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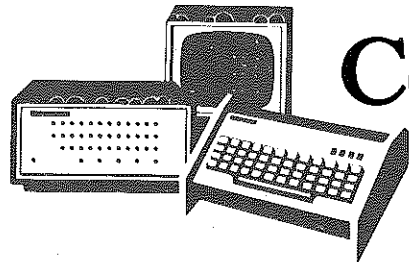
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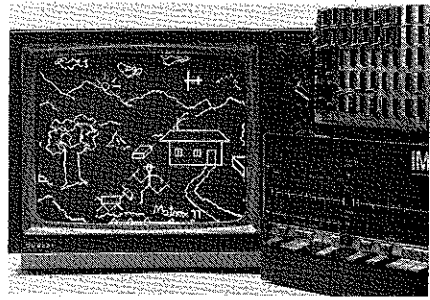
Computer Bits

by Leslie Solomon

HIGH-RESOLUTION GRAPHICS

NO MATTER how many alphanumeric characters your terminal can put on the screen, there are times when those characters are no substitute for graphics. However, when you examine the field, you will find that many low-cost "graphics" displays are simply non-alphanumeric characters resident within the character generator used, or they are limited to simple bar graphs. There are boards and systems that have some graphics capability, but the graphics are generally small "blocks" rather than discrete dots, so their overall effect is somewhat coarse.

Recently we had an opportunity to try out a new graphics board, the ALT-256*2 Graphic Display Interface (\$395 assembled and tested) from Matrox Electronic Systems, POB 56, Ahuntsic Stn., Montreal, Canada H3L 3N5 (Tel: 514-481-6838), and available through most computer stores. This S-100 bus board can display 256 lines with 256 individually addressed dots on each line, thus allowing for excellent resolution. Each dot can be made black, white, or, if three boards are used, any color. The system can work with as many as eight boards but in this case, direct manipulation of the color byte is required as explained in the manual. Access time is 3.4- μ s per dot, and the entire screen can be erased with a single instruction. The board can use external sync, and can be strapped for USA or European TV standards for noninterlaced display.



Graphics using the Matrox interface, shown at upper right.

The ALT-256*2 board contains 65k x 1 of RAM, and individual 8-bit registers for the X and Y coordinates and the data for each dot. Thus, it is easy to specify an individual dot anywhere on the screen, and determine whether that particular dot should be black or white (or color if you use extra boards). The screen can be erased black or white depending on the data sent to the input.

The software provided with the ALT-256*2 consists of a very detailed manual, and a pair of paper tapes. One tape contains the MTX GRAPH software that is configured as a series of callable subroutines while the second tape contains a demonstration program that uses the MTX GRAPH to create a continuous action graphics display. Total memory required is about 1k.

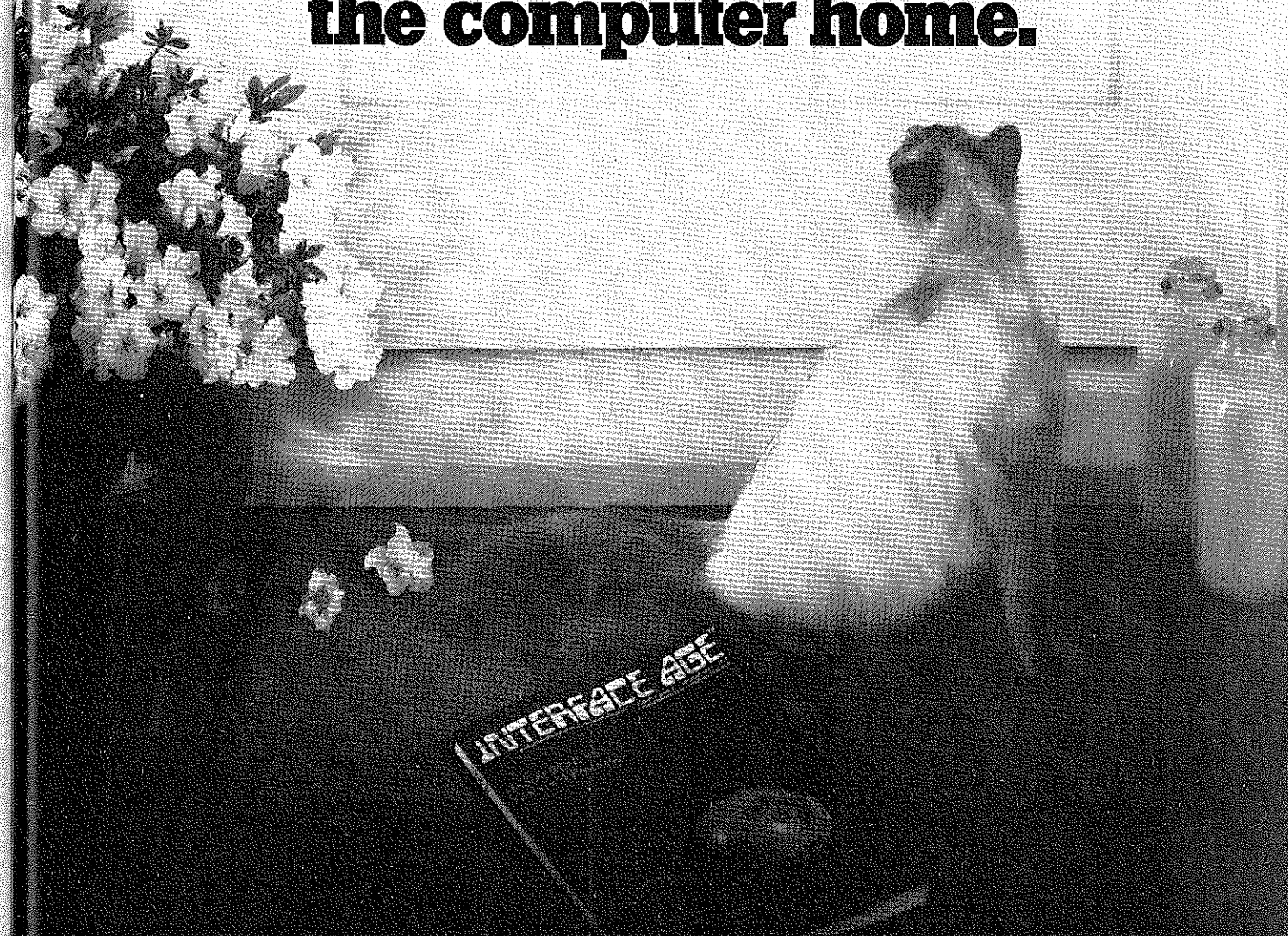
Six of the seven subroutines in the MTX GRAPH package are: INITG (initializes the system to standard defaults); PAGE (erases the entire screen); CURSOR (allows positioning the cursor at point X, Y); DOT (sets the point defined by the cursor); LINE (creates a line of dots between the current cursor position and the point X, Y); and CHAR (displays an ASCII character at the current cursor position). In the latter routine, the cursor is left at the next character position. Certain control characters are then used to select color, fixed or proportional character spacing, and dot size. The last routine is called ANIMAT, which produces a pause until the start of the next vertical blanking period, and is used in animation routines.

After plugging the ALT-256*2 into our S-100 computer, we loaded both tapes, and following the manual, started the demonstration program. Because we had only one board, and a monochrome monitor, we had no experience with color operation.

Comments on Use. The demonstration is impressive. It starts with a set of large characters on screen, followed by an interesting "lace curtain" effect that

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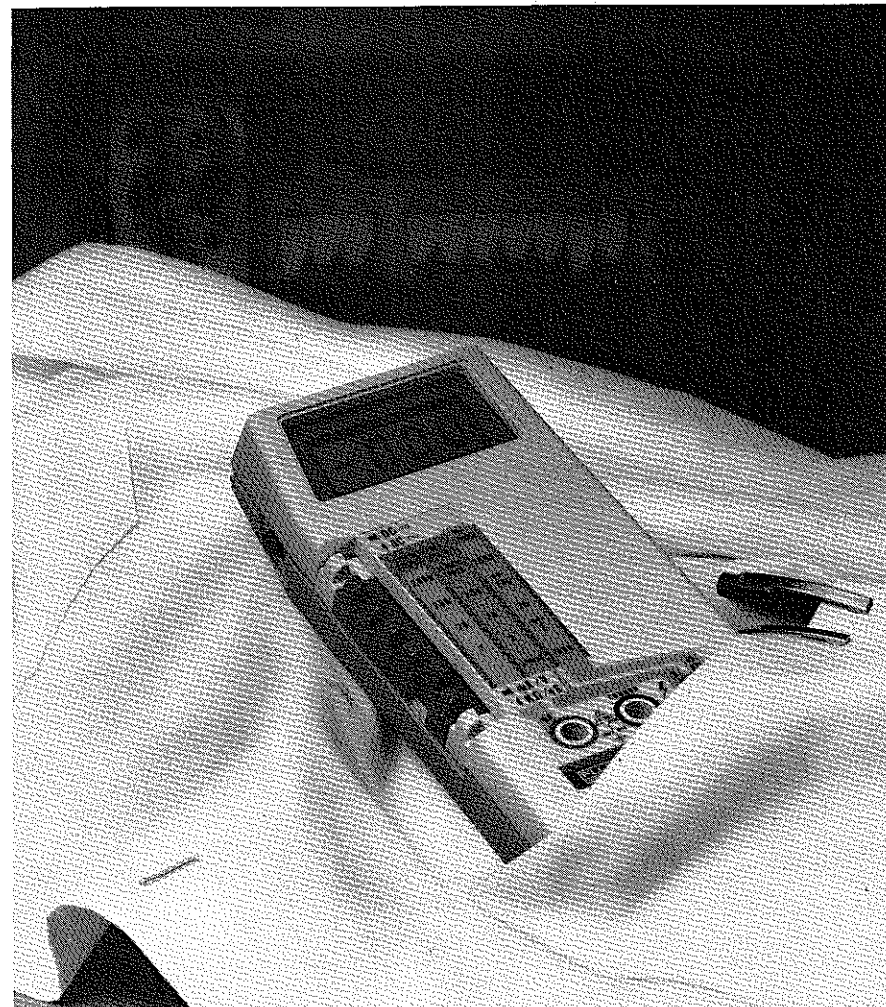
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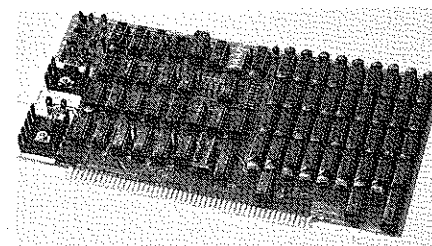
creeps across the screen. Suitable pauses are built-into the program so that you can study the various patterns on screen. Then follows a series of fan-like displays that illustrate line-calling routines, and some small (but very clear) alphanumericers. After a few more demonstrations of the various calling routines, a little man is made to "walk" across the screen, with swinging arms, to demonstrate the animation portion.

The manual contains a considerable amount of information and includes a complete listing of both the demonstration program and the MTX GRAPH package.

We have been playing with some 8080 machine language programs to "call" the various graphics subroutines and learn how best to use the high-resolution graphics. The results have been surprisingly good. We are also writing some BASIC programs using FILL and CALL commands to access the graphics software, also with successful results. One future project is a joystick interface for some really adventurous picture creations.

If high-resolution graphics appeals to you, drop into your local computer store and take a look at this new system from Matrox.

Z80 Things. North Star Computers, Inc., 2465 Fourth St., Berkeley, CA 94710 (Tel: 415-549-0858) has intro-



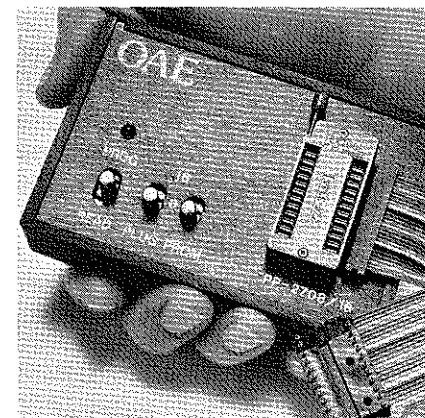
The North Star 16k RAM board for use with 8080 or Z80.

duced a couple of Z80 goodies. The first is a 4-MHz Z80 board compatible with an S-100 bus, called the ZPB. It is available for \$199 in kit form or \$259 fully assembled. Features include auto-jump startup, vectored interrupts, operation with or without front panel, and space for 1k of 2708 EPROM. The EPROM option is \$49 for the kit and \$69 assembled.

The other Z80 device is a 16k RAM board (S-100) for use with either 8080 or Z80 and will operate at full speed (no wait states) at 4 MHz. The RAM's are 200 ns, and on-board refresh is provided. Bank switching capability is provided

and board addressing is switch-selectable in two 8k sections. An important feature is the availability of a parity check option. The 16k board is \$399 in kit form, and \$459 fully assembled. The parity option is \$39 kit and \$59 assembled.

PROMing. Oliver Audio Engineering, Inc., 676 West Wilson Ave., Glendale, CA 91203 (Tel: 213-240-0080), which brought us the first low-cost paper-tape reader, now introduces its PP-2708/16 PROM programmer (\$249 as a kit, \$295 assembled and tested). The new programmer plugs directly into any 2708 or TMS-2716 socket, and the PROM to be programmed is mounted in its zero-insertion-force socket. The data is dumped over the eight lower address lines using the OAE interface. No additional power supplies are required and all timing and control sequences are au-



The OAE PP-2708/16 PROM programmer plugs into any 2708 or TMS-2716 socket.

tomatically handled by the programmer. Because of this simplicity, only a short software routine is required. A five-foot flat ribbon cable interconnects the programmer with the PROM socket.

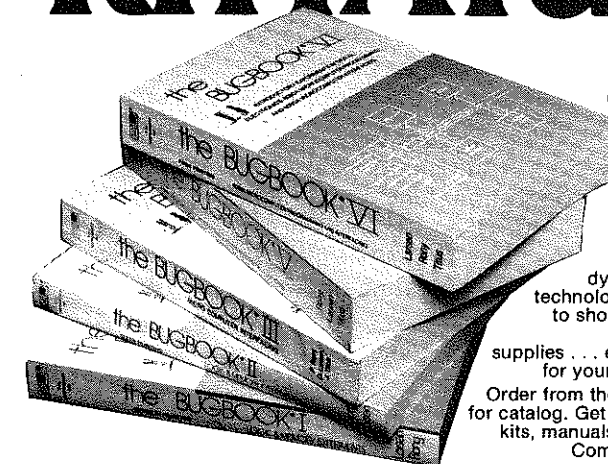
Bus Stop. If you have an Altair/S-100 bus system, or are planning to get one, there are a couple of new motherboards of which you should be aware. The first is from Vector Electronic Co., Inc., 12460 Gladstone Ave., Sylmar, CA 91342 (Tel: 213-365-9661). Their Model 8803 costing \$29.95 accommodates 11 plug-in boards, and can have passive or active bus termination. One slot position may be used to interface the motherboard for system expansion. Twelve tantalum capacitors are included to suppress transients on the various power supply lines. Ground and +5-volt traces are rated at 10 amperes while the ±12-volt busses are rated at 7 amperes.

The second S-100 bus motherboard is from Thinker-Toys, 1201 10th St., Berkeley, CA 94710 (Tel: 415-527-7548) and costs \$76. Called the Wunderbuss, this new motherboard features full shielding of the signal paths, and active termination of all data lines. Signal isolation is achieved by a cross-coupled system of ground lines interlaced between signal lines. The motherboard with 10 edge connectors is available for \$120, and with 20 edge connectors the price is \$154.

PROM/RAM Board. Now available from Vector Graphic, Inc., 790 Hampshire Road, Westlake Village, CA 91361 (Tel: 805-497-6853) is a new S-100 board that occupies two independently addressable 8k blocks, has 1k of RAM on board, and a capacity of up to 12k of 2708 EPROM's. Complete addressing flexibility is provided, and video or disk-operating system boards can be nested in the 3k of unused space. MWRITE logic and jump-on-reset allow operation without a front panel. A 24-command

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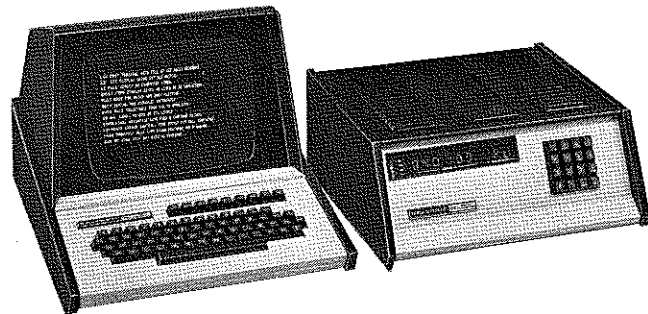
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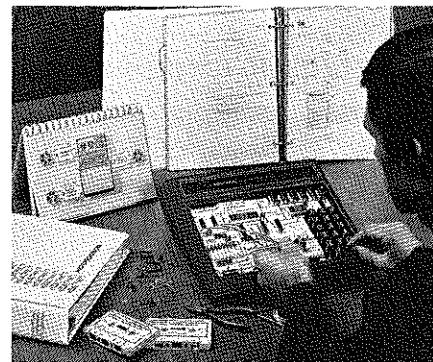


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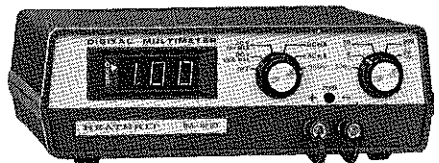
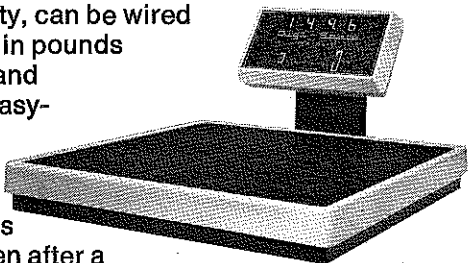


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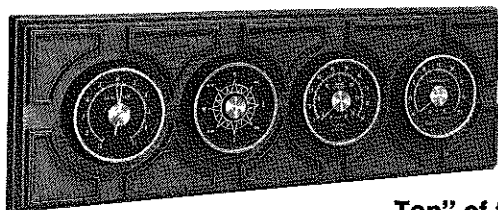
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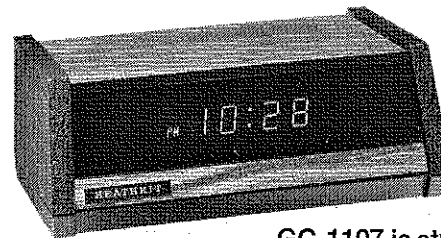


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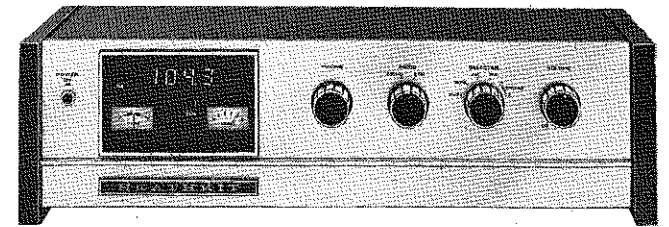
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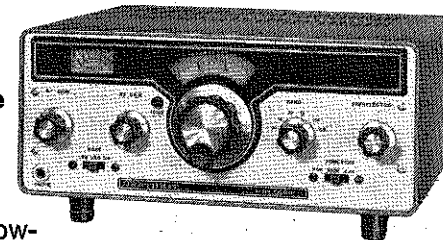
Unobtrusive and elegant, the GC-1107 is styled in handsome wood grained vinyl, and features an easy-to-read 4-digit blue-green display, 12 or 24 hour format, and automatic dimming to adjust for ambient light conditions. Its "snooze" feature lets you take 9-minute "catnaps" for as long as an hour. And for extra convenience — there's even a handy power failure indicator. A perfect kit for the beginner.



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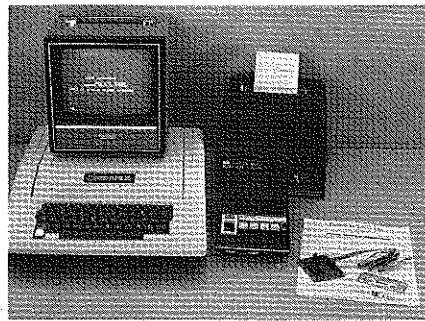
GX-346 _____ Zip _____

PROM monitor is available to interface with most I/O boards. Price is \$135 in kit form, \$175 assembled.

Print an Apple. If you have an Apple II computer, then you should be aware that Microproducts, 1024 17th St, Hermosa Beach, CA 90265 (Tel: 213-374-1673), has introduced its PCB that interfaces the Apple II with the SWTP PR-40 Printer. The board, at \$49.95 assembled, plugs into the Apple II and comes with an interconnecting ca-

ble. A cassette with operating software is also provided. The printer prints one line at a time when the return key is depressed. The printer subroutine can also be called in a BASIC program for usual printing.

New I/O Port. Since getting stuff into and out of a computer is somewhat of a necessity, and since most hobbyists now use more than one I/O device, multi-porting is becoming very important. Dajen Electronics, 7214 Springleaf Ct.,



A Microproducts board interfaces an Apple II with an SWTP PR-40.

Citrus Heights, CA 95610 (Tel: 916-723-1050) has one answer in their System Central Interface (SCI) board selling for \$285 in kit form and \$345 assembled and tested. This S-100 bus board provides a serial port with RS-232 and 20/60-mA current loops; baud rates from 45 to 9600; three independent 8-bit parallel ports that can be programmed bitwise for input and latched output; bi-phase (Tarbell) cassette port; onboard relays for control of two recorders; and three status lines to control an automatic tape deck. Also included are 256 bytes of RAM for stack and buffer storage; a 2708 programmer; space for three 2708's; and 2k system monitor program, having 18 commands. All IC's are socketed, and the board will work with 4-MHz Z80 systems. All output connectors, cable and plugs for recorder are provided.

1802 Items. Netronics, 333 Litchfield Rd., New Milford, CT 06776 (Tel: 203-354-9375), the source for the Elf-II, has announced a 4k RAM board for the Elf-II bus at \$89.95 plus \$3 postage/handling. Using 2102's and requiring 500-mA from the 5-volt line, the memory is buffered and decoded with page selection in 4k blocks anywhere in memory. There is an on-board regulator and three-state outputs. The board will preserve the 256 bytes of the original.

This same firm also has an Elf-II prototype board (\$17 plus \$1 postage/handling) that has room for 32 IC's in a mix of 14, 16, 20, 22, 24, or 40 pins. Wire-wrap or solder pencil connections can be used. Like the memory board, this board has gold-plated Elf-II bus connector fingers, and has provisions for a 5-volt regulator.

The third item announced by Netronics is an outboard Elf-II power supply that provides ± 8 volts at 5 amperes, unregulated, and ± 16 volts at 1 ampere, also unregulated. Price is \$34.95 plus \$3 for postage and handling. \diamond

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8080 Software Contest. College and university students and faculty are eligible to enter a software contest announced by Intel's Insite program library. Entries must be written in Intel assembly language or PL/M and must include a source listing and test program to assure program validity, and a source paper tape or diskette. More than \$28,000 worth of microcomputer development equipment, plus numerous \$100 memberships in the Intel User's Library, will be awarded to colleges and

universities submitting the best programs by June 30, 1978. Monthly winners will receive Intel PROMPT 48 or PROMPT 80/85 microcomputer design aid systems. The grand prize will be an Intel 8088 Microcomputer Development Center, including 64k RAM, dual-drive one-megabyte diskette system, CRT console, and software. Programs will be judged for their originality, documentation, creativity and applicability to microprocessors. Both individuals and teams may enter. For entry forms and details, write: Insite Library Contest, Intel Corp., Microcomputer Div., 3065 Bowers Ave., Santa Clara, CA 95051.

8080/Z80 Cassette Operating System. The ZAPS Cassette Operating System includes a Z80 assembler, text editor, in-memory file system, labelled cassette tape storage system and other utilities. Runs in 14k of memory, including buffers and 1k for symbol table, on most 8080 and Z80 systems. The assembler processes the Zilog mnemonic-

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ics, with a wide variety of pseudo-operands available. The system can accept numerical values in hex, octal, decimal or binary. A 90-page user manual includes I/O modification instructions. On Tarbell, Digital Group or TDL cassette, \$60 from computer stores or write to Algorithmics, Box 56, Newton Upper Falls, MA 02164.

High-Level Language for 6502. FCL65E, a high-level language similar to DEC's FOCAL, is available for 6502-based microcomputer systems. The 6.5k program offers 8-to-9-digit accuracy, 8-level priority interrupt handling, string variables and functions. Commands include Ask, Comment, Continue, Do, Erase, For, Go, If, Modify, On, Quit, Return, Set, Type and Write, plus several commands called by symbols. The interpreter permits editing, corrections of current line, debugging and error detection, plus functions for absolute value, integer, integer rounding, random number, I/O device functions, ASCII/decimal and decimal/ASCII conversions; terminal echo suppression, memory examine and deposit, user subroutines, string comparisons, and others. FCL65E is available for TIM- and KIM-based systems. All system-specific I/O calls are located in a zero page block for easy modifica-

tion to other 6502 systems. A complete listing is \$35, a mini-manual is \$6 and a 104-page user's manual is \$12. Hex or binary paper tape or hex dump is available for \$17. The program is also available on KIM cassettes in Hypertape (6X speed) format at \$19. At regular speed, KIM cassettes are \$23.50, and 3X-speed cassettes are \$20.25. Write: The 6502 Program Exchange, 2910 Moana Ln., Reno, NV 89509.

6800 Text Editing & Processing Systems. The editing system is line- and content-oriented for easier assembly-language program development and document preparation. Edit directives include Append, Change, Copy, Move, Delete, Insert, Overlay, Print, and Replace—plus pointer-addressing and string searches. Other commands display output-format and up to 20 tab-stop settings, and display or suppress line numbers. Re-numbering is also available, as are paper-tape or cassette save, write, read and gap (null string) commands. The Text Processing System, a companion program, is used to format edited files for printing or display. Options include paging, titling, page numbering, paragraphing, spacing and right-margin justification. The 6800 Text Editing System is \$23.50; the Text Processing System (which can also

be used independently) is \$32, with both in complete manual form with source listing. KC-standard cassettes are \$6.95 each, for either program. Write: Technical System Consultants, Inc., Box 2574, W. Lafayette, IN 47906.

PDP-8 Simulator for 8080. The Simulator permits 8080 computers to run PDP-8 programs, which are widely and inexpensively available. (However, speed limitations may preclude the use of such programs as PDP-8 BASIC and FOCAL, and the availability of DP-8 software on paper tape rather than cassette may be intolerable to some users.) Simulator is available on Intel-format paper tape or Tarbell cassette for \$20. Write: The Amide Corp., Box 600, Sag Harbor, NY 11963.

6800 Disassembler. Available in punched paper tape (MIKBUG format) with assembly listing, object code and instructions, this program will print an assembly listing of the object code of any program stored in memory. It operates in less than 1.8k bytes, beginning at 0800 hex (2k decimal). \$12.95. Write: Software Exchange, 2681 Peterboro, W. Bloomfield, MI 48033.

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