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AUGUST 1981/\$1

How Temperature Affects Components

Preview of the VHD Video Disc Player

Two Projects for Summer

Word-Processing Computer Systems



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N HOLLYWOOD

For all practical purposes, the typical functions found in larger implementations of BASIC are included (string operators such as MID\$, LEFT\$, RIGHT\$, are not). Bit-wise Boolean operations are permitted using NOT, AND, or OR. The character string function CHR\$ becomes a main operator in most programs, and a unique function TL\$(s) which returns the string (s) minus its first character is provided. The TL\$ operator, can be employed for creating unique displays, while the function CODE returns the ASCII code for the first

character of string. This latter function essentially takes the place of ASC found in most BASICs. Even PEEK and POKE are included to permit the user to get to the memory. To further support these functions,USR permits the calling of a user-written machine language routine.

Interestingly, the BASIC is well suited to the machine architecture. To enter a program, you merely tap the Q key. This executes NEW and clears the work space for a new program. Next type in a line number, depress the letter O to generate the keyword PRINT. When

you do this the cursor is displayed as an inverse K to indicate a keyword. Your next entry would, in this case, be a "quote" which would generate an inverse S, indicating that a syntax problem exists (there is no "end quote" yet), and remain displayed until you have finished the line and ended it with a quote. Once you have the line typed in, you depress the key marked NEWLINE. This key acts the same as RETURN on other computers.

When a line is entered, all the system variables, line numbers, and pointers to the next line are stored in an area below the user RAM area. Then the program is stored, as are the working variables (A\$, for example) and an indicator for end of line. Next, a working space is opened to input new lines, or for editing, then a display area that holds 24 NEWLINE characters is provided for screen updating. This is followed by a stack area that contains information for jumps and GOTOS.

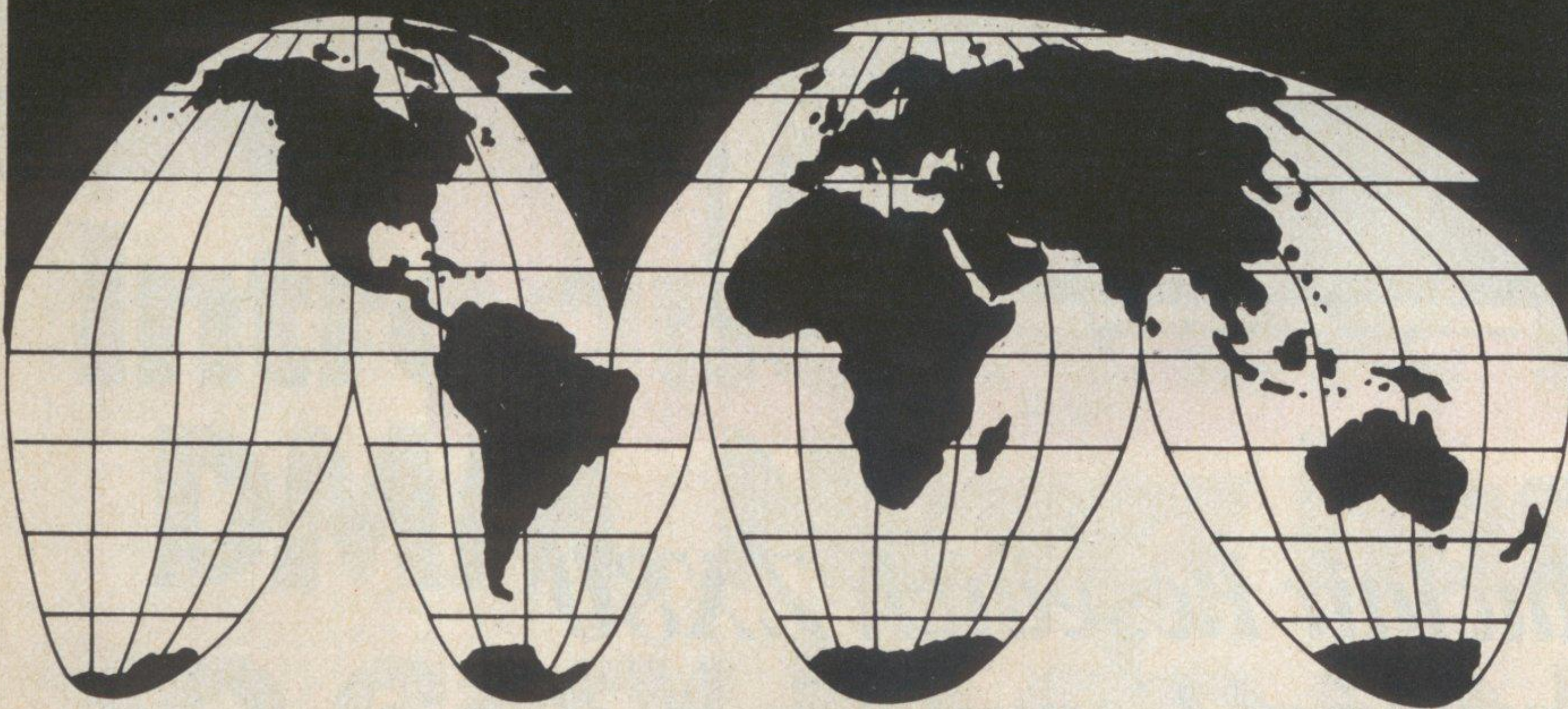
Since the code is compacted, a fair amount can be input into the 1K of available RAM. Sinclair exaggerates a little in saying that you can enter 100 32-character lines (which would be 3500 bytes, assuming two bytes for a line number, 1 byte for NEWLINE terminator and 1 byte per character), but you can come close to 3000 bytes. This is fairly easily done, since all the operators are stored as tokens and in a manner to provide maximum packaging. One technique used is to drop spaces and set bits to indicate where a space should appear.

Because of the unique implementation of the BASIC, editing is fairly simple. You LIST the program (depress the letter A), and then enter the editing mode by holding the SHIFT key and depressing NEWLINE. The cursor is moved to the desired line by holding down SHIFT and depressing one of the arrowed keys, 5 for left, 6 for down, 7 for up, and 8 for right. The chosen line then is redisplayed at the bottom of the screen, and can be edited by moving the cursor over the desired area and typing over material to be changed, including the line number. This gives you a quick way of copying lines into new line numbers.

When a program is run or a new line entered, the screen is blanked. For example, if you wrote a program to draw a maze, when you RUN, the screen will blank for a few seconds and redisplay with the maze drawn. Should your program ask for an input, the same thing happens once the data is entered. This is a bit disconcerting at first, but is not a disadvantage. It can be useful for creating certain games.

Quite honestly, the 130-page, spiral-bound operating manual supplied with the ZX80 is the best we have seen so far. The authors, realistically, assumed that the buyer of this machine would be a novice and wrote accordingly. Thus, the manual explains not only how to use the ZX80 but the basics of computer operation in general. In addition, there is a

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(continued from previous page)

The woofer system resonates at 68 Hz with a Q of 0.7. In the horizontal plane, the output is guaranteed to be within ± 2 dB of the axial response over a ± 20 -degree angle, up to 10,000 Hz. Vertically, in a ± 5 -degree angle the output is within ± 2 dB of the axial response up to 20,000 Hz. The rated axial response, at a 2-meter distance, is 70 to 20,000 Hz ± 3 dB (down 10 dB at 50 and 25,000 Hz).

Although the 303.2 does not have the elaborate electronic protection system featured in the costlier KEF Reference Series speakers, it can withstand an input of up to 20 volts RMS from 20 to 2,000 Hz, and to 10 volts rms between 2,500 and 20,000 Hz.

Laboratory Measurements. Close-miked woofer response of the KEF 303.2 was uniform within ± 2 dB from 70 to 1,000 Hz. The averaged output from the left and right speakers, measured in the reverberant field of the room at a 10-to-15-foot distance from the speakers, was corrected for the known absorption characteristics of the room. The result was an extremely flat response at the highest frequencies (only 1 dB overall variation from 4,000 to 20,000 Hz) with only slight variations in

output through the lower midrange. Splicing this curve to the woofer curve yielded a composite frequency response within ± 2.5 dB from 65 to 20,000 Hz. High frequency dispersion was good, as shown by the moderate divergence in response at positions on- and off-axis.

Woofer distortion was measured with close microphone spacing at inputs of 1 watt and 10 watts (based on the rated 8-ohm impedance). At 1 watt, distortion was about 0.2% at 100 Hz, increasing to 0.8% at 70 Hz and 5% at 40 Hz. At a 10-watt input the distortion was about 0.7% at the upper bass frequencies and still less than 10% at 40 Hz. Sensitivity was exactly as rated, with a measured SPL of 88 dB at 1 meter when the speaker was driven by 2.83 volts of pink noise in an octave bandwidth centered at 1,000 Hz.

The impedance minimum was about 6 ohms at 20 Hz and between 10,000 and 15,000 Hz. Maxima were 25 ohms at 73 Hz and 50 ohms at 1,600 Hz. Over most of the audio range the impedance was between 8 and 10 ohms, justifying the 8-ohm rating.

User Comment. On a variety of program material, the KEF 303.2 demonstrated its musical and eminently listen-

able quality with no irritating distortions or colorations. Although the low-frequency output is limited by design and size, the speaker never lacked bass. On the contrary, it often showed a comfortably "warm" quality, probably associated with the slightly elevated output (by 2 or 3 dB) between 80 and 200 Hz.

We installed the speakers on their stands about two or three feet from any walls. Imaging was excellent, and there was no tendency to focus on the speakers themselves as sound sources. Instead, a unified sonic panorama formed across the end of the room, behind the plane of the speakers.

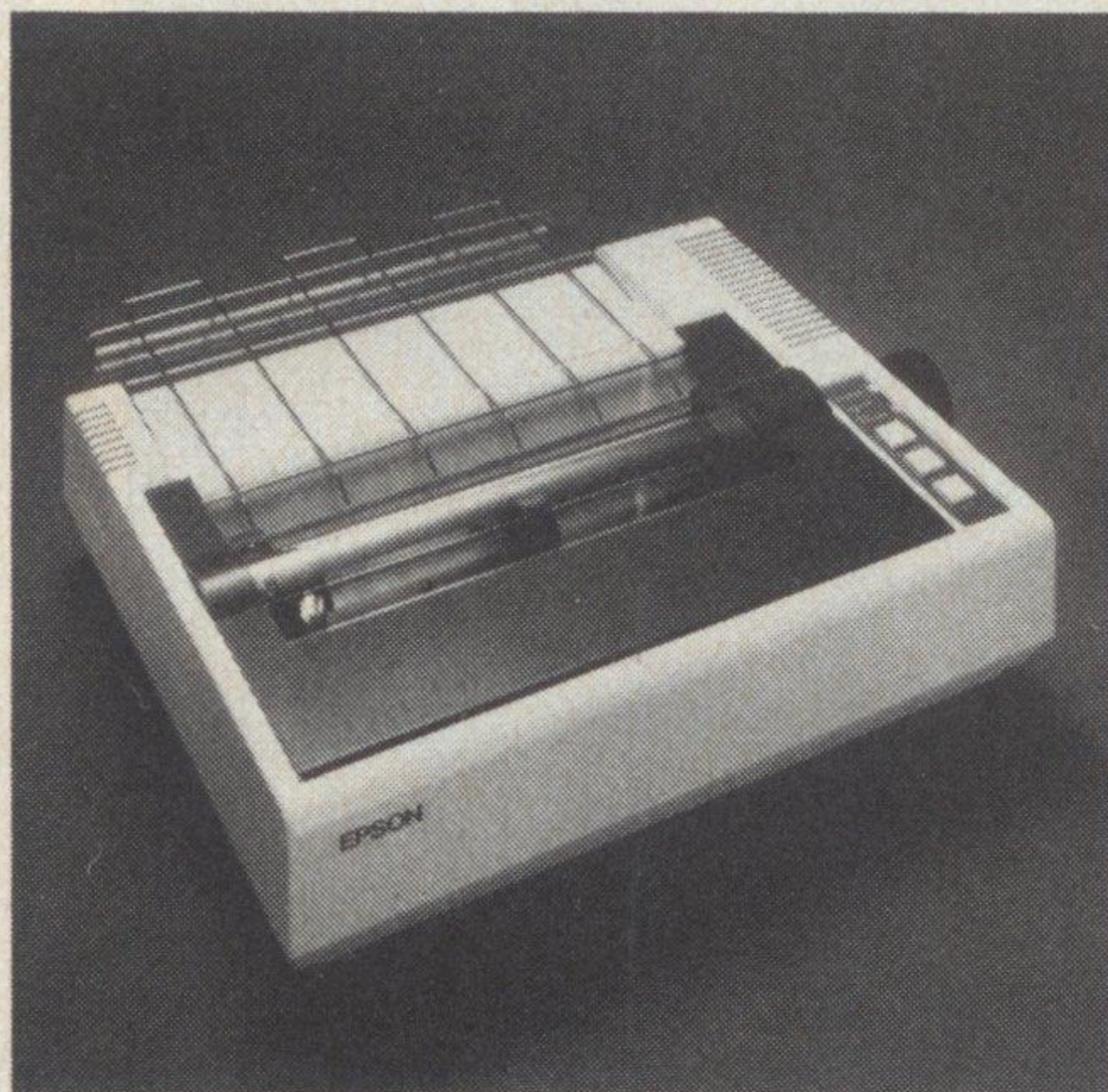
The 303.2 presented an attractive appearance, and the choice of colors for the grille, top and bottom plates, and stands provides numerous possibilities for making the speaker visually harmonious with its surroundings. We tried changing the grille cloths to see if it was as easy as claimed. It was, requiring only a screwdriver and a few minutes.

On the whole, the KEF 303.2 is a neatly engineered package and reasonably priced. It costs more than most "budget" speakers, but its standard of performance is appreciably higher.

—Julian D. Hirsch

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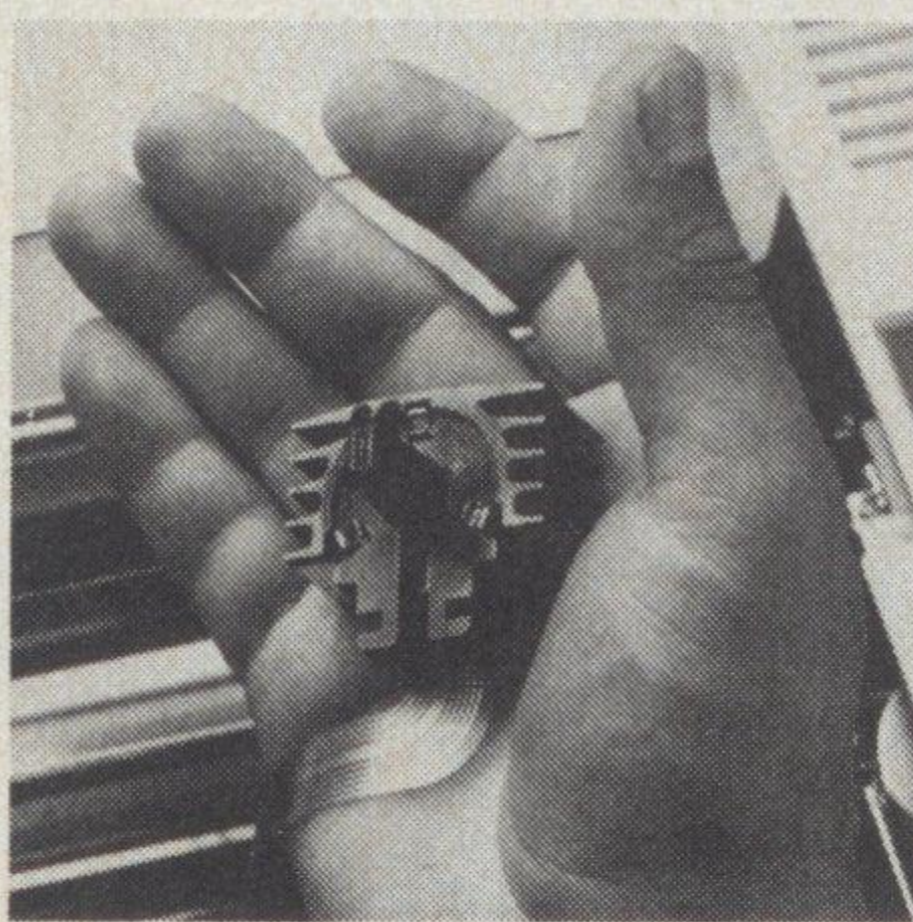
Epson.

The most revolutionary thing about the Epson MX-80 isn't the bidirectional printing or the logical seeking function. It isn't even the disposable print head — although that's pretty revolutionary. The most revolutionary thing about the MX-80 is the price. How, you may ask, could a printer that does as much as the MX-80 cost less than \$650?

Frankly, it wasn't easy. But the MX-80 could only have come from the world's largest manufacturer of print mechanisms. Epson.

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Among its features, the MX-80 prints 96 ASCII, 64 graphic and eight international characters in a tack-sharp 9x9 matrix. It prints bidirectionally at 80 CPS with a logical seeking function to maximize throughput. And it has the world's first *disposable* print head.

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INSIDE BASIC GAMES by Richard Mateosian — Uses a games format to teach program design in BASIC. Games run on TRS-80, APPLE II, PET/CBM and others. 300 pp., 100 Ill., Ref. B245, 7"x9", \$13.95 ■

FIFTY BASIC EXERCISES by J.P. Lamoitier — Teaches BASIC by actual practice using graduated exercises drawn from everyday applications. All exercises written in Microsoft BASIC. 300 pp., 140 Ill., Ref. B250, 7"x9", \$12.95 ■

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PROGRAMMING THE Z80 by Rodnay Zaks — A complete course in programming the Z80 microprocessor and a thorough introduction to machine language. 620 pp., 200 Ill., Ref. C280, 5½"x8½", 2nd Ed. \$14.95 ■

PROGRAMMING THE 6502 by Rodnay Zaks — Machine language programming of the 6502 from

basic concepts to advanced data structures. 392 pp., 160 Ill., Ref. C202, 5½"x8½", 3rd Ed., \$12.95 ■

6502 APPLICATIONS BOOK by Rodnay Zaks — Real life application techniques: the Input/Output book for the 6502. 288 pp., 207 Ill., Ref. D302, 5½"x8½", \$12.95 ■

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MICROPROCESSOR INTERFACING TECHNIQUES by Austin Lesea, Rodnay Zaks — Hardware and software interconnect techniques including D to A conversion, peripherals standard buses and troubleshooting. 464 pp., 400 Ill., Ref. C207, 5½"x8½", 3rd Ed., \$15.95 ■

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Word Processing

Has computer technology made the ordinary typewriter as obsolete as the quill pen?

BY LOREN WERNER

WHAT'S faster than a speeding typewriter, corrects errors in a single keystroke and produces unlimited original letters without manual intervention? Answer: a word processor.

Word processors, as the name suggests, are computer systems and/or programs that assist in the generation and handling of written text. They help achieve high levels of productivity because they allow easy, efficient editing and formatting of text. Tasks that would be very time-consuming using conventional typewriters are sped up and additional capabilities far exceeding those of the standard typewriter are offered.

Error correction is one example of this. Usually a correction is as quick and simple as backspacing over the incorrect characters. And because nothing is printed until the user is satisfied that a document is correct, there is a saving of paper and avoidance of erasures.

Another powerful word-processing

capability is inserting new material into existing text. With a typewriter, this means extensive retyping. Using a word processor, material is inserted into existing text without retyping of old material. The user indicates where the new material is to be inserted, and then types it. The word processor automatically adds this material and reformats the text as necessary.

Also valuable is the word processor's ability to rearrange text. In conjunction with the insertion facility, it is possible to move sentences or whole paragraphs from one place in the text to another.

Word processors have a number of features to facilitate text formation. These include justification, pagination, and special type faces, as well as automatic centering and margin setting. One special printing feature available on some word-processing systems is proportional spacing—which makes finished text appear as if it were typeset and printed. This is useful to businesses producing manuals and other documents.

Efficient mass mailing is a benefit that a word processor can provide to a business user. In this application, both the mailing list and the form letter are stored in the processor. These are then merged—that is, the form letter is re-typed once for each entry on the mailing list, giving every letter a unique heading. The processor can also print the addresses on all of the envelopes.

How They Work. Basically, word processors are of three types. The one

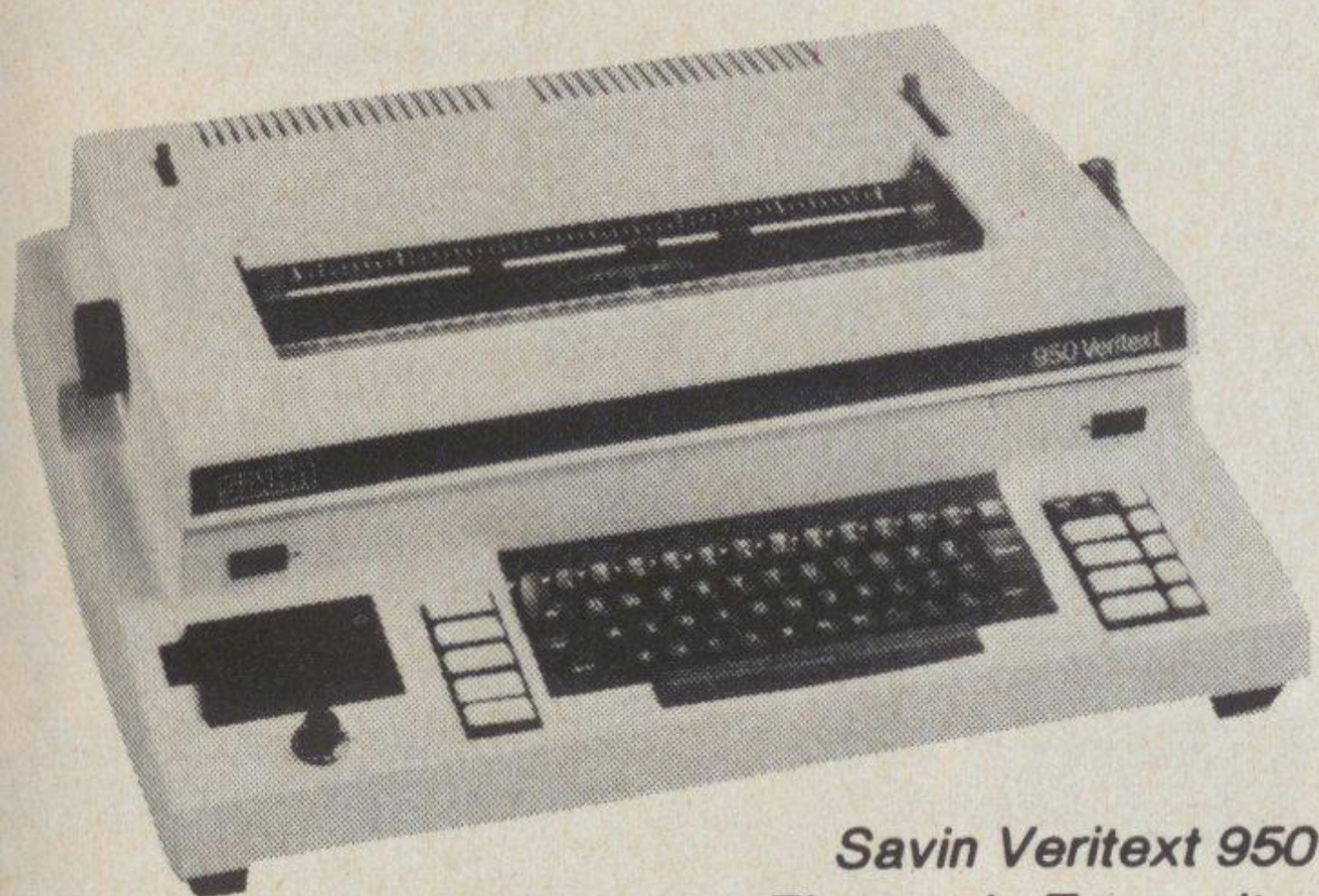
whose appearance most closely resembles the familiar typewriter is called the electronic typewriter. Machines of this type, made by Savin, Adler-Royal and IBM, among others, look like typewriters, but are larger. On electronic typewriters the normal keyboard is augmented by a number of special keys allowing one to perform functions such as DELETE, INSERT, FIND, and STORE. These units usually have a built-in high-speed printing system instead of the usual typewriter mechanism.

Electronic typewriters use computer memory elements to store text. Some machines have enough memory to hold one or two pages of text, while others can store up to 50 pages. Electronic typewriters increase efficiency by performing in the memory all revisions, deletions, insertions, and other changes. Text is printed when in finished form.

Besides memory, electronic typewriters also use computer-type mass storage devices. These allow one to store the contents of the memory on permanent removable media. Thus, a user can keep a library of documents on file. The documents can be read back into the electronic typewriter from the mass storage devices at any time to make more copies or further revise the documents.

Some electronic typewriters, like the one available from Savin, use a magnetic tape cartridge—very similar to a cassette tape—for mass storage. Other units, like the one from Adler-Royal, use floppy disks.

Word processing on an electronic



Savin Veritext 950
Electronic Typewriter

typewriter has the advantage of being easy to learn. Because the design and keyboard layout are similar to a standard typewriter, most operators find it easy to adjust to an electronic one. Since each major word-processing function is performed by pressing one of the clearly-marked buttons on the keyboard, using it for word processing is easy. Electronic typewriters are also relatively compact and easy to move.

One disadvantage, however, is that their input and output are printed directly onto the paper. This means the machine must retype a whole document when you want to see the changes you have made. This is time-consuming, even with a high-speed printer.

Some word processors avoid the problem of retyping by using a video monitor instead of paper to develop and correct documents. There are two such types—dedicated word processors that, like electronic typewriters, perform only functions associated with word processing; and small business and personal computers that perform many general computing functions in addition to word processing. The first word processor to use a video monitor was a dedicated word processor developed by Lexitron, called a videotyper.

When text is entered through the keyboard into memory, it appears on the monitor, and changes in the text appear as soon as they are made. Since most video monitors display a full page of text at a time, it is possible to see fairly extensive changes—such as the moving of whole paragraphs—immediately.

Like electronic typewriters, dedicated word processors use computer technology. A microprocessor controls all important functions, memory is used for storing text, and mass storage devices are used to create permanent, removable records. Dedicated word-processing units are generally larger than electronic typewriters and have a separate printer.

Because they are designed for use in business environments with high work volumes, dedicated word processors incorporate a number of features that help to increase throughput. Many systems, for example, allow the operator to type in a new document while a completed document is being printed.

Manufacturers of dedicated word processors also strive to enhance productivity by making their systems easy to use with a minimum of training. Thus, like electronic typewriters, most dedicated word processors have additional keys to perform those functions that are used most frequently. Operators are assisted by prompts on the video monitor that ask what the user wants, and tell what commands are necessary to accomplish the task.

DIRECTORY OF SOFTWARE VENDORS

Vendor & Address	Product	Target Computers
Apple Computer, Inc. 10260 Bandley Dr. Cupertino, CA 95014	Apple Writer	Apple Computers
Atari Inc. 1265 Borregas Ave. Sunnyvale, CA 94086	Atari Word Processor	Atari 800 with disk
Commodore Business Machines, Inc. 950 Rittenhouse Road Norristown, PA 19401	WordPro 1 WordPro 2 WordPro 3	Pet Computer
Cal Data Systems Box 178446 San Diego, CA 92117	Word Magic	TRS-80
Cromemco, Inc. 280 Bernardo Ave. Mountain View, CA 94040	Cromemco Word Processing System	Cromemco Computers
Digital Research Box 579 Pacific Grove, CA 93950	TEX	Any with CP/M
Digital Marketing 2670 Cherry Lane Walnut Creek, CA 94596	Copywriter	Any with CP/M
Interactive Microware, Inc. 116 S. Pugh St. State College, PA 16801	Pro-Type	North Star
Michael Shroyer Software 1198 Los Robles Dr. Palm Springs, CA 92262	Electric Pencil Electric Pencil II	Any with CP/M
MicroPro International 1299 4th St. San Raphael, CA 94901	WordStar, WordMaster	Any with CP/M

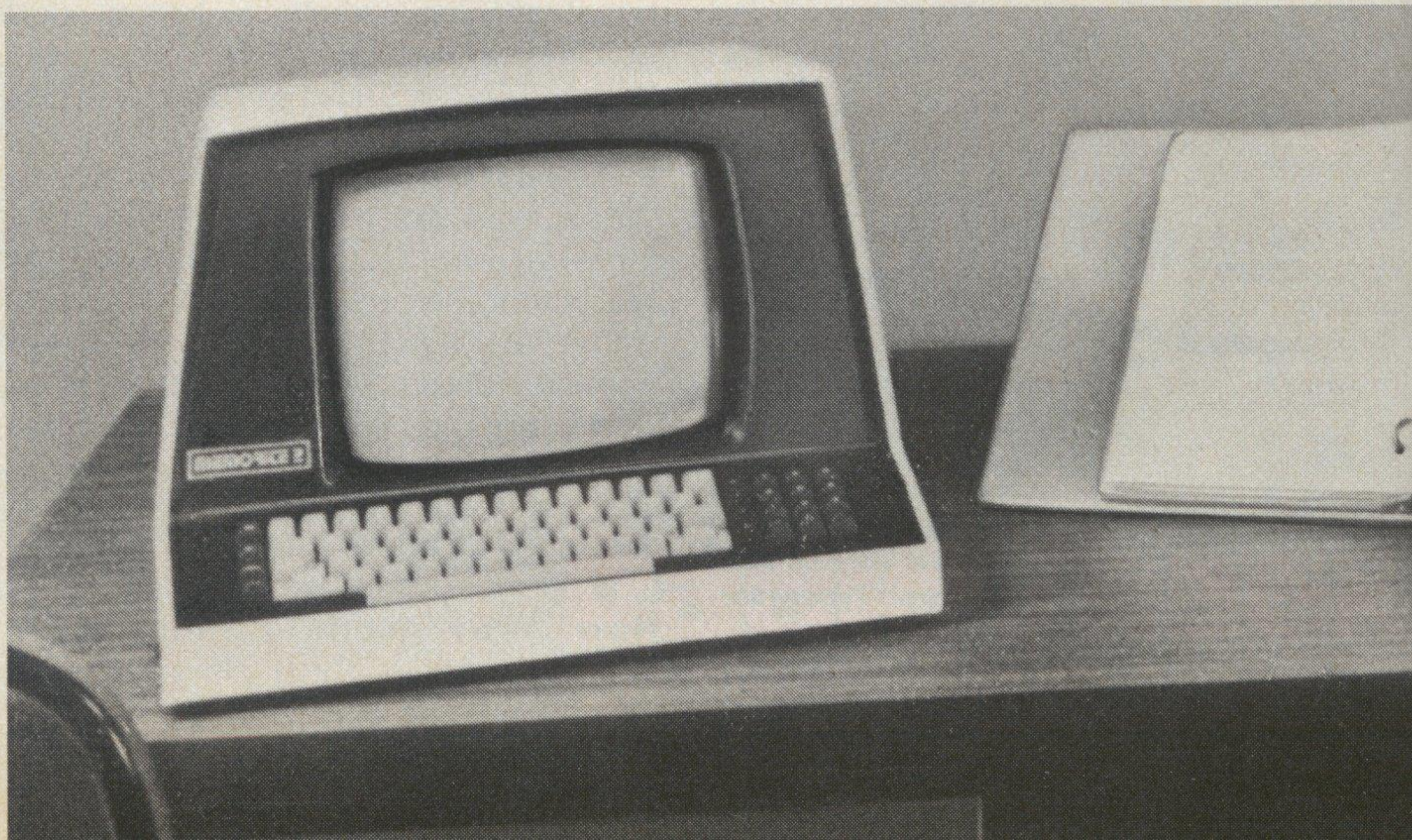
Advantages of dedicated word-processing systems are efficiency, capacity for very high throughput, and ease of use. The disadvantages are a relatively high price and little or no general computing capability.

Many businesses that require both word-processing and general-computing capability find the most cost-effective solution in a general-purpose business

computer that provides word processing through software. This is also an economical solution for owners of personal computers who want word processing. The necessary software is available for most popular personal and small business computers, including Apple, Pet, Heath, TRS-80, and Vector Graphic, among others.

When you develop a word processor

Vector Memorite Small Business System



MicroSource 1425 W. 12th Pl. Tempe, AZ 85281	AutoScribe	North Star Computers.
Muse 330 N. Charles St. Baltimore, MD 21201	Super-Text	Apple II and Apple II Plus
North Star Computers 1440 Fourth St. Berkeley, CA 94710	North Word	North Star
Ohio Scientific Inc. 1333 S. Chillicothe Rd. Aurora, OH 44202	WP-3	OSI Systems
Radio Shack 1400 One Tandy Center Ft. Worth, TX 76102	ScripSit	TRS-80
R&B Computer Systems 1954 E. University Tempe, AZ 95281	Benchmark	CP/M, North Star
Small Business Applications 3220 Louisiana St. Suite 210 Houston, TX 77006	Magic Wand	CP/M compatible
Software Dynamics 2111 W. Crescent, Suite 9 Anaheim, CA 92801	Edit	Any based on 6800 series processors
Supersoft Assoc. Box 1628 Champaign, IL 61820	Super-M-List	CP/M compatible
Vector Graphics, Inc. 31364 Via Colinas Westlake Village, CA 91362	Memorite III	Vector Graphic computers
Zenith Data Systems Corporation 1000 Milwaukee Ave. Glenview, IL 60026	AutoScribe	Heath computers

using a general-purpose computer and commercial software, there arise a number of hardware and software considerations to examine in detail. Instead of leaving the design up to the manufacturer, as you do when buying a dedicated system or electronic typewriter, you must now decide how much memory and mass storage to include, what printer to use, and what software package provides

the capabilities that most closely meet your needs.

Configuring the Hardware. In general, most small business and personal computer systems have the same basic hardware components. And most use the same type of video monitor for operator interaction. All can interface with various types of printers.

One important decision that must be made is how much memory the computer will have. For word processing, each byte of memory can store one character; and most personal and small business computers have memory capacities in the range of 4,096 (4K) to 65,536 (64K) bytes. The best results invariably come from having as much memory as you can afford.

While some systems, like the Pet and TRS-80, will function as word processors with as little as 16K of memory, most word-processing software requires a minimum of 48K, and 64K is even better if your machine will accept it.

There are several reasons for this. First, the computer's memory must hold not only the document you are typing in, but also the word-processing software and the computer's operating system. If a document is too long to fit into the computer's memory, parts of it must be saved on a mass-storage device, which slows operation considerably. Second, the large memory will increase efficiency of other computing tasks as well.

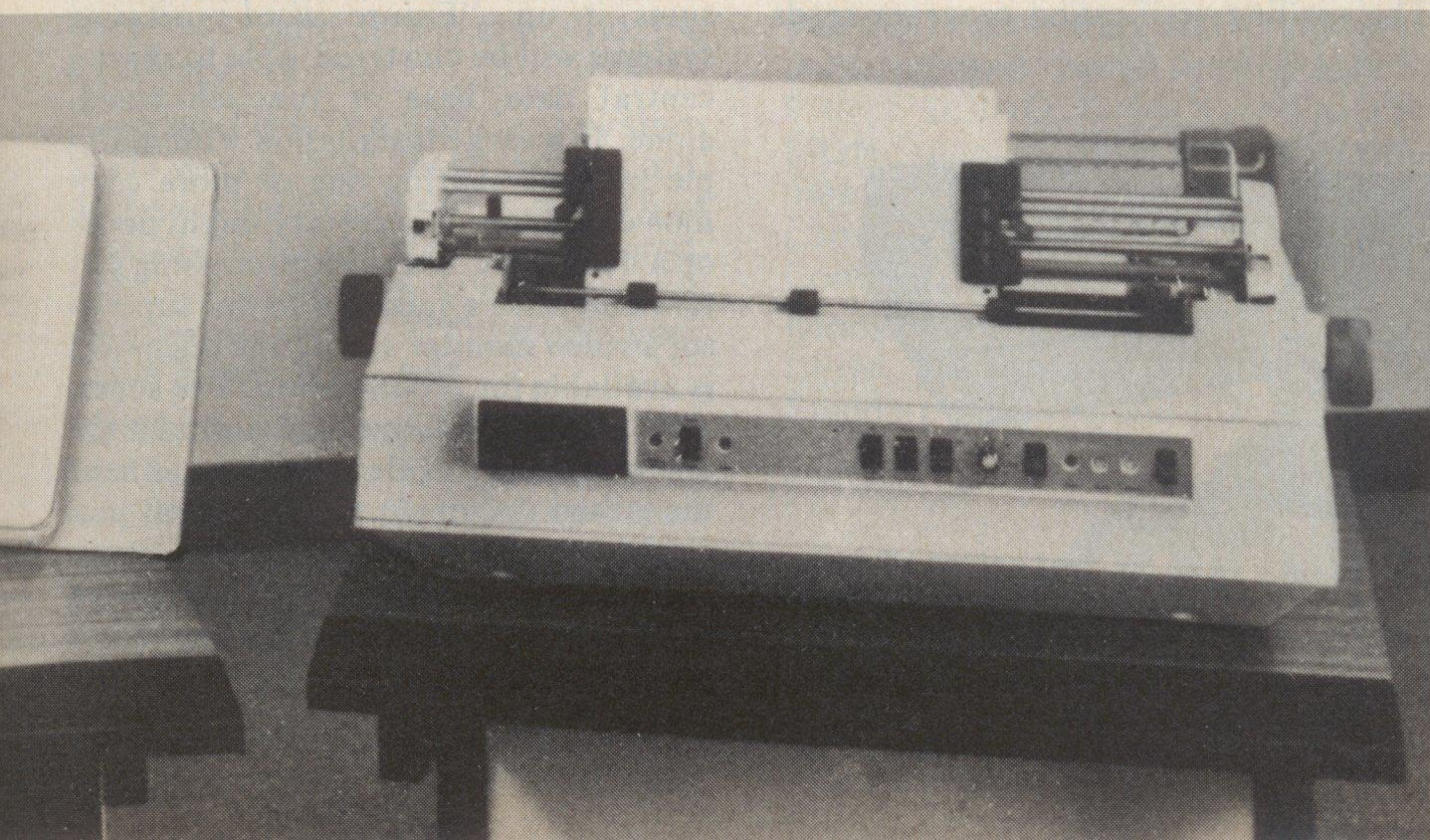
Mass storage is another important hardware feature. Most computer manufacturers offer a number of choices for mass storage, including data cartridges, standard cassette tapes, floppy disk drives, minifloppy disk drives and Winchester hard disk drives. The storage capacity, speed, and price of these devices varies greatly, and your choice will depend on your own requirements.

Data cartridges and cassettes are called serial storage devices. (This means data is written on and read from these devices sequentially.) Their main advantage is low cost. A principal disadvantage is slowness: if the data you need is at the end of a cassette you may have to rewind a large amount of tape to access that data.

There are also several types of disk storage devices available for computer-based systems. They cost more than cassettes, but provide random access to data anywhere on the disk surface. This helps to enhance overall system speed for both word processing and general computing.

Among the several types of disk storage devices are floppy and minifloppy disks—8" and 5 1/4" in diameter, respectively. Storage capacity varies from about 90K bytes for the minifloppy to about 1 million bytes for the 8" disk. Since several disk drives can be used, it is possible to include several million bytes of mass storage in a single system.

Winchester hard disks are another type of rotating, random-access storage device. Unlike floppies, they are not removable. They do, however, offer very high storage volumes (from 5 million to about 35 million bytes) and very fast



data access. Available in 5 1/4", 8", and 14" diameters, their capabilities can greatly enhance overall system response. For most word processing, however, they represent costly overkill.

One of the most critical hardware components is the printer. There are two basic types used with small computer systems. In one, the dot matrix printer, characters are formed with a pattern of dots. The most common grid size for each character is 7 by 9 dots. Dot matrix printing speeds range from about 120 characters per second (cps) to about 200 cps. Costs range from about \$500 to \$1200.

The other type of printer common to small business systems is called a formed-character printer. Like a typewriter, it works by striking type against a ribbon. Formed-character printers are slower than dot matrix printers, usually printing between 25 cps and 55 cps. Prices for them are generally higher than for dot matrix printers, ranging from about \$1800 to \$3500. Their print quality, however, is superior.

Print quality in dot matrix printers is far below that of the standard office typewriter. A dot matrix printer is adequate for rough drafts, but it simply cannot produce the letter quality required for business. Formed-character printers not only provide letter quality printing, but also allow very precise control of the printing function. In many formed-character printers, the computer can move the print head in increments as fine as 1/120 of an inch horizontally and 1/48 inch vertically. This allows a system to do subscripting, superscripting, and to produce boldface printing by overstriking characters with very slight shifting of the print position. One can also perform proportional spacing of characters—giving finished documents the look of typeset printing.

For the comfort and convenience of operating personnel, the keyboard is a hardware component worth considering. Each computer manufacturer usually offers only one keyboard, and each has its own distinct feel. System efficiency

depends, to a point, on operators being comfortable with the keyboard.

Choosing Software. The most crucial decision in word processing is selection of a software package. A wide variety is available from computer manufacturers and independent software sources. Word-processing packages range from relatively simple programs with only the basic functions, to more extensive packages rife with special features and capabilities.

Most makers of personal and small business computers offer word-processing packages. Apple's, for example, is called Apple Writer; Commodore has three packages called WordPros 1, 2, and 3; Heath sells the AutoScribe package under license from Zenith Data Systems Corporation; Radio Shack's TRS-80 uses a package called ScripSit; and Vector Graphic offers very comprehensive software called Memorite III.

As indicated by the Table such packages are also available from numerous independent vendors.

When comparing word-processing software it is important to remember that any given package may perform differently on different computers. One that gives fast response on a computer with 64K of memory may run much more slowly on a computer with only 48K of memory. Likewise, a package that must make extensive use of mass storage will probably run much faster when used with a system that contains a Winchester hard disk than on a system that uses floppy disks.

Beyond Word Processing. The leading edge of word-processing technology seems to be evolving toward a new generation of software and hardware. Already, sophisticated software packages offer enhancements that extend the power of word processors. Vector Graphic's Memorite III, for example, is compatible with a computer-based dictionary that checks text for spelling at a rate of about 1,000 words per minute. The spelling-verification program reads

files created by Memorite III, comparing text to a dictionary of the 30,000 most commonly-used words, plus 5,000 "spelling demons." Further, one can augment the main dictionary with custom dictionaries that recognize special words and proper names. MicroPro International reports that its word-processing package, WordStar, will soon include a spelling verification system.

Advances in software technology extend far beyond spelling verification and computer-aided instruction. As business embraces the evolving office of the future, word-processing software is continually developing to meet the challenge of integrating word processing and data processing. MicroPro, for example, offers a system of compatible software packages that perform data acquisition, data manipulation, word processing, and automated personalized mailing. Vector Graphic also offers combined word- and data-processing capability. The Memorite III software is compatible with Vector Graphic's EXECUPLAN software that allows one to perform statistical calculations, format formulas, and develop tables and charts. The files created by EXECUPLAN can be read by Memorite III, permitting their automatic merger into coherent documents.

As word processing and data processing begin to overlap, communication between word- and data-processing hardware becomes important. Many word-processing vendors are paying close attention to these requirements. Vendors are offering standard asynchronous, synchronous, and bisynchronous communications interfaces. Some vendors offer compatibility with communications networks. Lexitron's word processors, for example, can communicate on Raytheon's Raynet. Many vendors are now studying the requirements for Ethernet and other communication networks under development.

What is the potential for increased productivity and greater efficiency through integrated office systems? Vector Graphic Board Chairman Bob Harp sums it up: "Future word-processing systems will be clustered, able to share a central data base or function stand-alone. In a large installation with multiple systems sharing one or more common data bases, a secretary might develop a document on a word-processing system and send a message to her supervisor's video monitor saying the document is available for proofreading. The supervisor could then proofread and edit the document on the video monitor and send the edited document to the central processing unit for printing. The entire process could be conducted without using a single piece of paper until the final document is printed." ◇



Lexitron VT 1303
Word Processing System



Turn your Apple into the world's most versatile personal computer.

The SoftCard™ Solution. SoftCard turns your Apple into two computers. A Z-80 and a 6502. By adding a Z-80 microprocessor and CP/M to your Apple, SoftCard turns your Apple into a CP/M based machine. That means you can access the single largest body of microcomputer software in existence. Two computers in one. And, the advantages of both.

Plug and go. The SoftCard system starts with a Z-80 based circuit card. Just plug it into any slot (except 0) of your Apple. No modifications required. SoftCard supports most of your Apple peripherals, and, in 6502-mode, your Apple is still your Apple.

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BASIC included. A powerful tool, BASIC-80 is included in the SoftCard package. Running under CP/M, ANSI Standard BASIC-80 is the most powerful microcomputer BASIC available. It includes extensive disk I/O statements, error trapping, integer variables, 16-digit precision, extensive EDIT commands and string functions, high and low-res Apple graphics, PRINT USING, CHAIN and COMMON, plus many additional commands. And, it's a BASIC you can compile with Microsoft's BASIC Compiler.

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COMPUTER BITS

By Carl Warren

This Is the Year of Software.

A STRIKING difference between the sixth annual West Coast Computer Faire this past April and previous shows was the large number of software vendors in attendance. And this time, the software being shown was of great value and indicated the power possessed by microcomputers.

Sorcim for example, showed its latest piece of magic, called "Supercalc." This isn't just another electronic worksheet patterned off Personal Software's "Visicalc"; it's a powerful information-handling tool that happens to create spread sheets. The package lists for \$295 and works with the CP/M operating system. Data entry is facilitated by using single keystroke inputs for commands and menu selections. Somewhat similar to Supercalc is Ashton-Tate's dBase II. This comes in two flavors: a

\$700 package for large CP/M systems that support anything from 5.25-in. floppies to 10M byte Winchester, and a \$350 package for the Apple II. The latter version has some unusual hooks in it, requiring a Microsoft Z80 Softcard, and Apple CP/M. To ensure proper operation of the package, and to prevent it from being loaded to larger machines, the Apple version uses part of the 6502 instruction set for certain mathematical functions.

The dBase II package is delivered as a demo diskette and a system diskette. The demo diskette lets you do everything you can do with dBase II, up to a maximum of 15 records in any one database. The purpose is twofold: first, to let you decide if this is really the package for you; and, second, to let you configure the database(s) the way you want them

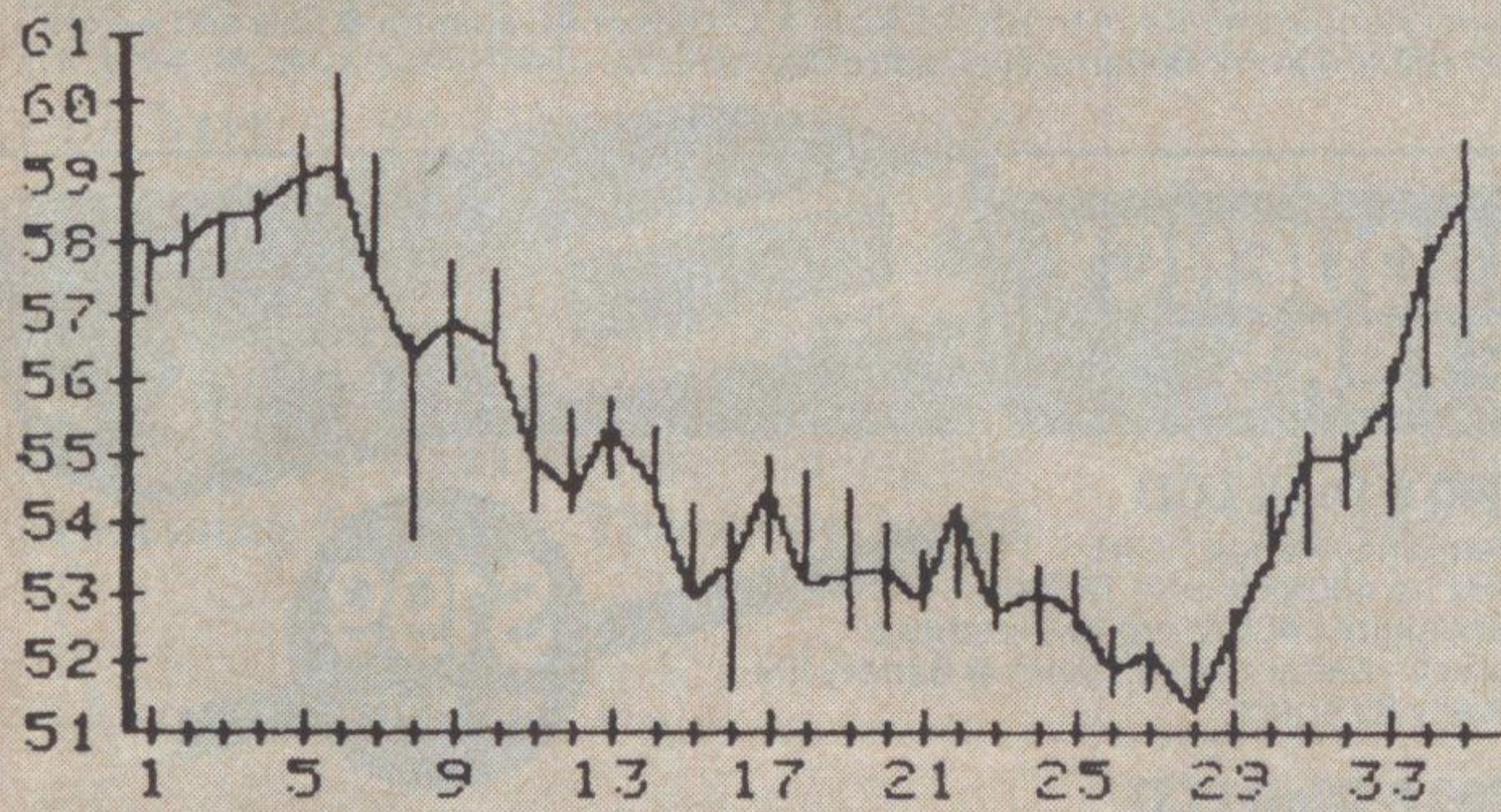
before committing yourself to the full package. If you decide it's for you—open the sealed and coded package.

I have been able to use dBase in a variety of ways. To make sure I fully understood the package (the documentation is good, but still needs refinement), George Tate, of Ashton-Tate, spent a day going over it with me.

One unique feature of dBase II is its built-in language. This nameless language was designed to permit the building of command files that will work on an automatic basis and require no operator intervention. However, the language is so powerful, using constructs very much like Pascal and Fortran, that you can create specialized applications.

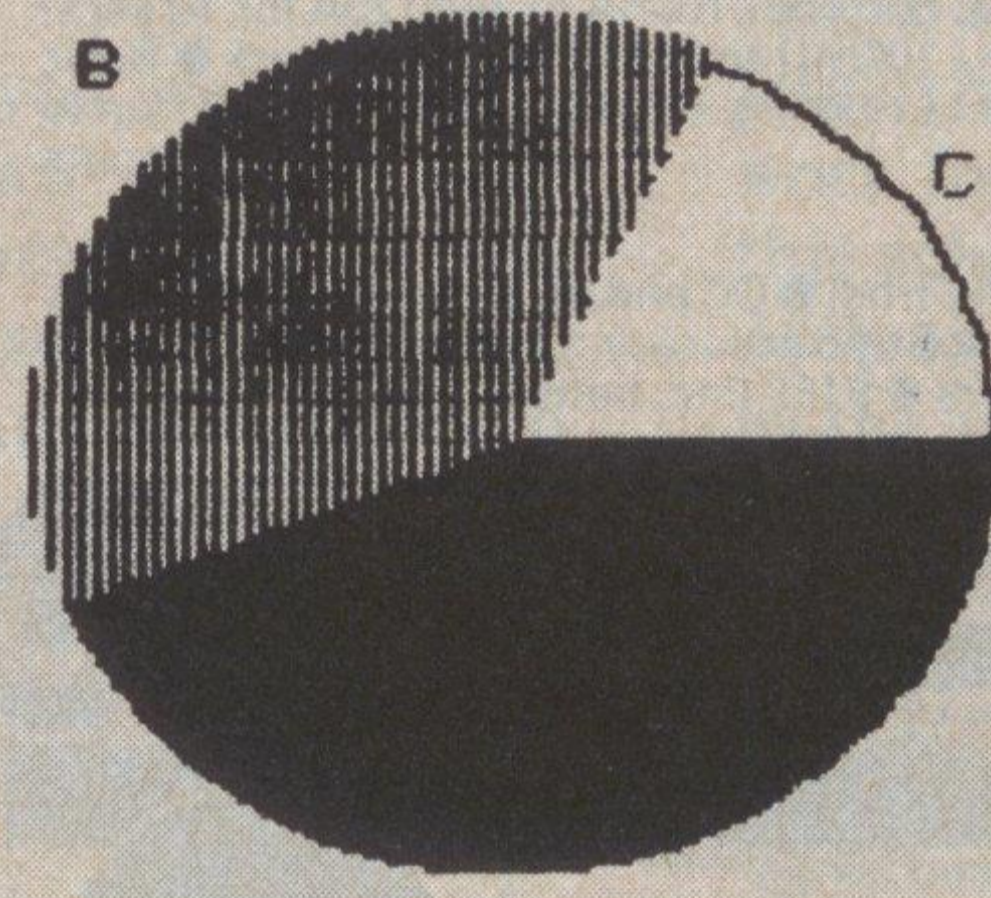
Still on the information retrieval side, are four packages from Personal Software. Created to turn a personal com-

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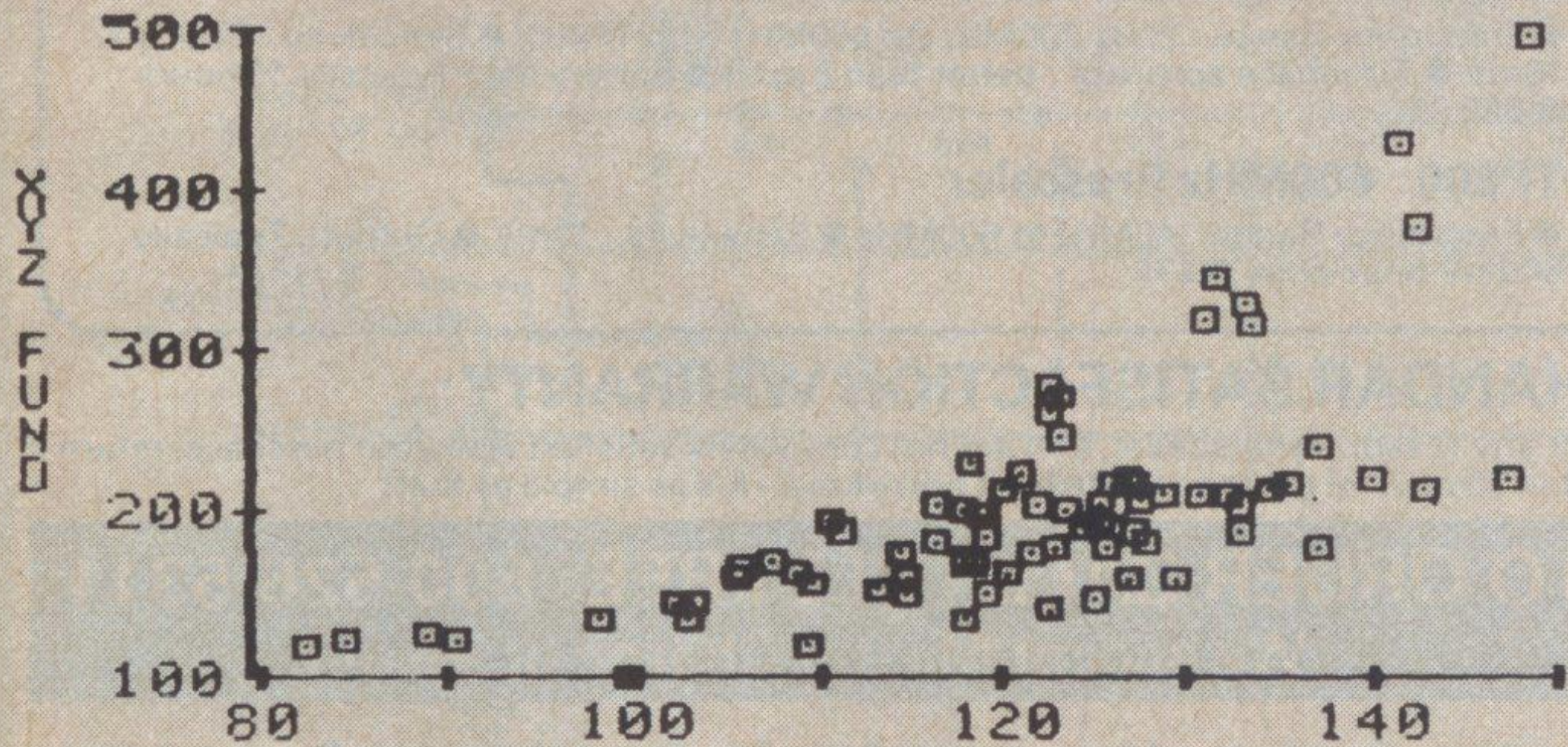
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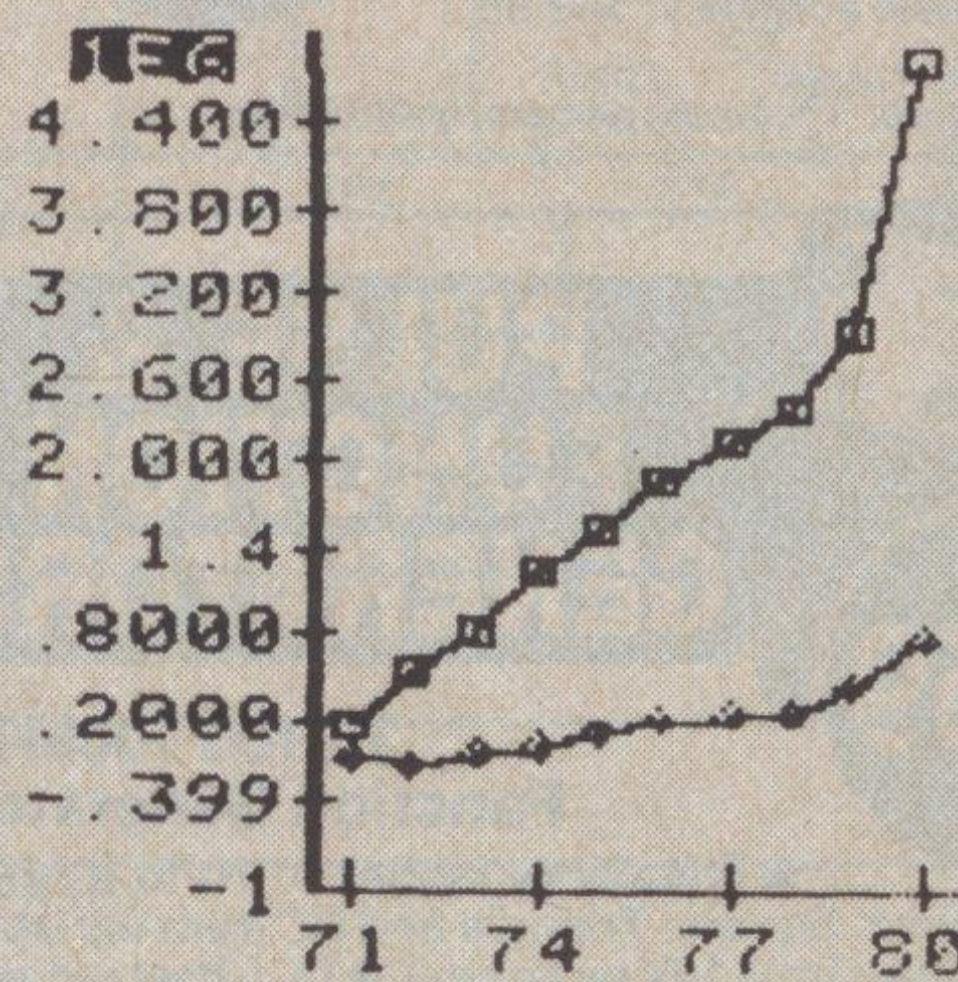


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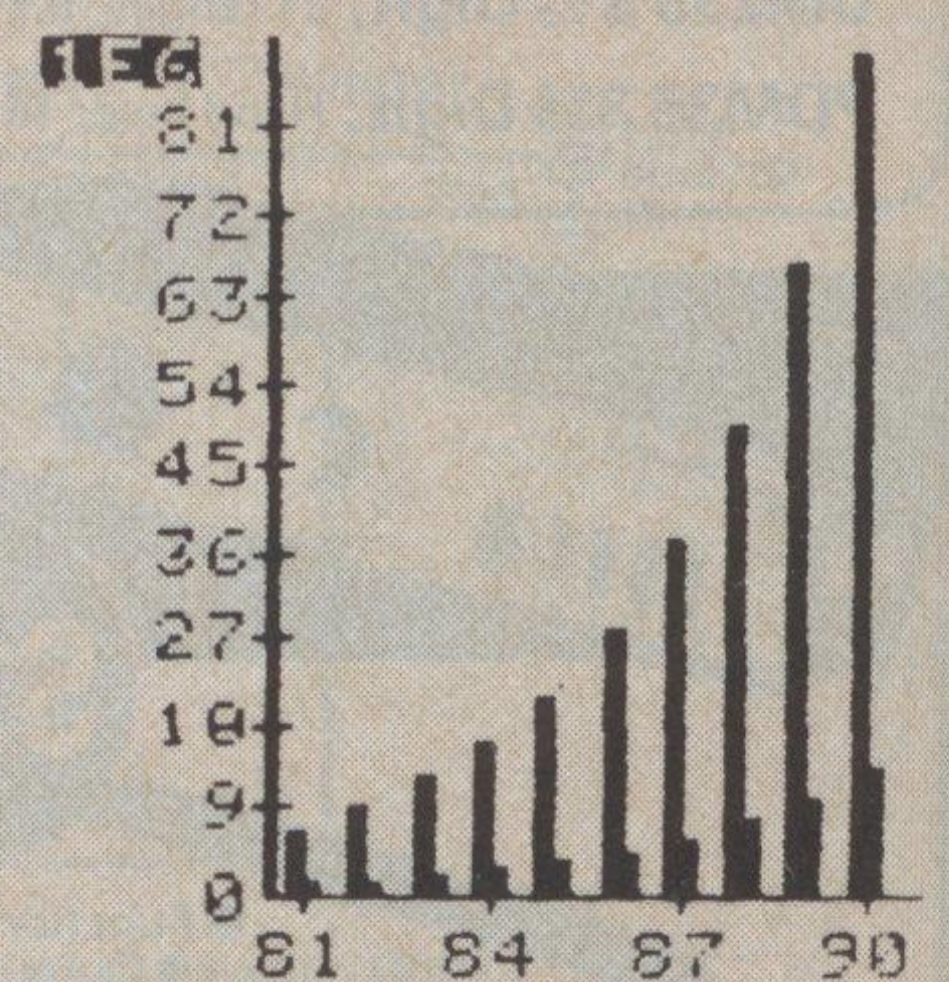
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NYSE INDEX
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SALES VS OPERATING INCOME



Sample printouts from the VisiPlot and VisiTrend/VisiPlot programs. Producible graphs include bar chart, scatter, pie, line, and high-low.

puter into a powerful intelligent worksheet, four generic software packages dubbed Visiplot, Visitrend, Visidex, and Visiterm provide powerful general capabilities. These include calculations, data plotting, and financial or statistical analysis. Moreover, the packages exhibit great flexibility. Currently designed to operate on the Apple computer, they are visually oriented, and require no special programming skill. Additionally, all the programs have a mutually consistent command structure. Visiplot, for \$179.95, produces high-resolution graphs and charts in six different formats and colors, without programming intervention on the part of the user. It can use numerical data entered directly or data generated by the popular Visicalc.

Visiplot's repertoire of "plots" includes bar graphs (cumulative and side-by-side), time-series-one plots, hi-lo charts, and scatter grams. A total of 645 data points is held in memory at one time and up to 150 data points can be plotted on a single graph. As an added feature, plots may be printed to either the Apple Silentype thermal printer, or the Integral Data Paper Tiger Models 440 and 445. Daisy wheel printers with graphics capability can also be used.

Combining the power of Visiplot with a forecasting program is Visitrend/Visiplot at \$259.95. This package speeds time-consuming statistical calculations. Among the many types of trend analysis that can be performed are: descriptive statistical analysis, multiple linear regression, trend-like forecasting, data transformations, cumulatively total data values, generation of fitted and residual series, moving average, smoothing—line of best fit—and lead/lag and percent change. Since Visitrend works in tandem with Visiplot, the results of the calculations can be displayed graphically. And, like Visiplot, it can accept data either from direct keyboard input or from Visicalc files.

The third program in the series, Visidex, stores and provides rapid retrieval of unrelated information. Priced at \$199.95, it permits information to be entered on the screen in free-form fashion in user-defined formats. Applications can include; tickler files, mail lists, to-do lists, memos, and virtually anything you now do on paper. Up to 36 six-letter keywords can be defined for any record, thus permitting access via multiple avenues. Also included in Visidex is a built-in calendar that facilitates retrieving information by date or, if your Apple is equipped with an onboard clock, automatically purge information on a given date or time or generate a reminder for you. This data can be sorted by keyword, numeric order, or by date and set for later print out.

The final package in the series, Visiterm, at \$149.95, permits the transfer of disk file information over the phone. It is designed to work with files created by the other information packages and in-

cludes such features as single-key macro definitions, a configuration feature to match host systems, scrolling, and entry of information in upper or lower case.

All these packages are available now from Apple and Personal Software dealers on 16-sector formatted diskettes. Although there has been controversy over the command structure used in Personal Software packages, I have found them easy to learn. Personal Software supplies very informative manuals with its products. Of course, they won't do you any good if you don't read them.

That North Star Book. Many of you have written requesting more information on North Star BASIC, and where to get that book I thought had been written. The book is entitled: "A User's Guide to North Star BASIC" by Robert R. Rogers. About 100 copies of the first edition are still available at \$14.95 plus \$2.50 UPS charges. You can order by contacting Robert Rogers at Scott Randolph Labs, 5924 Allday, Houston, TX 77036. Phone: 713-975-1807. The author is currently working on a new edition that might be available before year's end.

Let's Communicate. I know that many of you are looking for a method of getting onto MicroNet or setting up your own system. Here's how. Contact Microperipheral Corp. (2643 151st, NE, Redmond, WA 98052; 206-881-7544) and order the Microconnection for your favorite system. The modem is priced at \$199.50 with a terminal program; add another \$79.95 for the auto-dial/autoanswer module. With this in hand, you can set up your own network.

A question that has been asked about the Microperipheral modem is: why does it use a separate power supply, rather than deriving the power from the phone line? The answer, according to Microperipheral's Don Stoner, is that telephone line voltages tend to vary too much around the country, and, should a line spike occur, damage to the modem would be likely.

There seems to be a growing mass of evidence to support this design decision. A number of users on MNet have reported difficulties with modems powered from the phone line and have found it necessary to add pull-up resistors to force a higher voltage or add a power supply of their own. Pat McMullen, a technician with whom I do a great deal of work, and I ran a number of tests with various modems to determine whether or not they could work under a wide range of conditions. Our purpose was to choose a modem that could be implemented in a message network, of which we will divulge the number before the end of the year. We decided that the Microconnection met all our needs, and have it installed on the TRS-80, Heath H-89, and an S-100 bus system. Later, we will use it with the Apple II. So far, after two months, no problems. ◇

NEW!!! THE ELECTRIC MOUTH*



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- * Four models, which plug directly into S100, Apple, Elf II and TRS-80 Level II computers.
- * Get it to talk by using either Basic or machine language (very easy to use, complete instructions with examples included).
- * Uses National Semiconductor's "Digitalker" system.
- * Includes on-board audio amplifier and speaker, with provisions for external speakers and amplifier.
- * Adds a new dimension and excitement to programming; lets you modify existing programs and games to add spoken announcements of results, warnings, etc.
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five	forty	400hertz tone	feet	left	out	speed	g	x	
six	fifty	80hertz tone	flow	less	over	star	h	y	
seven	sixty	20ms silence	fuel	lesser	parenthesis	start	i	z	
eight	seventy	40ms silence	gallon	limit	percent	stop	j		
nine	eighty	80ms silence	go	low	please	than	k		
ten	ninety	160ms silence	gram	lower	plus	the	l		
eleven	hundred	320ms silence	great	mark	point	time	m		
twelve	thousand	centi	greater	meter	pound	try	n		
thirteen	million	check	have	mile	pulses	up	o		
fourteen	zero	comma	high	milli	rate	volt	p		
fifteen	again	control	higher	minus	re	weight	q		
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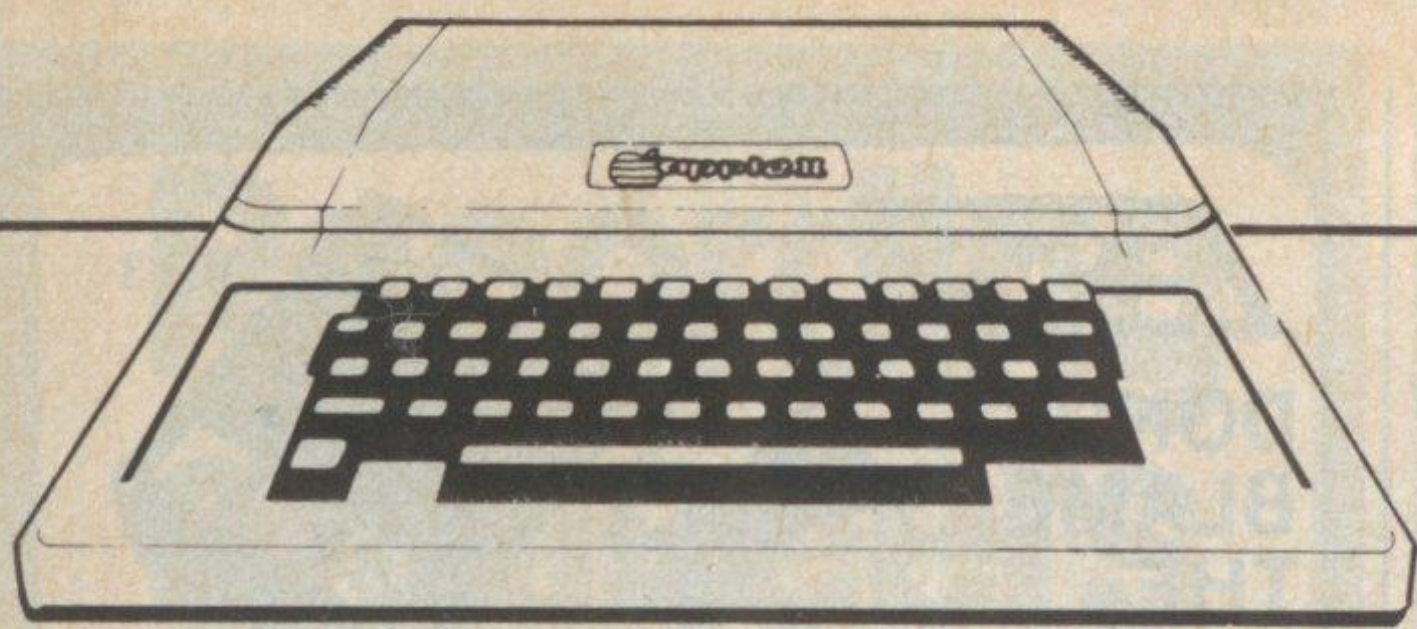
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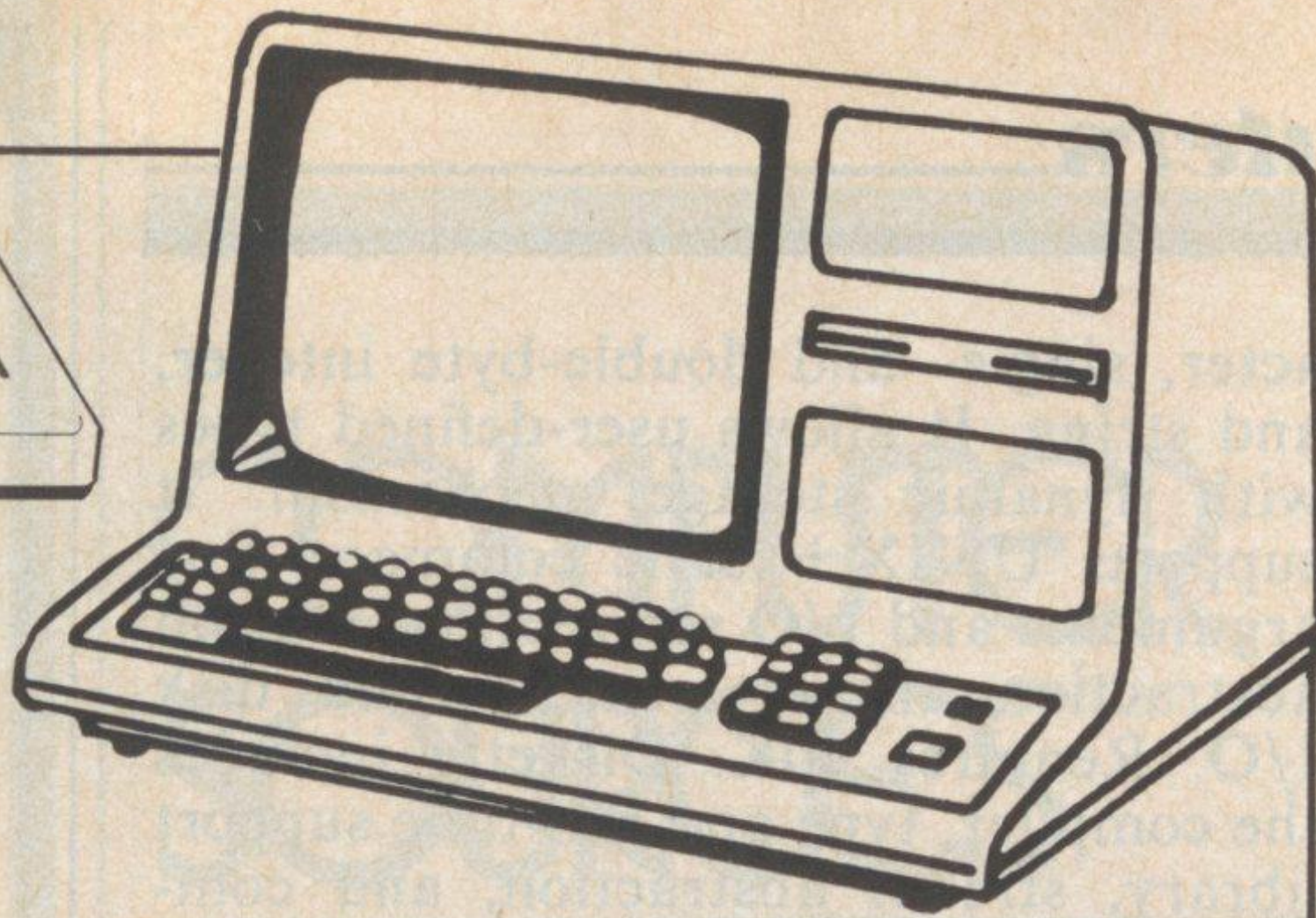
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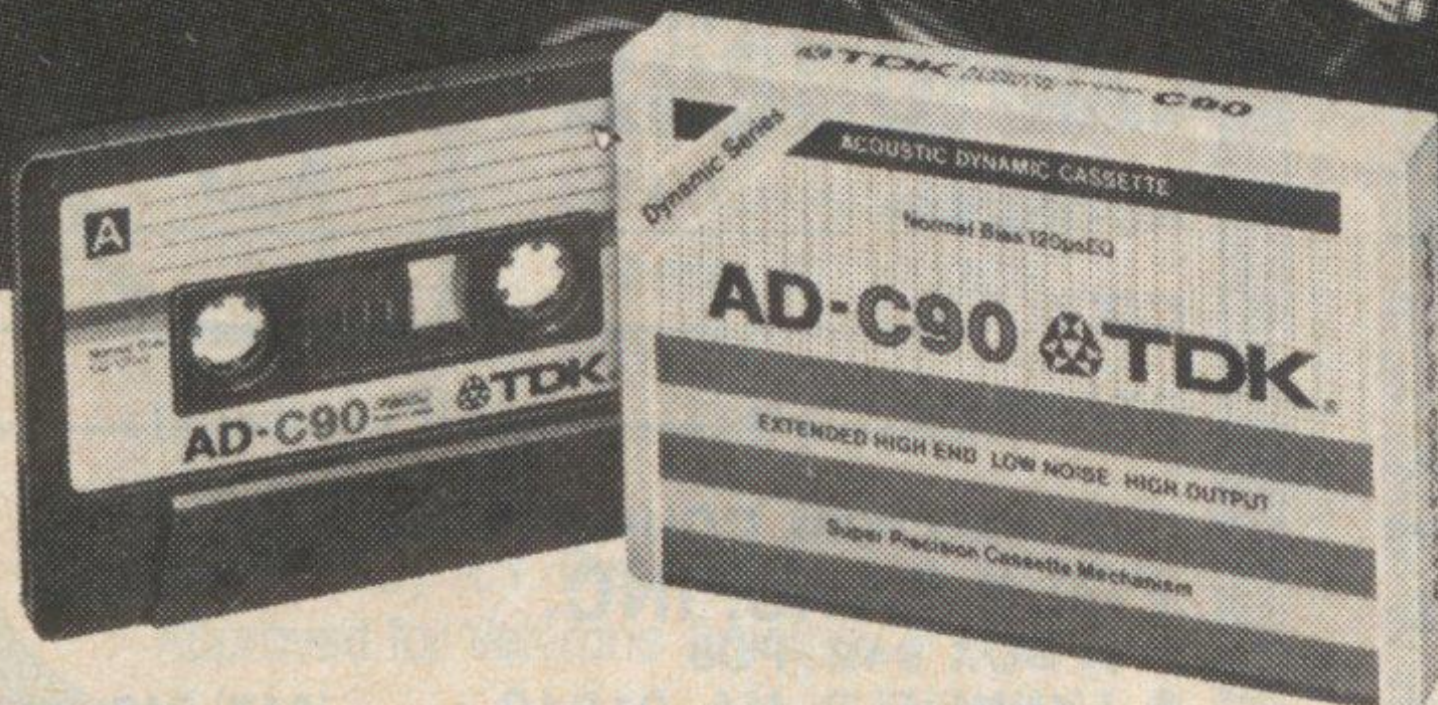
Educational Programs. A series of programs written for an Apple II with 16K and disk, and especially designed as childrens teaching aids include hand/eye coordination programs such as Cooperation Maze, Write In Color, Make A Tune, and Computer Palette. Also counting programs such as Count to 10, Counting Fun, Counting Numbers Less Than 101, and Counting By *; and a series of programs in arithmetic, vocabulary, synonyms and antonyms, hard/soft consonants, syllables, word break-up, basic reading skills, etc. **Address:** Edutek Corp., 415 Cambridge #14, Palo Alto, CA 94306 (Tel: 415-325-9965).

Apple Word Processor. Using a 48K Apple II with disk and Applesoft in ROM, WRITE-ON!-I and II allows personalized letters, mailing labels, bills, checks, and the creation and maintenance of data files, merging, etc. Version II can preformat often-used text for faster printing. No computer training is required to use either version. Version I does not have data file merge. \$99.50 for version I, \$150 for II. **Address:** Rainbow Computing Inc., 9719 Resada Blvd., Northridge, CA 91324 (Tel: 213-349-5560).

PASCAL Utilities. Screen Handler is compatible with a variety of terminals making CRT data input simple. Extensive error checking and an easy-to-use system for storing and changing user prompts without reprogramming are provided (\$75). Output Formatter makes reports easy to design and program. It includes tab, automatic page and line counter during program execution, and top of form routine (\$37.50). Forms Generator includes an output formatter and additional software that allows an end user to redesign reports without programming (\$49.50). **Address:** HDP Inc., 222 E. Anapamu St., Santa Barbara, CA 93101 (Tel: 805-965-4477).

Music and Animation. The Rainbow Writer is a graphics, text, music, and animation program for the Apple II. The program creates special effects using color, animation, alphabetics, shapes and sounds. It uses a simple menu-driven selection. Special character fonts can be created, or a selection can be made between nine sizes and 18 different colors of upper- and lower-case English or Greek letters. In the music mode, six chromatic octaves and special tonal effects can be produced. \$39.95. **Address:** Personal Software Inc., 1330 Bordeaux Drive, Sunnyvale, CA 94086 (Tel: 408-745-7841).

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EXPERIMENTER'S CORNER

By Forrest M. Mims

Remote Sensing—Part 2

LAST month, we discussed the basics of remote sensing. We also assembled a dual-wavelength green-leaf detector which relies upon the unique *reflectance signature* of green vegetation.

Leaves, as you might recall, reflect red light poorly but reflect near-infrared radiation very well. This generates a characteristic reflectance signature which makes it possible to use a red LED and a near-infrared LED as a pair of narrow-band radiation *detectors*. This is done in the leaf-detector circuit described last month in Part 1 of this series.

NASA's Image Classification Circuit. An expanded version of the leaf-detector circuit has been developed for NASA's Langley Research Center by Roland L. Hulstrom, Roger T. Schappell and John C. Tietz of the Martin Marietta Corporation. Like the circuit I described, NASA's circuit also teams a red sensor and a separate near-infrared sensor to detect green vegetation. Moreover, these two detectors also permit the detection of water, bare land, clouds and snow.

Figure 1 is the schematic for this new circuit as given in a recent NASA Tech Brief. The circuit, an expanded version of which is slated to be flight-tested aboard one or more Space

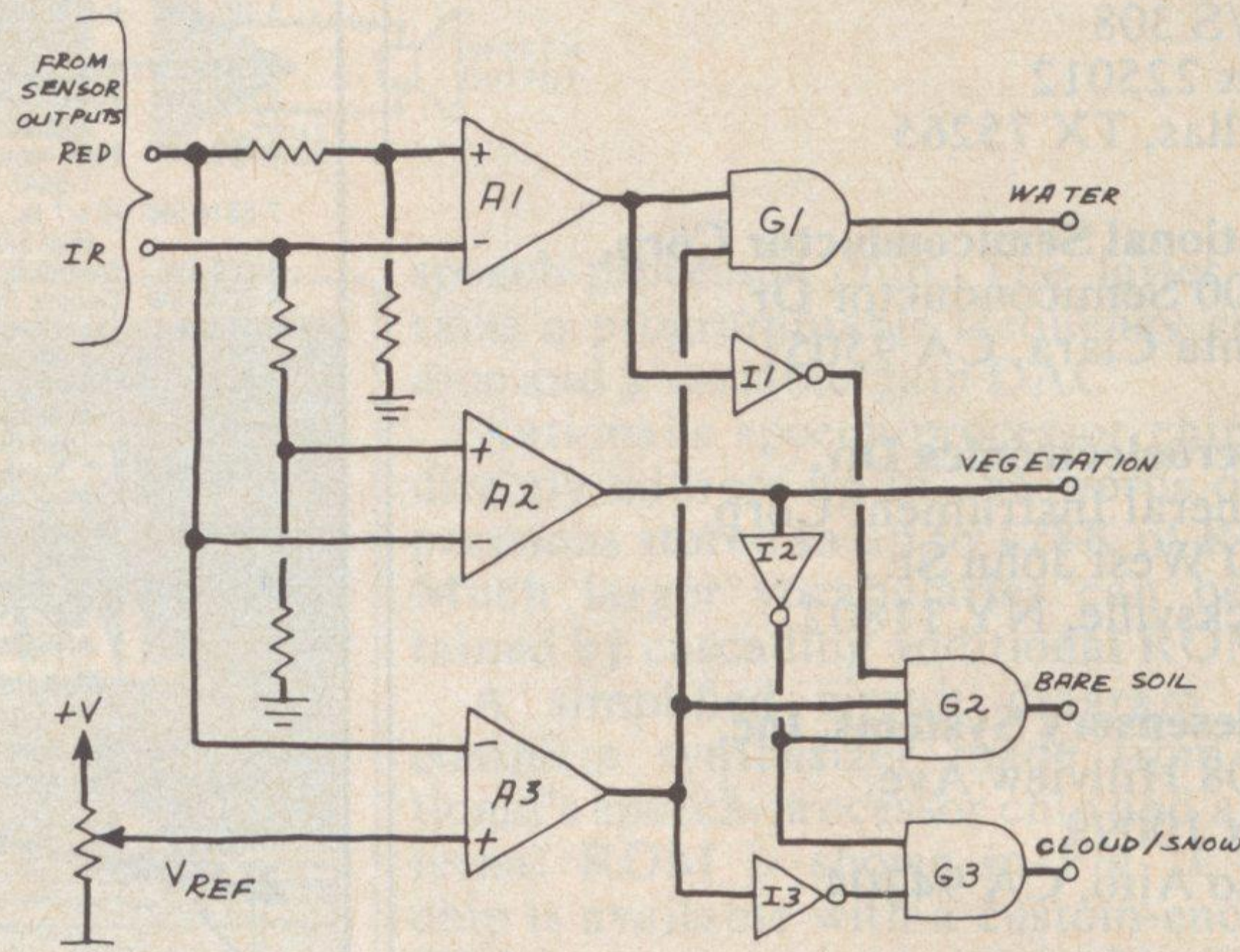


Fig. 1. Earth satellite picture classification circuit.

Shuttle missions, is designed to automatically reduce the quantity of unwanted imagery transmitted to earth from camera-carrying earth satellites.



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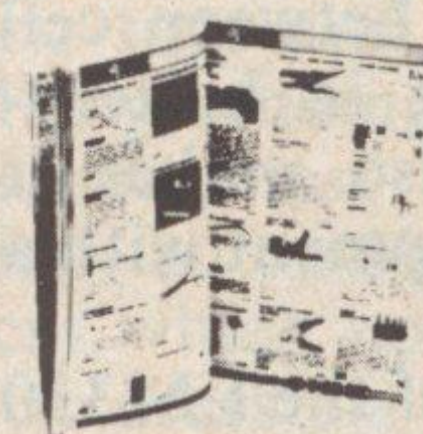
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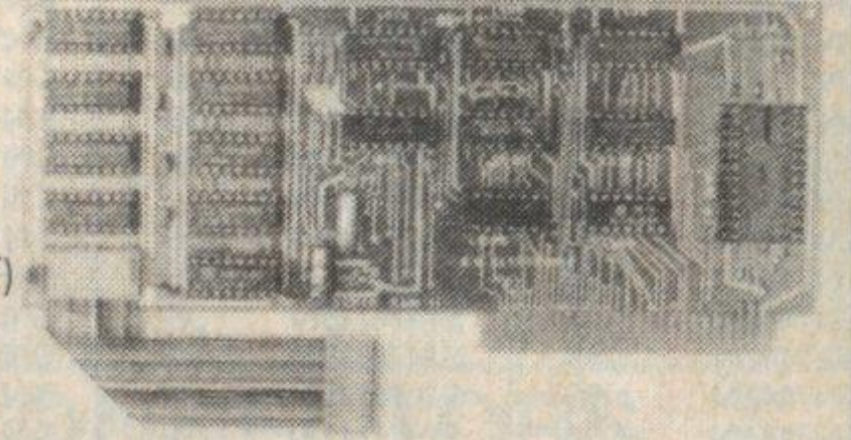
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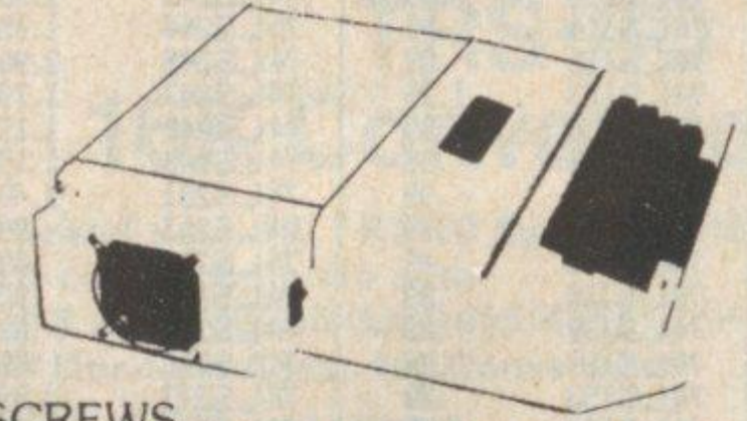


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WW = WIREWRAP

LEDS

Jumbo Red	10/1.00
Jumbo Green	6/1.00
Jumbo Yellow	6/1.00
5082-7760 .43'CC	.79
MAN74 .3'CC	.99
MAN72 .3'CA	.99

DYNAMIC RAMS

100pcs

4027	(250ns)	2.50	2.00
4116-150	(150ns)	8/21.95	2.65
4116-200	(200ns)	8/19.95	2.35
4116-300	(300ns)	8/16.95	2.00
4164	(200ns)	CALL	CALL

STATIC RAMS

100pcs

2101	(450ns)	1.95	1.85
2102-1	(450ns)	.89	.85
21L02-1	(LP) (450ns)	1.29	1.15
2111	(450ns)	2.99	2.49
2112	(450ns)	2.99	2.79
2114	(450ns)	8/18.95	2.25
2114L-2	(LP) (200ns)	8/22.95	2.45
2114L-3	(300ns)	8/21.95	2.45
2113L-4	(LP) (450ns)	8/18.95	2.25
4044-4	(450ns)	3.49	3.25
4044-3	(300ns)	3.99	3.75
TMM2016	(200ns)	CALL	CALL
MB6116	(200ns)	CALL	CALL

LP = LOW POWER

EPROMS

8pcs

1702	256 x 8	(1us)	4.95	4.50
2708	1024 x 8	(450ns)	3.95	3.50
2716	(5v) 2048 x 8	(450ns)	6.95	5.95
2758	(5v) 1024 x 8	(450ns)	9.95	8.95
2716-1	(5v) 2048 x 8	(350ns)	12.95	11.95
TMS2716	2048 x 8	(450ns)	9.95	8.95
TMS2532	(5v) 4096 x 8	(450ns)	21.95	19.95
2732	(5v) 4096 x 8	(450ns)	17.95	16.95

PROMS

74S188	(82S23)	OC	32 x 8	3.95
74S287	(82S129)	TS	256 x 4	4.75
74S288	(82S123)	TS	32 x 8	4.45
74S387	(82S126)	OC	256 x 4	5.75
74S471		TS	256 x 8	9.95
74S472	(82S147)	TS	512 x 8	16.85
74S474	(82S141)	TS	512 x 8	17.85
74S570	(82S130)	OC	512 x 4	7.80
74S571	(82S131)	TS	512 x 4	7.80

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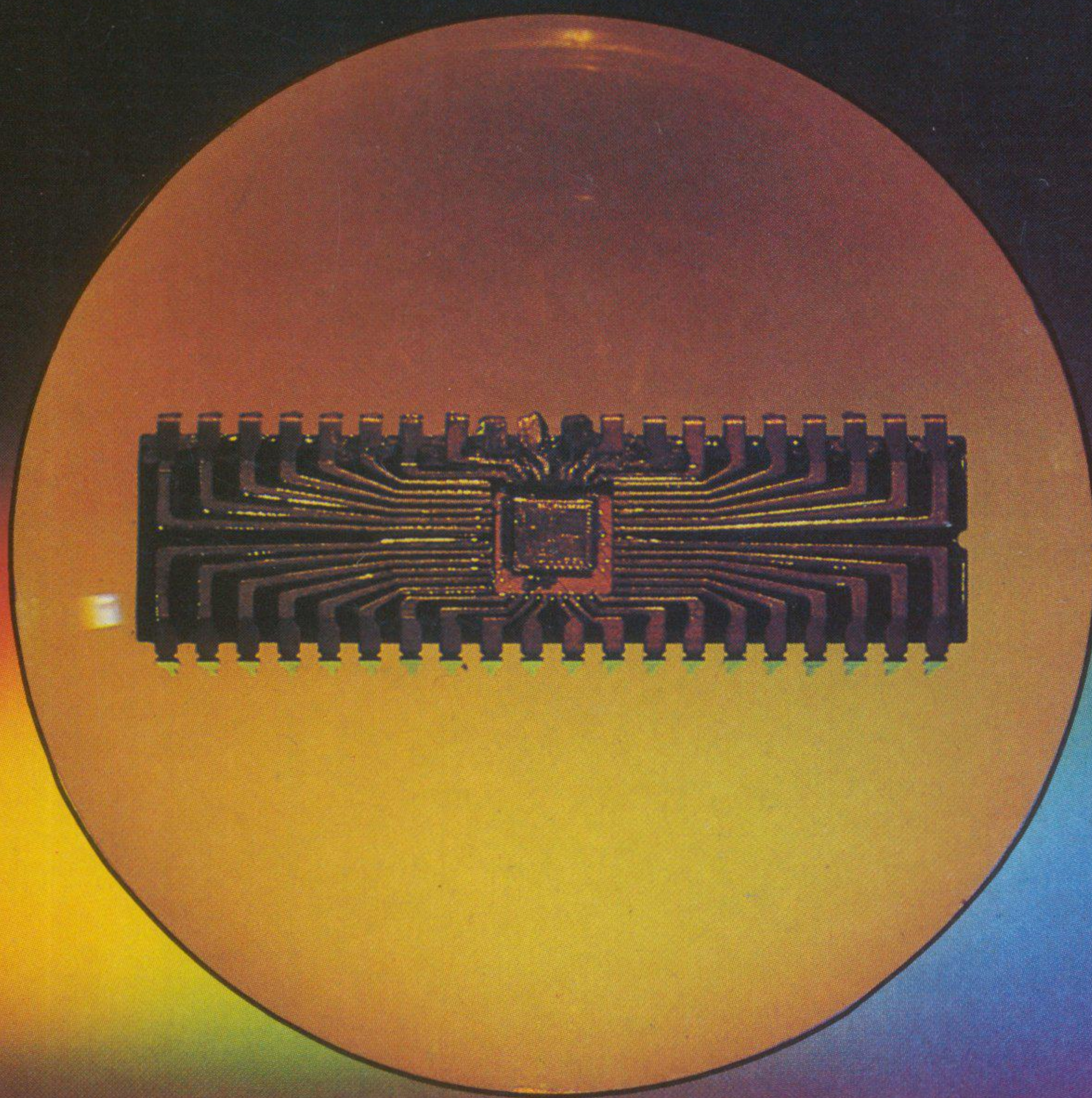
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For Realistic Music: An Audio Peak Extender

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New Ways to Use 8080 Microprocessors



Tested in this Issue:

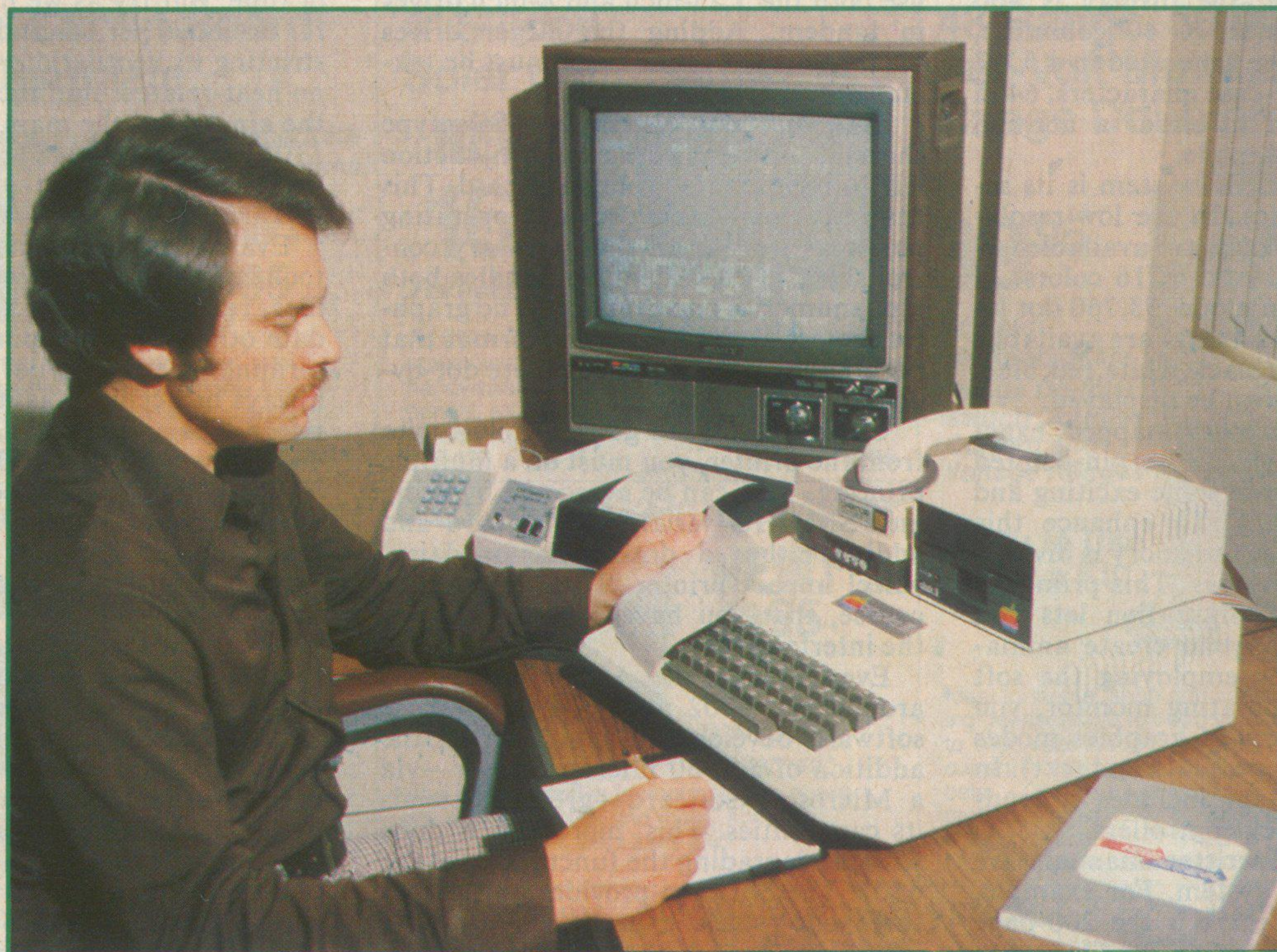
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Apple II Plus Personal Computer

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Popular Electronics Tests



The Apple II Plus Personal Computer System

ALTHOUGH it is not a new entry to the world of personal computers, the Apple II Plus is by far one of the most flexible and powerful machines available. Based on the 6502 microprocessor and an 8-bit bidirectional bus with eight so-called peripheral slots, the system can accommodate a wide range of applications. Essentially, the Apple II Plus is an upgraded version of the Apple II, containing built-in Applesoft and with the Integer BASIC dropped.

As designed, the Apple II Plus can operate with either a conventional TV receiver or a video monitor. When used with the former, the system needs an r-f modulator that meets FCC requirements. Performance is good either way, but the monitor is the best choice when color of very high quality is required.

The computer's enclosure is compact enough to be easily portable, and has a pleasing color. Other accessories, such as the video monitor, disks and printers, are outboard to the main unit. A carrying case, with pockets for cables, is provided for the main-frame section.

A basic Apple II Plus system with 16K bytes of RAM, ROM-resident Ap-

plesoft Extended BASIC, Auto-Start ROM, disassembler, and reference manuals—of which there are many—is priced at \$1330. However, locating a 16K system may be difficult, as Apple has elected to provide only 48K systems (which cost \$1530) to distributors. This has caused retailers some consternation, but, in our opinion, an extra 32K bytes of RAM for \$200 represents a good buy.

The configuration that we used for our evaluation consisted of:

Apple II Plus with 48K RAM and all standard features	\$1,530
Disks II, a 16-sector 5.25-inch single-density floppy with interface and DOS 3.3	645
Second disk drive	525
12-inch monochrome Sanyo monitor	320
Silentype printer with Apple II interface	635
Language System with Apple Pascal	495
SSM Microcomputer Products AIO serial and parallel Apple interface	195
Microsoft RAMcard	195
Z-80 Softcard	349
	<u>\$4,919</u>

In addition to the above, Personal Software has made available: VisiCalc, VisiDex, Visitrend/Visiplot, and Visiterm. Agent Computer Services provided the Buffered Modem program for testing the viability of communications, and Vista provided the Model-150 40-character keyboard buffer.

General Description. The Apple II Plus consists of a molded, high-impact plastic case that houses the 6502 CPU, a high-efficiency switching power supply with sufficient shielding to avoid EMI and RFI difficulties, a 52-key typewriter-style full-stroke keyboard, cassette recorder input and output jacks, and video display output jack. The system backplane contains eight peripheral slots.

The system keyboard sports 2-key rollover and four special-function keys: CTRL (control), ESC (escape), RESET (used to restart the system), and REPT (repeat—provides automatic repetition of a depressed key). The coding is upper-case ASCII. Lower case is omitted, but can be added by plugging in a PROM with a new character set.

(Continued on page 40)

(Continued from page 39)

The standard display is memory mapped into system RAM and provides three display modes: text, low-resolution graphics, and high-resolution graphics. In the text mode, the display is 960 characters (25 lines \times 40 columns), with each character generated in a 5×7 dot matrix. Upper-case characters, 64 in all, are generated in either a normal, inverse, or flashing mode.

The hallmark of the system is its sophisticated graphics. In the low-resolution mode, 1920 blocks are available (40×48 array) in a total of 16 colors. In the high-resolution mode, 53,760 dot locations (280×192 array) are available, and up to six colors (black, white, red, blue, green, and violet) can be displayed.

Because it is memory mapped, exact locations on screen can be pin-pointed by software to create some exciting and spectacular displays. To enhance this capability, the screen memory is divided into two areas, or pages. This primary/secondary page configuration lets you flip pages in and out to create animation. Moreover, by employing the soft switches of the operating monitor, you can invoke a variety of graphics modes and mixed modes (graphics and text). In addition, the system includes a loud-speaker and joystick controllers.

Numerous well-written manuals are supplied with the system. For example, to get you going, there is the 200-page *Apple II Reference Manual*. This manual provides information on the basic working of the system (including schematics) and supplies such data as important screen addresses and a listing of the ROM monitor. Other manuals explain—in similar detail—Applesoft BASIC, and PASCAL, as well as the use of the DOS.

Our sample system used the language card that bundled PASCAL. Recently, Apple has unbundled the PASCAL portion, offering the upgrade in memory separately. This is probably for compatibility with the Microsoft RAMcard, which was designed to work with existing Apple software and PASCAL.

The Plus II comes equipped with integer ROM-based BASIC and disk-extended Applesoft BASIC. The integer version doesn't support floating-point arithmetic and is like an expanded tiny BASIC. The extended version, however, offers complete BASIC capabilities, including a full set of graphics primitives, and peripheral controller calls such as PDL for paddle. (This function returns the current value from 0 to 255 of the game control specified as the argument. Unfortunately, we didn't have game controls, but are reasonably sure that everything works as advertised.)

The disk subsystem we used, a controller, and two drives, derives power right from the bus, thus reducing the number of wires hanging from the back of the enclosure. The only cable connections run from the controller card to the drives.

In a system of this size, two drives—

all that are generally used—seem to be more than sufficient. However, you can add additional controllers and have as many as six drives. One interesting approach is to add an 8-inch controller and use both the 5.25-inch and 8-inch drives in tandem. Adding the larger drives means that power for them must be taken from external power plugs.

Like the disk system, the Silentye thermal printer works in conjunction with a bus-oriented controller card. This fits into slot-1, and provides operating power as well as all the necessary control signals. The Silentye handles both alphanumeric and graphics. The graphics are presented in a raster format that permits the printing of complete dot-by-dot pictures.

Unfortunately, to get multiple copies from the printer, you must do a multiple printing. This can be overcome by using an SSM AIO serial/parallel card and adding either a dot-matrix or daisy-wheel impact printer. This assumes, of course, that you have an open slot for the interface.

Even though the Apple is designed around the 6502 and is meant to use software developed for that CPU, the addition of a Z-80 microprocessor—via a Microsoft Softcard—greatly extends its capabilities. This, moreover, is done without degrading the functioning of the 6502. The Softcard provides all the features one would expect from a Z-80, including support of the CP/M operating system. However, operation is more complex than it may seem. The Z-80 provides computing power, while the 6502 handles all I/O including operation of the screen display under Z-80 supervision. This arrangement is both speedy and efficient.

Evaluation. The Apple II, almost regardless of configuration, is easy to use. Because of the very carefully written, concise manuals, setting up a system like the one we used is straightforward, and takes only about 30 minutes.

Although not CP/M compatible, the disk operating system (DOS3.3) handles simple jobs extremely well. For example, initializing a disk is done by formatting it via a utility, then writing a Hello program under BASIC. This we found intriguing, as it meant we could be very inventive in our sign-on messages. Furthermore, for turnkey-type operation, our sign-on could be a unique program that interfaces to a larger program or other programs—a menu system, if you will.

When the system is first turned on, the unit begins looking for a disk to load. This is a function of the Auto-Start ROM and can be quite disconcerting at first, especially if you were planning to go into ROMBASIC. To suppress disk operation, simply hold down the RESET key while powering up. Should you power up and want to stop the disk, depressing RESET, will drop you into the ROM-resident language and stop the drives. If RESET is not used, the drives will run

without timing out, which could be a minor problem.

Rumors have circulated concerning the Apple's susceptibility to heat, especially after it has run for long intervals of time. But try as we might, running it for extended periods and deliberately restricting its ventilation, we could induce no heat-related malfunctions, even with the air around the main circuit board at 110°F . We conclude, therefore, that whatever problems the system had in this area have been solved.

Evaluating the system further, we took a program that would link to other files, read and hold tax tables, and update other files. The purpose was to determine whether or not the data would always be accurate as it transferred between files and out to a printer. We set an arbitrary limit of 500 items.

The whole process took about 1 hour and 30 minutes to generate, and another hour and 15 minutes to perform the swaps and sorts. In our test, no data was lost.

Going further, we tried a program that would generate graphics on the screen, using the database already generated. That data was handled with accuracy, but not with dispatch. (However, it must be remembered this is a floppy-based system and speed is not one of its prime virtues.)

Our next test used Personal Software's Visidex, which is designed to take information in any format and return it either on the screen or printer, sorted or unsorted. This program relies on the channel speed of the disk system to display information quickly. Access to a disk record is almost instantaneous. Furthermore, the software package is time-oriented so that records can be related either to system time (date and clock time) or actual time, assuming that you have a real-time clock.

Next, we tested to see if quickly raising and lowering line voltages would damage the rather large database we maintain under Visidex. It did not. Operation was unaffected by line voltages from 75% to 130% of nominal.

One annoying shortcoming was the lack of upper/lower case character set. Even though correctable through purchase of an ROM for about \$65 this omission seems out of place in an otherwise sophisticated system. Furthermore, the location of the arrowed keys is a problem since it is easy to hit one when your goal is the RETURN key. Even worse is the location of the RESET key directly above RETURN. We would have also liked to see some special-function keys, either fixed or user-definable.

Although the backplane design offers flexibility by memory-mapping devices into the system, it does assume that the operator has intimate knowledge of the machine. What would have been nice is a utility program under DOS that would check each slot for a device and determine if it could be properly interfaced. Should the installed card not be of Apple origin or directly supported by Ap-

ple, its attributes could then be requested and held in a system map file. Application programs could use this file by simply calling the device.

As described, we encountered no problems with heat or, for that matter, bus loading. But we noticed that it does become a tight fit when you start adding cards to the backplane; such is the price of ready portability. And speaking of portability, a card-restraint cage would be a nice touch, even at a slight cost.

Comments. The Apple is one of the most widely supported machines on the personal computer market today, with over 300 companies providing hardware, software or both. Additionally, numerous manufacturers see the machine as a low-cost entry to the high-end graphics marketplace.

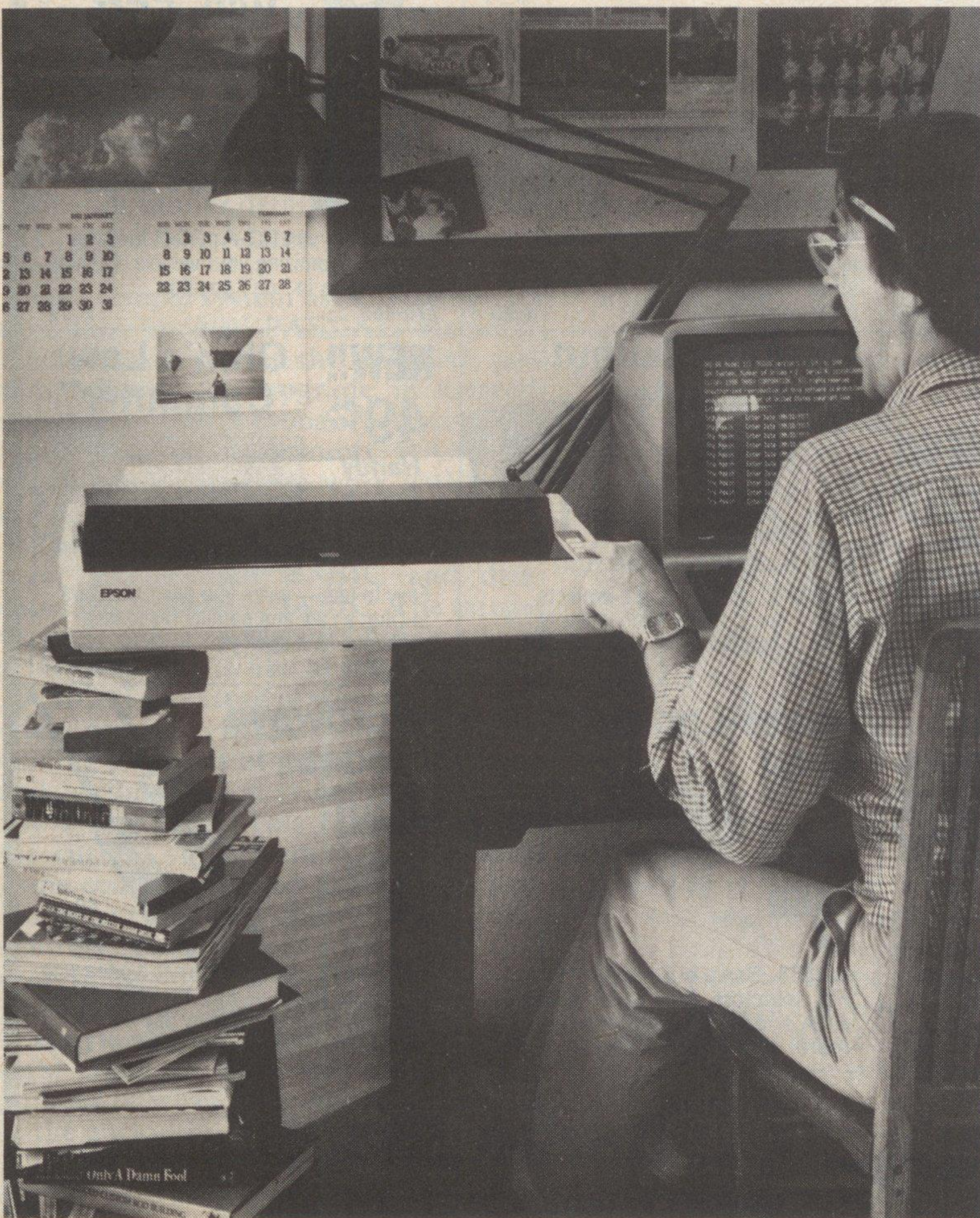
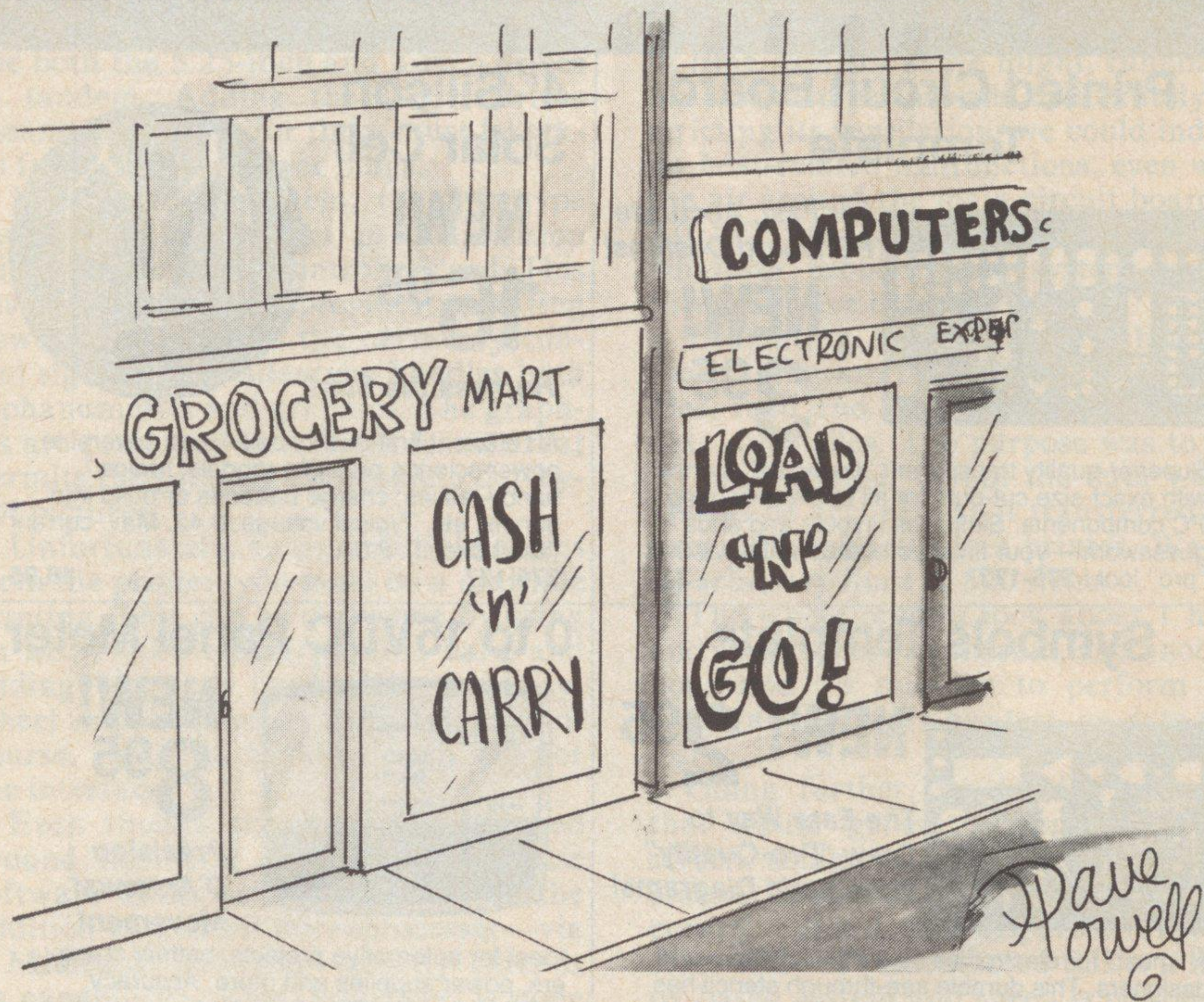
Interestingly, though this may be strictly our perception, the audio aspect of the machine has not caught on. But this may be changing. According to some observers, sophisticated voice-output devices will make the machine downright conversational.

As far as we are concerned, the Apple II Plus gets high marks and has no serious shortcomings anywhere. But as capable as this machine is, we aren't convinced that it is ideal for business. We

do believe, however, that it fits well into environments requiring rapid data collection and into graphic arts. In fact, the machine has found a home in numerous

schools that use it for teaching everything from computer science to manufacturing skills. —Carl Warren

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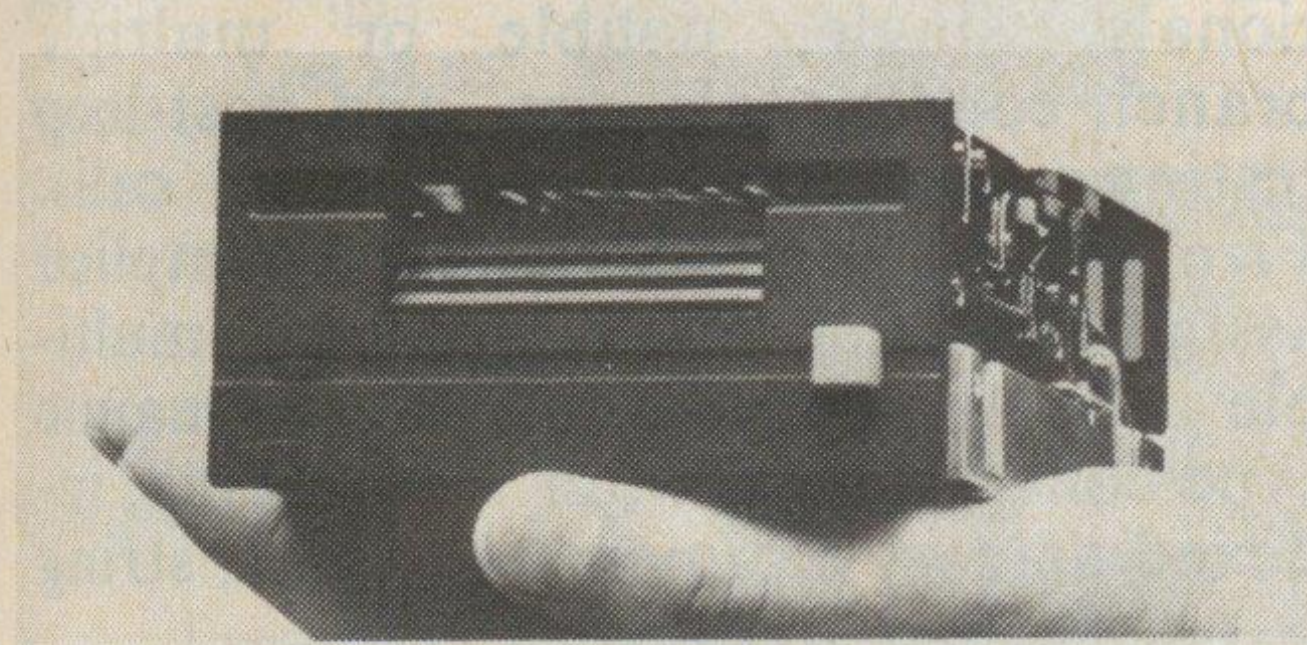
CIRCLE NO. 27 ON FREE INFORMATION CARD

COMPUTER SOURCES

By Leslie Solomon
Senior Technical Editor

Hardware

3.5" Floppy Disk. The Sony 3.5-inch "Micro Floppydisk Drive" features 437.5K bytes double-density, single-side unformatted and 322.5K bytes formatted. The transfer rate is 500K bits/s,



latency is 50 ms, and access time track-to-track is 15 ms. The drive is 2"H × 4"W × 5.1"D and weighs 1.7 pounds. A special hard-cover diskette is used. Power dissipation is 7.5 watts continuous, 3.3 watts standby. \$400. Diskettes are \$5 each. **Address:** Sony Data Products Div., 15 Essex Rd., Paramus, NJ 07652 (Tel: 201-368-5000).

Computer Percussion. The Rhythm Box is a computer peripheral that synthesizes the sounds of seven different percussion instruments including bass drum, wood block, snare drum, short cymbals, long cymbals, hand clap, and tom-toms. It is programmed in Level II BASIC or assembly language using a single OUT instruction. It comes with two interface options; Model RBX-T (\$149) for the TRS-80 Model I Level II and the RBX-S (\$179) for other computers, and connects to any standard 9600-baud serial port with RS232 or 20-mA provisions. **Address:** Newtech Computer Systems, Inc., 230 Clinton St., Brooklyn, NY 11201 (Tel: 212-625-6220).

Single-Board Computer. The CPU-1 is an 8085-based system similar to the Intel 80/04. It operates at 3 MHz, and includes 256 bytes of RAM, 22 I/O lines, serial I/O port, programmable counter/timer, and two sockets for EPROM, expandable on board to 512 bytes of RAM, 44 I/O lines, and two clock timers. The EPROM can be 2708,

2716, 2758, or TMS 2716. It has power-on reset, manual reset and it supports the 8085 interrupt structure. The power supply is on board and only an external transformer is required. It also has a wire-wrap area. \$185. CPU-1A (512 bytes RAM, 44 I/O lines, two timers) is \$220. **Address:** Pragmatic Designs Inc., 950 Benicia Ave., Sunnyvale, CA 94086 (Tel: 408-736-8670).

6800 Trainer. "Trainer 1" is a two-board computer using a 6808 CPU with 1¼K RAM, provisions for 4K PROM and onboard I/O. It has an 8-digit display, hex keypad, Tbug 2K monitor, and hardware trace. Optional equipment includes KC cassette I/O, parallel I/O, serial (RS232/20 mA) port, crystal-controlled baud rate generator, and expansion cards. Starts at \$349. **Address:** Omnibyte Corp., 245 W. Roosevelt Rd (1-5), West Chicago, IL 60185 (Tel: 312-231-6880).

Apple Parallel I/O. The APIO allows 8-bit parallel access to Apple II and Apple II Plus systems. The board provides 16 bidirectional data lines, and four handshaking lines for two 8-bit bidirectional interface ports. The direction of the data lines is under software control. On-board PROM operates a printer and makes the board independent of Apple slots. \$109 assembled, \$79 kit. **Address:** SSM Microcomputer Products Inc., 2190 Paragon Drive, San Jose, CA 95131 (Tel: 408-946-7400).

Tiny BASIC Module. The K-8073 uses the INS8073 CPU with Tiny BASIC, and includes an RS-232 I/O port, cassette port, 8K EPROM, with one slot, 1K RAM, with internal expansion to 8K, STD Bus, Asynchronous Rec/Trans remote controller for single-wire data control and retrieval of 8-bit words from 128 remote slave stations. It has PPI with 24 bi-directional I/O lines, and a real-time clock. Unit is on a 4.5" × 6.5" card and requires 5 volts. \$388. **Address:** Transwave Corp., RD 1, Box 489, Vanderbilt, PA 15486 (Tel: 412-628-6303).

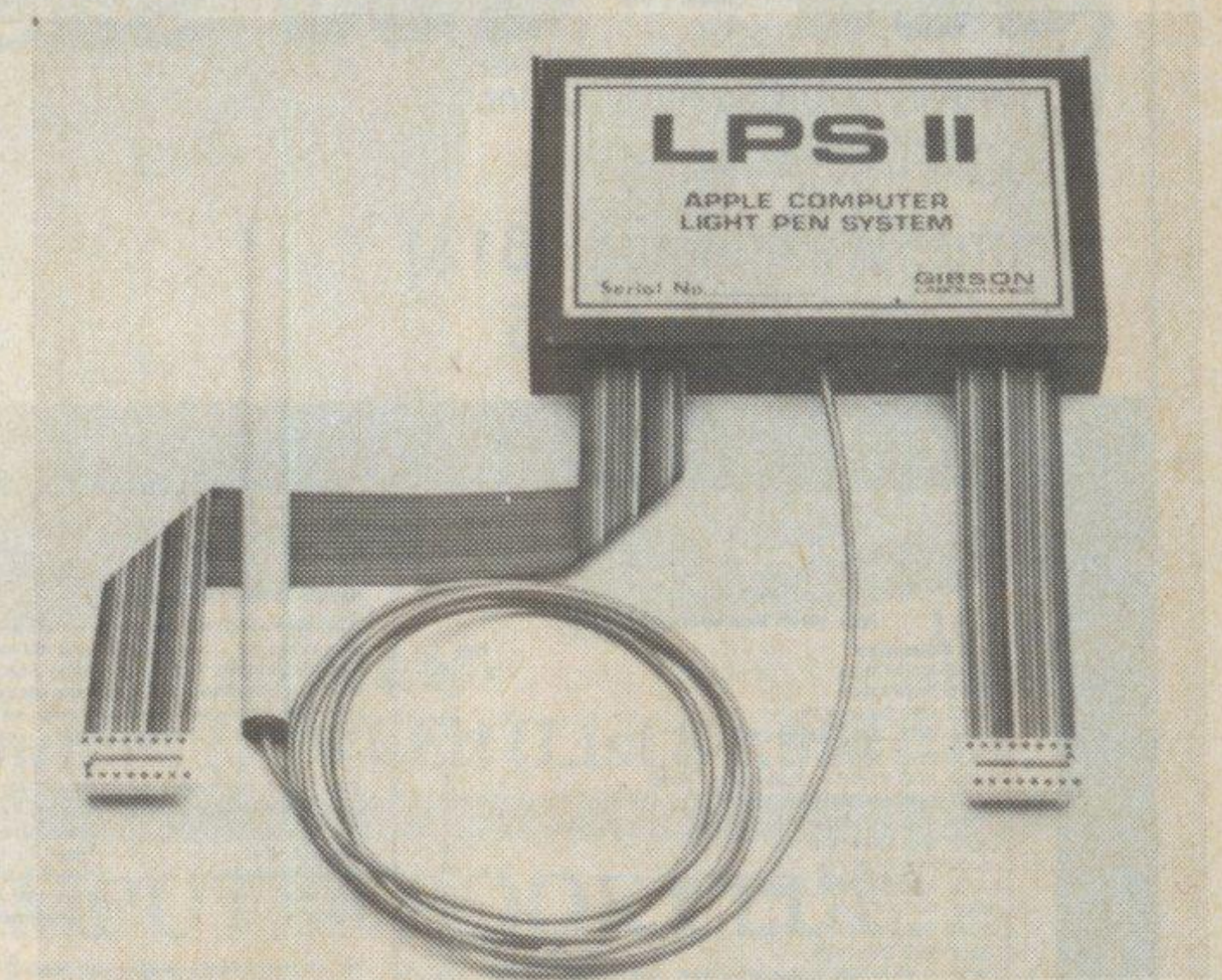
Color Printer Interface. The CPRINT module allows a Centronics-type parallel port for the TRS-80 Color Computer. Firmware allows all LLIST and PRINT #-2 outputs, a screen-print function can be initiated at any time, line width can be set, graphics in the LPVII can be accessed, page length can be set, and blank lines inserted between pages. The CPRINT module is a fully buffered 8-bit I/O port that can interface with any Model I/III which plug into the printer port. It is compatible with all versions of the Color Computer and requires no extra memory. \$49.95 **Address:** Micro-Labs, Inc., 902 Pinecrest, Richardson, TX 75080. (Tel: 214-235-0915).

CMOS Computer. The BASYS/1 is an all CMOS computer designed around

the CDP1802 CPU, with up to 2K of RAM and 8K of ROM. It has a flexible I/O circuit. Power requirements are 4 to 6 volts dc at 10 mA. Features include RS-232 or current-loop, parallel I/O, multiplexed I/O that can handle 10 digits and 80 keys, and a ROM monitor. A bus interface is provided. Price ranges from \$175 to \$300 depending on options. **Address:** Technical Micro Systems, Inc., 366 Cloverdale, Ann Arbor, MI 48105 (Tel: 313-994-0784).

Printers. The Sprinter-20 prints 20 characters wide, optionally sideways or upside down lines, at a normal print speed of 1.5 ips. Up to 5 different character sizes can be selected via ASCII control codes or 140 × n dot matrix in graphics mode. It measures 7.5" W × 5" D × 3" H (\$175). The Sprinter-40 prints 40 characters wide, at a selectable print speed of 2,3, or 4 ips. Wraparound facility permits printing of lines greater than 40 characters. In graphics mode, it has 280 × n dot matrix. It measures 10.5" W × 7.5" D × 4" H (\$295). Interface is parallel, 7-bit ASCII plus Strobe, Busy and Acknowledge. Serial RS-232 to 9600 baud, 1 or 2 stop bits. **Address:** Alphacom, Inc., 2323 So. Bascom Ave., Campbell, CA 95008 (Tel: 408-249-2152).

Apple Light Pen. The LPS II light pen allows high-resolution (280 × 192) graphics on an Apple II. It is compatible with all languages, and usable in every



screen mode. It provides 60-Hz coordinate generation, and can be installed on the Apple motherboard so no slots are required. \$285. **Address:** Gibson Labs., Building 10, 406 Orange Blossom, Irvine, CA 92714 (Tel: 714-559-8727).

Ham TRS-80. The "Terminall" converts any TRS-80 into a flexible amateur radio terminal. It contains the necessary interface, audio demodulation, AFSK tone generator and transmitter keying hardware. Plug it into the receiver headphone jack and copy Morse code, with code speed displayed on status line, Baudot, or ASCII. ASCII capability provides upper- and lower-case, control codes, even/odd/no parity, 6/7/8 data bits, 75/110 baud. Software is on cas-

sette or diskette and all you have to do is enter your call sign and time to initiate the program. Text can be typed while receiving or transmitting. Terminal T1 requires Model I with 16K RAM and Level II BASIC. Terminal T3 requires Model III with 16K RAM and Model III BASIC. **Address:** Macrotronics, Inc., 1125 N. Golden State Blvd., Turlock, CA 95380 (Tel: 209-667-2888 or 634-8888).

Software

Talking Dump. Designed for 6800/6809 SS-50 systems (and soon available for Radio Shack Color Computer), NEWTALK is a completely relocatable utility that does a byte-by-byte memory dump of a selected memory area and prints the output on screen as well as speaking it out through a loudspeaker. \$35 on disk or cassette. **Address:** Star-Kits, Box 209, Mt. Kisco, NY 10549.

Apple Games. "Three Mile Island" is a quick-response machine language game that simulates TMI in action. It features six full-color displays and auto/

demo and fast/normal modes (\$39.95). "The Best of Muse" includes five games with two three-dimensional maze puzzles, "Tank War," "Music Box," and six mini games. \$64.75. Both require an Apple with disk. **Address:** MUSE, 330 N. Charles St., Baltimore, MD 21201 (Tel: 301-659-7212).

Medical Software. Medirec is a total medical history and report preparation program for office forms, patient and family history, symptoms, diagnosis, and treatments. It can prepare referral requests, patient history summaries, and referral reports. The diskette records 550 visits (per diskette). Individual records can be recalled, linked and printed either whole or in parts. It also contains a full complement of office routines. It requires a 48K Apple, an 80-column printer, and two disk drives. A Corvus system is also available. \$199.95. **Address:** Charles Mann & Associates, Micro Software Div., 7594 San Remo Trail, Yucca Valley, CA 92284 (Tel: 714-365-9718).

Color Computer Utilities. The "Color Editor" designed for the Radio Shack Color Computer allows both upper- and lower-case features and will print via the RS232 port. It has change and search commands, and can copy or

move sentences or paragraphs to different locations (\$24.95). The "Color Assembler" is a 6809 type that supports all mnemonics and addressing modes along with standard assembler options and directives. It is a two-pass assembler (\$29.95). The Power Pack plugs into the interface slot and provides up to 6K additional RAM and a 2K monitor. A diagnostic cassette is included (\$159). **Address:** Computerware, Box 668, 1512 Encinitas Blvd., Encinitas, CA 92024 (Tel: 714-436-3512).

New Language. HI is a general-purpose microlanguage that fits in 3K bytes and features an incremental compiler using selective threaded-code techniques to produce portable ROM-able code. Data declarations allow character, byte, and integer types using upper- and lower-case symbolic names of unlimited length. It has fast integer math supported with decimal, hex, octal, or binary-bases; 14 statements allow multiple statements per line; 11 control structures allow input and timed input conditionals, single, double or multiple branch conditionals, pre- and post-loop testing, and machine-language calls. Five assignment modes provide implied assignment, multiple assignment, multiple equivalence, automatic dynamic type conversion, pointer referencing, indexed arrays, bidimensional files, string

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D10002 1N4738	.25
D10003 1N4140	.30
D10008 100V .3 Amp Silicon Diode	.25
D10015 200V .1 Amp Silicon Diode (radial)	.21
D10016 LM433 Microwave Diode	9.50
D10017 MA4M842 Microwave Diode	15.41
D10009 12 Amp Bridge	1.95
D10003 TIP121 - RCA121	1.10
D10010 MJE3055	.25
D10011 2N2222	.25
D10012 2N3054	.85

INTEGRATED CIRCUITS	
# & M # Description	Price
C10004 TI SN7400N	37
C10011 TI SN7428N	55
C10012 NSC DM74387N	55
C10009 INTEL 8086 16 Bit CPU	49.95
C10020 INTEL 8255	5.95
C10000 A/D 2111A-4 (256X4 Static RAM)	1.25
C10007 AND AM2840C (16 F.F.O.)	5.95
C10001 HSC MM53104N	2.10
C10002 NSC MM5739N	2.95
C10005 NSC DS88 77N	1.00
C10006 NSC LM1889N (video modulator)	2.95
C10008 INTEL P3205	.95
C10010 TOSHIBA TA7203P (dual audio amp)	14.00
C10016 NSC DM8160N	.99
C10018 TI SN72307L (log amp)	.55
C10019 RCA CD40103BE	1.29
C10013 TI SN75107AN	3.49
C10014 NSC DS7493ZN	1.12
C10015 NSC DS75493ZN	1.12
C10017 NSC LM555CN	.50

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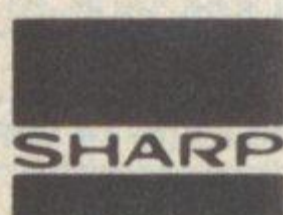


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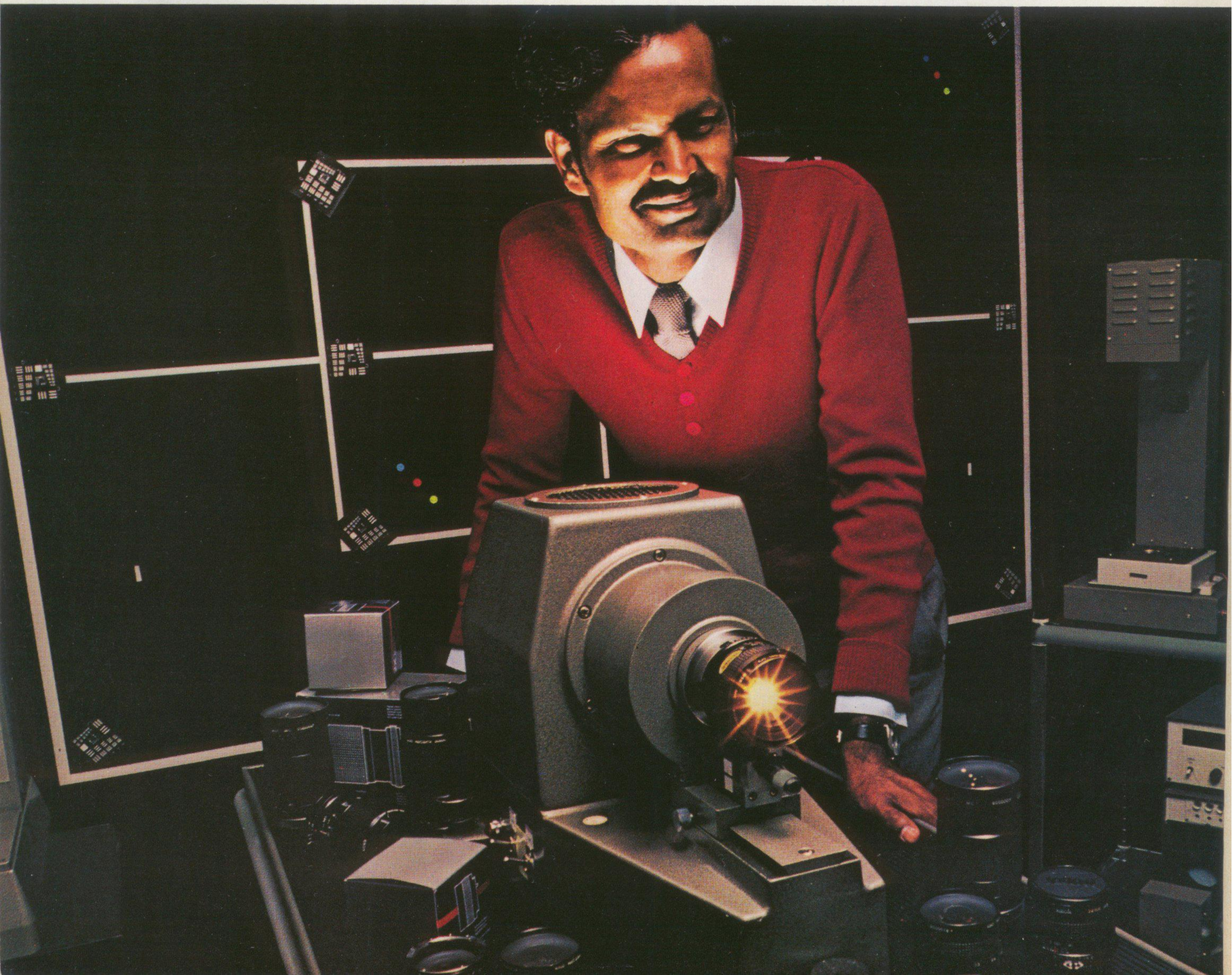
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Reddy Chirra improves his vision with an Apple.

Reddy is an optical engineer who's used to working for big companies and using big mainframes.

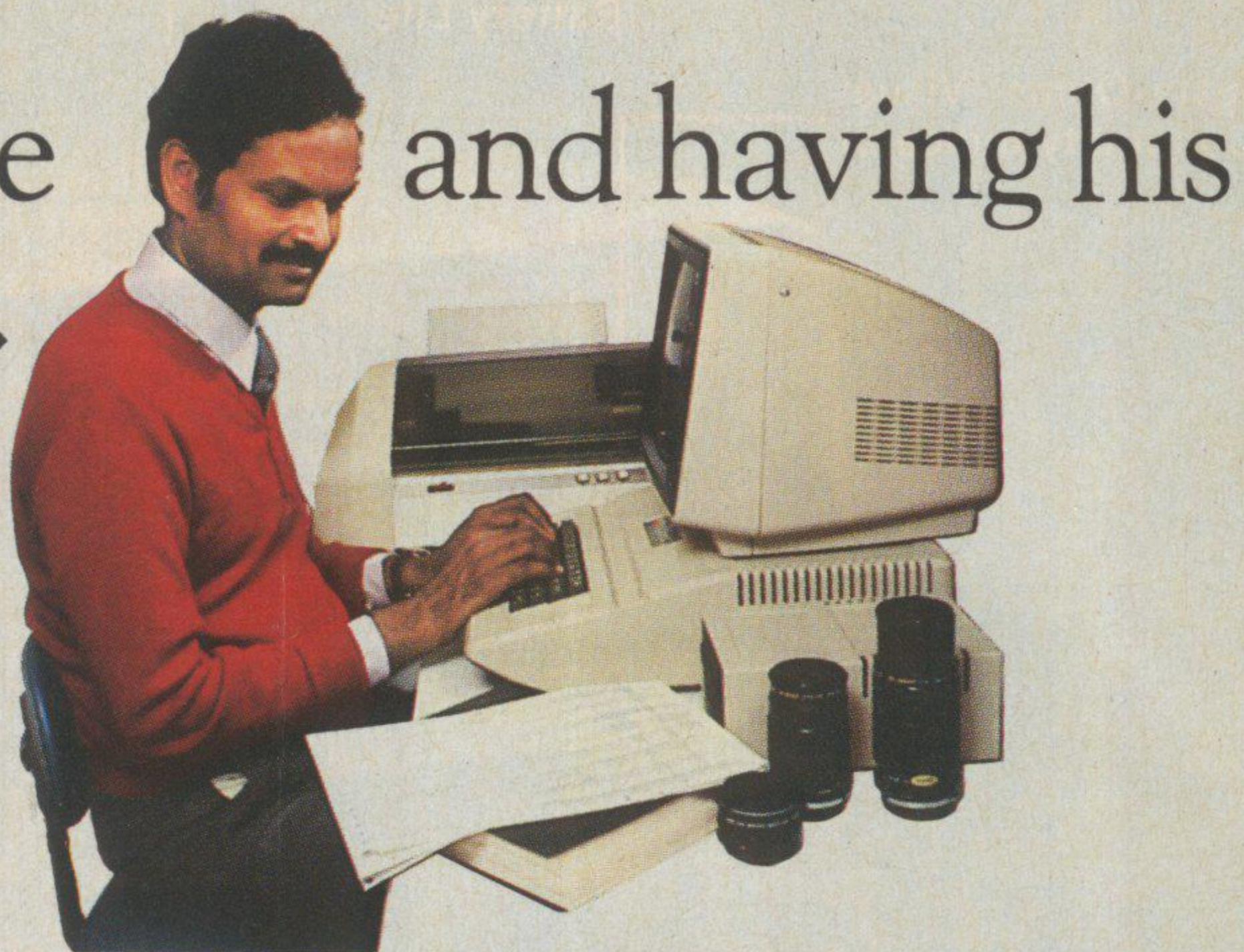
But when he started his own consulting business, he soon learned how costly mainframe time can be. So he bought himself a 48K Apple II Personal Computer.

And, like thousands of other engineers and scientists, quickly learned the pleasures of



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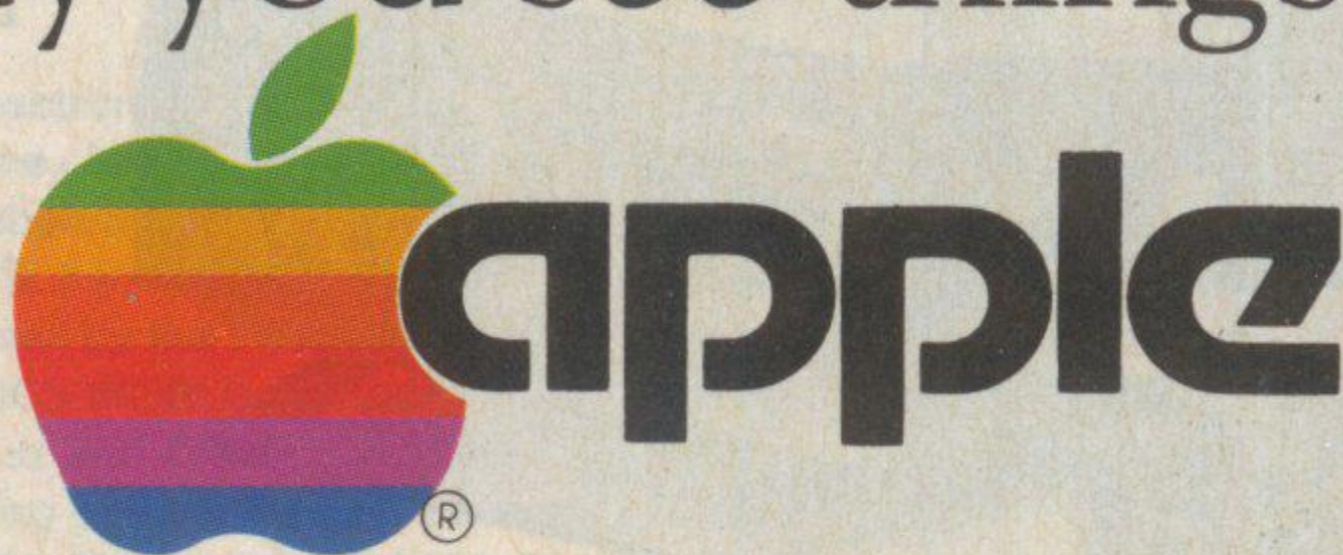
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COMPUTER BITS

Sweeten Your Apple

IF YOU have an Apple II Plus and are anxious to sweeten it up a bit, here are some items to consider.

I. Hardware

From Epson, comes the **MX-100 full carriage dot-matrix printer**. This \$945 unit sports a print rate of 80 cps bidirectionally and can handle bit-image graphics with a density as high as 120 dots per inch on the horizontal axis. It also permits double-emphasized characters (8x18 matrix) and can support as many as 233 characters per line in the compressed-character mode.

The standard MX-100 has a Centronics-style, 8-bit parallel interface with RS-232 and IEEE-488 optional. The normal 1K buffer is expandable to 2K, and the print head is disposable—one of the key features of Epson printers.

To improve throughput, consider add-

ing **Vista's Model 150 type-ahead buffer**. This \$49.95 module is compatible with all Apple II computers and software and is attached simply by plugging

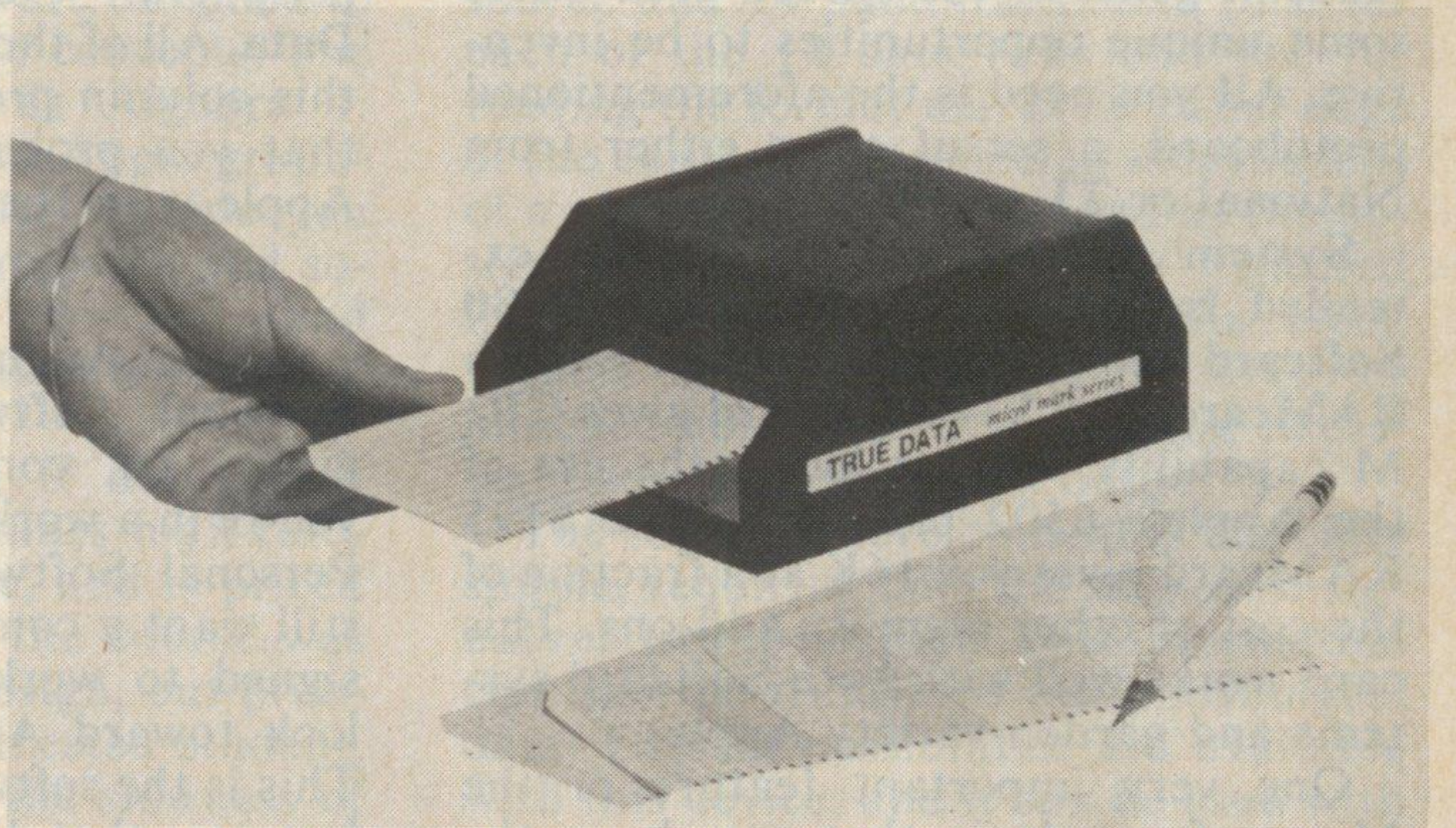
it in between the keyboard and the system. Model 150 provides a 40-character buffer for entering commands. This add-on is almost critical if you're planning to use an Apple for data input.

For developing innovative applications, think about adding a *prototyping/hobby card*. This handy \$24 item from Apple is available at most Apple dealers and can be used to build up any circuit you might need.

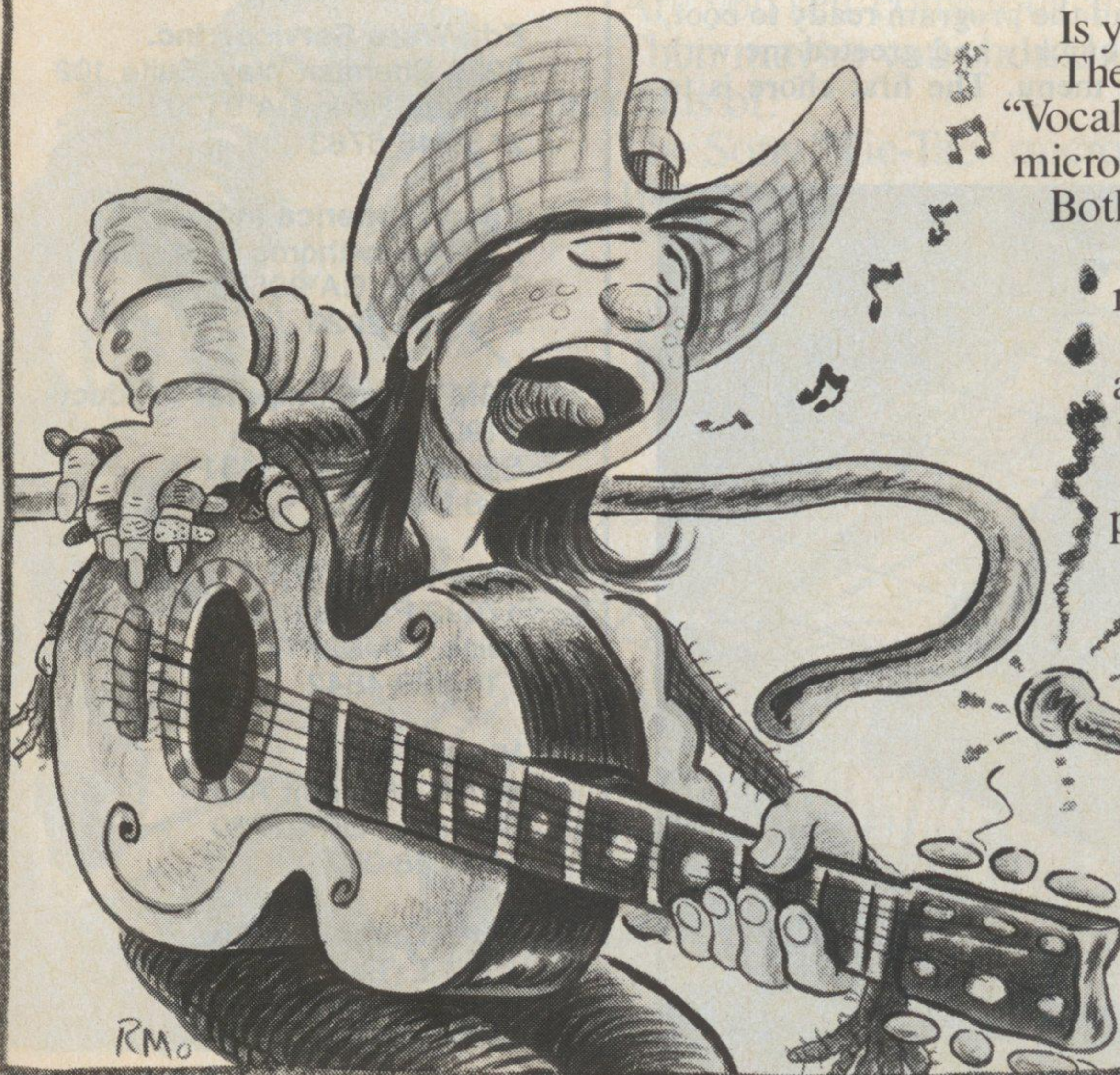
Vista also offers the **Vision 80**, an 80x24 video card, for \$350. This plug-in has both upper and lower case and, when working in tandem with some of Vista's PROMware, can even produce impressive script displays. With the proper drivers, the card can be used in

By Carl Warren

The Micro Mark I card reader from True Data Corp. is a low-cost (\$900) alternative to volume data collection.



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concert with either a plotter or graphics printer for making hardcopy of the scriptset.

The **Videx Videoterm** 80x24 video board at \$345 supports inverse video, alternate character sets, and graphics symbols. Apparently, you can contact Videx and they will provide a unique character set off the shelf or, for a price, create one to your specification.

To give voice to the Apple, the **Vista Vocalizer** should be available soon for about \$250. It is based on National Semiconductor's DT-1050 speech processor.

I think it might be interesting to develop software that talks to you—especially if it's asking for data input. And, in general, the speech area offers some unique opportunities to be inventive. All you need is the aforementioned protoboard, a set of chips either from National or TI, and time to play.

System capability can be easily extended by attaching **Microsoft's Z-80 Softcard** and adding memory with **RAMcard**. The \$349 Softcard gives CP/M capability without losing the use of the Apple's 6502 processor. The \$195 RAMcard gives you 16K at a fraction of the cost of other memory add-ons. This card works well with both Softcard systems and garden-variety Apples.

One very important feature of the Microsoft cards is that you have the ability to upload and download CP/M compatible software from other systems. In addition, you can use a number of the sophisticated communications packages written for CP/M.

To connect your Apple with the world, you need either a serial or parallel interface—preferably both. **SSM's AIO serial and parallel Apple interface** is a likely candidate. This \$195 Apple bus card supports switch-selectable serial rates from 110 to 4800 baud. Rates as high as 19.2K baud can be achieved by changing hardware jumpers. This serial port is

ideal for setting up communication with a modem.

To make the board flexible, an 8-bit parallel port is included to support a variety of printers including the Epson MX-100. To use the parallel interface, you'll have to part with another \$25 for the ROM that supports the printer of your choice.

Although you can get a communication board designed just for the Apple bus—the **Hayes Microcomputer Micro-modem**, for example—you may want to consider either the board from SSM or the Apple serial board, and use either an acoustic-coupled modem such as that available from **Tek-Com** or a direct-connect modem like those from the **Micro-peripheral Corporation** or **Universal Data**. All of these have been discussed in this column previously. We have found that you probably should consider the Apple with the Hayes board wired in.

II. Software

In the August column, I mentioned **Personal Software's Visiterm**, which gives you communication ability—if you're in a world that is compatible with Personal Software. If you're not, and still want a communication package designed to work with the SSM board, look toward **Agent Computer Services**. This is the software house I wrote about last year that does all that neat graphics ware for the OKI printers. It has come up with a humanized communication package called **The Buffered Modem**. This program, written in Apple BASIC, is priced at \$85, is delivered on a 13-sector Apple disk (conversion to 16-sector takes about 3 minutes), and permits configuring the system to whatever you have on the bus including the Hayes board, a wide range of video display boards, and several printer interfaces.

Once I had the program ready to boot, it came up quickly and greeted me with the sign-on menu. The first chore is to

configure the package to your system, and everything in the screen display and manual directs you toward this end. You must, however, know what slots contain the various cards.

A really nice feature of Agent's software is that when you choose a menu item, the program doesn't just take off, but asks again if you're sure. The same philosophy is used on the control codes that turn various functions such as the printer on and off. You must precede that function with a control-A to signal the software that the next command is a valid control command.

A potential problem you should be aware of is that if you are using an **Apple Silentype printer**, you'll be unable to download files directly to the printer without losing characters. The reason is that printers like this (or software intensive cards) make use of the system's 6502 processor. As a result, the data stream gets ahead of the output and everything gets dumped. The solution is to download the file and save it on disk (the program is very clear on how to do this), then dump it to the printer.

MORE INFORMATION

For additional information about products or services mentioned, contact the companies directly.

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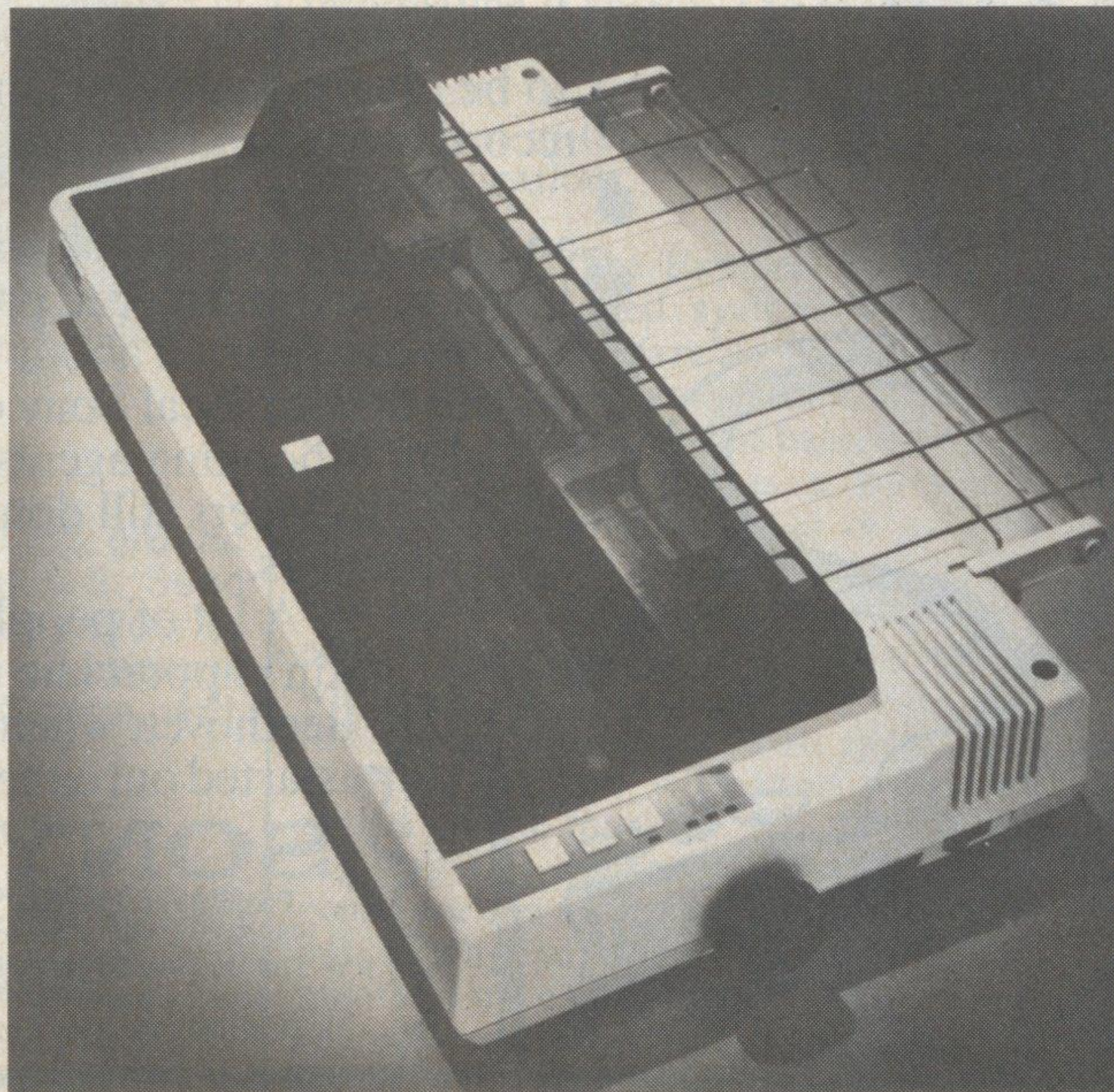
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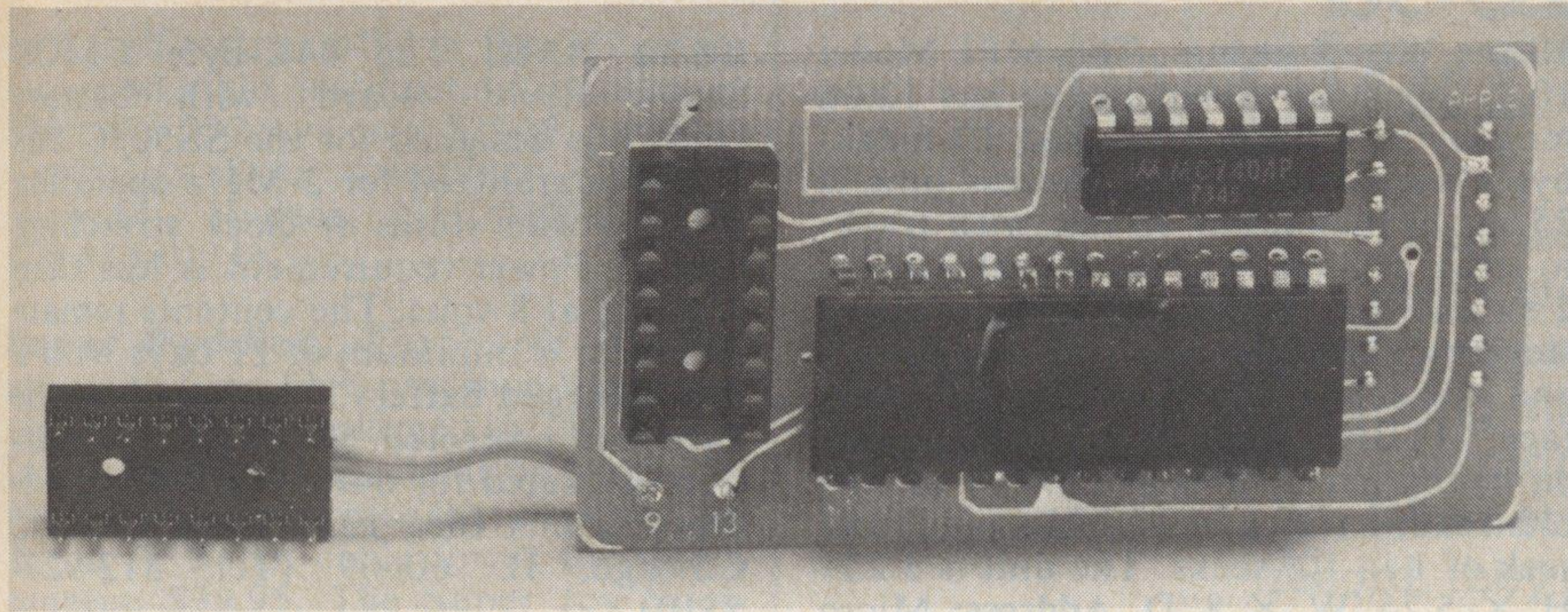
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With a full-size (15.5-in.) carriage, the Epson Mx-100 dot-matrix printer comes standard with raster graphics and almost letter-quality printing.



Vista's Model 150 provides a 40-character buffer for the Apple.

Currently, the Buffered Modem only permits the up- and downloading of text files without checking or referencing. In a later version, the ability to send packets of information, either sequential or random files, with error checking, will be available. Moreover, this updated version will be able to handle track-by-track or sector-by-sector transfers. Since this is still in the works, you'll need to contact Agent Computer Services directly for more information.

One of the mainstays of this machine has been courseware for Computer Aided Instruction (CAI). One company that has been harvesting the fruit of this growing market is **Edu-Ware**. It is dedi-

cated to developing software designed to teach skills, techniques, or concepts. The program supplied us was Algebra 1. This unique program uses Apple graphics and numerous menus to guide you through the algebraic problems and solutions. Set theory is covered, and chances to check your skills are provided with the program.

To maintain interest, if not excitement, the program combines high-resolution graphics and color, and is priced at \$39.95. I found that the course was interesting in its basic design, but problematic for even the interested student. The main annoyance is the slowness of the program. Moreover, to avoid at least

one notable omission, the authors could have used graphics to represent sets and demonstrate an intersection. Since Apple tells you the machine's secrets, such as the location of the disk drivers, they could have been turned on early to speed things up, and more frames could have been loaded at a time. Nonetheless, Edu-Ware's effort is laudable.

Further enhancing the Apple as a teaching machine is **True Data Corporation's Micro Mark I** hand-fed card reader. This unit, priced at \$900 with a serial interface, is designed to read cards for collecting data on test scores, and the like. The unit reads marks that are made with a pencil and relates them to specific spaces. The read head contains a light source and 14 phototransistors (one for each of the 12 data rows and one for reading the format marks on either edge of the card). Light reflected into the lens of a phototransistor is defined as the no-signal condition. When the reflected light level drops due to a data block (pencil mark, preprinted mark, or punched hole) the corresponding phototransistor yields a signal output.

The software development is basically simple, requiring only the transistor signal relative to position. This information can then be translated into meaningful data. Lots of possibilities are available with this device, and it can be used with almost any system. ♦

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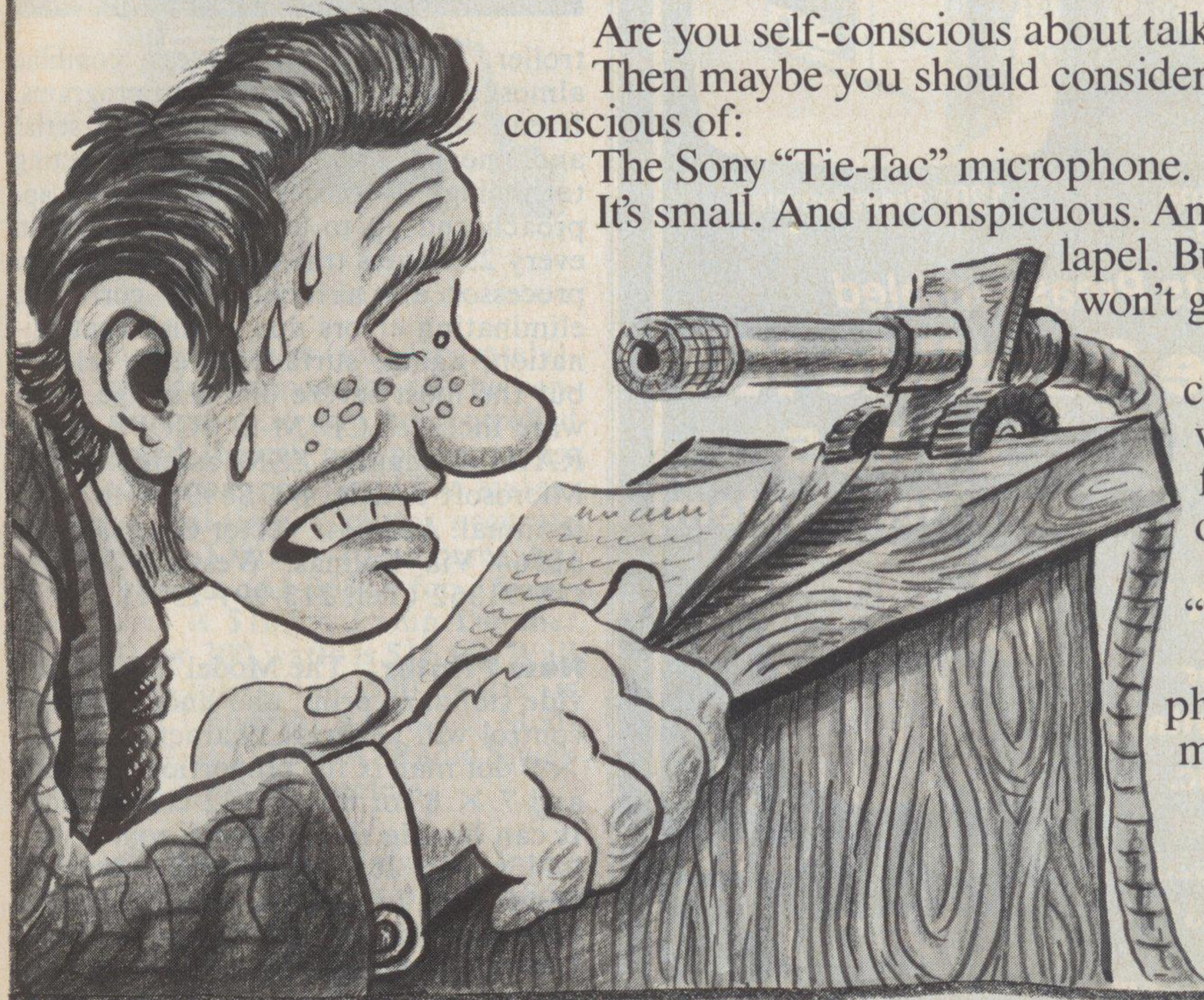
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Baked Apple.

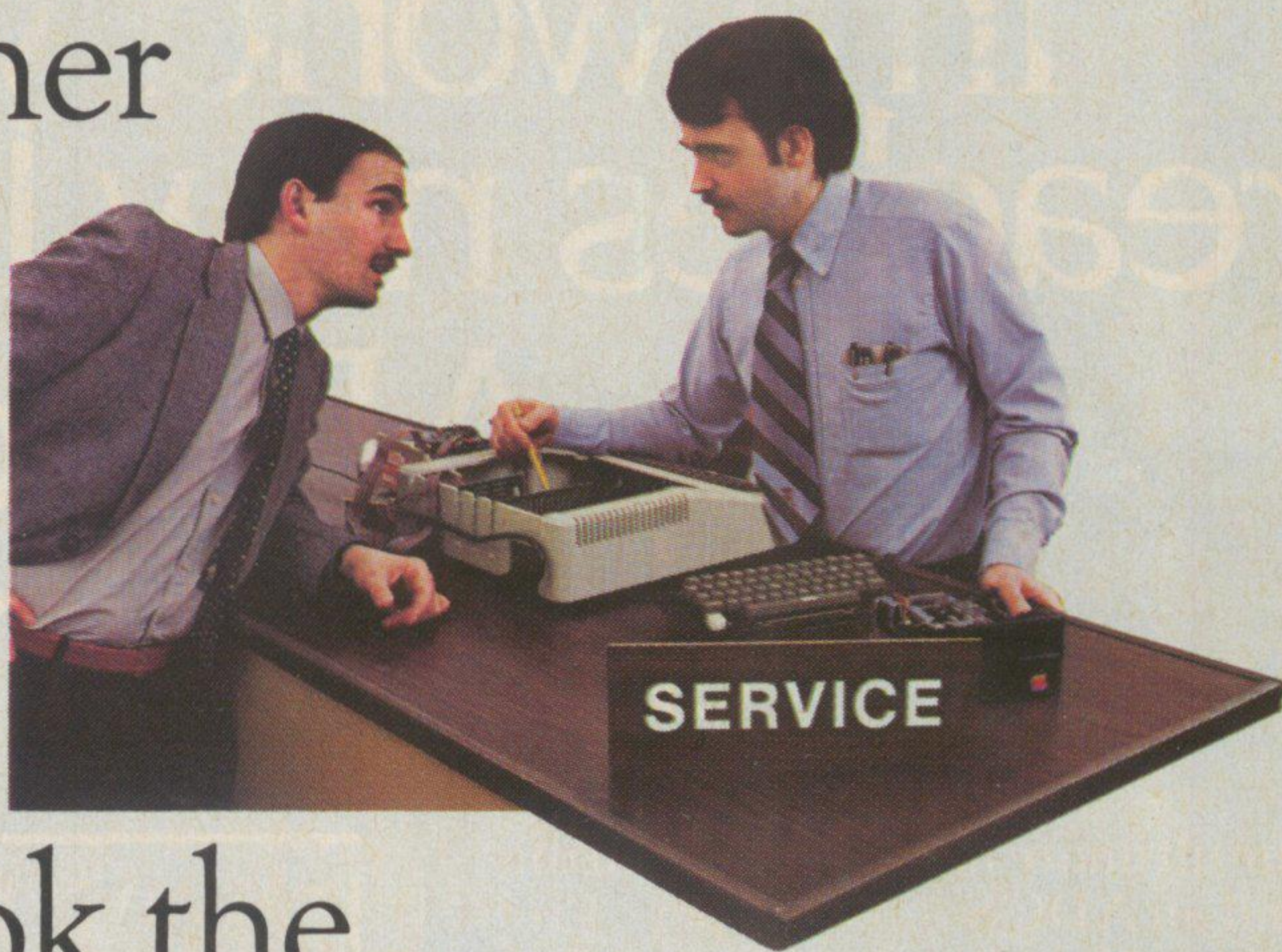
Last Thanksgiving, a designer from Lynn/Ohio Corporation took one of the company's Apple Personal Computers home for the holidays.

While he was out eating turkey, it got baked.

His cat, perhaps miffed at being left alone, knocked over a lamp which started



a fire which, among other unpleasantries, melted his TV set all over his computer. He thought his goose was cooked.



But when he took the Apple to Cincinnati Computer Store, *mirabile dictu*, it still worked.

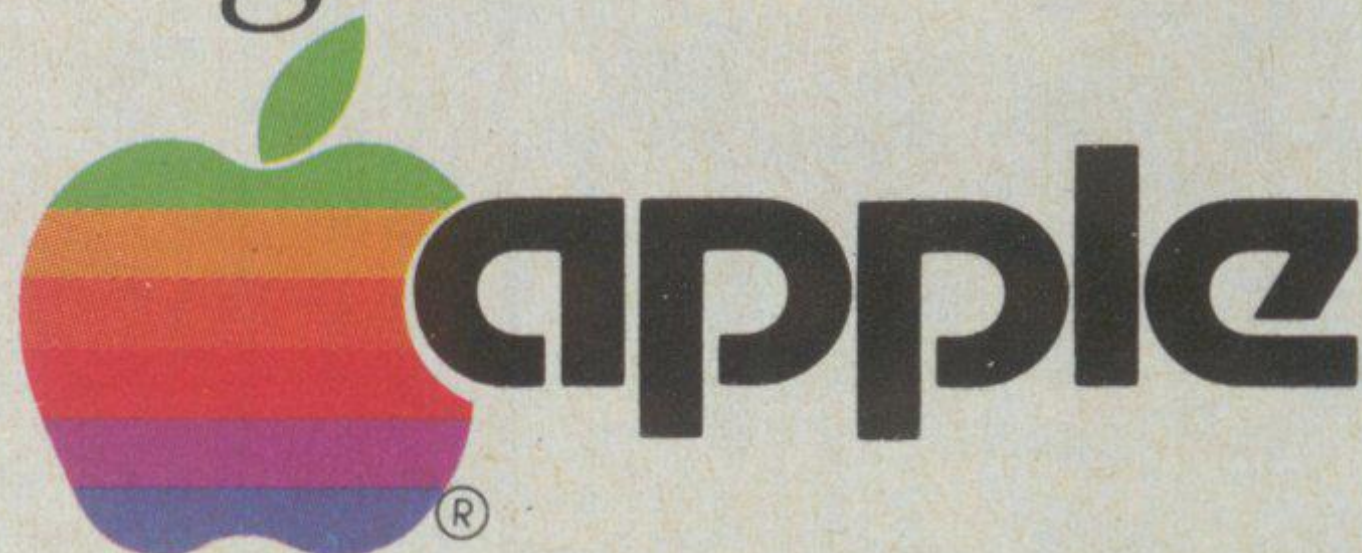
A new case and keyboard made it as good as new.

Nearly 1,000 Apple dealers have complete service centers that can quickly fix just about anything that might go wrong, no matter how bizarre.

So if you're looking for a personal computer that solves problems instead of creating them, look to your authorized Apple dealer.

You'll find everything well-done.

The personal computer.



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<http://www.cvxmelody.net/AppleUsersGroupSydneyAppleIIDiskCollection.htm>