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JUNE 1980/95¢

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● How they work ● How to buy ● What's coming up



Carl Warren Talks About the "Source" and "MicroNet" Computer Time-Sharing Systems

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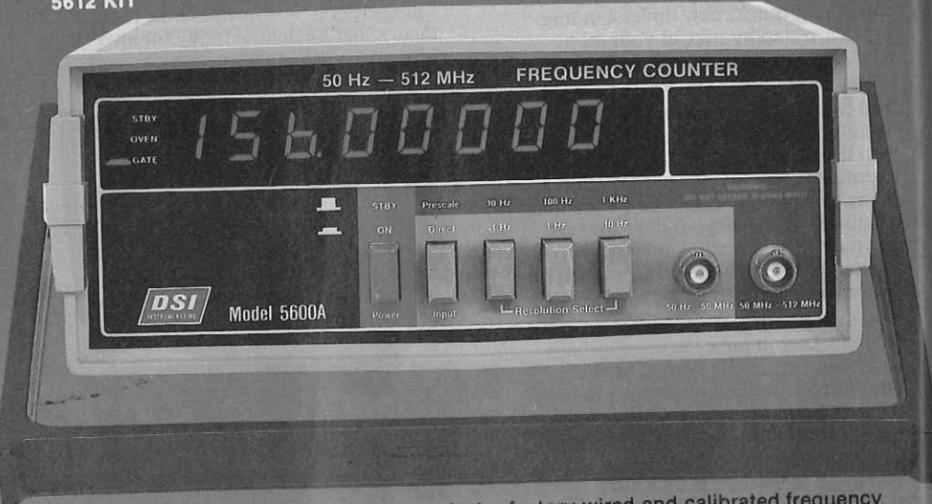


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				@ 100Hz-25MHz	@ 50-250MHz	@ 250-450MHz			
5600A-Kit	\$169.95	50Hz-550MHz	Proportional Oven .2 PPM 10° - 40° C	10-25mv	10-15mv	15-50mv	9	*115 VAC or 8.2-14.5 VDC	3 1/4" x 9 1/2" x 9"
5600A-Wired	\$199.95								
5612Kit	\$199.95	50Hz-1.2 GHz	Proportional Oven .2 PPM 10° - 40° C	10-25mv	10-15mv	15-50mv	9	*115 VAC or 8.2-14.5 VDC	3 1/4" x 9 1/2" x 9"
5612 Wired	\$239.95								
5500 Wired	\$109.95	50Hz-512MHz	TCXO 1 PPM 17° - 40° C	10-25mv	15-25mv	25-75mv	8	115 VAC or 8.2-14.5 VDC or NICAD PAK.	1 1/2" x 5" x 5 1/2"
5510 Wired	\$139.95	50Hz-1GHz							

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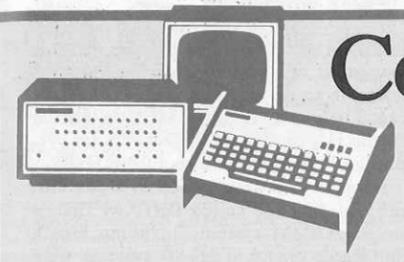
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Computer Bits

By Carl Warren

Time-Sharing Systems

IT now can be said that personal computers have truly "grown up." The reason? They can access and use large data bases and have, in addition, the facilities of electronic mail.

Low-cost time-sharing offering these capabilities exists now and has been available for almost a year. Specifically, Telecomputing Corporation of America's (TCA) "Source" network and CompuServe's "MicroNet" system have made this feasible. Both systems are outgrowths of commercial concerns, but at lower costs during off-prime-time hours. The two systems make use of commercial computer networks (Tymnet and Telenet). CompuServe has its own proprietary network at lower cost and higher efficiency; but in certain cities, it utilizes the Tymnet network. Either one of the timesharing systems for the personal computer user can be of major benefit, since they both offer the following features:

- Access to several major data bases including the New York and American stock exchanges.
- Ability to send messages to other users either privately, or to all users at one time.
- Ability to correspond on-line with another user for "real time" message switching. This is a major feature with the Source, but of less importance to the MicroNet people.
- Availability of several high-level languages. Both systems offer BASIC, Pascal, Fortran, assembly language and a variety of other command languages.
- Access virtually from anywhere in the United States. However, there are some things to watch out for, which will be discussed later.
- Relative low cost when compared with commercial systems costs and what it would take to develop similar data bases.

Choosing a Time-sharing Network. This decision can be as important as the one you made when buying your first personal computer. Although both the Source and MicroNet are similar in several respects, they do differ in what they offer in terms of cost, functions offered, user software, and user interaction in the form of download capabilities.

The Source requires a \$100 one-time charge as a subscription fee. This fee covers initial costs of signing on to the system and gives you the necessary access numbers, password, and a 48-page loose-leaf notebook that covers fundamentals of us-

ing the system. Once you are on the system, the basic charge is \$2.75 per hour of connect time based on one-minute intervals. There is no charge for computer time or System Resource Units (SRUs). The connect time is based on nonprime-time hours of 6 p.m. to 6 a.m. local time, weekends and certain holidays. Charges during prime hours are calculated at the rate of \$15 per hour. This rate also applies to building programs that require more than 64K of user memory. However, large, over 64K, Source-Written programs can be used at the \$2.75 per hour rate, according to company officials.

The Source network is built around Prime minicomputers and, as a consequence, software that is available reflects functions associated with the Prime system. TCA does offer complete sets of documentation for the different languages at prices ranging from \$5 to \$20.

The MicroNet service, on the other hand, is a time-sharing system built around a cluster of ten Digital Equipment Corporation PDP 10s. Therefore, all software offered is DEC quality and compatible with most micro-based software. (A number of system software writers for microcomputers used DEC as a model.)

Furthermore, the MicroNet service has a different pricing structure than the Source. Its subscription fee is a surprisingly low \$9.00 one-time charge. As with the Source, this brings you the access number and password which you define and can change yourself at anytime, and an extremely well prepared 71-page user's manual covering all essentials of the system. Also provided with the manual are short update sheets that describe new features added and not yet incorporated into the manual. The manual is of central importance from a user's standpoint, of course. This one is typeset, making it easier on the eyes, and presents necessary commands in a tutorial format.

Everything that is in the manual is du-

plicated on the system. So the user can always obtain data on how to use a specific function by either asking for it or simply typing HELP. Connect time for MicroNet is \$5.00 per hour timed at one-minute intervals, during the nonprime-time hours of 6 p.m. to 5 a.m. No provisions have yet been made for prime-time operation.

Like the Source, users' guides are available for a fee. However, MicroNet has extended the philosophy a bit and is offering a number of documents via the net. And all it costs is the connect time. According to John Meier, the MicroNet marketing manager, as time goes by and various copyright clearances are received, more documents will be available directly through the system.

Getting the Most Out of a Networking System. This is a matter of prime importance since dollars are involved. One complaint has been that, even though both systems offer connect service through telephone ports around the country, the cost really adds up. For example, I live in a suburb of Los Angeles. The direct private network number for MicroNet is a Los Angeles number which costs 16 cents for the first minute of use and 10 cents for every minute or partial minute thereafter during peak hours—before 5 p.m. After 5 p.m. the cost is 30% less, but still significant. In some areas, this can represent a fair amount of dollars. What you might want to do is use the Tymnet system, which costs an additional \$4.00 an hour on MicroNet, but would in most cases still represent a saving. For the Source, the Tymnet and Telenet charges are part of the \$2.75 per hour connect time. A great deal of care must be taken to check your local phone book to get the area code for the phone number you are calling and to see if any toll charges exist.

Based on the foregoing, it would appear that a major disparity exists in the pricing structures used by the two systems, when in fact they are almost equal! The equality does not come from the direct pricing, but in the method of charging for various services. The Source makes an extra charge for anything over 64K. MicroNet allows you up to 128K at no extra charge and gives free storage, while the Source charges 3.3 cents per block (2048 characters) of storage per month.

The Equipment Required. To get on a system, you may need only a terminal with a modem or a full-blown microcom-

The Model TC 3002, originate/answer acoustic coupled modem, from Tek-Com, provides a build-in direct-access connector and virtually noise-free coupling.



puter system may be required. A number of manufacturers such as Apple, Heath and Radio Shack offer modems and have communication software available to assist in transferring and manipulating data between the network and small system. Whatever you plan to do, a good modem is imperative! Many such devices are on the market and offer different capabilities and price ranges. The Tek-Com TC 3002 coupler pictured here as an example is a heavy-duty model that's made for the commercial world. The originate/answer coupler is priced at \$265. Couplers made

especially for home computer users are generally about \$65 to \$70 less.

Available Software. To make a microsystem emulate a terminal and provide uplink/downlink functions, there are a number of packages available. On the MicroNet system, there is executive software for the Apple and Radio Shack TRS-80 that performs this function. They even provide a loader to allow downloading of the executive into your system for future use. All at no cost.

Gerry Kabelman, at the Heath users

group (HUG), called to tell me about a new piece of software they are making available to perform system communication. The package, called MCS, is written for the Heath H8 and H89 computer systems and sells for \$18 direct from HUG.

Lifboat Associates also has a communication package called BSTAM that is for any CP/M system, including Heath and Radio Shack TRS-80 systems with modified versions of CP/M. This package sells for \$150.

MORE INFORMATION

Additional information about products discussed in this column can be obtained by contacting the companies:

Compuserve (MicroNet)
Personal Computing Division
5000 Arlington Centre Blvd.
Columbus, OH 43220
614-457-8600

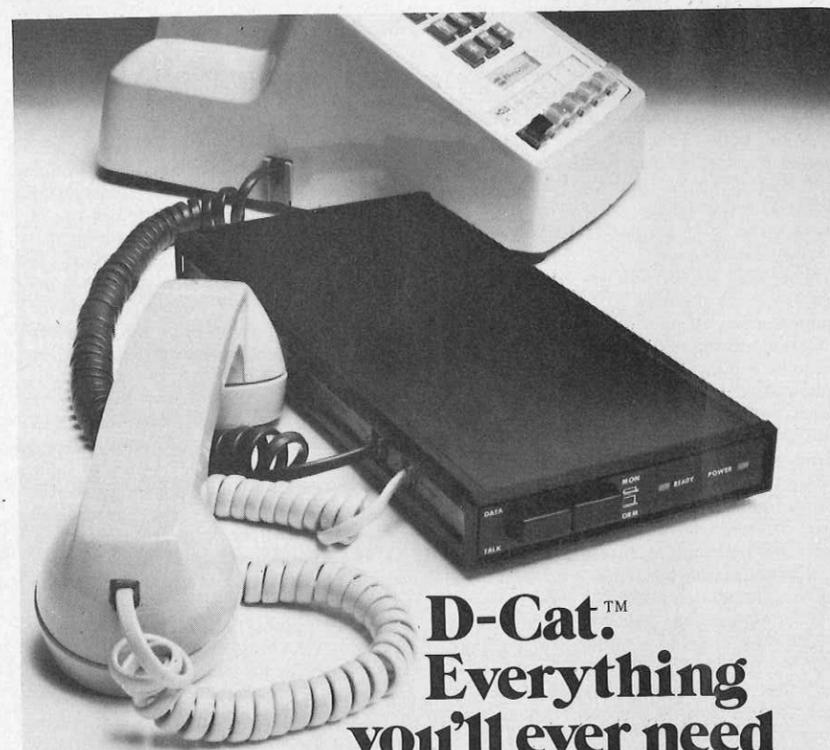
Heath Users Group (HUG)
Hilltop Road
St. Joseph, MI 49085

Lifboat Associates
2248 Broadway
New York, NY 10024
212-580-0082

Telecomputing Corporation of America (TCA)
1616 Anderson Rd.
McLean, VA 22102
800-336-3330

Tek-Com
2142 Paragon Dr.
San Jose, CA 95131
408-263-7400

Conclusion. To get the best value dollar-wise from these time-sharing networks, both companies, TCA and CompuServe, recommend that users with micro-computer systems prepare as much of the work as they can offline, then use the network to either pass information into users' files or gather updated data, such as stock information. This way, minimum time can be spent on the network and excessive connect costs are avoided.



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ELF II Explodes Into A Giant!
Master ELF II's \$99.95 capabilities, then expand with GIANT BOARD... KLUGE BOARD... 4k RAM BOARDS... TINY BASIC... ASCII KEYBOARD... LIGHT PEN... ELF-BUG MONITOR... COLOR GRAPHICS & MUSIC SYSTEM... TEXT EDITOR... ASSEMBLER... DISASSEMBLER... VIDEO DISPLAY BOARD... and, another great reason for getting your ELF II now—

BREAKTHROUGH!

Netronics proudly announced the release of the first 1802 FULL BASIC, written by L. Sandlin, with a hardware floating point RPN math package (requires 8k RAM plus ASCII and video display boards), \$79.95 plus \$2 p&h. Also available for RCA VIP and other 1802 systems Board includes area for a ROM version.

Master This Computer In A Flash!

Regardless of how minimal your computer background is now, you can learn to program an ELF II in almost no time at all. Our *Short Course On Microprocessor & Computer Programming*—written in non-technical language—guides you through each of the RCA COSMAC 1802's capabilities, so you'll understand everything ELF II can do... and how to get ELF II to do it! Don't worry if you've been stumped by computer books before. The *Short Course* represents a major advance in literary clarity in the computer field. You don't have to be a computer engineer in order to understand it. Keystroke by ELF II, it's loaded with "hands on" illustrations. When you're finished with the *Short Course*, neither ELF II nor the RCA 1802 will hold any mysteries for you.

In fact, not only will you now be able to use a personal computer creatively, you'll also be able to read magazines such as BYTE... INTERFACE AGE... POPULAR ELECTRONICS and PERSONAL COMPUTING and fully understand the articles. And, you'll understand how to expand ELF II to give you the exact capabilities you need!

If you work with large computers, ELF II and the *Short Course* will help you understand what they're doing.

Get Started For Just \$99.95, Complete!

\$99.95 ELF II includes all the hardware and software you need to start writing and running programs at home, displaying video graphics on your TV screen and designing circuits using a microprocessor—the very first night—even if you've never used a computer before.

ELF II connects directly to the video input of your TV set, without any additional hardware, Or, with an \$8.95 RF modulator (see coupon below), you can connect ELF II to your TV's antenna terminals instead.

ELF II has been designed to play all the video games you want, including a fascinating new target missile gun game that was developed specifically for ELF II. But games are only the icing on the cake. The real value of ELF II is that it gives you a chance to write machine language programs—and machine language is the fundamental language of all computers. Of course, machine language is only a starting point. You can also program ELF II with assembly language and tiny BASIC. But ELF II's machine language capability gives you a chance to develop a working knowledge of computers that you can't get from running only

pre-recorded tape cassettes.
ELF II Gives You The Power To Make Things Happen!
Expanded, ELF II can give you more power to make things happen in the real world than heavily advertised home computers that sell for a lot more money. Thanks to an ongoing commitment to develop the RCA 1802 for home computer use, the ELF II today's—being introduced by Netronics—keep you right on the outer fringe of today's small computer technology. It's a perfect computer for engineering, business, industrial, scientific and personal applications.

Plug in the **GIANT BOARD** to record and play back programs, edit and debug programs, communicate with remote devices and make things happen in the outside world. Add **KLUGE (prototyping) Board** and you can use ELF II to solve special problems such as operating a complex alarm system or controlling a printing press. Add **4k RAM Boards** to write longer programs, store more information and solve more sophisticated problems.

ELF II add-ons include the **ELF II Light Pen** and the amazing **ELF-BUG Monitor**—two extremely recent breakthroughs that have not yet been duplicated by any other manufacturer.

The **ELF-BUG Monitor** lets you debug programs with lightning speed because the key to debugging is to know what's inside the registers of the microprocessor. And, with the **ELF-BUG Monitor**, instead of single stepping through your programs, you can now display the entire contents of the registers on your TV screen. You find out immediately what's going on and can make any necessary changes.

The incredible **ELF II Light Pen** lets you write or draw anything you want on a TV screen with just a wave of the "magic wand." Netronics has also introduced the **ELF II Color Graphics & Music System**—more breakthroughs that ELF II owners were the first to enjoy!

ELF II Tiny BASIC

Ultimately, ELF II understands only machine language—the fundamental coding required by all computers. But, to simplify your relationship with ELF II, we've introduced an **ELF II Tiny BASIC** that makes communicating with ELF II a breeze.

Now Available! Text Editor, Assembler, Disassembler And A New Video Display Board!

The **Text Editor** gives you word processing ability and the ability to edit programs or text while it is displayed on your video monitor. Lines and characters may be quickly inserted, deleted or changed. Add a printer and ELF II can type letters for you—error free—plus print names and addresses from your mailing list!

ELF II's **Assembler** translates assembly language programs into hexadecimal machine code for ELF II use. The **Assembler** features mnemonic abbreviations rather than numerics so that the instructions on your programs are easier to read—this is a big help in catching errors.

ELF II's **Disassembler** takes machine code programs and produces assembly language source listings. This helps you understand the programs you are working with... and improve them when required.

The new **ELF II Video Display Board** offers you a sharp, professional 32 or 64 character by 16 line upper and lower case display on your TV screen or video monitor—dramatically improving your unexpanded \$99.95 ELF II. When you get into longer programs, the **Video Display Board** is a real blessing!

Now Available!

A-D/D-A Board Kit includes 1 channel (expandable to 4) D-A, A-D converters, \$39.95 plus \$2 postage & handling.

PILOT Language—A new text-oriented language that allows you to write educational programs on ELF II with speed and ease! Write programs for games... unscrambling sentences... spelling drills... fill in the missing word! tests, etc. **PILOT** is a must for any ELF II owner with children. **PILOT Language on cassette tape, only \$19.95 postpaid!**

Game Package on cassette tape (requires 4k RAM), \$9.95 plus \$2 postage & handling.

Clip Here and Attach to Your Order Below!

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333 Litchfield Road, New Milford, CT 06776
Yes! I want my own computer! Please rush me—

Power Supply (required), \$4.95 postpaid
 RCA 1802 User's Manual, \$5 postpaid
 Tom Philman's Short Course On Microprocessor & Computer Programming teaches you just about everything there is to know about ELF II or any RCA 1802 computer. Written in non-technical language, it's a learning breakthrough for engineers and laymen. \$29.95 plus \$2.50 p&h.
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 I want my ELF II wired and tested with power supply, RCA 1802 User's Manual and Short Course—all for just \$149.95 plus \$3 p&h.

ALSO AVAILABLE FOR ELF II

GIANT BOARD™ kit with cassette I/O, RS 232-C/TTY I/O, 8 bit P I/O decoders for 14 separate I/O instructions and a system monitor/editor. \$39.95 plus \$2 p&h.
 KLUGE (Prototype) Board accepts up to 36 IC's. \$17.00 plus \$1 p&h.
 4k Static RAM kit. Addressable to any 4k page to \$89.95 plus \$3 p&h.
 Gold plated 86-pin connectors (one required for each plug-in board) \$5.70 ea. postpaid.
 Expansion Power Supply (required when adding 4k RAM) \$34.95 plus \$2 p&h.
 Professional ASCII Keyboard kit with 128 ASCII upper/lower case set, 95 printable characters, onboard regulator, parity, logic selection and choice of 4 hand-shaking signals to mate with almost any computer. \$64.95 plus \$2 p&h.
 Deluxe metal cabinet for ASCII Keyboard, \$19.95 plus \$2.50 p&h.
 Video Display Board kit lets you generate a sharp, professional 32 or 64 character by 16 line upper and lower case display on your TV screen or video monitor—dramatically improving your unexpanded \$99.95 ELF II. (Fits inside ASCII Keyboard cabinet.) \$89.95 plus \$2 p&h.
 ELF II Tiny BASIC on cassette tape. Commands include SAVE, LOAD, ±, ×, ÷, (,). \$9.95 plus \$2 p&h.

Deluxe Metal Cabinet with plexiglas dust cover for ELF II. \$29.95 plus \$2.50 p&h.
 Tom Philman's Short Course on Tiny Basic for ELF II. \$5 postpaid.
 ELF-BUG™ Deluxe System Monitor on cassette tape. Allows displaying the contents of all registers on your TV at any point in your program. Also displays 24 bytes of memory with full addresses, blinking cursor and auto scrolling. A must for the serious programmer! \$14.95 postpaid.
 Text Editor on cassette tape gives you the ability to insert, delete or edit lines and words from your programs while they are displayed on your video monitor. (Add printer and you can use ELF II to type error-free letters plus insert names and addresses from your mailing list.) \$19.95 postpaid.
 Assembler on cassette tape translates assembly language programs into hexadecimal machine code for ELF II use. Mnemonic abbreviations for instructions (rather than numerics) make programs easier to read and help prevent errors. \$19.95 postpaid.
 Disassembler on cassette tape takes machine code

26 variables A-Z, LET, IF/THEN, INPUT, PRINT, GO TO, GO SUB, RETURN, END, REM, CLEAR, LIST, RUN, PLOT, PEEK, POKE. Comes fully documented and includes alphanumeric, generator required, display alphanumeric characters directly on your TV screen without additional hardware. Also plays tick-tack-toe plus a drawing game that uses ELF II's hex keyboard as a joystick. 4k memory required. \$14.95 postpaid.
 Tom Philman's Short Course on ELF II, \$5 postpaid.
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 ELF II connects directly to the video input of your TV set without additional hardware. To connect ELF II to your antenna terminals instead, order RF Modulator, \$8.95 postpaid.
Coming Soon: A-D, D-A Converter, Controller Board and more!

programs and produces assembly language source listings to help you understand and improve your programs. \$19.95 on cassette tape.
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 ELF II Color Graphics & Music System Board kit. \$49.95 plus \$2 p&h.
 ELF II connects directly to the video input of your TV set without additional hardware. To connect ELF II to your antenna terminals instead, order RF Modulator, \$8.95 postpaid.
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By Netronics

ASCII/BAUDOT, STAND ALONE



Computer Terminal COMPLETE FOR ONLY \$149.95

The Netronics ASCII/BAUDOT Computer Terminal Kit is a microprocessor-controlled, stand alone keyboard/terminal requiring no computer memory or software. It allows the use of either a 64 or 32 character by 16 line professional display format with selectable baud rate, RS232-C or 20 ma. output, full cursor control and 75 ohm composite video output.

The keyboard follows the standard typewriter configuration and generates the entire 128 character ASCII upper/lower case set with 96 printable characters. Features include onboard regulators, selectable parity, shift lock key, alpha lock jumper, a drive capability of one TTY load, and the ability to mate directly with almost any computer, including the new Explorer/85 and ELF products by Netronics.

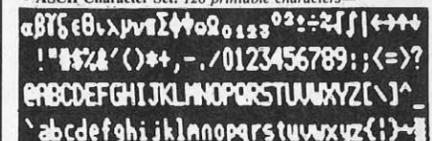
The Computer Terminal requires no I/O mapping and includes 1k of memory, character generator, 2 key rollover, processor controlled cursor control, parallel ASCII/BAUDOT to serial conversion and serial to video processing—fully crystal controlled for superb accuracy. PC boards are the highest quality glass epoxy for the ultimate in reliability and long life.

VIDEO DISPLAY SPECIFICATIONS

The heart of the Netronics Computer Terminal is the microprocessor-controlled Netronics Video Display Board (VID) which allows the terminal to utilize either a parallel ASCII or BAUDOT signal source. The VID converts the parallel data to serial data which is then formatted to either RS232-C or 20 ma. current loop output, which can be connected to the serial I/O on your computer or other interface, i.e., Modem.

When connected to a computer, the computer must echo the character received. This data is received by the VID which processes the information, converting to data to video suitable to be displayed on a TV set (using an RF modulator) or on a video monitor. The VID generates the cursor, horizontal and vertical sync pulses and performs the housekeeping relative to which character and where it is to be displayed on the screen.

Video Output: 1.5 P/P into 75 ohm (EIA RS-170) • Baud Rate: 110 and 300 ASCII • Outputs: RS232-C or 20 ma. current loop • ASCII Character Set: 128 printable characters—



BAUDOT Character Set: ABCDEFGHIJKLMNOPQRSTUVWXYZ [] ^ _ ` a b c d e f g h i j k l m n o p q r s t u v w x y z { | } ~
R S T U V W X Y Z . ? : * 3 \$ # () , - / 0 1 4 1 5 7 . 2 / 6 8 *
Cursor Modes: Home, Backspace, Horizontal Tab, Line Feed, Vertical Tab, Carriage Return. Two special cursor sequences are provided for absolute and relative X-Y cursor addressing.
Cursor Control: Erase, End of Line, Erase of Screen, Form Feed, Delete • Monitor Operation: 50 or 60Hz (jumper selectable).

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To Order From Connecticut Or For Technical Assistance, Etc. Call (203) 354-9375

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Please send the items checked below—

Netronics Stand Alone ASCII Keyboard/Computer Terminal Kit, \$149.95 plus \$3.00 postage & handling.
 Deluxe Steel Cabinet for Netronics Keyboard/Terminal in Blue/Black Finish, \$19.95 plus \$2.50 postage and handling.

Video Display Board Kit alone (less keyboard), \$89.95 plus \$3 postage & handling.

12" Video Monitor (10 MHz bandwidth) fully assembled and tested, \$139.95 plus \$5 postage and handling.

RF Modulator Kit (to use your TV set for a monitor), \$8.95 postpaid.

5 amp Power Supply Kit in Deluxe Steel Cabinet (±8VDC @ 5 amps, plus 6-8 VAC), \$39.95 plus \$2 postage & handling.

Total Enclosed (Conn. res. add sales tax) \$ _____
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