

REPORT NO. 111-KAR-04-001
**SAFETY COMPLIANCE TESTING
FOR FMVSS 111**

2/3
HS#
637250

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

BMW AG
2004 MINI COOPER
2 DOOR COUPE

NHTSA NO. C40501

PREPARED BY:
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June 29, 2004

FINAL REPORT

PREPARED FOR:
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SECTION 1
PURPOSE OF COMPLIANCE TEST

1. PURPOSE OF COMPLIANCE TEST

Tests were conducted on a 2004 Mini Cooper 2 Door Coupe manufactured by Bayerische Motoren Werke AG, 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 BMW Mini Cooper 2 Door Coupe was subjected to FMVSS 111 compliance testing. The tests were conducted at KARCO Engineering in Adelanto, California on May 26 and 27, 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, OCT84.

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 (S5.3 and S5.4)

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 1851 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 BMW Mini Cooper 2 Door Coupe on May 26 and 27, 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	BAYERISCHE MOTOREN WERKE	VIN	WMWRC33464TC49566
Manufacturing Date	10/03	Delivery Date	03/06/04
Dealer	BOB SMITH BMW	NHTSA No.	C40501
Odometer Reading (mi.)	34	Fuel Type	GAS
Engine Displacement	1.6	Cylinders	4 CYLINDER
Transmission	STANDARD	Final Drive	FRONT
Engine Placement	TRANSVERSE	Color	BLACK
Tire Press./Max. Cap. Front	40	Cold Tire Press. Front	32
Tire Press./Max. Cap. Rear	40	Cold Tire Press. Rear	32
Recommend Tire Size	175/65R15	Type of Spare	T115/70 R15
Tire Size on Vehicle	175/65R15	Manufacturer	CONTINENTAL
GVWR	3340	Cargo Capacity	1120
GAWR Front	1918	GAWR Rear	1609
Air Conditioning	YES	Power Steering	YES
Power Brakes	YES	AM/FM/Cassette	YES
Disc Brakes (Front)	YES	Disc Brakes (Rear)	NO
Power Windows	YES	Tilt Steering	YES
Anti-lock Brakes (ABS)	YES	Power Seats	YES
Driver Airbag	YES	Passenger Airbag	YES

TEST VEHICLE ATTITUDE (mm)

ATTITUDE	LF	RF	LR	RR
As Delivered	651	652	650	648
As Tested	636	632	610	606
Rear View Mirror	1280			

DATA SHEET NO. 1... (Continued)

VEHICLE			
YEAR	2004	MAKE	BMW
MODEL	MINI COOPER	BODY STYLE	2 DOOR COUPE
NHTSA NO.	C40501	VIN	WMWRC33484TC49585
TEST DATE:	05/28/04	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		312,8	312,8		312,8	312,8		312,8	312,8	
Y		-358,2	-432,2		-358,2	-432,2		-358,2	-432,2	
Z		455,6	455,6		455,6	455,6		455,6	455,6	
Mirror Mfr., Model And Part No.	Magna Spigelsysteme GmbH LH mirror Glass Flat Heated 7058063			Magna Spigelsysteme GmbH Inside Rearview Mirror 1508455			Magna Spigelsysteme GmbH RH Mirror Glass Convex Heated 7058070			
SRP Travel and Eye-Illipse	N/A									

Reference Point- Front Outer seat track mounting bolt. Co-ordinates X= 1343, Y= -340, Z= 210

DATA SHEET NO. 2

MOUNTING AND TILTING ADEQUACY TEST

VEHICLE			
YEAR	2004	MAKE	BMW
MODEL	MINI COOPER	BODY STYLE	2 DOOR COUPE
NHTSA NO.	C40501	VIN	WMWRC33464TC48565
TEST DATE:	05/26/04	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	9	-16.8	360	-360
DRIVER SIDE OUTSIDE MIRROR	24.7	-0.3	22	-4
PASSENGER SIDE OUTSIDE MIRROR	16	-0.5	33	-15

THIS SECTION IS RESERVED FOR MPVs, 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 —
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RECORDED BY: PABLO VEGA DATE: 05/26/04

APPROVED BY: MATTHEW A. IVORY DATE: 05/26/04

DATA SHEET NO. 3

FIELD OF VIEW TEST - INSIDE REARVIEW MIRROR

VEHICLE			
YEAR	2004	MAKE	BMW
MODEL	MINI COOPER	BODY STYLE	2 DOOR COUPE
NHTSA NO.	C40501	VIN	WMWRC33464TC49566
TEST DATE:	05/26/04	TEMPERATURE:	85°F

- E Distance from center of mirror to projected eye point location = 645.0 mm
- A Distance from rear of vehicle to projected eye point location = 2860.0 mm
- X1 Distance from rear of vehicle to field of view grid = 9093.2 mm
- Z1 Vertical distance to lowest point of field of view at distance X1 444.0 mm
- Z2 Height of center of mirror = 1280.0 mm
- 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) 15427.86 mm (15.4 m)

EYE LOCATION	MONOCULAR DATA (ALR & ARL ARE ANGLES)			
	YL (mm)	YR (mm)	ALR (°)	ARL (°)
LEFT EYE POINT	YLL = 1232	YRL = 2092		10.07
RIGHT EYE POINT	YLR = 2180	YRR = 1250	10.50	

CALCULATED HORIZONTAL AMBINOCULAR VIEW ANGLE (AB)

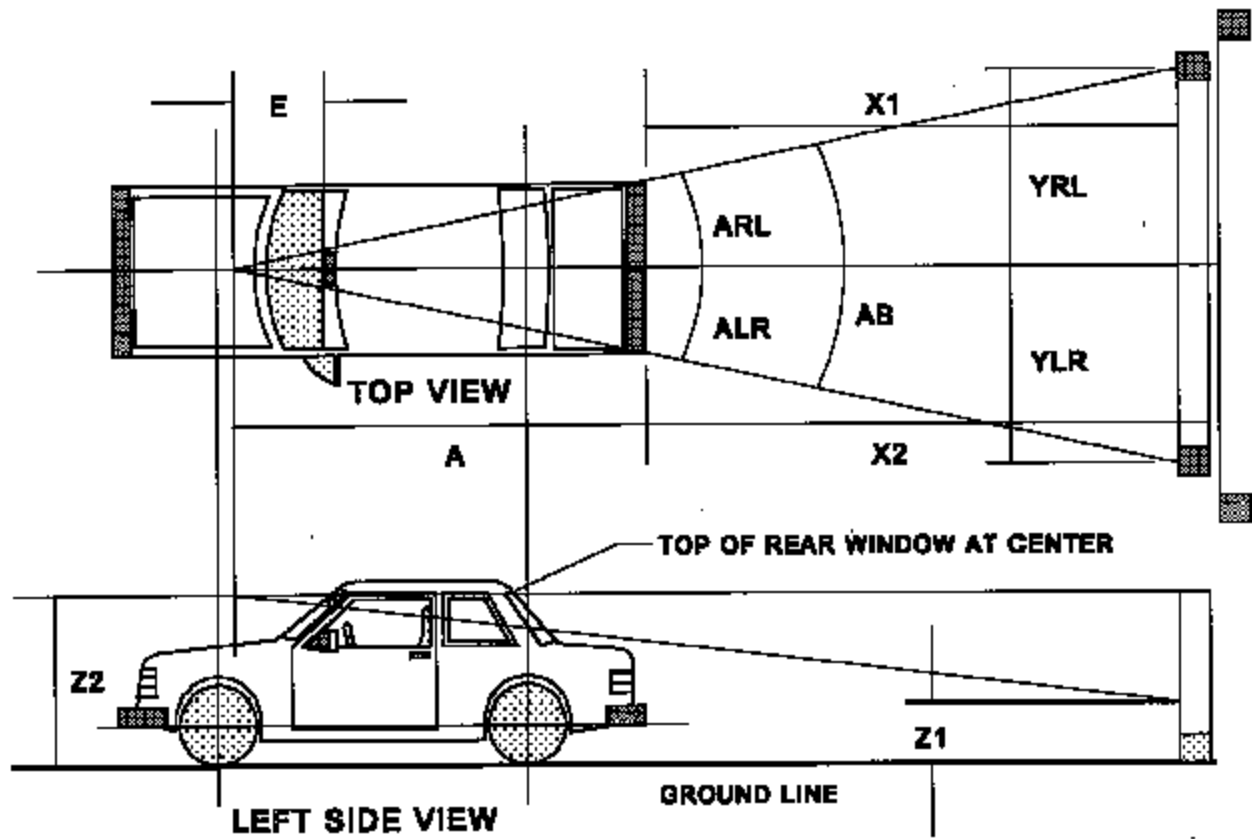
ANGLE AB = ANGLE ALR + ANGLE ARL

ALR = TAN⁻¹ [YLR/(X1 + A)] ARL = TAN⁻¹ [YRL/(X1 + A)]

ANGLE AB = 20.57 (S111 REQUIREMENT = 20 degrees minimum)

TEST STATUS:	PASSED —	x	FAILED —	
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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

HEIGHT OF TARGET DISC ON MIRROR 1058 mm

DISTANCE OF TARGET DISC ON MIRROR FROM VEHICLE TANGENT PLANE 31 mm

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

ENTIRE TRIANGULAR TEST TARGET AREA ON SCREEN VISIBLE YES NO

MIRROR PROTRUDES BEYOND VEHICLE TANGENT PLANE YES NO

PROTRUSION REQUIRED TO MEET FIELD OF VIEW REQUIREMENT YES NO

TEST STATUS:	PASSED —	X	FAILED —	
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PASSENGER SIDE MIRROR (S5.3 or MFG. OPTION)

PASSENGER SIDE MIRROR TYPE (convex or unit magnification) CONVEX

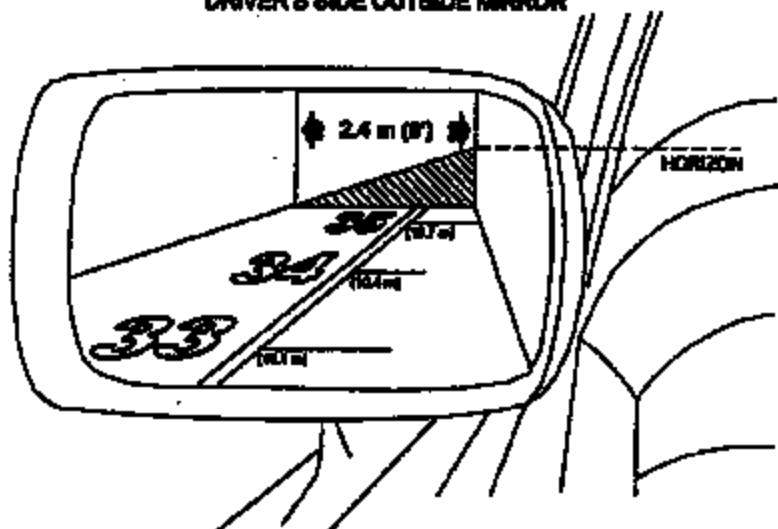
REMARKS:

RECORDED BY: PABLO VEGA DATE: 05/28/04

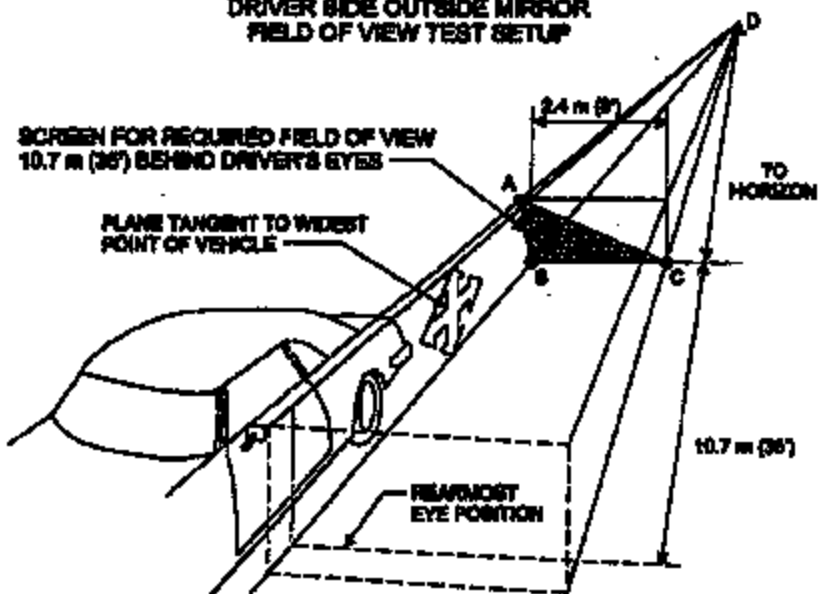
APPROVED BY: MATTHEW A. IVORY DATE: 05/28/04

DATA SHEET NO. 3... (Continued)

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

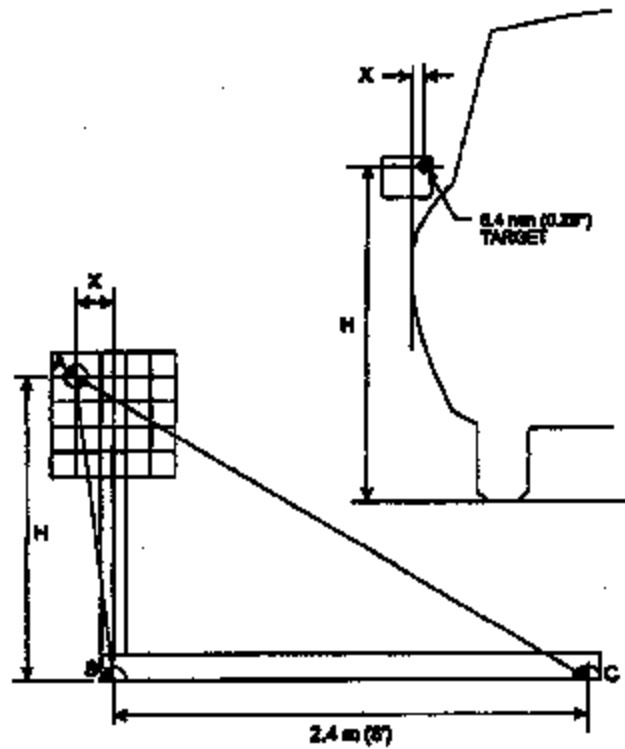


DRIVER SIDE OUTSIDE MIRROR
FIELD OF VIEW TEST SETUP

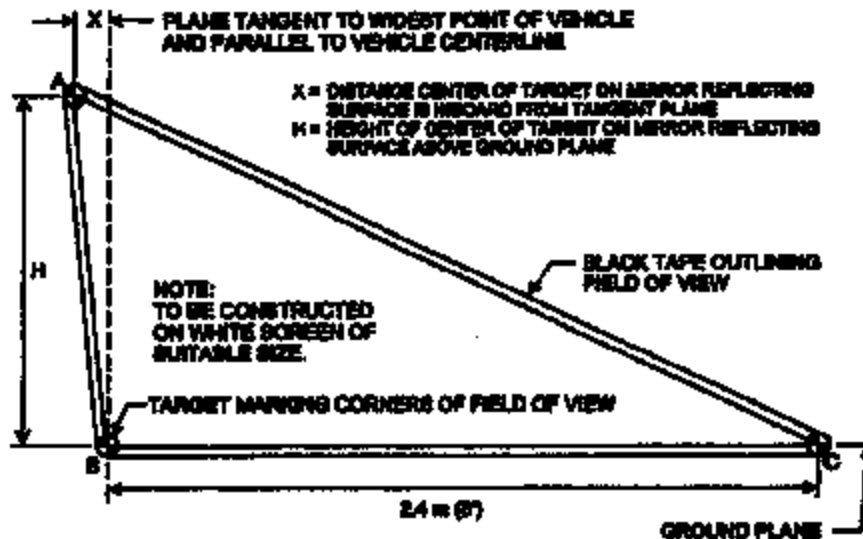


DATA SHEET NO. 3... (Continued)

**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	BMW
MODEL	MINI COOPER	BODY STYLE	2 DOOR COUPE
NHTSA NO.	C40501	VIN	WMWRC33464TC49566
TEST DATE:	06/26/04	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): 281 mV

VOLTAGE READING FROM LIGHT REFLECTED BY DAY MIRROR (Average Value): 273 mV

REFLECTOMETER VOLTAGE READINGS		
	DAY MIRROR	NIGHT MIRROR
TEST NO. 1	273 mV	193 mV
TEST NO. 2	273 mV	193 mV
TEST NO. 3	273 mV	193 mV
TEST NO. 4	273 mV	193 mV
TEST NO. 5	273 mV	195 mV*

REFLECTANCE (Day) = Voltage (Ref)/Voltage (Cal) = 0. 971 x 100 = 97.1 percent
(Min. Required = 35%)

VOLTAGE READING FROM CALIBRATION (Average Value) = 281 mV

VOLTAGE READING FROM LIGHT REFLECTED BY NIGHT MIRROR (Average Value): 193 mV

REFLECTANCE (Night) = Voltage (Ref)/Voltage (Cal) = 0. 686 x 100 = 68.6 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): 280 mV

VOLTAGE READING FROM LIGHT REFLECTED BY DAY MIRROR (Average Value): 269 mV

REFLECTOMETER VOLTAGE READINGS	
TEST NO. 1	269 mV
TEST NO. 2	268 mV
TEST NO. 3	269 mV
TEST NO. 4	269 mV
TEST NO. 5	269 mV

REFLECTANCE (Day) = Voltage (Ref)/Voltage (Cal) = 0. .960 x 100 = 96.0 percent
(Min. Required = 35%)

VOLTAGE READING FROM CALIBRATION (Average Value) = 280 mV

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

TEST STATUS:	PASSED —	X	FAILED —	
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RECORDED BY: PABLO VEGA DATE: 05/26/04

APPROVED BY: MATTHEW A. IVORY DATE: 05/26/04

DATA SHEET NO. 5

BREAKAWAY TEST - INSIDE REARVIEW MIRROR

VEHICLE			
YEAR	2004	MAKE	BMW
MODEL	MINI COOPER	BODY STYLE	2 DOOR COUPE
NHTSA NO.	C40501	VIN	WMWRC33464TC49568
TEST DATE:	5/28/04	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	173.7	10.0	X	
2	+45/90 DEGREES	201.7	12.1	X	
3	-45/90 DEGREES	97.5	17.2	X	
4	-45/+45 DEGREES	68.8	29.8	X	
5	+45/+45 DEGREES	100.5	35.5	X	
6	+45/-45 DEGREES	221.8	71.7	X	
7	-45/-45 DEGREES	80.5	38.7	X	

REMARKS:

DATA SHEET NO. 5... (Continued)

BREAKAWAY TEST - INSIDE REARVIEW MIRROR FAILURE TYPE - DESCRIPTION:

FAILURE TYPE - DESCRIPTION:

NONE

TEST STATUS:	PASSED —	X	FAILED —	
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REMARKS:

RECORDED BY: MICHAEL DUNLAP

DATE: 05/25/04

APPROVED BY: MATTHEW A. IVORY

DATE: 05/25/04

DATA SHEET NO. 6

UNIT MAGNIFICATION AND CONVEX MIRROR TESTS

VEHICLE			
YEAR	2004	MAKE	BMW
MODEL	MINI COOPER	BODY STYLE	2 DOOR COUPE
NHTSA NO.	C40501	VIN	WMWRC33464TC49566
TEST DATE:	05/26/04	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. 6... (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: 05/26/04

APPROVED BY: MATTHEW A. IVORY DATE: 05/26/04

DATA SHEET NO. 8

TEST SUMMARY-FMVSS 111-REARVIEW MIRRORS

VEHICLE			
YEAR	2004	MAKE	BMW
MODEL	MINI COOPER	BODY STYLE	2 DOOR COUPE
NHTSA NO.	C40501	VIN	WMWRC33464TC49568
TEST DATE:	05/26/04	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

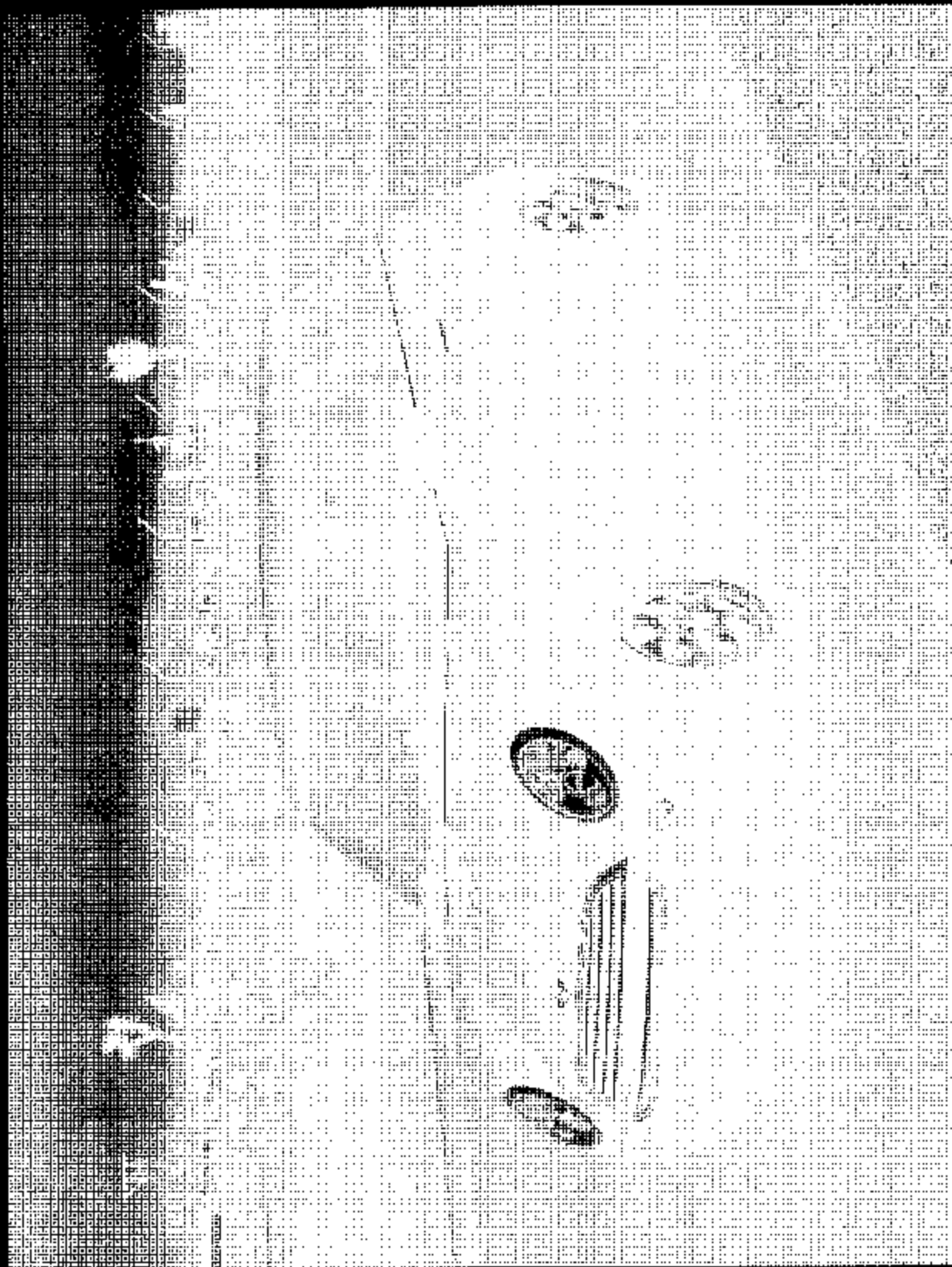


FIGURE 1: LEFT FRONT 3/4 VIEW

2004 BAW MINI COOPER
NHTSA NO. C40501
FMVSS NO. 111

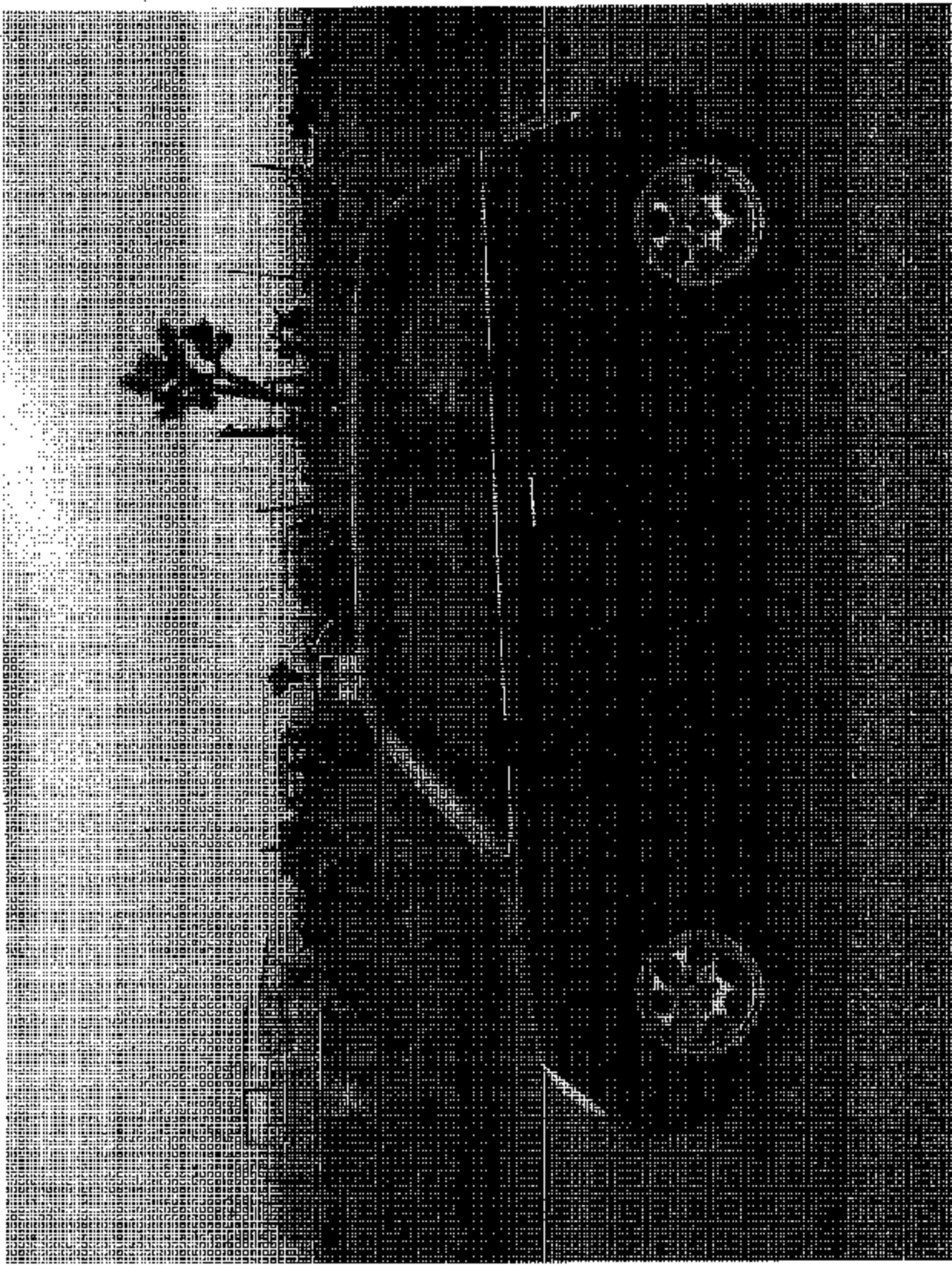


FIGURE 2: LEFT SIDE VIEW

2004 BMW MINI COOPER
NHTSA NO. C40501
FMVSS NO. 111




FIGURE 3: RIGHT REAR 3/4 VIEW

2004 BMW MINI COOPER
NHTSA NO. C40501
FMVSS NO. 111

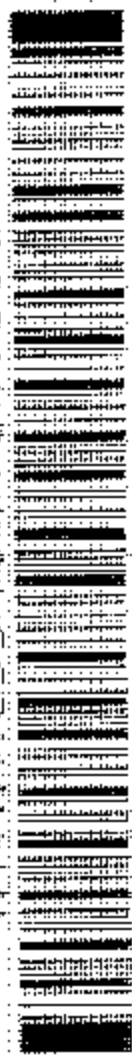


FIGURE 4: RIGHT SIDE VIEW

2004 BMW MINI COOPER
NHTSA NO. C40501
FMVSS NO. 111



MODEL: VEHICLE TYPE: PASSENGER CAR
 MAKE: BMW MOTOR VEHICLES DIVISION OF THE BMW GROUP OF AMERICAS, INC.
 VIN: WMLWRC33464TC49566
 GROSS WEIGHT: 3410 LBS. (1550 KG) REAR: 1609 LBS. (730 KG)
 THIS VEHICLE COMPLIES WITH ALL APPLICABLE U.S. FEDERAL MOTOR VEHICLE SAFETY BUMPER AND OTHER PERFORMANCE STANDARDS IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE.



WMLWRC33464TC49566

2004 BMW MINI COOPER
 NHTSA NO. C40501
 FMVSS NO. 111

FIGURE 5: MANUFACTURER'S LABEL

Contact the address in parentheses for more information. The address in parentheses is for the vehicle company, the dealer, or the company that sold you the vehicle. The address in parentheses is for the dealer, the company that sold you the vehicle, or the company that sold you the vehicle.

Year	Model	Make	Model	Year	Make	Model	Year	Make	Model
17245	R	1967	MINI	17245	R	1967	MINI	17245	R
17245	R	1964	MINI	17245	R	1964	MINI	17245	R
17245	R	1967	MINI	17245	R	1967	MINI	17245	R
20045	R	17	MINI	20045	R	17	MINI	20045	R
A 17245	R	1967	MINI	A 17245	R	1967	MINI	A 17245	R
A 20045	R	17	MINI	A 20045	R	17	MINI	A 20045	R
A 19645	R	1967	MINI	A 19645	R	1967	MINI	A 19645	R
A 20045	R	17	MINI	A 20045	R	17	MINI	A 20045	R
17245	R	1964	MINI	17245	R	1964	MINI	17245	R
17245	R	1967	MINI	17245	R	1967	MINI	17245	R
17245	R	1964	MINI	17245	R	1964	MINI	17245	R
17245	R	1967	MINI	17245	R	1967	MINI	17245	R

2004 BMW MINI COOPER
 NHTSA NO. C40501
 FMVSS NO. 111

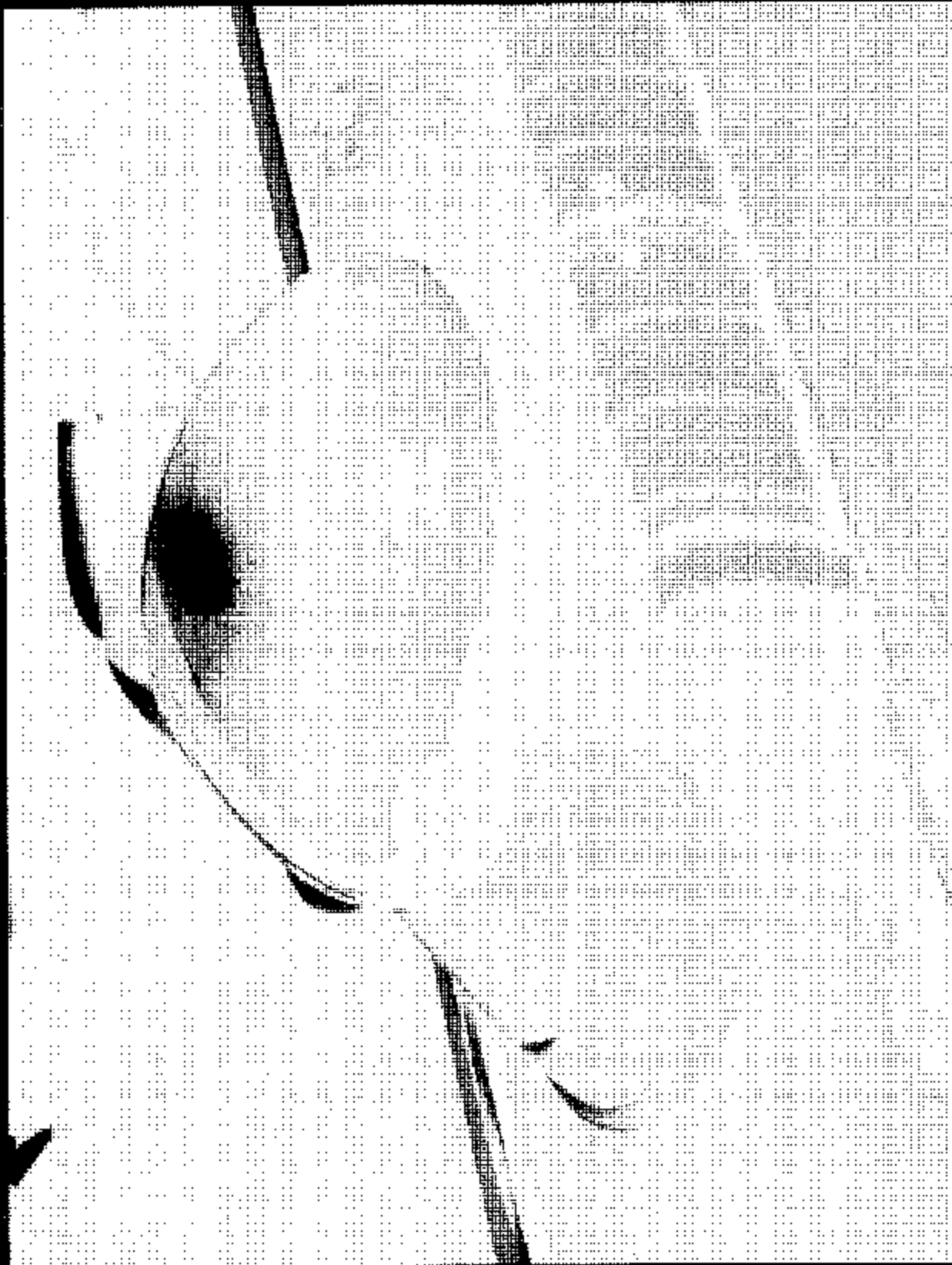


FIGURE 7: DRIVER SIDE REAR VIEW MIRROR AND MOUNTING

2004 BMW MINI COOPER
NHTSA NO. C40501
FMVSS NO. 111



FIGURE 8: PASSENGER SIDE REAR VIEW MIRROR AND MOUNTING

2004 BMW MINI COOPER
NHTSA NO. C40501
FMVSS NO. 111



FIGURE 9: INSIDE REAR VIEW MIRROR AND MOUNTING

2004 BMW MINI COOPER
NHTSA NO. C40501
FMVSS NO. 111



FIGURE 10: TEST SET-UP

2004 BMW MINI COOPER
NHTSA NO. C40501
FMVSS NO. 111

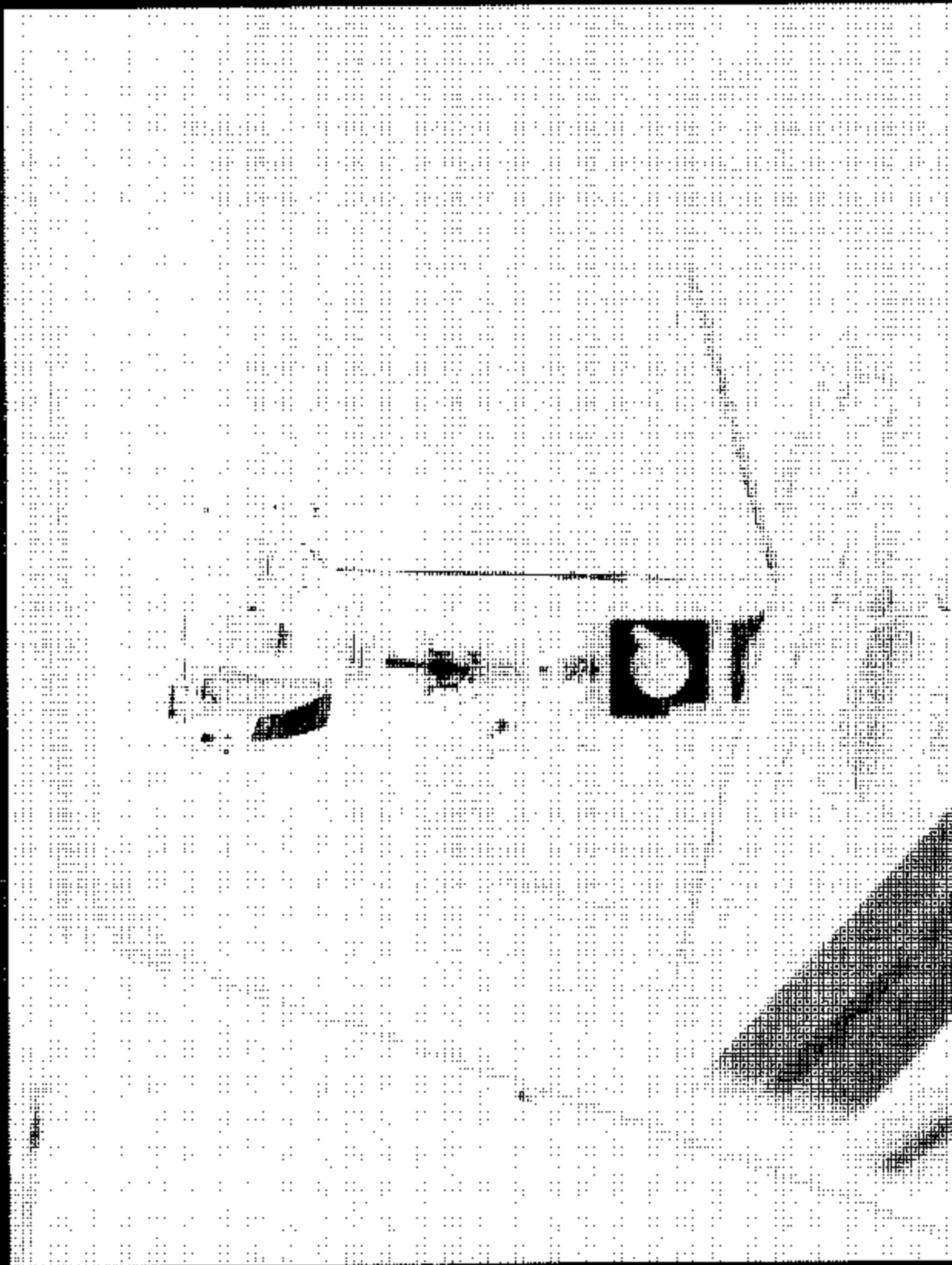


FIGURE 11: CAMERA SET-UP FOR PHOTOGRAPHING REFERENCE BOARD

2004 BMW MINI COOPER
NHTSA NO. C40501
FMVSS NO. 111



2004 BMW MINI COOPER FIGURE 12: OVERALL SET-UP AND INSTRUMENTATION FOR MIRROR BREAK-AWAY TEST
NHTSA NO. C40501
FMVSS NO. 111



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

2004 BMW MINI COOPER
NHTSA NO. C40501
FMVSS NO. 111

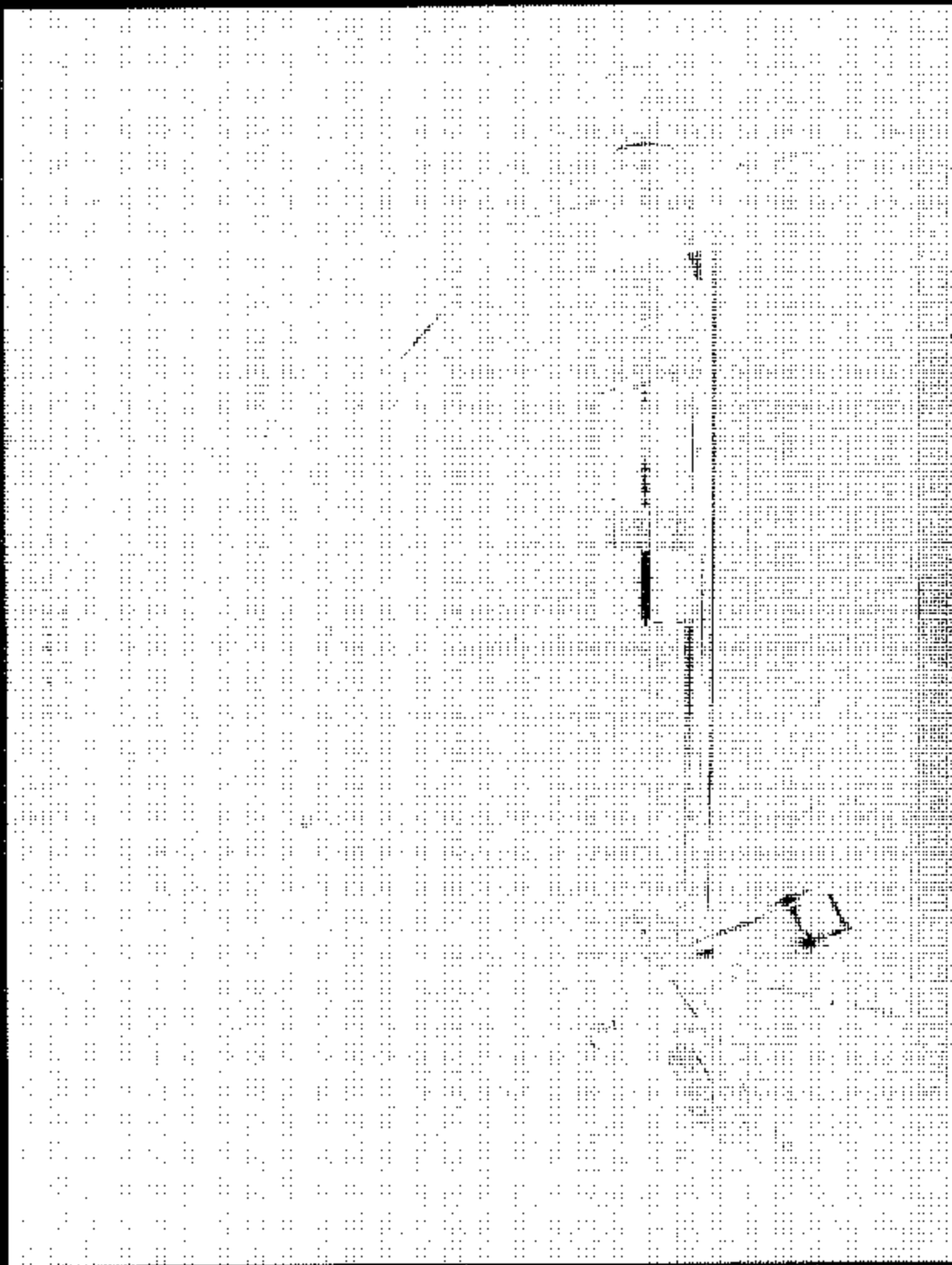


FIGURE 14: REFLECTION TEST SET-UP

2004 BMW MINI COOPER
NHTSA NO. C40501
FMVSS NO. 111

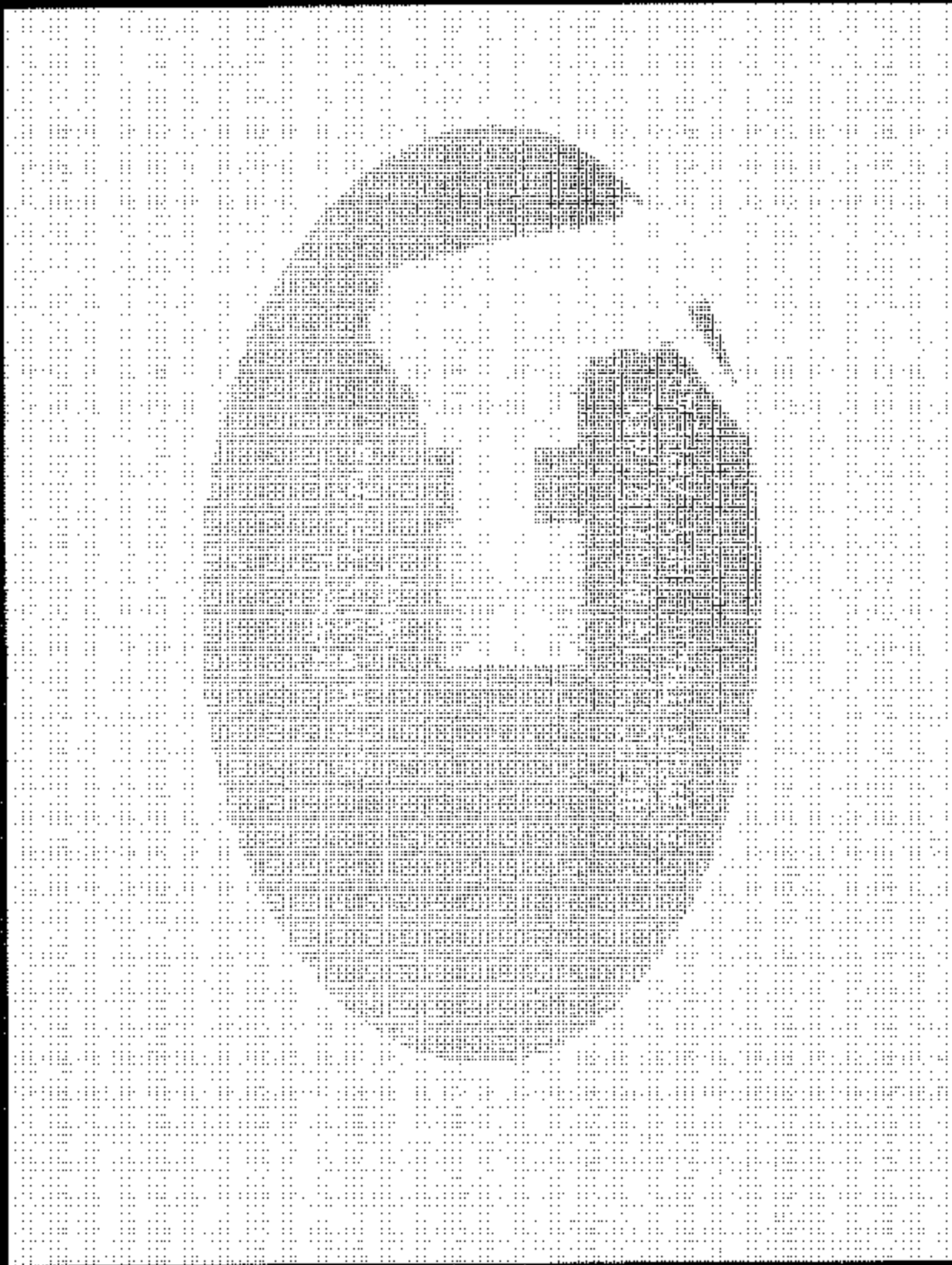


FIGURE 15: MIRROR SET-UP FOR AREA MEASUREMENT

2004 BMW MINI COOPER
NIHTSA NO. C40501
FMVSS NO. 111

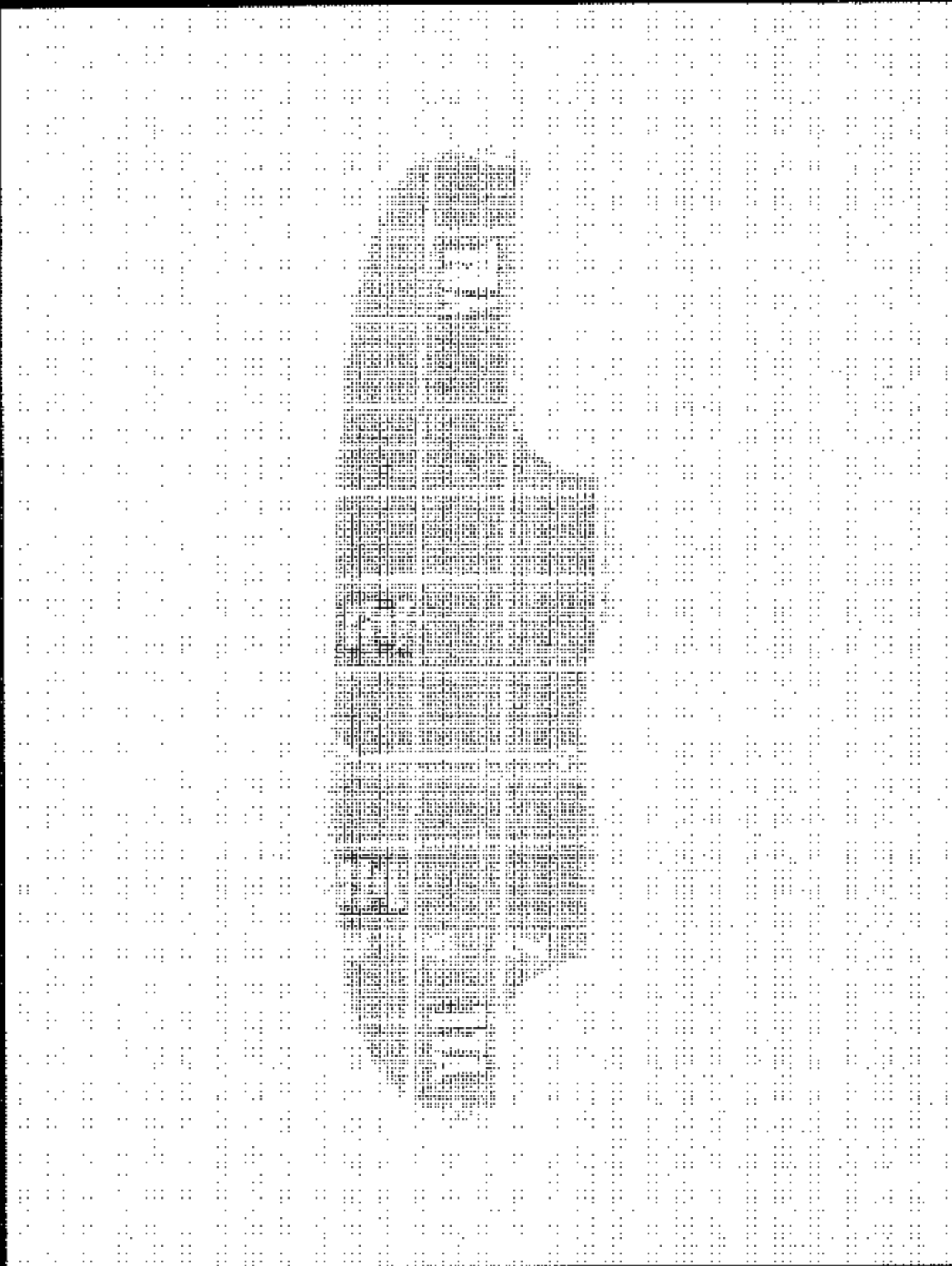
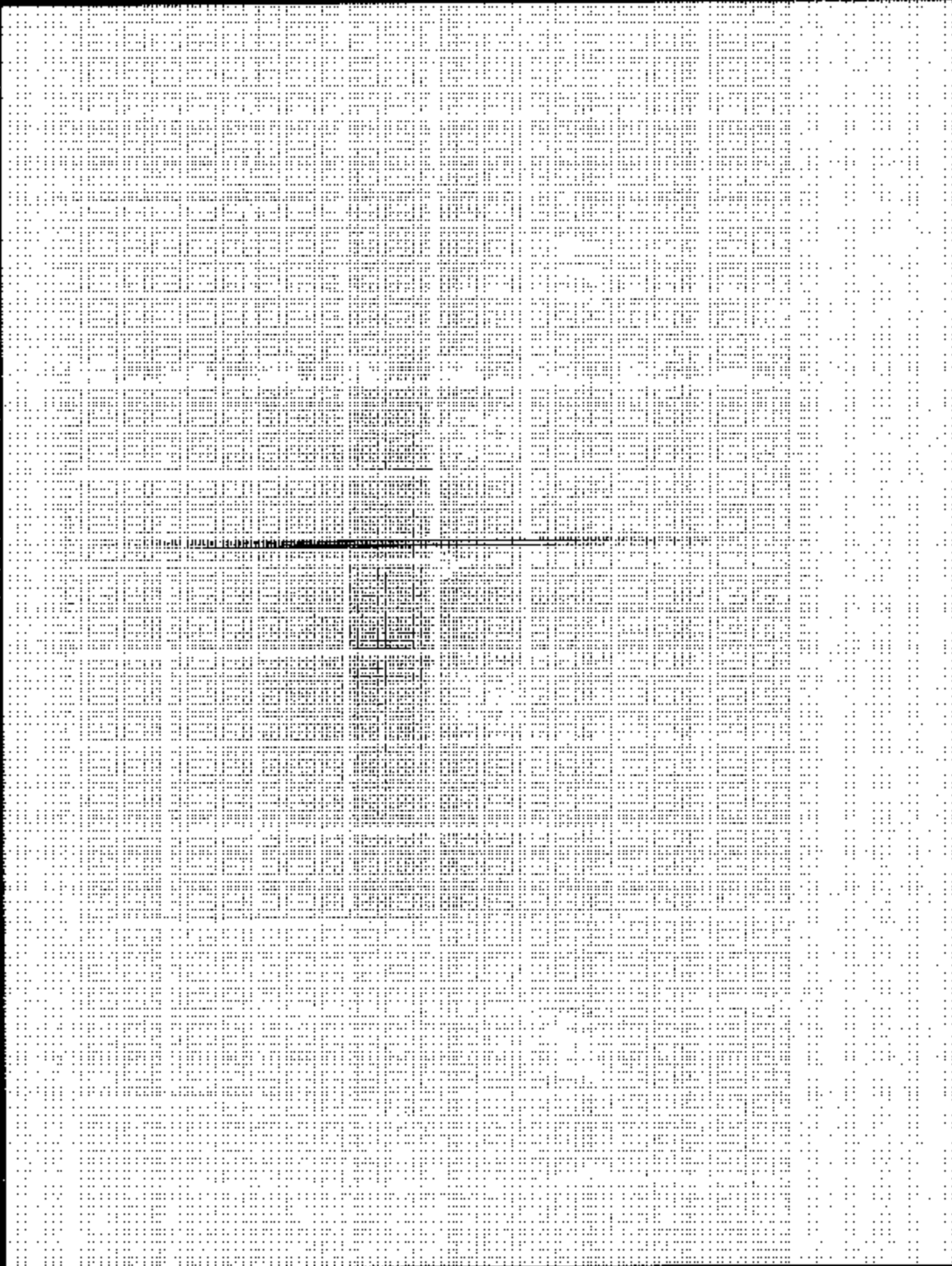


FIGURE 18: LEFT EYE FIELD OF VIEW TEST (INSIDE MIRROR)

2004 BMW MINI COOPER
NHTSA NO. C40501
FMVSS NO. 111



2004 BMW MINI COOPER
NHTSA NO. C40501
FMVSS NO. 111

FIGURE 17. REFERENCE BOARD FOR INSIDE MIRROR, LEFT EYE

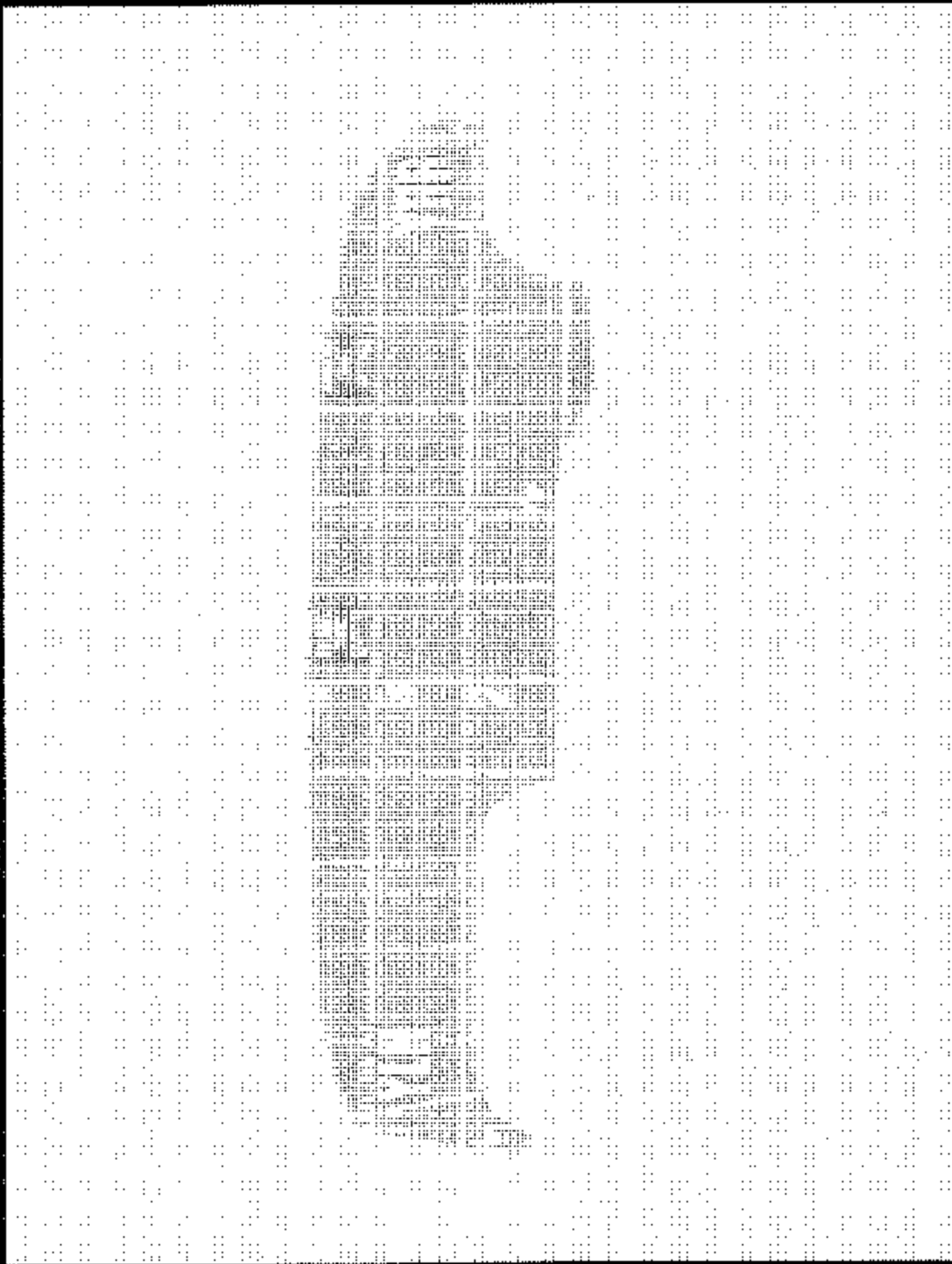


FIGURE 18: RIGHT EYE FIELD OF VIEW TEST (INSIDE MIRROR)

2004 BMW MINI COOPER
NHTSA NO. C40501
FMVSS NO. 111

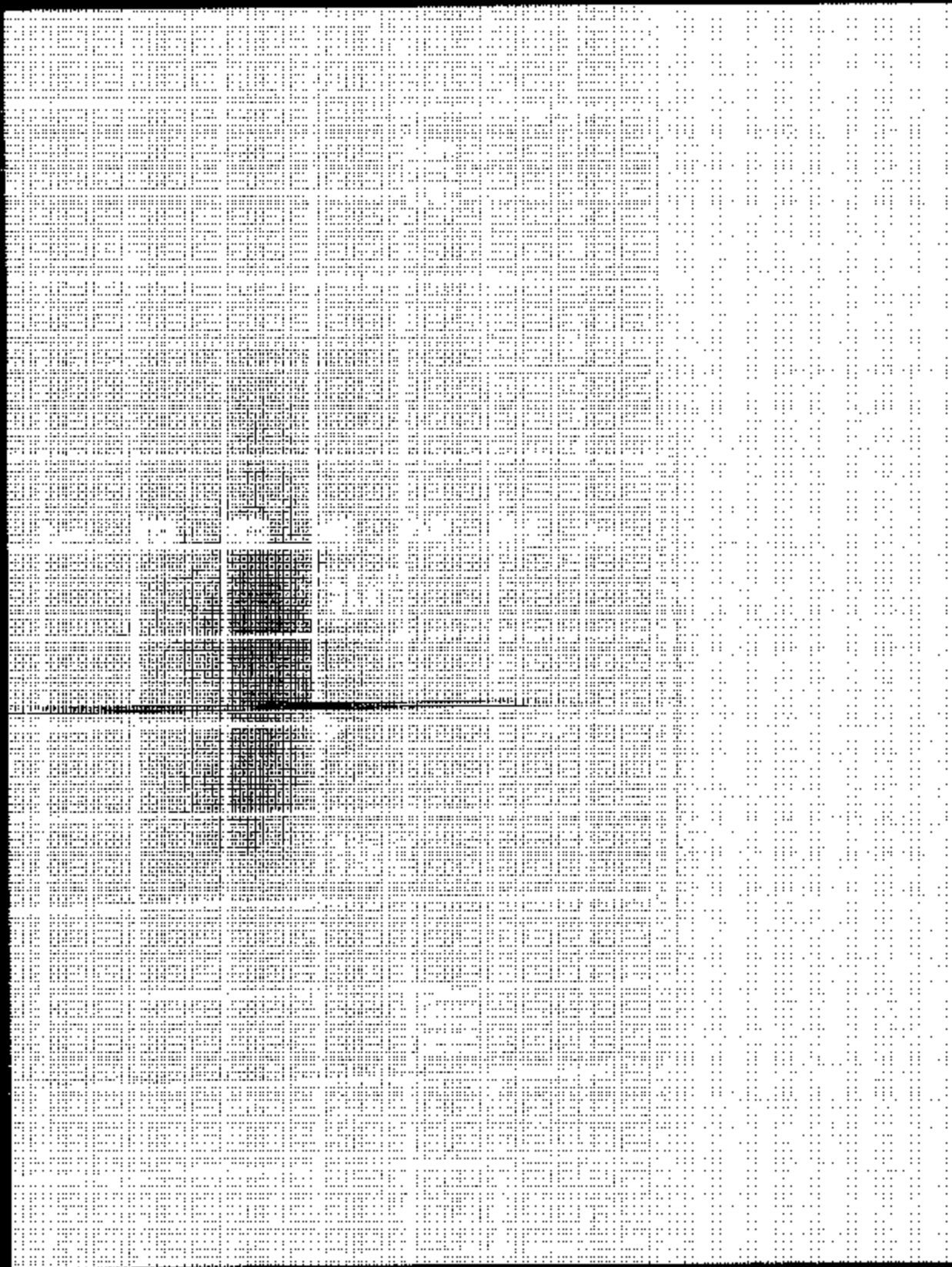


FIGURE 19: REFERENCE BOARD FOR INSIDE MIRROR, RIGHT EYE

2004 BMW MINI COOPER
NHTSA NO. C40501
FMVSS NO. 111

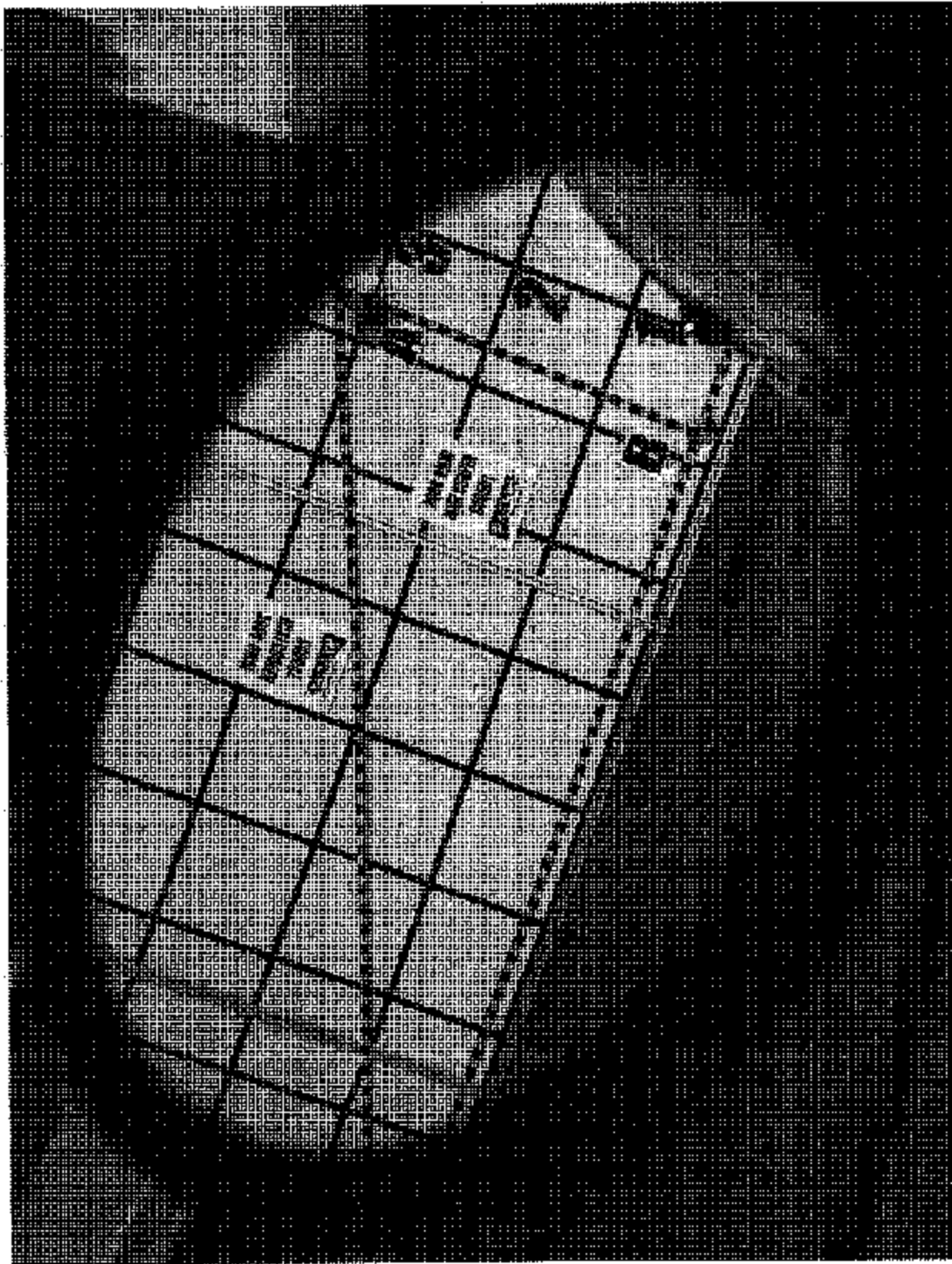


FIGURE 20: LEFT EYE FIELD OF VIEW TEST (DRIVER SIDE MIRROR)

2004 BMW MINI COOPER
NHTSA NO. C40501
FMVSS NO. 111

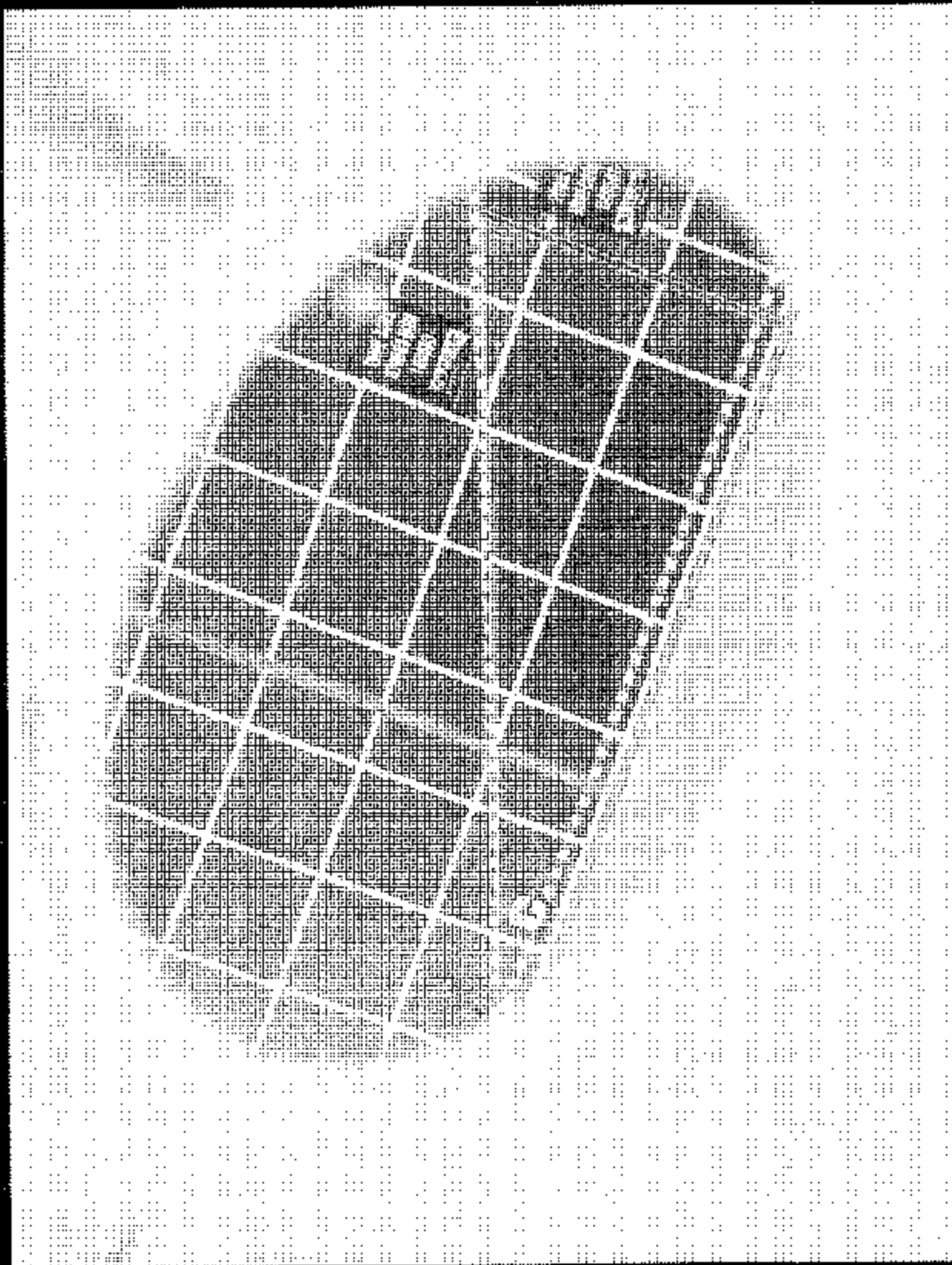


FIGURE 21:RIGHT EYE FIELD OF VIEW TEST (DRIVER SIDE MIRROR)

2004 BMW MINI COOPER
NHTSA NO. C40501
FMVSS NO. 111

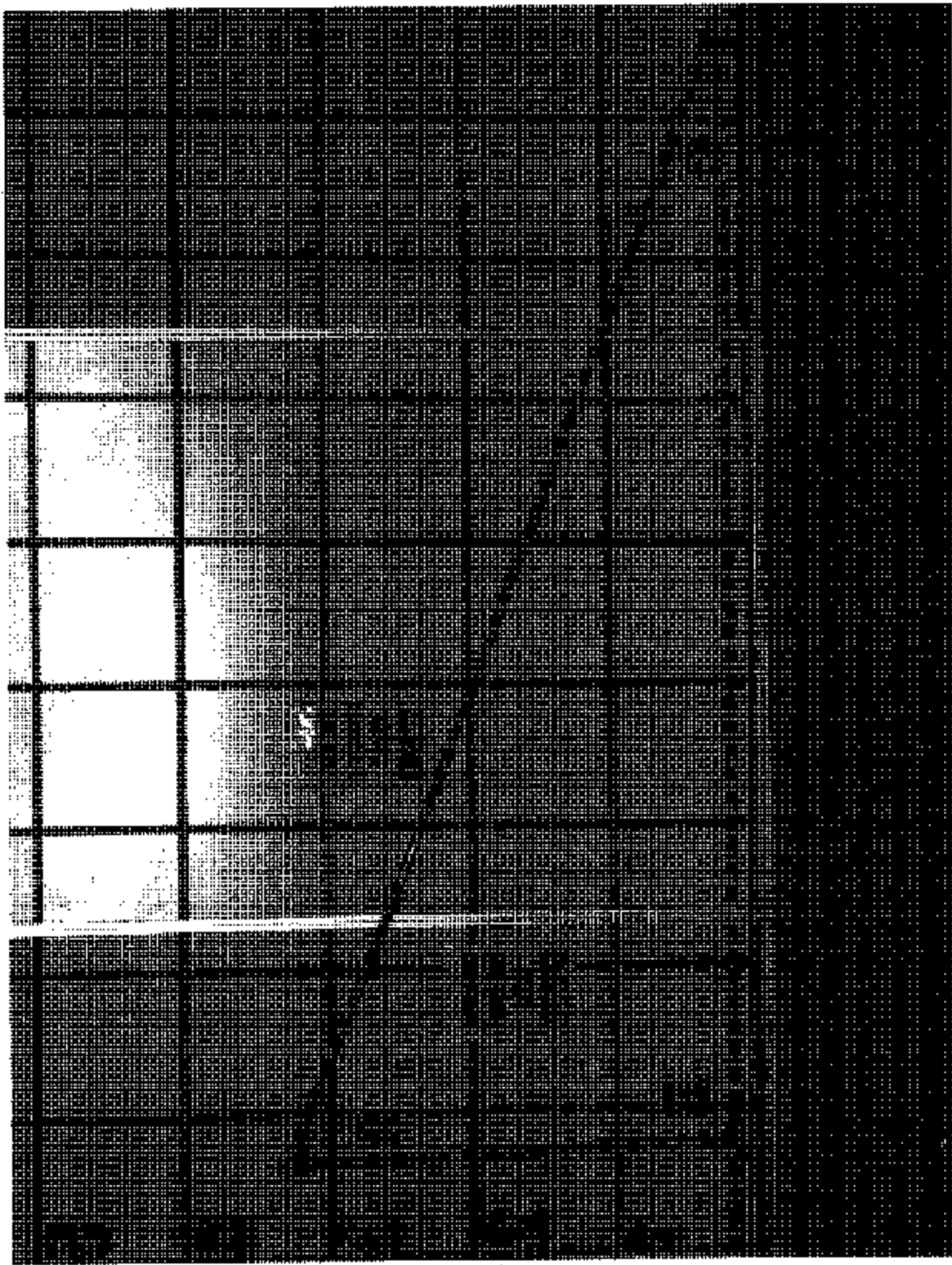
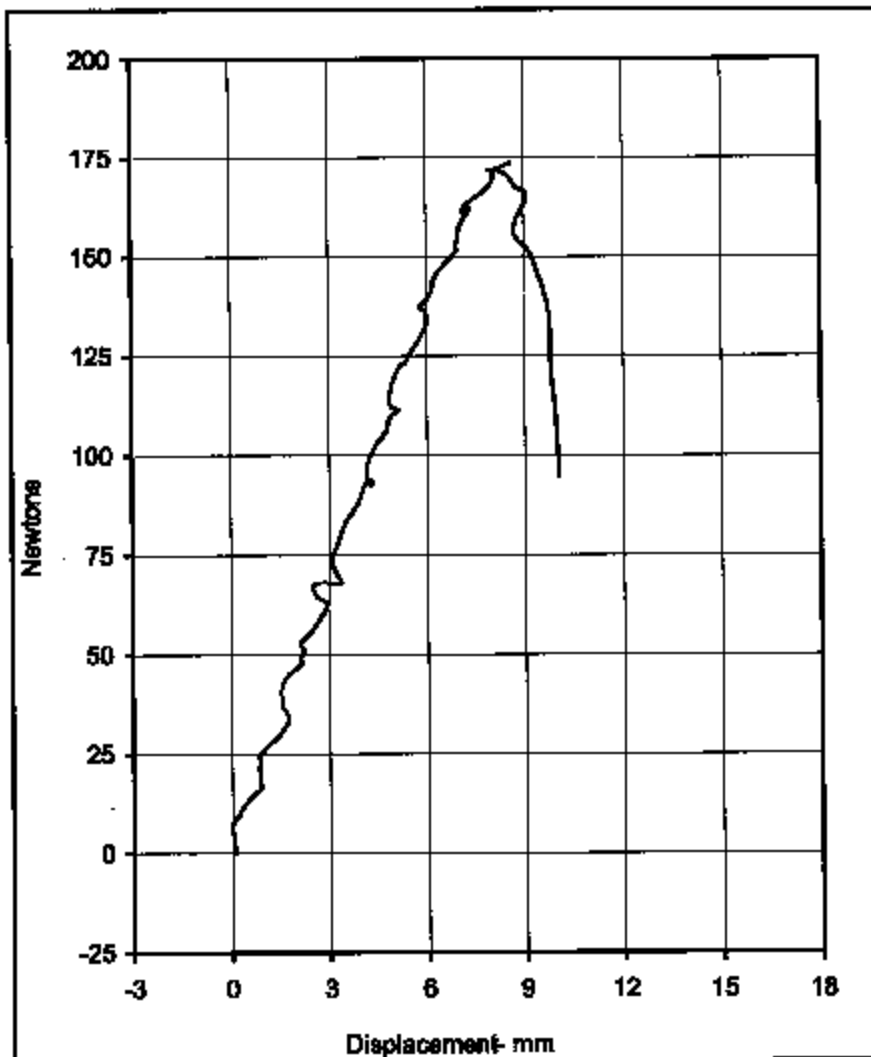


FIGURE 22:REFERENCE BOARD FOR DRIVER SIDE MIRROR

2004 BMW MINI COOPER
NHTSA NO. C40501
FMVSS NO. 111

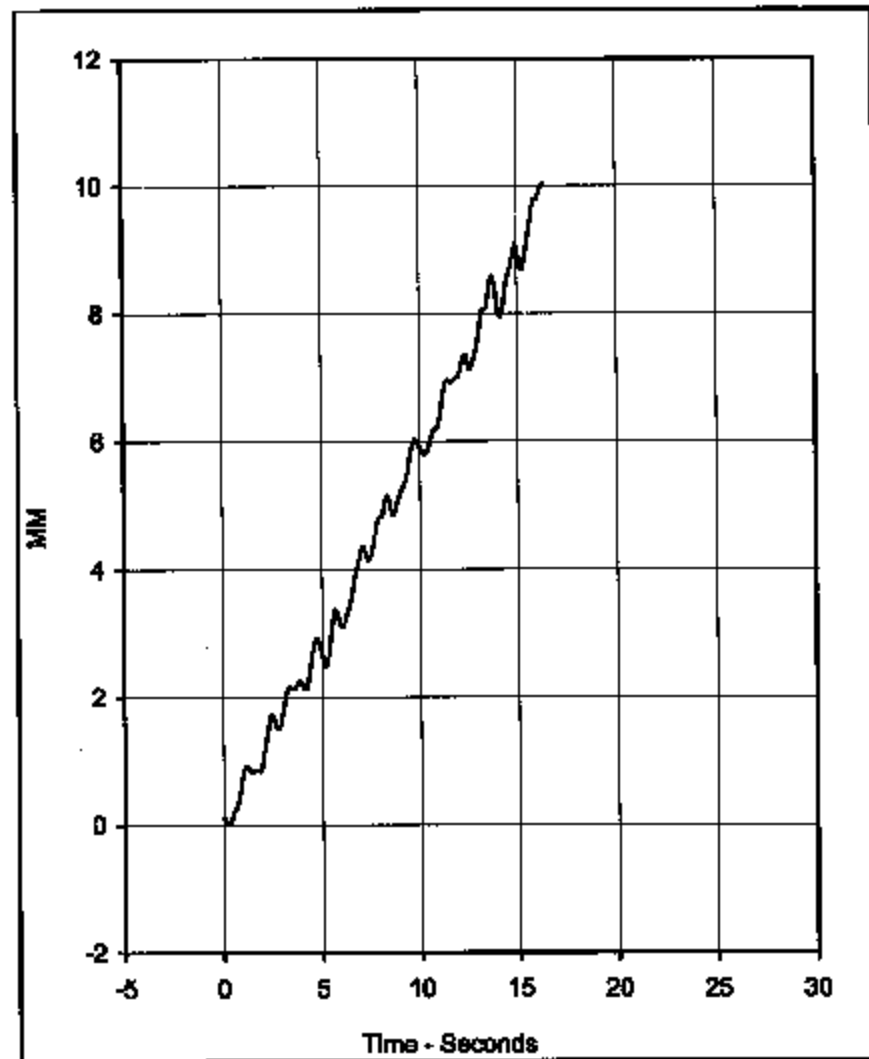
APPENDIX B
DATA PLOTS

B-1



Curve Description	CURNO	Type
Force vs. Displacement	001	FIL

Units	Peak Force	Displacement	Filter (Hz)
Newtons	173.7	8.6	1



Curve Description	CURNO	Type
Displacement vs. Time	002	FIL

Units	Max	Time	Displ. Rate (mm/min.)	Filter (Hz)
MM	10.0	16.4	36.9	1

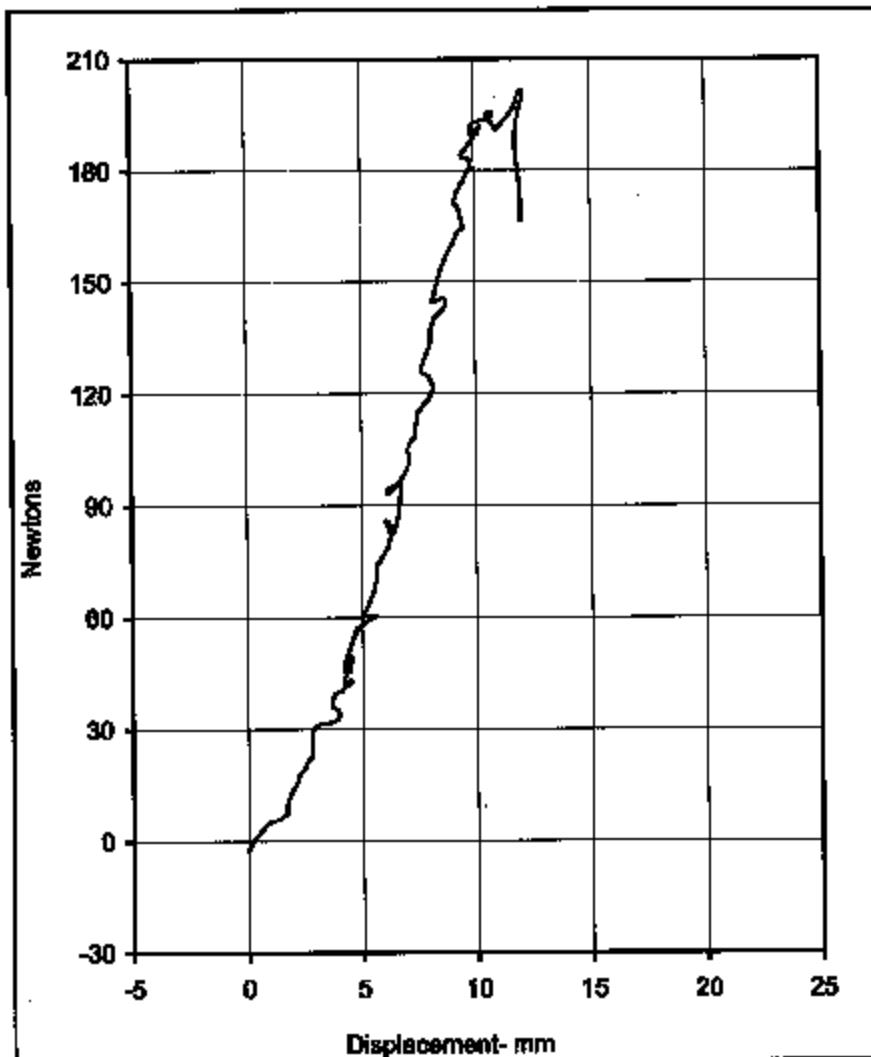
Test Program: 2004 FMVSS 111 Rearview Mirrors Test No.: 1
 Test Vehicle: 2004 BMW Mini Cooper No.: C40501

Load Direction: 0 / 90
 Test Date: 5/26/04



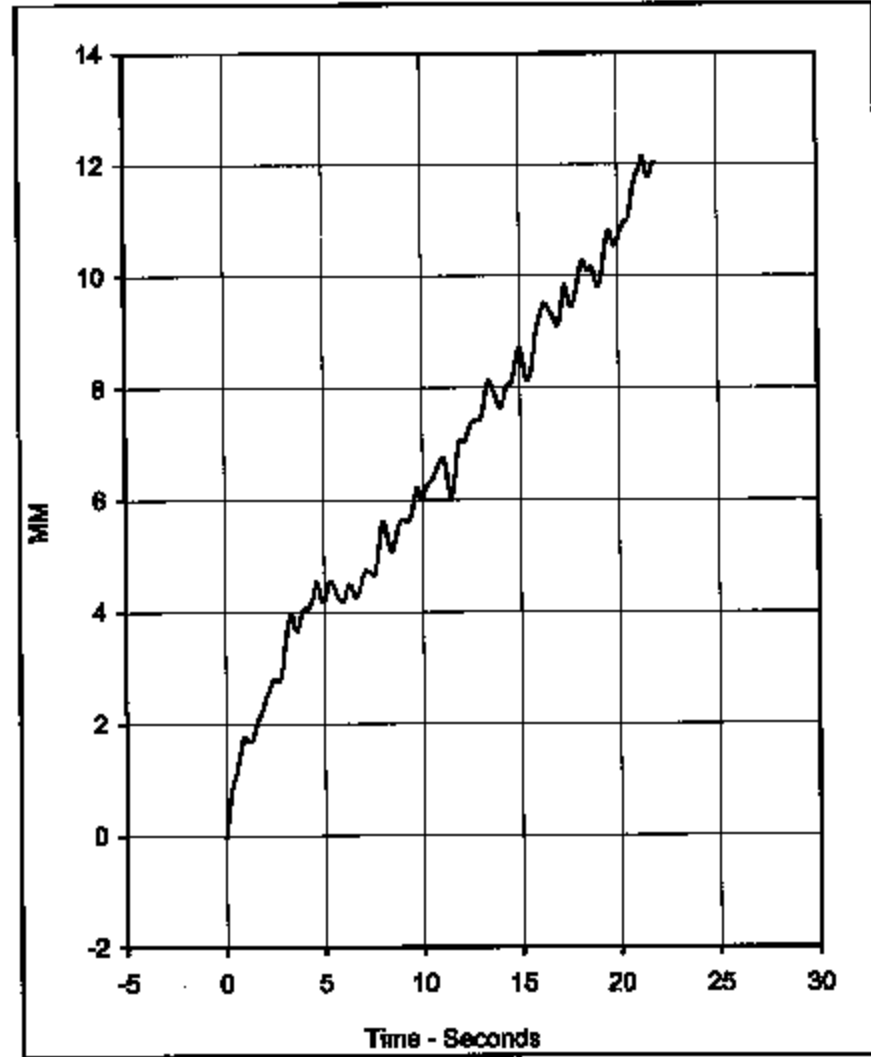
111-KAR-04-001

B-2



Curve Description	CURNO	Type
Force vs. Displacement	001	FIL

Units	Peak Force	Displacement	Filter (Hz)
Newtons	201.7	12.1	1



Curve Description	CURNO	Type
Displacement vs. Time	002	FIL

Units	Max	Time	Displ. Rate (mm/min.)	Filter (Hz)
MM	12.1	21.3	33.0	1

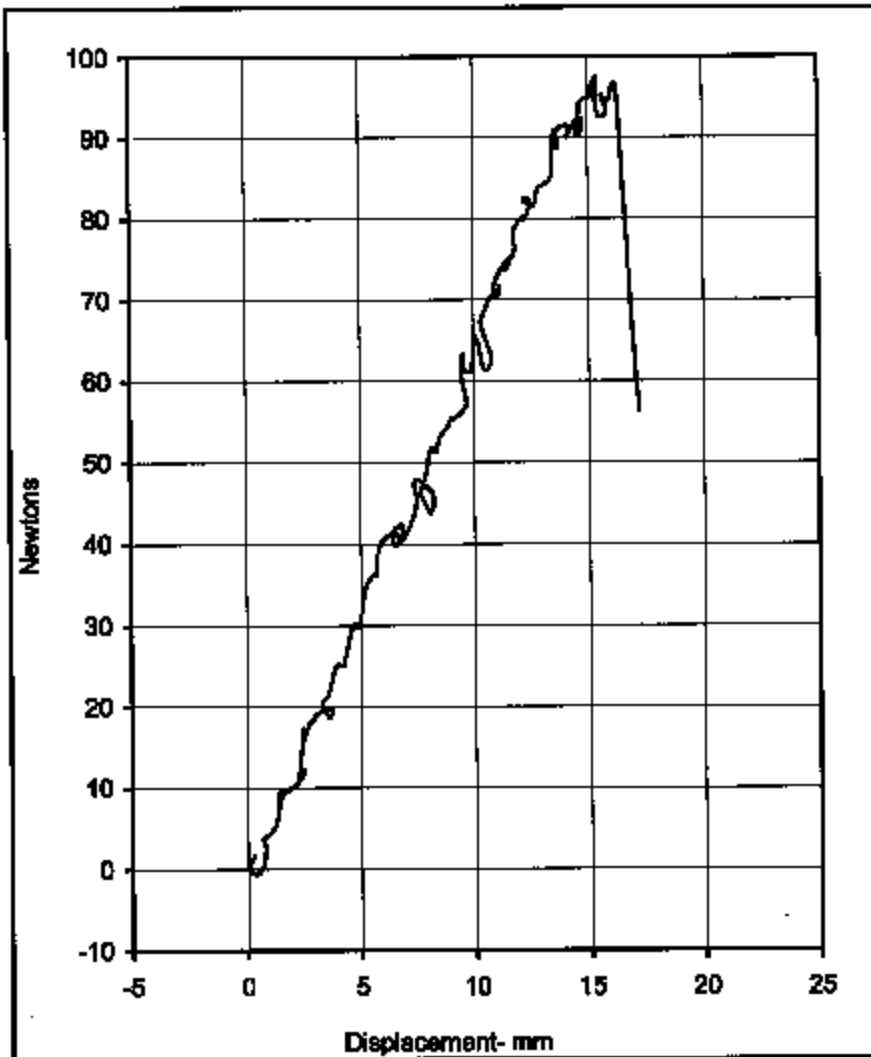
Test Program: 2004 FMVSS 111 Rearview Mirrors Test No.: 2
 Test Vehicle: 2004 BMW Mini Cooper No.: C40501

Load Direction: +45 / 90
 Test Date: 5/26/04



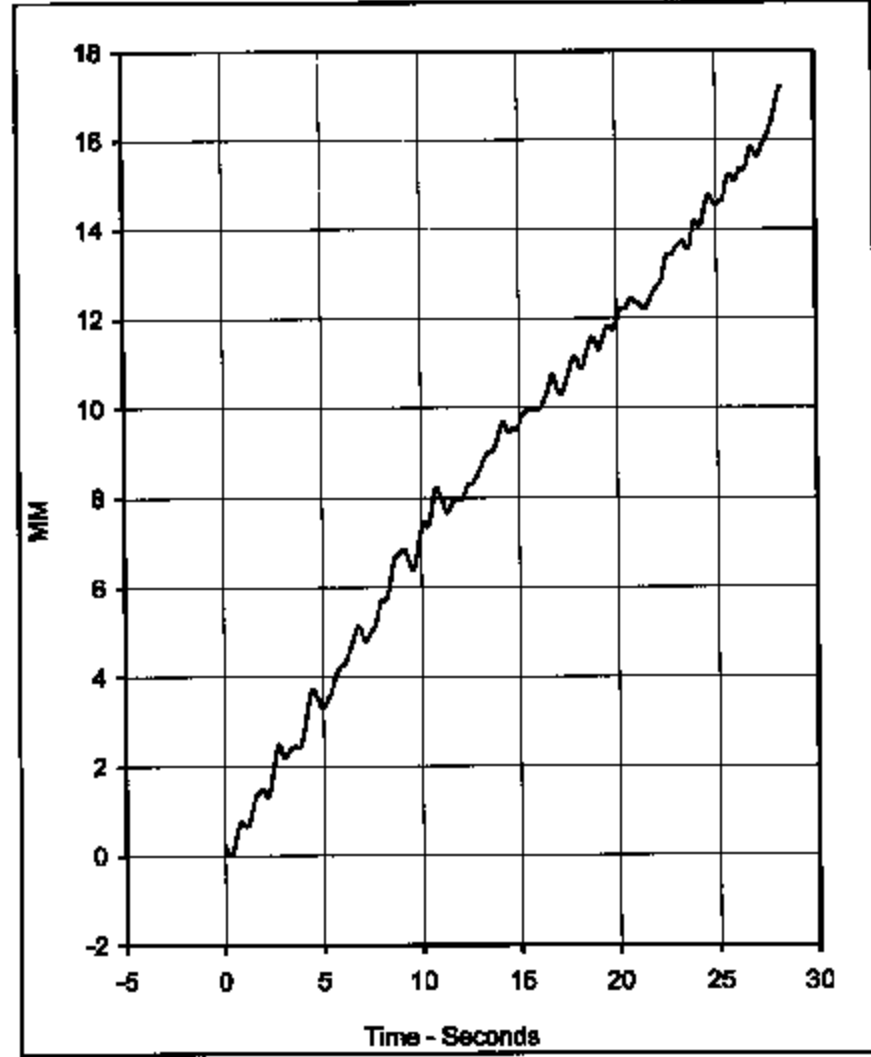
111-KAR-04-001

B-3



Curve Description	CURNO	Type
Force vs. Displacement	001	FIL

Units	Peak Force	Displacement	Filter (Hz)
Newtons	97.5	15.4	1



Curve Description	CURNO	Type
Displacement vs. Time	002	FIL

Units	Max	Time	Displ. Rate (mm/min.)	Filter (Hz)
MM	17.2	28.3	35.0	1

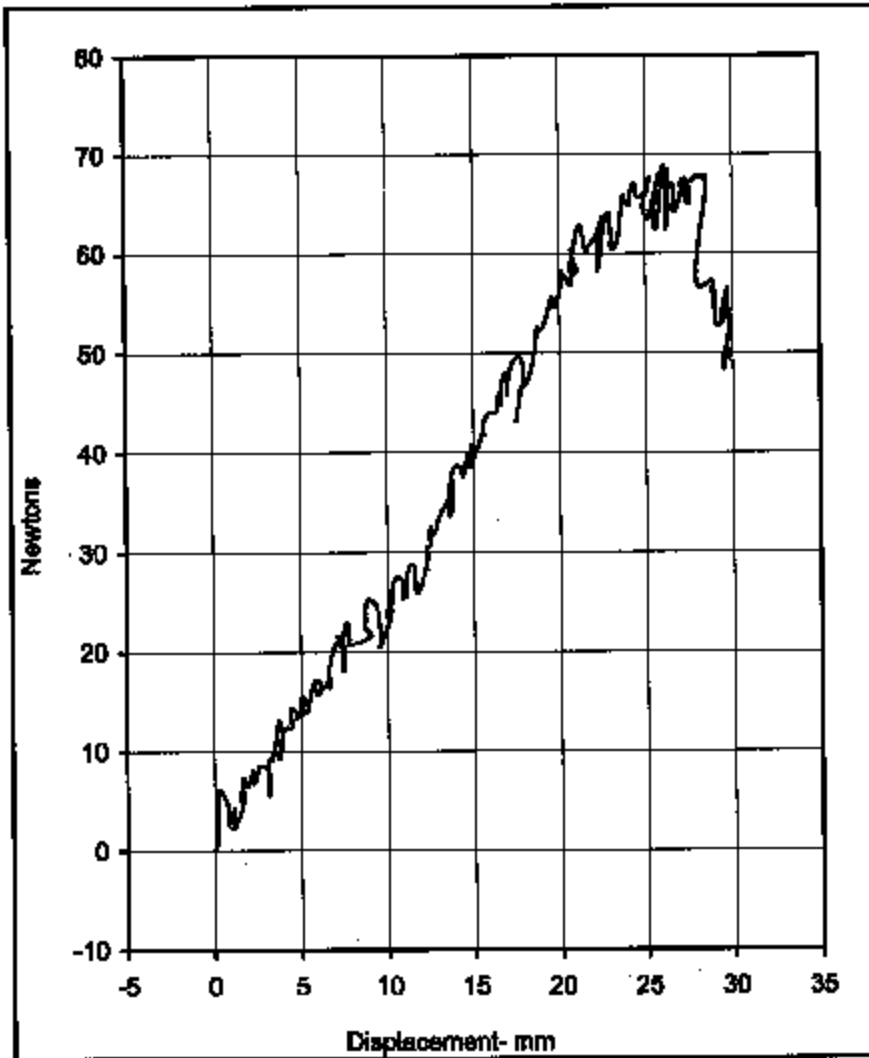
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 Test Vehicle: 2004 BMW Mini Cooper No.: C40501

Load Direction: -45 / 90
 Test Date: 5/27/04



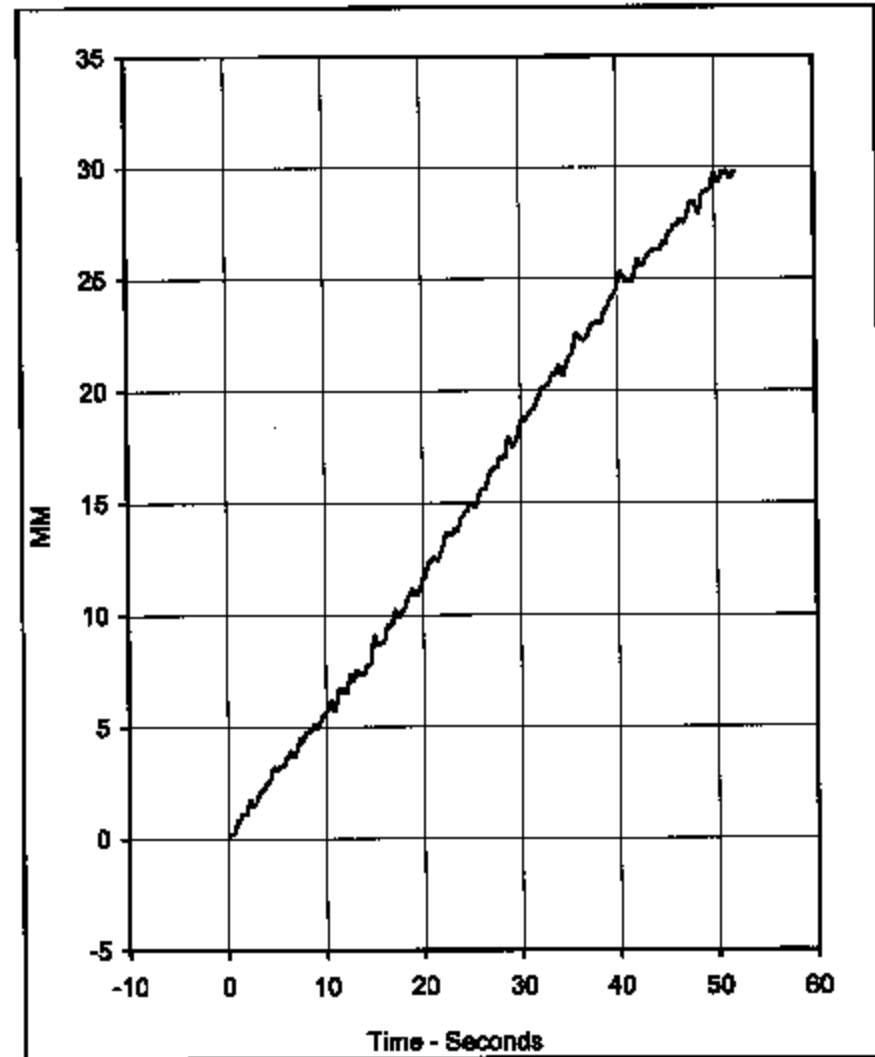
111-KAR-04-001

B4



Curve Description	CURNO	Type
Force vs. Displacement	001	FIL

Units	Peak Force	Displacement	Filter (Hz)
Newtons	68.8	26.1	1



Curve Description	CURNO	Type
Displacement vs. Time	002	FIL

Units	Max	Time	Displ. Rate (mm/min.)	Filter (Hz)
MM	29.8	51.2	35.6	1

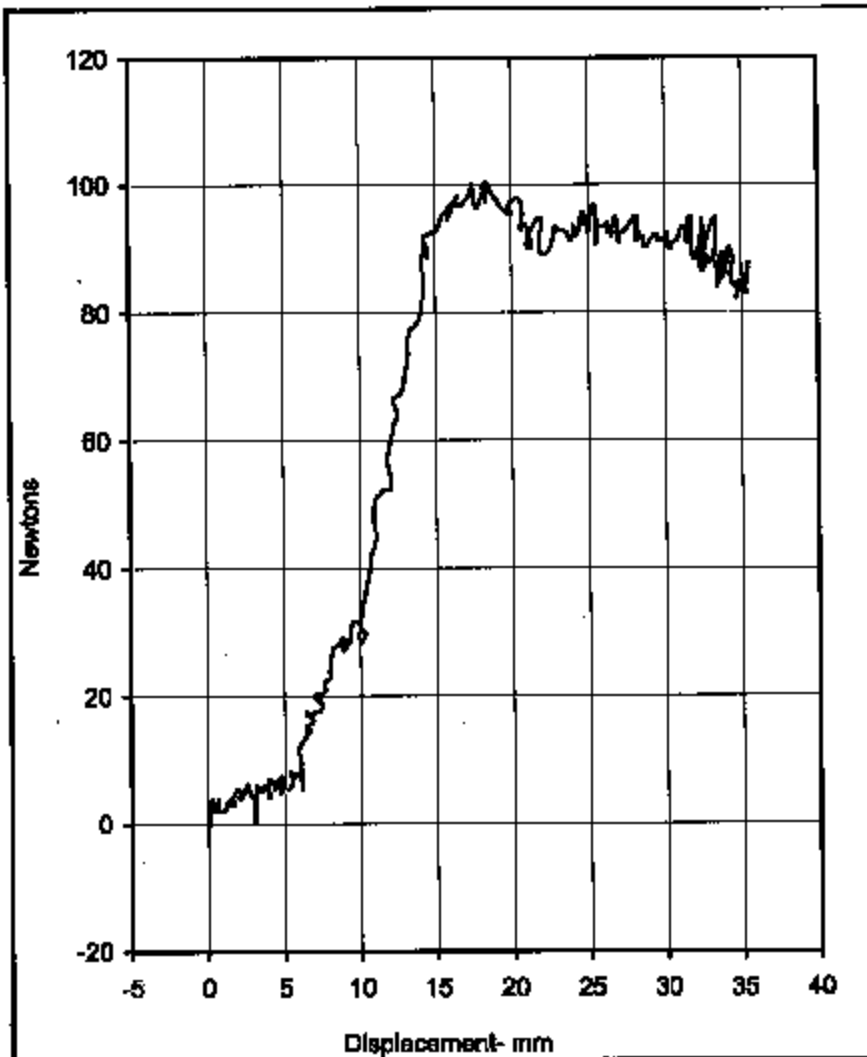
Test Program: 2004 FMVSS 111 Rearview Mirrors Test No.: 4
 Test Vehicle: 2004 BMW Mini Cooper No.: C40501

Load Direction: -45 / +45
 Test Date: 5/27/04



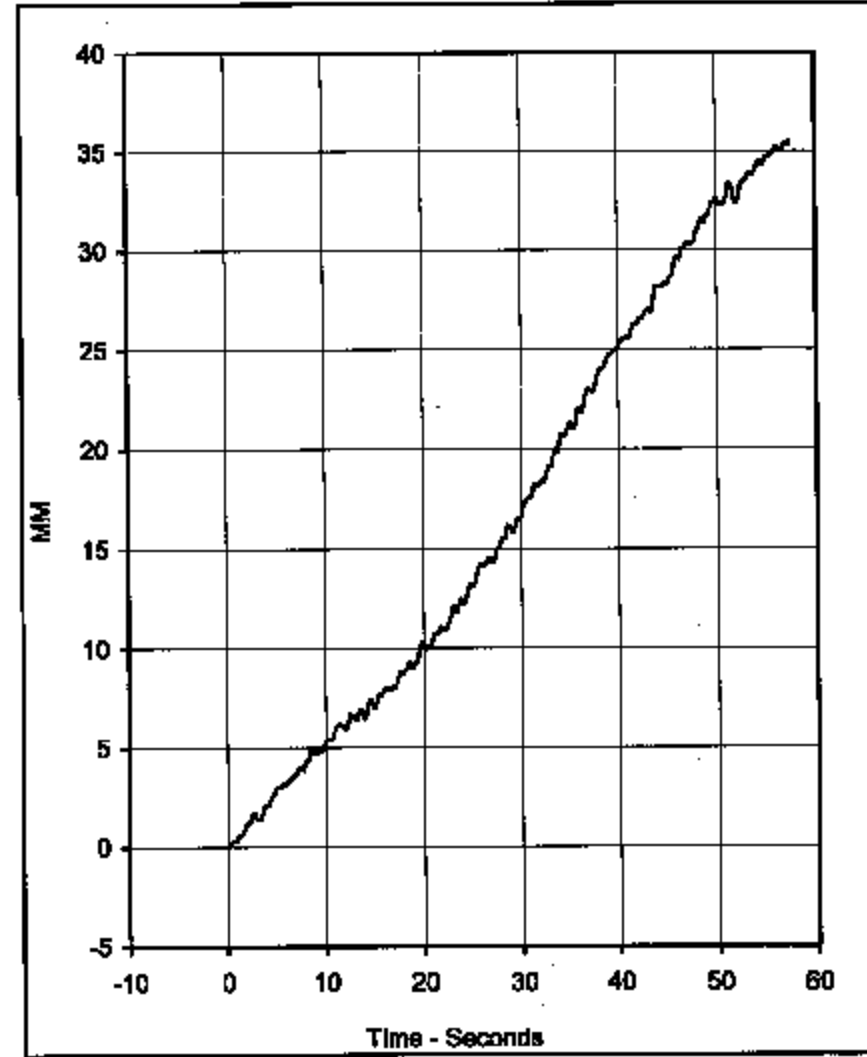
111-KAR-04-001

B-5



Curve Description	CURNO	Type
Force vs. Displacement	001	FIL

Units	Peak Force	Displacement	Filter (Hz)
Newtons	100.5	18.3	1



Curve Description	CURNO	Type
Displacement vs. Time	002	FIL

Units	Max	Time	Displ. Rate (mm/min.)	Filter (Hz)
MM	35.5	57.5	37.9	1

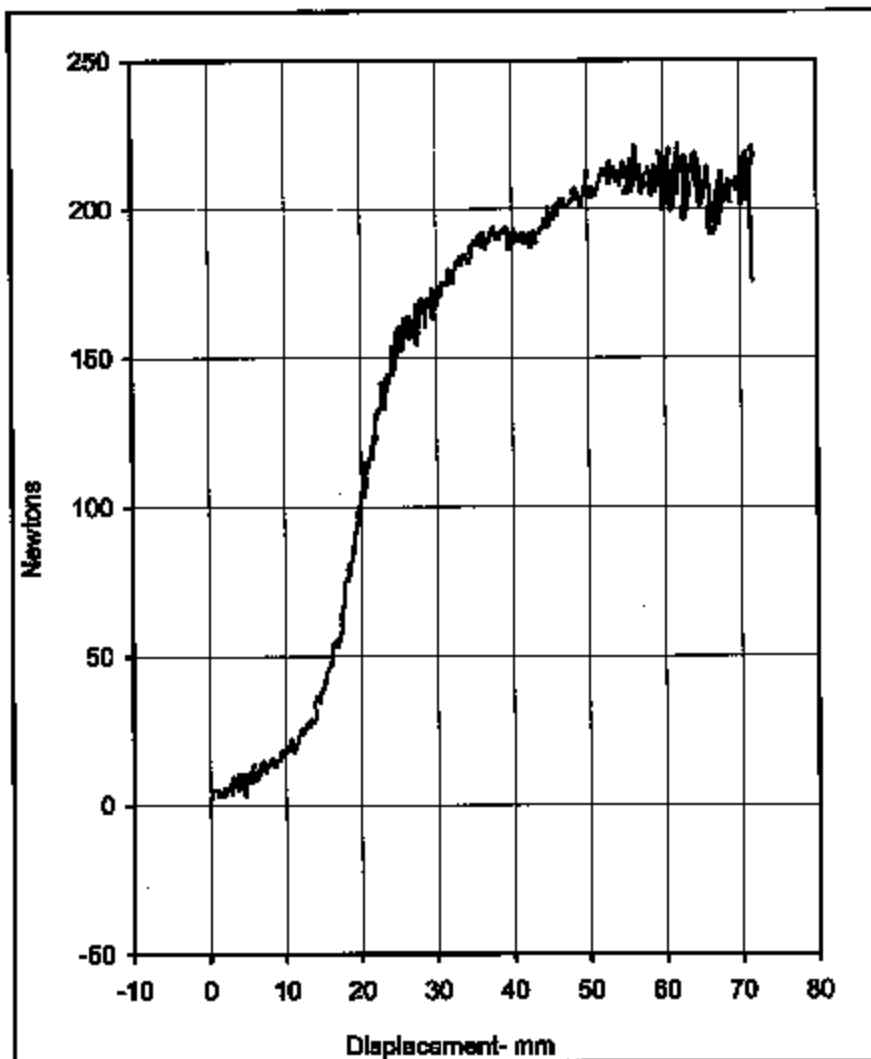
Test Program: 2004 FMVSS 111 Rearview Mirrors Test No.: 5
 Test Vehicle: 2004 BMW Mini Cooper No.: C40501

Load Direction: +45 / +45
 Test Date: 5/27/04



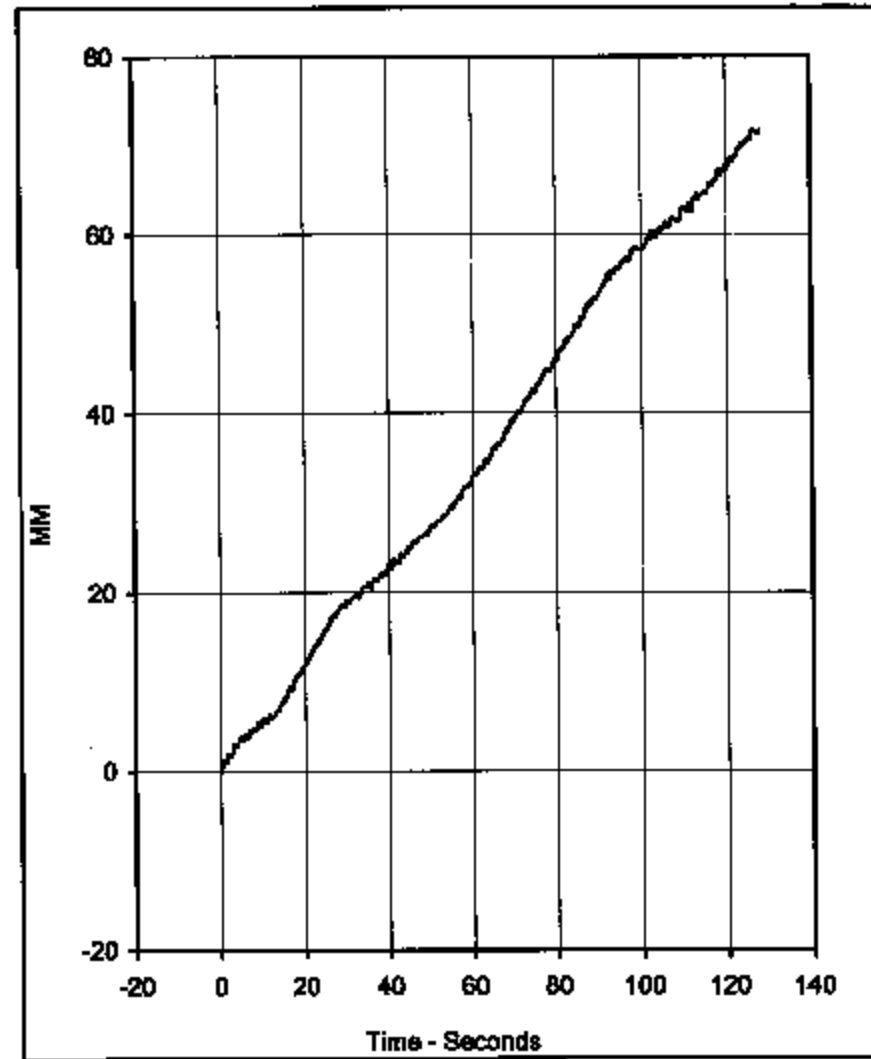
111-KAR-04-001

B-6



Curve Description	CURNO	Type
Force vs. Displacement	001	FIL

Units	Peak Force	Displacement	Filter (Hz)
Newtons	221.8	62.0	1



Curve Description	CURNO	Type
Displacement vs. Time	002	FIL

Units	Max	Time	Displ. Rate (mm/min.)	Filter (Hz)
MM	71.7	126.5	33.8	1

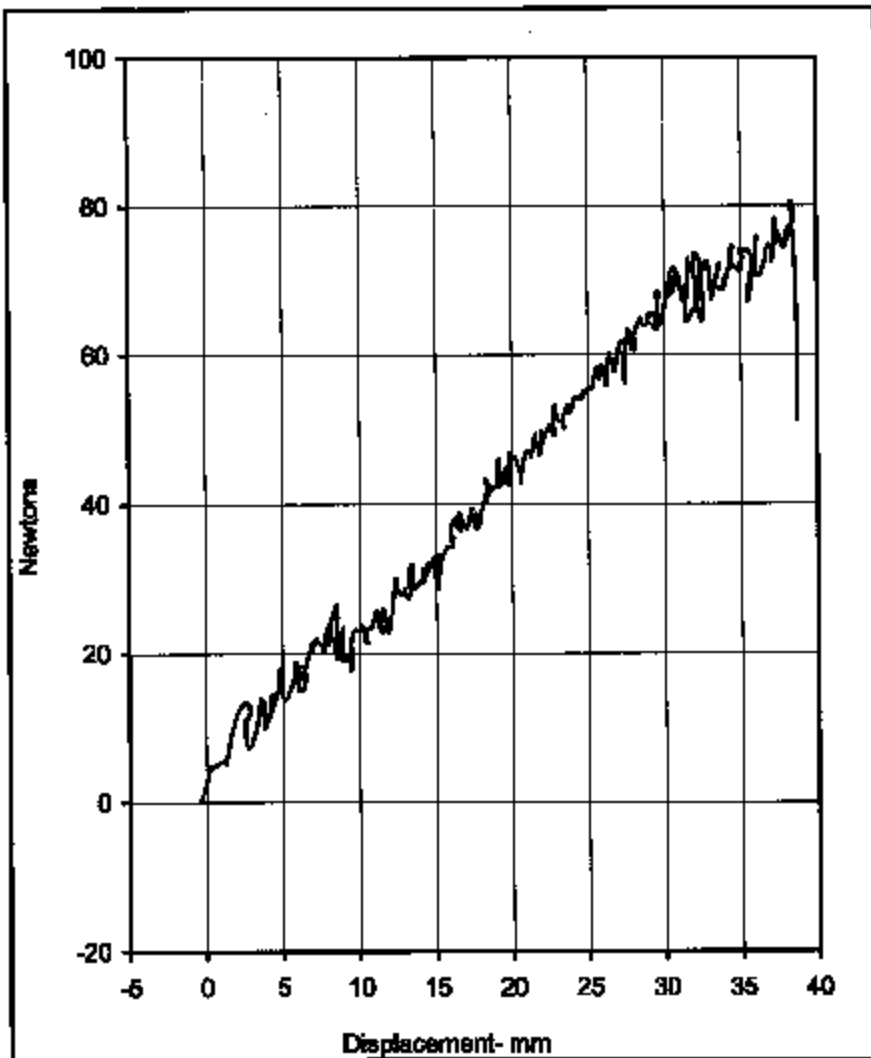
Test Program: 2004 FMVSS 111 Rearview Mirrors Test No.: 6
 Test Vehicle: 2004 BMW Mini Cooper No.: C40501

Load Direction: +45 / -45
 Test Date: 5/27/04



111-KAR-04-001

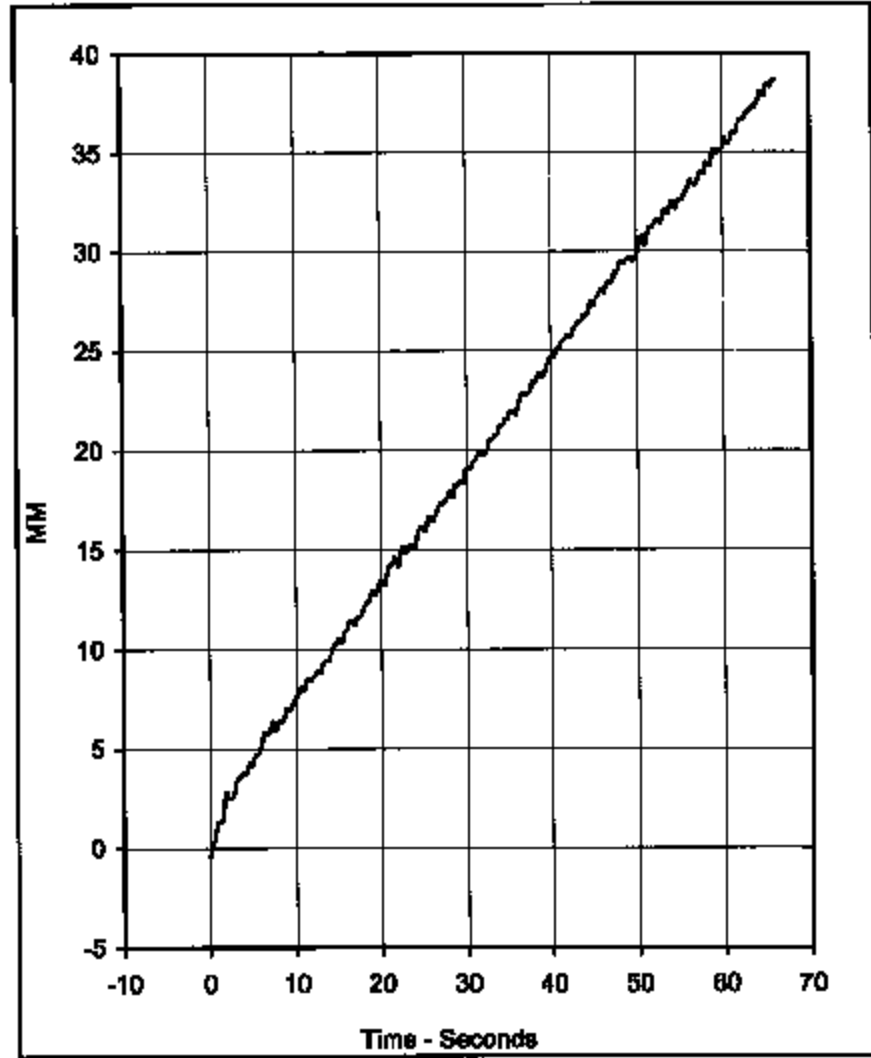
B-7



Curve Description	CURNO	Type
Force vs. Displacement	001	FIL

Units	Peak Force	Displacement	Filter (Hz)
Newtons	80.5	38.3	1

Test Program: 2004 FMVSS 111 Rearview Mirrors Test No.: 7
 Test Vehicle: 2004 BMW Mini Cooper No.: C40501



Curve Description	CURNO	Type
Displacement vs. Time	002	FIL

Units	Max	Time	Disp. Rate (mm/min.)	Filter (Hz)
MM	38.7	66.0	35.5	1

Load Direction: -45 / -45
 Test Date: 5/27/04



111-KAR-04-001

APPENDIX C

TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

2004 FMVSS 111 Rearview Mirrors

Test Equipment List

5/26/04

2004 BMW Mini Cooper

Description	Manufacturer	Model No.	Serial No.	Limit	Accuracy	Cal. Date	Due Cal.
Hydraulic Pump	Lincoln	T-3825-C	2480952	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	867 N	± 1.0%	6/20/03	6/19/04
Displacement Xdcr.	Calesco	PTX101-0030	J0654652	76 CM	± 1.0%	7/1/03	6/30/04

C-1

111-KAR-04-001



APPENDIX D

EYELIPSE LOCATIONS SUPPLIED BY MANUFACTURER

FVWS 111 EYE POINT LOCATIONS

Make: BMW Model: MINI Cooper Year: 2004

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 B pillar striker. (Provide sketch of reference point if necessary.)

Coordinates midpoint of lower door latch striker plate: $x = 0 / y = 0 / z = 0$.

COORDINATE	LEFT SIDE MIRROR		MIRROR MIRROR		RIGHT SIDE MIRROR	
	LE1 (left eye)	RE1 (right eye)	LE2	RE2	LE3	RE3
X	+312,8	+312,8	+312,8	+312,8	+312,8	+312,8
Y	-358,2	-423,2	-358,2	-423,2	-358,2	-423,2
Z	455,6	455,6	455,6	455,6	455,6	455,6
Mirror Mfr.	Magnas Spiegelversetze GmbH		Magnas Spiegelversetze GmbH		Magnas Spiegelversetze GmbH	
Model	LH Mirror Glass Flat Heated		Inside Rearview Mirror		RH Mirror Glass Convex Heated	
Part No.	7068068		1588468		7068070	