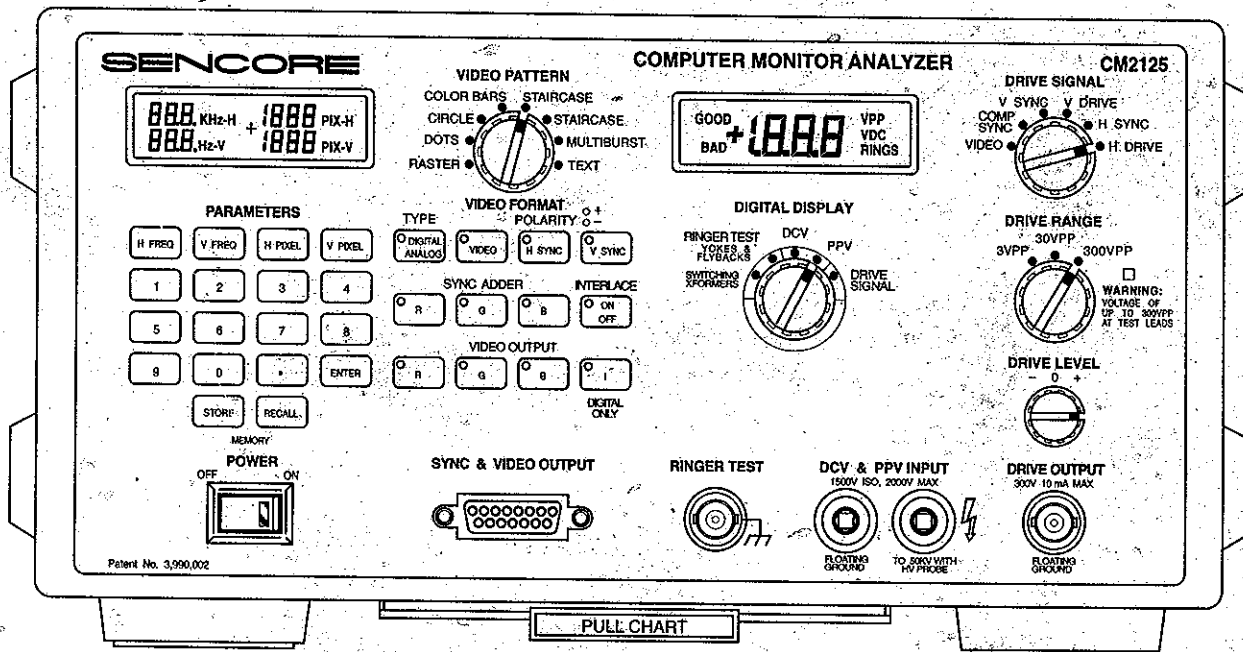


CM2125

COMPUTER MONITOR ANALYZER

Operation and Application Manual



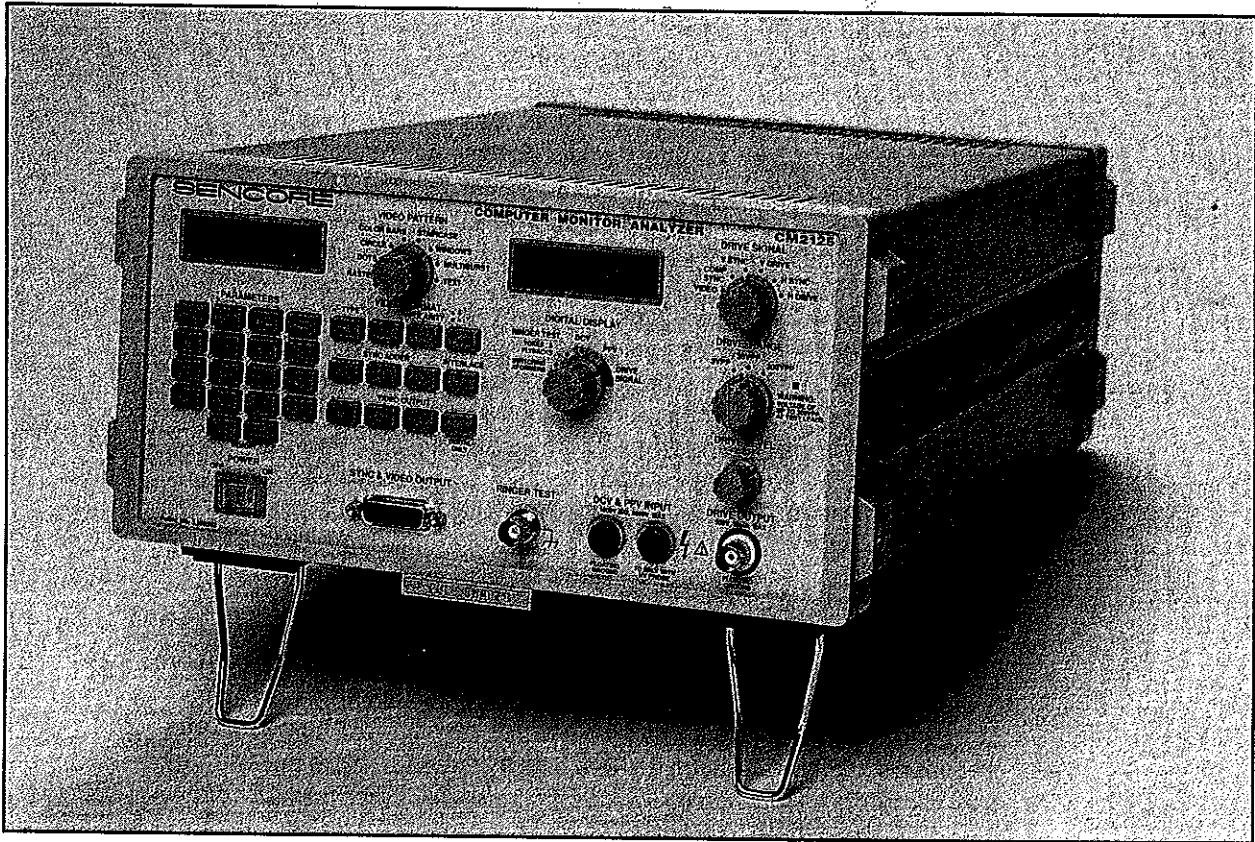
SENCORE

3200 Sencore Drive, Sioux Falls, South Dakota 57107

CM2125

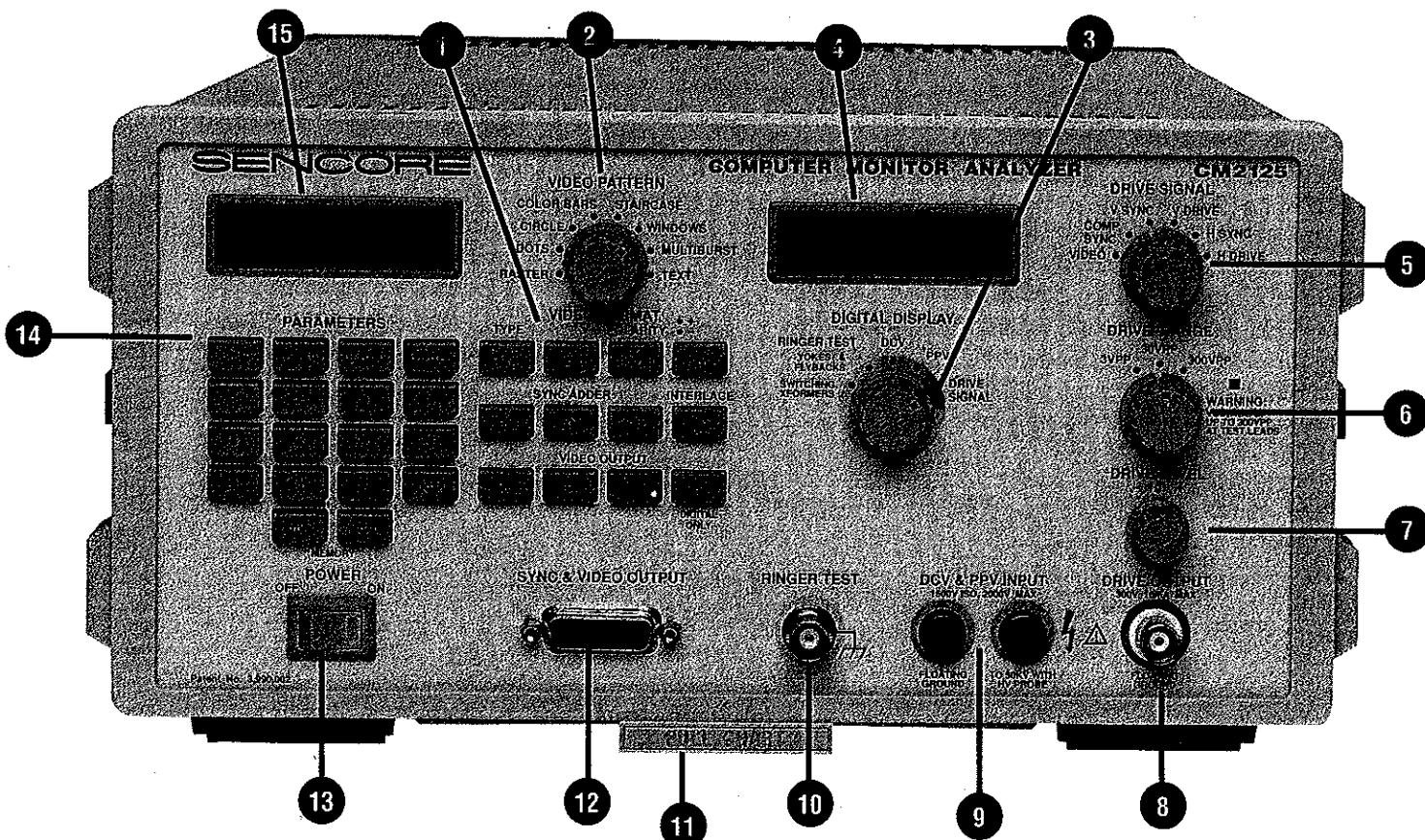
COMPUTER MONITOR ANALYZER

Operation and Application Manual



SENCORE

3200 Sencore Drive, Sioux Falls, South Dakota 57107



FRONT PANEL FEATURES

1. VIDEO FORMAT Buttons - Use to set the makeup of the video signal at the SYNC & VIDEO OUTPUT Jack (12). Push to activate and deactivate. Button is activated when the LED indicator in upper left corner lights. Setups may be stored and recalled with PARAMETER MEMORY Buttons (14g & 14h).

- a. **TYPE** - Use to select digital TTL or analog signal type. Indicator lights to signify "DIGITAL" and is off for "ANALOG."
- b. **POLARITY** - Use to set polarity of R, G, B & I signals ("VIDEO"), horizontal sync ("H SYNC"), and vertical sync ("V SYNC"). Indicator lights to signify positive polarity ("+") and is off to signify negative ("-") polarity.
- c. **SYNC ADDER** - Adds composite sync signal to selected video line. Indicator lights to signify which line(s) sync is added to.
- d. **INTERLACE** - Turns interlace sync on (indicator lit) and off.
- e. **VIDEO OUTPUT** - Turns R, G, B and I output lines on or off. Indicator lights when line is on.

2. VIDEO PATTERN Switch - Determines the video pattern at the SYNC & VIDEO OUTPUT Jack (12) that will be displayed on the monitor. Also selects the video pattern at the DRIVE OUTPUT

Jack (8) when the DRIVE SIGNAL Switch is set to "Video" (5a). Change the color of the pattern with the "Video Output" Format Buttons.

- a. **RASTER** - Provides a solid raster inside a framed border to test power supply regulation, purity and CRT phosphor.
- b. **DOTS** - Provides a grid of regularly-spaced dots to test dynamic convergence.
- c. **CIRCLE** - Provides a pattern of circles and lines to test linearity.
- d. **COLOR BARS** - Provides a sequence of colored bars to test the monitor's ability to produce color.
- e. **STAIRCASE** - Provides a 16-step staircase pattern to test gray scale and video linearity.
- f. **WINDOWS** - Provides a pattern consisting of 5 boxes - 1 in each corner and 1 in the center of the raster. Use to test power supply regulation and brightness uniformity.
- g. **MULTIBURST** - Provides a pattern consisting of 5 patches - 1 in each corner and 1 in the center of the raster. Each patch has horizontal and vertical lines that are 1, 2, 3 & 4 pixels wide, use to test the monitor's bandwidth and resolution.
- h. **TEXT** - Provides a full raster of text characters for checking focus and complete performance.

- 3. DIGITAL DISPLAY Switch** - Use to select the desired analyzer test function. Test results are displayed on the DIGITAL DISPLAY Readout (4).
- SWITCHING XFORMERS RINGER TEST** - Use with RINGER TEST Jack (10) and DIRECT TEST Lead (20) to check switching transformers for shorted turns.
 - YOKES & FLYBACKS RINGER TEST** - Use with RINGER TEST Jack (10) and DIRECT TEST Lead (20) to check deflection yokes and flyback transformers for shorted turns.
 - DCV** - Measures DC voltage applied to DCV & PPV INPUT Jack (9).
 - PPV** - Measures peak-to-peak voltage applied to DCV & PPV INPUT Jack (9).
 - DRIVE SIGNAL** - Measures peak-to-peak amplitude of internal Drive Signal available at DRIVE OUTPUT Jack (8).
- 4. DIGITAL DISPLAY Readout** - Displays results of tests selected by the DIGITAL DISPLAY Switch (3).
- 5. DRIVE SIGNAL Switch** - Determines the signal available at the DRIVE OUTPUT Jack. The sync frequencies are set by the PARAMETERS Buttons.
- VIDEO** - Provides a video signal to inject in the video circuits.
 - COMP SYNC** - Provides a vertical and horizontal sync only signal to inject before the sync separator.
 - V SYNC** - Provides a vertical sync signal to inject before the vertical oscillator.
 - V DRIVE** - Provides a vertical drive signal to inject after the vertical oscillator.
 - H SYNC** - Provides horizontal sync signal to inject before the horizontal oscillator.
 - H DRIVE** - Provides a horizontal drive signal to inject after the horizontal oscillator.
- 6. DRIVE RANGE Control** - Provides a coarse level adjustment of 3, 30 or 300 VPP for signals selected by the DRIVE SIGNAL Switch (5).
- 7. DRIVE LEVEL Control** - Provides fine level adjustment and polarity control of signals selected by DRIVE SIGNAL Switch (5).
- 8. DRIVE OUTPUT Jack** - Provides Drive Signal selected by DRIVE SIGNAL Switch (5). Use with DIRECT TEST LEAD (20).
- 9. DCV & PPV INPUT Jacks** - Provides connection to measure external DCV or PPV. Use with DVM TEST LEADS (21)
- 10. RINGER TEST Jack** - Provides connection for performing Ringer test. Use with DIRECT TEST LEAD (20).
- 11. PULL CHART** - Provides simplified instructions and setups.
- 12. SYNC & VIDEO OUTPUT Jack** - Provides video and sync signals selected by the VIDEO PATTERN Switch (2) with the parameters determined by the PARAMETERS Buttons (14) and VIDEO FORMAT Buttons (1).
- 13. POWER SWITCH** - Applies and removes AC power to the CM2125.
- 14. PARAMETERS Buttons** - Use to establish the correct numerical parameters of the RGB video signal at the SYNC & VIDEO OUTPUT Jack (12) to match the monitor being serviced.
- H FREQ** - Sets horizontal scan frequency from 10 to 250 kHz.
 - V FREQ** - Sets vertical scan frequency from 50 Hz to 250 Hz.
 - H PIXEL** - Sets number of horizontal pixels from 80 to 2048.
 - V PIXEL** - Sets number of vertical pixels from 80 to 2048.
 - DIGITS (0-9)** - Use with "Freq" and "Pixel" buttons (14a-d) to enter numerical value.
 - ENTER** - Press after numerical value to complete entry.
 - STORE** - Stores Parameter and Video Format setups in non-volatile User Memory locations 43 to 69 for later use.
 - RECALL** - Recalls preset setups from any memory location.
- 15. PARAMETERS Readout** - Displays active parameters and entries made using PARAMETERS Buttons (14).

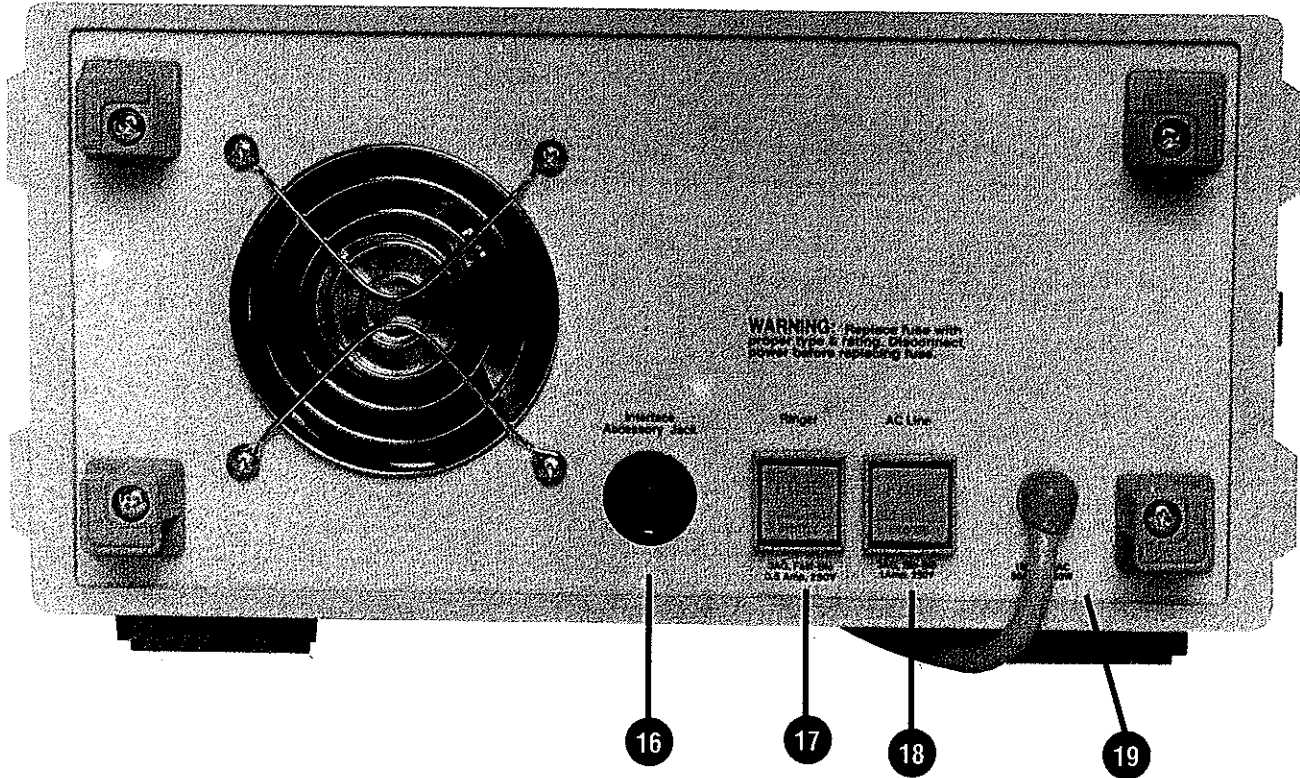
REAR PANEL FEATURES

16. INTERFACE ACCESSORY Jack - Provides a connection for the optional IB72 IEEE 488 Bus Interface Accessory (30) or IB78 RS232 Interface Accessory (31).

17. RINGER FUSE - Protects Ringer test circuitry from external voltage. Replace with 0.5 AMP, 250 Volt, Fast-Blo, Type 3AG.

18. AC LINE FUSE - Protects unit from damage due to internal problems that cause excessive current draw. Replace with 1 amp, 250 volt Slo-Blo, type 3AG.

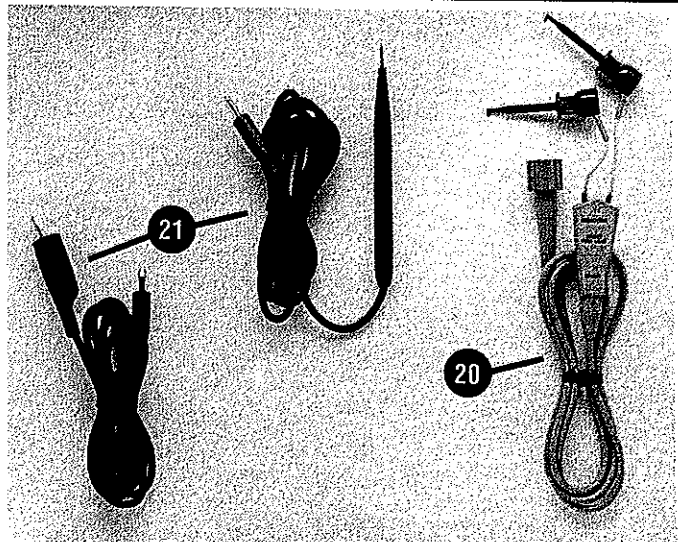
19. AC POWER CORD - Connect to a 105-125 VAC, 50/60 Hz, 60 watt source.



SUPPLIED ACCESSORIES

20. DIRECT TEST LEAD (39G221) - Use to connect the RINGER TEST Jack (10) to the component under test. Also use to connect the DRIVE OUTPUT Jack (8) to the circuit.

21. DVM TEST LEADS (39G264) - Provides a connection between DCV & PPV INPUT Jacks (9) and circuit.



OPTIONAL ACCESSORIES

22. **EXTENSION CABLE (39B271)** - Provides an extension cable for the SYNC & VIDEO Output Jack (12) (48 inches).

23. **UNIVERSAL CONNECTOR (39B273)** - Cable connects to SYNC & VIDEO OUTPUT Jack to provide a connection to monitors having non-standard connectors. (12 inches).

24. **CONNECTOR #1 (39B275)** - Adapter connects between the SYNC & VIDEO OUTPUT Jack and the input cable of CGA, MDA and Hercules type monitors.

25. **CONNECTOR #2 (39B280)** Adapter connects between the SYNC & VIDEO OUTPUT Jack and the input cable of EGA type monitors.

26. **CONNECTOR #3 (39B281)** - Adapter connects between the SYNC & VIDEO OUTPUT Jack and the input cable of PGC type monitors.

27. **CONNECTOR #4 (39B274)** - Adapter connects between the SYNC & VIDEO OUTPUT Jack and the input cable of VGA, PS/2*, SVGA and XGA type monitors.

28. **CONNECTOR #5 (39B276)** - Adapter connects between the SYNC & VIDEO OUTPUT Jack and the female input of Apple® and Macintosh® type monitors.

PS/2* is a registered trademark of IBM.

Apple® and Macintosh® are registered trademarks of Apple Computer Inc.

29. **CONNECTOR #5F (39B356)** - Adapter connects between the SYNC & VIDEO OUTPUT Jack and the male input of Apple® and Macintosh® type monitors

30. **CONNECTOR #6 (39B272)** - BNC cable connects to SYNC & VIDEO OUTPUT Jack to provide a connection to monitors having BNC input connectors (48 inches).

31. **ECL ADAPTER (39G346)** - Converts the CM2125's digital video output to ECL video output.

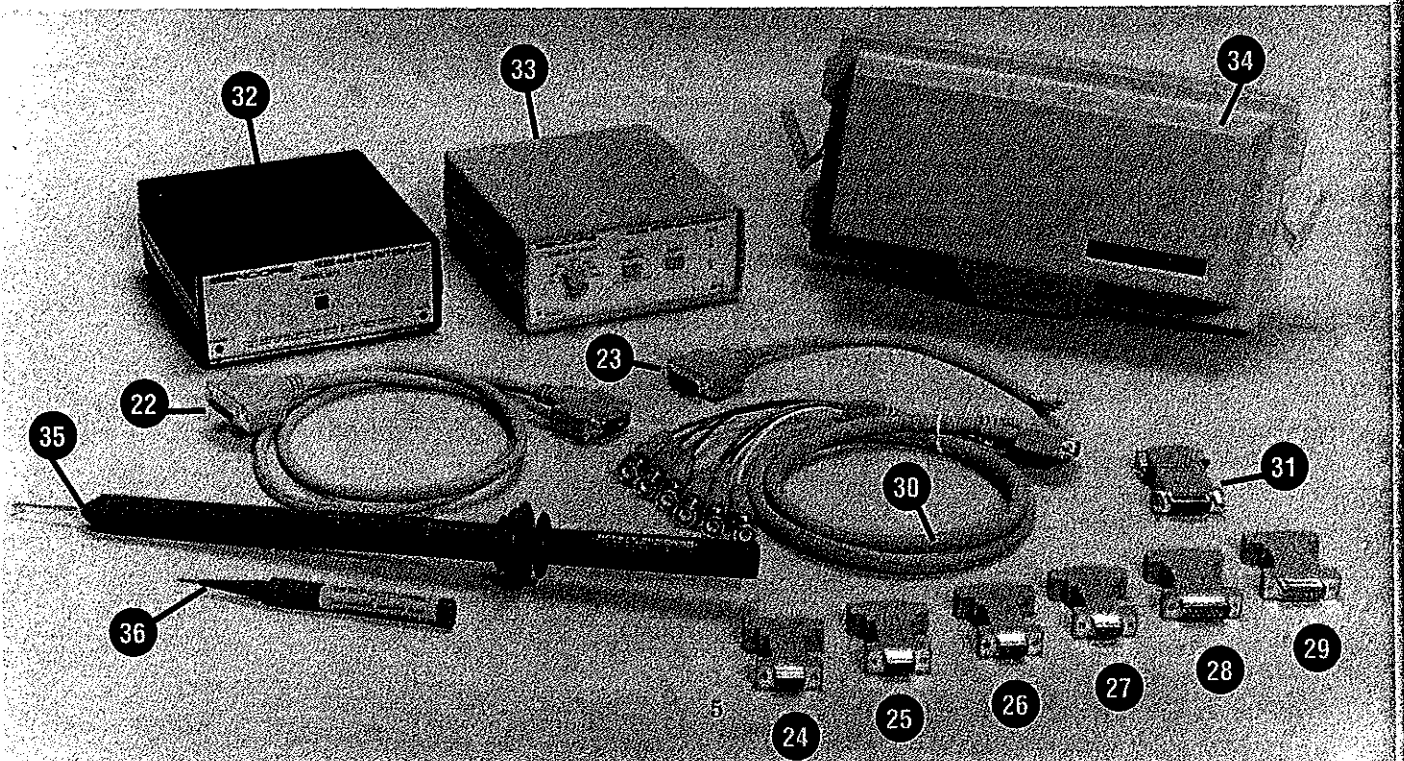
32. **IB72 IEEE-488 BUS INTERFACE ACCESSORY** - Connects between the INTERFACE ACCESSORY Jack (16) and the IEEE-488 port of a bus controller to provide IEEE Bus operation.

33. **IB78 RS232 INTERFACE ACCESSORY** - Connects between the INTERFACE ACCESSORY Jack (16) and the RS232 serial port of a computer to provide automated testing and programming.

34. **PC263 PROTECTIVE COVER** - Snap-on cover protects front panel and provides Test Lead and Interface Connector storage.

35. **HP200 50 kV HIGH VOLTAGE PROBE** - Use with DVM TEST LEADS (21) to extend the DCV measuring range to 50 kV.

36. **TP212 10 kV TRANSIENT PROTECTOR PROBE** - Use with DVM TEST LEADS (21) to extend the DCV measuring range to 10 kV.



SPECIFICATIONS

All specifications allow for 20 minutes warm-up and are guaranteed at 15-35 degrees C (59-95 degrees F).

Sync & Video Output

VIDEO BANDWIDTH: 125 MHz

HORIZONTAL SYNC:

RANGE: 10.0 KHz to 250 KHz

ACCURACY: +/- 200 nSec

STEPS: 10.0 KHz to 99.9 KHz, .1 KHz
and 100 KHz to 250 KHz, 1 KHz

LEVEL: 5 VPP

POLARITY: (+) or (-)

VERTICAL SYNC:

RANGE: 10.0 Hz to 250 Hz

ACCURACY: +/- (1/H FREQ)*(6)

STEPS: 10.0 Hz to 99.9 Hz, .1 Hz
and 100 Hz to 250 Hz, 1 Hz

LEVEL: 5 VPP

POLARITY: (+) or (-)

COMPOSITE SYNC:

LEVEL: 5 VPP

POLARITY: (-)

HORIZONTAL RESOLUTION:

RANGE: 80 pixels to 2,048 pixels in one pixel steps

VERTICAL RESOLUTION:

RANGE: 80 pixels to 2,048 pixels in one pixel steps

MEMORY:

70 computer monitor setup storage locations.

VIDEO:

VIDEO PATTERNS: raster, dots, circle, color bars, staircase, windows, multiburst and text

DIGITAL

LEVEL: 5 VPP

PATTERN POLARITY: (+) or (-)

VIDEO POLARITY: (+) or (-)

VIDEO OUTPUT: red, green, blue and intensity.

ANALOG

LEVEL: 1 VPP, white level .714 V, black 0.0, and sync -.286 into 75 ohms.

PATTERN POLARITY: (+) or (-)

SYNC ADDER: red, green, blue

MODE: Non-interlace or interlace

VIDEO OUTPUT: red, green, blue

SYNC TIMING: The CM2125 recognizes common computer monitor formats and adjusts the sync time, front porch and back porch.

SYNC TIMING DEFAULT: If the CM2125 does not recognize the computer monitor format it sets the output to 80% displayed video and 20% sync. The sync pulse is divided into thirds between the front porch, blanking and back porch.

SYNC TIMING PROGRAMMING: Sync timing parameters can be set through the front panel or the IEEE 488 or RS232 interface buses.

HORIZONTAL

Minimum blanking time is 1.5 uSec. Minimum sync time is 0.3 uSec.

VERTICAL

Minimum blanking time is 1/H freq. Minimum sync time is 1/H freq.

Digital Display

RINGER TEST

INDUCTOR RANGE: 10 uH and larger, non-iron core

ACCURACY: +/- 1 count on readings between 8 and 13 rings

RESOLUTION: +/- 1 count

EXCITING PULSE: 5 volts peak, 60 Hz rate

YOKES & FLYBACKS

counts rings up to a 25% damping point

SWITCHING TRANSFORMERS

counts rings up to a 5% damping point

DC VOLTMETER

RANGES: Autoranging in three ranges, 0.00 to 19.99 V, 20.0 to 199.9 V and 200 to 1999 V

ACCURACY: +/- 0.5% +/- 2 counts

RESOLUTION: 10 mV on 20 V range, .1 V on 200 V range and 1 V on 2000 V range

INPUT IMPEDANCE: 15 megohms +/- 1%

AC REJECTION: Greater than 60 dB

PEAK-TO-PEAK VOLTMETER

RANGES: Autoranged in three ranges, 0.0 to 19.9 V, 20 to 199 V, 200 to 1999 V

ACCURACY: +/- 1% +/- 2 counts, +/- 5% +/- 5 counts in the 200 to 1999 V range

FREQUENCY RESPONSE: 30 Hz to 5 MHz +/- 1 dB on 20 V range, 30 Hz to 250 KHz +/- 1 dB on 199 V and 2000 V ranges

RESOLUTION: .1 V on 20 V range and 1 V on 200 V and 2000 V ranges

INPUT IMPEDANCE: 15 megohm shunted by less than 40 pF

PROTECTION: 2000 VDC (DC + peak AC) across inputs. Maximum voltage between (-) and ground = 1500 V (DC + peak AC).

Drive Signals

All drive signals are phase-locked to the SYNC & VIDEO OUTPUT.

SIGNALS AVAILABLE: video, composite sync, vertical sync, vertical drive, horizontal sync, horizontal drive

RANGE: 3 ranges, 0.0 to 3.0 VPP, 0 to 30 VPP and 0 to 300 VPP

ACCURACY: +/- 1%, +/- 2 digits for H DRIVE signal

FREQUENCY RESPONSE: 30 Hz to 5 MHz < 3 dB on 3.0 VPP and 30 VPP ranges. 30 Hz to 250 KHz < 3 dB on 300 VPP range.

OUTPUT: 3 VPP range, 3 VPP, +/- 0.5 V into 100 ohms circuit impedance, 30 VPP, +/- 5 V into 100 ohms circuit impedance, 300 VPP, +/- 50 V into 10,000 ohms circuit impedance.

PROTECTION: +/- 450 V (DC + peak AC)

General

DISPLAYS: LCD readout for FREQUENCY and PIXEL parameters. 3 1/2 digit LCD readout for DRIVE OUTPUT/DVM.

GUARANTEED OPERATING TEMPERATURE:

15 to 35 degrees Centigrade

WARM-UP TIME: 20 minutes

SIZE: 6" X 11.5" X 15" (15.2 X 29.1 X 38.1 cm) HWD.

WEIGHT: 16 pounds (7.3 kg).

POWER: 105 to 125 VAC 50/60 Hz, 85 Watts.

All specifications are subject to change without notice.

OPERATION

INTRODUCTION

This portion of the manual explains how to prepare the CM2125 for operation, and describes how to use its controls and features. It contains 4 major sections: 1) Preparation For Use; 2) Connecting To A Monitor; 3) Troubleshooting And Analyzing, and 4) Computer Automated Operation.

Once you have become familiar with the features and operation of the CM2125, you can operate it using the information on the front panel and on the Pull Chart located beneath the unit. The APPLICATION portion of this manual includes specific application examples and troubleshooting procedures.

PREPARATION FOR USE

The CM2125 is ready for use when it is removed from its packing material and connected to a proper source of AC power. All the Supplied Accessories are in the same box as the CM2125. When you first unpack the unit, confirm that you have received all the Supplied Accessories listed on page 4. If any are missing, promptly notify the Sencore Service Department. (See inside back cover for their address and phone number).

Place the CM2125 in a convenient location that is within about 36 inches of the monitors that you will be servicing. This will provide an adequate work area while keeping the monitors close enough to use the test leads. Do not block the air vents located on the top and bottom rear of the unit.

Power Connection

The CM2125 is powered by a standard 105-125 VAC, 50/60 Hz, AC line (220 VAC optional). The power cord is not detachable and includes a third-wire safety ground. Do not defeat this third-wire ground as it is necessary for proper shielding, operation and safety.

Optional 220 VAC Operation

If 220 VAC operation is needed, contact the Sencore Service Department for more information.

Power On Test

When the POWER Switch is turned on the CM2125 undergoes a power-on test sequence that lasts approximately 10 seconds. During this time all the indicator LEDs on the VIDEO FORMAT Buttons should sequence "on" and all the annunciators in the LCD Readouts should turn on. If any of the LEDs or annunciators fail to turn on, the CM2125 requires service. When the readouts clear and reset to the selected functions, the CM2125 is fully operational. The CM2125 defaults to the VIDEO FORMAT and PARAMETER settings that were last used.

To operate the CM2125 from an AC line:

1. Connect the power cord to a properly grounded, 105-125 VAC, 85 W AC power source. (220 VAC optional)
2. Press the POWER Switch on the front of the CM2125 to "On." The switch will illuminate to show that the unit is receiving power. If the light does not illuminate:
 - a. Confirm that the AC power source is correct
 - b. Check the CM2125 AC line fuse located on the rear of the unit.
3. Confirm that all VIDEO FORMAT Button LED Indicators and LCD Readout annunciators turn on.
4. Allow approximately 10 seconds for the internal circuitry to reset after applying power.

CAUTION

Defeating the 3rd wire safety ground connection may cause the CM2125 to operate incorrectly and may cause damage to it.

AC Line Fuse - An AC line fuse, located on the rear of the unit, protects the unit from excessive damage caused by an internal failure. The proper fuse value is 1 amp, 250 volt, Slo-Blo, type 3AG. If the fuse blows, locate the cause of the problem and correct it before replacing the fuse. Only replace the fuse with another of the same type and rating. Installing an incorrect fuse may damage the unit and will void all warranties.

To replace the AC line fuse:

1. Press to release the snap-in fuse holder.
2. Pull the holder and the fuse out of the fuse holder base.
3. Replace the fuse with another of the same type and rating.
4. Insert the holder and fuse into the fuse holder base and snap it back into place.

CAUTION

The wrong AC line fuse may damage the CM2125. Replace only with a 1 amp, 250 volt, Slo-Blo, type 3AG.

ATTENTION

Remplacer les fusibles avec un type et une valeur qui convient. Déconnecter l'alimentation avant de remplacer les fusibles.

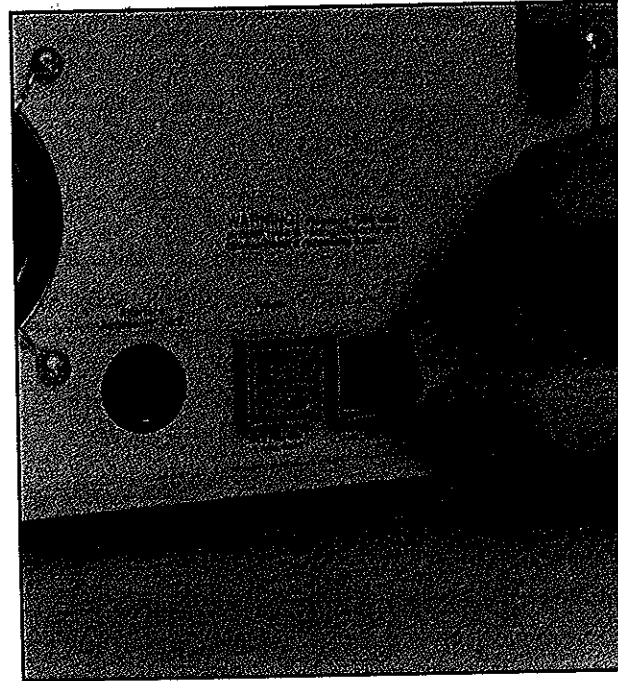


Fig. 1 If the CM2125 fails to power up when the POWER switch "on" check the AC line fuse.