1998-99 Full Line Catalog

SENCORE

About Sencore...

For almost 50 years, Sencore has been dedicated to one goal – helping technicians succeed.

Sencore was started in 1951 by R.H. (Herb) Bowden. Herb witnessed the difficulty most technicians were having using test equipment. Using this first-hand experience, he started customizing and building innovative, time-saving instruments.

Sencore's innovative design has successfully led technicians into today's high tech troubleshooting field... and will continue to do so into the new and exciting 21st century.

Sencore's Mission Statement

At Sencore we are striving to provide you with "Total Service Solutions" to optimize your time and productivity while maximizing your profitability.

Al Bowden
CEO and President

Highlighted throughout this catalog, you will find 7 key statements showing a portion of Sencore's commitment to you, our customer:

Innovative – unique, patented line of instruments
Service – equipment designed for the service industry
Quality – the highest reliability of any test instruments
Technology – state-of-the-art design for new technology product servicing
Solutions – efficient, effective, and profitable repairs
Value – equipment guaranteed to pay for itself
Success – our success is through your success

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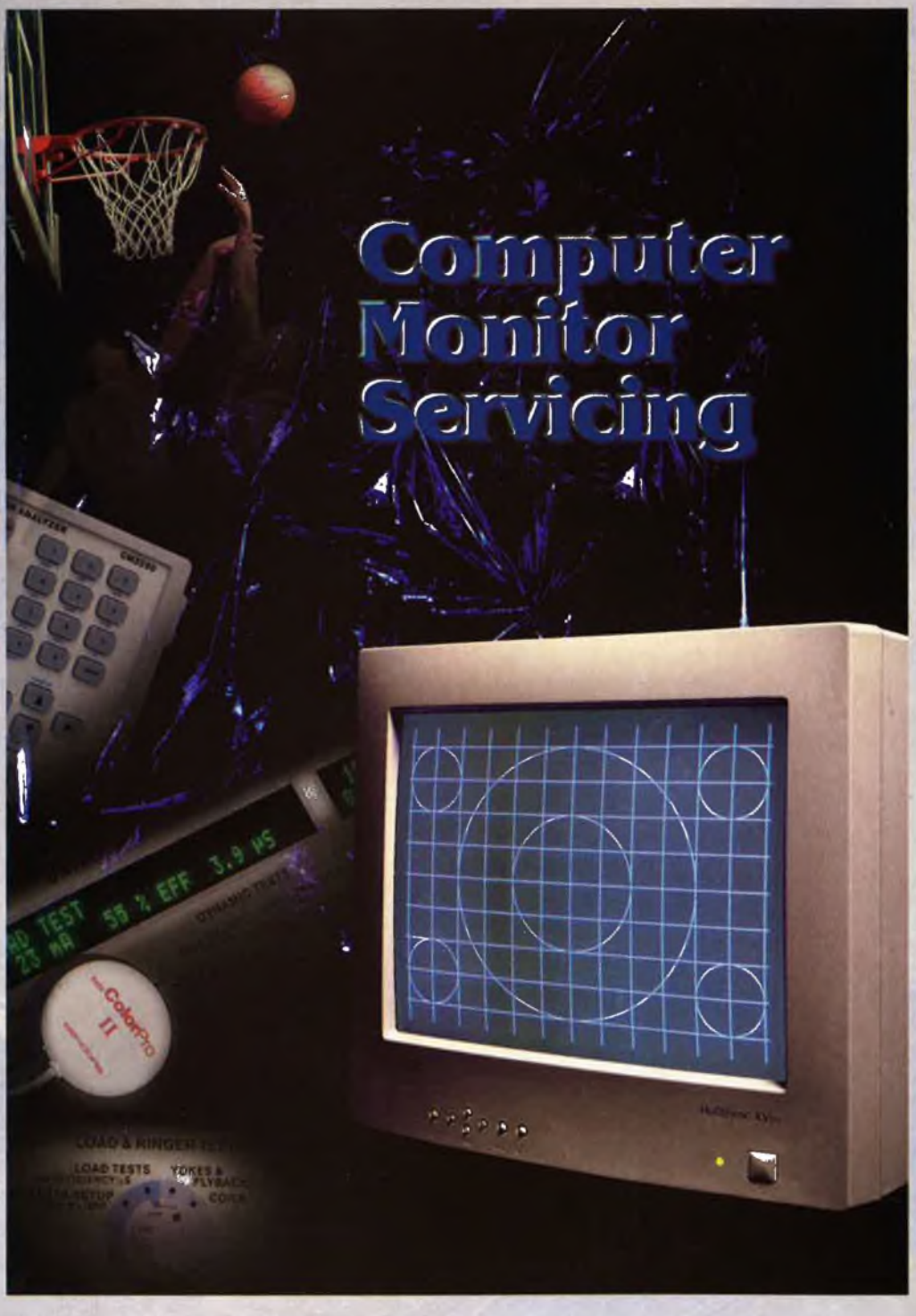

Innovative

You always miss
100% of the shots
you don't take.

Until now, 14 and 15-inch monitors have been the standard with businesses and the consumer. Back in 1993, for example, a 17-inch monitor cost between $1,000 and $1,500. Today, you can purchase a 17-inch plug/play for about $750.

So what's the advantage? Besides more screen area (approximately 45 to 60 percent), 17-inch monitors offer higher resolution. VGA on a 14-inch monitor is good and SVGA is satisfactory. Seventeen inch models run well at SVGA and 1024 x 768 resolution, but 14-inch monitors at 1024 x 768 display the information too small. Running at higher resolutions, the 17-inch monitor lets you display more information on the screen, not to mention the benefit to those with poor eyesight.

The number of 17-inch monitors being shipped is increasing, too. Ask any CAD/CAM user where it's a requirement to have a larger screen area. Those involved with desktop publishing work with page layouts and high resolution graphics of 1280 x 1024 and beyond. Even more so, the advances in animation, mapping, and scientific visualization-designing DNA models are other examples. As these hi-tech professions rapidly expand, so will the need for high resolution monitors and their applications.

In this "Computer Monitor Analyzing" product section, you will see the following exclusive Sencore test instruments:

CM125 "Pix Pak"™ Computer Monitor Signal Generator
CM2125 Computer Monitor Analyzer
CM2250 250 MHz Computer Monitor Analyzer
CM2250-PC "Pro" Computer Monitor Analyzer
EX220 Video Output Expander
CP288 Auto "ColorPro II" Color Analyzer
CP290 "ColorPro" Hand-Held Color Analyzer
HA2500 Universal Horizontal Analyzer

SENCORE

Computer Monitor Analyzers

Sencore's Exclusive Line Of Computer Monitor Analyzers
(See which analyzer best fits your needs.)

Model #	Description	Points of Difference	Where Used
CM125 (page 4)	The easy-to-use, programmable, portable RGB generator.	• 125 MHz bandwidth • Generator only	• Field testing • Burn-in rack • Quality assurance
CM2125 (page 6)	Completely test and troubleshoot monitors from the input connector to CRT	• 125 MHz bandwidth • Signal injection • Built-in DCV/PPV meter • Patented "ringer"	• "Tough Dog" repair • Component level repair • Analyzing and troubleshooting
CM2250 (page 8)	RGB video generator system for testing and aligning high bandwidth monitors	• 250 MHz bandwidth • Integrated "Process Generator" • Integrated color analyzer	• High bandwidth repair • Color analysis and alignment • Guided troubleshooting and alignment
CM2250-PC "Pro" (page 10)	PC based system for high bandwidth monitors including: RGB generator, process generator, and color analysis	• PC (card) based system • 250 MHz bandwidth • "Process Generator" • Color analyzer • Windows compatible	• High bandwidth repair • Color analysis and alignment • Guided troubleshooting and alignment

CM125 "Pix Pak"™
Computer Monitor Signal Generator

The Easy-To-Use, Programmable, Portable RGB Generator That Satisfies Your Computer Monitor Testing Needs!

PIXPAK

- RGB video generator for bench and field computer monitor troubleshooting and testing
- A fully programmable scan frequency and pixel resolution RGB video generator
  - *Video bandwidth to 125 MHz and 2048 X 2048 pixel resolution*
  - *Compatible with TTL, analog, and ECL video types*
  - *100 monitor setup memory locations (43 preprogrammed)*
  - *Output protected to prevent damage from defective computer monitors*
- A complete set of troubleshooting and performance testing video patterns to help you identify monitor defects
- Easy-to-use, portable, lightweight, and compact for all your field and bench testing needs
- Hook-up adapters available for all popular monitor types

RS232 Compatible

Even though the CM125 "Pix Pak"™ is small, it packs a powerful pixel punch with 125 MHz video bandwidth and 2048 x 2048 pixel resolution. The sync, pixel, and blanking times are also fully programmable so you can adjust to match the monitor under test. The "Pix Pak"™ is also compatible with TTL, analog, and ECL video types so you're ready for any situation.

The CM125 has storage locations for 100 computer monitor formats with the most popular formats in 43 preprogrammed locations. You just recall the "Pix Pak"™ storage location and start testing. A complete set of dynamic video patterns help test the performance and operation of monitors and point you toward defective circuits. Plus a special pattern sequence feature lets you automatically cycle the patterns several times a minute to prevent phosphor burns. The "Pix Pak"™ gives you these patterns:

- Raster
- Circle/Cross
- Color Bars
- Staircase
- Windows
- Multiburst
- Text

The CM125 "Pix Pak"™ was built lightweight, portable, and compact so it can go where your monitor testing takes you. And hook-up adapters are available for matching all common monitor formats.

CM125 "Pix Pak"™ Specifications

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) x 6. STEPS: 10.0 Hz to 99.9 Hz, .1 Hz and 100 Hz to 250 Hz, 1 Hz. LEVEL: 5 VPP POLARITY: (+) or (-)
Horizontal Pixel Resolution	Range: 80 to 2,048 pixels in one pixel steps
Vertical Pixel Resolution	Range: 80 to 2,048 pixels in one pixel steps
Video Patterns	RASTER, CIRCLE/CROSS, COLOR BARS, STAIRCASE, WINDOWS, MULTIBURST, TEXT
Digital Video	LEVEL: 5 VPP. VIDEO POLARITY: (+) or (-). BLANKING POLARITY: (+) or (-). VIDEO OUTPUT: red, green, blue, and intensity
Analog Video	LEVEL: 1 VPP, white level .714 V, black 0.0, and sync -.286 into 75 ohms. VIDEO POLARITY: (+) or (-). SYNC ADDER: red, green, blue. MODE: Non-interlace or interlace. VIDEO OUTPUT: red, green, blue
Blanking Timing	The CM125 recognizes common computer monitor formats and adjusts to the correct sync, front porch, and back porch times
ECL Video	LEVEL: -0.9 to -1.6 V. VIDEO POLARITY: (+) or (-). VIDEO OUTPUT: red, green, blue
Default	If the CM125 does not recognize the computer format, it sets the output to 80% displayed video and 20% sync. The blanking pulse is divided into thirds between the front porch, sync, and back porch
Programming	Blanking time parameters can be changed through the front panel (FRONT PORCH, BACK PORCH, and SYNC) or with a personal computer through the RS232 port
Minimum (Horizontal)	The minimum blanking time is 1.5 uSec. Minimum sync time is 0.3 uSec
Minimum (Vertical)	The minimum blanking time is 1/H freq. Minimum sync time is 1/H freq
Memory	PREPROGRAMMED: 0 - 42. USER DEFINABLE: 43 - 99
General	DISPLAY: LCD readout for frequency, pixel, porch times, memory and error messages. SIZE: 6.00" X 11.75" x 4.50" (15.2 X 29.9 X 11.4 cm) HWD. WEIGHT: 4.75 pounds (2.1 kg). POWER: 100 to 240 VAC, 47 to 63 Hz, 60 watts

All specifications subject to change without notice.

CM125 "Pix Pak"™ Accessory List

Supplied Accessories	AC Power Cable
Optional Accessories *(For complete connector descriptions, refer to page 17)*	39B273 Universal Connector 39B274A VGA 39B275 CGA, MDA, Hercules 39B377 Extension Cable 39B280 EGA 39B281 PGC 39B300 BNC 39B492 Male Apple-Mac 39B493 Female Input Apple-Mac

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CM2125 Computer Monitor Analyzer

Patented

Completely Test And Troubleshoot High Resolution And Multi-Scan Computer Monitors From The Input Connector To The CRT!

- A complete, easy-to-use, high resolution computer monitor analyzer
- A fully programmable scan frequency and pixel resolution RGB video generator
  - *bandwidth to 125 MHz and 2048 x 2048 pixels*
  - *compatible with TTL, analog, and ECL video types*
  - *70 monitor setup memory locations (43 preprogrammed)*
  - *outputs protected to prevent damage from defective computer monitors*
- Special sync-locked signal substitutor for pinpointing monitor circuit problems
- Innovative performance pattern generator
- Patented "ringer" and HV multiplier tester that finds defective:
  - *yokes*
  - *integrated high voltage transformers (IHVT)*
  - *switching transformers*
- Integrated 2,000 volt DCV and PPV meter eliminates the need for a DVM for complete one-unit troubleshooting
- "Hook-up" adapters available

RS232 Compatible

The CM2125 is a programmable RGB video and sync generator fully protected to prevent damage from defective computer monitors. Horizontal and vertical scan frequencies, pixel resolutions, and porch and sync times are all programmable so you can service any monitor that comes into your service center. With a bandwidth to 125 MHz and 2048 x 2048 pixels, you will be ready for all monitors – whether it's TTL, analog, or ECL.

With 70 monitor setup locations (43 preprogrammed), the CM2125 let's you recall the most common monitor formats, and store custom formats in the remaining locations. The innovative test patterns dynamically test the operation of computer monitors while exposing monitor defects that point you toward the defective circuits. You get these dynamic video patterns:

- Raster
- Circle
- Staircase
- Multiburst
- Dots
- Color Bars
- Windows
- Text

The CM2125 uses sync-locked substitution signals so you can divide-and-conquer problems down to a single stage by injecting a known-good signal into the monitor. The patented "ringer" test finds shorted turns in flybacks, yokes, switching transformers, and IHVTs – even a single shorted turn. With its integrated DCV/VPP digital meter and the exclusive hook-up adaptors for all common monitors, the CM2125 is your total answer to computer monitor analyzing.

CM2125 Computer Monitor Analyzer Specifications

Outputs	BANDWIDTH: 125 MHz. HORIZONTAL PIXEL RESOLUTION: 80-2048 pixels. VERTICAL PIXEL RESOLUTION: 80-2048 pixels. HORIZONTAL SCAN FREQUENCY: 10-250 kHz. VERTICAL SCAN FREQUENCY: 10-250 Hz. OUTPUT AMPLITUDE: TTL, analog, or ECL. MODE SELECTION: Interlaced or non-interlaced. GUN SELECTION: RGBI. SYNC ADDER: RGB. POLARITY SELECTION: Video, H-Sync, V-Sync
Sync Timing	The CM2125 recognizes common computer monitor formats and automatically adjusts for the correct sync, back porch, and front porch timing. Sync timing parameters can be changed through the front panel
Memory	70 computer monitor setup storage locations (43 preprogrammed)
Video Patterns	Raster, Dots, Circle/Crosshatch, Color Bars, Multiburst, Staircase, Text, Windows
Drive Signals	Signal at zero: Less than 3% of full range. Output at full level, 3 V range: 3 VPP, ± 0.5 V into 100 ohms. 30 V range: 30 VPP, ± 5 V into 100 ohms, 300 V range: 300 VPP, ± 50 V into 10,000 ohms
Peak-to-Peak Voltmeter	3 ranges (autoranged): 0.0 - 19.9 VPP, 20 - 199 VPP, 200 - 1999 VPP. ACCURACY: (All) ± 1%, ± 2 counts. FREQUENCY RESPONSE: 0 - 200 V, 30 Hz to 5 MHz, ± 1 dB from the average value across the band. INPUT IMPEDANCE: 15 Megohm
DC Voltmeter	3 ranges (autoranged): 00.00 - 19.99 V DC, 20.0 - 199.9 V DC, 200 - 1999 V DC. ACCURACY: (All) ± .2%, ± 2 counts. INPUT IMPEDANCE: (without probe) 15 Megohm
Meter Protection	2000 VDC (DC + peak AC), across the inputs. Maximum voltage between (-) lead and ground: 1500 (DC + peak AC)
Ringing Test	Dynamic test of coil's Q determined by counting the number of ringing cycles before reaching a preset damping point. The preset damping point is set at 25% of the excitation pulse. The number of cycles is displayed on the digital display and continually updated
General	DIGITAL METERS: 3½ digit, LCD readout. DIGITAL DISPLAY: LCD readout. SIZE: 6" x 12" x 14.3" (15.2 x 29.1 x 38.1 cm) HWD. WEIGHT: 16 pounds (7.3 kg). POWER: 105-125 VAC, 60 Hz, 140 W max

All specifications subject to change without notice.

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CM2125 Accessory List

Supplied Accessories	39G221	Direct Test Lead
	39G264	DVM Test Leads
Optional Accessories *(For complete connector descriptions, refer to page 17.)*	39B273	Universal Connector
	39B274A	VGA
	39B275	CGA, MDA, Hercules
	39B277	Extension Cable
	39B280	EGA
	39B281	PGC
	39B300	BNC
	39G346	ECL Adapter
	39B492	Male Apple-Mac
	39B493	Female Input Apple-Mac
	HP200	50 kV High Voltage Probe
	IB78	RS232 Interface Accessory
	PC263	Protective Cover
	TP212	10 kV Transient Protector Probe

New! CM2250 250 MHz Computer Monitor Analyzer

The Only Complete System For Troubleshooting, Testing, And Aligning High Bandwidth Computer Monitors From The Input To The CRT (Including Color Output Analysis) For Servicing Security And Growth For Years To Come!

- A complete and programmable high bandwidth RGB video generator with color analysis, unique "Process Generator"™, and a complete set of video test patterns to help you identify monitor defects
- Fully programmable scan and pixel generator:
  - *Video bandwidth to 250 MHz*
  - *Pixel resolution to 2048 x 2048*
  - *Scan frequencies to 250 kHz and 250 Hz*
  - *Adjustable blanking times, color levels, signal level, and aspect ratio*
- Exclusive "Process Generator"™ for entering interactive guided alignment and performance testing procedures
- Integrated Auto "ColorPro II"™ Color Analyzer to give you the confidence every monitor you service is operating to the manufacturer's standards
- Complete analyzing system:
  - *Data storage disc for saving and loading formats, alignments, and testing procedures*
  - *Keyboard interface for easy entering of alignments and procedures*
  - *DDC1 and DDC2B compatible for display data channel testing*
  - *Expandable for future accessories to enhance your monitor troubleshooting capabilities*

RS232 Compatible

The CM2250 250 MHz Computer Monitor Analyzer stores setup information by monitor manufacturer and model number so you can quickly recall all of a monitor's formats when troubleshooting or making alignments. The format editor feature lets you quickly set up scan frequencies, pixels, blanking times, and other format parameters. You can store over 2,000 monitor formats in the CM2250.

The CM2250 eliminates the need for a standalone color analyzer and signal generator. The CM2250 Computer Monitor Analyzer delivers high resolution RGB video signals as well as precise color analyzing capabilities. Now, you can align a computer monitor's white balance without having to reach for another instrument. The CM2250 provides everything you need in an integrated unit.

The exclusive "Process Generator" in the CM2250 Computer Monitor Analyzer greatly simplifies the monitor alignment procedure. The process generator lets you enter alignment procedures in the CM2250. You set up the monitor format and video pattern for each step of the procedure and enter alignment instructions. When the service engineer runs a process, the CM2250 automatically sets itself up with the correct format and video pattern for the servicer to complete the alignment step. The "Process Generator" saves time and eliminates alignment errors.

CM2250 Computer Monitor Analyzer Specifications

Video	ANALOG: VIDEO BANDWIDTH: 250 MHz VIDEO LEVEL: programmable 0.35 VPP to 1.5 VPP DC OFFSET: programmable ≈1.0 V to +1.25 V RISE TIME: less than 2.0 nS COLORS: 16 million color palette DIGITAL: Video Bandwidth: 80 MHz
Horizontal	SYNC RANGE: 10.000 kHz to 250.000 kHz PIXEL RANGE: 80 to 2048 pixels active video SYNC LEVEL: TTL POLARITY: (+) or (-) PIXEL RESOLUTION: 1 pixel SYNC RESOLUTION: 1 pixel to 125 MHz and 2 pixels 125 to 250 MHz
Vertical	SYNC RANGE: 10.00 Hz to 250.00 Hz PIXEL RANGE: 80 to 2048 pixels active video SYNC LEVEL: TTL POLARITY: (+) or (-) SYNC RESOLUTION: 1 horizontal line
Composite Sync	LEVEL: TTL
Sync On Video	LEVEL: programmable 0.1 VPP to 0.5 VPP
Color Analysis	SCREEN REFRESH: 30 to 120 Hz Y ACCURACY: ±4 %, ±1 digit xy: ±0.002 LUMINANCE RANGE: 0.5 to 150 fL Y REPEATABILITY: 0.3 % ±1 digit xy REPEATABILITY: ±1 %, ±1 digit
Display Data Channel	DDC1 DDC2B
Audio	1 kHz tone 500 mV into 10 k Ω load
General	OUTPUT PROTECTION (sync and video): ±250 VDC, 250V Peak AC GUARANTEED OPERATING TEMPERATURE: 15° to 35° C SIZE: 6" x 11.5" x 15" (15.2 x 29.1 x 38.1 cm) HWD WEIGHT: 20 lbs (9.07 kg) POWER: 100 to 240 VAC, 47 to 63 Hz

All specifications subject to change without notice.

CM2250 Accessory List

Supplied Accessories	39B443 EVC to 15 pin HD Extension Cable
Optional Accessories *(For complete connector descriptions, refer to page 17.)*	39B273 Universal Connector 39B274 VGA 39B280 EGA 39B281 PGC 39B300 BNC 39G346 ECL Adapter 39B441 EVC to 13W3 Extension Cable 39B492 Male Apple-Mac 39B493 Female Apple-Mac 39B555 EVC to 15 pin KB283 Keyboard PC263 Protective Cover

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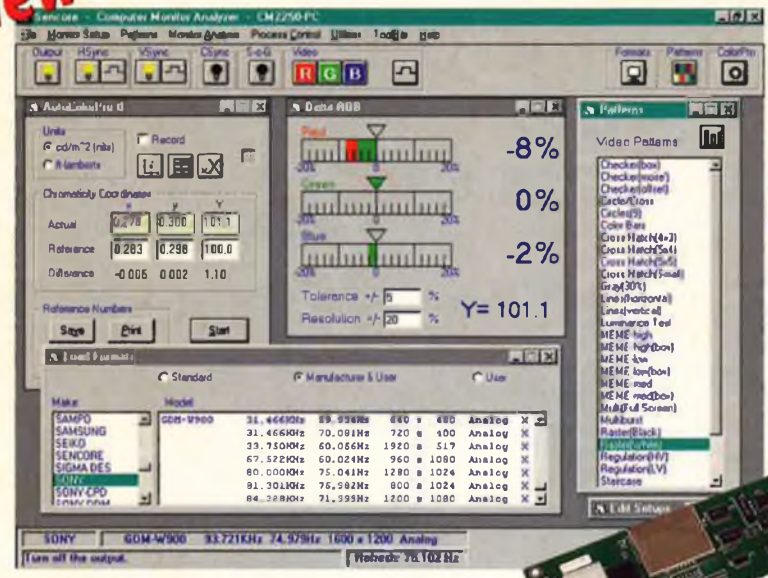
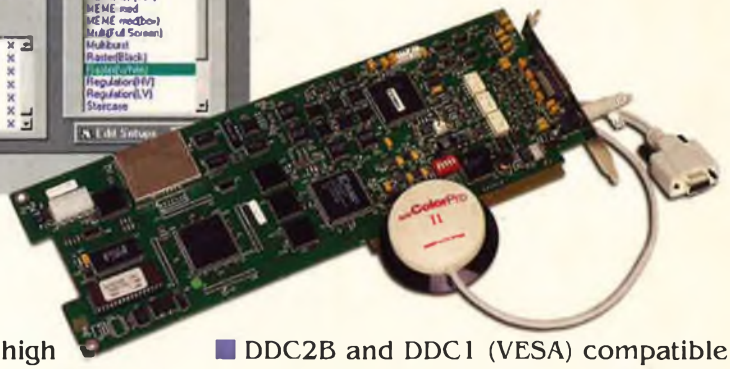
New! CM2250-PC "Pro" Computer Monitor Analyzer*



The Only Multi-Featured "Plug & Play" Video Signal Generator For Testing And Aligning High-End Displays (Up To 250 MHz), With Complete Color Analysis At A Fraction Of The Cost!



- A fully programmable RGB high bandwidth video generator
- Easy to use Windows® GUI, compatible with Plug-n-Play® for simplified setup and easy testing
- NTSC, PAL, Analog, TTL, and ECL video outputs (ECL requires optional adapter)
- Superior output protection
- Exclusive "Process Generator"™ for entering interactive alignment and performance testing procedures
- DDC2B and DDC1 (VESA) compatible for testing the display data channel
- DPMS (VESA) automated testing
- Includes Auto "ColorPro II"™ Color Analyzer for fast, accurate chromaticity measurements over a wide range of luminance on all CRTs, including television and color monitors
- A complete set of video test patterns to help identify monitor defects

The CM2250-PC "Pro" has simplified the setup for troubleshooting monitors. Now all you do is select the make and model of the monitor, and the CM2250-PC "Pro" automatically configures to its setup. We have integrated the ability to access setups through a convenient charting system. Or, you simply scroll through the monitors and press enter – there's no need to refer to service literature and spend valuable time entering parameters, we've done that for you.

The CM2250-PC "Pro" integrates an exclusive "Process Generator" that does all the above and more. Now you'll be able to use one system (CM2250-PC "Pro") to control the testing and alignment process in your business. The CM2250-PC "Pro" will automatically change the video patterns, signal parameters, wait for you to make a test or adjustment, and then take you through the next step. Simple, fast, and accurate!

As you can tell, the CM2250-PC "Pro" offers a complete listing of features including color output analysis with the CP288 Auto "ColorPro II" for servicing security and growth for years to come. These features are unmatched by other generators on the market – from the ease-of-use to the flexibility of operation. Plus, the CM2250-PC "Pro" is the only system that provides complete video generation (to 250 MHz) for complete monitor color analysis at one price that's less than single feature instruments.

CM2250–PC "Pro" Computer Monitor Analyzer Specifications

Video	VIDEO BANDWIDTH: 250 MHz RISE TIME: Less than 2.0 nS
Horizontal	SYNC RANGE: 10.000 kHz to 250.000 kHz PIXEL RANGE: 80 to 2048 pixels active video PIXEL RESOLUTION: 1 pixel SYNC RESOLUTION: 1 pixel to 110 MHz and 2 pixels 110 to 250 MHz
Vertical	SYNC RANGE: 10.00 Hz to 250.00 Hz PIXEL RANGE: 80 to 2048 pixels active video SYNC RESOLUTION: 1 horizontal line
General	OUTPUT PROTECTION (sync and video): ± 250 VDC or 250 Peak ACV 16 bit ISA compatible

CP288 Auto "ColorPro II" Specifications (see page 12)

All specifications subject to change without notice.

*** CM2250-PC "Pro" is available as a stand-alone instrument without the CP288 Auto "ColorPro II." Model # CM2250-PC**

CM2250-PC "Pro" Accessory List

Supplied Accessories	39B443 EVC to 15 pin HD Extension Cable
Optional Accessories *(For complete connector descriptions, refer to page 17.)*	39B273 Universal Connector 39B274 VGA 39B280 EGA 39B281 PGC 39B300 Connector #6 39B441 EVC to 13W3 Extension Cable 39B492 Male Apple-Mac 39B493 Female Apple-Mac 39B555 EVC to 15 pin 39G346 ECL Adapter KB283 Keyboard PC263 Protective Cover

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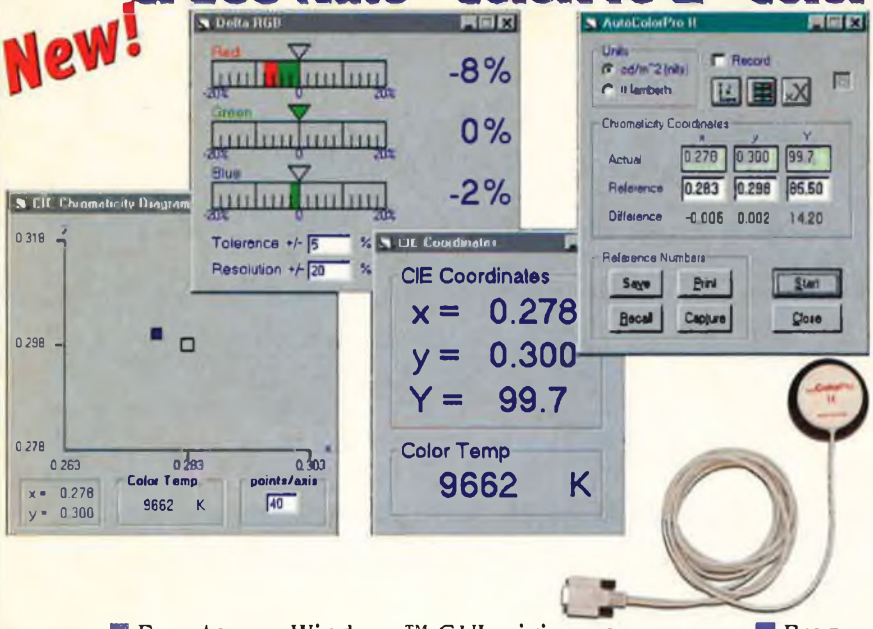
CP288 Auto "ColorPro II" Color Analyzer

New!



The Only PC-Based Color Analyzer To Give You Fast, Accurate Chromaticity & Luminance Measurements On All CRTs, For A Lot Less Green Than You Would Expect!

- Easy-to-use Windows™ GUI, giving you four options for displaying your measured data, a CIE Chromaticity Diagram, large CIE coordinates, RGB Levels, and the Auto "ColorPro II" control window
- Sync-locked measurements - automatically reads and displays the refresh rate of the display under test
- Industry standard measurement units and display modes – readings are displayed in Yxy, RGB, and color temperature in degrees Kelvin. Luminance units are selectable between foot-lamberts and cd/m² (nits)
- Programmable reference data – references may be entered and stored by the user, and is limited only by the amount of memory available on the host system
- Accuracy that only an engineer would require – the CP288 has the specs necessary to do a complete white-balance alignment, so you can be sure you match display manufacturer specifications
- Tracking data is made easy – print your analysis data straight from the measurement screen. The printed form will contain the manufacturer's name, model number, serial number, measured data, and comments

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CP288 Auto "ColorPro II" Specifications

Display Modes	xyY, ΔRGB, correlated temperature in Kelvins
Luminance Range	.05 to 150 fL; luminance units are selectable within the user interface for either foot lamberts or cd/m² (nits)
Accuracy	Y: ±4% ±1 digit, xy: ±0.002
Repeatability	Y: ±0.3% ±1 digit, xy: ±1.0% ±1 digit
Screen Refresh	30 to 120 Hz
Measurement Rate	(Vertical field rate)/12
Stored References	9300 Kelvin, references may be entered and stored by the user, and is limited only by the amount of memory available on the host system

All specifications subject to change without notice.

New! CP290 "ColorPro" Hand-Held Color Analyzer

The Only Portable Color Analyzer That Allows You To Confidently Measure White Balance On All CRTs Offering The Specifications And Features Necessary To Make It "The Complete Solution!"

- Compact (hand-held) portable white balance testing and alignment wherever the display is located
- Simple to use, menu-driven features with total control at your fingertips
- Fast, accurate chromaticity measurements over a wide range of luminance on all CRTs, including color monitors and television
- Industry standard measurement units and display modes
- Sync-locked measurements, no external sync needed
- Bright, easy-to-read LED screen helps reduce strain on your eyes
- No-drift color probe with calibration traceable to NIST standards
- Pre-loaded with the most common CIE Chromaticity references
- Long-use rechargeable batteries will give hours of testing when AC is not available (AC adapter/recharger included with every unit)
- Built-in user-selectable energy saver to conserve battery power
- High dollar performance at an affordable price

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CP290 "ColorPro" Specifications

Display Modes	Yxy, Yu'v', XYZ, ΔRGB, correlated color temperature in Kelvins
Luminance Range	.05 to 150 fL; luminance units are selectable on the front panel for either foot lamberts or cd/m² (nits).
Accuracy	Y: ±4% ±1 digit xy: ±0.002
Repeatability	Y: ±0.3% ±1 digit xy: ±1.0% ±1 digit
Screen Refresh	30 to 120 Hz
Measurement Rate	(vertical field rate)/12
Stored References	9300 K, D50, D65, D75, and custom for ΔRGB measurement modes
Battery Life (per charge)	Approximately 4 hours of usage per charge

All specifications subject to change without notice.

HA2500 Universal Horizontal Analyzer

Patented

New!

Now Everything You Need To Localize Horizontal And B+ Supply Defects In Computer Monitors In Less Time And More Profitably Than Ever Before!

- Unique frequency lock and variable horizontal frequency allows you to quickly service all horizontal circuits no matter the frequency
- Exclusive "Horizontal Output Load Test" makes setup and testing a snap – even without applying AC power for more accurate estimates, fewer damaged replacement parts, and faster diagnosis and repair
- Patented "ringer" proves the condition of flybacks and yokes in seconds – even a single shorted turn
- Exclusive "Dynamic Tests" help you analyze the horizontal circuit in powered-up conditions to catch even subtle defects in the power supply, noise, and drive signal
- Variable current limited & protected B+ substitute power supply permits testing of horizontal stages even when the power supply is dead
- Portable and field rugged to go on location when bringing the defective product to your bench isn't feasible

Sencore's HA2500 Universal Horizontal Analyzer is the one instrument designed specifically for analyzing all horizontal and B+ related defects. The HA2500 teams up with any of the Sencore computer monitor generators (or use it stand-alone) to give you complete monitor analyzing. Its patented and exclusive features give the HA2500 the capabilities to help you service computer monitors faster and more profitably than ever before.

The HA2500 provides exclusive analyzing tests and substitution capabilities to localize horizontal circuit defects faster than using conventional methods. The "chassis off" test determines if the horizontal stage is free of severe defects or if problems exist. The patented "ringer" test dynamically tests coils and transformers for one or more shorted turns – a common failure of flybacks. The exclusive Dynamic Tests analyze the input and output voltage parameters of the horizontal output stage with the chassis powered on without worry of test instrument or lead damage. The Horizontal Driver test and Sub Drive give you the rest of the capabilities you need for pinpointing all horizontal difficulties in any computer monitor.

HA2500 Universal Horizontal Analyzer Specifications

Horizontal Frequency Generator	FUNCTION: Squarewave generator for Load Tests and Sub Drive functions. FREQUENCY RANGE: <15 kHz to >125 kHz
External Sync Input	INPUT SIGNALS: Horizontal Sync, Composite Sync, Composite Analog Video (± Polarity). FREQUENCY RANGE: 15 kHz - 125 kHz. SENSITIVITY: Composite Analog Video > .5 VPP Horiz. or Composite Sync > 2 VPP
Horizontal Output Load Test B+ Power Supply	VOLTAGE RANGE: 0 - 18 VDC ± 0.5 volts. CURRENT LIMIT: 250 mA ± 10%
Horizontal Output Load Test Setup	EXCITATION DRIVE: Squarewave 50% duty cycle ± 2%. B+ VOLT RANGE: 0 - 19.9 volts. VPP RANGE: autoranged 0 - 400 VPP
Horizontal Output Load Tests	B+ mA RANGE: 0-250 mA. TIME µS RANGE: 0.1 µS - 50 µS. TIME µS TRIGGER LEVEL: 5% ± 1% of pos. pulses with VPP > 10 VPP
Ringer Test	FUNCTION: Approximate coil "Q" determined by exciting the coil and counting ringing cycles to a damped level.
Dynamic Tests (COLLECTOR OR DRAIN METER)	VDC RANGE: Autoranged, 0-400 volts. VPP RANGE: Autoranged, 0 VPP to 1500 VPP. TIME µS RANGE: 0 - 50 µS. TIME µS TRIGGER LEVEL: 5% ± 1% of pulse VPP >20 VPP
Dynamic Tests (BASE OR GATE METER)	VPP RANGE: 0 VPP to 50 VPP
Dynamic Tests (HORIZONTAL DRIVER TEST)	FUNCTION: Measures the horizontal driver stage output current capability by simulating a low impedance base/emitter transistor junction. BASE mA RANGE: 0 - 2000 mA
Dynamic Tests (SUB DRIVE)	FUNCTION: Substitute drive optimized to properly drive the base or gate of any horizontal output transistor. BASE SUB OUTPUT: Squarewave 50%, -2/+6% duty cycle GATE SUB OUTPUT: Squarewave, 50% duty cycle ±2%
Substitute B+ Supply	VOLTAGE RANGE: < 30 volts to > 180 volts. POWER OUPUT: 2 amps ± 10% to 40 volts, 80 watts ± 10% over 40 volts. POWER LIMIT RANGE: < 3 watt (min.) to > 80 watt
General	FLOATING GROUND ISOLATION: 600 volts (DC + peak AC) from "-" terminal to chassis ground with < 500 µA. DIGITAL DISPLAY: Vacuum fluorescent matrix, 40 x 2 AC POWER: 105 to 125 VAC 50/60 Hz. May be factory converted to 220 VAC. SIZE: 6" X 11.5" X 15.5" (15.2 X 29.1 X 39.3 cm) HWD. WEIGHT: 14 lbs. (6.4 kg.)

All specifications subject to change without notice.

HA2500 Accessory List

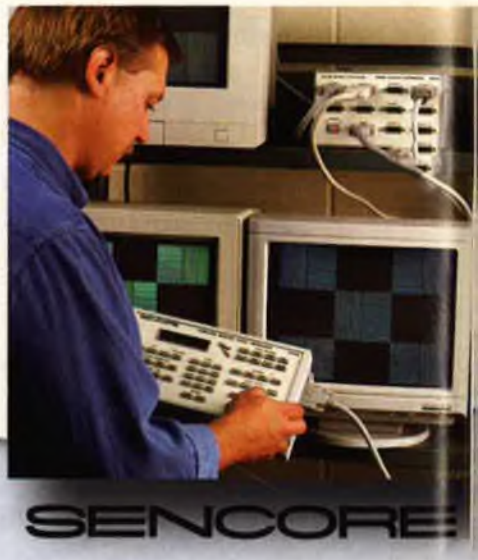
Supplied Accessories	39G469	Dynamic Test Lead
	39G470	Load & Ringer Test Lead
	39G481	B+ Supply Lead
Optional Accessories	39B296A	Video Test Cable
	39G348	Drive Sync Cable
	39G494	Dynamic DVM Test Lead
	39G508	Composite Sync Cable
	HP200	50 kV High Voltage Probe
	TP212	10 kV Transient Protector Probe
	PC263	Protective Cover

SENCORE

EX220 Video Output Expander

Now You Can Operate Up To 10 Monitors With One Signal Source – Great For Burn-in Racks To Reduce Call-Backs!

- Drive multiple monitors from a single RGB video source for after repair burn-in
- 90 MHz video bandwidth produces sharp pictures on high resolution computer monitors
- Separately buffered outputs keep bandwidth and levels constant plus provide protection from computer monitors that fail during burn-in



Drive multiple monitors with a single RGB source using the EX220 Video Output Expander. The multiple RGB outputs are great for after repair burn-in and overnight testing. Use the EX220 with your Sencore Computer Monitor Analyzer or other RGB sources. The 90 MHz video bandwidth gives the capability you need to accurately test multiple monitors simultaneously.

The EX220's individually buffered outputs keep bandwidths and levels constant so each signal is independent of the other. This provides extra protection from computer monitors that fail during burn-in. And each sync and video output is individually buffered for signal integrity and output protection to prevent downtime.

EX220 Specifications

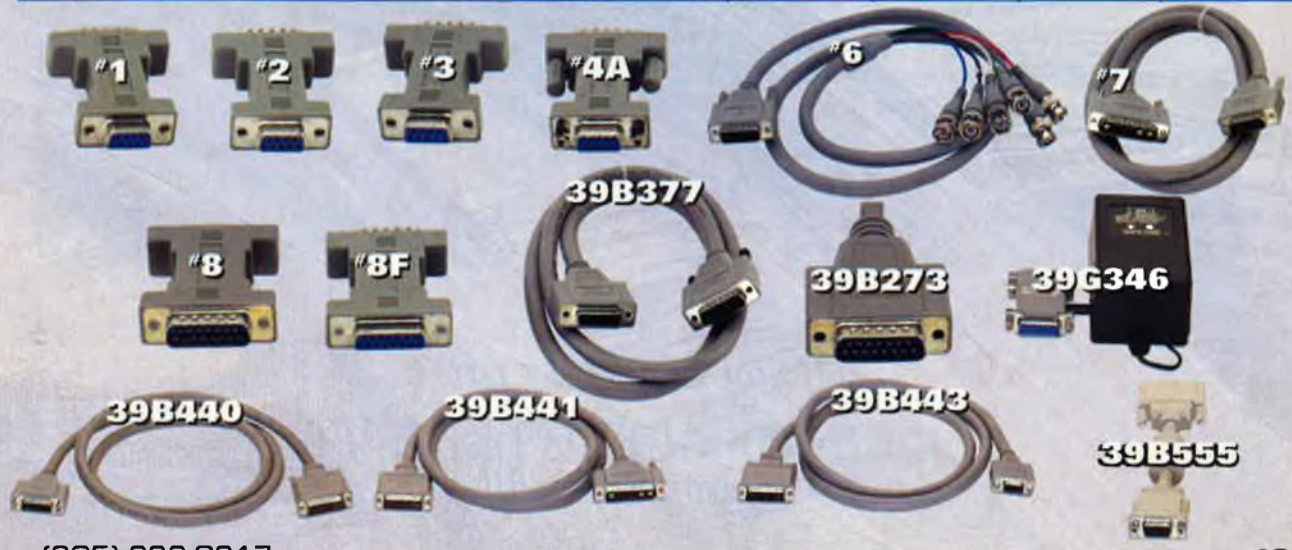
Input	15 pin D-sub
Output	Ten 15 pin D-subs. Individually buffered for signal integrity and output protection. Short-circuit protected outputs. Video Bandwidth: 90 MHz
General	Size: 4.97" X 8.05" X 6.45" (HWD). Weight: 4 lbs. Power Requirements: 105-125 VAC, 50-60 Hz, 30 Watts

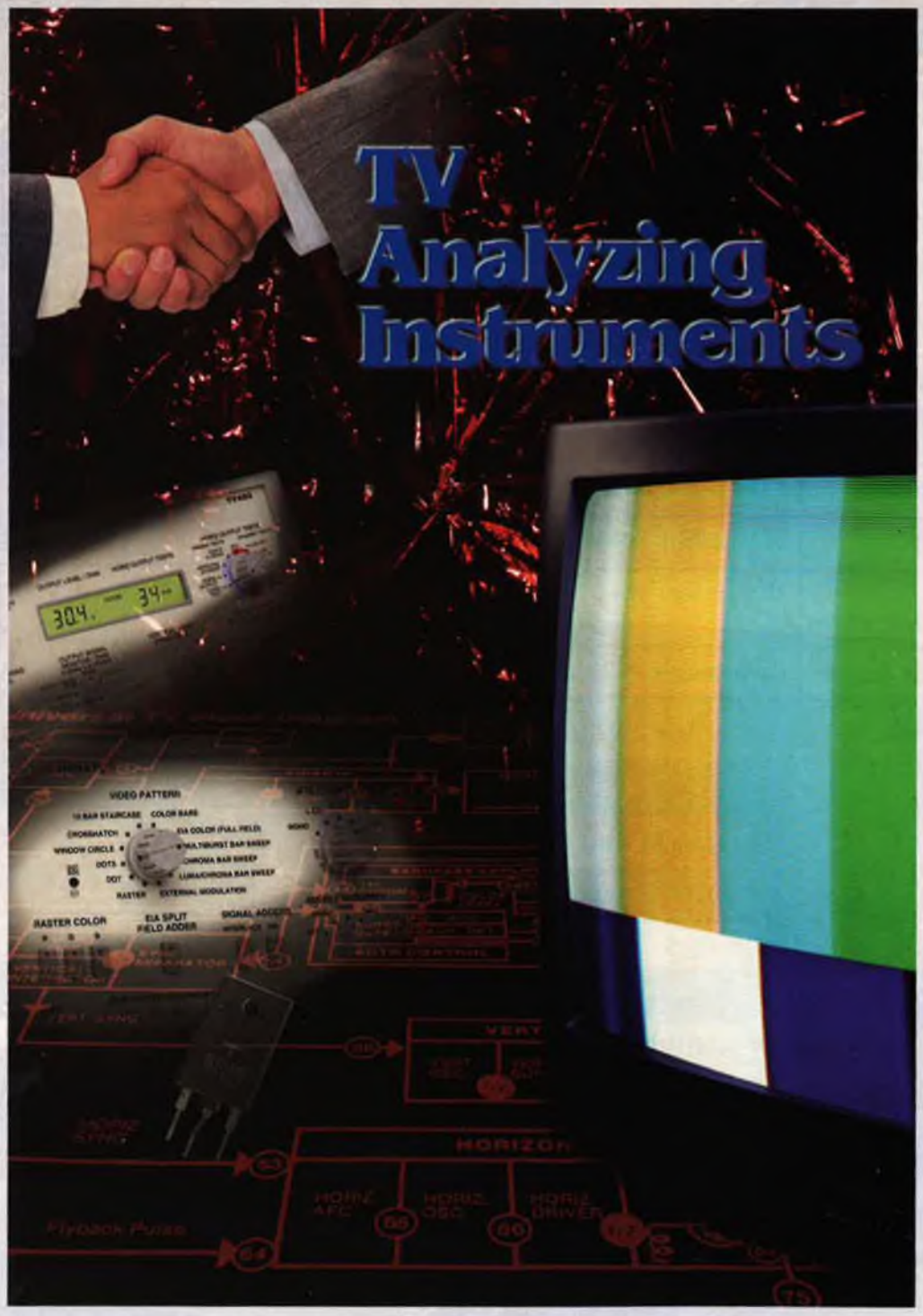
All specifications subject to change without notice.

Connectors Available For Sencore's Computer Monitor Analyzer/Generators					
Connector #	**Where Used**	**CM125**	**CM2125**	**CM2250**	**CM2250-PC/ CM2250-PC "Pro"**
#1 (39B275)	15 pin to CGA	✔	✔	✔	✔
#2 (39B280)	15 pin to EGA	✔	✔	✔	✔
#3 (39B281)	15 pin to PGC	✔	✔	✔	✔
#4A (39B274)	15 pin to VGA, PS/2, SVGA, and XGA	✔	✔	✔	✔
#6 (39B300)	15 pin to male BNC	✔	✔	✔	✔
#7 (39B416)	15 pin to 13W3 Extension Cable	✔	✔	✔	✔
#8 (39B492)	15 pin to BNC (male) Apple-Mac	✔	✔	✔	✔
#8F (39B493)	15 pin to BNC (female) Apple-Mac	✔	✔	✔	✔
39B377	DB15 to DB15 Extension Cable	✔	✔	✔	✔
39B273 Universal Connector	15 pin to bare wire	✔	✔	✔	✔
39G346 ECL Adapter	Converts digital (TTL) to ECL		✔	✔	✔

Above connectors require use of 39B440 or 39B560 when used with either the CM2250 or CM2250-PC

Non-CE Approved EVC Connectors					
38B440	EVC - 15 pin 48" Extension Cable			✔	✔
39B441	EVC to 13W3 Extension Cable			✔	✔
39B443	EVC to HD15			✔	✔
CE Approved EVC Connectors					
39B555	EVC to HD15 (9 inch)			✔	✔
39B560	EVC to DB15 (9 inch)			✔	✔
39B561	EVC to 13W3 (9 inch)			✔	✔
39B562	EVC to BNC female (9 inch)			✔	✔





Service

If you don't take care
of the customer...
someone else will.

Can you remember any sets this past week that you sent back unrepaired? If you're like most servicers, you've had at least one or two sets that the customer decided to take home unrepaired.

After the customer walked out the door with the unrepaired set in hand, did you second-guess yourself or feel like you had lost a potential profit? You may be losing profits you weren't even aware of if the following examples sound familiar:

1. Are you able to provide your customer with an estimate that you can confidently stick with?
2. When you're unsure of the true defect of a repair, do you estimate high to protect your shop from embarrassment or loss of profits?

When a customer receives an estimate for what he thinks is too much money, he'll often reply, "I'll just buy a new one!" Then, most likely he'll take the set to another shop and have it repaired for possibly less.

That particular set may have turned out to be profitable for you, but you didn't know. So the bottom line is: WILL THIS REPAIR BE PROFITABLE? That's a decision you'll have to make in a minimal amount of time.

To make that prompt and wise decision, you need techniques and the instruments to back you up. Sencore understands your problems. That's why we offer you the methods and the instruments to help you make that estimate as soon and as accurate as possible. There are three key techniques you can use every day for estimating service repairs. A good, quality estimate is the key to keeping those profits inside your service center.

In this "TV Analyzing Instruments" product section, you will see the following exclusive Sencore test instruments:

VG91 Universal Video Generator
TVA92 TV Video Analyzer

SENCORE

TV Analyzing Instruments

VG91 Universal Video Generator

Patented

A Complete All Channel RF/IF/MTS Universal Video Generator Designed To Performance Test And Isolate Defects In Any NTSC Video System!

- All channel TV-RF generator for complete tuner analyzing
- Variable level 45.75 MHz video-IF troubleshooting and alignment generator
- Proof-positive tests for MTS Stereo/SAP on all channels.
- Exclusive and dynamic NTSC video test signals
- Standard Y/C, composite video, and audio line outputs
- Spare video output and exclusive interconnect design that permits future updates or expansion
- Portable and easy-to-use

RS232 Compatible

The VG91 Universal Video Generator is an all-channel, TV-RF generator that simulates any off-air or cable channel to completely analyze all NTSC tuners. Variable level RF and IF signals allow you to prove the operation of tuner and IF circuits in seconds. The exclusive and dynamic video patterns provide you with the information you need to analyze the operation and performance of video equipment. You get these patterns:

- Raster
- Dot
- Window Circle
- Color Bars
- Chroma Bar Sweep
- Luma/Chroma Bar Sweep
- Crosshatch
- Dots
- 10 Bar Staircase
- EIA Color Pattern
- Multiburst Bar Sweep

The MTS audio generator of the VG91 provides both standard audio and MTS stereo signals for testing and troubleshooting both mono and MTS receivers. You also get standard Y/C, composite video, and line level audio found on consumer and most professional equipment. With the spare video output and exclusive interconnect design, the VG91 lets you add to your service bench as your needs grow.*

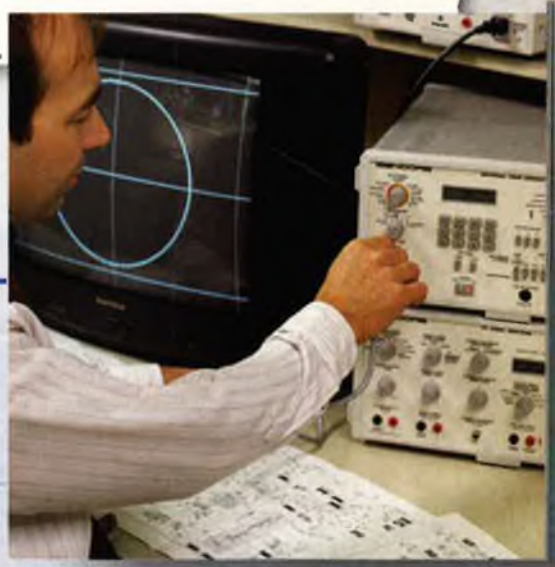
** Tech Choice compatible instruments:*

- TVA92 TV Video Analyzer
- VC93 All Format VCR Analyzer

VG91 Universal Video Generator Specifications

TV-RF Generator	STD TV 2-69, STD CABLE 2-125, HRC CABLE 1-125, ICC CABLE 1-125. RF CARRIER FREQUENCY ACCURACY: ± 50 kHz. AURAL CARRIER: Visual carrier + 4.5 MHz, ± 1 kHz. AUDIO MODULATING FREQUENCIES: 300 Hz, 1 kHz, 3 kHz, 5 kHz. RF AURAL STEREO SEPARATION: > 25 dB Typically > 30 dB
Video IF Generator	VIDEO IF FREQUENCY: Video: 45.75 MHz ±10 kHz; Aural: 41.25 MHz. IF TRAP SIGNALS: 47.25 MHz, 41.25 MHz, or 39.75 MHz ±10 kHz selectable. 4.5 MHz SOUND IF: 4.5 MHz ± 1 kHz
RF-IF Output	RF-IF LEVEL STEP ATTENUATOR: RF Output = LO: 5-50 µV, MED: 50-500 µV, HI: 500- 5,000 µV. RF-IF LEVEL VERNIER ACCURACY: RF "NORM" 1000 µV; ±3 dB HI range. RF-IF OUTPUT IMPEDANCE: 75Ω ± 10%
Video Pattern Generator	PATTERNS: Raster, Dot, Dots, Window Circle, Crosshatch, 10 Bar Staircase, Color Bars, EIA Color Full Field (Split Field Added), Multiburst Bar Sweep, Chroma Bar Sweep, Luma/Chroma Bar Sweep. External Modulation. INPUT: BNC jack, 1 VPP (negative sync) 75Ω impedance
Multichannel TV Sound Signal	AUDIO MODES: Mono, L only, R only, L+R, SAP. MODULATING FREQUENCIES: 300 Hz, 1 kHz, 3 kHz, & 5 kHz, ± 2 Hz. STEREO PILOT FREQUENCY: 15,734 Hz ± 2 Hz, locked to horizontal sync. STEREO PILOT LEVEL: Variable 0-100%; 100% = 5 kHz deviation. STEREO SUBCARRIER FREQUENCY: 31,468 Hz ±4 Hz, phase locked to pilot. SAP CARRIER FREQUENCY: 78,670 ± 10 Hz, phase locked to Pilot
STD Y/C Output	LEVEL: 1 VPP (Y) luminance ±10% into 75Ω; .63 VPP (C) chroma ±10% into 75Ω. LUMA & CHROMA SOURCE: Selected by VIDEO PATTERN switch. FREQUENCY RESPONSE: (Y) Flat Multiburst Bars to 4.5 MHz, ±10%
STD Video Output	STD VIDEO LEVEL: 1 VPP into 75Ω, negative sync. FREQUENCY RESPONSE: Multiburst flat to 4.5 MHz, ±10%
STD Audio Output	AUDIO SIGNAL: Selected by AUDIO FREQUENCY control. LEVEL: 400 mV ±150 mV into 10 kΩ
General	POWER: 105-125 VAC, 60 Hz, 42 Watts. SIZE: 7" X 14" X 16.7" (17.9 X 35.8 X 42.5 cm) HWD. WEIGHT: 18.2 lbs

All specifications subject to change without notice.



VG91 Accessory List

Supplied Accessories	39A161A	F to RCA Female Adapter Cable
	39A162A	F to RCA Male Adapter Cable
	39A302	RF-IF Troubleshooting Balun
	39B241A	Audio Test Cable
	39B270	S-Video Y/C Cable
	39B296	Video Test Cable
	39G301	RF-IF Test Cable
Optional Accessories	39G72	RF-IF Matching Balun
	39G232	BNC Cable
	39G266	Synchronizing Interconnect Cable
	IB78	RS232 Interface Accessory
	PC259	Front Panel Protection Cover

SENCORE

TVA92 TV Video Analyzer

Patented

Now You Can Isolate TV Defects, Troubleshoot Startup/Shutdown Problems, Test Expensive TV Components, Plus Accurately Estimate TV Repair Costs In Minutes!

- Exclusive "TV OFF" horizontal output load test
- Dynamic tests through a simple 3 lead hook-up to the horizontal output transistor
- Horizontal output transistor sub and drive
- Universal substitute TV signals
- Patented Ringer Test to quickly pinpoint shorted turns in flybacks, IHVTs, yokes, and switching transformers
- An exclusive yoke drive signal
- DC biasing supply
- Built-in monitor for all sub-signal results and making DCV and PPV measurements

** The TVA92 is a companion unit to the VG91 Universal Video Generator on page 20.*

Now you can troubleshoot problems in a TV's horizontal output stage – without turning on the TV. The TVA92's "TV OFF" Horizontal Output Load Test detects high current loading or short conditions on the TV's main B+ power supply. Once the TV is running, the dynamic "TV ON" Horizontal Output Tests analyze the four important parameters of the horizontal output stage: 1) B+ supply voltage, 2) flyback pulse PPV, 3) flyback pulse time, and 4) presence of input drive signal. This exclusive test is a great tool for accurate estimates and saves on parts damage.

The TVA92 also substitutes directly for the horizontal output transistor. The internal subbing transistor lets you power up the TV chassis so you can operate the high voltage circuits at full potential. This helps to guard against further defects which could bite you in the pocketbook later. You also get all the universal TV substitute signals you need plus the patented ringing test and exclusive yoke drive signal to dynamically test expensive IHVTs, flybacks, and yokes. The PPV/DCV meter and the 30 volt biasing supply complete the most comprehensive TV/video analyzing instrument on the market.

TVA92 TV Video Analyzer Specifications

Audio & Video Drives	SIGNALS: Audio, MTS Composite Audio, Video Chroma, V&H Sync, Vert Sync, Vert Drive, Horiz Drive, Horiz Key Pulse. OUTPUT: 0-300V in 3 ranges, IMPEDANCE: <50 ohms.
Simultaneous Drive Signals	SIGNALS AVAILABLE: V&H Blanking (Sandcastle) & 3.58 MHz color oscillator. OUTPUT: 0-30V, IMPEDANCE: <50 ohms.
Vertical Yoke Drive	LINEAR CURRENT OUTPUT: 0-1.5 Amp peak. EXTERNAL VOLTS PROTECTION: ±500 Volts (DC + Peak AC).
Horizontal Output Load Test	FUNCTION: Tests the horizontal output/flyback circuit by applying 15V B+ source, exciting drive to the flyback primary, and metering the B+ current and flyback pulse time. VOLTAGE APPLIED: 15 VDC ±.5 volts, current limited to 250 mA. PROTECTION: Diode and fuse protected.
Ringing Test	FUNCTION: Approximate tests of coil "Q" determined by applying an exciting pulse and counting the ringing cycles before reaching a preset damping level. ACCURACY: ±1 count on readings between 8 and 13 rings. EXCITING PULSE: 5 VPP, 60 Hz.
Horizontal Output Dynamic Measurements	All tests are done with a simple 3 lead hook-up to H.O.T. DCV RANGE: 0 to +199V. RESOLUTION: 0.1 volts 0 to 99.9V; 1 volt 100 to 199V. PULSE PPV RANGE: Autoranged, 0-1500 VPP. PULSE PPV ACCURACY: < 2%, ±2 counts at 1 kHz. PULSE TIME RANGE: 0-50.0 µS. PULSE TIME ACCURACY: 1%, ±2 counts. INPUT DRIVE FUNCTION: Monitors base lead to horizontal output and indicates if drive is present. INPUT DRIVE RESPONSE TIME: Immediate display updates with status change. INPUT DRIVE PROTECTION: 2,000V (DC + Peak AC) across inputs; 1500V (DC + Peak AC) from "–" terminal to ground.
Horizontal Output Device Sub & Drive	FUNCTION: Substitutes for the horizontal output transistor by switching the collector terminal to ground at 15,734 Hz rate and completing the flyback primary and yoke current paths. Current source is the chassis B+ power supply. SUB CONTROL "OFF": Permits normal chassis operation. CURRENT RANGE: Variable, 0-1.5 amps. Controlled by conduction time of transistor.
DC Bias Supply	RANGE: 0-30 volts, ±1 volt, current limited to 1 amp. CURRENT SINK CAPABILITY: 250 mA from external voltage source.
Output Signal Monitor/DVM	DCV RANGES: Autoranged, 0-1999 volts. DCV ACCURACY: <.5%, ±2 counts. DC BIAS mA: Autoranged, 0-1000 mA < 1%, ± 2 counts. PPV RANGE & ACCURACY: Autoranged, 0-1999 VPP < 2%, ± 2 counts.
General	POWER: 105-125 VAC 60 Hz. Power switched with generator. SIZE: 7" x 14" x 16.7" HWD (17.9 x 35.8 x 42.5 cm). WEIGHT: Approximately 20 lbs.

All specifications subject to change without notice.

TVA92 Accessory List

Supplied Accessories	39G174	Direct Alligator Clip Test Lead
	39G175-R	DVM Test Leads
	39G234	Direct Miniature Test Leads
	39G266	Synchronizing Interconnect Cable
	39G298	Ringer/Load Test Leads
	39G299	Dynamic Test Leads
	39G305	3.58 MHz & Blanking Drive Leads
Optional Accessories	HP200	50 kV High Voltage Probe
	PC259	Front Panel Protection Cover
	TP212	10 kV Transient Protector Probe

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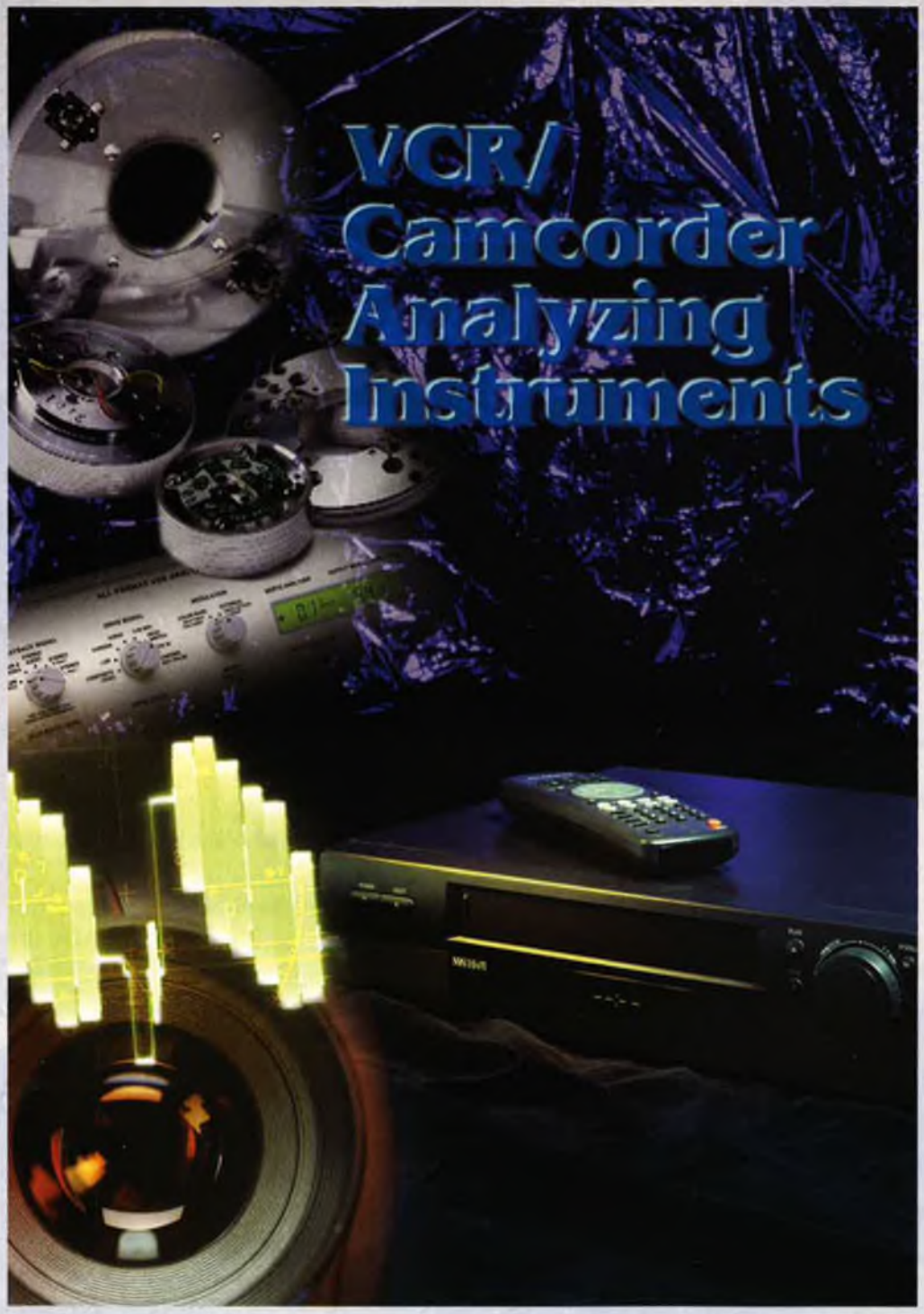

Technology

Technology is constantly changing our lives...
you must stay up-to-date or
you will quickly be left behind.

VCR servicing can be a very rewarding business, both personally and financially. The high number of machines sold each year, combined with the high failure rate of the mechanical and electrical stages, make VCRs a great service income generating product for most service centers. Yet, many service centers simply are not equipping the technicians with the tools they need to get the job done in the most cost-effective means possible.

Many VCRs have dropped drastically in price as compared to 10 years ago. And all too often, consumers are apt to purchase new equipment instead of paying the $100-$150 service invoice. Also, many consumers simply don't recognize the fact that a VCR costing $250 is much more complex than a $250 vacuum cleaner (for example), and repairing the VCR requires a skilled electronic technician.

The VCR technician must accurately pinpoint both mechanical and electrical defects, and do so quickly while providing the best customer service possible. Many of Sencore's customers are telling us that word-of-mouth advertising is the best source of business they have. Yet many don't continually pursue steps to help insure the best possible service. That's exactly why you cannot be without the only VCR analyzer on the market.

Every service center should have a VCR analyzer available for them to use. But, ultimately you must decide for yourself:

1. Are my estimates accurate? If a customer takes the VCR to another shop, will my estimate be overpriced?
2. Can I accurately verify the condition of expensive VCR components or do I swap components (shotgun) to find the defects?
3. Is my servicing streamlined and accurate for the highest efficiency?
4. Am I ready for all the formats of VCRs that my customers bring to me?
5. Am I adding all the profits to my service center that I possibly can?

In this "VCR/Camcorder Analyzing Instruments" product section, you will see the following exclusive Sencore test instruments:

VC93 All Format VCR Analyzer
CVA94 "Video Tracker"™ - NTSC Waveform Monitor/Vectorscope Analyzer
VR940 Video Reference

SENCORE

VCR/Camcorder Analyzing Instruments

VC93 All Format VCR Analyzer

Patented

Isolate Any Playback Or Record Problem In All VCRs, In Less Than Half The Time It Presently Takes.... Now And In The Future, Or Your Money Back!

- All-format VCR analyzer
- Dynamic VCR head signal substituter for all formats
- Exclusive Hi-Fi Stereo all-format head signal substituter
- Innovative VCR luminance, chroma, and audio analyzer
- Automatic servo analyzer (patented)
- Stand-alone analyzer or companion to the VG91 Universal Video Generator
- Complete all-format troubleshooting tool includes:
  - *Servo bias supply*
  - *Standard video & audio line outputs*
  - *Autoranging DCV and PPV meter*
  - *Output signal monitor*
- Obsolete-proof and expandable

RS232 Compatible

Now you'll have all the VCR signals you need in any format for your luminance, chroma, and Hi-Fi troubleshooting. The VC93's VCR head substitution signals give you dynamic proof if the heads are good or bad before you order the part. The substitute drive signals give you dynamic answers in any circuit – from the heads to the servos.

The VC93 catches servo defects with a patented good/bad test that pinpoints problems before you send the VCR out your door. You get these tests:

- Servo Locked Test
- Capstan Speed Test
- Capstan Jitter Test
- Drum Speed Test
- Drum Jitter Test

When used in conjunction with the Sencore VG91 or VA62A, you get extra test patterns and RF-IF testing capabilities. The built-in NTSC split-field test pattern makes the VC93 a standalone analyzer for added flexibility. With a DC servo bias, standard video/audio line outputs, and an autoranging DCV and PPV meter, the VC93 is your answer for every VCR problem that crosses your bench.

VC93 All Format VCR Analyzer Specifications

Formats	VHS, Super VHS, VHS-C, Super VHS-C, Beta, Super Beta, U-MATIC, U-MATIC SP, 8mm, Hi-8, plus update capability
Playback Signals	(For substituting before detectors) LUM (FM MOD): FM luminance-only portions of signals selected by VCR FORMAT switch. LUM AND CHROMA: FM luminance and chroma signals selected by VCR FORMAT switch. STEREO AUDIO: FM Stereo audio signals corresponding to VCR format selected by VCR FORMAT switch. STEREO R ONLY: Right channel only FM Stereo audio signals. STEREO L ONLY: Left channel only FM Stereo audio signals
Playback Output Level	Continuously variable to 5 VPP in three ranges
Chroma Lock	Phase-locks VC93 to the VCR to produce locked color. INPUT SIGNAL: SW30 from VCR. INPUT SIGNAL LEVEL REQUIRED: Greater than 1 VPP. CHROMA PHASE SELECT: 0 or 180 degrees. LOCK LIGHT: Lights when proper signal type and level received
Drive Signals	All drive signals phase-locked to modulation source selected by the MODULATION switch. SIGNALS AVAILABLE: Composite Video, Luminance, Chroma, Audio, 3.58 MHz, Headswitch, SW30, and Chroma Key Pulse
Drive Output Level	Continuously variable from -10 to +10 VPP. FREQUENCY RESPONSE: Flat out to 4.5 MHz
Modulation	INTERNAL: Split field color bar pattern. UPPER PORTION: 75% white, yellow, cyan, green, magenta, red, blue, and black. LOWER PORTION: 100% white, black. AUDIO TONE: 1 kHz sinewave. EXTERNAL: VG91 Video Analyzer through 15 pin Sencore interface cable
Servo Analyzer Tests	All servo tests results displayed as percentage indication to 0.01% resolution and GOOD/BAD indication. TESTS AVAILABLE: Servos Locked, Capstan Speed, Capstan Jitter, Drum Speed, Drum Jitter
Servo Sub Bias	Continuously variable from 0 to 10.0 VDC current limited to 1 amp. VOLTAGE RESOLUTION: 0.01 V
Standard Video Output	LEVEL: 1 VPP ± 10% into 75 ohms. IMPEDANCE: 75 ohm ± 10%
Standard Audio Output	LEVEL: 400 mVRMS ± 150 mV into 10 kohm load. OUTPUT IMPEDANCE: Less than 1 kohm
External Meter	DC VOLTMETER: Autoranging in three ranges – 0.001 to 199.9V. ACCURACY: 0.5% ± 2 digits. PEAK-TO-PEAK VOLTMETER: Autoranging in three ranges – 0.001 to 199.9V. ACCURACY: 1% ± 4 digits at 1 kHz. FREQUENCY RESPONSE: 0.001 to 19.99V – 15 Hz to 5 MHz ±1 dB; 20.0 to 199.9V – 30 Hz to 1 MHz ±1 dB
General	POWER: 105-130 VAC, 60 Hz. SIZE: 7" x 14" x 16.7" (17.9 x 35.8 x 42.5 cm) HWD. WEIGHT: 15 pounds (6.8 kg). DIGITAL METER: 3½ digit LCD readout for OUTPUT SIGNAL LEVEL/DVM plus 3 digit LCD readout for SERVO ANALYZER test

All specifications subject to change without notice.

VC93 Accessory List

Supplied Accessories	39G235	Servo Performance Test Lead
	39G236	Servo Troubleshooting Test Lead
	39G237	Chroma Lock Test Lead
	39G253	Head Substitution Test Lead
	39G264	Bias Supply/DVM Test Lead
	39G265	Direct Test Lead
	ST264	VHS Servo Performance Test Lead
Optional Accessories	39G266	Synchronizing Interconnect Cable
	IB78	RS232 Interface Accessory
	PC259	Protective Cover/Lead Storage
	ST265	Beta Servo Performance Test Tape
	ST266	VHS-C Servo Performance Test Tape
	ST267	U-Matic Servo Performance Test Tape
	PL207	RF Pick-up Loop

SENCORE

CVA94 "Video Tracker"™ – NTSC Waveform Monitor/Vectorscope Analyzer

Patented

Quickly And Accurately Analyze Camera Video Signals With Time-Saving Digital Measurements, Waveform And Vector Displays, And Exclusive Special Tests Designed For Fast Camera Servicing And Alignment!

- Digital waveform measurements for fast signal troubleshooting
- Digital vectorscope measurements for easy, error-free color checks
- Selectable video inputs compatible with both composite and high resolution Y/C camera outputs
- Special tests to positively identify and localize:
  - *Power adapter and power supply problems with exclusive "Hum" test*
  - *Poor picture quality with exclusive "Video Noise" test*
  - *Chroma circuit problems with exclusive "Chroma Noise" tests*
  - *Reference oscillator problems with exclusive "Burst Frequency" and "Frequency Error" tests*

RS232 Compatible

The CVA94 "Video Tracker"™ provides a complete vectorscope and waveform monitor, plus digital waveform measurements for fast signal troubleshooting. It's the only instrument designed specifically for camera analyzing, saving time, and building customer trust. You get these special tests to positively identify and localize camera problems:

- HUM test
- Video Noise test
- Chroma Noise test
- Frequency Error test
- Burst Frequency test

The selectable video inputs are compatible with both composite and high resolution Y/C camera outputs. And the integrated "Monitor Marker" allows you to see, directly on the picture, exactly what parts of the picture you are measuring. From the first time you use the "Video Tracker,"™ you'll positively identify and localize camcorder problems for fast service and alignment.

CVA94 "Video Tracker"™ Specifications

Video Input	COMPOSITE INPUT IMPEDANCE: 75 W, >40dB Return Loss, 50 kHz to 5 MHz. Y/C INPUT IMPEDANCE: Y; 75 W, >40dB Return Loss, 50 kHz to 5 MHz. INPUT PROTECTION: Max. externally applied voltage ±12 V (DC + Peak AC).
CRT Waveform Display	VERTICAL DEFLECTION FACTOR: 140 ± 2.1 IRE units at 1 VPP Cal with 1 VPP, 50 kHz input. FLAT FILTER RESPONSE: Within 2% from 25 Hz to 5 MHz, -3 dB at ±6 MHz. LUMA FILTER RESPONSE: 40 dB attenuation at Fsc. 50 kHz response within 1% of Flat. CHROMA FILTER RESPONSE: Lower -3 dB point; Fsc-1 MHz ± 300 kHz. Upper -3 dB point; Fsc+1 MHz ± 300 kHz. Fsc response within 1% of Flat. 60 Hz REJECTION: Hum Test; <2 dB. All other modes; >20 dB.
Horizontal	SWEEP LINEARITY: Within 5% TRIGGER SOURCE: Video signal input. TRIGGER MODE: TV trigger w/automatic level. TRIGGER POLARITY: Negative. Deflection Factor: With 756 mV ±11.3 mV of Fsc, deflects to outer vector circle. SUBCARRIER PULL-IN RANGE: Fsc ±200 Hz. PHASE ACCURACY: ±1.5° w/nominal burst. BURST POSITION RANGE: >360°. DIFFERENTIAL PHASE: ≤1%. DIFFERENTIAL GAIN: ≤1%.
Digital Measurements	WAVEFORM – DISPLAY UNITS: IRE, mV, V, %Burst. DISPLAY RANGE: 0-350 IRE, 0-999 mV, 1-2.5 V, 0-500% Burst. RESOLUTION: 1 IRE, 1 mV, 0.01 V, 1% Burst. ACCURACY: ±1%, ±2 counts at 50 kHz. Vector Phase – DISPLAY UNITS: Degrees. DISPLAY RANGE: 0-360° at 10-360 IRE of chroma. RESOLUTION: 0.1°. ACCURACY: ±1° w/nominal burst. Vector Amplitude – DISPLAY UNITS: %Burst (Referenced to nominal 40 IRE burst.) DISPLAY RANGE: 0-500% Burst. RESOLUTION: 1% Burst. ACCURACY: ± 2%, ±1 count. Special Tests: Hum – DISPLAY UNITS: %. DISPLAY RANGE: 0-10%. RESOLUTION: 0.1%. ACCURACY: ± 5 counts. Video S/N – DISPLAY UNITS: dB. DISPLAY RANGE: 30-56 dB. RESOLUTION: 1 dB. ACCURACY: Within 2 dB. Burst Freq – DISPLAY UNITS: MHz. DISPLAY RANGE: 3.579545 MHz ±200 Hz. RESOLUTION: 1 Hz. ACCURACY: ± 2 PPM ±1 Hz to ± 200 Hz. Burst Error – DISPLAY UNITS: ± Hz. DISPLAY RANGE: 0 ± 200 Hz. RESOLUTION: 1 Hz. ACCURACY: ± 2 PPM ±1 Hz to ±200 Hz. Saturation S/N – DISPLAY UNITS: dB. DISPLAY RANGE: 30-56 dB. RESOLUTION: 1 dB. ACCURACY: Within 2 dB. Hue S/N – DISPLAY UNITS: dB. DISPLAY RANGE: 30-56 dB. RESOLUTION: 1 dB. ACCURACY: Within 2 dB.
Video Output To Monitor	OUTPUT IMPEDANCE: 75 Ω. OUTPUT LEVEL: Within 10% of input level with 50 kHz sinewave. FREQUENCY RESPONSE: 50 kHz to 5 MHz, ±10%.
General	CRT DISPLAY GRATICULES: Etched, combination waveform and vector. BEAM SAVER™ TIMEOUT: CRT beam is blanked approx. 10 min after last control activation. SIZE: 7" x 14" x 16.7" (17.9 x 35.8 x 42.5 cm) HWD. WEIGHT: 17.4 lbs. (7.9 kg). POWER: 105 to 125 VAC, 50/60 Hz, 75 watts maximum.

All specifications subject to change without notice.

CVA94 "Video Tracker"™ Accessory List

Supplied Accessories	39B270 Video Test Cable Y/C 39G32 Trigger Test Cable 39G348 Video Test Cable BNC-RCA
Optional Accessories	PC259 Front Panel Protection Cover

For broadcast applications, see page 53 for the VSA794 CATV Video Signal Analyzer.

SENCORE

VR940 Video Reference Light Box

All The Accurate Reference Signals You Need For Dependable Camera Servicing In One Self-Contained Light Box!

- An industry standard source of indoor light allowing you to properly service and align all cameras
- A manufacturer specified source for reliable test results with uniform, and even illumination of all test patterns
- Self-contained 2,000 lux output meeting new camera test requirements
- A complete set of charts for both standard and special tests using the CVA94 "Video Tracker" Camera Video Analyzer
- Compact unit and built-in storage compartment to keep all charts at your fingertips and ready when you need them
- Portability for ease of movement on the bench or to storage

The VR940 Video Reference provides an affordable, high quality light source in a convenient package. The uniform 3200 Kelvin color temperature light output provides unvarying illumination of all the test charts without hot spots or dark spots to complicate camera testing or adjustment. It comes with a complete set of charts and filters needed to make tests and adjustments specified in camera service literature. These charts include:

Color Bar Chart
Tests for color phase and amplitude

Gray Scale Chart
Tests for luminance level and linearity, plus white balance

Temperature Conversion Filter
Converts indoor color temperature to outdoor

Video S/N Chart
Tests for composite video signal-to-noise

Red Chart
Tests for Chroma Saturation S/N and Chroma Hue S/N

Registration/Response Chart
Checks registration and frequency response

Blooming Test Chart
Checks for video smearing or blooming

Focus Chart
Checks for back and auto focus operation

Neutral Density Filter
Checks focus at lower light levels

VR940 Video Reference Specifications

Light Output		LIGHT TEMPERATURE: 3200, ±300° Kelvin. LIGHT INTENSITY: 2000, -100, +500 lux. LIGHT UNIFORMITY VERTICAL PLANE: < 100 lux variation. HORIZONTAL PLANE: < 65 lux variation
Charts Mechanical		OVERALL SIZE: 10" x 12" x approx. 3/16" thick. CHART WINDOW: 7" x 9⅓"
Color Bar Chart		DESCRIPTION: 7 equal width vertical bars; white, yellow, cyan, green, magenta, red, blue
Gray Scale Chart		DESCRIPTION: 11 equal width steps from 0% thru 100% white on top of pattern; repeated in reverse order on bottom of pattern; black, white, black in center of pattern; surround at level of center step. (2.2 gamma log corrected)
Video S/N Chart		DESCRIPTION: Left 1/7th of chart at 100% white. Remainder at 50% white (gamma corrected)
Red Chart		DESCRIPTION: Full screen red
Registration Response Chart		DESCRIPTION: Combination of cross-hatch, circles, and frequency response wedges
Blooming Test Chart		DESCRIPTION: Black w/center white rectangle. Rectangle dimensions equal to 10% of vertical and horizontal raster
Focus Chart		DESCRIPTION: Siemens Star. Black and white wedges converging in center of chart
Neutral Density Filter		DESCRIPTION: Reduces light intensity by 4 f-stops (6.25% transmission)
Temperature Conversion Filter		DESCRIPTION: Converts 3200° Kelvin to 5500°, ±400° Kelvin
General		SIZE: 19" x 13" x 11.25" (48.3 x 33 x 28.6 cm) HWD WEIGHT: 18.25 lbs (8.3 kg) with charts. POWER: 110 - 125 VAC, 75 watts maximum

All specifications subject to change without notice.

VR940 Accessory List

Supplied Accessories	163G45:A	Color Bar Chart
	163G5905	Gray Scale Chart
	163G5202	Video S/N Chart
	163G49:A	Red Chart
	163G5200	Registration/Response Chart
	163G259	Blooming Test Chart
	163G5199	Focus Chart
	163G51	Neutral Density Filter
	163G52	Temperature Conversion Filter

SENCORE

Quality

Countless, unseen details
are often the only difference between
mediocre and magnificent.

Electronic analyzing in one form or another, has been with us for over 50 years. Analyzing signals is one of the most basic, yet important functions performed by electronic professionals every day. Several years ago, new technology and innovative design produced a new revolution in signal analysis called waveform analyzing. Since that time, waveform analyzing has evolved even further and now allows you to digitally measure even more key parameters of the waveform.

You'll benefit from this revolution in waveform analyzing through decreased measurement time, less frustration, and improved accuracy. But, your analyzing doesn't stop with the waveforms. You're also faced with the many challenges of testing components once your waveform analyzing has narrowed the defect to a few suspect parts.

We depend on the proper operation of capacitors, inductors, transistors, CRTs, SCRs, and other components in almost every electronic device we service. If all these components perform their job, we see good video, hear good audio, and are generally happy with the results.

On the other hand, if one of these components fails to perform, the entire device could be affected. One leaky capacitor or SCR that fails to conduct can have minimal effects on a device, or it could shut the entire unit down.

The challenges facing you as a servicer is to find these defective components and find them fast. Sencore's exclusive line of general analyzing instruments provides quick and dynamic tests to make your troubleshooting more efficient and reliable.

In this "General Analyzing Instruments" product section, you will see the following exclusive Sencore test instruments:

SC3100 "AUTO TRACKER"™ Automatic 100 MHz Waveform & Circuit Analyzer
CR7000 "BEAM-RITE"™ CRT Analyzer & Restorer
LC103 "ReZolver"™ Capacitor & Inductor Analyzer
LC102 "AUTO-Z"™ Automatic Capacitor/Inductor Analyzer
PR570 "POWERITE II"™ Variable Isolation Transformer & Safety Analyzer
TF46 Portable Super Cricket™ Transistor/FET Tester
PSL60 Universal Power Supply Load

SENCORE

General Analyzing Instruments

SC3100 "AUTO TRACKER"™ Automatic 100 MHz Waveform & Circuit Analyzer

Patented

Now Touch And Test Any Circuit Test Point And Make Autoranged Error-Free Measurements In A Fraction Of The Time!

- A complete waveform and circuit analyzing system in one instrument
- Auto-Tracking™ digital readout of waveform voltage and frequency with one probe connection
- Integrated measurements of all circuit parameters provide fast troubleshooting answers
- Full performance, 100 MHz dual trace oscilloscope
- Exclusive autoranged timebase and vertical attenuators eliminate wasted time
- Digital delta measurements to analyze every portion of any waveform
- All functions microprocessor integrated for ease-of-use

RS232 Compatible

Now you can measure DC voltage, peak-to-peak voltage, frequency, DC current, ohms, continuity – and analyze waveforms up to 100 MHz in one complete, easy-to-use instrument. You simply connect one probe to the circuit and push a button for a digital readout of any of these parameters. With an autoranged timebase and vertical attenuators, the SC3100 "AUTO TRACKER"™ lets you view signals without resetting controls. You can keep your mind on the circuit – not on pushing buttons, surfing menus, or making calculations.

With an input capability of 2 kV, the "AUTO TRACKER"™ can handle any signal you need to measure – even the horizontal collector pulse! The "fiddle free" sync circuits give you hands-free analyzing all the way from sine waves to video waveforms. The Delta features let you analyze any portion of the waveform without counting graticules. The SC3100 "AUTO TRACKER"™ is your answer for fast, easy, and accurate waveform and circuit analyzing.

1-800-SENCORE (736-2673) Direct (605) 339-0100

SC3100 "AUTO TRACKER"™ Specifications

Vertical Amplifiers	DISPLAY MODES: Channel A, inverted channel A (-A), channel B, dual trace (A&B), algebraic sum (A+B) or difference (B-A), vector (X-Y). CALIBRATION ACCURACY: ±3% at 1 kHz. FREQUENCY RESPONSE (100 MHz): AC coupled: ±3 dB of 1 kHz level from 10 Hz to 100 MHz, usable to 150 MHz. SENSITIVITY: 20 mV/div. to 200 V/div. with supplied 39G292 10X probe; 2 mV/div. to 20 V/div. with (optional) DP270 Direct Probe. MAXIMUM INPUT PROTECTION: Supplied 39G292 10X Probe: 2500 volts breakdown (DC + Peak AC)
Horizontal Sweep	SWEEP RATES: 100 milliseconds/division to 20 nanosecond/division. Autorange automatically selects sweep rate to show approximately 2-5 cycles of waveform. ACCURACY: ±3%
Trigger Circuits	TRIGGER SOURCE: CH A, CH B, AC power line, or external. TRIGGER MODES: NORM, AUTO, TV
Auto-Tracking™ Digital Tests	DC Volts – DCV FUNCTION: Provides direct reading of DC voltage on selected channel. ACCURACY: ±0.5% ±2 digits Peak-to-Peak Volts – VPP FUNCTION: Provides direct reading of peak-to-peak voltage on selected channel with either X10 or direct probes. ACCURACY: ±2% ±4 counts. FREQUENCY RESPONSE: ±0.5 dB from 20 Hz to 30 MHz, ≤-3dB at 100 MHz AC Volts – ACV FUNCTION: Calculates RMS sinewave value from PPV measurement. dBm FUNCTION: Calculates dBm measurement from PPV sinewave measurement, referencing 1 mW across 600Ω (0 dBm =.7746 volts RMS) Frequency – Automatically displays the frequency of the signal on selected channel. RANGES: 10.00 Hz to 150 MHz. ACCURACY: .001% ±1 digit Delta Peak-to-Peak – Measures amplitude of intensified area on selected channel Delta Time – Measures time of intensified waveform portion l/Delta Time – Converts Delta Time reading to equivalent frequency Delta DC Volts – FUNCTION: Measures DC voltage level of marked waveform point with respect to ground using the PPV and DCV functions. MARKER: Fully adjustable over entire range of waveform
Digital Meter Tests	Ohms – FUNCTION: Provides in- or out-of-circuit ohms. RANGES: 0.00 to 100 MΩ. ACCURACY: 0.2% ±2 digits Continuity Test – Provides audible tone of continuity. RANGE: 0 to 199 Ω. Audible tone turns on if resistance is <10 Ω and turns off if resistance is >15 Ω, ±2 Ω DC Current – Provides measurement of DC current. RANGES: .001 to 1.99 amp ACCURACY: 0.3% ±2 digits
General	SIZE: 7.25" x 13.75" x 15" HWD (18.4 x 34.9 x 38.1 cm). WEIGHT: 25 lbs (9.33 kg.). POWER: 105 to 125 VAC, 50/60 Hz

SC3100 "AUTO TRACKER"™ Accessory List

Supplied Accessories	39G292	10X Low Capacity Probes (2)
	39G295	DVM Test Leads
	39G331	Probe Accessory Kit
Optional Accessories	39G81A	250 MHz Demodulator Probe
	39G303	Probe Accessory Kit
	DP270	1-1 Direct Probe
	HP200	50 kV High Voltage Probe
	IB78	RS232 Interface Accessory
	PC269	Protective Cover
	PL207	RF Pickup Loop
	TP212	10 kV Transient Protector Probe

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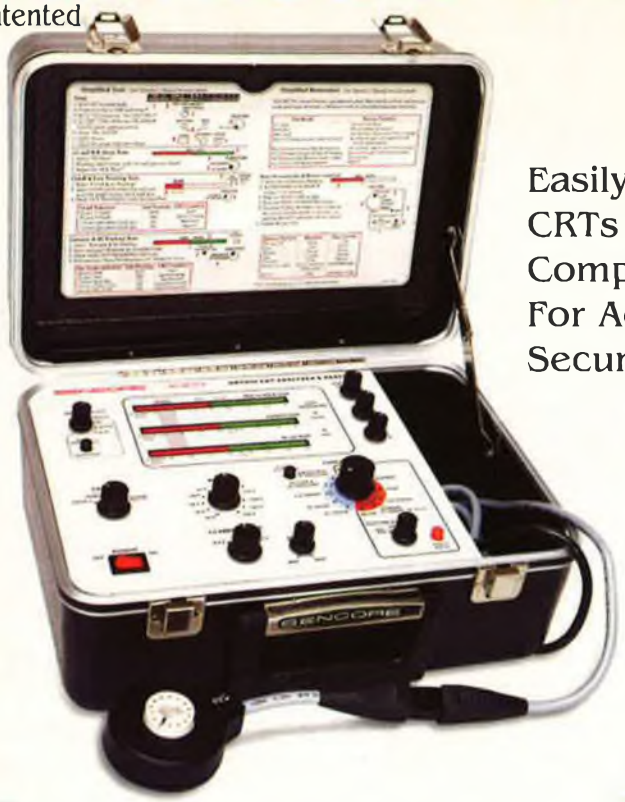
CR7000 "BEAM-RITE"™ CRT Analyzer & Restorer

Patented



Easily Test And Restore CRTs With The Most Complete Tests Available For Added Profit And Security!

- Tests for all CRTs, including: computer monitors, video displays, televisions, projection TVs, scopes, and special application CRTs – the CR7000 now has full dynamic range to test all CRTs – old and new!
- The easiest-to-use CRT tester on the market
- The most accurate and thorough tests of any CRT tester
- The safest and most effective restoration techniques available
- Newly designed sockets allow easy connection to hard-to-reach CRTs – new socket design allows the user to test projection TVs and computer monitors faster and easier

Now you'll have tests for all CRTs, including computer monitors, video displays, televisions, projection TVs, scopes, and special application CRTs. The CR7000 "BEAM-RITE"™ is the only analyzer to provide simultaneous display of all guns tested with new testing parameters that closely duplicate normal operation of the CRT.

The dynamic tests of the CR7000 are easy-to-use and are the most accurate of any CRT tester. CRT restoration is also as safe and effective as you need with the "BEAM-RITE's"™ progressive restoration system. You simply use as much power as you need to restore CRTs without worrying about stripping precious cathode material. The newly designed sockets allow easy connection to hard-to-reach CRTs and a universal adapter is included for the odd CRTs you encounter.

CR7000 "BEAM-RITE"™ Specifications

CRT Test Functions	Shorts Tests - G1 SHORTS: 20 megohm center scale. H-K SHORTS: 2 megohm center scale G2 Voltage - RANGE: 10-400 VDC Video 1, Proj, and Scope. CRT TYPES; 15-600 VDC Video 2 CRT type Bias Voltage - RANGE: Video & Projection: 20, 36, 52, 68, 84, 100, 116, 132, 148, 164, 184 VDC; Scope: all bias voltages divided by 10 Cutoff & Low Tracking Test - Tests ratio of G2 voltages needed to produce cutoff current in all 3 guns of a color CRT. Cutoff current measured between K and G1. "Good" indication if the G2 voltages are within 1.25:1 Emission Test - Measures true beam current reaching G2 Life Test - Provides approximate indication of cathode reserve current by lowering filament voltage by 25% Hi Tracking Test - Automatically compares emission current between highest and lowest guns in "Simultaneous" gun test and indicates Good/Bad result with LED Filament Voltage - Range: 0-4; 4-8; 8-16 VDC
Restore Functions	REACTIVE RESTORE: Filament voltage; 50% boost current limit: 1 mA max REACTIVE RESTORE: Filament voltage; normal current limit: 40 mA max NORMAL RESTORE: Filament voltage; normal current limit: 80 mA max. with 2 automatic cycles HIGH RESTORE: Filament voltage; 50% boost current limit: 100 mA max. with 3 automatic cycles EXTENDED RESTORE: Filament voltage; 50% boost current limit: 100 mA max REMOVE G1 SHORTS: Capacitive discharge between G1 and K/G2 after 20 second delay for filaments to cool REJUV: Capacitive discharge between G1 and K (400V)
General	SIZE: 7 3/4" x 12 1/2" x 8 3/4" HWD. WEIGHT: 13 lbs POWER: 105-125 VAC 50/60 Hz (210-230 VAC available)

All specifications subject to change without notice.

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CR7000 "BEAM-RITE"™ Accessory List

Supplied Accessories	39G454 Sockets 1 & 2 39G455 Sockets 3 & 4 39G456 Sockets 5 & 6 39G457 Socket 7 39G458 Socket 8 39G459 Universal Adapter 39G506 Pigtail Adapter CRT Setup Book - Form #6410 (current)
Optional Accessories	39G460 Sockets 9 & 10 39G461 Socket 11 39G517 Socket 12

LC103 "ReZolver"™ In-Circuit Capacitor/Inductor Analyzer

5 Patents, 2 Pending

New!

Now, For The First Time Ever, Reliably Pinpoint Bad Capacitors And Inductors In-Circuit, Or Completely Analyze Them Out-Of-Circuit With Exclusive, Dynamic, And Automatic Tests To EIA Standards.

ReZolver

- Pinpoints bad capacitors and inductors "in-circuit", and automatically tells you when further out-of-circuit tests are required
- Analyzes capacitors for all four failures out-of-circuit:
  - *Value from 1 pF to 20F*
  - *Equivalent series resistance*
  - *Leakage with up to 1,000 volts applied*
  - *Dielectric absorption*
- Tests SMT components in-circuit and accurately with exclusive, time-saving test accessories
- Analyzes inductors with exclusive, patented tests for:
  - *Value from .1uH to 20 H*
  - *Opens or shorts*
  - *Even one shorted turn with patented "Ringer"*
- Makes all tests, compares the results to EIA standards, and tells you "GOOD" or "BAD" - automatically
- Tests SCRs and triacs with optional SCR250 accessory

RS232 Compatible

How often have you found yourself removing capacitors or inductors because you thought they might be bad - only to find they tested good? How many times do you go ahead and replace the cap or coil just because you went to the trouble of removing the component? Now, with the new LC103 "ReZolver"™ you'll dramatically reduce the use of your soldering iron by removing only the bad components. The LC103's quick, one-button in-circuit test catches defective components that other testers miss.

The LC103 also provides the industry standard tests made popular by other Sencore Z-Meters. You get complete capacitor tests that catch all 4 failure modes, and complete coil tests for value and shorted turns. In fact, the LC103 is the newest addition to Sencore's exclusive Z-Meter line that provides complete dynamic tests that closely simulate normal circuit operating characteristics. The LC103 also does all the interpreting of test results for you by comparing the results to EIA standards and displaying "GOOD" or "BAD".

The "ReZolver"™ is guaranteed to save time when testing components – especially, surface mount components. **Now, you can test the component in-circuit** without fear of damage or dropping the tiny components on the bench. Plus, the LC103 allows you to test the larger SCRs, triacs, flybacks, and other transformers with the patented "Ringer" – catching even single shorted turns.

LC103 "ReZolver"™ Specifications

IN-CIRCUIT TESTS (Capacitors and Inductors)	Dynamic in-circuit tests to determine whether the component is good or bad. COMPONENT TYPES: Electrolytic, double layer lytic, tantalum, ceramic, and other capacitors. Yokes, flybacks, switching transformers, and coils. RANGE: INDUCTORS - 3.18 uH to 3.18 H CAPACITORS - 0.002 uF to 20,000 uF ACCURACY: Same as Out-of-Circuit tests for known good inductors and capacitors with no parallel current paths. SUGGEST REMOVAL Indication: Initiated when AC test differs from DC test by more than 20%, or if low level DCR test indicates a leakage path greater than 20% of charge current for capacitors
CAPACITORS (Out-of-circuit)	VALUE: Dynamic test of capacity value is determined by applying a constant current to the capacitor and measuring the dV/dt: ACCURACY: ±1%; ±1 pF; ±1 digit for values to 1990 uF; ±5%; ±0.1% of range full scale for values 2000 uF to 20 F.
EQUIVALENT SERIES RESISTANCE (ESR)	ACCURACY: ±5%; ±1 digit CAPACITOR RANGE: 0.01 uF to 20 F
DIELECTRIC ABSORPTION	ACCURACY: ±5% of reading ±1 count RANGE: 1 to 100% CAPACITOR RANGE: 0.01 uF to 20 F
LEAKAGE	ACCURACY: ±5%, ±1 digit. APPLIED VOLTAGE: keyboard entry 1.0 to 1000 volts in .1 volt steps short circuit current limited to 900 mA
INDUCTORS (Out-of-Circuit)	VALUE: A dynamic test of value determined by measuring the EMF produced when a changing current is applied to the coil under test. CURRENT RATES: automatically selected
RINGING TEST	A dynamic test of inductor quality determined by applying an exciting pulse to the inductor and counting the number of cycles the inductor rings before reaching a preset damping point. 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
GENERAL	TEMPERATURE: operating range: 32° to 104° F (0° to 40° C) range for specified accuracy (after 10 minute warm-up): 50° to 86° F (10° to 30° C)POWER: 105-130V AC, 60Hz, 30 watts with supplied PA251 power adapter. Battery operation with optional BY289 rechargeable battery. AUTO-OFF: Removes power during battery operation if unit sits idle longer than 5 minutes. BATTERY LIFE: 2 hours typical operation. SIZE: 6" x 9" x 11.5" (15.2 cm x 22.9 cm x 29.I cm) HWD WEIGHT: 6.0 lbs. (2.7 kg) without battery, 7.6 lbs. (3.4 kg) with battery. GOOD/BAD INDICATION: Functions on all tests. Requires user input of component type and value, or input of desired limits

All specifications subject to change without notice.

LC103 "ReZolver"™ Accessory List

Supplied Accessories	39G219	Out-of-Circuit Test Leads
	64G37	Test Lead Mounting Clip
	AP291	Adjustable In-Circuit Test Probe
	PA251	110 VAC Power Adapter/Charger
Optional Accessories	39G144	Test Lead Adapter
	BY289	Rechargeable Lead Acid Battery
	CC254	Carrying Case
	CH255	Component Holder
	PA252	220 VAC Power Adapter/Charger
	SCR250	SCR/Triac Test Accessory
	CH256	Chip Component Test Lead

SENCORE

LC102 "AUTO-Z"™ Automatic Capacitor/Inductor Analyzer

Patented

The Only Dynamic Capacitor/Inductor Analyzer Guaranteed To Help You Quickly Find Any Defective Capacitor Or Inductor That Other Testers Miss, Without Calculations, Look-Up Tables, Or Error!

- Analyzes capacitors for:
  - *Value from 1 pF to 20 F*
  - *Leakage with up to 1 kV applied*
  - *Dielectric absorption*
  - *Equivalent series resistance (ESR)*
- Analyzes inductors from 1 uH to 20 H for opens, shorts, value, and even one shorted turn
- Analyzes SCRs and triacs (with accessory), high-voltage resistors, and transmission lines
- Makes all tests, compares results to EIA standards, and tells you "GOOD" or "BAD" – automatically
- Portable; 9-hour battery operation for remote sites – AC operation for your bench

RS232 Compatible

The portable LC102 "AUTO-Z"™ brings speed, reliability, and extended ranges to cap/coil testing. Advanced digital technology allows you to completely analyze capacitors to 20 farads and inductors to 20 henries. The LC102 also tests for SCRs and triacs (with accessory) so you aren't slowed down by any component testing.

You simply enter the component's parameters: value, rated voltage, and tolerance. The "AUTO-Z"™ makes the readings, compares them against industry standard tables stored in memory, and displays whether the component is good or bad. With the push of a button, you quickly obtain the exact reading for value, leakage, dielectric absorption, and ESR for all capacitors.

The LC102 "AUTO-Z"'™ also analyzes inductors for value and shorts (even a single shorted turn). The patented "ringer" test dynamically pinpoints defective flybacks and IHVTs by testing for shorted turns, or the effective "Q" of the component. Take the LC102 "AUTO-Z"™ wherever you check components – from your bench to the customer's living room.

LC102 "AUTO-Z"™ Specifications

Capacitor Value	RANGE: 1.0 pF to 19.99 F fully autoranged. ACCURACY: ±1% ±1 pF ± 1 digit up to 1990 uF. ± 5% ± .1% of range fullscale for 2000 uF to 19.99 F. RESOLUTION: .1 pF on lowest range to .01 F on highest range: 12 ranges total. Automatically reads GOOD or BAD according to tolerance selected on keypad. Double layer lytics test patented
Capacitor Leakage Voltage	VOLTAGE RANGE: 1.0 V to 999.9 V in 0.1 V steps. VOLTAGE ACCURACY: +0% -5% POWER: Short circuit current limited to < 900 mA. Continuous power limited to 6 watts ± 10%. Selected on keypad
Capacitor Leakage (current)	RANGE: 0.01 uA to 19.99 mA fully autoranged. ACCURACY: ±5% ±1 digit. RESOLUTION: 0.01 uA to .01 mA for 0.01 uA to 19.99 mA in four ranges. VOLTAGE: Maximum reading determined by voltage setting
Dynamic Ohmmeter	RANGE: 100 ohms to 999 megohms depending on voltage setting. ACCURACY: ±5% ± 1 digit
Capacitor Dielectric Absorption Test	RANGE: 1 to 100%. ACCURACY: ±5% of reading, ± 1 digit. CAPACITOR RANGE: 0.01 uF to 19.99 F. Automatically reads GOOD or BAD on electrolytics at 15 percent variation in reading after charge and discharge; less for other capacitors
Capacitor Equivalent Series Resistance (ESR)	RANGE: 0.10 ohm to 1999 ohms fully autoranged. ACCURACY: ±5% ± 1 digit. RESOLUTION: .01 ohms to 1 ohm on high end in three ranges. CAPACITOR RANGE: 1 uF to 19.99 F
Inductor Value	RANGE: 0.10 uH to 19.99 H fully autoranged. ACCURACY: ±2% ± 1 digit. RESOLUTION: .01 uH for 20 uH range to .01 H for 19.99 H range: 9 automatic ranges.
Ringing Test	Excites inductor with sharp wavefront of 5 volts peak amplitude 60 Hz. ACCURACY: ± 1 count from readings of 8 to 13: 10 rings or more automatically indicated as GOOD. Automatically selects correct impedance match to produce maximum rings. RESOLUTION: ± 1 digit
General	DISPLAY: 6 digit LCD: auto decimal placement; leading zero suppression; pF, uF, F, uA, mA, %, KΩ, MΩ, ohms, uH, mH, H, V, RINGS, SHORT, OPEN, WAIT, GOOD, and BAD annunciators, overranged indication. POWER: 105-135 VAC 60 Hz with supplied PA251 power adapter. Battery with optional BY234, 2.0 AH battery for 9 hours continuous typical battery life. Auto-off approximately 20 minutes after use. Auto-off overidden when using external AC power. SIZE: 6" x 9" x 11.5" HWD (15.2 x 22.6 x 29.2 cm.). WEIGHT 6 lbs. (2.7 kg.) without battery. 7.6 lbs. (3.5 kg.) with battery

All specifications subject to change without notice.

LC102 "AUTO-Z"™ Accessory List

Supplied Accessories	39G144 Test Lead Adapter 39G201 Test Button Hold Down Rod 39G219 Test Leads 64G37 Test Lead Mounting Clip PA251 Power Adapter
Optional Accessories	39G85 Touch Test Probe BY234 Rechargeable Battery CC254 Carrying Case CH255 Component Holder CH256 Chip Component Test Lead FC221 Field Calibrator IB78 RS232 Interface Accessory SCR250 SCR/Triac Test Accessory

SENCORE

PR570 "POWERITE II"™ Variable Isolation Transformer & Safety Analyzer

Patented

Identify And Troubleshoot Virtually Any AC Supply Problem Fast...With The PR570 "POWERITE II"™!

- Insure your safety and the safety of your test instruments whenever servicing electronic products
- Conquer AC power source problems plus startup, shutdown, and regulator failures with a digitally accurate and variable 0-140 volt AC supply
- Have complete confidence your AC line is right with the AC line monitor
- An adjustable current trip feature minimizes expensive parts damage by automatically removing AC power when excessive current is being drawn
- Watch voltage levels and current draw with simultaneous current and voltage displays
- Test AC outlets with an exclusive receptacle checker to ensure correct earth grounding for the highest level of safety
- Protect your customers from electrical shock and protect your business from lawsuit with an automatic, auto-toggling AC line and safety ground leakage test (leakage to 10 microamps)

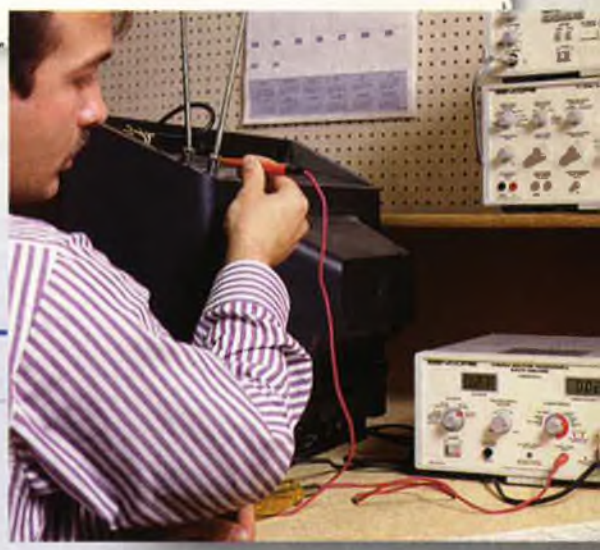
Now you get all the information you need with the PR570 "POWERITE II"™ for full control of your AC troubleshooting. Conquer AC power source problems plus startup, shutdown, and regulator failures with a variable 0-140 volt AC supply. The AC line monitor gives you confidence that your AC line is right with exclusive tests. Simultaneous digital displays of voltage and current draw help prevent parts damage and wasted time.

The PR570's isolated output reduces shock hazards and prevents damage to the chassis and your test equipment. The adjustable current trip feature minimizes expensive parts damage by automatically removing AC power when excessive current is being drawn – especially helpful in power supply and horizontal circuits. Plus, the safety leakage test builds additional profits while protecting your customer's safety, thus reducing the chance of lawsuits.

PR570 "POWERITE II"™ Specifications

Isolated Output	VOLTAGE: 0-140 VAC typical at 117 VAC input, continuously variable. CURRENT: 3 amps continuous; 3-4 amps, 470 watts maximum intermittent use (5 minutes on, 5 minutes off). OUTPUT LOADING: Less than 12 volts drop in output with 3 amp load at 120 VAC
AC Volts Functions	AC LINE VOLTAGE TESTS: Measures and displays the selected voltage: Hot to External Earth Ground, Hot to Safety Ground or Hot to Neutral. RANGE: 0-150 VAC. ACCURACY: ±3% reading ±2 counts, calibrated at 117 VAC. RESOLUTION: 1 volt. PROTECTION: 240 VAC. ISOLATED OUTPUT VOLTAGE: Measures and displays voltage at isolated output. Same as Line Voltage Tests
Output Current Monitor	MEASUREMENT: True Power. RANGE: 0 to 470 watts. ACCURACY: ±5% of reading, ±2 counts. RESOLUTION: 1 watt
Adjustable Current Trip	RANGE: 0-4 amps. ACCURACY: ±10% of reading, ±20 mA. RESOLUTION: Adjustable in 10 mA increments. TRIP TIME: 0.3 seconds max. with 200% overload
Hot Chassis Test	MEASUREMENT: Ties high and low lead of primary together and measures leakage to exposed metal with power off. RANGE: 0 to 1999 µA. ACCURACY: ±3% of reading, ±2 counts. RESOLUTION: 1 µA. PROTECTION: 150 mA RMS, 150 V max
Safety Leakage Test	MEASUREMENT: Referenced to either side of isolated output jack. (Automatically toggles high and low line and opens and closes safety ground and displays highest reading.) RANGE: 0 to 1999 µA. ACCURACY: ±3% of reading, ±2 counts. RESOLUTION: 1 µA. PROTECTION: 150 mA RMS, 150 V max. CAL CHECK: 100 µA, ±3% of reading, ±2 counts with isolated output at 120 VAC
Protection	AC INPUT: 4 amps, type 3AG slo-blo fuse. ISOLATED OUTPUT: Adjustable current trip, 1 to 4 amps
General	SIZE: 6" x 11.5" x 12" (15.2 x 25.4 x 29.2 cm) HWD. WEIGHT: 22 lbs. (10 kg). POWER: 105 to 125 VAC, 60 Hz. .4 amps idle current with no output load

All specifications subject to change without notice.



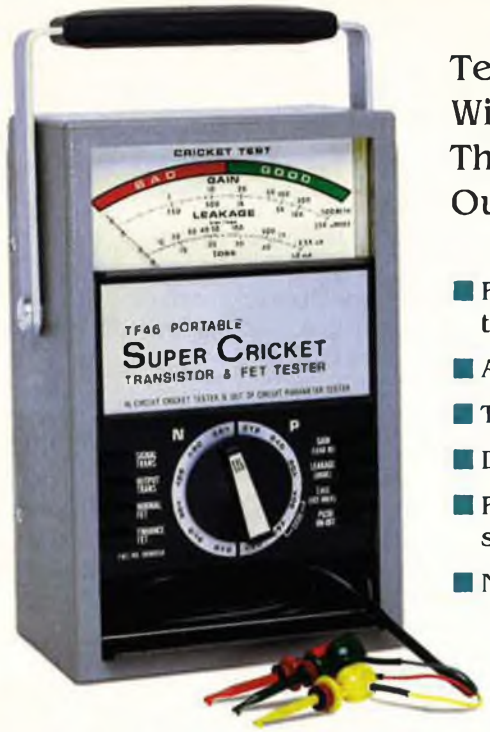
PR570 "POWERITE II"™ Accessory List

Supplied Accessories	39V1 Safety Leakage Probe 39V2 Ground Lead

SENCORE

TF46 Portable Super Cricket™ Transistor/FET Tester

Patented



Test Any Transistor Or FET With 99% Reliability In Less Than 15 Seconds – In Or Out Of Circuit!

- Patented in-circuit "go/no go" transistor/FET test
- Automatically identifies transistor leads
- Tests for all possible leakage paths
- Dynamic gain test for thorough analyzing
- Portable operation with auto shut-off to save your batteries
- No need for set-up book or instructions

The TF46 Super Cricket™ takes the guesswork out of solid state servicing. You simply connect the leads to the transistor, and rotate the switch. If the transistor is good, you'll hear a chirp. You don't need setup data and the test even works in-circuit!

The Super Cricket™ quickly and reliably distinguishes the basing of unknown transistors – automatically. It tests every possible leakage path plus identifies leaky or shorted diodes. The dynamic gain test helps you identify those borderline transistors and matches parameters for critical circuits such as push-pulls and high frequency oscillators.

SENCORE

TF46 Portable Super Cricket™ Specifications

Cricket Good/Bad	Detects ability of transistor to invert a square wave
Bi-Polar Transistor Beta	Dynamic Beta
Bi-Polar Leakage	Tests six paths with rotation of permutator switch (Icbo, Iebo, Ibeo, Iceo, Ieco, Ibco)
Field Effect Transistor Gm	Dynamic mutual conductance
FET Leakage (Igss)	0-2500 microamperes
Zero Bias Drain Current (IDss)	0-50 milliamps
General	TEST LEADS: Color-coded E-Z Hook®; connectors. BATTERIES: Six alkaline, carbon zinc, or rechargeable "AA" cells (not included). Auto shut-off after 10 minutes. METER: 4½", 100 uA, 5%, mechanical shock protected. SIZE: 10" x 5½" x 3½" (25.4 cm x 13.8 cm x 8.9 cm) HWD. WEIGHT: 4½ lbs (2.0 kg)

All specifications subject to change without notice.

TF46 Portable Super Cricket™ Accessory List

Optional Accessories	39G85 Touch Test Probe

On GSA Contract (See page 67)

PSL60 Universal Power Supply Load

New!

Now Dynamically And Accurately Load The Power Supply To Pinpoint Defects And Reduce Troubleshooting Time!

- Determine if the system's defects are in the power supply or the load circuitry
- Simulates different power demands or "loading" on the power supply output to duplicate symptoms and identify power supply problems
- Analyzes the power output capability of any power supply that outputs 4 to 200 volts
- Analyzes the current limiting circuits of a switching power supply to identify limiting defects

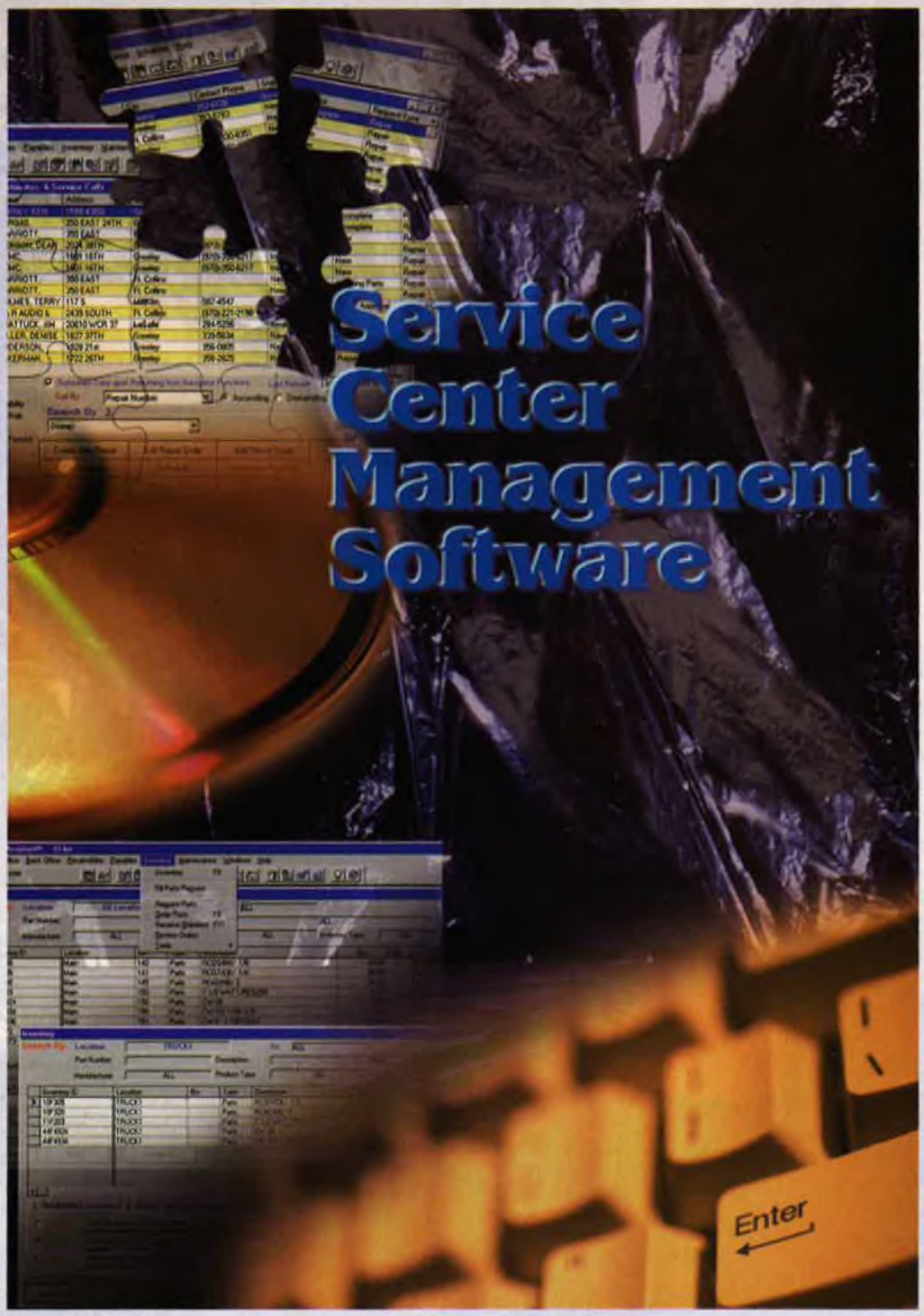
PSL60 Specifications

Load Ranges	Sets the power and voltage range of the electronic load RANGES: 20 Watts, 4-20 Volts 20 Watts, 15-60 volts 60 Watts, 15-60 volts 60 Watts, 4-20 volts (10 amps max.) 60 Watts, 50-200 volts
Input Volt Meter	Measures input voltage to the electronic load. RANGE: + .1-250 volts. ACCURACY: 1%, (2 counts). RESOLUTION: .1 volts
Load Current Settings	Sets the current level to the electronic load. RANGE: .01-10 amps. ACCURACY: 3%, (2 counts). RESOLUTION: (range dependent) .01 amps to .99 amps, .1 amps to 10 amps
Power Meter	Indicates electronic load power (volts X current). RANGE: .1-60 watts. ACCURACY: 4%, (4 counts). RESOLUTION: .1 watt in 20 watt ranges, 1 watt in 60 watt ranges
Load Input	VOLTS PROTECTION: (250 volts DC + peak AC). REVERSE VOLTAGE PROTECTION: diode
General	DIGITAL DISPLAY: LCD matrix. HUMIDITY: 0-99% no condensation. POWER REQUIREMENTS: 12 VDC, 300 mA min. (may be factory converted to 220 VAC). SIZE: 5.25" X 8" X 6.25" HWD. WEIGHT: approx. 3 lbs.

All specifications subject to change without notice.

PSL60 Accessory List

Supplied Accessories	60-G44 AC Power Adapter 39G481 Direct Test Lead
Optional Accessories	39G563 Direct Test Lead (reduced resistance)



Solutions

Coming together is a beginning...
Keeping together is progress...
Working together is a success!

Regardless of the type of service business we're in, we face challenges every day managing our operations. From managing customer communications to inventory, we are forced to find better and more effective ways to remain competitive as electronic servicers, often without the luxury of adding personnel to help track and manage our business operations. Add to this the added demands of employee productivity, vendor relationships, and manufacturer warranty claims, things can seem like they get out of control very quickly.

So, *"How can a software package improve my business?"* you might ask. The answer from management and business owners is not surprising. Any package implemented must make the business easier to run, provide the proper management reports, and increase the businesses' productivity and profitability.

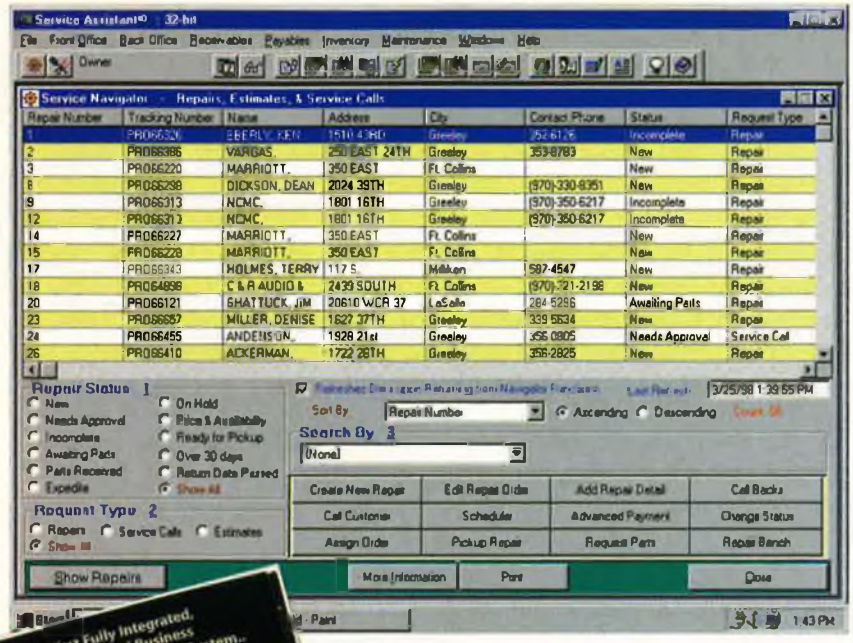
In order to increase productivity, you must be able to track it; you should be able to report what each technician invoiced, scrapped, restocked, and reworked each day, week, month, or year. The most effective service centers maintain a minimum inventory of repair parts. Your system should tell you what parts to maintain (based on use) and which vendors are satisfying your needs in keeping a small inventory. A business management system should tell you about cash flow in the business; what are the hot months, where you should focus your advertising, who are your "new" customers. Your system should provide useful reports, and you should be able to create new reports that meet your specific needs. The data in your system is yours and you should have easy access to it. The same information should never be input twice (or three times) into the system. Warranty claims information should be automatically gathered during the repair (as much as possible) and warranties should be tracked until they are satisfied.

The bottom line is, whatever business management software package you choose, you must see increased productivity and profitability. Your business should directly benefit in increased productivity, more business, better warranty tracking, and ultimately more dollars in your pocket. Again, the system should work the way you work!

SENCORE

Service Center Management Software

SA32 Service Assistant System Software



The first fully integrated, 32 bit windows-based business management software system that is guaranteed to streamline your repair processing for increased profits and productivity!

SA32 – Service Assistant
SA32N – NET.PRO Network Program
SA32NS – NET.PRO Workstation
SA32TS – Tech Support
SA32OST – On-Site Training and Install
SA32NL – NET.LITE
SA32RB – Repair Bench

Service Assistant
by Sencore

Prior to the mid 1980's, business management was predominantly a paper driven system. Very few electronic service operations could afford the price of customized, main frame systems and software.

Today, you need to be able to account for every component, time spent, expenses, receivables, and payables to run a business. Most of today's PC-based business software lacks the full capability you need to effectively run your business, or offer an off-the-shelf solution that hardly pertains to your business

We now include:

- On-Site Installation
- Training To Suit The User
- "PC Anywhere" Shipped With Network
- FTP & Web Site Support
- The personal attention required to improve your business

Let Service Assistant set you free to improve your business and profits from drop-off to pick-up and beyond!

1-800-SENCORE (736-2673) Direct (605) 339-0100

Things Sencore's Service Assistant Program Will Do For You!

Contact Management & Custom Reports

Your new program should allow you to track all of your customers and vendors. You should be able to see when the customer last visited, what they had serviced, and a complete service history on the customer. Your program should provide you with a lot of reports and you should be able to develop custom reports as necessary. Your reports should tell you where you are making and losing the most money and what direction to take your business for maximum profits.

Accounts Payable

Everyone incurs expenses. Businesses need to manage expenses to manage cash flow. By understanding where, when, and how you pay your parts bills, rents, leases, and shipping costs, today's business software solution should allow you to quickly get your cash flow under control.

Complete Inventory Management Control System

Tracking components, shop supplies, and other items is an important part of record keeping. Your service center software should allow you to instantly determine what happened to the last order of components, whether they were used in a completed service or whether they are still on the shelf. Your software should be able to track multiple locations, allow parts cross referencing, and work in real time throughout the network. You should also have a shipping and receiving section that is automatically updated during the repair process.

Accounts Receivable

Your future business management program should allow you not only to track unpaid repair order invoices, but also give you the flexibility of tracking payments and setting up special terms. In addition, purchase history is important when managing cash flow and for trending history for future projections.

Technician Productivity

Most company's biggest expense is labor. Knowing what your technician is doing and how well he is doing is a vital part of running your business. Any software solution you choose should be able to accurately tell you how well your technician is producing and how effective his troubleshooting techniques are.

Warranty Tracking And Filing

You need to file claims for warranty service. Your software should allow you to quickly file any claim through a variety of service providers with unlimited line item entries. Split claim processing and reconciliation is also a must these days. Your warranty feature should not require re-entry of data alreadyentered during the repair.

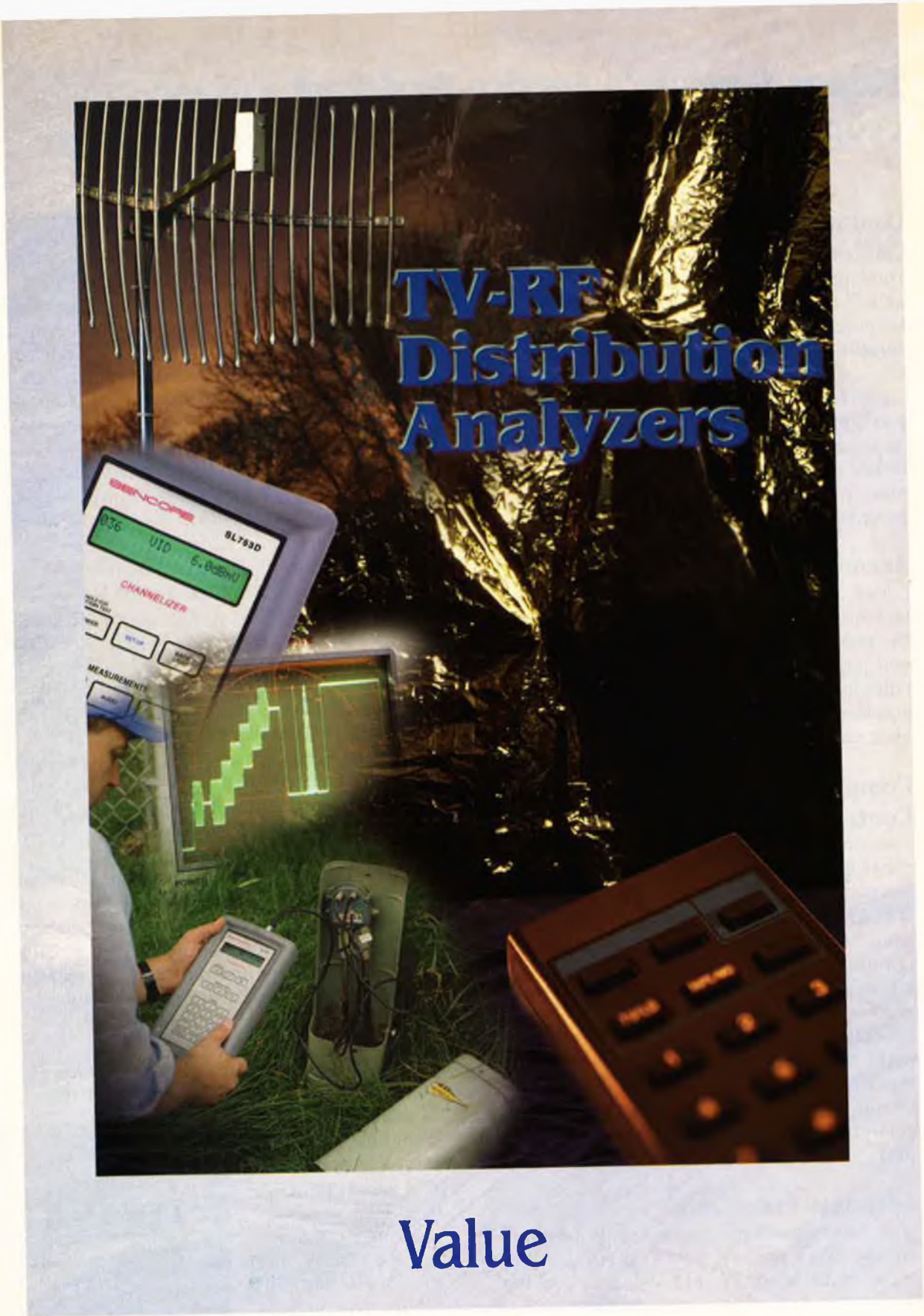
Compatibility

This means Windows 95 and Windows NT. For larger operations running networks or planning on upgrading to networks, a true client/server program is a must, with variable access for different levels of access. Compatibility also means being able to "get to" your data, if necessary, with other products and tools. Windows compatibility also means the product should be easy to use. You should also be able to import some of your existing data if not all. Any program you use should be web enabled and year 2000 compatible.

A Complete Tracking System

Today's business management software solution should allow you to track all aspects of your business, from customers to products serviced. You need the ability to quickly access customer records, service history, work in process and parts status. You also need to be able to schedule and track service calls.

SENCORE



Value

Always give people more than they expect to get

SL753D "CHANNELIZER"™ Signal Level Meter

Patented

The Only Easy To Use All Channel/Frequency Installer Meter With Exclusive On-Channel Tests And A Full Six Hours Of Continuous Use!

The SL753D "CHANNELIZER"™ installation meter was designed for quick and easy operation with no confusing on-screen graphics or complex menus to follow. The easy-to-use keypad lets you tune in the channels or frequencies you need (50-810 MHz), plus you can customize the "CHANNELIZER"™ to match your channel plans. With a measuring range from -35 dBmV to +60 dBmV, the SL753 lets you test systems at a variety of points for added flexibility.

Signal quality parameter testing is a snap with the "CHANNELIZER."™ You get tests for video level and audio level, plus a non-intrusive test for hum. Its rugged case design and exclusive battery management system are designed to maximize the life of the SL753D without compromising performance.

ON GSA CONTRACT (SEE PAGE 67)

SL754D Hand-Held "CHANNELIZER"™ Automatic Signal Level Meter

Patented

The Only Service Meter Designed To Cover All Your System Testing Needs Now And In The Future!

The SL754D is an easy-to-use, hand-held signal level meter that tunes by frequency or channel from 5-810 MHz including sub-band and UHF channels. You can test signal levels anywhere in your system from -35 dBmV to +60 dBmV automatically without changing attenuation. Choose from eight pre-programmed channel plans or generate your own custom plan.

You can automatically test all or some of the system information you need to insure a quality signal with just a quick look at the two line, back-lit LCD display. Auto Inspect capabilities include:

- Tilt
- P/V
- Ch. To Ch. Variation
- All Ch. To Ch. Variation
- Lowest Carrier Level
- Max A/V Ratio
- Min C/N Level
- Flatness
- Max Hum
- Highest Carrier Level

ON GSA CONTRACT (SEE PAGE 67)

DSL757 "DIRECTOR" Digital Signal Level Meter

Patented

The Only Easy-To-Use Wireless Technician's Meter With Down-Converter Power Source And Six Hours Of Continuous Use In A Field Ready, Weather Tight Package!

The DSL757 is designed exclusively for the wireless cable industry. Its lightweight design, down-converter power supply, and bar graph provide the tools needed for a quality installation every time. With full channel or frequency keypad tuning from 50-810 MHz, the DSL757 shows you the signal strength digitally and with a bar graph indicator from -35 dBmV to +60 dBmV. Use the eight pre-programmed channel plans or build your own custom plan.

The exclusive 18 volt 500 mA LNB power source provides a reliable and portable voltage source for making antenna alignments or troubleshooting power inserter problems. The exclusive Energy Management System eliminates overcharging and minimizes battery memory problems.

CA780 "CABLEIZER"™ Metallic Cable Analyzer

Patent Pending

Quickly And Easily Locate Defects In All Metallic Cable With A Highly Sensitive Analyzer And Easy-To-Read LCD Display!

The CA780 "CABLEIZER"™ minimizes downtime by quickly and accurately locating cable faults, including kinks, splits, radial cracks, and more. Superior 65 dB sensitivity provides the capability to find even minor faults. The CA780 also lets you determine the length of buried cable or a spool of cable with just the push of a button. And you can automatically determine the VOP of a known length of cable with no calculations or interpretation errors.

The "CABLEIZER"™ identifies the exact distance to cable faults, the first time, every time, so you can get it repaired. You get a visual indication of the fault and its type with a digital readout of the distance to the defect – from a few feet up to 65,000 feet. Just push a button and the CA780 stores the signature of the cable you're testing.

VIG791 CATV VITS Generator

Patent Pending

The First VITS Insertion Generator Designed Exclusively For CATV That Generates And Inserts Both Required Signals Simultaneously!

The VIG791 can be used to generate and insert two VITS video test signals in the VBI (vertical blanking interval) of any channel. VITS test signals are transparent to the customers and can be measured by the Sencore VSA794 or other video analyzers - providing a complete FCC quality test of the channel video performance. Sencore's exclusive signal router accessory can be permanently installed in a channel's video path, providing test signal insertion without interference to the channel's operation.

The special test signals provide capabilities for analyzing these special tests on one live channel:

- Differential Gain & Phase
- In-Channel Frequency Response
- Chroma To Luma Delay
- Percent Modulation • S/N & Hum

VSA794 CATV Video Signal Analyzer

Patent Pending

Now You Have The Versatility And Convenience Needed For Complete Headend Testing!

The VSA794 gives you the versatility and convenience that you need for complete baseband video testing in one complete waveform monitor/vectorscope. This exclusive instrument provides digitally accurate, automated measurements for complete testing without interference to your system.

One-button, automatic tests of key CATV video measurements make your FCC testing easy and accurate with minimum capital investment. The VSA794 provides direct digital readouts of these key parameters without complex calculations or interpretations:

- Differential Gain & Phase
- In-Channel Frequency Response
- Chroma To Luma Delay
- Percent Modulation
- S/N & Hum

QAM Analyzers

QAM961 – Designed to work with the Davic System

QAM962-B – MMDS designed to work with the QAM 64 Annex B System

QAM970 – Designed to work with the QAM 64 Annex B System

- Full tuning capabilities to test channels or carriers throughout your system
- Digital power measurements that give you average power level across the full channel space – not peak power measurements
- Quick and accurate estimated BER testing to help determine signal quality that is being delivered to the customer
- Equalization measurements that help determine micro-reflections (in the system or cable drop) without interrupting service to your customer
- Signal-to-Noise measurements to determine the quality of signal and identify problems with either signal or system noise
- Quick Good/Bad visual test to determine whether the set-top will operate properly when the signal is applied

The new QAM analysis meters are designed to provide you with a rugged, hand-held, weatherproof meter to make measurements of QAM modulated signals anywhere in your system. The meters will accurately tune by channel or frequency any QAM 64 modulated or analog signal, from 50 to 860 MHz for complete system testing. They will also provide you with full signal power measurements from -24 to +34 dBmV for taking power level readings throughout your system.

The Sencore QAM Analysis meters feature an exclusive Estimated Bit Error Rate Test designed to make accurate BER measurements on active digital channels in less than 10 seconds per channel for quick and reliable system testing and troubleshooting. The Drop Compensation test ensures complete system compatibility between all drop components. The Equalization measurement allows you to identify any signal anomalies including micro reflections or faults in the cable that may cause signal quality problems.

To ensure signal quality, the new QAM meters provide digital Carrier-To-Noise measurement capabilities. Plus the QAM meters provide true analyzing capabilities with an exclusive "Auto" function for easy system documentation and future test comparisons.

The new QAM analysis meters feature a "Smart Charge" Battery Charging System to eliminate overcharging and battery fatigue problems with an exclusive quick charge and battery conditioning system. They also are backed by Sencore's industry exclusive 3-year signal level meter warranty.

QAM Measurement Specifications:

LEVEL Mode	AMPLITUDE RESOLUTION: .1 dB. AMPLITUDE ACCURACY: ± 1.0 dB. LEVEL LINEARITY: ± .75 dB from -40 dBmV to +60 dBmV. FLATNESS: ± .75 dB from 5 MHz to 750 MHz. Typical: ± 1.5 Total, @ 70 degrees F
C/N Ratio	AUTOMATIC OFF CHANNEL TEST: AMPLITUDE RESOLUTION: 0.1 dB. AMPLITUDE ACCURACY: ±1.0 dB. DYNAMIC RANGE: Input Level 40 dB below actual result (i.e. -10 dBmV input provides a maximum C/N result of +30 dB, 0 dBmV input provides a maximum C/N result of +40 dB). (Noise Reference is set under the CONFIG section) NOISE REFERENCE FREQUENCY: User-defined 300 kHz wide sample anywhere from 5 MHz to 750 MHz
S/N Ratio (digital channels only) (QAM962/970 only)	METHOD: Statistical analysis of the QAM constellation. Errors calculated from the demodulated I and Q signals. Range: 0 to 30 dB* (normally signal lock is lost at a result approximately 22 dB) **On carriers with level ≥ -10 dBmV*
Tuning	QAM961: 116-128 MHz, 210-408 MHz. QAM962/970: 5 MHz-756 MHz. CHANNEL PLANS: MMDS Digital (961), FCC/EIA, HRC, IRC, VHF/UHF, MMDS (962 only), FCC Digital, MMDS Digital (962 only)
RF Input	SENSITIVITY: -34 to +24 dBmV (961), -40 to +60 dBmV (962/970) INPUT IMPEDANCE: 75 ohms, unbalanced. RETURN LOSS: 14 dB minimum. MAXIMUM SAFE INPUT: 100 Volts DC + AC peak < 1kHz, +65 dBmV > 1 kHz
Equalization	PERCENT DISPLAY RANGE: 0 to 100%. Reading is expressed in a percent of total equalizer activity. DB DISPLAY RANGE: Feed Forward Equalizers +10 to -50 dB. Decision Feedback Equalizers -8 to -68 dB
Composite Level	AMPLITUDE RESOLUTION: 0.1 dB. AMPLITUDE ACCURACY: ± 1.0 dB. DYNAMIC RANGE: -40 dBmV to +60 dBmV
Temperature Variance	Typical: ±1.0 dBmV
Drop Comp	100 MHZ AND 750 MHZ RANGE: Range: 0.0 dBmV up to 9.9 dBmV. Drop Cable loss levels between 100 MHz and 750 MHz are calculated.
Estimated BER	RANGE: Raw Display Preference: <1 x 10^{e-10} to >9.9^{e-4} (full floating decimal) before Reed Solomon Coding Forward Error Correction. CORRECTED DISPLAY PREFERENCE: <1.0^{e-10} to >1.0^{e-4} after Reed Solomon Forward Error Correction.
Auto Inspect	AUTO INSPECT TILT TEST: Amplitude Resolution: 0.1 dB. Amplitude Accuracy: ± 1.0 dB Range: Any two carrier levels -40 to +60 dBmV. AUTO INSPECT P/V TEST: Amplitude Resolution: 0.1 dB. Amplitude Accuracy: ± 1.0 dB. Range: Any two carrier levels -40 to +60 dBmV. AUTO INSPECT FLATNESS TEST: Amplitude Resolution: 0.1 dB. Amplitude Accuracy: ± 1.0 dB. Range: Calculated from any carrier with levels from -40 to +60 dBmV
LNB Power	18V @ 300 mA for 3 hours (does not apply to 970)

All specifications subject to change without notice.

QAM Accessory List

Supplied Accessories	Power Adapter
Optional Accessories	Carrying Case

SENCORE

Success

To succeed, you need to challenge your capabilities,
accept and ask for help when needed,
and stay focused toward the future.

TS100
"Hands-On" Computer Monitor Troubleshooting
(one full day)

Course topics include:

- Computer monitor familiarization
- Troubleshooting signal processing circuits
- Troubleshooting sync, mode switching, and power management circuits
- Troubleshooting deflection and high voltage regulator circuits
- And much more!

If you want to learn what it takes, or just need a refresher on how to service computer monitors – this course is what you've been dreaming of.



TS300
"Hands-On" Television Troubleshooting
(one full day)

Course topics include:

- Troubleshooting horizontal and vertical deflection circuits
- Conventional TV troubleshooting methods
- Troubleshooting and isolating defects without a schematic
- In-home troubleshooting methods

The TV technician today is faced with troubleshooting more complex circuits, both on the bench and in the home. This course will give you what it takes to improve your bench TV troubleshooting skills and enhance your ability to service TVs in the home.

TS400
"Hands-On" Switch Mode Power Supply *(one full day)*

Course topics include:

- Conventional power supply basics
- Common SMPS circuit configurations
- Troubleshooting Pulse Width Modulation SMPS
- Troubleshooting Pulse Rate Modulation SMPS
- Analyzing SMPS components

Tough switch mode power supplies made easy in just one day. Hard to believe, but true. You'll quickly learn what it takes just like thousands of other technicians who have been through this exciting, informative course.

SENCORE

TC100CD

Computer Monitor Service Training Course – Available on CD ROM

Course topics include:

- Overview of computer monitor
- Servicing Safety
- Scan frequencies, pixels, and blanking times
- Troubleshooting techniques
- Switch mode power supplies
- Vertical deflection
- Horizontal deflection/high voltage
- Sync, multimode, and multiscan
- Video amplifiers
- CRT circuits
- Component testing

The new TC100CD teaches fast, efficient computer monitor troubleshooting using practical troubleshooting knowledge you can immediately use in your business. The TC100CD brings new technicians up to speed on monitor repair quicker, increasing their efficiency to the level of an experienced technician. Complete with section checks and tests to track the learning progress of your technicians, this interactive computer based training makes learning interesting and fun.

TC100T

4½ Day "Hands-On" Computer Monitor Course

Course topics include:

- Switch mode power supply troubleshooting
- Multi-sync/multi-scan horizontal deflection circuit troubleshooting
- Vertical deflection circuit troubleshooting
- Computer monitor performance testing
- Video, sync, and mode circuit troubleshooting
- Plus much more!

Qualify to receive 3 CEU Credits.

Do you have what it takes to handle an intense 4½ days of technical training on computer monitors at the Sencore factory in Sioux Falls, South Dakota?

Sure this class is tough, but when you leave, you will know how to fix computer monitors from the input connector to the CRT and have a troubleshooting certificate to prove it!

TC100

Computer Monitor Troubleshooting Self-Study Guide

Course topics include:

- Troubleshooting switch mode power supplies
- Troubleshooting horzontal deflection circuits
- Troubleshooting vertical circuits
- Performance testing
- Troubleshooting video, sync, and mode circuits
- And much more!

This guide is a comprehensive, yet easy-to-use training course designed to help you become more efficient at computer monitor servicing. The course provides you with in-depth troubleshooting information on all of the complex monitor circuits, such as: switched mode power supplies, horizontal outputs, and CRT circuits. The Self Study Guide is great for everyone from technicians to instructors.

TT400

"Hands-On" Switch Mode Power Supply Course

New!

Includes:

- 3 power supplies with 'switch in' problems
  - Linear
  - Pulse rate modulated
  - Pulse width modulated
- Trainer base
- Universal Power Supply Load (PSL60)
- Self-Study Work Book
- Storage Case
- Certification Exam

SENCORE

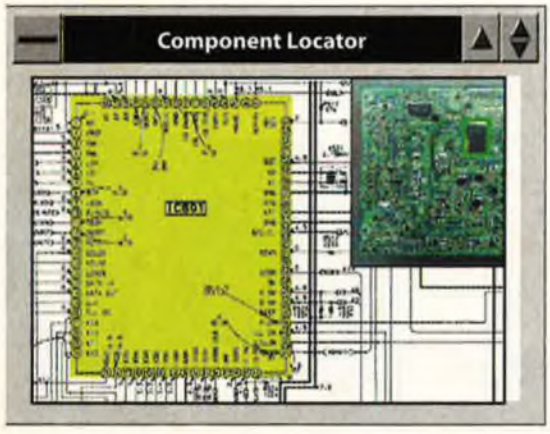
Now gain the knowledge and experience needed to become proficient in using test equipment to troubleshoot switch mode power supplies

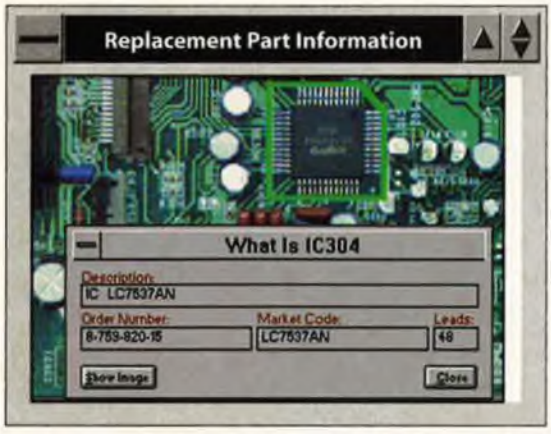
- Learn how to recognize common switching power supply types and problem symptoms
- Learn the functional stages and theory of the operation of switching mode power supplies
- Learn the effective troubleshooting procedures to isolate defects to the power supply or load circuit
- Learn the key test points among power supplies and the normal voltages or waveforms to expect at key test points
- Learn how to use test equipment to analyze symptoms and effectively measure voltages and waveforms
- Learn effective troubleshooting step-by-step procedures to isolate the power supply defect to a functional area of the supply
- Apply troubleshooting procedures on problem supplies to gain experience in power supply troubleshooting

TechDisc Multimedia Service, Operation And Training Manuals

TechDisc for service technicians...

- Improve your service productivity and efficiency
- Save time searching for the part you need
- Instant access to training material helps you understand complicated circuits
- Increase your profit on every product you service





TechDisc is a new multimedia service and training tool designed to increase the productivity of professional service technicians. TechDisc is loaded with critical service information that enables you to fix equipment faster, avoid common errors, achieve higher servicing performance and improve your skills and technical knowledge while you work.

TechDisc Delivers These Dynamic Features

TechTour – *Instant access to critical data on circuit theory and operation while you work. Eliminate flipping through pages of training manuals to find the information you need.*

Repair – *Step-by-step trouble trees with digital photographs of the circuit board to highlight test points. Helps you localize faulty components faster than ever.*

Printing – *All TechDisc information is printable so you can take a hard copy back to your bench... if you choose.*

Request The TechDisc Solution

Sencore is currently working with consumer and computer electronics manufacturers to convert their service and training material to the TechDisc format. Encourage the manufacturers you work with to consider the TechDisc solution.

techdisc™ by SENCORE

Call Sencore for available TechDisc Interactive Service Manual titles.

1-800-SENCORE (736-2673) Direct (605) 339-0100

TechDisc for manufacturers...

- Reduce learning time on your product 30-45%
- Reduce training costs (20% first year)
- Improve customer service while decreasing support costs
- Eliminate printing costs
- Get your customers up to speed faster on your product

With the cost of telephone support, field training, and servicing going through the roof, a new, affordable medium is needed for delivering critical product and service information to your customers and your service and support network.

Improve Productivity And Cut Costs With The TechDisc Solution

TechDisc is a new CD-ROM based, multimedia service and training tool designed to increase the productivity of the people that use, service, and support your products. TechDisc lets you package knowledge, procedures, and expertise and make it available to field engineers, customer service representatives, technical trainers, and your customers. High resolution photographs, audio clips, full motion video and animated graphics capture details, illustrate concepts, and demonstrate procedures quickly and comprehensively.

TechDisc provides critical information in real time, aiding efficient service and repair completion. TechDisc provides servicers a quantum increase in repair productivity with the power of interactive multimedia. TechDisc provides your customers quick access to the information they need to become proficient on your product faster. In addition, TechDisc significantly drives down your field training and telephone support costs by providing each of your customers and servicers with the critical information they need.

Two Ways To Get Started With TechDisc

First, with Sencore's TechDisc publishing system and digital production studio, our team of professional technical trainers, content authors, and multimedia developers can shape your existing support and training material into a cohesive, media-rich, interactive service and training product.

Or, Sencore can install a TechDisc Publishing System at your location. Our professional trainers work with your development staff to bring them up to the confidence level of efficiently creating your own highly interactive multimedia manuals.

Contact Sencore to find out how you can deliver critical service and training information with **TechDisc Multimedia Service, Operation, and Training Manuals.**

Sencore offers a complete selection of accessories to enhance the use of your Sencore instruments. The accessories listed in this section include some of our most popular items such as: probes, test leads, carrying cases, batteries, and other custom items. Not all accessories are listed in this section. If you have an accessory question or would like to know all the accessories for your Sencore instrument, give your Area Sales Representative a call at **1-800-SENCORE**.

39G266 Synchronizing Inter-Connect Cable
Provides a connection between the VG91 Universal Video Analyzer's accessory output jack and the input jack of the TVA92 TV Video Analyzer or future accessories. This sturdy cable is designed for years of durable use.

HP200 50 kV DC High Voltage Probe
Just slip this probe over the standard Sencore meter probe and measure DC voltages to 50,000 volts. Use with any Sencore 15 megohm input digital meter. This probe increases your meter's range 100 times and increases the meter's input impedance to 1500 megohms. The HP200 provides the safety and protection you need for all types of high voltage testing.

TP212 10 kV DC, 1% Transient Protector Probe
Extend the input protection and measuring capabilities of your Sencore meter to 10,000 volts DC. This durable probe prevents damage and downtime each time it protects your instrument from high voltage surges. The TP212 increases the input impedance of your meter from 15 megohms to 150 megohms.

DP213 Universal Meter RF Detector Probe
Use this low cost RF detector probe to trace RF signals. The DP213 converts the RF signal to DC for easy measuring by a DC voltmeter. The supplied conversion chart helps to determine the RF level applied. Usable to 250 MHz.

TP225 "Sure-Hold" Alligator Clip Adapter Probe
Convert any standard alligator clip into a "sure-hold" test clip. This durable probe lets you make measurements in "tight fit" circuits because the nose of the probe is narrow enough to clip onto the leg of a transistor or a pin of an IC. Purchase a "sure-hold" alligator clip adapter probe for each instrument you own.

DP270 Direct Probe For The SC3080 & SC3100
Connect directly to the DCV input jacks of the SC3080 and SC3100 "AUTO TRACKER." This special probe lets you take a separate DC voltage measurement while viewing a different waveform on the scope's CRT.

BY234 12 Volt Rechargeable Battery
For use with many of Sencore's portable instruments including the Z Meters, PA81, ST66, SR68, and FC71. These heavy duty, rechargeable, lead acid batteries are guaranteed to provide hours of continuous operation. On GSA Contract
(See page 67)

PA251 AC Power Adapter For Portable Z Meters
Use this special power adapter to operate Sencore's portable Z Meters. It is protected to 1500 volts (DC plus peak AC) to protect your instrument when it is necessary to float the common lead above earth ground. These Sencore instruments can be equipped with rechargeable batteries, in which case the PA251 also serves as a battery charger.

AN210 Frequency Counter Pick-up Antenna
This pick-up antenna lets you measure the output frequency of a transmitter by simply counting the RF transmitted through the air. Just connect this adjustable antenna to the 50 ohm or 1 megohm input of the FC71 and measure off-the-air frequencies of commercial AM, FM, TV, hand-held transmitters, and mobile radios – all without any time consuming connections.

FC221 Capacitor/Inductor Field Calibrator
This handy calibration tester lets you confirm your Z Meter is within its published specification. Low drift capacitors and inductors are individually compared to Sencore's NBS traceable standards, and their exact value written on the FC221 front panel. Note: These standards are only accurate with the dynamic DC tests used by our line of "Z Meters". We suggest that you return your FC221 to the Factory Service Department whenever you return your unit for service or calibration so the calibration of the FC221 can be rechecked against our standards.

SCR250 SCR & Triac Accessory For Any Z Meter
Tests all SCRs and triacs with dynamic, reliable tests. The SCR250 is completely isolated and dynamically tests components at their full working voltage (up to 1000 volts). The controlled internal battery supply tests sensitive gate SCRs while guaranteeing turn-on of the most demanding high current industrial SCRs and triacs. The SCR250 is easy to set up and you don't need any specifications. Just select the test, push a button, and test. You'll never again have to guess whether or not an SCR or triac is good. On GSA Contract (See page 67)

CH255 Component Holder
A timesaving test fixture for the Sencore line of Z Meters. This holder allows you to test axial and radial lead components without hooking up test leads each time. Fully adjustable to test any size component.

CH256 Chip Component Test Lead
A specially designed test lead for the Sencore line of Z Meters. The special prongs on the end allow you to test clip-type or surface mount components. Gives you the satisfaction of testing these tiny components with confidence. On GSA Contract (See page 67)

SR280 Synchronous Router For VIG791
This signal insertion device provides high reliability loop-through of live video program and convenient VITS insertion without program interruption. Used with the VIG791 CATV VITS Insertion Generator, the SR280 permits testing without interruption to the customers' signals. Install additional routers permanently in the video path for future troubleshooting and measurements without channel service interruption.

CC237 Black Plastic Lead Pouch
This "kangaroo" pouch fits any instrument larger than 8 x 11 inches. It uses tough Velcro strips that you can apply in the field. No special glues or applicators needed.

CC254 Z Meter Carrying Case
This handy carrying case is recommended for the protection of the portable Z Meters (LC76, LC77, & LC102). The stylish CC254 is waterproof and padded to prevent damage caused by portable use. Featured are three pouches, one for application manuals and two for extra batteries or leads, allowing you to take everything you need in one case. And it's washable for years of attractive use.
(Meter not included.)

PC259 Dust Cover And Lead Storage Compartment
Use this snap-on cover to help keep your instrument's (SG80, PA81, PM82, VG91, TVA92, VC93, CVA94, VSA794, or SC3100) front panel looking like new. Built-in lead compartment stores leads and tools during portable use. Made of high impact, tough ABS plastic for extra strength and durability.

CC271 Protective Carrying Case
The protective carrying case provides additional protection and easy carrying for the SL750A and SL750M plus accessories. The CC271 is field installed without tools and insulates your SL750A against the knocks and bumps that are typical of everyday field use. The additional protection will help keep your SL750 looking new longer and working long after other equipment has failed.

CC276 Protective Carrying Case For The SL753D
This protective carrying case provides additional protection and easy carrying for the SL753D. The CC276 insulates your SL753D against the knocks and bumps that are typical of everyday field use. The additional protection will help keep your SL753D looking new longer and working long after other equipment has failed. Plus, the SL753D can be operated through the vinyl window without removing the unit from the protective carrying case and is field installed without tools. *(Meter not included.)*

CC277 Protective Carrying Case For The CA780
The CC277 protective carrying case for the CA780 provides additional protection against the bumps and bruises of everyday field service work. The CC277 also provides handy storage pockets for the PA273 charger and test leads. The additional protection provided by the CC277 will help keep your CA780 looking new and working long after other equipment has failed. *(Meter not included.)*

Sencore's Value Added Business Building Resources

Call your Area Representative for a sample of any of the items listed below. You'll find they're geared to help make your business run as smoothly as possible, while helping to keep you profitable.

4979	Guarantee of Performance (VCR Certification Sticker)	6538	Helpful Methods To Make Accurate Estimates
6072	10 Ways To Add Profits To Your Business	6632	CR7000 Picture Tube Guarantee Certificate
6412	Guide To Repairing Lightning Damaged Sets	6713	Protect Yourself And Your Family (PR570 Poster)
6457	Technical Guide To Servicing Computer Monitors	6714	Computer Monitor Business Building Package
6528	Guide To Accurate & Profitable TV Servicing	66K273	Safety Certified Sticker (PR570)

Call 1-800-SENCORE, Today!

Sencore Store

Sencore now has "Sencore" clothing available for you! Our store consists of hats, short and long sleeve shirts with a Sencore logo embroidered on them.

(See sizes and colors available below.)

$29.95 All Long Sleeve Shirts
$19.95 All Short Sleeve Polos

Colored Shirts are 100% Cotton Twill Denim Shirts are 100% Cotton Denim Polos are 100% Combed Cotton Pique

The shirts & hats are marked with a # Use this # to identify Style & Color on the order form.

$7.00 Hats

Hats have an adjustable strap on the back.

HAT/SHIRT ORDER FORM

Item # (See Photo.)	Quantity	Size	Price/Each	Total Price

S & H: Add $5 for every hat/shirt ordered. Call for special pricing when ordering more than two.

Sub Total:$ _____
SD Res. add 6% sales tax:$ _____
Shipping & Handling:$ _____
Total Order Dollar Amount: $ _____

Select Payment Option
☐ Check Enclosed
OR
☐ VISA ☐ MC

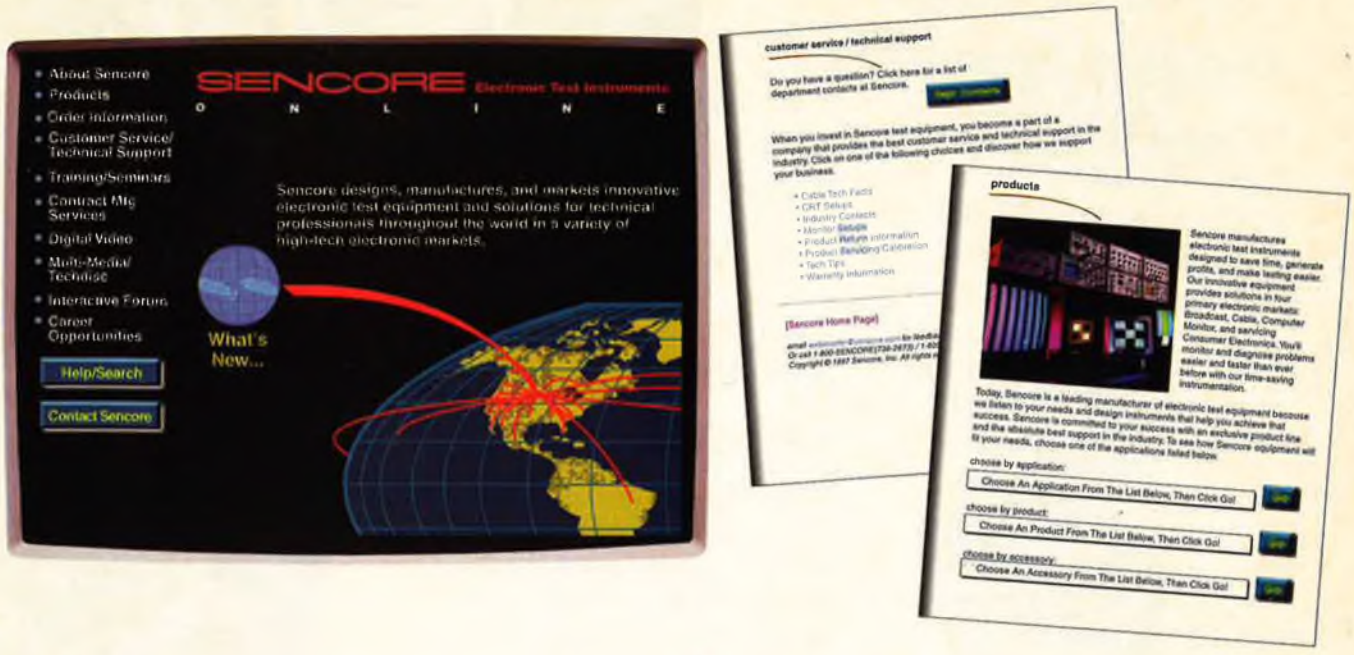
Acct# _____
Signature _____
Exp Date: _____

Name _____
Address _____
City _____ State _____ Zip _____
Ph# (_____) _____-_____

Mail a photo copy of the order form to:
SENCORE STORE, 3200 Sencore Drive, SF, SD 57107
or FAX Order Form To: (605) 335-6379

Special Full Line Catalog Offer
Denim Shirts Only $20.95

Sencore's Homepage – www.sencore.com



- What's New - keeps you up-to-date with Sencore
- About Sencore - see how Sencore got its start
- Products - complete explanation with specs and photos
- Order Information - easily enter your order for immediate processing
- Customer Service/Technical Support - if you have a question for Sencore
- Training/Seminars - complete up-to-date schedule
- Digital Video - new line of broadcast quality instruments
- Contract Manufacturing Services - check out this opportunity to have Sencore build you product
- Multi-Media/Techdisc - interactive CD ROM training material and manuals
- Interactive Forum - communicate directly with Sencore or other technicians
- Career Opportunities - see what available for a career with Sencore
- Contact Sencore - here's how you can contact anyone at Sencore

Now you can go to www.sencore.com 24 hours a day and discover facts and information about every facet of Sencore. From product information to our interactive forum, you'll have the information at your fingertips to learn more about our products and our company before you make that next important investment decision.

Our new "Interactive Forum" section gives you the chance to visit with technicians all over the world or to ask Sencore a technical question. New products announcements and updates to training seminar schedules are always available in our "What's New" section. Plus, our "Contract Manufacturing Services" and new "Techdisc Multi-media" are covered in detail.

So, if you're surfing the web, look us up at www.sencore.com.

General Service Administration Federal Supply Schedule
Authorized Federal Supply Schedule Price List

July 1,1996

FSC Group 66 Part II Section J

INSTRUMENTS AND LABORATORY EQUIPMENT

FSC CLASS: 6625 **CAGE CODE:** 33347

CONTRACT NUMBER: GS-24F-0812A

CONTRACT PERIOD: 07/16/93 - 5/31/98

CONTRACTOR'S NAME SENCORE INC.

ADDRESS: 3200 SENCORE DRIVE

SIOUX FALLS, SOUTH DAKOTA 57107-0724

605/339-0100 800/736-2673 FAX 605/339-0317

ADMINISTRATION SOURCES: Same as above

BUSINESS SIZE: Small

GSA Federal Supply Schedule

SIN	MODEL NUMBER	DESCRIPTION
627-10	TF46	Portable Super Cricket Transistor /FET Tester
627-20	VG91	Universal Video Generator
627-4	TVA92	TV Video Analyzer
627-4	VC93	All Format VCR Analyzer
627-4	CVA94	"Video Tracker"™ Camera Video Analyzer
627-31	LC102	"AUTO-Z"™ Automatic Capacitor/Inductor Analyzer
627-31	BY234	12 Volt Rechargeable Battery
627-31	SCR250	SCR And Triac Accessory For Any Z Meter
627-31	CH256	Chip Component Test Lead
627-4	PR570	"POWERITE II"™ AC Power Supply
627-4	SL753D	"CHANNELIZER"™ Signal Level Meter
627-4	SL754D	Hand-Held "CHANNELIZER"™ Automatic Signal Level Meter
627-4	CA780	"CABLEIZER"™ Metallic Cable Analyzer
627-4	CM2125	Computer Monitor Analyzer
627-4	HA2500	Universal Horizontal Analyzer
627-1	SC3100	"AUTO TRACKER"™ Automatic 100 MHz Waveform & Circuit Analyzer
627-10	CR7000	"BEAM-RITE"™ CRT Analyzer & Restorer

You can't make a wrong buying decision when you say "yes" to investing in Sencore test equipment. You're not investing in just an instrument, you're investing in your own piece of an entire organization dedicated to making you more successful. Here are our promises to you:

30 Day Money Back Guarantee

Sencore's no-nonsense 30 day money back guarantee assures you that you've made the right choice. Every Sencore instrument and accessory is covered by this guarantee of satisfaction. Simply stated:

> "If you are not completely satisfied with any Sencore instrument, you may return it during the first 30 days and we'll give you a full refund, including freight, no questions asked."

You're always sure you've made the right decision when you say **"yes"** to a Sencore investment.

Product Warranty

Every Sencore instrument is warranted for one year against defects of any cause except acts of God and abusive use (three years for Sencore hand-held signal level meters). During this warranty period, Sencore will correct any covered defect without charge for parts, labor, or recalibration.

Made Right Guarantee

We guarantee your Sencore instrument was "Made Right" or we will make it right without charge for parts and labor for as long as you own the instrument. This lifetime guarantee covers any defects caused by faulty design or workmanship errors. All parts and labor necessary to correct a workmanship defect covered by this guarantee will be at no charge to you. There will be a recalibration and handling charge if the instrument is no longer covered by Sencore's one year warranty.

Service

Sencore's service for repairs on out-of-warranty Sencore instruments covers parts and labor for 120 days from the date of repair. Under this warranty, your instrument is guaranteed to be free of the same defect(s) for 120 days or we'll repair the problem at no charge for parts or labor.

Here's How To Order:

Call Our Toll-Free Number, 1-800-SENCORE (736-2673)

A friendly and knowledgeable Sales Representative will assist you with your test equipment needs. The same toll-free number puts you in touch with:

- Application Engineers for technical consultation on instrument use
- Service Technicians for quick field repair tips
- An entire factory of people dedicated to making you and your business more successful

Flexible Investment Options

Sencore gives you easy purchasing terms at low rates.
Your options include:

- Net 30
- 2 to 5 month split payment plan
- 6 to 48 month "Pay As You Grow" investment plans that include add-on with zero dollars down, on approved credit
- MasterCard or VISA
- COD or cash in advance

Fast Product Delivery

Most Sencore products are in stock and are shipped within 48 hours of receipt of your order – guaranteeing you maximum productivity right from the start. Overnight delivery is available for immediate needs.

We Stand Behind Everything We Sell

If you're not satisfied with your investment of Sencore equipment for any reason, just return it within 30 days. We'll give you a full refund, no questions asked.

Call Now!

1-800-SENCORE (736-2673)

Fax (605) 339-0317

SENCORE
3200 Sencore Drive, Sioux Falls, SD 57107
Phone: (605)339-0100 Fax: (605)339-0317

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