

REPORT NO. 111-KAR-04-005

**SAFETY COMPLIANCE TESTING
FOR FMVSS 111**

313
HSE
637 274

**REARVIEW MIRRORS
(Other Than School Buses)**

2004 SUZUKI VERONA
4 DOOR SEDAN

NHTSA NO. C40502

PREPARED BY:
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June 30, 2004

FINAL REPORT

PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
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ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
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WASHINGTON, D.C. 20590

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

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8/6/04

Technical Report Documentation Page

| | | | |
|--|--|--|-----------|
| 1. Report No. 111-KAR-04-005 | 2. Government Accession No. | 3. Recipient's Catalog No. | |
| 4. Title and Subtitle Final Report of FMVSS 111 Compliance Testing of 2004 Suzuki Verona 4 Door Sedan NHTSA NO.: C40502 | | 5. Report Date June 30, 2004 | |
| | | 6. Performing Organization Code KAR | |
| 7. Author(s) Mr. Biren J. Patel, Project Engineer, KARCO Mr. Frank D. Richardson, Program Manager, KARCO | | 8. Performing Organization Report No. 111-KAR-04-005 | |
| 9. Performing Organization Name and Address KARCO Engineering 9270 Holly Road Adelanto, California 92301 | | 10. Work unit No. | |
| | | 11. Contract or Grant No. DTNH22-01-C-31025 | |
| 12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Enforcement Office of Vehicle Safety Compliance (NVS-220) 400 Seventh Street, SW, Room 6115 Washington, D.C. 20590 | | 13. Type of report and Period Covered Final Report- | |
| | | 14. Sponsoring Agency Code NVS 221 | |
| 15. Supplementary Notes | | | |
| 16. Abstract Compliance tests were conducted on the subject 2004 Suzuki Verona 4 Door Sedan on May 27 through June 24, 2004 in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP111V00 for the determination of FMVSS 111 compliance. There were no apparent test failures. | | | |
| 17. Key Words Compliance Testing Safety Engineering FMVSS 111 | | 18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Admin. Technical Information Services (TIS) Room 5108 (NAD-40) 400 Seventh St., SW Washington, DC 20590 | |
| 19. Security Classification (of this report) UNCLASSIFIED | 20. Security Classification (of this page) UNCLASSIFIED | 21. No. of Pages 69 | 22. Price |

Form DOT F1700.7 (8-72)

111-KAR-04-005

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SECTION 1
PURPOSE OF COMPLIANCE TEST

1. PURPOSE OF COMPLIANCE TEST

Tests were conducted on a 2004 Suzuki Verona 4 Door Sedan, manufactured by Daewoo Auto and Technology Company, to determine compliance with FMVSS 111, "Rearview Mirrors (Other than School Buses)". The purpose of this standard is to reduce the number of deaths and injuries that occur when the driver of a motor vehicle does not have a clear and reasonably unobstructed view to the rear.

All tests were conducted based on the current National Highway Traffic Safety Administration (NHTSA), Office of Vehicle Safety Compliance (OVSC) Laboratory Procedures, TP-111V-00, dated October 28, 1999, and corresponding KARCO Engineering test procedure KTP-111, dated April 18, 2001. Detailed procedures for receiving, inspecting, testing and reporting of test results are described in the test procedures and are not repeated in this report.

This report is organized in sections containing pertinent test information and data tables as follows:

- Section 2 - Compliance Test Procedure and Data Summary
- Section 3 - Test Results
- Appendix A - Photographs
- Appendix B - Data Plots
- Appendix C - Test Equipment List and Calibration Information
- Appendix D - Manufacturer Eyelipse Locations

SECTION 2
COMPLIANCE TEST PROCEDURE AND DATA SUMMARY

2. COMPLIANCE TEST PROCEDURE AND DATA SUMMARY

A 2004 Suzuki Verona 4 Door Sedan was subjected to FMVSS 111 compliance testing. The tests were conducted at KARCO Engineering in Adelanto, California on May 27 through June 24, 2004. Summary data is shown on page 23, Data Sheet No. 8. The following tests were performed:

- Inspection
- Mounting Adequacy Test
- Field-of-View Test, Inside Rearview Mirror
- Field-of-View Test, Driver's Side Outside Mirror
- Reflectance Test
- Breakaway Test
- Unit Magnification and Convex Mirror Tests

The tests were conducted per the FMVSS 111 test procedure. The significant aspects of the test procedure are described in the following paragraphs.

A. INSPECTION

Inspect the installation of the inside and outside rearview mirrors.

B. MOUNTING ADEQUACY TEST – ALL REARVIEW MIRRORS

B.1 INSIDE MIRROR (S5.1.2)

Determine that the mirror is securely mounted and determine the positive and negative angles of adjustment for both the vertical and horizontal directions.

B.2 OUTSIDE MIRROR(S) (S5.2.2 and S5.3)

Determine that the mirror(s) is (are) securely mounted. Determine that the driver's side mirror can be tilted in both horizontal and vertical directions from the driver's seated position. Determine that the passenger's side mirror is capable of adjustment by tilting in both the horizontal and vertical directions. Determine the positive and negative angles of adjustment for both horizontal and vertical directions for all outside mirrors. Determine that all outside mirrors are free of sharp points or edges that could contribute to pedestrian injury.

C. FIELD-OF-VIEW TEST – INSIDE REARVIEW MIRROR

C.1 REQUIREMENTS (S5.1.1)

The mirror shall provide a field of view with an included horizontal angle measured from the projected eye point of at least 20 degrees, and sufficient vertical angle to provide a view of a level road surface extending to the horizon beginning at a point not greater than 61m (200 feet) to the rear of the vehicle when the vehicle is occupied by the driver and four passengers or the designated occupant capacity, if less. The line of sight may be partially obscured by seated occupants or by head restraints.

Each car whose inside mirror does not meet the field of view requirements of S5.1.1 shall have an outside mirror of unit magnification or a convex mirror installed on the passenger's side. (S5.3)

D. FIELD-OF-VIEW TEST, DRIVER'S SIDE OUTSIDE REARVIEW MIRROR

D.1 REQUIREMENTS (S5.2)

Each passenger car shall have an outside mirror of unit magnification. The mirror shall provide the driver a view of a level road surface extending to the horizon from a line, perpendicular to a longitudinal plane tangent to the driver's side of the vehicle at the widest point, extending 2.4 meters (8 feet) out from the tangent plane 10.7 meters (35 feet) behind the driver's eyes, with the seat in the rearmost position. The line of sight may be partially obscured by rear body or fender contours. (S5.2.1)

Neither the mirror nor the mounting shall protrude farther than the widest part of the vehicle body except to the extent necessary to produce a field of view meeting or exceeding the requirements of S5.2.1. The mirror shall not be obscured by the un-wiped portion of the windshield. (S5.2.2)

E. REFLECTANCE TEST – ALL MIRRORS

E.1 REQUIREMENT (S11)

All single reflectance mirrors shall have an average reflectance of at least 35 percent. If a mirror is capable of multiple reflectance levels, the minimum reflectance level in the day mode shall be at least 35 percent and the minimum reflectance level in the night mode shall be at least 4 percent. The average reflectance of any mirror required by this standard shall be determined in accordance with SAE Recommended Practice J964, OCT 84.

F. BREAKAWAY TEST – INSIDE REARVIEW MIRROR

F.1 REQUIREMENTS (S5.1.2)

If the mirror is in the head impact area, the mounting shall deflect, collapse, or break away without leaving sharp edges when the reflective surface of the mirror is subjected to a force of 400 N (90 lb) in any forward direction that is not more than 45 degrees from the longitudinal direction.

G. UNIT MAGNIFICATION AND CONVEX MIRROR TESTS

G.1 REQUIREMENTS FOR PASSENGER CARS (§5.3 and §5.4)

The driver's side rearview mirror and the inside rearview mirror shall be unit magnification. If the field-of-view requirements are not met with the inside rearview mirror then the passenger's side rearview mirror is required. It can be either unit magnification or convex.

If the passenger's side mirror is convex, the average radius of curvature shall be not less than 889 mm (35 inches) and not more than 1651 millimeters (65 inches) and shall not deviate from the average by more than plus or minus 12.5 percent. The convex mirror shall have permanently and indelibly marked at the lower edge of the mirror's reflective surface in letters not less than 4.8 mm (3/16 inch) nor more than 6.4 mm (0.25 inch) high the words, "Objects in Mirror Are Closer Than They Appear."

SECTION 3

TEST DATA

3. TEST DATA

The results of FMVSS 111 compliance tests that were conducted on the 2004 Suzuki Verona 4 Door Sedan on May 27 through June 24, 2004 to determine compliance with FMVSS 111, "Rearview Mirrors (other than School Buses)" are presented in this section.

DATA SHEET NO. 1

VEHICLE INSPECTION AND IDENTIFICATION

| TEST VEHICLE INFORMATION | | | |
|-----------------------------|------------------------------------|------------------------|-------------------|
| Manufacturer | DAEWOO AUTO AND TECHNOLOGY COMPANY | VIN | KL5VJ52L34B098285 |
| Manufacturing Date | 07/03 | Delivery Date | 04/08/04 |
| Dealer | LANCASTER AUTO GROUP | NHTSA No. | C40502 |
| Odometer Reading (mi.) | 64 | Fuel Type | GAS |
| Engine Displacement | 2.5 | Cylinders | 4 |
| Transmission | AUTOMATIC | Final Drive | FRONT |
| Engine Placement | TRANSVERSE | Color | TEAL |
| Tire Press./Max. Cap. Front | 44 | Cold Tire Press. Front | 30 |
| Tire Press./Max. Cap. Rear | 44 | Cold Tire Press. Rear | 30 |
| Recommend Tire Size | P205/65R15 | Type of Spare | P205/65R15 |
| Tire Size on Vehicle | P205/65R15 | Manufacturer | KUMHO |
| GVWR | 4279 | Cargo Capacity | 898 |
| GAWR Front | 2165 | GAWR Rear | 2114 |
| Air Conditioning | YES | Power Steering | YES |
| Power Brakes | YES | AM/FM/Cassette | YES |
| Disc Brakes (Front) | YES | Disc Brakes (Rear) | YES |
| Power Windows | YES | Tilt Steering | YES |
| Anti-lock Brakes (ABS) | NO | Power Seats | NO |
| Driver Airbag | YES | Passenger Airbag | YES |

TEST VEHICLE ATTITUDE (mm)

| ATTITUDE | LF | RF | LR | RR |
|------------------|------|-----|-----|-----|
| As Delivered | 686 | 696 | 685 | 689 |
| As Tested | 661 | 671 | 633 | 641 |
| Rear View Mirror | 1310 | | | |

DATA SHEET NO. 1... (Continued)

| VEHICLE | | | |
|------------|----------|--------------|-------------------|
| YEAR | 2004 | MAKE | SUZUKI |
| MODEL | VERONA | BODY STYLE | 4 DOOR SEDAN |
| NHTSA NO. | C40502 | VIN | KL5VJ52L34B098285 |
| TEST DATE: | 05/27/04 | TEMPERATURE: | 84°F |

LEGEND: LE = Left Eye; RE = Right Eye; P = Neck Pivot Point, SRP = Seating Reference Point

COORDINATE SYSTEM:

X = Longitudinal Dimension

Y = Lateral Dimension

Z = Vertical Dimension

Positive Values are as follows:

X = Forward of Reference Point

Y = Outboard of Reference Point (to driver's side)

Z = Above Reference Point

Provide Reference Point or Body Fiducial Point that dimensions below are measured from. (Point should be usable by laboratory personnel, i.e., center of an anchorage bolt, door jam latch, etc.).

| COORDINATES | LEFT SIDE MIRROR | | | INSIDE MIRROR | | | RIGHT SIDE MIRROR | | | SRP |
|---------------------------------|------------------|-------|-------|---------------|-------|-------|-------------------|-------|-------|-----|
| | P1 | LE1 | RE1 | P2 | LE2 | RE2 | P3 | LE3 | RE3 | |
| X | | 130 | 130 | | 130 | 130 | | 130 | 130 | |
| Y | | 272.8 | 337.8 | | 272.8 | 337.8 | | 272.8 | 337.8 | |
| Z | | 870.3 | 870.3 | | 870.3 | 870.3 | | 870.3 | 870.3 | |
| Mirror Mfr., Model And Part No. | 96480831 | | | 96218436 | | | 96482441 | | | |
| SRP Travel and Eye-Ellipse | N/A | | | | | | | | | |

Reference Point- Front Outer seat track mounting bolt. Co-ordinates X = 3305.0, Y= 675.3, Z = 209.2

DATA SHEET NO. 1... (Continued)

| | | |
|---|----------------------------|------------------------------|
| DATE OF INSPECTION/IDENTIFICATION: | | 05/27/04 |
| TYPES OF REARVIEW MIRRORS: | | |
| | INSIDE REARVIEW-- | WINDSHIELD MOUNTED DAY/NIGHT |
| | DRIVER'S SIDE OUTSIDE-- | FLAT |
| | PASSENGER'S SIDE OUTSIDE-- | CONVEX |
| LOCATION AND DESCRIPTION OF FIDUCIAL MARKS: | | SEE PREVIOUS PAGE |
| MAXIMUM NUMBER OF OCCUPANTS: | | 5 |

RESULTS OR RECEIVING INSPECTION:

PASS -- X

FAIL --

CONDITIONAL --

CONDITIONS:

DISPOSITION/ACTION:

REMARKS:

RECORDED BY: PABLO VEGA DATE: 05/27/04

APPROVED BY: MATTHEW A. IVORY DATE: 05/27/04

DATA SHEET NO. 2

MOUNTING AND TILTING ADEQUACY TEST

| VEHICLE | | | |
|------------|----------|--------------|-------------------|
| YEAR | 2004 | MAKE | SUZUKI |
| MODEL | VERONA | BODY STYLE | 4 DOOR SEDAN |
| NHTSA NO. | C40502 | VIN | KL5VJ52L34B098285 |
| TEST DATE: | 05/27/04 | TEMPERATURE: | 84°F |

| MIRROR MOUNTING PROVIDES A STABLE SUPPORT | PASS | FAIL | CONDITIONAL |
|---|------|------|--------------|
| INSIDE REARVIEW MIRROR | X | | |
| DRIVER SIDE OUTSIDE MIRROR | X | | |
| PASSENGER SIDE OUTSIDE MIRROR | X | | NOT REQUIRED |

| OUTSIDE MIRRORS FREE OF SHARP POINTS OR EDGES | PASS | FAIL |
|---|------|------|
| DRIVER SIDE OUTSIDE MIRROR | X | |
| PASSENGER SIDE OUTSIDE MIRROR | X | |

| MIRROR IS ADJUSTABLE VERTICALLY & HORIZONTALLY | PASS | FAIL | CONDITIONAL |
|--|------|------|--------------|
| INSIDE REARVIEW MIRROR | X | | |
| DRIVER SIDE OUTSIDE MIRROR | X | | |
| PASSENGER SIDE OUTSIDE MIRROR | X | | NOT REQUIRED |

| DRIVER'S OUTSIDE MIRROR ADJUSTABLE FROM THE DRIVER'S SEATED POSITION | PASS | FAIL |
|--|------|------|
| DRIVER SIDE OUTSIDE MIRROR | X | |

| MIRROR ADJUSTMENT ANGLE | V+ | V- | H+ | H- |
|-------------------------------|------|-------|----|-----|
| INSIDE REARVIEW MIRROR | 21.5 | -43.4 | 35 | -25 |
| DRIVER SIDE OUTSIDE MIRROR | 11 | -5.5 | 24 | -13 |
| PASSENGER SIDE OUTSIDE MIRROR | 11 | -5.5 | 33 | -26 |

THIS SECTION IS RESERVED FOR MPV's, TRUCKS AND BUSES, OTHER THAN SCHOOL BUSES, NOT CONFORMING TO PASSENGER CAR REQUIREMENTS

| MIRROR PROVIDES A VIEW TO THE REAR ALONG BOTH SIDES OF THE VEHICLE | PASS | FAIL | CONDITIONAL |
|--|------|------|-------------|
| DRIVER SIDE OUTSIDE MIRROR | N/A | | |
| PASSENGER SIDE OUTSIDE MIRROR | N/A | | |

| | | | | |
|--------------|----------|---|----------|--|
| TEST STATUS: | PASSED — | X | FAILED — | |
|--------------|----------|---|----------|--|

RECORDED BY: PABLO VEGA DATE: 05/27/04

APPROVED BY: MATTHEW A. IVORY DATE: 05/27/04

DATA SHEET NO. 3

FIELD OF VIEW TEST - INSIDE REARVIEW MIRROR

| VEHICLE | | | |
|------------|----------|--------------|-------------------|
| YEAR | 2004 | MAKE | SUZUKI |
| MODEL | VERONA | BODY STYLE | 4 DOOR SEDAN |
| NHTSA NO. | C40502 | VIN | KL5VJ52L34B098285 |
| TEST DATE: | 05/27/04 | TEMPERATURE: | 85°F |

E Distance from center of mirror to projected eye point location = 530.0 mm

A Distance from rear of vehicle to projected eye point location = 3280.0mm

X1 Distance from rear of vehicle to field of view grid = 8280.4 mm

Z1 Vertical distance to lowest point of field of view at distance X1 730.0 mm

Z2 Height of center of mirror = 1310.0mm

X2 Distance from rear of vehicle where the road surface is first visible
 $X2 = [(Z2 \times X1) + (Z1 \times A)] / (Z2 - Z1) =$
 (S111 REQUIREMENT = 61m maximum) 22830.55mm (22.83 m)

| EYE LOCATION | MONOCULAR DATA (ALR & ARL ARE ANGLES) | | | |
|-----------------|---------------------------------------|------------|---------|---------|
| | YL (mm) | YR (mm) | ALR (°) | ARL (°) |
| LEFT EYE POINT | YLL = 2210 | YRL = 2815 | | 13.04 |
| RIGHT EYE POINT | YLR = 3005 | YRR = 1930 | 15.06 | |

CALCULATED HORIZONTAL AMBINOCULAR VIEW ANGLE (AB)

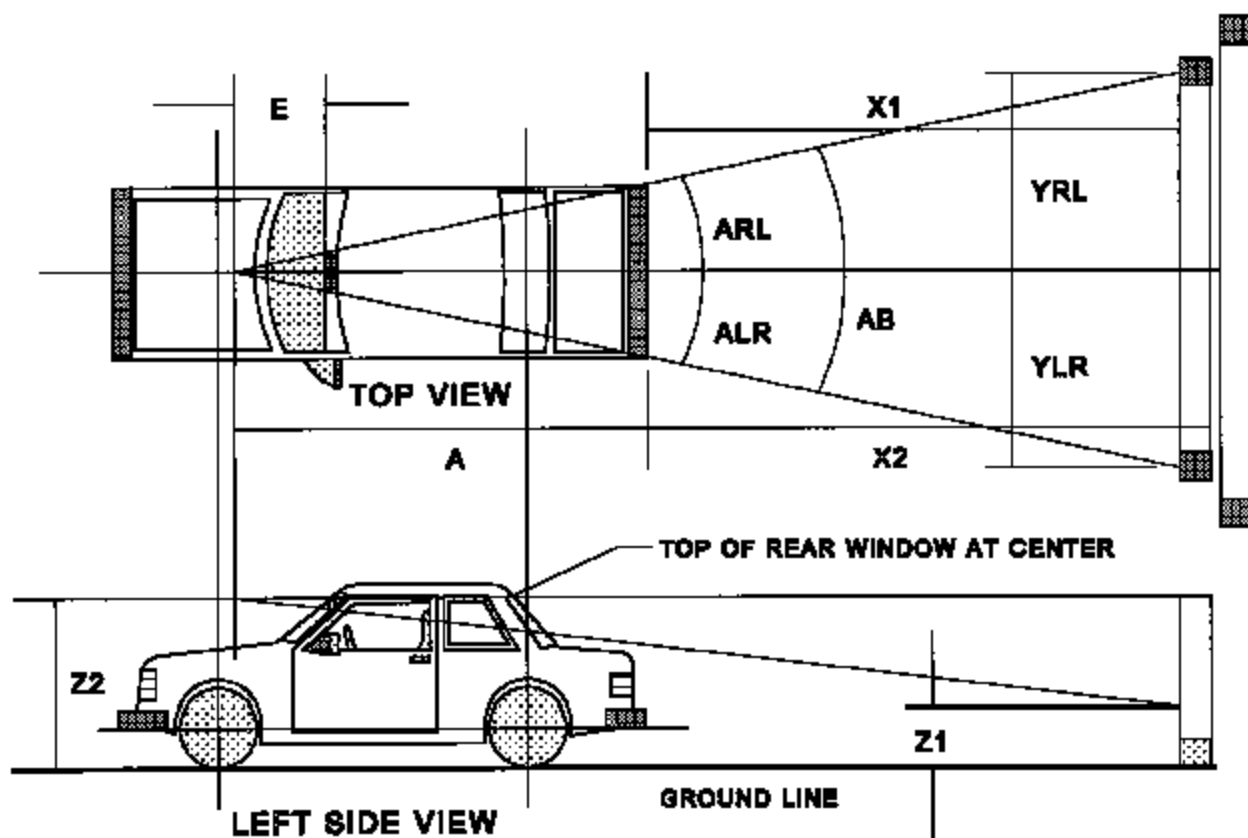
ANGLE AB = ANGLE ALR + ANGLE ARL

$ALR = \tan^{-1} [YLR / (X1 + A)]$ $ARL = \tan^{-1} [YRL / (X1 + A)]$

ANGLE AB = 28.10 (S111 REQUIREMENT = 20 degrees minimum)

| | | | | |
|--------------|----------|---|----------|--|
| TEST STATUS: | PASSED — | x | FAILED — | |
|--------------|----------|---|----------|--|

INSIDE REARVIEW MIRROR FIELD OF VIEW TEST GRID AND MARKER SETUP



DATA SHEET NO. 3... (Continued)

DRIVER SIDE MIRROR (S5.2)

MIRROR OBSCURED BY UNWIPED PORTION OF WINDSHIELD YES ____ NO X

HEIGHT OF TARGET DISC ON MIRROR 1143 mm

DISTANCE OF TARGET DISC ON MIRROR FROM VEHICLE
TANGENT PLANE 58 mm

TARGET DISC LOCATION RELATIVE TO VEHICLE TANGENT PLANE INBOARD
(Inboard or Outboard)

ENTIRE TRIANGULAR TEST TARGET AREA ON SCREEN VISIBLE YES X NO ____

MIRROR PROTRUDES BEYOND VEHICLE TANGENT PLANE YES X NO ____

PROTRUSION REQUIRED TO MEET FIELD OF VIEW REQUIREMENT YES X NO ____

| | | | | |
|--------------|----------|----------|----------|--|
| TEST STATUS: | PASSED — | X | FAILED — | |
|--------------|----------|----------|----------|--|

PASSENGER SIDE MIRROR (S5.3 or MFG. OPTION)

PASSENGER SIDE MIRROR TYPE (convex or unit magnification) CONVEX

REMARKS:

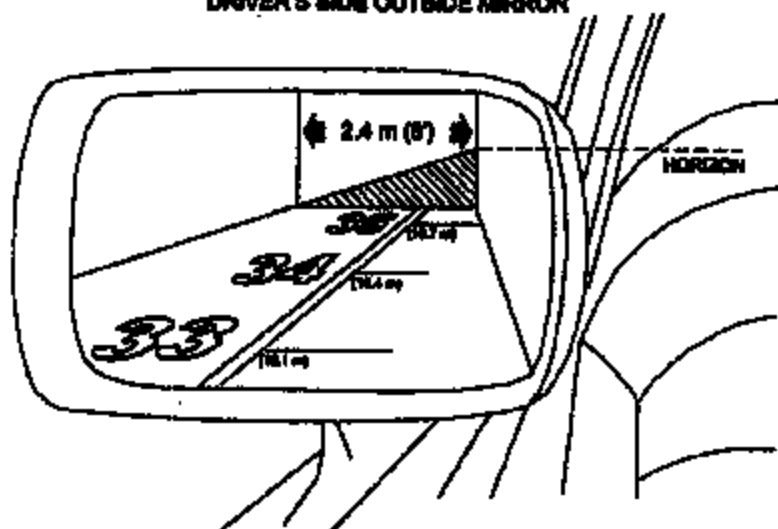
VEHICLE ATTITUDE AND GROUND LEVEL WERE RAISED 4".

RECORDED BY: PABLO VEGA DATE: 05/27/04

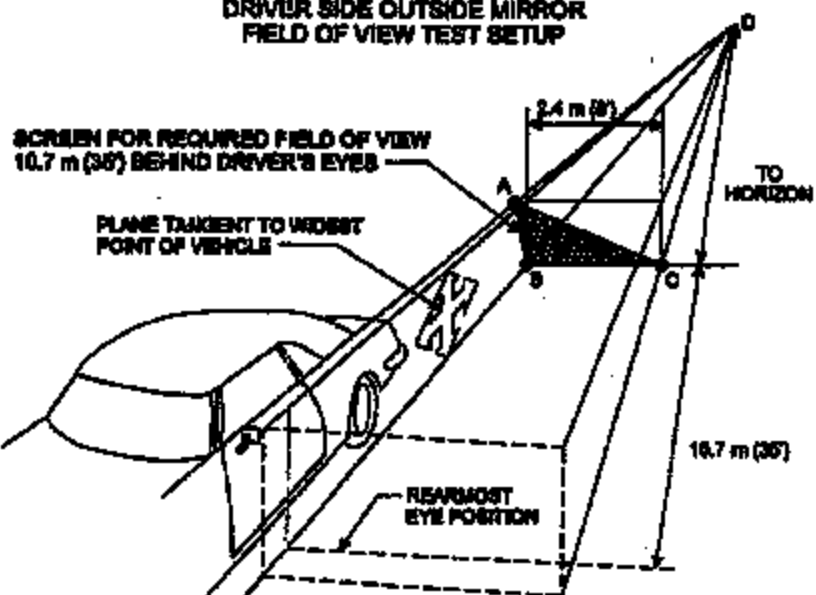
APPROVED BY: MATTHEW A. IVORY DATE: 05/27/04

DATA SHEET NO. 3... (Continued)

REQUIRED FIELD OF VIEW AS SEEN IN DRIVER'S SIDE OUTSIDE MIRROR

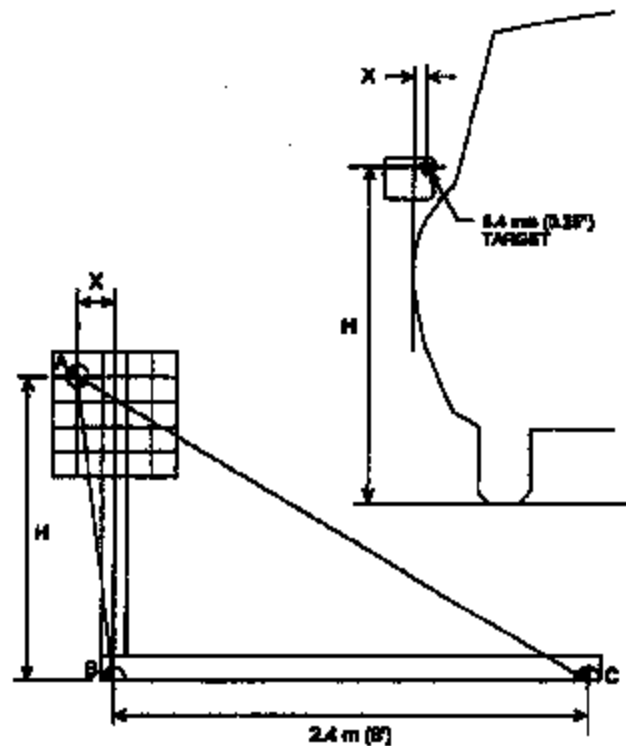


DRIVER SIDE OUTSIDE MIRROR FIELD OF VIEW TEST SETUP

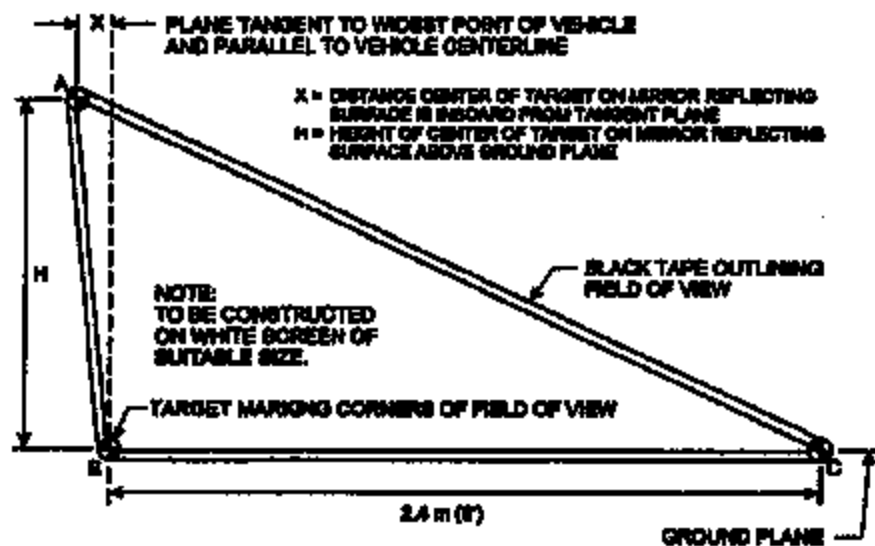


DATA SHEET NO. 3... (Continued)

DRIVER SIDE OUTSIDE MIRROR TARGET DISC LOCATION WITH X AND H DIMENSIONS



DRIVER SIDE OUTSIDE MIRROR REQUIRED FIELD OF VIEW TRIANGLE



DATA SHEET NO. 4

REFLECTANCE TEST

| VEHICLE | | | |
|------------|----------|--------------|-------------------|
| YEAR | 2004 | MAKE | SUZUKI |
| MODEL | VERONA | BODY STYLE | 4 DOOR SEDAN |
| NHTSA NO. | C40502 | VIN | KL5VJ52L34B096285 |
| TEST DATE: | 05/27/04 | TEMPERATURE: | 72°F |

DESCRIPTION OF TEST APPARATUS: THE APPARATUS CONSISTS OF AN INCANDESCENT TUNGSTEN FILAMENT LAMP OPERATING AT A NOMINAL COLOR TEMPERATURE OF 2,856 K, COLLIMATING OPTICS, A SAMPLE HOLDER POSITIONED AT 25°, A SILICON PHOTOCELL, AND A FLUKE 45 DUAL DISPLAY MULTIMETER (CALIBRATION DUE DATE 3-21-05). REFLECTANCE TESTS ARE CONDUCTED IN A 4'X6' WOODEN CABINET PAINTED FLAT BLACK.

MIRROR DESCRIPTION: INTERIOR DAY/NIGHT REAR VIEW MIRROR

VOLTAGE READING FROM CALIBRATION (Average Value): 295 mV

VOLTAGE READING FROM LIGHT REFLECTED BY DAY MIRROR (Average Value): 280 mV

| REFLECTOMETER VOLTAGE READINGS | | |
|--------------------------------|------------|--------------|
| | DAY MIRROR | NIGHT MIRROR |
| TEST NO. 1 | 279 mV | 208 mV |
| TEST NO. 2 | 280 mV | 209 mV |
| TEST NO. 3 | 279 mV | 208 mV |
| TEST NO. 4 | 280 mV | 208 mV |
| TEST NO. 5 | 280 mV | 208 mV |

*Day/night portion of mirror was electronic and required a voltage to keep the night portion active. As the tests progressed, the voltage of our supply battery dropped causing the reflectance level to increase. The mirror still met the reflectance requirements of FMVSS 111.

REFLECTANCE (Day) = Voltage (Ref)/Voltage (Cal) = 0. 949 x 100 = 94.9 percent
(Min. Required = 35%)

VOLTAGE READING FROM CALIBRATION (Average Value) = 295 mV

VOLTAGE READING FROM LIGHT REFLECTED BY NIGHT MIRROR (Average Value): 208 mV

REFLECTANCE (Night) = Voltage (Ref)/Voltage (Cal) = 0. 705 x 100 = 70.5 percent
(Min. Required = 4%)

NOTE: If meter reading directly in percent is used, record only percent

DATA SHEET NO. 4... (Continued)

MIRROR DESCRIPTION: DRIVER SIDE OUTSIDE MIRROR.

VOLTAGE READING FROM CALIBRATION (Average Value): 295 mV

VOLTAGE READING FROM LIGHT REFLECTED BY DAY MIRROR (Average Value): 274 mV

| REFLECTOMETER VOLTAGE READINGS | |
|--------------------------------|--------|
| TEST NO. 1 | 274 mV |
| TEST NO. 2 | 274 mV |
| TEST NO. 3 | 274 mV |
| TEST NO. 4 | 274 mV |
| TEST NO. 5 | 274 mV |

REFLECTANCE (Day) = Voltage (Refl)/Voltage (Cal) = 0. 928 x 100 = 92.8 percent
(Min. Required = 35%)

VOLTAGE READING FROM CALIBRATION (Average Value) = 295 mV

NOTE: If meter reading directly in percent is used, record only percent

| | | | | |
|--------------|----------|---|----------|--|
| TEST STATUS: | PASSED — | X | FAILED — | |
|--------------|----------|---|----------|--|

RECORDED BY: PABLO VEGA DATE: 05/27/04

APPROVED BY: MATTHEW A. IVORY DATE: 05/27/04

DATA SHEET NO. 5**BREAKAWAY TEST - INSIDE REARVIEW MIRROR**

| VEHICLE | | | |
|------------|---------|--------------|-------------------|
| YEAR | 2004 | MAKE | SUZUKI |
| MODEL | VERONA | BODY STYLE | 4 DOOR SEDAN |
| NHTSA NO. | C40502 | VIN | KL5VJ52L34B098285 |
| TEST DATE: | 5/27/04 | TEMPERATURE: | 86° F |

MOUNTING OF MIRROR (INSIDE) DESCRIPTION: TAB GLUED TO WINDSHIELD. MIRROR BASE SLIPS OVER BASE AND HELD IN PLACE WITH SET SCREW.

(Requirement: the mirror shall deflect, collapse or break away when it is subjected to a force of 400 N or less)

| TEST NO. | LOAD DIRECTION VERTICAL/HORIZONTAL | MAXIMUM FORCE (N) | DISPLACEMENT (MM) | PASS | FAIL |
|----------|------------------------------------|-------------------|-------------------|------|------|
| 1 | 0-90 DEGREES | 311.0 | 8.1 | X | |
| 2 | +45/90 DEGREES | 273.1 | 6.4 | X | |
| 3 | -45/90 DEGREES | 192.0 | 19.8 | X | |
| 4 | -45/+45 DEGREES | 74.4 | 18.8 | X | |
| 5 | +45/+45 DEGREES | 224.4 | 24.9 | X | |
| 6 | +45/-45 DEGREES | 301.4 | 34.7 | X | |
| 7 | -45/-45 DEGREES | 233.9 | 26.0 | X | |

REMARKS:

DATA SHEET NO. 5... (Continued)

BREAKAWAY TEST - INSIDE REARVIEW MIRROR FAILURE TYPE - DESCRIPTION:

FAILURE TYPE - DESCRIPTION:

NONE

| | | | | |
|---------------------|-----------------|----------|-----------------|--|
| TEST STATUS: | PASSED — | X | FAILED — | |
|---------------------|-----------------|----------|-----------------|--|

REMARKS:

RECORDED BY: MICHAEL DUNLAP

DATE: 05/27/04

APPROVED BY: MATTHEW A. IVORY

DATE: 05/27/04

DATA SHEET NO. 6

UNIT MAGNIFICATION AND CONVEX MIRROR TESTS

| VEHICLE | | | |
|------------|----------|--------------|-------------------|
| YEAR | 2004 | MAKE | SUZUKI |
| MODEL | VERONA | BODY STYLE | 4 DOOR SEDAN |
| NHTSA NO. | C40502 | VIN | KL5VJ52L34B098285 |
| TEST DATE: | 05/27/04 | TEMPERATURE: | 82°F |

DESCRIPTION OF TEST APPARATUS: 3-POINT LINEAR SPHEROMETER MANUFACTURED BY AMERICAN OPTICAL CORPORATION, GENEVA LENS MEASURE M667 1.53. SERIAL NUMBER 78622. THE SPHEROMETER USED DID NOT MEET THE ACCURACY REQUIREMENTS OF FMVSS 111. GAGE MEASURED IN DIOPTERS. RADIUS OF CURVATURE WAS CALCULATED USING THE EQUATION :

$$\text{RADIUS IN INCHES} = (530)(0.03937)/\text{GAGE READING}$$

DRIVER'S SIDE & INSIDE REARVIEW MIRRORS:

| DRIVER SIDE MIRROR | |
|--------------------|---------------|
| TEST POSITION | DIAL READINGS |
| 1 | 0 |
| 2 | 0 |
| 3 | 0 |
| 4 | 0 |
| 5 | 0 |
| 6 | 0 |
| 7 | 0 |
| 8 | 0 |
| 9 | 0 |
| 10 | 0 |

| INSIDE MIRROR | |
|---------------|---------------|
| TEST POSITION | DIAL READINGS |
| 1 | 0 |
| 2 | 0 |
| 3 | 0 |
| 4 | 0 |
| 5 | 0 |
| 6 | 0 |
| 7 | 0 |
| 8 | 0 |
| 9 | 0 |
| 10 | 0 |

All dial indicator readings for unit magnification mirrors must be zero.

DATA SHEET NO. 8... (Continued)

UNIT MAGNIFICATION AND CONVEX MIRROR TESTS

PASSENGER SIDE REARVIEW MIRROR:

**CONVERSION TABLE FROM SPHEROMETER DIAL
READING TO RADIUS OF CURVATURE**

| TEST POSITION | DIAL READINGS (DIOPTERS) PASSENGER | RADIUS OF CURVATURE (mm) | DEVIATION BETWEEN THE AVERAGE RADIUS OF CURVATURE AND THE TEST POSITION RADIUS OF CURVATURE (mm) | PERCENT DEVIATION FROM THE AVERAGE RADIUS OF CURVATURE |
|-----------------------------|------------------------------------|--------------------------|--|--|
| 1 | 0.300 | 1778.0 | 0 | 0 |
| 2 | 0.300 | 1778.0 | 0 | 0 |
| 3 | 0.300 | 1778.0 | 0 | 0 |
| 4 | 0.300 | 1778.0 | 0 | 0 |
| 5 | 0.300 | 1778.0 | 0 | 0 |
| 6 | 0.300 | 1778.0 | 0 | 0 |
| 7 | 0.300 | 1778.0 | 0 | 0 |
| 8 | 0.300 | 1778.0 | 0 | 0 |
| 9 | 0.300 | 1778.0 | 0 | 0 |
| 10 | 0.300 | 1778.0 | 0 | 0 |
| Average Radius of Curvature | | 1778.0 | Greatest Percent Deviation | 0 |

REMARKS:

MIRROR NOT REQUIRED TO MEET FMVSS 111 REQUIREMENTS.

DATA SHEET NO. 8... (Continued)

UNIT MAGNIFICATION AND CONVEX MIRROR TESTS

PASSENGER'S SIDE REARVIEW MIRROR

IF CONVEX, ARE THERE ANY DISCONTINUITIES IN THE SLOPE OF THE MIRROR SURFACE YES NO X

IF CONVEX, ARE THE WORDS, "OBJECTS IN THE MIRROR ARE CLOSER THAN THEY APPEAR" PRESENT YES X NO

IF CONVEX, MEASURE LETTER HEIGHT OF WORDS 5.0 mm

IF CONVEX, LETTERS ARE NOT < 4.8 mm OR > 6.4 mm HIGH YES X NO

IF CONVEX, RADIUS OF CURVATURE NOT < 889 mm OR > 1651 mm YES NO X

IF CONVEX, THE GREATEST PERCENT DEVIATION FROM AVERAGE RADIUS OF CURVATURE IS $\pm 12.5\%$ YES X NO

IF UNIT MAGNIFICATION, ALL DIAL READINGS ARE ZERO ± 0 . YES N/A NO

NOTE: PASSENGER SIDE MIRROR NOT REQUIRED TO MEET REQUIREMENTS OF FMVSS 111.

| | | | | |
|--------------|----------|-----|----------|--|
| TEST STATUS: | PASSED — | N/A | FAILED — | |
|--------------|----------|-----|----------|--|

RECORDED BY: PABLO VEGA DATE: 05/27/04

APPROVED BY: MATTHEW A. IVORY DATE: 05/27/04

DATA SHEET NO. 7
MIRROR REFLECTIVE SURFACE AREA TEST

| VEHICLE | | | |
|------------|----------|--------------|-------------------|
| YEAR | 2004 | MAKE | SUZUKI |
| MODEL | VERONA | BODY STYLE | 4 DOOR SEDAN |
| NHTSA NO. | C40502 | VIN | KL5VJ52L34B006285 |
| TEST DATE: | 05/27/04 | TEMPERATURE: | 82°F |

MPVs, TRUCKS & BUSES (OTHER THAN SCHOOL BUSES)

DATA TABLE FOR SURFACE AREA

| MIRRORS | AREA (cm ²) | REQUIREMENT | | RESULTS | |
|------------------------|-------------------------|---------------------|---------------------|---------|------|
| | | GVWR < 4536 kg | GVWR ≥ 4536 kg | PASS | FAIL |
| Outside Driver's Side | 156.64 cm ² | 126 cm ² | 323 cm ² | N/A | |
| Outside Passenger Side | 153.96 cm ² | 126 cm ² | 323 cm ² | N/A | |

MIRRORS LOCATED SO AS TO PROVIDE DRIVER A VIEW TO THE REAR:

LEFT SIDE YES X NO

RIGHT SIDE YES X NO

| | | | | |
|--------------|----------|-----|----------|--|
| TEST STATUS: | PASSED — | N/A | FAILED — | |
|--------------|----------|-----|----------|--|

REMARKS: NO SURFACE AREA REQUIREMENTS

| | | | |
|--------------|-------------------------|-------|-----------------|
| RECORDED BY: | <u>PABLO VEGA</u> | DATE: | <u>05/27/04</u> |
| APPROVED BY: | <u>MATTHEW A. IVORY</u> | DATE: | <u>05/27/04</u> |

DATA SHEET NO. 8

TEST SUMMARY-FMVSS 111-REARVIEW MIRRORS

| VEHICLE | | | |
|------------|----------|--------------|-------------------|
| YEAR | 2004 | MAKE | SUZUKI |
| MODEL | VERONA | BODY STYLE | 4 DOOR SEDAN |
| NHTSA NO. | C40502 | VIN | KL5VJ52L34B098285 |
| TEST DATE: | 05/27/04 | TEMPERATURE: | N/A |

PASSENGER VEHICLE TESTING:

| OUTSIDE DRIVER SIDE MIRROR | PASS | FAIL | COMMENTS |
|---|------|------|----------|
| STABLE SUPPORT | X | | |
| DOES NOT PROTRUDE BEYOND VEHICLE BODY | X | | |
| NOT OBSCURED BY UNWIPED PORTION OF WINDSHIELD | X | | |
| ADJUSTABLE BY TILTING | X | | |
| ADJUSTABLE FROM DRIVER SEAT | X | | |
| FREE OF SHARP EDGES | X | | |
| FIELD-OF-VIEW | X | | |
| REFLECTANCE | X | | |
| UNIT MAGNIFICATION | X | | |

| INSIDE REARVIEW MIRROR | PASS | FAIL | COMMENTS |
|------------------------|------|------|----------|
| STABLE SUPPORT | X | | |
| ADJUSTABLE BY TILTING | X | | |
| FIELD-OF-VIEW | X | | |
| REFLECTANCE | X | | |
| BREAK AWAY | X | | |
| UNIT MAGNIFICATION | X | | |

| OUTSIDE PASSENGER MIRROR * (IF REQUIRED) | PASS | FAIL | COMMENTS |
|---|------|------|----------|
| STABLE SUPPORT | X | | |
| ADJUSTABLE BY TILTING | X | | |
| FREE OF SHARP EDGES | X | | |
| UNIT OR CONVEX | | | Convex |
| LABELING | X | | |
| REFLECTANCE | N/A | | |

*NOT REQUIRED

APPENDIX A
PHOTOGRAPHS

A-1

111-KAR-04-005



2004 SUZUKI VERONA
NHTSA NO. C40502
FMVSS NO. 111

FIGURE 1: LEFT FRONT ¾ VIEW

A-2

111-KAR-04-005

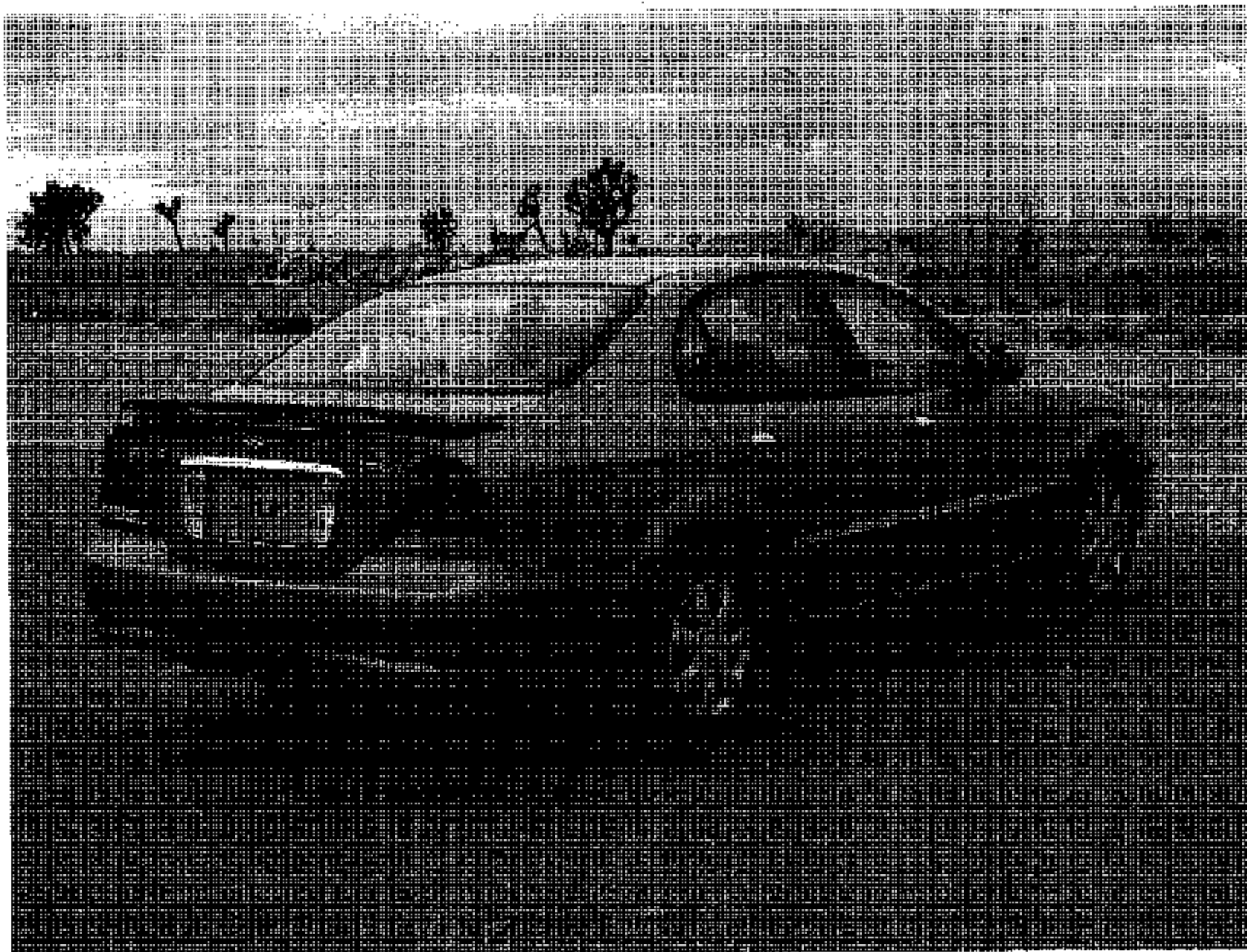


2004 SUZUKI VERONA
NHTSA NO. C40502
FMVSS NO. 111

FIGURE 2: LEFT SIDE VIEW

A-3

111-KAR-04-005



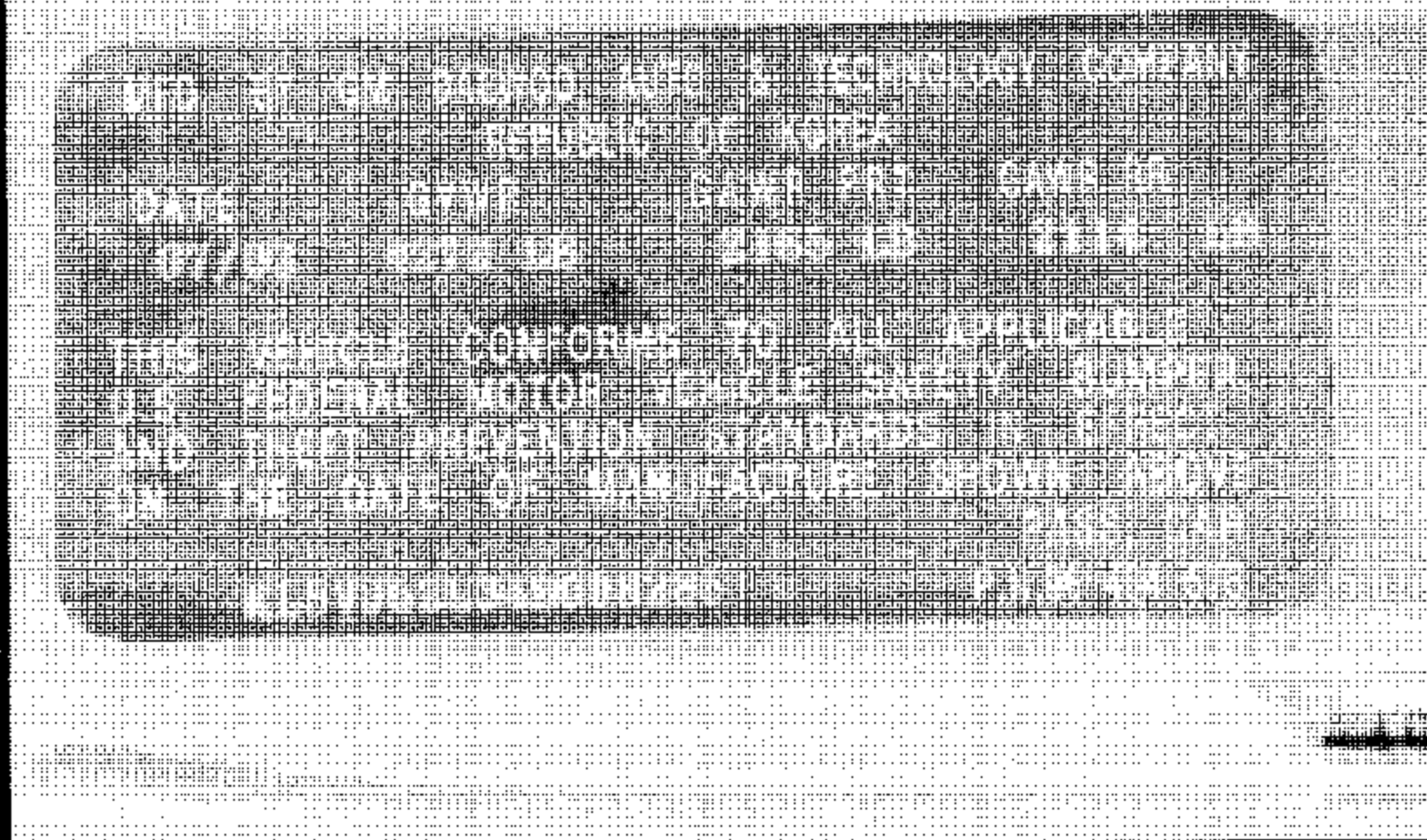
2004 SUZUKI VERONA
NHTSA NO. C40502
FMVSS NO. 111

FIGURE 3: RIGHT REAR 3/4 VIEW



2004 SUZUKI VERONA
NHTSA NO. C40502
FMVSS NO. 111

FIGURE 4: RIGHT SIDE VIEW



2004 SUZUKI VERONA
NHTSA NO. C40502
FMVSS NO. 111

FIGURE 5: MANUFACTURER'S LABEL



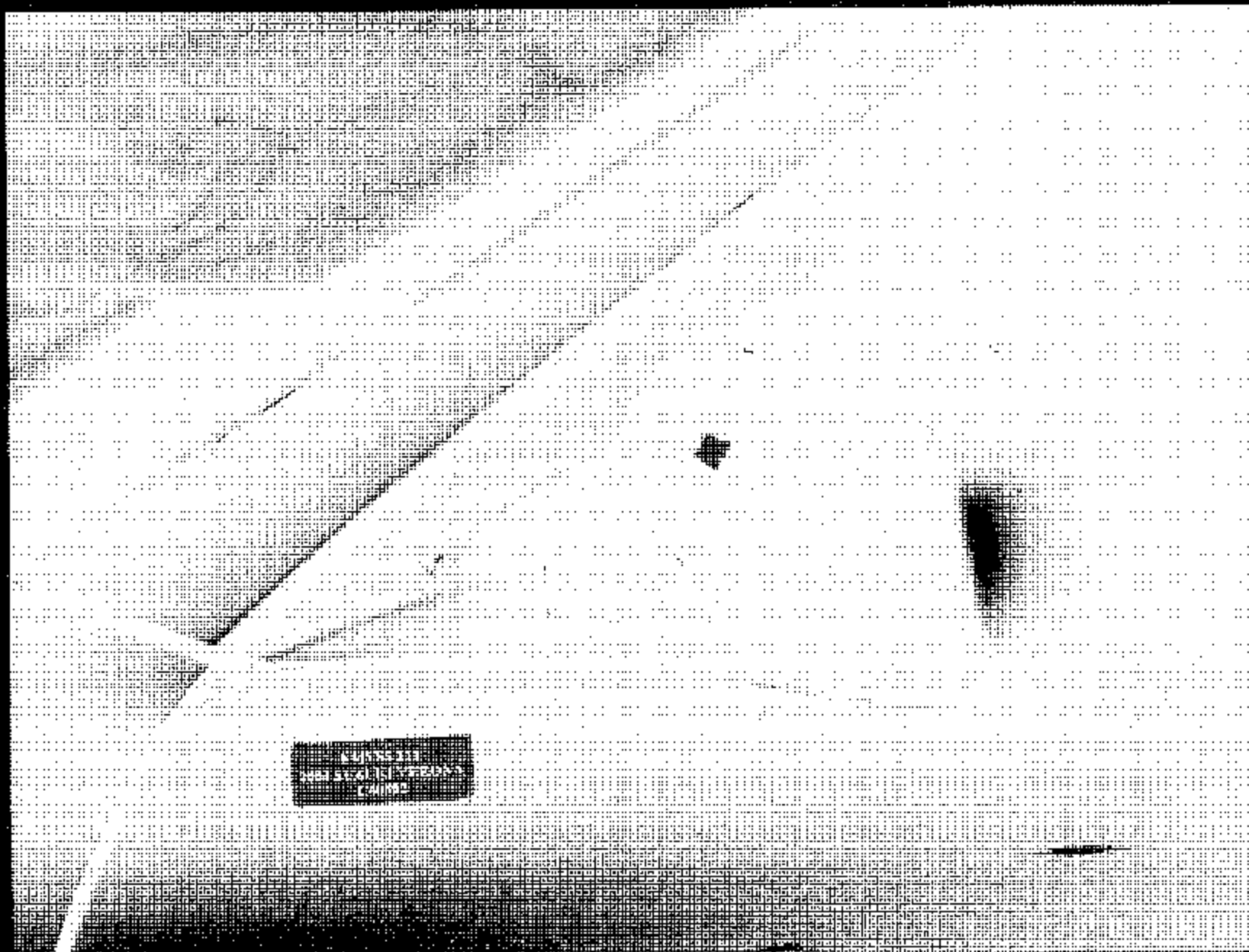
SEATING CAPACITY: TOTAL 5 (FRONT 2, REAR 3)

The combined weight of occupants and cargo should never exceed the weight shown below.

| ORIGINAL TIRE SIZE | COLD TIRE INFLATION PRESSURE | |
|--------------------|------------------------------|---------------|
| P205/65 R15 92H | FRONT | 210KPA, 30PSI |
| | REAR | 210KPA, 30PSI |
| SPARE TIRE | COLD TIRE INFLATION PRESSURE | |
| P205/65R15 92H | 210KPA, 30PSI | |

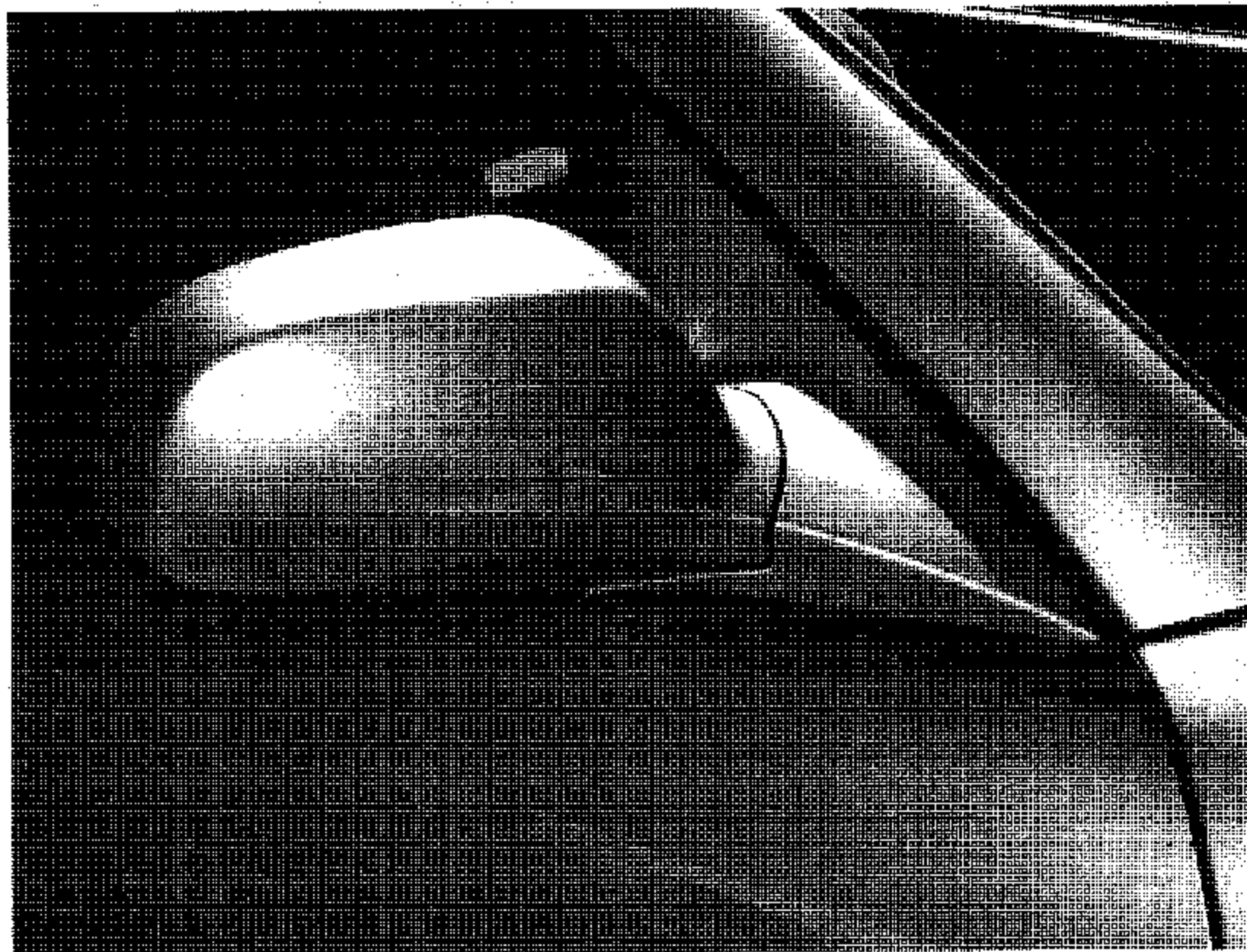
FIGURE 6: TIRE PLACARD

2004 SUZUKI VERONA
NHTSA NO. C40502
FMVSS NO. 111



2004 SUZUKI VERONA
NHTSA NO. C40502
FMVSS NO. 111

FIGURE 7: DRIVER SIDE REAR VIEW MIRROR AND MOUNTING



2004 SUZUKI VERONA
NHTSA NO. C40502
FMVSS NO. 111

FIGURE 8: PASSENGER SIDE REAR VIEW MIRROR AND MOUNTING

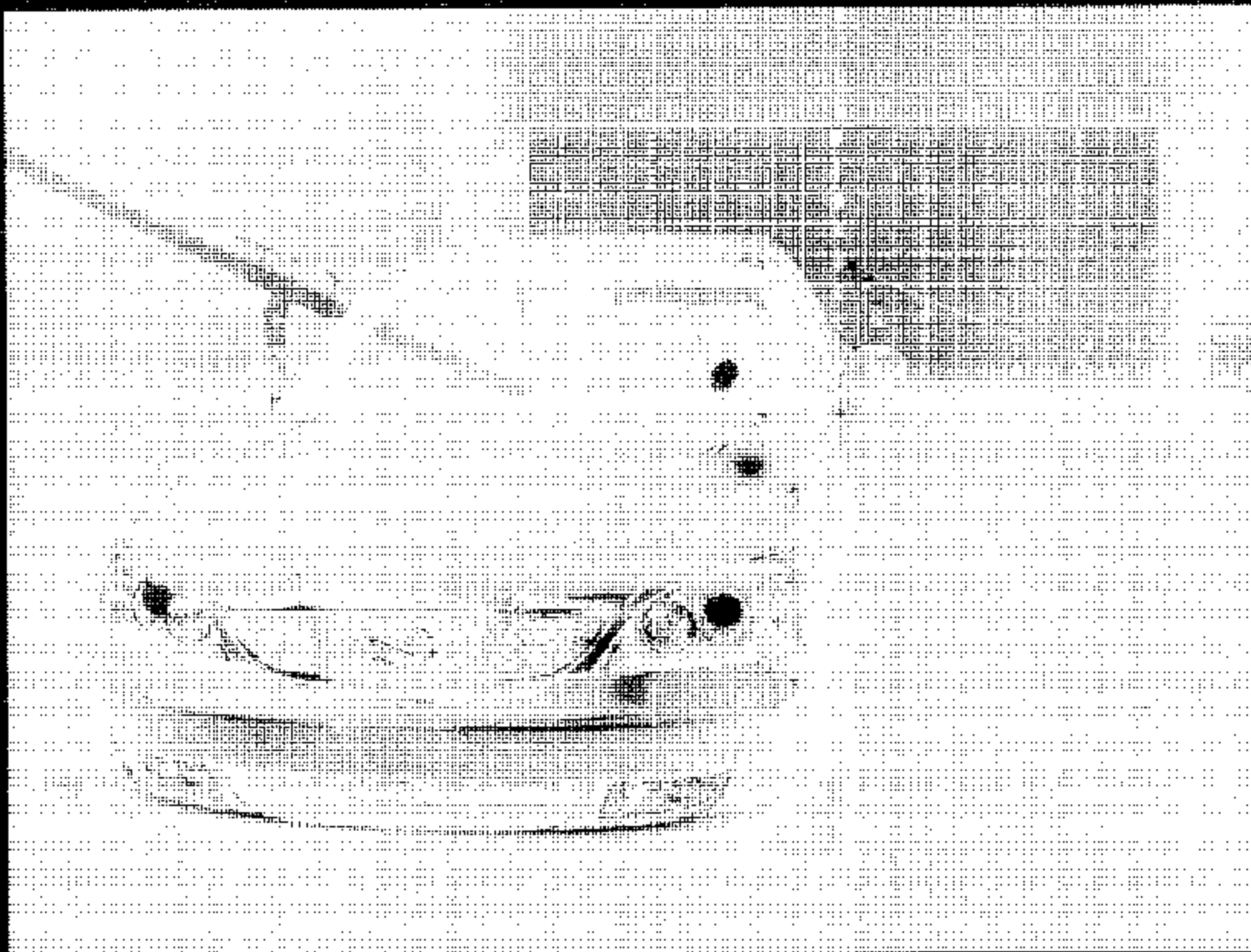
A-9

111-KAR-04-005



2004 SUZUKI VERONA
NHTSA NO. C40502
FMVSS NO. 111

FIGURE 9: INSIDE REAR VIEW MIRROR AND MOUNTING



2004 SUZUKI VERONA
NHTSA NO. C40502
FMVSS NO. 111

FIGURE 10: TEST SET-UP

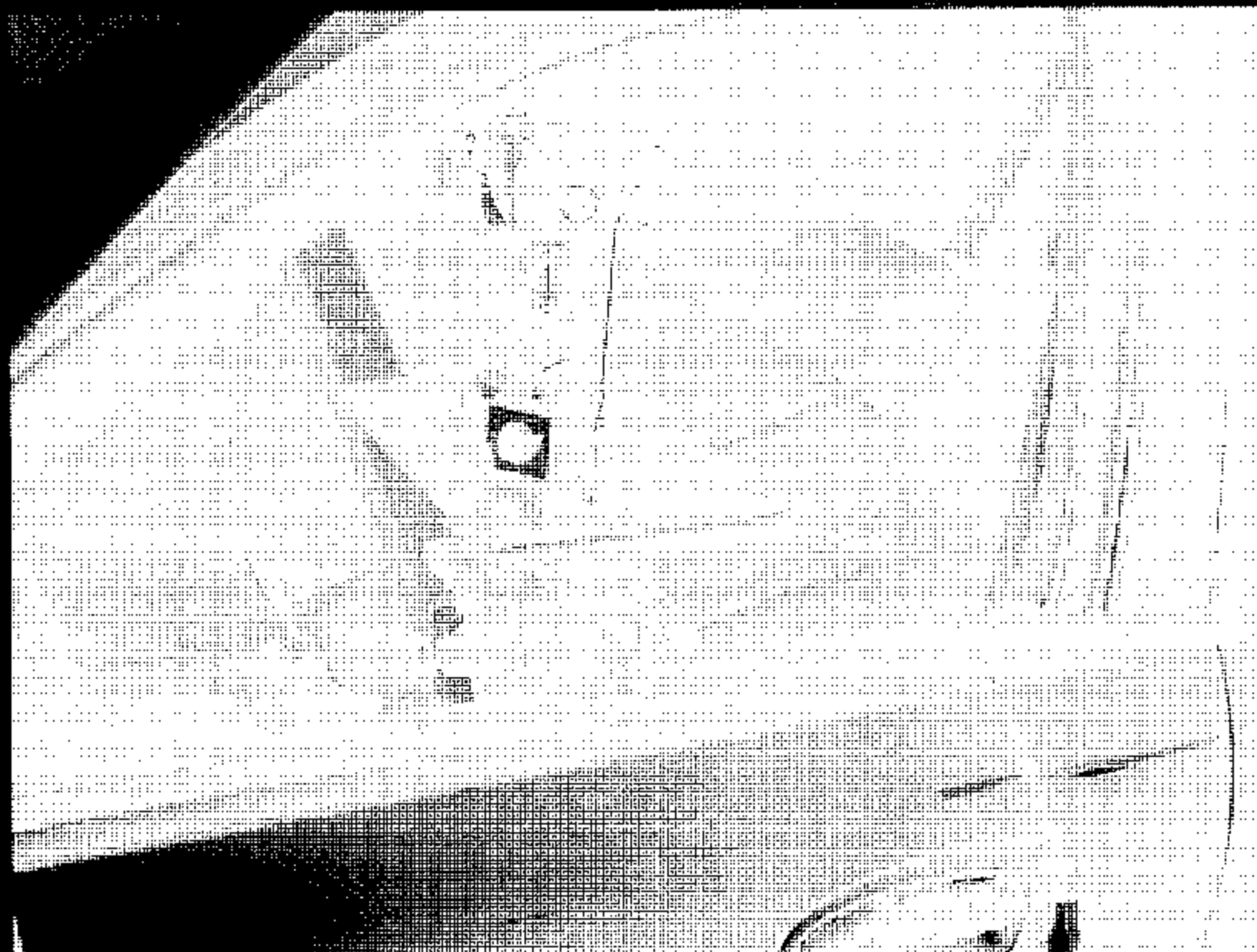


FIGURE 11:CAMERA SET-UP FOR PHOTOGRAPHING REFERENCE BOARD

2004 SUZUKI VERONA
NHTSA NO. C40502
FMVSS NO. 111

A-12

111-KAR-04-005



2004 SUZUKI VERONA · FIGURE 12: OVERALL SET-UP AND INSTRUMENTATION FOR MIRROR BREAK-AWAY TEST
NHTSA NO. C40502
FMVSS NO. 111

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111-KAR-04-005

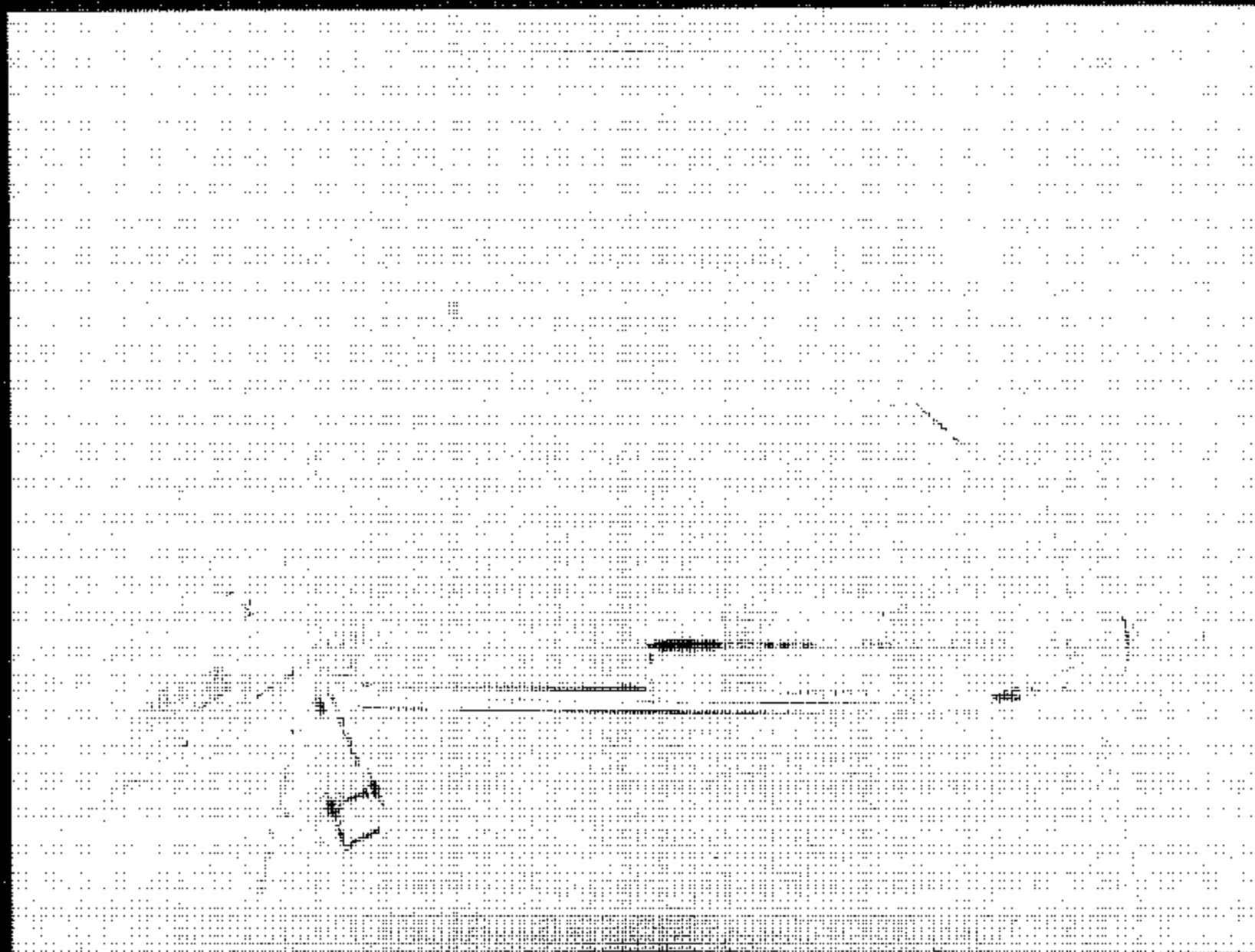


2004 SUZUKI VERONA
NHTSA NO. C40502
FMVSS NO. 111

FIGURE 13: CLOSE-UP OF MIRROR BREAK-AWAY TEST

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111-KAR-04-005



2004 SUZUKI VERONA
NHTSA NO. C40502
FMVSS NO. 111

FIGURE 14: REFLECTION TEST SET-UP

FMVSS 111
2004 SUZUKI VERONA
C40502



FIGURE 15: MIRROR SET-UP FOR AREA MEASUREMENT

2004 SUZUKI VERONA
NHTSA NO. C40502
FMVSS NO. 111

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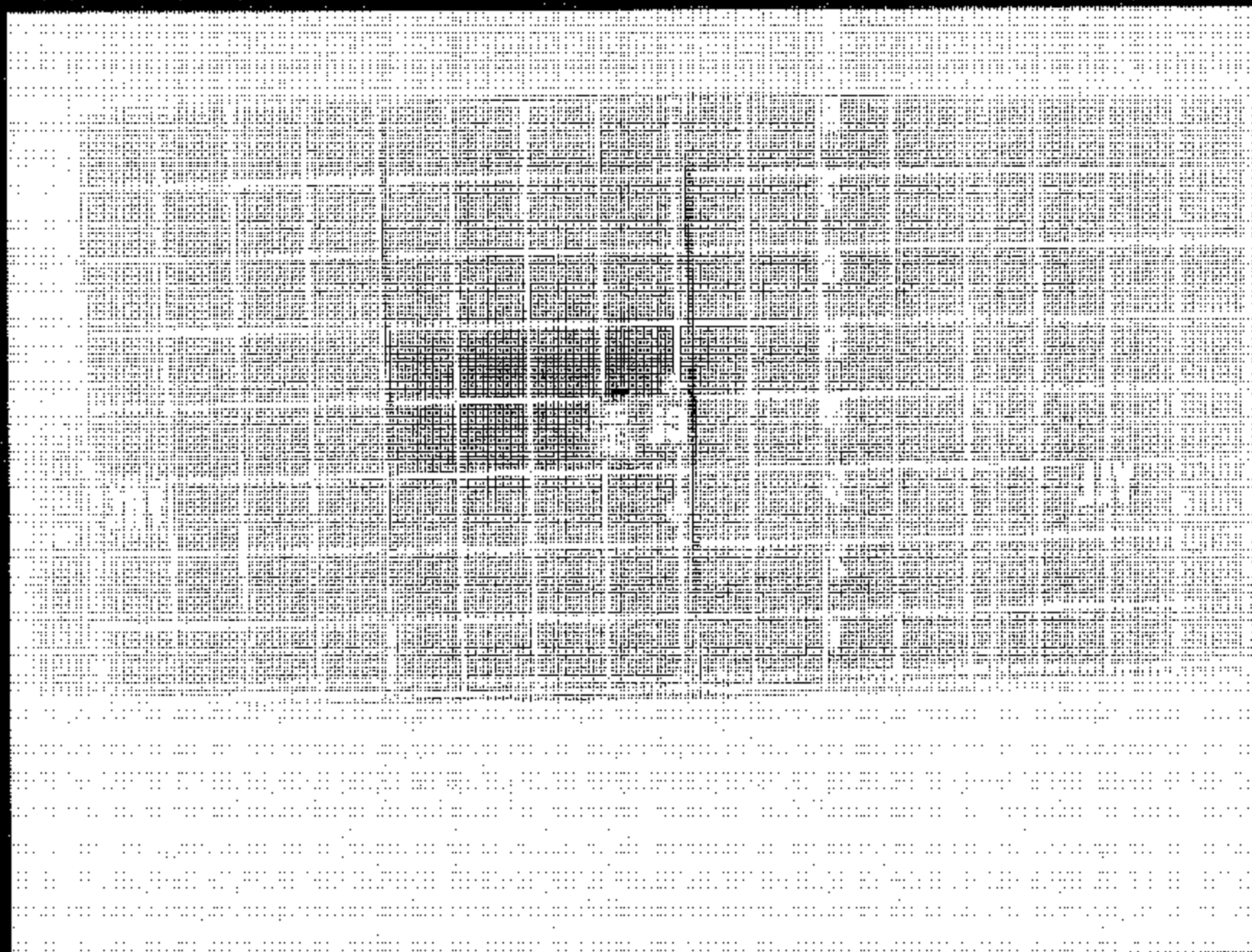


2004 SUZUKI VERONA
NHTSA NO. C40502
FMVSS NO. 111

FIGURE 16: LEFT EYE FIELD OF VIEW TEST (INSIDE MIRROR)

A-17

111KAR-04-005

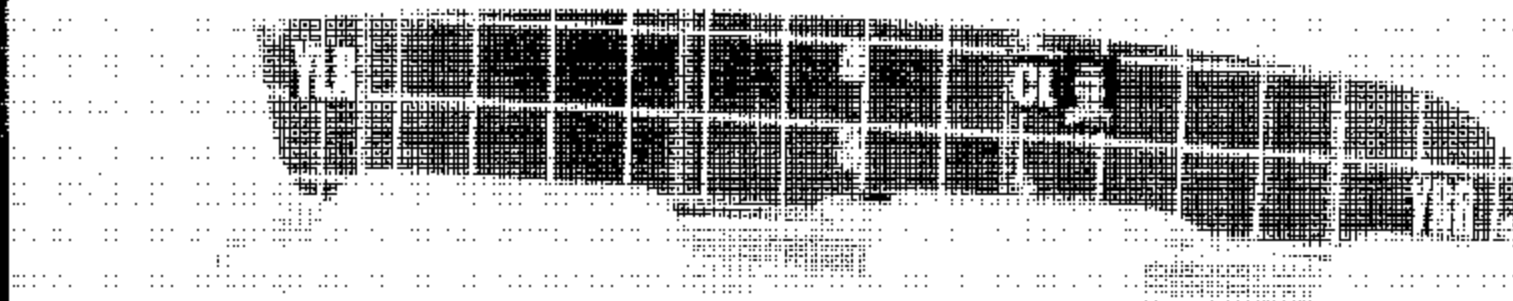


2004 SUZUKI VERONA
NHTSA NO. C40502
FMVSS NO. 111

FIGURE 17:REFERENCE BOARD FOR INSIDE MIRROR, LEFT EYE

A-18

111-KAR-04-005



2004 SUZUKI VERONA
NHTSA NO. C40502
FMVSS NO. 111

FIGURE 18: RIGHT EYE FIELD OF VIEW TEST (INSIDE MIRROR)

A-19

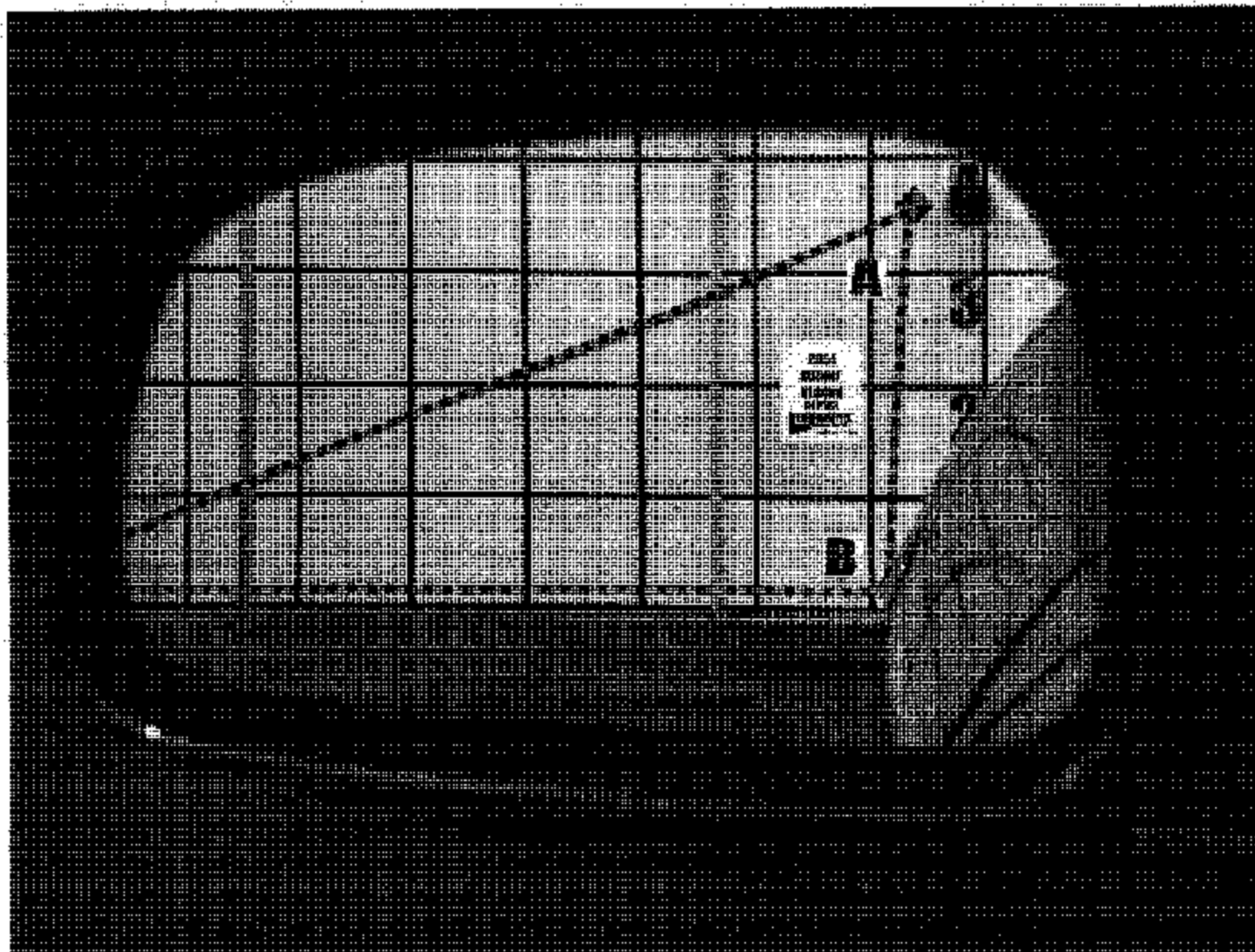
111-KAR-04-005

2004 SUZUKI VERONA
NHTSA NO. C40502
FMVSS NO. 111

FIGURE 19:REFERENCE BOARD FOR INSIDE MIRROR, RIGHT EYE

A-20

1114AR-04-005

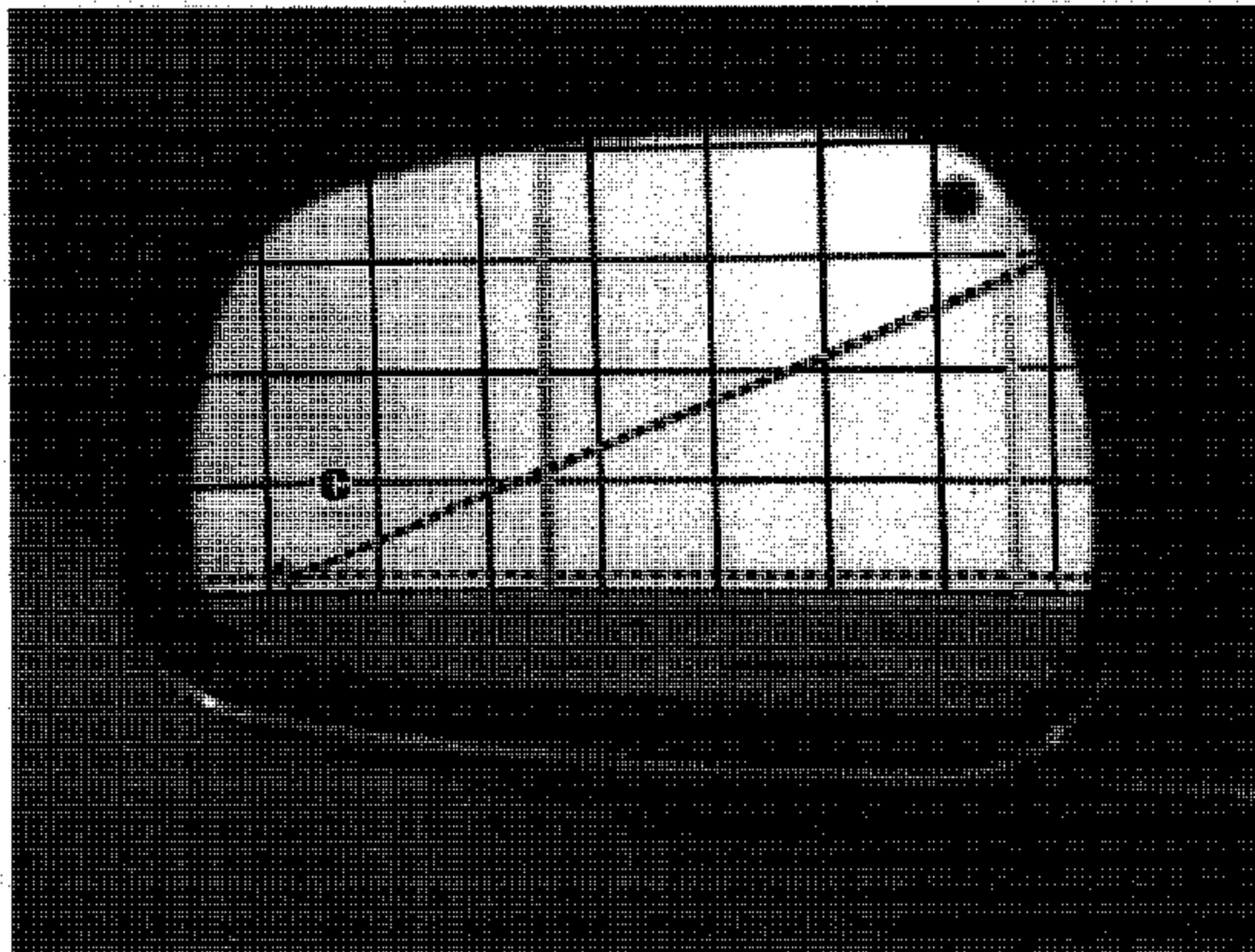


2004 SUZUKI VERONA
NHTSA NO. C40502
FMVSS NO. 111

FIGURE 20: LEFT EYE FIELD OF VIEW TEST (DRIVER SIDE MIRROR)

A-21

111-KAR-04-005

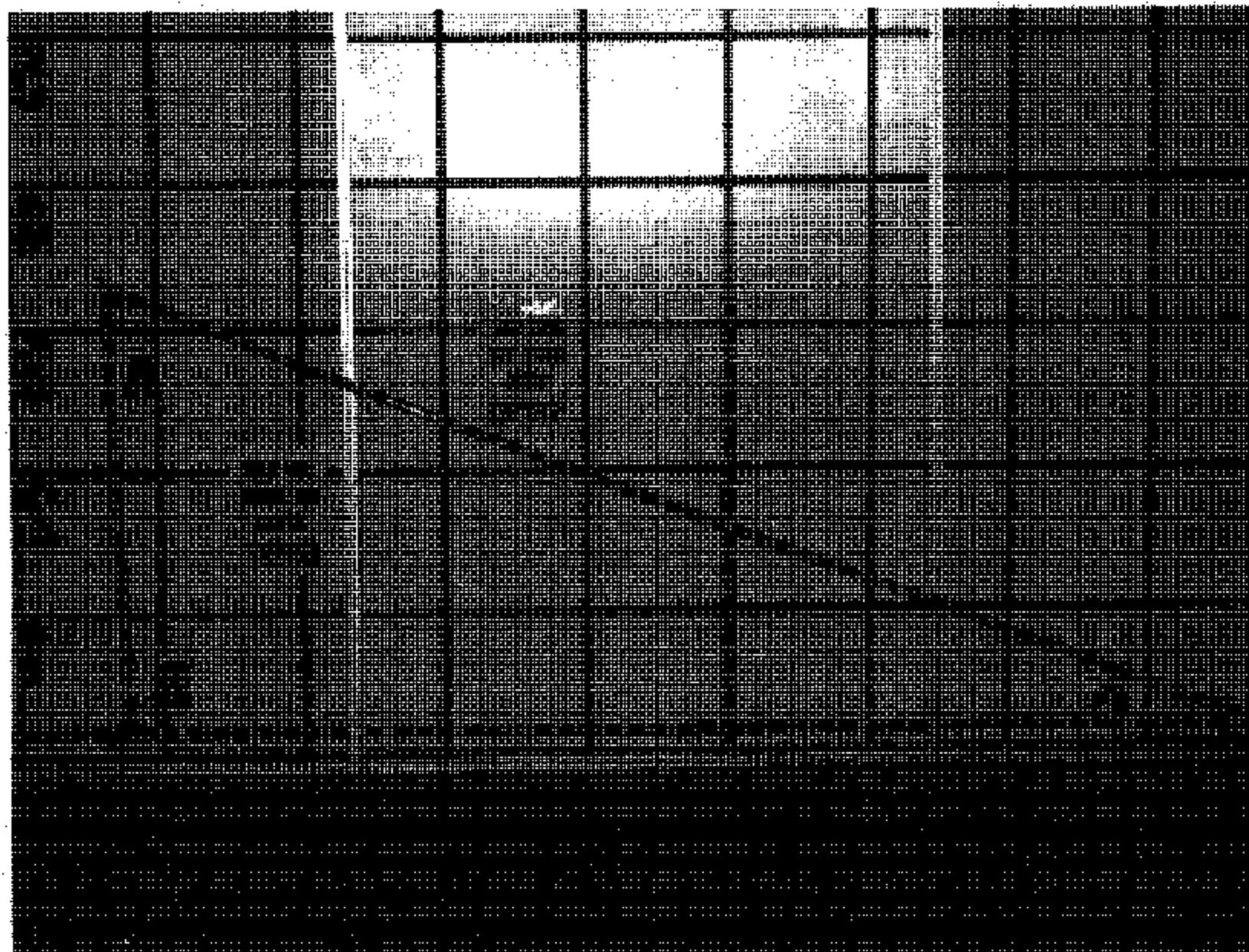


2004 SUZUKI VERONA
NHTSA NO. C40502
FMVSS NO. 111

FIGURE 21:RIGHT EYE FIELD OF VIEW TEST (DRIVER SIDE MIRROR)

A-22

11-KAR-04-005

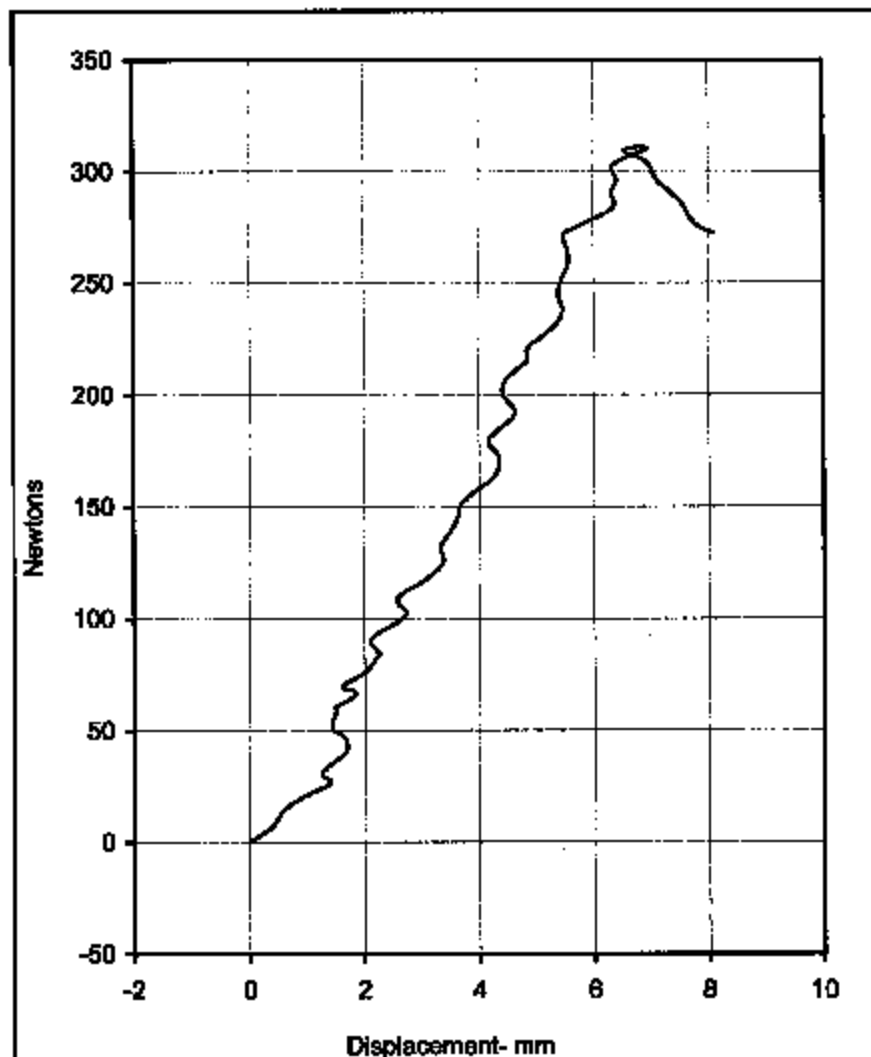


2004 SUZUKI VERONA
NHTSA NO. C40502
FMVSS NO. 111

FIGURE 22:REFERENCE BOARD FOR DRIVER SIDE MIRROR

APPENDIX B
DATA PLOTS

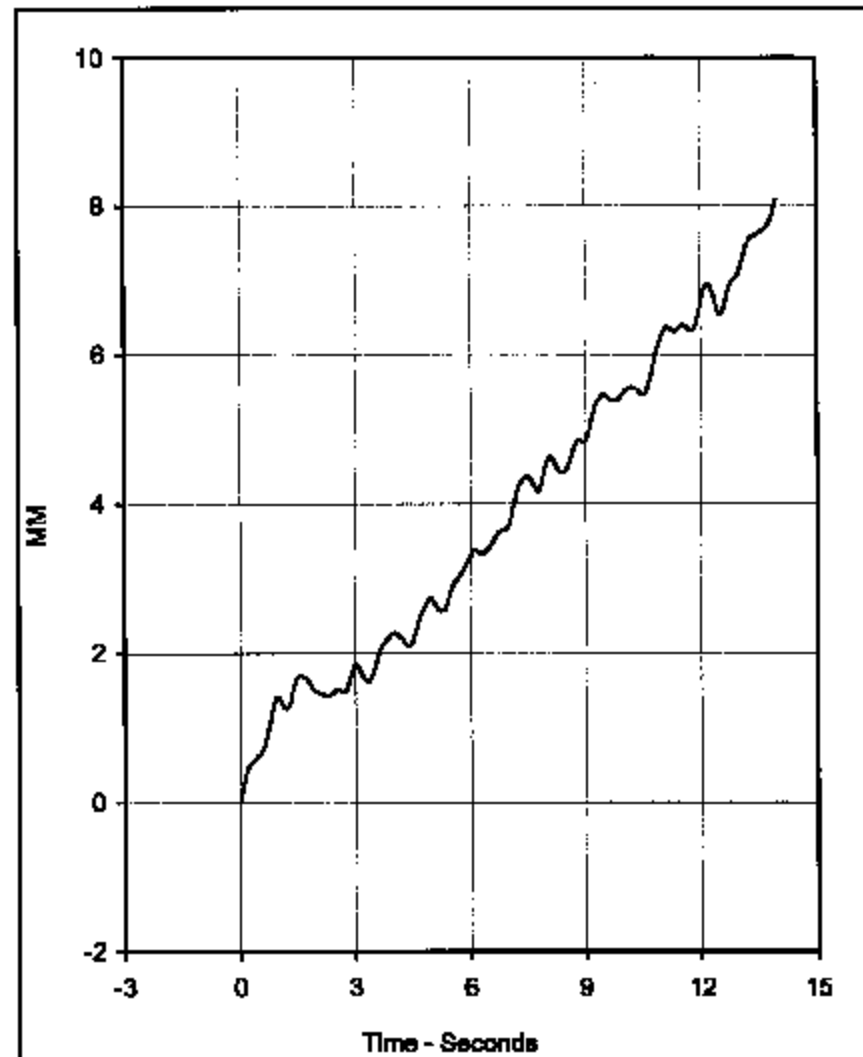
B-1



| | | |
|------------------------|-------|------|
| Curve Description | CURNO | Type |
| Force vs. Displacement | 001 | FIL |

| Units | Peak Force | Displacement | Filter (Hz) |
|---------|------------|--------------|-------------|
| Newtons | 311.0 | 6.8 | 1 |

Test Program: 2004 FMVSS 111 Rearview Mirrors Test No.: 1
 Test Vehicle: 2004 Suzuki Verona No.: C40602



| | | |
|-----------------------|-------|------|
| Curve Description | CURNO | Type |
| Displacement vs. Time | 002 | FIL |

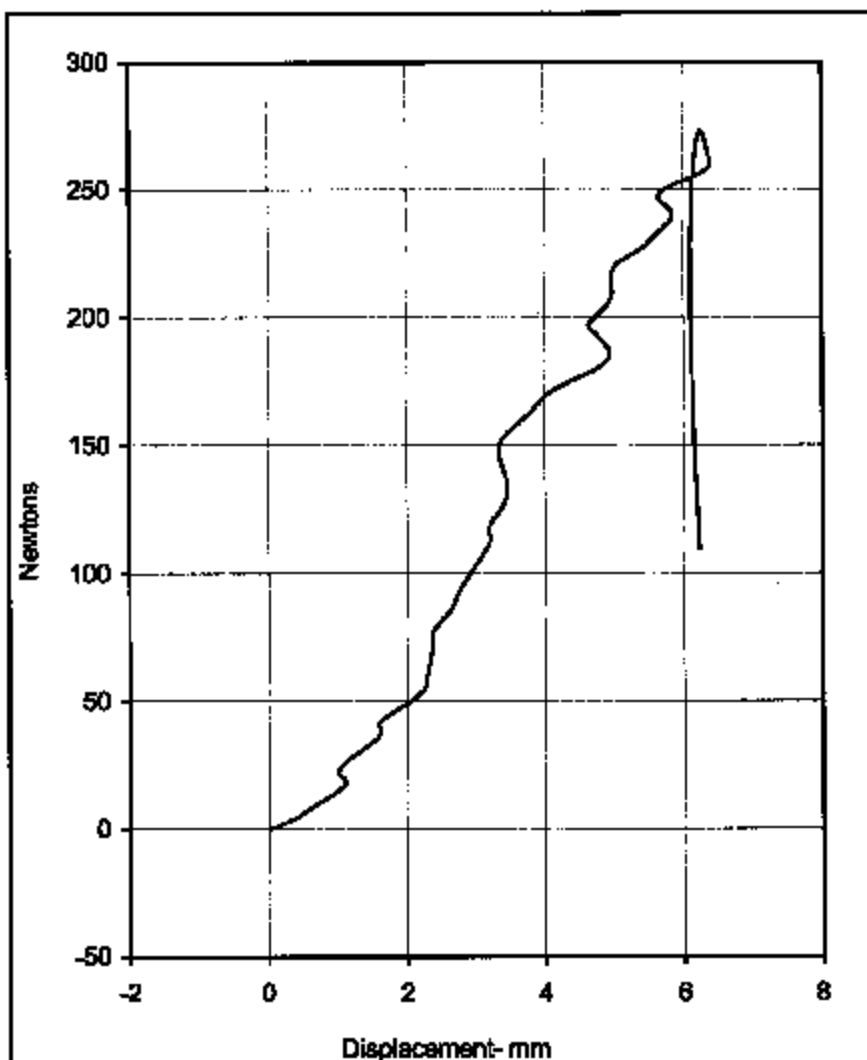
| Units | Max | Time | Displ. Rate (mm/min.) | Filter (Hz) |
|-------|-----|------|-----------------------|-------------|
| MM | 8.1 | 14.0 | 34.5 | 1 |

Load Direction: 0 / 90
 Test Date: 5/27/04



111-KAR-04-006

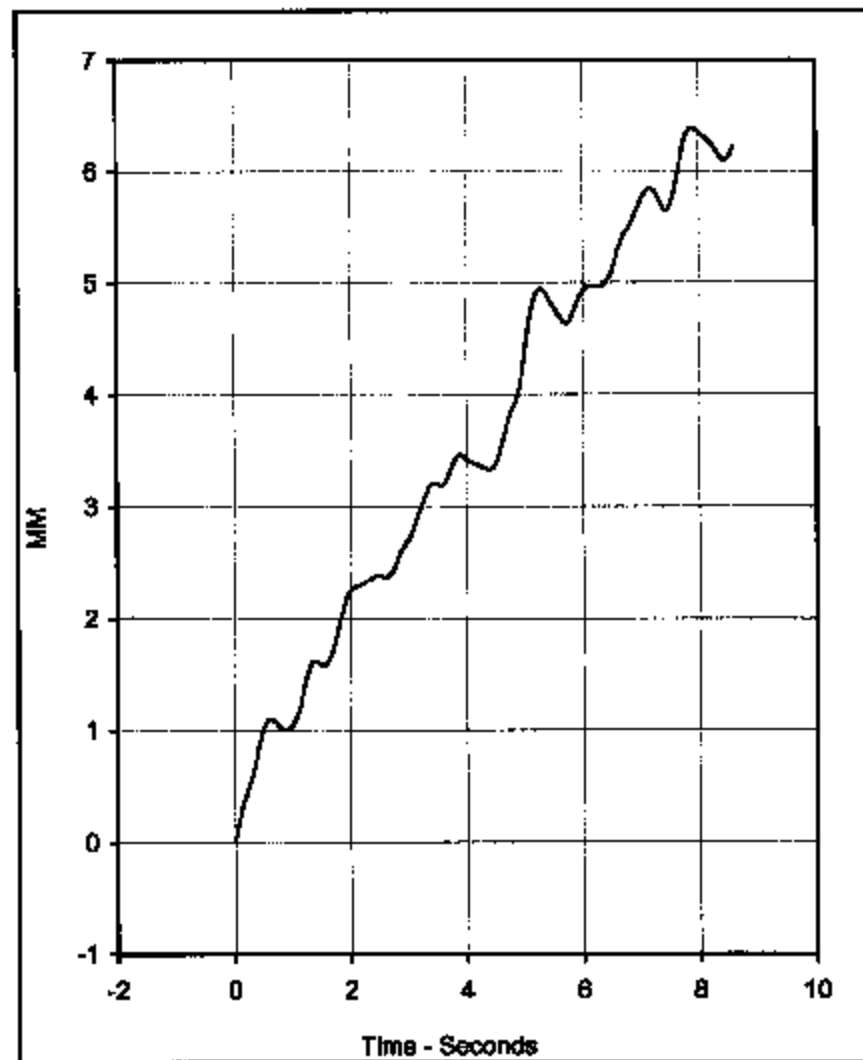
B-2



| | | |
|------------------------|-------|------|
| Curve Description | CURNO | Type |
| Force vs. Displacement | 001 | FIL |

| Units | Peak Force | Displacement | Filter (Hz) |
|---------|------------|--------------|-------------|
| Newtons | 273.1 | 6.3 | 1 |

Test Program: 2004 FMVSS 111 Rearview Mirrors Test No.: 2
 Test Vehicle: 2004 Suzuki Verona No.: C40502



| | | |
|-----------------------|-------|------|
| Curve Description | CURNO | Type |
| Displacement vs. Time | 002 | FIL |

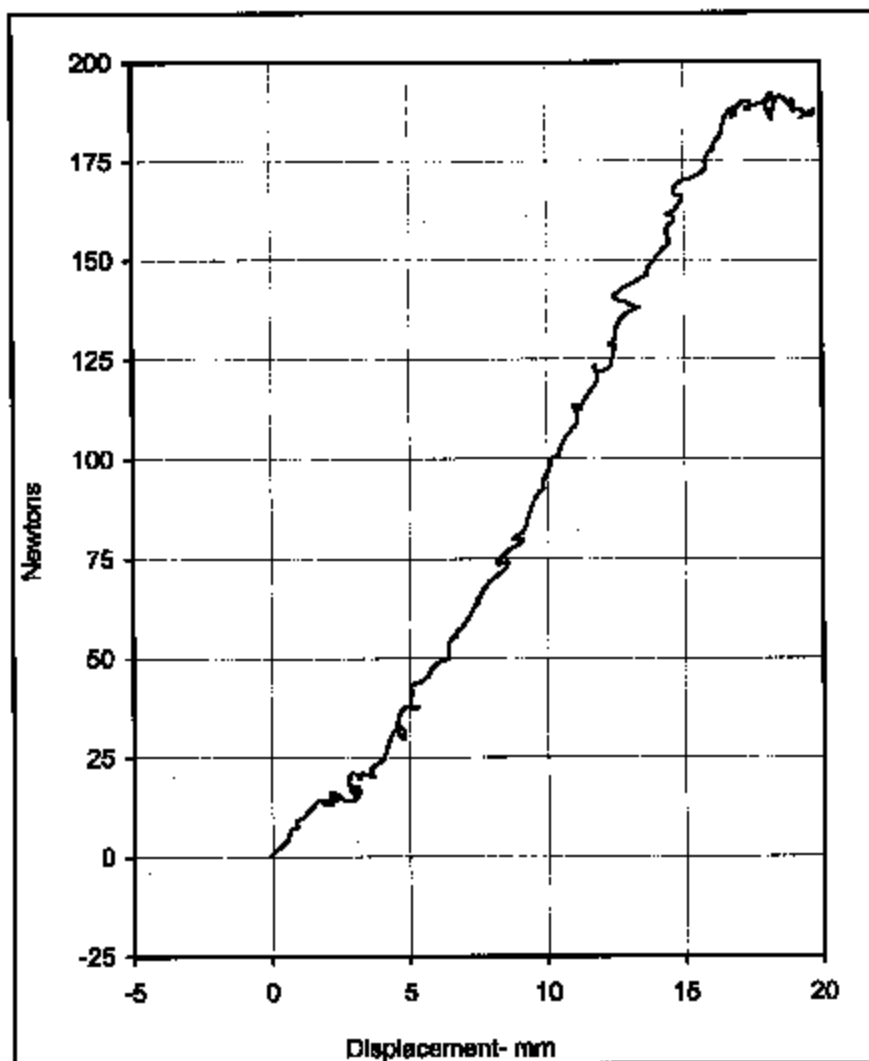
| Units | Max | Time | Displ. Rate (mm/min.) | Filter (Hz) |
|-------|-----|------|-----------------------|-------------|
| MM | 6.4 | 7.9 | 47.4 | 1 |

Load Direction: +45 / 90
 Test Date: 6/3/04



111-KAR-04-005

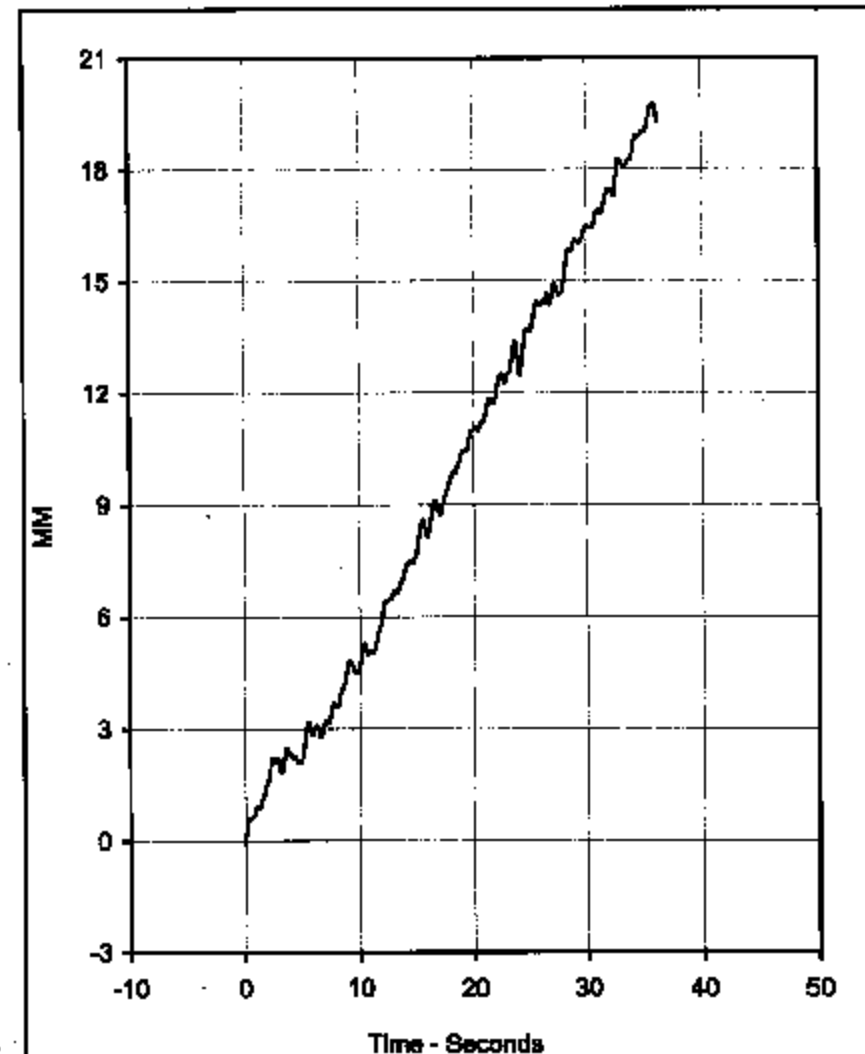
B-3



| | | |
|------------------------|-------|------|
| Curve Description | CURNO | Type |
| Force vs. Displacement | 001 | FIL |

| Units | Peak Force | Displacement | Filter (Hz) |
|---------|------------|--------------|-------------|
| Newtons | 192.0 | 18.2 | 1 |

Test Program: 2004 FMVSS 111 Rearview Mirrors Test No.: 3
 Test Vehicle: 2004 Suzuki Verona No.: C40502



| | | |
|-----------------------|-------|------|
| Curve Description | CURNO | Type |
| Displacement vs. Time | 002 | FIL |

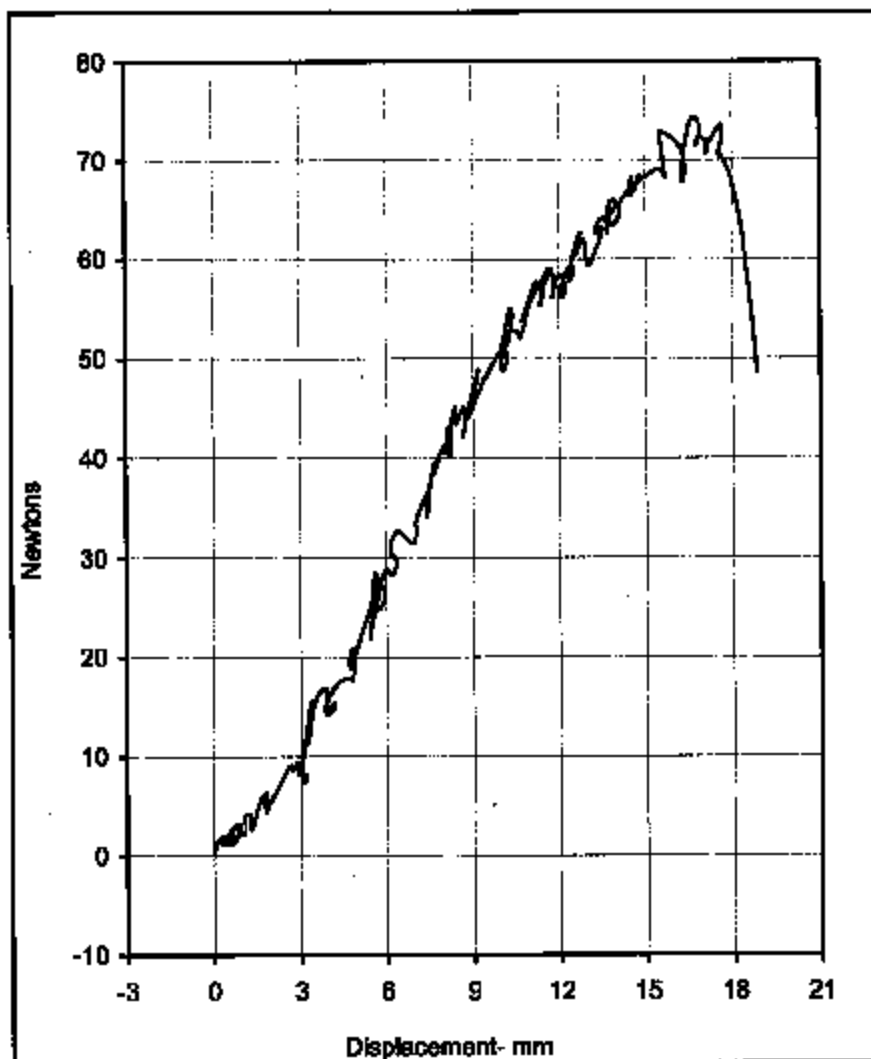
| Units | Max | Time | Displ. Rate (mm/mn.) | Filter (Hz) |
|-------|------|------|----------------------|-------------|
| MM | 19.8 | 35.9 | 33.0 | 1 |

Load Direction: -45 / 90
 Test Date: 6/24/04



111-KAR-04-005

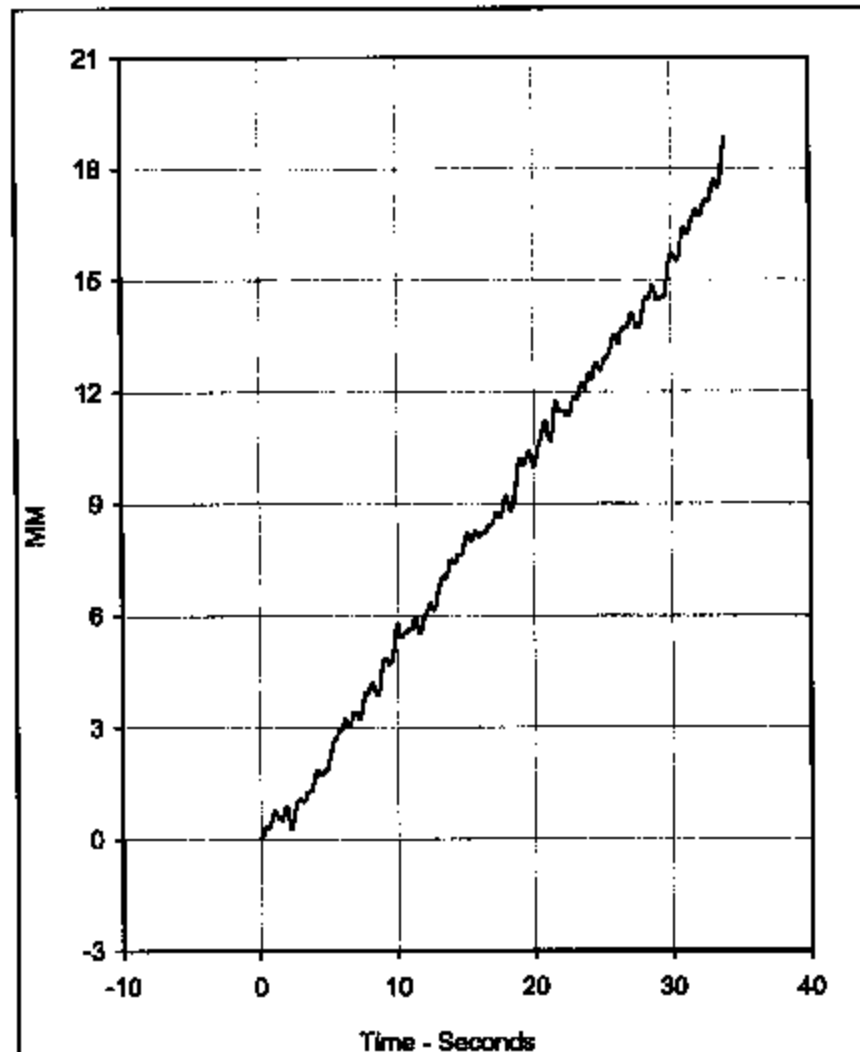
B-4



| Curve Description | CURNO | Type |
|------------------------|-------|------|
| Force vs. Displacement | 001 | FIL |

| Units | Peak Force | Displacement | Filter (Hz) |
|---------|------------|--------------|-------------|
| Newtons | 74.4 | 16.7 | 1 |

Test Program: 2004 FMVSS 111 Rearview Mirrors Test No.: 4
 Test Vehicle: 2004 Suzuki Verona No.: C40502



| Curve Description | CURNO | Type |
|-----------------------|-------|------|
| Displacement vs. Time | 002 | FIL |

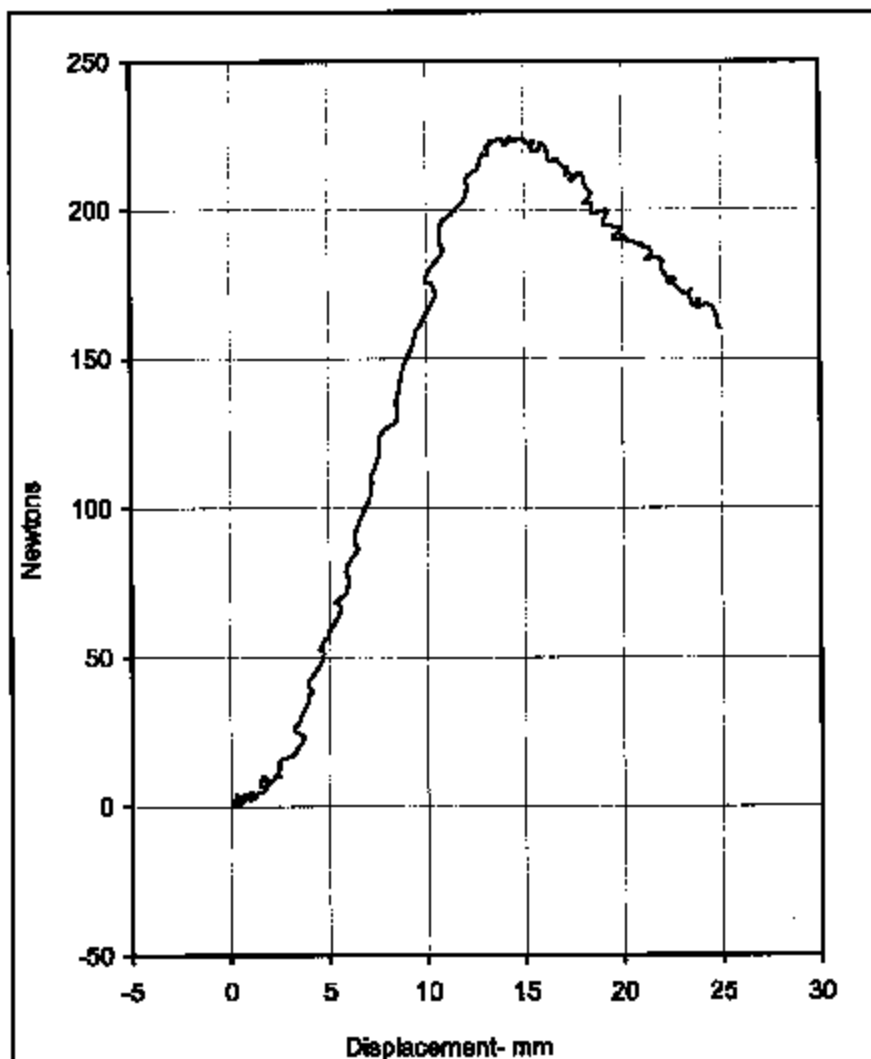
| Units | Max | Time | Displ. Rate (mm/min.) | Filter (Hz) |
|-------|------|------|-----------------------|-------------|
| MM | 18.8 | 33.9 | 32.1 | 1 |

Load Direction: -45 / +45
 Test Date: 6/24/04



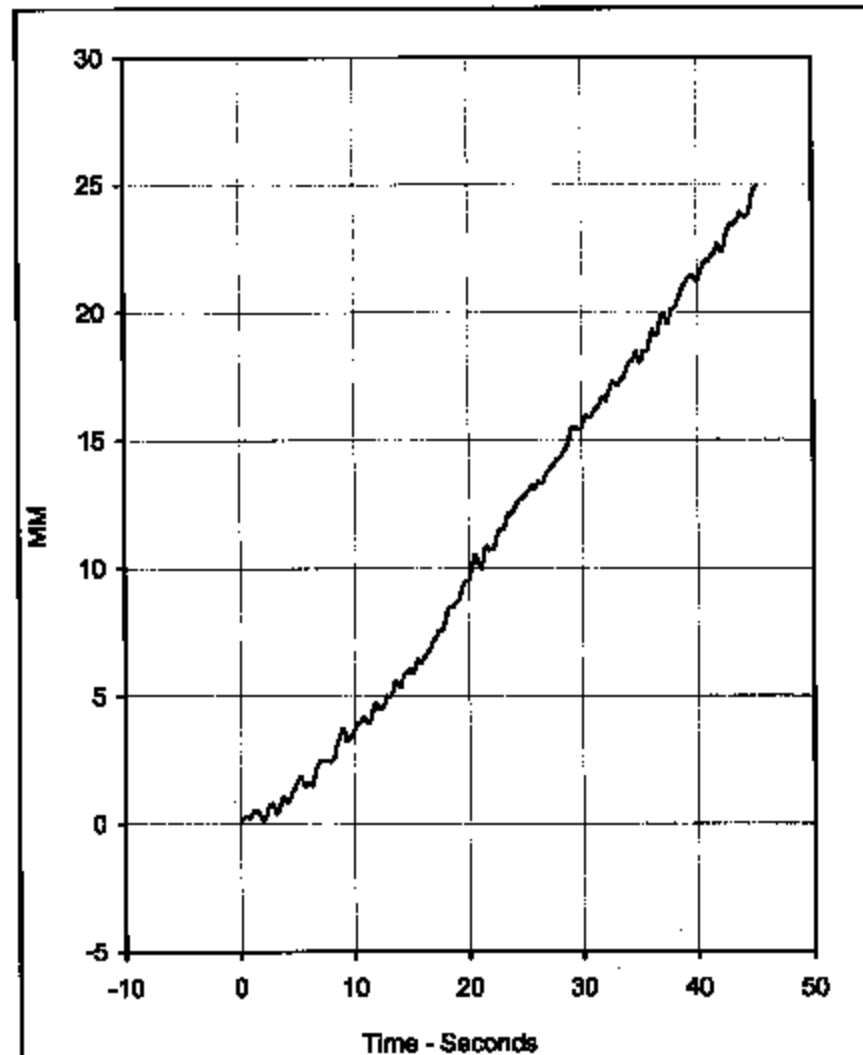
111-KAR-04-005

B-5



| Curve Description | CURNO | Type |
|------------------------|-------|------|
| Force vs. Displacement | 001 | FIL |

| Units | Peak Force | Displacement | Filter (Hz) |
|---------|------------|--------------|-------------|
| Newtons | 224.4 | 14.3 | 1 |



| Curve Description | CURNO | Type |
|-----------------------|-------|------|
| Displacement vs. Time | 002 | FIL |

| Units | Max | Time | Displ. Rate (mm/min.) | Filter (Hz) |
|-------|------|------|-----------------------|-------------|
| MM | 24.9 | 45.2 | 32.3 | 1 |

Test Program: 2004 FMVSS 111 Rearview Mirrors Test No.: 5
 Test Vehicle: 2004 Suzuki Verona No.: C40502

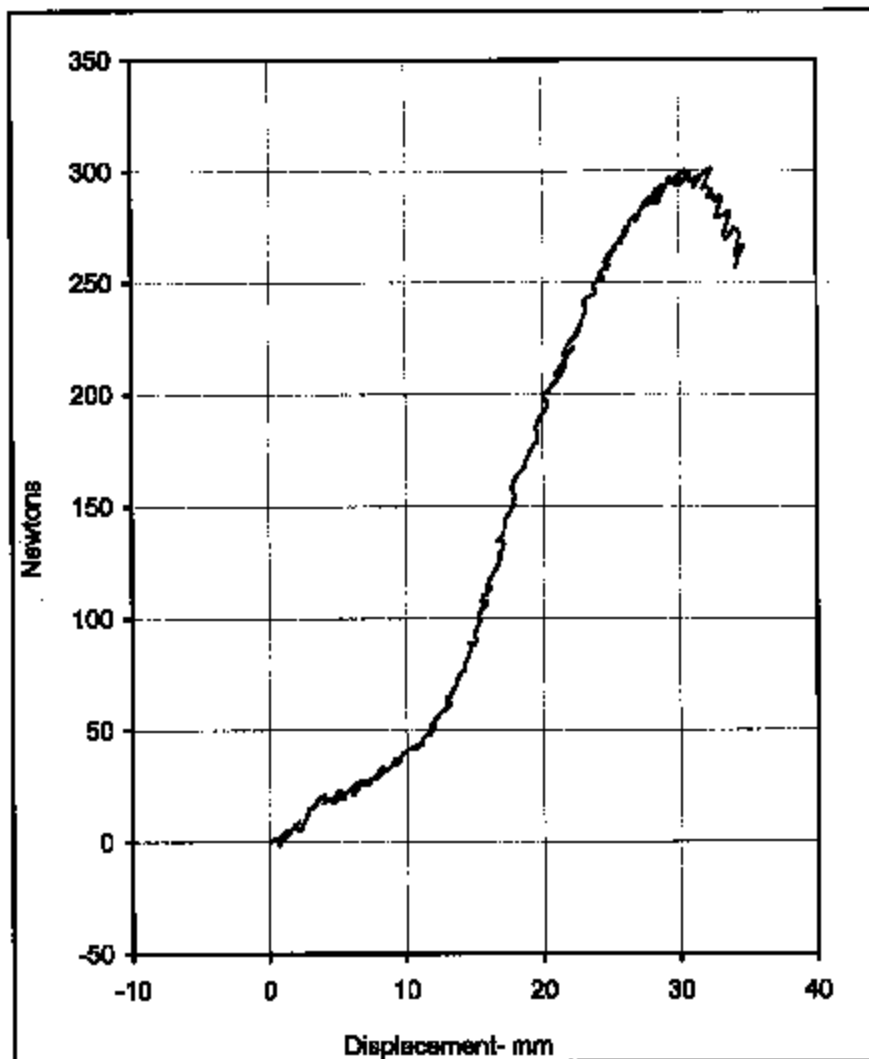
Load Direction: +45 / +45
 Test Date: 5/25/04



111-KAR-04-005

B-6

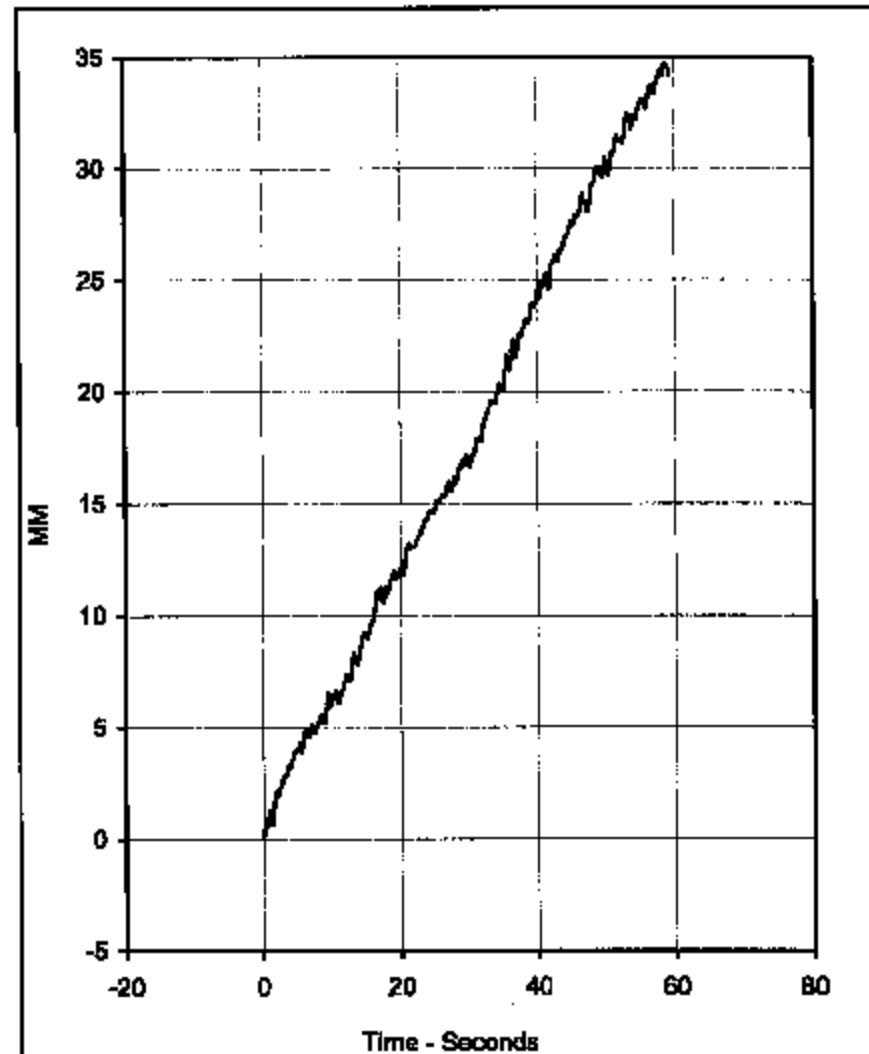
111-KAR-04-005



| Curve Description | CURNO | Type |
|------------------------|-------|------|
| Force vs. Displacement | 001 | FIL |

| Units | Peak Force | Displacement | Filter (Hz) |
|---------|------------|--------------|-------------|
| Newtons | 301.4 | 32.4 | 1 |

Test Program: 2004 FMVSS 111 Rearview Mirrors Test No.: 6
 Test Vehicle: 2004 Suzuki Verona No.: C40502



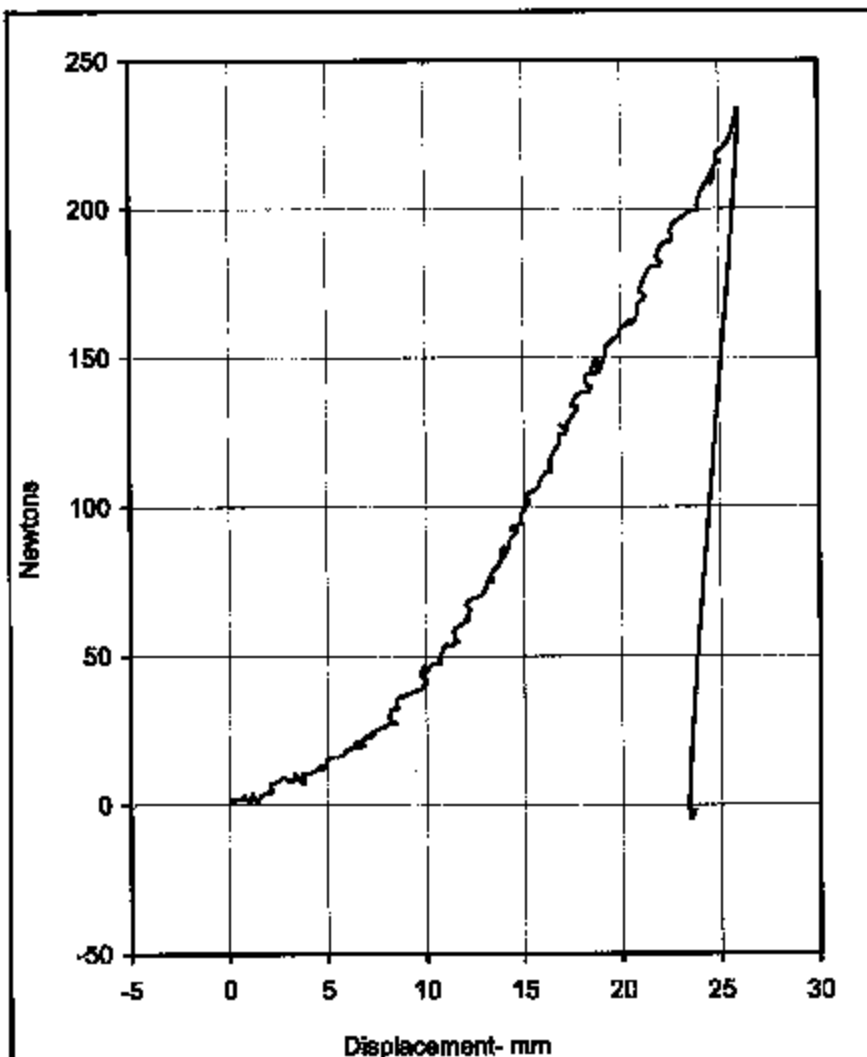
| Curve Description | CURNO | Type |
|-----------------------|-------|------|
| Displacement vs. Time | 002 | FIL |

| Units | Max | Time | Displ. Rate (mm/min.) | Filter (Hz) |
|-------|------|------|-----------------------|-------------|
| MM | 34.7 | 58.9 | 35.4 | 1 |

Load Direction: +45 / -45
 Test Date: 6/24/04

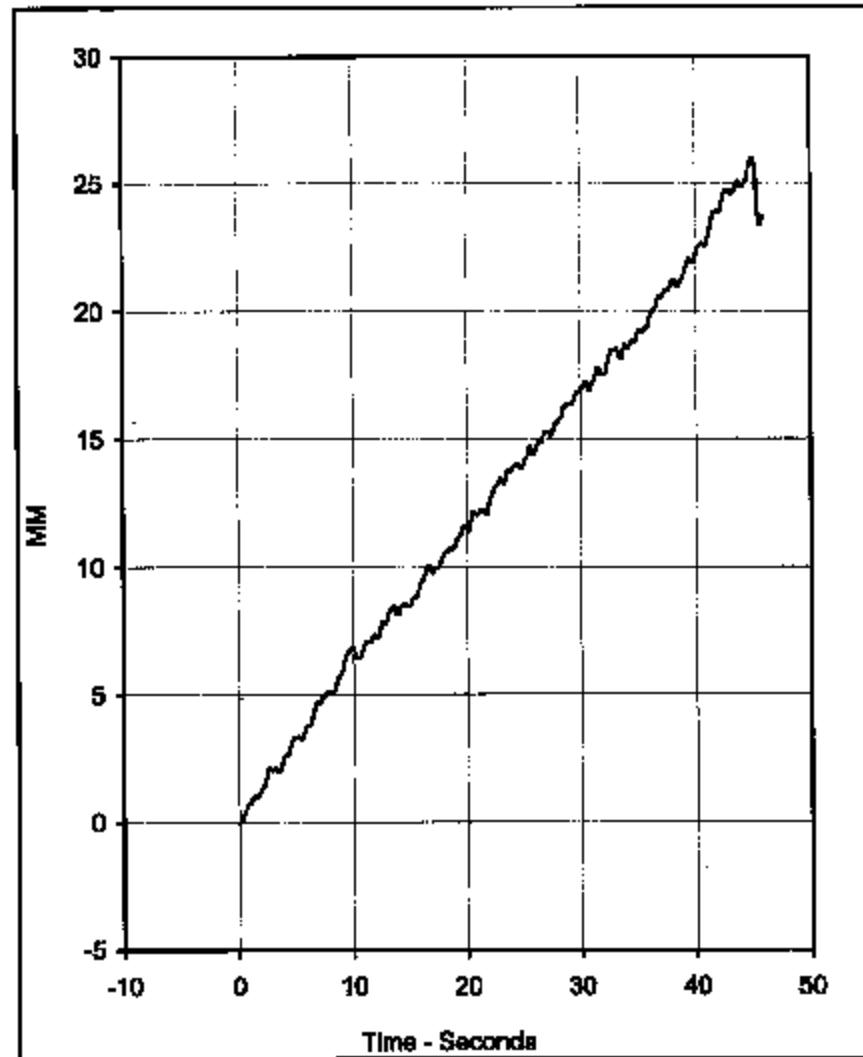


B-7



| Curve Description | CURNO | Type |
|------------------------|-------|------|
| Force vs. Displacement | 001 | FIL |

| Units | Peak Force | Displacement | Filter (Hz) |
|---------|------------|--------------|-------------|
| Newtons | 233.9 | 26.0 | 1 |



| Curve Description | CURNO | Type |
|-----------------------|-------|------|
| Displacement vs. Time | 002 | FIL |

| Units | Max | Time | Displ. Rate (mm/min.) | Filter (Hz) |
|-------|------|------|-----------------------|-------------|
| MM | 26.0 | 45.0 | 34.1 | 1 |

Test Program: 2004 FMVSS 111 Rearview Mirrors Test No.: 7
 Test Vehicle: 2004 Suzuki Verona No.: C40502

Load Direction: -45 / -45
 Test Date: 8/24/04



111-KAR-04-005

APPENDIX C
TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

2004 FMVSS 111 Rearview Mirrors

Test Equipment List

5/26/04

2004 Suzuki Verona

| Description | Manufacturer | Model No. | Serial No. | Limit | Accuracy | Cal. Date | Due Cal. |
|--------------------|--------------|-------------|------------|------------------|----------|-----------|----------|
| Hydraulic Pump | Lincoln | T-3825-C | 2460952 | 8 gpm @ 2700 psi | N/A | N/A | N/A |
| Computer | Panasonic | CF-71 | 81MAA01852 | N/A | N/A | N/A | N/A |
| TDAS | DTS | TDAS | DM0103 | N/A | SAE J211 | 11/28/03 | 11/27/04 |
| Load Cell | Lebow | 3167 | 1573 | 667 N | ± 1.0% | 6/1/04 | 6/1/05 |
| Displacement Xdcr. | Celeco | PTX101-0030 | J0854652 | 76 CM | ± 1.0% | 7/1/03 | 6/30/04 |

C-1

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APPENDIX D
EYELIPSE LOCATIONS SUPPLIED BY MANUFACTURER

FMVSS 111 EYE POINT LOCATIONS

Make: GMDAT

Model: VERONA

Year: MY04

Coordinate System:

X = Longitudinal Dimension

Y = Lateral Dimension

Z = Vertical Dimension

Positive Values are as follows:

X = Forward of Reference Point

Y = Outboard of Reference Point (to driver's side)

Z = Above Reference Point

Provide Reference/Body Fiducial Point that dimensions below are measured from. Point must be easily accessible and usable by test laboratory personnel, i.e. seat track mounting bolt, seat belt anchorage bolt, door latch ABe pillar striker. (Provide sketch of reference point if necessary.)

| COORDINATES | LEFT SIDE MIRROR | | INSIDE MIRROR | | RIGHT SIDE MIRROR | |
|-------------|-------------------|--------------------|---------------|---------|-------------------|---------|
| | LE1 (left eye) | RE1 (right eye) | LE2 | RE2 | LE3 | RE3 |
| X | 130mm | 130mm | 130mm | 130mm | 130mm | 130mm |
| Y | 272.8mm | 337.8mm | 272.8mm | 337.8mm | 272.8mm | 337.8mm |
| Z | 870.3mm | 870.3mm | 870.3mm | 870.3mm | 870.3mm | 870.3mm |
| Mirror Nbr. | 98480831 | | 98218438 | | 98482441 | |
| Model | | | | | | |
| Part No. | | | | | | |

