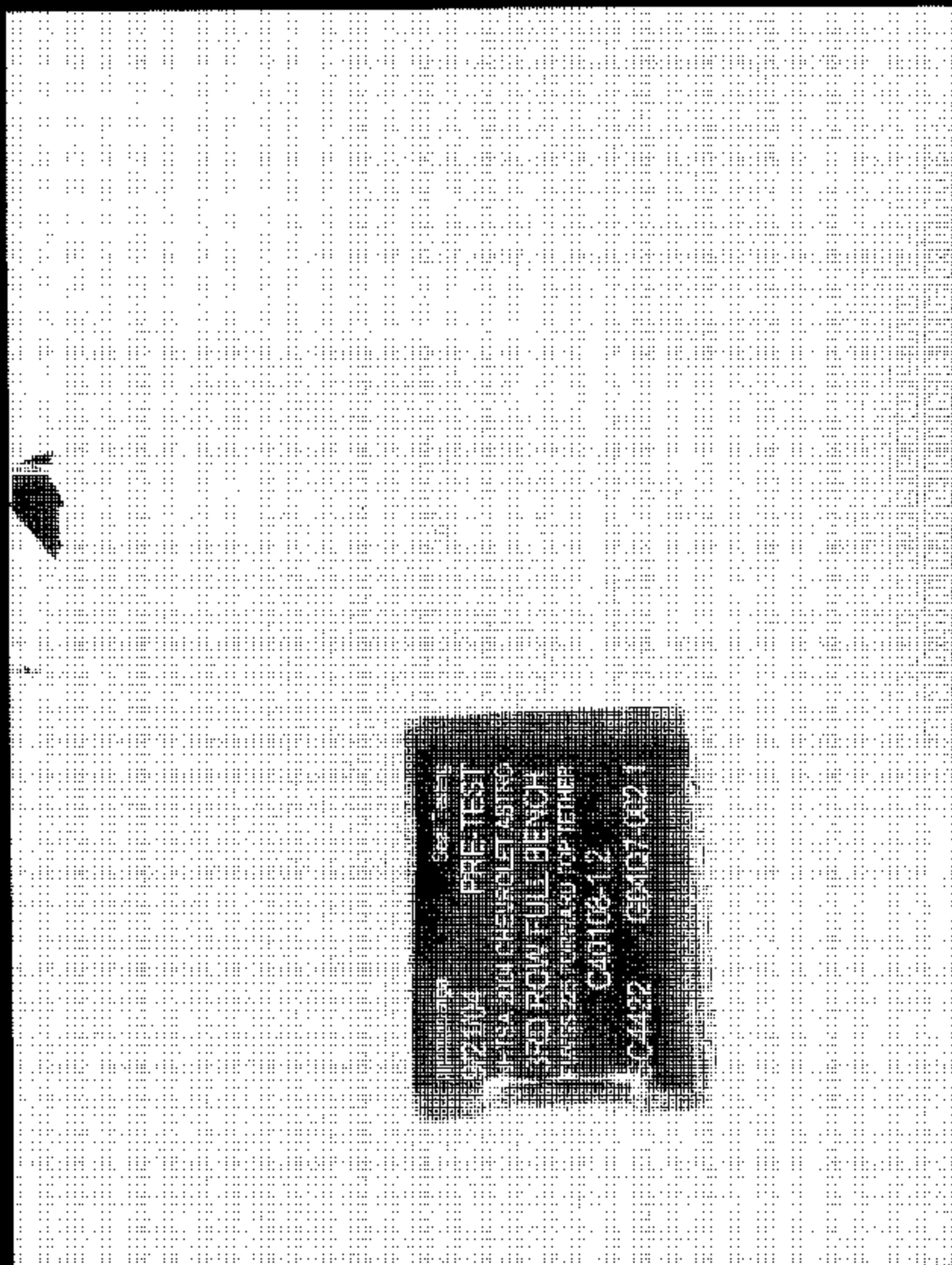
6.6.4 Pre-test photo #4 of SFADI test 2 of 2



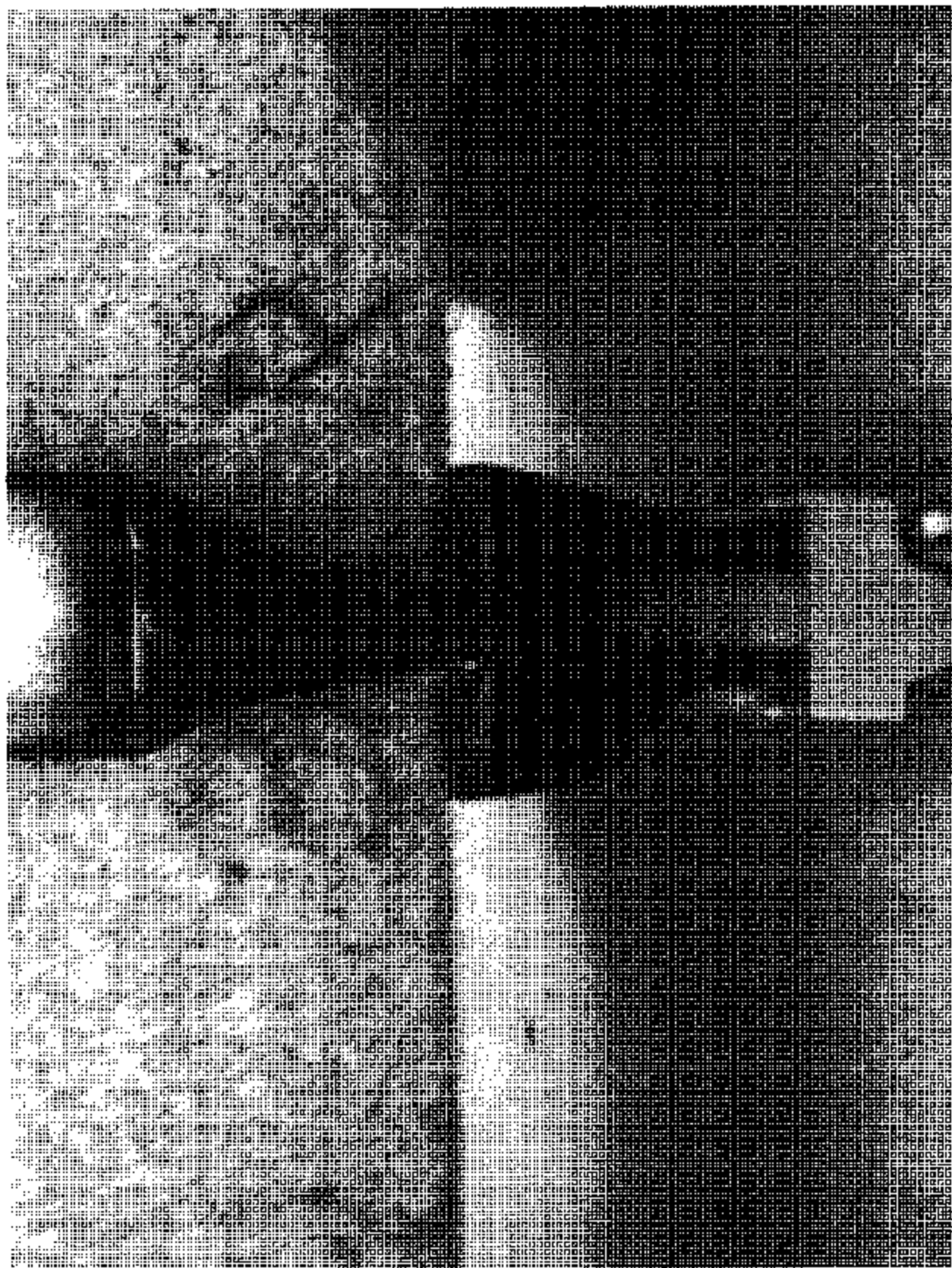
6.6.5 Pre-test photo #5 of SFAID test 2 of 2



6.6.6 Pre-test photo #6 of SFADI test 2 of 2

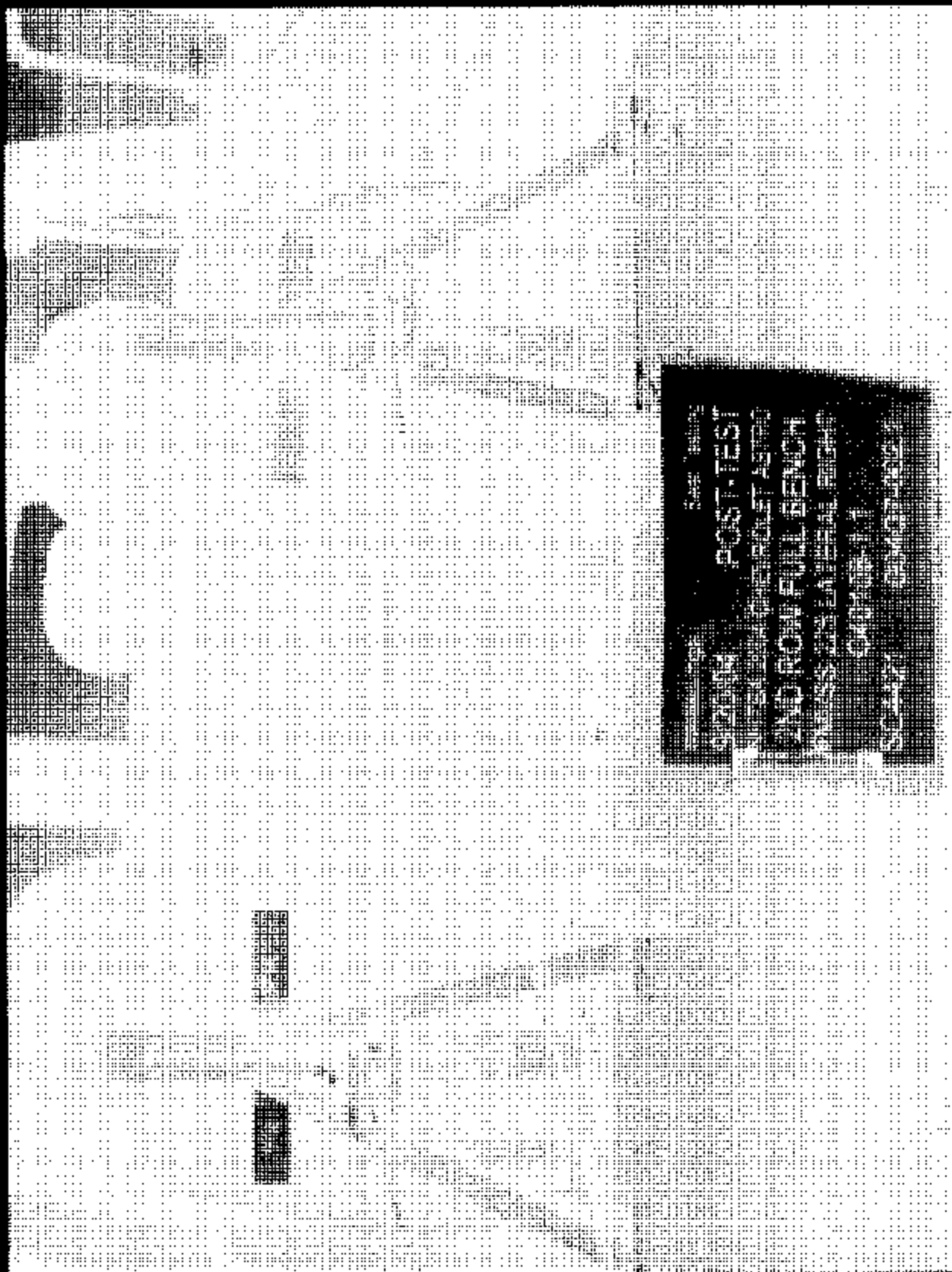


6.5.7 Pre-test photo #7 of SPADI test 2 of 2



6.7 Post-test condition of each child restraint anchorage system

6.7.1 Post-test photo #1 of SPADII test 1 of 2



6.7.2 Post-test photo #2 of SFADII test 1 of 2



6.7.3 Post-test photo #3 of SEADII test 1 of 2



6.7.4 Post-test photo #4 of SEADII test 1 of 2



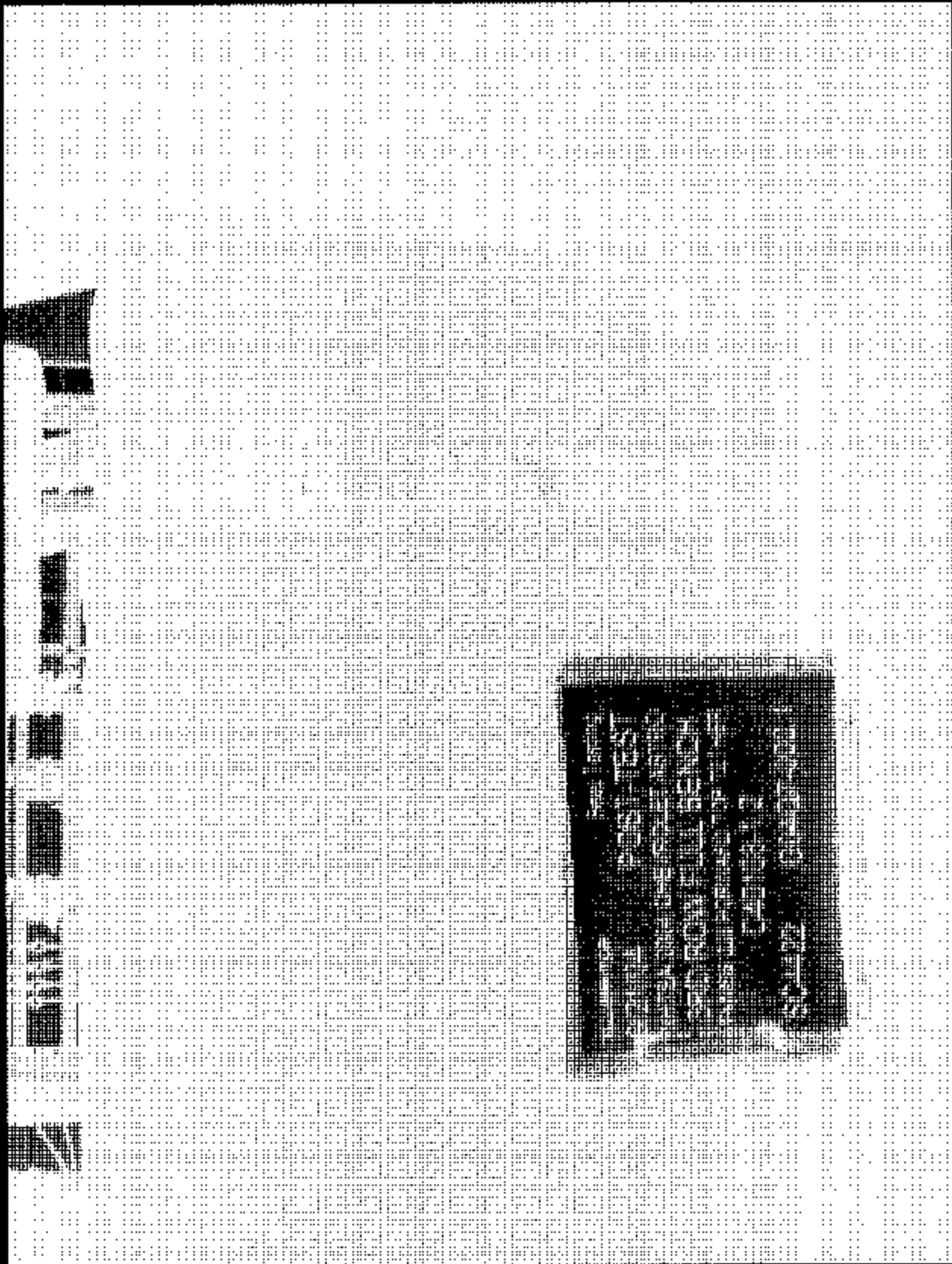
6.7.5 Post-test photo #5 of SFADII test 1 of 2



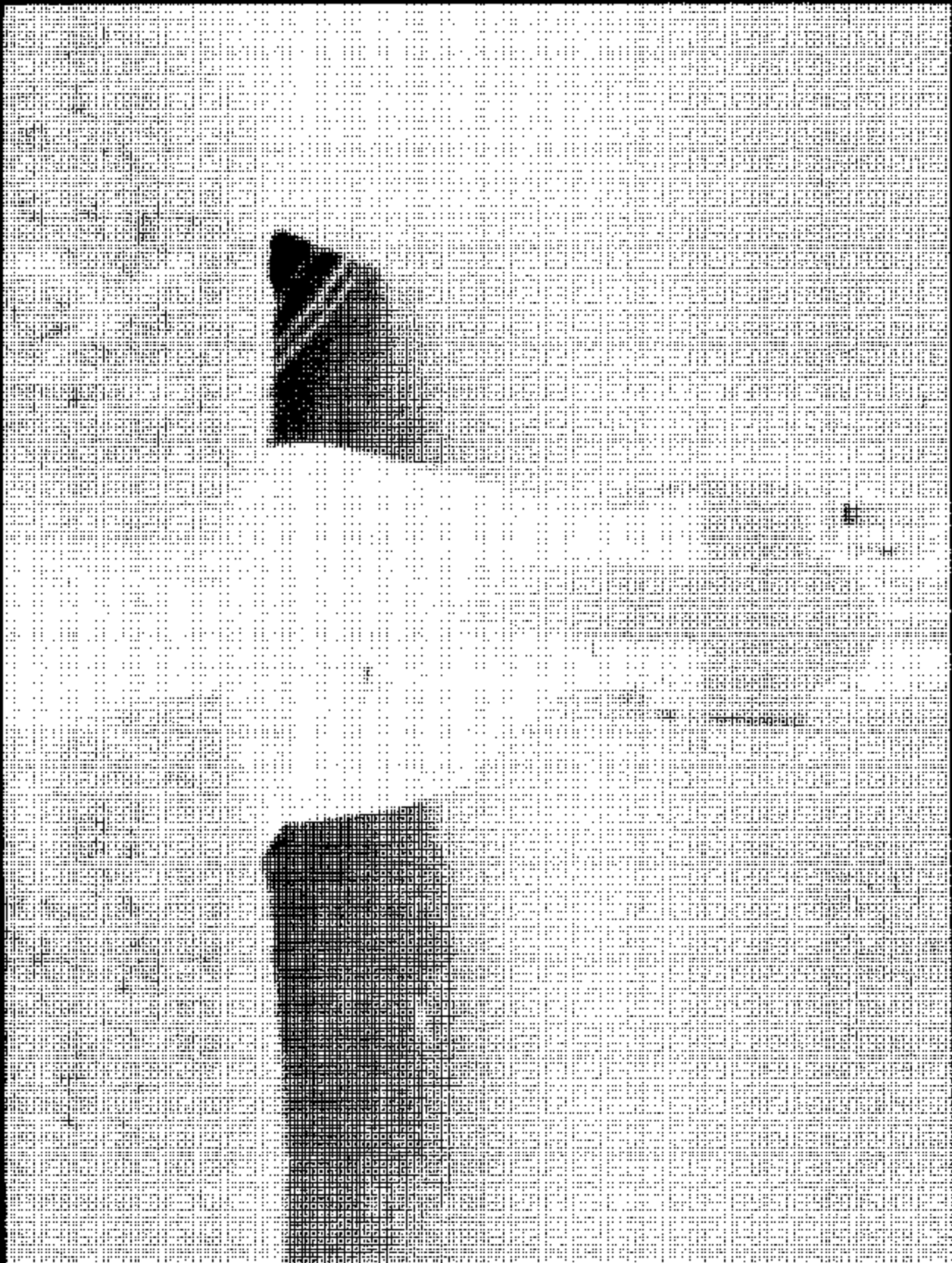
6.7.6 Post-test photo #6 of SFADII test 1 of 2



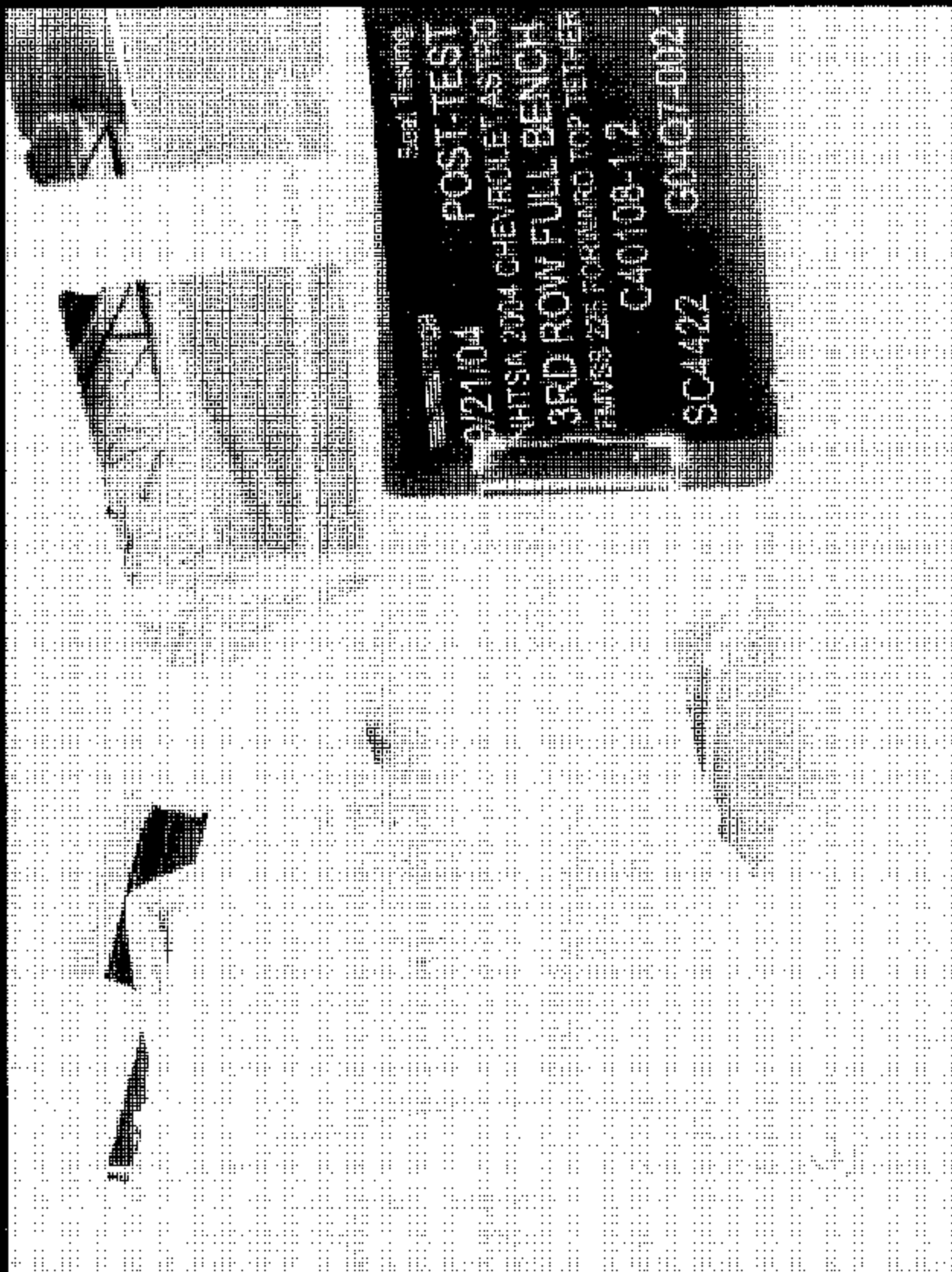
6.7.7 Post-test photo #7 of SFAD1 test 2 of 2



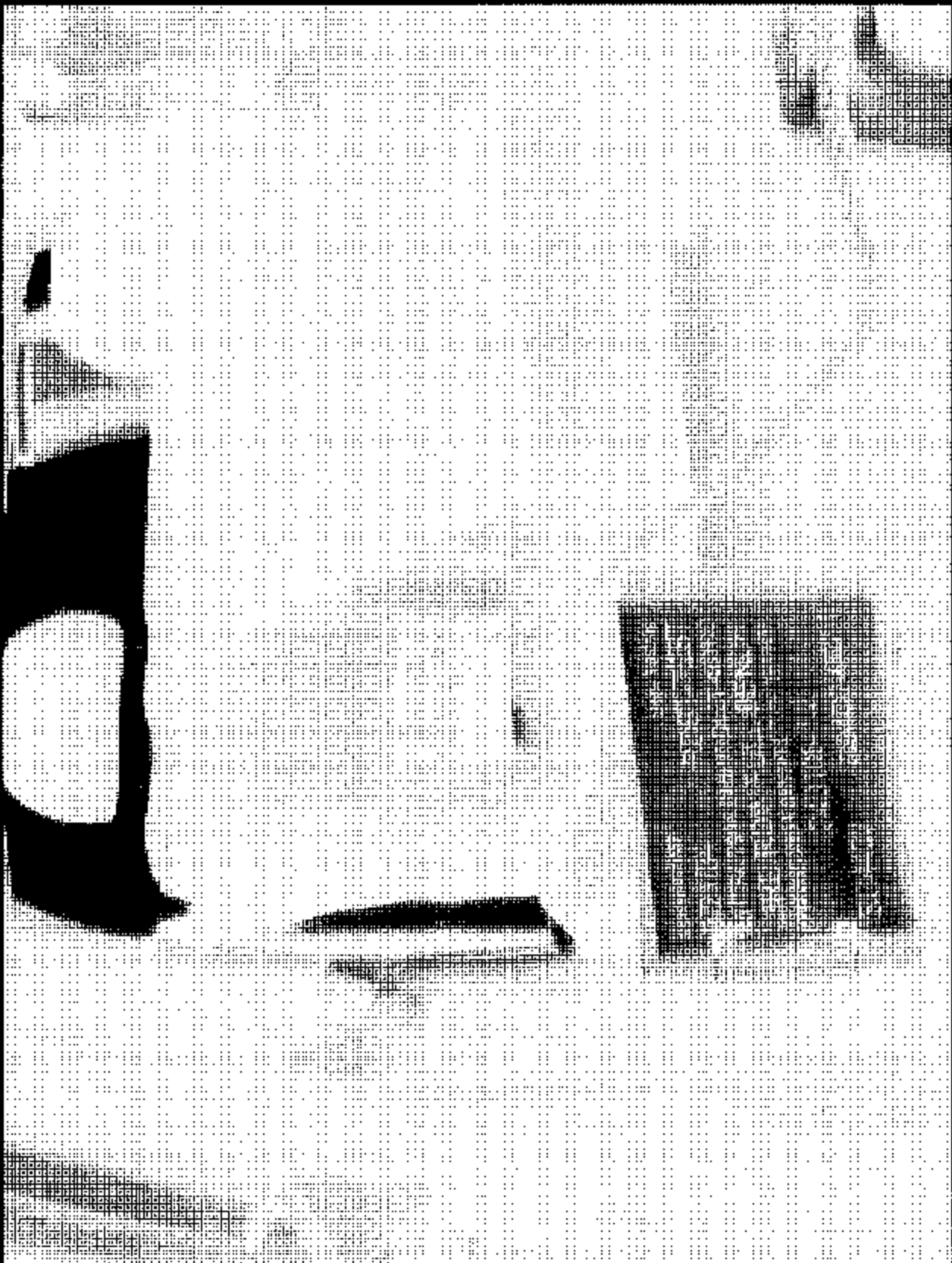
6.7.8 Post-test photo #8 of SFIAD test 2 of 2



6.7.9 Post-test photo #9 of SFADI test 2 of 2



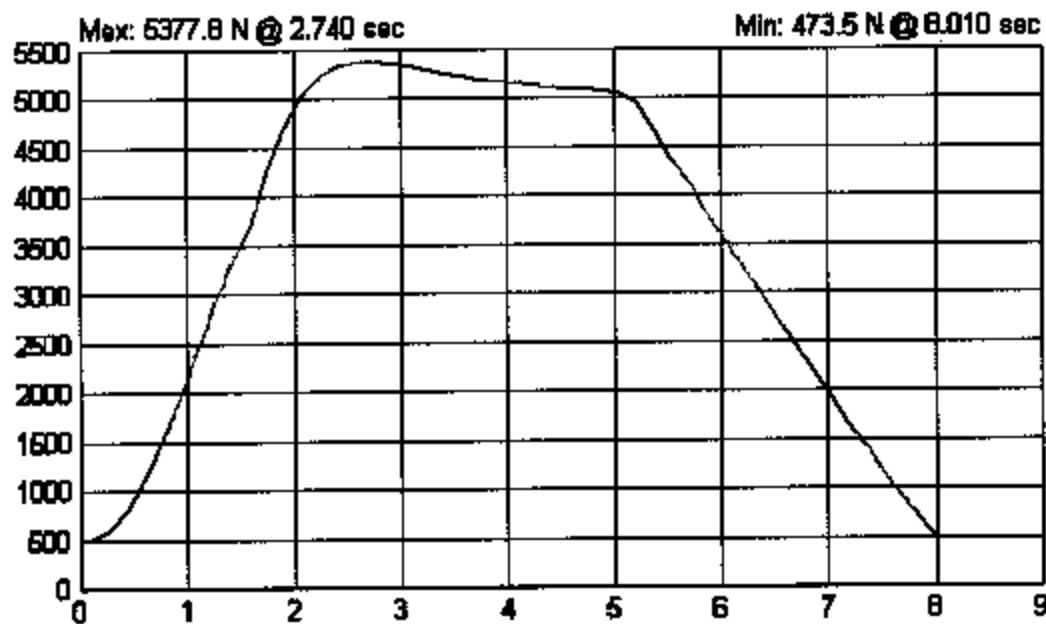
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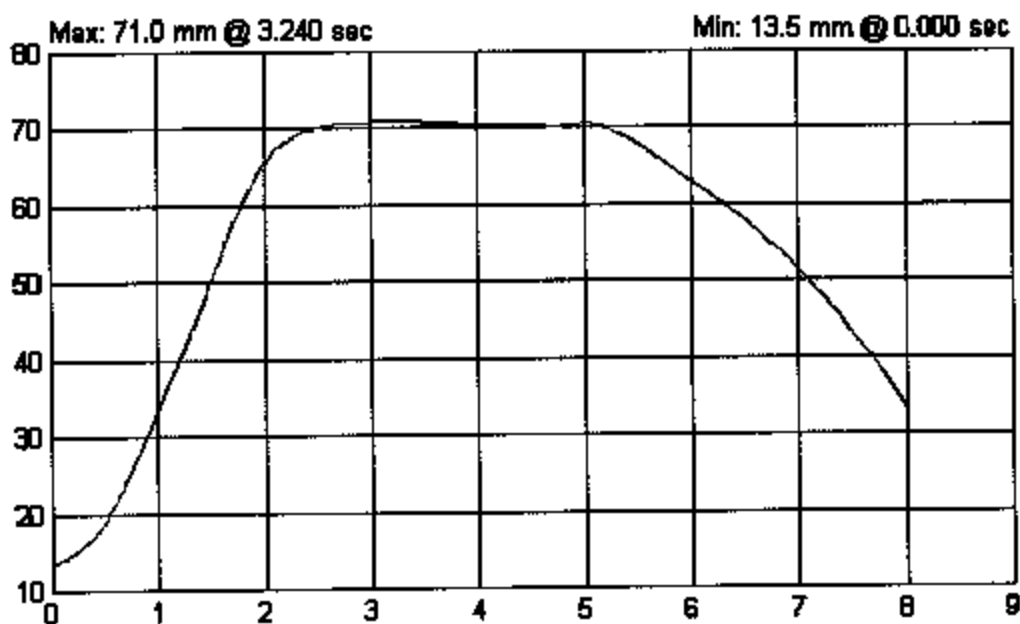
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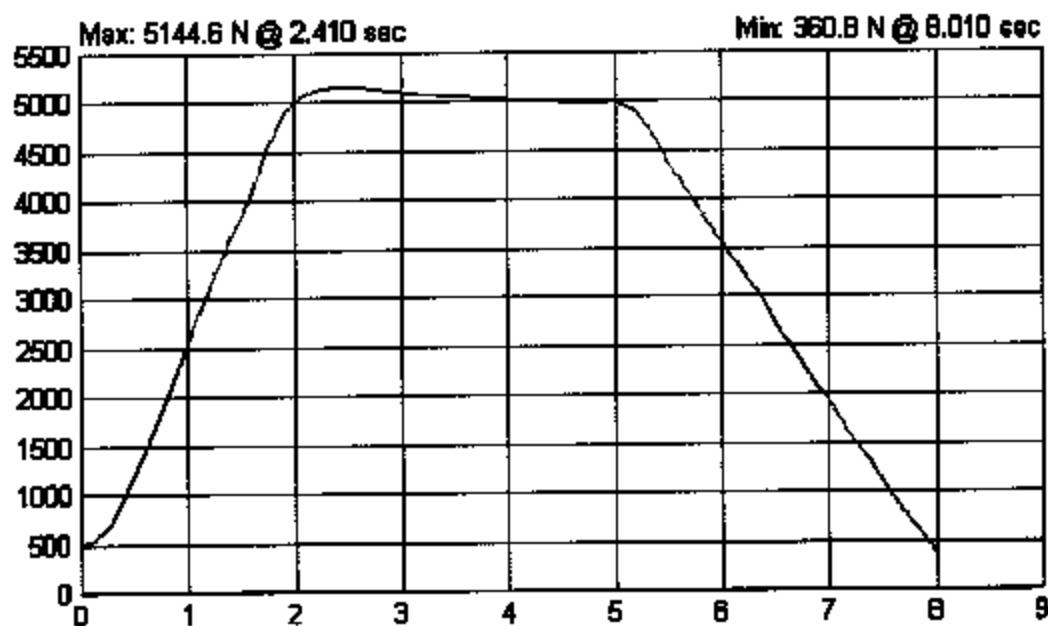
7.0 PLOTS



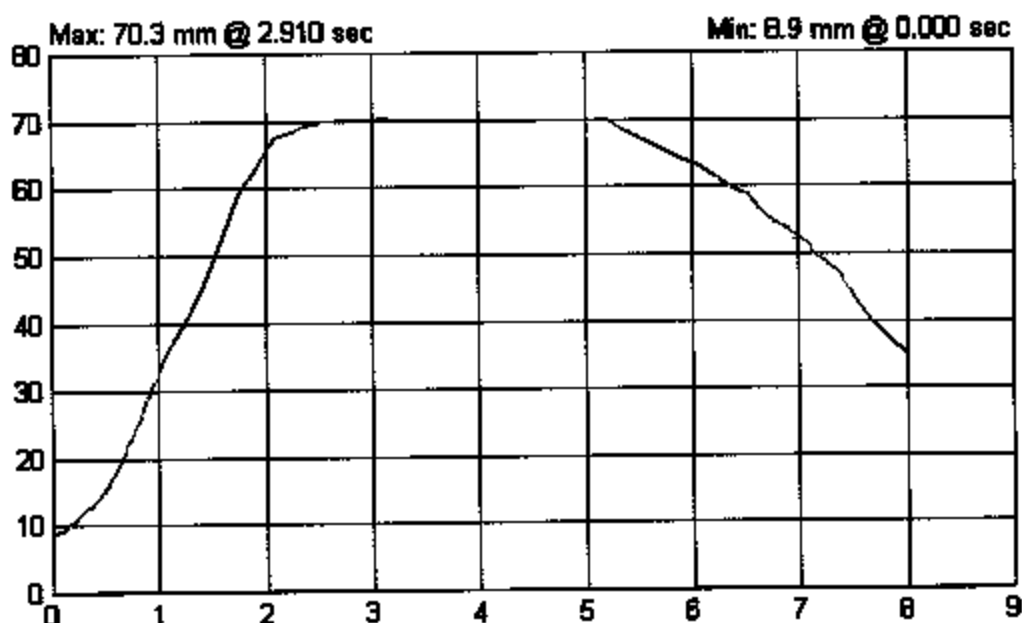
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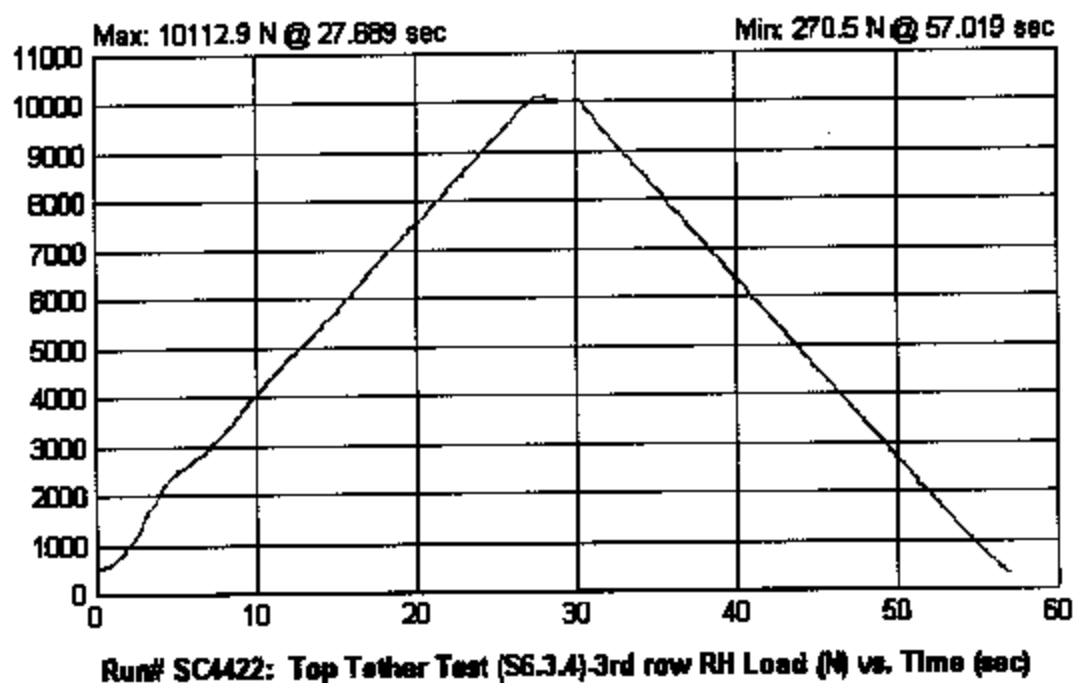
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Run# SC4421: Lateral Right Test (S15.1.2.2)-2R RH Load (N) vs. Time (sec)



Run# SC4421: Lateral Right Test (S15.1.2.2)-RH SFAD 2 X Disp. (mm) vs. Time (sec)



8.0 REPORT of VEHICLE CONDITION

REPORT OF VEHICLE CONDITION AT THE COMPLETION OF TESTING

CONTRACT No.: DTNH22-02-D-11043

DATES: September 20-21, 2004

From: MGA Research Corporation, 446 Executive Drive, Troy, MI 48063

To: NHTSA, OVSC, NVS-221

The following vehicle has been subjected to compliance testing for FMVSS No. 201U and 225

The vehicle was inspected upon arrival at the laboratory for the test and found to contain all of the equipment listed below. All variances have been reported within 2 working days of vehicle arrival, by letter, to the NHTSA Industrial Property Manager (NAD0-30), with a copy to the OVSC COTR. The vehicle is again inspected, after the above test has been conducted, and all changes are noted below. The final condition of the vehicle is also noted in detail.

VEH. MOD YR/MAKE/MODEL/BODY: 2004 Chevrolet Astro

VEH. NHTSA NO.: C40108 VIN: 1GNDM19X84B104278

COLOR: Grey

ODOMETER READINGS: ARRIVAL 0 miles Date: 10/2/03

COMPLETION 211 miles Date: 9/21/04

PURCHASE PRICE: N/A DEALER'S NAME: Buff Whelan Chevrolet

ENGINE DATA: 6 cylinder, 4.3 Liter

TRANSMISSION DATA: Automatic X Manual No. of Speeds 4

FINAL DRIVE DATA: X Rear Drive Front Drive 4 Wheel Drive

CHECK APPROPRIATE BOXES FOR VEHICLE EQUIPMENT:

TEST LABORATORY: MGA Research Corporation

OBSERVERS: Melanie Schick, Brad Reaume, Kenney Godfrey

☒	Air Conditioning		Traction Control	☒	Clock
☒	Tinted Glass		All Wheel Drive		Roof Rack
☒	Power Steering	☒	Speed Control	☒	Console
☒	Power Windows		Rear Window Defroster	☒	Driver Air Bag
☒	Power Door Locks		Sun Roof or T-Top	☒	Passenger Air Bag
☒	Power Seat(s)	☒	Tachometer	☒	Front Disc Brakes
☒	Power Brakes	☒	Tilt Steering Wheel	☒	Rear Disc Brakes
	Antilock Brake System	☒	AM/FM/Compact Disc		Other

REMARKS:

Salvage only.

Equipment that is no longer on the test vehicle as noted on previous pages:

All equipment inventoried and placed in vehicle.

Explanation for equipment removal:

Windshield and front seats were removed before conducting the testing.

Test Vehicle Condition:

Salvage only.

RECORDED BY: Melanie Schick, Kessy Godfrey

DATE: September 21, 2004

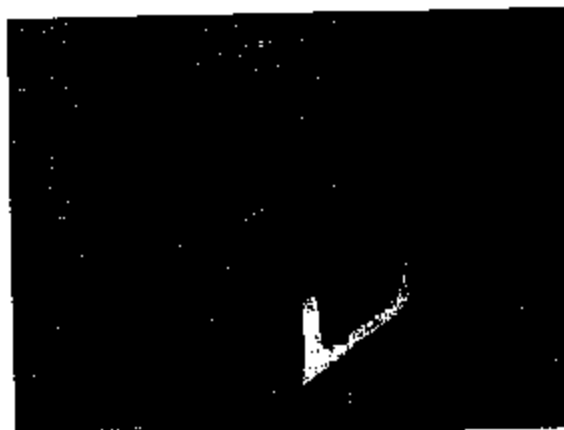
APPROVED BY: Brad Reaume

APPENDIX A
OWNERS MANUAL CHILD RESTRAINT SYSTEMS

Child Restraint Systems



An infant car bed (A), a special bed made for use in a motor vehicle, is an infant restraint system designed to restrain or position a child on a continuous flat surface. Make sure that the infant's head rests toward the center of the vehicle.



A rear-facing infant seat (B) provides restraint with the seating surface against the back of the infant. The harness system holds the infant in place and, in a crash, acts to keep the infant positioned in the restraint.

1-44



A forward-facing child seat (C-E) provides restraint for the child's body with the harness and also sometimes with surfaces such as T-shaped or shell-like shields.



A booster seat (F-G) is a child restraint designed to improve the fit of the vehicle's safety belt system. Some booster seats have a shoulder belt positioner, and some high-back booster seats have a five-point harness. A booster seat can also help a child to see out the window.

1-45

Q: How do child restraints work?

A: A child restraint system is any device designed for use in a motor vehicle to restrain, seat, or position children. A built-in child restraint system is a permanent part of the motor vehicle. An add-on child restraint system is a portable one, which is purchased by the vehicle's owner.

For many years, add-on child restraints have used the adult belt system in the vehicle. To help reduce the chance of injury, the child also has to be secured within the restraint. The vehicle's belt system secures the add-on child restraint in the vehicle, and the add-on child restraint's harness system holds the child in place within the restraint.

One system, the three-point harness, has straps that come down over each of the infant's shoulders and buckle together at the crotch. The five-point harness system has two shoulder straps, two hip straps and a crotch strap. A shield may take the place of hip straps. A T-shaped shield has shoulder straps that are attached to a flat pad which rests low against the child's body. A shelf- or armrest-type shield has straps that are attached to a wide, shelf-like shield that swings up or to the side.

When choosing a child restraint, be sure the child restraint is designed to be used in a vehicle. If it is, it will have a label saying that it meets federal motor vehicle safety standards.

Then follow the instructions for the restraint. You may find these instructions on the restraint itself or in a booklet, or both. These restraints use the belt system or the LATCH system in your vehicle, but the child also has to be secured within the restraint to help reduce the chance of personal injury. When securing an add-on child restraint, refer to the instructions that come with the restraint which may be on the restraint itself or in a booklet, or both, and to this manual. The child restraint instructions are important, so if they are not available, obtain a replacement copy from the manufacturer.

1-46

Where to Put the Restraint Except Cargo Vans

Accident statistics show that children are safer if they are restrained in the rear rather than the front seat. General Motors, therefore, recommends that child restraints be secured in a rear seat including an infant riding in a rear-facing infant seat, a child riding in a forward-facing child seat and an older child riding in a booster seat. Never put a rear-facing child restraint in the front passenger seat. Here is why:

⚠ CAUTION:

A child in a rear-facing child restraint can be seriously injured or killed if the right front passenger's air bag inflates. This is because the back of the rear-facing child restraint would be very close to the inflating air bag. Always secure a rear-facing child restraint in a rear seat.

CAUTION: (Continued)

CAUTION: (Continued)

If you secure a forward-facing child restraint in the right front seat, always move the front passenger seat as far back as it will go. It is better to secure the child restraint in a rear seat.

Whenever you install it, be sure to secure the child restraint properly.

Keep in mind that an unsecured child restraint can move around in a collision or sudden stop and injure people in the vehicle. Be sure to properly secure any child restraint in your vehicle — even when no child is in it.

1-47

Cargo Vans

The child restraint must be secured properly in the passenger seat. Never put a rear-facing child restraint in this vehicle. Here is why:

⚠ CAUTION:

A child in a rear-facing child restraint can be seriously injured or killed if the passenger's air bag inflates. This is because the back of the rear-facing child restraint would be very close to the inflating air bag. Do not use a rear-facing child restraint in this vehicle.

If you secure a forward-facing child restraint in the front passenger position, always move the front passenger seat as far back as it will go.

Keep in mind that an unsecured child restraint can move around in a collision or sudden stop and injure people in the vehicle. Be sure to properly secure any child restraint in your vehicle — even when no child is in it.

Top Strap

Some child restraints have a top strap, or "top tether." It can help restrain the child restraint during a collision. For it to work, a top strap must be properly anchored to the vehicle. Some top strap-equipped child restraints are designed for use with or without the top strap being anchored. Others require the top strap always to be anchored. Be sure to read and follow the instructions for your child restraint. If yours requires that the top strap be anchored, do not use the restraint unless it is anchored properly.

If the child restraint does not have a top strap, one can be obtained, in kit form, for many child restraints. Ask the child restraint manufacturer whether or not a kit is available.

1-48



In Canada, the law requires that forward-facing child restraints have a top strap, and that the strap be anchored. In the United States, some child restraints also have a top strap. If your child restraint has a top strap, it should be anchored.

Anchor the top strap to one of the following anchor points. Be sure to use an anchor point located on the same side of the vehicle as the seating position where the child restraint will be placed.

If you have an adjustable head restraint, route the top strap under it.

⚠ CAUTION:

Each top tether bracket is designed to anchor only one child restraint. Attaching more than one child restraint to a single bracket could cause the anchor to come loose or even break during a crash. A child or others could be injured if this happens. To help prevent injury to people and damage to your vehicle, attach only one child restraint per bracket.

Once you have the top strap anchored, you will be ready to secure the child restraint itself. Tighten the top strap when and as the child restraint manufacturer's instructions say.

1-49

Top Strap Anchor Location

Cargo Van Models

If your vehicle is a cargo van, the anchoring point for a top strap is located at the rear of the seat cushion on the right front passenger's seat spacer bar. Anchor the top strap through the two slots.

⚠ CAUTION:

A child in a rear-facing child restraint can be seriously injured or killed if the passenger's air bag inflates. This is because the back of the rear-facing child restraint would be very close to the inflating air bag. Do not use a rear-facing child restraint in this vehicle.

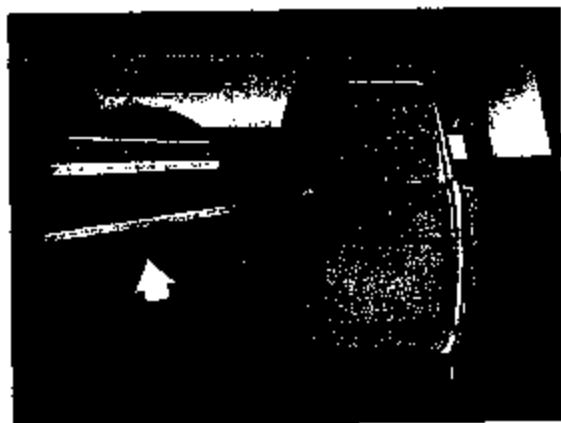
If you secure a forward-facing child restraint in the front passenger position, always move the front passenger seat as far back as it will go.



Cargo Van Models

1-60

Passenger Van Models



Passenger Van Bucket Seats

Bucket Seats: An anchoring point is located below the rear of the seat cushion on the spacer bar. Anchor the top strap through the two slots on the bar.



Passenger Van Bench Seat (Second row)

Bench Seats: An anchor bracket is located at the rear of the seat cushion near the top rear of the seat leg for each outboard seating position of the second row. For the third row, an anchor bracket is located at the rear of the seat cushion near the top rear of the seat leg for the right outboard seating position.

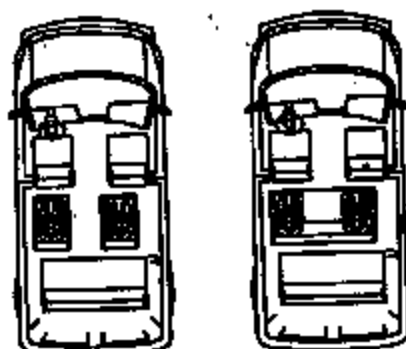
If you have adjustable head restraints, raise the head restraint and route the top strap under it.

1-51

The third row has one anchor for the passenger side outboard position only.

Do not use a child restraint with a top strap in the right front passenger's position, the second or third row center positions, or the third row driver side position because there is no place to anchor the top strap.

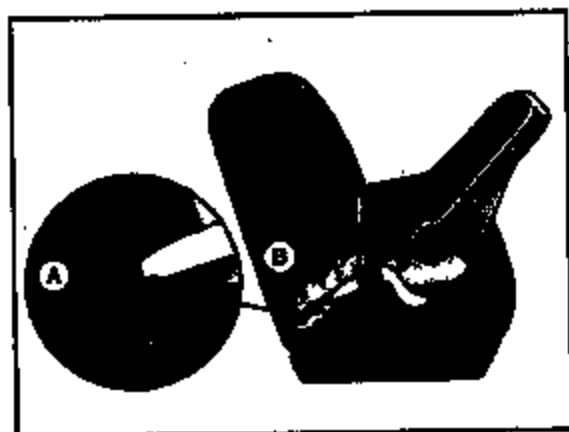
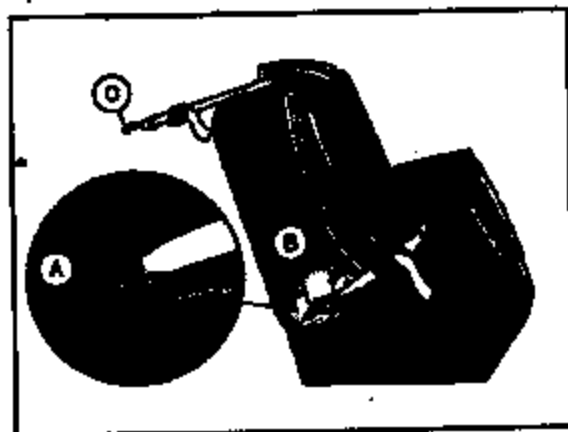
Lower Anchorages and Top Tethers for Children (LATCH System)



If you have a passenger van it has the LATCH system. It has two sets of anchors (A) in the second row of seats. In a seven passenger van, the anchors are located in each of the bucket seats in the second row. In an eight passenger van, the anchors are located in the driver and passenger side seating positions of the second row bench seat.

1-52

This system, designed to make installation of child restraints easier, does not use the vehicle's safety belts. Instead, it uses vehicle anchors (A, B) and child restraint attachments to secure the restraints. Some restraints also use another vehicle anchor to secure a top tether strap (C).



In order to use the LATCH system in your vehicle, you need a child restraint designed for that system.

1-53



With this system, use the LATCH system instead of the vehicle's safety belts to secure a child restraint.

To assist you in locating the lower anchors for this child restraint system, each seating position with the LATCH system has a label on the seatback at each lower anchor position. The labels are located on the inboard and outboard positions of the rear seats.

⚠ CAUTION:

If a LATCH-type child restraint is not attached to its anchorage points, the restraint will not be able to protect the child correctly. In a crash, the child could be seriously injured or killed. Make sure that a LATCH-type child restraint is properly installed using the anchorage points, or use the vehicle's safety belts to secure the restraint following the instructions that come with that restraint, and also the instructions in this manual.

1-54

Securing a Child Restraint Designed for the LATCH System

1. Find the LATCH anchorages for the seating position you want to use, where the bottom of the seatback meets the back of the seat cushion.
2. Put the child restraint on the seat.
3. Attach and tighten the LATCH attachments on the child restraint to the LATCH anchorages in the vehicle. The child restraint instructions will show you how.
4. If the child restraint is forward-facing, attach and tighten the top tether to the top tether anchorage. The child restraint instructions will show you how. Also see *Top Strap* on page 1-48.
5. Push and pull the child restraint in different directions to be sure it is secure.

To remove the child restraint, simply unhook the top tether from the top tether anchorage and then disconnect the LATCH attachments from the LATCH anchorages.

Securing a Child Restraint in a Rear Outside Seat Position



If your child restraint is equipped with the LATCH system, see *Lower Anchorages and Top Tethers for Children (LATCH System)* on page 1-52 in the Index. See *Top Strap* on page 1-48 if the child restraint has one.

1-55

There is no top strap anchor at the third row driver side position. Do not secure a child seat in this position if a national or local law requires that the top strap be anchored, or if the instructions that came with the child restraint say that the top strap must be anchored.

If your child restraint does not have the LATCH system, you will be using the lap-shoulder belt to secure the child restraint in this position. Be sure to follow the instructions that came with the child restraint. Secure the child in the child restraint when and as the instructions say.

1. Put the restraint on the seat.
2. Pick up the latch plate and run the lap and shoulder portions of the vehicle's safety belt through or around the restraint. The child restraint instructions will show you how.



3. Buckle the belt. Make sure the release button is positioned so you would be able to unbuckle the safety belt quickly if you ever had to.

1-66



4. To tighten the belt, push down on the child restraint, pull the shoulder portion of the belt to tighten the lap portion of the belt and feed the shoulder belt back into the retractor. If you are using a forward-facing child restraint, you may find it helpful to use your knee to push down on the child restraint as you tighten the belt.
5. Push and pull the child restraint in different directions to be sure it is secure.

To remove the child restraint, just unbuckle the vehicle's safety belt and let it go back all the way. The safety belt will move freely again and be ready to work for an adult or larger child passenger.

1-67

Securing a Child Restraint in a Center Seat Position

Bench Seat



If your child restraint is equipped with the LATCH system, see *Lower Anchorages and Top Tethers for Children (LATCH System)* on page 1-52. See *Top Strap* on page 1-48 if the child restraint has one.

There are no top strap anchors at the second and third row center seating positions. Do not secure a child seat in these positions if a national or local law requires that the top strap be anchored, or if the instructions that came with the child restraint say that the top strap must be anchored.

If your child restraint does not have the LATCH system, you'll be using the lap belt to secure the child restraint in this position. Be sure to follow the instructions that came with the child restraint. Secure the child in the child restraint when and as the instructions say.



1. Make the belt as long as possible by tilting the latch plate and pulling it along the belt.

1-58

2. Put the restraint on the seat.
3. Run the vehicle's safety belt through or around the restraint. The child restraint instructions will show you how.

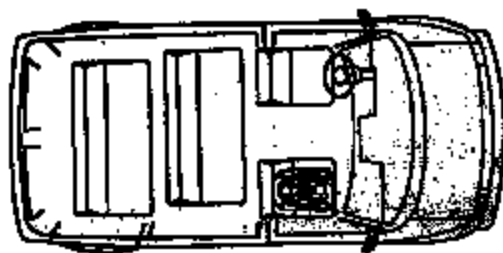


4. Buckle the belt. Make sure the release button is positioned so you would be able to unbuckle the safety belt quickly if you ever had to.
5. To tighten the belt, pull its free end and while you push down on the child restraint. If you're using a forward-facing child restraint, you may find it helpful to use your knee to push down on the child restraint as you tighten the belt.
6. Push and pull the child restraint in different directions to be sure it is secure.

To remove the child restraint, just unbuckle the vehicle's safety belt. It will be ready to work for an adult or larger child passenger.

1-59

Securing a Child Restraint in the Right Front Seat Position



If your child restraint is equipped with the LATCH system, see *Lower Anchorages and Top Tethers for Children (LATCH System)* on page 1-52. See *Top Strap* on page 1-48 if the child restraint has one.

Your vehicle has a front passenger air bag. Never put a rear-facing child restraint in this seat. Here's why:

⚠ CAUTION:

A child in a rear-facing child restraint can be seriously injured or killed if the front passenger's air bag inflates. This is because the back of the rear-facing child restraint would be very close to the inflating air bag. If your vehicle is a passenger van, always secure a rear-facing child restraint in a rear seat. If your vehicle is a cargo van, do not use a rear-facing child restraint in this vehicle. If you secure a forward-facing child restraint in the right front seat, always move the passenger seat as far back as it will go.

A rear seat is a safer place to secure a forward-facing child restraint.

1-60

If you need to secure a forward-facing child restraint in the right front seat, you will be using the lap-shoulder belt to secure the child restraint in this position. Be sure to follow the instructions that come with the child restraint. Secure the child in the child restraint when and as the instructions say.

1. Because your vehicle has a right front passenger air bag, always move the seat as far back as it will go before securing a forward-facing child restraint. See *Manual Seats* on page 1-2.
2. Put the restraint on the seat.
3. Pick up the latch plate, and run the lap and shoulder portions of the vehicle's safety belt through or around the restraint. The child restraint instructions will show you how.



4. Buckle the belt. Make sure the release button is positioned so you would be able to unbuckle the safety belt quickly if you ever had to.

1-61



5. Pull the rest of the belt all the way out of the retractor to set the lock.



6. To tighten the belt, push down on the child restraint, pull the shoulder portion of the belt to tighten the lap portion of the belt and lead the shoulder belt back into the retractor. You may find it helpful to use your knee to push down on the child restraint as you tighten the belt.
7. Push and pull the child restraint in different directions to be sure it is secure.

To remove the child restraint, just unbuckle the vehicle's safety belt and let it go back all the way. The safety belt will move freely again and be ready to work for an adult or larger child passenger.

APPENDIX B
MANUFACTURER'S DATA (OVSC FORM 1)

07/18/2004 09:36 FAX 202 336 3081

DOT OVSC 221

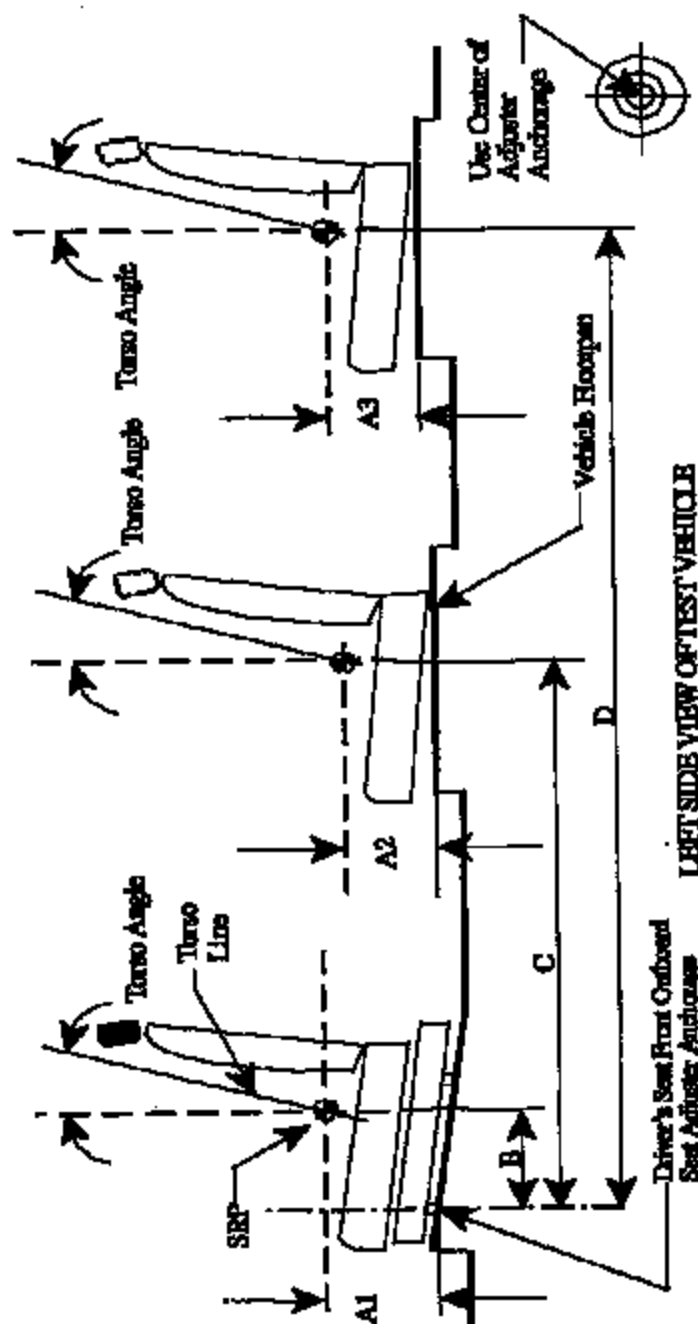
→ MGA TROY

0002/021

SEAT REFERENCE POINT (SRP) AND TORSO ANGLE DATA
FOR FMVSS 225

(All dimensions in mm)

Model Year	2004	Make	Chevrolet Astro	Model	Body Style	Multipurpose Vehicle—Van
Seat Style	Front Row	Base Buckle	Second Row	Base Bench	Third Row	Base Bench



LEFT SIDE VIEW OF TEST VEHICLE
Table 1. Seating Positions and Torso Angles

R 14
 Page 2 of 12

	Left (Driver Side)	Center (If any)	Right
A1	308.0	Not Applicable	308.0
A2	338.0	338.0	338.0
A3	338.0	338.0	338.0
B	229.0	Not Applicable	229.0
C	1197.0	1197.0	1197.0
D	2032.0	2032.0	2032.0
Torso Angle (degree)			
Front Row	23.0	23.0	23.0
Second Row	23.0	23.0	23.0
Third Row	23.0	23.0	23.0

Notes: 1. All dimensions are in mm. If not, provide the unit used.
 Dimensions are from top center of front outboard seat adjuster anchorage bolt.

07/18/2004 09:57 FAX 202 336 9881

DOT OVSC 221

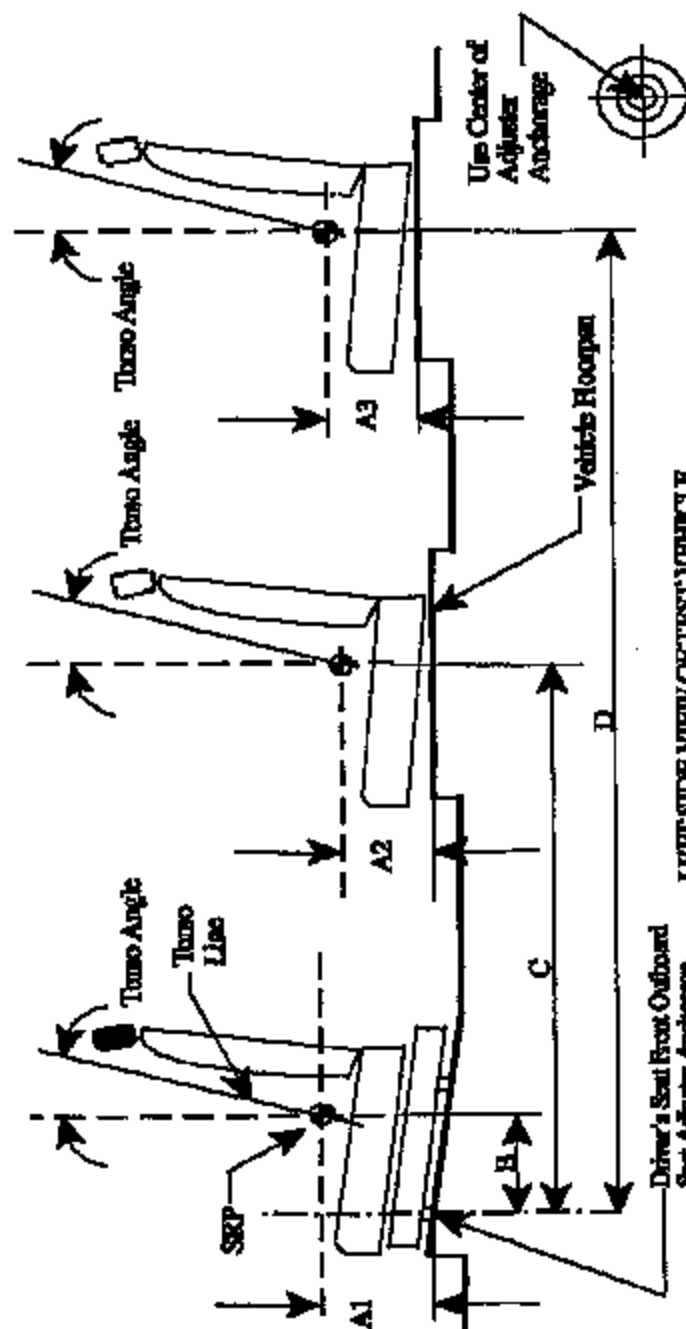
+ NGA TROY

4/004/021

SEAT REFERENCE POINT (SRP) AND TORSO ANGLE DATA
 FOR FMVSS 225

(All dimensions in mm)

Model Year	2004	Make	Chevrolet Astro	Model	Body Style	Multipurpose Vehicle--Van
Seat Style	Front Row	Tour Bucket	Second Row	Tour Bench	Third Row	Tour Bench



LEFT SIDE VIEW OF TEST VEHICLE

Table 1. Seating Positions and Torso Angles

114
Page 4 of 12

	Left (Driver Side)	Center (if any)	Right
A1	306.0	Not Applicable	3080
A2	336.0	336.0	336.0
A3	336.0	336.0	336.0
B	229.0	Not Applicable	229.0
C	1167.0	1167.0	1167.0
D	2032.0	2032.0	2032.0
Torso Angle (degree)	Front Row	23.0	23.0
	Second Row	23.0	23.0
	Third Row	23.0	23.0

Note: 1. All dimensions are in mm. If not, provide the unit used.
Dimensions are from top center of front outboard seat adjuster anchorage bolt.

07/10/2004 08:57 FAX 202 336 3081

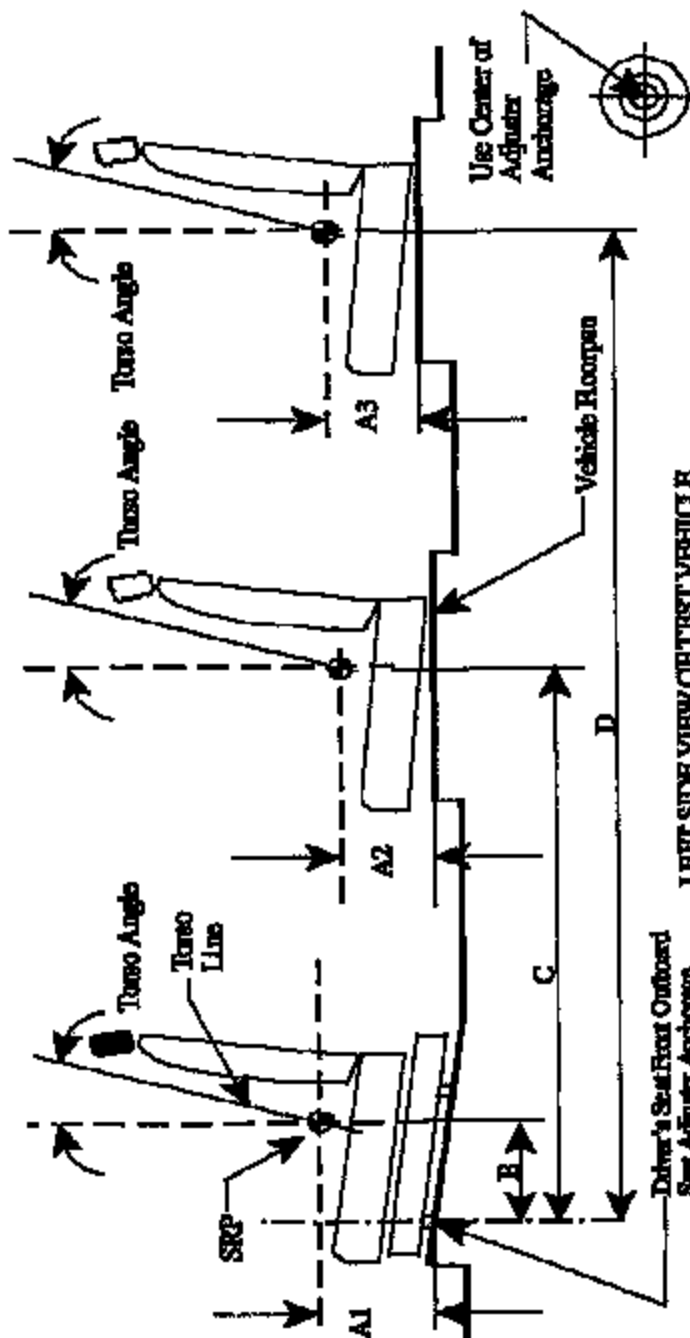
DOT GVSC 221

+ MCA TROY

M006/021

SEAT REFERENCE POINT (SRP) AND TORSO ANGLE DATA
 FOR FMVSS 225
 (All dimensions in mm¹)

Model Year	2004	Model	Chevrolet Astro	Model	Body Style	Multipurpose Vehicle—Van
Seat Style	Front Row	Tour Bucket	Second Row	Tour Busiest	Third Row	Tour Bench



LEFT SIDE VIEW OF TEST VEHICLE
 Table 1. Seating Positions¹ and Torso Angles

A 114
 Page 6 of 12

	Left (Driver Side)	Center (if any)	Right
A1	308.0	Not Applicable	308.0
A2	308.0	Not Applicable	308.0
A3	338.0	338.0	338.0
B	228.0	Not Applicable	228.0
C	1154.0	Not Applicable	1154.0
D	2032.0	2032.0	2032.0
Torso Angle (degree)	Front Row	23.0	23.0
	Second Row	23.0	23.0
	Third Row	23.0	23.0

Note: 1. All dimensions are in mm. If not, provide the unit used.
 Dimensions are from top center of front outboard seat adjuster anchorage bolt.

47/10/2004 09:50 FAX 202 336 3081

DOT 075C 321

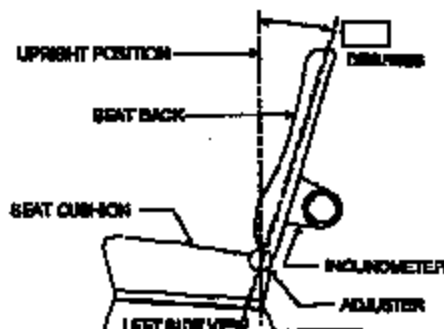
+ MSA TROY

48005/021

FORM 14
Page 7 of 12

NOMINAL DESIGN RIDING POSITION –

For adjustable driver, passenger, 2nd row and 3rd row seat backs, describe how to position the inclinometer to measure the seat back angle. Include description of the location of the adjustment latch/detent if applicable. Indicate if applicable, how the detents are numbered (Is the first detent "0" or "1"?). Indicate if the seat back angle is measured with the dummy in the seat.



Seat back angle for driver's seat = 23 degrees

Measurement Instructions:

Remove seatback material to expose lower portion of seatback frame.

Place inclinometer on frame—adjust seatback to 23 degrees

Seat back angle for passenger's seat = 23 degrees

Measurement Instructions:

Remove seatback material to expose lower portion of seatback frame.

Place inclinometer on frame—adjust seatback to 23 degrees

Seat back angle for 2nd row seat (base bench) = 23 degrees

Measurement Instructions:

Remove seatback material to expose lower portion of seatback frame.

Place inclinometer on frame.

Seat back angle for 2nd row seat (four bench) = 23 degrees

Measurement Instructions:

Remove seatback material to expose lower portion of seatback frame.

Place inclinometer on frame.

Seat back angle for 2nd row seat (four bucket) = 23 degrees

Measurement Instructions:

Remove seatback material to expose lower portion of seatback frame.

Place inclinometer on frame—adjust seatback to 23 degrees

07/18/2004 09:18 FAX 202 336 3091

DOT 079C 221

+ MGA TRUY

0000/021

FORM 14
Page 8 of 12

Seat back angle for 3rd row seat (base bench) = 23 degrees
Measurement Instructions:

Remove seatback material to expose lower portion of seatback frame.
Place inclinometer on frame.

Seat back angle for 3rd row seat (tour bench) = 23 degrees
Measurement Instructions:

Remove seatback material to expose lower portion of seatback frame.
Place inclinometer on frame.

07/16/2004 09:59 FAX 202 336 3081

DOT DVBC 221

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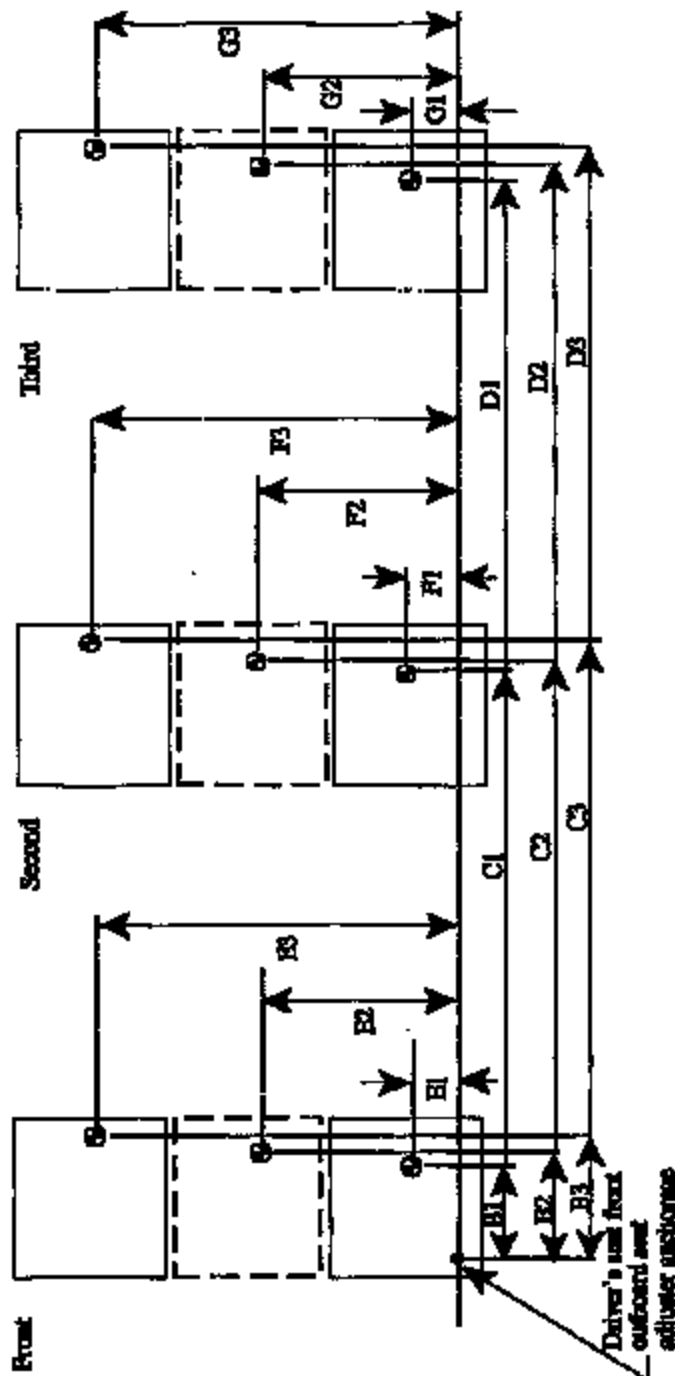
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SEATING REFERENCE POINT
 FOR FMVSS 225

(All dimensions in mm)

(Note: The Child Restraint Anchorage Location determines the 225 SRP locations)

Model Year 2004 Make Chevrolet Astro Model Base Body Style Base Vehicle Van
 Seat Style Front Row Base Bucket Second Row Base Bench Third Row Base Bench



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Table 2. Seating Reference Point and Tether Anchorage Locations

Seating Reference Point (SRP)		Distance from Driver's front outboard seat adjuster anchorage ¹
Front Row	B1	229.0
	E1	183.0
	B2	N/A
	E2	N/A
	B3	229.0
	E3	1075.0
Second Row (Base Bench)	C1	1194.0
	F1	182.0
	C2	1194.0
	F2	511.0
	C3	1194.0
	F3	980.0
Second Row (Tour Bench)	C1	1194.0
	F1	102.0
	C2	1194.0
	F2	511.0
	C3	1194.0
	F3	920.0
Second Row (Tour Bucket)	C1	1154.0
	F1	138.0
	C2	N/A
	F2	N/A
	C3	1154.0
	F3	1050.0
Third Row (Base Bench)	D1	2082.0
	G1	270.0

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Third Row (Four Bench)	D2	2032.0
	G2	619.0
	D3	2032.0
	G3	968.0
	D1	2032.0
	G1	210.0
	D2	2032.0
	G2	619.0
	D3	2032.0
	G3	1028.0

Note: 1. Use the center of anchorage.

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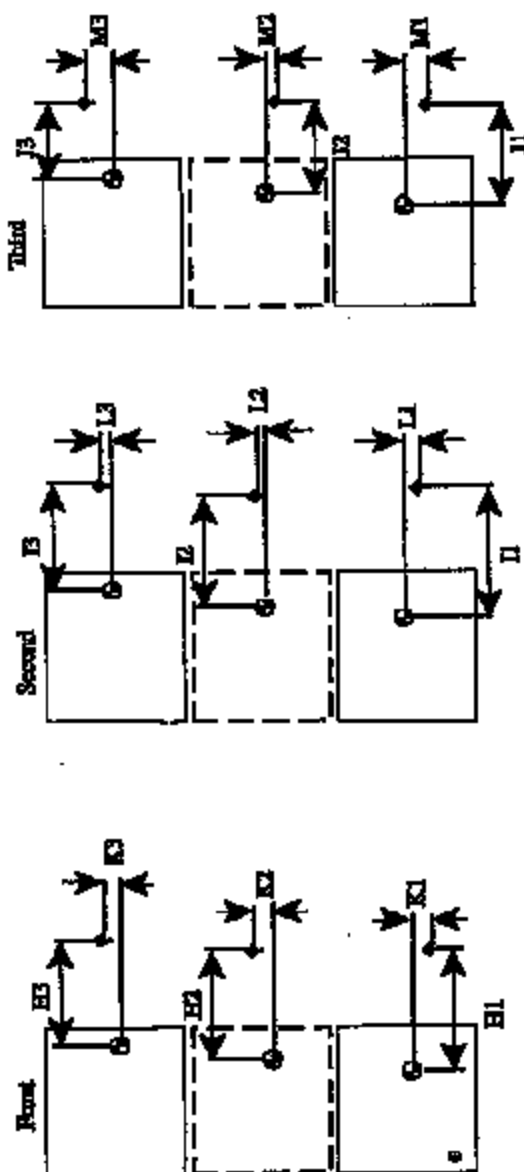
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**TETHER ANCHORAGE LOCATIONS
 FOR FMVSS 225**
 (All dimensions in mm)

Model Year	2004	Make	Chevrolet Astro	Model	Body Style	Multipurpose Vehicle—Van
Seat Style	Front Row	Tour Bucket	Second Row	All	Third Row	All



0: SEAT

⦿: Tether anchorage

Note: 1. The location shall be measured at the center of anchorage.

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Table 3. Seating Reference Point and Tether Anchorage Locations

Seating Reference Point (SRP)	Distance from SRP	
Front Row	H1	N/A
	K1	N/A
	H2	N/A
	K2	N/A
	H3	41
	K3	0
Second Row (Base Bench)	I1	158.0
	L1	93.0
	I2	N/A
	L2	N/A
	I3	158.0
	L3	65.0
Second Row (Tour Bench)	I1	158.0
	L1	93.0
	I2	N/A
	L2	N/A
	I3	158.0
	L3	5.0
Second Row (Tour Bucket)	I1	150.0
	L1	68.5
	I2	N/A
	L2	N/A
	I3	150.0
	L3	125.0
Third Row (Base Bench)	J1	N/A
	M1	N/A
	J2	201.0

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	M2	0.0
	J3	N/A
	M3	N/A
Third Row (Four Bench)	J1	N/A
	M1	N/A
	J2	201.0
	M2	0.0
	J3	N/A
	M3	N/A

Note: 1. Use the center of anchorage.

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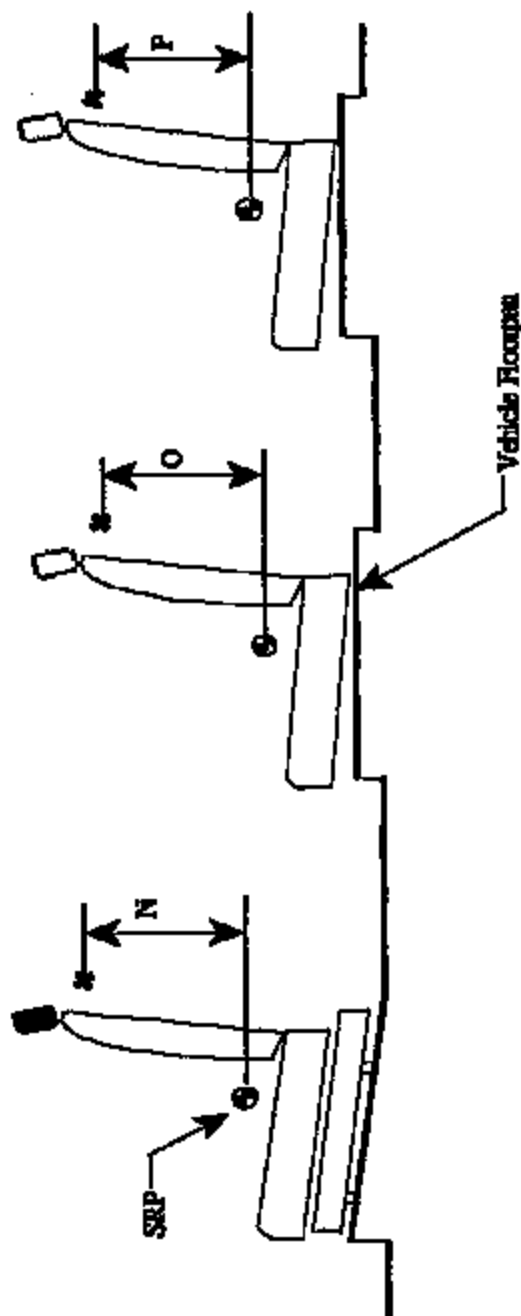
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TETHER ANCHORAGE LOCATIONS - VERTICAL
 FOR FMVSS 225
 (All dimensions in mm)

Model Year	2004	Make	Chevrolet Astro	Model	Body Style	Multipurpose Vehicle—Van
Seat Style	Front Row	Tour Buxlot	Second Row	All	Third Row	All



LEFT SIDE VIEW OF TEST VEHICLE

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Table 4. Vertical Dimension For The Tether Anchorage

Seating Row	Vertical Distance from Seating Reference Point	
Front Row	N1 (Driver)	N/A
	N2 (Center)	N/A
	N3 (Right)	289
Second Row (Base Bench)	O1 (Left)	180.0
	O2 (Center)	N/A
	O3 (Right)	180.0
Second Row (Tour Bench)	O1 (Left)	180.0
	O2 (Center)	N/A
	O3 (Right)	180.0
Second Row (Tour Bucket)	O1 (Left)	180.0
	O2 (Center)	N/A
	O3 (Right)	180.0
Third Row (Base Bench)	P1 (Left)	N/A
	P2 (Center)	181.0
	P3 (Right)	N/A
Third Row (Tour Bench)	P1 (Left)	N/A
	P2 (Center)	181.0
	P3 (Right)	N/A

Note: 1. All dimensions are in mm. If not, provide the unit anchorage.

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Test Procedures Used for Compliance Tests

Lower Anchorage

For each seating location in each row record applicable FMVSS Section		FMVSS 225 Section(s)			
Block 1	Lower anchorage location certification method used (Enter applicable section used in block 1 of each position by circling A or B) A) S.2.1 or B) S.1.2.2				
Block 2	Lower anchorage dimensions (Enter applicable section used in block 2 by circling A or B) A) S.1.1 or B) S.1.2.2 (also provide roll and yaw angles) Pitch _____° Roll _____° Yaw _____°				
Block 3	Lower anchorage marking (Enter applicable section used in block 3 by circling A or B) A) S.5 or B) S.4				
Block 4	Strength requirements (Enter applicable section used in block 4 by circling A or B) A) Section 9 or B) Section 15				
Driver	Driver	N/A			
	Center (If any)	N/A—No Seating Position			
	Right (If any)	N/A—No lower anchors installed due to seating.			
Second (Rear Bench)	Left	Block 1 A ☐	Block 2 A ☐ Pitch 25°, Roll 0°, Yaw 0°	Block 3 A ☐	Block 4 A ☐
	Center	N/A—Not Equipped with Lower Anchors			
	Right	Block 1 A ☐	Block 2 A ☐ Pitch 15°, Roll 0°, Yaw 0°	Block 3 A ☐	Block 4 A ☐
Second (Front Bench)	Left	Block 1 A ☐	Block 2 A ☐ Pitch 7.5°, Roll 0°, Yaw 0°	Block 3 A ☐	Block 4 A ☐
	Center	N/A—Not Equipped with Lower Anchors			
	Right	Block 1 A ☐	Block 2 A ☐ Pitch 7.5°, Roll 0°, Yaw 0°	Block 3 A ☐	Block 4 A ☐
Second (Over Back)	Left	Block 1 A ☐	Block 2 A ☐ Pitch 14.5°, Roll 0°, Yaw 0°	Block 3 A ☐	Block 4 A ☐
	Center	N/A—No Seating Position			
	Right	Block 1 A ☐	Block 2 A ☐ Pitch 14.5°, Roll 0°, Yaw 0°	Block 3 A ☐	Block 4 A ☐
3rd (Rear Bench)	Left	N/A—Not Equipped with Lower Anchors			

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Test (One Side)	Center	NEA—Not Equipped with Lower Anchors.
	Right	NEA—Not Equipped with Lower Anchors.
	Left	NEA—Not Equipped with Lower Anchors.
	Center	NEA—Not Equipped with Lower Anchors.
	Right	NEA—Not Equipped with Lower Anchors.

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Test Procedures Used for Compliance Tests
Tether Anchorages

For each seating location in each row record applicable FMVSS Section		FMVSS Section(s) - Req.		
Block 1		Tether anchorage location certification method used (Enter applicable section used in block 1 by circling A, B, C, D, E or F) A) 6.2.1 B) 6.2.1.1 C) 6.2.1.2 D) 6.2.2 E) 6.2.2.1 F) 6.2.2.2		
Block 2		Number of tether anchorages based upon the applicable section (Enter applicable section used in block 2 by circling A or B) A) 4.4 B) 4.5		
Block 3		Tether anchorage strength requirement (Enter applicable section used in block 3 by circling A, B, or C) A) 6.3.1 B) 6.3.2 C) 6.3.4		
Front	Driver	N/A		
	Center (if any)	N/A		
	Right (if any)	Block 1 ☐ B ☐ C ☐ D ☐ E ☐ F	Block 2 ☐ A ☐	Block 3 ☐ A ☐ B ☐
Second (Base) Bench	Left	Block 1 ☐ B ☐ D ☐ E ☐ F	Block 2 ☐ A ☐	Block 3 ☐ A ☐ B ☐
	Center	N/A		
	Right	Block 1 ☐ B ☐ C ☐ D ☐ E ☐ F	Block 2 ☐ A ☐	Block 3 ☐ A ☐ B ☐
Second (Tour Bench)	Left	Block 1 ☐ B ☐ D ☐ E ☐ F	Block 2 ☐ A ☐	Block 3 ☐ A ☐ B ☐
	Center	N/A		
	Right	Block 1 ☐ B ☐ D ☐ E ☐ F	Block 2 ☐ A ☐	Block 3 ☐ A ☐ B ☐
Second (Tour Bucket)	Left	Block 1 ☐ B ☐ C ☐ D ☐ E ☐ F	Block 2 ☐ A ☐	Block 3 ☐ A ☐ B ☐
	Center	N/A		
	Right	Block 1 ☐ B ☐ C ☐ D ☐ E ☐ F	Block 2 ☐ A ☐	Block 3 ☐ A ☐ B ☐

Safety Compliance Testing For FMVSS 225
 "Child Restraint Anchorage Systems"

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Third (Base Bench)	Left	N/A		
	Center	Block 1 ☒ B ☐ C ☐ D ☐ E ☐ F	Block 2 ☐ A ☒	Block 3 ☐ A ☐ B ☒
	Right	N/A		
Third (Tour Bench)	Left	N/A		
	Center	Block 1 ☒ B ☐ C ☐ D ☐ E ☐ F	Block 2 ☐ A ☒	Block 3 ☐ A ☐ B ☒
	Right	N/A		