VOLUME 2 NUMBER 2
FEBRUARY 1984
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A+

THE INDEPENDENT GUIDE FOR **apple** COMPUTING

APPLES BRANCH OUT

- GRAPHICS TABLETS FOR APPLE IIs
- APPLES GO INDUSTRIAL
- APPLES BREAK THE SOUND BARRIER
- THE EVERYTHING BOX
- REVIEWS
  - THE GRAPHIC SOLUTION
  - BEAGLE BASIC
  - SYSTEM SAVER
- BACK TALK AND LIP SERVICE
- HIGH-TECH MUSCLE TONE

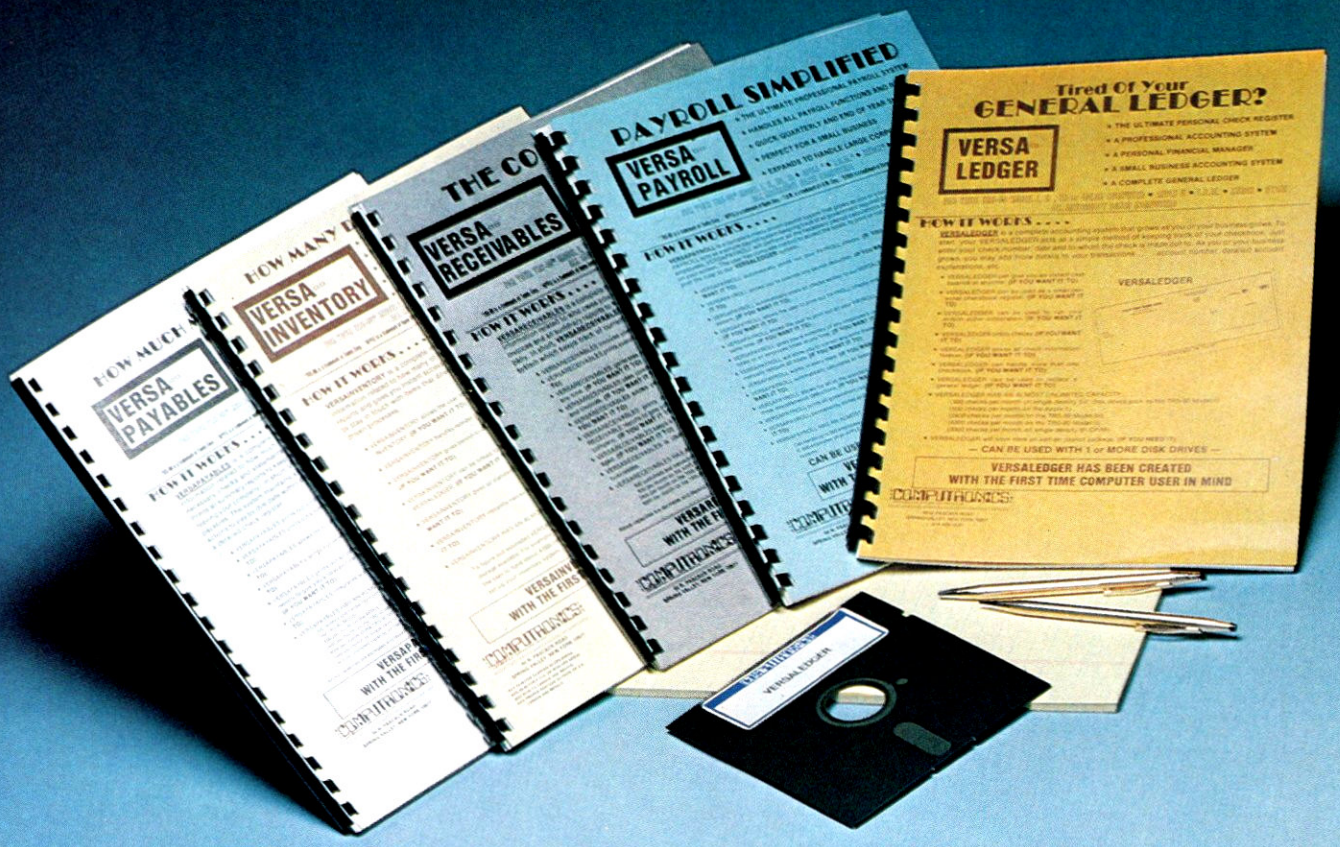


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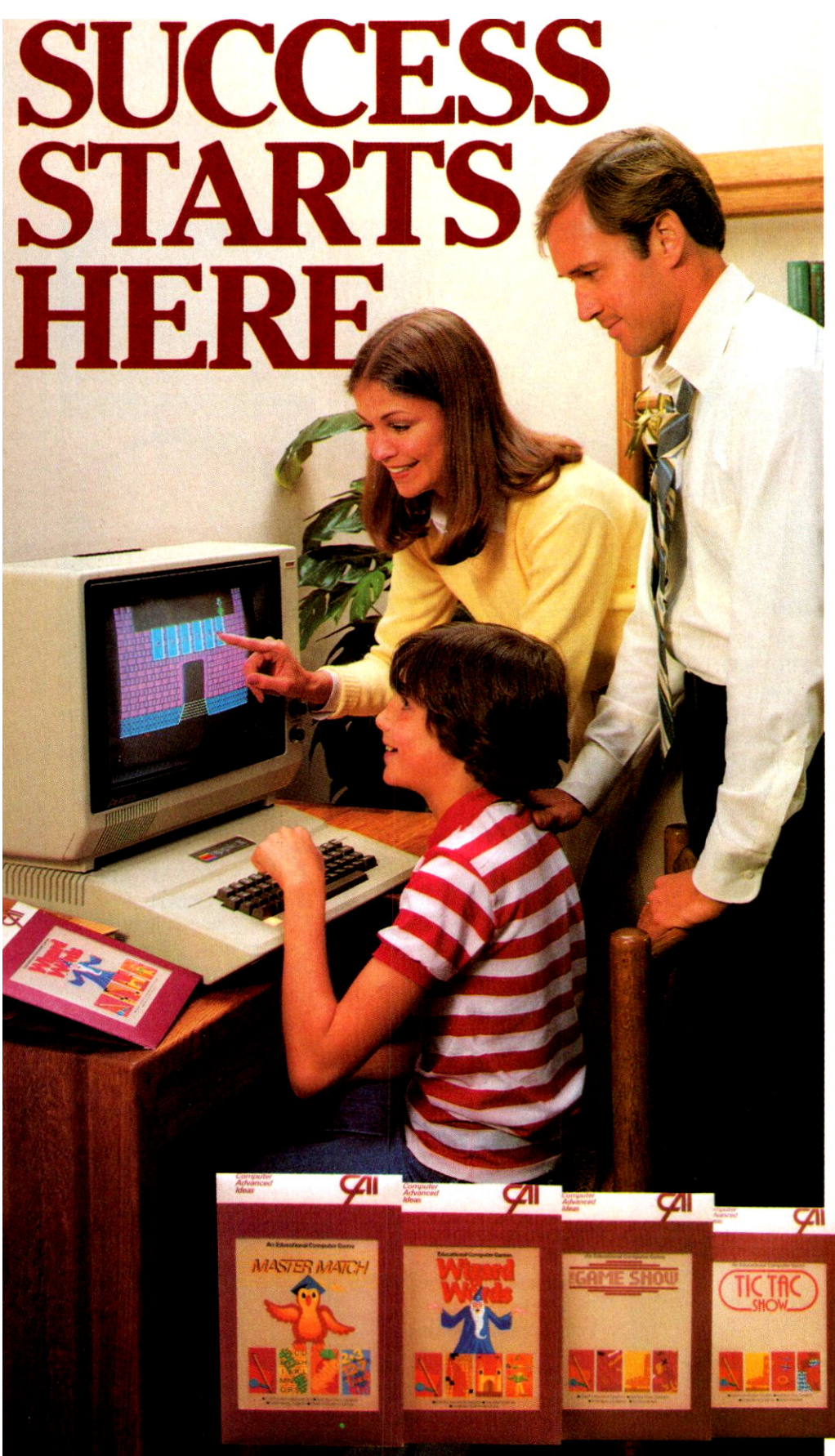
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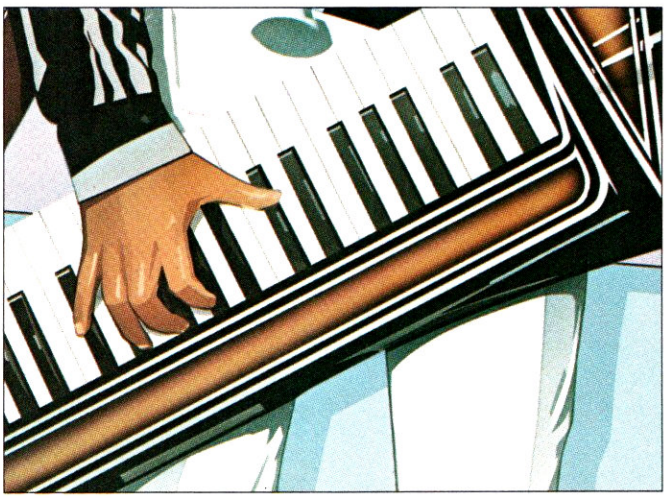
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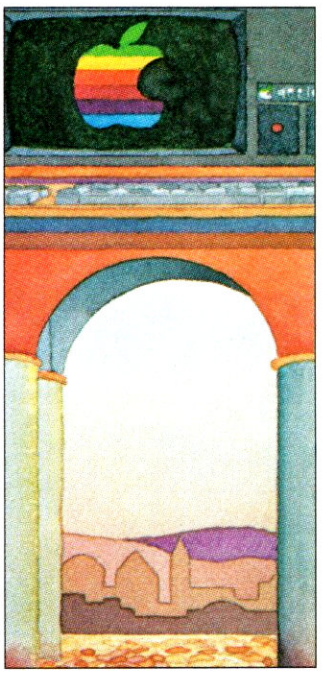
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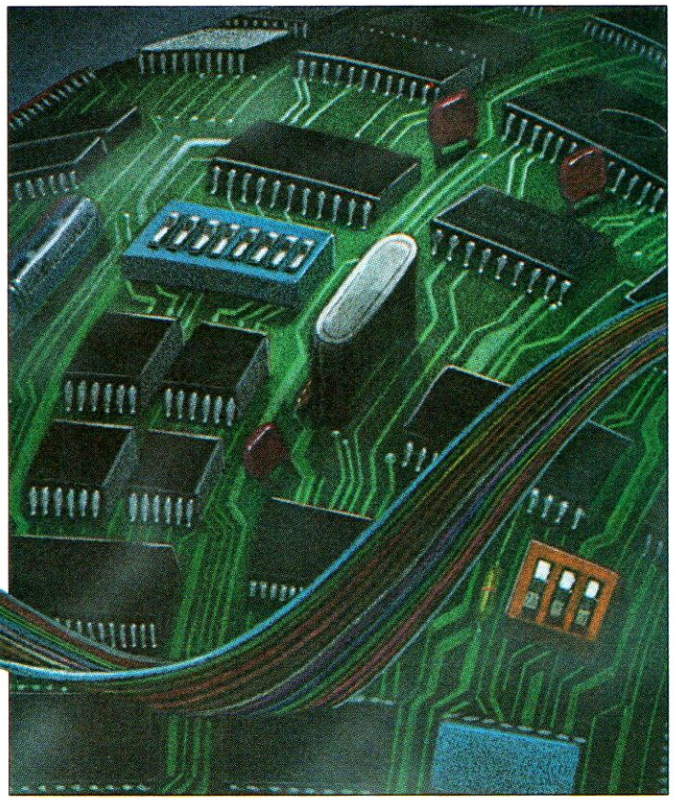
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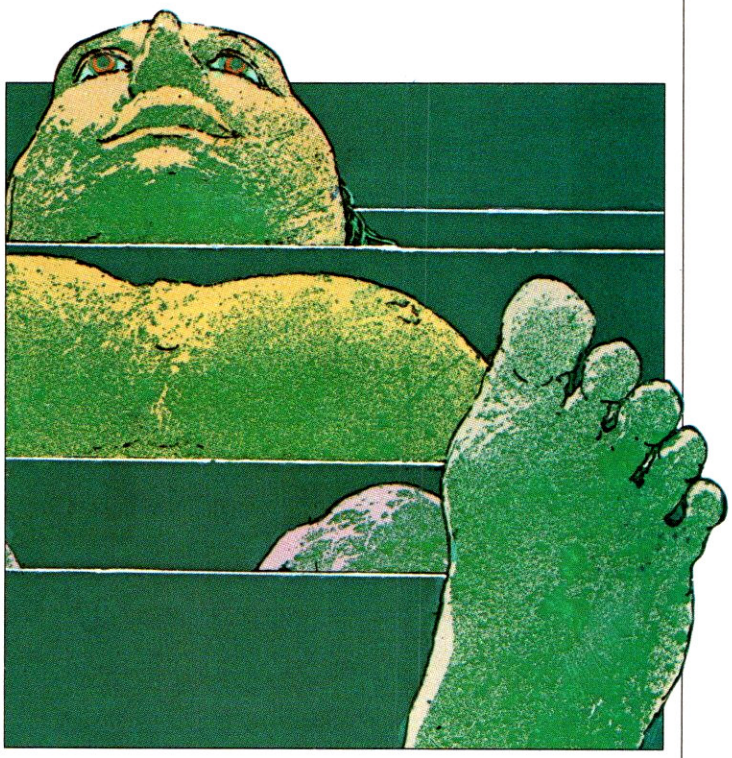
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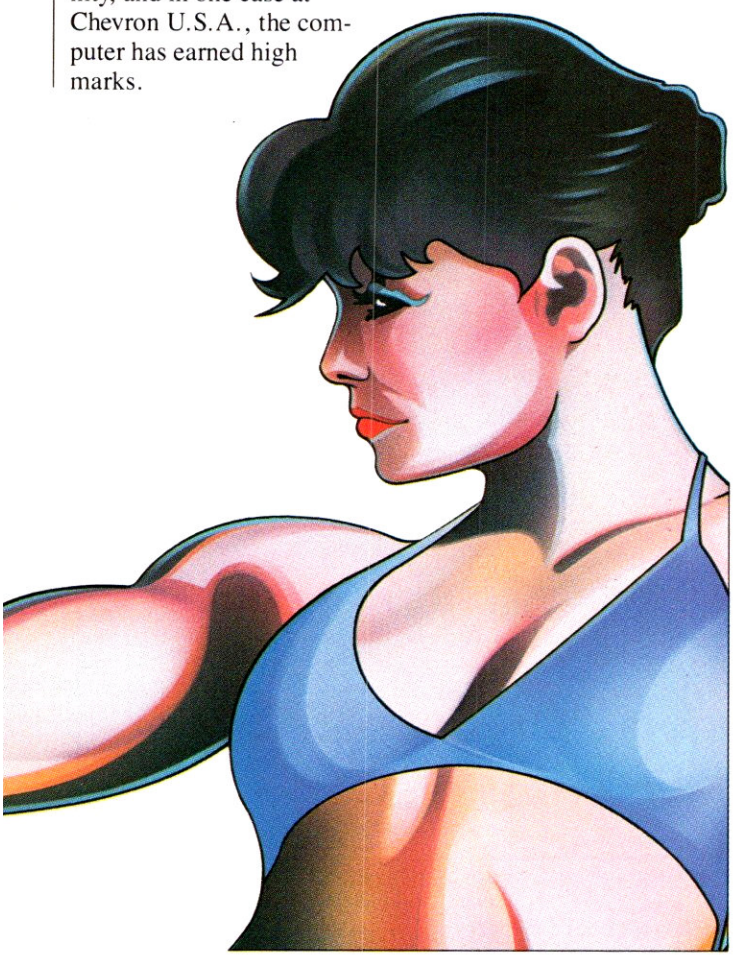
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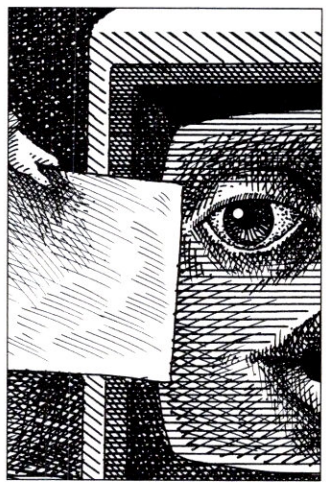
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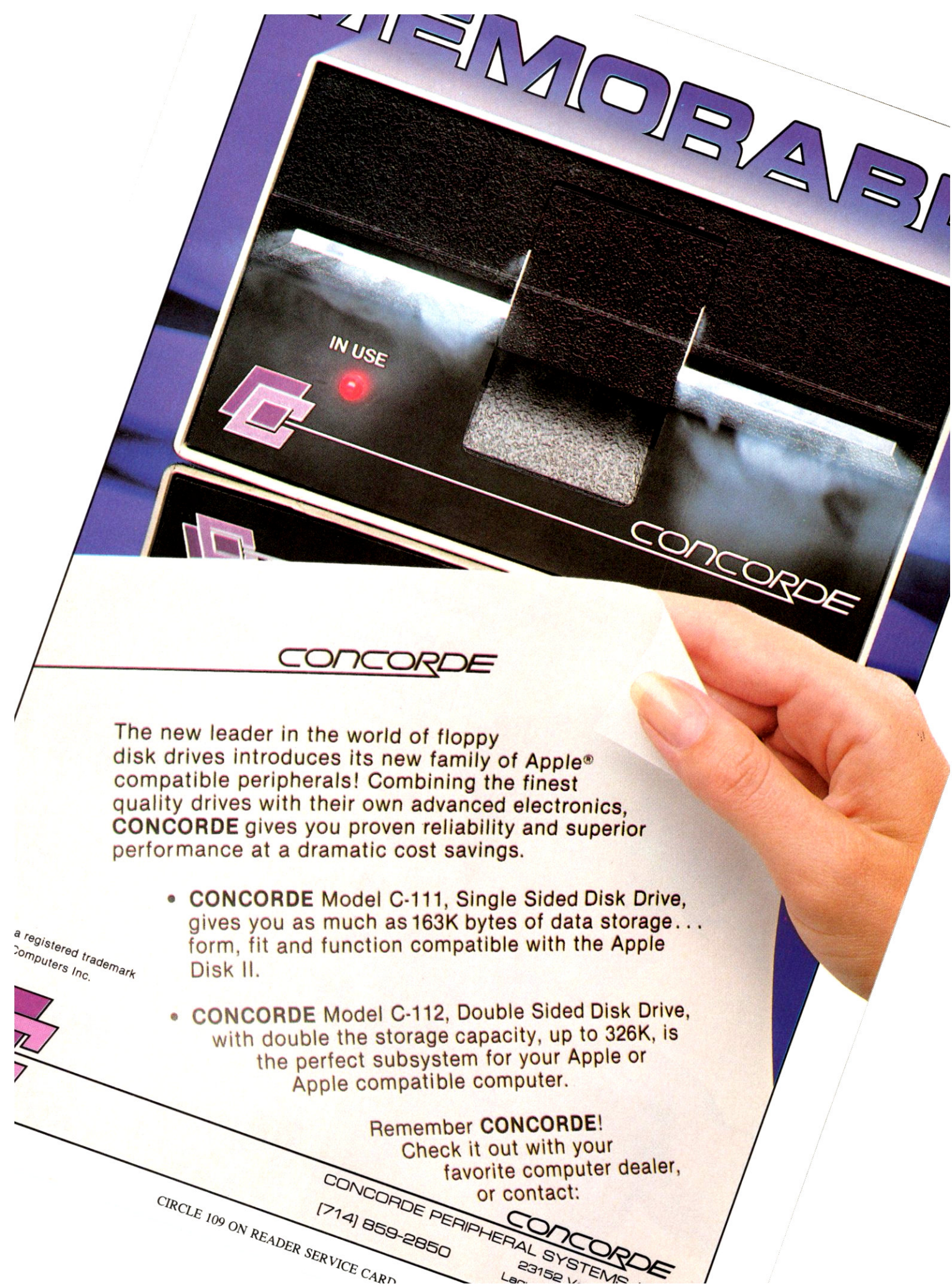
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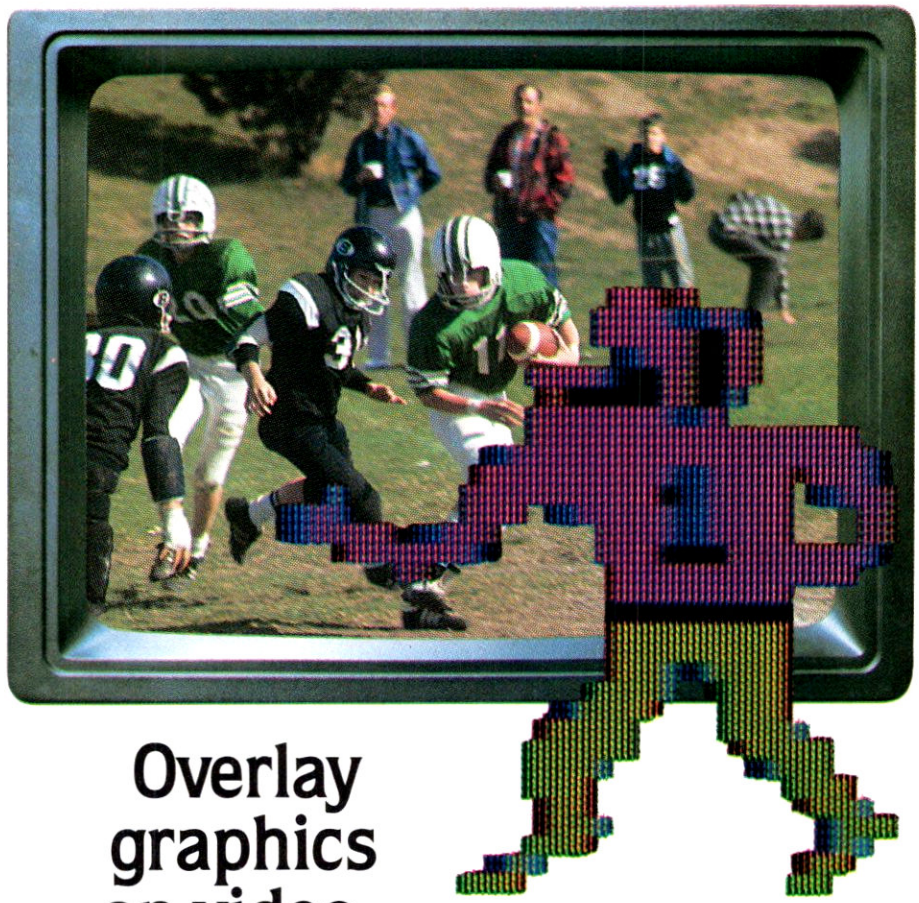
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CIRCLE 246 ON READER SERVICE CARD

Inside Apple

Vol. 1, No. 4

A dot matrix printer that will improve your image.

Meet the Apple® Imagewriter, the newest dot matrix printer for your Apple Personal Computer.

And with all that it has going for it, just maybe the best dot matrix printer on the market.

Take legibility, for instance.

The Imagewriter crams 140 x 160 dots into each square inch. So you get text that's highly readable and high resolution graphics, besides.

And is it fast.

The Imagewriter cruises at an unbelievable 120 characters per second. And that's just in the text mode. It's even faster printing graphics. 180 characters per second, to be exact.

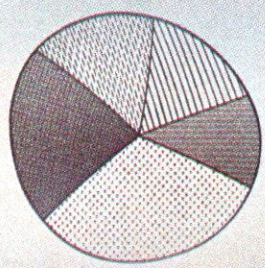
What's more, the graphics dump is up to 60% faster than other comparably priced dot matrix printers. And that makes the Imagewriter fast enough to handle the Lisa™.

Yet it's just as at home with an Apple III or Apple IIe. Thanks to Apple software experts who designed the control electronics to give the Imagewriter perfect compatibility. Not to mention some special capabilities like superscript and subscript, to name just two.

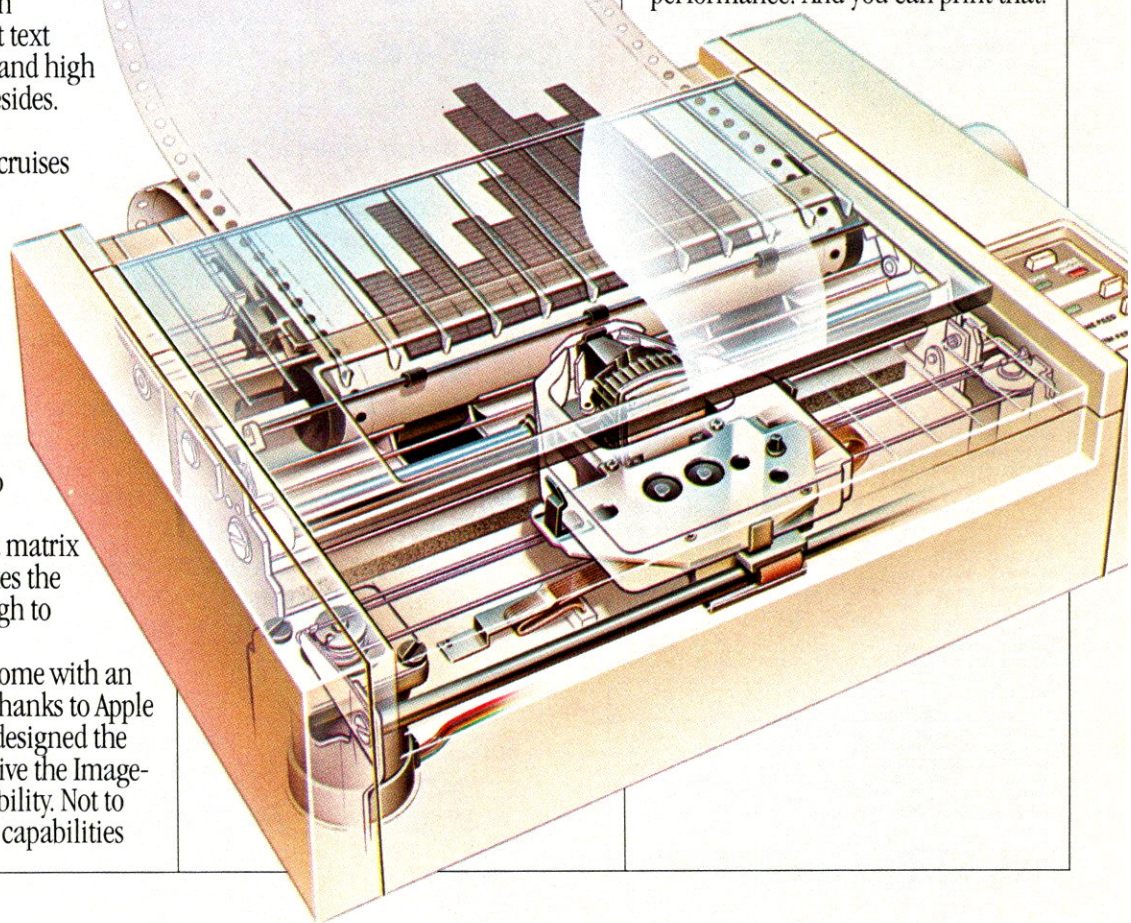
Now, with all this high-speed performance, you'd expect the Imagewriter to make the Devil's Own Noise. It doesn't. In fact, the Imagewriter is specially constructed — with overlaid seams and special sound-deadening materials — to achieve a remarkable 53 dB. How loud is a remarkable 53 dB? You'd make more noise if you read this aloud.

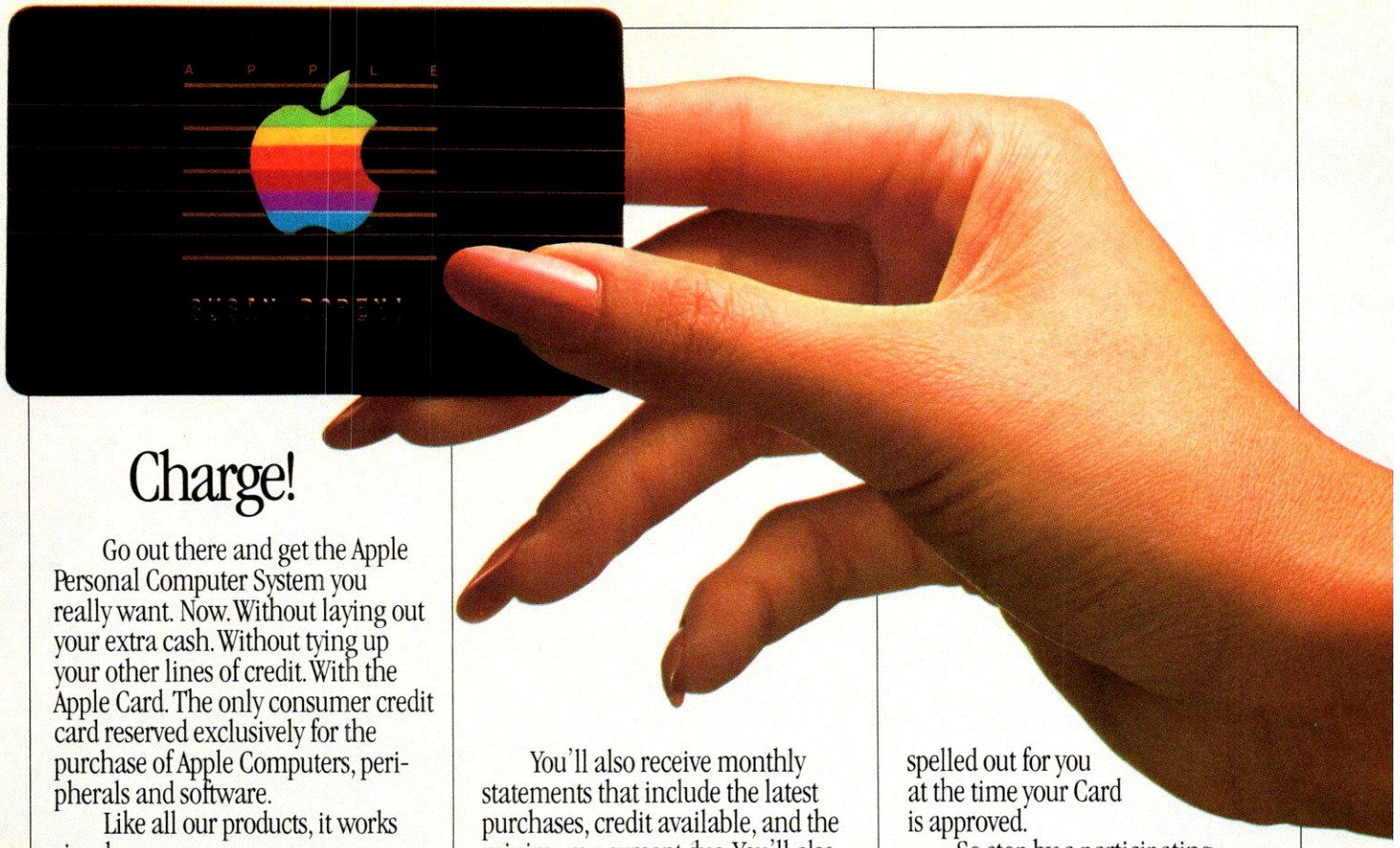
The Imagewriter even has quiet good looks, since we designed it to look like the rest of the Apple Family.

Yet even with all its improvements, the Imagewriter is a better deal than any other dot matrix printer with comparable performance. And you can print that.



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There is no annual fee for the Card, although a couple of restrictions do apply. The first purchase must include an Apple Personal Computer and you have to put 10% down. And subsequent purchases need to be at least $100 if made with the Card. Oh, yes — you'll also have a credit limit.

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So stop by a participating authorized Apple dealer and get an Apple Card. Just think of it as credit where credit is due.

Give your floppy disks the boot.

We call it the "floppy disk shuffle." It happens when you have two or more software programs on floppies and you need to work with both. What do you do? You put one disk in, boot it, do your work, take it out, put the other disk in, boot it, do your work — you get the idea.

Well, you can stop shuffling any time now.

Thanks to a unique new software program called Catalyst™ from Quark, Inc. Specially designed for your Apple III and ProFile™ hard disk.

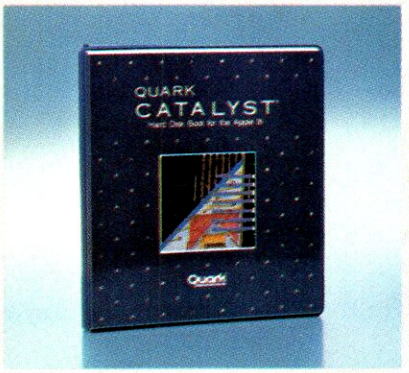
Catalyst allows you to take a wide variety of software programs and store them on your ProFile. Once they're on your ProFile, you just select the program you want from the Catalyst menu that appears on your monitor — then Catalyst does the rest. You'll never have to boot those programs again.

What kinds of programs will work with ProFile and Catalyst?

Almost anything written for the Apple III including copy-protected programs like VisiCalc,® Quick File™ and Apple Writer III. Or languages like Pascal, BASIC, or COBOL.

And once you've loaded these programs into your ProFile, the only diskette you may ever need is the Catalyst.

So if you have an Apple III and a ProFile and more floppies than you care to flip through, get yourself a Catalyst. And boot those disks for good.



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LETTERS TO THE EDITOR

Dear *A+*,

The Apple III article, "Mixing Words and Numbers," in your November issue was almost very helpful, but it seemed to be missing important information. What was the form letter I was supposed to type in, and where were those sample letters the author referred to?

Wendy Conleish
Los Altos, CA

This is the form letter that should be used for the Apple Writer/QuickFile form-letter demonstration. The "field numbers" are keyed to the numbers between the @'s on the PRESS LIST printout on page 101 of November's A+. *(For instance, whenever the form letter calls for "field2," the person's first name is inserted.)*

25 August 1983

(field2) (field1)
(field5)
(field6)
(field7)

Dear (field2),

In your position as (field3) of (field4), I'm sure you're always on the lookout for innovations in technology. I'd like to bring to your attention the fantastic capabilities of the Apple III personal computer. I would be happy to visit you at (field5) to discuss the Apple for (field4).

Yours,

W. Shannon

Three sample letters generated with the form letter follow: the first two illustrate problems discussed in "Mixing Words and Numbers."

25 August 1981

Steven McMurray
The Weekly Palm
2036 Sand St.
Orlando FL 88542

Dear Steven,

In your position as Features Editor of , I'm sure you're always on the lookout for innovations in technology. I'd like to bring to your attention the fantastic capabilities of the Apple III, personal computer. I would be happy to visit you at The Weekly Palm to discuss the Apple for .

Yours,

W. Shannon

25 August 1981

Eleanor Porter
Watsonville Daily News
5698 Lark Ave.
Watsonville TX 55412

Dear Eleanor,

In your position as Asst. Editor of Ask Eleanor, I'm sure you're always on the lookout for innovations in technology. I'd like to bring to your attention the fantastic capabilities of the Apple III personal computer. I would be happy to visit you at Watsonville Daily News to discuss the Apple for Ask Eleanor.

Yours,

W. Shannon

25 August 1981

Milton Johnson
WBXZ
223 73rd Ave.
Chicago IL 99987

Dear Milton,

In your position as Producer of Moments in Business, I'm sure you're always on the lookout for innovations in technology. I'd like to bring to your attention the fantastic capabilities of the Apple III personal computer. I would be happy to visit you at WBXZ to discuss the Apple for Moments in Business.

Yours,

W. Shannon

To our readers:

We ran an article called "Modem Magic" in our first issue that detailed various information services. One of the services, Bibliographic Retrieval Services After Dark, wrote to tell us that we had left out some important information and that some of the information we had printed was incorrect. The material was gleaned from brochures and a telephone conversation with a BRS employee, but we are anxious for our readers to have the most up-to-date and accurate information, so here is a summary of the letter from BRS:

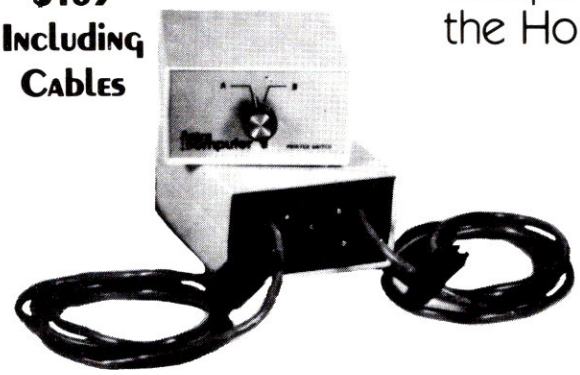
- *After Dark requires a $50 start-up fee that you can bill to an American Express, Mastercard, or VISA account. It is possible to establish a deposit account if credit-card billing is not possible or desirable.*
- *BRS offers Uninet, a popular and heavily used telecommunications service.*
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—Editors

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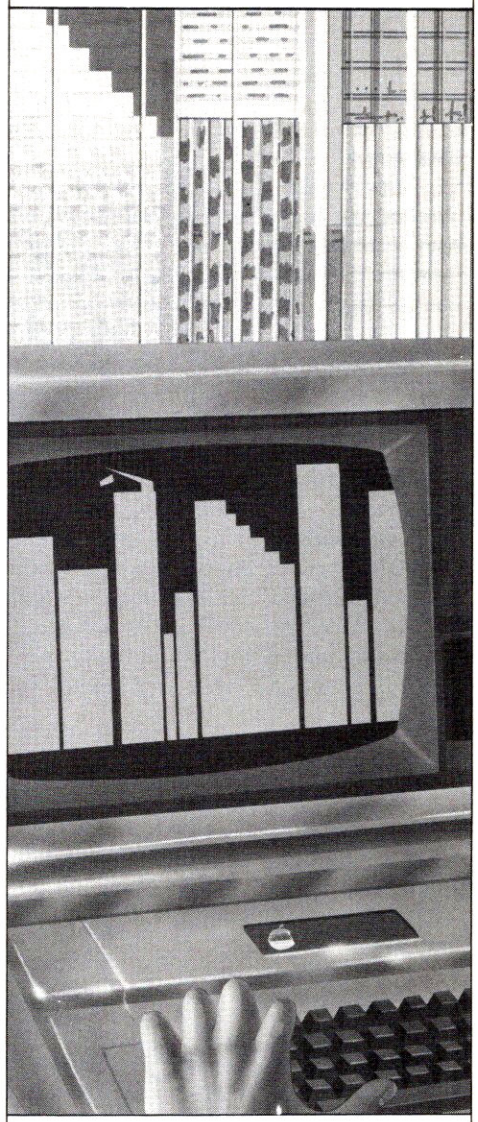
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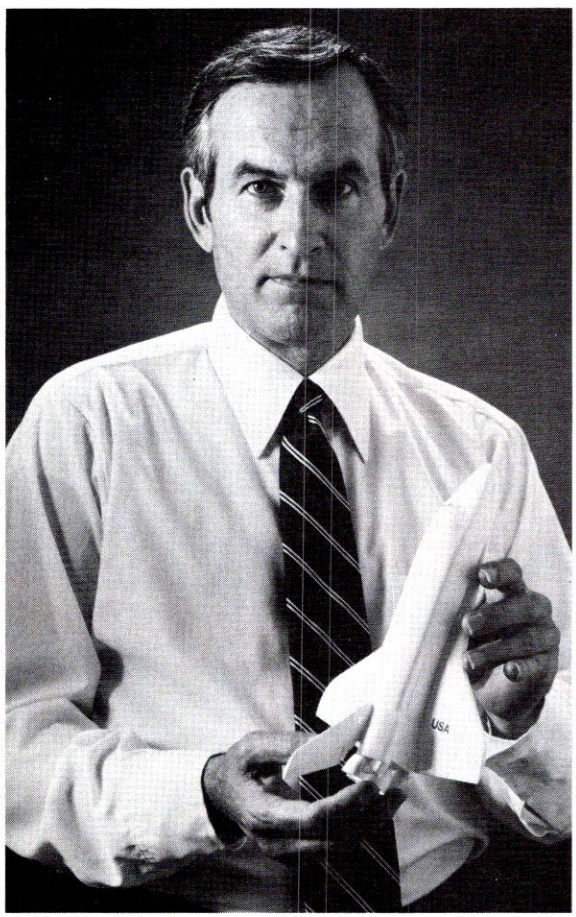
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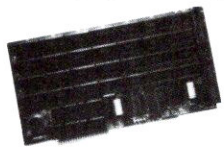
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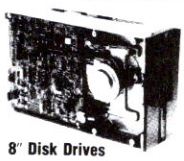
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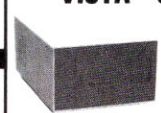
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TOP O' THE BARREL

Apple computers are the micros most used in business today. That's according to a recent survey by Datapro Research Corporation, the computer research arm of McGraw-Hill, Inc.

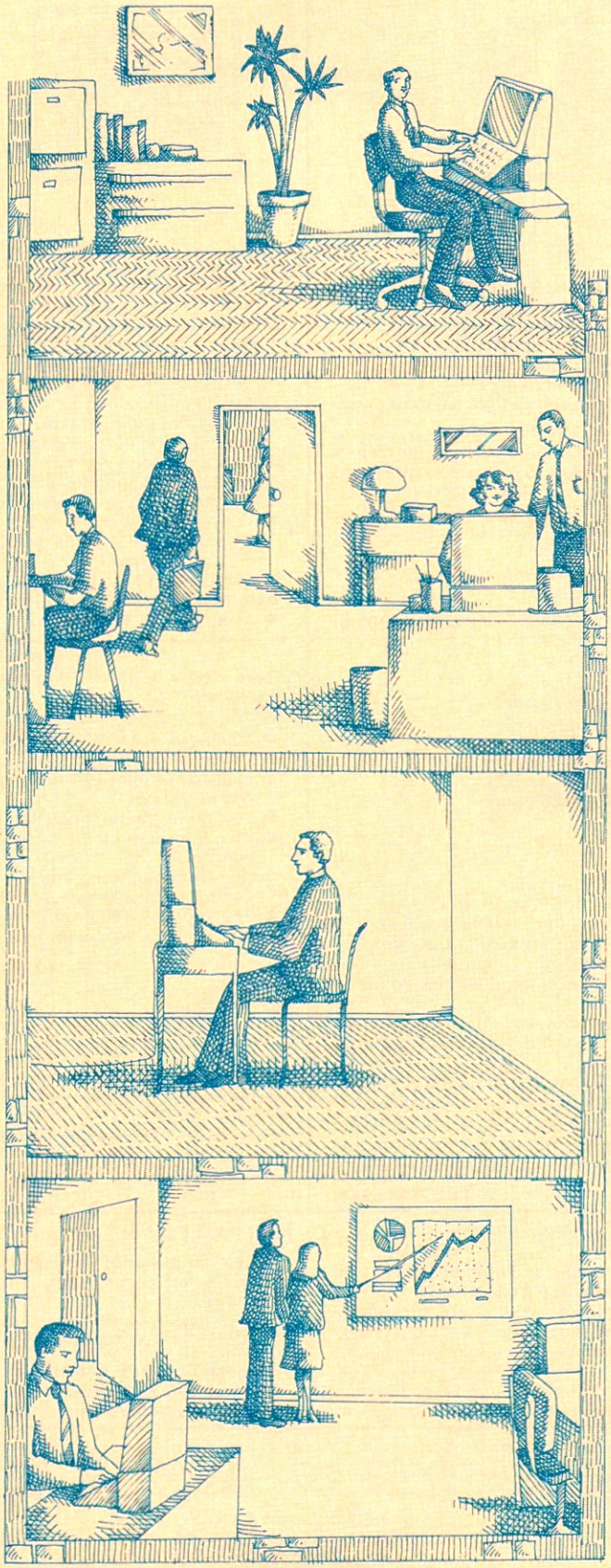
Six thousand respondents to a questionnaire mailed last August to *Byte* and *Personal Computing* subscribers reported on their machines of choice, their satisfaction with the systems, and the systems' cost.

Most respondents (19.2%) used the Apple II Plus. The IBM Personal Computer followed close behind with 13.7%, and then the Apple IIe with approximately 5%. Apple machines control almost one quarter of the business-oriented personal-computer market.

James P. Murray, Datapro's vice-president for planning and development, said the firm "specifically excluded the hobbyists" in its analysis, so the survey can be seen as an accurate picture of "serious, business-oriented users."

BEING OF SOUND MIND AND FLOPPY DISK . . .

Chances are you won't be able to take your Apple with you when you go to "human data heaven." (Would that we had a Save command to protect our circuits from that ultimate power spike.) So, to help California residents arrange their affairs "preneed," there's now a program that lets you prepare a legally acceptable will. No previous computer experience or legal knowledge are necessary.



Will Write I, by Legisoft, Inc., of San Francisco, California, explains itself to Apple II users in crisp non-legal terms, walking the predeceased through a form will prepared by the state legislature. This will was meant for people with relatively simple needs: you can name guardians for the children, set up a trust for them, or leave bequests. You can store up to five different wills on the program diskette and can change a will quickly and easily if, for instance, the person to whom you'd planned to will your ancient and collectible Apple I departs this earth before you do.

One point to keep in mind—a will is not a will unless you've printed it out. At least, in California, you'll need a hard copy witnessed by two people uninvolved in the will's contents—all your preparations go for naught if your will languishes on hard disk while you're buried in the hard earth.

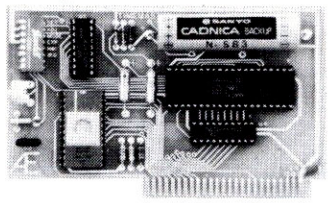
This is not the last such legal program that Legisoft will produce, by the way—the company has recently signed a contract with the well-known legal self-help publishers, Nolo Press, to produce a line of do-it-yourself software for legal problems.

APPLIED ENGINEERING Quality Starts On The Drawing Board....

But it doesn't end there. Our commitment to excellence applies all the way down the line, through manufacturing and testing to our three year no-hassle warranty. The aim, of course, is to provide you with the best designed and best crafted hardware available. Try any of the peripherals below and see what it's like to own the finest.

The TIMEMASTER
Finally, a clock that does it ALL!

Automatically date stamps files with PRO-DOS



Fully PRO-DOS compatible

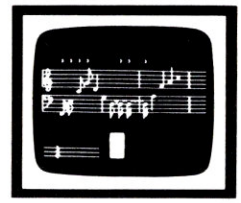
- Just plug it in and your programs can read the year, month, date, day, and time to 1 millisecond! The only clock with both year and ms.
- A rechargeable NiCad battery will keep the TIMEMASTER running for over ten years.
- Powerful 2K ROM driver — No clock could be easier to use.
- Full emulation of most other clocks, including Mountain Hardware's Appleclock (but you'll like the TIMEMASTER mode better).
- Basic, Machine Code, CP/M and Pascal software on 2 disks!
- Eight software controlled interrupts so you can execute two programs at the same time (many examples are included).
- On-board timer lets you time any interval up to 48 days long down to the nearest millisecond.

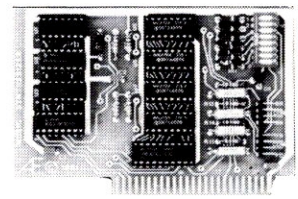
The TIMEMASTER includes 2 disks with some really fantastic time oriented programs (over 25) plus DOS dater so it will automatically add the date when disk files are created or modified. The disk is over a $200.00 value alone — we give the software others sell. All software packages for business, data base management and communications are made to read the TIMEMASTER.

If you want the most powerful and the easiest to use clock for your Apple, you want a TIMEMASTER.

PRICE $129.00

Super Music Synthesizer
Improved Hardware and Software

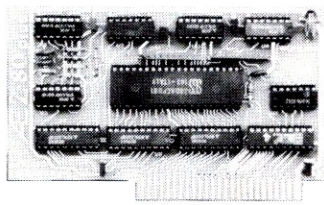




- Complete 16 voice music synthesizer on one card. Just plug it into your Apple, connect the audio cable (supplied) to your stereo, boot the disk supplied and you are ready to input and play songs.
- It's easy to program music with our compose software. You will start right away at inputting your favorite songs. The Hi-Res screen shows what you have entered in standard sheet music format.
- Now with new improved software for the easiest and the fastest music input system available anywhere.
- We give you lots of software. In addition to Compose and Play programs, 2 disks are filled with over 30 songs ready to play.
- Easy to program in Basic to generate complex sound effects. Now your games can have explosions, phaser zaps, train whistles, death cries. You name it, this card can do it.
- Four white noise generators which are great for sound effects.
- Plays music in true stereo as well as true discrete quadraphonic.
- Full control of attack, volume, decay, sustain and release.
- Will play songs written for ALF synthesizer (ALF software will not take advantage of all our card's features. Their software sounds the same in our synthesizer.)
- Our card will play notes from 30HZ to beyond human hearing.
- Automatic shutoff on power-up or if reset is pushed.
- Many many more features.

PRICE $159.00

Z-80 PLUS!



- TOTALLY compatible with ALL CP/M software.
- The only Z-80 card with a special 2K "CP/M detector" chip.
- Fully compatible with microsoft disks (no pre-boot required).
- Specifically designed for high speed operation in the Apple IIe (runs just as fast in the II+ and Franklin).
- Red "CP/M WORKING" LED indicator, the Z-80 Plus does not interfere with non-CP/M programs.
- A semi-custom I.C. and a low parts count allows the Z-80 Plus to fly thru CP/M programs at a very low power level. (We use the Z-80A at fast 4MHZ.)
- Does EVERYTHING the other Z-80 boards do, plus Z-80 interrupts.

Don't confuse the Z-80 Plus with crude copies of the microsoft card. The Z-80 Plus employs a much more sophisticated and reliable design. With the Z-80 Plus you can access the largest body of software in existence. Two computers in one and the advantages of both, all at an unbelievably low price.

PRICE $139.00

Viewmaster 80

There used to be about a dozen 80 column cards for the Apple, now there's only ONE.

- TOTALLY Videx Compatible.
- 80 characters by 24 lines, with a sharp 7x9 dot matrix.
- On-board 40/80 soft video switch with manual 40 column override
- Fully compatible with ALL Apple languages and software—there are NO exceptions.
- Low power consumption through the use of CMOS devices.
- All connections on the card are made with standard video connectors.
- All new design (using a new Microprocessor based C.R.T. controller) for a beautiful razor sharp display.
- The VIEWMASTER incorporates all the features of all other 80 column cards, plus many new improvements.

	PRICE	BUILT IN SOFTSWITCH	SHIFT KEY SUPPORT	LOW POWER DESIGN	THREE YEAR WARRANTY	7x9 DOT MATRIX	LIGHT PEN INPUTS	40 COLUMN OVERRIDE	INVERSE CHARACTERS
VIEWMASTER	**169**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
SUP'RTERM	MORE	NO	YES	NO	NO	NO	NO	YES	YES
WIZARD80	MORE	NO	NO	NO	NO	YES	NO	YES	YES
VISION80	MORE	YES	YES	NO	NO	YES	NO	NO	NO
OMNIVISION	MORE	NO	YES	NO	NO	NO	NO	YES	YES
VIEWMAX80	MORE	YES	YES	NO	NO	YES	NO	NO	YES
SMARTERM	MORE	YES	YES	NO	NO	NO	YES	YES	NO
VIDEOTERM	MORE	NO	NO	YES	NO	YES	YES	NO	YES

The VIEWMASTER 80 works with all 80 column applications including CP/M, Pascal, WordStar, Format II, Easywriter, Apple Writer II, VisiCalc, and all others. The VIEWMASTER 80 is THE MOST compatible 80 column card you can buy at ANY price!

PRICE $169.00

MemoryMaster IIe 128K RAM Card

- Expands your Apple IIe to 192K memory.
- Provides an 80 column text display.
- Compatible with all Apple IIe 80 column and extended 80 column card software (same physical size as Apple's 64K card).
- Can be used as a solid state disk drive to make your programs run up to 20 times FASTER (the 64K configuration will act as half a drive).
- Permits your IIe to use the new double high resolution graphics.
- Automatically expands Visicalc to 95 K storage in 80 columns! The 64K config. is all that's needed, 128K can take you even higher.
- PRO-DOS will use the MemoryMaster IIe as a high speed disk drive.
- Lowest power consuming 128K card AVAILABLE.
- Complete documentation included, we show you how to use all 128K.

If you already have Apple's 64K card, just order the MEMORYMASTER IIe with 64K and use the 64K from your old board to give you a full 128K. (The board is fully socketed so you simply plug in more chips.)

MemoryMaster IIe with 128K	**$249**
Upgradeable MemoryMaster IIe with 64K	**$169**
Non-Upgradeable MemoryMaster IIe with 64K	**$149**

Our boards are far superior to most of the consumer electronics made today. All I.C.'s are in high quality sockets with mil-spec. components used throughout. P.C. boards are glass-epoxy with gold contacts. Made in America to be the best in the world. All products work in the APPLE IIE, II, II+ and Franklin. The MemoryMaster IIe is IIe only. Applied Engineering also manufactures a full line of data acquisition and control products for the Apple; A/D converters and digital I/O cards, etc. Please call for more information. All our products are fully tested with complete documentation and available for immediate delivery. All products are guaranteed with a no hassle **THREE YEAR WARRANTY.**

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THE MOVING APPLE WRITES

While rumors fly that Apple Computer may market its own portable computer, other companies have sidestepped the issue and produced conversion kits to transform the stay-at-home Apples into globetrotters.

Port App, from ERI-LIS Computer Products in San Jose, California, packs the Apple II or II Plus motherboard, keyboard, internal peripherals, and disk drives into an aluminum case. The case can handle two external peripheral slots, two standard or four half-height disk drives, an 80-column card, and a 9-inch CRT. Obviously the kit's target market is cache-and-carry customers . . .

DON'T RAISE THE LANGUAGE, LOWER THE KEYBOARD

Programmers or business-computer users, weary of typing the same command over and over again, often wish they could use a single keystroke to cue the entrance of a specialized, oft-repeated function. Some have written their own shorthand command languages in protest.

One Tulsa, Oklahoma, company has attacked the problem with the development of a flat membrane keyboard using new decoding technology—instead of the fewer-than-100 keys on most standard keyboards, the surface of this board has 717 programmable keys for you to use.

The Keyport 717, from Polytel Computer Products, has three packaged applications, each with its own plastic overlay to indicate active keys. Users who don't want to work with BASIC, VisiCalc, or a children's educational program called The Farm can construct their own key layouts and overlays by wielding the Keyport's software tools, utility programs, and blank overlays.

The Keyport plugs into the Apple game I/O port and comes with cable and connector for the Apple II, II Plus, or IIe. With utility diskette, two programmer overlays, and interfaces for all three applications mentioned above, the Keyport costs $175.

NEARER MY BAUD TO THEE

They say that God is everywhere. Well, at least one religious group is capitalizing on God's global-area network. Jews for Jesus in San Francisco now hands prospective members a brochure designed to separate the dedicated believer from the casual user.

Do you "go through life feeling like a floppy disk with no drive"? Their flyer, "printed on a nice Jewish user-friendly machine," avows that the lacks in your life are "not a technology problem—it's one of human error. The human bugs and glitches have a name: SIN, and it's mankind's BASIC problem.

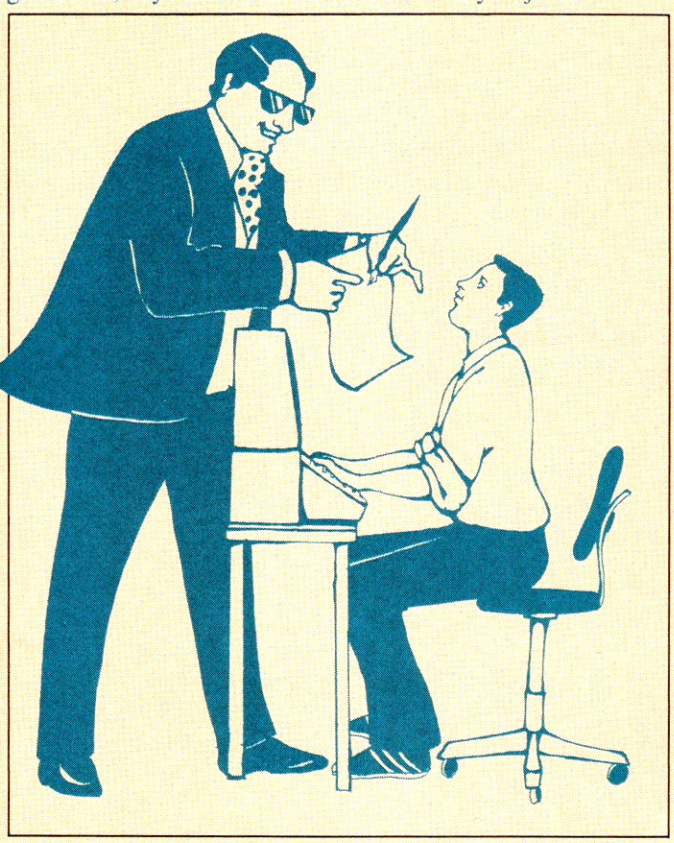
"Sin goes back to the time when Adam and Eve took a BYTE into the APPLE," the flyer continues. "They deviated from God's perfect program and the results of sin are still with us today." But hope remains—we're told that "God can erase our sin-damaged software and give us new life, because God has R.A.M. (erasable) memory."

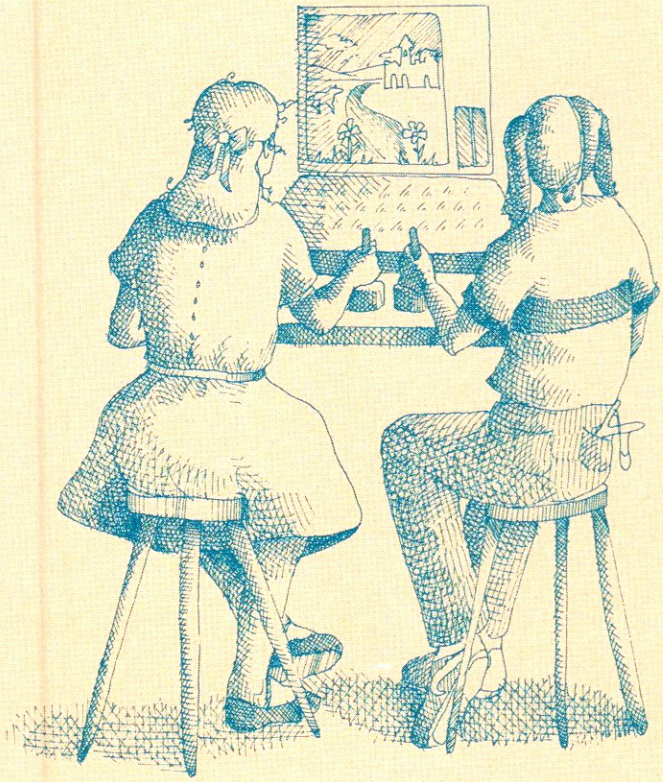
If only our computers were as forgiving . . .

THE FAME GAME

Schwab's, that fabled lunch counter in Hollywood where yearning youths nursed their milkshakes and waited to be discovered by major movie studios, is no more. Shed a tear. But aspiring programmers don't have to wait for the studio to call—at least one software house is promising talented programmers the chance to become shimmering, glimmering stars in the software firmament.

Brøderbund Software, the San Rafael, California, company that numbers Lode Runner and Bank Street Writer among its computer-game hits, says it models itself after the old movie-studio system. The company employs the equivalent of a roving talent scout, who scours the countryside looking for fresh faces. "We want to be on a first-name basis with every bright programmer in the country," says Gary Carlston, Brøderbund's cofounder. Meanwhile, if you'd rather become an independent producer, check out SeTT Your Software from ATC Software in Estill Springs, Tennessee. This market survey gives programmers tips on free directory listings, media coverage, and gaining inclusion in national databases. Your ticket to programming immortality could cost you just $20.





HANDS-OFF TRAINING

While Apple computers make their way into homes and schoolrooms, studies show that boys still outnumber girls in computer camps and classes by a three-to-one margin.

Stanford University researchers Irene Miura and Robert Hess compiled statistics and found that the number of girls in a computer class decreases as the cost of the education increases. In classes that teach higher-level computer languages, only 1 in 20 computer students is female. Hess and Miura also noted that most TV ads for computers feature boys, not girls, at the keyboards of computers.

They found another related lack—few women teach computer classes, so that girls don't feel a pressure to emulate their computer teachers. Girls don't usually have access to computers at home—in a study of 87 elementary-school children, 13% had computers at home, and all of those were boys.

One possible solution to this problem is the manufacture of software specifically for girls. Several companies now produce programs aimed at female under-15s.

One such software firm, Rhiannon Computer Games for Girls, advertises its wares as games that "give her time to explore, to experiment, to be enchanted." Rhiannon's Apple II games send plucky girls into past and future worlds—where they gather food, tend fires, and shelter plants. Part of the solution or part of the problem?

HARDWARE, SOFTWARE, AND TUPPERWARE

Are you ready for computer Tupperware parties? That's the latest merchandising tack for home and personal computers. Instead of incurring the start-up costs inherent in setting up a full-scale store, a few computer dealers have turned to the home-sales methods we've learned to love from Tupperware, Mary Kay Cosmetics, and Amway.

Wallace Micro-Mart in Peoria, Illinois, a national Apple mail-order dealer, says that through its Personal Computer Clinics its consultants "can provide the products, the demonstrations, and the personalized service missing from today's marketplace," at mail-order prices.

Bay Area Home Computers in Hayward, California, thinks staging computer parties could be a good moneymaker for parents at home with children. They're betting that the relaxed atmosphere of a home-computer party will rake in the shekels more easily than the hard-sell, high-tech approach often encountered in a computer store. The company also hopes that learning about RAM, ROM, and disk drives in familiar surroundings will break down potential users' computerphobia—and boost purchases.

We predict that the next step in computer marketing will be door-to-door sales—sign up now for your *Computer Britannica*.



MORE OF THE BEST FOR LESS

SPECIALS

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ASCII Express Pro (SWD)	95.95	Math Blasters (Davidson)	38.95	Lode Runner (BB)	26.95	Q-Bert (Parker)	38.95
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Cubit (Micromex)	29.95	Game Show (CAI)	30.95	Face Maker (Spinnaker)	26.95	Popeye (Parker)	38.95
Money Street (Computax)	79.95	Wizard of Words (CAI)	30.95	Practicale-64 (MSI)	39.95	Nite Strike (TG)	30.95
Infidel (Infocom)	36.95	Tax Manager (Howard)	195.00	Multiplan (HES)	79.95	Song Writer (Scarboro)	30.95
Tax Preparer (Howard)	195.00			Prof. Tour Golf (SSI)	30.95	Ultime III (Origin)	43.95
				Bank Street Writer (BB)	54.95	Ultime I (On Line)	28.95

APPLE GAMES

	Retail Price each	Your Price each
Broderbund Software		
The Arcade Machine	59.95	41.95
Choplifter	34.95	24.95
Serpentine	34.95	24.95
AE	34.95	24.95
Lode Runner	34.95	24.95
Spare Change	34.95	24.95
Datamost		
Aztec	39.95	27.95
Datasoft		
Zaxxon	39.95	27.95
Pooyan	29.95	20.95
Epyx/Automated Simulations		
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Archon	39.95	31.95
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Infocom		
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Starcross	39.95	27.95
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Witness	49.95	37.50
Planetfall	49.95	37.50
Enchanter	49.95	37.50
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Miner 2049er	39.95	27.95
Death in the Caribbean	35.00	24.95
Highrise	30.00	21.95
Scraper Caper	40.00	30.00
Muse Software		
Castle Wolfenstein	29.95	20.95
Titan Empire	34.95	24.95
Odesta Corporation		
Chess	69.95	49.95
Odin	49.95	37.95
Origin Systems		
Ultima III	54.95	43.95
Caverns of Calisto	39.95	31.95
Penguin Software		
Pie Man	19.95	15.95
Transylvania	19.95	15.95
The Quest	19.95	15.95
Minute Man	19.95	15.95
Quality Software		
Beneath Apple Manor Hi Res	29.95	21.95
Sierra On-Line Inc.		
Ultima II	59.95	41.95
Jawbreaker (New Version)	29.95	20.95
Dark Crystal	39.95	27.95
Sirius Software		
Bandits	34.95	24.95
The Balde of Blackpoole	39.95	27.95
Critical Mass	39.95	27.95
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Wizardry I	49.95	34.95
Wizardry II	34.95	24.95
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Police Artist	34.95	24.95
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Computer Ambush (2nd Edition)	59.95	41.95
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Flight Simulator	33.50	23.95
Night Mission Pinball	39.95	27.95
Space Vikings	49.95	37.95

APPLE BUSINESS/UTILITIES

Artsci		
Magic Window II	149.95	104.95
Magicalc	149.95	104.95
Ashton-Tate		
dBase II (Z-80 Required)	700.00	490.00
Friday (Z-80 Required)	295.00	206.95
Beagle Brothers		
Tip Disk #1	19.95	15.95
Utility City	29.95	20.95
Flex Text	29.95	20.95
Frame Up	29.95	20.95
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GPLE	49.95	37.95
Alpha Plot	39.95	27.95
Apple Mechanic	29.95	20.95
DOS BOSS	23.95	19.95
Double Take	34.95	24.95
Business Solutions		
Incredible Jack	179.00	134.95
Central Point Software		
Copy II+	39.95	31.95
Continental Software		
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Eagle Software		
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Multi-Tool Budget ANalysis	150.00	112.50
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GALE	49.95	37.50
Macrosoft	69.95	55.95
The Assembler	69.95	55.95
Pear Systems		
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Penguin Software		
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The Graphics Magician	59.95	41.95
Sensible Software		
Sensible Speller	124.95	93.95
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Multi Disk Catalog	25.00	20.00
Super Disk Copy II	30.00	21.00
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Screenwriter II	129.95	90.95
Silicon Valley Systems		
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List Handler	49.95	39.95
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Stoneware		
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DB Master Utility #2	129.00	97.50
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Visifile	250.00	174.95
Visischedule	300.00	210.00
Business Forecasting Model	100.00	80.00
Visicale IV	250.00	174.95

APPLE EDUCATION

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Science-The Human Body: An Overview	90.00	72.00
Science-Skeletal System	70.00	56.00
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Algebra Drill I	139.95	111.95
Counter Point Software		
Early Games for Young Children	29.95	23.95
Early Games Match Maker	29.95	23.95
Quizagon	39.95	31.95
Early Games Music	29.95	23.95
Early Games Fraction Factory	29.95	23.95
Krell Software		
Logo	89.95	72.95
SAT	299.95	240.00
Sierra On-Line		
Dragon's Keep	29.95	23.95
Troll's Tale	29.95	23.95
Learning with Leeper	34.95	27.95
Terrapin		
Terrapin Logo	149.95	119.95
The Learning Company		
Gertrude's Secrets	44.95	35.95
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Magic Spells	34.95	27.95

APPLE HARDWARE

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Hayes		
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System Saver	89.95	69.95
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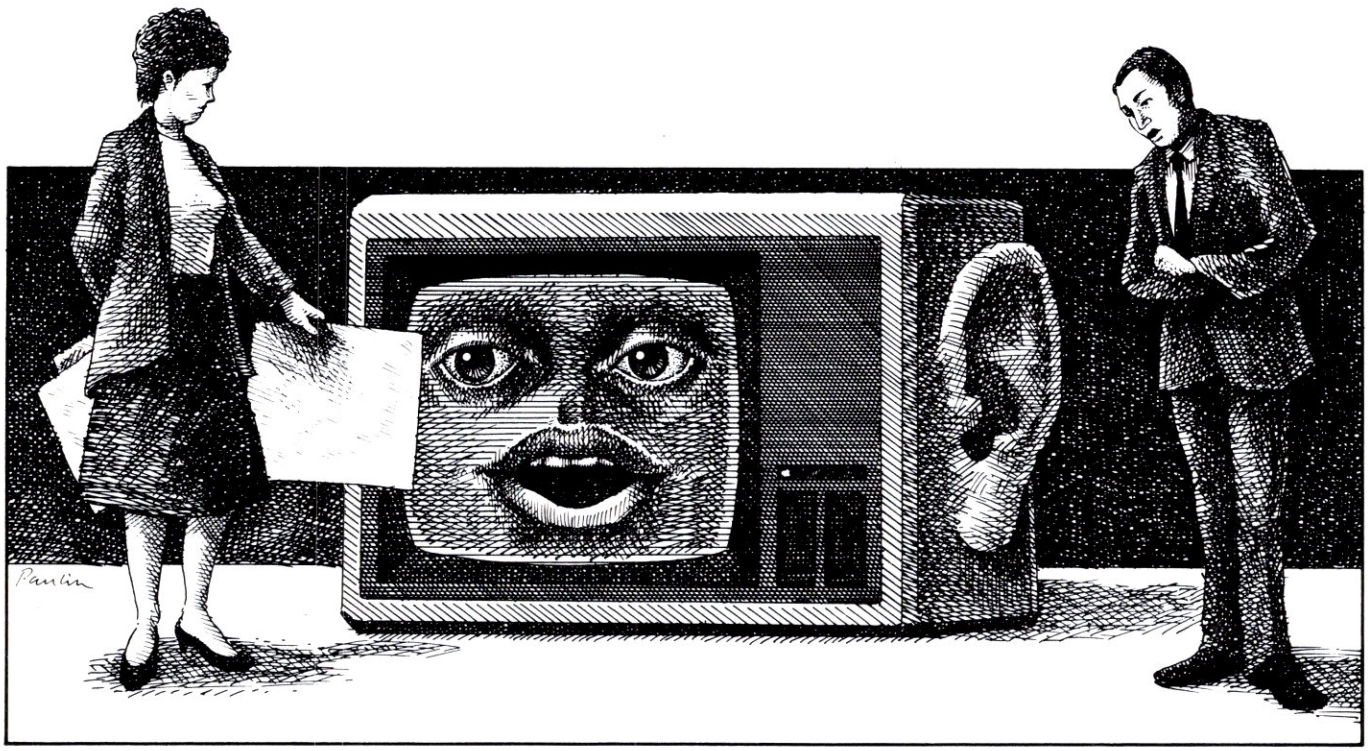
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Extend your Apple to open a wide range of new functions.



BYPASSING THE KEYBOARD

The screen and keyboard are only two of the doorways through which information for your Apple can pass. Personal computers can not only read and write, but they can also listen, speak, draw, measure, and control.

The image that most of us have of personal computers is of a machine sitting on a desk, complete with a disk drive or two and a monitor. Maybe over by the side there's a modem to let the computer exchange information over the telephone. And for permanent output, you run a serial or parallel cable to a printer.

Just as every human doesn't work processing papers in an office, though, not every Apple spends its days reading and writing text and numbers. Your Apple will never have calluses or large biceps, but it need not be completely isolated from direct contact with the world. If your concept of what you can do with a small computer can be expanded, so can the functions of your Apple.

Listen Closely, Now

For everyday calculations and word processing, using a keyboard is a fine way to communicate with your computer—but if your hands are full, you're disabled, or you don't know how to type, a keyboard becomes a barrier instead of a connection.

For a few hundred dollars, you can let your computer listen and respond to spoken words instead of just keystrokes. Depending on the board you add to the computer, you can teach it up to several dozen words or short phrases. You'll find more detailed descriptions of the actual products for the Apple in "Lip Service and Backtalk," starting on page 60 of this issue.

The technology, however, is aptly named "speech recognition" and not "speech understanding." The computer takes the sounds of your words and tries to make a good match with sound patterns you have previously stored. Each stored phrase stands for a single command or keyword and the computer makes no attempt to understand the meaning.

Because the technique is basically pattern matching, you can use any spoken word you want for a given keyword. Instead of saying "print," for example, you could just as well invent your own language, speak Pig Latin, or sing the first bar of your favorite golden oldy. Then as long as you repeat the performance each time you want to tell the computer to print, the system is quite content.

Although even the largest commercial computers can't yet decode spoken language as well as the average five-year-old, an Apple II with the right add-on board does quite a respectable job on

small vocabularies. Some manufacturers claim better than 95% accuracy, a figure comparable in scale to most people's typing skills.

On large computer systems, speech recognition is now being combined with "expert systems" to achieve intelligent listening. These systems do try to decode the meanings of words and check the results against their knowledge of the real world. Although none of the products for the Apple yet has that ability, it should not be long in coming. You can already buy simple expert systems and voice-input boards separately.

If you want your computer to have a large vocabulary or to speak words that you can't buy preencoded in ROM or on a diskette, you can also turn to speech synthesis.

Talking It Up

Speech output for your Apple is a question of trade-offs. You can get high-quality speech if you want to spend a lot of money and dedicate a great deal of memory, you can get barely comprehensible speech using public-domain programs and the built-in speaker, and in the middle are a range of products that give your machine varying abilities at proportional costs.

Actually, two very different forms of speech output are now available. Digitized speech is a way of using a computer as a fancy electronic recorder and reproducing and combining recordings of an original spoken sound library. Synthesized speech creates sounds purely from signals that never existed as pressure waves in the air.

Digitized speech gives you fairly high quality output, but of necessity has a limited vocabulary. You can output only words that have previously been spoken, analyzed, and stored as digital bit patterns. Analysis and recording is a complex process and is usually done either by the manufacturer of a speech-output IC chip or with a special development system.

Conceptually, the output process is simple. You send text words to the speech board, it looks up the electrical signals corresponding to the sounds, and the output controls a series of noise- and sound-generator circuits that drive a speaker.

If digitized words were stored simply as a direct digital recording of the speech sounds, the number of bits required for even short phrases would make speech output uneconomical. Speech contains elements up to several thousand cycles per second at varying volume levels, requiring a direct bit rate of about 64,000 bits per second for telephone-quality speech.

So, instead, your computer can store speech in one of several compressed forms that contains not the sounds themselves but instructions for their reproduction. One popular form is called linear predictive coding (LPC); the other is continuous variable-slope delta modulation (CVSD). Both produce understandable speech using about 1000 bits per second. Each method has its partisans.

If you want your computer to have a large vocabulary or to speak words that you can't buy preencoded in ROM or on a diskette, you can also turn to speech synthesis. With the right software, a speech-synthesis chip can vocalize anything that can be expressed as text.

The two conceptual steps in speech synthesis are selecting the appropriate speech element and then creating the electrical signal that makes the appropriate sound. The first part is often termed phoneme analysis, while the second part is phoneme-to-speech translation.

Phonemes are the basic sounds that make up the language—the vocal alphabet, so to speak. But just as a readable page often requires several different typefaces and sizes of the alphabet, making natural-sounding speech requires phonemes that are voiced with the appropriate tone and emphasis. These more refined units are called allophones and are the actual elements used by most speech-synthesis applications.

Phoneme analysis is usually done in software at this stage of development; phoneme-to-speech translation can be done either entirely by hardware or by a combination of programs and chips. So far, there are no complete text-to-sound chips, but you can buy a small unit that includes its own processor, memory, and speech chips.

The main problem with phoneme analysis is the English language itself. Character sequences that are pronounced one way in one word are spoken completely differently in another. The pronunciation of words varies according to the sentence and sometimes even according to the larger context.

Phoneme programs, therefore, contain many general rules for translating text—and then lists of exceptions. More advanced programs use more complex and detailed rules and have more complete lists of exceptions, but few programs—and certainly none on microcomputers—can do the necessary larger textual and content analysis to add the inflections that a human speaker would produce.

Once the computer has converted the desired text to phonemes, a specialized speech chip almost always makes the actual speech signals for the speaker. The Votrax chip is by far the most popular for this purpose. The output is clearly computer-generated, sometimes quite bizarre-sounding, but usually understandable.

You Needn't Draw a Blank

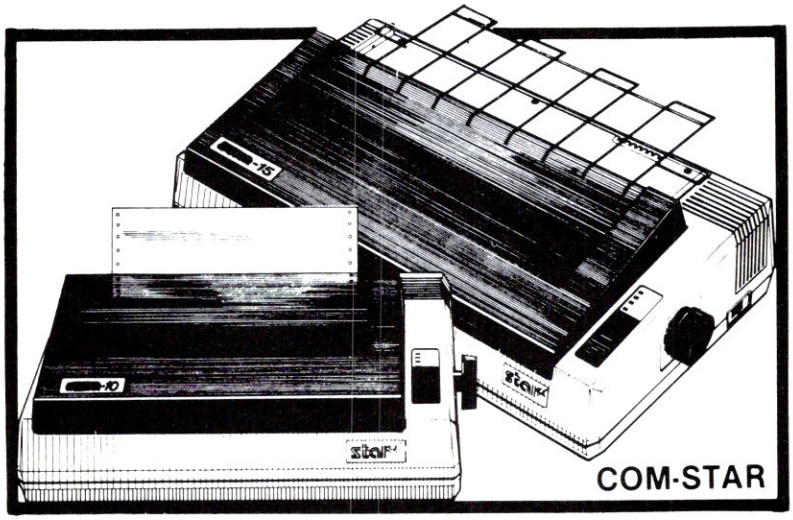
Sometimes even spoken words are no substitute for a good picture. A stock-model Apple is good at graphics, but only for display, so another way to extend your Apple is to allow it to read as well as output pictures.

An increasing number of cameras and imaging devices are on the market for small computers, but when all you have is an idea or a sketch, one of the best ways to get pictorial information into your Apple is with a graphics tablet.

So far, there are no complete text-to-sound chips, but you can buy a small unit that includes its own processor, memory, and speech chips.

Graphics tablets now include a wide range of devices that send position information to a computer—you can read about four models that plug into an Apple II in "Tablets for IIs," starting on page 54.

The basic job the tablets do is report to your machine the location you are indicating on their surface. The surface is the tablet or pad, and you point with your finger, a pen-shaped stylus, or a puck-shaped cursor. By mathematical tradition, the horizontal distance is called the "X displacement" and the vertical distance the "Y displacement."



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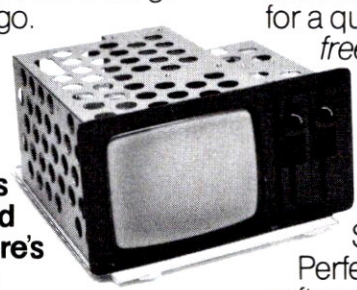
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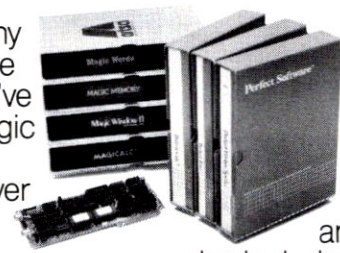


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Even though you can move your hand smoothly in a line or arc over the tablet, the device actually reports your position to the computer as a string of digital values. More expensive tablets provide more precise values and more reliably repeat the same reading for the same physical input.

More expensive tablets provide more precise values and more reliably repeat the same reading for the same physical input.

The main difference between a graphics tablet and a mouse (a cursor controller that you use as a pointer by rolling it over your desk or a special mirrored surface) is their reference points. A graphics tablet reports your current position relative to a fixed starting point—usually the top or bottom left corner of the tablet surface. A mouse, on the other hand, reports how much it has moved. As a result, a mouse device has no idea where you start each movement or whether you've picked the mouse up from the table in the middle of the move. A graphics tablet always knows exactly where you are, regardless of how you got there. Commercial graphics tablets use a wide range of technologies to produce location information. These include magnetic pulse, acoustical, resistive, and optical encoding.

Magnetic methods make use of the fact that a magnetic pulse creates an electronic signal in any wire that it crosses. In one variation, the stylus is a small magnetic pulse generator, and the pad covers a grid of finely spaced wires. By sending a pulse from the stylus and then checking which wires received it, the pad can tell what position you're pointing to.

In another variation, the pad generates the pulses, and the stylus is the receiver. Again, the pad covers a fine grid of wires, but this time each of the wires receives a pulse in turn, generating a magnetic field. By seeing when the stylus picks up a signal, the pad can correlate this information with the position of the wire triggering the signal.

Using acoustical methods, a stylus or cursor generates tiny, high-frequency acoustical pulses by sending an electrical spark over a short gap. Microphones arranged along one or two sides of the tablet receive the miniature thunderclap, and the pad computes the displacement from the time it takes the signal to arrive at the different microphones.

Acoustical pads do not pose a danger to floppy disks and are relatively insensitive to static electricity, but they do require careful operation, since you must not block them with an arm or small object.

Resistive pads are the only kind of graphics tablet onto which actual pressure must be applied—an advantage in some applications, since you can get a record of your input by drawing through

A graphics tablet reports your current position relative to a fixed starting point—usually the top or bottom left corner of the tablet surface.



CIRCLE 222 ON READER SERVICE CARD

a sheet of paper. Several of the graphics products for the Apple use this technology because it is the basis of some inexpensive products that you can plug directly into the Apple game port. The Apple itself can do the work of translating the raw input from the tablet into an actual X and Y displacement.

In addition to being used for inputting drawings, all types of graphics pads can also serve as specialized keyboards. Since all these methods work even if a sheet of paper covers the surface, you can use a printed or hand-drawn overlay to make the graphics tablet a response unit for a particular program or application. With the right software, you can create programs that even people who lack computer experience or knowledge of a standard keyboard can use.

Taking Control

Industrial control, of course, takes computers back to their mechanical origins. The original punch-card machine was a control unit for a weaving loom. The computer's ability to repeat the same process endlessly without error fits well with large-scale industrial production.

Large-scale industry doesn't always require large computers. Many tasks that need a computer to monitor and control a process don't need ultrafast mainframes or even dedicated minicomputers. As "Apples Go Industrial" on page 48 shows you, an Apple II has plenty of power for many industrial-control projects.

In smaller projects, Apples really shine. Since Apples are accessible, many people who would not dream of attempting to use a computer for a project find one of these machines comprehensible. Because of these computers' mass distribution, the software and hardware is inexpensive enough for less capital-intensive applications.

The Apple must have ways to read instruments and actuate valves or switches.

Processing power is not enough, of course. In order to be of use in the factory or the lab, the Apple must have ways to read instruments and actuate valves or switches. In the Apple II family, the only external input usually directly available is the game port. Since this port responds to a resistance or current source of the correct magnitude, one way to connect external signals to Apples is to pretend they are game controllers—but for most applications, you'll want a better solution. Input boards for the Apple are either analog boards (also known as analog-to-digital converters or ADC boards) and digital boards. You can make both kinds of boards connect directly to the signal source or, instead, connect through an optocoupler for electrical isolation.

Analog inputs are electronic signals that can take on a continuous value within a range. Digital values, by contrast, can take on only a series of values from a predefined set. By making the steps between values small, you can make a digital value precise enough for almost any application.

Analog boards are necessary because most measurements of physical properties produce an analog signal, and the Apple calculates and stores information in digital form. For example, a thickness gauge in a paper mill might produce an analog signal proportional to the distance between paper surfaces. To record and analyze it on a computer, the signal would have to be changed to a digital value. In this case, the thickness signal

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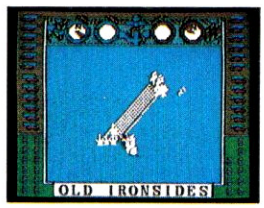
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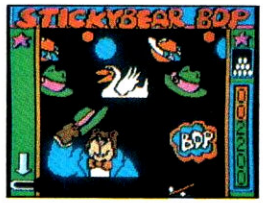
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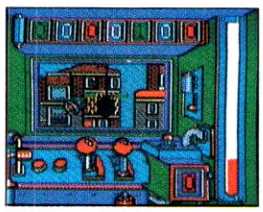


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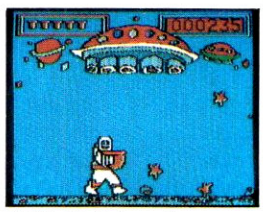


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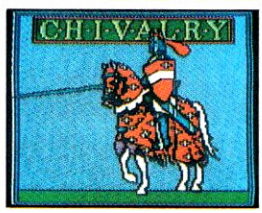
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CIRCLE 116 ON READER SERVICE CARD

might be digitized to a 12-bit value representing 0–16,384 microinches.

One difference among analog input boards is how finely they can divide the input. Most boards use 8-bit converters, allowing them to recognize 256 different input levels. Some boards have 12-bit ADC chips, however, and can thus distinguish 16,384 levels.

A board can provide independent converters for each of several channels, or it can multiplex (share) the converter among several inputs. Sharing the converter cuts costs, but independent converters can process more measurements per second.

Analog-input boards also differ in how many facilities they provide for signal conditioning, if any. Because of the ways ADC converter chips are made, their input signals must cover a standard range of values. Signals that are too small, too large, or centered on a different value must be converted to the right form.

Some signals are so different from the small voltages the Apple uses that they should not really be connected directly to its circuitry.

Some signals are so different from the small voltages the Apple uses that they should not really be connected directly to its circuitry. In an industrial plant, for example, a line carrying an input from a remote thermometer might also pick up noise spikes of several hundred volts when nearby motors start and stop. The lead-in wires from a simple home weather station may pick up static charges of thousands of volts.

For this reason, many companies making boards to connect Apples to various devices offer at least one model with isolated inputs. Although older designs often used transformers, the more common method is now the use of optical connections. The optical connections are referred to both as "optoisolaters" and "optocouplers"—the light does the coupling, and the electrical circuits are isolated.

With an optically isolated circuit, your input is routed through any signal-conditioning circuits and then to a light-emitting diode (LED). The LED is molded into a package with a photodiode or phototransistor, so the current on the output leads is proportional to the light received from the LED, and this light, in turn, is proportional to the original voltage or current applied.

Using optocouplers, your Apple is protected even if the input circuits are noisy or use a different ground (reference) voltage than your internal circuits. In areas such as biological and medical testing, the isolaters also protect the sensors from voltages inside the Apple.

Making Changes

Many industrial applications simply use an Apple for monitoring or recording the results of a process, but if you can clearly specify what the computer needs to do, given certain input conditions, you can also have your Apple carry out your orders.

Like inputs, outputs from a control board can be digital or analog. Digital signals can be simple on/off and relay closures for machine operation, or they can be full coded digital words for communicating with other digital systems.

Digital-to-analog converters (D/A or DAC) create analog outputs. The Apple sends out a digital value corresponding to the needed analog output, and the DAC circuits convert it into the required analog signal.

As in conversion from analog to digital, the number of bits in the converter affects the precision of the result. An 8-bit converter can produce 256 different values, which theoretically should be accurate to better than half of 1%. Since normal variations in electronic circuits are usually much larger, however, factors other than the number of bits normally limit these circuits in accuracy.

You can also use optical isolation on both analog- and digital-output circuits. Even lines that are intended purely as outputs can pick up noise spikes and can accidentally be shorted to high voltages. So, to protect the computer, many industrial applications also isolate output lines.

For any particular application, you may need only a few of these techniques, but there is no reason why you can't combine them. Take an Apple, add a speech board and a power-control output board, and you have an intelligent appliance controller. Use a graphics pad with digital outputs, and you have the starting point for a computerized manufacturing system. And, finally, after you've really polished your programming skills, you can even get your Apple to sing to you as it works. ✚

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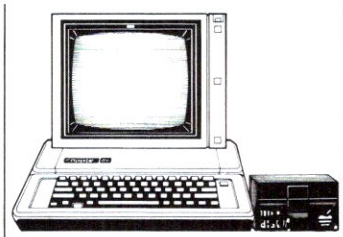
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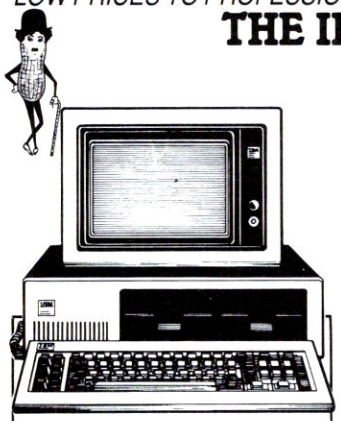
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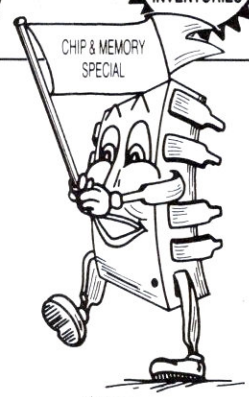
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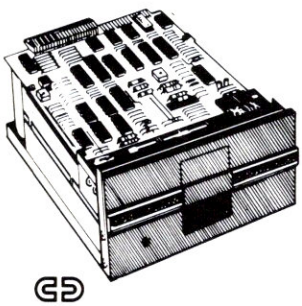
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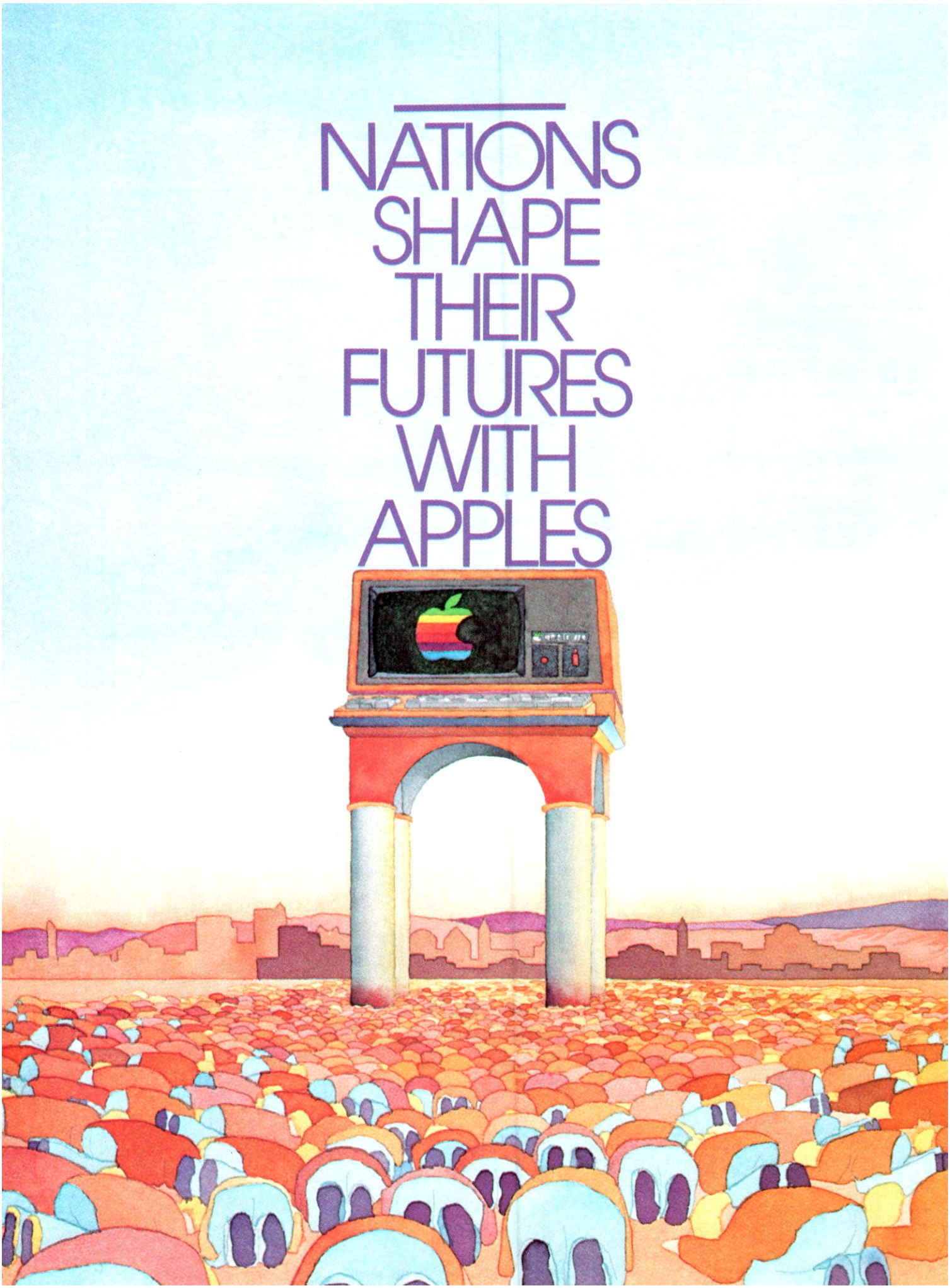
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FUTURES
WITH
APPLES

Apples help Third World nations make population-control decisions.

Most Americans think foreign aid consists of sacks of sorghum, building materials for schools, or medical supplies for a hospital. Few would add microcomputer technology to the list of materials essential for a developing country. That attitude is changing, though. An innovative Agency for International Development project, called RAPID II, is bringing Apple computers to emerging nations, where they are being used as important development tools.

RAPID (Resources for the Awareness of Population Impact on Development) uses Apples to show presidents, kings, and ministers of developing nations how population growth will affect their countries' abilities to achieve major social and economic goals. Using an Apple II Plus or IIe with specially written software, project analysts prepare a 20-year growth profile for each client country and present their findings to high-ranking government officials using a colorful, interactive graphics program.

When the analysts board the plane for home, they often leave an Apple system behind, so that people in the developing nation can continue the population-planning work. Since the project began in 1978, a total of 43 RAPID analyses have been made, 35 of which have included the high-level presentations, and Apples have been installed in 22 countries.

"There is no other AID program like this," says Adrienne Allison, a social-science analyst with the Agency's Office of Population, who was project monitor for the first five years of the RAPID program. "It is one of our more successful projects. A country's demographic situation is a good indicator of how its economic development is going to go."

The ten analysts who produce the RAPID studies are part of The Futures Group, an international consulting firm with offices in Washington, D.C., and Glastonbury, Connecticut, that has worked under contract with the Agency's Office of Population since the project began. The first five-year RAPID project, which used Apple II Plus computers, ended in June. The second five-year project, RAPID II, now underway, will use Apple IIe's.

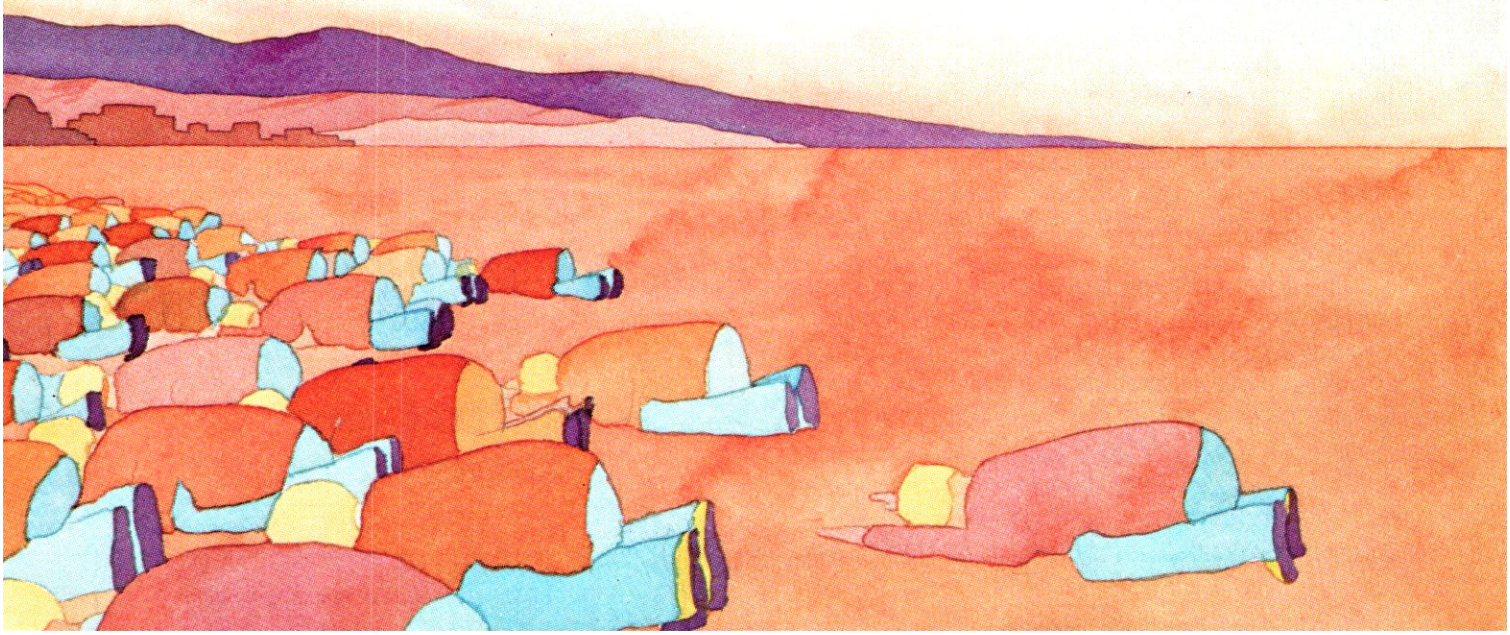
When the analysts board the plane for home, they often leave an Apple system behind.

"We chose the Apple computer after a comparison with all the other microcomputers on the market," says Phil Claxton, who heads the RAPID project for The Futures Group. "The principal reasons for choosing the Apple were its memory capacity, color graphics, reliability, and portability. Five years ago there were other small computers, but we thought Apple was the best."

RAPID presentations have been seen by leaders throughout the developing world. The late Egyptian president Anwar Sadat was the first head of state to see a RAPID presentation in January 1981. His successor, Hosni Mubarak, saw one soon after he came into office. Pakistani President Zia, after seeing the population presentation, called for a "jihad," or holy war, against excessive population growth. In the small African country of Cameroon, the prime minister proposed a toast to "the mastery of Cameroon's demographic problems" after seeing a RAPID presentation.

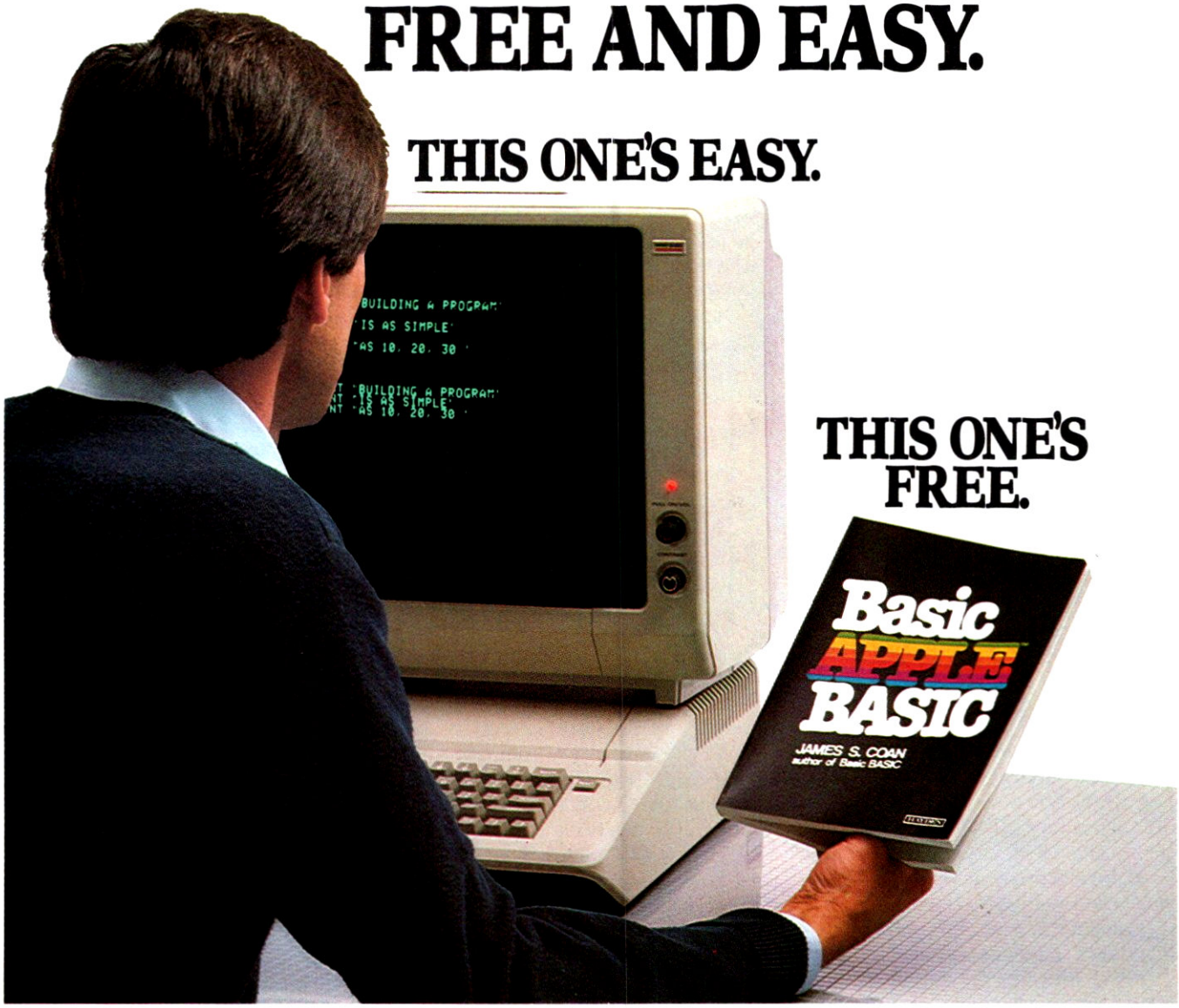
A Third World nation might want to be able to feed, house, and educate all its people by the year 2000, but if its population grows faster than its resources, these goals will probably be impossible to achieve. By supplying specific data on the relationship between population and development, RAPID studies can help these nations' leaders make population policy an integral part of their development plans.

In many developing nations, the birth rate can run as high as 3%. Although that figure might make an economist monitoring inflation gleeful, it's viewed with concern by demographers. Growing at 3% per year, the population of a country will double in 23 years. That means all the resources in the country will have to be doubled too, just to stay even. Some developing countries grow even faster. Iran's population skyrocketed from 17 to 35 million in 16 years. This kind of population pressure, Futures Group analysts say, forces emerging nations to abandon



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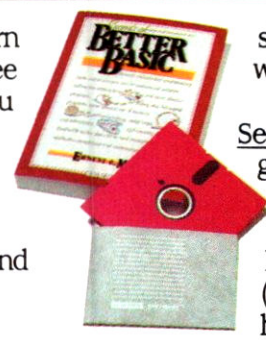
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development in their struggle to survive.

"The dynamics built into population growth are such that a majority of countries are going to be overburdened with population—if they're not already now, then in 20 years—and they're going to have serious problems," says Dr. Robert Smith, vice-president of The Futures Group.

'Dynamics built into population growth are such that a majority of countries are going to be overburdened with population.'

Futures Group analysts use Apples during every phase of their work, whether they're overseas introducing a country to the RAPID concept or giving a presentation to a nation's king. Often, after seeing the presentation, a country's government requests a study.

Once a government request is received, a Futures Group analyst begins work on the RAPID study, which takes about six months to complete. He flies to the client country with his Apple computer and spends about a week collecting demographic, economic, and social data necessary for the study. He then returns to the States and spends a minimum of two months preparing a working draft of the RAPID analysis.

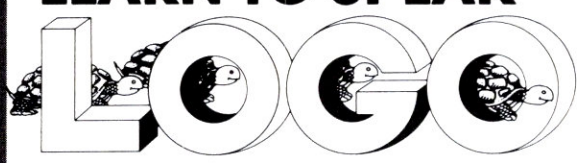
The analyst makes extensive use of the Apple while preparing the RAPID report. Using special analytical software, he studies the effect population growth will have on a variety of social and economic factors. The software, written in BASIC, features separate modules for each area of analysis. The Apple chaining program then joins the modules.

"This construction lets us use the full capacity of the computer for each module," says John Stover, one of the project's senior members. "Take urbanization, for instance. We use up all the memory available to us to do the urbanization calculations and displays. Then once we're finished with urbanization, we can go back to the main menu, which contains the selection of sectors, and choose another sector such as education. The program chains to the education program, loads it in, and we're off again."

Once his analyses are complete, the analyst takes his computer and travels back to the country to meet with officials to discuss the technical accuracy and final presentation of the RAPID report. He then goes home with updated information and prepares the final draft of the report, which is prepared for graphic presentation on the Apple and reproduced in booklet form. When everything is ready, the analyst and Apple computer return to the client country with a senior member of The Futures Group who will

He flies to the client country with his Apple computer and spends about a week collecting demographic, economic, and social data necessary.

LEARN TO SPEAK



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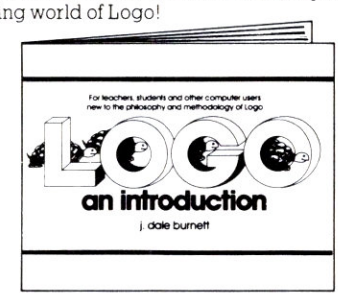
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make RAPID presentations to a variety of government officials, influential citizens, and, if possible, the country's head of state.

A RAPID presentation reviews a country's basic demographic facts and then illustrates graphically how these will affect the country socially and economically. Basic demographic factors reviewed include: the country's fertility level, birth and death rates and the resulting natural increase in population, age distribution, the population's child-dependency ratio, and internal and external migration levels. Once these factors are reviewed, projections of future population and age distribution are made under three assumptions—continued high population growth, intermediate, and low population growth.

A RAPID presentation reviews a country's basic demographic facts and then illustrates graphically how these will affect the country.

The RAPID presentation then projects the effect of each of these demographic scenarios on a series of economic and social areas. It details the effect population growth will have on the country's gross national product, labor force and job requirements for youth, food and agricultural production for domestic consumption and export, food import needs, natural resources, urban growth, housing, primary and secondary education, health care, internal budget, savings and investment for development, balance of payment, and international debt.

RAPID's presentation software displays these projections in simple, appealing graphics that capture and hold an audience's attention. The program, which is completely interactive, is like a sociological spreadsheet that allows users to experiment with different data and do "what-if" analyses on the spot.

"While doing a RAPID presentation in Egypt, the country's minister of education asked us to change our projection of 62% enrollment of primary-school children to 75%. The computer's interactive abilities let us do that," said Claxton, adding that the audience was impressed by the computer's ability to receive new data and refigure its projections immediately. "This form of presentation can get and hold the attention of senior people. They respond to it."

Using Apples in the RAPID project is rewarding, say Futures Group staff members, but bringing microcomputers into developing countries can create some unexpected problems. They've had Apples seized by dubious airport customs officials, had to scramble to find replacement parts for micros that break down, and have grappled with enough power problems to carry system savers or backup computers whenever possible. "Get a thunderstorm in Bangkok and see what happens to an Apple computer," says Smith.

The audience was impressed by the computer's ability to receive new data and refigure its projections immediately.

"We've had the vice-president of an

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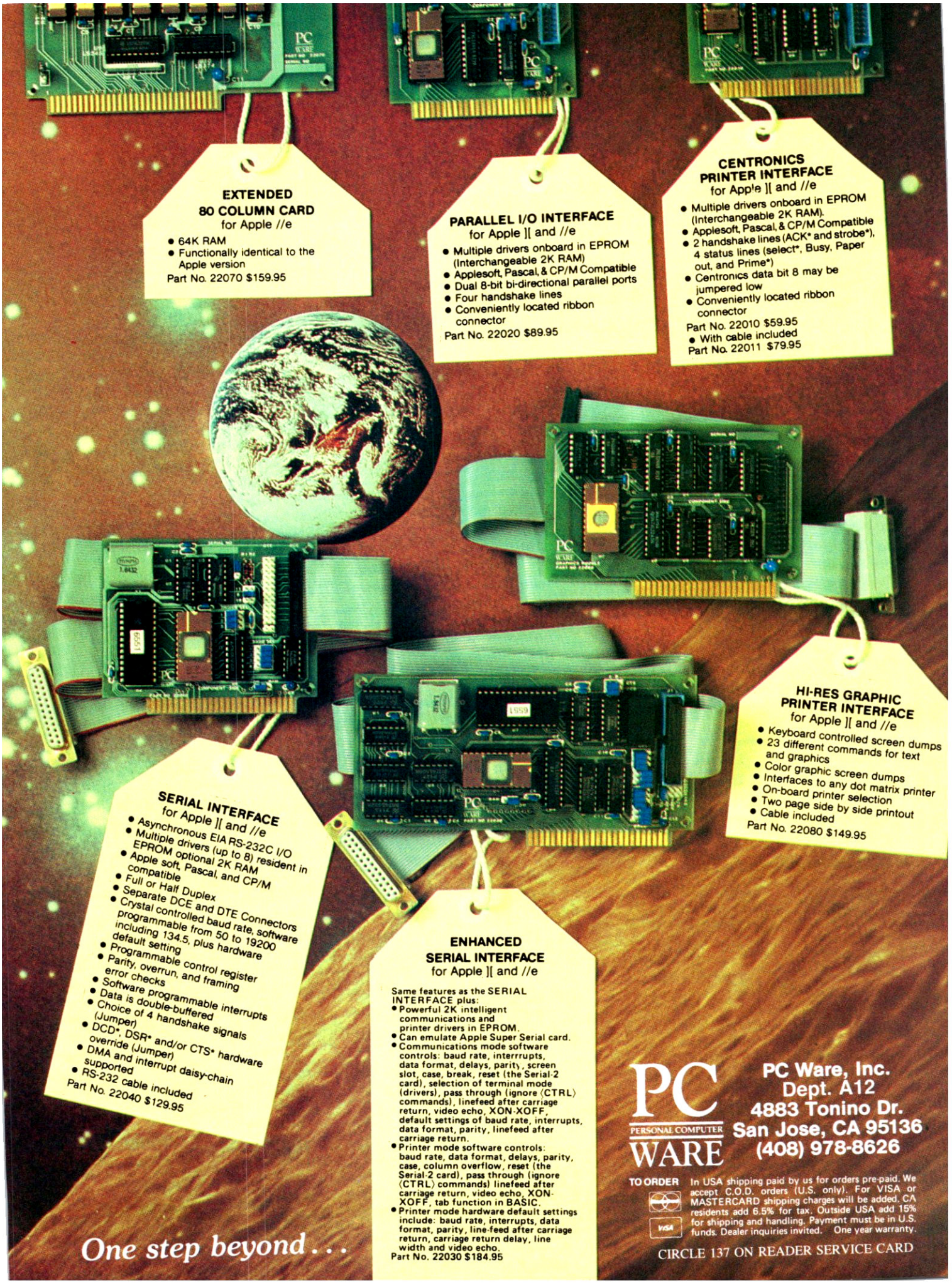
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CIRCLE 238 ON READER SERVICE CARD

unnamed country have to get our computer out of bond so we could make a presentation to the president," he adds. "When we went to Yemen and set up the computer for a presentation, we blew the motherboard. We didn't have a spare computer with us but were able to get another Apple within two hours by going to the international school there."

There are no manufacturers' hot lines, no large user-support groups, no dealers across town to go to for help with a flaky chip or disk drive.

Before The Futures Group decides to give an Apple system to a developing country, it has to be sure someone will use it once its analysts are gone. The group tries to find people in the Ministry of Planning or Office of Population Development to continue the work they've begun or to find people who can be trained to give RAPID presentations to unions, chambers of commerce, clubs, and local organizations. The kind of system the group donates depends on the needs of the country, but it typically includes the Apple, one or two disk drives, a printer, color monitor, and, occasionally, a system saver, surge protector, and fan.

Futures Group members teach as many people as possible how to use the Apple, its RAPID software, and several other commercially available software packages before they leave the country. Often they are able to teach a bit of programming before they go. Along with training, the group supplies new users with a simple repair kit for use if the computer breaks down.

When The Futures Group analysts head home, the Apple they leave behind might be the only microcomputer ever seen in that developing nation. That situation gives a new meaning to the term "new user." If American novice computer users think their lives are hard, they should talk to a new user in Mali. There are no manufacturers' hot lines, no large user-support groups, no dealers across town to go to for help with a flaky chip or disk drive.

Sometimes, foreign users send their Apples back to The Futures Group for servicing or ask if a technician can make a house call to revive a sick computer system.

The Futures Group donated an Apple to the National Institute for Statistics and Demographics in Upper Volta, a country in northwest Africa. About a month after the Institute received the computer, Adrienne Allison received an urgent cable from Upper Volta's AID Mission explaining that the computer wouldn't load and asking if someone from The Futures Group could drop by and lend a hand. They were in luck. Maurice Middleburg, a group technician who was on his way to Mali, flew in and fixed the computer.

"We received a long cable from the Institute that said 'Thanks to The Futures Group for having the technician come by. Maurice Middleburg sat down in front of the computer and was heard to mutter an incantation in computerese, and abracadabra. The computer was fixed!' " says Adrienne Allison.

Many new RAPID studies will be done in the next five years with the help of the Apple IIe computer. RAPID presentations have been received enthusiastically throughout the world, the analysts say, but it is still too early to assess the project's full impact on population planning in the developing world.

Some leaders, such as Pakistani President Zia, call for direct action on population matters after seeing a RAPID presentation, while others take longer to create new policy, if they do at all. Persuasive analyses can be displayed vibrantly on the Apple, but it is ultimately up to a developing country's government to decide whether to act on the report's findings and form new population policy.

It is still too early to assess the project's full impact on population planning.

"The whole process of policy making in the population area is an incredibly long and involved one, and nobody is going to make a change overnight just because we went in and made a presentation," says John Stover. "But to the extent that we can contribute to the process and, by leaving computers in these countries, encourage people to think about population planning, we are having an effect on population policy." ✚

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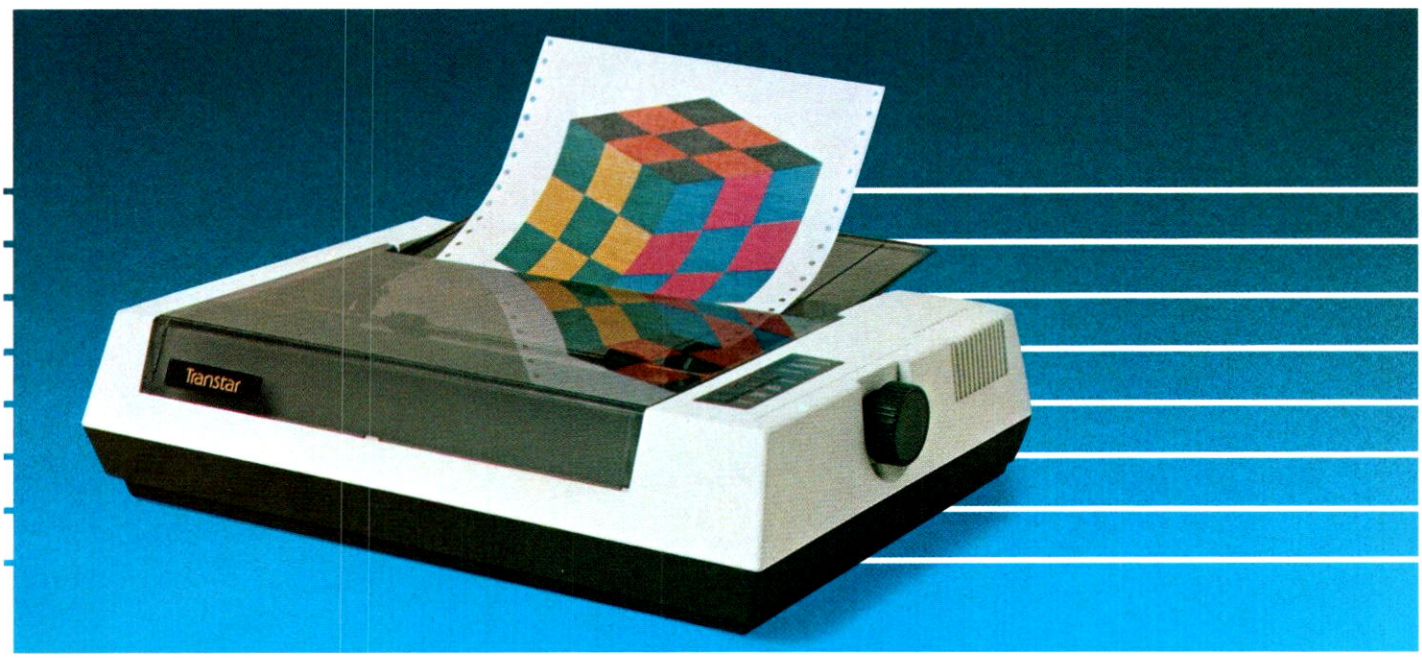
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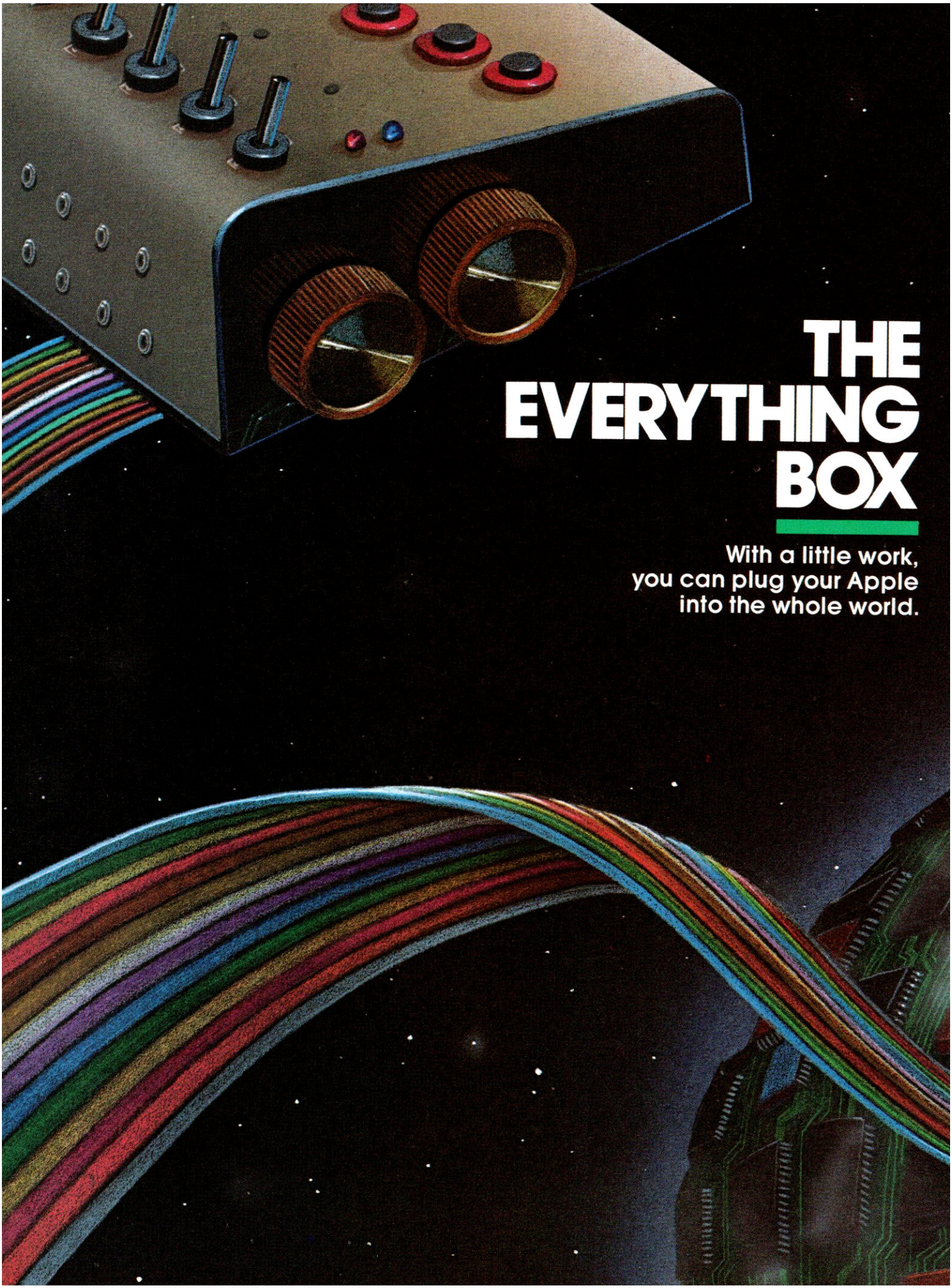


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EXTENDING YOUR APPLE/BY KEN GLICKFELD

Have you ever tried to plug a potato into an Apple? You can do it, if you want to—it might be idiotic, but it isn't difficult with the computer's game port.

In 1975, I began to make interactive sculpture—pieces that you could turn on by operating switches and buttons. About this time, the first microcomputers came on the market, and, thinking they would be useful to me, I began researching those available. I discovered the Apple.

Steve Wozniak, the engineer who created it, designed an easy-to-use set of instructions that he made part of the computer by putting them onto read-only memory chips. These chips control things such as how to add numbers, or how a pressed key shows up as a letter on the screen. This firmware is the soul of the Apple.

In addition to the keyboard, video output, and speaker, Wozniak provided many ways to plug things in. There are eight peripheral slots; a cassette port; and the game port, a 16-pin connector that contains a whole bunch of useful things. When I found out there was all this I/O (input/output), I was hooked.

The Game Controller

As you can see from figure 1, the game I/O connector has holes for a 16-pin connector. Each of these pins connects to a different function. There are three connections for push buttons and four for game controllers—those are the knobs that you can turn on the paddles. There are four annunciators, which are used for outputs; a strobe signal, which turns on briefly when you call on it; a power source (+5 volts); a ground line; and two pins that aren't connected to anything.

The inputs on the game port are designed to handle the voltage that is already available on its pin 1.

The Apple provides built-in programming to process data from these inputs, making a standard format through which you can plug in a wide variety of devices.

The data arrives at the game port through the action of on/off switches (the buttons) and variable resistances (the paddles). A variable-resistor part resists the flow of electricity, in something like the way the water pressure drops as you add more sections to a hose. The resistance to the flow increases depending on the length and the diameter of the hose. The symbols for a resistor and a variable resistor are

Resistor 

Variable Resistor 

To complete the analogy, the water pressure is the



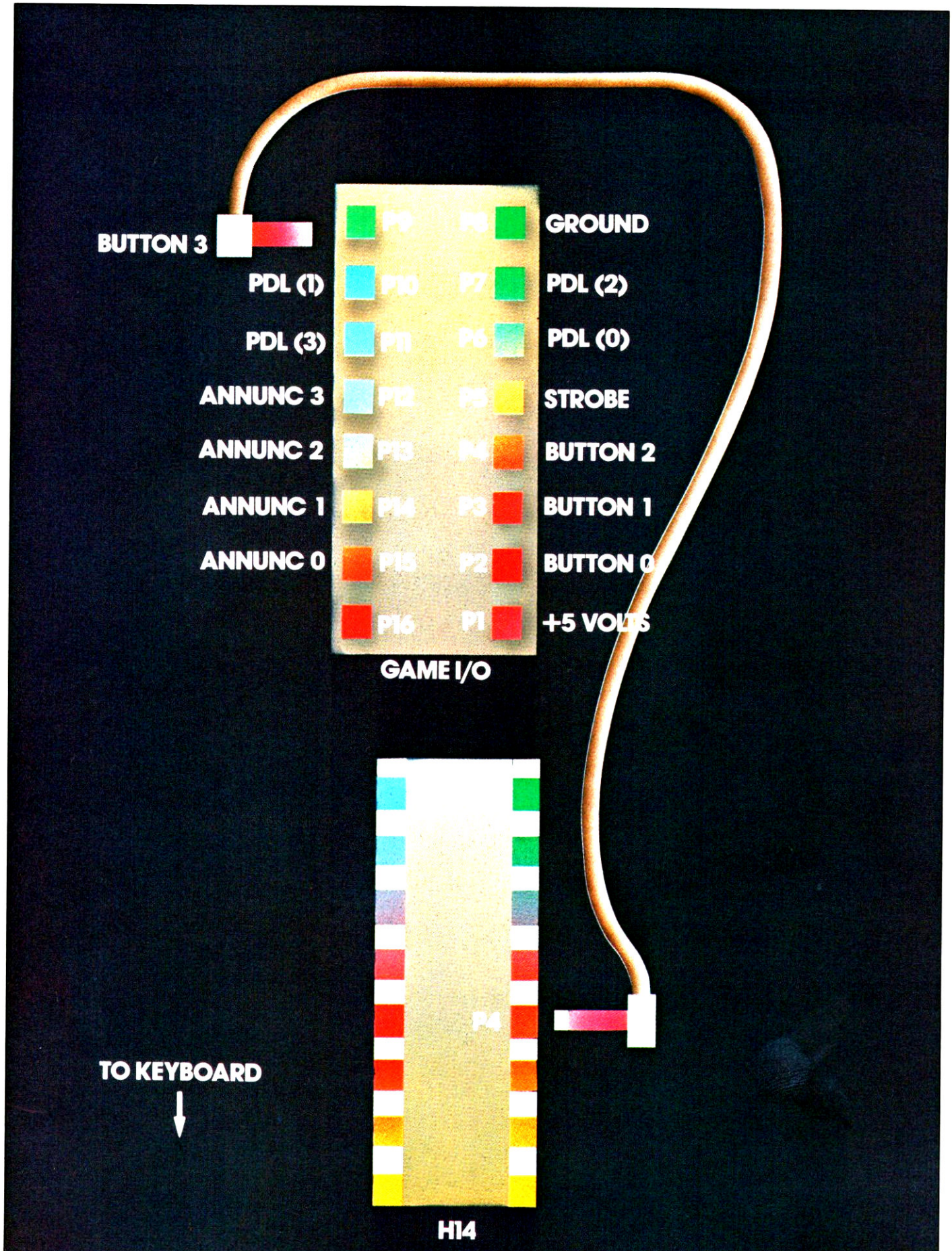


Figure 1: A sample hookup for a fourth button to Apple Computers' game I/O connector

voltage, and the rate at which the water passes through every second is the amperage.

The built-in hardware and program firmware transform the input voltage, which can range from zero to five volts, into a number from 0 to 255. Programmers can then use this number to control parts of their programs.

By the way, any kind of simple switch can replace a button, but the Apple needs a resistance of about 150,000 ohms (a unit of electrical resistance) for a full-scale reading of 255.

How to Read the Game Port

Here's how you can "read" the game port in your programs.

The inputs from the game port are connected (directly and indirectly) to a chip that, in turn, outputs a single bit (an *on* or *off*) to the central processor. They are connected to the "high bit," which is significant for us, as it determines the way we read the buttons.

The largest decimal number that you can write with a single binary byte (eight bits) is 255. In other words, all 0's in your byte equal the decimal number 0, and all 1's equal the decimal number 255. A byte that contains a 1 and seven 0's

The Apple uses several memory bytes to store numbers that it uses for its own operations.

equals 128 (1000 0000 binary = 128 decimal). That 1 in the eighth place is called the high bit. When it is turned on (a 1), the byte as a whole equals *at least* 128. When it is off (a 0), then the number can only be as large as 127 (255 - 128 = 127). Press the button, and the byte is 128 or more. Release it, and the number is less than 128.

This gives us a way, once we find out where this byte lives, to test whether or not a button is being pressed.

The Apple's memory is composed of bytes arranged one after the other, like so many identical houses on a street in a subdivision. The only way to tell them apart is that the addresses are different for each house.

You can PEEK through a window to see what's inside, or POKE a number through the door and store it inside.

Some bytes always have the same thing in them, and you can't change them—these are the read-only memory (ROM). You can change some of them through programs or commands—these are in random-access memory (RAM).

Button Addresses

```
Button 0 49249
    or -16287
Button 1 49250
    or -16286
Button 2 49251
    or -16285
Button 3 49248
    or -16288
```

Note: Button 3 requires a jumper wire.

The Apple uses several memory bytes to store numbers that it uses for its own operations. You can find these useful addresses in the Apple reference manual. The addresses for the buttons are 49249 to 49251 (or -16287 through -16285). This means that if you write a line such as

```
PRINT PEEK(49249)
```

you'll get a number less than 128 (button not pressed), or at least 128 (if pressed). To get this reading, you must hold the button down at the same time as you press Return.

To check whether a button is on or off in a program, you could write a line something like this:

```
10 IF PEEK(49249) >
    127 then GOTO 100
```

You can read three buttons this way without doing anything to your Apple, but it's possible to get a fourth button working as well (see figure 1).

Wait a minute. If the Apple is turning on only one bit, how can you get a resistance to read from 0 to 255? It's all in the timing.

To read a paddle, Applesoft provides a command that starts a firmware routine. This routine uses another bit of hardware in a clever way. When you issue a command to read a paddle, a capacitor, a device that stores electrical energy, begins to charge. At the same time, a counter starts timing how long it takes for the capacitor to fully charge. When the capacitor is charged, the timer stops counting. The variable resistance controls the rate at which the capacitor charges, and a firmware routine uses the count to arrive at a number of 0 to 255. When you trigger the timer, all the paddle timers start.

A side effect of this method causes a problem in a program that reads a second paddle immediately after the first reading. The second paddle timer could still be running when you trigger it a second time. If you get screwy readings, try inserting a small delay—a short loop will do:

```
10 FOR PAUSE = 1 TO
    20: NEXT PAUSE
```

This is just long enough to let the timers finish the first time through.

The Applesoft method of reading a paddle is X = PDL(0) or PDL(1,2 or 3).

Here's a program to test your buttons and paddles. It

The Apple's memory is composed of bytes arranged one after the other, like so many identical houses on a street. The only way to tell them apart is that the addresses are different.

provides for all buttons and paddles, even if you don't want to test all of them.

```
100 HOME
200 HTAB (6): VTAB
    (8): PRINT ''PDL
    (0) PDL(1)PDL(2)
    PDL(3)''
300 HTAB (6): VTAB
    (10)
400 PRINT PDL (0)
    '' ''PDL (1)''
    ''PDL (2)''''PDL
    (3)''
500 BTN(0) = PEEK
    ( - 16287) >127:
    BTN (1) = PEEK
    ( - 16286) > 127
600 BTN(2) = PEEK
    ( - 16285) >127:
    BTN (3) = PEEK
    ( - 16288) > 127
700 HTAB (6): VTAB
    (12): PRINT
    ''BTN(0) BTN(1)
    BTN(2) BTN(3)''
800 HTAB (6): VTAB
    (14): PRINT BTN
    (0);'' '';BTN(1);
    '' '';
900 PRINT BTN(2);''
    '';BTN(3)
1000 GOTO 300
```

Notes

Line 100 clears the text screen

Lines 200 and 700 print the headings

Line 300 makes sure that the readings write on the correct line

Line 400 fetches and prints the paddle readings

Lines 500 and 600 check the buttons and assign the result to variables

Lines 800 and 900 print the button variables

Line 1000 starts the whole thing over

There are lots of more expensive ways to connect things to the Apple using the peripheral slots, but the cheapest way is through the game port. All the built-in features make it simple to plug into.

The peripheral slots have a lot more options available on them, but they are not protected from damage in the same way as the game port. The peripheral slots have several different voltages on them, and many of the pins connect directly to the central processor unit (CPU). This is the 6502 processor chip—the brain of your machine.

The game port, on the other hand, is connected to an intermediary, which outputs data to the CPU. These intermediate chips are associated with resistors that prevent accidental short-circuit damage. The voltage on pin 1 (+5 volts) is the only voltage source that you should use.

Going Shopping

When you buy a set of game paddles, you are actually getting two switches in the form of buttons, and two variable resistances. Apple starts counting from 0, so your first two paddles are numbered paddle 0 and paddle 1.

If you buy an Apple joystick, you get a box that contains at least two buttons, and one stick that couples two paddles. Paddle 0 moves left to right, and paddle 1 moves up and down.

There are a variety of styles to choose from: two- and three-button types, large- and small-handled, jet-plane types with a button on top of the stick, even one shaped like a fruit. Which type you choose depends on your software. Look for one that allows you a full range of movement, some sort of

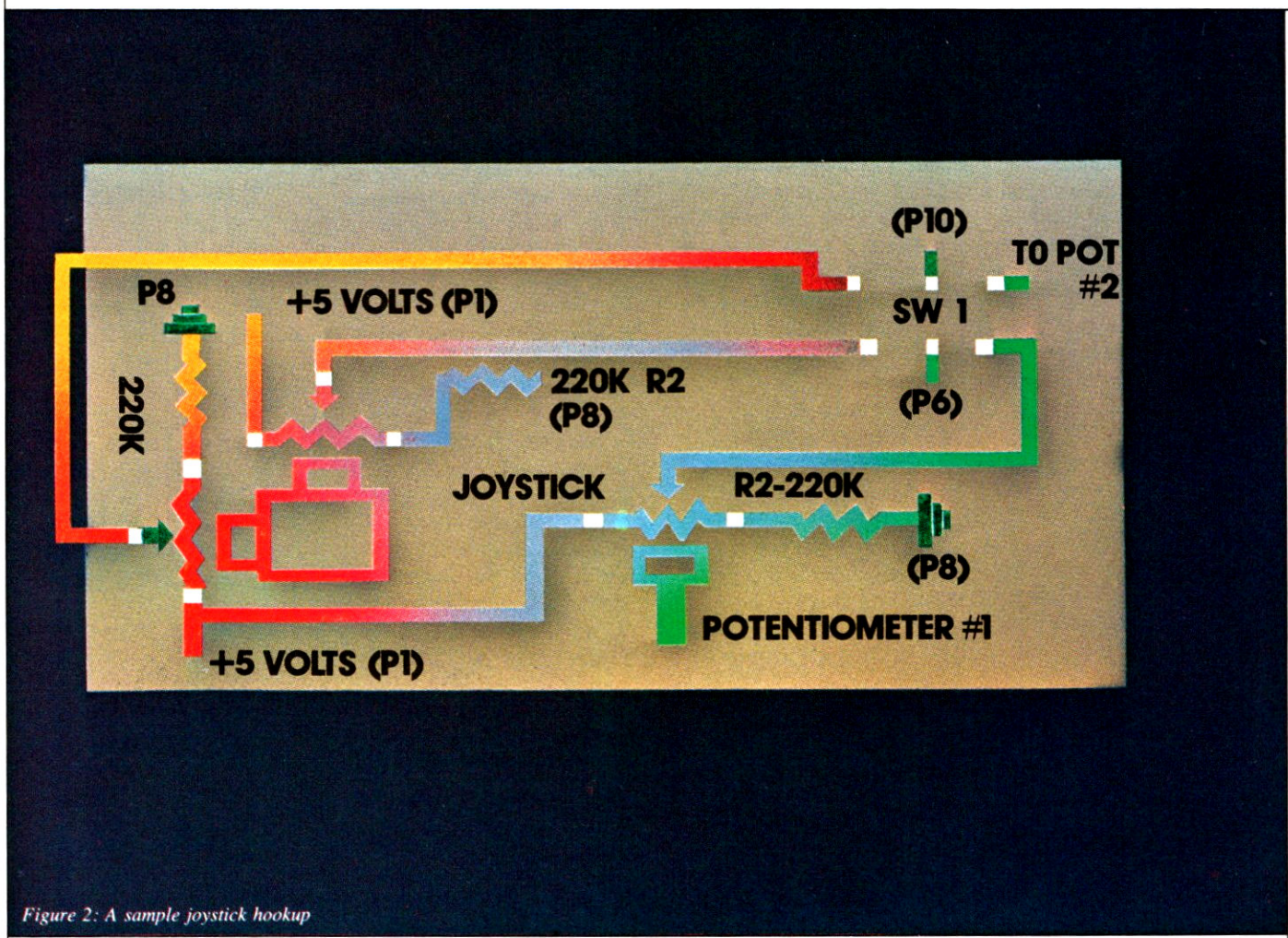


Figure 2: A sample joystick hookup

BUILDING HINTS

Here are some building hints.

Collect all your parts before you start. Make a complete drawing of how you want to connect the parts. Make a template drawing of where you will mount the parts on the box and tape it to the box. Find the center of each hole you want to drill, and, using a ten-penny nail or punch and a hammer, make a mark on the box deep enough to keep your drill bit from slipping when you start to drill.

Give some thought to how you will connect your wires. First, solder the parts that are hardest to reach. Then install the rest of the parts.

I have included a PC board and 16-pin DIP socket in the parts list because it simplifies wiring if you connect the wires to the PC board rather than directly to a cable going out of the box. Solder the DIP socket to the PC board. Mark all the pin numbers on both

trimming control, and a way to turn off self-centering. (The Centering feature is a boon to game players, but a pain in the neck if you are trying to draw with it.)

You can't plug joysticks directly into the Apple. Some, the Atari style for example, use internal switches instead of variable resistances to enter information. These might not function properly with your software, even with special adapters, so try them before you buy them.

Since the Apple doesn't care how you arrive at the resistance that you plug in, it's possible to use all sorts of devices—joysticks and paddles; digitizers such as Versa-Writer, the Koala-Pad, and the Power Pad; and all kinds of sensors that are sensitive to light, heat, noise, and movement. Remember that as long as you stay in range, the Apple translates your resistance into numbers. If instead of a paddle you connect an Idaho potato, you will not get a full-scale reading—my potato measured a constant 90,000 ohms.

Rolling Your Own

You can customize your controller to your own specifications. You may have big hands or small hands. You may be left-handed, or maybe you are writing a game that *absolutely* requires the use of your feet.

If you write your own software, or have a small workshop to fool around in, you might want to make your own personalized controller.

When I am working on a project, I find it inconvenient to have to build a whole new device before I can plug it in and test the software. To get around this problem, I need a controller as flexible as my computer, so I have devised a simple "Everything Box."

The Everything Box gives me the use of paddles, joysticks, buttons, and external device plugs that use two wires, so I don't have to plug in 16-pin connectors every time I think up a new gadget.

Sometimes I want a joystick. Sometimes I want paddles. Sometimes I want joystick and paddles (sometimes I want two joysticks, but there wasn't any room left in the box).

The buttons on my Everything Box don't run in a

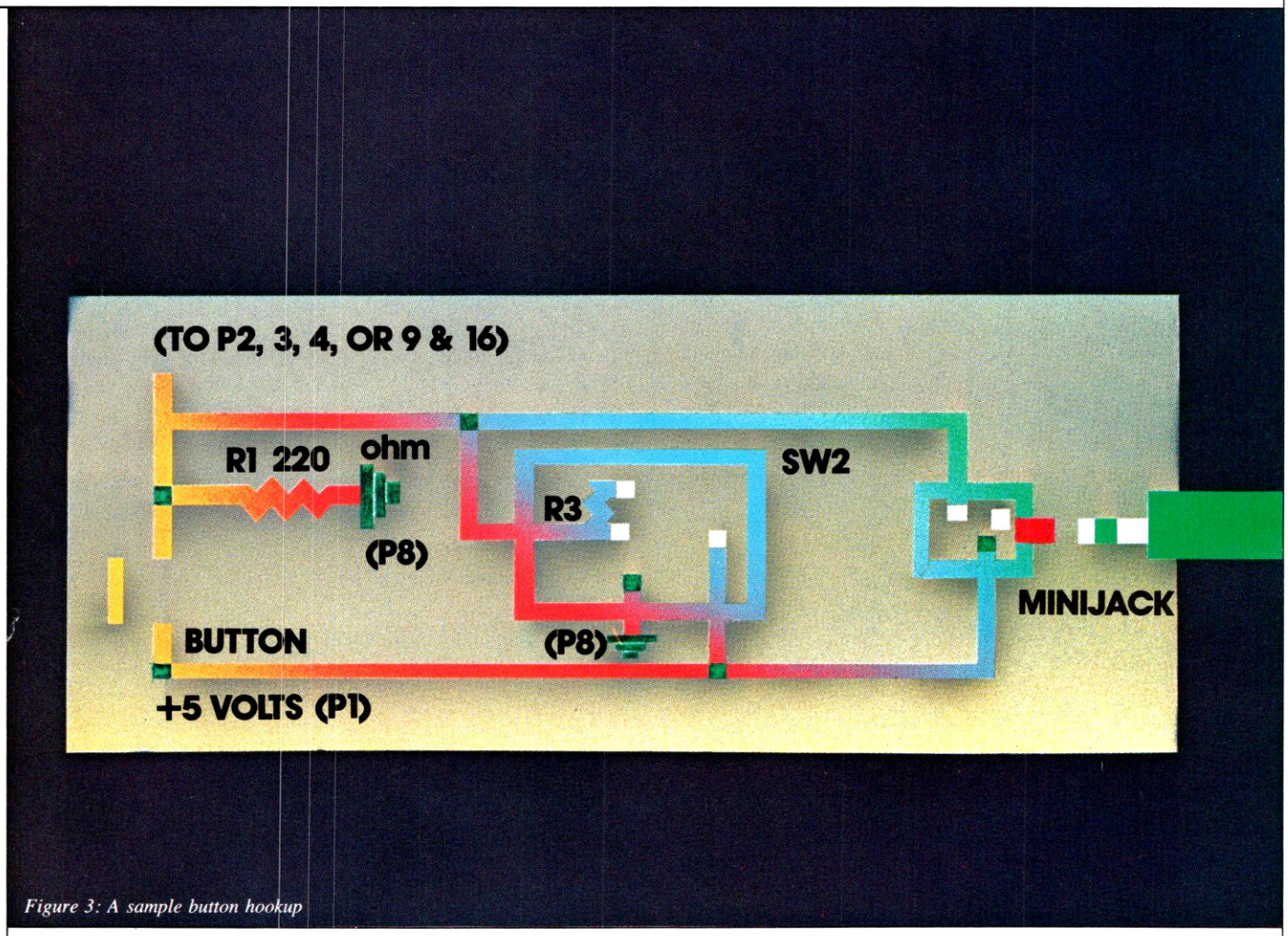


Figure 3: A sample button hookup

sides of the PC board. (I drill tiny holes through the PC board at each solder pad. This gives me a convenient place to put the bent end of the wire as I solder the connection).

After you've soldered all the wires to the PC board, screw it to the box. Then plug the jumper cable into the socket, as shown in figure 2. This schematic shows you how to connect the joystick and pots for a joystick *or* paddle switcher. Figure 3 shows you how to connect a button, switch, or external switch. Be sure to use jack connections that are not grounded to the box.

That's the reason for the three-terminal jack in the parts list. You can use a stereo-type five-pin jack that has a disconnect feature. This prevents you from mixing internal and external signals. Either way, use only a stereo plug. (The hookup for switch 2 does not follow the schematic that is enclosed when you buy the switch.)

straight line. That's because fingers don't rest comfortably in a straight line. I have provided toggle switches for those times when I want to keep the button pressed down—a major saving in finger flesh. And since I'm left-handed, so is the box!

The switches light up when the buttons are pressed, so I can be sure that they are working. There is a rectangular button that connects to an unused pin on the game port that is connected to the IRQ line from the peripheral slot. This permits me to interrupt a program in motion, do some other program, then return to the place where I left off in the first program.

You can use another one of the two unused pins to give yourself a fourth button. (See figure 1.)

If you connect a pair of micro-test clips (Radio Shack part #270-370), with a thin wire, you can make a jumper that won't permanently change your Apple. *Carefully* lift the chip H14 (that's the one that is immediately below your game port on the Apple II Plus), just enough to hook on one of your clips, and clip it to pin 4. Hook the other clip to one of the unused pins—9 or 16 on the game-port adapter that you plug into the game port. Pin 4 on H14 connects to the cassette port, but your jumper won't interfere with it unless you press the button while using a cassette recorder.

Before you start constructing your own master controller, think about how to make the controls convenient and comfortable. Place your hand on a sheet of paper and trace where your fingertips naturally fall. Make sure you give yourself enough room to operate your controls. The device should feel right to hold with your hands.

Spend a little money on a nice-looking box to hold everything. You will be happier with the result if it looks good. It will also impress your friends more if your gadgets don't look like something you found in a garage sale.

Before you start constructing your own master controller, think about how to make the controls convenient.

Even if you don't want to build a whole Everything Box, you might think about getting a zero-insertion-force socket. This handy device lets you plug in those little 16-pin connectors without giving yourself an accidental blood test. If you are the owner of an Apple IIe that has an exter-

MEASURING THE RESISTANCE OF POTATOES AND OTHER VEGETABLES

If you connect two pointed probes, such as the Radio Shack #274-721, to wires that you then solder to a DIP header #276-1980, using pins 1 and 6 (of course, you can use a miniplug if you have built an Everything Box), you can stick the probes into various defenseless objects such as potatoes. You can then calculate rough resistances by running this program. You are limited to fewer than 80,000 ohms.

```
100 HOME
200 VTAB 10: VTAB 10
300 IF PDL (0) = 255
    THEN PRINT
    ''METHINKS THIS
    OBJECT RESISTS
    TOO MUCH'': GOTO
    200
400 PRINT ''THE
    RESISTANCE IS
    ABOUT ''; PDL (0)
    * 320;'' OHMS''
500 GOTO 200
```

This might seem a fruitless exercise, but consider the possible applications. With a little trial and error testing to determine the value of your constant (I used 320), you could measure your garden pH, or make a primitive lie detector.

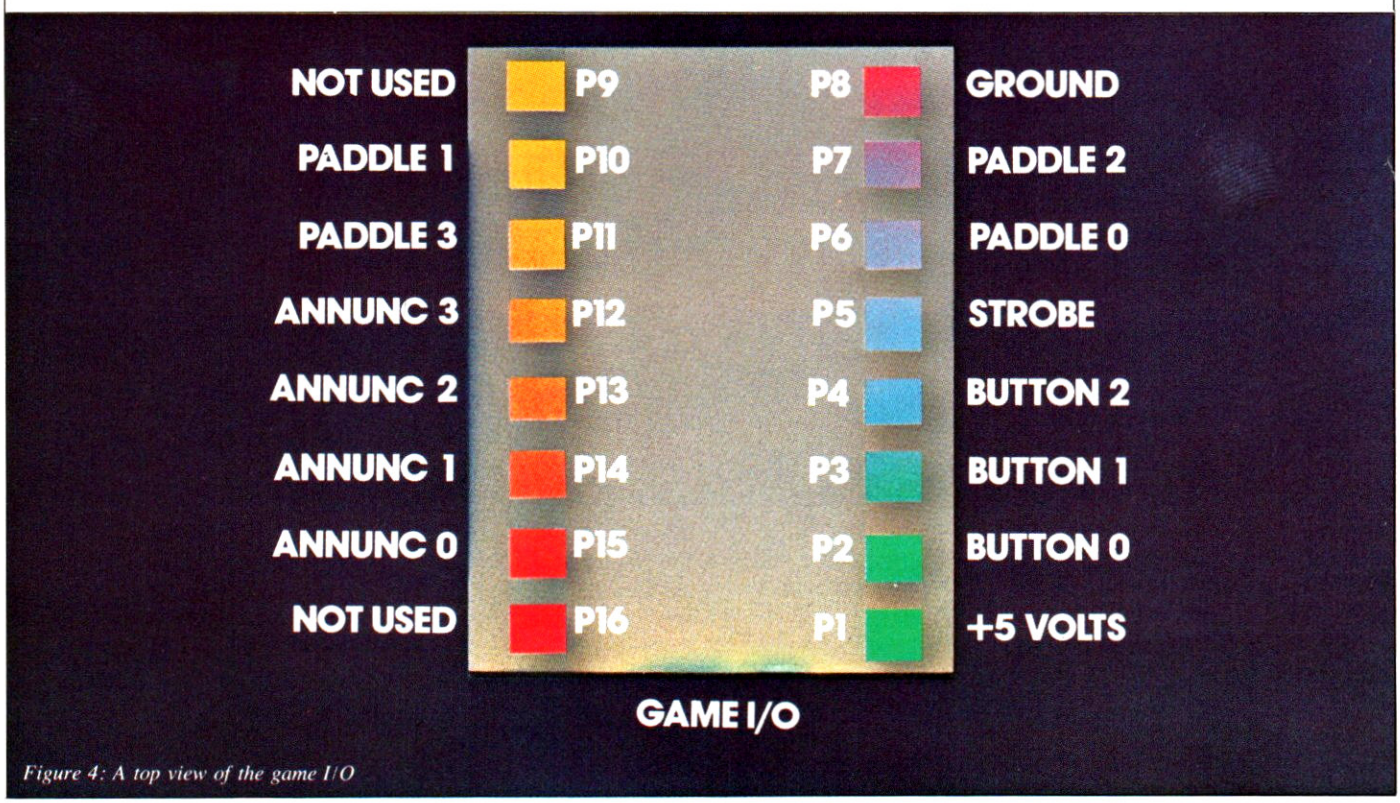


Figure 4: A top view of the game I/O

nal joystick plug, you still have a game port on your motherboard. You can bring this out of the case by plugging in a zero-insertion-force adapter.

Several companies make these adapters, and they will save you a lot of frustration.

But What's It For?

Lately I have been making controllers for interactive graphics programs so that I don't need to use the keyboard for input. I also don't want the image to disappear while I check a menu to change functions. This means I need a controller with a lot of options. Perhaps I can make three buttons act like eight. One way would be to make an image of the three buttons as though they were three bits of a binary number. Then I could make a look-up table to select functions from this image.

```
N TABLE
 1.000
 2.001
 3.010
 4.011
 5.100
 6.101
 7.110
 8.111
```

You will notice that the first entry in the table

It will also impress your friends more if your gadgets don't look like something you found in a garage sale.

(N = 1), arises when no button is selected.

Here's a routine that reads the buttons this way.

```
50 HOME
100 LET A$ = '' ''
    :REM CLEAR STRING
200 FOR N = 2 TO 0
    STEP -1:REM
    SAMPLE EACH
    BUTTON IN TURN
300 LET A$ = A$ +
    STR$ (PEEK
    (-16287+N)>127):
    REM MAKE STRING
    IMAGE
400 NEXT N
500 VTAB 10:HTAB 8:
    PRINT A$
600 GOTO 100
```

The lookup table contains an image of each of the combinations.

```
1000 FOR K=1 TO 8
1100 FOR E = 1 TO 3
1200 READ BIT
1300 LET TABLE$(K)=
     TABLE$(K) + STR$
     (BIT)
1400 NEXT E
1500 NEXT K
1600 DATA
0,0,0,0,0,1,0,1,0,0,
1,1,1, 0,0,1,0,1,1,1,
0,1,1,1
```

Now that we have a table, we need a routine to compare our button string to the table.

```
700  FOR N = 1 TO 8:
     REM CHECK EACH
     TABLE LISTING
720  IF A$ = TABLE$(N)
     THEN J = N: LET N
     = 8: REM WHEN YOU
     FIND A MATCH
     EXIT LOOP
740  NEXT N
800  ON J GOSUB 3000,
     3100, 3200,3300,
     3400, 3500, 3600,
     3700,3800: REM DO
     SELECTED
     SUBROUTINE
```

Or, you could use the paddle to select routines.

```
100  HOME
200  LET N = INT (PDL
     (0) /31): REM
     SELECT NUMBER
300  IF PEEK ( - 16287)
     > 127 THEN J = N
400  VTAB 10: HTAB 15:
     PRINT J
500  GOTO 200
```

Note: This routine prints the selected number when you press button 0. The game Brick-Out on the Apple system master disk uses something similar.

Once you start to think of things you want to connect to your computer, you will be thankful that you didn't buy one of those other computers. Because with a little work, you can plug your Apple into the whole world. ✚

SELECTED REFERENCES

MAGAZINE ARTICLES

"The Input/Output Primer, Parts 1-6," Steve Leibson, ***Byte,*** Feb.–July, 1982.

"Build a Simple Light Pen for the Apple II," David J. Lilja, ***Byte,*** June 1983.

"Joysticks, Paddles, and Game Port Extenders," (parts 1-3), David H. Ahl, ***Creative Computing,*** Aug.-Oct. 1982.

"Rebuilding Game Paddles and Joysticks," Tom Riley, ***Creative Computing,*** Feb. 1983.

"Build an Airplane Controller for Your Computer," Tom and Kilda Riley, ***Creative Computing,*** April 1983.

"Controller Update," Owen Linzmayer, ***Creative Computing,*** Sept. 1983.

"An Inexpensive Joystick for the Apple II," Phil Daley and Dan Weston, ***Micro,*** July 1983.

"A Fourth Switch Input," Joel Buckley, ***Call A.P.P.L.E.,*** Sept. 1982.

"Interrupts and Apples," Richard L. Emerson, ***Call A.P.P.L.E.,*** Feb. 1983.

BOOKS

The Apple II Circuit Description, Winston Gayler, Howard Sams & Co., Inc., 1983.

Real Time Programming—Neglected Topics, Caxton C. Foster, Addison-Wesley Publishing Company, 1981.

The Apple Connection, James W. Coffron, Sybex, Inc., 1982.

PARTS LIST

1. Joystick: Radio Shack #271-1705

2. Potentiometers: Radio Shack #271-92

3. Mini phone jacks: Radio Shack #274-249

4. Mini phone plugs: Radio Shack #274-284

5. Switch 1 (SW1): Radio Shack #275-666

6. Switch 2(SW2): Radio Shack #275-680

7. Resistor 1(R1): Radio Shack #271-1313

8. Resistor 2(R2): Radio Shack #271-1350

9. Resistor 3(R3) comes with switch 2

10. IC Board: Radio Shack #276-024

11. DIP socket: Radio Shack #276-1998

12. 16-pin DIP jumper: Radio Shack #276-1976

13. Box (like mine): LMB KB-7, "The Keyboarder," Sylvan Wellington

14. Buttons (like mine): Vanco PBM-1, Sylvan Wellington

15. Zero insertion-force socket extenders: #GS-4(2 sockets), Happ Electronics Note: This firm advertises different kinds of extenders.

Addresses

Happ Electronics, 4640 Island View, Oshkosh, WI 54901; (414) 231-5128

Sylvan Wellington, 269 Canal Street, New York, NY 10013; (212) 226-5811

LMB, 2946 East 11th Street, Los Angeles, CA 90023; (213) 261-0382

APPL INDUS

An array of interface cards lets Apple users hook up their machines to a variety of practical peripherals.

Since the Apple's inception in 1976, many companies have developed interface cards that accomplish tasks that required thousands of dollars' worth of specialized instruments a few years ago, but require only a few hundred today for completion. There is no limit to the application of these devices, and new ideas are cropping up every day.

One of the many applications that Apples are good at is "real-world interfaces." This field includes a range of uses from baseball to freeze-drying units. In some situations, experimenters have used the Apple to handle tasks that they had never previously explored.

The Philadelphia Phillies use an Apple with an interface card to improve the team athletes' performances. When Pete Rose injured a muscle, his trainers hooked an Apple to an exercise machine with an Interactive Structures AI13 A/D card. Then with proper plotting software, they made an analysis of Rose's muscle weaknesses and strengths. It is fairly common, for example, for an athlete to have one leg that is 10% stronger than the other. A computer analysis made with this equipment can detect this situation. An athlete such as Rose then has the information he needs to strengthen his weaker leg or any weak muscles.

A similar product from the same company, the AI02 A/D converter, was used in the NASA Spacelab project. NASA did an experiment on the Spacelab to study why plants follow a spiral growth pattern. This process is called circumnutation. Although it is quite common, no one has had a good explanation for it.

The system the Spacelab experimenters set up was designed to rotate a centrifuge to generate 1G of gravity, with three video cameras collecting pictures of plant growth at certain time intervals. They used infrared light when they took their photographs because they didn't want ordinary camera lighting to affect the plants' growth. The equipment switched on and off to conserve the limited amount of power. It was the AI02's job to monitor the temperature.

The scientists made many modifications to the AI02 board. For example, they removed all the devices from their sockets and connected them directly to the board; this was done to minimize problems that might have resulted from vibrations during lift-off and reentry. All of the exposed circuits were coated with a special coating film to protect them from dust and liquids.

Why would NASA use an Apple and an interface card costing a few hundred dollars on a multimillion-dollar space mission? The AI02/Apple system passed all the tests and has saved NASA tens of thousands of dollars in custom equipment. The system will be used in the next Spacelab launch.

If you want to use your Apple for control as well as monitoring, you can find other boards to do that. Interactive Structures, for example, has a board that allows you to monitor or control many different digital processes. The applications of this interface range from home or office security setups to heavy-duty industrial processing. In addition, the DI09 can also be used effectively in energy management.

The DI09/Apple system can control up to 32 items at once. You can expand that number of control items by adding more DI09 interfaces. Most applications do not require you to control more than 32 items, so there is little need for the purchase of additional hardware.

▸aSCOPE BY NORTHWEST INSTRUMENT SYSTEMS

Northwest Instrument Systems' Model 85A aSCOPE Digital Memory Oscilloscope is a sophisticated scope card that plugs into an Apple II or IIe.

The aSCOPE lets you look at electronic signals graphed out on the Apple's high-resolution screen. The unit also allows you to dump the high-resolution screen image to almost any type of dot-matrix printer.

The retail price for the aSCOPE is $995. The specifications for the unit are as follows:

DIGITIZER/MEMORY
Real time: 20 S/div to 1 mS/div (25 KHz maximum sample rate)
Resolution: 8 bits (1 part in 256)
Record length: 256 samples/channel

TIMEBASE
Range: 10 nS/div to 20 S/div
Mode: simultaneous sampling on both channels (except 1 mS/div, which is done in the Alternate mode)
Accuracy: within ±3%

E S · G O

TRIAL

You can use the DI09 in conjunction with any of the other Interactive Structures cards.

aSCOPE

Another interesting application that you can run on your Apple system requires Northwest Instrument Systems' Model 85A aSCOPE Digital Memory Oscilloscope. This unit lets you look at electronic signals graphed out on the Apple's high-resolution screen. The cost of the unit is $995, which is about the price of an inexpensive oscilloscope. You may wonder why someone would spend this much for a scope attachment for a computer. The reason is simple; it offers some features that most low-to midpriced scopes on the market simply do not have.

If a signal is noisy, on a regular scope, you may have difficulty determining what the signal is supposed to look like. The aSCOPE averages the signal and displays it on the screen in a more readable form.

In addition, you can store the signal in memory. With a regular scope, you usu-



Equivalent: >7nS
Sensitivity: rmV/div to 5V/div
Maximum input voltage
5 mV/div to 200 mV/div:±5V
500 mV/div to 5V/div:±100V

WAVEFORM PROCESSING
Averaging: 2 to 255 times
Hardcopy:hard-copyoutput is supported through Apple dot-matrix, Epson, NEC and Okidata printers

TRIGGERING
Mode: Normal (trigger required for display of waveform)
Level: ±1.26 V in 10 mV steps for 5mV/div to 200mVdiv
Slope: plus or minus
Source: Channel 1 or 2
INPUT CHANNELS
Modes: Ch1, Ch2, or Ch1 and Ch2(dual)
Bandwidth
Real time: DC>10 KHz
Equivalent time: DC>50 MHz
Rise time
Real time: >40 microseconds

ally have to synchronize the scope, send the pulse, and photograph the image with a Polaroid-instant-type camera. This photograph usually shows only a small, sometimes barely readable pattern. The aSCOPE allows you to dump the high-resolution screen image to most any type of dot-matrix graphics printer, using one of three popular graphics cards. You now have a beautiful printout.

The aSCOPE is extremely fast so you can see clean details on fast waveform edges. You have two independent channels, and you can use one waveform to trigger another.

You have room to put a program of up to 8K, written in either BASIC or machine language, into memory. You can even sample the waveform up to 255 times to get the average that you want.

Another feature that is not mentioned in either the manual or any of the literature is that once you have a trace saved on disk, you can send the actual hi-res page to anyone who has an Apple with a modem. You send the binary file with any good terminal-emulator program—such as ASCII Express Professional—

The aSCOPE allows you to dump the high-resolution screen image to most any type of dot-matrix graphics printer, using one of three popular graphics cards.

BSAVE the file at the other end, and then BLOAD it onto the screen. You use a graphics card and dump the file to the printer. You now have an exact copy of the original trace.

UI16

One of the major headaches in using any real-world interface with any systems occurs when you run up against troublesome situations such as dealing with AC circuits, odd voltage levels or polarities, grounding problems, or equipment that generates static electricity or spikes. You can solve headaches such as these by using the Interactive Structures UI16.

The UI16 communicates through the use of an optical isolator. In effect, you isolate yourself from the problems of the outside world and feed only trouble-free information into the computer.

The UI16 is designed to work effectively with the DI09 interface card. The UI16-PAM16 is a 16-channel system and uses 16 DI09 lines. Because of the way the UI16 uses the board-address lines, the processor can manage a maximum of 1024 circuits.

The different modules that plug into these systems determine what each circuit does. Output modules allow the program to switch a circuit on or off, while input modules allow the software to determine the presence or absence of voltage in a circuit. You can choose from AC and DC modules.

AMPRIS

There are many situations in which users do not want to write their own software when they use any of the Interactive Structures cards, or prefer to work with a turnkey system. If this is true in your case, you can use AMPRIS. AMPRIS is a series of software packages that allow easy use of all of the Interactive Structures real-world devices. These modules are prepackaged, assembly-language programs that eliminate the need for you to write your own software for each application.

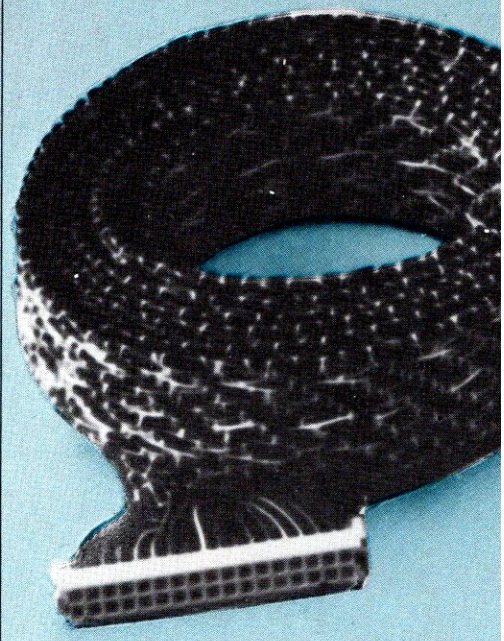
The software is extensive; there are separate modules for each of the Interactive Structures devices. Each program module costs $125, except for the DI09, which is $195, and the AI13, which is $225. Application notes for the DAISY interface line (AI02, AI13, DI09, and UI16) are available on request at no additional charge. A software directory that includes various programs for many different applications is also available on request. This directory includes the names and addresses of individuals who have formulated their own software. In many cases, there is no charge for this software.

Firsthand Experience

I personally used several of these cards in a project involving a freeze-drier for preserving food. Our goal was to use a computer to take freeze-drying measurements, instead of purchasing expensive equipment to do so. I designed software to enable the system to sample any one of four temperatures and either of

AI13

The AI13 has a higher level of resolution than the AI02. The resolution is 12 bits, compared to 8 bits in the latter. The latest unit of this model also has a precision reference power supply that gives you accurate results throughout the testing range.



You use the hardware by executing simple BASIC routines; an example is listed below:

```
10 INPUT "SLOT NUMBER";N
20 A=-16384+(256*N)
30 INPUT "CHANNEL NUMBER";
   C
40 POKE A+1,C
50 PRINT PEEK (A)
60 GOTO 40
```

You can substitute machine language routines if you want to avoid using BASIC.

For special applications where high-speed readings must be taken and where you want true 12-bit reso

AI02

The AI02 is an analog input card that can read the voltage present at any one of 16 points. You can read the card from either a BASIC or an assembly-language program. The voltage must be in the range of 0–5 volts and appears in the program as a number between 0 and 255. You may ask,



lution, you can use the AI13. It has several features that you generally find only in much more expensive pieces of equipment. Some of the features include:

1. a precision voltage-reading interface
2. tested software, ready for immediate use
3. program selection of up to 16 separate channels
4. program selection of scaling; up to eight full-scale ranges
5. accurate, true 12-bit (0.024%) resolution
6. speed—it takes a reading in 20 microseconds
7. sample and hold circuitry to capture dynamic signals
8. external trigger to allow you to synchronize the unit with other equipment

The specifications of the AI13 are significant:

ANALOG SPECIFICATIONS

Input full scale: 0 to 5000, 0 to 500, −5000 to 5000, −500 to 500, 0 to 1000, 0 to 100, −1000 to 1000, and −100 to 100

Input Impedance: 10 megaohms
Crosstalk from unselected channel: −95db

Input protection: Inputs can withstand ±22 V(±10 V with Apple OFF)

CONVERSION SPECIFICATIONS
Resolution: 12 bits, 4096 steps

CONVERSION TIMING
Total conversion time:
20 microseconds

"What good is a unit if it will only read a limited voltage range?" Well, it is relatively easy to convert any current or voltage into this range by using appropriate resistors or voltage dividers. The circuitry needed to accomplish the above is simple: in most cases, only one or two resistors.

With the AI02, you have a fair amount of flexibility. You can sample up to 12,000 samples per second, which is high enough to feed in audio at a rate of up to 5 KHz. You can input up to 16 separate inputs in the 0–5-volt range. The resolution is 8 bits.

The latest of these units has a precision reference power supply that gives you excellent accuracy throughout the testing range. You use the hardware by executing simple BASIC routines; these follow:

```
10 GR:INPUT"'WHICH SLOT";
   N:A=-16384 + (256*N)
20 FOR I= 0 TO 15
30 POKE A=1,I
40 X=PEEK (A)
50 COLOR=0:VLIN 0,39 AT I+1
60 COLOR=7+1/2:VLIN 39-X/
   7,39 AT I+1
70 NEXT I: GOTO 20
```

two resistances, display any one of five graphs on a real-time basis, and print out a total of seven graphs from the finished data.

The unit consists of four thermocouples, two pH-resistance probes, a signal conditioner, the Interactive Structures AI13, an Apple II, a dot-matrix graphics printer, and the PKASO printer card (the card is also available from Interactive Structures). The complete cost of the package, including the custom software and support, is about $9900.

One of the more difficult aspects of the task was to measure resistances in the range from 500 megaohms down to 10 ohms. This had to be done in three stages; the AI13 handled it well.

The thermocouple's outputs were in the millivolt range, so we had to use the signal conditioner to amplify those outputs in order to input stable readings into the AI13. We used a custom switching card to feed all of the inputs into the card in an organized fashion.

Another problem we had during the project was dealing with electrical noise generated by adjacent equipment. We had to warm up the unit and let its temperature stabilize, and keep power cords away from sensing devices.

Once the data was collected and displayed, the results proved not only that the system worked, but also that it gave some results that were not available from larger

▸SC14 SIGNAL CONDITIONER

There are some situations where the signal level is too low to allow accurate readings into the equipment. You can use an amplifier, such as the Interactive Structures SC14 signal conditioner, in order to remedy such a situation. The SC14 has the following features:

1. the amplification of small signal ranges

2. filtering and nonlinear functions are easily constructed

3. each channel is individually programmable and adjustable

4. no external power supply is required

The SC14 signal conditioner allows your system to amplify voltage levels from the millivolt range to give the full 5-volt scale needed for the AI02 and AI13 cards.

When you feed information into the computer system, you must prevent noise from distorting the actual signal. To filter out this type of noise, it is necessary to add what is called a low-pass filter, which only passes information below a certain frequency. The SC14 allows you to construct this type of filter. You can use low-pass filtering to reduce noise or AC components of the waveform. In addition, you can transfer nonstandard voltages such as 2–6 volts into the necessary 0–5.0-volt range. One additional feature of the SC14 allows you to feed in AC voltage or current inputs and feed these directly into the AI02 and AI13 with no ill effects, maintaining the proper voltage range.

The unit is programmable: you can set any of the 14-pin DIP function modules. You can use two trimmer adjustments to control the limit that you desire the unit to have.

The SC14 amplifies the signal at the source; therefore, noise picked up by the signal when it reaches the computer is curtailed.

You can configure the unit in one of several ways, including single-channel conditioner, 4-channel setup, or 16-channel setup in a rack-mounted enclosure.

Apple system.

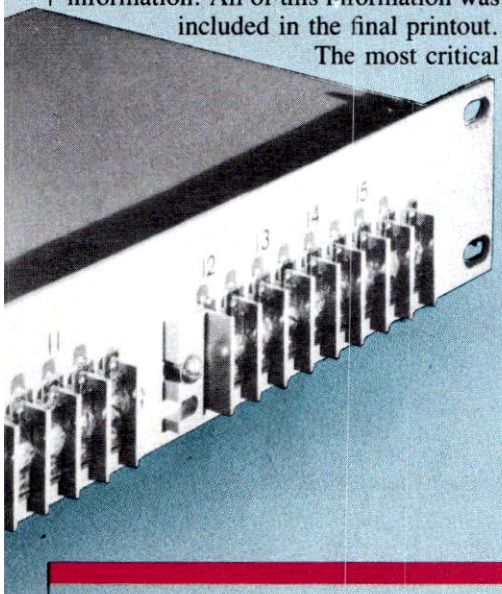
The results we tabulated gave not only a complete listing of all the data, but also a graphic analysis of the data, with auto-scaling functions included. The computer memory of 48K was sufficient to hold approximately 500 units of data, each unit consisting of four temperatures, two resistance readings, the time, and other forms of calculated information. All of this information was included in the final printout.

The most critical control. A temperature change of less than 0.5 degrees centigrade can have significant consequences. Precision in temperature control is difficult to achieve with most units on the market.

An advantage of this system is its phenomenal precision in measuring and controlling temperature. Temperature readings were within a standard deviation of 0.05 degrees centigrade.

If you plan to use one of these systems in a setup where power failures are prevalent, you can add backup power supThe operation of the unit is smooth and efficient. Printouts of sample data are included for your information.

You can see that the Apple can be quite a powerful computer for real-world interfaces when you add appropriate hardware and software. The only limit is your imagination. People are coming up with new applications every day. I hope that many of you reading this article will let the world know what you are doing, so that we can start seeing many more uses for the Apple II. ✚



▸LIST OF MANUFACTURERS

Interactive Structures, Inc.
146 Montgomery Avenue
P.O. Box 404
Bala Cynwyd, PA 19004

SUGGESTED RETAIL PRICES:
AI02 $299
AI13 $550
DI09 $330
SC14-16 $440
UI16-16 $155
Ampris AO03 $125-$225 (depending on which module)

Northwest Instrument System, Inc.
P.O. Box 1309
Beaverton, OR 97075

SUGGESTED RETAIL PRICE:
Model 85 aSCOPE $995

T. A. Jennings Associates
P.O. Box 527
Bala Cynwyd, PA 19004

SUGGESTED RETAIL PRICE:
D2 & DTA Analytical System $9900

▸SAMPLE DATA PRINTOUTS

The following are sample printouts from T.A. Jennings Associates' work with a freeze-drying testing unit using an Apple system.

```
                RUN IDENTIFICATION

SAMPLE NAME      : CSODIUM CHLORIDE-5%
DATE             : 11/5/1983
FILL VOLUME      : 3.0
DTA REFERANCE    : METHANOL
WATER SAMPLE     : TAJA
NOTEBOOK NUMBER  : N/A
NOTEBOOK PAGE    : N/A

                PARAMETER TABLE

RESISTANCE READ COUNT     5
TEMPERATURE READ COUNT    10
ELAPSED TIME (HRS)        5

 T-1/GRID          : 2
 T-2/GRID          : 2
 T-3/GRID          : 2
 T-4/GRID          : 2

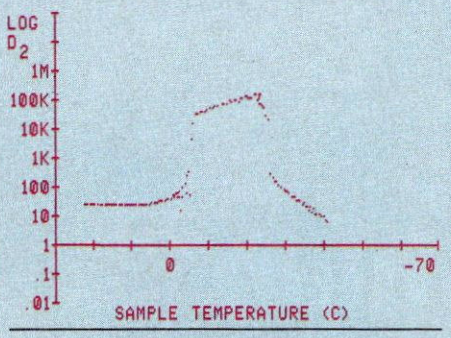
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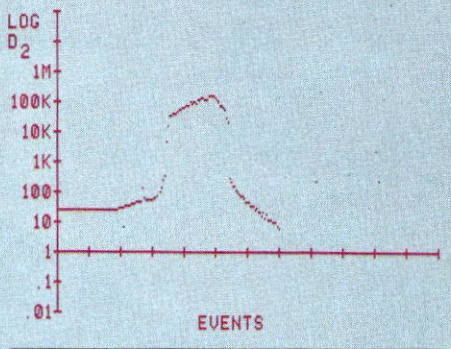
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SHELF TEMP        : 1.78
SAMPLE TEMP       : .13
BATH TEMP         : 0
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ICE TEMP S.D.   = .05
SHELF TEMP S.D. = .1

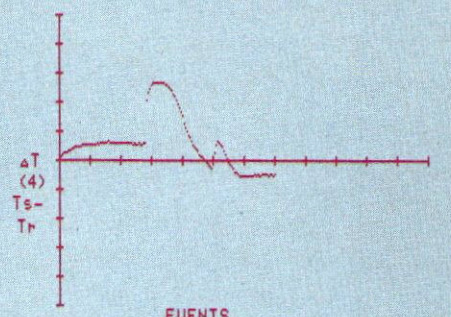
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                CORRECTIONS

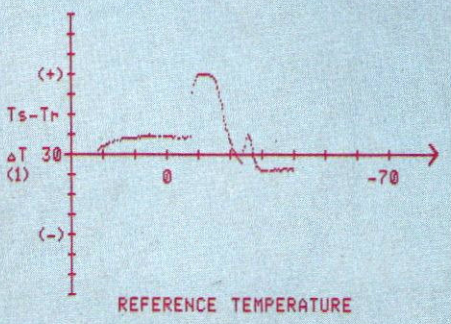
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CORR. FOR SAMPLE TEMP.       : -.13
CORR. FOR REF TEMP.          : -.45
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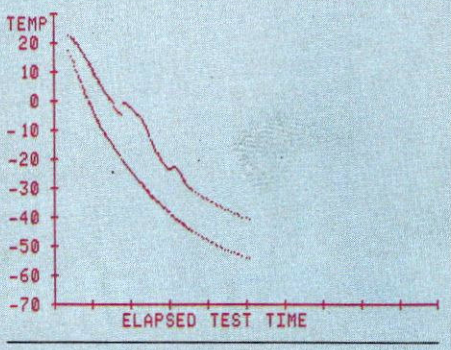
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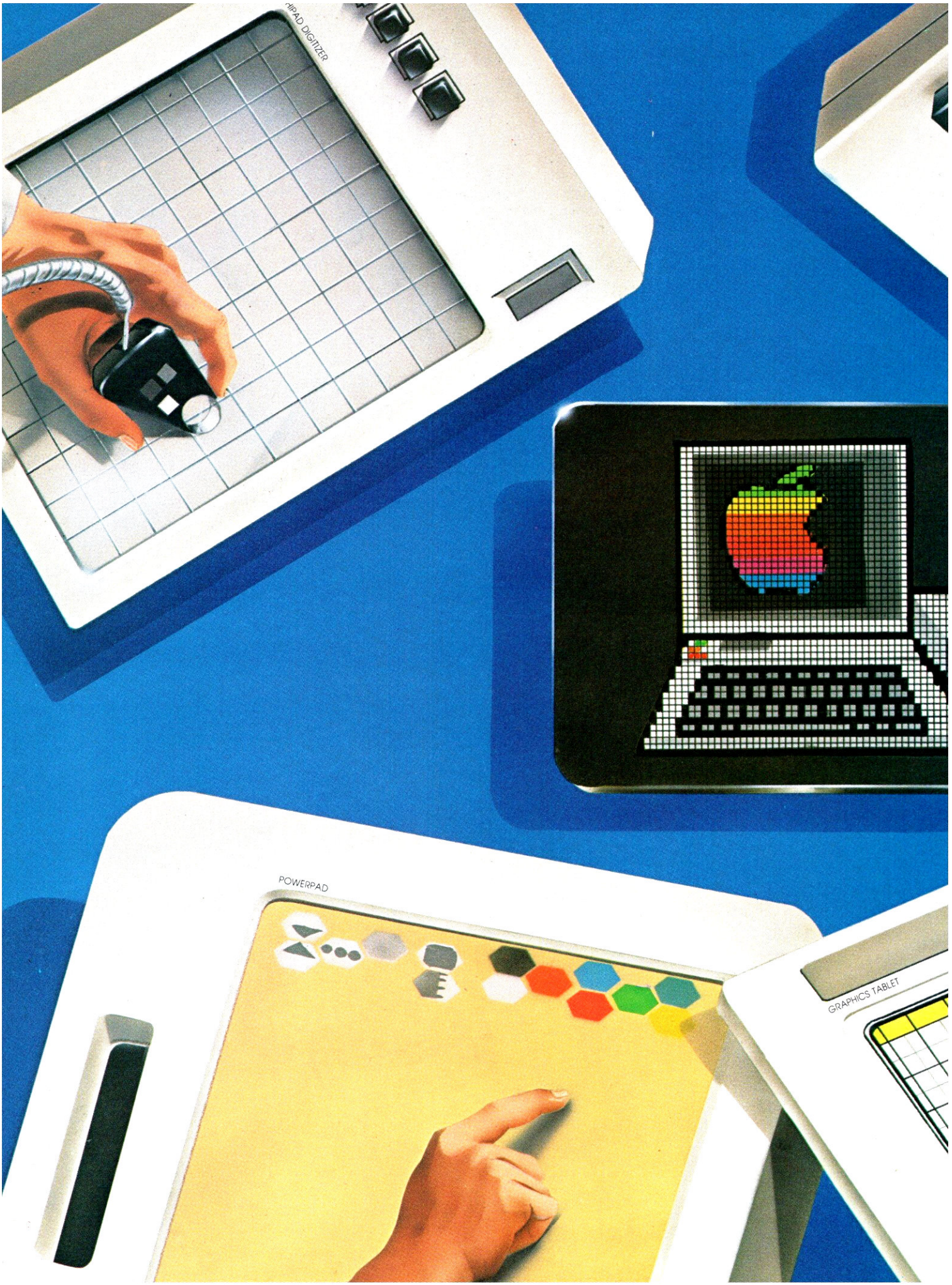











HIPAD DIGITIZER
POWERPAD
GRAPHICS TABLET



EXTENDING YOUR APPLE/BY FREFF

TABLETS FOR IIs

They're not just for drawing anymore.

Graphics tablets are only beginning to come into their own. For centuries, pad and pen have been artists' tools, and their electronic equivalents have found widest acceptance as the primary input and control devices for computer-aided design, animation, and illustration. That's changing—prices have dropped; new models are available; old models, sadly discontinued, have returned. Along with these changes has come a recognition that there is a class of data, a style of thinking, for which a tablet is the best tool to use.

Why should your music-instruction program bother with a typewriter keyboard when you can pattern a tablet with the layout of the instrument of your choice? How much practical use is research into geometry without the capacity to directly manipulate a shape and its relationships? Aren't flow charts and block diagrams the best way to create logic loops and circuit designs? Software designers are realizing these things and applying their creative talents to new graphics-tablet applications.

Four different tablets are available for the Apple right now, with more under development. Each of the four is based on a different technology. Happily, their prices and abilities are also different enough to meet just about everyone's needs—professionals, students, hobbyists, or kids at play. Here they are.

The PowerPad, from Chalk Board, Inc., is both the newest and cheapest graphics tablet. When it was introduced at a press conference in New York City in September 1983, the company admitted that the PowerPad was being targeted at two specific, related audiences: computer owners who were also the parents of small children, and schools. This was evident from the PowerPad's price ($99.95 suggested retail), its rugged plastic construction, and the library of educational software being

marketed along with it. So, it's a kid's toy and a good one, at that, serving the avowed purpose of offering a "friendly" gateway to the home computer for children too young to work with a typewriter-style keyboard.

Don't be fooled, though. Just because the PowerPad met its original design goals doesn't mean that those goals are the end of its usefulness. Its price, large 12 × 12-inch working area, and extremely light weight make it good for all sorts of alternative applications. Here are just two: a preprogrammed "touch-typing" pad with extra-large "keys" for people with physical problems that prevent them from using a normal computer keyboard; or an automatic musical-composition machine, controlling pitches and note durations and other musical qualities from the movement of a finger on its surface.

These kinds of tricks become possible as soon as you know enough about your Apple and the PowerPad. For the first, dig into your Apple programming and reference manuals. For the second, there's a software and reference package from Chalk Board, called the PowerPad Programming Kit.

In the meantime, if you want to use the software that's already available (or perhaps you're one of those parents with computer-curious kids to satisfy), there are several different Apple-compatible programs on the market, such as Leo's Links, a Logo-like application with which you design your own golf course and then go back and play it; Music Math, which explores the relationship between mathematical functions and musical intervals; Bear Jam, a reading game; and Micro-Illustrator, which is rapidly becoming one of the most commonly available electronic painting programs for the Apple's high-resolution screen. (In this incarnation it has a few differences from its other available forms, such as new Mirror and Scaling commands.)

In fact, the only thing about the PowerPad that might limit its usefulness to Apple owners is a feature of its design that is a plus on most other computers. Inside the PowerPad is a grid of membrane switches, 100 to the square inch, capable of sensing more than one contact point at a time. This means that if you plugged your PowerPad into a Commodore 64, you could trigger more than one event simultaneously and independently. Two kids could fingerpaint with all 20 fingers if they felt like it; you could play three-note chords by pressing the right points on a piano-keyboard overlay; and more. Such activities aren't possible with the Apple, where the PowerPad plugs straight into the game port.

Because its resolution is only a grid of 120 × 120, and the Apple hi-res screen's is 192 × 280, the PowerPad won't give you the graphics or control abilities of a more sophisticated tablet, but it's



The PowerPad won't give you the graphics or control abilities of a more sophisticated tablet, but it's going to hurt your wallet a lot less, too.



going to hurt your wallet a lot less, too.

KoalaPad

The KoalaPad, a product of a company called Koala Technologies, is another inexpensive tablet—only $125 (a price that includes the standard release of Micro-Illustrator). It's a nifty one. Sleek and white, with two buttons across the top and a 4 × 4-inch drawing surface, the KoalaPad is easy to hold in one hand while working with the other, feeling like an electronic memo pad.

Like the PowerPad, it plugs into the Apple's game port. Unlike it, it doesn't use a digital switch technology to communicate with the computer. Instead, the KoalaPad is an analog device. Beneath the working surface are two electrically resistive surfaces that are kept slightly apart. When you press down with stylus or fingertip, the surfaces come together. The KoalaPad's internal electronics translate the electrical signal into x and y coordinates, and they then send that set of numbers into the computer disguised as standard joystick or game-paddle readings.

The KoalaPad functions so much like a set of game paddles, using the same Applesoft Peek and Poke commands and numbers, that this tablet can add some interesting new twists to playing Choplifter!, Little Brick Out, and many other games. You can control any program, serious or silly, that uses normal Apple game-paddle programming with the KoalaPad. (The Programmer's Guide, available for $15, offers a number of suggestions, tips, and sample routines.)

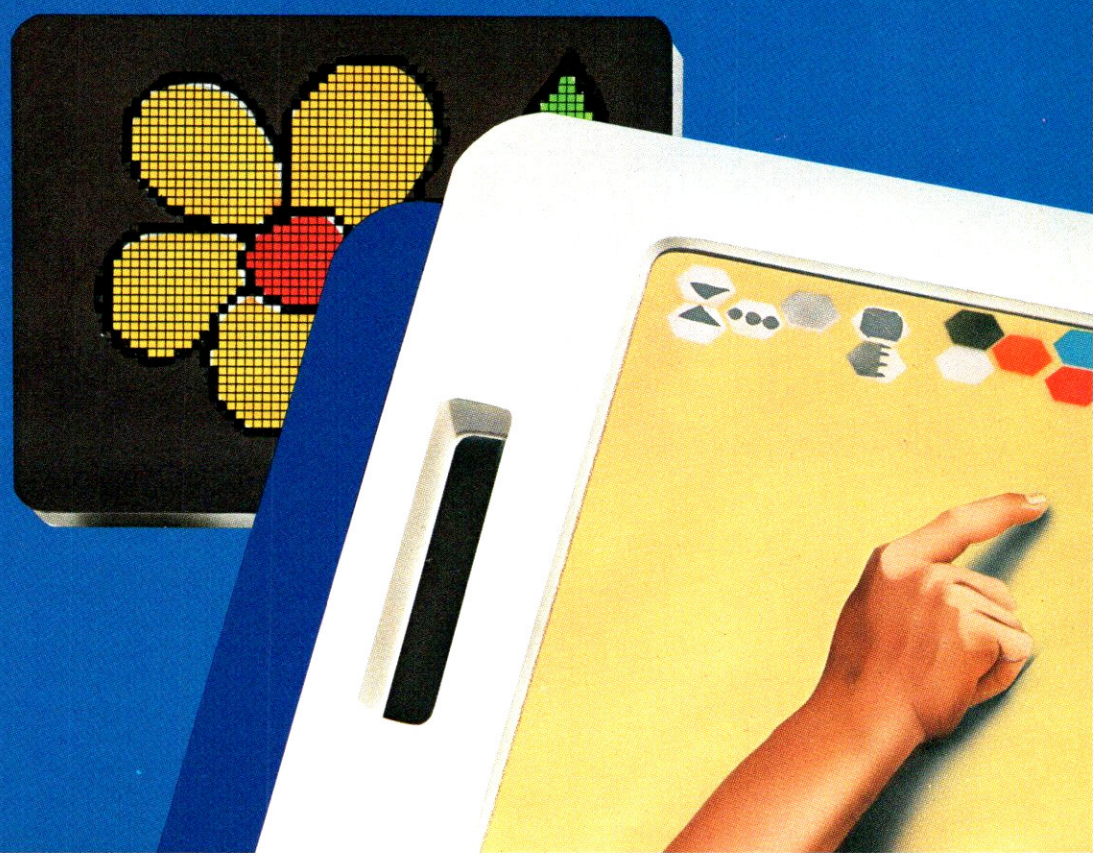
Its only real weaknesses are also strengths. Resolution is phenomenal, with well over 500 individual points measurable along each axis. Those axes, though, are only 4 inches long, and the 500-plus points are translated into the numerical limits of the game port (0 to 255), so sometimes it's hard to be precise with your fingertip or stylus. (The blunter the stylus, the better, both to protect the working surface from damage and because the KoalaPad averages its final output signal from all the contact points being pressed—thus the blunter the stylus, the steadier the average output number.)

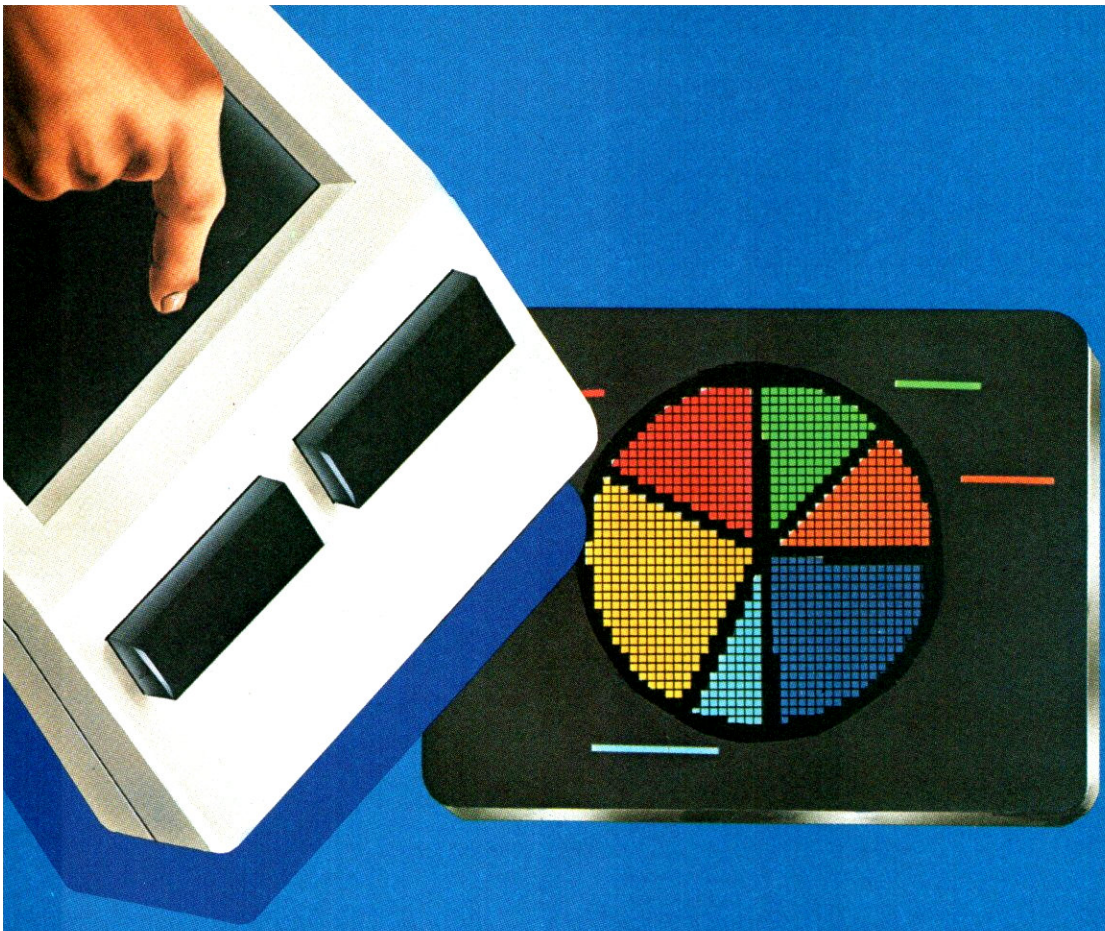
Another minor problem comes from the sensitivity of its pressure-sensitive surfaces. In some KoalaPads on the market, the surfaces are so sensitive that they detect the slightest lifting of the stylus from the tablet's surface. This wouldn't be so bad, except that often the lifting is too slight for a human hand to detect, so you can find your drawings and work suddenly interrupted by the KoalaPad "jerking" toward the upper-left corner, its origin point for measurement. Software changes have minimized this problem, but it's something to watch out for.

Micro-Illustrator, and the two "coloring books" of geometrical computer graphics that you can buy to go with it, have been followed by several other KoalaPad software packages. There's Spider Eater, a music-education game for children that involves identifying notes on a piano-keyboard overlay in time to keep an animated spider from reaching its web; Logo Design Master; and KoalaGrams, a word-unscrambling game.

At first glance, you might think the KoalaPad and the PowerPad present you with an either/or choice. Both are inexpensive, both plug into the game port, and both have a heavy marketing commitment to children and gamers. That's a short-sighted attitude, though. Their size, resolution, and technical differences actually offer you a choice; sometimes one might be preferable to the other in an application. You might well want to work with both.

(A practical hint, no matter what your choice. Get some kind of game-port extender cable, with zero-insertion-force sockets at the working end, such as the E-Z





Port II. It will save you from damaging the fragile game-port plugs on either tablet, as well as sparing you the hassle of having to root around in the nooks and crannies of your Apple more than the one time it takes to hook up the cable.

HiPad

Ready for the big leap? Then jump up $700 to the HiPad, from Houston Instruments. This isn't for the hobbyist or the preschooler, not at $835 for a stylus-equipped model and $940 for the deluxe model with a four-button cursor. You aren't going to find educational software here, either. The HiPad is a professional's graphics tablet, and where you'll find it is the professional marketplace—calculating weights, volumes, and areas for the engineering-graphics packages from AFS (American Foundryman Software), or doing scientific graphic measurements for biological analysis in the Bioquant II package, or handling computer graphics input all the way from $100,000 state-of-the-art systems down to Penguin Software's Graphics Magician.

It's precise. It works by measuring a set of standing magnetic-phase relationships. Inside the pad are two sets of wires, which together form an x,y grid. The current flowing along each axis is 90° out of phase with the other one; wherever you place your stylus or cursor, the phase relationships of the two magnetic fields at that point are measured, summed together, and used to derive an x,y coordinate setting. (The theoretical limit of the HiPad is around 200 lines to the inch; higher than that, and signal-to-noise problems start distorting the readings.) That kind of resolution (plus fancy add-ons such as an optional display that gives a constant readout of the x and y coordinates in both inches and millimeters) make the HiPad one of the true high-class acts in the graphics-tablet field. It has, however, also pushed software development in the direction of engineering and scientific applications, which may not be for you.

The Apple Graphics Tablet

The last product is a special one. It was the first graphics tablet offered as part of a popular microcomputer's line when it came out in 1979. It had some of the best software around, especially for art, for it attracted the innovative efforts of top programmers. It also went out of production, for too long and sad a time, having failed in 1981 to get FCC clearance as a Class B computing device. But, it's back—FCC-approved at last. For a paltry $795 suggested retail price (worth every penny if you're serious about digging into the tablet approach to computing), you can now, once again, own Apple Product A2M2007.

If I sound like a convert, it's because I am. The Apple Graphics Tablet is wonderful for the same reasons as is my Apple. First, there's lots of software support, and second, there's lots of Apple support. The manual that comes with the Apple Graphics Tablet gives you everything: program listings of the tablet code, subroutines, the ROM code, a variety of useful utilities, even a schematic diagram of the interface card.

The tablet is actually built by two companies. Summagraphics, a firm that specializes in making digitizing tablets for high-cost, computer graphics systems, supplies the tablet hardware, (which is an enclosed grid of "magnetostrictive" wires similar to another product it makes, the BitPad). Apple then adds its own electronics, interface card, cable, and logo.

What's magnetostriction all about? Magnetostriction is a little-known characteristic of certain alloys of magnetic metals. When these alloys are pulsed with a magnetic field, the field creates a "constriction"—a variance in field strength—that travels along the wire at the speed of sound inherent to that partic-

ular wire's alloy. This constriction can induce an electrical current in a coil. By knowing the speed of the constriction's travel and the length of the wire, you can time how long it takes a pulse to travel from its origin point to where it induces a current in a coil and use that timing to generate planar coordinates. Put those wires in grid form in a tablet; pulse the x and y grids some 200 times a second each; then put the coil inside a movable stylus, and you have an elegant, controllable tool that will do wonders with your computer when it's programmed properly.

There are two drawbacks. First, this technology is sensitive to static charges. Wiping the tablet down with an antistatic cloth periodically is a good idea; otherwise it might misinterpret a static release as some kind of input, drawing a line you didn't intend to or otherwise scrambling the data you're working with. Second, the magnetic grid is capable of wiping out the information stored on a floppy disk. Never lay a diskette on top of it.

It might misinterpret a static release as some kind of input, drawing a line you didn't intend to or otherwise scrambling the data you're working with.

The basic software that comes with the Apple Graphics Tablet is meant as a primer. It does some drawing, some calibrating, some measurement—enough to give you several useful functions and point you in plenty of directions. You can set "windows" of any size you please, making a small part of the Graphics Tablet correspond to the entire hi-res screen. You can do elaborate drawings in the Apple's six colors and manipulate their position on the monitor in a number of ways. You can do Catalog, Load, and Save commands from the tablet and even use it to quickly measure areas and calculate distances.

These are the four graphics tablets that are available now for your Apple. Try one. Try two. You'll learn something and have fun at the same time. ✚

PRODUCT INFORMATION

POWERPAD
Chalk Board, Inc.
3772 Pleasantdale Road
Atlanta, GA 30340
(404) 496-0101
or (800) 241-3989
Suggested list price: $99.95

KOALAPAD
Koala Technologies Corp.
3100 Patrick Henry Drive
Santa Clara, CA 95050
(408) 986-8866
Suggested list price: $125

HIPAD
Houston Instruments
8500 Cameron Road
Austin, TX 78753
(512) 835-0900
Suggested list price: $835

APPLE GRAPHICS TABLET
Apple Computer
20525 Mariani Avenue
Cupertino, CA 95014
(408) 996-1010
Suggested list price: $795

BACK TALK

LIP SERVICE

You tell your computer that you want 15 more minutes of sleep—it's just awakened you with an alarm followed by voice output of the time and date. So, 15 minutes later, you are again roused from sleep by an updated message that also reminds you of your earlier indulgence.

Your response, "OK, I'm awake," brings a vocal query for further commands. You then ask for a printout of that day's appointments as well as the opening prices of the stocks in your investment portfolio. As you shave and shower, this material is prepared and ready to take to the office.

Upon leaving for the office, you tell the computer to go into the answering/security mode, which answers your calls with a preprogrammed message. Also, your home-security and fire-alarm systems are under computer control, and in this mode any triggering will result in your computer's calling any number of specified persons or emergency numbers (e.g., neighbors, your office, the police or fire departments). Upon making the calls, the computer describes the problem, including its location, and requests aid from each party called.

From the office you call home and instruct your system to print an updated stock listing at closing with additional data about some issues that you're studying. This, as well as any messages received, will be prepared and ready when you arrive home.

Voice Recognition

Though this description may sound implausible, all these abilities are within the scope of your Apple computer. Other than a modem for phone hookup, the remaining requirements can be filled by various voice I/O systems now commercially available.

Voice recognition works on a simple concept. The computer digitizes analog voice waveforms of each spoken word and compares them to a stored reference vocabulary in memory.

This process is more akin to pattern analysis and matching than it is to our everyday understanding of speech. In these systems, "words" to be recognized are first entered into the system. They become the basis for producing a template to which sounds are referenced in the recognition process.

These systems usually are limited to recognition of one person.

Entered words must not only have pauses between them but must be a certain duration (typically between .15 and 3 seconds) to be recognized. You can improve performance by tailoring your vocabulary to contain words that sound as different from each other as possible. Because of the variation in speech from person to person, these systems usually are limited to recognition of one person. This speaker-dependency will stay with us until further hardware advances are made or until we all sound alike.

Once it recognizes a word or phrase as matching a specific pattern, the computer cross-references the information and executes the appropriate action. The system doesn't care whether you speak English or Japanese, because recognition is based on your previously entered vocabulary.

VIM-2 for the Apple

Voice Machine Communications' VIM-2 Voice Input Module for the Apple is a representative voice-recognition system. It includes a microphone for data input, a card for one of the Apple's slots, and the necessary hardware to make the whole thing work.

Installation requires putting the card in any slot, with the keyboard connector plugged into the board, which then connects to the motherboard socket via a supplied cable. Plug in the microphone, boot the supplied software, and you're ready to start talking to your Apple.

Following the menu-driven software, you create the desired vocabulary or else use one of the vocabularies supplied, which you then "train" to your voice by pronouncing each vocabulary entry three times. The unit permits individual-word retraining, vocabulary editing, and recognition testing. Also, you can vary the unit's selectivity (ability to discriminate between similar-sounding words) as well as the relative similarity of all entries in your vocabulary.

You can run application programs after loading the vocal vocabulary because most of the system's overhead

resides on the peripheral card, leaving normal program space intact. Vocabularies can be as varied as the application demands, with several representative ones being supplied on disk. These include vocabularies for popular software, such as VisiCalc and WordStar, as well as more general calculator and alphanumerics lists, to name a few. These vocabularies require only the vocal-training step by the user to be fully functional.

Resident programs then can be controlled by voice as well as by standard keyboard input, which also remains active. The system can be running, with you talking to your Apple, in less than an hour. For fun, a vocal blackjack game is supplied, with all betting and card-play commands entered by the speaker. This program could sidetrack you for several hours or until it could be taught to play strip poker.

Games are just one of myriad applications that could utilize voice recognition. Other possibilities include systems for the handicapped and data entry when hands and attention cannot be at the keyboard, such as inventory taking. In fact, with the optional remote microphone, you can enter data into your Apple from distances up to half a mile.

The possibilities are limited only by your programming skills and imagination in applying any vocabulary sets up to 80 "words" long. In all, the VIM-2 is a most impressive system just waiting for your special applications.

Speech Output

Fortunately, the requirements for speech production by computer are quite different from those used in recognition. Several approaches are possible, including phoneme-driven speech synthesis, fixed-vocabulary synthesis, and digital speech-waveform recordings.

Digital speech recordings are as easy to use as a tape recorder, since you merely record and replay your entered speech. Vocabulary is unlimited, but memory requirements are steep, with about 8K per second needed for telephone quality. All possible utterances must be accessible by memory for the system to function.

Computer Tape Recorder?

An interesting example of this process is Decillonix's DX-1 Sound Processing System for the Apple. With this system you record desired sounds directly into the computer memory to be stored for playback. This device strictly controls input data. It is representative, however, of digital waveform storage, the most memory-intensive yet simple way of producing speech.

The unit consists of a board connected to a microphone and output speaker. Also supplied is software to get the system running. It is a system with many abilities, speech production being only a minor sideline.

Fixed Vocabulary vs. Phoneme-Driven Systems

Fixed-vocabulary systems supply possible words or phrases with the hardware, and generating speech requires only accessing these words in the proper order. The Multitech Industrial Corporation's SSB-Apple (Speech Synthesizer Board) is of this variety. Supplied on disks is a vocabulary of some 700 words. Unfortunately, this vocabulary has some glaring omissions that could create problems. Also, each sentence to be spoken must first be compiled word by word from the available lists and strung together. The task becomes a tedious exercise in disk swapping. Also, speech quality leaves something to be desired.



Games are just one of myriad applications that could utilize voice recognition.

The ECHO II

The ECHO II Speech Synthesizer by Street Electronics Corporation is one of the best offerings in the speech-output field. Included with the hardware card is a speaker and a software package that can have the package working in no time. Simply insert the card into one of your Apple's slots, attach the speaker, boot the software, and you're ready.

This system incorporates a text-to-speech algorithm that converts written text into phonemic form that then drives the hardware to produce speech. The system's algorithm is based on nearly 400 rules of pronunciation to correctly convert your typed text into speech. Using creative spelling and spacing greatly enhances pronunciation for those words that defy normal rules (e.g., to force long vowel sounds, use *ay* and *ee* for *a* and *e*, respectively).

Another program, Speakeasy, gives users even greater control in dealing with the vagaries of the English language. You enter desired phrases word by word, coding them phonemically.

Using this method, you can produce nearly any speech. In fact, after some practice you may even prefer this form of spelling.

Included in the software package are several programs designed to help blind people use the system. The features include bidirectional spelling of words passed over with the arrow keys and audio cursor controls. This unit should certainly find numerous applications in assisting the visually impaired; one obvious example is help in accessing telecommunications systems.

This system is a favorite of mine, based on its ease of use, intelligibility of speech, and general operation. It could become a performance standard for speech synthesis, if it isn't already. ✚

▶ PRODUCT INFORMATION

VIM-2 Voice Input Module
Voice Machine Communications, Inc.
1000 South Grand Avenue
Santa Ana, CA 92705
(714) 541-0454
Requires: Apple II, II Plus, or IIe
List Price: $920 for II and II Plus; $995 for IIe

DX-1 Sound Processing System
Decillonix
P.O. Box 70985
Sunnyvale, CA 94086
(408) 732-7758
Requires: 48K, Apple II, II Plus, or IIe; DOS 3.3; and Applesoft BASIC
List Price: $239

ECHO II Speech Synthesizer
Street Electronics Corporation
1140 Mark Avenue
Carpinteria, CA 93103
(805) 684-4593
Requires: Apple II or II Plus
List Price: $149.95

BREAKING THE SOUND BARRIER

Take one Apple IIe (or an Apple II Plus with a language card). Add one disk drive, a color monitor, two game paddles, and the MusicSystem oscillator cards from Mountain Computer; then top it off with a five-octave keyboard and operating software from the Syntauri Corporation. Hook the whole thing into your home stereo for amplification, and *presto!* You have an alphaSyntauri music system.

Here's how it works. Every instrument, from a banjo to a bassoon, has two principal parts: the part that generates the sound, and the part that shapes it. In the alphaSyntauri, the

▸EXTENDING YOUR APPLE/BY FREFF



sound. They have been available for several years and can produce an incredibly wide variety of waveforms, which are the basic building blocks of sound. In fact, the cards are capable of a lot more than their designers originally realized. The software that (which you get as a kind of mixed-blessing bonus when you buy an alphaSyntauri system) is rigid, difficult to use, and just not terribly musical. So—great sound, lousy control. That's where the Syntauri Corportion comes in. Its software and hardware

THE ALPHASYNTAURI DIGITAL SOUND SYNTHESIZER CAN EXPAND YOUR MUSICAL HORIZONS.



provide the sound *shaping*, bringing the best out of the MusicSystem and turning your Apple into a professional-class digital synthesizer, great for playing, composing, teaching, and even multitrack recording.

Development of the alphaSyntauri system began in 1979 with Charlie Kellner, a programmer and engineer who worked for Apple. An amateur musician, Kellner had had to leave his piano behind when he moved to California from Oregon, and he wanted a substitute. He tied together his Apple, the MusicSystem cards, and an old organ keyboard with several thousand connections and a jerry-rigged interface. Then he wrote some primitive software, and thus was invented the first microcomputer synthesizer.

Kellner named it the alphaSyntauri (a multiple play on words involving synthesis; Apple; and our nearest stellar neighbor, Alpha Centauri) and offered it to Apple as a product. Apple turned it down. It wasn't until later in the year, at the National Computer Conference in New York, that the alphaSyntauri found a home with Ellen Lapham and Scott Gibbs, now president and chief software designer, respectively, of the Syntauri Corporation. They bought the rights to Kellner's instrument, assembled investors and software/engineering talent, and set out to market an improved—and continually improving—version of the product.

That was four years ago. While there is still room for improvement (Rule #1 of computer product development), the team at Syntauri has reason to be proud of what it has accomplished.

Three in One

When you buy an alphaSyntauri, three software packages come with it: alphaPlus, Sounds Trio, and Metatrak II.

alphaPlus is the basic operating system. With it you can play up to eight notes at a time, in the instrument sound of your choice. Ten such instruments—Syntauri calls them "presets," each consisting of two waveforms and separate loudness envelopes, plus vibrato controls—are available in RAM. You select which one you want to play by tapping the number keys across the top of the Apple. If the instrument you want to play isn't there, you can call it up from disk by typing Control-P and asking the alphaSyntauri to load the set of ten presets it belongs to. These are called "preset masters," and around 20 of them can fit on a disk. So you have 200 different sounds!

On the screen you see two things: a text window at the bottom has number settings for each preset's loudness envelopes and vibrato, and the rest of the screen is real-time readout of whatever you play, represented by flashing color bars. It looks a lot like the scene at the end of *Close Encounters of the Third Kind*, when the humans are signaling the alien mothership with a giant colorboard. It's surprisingly useful. After a time you can analyze a piece of music by its color pattern with no trouble at all. (On occasion I've even used the patterns as the first step in composing.)

Since the alphaPlus software is primarily for structuring and fine-tuning your sounds, it includes two subprograms to generate waveforms. The first, called Wave, lets you build up a sound by specifying the waveforms and amplitudes of the sound's harmonics. As the computer calculates these for you, it draws the waveform on the screen and plays it too, so you can tell if it's what you want. The newer program, called Quickwave, is a lot faster. With it, you can take any waveform that's already been designed and use the Apple's cursor and key commands to change the volume levels of its harmonics rapidly. It's a powerful way to tune the timbre (tone color) of a sound precisely.

After a time you can analyze a piece of music by its color pattern.

Sounds Trio is a set of programs written by software writer/rock 'n' roller Steve Leonard (a one-time member of the Cretones, Linda Ronstadt's backup band during her flirtation with punk-rock music). B-3 Wavemaker turns the alphaSyntauri into a credible imitation of a Hammond B-3 organ—you even specify your sound by marking drawbar positions, as on the Hammond itself. Auto Pulse and Draw Waves provide new and different ways to create waveforms, including drawing them with the game paddles or charting x,y points on the screen. You can input the skyline of your hometown into your Apple—and then hear what it sounds like.

Metatrak II is the pride of the Syntauri designers, and with good reason. This software turns the alphaSyntauri into a self-contained 16-track recording and special-effects studio. The computer's memory can record whatever you play on the keyboard, and you can overdub it with musical lines you play with other preset sounds. When your overdubbing is finished, you can speed the music up, slow it down, edit it, even reorchestrate it. Metatrak II is a composer's dream.

Even more software is available, such as MusicMaster, a music-theory education course from Stanford University, originally written for use on mainframes and adapted for the Apple by Syntauri. Composer's Assistant takes Metatrak II compositions and prints them out in musical notation, requiring only an Epson MX-80 with Graftrax. There's even a program called Dolphin Dialog.

The alphaSyntauri in Research

Whenever you buy Dolphin Dialog from Syntauri, the purchase price ($39.95) goes not to Syntauri but to the Cetuman Foundation, which supports the work of the Institute for Delphinid Research. What you get for your money is a fun program that lets you use your computer to create dolphinlike clicks, whistles, burrs, and buzzes. What the institute gets is funding for some of the most exciting investigation into another intelligence that has ever been done.

Basically, the researchers are bridging the language gap between man and cetacean, using a Syntauri modified by Kellner to meet their needs. As Ron Reisman of the institute explains, "We wanted to be able to hear dolphin sounds, which in some cases are ten times higher than our own hearing range, and also see them graphically analyzed on a computer screen. Then we had to be able to talk back to them in a way they could understand." Kellner built a digitizer board that could take a human whistle and convert it into data the Apple could process. The sounds were then kicked up into the dolphin hearing range and broadcast to the dolphins in the research pools.

To date, the institute's researchers have developed a crude but workable syntax.

"We have some generalization, some identification on an object-to-object basis," says Reisman. "Now it's time to move on. At the moment, we're transmitting to *them*. That's very good, and some of the things we've learned are significant, but it's time to open the other side of the dialogue." He expects that goal to be at least three more years away—many technical problems remain to be solved—but thanks to Kellner's musical interest in the Apple, we may be a little closer to understanding just how smart dolphins actually are.



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Softerm 1 offers file transfer methods flexible enough to match any host computer requirement. These include the *character* protocol with user-definable characteristics to provide maximum flexibility for text file transfers to any computer. The CP/M User's Group standard *XMODEM* protocol may be used for binary file transfers with systems using the CP/M operating system. The intelligent *Softrans* protocol can be used to transfer *any* type file and provides automatic binary encoding and decoding, error detection and automatic retransmission, and data compression to enhance line utilization. A FORTRAN 77 source program is supplied with Softerm 1 which is easily adaptable to any host computer to allow communications with Softerm using the Softrans protocol. Specific host computer versions of the Softrans FORTRAN program are available on request.

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SOFTRONICS

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CIRCLE 163 ON READER SERVICE CARD

Research shades into education, and education into performing. Don Muro, Ron Pellegrino, Paul Earls, and Christopher Cerf know about the range of uses of the alphaSyntauri. These four men are using it to keep their work aimed straight ahead into the future.

Muro has been teaching people about electronic instruments and recording equipment for nearly two decades; in fact, that's his job. He presents more than 60 seminars and concerts a year, for schools, conventions, and workshops—and the alphaSyntauri is one of his steady traveling companions. "More and more people are computer literate, so I can skip over formalities such as 'This is a diskette' and get straight into how to *use* the system. The alphaSyntauri is suited for today's precise, high-tech kind of sound. It's a great way to show people what contemporary musical technology is and how it relates to education, performance, and composition." One of Muro's favorite techniques is to take an already complex waveform and then use Quickwave to adjust its harmonics. "There are sounds I can get with this that I just can't get with other synthesizers. The thing about a digital machine like the alphaSyntauri, as opposed to my other instruments, is that it's a lot easier to stumble onto something wonderful by accident."

Pellegrino, as well as being an educator, is an expert on technology in the arts (his book, *The Electronic Arts of Sound and Light,* is one of the hallmarks of the field). "I teach people all the way from junior-high-school students to retirees, through programs such as 'Excel' at Sonoma State University [California] and others, and for those students I've been placing the alphaSyntauri in the context of a complete electronic-arts studio. It incorporates a lot of things in the system; you can see things happening at the same time as you hear them and that's important—to make that connection between the eye and the ear. All of the wave-building programs are incredible in that respect. With them I can teach people 'systems' thinking by showing them how altering one variable can change the way an entire system works. This is what music theory will be like in ten years—except that I have it now, today, because of the alphaSyntauri." In addition, he uses it in his own research in psychoacoustics and laser projection, creating visual analogs to accompany his music at lectures and recitals.

Composer Earls is also working with the alphaSyntauri and lasers. Earls is a fellow at MIT's Center for Advanced Visual Studies. His most complex project was an ever-changing light and sound environment called Modulations. It was unique in that every element of the environment, including the viewer, affected every other element. In a huge, dark gallery, computer-controlled laser imagery was projected on the walls, ceiling, and transparent hanging scrims. The light danced in response to music that Earls had written on the alphaSyntauri, in a scale with ten notes to the octave. Even as it modulated the lasers, the music itself was changed, in pitch, or speed, or choice of preset sounds, by sensors in the gallery that detected audience movement. By the time the show's run ended, an astonishingly complex pattern of music and light had evolved.

Cerf (son of the late humorist Bennett Cerf) doesn't work with lasers, but you could argue that he has even more fun, because the tools of his trade are Muppets. Cerf is one of the principal songwriters for *Sesame Street* and has found that the alphaSyntauri makes his life a lot easier. "The way I used to do it was to turn a song in to the musical director, discuss the arrangements with him, and sometimes include a stack of albums that would show him what I wanted it to sound like. Then I'd hope it came out that way. A lot of the things I do need very specific sounds, because they are parodies of Bruce Springsteen, or the Beatles. Now I can take my alphaSyntauri and make a demo that sounds pretty much like the final form should sound. It's been an unbelievable help in guiding the arranger." Normally the tunes are re-recorded with real instruments, but for a Vangelis parody called "Chariots of Fur," in which two Muppets argue about counting as they run a race, the alphaSyntauri held its own on the air against a stack of popular synthesizers. Without it, Cerf might never have made "Born to Add" and "Letter B" into instant anthems for an entire generation of preschoolers. "I love playing with it. Rock 'n' roll piano is a hobby of mine, and this adds a whole new sound," he asserts.

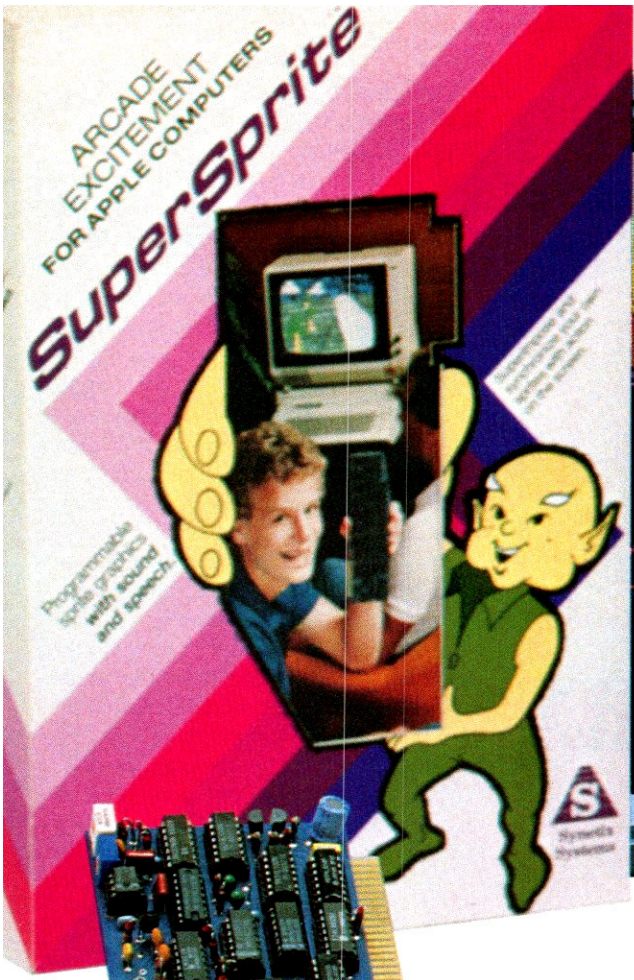
'It incorporates a lot of things in the system; you can see things happening at the same time as you hear them.'

The alphaSyntauri in Performance

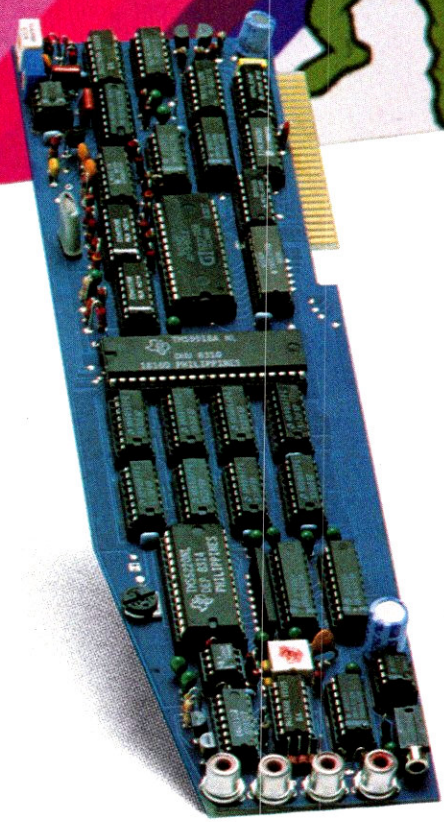
The ultimate point of making music, of course, is to get people to hear it. Over the air, on a record, or in a concert hall, it's the performance that's the thing, and computers will never change that. All they'll do, when used by talented people, is make performances more exciting.

The most famous alphaSyntauri user, by far, is jazz keyboardist Herbie Hancock. He was already an Apple computer owner and user when he encountered the alphaSyntauri at the West Coast Computer Faire in 1981; now he's on the Syntauri Corporation's board of advisors. "The thing that impressed me," he says, "was that it could do so many things, have such flexibility, and be so inexpensive. I mean, even the cheapest digital synthesizer I'd heard of at the time cost $15,000, and it wasn't even programmable. Yet here was this instrument selling for less than $2000. Incredible." Hancock hasn't taken his instrument on the road yet, but he has played it in the studio on several recordings, using Metatrak II's "ensemble" mode to double and triple up the instrument sounds he could play at one time, and make his tracks "heavier." Of course, a member of a board of advisors is supposed to advise, and Hancock does feel that the alphaSyntauri has room for improvement. He wants the sounds to be a lot thicker still, and the game paddles just aren't convenient sound controllers for someone used to synthesizer pitch-bending wheels. "I mean, I just don't know where to put them. But I have to say this: The great thing about this company is that the software changes and improves so fast. I can make a critical statement this week, and the next week the statement will no longer be valid."

Don Preston has played his alphaSyntauri with the Grandmothers (a band made up entirely of people who, like Don, used to be in Frank Zappa's Mothers of Invention). But nowadays he uses it mostly to write film soundtracks, including ones for *Android,* starring Klaus Kinski, and a Jose Ferrer horror movie called *Freak.* "I have a professional eight-track recording studio in my home, and I'll use that to put onto tape what I've already worked out with Metatrak II. Think about it—I can put multitracked parts onto each track of the tape. That means I can do a full orchestral-style score at home, instead of having to go out and work in a 24-track studio. I'd say I do at least 75% of any given score straight off the alphaSyntauri. All I add







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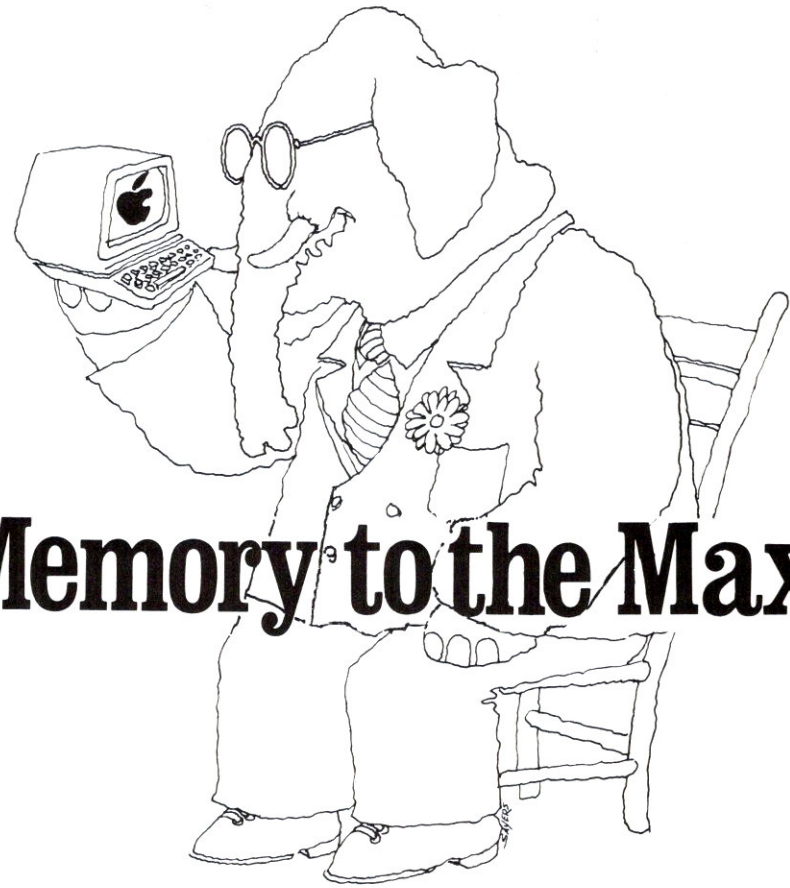
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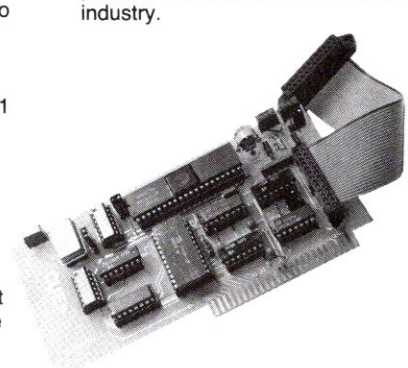
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Memory to the Max

The DiscMaster II by Data Cue expands the storage of your Apple II or Apple II compatable systems. The DiscMaster allows you to connect two 8″ or two 3½ ″ double density disk drives per controller to your computer. The drivers are supplied for DOS 3.3 and PASCAL 1.1 operating systems. Optional drivers are available to read and write standard 8″ CP/M, IBM P.C., DEC P.C. and SUPERBRAIN disks.

The DiscMaster II is completely contained on a single Apple II compatible I/O board which can be installed in any one of six of the eight peripheral slots in the computer. The DiscMaster uses the latest technology in floppy disk controllers to give a price performance ratio unmatched in the industry.



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CIRCLE 264 ON READER SERVICE CARD

is a little digital delay or EQing now and then, to make an instrument more lively, or more realistic.''

Being a one-man band in a studio, even a home studio, is one thing, but being a one-man band on stage is a lot tougher. Kenn Lowy, who plays at rock clubs on the East Coast under the name Wrinklemuzik, uses an alphaSyntauri to make it possible. ''The first song I play on stage these days is actually a song where I don't play anything! I was messing around with Metatrak II at home, and when I was done I realized the song was complete and there just wasn't anything to add to it. So what I do is have it all set up to go, and then I send someone out on stage to press the Apple's Return key. The song starts up and the alphaSyntauri triggers my drum machine to play along. It has lots of little changes, and the audience gets kind of mesmerized, watching the little bars of color bounce on the monitor screen.'' After that song is over, Lowy finally comes out and goes to town, using the alphaSyntauri both as a keyboard instrument in its own right and as a way of freeing his hands to play guitar leads over his own keyboard riffs. ''My music was getting more and more complicated, and I just couldn't do justice to it live. I found out about the alphaSyntauri, started checking it out, and finally bought. The price was right, and it was the perfect excuse to get something for my music and also get a computer, so I could learn both things at once. I'm still learning a lot. And I love it.''

'I was messing around with Metatrak II at home, and when I was done I realized the song was complete and there just wasn't anything to add to it.'

I've used my alphaSyntauri to compose parts for bands I've worked with, by setting up the chord sequence of a song and looping it so it played endlessly. Then all I did was play along, trying out idea after idea, until one clicked. I can second the positive comments of the other alphaSyntauri users I've profiled in

this article. If you have an Apple computer, and spreadsheets and databases don't do it for you anymore, you might want to venture into the world of music with the alphaSyntauri. ✚

PRODUCT INFORMATION

The alphaSyntauri system is on sale in many computer and music stores around the country. For information on the dealer nearest you, or direct sale, contact the Syntauri Corporation, 4962 El Camino Real #112, Los Altos, CA 94022.

The company markets two basic systems. The five-octave version (with velocity-sensitive keyboard) comes with 61-note keyboard, keyboard interface cable and card, the Mountain Computer MusicSystem oscillator cards and software, two footpedals, and three Syntauri software packages: alphaPlus, Sounds Trio, and Metatrak II. It costs $1995.

The four-octave version is identical to the above, except that its keyboard has only 49 keys and is not velocity-sensitive. It costs $1795.

Other software packages from Syntauri include Musicmaster ($150), for music theory and ear training; Composer's Assistant ($395), for graphically printing out the scores of the compositions you record with an alphaSyntauri; Dolphin Dialog ($39) for having fun and aiding dolphin research; and Simply Music (not yet available), a keyboard and music teaching program for the child or adult beginner.

The alphaSyntauri can be used in direct connection with a number of electronic drum machines (on some units this will require the use of a special interface cable, available from Syntauri for $60). For specifics on interfacing, contact Syntauri. Some of the machines it supports include:

- the LinnDrum, from Linn Electronics, 18720 Oxnard Street, Tarzana, CA 91356. *(List price $2995)*
- the Drumulator, from E-Mu Systems, 2815 Chanticleer, Santa Cruz, CA 95062. *(List price $995)*
- the Roland TR-808 and TR-606, from RolandCorp, 2401 Saybrook Avenue, Los Angeles, CA 90040. *(List prices $1095 and $395, respectively)*
- the Korg KPR-77, from Unicord, 89 Frost Street, Westbury, NY 11590. *(List price $695)*
- the Oberheim DMX and DX, from Oberheim Electronics, 2250 South Barrington Avenue, Los Angeles, CA 90064. *(List prices $2895 and $1395, respectively)*

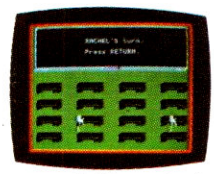


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BEAGLE BASIC

Here's a program that lets you use NEWBASIC on your Apple II, II Plus, or IIe.

Beagle BASIC, Applesoft Enhancer
Beagle Bros, Inc.
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San Diego, CA 92103
(619) 296-6400
List Price: $34.95
Requires: Apple IIe, II, or II Plus with RAM card; 64K RAM; one disk drive; DOS 3.3; monitor

Are you in love with your Apple but having doubts about Applesoft as a programming language? Consider the possibility of placing a modified version of Applesoft in the RAM space normally reserved for Integer BASIC or Pascal. Maybe you would like to use IF-THEN-ELSE logic, or you would like to make the editor easier to use. You may wish to modify error messages such as BAD SUBSCRIPT ERROR that seem like value judgments. If these possibilities interest you, then there is news from the Beagle Bros about an Applesoft enhancer called Beagle BASIC.

For a modest fee, the Beagles can provide you with a program that loads NEWBASIC into RAM in place of Integer BASIC or some other language. With this NEWBASIC, you can have a better Applesoft, or at least a modifiable version, in addition to the original stored in ROM.

This product is a natural follow-up to DOS BOSS, the Beagle utility that allows you to modify the Apple operating system. Beagle Bros also recommends that you use NEWBASIC with its Global Program Line Editor utility.

BASIC du Jour

Using a set of copyable programs, Beagle BASIC takes a version of the ROM-based Applesoft and places it in RAM. You can then enhance it in a variety of ways. You can alter it so that all commands and error messages are in French or some other foreign language. You can also save separate versions on different disks.

With this NEWBASIC, you can have a better Applesoft, or at least a modifiable version.

If you decide not to use a copy of the original program disk, you must save two programs on your disk in order to use your new Applesoft BASIC. The first program is a six-sector Applesoft file called NEWBASIC LOADER, which you copy from the original program disk. The second program is NEWBASIC IIE or NEWBASIC II/II+, which is written in binary code and occupies 50 sectors on a disk. To use NEWBASIC, you must either run the NEWBASIC LOADER or make it the program that runs when your system is turned on.

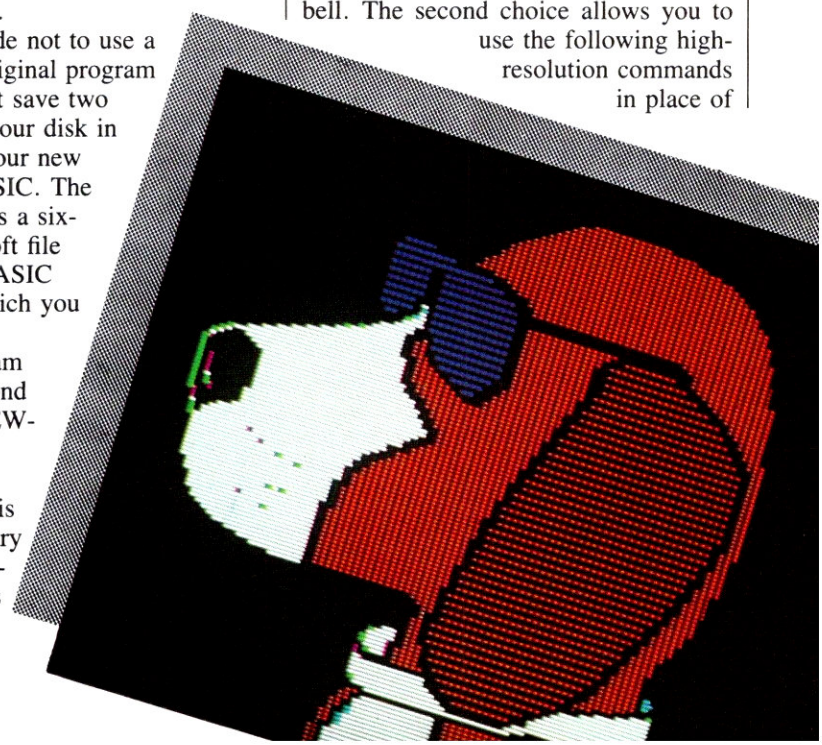
Depending on how much memory you have and what changes you want to make to Applesoft, NEWBASIC need only occupy 56 sectors on your disk. You could take the Beagle BASIC disk and transfer the necessary files using the NEWBASIC provided by Beagle itself, without making any modifications—Applesoft would still be improved.

What Can Beagle Give Me?

Replacing the space formerly used by Applesoft cassette commands, Beagle BASIC offers new commands. They include: ELSE, to complement the IF-THEN statement; SWAP, to exchange the values of variables; TONE, to play music without POKES or CALLS; HSCRN, which tells if a hi-res point is on or off; SCRLDN, to scroll the text screen down one line; TXT2, which lets you use text page 2; G2 to allow access to low-res page 2; and CLRKEY, to clear the keyboard buffer.

If you have no intention of using low-resolution graphics in a program, you can trade in the low-res commands, PLOT, HLIN, VLIN, and COLOR=, for any one of the three following groups of commands.

The first choice offers the TEXT and BELL commands. They include: CLLN, to clear a text line; CLDN, to clear text from the cursor to the bottom of the text window; SCRLUP, to scroll text up one line; and BELL, to ring the Control-G bell. The second choice allows you to use the following high-resolution commands in place of



comparable POKE commands: MODE1, to turn on graphics; MODE2, to switch to the text screen; MIX0, for full-screen graphics; MIX1, to split the screen between graphics and text; PAGE1 and PAGE2, for page switches; RESL1, for low-res switch; and RESL2, for hi-res switch. The final option provides cursor commands; CRSU, CRSD, CRSL, and CRSR, to move the cursor up, down, left, or right.

That's not all! You can change the appearance of the cursor to a flashing plus sign while you are in the Escape or Edit mode. You can also change the sound of the bell and modify GOTO and GOSUB to accept variables instead of only line numbers.

In addition, you can rename any Applesoft command or error message to suit your tastes. For example, you can change SYNTAX to TYPO if you wish. You can also affect the listing of your programs to allow for inverse REM statements or change the width of a list from 32 characters to any value between 1 and 40, which can make editing easier.

Adding the enhanced features that you want to Applesoft is not difficult. Beagle BASIC uses menus that are easy to understand.

The program allows you to vary the indentation of Beagle BASIC lists from 0 to 39.

Walking the Dog

Adding the enhanced features that you want to Applesoft is not difficult. Beagle BASIC uses menus that are easy to understand. The first menu displayed gives you a choice of options that include a program demo, updates on the program, and Create NEWBASIC. The Create NEWBASIC option lets you make an enhanced version of Applesoft.

By choosing this option, you are taken to the Create NEWBASIC main menu. It includes: Command Editor, Error Message Editor, List Formatter, Add New BASIC Commands, Other Features, Save NEWBASIC, and Quit. Accessing all the available features for your custom-designed NEWBASIC is simple with the two editors and a keychart template that fits above the top row of keys on your Apple.

You can list both Applesoft commands and error messages on the screen. Using the editor, you can move the cursor around to change any of them quickly. Any changes that you make are limited to the available memory space and must follow many of Applesoft's rules.

The keychart explains the purpose of keys 1 through 0. These become special-function keys when you use either of the two editors. The keychart commands include: Return to Main Menu, Edit, Find, Sort, Token Number, Highlight Commands, Highlight Standard, Normalize, Print Old/New (commands or error messages), and Print Screen. Find moves the cursor directly to a specific BASIC command. Sort temporarily alphabetizes the commands on the screen. Token Number gives you the Applesoft number in hex and decimal for the commands. Highlight Standard shows the standard version of each command or error message that you have changed. Normalize changes the commands or error messages back to their original state.

The last two Keychart commands require a printer. Print Old/New prints a list of all standard and revised Applesoft commands or error messages. This feature is useful, since you might have difficulty remembering exactly what features your NEWBASIC contains. Print Screen prints the current text screen and is useful for printing an alphabetized list of commands.

Limitations

Having the ability to change Applesoft BASIC to NEWBASIC is a great gift from the Beagles, but it's not perfect. Obviously the more you know about Applesoft, the more useful your design of NEWBASIC can be. You must be careful to document the changes that you make. It's easy to get carried away making changes, especially with the error messages, but you must remember what they all mean. Reading programs written in BASIC is confusing enough, without making mysterious changes.

NEWBASIC is not compatible between the IIe and the II or II Plus—each Apple uses a different version.

A few things are tricky. For example, you cannot edit REM statements if you use the inverse REM option—you must type over them. We found no easy way to edit our NEWBASIC once it had been saved to another disk. We had to go back to the Beagle BASIC disk and start again. Make sure that your Caps Lock key is on if you are using a IIe.

Other limiting tidbits include the inability to relocate DOS and to use the top 16K of RAM. These limitations should cause problems for only a few expert programmers.

Perhaps the most limiting aspect of Beagle BASIC is that NEWBASIC is not compatible between the IIe and the II or II Plus—each Apple uses a different version. This means that if you write a program with NEWBASIC IIe, it will not run on the II Plus. You can get around this restriction by creating two versions,

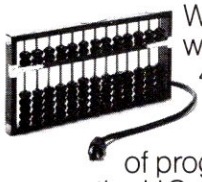
```
]
?WRONGO GOOF
]LIST

5 REM BEAGLE BASIC PROGRAM
10 INPUT ''The capital of New York is '';A$
20 IF A$ = ''ALBANY'' THEN 40 ELSE PRINT ''Sorry the answer is
Albany.''
30 GOTO 45
40 PRINT ''CORRECT!''
45 PRINT : PRINT
50 INPUT ''THE CAPITAL OF New Hampshire is '';B$
60 IF B$ = ''CONCORD'' THEN 70 ELSE PRINT ''Sorry the answer
is Concord.''

65 GOTO 80
70 PRINT ''Totally awesome.''
80 END
```

Figure 1: Sample printout from the Beagle BASIC program.

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one for the IIe and one for the II Plus, and placing both of them on your disk. Although you would use up 106 sectors, it would solve the compatibility problem.

We hope that any revisions of Beagle BASIC will increase the menu of new commands to include PRINTUSING or other common commands not found in Applesoft. We can imagine emulating other established BASIC-language implementations using the Beagle BASIC approach.

If You Don't Like Cute Manuals . . .

Beagle BASIC comes with a concise 40-page manual written by Mark Simonsen and Bert Kersey. It contains instructions on how to use the Beagle BASIC disk, how to enhance Applesoft and add other features, technical notes, some interesting odds and ends, and an index. The Beagle BASIC disk contains some brief notes plus updates to the manual.

Beagle also includes the Apple Tip Book #6 and a PEEKS, POKES, and POINTERS chart. The Tip Book contains extra programs such as a text screen formatter, Cursor Madness, IIe Flickerbug, Printer De-Bugger, and Beagle Blackjack.

These programs are designed to help you get more mileage out of your Apple, to make you a more productive programmer, and to be entertaining. Some of them are on the Beagle BASIC disk, but you must type in others.

Of the extra programs included in the Tip Book #6, we found the text screen formatter valuable. It lets you wander about a blank text screen, placing characters where you want them, properly spaced. After you finish designing your text screen, this program generates the Applesoft code that produces your formatted text screen from a program.

Products such as Beagle BASIC might be heralding the end of unchangeable ROM-based languages that are burned-in at the factory.

The manual is well designed and easy to use. It has been written in a humorous way by people who really understand Apples. We are still looking for the free cash on page 49!

The Beagle Is a Kindly Animal

Beagle Bros is available by phone to answer any questions relating to its products. It also maintains a mailing list and will send you a Beagle Bulletin containing Apple tips and product information. We spoke to the author of Beagle BASIC, who was obviously well informed about the product. The program disk is not copy-protected, so you can make as many backups as you need.

Is the Bark Worth the Bite?

Products such as Beagle BASIC might be heralding the end of unchangeable ROM-based languages that are burned-in at the factory. There is no reason why you cannot pick the commands that you need for any given program and avoid the trade-offs that are encountered when selecting a version of BASIC that comes with your hardware. Since the Apple's processor can access only 64K at a time, why have 16K that you can never alter?

Beagle BASIC is a wonderful software product that can make life easier for experienced Applesoft programmers or for newcomers. For under $35, it's a rare bargain. ✚

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*Includes word processing hardware & multistation support. †Requires additional CP/M Hardware for your personal computer ($200-600 extra). CP/M is a registered trademark of Digital Research. *VisiCalc ©is a registered trademark of VISIcorp. **Very similar program called Easywriter Professional, available for the Apple II.

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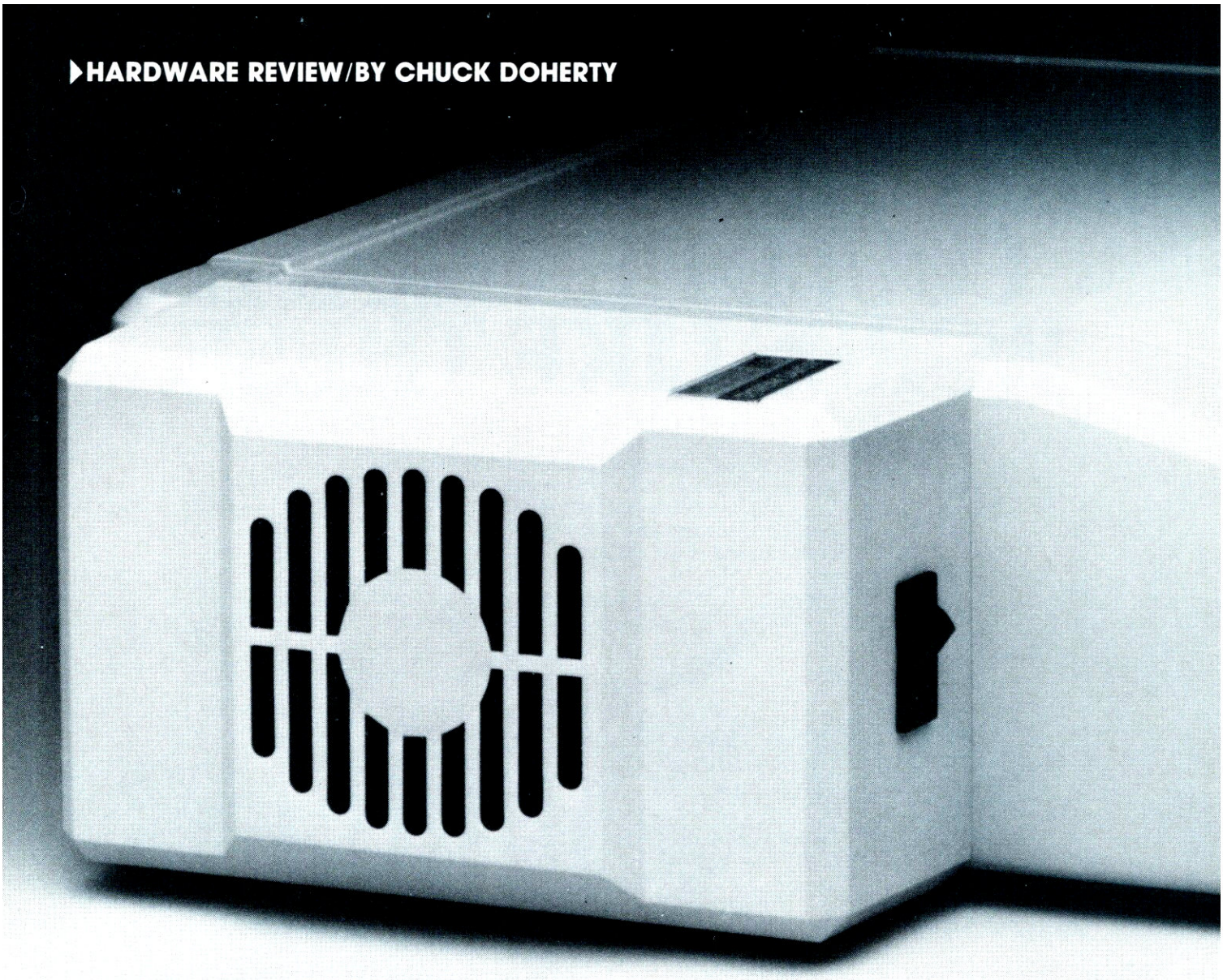
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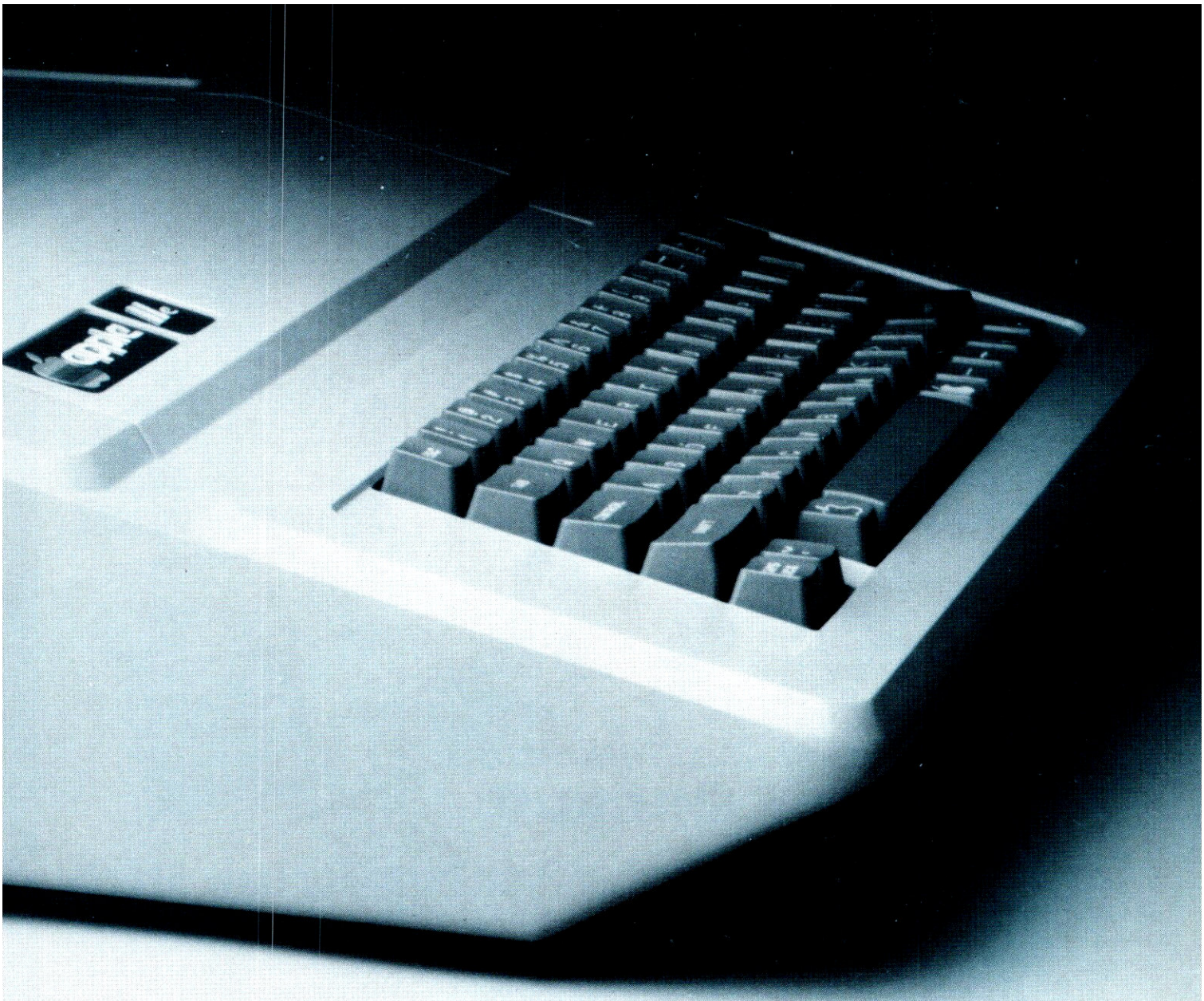
Have you ever stopped to think what an inconvenience, not to mention expense, it would be if your computer system were to need major service? And what about your data—could you even put a price on some of that?

Even when you carefully follow good data-processing practice, such as making backup copies of your work and protecting your diskettes from damage, there can be times when problems occur or data is lost without an apparent cause. Perhaps some of those problems stem from a source to which you have given little thought—the power line.

The majority (between 70% and 90%) of all microcomputer malfunctions can be traced to power-line problems. Although computer installations in older buildings (often with poor grounding and questionable wiring) can be especially troublesome, even those in the most modern structures can have problems stemming from the power source. Can you really trust the signal coming from your local power company to be totally pure, completely free from surges in voltage and "spikes" of noise? You will be in for trouble if you do!

System Saver is a device that can protect your Apple computer from the most savage power-line fluctuations, while providing relief from another great enemy of computer hardware—heat.

System Saver hangs from the ventila-



tion slots on the left side of the computer. You don't need to lift the Apple's cover to attach this device; you simply slide it on, and the mounting tabs hold it snug. Its matching color and texture make System Saver look like an integral part of the system. To connect it to your Apple, you unplug the standard line cord, place the Apple's on/off switch in the *on* position, and plug in the System Saver.

The level of protection System Saver provides is impressive; voltages as high as 1750 volts DC are safely blocked, and the output voltage never exceeds 130 V RMS. It can even handle a current peak of 4000 amps. A heavy-duty metal-oxide varistor is at the heart of System Saver's protection circuitry. This device responds to voltage surges in less than 50 billionths of a second, fast enough to prevent damage to computer circuitry. In addition to overvoltage protection, a PI-type filter eliminates almost all traces of troublesome high-frequency noise, often present on the incoming line voltage.

When the power-line voltage is stable, System Saver stays busy by moving 17 cubic feet of air through the Apple's cabinet every minute. Proper air flow and ventilation become especially important when the expansion slots in the Apple are filled with accessory cards for printers, disk drives, and additional memory. Not only do these cards produce heat, but they can also put additional strain on the power supply and reduce air flow through the cabinet.

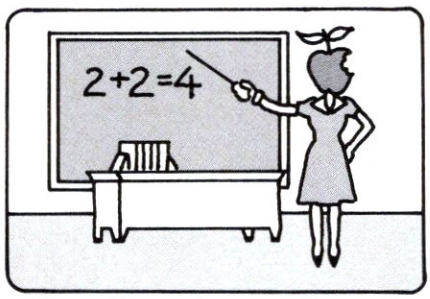
System Saver's main power switch is mounted on the front of the device. This switch controls not only power to the computer itself, but also to two additional devices plugged into electrical sockets on the back of the module. In a typical system, you can connect the video monitor and printer through System Saver, allowing one-switch operation of the entire system.

Although System Saver is an excellent add-on for any Apple, it is indispensable to those who handle valuable data or use many heat-producing peripheral cards. It is a well-built, carefully engineered product and provides ample protection from what can be a serious problem. ✚

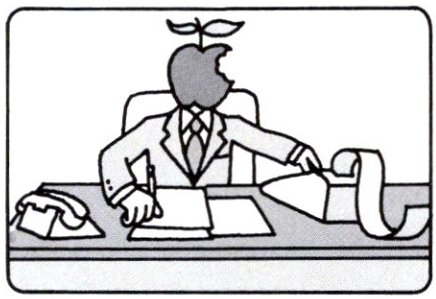
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Rated current:	9 amperes
Temperature range:	−25C to +85C
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Max. average power dissipation:	.6W
Energy rating:	40 joules
Current peak:	4000 amperes
Response time:	<50 nanoseconds
Maximum ambient temp:	60° C
Noise-rejection freq.:	600KHz–30MHz
Attenuation:	30–50db
Cooling rate:	17 cu. ft./mn.

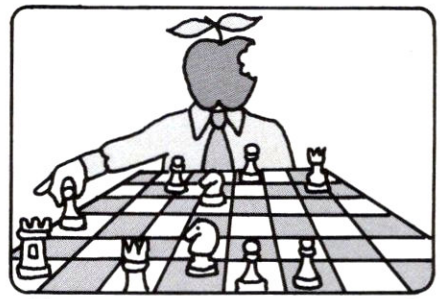
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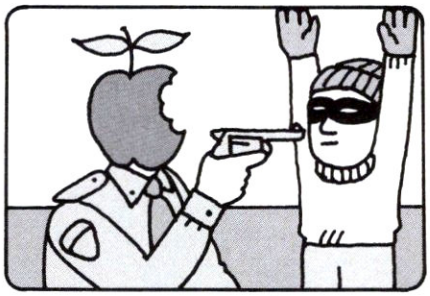
A schoolteacher?



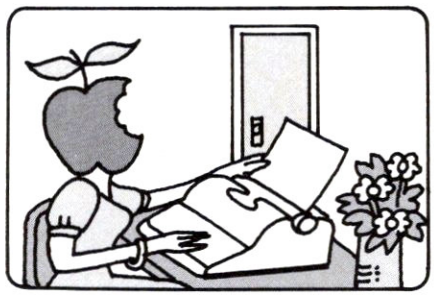
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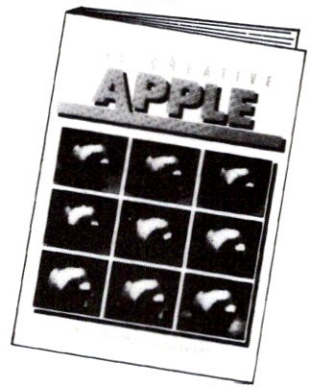
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▸ SOFTWARE REVIEW/BY CHRIS ALBERTSON

THE APPLE III CAST OF CHARACTERS

Patient computerists can have an unlimited choice of fonts.

If you have Apple Business BASIC or Apple Writer III, you have probably noticed the alternate fonts built into the programs. Although seeing your text change from standard to slant to practically unreadable Gothic is interesting, the value of such fancy pixel work is questionable unless you can direct the result to a printer. Granted, if you have written a program and want to distinguish one portion of your text from another, changing fonts on the screen can be both useful and aesthetically pleasing. If it is restricted to screen output, however, the feature adds nothing to a word processor such as Apple Writer III.

When I acquired that program a couple of years ago, I wondered why it offered a choice of four additional fonts. The answer is, of course, that the program's developers at Apple Computer, along with authors Paul Lutus and Liane Finstad, were preparing for the day when screen images could be reproduced on paper.

Enter PKASO

That day is here, and although other methods are available, the most satisfying answer to the problem of printing out special fonts is, so far, PKASO, a card by Interactive Structures, Inc., of Bala Cynwyd, Pennsylvania. With the proper drivers, this product is as effective a peripheral for the Apple III as it is for the II Plus and IIe. William O'Brien, in the December 1983 issue of *A+*, has already discussed some of the PKASO card's virtues as applied to the Apple III ("A Thousand Words Is Worth a Picture"), so I will not dwell on it here. I mention this product, however, because it can turn what essentially was a gimmick into a truly practical feature. If you have a daisy-wheel or thimble printer, the extra fonts are still of little use, but armed with a graphics-equipped dot-matrix printer, you will see those extra fonts in a new and practical light. You need not restrict yourself to the Apple's regulation fonts, though, because software is available that allows you to create your own. With a good font generator, you can write letters in exotic languages, design your own symbols, and even create logos.

The number of Apple III software packages has not grown at anything near the pace of what you can get for the Apple II and IIe, but there is more out there than most of us realize. Thus, Apple Computer recently published "Will Someone Please Tell Me What an Apple III Can Do?," a 100-page booklet listing over 300 software products for the Apple III. Among them are three font-generating programs, which I have examined with disparate and, in one case, disappointing results.

With a good font generator, you can write letters in exotic languages, design your own symbols, and even create logos.

Most of the better dot-matrix printers are already outfitted with a selection of fonts, but even the most versatile machine often lacks the very symbol or character you need. My new Okidata 92, for example, has a Danish DIP switch setting, which finally solves the problems I have had when writing in that language, but I also occasionally need to write in Icelandic, and here I encounter even greater difficulty, for several of the Old Norse characters are unique. My first goal—once I learned how to work the programs—was, therefore, to create the characters I needed to print my father's name, which, out of necessity, had hitherto appeared in the unsatisfactory form of "Thordur."

Apollo Delivers

Before you can run Apollo Software's Font Generator III (FG III), you must boot a copy of Apple III Business BASIC and go through a small ritual that involves loading FG III and deleting from it line 6 (PERFORM GLOAD."/FONTMAKER/APOLLO"). Or, to save future time and effort, use the System Utilities program to create a new, bootable diskette by combining all the FG III files with the necessary ingredients from the Business BASIC program. Both procedures are simple and well explained in the accompanying 12-page documentation, which could be written in better English but still is easier to understand than many instruction manuals from major software houses.

Once it's running, Font Generator III is menu-driven and straightforward. The disk already contains the fonts that come with Apple Writer III and Apple Business BASIC (i.e., standard, Apple, byte, Roman, stop, Gothic, slant, inverse), and pressing the right-arrow key starts an automatic search feature that neatly brings up the font filenames, one at a time. You can then load these fonts by pressing the Return key. You can also conjure up fonts of your own creation with the right-arrow key, but only if you have saved them with the .FONT suffix. FG III saves fonts as text files and uses the filer from the System Utilities disk, which lacks Pascal's A)lter command. If you have the Pascal filer, just change the suffix from .TEXT to .FONT.

All these procedures will become academic when Apollo releases its promised Pascal version of FG III, which should also be somewhat faster. Registered owners will be able to get the upgrade at

a minimal charge.

Once you have loaded a font into memory, you must place it into a temporary menu of active (i.e., loaded) font files. You can reach this temporary font menu at any time through option 3 of the main menu. Calling up a font produces a complete listing of the characters and their respective ASCII numbers and gives you a chance to see how the font looks in actual use; with the listing still on your screen, you can start typing to test the font. Pressing Return does just that—it returns you to the main menu. You can then try another font or move on to some of the program's more interesting features.

Plotting Pixels

Now for the creative process. If designing a new version of the alphabet seems too ambitious a task, you might start by modifying an existing font. That's what I did in order to create the

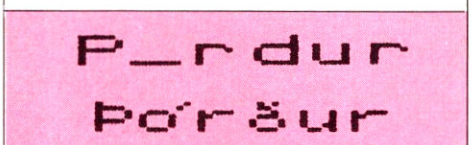


Figure 1: This Icelandic character was created by copying the letter P and then modifying it.

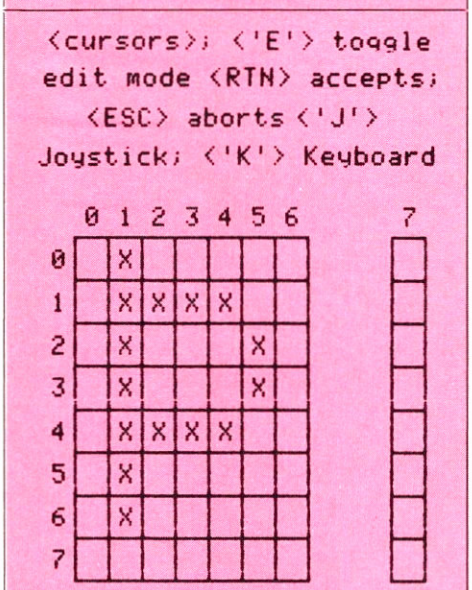


Figure 2: By turning the 'bits' in this 8×8 grid on and off, you can create or modify characters, such as modification in figure 1.

Icelandic characters in my father's name. Option 4 on the main menu gets you into the Create/Modify mode by producing an 8 × 8 grid on which each square represents a bit. By turning bits on and off, you create the character or symbol—it's a simple cursor operation that you can do either with the keyboard or with a joystick connected to the B port in the back of the Apple III. I use The Keyboard Company's Cursor III joystick, and it works well. Saving your work is just as easy, and the program even has a provision for copying individual characters from a saved font. I used that feature to copy the P and then simply modified it to create the first letter of my father's name (see illustration).

Colorful Characters

Font Generator III's author, Steven C. Robertson, designed the program so that you can work in any of the Apple III's three text modes, so you can easily view your handiwork in the various formats.

By changing text and background colors, you can obtain some pleasing combinations. With PKASO and the right sort of printer, you can preserve your creation on paper in all its glory. Several other nice details are incorporated into this program, but I think I have conveyed enough information to express my satisfaction with it.

Sun Data's two-disk Fontwriter is more flexible than FG III, and it is better packaged, but it also costs an additional $35. You don't have to do any reconfiguring—the program disk boots just as it comes, and the second diskette contains 19 ready-made fonts. Fontwriter is actually a set of three utility programs: Letter Set Editor, Picture Set Editor, and Keyboard Editor. The first works much like FG III, except for the lack of joystick control, but it has some added advantages, such as instant display of characters or changes, in their actual size. Both programs also furnish a mathematical definition of each individual character or symbol.

FG III lists integers and hexadecimal bytes; Fontwriter displays the binary, decimal, and hexadecimal values of each character's bit pattern. If you lack a PKASO card or some equivalent hardware or software tool, the latter feature takes much of the drudgery out of downloading characters to printers such as the Okidata 92/93 or Epson's FX series.

Getting a Broader Picture

Fontwriter's Picture Set Editor opens the door to intriguing possibilities by letting you create a continuous image comprising 35 7 × 8-pixel font characters. This feature can be handy for creating logos (up to seven characters wide and five characters high), any characters larger than 7 × 8 pixels, or a graphic image.

Granted, you can draw much fancier graphics using other methods, but Fontwriter lets you do it in the Text mode, which is what makes this feature so interesting. Having graphics in the Text mode means that your images will be generated faster and that you can totally integrate text and picture. By changing a subset of the characters quickly, you can even create animation on the screen—I have not tried this yet, but the manual says it's possible, and I believe it.

The keyboard editor is a useful utility that lets you completely customize the Apple III's keyboard by editing existing keyboard files. Two such data files, Dvorak and Sholes, come on the font diskette.

Following a simple set of instructions, you can change the ASCII value of any key, assigning it up to four new values: the key alone; with shift; with control; and with control *and* shift. Thus, you have plenty of room for those special characters you have created, and you don't have to go the usual route and

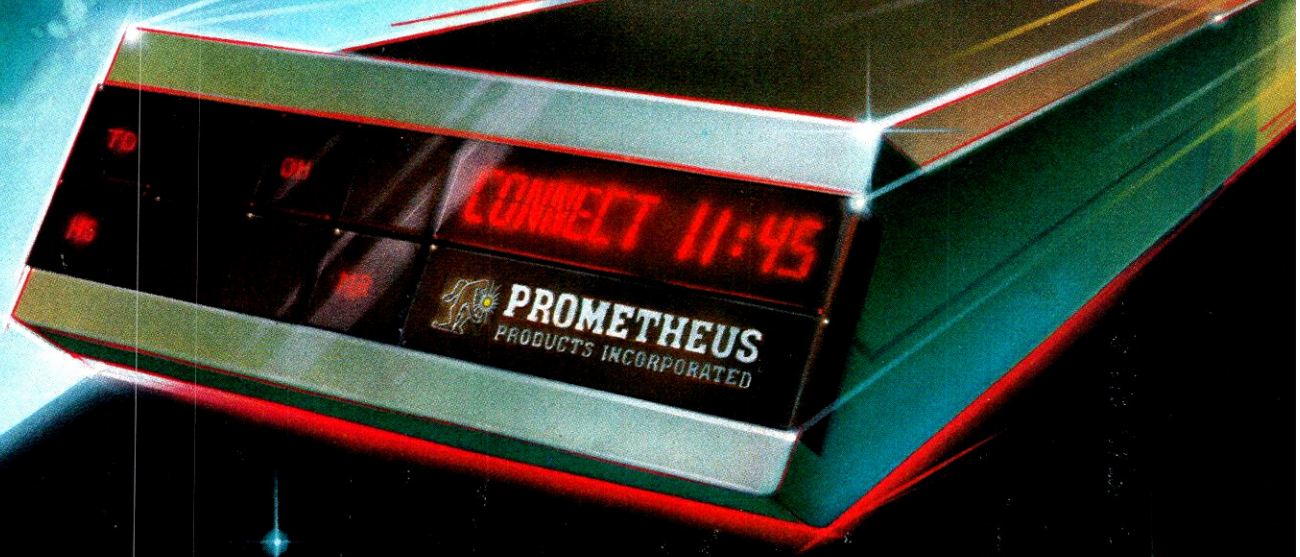
Fontwriter's Picture Set Editor opens the door to intriguing possibilities by letting you create a continuous image comprising 35 7 × 8-pixel font characters.

replace some of the rarely used (but possibly needed) characters. You can also, for example, change your keyboard from the standard Sholes to the faster Dvorak layout and create a new SOS.Driver file that automatically installs the new layout each time you boot the disk. You would have to change your key caps around, but that is not difficult as long as you leave the wider keys alone. If you have ever had to put a space bar back in its sockets, you know what I mean.

Challenging Characters

Finally, we have the Charset System Character Set Editor (Charset) from Power Tools. You must have Apple III Pascal to run this program, and the instructions are only for those who have had experience with Pascal. My own experience with Pascal is limited, but I have several years' practice interpreting complex, often poorly written computer manuals and have yet to see one that I couldn't eventually figure out—until I came across Charset, that is. When three long evenings spent with the program had yielded me no more than a directory of the disk, I took advantage of author Al

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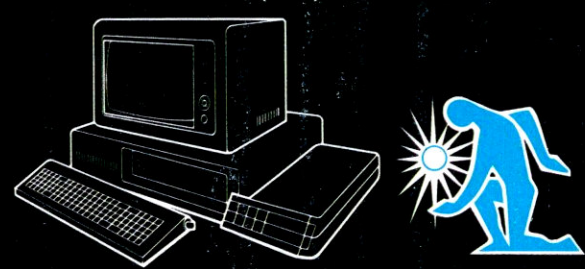
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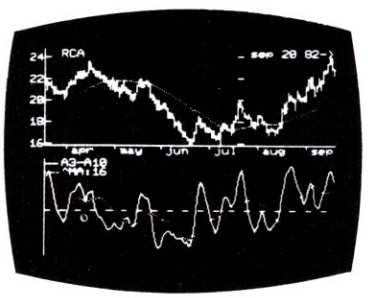
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1	Print VisiCalc models with variable-width columns!		
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Evans' offer to give him a call at home, an invitation he extends to all his customers and which, according to Evans, has yielded nothing but compliments so far.

Unfortunately, my call proved to be the exception. The ritual involved in getting Font Generator III going was child's play compared with the job of figuring out the short, two-paragraph instructions that accompany Charset, so I assumed I could easily solve the problem if I had the author guide me step by step through the procedure. Wrong! Evans was very willing to help, but he had been running his program from a ProFile hard disk for so long that he had all but forgotten how to load it from mere floppies. He searched his memory, and I taped his

The keyboard editor is a useful utility that lets you completely customize the Apple III's keyboard by editing existing keyboard files.

recollections, but it took me still another day to get results.

Once I found the key, the procedure was relatively simple, if somewhat time-consuming. You have to create disks for a two-stage Pascal boot, which means having to use three disks each time you run the program. Is it worth it? Not really. Granted, Charset is faster than Font Generator III, but it contains essentially the same features—including the joystick option—and I cannot imagine anyone being in such a hurry to create or alter fonts that the few seconds saved by the speed of Pascal would make much difference.

One nice feature of Charset is the on-line set of instructions—they are as clear and concise as the boot-up directions should have been.

Conclusions

Summing up, all three programs perform well the tasks for which they were designed, but my nod goes to Fontwriter—the extra $35 is well spent, considering the easy access and the sophistication of the program. While FG III and Charset cost the same and perform equally well, I opt for the former, because it requires less preparation, but the true Pascalite will probably want the latter. ✚


WASHINGTON (UPI) — The U.S. Air Force/NASA have developed an experimental spacecraft given the title XTM. Due to the vague description as to the design or purpose of the XTM, the press is still in the dark about many aspects of the craft or its intended mission. It has been discovered, however, that at least three pilots have been lost in the current flight testing program of the mysterious
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THE GRAPH

The 64K version of this animation system and graphics editor lets you combine graphics, animation, and text.

TGS: THE GRAPHIC SOLUTION
64K Version
Accent Software, Inc.
3750 Wright Place
Palo Alto, CA 94306
(415) 856-6505

System Requirements:
Apple II or IIe with ROM Applesoft
64K RAM
One or two disk drives
DOS 3.3
Color TV or monitor (optional but recommended)
Printer (optional)

List Price: $149.95 and $10 for a demo disk
$35 for each Expansion Module

Animated characters on a computer's TV screen can be fascinating, but for most of us, writing programs that display animated pictures on a high-resolution grid may be as fascinating as taking out the garbage.

If you have ideas that you would like to bring to life, you may want to purchase a high-resolution-graphics utility. Who could criticize you if you are not masochistic enough to hibernate for the countless hours required to program even the crudest animation from scratch? Of course, we assume that you already rank as a genius-level programmer with advanced abilities in assembly language. Perhaps TGS: The Graphics Solution can help you.

Although it's not as easy as imagining your creations and watching them come to life on the screen, TGS is a lot easier than brute-force programming. You must be willing to spend a few hours learning the program before actually using it, and the more you know about BASIC, the more useful TGS can be.

Journey through TGS

TGS is an animation system and graphics editor that combines graphics, animation, and text. With keyboard commands, you can build bit-map shapes that you can animate and then edit as if you were making a movie.

This program is compatible with other graphics programs that save high-resolution screens or pictures as regular DOS 3.3 files. Thus, you don't have to recreate shape tables and other hi-res pictures that you already have.

You are not limited to the TGS keyboard drawing modes. You can use the KoalaPad Touch Tablet or the Gibson Light Pen if you purchase the appropriate expansion module ($35) from Accent. We received the KoalaPad module and found that we could create some backgrounds more quickly. At times we preferred the greater control provided by the keyboard, however.

TGS comprises two basic modes: drawing shapes and animation. You draw shapes by using a series of keystrokes on either the low-resolution or high-resolution screen. Low-res drawing is useful because it magnifies the shapes, making them easier to refine. In the Low-res mode, you plot and erase dots or lines to create a shape. You can then move the low-res shapes to the hi-res screen.

IC SOLUTION

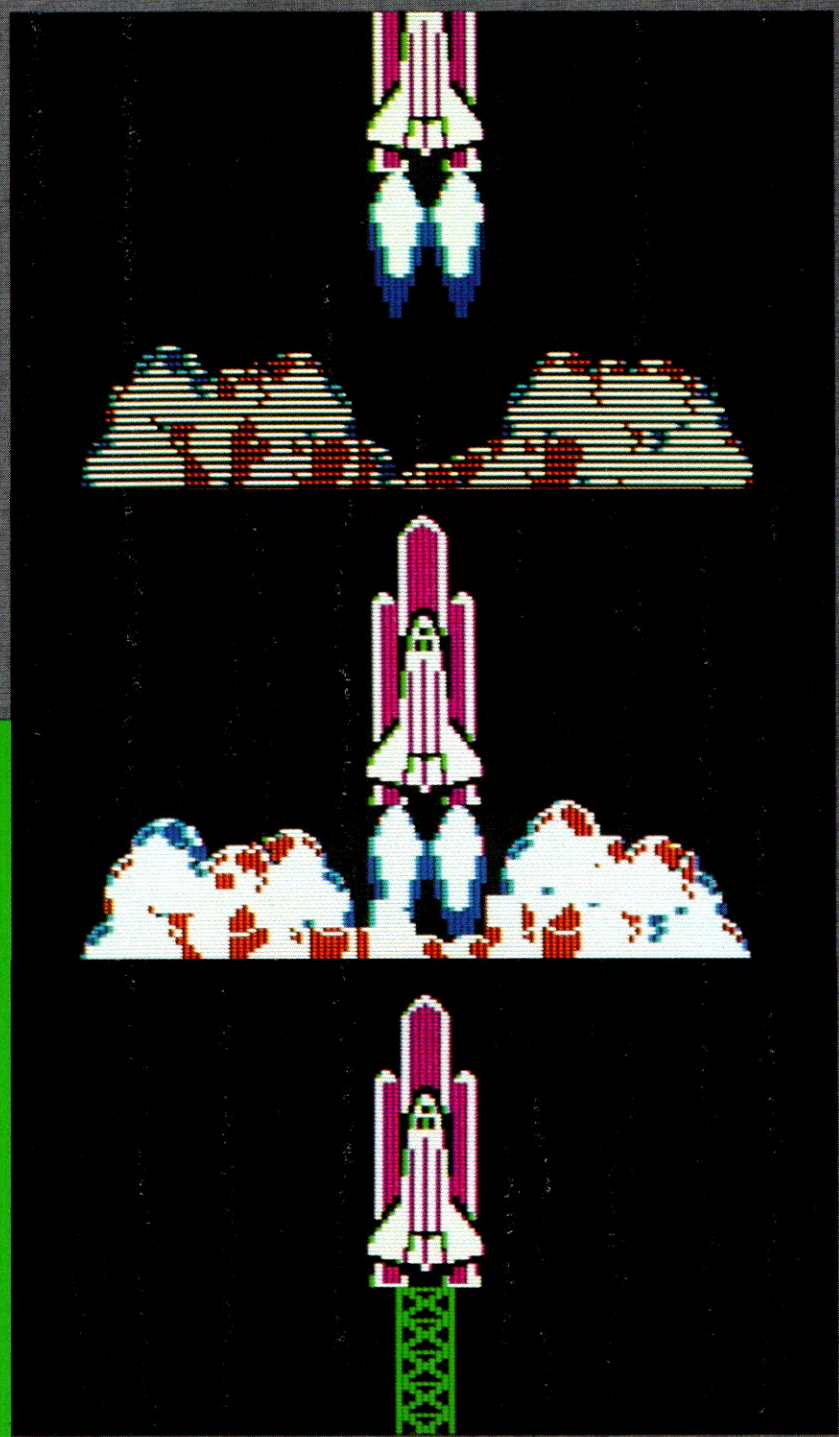
When you copy low-res shapes to the hi-res screen, you use a 35 × 39-dot window. If you wish to animate larger shapes, you must treat them as two or more smaller shapes, unless you want to increase the size of the animation window. We recommend neither approach until you gain proficiency with the TGS system.

As experienced low-res programmers realize, moving a low-res grid of dots to the hi-res screen causes some distortion, since low-res dots are rectangular. Adapting to this stretching of our low-res shapes is not too difficult. KoalaPad users can avoid this distortion—since shape making involves large hi-res dots with a window in the corner of the screen, you can see what the shape looks like in hi-res as you work.

You use the Hi-res mode for all animation by moving a rectangular window with your shape inside around the screen. You can add any portion of the hi-res screen to your table of shapes and create shapes that are shifted horizontally by a single dot. You use a series of specific keyboard commands to animate shapes when they are placed in the window.

You can save your animated sequences to your own data disks and show the sequence if your disk contains a file called Projector that comes with the TGS package. The Projector needs only 48K of memory to run. Thus, you need the program disk only for the creation of animation sequences or shapes.

The TGS package contains two disks and a manual. The disks have programs on each side, including two identical program disks that are copy-protected. The flip sides contain a running demo of animated sequences for different applications and several animated sequences that you can use with the manual as you learn the system. Neither the demo nor the sequence disk is copy-protected. Damaged disks will be replaced if you



have proof of purchase and pay $10.

Moods and Modes

TGS operates in seven different modes: Low-res, Hi-res, Show, Speed, Line, Text, and Circle. The Low-res and Hi-res modes serve as the main part of the program since you do all creating and animation with them. You can combine all shapes, lines, circles, text, and backgrounds to achieve your graphic objectives with these two modes.

Using the Show mode, you can edit and display your animated sequences. In this mode you can cut frames from or add them to your films. A submode of Show is the Speed mode. Here you can adjust the timing value of the film. You can manipulate the time delay between individual frames or shapes. Timing values range from 0 to 248 with an increment of 8.

You can draw directly on the hi-res screen while you're in the Line mode. This mode is useful for drawing long lines, big boxes, or any other shape that is too large for the 40 × 40-dot Low-res mode. You can animate multiple shapes also.

The Text mode lets you add text to a sequence or background. You produce text in the Hi-res mode and enter it directly from the keyboard. The Circle mode draws circles but also includes the functions of the Line mode.

A Complex Program

TGS lets you do many interesting things, but you have to use a series of keystrokes that can become complex. To avoid long series of keystrokes that you wish to repeat, you can create a macro command. A macro is an instruction that allows you to combine several commands into one keystroke as you build a specialized graphics command. Unfortunately, you cannot save any of your macros to your data disk, and only one can reside in memory at a time.

As you begin to create either your background pictures or animated sequences, you should save them to a data disk, which can be any DOS 3.3 initialized disk. Backgrounds and sequences are saved differently on the disks—sequence file names automatically have the suffix .S added to them. Sequences are saved to the disk in a special packed form, but backgrounds are not compressed. To avoid frustration with your developing project, try not to confuse these two features.

Fast Animation, Strange Keystrokes

The animated sequences or films you make with The Graphic Solution are fast, and you can control the speed precisely. TGS makes DRAW and XDRAW an unpleasant memory. Only one character set comes with the program, however, so you must resort to hi-res shapes if you want more variety.

The strange keystrokes of this program complicate the animation process. Key assignments seem arbitrary: You have to use the space bar to go back and forth between the Show and Hi-res modes and Control-Z to snap a frame into your movie, for instance.

Keys for creating shapes in the Low-res mode are primarily on the left-hand side of the screen, making us wonder if the programmer is left-handed. For example, the A,W,D, and X keys control cursor movement. We found this setup to be awkward for right-handers used to the I,J,K, and M keys. You must press the space bar each time you change between modes that plot or erase graphics, or just move the cursor. We would have liked an option of choosing a right-hand set of cursor movements.

TGS works well on the Apple IIe but does not take advantage of the new keyboard features. Future revisions might put the arrow keys or Delete key to good use.

TGS makes DRAW and XDRAW an unpleasant memory.

Is It Easy Enough for Me?

If you can write simple programs in BASIC, you can use TGS with some practice. The reverse is also true. We can imagine someone learning TGS first and then picking up the necessary BASIC expertise as needed.

Remember, there is no substitute for hard work, cleverness, and imagination. You must plan your work carefully and perhaps use the storyboard technique that cartoonists often use. Only you can decide on the subject of the film, shapes, backgrounds, text, or animation. If you consider the range of features that TGS offers, it is easy to use.

Lost in a Series of Options

With such a complex program, it is easy to get lost as you move from one mode to another. You can call up an execution menu similar to a help screen by pressing the Escape key. This menu tells you what commands are available in your present mode and can even take you back to the main menu. We could not crash the program and were always able to get back to either the Low-res mode or the main menu.

We had few problems getting all of the various options and keystrokes to work. If you are using a nonstandard operating system, however, you may not be able to use the main-menu option to save the Projector file to your data disk. You can resort to the FID program on the system-master disk to transfer the Projector file and other TGS text files from the unprotected demo and sequence disks.

Licensing Agreements

Because of the Projector program, you do not need the TGS program disk to show your films. For your personal use, you can make as many copies of your film as you need. If you are using your film for commercial purposes, though, you must obtain a licensing agreement from Accent Software prior to publishing a program containing the company's Projector file. You will find the staff to be helpful and knowledgeable about licensing as well as all aspects of the product.

TGS Tutorial

TGS includes an excellent, well-organized manual of 207 pages. It clearly explains all of the program's features, including setting up your computer; saving and retrieving files; descriptions of the seven modes and a summary of their commands; detailed tutorials and exercises, using advanced features; and using the Projector. Five appendices contain a memory-utilization map, answers to the practice exercises, suggested peripherals and software, descriptions of the expansion modules, and information on how to use the sequence disk.

The manual includes a series of lessons that allow you to create an animated sequence. This well-written tutorial should help you develop a general understanding of the TGS system.

In addition to the written documentation, both the demo and sequence disks contain examples of how TGS functions. The only improvement we can suggest is that a more detailed tutorial on storyboards and planning your work be included.

A Useful Tool

The Graphics Solution does not pretend to do everything. Alone, it has many abilities and a few limitations. If you use it along with utilities that specialize in creating backgrounds and filling areas with color, you will be able to create even better animation. To date, a variety of institutions including Scholastic Magazine's *Microzine*, the National Dairy Council, and the U.S. Army Intelligence School have taken advantage of TGS's computer graphics. ✚



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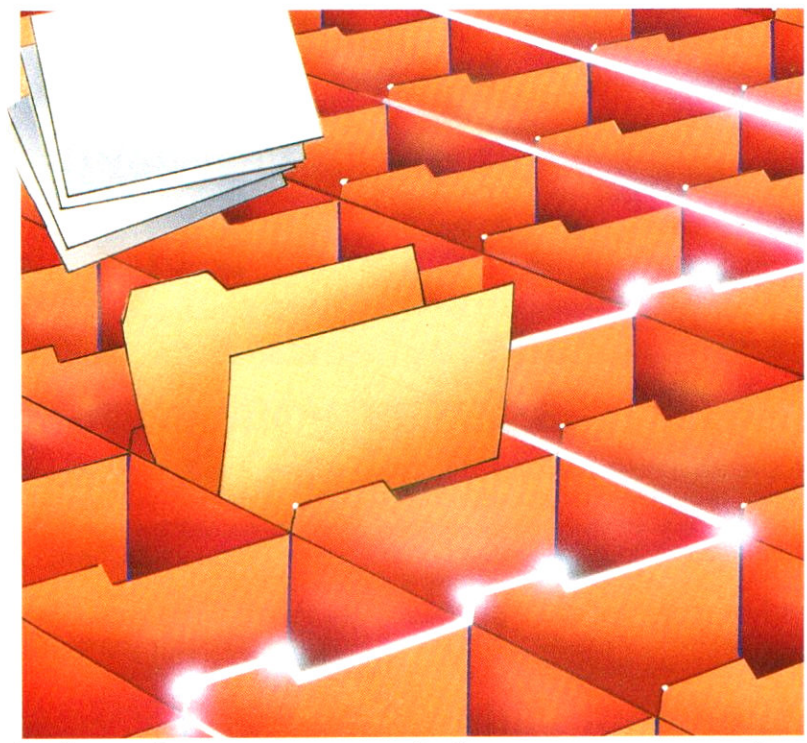
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CIRCLE 500 ON READER SERVICE CARD

This book presents a variety of VisiCalc routines that perform tasks found in an individual's or a small business's financial activity. It includes programs for record keeping; creating financial, budget, and sales reports; and for applications related to real estate, manufacturing, and taxes.

The spreadsheets included in this book were designed according to principles of structured documentation. The programs are in an easily understandable format, including indentations that highlight a program's structure. Parentheses are used consistently in mathematical formulas, rather than writing programs in a way that depends on the order of operations built into a software system.

In this book excerpt, a Sales Register is created as the first example of using VisiCalc. This is followed by instructions for setting up a Check Register, which is then converted into an Expense Register. Other examples involve formulas for analyzing investments, such as bonds.

SALES REGISTER

We will begin by using the VisiCalc program to design a sales register. We start with this example because it is relatively simple and introduces many of the concepts that we will be using throughout this book.

Application Example

Let's assume that you own a small bakery that sells to both wholesale and retail customers. You want to record your sales on a daily basis. For wholesale transactions you plan to record the invoice number, the date of the sale, the customer's name, and the amount of the sale. For retail sales you plan to enter daily sales figures from a cash register tape. You want to compute monthly totals; and you plan to initiate a new register each month.

Spreadsheet Design

The easiest way to plan the layout for this type of display is to sketch out a design on a sample VisiCalc spreadsheet and then add sample data. Figure 1 shows a preliminary layout for this example. In this figure, we can see that the "SOLD TO" column must be wider than we had originally planned. We must use a double column. In addition, to ensure that the invoice numbers do not overlap the customer names, we must use the LEFT FORMAT (/FL) command. (*Remember:* labels are automatically left-justified, and numbers right-justified.)

A corrected and completed spreadsheet appears in Figure 2. We can use this spreadsheet to compute the net sales figures by adding the sales tax to the amount of sales. The spreadsheet instructions for this display appear in Figure 3.

Spreadsheet Instructions

Let's now refer to Figure 3 and examine each instruction.

We begin the spreadsheet instructions by writing

```
/CY
/SL MASTER.VC
/GF$
```

The first instruction, /CY, performs five tasks. It erases any

```
DATE     INVOICE  SOLD TO   AMOUNT   TAX      NET
 1/4        1000  RISTORANTE 100               100
```

Figure 1: Preliminary layout for sales register

	A	B	C	D	E	F	G
1							
2				MYCO INC.			
3				415 WEST HARRISON STREET			
4				JACKSON CALIF. 94223			
5							
6				SALES REGISTER			JAN. 1982
7	DATE	INVOICE	SOLD TO		AMOUNT	TAX	NET
8	1/4	1000	BLUE FOX		100.00		100.00
9	1/4	1001	OSCARS		75.00		75.00
10	1/4	1002	DOROS		60.00		60.00
11	1/4	1003	KNNIES		125.00		125.00
12	1/4		CASH		351.40	22.84	374.24
13	1/5	1004	BLUE FOX		90.00		90.00
14	1/5	1005	DOROS		85.00		85.00
15	1/5	1006	KNNIES		130.00		130.00
16	1/5		CASH		303.39	19.72	323.11
17	1/6	1007	DOROS		120.00		120.00
18	1/6	1008	OSCARS		80.00		80.00
19	1/6	1009	BLUE FOX		70.00		70.00
20							0.00
21							0.00
22							0.00
23							0.00
24							0.00
25							0.00
26							0.00
27							0.00
28							0.00
29							0.00
30							
31				TOTALS	1589.79	42.56	1632.35

Figure 2: Sales register

current information from the computer memory, sets the default global formats, returns the cursor to the home position, sets the order of calculation to column, and enables automatic recalculation as data is entered.

Note: you will need to press either the RETURN or ENTER key after entering each instruction.

The next instruction, /SL MASTER.VC, loads into the computer memory the master form that we developed. (See figure 1.) The instruction /GF$ ensures that all data appear in dollar and cents format (i.e., that the data appear with two figures to the right of the decimal point).

You may also wish to save your spreadsheets with the entered data. If you do this, however, be sure to use different file names for these spreadsheets.

Next, we enter the labels and formulas that specify the spreadsheet layout. The instructions:

```
C5:SALES D5:REGISTER G5:JAN. 1982
```

create the form title and date.

The column heading for the date is:

```
A7:DATE
```

We enter the invoice numbers in column B. To make a more readable report, we left-justify the invoice numbers. Thus:

```
B7:INVOICE
  B8:/FL
  /R:B9.B29
```

Next, we enter the additional column labels:

```
C7:SOLD TO
E7:/FR
/R:F7.G7
E7:AMOUNT     F7:TAX
```

We right-justify the amount and tax columns to create a neater form appearance.

The net amount equals the sales price, plus the tax. Thus, using a structured format, we write:

```
G7:NET
  G8:+E8+F8
  /R:G9.G29:RR
```

Next, we use the REPEAT LABEL (/—) command, followed by a dash, to draw a line across the bottom of the form:

```
A30:/- -
/R:B30.G30
```

Finally, we compute the total sales by summing the sales column:

```
D31:TOTALS
  E31:@SUM(E8.E29)
  /R:F31.G31:RR
```

We will now save the sales register on diskette. We do this by using the STORAGE (/SS) command. We select a file name, SLREG.VC, that will be easy to recall. We then create a disk file by writing:

```
/SS SLREG.VC
```

Note: be sure to save all your spreadsheet instructions on a VisiCalc diskette, as soon as you enter them into your computer.

You may also wish to save your spreadsheets with the entered data. If you do this, however, be sure to use different file names for these spreadsheets, so that your blank spreadsheet will also be saved. For example, if you call the blank sales register SLREG.VC, you might want to call the registers with data SL1REG.VC, SL2REG.VC, etc.

Data Entry

We are now ready to enter the data. Figure 4 shows a sample data entry: In this example, we have specified the date in label format by using the quote symbol. The invoice numbers appear in integer format because we have used the /FL command. (That's right; try it!)

Note that in the printed example in Figure 2, a string of 0s appears in the net column—even though there are no calculations evident. This is because the VisiCalc program multiplies the blank entries in columns E and F, and generates a 0 result. This has absolutely no effect—other than an aesthetic one—on the report.

Additional Remarks

As it is currently specified, the sales register has 22 rows of data. If you require more rows for your application, you can add them in one of two ways. If you are adding only a few rows, the simplest way is to use the INSERT ROW (/IR) command. Simply place the cursor anywhere in row 29 and type the /IR command as many times as the number of rows you wish to add. The VisiCalc program will automatically adjust all the formulas.

There is, however, a more general procedure for adding a large number of rows. For example, to add 30 rows to the sales register you would use the following sequence of instructions:

```
A30:/R:A30.F30:A60
/B
/R:B30.F30

D31:/B
/R:E31.F31
```

```
/CY
/SL MASTER.VC
/GF$
  C5:SALES              D5:REGISTER          G5:JAN. 1982
  A7:DATE
  B7:INVOICE
    B8:/FL
    /R:B9.B29
  C7:SOLD TO
  E7:/FR
  /R:F7.G7
  E7:AMOUNT             F7:TAX
  G7:NET
    G8:+E8+F8
    /R:G9.G29:RR
  A30:/- -
  /R:B30.G30
  D31:TOTALS
    E31:@SUM(E8.E29)
    /R:F31.G31:RR
```

Figure 3: Spreadsheet instructions for sales register

```
A8:" 1/4              B8:1000              C8:BLUE FOX
D8:100
```

Figure 4: Sample data entry

```
D61:TOTALS
   E61:@SUM(E8.E59)
   /R:F61.G61:RR

G8:/R:G9.G59:RR
```

In the above sequence, the first two instructions move the dashed line to row 60; the next two move the totals; and the final instructions recompute the calculations for the net amount. In general, you can use any of these techniques to extend any of the forms described in this book. You may also use the MOVE (/M) command to relocate rows or columns.

Note: If you intend to use this register for a retail business, you may want to make one more modification. You may want to modify the form, so that it automatically computes sales tax. For example, to compute the sales tax at 6.5%, you would include the following instructions:

```
F7:TAX
   F8:.065*E8
   /R:F9.F29:R
```

Figure 5 shows a sales register with automatic tax calculation.

CHECK REGISTER

Let's now use the VisiCalc program to design a spreadsheet for recording checks and deposits for a one-month period. We will design this register so that it is useful for both business and personal applications.

Application Example

You want to design a check register that will maintain your checking account information for one month. You plan to record the following information: the check number, the date, a description of the check, the amount of the check, the amount of the deposit, and a running balance. You also want to maintain column totals for the CHECK and DEPOSIT columns.

Spreadsheet Design

The layout for the check register is very similar to that of the sales register. Figure 6 shows a sample layout. An example of a completed check register appears in Figure 7.

Spreadsheet Instructions

Figure 8 shows the spreadsheet instructions for this example. Let's examine them in detail.

As before, we begin by clearing the screen, loading the master form, specifying the dollar format, and labeling the title. For this example, we want to calculate the balance after the first check. To do this, we use the following formula:

Balance = Balance Forward + Deposit − Check

For the subsequent balances we use the formula:

Balance = Previous Balance + Deposit − Check

The instruction sequence:

```
G7./FR BALANCE
   G9:+G8+F9-E9
   /R:G10.G29:RRR
```

sets up the required format. The next sequence:

```
C31:TOTALS
   E31:@SUM(E8.E29)
   F31:@SUM(F8.F29)
```

totals the checks and deposits.

Data Entry

Let's now enter the sample data. To do this, we write:

```
A9:100      B9:'' 1/1      C9:ATLAS
D9:REALTY   E9:300
```

Note the following:

- To enter the dates as labels we have used the quote symbol. We have also used leading spaces to separate the date from the check number.
- We have placed the item descriptions in a double column, so that we can easily split long words if necessary. Once a coordinate position is filled, we can then simply move the cursor right and continue to type the item description.

In the completed check register in Figure 7, if a check or deposit is not entered, the account balance will be duplicated. This is due to the way the VisiCalc program performs its internal arithmetic: as you make an entry, the balance changes.

Additional Remarks

As in the previous example, you can add rows to accommodate additional checks or deposits. The simplest way to do

	A	B	C	D	E	F	G
1				MYCO INC.			
2				415 WEST HARRISON STREET			
3				JACKSON CALIF. 94223			
4							
5				SALES REGISTER			JAN. 1982
6	==========						
7	DATE	INVOICE	SOLD TO		AMOUNT	TAX	NET
8	1/4	1000	BLUE FOX		100.00	6.50	106.50
9	1/4	1001	OSCARS		75.00	4.88	79.88
10	1/4	1002	DOROS		60.00	3.90	63.90
11	1/4	1003	ERNIES		125.00	8.13	133.13
12	1/4		CASH		351.40	22.84	374.24
13	1/5	1004	BLUE FOX		90.00	5.85	95.85
14	1/5	1005	DOROS		85.00	5.53	90.53
15	1/5	1006	ERNIES		130.00	8.45	138.45
16	1/5		CASH		303.39	19.72	323.11
17	1/6	1007	DOROS		120.00	7.80	127.80
18	1/6	1008	OSCARS		80.00	5.20	85.20
19	1/6	1009	BLUE FOX		70.00	4.55	74.55
20						0.00	0.00
21						0.00	0.00
22						0.00	0.00
23						0.00	0.00
24						0.00	0.00
25						0.00	0.00
26						0.00	0.00
27						0.00	0.00
28						0.00	0.00
29						0.00	0.00
30	----------						
31				TOTALS	1589.79	103.34	1693.13

Figure 5: Sales register with modifications

NUMBER	DATE	DESCRIPTION	CHECK	DEPOSIT	BALANCE
		BALANCE FORWARD			1000.00
100	1/1	ATLAS REALTY	300.00		700.00

Figure 6: Preliminary layout for check register

	A	B	C	D	E	F	G
1				MYCO INC.			
2				415 WEST HARRISON STREET			
3				JACKSON CALIF. 94223			
4							
5				CHECK REGISTER			JAN. 1982
6	==========						
7	NUMBER	DATE	DESCRIPTION		CHECK	DEPOSIT	BALANCE
8			BALANCE	FORWARD			1000.00
9	100	1/1	ATLAS	REALTY	300.00		700.00
10	101	1/1	BAKERY	SUPPLY	176.55		523.45
11	102	1/1	VALLEY	STATIONER	22.19		501.26
12	500	1/3	DEPOSIT			442.19	943.45
13	501	1/4	DEPOSIT			1000.00	1943.45
14	103	1/5	GOLDEN	DAIRY	122.32		1821.13
15	104	1/6	DELTA	LINEN	23.00		1798.13
16	105	1/6	BAKERY	ASSOC	25.00		1773.13
17	106	1/7	CASH		100.00		1673.13
18	501	1/7	DEPOSIT			412.34	2085.47
19	107	1/9	MW GAS		50.25		2035.22
20	108	1/9	PAC ELECTRICITY		44.18		1991.04
21	109	1/9	PAC TELEPHONE		27.79		1963.25
22	110	1/10	HAROLD	SMITH	100.00		1863.25
23	111	1/12	JACKSON	BEE	18.00		1845.25
24	112	1/12	PEGGY	WATSON	175.00		1670.25
25	113	1/12	BAKERY	SUPPLY	55.00		1615.25
26	114	1/15	PELHAM		28.72		1586.53
27							1586.53
28							1586.53
29							1586.53
30	----------						
31			TOTALS		1268.00	1854.53	

Figure 7: Check register

```
/CY
/SL MASTER.VC
/GF$
   C5:CHECK              D5:REGISTER          G5:JAN. 1982
   A7:/FR NUMBER
      A8:/FI
      /R:A9.A29
B7:" DATE                C7:DESCRIPTI
   D7:ON                 E7:/FR CHECK         F7:/FR DEPOSIT
   G7:/FR BALANCE
      G9:+G8+F9-E9
      /R:G10.G29:RRR
A30:/--
/R:B30.H30
C31:TOTALS
      E31:@SUM(E8.E29)
      F31:@SUM(F8.F29)
```

Figure 8: Spreadsheet instructions for check register

NUMBER	MATLS	SUPPLIES	. . .	TAXES	INSURANCE
	1	2		10	11
100	321.21				
101		98.27			
.					
.					
.					
TOTALS	321.21	98.27		100.00	75.00

Figure 9: Preliminary layout for expense register

this is by using the INSERT ROW command. Recall that this command automatically keeps all formulas correct.

You may find it most convenient to maintain a separate

	A	B	C	D	E	F	G	H
1				MYCO INC.				
2				415 WEST HARRISON STREET				
3				JACKSON CALIF. 94223				
4								
5			CHECK	REGISTER				JAN. 1982
6	NUMBER	DATE	CODE	DESCRIPTION		CHECK	DEPOSIT	BALANCE
7				BALANCE	FORWARD			1000.00
8	100	1/1	4	ATLAS	REALTY	300.00		700.00
9	101	1/1	1	BAKERY	SUPPLY	176.55		523.45
10	102	1/1	2	VALLEY	STATIONER	22.19		501.26
11	500	1/3		DEPOSIT			442.19	943.45
12	501	1/4		DEPOSIT			1000.00	1943.45
13	103	1/5	1	GOLDEN	DAIRY	122.32		1821.13
14	104	1/6	2	DELTA	LINEN	23.00		1798.13
15	105	1/6	6	BAKERY	ASSOC	25.00		1773.13
16	106	1/7	6	CASH		100.00		1673.13
17	501	1/7		DEPOSIT			412.34	2085.47
18	107	1/9	5	NW GAS		50.25		2035.22
19	108	1/9	5	PAC ELECTRICITY		44.18		1991.04
20	109	1/9	5	PAC TELEPHONE		27.79		1963.25
21	110	1/10	8	HAROLD	SMITH	100.00		1863.25
22	111	1/12	7	JACKSON	BEE	18.00		1845.25
23	112	1/12	3	PEGGY	WATSON	175.00		1670.25
24	113	1/12	1	BAKERY	SUPPLY	55.00		1615.25
25	114	1/15	7	PELHAM		28.72		1586.53
26								1586.53
27								1586.53
28								1586.53
29								1586.53
30								
31				TOTALS		1268.00	1854.53	

Figure 10: The first part of expense register (check register with expense account code)

register for each month. To do this, you first create a blank check register, by using the spreadsheet specification just described, then you use the STORAGE (/SS) command to make twelve copies of the blank register on diskette. Be sure to give each disk file a different name. For example, you could create files for January, February, and March as follows:

```
/SS CKJAN.VC
/SS CKFEB.VC
/SS CKMAR.VC
```

EXPENSE REGISTER

We will now show how data from one display can become a

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- Protected files may be backed-up by user

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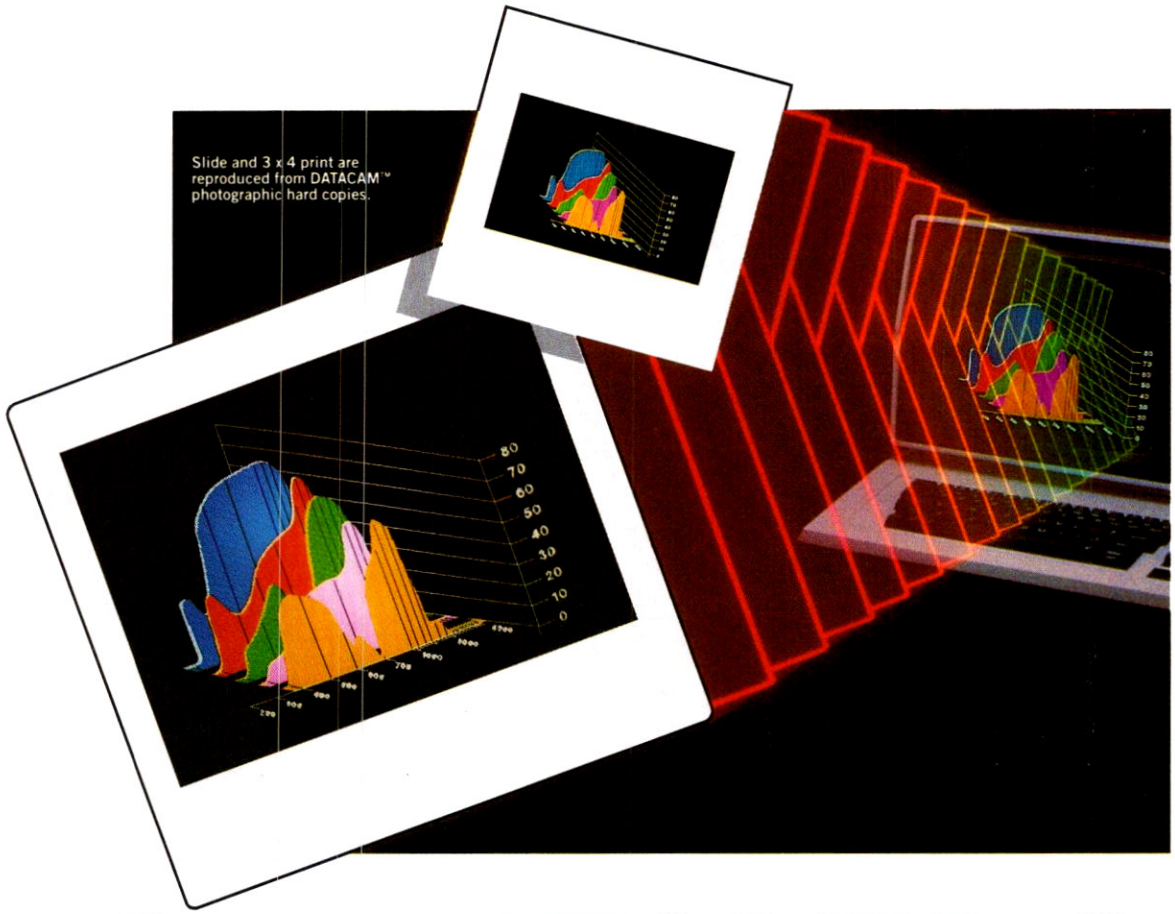
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1						
2						
3						
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5					EXPENSE	REGISTER
6	==========	==========	==========	==========	==========	==========
7	NUMBER	MATLS	SUPPLIES	PAYROLL	RENT	UTIL
8		1	2	3	4	5
9	100	0.00	0.00	0.00	300.00	0.00
10	101	176.55	0.00	0.00	0.00	0.00
11	102	0.00	22.19	0.00	0.00	0.00
12	500	0.00	0.00	0.00	0.00	0.00
13	501	0.00	0.00	0.00	0.00	0.00
14	103	122.32	0.00	0.00	0.00	0.00
15	104	0.00	23.00	0.00	0.00	0.00
16	105	0.00	0.00	0.00	0.00	0.00
17	106	0.00	0.00	0.00	0.00	0.00
18	501	0.00	0.00	0.00	0.00	0.00
19	107	0.00	0.00	0.00	0.00	50.25
20	108	0.00	0.00	0.00	0.00	44.18
21	109	0.00	0.00	0.00	0.00	27.79
22	110	0.00	0.00	0.00	0.00	0.00
23	111	0.00	0.00	0.00	0.00	0.00
24	112	0.00	0.00	175.00	0.00	0.00
25	113	55.00	0.00	0.00	0.00	0.00
26	114	0.00	0.00	0.00	0.00	0.00
27	0	0.00	0.00	0.00	0.00	0.00
28	0	0.00	0.00	0.00	0.00	0.00
29	0	0.00	0.00	0.00	0.00	0.00
30	----------	----------	----------	----------	----------	----------
31		353.87	45.19	175.00	300.00	122.22

	O	P	Q	R	S	T
1						
2						
3						
4						
5						
6	==========	==========	==========	==========	==========	==========
7	MISC	ADVT	LEGAL	ACCT	TAXES	INS
8	6	7	8	9	10	11
9	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00
13	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00
15	0.00	0.00	0.00	0.00	0.00	0.00
16	25.00	0.00	0.00	0.00	0.00	0.00
17	100.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00
19	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00
21	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	100.00	0.00	0.00	0.00
23	0.00	18.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	28.72	0.00	0.00	0.00	0.00
27	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00
29	0.00	0.00	0.00	0.00	0.00	0.00
30	----------	----------	----------	----------	----------	----------
31	125.00	46.72	100.00	0.00	0.00	0.00

Figure 11: Expense register

```
/CY
/SL CKREG.VC
M5:EXPENSE                N5:REGISTER
C7:/IC
C6:/- =
/R:D6.T6
  C7:CODE
    C8:/FL
    /R:C9.C29
I7:/FR
/R:J7.T7
  I7:NUMBER
    I9:/FI+A9
    /R:I10.I29:R
    J7:MATLS
      J8:/FI 1
      J9:@IF(C9=J8,F9,0)
      /R:J10.J29:RNR
    K7:SUPPLIES
      K8:/FI 2
      K9:@IF(C9=K8,F9,0)
      /R:K10.K29:RNR
    L7:PAYROLL
      L8:/FI 3
      L9:@IF(C9=L8,F9,0)
      /R:L10.L29:RNR
    M7:RENT
      M8:/FI 4
      M9:@IF(C9=M8,F9,0)
      /R:M10.M29:RNR
    N7:UTIL
      N8:/FI 5
      N9:@IF(C9=N8,F9,0)
      /R:N10.N29:RNR
    O7:MISC
      O8:/FI 6
      O9:@IF(C9=O8,F9,0)
      /R:O10.O29:RNR
    P7:ADVT
      P8:/FI 7
      P9:@IF(C9=P8,F9,0)
      /R:P10.P29:RNR
    Q7:LEGAL
      Q8:/FI 8
      Q9:@IF(C9=Q8,F9,0)
      /R:Q10.Q29:RNR
    R7:ACCT
      R8:/FI 9
      R9:@IF(C9=R8,F9,0)
      /R:R10.R29:RNR
    S7:TAXES
      S8:/FI 10
      S9:@IF(C9=S8,F9,0)
      /R:S10.S29:RNR
    T7:INS
      T8:/FI 11
      T9:@IF(C9=T8,F9,0)
      /R:T10.T29:RNR
J31:@SUM(J9.J29)
/R:K31.T31:RR
```

Figure 12: Spreadsheet instructions for expense register

	C	D	E	• • •	M
1					
2					
3					
4					
5					
6					
7	CODE	DESCRIPTION	CHECK		RENT
8					4
9	4	**ATLAS REALTY**	**300**		300

Figure 13: Example of a typical expense register

	A	B	C	D	E
1	90000	15000	17000	19000	125000
2	INT				
3	NPV				

Figure 14: Simple VisiCalc form layout

source for another. In this example, we will use data from the check register to allocate expenses automatically. We could allocate the expenses manually; however, it is much easier to use the VisiCalc program to perform the account allocation. We can do this by simply adding an account code to the check information in the check register, and then using the VisiCalc @IF function.

Application Example

Let's assume that you need to keep track of expenses in eleven categories and you want to compute monthly totals. You plan to have the expenses categorized automatically, as you enter information about each check. To do this, you need to add a two-digit expense account code.

Spreadsheet Design

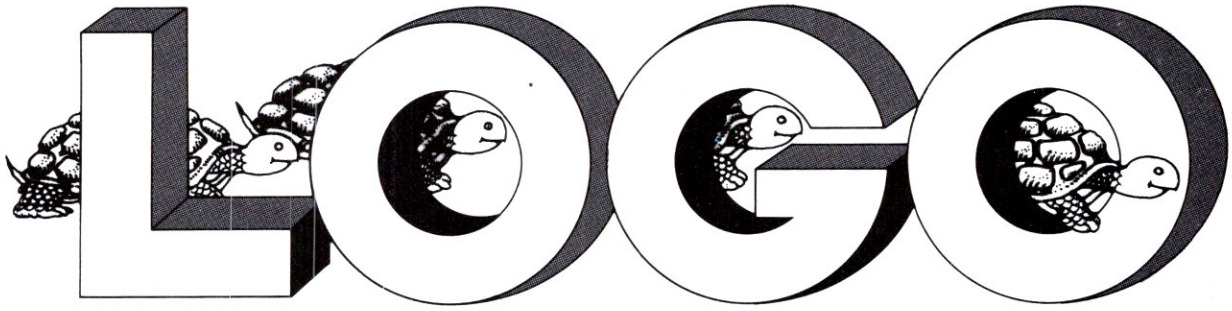
Figure 9 shows a sample layout of an expense register spreadsheet. To record expenses in eleven different categories, we assign one of eleven different account codes to each check; we then use the VisiCalc @IF function to distribute the expenses into their proper columns.

If we store the expense register in the same disk file as the check register, the VisiCalc program will make entries automatically. By carefully aligning the check and expense registers, we can display check and expense account information in one row. As shown in Figure 11, it is best to put the account number below the expense account categories and then align these categories with the row containing the balance forward.

Figure 10 shows the check register with the expense account code added. The expense register appears in Figure 11.

Figure 12 shows the spreadsheet instructions for the expense register. Let's examine them.

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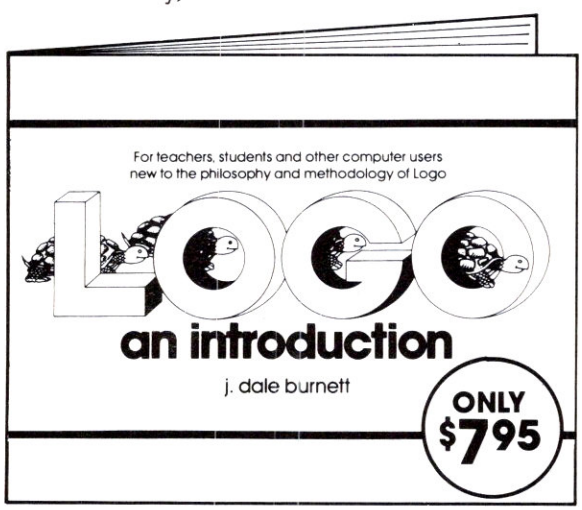
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We use the STORAGE LOAD (/SL) command to bring the check register spreadsheet from diskette. We then specify the title (for the expense register) and the column headings in the usual way. To obtain automatic expense allocation, we next add an expense code to each check. To do this, we must add a column to the check register between the check number and the description. The sequence:

```
C7:/IC
C6:/- =
/R:D6.T6
```

	A	B	C	D	E	F
1						
2			BOND	ANALYSIS		
3		INCOME	TAX	NET		
4	(10.37)	-86.80			IRR	.045
5	MAY 82	5.18	2.59	2.59	PV	86.80
6	NOV 82	5.18	2.59	2.59		
7	MAY 83	5.18	2.59	2.59		
8	NOV 83	5.18	2.59	2.59		
9	MAY 84	5.18	2.59	2.59		
10	NOV 84	5.18	2.59	2.59		
11	MAY 85	5.18	2.59	99.95		
12	MAY 85	100.00	2.64			
13						
14						
15						
16	(14.37)	-96.14				
17	MAY 82	7.15	3.58	3.58	IRR	.0416
18	NOV 82	7.15	3.58	3.58	PV	95.93
19	MAY 83	7.15	3.58	3.58		
20	NOV 83	7.15	3.58	3.58		
21	MAY 84	7.15	3.58	3.58		
22	NOV 84	7.15	3.58	3.58		
23	MAY 85	7.15	3.58	102.80		
24	MAY 85	100.00	0.77			

Figure 15: Bond analysis

```
/CY
/GF$
D2:BOND                E2:ANALYSIS
B3:/FR
/R:C3.D3
A4:"(10.37)
  A5:MAY 82            A6:NOV 82          A7:MAY 83          A8:NOV 83
  A9:MAY 84-           A10:NOV 84         A11:MAY 85         A12:MAY 85
A16:"(14.37)
  A5:/R.A12:A17
B3:INCOME
  B4:-86.8
  B5:5.18
  /R:B6.B11
  B12:100
  B16:-96.14
  B17:7.15
  /R:B18.B23
  B24:100
C3:TAX
  C5: .5*B5
  /R:C6.C11:R
  /R:C17.C23:R
  C12: .4*.5*(B12+B4)
  C24: .4*.5*(B24+B16)
D3:NET
  D5:+B5-C5
  /R:D6.D10:RR
  /R:D17.D22:RR
  D11:+B11+B12-C11-C12
  D23:+B23+B24-C23-C24
E4:/FR IRR             E5:/FR  PV
  F5:/FG @NPV(F4,D5.D11)
E17:/FR IRR            E18:/FR  PV
  F18:@NPV(F17,D17.D23)
```

Figure 16: Spreadsheet instructions for discounted bonds

```
C7:CODE
C8:/FL
/R:C9.C29
```

sets up the new column. We use the REPEATING LABEL command at C6 because the line that goes across the register was broken when we added the new column. Next, we replicate a left format instruction down the code column.

Finally, we enter the formulas. In addition to entering the formulas we also want to copy the check number from the check register to the expense register. We do this as a convenient reference in case we want to print the register separately. The sequence:

```
I7:NUMBER
    I9:/FI+A9
    /R:I10.I29:R
```

accomplishes this copy operation.

Let's now examine in detail how a check amount is entered in the appropriate expense column. To do this, let's look at a portion of a typical register.

In the register in Figure 13, the Atlas Realty check is coded to expense category 4—the category for rent. We can use the "@IF" function in the rent column to transfer the amount of the rent. In English, we would write this as:

IF CODE=4, THEN COPY CHECK,
OTHERWISE, ENTER 0.

In VisiCalc notation, we specify this as:

```
M9:@IF(C9=M8,F9,0)
```

For a typical column, we would enter the formulas:

```
J7:MATLS
    J8:/FI 1
    J9:@IF(C9=J8,F9,0)
    /R:J10.J29:RNR
```

The replicate sequence tests each column position, row-by-row, against the constant expense category number.

Finally, to calculate the column totals, we enter the following instruction sequence:

```
J31:@SUM(J9.J29)
/R:K31.T31:RR
```

Additional Remarks

Since the expense register in Figure 11 is wider than 80 columns you will need to print the expense register in two parts to accommodate standard width printers. To do this, first print the rectangle between coordinates I1 and P31, and then print the data between coordinates Q1 and T31.

INVESTMENT DECISION

We will now review an investment decision using the internal rate of return (IRR). The IRR is the interest rate that equates the present value of future cash flows to the initial cash outlay. Because the VisiCalc program does not have a built-in IRR function, we will use the @NPV function to determine the IRR. We can do this in the following steps:

1. First, we set up a net present value calculation based on after-tax cash flows. We make an educated guess at the interest rate.
2. Then, we subtract the initial cash outlay from the NPV. If the result is zero, we have made the correct guess—the IRR is equal to the rate guessed. If the result is not zero, we must guess a new rate and recompute the calculation. We repeat this procedure until we obtain a difference of zero.

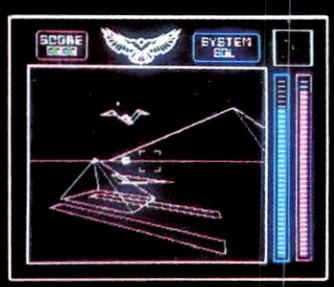
A simple guessing method is to start arbitrarily high. As long as the NPV is higher than the initial outlay, we halve the next guess. Once the NPV becomes less than the initial outlay, we have bracketed the IRR between the two values. We should then continue guessing until the NPV and initial outlay

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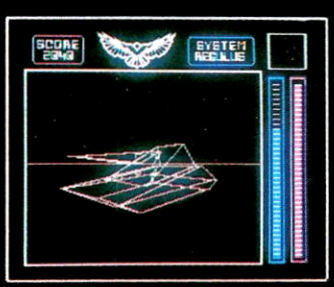
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Application Example

Let's assume that you are considering an investment that requires an initial cash outlay of $90,000, and brings cash flows of $15,000, $17,000, $19,000, and $125,000. Using these figures you want to compute the IRR.

Spreadsheet Instructions

For this example we will set up a very simple VisiCalc form, as shown in Figure 14.

We guess the initial interest rate and enter it at B2. The NPV is then equal to:

```
A3:NPV
   B3:-A1+@NPV(B2,B1.E1)
```

We continue guessing until the NPV approximates the initial cash outlay. We summarize this process in the following table:

INT	NPV
.300	-15988
.150	19859
.225	-581
.220	605
.223	-109

We can use an IRR of 22% since the NPV is close to zero.

DISCOUNTED BONDS

When bonds are issued they can usually be purchased at very near par value. As market interest rates rise and fall so do the prices of bonds. Bonds are said to be purchasable at a discount rate when their price falls below par value. Since the rate of interest paid is fixed, the investor's yield rises. As the bond matures its price returns to par value, thus resulting in a capital gain. In this example, we will show one way of reviewing alternate choices of discounted bonds.

Application Example

Let's assume that you are in the fifty percent tax bracket and are considering purchasing United States Treasury bonds. You wish to determine which of two bonds would be the better investment. The bond rates and prices are:

DATE	INTEREST	PRICE
May 85	10.37	86.80
May 85	14.37	96.14

Interest is paid twice a year at half the indicated rate. Tax is 50% on the interest received. During the final period you will also receive a capital gain. Tax is paid at the 50% rate, but only on 40% of the gain.

Spreadsheet Instructions

Figure 15 shows the printout for this example. The spreadsheet instructions appear in Figure 16.

In this example, we enter the interest received in column B. We compute the tax and net income on the first bond as follows:

```
C3:TAX
   C5:.5*B5
   /R:C6.C11:R
   C12:.4*.5*(B12+B4)
D3:NET
   D5:+B5-C5
   /R:D6.D10:RR
```

We enter the initial payment for the bond as a negative number, thus accounting for the plus (+) sign in the previous expression. We similarly enter the tax and income for the other bond.

Next, we set up a net present value calculation and use the iterative procedure to determine the IRR. This calculation shows the IRR for the deep-discounted bond at 4.5%, and the IRR for the higher priced bond at 4.1%. Thus, the deep-discounted bond is slightly more favorable. Note that since payments are received twice yearly, the actual IRR is about 9%.

Additional Remarks

This type of analysis is useful for many different investment

	A	B	C	D	E	F	G
1				INVESTMENT ANALYSIS			
2							
3	INVSTMT	VALUE	YR1	YR2	YR3	YR4	YR5
4	TAXABLE						
5							
6	STOCKS	200000	20000	22000	24200	26620	29282
7	DEEDS	100000	18000	16200	14580	13122	11810
8	CDS	100000	15000	13500	12150	10935	9842
9	SAVINGS	10000	1400	1260	1134	1021	919
10	TOTAL	410000	54400	52960	52064	51698	51852
11							
12	TAX		27200	26480	26032	25849	25926
13							
14	BONDS	400000	32000	32000	32000	32000	32000
15							
16	INCOME		59200	58480	58032	57849	57926
17							
18	EXPENSES	30000	30000	33000	36300	39930	43923
19							
20	SAVINGS						
21	BALANCE	10000	39200	64680	86412	104331	118334

Figure 17: Investment analysis

```
/CY
/GFI
D1:INVESTMEN        E1:T ANALYSI        F1:S
A3:/FR
/R:B3.G3
A3:INVSTMT          B3:VALUE            C3:YR1              D3:YR2
E3:YR3              F3:YR4              G3:YR5
A4:TAXABLE
   A6:STOCKS
      C6:.1*B6
      D6:1.1*C6
      /R:E6.G6:R
   A7:DEEDS
      C7:.18*B7
      D7:.9*C7
      /R:E7.G7:R
   A8:CDS
      C8:.15*B8
      D8:.9*C8
      /R:E8.G8:R
   A9:SAVINGS
      C9:.14*B20
      D9:.9*C9
      /R:E9.G9:R
   A10:TOTAL
      B10:@SUM(B6.B9)
      /R:C10.G10:RR
   A12:TAX
      C12:.5*C10
      /R:D12.G12:R
   A14:BONDS
      C14:.08*B14
      /R:D14.G14:N
   A16:INCOME
      C16:+C10-C12+C14
      /R:D16.G16:RRR
   A18:EXPENSES
      C18:+B18
      D18:1.1*C18
      /R:E18.G18:R
   A20:SAVINGS      A21:BALANCE
      C20:+B20+C16-C18
      /R:D20.G20:RRR
```

Figure 18: Spreadsheet instructions for investment analysis

situations. The key factor in making investment decisions among like investments is the tax consequence, which you can easily evaluate using the VisiCalc program. You may want to use this type of analysis to set up similar forms for common stock evaluations as well. For example, you can change the spreadsheet to compare stocks paying different dividend rates, and then assume various growth rates in the value of the stock. However, keep in mind that, unlike the case with bonds, this growth is not assured.

PORTFOLIO ANALYSIS

The VisiCalc program can be used as a simulation tool for analyzing alternative investments. With a properly set up investment table, it is possible to analyze various investment alternatives quickly. In this example, we will review an investment portfolio.

Application Example

An investor desires to review an investment portfolio mix. His initial plan is to spread his capital in the following way:

- $200,000 in stocks that are currently paying a 10% dividend; dividends are expected to grow at a rate of 10% per year.
- $100,000 in trust deeds at 18% interest.
- $100,000 in CD's at 15% interest.
- $10,000 in money market funds at 14% interest.

The investor projects that interest rates will fall at a rate of 10% per year.

The investor also has an additional investment in tax-free bonds that is providing an 8% return. The investor's living expenses are $30,000 per year; he expects them to increase at a rate of 10% per year.

Spreadsheet Instructions

Figure 17 shows a printout of the investment analysis form for this example. The spreadsheet instructions appear in Figure 18. Let's examine them.

Taxable income consists of stock dividends and interest income. The common stocks dividend is 10% of the current value and grows at a rate of 10%. In this example, we express this as:

```
A6:STOCKS
   C6:.1*B6
   D6:1.1*C6
   /R:E6.G6:R
```

The deeds, CD's, and money market funds all pay interest on the current investment, but this interest is expected to fall. We write the CD income as:

```
A8:CDS
   C8:.15*B8
   D8:.9*C8
   /R:E8.G8:R
```

We write the other interest income in a similar way.

Next, we total the interest income and apply the tax:

```
A10:TOTAL
   B10:@SUM(B6.B9)
   /R:C10.G10:RR
A12:TAX
   C12:.5*C10
   /R:D12.G12:R
```

The interest from the bonds is nontaxable.

Next, we compute the bond income and add it to the net income we obtained above:

```
A14:BONDS
   C14:.08*B14
   /R:D14.G14:N
A16:INCOME
   C16:+C10-C12+C14
   /R:D16.G16:RRR
```

We write the investor's expenses as:

```
A18:EXPENSES
   C18:+B18
   D18:1.1*C18
   /R:E18.G18:R
```

Finally, we compute the rise or fall in the investor's savings balance by subtracting the expense totals from his income and adding the result to the savings balance:

```
A20:SAVINGS A21:BALANCE
   C20:+B20+C16-C18
   /R:D20.G20:RRR
```

Additional Remarks

You can extend this technique to include any number of investments. Since uniform increases and decreases in the interest and dividend rates have been assumed, you can change the form to reflect a number of projected patterns. As an example, you could set up an identical grid to reflect actual income. The comparison of actual versus projected income can be a useful tool in deciding whether the portfolio mix should remain as is, or be modified in concert with changing economic conditions. You could also modify the form so that the savings balance is not allowed to rise above $10,000. You can do this by transferring excess funds to the savings account and allowing extra interest to be earned.

SUMMARY

We have learned to use the VisiCalc program in a number of financial situations. We have seen that it can be a very useful tool for performing tedious calculations, such as those done on financial statements and balance sheets. Many of the examples have included NET PRESENT VALUE analyses. We have used the built-in @NPV function to develop powerful models in a variety of applications. ✚

A VISICALC MASTER FORM

If you plan to use the *VisiCalc* program to create a series of reports or forms for a business, you may want to create and maintain a master form that contains the name and address of your firm, as well as other pertinent information. You can then store this master form as a *VisiCalc* file on disk, and recall it prior to specifying each new spreadsheet display. By doing this, you can avoid re-entering the same information over and over again.

For the examples in this book, we have developed a master form for MYCO, Inc. We have stored this form as the file, MASTER.VC.

In this book, each time we create a new report, we will simply clear the VisiCalc memory and then load this master file. To do this, we type:

```
/CY
/SL MASTER.VC
```

The specifications for this master form are:

```
D1:MYCO INC.
C2:"415 WEST    D2:HARRISON  E2:STREET
C3:JACKSON      D3:CALIF.    E3:"94223
D5:TITLE        G5:DATE
A6:/- =
/R:B6.H6
```

An example of our master form appears in Figure 1. As we use this form with each new spreadsheet, we will replace the "TITLE" and "DATE" labels with the appropriate information.

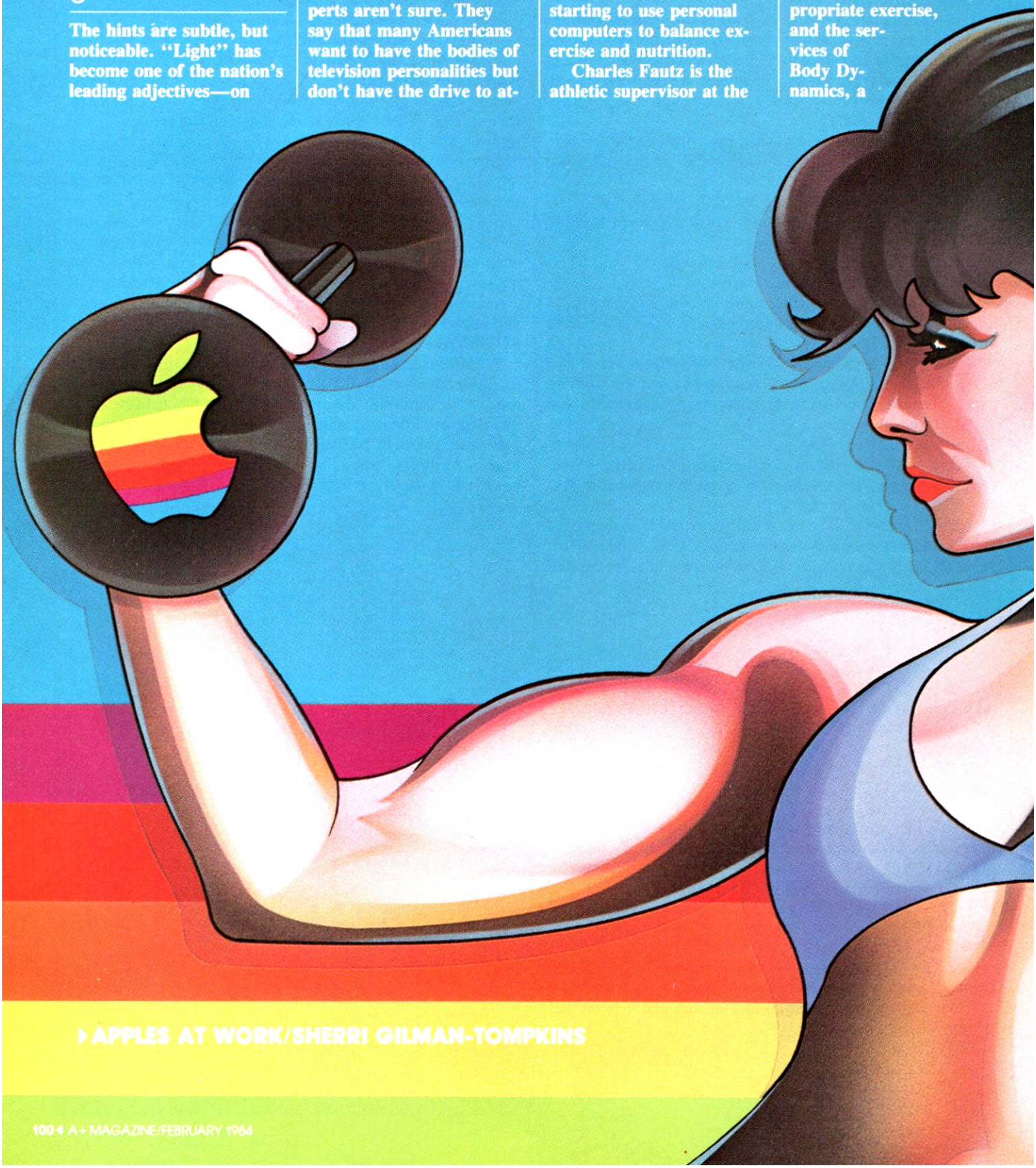
HIGH-TECH-M

The relationship between diet and nutrition is complicated. Apple helps you go from fat to fit.

The hints are subtle, but noticeable. "Light" has become one of the nation's leading adjectives—on beer cans, packages of cheese, and canned fruit. Once-salty products such as tomato sauce and potato chips now have no-sodium counterparts.

Is concern about health a fad? Diet and health experts aren't sure. They say that many Americans want to have the bodies of television personalities but don't have the drive to attain their goals. Though some people exercise and others monitor their diets, a combination of the two strategies is usually necessary. A range of athletes, from weekend cyclists to world-class runners, are starting to use personal computers to balance exercise and nutrition.

Charles Fautz is the athletic supervisor at the Los Angeles Athletic Club. He is one of those experts working with people who want to achieve a high standard of fitness, a goal that Fautz expects from all his customers. With a charted diet, appropriate exercise, and the services of Body Dynamics, a



▸APPLES AT WORK/SHERRI GILMAN-TOMPKINS

USCLE-TONE



sports club located in Santa Monica, California, Fautz can keep his customers on programs longer and teach them how to keep themselves fit.

He uses one of the most popular methods for keeping his customers confident of their ability to lose weight and stay in shape—the Apple II computer.

IMMERSIBLE FAT

At Body Dynamics, Ed Wehan, vice-president of marketing, has incorporated the Apple II into fitness programs by linking the computer to the hydrostatic underwater measuring device that measures a person's body fat

and optimum weight level.

The fiberglass tub is a kind of scale built specifically to Body Dynamics' specifications. You lower yourself into the tank and exhale to remove the volume of air in your lungs, and your optimum weight level and body composition are measured and calculated. The Apple then prints out information that allows you and the counselor to note changes that occur after the first measurement. This allows you to adjust the program.

Californians may occasionally witness this test of physical health. Wehan visits various clubs around the state transporting the Apple and tank in the Body Dynamics van.

"That computer can take a lot of abuse. We bang it around constantly. Sometimes we do the testing outdoors, and even when we have it in the humidity all day, it keeps on working," Wehan said.

Wehan is busy these days at Body Dynamics. He says he sees an increase in

'The Apple helps us a great deal. Without it we wouldn't know exactly what kind of program to put them on.'

the number of people who want to improve their physique and general health condition.

"There are a lot of things we feel go into strengthening your body. We can give you readouts, which are a true measure of your fat content; we can tell how lean you are and how many calories you need to eat and burn. Along with a proper diet and an exercise program, we try to stress a certain life-style. A good sense of emotional awareness is essential to your physical well-being," Wehan said.

Healthy Skepticism

Though health clubs are growing, Dave Mastorakis, a private trainer and fitness coordinator for the Sportsconnection in Santa Monica, California, is skeptical about the current popular interest in health.

"Health clubs are in fashion. In California everyone wears leotards and dance attire. This is especially true for women. They enroll in those clubs with high hopes, and then they eventually lose interest. Those clubs cannot meet their demand for progress," he said.

Mastorakis believes that his customers stay interested after the thrill of wearing Danskin fades because of the completeness of the training programs and the feedback they get from the Apple.

"When they look at the readouts from the Apple they actually see results. The initial weigh-in establishes a standard. People are going to be discouraged if they don't know their hard work is paying off. The actual readouts are a big motivator," he said.

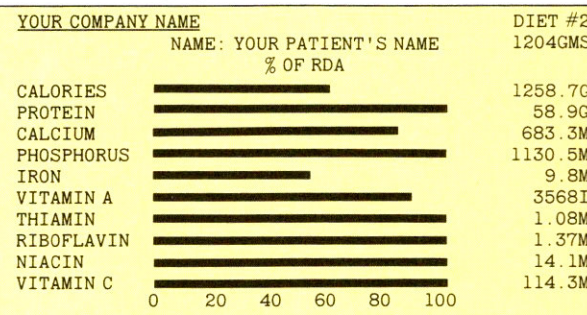
A large number of professional people are taking advantage of this high-tech health program.

"We have a lot of 9-to-5'ers who sit all day and who are burning out, going through emotional as well as muscular failure," said Paul Manning, program director at Sportsconnection.

"The Apple helps us a great deal. Without it we wouldn't know exactly what kind of program to put them on. The readouts help the explanation of the weigh-ins go smoother. We can show them that X is their total body composition now and that if they continue on the assigned fitness program, it will result in Y," he said.

Rich Kaufman is a Sportsconnection customer who uses the hydrostatic weighing machine and the Apple's printout information to help maintain his build and weight.

"Even if you look at your body and don't notice the physical difference right away, the printouts will tell you if you are making progress. It's a natural stim-



DIET #2

ITEM#	FOOD NAME	PORTION	SERVING	WEIGHT
102	SCRAMBLED EGG-OMLET-MILK-BUTTER	1 EGG	100%	64 GRAMS
5	CHEDDAR CHEESE-SHREDDED	1 CUP	15%	16 GRAMS
630	MUSHROOMS-RAW-SLICED OR CHOPPED	1 CUP	20%	14 GRAMS
362	WHOLE WHEAT BREAD-FIRM/CRUMB-TOAST	1 SLICE	100%	21 GRAMS
551	JELLIES	1 TBSP	50%	9 GRAMS
59	FLUID NONFAT MILK-MILK SOLIDS ADDED	1CUP	80%	196 GRAMS
621	ENDIVE-CURLY (ESCAROLE)-RAW	1 CUP	100%	50 GRAMS
671	TOMATOES-RAW	1 TOMATO	50%	67 GRAMS
608	CELERY-PASCAL TYPE-RAW	1 STALK	50%	20 GRAMS
136	REGULAR ITALIAN DRESSING	1 TBSP	100%	15 GRAMS
443	MUFFINS-BLUEBERRY-HOME RECIPE	1 MUFFIN	100%	40 GRAMS
299	PINEAPPLE JUICE-UNSWEETENED-CANNED	1 CUP	80%	200 GRAMS
156	SHAD-BAKED WITH BUTTER/MARG.-BACON	3 OZ	100%	85 GRAMS
648	POTATOES-FRENCH/FRIED-PREPARED/RAW	10 STRIPS	100%	50 GRAMS
586	BLACKEYE PEAS-CKD./FROZEN-DRAINED	1 CUP	60%	102 GRAMS
580	BEETS-COOKED-DRAINED-PEELED-WHOLE	2 BEETS	100%	100 GRAMS
691	TABLE WINE	3 ½ OZ	150%	153 GRAMS

NUTRITIVE COMPONENTS

1	CALORIES	1258.7C (62%)	11	CHOLESTEROL	367.5M
2	PROTEIN	58.9G (133%)	12	CARBOHYDRATE	137.6G
3	CALCIUM	683.3M (85%)	13	POTASSIUM	2742.6M
4	PHOSPHORUS	1130.5M (141%)	14	SODIUM	1387.3M
5	IRON	9.8M (54%)	15	FAT	44.9G
6	VITAMIN A	3568I (89%)	16	SAT FA	11.2G
7	THIAMIN	1.08M (108%)	17	OLEIC FA	8.3G
8	RIBOFLAVIN	1.37M (114%)	18	LINOLEIC FA	9.7G
9	NIACIN	14.1M (108%)	19	WEIGHT	1204G
10	VITAMIN C	114.3M (190%)	20	WATER	938G

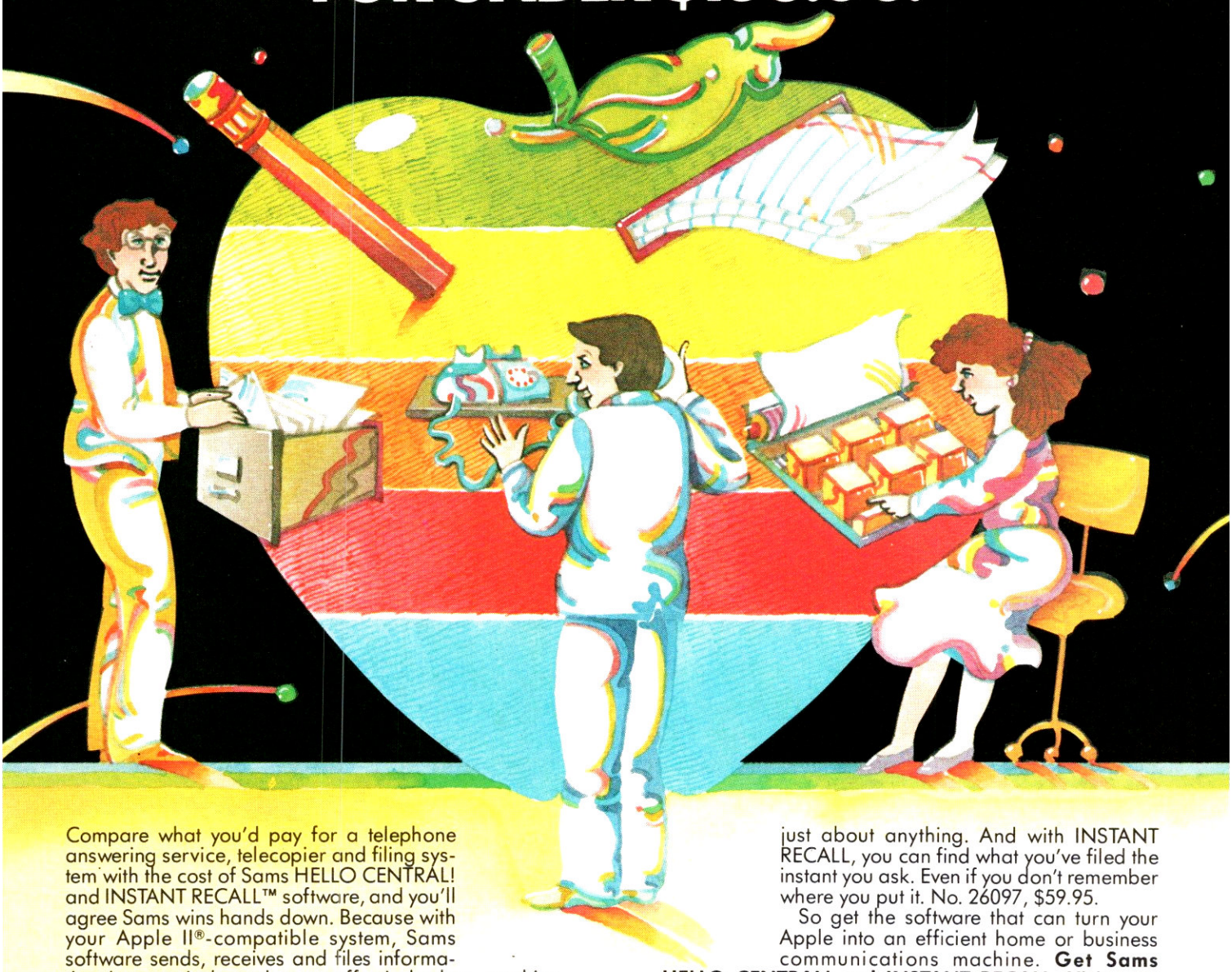
PERCENTAGES BY CALORIE (4:4:9)

PROTEIN: 19% CARBOHYDRATE: 44% FAT: 32%

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Figure 1: Software programs available for the Apple graphically display nutritional analysis of foods, menus, meals, and diets.

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INSTANT RECALL requires an Apple II-compatible system with 48K RAM, DOS 3.3, Applesoft in ROM, and one disk drive. 80-column printer optional.

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ulant to know you're progressing, even if you can't see it at first. The computer printouts are the biggest motivator, I have found," he said.

Individual Programs

As the Apple is being used in health spas for body maintenance, it is also being used by individuals who are serious about their sports.

Cupertino, California, resident Art Ignacio, 32, is a bodybuilder who has been training professionally for five years. Ignacio originally bought a Commodore VIC 20 to set up a program for himself. Now Ignacio runs his own programs on an Apple IIe.

'It's a natural stimulant to know you're progressing, even if you can't see it at first.'

"I wanted to see if I could write my own program. The one I did write allows me to determine what I've consumed and gives me total calories, fat, and protein for each meal. It allows me to adjust for change. I then analyze what I can lift in one movement for a seven-to-nine-week period. I work slowly to the top percentage of the weight I can lift," he said.

Other professional athletes use the Apple to help them train. World-class runners use a program that any runner can adapt. Jack Daniels, a research physiologist, is writing a book about it.

Daniels does research for Athletics West, a part of Nike, Inc. His 20 years of research predict a runner's times in a given race.

A short physiology lesson is necessary to understand what Daniels does.

Each person has a maximum energy capacity, written in shorthand as VO^2. This is an athlete's ability to consume oxygen. To get a VO^2 measurement you usually pedal an exercise bike or run around a track. While doing this, you breathe into an apparatus that collects air samples and indicates the amount of air consumed. That amount is the VO^2.

Once Daniels has that measurement, he lets the Apple II Plus calibrate the predicted and calculated times. The program adjusts itself until the two numbers converge. The computation allows Daniels to predict accurate running times. He has called marathon times within 20 seconds of the actual time.

```
Weight control information for:
Jane Dough    FEMALE    Height (in.) =  63    Age ( years) =  25
Weight (lb.)   Actual = 120    Ideal = 112% of ideal weight = 107.0%

          Hrs/day Vigorous work:        2, Cal=  570
          Hrs/day Walking:              2, Cal=  398
          Hrs/day Standing:            10, Cal= 1291
          Hrs/day Sitting:              2, Cal=  157
          Hrs/day Sleeping:             8, Cal=  443

Daily calories required to   Desired weight loss =     8 lbs in 10 wks
    maintain weight = 2860       Decrease in calories per day = 400

          Week #1       Weight: 120
                        Maximum allowable caloric intake =      2460

          Week #2       Weight: 119
                        Maximum allowable caloric intake =      2448

          Week #3       Weight: 118
                        Maximum allowable caloric intake =      2436

          Week #4       Weight: 118
                        Maximum allowable caloric intake =      2423

          Week #5       Weight: 117
                        Maximum allowable caloric intake =      2411

          Week #6       Weight: 116
                        Maximum allowable caloric intake =      2399

          Week #7       Weight: 115
                        Maximum allowable caloric intake =      2387

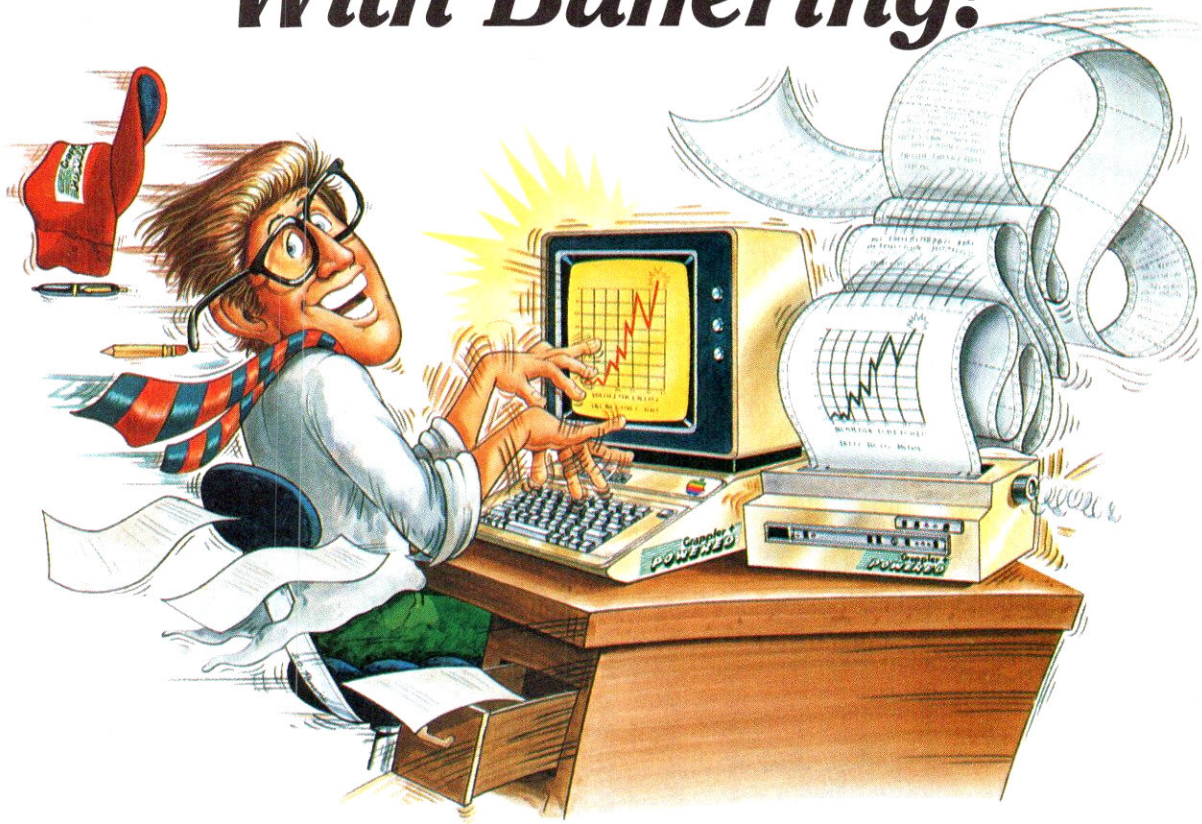
          Week #8       Weight: 114
                        Maximum allowable caloric intake =      2375

          Week #9       Weight: 114
                        Maximum allowable caloric intake =      2362

          Week #10      Weight: 113
                        Maximum allowable caloric intake =      2350
```

Figure 2: Sample readout shows caloric information for a 10-week weight-loss plan.

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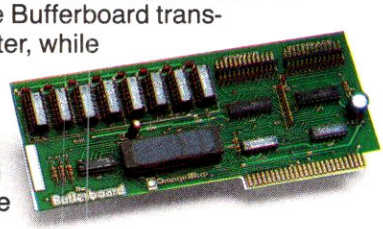


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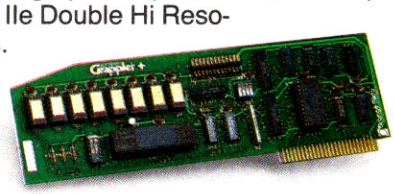


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"The computer eliminates a lot of mathematical calculations that would take us forever. The runner benefits because it can be programmed for specific factors—the person's weight, the weather, and how fast or slow the runner should go—to allow him to run a better race. The Apple is very useful, and it's available all over the world. It was used at the Boston, London, and Stockholm marathons all within the last year," Daniels said.

Sprout Freaks

There is one other group of people who use the Apple to stay fit: health fanatics, those people who are conscious of their health and demonstrate their awareness by eating wholesome foods and avoiding junk foods. Whole foods devotees want to stay healthy and hope others will too.

Don Snow thinks nutrition is important. He wants to stay in shape and eat right. To help him do that he uses a software program called The Nutritionist, available from N^2 Computing in Silverton, Oregon. The Nutritionist provides a database of the U.S. Department of Agriculture's evaluation of foods.

The program, which runs on any Apple, graphically displays nutritional analyses of single foods, meals, menus, recipes, and diets. The information is given according to the individual's sex, age, weight, and height. Percentages of protein, fat, and carbohydrates as a proportion of the caloric value of the diet are also included. This program allows you to monitor diets that, when combined with the right exercise, will keep you in the best form.

"I have an IBM, and I recently bought the converting chip so I could use the software that is available for the Apple. I became interested in my own state of health for many reasons. One was because of avocados," Snow said. "I grow avocados and eat a lot of them. People are always telling me that avocados aren't good for you, that they are fattening. I wanted to prove them wrong. They are very good for you, and they are an excellent source of vitamin C. People in our society don't take in the vitamins they should, so I wanted to research foods that provide them."

'The computer has allowed me to give this program more exposure.'

Cautions

Dave Mastorakis, who earlier was skeptical of health clubs in big cities, stresses that the quality of a fitness program is more important than the length of membership the health clubs offer.

"People should remember that health clubs must have a lot of members to remain financially sound. We've had people come to Sportsconnection after they have a taste of health clubs. I am ethical in what I do. The private training I do is hard because I don't have a lot of equipment to offer my clients. I have to motivate them to motivate themselves. I play the roles of counselor and nutritionist," Mastorakis said.

Despite his skepticism, Mastorakis believes in the high-tech approach to fitness. "There is a science to keeping fit. With the hydrostatic weighing machine and the Apple, I can assure the person that results are happening faster than he or she thinks. The computer has allowed me to give this program more exposure. This may cost a little extra, but it's worth it, and people must be satisfied because more people have taken an interest in it. I don't feel like I'm promoting the Apple; it just gives me the ability to help more people." ✚

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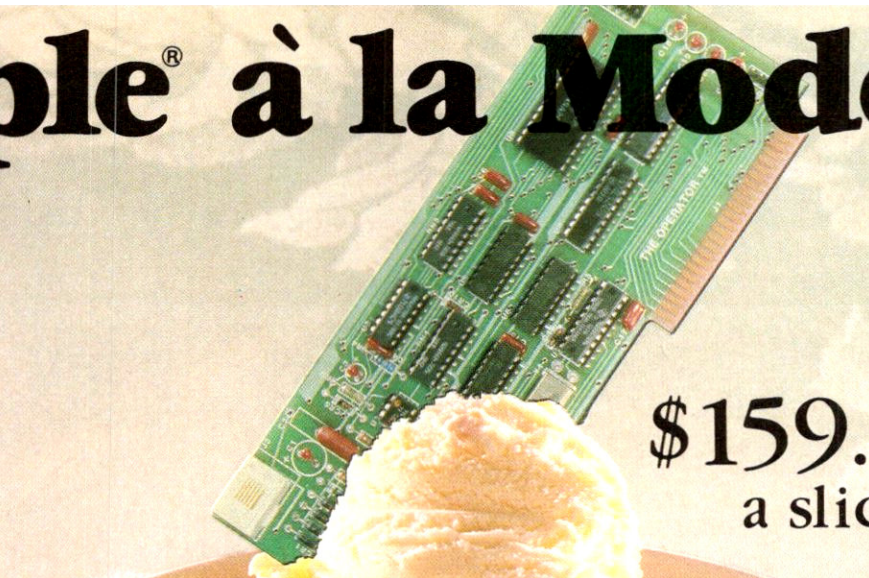
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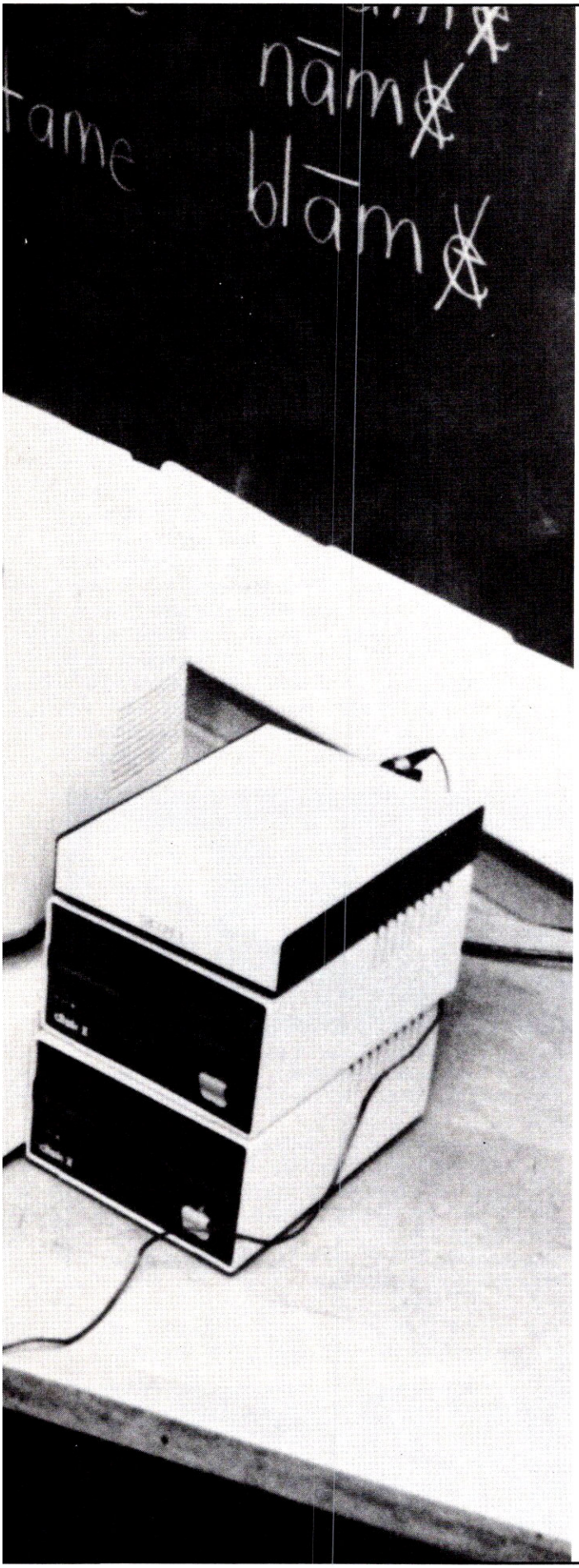
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SPECIAL MACHINES FOR SPECIAL CHILDREN

Apple computers help special children learn while helping educators teach their handicapped pupils.

At the California School for the Deaf, Margaret Irwin, the coordinator of the Computer-Assisted Instruction program for hearing-impaired students, says, "Our kids love their computers." In Dallas, Dr. Ed Hammer trains teachers to use Apples with learning-disabled children and says, "Our kids love their computers."

And why not? Kids are kids. And if there's one thing a physically disabled or handicapped child has in common with the other little children on the block, it's a fascination with Apples.

Irwin and Hammer are two of the many professionals working to see that these special children receive an opportunity to participate in the computer revolution. They, and others with the same concern and vision, are permitting the full power of the microcomputer to work with the problems of the physically impaired student. Using Apple-compatible hardware and software, they're forging a future for these children. Today, their major efforts are taking two equally fruitful directions: toward software programs that allow parents and teachers to tailor computer-aided instructional materials for individual students or special classes, and toward hardware that capitalizes on voice-recognition technology and the accommodation of special needs.

The BLOCKS '82 Program

An example of the new software programs is BLOCKS '82, an "authoring system" designed by the California School for the Deaf. An authoring system provides the teacher with a means to create lessons and store them on disk so they remain available to access by other students. Similar systems require computer expertise and programming knowledge on the part of the teacher who uses them. But BLOCKS '82 is much simpler than others. It allows teachers without programming experience to create lessons in any subject, on any level, and, in this case, for the language-deprived children.

Margaret Irwin, coordinator of computer-assisted instruction for the state-supported California School for the Deaf, has been working with children and computers for 15 years. "We started out," she says, "on large mainframe computers, using standardized computer-aided-instruction (CAI) software. But very, very early in our experience with CAI, we learned that we had to put more power in the teacher's hands—let the teacher determine the exact content of the lesson material. The standard CAI packages we started out with worked fine as long as the students were solving the problems correctly. But when they would get into trouble and the program would present tutorial material on the screen, it would simply not be suited to their language level, because it had been written for hearing students."

Irwin states that CAI material for the hearing impaired needs to be written by a teacher trained in the students' special needs. So Irwin and her colleagues at the California School for the Deaf set out to assist teachers to formulate ideas concerning lesson content. The result was BLOCKS '82, a program that lets teachers build an interactive lesson on any grade level or subject matter without the knowledge of computer programming. "It's important," explains Irwin, "that in the world of educational software, programmers program and teachers teach. Too often what passes for educational software suffers from being written by a programmer who's not the world's best teacher, or a teacher who should never have tried to take up programming. With BLOCKS '82, we have the best of both worlds."

'Too often what passes for educational software suffers from being written by a programmer who's not the world's best teacher.'

In versions running on the Apple II, Apple II Plus, and Apple IIe with high-resolution graphics and color, authoring packages require only one disk drive, although two drives make it more convenient. "It's as flexible as a piece of paper," Irwin concludes. The program disk can be copied within a school site, but lesson disks and graphics disks can be copied and shared among teachers and school systems. The Montana Office of Public Education will act as a clearinghouse to accept and distribute user courseware, and, in Helena, the first users' group has been formed.

Another flexible authoring system receiving attention from professionals who work with handicapped students is VBLS, a voice-based learning system developed by Scott Instruments Corporation of Denton, Texas. Like BLOCKS '82, it's designed for use by people who know nothing about computers. With VBLS, something revolutionary has been added: hardware developed specifically to remove learning barriers.

At Scott, they're teaching Apples to listen to the handicapped and accept verbal responses during classroom sessions. According to Carin E. Horn, director of the company's Instructional Systems Group, the keyboard no longer becomes a barrier for people unable to use their hands or the Apple computer. If the students are capable of speech, even severely impaired speech, the computer can be taught to recognize and respond to their individual speech patterns, and thus enables them to partake of computer-aided instruction available to other stu-

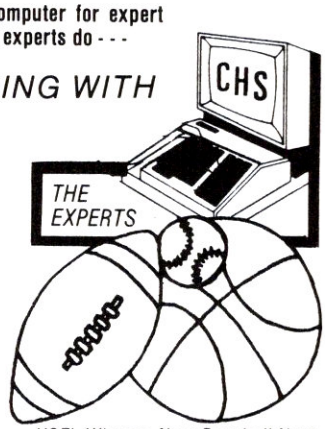
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dents. If speech therapy itself is the object of the lesson, the student can receive visual feedback in the form of a bar graph that indicates the accuracy of his pronunciation in regard to what the computer has been taught to respond to as "correct."

VBLS is the authoring program with which teachers, or parents, can create lessons for the students. This system contains a special piece of hardware called a voice-entry terminal and a headset microphone through which users program speech for the computer. It's available for the Apple II, Apple II Plus, and Apple IIe for a retail price of less than $900. The teacher who creates the lessons will need access to two disk drives, but the student using the lesson will need only one.

Learning to Use the Programs

In the home or classroom, student and adult cooperate in training the system to recognize the student's individual sound patterns, so that when the learning session begins, the student can control the entire operation by voice alone.

The training process is simple and consists of repeating words several times into a microphone. First, the adult speaks the word and creates the beginning of what Horn calls a "template" in the computer's memory. Then, the student speaks the word, or whatever equivalent he is able to manage, several times. The computer converts the sounds to numbers, and then averages the numbers to come up with a range of sounds it will recognize as the representation of that word.

Horn says that a certain amount of pre-use training is necessary to show students "how to talk to a computer." This training simply stresses the need for being consistent in the sounds they make by using their own method of phrasing words. In other words, they need to be aware of the sounds they're teaching the computer in order to realize what they can expect from it in the future.

Creating a communications loop between people and computers is fascinating to Horn. She's the author of two books on computer literacy (both by Sterling Swift Publishing Company) and many articles on the subject. She presently is involved with the process of researching and writing her Ph.D. dissertation on multisensory human/machine communications. As a person accustomed to delivering human services, Carin Horn believes there is unlimited potential in the high technology of systems similar to VBLS from Scott Instruments.

Applications of that technology are generating interest among special-education professionals around the country. Dr. Ed Hammer of the University of Texas at Dallas has been training teachers to develop lessons on this system. "I've used it with learning-disabled kids," he says enthusiastically, "with the vision impaired, and with almost any group of kids who need both special help and the extraordinary patience a computer has to give—including the very young." As an example of the work his teachers-in-training are doing with the Apple and the VBLS, he discusses the courseware developed by one of his graduate students to screen preschoolers in readiness for letter recognition and word recognition. "The applications for this kind of system are almost infinite," he declares.

In Fort Worth, directly across the Trinity River from UTD, Dr. Rusty Hollingsworth is testing the temper of the VBLS. It has a special place in the exciting plans he and several colleagues are bringing to fruition in the form of a training and research facility called the Center for Computer Assistance to the Handicapped. A nonprofit foundation, the Center will serve as a clearinghouse for

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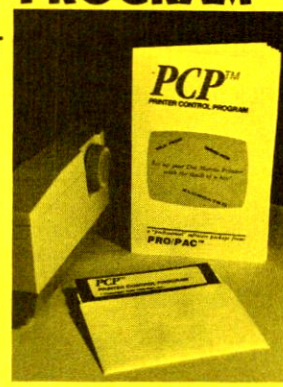
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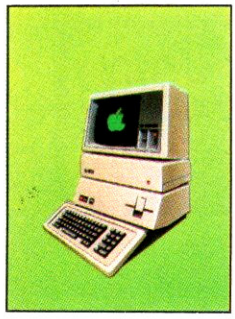
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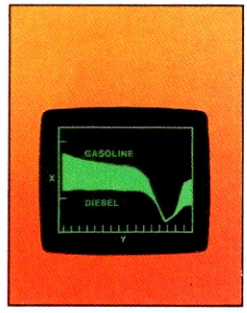
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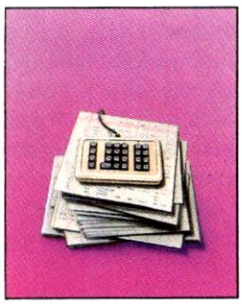
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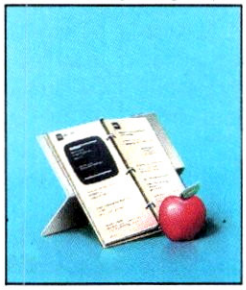


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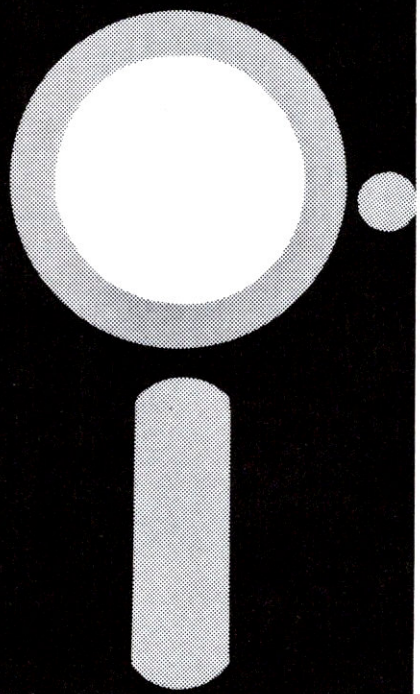
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information about computers and the handicapped.

"Parents might come to us," Hollingsworth explains, "describe their child's disability, and ask us about the hardware and software options available for educating the child and enhancing the child's environment. We'll be set up to be able to answer those questions. At the facility itself, we plan to offer educational courses customized to clients' special needs, provide job training and placement, and do equipment-specific training to help people learn to use devices tailored to their needs, maybe devices for environment control, for instance."

Prescribing Programs

But Hollingsworth and his colleagues aren't waiting for the completion of their facilities. They've begun to explore the horizons of computer assistance for the handicapped. Dr. Richard Roa, a bioengineer with Baylor Medical Center, has provided one client, a disabled writer and artist, with a specially adapted Apple keyboard and software that allows her to type with a special shorthand, which the computer's screen displays as entire words. A brass overlay on the keyboard prevents the user from striking incorrect keys. Dr. Hollingsworth says that this woman has every intention of writing a book for children using her modified Apple, and she plans to illustrate it with computer graphics!

'Voice recognition has tremendous potential, and we believe it's the wave of the future.'

"Of course, we'll be using other computers besides the Apple," Hollingsworth continues, "but the Apple is very well suited for use by people with special needs, especially when coupled with the voice-recognition technology developed at Scott. We have one client, for instance, a quadriplegic who barely has use of one arm. He wants to be a programmer, and he's already using voice entry to write computer programs via a system supplied by Scott Instruments.

"There's just no way," Hollingsworth declares, "that voice activation can fail to have enormous impact on the future of working with the disabled. It's going to be big, big stuff!"

That enthusiasm is mirrored by Carol Cohen at the Schneier Communications Center in Syracuse, New York. Working with a staff of eight at a large cerebral palsy center, Director Cohen is evaluating and prescribing microcomputer-based learning systems for severely impaired people. One of the systems she's working with is the VBLS.

"Many of our people," she says, "can best access or control the computer through voice, and we're researching the use of voice recognition for people who can't use their hands. And classroom applications for this kind of system is a major concern of ours. The results aren't all in yet, but I can tell you this—voice recognition has tremendous potential, and we believe it's the wave of the future. As voice-recognition systems grow closer and closer to perfection, we're going to have a solid tool for helping the handicapped."

At Schneier, they're extending the use of voice communication with Apples by using another technology called voice synthesis. Voice entry allows the user to control the computer by voice, but voice synthesis allows the computer to talk back or, in effect, *become* a means of speech output for the user. A speech-impaired student can type his or her statement at the keyboard and hear it announced to the world in fully intelligible syllables. Interfaced with a voice-synthesis system, such as a Votrax personal speech synthesizer and software such as that developed by the Center for severely impaired clients, voice entry dramatically increases the available range of communication.

Besides developing programs for victims of cerebral palsy and other neuromuscular conditions, the Schneier unit designs systems to meet individual needs. Without support from grants or charity, the unit serves about 100 profoundly impaired clients a year, mostly from the Northeast, on a fee-for-service basis.

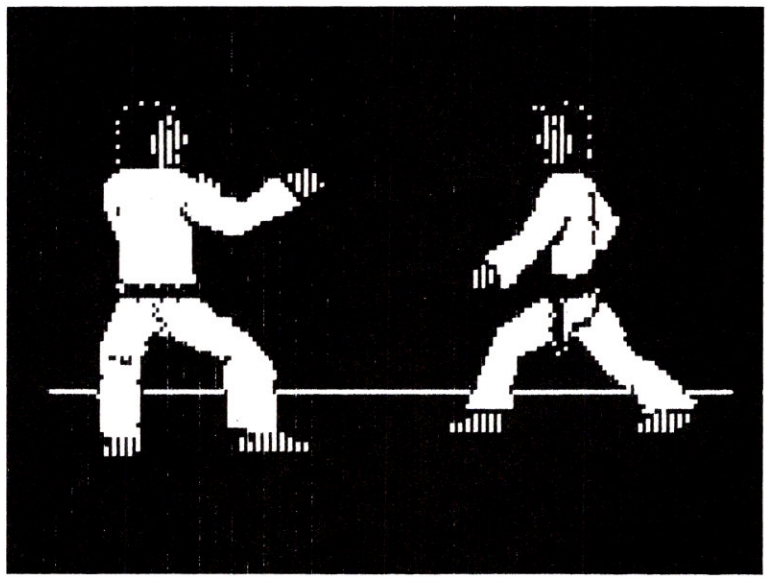
Kids and Apples naturally go together. Professional scientists and educators around the country are pioneering tools for handicapped people to enable them to participate in the age of the microcomputer. They're showing us little reason disabled or handicapped children should be denied access to the high technology of our future generation. ✚

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EARTHWARE

PRESENTS

Black* Belt



Programming and graphics by Kevin Ryan.

Black Belt is a challenging arcade game of the martial art, taekwondo. The combination of the Mockingboard sound and speech synthesizer, a joystick and keyboard, create an atmosphere of fun while learning for boys and girls. Follow the rules of championship sparring and take time out to visit the practice section of the disk and you will learn some of the forms. **Black Belt** was designed with input from professionals. Brutality and rule infractions affect score. Only legal forms may be used and skill is the watchword.

The one-person game has a built-in synthetic artificial intelligence factor rather than using the random generator. An instruction booklet is included. Requires Apple][computer, 48K, one disk drive, and a joystick. The Mockingboard is optional, but adds exciting dimension to this delightful game. Priced at $29.95. Suitable for ages 9 to 90.

Zoo MASTER



This fast-moving, arcade game proves that 'action-packed' doesn't necessarily mean 'full-of-violence.' Softalk says ... **"The game has a lot more depth than meets the glancing eye ... and ... Youngsters and adults are apt to play it for different values."**

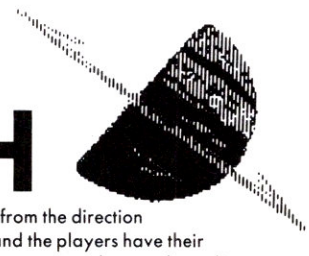
The fun starts when a mad scientist lets wild animals escape from the zoo. The challenge starts when you must locate and recapture the animals. And while you're at it, you'd better find the mad scientist! But watch out — this game is multi-level — the higher you go, the more animals there are. They may disappear only to reappear and zap you when you least expect it.

Did I forget to mention the Yeti? Oh well, you'll meet him sooner or later on your own.



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STAR SEARCH



In Star Search, Pluto star base receives a signal from the direction of Epsilon Eridani (about 10 light years away) and the players have their mission. Each is captain of a ship and must choose crew members and supplies, then search for the origin of the signal. Players are told how many planets have been discovered by the ship's automated telescopes and must plan their exploration. You may gather information by flying probes through planets' atmospheres, or even land a pinnace with crew members for first-hand observations. You may also find alien life forms!

You may opt to go into the asteroid belt to conserve fuel but be ready to dodge meteoroids or destroy them with your laser gun just as in some arcade games. Each game is designed to be different and can be saved for later re-entry, just as in VOLCANOES. You win the game by managing your resources well and making discoveries.

An educational version is also available and should be requested on school letterhead. System requirements; Apple][, 48K. Priced at $45.00 with dealer discounts available.

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CIRCLE 290 ON READER SERVICE CARD



LADY TUT

Progame—California Pacific Computer Co.
757 Russell Blvd.
Davis, CA 95616
List Price: $29.95
Requires: 48K

CIRCLE 505 ON READER SERVICE CARD

Egyptology is a fascinating discipline, and it used to be a popular hobby for those who tired of Agatha Christie. Cult groups even formed, mostly on college campuses, where fads flourish, die out, and flourish again.

Despite the ebb and flow of its popularity, there's still something intriguing about pyramids, mummies, scarobs, and hidden treasures. That intrigue, of course, is its mysteriousness.

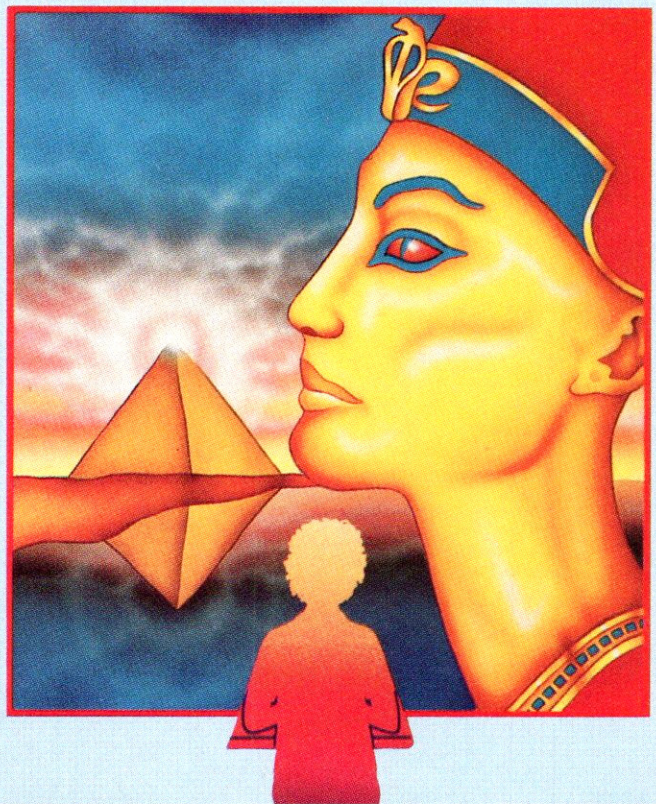
Humans are drawn to the unknown like a horse is drawn to water. "You can't make 'im drink it," though. Maybe humans don't *want* to know, for what is a mystery if it is solved?

It is the mystery that makes Lady Tut, a new game by Progame (a division of California Pacific Computer Company) appealing. Once you learn the game's secret, however, something goes wrong. The unknown is known; the water is tested.

Progame has combined the mysteries, mazes, and evils of the secret tombs to stump the explorer. As the explorer, you must uncover the mysteries, weave through the mazes, and battle the evils to reach the secret tombs.

Basically, the object of the game is twofold: (1) score points by capturing rings (200 to 750 points) and zapping creepy crawlers (spiders—10; serpents—20 and 40; skulls—30) and (2) graduate from one tomb into another.

Here's the catch: You can't zap creepy crawlers without a weapon, and you can't make entrances and exits without a key. You have to find the rings, weapons, and keys (while dodging the tomb's evils) before any real action transpires. Once you've taken care of that, you can make your way through the maze to the other tombs, each providing plenty of horrors.



It isn't as easy as it sounds. In order to shoot the creepy crawlers, you have to be a sureshot. To make matters worse, running low on ammo is a given; to remedy this situation, you must gather another gem—an extra ten shots. If collecting points seems impossible at first, you have the option of entering through a trap door, which the horrors cannot. In fact, it is not even necessary to collect points—just grab the keys and proceed to another tomb.

Perhaps the most challenging aspect of the game is deciding what keys to use for controls, if you opt for a keyboard. The documentation suggests I, J, K, and M, and Z and X for firing, but you can change them. The given four work well together, but their proximity to each other may prove difficult for fat-fingered Egyptologists.

Lady Tut comes complete with background music, the Middle Eastern standby "The Dance of the Midnight Cobra." You can switch the sound on and off with the "1" key. Another



feature is the option to suspend the game being played (Shift-Control-M), which lets you reselect keys and continue where you left off. Press the Escape key to freeze the action; resume by pressing any key.

Graphically, Lady Tut does not offer anything new in the high-resolution field, but its graphics are passable. Skulls do the basic open-and-shut-mouth boogie, and the creepies squiggle. The total form enhances the game's function without overusing the graphics, which you may find a little busy if you're looking for a clean graphic style.

Included in the sound effects is the tick-ticking of the explorer walking nonchalantly through the tombs. When you exit to another level, you are serenaded with another melody.

In general, the sound is the game's major defect. The music sets the mood, but enough is enough. If the "nee-nee"s alone don't drive you crazy, having to listen to the squeaks after every game will.

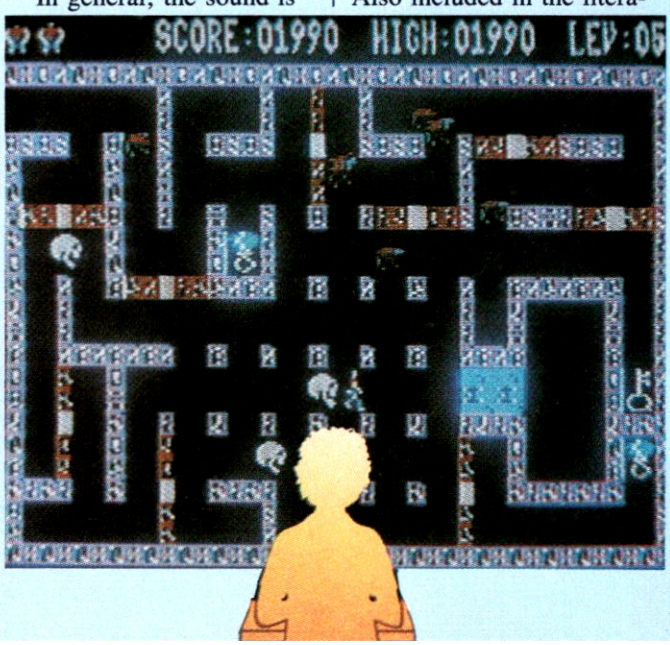
Progame warns about the sound in the instructions, stating, "Some say the sights within the pyramid are terrifying enough without the sounds that accompany them. We can provide you with remote-controlled electronic sound elimination from outside the tomb." That's putting it nicely.

The sound is probably why Lady Tut can function with the Mockingboard, a device ranging from $99 to $299 in price, designed to take the squeaks out of the Apple.

The game's documentation is vague, no doubt an attempt by the author to milk the mystery theme. Also included in the literature is a piece on Lady Tut herself. Although the briefing doesn't provide much information about the game, it does reveal a bit of Lady Tut's philosophy: "Unless goats have learned to fly and dogs read, then pigs such as yourselves have not learned to think. You will not succeed."

No need to worry. Goats do not fly; only a few dogs read; and pigs can, indeed, learn to think and master this game.

Nell Fields



MINIT MAN

Penguin Software
P.O. Box 311
Geneva, IL 60134
List Price: $19.95
Requires: 48K; Apple II, II Plus, or IIe; one disk drive; joystick (with two fire buttons).

CIRCLE 506 ON READER SERVICE CARD

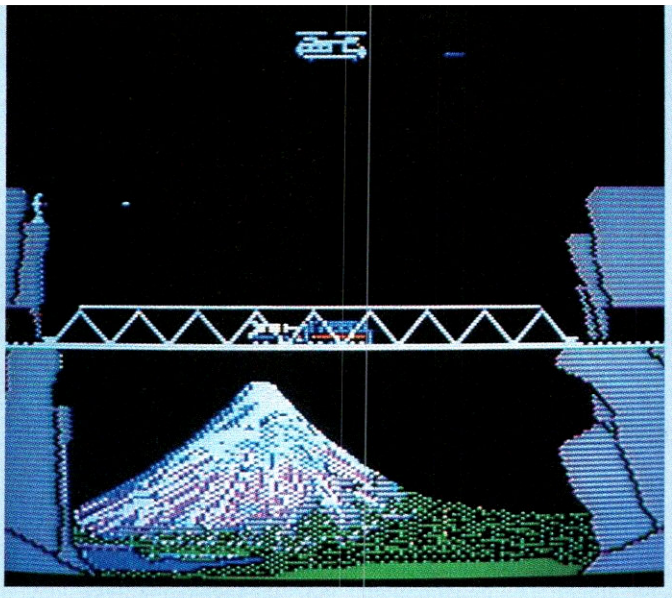
The scenario sounds familiar. Alien robots are attacking, and only one man, usually a trigger-happy hero with multiple lives, can save the Earth. Far from the usual space shoot-'em-up, though, this freedom fighter must complete other tasks besides destroying hordes of aliens.

Minit Man, an exhilarating and challenging arcade-type game, makes you the last defender of Earth. As you pilot a laser-armed helicopter across three screens, your primary objective is to load and launch three interplanetary missiles before the alien mother ship drops its own doomsday bomb. The missiles, however, are on the other side of a gorge, and the bridge across the gorge has been destroyed. You must fly to the government warehouse in the right-hand screen, pick up trusses and beams, one at a time, and then fly to the left-hand screen and build the bridge. In addition, while passing through the middle screen, you must protect the launch computer in the command building from marauding robots.

Once you have built the bridge, a train automatically brings a missile to the launching pad on the middle screen. You must then land, disembark from the helicopter, and descend through a maze of corridors in the command building to reach the launch computer. The robots are also after the launch computer—that is, the ones that are not trying to blow up the bridge. A single robot can block the narrow corridors. If you reach the computer, you can fire the missile. You must launch three missiles in under five minutes to complete the first level. If you find that too easy, the second level requires you to launch three missiles in four minutes to save the Earth.

Your primary objective is to load and launch three interplanetary missiles before the alien mother ship drops its own doomsday bomb.

Joystick controls are responsive. The helicopter faces in five directions—left, right, straight toward you, 45° left, and 45° right—and pushing the second fire button quickly rotates the helicopter. The helicopter moves faster in the direction it is facing. Only a slight hesitation occurs when you fly off one screen and onto another. Pressing the first fire button rapidly releases three laser bolts.



Building the bridge really tests your eye/hand coordination as you try to steady the helicopter while simultaneously punching the first and second fire buttons to drop the truss or beam into place. Many a bridge piece falls into the chasm due to jittery joystick manipulation.

Game play is fast and furious as the robots gradually swarm onto the middle screen and maneuver through the corridors of the command building in search of the launch computer. Every so often, a robot ignores the launch computer and attempts to destroy part of the bridge, forcing you to protect two screens at once while rushing to and from the warehouse on the third screen. Once the bridge has been repaired, the robots immediately attack the bridge, which usually means you have to rebuild it before you can bring the second missile to the launching pad. Meanwhile, the timer relentlessly counts seconds.

These robots are not the usual silicon wimps. They set up antiaircraft batteries above the bridge and over the warehouse. They always seem to wait until you are at the warehouse before sending the bridge-blowing robot. Each robot takes three hits before it's destroyed and then it leaves a land mine in its place. Furthermore, each robot fires multiple shots, so your intrepid hero does not have the usual 10:1 firepower ratio over the robots.

Minit Man possesses some advantages over the robots. The helicopter flies faster than the robots and can shoot through the windows of the command building to destroy robots in the corridors. Once inside the building, Minit Man can duck underneath the robots' shots. When a Minit Man dies he leaves a green power pill. If a robot runs over

Every so often, a robot ignores the launch computer and attempts to destroy part of the bridge, forcing you to protect two screens at once.

the power pill, it cannot shoot. If a Minit Man runs over the pill, his speed is temporarily increased.

The graphics are clear, sharp, detailed, and other wise spectacular. The right hand screen holds the warehouse, which does not have any walls, but does have the bridge trusses and beams neatly stacked. A tower holds the antiaircraft battery that continuously fires white laser bolts. Half the command building, portrayed as an orange framework, is located on the screen.

The middle screen holds the other half of the command building, including the important launch computer. The three missile silos—vertical green caves on the edge of a concrete-white military base—are placed in partial 3-D perspective.

The left-hand screen contains the most picturesque scenery of the game. Gray rock, carved with intricate fissures and cracks, forms the sides of the gorge. In the distance, a purple mountain towers majestically above green forests. A few fluffy clouds float in light blue skies. The bridge, made of plain white lines, seems barely adequate, but a sleek blue train carries the missile that looks like a V-2 rocket.

The good guy, Minit Man, is a little white stick figure with blue gloves. For such an undistinguished figure, he assumes the most dramatic poses when running, ducking, and firing. His white helicopter dazzles the sky with its multidirectional facing and whirling blades.

The alien robots are cleverly crafted and look familiar. Initially, they appear as white and orange R2D2s from *Star Wars*. After being hit once, they mutate into the orange Maulers from *Tron*. After their second hit, they turn into white robots from *Lost in Space*. With the third hit, they vaporize in a puff of smoke and become orange rectangles representing land mines.

The sound effects are better than average. The helicopter chops the air with a driving rhythm and assorted high-pitched whines represent laser shots. A resounding beep indicates you have picked up a bridge part, and a staccato beep means a robot has destroyed a piece of the bridge. When you have

These robots are not the usual silicon wimps. They set up antiaircraft batteries above the bridge and over the warehouse.

30 seconds left on the timer, a high-pitched beep counts down the seconds.

Minit Man provides fast, colorful and challenging play. At first, it seems too challenging, but continued practice allows you to gradually extend the bridge, fire the first missile, then finally fire off all three missiles and enter the next level. Much of the enjoyment stems from doing something more constructive than blasting aliens into oblivion.

The clear and thorough instructions are about a page in length and provide a good description of how the game plays.

The game allows you to pause during play and turn off the sound. It does not save high scores on disk.

Minit Man offers good sound effects, exciting play, and superb graphics. Although it takes a minute to learn, it will take a long time to master.

Russ Lockwood



ZAXXON

Datasoft, Inc.
9421 Winnetka Avenue
Chatsworth, CA 91311
List Price: $39.95
Requires: Apple II, II Plus, or IIe; 48K RAM
Disk drive with DOS 3.3
TV set or video monitor
Joystick

CIRCLE READER SERVICE NUMBER 507

Zap, zoom, whap, blam!!! Your laser missiles dart into the heavens and explode in a series of brilliant yellow flashes, leaving the hulks of enemy starfighters littering the darkened twilight. Ho hum. Just another day in the life of a video star pilot. You've nailed every alien across the universe who's had the guts to engage you in hostilities. So what's new? You're left to polish your medals. Hold on, though; all hope is not lost. Zaxxon, a first-rate new 3-D action game has arrived that is sure to get starpilots everywhere soaring again.

Name sound familiar? You guessed it—it's the same Zaxxon that's been in the arcades for over a year. This Zaxxon is the best translation of an action arcade game to date and is in fact a vast improvement over its progenitor. Zaxxon's superb 3-dimensional graphics, realistic sound effects, and challenging strategies will get you and your flight crews scrambling again.

Your fighter pilot's mission is to defeat the Zaxxon robot and its homing missile. To reach this plodding laundry machine, however, you must maneuver your way through a series of heavily defended space fortresses and also battle a deadly phalanx of enemy

This Zaxxon is the best translation of an action arcade game to date.

star fighters. You have three ships to complete your mission.

Your playing field is a bird's eye view of a long narrow surface, bristling with gun emplacements, rocket launchers, walled barriers, and so forth. The whole perspective is cleverly angled and images are finely detailed, resulting in a realistic 3-D effect. The color of the graphics display is impressive.

Flight simulation is outstanding. Using your flight skills, you must thread through a series of walled barricades that are separated by no-man's-land stretches of combat zone. You drop your craft low into a strafing run here to score points and knock out enemy installations. You're faced with gun emplacements firing horizontally at ground level and missiles firing up. After clearing the last wall, you suddenly find yourself outgunned, face to face with a squadron of enemy star fighters. Navigation is tenuous at this point because of the difficulty of judging three dimensions on a two-dimensional screen.

If you've survived this gauntlet, you next face the second fortress, which is much like the first, except that the walls are topped by force fields. Threading through these deadly obstructions requires careful control of your altitude. Unfortunately, the altimeter on the left of your screen is useless. Your only means of positioning yourself for these maneuvers is to lob a barrage of shells at a wall and watch where the shells hit. Seeing impact points can be difficult, though, especially on darker-screened monochrome monitors.

At the second fortress, fuel consumption comes into play. Flight at higher altitudes gulps fuel voraciously, forcing your ship to skim low and capture enemy fuel tanks to replenish

While Zaxxon has only one skill level, the levels of difficulty are graduated to prevent terminal boredom.

your own fuel supplies. Once you're through the seven walls of the fortress, you encounter the Zaxxon robot Looking like a cross between Fidel Castro and a trash compactor, the robot is armed with a homing missile that you must destroy with many direct hits. Once again you'll have trouble seeing your shots and therefore aiming effectively, thus making the robot encounter one-sided.

If you manage to obliterate the robot, the same sequence of screens reoccurs, but subsequent battles become more challenging. While Zaxxon has only one skill level, the levels of difficulty are graduated to prevent terminal boredom in veteran video blasters and terminal frustration for neophytes.

The program is copy-protected. The game registers and retains the top score only until the power is shut off. The game also offers a sound on or off option, as well as a pause key.

Overall, Zaxxon stands out as a high-powered and exciting game, one of the best new offerings in years.

Holten Norris



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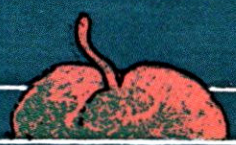
CIRCLE 169 ON READER SERVICE CARD



An Apple II Plus helps one company's clients 'float to success.'

You're floating in a warm, buoyant solution, listening to Handel's *Water Music*. You feel weightless, relaxed. It is dark, except for the small video screen above your head. The music fades out, and a vivid blue image appears on the screen. A voice says, "Would you like to see the backhand (a), the forehand (b), or the serve (c) first?" The same choices are presented in menu form on the screen. "(a)—backhand," you answer. "Thank you," replies the voice, and Stan Smith appears on the screen, performing perfect backhand strokes as you hear the sound of the ball hitting the sweet spot on his tennis racket. The image is so vivid in this environment that you feel as if you were there, hitting those perfect backhands yourself. You forget that there's an Apple II Plus working out in the room next door, searching for your selections on the videotape and then sending them to the isolation tank's screen.

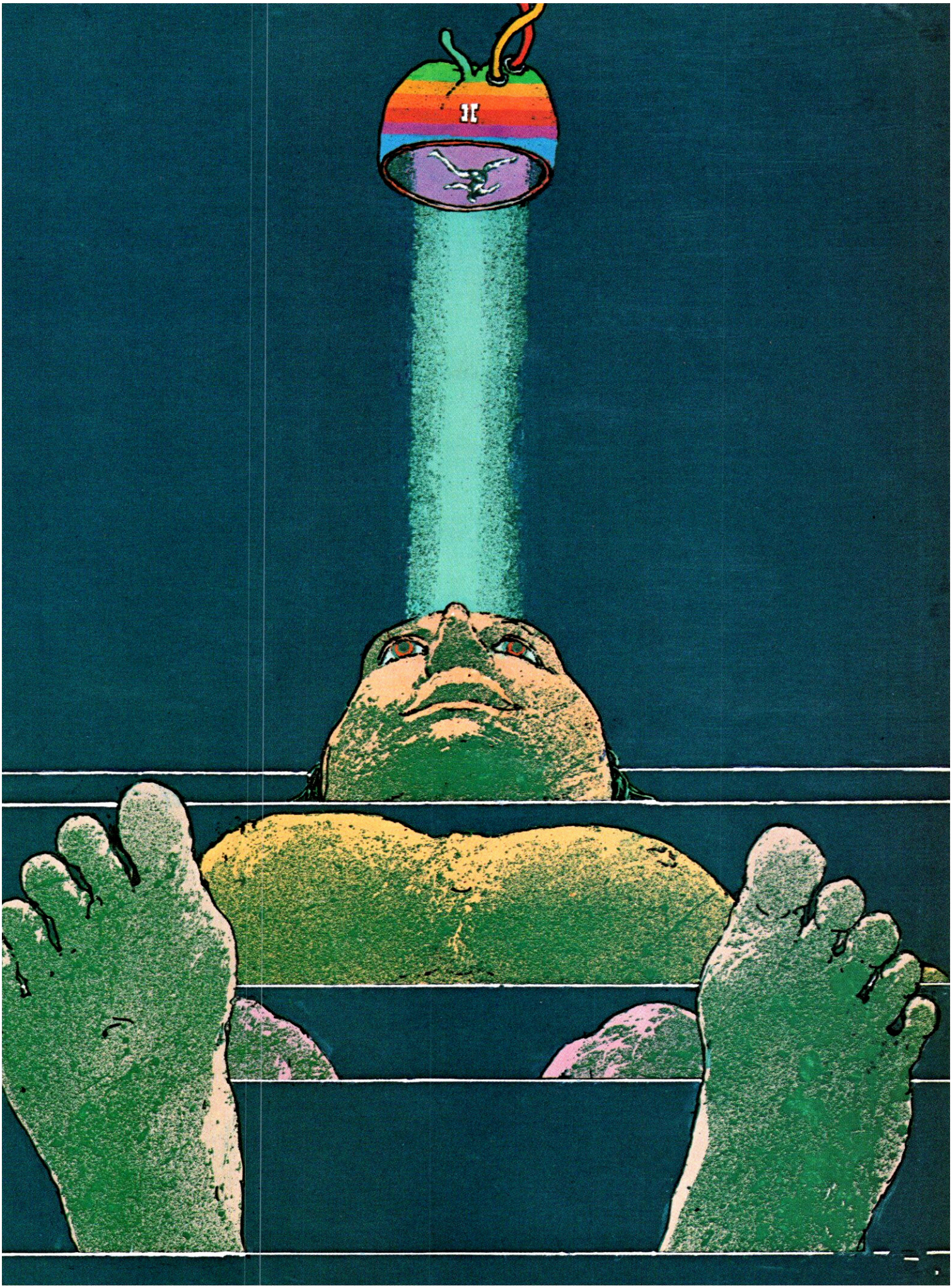
Scenes like this take place many times a day at Psykon Achievement Systems, Inc., except that



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the program varies from tennis to golf, skiing, dance, and such diverse subjects as business achievement, smoking cessation, and weight reduction. The Palo Alto, California, company uses an Apple II Plus microcomputer, a Sony Betamax videocassette recorder, a 12-channel audio board, and an isolation tank equipped with stereo speakers and a video screen to train clients in the psychological skill of "Imaging to Achieve."

Floating Video

"The flotation tank is the ideal environment for learning through imaging," says J. Brian Hennessy, founder and president of Psykon. "All unwanted stimuli are removed, allowing complete concentration on the subject at hand."

Psykon uses the Apple with Whitney Educational Services' Video Command Module (an interface card), Apple SuperPILOT software, and Psykon software to search for program selections on the videotape. The people who float in the tank can direct the sequence of audiovisual topics at their own speed. The whole computer system is connected to the tank next door by a series of cables.

"Without the Apple, it would take too long to find and organize specific sections on the tape," says Hennessy. "The Apple gives us the flexibility to customize the order of events for each client, at the beginning of the sessions."

After the client undresses, showers, and settles into the tank, the operator in the next room turns off the music and presents the videotape's menu by entering commands on the Apple. The operator sees on his screen exactly the same image as what is being projected into the tank. The operator and the floating client communicate through microphones. When the client states a choice, the operator presses the appropriate key on the Apple, leading the client through a series of menus to preset the entire 90-minute session. After the person in the tank has made his selections, the Apple takes over and runs the session, controlling the VCR's projection.

"Once we've programmed the videotape to run with the Whitney card, a child could run the session," says Hennessy. Psykon employs no children, but operating the system doesn't require any special training.

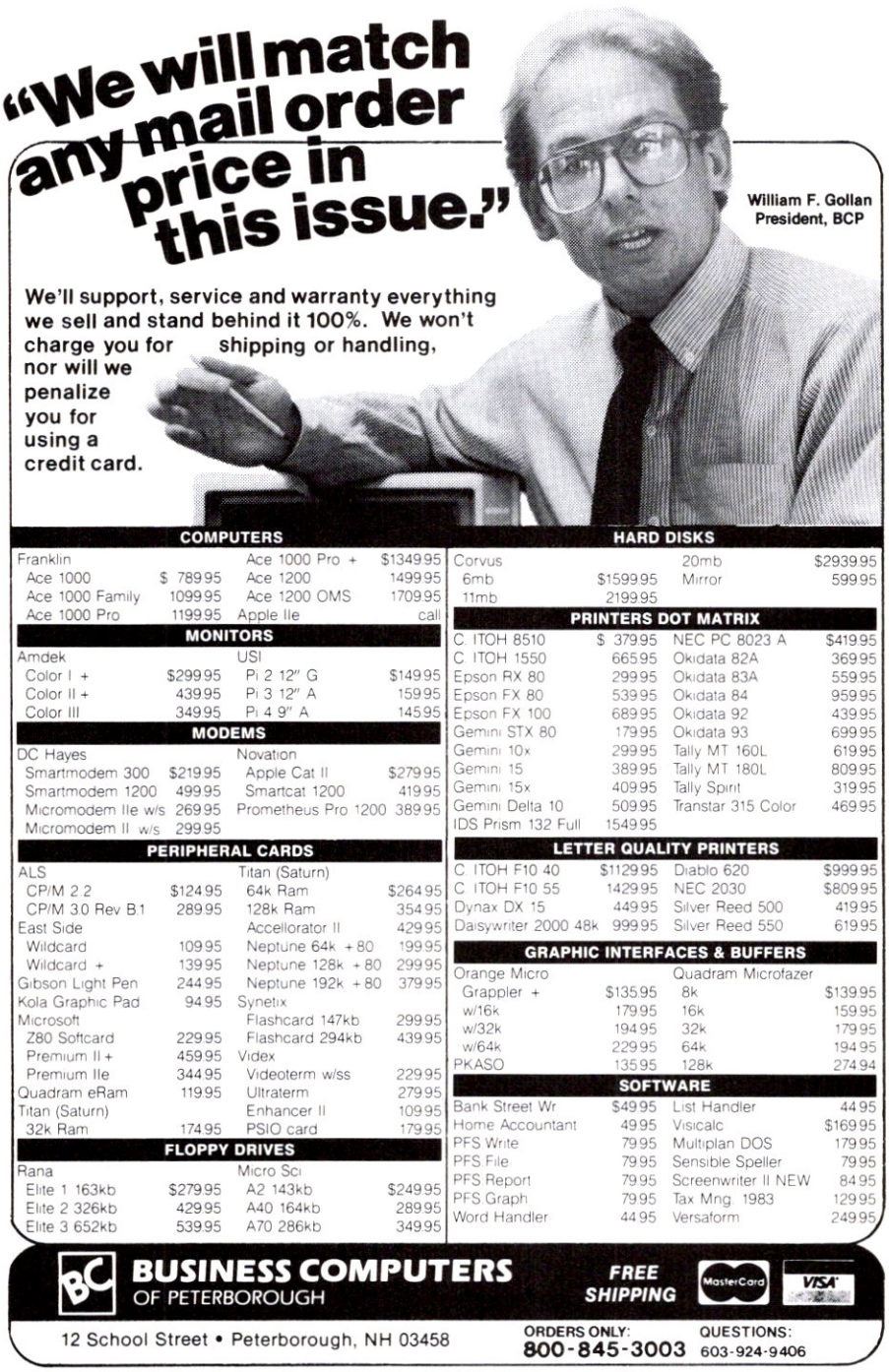
Bradley Bartanen, Psykon's programming specialist, put the system together and wrote the software that lets the Apple use the Whitney card to control the VCR.

When Psykon was organized in May of 1983, Hennessy wanted an interactive computer system for the company's psychological training. The Whitney card was the first computer/VCR interface he and Bartanen came across, and it was designed to run on an Apple II Plus with 64K of RAM, two disk drives, and Apple's SuperPILOT software. Encouraged by friends at Apple Computer, Hennessy purchased the system, and, after some installation work, Psykon programs were officially computer-interactive.

"In addition to giving our programs flexibility, the Apple makes psychological training tangible and validates our process. When people see the Apple, they believe our work is real," says Hennessy.

Most of Bartanen's installation work involved writing the software that, with the Whitney card and the Apple SuperPILOT software, allows Psykon to edit, catalog, and search for sections of videotape for program development and presentation.

Psykon's software is written in Applesoft BASIC. Bartanen combined it



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with the Whitney utilities to allow the Apple to put a "time code" on the second audio track of a videotape, from which each frame on the videotape can be numbered and then cataloged into a certain section. He used the Apple SuperPILOT software to create menus of cataloged sections for each videotape. Assigning addresses to these videotape sections allows the Apple to search for them during session customization and projection.

The Tank

The acrylic, rectangular flotation tank sits in a soundproof room with hardwood floors and gray-carpeted walls. The video monitor is mounted on top of the tank. The audio transducers are mounted on the sides, turning the whole tank into a speaker cone for maximum sound quality. The ten-inch-deep Epsom-salt solution inside the tank is kept at 93.5° Fahrenheit, which is about the temperature of the skin, plus or minus .5°.

Most people use isolation tanks for relaxation or for exploring the imagination in a sensory-deprived environment. For Psykon's Imaging to Achieve purposes, the tank offers the advantage of unusually vivid audio and visual projection and a high signal/noise ratio for enhanced coding.

The focused yet relaxed state of floating also enhances the learning process of Imaging to Achieve, but it takes most people a while to get used to the environment before it is completely relaxing. Psykon recommends that each client float twice for 90 minutes to practice losing time and space awareness before beginning an Imaging to Achieve programming session in the tank.

Imaging to Achieve

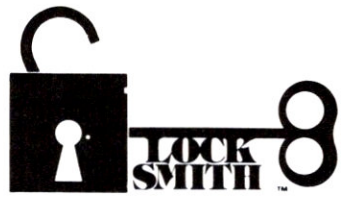
The theoretical basis for Psykon's work is drawn from Hennessy's doctoral studies in neuropsychology and education at Stanford University and from his previous work as director of research and development at SyberVision Systems, Inc., a San Leandro, California, company that produces sports-training videotapes. Imaging to Achieve evolved as the basic psychological concept in Hennessy's psychological-skills training system.

Psykon defines Imaging to Achieve as a conscious process of "coding" sensory information into images that your brain "decodes" for improved action. Psykon presents this sensory information via videotapes of "superachiever" models who perform their skills perfectly. Hennessy maintains that the most effective way to learn is to emulate the best. Psykon presents the client with an audio-visual image of a superachiever, such as Stan Smith in tennis, or Al Geiger in golf, and then teaches the individual how to code this information to reach a higher level of competence himself.

Hennessy, who works with world-class athletes as well as amateurs, is quick to assert that Imaging to Achieve will not make a champion out of someone with average ability, but it will help that person make the most of his own psychological and physical disposition. "Most people play a sport or perform in their work at a level far below their potential," says Hennessy. "They are so caught up in striving for a far-off goal or winning that they neglect the process of achieving it. There are always more goals, yet the unifying function underlying the achievement of goals is a process of imaging the achievement."

Hennessy gives the example of a top-level tennis player he works with whose performance was inhibited by overly goal-oriented thought. "I asked him to 'image'—to retell in vivid sensory detail—a match he had won. He maintained with incredible resolution a series

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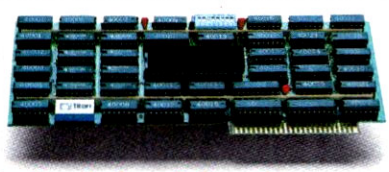


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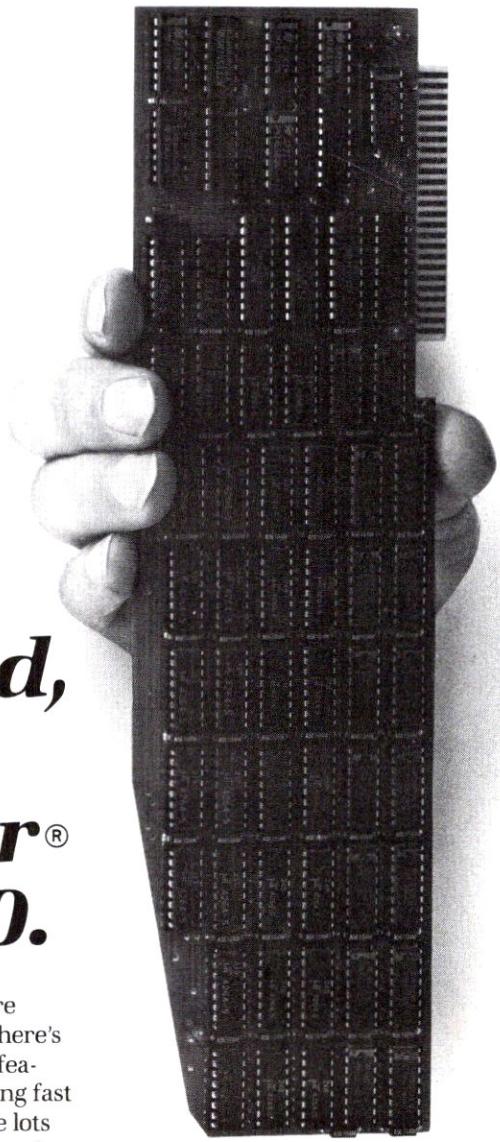
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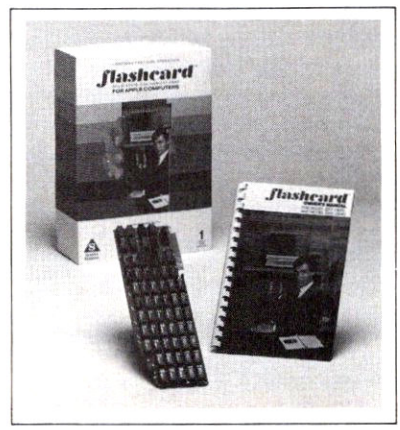


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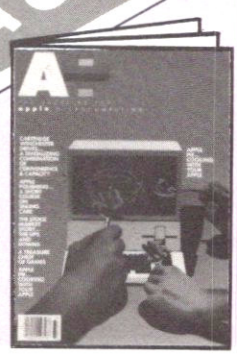
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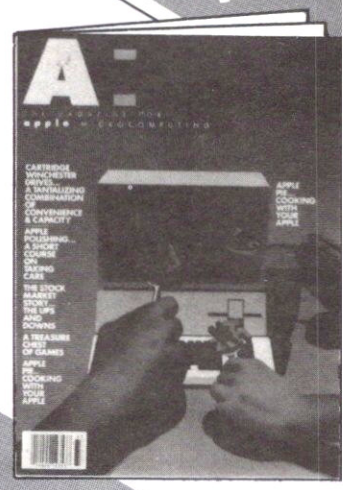
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of images dominated by the mistakes he made and the points he lost. This psychological disposition is imaging to fail, not imaging to achieve.''

In the theory of Imaging to Achieve, actions are direct consequences of images whose efficacy depends on the degree of resolution and vividness of those images. An image is highly resolved when all the senses related to the action (including sight, sound, taste, touch, smell, and ''feel'') are consciously accessible. When the particular image is highly resolved, the image and the action are indivisible.

As part of the improvement process of imaging certain models of achievement, the Psykon technique helps clients identify sensory cues from their own professional or performance environment that will serve as signals that they should use their memory of achieving imagery. For example, a surgeon is guided through the sensory details of washing his hands before surgery to integrate those details into his image of achievement. Other specific sensory cues would include pulling a golf club from a bag, pushing the buttons on a telephone, or listening to a certain type of music prior to performance.

The brain's associative properties use these cues to retrieve positive actions that have already been coded in previous Imaging to Achieve programming sessions. Psykon chooses cues that are already part of the individual's routine. The cue-triggered images create actions just before their execution, through what Hennessy calls ''a neutral parallel-processing mechanism.''

The cue-triggered images create actions just before their execution.

The Apple/Brain Connection

Psykon plans to replace the VCR with a laser disc and to add a Votan Voice Recognition and Synthesis System to have a closed-loop, ''brain-interactive'' system by 1986. The brain-interactive system will connect the Apple and laser disc to the clients without any human intervention. The voice synthesizer and software will allow the Apple, instead of an operator, to lead the clients through the menus. This verbal interaction will identify individuals to the system through voice recognition and establish their program choices.

Imaging to Achieve uses a magnetic encephalograph (MEG) to pace the session according to remote interaction between the individual and the system. The MEG, a device that is sensitive to biomagnetic brain-wave activity caused by cortical electrical potentials, will receive information from a superconductive helium ''doer'' that will be close to, but not touching, the head of the person floating in the tank. According to Hennessy, a custom card similar to one that exists in his lab at Stanford's neuropsychology department will allow the Apple to receive and interpret these amplified brain electrical patterns.

Neurological research at Stanford and at the University of Vienna has identified a certain brain state during which the brain is more receptive to information than at any other time. Psykon plans to use the MEG to detect this state, which has been referred to as ''the teachable moment,'' and to control the Apple and laser disc accordingly.

Further brain/computer interaction will be achieved through the use of artificial-intelligence-based heuristic software that will allow the system to react to the client's responses in a digitized imitation of his voice, instead of follow-



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ing a predetermined set of questions.

"The technology to accomplish this level of noninvasive brain interaction exists," says Hennessy. "It's also very expensive, and we're in the process of raising the capital to put together a research-and-development partnership for a prototype system."

Programs

Psykon's Imaging to Achieve programs cover a broad selection of sports, in addition to health, business, dance, and creativity programs. Psykon uses some of SyberVision's videotapes for tennis and golf programming but adds personal interaction, guided imaging, and follow-up training.

In the area of business training and human resources, Psykon also designs custom programs to create a "Corporate Library" for a particular company. These programs present the atmosphere of the company, the personalities, goals, and values of the company's founders and employees to provide a portrait of the corporate culture to prospective and new employees. The tapes can be used with or without the flotation tank.

Hennessy also suggests that an audiovisual, computer-interactive Corporate Library controlled by Apples would be an effective means of communicating and marketing a company's culture and ideology.

One of Psykon's ongoing projects is the development of a "Superachievers Library." This collection of programs will profile successful individuals from various fields. In the tapes the subjects discuss their personal philosophies and strategies for success and are portrayed in business and recreational settings.

The next step may be relaxation training for computers.

Psykon is considering making the audiovisual Superachievers Library accessible to schools and individuals throughout the country via a modem and fiber-optic network. "We don't have enough heroes anymore," says Hennessy. "The Superachievers Library will let people choose their own models and then live with them electronically for a while, absorbing behaviors that they would like to emulate. This adds to the individual's repertoire of achieving characteristics and enhances his creative process."

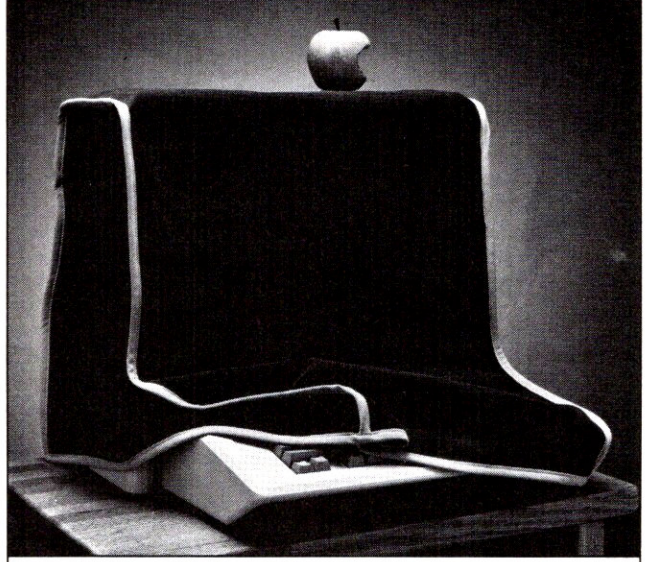
Psykon's plans for the future include a multipurpose center that would combine psychological training (Imaging to Achieve) with nutritional and physical training to address the overall needs of an individual in interactive programs.

Hypertension could be treated along with training for an improved golf game and weight reduction. Stress-reduction techniques will be related to better concentration in sports and refined communications skills; cardiovascular fitness will be coached in conjunction with smoking cessation. The center will serve professional athletes as well as business professionals and allow for interaction between the individuals.

"Human well-being and performance depend on a number of interrelated factors. An integrated set of programs combining psychological, physical, and nutritional aspects of training and conditioning within a health, sports, and business-education center is the most efficient way to optimize the potential within the individual," says Hennessy.

From time-coding videotapes, to running flotation sessions, to interacting with the brain, computers are being used to improve human achievement. The next step may be relaxation training for computers—without the tank. ✚

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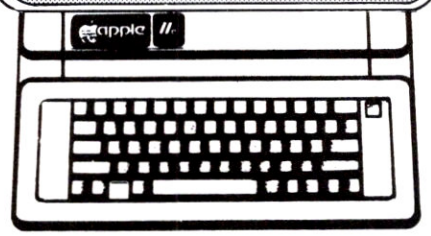
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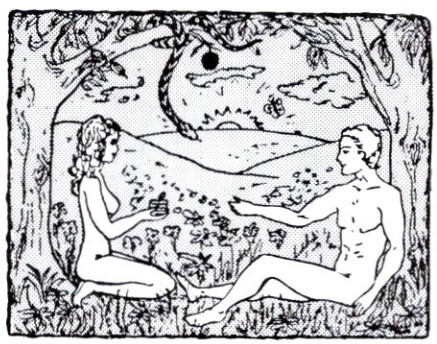
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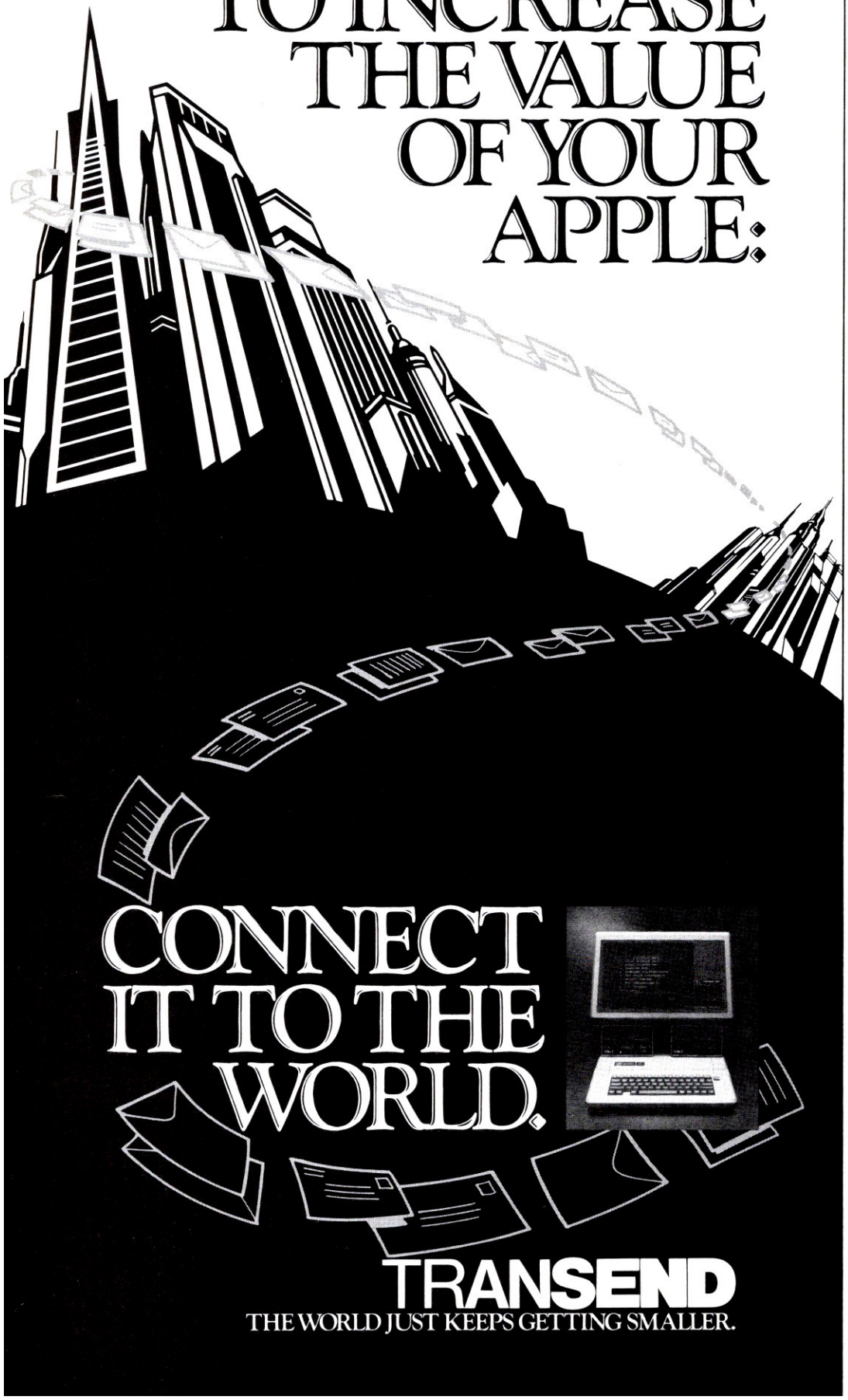
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THE WORLD JUST KEEPS GETTING SMALLER.

CIRCLE 123 ON READER SERVICE CARI

BY VANESSA SCHNATMEIER

LITTLE LISA MEETS BIG OIL

Apple has been testing the Lisa in the business community, where the company hopes to find a strong market. In one test case at Chevron U.S.A., the computer has earned high marks.

Even an oil company executive deserves to have some fun. Jack Bontemps of Chevron U.S.A. clearly was enjoying himself as he showed off some of the graphics he personally had designed on his Lisa for various reports using the LisaDraw application (see graphics on page 136).

Here was a respectable rendition of an oil tanker in the waves; further up the screen was a reasonable representation of an oil pipeline; and yes, of course, the Chevron logo. But what were these symbols in the lower right—a circular drilling platform and an atomic diagram?

"No," smiled Bontemps, "the drawing on the left is a spinning top and the one on the right is a jack. You know, for the children's game jacks." He blushed and changed the subject, but the secret was out: Bontemps, who until recently had been unfamiliar with computers, was now comfortable enough with this one to occasionally forget its role as a productivity-enhancement tool and *play*.

Lisa Goes to Work

Apple's newest release, the Lisa, was on the road for beta testing and evaluation for several months, looking for good out-of-town reviews from the people Apple hopes are the Lisa's harshest critics and strongest users: the business community.

The Lisa was designed with the goal of establishing a less-forbidding bond between the user and the computer, letting people work in a fashion that hews as close as possible to their usual working habits without necessitating many long hours of instruction in the computer's language and capabilities.

To accomplish this, the Lisa employs a "mouse," a palm-size device with a trackball on the bottom and a single rectangular button on top, which positions the cursor anywhere on the screen. By moving the mouse on the desktop, users can point to and select objects or menu commands on the screen for action. The user needs to touch the keyboard only when actually entering data, and not when typing a command or otherwise directing the Lisa.

Also, computer jargon has been kept to a minimum: no "Control-Y" or "PIP.COM" for Lisa. Instead, users merely tap the mouse beside the command "Save and Put Away 'Stationery.'"

Probably most appealing to novice users (a class that encompasses many executives), is the Lisa's extensive use of graphics. Tiny pictures of common office objects—stationery, clipboard, wastebasket, and others—represent groups of tasks, such as writing, filing, setting documents aside on the desktop, or throwing a piece of paper away. These cunning pictures constitute the "desktop manager," the visual aspect of the Lisa's advanced hardware and software architecture that organizes information, documents, and tasks the same way one would in a typical office.

A Test Run

After the Lisa was developed, the logical next step was to see how it was received in a typical office. (This stage of testing is just winding down.) Among the companies that consented to take a gander at the newborn Lisa was Chevron U.S.A., Inc., the U.S. subsidiary of Standard Oil of California. Chevron U.S.A., a vertically integrated company, deals in all aspects of crude oil, natural gas, and petroleum products. Its activities include oil exploration, land acquisition, production, manufacturing, distribution, and marketing.

The company accepted a total of seven Lisas and spread them throughout different divisions of the firm. To sample Chevron U.S.A.'s reaction to the Lisa, *A+* spoke to Jack R. Bontemps, manager of administrative and MIS services for the supply and distribution department.

Many executives considering purchase of a personal computer wonder if the bulk of the hardware will take up an inordinate amount of work space. That question seemed to be answered in the negative by the almost austere efficiency of Bontemps' office. His actual desk remained clear; the Lisa monitor and keyboard sat behind his desk on a credenza, while the printer was balanced decorously on the windowsill. The ProFile hard-disk unit nestled behind the credenza. All software for the Lisa awaited use in the room's one other storage space, a dark wood cabinet.

The supply and distribution department of Chevron U.S.A., Bontemps explained, is responsible for monitoring the balance of oil supply and demand. The department forecasts the movement of crude oil from oil fields and tracks the transportation of raw materials from the company's domestic refineries.

Before the Lisa, Bontemps said, he would walk down the hall to work with one of the IBM PCs or other machines hooked up to the in-house timesharing system if there was a problem that needed computer time or number-crunching. But now, all he has to do is turn around in his chair to get access to a large amount of computer power.

Bontemps had been chosen as a guinea-pig for the Lisa experiment by Gerald Brody, head of the computer services

division. When *A+* spoke with him, he had been working with the Lisa for four months.

What kind of training did he undergo to get acquainted with the Lisa? "Well, first I went through the tutorial, LisaGuide, which explains the philosophy of using the mouse, the desk, and file management systems," he said. For further training, he went to Apple's main office in Cupertino, where he methodically worked through the subtutorials in each of the various applications—LisaWrite, LisaProject, LisaCalc, LisaGraph, LisaDraw, and LisaList—in turn.

"I estimate it took me about 20 real hours on the system before I had a comfortable working knowledge of all the programs. That counts reading the manual and working the tutorials."

Four months later, he felt he was beginning to tap the possibilities of the machine. For instance, he used it to keep a daily job log, a daily reminder, and a daily calendar. The jobs he listed were sorted by priority A, B, C, or D (for delegate). All the daily files were listed under JAX, for Jack's Jobs. On the day we spoke with him, he had begun putting together a list of ideas, "things to do, things that might be good ideas in the near future," such as holding a monthly meeting with the computer-services division to review activities and improve communication.

'It took me about 20 real hours on the system before I had a comfortable working knowledge.'

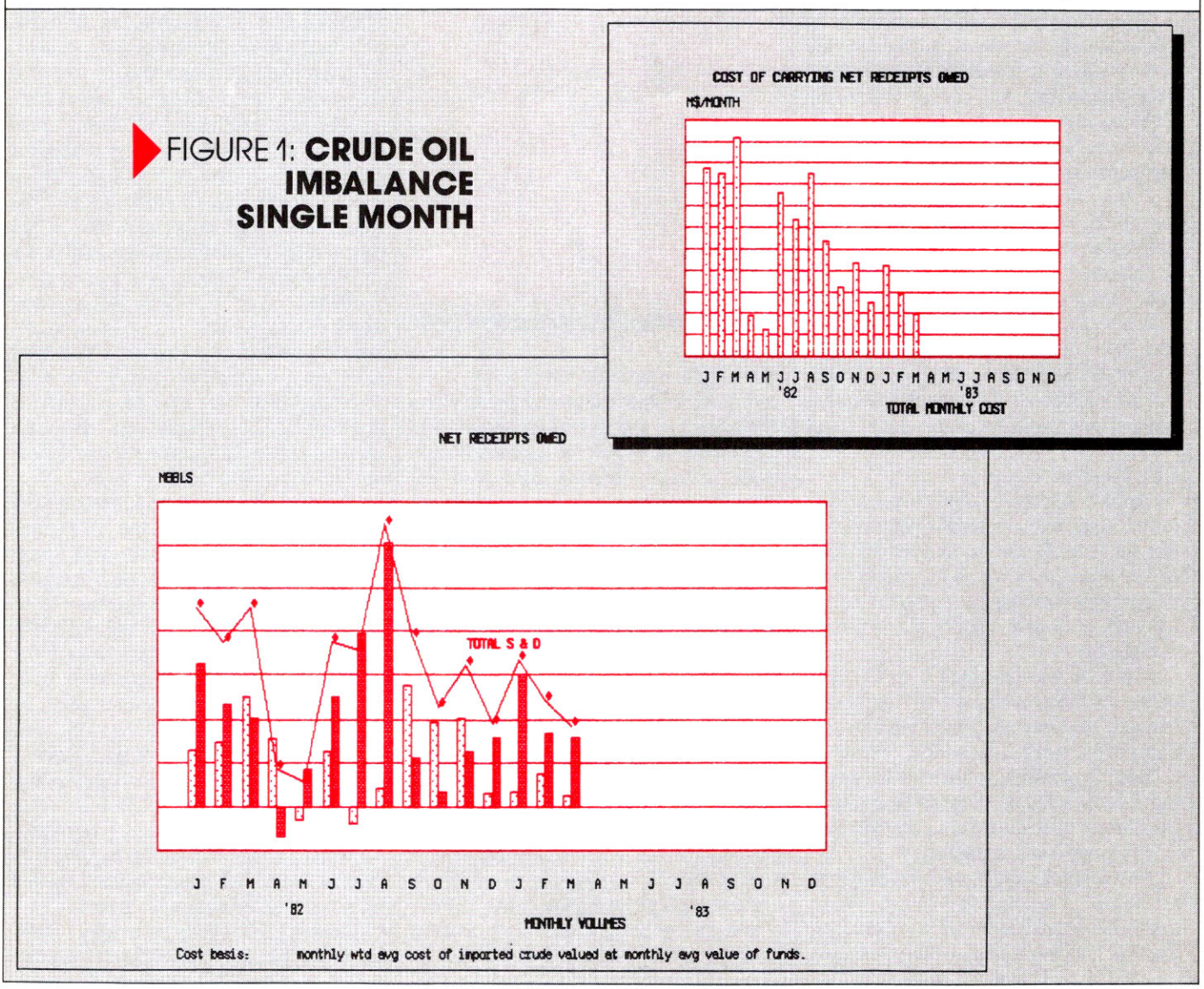
"If we had a micro with just the capability to read floppy disks, we'd probably have a file-management problem," he said. "There probably would be 200 disks and labels that would have to be coordinated. With a floppy-disk system, you'd have to keep track of twice the information you do with the Lisa."

Among other things, his office keeps in touch with Chevron's government-affairs office on items relating to proposed state or federal legislation, and works with them to determine how these regulations might affect oil supply and distribution.

Using the Lisa, he's now able to keep up with articles and references in trade journals that might be supportive of Chevron's position (or opposed to it, he added). With LisaList, he's able to keep track of these references and file them by subject and keyword. He might enter one reference as "article in *Oil & Gas Journal*," noting that it was written by someone he thinks writes well, and identify it further with two or three keywords. "That way it's easy to retrieve and easy to purge," he said. Bontemps tries to purge his reference files on a regular basis.

Bontemps also provides information services, such as auditing and credit

FIGURE 1: **CRUDE OIL IMBALANCE SINGLE MONTH**



reports necessary on the supply side of the oil business. His group has to put together a large number of routine reports that cover expense forecasts, budgets, manpower estimates, and other topics.

The Lisa helps him with these routine reports by acting as a tickler file. "For example, there's an operating expenses forecast due October 15. The Lisa tells me when to alert some departments that certain information is necessary and lets me know that I have to flag two to three financial periods."

What Bontemps likes best about the Lisa, though, are its information-compressing graphics capabilities. He praised LisaGraph for the amount of information it could pack onto a single chart. As an example, he showed one graph printed by the Lisa depicting the crossover of maintenance and development costs. "Look how easily you can see the ongoing trends," he remarked.

His group was in the middle of consolidating the five-year manpower plans for the department, which manages over 600 people. He indicated another graph, one that depicted the decrease of computer development and production costs relative to maintenance costs over the next few years.

"The Lisa provides a clear picture of information on exchange volumes and operating expenses involved with shipping," Bontemps said. (See figure 1 and figure 2 for samples of Lisa's graphics capabilities.) His group was able to examine selected expense trends with ease. "We couldn't do this before," he commented. "We would have done it with stacks of graphs and tables."

The Lisa helps him with these routine reports by acting as a tickler file.

With the LisaDraw and LisaGraph programs, Bontemps has put together his own presentations and charts for major meetings, a procedure that might have taken him from 1 to 3 days before the Lisa, including the time involved in running the package to Chevron's graphic-arts department. Now, he says, it takes him four minutes.

A Dissenting Opinion

Not everyone at Chevron is as enthusiastic as Bontemps about the new Lisa. This apparent disparity of opinion stems from the differing needs of the various departments. While an executive in one area might find certain Lisa utilities helpful, someone doing another kind of work might not require them.

Kitty Maffei, Chevron's manager of advanced office systems, was concerned about the Lisa's communications capabilities. "Communications is a necessary adjunct," she said, "and communications is in a prototype stage."

In the advanced-office-systems sec-

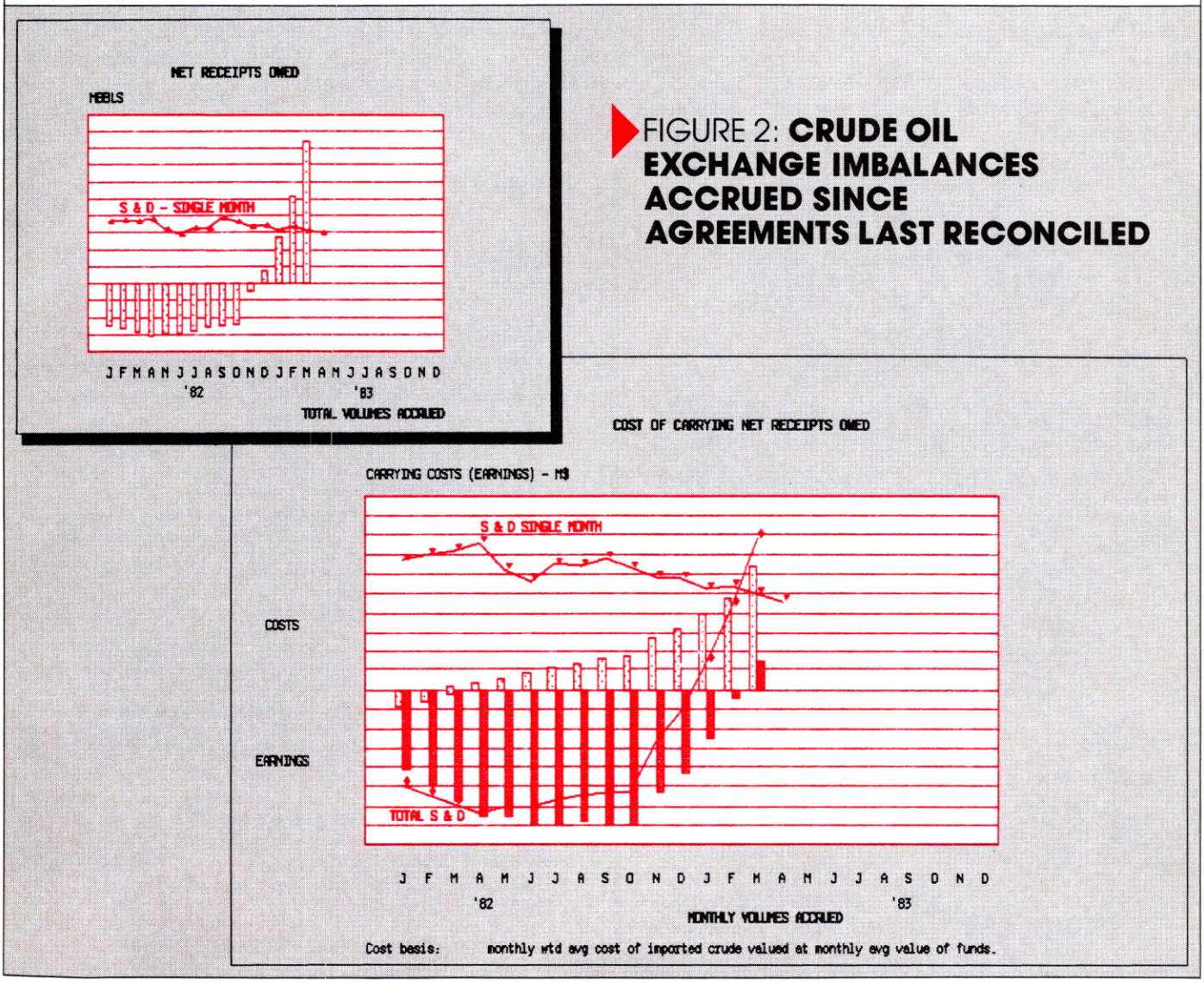
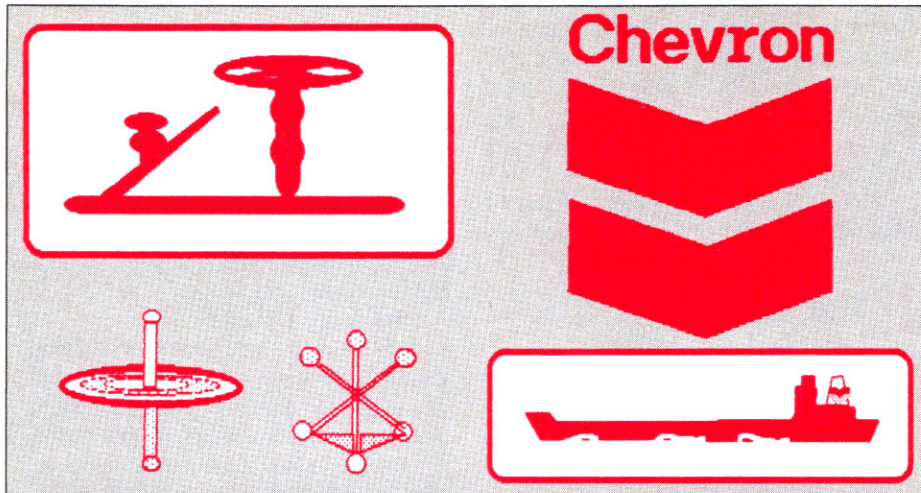


FIGURE 2: **CRUDE OIL EXCHANGE IMBALANCES ACCRUED SINCE AGREEMENTS LAST RECONCILED**



Drawings by Chevron's Jack Bontemps using LisaDraw depict, clockwise, an oil pipeline, the Chevron logo, a spinning top and jack, and an oil tanker.

tion, the Lisa was placed for comparison next to a Xerox Star in a demonstration room. The Xerox Star is the word processor used most widely throughout Chevron, and it is considered a benchmark for measuring the potential worth of other systems. Compared to the Star, at least, word-processing speed is not the Lisa's strongest suit, according to Maffei.

Bontemps concurred. "The Lisa could be faster," he said, "but when you compare it to what we were doing previously," which was walking down the hall to the computer in another office and asking someone else to package some information for them, "the time savings are still tremendous."

The Lisa currently is being considered for Chevron's "recommended list," a group of computers the company considers well suited to in-house needs. Employees are welcome to purchase computers not on the recommended list, but the officially approved micros are supported within the firm.

Score One for the Lisa

But the Lisa has already earned a high rating on Bontemps' personal list. Not only does it make planning enjoyable, he said, but it provides continuity within the office. A personal computer such as the Lisa "establishes the level and the discipline of information," he commented.

"When we want to look at some data or similar data again after we've used it, we can just reprint the graph. You're not just doing it from scratch. It has a name, it's backed up well, it's all printed. Before, you might have been starting from the bottom.

'When we want to look at some data or similar data again after we've used it, we can just reprint the graph.'

"The Lisa helps management manage an office."

In this executive, at least, the Lisa appears to have found a disciple. ✚

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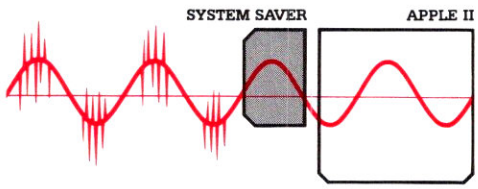
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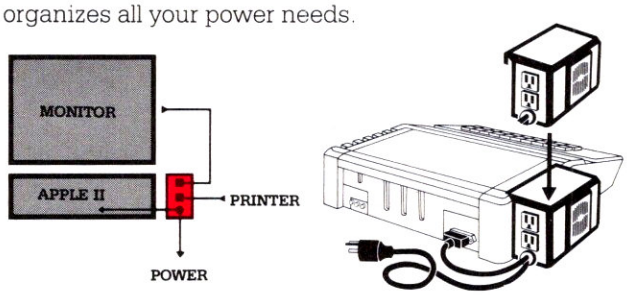
Power line noise can often be interpreted as data. This confuses your computer and produces system errors. Power surges and spikes can cause severe damage to your Apple's delicate circuitry and lead to costly servicing.

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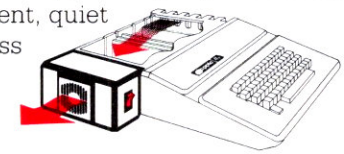


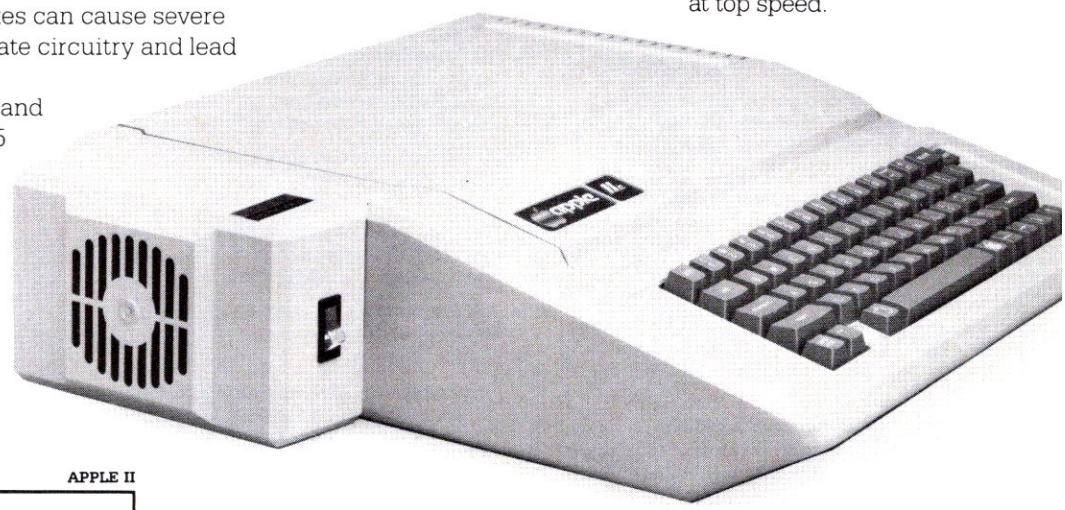
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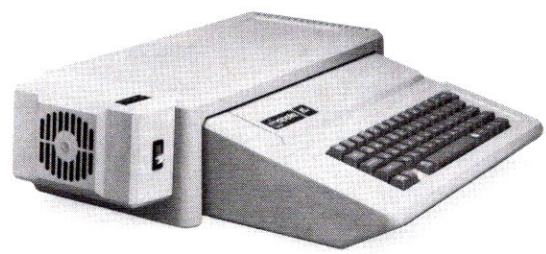
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*Softsel Computer Products Hot List. **PC Magazine: March 1983.

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CIRCLE 132 ON READER SERVICE CARD

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- "My husband, who is responsible for the household bills, is especially appreciative of the running totals of each category. What a magnificently thought-out program! Thank you. It's worth every penny." Joan Hoffman, Westport, CT.
- "The program is fabulous—I love it." Richard Rodney, D.D.S., Toronto, Canada.
- "The program is both easy to use and a very helpful addition to my software library. The most useful features are the automatic totaling of categories and the automatic retrieval of split entries." Louis Wofsy, Burk, Virginia.
- "As promised, it is not only easy to learn but an extremely valuable tool for keeping tax deductible items readily at hand." H.M. Stover, Yountville, Calif.
- "You guys are great!" Dick Palmer, San Diego, Calif.
- "I think the phrase 'as promised' sums up my reaction to the program. I wound up balanced to the penny. This from someone who hasn't looked at a bank statement in ten months!" Glenn Pironlick, Charlotte, NC.
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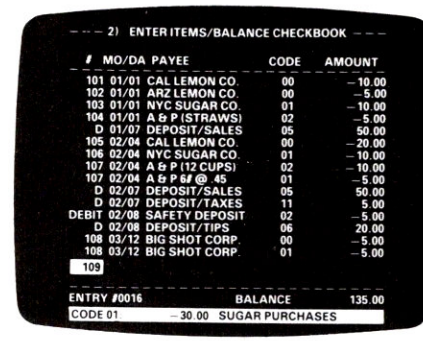
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HOW TO dBASE II

PART IV

In a tutorial series on dBase II, a popular program for database management.

So far in the *A+* series of dBASE II tutorials, we've covered techniques for creating databases, storing information in them, and keeping that information updated. In addition, we have explored almost all of the dBASE II commands for data retrieval.

In this tutorial, we'll explore the fastest and most convenient techniques for finding desired information, using sorted and indexed databases.

We will also experiment with the Report command, which creates professional-looking hard-copy printouts from your database. The past few issues have used a telephone book database for examples, but this time create the following database:

```
STRUCTURE FOR FILE:   A:CAMPLIST.DBF
NUMBER OF RECORDS:    00000
DATE OF LAST UPDATE:  00/00/00
PRIMARY USE DATABASE
FLD    NAME     TYPE   WIDTH   DEC
001    item       C      010
002    weight     N      002
003    cost       N      005    002
004    owner      C      010
```

Now, using APPEND, enter the following data:

Record	Item	Weight	Cost	Owner
00001	BACKPACK	10	65.00	KARL
00002	STOVE	25	85.00	KARL
00003	TENT	12	62.33	LISA B.
00004	FOOD	30	45.27	GROUP
00005	RAINGEAR	7	12.95	VALERIE

Sorting Things Out

So far, you have probably determined the order of the records in your phonebook database (which we used in past examples) haphazardly. When you found a new person to add to it, you simply used the Append command to make the addition. And when you listed out your data, it did not appear in any particular order other than chronological, based on when you entered it.

There are times, however, when it is useful to rearrange an entire database according to information in a specific field. The telephone book you receive from the phone company is a good example. Once it has acquired all the new data for a year, the phone company prints out a list in alphabetical order according to last name. This way, without even using a computer, you can easily look someone up. In dBASE II, the Sort command is your means of rearranging your database.

Sort creates a new database file using the information in an already existing file, but the new file has all its records organized according to a scheme that you decide on in advance. For example, let's take the camping-list example.

```
. use camplist <CR>
. list <CR>
00001   BACKPACK   10   65.00 KARL
00002   STOVE      25   85.00 KARL
00003   TENT       12   62.33 LISA B.
00004   FOOD       30   45.27 GROUP
00005   RAINGEAR    7   12.95 VALERIE
```

This is the order in which you entered the data, but let's say you wanted to rearrange it according to weight. The command would look like this:

```
. sort on weight to camp2 <CR>
SORT COMPLETE
```

dBASE has created a new file called camp2 that has all the same records as Camplist, only reorganized according to weight. In database lingo, the field you are basing the order on is called the *key* or *key field*. To see what the new file looks like, type

```
. use camp2 <CR>
. list <CR>

00001   RAINGEAR    7   12.95 VALERIE
00002   BACKPACK   10   65.00 KARL
00003   TENT       12   62.33 LISA B.
00004   STOVE      25   85.00 KARL
00005   FOOD       30   45.27 GROUP
```

dBASE assumes you want to use an ascending order in your sort, but descending is also possible.

```
. sort on weight to camp2 descending
SORT COMPLETE

. use camp2
. list

00001   FOOD       30   45.27 GROUP
00002   STOVE      25   85.00 KARL
00003   TENT       12   62.33 LISA B.
00004   BACKPACK   10   65.00 KARL
00005   RAINGEAR    7   12.95 VALERIE
```

Notice that the weight field now decreases in size. dBASE also allows you to sort on a character field in either ascending or descending order. For example:

```
. sort on item to camp3
SORT COMPLETE
. use camp3
. list

00001   BACKPACK   10   65.00 KARL
00002   FOOD       30   45.27 GROUP
00003   RAINGEAR    7   12.95 VALERIE
00004   STOVE      25   85.00 KARL
00005   TENT       12   62.33 LISA B.
```

Another useful feature of the Sort command is the ability to create databases that are sorted on more than one field. This process is called a multilevel sort. Using the phone book example again, say you sorted according to last name, but under each last name you wanted first names alphabetized (e.g., Suzy Raymond listed before Tina Raymond). To achieve this arrangement, you sort on the least significant field first (first name) and then on the most significant field (last name). Let's do a multilevel sort on Camplist for practice, using Owner as the most significant key and Item as least significant key:

```
. use camplist <CR>
. sort on item to camp2 <CR>
SORT COMPLETE
. use camp2 <CR>
. sort on owner to camp3 <CR>
SORT COMPLETE
. use camp3 <CR>
. list <CR>

00001   FOOD       30   45.27 GROUP
00002   BACKPACK   10   65.00 KARL
00003   STOVE      25   85.00 KARL
00004   TENT       12   62.33 LISA B.
00005   RAINGEAR    7   12.95 VALERIE
```

Only Karl's records are relevant here, since only he is listed more than once. Notice that his backpack is listed before his stove, since, alphabetically, B comes before S.

So you see, you can create many differently organized databases from one master list. But here's the catch: Every time you append any sorted databases, you have to re-sort them if you want them to remain in order. That might be OK, except that sorting large databases can take a long time—sometimes many hours for a single sort. Obviously, the Sort command is not the solution for efficient on-line data modification and retrieval.

Index Is Faster

Luckily, another command, Index, solves this problem and then some. Index is a powerful command and is often the basis for advanced database systems. In contrast to Sort, Index does not copy your entire database. Instead, it creates a new file that has "pointers" to records in your database. In theory, this "pointer file" works similarly to the card catalogs in a library. Instead of searching through all the books in a library, you look through indexes (author, title, and subject) to point you to the one you want. Since the catalogs are kept in alphabetical order, this is usually a quick and simple process.

dBASE II indexes work the same way, only faster, thanks to your computer, and they consume less disk space than sorted files. In addition, dBASE can automatically keep the indexes up to date whenever you make changes to your master database.

Best of all, indexed databases allow you to use another command, Find, which is like Locate, but is much faster (more about that later).

Now for the details of indexing. For starters, let's create an index. As with the Sort command, you must specify the field you want to index on and the name of the index file in which dBASE is to store the pointers. The program will give each index the file extension *.ndx,* unless you stipulate otherwise.

```
. use camplist <CR>
. index on item to campitem <CR>
00005 RECORDS INDEXED
```

Now you should have a new file on your disk called *campitem.ndx*. You can verify this by typing

```
. display files like *.ndx <CR>
CAMPITEM.NDX
```

Assuming everything has gone as planned, you can now open the Campitem index. Opening indexed databases is a little trickier than opening normal ones and requires a variant form of the Use command. When starting from scratch (no databases open) you type

```
. use camplist index campitem <CR>
```

But if Camplist were already open, the command

```
. set index to campitem <CR>
```

would have done the trick. Incidentally, you must take special care if you want to create and/or open indexes on a disk that is not in the "logged in" drive. For example, to create and then open a database/index combination on drive B, you must use this syntax:

```
. index on fieldname to b:indexname <CR>
. use b:filename index b:indexname <CR>
```

In any case, it is a good idea to check things just to verify that you have the correct files open. Use the following command:

```
. display status <CR>

DATABASE SELECTED – A:CAMPLIST.DBF
PRIMARY USE DATABASE

. INDEXES:          KEY EXPRESSION:
  A:CAMPITEM.NDX    item
```

When you have indexes open, dBASE is kind enough to remind you of their names and the key on which you created them. Assuming everything looks good, take a look at your database through the "eyes" of your new index:

```
. list <CR>

00001   BACKPACK   10   65.00 KARL
00004   FOOD       30   45.27 GROUP
00005   RAINGEAR    7   12.95 VALERIE
00002   STOVE      25   85.00 KARL
00003   TENT       12   62.33 LISA B.
```

Notice that the record numbers are now out of order, though the item names *are* in order. Why is this? Again, remember the library example. The books remain in the same order on the shelves. Only the catalog changes. Your records have not been rearranged—only the pointers have.

Finding Data the Fast Way

Now for the fun part. The main reason for indexing is to let you use the Find command. This command is so fast at grabbing the data you want that, even in very large databases, you will have to wait only a few seconds for dBASE to respond.

Naturally, you have to use Find with the field you created the index on, and if that field is a character (c) field, your prompt must be in quotation marks.

```
. find ''BACKPACK'' <CR>
. display <CR>

00001   BACKPACK   10   65.00 KARL

. find ''TENT'' <CR>
. ? # <CR>
     3
. display <CR>

00003   TENT       12   62.33 LISA B.
```

Since the pointer is now located on the record you want, you can use the Edit command to change things or just to display the record in a format that is easier to read:

```
. EDIT # <CR>

RECORD # 00003
Item    :TENT      :
Weight  :12:
Cost    :62.33:
Owner   :LISA B.   :
```

(Use ^0 to return to the dBASE prompt.) If you try to find an item that is not in the database, dBASE will let you know about it in two ways. First, it will say NO FIND. Then, if you display the pointer number, you will find that it is 0. For example:

```
. find ''BINOCULARS'' <CR>
NO FIND
. ? # <CR>
      0
.
```

A Few More Notes on Indexing

- You can create as many indexes as you like, but dBASE allows no more than seven indexes to be "open" at one time. You open multiple indexes by using commas to separate the index names—e.g.,

```
. set index to item, owner, weight, cost <CR>
```

- The first index in a list of indexes is called the "master index." The Find command references only the master index, but all open indexes will be updated after the use of Append, Edit, Browse, and Replace.
- After doing a Find, do not change the data in the field on which the master index was made (the master key). If you must change the data, use the Set Index command to reassign the master index and then edit, replace, and so on.
- Packing a file while indexes are open causes an automatic reindexing of all currently open indexes. dBASE reports its progress as it performs the tasks.
- Trying to find someone in an unindexed database or when the index is not open will result in an error message; e.g.:

```
DATABASE IN USE IS NOT INDEXED
      ?
find CANTEEN
CORRECT AND RETRY (Y/N)?
```

- In general, the more indexes you have open, the slower things get, especially when you're appending, so don't use any more than you have to, unless your database is going to remain small.
- Typing *set index to* <*CR*> deselects all indexes.

Professional-Looking Reports

Congratulations! Assuming you have participated in all the previous *A+* dBASE II tutorials, you should now have all the rudimentary commands under your belt. Now you can take the next step, creating a report from data you have entered.

dBASE II has a built-in report generator that can, within only a few minutes, create fairly sophisticated printouts (either on screen or paper) based on information in a database. Even though this feature is not advanced enough for creating complex reports, it will often do the trick nicely for everyday efforts.

You can prepare reports right at the keyboard, in response to dBASE II prompts. Once you've answered the prompts, dBASE saves your answers for future use. This way, you can run the report instantly the next time, without having to answer the prompt questions.

Before experimenting with the Report command, you will need some material to work with. Create the following database and append it with the data shown in figure 1.

To create a report, you simply type

```
. REPORT <CR>
```

Now dBASE will ask you a lot of questions. Your responses are in boldface letters.

```
ENTER REPORT FORM NAME: STEREO <CR>
```

The first thing the program asks you is what the filename of your report will be. As with other files (such as database files, for example), you may use up to eight letters, a period, and an extension. If you do not use an extension, dBASE will add ".FRM" to the filename. Since we'll be using this file with the STEREO database, let's call it STEREO. (dBASE II will be able to differentiate between these two STEREO files because the other one has a ".DBF" extension.)

```
ENTER OPTIONS, M=LEFT MARGIN, L=LINES/
PAGE, W=PAGE WIDTH <CR>
```

Next, you have the choice of a few formatting options for affecting the appearance of your report. You can elect to set these (for example, L=25 sets the left margin at the 25th column) or just press the carriage return to accept the defaults of 8, 57, and 80. This time, just type the <CR>.

```
PAGE HEADING? (Y/N) Y <CR>
```

This means, "Do you want something written at the top of each page in your report?" "Yes."

```
ENTER PAGE HEADING: Bob's Low-End Hi-Fi Inventory<CR>
```

Since you said **Y** to the last question, you got the page-heading prompt and entered an appropriate heading.

```
DOUBLE SPACE REPORT? (Y/N) N <CR>
```

Do you want your report to be double-spaced? If you type **N,** you get a single-spaced report.

```
ARE TOTALS REQUIRED? (Y/N) Y <CR>
```

This prompt refers only to numerical fields. Since dBASE is going to form some columns, it wants to know whether columns of numbers should have totals at the bottom. Say **Y** here, since we want to see totals.

```
SUBTOTALS IN REPORT? (Y/N) N <CR>
```

dBASE can figure out subtotals on a particular numerical field if you want—for example, you might want to know the total cost for all receivers—but this time, we will skip the subtotals. Type **N.**

```
COL      WIDTH.CONTENTS
```

Now dBASE wants to know the sizes and contents of the columns that are to appear in your report. As for size, you can

```
STRUCTURE FOR FILE:   A:STEREO.DBF
NUMBER OF RECORDS:    00010
DATE OF LAST UPDATE:  00/00/00
PRIMARY USE DATABASE
FLD   NAME       TYPE  WIDTH  DEC
001   CATEGORY    C      010
002   BRAND       C      010
003   MODEL       C      006
004   QUANTITY    N      002
005   COST        N      006  002
006   PRICE       N      006  002
**TOTAL**              00041

. LIST

00001  RECEIVER   NIZO       T-33     5  225.49  350.49
00002  RECEIVER   NIZO       T-35     4  312.00  425.25
00003  RECEIVER   ACME       R25-MT  13   19.99   49.99
00004  RECEIVER   NADIR      2-CHP   50   12.95   29.99
00005  SPEAKERS   RAZCO      L-55    30  199.00  249.00
00006  SPEAKERS   TALBEST    BG-20    6  250.00  350.88
00007  TAPE DECK  ROLLEM     CAS-3   10  125.65  212.99
00008  TAPE DECK  FLOWUTTER  WBL-5    5  149.33  250.77
00009  TURNTABLE  XIRTAM     25-L     5   99.99  149.99
00010  TURNTABLE  RALURIC    RND-1    3  595.00  850.00
```

Figure 1: Data to create prior to experimenting with the Report command

PAGE NO. 00001

Bob's Low-End Hi-Fi Inventory

BRAND	CATEGORY	MODEL	QUAN	COST	PRICE	INVEST.
NIZO	RECEIVER	T-33	5	225.49	350.49	1127.45
NIZO	RECEIVER	T-35	4	312.00	425.25	1248.00
ACME	RECEIVER	R25-MT	13	19.99	49.99	259.87
NADIR	RECEIVER	2-CHP	50	12.95	29.99	647.50
RAZCO	SPEAKERS	L-55	30	199.00	249.00	5970.00
TALBEST	SPEAKERS	BG-20	6	250.00	350.88	1500.00
ROLLEM	TAPE DECK	CAS-3	10	125.65	212.99	1256.50
FLOWUTTER	TAPE DECK	WBL-5	5	149.33	250.77	746.65
XIRTAM	TURNTABLE	25-L	5	99.99	149.99	499.95
RALURIC	TURNTABLE	RND-1	3	595.00	850.00	1785.00
** TOTAL **				1989.40	2919.35	15040.92

Figure 2: A sample of a dBase II report, showing totals in the numerical fields

make a column as large or small as you want. If the data in the field being displayed is too long to fit on one line, it will be wrapped around to the next line automatically. With experimentation you will find ways to separate or bring columns closer together by changing their sizes. As far as content is concerned, columns usually contain data from one of your database fields, but they can also contain a value that the computer calculates from other numbers. Notice that column 7 in this report will contain the product of "quantity" × "cost." You also get a choice of how to label each column. The ; means to continue the next part of the heading one line down. In this case, the result is an underline. Now, just type in these responses and watch what happens. Mind your spelling and punctuation.

```
001       10,brand
ENTER HEADING: BRAND;=====
002       10,category
ENTER HEADING: CATEGORY;========
003       6,model
ENTER HEADING: MODEL;=====
004       5,quantity
ENTER HEADING: QUAN;====
ARE TOTALS REQUIRED? (Y/N) N
005       7,cost
ENTER HEADING: COST;====
ARE TOTALS REQUIRED? (Y/N) Y
006       7,price
ENTER HEADING: PRICE
ARE TOTALS REQUIRED? (Y/N) Y
007       8,quantity*cost
ENTER HEADING: INVEST;======
ARE TOTALS REQUIRED? (Y/N) Y
008    <CR>
```

Now dBASE goes ahead to do the report for you. It should look like figure 2.

This might seem like a big hassle for generating such a simple report, but remember, our database is not very extensive. If it were larger, this could be a real time saver. Besides, the next time you want this report, all you have to do is type

```
. report form stereo <CR>
```

And if you want it to print out on paper say:

```
. report form stereo to print <CR>
```

Now, let's try running the report again, only this time electing to show subtotals. First, here's an explanation, since the Subtotals option is a little confusing. After you indicate that you want subtotals, the program asks you which field to do subtotals on. This does not mean the field whose contents should be added up to arrive at the subtotal. It means, "In which field do you want dBASE to look for groups of similar records to base subsequent subtotal calculations on?" For example, say you want to see a subtotal of each numerical field in the Stereo database, grouped by category—in other words, totals for receivers, speakers, tape decks, and turntables listed separately. Figure 3 shows how you would do it.

Pretty spiffy. Now a few more notes: You probably noticed that dBASE asked whether you wanted a summary report only. If you had said yes, the details of each category would have been eliminated. In the Summary mode, our report looks like figure 4.

Also, answering "EJECT PAGE AFTER SUBTOTALS?" affirmatively applies only to printing out your report on paper. With this option, you can print a separate page for each cat-

```
ENTER REPORT FORM NAME: stereo2
ENTER OPTIONS, M=LEFT MARGIN, L=LINES/PAGE,
    W=PAGE, WIDTH
PAGE HEADING? (Y/N) Y
ENTER PAGE HEADING: Bob's Low-End Hi-Fi Store
DOUBLE SPACE REPORT? (Y/N) N
ARE TOTALS REQUIRED? (Y/N) Y
SUBTOTALS IN REPORT? (Y/N) Y
ENTER SUBTOTALS FIELD: CATEGORY
SUMMARY REPORT ONLY? (Y/N) N
EJECT PAGE AFTER SUBTOTALS? (Y/N) N
ENTER SUBTOTAL HEADING: Figures for all
COL       WIDTH, CONTENTS
001       10,BRAND
ENTER HEADING:BRAND;=====
002       10,CATEGORY
ENTER HEADING:CATEGORY;=====
003       6,MODEL
```

Figure 3: Getting subtotals by category

(Figure 3 continues on next page)

(Figure continued from page 143)

```
ENTER HEADING:MODEL;=====
004       5,QUANTITY
ENTER HEADING:QUAN;====
ARE TOTALS REQUIRED? (Y/N) Y
005       7,COST
ENTER HEADING: COST;====
ARE TOTALS REQUIRED? (Y/N) Y
006       7,PRICE
ENTER HEADING: PRICE;=====
ARE TOTALS REQUIRED? (Y/N)Y
007       8,QUANTITY*COST
ENTER HEADING: INVEST;======
ARE TOTALS REQUIRED? (Y/N) Y
008
```

egory (i.e., subtotal).

As you can see, the Report command is pretty powerful. With knowledge of only a few commands—Create, Append, and Report—anyone can do useful database work. Since you can create many report forms for each database, you can base many applications on the same collection of information, eliminating duplication of effort.

Congratulations. You now know all of the important commands necessary to do many complex jobs with dBASE II. Until the next issue, try to take the time to experiment on your own—and, of course, always keep a backup disk of your files in a safe place. ✚

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```
PAGE NO. 00001
                    Bob's Low-End Hi-Fi Store
BRAND        CATEGORY     MODEL      QUAN     COST      PRICE     INVEST.
=====        =====        =====      ====     =====     =====     ======

* Figures for all RECEIVER
NIZO         RECEIVER     T-33          5     225.49    350.49    1127.45
NIZO         RECEIVER     T-35          4     312.00    425.25    1248.00
ACME         RECEIVER     R25-MT       13      19.99     49.99     259.87
NADIR        RECEIVER     2-CHP        50      12.95     29.99     647.50
** SUBTOTAL **                         72     570.43    855.72    3282.82

* Figures for all SPEAKERS
RAZCO        SPEAKERS     L-55         30     199.00    249.00    5970.00
TALBEST      SPEAKERS     BG-20         6     250.00    350.88    1500.00
** SUBTOTAL **                         36     449.00    599.88    7470.00

* Figures for all TAPE DECK
ROLLEM       TAPE DECK    CAS-3        10     125.65    212.99    1256.50
FLOWUTTER    TAPE DECK    WBL-5         5     149.33    250.77     746.65
** SUBTOTAL **                         15     274.98    463.76    2003.15

* Figures for all TURNTABLE
XIRTAM       TURNTABLE    25-L          5      99.99    149.99     499.95
RALURIC      TURNTABLE    RND-1         3     595.00    850.00    1785.00
** SUBTOTAL **                          8     694.99    999.99    2284.95
** TOTAL **                           131    1989.40   2919.35   15040.92
```

Figure 3: Subtotals of each numerical field, grouped by category

```
PAGE NO. 00001
                    Bob's Low-End Hi-Fi Store
BRAND        CATEGORY     MODEL      QUAN     COST      PRICE     INVEST.
=====        =====        =====      ====     =====     =====     ======
* Figures for all RECEIVER
** SUBTOTAL **                         72     570.43    855.72    3282.82

* Figures for all SPEAKERS
** SUBTOTAL **                         36     449.00    599.88    7470.00

* Figures for all TAPE DECK
** SUBTOTAL **                         15     274.98    463.76    2003.15

* Figures for all TURNTABLE
** SUBTOTAL **                          8     694.99    999.99    2284.95

** TOTAL **                           131    1989.40   2919.35   15040.92
```

Figure 4: Subtotal report in Summary mode

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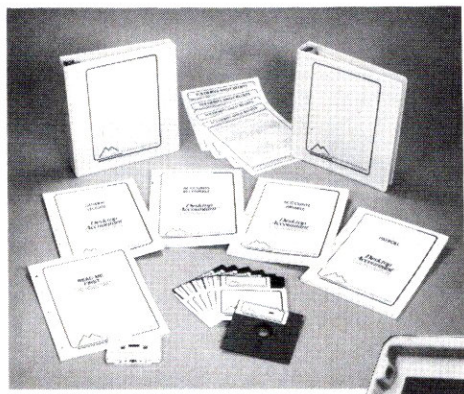
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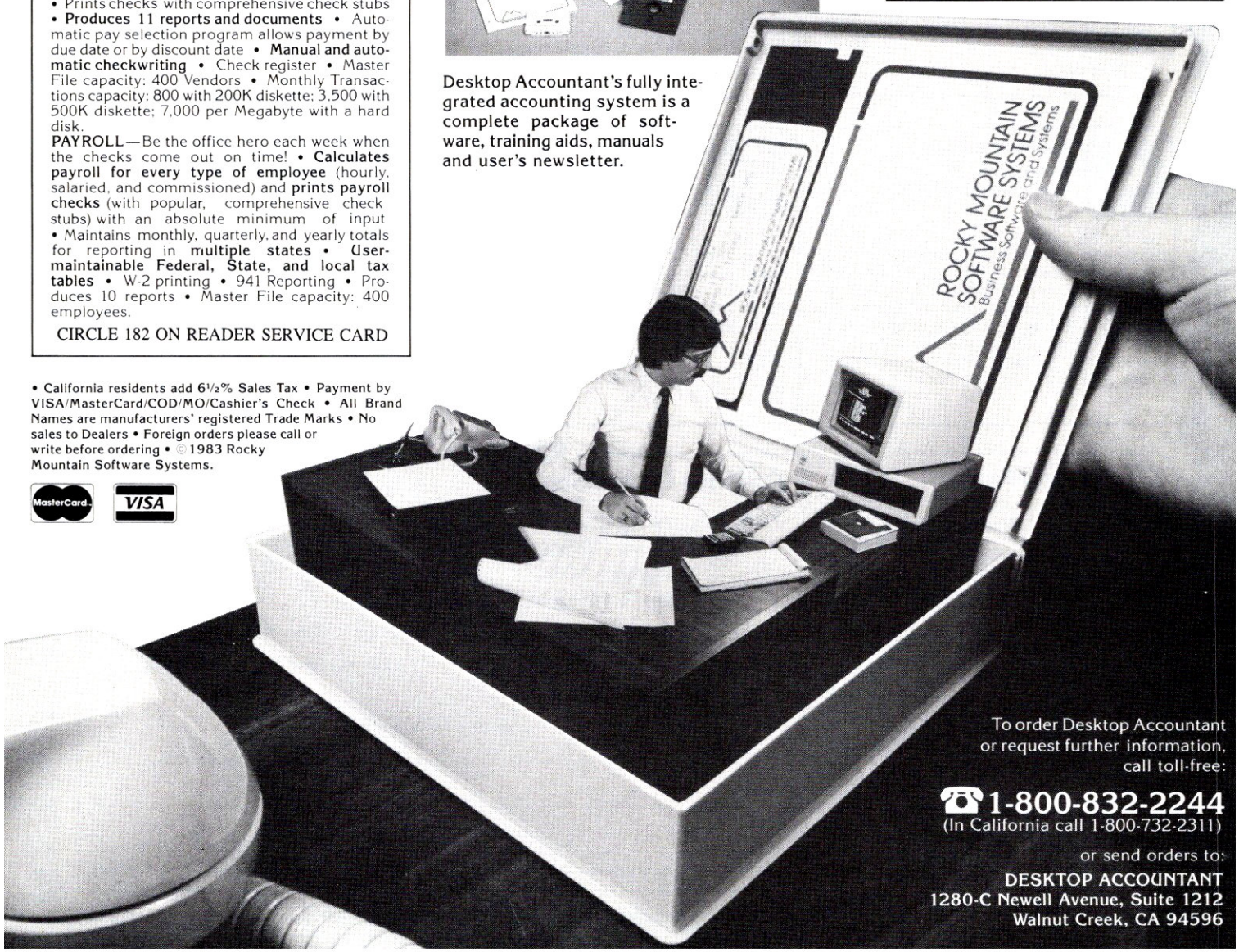
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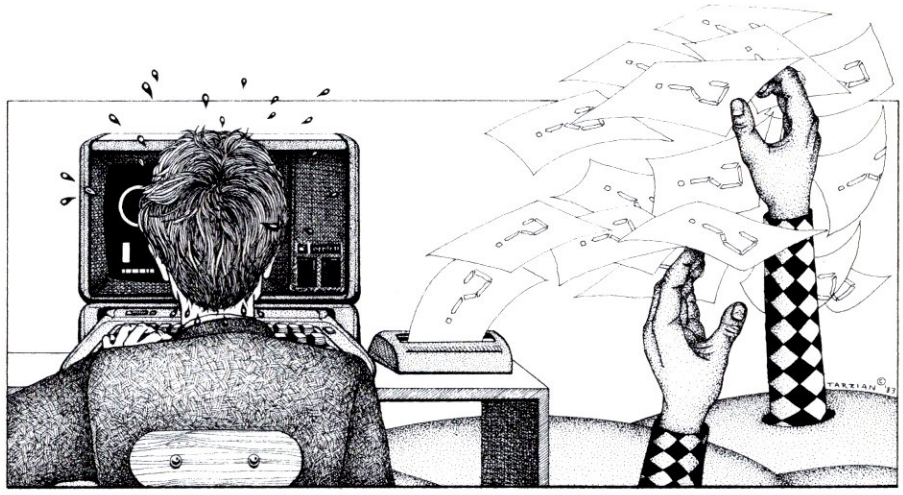
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RESCUE SQUAD/BY LINDSAY McGRATH

Questions about how to enter control characters into Apple Writer II, printing with Tax Planner, and more are answered by the Rescue Squad.



Apple Writer II Control Characters

Q. How can I enter control characters into Apple Writer II if I can't type them from the keyboard or the Apple Writer II won't allow them?

A: *The Apple II keyboard will not allow certain ASCII codes to be typed. Apple Writer II will also ignore an ASCII 0 put into text. But don't despair, there is a way around this problem. Follow the directions below, using an Apple II Plus or an Apple II with an Applesoft ROM Card or Language Card.*

First, insert your DOS 3.3 Master disk into your disk drive. Turn on the power, so the disk starts up. Type the word NEW and press Return. Now type in the following Applesoft program:

```
10 D$=CHR$(4)
20 PRINT D$;"OPEN GFILE"
30 PRINT D$;"WRITE GFILE"
40 PRINT "1";CHR$(31)
41 REM CONTROL UNDERLINE
50 PRINT "2";CHR$(128)
51 REM CONTROL @ WITH HIGH
   BIT SET-CHR$(0) A 'NUL'
60 PRINT D$;"CLOSE GFILE"
70 END
```

Once the program is entered, insert your Apple Writer disk into the drive in place of the DOS 3.3 disk. Type RUN and press Return to run the program. A file called GFILE will be written on your disk. Don't worry, this won't hurt the Apple Writer disk.

Start your Apple Writer program and type control-0, select Option 5 and type GFILE. Now, if you want an ASCII 31, you can type control-G1, an ASCII code 0 will be control-G2.

Tax Planner's Double Line Feeds

Q: I plan to save lots of money by using my Apple and Tax Planner software to match wits with the IRS this year. I am having a problem printing out my financial figures, though. When I use Tax Planner, my printer keeps producing double line feeds. Can I stop this?

A: *Yes, there are two ways to correct this problem. The spacing problem is because Tax Planner is written in Pascal, and Pascal produces a line feed after each carriage return.*

To alleviate the problem, stop your printer from producing a line feed automatically or exchange the P9-00 PROM on the Apple parallel printer interface with a P1-02 PROM. If you change the PROM, you can expect normal operation under DOS and Pascal.

Too much oxidation can cause an unreliable connection.

Booting With an Empty Drive

Q: What happens when you boot an Apple system without a disk in the disk drive? Can it damage the computer or the drive?

A: *No, your system won't be harmed. The disk drive just runs on and on, if you've forgotten to insert a disk. The same thing will happen if you boot your Apple with a disk it can't read—such as trying to boot a 13-sector disk on a 16-sector Apple.*

You can insert a disk into a drive while it is running. You can also stop the drive by turning off the power or by pressing Reset, or Control-Reset, if necessary.

Firmware Card Cleaning

Q: I recently obtained an Integer BASIC Firmware Card for use with my Apple. Everything worked fine for a while, but then my system began spewing out errors and crashing. What can I do?

A: *You may need to clean your peripheral card's contact fingers. Sometimes Integer BASIC Firmware Cards, like other peripheral cards with solder-plated edge connectors, collect oxidation on the contact fingers. Too much oxidation can cause an unreliable connection that could spawn the kinds of system problems you're experiencing.*

Chances are you'll be able to solve your problem by cleaning the Firmware Card's contact fingers with a soft pencil eraser and some rubbing alcohol. Turn your Apple system off, remove the card, and carefully clean its fingers with the eraser and a little bit of rubbing alcohol. Then put the card back into your Apple, boot the system, and see how it performs. If your problems continue, see your dealer. ✚

Please send your questions and problems to Rescue Squad, A+, 1 Davis Drive, Belmont, CA 94002.

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How?



1 In the beginning, many different companies made cars. Same with computers.

2 In the beginning, car owners were portrayed as just cruising along and no one was shown changing flat tires. Same with crashing computers.

3 Different cars run on different fuels. Different computers have different operating systems.

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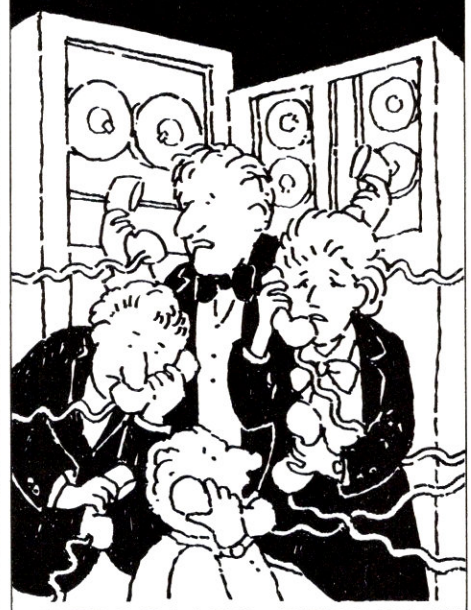
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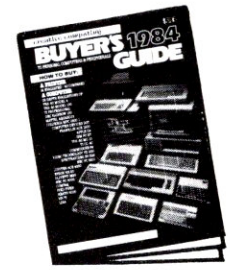
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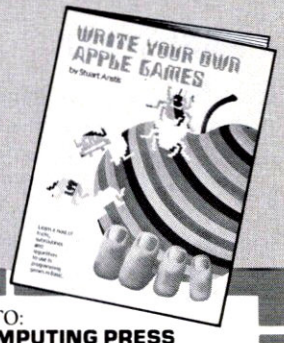
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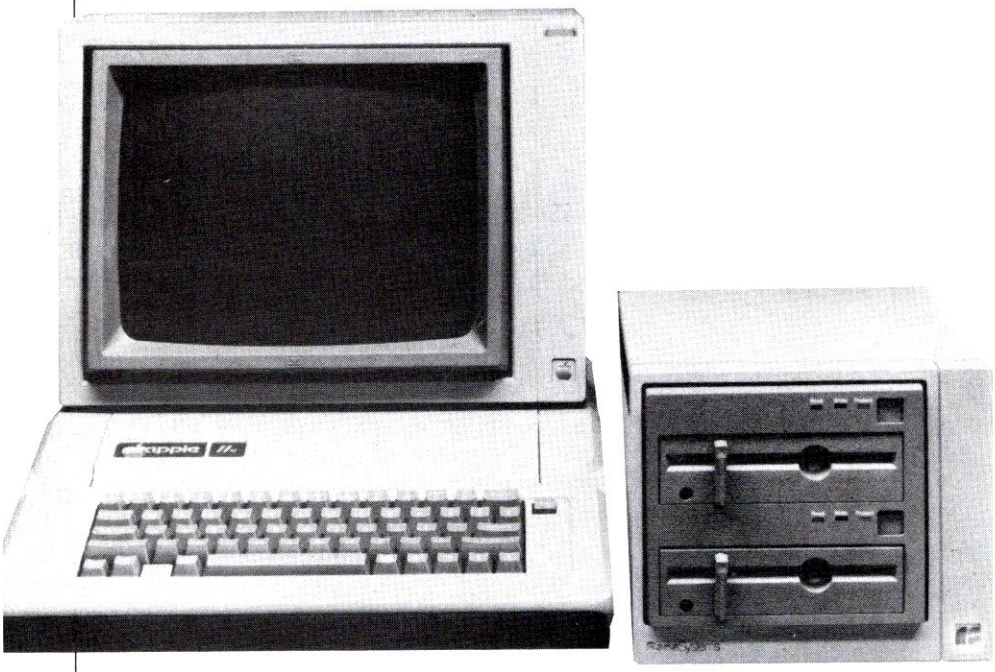
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PRODUCT NEWS



The Rana 8086/2 disk-drive system will make the Apple II compatible with IBM PC's MS-DOS system.

HARDWARE

Rana 8086/2 Disk-Drive System
A disk-drive system that will enable Apple II users to run software programs based on the IBM Personal Computer's MS-DOS operating system has been developed by Rana Systems and will be available next month. The Rana 8086/2 is a plug-compatible coprocessor and dual-disk-drive system. It uses an 8086 microprocessor, with the double-sided drives providing 360K of storage per drive. The coprocessor portion will provide 256K of main memory, expandable to 512K. *(List price: $1795)*
Requires: Apple II or IIe
Rana Systems
21300 Superior Street,
Chatsworth, CA 91311
(213) 709-5484

CIRCLE 520 READER SERVICE CARD

Genie 5 + 5
The Genie 5 + 5 is a ten-megabyte Winchester disk drive that includes a five-megabyte removable Winchester cartridge.

Because there is no limit to the number of cartridges you can use, the Genie 5 + 5 provides unlimited data-storage capacity. The cartridge is completely sealed; a sliding door that can be opened only by the drive itself makes the storage media available. The system can back up five megabytes in less than two minutes, and backup data goes on-line when you insert the cartridge. *(List price: $39.95)*
Requires: Apple II or IIe
Genie Computer Corporation
31117 Via Colinas, Suite 402
Westlake Village, CA 91362
(213) 991-6210

CIRCLE 521 ON READER SERVICE CARD

Amdisk-I
The Amdisk-I is an Apple II-compatible three-inch micro-floppy disk drive. It uses double-sided hard plastic cartridges that hold up to 143 KBytes per side. Its recording format, data-transfer rate, and disk-rotation speed are compatible with Apple II 5¼-inch disk drives. *(List Price: $299)*
Requires: Apple II Plus or IIe; DOS 3.3
Amdek
2201 Lively Blvd.
Elk Grove Village, IL 60007
(312) 364-1180

CIRCLE 522 ON READER SERVICE CARD

Apple Serial Card III
By inserting the Apple Serial Card III into one of the Apple III's internal slots, a user can communicate with a variety of modems, plotters, printers, and other serial (RS-232C) communications devices without disconnecting or reattaching any of the system's cables. Depending on the user's communications requirements, up to four cards can be used at once. With appropriate software, the card enables professionals and small businesses to perform multiple communications tasks, such as printing documents while simultaneously communicating with another computer via a modem.

An accessible switch on the card permits changing from DTE to DCE formats without making you replace the modem eliminator cable. If a user requires only one serial-communications device, it can be connected directly to the built-in serial port on the Apple III's back panel. *(List price: $225)*
Requires: Apple III
Apple Computer, Inc.
20525 Mariani Ave.
Cupertino, CA 95014
(408) 973-2042

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SOFTWARE

Jane Integrated Software Package
An integrated software package that combines several business applications in one system, the Jane is a mouse-driven system that features universally understood pictures and symbols in place of programming instructions. Users access the various applications and perform inputting and outputting instructions by pointing with the mouse to the appropriate symbol on the screen. The Jane's initial applications include word processing, spreadsheet management and file/list management. Each application is interactive with the others, and users can work with each (or all) of all programs through the display of up to four on-screen "windows," whose dimensions may be changed at the user's discretion.

The system comes complete in either 5¼-inch mini-floppy diskette or in cartridge form, with a mouse, a mouse-controller card, and a step-by-step installation and users's guide. *(List price: $295)*
Requires: Apple II, II Plus or IIe; 64K RAM
Arktronics Corporation
113 South Fourth Avenue
Ann Arbor, MI 48104
(313) 769-7253

CIRCLE 524 ON READER SERVICE CARD

AppleWorks and III E-Z Pieces
The new AppleWorks integrated software for Apple II and Apple III computers combines word processing, database management, and financial modeling into a single program. The product for the Apple II will be marketed by Apple Computer beginning in March 1984.

Apple III product is called III E-Z Pieces, and will be available in January 1984 from Haba Systems, Inc., a Van Nuys, California developer of Apple-compatible software and peripheral equipment.

AppleWorks and III E-Z Pieces can be used in a business or home environment. Each function operates with the same speed as many stand-alone applications, and the program provides three levels of integration that further increase efficiency for the user:

- Commands mean the same or similar things in each application, which can reduce learning time.
- With few keystrokes, users can move freely among files in any of the three applications, eliminating time-consuming swapping of disks found in other programs. Up to 12 files can be contained in memory at once.
- Users can easily move information among files produced by the same application or from any file to a word-processing file, using the program's "cut" and "paste" functions.

The *word-processing* application displays documents on the screen as they will appear when printed. It incorporates advanced text-processing features such as proportional spacing, superscripts and subscripts, boldface characters, and find-and-replace capabilities.

The *spreadsheet* program provides a large work area of 999 rows by 127 columns for financial models. Program features include precise numerics accurate up to 15 digits, variable column widths, extensive cell formatting commands, and row sorting. AppleWorks and III E-Z Pieces can read VisiCalc data files and can read and write DIF files.

The *database manager* is similar to Apple's Quick File data-management system.

Users can arrange up to 30 categories of records in alphabetic, numeric, date, or time order. Sorting is fast—for example, with AppleWorks, 800 records will sort in ten seconds. The built-in report function can create and print reports in either table or label formats. The program can read Quick File data files and can read and write DIF files.

AppleWorks and III E-Z Pieces include a "desktop manager" that handles utility functions such as loading and saving files, formatting disks and specifying printer information.

AppleWorks is based on ProDOS, Apple's new operating system for the Apple II that is compatible with the Apple III Sophisticated Operating System (SOS). As a result, both AppleWorks and the SOS-based III E-Z Pieces can use mass-storage systems, including Apple's five-megabyte ProFile hard disk, and data files can be used interchangeably between Apple II and Apple III computers. *(List Price: AppleWorks, $250; III E-Z Pieces, $295).*
AppleWorks requires: Apple IIe; 64K RAM; 80-column card; one floppy-disk drive; and a monitor. (Extended 80-Column Card and a printer are recommended)
III E-Z Pieces requires: Apple III; 256K RAM

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III E-Z Pieces software package for the Apple III combines word processing, database management, and financial modeling.

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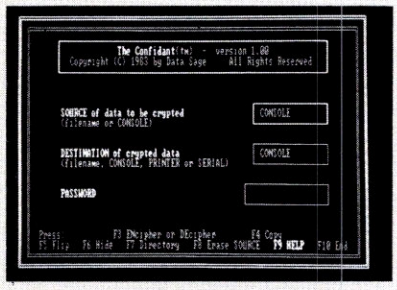
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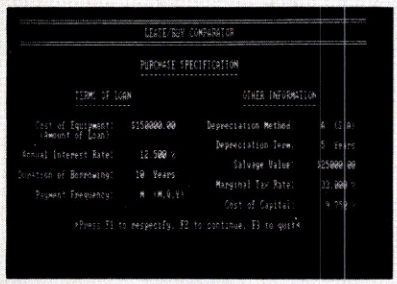
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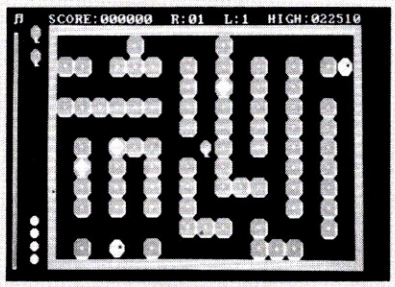
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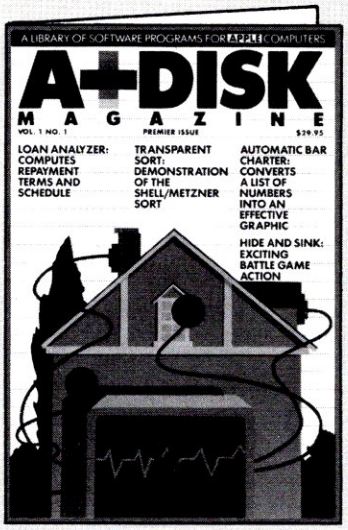
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PRODUCT NEWS

AppleFile III
A new data-management program that provides a system for organization, management, and maintenance of large files on the Apple III has been developed by Apple Computer, Inc. AppleFile III enables users to store, arrange, review, and print records in files up to 16 megabytes in size. The program handles multiuser applications, and automatically checks entries for clerical errors and reliability during all phases of operation. Should a file record be damaged by power failure, the program helps rebuild the file through on-screen prompting. On-line help screens also are available at any point in the program. AppleFile III provides 80 fields per record, eight keys per file, and eight fields per key; storage of 20,000 to 30,000 records of 100 characters each on an empty ProFile hard disk; and extensive user training.

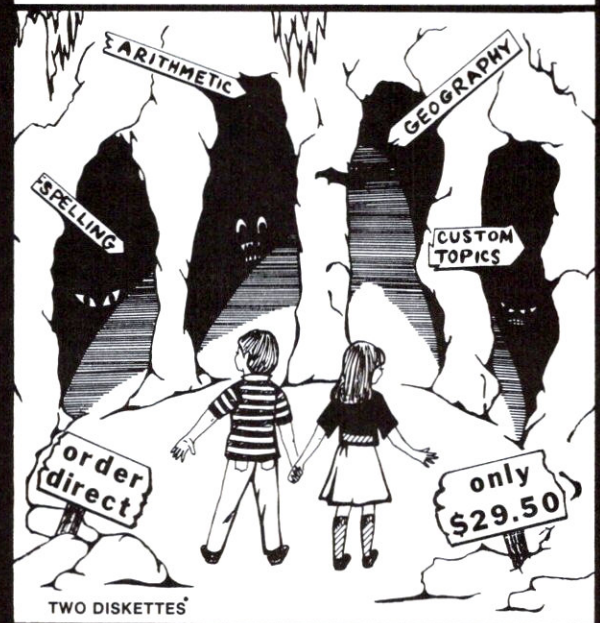
Designed for professional data management, the program enables users to print reports in rows and columns and to summarize data with totals, averages, and counts. Users can organize information into any of eight orders or create a temporary order with which to print reports. *(List price: $325)*
Requires: Apple III; 256K RAM; ProFile hard disk or comparable unit
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CIRCLE 526 ON READER SERVICE CARD

Business Software for Apple III
Several new business-software programs are now available for the Apple III. The programs include word processing, database management, personal productivity tools, communications and integrated business software, adding to the nearly 400 business-oriented applications previously available. The new offerings available include:

BPI General Accounting, a general-ledger package that will also perform basic accounts payable, accounts receivable, and payroll functions.
AppleWriter III (Version 2.0), a revision of the Apple Writer III word-processing package. Included in the revision are options that allow the integration of Apple Speller III into the main program. The Apple III keypad also can be used to redefine multiple-keystroke commands into single-keystroke operations. The program also includes enhancements to the screen- and text-handling functions.
Apple Speller, designed to be used as either an integrated spelling checker with Apple Writer III (Version 2.0) or as a stand-alone package for use with the original Apple Writer program and a number of other word processors. It includes an 81,000-word dictionary that can be edited or expanded.
AppleFile III, a database designed to handle large files, lets the user store,

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Keystroke DataBase Manager and Report Generator, two integrated-software products from Brock Software Products, Inc. Keystroke Data Base provides powerful, relational data-management capabilities. The Keystroke Report Generator takes data gathered by the database module and organizes it in a columnar format.

HABADEX from Haba Systems, Inc., enables Apple III users to track telephone costs; store up to 6000 names, addresses, and phone numbers; automatically dial numbers; develop mail lists; and keep track of calendars.

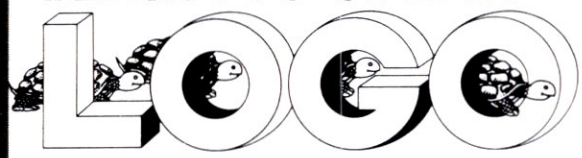
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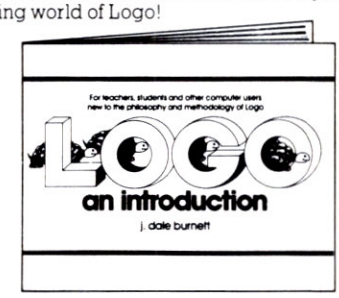
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PRODUCT NEWS

ProFile for the Apple II
Two new software products from Apple allow business professionals to use a ProFile hard-disk drive with their Apple II, II Plus, or IIe computers. ProDOS, Apple's new operating system for the Apple II, enables the computer to communicate with mass-storage devices such as the ProFile. ProDOS provides hierarchical file management and fast disk access, features that are particularly beneficial to ProFile users. In addition, the Apple Pascal Development System has been revised to support ProFile.

Any application based on ProDOS or Pascal (Version 1.2) can use ProFile. Over 400 companies are currently licensed to develop ProDOS-based applications for the Apple II.

The ProFile offers storage capacity up to the equivalent of 35 floppy diskettes—about 1200 single-spaced, typewritten pages—and retrieves information ten times as fast as does a conventional floppy-disk drive. It is packaged with Backup II, a software utility that backs up and restores files stored on the ProFile. With Backup II, all stored files, even those too large for a single floppy diskette, can be transferred to and stored on back-up floppies.

In addition to Backup II, purchasers of ProFile for an Apple II will receive an interface card to connect ProFile to one of the computer's expansion slots and a software utility to manage Pascal files on ProFile. *(List Price: $2200)*
Requires: Apple II, II Plus, or IIe; 64K RAM
Apple Computer, Inc.
10260 Bandley Drive
Cupertino, CA 95014
(408) 996-1010

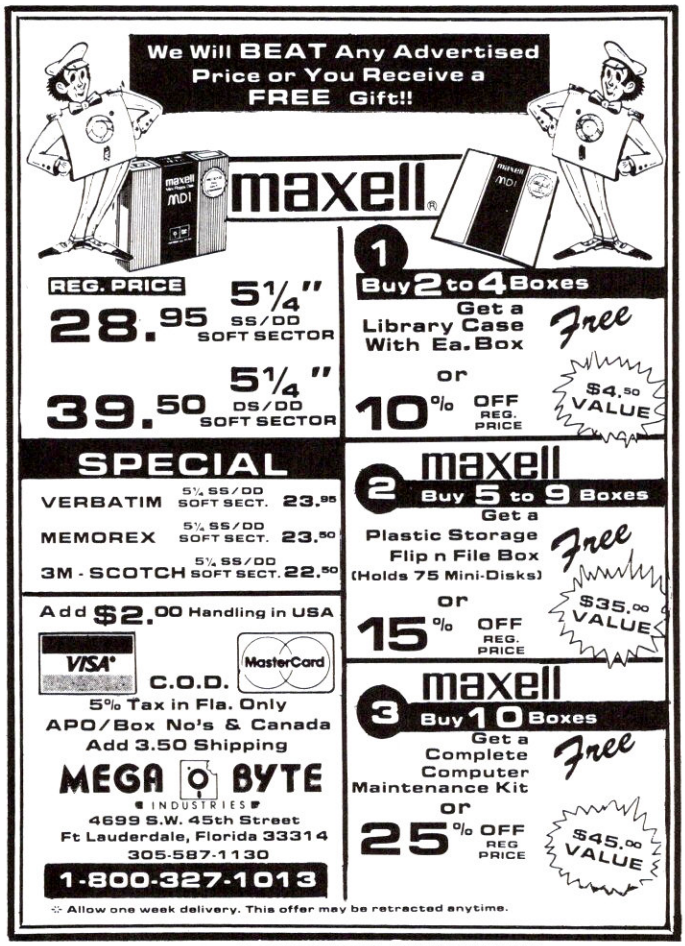
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Music Construction Set
The Music Construction Set is an advanced software program that serves as a music composition and learning tool. It enables experienced and inexperienced musicians to compose and play their own music.

Users manipulate an on-screen "hand" with a joystick, keyboard, or touchpad to position notes, rests, sharps, flats, clef signs, and other musical symbols on a formatted staff, with immediate playback. A cut-and-paste feature enables the user to mix melodies at different volumes and speeds, and with different tone qualities. The compositions can be stored on disk for review and rework.

The Music Construction Set also includes a library with a wide range of musical selections. *(List price: $40)*
Requires: Apple II, II Plus, or IIe
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HARDWARE/SOFTWARE

AppleMouse II and MousePaint
AppleMouse II, a mouse cursor controller for the Apple II line of computers, will be packaged with MousePaint software that uses the mouse to design charts, diagrams, free-hand drawings, and other visual aids for reports and presentations.

Program users can insert text in a drawing and can choose from a variety of character fonts and fill patterns. MousePaint simulates bit-map graphics to support the Apple II's high-resolution capabilities.

Independent software developers are being encouraged to write applications that take advantage of the mouse. Most future Apple software programs for the Apple II family will offer the mouse as an option. Apple is also developing a mouse to work with Apple III personal computers.
Apple Computer, Inc.
10260 Bandley Drive
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(408) 996-1010

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LisaTerminal and IBM 3270 Cluster Controller Emulator
LisaTerminal and the Apple Cluster Controller are data-communications products that allow the Lisa to interact with most mainframes and minicomputers, including IBM and Digital Equipment Corporation systems.

LisaTerminal data-communications software allows the Lisa to emulate VT100, VT52, and TTY terminals and exchange information, via modem, with computers supporting asynchronous protocols. In addition, users can gain access to remote mainframe computers and information services such as CompuServe, The Source, and Dow Jones News/Retrieval Service.

The Apple Cluster Controller is a protocol converter that, used with appropriate software, emulates an IBM 327X-type cluster controller. When used with LisaTerminal, it enables the Lisa to communicate with IBM mainframe networks by emulating IBM 3278 Model 2 terminal functions. LisaTerminal shares the same characteristics of other Lisa software:

- Visual user interface: With the Lisa's mouse, users simply select the LisaTerminal icon, choose an appropriate terminal from the list displayed on the screen, and type in the phone number and password.
- Cut/paste integration between applications: With the Lisa's cut-and-paste function, users can easily transfer information from the remote computer to LisaWrite, the Lisa's word-processing application, and use its editing functions.
- Multiple windows. With LisaTerminal, users can display information from different mainframes in multi-

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Ten New DOS Commands

1. **TLOAD speed loads all Text Files, random or sequential, to ram.**
2. **TSAVE speed saves all Text Files, random or sequential, from ram.**
3. **TLIST Lists all Text Files, random or sequential to screen/printer.**
4. **DUMP Memory to screen/printer in Hex with Ascii on right side.**
5. **DISA disassembles Binary to screen or printer.**
6. **AL prints last loaded program Address & Length in decimal & hex.**
7. **HIDOS moves DOS to Language Card & continues operation of program.**
8. **/ is a one keystroke Catalog in addition to the original command.**
9. **DATE prints with any clock. Also File Dating with clock or manual.**
10. **FIND prints address's of hex found in 64k memory. Hidos cmd only.**

Compatible

All DOS entry addresses have been preserved. DOS is original length and compatible with most software. David-Dos II is copyable and creates fully copyable updated disks. DAVID-DOS II is licensed by programmers for inclusion in the software they sell. Init areas were used for David-Dos II. Works with all Apple IIs including IIe 80 Col, Franklin & Hard Disks, such as Corvus & Xebec. Requires 48K. Complete documentation for screen or printing and many utilities are on the disk.

All times in seconds (Time Test programs available)		DAVID DOS-II	ProDOS	DIVERSI DOS	DOS 3.3
TEXTFILES (100 Sectors)	TSAVE	8.0	NO	NO	NO
	TLOAD	6.2	NO	NO	NO
(791 Strings, 32 chars ea)	WRITE	29.3	28.0	29.4	88.4
	READ	24.3	16.3	24.3	83.8
	PRINT/READ	44.2	45.9	45.1	117.1
(442 Sectors, 7 x 500)	APPEND	142.3	142.9	151.1	1231.2
APPLESOFT (100 Sectors)	*SAVE	7.1	16.4	6.4	33.1
	LOAD	5.0	4.0	5.0	23.5
INTEGER (100 Sectors)	*SAVE	7.3	NO	6.6	33.4
	LOAD	4.9	NO	4.9	23.4
BINARY (100 Sectors)	*BSAVE	7.8	18.4	7.3	28.7
	BLOAD	5.8	4.8	5.8	24.5
48K PROGRAM SPACE (With 3 Bufs avail)	APPLESOFT	36,352	NO	36,352	36,352
	INTEGER	36,352	NO	36,352	36,352
	BINARY	36,352	34,816	36,352	36,352
64K PROGRAM SPACE (With 5 Bufs avail)	APPLESOFT	46,592	31,232	45,658	35,162
	INTEGER	46,592	NO	35,162	35,162
	BINARY	46,592	40,704	45,658	35,162
NUMBER OF DOS COMMANDS		37	29	31	28
CLOCK FILE DATING		YES	YES	NO	NO
MANUAL FILE DATING		YES	NO	NO	NO
ONE KEYSTROKE CATALOG		YES	NO	YES	NO
AUTO USE INTEGER CARD ANY SLOT		YES	NO	NO	NO

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ple windows on the Lisa's screen. For example, one LisaTerminal window can emulate an IBM 3278 terminal, another window can emulate a DEC VT100, and an unlimited number of other windows can run Lisa applications programs.

The Apple Cluster Controller converts SNA/SDLC or BSC protocols to asynchronous protocols. It comes equipped with either three or seven serial RS232 ports, allowing combinations of up to seven Lisas or serial printers to be attached to the IBM 3270 network.

Available in both SNA/SDLC or BSC versions, the Cluster Controller monitors the flow of information from each port in both directions. In addition, it lets both the Lisa and an attached printer communicate on one Cluster Controller port, eliminating the need for separate printer ports.

Because users can dial into the Apple Cluster Controller via a modem, it's possible to communicate with a mainframe computer from any remote location where there is access to a telephone. *(List Price: LisaTerminal, $295; Cluster Controller $4500 [three-port version] or $7000 [seven-port version])*
Apple Computer, Inc.
20525 Mariani Ave.
Cupertino, CA 95014
(408) 973-2042

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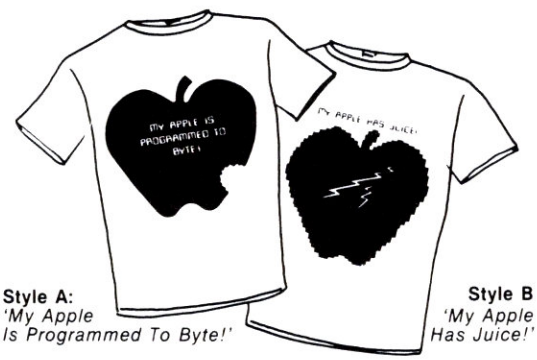
Apple III Business System
The Apple III Business System provides hardware and system software components for professionals and small- to medium-size businesses. The system consists of an Apple III personal-computer system with 256K RAM and a built-in floppy-disk dirve; ProFile; 12-inch Monitor III; Catalyst 2.0 Program Selection software from Quark Incorporated, which enables the user to select and switch programs resident in the hard disk without resetting the system; and the Systems Utilities Product Training Pak, which includes complete instructions, quick reference cards, and a self-help tutorial training disk. *(List price: $288)*
Requires: Apple III
Apple Computer, Inc.
20525 Mariani Ave.
Cupertino, CA 95014
(408) 973-2042

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CORRECTION

In the December, 1983 issue of *A+*, page 210, two Product News photographs were incorrectly identified. While both products are indeed from Penguin Software, the photograph which was identified as the Minit Man arcade game is in fact of The Spy Strikes Back, and the photograph identified in *A+* as The Spy Strikes Back is of the Minit Man Game.

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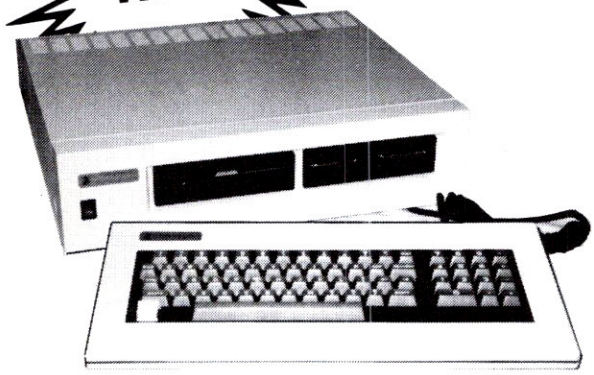
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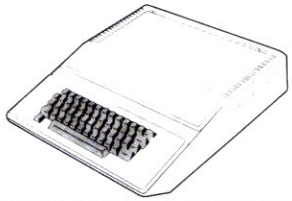
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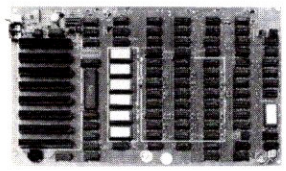
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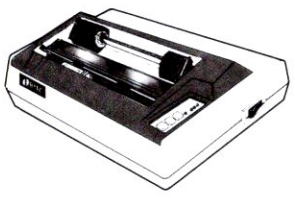
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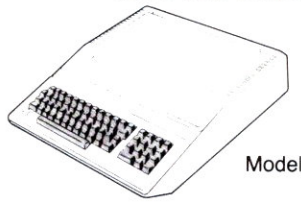
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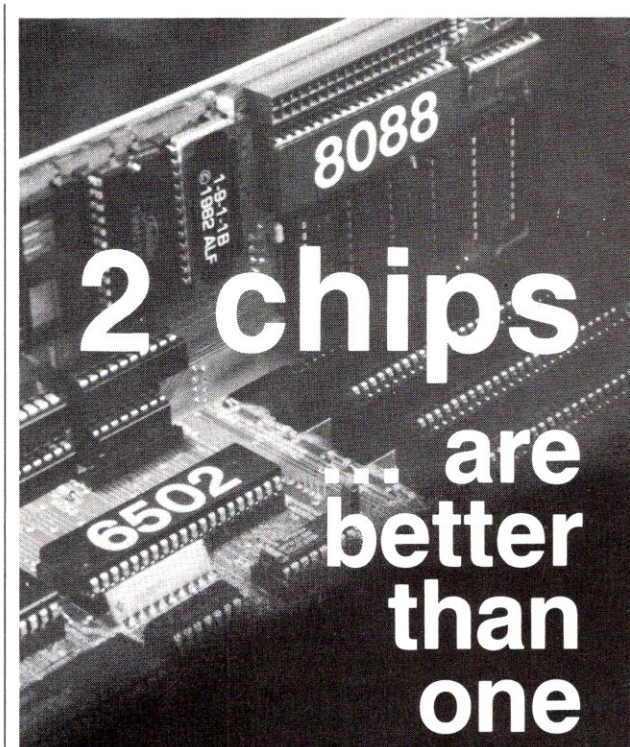
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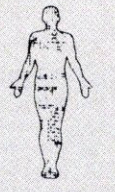
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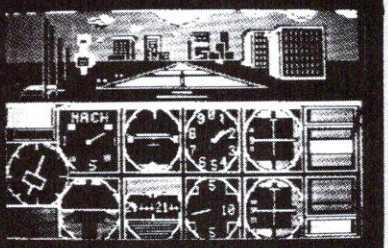
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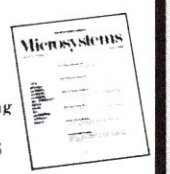
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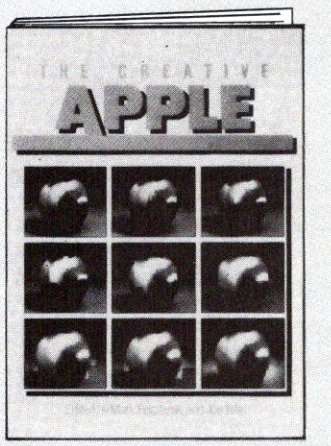
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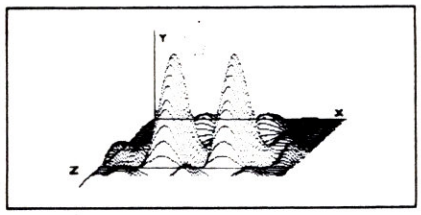
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For APPLE II (48K) and IBM PC (64K) $50.00



BUSINESS SOFTWARE SERIES

Both Programs $250.00

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- Up to 500 accounts and 500 transactions per month.
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  - Account Listings

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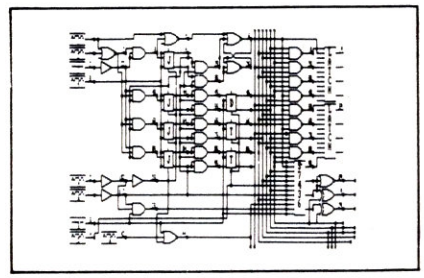
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  - Sales Analysis
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  - Customer Balances

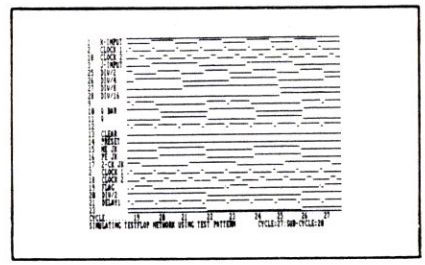
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An interactive graphics program for designing and simulating digital logic systems. Using the built-in graphics module, the user creates a logic diagram consisting of AND, OR, NAND, NOR, EX-OR, D, T, JK FLIP FLOP and powerful 16 pin user-defined MACRO functions. A typical page of a logic diagram looks like this:



The system provides on-screen editors for NETWORKS/MACROS DATA CHANNELS, CLOCK WAVEFORMS and GATES. GATE attributes include DELAY, TRUTH TABLE, NAME and I/O clocking.



The system is available for Apple II and IBM PC computers. A non-graphics version is available for CP/M 2.2 It uses the network editor to create netlists and text printer plots to display simulation results. All versions require 2- 5 1/4" disk drives.

For APPLE II, IBM PC (192K) and CP/M (70K) $450.00
MANUAL & DEMO DISKETTE $50.00

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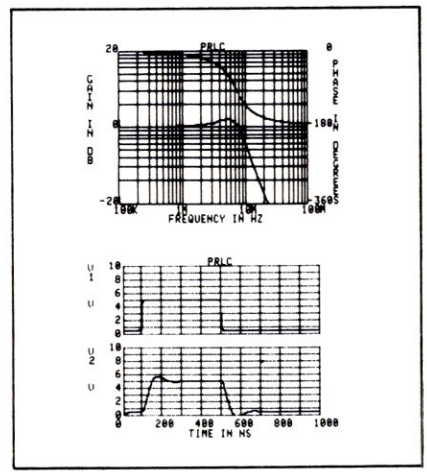
Handles 25 Asset/Liability Accounts
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Budgets Income & Expense
Reconciles to Bank Statements
Prints Checks & Mailing Labels
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For APPLE II and IBM PC $75.00

MICRO-CAP

Microcomputer Circuit Analysis Program

Tired of trial & error circuit design? Analyze and debug your designs before you build them. With MICRO-CAP you simply sketch your circuit diagram on the CRT screen and run an AC, DC or TRANSIENT ANALYSIS. Your circuit may consist of RESISTORS, CAPACITORS, INDUCTORS, DIODES, BATTERIES, BIPOLAR or MOS TRANSISTORS, OPAMPS TRANSFORMERS, and SINSUSOIDAL or USER-DEFINED TIME DEPENDENT VOLTAGE SOURCES. MICRO-CAP can analyze any such network containing up to 40 separate nodes. Includes a user controlled MACRO library for modelling complex components such as OPAMPS and Transistors.



For APPLE II and IBM PC computers. A non-graphics version using an on-screen editor to enter networks and text printer plots to display simulation results is available for CP/M (2.2- 5 1/4" SSSD) systems. Requires 2 disk drives.

For APPLE II, IBM PC (192K) and CP/M (70K) $475.00
MANUAL and DEMO DISKETTE $50.00

ORDERING INSTRUCTIONS: All programs are supplied on disk and run on Apple II (64K) or IBM PC (128K) with a single disk drive unless otherwise noted. Detailed instructions included. Orders are shipped within 5 days. Card users include card number. Add $2.50 postage and handling with each order. California residents add 6 1/2% sales tax. Foreign orders add $5.00 postage and handling per product.

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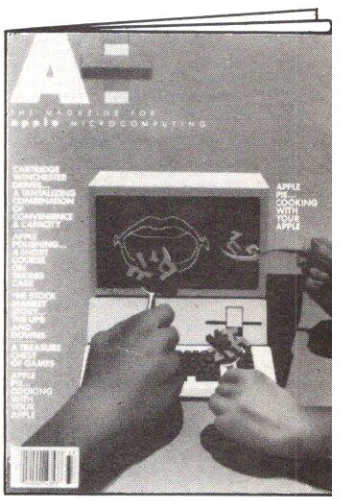
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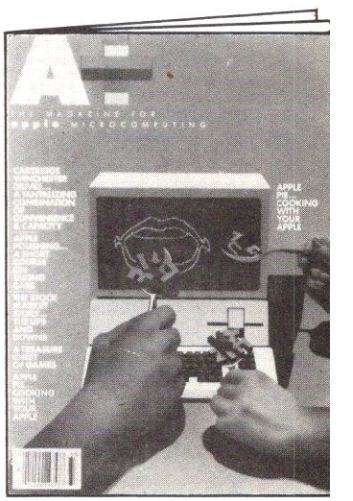
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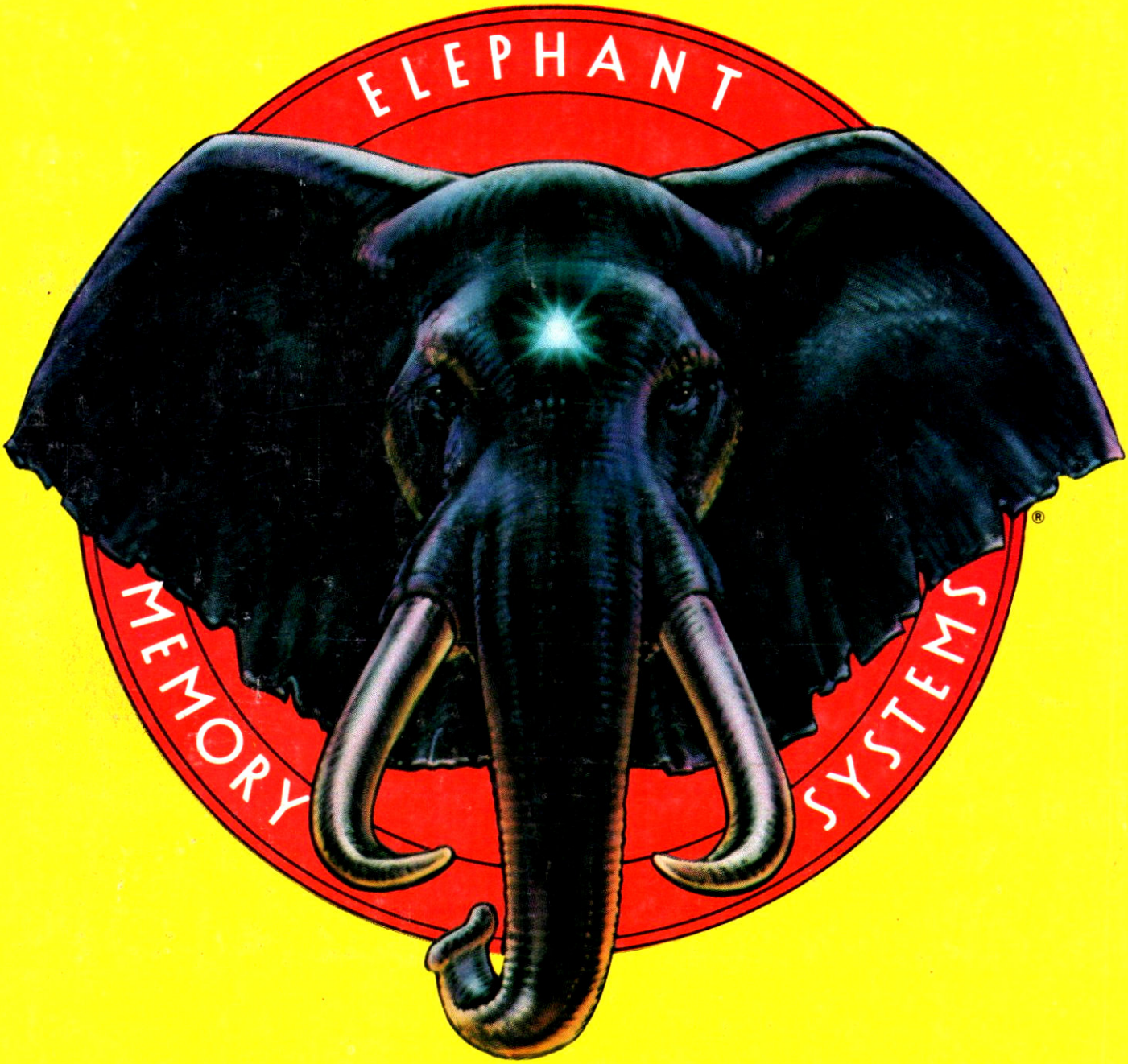
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