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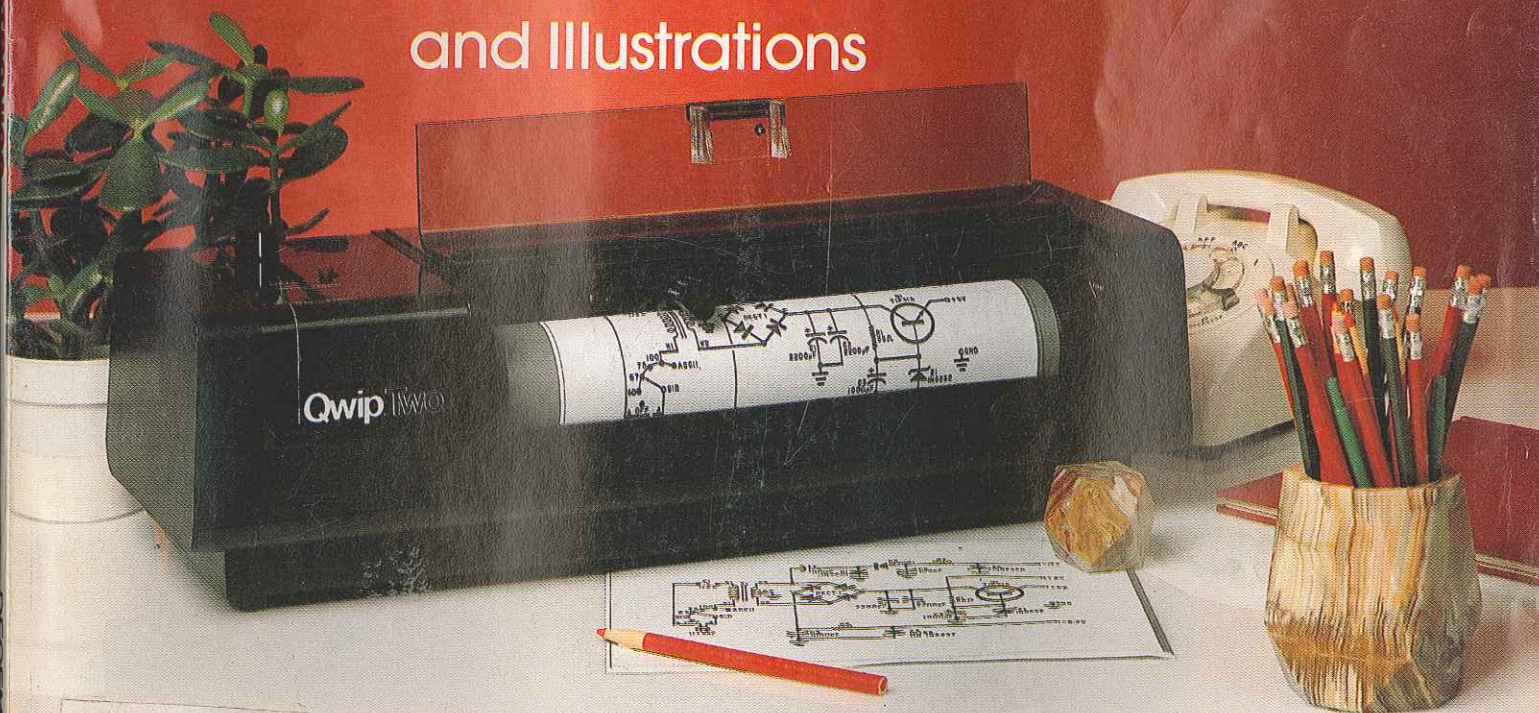
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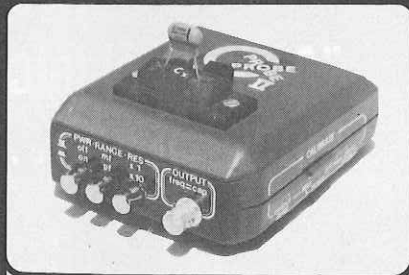


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CIRCLE NO. 14 ON FREE INFORMATION CARD

Computer Bits



By Leslie Solomon
Technical Director

NEW DEVELOPMENTS IN BUBBLE MEMORIES

A COUPLE of months back, I had the pleasure of speaking with four designers of magnetic-bubble memory chips from four different companies. My interest was in practical applications rather than the research going on. Here are some of the things I found out:

Operating speed is going up. One researcher claimed that 1-MHz operating speed with density expected to top 10⁷ bits is in the foreseeable future. The price curve, of great importance to the computer experimenter, is expected to follow that of the microprocessor—down by a factor of 10 in the next three years. (Remember, that the 8080 went from over \$300 in 1975 to about \$10 today.)

The Bell Labs man had some very interesting things to say. The biggest piece of news is that Bell already has an experimental 1-megabyte chip in operation. In comparison, the largest RAM chip is 64K bits (8K bytes) and the largest ROM is 128K bits.

The experimental Bell bubble chip is 1.3" (33-mm) square and has 1792 minor loops, each of which is capable of storing 6441 bits. This yields a maximum capacity of 11.5-megabits, which provides redundancy in the event of minor-loop failure. The bubble domain has been reduced to 1.7 micrometers and separate read and write lines provide access to the minor loops. We could not get a price (which should be tremendous at this time), nor could we obtain information about when this chip will become available.

If Bell Labs continues along these lines (and if other chip manufacturers climb on the high-density, high-speed bubble bandwagon), the day of the solid-state, no-moving-parts (if you don't consider the bubbles as a mechanical element even if they do move) replacement for the sometimes troublesome mechanical disk will soon be with us.

Printer. The Model 88T dot-matrix printer features 100-character-per-second, bidirectional printing at 80, 96 or 132 columns, and can print at 10, 12 or 16.5 characters per inch, with an upper and lower case 96-character ASCII set on a 7x7 dot matrix. It accepts fanfold forms from one to 9.5 inches in width, or it will act as a pressure roll feed when using 8.5-inch roll paper up to 5 inches in diameter. Its continuous-loop ribbon cartridge allows the entire half-inch wide ribbon to be used with the 0.1-inch character height. It will accept RS-232CL or parallel data and has a two-line buffer. Physically,

the 88T is 16 1/4 inches wide by 10 1/2 inches deep by 6 1/4 inches high. \$749. Micro Peripherals, Inc., 2099 West 2200 South, Salt Lake City, UT 84119 (Tel: 801-973-6053).

Apple Joystick. This X- and Y-axis single joystick is plug-compatible with the Apple-II paddle connector. It has a gimbaled self-centering action and its case and color are consistent with the Apple. It has front-panel X-and Y-axis trimmers and a capacitively-activated closure switch that operates with the touch of a fingertip. This APJS device is \$65 from PAIA Electronics, Inc., 1020 Wilshire Blvd., Oklahoma City, OK 73116 (Tel: 405-843-9626).

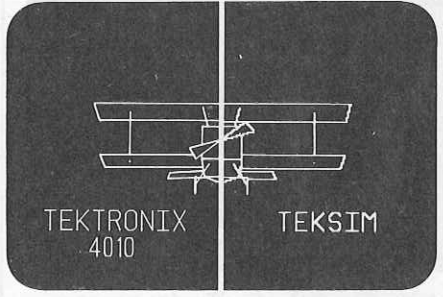
PET Toolkit. The "Toolkit" is a 2K ROM that contains 10 new commands for the PET computer. Among these are: AUTO for automatic creation of line numbers; DELETE lines; FIND, which locates lines containing a named set of characters; HELP, which prints the line where the error occurred and highlights the erroneous portion; RENUMBER lines; APPEND; and DUMP, which lists names and variables in an executing program. The plug-in version for the 8K PET (attaches to memory expansion port) is \$79.95, while a plug-in Toolkit for the 16K or 32K PET is \$49.95. Palo Alto IC's, 430 Sherman Ave., Palo Alto, CA 94306 (Tel: 415-327-0125).

SS-50 Video Board. The VDB-1 Smokewriter generates an 80 x 24 display with 32 graphic characters, upper and lower case (with descenders), and 128 character graphics are optional. Its programmable character set, a total of 128 characters, is in a 2K EPROM with a 256-character 4K EPROM optional. The display features reduced intensity, reverse video and has a programmable display rate of 10-5000 characters per second. It also has protected fields, an addressable cursor, 2K video RAM, 128 bytes of scratch-pad RAM, and a 1K EPROM for software drivers. \$349 from Smoke Signal Broadcasting, 31336 Via Colinas, Westlake Village, CA 91361 (Tel: 213-889-9340).

Apple Speakcontrol. The Model 70 Controller card works with this firm's Model 20A Speechlab for the Apple II computer. The Model 70 provides two spdt relay closures for external control via a spoken word input. Software is available on cassette. Heuristics, Inc., 900 N. San Antonio Rd., Los Altos, CA 94022 (Tel: 415-948-2542).

Apple Graphics Tablet. The Apple Graphics Tablet requires Apple II floppy disk and 48K RAM. It uses a standard software package (BASIC) and can be customized with special symbols and functions. The tablet features a Mylar overlaid 11" by 11" drawing surface (containing the menu of tablet functions), a stylus for drawing, disk-based software and a plug-in interface board. The tablet allows freehand drawing (up to 100 points per second); a selection of black, white, magenta, green, orange and blue colors; a Calibrate function that maps a portion of the tablet to the full size of the screen; a Viewport function so that a section of the screen can be used for work with any changes affecting only the specified area; a Reduce function so that the entire tablet surface can be used for a sectioned-off area; and a Box function to allow the user to create a box merely by touching the stylus to two points that are used as the diagonal. The Tablet also allows for color separations. Functions are selected with the stylus. \$795 from Apple dealers.

Apple Graphics. The TEKSIM is a ROM-based "Tektronix Simulator" that enables an Apple-II to emulate a Tektronix 4010-series graphic terminal. No modification to the host-resident program is required to display or input graphical data. The Apple has only one-



The TEKSIM enables an Apple-II to emulate a Tektronix graphic terminal.

fourth the resolution of the Tektronix terminal. Multi-colored displays, selectable erase, and standard video output are provided. \$795. Cybersoft Systems, 301 S. Livernois, Rochester, MI 48063 (Tel: 313-652-9008).

TRS-80 Disk Drive. The Model TF-7 mini disk system features 77 tracks and allows up to 195K bytes of on-line storage with the TRS-80, compared with 80K bytes on 35-track models and 100K bytes found on most 40-track versions. The MTI/APPARAT DOS+ disk operating system is also available. \$625. Microcomputer Technology Inc., 2080 South Grand Ave., Santa Ana, CA 92705 (Tel: 714-979-9923).

EPROM Programmer. The PB1 is designed for 2708 and 5-volt 2716 EPROM's. Two easy-insertion sockets are provided and no external high-voltage supply is required. Programming sockets are addressable to any 4K boundary. A special LED indicator is provided to prevent accidental programming. Software listings are included for checking EPROM erasure, programming and verification. The board also includes four additional EPROM's independently addressable to any 4K (2708) or 8K (2716) boundary above

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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.

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 Professional ASCII Keyboard kit with 128 ASCII upper/lower case set, 96 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.
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 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, +, X, + (1)

26 variables A-Z, LET, IF/THEN, INPUT, PRINT, GO TO, GOSUB, 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.
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 Assembler on cassette tape translates assembly language programs into hexadecimal machine code for ELF II use. Mnemonic abbreviations for instructions (rather than numbers) 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.
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8000 hex. The board is fully buffered and 0 to 4 clock cycle wait states are available. Kit is \$145, and \$219 assembled and tested. Solid State Music, 2116 Walsh Ave., Santa Clara, CA 95050 (Tel: 408-246-2707).

Apple/PET/Kim Interface. The Model 4609 is a peripheral interface "breadboard" that allows the construction of custom circuits for the Apple-II and Superkim computers. It may also be used with the PET if it is provided with an "Expandamem" adapter. This new board has provisions for three I/O connectors, and features a large board area, and dual heavy-duty power busses between the IC leads. The board is 7.7-inches long to take advantage of the unused space within

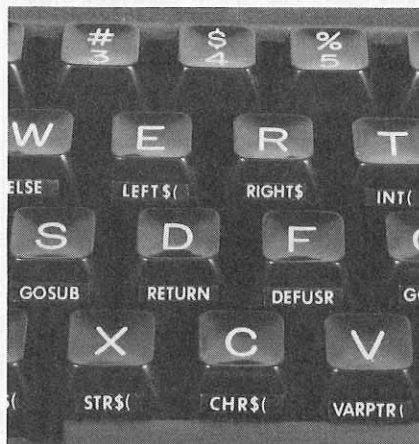
the Apple and PET enclosures; 14-to-40-pin sockets may be installed in the solder-coated holes, which are also arranged for Wire Wrap. A third bus on the rear may be used at the designer's discretion. Gold-flashed nickel-plate is used on the edge connectors. \$21.50. Vector Electronic Co. Inc., 12460 Gladstone Ave., Sylmar, CA 91342 (Tel: 213-365-9661).

TRS-80 Printer Interface. The TRS-80 Print Module plugs directly into the back of the keyboard and eliminates the need for the Expansion Interface when driving such printers as Centronics (P1, 779, and 703), Telpar, and Axium. All line print commands in Level-II BASIC are compatible; and the print module

draws power from the printer. The interface module is \$99.95. American Micro Products, 6550 Tarnef, M/S 11, Houston, TX 77074 (Tel: 713-777-2759).

Apple Talker. Supertalker plugs into an Apple slot and generates speech signals for an external audio system. Initially, spoken words (via the microphone) are digitized into the RAM. Speech data is then manipulated like other stored data. The Supertalker DOS permits speech output under program control with direct I/O routines. You can create voice files on the diskette. BASIC one-line statements are used to output a word or phrase. \$279. Mountain Hardware, Inc., 300 Harvey West Blvd, Santa Cruz, CA 95060.

BASIC Shorthand. TSHORT is a Level-II BASIC shorthand that allows 32 BASIC commands to be entered with a single keystroke. Immediately after the keystroke, the entire command is spelled out on screen in its normal format. TSHORT features a Kustom key,



A set of decals can be affixed to keys to indicate command locations.

changeable at any time, for user-defined functions up to 64 characters of instruction, as well as a GOTO 10 function (line 10 may contain the RUN statement). Comes on cassette with one side for Level-II BASIC and the other for TRS DOS/NEWDOS. A set of pressure-sensitive decals (white letters on clear) are easily affixed to the front surface of each key. It requires 580 bytes of low memory and does not interfere with BASIC, DOS V2.1, 2.2 or user machine-language routines. \$9.95. Web Associates, P.O. Box 60 EA, Monrovia, CA 91016 (Tel: 714-559-6249).

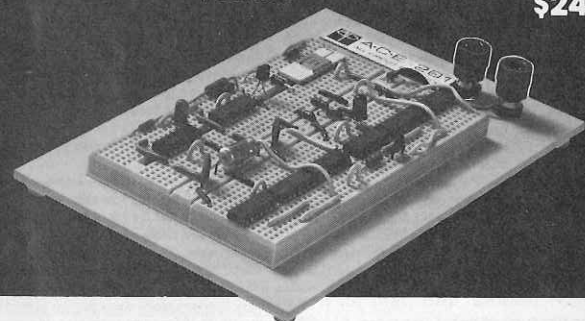
Apple ROM Board. The ROMPLUS+ board for the Apple-II offers six individually addressable sockets for 2K ROM's or EPROM's plus scratchpad RAM. On-board firmware allows two or more 2K ROM's to be simultaneously utilized. The board also provides two TTL input connections. One socket contains Keyboard Filter, a 2K program that offers upper/lower case, multiple user-defined character sets, colored or inverse-colored letters, keyboard macros, improved cursor control, graphics and editing functions. Compatible with Integer and Applesoft BASIC and DOS. \$169. Mountain Hardware, Inc., 300 Harvey West Blvd., Santa Cruz, CA 95060 (Tel: 408-429-8600).

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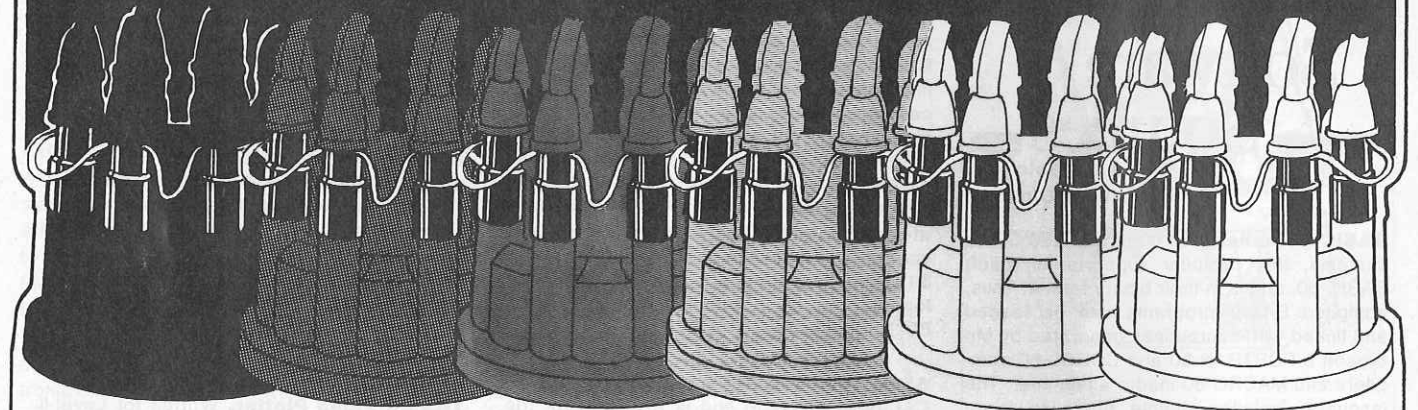


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