

REPORT NO. 111-KAR-04-004

**SAFETY COMPLIANCE TESTING  
FOR FMVSS 111**

3/3

HS

#

637273

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

2004 CHEVROLET MALIBU  
4 DOOR SEDAN

NHTSA NO. C40105

PREPARED BY:  
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9270 HOLLY ROAD  
ADELANTO, CALIFORNIA 92301



June 30, 2004

FINAL REPORT

PREPARED FOR:  
U.S. DEPARTMENT OF TRANSPORTATION  
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION  
ENFORCEMENT  
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**SECTION 1**  
**PURPOSE OF COMPLIANCE TEST**

## **1. PURPOSE OF COMPLIANCE TEST**

Tests were conducted on a 2004 Chevrolet Malibu 4 Door Sedan manufactured by General Motors Corporation, 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 - 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 Chevrolet Malibu 4 Door Sedan was subjected to FMVSS 111 compliance testing. The tests were conducted at KARCO Engineering in Adelanto, California on May 10 through May 17, 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 (§5.1.2)**

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) (§5.2.2 and §5.3)**

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 (§5.1.1)**

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 §5.1.1 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 (§5.2)**

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 §5.2.1. 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 (§11)**

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 (§5.1.2)**

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 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 Chevrolet Malibu 4 Door Sedan on May 10 through May 17, 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**

<b>TEST VEHICLE INFORMATION</b>			
Manufacturer	GENERAL MOTORS CORPORATION	VIN	1G1ZT52864F122193
Manufacturing Date	10/03	Delivery Date	03/26/04
Dealer	CREST CHEVROLET	NHTSA No.	C40105
Odometer Reading (mi.)	72	Fuel Type	GAS
Engine Displacement	3.5	Cylinders	V6
Transmission	AUTOMATIC	Final Drive	FRONT
Engine Placement	TRANSVERSE	Color	SPORT RED METALLIC
Tire Press./Max. Cap. Front	40	Cold Tire Press. Front	30
Tire Press./Max. Cap. Rear	40	Cold Tire Press. Rear	30
Recommend Tire Size	P205/65R15	Type of Spare	T125/70R15
Tire Size on Vehicle	P205/65R15	Manufacturer	BRIDGESTONE
GVWR	4220	Cargo Capacity	917
GAWR Front	2250	GAWR Rear	1970
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)	YES	Power Seats	NO
Driver Airbag	YES	Passenger Airbag	YES

**TEST VEHICLE ATTITUDE (mm)**

ATTITUDE	LF	RF	LR	RR
As Delivered	708	712	696	696
As Tested	688	697	648	643
Rear View Mirror	1320			

**DATA SHEET NO. 1... (Continued)**

VEHICLE			
YEAR	2004	MAKE	CHEVROLET
MODEL	MALIBU	BODY STYLE	4 DOOR SEDAN
NHTSA NO.	C40105	VIN	1G1ZT52864F122193
TEST DATE:	05/17/04	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		-348	-348		-350	-350		-329	-329	
Y		-228	-290		-178	-243		-184	-228	
Z		845	845		848	848		844	844	
Mirror Mfr., Model And Part No.	GENTEX 22706721, 22706822			MAGNE DONNELLY 22698336			SCHEFENACKER 10340721			
SRP Travel and Eye-Illipse	N/A									

Reference Point- Front Outer seat track mounting bolt. Co-ordinates X = 2805.96, Y= -597.99, Z = 287.56





**DATA SHEET NO. 2**

**MOUNTING AND TILTING ADEQUACY TEST**

VEHICLE			
YEAR	2004	MAKE	CHEVROLET
MODEL	MALIBU	BODY STYLE	4 DOOR SEDAN
NHTSA NO.	C40106	VIN	1G1ZT52664F122193
TEST DATE:	05/17/04	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	6.0	40.0	22.0	22.0
DRIVER SIDE OUTSIDE MIRROR	14.5	7.5	12	-24
PASSENGER SIDE OUTSIDE MIRROR	12.0	9.5	9	-11

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: 05/17/04

APPROVED BY: MATTHEW A. IVORY DATE: 05/17/04

**DATA SHEET NO. 3**

**FIELD OF VIEW TEST - INSIDE REARVIEW MIRROR**

VEHICLE			
YEAR	2004	MAKE	CHEVROLET
MODEL	MALIBU	BODY STYLE	4 DOOR SEDAN
NHTSA NO.	C40105	VIN	1G1ZT52864F122193
TEST DATE:	05/17/04	TEMPERATURE:	85°F

- E Distance from center of mirror to projected eye point location = 595.0 mm
- A Distance from rear of vehicle to projected eye point location = 3520.0 mm
- X1 Distance from rear of vehicle to field of view grid = 6280.4 mm
- Z1 Vertical distance to lowest point of field of view at distance X1 439.0 mm
- Z2 Height of center of mirror = 1320.0 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) 14160.50 mm (14.50 m)

EYE LOCATION	MONOCULAR DATA (ALR & ARL ARE ANGLES)			
	YL (mm)	YR (mm)	ALR (°)	ARL (°)
LEFT EYE POINT	YLL = 1772	YRL = 2650		12.80
RIGHT EYE POINT	YLR = 2695	YRR = 1667	13.03	

**CALCULATED HORIZONTAL AMBINOCULAR VIEW ANGLE (AB)**

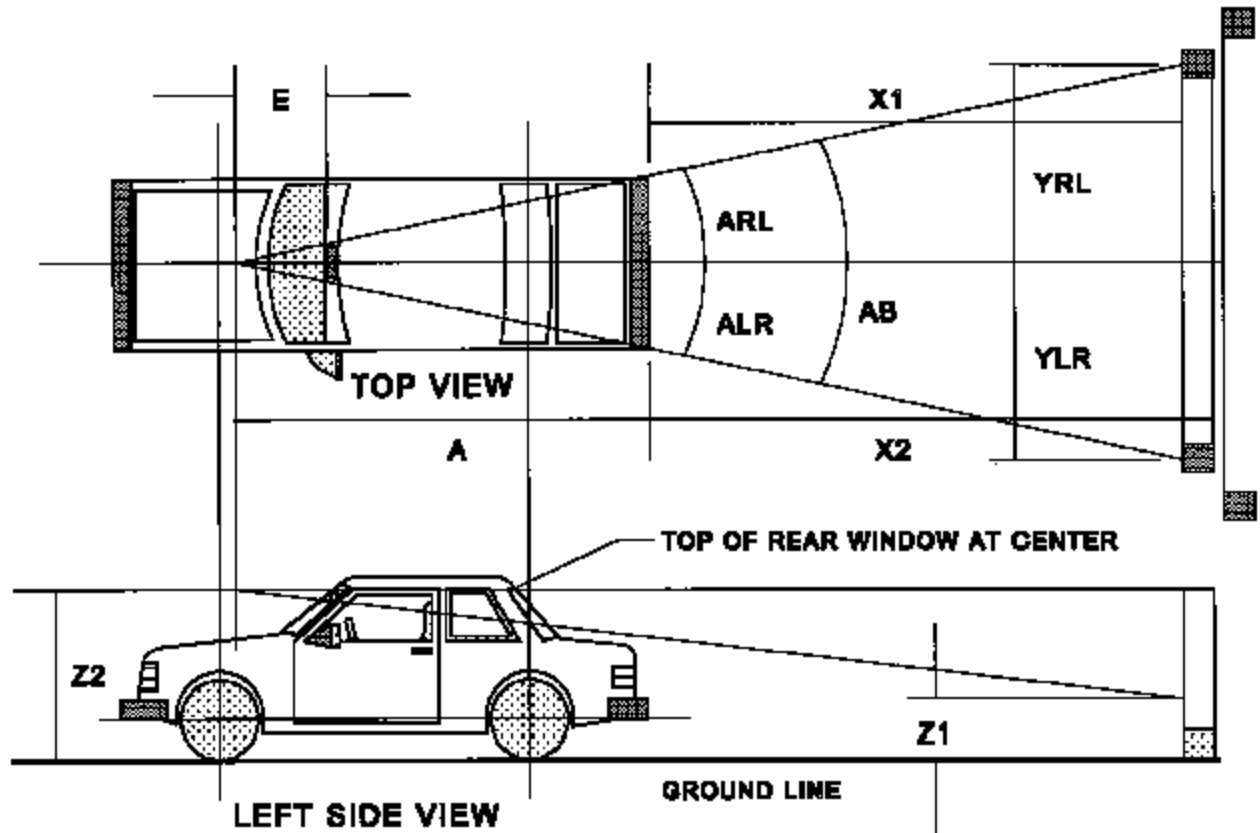
ANGLE AB = ANGLE ALR + ANGLE ARL

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

ANGLE AB = 25.83 (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 X

HEIGHT OF TARGET DISC ON MIRROR 1040 mm

DISTANCE OF TARGET DISC ON MIRROR FROM VEHICLE TANGENT PLANE 37 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 —	<b>X</b>	FAILED —	
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**PASSENGER SIDE MIRROR (S5.3 or MFG. OPTION)**

PASSENGER SIDE MIRROR TYPE (convex or unit magnification) CONVEX

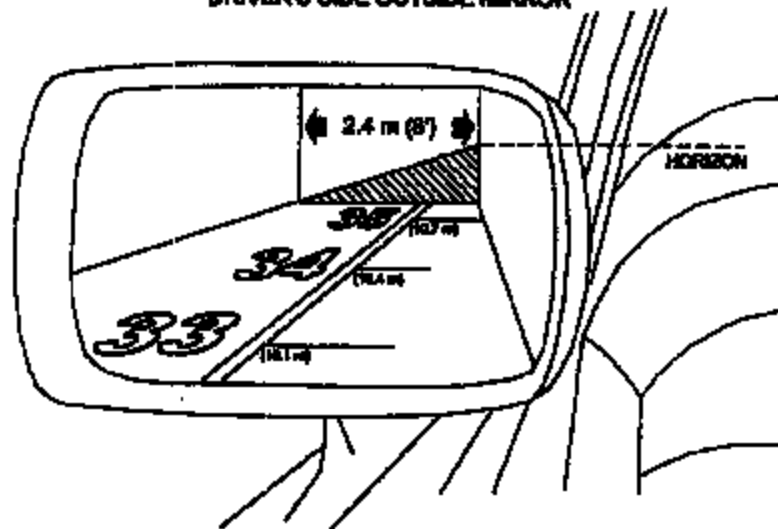
**REMARKS:**

**VEHICLE ATTITUDE AND GROUND LEVEL WERE RAISED 4". (101.6 mm)**

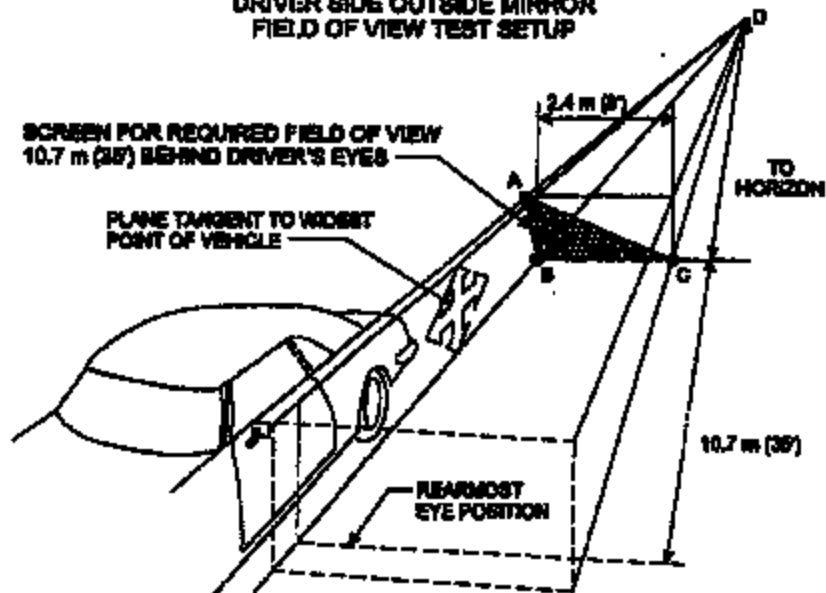
RECORDED BY: PABLO VEGA DATE: 05/17/04

APPROVED BY: MATTHEW A. IVORY DATE: 05/17/04

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

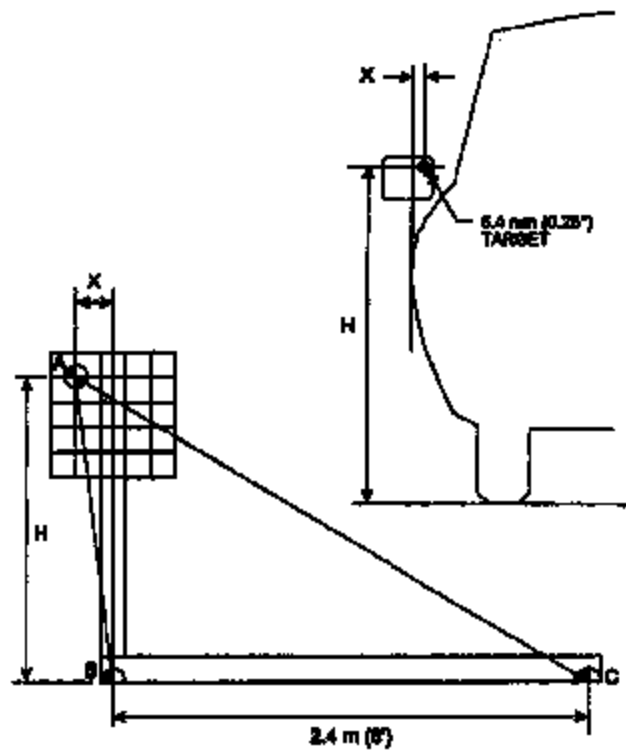


DRIVER SIDE OUTSIDE MIRROR  
FIELD OF VIEW TEST SETUP

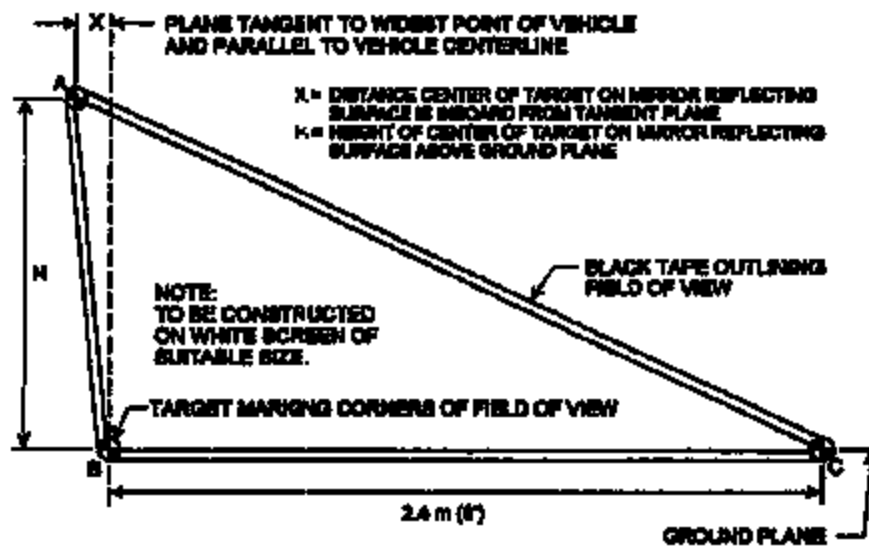


**DATA SHEET NO. 3... (Continued)**

**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	CHEVROLET
MODEL	MALIBU	BODY STYLE	4 DOOR SEDAN
NHTSA NO.	C40105	VIN	1G1ZT52864F122193
TEST DATE:	05/17/04	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 PHOTOCCELL, 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): 282 mV

REFLECTOMETER VOLTAGE READINGS		
	DAY MIRROR	NIGHT MIRROR
TEST NO. 1	282 mV	206 mV
TEST NO. 2	281 mV	206 mV
TEST NO. 3	282 mV	206 mV
TEST NO. 4	282 mV	205 mV
TEST NO. 5	282 mV	205 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. 955 x 100 = 95.5 percent  
(Min. Required = 35%)

VOLTAGE READING FROM CALIBRATION (Average Value) = 295 mV

VOLTAGE READING FROM LIGHT REFLECTED BY NIGHT MIRROR (Average Value): 206 mV

REFLECTANCE (Night) = Voltage (Ref)/Voltage (Cal) = 0. 698 x 100 = 69.8 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): 278 mV

REFLECTOMETER VOLTAGE READINGS	
TEST NO. 1	274 mV
TEST NO. 2	280 mV
TEST NO. 3	280 mV
TEST NO. 4	277 mV
TEST NO. 5	278 mV

REFLECTANCE (Day) = Voltage (Ref)/Voltage (Cal) = 0. .942 x 100 = 94.2 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 —	
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RECORDED BY: PABLO VEGA DATE: 05/17/04

APPROVED BY: MATTHEW A. IVORY DATE: 05/17/04



**DATA SHEET NO. 5**

**BREAKAWAY TEST - INSIDE REARVIEW MIRROR**

VEHICLE			
YEAR	2004	MAKE	CHEVROLET
MODEL	MALIBU	BODY STYLE	4 DOOR SEDAN
NHTSA NO.	C40105	VIN	1G1ZT52864F122193
TEST DATE:	5/17/04	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	FORCE (N)		DISPLACEMENT		PASS	FAIL
		Required	Peak	Peak (mm)	Rate (mm/min)		
1	0-90 DEGREES	<400	249.7	10.4	32.3	X	
2	-45/+45 DEGREES	<400	109.0	44.0	35.8	X	
3	+45/90 DEGREES	<400	221.8	10.3	33.2	X	
4	-45/90 DEGREES	<400	88.0	24.8	37.2	X	
5	+45/+45 DEGREES	<400	126.4	65.7	35.8	X	
6	+45/-45 DEGREES	<400	178.1	26.8	35.1	X	
7	-45/-45 DEGREES	<400	79.7	41.9	36.3	X	

REMARKS:

**DATA SHEET NO. 5... (Continued)**

**BREAKAWAY TEST - INSIDE REARVIEW MIRROR FAILURE TYPE - DESCRIPTION:**

**FAILURE TYPE - DESCRIPTION:**

**NONE**

<b>TEST STATUS:</b>	<b>PASSED —</b>	<b>X</b>	<b>FAILED —</b>	
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**REMARKS:**

**RECORDED BY: MICHAEL DUNLAP**

**DATE: 05/17/04**

**APPROVED BY: MATTHEW A. IVORY**

**DATE: 05/17/04**

**DATA SHEET NO. 6**

**UNIT MAGNIFICATION AND CONVEX MIRROR TESTS**

VEHICLE			
YEAR	2004	MAKE	CHEVROLET
MODEL	MALIBU	BODY STYLE	4 DOOR SEDAN
NHTSA NO.	C40105	VIN	1G1ZT52864F122193
TEST DATE:	05/17/04	TEMPERATURE:	82°F

**DESCRIPTION OF TEST APPARATUS: 3-POINT LINEAR SPHEROMETER MANUFACTURED BY AMERICAN OPTICAL CORPORATION, GENEVA LENS MEASURE M667 1.53. SERIAL NUMBER 78822. 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			INSIDE MIRROR	
TEST POSITION	DIAL READINGS		TEST POSITION	DIAL READINGS
1	0		1	0
2	0		2	0
3	0		3	0
4	0		4	0
5	0		5	0
6	0		6	0
7	0		7	0
8	0		8	0
9	0		9	0
10	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**

<b>TEST POSITION</b>	<b>DIAL READINGS (DIOPTERS) Passenger</b>	<b>RADIUS OF CURVATURE (mm)</b>	<b>DEVIATION BETWEEN THE AVERAGE RADIUS OF CURVATURE AND THE TEST POSITION RADIUS OF CURVATURE (mm)</b>	<b>PERCENT DEVIATION FROM THE AVERAGE RADIUS OF CURVATURE</b>
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
<b>Average Radius of Curvature</b>		<b>1778.0</b>	<b>Greatest Percent Deviation</b>	<b>0</b>

**REMARKS:**

**MIRROR NOT REQUIRED TO MEET FMVSS 111 REQUIREMENTS.**

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  $\pm 0$ . 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: 05/17/04

APPROVED BY: MATTHEW A. IVORY DATE: 05/17/04

**DATA SHEET NO. 7**  
**MIRROR REFLECTIVE SURFACE AREA TEST**

VEHICLE			
YEAR	2004	MAKE	CHEVROLET
MODEL	MALIBU	BODY STYLE	4 DOOR SEDAN
NHTSA NO.	C40105	VIN	1G12T52864F122193
TEST DATE:	05/17/04	TEMPERATURE:	82°F

MPVs, TRUCKS & BUSES (OTHER THAN SCHOOL BUSES)

DATA TABLE FOR SURFACE AREA

MIRRORS	AREA (cm <sup>2</sup> )	REQUIREMENT		RESULTS	
		GVWR < 4536 kg	GVWR > 4536 kg	PASS	FAIL
Outside Driver's Side	187.09 cm <sup>2</sup>	126 cm <sup>2</sup>	323cm <sup>2</sup>	X	
Outside Passenger Side	164.83 cm <sup>2</sup>	126 cm <sup>2</sup>	323 cm <sup>2</sup>	X	

**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: PABLO VEGA      DATE: 05/17/04

APPROVED BY: MATTHEW A. IVORY      DATE: 05/17/04

**DATA SHEET NO. 8**

**TEST SUMMARY-FMVSS 111-REARVIEW MIRRORS**

VEHICLE			
YEAR	2004	MAKE	CHEVROLET
MODEL	MALIBU	BODY STYLE	4 DOOR SEDAN
NHTSA NO.	C40105	VIN	1G1ZT52864F122193
TEST DATE:	05/17/04	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 UNWIPE 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**



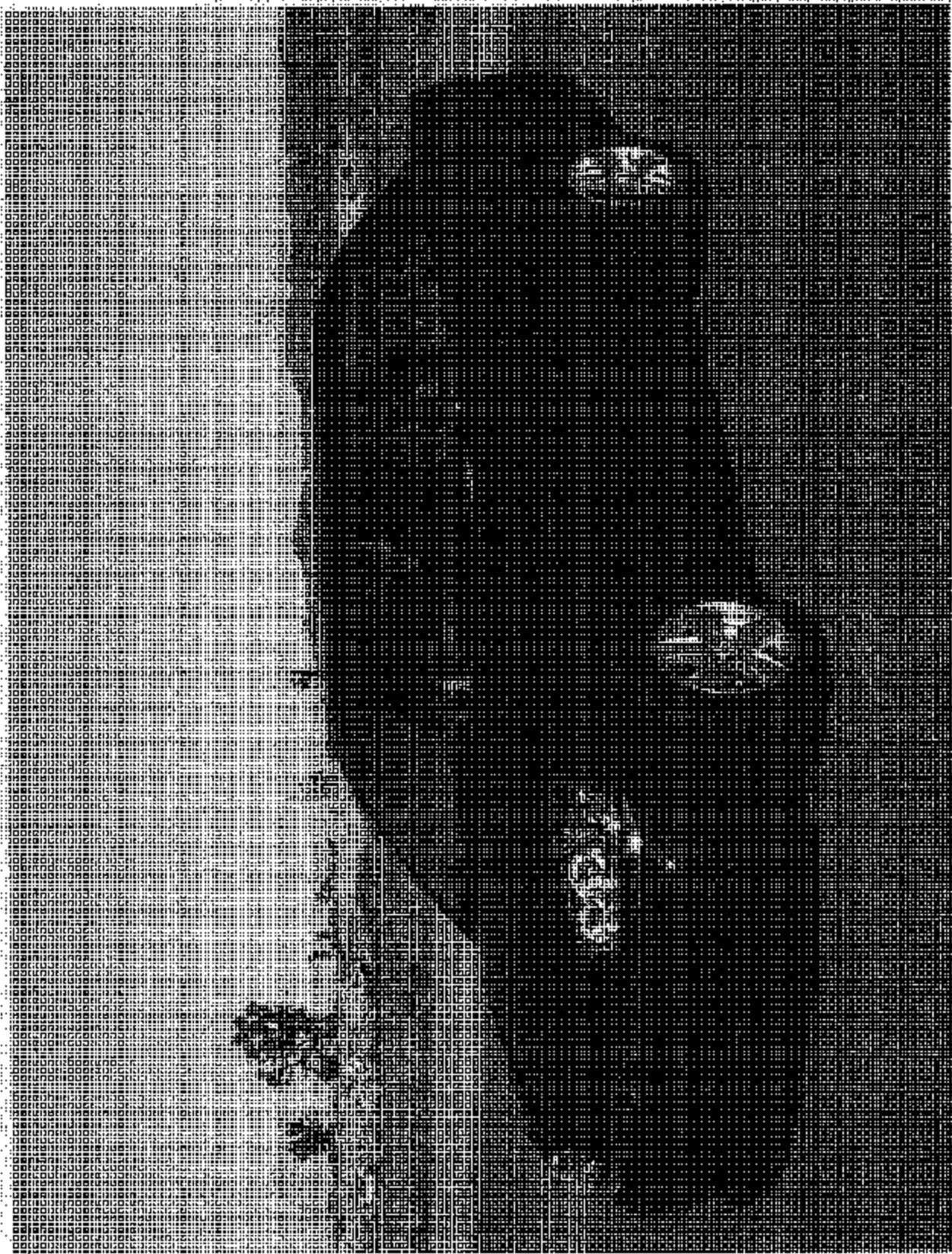


FIGURE 1-LEFT FRONT 3/4 VIEW

2004 CHEVROLET MALIBU  
NHTSA NO. C401125  
FMVSS NO. 111

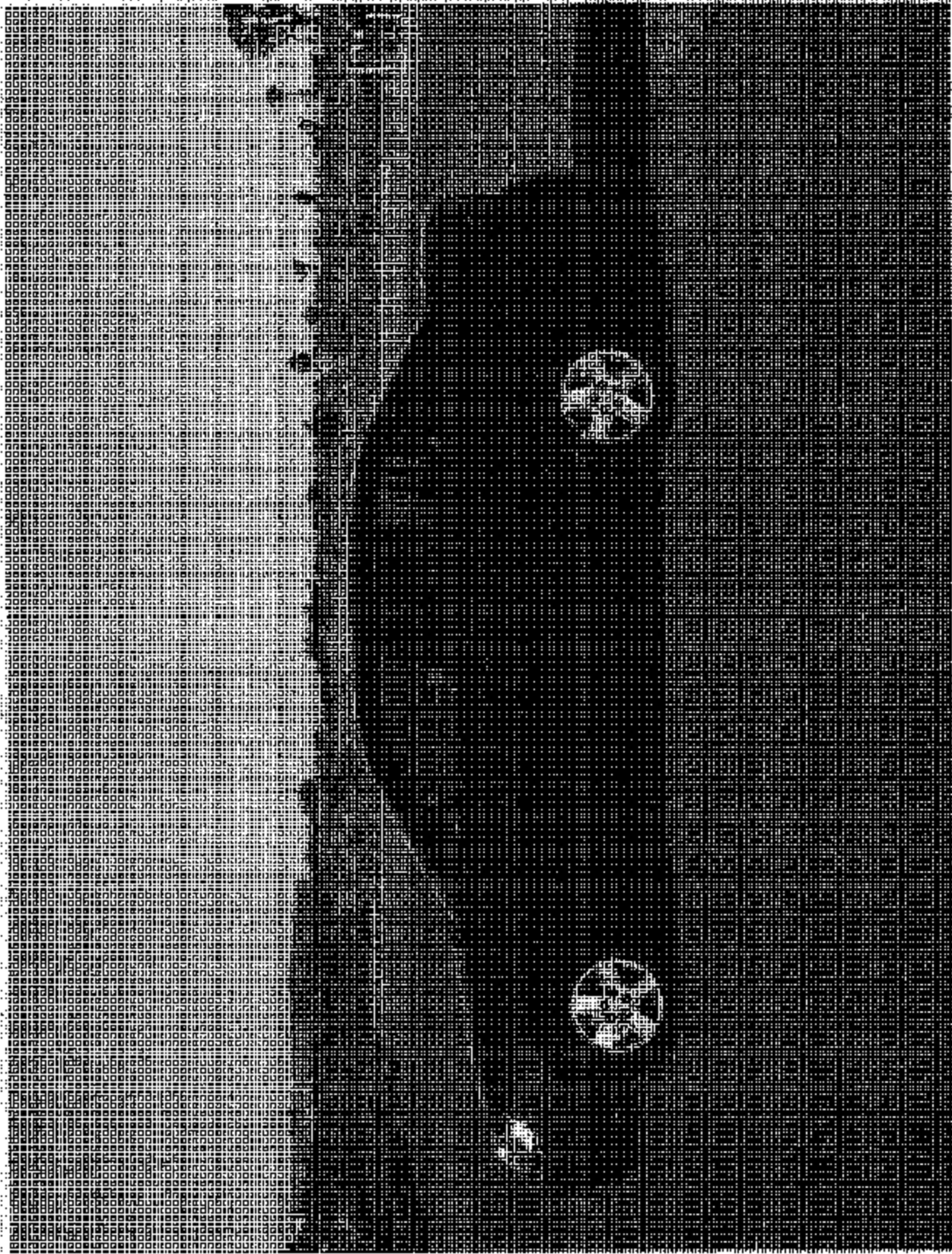


FIGURE 2 LEFT SIDE VIEW

2004 CHEVROLET MALIBU  
NHTSA NO. C40105  
FMVSS NO. 111



FIGURE 3: RIGHT REAR 3/4 VIEW

2004 CHEVROLET MALIBU  
NHTSA ID: C60Y05  
FMVSS NO. 111

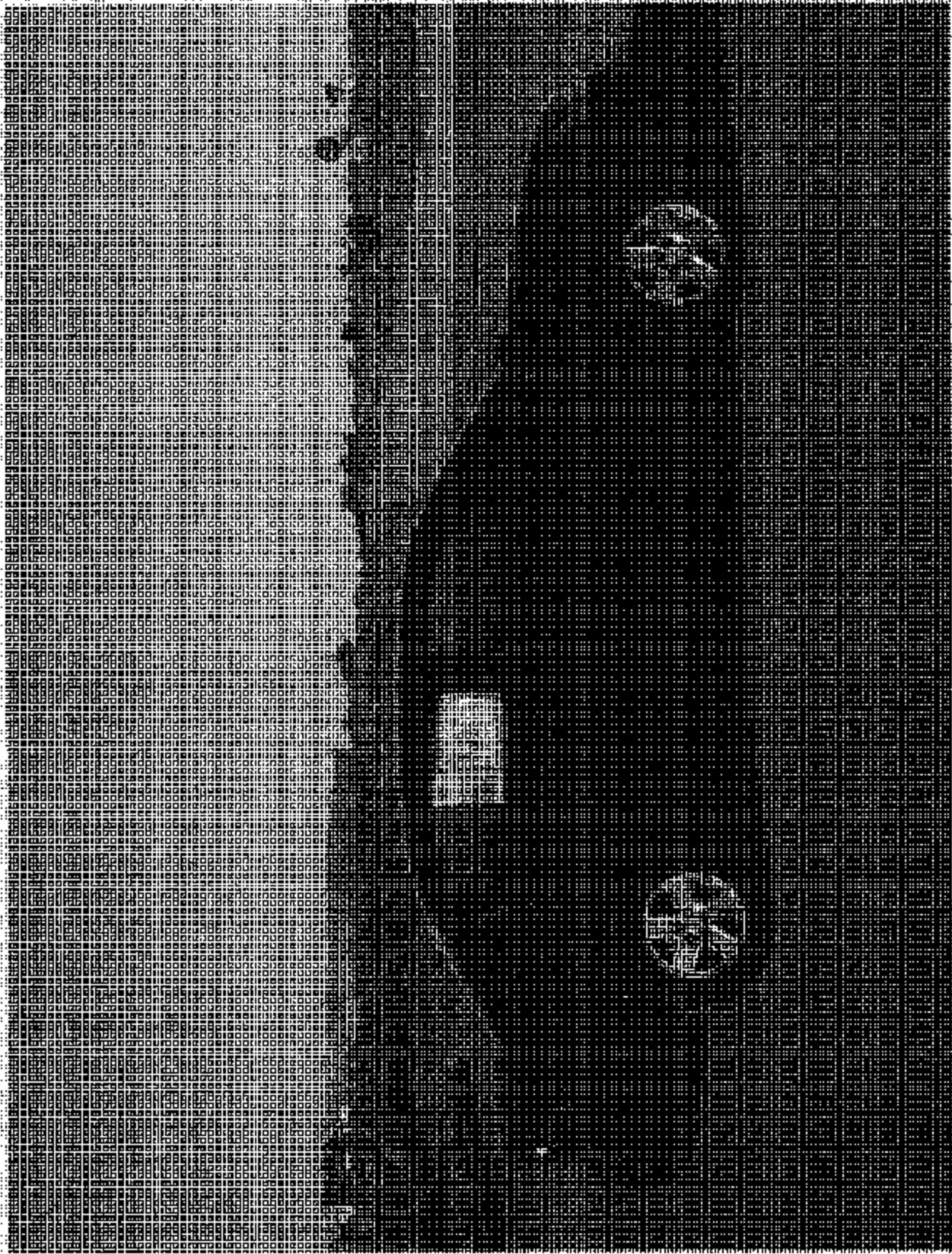


FIGURE 4 RIGHT SIDE VIEW

2004 CHEVROLET MALIBU  
NETSA NO. C40105  
FMVSS NO. 111



MADE BY GENERAL MOTORS CORP.

DATE	QUANTITY	QUANTITY	QUANTITY
1983	1000	1000	1000
	1000	1000	1000
	1000	1000	1000

FOR THE PURPOSES OF THE FEDERAL MOTOR VEHICLE SAFETY ACT, THIS LABEL IS TO BE CONSIDERED A PART OF THE MOTOR VEHICLE. THE INFORMATION ON THIS LABEL IS TO BE USED TO IDENTIFY THE MOTOR VEHICLE AND TO DETERMINE THE MANUFACTURER'S RESPONSIBILITY FOR THE MOTOR VEHICLE.

FOR THE PURPOSES OF THE FEDERAL MOTOR VEHICLE SAFETY ACT, THIS LABEL IS TO BE CONSIDERED A PART OF THE MOTOR VEHICLE.

2004 CHEVROLET MALIBU  
 NHTSA NO. C4D105  
 FMVSS NO. 111

FIGURE 5: MANUFACTURER'S LABEL



FIGURE 111-1 PLACARD

ARMY CENTER FOR MALIBU  
 NHTSA NO. CA0105  
 FMVSS NO. 117

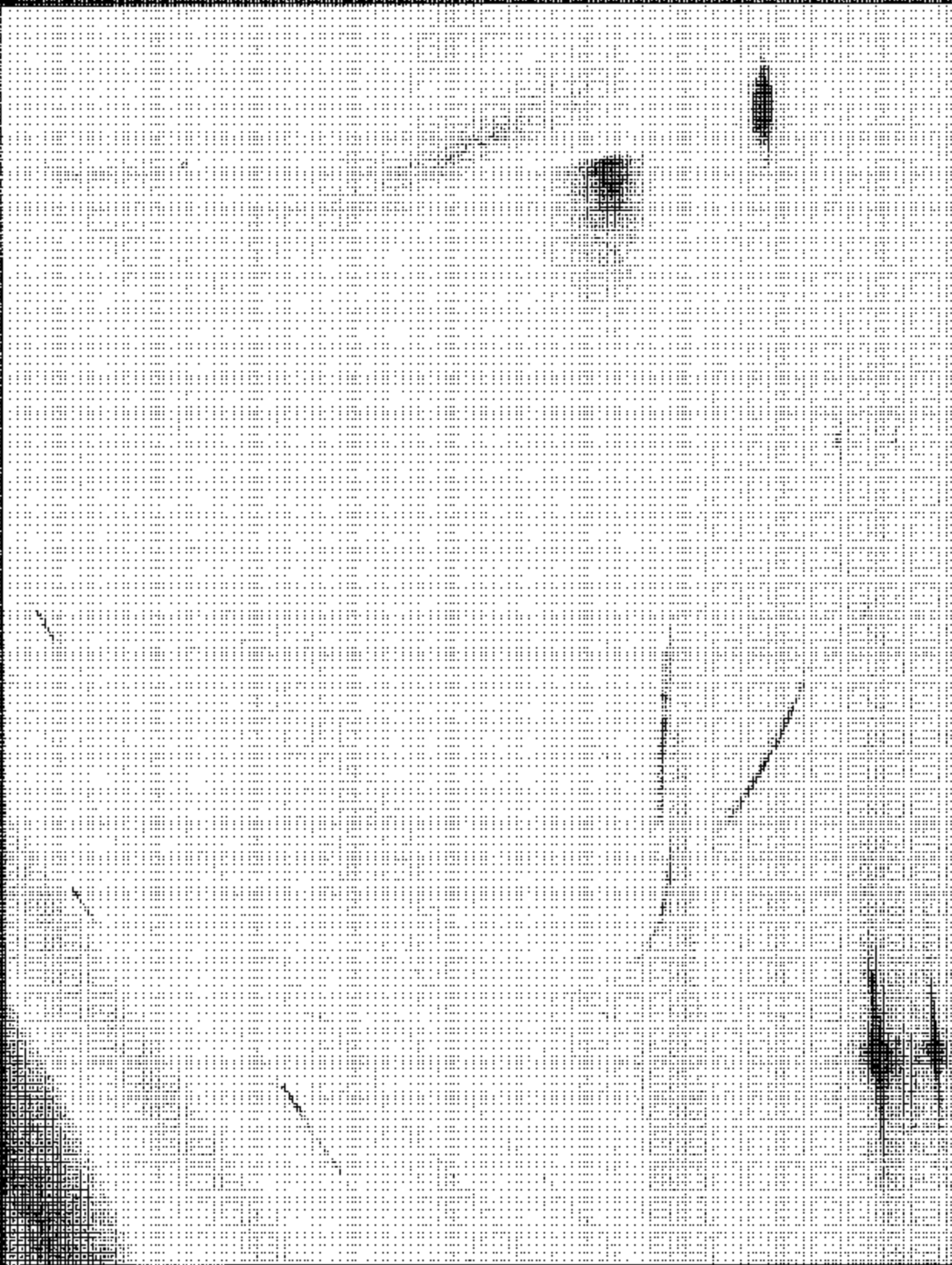


FIGURE 7 DRIVER SIDE REARVIEW MIRROR AND MOUNTING

2004 CHEVROLET AMBU  
NHISA NO. C40105  
FAMSS NO. 112

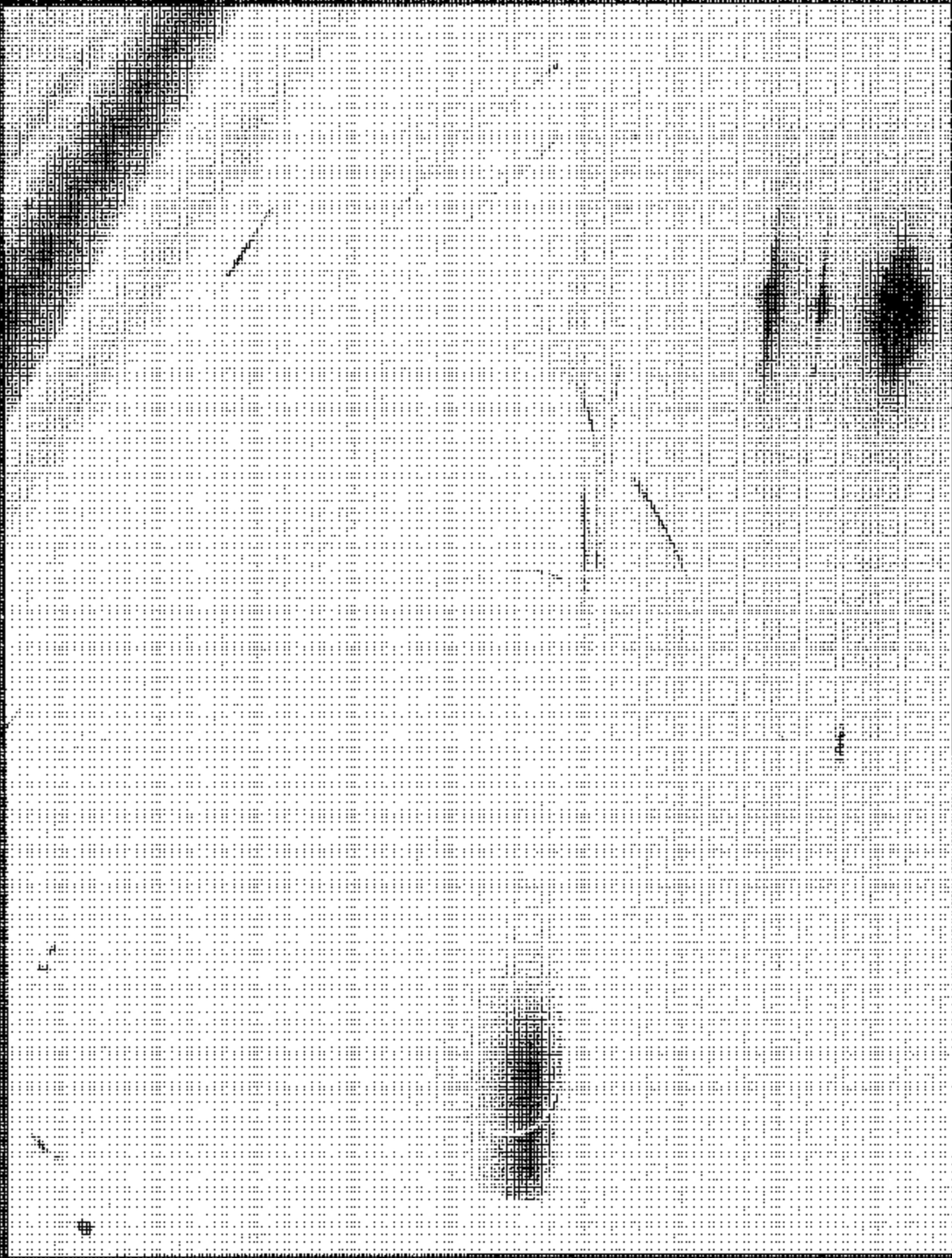


FIGURE 6: PASSENGER SIDE REAR VIEW MIRROR AND MOUNTING

2004 CHEVROLET MALIBU  
NHTSA NO. C40105  
FMVSS NO. 111





FIGURE 9. INSIDE REAR VIEW MIRROR AND MOUNTING

794 CHEVROLET MALIBU  
NHTSA NO. C40105  
FMVSS NO. 117



FIGURE 01257 SETUP

2007 CHEVROLET MALIBU  
NHTSA NO. C40105  
FMVSS NO. 111



FIGURE 1: CAMERA SET-UP FOR PHOTOGRAPHIC REFERENCE BOARD

2004 CHEVROLET MALIBU  
NHISA NO. C49105  
FMVSS NO. 111



204 CHEVROLET MALIBU FIBER & OVERALL SET-UP FOR MIRROR BREAK AWAY TEST

204 CHEVROLET MALIBU  
NHTSA NO. C40165  
FMVSS NO. 11F



FIGURE 13: CLOSE-UP OF MIRROR BREAKAWAY TEST

2004 CHEVROLET MALIBU  
NHTSA NO. C40105  
FMVSS NO. 111

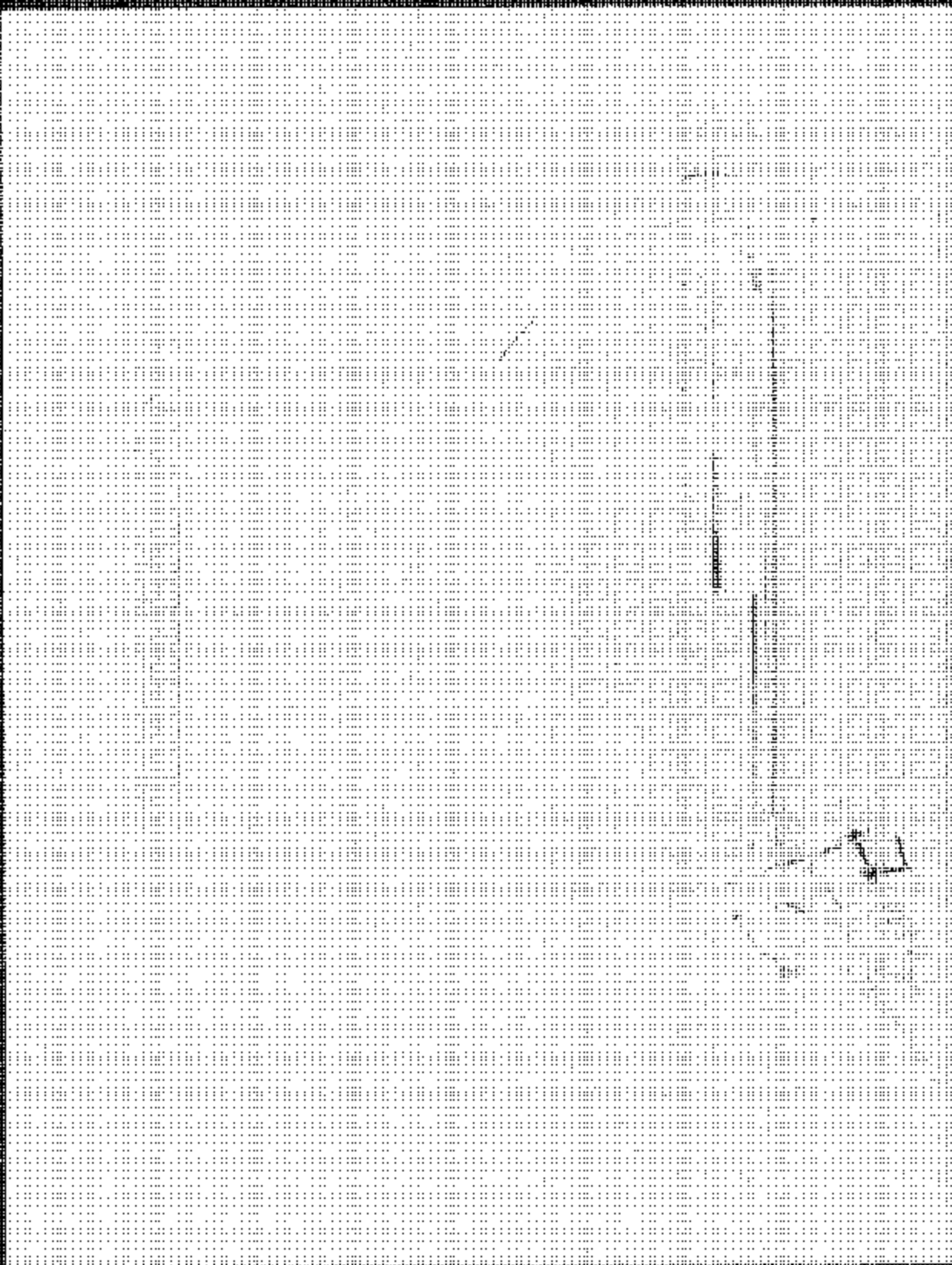


FIGURE 16 REFLECTION TEST FIELD

2004 CHEVROLET MALIBU  
 NHTSA NO. C46105  
 FMVSS NO. 111



FIGURE 16. MIRROR SETUP FOR AREA MEASUREMENT

2004 CHEVROLET MALIBU  
NHTSA NO. C60105  
FMVSS NO. 111

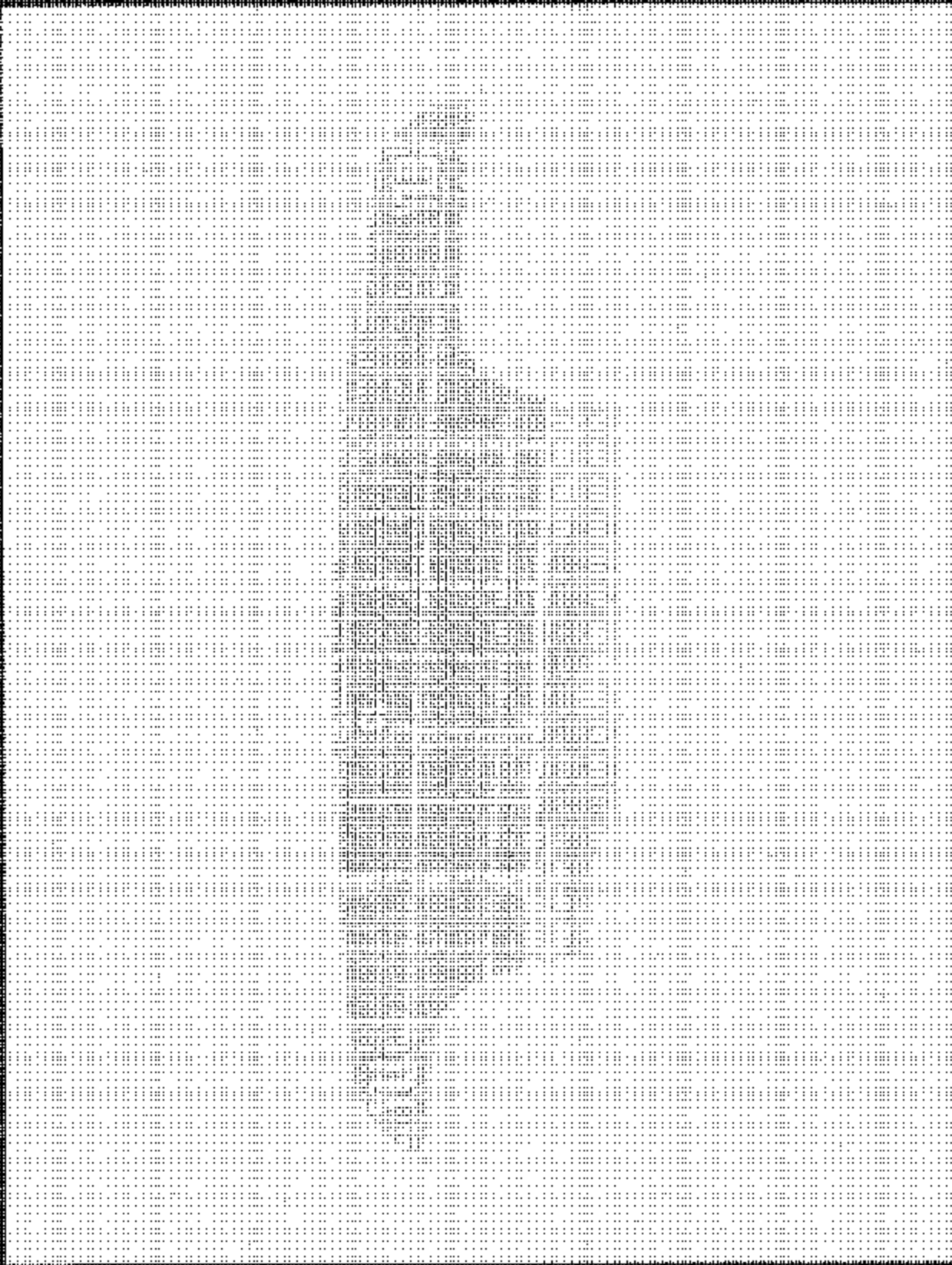
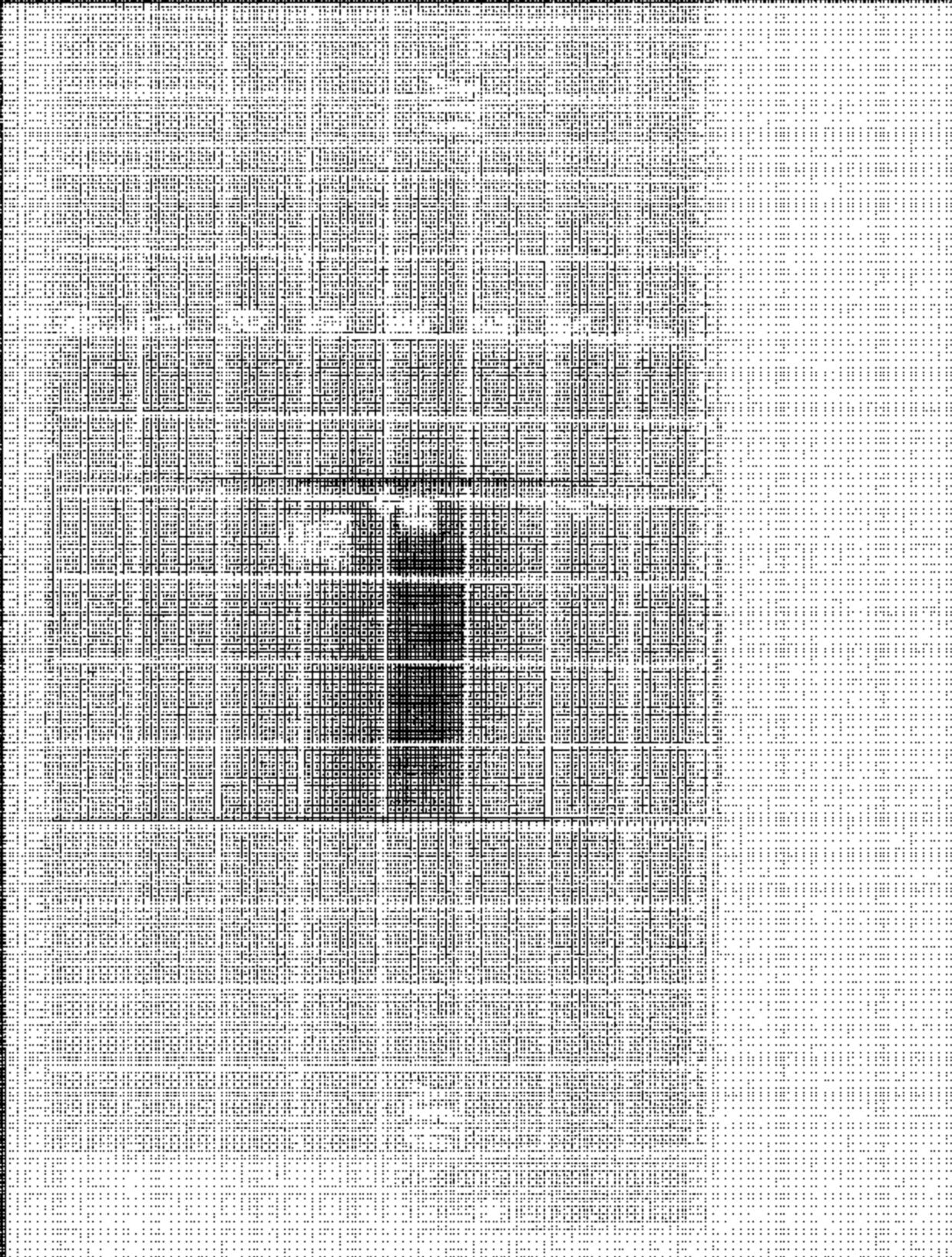


FIGURE 10 LEFT EYE FIELD OF VENTURES (INSIDE MIRROR)

2004 G# 170101 MALIBU  
NHTSA NO. C40100  
FMVSS NO. 111





254 CHEVROLET MALIBU  
 NHTSA NO. C40103  
 FMVSS NO. 111  
 FIGURE THREE REAR OF BOARD FOR INSIDE VIEW, LEFT EYE

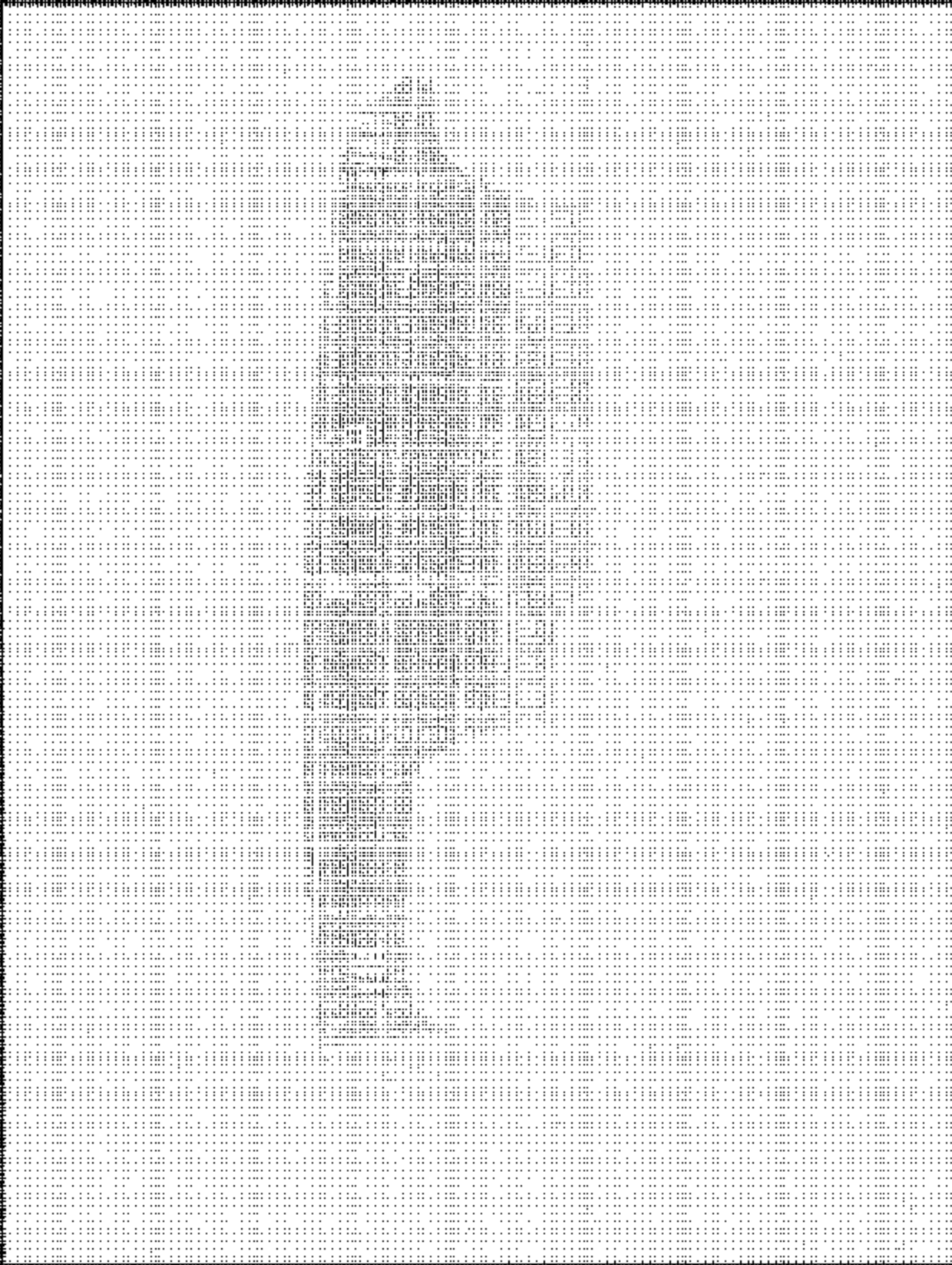


FIGURE 18 RICHIE EYE FIELD OF VIEW TEST (INSIDE MIRROR)

2004 CHEVROLET MALIBU  
NHTSA NO. C-60160  
FMVSS NO. 114

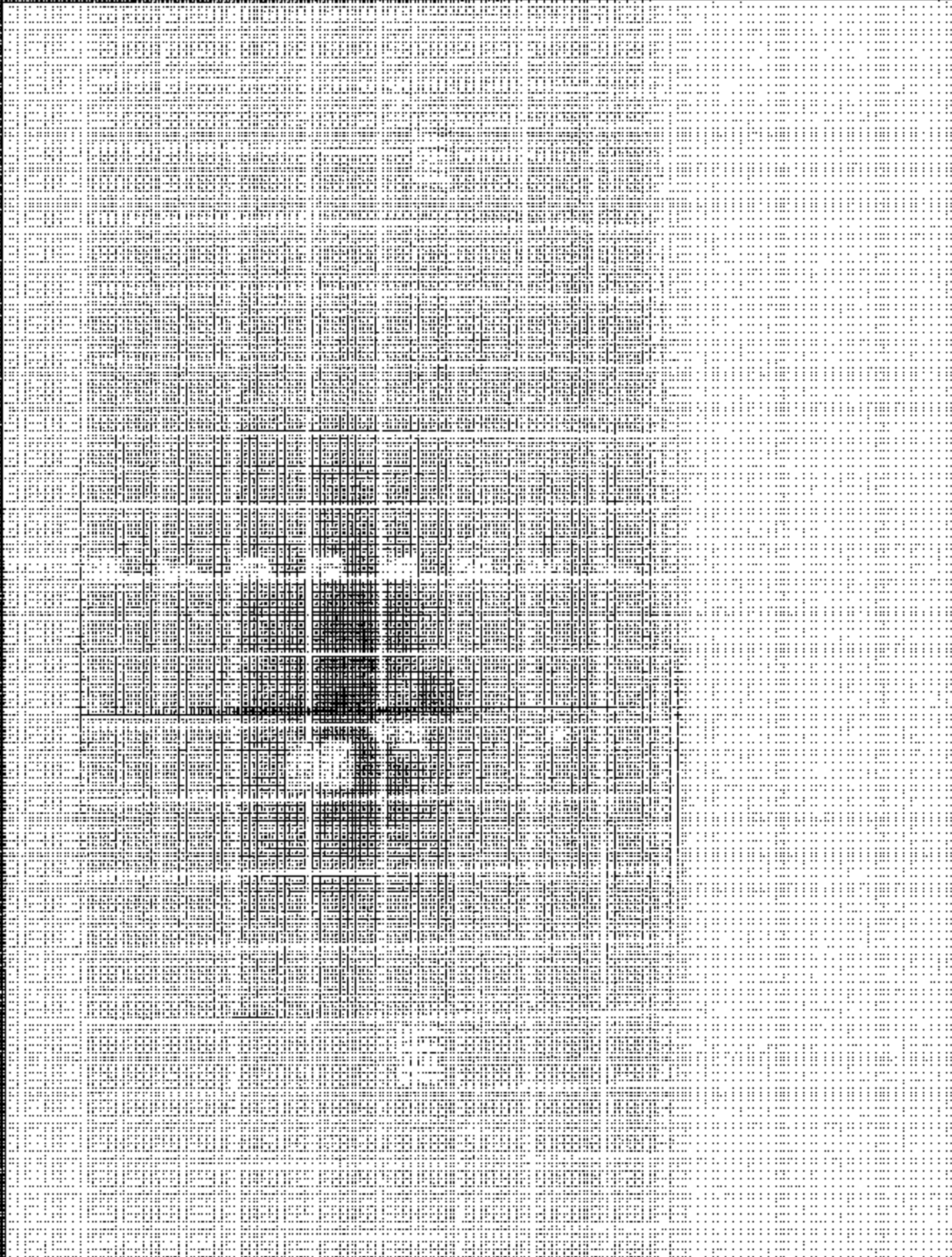


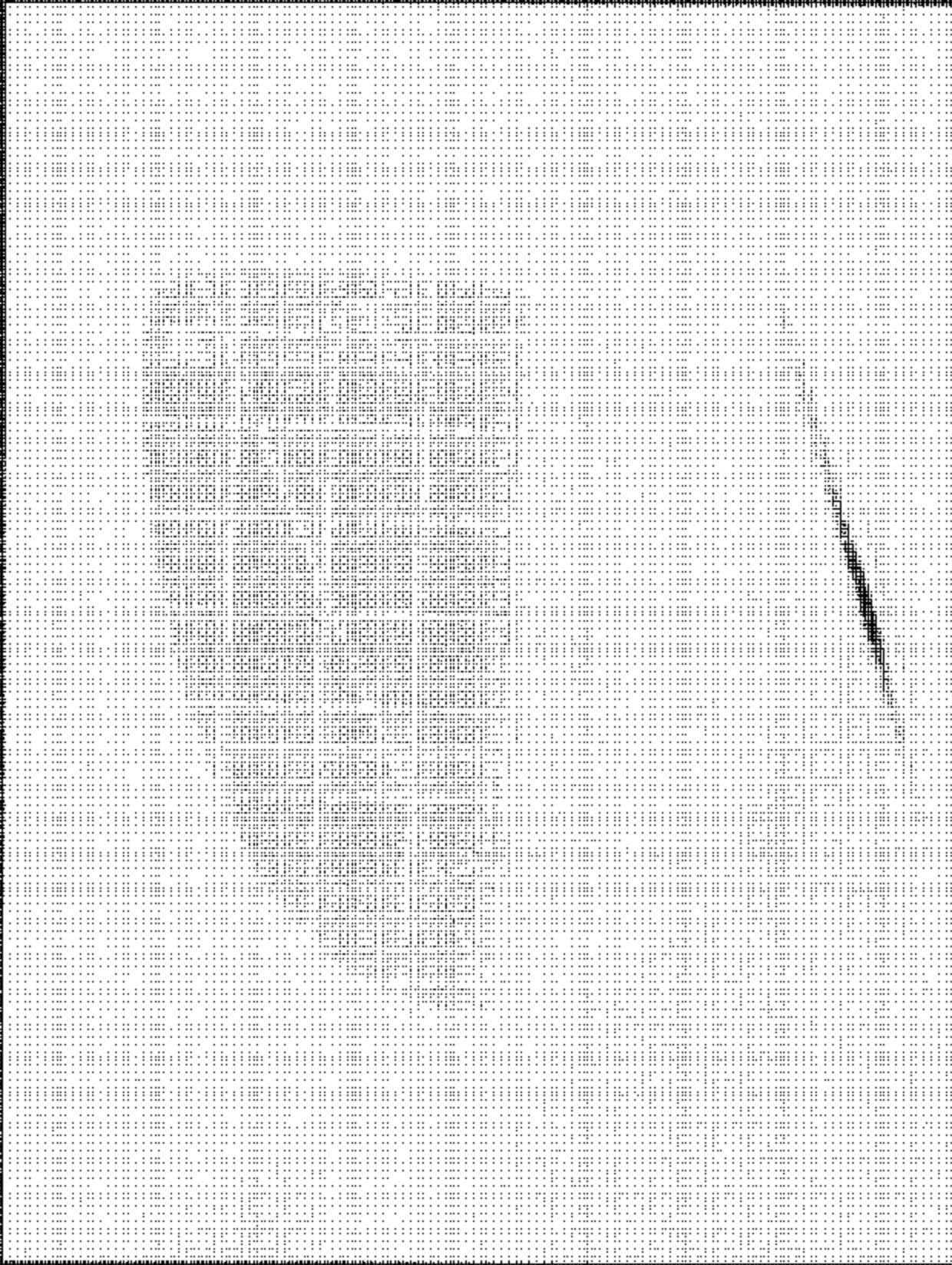
FIGURE 1 REFERENCE BOARD FOR INSIDE MIRROR, RIGHT EYE

2004 CHEVROLET IMPALA  
NHTSA NO. 040105  
FMVSS NO. 111



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

2004 CHEVROLET MALIBU  
NHTSA NO. C60705  
FMVSS NO. 111



2001 CHEVROLET MALIBU      FIGURE 21 (RIGHT EYE) FIELD OF VIEW TEST (DRIVER SIDE) (PRGR)  
AHTSA NO. C44105  
FMVSS NO. 111

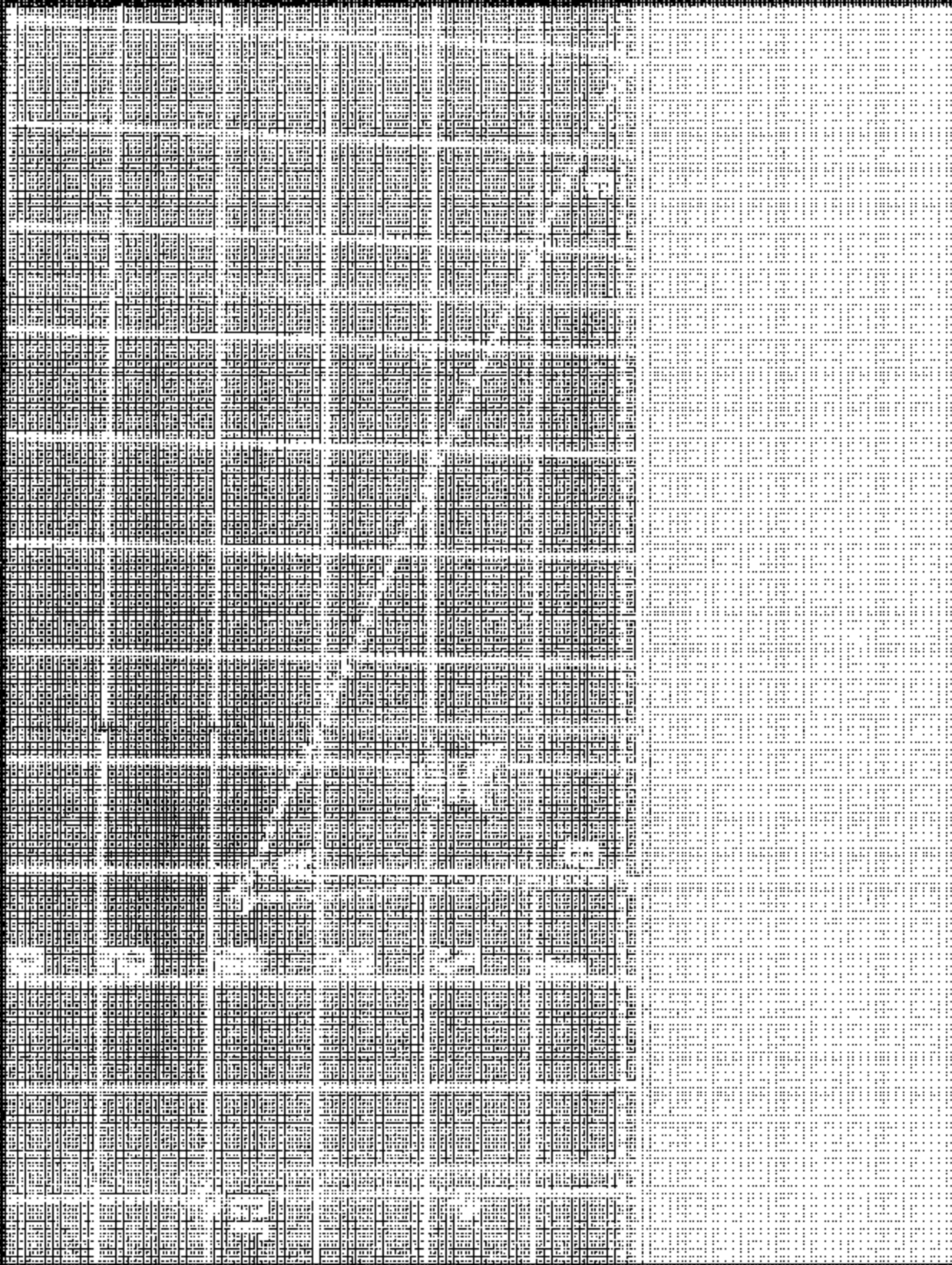
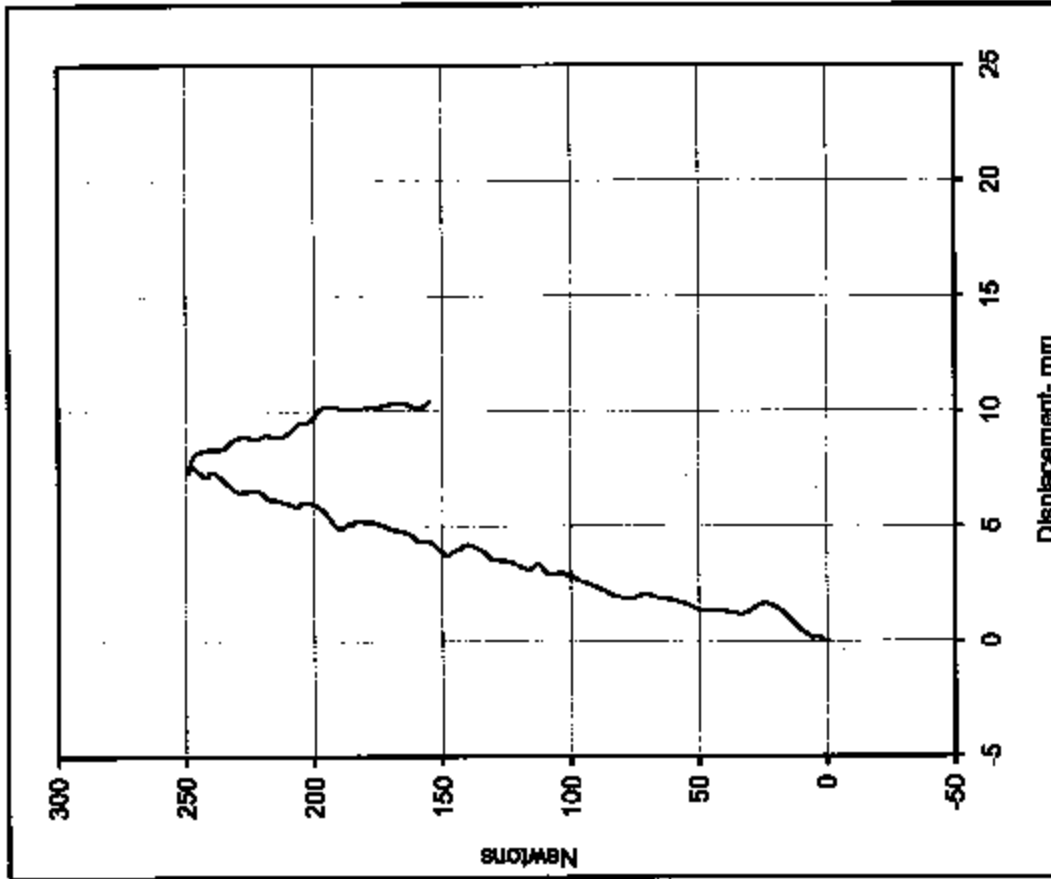


FIGURE 2: REFERENCE BOARD FOR DRIVER SIDE MIRROR

2294 CHEVROLET MALIBU  
 NHTSA NO. C46105  
 FMVSS NO. 411

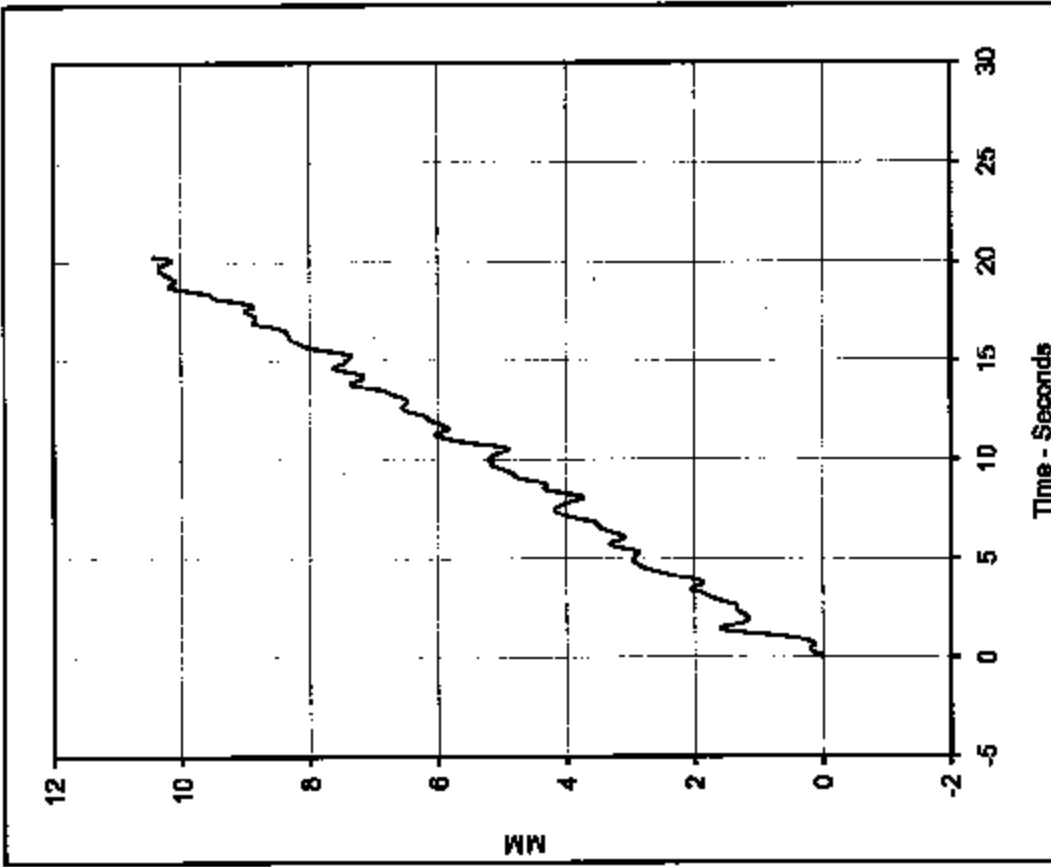
APPENDIX B  
DATA PLOTS



Curve Description	CURNO	Type
Force vs. Displacement	001	FIL

Units	Peak Force	Displacement	Filter (Hz)
Newtons	249.7	7.4	1

Test Program: 2004 FMVSS 111 Rearview Mirrors Test No.: 1  
 Test Vehicle: 2004 Chevrolet Malibu No.: C40106



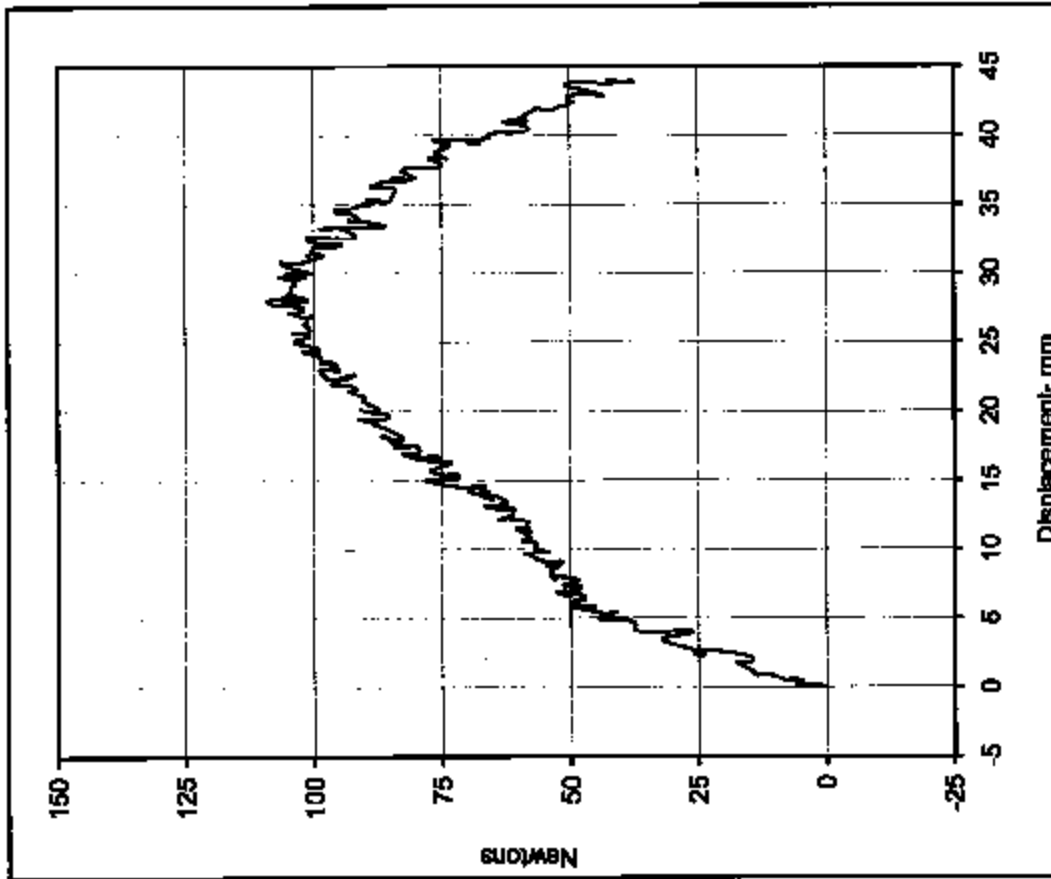
Curve Description	CURNO	Type
Displacement vs. Time	002	FIL

Units	Max	Time	Displ. Rate (mm/min.)	Filter (Hz)
MM	10.4	20.3	32.3	1

Load Direction: 0 / 90  
 Test Date: 5/7/04



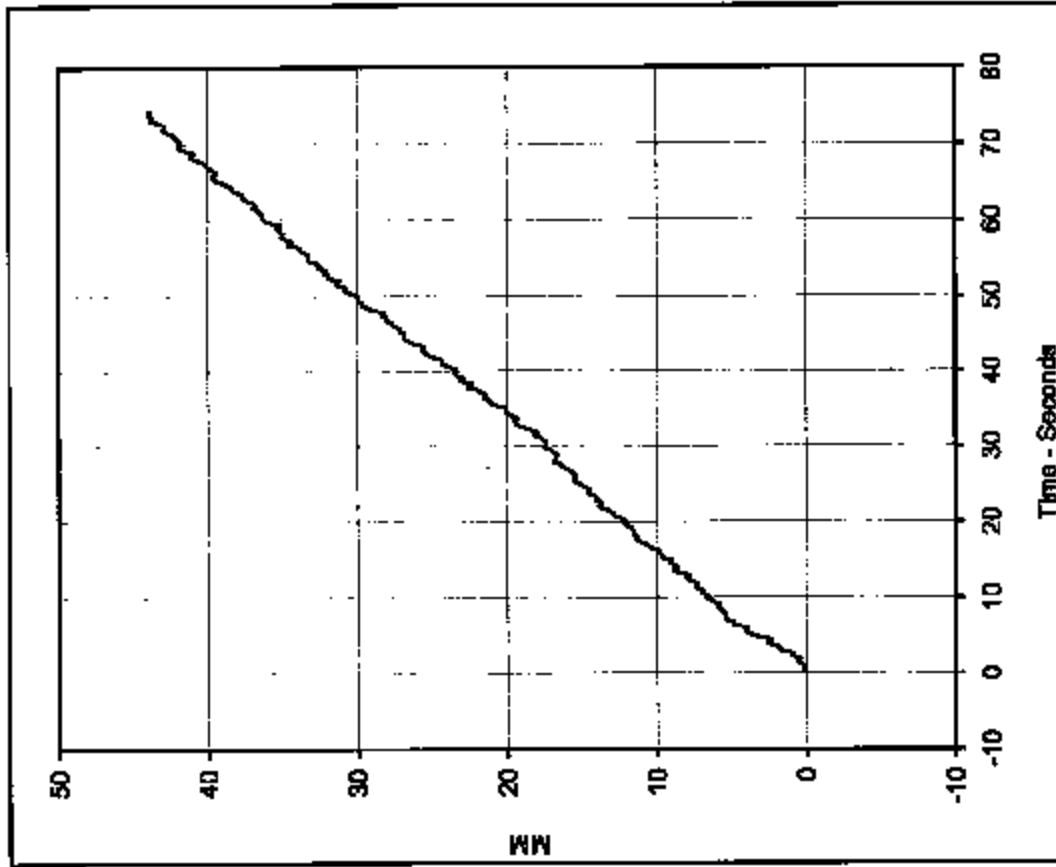




Curve Description	CURNO	Type
Force vs. Displacement	001	FIL

Units	Peak Force	Displacement	Filter (Hz)
Newtons	108.0	28.0	1

Test Program: 2004 FMVSS 111 Rearview Mirrors Test No.: 2  
 Test Vehicle: 2004 Chevrolet Malibu No.: C40105

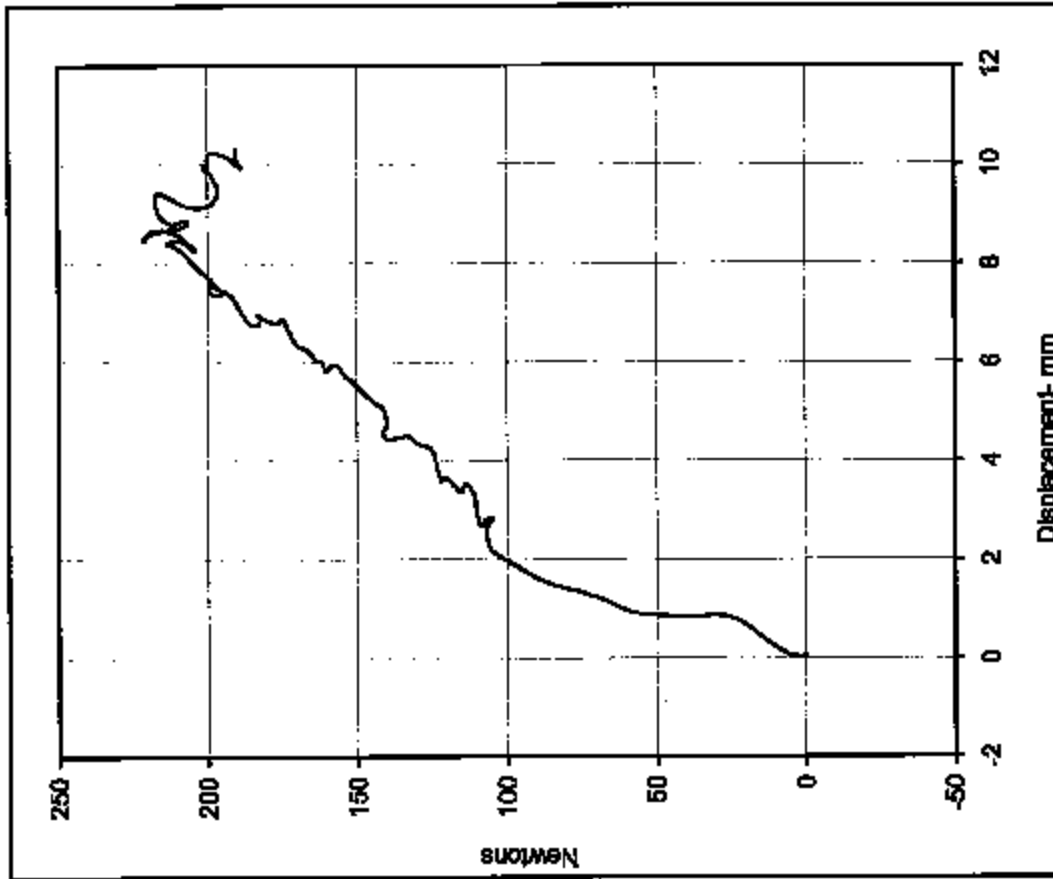


Curve Description	CURNO	Type
Displacement vs. Time	002	FIL

Units	Max	Time	Displ. Rate (mm/min.)	Filter (Hz)
MM	44.0	73.9	35.6	1

Load Direction: -45 / +45  
 Test Date: 5/10/04



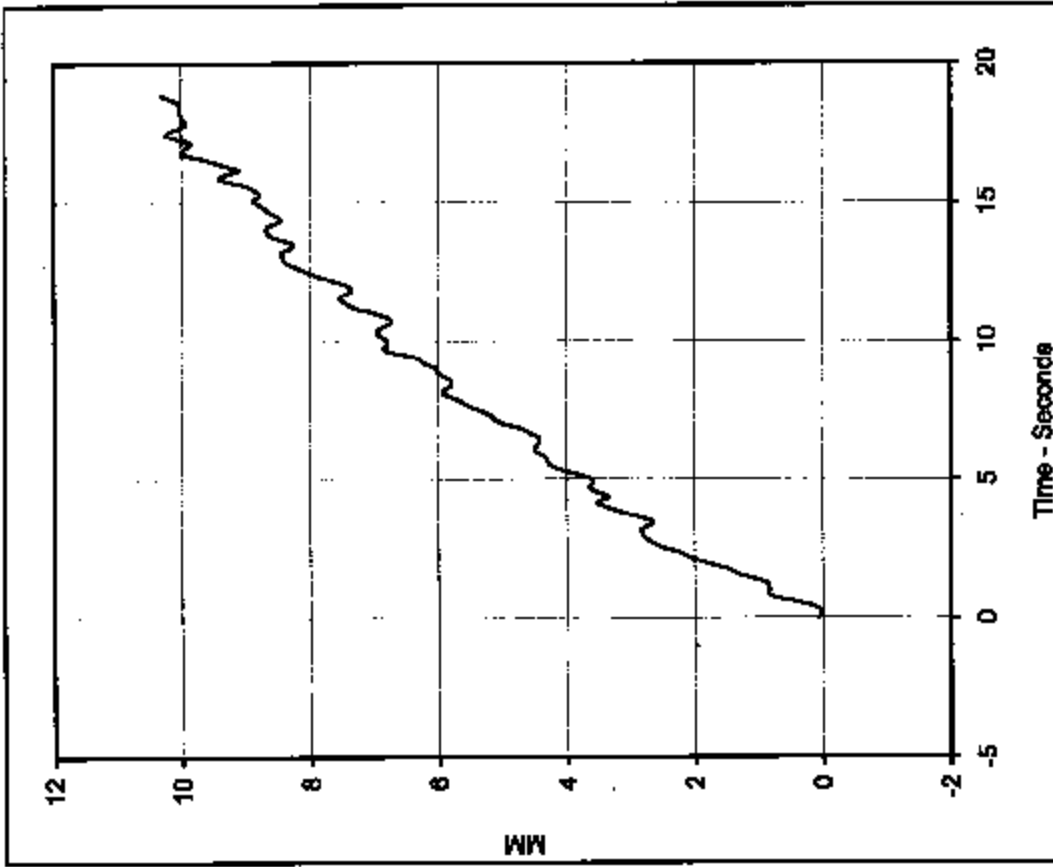


Curve Description	CURNO	Type
Force vs. Displacement	001	FIL

Units	Peak Force	Displacement	Filter (Hz)
Newtons	221.8	8.5	1

Test Program: 2004 FMYSS 111 Rearview Mirrors Test No.: 3

Test Vehicle: 2004 Chevrolet Malibu No.: C40105



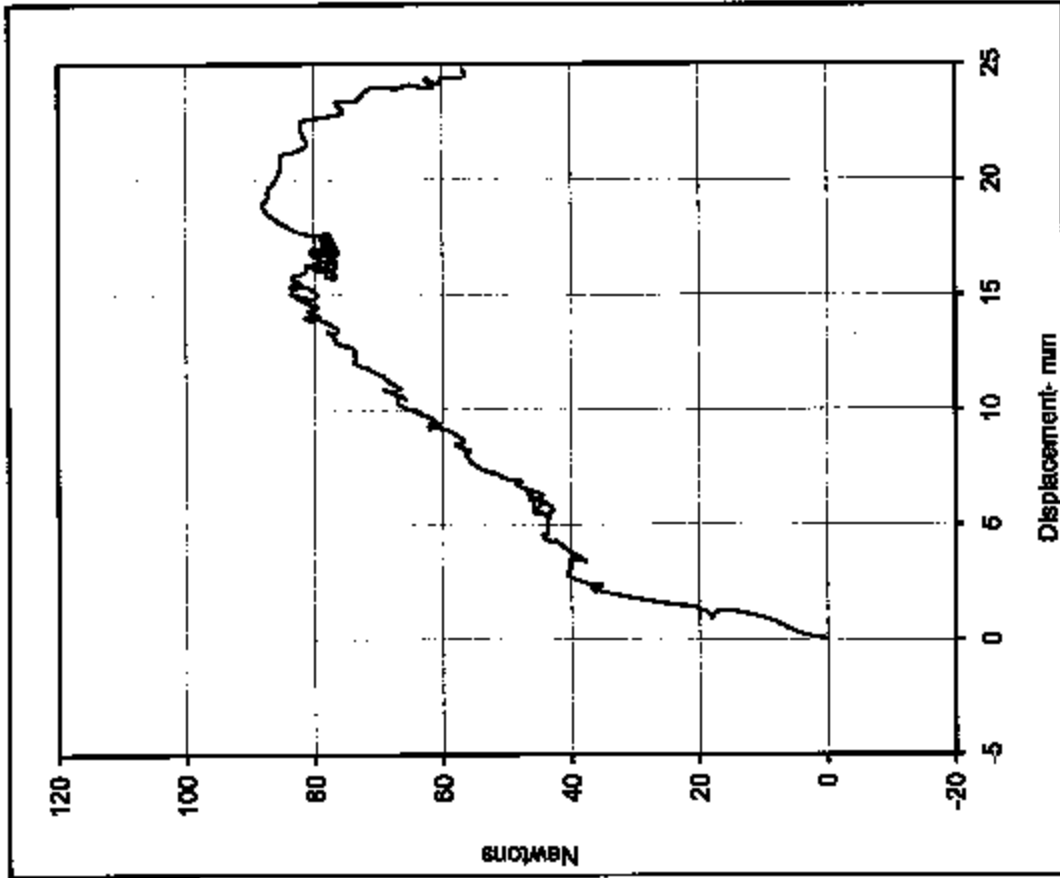
Curve Description	CURNO	Type
Displacement vs. Time	002	FIL

Units	Max	Time	Displ. Rate (mm/min.)	Filter (Hz)
MM	10.3	18.9	33.2	1

Load Direction: +45 / 90

Test Date: 6/10/04

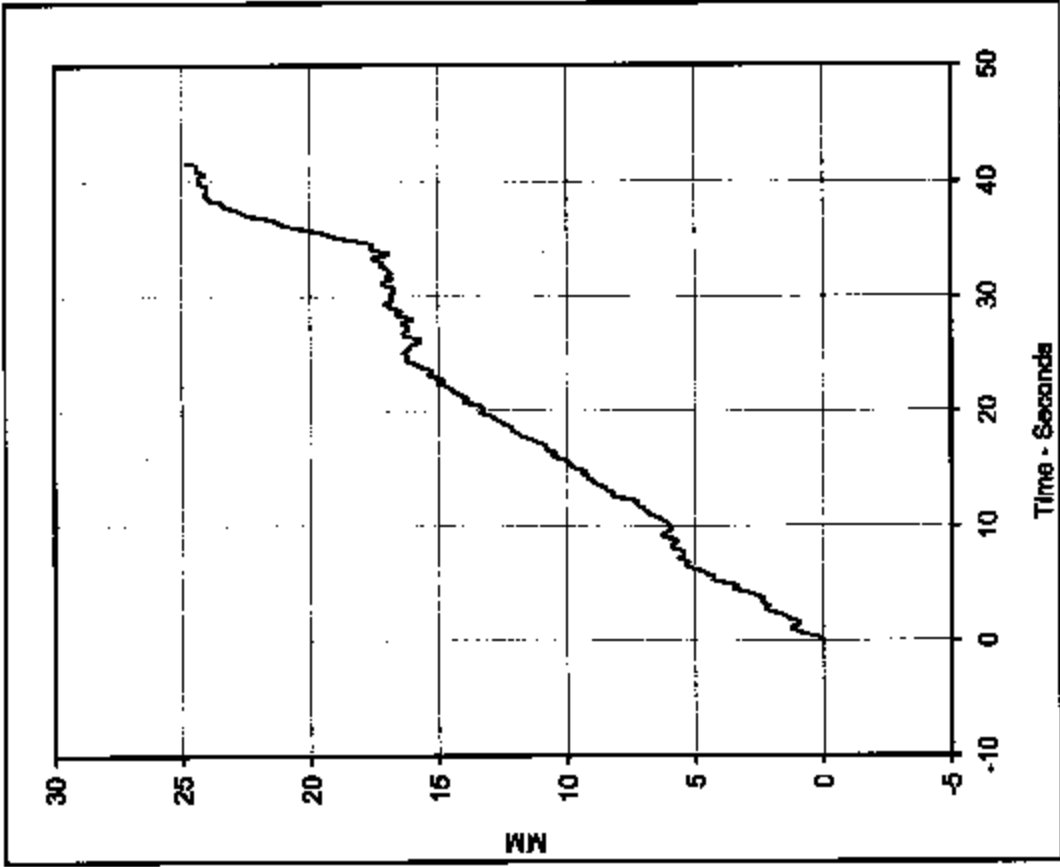




Curve Description	CURNO	Type
Force vs. Displacement	001	FIL

Units	Peak Force	Displacement	Filter (Hz)
Newtons	88.0	18.9	1

Test Program: 2004 FMVSS 111 Rearview Mirrors Test No.: 4  
 Test Vehicle: 2004 Chevrolet Malibu No.: C40105

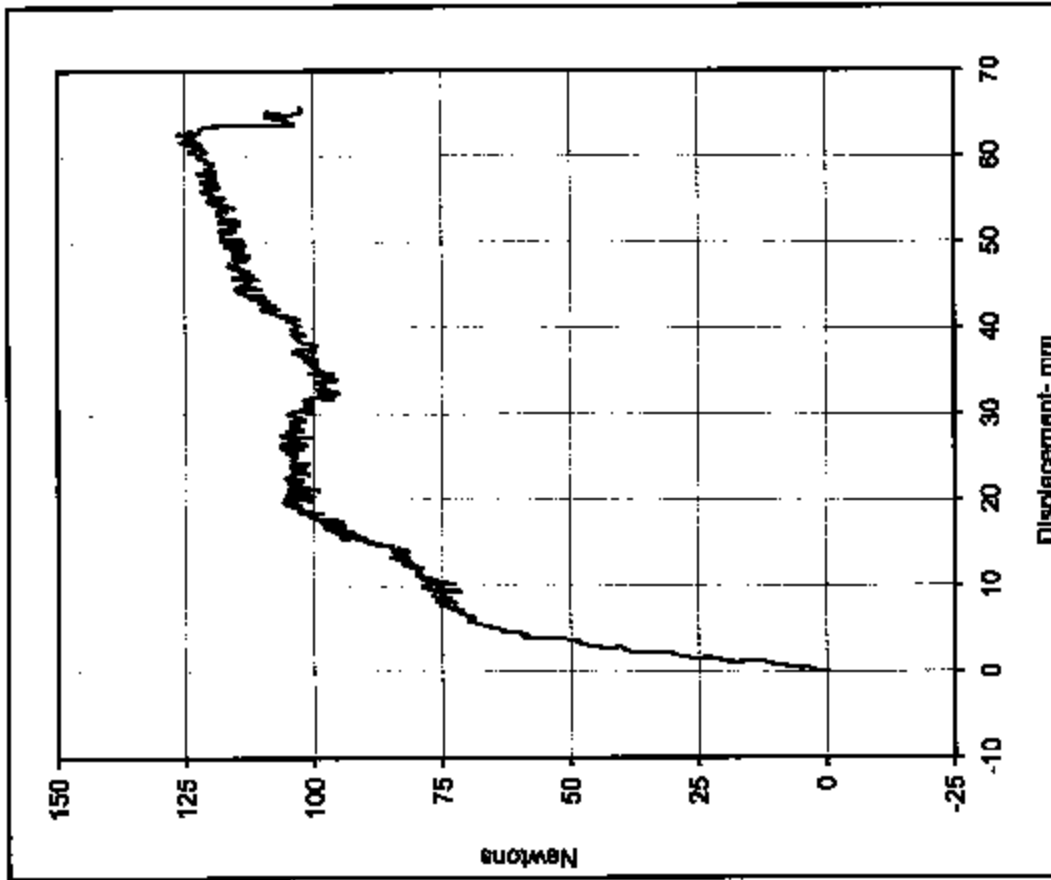


Curve Description	CURNO	Type
Displacement vs. Time	002	FIL

Units	Max	Time	Displ. Rate (mm/min.)	Filter (Hz)
MM	24.8	41.6	37.2	1

Load Direction: -45 / 90  
 Test Date: 5/10/04

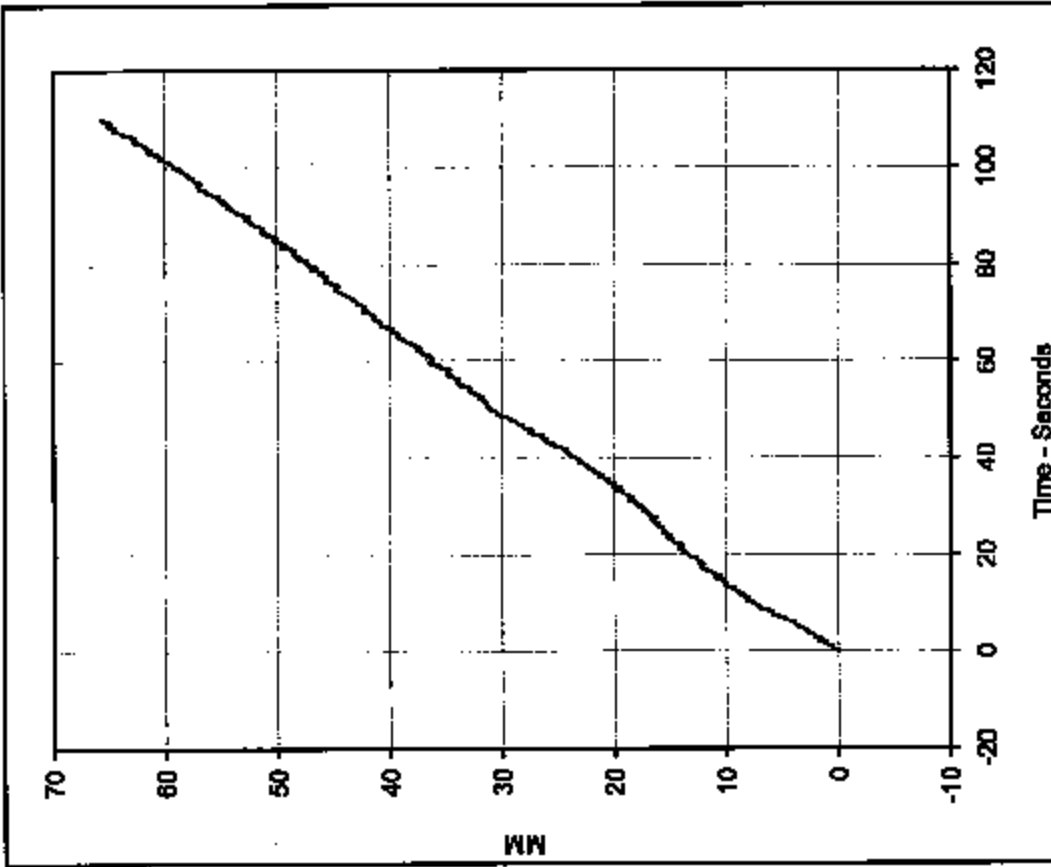




Curve Description	CURNO	Type
Force vs. Displacement	001	FIL

Units	Peak Force	Displacement	Filter (Hz)
Newtons	126.4	62.6	1

Test Program: 2004 FMVSS 111 Rearview Mirrors Test No.: 5  
 Test Vehicle: 2004 Chevrolet Malibu No.: C40105

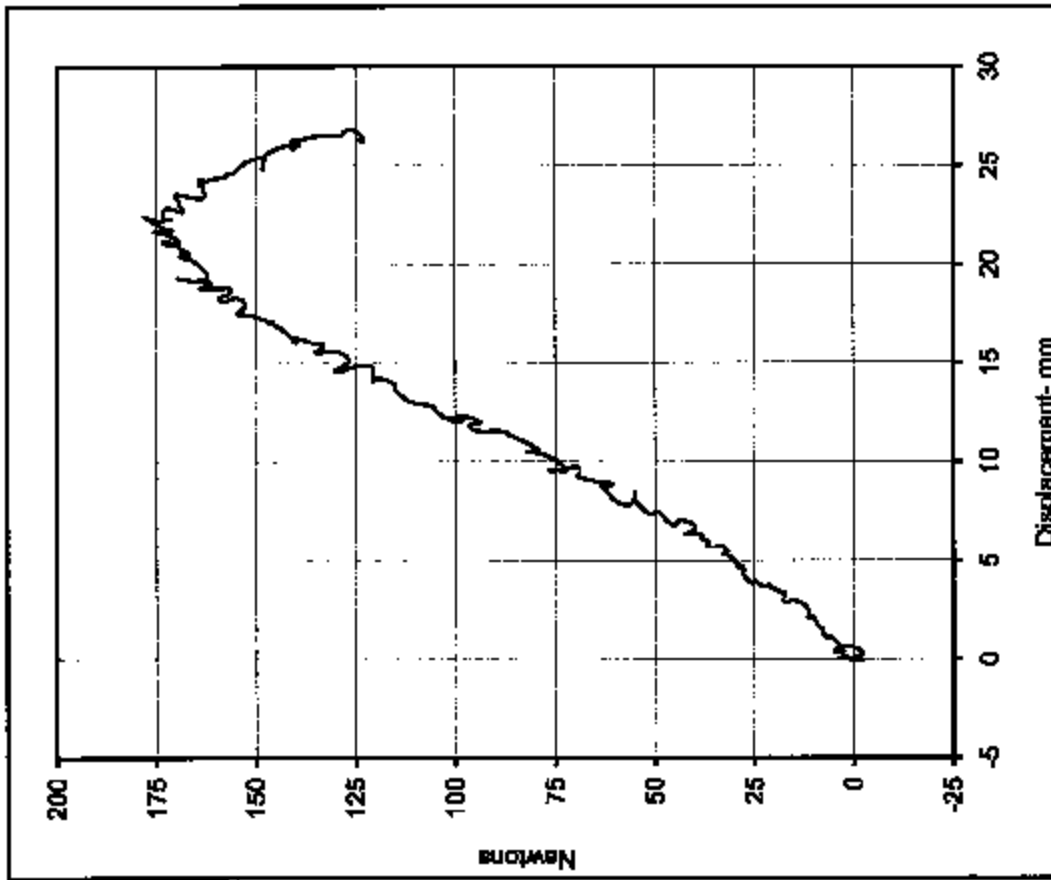


Curve Description	CURNO	Type
Displacement vs. Time	002	FIL

Units	Max	Time	Displ. Rate (mm/min.)	Filter (Hz)
MM	65.7	108.9	35.8	1

Load Direction: +45 / +45  
 Test Date: 6/10/04

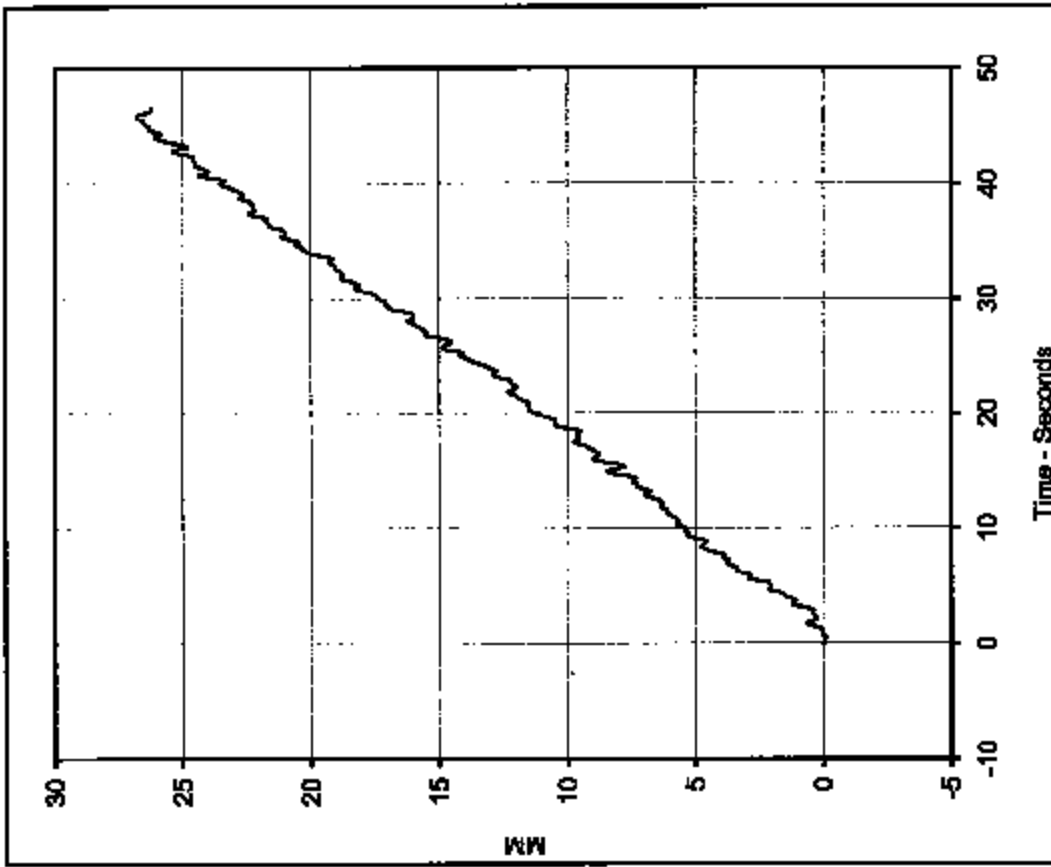




Curve Description		CJRNO	Type
Force vs. Displacement		001	FIL

Units	Peak Force	Displacement	Filter (Hz)
Newtons	178.1	22.4	1

Test Program: 2004 FMVSS 111 Rearview Mirrors Test No.: 6  
 Test Vehicle: 2004 Chevrolet Malibu No.: C40105

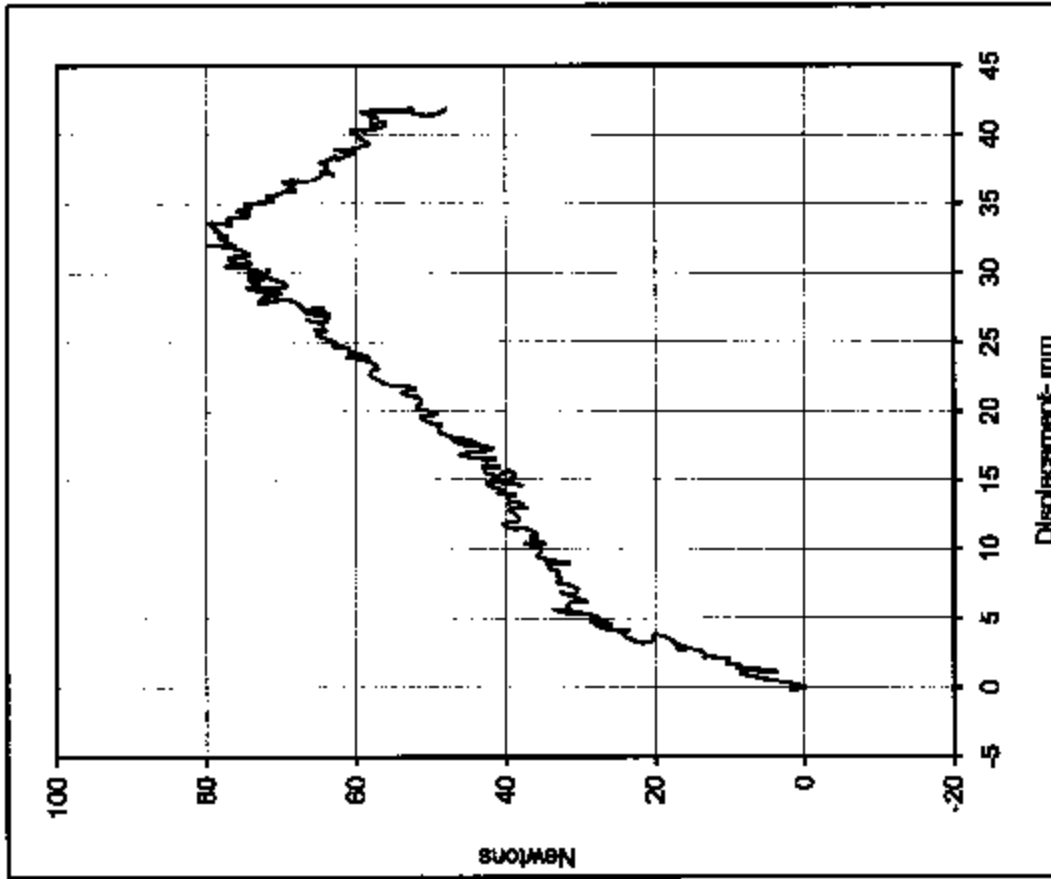


Curve Description		CURNO	Type
Displacement vs. Time		002	FIL

Units	Max	Time	Displ. Rate (mm/min.)	Filter (Hz)
MM	26.8	45.9	35.1	1

Load Direction: +45 / -45  
 Test Data: 5/17/04

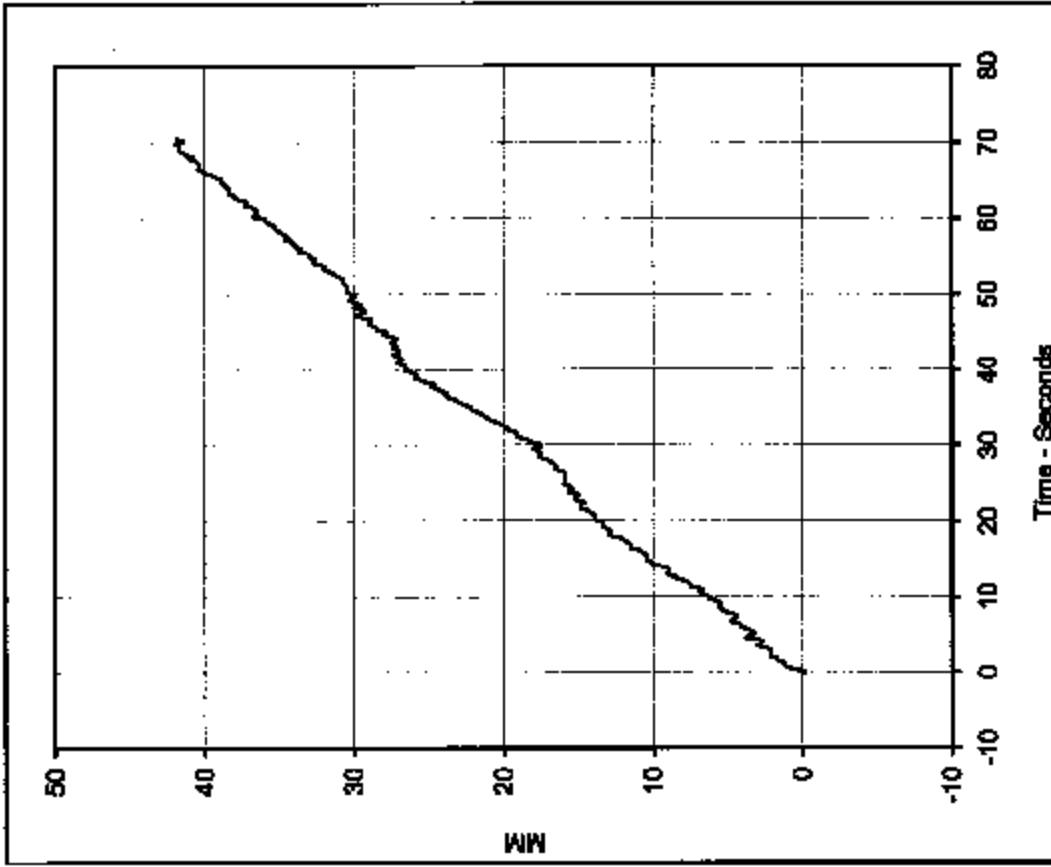




Curve Description	CURNO	Type
Force vs. Displacement	001	FIL

Units	Max	Time	Displ. Rate (mm/min.)	Filter (Hz)
MM	41.9	69.9	36.3	1

Test Program: 2004 FMVSS 111 Rearview Mirrors Test No.: 7  
 Test Vehicle: 2004 Chevrolet Malibu No.: C40105



Curve Description	CURNO	Type
Displacement vs. Time	002	FIL

Units	Max	Time	Displ. Rate (mm/min.)	Filter (Hz)
MM	41.9	69.9	36.3	1

Load Direction: -45 / -45  
 Test Date: 5/17/04



**APPENDIX C**

**TEST EQUIPMENT LIST AND CALIBRATION INFORMATION**

2004 FMVSS 111 Rearview Mirrors

Test Equipment List

5/7/04

2004 Chevrolet Malibu

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	81MAAO1852	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%	6/20/03	6/19/04
Displacement Xdcr.	Celeasco	PTX101-0030	J0654852	76 CM	± 1.0%	7/1/03	6/30/04





**APPENDIX D**  
**EYELIPSE LOCATIONS SUPPLIED BY MANUFACTURER**

MAI 1965  
FOLIO 111

INFORMATION SYSTEMS DEPARTMENT  
DATE: 11/11/65 10:30 AM  
RECEIVED WHEN PAID: 11/11/65 10:30 AM  
AMOUNT PAID: 11/11/65 10:30 AM

ACCOUNT NO. 11111111

1001	1001.111111111111	1001.111111111111
1002	1002.111111111111	1002.111111111111
1003	1003.111111111111	1003.111111111111

FMVSS 111 EYE POINT LOCATIONS

Make: Chev Model: Malibu 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 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	-346	-346				
Y	-226	-290				
Z	845	845				
Mirror Mfr., Model Part No.	MAGNA DINNELLY # 22685599					

FMVSS 111 EYE POINT LOCATIONS

FORM  
10/11A

Make: \_\_\_\_\_ Model: \_\_\_\_\_ Year: \_\_\_\_\_

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. Po 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					-329	-329
Y					-164	-228
Z					844	844
Mirror No., Model, Part No.	MAGNA DUNNIELLY #22685398					

FMV88 111 EYE POINT LOCATIONS

Make: \_\_\_\_\_ Model: \_\_\_\_\_ Year: \_\_\_\_\_

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	LEFT SIDE MIRROR		INSIDE MIRROR		RIGHT SIDE MIRROR	
	LE1 (left eye)	RE1 (right eye)	LE2	RE2	LE3	RE3
X			-350	-350		
Y			-178	-243		
Z			846	846		
Mirror Mfr.	GENTEX		MAGNA		SCHIEFFELACKER	
Model	#22706721		DANNELLY		#10340721	
Part No.	#22706822		#22698336			