

REPORT NUMBER TR-P25007-03-NC

FMVSS 301-FUEL SYSTEM INTEGRITY

**MITSUBISHI MOTORS CORPORATION
2005 MITSUBISHI LANCER
4-DOOR SEDAN**

NHTSA NUMBER: C55600

**PREPARED BY:
KARCO ENGINEERING, LLC
9270 HOLLY ROAD
ADELANTO, CALIFORNIA 92301**



10/05/05

FINAL REPORT

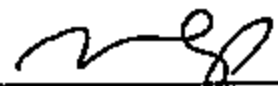
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U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
ROOM 6115 (NVS-221)
400 SEVENTH STREET, SW
WASHINGTON, D.C. 20590**

This final test report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, in response to Contract Number DTNH22-01-C-31025.

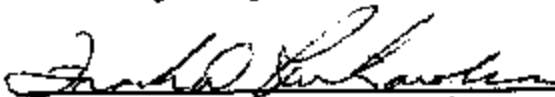
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Date: October 5, 2006

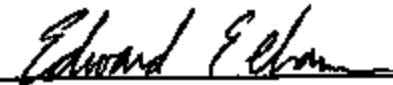
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Date: October 5, 2005

FINAL REPORT ACCEPTED BY:


COTR

10/27/05
Date of Acceptance

Technical Report Documentation Page

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7. Authors Mr. Matt Ivory, Project Engineer, Karco Mr. Frank Richardson, Program Manager, Karco				8. Performing Organization Report No. TR-P25007-03-NC	
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15. Supplementary Notes					
16. Abstract This 30 mph rear moving barrier impact test is a part of the Federal Motor Vehicle Safety Standard (FMVSS) 301 Compliance Test Program conducted for the National Highway Traffic Safety Administration (NHTSA) by KARCO Engineering, LLC Laboratories under Contract No. DTNH22-01-C-31025. The purpose of this test was to determine if the subject vehicle, a 2005 Mitsubishi Lancer 4-Door Sedan, meets the performance requirements of FMVSS No. 301, "Fuel System Integrity." The test was conducted on August 19, 2005 in accordance with the Office of Vehicle Safety Compliance Laboratory Test Procedure TP-301-03, dated February 28, 2003. The impact velocity was 48.00 Km/h. The ambient temperature at the time of impact was 33.3 degrees Celsius. The vehicle's maximum post-test static crush was 402 mm right of the vehicle's centerline					
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SECTION 1

PURPOSE OF TEST

1. PURPOSE

The purpose of this test was to determine if the subject vehicle, a 2005 Mitsubishi Lancer 4-Door Sedan, meets the performance requirements of FMVSS No. 301, "Fuel System Integrity." The test was conducted in accordance with the Office of Vehicle Safety Compliance Laboratory Test Procedure TP-301-03, dated February 28, 2003.

SECTION 2

SUMMARY OF TEST

2. SUMMARY

A 1395 kg 2005 Mitsubishi Lancer 4-Door Sedan was impacted from the rear by a 1799 kg moving barrier at a velocity of 48.00 Km/h (29.83 mph). The test was performed by KARCO Engineering, LLC on August 19, 2005.

The vehicle was prepared and tested following the Office of Vehicle Safety Compliance Test Procedure for Federal Motor Vehicle Safety Standard (FMVSS) 301R (OVSC TP-301-03, dated February 28., 2003).

The crash event was recorded by ten (10) high speed and two (2) real time cameras. Camera locations and other pertinent camera information are found in the data sheets. Appendix A contains Pre- and Post-Test Photographs.

There was no fuel system fluid spillage following the impact event or during any portion of the static rollover test. The maximum longitudinal crush was 402 millimeters. The vehicle appeared to comply with all the requirements of FMVSS No. 301 "Fuel System Integrity."

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2005 Mitsubishi Lancer 4-Door Sedan
 Test Program: FMVSS 301-Fuel System Integrity

NHTSA No.: C55800
 Test Date: 8/19/05

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	C55800
Make	Mitsubishi
Model	Lancer
Body Style	4-Door Sedan
Vin No.	JA3AJ28E65U007781
Color	White
Delivery Date	9/24/04
Odometer	66
Dealer	Riverside Mitsubishi
Transmission	5 Speed Manual
Final Drive	Front
Type/No. Cyl.	4
Engine Disp. (L)	2.0
Engine Placement	Transverse
Roof Rack	No
Sunroof/T-Top	No
Tinted Glass	No
Traction Control	No
Power Brakes	Yes
Front Disc	Yes
Rear Disc	Yes

Anti-Lock Brakes	No
All Wheel Drive	No
Power Steering	Yes
Driver Front Airbag	Yes
Driver Side Airbag	No
Driver Head Airbag	No
Driver Curtain Airbag	No
Pass. Airbag	Yes
Pass. Side Airbag	No
Pass. Head Airbag	No
Pass. Curtain Airbag	No
Pre-Tensioners	
Load Limiters	
Bucket Seats	Yes
Air. Cond.	Yes
AM/FM Cassette	Yes
Tilt Steering	Yes
Automatic Door Locks	No
Power Windows	Yes
Power Seats	No
Other	

DATA FROM CERTIFICATION LABEL

Manufactured By	Mitsubishi Motors Corporation
Date of Manufacture	Jul-04

GVWR (kg)	1670
GAWR Front (kg)	920
GAWR Rear (kg)	780

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench	None	
Number of Occupants	2	3	0	5
Capacity Weight (VCW) (kg)				375
Cargo Weight (RCLW) (kg)				35

DATA SHEET NO. 1...(CONTINUED)
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2005 Mitsubishi Lancer 4-Door Sedan
 Test Program: FMVSS 301-Fuel System Integrity

NHTSA No.: C55800
 Test Date: 8/19/05

TEST VEHICLE WEIGHTS

	Units	As Delivered Weights (UVW)			As Tested Weights (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	382	234		399	303	
Right	kg	367	231		395	298	
Ratio	%	61.7%	38.3%		58.9%	43.1%	
Totals	kg	749	465	1215	794	601	1395

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1215
Weight of 2 P572 ATD's	kg	152
Rated Cargo/Luggage Wt. (RCLW)	kg	35
Calculated Vehicle Target Wt. (TVTW)	kg	1402

TEST VEHICLE ATTITUDE AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	636	641	628	637	992
As Tested	mm	634	635	600	602	1116

Vehicle Wheel Base (mm) 2590

Weight of Ballast Secured in cargo area (kg) 0.0

Vehicle Components Removed Radiator, alternator, exhaust header

* Ballast weight does not include cameras, instrumentation and brake abort system.

FUEL SYSTEM DATA

Fuel System Capacity From Owners Manual (L) 49.96

Usable Capacity Furnished by COTR (L) 49.96

Actual Test Volume with entire fuel System Filled (L) 47.69

1/3 of Usable Capacity (L) N/A

Test Fluid Type: Stoddard Solvent

Kinematic Viscosity: as per ASTM Standard D484-71 Purple

Is Vehicle Fuel Pump Electric or Mechanical? Electric

If electric, does pump operate with ignition switch "On" & engine "OFF" Yes

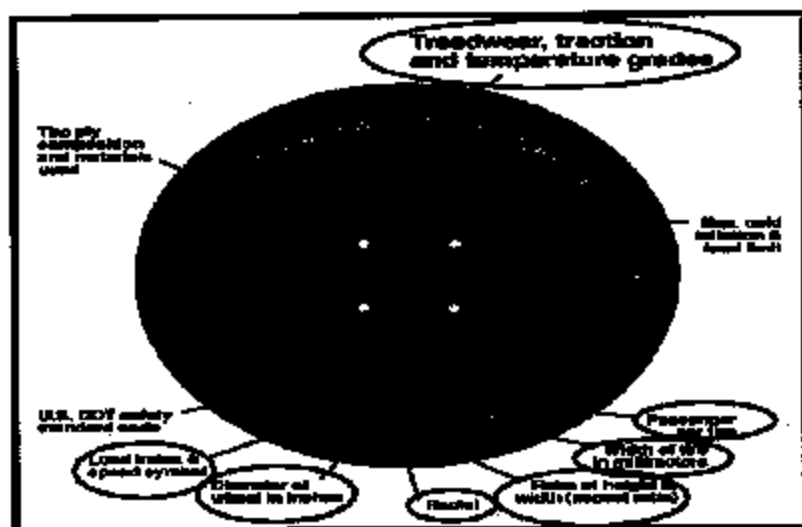
Fuel System Particulars: The fuel filler door is located on the left rear fender.
The standard fuel tank occupies the area under the rear seat.

DATA SHEET NO. 1...(CONTINUED)
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2005 Mitsubishi Lancer 4-Door Sedan
 Test Program: FMVSS 301-Fuel System Integrity

NHTSA No.: C55600
 Test Date: 8/19/05

Collect year, make, model, VIN, items circled in red, and tire manufacturer and tire name.



TIRE INFORMATION

Measured Parameter	Front	Rear
Max. Tire Pressure (kpa)	245	245
Cold Pressure (kpa)	200	180
Recommended Tire Size	P185/85R14	P185/85R14
Tire Size on Vehicle	P185/85R14	P185/85R14
Tire Manufacturer	Yokohama	Yokohama
Treadwear	180	180
Traction	A	A
Temperature Grades	B	B
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	1 Polyester, 2 Steel, 1 Nylon	1 Polyester, 2 Steel, 1 Nylon
Load Index/Speed Symbol	85S	85S
Tire Material	Polyester, Steel, Nylon	Polyester, Steel, Nylon
DOT Safety Code Right	FC06 NH1 2204	FC06 NH1 2204
DOT Safety Code Left	FC06 NH1 2204	FC06 NH1 2204

**DATA SHEET NO. 2
MOVING BARRIER DATA**

Test Vehicle: 2005 Mitsubishi Lancer 4-Door Sedan
Test Program: FMVSS 301-Fuel System Integrity

NHTSA No.: C55600
Test Date: 8/19/05

BARRIER SPECIFICATIONS

Measurement Description	mm
Barrier Face Height	1525
Barrier Face Width	1980
Barrier Face Ground Clearance	115
Tread Width	200
Wheelbase	3045
Tread Width	1530

LOCATION OF BARRIER CG

Measurement Description	mm
X-distance rearward of front wheel center	1372
Y-distance from longitudinal-vertical plane of symmetry	1523

BARRIER WEIGHTS

	Units	Front Axle	Rear Axle	Total
Left	kg	494	405	
Right	kg	494	406	
Ratio	%	54.8%	45.1%	
Totals	kg	988	811	1799

BARRIER TIRES

Manufacturer	Maximum II
Model	Remington
Size	205-75-R15
Pressure (kPa)	241

BARRIER IMPACT VELOCITY

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	48.51 to 48.12	48.00
Trap No. 2 Velocity (Redundant)	km/h	48.51 to 48.12	47.95

DATA SHEET NO. 3
FUEL SYSTEM INTEGRITY POST-IMPACT DATA

Test Vehicle: 2005 Mitsubishi Lancer 4-Door Sedan
Test Program: FMVSS 301-Fuel System Integrity

NHTSA No.: C55800
Test Date: 8/19/05

Test Time: 2:37 PM

Temperature: 33.3 Deg. C.

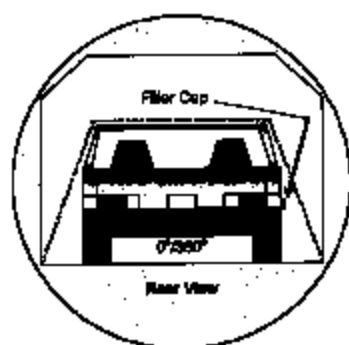
STODDARD SOLVENT SPILLAGE MEASUREMENTS

- A. From impact until vehicle motion ceases: 0.0 oz.
(Maximum Allowable = 1 ounce)
- B. For the 5 minute period after motion ceases: 0.0 oz.
(Maximum Allowable = 5 ounces)
- C. For the following 25 minutes: 0.0 oz.
(Maximum Allowable = 1 oz./minute)
- D. Spillage Location Details: No leakage occurred

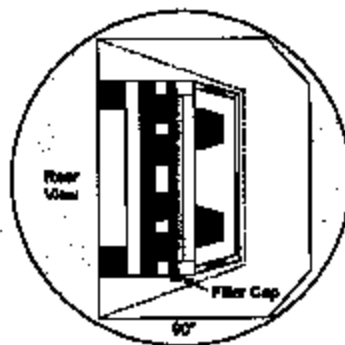
DATA SHEET NO. 4
STATIC ROLLOVER DATA

Test Vehicle: 2005 Mitsubishi Lancer 4-Door Sedan
Test Program: FMVSS 301-Fuel System Integrity

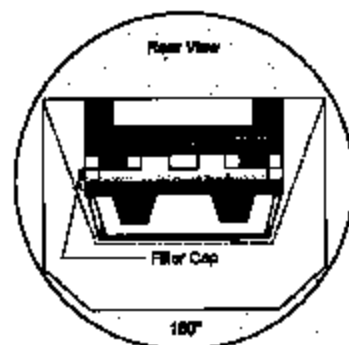
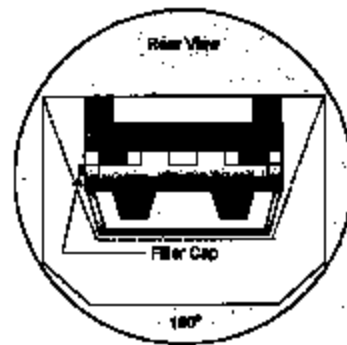
NHTSA No.: C55600
Test Date: 8/19/05



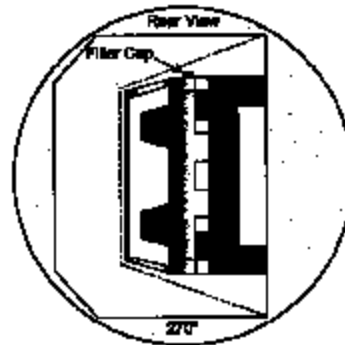
0° to 90°



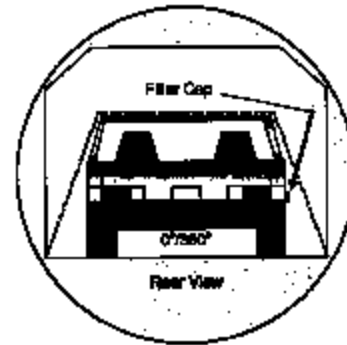
90° to 180°



180° to 270°



270° to 360°



1. The specified fixture rollover rate for each 90° of rotation is 60 to 120 seconds.
2. The position hold time at each position is 300 seconds (minimum).
3. No solvent leakage occurred during rollover.

DATA SHEET NO. 4...(CONTINUED)
STATIC ROLLOVER DATA

Test Vehicle: 2005 Mitsubishi Lancer 4-Door Sedan
 Test Program: FMVSS 301-Fuel System Integrity

NHTSA No.: C55800
 Test Date: 8/19/05

SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	82	300	382
90° to 180°	79	300	379
180° to 270°	78	300	378
270° to 360°	80	300	380

FMVSS 301 SPILLAGE TABLE REQUIREMENT (oz.)

First 5 Minutes	5.0
Sixth Minute	1.0
Seventh Minute	1.0
Eighth Minute	1.0

ACTUAL TEST VEHICLE SOLVENT SPILLAGE TABLE (oz.)

Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0° to 90°	0	0	0	0
90° to 180°	0	0	0	0
180° to 270°	0	0	0	0
270° to 360°	0	0	0	0

SOLVENT SPILLAGE LOCATION TABLE

Test Phase	Spillage Location
0° to 90°	None
90° to 180°	None
180° to 270°	None
270° to 360°	None

**DATA SHEET NO. 5
CAMERA LOCATIONS**

Test Vehicle: 2005 Mitsubishi Lancer 4-Door Sedan
Test Program: FMVSS 301-Fuel System Integrity

NHTSA No.: C55800
Test Date: 8/19/05

VEHICLE CAMERA MEASUREMENT TABLE

No.	Camera View	Location (mm)			Angle (deg.)	Lens (mm)	Speed (fps)
		X	Y	Z			
1	Real Time, Documentary	2053	1515	-1861	-7.0	Zoom	30
2	Left Side	585	-12163	-1707	0.0	35mm	1000
3	Right Side	2288	-11872	-1712	0.0	35mm	1000
4	Overhead	1233	2889	-5488	-90.0	20mm	1010
5	Moving Barrier	0	0	-2332	64.0	7mm	NTM
6	Rear Underside	634	0	1826	90.0	13mm	1000
7	Mid Underside	1865	0	1865	90.0	12mm	1000
8	Front Underside	3055	0	1820	90.0	12mm	1000
9	Underside Close-Up	760	288	1870	84.0	25mm	1000
10	Driver Side On-Board	-1640	70	-1180	-2.0	14mm	1000
11	Passenger On-Board	-1650	-85	-1180	-2.0	8mm	1000
12	Real Time Left Side	730	-12000	-1630	-2.0	Zoom	30

X = Monorail Centerline Y = Impact Location Z = Ground DNR = Did Not Run NTM = No Timing Marks

DATA SHEET NO. 8
ACCIDENT INVESTIGATION DIVISION DATA

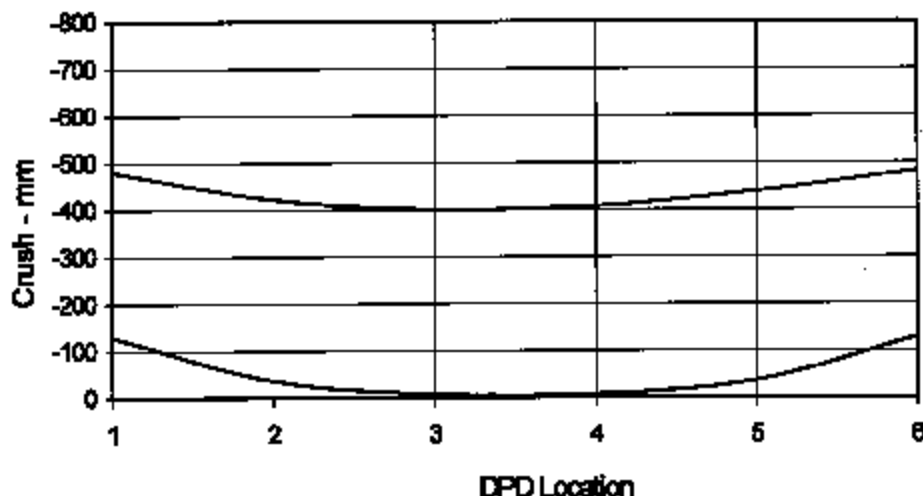
Test Vehicle: 2005 Mitsubishi Lancer 4-Door Sedan
 Test Program: FMVSS 301-Fuel System Integrity

NHTSA No.: C55600
 Test Date: 8/19/05

CRUSH PROFILE

Damage Region Length (mm): 1434 Midpoint of Damage: Centerline
 Impact Mode: Rear Impact (0 Deg.)

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	-129	-480	351
C2	Crush zone 2 on left side	mm	-36	-422	386
C3	Crush zone 3 on left side	mm	-8	-400	392
C4	Crush zone 4 on right side	mm	-8	-407	399
C5	Crush zone 5 on right side	mm	-36	-438	402
C6	Crush zone 6 at right side	mm	-128	-482	354



APPENDIX A
PHOTOGRAPHS

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A-1

HRP2507-03 MC



Figure A-1: Left Front ¾ View, As Received

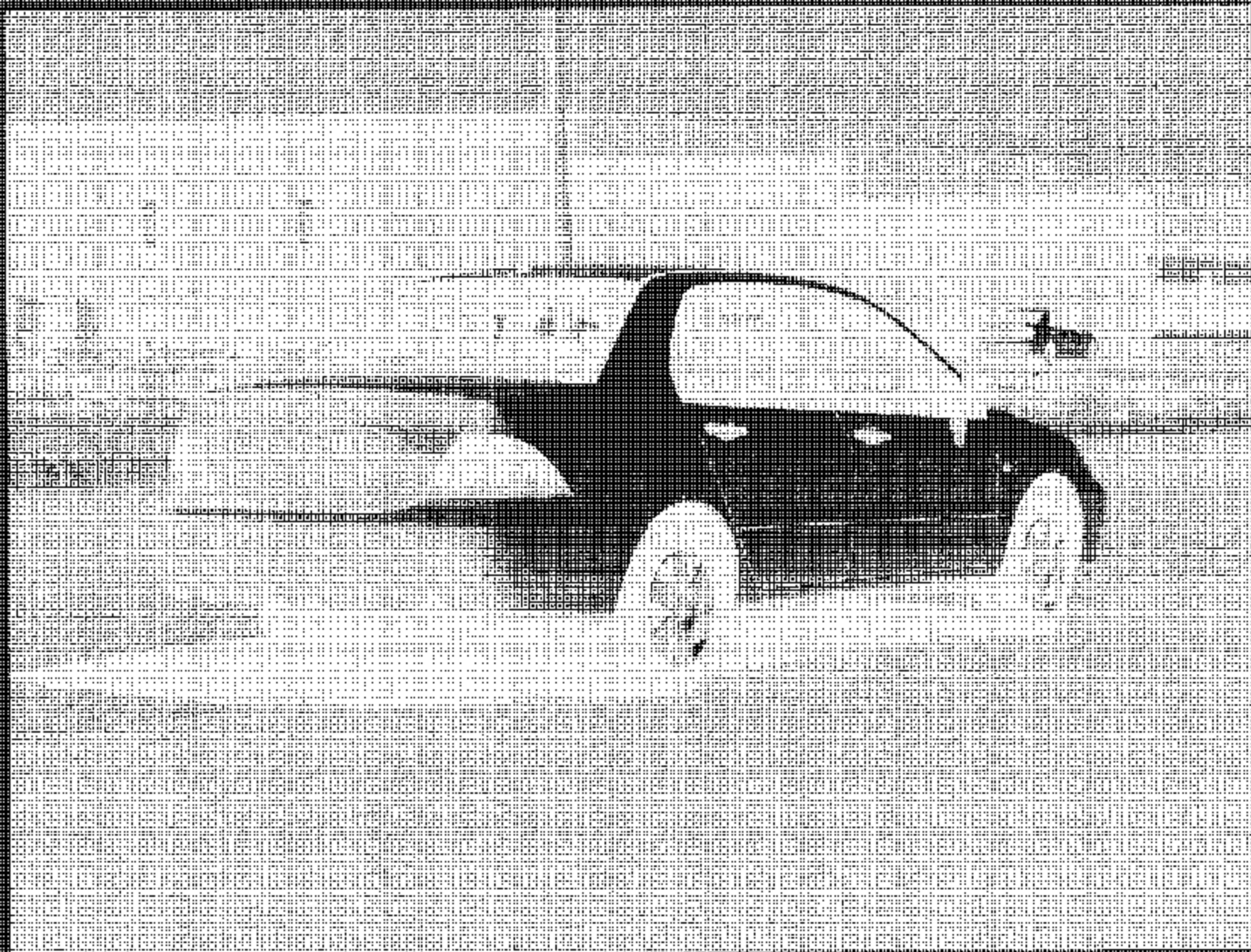


Figure A-2. Right Rear $\frac{3}{4}$ View, as Received

MFG. BY MITSUBISHI MOTORS CORPORATION

GWR 3682LBS/ 1670KG

GVWR FR 2028LBS/ 920KG GAWR 1214LBS/ 550KG

THIS VEHICLE CONFORMS TO ALL FEDERAL

FEDERAL MOTOR VEHICLE SAFETY STANDARDS

THEFT PREVENTION STANDARDS

THE DATE OF MANUFACTURE



JACAJ2610500170

VEHICLE TYPE: PASSENGER CAR

A-3

TR P25007-03 NC

Figure A-3. Vehicle Certification Label

A-1

TR-P25007-43-NO

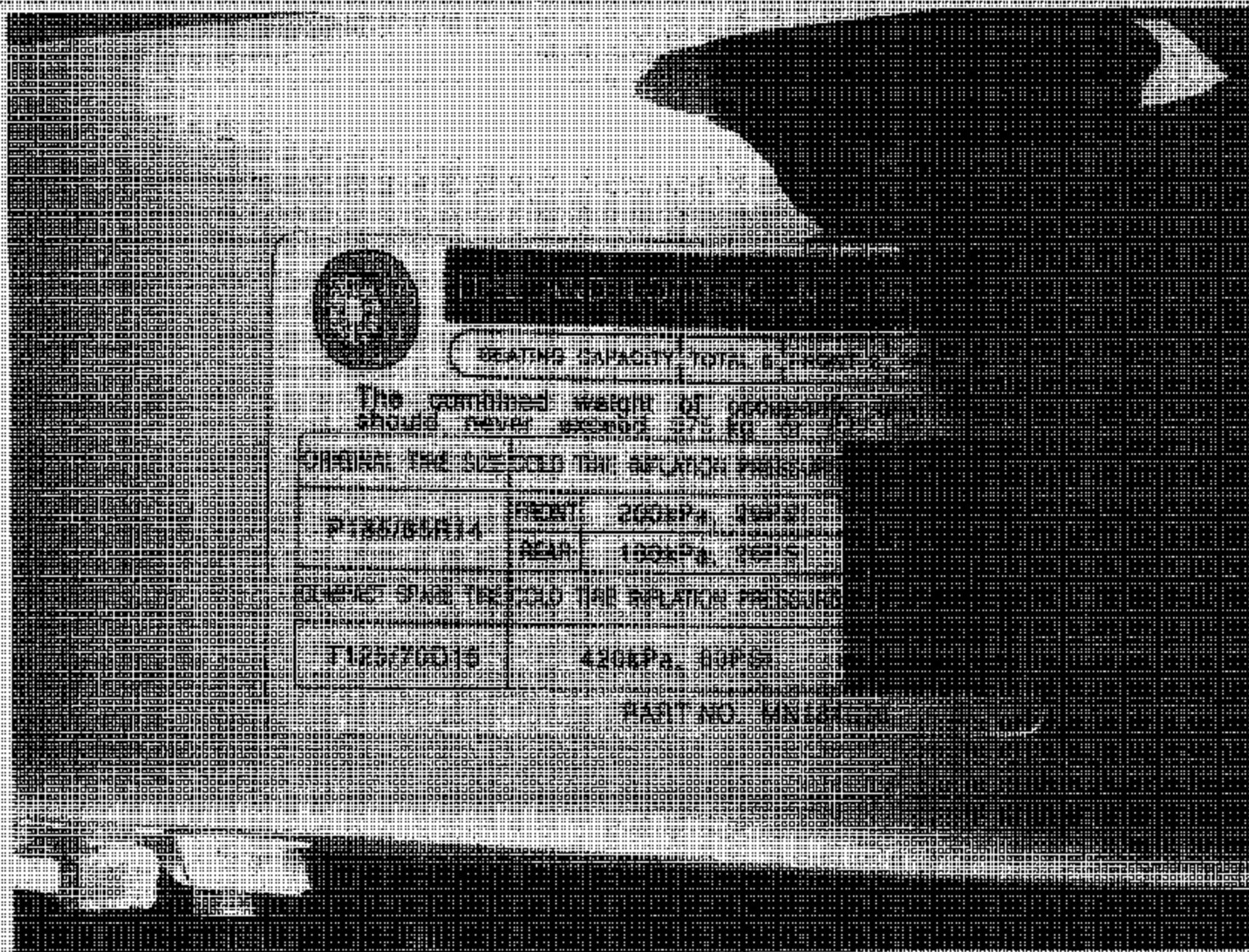


Figure A-4. Vehicle Tire Label



Figure A-5. Pre-Test Front View

A-5

TR F45687-11-NO

A-5

TR-P25007 (S) NC



Figure A-5: Post-Test Front View

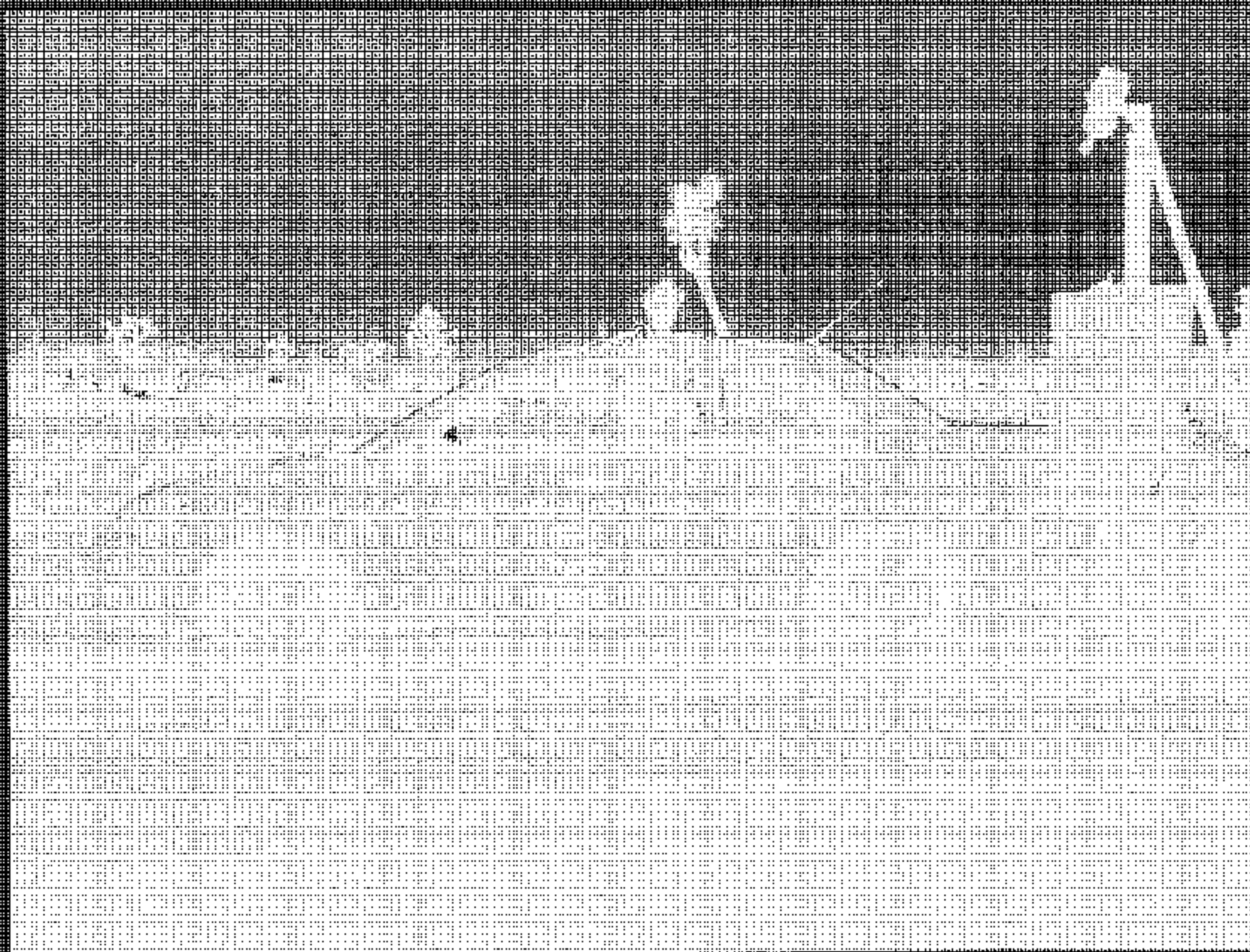


Figure A-7. Pre-Test Loft Side View

A-8

TR-P-25007 (3-NO)

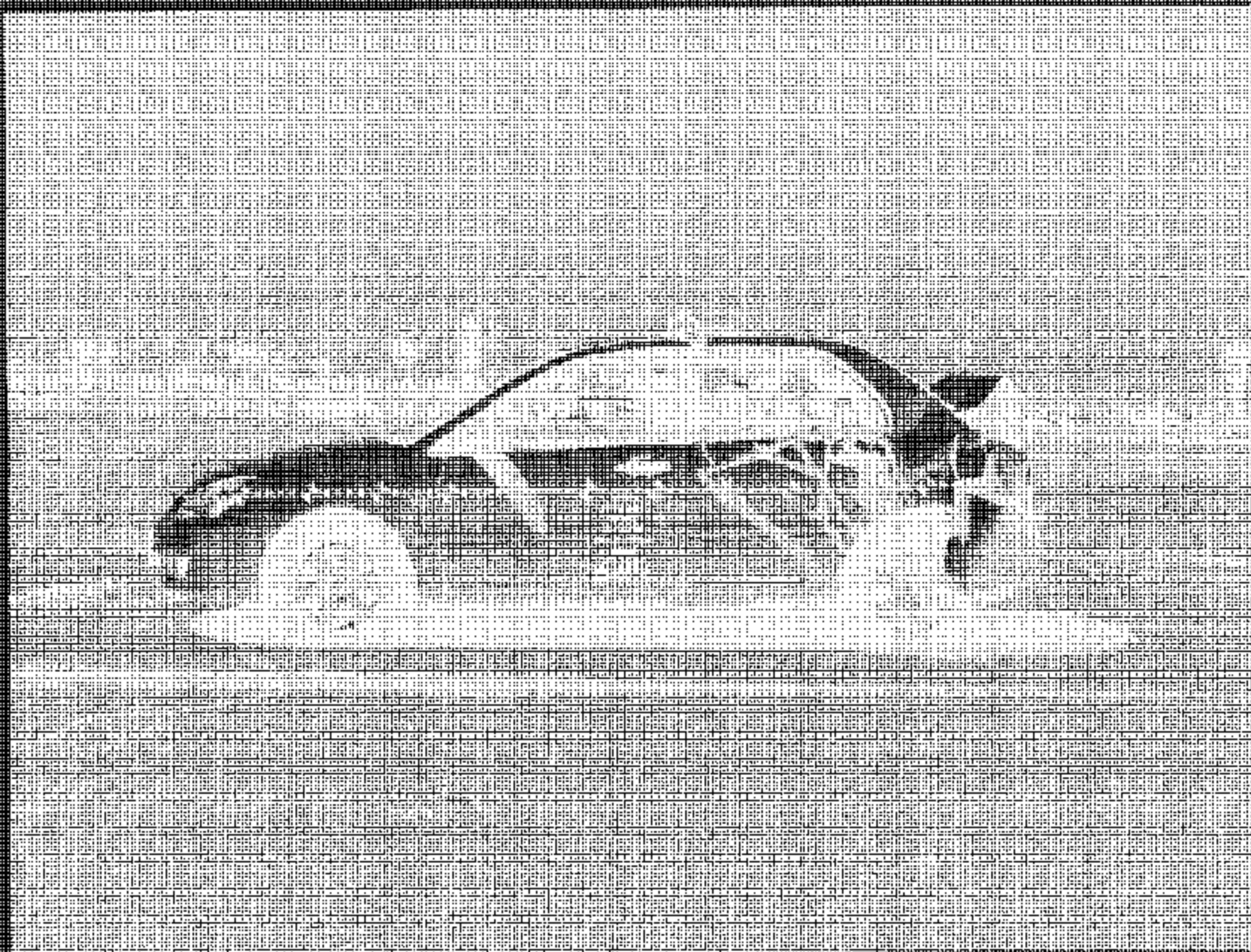


Figure A-8: Post-Test Left Side View

A-4

TP25007-02 NC

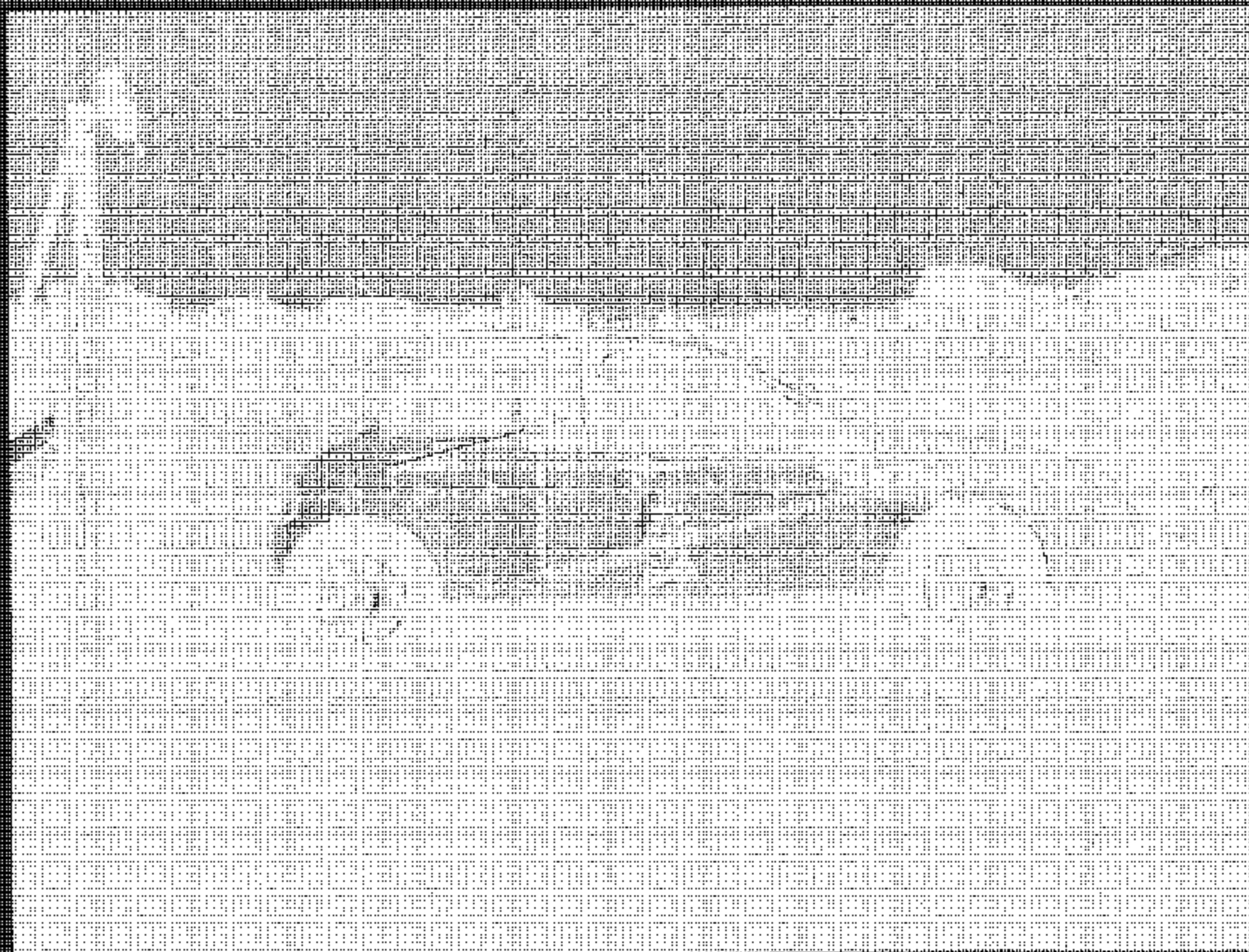


Figure A-9: Pre-Test Right Side View

A-10

TR-P25007-03-NO

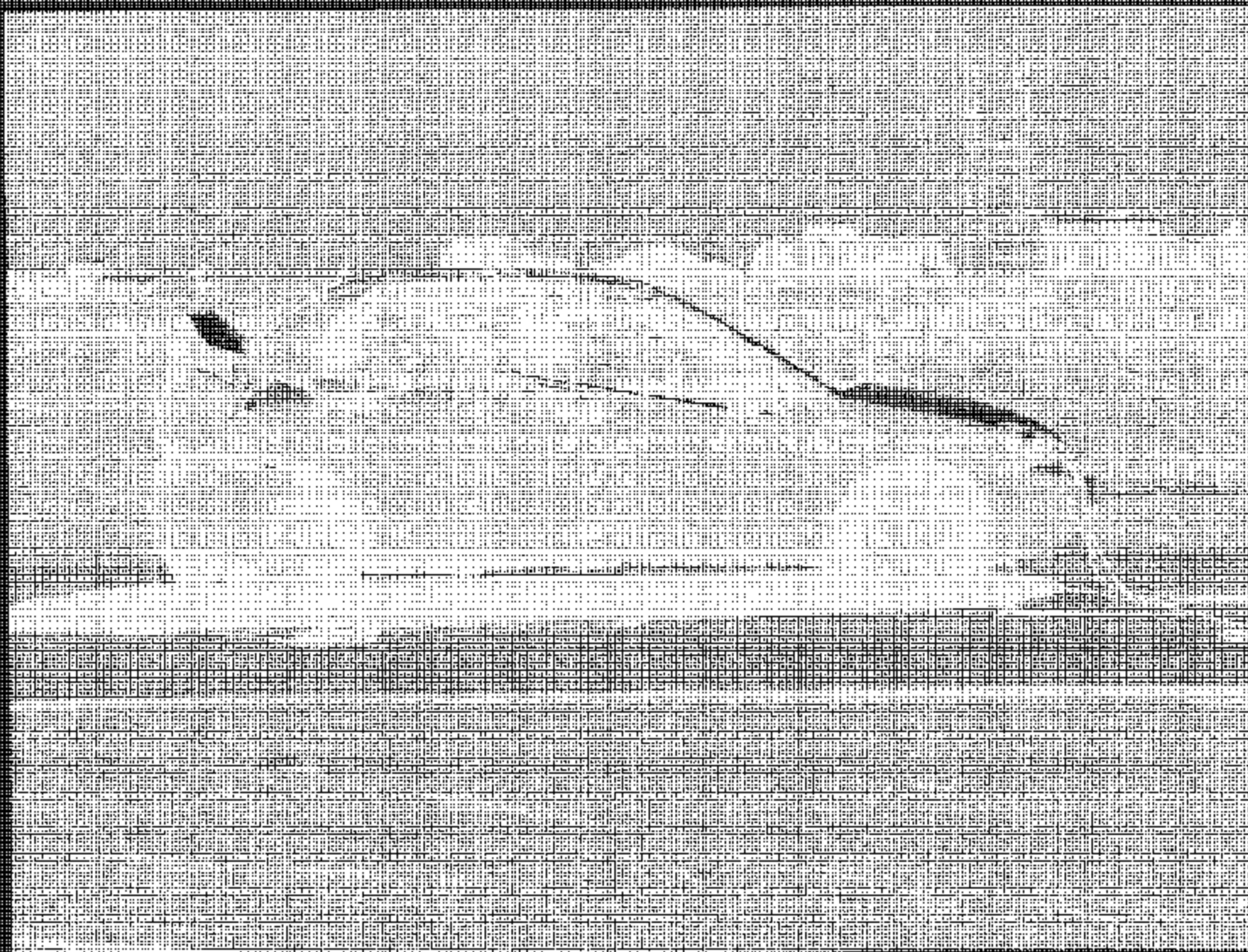


Figure A-10: Post-Test Right Side View

A-11

TR-172597-03-NC



Figure A-11: Pre-Test Left Front $\frac{3}{4}$ View



Figure A-12. Post-Test Left Front $\frac{3}{4}$ View (Vehicle Moved)

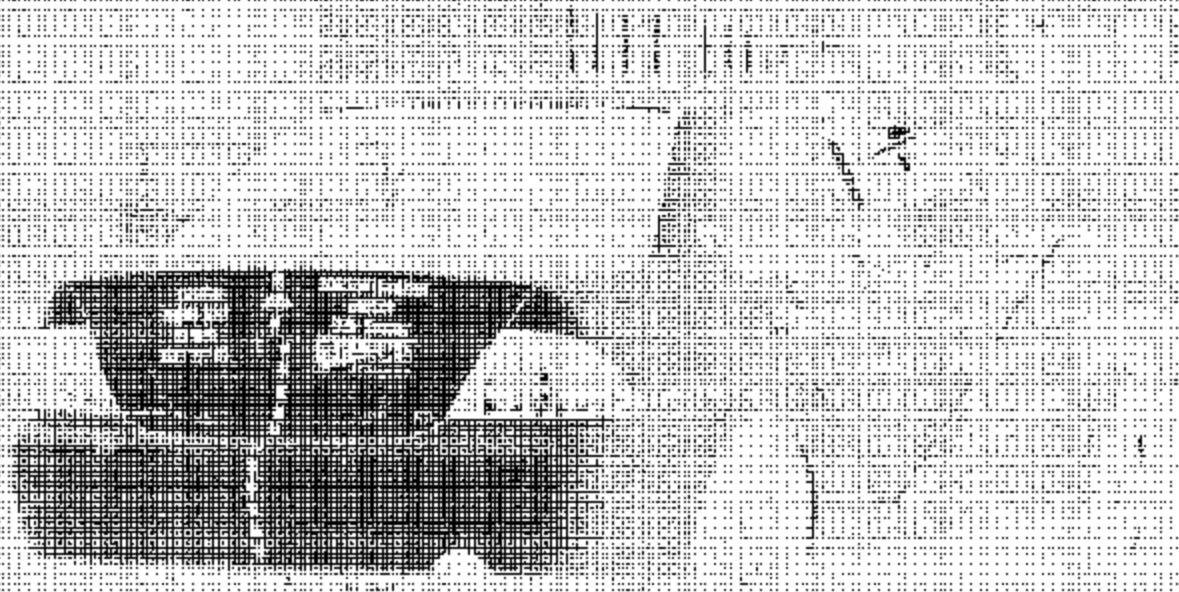


Figure A-13: Pre-Test Right Rear 1/4 View

A-14

HRP250743-ND



Figure A-14: Post-Test Right Rear 3/4 View

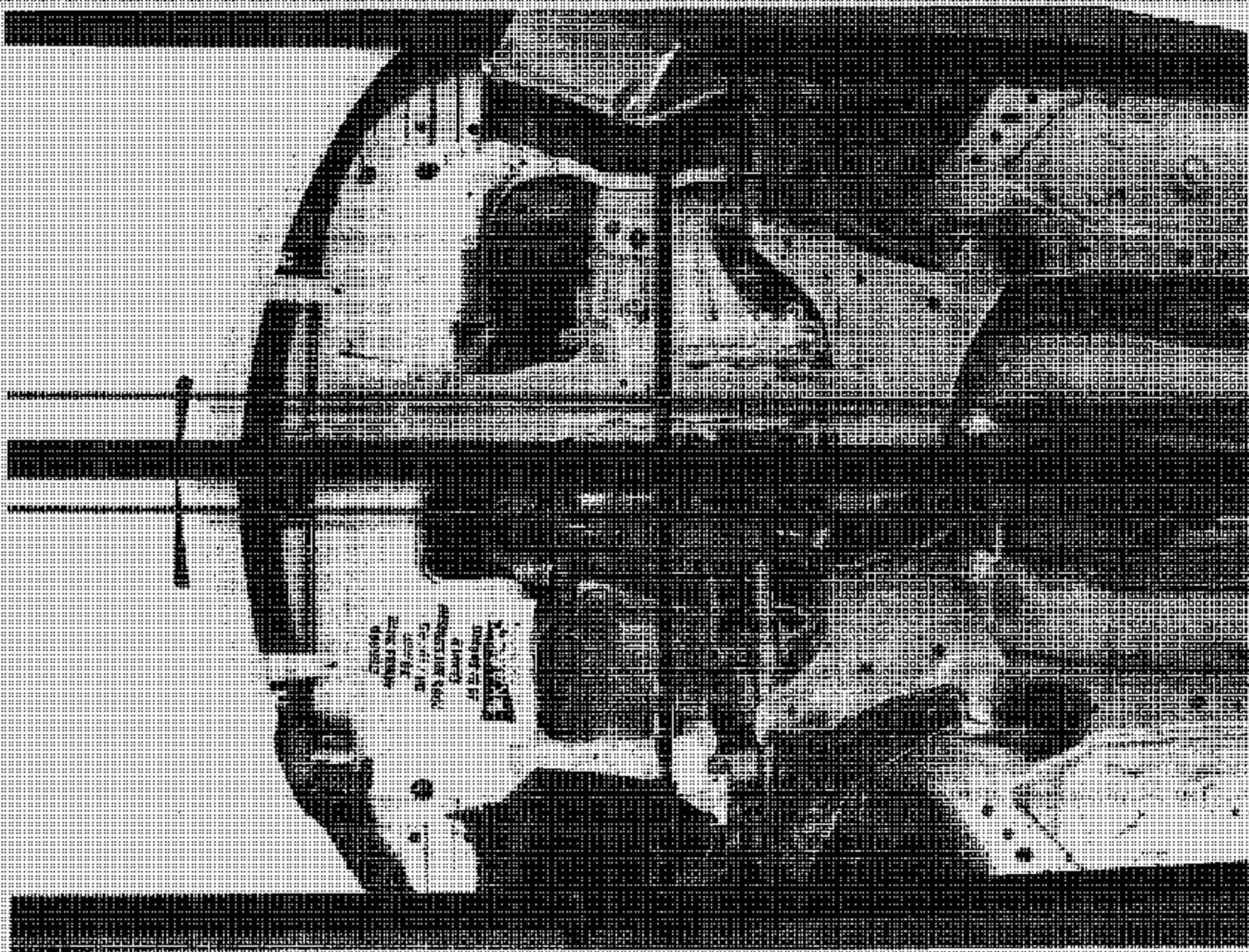


Figure A-15. Pre-Test Front Underbody

A-16

TR-P3500-03-NO

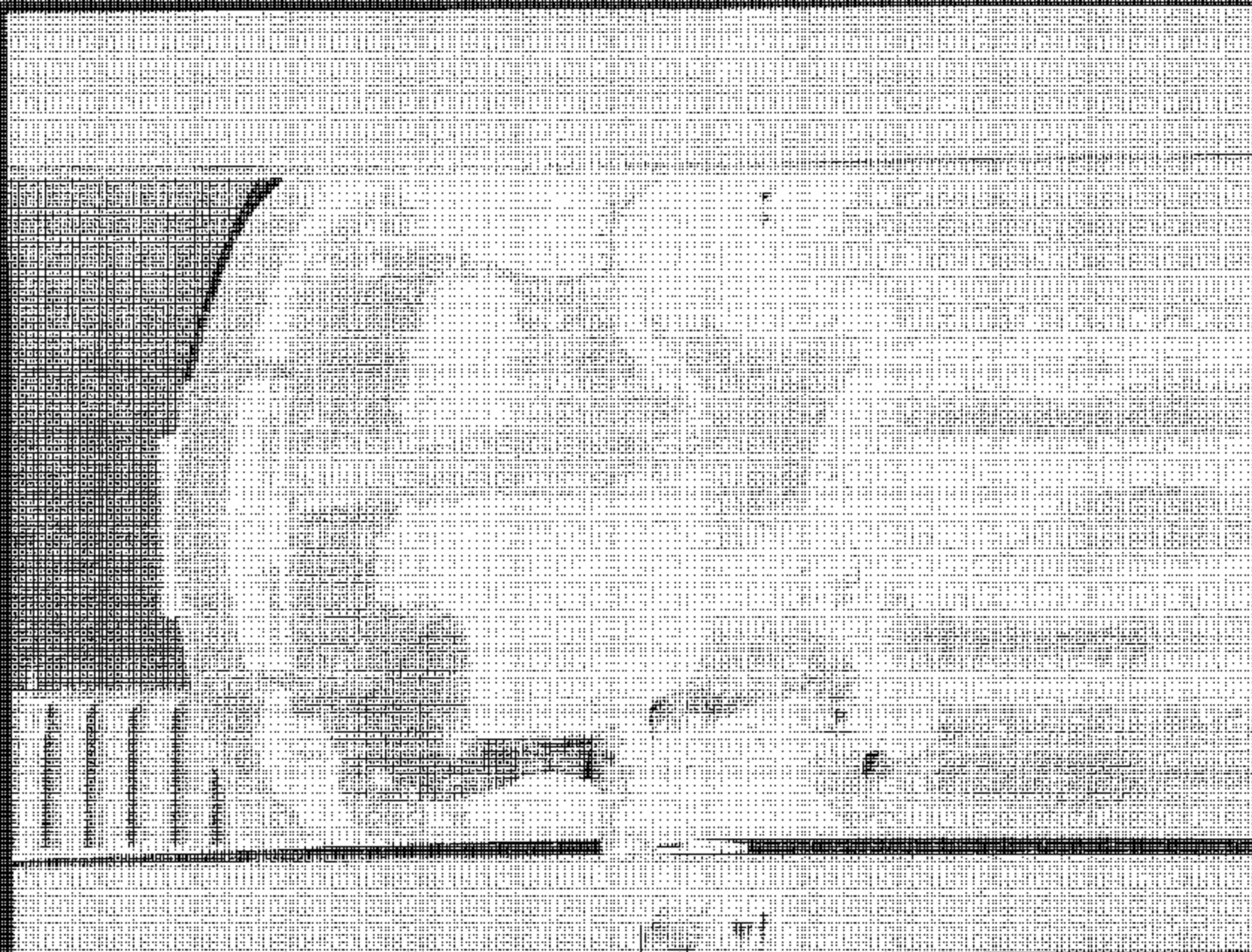


Figure A-16. Post-Test Front Underbody

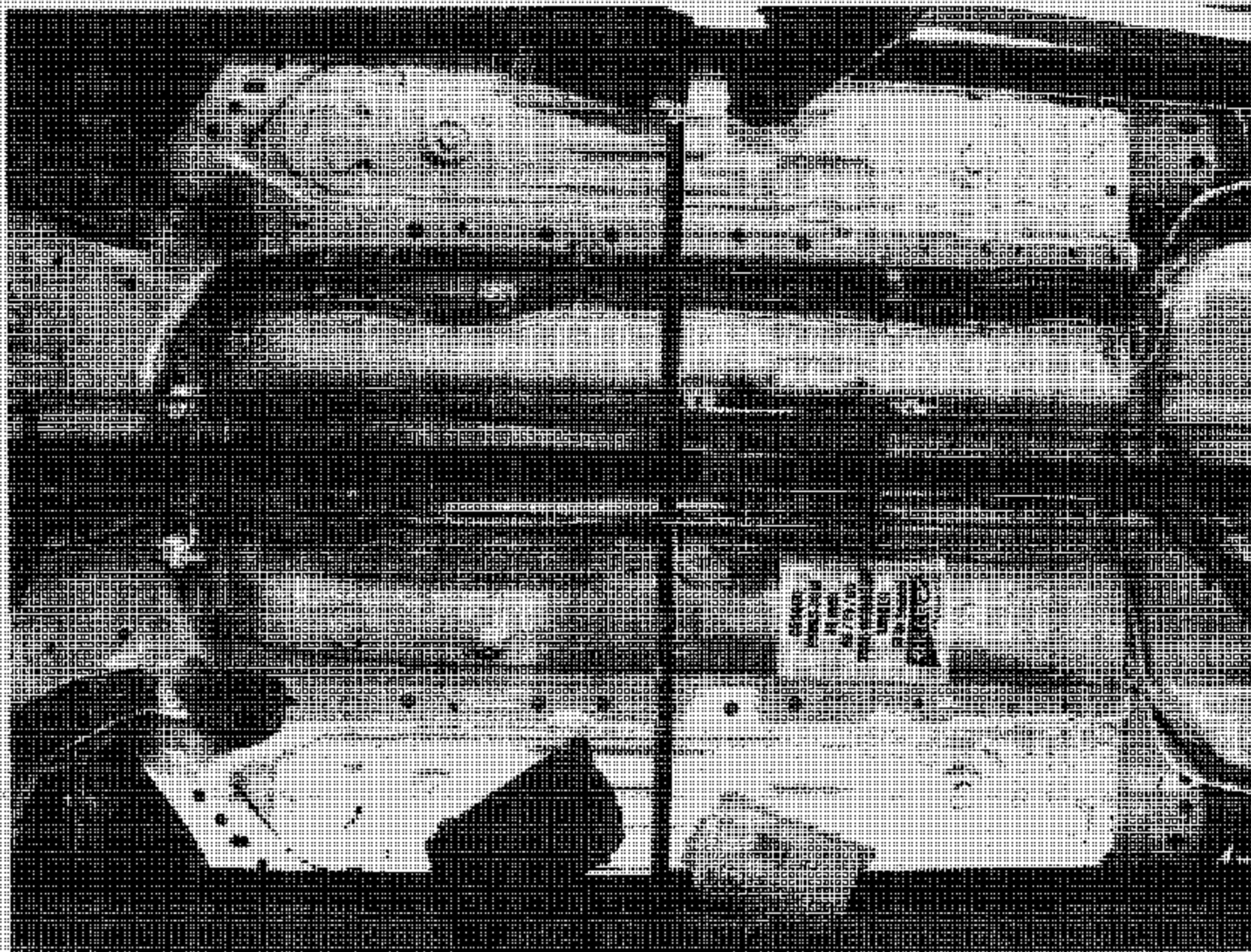


Figure A-17: Pre-Test Mid Underbody

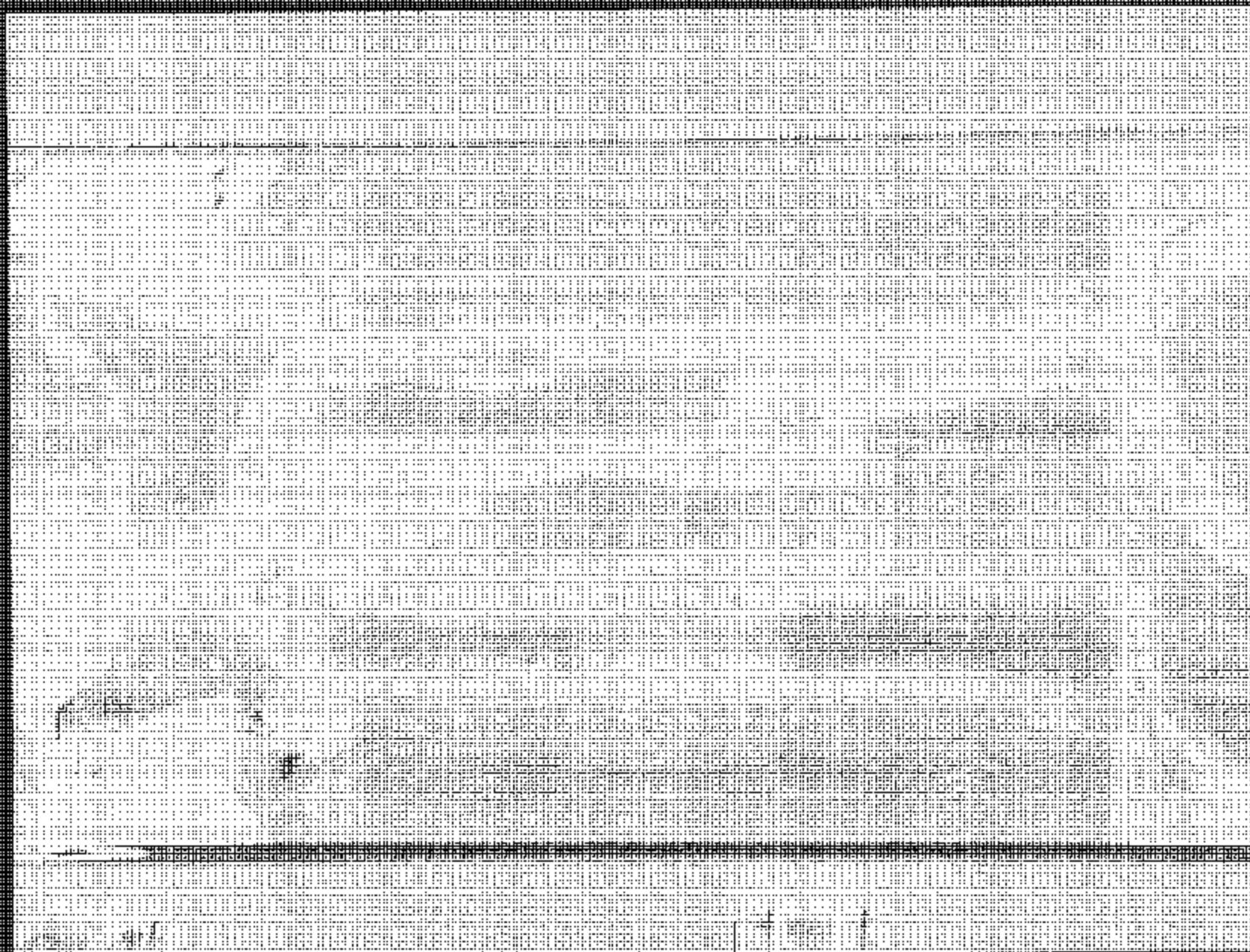


Figure A-18: Post-Test Min Underbody



Figure A-18. Pre-Test Rear Underbody

A-20

TR-P2507-RS-MC

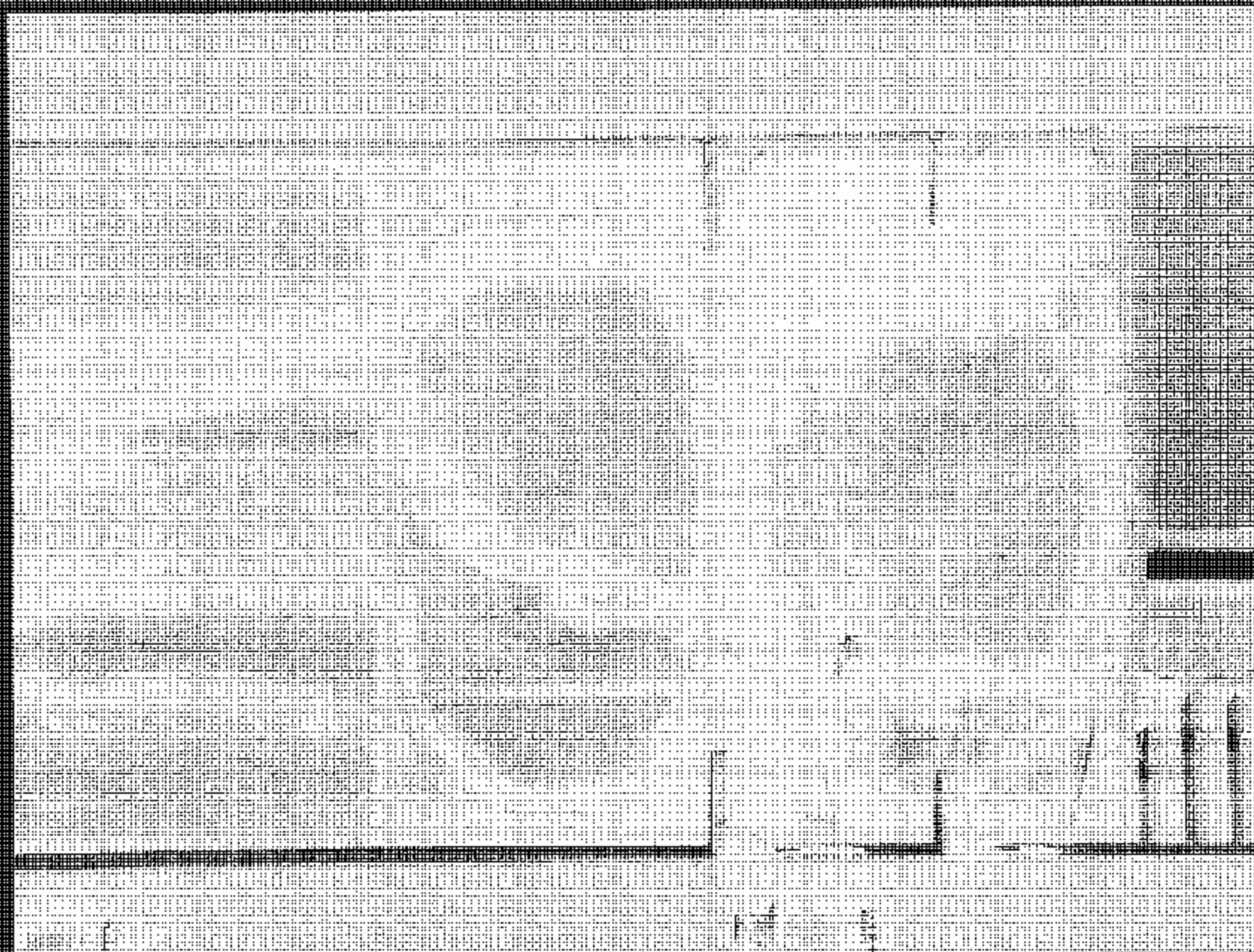


Figure A-20: Post-Test Rear Underbody



Figure A-21: Vehicle on Rotover Device at 0°

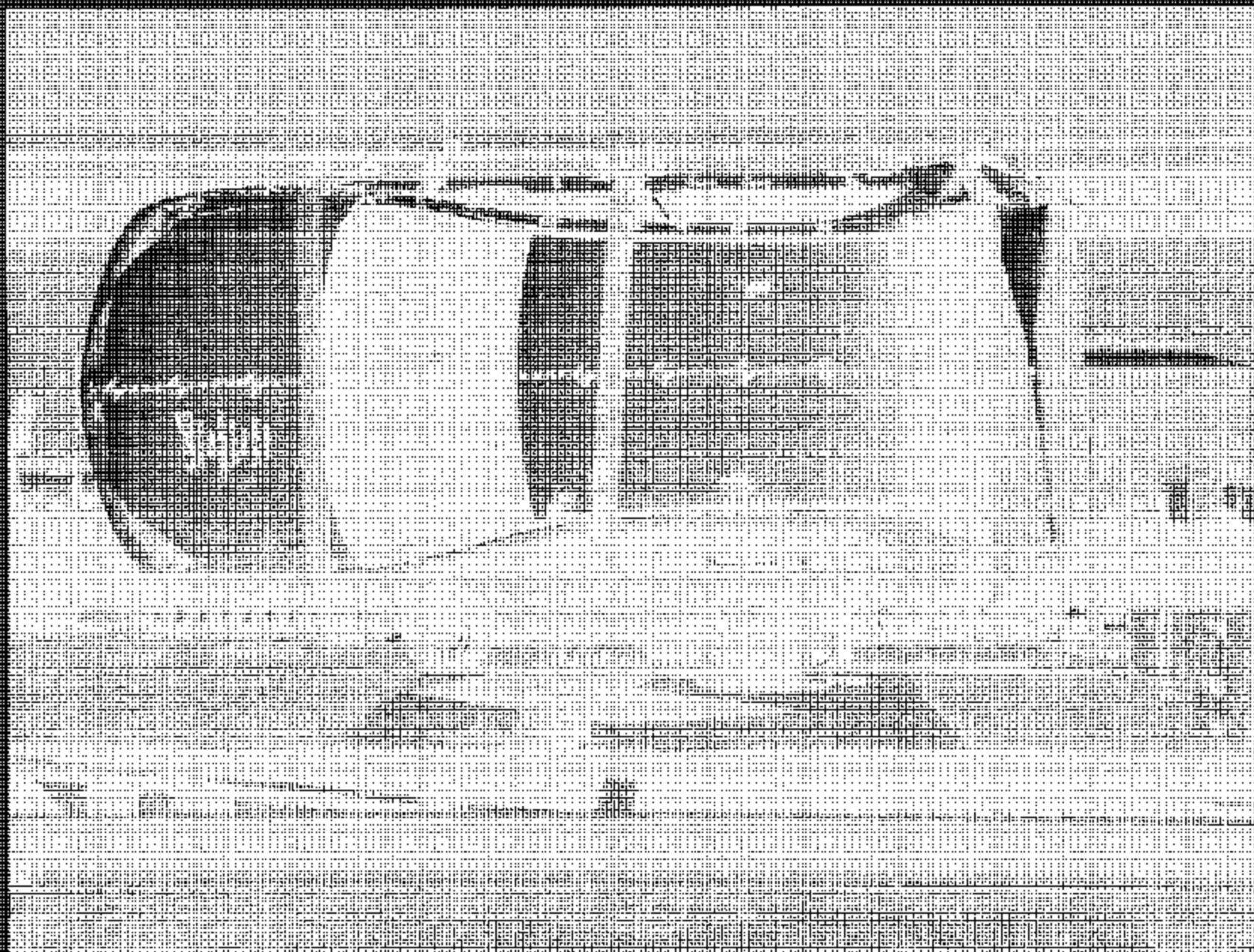


Figure A-22 Vehicle on Rollover Device at 90°

A-25

TR-535007-03 NC



Figure A-23: Vehicle on Rollover Device at 180°

A-26

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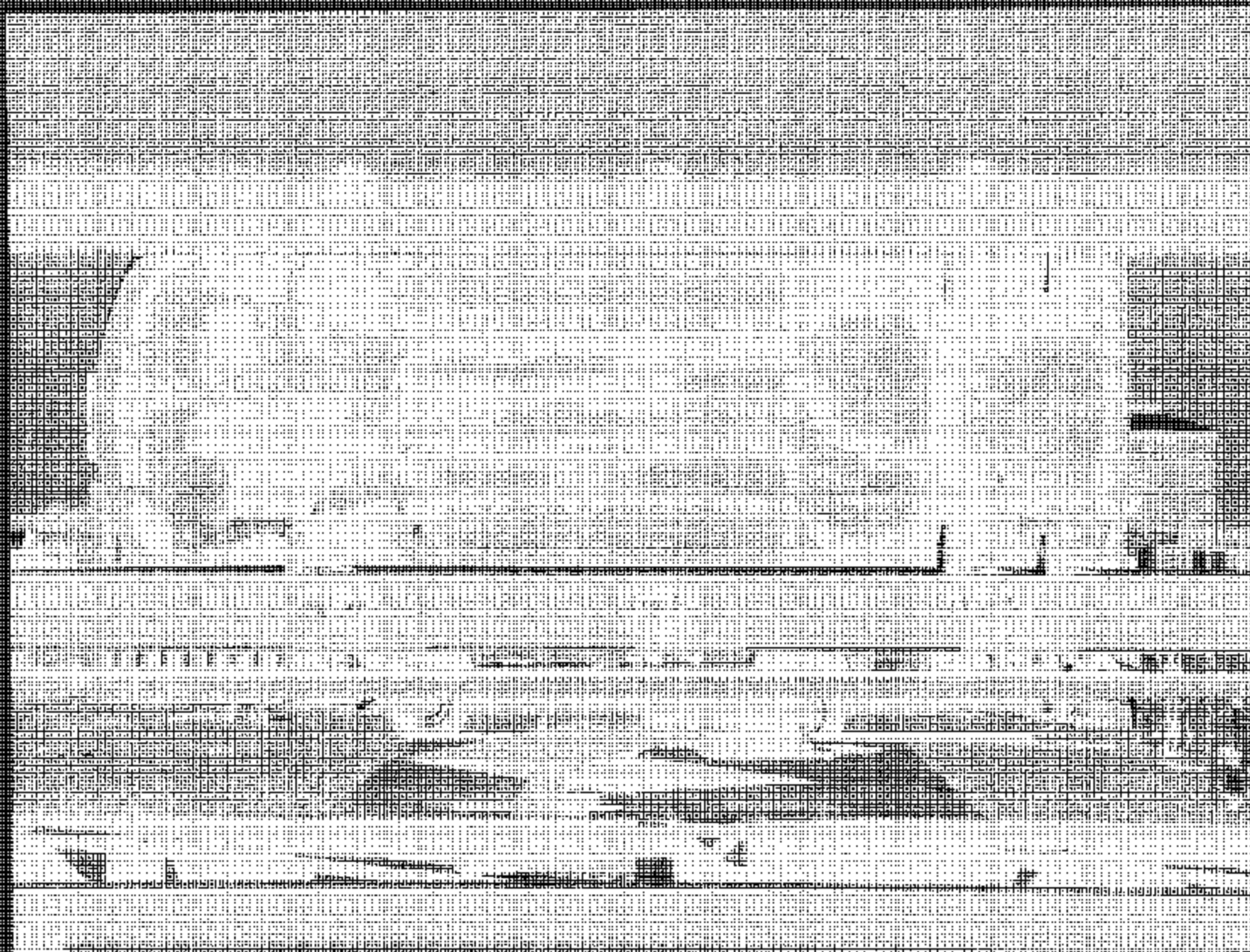


Figure A-24. Vehicle on Rollover Device at 270°



Figure A-25. Vehicle During Impact

A-25

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Figure A-25. Post-Test Fuel Door