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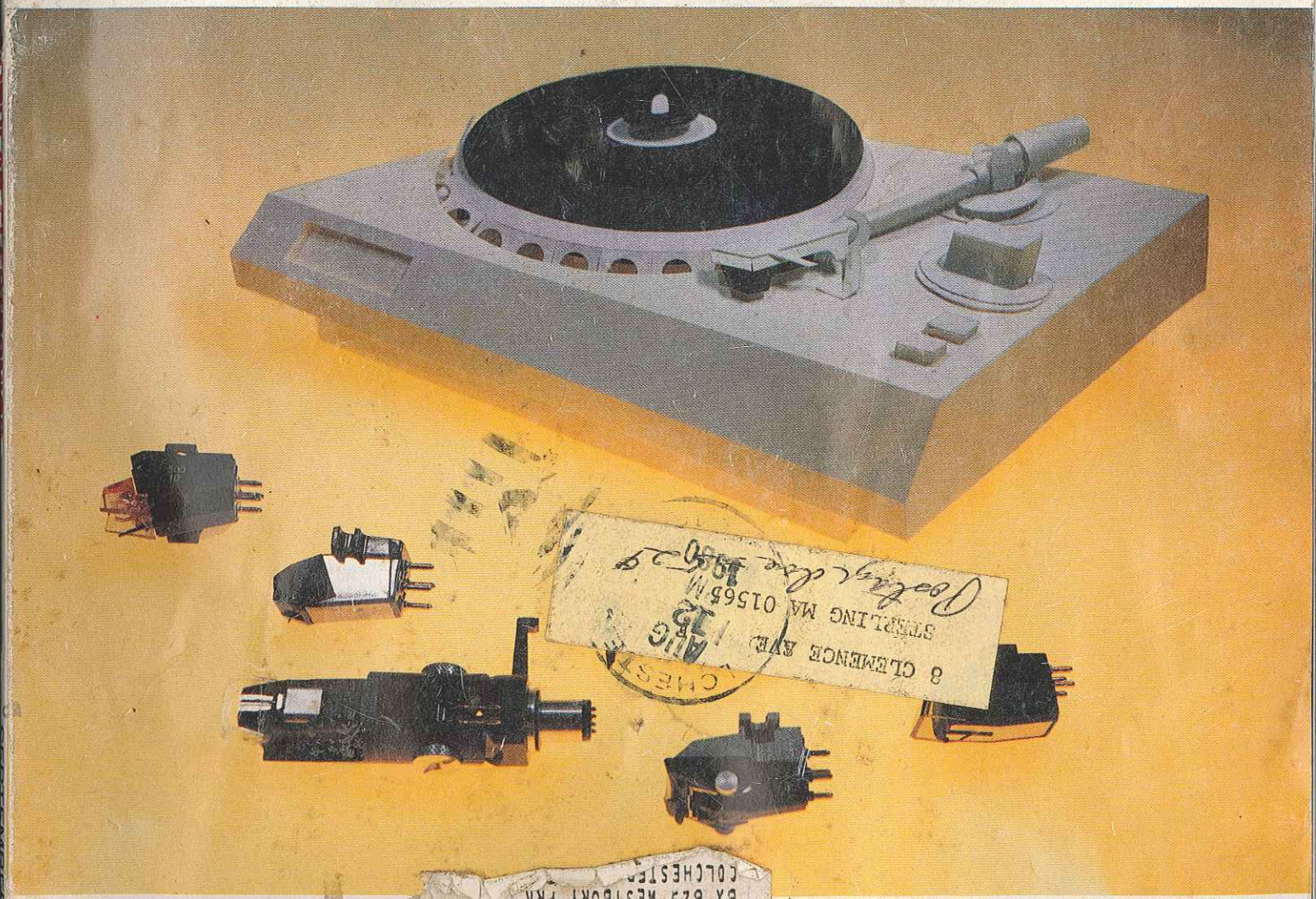
- TRS-80 Data Tape Conditioner
- Degree-Day Meter Monitors Heat Loss
- Measuring Large Currents With DMMs

PE Compares Six Phono Pickups



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Nakamichi Model TCD-440A Cassette Deck

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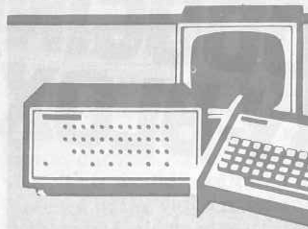


Computer Bits

By Carl Warren

New Equipment and Handy Hints

THIS past May, the latest model of Apple computer was introduced to the world. The new model, dubbed the Apple III, is designed for the small business field and, unlike the ubiquitious Apple II which had a base price tag of $1195, comes for a much healthier $4400. But look what you get besides expected graphics functions:

☐ An enhanced 6502 microprocessor that permits addressing up to 128K bytes of memory.

☐ 96K bytes of RAM, a built-in 5.25-in. floppy disk, a typewriter keyboard with 13-key numeric keypad, a 12-in black-and-white Sanyo monitor, and two built-in printer interfaces.

☐ What the company terms the Sophisticated Operating System (SOS). Features of this system include an integrated file system, and a device and event management system. Application software consists of Personal Software's Visicalc III, and a Mail list Manager. A Business BASIC is also included.

Apple III includes CPU, disk drive, keyboard, and video monitor.

A Sanyo color monitor, a letter-quality printer, and additional disk drives are also available as options. Customer deliveries of the system began this past June.

Apple isn't the only one making new system introductions. Motorola, has introduced its Exorset 30, a 6809 based machine. It carries a $5995 price tag and offers some very impressive features. Among these are: two built-in 5.25-in. floppy disks, a CRT display that can handle both alphanumeric and graphics, programmable timer for a real-time clock, and 48K bytes of RAM.

The built-in CRT on the Exorset 30 is of the 9-in. type and permits a 80 × 22 character presentation; for graphics a 256 × 320 dot pattern. You can also add a printer, and a very powerful BASIC is included. It would appear from all indications that this machine could very definitely become one of the major business machines—of course, this assumes full application software support is available.

Boards That Make Things Work. If you have a daisy-wheel printer that does just about everything you need but not all, then you might want the Daisy Brain®, from Wilker, Inc. This board is for the Diablo HyType or Qume daisy-wheel-type printers. The unit comes with 3K ROM, a 2K byte RAM buffer and a Z-80 microprocessor. What it does is give your printer the ability to handle right-margin justification, centering, columns, true proportional spacing, super- and subscripting, bold face, shadow printing, and underlining. The Daisy Brain, also permits both vector plotting and simple user control plotting. The board is priced at $1100.

Those of you that have the Radio Shack TRS-80 Model I and a yen to make use of the several hundred option boards designed for the S-100 bus will possibly be interested in the 8100 Bus adapter motherboard. Manufactured by California Computer Systems, the 8100 has six S-100 card slots, and a 2-MHz programmable baud rate clock. You will have to contact the company directly about prices since there are a variety of options available.

If you're planning a project where 6-bit A/D conversion at a fast rate is required (in the realm of 33 ns), then TRW LSI has the answer with its latest evaluation board. Called the TDC1014PCB, this board is priced at only $168 and contains the firm's TDC1014J A/D converter chip. The unit has 63 parallel differential comparators that look at the analog input simultaneously, then compare it with a reference voltage. The comparator outputs are translated into a binary code by means of a 63:6 encoder. This evaluation board requires a power supply capable of delivering +5 and ±15 V.

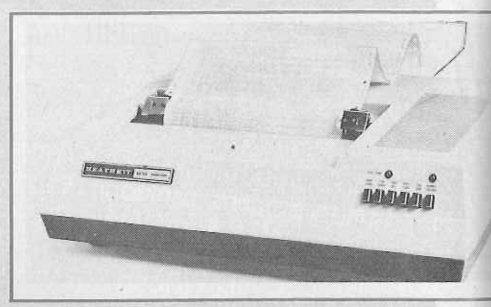
With the current interest in 16-bit microprocessors, it's not surprising to find an S-100 compatible board from Godbout Electronics. But this is not just a board with a single processor; instead, it contains both the Intel 8085 8-bit processor and the Intel 8088 byte-oriented 16-bit processor for only $295.

What Godbout has done, by implementing the dual processor design, is to give software designers the ability to develop software using the 8-bit 8085, and existing software such as CP/M, and Microsoft's 8080/8086 macro cross-assembler.

Both of the processors run at 5 MHz, and a software switch permits dynamic switching of the processors. This board is not for the beginner, and to use it correctly requires a great deal of understanding of both 8-bit and 16-bit processor operation.

Completing Your System. If you have been bitten by the computer bug, you probably are always in need of that one new item that will just complete your system. The following may fall into your price range and needs.

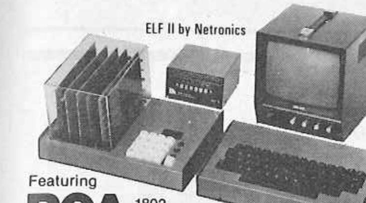
The H-14 dot-matrix printer from Heath is priced at $635 kit, or $895 factory built and tested. This unit took me over 30 hours to build and can't be considered a beginner's project. According to Heath, this printer was designed to be a low-cost alternative to higher-priced units.



Heathkit H-14 dot-matrix printer has variable baud rate to 4800 bps.

C. Itoh Electronics, a Japanese trading company, has two entries in the printer family. The first is the Comet 80-column dot matrix printer, priced at $995, which puts it on a par with most of the units currently being offered. It has a print speed of 125 CPS, bidirectional printing (a not so common feature). The Comet can handle baud rates from 110-9600.

The second unit, called the Starwriter 25 CPS Daisy-wheel printer, is priced at $2195 (about $500 less than comparable systems). It can print 136 columns with a pica pitch or 163 with elite. Both printers are manufactured



Write and run programs—the very first night—even if you've never used a computer before!

You're up and running with video graphics for just $99.95 — then use low cost add-ons to create your own personal system that rivals home computers sold for 5-times ELF II's low price!

Featuring RCA 1802 COSMAC CPU

Own a powerful home computer system, starting for just $99.95—a price that gets you up and running the very first night...with your own TV for a video display. $99.95 ELF II includes RCA 1802 8-bit microprocessor addressable to 64k bytes with DMA, interrupt, 16 registers, ALU, 256 byte RAM, full hex keyboard, two digit hex output display, stable crystal clock for timing purposes, RCA 1861 video IC to display your programs on any video monitor or TV screen *and 5-slot plug-in expansion bus (less connectors) to expand ELF II into a giant!*

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 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. Keyed to 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 committment to develop the RCA 1802 for home computer use, the ELF II products—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 already 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 lightening 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 hexidecimal 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** 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. 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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Yes! I want my own computer! Please rush me—

☐ RCA COSMAC ELF II kit at $99.95 plus $3 postage and handling (requires 6.3 to 8 volt AC power supply)

☐ Power Supply (required). $4.95 postpaid

☐ RCA 1802 User's Manual. $5 postpaid

☐ Tom Pittman'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 alike. $5 postpaid.

☐ Deluxe Metal Cabinet with plexiglas dust cover for ELF II, $29.95 plus $2.50 p&h.

☐ I am also enclosing payment (including postage & handling) for the items checked below!

☐ **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.**

Total Enclosed $ ________
(Conn. res. add tax)

CHARGE IT! Exp. Date ______
☐ Visa ☐ Master Charge
(Bank # ____)

Account # ________

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 64k. **$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, 96 printable characters, onboard regulator, parity, logic selection and choice of 4 handshaking 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, ±, ×, ÷, (), 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 to 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 Pittman'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 hexidecimal 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 programs and produces assembly language source listings to help you understand and improve your programs **$19.95** on cassette tape.

SAVE $9.90—Text Editor, Assembler & Disassembler purchased together, only **$49.95!** (Require Video Display Board plus 4k memory.)

☐ **ELF II Light Pen,** assembled & tested, **$7.95** plus $1 p&h

☐ **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.

Coming Soon: A-D, D-A Converter, Controller Board and more!

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DEALER INQUIRIES INVITED

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 requring 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.

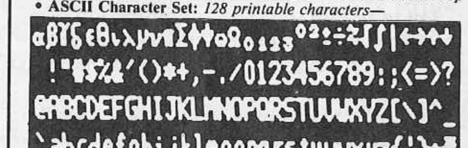
The Computer Terminal requires no I/O mapping and includes 1k of memory, character generator, 2 key rollover, processor controlled cursor control, parallel ASCII/BAUDOT to serial conversion and serial to video processing—fully crystal controlled for superb accuracy. PC boards are the highest quality 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: *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 - ? : * 3 $ # ( ) . , 9 0 1 4 ! 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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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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☐ Personal Check ☐ Cashiers Check/Money Order
☐ **Visa** ☐ **Master Charge** (Bank # ____)
Acct. # ________
Signature ________ Exp. Date ______
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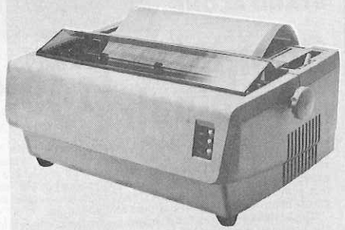
City ________
State ______ Zip ______
☐ **Send Me More Information**

by Toyko Electric Co. (TEC) for C. Itoh following its specifications, and are available now.

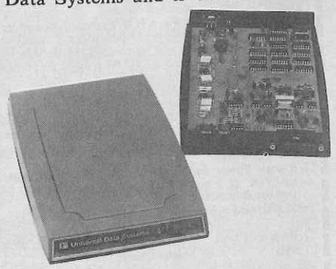


The Starwriter Daisy-wheel printer provides 136 columns of pica type.

C. Itoh also has 5.25- and 8-in. double-sided double-density disk units. The maxi-flexi and mini-flexi line of disk drives are made by Toshiba and have a fairly good reputation as being reliable drives. The 8-in unit sells for $725, which is about $25 cheaper than a comparable Shugart drive. The 5.25-in drive is $450, about the same as a Shugart drive.

In the July "Computer Bits," I mentioned Lobo's winchester package. Well, they have taken it just one step further with a Model 1850 dual fixed/floppy disk memory system. This unit puts the IMI 8-in. winchester drive in the same box as a 1.6M byte floppy. For the configuration of a 10M byte fixed disk drive, double-density floppy, chassis, and power supply, the price is a respectable $4695. Although this may appear high, it's actually low by about $1400 compared to similiar systems. The unit, as designed, is for the TRS-80 and Apple computers.

Communications Items. I'm a big proponent of electronic mail, and the benefits it brings to the computer user. I also keep an eye out for those items such as modems, that are a definite must to the use of these systems. One such modem is from Universal Data Systems and is called the 202



Universal 202 LP is a 1200-baud asynchronous communications modem.

LP. The unit is a certified FCC model, which allows for direct connection to the dial-up telephone network with-

MORE INFORMATION
For additional information about products and services mentioned here, contact the companies directly.

Apple Computer, Inc.
10260 Bandley Dr.
Cupertino, CA 95014
408-996-1010

California Computer Systems
250 Caribbean Dr.
Sunnyvale, CA 94086
408-734-5811

Compuserve (MicroNet)
Personal Computing Div.
5000 Arlington Centre Blvd.
Columbus, OH 43220
800-848-8990

C. Itoh Electronics, Inc.
5301 Beethoven St.
Los Angeles, CA 90066
213-390-7778

CompuPro/Godbout Electronics
Bldg. 725, Oakland Airport
Oakland, CA 94614
415-562-0636

Heath Co.
Dept. 010-684
Benton Harbor, MI 49022

Lobo Drives Intl.
935 Camino Del Sur
Goleta, CA 93017
805-685-4546

Micro Peripheral Corp.
Box 529
Mercer Island, WA 98040
206-454-3303 (voice)
206-723-DATA (modem)
70210,205 on MicroNet

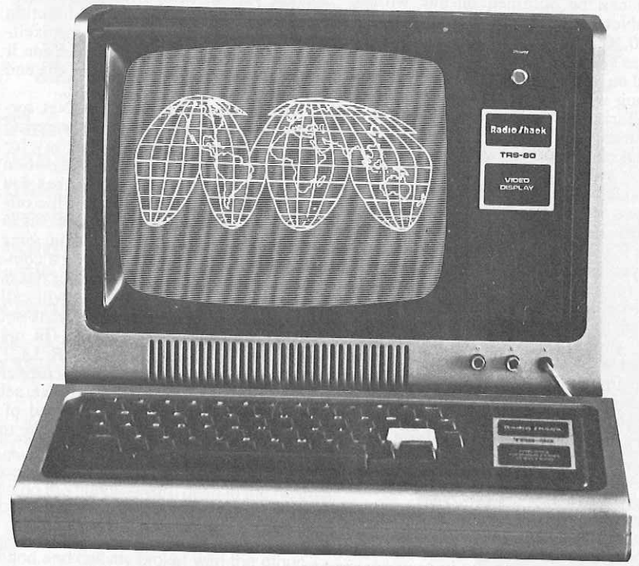
Motorola Semiconductor Products Inc.
Box 20912,
Phoenix, AZ 85036
602-962-2209

TRW LSI Products
2525 E. El Segundo Blvd.
El Segundo, CA 90245
213-535-1831

Universal Data Systems
5000 Bradford Dr.
Huntsville, AL 35805
205-837-8100

CONNECTION LISTING 1—BASIC PROGRAM

```
100 REM **CONNECT.BAS**
110 REM DICK BARKER 3/21/80
120 REM EXAMPLE OF SETUP AND USE OF THE 'CONNECTION'
130 CLEAR 2000
140 DEFINT B,H-Z
150 TM$=STRING$(38," ")
160 '****** SETUP 8251 FOR 8 BIT WORD , NO PARITY , 1 STOP BIT
170 OUT 241,7              'SEND IT ANYTHING WITHOUT BIT 6
180 FORJ=1TO10:NEXT        'NEED SHORT DELAY
190 OUT 241,64             'SEND RESET
200 OUT 241,78             'MODE SETUP
210 OUT 241,7              'COMMAND INSTRUCTION
220 Q=INP(240)             'CLEAN OUT REC BUFFER
230 GOSUB 10000                    'SETUP USR ROUTINE IN TM$
240                       'FOR DISK SYSTEMS, REPLACE THE FOLLOWING
    LINE WITH DEFUSR=K
245 POKE 16526,PEEK (VARPTR(TM$)+1):POKE 16527,PEEK (VARPTR(TM$)+2)
250 REM SEND DATA TO CONNECTION AS USR ARGUMENT
260 REM GET DATA FROM CONNECTION BY USING ZERO FOR USR ARGUMENT
270 'OUT254,1       'CLOCK SPEEDUP IF INSTALLED


1000 REM **** TERMINAL EXAMPLE *****

1010 CLS:PRINT"  SIMPLE TERMINAL PROGRAM FOR THE CONNECTION":
     PRINT"USE SHIFTED CHARACTERS FOR CONTROL CHARACTERS":PRINT
1020 I$=INKEY$:I=0:T=96:R=0:O=0:LF=10:PRINTCHR$(14);
1030 REM FOR HALF DUPLEX CHANGE X=USR(I) TO ?CHR$(USR(I));
     ON LINE 1040 IN TWO PLACES.

                        PROGRAM LOOPS THROUGH NEXT LINE WHEN RUNNING:

1040 PRINTCHR$(USR(O));:I=0:I$=INKEY$:IFI$<>""THENI=ASC(I$):
IFI>TTHENI=I-T:X=USR(I):GOTO1040ELSEX=USR(I):GOTO1040:ELSE1040

9999 REM **** POKE USR ROUTINES TO TM$ ****
10000 X=VARPTR(TM$)+1:A=PEEK(X)+256*PEEK(X+1):
            IFA>32767THENK=A-65536 ELSE K=A
10001 FOR I=0 TO 37:READ J:POKEK+I,J:NEXT:RETURN
10002 DATA 205,127,10,125,183,40,10,219,241,203
10003 DATA 71,40,250,125,211,240,201,33,0,0
10004 DATA 219,241,203,79,40,5,219,240,230,127
10005 DATA 254,10,40,1,111,195,154,10
10006 END
```

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This exciting service is available in more than 250 cities between 6 p.m. and 5 a.m. weekdays, all day weekends and most holidays. Cost? Only $5.00 per hour billed in minutes. All you need is a 300 baud modem, and our complete information service is only a local phone call away.

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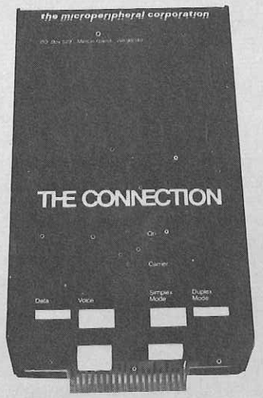
out a Data Access Arrangement (DAA). It is only 1.25-in. thick, fits under the telephone, and requires only two snap-in connections. The 202 LP provides 1200-baud half-duplex asynchronous communication for $295.

Also supporting the use of microcomputers for communication and data acquisition is the Peripheral



Peripheral's Connection is a direct-coupled modem for TRS-80.

people, located in Mercer Island, WA. This small company has developed a $249 modem, called the Connection®, that turns a 4K Level I TRS-80 into an intelligent remote terminal. This 300-baud model connects to the TRS-80 via the screen printer port and directly to the telephone lines via an FCC type-approved connector.

A very striking and important feature of the Connection is that it is provided with full software support to permit autodialing and data transfer. Also, the folks at Mercer Island have made available (for free) software that can be used to make the Connection, or for that matter any modem, work with general-purpose micros. An example of this software, is shown in Listings 1 and 2.

Listing 1 is a BASIC program for use on a TRS-80, with the Connection. This is ready to run—just type it in and go! Should you have a need to modify it, specifically the user routines in lines 10000-10006, Listing 2 is a complete Z-80 source listing of those data items.

As an added benefit and helpful tool (incidently you can use this whether or not you engage in telecommunications) is Listing 3. This FIXIT program allows you to add or delete line numbers from a text file. You will find this function important for editing purposes since you can then reference a specific line number for changes. Then, after the text is updated, remove the numbers before submitting the source to an assembler or a text formatter. All of these programs can be obtained on-line with MicroNet by typing in: DIR [70210,205] FIXIT.BAS. The program as shown in Listing 3 will be displayed on your terminal.

Along with the software and modem offering, the Peripheral People have made available, through MicroNet, an on-line HAM system. To use this system, enter: IRUN [70210,205] HAMGAB.SHR. You will now be able to operate in much the same manner as you would on 20-meter RTTY.

If you have been considering subscribing to MicroNet, but think it might be too difficult to use, you will be glad to know that the service has been simplified. Now users are greeted with a selection menu which allows for a choice of functions, such as news, weather, sports, financial, and MicroNet.

The menu system allows you to quickly obtain up-to-date information on the various categories. The MicroNet service will, however, function pretty much the same; but some exciting enhancements are planned for it also, and should be in place by the end of this year.

If you are using the MicroNet service now and have been wondering how to get the most out of it, say for word processing, here is a suggestion that may work. First, assume that you have developed a text or data file offline and, for whatever reason, now want to transfer it to a file in your MicroNet working area. Using a communication package such as MCS from Heath users group, you will call and sign into MicroNet. Be sure to set the correct lower-case option (in my case for an H-89 I, type TER LCT off, which permits entering of upper and lower case characters). Next, set up a file using the File command of: FIL (file name. ext); then return to

CONNECTION LISTING 2—Z-80 SOURCES

```
SCONUSR00100 ; CONBAS/ASM
  00300 ; DICK BARKER 3/21/80 COPYRIGHT 1980 MICRO PERIPHERAL
00300 ;DICK BARKER 3/21/80
00400 ;300 BAUD, 8 BIT WORD, NO PARITY, 1 STOP BIT
00500 ;*********************************
00600 ; THIS IS WRITTEN AS A RELOCATABLE ROUTINE
00700 ;WITH ONLY ONE ENTRY POINT AND MAY BE USED
00800 ;WITH DISK OR NON-DISK LEVEL II MACHINES
00900 ;*********
01000 ;TO SEND A CHARACTER PASS THE ASCII VALUE AS
01100 ;THE ARGUMENT FOR THE USR ROUTINE.
01200 ;*********
01300 ;TO GET A CHARACTER PASS A ZERO TO THE USR
01400 ;ROUTINE, IF NOTHING IN BUFFER A ZERO WILL
01500 ;BE RETURNED , ELSE THE 7 BIT ASCII VALUE
01600 ;WILL BE RETURNED.
01700 ;*********************************
01800 DPORT     EQU     240     ;DATAPORT
01900 SPORT     EQU     241     ;STATUS PORT
02000   ORG     8000H
02100 ;*********************************
02200 ;SEE IF USR WANTS TO SEND OR GET A CHARACTER
02300 ;*********************************
02400   CALL    0A7FH           ;GET USR ARGUMENT IN HL
02500   LD      A,L
02600   OR      A               ;UPDATE STATUS
02700   JR      Z,GETCH         ;NO CHARACTER TO SEND SO
02800                           ;NEED TO GET ONE
02900 ;*********************************
03000 ;SEND CHARACTER THAT IS IN L REG.
03100 ;*********************************
03200 BZY       IN      A,(SPORT)
03300   BIT     0,A             ;CHECK TX BUFFER
03400   JR      Z,BZY           ;WAIT IF BUZY
03500   LD      A,L
03600   OUT     (DPORT),A       ;SENDIT
03700   RET
03800 ;*********************************
03900 ;GETCHAR ROUTINE FOLLOWS
04000 ;*********************************
04100 GETCH     LD      HL,0  ;MAY NEED TO RETURN A NULL
04200   IN      A,(SPORT)
04300   BIT     1,A             ;CHECK REC BUFFER
04400   JR      Z,FIN           ;NOTHING THERE
04500   IN      A,(DPORT)       ;GET CHAR
04600   AND     07FH            ;STRIP PARITY
04700   CP      10              ;IS IT A LINEFEED?
04800   JR      Z,FIN           ;LF NOT WANTED
04900   LD      L,A             ;VALUE TO RETURN
05000 FIN       JP      0A9AH           ;BACK TO BASIC
05100 ZEND      EQU     $
05200   END     402DH
```


Announcing . . .
The Phone Ranger

The cordless phone that works like a regular phone up to 300 feet from your house. Use it in your own back yard with our compliments. Keep it, if you wish, for ONLY $119.95!

I live on five acres. And I keep four horses in my back yard. Used to be, if I got a call while I was down at the corral, one of the kids would yell out the kitchen window and I'd do the hundred-yard dash to the nearest house phone.

No more. With The Phone Ranger I can groom Laird, my Palomino gelding, with one hand and call my broker with the other.

Take or make calls up to 300 feet away.

Maybe you don't keep horses. But if you've got a pool, patio, garden, workshop, tennis court or garage—and you'd like the phone to come to you instead of you going to it—this is the answer.

Try The Phone Ranger for 15 days. Send it back if you want. If you decide to keep it, the best news is the price!

Units that look like toys sell for up to $495.00!

There's a unit called "ROVAPRO" that looks like my son's toy walkie-talkie—not like a real phone at all—and it goes for a cool $495.00.

Then there's "MURAPHONE." It's $149.95. But it's even more like a toy walkie-talkie. You have to push a button to talk and release to listen—with all that "Roger, over to you" stuff in between. Not like a real phone at all.

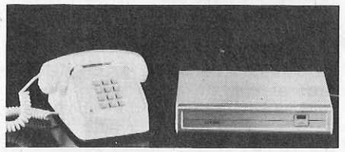
The Phone Ranger looks like a real phone, rings like a real phone, dials out like a real phone . . . has a range of 300 feet . . . and it's only **$119.95** plus $5.95 shipping and handling. If you'd prefer a range of a full 750 feet, order the deluxe version for only $189.95 plus $5.95 shipping and handling.

Doubles as an extra extension phone.

When you're not using it outside, use it as an extra extension phone without paying monthly charges to the phone company.

Works so simply.

Plug base unit into phone jack and into AC house current. Then plug The Phone Ranger into base unit to charge battery. Now unplug The Phone Ranger and you're ready to use it to take or make calls up to 300 feet away (750 feet if you choose the deluxe version). Red indicator light tells you when it's time to recharge.



If you don't have a phone jack, the phone company will install one for a nominal one-time charge. If you have an old-fashioned, 4-prong jack, The Phone Ranger comes with an adaptor you can use. Even if you live in an area with rotary dialing, the pushbutton system on your Phone Ranger will work. And the entire unit is FCC approved.

Includes amazing "last number" memory!

No need to re-dial when you get a busy signal. Just press the # or the * button and The Phone Ranger automatically redials the last number you called!

(A great security idea: "program" your phone to your local police number before you go to bed. The touch of a single button alerts police in case of emergency.)

Pick up your regular phone right now. Here's the number to call . . .

CALL TOLL-FREE
800-621-5839

(In Illinois, call 800-972-5858)

For faster service, give this number 15-9500 as soon as the operator answers. Lines are open 24 hours, 7 days a week.

If you're using your credit card, use our toll-free number. If for any reason you're not, return it within 15 days for a full refund, no questions asked. Use the carton it comes in to return it.

I know you'll have fun with it. Order now.

Roy Thomas
& ASSOCIATES, INC.
733 Lee Street, Dept. 15-9500
Des Plaines, IL 60016

Catch the fastest C-meter under $200

the autoranging B&K-PRECISION 830

Model 830 $199
Model 820 $155 (not shown)

B&K-PRECISION was the first company to offer a lab-quality capacitance meter for under $150, now we're first with autoranging for under $200. The new **830** is fast, accurate and built with famous B&K-PRECISION dependability.

The 830 offers features that are tough to match at any price, such as 0.1 pF resolution, large 3½-digit LCD display and fuse protection against charged capacitors. Basic accuracy is 0.2%, much greater than the tolerance of most capacitors. Measurement range extends to 199.9 mF.

Simplicity of operation is another strong suit for the 830. For checks limited to a narrow value range, the "range hold" capability can lock the 830 onto one range—an added time saver. This feature, along with its fast reading time, makes the 830 especially valuable for incoming inspection applications.

For applications suited to manual ranging, B&K-PRECISION offers the LED readout **820** at an even lower cost.

With either B&K-PRECISION C-meter you can, measure unmarked capacitors...verify capacitor tolerance...measure cable or switch capacitance...match capacitors for critical applications ...measure complex capacitor networks ...set trimmer capacitors.

For more information, contact your local distributor and see why B&K-PRECISION is now the leading supplier of digital capacitance meters.

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CIRCLE NO. 10 ON FREE INFORMATION CARD

CONNECTION LISTING 3—FIXIT PROGRAM

```
10 REM ** COPYRIGHT 1979 BY THE PERIPHERAL PEOPLE **
20 REM ** FIXIT **
30 CLS:CLEAR 1000:Z$=STRING$(31,"*"):PRINTCHR$(23)
40 PRINTZ$:PRINTTAB(4)"* * * F I X I T * * *":PRINTZ$:PRINT
50 PRINT"THIS PROGRAM WILL ADD LINE NUM-"
60 PRINT"BERS TO A TEXT FILE OR DELETE"
70 PRINT"THEM FROM AN ASCII SAVED FILE.":PRINT
80 LINEINPUT"FILENAME TO BE CONVERTED? ";X$:PRINT
90 INPUT"ADD (1) OR DELETE (2) NUMBERS";X:IFX<1 OR X>2 THEN 90
100 CLS
110 OPEN"I",1,X$
120 OPEN"O",2,"TEMPFILE"
130 IFX=2THEN200 ELSE 300
200 REM ** DELETE LINE NUMBERS FROM ASCII FILE **
210 IFEOF(1)THEN280
220 LINEINPUT#1,A$
230 IFLEFT$(A$,1)<>"/" THEN A$=RIGHT$(A$,LEN(A$)-1):GOTO230
240 A$=RIGHT$(A$,LEN(A$)-1)
250 PRINTA$
260 PRINT#2,A$
270 GOTO210
280 GOTO400
300 REM ** ADD LINE NUMBERS TO TEXT FILE **
310 N=10
320 IFEOF(1) THEN 400
330 LINEINPUT#1,A$
340 A$=STR$(N)+" "+A$
350 A$=RIGHT$(A$,LEN(A$)-1)
360 PRINTA$
370 PRINT#2,A$
380 N=N+10
390 GOTO320
400 REM ** REWRITE ORIGINAL FILE **
410 CLOSE 1,2
420 OPEN"O",1,X$
430 OPEN"I",2,"TEMPFILE"
440 IFEOF(2) THEN 480
450 LINEINPUT#2,A$
460 PRINT#1,A$
470 GOTO440
480 CLOSE1,2
490 KILL"TEMPFILE"
500 PRINT"NOW, LOAD FILE ";X$;" AND EDIT IT IN THE NORMAL MANNER"
510 PRINT"WITH YOUR TRS-80 EDITOR.  WHEN DONE, BE SURE TO SAVE
    THE FILE IN ASCII (";X$;",A)".
```

your communication package (for MCS type a control B); then send the file to MicroNet.

You must be sure to return back to MicroNet control and issue an "EX" to save the file. Now the file is available for manipulation in the MicroNet system. As an example of this, this month's column was written and edited off-line, then transferred to MicroNet for formatting via its text processor RUNF10. The processed file, which now has a .DOC extension, was then downloaded to my system and played out on hardcopy. If your concern is over cost, this whole process cost me (and this includes the $2/hr tymnet charge) about $3.00. The key here was that most of the work was prepared off-line using the functions of my computer.

If you just want to have some fun with MicroNet, they have implemented a user talk system that is patterned after Citizens Band Radio. You can now monitor pseudo CB channels 1-40 and break in and have a chit-chat. The MicroNet people have also built in a scrambler so you and a friend can carry on private conversations via your computer.

Information and Fun Books. It's always a good idea to have information resources in your library, and two books that are important to have, are: Radio Shack's *The Engineer's Notebook*, and *Electronics Designer's Casebook No. 3*. The first is written by PE's own Forrest Mims and is a collection of circuits from amplifiers to LED oscilloscopes. This book is available from any Radio Shack store for only $1.99. *The Designer's Casebook*, is a collection of design projects from *Electronics* magazine from Feb. 16, 1978 to January 4, 1979. This book covers circuits from audio to signal sources and is available from McGraw-Hill for $5.

Just for fun, Radio Shack has made available, free, a comic book about how a TRS-80 helps Superman save Metropolis. Although the story is a little improbable, so is Superman. It's fun reading and for comic book fans makes an important addition to that priceless collection. ◇

The first personal computer for under $200.

The Sinclair ZX80. A complete computer—only $199.95 *plus $5.00 shipping.*

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We've packed the conventional computer onto fewer, more powerful LSI chips—including the Z80A microprocessor, the faster version of the famous Z80. This makes the ZX80 the world's first truly portable computer (6½" x 8½" x 1½" and a mere 12 oz.). The ZX80 also features a touch sensitive, wipe-clean keyboard and a 32-character by 24-line display.

Yet, with all this power, the ZX80 is easy to use, even for beginners.

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The ZX80 comes complete with its own 128-page guide to computing. The manual is perfect for both novice and expert. For every chapter of theory, there's a chapter of practice. So you learn by doing—not just by reading. It makes learning easy, exciting and enjoyable.

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Sinclair's 4K integer BASIC has performance features you'd expect only on much larger and more expensive computers. These include:

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- Automatic error detection. A cursor identifies errors immediately to prevent entering programs with faults.
- Powerful text editing facilities.
- Also programmable in machine code.
- Excellent string handling capability—up to 26 string variables of any length.
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- Built-in random number generator for games and simulations.

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Order your ZX80 now!

The ZX80 is available only by mail from Sinclair, a leading manufacturer of consumer electronics worldwide. We've already sold tens of thousands of units in Europe, so demand will be great.

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Do you own another personal computer? ☐ Yes ☐ No. *For Conn. deliveries, add 7% sales tax.