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Blockbuster Review Section

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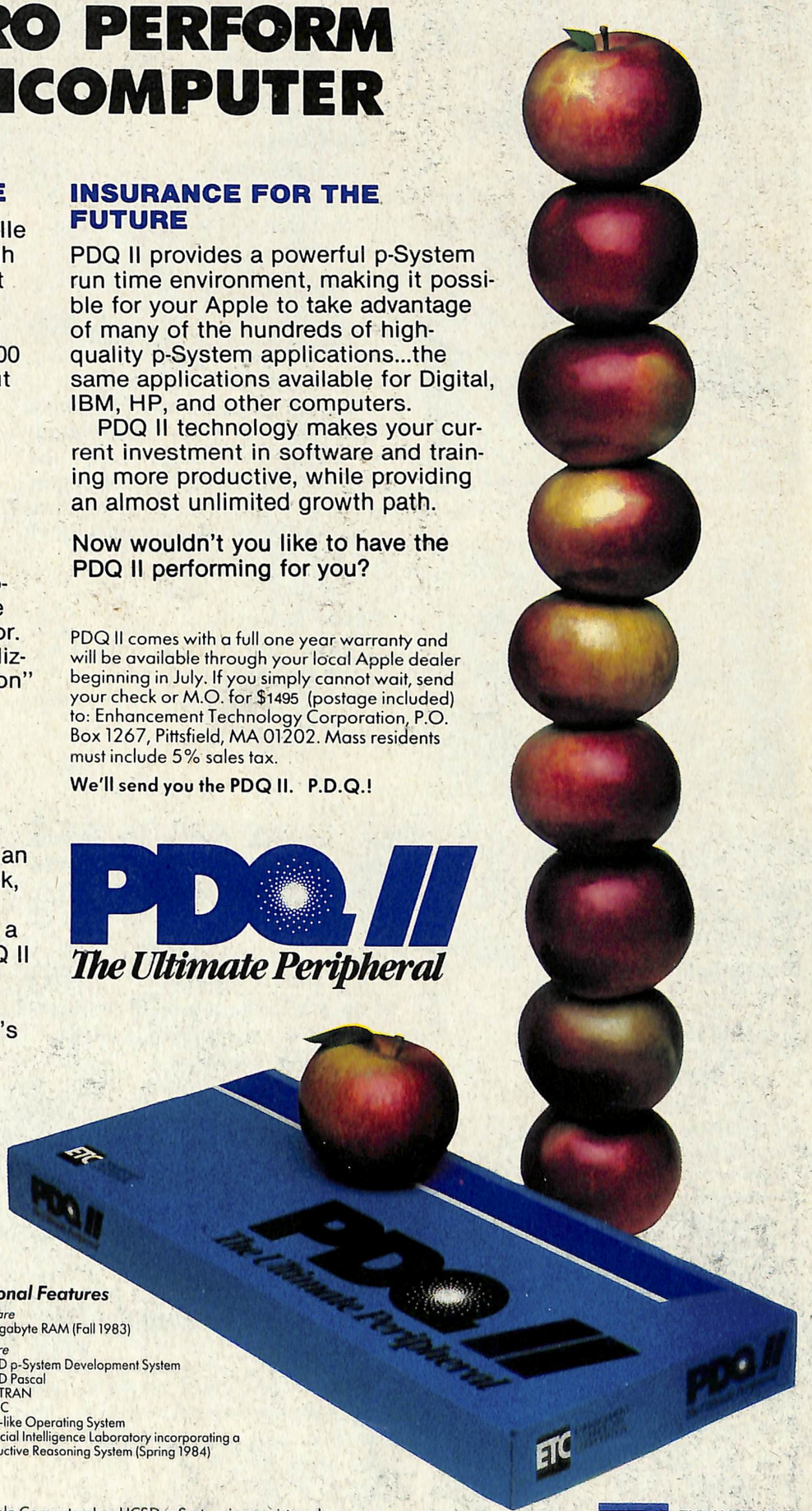

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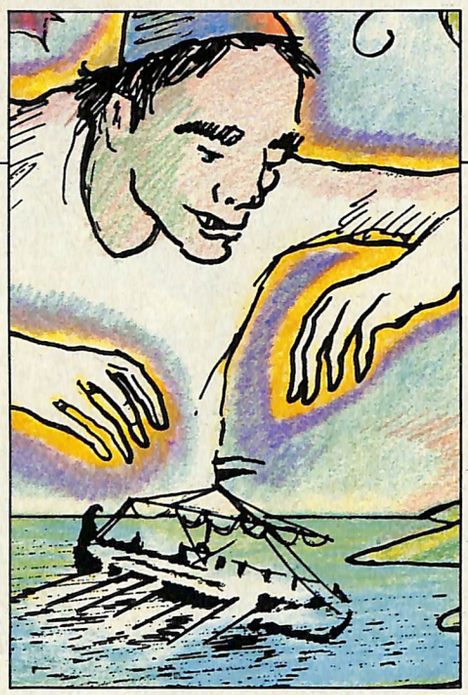

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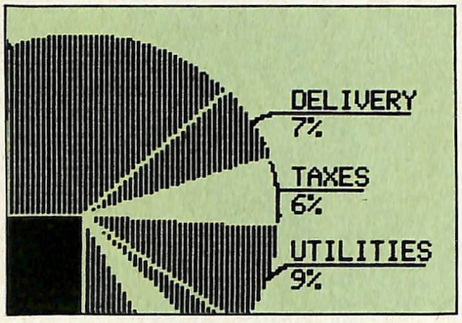

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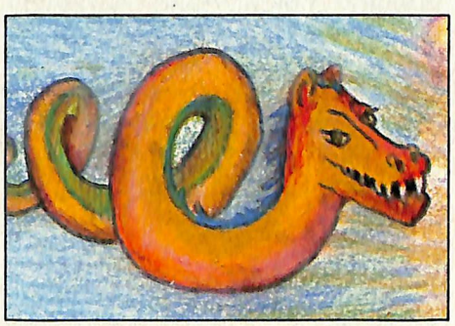

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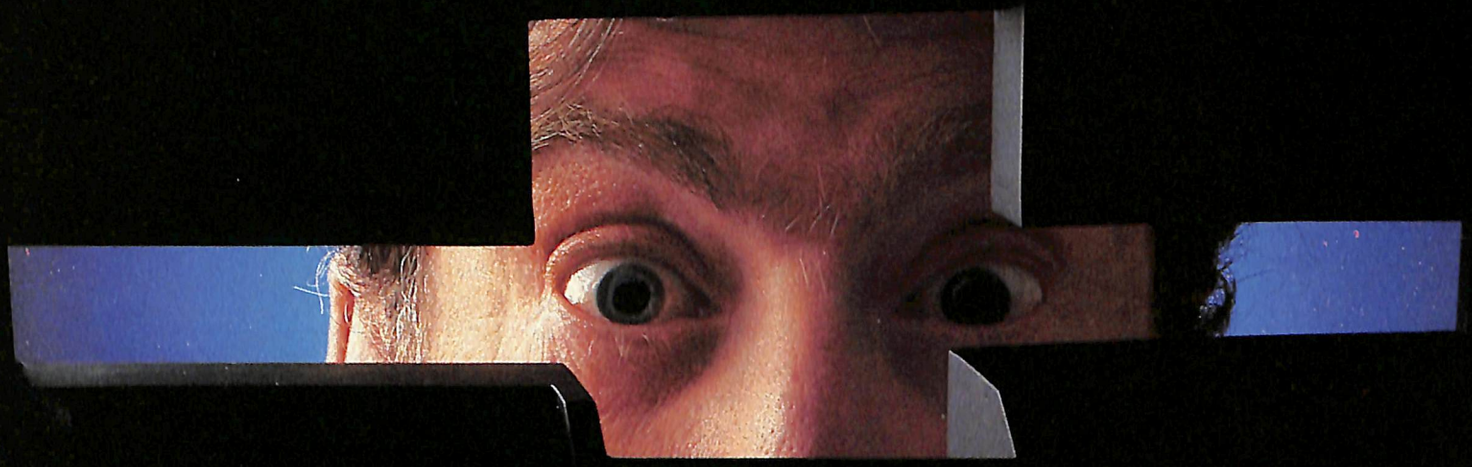

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Remarks from the Publisher... Wayne Green

Yes, I know you love your Apple and you want nothing more than to read about it as much as possible. But try, in the throes of your passion, to remember somewhere in the far reaches of your mind, that there *are* other microcomputers out there. And, while trying to remember this unpleasant fact, also be aware that as a microcomputer "expert" to some degree, you really have a responsibility to yourself... and your friends... to know what the hell is going on outside of your own personal heaven.

I publish *inCider* to give you your Apple fix each month. You are permitted to read it, memorize it, index it and file the index in your Apple so you can locate needed information at will. You may even show the contents page to other Apple addicts, driving them into a frenzy for a subscription. You will be considered a traitor and pariah if you permit friends to actually read your copy rather than buy their own. We're not in this entirely for the fun of it, you know... though sometimes we feel pretty sneaky making a fortune while having such a good time. We make every effort to get used to that feeling.

Another totally forbidden practice is to make copies of *inCider* articles for cheapskates. Let the bums buy their own copies. And the hell we have reserved for the lowlife who keys in a program and then lets a friend copy it can't be put into print.

In addition to *inCider*, I also publish a magazine called *Microcomputing*. Now, I am not doing that entirely for the fun of it, though, like *inCider*, it is admittedly a joy to publish. This magazine is designed to keep you, the avid Apple fanatic, up to date on other things going on in the microcomputing world. And you'd darned well better keep a weather eye open on the whole field so you'll know about it.

For instance, unless you lift your eyes from your Apple now and then, you may not know what's going on with the growing number of el cheapo computers. Since these little guys are getting to be a major part of the whole market, with sales zipping right past the Apple, you will at least want to know what these little systems are... what they can do... and where they fit in. Not everyone wants to start off with a thousand dollar computer. Some people want to get their feet wet with a $39 model. These are interesting "toys" once you find out what the incredible little contraptions can do.

There's no way you could miss seeing and reading about the Radio Shack Model 100, but you surely aren't going to get a lot of information about it in an Apple magazine. No, you have to read something else to get perspective. That Model 100 is going to be a very big computer... and could integrate with your Apple system one of these days.

There are a number of exciting developments you need to know about, and we'll see that you get the hot scoop if you read *Microcomputing*. Between *inCider* and *MC* you'll have a fairly good perspective on what is going on... and get more information about your Apple than you can handle.

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What's New This Month?

The special emphasis of this month's magazine is adventuring, and the issue would not be complete without a mention of one of the most popular and best selling software packages on the market: Wizardry.

In the Fermentations column, guest editor James Reid disagrees with those who believe video games may be harmful—leading children and adults alike into a fantasy world of aggression. Adventure games like Wizardry, he suggests, may in fact help some of us—especially the young—prepare for the vicissitudes of life.

Kerry Lanz, an experienced adventurer and an avid admirer of Wizardry, has created a utility that allows you to modify your Wizardry characters. Wixfix works on your backup disks, so there's no chance of damaging your original characters. And Gary Cage shares his Create-A-Venture, a program that allows you to create your own adventure.

Several adventure games are discussed and evaluated in our software review section this month. The Mask of the Sun adventure takes place in Mexico, primarily within Aztec ruins; in Cyborg the adventurer becomes half human, half machine; and in Transylvania you enter a moonlit land of vampires and goblins and werewolves.

Timothy Daniel helped a friend install 80-column and Z-80 boards in his Apple one rainy Saturday. With the CP/M operating system loaded, they tried to run WordStar, but ran into some messy problems. The answer to their problems. . . you'll find them and more in Don't Be a Video Idiot.

"What's more natural than creating pie charts on your Apple?" asks Greg Glau in this month's Bent on Business column. Pie charts can convey how each individual part of your business relates to the whole, and they are easily understood by all.

The Applesoft Adviser covers the Basic commands relating to hi-res graphics and then discusses a simple approach for formulating shape tables that will produce sophisticated graphics and animation. And Don Fudge, our graphics columnist, writes of color-filling algorithms and about a program that color-fills line drawings made by white lines on a black background.

If you are a Basic programmer itching to learn assembly language programming, don't miss Jeffery Foster's article, "Peeling Your Apple's Text Screen." Foster points out that there are a myriad of useful assembly language subroutines in the system monitor that you can modify. And if you've ever wished that your Apple could interpret FORTRAN-formatted data, read Steven Schwartz's FORTRAN Formatted Data in Applesoft.

Enjoy the August issue of *inCider*. And watch for the September issue, which is devoted to your Apple and education. ■

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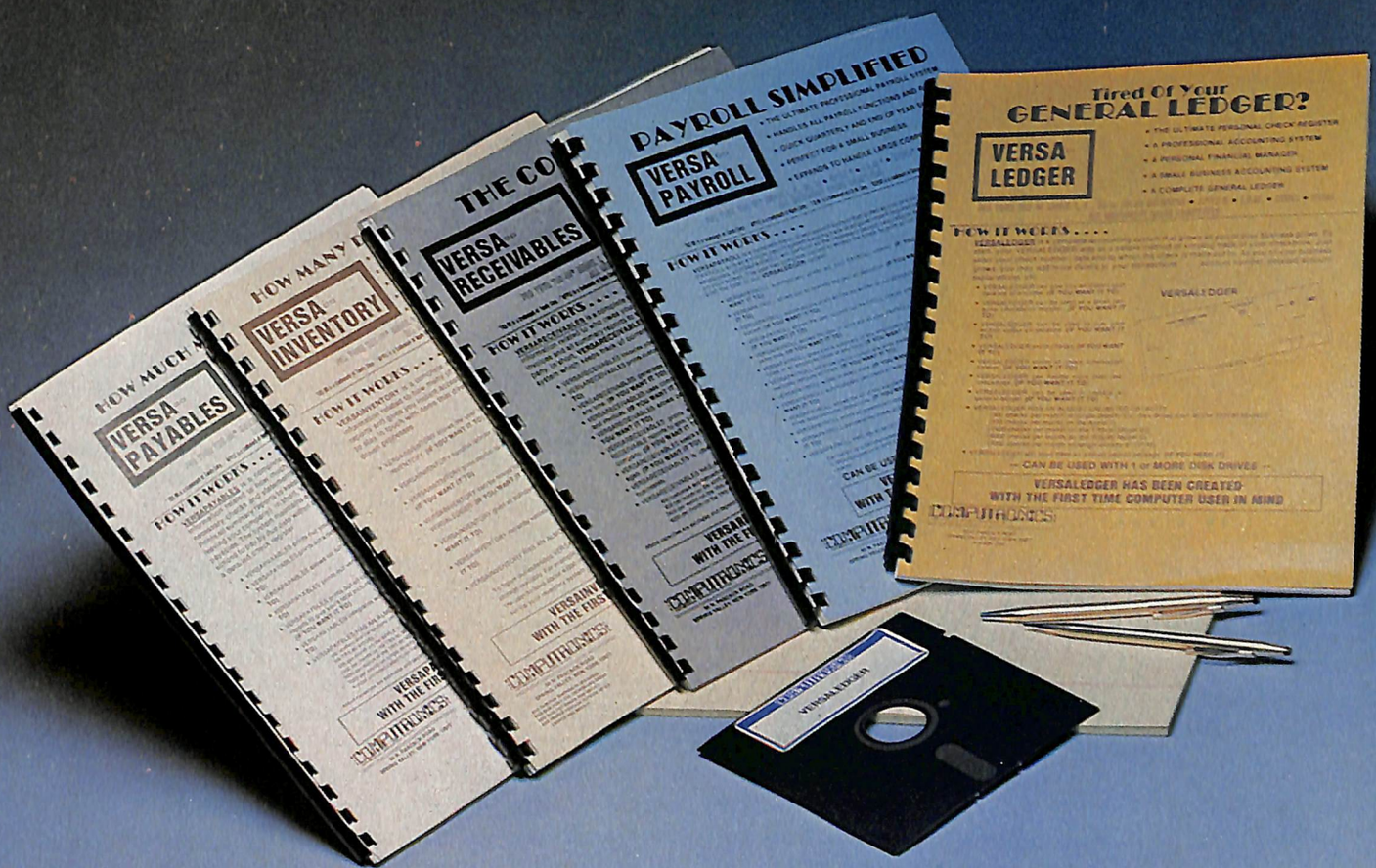

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Fermentations

by James E. Reid

Wizardry's White Magic

By chance and the lucky recommendation of a dealer, I bought a game called Wizardry to interest my teenage son in our new Apple. The game needs considerable explanation to be understood, so let's just say it's a game of strategy. My son, who is knowledgeable in these matters, says it's similar to Dungeons and Dragons.

Wizardry requires the player to create a number of characters, each exhibiting certain strengths and weaknesses. This group is sent six-at-a-time into a programmed maze where they encounter a variety of monsters they must destroy or deter. The maze harbors surprises such as secret doors and passages, and teleporters that launch the entire party to a new location. With experience comes expertise in using the characters to their utmost, which in turn earns opportunities to explore deeper into the maze and to accomplish greater feats.

News stories warn us daily that arcade games may be sapping the strength and intelligence of our youth, leading them into a fantasy world of aggressiveness. It is an age-old warning.

But isn't Wizardry perhaps beneficial and good? Isn't it possible that this game prepares our young people for life? Does it simply occupy their attention and serve as an escape from boredom? "Answer me that, my dear Crito," the old philosopher might say.

Wizardry, as I said, is a game of *strategy*, a word that comes from the Greek *strategos*, which has to do with generalship and military thought patterns. Strategy encompasses both prior planning and the tactics of dealing with specific situations as they arise. Both of these must be employed in negotiating the Wizardry maze. The player must apply knowledge of himself and his characters in creating his strategy, much as a general must evaluate himself and his subordinates in deciding how to deploy troops and wage the battle.

As you prepare to enter the maze—the planning phase—you must decide what characters to include in your hardy band. You might choose some fighters equipped with the best armaments available, a priest who can heal the wounded and cast defensive spells, a mage with terrible powers of incantation to hurl death and destruction, and an elfin sort of mole called a thief who spies and scrounges treasures and secrets. You must also anticipate where they will go in the maze, what dangers they will encounter, and what weapons and other provisions they will need to deal with these adversities.

Once in the maze, as they are confronted by evildoers such as dragons, giants, sorcerers and wispy demons that sap one's strength, you must devise appropriate tactics to lead your charges to victory.

The monsters are predictable up to a point. However, those that are minor minions at one time and easily overcome are, in another place and time, formidable foes.

In each case you must decide how best to allocate your resources. As your experience grows, you learn which magic spells work best on which villains, whether the situation requires a full-scale attack or simply a sword-rattling display from your fighters, and if you should keep your priest, mage and thief in reserve to use when their unique capabilities are at a premium.

Such is life—anticipating the situations we'll face and preparing to deal with them, and then, as the future unfolds, rising to whatever the occasion demands. Isn't Wizardry preparation for this? ■

Address correspondence to James E. Reid, PO Box 993, Healdsburg, CA 95448.

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Letters

Heartbroken Owner

I am a new subscriber to *inCider* magazine. I find it very informative and I look forward to reading it every month. But in the two issues I have received so far, I have noticed a negative undertone in some of the articles describing the Apple computer and its performance. I don't want to read any articles saying that the Apple is all washed up, or the Apple is not as good as some other computer, or that Apple management might be making the wrong decisions. I am an Apple owner! These articles are of no interest to me.

I also subscribe to *Nibble, Softalk* and *Softline*. These are all Apple magazines and they have never had an article convey a negative tone about the Apple. So excuse me for being upset about some of the articles in your magazine, but I was shocked and upset when I read them.

Chris Strawser
600 Biltmore Way #519
Coral Gables, FL 33134

We calls 'em as we sees 'em, Chris. inCider *owns lots of Apples, but Apple doesn't own* inCider.

Franklin Friend

I am very disappointed to see a fresh new publication like *inCider* carry a dated and inadequate review on the Franklin Ace 1000 computer.

The regional service center with which I am associated serves a number of school districts using both Apples and Ace 1000s (with color), as well as a variety of other computers. Our experience with the Ace has been favorable and we find that it is as popular, if not more popular, than the Apple II Plus or IIe.

As to the question of software compatibility, we have not identified any educational courseware that will not run on the Ace 1000. Perhaps *inCider* could be of assistance in this area by providing a list of educational, business, and home/hobby software that will run on the II Plus and IIe, but not the Ace 1000.

While the Franklin Ace 1000 will never measure up to the standards of the Apple purist, those of us in the field think it deserves a more comprehensive review than offered by your May issue.

R. E. Gillan, Ed.D.
106 Martin
Natchitoches, LA 71457

My face is red. From now on I'll ask more questions before publishing a review.—ls

Don't Give Up

First the good news: I like the idea of a magazine devoted to the Apple computer only. It really is nice seeing the same advertising month after month—like meeting old friends.

To continue: I just have one question? Who defined your reader? I have had my Apple for about a year now and have written my own personal financial program in Basic (just to let you know where I'm coming from). But I only understand about 10 percent of what is in your articles! Even when there is an article about something I feel I know a little about, I get lost after a couple of paragraphs.

For example, in the May issue, I don't understand Pascal, Logo, or CP/M. I am not comfortable with poking or peeking and these articles seem to assume more than I understand. I feel that Basic has more to it than I probably understand and that my Apple can do more than it does.

Rex Douglass
8130 Brunache St.
Downey, CA 90242

File away your old copies of inCider *and you may find, a year from now when you go back through your stacks, that all will seem much clearer.*

Speak and Spell Interface

I have an Apple II Europlus with 64K, one disk drive and DOS 3.3. Is it possible to attach my Apple to a Texas Instruments Speak and Spell and use it for a voice synthesizer? If so, please tell me how.

Mike Neil
10619 Sudan
Portage, MI 49002

Apple Works Hardest

We've been managing our magazine's mailing list for the last six months with an Apple II Plus and were delighted when a friend introduced us to your January issue.

We'll probably never get around to writing our own programs, but we like to keep up-to-date on the latest software for the hardest working employee we've got—our Apple.

inCider has made our advertising projections and management much simpler; subscription management is a snap. Everyone here would be fired long before the Apple—it's got a totally secure job.

Albert Lewis
NY Center for Graphic Arts
270 Lafayette St.
NY, NY 10012

"Mr Lewis, we regret to inform you that you *have just been replaced by an Apple. . . ."*

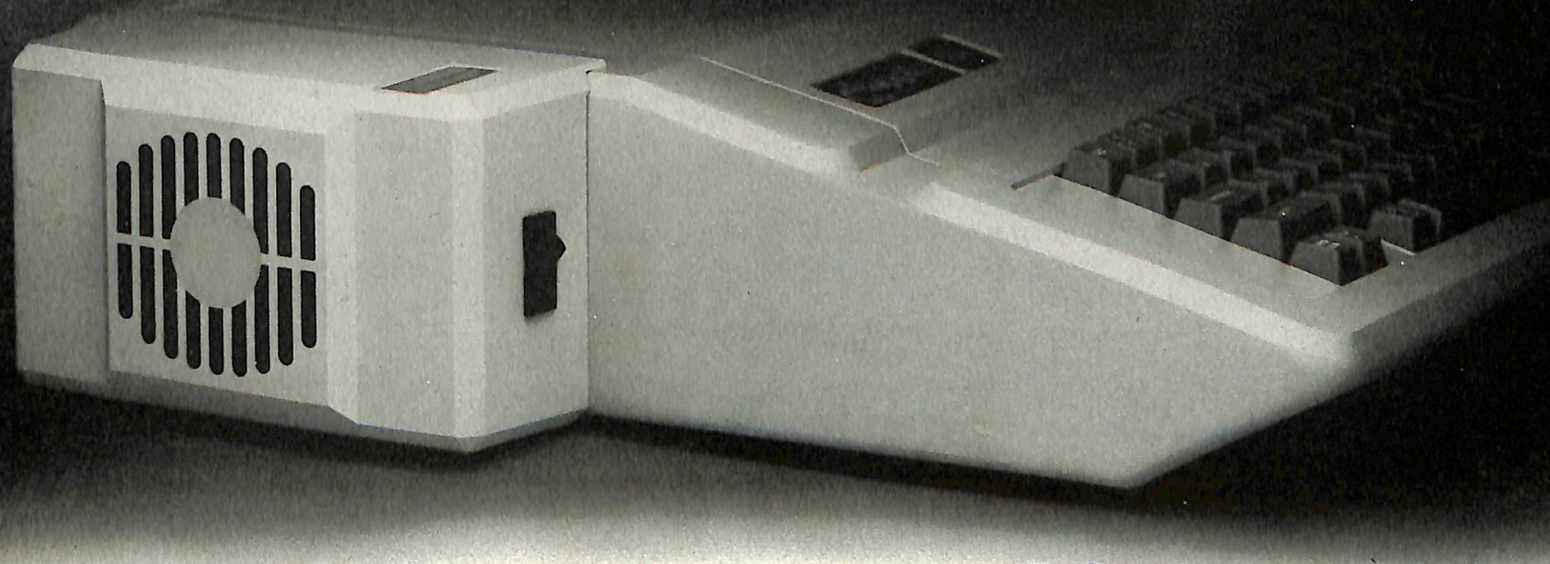
Payroll Praise

I have been looking for a simple payroll program for my small printing business, without all the fancy tax tables and yearly update subscription services.

Your article "Ah, Payday" by Greg Glau in *inCider*, May 1983, sounded like it might be just the ticket. Most of our employess earn the same every week and many have extra withholdings on federal taxes so the tax tables really aren't helpful. I would like an easy program where perhaps the social security and state tax (both flat rates) can be computed but we could manually adjust any of the other withholdings week after week without any great hassle. It should also print checks and all those darn reports to the IRS. It would be nice if the program could find the money for

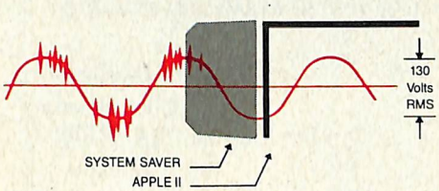
System Saver™

The most important peripheral for your Apple II and IIe.



For Line Surge Suppression

The SYSTEM SAVER provides essential protection to hardware and data from dangerous power surges and spikes.

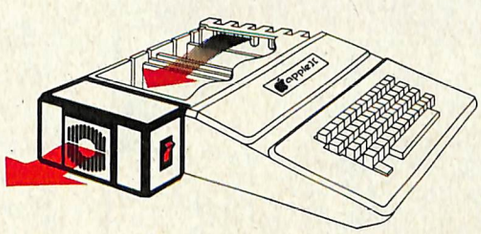


By connecting the Apple II power input through the SYSTEM SAVER, power is controlled in two ways: 1) Dangerous voltage spikes are clipped off at a safe 130 Volts RMS/175 Volts dc level. 2) High frequency noise is smoothed out before reaching the Apple II. A PI type filter attenuates common mode noise signals by a minimum of 30 dB from 600 khz to 20 mhz, with a maximum attenuation of 50 dB.

For Cooling

As soon as you add 80 columns or more memory to your Apple II you need SYSTEM SAVER.

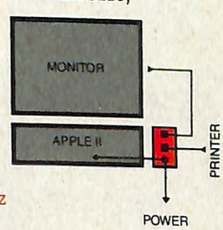
Today's advanced peripheral cards generate more heat. In addition, the cards block any natural air flow through the Apple II creating high temperature conditions that substantially reduce the life of the cards and the computer itself.



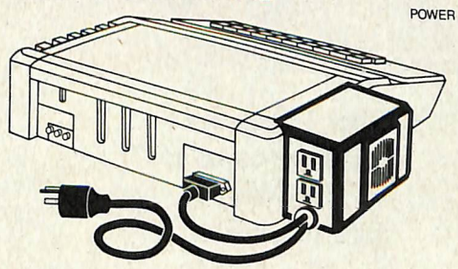
SYSTEM SAVER provides correct cooling. An efficient, quiet fan draws fresh air across the mother board, over the power supply and out the side ventilation slots.

For Operating Efficiency

SYSTEM SAVER contains two switched power outlets. As shown in the diagram, the SYSTEM SAVER efficiently organizes your system so that one convenient, front mounted power switch controls SYSTEM SAVER, Apple II, monitor and printer.



Available in 220/240 Volt. 50 Hz



The heavy duty switch has a pilot light to alert when system is on. You'll never use the Apple power switch again!

Easy Installation

Just clips on.
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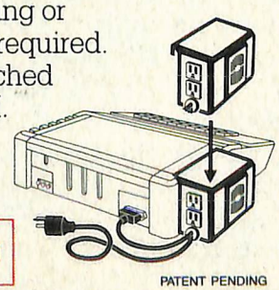
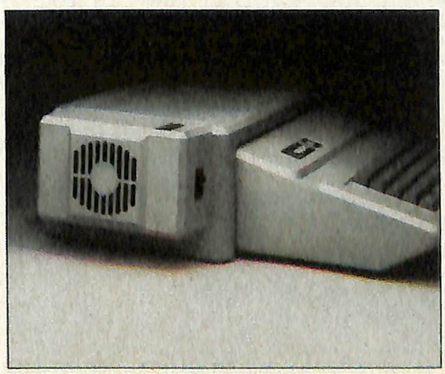
Color matched to Apple II.



Compatible with Apple Stand



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each week's payroll, but I realize that is asking a bit much.

I have toyed with trying to develop what you outlined, but my experience with the Apple is limited. Would Greg Glau be interested in selling his program to me and others in my category?

Richard W. Taylor
KNA Press Inc.
PO Box 68
Kennett Square, PA 19348

Greg Glau has said he would happily answer questions (sent with a self-addressed envelope) but he is not in the selling software business.

APO Answer

Perhaps I can explain APO/FPO shipping problems from the U.S. in response to the letter in the June *inCider*.

I import from Europe on the wholesale level and sell in the U.S. partially on the retail level. I get APO/FPO shipping requests. Here is what I discovered through bitter practical experience.

Some countries will not allow American products to be sent directly to members of the U.S. Armed Forces stationed within their limits.

Other countries insist on customs declarations and charge members of our Armed Forces duty, even though the product is shipped directly to them through APO/FPO addresses.

As for the 10–15 percent surcharge for overseas shipping, in most cases it is legitimate. Product packing is more costly for overseas shipping both from overseas to the U.S. and vice versa. Add the cost of the documents needed, and it is apparent a price addendum is necessary.

I hope this helps Mr. West and other *inCider* readers understand the problems encountered in overseas shipping.

Robert P. Lazear
Bents Unlimited Inc.
434 Woodbine Drive
Pensacola, FL 32503

Thanks for a clear explanation from the shipper's point of view.

Dump Hi-Res Page

The March 1983 issue of *inCider* had a neat, short hi-res dump utility for the Epson printer called "From Screen to Printer" by Bill Basham.

The routine can dump hi-res page 2 by modifying 8 bytes in the y base high address table. Just change 3A9:20 24 28 2C 30 34 38 3C to 3A9:40 44 48 4C 50 54 58 5C.

David Magliozzi
4 Webber Road
Burlington, MA 01803

Apple III's Growing Popularity

In response to Miss Newton's letter (Letters: "Apple III Programs Wanted," *inCider*, May 1983) I echo her sentiments and wish to suggest a solution.

Having acquired some familiarity with the Apple II in the laboratory, I decided to purchase a personal computer and spent many months investigating the advantages and disadvantages of several large memory machines. My choice finally narrowed down to the IBM PC and the Apple III. On closer inspection, the Apple III proved not only to be more cost efficient but every bit as capable as the IBM PC and the better buy overall. The software support for the III through Apple II programs was certainly a factor in my decision.

Incidentally, the ability of the III to use Apple II software should not be underrated. Even programs requiring joysticks are easily used since a simple modification of the emulation

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program (e.g., T.G Products, 1104 Summit Ave., Plano, Texas 75054) permits x and y inputs on one joystick, duplicating the paddle/joystick inputs of the II. Unfortunately, few software houses have taken advantage of the considerable programming capabilities of the III, with the result that software specifically for the Apple III is less than adequate at present.

Several of my colleagues are also planning to purchase a personal computer and the Apple III is their likely choice. In our opinion, an appreciation for the power of the Apple III is rapidly growing among hobbyists as well as non-programming users, which will lead inevitably to a marked increase in software for the III in the near future. The recent price reduction of the III by Apple Computer Inc. will certainly encourage the popularity of this fine computer. In the meantime, I suggest that we Apple III users form a group to share ideas and home-brewed programs. I offer my membership herewith.

Edward P. Gardner, Ph.D.
National Center for
Atmospheric Research
PO Box 3000
Boulder, CO 80307

Copy Expert?

I recently bought Copy II Plus, which is a combination nibble copier and conventional copy utility. As owner of Super Disk Copy II, Nibbles Away II, Locksmith 4.1, and Back It Up 2.3, I feel qualified to say Copy II Plus is the most powerful, easy-to-learn and well documented copy utility around. And at $39.95 it's the biggest software bargain I've found.

Jerry A. Krogy

Jerry, what do you do in your spare time besides copying?

Disk Copies to Come

I agree with the other letters to the editor asking to have your programs available on disk for a small price of from $10 to $15.

Pat Mecartea
2795 S. Helena Way
Aurora, CO 80013

Put them on disk!

Jim Willis
1300 Hinton
Westmoreland, LA 71291

This is a top priority item for the future. Watch for news!

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///'s Company

by Bill O'Brien

● High Speed Crash

● Word Juggler: A Balanced Review

Writing a monthly column and *typing* a monthly column can sometimes be two separate and profound experiences. Being essentially lazy, I usually sketch out this column in my mind, and, after urging my body into motion, produce a more-often-than-not intelligible pattern of words and phrases.

Imagine my consternation recently when, having given my III a four-day vacation, I found I could not format a disk. Nothing worked. The internal drive gave I/O error reports, while both of the external drives offered the obscure message, "Device Dependent error #34."

I have always considered myself a man of resource, so I wasn't entirely put out. I went immediately to the owner's manual and, surprisingly enough, found an explanation. Although it didn't tell me what the number 34 referred to, the device dependent nature of the error indicated that the device in question was either not connected or not turned on. I could have believed that, but the external devices I was using were Disk III's that were definitely connected and didn't need to be turned on.

I tried reading, deleting and copying files. Those worked fine. I just couldn't format, not for love nor money. In desperation I called my local Apple dealer and asked to swap the III's motherboard. If one drive doesn't work there's an odds-on chance the drive is bad; however, when all three drives are kaput, you'd better start looking at the controller. However, hearing what the financial arrangements would be (no, I haven't gotten the service contract for the III yet), I thought I'd better get out Sammy the Screwdriver and do a little investigating on my own. Besides, the dealer didn't have the 12-volt motherboard my 128K machine requires and "getting it in any day" wasn't definite enough for my rapidly diminishing deadline. (You might want to file that information away somewhere. Machines that were delivered as 128K have 12-volt motherboards, while the 256K models are 5-volt.)

Of Chips and Men

Most of the non-memory, non-VIA, support-type chips in the III are low-power Schottky devices usually designated by 74LSxxx, where the xxx is an identifying number. Apple has never seen fit to publish an Apple III equivalent to the *Apple II Technical Reference Guide*, so I had to search around the motherboard until I found the disk controller section by locating the Apple II P6a PROM (Programmable Read Only Memory) chip. (This is the same chip Apple uses on the II's controller card.) I found it in the right rear to center rear portion of the board.

Jotting down the chip numbers in that section, I went to my local electronics supermarket. Of the 11 chip types that I needed, which didn't include the Apple proprietary PROM or any non-74LSxxx chips, the store I went to had one in stock.

As long as I was now forced into a trip to midtown Manhattan, I figured I might as well do a semi-overhaul. So, I also bought three chips for the disk drive analog board (those boards that sit under the cover on top of each drive), including the ever-popular 74LS125, the chip that always goes up in a cloud of acrid smoke when you plug the cable in backwards. Altogether I spent about $32 and two hours of my time.

I plugged in all of the chips at once, a very unscientific method, since deductive reasoning would call for installing one at a time and noting the results. But I was in a hurry and taking the III's bottom plate off and putting it back again is a time consuming process. Needless to say, when I had everything back together again, turned the power on, booted up the system utilities disk and tried to format, I got the same errors.

By that time I was doing an unseemly Irish jig up and down my living room floor. I traced the ancestry of the III back to paleolithic times and brought it forward again as an offspring of toasters and waffle irons. Then I remembered something that had bothered me a long time ago about the III.

I had bought a Disk III analog card and stuck it on a slightly modified Shugart SA400 drive left over from my Radio Shack Model I. At first the drive didn't work; I got I/O error messages. When I ran the Apple III diagnostics over it, the drive failed. I knew the drive worked, so I was taken aback.

Well, someone had forced a copying program on me when I had my II. The program had a disk speed test on it. I put the III into emulation mode, booted the copy program, loaded a blank disk into the drive and ran the speed test. Sure enough, the drive I had just added was off speed. It wasn't off by much—in fact it was within Apple II tolerances. But it was only when I set it dead on the mark that it worked fine with the III. Sitting there with three drives that wouldn't format wasn't appealing at all, and, having nothing to lose, I went back to the speed test.

Address correspondence to Bill O'Brien at WABASA Consulting & Manangement, 111 Brook St., Scarsdale, NY 10583.

Speed Kills

Sure enough, the speeds of both the III's external drives and the internal one were off. Two of them were fast, one slow, but none deviated by more than about one and a half percent. (Speeds on the II are considered alright up to about three percent deviation, if memory serves me.)

I got out a non-ferrous "tweaking" wand, the type used on television sets, and located the speed potentiometer on the small pc board at the back of the drive. (Using a small metal screwdriver is okay, as long as you don't accidentally bridge any of the solder points. But, Murphy is the patron saint of all such endeavors, and I prefer to give him as little work as possible.)

I tweaked the pots on the drives (that's a very important technical term that means "turned the little screw in the potentiometer" until the speed deviated zero percent from what the program indicated it should be. I crossed my fingers and booted the system utilities.

If things didn't work out well this time there was nothing more I could do on my own. So, it was with great trepidation that I started the format process. I'm still not too sure if it was the chips or the speed adjustment, but this time it worked. In fact, it worked on *all* the drives. Somewhere in there is a lesson about looking for the simplest solution first and *then* going through all the gyrations and machinations that cover the myriad other possibilities. So much for technical work being out of reach of the normal person.

LOOSE ENDS AND OLD PROMISES

A while back I got two letters from a friend in Wisconsin. Included in the first was mention of some accounting packages she was using at the office and her inability to get them to run at home on the III. She was particularly concerned about the Continental Software General Ledger.

I swept out the crevices of my brain seeking possible reasons, like

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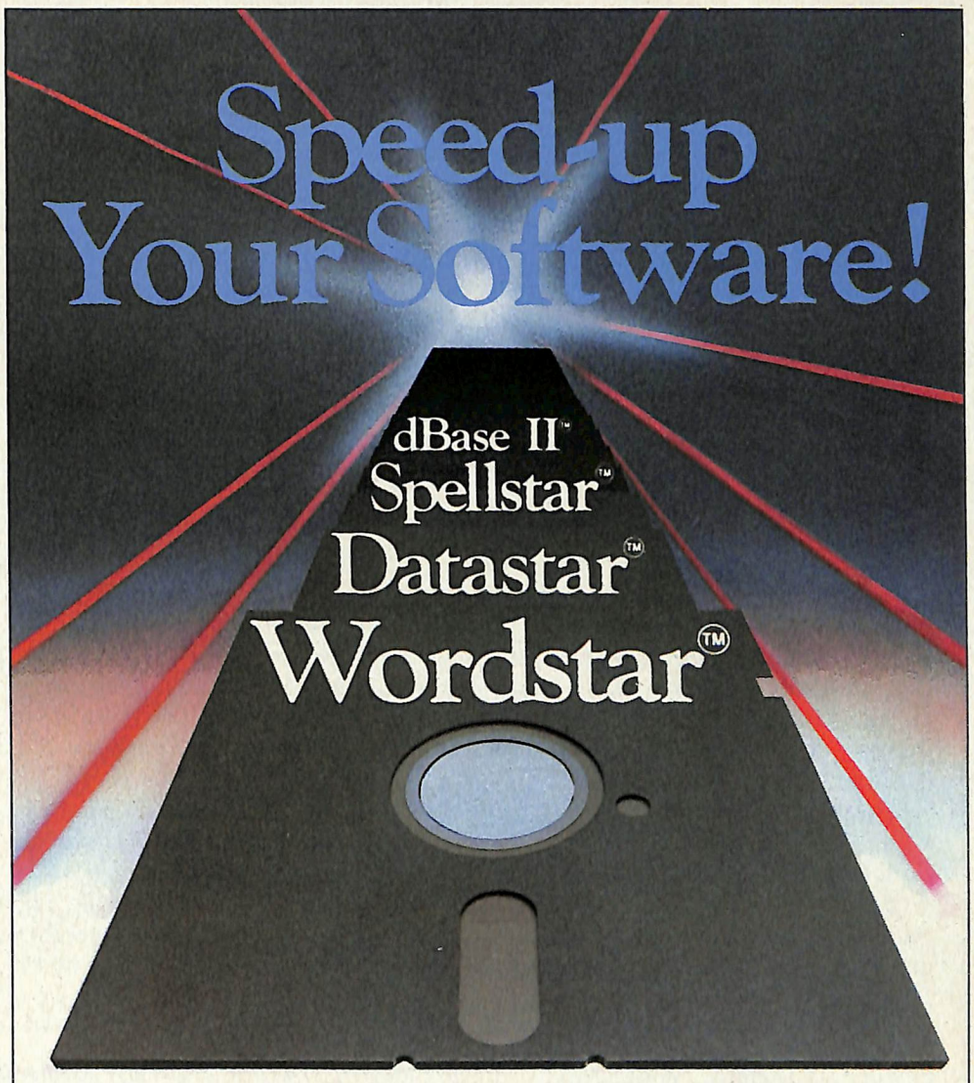

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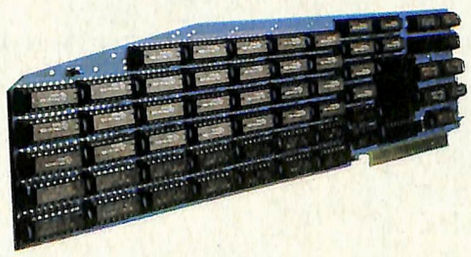

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gameport devices, for the General Ledger problem, and popped a reply back to her. Enter letter number two and some interesting discoveries. Apparently, she claims, the folks at Continental are tricky. In my correspondent's words, "I printed out the entire source code for the package. The result was that I found a couple of places where the operations handed off from Applesoft to Integer—which, of course, you can't do in emulation mode without rerunning." She removed the offending lines and the program now works correctly on the III in emulation mode, although she's not at all happy with its slowness.

Another program she couldn't run was called Micro GL III, which, she says, has an important glitch in it: it *adds* expenses to income to get a cash balance. Well, I always wondered about the derivation of the terms "hard" and "soft" dollars.

She also asked about the Denver Software EASY package. I've seen it in its version for the II, but that was some time ago. I spoke to the people at Denver and they confirmed that EASY is an expanded version of the program I'd seen. They say they've added a lot more to it to use extra memory available on the III. Unfortunately, at least to me, they haven't changed its double entry system. If you pay a bill by entering a payment into A/P, you've got to make a corresponding entry into the cash journal to indicate the money left. I've got a demo copy of both EASY and their Service Manager programs that I intend to review for you.

She also reminded me that I had promised to do some word processing reviews (I like to call them previews, since they tend to be a little intense) in one of my early columns and up until now I haven't produced. There are reasons for that. When I started to do the workup on the programs, I found that after going over two of them I had written about 30 pages and had 20 additional pages of tables. Not wishing to publish my own magazine, I shelved the idea for a while, finally deciding to put them out individually over a few months' time.

So, Teresa, there still isn't a Santa Claus in my keyboard, but this month marks the first of a series of previews that will tell you everything you could ever want to know about word processors for the Apple III.

WORD JUGGLER

A while back, when I was selling retail, I had about a half dozen different computer brands that routinely found their way out the door and into someone's previously happy and well-adjusted home. Most of them went out to business people, since that was mainly the clientele I handled, and of those, the majority of them wanted their computer for word processing.

The hardest part of the sale was picking out a computer that they were comfortable with, and in fact it was the part that most often got me into trouble with my "overlings." Depending on individual needs and preferences, one customer might select a hardware/software package that would seem totally off the wall to someone else.

All in all, it comes down to a very personal decision, one that is never objective. Keep that in mind when you read through this and subsequent reviews because they are *my* feelings, using *my* subjective criteria.

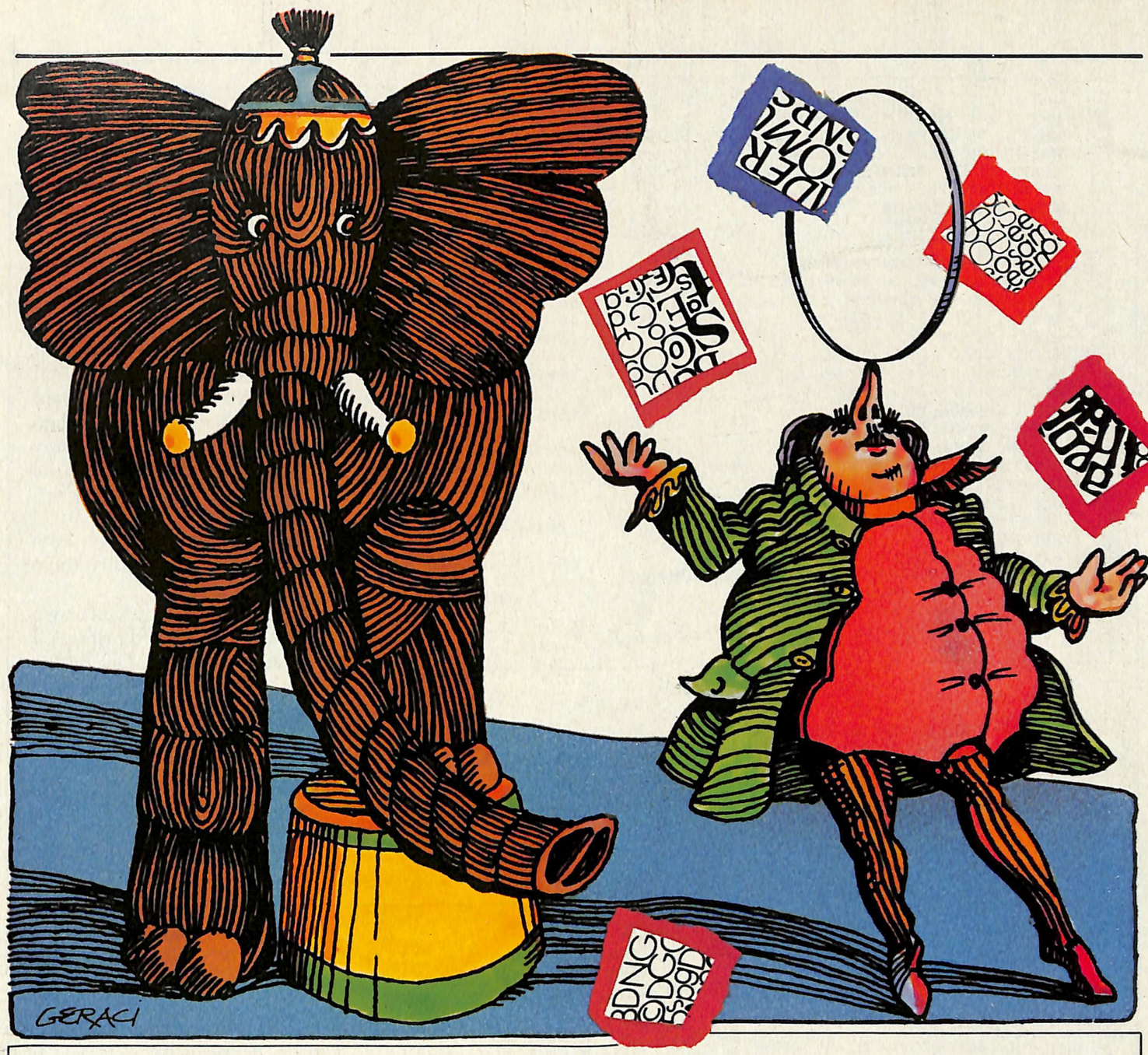
I don't want any of you saying, "I don't think that's a valid comment, I *like* that feature. Boy, what a jerk!" (Well, you can say it if you really want to.) Finding a word processing package that you are comfortable with is like getting fitted for false teeth: You know what your own teeth looked like, and how they felt. Now you're trying to find something that reminds you enough of them to

ERASE CURRENT DOCUMENT FROM MEMORY	[N]
DIRECTORY	[C]
LOAD A DOCUMENT	[L]
SAVE A DOCUMENT	[S]
ERASE A FILE FROM DISK	[P]
FORMAT A DISKETTE	[F]
DEFINE PREFIX	[D]
EDIT PRINT/PARAMETER SELECTIONS	[E]
REBOOT	[R]

Table 1. Main program menu.

PAGE LENGTH	[ESC] [8]
TOP MARGIN	[ESC] [9]
TEXT LENGTH	[ESC] [0]
LEFT MARGIN	[ESC] [(]
TEXT WIDTH	[ESC] [)]
PAGE PAUSE	[ESC] [*]
SINGLE SPACE	[ESC] [7]
DOUBLE SPACE	[ESC] [&]
TRIPLE SPACE	[ESC] [CTRL] [7]
INDENT	[ESC] [6]
PAGE	[ESC] [^]
SKIP	[ESC] [-]
PAGE CONDITIONAL	[ESC] [_]
LEFT JUSTIFY	[ESC] [@]
RIGHT JUSTIFY	[ESC] [CTRL] [2]
JUSTIFY	[ESC] [2]
CENTER	[ESC] [1]
COMMENT	[ESC] [c]
REDEFINE CHARACTER	[ESC] [5]

Table 2. Formatting functions.



make you use them all the time.

Unless someone "donates" something else, the III is where the buck stops, literally. It actually has everything I need (or at least anything else can be added). What follows are some of the things I've noticed.

Tooth Marks

I'm using Word Juggler now, and have been for about the last three months, courtesy of the folks at Quark (it's on the four-month review Return-o-rama plan). I think I like it.

You boot the disk (it's copy-protected, but you get a backup disk to stick in your local family vault, just in case) and up comes the menu, whose options I've reproduced in Table 1. The first thing you do is set up the print/parameter defaults so you can use your printer. It's a one time deal unless you change printers. In there also you can set the default line spacing, text length, width, top margin and page length. With the exception of the page length these can all be modified from within the edited file.

Along with the disk, there are two overlays included in the package. The first goes above the main keyboard and reflects the formatting functions available by using the escape key and the top row of characters. Some of these are shown in Table 2.

The other is a square, cut-out affair that fits over the numeric keypad and modifies those keys as well (Table 3). While the first grouping is only valid after the escape key is pressed, the changes in the numeric keypad characters are always in effect.

The editing screen itself is 23 lines deep. The bottom line of the III's display is used as a status line for the program. It contains the name of the current document in memory, the current line and column number and the total number of lines available in memory. A "tab" line can be displayed to show you all your currently set tabs, and by pressing the keypad's zero key you can toggle on and off an on-screen table that shows you which keys do what to move the cursor.

Word Juggler is a line-oriented word processor. With 128K of memory, the document area is 723 lines long (about 30 pages). More memory would allow larger documents, but somewhere the line has to be drawn between available memory and available disk storage space. Obviously, a document larger than 273 blocks (probably about 95 pages, pre-

PRINT DOCUMENT AT PRINTER	[SHIFT] [.]
SELECT PAGE PRINTING TO PRINTER	[CONTROL] [SHIFT] [.]
PRINT DOCUMENT TO SCREEN	[.]
SELECT PAGE PRINTING TO SCREEN	[CONTROL] [.]
FIND FROM TOF	[SHIFT] [1]
FIND FROM CURSOR	[1]
TYPE TO PRINTER	[SHIFT] [2]
PRINT CURRENT LINE	[2]
CHANGE BY OPTION FROM TOF	[SHIFT] [3]
CHANGE BY OPTION FROM CURSOR	[3]
BLOCK DELETE MARKER	[CTRL] [4]
BLOCK STORE & DELETE	[CTRL] [SHIFT] [4]
BLOCK STORE	[SHIFT] [4]
BLOCK LOAD	[4]
BLOCK MOVE	[SHIFT] [5]
BLOCK COPY	[5]
AUTO CHANGE FROM TOF	[SHIFT] [6]
AUTO CHANGE FROM CURSOR	[6]
INSERT MODE	[SHIFT] [7]
OVERWRITE MODE	[7]
DELETE TO EOL	[SHIFT] [8]
DELETE CHARACTER	[8]
DELETE TO MARKER	[SHIFT] [9]
DELETE WORD	[9]
DISPLAY TAB SETTINGS	[SHIFT] [0]
DISPLAY SPECIAL KEY DEFINITIONS (ON/OFF)	[0]
OPTIONS MENU (ON/OFF)	[ENTER]

Table 3. Numeric keypad reassignments.

suming 1600 characters to a page) wouldn't fit on the disk. In memory, the document would have to be split and then reviewed at a later date with the INSERT DOCUMENT command.

Editing a document, or, actually, typing it in, is a matter of just entering the words. You are defaulted into INSERT mode, but you can change that if you'd like. Cursor controls are implemented, on their most primitive level (up, down, left, right) via the arrow keys. Additional cursor movements are provided by augmenting the keys with shifts and controls (Table 4). If you happen to forget what they are, as I said, pressing the keypad zero will toggle a display on and off.

Word Juggler does not display text as it will appear on the printed page while you are typing it in. To do that, you can use one of the keypad commands.

Printing

Printing functions can be modified (see Table 5) to produce all of the common enhancements, if your printer is covered in one of the Word Juggler parameter files. Enhancement codes for NEC, Diablo, Xerox, Qume and "other," with or without a backspace facility and with or without a local line feed, are included on the disk. Also supplied on the disk are three additional parameter files (or filters, as they're called), one for the Silentype, one for the Anadex 9500/9501 and one for the IDS 560. If these do not fit the needs of your printer, there are instructions for writing your own filter, but to quote from the Word Juggler manual: "On entry to set HMI routine, the X register contains the width in microspaces of subsequent characters. You should set the printer's horizontal motion index (or inter-character gap) accordingly. Just do an RTS when you are through. You may use any register you like, but be sure that the interrupt and decimal flags are unmodified."

You can bet everything you own that I'm not going to modify those flags.

Other than that, if you don't own one of the aforementioned printers, I wouldn't worry about it. Dot matrix printers are rarely going to look as good as a thimble or daisy wheel printer. I find that not having bold or underline available doesn't really affect me.

Printing can be done either on continuous sheets or, by using the PAUSE control (ESCAPE, SHIFT 6), on cut

CURSOR LEFT	[LEFT ARROW]
CURSOR RIGHT	[RIGHT ARROW]
CURSOR UP	[UP ARROW]
CURSOR DOWN	[DOWN ARROW]
TAB	[TAB]
WORD LEFT	[SHIFT LEFT ARROW]
WORD RIGHT	[SHIFT RIGHT ARROW]
START OF LINE	[CONTROL SHIFT LEFT ARROW]
END OF LINE	[CONTROL SHIFT RIGHT ARROW]
START OF TEXT	[CONTROL SHIFT UP ARROW]
END OF TEXT	[CONTROL SHIFT DOWN ARROW]

Table 4. Cursor control commands.

UNDERLINE ON	[OPEN APPLE] [u]
UNDERLINE OFF	[OPEN APPLE] [U]
BOLD ON	[OPEN APPLE] [b]
BOLD OFF	[OPEN APPLE] [B]
SUPERSCRIPT ON/OFF	[OPEN APPLE] [UP-ARROW]
SUBSCRIPT ON/OFF	[OPEN APPLE] [DOWN-ARROW]
PRINT DOCUMENT AT PRINTER	[SHIFT] [.]
PRINT DOCUMENT TO SCREEN	[.]
TYPE TO PRINTER	[SHIFT] [2]
PRINT CURRENT LINE	[2]
10 PITCH	[ESC] [4]
12 PITCH	[ESC] [$]
15 PITCH	[ESC] [CTRL] [4]
SPECIAL PRINTER CHARACTERS	[ESC] [p]

Table 5. Printer controls.

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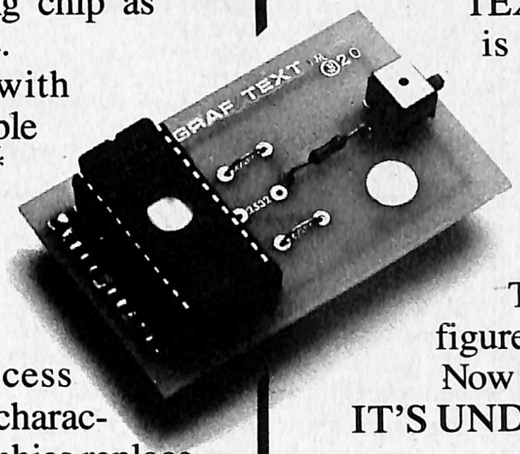

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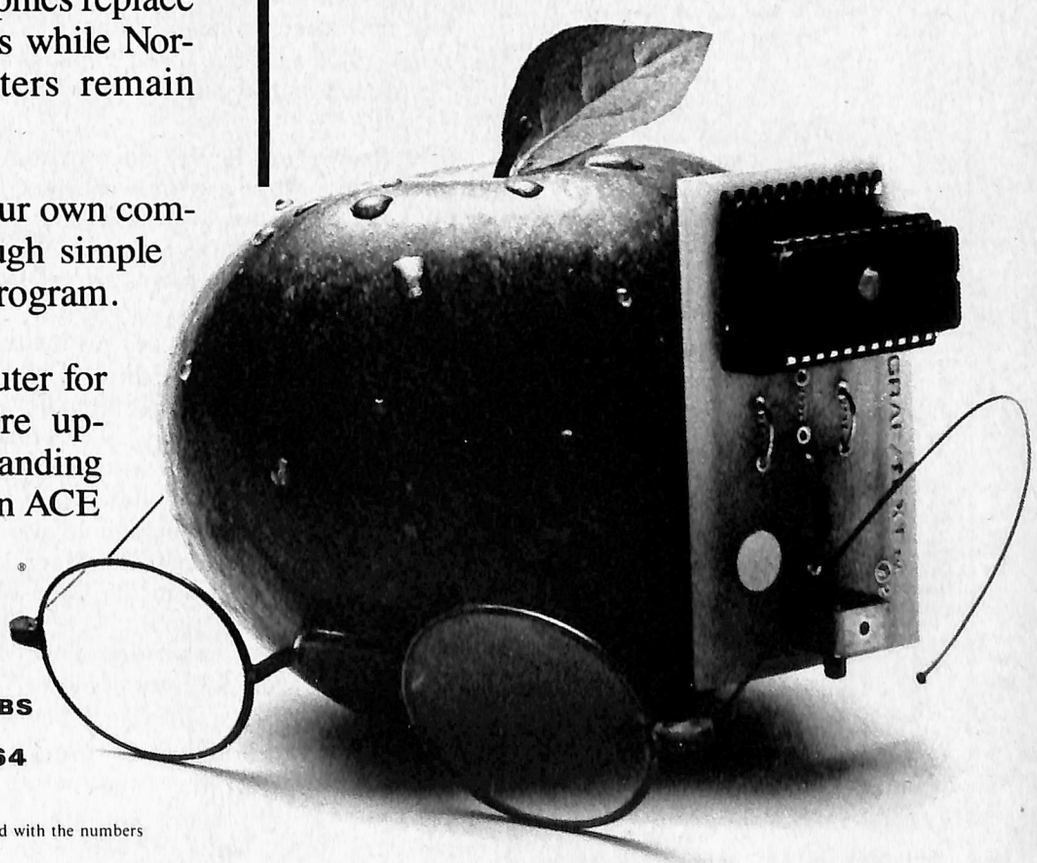

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BLOCK STORE	[SHIFT]	[4]
BLOCK LOAD		[4]
BLOCK MOVE	[SHIFT]	[5]
BLOCK COPY		[5]
AUTO CHANGE FROM TOF	[SHIFT]	[6]
AUTO CHANGE FROM CURSOR		[6]
FIND FROM TOF	[SHIFT]	[1]
FIND FROM CURSOR		[1]
CHANGE BY OPTION FROM TOF	[SHIFT]	[3]
CHANGE BY OPTION FROM CURSOR		[3]
BLOCK DELETE MARKER	[CTRL]	[4]
BLOCK STORE & DELETE	[CTRL] [SHIFT]	[4]

Table 6. Block handling features.

MM/DD/YY	$DATE
FULL YEAR	$YEAR
LAST 2 DIGITS OF YEAR	$YR
MONTH NAME	$MONTH
3 LETTER MONTH ABRV.	$MON
MONTH NUMBER	$MONTH#
DAY NAME	$DAY
DAY DATE	$DAY#
TIME (12 HOUR CLOCK)	$TIME
TIME (24 HOUR CLOCK)	$TIME24

Table 7. Predefined variables.

sheets. In case of the latter, the program will prompt you to press the space bar when you want the printing to continue. In the printing vein, you can allow pages to break according to the flow of the text. You can also preselect junctures at which you want new pages to begin, either absolutely or according to how many lines are left on the page (conditional paging).

If, after printing the document, you find that there are some changes you'd like to make, you have complete block handling control (Table 6). The standard movements are supported as far as cut and paste is concerned, and instructions are printed out as you use the procedure. The program is *very* friendly in this mode.

One of the treats I enjoy is Word Juggler's ability to format a disk without leaving the word processing system. FORMAT is implemented as part of the main menu commands and works on any disk in the internal drive.

Table 7 will give you an idea of one of the other special features of Word Juggler. It supports variables. You can use one of the predefined ones if you so desire (and if you have a clock), or, for purposes of customizing form letters, you can create your own. When you print the text, Word Juggler will ask you for the value you want that variable to contain.

The program works very well and, as I said, I have been using it for some time now. (The spelling checker option is one of my favorites.) But that doesn't mean that it's the last word (forgive the pun) in word processors. There are a few things I don't like about it.

Keypad

Some of the time I use my III, in its word processing state, to write programs. Given the amount of editing that might be needed, I think it's a natural offshoot. And that means that I have line numbers to enter. I've had the III longer than I've had Word Juggler and, although I've got a row of numbers above the main keyboard, I've become fond of using the numeric keypad. In fact, all my number entry is done on that keypad. But Quark has redefined it so that it doesn't produce my lovely numbers anymore. It's a lot like trying to train a left-handed person to use the other hand.

Yes, there is a template that will always remind me that these are not real numbers any more, but I also hate templates! My nicely functional keypad has become a multi-defined monster like the TI 99-4 or Sinclair

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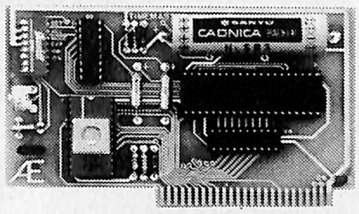

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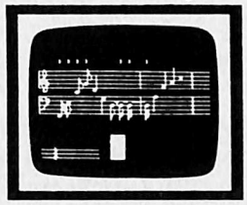

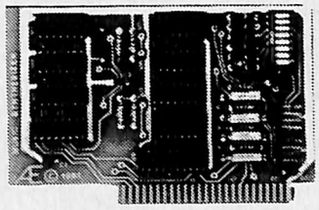

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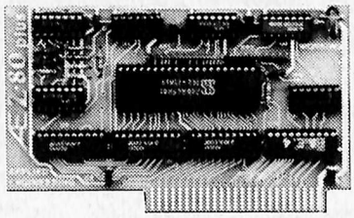

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INSERT MODE	[SHIFT] [7]
DELETE TO EOL	[SHIFT] [8]
DELETE CHARACTER	[8]
DELETE TO MARKER	[SHIFT] [9]
DELETE WORD	[9]
TEXT AT	[ESC] [#]
INSERT FILE (TEXT)	[ESC] [%]

Table 8. Editing commands.

DISPLAY TABS	[SHIFT] [0]
DISPLAY CRSR CTRL KEYS	[0]
DELETE PREVIOUS CHARACTER	[-]
DISPLAY MENU	[ENTER]
LOAD FORM LETTER PKG	[CLOSED APPLE] [.]
START W/PAGES NUMBERED	[CTRL] [.]
START W/PAGE-END W/PAGE	[CTRL] [SHIFT] [.]
TYPEWRITER MODE	[CTRL] [SHIFT] [2]
SET LEFT MGN FOR TYPE	[CTRL] [2]
SET TAB	[SHIFT TAB]
CLEAR TAB	[CONTROL TAB]
START OF VARIABLE DEFINITION	[CONTROL] [OPEN APPLE] [<]
END VARIABLE DEFINITION	[CONTROL] [CLOSED APPLE] [>]

Table 9. Miscellaneous functions.

keyboards.

Quark's attempt to simplify command structure is, to my tastes, overengineering and the one feature that might make me dump the program later on.

When I begin writing an article I like to drop the first line down a bit. Being an old typewriter mutant, usually I accomplish this by pressing the return key a few times. Each one of those returns, although physically one character, eliminates one line from the amount of text I can enter. There are other ways you can do it (one of which is to use the SKIP function), but I'm not sure how far I or any typist should be expected to deviate from old typewriter habits in order to use a computerized word processor.

Any formatting command such as CENTER, or JUSTIFY, or DOUBLE SPACE, which may be interpreted by the program as one character, also takes a whole line from my available typing space. Give it back! I don't want to be put in the position that many mainframe people are in. The Apple III *can* accommodate 256K of memory, but I don't want to be forced into purchasing the extra memory simply because of the idiosyncracies of the program I'm using. If this software had been written for a 48K or 64K machine, I wonder if it would have been done the same way?

Appending Text

You can add another document or section of text to the current document by using the INSERT DOCUMENT command. Trust me on this one—it's a great feature. I use a lot of figures and tables and I can generate them externally to my current text, thus saving space in memory. They are only incorporated in the calling document at print/display time, and even then they do not become a physical part of the document, but remain ancillary text that is pulled in *only* when printing. As I say, this preserves memory, but it's also a two-edged sword.

If I make a change in the main document that affects any of the figures or tables (or if, while printing, I see a mistake in any of them), I have to leave the document I'm currently editing and load in any affected text; which means I've got to jot down the changes I've made and load some or all of the tables and figures. That may not sound like much, but this review, for instance, has over 30 ancillary documents—that's an armful to load, change and save.

I can also use INSERT DOCUMENT to split up text that is longer than memory would normally allow me to print. Unfortunately, you cannot embed insert commands more than one deep. If I have tagged the main portion of text with an insert for the remainder, and that remainder also tries to insert something, an error message is generated.

Alternately, you can use BLOCK LOAD to append text to the main document, but this is not always practical, given the constraints of available memory space. (To you 256K folk, I tip my hat.) The probable solution would be to cram as much as you can into each document segment—perhaps chapter by chapter—and then create an additional document consisting only of insert instructions.

As for the printer filters, those files that allow the use of enhanced printing commands, I appreciate the fact that the people at Quark have gone out of their way to provide as many printer formats as they can. But there seems to be a rampant assumption that someone who uses a computer for typing is going to know all about the machine. It's an unrealistic premise.

Also, is there some law that says you've got to have one character to turn on a feature and another to turn it off? Why add to the number of different keys that have to be remembered (and, despite the two keyboard overlays, that's essentially what has to be done unless you want to stop and hunt for the functions you need). To begin underlining, I press open apple u. When I want to stop it, I have to press open apple shift u. How much code could be involved in turning an underline (or other enhancement) flag on and off via one code?

As long as we're on the subject of printers, my printer (C. Itoh 8015) isn't as consistent with Word Juggler as I'd like it to be. If I embed a few carriage returns in the text, there are occasions when my printer will ignore some of them. Whether or not this is my printer is really not the issue. It is a thing that's happening, and *that's* what's important.

If you can't afford a letter quality printer and your dot matrix substitute has the ability to enhance its printing in one shape or another, you can use the ESCAPE p option in Word

> **"Quark's attempt to simplify command structure is, to my tastes, over-engineering."**

Juggler. The notice PRINTER CONTROL will appear on the screen, and the next line will be sent as a printer control code, not as part of the text.

The problem is that printer controls must appear on a separate line, so if you're looking to stop and start something in midstream, you may not be successful.

There are some minor points about cursor control, too. Apparently the system doesn't recognize the character left behind by the right arrow and tab keys. For example, if you get to a blank line and want to start a table indented slightly to the right, you can use the right arrow key to get there. If you stop and decide to back up a space or two, you've got to use the left arrow key to do it. Trying to use the keypad hyphen to delete the previous character just rings the bell. Likewise, if you tab over to a spot and decide to go back a bit, you're stuck with the arrow. (But, delightfully, Word Juggler remembers the tab assignments for each document you load in.)

Having now conditioned myself to use the hyphen to delete characters with Word Juggler, it's annoying when I go for it in Basic and I wind up with a bunch of hyphens instead of erased characters. I also think it's in the wrong spot (or at least a poor choice of keys), having fallen victim to the enter key more than once when reaching for the hyphen. Nothing terrible happens—you wind up in the main menu—but you've got to hit enter again to get back to the document you're working on and you waste time in the process.

Finally, other than physically writing your document to another file, there are no backup procedures. I would have preferred a request to back up the old file that existed (if, indeed, one did), rather than being asked if I wanted to purge the old file and add the new one. (For those of you with a clock, Word Juggler does not seem to write over the old file. Apparently, the older version of the current document is first deleted and the new version is then saved. There is, then, no way to determine creation date and modification date of this document if the storage disk directory is viewed using the CAT command from Basic. Everything is listed as of the last save date/time.)

There's more to the review, and we'll see it next time. Meanwhile, live long and program.

Ciao bene, AppleAmerica! ■

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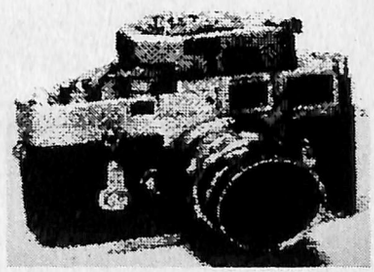

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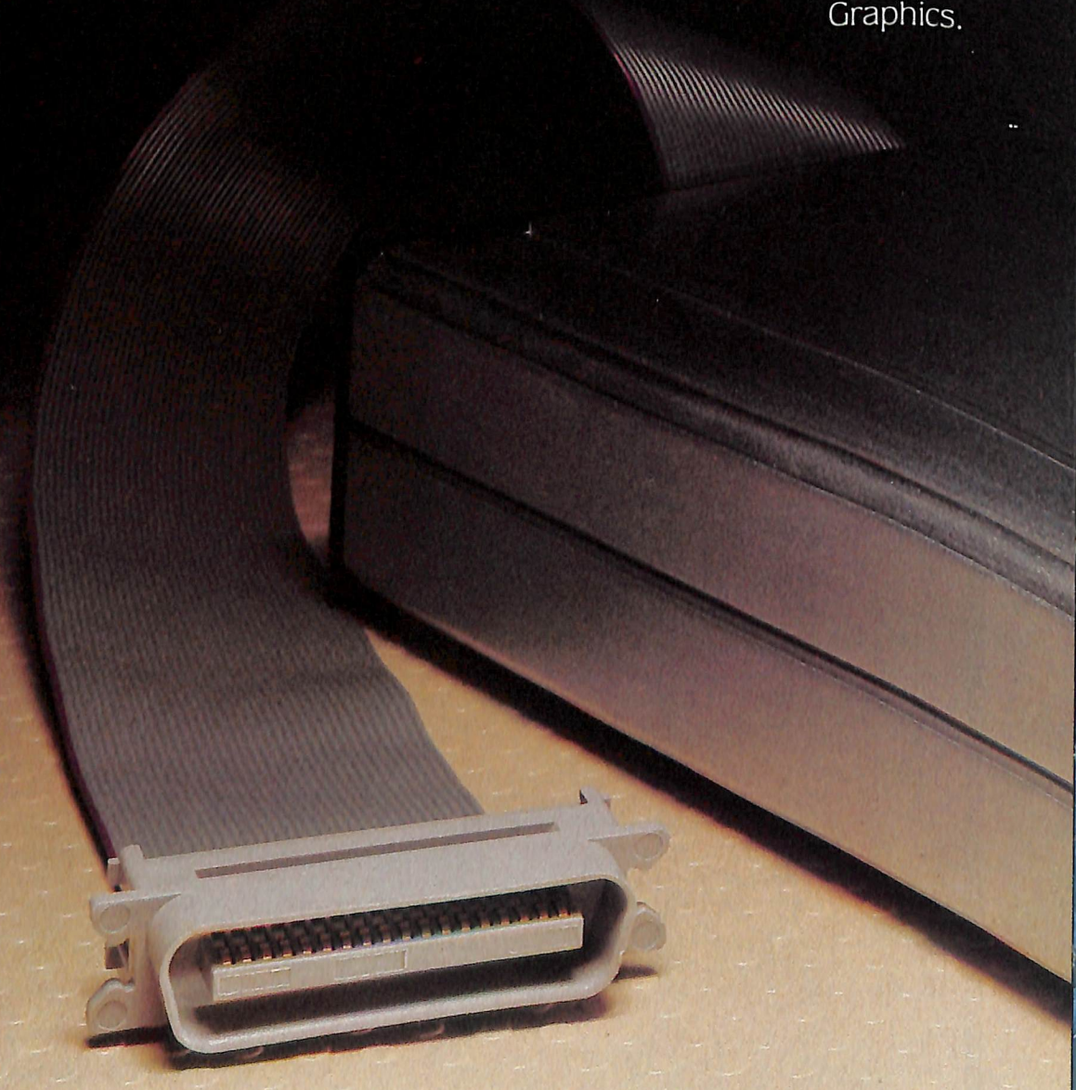

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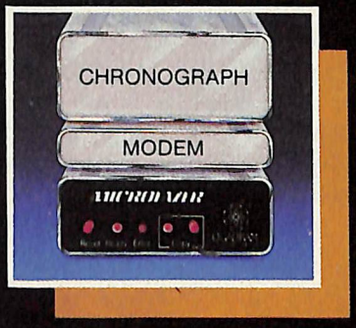

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The Applesoft Adviser

by Dan Bishop

Hi-Res Apple Graphics

Last month's column discussed lo-res graphics displays and demonstrated how lines could be drawn, boxes filled in (or painted), histograms drawn and simple figures animated. Using only Basic instructions, a bouncing ball and an animated jumping jack were created to illustrate these principles. In most cases, however, lo-res graphics will be limited to program title pages (using large block characters) and relatively simple games such as tennis simulations and break-out games.

This month I'll tackle hi-resolution graphics. Don't hope to learn everything there is to know about hi-res in this article, however! There is much more than could possibly be covered by a single column. This article will deal first with a review of some of the basics relating to hi-res graphics that were mentioned in the previous article, and then proceed to cover the Basic commands relating to the use of hi-res. Then, a simple approach to formulating shape tables will be presented so that you can quickly produce more sophisticated graphics and animation.

Features of the Hi-Res Graphics Mode

High resolution graphics on the Apple produces a screen display consisting of 280 columns (numbered 0 to 279) and 192 rows (numbered 0 to 191) when in full screen mode. This allows room for 53,760 individual dots to be displayed on the screen. Keeping track of each screen position and the color to be displayed at that location requires a tremendous amount of memory (almost 8200 bytes) to serve as a buffer for storing this information. To use hi-res graphics, and still have room for your program and other memory overhead, you must have a minimum of 16K of RAM memory installed in your Apple.

Applesoft readily supports two different hi-res buffer areas. The first extends from memory location 8192 through 16383. The second uses locations 16384 through 24575. Thus, if you wish to use both primary and secondary hi-res buffers (referred to confusingly as "pages" in some Apple manuals), you will need at least 24K of RAM memory.

Another memory fact that you need to be aware of is that your Basic program instructions are stored beginning at memory location 2048. This means that, if you are to use the primary memory buffer, and you have a Basic program that is more than 6145 bytes long (8192 minus 2048), then the first time your program clears the hi-res buffer area, the tail end of your Basic program (stored from location 8192 and up) will go up in smoke. One method for dealing with this problem will be discussed in a later article.

One additional related consideration must be dealt with when using the primary hi-res buffer with a 16K system, or the secondary hi-res buffer with a 24K system. Even if your program instructions do not interfere with the RAM needed for your hi-res buffers, the computer may still decide to use some of that memory space to store the values associated with the variables your program is using. To avoid this, it is necessary to fool the computer into thinking that the available RAM is smaller than it really is. The use of the command HIMEM: 8192 (yes, that command does have a colon!) will cause all variables to be stored below address 8192, so that the primary buffer will be used only for hi-res graphics. If you are using a 24K system, and using only the secondary hi-res buffer, then HIMEM: 16384 will accomplish the same task for this memory area, effectively reserving its use for graphics.

The primary hi-res buffer may easily be configured to a screen display that consists of 280 columns by 160 rows, with the bottom 32 rows opened up for a four-line text window at the bottom of the screen. In fact, this is the normal configuration of the primary hi-res display when the command HGR is used to switch to this display mode from text mode. As with lo-res, text may be displayed in these rows by using the VTAB command to position the cursor down into this window (VTAB 21, for example) and then using PRINT or INPUT statements in the normal fashion. On the other hand, the secondary hi-res display, called by using the HGR2 command, normally uses full screen mode. Although it is possible to set the secondary display in mixed text-plus-graphics mode (refer to Table 1), clearing the bottom four lines in order to display text information is not an easy task. This problem will be dealt with in a later article also.

Fundamental Hi-Res Basic Commands

Plotting points and drawing lines on the hi-res display is as simple, and in some cases simpler, than carrying out the same task on a lo-res display. As mentioned above, the first command, which instructs the computer to reflect the appropriate memory buffer information from RAM to the video display screen, is either HGR or HGR2, depending on whether you desire to use the primary or secondary hi-res buffer. Following this, you

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must select a color, using the HCOLOR = # command, where # represents some number between 0 and 7. (More about hi-res colors below.)

In order to plot a single point, the command is simply HPLOT XX, YY where XX and YY are the corresponding column (0 to 279) and (0 to 191) location for the dot. Of course, if you are using mixed text-plus-graphics mode, and your YY value is greater than 159, the point plotted will not be visible on the screen, having been plotted behind the text window.

Everything described so far is rather analogous to lo-res techniques. Hi-res is considerably simpler when it comes to drawing lines. Lo-res has two separate instructions used for drawing horizontal and vertical lines, and requires use of a FOR...NEXT loop to construct diagonal lines. Hi-res uses a single command structure for all lines drawn, regardless of their direction or orientation on the screen. To simplify things even further, that command is the same HPLOT command used above to plot a single point, extended with the word TO, followed by the coordinates of a second point. The execution of that command results in a line being drawn between the two points.

For example,

```
HPLOT 120,43 TO 200,43
```

plots a horizontal line on row 43 between columns 120 and 200. The same command can be extended with another TO instruction, forcing the line to a third point, and with yet another TO instruction, sending it off to a fourth point. The only limit on the number of extensions is the 239-character limit set for a Basic instruction line.

Listing 1 illustrates the use of these techniques with a short program that constructs a number of boxes on the screen, using a different HCOLOR code for each box. When you run this program, pay particular attention to the colors of each line. The explanation for their appearance will be discussed next.

```
POKE -16303,0          Select Text Mode.
POKE -16304,0          Select Graphics Mode.  Graphics
                       display will not be erased.

POKE -16301,0          Select mixed screen graphics +
                       text mode.  Bottom four lines will
                       be open as a text window.
POKE -16302,0          Select full screen graphics mode.

POKE -16299,0          Select secondary buffer.  Graphics
                       display will not be erased.
POKE -16300,0          Select primary buffer.  Graphics
                       display will not be erased.

POKE -16297,0          Select Hi-Res graphics buffer.
POKE -16298,0          Select Lo-Res graphics buffer.

CALL 62450             Clears current high resolution
                       buffer (and screen to black).
CALL 62454             Clears current high resolution
                       screen to the last HCOLOR that was
                       plotted.
```

Table 1. Additional commands that may be used to control hi-res graphics displays.

```
 10 HIMEM: 8192
 15 REM PROGRAM TO ILLUSTRATE HCOLOR CODE CONVENTIONS
 20 FOR C=0 TO 7
 25    HGR
 30    HCOLOR = C
 35    VTAB 21: PRINT"<--EVEN-->   <--ODD-->   <--DOUBLED-->"
 40    PRINT"     POSITION OF VERTICAL LINES"
 45    PRINT: PRINT"          HCOLOR = ";C;
 50    HPLOT 10,10 TO 50,10 TO 50,100 TO 10,100 TO 10,10
 55    HPLOT 131,10 TO 161,10 TO 161,100 TO 131,100 TO 131,10
 60    HPLOT 200,10 TO 250,10 TO 250,100 TO 200,100 TO 200,10
 65    HPLOT 201,10 TO 201,100: HPLOT 251,10 TO 251,100
 70    HPLOT 10,120 TO 10,150: HPLOT 80,120 TO 80,150
 75    HPLOT 141,120 TO 141,150: HPLOT 161,120 TO 161,150
 80    FOR I=10 TO 80 STEP 2:HPLOT I,120:HPLOT I,150:NEXT I
 85    FOR I=141 TO 161 STEP 2:HPLOT I,120:HPLOT I,150:NEXT I
 90    INPUT"PRESS <RETURN>";X$
 95 NEXT C
100 GOTO 20
```

Listing 1. Demonstration program that illustrates the effect of column position on the color a hi-res dot will assume for various values of HCOLOR.

Hi-Res Color

Before any HPLOT command may be given, you must specify the color you wish to use for the dot(s) being plotted on the screen. With lo-res, this was a simple matter of selecting a color code between 0 and 15, with the assurance that the color selected would be the color displayed. Things aren't so simple with hi-res. In the first place, only values between 0 and 7 may be used with the HCOLOR command. This doesn't mean that there are eight possible colors, however. It also doesn't mean that there is a direct correlation between the number selected and the color that appears on the screen.

As it turns out, the number selected will correspond to one color for dots being plotted in an even-numbered column (0, 2, 4, etc.) and to a second color for dots being plotted in an odd-numbered column (1, 3, 5, etc.), and, if another dot is plotted right next to the first dot on the same horizontal row, and the value for HCOLOR is 3 or 7, both dots will appear to be white.

Now, as for the colors themselves, 0 and 4 are the attributes for black, and black is the only color that can be relied upon (since it simply represents the fact that those points plotted with HCOLOR = 0 or HCOLOR = 4 are not displayed on the screen).

If the HCOLOR code used is 3, then the dot that is plotted will be either violet (even-numbered columns) or green (odd-numbered columns), unless there is a horizontally adjacent dot, in which case both will appear white. If the HCOLOR code used is 7, then dots plotted in even-numbered columns will appear blue, those in odd-numbered columns will appear as red or orange, and as before, adjacent dots will both appear as white.

On the other hand, if HCOLOR = 1,

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HCOLOR	even column	odd column	double horiz. dots
0	black	black	black
1	black	green	green
2	violet	black	violet
3	violet	green	white
4	black	black	black
5	black	red	red
6	blue	black	blue
7	blue	red	white

Table 2. HCOLOR code conventions. Note that if HCOLOR has a value of 3 or 7, any two horizontally adjacent dots will appear to be white.

then the color being plotted will be green and the dot will appear only if the column is odd). The same rule holds for HCOLOR = 5 for red (or orange) dots. By the same token, if HCOLOR = 2, then the color being plotted will be violet and the dot will appear only if the column is even-numbered. This rule also is in force for HCOLOR = 6 and blue dots. Table 2 lists these relationships.

Of course, if you are using a black and white monitor or a green screen, lighted dots will appear as white (or green), with no regard to their color designation. The program in Listing 1 draws several boxes with special regard being given to column positioning and color designations to illustrate these concepts. Notice that, in order to obtain a white vertical line, it was necessary to plot two vertical lines side by side using HCOLOR = 3, and that a horizontal line having a specific color could be produced using HCOLORS of 3 or 7 by skipping every other position in order to avoid having adjacent dots blend to a white.

Based on Listing 1, it becomes apparent that only three HCOLOR designations need to be used (0, 3, and 7), as long as care is taken in determining which columns are used for the points that define the object to be displayed. If you make good use of the STEP 2 feature of FOR...NEXT loops, you can define any horizontal line color you wish with these three color codes. Of course, this means you will be using HPLOT...TO as a command only for vertical lines and for white horizontal lines.

Shape Tables Made Easier

Applesoft provides a very sophisticated and convenient method for displaying a predefined shape or object on the monitor when hi-res graphics are being used. Several shapes may be predefined, and the command:

DRAW ## AT XX, YY

causes shape number ## to appear at column XX, row YY on the screen, instantly (much faster than if the object were drawn using HPLOT instructions). A similar single command can be used to erase the image from the screen without going through the process of changing the color designations. This command has the same format as the DRAW command, and is:

XDRAW ## AT XX, YY

Furthermore, the size of the object can be changed by using the command:

SCALE = ##

where ## may be any number from 1 to 255, with 1 representing the object as defined, 2 representing a displayed image twice the size of the defined image, etc.

Finally, the command:

ROT = ##

where ## may be any number from 1 to 255, may be used to make the displayed image appear to have been rotated some number of degrees (depending on the current scale value) within the two-dimensional plane of the screen.

It is important to assign the desired values to SCALE and ROT before DRAW is used so the computer can know just how the image is to be displayed. This is the easy part.

The difficult part, of course, is defining the image itself and storing

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First Move Does NOT Plot		First Move DOES Plot	
up-plot-up	32	plot-up	4
up- right	8	plot-up-plot-up	36
up-plot-right	40	plot-up- right	12
up-plot-down	48	plot-up-plot-right	44
up- left	24	plot-up-plot-down	52
up-plot-left	56	plot-up- left	28
		plot-up-plot-left	60
down-plot-up	34	plot-down-plot-up	38
down- right	10	plot-down- right	14
down-plot-right	42	plot-down-plot-right	46
down- down	18	plot-down- down	22
down-plot-down	50	plot-down-plot-down	54
down- left	26	plot-down- left	30
down-plot-left	58	plot-down-plot-left	62
right-	1	plot-right-	5
right-plot-up	33	plot-right-plot-up	37
right- right	9	plot-right- rght	13
right-plot-right	41	plot-right-plot-rght	45
right- down	17	plot-right- down	21
right-plot-down	49	plot-right-plot-down	53
right-plot-left	57	plot-right-plot-left	61
left-	3	plot-left-	7
left-plot-up	35	plot-left-plot-up	27
left-plot-right	43	plot-left-plot-right	47
left- down	19	plot-left- down	23
left-plot-down	51	plot-left-plot-down	55
left- left	27	plot-left- left	31
left-plot-left	59	plot-left-plot-left	63

Note: No code is given for any pair that ends in an upward movement without plotting first. That is, be sure your second arrow isn't simply "up" (a "plot-up" is acceptable).

Table 3. Hi-res shape table vector codes. Refer to the text for rules regarding selection and use.

```
10 HIMEM: aaaa
20 POKE 232, bb
21 POKE 233, cc
30 DATA dd, 00, ee, ff, gg, hh, ..., ... etc
31 DATA x1, x2, x3, x4, x5, x6, ..., ... etc, 00
32 DATA y1, y2, y3, y4, y5, y6, ..., ... etc, 00
      (all shape codes are entered here as data elements)
50 FOR I=1 TO mm: READ A%: POKE pppp + I, A%: NEXT I
```

Listing 2. Recipe for entering shape table data into a Basic program. Refer to text for explanation.

that image in RAM as a shape table. The process described in Chapter 9 of the *Applesoft Manual* is complete enough, but requires some understanding of binary and hexadecimal arithmetic. The method I am about to present sticks to good old decimal, and uses the values shown in Table 3 to define the shape vectors. Furthermore, the Basic code in Listing 2 can be used as a general format for any program in which a shape is to be defined and stored in RAM—sort of a cookbook type of procedure. Simply provide the appropriate numbers (described below) to replace the lowercase letters used in that listing.

The Shape Codes

Listing 2 contains the actual shape codes for each image in lines 31 through 49 as data elements that are read in line 50 and poked into RAM. In Listing 2, the shape codes are represented by x1, x2, x3, etc. for shape number 1. The 00 at the end of line 31 is the last data element for that shape, indicating to the computer that the definition for the shape is finished. Shape number 2 has its codes stored as data elements in line 32 as y1, y2, y3, etc. The sequence of codes for this shape also ends in 00. If more shapes are to be defined within the program, simply follow this procedure. Enter the codes for each shape in sequence as elements of a data line, and end the shape definition with a 00.

To determine the numbers to use, you must start with a sheet of graph

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paper and place a dot in the center of each square that is to be lit. Keep in mind the color/column problem when sketching this image. You may want to be sure that all dots are doubled (horizontally) and use a color code of 3 or 7 to be sure that a vertical line in your shape doesn't mysteriously disappear!

When you have finished plotting the dots on graph paper, you must decide where you wish to begin your shape definition. This is an important decision, because when you go to draw the image onto the screen, the XX, YY coordinates that you use with the DRAW command will correspond to the first square you define in your shape table. (The starting square does not have to contain a dot.) Also, the rotation command will rotate the image about this first square. Thus, you may want to select a square in the center of the image for symmetrical rotations, or a square at the outer edge for a different effect.

Starting with this first square, draw an arrow to the center of an adjacent square. This square does not necessarily have to have a dot in it either, but it must be horizontally or vertically adjacent to the square you are using for a starting point. (In other words, no diagonal moves are allowed.) Now draw a second arrow from that square to one of the squares adjacent to it. You have drawn two arrows. The object of this game is to eventually connect all of the dots with pairs of arrows. There are only two rules to be followed. The first is that the arrows must be drawn horizontally or vertically (never diagonally). The second is that if the first arrow in a pair must begin in a box without a dot and move vertically upward into another vacant box, then the second arrow may not also move vertically upward. That is, two upward moves from boxes that do not contain at least one dot are not allowed to make up a pair.

Following these rules, draw two arrows at a time and refer to Table 3 to determine the decimal code that corresponds to these two moves. It may be helpful to refer to each arrow using the following designations. If the arrow begins in a box that has no dot, then refer to the move as either "up," "down," "right" or "left." If the arrow begins in a box that has a dot, refer to the move as "plot-up," "plot-down," "plot-right," or "plot-left." In other words, a "plot-up" means "plot a point in this square and then move up." For example, if a given pair of arrows are both pointed upwards, and both start in boxes containing dots, then the arrows make a "plot-up-plot-up" pair, and, from Table 3, this pair has a 36 for its deci-

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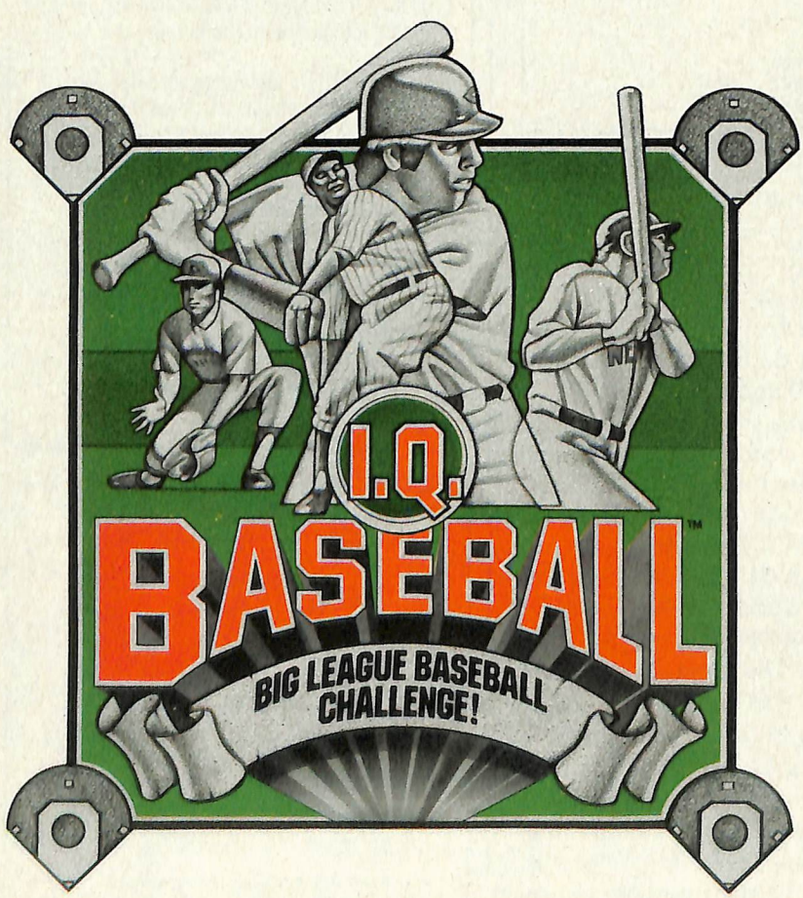

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mal designation.

When you have successfully connected all of the dots in your figure, you should also have a list of codes that relate each successive pair of arrows to a decimal code obtained from Table 3. This sequence of numbers is your shape definition, and, if this is to be shape number 1, these numbers correspond to x1, x2, x3, etc., in line 31 of your program. Don't forget to add a 00 to the end of this data list.

Continue with this process until you have defined all of the shapes your program will use and have entered their codes into appropriate data lines. Listing 3, which contains a sample program that uses hi-res graphics techniques, defines two shapes to be saved in the shape table. The first, a simple ball, is defined in line 31. The second, a cross or star, is defined in line 32.

There is one other task to be done before the shape table definition is completed. The data elements of line 30 must be determined. The first data element, dd, is simple. This number corresponds to the number of different shapes you have defined. In Listing 3, the number is 2, corresponding to the fact that two shapes have been defined.

The second element in line 30 is always 00. Then things get slightly more complicated. The remaining data elements in line 30 are actually taken in pairs. You will have as many pairs of data elements as you have shapes in your shape table. So ee and ff together are related to shape number 1, gg and hh are related to shape number 2, etc. But to determine the numbers to use in these positions, you must first draw two dashes for each shape you have defined and separate each dash with a comma. At this point, line 30 may look like this:

```
30 DATA 05,00,-,-,-,-,-,-,-,-,-,-
```

This assumes that you have five shapes in your table. Note that there are ten dashes (two for each shape).

Now, starting at the first data element in line 30, count the number of data elements (including dashes) that will have to be read before encountering the first data element for shape number 1. In this case, the number will be 12. Data elements 3 and 4 in line 30, taken as a pair, are used to give this value to the computer. Since the number 12 is less than 255, data element 3 will be 12, and data element 4 will be 00. Line 30 now looks like this:

```
30 DATA 05,00,12,00,-,-,-,-,-,-,-,-
```

Start counting again at the first data element in line 30, and count the number of data elements that will have to be read before encountering

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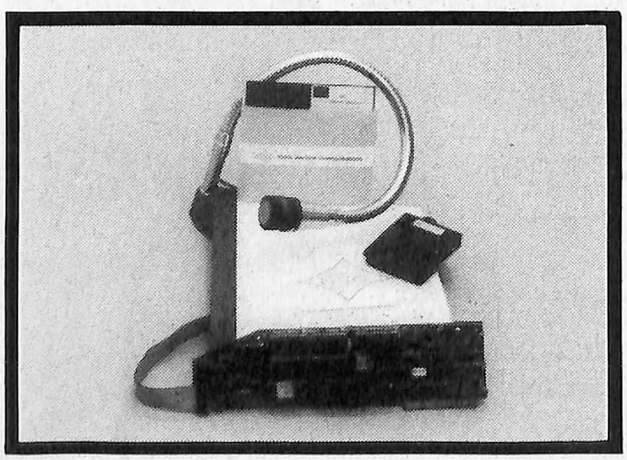

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```
 10 HIMEM: 8192
 20 POKE 232,00
 21 POKE 233,64
 30 DATA 02,00,06,00,16,00
 31 DATA 18,63,32,36,41,45,50,54,59,00
 32 DATA 36,36,12,50,54,54,54,54,30,32,36,36,63,63
 33 DATA 23,41,45,45,45,45,45,24,63,63,00
 50 FOR I=1 TO 41: READ A%: POKE 16383 + I, A% : NEXT I
 59 REM MAIN PROGRAM STARTS HERE
 60 HOME: VTAB 22: PRINT"   THE CANNONBALL  EXPRESS"
 70 GOSUB 900
200 T=5: B=154: L=0: R=61: X=150: Y=50
205 GOSUB 960: GOSUB 1250: GOSUB 1000
210 L=R: T=154: R=215: GOSUB 960
220 GOSUB 1800: GOSUB 2000
230 GOTO 150
240 END

899 REM SUBROUTINE TO PLOT UNMOVING OBJECTS (BACKGROUND)
900 HGR
905 SCALE = 2
910 ROT = 1
915 HCOLOR = 2
920 HPLOT 0,10 TO 50,10
925 HPLOT 46,10 TO 46,159
930 HPLOT 220,159 TO 220,129 TO 250,129 TO 250,159 TO 220,159
935 HPLOT 0,159 TO 279,159
940 RETURN

959 REM SUBROUTINE TO PLOT HORIZONTALLY ROLLING BALL
960 FOR I=L TO R
965     HCOLOR = 1: DRAW 1 AT I,T
970     XDRAW 1 AT I,T
975 NEXT I
980 RETURN
999 REM PLOT FALLING BALL; USED FOR BOUNCING BALL ROUTINE
1000 FOR I=T TO B
1005    HCOLOR = 1: DRAW 1 AT R,I
1010    XDRAW 1 AT R,I
1015 NEXT I
1020 PRINT CHR$(7);:          REM RING BELL
1025 GOSUB 1250:              REM ROTATE STAR
1030 T=B-(B-T)/1.5:          REM CALCULATE NEW T FOR BALL BOUNCE.
1035 FOR I=B TO T STEP -1:   REM ROUTINE FOR RISING BALL
1040    DRAW 1 AT R,I
1045    XDRAW 1 AT R,I
1050 NEXT I
1055 R = R + 10
1060 GOSUB 1250:              REM ROTATE STAR
1070 IF B-T > 5 THEN 1000:    REM REPEAT BOUNCE ROUTINE
1080 RETURN

1199 REM SUBROUTINE FOR CANNON BLAST
1200 FOR I=1 TO 255 STEP 4
1205    ROT = I
1210    HCOLOR = 3: DRAW 2 AT X,Y
1215 NEXT I
1220 RETURN

1249 REM SUBROUTINE TO DRAW STAR AND CALC. NEW ROTATION VALUE
1250 ROT = Z
1255 XDRAW 2 AT X,Y
1260 Z = Z + 4
1265 IF Z > 255 THEN Z=1
1270 ROT = Z
1275 HCOLOR = 3: DRAW 2 AT X,Y
1280 ROT = 1
1285 RETURN

1799 REM SUBROUTINE TO DRAW CANNON
1800 HCOLOR = 2
1805 HPLOT 220,134 TO 190,105 TO 190,100 TO 195,95 TO 230,129
1810 X=190: Y=100
1815 GOSUB 1200
1820 RETURN

1999 REM SUBROUTINE TO PLOT FLIGHT OF CANNON BALL
2000 FOR I=190 TO 0 STEP -1
2005    HCOLOR = 1: DRAW 1 AT I, I/2
2010    XDRAW 1 AT I, I/2
2015 NEXT I
2020 RETURN
```

Listing 3. The Cannonball Express. A demonstration program that uses hi-resolution graphics techniques, shape tables and animation.

the first data element for shape number 2. This number will be the number entered in place of the next two dashes shown above. Again, if the number counted is less than 255, then the number is simply entered in place of the first dashed line, and a 00 is entered in place of the second. On the other hand, if the number is greater than 255, then divide the number by 256. For example, if shape number 1 requires 626 data elements, then the count to get to the first element of the second shape would come to 638. The number 638 is divided by 256, yielding 2.49219. The integer value of the result (for example, the number 2 if the result is 2.49219) is placed in the second position (where 00 was used in the examples above) for that pair of dashes. Then multiply the decimal portion (0.49219 in this case) by 256 to arrive at the number to be placed in the first position for that pair. Since 0.49219 times 256 equals 126, line 30 now looks like this:

30 DATA 05,00,12,00,126,02,-,-,-,-,-,-

This process is continued until all of the dashes in line 30 have been replaced by numbers. Finally, count all of the data elements starting with line 30, and enter the result in line 50 to tell the computer how many elements to read. That is, referring to Listing 2, enter the number of elements counted in place of mm.

Where in Memory

The last task to be accomplished is to define exactly where in memory the shape table is to be stored. This may be dictated by the amount of RAM your Apple contains. For example, if you have 24K and you plan to use both hi-res buffer areas, you may want to preserve RAM clear up to address 24575 so as not to interfere with the secondary hi-res buffer area. So, you might elect to store your shape table beginning at 24576. In line 50, the pppp would correspond to 24575 so that the first data element read would be poked into memory location 24575 + 1, or 24576. Lines 20 and 21 are also related to that number, 24576, and the values for bb and for cc are found using the same technique described above. First find the inte-

ger value of 24576 divided by 256. This is 96. Enter 96 in place of the cc in line 21. Next, take the decimal remainder, multiply it by 256, and enter the result in place of the bb in line 20. This result is 00 in this case.

On the other hand, if you have 16K of RAM to work with, or if you have more than 16K but are only using the primary hi-res graphics buffer, you might elect to save your shape table immediately above the memory area reserved for this primary buffer, beginning at address 16384. Line 50 would use 16383 in place of pppp, and since 16384 divided by 256 is 64, with no remainder, line 20 would contain 00 for bb and line 21 would contain 64 for cc.

The last consideration is for the value to be used by the HIMEM: command. In the cases cited above, where the primary buffer is to be used, the value of 8192 should be substituted for aaaa in line 10. On the other hand, if only the secondary hi-res buffer area is to be used, then 16384 could be used in line 10.

The Cannonball Express

Listing 3 is a demonstration program that illustrates several of the techniques that have been described above for hi-res graphics displays. Since this program uses only the primary hi-res buffer area, HIMEM is set to 8192 and the shape tables are poked into addresses just above this buffer, beginning at address 16384 (see lines 20, 21 and 50).

As mentioned above, only two shapes are used in this program. The first shape requires 10 data elements, and the second requires 25. This means that, to get to the first element of shape number 1, 6 elements must be read, while to get to the first element of shape number 2, 16 elements must be read. These values, 2, 6, and 16 appear in line 30. I'll leave it to you, with pencil and graph paper at hand, to work through the shape codes, using Table 3, and trace out the actual shapes defined.

The program itself makes use of subroutines for each of the images displayed. In some cases, several parameters are set before the subroutine is called so that the position and orientation of the object is properly defined. Furthermore, the program, once begun, settles into an infinite loop (line 230) and can only be interrupted using the reset key.

The subroutine at 900 sets the initial values to be used by SCALE and ROT for later subroutines, and then uses simple HPLOT commands. A moving ball (shape number 1) is drawn on the screen. Its highest position is specified by T (top row number) and its lowest position (bottom row) by B. Its leftmost position is designated by L and its rightmost position by R. A star (shape number 2) is drawn at position X,Y on the screen. These six parameters are defined in line 200 before going to the subroutines that actually draw the figures on the screen.

The subroutine at line 960 draws a horizontally rolling ball, rolling between columns L and R. Subroutine 1250 draws a star on the screen, giving this figure a specific rotation value based on Z. Each time the star is drawn, the value of Z is incremented by 4, until its value reaches 255 and Z is reset to 1. Subroutine 1000 is similar to subroutine 960, except that the row position of the ball is now changed instead of the column position, causing the ball to appear to fall from T to B down the screen. When the ball hits the bottom, a bell rings, the star rotates, and a new value for T is calculated so that the ball can rise to this new, lower level, on a bounce.

At the top of the bounce, the star rotates again and the process repeats itself from the falling ball, until the ball simply rolls along and disappears inside a box (line 210). Suddenly a cannon appears at the box, a blast is seen at its muzzle, and the ball reappears, flying through the air to its original position (subroutine 2000).

An interesting relation exists between the star and the cannon blast. Both use the same figure, shape number 2. The difference is that, as the star rotates, the old shape is erased before the new one is drawn. With the cannon blast, the star is drawn and redrawn in several rotations without being erased. The effect actually does resemble a blast from a cannon!

Conclusion

I hope that the method described above for using shape tables will encourage you to give it a try, particularly if you have attempted to use this technique before but had difficulty following the procedures described in the Applesoft manuals. Try using shapes to define different positions of an object in motion and then DRAW and XDRAW them onto your hi-res screen in rapid succession. Compared with the lo-res attempt at animation in last month's column, you will be quite pleased with the results.

Next month's column will be devoted to the construction of educational programs. Having spent ten years in teaching science, and knowing the types of problems students encounter in trying to master difficult material, I have some very definite ideas on how educational programs ought to be designed. I have also taught several graduate extension courses for public school teachers dealing with using the microcomputer in the classroom. With that as background, I am looking forward to sharing these ideas with you. Until then, happy experimenting with high-resolution graphics! ■

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Bent on Business

by Gregory R. Glau

A Slice of Time

What's more natural to do on your Apple than create pie charts? This type of graph—with which everyone is kind of familiar—is perfect for displaying "parts of the whole." For specific business applications it sends its own distinct messages.

You'll find the most productive use of pie charts in your business. Where do your sales come from? What's your overhead breakdown? Where do your employees spend their time (and your payroll dollars)? What part of your expenses go for utility costs or telephone charges or taxes?

Most other types of graphs use a time series approach to present their information. Usually the vertical scale measures the graphic equivalent of your data, while the scale that runs horizontally indicates the passage of time. So a line or bar chart will show you how your sales or overhead or utilities, for example, have moved in dollars over a period of time.

You can also use a bar or line chart to *compare* two or more sets of information. To see what last year's monthly sales look like next to this year's amounts. To see how your advertising is working as you compare its costs to your sales revenues. To see how your accounts receivable totals compare to the cash you're collecting.

A pie chart, though, has the unique ability to convey how each individual part relates to the whole picture—how much of the entire pie each slice is. It gives you a perspective you can't get from the numbers themselves or from another type of graph. And almost everyone can understand a pie chart and quickly see what the graph is meant to show. The pie chart brings your numbers to life.

The main purpose of any graph is, of course, to convey an impression about the data it depicts. It really represents a slice of time, a moment in your business history you capture on paper. You needn't be able to read exact dollar figures (or percentages). What you want is the "feeling" of how the data items relate to one another.

Figure 1 is a good example. It's a simple drawing showing eight major overhead expenses for a business for 1982. It's readily apparent that rent and salaries are the major parts of the total while the other categories contribute nowhere near as much. It's easy to see, too, how the two major expenses compare to each other.

So, lesson one is, use a pie chart to display single data sets if they're part of a whole picture—pieces of an entire pie.

But the Figure 1 graph has almost too much information in it. It shows eight slices, and five or six is really about the maximum number you can display and still get the message across.

Figure 2 is a "more graphic" example of how you can put too much information in a pie chart. The 11 slices are simply too many for clarity. Figure 2 looks more like a wagon wheel. So, lesson two is, keep it simple.

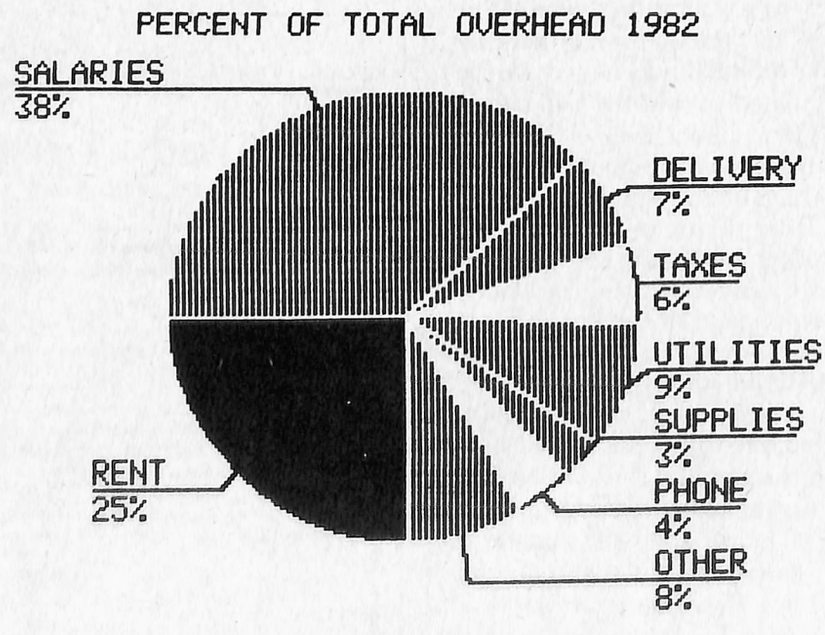

Figure 1. A simple pie chart that shows overhead percentages.

A Pie Apiece

As for what particular type of information to represent with a pie chart, flip through your financial statement and you'll find all sorts of good applications. See where your sales come from by amount or by percent. Break down your overhead by dollars or by percentages.

If you have a *huge* overhead item, try to break it down. Say that office

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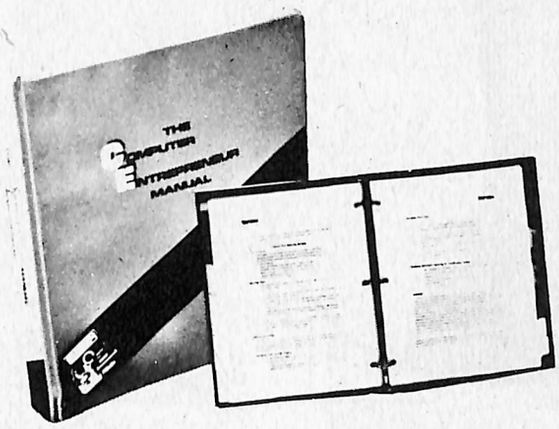

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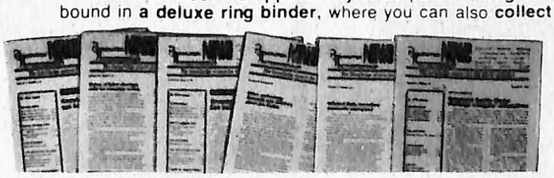

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Circle 384 on Reader Service card.

salaries are high—consider breaking the total down by individual employees. If advertising is a big expense, break it down according to where you advertise.

Although pie charts aren't really designed to compare things, if you do break your advertising down by where you spend your dollars, determine also where your sales come from and plot that information, then put it side-by-side with your advertising pie chart. You may come up with something like Figures 3a and 3b.

Figure 3a displays the fictional advertising budget of a business for 1982. You can see that television advertising consumed most of the advertising dollar, followed at eight percent less by the local newspaper. The business also tried direct mail and radio, and spent seven percent of its advertising budget on the Yellow Pages. This is an interesting picture, to be sure, and gives the business owner an idea, at least, of where his dollars went.

But even better is when the picture we see in Figure 3a is compared to Figure 3b. Figure 3b is the result of a survey the business did in an effort to determine where its advertising was doing the most good. You don't have to do anything fancy to get this information—just ask your customers how they heard about you.

With both pie charts it's pretty easy to determine what advertising is working and what isn't. It's obvious that the newspaper and Yellow Page dollars are doing more good for this business on a percentage basis than the other advertising media. This doesn't mean the ones that aren't quite as effective should be eliminated, of course. But the figures indicate additional money may be better spent in those two areas, at the expense of the places that don't seem to produce effective results.

It's just common sense. And yes, you could dig out the percentages or dollar amounts and compare them directly in a little list, but it's just not quite as helpful (or as much fun).

This is one way pie charts *can* work to display comparative information. In situations like this it may

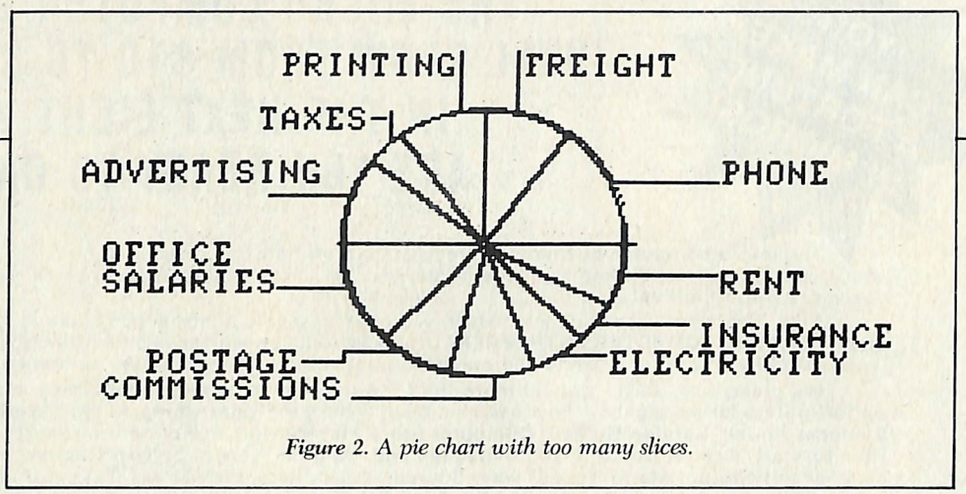

Figure 2. A pie chart with too many slices.

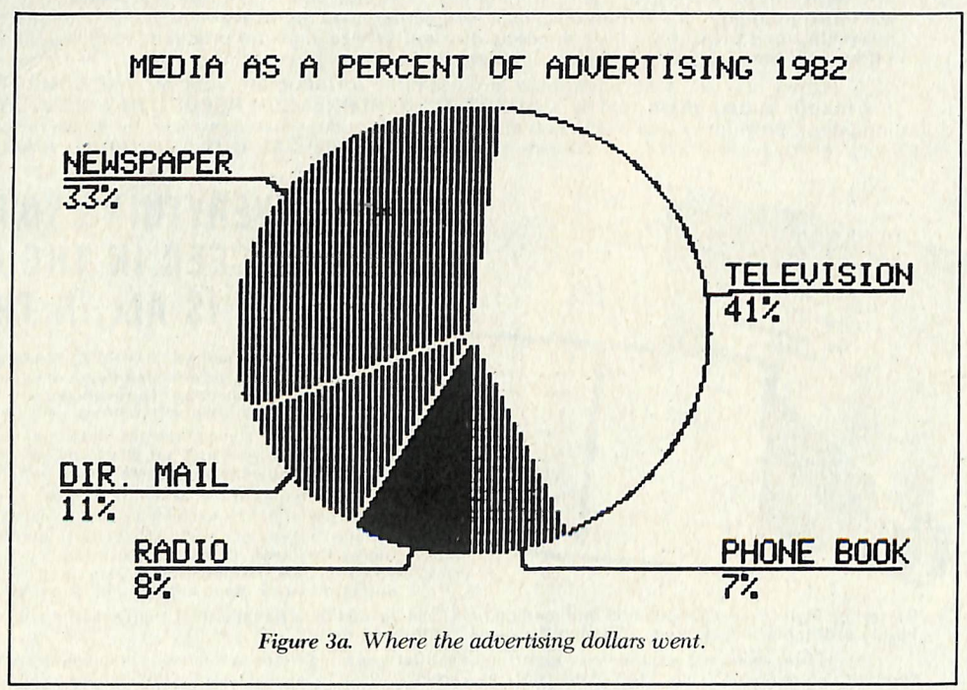

Figure 3a. Where the advertising dollars went.

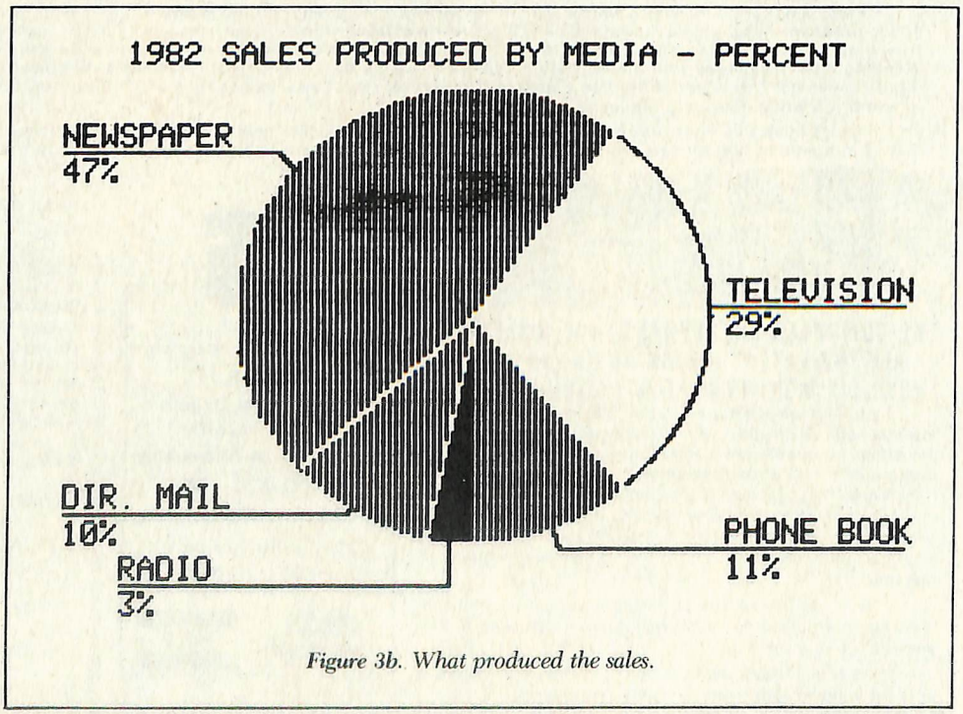

Figure 3b. What produced the sales.

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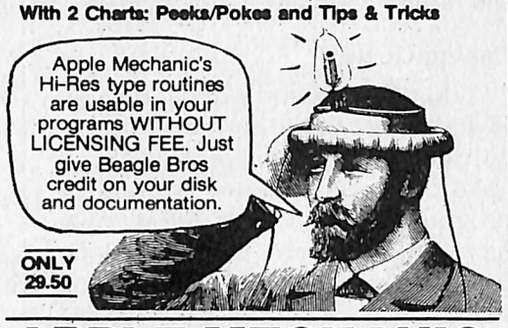

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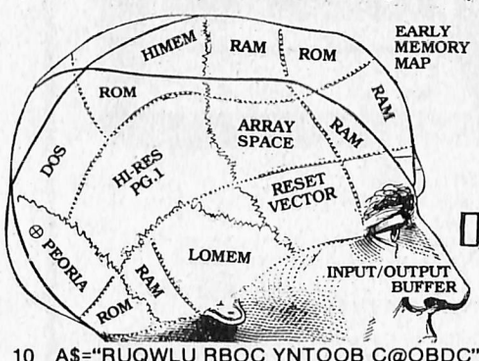


```
10  A$="RUQWLU RBOC YNTOOB C@OBDC":
    SPEED=180: VTAB 10: PRINT A$
20  FOR X=0 TO LEN(A$)-1: S=SCRN(X,19):
    COLOR=S+(S=12)-(S=13)-(SCRN(X,18)>10):
    PLOT X,19: NEXT X: GOTO 10
```

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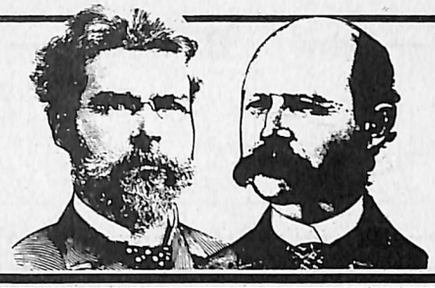

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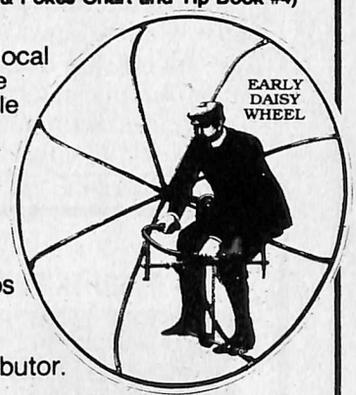

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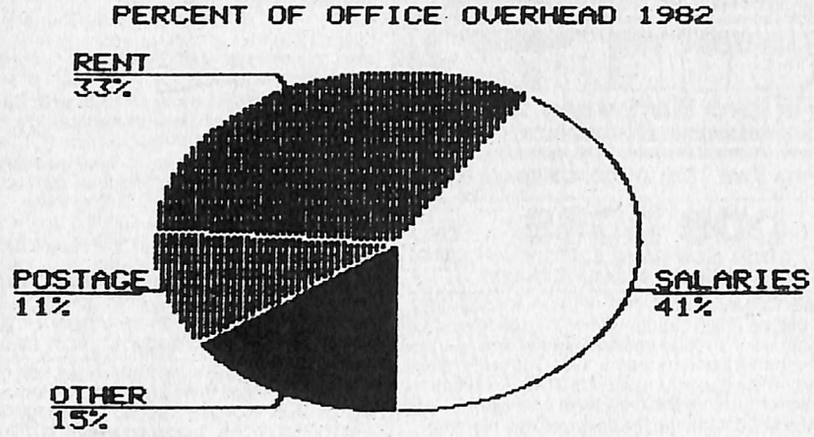

Figure 4. The infamous egg graph.

be impossible to compare data as effectively with line or bar graphs. Your advertising dollars are spent on a much smaller scale than your sales, so the *scales* of the line or bar graphs would vary widely.

So, lesson three—you can at times compare, on different pie charts, two widely different data sets. In fact, it may be the only possible way to do a particular comparison.

And lesson four—decide if you like a touch of shading in your pie charts and stick with the same format all the way through. It makes them much easier to compare if they're all done the same basic way.

Baking Utensils

While this column is about the uses of a pie chart in the business world, a note about the buying process. If you have or are considering a graphics program that cannot create its own hard copies, there are hard copy print systems available separately. However, it's a good idea to *try out* any combination you have in mind *at the store*, just to make sure they work well together. And to see that they'll work on your printer (or the printer you plan to buy).

Be especially sure to check out the sizes of a printed image a program can produce. Many will print various sizes of your graphs—which is quite handy.

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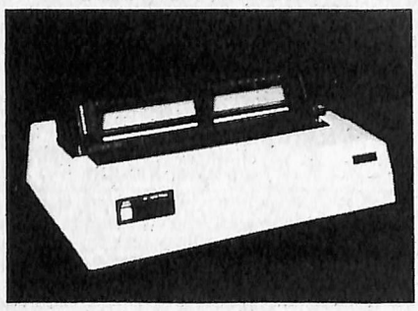

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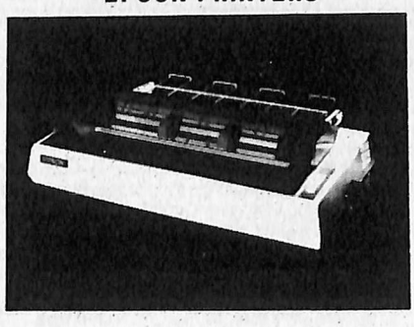

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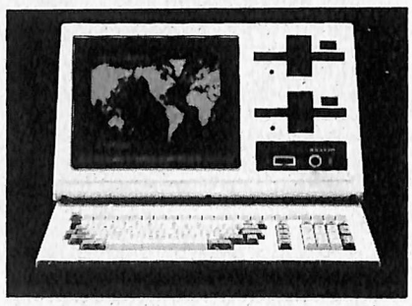

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However, watch for the situation in Figure 4. One of the programs we used to create these graphs works fine in the largest and smallest size, but in the middle size it somehow *stretches out* the horizontal part of the picture more than it does the vertical. While this doesn't create a problem with line or bar charts, it produces the infamous "egg graph" you see.

So, the next lesson is to try before you buy.

A Slice at a Time

While most graphics programs available for your Apple can produce pie charts, few can create what is called a "detached slice" chart. Such charts are especially useful for comparing two big amounts, and to highlight one to set it off from the other.

Sirius Software (10364 Rockingham Drive, Sacramento, CA 95827) sells a little package called EZ Draw ($49.95) that will not create graphs for you, but will let you draw about anything you'd like. We used EZ Draw to produce the detached-slice pie chart in Figure 5.

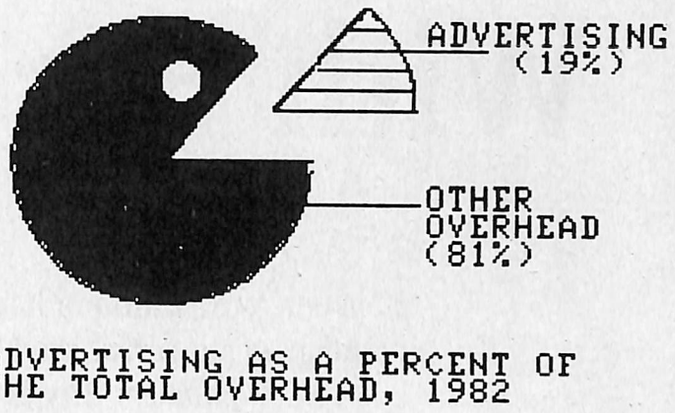

Figure 5. A detached-slice pie chart, partly eaten.

Excuse the hole in the main body of this graph. It appears to be an eye of some sort, but would you believe, it's actually a bite our five-year-old, Kohl, ate out of the pie to create his favorite video game hero?

Maybe that's the best part about pie charts—they're fun! ■

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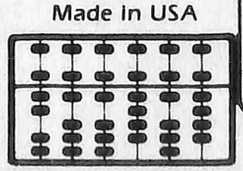

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Take Control With Screenops

p-System programmers have always had the advantage of powerful screen control. Now this potent utility is yours.

by John Stephenson

Field Name	Value	Key Name
backspace	8	ctrl H
erase line	29	ctrl]
erase screen	12	ctrl L
erase to end of line	29	ctrl]
erase to end of screen	11	ctrl K
has lower case	true	
key to move cursor down	10	ctrl J
key to move cursor left	8	ctrl H
key to move cursor right	28	ctrl \
key to move cursor up	31	ctrl _
move cursor home	25	ctrl Y
screen height	24	
screen width	80	

Table of set-up codes for the Videx 80-column board.

Listing 1. SCREENOPS.TEXT.

```
                        {$U-,S+,V-}
                    PROGRAM FAKEKERNEL;
    { Memory match for syscom^ area to retrieve system info.}
    { This program is for overlay information only.          }
    { (It is compiled as segment 0 due to U- setting.)       }
    { Works for Apple Pascal 1.1.  Use ScreenOps as          }
    { supplied with Softech version IV.x when running        }
    { in that environment.                                   }

                        {$I SYSCOM.TEXT}

                        UNIT screenops;
                    INTRINSIC CODE 24 DATA 25;

  { version for Apple Pascal 1.1 to maintain functional compatability
    with Softech's version IV.x }

                            INTERFACE

CONST
    sc_fill_len = 11;
    sc_eol = 13;
TYPE
    sc_chset        = SET OF CHAR;
    sc_misc_rec     = PACKED RECORD
                        height, width : 0..255;
                        can_break, slow, xy_crt, lc_crt,
                        can_upscroll, can_downscroll : BOOLEAN;
                      END;
```

Listing continued.

Screen control may be the most common task in applications programming. Robust screen control can make the difference between a professional, friendly program and an amateur, difficult-to-use program.

Among the large assortment of utilities supplied with version IV.1 UCSD Pascal by Softech Microsystems that Apple Pascal 1.1 owners don't get is a unit called Screenops. It provides a standard interface for screen control, regardless of system or terminal. So many Pascal programmers use this unit that calls to it seem like intrinsics of the language.

This article describes a downwardly compatible partial implementation of Screenops for Apple Pascal 1.1. Though quite useful in its own right, using this implementation will also enable you to upgrade your programs to Softech's version IV.1 UCSD Pascal with greater ease, should you later discover a need for its diverse and advanced features. Purchasing the Softech IV.1 system is a hefty investment. The upgrade is well worth it for any serious programming work—but, that's another article.

For a refresher on Apple Pascal units, reread pages 75–81 in the *Apple*

Address correspondence to John Stephenson, 9118 Smith Ave., North Bergen, NJ 07047.

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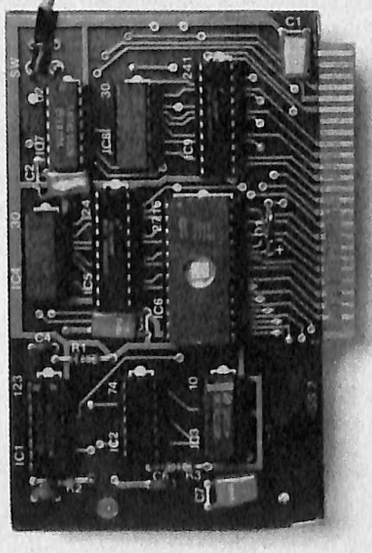

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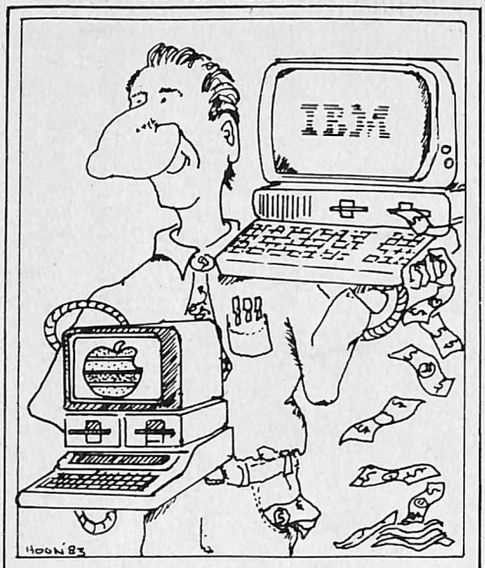

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Listing continued.

```
        sc_date_rec      = PACKED RECORD
                             month : 0..12;
                             day :   0..31;
                             year :  0..99;
                           END;
        sc_info_TYPE     = PACKED RECORD
                             sc_version : STRING;
                             sc_date : sc_date_rec;
                             spec_CHAR : sc_chset; {characters NOT TO echo}
                             misc_info : sc_misc_rec;
                           END;
        sc_long_STRING   = STRING[255];
        sc_scrn_command  = (sc_whome, sc_eras_s, sc_erase_eol, sc_clear_lne,
                            sc_clear_scn, sc_up_cursor, sc_down_cursor,
                            sc_left_cursor, sc_right_cursor);
        sc_key_command   = (sc_backspace_key, sc_del_key, sc_eof_key, sc_etx_key,
                            sc_escape_key, sc_del_key, sc_up_key, sc_down_key,
                            sc_left_key, sc_right_key, sc_NOT_legal);
        sc_choice        = (sc_GET, sc_give);
        sc_window        = PACKED ARRAY [0..0] OF CHAR;
        sc_tx_port       = RECORD
                             row, col,              { screen relative}
                             height, width,         { size OF txport (zero based)}
                               cur_x, cur_y  : INTEGER;
                                {cursor positions relative TO the txport }
                             END;


        PROCEDURE sc_use_info(DO_what:sc_choice; VAR t_info:sc_info_TYPE);
        PROCEDURE sc_use_port(DO_what:sc_choice; VAR t_port:sc_tx_port);
        PROCEDURE sc_erase_TO_eol(x,line:INTEGER);
        PROCEDURE sc_left;
        PROCEDURE sc_right;
        PROCEDURE sc_up;
        PROCEDURE sc_down;
        PROCEDURE sc_getc_ch(VAR ch:CHAR; return_on_match:sc_chset);
        PROCEDURE sc_clr_screen;
        PROCEDURE sc_clr_line (y:INTEGER);
        PROCEDURE sc_home;
        PROCEDURE sc_eras_eos (x,line:INTEGER);
        PROCEDURE sc_GOTO_xy(x, line:INTEGER);
        PROCEDURE sc_clr_cur_line;
        FUNCTION  sc_find_x:INTEGER;
        FUNCTION  sc_find_y:INTEGER;
        FUNCTION  sc_scrn_has(what:sc_scrn_command):BOOLEAN;
        FUNCTION  sc_has_key(what:sc_key_command):BOOLEAN;
        FUNCTION  sc_map_crt_command(VAR k_ch:CHAR):sc_key_command;
        FUNCTION  sc_prompt(line :sc_long_STRING; x_cursor,y_cursor,x_pos,
                            where:INTEGER; return_on_match:sc_chset;
                            no_CHAR_back:BOOLEAN; break_CHAR:CHAR):CHAR;
        FUNCTION sc_check_CHAR(VAR buf:sc_window;
                               VAR buf_index,bytes_left:INTEGER):BOOLEAN;
        FUNCTION space_wait(flush:BOOLEAN):BOOLEAN;
        PROCEDURE sc_init;

                                  IMPLEMENTATION

                                {$I IMPLEMENT.TEXT}

    BEGIN {UNIT}
    WRITELN ('Unit Screenops -- Apple IE Pascal 1.1 Version -- jcs 3/83');
    END;

BEGIN {PROGRAM FAKE} END.
```

Listing 2. SYSCOM.TEXT.

```
                { Global declarations from UCSD Pascal version 1.3 follow }

    CONST
         MAXUNIT = 8;(*MAXIMUM PHYSICAL UNIT # FOR UREAD*)
         MAXDIR = 77;(*MAX NUMBER OF ENTRIES IN A DIRECTORY*)
         VIDLENG = 7;(*NUMBER OF CHARS IN A VOLUME ID*)
         TIDLENG = 15;(*NUMBER OF CHARS IN TITLE ID*)
         MAXSEG = 15;(*MAX CODE SEGMENT NUMBER*)
         FBLKSIZE = 512;(*STANDARD DISK BLOCK LENGTH*)
         DIRBLK = 2;(*DISK ADDR OF DIRECTORY*)
         AGELIMIT = 300;(*MAX AGE FOR GDIRP...IN TICKS*)
         EOL = 13;(*END-OF-LINE...ASCII CR*)

    TYPE

         IORSLTWD = (INOERROR,IBADBLOCK,IBADUNIT,IBADMODE,IHARDXTRA,
     ILOSTUNIT,ILOSTFILE,IBADTITLE,INOROOM,INOUNIT,
     INOFILE,IDUPFILE,INOTCLOSED,INOTOPEN,IBADFORMAT);

    (*ARCHIVAL INFO...THE DATE*)

         DATEREC = PACKED RECORD
     MONTH: 0..12;(*0 IMPLIES DATE NOT MEANINGFUL*)
     DAY: 0..31;(*DAY OF MONTH*)
     YEAR: 0..100(*100 IS TEMP DISK FLAG*)
           END (*DATEREC*) ;

    (*VOLUME TABLES*)
         UNITNUM = 0..MAXUNIT;
         VID = STRING[VIDLENG];
```

Listing continued.

Pascal 1.1 Language Reference Manual.

What Is Screenops?

Listing 1, SCREENOPS.TEXT, shows the interface of unit Screenops. All type, procedure and function names begin with sc, which stands for "screen control," to minimize chances of naming conflicts with calling programs.

Procedure sc_use_info and procedure sc_use_port allow a progam to pass information back and forth to Screenops, such as the version name and date, the set of special characters that don't echo to the screen (control characters), the height and width of

"Robust screen control can make the difference between professional and amateur programs."

the screen, and scrolling characteristics.

Procedure sc_erase_to_eol starts at position (X,Line), as passed in the parameter list, and erases everything to the end of the line.

Procedure sc_left, procedure sc_right, procedure sc_up, and procedure sc_down cause non-destructive non-wrapping cursor movement.

Procedure sc_getc_ch assigns a character entered by the operator to the variable CH as long as the entered character is among the set specified by RETURN_ON_MATCH. All lowercase is converted to uppercase.

Procedure sc_clr_screen is like the HOME command in Basic. It clears the screen to blanks.

Procedure sc_eras_eos starts at position (X,LINE), as passed in the parameter list, and erases everything to the bottom of the screen.

Procedure sc_GOTO_xy positions the cursor at (X,LINE), as passed in the parameter list.

Procedure sc_clr_cur_line removes all characters on the line occupied by the cursor.

Function sc_find_x and function sc_find_y return the respective column and row positions of the cursor.

Function sc_screen_has returns true

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Peelings II evaluation		
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Listing continued.

```
(*DISK DIRECTORIES*)
     DIRRANGE = 0..MAXDIR;
     TID = STRING[TIDLENG];

     FILEKIND = (UNTYPEDFILE,XDSKFILE,CODEFILE,TEXTFILE,
  INFOFILE,DATAFILE,GRAFFILE,FOTOFILE);

     DIRENTRY = RECORD
    DFIRSTBLK: INTEGER;(*FIRST PHYSICAL DISK ADDR*)
    DLASTBLK: INTEGER;(*POINTS AT BLOCK FOLLOWING*)
    CASE DFKIND: FILEKIND OF
      UNTYPEDFILE: (*ONLY IN DIR[0]...VOLUME INFO*)
        (DVID: VID;(*NAME OF DISK VOLUME*)
  DEOVBLK: INTEGER;(*LASTBLK OF VOLUME*)
  DNUMFILES: DIRRANGE;(*NUM FILES IN DIR*)
  DLOADTIME: INTEGER);(*TIME OF LAST ACCESS*)
      XDSKFILE,CODEFILE,TEXTFILE,INFOFILE,
      DATAFILE,GRAFFILE,FOTOFILE:
        (DTID: TID;(*TITLE OF FILE*)
  DLASTBYTE: 1..FBLKSIZE;(*NUM BYTES IN LAST BLOCK*)
  DACCESS: DATEREC)(*LAST MODIFICATION DATE*)
  END (*DIRENTRY*) ;

     DIRP = ↑DIRECTORY;

     DIRECTORY = ARRAY [DIRRANGE] OF DIRENTRY;

(*FILE INFORMATION*)

     CLOSETYPE = (CNORMAL,CLOCK,CPURGE,CCRUNCH);
     WINDOWP = ↑WINDOW;
     WINDOW = PACKED ARRAY [0..0] OF CHAR;
     FIBP = ↑FIB;

     FIB = RECORD
     FWINDOW: WINDOWP;(*USER WINDOW...F↑, USED BY GET-PUT*)
     FEOF,FEOLN: BOOLEAN;
     FRECSIZE: INTEGER;(*IN BYTES...0=>BLOCKFILE, 1=>CHARFILE*)
     CASE FISOPEN: BOOLEAN OF
       TRUE: (FISBLKD,(*FILE IS ON BLOCK DEVICE*)
      FGOTACHAR:BOOLEAN;(*MARK FOR CHAR LOOK-AHEAD*)
      FUNIT: UNITNUM;(*PHYSICAL UNIT #*)
      FVID: VID;(*VOLUME NAME*)
      FNXTBLK,(*NEXT REL BLOCK TO IO*)
      FMAXBLK: INTEGER;(*MAX REL BLOCK ACCESSED*)
      FMODIFIED:BOOLEAN;(*PLEASE SET NEW DATE IN CLOSE*)
      FHEADER: DIRENTRY;(*COPY OF DISK DIR ENTRY*)
      CASE FSOFTBUF: BOOLEAN OF(*DISK GET-PUT STUFF*)
TRUE: (FNXTBYTE,FMAXBYTE: INTEGER;
       FBUFCHNGD: BOOLEAN;
       FBUFFER: PACKED ARRAY [0..FBLKSIZE] OF CHAR))
   END (*FIB*) ;

(*USER WORKFILE STUFF*)

     INFOREC = RECORD
 SYMFIBP,CODEFIBP: FIBP;(*WORKFILES FOR SCRATCH*)
 ERRSYM,ERRBLK,ERRNUM: INTEGER;(*ERROR STUFF IN EDIT*)
 STUPID: BOOLEAN;(*STUDENT PROGRAMMER ID!!*)
 GOTSYM,GOTCODE: BOOLEAN;(*TITLES ARE MEANINGFUL*)
 WORKVID,SYMVID,CODEVID: VID;(*PERM&CUR WORKFILE VOLUMES*)
 WORKTID,SYMTID,CODETID: TID(*PERM&CUR WORKFILES TITLE*)
       END (*INFOREC*) ;

(*CODE SEGMENT LAYOUTS*)

     SEGRANGE = 0..MAXSEG;
     SEGDESC = RECORD
 DISKADDR: INTEGER;(*REL # IN CODE...ABS # IN SYSCOM↑*)
 CODELENG: INTEGER(** BYTES TO READ IN*)
       END (*SEGDESC*) ;

(*DEBUGGER STUFF*)

     BYTERANGE = 0..255;
     TRICKARRAY = ARRAY [0..0] OF INTEGER; (* FOR MEMORY DIDDLING*)
     MSCWP = ↑ MSCW;(*MARK STACK RECORD POINTER*)
     MSCW = RECORD
      STATLINK: MSCWP;(*POINTER TO PARENT MSCW*)
      DYNLINK: MSCWP;(*POINTER TO CALLER'S MSCW*)
      MSSEG,MSJTAB: ↑TRICKARRAY;
      MSIPC: INTEGER;
      LOCALDATA: TRICKARRAY
    END (*MSCW*) ;

(*SYSTEM COMMUNICATION AREA*)
(*SEE INTERPRETERS...NOTE  *)
(*THAT WE ASSUME BACKWARD  *)
(*FIELD ALLOCATION IS DONE *)
     SYSCOMREC = RECORD
   IORSLT: IORSLTWD;(*RESULT OF LAST IO CALL*)
   XEQERR: INTEGER;(*REASON FOR EXECERROR CALL*)
   SYSUNIT: UNITNUM;(*PHYSICAL UNIT OF BOOTLOAD*)
   BUGSTATE: INTEGER;(*DEBUGGER INFO*)
   GDIRP: DIRP;(*GLOBAL DIR POINTER,SEE VOLSEARCH*)
   LASTMP,STKBASE,BOMBP: MSCWP;
   MEMTOP,SEG,JTAB: INTEGER;
   BOMBIPC: INTEGER;(*WHERE XEQERR BLOWUP WAS*)
   EXPANSION: ARRAY [0..14] OF INTEGER;
   HIGHTIME,LOWTIME: INTEGER;
   MISCINFO: PACKED RECORD
       NOBREAK,STUPID,SLOWTERM,
       HASXYCRT,HASLCCRT,HAS8510A,HASCLOCK: BOOLEAN
     END;
   CRTTYPE: INTEGER;
   CRTCTRL: PACKED RECORD
```

Listing continued.

if the system's terminal has the particular command passed in the parameter list. Function sc_has_key returns true if the system's terminal can generate the particular control command passed in the parameter list. Function sc_map_crt_command returns the sc_key_command mapped from the control character passed in the parameter list. All these routines make use of the special types defined in Screenop's TYPE section called sc_scrn_command and sc_key_command.

Function sc_prompt returns a character pressed by the operator in response to a prompt line. The prompt, passed as LINE, is displayed at position X_POS, WHERE, and the cursor is placed at position X_CURSOR, Y_CURSOR. If X_CURSOR is less than 0 then the cursor is simply placed at the end of the prompt. If the prompt is too long to fit on the screen, it is broken up into pieces at points defined by the BREAK_CHAR (typically a space). The operator cycles through the different pieces of the prompt by pressing the ? key. The parameter NO_CHAR_BACK determines if the character pressed should echo to the screen. The parameter RETURN_ ON_MATCH delineates the acceptable character set. All lowercase is converted to uppercase, so RETURN_ ON_MATCH should contain uppercase characters.

Function sc_check_CHAR is used for processing rub-out characters,

Function space_wait repeatedly reads from the keyboard until a space or return is typed. If a space is pressed then false is returned, otherwise true. If the parameter FLUSH is set to true, then the string press <space> to continue is displayed. Note that function space_wait should have been called function sc_space_wait. This omission appears in Softech's interface.

Finally, procedure sc_init initializes all tables. This is primarily an operating system call in version IV.1 UCSD Pascal.

Pascal Globals

Listing 2, SYSCOM.TEXT, shows the global declarations taken from an early version of UCSD Pascal, known as 1.3. As far as I can tell, these globals work for Apple Pascal 1.1.

Most of these global declarations re-

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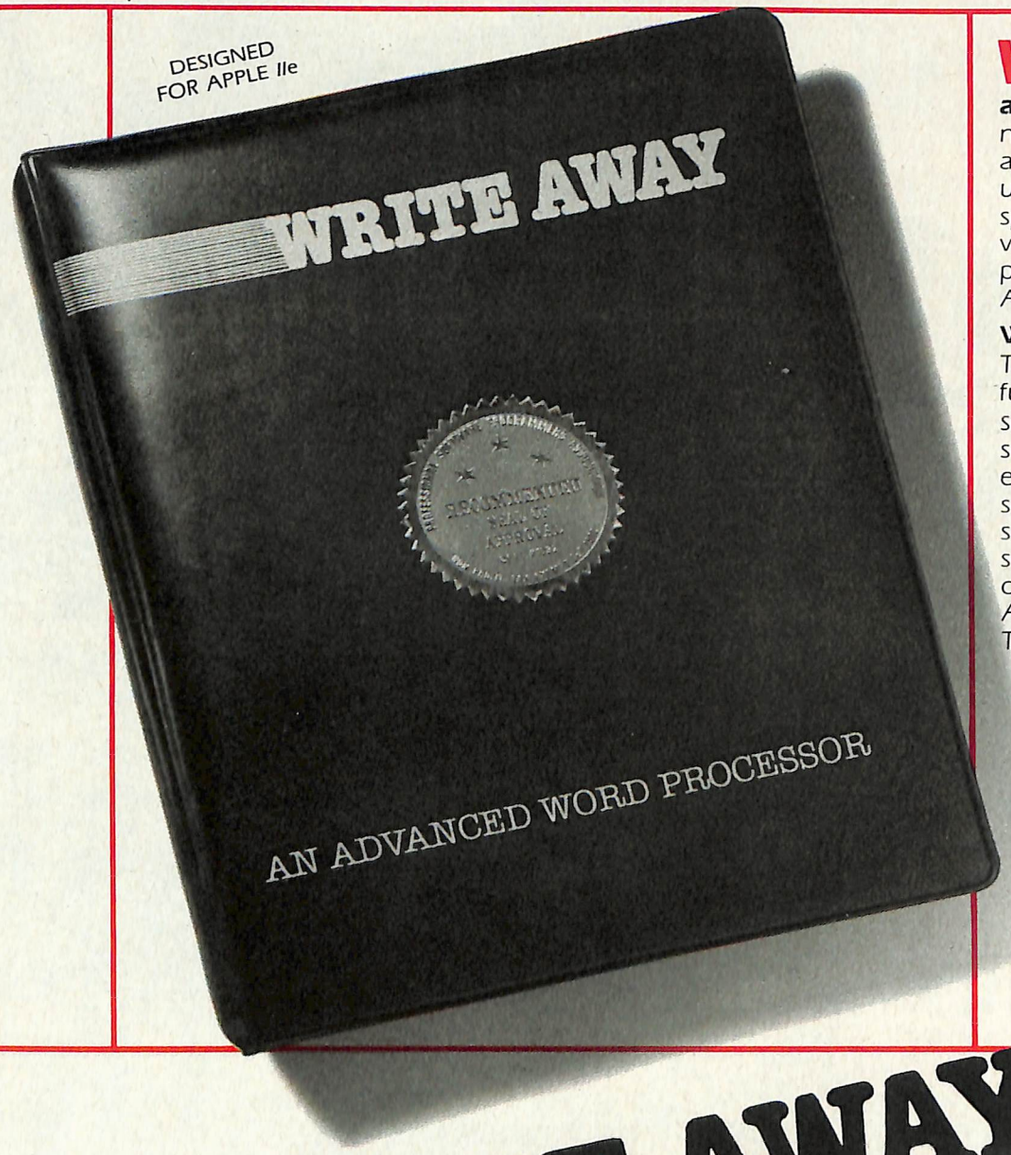

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Listing continued.

```
        RLF,NDFS,ERASEEOL,ERASEEOS,HOME,ESCAPE: CHAR;
        BACKSPACE: CHAR;
        FILLCOUNT: 0..255;
        EXPANSION: PACKED ARRAY [0..3] OF CHAR
      END;
    CRTINFO: PACKED RECORD
        WIDTH,HEIGHT: INTEGER;
        RIGHT,LEFT,DOWN,UP: CHAR;
        BADCH,CHARDEL,STOP,BREAK,FLUSH,EOF: CHAR;
        ALTMODE,LINEDEL: CHAR;
        EXPANSION: PACKED ARRAY [0..5] OF CHAR
      END;
    SEGTABLE: ARRAY [SEGRANGE] OF
        RECORD
  CODEUNIT: UNITNUM;
  CODEDESC: SEGDESC
        END
 END (*SYSCOM*);

VAR
    SYSCOM: ↑SYSCOMREC;(*MAGIC PARAM...SET UP IN BOOT*)

            ( End Global declarations for UCSD Pascal version 1.3 )
```

fer to file and directory structures. Further down are declarations referring to the debugger, which was never successfully implemented. Finally, there are the declarations of the system communications area. This is the crucial information for screen control.

Nearly all data needed for screen control exists in three packed record structures. MISCINFO contains flags indicating such things as lowercase availability. CRTCTRL contains the values for various control functions, such as backspacing and erasing to the end of the line. CRTINFO contains the values relating to cursor behavior. As long as the user has configured his system

"Nearly all data needed for screen control exists in three packed record structures."

properly, screen control can be accomplished by following this system communication map. The map is packaged in a record type named SYSCOMREC, which is identified by the pointer variable SYSCOM. SYSCOM↑ contains screen information, which is built during the boot process and maintained securely in RAM until power is removed or the Pascal system is halted.

The Keys to the Kingdom

In order to directly access the global data structures of the Pascal system, units must be compiled at the U-, or system level. Unit Screenops is compiled at the U- level by surrounding it with a program called FAKEKERNEL. This program does nothing by itself. It is a place holder for the real Pascal operating system kernel. Because SYSCOM.TEXT is included (note the $I compiler directive in the main file SCREENOPS.TEXT), unit Screenops can refer to the SYSCOM↑ area. During compilation, the compiler will build pointers into areas of memory that exactly correspond to the locations of screen information.

Implementation

Explanation of some of the Screenops routines follows, in the order in which they appear in Listing 3, IMPLEMENT.

Listing 3. IMPLEMENT.TEXT.

```
CONST
          bell    = 7;

VAR
          continue          : boolean;
          window            : sc_window;


PROCEDURE sc_GOTO_xy((x, line:INTEGER));
BEGIN
gotoxy(x,line);
END;

PROCEDURE sc_getc_ch((VAR ch:CHAR; return_on_match:sc_chset));

          PROCEDURE uppercase (VAR ch:CHAR);
          BEGIN
          IF((ch>='a')AND(ch<='z')) THEN
                    ch:=chr(ord(ch)-ord('a')+ord('A'))
          END;
BEGIN
          repeat
                    unitread(2,window[0],1,0,12);
                    ch:=window[0];
                    uppercase(ch);
          until (ch IN returnonmatch);
END;

FUNCTION space_wait((flush:BOOLEAN):BOOLEAN);
VAR c:char;
BEGIN
if flush then
          BEGIN
          unitclear(2);
          write ('press <space> to continue');
          END;
scgetch(c,[' ',chr(13)]);
if(c=' ')then space_wait:=false else space_wait:=true;
END;

PROCEDURE notimplemented;
VAR
          warnins : boolean;
BEGIN
          WRITE(CHR(bell));
          WRITELN;
          WRITE ('UNIMPLEMENTED PROCEDURE CALLED IN SCREENOPS!!! ');
          warnins:=spacewait(true);
END;
PROCEDURE controlchar (c:char);
begin
          window[0]:=c;
          unitwrite(1,window[0],1,0,8);
end;

PROCEDURE sc_use_info((DO_what:sc_choice; VAR t_info:sc_info_TYPE));
BEGIN
case dowhat of
  sc_give:with tinfo do
          begin
          syscom↑.crtinfo.height:=miscinfo.height;
          syscom↑.crtinfo.width:=miscinfo.width;
          syscom↑.miscinfo.nobreak:=not(miscinfo.canbreak);
          syscom↑.miscinfo.slowterm:=miscinfo.slow;
          syscom↑.miscinfo.hasxycrt:=miscinfo.xycrt;
          syscom↑.miscinfo.haslcrt:=miscinfo.canupscroll;
          end;
  sc_set: with tinfo do
          begin
          scversion:='Kludged For Apple 1.1';
          scdate.month:=1; scdate.day:=24; scdate.year:=83;
          specchar:=[CHR(0)..CHR(255)]-[' '..'}'];
```

Listing continued.

Listing continued.

```
            miscinfo.height:=syscom↑.crtinfo.height;
            miscinfo.width:=syscom↑.crtinfo.width;
            miscinfo.canbreak:=not(syscom↑.miscinfo.nobreak);
            miscinfo.slow:=syscom↑.miscinfo.slowterm;
            miscinfo.xycrt:=syscom↑.miscinfo.hasxycrt;
            miscinfo.lcrt:=syscom↑.miscinfo.haslcrt;
            miscinfo.canupscroll:=true;
            miscinfo.candownscroll:=false;
            end;
  end;
END;

PROCEDURE sc_use_port((DO_what:sc_choice; VAR t_port:sc_tx_port));
BEGIN
case dowhat of
  scgive:with tport do
          BEGIN
          notimplemented;
          END;
  scget: with tport do
          BEGIN
          notimplemented;
          END;
  end;
END;

PROCEDURE sc_erase_TO_eol((x,line:INTEGER));
BEGIN
sc_GOTOXY(x,line);
controlchar(syscom↑.crtctrl.eraseeol);
END;

PROCEDURE sc_left;
BEGIN
controlchar(syscom↑.crtinfo.left);
END;
PROCEDURE sc_right;
BEGIN
controlchar(syscom↑.crtinfo.right);
END;

PROCEDURE sc_up;
BEGIN
controlchar(syscom↑.crtinfo.up);
END;

PROCEDURE sc_down;
BEGIN
controlchar(syscom↑.crtinfo.down);
END;

PROCEDURE sc_clr_screen;
BEGIN
page(output);
END;

PROCEDURE sc_clr_line ((y:INTEGER));
BEGIN
sc_GOTOXY(0,y);
controlchar(syscom↑.crtctrl.eraseeol);
END;

PROCEDURE sc_home;
BEGIN
controlchar(syscom↑.crtctrl.home);
END;

PROCEDURE sc_eras_eos ((x,line:INTEGER));
BEGIN
sc_GOTOXY(x,line);
controlchar(syscom↑.crtctrl.eraseeos);
END;

FUNCTION  sc_find_x(:INTEGER);
{ Implemented for a VIDEX80 card in slot #3 of the Apple II.  Refer
  to David L. Kutzler's article "Screen Shepherd" beginning on
  p. 44 in the Feb. '83 issue of INCIDER. }
TYPE
          byte    = packed array [0..1] of 0..255;
VAR
          memory          : packed record case boolean of
                  true:  (address:integer);
                  false: (location:↑byte);
                  end;
BEGIN
memory.address:=1403;
sc_find_x:=memory.location↑[0];
END;

FUNCTION  sc_find_y(:INTEGER);
{ Implemented for a VIDEX80 card in slot #3 of the Apple II.  Refer
  to David L. Kutzler's article "Screen Shepherd" beginning on
  p. 44 in the Feb. '83 issue of INCIDER. }
TYPE
          byte    = packed array [0..1] of 0..255;
VAR
          memory          : packed record case boolean of
                  true:  (address:integer);
                  false: (location:↑byte);
                  end;
BEGIN
memory.address:=1531;
sc_find_y:=memory.location↑[0];
END;
```

Listing continued.

TEXT. All routines were not implemented, but the heavily used routines were.

Procedure sc_GOTO_xy simply calls the language intrinsic GOTO_xy. I believe that sc_GOTO_xy, in version IV.1, was implemented in such a way as to improve cursor addressing speed. Here it is merely a pass-along.

Procedure sc_getc_ch and function space_wait are quite straightforward and speak for themselves.

Procedure notimplemented warns the programmer if a call to one of the unimplemented Screenops routines was made.

Procedure controlchar uses the low level intrinsic UNITWRITE to send control characters to the CRT.

Procedure sc_use_info uses the special types defined in Screenops called sc_choice and sc_info_TYPE to either read or alter information in the global area SYSCOM↑. If the parameter DO_what is passed as sc_GET, then information from SYSCOM↑ is loaded into the caller's T_info record. If the parameter DO_what is passed as sc_give, then information in the SYSCOM↑ area is changed, according to the caller's t_info record. This may be dangerous. This procedure is normally used only to read and not alter the SYSCOM↑ information.

Procedure sc_erase_TO_eol through procedure sc_eras_eos are cursor movement and screen clearing procedures that were trivial to implement once SYSCOM↑ became accessible.

Procedure sc_find_x and procedure sc_find_y are, unfortunately, hardware dependent. They need to examine memory locations specific to the brand of 80-column card or terminal you are using. In both procedures they are set for the Videx 80-column board. Change the value assigned to the variable MEMORY.ADDRESS according to your hardware's manual.

Function sc_prompt first checks the parameters for validity. If the prompt LINE fits within the screen window, then the function simply waits for an acceptable character to be pressed. If the prompt LINE is wider than the screen window, a pair of pointers called BEGINPTR and ENDPTR is used to keep track of the various subsections of LINE that may be displayed and cy-

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Listing continued.

```
PROCEDURE sc_clr_cur_line;
VAR
        saveX   : integer;
BEGIN
saveX:=sc_find_x;
sc_clr_line (sc_find_y);
sc_GOTOXY (saveX,sc_find_y);
END;

FUNCTION  sc_scrn_has((what:sc_scrn_command):BOOLEAN);
BEGIN
notimplemented;
scscrnhas:=true;
END;

FUNCTION  sc_has_key((what:sc_key_command):BOOLEAN);
BEGIN
notimplemented;
schaskey:=true;
END;

FUNCTION  sc_map_crt_command((VAR K_ch:CHAR):sc_key_command);
BEGIN
notimplemented;
scmapcrtcommand:=scnotlegal;
END;

FUNCTION  sc_prompt((line :sc_long_STRING; x_cursor,y_cursor,x_pos,
                  where:INTEGER; return_on_match:sc_chset;
                  no_CHAR_back:BOOLEAN; break_CHAR:CHAR):CHAR);

VAR
        beginptr,
        endptr,
        i                       : integer;
        c                       : char;

        procedure abort;
        var
                throwaway       : boolean;
        begin
        writeln;
        writeln('Error in procedure sc_prompt! ');
        throwaway:=space_wait(true);
        c:=chr(bell);
        end;

        function screenroom: integer;
        VAR
                screen  : sc_info_type;
        begin
        sc_use_info (sc_get,screen);
        screenroom:=screen.miscinfo.width-xpos;
        end;

        procedure checkparameters;
        var
                aok     : boolean;

                function checkwidth: boolean;
                begin
                checkwidth:=(screenroom>0);
                end;

                function checkset: boolean;
                begin
                if (return_on_match = []) then checkset:=false
                else checkset:=true;
                end;

                function checkline: boolean;
                begin
                if (length(line)<1) then checkline:=false
                else checkline:=true;
                END;

        begin
        if not((checkwidth)and(checkset)and(checkline)) then abort;
        end;

        procedure writeprompt(p:sc_long_string);
        begin
        sc_erase_to_eol(x_pos,where);
        sc_gotoxy(x_pos,where);
        write(p);
        if(x_cursor>=0) then sc_gotoxy(x_cursor,y_cursor);
        end;

        function promptfits: boolean;
        begin
        promptfits:=(length(line)<=screenroom);
        end;

        function chop:integer;
        var
                find,
                cut     : integer;
        begin
        if (screenroom>=(length(line)+1-beginptr))
                then chop:=length(line)
        else
                begin
                cut:=beginptr+screenroom-1;
                find:=abs(scan(-(cut-beginptr),=breakchar,line[cut]));
                if (find=(cut-beginptr)) then find:=0;
```

Listing continued.

cled through. This is managed with function chop and function screenroom. Functions clarify the meanings of expressions because they may occur on the right side of the becomes (:=) operator as arguments.

Finally, the Screenops unit initialization section writes a title line on the screen prior to the execution of the calling program.

Installation

Type in the main file SCREENOPS.TEXT from Listing 1, and the two include files SYSCOM.TEXT from Listing 2 and IMPLEMENT.TEXT from Listing 3. Compile the file SCREENOPS.TEXT into SCREENOPS.CODE. Then, install unit Screenops into the SYSTEM.LIBRARY file on your boot disk by following the directions on pages 186–193 of the *Apple Pascal Operating System Reference Manual.* Those pages describe how the utility program APPLE3:LIBRARY works. The segment called FAKEKERN that occupies slot 0 need not be transferred.

"The cursor will move about the screen in cycles of rectangles."

Testing

Listing 4 TESTCURSOR.TEXT, shows a program for exercising the prompt and cursor movement parts of Screenops. TESTCURSOR.TEXT can be compiled and executed after installing unit Screenops into SYSTEM.LIBRARY. The cursor will move about the screen in cycles of rectangles. If cursor movement does not occur as expected, then execute the Apple supplied utility program called SETUP located on the disk APPLE3. Follow the directions on pages 199–202 of the *Apple Pascal Operating System Reference Manual.* Alter the necessary fields according to your 80-column card or terminal. A listing of pertinent fields for the Videx 80-column card is shown in Listing 5, VIDEX80.TEXT.

Applying a standard method of screen control should prove an asset to your programming products. ■

Listing continued.

```
                        chop:=cut-find;
                        end;
                end;

        BEGIN
        checkparameters;
        beginptr:=1;
        if(promptfits) then
                begin
                writeprompt(line);
                sc_getc_ch(c,return_on_match);
                if (no_char_back=false) then write(c);
                end
        else
                repeat
                        if (beginptr>length(line))then beginptr:=1;
                        endptr:=chop;
                        writeprompt(copy(line,beginptr,endptr+1-beginptr));
                        beginptr:=endptr+1;
                        sc_getc_ch(c,return_on_match + ['?']);
                        if (c <> '?') and not(no_char_back) then write(c);
                until(c <> '?');
        sc_prompt:=c;
        END;

        FUNCTION sc_check_CHAR((VAR buf:sc_window;
                                VAR buf_index,bytes_left:INTEGER):BOOLEAN);
        BEGIN
        notimplemented;
        END;


        PROCEDURE sc_init;
        BEGIN
        notimplemented;
        END;
```

```
                                program exercisecursor;
                                   uses screenops;

  var
      replyset          : sc_ch_set;
      promptstring      : sc_long_STRING;

      procedure slowdown (time:integer);
      var
          wait      : integer;
      begin
          for wait:=time downto 0 do begin {nothing} end;
      end;

      procedure rectangle;
      const
          startX        =  10;
          startY        =   8;
          stepX         =  60;
          stepY         =   8;

          procedure clockwise;
          var i:integer;
          begin
          for i:=1 to stepX do sc_right; slowdown(2047);
          for i:=1 to stepY do sc_down; slowdown(2047);
          for i:=1 to stepX do sc_left; slowdown(2047);
          for i:=1 to stepY do sc_up; slowdown(2047);
          end;

          procedure counterclockwise;
          var i:integer;
          begin
          for i:=1 to stepY do begin sc_down; slowdown(63) end;
          for i:=1 to stepX do begin sc_right; slowdown(63) end;
          for i:=1 to stepY do begin sc_up; slowdown(63) end;
          for i:=1 to stepX do begin sc_left; slowdown(63) end;
          end;

      begin
      sc_GOTO_xy(startX,startY);
      slowdown(511);
      clockwise;
      counterclockwise;
      slowdown(511);
      end;

  begin
      replyset:=['M','Q'];
      promptstring:=' Move the cursor in a rectangle   Quit';
      promptstring[1]:=chr(7); {insert a bell as the first character}
      sc_clr_screen;



     sc_home;
     writeln ('Program to exercise cursor movement using unit screenops.');
     while(sc_prompt(promptstring,-1,0,0,1,replyset,true,' ')<>'Q') do rectangle;
     sc_clr_screen;
end.
```

Listing 4. TESTCURSOR.TEXT.

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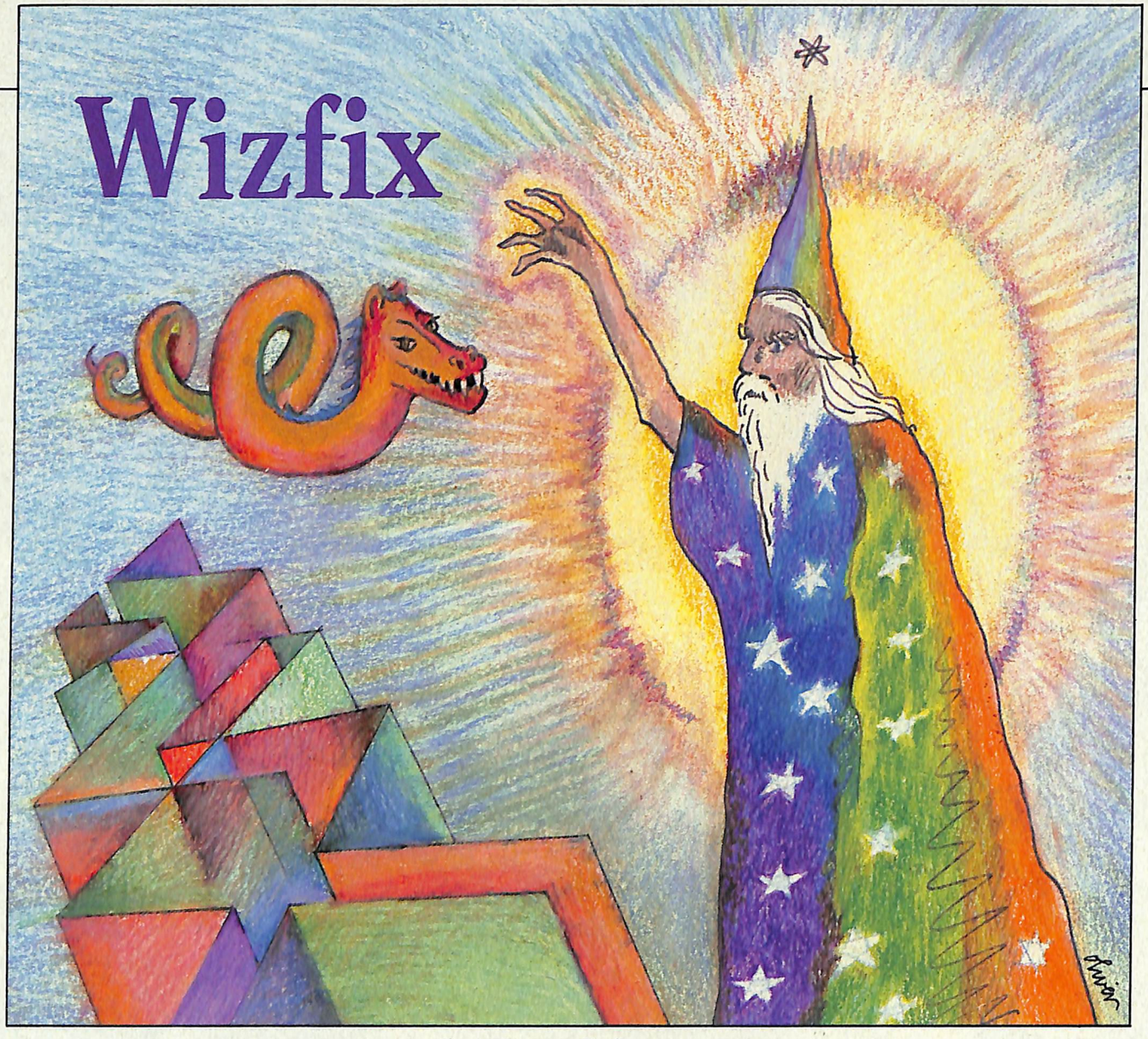
Wizfix



by Kerry J. Lantz

You say your brother is lost forever? Have your best friends been killed off in the depths of Wizardry? Would you give anything to be a level 25 bishop? Want to get a Ring of Healing, cheap? Would you rather a dozen +5 swords? Then this program is just what you need.

One of the best-selling software packages these days is the game of Wizardry. The richness and complexity of this game provide months of excitement to the casual player and the experienced adventurer alike. Its success has led its creators, Sir-tech Software, to produce a new addition, Knight of Diamonds, and to promise a continuing series of scenarios.

Wizardry is a role-playing game, similar to Dungeons and Dragons. You develop characters as you pursue adventures in a maze. Each time you play your characters gain strength, earn money, learn spells, and find ever more sophisticated weapons and armor. That is, unless they are killed off or, worse yet, declared "lost forever."

The process of building characters is lengthy and can be frustrating. Losing one can be a severe setback. In later stages you may inadvertently lose a character in which you have invested many months of development.

As set up by Sir-tech, Wizardry allows you to change the name and the password of your characters, but to determine little else. The Wizfix utility gives you control of character development. With it you can modify your characters predictably. You can also print out at any time a roster of your characters or a complete description

```
WIZARDRY  ROSTER
--------------------------------
A. KERRY          B. MARY
C. SHELL          D. UNCLE
E. ANGEL          F. APPLE
G. GOFER          H. SINBAD
I. FRANKENSTEIN   J. DEVIL
K. MERLIN         L. ROCKY
M. SAMSON         N. MR. SPOCK
O. FAGAN          P. DARTH VADER
Q. MAGUS          R. PESTILENCE
S. FRODO          T. ASLAN
```

Figure 1. Roster of characters printout.

Address correspondence to Kerry J. Lanz, 834 Brookside Drive, Fairfield, CT 06430.

of the characters and what they are carrying.

Wizfix is written in Applesoft Basic for a 48K Apple II Plus. If your system is smaller, just follow the suggestions for relocating the character in RAM.

Once Upon a Time

When I first acquired Wizardry, I didn't realize I was getting into months of work and excitement. Creating characters gave way to adventuring and I became hooked. As I played, the thrill of making another level in a character was matched only by the despair of "losing a character forever." I soon learned to make a backup disk of my characters periodically. At times it took forever to solve a level of the maze and move on. After months of play, I finally reached Werdna's Lair and bested the evil wizard to recover the amulet.

Now what? The Wizardry box was filed on the shelf and the excitement grew cold. As I awaited the promised new scenario from Sir-tech, my expensive game sat gathering dust.

"I cautiously changed a few bytes and returned the characters to life."

Then one day, out of curiosity, I looked for my backup characters using a disk zap utility. I found them in the area usually reserved for DOS, tracks 0–2. With fear and excitement, I cautiously changed a few bytes and returned the characters to life. Presto! One was level 50 and one was rich beyond dreams, while one was dead and lost. A new puzzle lay before me—to solve the genetic code of the characters; to map the locations of the bytes that define them. Wizardry came off the shelf and came alive again.

Wizfix is the result. It is a utility that enables you to examine your characters and change their characteristics. It reads the 208 bytes needed to define each character from the disk and stores them in RAM where they can be changed by poking in new values. They are stored at location 38000, as defined by variable BASE in line 906. This lies between DOS and HIMEM (as set in line 105) on a 48K system. If your system is smaller, just change HIMEM and BASE accordingly. By creating this small buffer, there are no conflicts with Applesoft's use of memory for strings.

Wizfix will work only on the backup disk, for two excellent reasons. Wizardry scenarios are a sizable investment. By using only the backup there is no chance of damaging the original. Also, characters are stored at a different location on the Wizardry disk. Wizfix is not prepared to find them there.

Circle 302 on Reader Service card.

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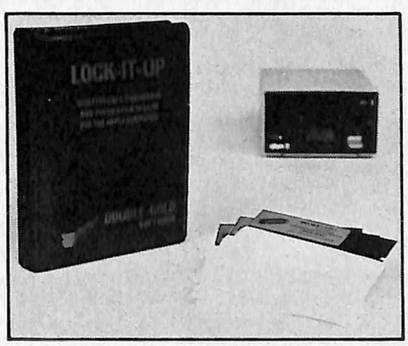

DOS VERSION:

- Any standard DOS 3.3 diskette can be protected.
- DOS command names can be changed and/or deleted.
- Autorun can be used to prevent the listing of a program or the use of any basic commands outside of a program.
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REQUIRES: 48K Apple II or II+ with Applesoft in ROM or language system and at least two disk drives.

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- Any standard Apple Pascal 1.1 diskette can be protected.
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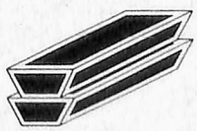
REQUIRES: Apple Pascal and at least two disk drives.



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Program listing. Wizfix.

```
100  REM
*********************************
            WIZFIX
*********************************

101  REM
   WIZARDRY CHARACTER UTILITY

102  REM
--------------------------------
        BY KERRY J. LANZ
--------------------------------

105  HIMEM: 38000
110  DIM N$(20),TRK(20),SEC(20),T$(140)
115  GOSUB 800
120  GOSUB 700: GOTO 400
200  REM  IDENTIFY CHARACTER
205 P$ = "": FOR MAP = BASE + 17 TO BASE + 31:P$ = P$ +  CHR$ ( PEEK
   (MAP)): NEXT
210 L$ =  STR$ ( PEEK (BASE + 200)) + "-EAST " +  STR$ ( PEEK (BASE +
   202)) + "-NORTH LEVEL-" +  STR$ ( PEEK (BASE + 204))
220 R =  PEEK (BASE + 34):C =  PEEK (BASE + 36):S =  PEEK (BASE + 40):O =
   PEEK (BASE + 42)
225 Y1 =  PEEK (BASE + 38):Y2 =  PEEK (BASE + 39):OL =  INT ((Y1 + Y2 *
   256) / 52)
230 C1 =  PEEK (BASE + 44):C2 =  PEEK (BASE + 45):C3 =  PEEK (BASE +
   46):C4 =  PEEK (BASE + 47)
231 ST = C1 - INT (C1 / 32) * 32
232 IQ =  INT (C1 / 32) + (C2 -  INT (C2 / 4) * 4) * 8
233 PI =  INT (C2 / 4) - 32 *  INT (C2 / 128)
234 VI = C3 -  INT (C3 / 32) * 32
235 AG =  INT (C3 / 32) + (C4 -  INT (C4 / 4) * 4) * 8
236 LU =  INT (C4 / 4) - 32 *  INT (C4 / 128)
240 G1 =  PEEK (BASE + 52):G2 =  PEEK (BASE + 53):G3 =  PEEK (BASE +
   54):G4 =  PEEK (BASE + 55)
241 CASH = G1 + (G2 * 256) + ((G3 + (G4 * 256)) * 10000)
245 E1 =  PEEK (BASE + 124):E2 =  PEEK (BASE + 125):E3 =  PEEK (BASE +
   126):E4 =  PEEK (BASE + 127)
246 EP = E1 + (E2 * 256) + ((E3 + (E4 * 256)) * 10000)
250 LE =  PEEK (BASE + 132) + ( PEEK (BASE + 133) * 256):PH =  PEEK (BASE
   + 134):TH =  PEEK (BASE + 136):AC =  PEEK (BASE + 176): IF  PEEK (BASE +
   177) > 0 THEN AC = (AC - 256)
255  FOR K = 1 TO 7:MAP = BASE + 144 + (2 * K):M(K) =  PEEK (MAP): NEXT
260  FOR K = 1 TO 7:MAP = BASE + 158 + (2 * K):P(K) =  PEEK (MAP): NEXT
265  RETURN
300  REM  PRINT CHARACTER
305  HOME
310  PRINT N$(A),O$(O);"  ";R$(R);"  ";C$(C): PRINT "PASSWORD==>";P$:
   PRINT
315  PRINT " STRENGTH "; SPC( ST < 10);ST; SPC( 5);"GOLD ";CASH
320  PRINT "      I Q  "; SPC( IQ < 10);IQ; SPC( 6);"EXP ";EP
325  PRINT "     PIETY "; SPC( PI < 10);PI
330  PRINT " VITALITY "; SPC( VI < 10);VI; SPC( 4);"LEVEL ";LE; SPC(
   6);"AGE ";OL
335  PRINT "  AGILITY "; SPC( AG < 10);AG; SPC( 5);"HITS ";PH;"/";TH; SPC(
   2);"AC ";AC
340  PRINT "      LUCK "; SPC( LU < 10);LU; SPC( 3);"STATUS ";S$(S): PRINT
342  PRINT "      MAGE
   ";M(1);"/";M(2);"/";M(3);"/";M(4);"/";M(5);"/";M(6);"/";M(7)
344  PRINT "    PRIEST
   ";P(1);"/";P(2);"/";P(3);"/";P(4);"/";P(5);"/";P(6);"/";P(7)
346  PRINT : PRINT "LOCATION: ";L$
348  FOR K = 1 TO 39: PRINT "*";: NEXT : RETURN
350  REM  CHOICES
353  PRINT
355  PRINT "A-LIFE         E-LEVEL+1     I-EXPERIENCE"
360  PRINT "B-CASTLE       F-HIT POINTS  J-GOLD"
365  PRINT "C-IDENTIFY     G-M SPELLS    K-YOUTH"
370  PRINT "D-UNCURSE      H-P SPELLS    L-QUALITIES"
375  PRINT " <2> P.2,REMAKE  <3> P.3, TRADING POST"
377  PRINT " <ESC>  ROSTER, CHANGES CANCELLED"
380  PRINT " <RET>  ROSTER, CHANGES PERMANENT"
385  PRINT " CTRL-P PRINT-OUT OF CHARACTER": RETURN
400  REM  MAIN PROGRAM
405  GOSUB 200: GOSUB 300: GOSUB 350: POKE 35,15
410  VTAB 15: HTAB 19: POKE  - 16368,0: GET B$:B =  ASC (B$)
415  IF B = 27 THEN  GOTO 120
416  IF B = 50 THEN 600
417  IF B = 51 THEN 650
420  IF B <  > 16 THEN 430
422  VTAB 14: HTAB 1: PRINT " ->START PRINTER AND PRESS ANY KEY<- ";: GET
   A$: PR# 1
424  PRINT : FOR K = 1 TO 40: PRINT "*";: NEXT : PRINT : GOSUB 300: PRINT
   : GOSUB 696: GOSUB 348: PRINT : PR# 0
426  GOSUB 300: GOTO 410
430  IF B = 13 THEN  POKE 47092,2: CALL 768: POKE 47092,1: GOTO 120
435  IF B < 65 OR B > 76 THEN  GOTO 410
440 B = B - 64
445  ON B GOSUB 500,505,510,515,520,525,530,535,540,545,550,555: GOSUB
   200: GOSUB 300: GOTO 410
500  POKE BASE + 40,0: POKE BASE + 41,0: RETURN
505  POKE BASE + 32,0: FOR K = 200 TO 205: POKE BASE + K,0: NEXT : RETURN
510  FOR MAP = BASE + 64 TO BASE + 120 STEP 8: POKE MAP,1: NEXT : FOR K =
   8 TO 1 STEP  - 1: IF  PEEK (BASE + 58 + (8 * K)) = 0 THEN  NEXT :K = 0
511  POKE BASE + 58,K: RETURN
515  FOR MAP = BASE + 62 TO BASE + 118 STEP 8: POKE MAP,0: POKE MAP - 2,0:
   NEXT : RETURN
520 K =  PEEK (BASE + 132): IF K < 254 THEN  POKE BASE + 130,K + 1: POKE
   BASE + 132,K + 1: RETURN
521  RETURN
525 K =  PEEK (BASE + 136): IF K < 245 THEN  POKE BASE + 134,K + 10: POKE
   BASE + 136,K + 10
```

Listing continued.

How To Use It

First, enter the program as it appears in the Program listing—except for line 430. *Until the program is completely debugged maintain line 430 as 430 REM.* The reason is that Wizfix is of the "disk zap" family of utilities that uses the RWTS routine of DOS to read data directly from the disk and to write it back to disk after modifying it. (More information on this routine appears on page 94 of the *DOS Manual.*) Line 430 directs RWTS to send 256 bytes from your Apple's memory back to the disk, obliterating what *is* already there. Until you are sure that Wizfix is working correctly, do not send a modified character to take the place of a tried and true warrior. When everything is working, alter line 430 to that shown in the listing and changes will be permanently reported to the disk.

Enter the listing carefully. Check it twice for typing mistakes. Having someone else check it would be good. Pay special attention to all the data statements. Some items are listed twice (Great Mage Wand); some are unusual words (Shuriken); some sound out of place (winter mittens??).

The large array, T$, contains the names of all the things used in both Wizardry scenarios: items 1–129 for Knight of Diamonds (or KOD), items 1–93 and 130–136 for Proving Grounds of the Mad Overlord. Wizfix uses the vocabulary of KOD. While you're playing Proving Grounds add the line `912 FOR K =94 TO 100: T$(K) = T$(K + 36): NEXT` to change the vocabulary. When you move on, delete the line.

Next, make two backup disks of your characters following the instructions in the Wizardry manual for utilities. One backup will be used by Wizfix. The other is insurance, "just in case." Now, run Wizfix. The program will instruct you from there.

The title page tells you to insert the backup disk and press return. At this point any other key will exit the program. Wizfix then reads the disk for the names of all the characters and produces a roster of all the presently available characters. Control-P sends the roster to your printer. You can now leave the program by pressing escape

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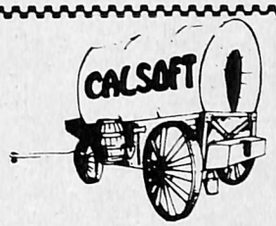

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Listing continued.

```
526  RETURN
530  POKE BASE + 138,255: POKE BASE + 139,255: POKE BASE + 140,255: FOR K
   = 1 TO 7:MAP = BASE + 144 + (K * 2): POKE MAP,9: NEXT : RETURN
535  POKE BASE + 140,255: POKE BASE + 141,255: POKE BASE + 142,255: POKE
   BASE + 143,255: POKE BASE + 144,7: FOR K = 1 TO 7:MAP = BASE + 158 + (K
   * 2): POKE MAP,9: NEXT : RETURN
540  IF  PEEK (BASE + 126) < 254 THEN  POKE BASE + 126, PEEK (BASE + 126)
   + 1
541  RETURN
545  IF  PEEK (BASE + 54) < 254 THEN  POKE BASE + 54, PEEK (BASE + 54) + 1
546  RETURN
550  POKE BASE + 38,170: POKE BASE + 39,3: RETURN
555  POKE BASE + 44,82: POKE BASE + 45,74: POKE BASE + 46,82: POKE BASE +
   47,74: RETURN
600  REM  RECREATE CHARACTER
602  TEXT : HOME
605  PRINT N$(A),O$(O);" ";R$(R);" ";C$(C): PRINT : FOR K = 1 TO 40: PRINT
   "*";: NEXT
610  PRINT "A-GOOD          D-HUMAN        I-FIGHTER"
611  PRINT "B-NEUTRAL       E-ELF          J-MAGE"
612  PRINT "C-EVIL          F-DWARF        K-PRIEST"
613  PRINT  TAB( 16)"G-GNOME        L-THIEF"
614  PRINT  TAB( 16)"H-HOBBIT       M-BISHOP"
615  PRINT  TAB( 30)"N-SAMURAI": PRINT  TAB( 30)"O-LORD": PRINT  TAB(
   30)"P-NINJA"
616  PRINT : PRINT " <RET>  RETURN TO P.1"
620  VTAB 16: HTAB 19: POKE  - 16368,0: GET B$:B =  ASC (B$): IF B = 13
   THEN 405
621 B = B - 64: IF B < 0 OR B > 16 THEN 620
622  IF B < 4 THEN 630
623  IF B < 9 THEN 635
624  GOTO 640
630 O = B: POKE (BASE + 42),O: GOTO 602
635 R = B - 3: POKE (BASE + 34),R: GOTO 602
640 C = B - 9: POKE (BASE + 36),C: GOTO 602
650  REM  TRADING POST
651  GOSUB 510: GOSUB 515: TEXT
652  HOME :T(0) =  PEEK (BASE + 58): GOSUB 695
653  FOR K = 1 TO 40: PRINT "*";: NEXT : PRINT
654  PRINT "YOU MAY CHOOSE:": PRINT " A. BASICS": PRINT " B. BETTER STUFF"
655  PRINT " C. REALLY GOOD STUFF": PRINT " D. PROVING GROUNDS ONLY":
   PRINT " E. KOD ONLY, PART 1"
656  PRINT " F. KOD ONLY, PART 2": PRINT " G. DROP SOMETHING": PRINT :
   PRINT "<RET> RETURN TO P.1"
657  VTAB 22: HTAB 19: POKE  - 16368,0: GET B$:B =  ASC (B$): IF B = 13
   THEN 405
658  IF B < 65 OR B > 71 THEN 657
659 B = B - 64: ON B GOTO 670,671,672,673,674,675,660
660  VTAB 22: HTAB 1: PRINT "TYPE NUMBER OF OBJECT TO DROP: ";: POKE  -
   16368,0: GET B$:B =  ASC (B$): IF B < 49 OR B > 56 THEN 660
661 B = B - 48: FOR K = B TO 8: POKE BASE + 58 + 8 * K, PEEK (BASE + 66 +
   8 * K): NEXT : POKE BASE + 122,0
662  POKE BASE + 58, PEEK (BASE + 58) - 1: GOTO 652
670 TT$ = "BASIC  ITEMS":TLO = 1:THI = 15: GOTO 680
671 TT$ = "BETTER ITEMS":TLO = 33:THI = 15: GOTO 680
672 TT$ = "REALLY  GOOD ITEMS":TLO = 64:THI = 14: GOTO 680
673 TT$ = "PROVING GROUNDS ONLY":TLO = 130:THI = 3: GOTO 680
674 TT$ = "KNIGHT OF DIAMONDS  ONLY":TLO = 94:THI = 14: GOTO 680
675 TT$ = "KNIGHT OF DIAMONDS  ONLY":TLO = 124:THI = 2: GOTO 680
680  HOME : HTAB 20 -  LEN (TT$) * .5: PRINT TT$: PRINT
681  FOR K = TLO TO TLO + THI: PRINT K;"-";T$(K): NEXT : VTAB 3
682  FOR K = TLO + THI + 1 TO TLO + 1 + (THI * 2): HTAB 20: PRINT
   K;"-";T$(K): NEXT
683  VTAB 19: FOR K = 1 TO 40: PRINT "*";: NEXT
684 T(0) =  PEEK (BASE + 58): PRINT "YOU HAVE ";T(0);" OBJECTS.": IF T(0)
   > 7 THEN  PRINT "YOU HAVE NO MORE ROOM.": FOR K = 1 TO 1500: NEXT : GOTO
   652
685  PRINT "YOU MAY CHOOSE AN OBJECT BY NUMBER, OR  PRESS <RETURN> TO GO
   TO TRADING POST."
686  VTAB 23: HTAB 19: INPUT "";B$: IF B$ = "" THEN 652
687 B =  VAL (B$): IF B < TLO OR B > TLO + 1 + (THI * 2) THEN 686
688  IF B > 129 THEN B = B - 36
689  POKE BASE + 58,T(0) + 1: POKE BASE + 58 + (8 * (T(0) + 1)),B: GOTO 680
695  PRINT  TAB( 14)"TRADING POST": PRINT : PRINT C$(C);" ";N$(A);":
   ";T(0);" OBJECTS"
696  FOR K = 1 TO 8:T(K) =  PEEK (BASE + 58 + 8 * K): NEXT
697  PRINT : FOR K = 1 TO 8 STEP 2: PRINT K;"-";T$(T(K)); SPC( 17 -  LEN
   (T$(T(K))));K + 1;"-";T$(T(K + 1)): NEXT : PRINT : RETURN
700  REM  ROSTER
705  TEXT : HOME : GOSUB 750: PRINT : PRINT : PRINT "THESE ARE THE
   CHARACTERS ON YOUR BACK-UPWIZARDRY DISK.  YOUR OPTIONS NOW ARE:": PRINT
710  PRINT "'A' TO 'T' CHOOSE A CHARACTER BY LETTER  <ESCAPE>  ENDS THE
   PROGRAM                CTRL-P   PRINTS OUT THE ROSTER": PRINT
715  VTAB 22: HTAB 19: GET A$:A =  ASC (A$): IF A = 27 THEN 840
720  IF A <  > 16 THEN  GOTO 730
722  PRINT : PRINT  TAB( 4)"START PRINTER AND PRESS ANY KEY. ";: GET A$:
   PR# 1
724  PRINT : GOSUB 750: PRINT : PR# 0
726  GOTO 705
730  IF A < 65 OR A > 84 THEN  GOTO 715
735 A = A - 64: POKE 47084,TRK(A): POKE 47085,SEC(A): CALL 768: RETURN
750  PRINT  SPC( 8)"WIZARDRY  ROSTER": FOR K = 1 TO 32: PRINT "-";: NEXT :
   PRINT
755  FOR K = 1 TO 20 STEP 2: PRINT  CHR$ (K + 64);". "; LEFT$ (N$(K),12),;
   CHR$ (K + 65);". "; LEFT$ (N$(K + 1),12): NEXT : RETURN
800  REM  TITLE PAGE
805  TEXT : HOME
810  VTAB 5: HTAB 16: INVERSE : PRINT "+      +": VTAB 6: HTAB 16: PRINT "
   WIZFIX ": VTAB 7: HTAB 16: PRINT "+      +": NORMAL : PRINT : PRINT :
   SPEED= 100
815  PRINT "-WIZARDRY KILLED OFF YOUR BEST FRIENDS?": FOR K = 1 TO 1200:
   NEXT : PRINT "-YOU SAY YOUR BROTHER IS  LOST FOREVER?": FOR K = 1 TO
   1200: NEXT
```

Listing continued.

or examine any character more closely by pressing the letter of that character.

You may find characters on the roster that you thought were "lost forever." Surprise—they are actually still there, waiting to be restored! That's because characters that are lost, deleted or transferred to another scenario are not erased. Only when a new character is written over the old one does the latter become truly "lost forever."

When you examine a character, Wizfix shows you the character's name and reveals the password, if you use one. You will see all the familiar Wizardry values for experience, gold; level, hit points, spells, and so on. All this

```
************************************
GOFER            EVIL  GNOME  FIGHTER
PASSWORD==>GO FOR IT

 STRENGTH 11      GOLD 148
    I Q   7        EXP 0
   PIETY 10
 VITALITY 12     LEVEL 1       AGE 18
 AGILITY 10       HITS 9/9   AC 10
    LUCK  9     STATUS LOST FOREVER

    MAGE 0/0/0/0/0/0/0
  PRIEST 0/0/0/0/0/0/0

LOCATION: 14-EAST 8-NORTH LEVEL-6
************************************

1-                  2-
3-                  4-
5-                  6-
7-                  8-

************************************
```

Figure 2a. Character printout before alterations.

```
************************************
GOFER              GOOD  GNOME  LORD
PASSWORD==>GO FOR IT

 STRENGTH 18      GOLD 200148
    I Q   18        EXP 300000
   PIETY 18
 VITALITY 18     LEVEL 15       AGE 18
 AGILITY 18       HITS 159/159   AC 10
    LUCK  18    STATUS OK

    MAGE 9/9/9/9/9/9/9
  PRIEST 9/9/9/9/9/9/9

LOCATION: 0-EAST 0-NORTH LEVEL-0
************************************

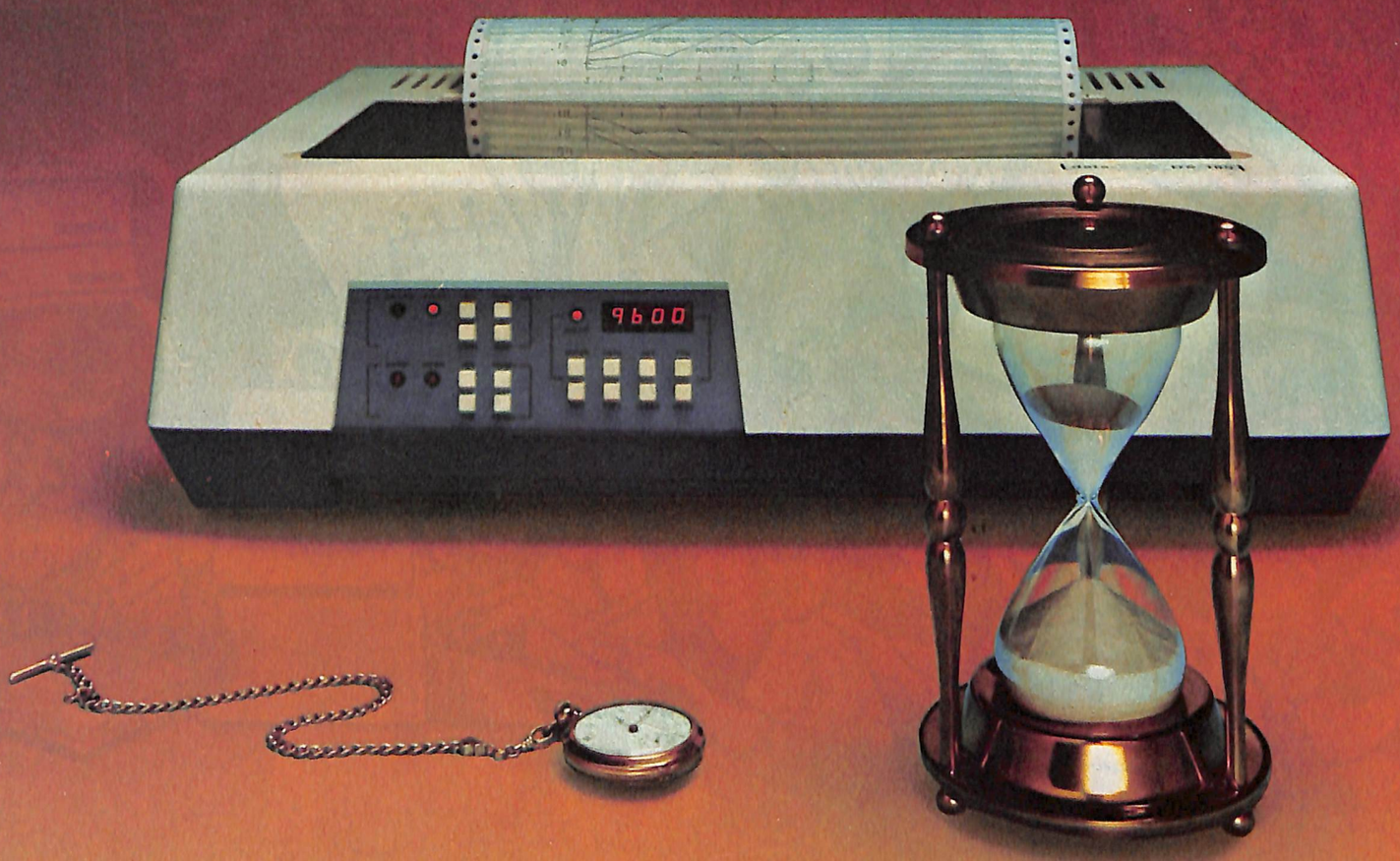
1-LORDS GARB          2-SILVER GLOVES
3-SHIELD +3           4-RING OF HEALING
5-HELM +1             6-LONG SWORD +5
7-MAKANITO AMULET     8-

************************************
```

Figure 2b. Character printout after alterations.

Circle 117 on Reader Service card.

TIME-PROVEN PERFORMANCE



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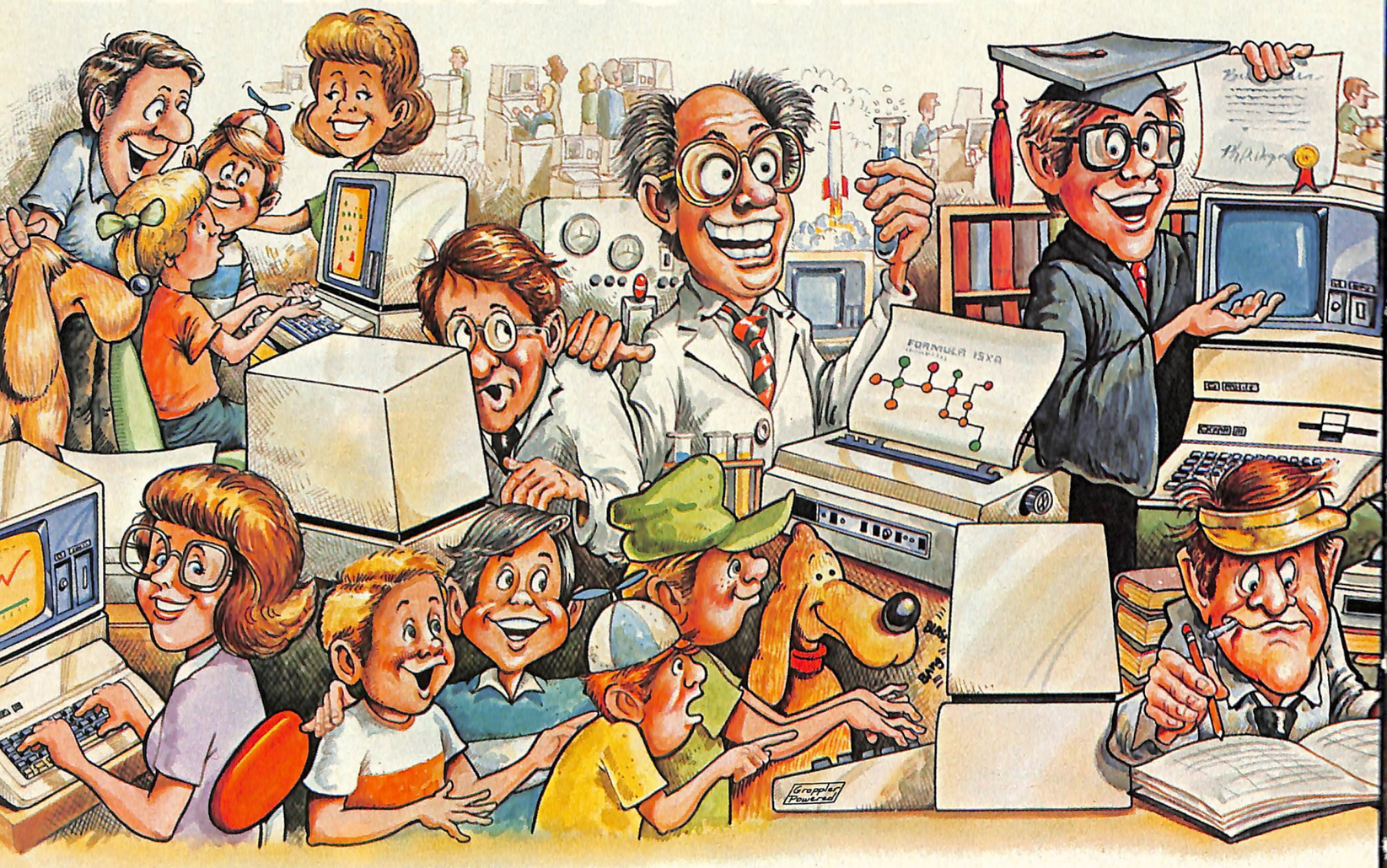

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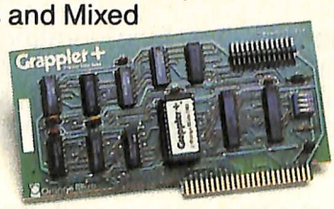

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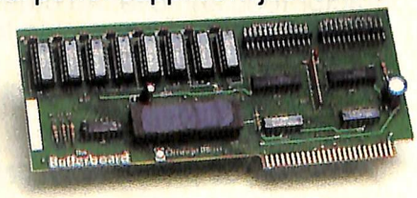

*Versions for standard Grappler + , Epson APL and Apple Parallel Interfaces.

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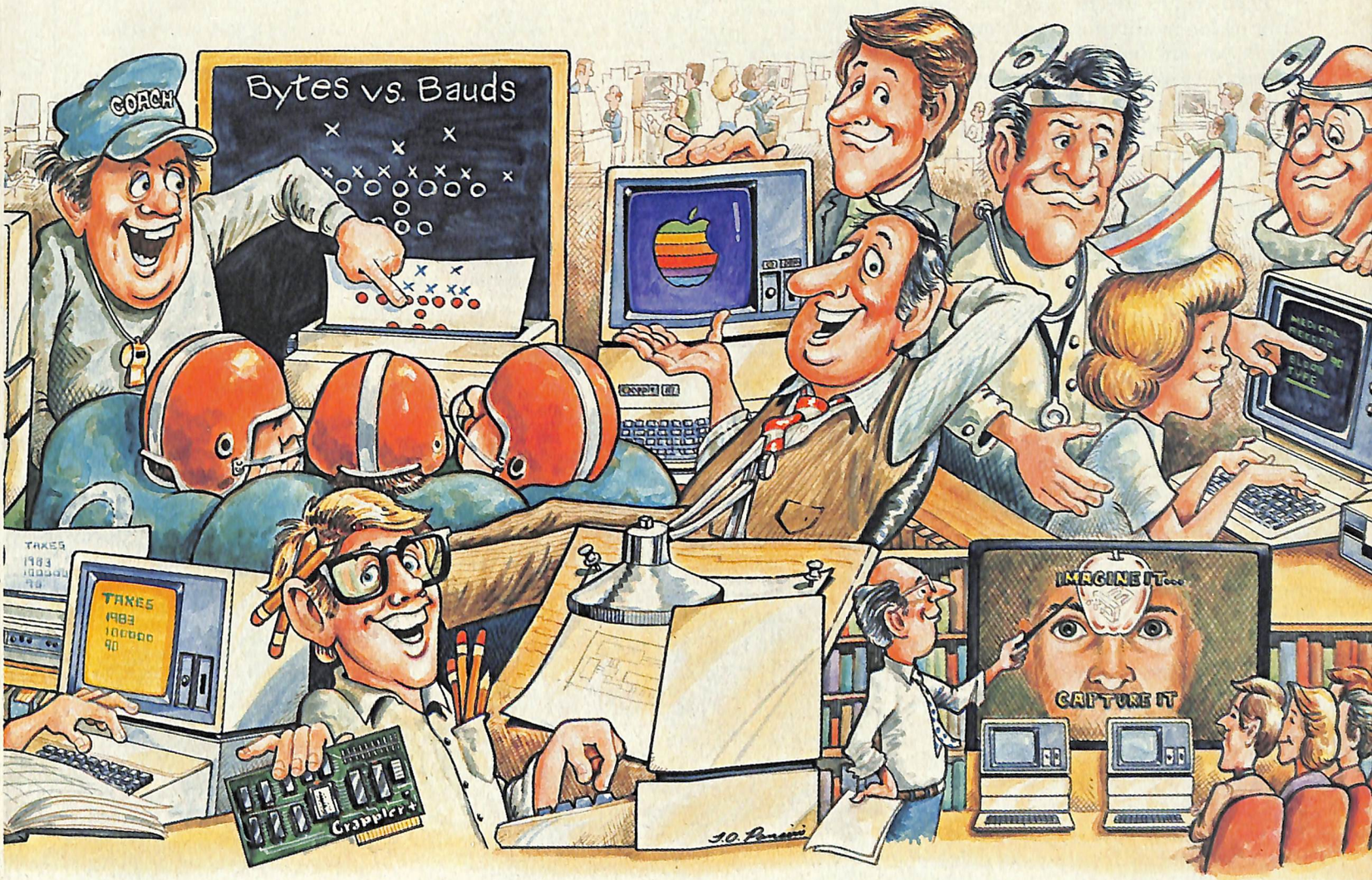

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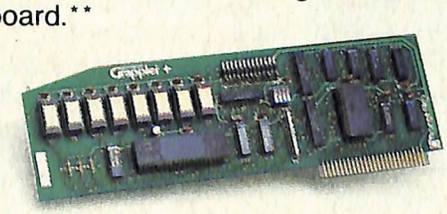

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Circle 5 on Reader Service card.

Listing continued.

```
820  PRINT "-YOU'D GIVE  ANYTHING FOR 1 MORE LEVEL?": FOR K = 1 TO 1200:
   NEXT : PRINT : PRINT : PRINT  TAB( 10)"WIZFIX IS THE ANSWER": PRINT
   TAB( 10)"------": PRINT : FOR K = 1 TO 1500: NEXT
825  PRINT "  MAKE A BACK-UP DISK OF YOUR CHARACTERSUSING THE  WIZARDRY
   UTILITIES.   WIZFIXWILL HELP YOU DO ALL MANNER OF MAGICS.        USE
   ONLY THE BACK-UP!!!!!!": PRINT  TAB( 10)"INSERT BACK-UP DISK. "
830  SPEED= 255: GOSUB 900: PRINT  TAB( 8)"PRESS <RETURN> TO BEGIN ";: POKE
     - 16368,0: GET A$: IF A$ =  CHR$ (13) THEN  GOTO 850
840  HOME : VTAB 11: HTAB (16): PRINT "FAREWELL": PRINT : PRINT : PRINT : PRINT
     : END
850  FOR K = 1 TO 20: POKE 47084,TRK(K): POKE 47085,SEC(K): CALL 768:N$(K)
      = "": FOR L = 1 TO 15:N$(K) = N$(K) +  CHR$ ( PEEK (BASE + L)): NEXT
     : NEXT : RETURN
900  REM  INITIALIZATION
905  POKE 768,32: POKE 769,227: POKE 770,3: POKE 771,76: POKE 772,217: POKE
     773,3: POKE 47083,0: POKE 47091,0: POKE 47092,1
906 BASE = 38000
907  POKE 47088,BASE -  INT (BASE / 256) * 256: POKE 47089, INT (BASE / 25
     6)
910  FOR K = 1 TO 5: READ R$(K): NEXT : FOR K = 0 TO 7: READ C$(K): NEXT :
      FOR K = 0 TO 7: READ S$(K): NEXT : FOR K = 1 TO 3: READ O$(K): NEXT
     : FOR K = 1 TO 20: READ TRK(K),SEC(K): NEXT
911 T$(0) = " ": FOR K = 1 TO 136: READ T$(K): NEXT
915  RETURN
930  DATA  HUMAN,ELF,DWARF,GNOME,HOBBIT
931  DATA  FIGHTER,MAGE,PRIEST,THIEF,BISHOP,SAMURAI,LORD,NINJA
932  DATA  OK,AFRAID,ASLEEP,PARALYZED,STONED,DEAD,ASHES,LOST FOREVER
933  DATA  GOOD,NEUTRAL,EVIL
934  DATA  0,0,0,13,0,11,0,9,0,7,0,5,0,3,0,1,1,0,1,13,1,11,1,9,1,7,1,5,1,3
     ,1,1,2,0,2,13,2,11,2,9
935  DATA LONG SWORD,SHORT SWORD,ANOINTED MACE,ANOINTED FLAIL,STAFF,DAGGER
     ,SMALL SHIELD,L. SHIELD,ROBES,LEATHER ARMOR
936  DATA CHAIN MAIL,BREAST PLATE,PLATE MAIL,HELM,DIOS POTION,LATUMOFIS PO
     TION,LONG SWORD +1,SHORT SWORD +1,MACE +1,STAFF OF MOGREF
937  DATA KANTINO SCROLL,LEATHER +1,CHAIN MAIL +1,PLATE MAIL +1,SHIELD +1,
     BREAST PLATE +1;BADIOS SCROLL,HALITO SCROLL,LONG SWORD -1,SHORT SWORD
      -1
938  DATA MACE -1,STAFF +2,DRAGON SLAYER,HELM +1,LEATHER -1,CHAIN -1,BREAS
     T PLATE -1,SHIELD -1,JEWELED AMULET,BADIOS SCROLL
939  DATA SOPIC POTION,L. SWORD +2,S. SWORD +2,MACE +2,LOMILWA SCROLL,DILT
     O SCROLL,COPPER GLOVES,LEATHER +2,CHAIN +2,PLATE MAIL +2
940  DATA SHIELD +2,HELM +2(EVIL),DIAL POTION,PORFIC RING,WERE SLAYER,MAGE
      MASHER,MACE PRO POISON,MONTINO STAFF,BLADE CUSINART',MANIFO AMULET
941  DATA ROD OF FLAME,EVIL CHAIN +2,NEUT P-MAIL +2,EVIL SHIELD +3,MAKANIT
     O AMULET,MALOR DIADEM,BADIAL SCROLL,SHORT SWORD -1,DAGGER +2,MACE -2
942  DATA STAFF -2,DAGGER OF SPEED,CURSED ROBE,LEATHER -2,CHAIN -2,BREAST
     PLATE -2,SHIELD -2,CURSED HELMET,BREAST PLATE +2,SILVER GLOVES
943  DATA EVIL SWORD +3,EVIL SSWORD +3,THIEVES DAGGER,BREAST PLATE +3,LORD
     S GARB,MURASAMA BLADE,SHURIKEN,CHAIN PRO FIRE,EVIL PLATE +3,SHIELD +3

944  DATA RING OF HEALING,RING PRO UNDEAD,DEADLY RING,ROD OF RISING,AMULET
      OF COVER,ROBE +3,WINTER MITTENS,NCKLCE,PRO MAGIC,STAFF OF LIGHT,LONG
      SWORD +5
945  DATA SWINGING SWORD,PRIEST PUNCHER,PRIEST'S MACE,SWINGING SSWORD,RING
      PRO FIRE,CURSED PLATE +1,PLATE MAIL +5,STAFF OF CURING,RING OF REGEN
     ,METAMORPH RING
946  DATA STONE STONE,DREAMER'S STONE,DAMIEN STONE,GREAT MAGE WAND,COIN OF
      POWER,STONE OF YOUTH,MIND STONE,STONE OF PIETY,BLARNEY STONE,AMULET
     OF SKILL
947  DATA AMULET OF SKILL,GREAT MAGE WAND,COIN OF POWER,STAFF OF GNILDA,HR
     ATHNIR,KOD HELMET,KOD SHIELD,KOD GAUNTLETS,KOD ARMOR
948  DATA WERDNA'S AMULET,BEAR STATUE,FROG STATUE,BRONZE KEY,SILVER KEY,GO
     LD KEY,BLUE RIBBON
```

information can be sent to the printer for a permanent record.

Then comes the magic—the many options for modifying your character. While you are making changes you can cancel the session at any time by pressing escape and the changes are not reported to the disk. Thus you can change your mind without changing the character. Pressing return sends the new character attributes back to the disk and you have permanently enhanced your hero.

A Wizard's Dozen

There are three pages full of options for developing your explorers. Don't be overwhelmed. Take your time to browse and shop. Begin by picking up a few character levels and a little gold, then progress to the exotic weaponry.

Page 1 changes the character with a wizard's dozen of options. A definition of these 12 options and when they are needed will help you understand the power of this utility.

Option A, Life, is possibly the most powerful option. Wizardry is lazy, as all good programs are. As mentioned, it does not erase a character from memory or from the disk until that character is overwritten. It just changes pointers. Only one byte is altered so that the game will ignore that character. The Wizfix option of Life restores that character by resetting the pointer. You can even give a character to a friend or move it to another scenario and then bring it back. Your character can be in two places at once.

Option B, Castle Return, restores a character to the castle at coordinates 0-North, 0-East, 0-Level. Any party of adventurers that is killed or disbanded in the maze remains in the maze unless they are recovered. This option brings them back to the castle without risking another expedition.

Option C, Identify, is dynamite. When characters die and are left in the maze, they lose much of their equipment. This option restores and identifies all objects. And, there is a hidden bonus. Since Wizardry never erases information unless necessary, but just changes the pointer, when one character trades a sword to someone else, the program does not erase the first sword. It just points to one less object. By resetting the pointer, you even restore objects you traded to a friend.

Option D uncurses and unequips everything you are carrying. If a character is stuck dragging a cursed sword or robe, with this option you can throw it away.

Would you like to be level 50? Just keep using option E. Each time you press E, you promote your character one level. But be gentle—the game is not expecting to find characters of level 50, so monsters will not really have a chance and the game will get boring.

Your ability to withstand damage is measured in hit points. Option F restores all hit points you have lost and increases your total by 10. The highest value for this byte is 255, which makes you almost invulnerable. However, if a monster hits you with the Mabadi spell, you'll need them.

The key to success in Wizardry scenarios is judicious use of spells. Many long adventures are devoted to learning new spells and accruing the strength to cast spells more often. Options G and H reveal all the priest and mage spells and, in most cases, let you cast them nine times, the maximum allowed by the game. There is an object in Knight of Diamonds that does the same thing. Have you found it?

Experience points are awarded after battles, as is money. Options I and J are for armchair generals who want rewards the easy way. These options increase both experience and gold by 10,000. But don't be greedy; you'll soon find that there is little to do with all that money in lower levels of the maze and in other scenarios. The game combines level and experience points in telling you how many more points are needed for the next level. Wizfix registers extremely high amounts of

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Softlights

By Barbara Huntington

This ad should break in July so we'll talk about children's programs in honor of our daughter Melody's 4th birthday.

We really are getting good stuff for kids — **Sticky Bear ABC, Sticky Bear Numbers, Sticky Bear Bop** and **Old Ironsides,** all from Xerox are **$33.89** each.

We also have the prestigious Plato series from Control Data. Each one is **$50.99** (list is $60). Some titles are **French Vocabulary, German, Spanish, Computer Literacy, Fractions, Whole Numbers, Basic Number Facts, Decimals** and **Physics-Elementary Mechanics.**

We had a holdup on the documentation for **Child's Play,** (We've got our daughter, Melody, on the cover, naturally.) but by the time you read this it will finally be out. Melody loves the little ant that runs through a maze in one of the programs. We're moving with the trend for lower software prices so Child's Play is only **$19.99.** It's great for preschoolers.

Also for preschoolers is Software Production's **Alpha Beasts and Co.** (ABC) (#7291) and Versa's **Alphabet Squares** (#7953), each at **$25.39.** ABC has beautiful graphics. Alphabet Squares teaches beginning letters with a little face that moves. When your child moves the face onto the picture of an Indian for the letter I, the picture fills the whole screen. If the wrong answer is chosen, nothing happens — only positive reinforcement. We carry Spinnaker, Learning Company, DCM and many other educational products. For older kids, Harcourt-Brace has a good **SAT** program we sell for **$59.39** (#7080).

PROGRAMMERS

Fred likes the program **Busywork** from Datum Consultants. It takes some of the drudgery out of programming by offering ready-to-use subroutines for your own program. Writing input routines, checking input, centering titles, writing title pages and menus are included. It has a 60-page booklet, a demo and gobs of good subroutines. #8400 for **$35.99.** Lets hear it for Dale Ludwig, the author.

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—Barb H.

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"After 50 you start getting more and more feeble. Option K is an instant fountain of youth, restoring the character to a vigourous 18."

gold and experience simply as 1.

Older characters can be a liability. As the manual says, "After 50 you start getting more and more feeble." Option K is an instant fountain of youth, restoring the character to a vigorous 18, the youngest age allowed by the game.

There are six characteristics that Wizardry uses in determining the outcome of adventures: strength, IQ, piety, vitality, agility and luck. The character's class is based on these. The maximum number of points the game allows in each category is 18. Option L improves them—not one point at a time, but all at once. By giving the characters 18 in each category, they become eligible for promotion to any class.

Pressing 2 or 3 sends you to two more pages of options for redefining a character. As mentioned, with the escape key you can cancel what you have done and return to the roster without changing your character. Pressing return brings you to the roster with your new character reported to the disk. Whatever modifications you have made are then permanent on the backup. Using control-P sends the contents of the screen to the printer for a permanent record of all the current values for your character.

Remake Your Character

Page 2 is called Remake. With it you can change three of the most basic attributes of a character: orientation, race and class. Orientation can be good, neutral or evil. Good and evil characters cannot journey together, while neutral characters can travel with either. With Remake you can pick the orientation of each character.

The five races to choose from are human, elf, dwarf, gnome and hobbit. Some races are better at fighting or magic than others. Experience will teach you the best race for a mage, lord or priest.

Finally, there are eight classes: fighter, mage, priest, thief, bishop, samurai, lord and ninja. A character begins life as one of the first four and may later graduate to one of the higher four. It takes many weeks of adventuring to rise to a higher class. Now you can promote deserving candidates ahead of schedule. You can even create a "good ninja" or an "evil lord," which are supposed to be impossible.

Trading Post

Boltac went on vacation and left you minding the store. Did he ever make a mistake! A lot of the space in this program is devoted to page 3, the Trading Post. It presents seven screens of armaments and magic objects you

Circle 387 on Reader Service card.

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can bestow on your characters, and unlimited time to shop.

Each character can hold a maximum of eight objects. What they are is stored in 8 bytes, one for each. Each object has other associated bytes that indicate if it is identified, cursed or equipped. The Trading Post option starts by identifying everything the character is holding, removing all curses, and unequipping everything. You start from neutral, ready to add to or subtract from the supplies.

The first scenario of Wizardry, Proving Grounds of the Mad Overlord, includes 100 possible objects, with the object bytes containing values of 1 to 100. A value of 0 means empty or "broken item." The second scenario, Knight of Diamonds, uses 129 objects, numbered 1 to 129. Unfortunately, items 93 to 100 are different in the two scenarios, so these things cannot be transferred from the first scenario to the second. Right now, as mentioned, the Wizardry listing is set for the KOD vocabulary. If you are doing Proving Grounds, then add the line indicated earlier.

"Really Good Stuff is exotic items like Lord's Garb, Murasama Blade, Shuriken, many +3 items, and the fabulous Ring of Healing."

Trading Post begins by listing what objects you now hold. Then you can choose to shop from six different screens for new acquisitions, drop something or return to page 1.

The first screen is Basics—robes, shields, swords and some +1 items. Better Stuff includes copper gloves, Blade Cusinart and many +2 objects. You might be tempted to gather up lots here, but wait until you see the next goodies. Really Good Stuff is exotic items like Lord's Garb, Murasama Blade, Shuriken, many +3 items, and the fabulous Ring of Healing.

Objects good only for "Proving Grounds" include statues, keys and Werdna's Amulet. About 40 items are unique to Knight of Diamonds. The screen called Part 1 offers an amulet of skill, a Blarney Stone, and some +5 weapons. Part 2 lists items necessary for solving the mystery of Gnilda's curse.

Not every character is able to use every object. Experience will teach you the most valuable equipment for each class. But here again, use some restraint. There is more fun in finding the Knight of Diamond's equipment in the maze than in taking it from the Trading Post. Keep in mind what the game is about.

Line by Line

Lines 100–120 call several subroutines to print the title page, read the names of your characters and initialize. HIMEM is lowered just a bit to reserve some memory space for the character you are working on.

Lines 200–265 make up the subroutine that reads a character from memory. It is called often—each time you make a change in a character—so it is placed near the front of the program. Through a series of peeks, this subroutine reads the character now in RAM and stores that information in variables. All peeks are done relative to the location BASE. If you feel adventuresome, try peeking in other locations to see what you find.

The most complicated math is found in lines 230–236. The six characteristics (strength, IQ, piety, vitality, agility and luck) are stored in 4 bytes. Wizardry, written in Pascal, has two

Circle 372 on Reader Service card.

"Moderate use of Wizfix to restore and enhance your characters can revive the magic of a stalled adventure without destroying the fun."

functions, MOD and DIV, that are used for determining the characteristics and are not available in Applesoft. The tortuous formulae in lines 230–236 produce the equivalent results.

Lines 300–348 are a subroutine that prints on the screen or paper the character currently stored in the variables. This routine is called frequently, thus is also near the front of the program.

Lines 350–385 print the menu of modifications available in Wizfix. If you are successful in poking to other locations, you may find the right spots to produce other enhancements of your character. For now you have the 12 choices on page 1, or you can branch to pages 2 and 3.

Lines 400–445 make up the heart of Wizfix. They control the calling of most of the subroutines and the screen updating. Line 405 displays the current status of one character on the screen, lists your options, and raises the bottom margin. After each change the upper half of the screen is updated to show what you have done. The line 430 I have already mentioned is possibly the most important of all. That poke to 47092 changes the RWTS routine from read to write. I'll emphasize again, *do not enter this line until you are certain that the rest of the program is working perfectly.* Line 430 puts your modified character back on the disk, and if there are bugs elsewhere in the program, your superman may turn out to be a monster. Line 445 checks for which change you want to make and calls the appropriate subroutine.

Lines 500–555 do the magic for the options on the first page by poking new numbers into the correct bytes. Careful study will reveal what pokes produce which changes. You can modify the pokes to produce heroes of awesome proportions. However, I'll remind you again that Wizardry is set to play with ordinary characters and level 1000 characters will find no challenge.

Lines 600–640 are page 2, the alteration of basic characteristics. BASE defines the beginning of the 208 bytes that define your character. Orientation is stored in the 42nd byte, and is changed by line 630. Race is in byte 34 and line 635 changes that. Class is the 36th byte and is poked by line 640. It's really quite simple, when you find the right spot to poke.

Lines 650–690 are page 3, the Trading Post. First, line 651 calls two subroutines to set the stage for shopping by identifying all your character's objects, freeing them from curses and unequipping them. Lines 652–657 provide a list of the objects and your Trading Post choices. If you decide to drop an object, lines 660–662 erase it and move everything else up to take its place. Lines 670–675 set the parameters to read the proper section of the T$ array of all the things Wizardry accepts.

Lines 680–686 show a part of the many items available. If you have room for something, you can pick anything from the list. Line 689 pokes the new object into your pockets. The subroutine for printing the revised list of eight objects is located in lines 695–697.

Lines 700–755 display a roster of all the characters on the backup disk. The roster can be sent to the printer for a permanent record. This subroutine asks which character you would like to study and modify and then reads the character from the disk and stores it in RAM.

Lines 800–850 set up the title page, call the initializing subroutine and read all your characters to fill the N$ array with character names.

Lines 900–948 do the initialization. The pokes in 905 prepare the RWTS routine to read data directly from the disk. BASE, the target used by RWTS when it moves data, is defined in 906. All locations in Wizfix are relative to BASE; if you want your character stored elsewhere, just change the value of BASE. Line 911 packs the T$ array during initialization.

Line 934 contains the tracks and sectors where your characters are stored on the backup. (Characters are stored in other places on the scenario disk.) Recognize these locations? They are stored in the area usually reserved for DOS. That is why a backup Wizardry disk cannot boot your system. If you have a disk zap type of utility, you might use these locations to do some exploring on your own.

Lines 935–948 contain all the treasures, trifles and traps available to your intrepid band.

Werdna and Gnilda Are Waiting

The rest is up to you. The Wizardry scenarios are universally acclaimed as products of genius and imagination. They are milestones in programming and gaming. Moderate use of Wizfix to restore and enhance your characters can revive the magic of a stalled adventure without destroying the fun. A refurbished and rejuvenated band can solve the scenario you are now working on so you can join the rest of us in awaiting the next episode. ■

Figure 3. Wizfix variable list.

A	Position of chosen character on the roster
A$	Keyboard command from roster screen
AC	Armor class
AG	Agility of character
B$,B	Keyboard input
BASE	Starting location in RAM for character
C$(C)	Class from array of class labels
C1–C4	Characteristic bytes
CASH	Amount of gold
E1–E4	Experience bytes
EP	Experience points
G1–G4	Gold bytes
IQ	IQ of character
K	Miscellaneous counter
L$	Location relative to castle
LE	Level of character
LU	Luck of character
M	Mage spells, number per level
MAP	Miscellaneous
N$	Array of 20 character names
O$(O)	Orientation, from array of orientation labels
OL	Years old
P$	Password
P	Priest spells, number per level
PH	Present hit points
PI	Piety of character
R$(R)	Race, from array of race labels
S$(S)	Status, from array of status labels
SEC	Sectors on disk
ST	Strength of character
T$	Array of objects
T	Values in the 8 object bytes
TLO	Low parameter of object list
THI	High parameter of object list
TT$	Titles of object list sections
TRK	Tracks on disk
VI	Vitality of character
Y1–Y2	Age bytes in weeks

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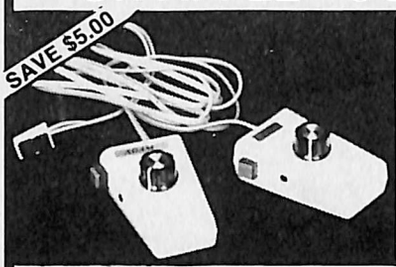

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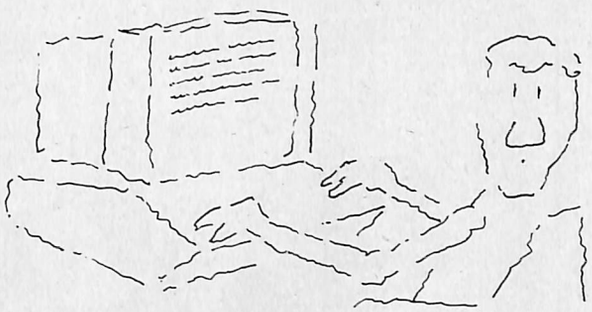

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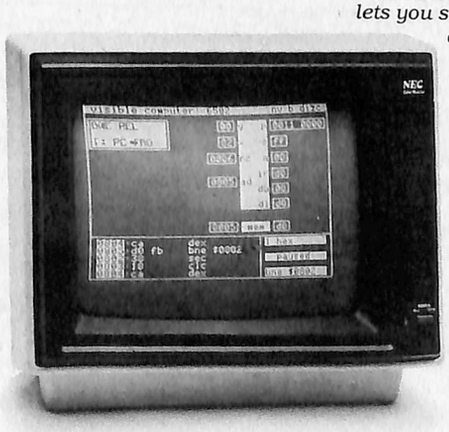

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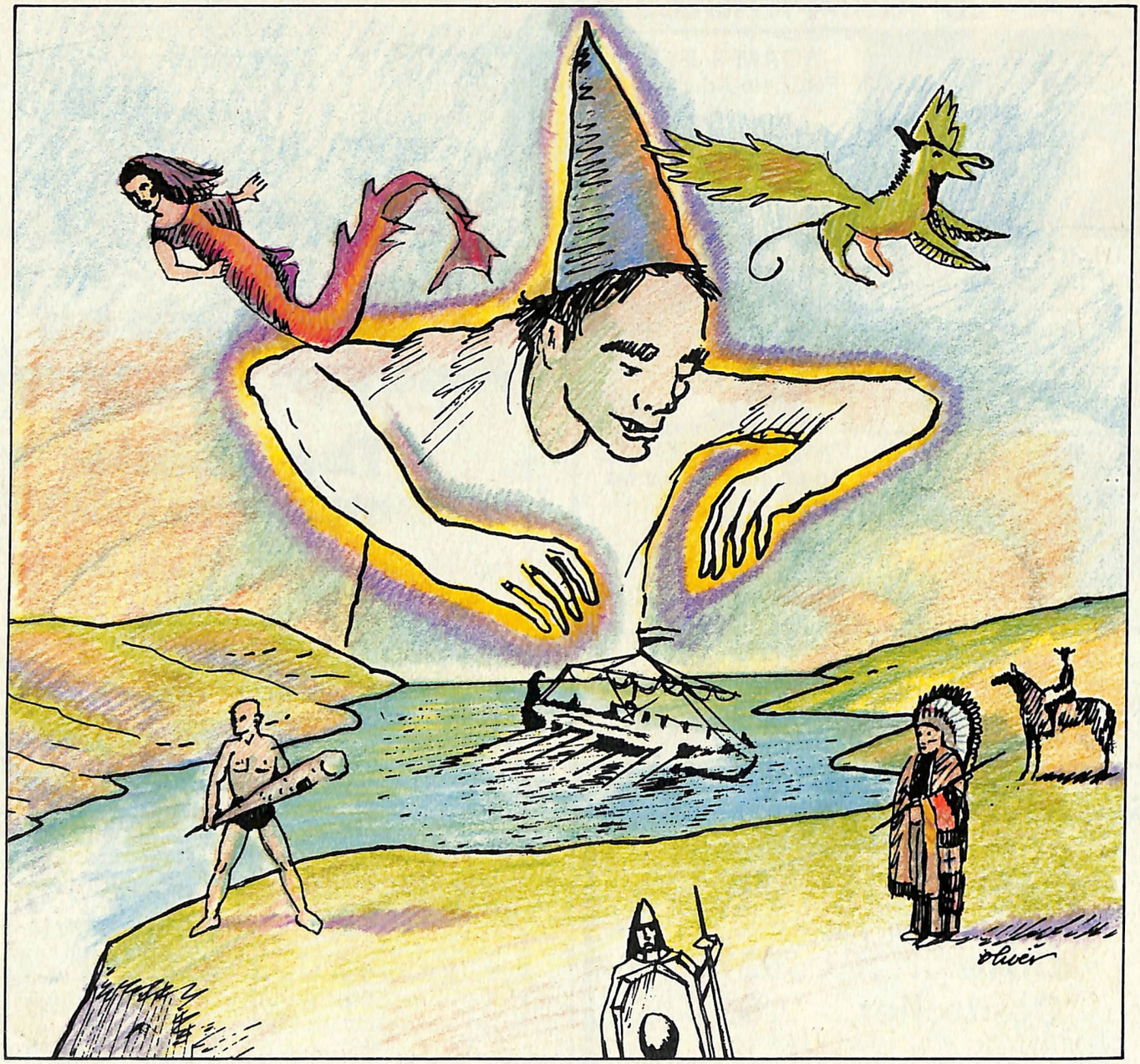


Create-A-Venture

by Gary Cage

I recently wrote an adventure program that I felt was unique. Instead of the old scenario of fighting trolls, rescuing maidens, hunting for gold and the like, the adventurer appeared in a modern day situation. The adventure unfolded at his place of work and the main object was to get rid of the boss before the adventurer could be fired.

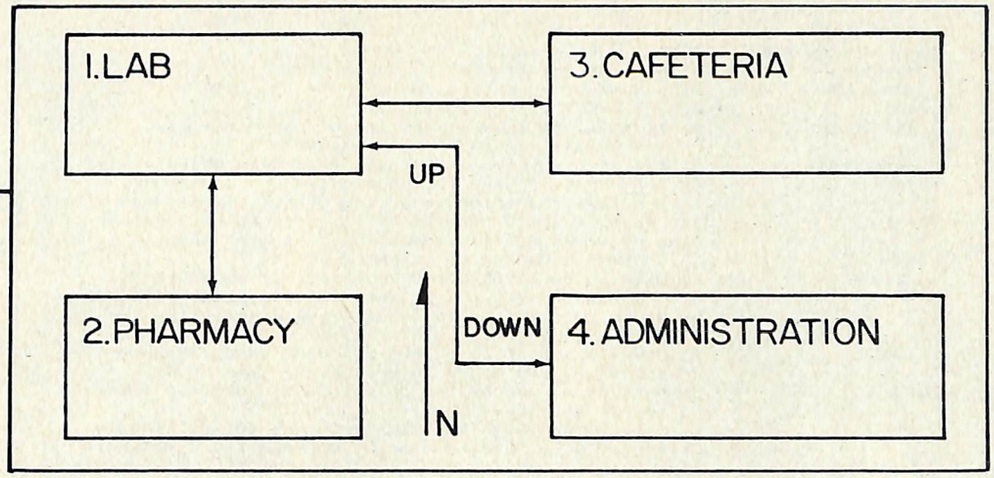
Unfortunately, I chose a setting similar to my own job, where I work in a laboratory as a microbiologist. It was soon pointed out to me that other game players not acquainted with the workings of a laboratory might be bored to tears. Also, I named the program Get Ralph! after my real life boss, and there were those at work who wished I would change the name to protect their jobs.

All of this led me to develop Create-A-Venture wherein you, the programmer, decide what the adventure will be. You plan how many locations you want (25 to 100), the description of each, the placement of exits, and, most importantly, the description of the main character—the object of the adventure. Your goal is to appease this character by bringing him/her/it five gifts that you must pick up along the way.

Spice is added to Create-A-Venture by random elements that may make it difficult for you to succeed. Unfortu-

Address correspondence to Gary Cage, 5416 East Verde Lane, Phoenix, AZ 85018.

Figure 1. Preliminary map.



nately the program is somewhat of a bear to type in.

It is divided into three subprograms: a MENU program (Listing 1), a CREATOR program (Listing 2) that helps you design the game, and the actual ADVENTURE (Listing 3) which uses the information from CREATOR.

Create-A-Venture requires at least 48K RAM. Because of the interaction between the three subprograms, it is essential that a disk system be used, not tape.

Create-A-Venture is written in three parts to conserve space in memory. Altogether the program itself takes up about 29–30K. But if you were to add the data generated in running the CREATOR program, you would have another 20K maximum, thus effectively exceeding a 48K system (remember, 10K is used for DOS).

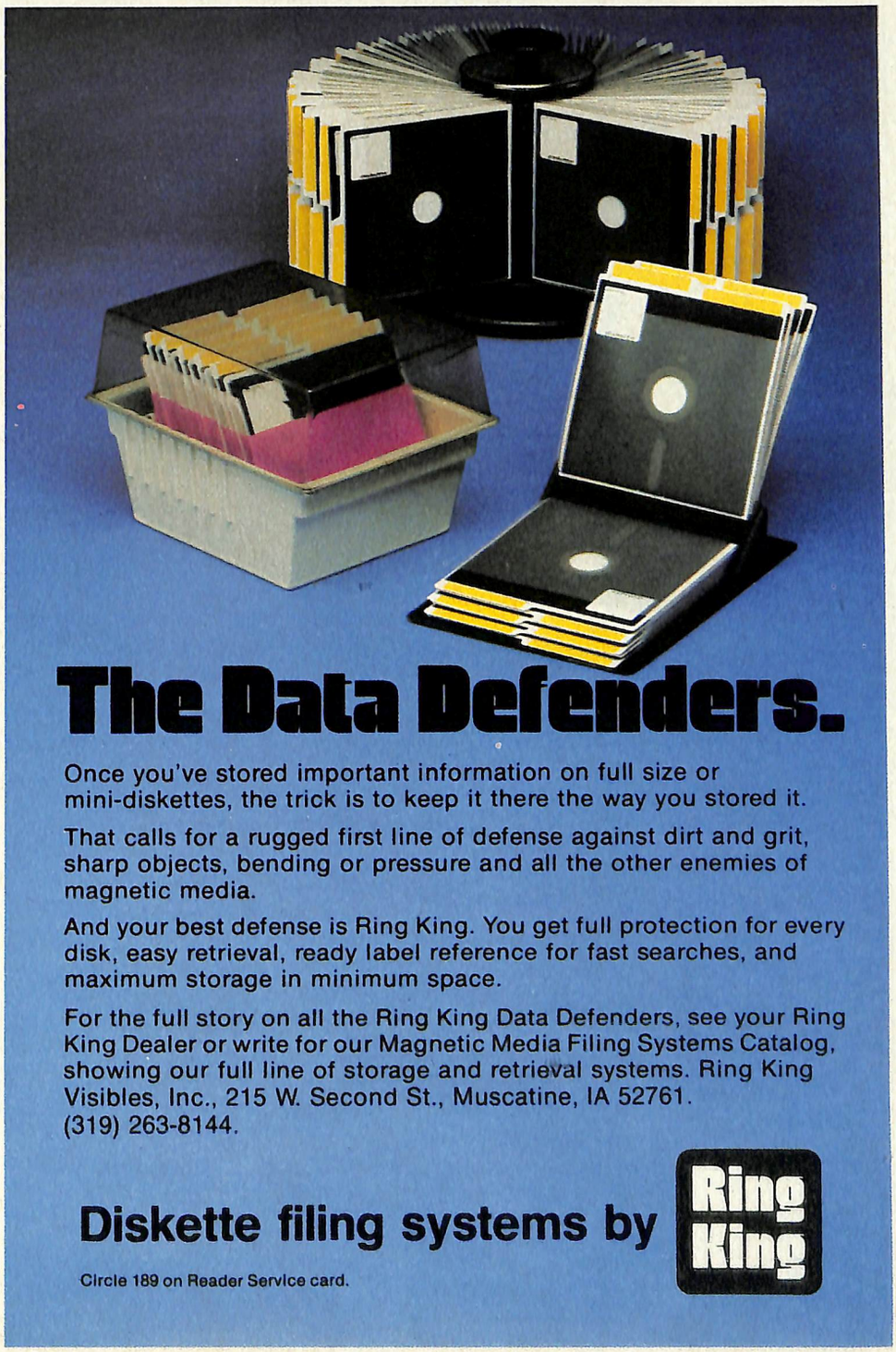
There is one problem with the program that I should point out. Most of the CREATOR data is saved in arrays. As the ADVENTURE program proceeds, variables and arrays are frequently redefined. Instead of storing the new data in the old variable space in memory, Apple just puts it in a new spot. When there is no memory left, Apple does some housecleaning to get rid of the old garbage data.

The problem is that this takes time and the program freezes until the task is accomplished. The use of the FRE(0) function doesn't really speed this process up if you have stored a lot of data. I am aware that there are machine language "garbage collector" routines that would work much faster, but I can't seem to find one. You might want to hunt one up and incorporate it in the ADVENTURE program, issuing a CALL to that routine after every command in the INPUT subroutine. Otherwise you will have to live with this minor annoyance if you have a really large adventure.

What follows is a brief description of the workings of all three parts of Create-A-Venture.

Menu Program

This program presents a choice of running the ADVENTURE program or the CREATOR program, accessing instructions for Create-A-Venture, or quitting. Because all of the programs can call the others, it seemed ridiculous to print the title every time you return to the menu, so I used memory location 778 which is peeked at before the title routine is called. If the value is



```
A$,AA$,AN,AN$   =  A,C,M: User's input.
ARROW$          =  M: Holds arrow figure for menu.
AUTHER$         =  A,C: Name of adventure designer.
BELL$           =  A,C,M: CHR$(7).  Beeps Apple.
BLOCK%(*)       =  A: If equal to 1, prevents any of the previous
                   chosen OBJ$(*)s from being obtained.
BLOCK$(*)       =  A: Explains why you cannot get a certain object.
BS              =  A: Back space.  Used in introduction to adventure.
                   If the last character in a line of text (IN$) does
                   not equal a space then BS=BS - 1.  It is this value
                   plus 40 which decides where the line will end.
BS$             =  C: CHR$(8).  Backspace character.
CHANGE          =  C: Used in Location Query Routine.  If equal to 1,
                   then allows you to change the Location Name.  If
                   equal to 2, then you can change the description for
                   a particular location.
CHECK           =  A: Used to see if an object has been used, dropped
                   or gotten.  1 is added to this every time NOUN$
                   doesn't equal one of the objects.  If CHECK=10 then
                   no object matches.
CK              =  C: Used in the Disk Routines.  Checks to see if both
                   pieces of data have been saved or recalled (.TITLE
                   and .DATA).
CYCLE           =  A: # of times through loop in Sound Routine; to vary
                   the sound.
CS              =  C: Indicates if CTRL-S may be used (0=NO, 1=YES).
CS$             =  C: Message indicating that CTRL-S may be used.
D%(*)           =  A,C: Down direction for every location.  If equal to
                   zero, then you can't go down.
D$              =  A,C,M: CHR$(13) + CHR$(4).  Used for DOS routines.
D1,D2$,D3$,D4$  =  A: Various data read into arrays.  Used in
                   Initialization Routine.
DISK            =  A,C: In CREATOR, 0 = Save data, 1 = Recall data.  In
                   ADVENTURE, 1 = Saves game in progress, 2 = Recalls
                   game, 3 = Recalls CREATOR.DATA, 4 = Recalls
                   CREATOR.TITLE information.
DTA,DTA$        =  C: Same function as D1,D2$,D3$,D4$.  See above.
DUN             =  A: Used in Win Routine.  Allows parts of the
                   Introduction Routine to be skipped over if equal to
                   1.
E%(*)           =  A,C: East direction for every location.  If equal to
                   zero, then you can't go east.
ERR             =  A,C,M: PEEK (222).  ONERR error code.
FALSE           =  C: Equals zero.
FINISH          =  C: Signifies how many times loop must repeat.
FRIE            =  C: FRE(0).  Clears out old string variables in
                   memory.
H,HH            =  A,C: Horizontal cursor values.
HEAD$           =  C: Heading used to show name of CREATOR program.
HRIGHT          =  C: Right-most limit of display for various inputs of
                   user.
I,II            =  A,C,M: General counters for loops (Increment).
IN$             =  A: Used to hold text for Introduction routine
                   (Information).
ITEMS           =  M: # of items contained in menu.
J               =  A: Another general counter for loops.
KEY             =  C,M: PEEK (49152).  Reads the keyboard strobe.  If
                   KEY > 127, then a key was pressed.
L               =  C: Used in Locations and Exits Query.  Equals a
                   chosen location so that you may go back and change
                   it if you wish.
L160$,L20$,L40$=   C: Various drawn line lengths (160,20, and 40).
LD$(*)          =  A,C: Location #*'s description.
LEFT            =  M: Left margin of menu.
LINE            =  A,C,M: Line number of program where an error
                   occurred.
LINE$           =  C: Drawn line used in Exits Query.  Length varies
                   according to number of digits in the number of
                   locations (ie, if NL%=25, THEN LINE$ length would be
                   2).
LN$(*)          =  A,C: Location #*'s name.
LNGTH           =  C: Maximum allowable length of a particular answer.
                   Used in Get Answer Routine.
MAX             =  C: Maximum number of locations that can be used.
MC              =  A: Counts how many times you were in a location with
                   the Main Character.  If equal to 4, then MCHAR$ goes
                   to another random location.
MCHAR$          =  A,C: Name of the Main Character.
MENU$(*)        =  M: Name of items used in the menu.
MIN             =  C: Minimum number of locations that can be used.
MOVE            =  A: If equal to 1, then all objects get moved to
                   random locations.
MPROG$          =  A,C,M: Main Program name (CREATE-A-VENTURE).
MSG$            =  A: Win message.
N%(*)           =  A,C: North direction for every location.  If equal
                   to zero, then you can't go north.
N1,N2           =  C: N1 makes sure you have chosen 5 objects from the
                   list, N2 is used to number the list of those that
                   you chose.
NAME$           =  M: My name.
NH              =  C: Horizontal cursor position for placement of
                   location #.
NL%             =  A,C: Number of locations chosen by user.
NOISE           =  A: Memory location 49200; when PEEKed, clicks
                   speaker.
NOUN$           =  A: The second half of user's input.  Determines
                   directions and objects.  Depends on VERB$.
NUE             =  C: If equal to 1, then user creates new data for
                   adventure.  If equal to zero, then user recalls old
                   data.
NUM             =  A: Number of OBJ$(*) in user's possession.  Must
                   equal 5 to win.  M: Program # user chose from menu.
NV              =  C: Vertical cursor position for placement of
                   location #.
```

Figure continued.

Figure 2.
Variables list. A means Adventure program, C means Creator program, M means Menu program.

zero, the title is printed. If not, the title routine is skipped. Once you have turned your Apple on, even loading and running programs won't touch this location.

The MENU program creates a menu of any length and situates it on the screen according to your specifications. Changing the variables in the initialization routine accomplishes this.

This program is pretty straightforward. A machine language routine I got from the *Applesoft Basic Programming Reference Manual* (page 82) is included to get rid of some of the quirks of the ONERR...GOTO instruction. See that book for more information.

Creator Program

This program is the vehicle for entering data about the adventure you are creating. Why is it so long? Because, in any kind of data entry and retrieval operation, you can just bet you are going to make mistakes, whether they be typos, changing your mind about something or whatever. This program is replete with routines that allow you to fix those mistakes. Also, the program is set up to convey easily to the user exactly what and how much information is required. CREATOR could have been cut in half, but it wouldn't have performed as well.

There are a couple of problems with storing data to disks. The more data you feed in, the longer it takes to get it out. So, when this data is loaded into ADVENTURE, you might have to wait a bit until it's all in memory.

Also, you can store anything to disk because you use the PRINT statement to put it there. However, you may not get it all back because you use the INPUT statement to recall it. If your data includes commas, colons or quotes, you may get an error message.

To eliminate this problem, I have included a check in line 9040 to see if any of those punctuation marks have been entered. (This also includes the right arrow key, but that's eliminated because it can mess up the display.) A book called *Apple Backpack* by Scot Kamins and Mitchell Waite (McGraw-Hill, 1982) describes a routine to store and retrieve all this extra punctuation. If you care to incorporate it, just modify line 9040 (and the instructions

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Figure continued.

```
OBJ%(*)          =  A,C: If equal to -1, then object was not chosen for
                    adventure, otherwise this equals the location number
                    in which the object was found.  If equal to zero,
                    then it is in user's possession.
OBJ$(*)          =  A,C: Object's name.  These are the five objects you
                    need to win.
OBJECT           =  A: Indicates number of ALL objects in user's
                    possession.
OLDR             =  A: Previous room (location) number.
PROG$            =  A,C: Names of various disk files.
RANGE            =  C: Checks to see if numerical values are within a
                    specified range.  Zero for yes, 1 for no.
RESULT$(*)       =  A: Prints message of something that happens as a
                    result of USING some object.
ROOM             =  A: Present room (location) number.
RR(*)            =  A: Random Room function.  Randomly chooses which
                    locations objects are kept.  NOT AN ARRAY!
RTN$             =  A,C,M: CHR$(13).  Carriage return.
S%(*)            =  A,C: South direction for every location.  If equal
                    to zero, then you can't go south.
SAME             =  A: Used to make sure objects aren't stored in the
                    same location.  Zero for no, 1 for yes.
SC%(*)           =  A: Flag to see whether a Special Condition message
                    should be printed.  Zero for no, 1 for yes.
SC$(*)           =  A: Special Condition message.
SOUND            =  A: # of times speaker location is PEEKed.  Makes
                    noise.
SPACE$           =  A: Space character.  Used to tell where user's input
                    should divide into VERB$ and NOUN$.  C: A string of
                    spaces used to erase the Location description.  M: A
                    string of spaces used to erase the ARROW$ character.
START            =  C: Signifies on what number the loop will start.
TIME             =  A,C,M: Used for delay loops.
TITLE$           =  A,C: Title of adventure chosen by user.
TP               =  M: Top margin of menu.
TRUE             =  C: Equals 1.
TS               =  C: Used to indicate a Temporary Save, so that if an
                    error occurs, Error Routine knows which part of the
                    program to return to.  Zero means no temp save, 1
                    means there was a temp save.
U%(*)            =  A,C: Up direction for every location.  If equal to
                    zero, then you can't go up.
UNBLOCK%(*)      =  A: Room number in which object to obtain OBJ$(*) is
                    located.
UNBLOCK$(*)      =  A: Name of the object used to obtain OBJ$(*).
V,VV             =  A,C: Vertical cursor position.
V$               =  A: Same as VERB$.  Used to save space.
VERB$            =  A: Verb or first part of user's input.  Determines
                    valid primary commands.
VERT             =  M: Starting vertical line # of menu.  Same as TP,
                    but used to move arrow position.
VLESS1           =  M: Vertical positon minus 1.  Used to keep track of
                    position of items in menu.
W%(*)            =  A,C: West direction for every location.  If equal to
                    zero, then you can't go west.
WIDTH            =  M: # of characters in largest of the MPROG$ or NAME$
                    variables.  Used to determine # of "*" used in title
                    display.
X                =  A: Horizontal cursor positon used in Win Routine.
XS               =  A: # of excess characters left after a line of text
                    has been printed to the screen.  Used in the
                    Introduction Routine.
XS$              =  A: String of excess characters left over from IN$
                    after being printed to the screen.
XX               =  A: Used to list items in possession in the Inventory
                    Routine.
Y                =  A: Vertical cursor position used in the Win Routine.
Z                =  A: Throw-away variable used in setting up the RR(*)
                    function.
ZERO             =  C: Flag to see if all zeros were chosen as exits for
                    any given location.  Zero equals no, 1 equals yes.
```

```
CALL -958                  :  Clears screen from cursor to bottom.
CALL -868                  :  Clears text line from cursor to right margin.
CALL  768                  :  Machine language routine to cure some
                              problems with the ONERR ... GOTO instruction.
                              Found in the Applesoft Manual.


PEEK(218)+PEEK(219)*256:  Line number where error occured.
PEEK (222)                 :  ONERR error code.
PEEK (49152)               :  Reads the keyboard.
PEEK (49200)               :  Clicks Apple's speaker.


POKE 32,*                  :  Left margin of text screen.
POKE 33,*                  :  Width of text screen.
POKE 34,*                  :  Top margin of text screen.
POKE 35,*                  :  Bottom margin of text screen.
POKE 216,0                 :  Clears ONERR flag.
POKE 768-777,*             :  Where machine language routine to help ONERR
                              is located.
POKE 778,0                 :  Flag to allow title page of menu to print.
POKE 778,255               :  Flag to prevent title page of menu from being
                              printed.
POKE 49168,0               :  Clears keyboard buffer.
```

Figure 3. CALL, PEEK and POKE list.

in the MENU program).

There is a function in CREATOR that enables you to save data to the disk as you go along to guard against power failures. Just hit control-S and all the data up to that point will be saved.

The CREATOR program works best if you have your adventure completely planned out ahead of time. Draw a map of all the locations, numbering each one consecutively. Include the name and description of each location and its entrances and exits. See Figure 1 for an example.

While the example has four locations, you, of course, have to design 25 to 100. When asked for the exits from location #1 (the lab), you would type NORTH: 0, WEST: 0, SOUTH: 2, EAST: 3, UP: 4, DOWN: 0. The numbers represent the location each exit leads to. Zero indicates that there is no exit in that direction. The program checks for all zeros (thus no exits at all from that location), and exits to itself (which is impossible). It does *not* check, however, to see if all locations have accesses. Therefore, you must make sure they do. Otherwise you may design a game that no one can win.

Note that I have provided for up to four lines of text (160 characters) for each location description, but I realize that you may want to be more descriptive. The solution is simple. Just change line 1120 to FOR I=1 TO XXX where XXX is the number of characters desired. Don't go over 240 characters, though. Also, if you use all those lines you cut into the amount of memory you'll have for data. In other words, you'll have to cut down on the maximum number of locations allowed. If you use an extra line (200 characters), change lines 1200 and 3520 to MAX=80, or thereabouts.

Adventure Program

This is another *large* program. To conserve space, you might want to eliminate REM statements, trim variables down to one or two characters, have the title printed without embellishments (lines 2000–2640), and, if you're the only one using the program, eliminate the HELP routine that advises the user what commands are valid in the game.

A few words about some of the AD-

Listing 1. Menu subprogram.

```
0  REM

MAIN PROGRAM

100  TEXT : HOME
110  GOSUB 1000: REM  INIT
120  IF  PEEK (778) = 0 THEN  GOSUB 2000: REM  TITLE
130  GOSUB 3000: REM  MENU
140  HOME
150  PRINT "... END OF ";MPROG$;".MENU PROGRAM"
160  POKE 778,0: REM  ALLOWS TITLE SUB TO RUN
170  VTAB 22: END
999  REM

INITIALIZATION

1000 ARROW$ = "--> "
1010 BELL$ =  CHR$ (7)
1020 D$ =  CHR$ (13) +  CHR$ (4)
1030 ITEMS = 4: REM  # ITEMS IN MENU
1040  DIM MENU$(ITEMS + 2)
1050 LEFT = 1: REM  LEFT MENU MARGIN
1060  FOR I = 1 TO ITEMS + 2
1070  READ DTA$
1080 MENU$(I) = DTA$
1090  NEXT I
1100 MIN = 25
1110 MPROG$ = "CREATE-A-VENTURE"
1120 NAME$ = "BY G. CAGE"
1130 RTN$ =  CHR$ (13)
1140 SPACE$ = "    ": REM  4 SPACES
1150 TP = 5: REM  TOP MARGIN OF MENU
1160 VERT = 5: REM  STARTING VERT LINE # OF MENU. SAME AS TP.
1170 VLESS1 = VERT - 1
1180  FOR I = 768 TO 777
1190  READ DTA
1200  POKE I,DTA
1210  NEXT I
1220  RETURN
1999  REM

TITLE

2000  IF  LEN (MPROG$) >  LEN (NAME$) THEN WIDTH =  LEN (MPROG$): GOTO 2
     020
2010 WIDTH =  LEN (NAME$)
2020  FOR I = 1 TO WIDTH
2030  VTAB 3: HTAB I: PRINT "*"
2040  VTAB 8: HTAB I: PRINT "*"
2050  NEXT I
```

Listing continued.

VENTURE subroutines:

Lines 3000–3340, Introduction. This routine is adapted from *Apple Backpack* (see above). Because variables are used (the game's title and main character) within the text, not knowing their exact length could make words on the screen wrap around and print on the next line, causing a confusing (not to mention, unattractive) display. This routine grabs a string of text from a data statement, and, starting from character #40, works backwards and checks for a space (signifying the end of a word). It keeps backing until it finds one, then prints the line up to that point. The characters that were passed over are stored in a temporary variable called XS$. Then the routine takes XS$, adds some more data to the end of it and the process begins again. Eventually you get a display that looks as if it were tailor-made for your data.

Lines 3500–3790, Input routine.

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Listing continued.

```
 2060  VTAB 5: HTAB 1: PRINT MPROG$
 2070  PRINT NAME$
 2080  FOR TIME = 1 TO 1500
 2090  NEXT TIME
 2100  RETURN
 2999  REM

 MENU

 3000  ONERR  GOTO 6000
 3010  HOME
 3020  PRINT MPROG$;" MENU:"
 3030  FOR I = 1 TO  LEN (MPROG$) + 5: PRINT "=";: NEXT I
 3040  VTAB TP
 3050  FOR I = 1 TO ITEMS
 3060  HTAB LEFT +  LEN (ARROW$): PRINT MENU$(I)
 3070  NEXT I
 3080  VTAB 21: PRINT MENU$(I)
 3090  PRINT MENU$(I + 1)
 3100  VTAB VERT: HTAB LEFT: PRINT ARROW$;
 3110  INVERSE : PRINT MENU$(1): NORMAL
 3120 KEY =  PEEK (49152): IF KEY < 128 THEN  GOTO 3120
 3130  POKE 49168,0
 3140  IF KEY = 141 THEN  GOTO 3210: REM   RTN IS PRESSED.
 3150  IF KEY <  > 160 THEN  GOTO 3120
 3160  VTAB VERT: HTAB LEFT: PRINT SPACE$;MENU$(VERT - VLESS1)
 3170 VERT = VERT + 1: IF VERT > TP + ITEMS - 1 THEN VERT = TP
 3180  VTAB VERT: HTAB LEFT: PRINT ARROW$;
 3190  INVERSE : PRINT MENU$(VERT - VLESS1): NORMAL
 3200  GOTO 3120
 3210  VTAB VERT: HTAB LEFT: PRINT ARROW$;
 3220  FLASH : PRINT MENU$(VERT - VLESS1): NORMAL
 3230  VTAB 21: HTAB 1: CALL  - 958: PRINT BELL$;"IS THIS THE CHOICE YOU
      WANT (Y/N)? ";
 3240  GET AN$
 3250  IF AN$ = "N" THEN  VTAB VERT: HTAB LEFT: PRINT ARROW$;: INVERSE : PRINT
      MENU$(VERT - VLESS1): NORMAL : VTAB 21: CALL  - 958: PRINT MENU$(I)
      : PRINT MENU$(I + 1): GOTO 3120
 3260  IF AN$ <  > "Y" THEN  GOTO 3240
 3270 NUM = VERT - VLESS1
 3280  HOME : VTAB 4
 3290  ON NUM GOTO 3300,3300,3330,3340
 3300  PRINT "NOW ";: FLASH : PRINT " LOADING ": NORMAL
 3310  PRINT MENU$(NUM);" PROGRAM."
 3320  PRINT D$;"RUN";MENU$(NUM)
 3330  GOSUB 4000: GOTO 3010: REM  INSTRUCTIONS
 3340  RETURN
 3999  REM

 INSTRUCTIONS

 4000  HOME
 4010  HTAB 14: PRINT "INSTRUCTIONS"
 4020  HTAB 14: PRINT "------------"
 4030  POKE 34,2
 4040  VTAB 5
 4050  PRINT "  THIS PROGRAM ALLOWS YOU TO DESIGN YOUROWN ADVENTURES.  BY
       SELECTING THE": INVERSE : PRINT "CREATOR";: NORMAL : PRINT " OPTIO
      N FROM THE MAIN MENU, YOU"
 4060  PRINT "CAN TAILOR AN ADVENTURE TO SUIT YOUR    TASTES."
 4070  PRINT : PRINT "  YOU WILL NEED TO PLAN OR MAP OUT YOUR ADVENTURE,
      DETERMINING THE NUMBER OF    LOCATIONS, VARIOUS EXITS TO OTHER"
 4080  PRINT "LOCATIONS, AND DESCRIPTIONS OF EACH OF  THOSE.  WHAT YOU SA
      Y IS ENTIRELY UP TO  YOU.  YOU CAN'T USE COMMAS, COLONS OR  QUOTES
      , HOWEVER."
 4090  GOSUB 5000
 4100  HOME
 4110  VTAB 5
 4120  PRINT "  THERE IS A <CRTL-S> OPTION THAT ALLOWSYOU TO TEMPORARILY
      SAVE TO DISK ALL YOURINFORMATION, WHICH IS A GOOD IDEA TO DO PERIOD
      ICALLY, ESPECIALLY IF YOU HAVE A  LOT OF DATA TO ENTER."
 4130  PRINT : PRINT "  ALL THIS IS FINALLY SAVED TO DISK WITHA MAXIMUM 4
       SECTORS USED FOR EVERY      5 LOCATIONS (THAT'S APPROXIMATELY 1K)."
 4140  PRINT "TO KEEP THE ACTUAL ADVENTURE INTERESTINGYOU WILL HAVE TO DE
      SIGN A MINIMUM OF": PRINT MIN;" LOCATIONS."
 4150  GOSUB 5000
 4160  HOME
 4170  VTAB 5
 4180  PRINT "  ONCE YOUR 'CREATOR' DATA IS STORED ON DISK, YOU MAY SELEC
      T THE ";: INVERSE : PRINT "ADVENTURE": NORMAL
 4190  PRINT "OPTION FROM THE MAIN MENU, WHICH WILL   UTILIZE YOUR DATA F
      OR THE ACTUAL GAME."
 4200  PRINT : PRINT "  THE OBJECT WILL BE TO APPEASE THE MAINCHARACTER Y
      OU DESIGNATED.  TO DO THIS,  YOU MUST BE IN POSSESSION OF ALL 5 OF
        THE OBJECTS YOU CHOSE IN THE 'CREATOR'  PROGRAM."
 4210  PRINT : PRINT "  BECAUSE A CERTAIN AMOUNT OF RANDOMNESSHAS BEEN IN
      TRODUCED (EVEN THOUGH YOU    DESIGNED THE GAME), YOU MAY HAVE A": PRINT
      "DIFFICULT TIME IN WINNING."
 4220  GOSUB 5000
 4230  POKE 34,0
 4240 VERT = TP
 4250  RETURN
 4999  REM

 <RETURN> TO CONTINUE

 5000  VTAB 22: HTAB 9
 5010  PRINT "PRESS <RETURN> TO CONTINUE ";
 5020  GET AN$
 5030  IF AN$ <  > RTN$ THEN  GOTO 5020
 5040  RETURN
 5999  REM

 ERROR ROUTINE
```

Listing continued.

This is the routine that checks for what you want to do. Your input includes a verb and a noun. The verb is checked to determine which subroutine to access. If the subroutine specified doesn't exist, you are so informed. The noun determines further action within that subroutine.

Lines 4000–7560, Various commands. These are all the verb commands available to you, each in its own subroutine.

Lines 8000–8590, Print command. This routine prints each location's name and description, plus whatever objects are presently there. First of all, the routine must check to see if any special conditions exist that would affect that particular location's description (lines 8500–8590). For example, if you wander into a randomly chosen location and have three of the necessary objects in your possession, you are sent to another random location, losing those objects in the process (line 8580).

Lines 9000–9260, Objects in random locations routine. This routine determines what goes in what location, based on the number of locations you chose (NL%). It uses the function equation FN RR(0), which is defined in line 11680 as DEF FN RR(Z) = INT (NL% * RND(1)) + 1. Z is just a throw-away variable, but is needed to set up the definition. (I used zero in the function itself to show that no variable was used.) The function yields a random number anywhere from 1 to the total number of locations in the game.

This routine also checks to make sure that initially no more than one object resides in any given location.

Lines 10000–10380, Win routine. This is where you end up when you've met all the conditions of the game. The routine tells you you've won and ends the program.

Lines 11000–11690, Disk routines. These enable you to retrieve your CREATOR data. Two sub-subroutines make it possible to save the played game at any point and recall it later.

That's it. I realize Create-A-Venture requires a lot of typing, but I think you'll find it's worth it. Be sure to check out the variables list (Figure 2) and the CALL, PEEK and POKE list (Figure 3). They will help you understand how things work. ■

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Listing continued.

```
6000 ERR =  PEEK (222)
6010 LINE =  PEEK (218) +  PEEK (219) * 256
6020  HOME : VTAB 4: PRINT BELL$;
6030  IF ERR = 6 THEN  PRINT "THAT PROGRAM IS NOT ON THIS DISK. PLEASEIN
     SERT THE CORRECT ONE AND TRY AGAIN.": GOTO 6090
6040  IF ERR = 8 THEN  PRINT "THERE IS A PROBLEM WITH THE DISK. PLEASEMA
     KE SURE IT IS INSERTED CORRECTLY.": GOTO 6090
6050  PRINT ;"NOTE: ERROR #";ERR;" OCCURED AT LINE ";LINE;"."
6060  PRINT  SPC( 6);"PLEASE CONSULT THE 1978 APPLESOFT"; SPC( 7);"MANUA
     L (PG. 136) FOR FURTHER IN-"; SPC( 8);"FORMATION."
6070  POKE 216,0: POKE 778,0: REM  SEE LINE #70
6080  VTAB 10: HTAB 18: PRINT "* END *": VTAB 22: END
6090  FOR TIME = 1 TO 2500: NEXT TIME
6100 VERT = TP
6110  POKE 216,0: ONERR  GOTO 6000
6120  CALL 768
6130  GOTO 130
6999  REM                                                    DATA FO
     R MACHINE LANG            ERROR ROUTINE

7000  DATA  " ADVENTURE "," CREATOR "," INSTRUCTIONS "," QUIT "
7010  DATA  "HIT SPACE BAR TO SCAN MENU."
7020  DATA  "  HIT <RETURN> TO CONFIRM CHOICE."
7030  DATA  104,168,104,166,223,154,72,152,72,96
```

Listing 2. Creator subprogram.

```
0  REM

MAIN PROGRAM

100  TEXT : HOME
110  GOSUB 1000: REM INIT
120  GOSUB 2000: REM NEW/OLD SET UP
130  IF NUE = FALSE THEN  GOTO 230
140  GOSUB 3000: REM TITLE/AUTHOR
150  IF NUE = FALSE THEN  GOTO 230
160  GOSUB 3500: REM # LOCATIONS
170  IF NUE = FALSE THEN  GOTO 230
180  GOSUB 4000: REM LOCATIONS
190  IF NUE = FALSE THEN  GOTO 230
200  GOSUB 5000: REM EXITS
210  IF NUE = FALSE THEN  GOTO 230
220  GOSUB 6000: REM OBJECTS
230  GOSUB 7000: REM CHANGES?
240  GOSUB 8000: REM DISK ROUTINE
250  HOME
260  PRINT : PRINT "HIT <RETURN> TO RETURN TO MENU."
270  PRINT "... OR ANY OTHER KEY TO END PROGRAM: ";
280  GET AN$
290  IF AN$ <  > RTN$ THEN  POKE 776,0: TEXT : HOME : PRINT "END OF CREA
     TOR PROGRAM FOR": PRINT MPROG$: VTAB 22: END
300  PRINT D$;"RUN";MPROG$
999  REM

INITIALIZATION

1000  ONERR  GOTO 14000
1010  FOR I = 768 TO 777
1020  READ DTA
1030  POKE I,DTA
1040  NEXT I
1050 BELL$ =  CHR$ (7)
1060 BS$ =  CHR$ (8)
1070 CS$ = "CTRL <S>:  SAVE CURRENT DATA TO DISK"
1080 D$ =  CHR$ (13) +  CHR$ (4)
1090 DISK = 1
1100 FALSE = 0
1110 L160$ = "":L40$ = "":SPACE$ = ""
1120  FOR I = 1 TO 160
1130 L160$ = L160$ +  CHR$ (95)
1140 SPACE$ = SPACE$ + " "
1150  NEXT I
1160 L20$ =  LEFT$ (L160$,20)
1170  FOR I = 1 TO 40
1180 L40$ = L40$ + "-"
1190  NEXT I
1200 MAX = 100
1210 MPROG$ = "CREATE-A-VENTURE"
1220 HEAD$ = MPROG$ + " CREATOR PROGRAM"
1230 RTN$ =  CHR$ (13)
1240  FOR I = 1 TO 10
1250  READ DTA$
1260 OBJ$(I) = DTA$
1270  NEXT I
1280 TRUE = 1
1290 TS = FALSE
1300 ZERO = FALSE
1310  POKE 778,255: REM  >0 KEEPS TITLE OF MENU PROGRAM FROM PRINTING
1320  DIM D%(MAX),E%(MAX),LD$(MAX),LN$(MAX),N%(MAX),S%(MAX),U%(MAX),W%(M
     AX)
1330  RETURN
1999  REM


NEW/OLD SETUP

2000  VTAB 6: PRINT "DO YOU WISH TO CHANGE AN ";: INVERSE : PRINT "OLD";
     : NORMAL : PRINT " ADVENTURE,"
2010  PRINT "CREATE A ";: INVERSE : PRINT "NEW";: NORMAL : PRINT " ADVEN
     TURE, OR"
2020  INVERSE : PRINT "RETURN";: NORMAL : PRINT " TO THE MAIN MENU PROGR
     AM?"
2030  VTAB 10: HTAB 15: PRINT "(O/N/R): ";
2040  GET AN$
2050  IF AN$ = "R" THEN  PRINT "RETURN": PRINT D$;"RUN";MPROG$
2060  IF AN$ = "O" THEN NUE = FALSE:DISK = 1: GOSUB 8000: GOTO 2090: REM
      DISK ROUTINE
2070  IF AN$ = "N" THEN NUE = TRUE: GOTO 2090
2080  GOTO 2040
2090  HOME
2100  VTAB 2: PRINT L40$;
2110  POKE 34,2
2120  RETURN
2999  REM

TITLE/AUTHOR QUERY

3000  HOME
3010 CS = FALSE: VTAB 1: CALL  - 868: PRINT HEAD$
3020 H = 12:HH = H:HRIGHT = H +  LEN (L20$):V = 8
3030  VTAB V: PRINT "TITLE:"; SPC( 5);L20$
3040  VTAB V + 3: PRINT "AUTHOR:"; SPC( 4);L20$
3050  VTAB V + 5: PRINT "MAIN": PRINT "CHARACTER: ";L20$
3060  IF NUE = TRUE THEN  GOTO 3110
3070  VTAB V: HTAB H: PRINT TITLE$
3080  VTAB V + 3: HTAB H: PRINT AUTHER$
3090  VTAB V + 6: HTAB H: PRINT MCHAR$
3100  GOTO 3170
3110 VV = V: VTAB V: HTAB H: GOSUB 9000: REM  GET ANSWER ROUTINE
3120 TITLE$ = A$
3130 VV = V + 3: VTAB VV: HTAB H: GOSUB 9000
3140 AUTHER$ = A$
3150 VV = V + 6: VTAB VV: HTAB H: GOSUB 9000
3160 MCHAR$ = A$
3170  VTAB 20: HTAB 1: CALL  - 958: PRINT "CHANGES (Y/N)? ";
3180  GET AN$
3190  IF AN$ = "N" THEN  GOTO 3310
3200  IF AN$ <  > "Y" THEN  GOTO 3180
```

Listing continued.

Listing continued.

```
3210  VTAB 20: HTAB 1: CALL  - 958: PRINT "PRESS 'T' FOR TITLE"
3220  PRINT  SPC( 6);"'A' FOR AUTHOR"
3230  PRINT  SPC( 6);"'C' FOR CHARACTER"
3240  PRINT  SPC( 6);"'*' FOR NO CHANGES"
3250  GOSUB 10000: REM  READ KEYBOARD
3260  IF KEY = 170 THEN  GOTO 3310
3270  IF KEY = 193 THEN VV = V + 3: VTAB VV: HTAB H: PRINT L20$: VTAB VV
    : HTAB H: GOSUB 9000:AUTHER$ = A$: GOTO 3170
3280  IF KEY = 195 THEN VV = V + 6: VTAB VV: HTAB H: PRINT L20$: VTAB VV
    : HTAB H: GOSUB 9000:MCHAR$ = A$: GOTO 3170
3290  IF KEY = 212 THEN VV = V: VTAB V: HTAB H: PRINT L20$: VTAB V: HTAB
    H: GOSUB 9000:TITLE$ = A$: GOTO 3170
3300  GOTO 3250
3310  FOR I = 1 TO 22
3320  PRINT
3330  NEXT I
3340  RETURN
3499  REM

# LOCATIONS QUERY
3500  HOME
3510 CS = FALSE: VTAB 1: CALL  - 868: PRINT HEAD$
3520 MIN = 25:MAX = 100
3530 H = 19:HH = H:HRIGHT = H +  LEN ( STR$ (MAX)):V = 6
3540  VTAB V: PRINT "THE NUMBER OF LOCATIONS TO BE USED FOR"
3550  PRINT TITLE$;"?"
3560 VV = V + 5: VTAB VV: HTAB 16: PRINT "-> "; LEFT$ (L160$, LEN ( STR$
    (MAX)))
3570  IF NUE = TRUE THEN  GOTO 3590
3580  VTAB VV: HTAB H: CALL  - 868: PRINT NL%: GOTO 3630
3590 RANGE = 0: VTAB VV: HTAB H: GOSUB 9000
3600  GOSUB 11000
3610  IF RANGE = 1 THEN NL% = MIN: GOTO 3580
3620 NL% =  VAL (A$)
3630  VTAB 20: HTAB 1: CALL  - 958: PRINT "CHANGES (Y/N)? ";
3640  GET AN$
3650  IF AN$ = "N" THEN  GOTO 3720
3660  IF AN$ <  > "Y" THEN  GOTO 3640
3670  VTAB 20: HTAB 1: PRINT "PRESS 'C' FOR CHANGE"
3680  PRINT  SPC( 6);"'*' FOR NO CHANGE"
3690  GOSUB 10000
3700  IF KEY = 195 THEN  VTAB VV: HTAB H: PRINT  LEFT$ (L160$, LEN ( STR$
    (MAX))): GOTO 3590
3710  IF KEY <  > 170 THEN  GOTO 3690
3720  FOR I = 1 TO 22
3730  PRINT
3740  NEXT I
3750  RETURN
3999  REM

LOCATION QUERY

4000  HOME
4010 CS = TRUE: VTAB 1: CALL  - 868: PRINT CS$
4020 CHANGE = 0
4030 H = 12:V = 7:NV = 4:NH = 4
4040 L = 1:MIN = 1:MAX = NL%
4050 START = L:FINISH = NL%
4060  VTAB NV: PRINT "LOCATION #"
4070  VTAB V: PRINT "LOCATION NAME:  ";L20$
4080  VTAB V + 3: PRINT "DESCRIPTION:"
4090  VTAB V + 5: PRINT L160$
4100  IF NUE = TRUE THEN  GOTO 4150
4110  VTAB NV: HTAB H: CALL  - 868: PRINT L
4120  VTAB V: HTAB H + 5: CALL  - 868: PRINT LN$(L)
4130  VTAB V + 5: HTAB 1: PRINT SPACE$: VTAB V + 5: HTAB 1: PRINT LD$(L)

4140  GOTO 4320
4150  FOR I = START TO FINISH
4160  VTAB NV: HTAB H: CALL  - 868: PRINT I
4170  IF CHANGE > 0 THEN  ON CHANGE GOTO 4200,4230
4180  VTAB V: HTAB H + 5: PRINT L20$
4190  VTAB V + 5: HTAB 1: PRINT L160$
4200 VV = V:HH = H + 5:HRIGHT = HH +  LEN (L20$): VTAB VV: HTAB HH: IF C
    HANGE > 0 THEN  PRINT L20$: VTAB VV: HTAB HH
4210  GOSUB 9000
4220 LN$(I) = A$: IF CHANGE > 0 THEN  GOTO 4290
4230 VV = V + 5:HH = 1:HRIGHT = HH +  LEN (L160$): VTAB VV: HTAB HH: IF
    CHANGE > 0 THEN  PRINT L160$: VTAB VV: HTAB HH
4240  GOSUB 9000
4250 LD$(I) = A$
4260  VTAB VV: HTAB HH: PRINT SPACE$: VTAB VV: HTAB HH: PRINT LD$(I)
4270  IF CHANGE > 0 THEN  GOTO 4290
4280 L = I
4290 CHANGE = 0
4300 FRIE =  FRE (0)
4310  NEXT I
4320  VTAB 20: HTAB 1: CALL  - 958: PRINT "CHANGES (Y/N)? ";
4330  GET AN$
4340  IF AN$ = "N" THEN  GOTO 4510
4350  IF AN$ <  > "Y" THEN  GOTO 4330
4360  VTAB 20: HTAB 1: CALL  - 958: PRINT "PRESS '#' FOR LOCATION NUMBER
    "
4370  PRINT  SPC( 6);"'N' FOR LOCATION NAME"
4380  PRINT  SPC( 6);"'D' FOR DESCRIPTION"
4390  PRINT  SPC( 6);"'*' FOR NO CHANGES"
4400  GOSUB 10000
4410  IF KEY = 170 THEN  GOTO 4510
4420  IF KEY = 196 OR KEY = 206 THEN START = L:FINISH = L
4430  IF KEY = 196 THEN CHANGE = 2: GOTO 4150
4440  IF KEY = 206 THEN CHANGE = 1: GOTO 4150
4450  IF KEY <  > 163 THEN  GOTO 4400
4460 RANGE = 0: VTAB 20: HTAB 1: CALL  - 958
4470  INPUT "WHICH LOCATION #? ";A$
4480  GOSUB 11000: IF RANGE = 1 THEN  GOTO 4460
4490 L =  VAL (A$)
4500  GOTO 4110
4510  FOR I = 1 TO 22
4520  PRINT
4530  NEXT I
4540  RETURN
4999  REM

EXITS QUERY

5000  HOME
5010 CS = TRUE: VTAB 1: CALL  - 868: PRINT CS$
5020 MIN = 0:MAX = NL%
5030 LINE$ =  LEFT$ (L160$, LEN ( STR$ (MAX)))
5040 H = 8:HH = H:HRIGHT = H +  LEN (LINE$)
5050 V = 12:NV = 9:NH = 11
5060 L = 1:START = L:FINISH = NL%
5070  VTAB V - 8: PRINT "EXITS (TYPE LOCATION # THAT EACH"; SPC( 10);"LE
    ADS TO, OR TYPE 'O' TO INDICATE THAT"; SPC( 2);"THERE IS NO EXIT IN
     THAT DIRECTION):"
5080  VTAB NV: PRINT "LOCATION #"
5090  VTAB V: PRINT "NORTH:"
5100  PRINT "WEST :"
5110  PRINT "SOUTH:"
5120  PRINT "EAST :"
5130  PRINT "UP   :"
5140  PRINT "DOWN :"
5150  IF NUE = TRUE THEN  GOTO 5210
5160  VTAB NV: HTAB NH: CALL  - 868: PRINT L;" ";: INVERSE : PRINT " ";L
    N$(L);" ": NORMAL
5170  VTAB V: HTAB H: CALL  - 868: PRINT N%(L): HTAB H: CALL  - 868: PRINT
    W%(L)
5180  HTAB H: CALL  - 868: PRINT S%(L): HTAB H: CALL  - 868: PRINT E%(L)

5190  HTAB H: CALL  - 868: PRINT U%(L): HTAB H: CALL  - 868: PRINT D%(L)

5200  GOTO 5490
5210  FOR I = START TO FINISH
5220  VTAB NV: HTAB NH: CALL  - 868: PRINT I;" ";: INVERSE : PRINT " ";L
    N$(I);" ": NORMAL
```

Listing continued.

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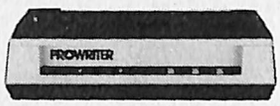

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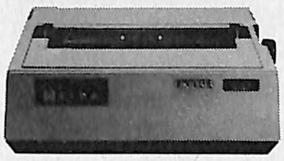

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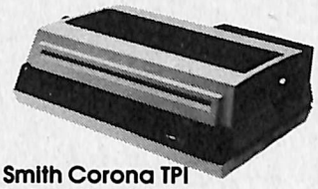

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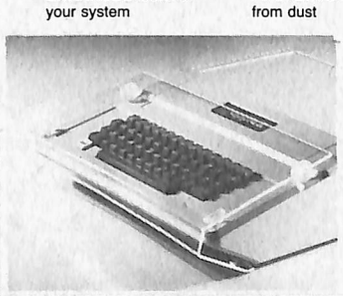

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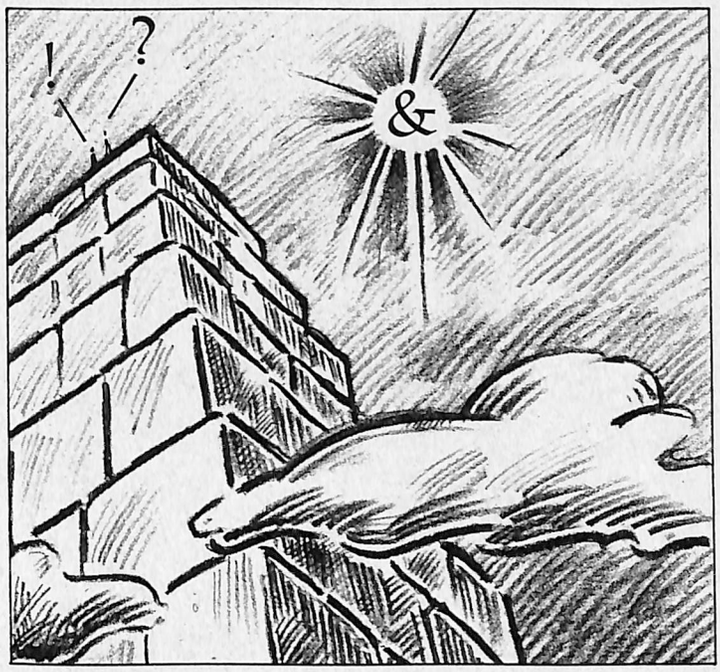

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Listing continued.

```
5230  FOR II = 0 TO 5
5240  VTAB V + II: HTAB H
5250  PRINT LINE$
5260  NEXT II
5270 RANGE = 0:VV = V: VTAB VV: HTAB H: GOSUB 9000
5280  GOSUB 11000: IF RANGE = 1 OR  VAL (A$) = I THEN  VTAB VV: HTAB H: PRINT
     LINE$: GOTO 5270
5290  GOSUB 12000:N%(I) =  VAL (A$)
5300 RANGE = 0:VV = V + 1: VTAB VV: HTAB H: GOSUB 9000
5310  GOSUB 11000: IF RANGE = 1 OR  VAL (A$) = I THEN  VTAB VV: HTAB H: PRINT
     LINE$: GOTO 5300
5320  GOSUB 12000:W%(I) =  VAL (A$)
5330 RANGE = 0:VV = V + 2: VTAB VV: HTAB H: GOSUB 9000
5340  GOSUB 11000: IF RANGE = 1 OR  VAL (A$) = I THEN  VTAB VV: HTAB H: PRINT
     LINE$: GOTO 5330
5350  GOSUB 12000:S%(I) =  VAL (A$)
5360 RANGE = 0:VV = V + 3: VTAB VV: HTAB H: GOSUB 9000
5370  GOSUB 11000: IF RANGE = 1 OR  VAL (A$) = I THEN  VTAB VV: HTAB H: PRINT
     LINE$: GOTO 5360
5380  GOSUB 12000:E%(I) =  VAL (A$)
5390 RANGE = 0:VV = V + 4: VTAB VV: HTAB H: GOSUB 9000
5400  GOSUB 11000: IF RANGE = 1 OR  VAL (A$) = I THEN  VTAB VV: HTAB H: PRINT
     LINE$: GOTO 5390
5410  GOSUB 12000:U%(I) =  VAL (A$)
5420 RANGE = 0:VV = V + 5: VTAB VV: HTAB H: GOSUB 9000
5430  GOSUB 11000: IF RANGE = 1 OR  VAL (A$) = I THEN  VTAB VV: HTAB H: PRINT
     LINE$: GOTO 5420
5440  GOSUB 12000:D%(I) =  VAL (A$)
5450  IF N%(I) = 0 AND W%(I) = 0 AND S%(I) = 0 AND E%(I) = 0 AND U%(I) =
     0 AND D%(I) = 0 THEN  GOSUB 13000
5460  IF ZERO = TRUE THEN ZERO = FALSE: GOTO 5230
5470 L = I
5480  NEXT I
5490  VTAB 20: HTAB 1: CALL  - 958: PRINT "CHANGES (Y/N)? ";
5500  GET AN$
5510  IF AN$ = "N" THEN  GOTO 5660
5520  IF AN$ <  > "Y" THEN  GOTO 5500
5530  VTAB 20: HTAB 1: CALL  - 958: PRINT "PRESS '#' FOR LOCATION NUMBER
     "
5540  PRINT  SPC( 6);"'E' TO CHANGE EXITS"
5550  PRINT  SPC( 6);"'*' FOR NO CHANGES"
5560  GOSUB 10000
5570  IF KEY = 170 THEN  GOTO 5660
5580  IF KEY = 197 THEN START = L:FINISH = L:MIN = 0: GOTO 5210
5590  IF KEY <  > 163 THEN  GOTO 5560
5600  VTAB 20: HTAB 1: CALL  - 958
5610 MIN = 1:RANGE = 0
5620  INPUT "WHICH LOCATION #? ";A$
5630  GOSUB 11000: IF RANGE = 1 THEN  GOTO 5600
5640 L =  VAL (A$)
5650  GOTO 5160
5660  FOR I = 1 TO 22
5670  PRINT
5680  NEXT I
5690  RETURN
5999  REM

OBJECT QUERY

6000  HOME
6010  VTAB 1: CALL  - 868: PRINT HEAD$
6020 N1 = 1:N2 = 1:V = 8
6030  FOR I = 1 TO 10
6040 OBJ%(I) =  - 1
6050  NEXT I
6060  VTAB V - 4: PRINT "CHOOSE 5 OF THE FOLLOWING THAT YOU WISH TO APPE
     AR IN ";TITLE$;":"
6070  VTAB V
6080  FOR I = 1 TO 10
6090  PRINT  CHR$ (64 + I);".  ";OBJ$(I)
6100  NEXT I
6110  VTAB 20: HTAB 1: CALL  - 958
6120  PRINT "LETTER -> ";
6130  GET AN$
6140  IF AN$ < "A" OR AN$ > "J" THEN  GOTO 6130
6150  VTAB  ASC (AN$) - (65 - V): HTAB 1
6160  INVERSE : PRINT AN$;".": NORMAL
6170  IF OBJ%( ASC (AN$) - 64) <  > 0 THEN  GOTO 6220
6180  VTAB 20: HTAB 1: CALL  - 958
6190  PRINT BELL$;"SORRY, YOU HAVE ALREADY CHOSEN THAT."
6200  FOR TIME = 1 TO 1500: NEXT TIME
6210  GOTO 6110
6220 OBJ%( ASC (AN$) - 64) = 0
6230 N1 = N1 + 1: IF N1 <  = 5 THEN  GOTO 6110
6240  HOME
6250  PRINT : PRINT "THESE ARE THE OBJECTS YOU CHOSE:"
6260  VTAB 6
6270  FOR I = 1 TO 10
6280  IF OBJ%(I) = 0 THEN  PRINT N2;".  ";OBJ$(I):N2 = N2 + 1
6290  NEXT I
6300  VTAB 20: HTAB 1
6310  PRINT "CHANGES (Y/N)? ";
6320  GET AN$
6330  IF AN$ = "Y" THEN  GOTO 6000
6340  IF AN$ <  > "N" THEN  GOTO 6320
6350  FOR I = 1 TO 22
6360  PRINT
6370  NEXT I
6380  RETURN
6999  REM

CHANGES?

7000  HOME
7010  VTAB 1: CALL  - 868: PRINT HEAD$
7020 NUE = FALSE
7030  VTAB 4
7040  PRINT "WOULD YOU LIKE TO CORRECT ANY SECTION:"
7050  POKE 33,36: POKE 32,4
7060  VTAB 6
7070  PRINT "1. TITLE/AUTHOR"
7080  PRINT : PRINT "2. NUMBER OF LOCATIONS"
7090  PRINT : PRINT "3. DESCRIPTIONS OF LOCATIONS"
7100  PRINT : PRINT "4. EXITS OF LOCATIONS"
7110  PRINT : PRINT "5. OBJECTS"
7120  PRINT : PRINT "6. NO, I DON'T NEED TO CORRECT"; SPC( 9);"A THING.
     THANKS JUST THE SAME."
7130  POKE 33,40: POKE 32,0
7140  VTAB 20
7150  PRINT "NUMBER -> ";
7160  GET AN$
7170 AN =  VAL (AN$)
7180  IF AN < 1 OR AN > 6 THEN  GOTO 7160
7190  IF AN < 6 THEN  POP
7200  ON AN GOTO 7210,7220,7230,7240,7250,7260
7210  GOTO 140: REM  TITLE/AUTHOR
7220  GOTO 160: REM  # LOCATIONS
7230  GOTO 180: REM  LOCATIONS
7240  GOTO 200: REM  EXITS
7250  GOTO 220: REM  OBJECTS
7260 DISK = 0
7270  RETURN
7998  REM

DISK ROUTINES:

7999  REM

1. DISK=0 (SAVE)
8000 PROG$ = "^" + MPROG$ + ".TITLE"
8010 CK = 0
8020  HOME
8030  VTAB 1: CALL  - 868: PRINT HEAD$
8040  PRINT L40$;
8050  VTAB 4
```

Listing continued.

Listing continued.

```
8060  IF DISK = 1 THEN  GOTO 8500: REM  READ
8070  PRINT "TO SAVE ";MPROG$;" DATA TO DISK:"
8080  PRINT : PRINT : HTAB 6: PRINT "1. INSERT DISK INTO DRIVE #1"
8090  PRINT : HTAB 6: PRINT "2. PRESS <RETURN> TO SAVE"
8100  PRINT : HTAB 6: PRINT "3. ANY OTHER KEY TO RETURN: ";
8110  GET AN$
8120  IF AN$ = RTN$ THEN  GOTO 8140
8130  POP : GOTO 230
8140  HOME
8150  VTAB 8: HTAB 1: PRINT "NOW ";: FLASH : PRINT " SAVING ": NORMAL : PRIN
     PROG$;" TO DISK."
8160  PRINT D$;"OPEN";PROG$
8170  PRINT D$;"DELETE";PROG$
8180  PRINT D$;"OPEN";PROG$
8190  PRINT D$;"WRITE";PROG$
8200  IF CK = 1 THEN  GOTO 8250
8210  PRINT TITLE$
8220  PRINT AUTHER$
8230  PRINT MCHAR$
8240  IF CK = 0 THEN CK = 1: PRINT D$;"CLOSE":PROG$ = "^" + MPROG$ + ".D
     ATA": GOTO 8140
8250  PRINT NL%
8260  FOR II = 1 TO NL%
8270  PRINT LN$(II): PRINT LD$(II)
8280  PRINT N%(II): PRINT W%(II): PRINT S%(II): PRINT E%(II): PRINT U%(I
     I): PRINT D%(II)
8290  NEXT II
8300  FOR II = 1 TO 10
8310  PRINT OBJ%(II): PRINT OBJ$(II)
8320  NEXT II
8330  PRINT D$;"CLOSE"
8340  GOTO 8770
8499  REM

2. DISK=1 (RECALL)

8500  PRINT "TO RECALL OLD ";MPROG$;" DATA:"
8510  PRINT : PRINT : HTAB 6: PRINT "1. PLACE CORRECT DISK IN DRIVE #1"
8520  PRINT : HTAB 6: PRINT "2. PRESS <RETURN> TO RECALL"
8530  PRINT : HTAB 6: PRINT "3. ANY OTHER KEY TO RETURN: ";
8540  GET AN$
8550  IF AN$ = RTN$ THEN  GOTO 8570
8560  POP : POP : HOME : GOTO 120
8570  HOME
8580  VTAB 1: CALL  - 868: PRINT HEAD$: PRINT L40$;
8590  VTAB 8: HTAB 1: PRINT "NOW ";: FLASH : PRINT " LOADING ": NORMAL :
     PRINT PROG$;" FROM DISK."
8600  PRINT D$;"VERIFY";PROG$
8610  PRINT D$;"OPEN";PROG$
8620  PRINT D$;"READ";PROG$
8630  IF CK = 1 THEN  GOTO 8680
8640  INPUT TITLE$
8650  INPUT AUTHER$
8660  INPUT MCHAR$
8670  IF CK = 0 THEN CK = 1: PRINT D$;"CLOSE":PROG$ = "^" + MPROG$ + ".D
     ATA": GOTO 8570
8680  INPUT NL%
8690  FOR II = 1 TO NL%
8700  INPUT LN$(II): INPUT LD$(II)
8710  INPUT N%(II): INPUT W%(II): INPUT S%(II): INPUT E%(II): INPUT U%(I
     I): INPUT D%(II)
8720  NEXT II
8730  FOR II = 1 TO 10
8740  INPUT OBJ%(II): INPUT OBJ$(II)
8750  NEXT II
8760  PRINT D$;"CLOSE"
8770  RETURN
8999  REM

GET ANSWERS ROUTINE

9000 A$ = ""
9010 LNGTH = HRIGHT - HH
9020  GET AN$
9030  IF CS = TRUE AND AN$ =  CHR$ (19) THEN AN$ =  CHR$ (13):TS = TRUE:
     CK = 1:PROG$ = "^" + MPROG$ + ".DATA":GOSUB 8160
9040  IF AN$ =  CHR$ (21) OR AN$ =  CHR$ (34) OR AN$ =  CHR$ (44) OR AN$
      =  CHR$ (58) THEN  GOTO 9020
9050  PRINT AN$;
9060  IF AN$ = RTN$ AND A$ = "" THEN  VTAB VV: HTAB HH: GOTO 9020
9070  IF AN$ = RTN$ THEN  VTAB VV: HTAB HH: CALL  - 868: PRINT A$: GOTO
     9130
9080 A$ = A$ + AN$
9090  IF  LEN (A$) > 2 AND AN$ = BS$ THEN A$ =  LEFT$ (A$, LEN (A$) - 2)
     : GOTO 9110
9100  IF AN$ = BS$ THEN A$ = "": VTAB VV: HTAB HH
9110  IF  LEN (A$) >  = LNGTH THEN A$ =  LEFT$ (A$,LNGTH): VTAB VV: HTAB
     HRIGHT: CALL  - 868
9120  GOTO 9020
9130  RETURN
9999  REM

READ KEYBOARD

10000 KEY =  PEEK (49152)
10010  IF KEY < 128 THEN  GOTO 10000
10020  POKE 49168,0
10030  RETURN
10999  REM

CHECK # RANGE

11000  IF  VAL (A$) >  = MIN AND  VAL (A$) <  = MAX THEN  GOTO 11070
11010  VTAB 20: HTAB 1: CALL  - 958
11020  PRINT BELL$;"SORRY- THE VALUE MUST BE BETWEEN"
11030  PRINT  SPC( 7);MIN;" AND ";MAX;"."
11040 RANGE = 1
11050  FOR TIME = 1 TO 1500: NEXT TIME
11060  VTAB 20: HTAB 1: CALL  - 958
11070  RETURN
11999  REM

FORMAT EXIT #'S

12000  IF  VAL (A$) <  > 0 THEN  GOTO 12040
12010  VTAB VV: HTAB HH: CALL  - 868
12020  PRINT 0
12030 A$ =  STR$ (0)
12040  RETURN
12999  REM

EXITS=0 ERROR ROUTINE

13000  VTAB 20: HTAB 1: CALL  - 958
13010  PRINT BELL$;"*** YOU HAVE ENTERED ALL ZEROS."; SPC( 13);"THEREFOR
     E, NO EXITS ARE POSSIBLE."
13020  PRINT  SPC( 4);"PLEASE TRY AGAIN, WITH AT LEAST"; SPC( 9);"ONE EX
     IT."
13030  FOR TIME = 1 TO 2000: NEXT TIME
13040  VTAB 20: HTAB 1: CALL  - 958
13050 ZERO = TRUE
13060  RETURN
13999  REM

ERROR ROUTINES

14000 ERR =  PEEK (222)
14010 LINE =  PEEK (218) +  PEEK (219) * 256
14020  HOME : VTAB 6: PRINT BELL$;
14030  IF ERR = 4 THEN  PRINT "YOUR DISK IS WRITE PROTECTED.": GOTO 1409
     0
14040  IF ERR = 6 THEN  PRINT "THAT PROGRAM IS NOT FOUND ON THIS       P
     ARTICULAR DISK.": GOTO 14090
14050  IF ERR = 8 THEN  PRINT "THERE IS AN INPUT/OUTPUT ERROR.  CHECK  T
     O BE SURE DISK IS IN DRIVE PROPERLY ANDDOOR IS CLOSED.": GOTO 14090
```

Listing continued.

Listing continued.

```
14060  IF ERR = 9 THEN  PRINT "THE DISK IS FULL.  NO MORE INFO CAN BE  A
     DDED.  PLEASE USE ANOTHER DISK.": GOTO 14090
14070  IF ERR = 10 THEN  PRINT "THE FILE WAS LOCKED.  IT HAS NOW BEEN
     UNLOCKED.": PRINT D$;"UNLOCK";PROG$: GOTO 14090
14080  TEXT : HOME : PRINT "THERE IS AN ERROR #";ERR;" IN LINE ";LINE;".
     ": PRINT "THIS PROGRAM HAS ENDED.": POKE 216,0: POKE 776,0: END
14090  FOR TIME = 1 TO 2000: NEXT TIME
14100  POKE 216,0
14110  CALL 768
14120  ONERR  GOTO 14000
14130  IF DISK = 1 THEN  HOME : GOTO 120
14140  IF TS = TRUE AND NUE = FALSE THEN TS = FALSE: GOTO 230
14150  GOTO 240
14999  REM

DATA

15000  DATA  104,168,104,166,223,154,72,152,72,96
15010  DATA  COIN,FLOWER,NAIL,PAPER,PEN
15020  DATA  RING,ROPE,STICK,STONE,WATER
```

Listing 3. Adventure subprogram.

```
0  REM

MAIN PROGRAM

100  TEXT : HOME
110  GOSUB 1000: REM  INIT
120 DISK = 4: GOSUB 11000: REM   LOAD TITLE DATA
130  GOSUB 2000: REM  TITLE
140 DISK = 3: GOSUB 11000: REM   LOAD ADVENTURE DATA
150  GOSUB 3000: REM  INTRO
160  GOSUB 3500: REM  INPUT
170  HOME
180  VTAB 6: PRINT "DO YOU WISH TO QUIT (Y/N)? ";
190  GET AN$
200  IF AN$ = "N" THEN  GOSUB 8000: GOTO 160
210  IF AN$ <  > "Y" THEN  GOTO 190
220  VTAB 1: HTAB 1: CALL  - 868
230  VTAB 22: CALL  - 958
240  VTAB 6: HTAB 28: PRINT "YES"
250  VTAB 9: PRINT  SPC( 2);"HIT <RETURN> TO RETURN TO MAIN MENU,"
260  PRINT  SPC( 4);"ANY OTHER KEY TO END. ";
270  GET AN$
280  IF AN$ = RTN$ THEN  POKE 778,255: PRINT D$;"RUN";MPROG$
290  TEXT : HOME
300  PRINT "END OF ADVENTURE PROGRAM FOR": PRINT MPROG$
310  VTAB 22
320  END
999  REM

INITIALIZATION

1000  DIM SC%(4),SC$(4)
1010 BELL$ =  CHR$ (7)
1020 D$ =  CHR$ (13) +  CHR$ (4)
1030 DUN = 0
1040 MC = 0
1050 MOVE = 0
1060 MPROG$ = "CREATE-A-VENTURE"
1070 MSG$ = "YOU WIN (YAY!)"
1080 NOISE = 49200
1090 RTN$ =  CHR$ (13)
1100  FOR I = 1 TO 10
1110  READ D1,D2$,D3$,D4$
1120  POKE I + 767,D1
1130 BLOCK$(I) = D2$
1140 RESULT$(I) = D3$
1150 UNBLOCK$(I) = D4$
1160  NEXT I
1170  FOR I = 0 TO 4
1180  READ D2$
1190 SC%(I) = 0
1200 SC$(I) = D2$
1210  NEXT I
1220  POKE 778,0: REM  MENU TITLE PRINTS
1230  RETURN
1999  REM

TITLE

2000  HOME
2010 V = 5
2020  FOR I = 1 TO 40
2030  VTAB V - 2: HTAB I: PRINT "="
2040  VTAB V + 2: HTAB I: PRINT "="
2050  NEXT I
2060 CYCLE = 1
2070 A$ = TITLE$
2080  GOSUB 2500
2090 A$ = "BY: " + AUTHER$
2100  GOSUB 2500
2110 CYCLE = 4
2120  VTAB 23
2130  FOR I = 1 TO V + 1
2140  PRINT
2150  GOSUB 9500
2160  NEXT I
2170  RETURN
2499  REM

MOVE TITLE/NAME

2500 AA$ = A$
2510 H = 21 -  LEN (AA$) / 2
2520  FOR I = 1 TO 40
2530 A$ = " " + A$
2540  NEXT I
2550  VTAB V
2560  PRINT  MID$ (A$,1,40)
2570  GOSUB 9500
2580  FOR TIME = 1 TO 10: NEXT TIME
2590  IF  MID$ (A$,H, LEN (AA$)) = AA$ THEN  FOR TIME = 1 TO 500: NEXT T
    IME
2600 A$ =  MID$ (A$,2) +  LEFT$ (A$,1)
2610  IF  MID$ (A$,41, LEN (AA$)) = AA$ THEN  VTAB V: PRINT " ": GOTO 26
    30
2620  GOTO 2550
2630  FOR TIME = 1 TO 200: NEXT TIME
2640  RETURN
2999  REM

INTRODUCTION

3000  HOME
3010  FOR I = 1 TO 40
3020  VTAB 2: HTAB I: PRINT "-"
3030  VTAB 20: HTAB I: PRINT "-"
3040  NEXT I
3050  POKE 34,2: POKE 35,19
3060  VTAB 4
3070  READ IN$
3080  IF IN$ = "CHAR" THEN IN$ = MCHAR$
3090  IF IN$ = "TITLE" THEN IN$ = TITLE$
3100  IF IN$ = "?" THEN  PRINT XS$:XS$ = "": PRINT : GOTO 3070
3110  IF IN$ = "%" THEN  PRINT XS$:XS$ = "": GOTO 3240
3120 IN$ = XS$ + IN$
3130 BS = 0
3140 XS$ =  LEFT$ (IN$,40 + BS)
3150  IF  LEN (XS$) =  LEN (IN$) THEN  GOTO 3070
3160  IF  RIGHT$ (XS$,1) = " " THEN  GOTO 3190
3170 BS = BS - 1
3180  GOTO 3140
```

Listing continued.

Listing continued.

```
3190  PRINT  LEFT$ (XS$,39)
3200 XS =  LEN (IN$) -  LEN (XS$)
3210  IF XS = 0 THEN  GOTO 3070
3220 IN$ =  RIGHT$ (IN$,XS)
3230  GOTO 3130
3240  IF DUN THEN  GOTO 3340
3250  VTAB 22
3260  PRINT "PRESS <RETURN> TO START ";
3270  GET AN$
3280  IF AN$ <  > RTN$ THEN  GOTO 3270
3290  VTAB 22: HTAB 1: CALL  - 958
3300  HOME
3310  VTAB 1: HTAB 1: PRINT "LOCATION:"
3320 ROOM = 1
3330  GOSUB 8000
3340  RETURN
3499  REM

INPUT ROUTINE

3500  VTAB 22: HTAB 1: CALL  - 958: INPUT "COMMAND: ";AN$
3510  IF AN$ = "" THEN  GOSUB 8000: GOTO 3500
3520 II = 0
3530  FOR I = 1 TO  LEN (AN$)
3540 SPACE$ =  MID$ (AN$,I,1)
3550  IF SPACE$ = " " THEN II = I:I =  LEN (AN$)
3560  NEXT I
3570  IF II = 0 THEN II = I
3580 VERB$ =  MID$ (AN$,1,II - 1)
3590  IF II >  LEN (AN$) THEN NOUN$ = "": GOTO 3620
3600 NOUN$ =  MID$ (AN$,II + 1)
3610  IF  LEFT$ (NOUN$,1) = " " THEN NOUN$ =  MID$ (NOUN$,2): GOTO 3610
3620 V$ = VERB$
3630  IF V$ = "DROP" OR V$ = "LEAVE" THEN  GOSUB 4000: GOTO 3500
3640  IF V$ = "FIND" THEN  GOSUB 4500: GOTO 3500
3650  IF V$ = "GET" OR V$ = "TAKE" THEN  GOSUB 5000: GOTO 3500
3660  IF V$ = "GIVE" THEN  GOSUB 10000: GOTO 3500
3670  IF V$ = "GO" THEN  GOSUB 6000: GOTO 3500
3680  IF V$ = "SAVE" THEN DISK = 1: GOSUB 11000: GOTO 3500
3690  IF V$ = "USE" THEN  GOSUB 5500: GOTO 3500
3700  IF V$ = "D" OR V$ = "E" OR V$ = "N" OR V$ = "S" OR V$ = "U" OR V$ =
     "W" THEN  GOSUB 6000: GOTO 3500
3710  IF V$ = "HELP" THEN  GOSUB 6500: GOTO 3500
3720  IF  LEFT$ (V$,3) = "INV" THEN  GOSUB 7000: GOTO 3500
3730  IF V$ = "LOOK" THEN  GOSUB 7500: GOTO 3500
3740  IF  LEFT$ (V$,1) = "Q" THEN  GOTO 3800
3750  IF V$ = "RECALL" THEN DISK = 2: GOSUB 11000: GOTO 3500
3760  HOME
3770  GOSUB 8000
3780  PRINT BELL$;"* YOU CAN'T "; LEFT$ (V$,16);" SOMETHING."
3790  GOTO 3500
3800  RETURN
3999  REM

'DROP' ROUTINE

4000 CHECK = 0
4010  FOR J = 1 TO 10
4020  IF NOUN$ = OBJ$(J) AND OBJ%(J) = 0 THEN OBJ%(J) = ROOM:BLOCK%(J) =
     1:OBJECT = OBJECT - 1:NUM = NUM - 1: GOTO 4050
4030  IF ( LEFT$ (NOUN$,3) =  LEFT$ (UNBLOCK$(J),3) OR  RIGHT$ (NOUN$,4)
      =  RIGHT$ (UNBLOCK$(J),4)) AND UNBLOCK%(J) = 0 THEN UNBLOCK%(J) =
     ROOM:OBJECT = OBJECT - 1:BLOCK%(J) = 1: GOTO 4050
4040 CHECK = CHECK + 1
4050  NEXT J
4060  GOSUB 8000
4070  IF CHECK = 10 THEN  PRINT BELL$;"* YOU DON'T HAVE THAT!"
4080  RETURN
4499  REM

'FIND' ROUTINE

4500  GOSUB 8000
4510  PRINT BELL$;"* I'M AFRAID YOU'RE GOING TO HAVE TO    FIND THAT FOR
     YOURSELF."
4520  PRINT
4530  RETURN
4999  REM

'GET' ROUTINE

5000 CHECK = 0
5010  IF OBJECT = 6 THEN  GOSUB 8000: PRINT BELL$;"* YOU CAN'T CARRY ANY
     THING ELSE.": GOTO 5140
5020  FOR J = 1 TO 10
5030  IF NOUN$ <  > OBJ$(J) THEN  GOTO 5070
5040  IF OBJ%(J) = ROOM AND UNBLOCK%(J) = 0 AND BLOCK%(J) = 0 THEN OBJ%(
     J) = 0: GOSUB 8000:OBJECT = OBJECT + 1:NUM = NUM + 1:J = 10: NEXT J
     : GOTO 5140
5050  IF OBJ%(J) = ROOM AND BLOCK%(J) > 0 THEN  GOSUB 8000: PRINT BELL$;
     BLOCK$(J):J = 10: NEXT J: GOTO 5140
5060  IF OBJ%(J) = 0 THEN  GOTO 5100
5070  IF  LEFT$ (NOUN$,3) <  >  LEFT$ (UNBLOCK$(J),3) AND  RIGHT$ (NOUN$
     ,4) <  >  RIGHT$ (UNBLOCK$(J),4) THEN  GOTO 5110
5080  IF UNBLOCK%(J) = ROOM THEN UNBLOCK%(J) = 0: GOSUB 8000:OBJECT = OB
     JECT + 1:J = 10: NEXT J: GOTO 5140
5090  IF UNBLOCK%(J) <  > 0 THEN  GOTO 5110
5100  GOSUB 8000: PRINT BELL$;"* YOU ALREADY HAVE THAT!":J = 10: NEXT J:
      GOTO 5140
5110 CHECK = CHECK + 1
5120  NEXT J
5130  IF CHECK = 10 THEN  GOSUB 8000: PRINT BELL$;"* I DON'T SEE THAT HE
     RE."
5140  RETURN
5499  REM

'USE' ROUTINE

5500 CHECK = 0
5510  FOR J = 1 TO 10
5520  IF NOUN$ = OBJ$(J) THEN  GOSUB 8000: PRINT BELL$;"* YOU CAN'T USE
     THAT!":J = 10: NEXT J: GOTO 5590
5530  IF  LEFT$ (NOUN$,3) <  >  LEFT$ (UNBLOCK$(J),3) AND  RIGHT$ (NOUN$
     ,4) <  >  RIGHT$ (UNBLOCK$(J),4) THEN  GOTO 5560
5540  IF UNBLOCK%(J) = 0 AND OBJ%(J) = ROOM THEN BLOCK%(J) = 0: GOSUB 80
     00: PRINT "OKAY ...": PRINT RESULT$(J):J = 10: NEXT J: GOTO 5590
5550  IF UNBLOCK%(J) = 0 THEN  GOSUB 8000: PRINT BELL$;"THERE IS NOTHING
      HERE TO USE THAT ON.":J = 10: NEXT J: GOTO 5590
5560 CHECK = CHECK + 1
5570  NEXT J
5580  IF CHECK = 10 THEN  GOSUB 8000: PRINT BELL$;"* YOU DON'T HAVE THAT
     !"
5590  RETURN
5999  REM

DIRECTION

6000 OLDR = ROOM
6010  IF ((NOUN$ = "" AND VERB$ = "N") OR  LEFT$ (NOUN$,1) = "N") AND N%
     (ROOM) > 0 THEN ROOM = N%(ROOM): GOTO 6100
6020  IF ((NOUN$ = "" AND VERB$ = "W") OR  LEFT$ (NOUN$,1) = "W") AND W%
     (ROOM) > 0 THEN ROOM = W%(ROOM): GOTO 6100
6030  IF ((NOUN$ = "" AND VERB$ = "S") OR  LEFT$ (NOUN$,1) = "S") AND S%
     (ROOM) > 0 THEN ROOM = S%(ROOM): GOTO 6100
6040  IF ((NOUN$ = "" AND VERB$ = "E") OR  LEFT$ (NOUN$,1) = "E") AND E%
     (ROOM) > 0 THEN ROOM = E%(ROOM): GOTO 6100
6050  IF ((NOUN$ = "" AND VERB$ = "U") OR  LEFT$ (NOUN$,1) = "U") AND U%
     (ROOM) > 0 THEN ROOM = U%(ROOM): GOTO 6100
6060  IF ((NOUN$ = "" AND VERB$ = "D") OR  LEFT$ (NOUN$,1) = "D") AND D%
     (ROOM) > 0 THEN ROOM = D%(ROOM): GOTO 6100
6070  HOME
6080  GOSUB 8000
6090  PRINT BELL$;"* YOU CAN'T GO IN THAT DIRECTION.": GOTO 6110
6100  GOSUB 8000
6110  RETURN
6499  REM

'HELP' ROUTINE
```

Listing continued.

Listing continued.

```
 6500 HOME
 6510 VTAB 1: HTAB 1: CALL  - 868: PRINT "LEGAL COMMANDS:"
 6520 VTAB 3
 6530 PRINT "VERBS:"; SPC( 7);"NOUNS:"
 6540 POKE 33,38: POKE 32,2
 6550 PRINT : PRINT "DROP"; SPC( 9);"OBJECT NAME"
 6560 PRINT "GET"; SPC( 10);"OBJECT NAME"
 6570 PRINT "GIVE"; SPC( 9);"... (TO WIN GAME)"
 6580 PRINT "HELP"; SPC( 9);"... (LIST OF COMMANDS)"
 6590 INVERSE : PRINT "INV"; NORMAL : PRINT "VENTORY"; SPC( 3);"... TIT
      EMS IN POSSESSION)";
 6600 PRINT "LEAVE"; SPC( 8);"<SAME AS DROP>"
 6610 PRINT "LOOK"; SPC( 9);"OBJECT NAME"
 6620 INVERSE : PRINT "Q"; NORMAL : PRINT "UIT"; SPC( 9);"... (ENDS ADV
      ENTURE)"
 6630 PRINT "RECALL"; SPC( 7);"... (LOADS SAVED GAME)"
 6640 PRINT "SAVE"; SPC( 9);"... (SAVE GAME)"
 6650 PRINT "TAKE"; SPC( 9);"<SAME AS GET>"
 6660 PRINT "USE"; SPC( 10);"OBJECT NAME"
 6670 POKE 33,40: POKE 32,0
 6680 VTAB 22: HTAB 1: CALL  - 958
 6690 PRINT "PRESS <RETURN> TO CONTINUE ";
 6700 GET AN$
 6710 IF AN$ <  > RTN$ THEN  GOTO 6700
 6720 HOME
 6730 VTAB 5
 6740 PRINT "TO MOVE IN A DIRECTION, THE COMMAND MAY BE 'GO' WITH AN APP
      ROPRIATE DIRECTION"
 6750 PRINT "(IE; N,W,S,E,U OR D), OR ... YOU MAY USEJUST THE DIRECTION
      ITSELF."
 6760 PRINT : PRINT "FOR EXAMPLE:"
 6770 PRINT : PRINT  SPC( 3);"1) COMMAND: GO NORTH"
 6780 PRINT  SPC( 3);"2) COMMAND: GO N"
 6790 PRINT  SPC( 3);"3) COMMAND: N"
 6800 PRINT : PRINT "ANY ONE OF THOSE WILL ALLOW YOU TO GO INTHE NORTH D
      IRECTION."
 6810 VTAB 22: HTAB 1: CALL  - 958
 6820 PRINT "PRESS <RETURN> TO CONTINUE GAME ";
 6830 GET AN$
 6840 IF AN$ <  > RTN$ THEN  GOTO 6830
 6850 HOME
 6860 VTAB 1: HTAB 1: CALL  - 868
 6870 PRINT "LOCATION:"
 6880 GOSUB 8000
 6890 RETURN
 6999 REM

 'INVENTORY' ROUTINE

 7000 HOME
 7010 VTAB 1: HTAB 1: CALL  - 868
 7020 PRINT "INVENTORY:"
 7030 VTAB 4
 7040 PRINT "YOU NOW HAVE IN YOUR POSSESSION:"
 7050 PRINT
 7060 XX = 0
 7070 FOR I = 1 TO 10
 7080 IF OBJ%(I) = 0 THEN XX = XX + 1: PRINT " #";XX;". ";OBJ$(I)
 7090 IF UNBLOCK%(I) = 0 THEN XX = XX + 1: PRINT  SPC( 2);XX;". ";UNBLOC
      K$(I)
 7100 NEXT I
 7110 VTAB 17: PRINT "(#) OBJECT NEEDED TO APPEASE"; PRINT  SPC( 4);"MCHA
      R$;"."
 7120 VTAB 22: HTAB 1: CALL  - 958
 7130 PRINT "PRESS <RETURN> TO RETURN TO GAME ";
 7140 GET AN$
 7150 IF AN$ <  > RTN$ THEN  GOTO 7140
 7160 HOME
 7170 VTAB 1: HTAB 1: CALL  - 868
 7180 PRINT "LOCATION:"
 7190 GOSUB 8000
 7200 RETURN
 7499 REM
```

Listing continued.

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Listing continued.

```
 LOOK' ROUTINE

7500  GOSUB 8000
7510  IF NOUN$ = "" THEN  PRINT "LOOK AT WHAT?": GOTO 7560
7520  FOR I = 1 TO 10
7530  IF NOUN$ = OBJ$(I) AND OBJ%(I) = ROOM AND BLOCK%(I) = 1 THEN  PRINT
     BLOCK$(I):I = 10: NEXT I: GOTO 7560
7540  NEXT I
7550  PRINT "THERE ISN'T ANYTHING SPECIAL TO SEE."
7560  RETURN
7999  REM

PRINT ROUTINE

8000  HOME
8010  GOSUB 8500
8020  VTAB 1: HTAB 11: CALL  - 868
8030  INVERSE : PRINT " ";LN$(ROOM);" ": NORMAL
8040  VTAB 18: PRINT LD$(ROOM): PRINT
8050  FOR II = 1 TO 10
8060  IF II = 10 AND OBJ%(II) = ROOM THEN  PRINT "THERE IS SOME ";OBJ$(I
     I);" HERE.": GOTO 8080
8070  IF OBJ%(II) = ROOM THEN  PRINT "THERE IS A ";OBJ$(II);" HERE."
8080  IF UNBLOCK%(II) = ROOM THEN  PRINT "THERE IS A ";UNBLOCK$(II);" HE
     RE."
8090  NEXT II
8100  IF OBJ%(0) = ROOM THEN  PRINT MCHAR$;" IS LURKING HERE."
8110  FOR II = 0 TO 4
8120  IF SC%(II) = 1 THEN SC%(II) = 0: PRINT BELL$;SC$(II)
8130  NEXT II
8140  IF MOVE = 1 THEN MOVE = 0: GOSUB 9000
8150  RETURN
8499  REM

SPECIAL CONDITIONS

8500  IF OBJ%(0) <  > ROOM THEN  GOTO 8550
8510  IF NUM < 3 THEN SC%(0) = 1:MOVE = 1:MC = 0: GOTO 8550
8520  IF NUM = 4 THEN ROOM = OLDR:SC%(1) = 1: GOTO 8540
8530  IF NUM = 5 THEN DUN = 1
8540 MC = MC + 1: IF MC = 4 THEN MC = 0:OBJ%(0) =  FN RR(0)
8550  IF UNBLOCK%(2) = 0 AND UNBLOCK%(3) = 0 THEN SC%(2) = 1:UNBLOCK%(2)
     =  FN RR(0):UNBLOCK%(3) =  FN RR(0):OBJECT = OBJECT - 2
8560  IF UNBLOCK%(7) = 0 AND UNBLOCK%(9) = 0 THEN SC%(3) = 1:UNBLOCK%(7)
     =  FN RR(0):UNBLOCK%(9) =  FN RR(0):OBJECT = OBJECT - 2
8570  IF NUM = 3 AND ROOM =  FN RR(0) THEN ROOM =  FN RR(0):SC%(4) = 1: GOSUB
     9000
8580  RETURN
8999  REM
OBJECTS IN RND LOCS

9000 DUN = 0
9010 NUM = 0
9020 OBJECT = 0
9030 SAME = 0
9040  FOR I = 1 TO 10
9050 BLOCK%(I) = 1
9060  IF OBJ%(I) <  > 0 THEN  GOTO 9130
9070 OBJ%(I) =  FN RR(0)
9080  IF I = 1 THEN  GOTO 9130
9090  FOR II = 1 TO I - 1
9100  IF OBJ%(I) = OBJ%(II) THEN II = I - 1:SAME = 1
9110  NEXT II
9120  IF SAME = 1 THEN SAME = 0: GOTO 9070
9130  NEXT I
9140  FOR I = 1 TO 10
9150 UNBLOCK%(I) =  FN RR(0)
9160  IF I = 1 THEN  GOTO 9210
9170  FOR II = 1 TO I - 1
9180  IF UNBLOCK%(I) = UNBLOCK%(II) THEN II = I - 1:SAME = 1
9190  NEXT II
9200  IF SAME = 1 THEN SAME = 0: GOTO 9150
9210  FOR II = 1 TO 10
9220  IF UNBLOCK%(I) = OBJ%(II) THEN II = 10:SAME = 1
9230  NEXT II
9240  IF SAME = 1 THEN SAME = 0: GOTO 9150
9250  NEXT I
9260 OBJ%(0) =  FN RR(0)
9270  RETURN
9499  REM

SOUND ROUTINE

9500  FOR II = 1 TO CYCLE
9510 SOUND =  PEEK (NOISE) -  PEEK (NOISE) +  PEEK (NOISE)
9520  NEXT II
9530  RETURN
9999  REM

WIN ROUTINE

10000  IF DUN <  > 1 OR OBJ%(0) <  > ROOM THEN  GOSUB 8000: PRINT "NOTHI
     NG HAPPENS!": RETURN
10010  TEXT : HOME
10020 CHECK = 0
10030  SPEED= 0
10040  VTAB 4
10050  GOSUB 3070
10060  FOR TIME = 1 TO 500: NEXT TIME
10070  SPEED= 255
10080  HOME
10090  INVERSE
10100 X = 40:Y = 22
10110  FOR I = 0 TO 8
10120  FOR H = I + 1 TO X
10130  VTAB 24 - Y: HTAB H: PRINT " "
10140  NEXT H
10150 X = X - 1
10160  FOR V = 25 - Y TO Y
10170  VTAB V: HTAB H - 1: PRINT " "
10180  NEXT V
10190 Y = Y - 1
10200  FOR H = X TO I + 1 STEP  - 1
10210  VTAB V - 1: HTAB H: PRINT " "
10220  NEXT H
10230  FOR V = Y TO 24 - Y STEP  - 1
10240  VTAB V: HTAB H + 1: PRINT " "
10250  NEXT V
10260  NEXT I
10270  NORMAL
10280  VTAB 12: HTAB 14: PRINT MSG$
10290 CYCLE = 15
10300  IF CHECK = 0 THEN CHECK = 1: GOSUB 9500: GOTO 10100
10310  VTAB 23
10320 CYCLE = 1
10330  FOR I = 1 TO 12
10340  PRINT
10350  GOSUB 9500
10360  NEXT I
10370  PRINT "THE END"
10380  END
10999  REM

DISK ROUTINES

11000  HOME
11010  ONERR  GOTO 12000
11020 V = 10
11030  ON DISK GOTO 11040,11270,11270,11270
11040 PROG$ = "^" + MPROG$ + ".GAME"
11050  PRINT : PRINT "SAVE GAME TO DISK:"
11060  PRINT : HTAB 5: PRINT "1. PLACE DISK IN DRIVE #1."
11070  PRINT : HTAB 5: PRINT "2. PRESS <RETURN> TO SAVE GAME. ";
11080  GET AN$
11090  IF AN$ <  > RTN$ THEN  GOTO 11080
11100  HOME
11110  VTAB V: HTAB 1: PRINT "NOW ";: FLASH : PRINT " SAVING ": NORMAL
```

Listing continued.

Listing continued.

```
11120  PRINT " ";PROG$
11130  PRINT D$;"OPEN";PROG$
11140  PRINT D$;"DELETE";PROG$
11150  PRINT D$;"OPEN";PROG$
11160  PRINT D$;"WRITE";PROG$
11170  PRINT ROOM
11180  PRINT NUM
11190  PRINT OBJ%(0)
11200  PRINT OBJECT
11210  FOR I = 1 TO 10
11220  PRINT BLOCK%(I)
11230  PRINT OBJ%(I)
11240  PRINT UNBLOCK%(I)
11250  NEXT I
11260  GOTO 11660
11270  IF DISK = 2 THEN PROG$ = "^" + MPROG$ + ".GAME": GOTO 11300
11280  IF DISK = 3 THEN PROG$ = "^" + MPROG$ + ".DATA": GOTO 11360
11290 PROG$ = "^" + MPROG$ + ".TITLE": GOTO 11380
11300  PRINT : PRINT "RECALL GAME FROM DISK:"
11310  PRINT : HTAB 5: PRINT "1. PLACE DISK IN DRIVE #1."
11320  PRINT : HTAB 5: PRINT "2. PRESS <RETURN> TO RECALL GAME. ";
11330  GET AN$
11340  IF AN$ <  > RTN$ THEN  GOTO 11330
11350  HOME
11360  VTAB V: HTAB 1: PRINT "NOW ";: FLASH : PRINT " LOADING ": NORMAL

11370  PRINT " ";PROG$
11380  PRINT D$;"VERIFY";PROG$
11390  PRINT D$;"OPEN";PROG$
11400  PRINT D$;"READ";PROG$
11410  IF DISK = 3 THEN  GOTO 11530
11420  IF DISK = 4 THEN  GOTO 11630
11430  INPUT ROOM
11440  INPUT NUM
11450  INPUT OBJ%(0)
11460  INPUT OBJECT
11470  FOR I = 1 TO 10
11480  INPUT BLOCK%(I)
11490  INPUT OBJ%(I)
11500  INPUT UNBLOCK%(I)
11510  NEXT I
11520  GOTO 11660
11530  INPUT NL%
11540  DIM D%(NL%),E%(NL%),LD$(NL%),LN$(NL%),N%(NL%),S%(NL%),U%(NL%),W%(
    NL%)
11550  FOR I = 1 TO NL%
11560  INPUT LN$(I): INPUT LD$(I)
11570  INPUT N%(I): INPUT W%(I): INPUT S%(I): INPUT E%(I): INPUT U%(I): INPUT
    D%(I)
11580  NEXT I
11590  FOR I = 1 TO 10
11600  INPUT OBJ%(I): INPUT OBJ$(I)
11610  NEXT I
11620  GOTO 11660
11630  INPUT TITLE$
11640  INPUT AUTHER$
11650  INPUT MCHAR$
11660  PRINT D$;"CLOSE"
11670  IF DISK < 3 THEN  GOSUB 8000
11680  IF DISK = 3 THEN  DEF  FN RR(Z) =  INT (NL% * RND (1)) + 1: GOSUB
    9000
11690  RETURN
11999  REM

ERROR ROUTINE

12000 ERR =  PEEK (222)
12010 LINE =  PEEK (218) +  PEEK (219) * 256
12020  HOME : VTAB 6: PRINT BELL$;
12030  IF ERR = 4 THEN  PRINT "YOUR DISK IS WRITE PROTECTED.": GOTO 1209
    0
12040  IF ERR = 6 THEN  PRINT PROG$: PRINT "IS NOT FOUND ON THIS PARTICU
    LAR DISK.": GOTO 12090
12050  IF ERR = 8 THEN  PRINT "THERE IS AN INPUT/OUTPUT ERROR.  CHECK I
    O BE SURE DISK IS IN DRIVE PROPERLY ANDDOOR IS CLOSED.": GOTO 12090

12060  IF ERR = 9 THEN  PRINT "THE DISK IS FULL.  NO MORE INFO CAN BE A
    DDED.  PLEASE USE ANOTHER DISK.": GOTO 12090
12070  IF ERR = 10 THEN  PRINT D$;"UNLOCK";PROG$: GOTO 12120
12080  TEXT : HOME : PRINT "THERE IS AN ERROR #";ERR;" IN LINE ";LINE;".
    ": PRINT "THIS PROGRAM HAS ENDED.": POKE 216,0: END
12090  PRINT : PRINT "PRESS <RETURN> TO CONTINUE.";
12100  GET AN$
12110  IF AN$ <  > RTN$ THEN  GOTO 12100
12120  POKE 216,0
12130  CALL 768
12140  IF DISK < 3 THEN  GOTO 8000
12150  IF DISK = 4 THEN  POKE 778,255: PRINT D$;"RUN";MPROG$
12160  GOTO 11000
12999  REM

DATA

13000  DATA  104,THE COIN IS LOCKED IN A SAFE.,THE SAFE IS UNLOCKED AND
    OPENS EASILY.,SAFE COMBINATION
13010  DATA  168,YOU NEED SOMETHING TO PUT IT IN.,THE FLOWERS LOOK GREAT
     IN THE VASE.,VASE
13020  DATA  104,THE NAIL IS STUCK IN A PIECE OF WOOD.,THE HAMMER PULLS
    OUT THE NAIL..CLAW HAMMER
13030  DATA  166,YOU NEED SOMETHING TO PUT IT IN.,THE PAPER FITS IN THE
    ENVELOPE.,MANILA ENVELOPE
13040  DATA  223,THIS PEN WON'T WRITE.,NOW THE PEN WORKS FINE.,INK REFIL
    L
13050  DATA  154,THE RING IS LOCKED IN A JEWEL CASE.,THE JEWEL CASE IS N
    OW OPEN.,KEY
13060  DATA  72,THE ROPE IS TIED TO A HEAVY WEIGHT.,THE ROPE IS EASILY C
    UT.,SHARP KNIFE
13070  DATA  152,THE DOG (DOG?) WON'T LET YOU HAVE IT.,DOG DROPS THE STI
    CK & GRABS THE STEAK.,RAW STEAK
13080  DATA  72,YOU NEED SOMETHING TO CARRY IT IN.,THE STONE FITS IN THE
     SACK.,BURLAP SACK
13090  DATA  96,YOU NEED SOMETHING TO CARRY IT IN.,THE PAIL HOLDS THE WA
    TER PERFECTLY.,RUSTY PAIL
13100  DATA  ">> YOU DON'T HAVE ENOUGH GIFTS, SO THEY    ALL DISAPPEAR."
    ,"YOU CAN'T GO THERE RIGHT NOW."
13110  DATA  "THE HAMMER BREAKS THE VASE, AND THEY    BOTH DISAPPEAR.","
    THE KNIFE CUTS THE SACK AND YOU LOSE    BOTH OF THEM."
13120  DATA  "YOU LOSE EVERYTHING AND END UP HERE."
13130  DATA  "  WELCOME TO "
13140  DATA  TITLE
13150  DATA  ". "
13160  DATA  " YOUR GOAL, SHOULD YOU DECIDE TO ACCEPT IT, IS TO ELIMINAT
    E THE EVIL "
13170  DATA  CHAR
13180  DATA  ". "
13190  DATA  " TO DO THIS, YOU MUST SEEK OUT AND OBTAIN 5 PARTICULAR OBJ.
    ECTS IN WHICH TO BUY "
13200  DATA  CHAR
13210  DATA  " OFF. "
13220  DATA  " FAILING TO DO THIS MAY MAKE ."
13230  DATA  CHAR
13240  DATA  " A TRIFLE ANGRY, AND IT IS YOU WHO MAY BE ELIMINATED. "
13250  DATA  ?
13260  DATA  "  IF YOU'RE NOT SURE WHICH COMMANDS ARE VALID IN "
13270  DATA  TITLE
13280  DATA  ", TYPE <HELP> AT ANY POINT IN THE GAME. "
13290  DATA  %
13300  DATA  CHAR
13310  DATA  " NOTICES THAT YOU HAVE ALL 5 GIFTS. "
13320  DATA  CHAR
13330  DATA  " IS REALLY, REALLY HAPPY! "
13340  DATA  ?
13350  DATA  CHAR
13360  DATA  " ACCEPTS ALL OF THE GIFTS. "
13370  DATA  ?
13380  DATA  "THEREFORE ... "
13390  DATA  %
```

Listing continued.

Crypto

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by Bob Marshall

The use of coded messages has been going on for ages—Julius Caesar devised a coded alphabet that worked on letter substitution. Besides military encrypting, now thousands of newspapers generate the popular cryptograms (usually found on the comics page) for the enjoyment of everyone.

This program generates a Caesarean alphabet and a cryptogram for you to solve. The sentences used by the computer are input by the user (assuming two players) or obtained from a list of phrases stored in the program.

Program Description

- Lines 10–100 print information about the program and what it does while the computer generates the Caesarean alphabet for storage in the A$ array.
- Lines 110–120 dimension the arrays—A$ array is the Caesarean alphabet; J$ holds the coded sentence; K$ holds the decoded data until the answer is found; C$ is the reference.
- Lines 125–150 load 0 into the A$ array. This data determines if a letter has been assigned to that position yet.
- Lines 160–230 generate the Caesarean alphabet. Line 160 gets a random number from 1–26. The FOR-NEXT loop starting at line 170 first checks if a random letter has already been used. If it has, then it chooses another letter. If not, line 190 checks for the EMPTY flag. If the position of the array already has a letter assigned to it, it increments X and checks the next position. Line 195 was added to the original program to prevent the replacement letter from being assigned to the same letter as the actual letter position in the alphabet. Assuming that the array position has been previously unassigned and is not the same as the real letter, line 200 stores a letter in the A$ array. Line 210 counts the number of letters assigned and, when all letters have been placed (N = 26), jumps out of the loop.
- Line 260 insures that the FOR-NEXT loop is cleared before continuing. You can also see the coded alphabet by inserting a print command (?A$;) before the NEXT command.
- Lines 260–295 select the method of input to be coded. If the computer generates a sentence, line 295 sends the program off to fetch a sentence (line 1000, returning at line 330).
- Lines 300–320 are used if you input a sentence from the keyboard. In either case the sentence is stored in D$.
- Line 330 blanks out the coded sentence array (K$).
- Lines 340–400 constitute a FOR-NEXT loop that reads the coded sentence, puts in blanks where they belong, then prints the coded sentence.
- Lines 500–535 print the coded sentence and accept a letter from the keyboard.
- Lines 540–590 search the coded sentence for a matching letter and store the replacement letter in the answer array (K$).
- Lines 600–680 print the coded sentence and the answer sentence on the screen. The Y variable makes sure that the first 39 letters of the sentence are printed on one line and then increments the line printed.
- Lines 690–692 read the answer and compare the decoded sentence with the answer. If a match occurs, the program jumps out and prints the correct sentence, telling the player that the answer was correct (line 2000).
- Lines 695–770 provide a menu that allows you to input another letter, start over, do another puzzle or quit.
- Lines 1000–1410 contain the various sentences stored for possible use in the puzzle. The random number routine controls selection.
- Lines 2000–2010 display the correct answer and winner message, then jump back to ask what to do next (quit or do it again).

This program was originally written for the TRS-80 by James P. Morgan (80 Microcomputing, August 1980) and adapted for the Apple computer by Bob Marshall.

Address correspondence to Bob Marshall, 419 San Francisco Ave., Brisbane, CA 94005.

```
10  TEXT : HOME : VTAB 6: HTAB 19
    : INVERSE : PRINT "CRYPTO": NORMAL
12  CLEAR
15  VTAB 8: PRINT "       WRITTEN
    BY JAMES MORGAN FOR THE "
17  VTAB 10: PRINT "          TRS-8
    0. ADAPTED FOR APPLE II "
18  VTAB 12: PRINT "          BY B
    OB MARSHALL.  03-03-83 "
19  FOR Z = 1 TO 3000: NEXT
20  HOME : PRINT : PRINT "   THIS
     PROGRAM WILL CREATE SECRET
    "
30  PRINT : PRINT "MESSAGES USING
     A DIFFERENT CODE EACH "
40  PRINT : PRINT "TIME. TWO PLAY
    ERS CAN PLAY WITH EACH"
45  PRINT : PRINT "OTHER OR ONE P
    LAYER CAN TEST HIS/HER ".
47  PRINT : PRINT "CODE BREAKING
    ABILITY AGAINST THE COMP-"
50  PRINT : PRINT "UTER. THE GAME
     IS EXACTLY LIKE THOSE "
60  PRINT : PRINT "FOUND IN THE D
    AILY NEWSPAPERS AND"
70  PRINT : PRINT "MAGAZINES IN T
    HAT A CODED MESSAGE IS "
80  PRINT : PRINT "PRESENTED AND
    THEN BROKEN BY ANALYSIS "
90  PRINT : PRINT "OF STRUCTURE A
    ND LETTER SUBSTITUTION."
100  PRINT : PRINT " ONE MOMENT P
    LEASE!"
110  DIM A$(30),J$(150),K$(150):A
    $(30) = " "
115  REM  A$ IS CODE, J$ HOLDS CO
    DED SENTENCE, K$ HOLDS CODE
    BREAKING
120 C$ = "ABCDEFGHIJKLMNOPQRSTUVW
    XYZ"
125  REM  SET A$ TO ZERO
130  FOR X = 1 TO 26
140 A$(X) = "0"
150  NEXT
160 B =  INT (26 *  RND (1)) + 1:
     REM  SELECT RANDOM ALPHABET
     VALUE
170  FOR X = 1 TO 26
180  IF A$(X) =  MID$ (C$,B,1) THEN
    160: REM  IS LETTER ALREADY
    PICKED?
190  IF A$(X) <  > "0" THEN 230: REM
     IS THERE SPACE AVAILABLE?
195  IF B = X THEN 160: REM  CHEC
    K FOR RANDOM LETTER = ACTUAL
     LETTER
200 A$(X) =  MID$ (C$,B,1): REM
    ASSIGN CODED LETTER TO A$
210 N = N + 1: IF N = 26 THEN 260
    : REM  COUNTS LETTERS PLACED
     IN STRING
220  GOTO 160
230  NEXT X
260  FOR X = 1 TO 26: NEXT : REM
     ALL DONE
270  HOME : PRINT "OK, THE COMPUT
    ER IS SET."
275  PRINT : PRINT "TYPE 1 TO PLA
    Y AGAINST ME OR"
280  PRINT "TYPE 2 FOR TWO PLAYER
    S. "
290  PRINT : PRINT "ENTER A 1 OR
    2, PLEASE!";: GET Z$
295  IF Z$ = "1" THEN 1000
300  PRINT : PRINT : PRINT "ENTER
     SENTENCE TO BE CODED.": PRINT
    "DO NOT USE ANY PUNCTUATION.
    "
310  INVERSE : PRINT "(DO NOT SHO
    W TO THE OTHER PLAYER.)": NORMAL

315  PRINT : PRINT "TYPE SENTENCE
     AND HIT 'RETURN' NOW!"
320  INPUT D$
330  HOME :M =  LEN (D$): FOR Y =
    1 TO M:K$(Y) = " ": NEXT
335  REM  THE ABOVE SETS THE CODE
    D SENTENCE ARRAY (K$) TO BLA
    NKS
340  FOR Y = 1 TO M
350  FOR X = 1 TO 26
355  REM  IS THE LETTER OF THE D$
     SENTENCE A SPACE BETWEEN WO
    RDS?
360  IF  MID$ (D$,Y,1) = " " THEN
     PRINT " ";: GOTO 395
365  REM  MATCH VALUE OF LETTER I
    N SENTENCE WITH NORMAL ALPHA
    BET
370  IF  MID$ (C$,X,1) =  MID$ (D
    $,Y,1) THEN 390
380  NEXT X
390  PRINT A$(X);:J$(Y) = A$(X): GOTO
    400: REM  PRINT AND ASSIGN C
    ODES
395 J$(Y) = " ": REM  ASSIGN BLAN
    K SPACE BETWEEN WORDS
400  NEXT Y: REM  GO BACK FOR ANO
    THER LETTER
500  PRINT : PRINT : PRINT "THE A
    BOVE SENTENCE CAN BE DECODED
     BY"
510  PRINT "DIRECT SUBSTITUTION."

512  PRINT "SELECT LETTER TO BE C
    HANGED..."
520  PRINT : INPUT "WHAT IS THE L
    ETTER YOU WANT TO CHANGE?";O
    $
530  PRINT : PRINT "CHANGE '";O$;
    "' TO WHAT LETTER?"
535  PRINT "(QUOTE-SPACE-QUOTE WI
    LL ENTER A BLANK)": INPUT N$

540  FOR Y = 1 TO M
550  IF J$(Y) =O$ THEN 580: REM
     CHECK J$ FOR SELECTED LETTE
    R
560  IF K$(Y) = " " THEN 590: REM
     CHECK FOR EMPTY SPACE
570 K$(Y) = K$(Y): GOTO 590: REM
     HOLD VALUE
580 K$(Y) = N$: REM  ASSIGN NEW L
    ETTER TO CODED SENTENCE
590  NEXT Y
600  HOME : PRINT "HERE IS THE CO
    DED SENTENCE WITH YOUR": PRINT
    "SUBSTITUTIONS:"
610  PRINT :N = 1
620  FOR Y = N TO M: PRINT J$(Y);
    : REM  PRINT CODED SENTENCE
630  IF Y = 40 THEN 650: REM  SC
    REEN LIMIT
640  NEXT Y: PRINT
650  FOR Y = N TO M: PRINT K$(Y);
    : REM  PRINTS CHANGES
660  IF Y = 40 THEN 680
670  NEXT Y: PRINT : GOTO 690
680  PRINT :N = 41: GOTO 620: REM
     SETS UP FOR NEXT LINE OF
    CODE
690  FOR Q = 1 TO M:Q$ = Q$ + K$(
    Q): NEXT
691 Q$ =  RIGHT$ (Q$,M)
692  IF Q$ = D$ THEN 2000
695  PRINT : PRINT "TAP 'Y' FOR F
    URTHER CHANGES."
697  PRINT "TAP 'N'--START OVER,T
    HIS CRYPTO"
700  PRINT "TAP 'A'--ANOTHER GAME
    "
710  PRINT "TAP 'E'--END GAME"
720  GET M$: IF M$ = "" THEN 720
730  IF M$ = "Y" THEN 520
740  IF M$ = "A" THEN 10
750  IF M$ = "E" THEN 999
760  IF M$ = "N" THEN 330
770  PRINT "TAP Y,N,A,OR E ONLY!!
    ": GOTO 720
999  HOME : PRINT "SO LONG FOR NO
    W!!! ": END
1000 L =  INT ( RND (1) * 2 + .5)
    : REM  SELECT RANDOM SENTEN
    CE FOR CODING
1010  ON L GOTO 1100,1300
1100 L =  INT ( RND (1) * 10 + .5
    )
1110  ON L GOTO 1120,1130,1140,11
    50,1160,1170,1180,1190,1200,
    1210
1120 D$ = "THE LOVE OF JUSTICE IN
     MOST MEN IS SIMPLY THE FEAR
     OF SUFFERING INJUSTICE": GOTO
    330
1130 D$ = "SILENCE IS THE BEST TA
    CTIC FOR HIM WHO DISTRUSTS H
    IMSELF": GOTO 330
1140 D$ = "THINGS ARE ALWAYS AT T
    HEIR BEST IN THEIR BEGINNING
    ": GOTO 330
1150 D$ = "ALL MEN WOULD BE TYRAN
    TS IF THEY COULD": GOTO 330
1160 D$ = "ONCE A WOMAN HAS GIVEN
     YOU HER HEART YOU CAN NEVER
     GET RID OF HER": GOTO 330
1170 D$ = "HE WAS A BOLD MAN THAT
     FIRST ATE AN OYSTER": GOTO
    330
1180 D$ = "MAY YOU LIVE ALL THE D
    AYS OF YOUR LIFE": GOTO 330
1190 D$ = "A BIRD IN THE HAND IS
    WORTH TWO IN THE BUSH": GOTO
    330
1200 D$ = "ASK NOT WHAT YOUR COUN
    TRY CAN DO FOR YOU BUT WHAT
    YOU CAN DO FOR YOUR COUNTRY"
    : GOTO 330
1210 D$ = "EXPERIENCE IS THE NAME
     EVERYONE GIVES TO THEIR MIS
    TAKES": GOTO 330
1300 L =  INT ( RND (1) * 10 + .5
    )
1310  ON L GOTO 1320,1330,1340,13
    50,1360,1370,1380,1390,1400,
    1410
1320 D$ = "IT IS BETTER TO REMAIN
     SILENT AND BE THOUGHT OF AS
     A FOOL THAN TO SPEAK AND RE
    MOVE ALL DOUBT": GOTO 330
1330 D$ = "THE APPLAUSE OF A SING
    LE HUMAN BEING IS OF GREAT C
    ONSEQUENCE": GOTO 330
1340 D$ = "IT IS BETTER TO LIVE R
    ICH THAN TO DIE RICH": GOTO
    330
1350 D$ = "A PRETTY FOOT IS A GIF
    T OF NATURE": GOTO 330
1360 D$ = "A MEAL WITHOUT WINE IS
     LIKE A DAY WITHOUT SUNSHINE
    ": GOTO 330
1370 D$ = "ASK YOURSELF IF YOU AR
    E HAPPY AND YOU WILL CEASE T
    O BE SO": GOTO 330
1380 D$ = "GOD MADE INTEGERS ALL
    ELSE IS THE WORK OF MAN": GOTO
    330
1390 D$ = "WAR IS MUCH TOO SERIOU
    S A MATTER TO BE ENTRUSTED T
    O THE MILITARY": GOTO 330
1400 D$ = "WHEN YOU ARE FLAT ON Y
    OUR BACK THERE IS NO PLACE T
    O LOOK BUT UP": GOTO 330
1410 D$ = "THE ONLY WAY TO GET RI
    D OF A TEMPTATION IS TO YIEL
    D TO IT": GOTO 330
2000  HOME : VTAB 5: FLASH : PRINT
    "CONGRATULATIONS": NORMAL : VTAB
    10: PRINT D$: VTAB 12: PRINT
    : PRINT "THAT'S THE SENTENCE
    !!!": PRINT
2010  PRINT "YOU HAVE SOLVED THE
    CRYPTO!!!": PRINT : PRINT : GOTO
    700
```

Program listing. Crypto.

Changes made to convert this program from TRS-80 Basic were very minor—mostly screen formatting. The only other type of change replaced the way random numbers within a range were generated. The RND(X) function in the TRS-80 returns a random number from 0 to X. To simulate this function in Applesoft II, the following statement is used:

B = INT (RND(1)*X + 1)

For generating a number from 1 to 26, X becomes 26. The +1 prevents generating 0. A 0 would cause an OUT-OF-RANGE error in the MID$ statements.

This short program provides hours of entertainment for the avid cryptologist without a worry about the eraser tearing a hole in the newsprint before the answer is determined. Sentences stored in the program are easily replaced when they become too familiar to the player. ■

Don't Be A Video Idiot!

Doing word processing or hi-res graphics? Choose your monitor carefully...high prices don't always mean high performance.

by Timothy Daniel

What better way to spend a rainy Saturday morning than helping a buddy install newly purchased 80-column and Z-80 boards in his Apple? These hardware additions would allow him to use WordStar, a sophisticated text editor that displays 80 characters on a line. With some encouragement my friend, who is ill-at-ease with anything more complicated than a toaster, managed to get both boards in and the CP/M operating system loaded. So far, so good.

WordStar was a different story. A problem, a very big problem, became obvious. The screen was one blurry, smeared mess. You could tell that there were 80 characters on a line but that was about all. After fiddling with keys and controls for awhile we gave up and the no-longer-proud Apple owner found solace in his favorite alien zapping game.

During the drive home I remembered a conversation I had overheard a few weeks earlier at the local computer store. A customer was buying a Z-80 board, 80-column display unit and a fancy word processing program. But, unlike my friend, this fellow was taking home a green-screen monitor too. The clerk had suggested the monitor, insisting that the customer's RF modulator/TV display wouldn't be suitable for high-resolution 80-column video.

When it comes to salesmen I am usually a "doubting Thomas," but this particular pitch made sense, so I grabbed my trusty monitor and headed back into the rain. By this time my friend was past "superwarp" and thoroughly convinced that the problem must be in the software or new hardware. With more than a little reluctance he helped me disconnect his display, an ancient color TV driven by a modulator, and hook up my monochrome monitor.

Before long WordStar was running again, and this time there were 80 crisp, easy-to-read characters on each line. The smeared, blurry video was gone. Like any true friend would have done, I loaned my monitor to the now-pleased WordStar owner with the understanding that it would be returned Monday morning, just after the computer store opened and he could get one of his own.

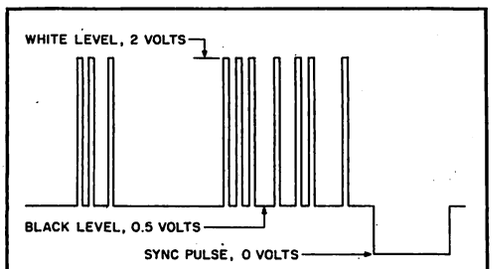

Figure 1. An Apple produces a video signal that is similar to the NTSC composite video standard. White levels occur at approximately 2 volts, black at 0.5 volts (there are no grays) with vertical and horizontal synchronization pulses at zero volts.

With the rain still coming down and no way to use my computer I decided to spend a few hours learning more about video monitors. I knew that the TV/modulator combination was fine for playing the latest full-color death and destruction games, but for high-resolution functions like word processing a monochrome monitor seemed better. Two questions needed answering: why the difference in performance and how could a computerist make the most of the situation?

My search for answers started with Apple's *Reference Manual* where it became obvious that the way an Apple generates video isn't important. In fact you can consider the Apple to be a "black box." And according to the *Reference Manual*, this box has a video output "similar to an Electronics Industries Association (EIA) standard, National Television Standards Committee (NTSC) compatible, positive composite color video signal." What a mouthful! Perhaps it is better expressed graphically, as shown in Figure 1.

Figure 1 shows a monochrome (black and white) composite video signal. The term composite results

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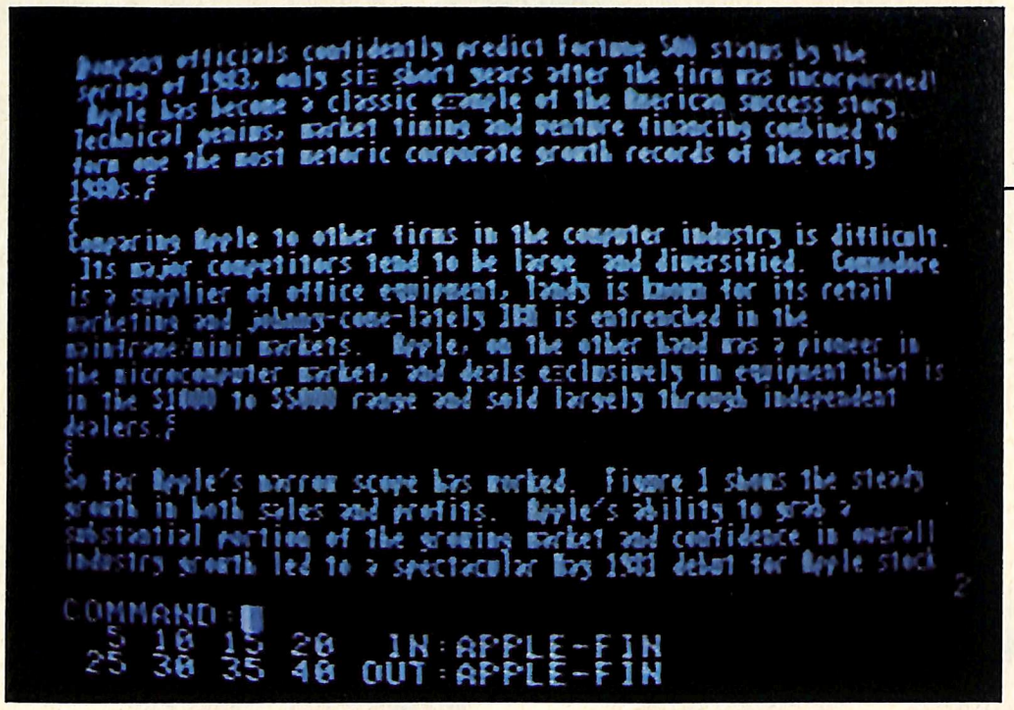

Photo 1. The ScreenWriter II word processing program uses the Apple high-resolution graphics to display text. The typical TV set displays an image that is smeared and blurred as shown here.

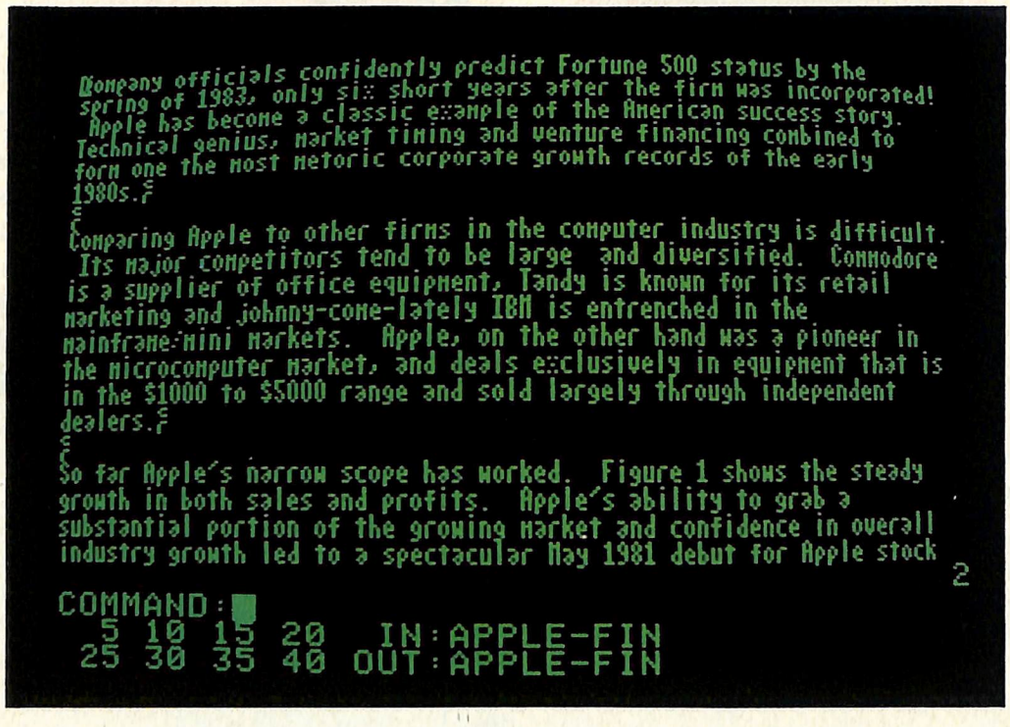

Photo 2. Here is the ScreenWriter image displayed on a monochrome monitor. The result is much easier to read.

from the combined presence of brightness and synchronization information. The high or 2-volt level corresponds to white. Black is represented by a 0.5-volt signal. In conventional television broadcasting a black and white signal will vary between these two levels, giving various shades of gray. Apple video, however, is limited to the two extreme levels of brightness, black and white.

The excursions below 0.5 volts are sync pulses. They indicate when the end of a horizontal line is reached and a frame is completed. The timing of the sync pulses is based on the standards set for NTSC video where each frame is made up of 262 horizontal lines with 60 frames displayed each second, as shown in Figure 2. An Apple computer adheres to the 60-frames-per-second standard but only displays 192 lines per frame. Both result in a sweeping action where the picture is constantly refreshed or replaced.

Just as you would use a carriage return at the end of a typed line, the Apple sends a horizontal sync pulse to signal the end of a line and give the display unit time to return to the beginning of the next line. This delay is known as a blanking interval since nothing is being added to the screen for its duration. After 192 lines are displayed a vertical sync pulse occurs, then the trace returns to the top of the screen and starts a new frame, very much like completing one page and inserting a new one into your typewriter.

The sync signals are invisible to the user, but they do have an indirect effect on the quality of your video since they provide a fixed amount of time when the Apple's video circuitry can communicate brightness information to the screen. In theory, a computer could make the most of each display line and provide thousands of discrete changes in brightness to get the best possible resolution. But in practice your video display may not be able to keep up with rapid changes in brightness. The result is a picture with poor resolution. As my friend who tried to display 80 characters per line on his television set found out, all monitors are not created equal; some are able to keep up with high resolution video, others are not.

Just how fast do these changes in brightness take place? A handful of calculations will show that, out of every frame of video (which lasts 1/60 of a second), 16 percent of the time is spent on blanking intervals. Blank space at the top, bottom and sides of the screen eats up another 40 percent, leaving about .0075 second to display the information in one frame of video. If you're using high-resolution graphics where there are 53760 dots in a 280-by-192 array, it works out to seven million dots per second. The same calculation, when worked for an 80-column display, yields a dots-per-second value close to 14 million.

With those kernels of knowledge stored away I shifted my attention to the culprit. The computer and software aren't guilty; all they do is generate video. It is the user's responsibility to view it on a suitable monitor. But don't ask for a seven-million-dot-per-second model. Instead, specify bandwidth, another way of indicating the rate of change.

Bandwidth is measured in Hertz (cycles per second). Now I needed to

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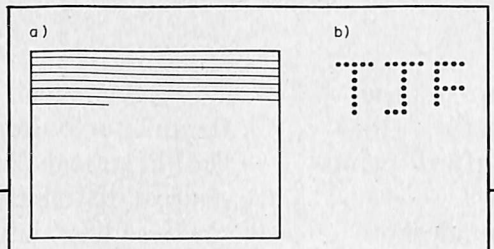


Figure 2. A video image is displayed by left-to-right scanning (relative to the viewer), with 192 lines-per-frame for Apple video and 60 frames-per-second. Part b shows a close-up of the scanning action; when the line is completed the dots will spell TIE.

find a way of converting my dots-per-second figures into bandwidth. At first glance the bandwidth of a video signal appears to equal the dots-per-second rate. After all, Apple recommends that monitors used with its Apple IIe 80-column option have at least 14 MHz of bandwidth. But after digging through some musty textbooks I discovered another rule of thumb: the bandwidth of a baseband video signal is one half the dots-per-second rate. Or put another way, 40-column video has a bandwidth of about 3.5 MHz and it's 80-column counterpart requires twice as much, or 7 MHz of bandwidth. Why does Apple recommend a 14 MHz monitor? Perhaps because it insures a healthy margin of safety.

Getting back to the original problem, that color television set which costs upwards of $500 doesn't have as much bandwidth as a $200 monitor. Both the television and the monitor accomplish the same task but in very different ways. When you go the television route the computer's video output must be converted to radio frequency energy by a modulator. Then the television set converts the signal back to baseband video. The monitor deals directly, avoiding the need for a modulator, tuner and intermediate frequency circuitry.

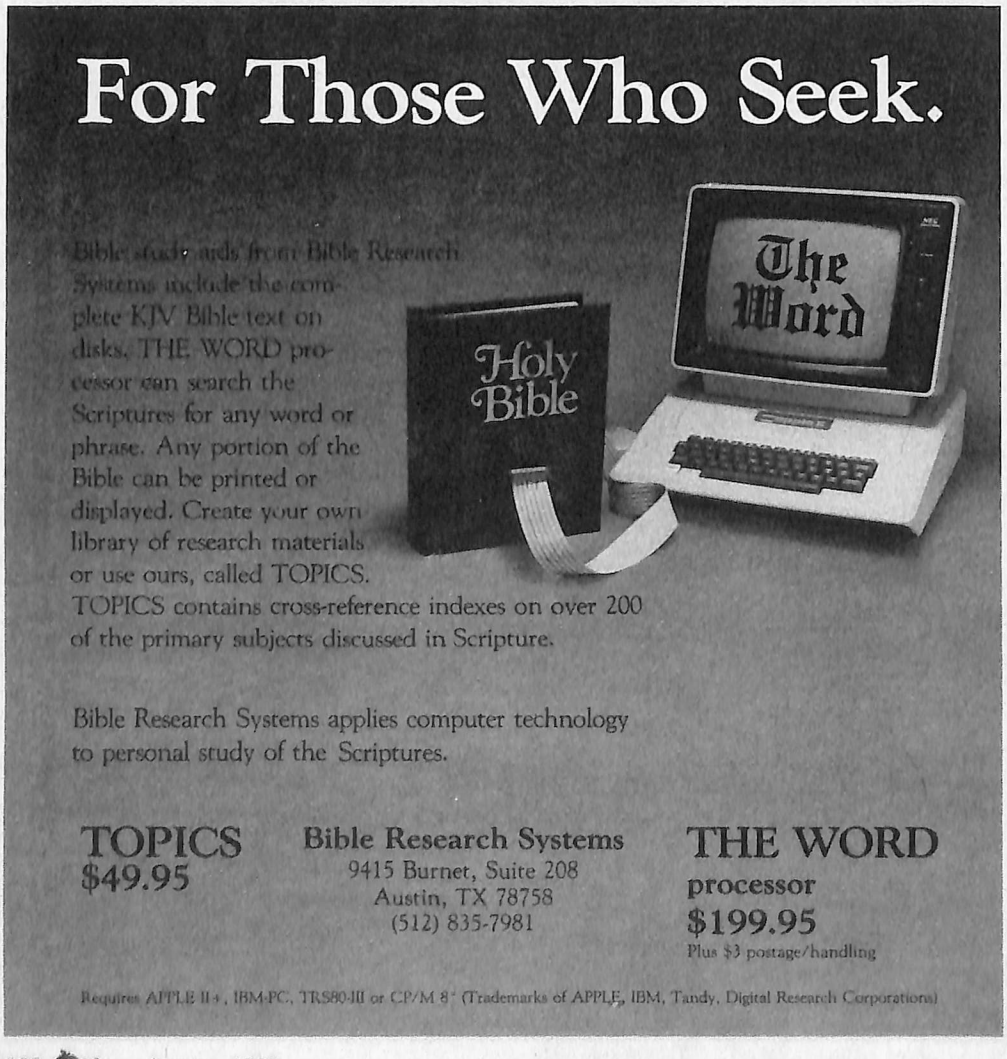
A television's front-end circuits are designed to have a limited bandwidth. This prevents the problem of receiving signals from two adjacent channels. Designers aren't concerned about getting more than three or perhaps four MHz of bandwidth. While the cheapest of television sets seem to have the lowest bandwidths there is no guarantee that paying a high price will give you a significantly better model for use with your computer. If you're buying a new set it might be a good idea to try it out with your computer first.

So what's a person to do? If your applications don't include a lot of word processing or adding an 80-column board, then a television set could be your best choice—especially if you have an extra color set around the house. You can assure yourself of the best possible results by using a good modulator that is properly installed.

In the early days of personal computing, monitors were a precious commodity and fetched big prices. Enterprising hobbyists, unhappy with the results from a television display, kluged their own monitors. By modifying a TV set for direct video entry they got the convenience and low cost of using a television along with the bandwidth advantage of a monitor. That way no modulator is needed and the television's tuner and intermediate frequency circuits are bypassed. But as enticing as chopping and channeling the family's television may sound, it should be done with caution. You might not gain a lot of bandwidth and it is easy to do damage to the set, yourself or heaven forbid, your Apple! If you decide to go this route I strongly recommend getting a thorough set of instructions. *The TV TypeWriter Cookbook* by Don Lancaster is a good starting point.

Using a television set, even one modified for direct entry, is not going to be satisfactory if you want quality 80-column video. But as my friend found out, choosing a monitor is not always easy. By Wednesday of the following week he still hadn't returned my green screen and I was starting to get impatient. When he suggested that we get together for lunch and that he'd buy, I knew that something must be wrong. Fearing for my monitor's well-being I quickly agreed.

It didn't take long for him to get to



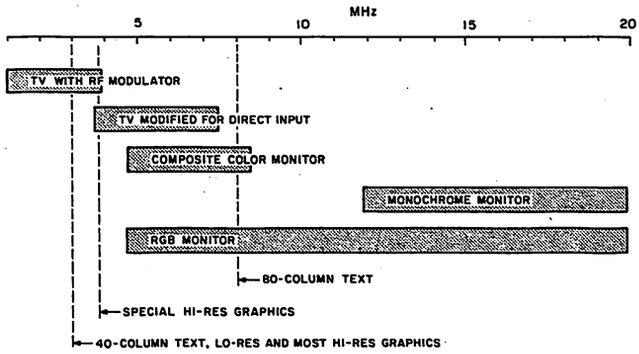


Figure 3. The type of video display you should use depends on your application. The limiting factor is bandwidth. Modulator-television combinations have bandwidths in the neighborhood of two or three MHz compared to monochrome monitors that offer suitable bandwidth to display 80-column video. For best results choose a display that falls above the cutoff line for your particular application.

the point. Just like he had promised, first thing Monday morning he went to the computer store and told the salesman that he wanted a monitor. And after looking at a couple of different models my friend did the logical thing, he chose the most expensive one. Shunning the monochrome models that cost about $200, he went all out and bought a composite color job for about $400. After all, if you pay twice as much you should get twice the monitor. Right?

While we waited for the main course to arrive he reached the heart of his tale. The $400 monitor worked great for games, but when it came to WordStar it was only marginally better than the old television set. Of course, I would be getting my monitor back; he was going to that $*& store this afternoon and demand a color monitor that worked better or else he wanted a plain old green-screen model and a refund for the difference!

Being an interested bystander, I offered to go along. As soon as we walked into the store the salesman who had sold my friend the monitor noticed the serious look in our eyes and without saying a word headed to the back room and emerged a few minutes later with a young kid whom he introduced as the store's technician.

After listening to an abbreviated version of my friend's diatribe the kid just laughed and then launched into a discourse about how a composite color monitor didn't have the same resolution as a monochrome monitor; something to do with the bandwidth limitations that result from a color system that combines luminance and chrominance signals with a phase reference carrier. My friend looked bewildered and I felt about two feet tall after listening to the kid's jargon. We decided to retreat, but only after we had exchanged the color monitor for a more modest green-screen and a credit slip for the difference in price.

I had my monitor back, my friend was happy using his new monitor for word processing, switching to the TV for game playing, and the kid must have been feeling quite smug. Still, I was curious about what the kid had said. So that night it was back to the books.

I already knew that a television set had less bandwidth than a monitor. And now it seemed that I had to extend my theory to account for the difference in bandwidths between color and monochrome monitors. Finding out why meant a trip back to the early days of television. When color television came along in the 1950s broadcasters wanted a system that would be compatible with the existing black and white equipment, so engineers devised a way to tack on color information without harming the quality of a picture received on a black and white set.

While it met the commercial requirements of the day, it became apparent that adding color had an adverse effect on bandwidth and therefore the ultimate resolution that a video image could have. Color sets usually include a filter that actually limits the bandwidth to something less than 3.6 MHz! In theory a black and white set should outperform a color one. But in practice a discount priced black and white set is likely to have a mediocre bandwidth too. Moving from television sets to dedicated video monitors, I found that monochrome models (those with black and white or green screens) have wider bandwidths than the more expensive composite color counterparts. It is one time when the "give me the more expensive model" philosophy may fail you.

What both the salesman and the whiz kid technician failed to tell us was that you can have your cake and eat it too. By *not* using a composite video signal you'll get both color and high resolution. RGB monitors do just that. A special interface board installed in your Apple provides separate signals for Red (R), Green (G) and Blue (B) color components as well as synchronization information to a specially designed monitor. Stunning is probably the best way to describe a good RGB picture. There is no blurring and whites show up as true whites, not some off-shade. Of course there is one tradeoff—price. Prices for a medium bandwidth RGB monitor start at around $350, with top-of-the-line models selling for over $1000.

The bottom line or end result of my digging is summed up in Figure 3. The vertical lines are estimates of the bandwidth needed to view a specific kind of Apple video. Horizontal bars are used to represent the approximate range of bandwidths offered by different types of monitors. Of course there are exceptions. You just might own the one television set in 10,000 that is good enough to display 80-column video. Or you could be so discerning that even a $500 20 MHz display has faults. But treated as a rough guideline, the information in Figure 3 should keep you out of trouble.

Theorists will argue that the bandwidth of an Apple high-resolution display is the same, regardless of what you are trying to show. I agree, but suggest that the subject does matter when it comes time to choose a monitor. The high-resolution graphics in a game like Bug Attack can still be enjoyed, even if they are slightly blurred. But what about a word processor like Screen Writer II where the Apple's high-resolution graphics are used to display a 70-character line? The two photographs show the difference. A television set driven by an RF modulator is displaying a Screen Writer II text in one photo. The second photograph shows the same text, this time displayed on a green screen video monitor. Which would you rather stare at? ■

Designer Letters by Apple and the NEC 8023

Your printer knows how to create some fine-looking prose. The trick is telling it what you want.

by Mike Brewer

Like most recent Apple II Plus buyers, our small business obtained a copy of AppleWriter II with the purchase of one of our systems. Since obtaining the package, we have used it for all our text editing needs and have done quite a few mass mailings, assisted by its easy-to-learn word processing language (WPL) routines.

After the work is done, however, we usually find a few moments to sit down and do some serious investigating of the "extraordinary attributes" of the program. One of these happens to be controlling the NEC 8023 impact printer via text-embedded escape and control characters through a Microtech parallel interface.

Since discovering these capabilities, we have breathed new life into our personal letters and mass mailings by embellishing each piece with such things as variable printing of pica, elite, condensed and proportional characters. We produce enlarged characters and enhance them for emphasis (or when the ink is running low on my ribbon cartridge). We also create forms with neat rows of horizontal and vertical boxes, complete with big titles, medium headings and tiny acknowledgements at the bottom of each.

All of this can be done very simply and easily with your AppleWriter II, and, quite probably, with any other of the fine text editing programs that are currently available.

Address correspondence to Mike Brewer at Columbus Photographics Corp., 4936 Tamarack Blvd., Columbus, OH 43229.

How to Begin

Check your NEC printer DIP switches, which are located under a printed piece of clear, flexible plastic marked SW-1 and SW-2. This strip can be seen in the right side of the gully where the print head control wires are. They should be set as follows:

SW-1. Only DIP switch number 6 should be on; all the others should be off or locked in the open position.

SW-2. DIP switches 1, 6 and 7 should be on; all others should be off or in the open position. (These settings are different from those set at the factory.)

Now turn on your computer system and type, then print, the following passage: NOW IS THE TIME FOR ALL GOOD MEN TO COME TO THE AID OF THEIR COUNTRY! About the only thing that makes this line impressive is the exclamation point. Now let's dress it up!

Condensed Type

Move your cursor to the immediate left of the N in the first word and type control-V. You should see a V in the left side of the data line at the top of your screen. Now push the escape key as many times as necessary until you get a right-facing bracket on an inverse background. Now hit escape once more to get a ^, then press Q. *Note: If your computer is equipped with a shift key option, there is no need to precede the above Q or N with a ^; simply hold down the shift key and press the appropriate letter.* Push escape once more to get another right-facing bracket on an inverse background. Then type control-V, followed by a space. Repeat the procedure at the end of the sentence, substituting the letter N for Q. Now type control-P and NP. You will notice a different sort of sound coming from your printer. Don't be concerned—it's normal.

If everything was done correctly, you have produced a sentence in condensed type at the rate of 17 characters per inch. At the end of the sentence, you will also have set the printer to begin typing pica letters, the default (normal) mode for the NEC printer.

Type the sentence again, without control characters. Now, hit control-P and NP. Your new sentence should look (and sound) normal.

Troubleshooting Hints

If something did not go as scheduled, retype the sentence with control characters until you get it right. If a reentry fails to produce the desired results, then there are four things that could be amiss:

1. Your printer DIP switches are set incorrectly;

2. You used lowercase control characters inside the brackets;
3. You are still under the influence of control-V; or
4. You failed to follow each control-ending bracket with a space, in which case the printer did not recognize the following character. If there is no space, then the first character will not be printed. You'll end up with an OW instead of a NOW, for example.

Underlining

Repeat the sentence example again, substituting X for Q and Y for N, then print it. You should now have:

NOW IS THE TIME FOR ALL GOOD...

Congratulations! You have just turned on and shut off an underlined sentence. Easy, isn't it?

Conventions

Now, in order to avoid confusion, let's agree on some conventions. What we called control characters in the preceding section are actually escape commands, or simply capital letters between brackets. Let's call what follows control commands, because we will actually use the control key to set up these commands.

Enlarged and Expanded Letters

Type control-V, hit escape to get the right-facing inverse bracket and then, while holding down both the shift and control keys, type ^R. Press escape, again to get the right-facing bracket, skip a space and retype our favorite sentence. At the end of the sentence, repeat the control process, substituting ^T. Print it!

Your printer will make another strange noise and print enlarged letters. These are generally great for titles, but are lighter because of the wider-than-normal print head pin striking. The problem can be alleviated as follows:

After the control-^R bracket set, skip a space and type in the escape-! bracket set and a space, just exactly as we did the escape-Q bracket set above. And at the end of the sentence, following the control-T bracket set, skip a space and type in an escape-" bracket set. Now print it!

You will now see the expanded-letter sentence, but with considerably darker type.

By way of explanation, the ^R turned on the expanded printing mode, the escape-! turned on the enhanced printing mode, the ^T turned off the expanded printing mode and the escape-" turned off the enhanced printing mode.

CONTROL CODE	RESULTANT PRINT STYLE
ESCN	Pica is the default mode.
ESCE	Elite is 12 characters per inch.
ESCP	Proportional has an All American look.
ESCQ	Condensed will produce 132 characters per line
ESCX and ESCY	These are always used in pairs to underline!
ESC!	Now your type will appear bolder.
ESC"	This will get you back to normal.
ESCB	In case you haven't already guessed, you have just begun printing seven lines per inch rather than the standard six.
ESCA	Now things have been returned to normal at the rate of six lines per inch. This is considerably less crowded and easier to read.
ESC&	ﾚｱBﾁﾛﾛｲ±U It's Greek to me!
ESC$	Now, we're back to ASCII English!
CONTROL^N	ﾁﾘﾃﾄﾅﾆﾇﾈﾉ Just a word of thanks to the folks who made your printer.
CONTROL^R	For real excitement expand something!
CONTROL^T	This one turns off the expanded mode.
CONTROL^R + ESC! + ESCX	How about big, bold and underlined!
CONTROL^T + ESC" + ESCY	Now you can try mixing control codes.

Type samples.

Further Experimentation

By now, you should be both amazed and feel like an expert. However, there is much more to come. Before going further, though, practice a bit with the above and experiment with the following sets: escape-B (7 lines/inch), then escape-A (6 lines/inch); escape-& (Greek letters), then escape-$ (ASCII character set); escape-P (proportional type), then escape-N (pica); and escape-E (elite type), then escape-N.

Now try stacking the commands, as we did above with ^R and escape-!. Try a paragraph with condensed (escape-Q) letters that are enhanced (escape-!) and printed at the rate of 7 lines per inch (escape-B). Then, at the end, you will have caused the printer to return to pica type (escape-N), without enhanced letters (escape-") and at the default rate of six lines per inch (escape-A).

Now you have absolutely no excuse for avoiding those great works of prose that you have promised the world for so long. Since practice makes perfect, you should use the above as quickly and frequently as possible. ■

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FORTRAN Formatting in Applesoft

FORTRAN is designed for ease in data handling. Applesoft can format the FORTRAN way.

by Steven A. Schwartz

How many times have you wished that your Apple could interpret FORTRAN-formatted data? When entering a series of variables, wouldn't it be simpler to just type 3298351203 and have your Apple interpret it as 32.98, 35, and 12.03? Does the idea of re-entering a large FORTRAN-formatted data file to conform with Applesoft requirements (i.e., a comma separating each entry) depress you? It should! The task is time-consuming, boring and exceptionally error prone. The technique described below enables you to use and interpret FORTRAN data strings in your own programs.

First, examine Figure 1. Your data, in lines 30–60, consist of four integer arrays: A(I), B(I), C(I) and D(I). If assigned to a real or integer variable, line 30 would be interpreted by Applesoft as 982,739,127,834. However, if this data were from a FORTRAN program with a format of (I3,I4,I2,I3) or (F3.0,F4.0,F2.0, F3.0), line 30 would actually be interpreted as four variables that result in the numbers 982, 7391, 27 and 834.

By the way, for those of you with little FORTRAN experience, in the first format (I or Integer format), the number following the I is the number of digits in the integer. I3, for example, means a three-digit number. When the I is also preceded by a number, as in 3I2, the initial number indicates the number of repetitions of the format. Thus, 3I2 is read as three two-digit integers.

In F (Floating Point) format, the first digit after the F is the number of digits or the field width, and the number following the decimal point indicates the number of places to the left of the final digit that the decimal should be inserted. For example, reading 123 with an F3.1 format results in a real number of 12.3; in F3.0 the same number would be interpreted as 123.

Figure 1 assumes that all FORTRAN-formatted data is integers, or whole numbers. The procedure to convert the data strings to a series of integers is as follows:

1. Read the data into a string array—in this case F$(I).
2. Using the MID$ statement (lines

```
20    HOME : FOR I = 1 TO 4: READ F$(I): NEXT I
30    DATA "982739127834"
40    DATA "249132400345"
50    DATA "013729424393"
60    DATA "133743791034"
70    REM ASSIGN PROPER VALUES TO VARIABLES
80    FOR I = 1 TO 4
90    A(I) = VAL ( MID$ (F$(I),1,3)): REM VAR. A = 1ST 3 COLS. OF F$(I)
100   B(I) = VAL ( MID$ (F$(I),4,4)): REM VAR. B = COLS. 4-7 OF F$(I)
110   C(I) = VAL ( MID$ (F$(I),8,2)): REM VAR. C = COLS. 8-9 OF F$(I)
120   D(I) = VAL ( MID$ (F$(I),10,3)): REM VAR. D = COLS. 10-12 OF F$(I)
130   NEXT I
140   REM PRINT RESULTS
150   PRINT "A(I)"; TAB( 9)"B(I)"; TAB( 17)"C(I)"; TAB( 25)"D(I)": PRINT
160   FOR I = 1 TO 4
170   PRINT A(I); TAB( 9)B(I); TAB( 17)C(I); TAB( 25)D(I)
180   NEXT I
190   END
```

Figure 1. Sample progrant.

Address correspondence to Dr. Steven A. Schwartz, 9226 Vantine St., Pittsburgh, PA 15235.

Figure 2.
Data interpreted by sample program.

A(I)	B(I)	C(I)	D(I)
982	7391	27	834
249	1324	0	345
13	7294	24	393
133	7437	91	34

90–120), indicate the place in the string where each data element begins and the number of digits in each number. For A(I), the 1,3 indicates that A(I) begins at the first place in F$(I) and is three digits long.

3. Use the VAL function to convert the new string segment into a number.

That's all there is to it. Figure 2 shows how our sample program interprets the data in lines 30–60.

Some of your programs may all access the same general data base. This is often the case if you are writing or using statistical programs that have one large data base, but require several different types of analyses of the same information. When reading Applesoft-generated data files with ten variables per record, for instance, if you require only the tenth variable, you still have to read the first nine! (This is not strictly true, but the instructions for using the B (byte) command in the *DOS Manual* to position a read are a bit scary.) Using our new technique, it is easy to skip over unwanted variables or columns within the initial string.

As an example, change line 120 to read:

```
120 D(I) = VAL(MID$(F$(I),12,1))
```

When you run the program again, the entries for D(I) will be one-digit numbers read from the twelfth column of each F$. You just told your Apple that there are no numbers of interest in columns 10–11 of F$! If you eliminate lines 90–110, the program assigns values only to array D(I), skipping arrays A(I), B(I) and C(I) entirely.

Using this technique also allows you to reassign groups of digits within the F$ strings easily *without* using the RESTORE statement. Suppose, for example, that the first digit of A(I) was also a special identification number that you wished to process along with the entire value of A(I). Instead of entering this identification number as a separate data element (as in Applesoft) you could make the following changes and additions:

```
125 E(I) = VAL(MID$(F$(I),1,1))
150 PRINT "A(I)";TAB(9)"B(I)";TAB(17);
    "C(I)";TAB(25)"D(I)";TAB(33)"E(I)":
    PRINT
```

A(I)	B(I)	C(I)	D(I)	E(I)
98.2	7.391	.27	834	9
24.9	1.324	0	345	2
1.3	7.294	.24	393	0
13.3	7.437	.91	34	1

Figure 3. Alternative interpretations of data.

```
170 PRINT A(I);TAB(9)B(I);TAB(17)C(I);
    TAB(25)D(I);TAB(33)E(I)
```

Run the program and you will see digit one of F$(I) as the identification variable E(I).

In some cases you may wish to interpret segments of F$(I) as real or floating-point numbers. To do so, just divide each entry in your original variables (lines 90–120) by 10^X, where X represents the number of decimal places to the left of the original string where you want the decimal moved. For A(I), as an example, to change this to an F3.2 format, divide A(I) by 100 (that is, 10^2).

```
90 A(I) = VAL(MID$(F$(I),1,3))/100
```

To change B(I) to an F4.4 format, divide B(I) by 10,000, and so forth. Try to make the following changes and see if the results look like those in Figure 3.

1. Change A(I) to an F3.1 format.
2. Change B(I) to an F4.3 format.
3. Change C(I) to an F2.2 format.
4. Leave D(I) and E(I) as integers.

Pretty simple, isn't it? For those of you who had any trouble, you divide line 90 by 10, line 100 by 1000, and line 110 by 100. All other lines remain unchanged.

Are you beginning to see the power of FORTRAN-type data formatting? A final plus may be a savings in disk space when writing such data strings to sequential text files. Although I am not a DOS wizard by any means, sequential files insert a RETURN character after each data entry within a record. Since the FORTRAN approach leaves no spaces between data elements, less disk space should be needed to store the data. The amount of savings should be related to the number of elements you insert in each data string. ■

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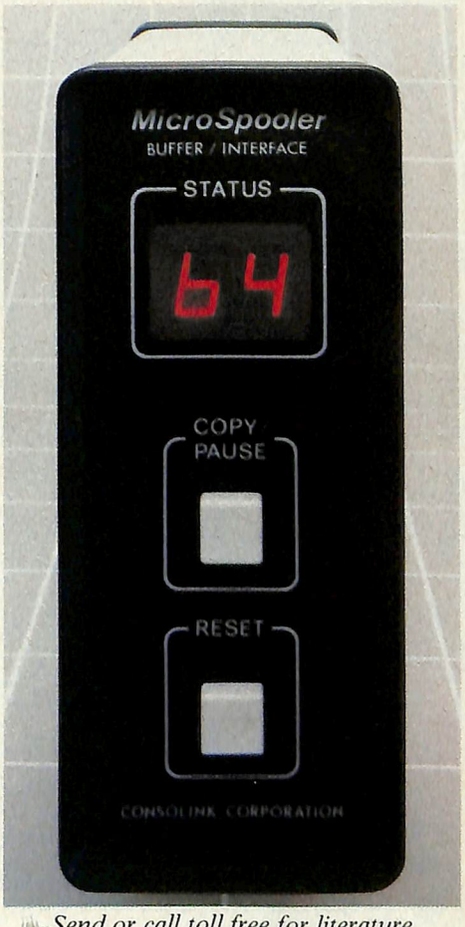

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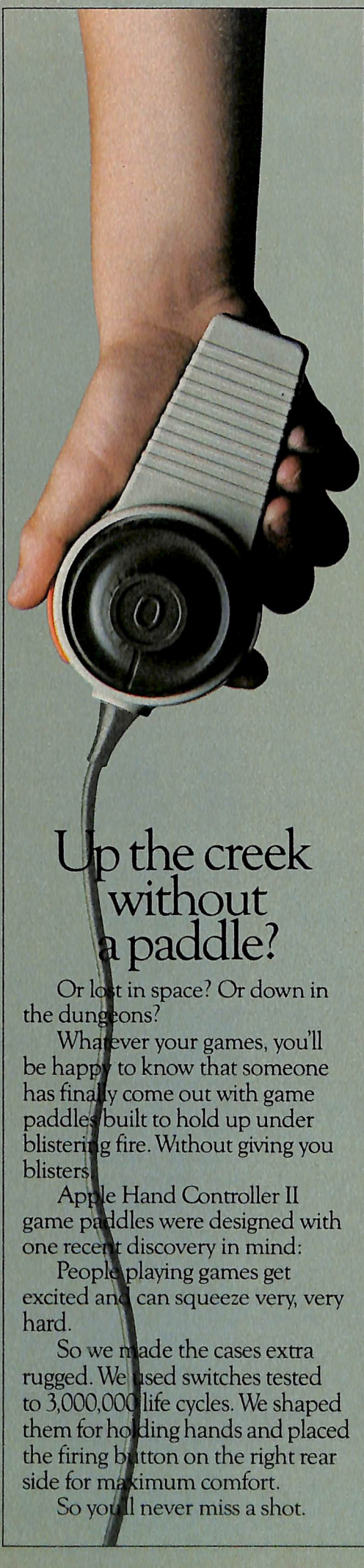

A storehouse of knowledge.

If you work with so much data or so many programs that you find yourself shuffling diskettes constantly, you should take a look at Apple's ProFile,™ the personal mass storage system for the Apple III Personal Computer.

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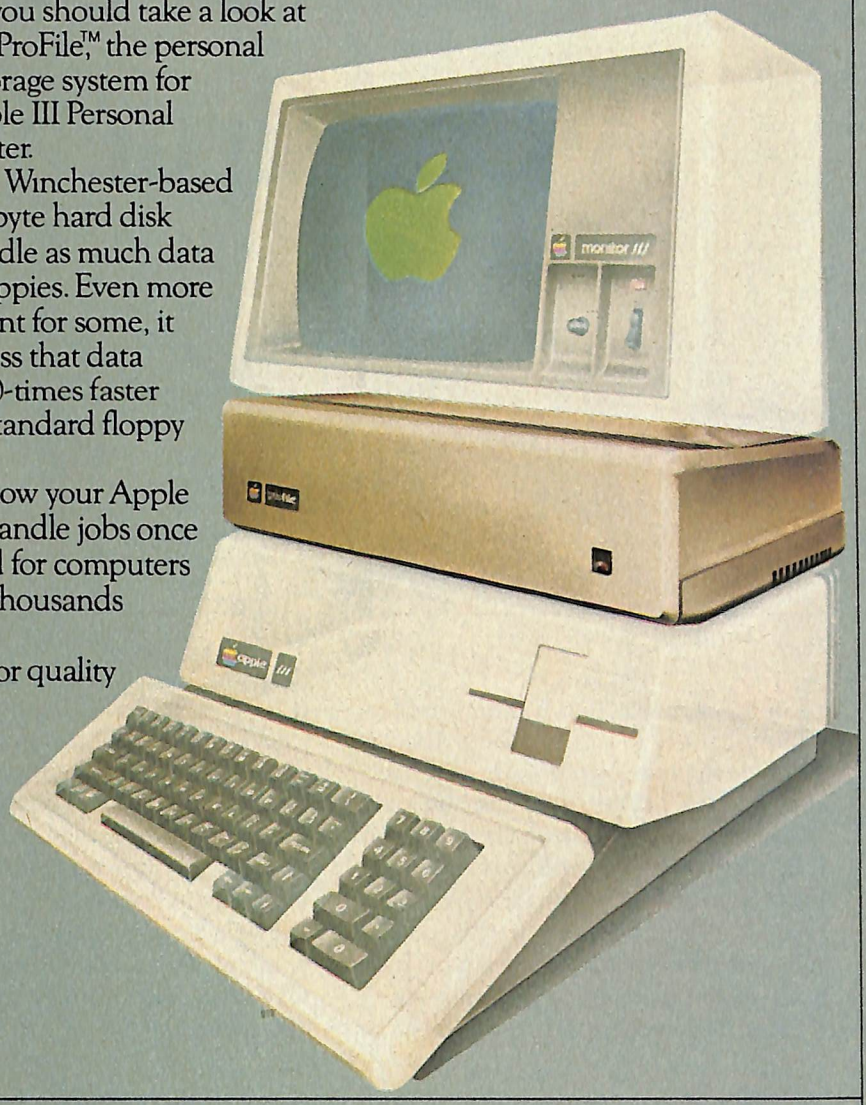

Up the creek without a paddle?

Or lost in space? Or down in the dungeons?

Whatever your games, you'll be happy to know that someone has finally come out with game paddles built to hold up under blistering fire. Without giving you blisters.

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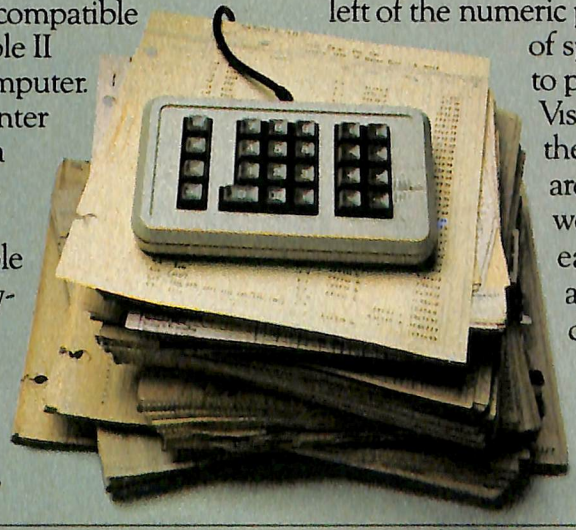

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Line Cleaner
A Construction Project

**Don't just reach for your wallet.
Build a surge suppressor yourself and save...**

by George M. Engel

In an earlier article I mentioned using MOVs (Metal Oxide Varistors) to protect your Apple from line transients. This article presents the parts detail necessary to construct your own line cleaner. We will use standard parts available from your local Radio Shack. The total cost of this project will not exceed $25, even if you have none of the parts in your junkbox.

The finished product will remove transients from your power line, barring a direct lightning strike. And if you run your Apple in the middle of a thunderstorm, you deserve what you get. The line cleaner will also remove EMI/RFI noise from your line. There's an optional "power on" indicator to install for less than a dollar. If you don't want to build your own, you can always buy the commercial product for $90 to $100.

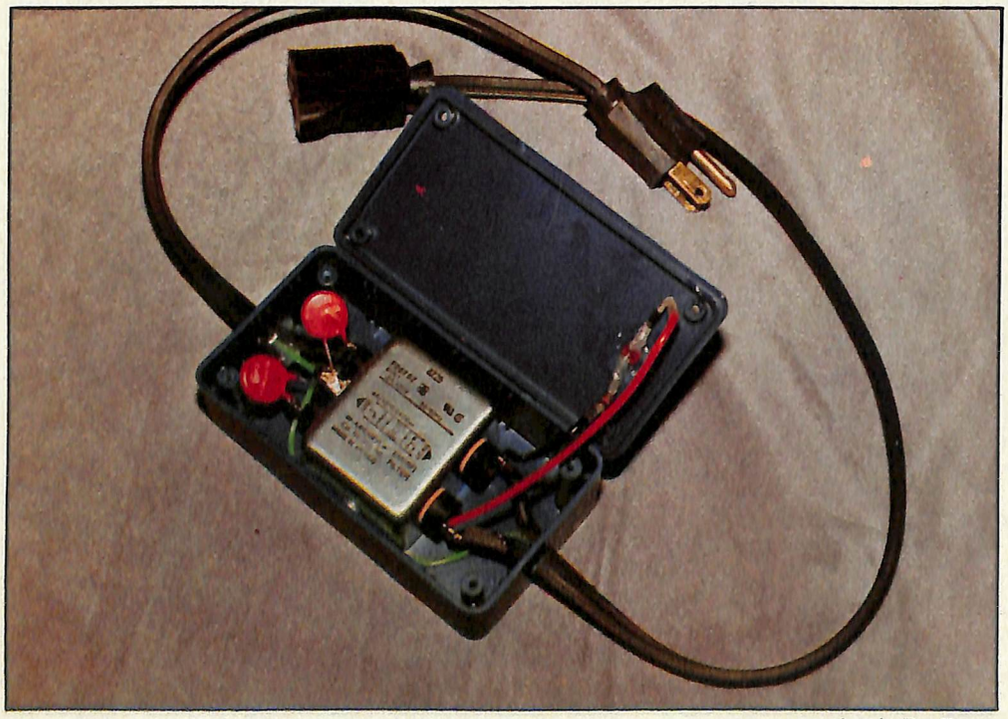

photo by Don Kronen

A completed line cleaner.

Sound interesting? Buy the parts in the list (Figure 1) and let's get at it!

The first step is to drill a hole in each end of the box to accommodate the *three*-conductor line cord that powers the computer. Do *not* use a two-conductor cord; it won't work. Drill the hole approximately two-thirds of the way down the side of the box. Now fold back the two side tabs on the filter so it will fit in the box. (You won't be needing the side tabs.)

Position the filter in the middle of the box with a connector end facing each hole you just drilled. Now that you know where it goes, put a couple of gobs of GE silicone sealer or equivalent on the bottom and press it into place in the box. The sealer sets in about 30 minutes. While you're waiting, plug in your soldering iron for the next step. Pretty easy so far, isn't it?

Now to cut the extension cord. I cut mine 12 to 16 inches from each end. The object is to install the filter as close to the wall outlet as possible. Strip back the insulation on all the cut conductors approximately one-half inch. Apply your soldering iron to the ends, flowing the solder to the bare conductors just enough so the strands take up the melted solder. Not too much now. You just want to prevent individual

Address correspondence to George Engel, 35 Old Ansonia Road, Seymour, CT 06483.

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"To add a finished look to the project, for about $1 you can install a red LED to indicate power-on status."

Part	Part No.	Price
EMI/RFI filter*	273-100	$11.95
MOV (two)	276-570	$1.59 ea.
Plastic box	270-222	$2.19
3-conductor extension cord	61-2762	$3.99
LED (optional)	276-041	$0.79 pkg.
Diode (optional)	276-1102	$0.59 pkg.
10k resistor (optional)	271-034	$0.19 pkg

Tools and supplies: soldering iron and solder, drill and bits, GE silicone sealer or other glue, wire cutters and stripping tool, electrical tape or heat shrink tubing, multimeter or "some" 115 vac device.

*The Radio Shack filter can be replaced by the better Cornell-Dubilier model #APF 531L, LW or W type. The C-D unit has better attenuation, ergo, more filtration.

Figure 1. Parts list.

strands from working loose. This is called "tinning" your leads.

With all six conductors tinned, it's time to wire up the box. As you read this description refer to the photo and Figure 2 for clarification. Insert the male piece of line cord through the hole in the box near the side of the filter labelled "line." Connect the green wire to the filter tab in the middle, making sure you have a good mechanical connection. Now attach the black and white wires to the insulated posts on either side of the tab. Again, make a good mechanical connection. Do not solder the leads yet.

Insert the female half of the line cord through the other hole in the box—on the "load" side of the filter. Connect the white and black leads to the insulated posts. The green wire will be brought around the filter and, along with the green wire from the line side, attached to the tab on the line side of the filter. Once again, do not solder yet.

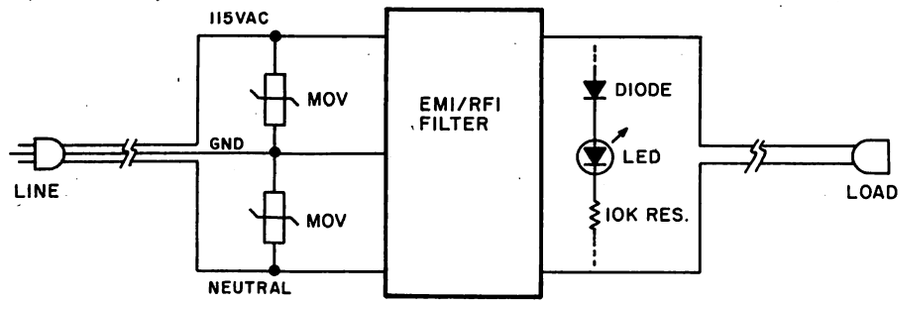

Figure 2. Line cleaner diagram.

We're close now! Wire the MOVs into the circuit on the line side of the filter. The first should be connected on one side to the white-wire insulated post and on the other side to the green-wire tab. The second goes between the black-wire post and the green-wire tab. You can now solder all the line side connections carefully. Do not solder the load side yet.

To add a finished look to the project, for about $1 you can install a red LED to indicate power-on status. The LED circuit consists of a resistor, a diode and the LED itself. Drill a hole in the output side of the lid of a size to accept the LED snugly. Mechanically connect one side of the 10k ohm resistor to the cathode (flat side) on the LED. Now connect the cathode (striped end) of the diode to the other leg (anode) of the LED. Gently solder these connections and apply a little electrical tape or heat shrink tubing for isolation purposes. Now, with glue or silicone sealer, cement the LED into the hole in the lid.

All that remains is to connect the resistor to one post on the load side of the filter and the diode to the other post on that side. Be sure to splice in enough wire so you can remove the lid for inspection. Again, cover all bare connections with electrical tape or heat shrink tubing; remember, that's 115 volts you're playing with. Double-check that all connections are soldered and well insulated. Gently form the power-on components so they will fit in the box without touching anything when you close the lid.

The power-on feature of the line cleaner, by the way, can be used for many appliances, stereos, etc., that don't have power-on indicators. Let your imagination be your guide.

When you're satisfied with your line cleaner, close the lid on the box and plug it into the wall outlet. If you have a multimeter, measure the output for 115 vac. If not, plug a low-cost 115 vac "something" into the female receptacle of the cord. Does it work normally? If so, you can plug in your Apple and the job is done. Your Apple is now protected.

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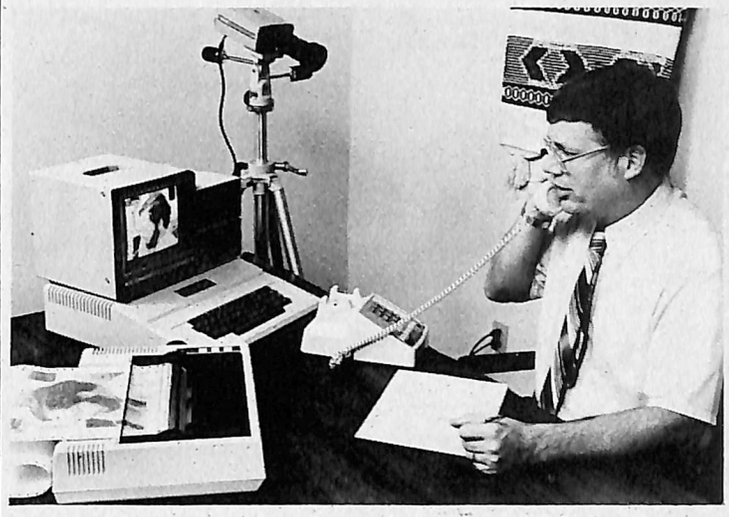

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Get It on Paper

Used to be that dot matrix printouts were fuzzy and hard to read. The Microprism 480 printer proves that doesn't need to be.

by Lee E. Sumner, Jr.

Probably your first major peripheral purchase, after buying your Apple, is a printer. These days there are so many that it is hard to choose. With some planning, though, you can narrow the choice down to a few. This is what I did.

Personal Requirements

First I wrote down my requirements. At the top of the list was local service. Since I was going to use my printer with a word processor to write articles like this, I did not want a breakdown to hold up my work.

The other major criterion was a good letter font. It had to have lowercase descenders and a good filled-dot matrix. I had decided against a letter quality printer since my editors are tolerant folk, and I wanted something with speed.

Price was another criterion.

I took my list to dealers within a 30-mile radius to see what they could do. All had in-house service for the printers they handled; my first criterion was met. Most of the printers had a good dot matrix character set.

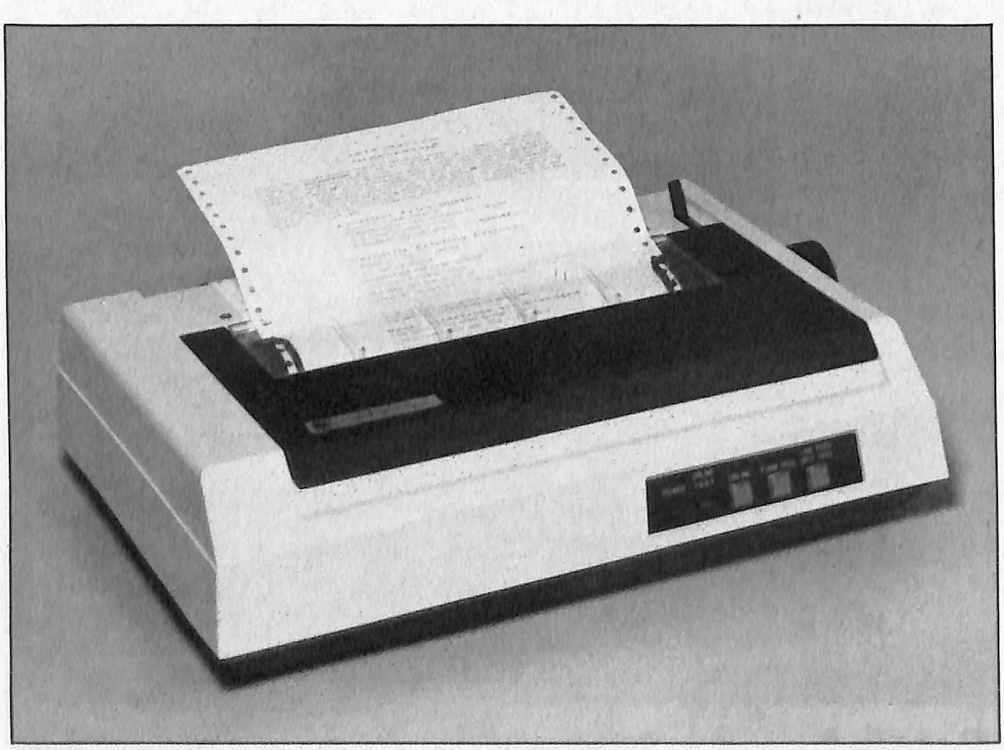
Each printer had its own special features that were useful. I finally settled on the IDS Microprism 480 because of the combination of these features:

- both serial and parallel interfaces
- near letter quality character set
- data character set for fast print
- single sheet capability for letterheads
- compatibility with IDS Prism software

One little-known detail of some printers is that you must remove the case to set some of the switches for default settings. On the Microprism you can reach the switches by lifting the lid. This turned out to be a big time-saver for me since I use this printer on different settings with both Apple and TRS-80 computers.

General Specifications

The IDS 480 is a microprocessor controlled, table-top dot matrix printer. It measures about 4.5 inches



The IDS 480 is styled very much like the Epson MX-80. The control buttons are on the right front of the unit. The black section of the cover lifts off for easy access to the ribbon and switches.

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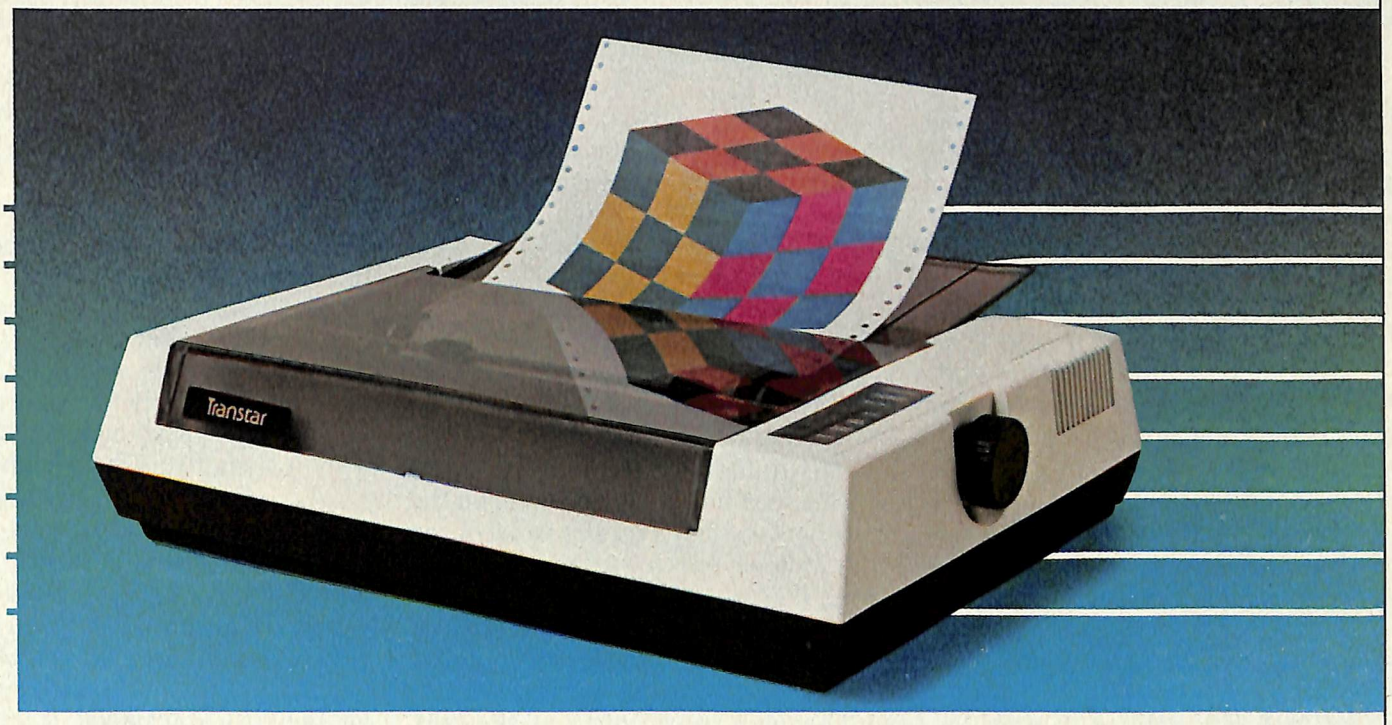

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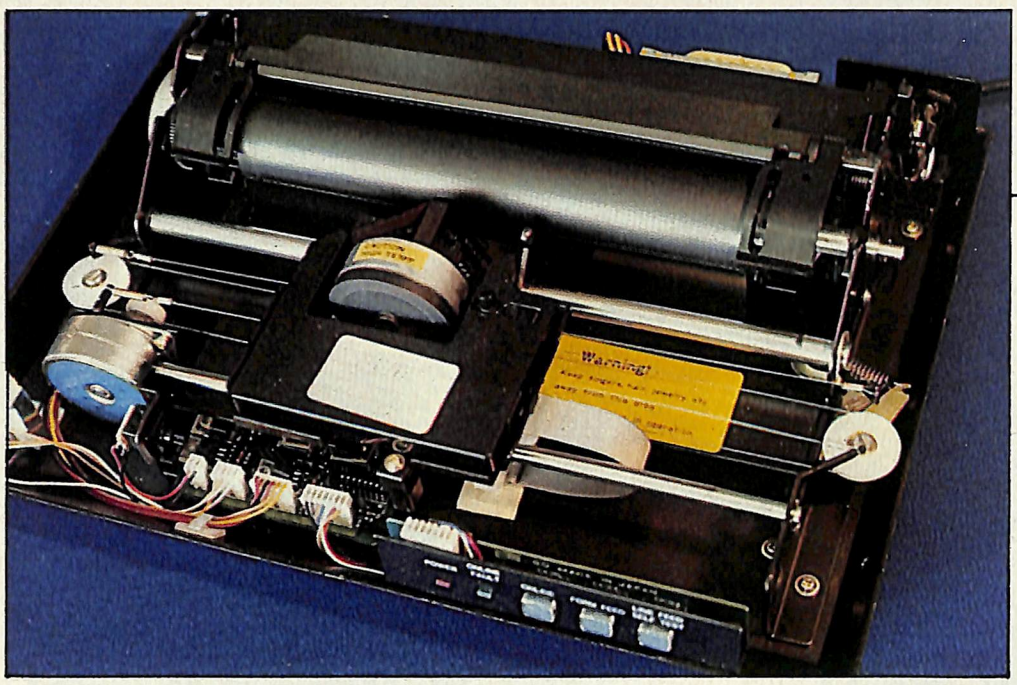

The IDS 480 with all its clothes off. The ribbon cartridge rides with the print head on two metal bars. The default switches can be seen right under the back of the ribbon cartridge.

high, 16 inches wide, and 12 inches deep. The printer weighs in at a hefty 19 pounds. An access cover on top of the machine allows easy ribbon replacement, paper loading and dip switch twiddling.

The printer can feed 9.5-inch fanfold paper, 6-inch roll paper (bracket included) and cut sheet using friction feed. Paper is fed into the printer from behind a rotating platen much like a typewriter. The printer can handle 15- to 20-pound single-part and 6- to 8-pound carbon multi-part paper (an original plus two copies).

A penetration control lever on the head carriage allows you to compensate for paper thickness. Getting the paper in the machine takes a little patience. The printer will print to the bottom of a single sheet before out-of-paper is signaled.

Operator controls and lights are located at the right side of the front panel of the unit. Three push-button switches control formfeed, linefeed and printer on-line/off-line. A self-test of the printer is done by holding down the linefeed button and turning on the power. Two lights on the front of the unit indicate power on and printer on-line. The on-line light flashes if the printer is out of paper. On the back of the printer is the power switch and a nondetachable power cord.

The main power fuse is on the back of the unit with two more fuses on the main PC board for the dc power supplies. These two fuses are oddball sizes, as I found out when I blew them using my TRS-80 with an incorrect ground. The dealer had never blown any of them before and had only one. I had to wait three days before he was able to get more.

```
Now the margins are set to
about 2 inches in width.
Be sure to notice that
justification is still in
effect and both the right
and left margins are still
straight.
```

Figure 1. Print sample using IDS 480.

The ribbon is a snap-in cartridge, and is driven by carriage motion through two one-way clutches. The specified life of a ribbon is 1.5 million characters. I did notice a lightness in the print density long before reaching that level. The ribbon takes about five seconds to replace. I keep one ribbon back for final copies and do all drafts with well-worn ribbons. I use up a $13 ribbon every four weeks. Graphics really eat up the ink, too.

The print head has two vertical columns of print needles. Needles are positioned to print overlapping dots, increasing the print quality. A stepper motor moves the print head via a pulley and wire system. The print head can be removed by taking out two screws.

Print head movement is logic-seeking bidirectional, for maximum printer throughput. For graphics it uses unidirectional (left to right) printing. The graphics print rate is about seven horizontal inches per second.

The paper drive system is driven by a stepper motor. The maximum slew rate is a rather slow 3.5 inches per second. Form feeds seem to take forever. The platen is a hard rubber cylinder with fixed pins on the ends. There is a platen release lever located in the right rear top of the printer. You use this to engage the friction feed rollers for single sheets or roll paper. It is not used for pin feed. The rubber platen reduces the noise level a great deal. I have compared the IDS 480 printer side-by-side with Epson and Okidata printers and the IDS is noticeably quieter.

Printer Interface

The IDS 480 comes with both serial

```
While we are at it, here is an example of 12 CPI ENHANCED
printing. This is a subscript and a superscript printed with only two control codes. A
vertical Advance 2 is used to move the paper down half a line and a Vertical
Advance 3 moves it up half a line.

While we are at it, here is an example of 12 CPI ENHANCED
printing This is a subscript and a superscript printed with only two control codes. A
vertical Advance 2 is used to move the paper down half a line and a Vertical
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Figure 2. Sample using proportional, superscript and subscript characters.

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Or maybe your interests lie in other galaxies. Imagine yourself trapped in a mirror filled **LAZER MAZE**, knowing that an alien opponent is lurking nearby. He's waiting for you to fire your lazer at the wrong mirror, sending its reflected beam zig-zagging harmlessly out of his path, allowing him to fire upon you! Be accurate and be fast in this timed action game. **LAZER MAZE**, adding fuel to the summer fire! (Apple, Atari, IBM PC, VIC 20, Commodore 64)

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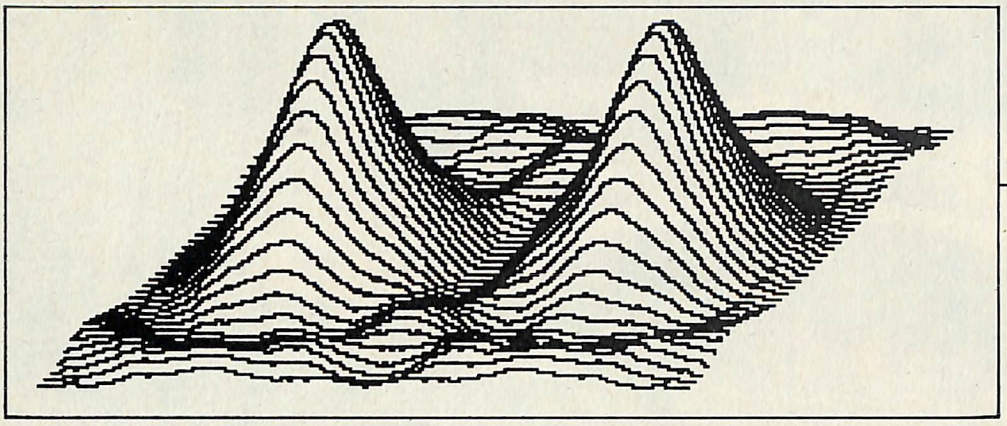

Figure 3.
Sample plot from Computer Stations Inc. program.

and "Centronics compatible" parallel ports. They are both wired to a single male 25-pin RS-232C compatible connector on the back of the unit. Data rates available for the serial port are 300, 1200 and 9600 baud. The rate can be changed using a DIP switch.

The parallel interface is configured using movable jumpers on the PC board. To change these you must remove the cover, which takes about five minutes and a screwdriver. I did not have to change anything to make it work on both Apple and TRS-80 parallel printer ports. Complete schematics of the interface and timing charts are included in the manual to aid you in making any kind of cable.

The maximum transfer rate of the parallel port is 35 kilobytes per second. There is automatic multiple line buffering of about 1400 bytes, but no option to add more.

Printer Options

Part of the printer power-on sequencing establishes various printer options selected by the eight-position DIP switch under the access cover. Many of these functions are also programmable and can be redefined under program control.

The DIP switch, at power up, can set parallel or serial interface, baud rate, 10 or 16.8 cpi print density, enable or disable the programmable feature, enable or disable an automatic line feed, enable or disable an automatic one-inch skip at the bottom of a form and can select one of four page lengths from 3.5 to 11 inches.

The IDS 480 printer utilizes the ASCII character set for its standard print character format. All 96 printable ASCII characters are included. ASCII control codes are used to program the printer.

Figure 1 is a display from a portion of the self-test mode. It gives you an idea of the quality of the print font. Figure 2 is a sample of the proportional, superscript and subscript capabilities of this printer.

There are two basic character fonts—near letter quality and draft. The printer can be programmed to print at 10, 12 and 16.8 cpi in each font. Proportional spacing is available with the near letter quality font. The faster draft quality is used when you don't need the high quality print. Draft quality is printed from 20 to 35 percent faster than letter quality, vary-

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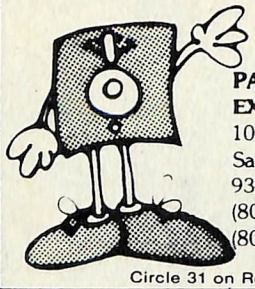

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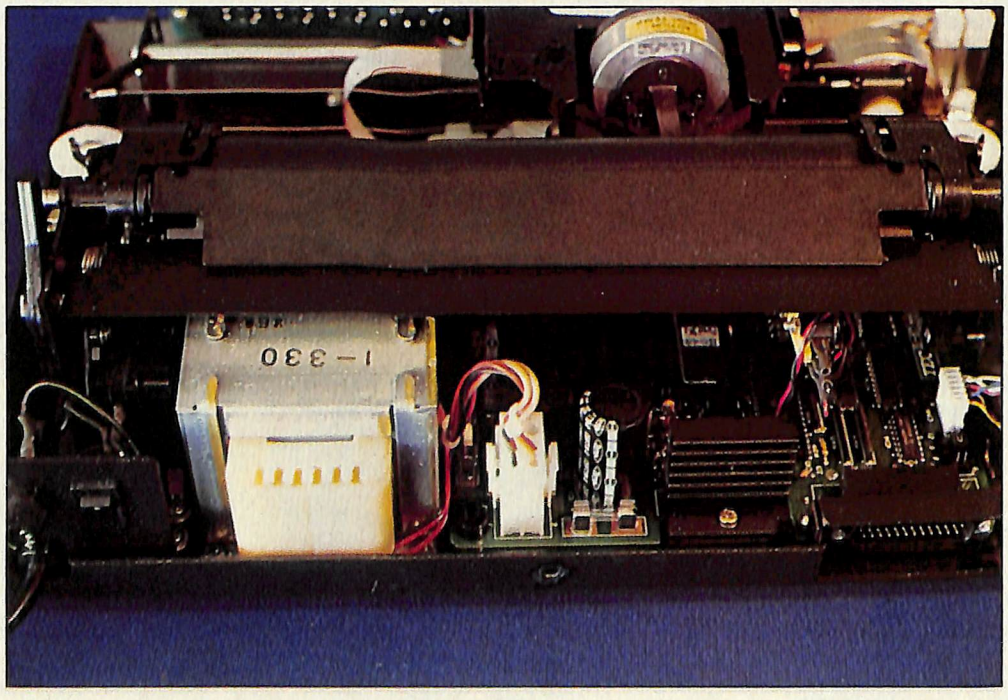


This rear view shows the electronic parts stuffed under all the mechanical parts. From left to right are the main power fuse, the power switch, the power transformer, two dc power supply fuses on either side of the power connector, a heat sink and the DB-25 serial and parallel connector.

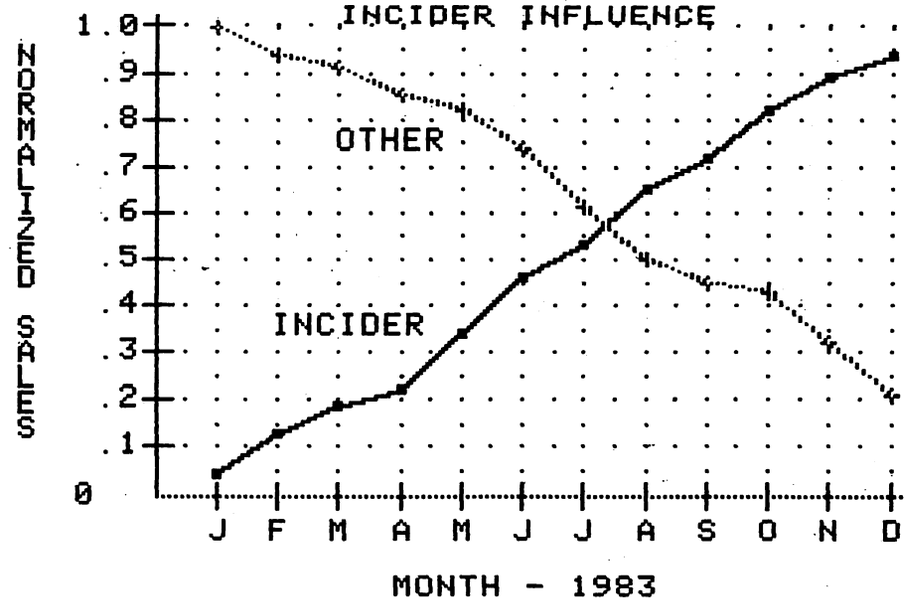


Figure 4. Graph using Apple Plot and Computer Stations Inc. program.

ing according to the print density you have selected.

Using ASCII control characters you can program the IDS 480 for the following functions:

- three separate up or down vertical paper movements in 1/48-inch increments
- left and right margins anywhere on a line in 1/120-inch increments
- form size and printable space on the form in 1/48-inch increments
- up to 21 horizontal tab positions in 1/120-inch increments
- up to 8 vertical tab positions in 1/48-inch increments
- absolute positioning of the paper and next printable character in 1/120 horizontal and 1/48 vertical increments
- absolute line and character positioning using line counting and character positions
- relative horizontal positioning of the next printable character in 1/120-inch increments relative to the current printed character, either left or right, allowing you to do underlining and overstriking
- selection of any of the character sets in standard or double-width emphasized mode giving you fonts of 5, 6, 8, 10, 12, and 16.8 cpi.

Printing Graphics

The IDS 480 uses the same graphics printing codes as the big brother Prism printers. You can use the same software and hardware for both the 480 and the Prism printers.

Characters received while in the graphics mode are printed as a single column of seven dots. Only the seven least-significant bits in each character are printed. A dot is printed for each bit that is set in the character. The least significant bit is printed as the top dot, and bit 6 is printed as the bottom dot. Successive characters are printed in adjacent vertical columns. Graphics resolution is 84 dots per inch both vertically and horizontally. Dots this close together can form a solid black image. As I said before, graphics use a lot of ink.

Figure 3 and Figure 4 give you an idea of the excellent graphics that can be done on the IDS 480. Figure 3 is one of the sample plots included on the disk with the Computer Stations Inc. 460-560 graphics driver. Figure 4 was created using Apple Plot. Any software that will drive the old IDS 460-560 series printers will drive the IDS 480.

Manual

The manual is complete. It has a quick index on the first page so you can find things in a hurry. The manual provides, beside operating and programming instructions, information for repacking the machine for shipment. The interface description is comprehensive. But a number of errors creep in when the manual references different figures and tables. When I compared my early version of the Microprism manual to the Prism manual, I noticed that much of the text, but not the tables, had been copied to the Microprism manual.

The manual is well illustrated with photos and diagrams. Preventive maintenance is basically keeping the machine clean and oiled. Included in the troubleshooting section is the 800 number of the Customer Support Group at IDS. I have not had occasion to call them yet, but it's nice to know they provide this kind of help. Finally there is a glossary of terms used in the manual that a novice may find useful.

Final Analysis

As a final analysis, after seven months of use I find the IDS 480 printer reliable, with good print quality, versatile interface, excellent graphics, and convenient single sheet and pin feed paper handling. It's faster than average (see Figure 5), and quieter than most dot matrix printers.

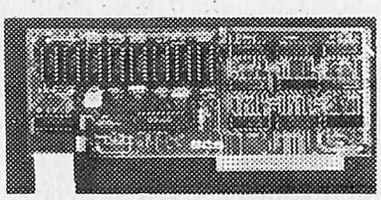
On the negative side, I wish it had TRS-80 graphics, less fussy starting of pin feed paper and a longer-lasting ribbon. I have averaged about $15 a month on ribbons to feed this little beast. Also, the printed period, colon and caret (^) are too small to read easily.

Overall, I feel I made a good choice for my particular requirements. The printer is made by Integral Data Systems Inc., Milford, NH 03055. It retails for $799. ■

	OKIDATA	MX-80		IDS 480	
TEST TYPE	82A	DS	STD	NLQ	DFT
Short line (21 char)	63.1	11.1	33.5	40.8	49.3
Med. Line (42 char)	83.0	17.6	47.1	52.8	68.6
Long Line (75 char)	96.2	20.4	56.9	60.8	82.0
Mixed line	66.0	16.3	38.5	41.5	54.7
Random Lines	72.0	17.0	42.7	46.5	59.8

Figure 5. Comparison of printer speeds.

Apple II™ 16K RAM



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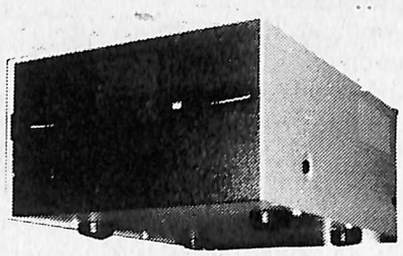

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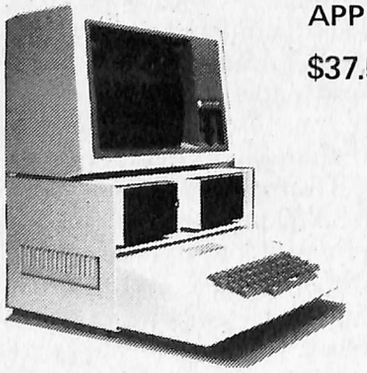

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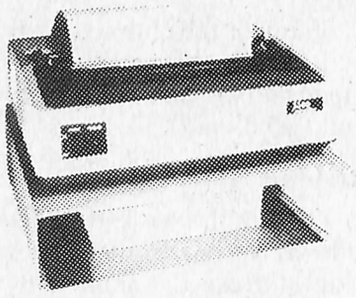

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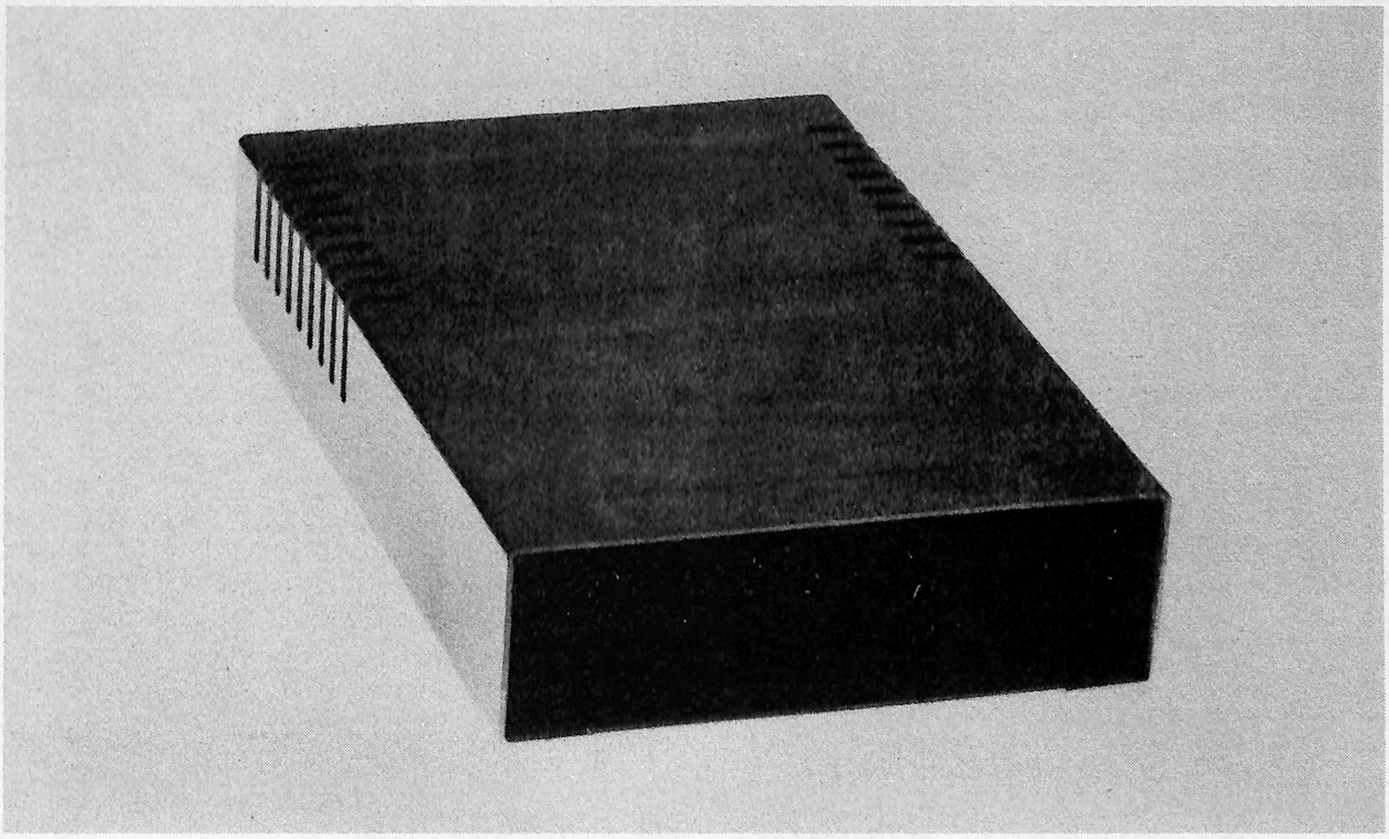

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Peeling the Apple Text Screen

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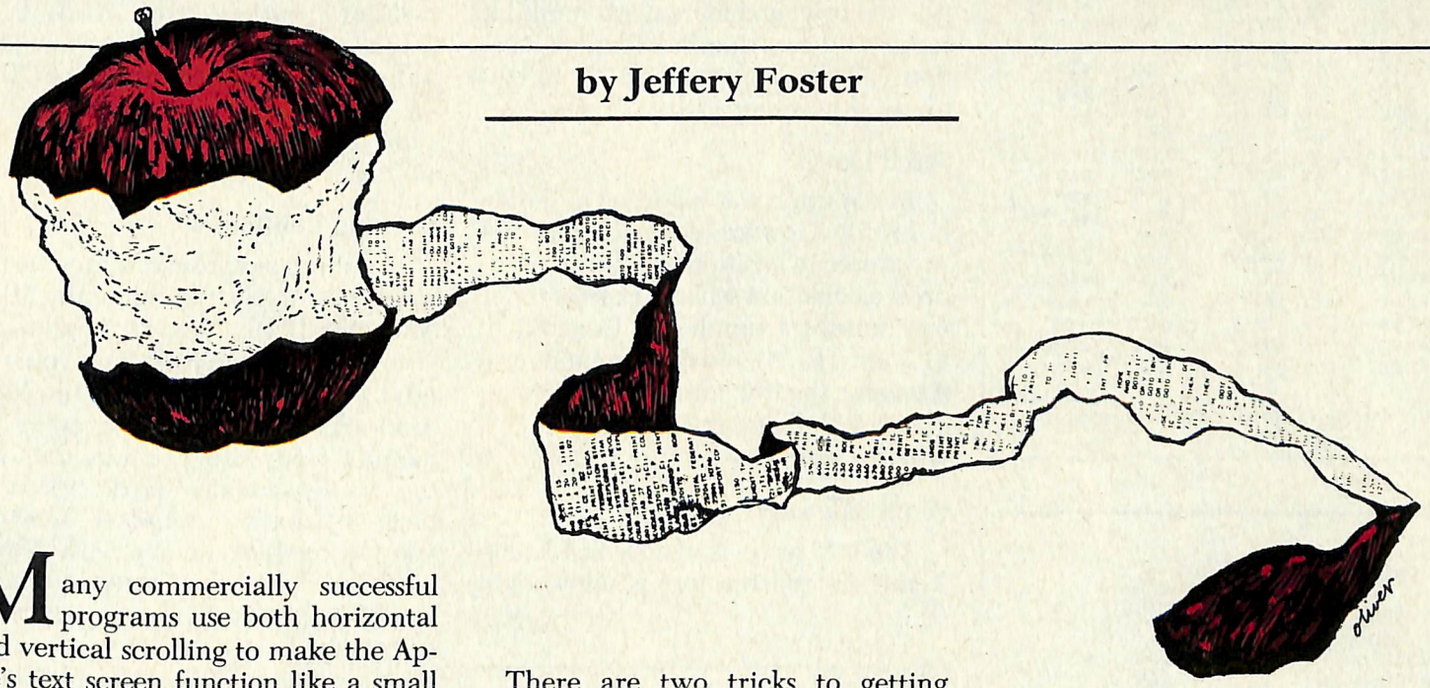

Many commercially successful programs use both horizontal and vertical scrolling to make the Apple's text screen function like a small "window" outlining a portion of a much larger spreadsheet or data list. This could be done in Applesoft Basic by clearing the screen and rewriting the data in a new position. However, the result would be too slow to be practical. Machine (or assembly) language routines, on the other hand, work fast enough to accomplish this feat easily.

Writing a program in assembly language may appear to be an insurmountable task for the newly-addicted microcomputerist, what with all those bytes and bits to keep track of, and no variable names! However, for anyone who has looped and branched their way through Basic programs, assembly language programming should be the next nut to crack.

There are two tricks to getting started in assembly language programming:

1) Find a small application such as a subroutine you can CALL from your Basic program. (Very few prople want to write a revised version of DOS 3.3, in 10.5K of code, without substantial prior experience.)

2) Find someone else's routine that you can modify to do your task. There is a myriad of useful assembly language subroutines in the system monitor, and they are all listed in Appendix C of your *Apple II Reference Manual.*

Making the Apple's screen scroll is an excellent case in point. The monitor has a routine to scroll the screen up, since this is necessary in order to print more than 24 lines of text, but has no routines to scroll in the other three directions.

Monitor Routine

The monitor's scrolling routine is located at $FC70 (64624 or −912 for those of you without the 16 fingers required to count in hexadecimal) and scrolls only the part of the screen in the current text window. It is shown in Listing 1, assembled by the monitor's List command. (Read Chapter 3 in the

Jeffery Foster is a programmer who is establishing his own software business. Address correspondence to him at Biziwerks Inc., PO Box 943, Grants, NM 87020.

Table 1.
Addresses pertaining to the text screen.

Hex	Decimal	Normal Range	Description
$20	32	0–39	Leftmost column in text window minus 1.
$21	33	1–40	Width of text window.
$22	34	0–23	Top row of text window minus 1.
$23	35	1–24	Bottom row of text window.
$25	37	0–23	Vertical cursor position.
$28	40	$10, $28, $50 $80, $A8, $D0	Low order byte of base address for current line.
$29	41	$4, $5, $6, $7	High order byte of base address for current line.
$2A	42	$00, $28, $50 $80, $A8, $D0	Low order byte of base address for previous line.
$2B	43	$4, $5, $6, $7	High order byte of base address for previous line.

Reference Manual and return.) It calls two secondary monitor routines. $FC24 calculates the address of the leftmost character position on the current line (for the currently defined text window), and $FC95 clears the bottom line when routine $FC70 is done. These two routines in turn use routines $FC22 and $FBC1 to accomplish their tasks. (The avid student will immediately draw a flow chart to show this relationship.)

```
]CALL-151

*FC70L

FC70-   A5 22       LDA   $22
FC72-   48          PHA
FC73-   20 24 FC    JSR   $FC24
FC76-   A5 28       LDA   $28
FC78-   85 2A       STA   $2A
FC7A-   A5 29       LDA   $29
FC7C-   85 2B       STA   $2B
FC7E-   A4 21       LDY   $21
FC80-   88          DEY
FC81-   68          PLA
FC82-   69 01       ADC   #$01
FC84-   C5 23       CMP   $23
FC86-   B0 0D       BCS   $FC95
FC88-   48          PHA
FC89-   20 24 FC    JSR   $FC24
FC8C-   B1 28       LDA   ($28),Y
FC8E-   91 2A       STA   ($2A),Y
FC90-   88          DEY
FC91-   10 F9       BPL   $FC8C
FC93-   30 E1       BMI   $FC76
```

Listing 1. Monitor scroll up routine.

```
*
]CALL-151

*320L

0320-   A5 23       LDA   $23
0322-   38          SEC
0323-   E9 01       SBC   #$01
0325-   48          PHA
0326-   20 24 FC    JSR   $FC24
0329-   A5 28       LDA   $28
032B-   85 2A       STA   $2A
032D-   A5 29       LDA   $29
032F-   85 2B       STA   $2B
0331-   A4 21       LDY   $21
0333-   88          DEY
0334-   68          PLA
0335-   C5 22       CMP   $22
0337-   D0 03       BNE   $033C
0339-   4C 95 FC    JMP   $FC95
033C-   38          SEC
033D-   E9 01       SBC   #$01
033F-   48          PHA
0340-   20 24 FC    JSR   $FC24
0343-   B1 28       LDA   ($28),Y
*L

0345-   91 2A       STA   ($2A),Y
0347-   88          DEY
0348-   10 F9       BPL   $0343
034A-   30 DD       BMI   $0329
```

Listing 2. Scroll down routine.

Some pertinent addresses for analyzing these routines are given in Table 1. For the actual screen addresses refer to Map of the Text Screen, Figure 1 on page 16 of the *Reference Manual.* (Now do you see why it is called a "reference" manual?) Routine $FC70 starts at the row stored in location $22 (the top row) and increments it until it reaches the row number found in location $23, looping through all 40 columns, if necessary, for each row.

Scroll Down

This routine was modified as shown in Listing 2 to start at one less than the row stored in location $23 (the base address calculation scheme expects to see row numbers numbered from $0 to $17, not 1 to 24) and decrement it until it reaches the row number stored in location $22. This action scrolls the text window down.

Scroll Sideways

The two sections of code in Listings 3 and 4 scroll the text window right and left. These programs are somewhat simpler, since they handle only a single line at a time and loop from top to bottom.

```
]CALL-151

*34CL

034C-   A5 22       LDA   $22
034E-   48          PHA
034F-   20 24 FC    JSR   $FC24
0352-   A4 21       LDY   $21
0354-   88          DEY
0355-   F0 0A       BEQ   $0361
0357-   88          DEY
0358-   B1 28       LDA   ($28),Y
035A-   C8          INY
035B-   91 28       STA   ($28),Y
035D-   A9 00       LDA   #$00
035F-   F0 F3       BEQ   $0354
0361-   A9 A0       LDA   #$A0
0363-   91 28       STA   ($28),Y
0365-   68          PLA
0366-   18          CLC
0367-   69 01       ADC   #$01
0369-   C5 23       CMP   $23
036B-   90 E1       BCC   $034E
036D-   60          RTS

*
```

Listing 3. Scroll right routine.

Advanced or intermediate assembly language programmers will recognize the use of the indirect indexed addressing mode to accomplish the character moving and may wish to examine the monitor routine from $FBC1 to $FBD8 in detail to see how the screen addresses on the Map of the Text Screen are calculated. This involves some tricky binary mathematics (but most of you have at least two fingers!).

Entering Routines

The three new routines may be entered from the listings using the Mini-Assembler if you have an Apple II. If you have an Apple II Plus you will need a language card to use the Mini-Assembler, and you must enter the monitor from Integer Basic, then call the Mini-Assembler as described on page 49 (that's in Chapter 3, which you just read) of the *Reference Manual.* A hex dump of all three routines is shown in Listing 5, if you must resort to byte-by-byte entry, but be sure to use the monitor List command (L) and check your programs with the assembled lists.

The machine language entry points and the corresponding decimal values to use with a call from Basic are:

$FC70	−912	Scroll Up
$320	800	Scroll Down
$34C	844	Scroll Right
$36E	878	Scroll Left

Once you have entered these programs they may be moved anywhere, since they are relocatable. The only absolute references are to routines in the monitor, which is in ROM and will not move.

Applesoft Demonstration

A demonstration program written in Applesoft is shown in Listing 6. It

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Circle 14 on Reader Service card.

```
]CALL-151

*36EL

036E-   A5 22       LDA   $22
0370-   48          PHA
0371-   20 24 FC    JSR   $FC24
0374-   A0 00       LDY   #$00
0376-   C8          INY
0377-   C4 21       CPY   $21
0379-   F0 0A       BEQ   $0385
037B-   B1 28       LDA   ($28),Y
037D-   88          DEY
037E-   91 28       STA   ($28),Y
0380-   C8          INY
0381-   A9 00       LDA   #$00
0383-   F0 F1       BEQ   $0376
0385-   A9 A0       LDA   #$A0
0387-   88          DEY
0388-   91 28       STA   ($28),Y
038A-   68          PLA
038B-   18          CLC
038C-   69 01       ADC   #$01
038E-   C5 23       CMP   $23
*L
0390-   90 DE       BCC   $0370
0392-   60          RTS
```

Listing 4. Scroll left routine.

```
*
]CALL-151

*320.34B

0320- A5 23 38 E9 01 48 20 24
0328- FC A5 28 85 2A A5 29 85
0330- 2B A4 21 88 68 C5 22 D0
0338- 03 4C 95 FC 38 E9 01 48
0340- 20 24 FC B1 28 91 2A 88
0348- 10 F9 30 DD
*34C.36D

034C- A5 22 48 20
0350- 24 FC A4 21 88 F0 0A 88
0358- B1 28 C8 91 28 A9 00 F0
0360- F3 A9 A0 91 28 68 18 69
0368- 01 C5 23 90 E1 60
*36E.392

036E- A5 22
0370- 48 20 24 FC A0 00 C8 C4
0378- 21 F0 0A B1 28 88 91 28
0380- C8 A9 00 F0 F1 A9 A0 88
0388- 91 28 68 18 69 01 C5 23
0390- 90 DE 60
```

Listing 5. Hex dump.

enables you to define a text window, fills it with random characters (somewhat slowly), and uses the arrow keys and the A and Z keys to call any of the four scrolling routines at a single keystroke. The random characters are thereby moved about the screen until they have all disappeared off one of the four edges. Your own Applesoft application program can be written to write new data to the screen as the old data is scrolled off—even making an endless loop and/or inserting your disk drive in the loop for very large datasets.

If you cannot do this yet, try the demonstration program, since the speed with which assembly language works is dramatically evident. Even with a full-screen text window (1024 characters moved one at a time from one position to another) the text appears to move as an entire block. Compare this to the speed with which Applesoft fills the window with random characters. Then, as a homework assignment, write an assembly language routine to replace the For... Next loop in statement 110 to speed up the character filling. By then you will have become an assembly language programmer. ■

```
]LIST

5 D$ =  CHR$ (4): PRINT D$;"BLOADSCROLL"
10  TEXT : HOME : NORMAL : VTAB 5: PRINT "
     <<WINDOW SCROLLING DEMONSTRATION>>": VTAB
     8: PRINT "   COLUMN NOS. ARE   1 THRU 4
     0": PRINT "   ROW    NOS. ARE   1 THRU
     24": PRINT
20  INPUT "ENTER COL NO OF LEFTMOST COLUMN==
     >";LC
30  INPUT "ENTER COL NO OF RITEMOST COLUMN==
     >";RC
40  INPUT "ENTER ROW NO OF TOP ROW IN WINDOW
     ==>";TR
50  INPUT "ENTER ROW NO OF BOTTOM ROW IN WIN
     DOW==>";BR
60  IF LC < 1 OR RC > 40 OR LC > RC THEN 300

70  IF TR < 1 OR BR > 24 OR TR > BR THEN 300

80 NC = (RC - LC + 1) * (BR - TR + 1)
90  HOME : PRINT : PRINT : PRINT "YOUR WINDO
     W CONTAINS ";NC: PRINT "CHARACTER SPACE
     S": PRINT
95  PRINT "  YOU CAN SCROLL THE WINDOW USING
      THE   ARROW KEYS FOR LEFT AND RIGHT AN
     D THE   A AND Z KEYS FOR UP AND DOWN."
96  PRINT "  PRESS THE F KEY TO REFILL THE W
     INDOW  WITH CHARACTERS OR THE W KEY TO
     DEFINE  A NEW WINDOW. HIT RETURN TO STA
     RT": GET A$
100  POKE 32,LC - 1: POKE 33,RC - LC + 1: POKE
     34,TR - 1: POKE 35,BR
110  HOME : CALL  - 1998: HOME : FOR I = 1 TO
     NC - 1: PRINT  CHR$ ( INT (59 *  RND (1
     ) + 32));: NEXT
120  GET A$:A =  ASC (A$)
130  IF A = 8 THEN  CALL 878
132  IF A = 21 THEN  CALL 844
134  IF A = 65 THEN  CALL  - 912
136  IF A = 90 THEN  CALL 800
138  IF A = 70 THEN 110
140  IF A = 87 THEN 10
150  GOTO 120
300  PRINT : PRINT : PRINT  CHR$ (7); CHR$ (
     7); CHR$ (7);: FLASH : PRINT "ILLEGAL T
     EXT WINDOW";: NORMAL : PRINT "  PLEASE
     REDEFINE": FOR I = 1 TO 1500: NEXT : GOTO
     10
310  END
```

Listing 6. Demonstration program.

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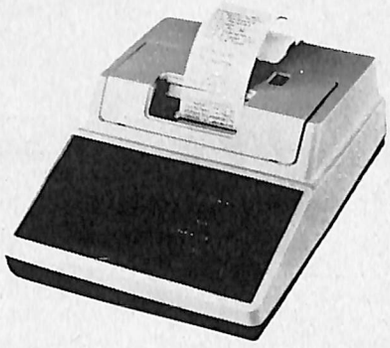

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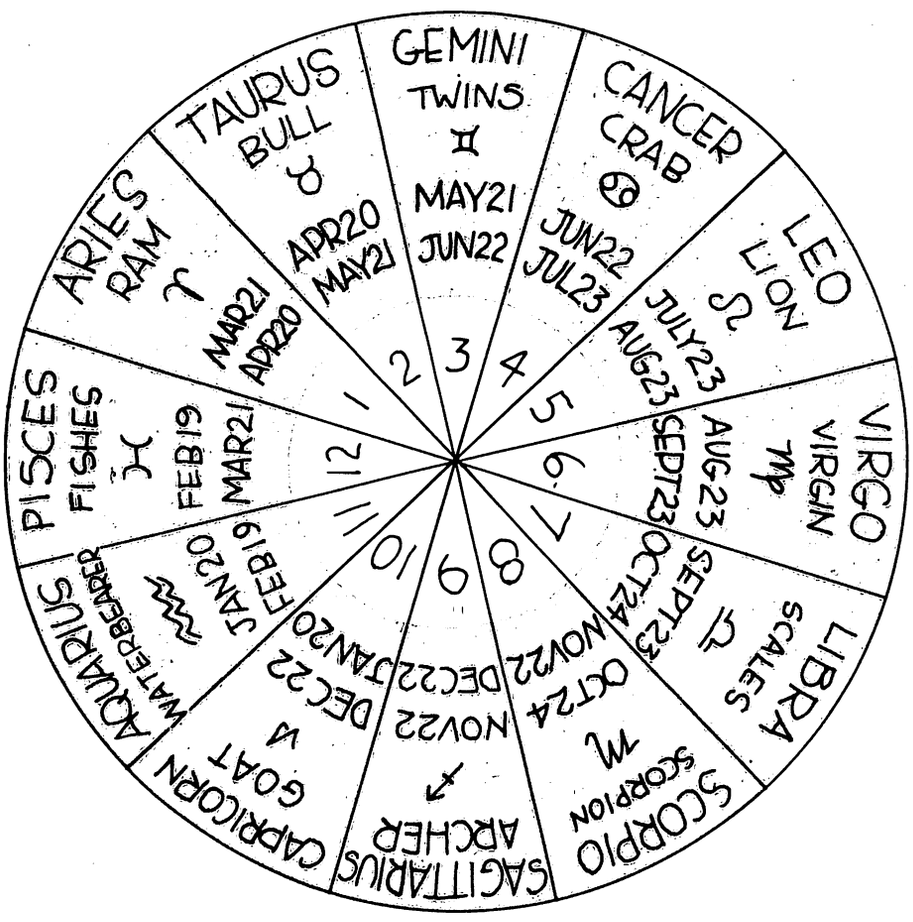

As any successful businessperson can tell you, it takes only a few ingredients to make it big in the business world: a willingness to work, a reasonable amount of money, a little luck and one helluva good idea.

I'll give you the idea.

As far as the rest of it goes—you are on your own! For, after all, you very likely have all it takes to succeed. You obviously are a glutton for work, or you wouldn't be pounding in programs from this magazine; you certainly must have a few bucks set aside or you would be playing some expensive hires game instead of quietly (and cheaply) reading this publication. All you need now is luck—and my secret formula for wealth.

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The Obvious

Leave the programs which have anything to do with music to Paul Lutus. Forget trying to make arcade games—that is for the Carlston family. And you don't have a chance at adventure stuff as long as Bob Clardy is at work. Pick a subject *you* know best and develop it into a program others will want to use and buy.

The best example I can provide is based on my own hobbies of gambling, desert skiing and astrology.

Obviously, I am very reluctant to share my gambling secrets with anyone since I have done so well at the craps tables in Vegas. Done so well, in fact, that I am almost even!

Desert skiing attracts a limited number of participants, particularly

Paul Raymer (Paul's Electric Computer, 3464 Townhouse Drive, Las Vegas, NV 89121) is a defrocked English teacher who writes magazine articles in an attempt to restore his former status, or at least get his library card back.

Program listing. Paul's Electric Horoscope.

```
100  TEXT : HOME : CLEAR
110  REM
120  REM  ELECTRIC HOROSCOPE
130  REM
140  REM  PAUL RAYMER
150  REM

========================

PAUL'S ELECTRIC COMPUTER
BOX 42831
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========================

160  REM  VI/I/MCMLXXXII
170  REM
180  INPUT "WHAT IS YOUR NAME? ";N$
181  IF  LEN (N$) = 0 THEN N$ = "STRANGER"
190  HOME : PRINT "THANK YOU, ";N$
200  INPUT "WHAT IS YOUR SIGN? ";S$
210  HOME
220 H$ =  LEFT$ (S$,3)
230  IF H$ = "ARI" THEN 1000
240  IF H$ = "TAU" THEN 2000
250  IF H$ = "GEM" THEN 3000
260  IF H$ = "CAN" THEN 4000
270  IF H$ = "LEO" THEN 5000
280  IF H$ = "VIR" THEN 6000
290  IF H$ = "LIB" THEN 7000
300  IF H$ = "SCO" THEN 8000
310  IF H$ = "SAG" THEN 9000
320  IF H$ = "CAP" THEN 10000
330  IF H$ = "AQU" THEN 11000
340  IF H$ = "PIS" THEN 12000
350  PRINT  CHR$ (7): GOTO 100
1000  REM

==========
ARIES
==========

1005 R =  INT (3 *  RND (1)) + 1
1010  ON R GOTO 1100,1200,1300
1100  VTAB 1: HTAB 18: PRINT "OTHERS"
1105  VTAB 13: HTAB (40 -  LEN (N$)) / 2: PRINT N$
1110  SPEED= 150
1115  FOR X = 1 TO 40 STEP 2
1120 RR =  INT (3 *  RND (1)) + 1
1125  IF RR = 1 THEN H =  - 1
1130  IF RR = 2 THEN H = 0
1135  IF RR = 3 THEN H = 1
1140  VTAB 7 + H: HTAB X: PRINT "*"
1145  VTAB 7: HTAB X + 1: PRINT "*"
1150  NEXT X
1155  FOR X = 1 TO 40
1160  VTAB 20: HTAB X: PRINT "*"
1165  NEXT X
1170  VTAB 22: HTAB 1: PRINT "YOU ARE VERY DIRECT"
1175  GOTO 22222
1200  FOR X = 1 TO 20
1205  VTAB X: HTAB 10: PRINT "OTHERS"
1210  NEXT X
1215  FOR Z = 1 TO 1000: NEXT Z
1220  FOR X = 19 TO 1 STEP  - 1
1225  VTAB X: HTAB 10: CALL  - 868: PRINT N$
1230  VTAB X + 1: HTAB 10: CALL  - 868: PRINT "OTHERS"
1235  FOR Z = 1 TO 250: NEXT Z
1240  NEXT X
1245  VTAB 22: HTAB 1: PRINT "YOU PUT YOURSELF AHEAD OF OTHERS": GOTO 22
     222
1300  FOR X = 1024 TO 2039
1305  POKE X,32
1310  NEXT X
1315  FOR X = 1025 TO 2040
1320  POKE X,160: POKE X - 1,32
1325  NEXT X
1330  VTAB 22: HTAB 1: PRINT " YOU ARE HIGHLY ENERGETIC, ";N$;" ": GOTO
     22222
2000  REM

==========
TAURUS
==========

2005 R =  INT (3 *  RND (1)) + 1
2010  ON R GOTO 2100,2200,2300
2100  SPEED= 200:NN$ = N$ +  CHR$ (32)
2105 L =  INT (39 /  LEN (NN$))
2110  FOR X = 1 TO 20
2115  FOR Y = 1 TO L
2120  PRINT NN$;
2125  NEXT Y
2130  PRINT
2135  NEXT X
2140  SPEED= 50: VTAB 22: HTAB 1: PRINT "YOU ARE SELF-INDULGENT": GOTO 2
     2222
2200  VTAB 10: PRINT "YOU ARE VERY PATIENT, "
2205  FOR X = 1 TO  LEN (N$)
2210  VTAB 10: HTAB 22 + X: PRINT  MID$ (N$,X,1)
2215  FOR Z = 1 TO 2000: NEXT Z
2220  NEXT X
2225  GOTO 22222
2300  GOSUB 2350: VTAB 1: PRINT "YOU"
```

Listing continued.

since very few areas in the United States have the flat, snowless terrain essential for this taxing and debilitating outdoor sport.

The Only Choice

Astrology is certainly a good choice. It has a wonderful history reaching back into the days of the ancients, long before the pharaohs of Egypt built the pyramids, before Aristotle, Galileo, even before the founders of accient Rome—ROMulus and RAMus.

It is said by those who follow this ancient art that modern astrology is really a combination of astronomy and computer science. While I do not entirely agree with that concept, I believe that until we get a better definition of "computer literacy," it is as good a definition as any. I am sure all of you, except those of the Taurus persuasion, will agree.

Actually, I have some doubts about the whole field of astrology, but then most Aquarians feel the same way. Without getting too deep in the technical aspects of the whole thing, which can get to be a real drag, it may be enough to concede that some very interesting insights may be learned about people, if one knows his/her sign of the zodiac. If you wish to learn more about why there are 12 signs in the celestial zodiac, where each sign got its name, why each sign contains exactly 30 degrees of space and what the original name for Virgo was before it was cleaned up, you may wish to read "Why is Gaul Divided into Only Three Parts?" a quasi-scientific paper by this author which uncovers real Latin names for many of the stars now in the sky, explains why we only have 12 months in a year and what effect the sun and moon have on the social drinker.

I will only get into the moneymaking aspects of astrology in this article. Intensive research has revealed that 82 percent more readers of the *Enquirer*, *Star*, *Playboy* and *People* magazines read horoscopes on a regular basis than readers of *The New York Times*, *Christian Science Monitor* and *The Wall Street Journal*. With this vital information, and knowing that thousands of people own (or at least are making payments on) an Apple—it is obvious that a well-written astrology

Listing continued.

```
2305  GOSUB 2350: VTAB 2: PRINT "HAVE"
2310  GOSUB 2350: VTAB 3: PRINT "STRONG"
2315  GOSUB 2350: VTAB 4: PRINT "POWERS"
2320  GOSUB 2350: VTAB 5: PRINT "OF"
2325 RR =  INT (3 *  RND (1))
2330  ON RR GOTO 2335,2340,2345
2335  GOSUB 2350: VTAB 7: PRINT "ENDURANCE!": CALL  - 958: GOTO 22222
2340  GOSUB 2350: VTAB 7: PRINT "PERSISTANCE!": CALL  - 958: GOTO 22222
2345 : GOSUB 2350: VTAB 7: PRINT "DETERMINATION!": CALL  - 958: GOTO 222
     22
2350  VTAB 22: HTAB 2: PRINT " === PRESS ANY KEY TO CONTINUE === ";: GET
     A$: FOR Z = 1 TO 1000: NEXT Z: HTAB 1: RETURN
3000  REM

==========
GEMINI
==========

3005 R =  INT (3 *  RND (1)) + 1
3010  ON R GOTO 3100,3200,3300
3100  SPEED= 175
3105  FOR X = 1 TO 10
3110 RR =  INT (4 *  RND (1))
3115  FOR Y = 1 TO  LEN (N$)
3120  PRINT  MID$ (N$,Y,1); SPC( RR);
3125  NEXT Y
3130  PRINT : PRINT
3135  NEXT X
3140  VTAB 22: PRINT N$;", YOU ARE VERY ADAPTABLE": GOTO 22222
3200  FOR X = 1 TO 24
3205 RR =  INT (4 *  RND (1)) + 1
3210  IF RR = 1 THEN A$ = "GERMAN"
3215  IF RR = 2 THEN A$ = "FRENCH"
3220  IF RR = 3 THEN A$ = "SPANISH"
3225  IF RR = 4 THEN A$ = "BASIC"
3230  PRINT A$,
3235  IF X / 3 =  INT (X / 3) THEN  PRINT
3240  NEXT X
3245  VTAB 20: HTAB 1: PRINT "YOU HAVE A FLAIR FOR LANGUAGES, ";N$
3250  GOTO 22222
3300  FOR Y = 1 TO 5
3305  FOR X = 1 TO  LEN (N$)
3310 RR =  INT (3 *  RND (1))
3315  POKE 1288 + V + 2 * X,( ASC ( MID$ (N$,X,1)) - 64) + (RR * 64)
3320  FOR Z = 1 TO 100: NEXT Z
3325  NEXT X
3330 V = V + 128
3335  NEXT Y
3340  VTAB 20: PRINT "YOU ARE CHANGEABLE & RESTLESS, ";N$: GOTO 22222
4000  REM

==========
CANCER
==========

4005 R =  INT (3 *  RND (1)) + 1
4010  ON R GOTO 4100,4200,4300
4100 RR =  INT (3 *  RND (1)) + 1
4105  IF RR = 1 THEN A$ = "SUNRISE IN A COAL MINE"
4110  IF RR = 2 THEN A$ = "INSIDE A REFRIGERATOR WITH DOOR CLOSED"
4115  IF RR = 3 THEN A$ = "THE TV MONITOR WITH POWER OFF."
4120  INVERSE : FOR X = 2 TO 39: VTAB 2: HTAB X: PRINT  CHR$ (32): VTAB
     18: HTAB X: PRINT  CHR$ (32): NEXT X
4125  FOR Y = 2 TO 18: VTAB Y: HTAB 2: PRINT  CHR$ (32): VTAB Y: HTAB 39
     : PRINT  CHR$ (32): NEXT Y: NORMAL
4130  SPEED= 100
4135  INVERSE : VTAB 20: HTAB 1 + (40 -  LEN (A$)) / 2: PRINT A$: NORMAL
4140  FOR Z = 1 TO 2000: NEXT Z
4145  VTAB 22: HTAB 1: PRINT "YOU HAVE A GOOD IMAGINATION, ";N$
4150  GOTO 22222
4200  FOR X = 1 TO 10
4205 RR =  INT (50000 *  RND (1))
4210  VTAB X: HTAB 10: PRINT  CHR$ (7)"?SYNTAX ERROR IN LINE "RR
4215  FOR Z = 1 TO 150: NEXT Z
4220  NEXT X
4225  VTAB 20: PRINT "YOU CAN BE UNFORGIVING, ";N$
4230  GOTO 22222
4300  FOR X = 1024 TO 2039: POKE X,32: NEXT X
4305  POKE 34,5: POKE 35,15: POKE 32,15: POKE 33,10
4310  HOME
4315  SPEED= 50
4320  PRINT "NOW USING ONLY 10%  OF THE    VIDEO     MONITOR."
4325  PRINT : PRINT "SAVING 90%OF ENERGY COSTS AND WEAR AND  TEAR ON   T
     HE EQUIP-MENT.": PRINT
4330  PRINT "YOU CAN BEVERY      THRIFTY,": PRINT N$;"."
4335  FOR Z = 1 TO 1000: NEXT Z: GOTO 22222
5000  REM

==========
LEO
==========

5005 R =  INT (3 *  RND (1)) + 1
5010  ON R GOTO 5100,5200,5300
5100  FOR X = 1 TO 10
5105 RR =  INT ((39 -  LEN (N$)) *  RND (1)) + 1
5110  VTAB X: HTAB RR: PRINT N$
5115  FOR Z = 1 TO 250: NEXT Z
5120  NEXT X
5125  FOR Z = 1 TO 1000: NEXT Z
5130  FOR X = 1 TO 10
5135  FOR Y = 38 -  LEN (N$) TO 1 STEP  - 1
5140  VTAB X: HTAB Y: PRINT "]";N$;" "
5145  FOR Z = 1 TO 50: NEXT Z
5150  NEXT Y
5155  NEXT X
5160  VTAB 22: HTAB 1: PRINT "YOU ARE A GOOD ORGANIZER, ";N$
5165  GOTO 22222
5200  FOR X = 1 TO  INT (800 /  LEN (N$))
```

Listing continued.

program would succeed.

A solid framework for such a program is provided here for the home computerist. A good idea is to immediately make this proprietary program into something called "Public Domain." I'm not exactly sure what that means, but apparently it merely requires the removal of the names of the author and publisher, and © notices, and then just renumbering all the lines. With the recent discovery of the Renumber program on the System Master (which is handy, but not as much fun as Lemonade Stand), it is much easier than retyping everything, as we used to do in the old days (1981).

The program, Electric Horoscope, presents an astrological reading for each of the 12 most common zodiac signs, and three different readings within each sign. Some of those are also varied. As you develop skills in programming, increase your research skills in astrology and eat things like tacos with too much hot sauce just before bedtime, you will get other ideas that may prove of interest in developing the program further.

When you add all the embellishments you feel the program can stand, you are ready to start selling the program. Think Big! Run ads in all the leading magazines, offering the program disks at $100 each. Specify that it is "user friendly," "a powerful program" and/or that "this is what you bought your Apple for" and other such phrases. What the heck, at a hundred bucks each, how many do you need to sell?

This is the part where luck may enter into the problem, so if you are a Sagittarius you may as well give up now. You know how events work out for Sagittarians, don't you?

Someone else who reads this article, and who can type faster than you, may have a marketable astrology program on the streets before you do! If you are an Aries you may be a good typist, although you probably look at the keys.

Without further ado, let's look at the program that could very well change your life. It has certainly changed mine. But that's another story.

Electric Horoscope

Note: Because of the length of this

program and your possible reluctance to spend the whole weekend typing it in, it has been designed to be typed in as a multiple-part program.

First, type in lines 100–350 and lines 22222–22262. I call this an "Intro" section, but you may call it whatever you wish. Then type the "Hang in There" section shown in Listing 1. Finally you can type in just *your* sign, using the correct line numbers, and it will work!

If you are ambitious, you may wish to complete the rest of the program as you get time. The "Hang in There" lines will automatically be replaced as you do each sign.

Intro

How it works:

Lines 100–170 clear the screen and identify the author. Possibly the last time you will see his/her name in this program.

Lines 180–200 determine the name of the person using the program. The "stranger" ploy provides an answer of some sort and prevents just a blank screen from appearing later. The adventurous programmer may use saltier words. The "thank-you" is a nice touch, which can't hurt.

Lines 210–220 determine the sign and clear the screen in case the guy/gal spelled the sign wrong.

Lines 230–350 take care of that problem. It makes it easier to use, in that only the first three letters need be correct. Go ahead, *you* try to spell *all* the signs correctly! Line 350 takes care of the totally incompetent and those guys who may type in "Mickey Mouse" or other copyrighted names of animals.

Lines 22222–22262 are numbered that way to be very impressive. No way are there that many lines! Everything has been blocked off—as you will see—for ease of following the program. This section is basically a delay loop and one which continues the program along. We will need to use it a bunch of times, so I made a subroutine of it. Because speed is not important to this program, it was stuck at the end of the program to get it out of the way.

The Program

Aries

Lines 1000–1005 determine that the Aries sign will have three different readings, and line 1010 determines

Listing continued.

```
5205  PRINT N$; CHR$ (32);
5210  NEXT X
5215  PRINT
5220  FOR Z = 1 TO 2000: NEXT Z
5225  INVERSE
5230  FOR X = 6 TO 8 STEP 2
5235  VTAB X: HTAB 11: PRINT  SPC( 5)
5240  NEXT X
5245  FOR X = 12 TO 14 STEP 2
5250  FOR Y = 5 TO 9 STEP 2
5255  VTAB Y: HTAB X: PRINT  SPC( 1)
5260  NEXT Y: NEXT X
5265  FOR X = 6 TO 14
5270  VTAB X: HTAB 19: PRINT  SPC( 3)
5275  NEXT X
5280  VTAB 15: HTAB 18: PRINT  SPC( 5)
5285  VTAB 7: HTAB 18: PRINT  SPC( 1): FOR Z = 1 TO 1000: NEXT Z
5290  VTAB 22: HTAB 1: CALL  - 868: PRINT " YOU CAN BE VERY CONCEITED, "
     ;N$;" "
5295  GOTO 22222
5300  FOR X = 1 TO 20
5305 RR =  INT (13 *  RND (1)) + 1
5310  FOR Y = 1 TO 39:A$ = A$ +  CHR$ (32 + RR): NEXT Y
5315  PRINT A$
5320 A$ = ""
5325  NEXT X
5330  VTAB 10: HTAB (40 -  LEN (N$)) / 2: FLASH : PRINT N$: INVERSE
5335  VTAB 21: HTAB 1: PRINT "   YOU HAVE A FLAIR FOR SHOWMANSHIP,   "; VTAB
     22: HTAB 1: PRINT  SPC( 3);N$: VTAB 22: HTAB ( LEN (N$) + 4): PRINT
      SPC( 36 -  LEN (N$))
5340  GOTO 22222
6000  REM

==========
VIRGO
==========

6005 R =  INT (3 *  RND (1)) + 1
6010  ON R GOTO 6100,6200,6300
6100  FOR X = 1 TO 10
6105 V =  INT (20 *  RND (1)) + 1
6110 H =  INT ((39 -  LEN (N$)) *  RND (1)) + 1
6115  VTAB V: HTAB H: PRINT N$
6120  FOR Z = 1 TO 100: NEXT Z
6125  VTAB V: HTAB H: CALL  - 868
6130  FOR Z = 1 TO 500: NEXT Z
6135  NEXT X
6140  SPEED= 50
6145  VTAB 22: HTAB 1: PRINT "YOU CAN BE VERY MODEST, ";N$: GOTO 22222
6200  SPEED= 50
6205  FOR X = 1 TO 26
6210 RR =  INT (10 *  RND (1)) + 1
6215  VTAB RR + 1: HTAB X: PRINT  CHR$ (64 + X)
6220  NEXT X
6225  FOR Z = 1 TO 1000: NEXT Z
6230  SPEED= 255
6235  FOR X = 1 TO 26
6240  FOR Y = 2 TO 11
6245  VTAB Y: HTAB X: PRINT  CHR$ (64 + X)
6250  VTAB Y - 1: HTAB X: PRINT " "
6255  NEXT Y: NEXT X
6260  SPEED= 50
6265  VTAB 22: HTAB 1: PRINT "YOU CAN BE VERY TIDY, ";N$
6270  GOTO 22222
6300  VTAB 5: PRINT "PI EQUALS:"
6305  SPEED= 10
6310 RR =  INT (7 *  RND (1)) + 1
6315  VTAB 7: HTAB 5: PRINT "3.1415926535";RR
6320  SPEED= 255
6325  FOR Z = 1 TO 3000: NEXT Z
6330  VTAB 10: HTAB 5: PRINT "3.1415926535";: INVERSE : PRINT RR;: NORMAL
     : PRINT "?"
6335  FOR Z = 1 TO 3000: NEXT Z
6340  VTAB 12: HTAB 5: PRINT  CHR$ (7);"*ERR"
6345  FOR Z = 1 TO 2000: NEXT Z
6350  VTAB 12: HTAB 5: PRINT "BETTER ADD ";8 - RR;
6355  FOR Z = 1 TO 3000: NEXT Z
6360  VTAB 7: HTAB 17: CALL  - 958: PRINT "8"
6365  FOR Z = 1 TO 2000: NEXT Z
6370  SPEED= 50
6375  VTAB 22: PRINT "THAT'S MORE NEARLY CORRECT."
6380  FOR Z = 1 TO 1000: NEXT Z
6385  VTAB 22: HTAB 1: PRINT "YOU CAN BE HYPERCRITICAL, ";N$
6390  GOTO 22222
7000  REM

==========
LIBRA
==========

7005 R =  INT (3 *  RND (1)) + 1
7010  ON R GOTO 7100,7300,7400
7100 RR =  INT (3 *  RND (1)) + 1
7105  SPEED= 50
7110  ON RR GOTO 7115,7155,7205
7115  VTAB 5: HTAB 7: PRINT "ARITHMETIC"
7120 A =  INT (4 *  RND (1)) + 1:B =  INT (4 *  RND (1)) + 1:C =  INT (3
     *  RND (1))
7125  VTAB 7: HTAB 16: PRINT A
7130  VTAB 8: HTAB 15: PRINT "+";B
7135  VTAB 9: HTAB 16: PRINT "-"
7140  VTAB 10: HTAB 7: PRINT "APPROX   ";A + B + C
7145  VTAB 22: HTAB 1: PRINT "YOU HAVE AN EASY GOING NATURE, ";N$
7150  GOTO 22222
7155  VTAB 5: HTAB 7: PRINT "THE CAPITAL OF THE U.S. IS:"
7160  VTAB 7: HTAB 10: PRINT "NEW YORK"
7165  VTAB 8: HTAB 10: PRINT "CLEVELAND"
7170  VTAB 9: HTAB 10: PRINT "WASHINGTON D.C."
7175 RR =  INT (3 *  RND (1)) + 1
```

Listing continued.

Listing continued.

```
7180  VTAB 6 + RR: HTAB 7: PRINT "->"
7185  FOR Z = 1 TO 1000: NEXT Z
7190  VTAB 22: HTAB 1: PRINT "PROBABLY..."
7195  FOR Z = 1 TO 2000: NEXT Z
7200  GOTO 7145
7205  VTAB 5: HTAB 7: PRINT "GETTYSBURG ADDRESS"
7210  VTAB 7: HTAB 10: PRINT "NO. 10 DOWNING STREET"
7215  VTAB 8: HTAB 10: PRINT "1600 PENNSYLVANIA AVE"
7220  VTAB 9: HTAB 10: PRINT "NUMBER ONE MAIN STREET"
7225  VTAB 10: HTAB 10: PRINT "87 LINCOLN DRIVE"
7230 RR =  INT (4 *  RND (1)) + 1
7235  INVERSE : VTAB 6 + RR: HTAB 8: PRINT " ";: NORMAL
7240  GOTO 7185
7300  SPEED= 50:A =  INT (3 *  RND (1)) + 1:B =  INT (3 *  RND (1)) + 1
7305  IF A = 1 THEN A$ = "CERTAINLY A"
7310  IF A = 2 THEN A$ = "A VERY"
7315  IF A = 3 THEN A$ = "REALLY A"
7320  IF B = 1 THEN B$ = "NICE"
7325  IF B = 2 THEN B$ = "KIND"
7330  IF B = 3 THEN B$ = "PLEASANT"
7335  VTAB 5: HTAB 1: PRINT  CHR$ (34);"YOU ARE ";A$;" ";B$;" PERSON"; CHR$
     (34)
7340  VTAB 22: HTAB 1: PRINT "YOU ARE VERY CHARMING, ";N$
7345  GOTO 22222
7400  VTAB 5: HTAB 10: PRINT "MY NAME IS:"
7405  FOR X = 1 TO  LEN (N$)
7410 RR =  INT (26 *  RND (1)) + 1
7415  POKE 1935 + X,RR
7420  IF  ASC ( MID$ (N$,X,1)) - 64 = RR THEN 7435
7425  FOR Z = 1 TO 30: NEXT Z
7430  GOTO 7410
7435  NEXT X
7440  VTAB 22: HTAB 1: PRINT "YOU CAN BE VERY INDECISIVE, ";N$
7445  GOTO 22222
8000  REM

==========
SCORPIO
==========

8005 R =  INT (3 *  RND (1)) + 1
8010  ON R GOTO 8100,8200,8300
8100  INVERSE : FOR X = 1 TO 39 STEP 3
8105  FOR Y = 5 TO 9
8110  HTAB X: VTAB Y: PRINT " "
8115  NEXT Y: NEXT X: NORMAL
8120  FOR X = (39 -  LEN (N$)) TO 1 STEP  - 1
8125  VTAB 7: HTAB X: PRINT N$" "
8130  FOR Z = 1 TO 500: NEXT Z
8135  NEXT X
8140  SPEED= 100: VTAB 22: HTAB 1: PRINT "YOU ARE VERY DETERMINED, ";N$
8145  GOTO 22222
8200 R =  INT (3 *  RND (1)) + 1
8205  IF R = 1 THEN A$ = "A SCORPIO PERSON IS VERY PASSIONATE"
8210  IF R = 2 THEN A$ = "SCORPIOS HAVE VERY POWERFUL FEELINGS"
8215  IF R = 3 THEN A$ = "SCORPIOS CAN BE OBSTINATE AND STUBBORN"
8220 RR = 3
8225  FOR X = 1 TO  LEN (A$)
8230  VTAB (9 - RR): HTAB X: PRINT  CHR$ ( ASC ( MID$ (A$,X,1)) + RR)
8235  FOR Z = 1 TO 100: NEXT Z
8240  NEXT X
8245 RR = RR - 1: IF RR >  = 0 THEN 8225
8250  VTAB 22: HTAB 1: PRINT "AND SECRETIVE TOO, ";N$
8255  GOTO 22222
8300  INPUT "PLEASE TYPE A SHORT SENTENCE ";A$: HOME : SPEED= 100
8305  FOR X = 1 TO  LEN (A$)
8310 RR =  INT (7 *  RND (1)) + 1
8315  FOR A = 1 TO RR:E$ = E$ + "!": NEXT A
8320  PRINT  MID$ (A$,X,1);
8325  IF  MID$ (A$,X,1) = " " THEN  PRINT  CHR$ (8)E$
8330 E$ = "!"
8335  NEXT X
8340  IF  RIGHT$ (A$,1) >  = "A" THEN  PRINT "!"
8345  VTAB 22: HTAB 1: PRINT "YOU CAN BE VERY EMOTIONAL, ";N$;"!"
8350  GOTO 22222
9000  REM

============
SAGITTARIUS
============

9005 R =  INT (3 *  RND (1)) + 1
9010  ON R GOTO 9100,9200,9300
9100 E$ = ""
9105  FOR X = 1 TO  LEN (N$):E$ = E$ + "*": NEXT X
9110  SPEED= 100: FLASH
9115  FOR Y = 1 TO 3
9120  FOR X = 1 TO  LEN (N$)
9125  VTAB 5: HTAB (40 -  LEN (N$)) / 2 + X: PRINT  MID$ (N$,X,1)
9130  NEXT X
9135  FOR X = 1 TO  LEN (N$)
9140  VTAB 5 + X: HTAB (40 -  LEN (E$)) / 2 + 1: PRINT E$
9145  NEXT X
9150  FOR X =  LEN (N$) TO 1 STEP  - 1
9155  VTAB 5 +  LEN (N$): HTAB (40 -  LEN (N$)) / 2 - X +  LEN (N$) + 1:
     PRINT  MID$ (N$,X,1)
9160  NEXT X
9165  IF Y = 1 THEN  NORMAL
9170  IF Y = 2 THEN  INVERSE
9175  FOR Z = 1 TO 1000: NEXT Z
9180  NEXT Y
9185  VTAB 22: HTAB 1: PRINT "YOU ARE VERY VERSATILE, ";N$: GOTO 22222
9200  PRINT "PLEASE TYPE A SHORT SENTENCE WITH       NUMBERS IN IT
                  -------       ": INPUT " ";A$
9205  PRINT : PRINT "==========================================": PRINT
9210  FOR X = 1 TO  LEN (A$)
9215 B$ =  MID$ (A$,X,1):B =  VAL (B$)
9220  IF B > 0 THEN B = B * 2:B$ =  STR$ (B)
9225  PRINT B$;
```

Listing continued.

where the readings will appear. For clarity I have started each routine at a round number like 1100, 1200 or 1300 to make it easier to follow. When you get all done with this you can use a cruncher like the neat one the folks at Sensible Software make (B.E.S.T.) or just renumber the lines. I think it is nicer this way in case anyone ever lists your program.

Line 1100 prints a word at the top of the screen.

Line 1105 centers your name on vertical line 13. Something, it appears, is about to happen.

Line 1110 slows the action down, and shows my disdain for blistering speed arcade games. Needn't worry about eventually returning speed to normal. It's been taken care of at 22222.

Lines 1115–1150 print asterisks in a random pattern horizontally across the screen. Could there be some Freudian significance to this?

Lines 1155–1175 print a row of stars (which look much like asterisks) and offer the pithy commentary and end the routine.

Lines 1200–1215 print a stack of words. Looks familiar, but it ain't!

Lines 1220–1240 are busy little things that print your name, and then on the line below print the orginal word. This will look as though the word is "climbing." Line 1235 delays the action for emphasis. This is a neat place to add your ingenuity. Some programmers may use the word *wait* instead of variable Z. Some may wish to use a different number instead of 250.

Line 1245 completes the cycle and ends the routine.

Lines 1300–1310 fill up the entire screen (one box at a time) with white dots made of inverse spaces. (Huh?)

Lines 1315–1325 now travel the same route, making a black box. Really we are making a normal space followed by an inverse space. It looks less strange than it sounds!

Line 1330—program ends with a sage comment.

Taurus

Lines 2000–2010 select one of three possible readings for this sign.

Line 2100 reduces the speed slightly (SPEED = 200 has a nice "wiping" effect on the screen) and automatically

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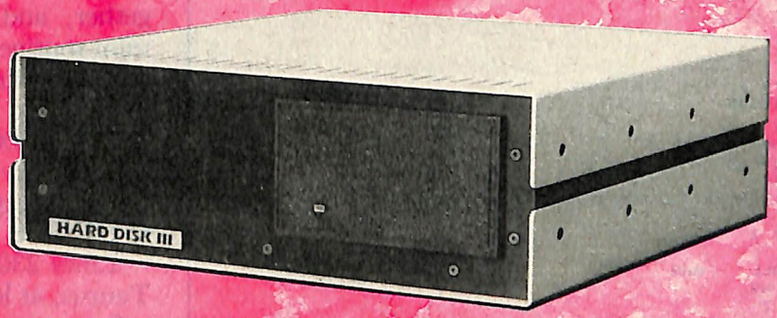

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Listing continued.

```
9230  NEXT X
9235  VTAB 22: HTAB 1: PRINT "YOU ARE PRONE TO EXAGGERATION, ";N$: GOTO
    22222
9300  SPEED= 100
9305 A$ =  RIGHT$ (N$,2):B =  ASC (A$)
9310  IF (B = 65 OR B = 69 OR B = 73 OR B = 79 OR B = 85) THEN  GOTO 932
    0
9315 A$ =  RIGHT$ (N$,3)
9320  VTAB 5: PRINT "THERE ONCE WAS A PERSON NAMED ";N$
9325  VTAB 7: PRINT "WHO WENT TO THE TOWN OF BENED";A$
9330  VTAB 9: HTAB 5: PRINT N$;" FOUND A PURSE"
9335  VTAB 11: HTAB 5: PRINT "AND STARTED TO CURSE"
9340  VTAB 13: HTAB 1: PRINT "WHICH SOUNDED LIKE "; CHR$ (34);"&@%$&#"; CHR$
    (34);" TO ";N$
9345  FOR Z = 1 TO 2000: NEXT Z
9350  VTAB 16: PRINT "(AND ";: INVERSE : PRINT "SHOCKED";: NORMAL : PRINT
    " ALL THE FOLKS IN BENED";A$;"!)"
9355  VTAB 22: HTAB 1: PRINT "YOU ARE VERY JOVIAL, ";N$;"!": GOTO 22222
10000  REM

==========
CAPRICORN
==========

10005 R =  INT (3 *  RND (1)) + 1
10010  ON R GOTO 10100,10200,10300
10100 RR =  INT (3 *  RND (1)) + 1
10105  IF RR = 1 THEN A$ = "COUNT"
10110  IF RR = 2 THEN A$ = "DEPEND"
10115  IF RR = 3 THEN A$ = "RELY"
10120  VTAB 5: PRINT "EVERYONE KNOWS YOU CAN ALWAYS ";A$: PRINT "ON YOUR
    GOOD OLE BUDDY ";N$
10125  FOR Z = 1 TO 2000: NEXT Z
10130  FOR X = 7 TO 22
10135  VTAB X - 1: HTAB 24: CALL  - 868
10140  VTAB X: HTAB 24: PRINT N$
10145  FOR Z = 1 TO 250: NEXT Z
10150  NEXT X
10155  FOR Z = 1 TO 1000: NEXT Z
10160  SPEED= 50: VTAB 22: HTAB 1: PRINT "YOU ARE VERY RELIABLE, ";: GOTO
    22222
10200  VTAB 5: PRINT "MY NAME IS "
10205  FOR X = 1 TO  LEN (N$)
10210 RR =  INT (26 *  RND (1)) + 65
10215  VTAB 5: HTAB 11 + X: PRINT  CHR$ (RR)
10220  FOR Z = 1 TO 200: NEXT Z
10225  NEXT X
10230  FOR Z = 1 TO 1000: NEXT Z
10235  FOR X = 1 TO  LEN (N$)
10240 RR =  INT (26 *  RND (1)) + 65
10245  VTAB 5: HTAB 11 + X: PRINT  CHR$ (RR)
10250  IF  MID$ (N$,X,1) =  CHR$ (RR) THEN 10265
10255  FOR Z = 1 TO 100: NEXT Z
10260  GOTO 10240
10265  NEXT X
10270  VTAB 22: HTAB 1: PRINT "YOU ARE VERY DETERMINED, ";N$: GOTO 22222

10300  INPUT "WHAT IS YOUR FAVORITE SUBJECT ";A$
10305  HOME : PRINT A$;"?"
10310  PRINT : PRINT "THE FAVORITE SUBJECT OF MOST CAPRICORNS IS..."
10315  FOR Z = 1 TO 1000: NEXT Z: PRINT "================================
    ========": PRINT
10320  FOR X = 1 TO 880: PRINT "$";: NEXT X
10325  FOR Z = 1 TO 1000: NEXT Z
10330  VTAB 1: HTAB 1: FOR X = 1 TO 612
10335  PRINT "$";: IF X / 2 =  INT (X / 2) THEN  PRINT " ";
10340  NEXT X
10345  INVERSE : VTAB 22: HTAB 1: PRINT "A CAPRICORN CAN BE MISERLY, ";N
    $; SPC( 12 -  LEN (N$)): GOTO 22222
11000  REM

==========
AQUARIUS
==========

11005 R =  INT (3 *  RND (1)) + 1
11010  ON R GOTO 11100,11200,11300
11100 C$ = "":B$ = N$ +  CHR$ (32)
11105 H =  INT (40 /  LEN (B$))
11110  FOR X = 1 TO H:C$ = C$ + B$: NEXT X
11115  FOR Y = 1 TO 4
11120  IF Y / 2 =  INT (Y / 2) THEN  INVERSE
11125  FOR V = 1 TO 22: VTAB V: HTAB 1: PRINT C$: NEXT V
11130  FOR Z = 1 TO 500: NEXT Z: NORMAL
11135  NEXT Y
11140  IF  LEN (N$) > 15 THEN  VTAB 22: HTAB 1: PRINT "YOU ARE VERY INVE
    NTIVE, ";N$: GOTO 22222
11145  VTAB 22: HTAB (40 - (24 +  LEN (N$))) / 2: PRINT "YOU ARE VERY IN
    VENTIVE, ";N$: GOTO 22222
11200 RR =  INT (3 *  RND (1)) + 1
11205  ON RR GOSUB 11250,11255,11260
11210  FOR X = 1 TO 3
11215  IF X = 1 THEN X$ = A$
11220  IF X = 2 THEN X$ = B$
11225  IF X = 3 THEN X$ = C$
11230  FOR Y =  LEN (X$) TO 1 STEP  - 1
11235  VTAB X: HTAB Y: PRINT  MID$ (X$,Y,Y);
11240  NEXT Y
11245  NEXT X: GOTO 11265
11250 A$ = "WHEN IN THE COURSE OF HUMAN EVENTS, IT":B$ = "BECOMES NECESS
    ARY FOR ONE PEOPLE TO":C$ = "DISSOLVE THE POLITICAL BANDS...": RETURN

11255 A$ = "FOURSCORE AND SEVEN YEARS AGO OUR":B$ = "FATHERS BROUGHT FOR
    TH ON THIS ":C$ = "CONTINENT A NEW NATION": RETURN
11260 A$ = "NOTHING IN THIS WORLD IS SO POWERFUL":B$ = "AS AN IDEA WHOSE
     TIME HAS COME":C$ = "                          -- VICTOR HUGO": RETURN
11265  SPEED= 100: VTAB 22: PRINT "YOU ARE VERY INTELLECTUAL, ";N$: GOTO
    22222
```

Listing continued.

adds a space to your name.

Line 2105 determines how long the line should be so that each time the name is printed it will not break in the middle.

Lines 2110–2140 fill up the screen without scrunching all the letters together, and the program ends. This mini-routine could be greatly enhanced and an entire new game built around it. It would be quite boring, however.

Lines 2200–2225 use the MID$ function to very s-l-o-w-l-y spell out your name. Not great, but nicely applicable in this case.

Lines 2300–2350 will delight every Taurus, at least to the minimal degree a Taurus can be delighted. The routine is easy to follow, for basically we print a message (line by line) and then, using the random function in line 2325, select the last line by chance.

This routine is quite effective for the purpose for which it was intended, is astrologically correct, is generally explained in great detail in the expensive new series of *How to Program* and/or *Understanding Your Computer* programs, books and seminars. Here it is, short and sweet—and free!

(Hey! Perhaps you could collect a bunch of little routines like this, put them together and sell them to a popular computer magazine? Or has that been done?)

Gemini

Lines 3000–3005 select which of the three different readings will be made for this sign.

Lines 3100–3140 print your name ten times on the screen.

Line 3110 creates a random number which is used in line 3120 to add a number of spaces after each letter in the name. The average person would want his name more than ten times on the screen, but Geminis don't seem to mind.

Lines 3200–3225 decide we are going to do something 24 times. RR helps us pick the target by selecting a random number from 1 to 4. Using a very complex algorithm in lines 3210–3225, which I learned in a Radio Shack store years ago while waiting for my free battery, we decide what A$ will be!

Line 3230 prints our message. Note the comma. (Explanation for CPAs, CEOs and SOBs: a comma is like a pe-

riod, but has a little tail on the bottom. It will make the Apple print in three columns.) Serious programmers will refer to this handy little mark as $2C. Where I come from, you just don't use words that sound like "2C" without smiling.

Line 3235 is really neat. It decides when to start a new line. I really don't understand it, exactly; it's probably something to do with periodic tables, black holes in space or why 1K = 1024 instead of 1000, but it works.

Lines 3240–3250 complete the routine just in time, because a new one is starting up on the next line.

Line 3300 starts whatever it is, to do it five times.

Line 3305 decides to make the length the same length as your name. Except for a fellow I knew in Boise, Idaho, whose name was Leonard Enstring, the LEN (N$) usually means only that.

Line 3310 is going to pick a number from 1 to 3. The truly adventurous person may wish to increase this number to 4, or 5, but if you have friends with long names you'll run into trouble later.

Line 3315 is a programmer's delight. It does just what I wanted to do, and does it correctly almost every time the program runs! Starting at 1288 (which is the same place as VTAB 3: HTAB 9) we print one letter of the name.

The MID$ picks out the letters, one at a time. The ASC − 64 thing assigns a "sequence" number to the letter, A = 1, B = 2, et cetera. Adding the RR*64 will now give it a value to display as normal, inverse or flashing when it is poked. Makes a great display!

Lines 3320–3340 complete the FOR... NEXT loop after a small delay. The copy will now print on the next line, because we have added 128 to the value of V. This can only be done a limited number of times or you will find yourself on the bottom of the screen—or worse, on the Channel 8 news!

Cancer

Lines 4000–4010 prepare us for three different readings for the Moon Child.

Lines 4100–4115 give a name to variable A$. This is the part of the program where you can help. Goodness knows, this program needs all the help it can get. You may increase the number in line 4100 and add as many more descriptors as you wish. Of course, they should all be relevant to the subject and befitting the respect which a Cancer usually gets, which is not that much.

Lines 4120–4125 use my text graphics technique to draw stuff on the screen, mainly because the concepts of shape tables and vectors still scare the pants off me.

Lines 4130–4150 center the title on the screen and complete the program. This is a real delight to Moon Children, who are so easily pleased.

Lines 4200–4230 produce a devastating message, different each time, which will annoy regular people and make Moon Children climb up the walls. You'll love it!

Line 4300 fills up the whole screen with little white squares.

Line 4305 makes a text window starting at the fifth line from the top to the 15th line, from the 15th column on the left to 10 columns further right (15 + 10 = 25). If you were lucky enough to get an instruction manual with your Apple, information on text windows may be in there.

Line 4310 clears the screen. Aha! It may not be what you think, if you haven't fooled around with text windows, or those of the opposite sex. If you have, you surely should have finished entering this program by now.

Line 4315 slows down to first gear for easy comprehension of that to follow.

Listing continued.

```
11300  FOR X = 1 TO  LEN (N$)
11305 A$ =  MID$ (N$,X,1)
11310  FOR Y = X TO 40 - X
11315  VTAB X: HTAB Y: PRINT A$
11320  NEXT Y
11325  FOR Y = X TO 20 - X: VTAB Y: HTAB 40 - X: PRINT A$: NEXT Y
11330  FOR Y = (40 - X) TO X STEP  - 1
11335  VTAB 20 - X: HTAB Y: PRINT A$: NEXT Y
11340  FOR Y = 20 - X TO X STEP  - 1
11345  VTAB Y: HTAB X: PRINT A$;: NEXT Y
11350  NEXT X
11355  SPEED= 100:B$ = "YOU ARE VERY ECCENTRIC, " + N$
11360  FOR X =  LEN (B$) TO 1 STEP  - 1
11365  VTAB 22: HTAB X: PRINT  MID$ (B$,X,X)
11370  NEXT X
11375  GOTO 22222
12000  REM

==========
PISCES
==========

12005 R =  INT (3 *  RND (1)) + 1
12010  ON R GOTO 12100,12200,12300
12100  FOR X = 1 TO 20
12105 RR =  INT (3 *  RND (1)) + 1
12110  IF RR = 1 THEN A$ = "EXCUSE ME"
12115  IF RR = 2 THEN A$ = "I'M SORRY"
12120  IF RR = 3 THEN A$ = "PARDON ME"
12125 H =  INT (30 *  RND (1)) + 1
12130  VTAB X: HTAB H: PRINT A$
12135  FOR Z = 1 TO 250: NEXT Z
12140  NEXT X
12145  INVERSE : VTAB 20: HTAB 1: PRINT N$;", PISCES ARE HUMBLE": GOTO 2
    2222
12200  PRINT "ASK A QUESTION WHICH MAY BE ANSWERED BY A (YES) OR (NO)": INPUT
    " ";A$
12201  IF  RIGHT$ (A$,1) < "A" THEN A$ =  LEFT$ (A$, LEN (A$) - 1)
12205  HOME : VTAB 3: PRINT  CHR$ (34);A$;"?"; CHR$ (34): PRINT : PRINT
    "========================================"
12210  VTAB 5: HTAB 1: PRINT "PISCES ANSWER IS..."
12215  FOR X = 1 TO 10
12220  IF X / 2 =  INT (X / 2) THEN  INVERSE
12225 RR =  INT (2 *  RND (1)) + 1
12230  IF RR = 1 THEN  VTAB 5: HTAB 20: CALL  - 868: PRINT "YES"
12235  IF RR = 2 THEN  VTAB 5: HTAB 20: CALL  - 868: PRINT "NO"
12240  FOR Z = 1 TO 500: NEXT Z
12245  NORMAL
12250  NEXT X
12255  VTAB 22: HTAB 1: PRINT "PISCES CAN BE INDECISIVE, ";N$: GOTO 2222
    2
12300 A$ = "I LOVE YOU * KISS ME * YOU ARE WONDERFULHUG ME * I LOVE YOU
    * YOU ARE MARVELOUS*YOU ARE FANTASTIC * I LOVE YOU * HOLD MEI LOVE
    YOU * YOU ARE WONDERFUL * KISS ME"
12305 B$ = "KISS ME * YOU ARE WONDERFUL * HOLD ME * I LOVE YOU * YOU ARE
     MARVELOUS * HUG ME YOU ARE WONDERFUL * KISS ME * I LOVE YOUI LOVE
    YOU * I LOVE YOU * I LOVE YOU!!!"
12310  SPEED= 176
12315  FOR X = 1 TO 4
12320  PRINT A$;
12325  NEXT X
12330  PRINT B$
12335  FOR Z = 1 TO 2000: NEXT Z
12340  VTAB 22: HTAB 1: PRINT "WHAT WAS YOUR NAME, AGAIN? "
12345  FOR Z = 1 TO 2000: NEXT Z
12350  SPEED= 50
12355  VTAB 22: HTAB 1: PRINT "YOU ARE EMOTIONAL, ";N$;: CALL  - 868: FOR
    Z = 1 TO 1000: NEXT Z: PRINT " AND VAGUE!": GOTO 22222
22222  NORMAL : SPEED= 255: TEXT
22232  FOR Z = 1 TO 2000: NEXT Z
22242  VTAB 24: HTAB 6: PRINT "=== ANOTHER READING? === (Y/N)"; CHR$ (8)
    CHR$ (8) CHR$ (8) CHR$ (8) CHR$ (8);: GET AN$
22252  IF AN$ <  > "N" THEN 100
22262  HOME : END
```

Line 4320 needs the spaces just right. Consider * as a space. Type it NOW*USING*ONLY*10%**OF*THE****VIDEO*****MONITOR.

Line 4325—same way. Type SAVING 90% OF*ENERGY*COSTS*AND*WEAR AND**TEAR*ON***THE*EQUIP-MENT.

Line 4330 Type YOU*CAN*BE*VERY ******THRIFTY,. There, that should do it!

Leo

Lines 5000–5010 get Leo set for his/her three different readings.

Lines 5100–5110 pick random points for HTABS to start. The maximum number of 39 was used (instead of 40) because funny things happen sometimes when a word ends exactly at the end of a line. At each of the 10 lines a random HTAB is determined and your name is printed there.

Lines 5115–5125—after this remarkable event, the program rests for a moment to gloat.

Lines 5130–5165 then complete the project. All Leos will appreciate the complexity of this program and marvel at the ingenious action in line 5140. The rest of you may just sigh and ask, "That's it?" Do not underrate the simple programs. They can be developed into real money-makers. For example, I have 225 disks full of simple programs, and I am sure the Dysan company has made plenty on just the disks alone.

Lines 5200–5210 decide how many times your name will fit on the screen without being chopped off. It then prints your name that many times on the screen. Truly an impressive sight, unless your name is Daniel or Melvin or something like that.

Lines 5225–5295 are so complex, I have no idea in the world what they do. I must have when I wrote the program, but I forget. I'll send a thank-you note to the first dozen people who can tell me. If you include a self-addressed stamped envelope, I'll send you a real Las Vegas casino souvenir too. Send it to me, not to this magazine. They won't know what to do with it and will probably forward it to *BYTE* or *Softalk*.

Lines 5300–5340 print a selection of non-alpha characters to fill the screen from lines 1–20. It then adds the tag line and tells Leo what Leo already must know! This routine was inspired by writings uncovered from the Land of Chaldea. I had once thought it was an ancient kingdom, but it may only be a concept by Scott Adams that he made into an adventure.

Virgo

Lines 6000–6010 allow for three readings for Virgo.

Lines 6100–6145 print your name on the screen at randon locations and then quickly erase it. The illusion is an excellent graphic depiction of the sign Virgo. I am very familiar with the sign

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"This is a very sentimental program, one I wrote for my wife years ago."

Virgo, from my study of Latin, Greek and other pre-Semantic languages. My white paper, "Papel blanco," covering this subject has been very well received in North America and parts of the United States.

Lines 6200–6220 slow the pace down a bit. If you intend to compile this program later, line 6200 may be omitted. We will not print alphabets on the screen at staggered locations. The screen will look a mess. If this were a Pisces reading, the Pisces would be ill.

Lines 6225–6270 pause for a decent interval, so that the moral is not lost; the screen is then more neatly arranged. Each little letter is now where it belongs. All is peace in a turbulent world.

Line 6300 is a clue to the complex mathematical formulae we are about to encounter. The weak at heart should return to the calmness and security of Wizardry or the new Escape from Cleveland.

Line 6305 reduces speed to about its lowest. At this point it simulates the sorting process on many business computers.

Lines 6310–6320 add a number at the end of pi, carried out, now, to 11 places. Speed is returned to normal for the intense computations about to take place. Fasten your seat belts, please.

Lines 6325–6390 print various arithmetical calculations at blistering speed, slowed down only by the excessive number of delay loops.

The statement in line 6375 is correct as printed. This is not the exact value of pi, but it is as close as I care to get to it in this program. For those of a curious nature, see my program "Pi to 1000 Decimal Places: World's Most Boring Program."

Libra

7000–7010 signals we are ready for three readings for Libra.

Line 7100 is a bonus indicator. There will be three variations within the first reading.

Lines 7115–7150 select three numbers at random and perform a simple addition problem. The answer may not always be what you expect, but as a Libra you will understand. The display of this routine inspired the people at Edu-Ware to form a company to teach kids a proper way to do adding and take-away stuff. I've asked for a demo to help me work out problems like this, but I just get nasty notes from them suggesting I write to Hayden or *Reader's Digest* instead.

Lines 7155–7200 explore the science of geography. Much of the credit for research must be given to the Clark County Library for their assistance in helping to identify certain popular cities. Any fallacy in the program may have resulted from the fact that I had to do the work in the library, since they—for some reason unknown to me—will not allow me to have a library card. Please note that in line 7180 the arrow indication is made by using a hyphen and greater-than sign. It would look better using an equal sign and a greater-than sign, but I understand that those two characters and their relationship to each other is copyrighted by the Apple Computer Company, and I am not the one who will be taking pot shots at Steve Jobs or any of his crew.

Lines 7205–7240 take a stroll down memory lane. Those of you who are Anglophiles, American history buffs, Lincoln fans and high rollers will easily identify all of the locations. The rest of you will just have to plod along in your own dull world and do the best you can. I understand *Creative Computing* magazine may have a contest offering thousands of dollars for the correct answers. Why not write to them and ask for details?

Lines 7300–7345 create phrases by use of two random functions and then allow the comment of a true Libra to be expressed. This is a very sentimental program, one I wrote for my wife many years ago. It certainly showed my devotion to her since computers at that time took up entire rooms and I was unable to run the program to see if it would work. Now that I have my own Apple, I really don't have much time to talk with her. I am sure she un-

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derstands—she is a Libra.

Lines 7400–7445 print out a name in random sequence. A letter is selected at random (RR in line 7410) and it is poked on the screen somewhere. If it matches the correct letter in the name, after deducting the 64 from the ASCII thing to make it equal the POKE thing (line 7420), then it goes on to try the next letter.

I learned this routine by using Back it Up II, a nibbler disk copier, to decipher Locksmith, which had this routine at some sector loaded with a bunch of hex numbers.

Scorpio

Lines 8000–8010 get us started on Scorpio. Just in time, too—you know how restless Scorpios can be.

Lines 8100–8115 print a series of vertical bars on the screen. This is a handy routine if you wish to design a game which plays ten tic-tac-toe games at one time. Working out the horizontal lines should not be too tough. I really would rather not get involved.

Lines 8120–8145 move your name slowly from right to left through the vertical bars. It is a stunning effect, particularly if you are from the Middle East, an admirer of farm machinery, or one with a proclivity to have natural inclinations.

Lines 8200–8255 select one of three lines and print it on screen in code. Step by step the code becomes clearer until—often in less than a few days—the answer is readily apparent. Scorpios will find it amusing, which is amusing, since Scorpios seldom find anything amusing.

Lines 8300–8350 create something that is truly state-of-the-art in artificial intelligence. This routine takes an ordinary sentence, or phrase, typed (probably incorrectly at that), and adds the emotional feelings of a Scorpio to the output. It has the ability to recognize if the last character in the sentence is a mark of punctuation. Its only failing may be its inability to correct spelling errors. But then most Scorpios can't either.

The length of the "short sentence" is quite significant, according to *National Enquirer* or *Psychology Today* (I can't recall which offhand). This is covered in more detail in the November 1961 issue of *inCider* pages 34–64.

Capricorn

Lines 10000–10010 forbode three readings for Capricorn, which will not disturb them at all.

Lines 10100–10120 select a word at random from the large vocabulary present. A message is now displayed on the screen, including your name and the preselected word.

Lines 10125–10155 slowly move the key word down to VTAB 22. It really doesn't "move down." It is really printing a new word at one line and erasing the old line above it. Let this be our secret.

Line 10160 completes the routine with a nice complimentary touch, befitting a Capricorn.

Lines 10320–10345 fill up the screen with some fancy footwork and the program comes to a succinct ending.

Aquarius

Lines 11000–11010 tell the impatient Aquarius that three clever readings can be made.

Lines 11100–11145 go to a lot of work to make an unusual screen display. It is a good experiment in screen character manipulation and what can be done when there is nothing good to watch on TV. This display could provide an interesting title for programs you create.

Of interest may be line 11105, which decides how many times a word will fit on the screen without getting crunched.

Lines 11200–11265 again dip into our half-vast library of knowledge and select a famous quote. It is then printed on the screen line-for-line, backwards, flush to the left margin. You may note that the quotes are broken into three parts (A$, B$ and C$) to make life easier when it needs to be formatted for screen printing. If you show any interest in typing in this

Circle 186 on Reader Service card.

"If you are an Aquarius you won't be satisfied with whatever appears on the screen anyhow."

program, you may wish to type in 22 spaces before the two hyphens in line 11260.

There are two good features about this routine. First, it is really easy to add more quotations. Second, we are near the end of the zodiac.

Lines 11300–11375 present a novel screen pattern. Because of the complexity of the explanation of the program, this one falls into the "trust me" class. Try pounding it into your computer. If you get all the colons and semicolons in correctly, you have a darn good chance of this thing working. If you are an Aquarius you won't be satisfied with whatever appears on the screen anyhow.

Pisces

Lines 12000–12010 notify the Pisces that she/he has not been forgotten. Three readings will be available.

Lines 12100–12145 select a message and print it 20 times on your screen. The message will change each time and the position on the screen will vary, mostly because of the indecisiveness of line 12125. This type of programming can lead to a deeper understanding of a Pisces and to a black eye if the Pisces is bigger and/or stronger than you.

Lines 12200–12255 offer the Pisces a chance to answer a question, and then the computer, in typical Pisces fashion, answers.

Of moderate interest may be line 12201 which decides if a question mark (or other punctuation) ends the sentence. If it does, it is removed. Little traps are necessary because of the way Pisces tend to answer computer questions. If this routine was for a Gemini there would be no need for such a line.

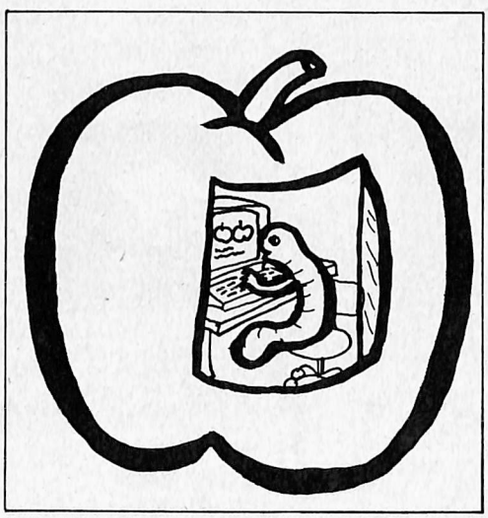
Lines 12300–12355 present a marvelously sensual ending to an otherwise dull program. Only a Pisces would allow such carrying on and not call the cops.

Care should be taken to ensure that A$ and B$ are typed in exactly as written; otherwise you may find yourself engaged to a total stranger. Do not attempt to change any of the words in these two strings until you have (1) gained at least one year of experience, (2) read Roger Wagner's "Assembly Lines" or (3) received an answer to a letter from (a) Apple Computer or (b) Microsoft.

That pretty well wraps up the Electric Horoscope.

If you have additions, improvements or comments, I'd like to see them. If possible, put them on disk, include enough postage for me to send the disk back, and I will try to incorporate all of the goodies into one big fat program to present at a later time. Credit for your contribution, if used, will be included of course.

Wait until you see my program on Marital Arts and Martial Aids! ■



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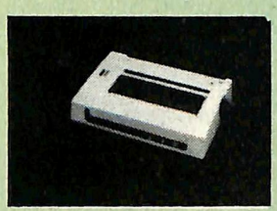
Prowriter



This printer is a major contender. Reviewers laud the **Prowriter**'s speed (120 cps), the buffer (1.5K), character sets (5 fonts) and graphics (160x144 dpi). It's the printer of choice for several major OEMs (like Apple). The **Prowriter 2** has the same specs, but in a 136 column format. Because delivery is slow nationwide, the **Prowriter** has become "The Printer Worth Waiting For..."

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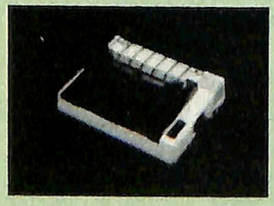
Gemini 10X/15



Gemini 10X is a new version of an old favorite. The big change is the 120 cps. The 120x144 dpi, 5 fonts (w/ italics) & 2.2K buffer is standard. The Epson code compatability is improved too. **Gemini** comes with tractors & uses plain spool ribbons. The **Gemini 15** is the 136 column version. Call (800) 343-0726 for the latest & greatest prices.

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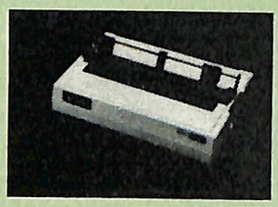


We use these printers in our offices. **Microline 82A**s & **83A**s are data crunchers with 120 cps and optional dot-addressable graphics ROM.

The **Microline 92** & **93** are text processors with 160 cps draft mode, a 40cps correspondence mode & the graphics included. The **Microline 84** combines full graphics & speed (200 cps) with exceptional performance (we use the 84 to print our invoices).

Microline 82A **$419.88**
82A/92 Tractor **$59.88**
82A/83A Okigraph ROM **$49.88**
Microline 83A **$679.88**
Microline 92..... **$524.88**
Microline 93..... **$884.88**
Microline 84 ..... **$1024.88**

MANNESMANN TALLY

MT-160 L

The **MT-160 L** is the newest & finest of the correspondence quality printers. It has speed (160 cps), 8 fonts, parallel & serial interfaces, friction/tractor feed, plus menu-driven installation for easy set-up from the control panel.

MT-160 L **$789.88**

We sell other dot matrix printers, including the **Anadex WP6000, 9501A, 9620A & 9625A**, the **Centronics 122 & 352** & the **IDS Prism 80, 132 & Microprism**. Call (603) 881-9855 for technical details. For prices, or to order, call (800) 343-0726.

Letter-Quality Printers

Letter-quality printers are business machines, & very high-ticket ones at that. Most individuals should buy a dot matrix first, adding letter-quality when it's needed. If you *must* have letter quality first & foremost, back yourself up with a cheaper dot matrix for drafts: they're faster & the letter-quality printer is reserved for final drafts.

C. ITOH

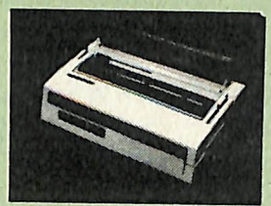
Starwriter

The **Starwriter**, released last year by C. Itoh, has proven a worthy printer. You don't trade-off speed for price or quality. The **Starwriter** uses Diablo code, wheels & ribbons, has a 40 cps print speed, 1/48" line space, 1/120" horizontal spacing—ideal for proportional modes. (For real speed freaks, there's the **Printmaster**, at 55 cps. Same specs as above.)

Starwriter Parallel..... **$1379.88**
Printmaster Parallel..... **$1679.88**

SILVER REED

EXP-550



Why buy a Transtar when you can buy from the guys who make them? The Silver Reed **EXP-550** is a 16 cps, 132 column letter-quality printer with *true* Diablo emulation, making it compatible with most word processing software. It's ideal for medium duty office work. The **EXP 500** is the 12 cps version.

EXP-550 (Parallel)..... **$719.88**
EXP-500 (Parallel)..... **$CALL**

SMITH-CORONA

TP-1

The **TP-1** is an ideal second printer for small offices or homes. The tractor feed (now available) enhances its paper handling. If you're letter-quality needs are light, this might be the machine. (Specify 10 or 12 cpi when you order.)

TP-1 ..... **$CALL**

We sell a variety of other letter-quality printers, including the Comrex **Com-Riter**, the **Diablo 620 & 630**, the **DTC 380Z**, the **NEC 3530, 3550 & 7730** Spinwriters, the **Qume Sprint 11+** & many others. Call (603) 881-9855 for technical details. For prices, or to order, call (800) 343-0726.

LEGEND: CPI-Characters per inch CPS-Characters per second DPI-Dots per inch

Interface Cards

We carry several interface cards for the Apple They all come with a printer cable, ready to run.

INTERACTIVE STRUCTURES

Pkaso

The **Pkaso** is our interface card of choice. It's dedicated to a specific printer, which means you'll get to use *all* the features on that printer. **Pkaso** can dump text or graphics from the screen, rotate graphics 90° to the printer, printing in 16 shades of grey (halftoning), etc. It has excellent documentation, plus a demo disk with utilities on it for VisiCalc, AppleWriter and others. Printers covered include the C. Itoh/NEC/Apple DMP, Epson MX/FX Series, Gemini 10/15, IDS Prism Series*, Okidata 80/90 Series & Centronics Series.

Pkaso Interface **$139.88**
*IDS Prism (Color) **$159.88**

ORANGE MICRO

Grappler+

The **Grappler+** is an excellent choice if you have more than one printer. For us it's ideal, because we only have to stock one card. End users might not agree—**Grappler+** does not fully support every single feature on every printer. The **Bufferboard** lets you add 16K a print buffer, but only for the **Grappler+**.

Grappler+ **$149.88**
Bufferboard (16K) **$149.88**

APPLE COMPATABILE

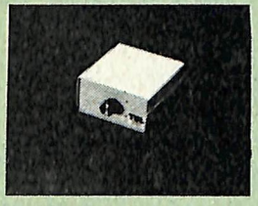
Parallel Card

We aren't stuck on a single vendor here. Tymac, Quadram or Microtek parallel cards all perform well, but Epson's do not—they only work on an Epson. Thus you will never get one from us.

Parallel Card..... **$89.88**

TBL PRODUCTS

Printer Switch



We finally found a printer switch box that we like. Switch between two printers, in parallel/parallel or serial/serial versions (all female plugs).

2-Way Printer Switch **$119.88**

QUADRAM

Microfazer

Quadram's **Microfazer** is a stand-alone buffer that can be moved from system to system. The copy feature lets you print unlimited copies of a document. Comes with its own cable. The power supply is optional.

8K parallel/parallel **$154.88**
64K parallel/parallel..... **$219.88**
256K parallel/parallel **$629.88**
512K parallel/parallel **$979.88**
9 Volt Power Supply..... **$19.88**

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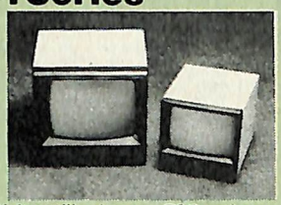
Monitors

We can't imagine why people want RGB monitors on Apples or Franklins, but we get an order a month. Take our word for it—unless you're doing something unusual, composite video output is more than sufficient. As regards amber monitors, read on...

USI

Pi Series



We're *still* using our **Pi 3** amber monitor advertised last year. The concensus is yes, amber is easier on the eye. So is the **Pi-3**'s 20MHz bandwidth and sharp, clear phosphor. Comes in 9 or 12", & in green for you stubborn types.

Pi 2 (12" green) **$159.88**
Pi 3 (12" amber) **$189.88**
Pi 4 (9" amber) **$159.88**

AMDEK

Color 1/300s

The **Color 1** offers the best color video output for Apple/Franklin we've seen. It's perfect for games & graphics, but like most color monitors it suffers in the text mode. It beats the bother of RGB, with its special interfaces.

The **300G** or the **300A** (green & amber respectively) offer 15MHz bandwidth in a monochrome display. Cosmetically superior to the Pi series.

Color 1 ..... **$339.88**
300A **$159.88**
300G **$149.88**

ZENITH

ZVM 121

A neat feature on the **ZVM 121** is the 80 to 40 column switch. The 40 column output fills the screen (double width); switch off and you're in the 80 column mode again. The 12" green screen output is okay, but unremarkable.

ZVM 121 (12" green) **$139.88**

Modems

Internal? External? 300 baud? 1200? Only you can answer these questions. 1200 baud makes sense if you're on-line during the day. If you're at home, on-line late at night, 300 baud may be all you need. As always, research this stuff *before* you buy.

US ROBOTICS

Password

Password represents state-of-the-art LSI technology. The small, compact case holds a 0-300/1200 baud, originate/answer, full/half duplex, auto dial/answer modem. **Password**'s operations are handled completely through software. Comes complete with a RS-232C cable.

Password **$379.88**

DC HAYES

Micromodem II

The **Micromodem II** is a 300 baud originate/answer, auto dial/answer, full/half duplex internal. It comes complete with all hardware & software. It's essentially an Apple/Franklin version of the Smartmodem, but with no 1200 baud upgrade in sight.

Micromodem II **$309.88**

Smartmodems are external units. Software is optional.

Smartmodem (300 baud) **$219.88**
Smartmodem (1200 baud) ... **$539.88**

NOVATION

Apple Cat II

Answering the Hayes challenge, Novation sweetened the **Apple Cat** package with software & a free hour on the source. Originate/answer, auto dial/answer, full/half duplex, the **Apple Cat** can be upgraded from 300 to 1200 baud with an additional board.

Apple Cat II **$319.88**
1200 baud upgrade **$349.88**

Novation also makes external units. Call (603) 881-9855 for technical details/specs.

D-Cat (300 baud) **$159.88**
J-Cat (300 baud) **$139.88**
SmartCat (300 baud) **$199.88**
SmartCat (1200 baud) **$499.88**
AutoCat (300 baud) **$229.88**
AutoCat (1200 baud) **$629.88**

RS-232C Communication Interface Board **$99.88**

Peripherals

The big question these days is IIe compatability. It's touch-and-go in some cases. You should check with the manufacturers to be certain, but also ask us—we're a gold mine of info sometimes.

FRANKLIN *Ace 1000*
$799.88 UPS DELIVERED

The **Ace 1000** is an Apple-compatabile computer with 64K RAM, hi-res graphics, 8 slots, a cooling fan, numeric keypad, 40 column w/upper-lower case & joystick ports. The ***Ace 1000*** can use any & all Apple II/II+ hardware or software—we've tested it in our showroom and sold many of these units with Rana Drives and Videx cards, to make whole systems. It's about as compatabile as any computer can be short of being an Apple. Definitely the bigger bang for the buck.

MICROSOFT

Premium Pack

The Microsoft **Premium Package** includes the Z80 Softcard for CP/M™, Videx's Videoterm for 80 column display, a 16K RAMcard and Thom Hogan's book on CP/M™. If you're thinking about an upgrade, this is it.

Premium Package **$474.88**

If you've already got 16K RAM (Franklin, for example), get the Z80/Softcard Combo. Same spec's, but *without* 16K.

Z80/Videx Combo **$444.88**

Z80 Softcard **$229.88**
16K RAMcard **$74.88**

SATURN SYSTEMS

Accelerator II

The **Accelerator II** makes an Apple II run 3½ times faster than it normally does. We've tried it on our Franklin, and everyone's been impressed. High-speed 6502 processor and 64K memory. Comes with pre-boot.

Accelerator II **$409.88**

RAMboards by Saturn

32K Memory Board **$179.88**
64K Memory Board **$274.88**
128K Memory Board **$389.88**

RANA SYSTEMS

Elite-1

The **Elite-1**'s are single-sided, with 163K storage, 84ms access time & 13 or 16 sectoring—important points when choosing that second drive (you also get an Enhancer Disk free, which lets you access 5 extra tracks). The **Controller Card** can run four drives—Apples, Rana's or whatever—in any combination. The **Elite-2**'s are double-sided drives, **Elite-3**'s are 80 track drives.

Elite-1 ..... **$289.88**
Elite-2 ..... **$474.88**
Elite-3 ..... **$614.88**

MEMBER DIRECT MARKETING ASSOCIATION

WANT PRODUCTS

The Micro Drive

The **Micro Drive** is a 5¼" floppy disk, half-height, for the Apple/Franklin computer. It's a single-sided drive, with 35 or 40 tracks that features direct drive technology, electronic write/protect, a 5 ms stepper motor and band positioning for unrivaled accuracy. The **Micro Drive** comes as a single unit, priced above, a stacked pair or two side-by side (fits right over the case, & you can stack a monitor). Comes complete with cables & documentation.

The Micro Drive **$299.88**
Micro Drive (stacked) **$579.88**
Micro Drive (side/side) ... **$589.88**

VIDEX

VideoTerm

The **VideoTerm** 80-column card is something of a standard. It gives you 80-column display on the Apple/Franklin, with upper/lower case. It's a must for CP/M™ or Pascal. Comes with or without the Soft Video Switch, which lets you enable or disable the 80 columns from your keyboard.

VideoTerm w/switch **$234.88**
VideoTerm w/out switch ... **$204.88**

VIDEX

Enhancer II

The **Enhancer II** expands your Apple keyboard. Type-ahead buffer, repeat, shift/cap lock, programmable keys, full ASCII (upper/lower case) & more!

Enhancer II **$109.88**

QUADRAM

eRAM

An **eRAM** gives IIe users 80 columns and 63K of additional memory (1K gets used in the character set). This is particularly nice, since IIe compatability is rare these days.

eRAM Board **$119.88**

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Sorry, we cannot accept open POs or extend credit/terms at these prices. APO and foreign orders are not accepted. We prepared this ad in April, & prices do change, so call to verify them.

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Computed GOSUB and GOTO for Applesoft!

by Lawrence Houbre

Most Apple programmers believe that Applesoft lacks computed GOTO and GOSUB commands. This is true in the strict sense of Applesoft, but can be overcome with a little programming magic, and the & command. Presented here are the incantations for &GOSUB and &GOTO.

The sample program demonstrates the use of &GOSUB. Line 200 has the magic phrase. The argument to &GOSUB (and &GOTO) can be any variable, number or expression that results in the line number desired. If the resulting number does not exist, an UNDEF'D STATEMENT error is generated.

The program begins by setting up the & vector, and then pokes the &GOSUB code into page 3 of memory. Now, whenever Applesoft encounters the &, it will execute the installed code. The routine in turn checks for the GOSUB, then evaluates the formula, and causes a GOSUB to the result.

&GOTO can be used by replacing the data with the following line, and changing the FOR I=768 TO 809 to FOR I=768 TO 786.

```
10  REM COMPUTED GOSUB EXAMPLE
15  REM LARRY HOUBRE 8/30/82
20  REM
25  REM SETUP & VECTOR
30  POKE 1013,76: POKE 1014,0: POKE
     1015,3
35  REM POKE IN THE &GOSUB ROUTIN
    E
40  FOR I = 768 TO 809: READ A: POKE
     I,A: NEXT I
45  DATA 201,176,240,3,76,201,222
    ,169,3,32,214,211,165,185,72
    ,165,184,72,165,118,72,165,1
    17,72,169,176,72,32,177,0,32
    ,103,221,32,82,231,32,65,217
    ,76,210,215
50  REM DO TITLE PAGE
55  TEXT : HOME : VTAB 10
60  HTAB 9: PRINT "COMPUTED GOSUB
     EXAMPLE"
65  PRINT : HTAB 12: PRINT "BY LA
    RRY HOUBRE"
70  FOR I = 1 TO 1000: NEXT : FOR
     I = 1 TO 20: PRINT : NEXT : POKE
     34,4
75  REM
80  REM SETUP MENU AND GET
85  REM USER RESPONSE
90  VTAB 10: HTAB 18: PRINT "MENU
    "
95  POKE 32,10
100  PRINT : PRINT "1 - LIST PROG
    RAM"
105  PRINT : PRINT "2 - SHOW MACH
    INE LANGUAGE"
110  PRINT : PRINT "3 - GENERATE
    AN ERROR"
115  PRINT : PRINT "4 - EXIT PROG
    RAM"
120  POKE 32,0
125  VTAB 20: HTAB 5: PRINT "WHIC
    H ?"; CHR$ (8);: GET A$
130  REM CHECK RESPONSE
135 A =  ASC (A$) - 48: IF A < 1 OR
    A > 4 THEN 125
140  REM GOSUB TO DESIRED ROUTINE

200  &  GOSUB 300 + A * 10: HOME
    : GOTO 90
310  LIST : FLASH : PRINT "NOTICE
     LINE 200";: NORMAL : GET A$
    : RETURN
320  HOME : POKE 58,0: POKE 59,3:
     CALL  - 418: GET A$: RETURN

340  HOME : VTAB 20: HTAB 1: PRINT
    "YOU ARE NOT ALLOWED TO EXIT
     THIS PROGRAM" CHR$ (7): FOR
    I = 1 TO 2000: NEXT : HOME :
     RETURN
```

Program listing. Demonstration of &GOSUB in Applesoft.

** &GOTO data line **

```
DATA 201,171,240,3,76,201,222,32,177,0,32,
103,221,32,82,231,76,65,217
```

Both &GOSUB and &GOTO are relocatable and will run from any reasonable place in the Apple memory. Good luck &GOTO work! ■

Address all correspondence to Lawrence R. Houbre, Jr., 358 Ashley Blvd., New Bedford, MA 02746.

Prevent Program Copying

by Marc Dodson

A recent *inCider* article ("Apple Combination Lock" by Harry White, April 1983) explained how to lock your disk files from unauthorized tampering. Here are some additional ways to prevent this problem.

Rather than use paddle setting inputs, which can be cumbersome and inconvenient if you must transfer from machine to machine, simply use an input statement. If the input string (either alpha or numeric) does

Address correspondence to Marc Dodson, 27202 Via Burgos, Mission Viejo, CA 92691.

```
10 TEXT:HOME
20 PRINT "TEST PROGRAM"
30 ONERR GOTO 70
40 PRINT CHR$(4);"DELETE TEST
   PROGRAM"
50 PRINT "PROGRAM DESTROYED"
60 DEL 10,90
70 PRINT "TEST PROGRAM OK"
80 POKE 216,0
90 END
```

Program Listing. Utility for protecting files.

not match your predetermined answer string exactly, the program will not function. These can be spread throughout the program, asking such things as the author's mother's maiden name, social security card number or anything else. If the operator fails to enter the correct input, the program will stop, destroy the program, set off an alarm (as noted in the article), or perhaps (using a POKE 50,RANDOM) scramble text output.

To prevent unauthorized copying of a progam when you leave a machine or disk unattended, the Test Program in the program listing should be of help. Since most people will not bother to lock a program or to tape over the write notch on the disk, the program self-destructs the first time it is run. The ONERR GOTO statement in line 30 tells the program where to go when an error is encountered. Line 40 tries to delete the disk copy of the program and line 60 destroys the program in memory. If the program is locked or the disk is write-protected, the ONERR GOTO statement comes into play (since this condition generates an error statement) and the program skips to line 70, letting you know everything is OK. Line 80 cancels the ONERR command.

Be careful, since line 80 acts as a CLEAR command and also resets all variables to 0. Obviously, this routine is meant to be placed at the beginning of the program before any variables are introduced. And the author must make sure his program is locked or write-protected, or load the program first, then type RUN 100 to bypass the routine entirely.

Other useful commands besides the POKE 214,128 (RUN only) mentioned in the article are POKE 50,128, which makes the listing and cataloging invisible, and POKE 1010,102:POKE 1011,213:POKE 1012,112, which makes RESET run.

Another technique is to enter non-printing control characters in the program name when saving the program to disk. This prevents access by anyone who doesn't know what the control characters are and where they are placed within the program name. In fact, this works so well I outwitted myself. While saving a program to disk I must have inadvertently hit the control key. Since I have no idea what control character was hit or where it was placed, I can't access the program. If anyone has any suggestions about how to get around this, I would like to hear them. ■

Micro Typewriter

by Winfield H. Edwards

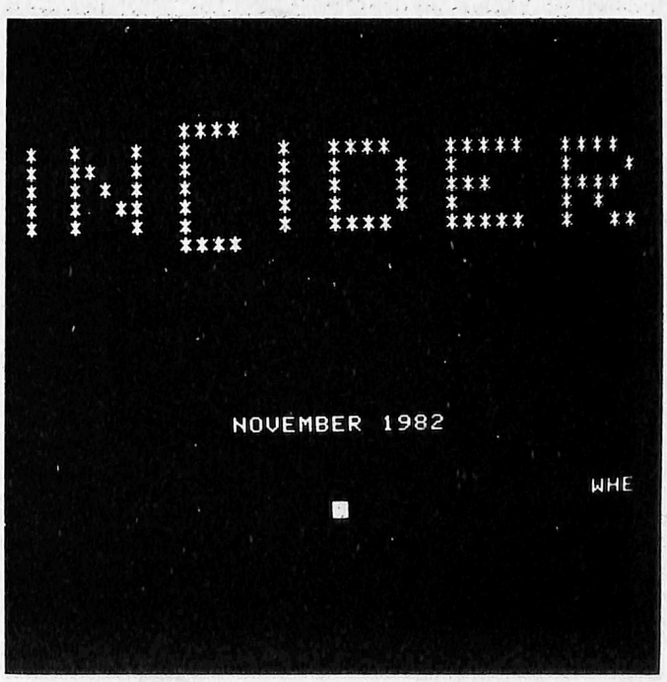
This short program uses three subroutines from the Apple's monitor and autostart ROM to produce some rather interesting results. The 6502 manages this binary data at very high speeds, compared to Basic. No formal assembler is required in this case.

Three mnemonics and associated hex codes are employed:

JSR 20—GOTO SUBROUTINE ADDRESS AND EXECUTE
JMP 4C—GOTO ADDRESS (LIKE BASIC GOTO)
RTS 60—RETURN FROM SUBROUTINE (TIDY UPPER)

Three subroutines are used (see pages 61–64 of the *Reference Manual*):

Address all correspondence to Winfield Edwards, 300 Firwood Drive, Grants Pass, OR 97526.



Screen display of simple graphics.

```
]CALL-151

*300L

0300-   20 58 FC    JSR   $FC58
0303-   20 35 FD    JSR   $FD35
0306-   20 ED FD    JSR   $FDED
0309-   4C 03 03    JMP   $0303
030C-   60          RTS
030D-   00          BRK
030E-   00          BRK
030F-   00          BRK
0310-   83          ???
0311-   C0 AD       CPY   #$AD
0313-   83          ???
0314-   C0 A9       CPY   #$A9
0316-   A5 8D       LDA   $8D
0318-   00          BRK
0319-   D0 CD       BNE   $02E8
031B-   00          BRK
031C-   D0 D0       BNE   $02EE
031E-   13          ???
031F-   4A          LSR
0320-   8D 00 D0    STA   $D000
```

Listing 2. Output from listing the program in Listing 1.

$58FC—CLEAR SCREEN (BASIC HOME)
$FD35—GET INPUT CHARACTER OR ESC CODE
$FDED—OUTPUT A CHARACTER

All elements are at hand and it is possible to write the program. Type CALL-151 and return to get into the monitor mode, which should display an asterisk prompt and a blinking cursor block. Copy Listing 1 as shown and BSAVE (optional). Type list command 0300L. This will produce Listing 2. Next, type 0300G, which will run the program, leaving the cursor in the upper left corner of the screen. For Basic operation, press control-C, then type PR#1 (if using a printer), CALL 768 and return. Line numbers are not used. This replaces the 0300G command.

```
0300:20 58 FC
0303:20 35 FD
0306:20 ED FD
0309:4C 03 03
030C:60
```

Listing 1. Assembly language program that turns your video screen into a blackboard.

This is the point where the fun begins. Study carefully pages 34 and 35 of the *Reference Manual*, titled Escape Codes. The cursor may be moved over the entire screen window. With a printer on line, the Apple will send directly to the printer, much like a typewriter. The photograph shows the screen displaying graphics and text using characters.

It's easy to use this system as a typewriter, but transferring character designs to the printer is difficult. Also, remember the Apple will not transmit lowercase text to a printer unless you use a word processor. Experiment with margin settings, headings, and so forth. Also, messages may be built into a design. For example, the screen shows the first letter using the letter I, the second using N, and so on.

An Apple II Plus with 48K RAM and 16K RAM card was used to write this assembly language program. ■

Input Sorts

by Jeffrey A. Mills

Writing a file program that inputs names or titles? Here are two handy subroutines to help sort out your inputs.

The first (Listing 1) removes *a*, *an* or *the* from the beginning of a title and moves it to the end of the string, preceded by a semicolon. Please note that the length checks (1010, 1030, 1050) must be in ascending order of length for the routine to work.

The second (Listing 2) sorts out a name so it is formatted with the last name first, followed by a semicolon and the rest of the name.

Both of these routines can make alphabetizing a file much more systematic. The strings are ordered so they can be filed by their first letter.

Before you call the GOSUB to run these routines, be sure to set Z$ equal to the string you want to sort. After returning from the GOSUB you must reset your string variable to equal Z$.

```
0  REM ******* LISTING #1 *******
       * BY JEFFREY A. MILLS  ***

1000  REM  *** LISTING #1 ***
1001  REM  *** SET Z$ = TO STRING
      TO SORT BEFORE ENTERING SUB
      ROUTINE ***
1010  IF  LEN (Z$) < 3 THEN 1090
1020  IF  LEFT$ (Z$,2) = "A " THEN
      ZZ$ = "; A":Z$ =  RIGHT$ (Z$
      , LEN (Z$) - 2) + ZZ$: GOTO
      1090
1030  IF  LEN (Z$) < 4 THEN 1090
1040  IF  LEFT$ (Z$,3) = "AN " THEN
      ZZ$ = "; AN":Z$ =  RIGHT$ (Z
      $, LEN (Z$) - 3) + ZZ$: GOTO
      1090
1050  IF  LEN (Z$) < 5 THEN 1090
1060  IF  LEFT$ (Z$,4) = "THE " THEN
      ZZ$ = "; THE":Z$ =  RIGHT$ (
      Z$, LEN (Z$) - 4) + ZZ$
1090  RETURN
```

Listing 1. Moves a, an *and* the *to the end of a title.*

You can test these routines by adding the following four lines to either of the subroutines:

```
10 INPUT "NAME OR TITLE>";A$
20 Z$ = A$ : GOSUB 1000 : A$ = Z$
30 PRINT A$
40 END
```

This input routine should simplify the job. ■

```
0  REM ******* LISTING #2 *******
       * BY JEFFREY A. MILLS  ***

1000  REM  *** NAME FLIP ***
1001  REM  *** SET Z$ = TO THE NA
      ME TO FLIP BEFORE ENTERING S
      UBROUTINE ***
1010 N = 0: FOR Z = ( LEN (Z$)) TO
      1 STEP  - 1
1020  IF  MID$ (Z$,Z,1) <  > " " THEN
      1040
1030 N = A:Z = 1
1040  NEXT : IF N = 0 THEN 1070
1050 ZZ$ =  RIGHT$ (Z$, LEN (Z$) -
      N) + "; " +  LEFT$ (Z$,N)
1060 Z$ = ZZ$
1070  RETURN
```

Listing 2. Formats last name first.

Address correspondence to Jeffrey A. Mills, PO Box 151412, Columbus, OH 43215.

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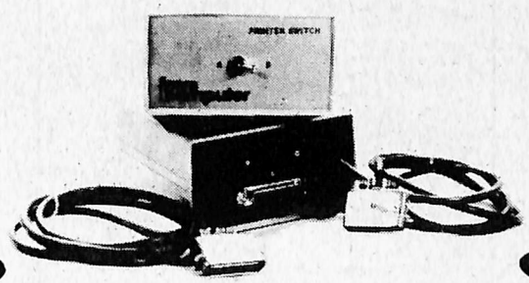

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Auto-Menu for the Apple II—Revisited

by Michael Losk

This article is an update of the Applesoft version of the program called Auto-Menu presented by Kenneth Miles in the March 1981 issue of *Microcomputing*. The purpose of Auto-Menu is to avoid the problem of typos in entering menu selections. The program accomplishes this by assigning a single-letter designation to each program in the disk catalog. Then the user has to type just the one letter to make a choice.

The update consists of two improvements: allowing Auto-Menu to run with a disk that has *any* number of programs, and allowing the user to request a RUN or a LOAD of the chosen program.

Modifying Auto-Menu

(1) Add statement 0 to read:

0 HOME

(2) Add statement 1 to read:

1 D$ = " "

(Hit control-D after the first quote symbol.)

(3) Add statement 2 to read:

2 PRINT D$; "CATALOG"

(4) Add statement 3 to read:

3 GOSUB 200

(5) Delete statement 10

(6) Add statement 21 to read:

21 D$ = " "

(Hit control-D after the first quote symbol.)

(7) Change statement 110 to read:

110 PRINT:PRINT DBEA

(8) Add statements 200 to 230:

```
200 PRINT:INPUT "PRESS <R> FOR RUN
OR <L> FOR LOAD---";E$
210 IF E$ = "R" THEN E$ = "RUN"
220 IF E$ = "L" THEN E$ = "LOAD"
230 RETURN
```

Explanation of Changes

Step (1) clears the screen.
Steps (2) and (3) display the catalog.
Step (4) is a subroutine to allow for the RUN or LOAD option (GOSUB instruction).
Step (5) deletes statement 10 because statement 0 already provides this function.
Steps (6) and (7) RUN or LOAD the program from disk.
Step (8) is a subroutine to allow for the RUN or LOAD option.

Instructions for Operation

If your disk contains 21 programs or fewer, run Auto-Menu. If a blinking cursor appears at the bottom of the catalog, press the space bar and continue by selecting the RUN or LOAD option and pressing return.

If your disk contains 22 or more programs, run Auto-Menu. Press the space bar until the desired program is displayed and a blinking cursor appears at the bottom of the screen. (If there is no blinking cursor, then select the RUN or LOAD option and press return.) Then press reset, type RUN 3 and hit return. Indicate the RUN or LOAD option and press return. ■

```
0  HOME
1 D$ = ""
2  PRINT D$;"CATALOG"
3  GOSUB 200
20 I = I + 2: IF  SCRN( 4,I - 1) =
    10 THEN 20
21 D$ = ""
25 P = I / 2
30  VTAB P + Q: HTAB 1:Q = Q + 1:
    R = I + Q * 2 - 2
40 A$ =  CHR$ ( SCRN( 0,R - 2) +
    SCRN( 0,R - 1) * 16 - 128) +
    CHR$ ( SCRN( 1,R - 2) +  SCRN(
    1,R - 1) * 16 - 128)
50  PRINT "   ...";: COLOR= (Q +
    128) / 16: PLOT 3,R - 1: COLOR=
    Q + 128 -  INT ((Q + 128) /
    16) * 16: PLOT 3,R - 2
60  HTAB 38: PRINT A$: IF  MID$ (
    A$,2,2) = "T" THEN  VTAB P +
    Q - 1: HTAB 1: PRINT "  TEXT
     ":
70  IF  SCRN( 4,R + 1) <  > 10 THEN
    30
80  PRINT "       TOUCH LETTER OF
     CHOICE---";
90 P =  PEEK ( - 16384): IF P < 1
    28 THEN 90
91  PRINT  CHR$ (P);
93  POKE  - 16368,0: IF P < 193 OR
    P > 192 + Q THEN  END
95 I = I + (P - 193) * 2 - 2
100 B$ = " ": IF  SCRN( 38,I) = 2
    THEN B$ = "B"
105 A$ = "": FOR P = 7 TO 37:A$ =
    A$ +  CHR$ ( SCRN( P,I) +  SCRN(
    P,I + 1) * 16 - 128): NEXT P

110  PRINT : PRINT D$B$E$A$
200  PRINT : INPUT "PRESS <R> FOR
     RUN OR <L> FOR LOAD---";E$
210  IF E$ = "R" THEN E$ = "RUN "

220  IF E$ = "L" THEN E$ = "LOAD
     "
230  RETURN
```

Program listing. Auto-Menu, modified.

Address correspondence to Michael Losk, 3601 24th Ave., West Room 302, Seattle, WA 98199.

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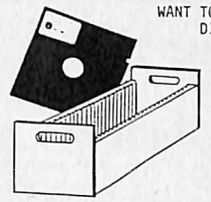

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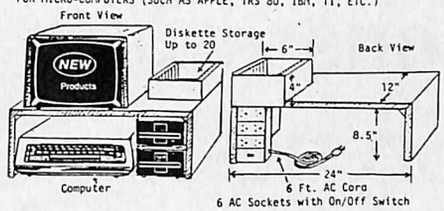

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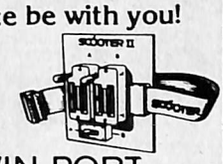

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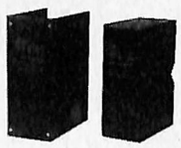

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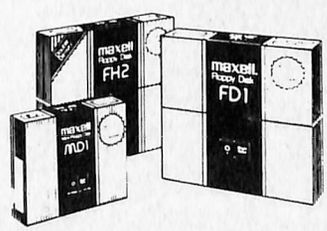

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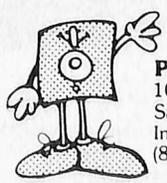

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Fudge It!

by Don Fudge

Create Gorgeous Color-Filled Scenes!

In this column I'll discuss color-filling algorithms and present a machine language program called FILL4 that color-fills line drawings made by white lines on a black background. The program enables you to create scenes easily and is fun to use. It does, however, require prior creation of a line drawing picture. You may use HPLOT shape-drawing routines that I have presented in earlier columns, or write your own. You might want to create an etch-a-sketch screen drawing program by having the computer HPLOT lines connecting various coordinates determined by game paddle settings (as you move the paddles and push a paddle button to cause hplotting from your earlier hi-res screen position to your newest hi-res screen position). Or simply do HGR: POKE–16302,0:HCOLOR = 3:HPLOT X1,Y1 TO X2,Y2 TO X3,Y3 TO X4,Y4------.

Once that line drawing is saved (BSAVE line drawing, A$2000,L$1FF8) you are ready to color it. When you key in the enclosed programs, you will have some great scene creation utilities (including the fastest color-fill algorithm available anywhere). If you haven't the time to type programs, I would suggest Avant-Garde's Paint Master Scene Utility as an inexpensive scene creator.

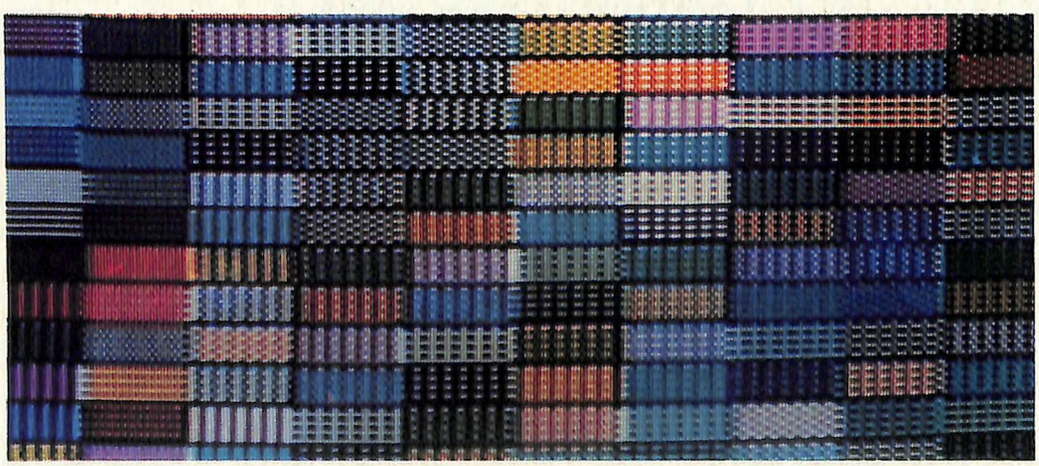
Scene painting is filling enclosed spaces with colors and/or patterns. The palette included here contains hundreds of colors/patterns to choose from. Or use Listing 4 (with line 10 modified to 10 HGR2) from my March *inCider* column to create a color palette (see photo), and then hit control-reset and type BSAVE PATRN, A$4000, L$1FF8. Don't forget to use POKE 103,1: POKE 104,96: POKE 24576,0 *before* loading or running that listing.

Start-of-Program Pokes

A note about the above pokes. Several people have written saying that they've had trouble making programs work after typing them from *inCider* columns. The problem in all cases was either that they did not carefully read the column and skipped the section about the necessary pokes, or they decided to put the pokes at the beginning of their graphics programs. *This will not work!*

Here is what happens. The Apple normally loads all Applesoft programs at $800. But to avoid having graphics and string or variable storage clashing in memory, you should begin graphics programs at $4000 if they use hi-res page 1, and $6000 if they use hi-res page 2. This enables you to ignore HIMEM and LOMEM and to use $800–$1FFF for subroutine and data table storage. Further, it al-

Address correspondence, including inquiries about additional routines and programs, to Don Fudge at Avant-Garde Creations, PO Box 30160, Eugene, OR 97403.



Some of the colors in a scene painting palette.

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POKE 103,1: POKE 104,64: POKE 16384,0 permits use of page 1 graphics and starts your Basic programs at $4000. POKE 103,1: POKE 104,96: POKE 24576,0 permits use of page 1 and/or page 2 graphics and starts your Basic programs at $6000. Page 1 is $2000–$3FFF and page 2 is $4000–$5FFF.

Now, it is impossible to move a loaded program by use of these pokes; if you put the pokes in line 1, your program will bomb. Line 1 is not run until a program is entirely loaded and by then it is too late. So you must do these pokes either in IMMEDIATE mode (no line number) or in the Hello program that boots when you turn on your computer and your drive runs. It is okay to have a line like 90?CHR$(4)"RUN PALETTE" *after* a line such as 50 POKE 103,1: POKE 104,96: POKE 24576,0.

Getting Ready

For Listing 1 (FILL4) you need only do CALL-151 and 9000:, and then start typing code, hitting return after six lines are full and updating your address. PATRNMAKER (Listing 2) needs only to be keyed in, saved and run, from Basic. Again, saving the March issue's color palette, as previously advised, is also viable here, but you get no patterns—just colors.

Once FILL4 is keyed in, use BSAVE FILL4,A$9000,L$400. Then, after you're done running PATRNMAKER (POKE 103,1: POKE 104,96: POKE 24576,0 *first*) a file called PATRN will have been saved on your disk. This is the palette (a binary picture) your PALETTE program will be looking for when you choose your very first color.

PALETTE, Listing 3, is another Basic program to key in. Once FILL4, PATRN, and PALETTE are all saved on your disk, do POKE 103,1: POKE 104,96: POKE 24576,0 and run PALLETTE.

Using the PALETTE Program

Here are a few details you will need to know:

1. If you will be loading any HPLOT shapes, TEST 0 (CALL2048) must be on the disk. This file was presented in my March column as Listing 2. If you have no such file, do not worry; just avoid the HPLOT shape part of option 9.

2. If you will be loading block shapes into your scene (also in option 9) you will need TESTTB, another routine presented in March. If you have no TESTTB, all is well—simply avoid using block shapes as additions to the screen.

3. If you will want to use option 13 (GO TO SCAN & SAVE SHAPE) you will need my SCANA program from the April *inCider*. It turns any part of the screen into a table-ized block shape. If you have no such file, no problem—just don't try to create block shapes with sections of the screen in the hi-res scenes you create with PALETTE.

Incidentally, do you notice how I'm tying all the programs I've presented in this column together to create a *system* with which you can perform any general graphics feat you

```
*9000.93FF

9000- A9 00 85 1F 85 FA 85 1B
9008- 85 FB 85 1D 85 FC 85 1A
9010- 85 EC 85 EE 85 CF 85 CE
9018- 85 E3 A5 26 85 FD A5 27
9020- 85 FE A4 FF 84 EF B1 26
9028- C9 7F D0 01 60 C9 FF D0
9030- 01 60 A5 EF C9 04 90 0B
9038- 4A 4A 0A 0A 85 D3 A5 EF
9040- 38 E5 D3 85 FC A5 FC D0
9048- 07 A5 06 A2 06 4C 6A 90
9050- C9 01 D0 07 A5 07 A2 07
9058- 4C 6A 90 C9 02 D0 07 A5
9060- 08 A2 08 4C 6A 90 A5 09
9068- A2 09 86 1E 85 D3 B1 26
9070- 0A D0 07 A5 D3 91 26 4C
9078- 3E 91 B1 26 29 7F 85 19
9080- A5 ED 29 7F C5 19 B0 06
9088- 20 E5 90 4C 31 91 20 94
9090- 90 4C 31 91 A9 00 85 FB
9098- 85 EB 85 CF B1 26 0A E6
90A0- EB 0A 90 FB A5 EB C9 02
90A8- B0 03 E6 CF 60 A2 00 A1
90B0- 1E 85 19 C6 EB F0 29 A9
90B8- 07 38 E5 EB 85 EB 85 EC
90C0- A5 19 C9 80 90 02 E6 FB
90C8- 4A C6 EB D0 FB 0A C6 EC
90D0- D0 FB 85 19 B1 26 05 19
90D8- A6 FB F0 02 09 80 91 26
90E0- E6 1A E6 E3 60 A9 00 85
90E8- FB 85 EB 85 CF B1 26 E6
90F0- EB 4A 90 FB A5 EB C9 02
90F8- B0 03 E6 CF 60 A2 00 A1
9100- 1E 85 19 C6 EB F0 29 A9
9108- 07 38 E5 EB 85 EB 85 EC
9110- A5 19 C9 80 90 02 E6 FB
9118- 0A C6 EB D0 FB 4A C6 EC
9120- D0 FB 85 19 B1 26 05 19
9128- A6 FB F0 02 09 80 91 26
9130- 60 A5 1A D0 09 A9 00 85
9138- FA 85 1A 4C 81 91 A9 00
9140- 85 1A 85 FA C0 27 F0 ED
9148- C8 E6 EF E6 1E A5 1E C9
9150- 0A D0 07 A2 06 86 1E 4C
9158- 62 91 C9 E0 D0 04 A2 DC
9160- 86 1E B1 26 C9 7F D0 02
9168- F0 CB C9 FF D0 02 F0 C5
9170- B1 26 0A D0 09 A2 00 A1
9178- 1E 91 26 4C 3E 91 20 E5
9180- 90 A6 E3 F0 07 A9 00 85
9188- E3 4C 1F 92 C0 00 F0 F9
9190- E6 FA A5 FA C9 02 B0 4E
9198- A4 FF A5 1E C9 0A B0 24
91A0- A5 FC D0 06 A9 0A 85 1E
91A8- D0 3C C9 01 D0 06 A9 07
91B0- 85 1E D0 32 C9 02 D0 06
91B8- A9 08 85 1E D0 28 A9 09
91C0- 85 1E D0 22 A5 FC D0 06
91C8- A9 E0 85 1E D0 18 C9 01
91D0- D0 06 A9 DD 85 1E D0 0E
91D8- C9 02 D0 06 A9 DE 85 1E
91E0- D0 04 A9 DF 85 1E 88 84
91E8- EF C6 1E A5 1E C9 05 D0
91F0- 07 A2 08 86 1E 4C 00 92
91F8- C9 DB D0 04 A2 DF 86 1E
9200- B1 26 C9 7F D0 02 F0 17
9208- C9 FF D0 02 F0 11 B1 26
9210- 0A D0 09 A2 00 A1 1E 91
9218- 26 4C 81 91 20 94 90 A9
9220- 00 85 E3 A5 1D F0 03 4C
9228- EE 92 A5 1E C9 0A B0 24
9230- A5 FC D0 06 A9 DC 85 1E
9238- D0 3C C9 01 D0 06 A9 DD
9240- 85 1E D0 32 C9 02 D0 06
9248- A9 DE 85 1E D0 28 A9 DF
9250- 85 1E D0 22 A5 FC D0 06
9258- A9 06 85 1E D0 18 C9 01
9260- D0 06 A9 07 85 1E D0 0E
9268- C9 02 D0 06 A9 08 85 1E
9270- D0 04 A9 09 85 1E 20 D5
9278- F4 A4 FF 84 EF A5 27 C9
9280- 3F 90 0C A5 26 C9 D0 90
9288- 06 20 04 F5 4C EE 92 B1
9290- 26 C9 7F D0 02 F0 57 C9
9298- FF D0 02 F0 51 B1 26 0A
92A0- F0 43 A5 EE D0 1F B1 26
92A8- 29 7F 85 19 A5 ED 29 7F
92B0- C5 19 B0 0D 18 A5 19 4A
92B8- B0 07 A9 02 85 EE 4C C5
92C0- 92 A9 01 85 EE A5 EE C9
92C8- 02 F0 0C 20 94 90 A5 CF
92D0- D0 1C E6 E3 4C 3E 91 20
92D8- E5 90 A5 CF D0 10 A9 02
92E0- 85 FA 4C 81 91 A2 00 A1
92E8- 1E 91 26 4C 3E 91 E6 1B
92F0- A5 1B C9 02 B0 2D A5 FC
92F8- D0 06 A9 DC 85 1E D0 18
9300- C9 01 D0 06 A9 DD 85 1E
9308- D0 0E C9 02 D0 06 A9 DE
9310- 85 1E D0 04 A9 DF 85 1E
9318- A5 FD 85 26 A5 FE 85 27
9320- 4C 6F 93 A5 1E C9 0A B0
9328- 24 A5 FC D0 06 A9 DC 85
9330- 1E D0 3C C9 01 D0 06 A9
9338- DD 85 1E D0 32 C9 02 D0
9340- 06 A9 DE 85 1E D0 28 A9
9348- DF 85 1E D0 22 A5 FC D0
9350- 06 A9 06 85 1E D0 18 C9
9358- 01 D0 06 A9 07 85 1E D0
9360- 0E C9 02 D0 06 A9 08 85
9368- 1E D0 04 A9 09 85 1E 20
9370- 04 F5 A4 FF 84 EF A5 27
9378- C9 21 B0 07 A5 26 C9 28
9380- B0 01 60 B1 26 C9 7F D0
9388- 02 F0 F7 C9 FF D0 02 F0
9390- F1 B1 26 0A F0 46 E6 1D
9398- A5 CE D0 1F B1 26 29 7F
93A0- 85 19 A5 ED 29 7F C5 19
93A8- B0 0D 18 A5 19 4A B0 07
93B0- A9 02 85 CE 4C BB 93 A9
93B8- 01 85 CE A5 CE C9 02 F0
93C0- 0C 20 94 90 A5 CF D0 13
93C8- E6 E3 4C 3E 91 20 E5 90
93D0- A5 CF D0 07 A9 02 85 FA
93D8- 4C 81 91 60 A2 00 A1 1E
93E0- 91 26 E6 1D 4C 3E 91 00
93E8- 46 42 46 42 46 46 46 46
93F0- 40 60 40 60 40 40 40 40
93F8- 44 40 44 40 44 44 04 44
```

Listing 1. FILL4.

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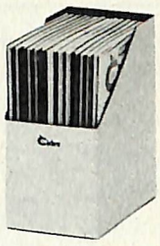

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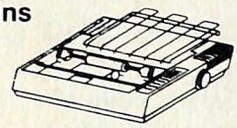

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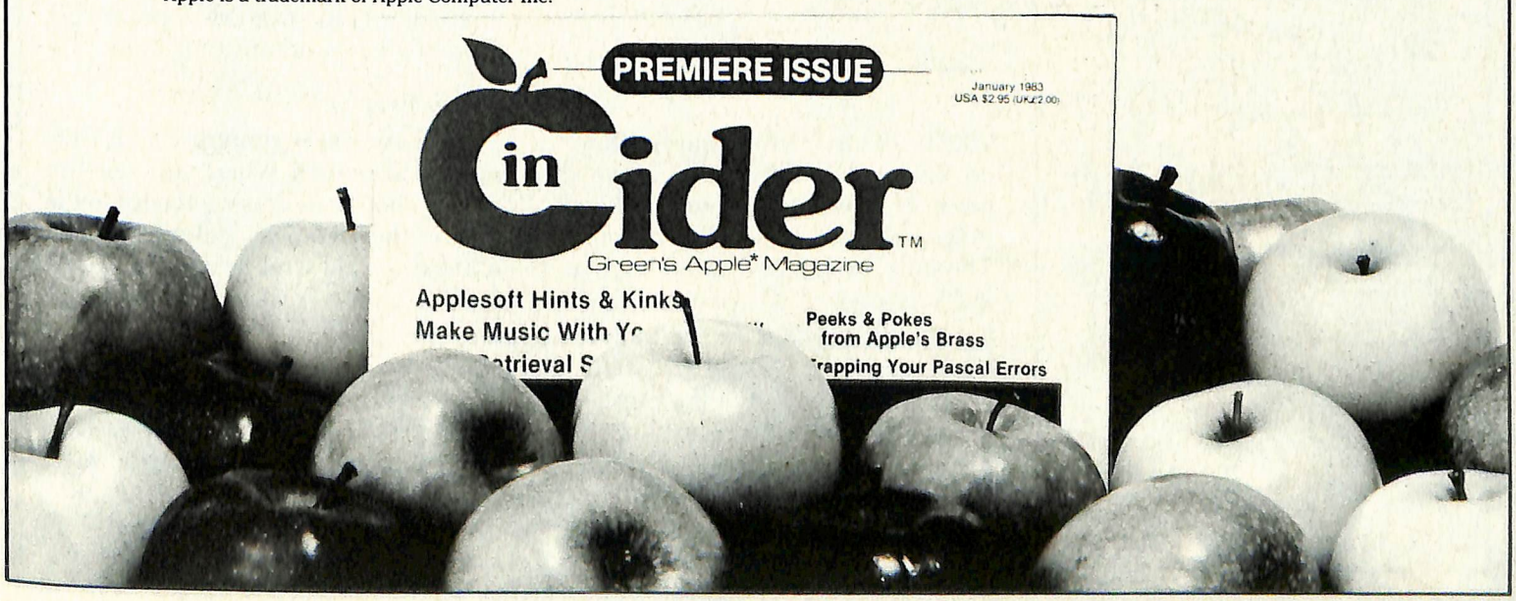

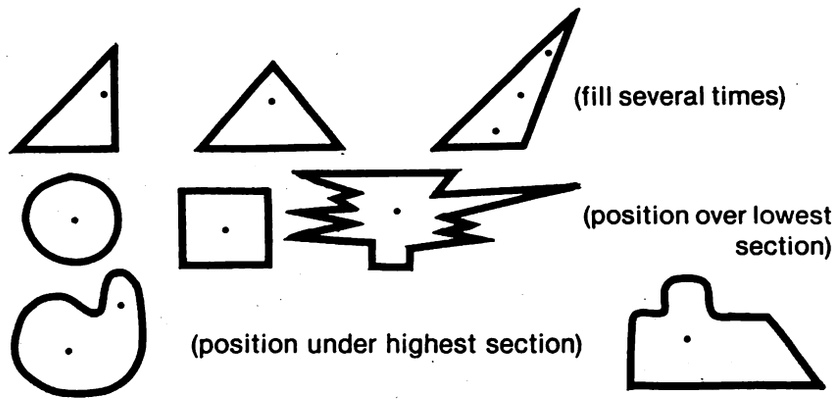

Figure 1. Sample figures to be filled.

desire with ease and convenience? This is no accident. It parallels the way I have written my major graphics utilities. The only problem this might create for you is that there will be so many possibilities for graphics creativity, you may have trouble deciding what to do next. Such is life.

4. Pictures you save with PALETTE will be hi-res page 1 pictures ($2000). If you need them in your own programs at $4000, simply BLOAD them at that address when using them. If you need to save screen pictures in only a few sectors and to retrieve and draw them in only a few seconds, you'll need to go beyond PALETTE to something like Paint Master Scene Utility.

5. When creating line drawings, frame them. They will look better and "color wraparound" will be precluded. HPLOT 0,0 TO 0,191 TO 279,191 TO 0,0 will do it.

6. It is best, especially on unframed pictures, to start filling near the right side of the screen and work left.

7. To quiet the cursor clicks, hit A.

8. When filling with color, hit the space bar to produce an extra large paintbrush.

9. To see screen coordinates when filling, hit C.

10. During filling, if you hit 1-9 you will be asking for the PAINTBRUSH feature (which has nothing to do with color-filling). To move the paintbrush without affecting the picture, hold down paddle button #1. To paint use the paddle #0 knob and work sideways. To paint higher or lower on the screen use the paddle #1 knob to move vertically, with or without holding down the paddle #1 button (depending upon whether or not you want the picture to be affected). Move the paddle #0 knob fairly slowly as you paint. Choose different heights of brush and different colors by hitting the space bar to stop painting, then P for PAINTBRUSH mode and 1-9 for height and 0-7 for color. The colors are black = 0 or 4, white = 3 or 7, green = 1, violet = 2, orange = 5, and blue = 6.

11. To color-fill use option 11, but make sure you have first picked a color via option 10 or 17. Move the cursor around the screen with the paddles, using the #0 button to fill and the #1 button to cease filling.

12. Options 2-8 all relate to vector shape use. Use option 9 to load in your vector shape table first and then view the entire table with option 2 (control-C for early exit), or specify DRAW/XDRAW, ROT (rotation), HCOLOR, X-Y coordinates, SCALE, or background color via options 2-8.

13. After loading in a block or vector shape, with option 9 you can move the shape around on the screen (as a cursor) and print it by hitting button #0. Then hit any key and choose to have more shapes, if desired. Shape tables of the vector type must have standard indexes to work; see your *Applesoft Manual*. Rotate (ROT) 16 units for every 90 degree rotation desired (option 4). Upside-down is a rotation of 32, for example.

14. SEE COLOR BYTE #S, option 16, is only for the more advanced. If you understand the way color bytes work (see my March *inCider* column) then it might be useful to see what color bytes you are color-filling with. Hitting C during filling gets you color bytes as well as X-Y coordinates.

15. MYSTERY COLOR (option 17) merely gives random color bytes.

"There will be so many possibilities for graphics creativity, you may have trouble deciding what to do next."

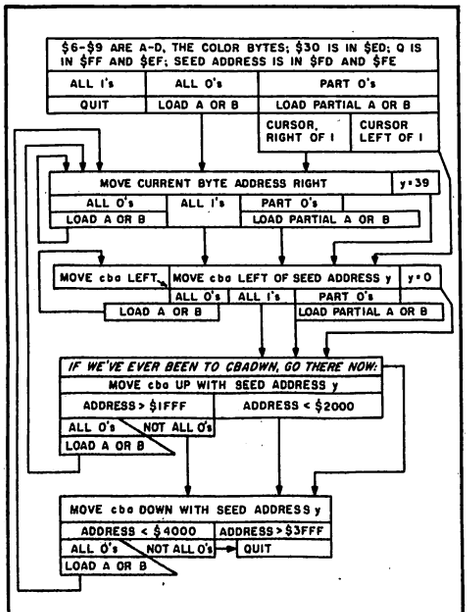

Figure 2. Fill routine flow chart.

A Dry Run

Let's say you're running PALETTE now. Hit return when you see the notice about not erasing the screen if you hit the space bar, unless you have a line drawing already on hi-res page 1. Use option 10 to choose a color and the paddles and button #0 to select a color or pattern. When choosing, have both dots on the palette color chosen as centered as possible. Back in the menu, select option 9 if you have a binary picture line drawing to load in and color. Remember that FILL4 fills color on

black backgrounds only and that lines must be white.

Now use option 11 to fill color, with button #0 as the fill button and button #1 as the quit button. If there is nothing on the screen to fill, choose white (rightmost column) in the palette. Then when in the fill subroutine, hit button #0 to fill the screen with white, followed by the space bar, and then hit 0 to designate 0 (black) for paint color. Create lots of black rectangles to color-fill by using paddle #0 to paint, and both paddles and button #1 (held down) to relocate. Hit the space space bar to exit painting and E to exit back to menu. Use option 10 to choose a color and option 11 to go to your picture and color-fill the rectangles.

If you're not having a great time, perhaps you need a good line drawing to color-fill with. Take care of that problem in the ways I have already mentioned, or you can ask Avant-Garde for their Dot and Draw program, which has dozens of line-drawings you can fill.

How to Color-Fill

Do not fill too close to lines. Consider that the bottom of the cursor is where the filling commences. Use picture frames to avoid wraparound. If you are filling with a color that has color bytes whose values exceed 127, then you have a color-bit-on color. If the values are less than 128, then you have a color-bit-off color. Color clash (a function of Apple graphics, not Fudge programming) can happen if color-bit-on and color-bit-off colors are horizontally adjacent. Don't forget to hit C to see color bytes of the current color or X-Y coordinate positions, if necessary.

Finally, fill as cleanly as possible. This means filling at the most appropriate places in an enclosure. Refer to Figure 1. The hardest types of figures to fill are tiny ones and those shaped like stars.

The FILL4 routine in PALETTE is made with speed as priority one, variety of colors/patterns as priority two, and completeness of color-fill of a complex figure as priority three. In my opinion an adventure game whose

Listing 2. PATRNMAKER.

```
2 C(1) = 0:C(2) = 42:C(3) = 85:C(4) = 127:C(5) = 170:C(6) = 217
10  HGR2
12  GOSUB 15: GOTO 81
15 X = 16384:Q = 0:Z = 1024:E = 0:V = 2:XX = 16384
20  FOR A = 1 TO 6: FOR B = 1 TO 6: IF A - B = 0 THEN 62
30  FOR C = 1 TO 6: IF (A - C) * (B - C) = 0 THEN 61
40  FOR D = 1 TO 6: IF (A - D) * (B - D) * (C - D) = 0 THEN 60
50 N = N + 1: IF N > 480 THEN  CALL 54915: RETURN
52  POKE X,C(A): POKE X + 1,C(B): POKE X + Z,C(C): POKE Z + X + 1,C(D):X =
     X + 2048:Q = Q + 1: IF Q < 4 THEN 52
53 Q = 0:X = XX + V + E:V = V + 2: IF V < 42 THEN 60
54 V = 2:E = E + 128:X = XX + E: IF E < 1024 THEN 60
55 X = X - 984:E = 128: RETURN
60  NEXT
61  NEXT
62  NEXT
63  NEXT
81  DATA  8,17,34,68,136,145,162,196,17,34,68,8,145,162,196,136,119,110,93
     ,59,247,238,221,187,110,93,59,119,238,221,187,247,25,51,102,76,153,17
     9,230,204,51,102,76,25,179,230,204,153,42,85,42,85,170,213,170,213,85
     ,42,85,42,213,170,213,170
82  DATA  127,127,127,127,127,255,255,255,255,0,0,0,0,128,128,128,128,34,68,8,
     17,162,196,136,145,68,8,17,34,196,136,145,162,93,59,119,110,221,187,2
     47,238,59,119,110,93,187,247,238,221,102,76,25,51,230,204,153,179,76,
     25,51,102,204,153,179,230
83  DATA  1,21,1,22,2,21,2,22,1,5,1,6,2,5,2,6,1,13,1,14,1,15,1,16,1,17,1,1
     9,2,13,2,14,2,15,2,16,2,17,2,19,3,23,3,24,4,23,4,24,3,7,3,8,4,7,4,8,3
     ,13,3,14,3,15,3,16,3,17,3,19
84  DATA  4,13,4,14,4,15,4,16,4,17,4,19,5,25,5,26,6,25,6,26,5,13,5,14,5,15
     ,5,16,5,17,5,19,6,13,6,14,6,15,6,16,6,17,6,19,7,27,7,28,8,27,8,28,7,1
     3,7,14,7,15,7,16,7,17,7,19,8,13,8,14
85  DATA  8,15,8,16,8,17,8,19,9,29,9,30,10,29,10,30,9,13,9,14,9,15,9,16,9,
     17,9,19,10,13,10,14,10,15,10,16,10,17,10,19,11,31,11,32,12,31,12,32,1
     1,13,11,14,11,15,11,16,11,17,11,19,12,13,12,14,12,15,12,16,12,17,12,1
     9
86  DATA   5,6,6,7,7,8,5,7,5,8,6,8,5,5,6,6,7,7,8,8,13,13,13,14,13,15,13,16
     ,13,17,13,19,14,14,14,15,14,16,14,18,14,20, 15,15,15,16,15,17,15,19,1
     6,16,16,18,16,20,17,17,17,19,19,19,2,2
87  DATA  1,1,3,3,4,4,28,27
88  DIM C1(33),C2(33),C3(33),C4(33)
90  FOR A = 1 TO 32: READ C1(A),C2(A),C3(A),C4(A): NEXT
100  DIM B1(141),B2(141)
110  FOR A = 1 TO 140: READ B1(A),B2(A): NEXT
115  HCOLOR= 0
116 N = 1
117  FOR X = 0 TO 36 STEP 4
120  FOR Y = 64 TO 168 STEP 8
130  FOR A = 0 TO 6 STEP 2
135 I = B1(N):J = B2(N)
140  HPLOT 279,Y + A:AD =  PEEK (38) +  PEEK (39) * 256 + X
160  POKE AD,C1(I): POKE AD + 1,C2(I): POKE AD + 2,C3(I): POKE AD + 3,C4(I
     )
162  HPLOT 279,Y + A + 1:AD =  PEEK (38) +  PEEK (39) * 256 + X
165  POKE AD,C1(J): POKE AD + 1,C2(J): POKE AD + 2,C3(J): POKE AD + 3,C4(J
     )
168  NEXT
170 N = N + 1
180  NEXT : NEXT
190  PRINT  CHR$ (4)"BSAVEPATRN,A$4000,L$1FF8"
```

Listing 3. PALETTE.

```
0  CLEAR : HOME : TEXT : VTAB 9: HIMEM: 36864
1  ONERR  GOTO 63990
2 C(1) = 0:C(2) = 42:C(3) = 85:C(4) = 127:C(5) = 170:C(6) = 217
3  PRINT : FLASH : PRINT "IF YOU DON'T WANT SCREEN ERASED NOW, HITSPACE BA
     R; ANY OTHER KEY WILL ERASE THE SCREEN.": NORMAL
4 PP =  PEEK ( - 16384): IF PP > 127 THEN  POKE  - 16368,0: IF PP <  > 160
      THEN  HGR : GOTO 7
5  IF PP > 127 THEN 7
6  GOTO 4
7 C = 3:S = 1:R = 64:X = 139:Y = 79:D$ =  CHR$ (4): HOME :B = 0:X$ = "D": GOTO
     89
8  IF Z9 = 0 THEN Z9 = 1: HGR2 : GOSUB 15: GOSUB 300: GOTO 10
9  POKE  - 16299,0: POKE  - 16304,0: POKE  - 16297,0
10  GOSUB 190:X = 139:C = 3:B = 0: GOTO 89
15  REM
88  RETURN
89  HOME : POKE  - 16303,0: POKE  - 16298,0: HCOLOR= C: SCALE= S: ROT= R
90  PRINT : INVERSE : VTAB 1: HTAB 5: PRINT "DO YOU WANT TO:": NORMAL : PRINT
     "(0)GO TO MAIN MENU": PRINT "(1)VIEW SCREEN": PRINT "(2)SEE THEM ALL
     (VECTOR), ONE AFTER        ANOTHER": PRINT "(3)SPECIFY DRAW OR XDRAW"
     : PRINT "(4)SPECIFY ROTATION"
91  PRINT "(5)SPECIFY COLOR": PRINT "(6)SPECIFY COORDINATES": PRINT "(7)SP
     ECIFY SCALE": PRINT "(8)SPECIFY BACKGROUND": PRINT "(9)LOAD A SHAPE O
     R PICTURE": PRINT "(10)CHOOSE A PALETTE COLOR": PRINT "(11)FILL SHAPE
     S OR PICTURES"
92  PRINT "(12)MIXED-SCREEN TO FULL-SCREEN GRAPHICS(13)GO TO SCAN & SAVE S
     HAPE": PRINT "(14)SAVE 34 SECTOR SCREEN PICTURE": PRINT "(15)ERASE SC
     REEN": PRINT "(16)SEE COLOR BYTE #S": PRINT "(17)MYSTERY COLOR"
```

Listing continued.

Listing continued.

```
 95  INPUT "(TYPE 0-17):";B$: IF  LEN (B$) = 0 THEN 90
 96  IF  ASC (B$) > 57 OR  ASC (B$) < 48 THEN 90
 97 ZZ =  VAL (B$): IF ZZ < 0 OR ZZ > 17 THEN 90
 98  ON ZZ GOTO 100,110,1100,1200,1300,1600,1700,1800,400,8,900,8000,9000,1
     0000,11000,12000,13000
100  IF  ASC (B$) = 49 THEN  POKE  - 16304,0: POKE  - 16297,0: GOSUB 63000
     : HOME : GOTO 89
110  IF  ASC (B$) = 50 THEN 140
111  REM
113  IF ZZ = 0 THEN  END
140 D =  INT (AD / 256):T = D * 256:SM = AD - T
145 NU =  PEEK (AD)
150  POKE 232,SM: POKE 233,D
155  PRINT : PRINT "YOU'LL SEE FROM SHAPE 1 TO SHAPE "NU".": PRINT "HIT SP
     ACE BAR TO MOVE ON TO NEXT SHAPE.": GOSUB 63000
158  HGR : SCALE= S: ROT= R: HCOLOR= B: HPLOT 0,0: CALL 62454
159  HCOLOR= C
160  FOR GH = 1 TO NU: GOSUB 1000: VTAB 23: PRINT "SHAPE: "GH: GOSUB 63010
     : HGR : SCALE= S: ROT= R: HCOLOR= B: HPLOT 0,0: CALL 62454: HCOLOR= C
     : NEXT
161  HOME : GOTO 89
190  POKE 232,96: POKE 233,3: POKE 864,1: POKE 865,0: POKE 866,4: POKE 867
     ,0: POKE 868,60: POKE 869,54: POKE 870,0: ROT= 0: SCALE= 1: IF VV = 1
      THEN VV = 0: RETURN
195  POKE 230,64
200 P0 = 1.09 *  PDL (0):P1 = .75 *  PDL (1): IF P0 + 18 < 280 THEN  XDRAW
     1 AT P0,P1: XDRAW 1 AT P0 + 18,P1: FOR GH = 1 TO 100: NEXT : XDRAW 1 AT
     P0 + 18,P1: XDRAW 1 AT P0,P1:O =  PEEK ( - 16336)
201  IF P0 + 18 > 279 THEN  GOSUB 62090: GOTO 200
210 PP =  PEEK ( - 16287): IF PP > 127 THEN P =  PEEK (229): IF P / 2 <  >
      INT (P / 2) AND P > 0 THEN P = P - 1
215  IF PP < 128 THEN 200
220 A =  PEEK (P +  PEEK (38) +  PEEK (39) * 256):B =  PEEK (P + 1 +  PEEK
     (38) +  PEEK (39) * 256)
225 C =  PEEK (P + 2 +  PEEK (38) +  PEEK (39) * 256):D =  PEEK (P + 3 +  PEEK
     (38) +  PEEK (39) * 256)
230  XDRAW 1 AT P0,P1 + 1: XDRAW 1 AT P0,P1 + 1:E =  PEEK (P +  PEEK (38) +
      PEEK (39) * 256):F =  PEEK (P + 1 +  PEEK (38) +  PEEK (39) * 256): POKE
     6,A: POKE 7,B: POKE 8,C: POKE 9,D
232 G =  PEEK (P + 2 +  PEEK (38) +  PEEK (39) * 256):H =  PEEK (P + 3 +  PEEK
     (38) +  PEEK (39) * 256)
235  POKE 220,E: POKE 221,F: POKE 222,G: POKE 223,H
290  POKE 230,32: POKE  - 16368,0: POKE  - 16300,0: RETURN
300  PRINT  CHR$ (4)"BLOADPATRN,A$4000": RETURN
400  HOME : VTAB 9: POKE  - 16303,0: POKE  - 16298,0
410  PRINT "WHICH TYPE OF PICTURE DO YOU WISH TO    FILL:": PRINT : PRINT
     "(1)BLOCK OR HPLOT SHAPES": PRINT "(2)VECTOR SHAPES": PRINT "(3)34 SE
     CTOR SCREEN PICTURE": PRINT : INPUT "(1-3):";A: IF A < 1 OR A > 3 THEN
     410
412  IF A = 1 THEN 420
415  PRINT : INVERSE : PRINT "SWITCH TO YOUR SHAPE DISK:": NORMAL : GOSUB
     63000
420  ON A GOTO 500,600,700
500  PRINT : INPUT "SHAPE TABLE NAME: ";ST$: IF  LEN (ST$) = 0 THEN 500
505  PRINT : PRINT "IF HPLOT SHAPE DESIRED, HIT H.";: GET H$: PRINT  CHR$
     (13): IF  LEN (H$) = 0 THEN 509
506  IF  ASC (H$) = 72 THEN  PRINT D$"BLOADTEST 0 (CALL2048)": GOTO 509
508  PRINT D$"BLOADTESTTB"
509  PRINT : INVERSE : PRINT "SWITCH TO YOUR SHAPE DISK:": NORMAL : GOSUB
     63000
510 D$ =  CHR$ (4): PRINT D$"BLOAD";ST$: PRINT "ADDRESS: " PEEK (43634) +
      PEEK (43635) * 256: PRINT "LENGTH: " PEEK (43616) +  PEEK (43617) *
     256
525  PRINT : INPUT "SHAPE #: ";SN: IF SN > 23 OR SN < 1 THEN 525
530  POKE 7,SN
535  IF  ASC (H$) = 72 THEN  CALL 2048: POKE  - 16304,0: POKE  - 16297,0: GOSUB
     63010: GOTO 550
540  PRINT : INPUT "VT: ";VT: INPUT "VB: ";VB: INPUT "HR: ";HR: INPUT "HL:
      ";HL
541 VV = 1: GOSUB 190: POKE  - 16304,0: POKE  - 16297,0
542 P0 = 1.09 *  PDL (0):P1 = .75 *  PDL (1): XDRAW 1 AT P0,P1: FOR GH = 1
      TO 100: NEXT : XDRAW 1 AT P0,P1:O =  PEEK ( - 16336)
543 PP =  PEEK ( - 16287): IF PP > 127 THEN 546
544  IF PP < 128 THEN 542
546 TV =  INT (P1 - (.5 * (VB - VT))):BV = TV + (VB - VT):RH =  INT ((P0 /
     7) + (.5 * (HR - HL))):LH = RH - (HR - HL)
547  IF (TV < 0 OR BV > 191) OR (RH > 39 OR LH < 0) THEN  GOSUB 60000: POP
     : GOTO 542
548  POKE 252,TV: POKE 253,BV: POKE 254,RH: POKE 255,LH
550  CALL 2116: GET A$: PRINT  CHR$ (13): HOME : VTAB 9: POKE  - 16303,0: POKE
      - 16298,0: INPUT "DO YOU WANT ANOTHER? (Y/N): ";A$: IF  LEN (A$) = 0
      THEN 550
560  IF  ASC (A$) = 89 THEN 525
570  GOTO 89
600  PRINT : INPUT "SHAPE TABLE NAME: ";ST$: IF  LEN (ST$) = 0 THEN 600
610 D$ =  CHR$ (4): PRINT D$"BLOAD";ST$: PRINT "ADDRESS: " PEEK (43634) +
      PEEK (43635) * 256: PRINT "LENGTH: " PEEK (43616) +  PEEK (43617) *
     256
611 AD =  PEEK (43634) +  PEEK (43635) * 256:NS =  PEEK (AD)
612  PRINT "# OF SHAPES IN TABLE: "NS
620  PRINT : INPUT "SHAPE #: ";SN: IF SN > NS OR SN < 1 THEN 620
625  POKE  - 16304,0: POKE  - 16297,0
630 HI =  INT (AD / 256):LO = AD - (HI * 256)
640 VV = 1: GOSUB 190
642 P0 = 1.09 *  PDL (0):P1 = .75 *  PDL (1): XDRAW 1 AT P0,P1: FOR GH = 1
      TO 100: NEXT : XDRAW 1 AT P0,P1:O =  PEEK ( - 16336)
644 PP =  PEEK ( - 16287): IF PP > 127 THEN 649
645  IF PP < 128 THEN 642
649  POKE 232,LO: POKE 233,HI: ROT= R: SCALE= S: HCOLOR= C
650  POKE  - 16304,0: POKE  - 16297,0: DRAW SN AT P0,P1: GOSUB 63000: HOME
```

Listing continued.

scenes take a long time to fill gets old really fast.

How Color-Filling Works

In general, color-filling works like this. Bytes on the screen are inspected for on bits. If there is room to stick some or all of a color-byte into the screen-byte, it is done. Once the byte is "filled" the next screen-byte to the right is handled in the same way. If the byte found is not all 0's (black), it tells the routine to quit moving to the right because a line has been encountered. So now bytes are inspected from right to left. Once on bits (a line) are found, this particular horizontal line in the enclosed space being filled

"If there is room to stick some or all of a color-byte into the screen-byte, it is done."

is done, so we go up a line and fill. The same right-first-and-left-second sequence of inspection happens here. Once that line is filled, up again... until you hit a line that says you can no longer fill in the upward direction. Then you start filling in a downward direction, with the same right and left sequence. When you hit the bottom of the enclosed space (too many on bits to allow byte-filling) the routine ceases.

The fill location is where all this starts. But the horizontal byte column number of the fill location is also the "go-back-to" X coordinate. This means that once you have hit a right boundary you go to X equals "go-back-to" minus 1. And when you're done with leftward filling due to an encounter with a line, you go up to the next line (using the "go-back-to"

(minus 1 as Y coordinate) to use "go-back-to" as the X byte coordinate (there are 280 X coordinates at the bit level, but only 40 at the byte level). Once you are done with upward filling, use the original "go-back-to" Y coordinate plus 1 as the next inspection byte for filling.

This type of algorithm is great for speed, but don't be surprised if complex shapes or enclosures need extra fills in some places. By thinking about the "go-back-to" X coordinate parameter, you can easily visualize how a complex figure might need multiple fills. When a line is encountered while filling upward (still using right-then-left inspection sequencing for the current horizontal line) the routine goes all the way back down to the original fill location (with Y incremented by 1 since lower equals greater for Y) for further inspections. For a hand-like figure with fingers pointing upward, five fills would be needed.

See Figure 2 for a flow chart from the Hi-Res Secrets manual. It relates to the FILL1 routine, which uses only four color bytes. FILL4 not only uses $6–$9, but $DC–$DF as well (8 color bytes).

In the Figure 2 flow chart, details are omitted. "Y" means Y register where the horizontal byte coordinate (0–39) is stored. This is an X, not Y, coordinate. Also,"cba"means current

Listing continued.

```
     : VTAB 9: POKE  - 16303,0: POKE  - 16298,0: INPUT "DO YOU WANT ANOTHE
     R? (Y/N): ";A$: IF  LEN (A$) = 0 THEN 650
660  IF  ASC (A$) = 89 THEN 620
670  GOTO 89
700  PRINT : INPUT "34 SECTOR PICTURE NAME? ";PC$: PRINT D$"BLOAD";PC$: HOME
     : GOTO 89
900 VV = 1: POKE  - 16304,0: POKE  - 16297,0: GOSUB 190
902  IF V8 = 0 THEN V8 = 1: PRINT  CHR$ (4)"BLOADFILL4"
905  POKE  - 16300,0: POKE 230,32
906 Z6 = 0
907  IF V9 = 0 THEN V9 = 1: POKE  - 16303,0: POKE  - 16298,0: HOME : PRINT
     "PDL #0 TO FILL , PDL #1 TO EXIT": GOSUB 62000: POKE  - 16304,0: POKE
      - 16297,0
910 P0 = 1.09 *  PDL (0):P1 = .75 *  PDL (1): GOSUB 1500: XDRAW 1 AT P0,P1
     : FOR QW = 1 TO 100: NEXT : XDRAW 1 AT P0,P1: IF V1 = 0 THEN Z =  PEEK
     ( - 16336)
915 Q =  PEEK (229): POKE 255,Q: POKE 239,Q
916 P9 =  PEEK ( - 16384): IF P9 > 127 THEN  POKE  - 16368,0: IF P9 <  > 1
     95 THEN  GOSUB 15000
917  IF P9 = 195 THEN  HOME : GOSUB 16000
918 PP =  PEEK ( - 16286): IF PP > 127 THEN  HOME : GOTO 89
920 PP =  PEEK ( - 16287): IF PP > 127 THEN 950
930  IF PP < 128 THEN 910
950  XDRAW 1 AT P0,P1: POKE 237, PEEK (48): XDRAW 1 AT P0,P1: CALL 36864
980  GOTO 910
1000  IF X$ = "D" THEN  DRAW QW AT X,Y: RETURN
1010  IF X$ = "X" THEN  XDRAW QW AT X,Y: RETURN
1020  RETURN
1100  HOME : VTAB 9: TEXT : INPUT "DO YOU WANT DRAW OR XDRAW? (D OR X):";X
     $: IF X$ <  > "D" AND X$ <  > "X" THEN 1100
1120  HOME : GOTO 89
1200  HOME : VTAB 9: TEXT : INPUT "GIVE DESIRED ROTATION (0-255):";R: IF R
     < 0 OR X > 255 THEN 1200
1220  HOME : GOTO 89
1300  HOME : VTAB 9: TEXT : INPUT "GIVE DESIRED SHAPE COLOR (0-7)------(0
     OR 4 = BLACK; 3 OR 7 = WHITE: 1 = GREEN;2 = VIOLET; 5 = ORANGE; 6 =
     BLUE  :";C
1305  IF C < 0 OR C > 7 THEN 1300
1320  HOME : GOTO 89
1500  IF  INT ( INT (P1) / 2) <  >  INT (P1) / 2 THEN P1 = P1 - 1
1510  RETURN
1600  HOME : VTAB 9: TEXT : INPUT "GIVE DESIRED X COORD. (0-279):";X: IF X
     < 0 OR X > 279 THEN 1600
1610  HOME : VTAB 9: TEXT : INPUT "GIVE DESIRED Y COORD. (0-191):";Y: IF Y
     < 0 OR Y > 191 THEN 1610
1620  HOME : GOTO 89
1700  HOME : VTAB 9: TEXT : INPUT "GIVE DESIRED SCALE (1-255):";S: IF Y <
     0 OR Y > 255 THEN 1700
1720  HOME : GOTO 89
1800  HOME : VTAB 9: TEXT : INPUT "GIVE DESIRED BACKGROUND COLOR (0-7) (0
     OR 4 = BLACK; 3 OR 7 = WHITE: 1 = GREEN;2 = VIOLET; 5 = ORANGE; 6 =
     BLUE  :";B
1810  IF B < 0 OR B > 7 THEN 1800
1815  HCOLOR= B: HPLOT 0,0: CALL 62454: HCOLOR= C
1820  HOME : GOTO 89
8000  POKE  - 16302,0: GOTO 89
9000  FLASH : PRINT "SWITCH TO YOUR PROGRAM DISK!": NORMAL : GOSUB 63000: PRINT
     D$"RUNSCANA"
10000  PRINT : INPUT "34 SECTOR SCREEN PICTURE NAME:          ";N$: IF  LEN
     (N$) = 0 THEN 89
10002  PRINT : INPUT "DID YOU GET IT RIGHT? (Y/N):";A$: IF  LEN (A$) = 0 THEN
     10002
10004  IF  ASC (A$) = 78 THEN 10000
```

Listing continued.

Circle 82 on Reader Service card.

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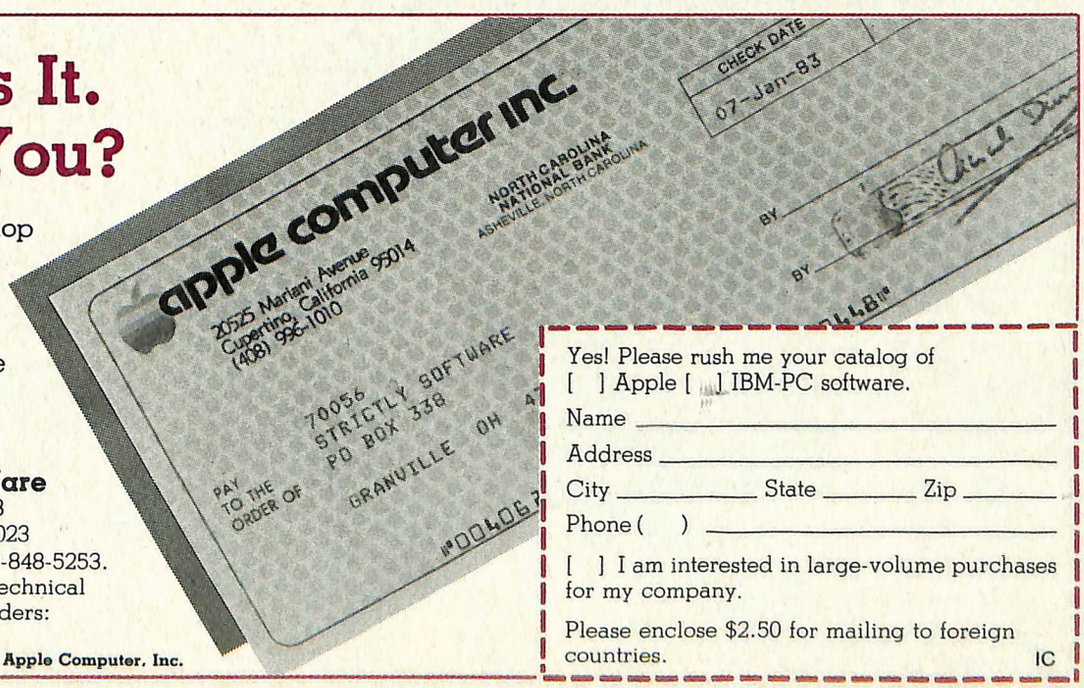

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Listing continued.

```
10006  FLASH : PRINT "SWITCH TO SHAPE DISK!": NORMAL : GOSUB 63000: PRINT
    D$"BSAVE";N$;",A8192,L8192": GOTO 89
11000  HOME : VTAB 9: TEXT : FLASH : INPUT "SURE YOU WANT TO ERASE SCREEN?
    (Y/N):";A$: IF  LEN (A$) = 0 THEN 11000
11010  NORMAL : IF  ASC (A$) <  > 89 THEN 89
11020  CALL 62450: GOTO 89
12000  HOME : TEXT : VTAB 3: INVERSE : HTAB 3: PRINT "YOUR COLOR #S, IN $6
    -$9 & $DC-$DF ARE:"
12010  VTAB 6: PRINT "(A) $6 = " PEEK (6): PRINT : PRINT "(B) $7 = " PEEK
    (7): PRINT : PRINT "(C) $8 = " PEEK (8): PRINT : PRINT "(D) $9 = " PEEK
    (9): PRINT : PRINT
12020  PRINT "(E) $DC = " PEEK (220): PRINT : PRINT "(F) $DD = " PEEK (221
    ): PRINT : PRINT "(G) $DE = " PEEK (222): PRINT : PRINT "(H) $DF = " PEEK
    (223)
12030  NORMAL : VTAB 23: PRINT "    (HIT ANY KEY TO CONTINUE):": GOSUB 630
    10: GOTO 89
13000  HOME : VTAB 7: HTAB 15: PRINT "MYSTERY COLOR:": INVERSE : VTAB 9: HTAB
    15: PRINT "     ": VTAB 9: HTAB 22: PRINT "     ": VTAB 11: HTAB 15: PRINT
    "     ": VTAB 11: HTAB 22: PRINT "     "
13010  FOR Q = 1 TO 20:Q1 =  INT ( RND (1) * 256): VTAB 9: HTAB 16: PRINT
    Q1:Q2 =  INT ( RND (1) * 256): VTAB 9: HTAB 23: PRINT Q2:Q3 =  INT ( RND
    (1) * 256): VTAB 11: HTAB 16: PRINT Q3:Q4 =  INT ( RND (1) * 256): VTAB
    11: HTAB 23: PRINT Q4
13015  IF Q = 20 THEN 13021
13020  VTAB 9: HTAB 16: PRINT "   ": VTAB 9: HTAB 23: PRINT "   ": VTAB 11
    : HTAB 16: PRINT "   ": VTAB 11: HTAB 23: PRINT "   ":PK =  PEEK ( -
    16336):PK =  PEEK ( - 16336): NEXT
13021  INVERSE : VTAB 14: HTAB 15: PRINT "     ": VTAB 14: HTAB 22: PRINT
    "     ": VTAB 16: HTAB 15: PRINT "     ": VTAB 16: HTAB 22: PRINT "
    "
13022 Q5 = Q1:Q6 = Q2:Q7 = Q3:Q8 = Q4: VTAB 14: HTAB 16: PRINT Q5: VTAB 14
    : HTAB 23: PRINT Q6: VTAB 16: HTAB 16: PRINT Q7: VTAB 16: HTAB 23: PRINT
    Q8
13023  VTAB 10: PRINT "$6-$9:": VTAB 15: PRINT "$DC-$DF:"
13025  POKE 220,Q5: POKE 221,Q6: POKE 222,Q7: POKE 223,Q8
13026  POKE 6,Q1: POKE 7,Q2: POKE 8,Q3: POKE 9,Q4
13030  FOR Q = 1 TO 80:PK =  PEEK ( - 16336): NEXT : NORMAL : PRINT "": VTAB
    21: GOSUB 63000: GOTO 89
15000  IF P9 = 193 OR P9 = 211 THEN V1 = 1: RETURN
15001 Z6 = 0
15010  HOME : VTAB 9: POKE  - 16303,0: POKE  - 16298,0: PRINT "PAINTBRUSH
    HCOLOR? (0-7):";: GET C$: PRINT C$: PRINT  CHR$ (13): IF  LEN (C$) =
    0 THEN 15010
15012  IF Z6 = 1 THEN  PRINT : PRINT "GIVE PAINTBRUSH HEIGHT:";: GET H$: PRINT
    H$: PRINT  CHR$ (13)
15015  IF V5 = 0 THEN V5 = 1: PRINT : PRINT "PDLS TO PAINT, PDL #1 BUTTON
    TO EXIT.": PRINT
15020  IF  VAL (C$) > 7 OR  VAL (C$) < 0 THEN 15010
15030 HT = P9 - 176:HC =  VAL (C$): HCOLOR= HC: IF Z6 = 1 THEN HT =  VAL (
    H$)
15031 Z6 = 1
15035  POKE  - 16304,0: POKE  - 16297,0
15039  IF  PDL (1) * .75 < 191 - (HT - 1) THEN P0 =  PDL (0) * 1.0942:P1 =
    PDL (1) * .75:P4 = P0:P6 = P0
15040  IF  PDL (1) * .75 < 191 - (HT - 1) THEN P0 =  PDL (0) * 1.0942:P1 =
    PDL (1) * .75
15041 P6 = P4:P4 = P0
15042 Z3 = 1: IF P6 > P0 THEN Z3 =  - 1
15043 PK =  PEEK ( - 16286): IF PK > 127 THEN P0 =  PDL (0) * 1.0942:P1 =
    PDL (1) * .75: XDRAW 1 AT P0,P1: FOR Q = 1 TO 100: NEXT : XDRAW 1 AT
    P0,P1: GOTO 15039
15045  IF  PDL (1) * .75 < 191 - (HT - 1) THEN P2 =  PDL (0) * 1.0942:P3 =
    PDL (1) * .75: FOR P = P6 TO P2 STEP Z3: HPLOT P,P3 TO P,(P3 + (HT -
    1)) * (P3 + (HT - 1) > 0) * (P3 + (HT - 1) < 192): NEXT
15050 PP =  PEEK ( - 16384): IF PP > 127 THEN  POKE  - 16368,0: GOTO 15070
15060  GOTO 15040
15070  POKE  - 16303,0: POKE  - 16298,0: HOME : VTAB 9: INPUT "WANT TO PAI
    NT SOME MORE OR FILL OR EXIT?(TYPE P OR F OR E):";A$: IF  LEN (A$) =
    0 THEN 15070
15080  IF  ASC (A$) = 69 THEN  POP : GOTO 89
15082  IF  ASC (A$) = 70 THEN  POKE  - 16304,0: POKE  - 16297,0: RETURN
15084  IF  ASC (A$) = 80 THEN 15010
15086  GOTO 15070
16000  POKE  - 16303,0: POKE  - 16298,0: VTAB 7: PRINT "COORDINATES:": PRINT
    : PRINT "X = " INT (P0): PRINT "Y = " INT (P1): PRINT : PRINT "COLOR
    BYTES:": PRINT
16010  PRINT  PEEK (6)"  " PEEK (7)"  " PEEK (8)"  " PEEK (9): PRINT  PEEK
    (220)"  " PEEK (221)"  " PEEK (222)"  " PEEK (223): GOSUB 63000: POKE
     - 16304,0: POKE  - 16297,0: RETURN
60000  FOR QW = 1 TO 10:PM =  PEEK ( - 16336): NEXT : RETURN
62000  PRINT : PRINT "HIT A TO STOP CLICKS.": PRINT : PRINT "HIT 1-9 TO GE
    T HOR. PAINTBRUSH OF THAT  HEIGHT & HIT 0-7 FOR HI-RES COLORS 0-7.": PRINT
    : PRINT "HIT SPACE BAR TO EXIT PAINTING."
62005  PRINT : PRINT "(HITTING SPACE BAR WHEN IN FILL MODE    WILL GET YOU
    PAINTBRUSH HEIGHT OF 18----THEN YOU MERELY CHOOSE HI-RES COLOR.)"
62010  PRINT : PRINT "TO MOVE PDLS WITHOUT PAINTING, HOLD DOWNPDL BUTTON #
    1."
62020  PRINT : PRINT "HIT C FOR COORD.S  & COLOR BYTES."
62030  GOTO 63000
62090  TEXT : HOME : PRINT "TURN PADDLE #0 COUNTERCLOCKWISE!!": FOR Q0 = 1
    TO 18:QC =  PEEK ( - 16336): NEXT : POKE  - 16304,0: POKE  - 16297,0
    : POKE  - 16299,0: RETURN
63000  PRINT : PRINT "(HIT ANY KEY TO CONTINUE):": PRINT
63010 PP =  PEEK ( - 16384): IF PP > 127 THEN  POKE  - 16368,0: RETURN
63020  GOTO 63010
63990  POKE 216,0:KP =  PEEK (222)
63991  ONERR  GOTO 63990
63995  IF KP = 254 THEN  RESUME
63997  PRINT "";"";""
63998  CALL 54915
63999  GOTO 89
```

byte's address ($2000–$3FFF), and "CBADWN" means the routine that checks downward for the next screen byte (cba) inspection.

"A or B" refers to the fact that in FILL1 there are two different horizontal color bytes (FILL4 has four) and I have named one A and one B. If you put A where B belongs, it changes color, so take care.

"Y = 39" is a place where you hit the right edge of the screen while moving to the right (0–39 are the only possible X-byte column coordinates), and "Y = 0" refers to the left edge of the screen's byte column.

"For a hand-like figure with fingers pointing upward, five fills would be needed."

Seed address is the starting coordinate's screen byte and the "go-back-to" parameter in both X and Y coordinate questions. ">$3FFF" refers to the bottom edge of the screen and "<$2000" refers to the top edge of the hi-res page 1 screen.

The entire block that contains "address>$1FFF" and "address<$2000," etc., is called CBAUP since you are inspecting upward at this point. The entire block below the CBAUP block is the CBADWN block and contains "address>$3FFF" and other goodies. The block above CBAUP is the CBALFT block and the one above that is the CBARGT block (left and right respectively). Since right, left, up and then down is the sequence of inspection, you can see that this flow chart is to be read from top to bottom.

Next month's column is going to be a surprise—I'm not telling! ■

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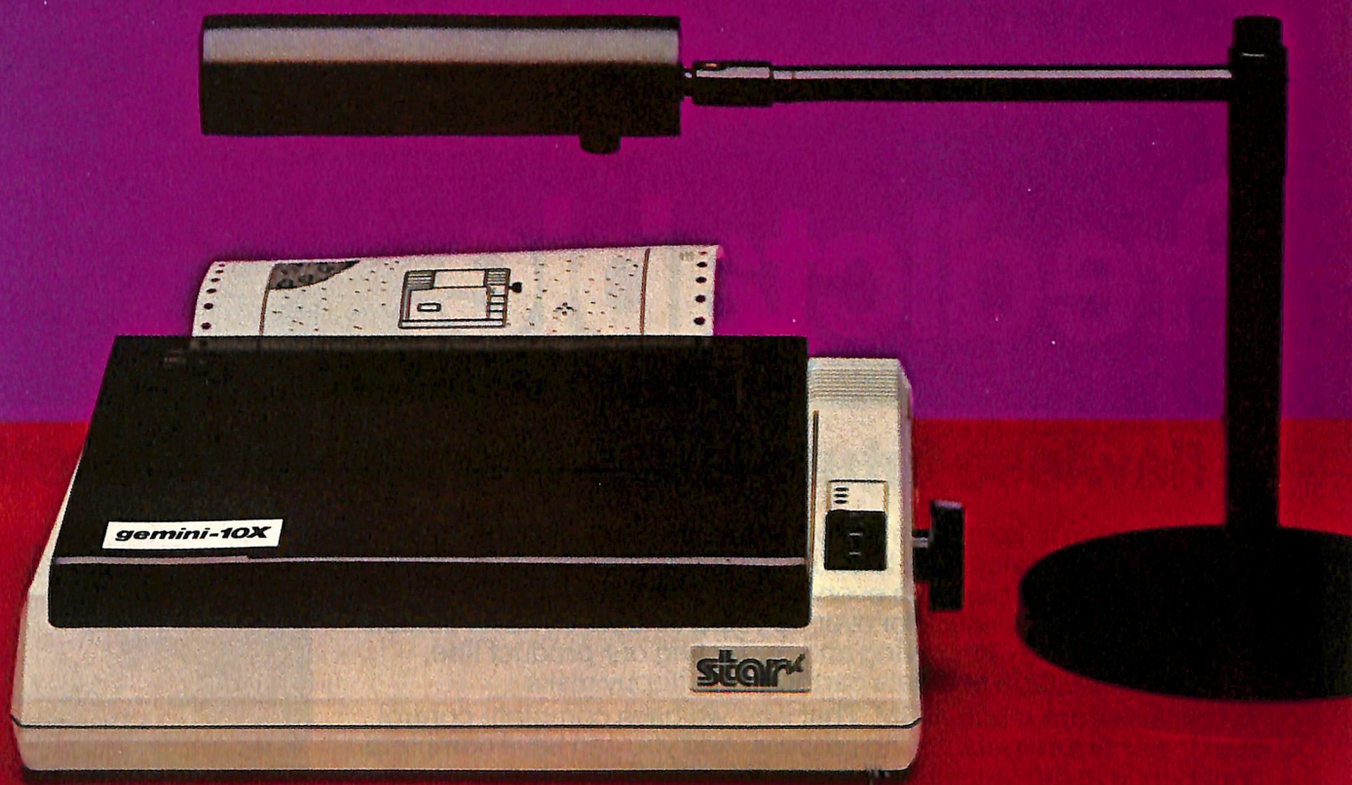

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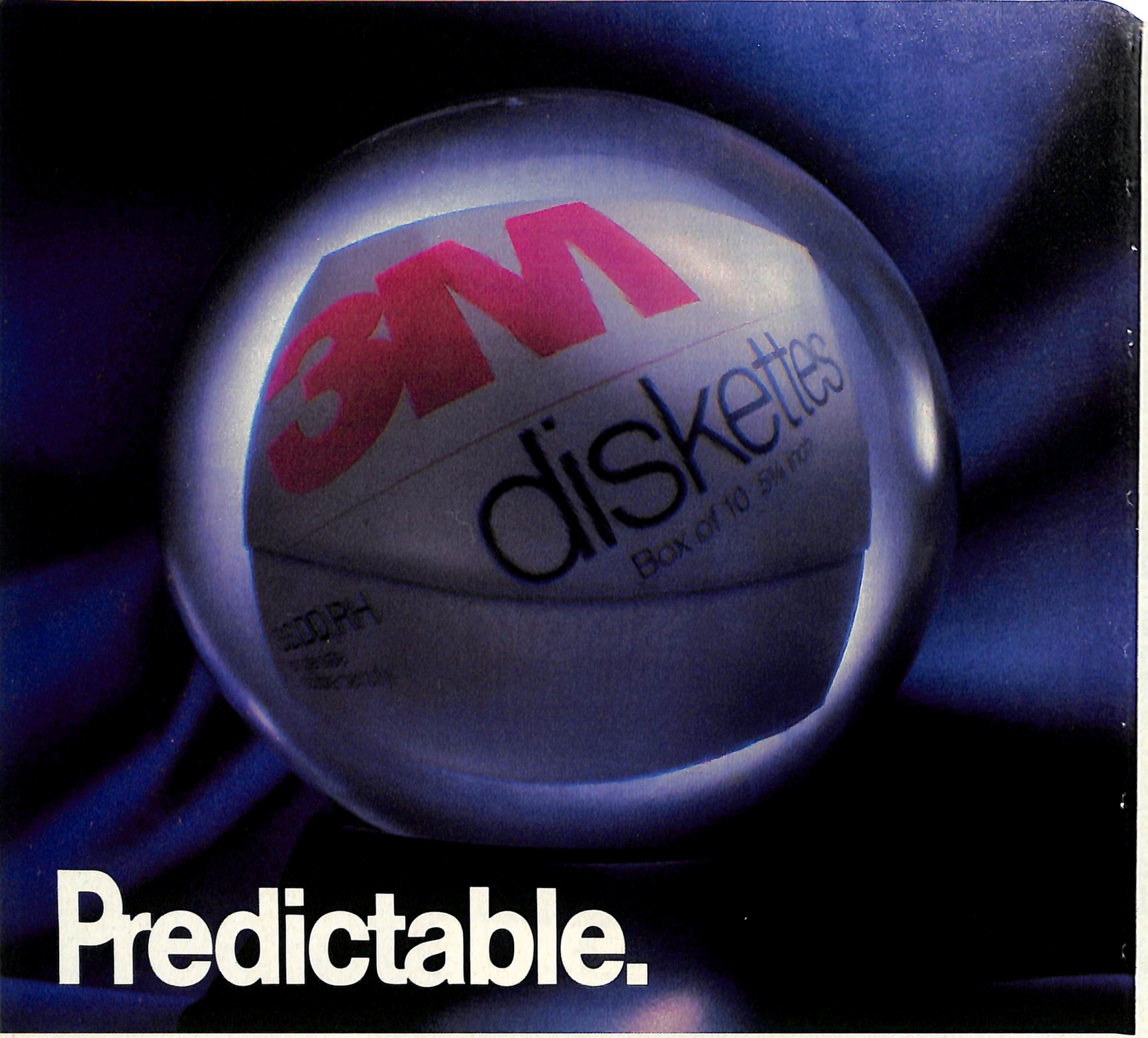

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Book Reviews

Enhancing Your Apple II, Vol. 1

by Don Lancaster

Howard W. Sams and Co.
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Softcover, $15.95

Solving mysteries and unlocking hidden doors is the stuff that adventure games are made of. It is also the theme of *Enhancing Your Apple II, Vol. 1.* Instead of fighting off pirates in a quest for buried treasure you'll confront the computer itself, with the reward being hardware mods, powerful graphics capability and a better understanding of the elusive Apple.

Pick up the typical microcomputer hardware book and you will find that it costs at least $10 and more often $20. For your hard-earned money you usually get warmed over A/D and D/A theory with a useful circuit or program occasionally thrown in. *Enhancing Your Apple II* is not typical. It goes beyond the obvious, digging into little known capabilities of your machine.

Of course, you can't master an expert level adventure until you've done time on the beginner and intermediate levels. And to make the most of *Enhancing Your Apple II* you must have paid your dues, learning the basics with books like *TTL Cookbook* and *CMOS Cookbook*, also by Don Lancaster. And you need to be ready to run with the ball when it is handed to you. Consider the book to be a hardware/software adventure where you are handed a fist full of keys and the rest is up to you.

There are eight enhancements in Volume 1. The typical project combines a simple hardware modification with machine language software, and perhaps a smidgen of Applesoft Basic. The projects range from a trivial quick disconnect for your TV/computer cable to a complex scrolling routine for high-resolution text displays. Each enhancement is presented in "unbundled" form. You gather your own parts and type in the listings, or you buy a kit and companion disk. The final element is a feedback card to communicate directly with the author.

Enhancement one is so easy that it sticks out like a sore thumb. Directions are given for building two kinds of "glompers." A glomper is designed to simplify the hookup between your Apple and a television set. Even the most dyed-in-the-wool software hacker should be able to build a glomper thanks to the step-by-step instructions and numerous illustrations. This is typical of later hardware projects, too. The author takes nothing for granted even including a list of the tools you'll need.

In enhancement two you get software control over the Apple's color capability by adding one resistor. It makes the color fringes that plague high-resolution text displays a thing of the past and allows you to switch back and forth between color and gray in lo-res. Enhancement two is like most of the rest; it deals with video. The author might even be considered a video fanatic. (His earlier books include *TV Typewriter Cookbook*, *Cheap Video Cookbook* and *Son of Cheap Video*.) If you don't share some of this enthusiasm then you probably won't get your $15.95's worth from *Enhancing Your Apple II.*

The cornerstone to three of the remaining enhancements is a field sync modification. This one-wire mutation lets you lock into the Apple's video timing. That way it is easy to mix hi-res and text, lo-res and hi-res, or even hi-res, lo-res and text all on the same screen. Field sync is so powerful that it was included on the new Apple IIe.

If you make the field sync enhancement then you'll probably want to follow the book's suggestion and add a glitch stomper, too. With these two modifications in place you can take full advantage of the chapter on "Fun with Mixed Fields" where the possibility of having 121 lo-res colors is discussed.

Field sync is optional for the two remaining video enhancements. One is Slow Scroll, a routine that makes hi-res text scroll up in eight small steps instead of one large one. The second is a utility that permits you to draw a solid background in any of 191 colors or 18,466,744,073,551,616 patterns. Neither enhancement requires hardware modifications, but Slow Scroll is designed to work with the High-Resolution Character Generator (HRCG) that comes with Apple's DOS Toolkit. Routines like Fast Backgrounder and Slow Scroll explain why good commercial software seems so much better than what the average hacker writes. Joe Average may never write a best seller, but now he can add some of the same polish as the professionals.

Chapter three of *Enhancing Your Apple II* is a guide to "breaking down and understanding someone else's Apple II machine-language program." Starting with the premise that good software is almost always written in machine language, the author goes on to explain how you can learn from other people's code and even make modifications to it. The effectiveness of Lancaster's serendipity-centered approach falls somewhere between the book jacket's claim of "fast and easy" and the time wasting orthodox methods for cracking machine code. The book's example centers around the DOS Toolkit HRCG program, but you can apply the same concepts to any machine code.

Amidst his lambasting of Basic and discussing the need for the "right attitude," Lancaster diverges to the subject of copy protection. And just as in the popular adventure game, The Wizard and the Princess, you'll come away with more questions than you started with. If you want to learn fundamentals buy another book. If you are looking for programs that you just type in and run choose something else. Laid back and at the same time opinionated, *Enhancing Your Apple II* is best suited to real-life adventurers. ■

Timothy Daniel
Oxford, OH

Rana's Elite Three

One of the great nuisances of using Apple's Disk II drive is the limited capacity of its disks. Nominally 143K bytes per disk, by the time DOS 3.3 is entered, through INIT, its usable storage is down to 127K. (If you have DOS 3.2.1 or earlier, you start at 117K nominal and wind up with 103K.)

This isn't a big deal if you're writing small programs or using your word processor for letters or short papers and can keep everything in separate packages, so to speak. However, if you're going to write a book or even a very long term paper, you'll find yourself using quite a few disks in the process. The average 8½-by-11 double-spaced page will use slightly under 3K bytes; therefore, you'll get only 42 pages on a disk before the DISK FULL message appears.

Using a CP/M word processing program such as MicroPro's WordStar will be even more annoying. By the time you've formatted a disk for CP/M and copied the three necessary WordStar file overlays onto it, you have only 47K (16 pages) left. Whenever you save a file with WordStar, it automatically creates a backup file for you on the same disk, so you really have room for only eight pages.

Several manufacturers have made life easier for those who need greater storage capability but would rather avoid the much larger 8-inch drives and have little or no use for a hard disk. Most have contented themselves with 40-track drives that give a nominal capacity of just under 164K bytes. They require some patches to DOS to use the extra five tracks when present and, at the same time, function normally when only 35 tracks are available. These patches, plus DOS, leave you with a disk storage capacity of about 143K—another seven pages in DOS, three and a half in WordStar.

To the rescue comes Rana Systems with their Elite Three drive and a four-drive-capacity controller. The drive lists for $849 and the controller for $145. The controller and drive together (in a package called the Elite Three Plus) are $949. All are advertised at discounts by many mail-order houses or can be obtained from Rana Systems (20620 South Leapwood Ave., Carson, CA 90746).

The controller card, drive, manual and Enhancer disk are well-packed in a molded styrofoam enclosure. The manual is clearly written (although typographical errors abound) and gives step-by-step instructions for installation of the controller and drive(s) and the use of the Enhancer disk which contains modifications to DOS and CP/M. These are necessary to use the 652K(!) bytes of storage available on the double-sided 80-track minifloppy drive when used with appropriate disks.

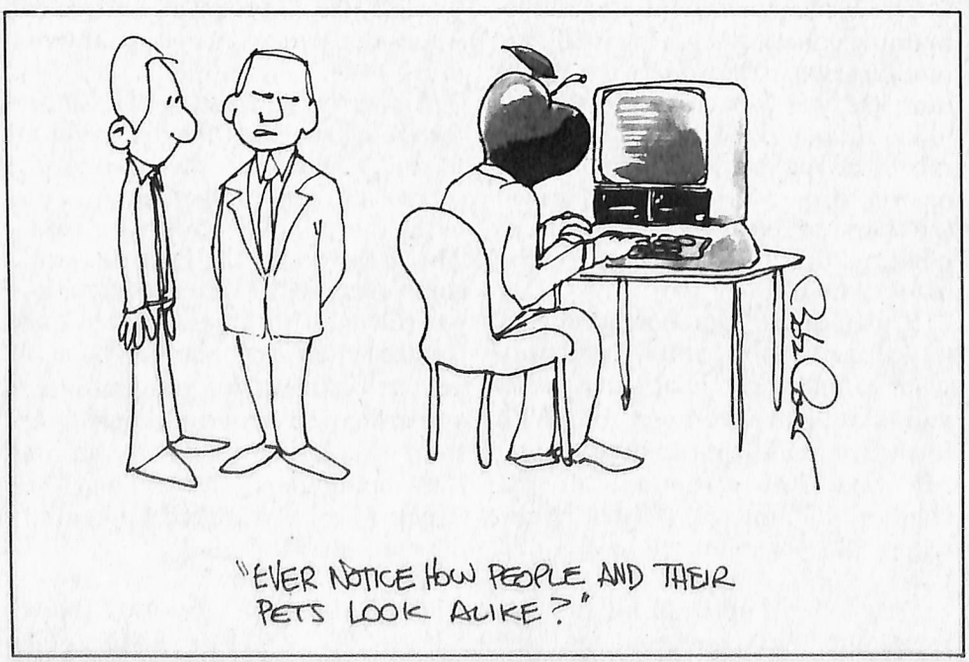
The controller card accommodates from one to four 5¼-inch disk drives, which may be any combination of Disk IIs and/or Rana Elite Series One, Two or Three. My Micro-Sci A2 works fine with it too. On a cold system boot, all these drives come up as Disk II work-alikes unless you use the Enhancer disk and modify DOS or CP/M (with a program called Profile) to recognize the increased capacity and speed of the Elite Two or Three. Disk IIs cannot be changed, of course, and neither DOS nor CP/M is supplied by Rana—only the modifications. It's compatible with Apple DOS 3.3, MicroSoft's CP/M 2.20B and Pascal 1.1 and will automatically boot both 13- and 16-sector disks.

The double-sided drive itself is larger than the Disk II (4.5 inches high by 6.75 inches wide and 9.25 inches deep). Rana has also incorporated a touch-switch at the top left of the drive (alongside the "busy" LED) that allows you to write-protect a disk without having to put a tab over the notch. This doesn't affect the status of a disk that already has a tab over the notch. A small LED, when on, indicates that the disk is currently protected. In its high-capacity, high-speed mode, the Elite Three is quieter than the Disk II, but otherwise it makes the same noises. Its track-to-track access time is 5ms versus Disk II's 18ms. It will work with a Disk II controller card but only as if it were a Disk II, a slow 35-track drive, so why bother?

I use Datalife (Verbatim) MD 557-01 disks which are double-sided/double-density and 77/80 tracks per side. They cost less than twice what I pay for MD 525-01 single-sided/double-density 40-track disks (which I use for my other drives) and each stores about five times the information.

The Enhancer disk contains five DOS utilities: Format, Clone, Profile, Enhance and FID Enhance.

● Format is used to initialize new



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disks instead of INIT. It enables me to format disks from 143K for my Disk II to 625K for my Elite Three.

- Clone makes exact copies of a source disk to a destination disk. It can also copy only the enhanced DOS from one disk to another.
- Profile lets DOS know what kind of drives are on the system and where they are located. Obviously, you can't put 652K bytes on a Disk II disk. Profile also allows you to specify the speed of the drive, since the Rana is faster than the Disk II.
- Enhance performs (only once) the other four enhancements to DOS.
- FID Enhance makes FID completely compatible with the entire Elite Series drive line and the four drives of the Elite Controller. It results in a file FIDR.

There are also five CP/M utilities on the Enhancer disk. Format, Copy, Profile, and Enhance are the CP/M equivalents of the DOS utilities. The fifth, SGLDrive is a special utility for those who have only one disk drive. It "persuades" CP/M that one drive is actually two, enabling some of the CP/M utilities (such as PIP) to be used with fewer problems.

I haven't had any problems in reading or writing from or to my Disk II or Micro-Sci A2. It has not, however, fulfilled all the hopes I had for its use with VisiCalc, which erases or overwrites Rana's enhanced DOS when it boots. I write about a thousand checks a year and enter them on a monthly basis into my VisiCalc program and allocate the amounts across 18 entry columns. Rana has no utility available to transfer VisiCalc onto the larger capacity disk so that I can store a year or more on one disk rather than the three disks I have required until recently. (I understand that Micro-Sci has such a utility for its A-70.) I used to get around this nuisance by copying each month's file to my high-capacity disk with FIDR. A few weeks ago I began using Artsci's MagicCalc, which can make use of the increased capacity, as well as having a number of enhancements not yet available to any but the users of the VisiCalc Advanced Version for the Apple III. Rana has plans to bring out its own spreadsheet package that will make use of the drive's features.

I have no problems at all with CP/M and the Rana modifications. Since I use WordStar more than any other program, I'm quite satisfied with my investment.

During the few conversations I've had with some of Rana's people regarding minor problems, I have found them to be both helpful and knowledgeable, although they don't always have the answers. For instance, they have advised me that, at present, only the MicroSoft version of CP/M is compatible with the added features of the drive. Neither PCPI Appli-Cards (4MHz and 6MHz) nor the new ALS card with CP/M 3.0 is yet supported, although plans to do so are in the works.

I would not hesitate to recommend the Elite Three to anyone needing a reliable, high-capacity disk drive. ■

J. D. Schwarz
Port Chester, NY

Red Ball

Wico Corporation's Command Control Red Ball arcade joystick is intended to interface with Atari, Commodore, Texas Instruments, TRS-80 and Odyssey computers and game systems. . . and the Apple II. As an Apple II peripheral it certainly leaves something to be desired.

In appearance, at least, the joystick certainly cuts a very distinctive figure. The body of the unit is black and red; the joystick shaft is of shiny chrome-colored metal topped by a bright red ball. A unit like this certainly stands out amid all the bland, white Apple accessory hardware.

The unit looks sturdy and has a nice solid feel. The joystick appears to be ruggedly built and capable of taking the kind of abuse and punishment that dedicated game players inflict. A white fire button is positioned conveniently at the top of the ball. It is

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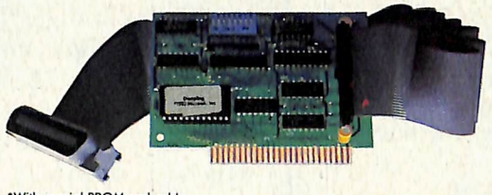

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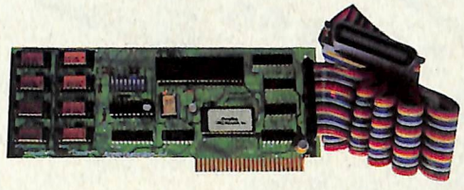

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TECHNOLOGY UPDATE

Circle 329 on Reader Service card.

perfectly situated for thumb firing. A second button is located in the body of the unit. A switch allows you to select which button you prefer to fire, though you cannot use both buttons simultaneously.

The shaft will center itself if you let go. In some situations this may be a good feature, but more often the self-centering means that the player must really concentrate to keep the stick under control.

This is not to say that the Wico unit proved completely inadequate to the demands of my favorite games. On my third try at Alien Rain I scored over 8,000 points (a good score for me) using the Red Ball unit, and I also performed admirably in Star Blazer, Nightmare Gallery and Threshold. I found that play was difficult at first, but as I became accustomed to the feel of the unit, my scores improved.

With only one firing button usable at any given time, using the Wico joystick is like playing with just one paddle. The limited play of its joystick shaft puts the Wico Red Ball at a disadvantage compared to the significantly superior control offered by the paddle dials and joysticks of units designed specifically for the Apple.

You have to buy a special adapter unit in order to interface the joystick with an Apple II. True, the adapter does allow you to interface two Wico joysticks simultaneously with your Apple, but considering the fact that it does not match or exceed the performance of units designed especially for the Apple, it does not seem worth the extra expense.

It's almost inevitable that hardware designed to interface with many different systems should reveal inadequacies. The claims of superior performance made by the manufacturer notwithstanding, Wico's Command Control Red Ball joystick offers no advantage over existing units designed especially for the Apple II.

The Wico Command Control Red Ball joystick, manufactured by Wico Corporation, 6400 W. Gross Point Road, Niles, IL 60648, lists for $34.95. The Apple II adapter unit lists for $21.95. ■

Brian Murphy
Fairfield, CT

Pipeline

There's a short supply of freedom these days. . . especially when dealing with a printer without a buffer attachment. Considering the snail-like cps rate of most affordable parallel interface printers, the wait to regain control of the computer can be agonizingly slow. To remedy this situation, Interactive Structures offers an intelligent printer buffer that will grow in memory size without rupturing your pocketbook. Their product is called Pipeline.

This review examines the PKASO Model Pipeline with 128K buffer memory (131,072 data characters). A 16-pin connection to the PKASO interface board runs to the Pipeline for data routing. The unit is housed in a low-profile metal box, painted in dandy yellow, with two toggle switches and two buttons. For other interface boards, the Universal model is available at slightly higher cost.

The base unit may be purchased with as little as 8K RAM, at reduced cost. Memory expansion is in 8K increments at $14 per RAM chip. Many 64K-by-1 dynamic RAM chips are compatible, and the documentation lists the manufacturers and the corresponding chip numbers of RAM chips that have been verified as compatible with Pipeline.

The documentation for Pipeline is entirely adequate. Consisting of nine chapters, an index and fold-out reference sheet, it guides the user easily through the buffer's operations.

The buffer can be used in any of three modes. In Bypass mode, data is sent from the computer as if Pipeline didn't exist. "First in, first out" (Fifo), the manner in which most buffers

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"Graphics, phrases, and other sections of information can be stored non-sequentially..."

work, transmits data to the printer in the same order as it is received by the buffer. Data is printed as fast as the printer can type and turns the computer back to the user for other endeavors. The third mode, Random Access Printing (Rap), is where Pipeline excels. In this mode, information is stored in "buckets," or pieces of data which can be called by name and printed. Graphics, phrases, and other sections of information can be stored non-sequentially and retrieved for printing in *any order* you specify.

In the Fifo mode, the "dumb" buffer operation, have the switches set to Fifo and Normal, with the interrupt and Erase buttons pressed simultaneously. Pipeline rapidly compresses and stores the information from the computer and sends the data to the printer as fast as it can be acted upon. Meanwhile, control of the computer is returned to the user. This flow of information can be halted by entering Bypass mode during Fifo execution. Perhaps while the previously stored information was being printed, you suddenly realized that an entire group of customers whose names began with "Mac" had been left out of the form letter. Access to your printer is immediately obtained by toggling the switch to Bypass and pressing the Interrupt button. Your deleted information is passed to the printer. When completed, the switch is toggled back to normal and the interrupt button pressed again. The buffer resumes transmission of stored data at the point of interruption.

Using Rap, a graphics program diagram can be inserted into a report, form letters can be duplicated using different demographics for each letter, entire documents may be composed from separate "buckets" of information. Interesting variations are possible, including type style changes, or even foreign language characters in differing areas of your text.

Pipeline begins the Rap mode in Fillup phase. No printing goes on during this phase. Information is either output via the computer keyboard or a program, such as a word processor. After Fillup, the unit enters the Print phase, where the information from the computer or buffer source is acted upon. Pipeline either passes the data to the printer, or acts on the Rap commands that are embedded in the data.

To create a bucket, you'd enter @c, where c is a one-character bucket name. This is the operand. If this were your first bucket, an @a or @A might be more appropriate. During fillup phase, the @c accompanies the rest of its related data into Pipeline's memory. During the print phase, you tell Pipeline to print bucket c. A memory search is underway, and when the designated characters are found, Pipeline prints the bucket.

Those who produce a great deal of computer-generated hard copy need a printer buffer to save time. I highly recommend Pipeline, not only because it operates in the conventional manner with Fifo, but because of its added attractions. Rap is highly efficient and can spice up dull reports with graphics presentations, spreadsheet statistics, and a change in font styles mid-text. The Rap commands are easy to use and don't deter experimentation. The convenience of portability between interface boards, affordability, and simplicity of use earn Pipeline high marks. ■

Hartley G. Lesser
Hayward, CA

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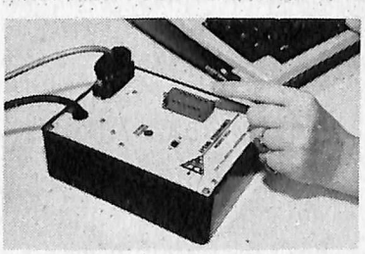

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Software Reviews

Apple II Flight Simulators

The Air Force and commercial airlines have spent millions of dollars developing and buying airplane and spacecraft simulators. Many of these simulators are run on large computers with elaborate and expensive picture systems. The same functions have been accomplished on the Apple II by two impressive and fun programs developed by EduWare and subLogic—Rendezvous and A2-FS1 Flight Simulator.

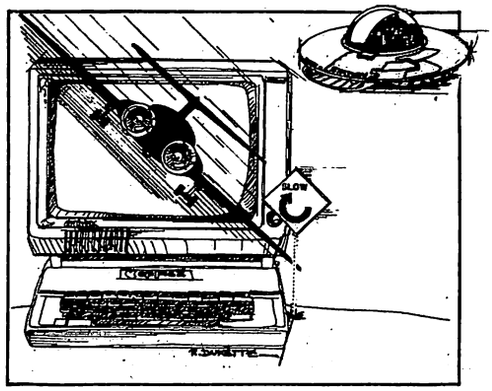
Rendezvous is a simulation of a spaceship flight from liftoff to a space rendezvous and docking with an orbiting space station. The controls of the spaceship can be operated with either the keyboard or a joystick. The flight manual consists of 26 pages of instructions, pictures and practice examples.

It was developed by Dr. Wesley Huntress of NASA. Besides being fun to fly, it teaches several concepts about the physics and mathematics of space flight.

It is not an easy program to master in only one sitting. The rules of flight are close to those that are encountered on an actual flight of a space shuttle or spaceship. My son and I found it took two evenings of trial and error before we could master the maneuvers necessary to perform a rendezvous with the space station.

The flight is divided into four parts: earth liftoff, orbital rendezvous, approach and docking phase. The first part of the flight starts with a picture of a spaceship at a launching pad. When you fire the engines, the spacecraft begins to rise until it has cleared the launching pad. A small screen on the left then shows the path of the spacecraft while you control the angle in which the ship is flying. A readout at the bottom shows the velocity in the down-range direction and in the upwards direction.

There are two staging events when an engine booster is released at each event. When the fuel from both boosters is gone, the picture on the screen changes to a view of the earth with an orbiting space station. Your



path is also shown on the screen. The job now becomes to match your position and orbit with that of the space station.

When this task is completed; the scene changes. There is a blinking dot on the screen that shows the position of the space station. You must now use the control jets on the spacecraft to fly within two kilometers of the station. I found that this sometimes took up to 30 minutes or more to do.

When you finally get within the required distance of the space station, the fourth scene comes on the screen. This is a picture of the space station you will approach and enter. I found this the hardest part of the flight. It took several tries before I could enter the docking bay and complete the mission. You have a limited amount of fuel for the entire flight.

Once I finished my first full successful flight, a rating of my performance was awarded. I was rated a "Swab," one step above zero, while my son achieved a ranking of "Captain," four steps above me.

A2-FS1 Flight Simulator is a complete small airplane simulation. The instrument panel contains dials for airspeed and altitude, and in addition, there are indicators for throttle setting, roll rate, elevator position, turn rate, heading, oil pressure, oil temperature, vertical velocity, tachometer setting and a radar display.

As you fly along, you see the ground and three different airports, a range of mountains and an enemy fuel depot. This is quite a bit of scenery and instrumentation to display on the screen of a home computer.

Your flight begins at the British air base. You must taxi the plane from the parking area to the runway. Then, after giving full throttle, the plane lifts off and you can see the ground dropping away beneath you. After putting the landing gear up, you can fly the plane anywhere within a six mile square and explore the civilian airport, the mountains or the enemy airbase. Loops and rolls are possible if you develop advanced flying skills. During the flight you must pay attention to your instruments and maintain proper altitude and airspeed. Control of the airplane is possible from either the keyboard or a joystick. Either method requires a bit of practice to master complete control of your plane.

The view from the front window is done in a line drawing mode. The ground is represented by a series of grid lines that divide the ground into one mile square areas. The mountains are a thin outline along the north edge of the grid. The British air base has two views. When the gear is down, the runway and parking area are shown. When the gear is up, the airports are represented by simple lines.

The enemy fuel dump is represented by a dot on the ground. The display is impressive when seen as a moving scene from the front window. All of the plane's controls are displayed at the same time.

After flying around and getting the feel of your airplane, you may become bored. At this point you may declare war on the enemy and attempt to bomb his fuel depot. He will launch five fighters to intercept you, and you must maneuver and shoot down the five planes before beginning a bombing run on the fuel depot. This is not easy since all five fighters attack with different strategies. I have not yet shot all five planes down.

There is little doubt when you have been shot down. A spectacular crash scene occurs. One point is scored for each enemy destroyed, two points for bombing the fuel depot with minimal damage and three points for bombing the depot with extensive damage. It takes at least 20 points to become an ace. This means

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Fast Disk Read	Array Rounding	USR Function Library
Fast Disk Write	Matrix Identity	Fast FP Run
Search	Matrix Transpose	Fast Brun
Sort	Matrix Multiply	Hex Poker
Delimited Strings (1D)	Matrix Inverse	Keyboard Scan
Rename	Array Randomize	FP Onerr Fix
Clear	Array VAL	RP Rnd Fix
Redim (no data loss)	Array STR$	FP Return Fix
Row/Column Add	Row/Column Delete	Fast Garbage Routine

&SCREEN — $49.95*

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An extraordinary collection of screen related routines, this disk is dedicated to text display and input for the Apple II/IIe. For starters, the Screen Generator/Screen Processor allows you to design an entire input or output screen format, and then have the entire screen executed as one or two statements. This is useful for reports, menus, data entry and more. In addition to the Screen Processor, the following routines are also included:

Input Using	Speed Control	Control Char Display
Input With Editing	Print Pause	Lower Case Input
4 Way Scrolling	Keyboard Click	Special Line Scroller
Musical Keyboard	Printer Control	Center/Justify Strings
Screen Dump	Print Repeat	Clear Screen
Memory Dump	Memory Disassemble	Cursor Mouse Routine

&SAMPLER I — $49.95*

Library Disk

This disk is a collection of a wide variety of useful routines written by Peter Meyer, author of the Routine Machine, and other professional programmers.

Number Input	Catalog Modifications	String Execute
If-Then-Else	Disk File Data	Write Protect Sense
Controlled Get	Catalog to Array	FP Program Erase
Print Hex	File Selector	Speed Up Applesoft
Print Binary	FP Disk RWTS	Modified Chain
String Character Strip	Disk Sector Map	Slot Drv Vol Select
String Left/Right Fill	Find Free Sector	Disk Catalog Sort
String Overlay	Mark Sector	Push Button Read
Shellsort (1D)	Disk R/W String	

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you will have to land, refuel and attack several times before you can gain enough points to become an ace.

A2-FS1 Flight Simulator is supplied on both disk and on tape. The tape version requires only 16K of memory but does not have the down view and several other enhancements. The disk version requires 32K of memory and has all of the enhancements.

A2-FS1 is manufactured by subLogic Communications Corporation, 713 Edgebrook Drive, Champaign IL, and sells for $33.50 disk and $25 tape. Rendezvous is $39.95 and is manufactured by Edu-Ware Services Inc., Box 22222, Agoura, CA 91301. ■

Floyd Berghout
Fruit Heights, UT

The Caves of Olympus

Having just returned from an adventure on the planet Olympus, a medium size planet circling a binary star, I thought I'd share some of my enthusiasm for the "trek" with you.

Howard W. Sams and Company, 4300 West 62nd St., Indianapolis, IN 46268, has provided a well documented alternative world in Caves of Olympus.

After booting the disk, I was given the choice of reading a short history/instruction scenario or charging headlong into the caves. There was further historical and biographical information available in the instruction manual. I read and studied both, and I suggest you do the same.

The manual suggests that you map your travels and moves. I couldn't agree more! The subterranean complex is intricate. If you plot out your moves, it will certainly aid in the development of a feeling of where you are.

Not only is Caves of Olympus well written and documented, it is well illustrated. As you journey into the caves, a touch of the return key flips you into a hi-res graphics display of the area in which you are located, complete with flashy special effects.

Included with the manual is a sheet marked "Open only in case of severe frustration." I reached that point after about 45 minutes of being blasted by Laren, melted down by fusion reactors, and disintegrated by combat robots. With a loud Argh!, I opened the sheet. It said, "How to Win the Game!" I think perhaps "How to get nowhere fast!" would be a more appropriate title. What I discovered was a few moves inside the caves that get you started without an immediate death. Don't worry... you will still have a long, complicated journey ahead of you!

After four hours of circling through caves with no end in sight, let me assure you I was frustrated and delighted! I finally completed my quest and solved the secrets of the Caves of Olympus.

Suffice it to say the Caves of Olympus, priced at $39.95, is an exciting adventure and should be tried by every computer gamer. ■

Jeffrey Mills
Columbus, OH

Frontline

If you want to use your brains as well as your reflexes in a computer game, then subLogic has just what you're looking for in Frontline. The documentation describes Frontline as a "strategy game that plays like an arcade game," a statement that holds true after many games.

Frontline simulates a battle between two armies. Units are symbolized on the high-resolution graphics screen by circles for infantry units, squares for antiaircraft guns and triangles for aircraft. The battle lines of the two armies face each other across a no man's land dividing the screen horizontally. No infantry or guns may cross, but attacking aircraft can make one-way attacks. Infantry and artillery units do their share in the battle by keeping up a steady stream of fire at each other across the boundary.

Your principal task is to wipe out all the frontline forces of the enemy in one of the three vertical sectors in which the two forces are divided. To do this you must dispatch reinforcements from a behind-the-lines depot to the battle front and launch air attacks. Keys ZXC dispatch antiaircraft guns to the left, center and right sectors, respectively; keys ASD send infantry to the appropriate sectors, QWE launch planes and 123 launch air attacks (a similar key set at the other end of the keyboard is available for use if you're playing against a human opponent).

Only one unit will be moved from the reserve to the front per screen update, which occurs at about one second intervals, but you can enter commands at a much faster rate and anticipate your tactical needs in advance. The computer will store the moves and execute one at a time per update. If you've made the right moves, you can buy yourself some time to think about later moves; if you've made the wrong guesses about your strategy, you'll have to live with the results.

No matter what you do, the enemy's reserves will continue to move up and attack. Keeping a careful eye on the enemy's aircraft, you have to time the arrival of your reinforcements to bolster sagging sectors and pace your airstrikes to exploit the enemy's weakness at the right moment. The timing ground unit attacks and the result of those attacks is determined by chance; your job is to put your units in the spot where they're likely to do the most good.

To get the neophyte started off on the right foot, the game offers introductory and easy levels of competition in the solitaire mode; the computer moves its units slowly and the player learns the rhythms of the game. At first you'll take a beating as your computer opponent's planes sweep down your front, slaughtering your units and posting points for the other side. As you gain experience, you'll learn how to protect your weaker pieces and how to determine when an air attack of your own is most likely to succeed.

When you think you're ready, it will be time to play in the competition mode. At this level, the enemy's units move more swiftly and air at-

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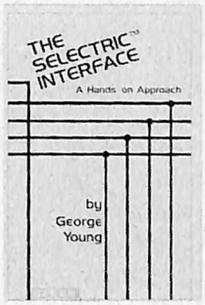

THE BOOK OF APPLE SOFTWARE—edited by Jeffrey Stanton, Robert P. Wells, Ph.D., and Sandra Rochowansky. Are you bewildered by the thousands of Apple II programs on the market? Here is the advice you need, with descriptions, ratings, and evaluations of over 500 of the most popular programs for the Apple II. You'll find reviews of business, education, game, and utility programs, and advice on hardware options and software vendors. BK1265 $19.95.

THE APPLE CONNECTION—by James W. Coffron. Connect your Apple to household appliances for greater control. With this book you will learn about elementary interfacing and about BASIC programming, including input/output techniques and devices, building real systems, and even analog to digital and digital to analog conversion. All programs are written in BASIC and no prior electronic knowledge is required. BK1262 $12.95

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MASTERING CP/M—by Alan R. Miller For advanced CP/M users or systems programmers who want maximum use of the CP/M operating system, this book takes up where the *CP/M Handbook* leaves off. It will give you an in-depth understanding of the CP/M modules such as CCP (Console Command Processor), BIOS (Basic Input/Output System), and BDOS (Basic Disk Operating System). It explains the incorporation of additional peripherals to the system, console I/O, the use of the file control block and much more. It also includes a library of useful macros and a comprehensive set of appendices. BK1263 $15.95

THE APPLE II USER'S GUIDE—By Lon Poole, Martin McNiff, and Steven Cook This guide is the key to unlocking the full power of your Apple II or Apple II Plus. Topics include: "Applesoft and Integer BASIC Programming"—especially how to make the best use of Apple's sound, color and graphics capabilities. "Machine Level Programming," "Hardware Features"—which covers the disk drive and printer, and "Advanced Programming"—describing high resolution graphics techniques and other advanced applications. Well organized and easy to use. BK1220 $16.95

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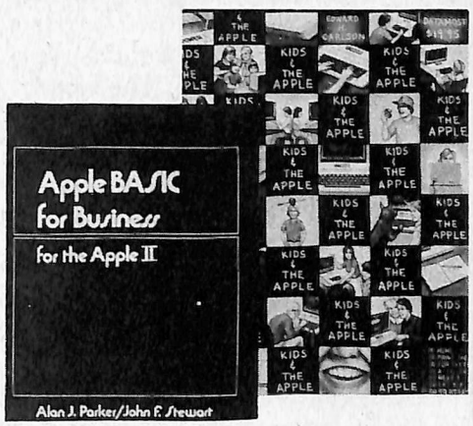

APPLE BASIC FOR BUSINESS: for the Apple II—by Alan J. Parker and John Stewart. Unlike most introductory BASIC books, this book uses files extensively. It is written specifically for the Apple II microcomputer with DOS Version 3.2. All programs presented are compatible with DOS Version 3.3. With the emphasis on problem-solving, the focus of this book is the point at which problem elements meet language capabilities. BK1247 $15.95

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ASSEMBLY LANGUAGE PROGRAMMING FOR THE APPLE II—by Robert Mottolz. This comprehensive, easy to understand introduction provides solid groundwork for getting started in assembly language programming on the Apple II.* Many subroutines written in assembly language are provided, and most explanations are shown with equivalent examples in BASIC. There's an excellent section on hexadecimal arithmetic included, as well as appendices for further study. BK1249 $12.95

APPLE MACHINE LANGUAGE—by Don Inman and Kurt Inman. APPLE MACHINE LANGUAGE builds upon your previous knowledge of BASIC, and teaches you the machine language in small, easy, completely illustrated steps. Following this guide, you will be able to write machine language programs directly, using the Apple System Monitor. Each new program is thoroughly presented in functional blocks, with sketches of how each step will actually appear on the video screen. Soon you will be entering and executing your own machine language programs, with predictable results! BK1248 $14.95

KIDS AND THE APPLE—by Edward H. Carlson. Whether you are a kid, a parent, or a teacher, this book is something unique. It starts with the bare bones introduction to programming, leads quickly to more interesting programs, and gives anyone who uses it a complete knowledge of Applesoft BASIC. Lively illustrations, notes to parents and teachers and questions for the reader are sprinkled throughout the book. While this guide is aimed at 8-16 year olds, adults will find it equally attractive as a beginning book for use the Apple personal computer! BK1253 $19.95

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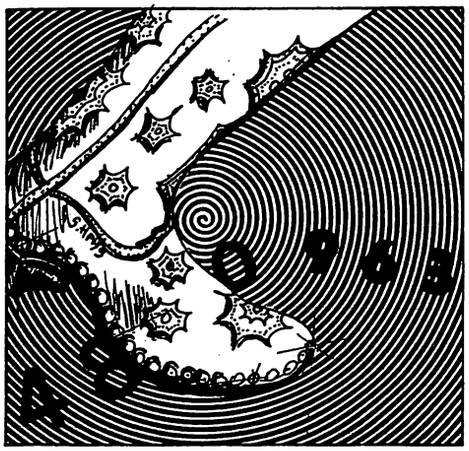

tacks are timed with more precision. The action is faster, but still, it can be mastered.

As your skills improve, and you gain an instinct for the strategy of the game, the moves will become more or less automatic. Learning to do this in the fourth and most challenging level of play, Hyper-War, takes extraordinary coolness, but even this rapid-fire mode is beatable. The victor, of course, is the player (or machine) who scores the most points.

The game is divided into five rounds. Each round begins with a full complement of troops and will end only when the frontline of one sector is completely wiped out. When you win a round, you are given points for the number of enemy troops scored and a 100 point bonus for having won that segment of the game. When you are on the losing side your score will be adjusted down by the number of units you have remaining in the reserve depot.

Of course, you won't be doing much counting as you struggle to keep up with your computer opponent in your first few games. But the feeling you get when you win for the first time, especially on one of the tougher levels, is sublime.

Frontline requires an Apple II Plus with 48K of memory and a disk drive with 3.3 DOS. The manufacturer, subLogic Communications Corporation, 713 Edgebrook Drive, Champaign, IL 61829, lists the game at $29.95. ■

Brian Murphy
Fairfield, CT

Rocky's Boots

Imagine, some rainy Saturday, sitting your eight-year-old down and explaining, "Today we're going to learn all about logic gates, flip-flops and some other circuit design elements. Then, we'll put together a few machines to accomplish some specific tasks. Furthermore, you are really going to enjoy this!"

If your eight-year-old is like mine, you would probably draw either a blank stare or mild hysteria. Take heart, there is a way of teaching both yourself and your eight-year-old a thing or two about logical circuit design. Rocky the Racoon is the guide to a program from The Learning Company with just such a purpose in mind.

Rocky introduces and explains computer parts such as And, Or and Not gates, clocks, flip-flops, delays, sensors, and so on. Of course, the boot for which the program is named becomes a part of the machines you get to design. Rocky's Boots is designed for the Apple II and II Plus. Although not required, a color TV or monitor greatly enhances the usefulness of the program.

Features and Operation

On booting the disk, a short demonstration precedes the menu. Pressing the spacebar displays the menu and control-G toggles the sound on. The program menu features six choices that Rocky suggests be played in order. A seventh choice (End) simply exits the program and provides an opportunity to boot another disk. When each of the menu choices is made, the cursor is moved from "room to room." Each room presents a new concept or activity. The user may move to another room or return to previous rooms at any time.

Option 1 explains How To Move. The I, J, K, M keys are used to move the cursor, which is shown as an orange box. If a joystick is connected to the system, it may be used to move the cursor. Escape returns you to the program menu at any time. In addition to moving, you need to know how to pick up and drop objects with either the spacebar or joystick button. Once the basic moves have been learned, an opportunity for practice is provided.

Item 2, titled Building Machines, introduces the concept of building simple machines using a combination of parts. Each of the parts (switch, clacker, boot, wire, green sensor, purple sensor and knife) are explained separately and then combined into machines. The user is shown how to combine and separate parts. Each of the devices is activated by electricity (shown in orange) provided by the cursor. The actual flow of electricity is shown for each of the devices except the knife, which is used only to separate parts.

Option 3 explains Logic Gates. Each of the gates are shown on the screen and explained in some detail. The user may practice with activating the various inputs to see the output effects. Of course, opportunity is provided for construction of machines for practice using the various gates.

Number 4 (Rocky's Boots) teaches the user to build machines that kick various target shapes. The kicking is done, by the way, by Rocky's electric boot. Targets have shapes, colors and numeric values. The first game, for instance, asks that a machine be built to kick only those targets with positive values. The user must attempt to design a machine that will allow him to collect 24 points per game. When that figure has been reached, a little hi-res Rocky does an Irish jig on the screen! Other game options may be selected and other machines may be designed using the devices discussed to this point. In the interest of authenticity, even a wire with a glitch is included. How true to life can you get?

In Option 5, flip-flops, clocks and delays are explained and illustrated. As in the earlier explanations, the user is provided an opportunity to experiment with the new concepts presented by actually using the devices in simple settings.

The pinnacle of this program is represented by Option 6, Rocky's

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VISA

Circle 309 on Reader Service card.

Challenge. This selection consists of fifteen rooms. The goal, of course, is to create a machine to win each of the games Rocky presents. The games range in difficulty from simple to downright complex. One of the rooms allows the user to make up any number of games by altering sensors, targets and so on.

Impressions

Rocky's Boots takes advantage of the Apple II's color, graphics and sound capabilities. But does it teach the concepts outlined? Indeed it does! As I mentioned earlier, logical circuit design never has been one of my strong points. This program certainly cleared up some of the misconceptions I held regarding the complexity of learning about the topic. My eight-year-old (naturally) learned the subject very easily and became quite proficient at designing some of the machines. As a matter of fact, it didn't take her very long to run circles around Dad!

Is it interesting? Definitely. Probably the best indication is my thirteen-year-old daughter. As anyone who has young teenagers around will tell you, it takes a lot to keep their interest. She was the first in the family to use Rocky's Boots and spent quite some time with it.

Summary

Rocky's Boots is an excellent method of learning the basics of logical circuit (computer) design. The combination of colorful graphics and well designed progression of concepts make this program well worth its price of $49.95. Just be sure not to tell your kids it's educational!

Rocky's Boots is published by The Learning Company, 545 Middlefield Road, Suite 170, Menlo Park, CA 94025. ■

Leslie Schmeltz
Bettendorf, IA

A.E.

The goal of A.E. is to wipe out stingrays from here to the ends of the galaxy. You start out in your own city and progressively work your way into the galaxy spirals, step by step. To be successful at each step you must wipe out three waves of attackers.

A Perfect Attack is one where you shoot down all the stingrays in an attacking wave. If only one of them escapes, you have to do it again. After you wipe out three stingray attacks, you go to the next level. How many levels are there? In the opening demonstration, I saw eight!

Circle 34 on Reader Service card.

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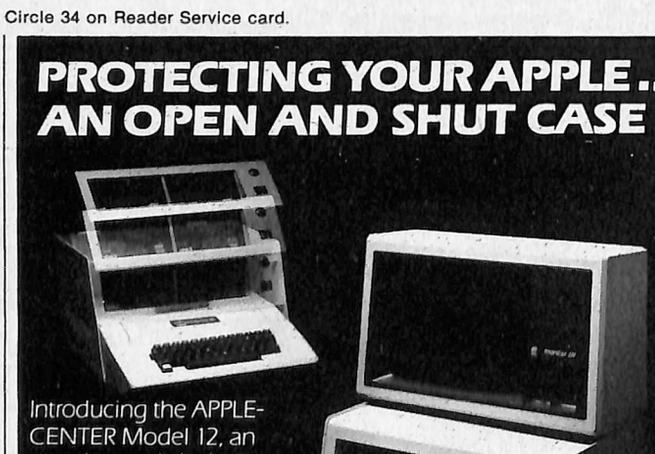

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Watching the stingrays can be fascinating. Fighting them is something else again. The patterns are beautiful. It's poetry in motion. The closer they get, the larger they are. As they fade into the distance, they dissolve into mere specks. Beautiful three-dimensional effect.

The stingrays come at you six in a line. Well. . . sometimes. They also come at you in two groups of three, each group in a dancing pattern. Well. . . sometimes. They also come at you. . . . See what I mean? But be assured, they come at you!

The three-dimensional graphics effects are beautiful and smooth in animation. The colors are good and work well.

A.E. is manufactured by Broderbund Software, 1938 Fourth St., San Rafael, CA 94901. Price is $34.95. ■

George Engel
Seymour, CT

General Physics

Cross Educational Software, Ruston, LA 71270, has assembled a fine set of physics software. The complete set consists of 11 disks—two of which are two-sided—that cover the major disciplines of physics.

They can be purchased individually, but when one considers that the price for the programs is only $200, it would be foolish not to have the entire set.

The complete set consists of:

Vol. 1 Vectors and Graphing, $10
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Vol. 3 Motion, $12
Vol. 4 Conservation Laws, $12
Vol. 5 Circular Motion, $15
Vol. 6 Thermodynamics $20
Vol. 7 Electricity and Magnetism, $12
Vol. 8 Optics (Side A)
Lasers and Diffraction (Side B), $20
Vol. 9 Atomic Physics, $30
Vol. 10 Solar System Astronomy, $30
Vol. 11 Stellar Astronomy (Side A)
Cosmology (Side B), $30

What makes these educational programs so unique is they are so beautifully made. Great thought and care has gone into every aspect: formatting, ability to write clearly-understood directions, user-friendliness, liberal use of graphics, and, yes, even a delightful sense of humor. That last is most evident in Cosmology II when running the program called "New Consciousness" that engulfs the viewer in a series of ethereal sights and sounds. You leave the screen with a fresh appreciation of the universe and its mysteries.

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space bar, or just reading the properly-paced text, there are interesting interludes of clicks, squeals, and zaps to rivet your attention to the screen! Rarely have I enjoyed reading text as much as with this series.

The main strength of all of the programs lies in their commitment to the user who will be learning (or reviewing) physics. In describing the Physics programs, Cross Software states, "The average level of the programs is intended for college freshmen. About one third are suitable for high school students and some are for advanced physics majors."

The problems that are presented prompt the viewer to have a paper, pencil and calculator ready. If the student wishes not to work the problems, he has the option of continuing without supplying a correct answer. This, in my opinion, is one of the program's greatest strengths. They can be used as a teaching tutorial or as a review at the discretion of the student.

The documentation is superb. Each disk is accompanied by an instruction book that clearly describes the entire program, offers suggestions on how to solve the problems, gives illustrations of some of the actual graphics, and lists one or more of the programs for student examination.

As an added bonus, each book concludes with useful programming information covering such topics as "Writing on a Hi-Res Screen," "ASCII Character Shape Tables," "Explanations of Program Structure," "Programming Notes on Paddle Graphics," and more. Hence, the user is learning more than physics. This is sincerely appreciated, for the 11 disks immerse the viewer in a total educational experience rarely seen in educational programming.

Each disk is subdivided into many subheadings with an uncluttered menu making the choices clear. For example, the program on Vectors and Graphing is subdivided into:

Vector Resolution
Dot Products
Vector Products with Unit Vectors
Vectors and Scalars Quiz
Vector Addition
Cross Products
Datagraph

Another disk, Electricity and Magnetism, has the following programs:

Gauss's Law
Ampere's Law
Resistor Combinations
Capacitor Combinations
R C Circuits
R C L Circuits
Lorentz Force

My favorite program is called "Molecular Motion and Pressure" on the disk Thermodynamics. The concept of molecular motion is in itself not particularly difficult to com-

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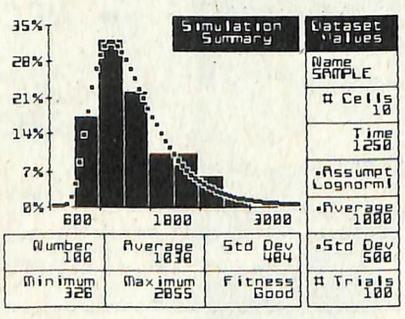
Monte Carlo Simulations



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PAT. PEND.

prehend, but its visualization is. The presentation here is unique and probably could not be done better on a blackboard or motion picture screen! A gas container, with molecules randomly moving about occasionally bumping into the pressure gauge, is shown in the hi-res screen. Of course, this produces one of those interesting little clicks present in all of the programs. The viewer can control not only the number of moleules in the container but also the temperature (in Kelvin degrees, naturally). Below all of this is a continuously moving graph plotting pressure against time. One of the selections is L for Less Molecules, which would have been more grammatically correct had it been F for Fewer Molecules!

There is hardly space in this review to completely catalog the 11 disks, but I added up the total subprograms on all of the 11 and came up with an astounding 68 separate programs! Even the Vectors done in lo-res graphics are just right for the subject! Without a doubt, this set is the best bargain in educational software.

The disks are not copy protected, and Cross expects buyers to make their standard backup copies and store the originals in a safe place. Very reasonably, the suggestion is made that schools wishing additional copies for learning labs should purchase "permissions" to make extras at 30 percent of the retail price. Because of the excellence of the programs, schools should honor this request. Perhaps this is one way to encourage other software companies to consider more educational programming—an area generally behind the rest of the industry that caters mostly to business and recreational demands. ■

James C. Benton
Lake Forest, IL

Transylvania

You're in the middle of a sandy field staring for the 33rd time at an obnoxious little goblin who won't part with anything more endearing than a Bronx cheer.

You would think that two reasonably adventure-wise adults with two alert teenagers could outwit a goblin just the way they did a vampire and werewolf. But not being able to solve things the first time, or the second, or the 33rd is the frustration—and the fun—of adventuring. And if a copy of Transylvania happens to pop into your computer someday, you'll have plenty of both.

There are several things I liked about this high-resolution graphics game and high on the list was the fairness exhibited by the authors. Quite frequently I found myself looking for all sorts of exotic solutions to problems, when, in fact, the solution was simple and straightforward.

You enter Transylvania at midnight and find yourself in a moonlit field facing a stump with some indecipherable writing on it. You soon learn that Sabrina (may the game gods have mercy on her) is in deathly danger. If you can't rescue her by 5 a.m. she meets a gruesome end. Time marches on—real time and game time—as you scurry about from scene to scene trying to find Sabrina and rescue her.

Mental and physical obstacles are

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* Hi-res screen ‡ 80-sector BASIC program
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thrown in your path, as are many clues and helpful objects. As an adventurer you too can meet an untimely end in Transylvania, but only if you insist on pressing your luck beyond the normal range of good sense.

Throughout the game you are limited to two-word commands—a verb and a noun. The program has a workable vocabulary, and it lets you know if it doesn't understand either the verb or the noun. At times it will even prompt you to do the correct thing, although for the most part you're on your own.

As with any adventure game, you are wise to draw a map from the outset. I devised a system to test each possible direction and move for each scene. The accompanying chart soon had all the clarity of an income tax form, so my daughter drew what she called an "easy map for idiots." I used it thereafter.

With pictures taking up most of the screen, you sometimes want an opportunity to look at your last move. By hitting return you get an all-text screen. At the top is a description of your location and your obvious options for a next move. The rest of the screen contains your recent moves. Hitting return toggles back to the picture.

If you are a beginning adventurer, accept a few hints: Examine all pictures carefully. Sometimes they contain clues not mentioned in the text. Besides the words given in the instructions, some other helpful words are move, look, read, wear and pull. Above all, experiment.

Transylvania provides a Save Game feature that allows you to stop when you get tired or when you are about to try a risky (stupid?) move and don't want to blow it all.

In short, it's a fine way to spend a rainy summer day. Transylvania is available from Penguin Software, 830 4th Ave., Geneva, IL 60134, and costs $19.95. ■

Greg Stone
Westport, MA

Battlesight

Battlesight is promised to be a "real-time tank warfare simulation on a hi-res three-dimensional battlefield." Being an old tank fiend in my high school days, I could hardly wait to play.

And there's a further enticement: "The player's view of the battle is through the M60's battlesight, and both turret and tread control are used to bring the main gun and COAX machine gun to bear on targets."

Circle 228 on Reader Service card.

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However, you are cautioned that "this is not an arcade game against relatively defenseless Klingons, but a realistic simulation involving well equipped and trained adversaries." At last, a chance to relive my high school glories!

Upon booting up Battlesight, you are presented with a hi-res front view of a tank that proceeds to take an unrealistic shot at your face. When the theme music (Gary Owens) finishes, the main menu is presented. You are allowed a variety of choices: seeing the instructions, getting Helpful Hints for Hopeful Heroes, playing Battlesight and quitting.

There are two other curious choices in the menu. One, titled The Soviet Threat, shows well detailed graphics and various Soviet tanks and helicopters. The other is titled Intelligence Report, and it lays out the scenario of the game. In essence, it is the start of World War III (let's hope that it only happens in games!) and you are in command of five tanks that overlook a ridge in a town in Germany. It is your job to stop the advancing enemy tanks as they pour through the pass.

What bothers me about these two sections is that they present this information in a style which too closely resembles propaganda. I don't want to start political and ideological battles, but I object to terms such as Red Horde. Not only is that term out of date but it is offensive. I am sure no one in this country likes being called an Ugly American.

Enough of that and on to the game. When Battlesight is selected from the menu you are asked to select a level of play from 1 to 5. Levels 1 to 4 give you progressively more enemy tanks in an attacking wave, while level 5 gives you "fire and forget" missiles as well as the ability to fire rapidly.

You are also allowed the option of night fighting. In this mode some of the attacking waves are invisible and simulate night conditions. You can spot the enemy only with periodic flashes of infrared light or by the light of an exploding shell.

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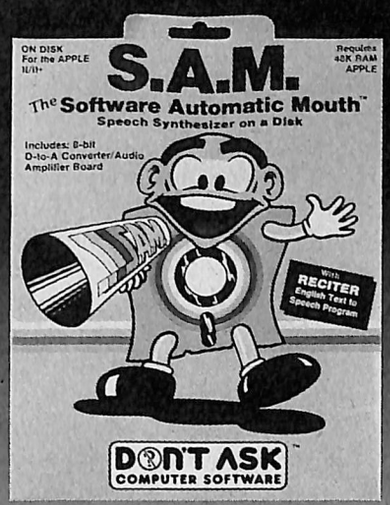

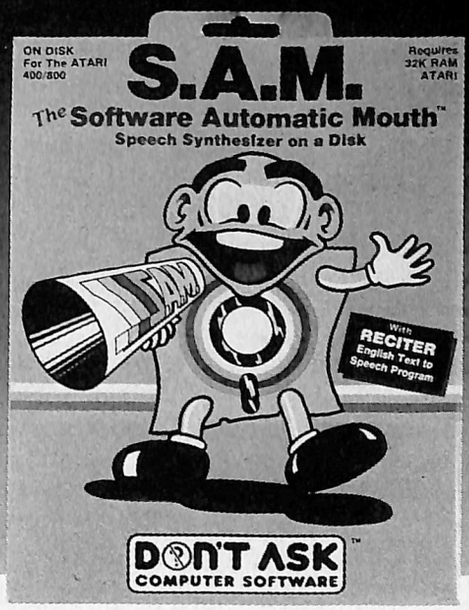

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S.A.M. programmed by Mark Barton.

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gun, fired by paddle 0 of a joystick or game paddles (the game requires one or the other), and a machine gun fired by pressing the space bar or just about any key on the keyboard. You also have mobility, of sorts. You can move the turret left, right, up or down by moving the joystick or paddles. The treads may be used to rotate you left or right. This is accomplished by pushing button 1 on the joystick and using the controller to choose the direction of movement. There is no real motion, however. You are always stuck on the hill looking down on the enemy. One interesting feature of the game is that you can repair your tank after you've been hit and damaged. Pressing R initiates a repair cycle but you are totally immobile and cannot fire. You may also halt the game at any time by pressing escape or quit altogether by pressing control-C.

The game itself is actually quite a disappointment. The graphics are poor. The background is a straight line that runs along the top of the screen rising to an inverted V in the center. I am not sure if this is a hill or a road. The foreground is similar and represents the overlook where you are stationed. An inverted V represents, in this case, a hill behind which you may hide. A cross hair moves between the two lines and is used to aim the main gun and the machine gun.

The enemy tanks, which come out of the background in various quantities, are poorly represented by a squared-off front view. The animation is far from smooth. At various intervals, as the tanks approach your position, they suddenly increase in size in an attempt to convey a sense of perspective. Flying in the backgound from time to time is a strange representation of an enemy airplane whose job is to report your position.

The idea of the game is to aim the cross hairs of your gun on the enemy's tanks and blow them up. It is fairly easy to aim at the tanks as they slowly hop towards you, and a shot is fired by pressing the fire button for about a second. You hear a whistle as your shot streaks towards your enemy, invisible to the naked eye. However, even though you seem to have aimed perfectly, a shot may not kill the enemy. Even more annoying is that it may take 15 seconds or so to reload your gun, while the enemy keeps coming firing. The time for reloads is supposed to get better as your crew gets more experienced at loading and aiming. In any case, I found the time between shots much too long and very annoying. Level 5 allows quick shots and makes more sense for this type of game.

If you get hit, several things may happen. Your treads or turret may get damaged, in which case your mobility is limited. If you get blown away, a new tank takes your place. When damaged, you may repair yourself at the expense of being a sitting duck.

When you have finished off a wave of tanks, a helicopter generally appears in the background. (At least it is supposed to be a helicopter; it looks more like a miniature character from Space Invaders.) You must either kill this creature or it will fire a deadly missile at you. In reality, I never missed the thing; the sloppiest aim is sufficient to score a hit. I forgot to mention that you are also supposed to kill the little plane that flies by during play. This is done by firing the machine gun. When you fire the machine gun all the action freezes and the screen flashes brightly.

As each round ends, you are presented with a score and report card which shows your overall performance and efficiency. You are informed of the size of the next round, and the game resumes with the press of any key.

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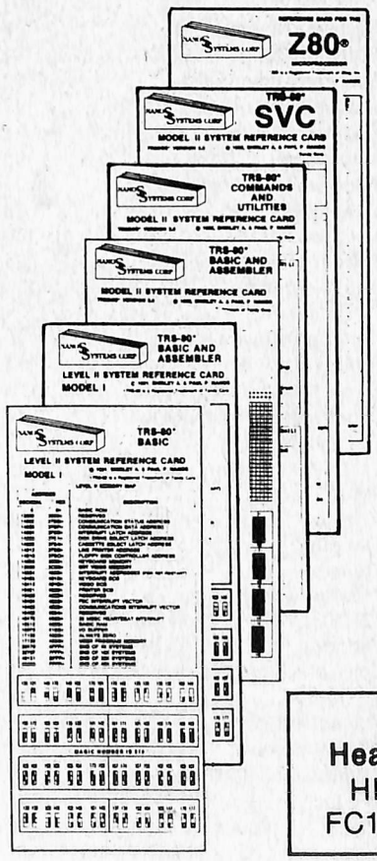

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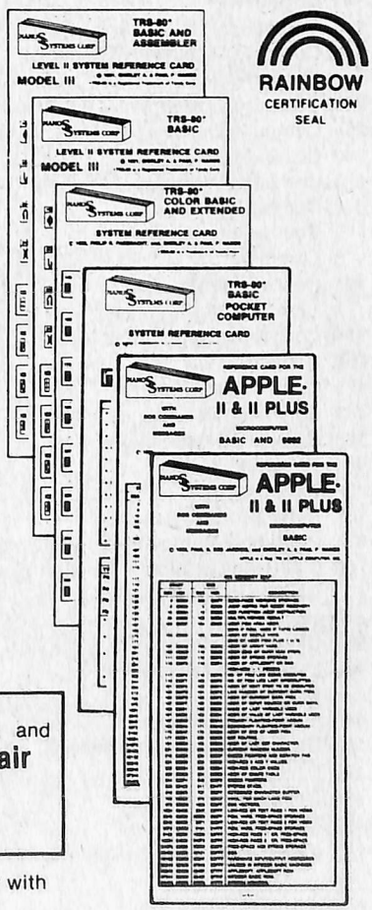

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tanks, or when five enemy tanks have escaped by flanking your position. High scores and names are recorded on the disk for posterity.

As you have guessed by now, I am not thrilled by this game. The graphics are less than third rate. They may have been acceptable in the early Apple days—but not now! The game is said to be as close to real life as the microcomputer will permit, but I find this statement hard to believe. The game is written mostly in Applesoft, which is not exactly one of the fastest implementations of Basic. This would partially account for the jerky graphics.

Since this program is unprotected, which is about the most positive thing I can say, it at least allows for modification. I removed the long delay required for reloading and repairs. This made the game slightly more interesting (about 15 minutes worth), but I think shooting Klingons would be more fun. Perhaps someone could take the ideas and algorithms of Battlesight and turn it into a workable and interesting game.

Battlesight is published by Versa Computing, 3541 Old Conejo Rd., Suite 104, Newbury Park, CA 91320. ■

Alexander Marx
New York, NY

The Mask of the Sun

Your name is Mac Steele. As an archeologist of some repute, your latest find has been stolen by a colleague. In retaliation (and as a demonstration of your own superior sense of ethics), you steal a Pre-Columbian amulet that *he* uncovered in a recent dig.

Research leads you to believe that the amulet is somehow related to a more valuable artifact: a solid gold mask known as the Mask of the Sun. The mask is reputed to have awesome magic powers. Your examination of the amulet reveals a secret compartment which, unfortunately, exposes you to a lethal gas. In order to prevent a lingering death, you must locate the Mask of the Sun and learn its secrets. Thus begins your quest.

The Mask of the Sun is a big adventure and is sold as a double-sided disk. It takes place in Mexico, primarily within three Aztec ruins. In your quest, you buzz from place to place in a jeep, explore pyramids, chat with inanimate objects and die much more often than you'd like. All action is displayed on the hi-res screen. Using Ultravision, Ultrasoft's special graphic adventure language,

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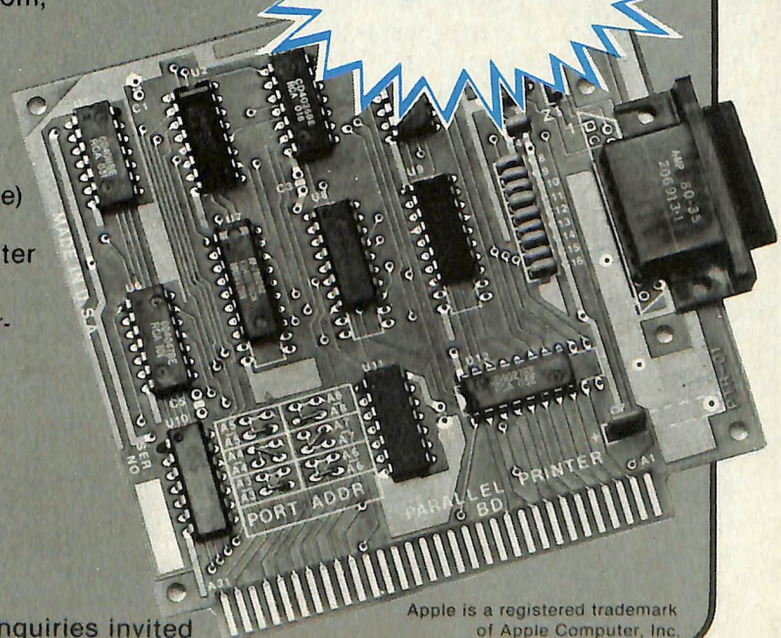

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pictures change almost instantly—no long waits for pictures to load or be "drawn." I think you'll be pleasantly surprised by the picture quality as well. Each scene is vaguely reminiscent of an Andy Warhol pop art painting—a series of interconnected dots that define each color and shape.

The parser (used by the program to interpret your commands) has some interesting features. First, you are not limited to two-word commands like Use Knife or Look Urn. Instead, commands may use multiple words for greater specificity such as Throw Knife at Left Guard. Directions may be abbreviated, in most cases, to one or two letters; S for south, NW for northwest, and U for up. All other commands may be cut to the first five letters. In general, the program will accept several variations of a command as being equivalent. For example, Go Door, Leave Room, and Exit might all be acceptable. In some instances, however, commands must use a specific string of words or contain essential key phrases in order to have any effect. Experimentation will show what is or is not acceptable.

In addition, Mask of the Sun allows multiple commands to be issued simultaneously, as long as they are separated by commas or periods. Or you can use the words "and" or "then". The only limitation is that they must fit within the 37-character text window. Each command is performed in the sequence issued.

The program includes a handy Save Game/Restore Game option. Whenever you reach what appears to be a critical point in the adventure—particularly when death seems likely—you may save the game on your own initialized disk. Play continues from that point. If you then die or desire to go back to see if you missed something, you just type Restore Game, insert your disk, and you have a second chance to do better (and a third chance, a fourth, a fifth. . .). Save and Restore take only a moment so don't be afraid to use them often.

The program incorporates some interesting use of timing loops. If you do not react appropriately within the

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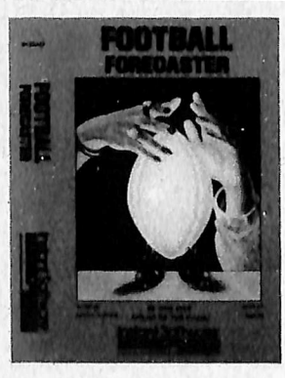

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time allowed, death often results. Expect to repeat such sequences many times before success is obtained.

The adventure is not easily solved. After a month of diligent play, I'm *still* not quite finished. The difficulty lies not so much in the puzzles to be solved but in identifying and getting the items needed at later stages in your journey. It's very easy to miss a critical object, so you must Look at, Examine, and Search religiously. Do not fail to map your progress, especially within the ruins. Without a map it is easy to make the same fatal turns over and over or to become hopelessly lost.

Whether you are new to adventures or are an old hand, you'll get many hours of pleasure and excitement from this one (with a liberal dose of frustration thrown in for good measure). Mask of the Sun is sold by UltraSoft, Inc. and can be purchased from local dealers. Price is $39.95. ■

Stephen Schwartz
Pittsburgh, PA

Cytron Masters

It's a shame there isn't an award for best game of the year. But as a reviewer that doesn't keep me from presenting a nominee. Cytron Masters is the most dynamic, exciting and challenging game that I have seen in a long time. It definitely deserves some sort of prize.

Unlike many of the currently popular games, it is not a Pac-Man copy, has no mazes, and doesn't require the destruction of cutesy aliens. Cytron Masters is a real strategy game for one or two players that is almost chess-like in execution.

In Cytron Masters wars involving human combatants have been eliminated. Disputes are resolved by trained Cytron Masters, warriors skilled in *symbolic* warfare. Each side appoints a master as its representative. Seated at computer terminals, the two Masters manage a number of Cytrons (cybernetic electronic devices) on a special battlefield. The object is to destroy the opponent's command center. Once this has been accomplished, the dispute is resolved in favor of the victor.

The Cytrons

Cytrons are mobile robots with limited intelligence. Each type of Cytron has a prime function that it performs without direction from the Master. Each moves across the battlefield at a uniform pace and is capable of receiving supplementary directions from the Master.

A Mine Cytron is an explosive device that destroys any enemy Cytron on contact. It is the only type of Cytron capable of destroying an opponent's command center.

The Bunkers function as shields or protective covering for other Cytrons. They cannot damage an enemy Cytron since they have no weapons.

Shooter Cytrons are armed with laser cannons. Each shooter scans for enemy Cytrons within a three-space radius of its present location. If one or more is identified, the shooter automatically fires at the closest Cytron. The laser fire never damages friendly Cytrons, even if the shooter must fire through one of its own to reach the enemy target. Shooters have limited protective armor.

Commander Cytrons are used by the Master to relay orders to the field. Commands are limited to the direction of march. An order to a commander is relayed to all Cytrons within three spaces of the commander's position. Commanders are susceptible to enemy attack. Each Master may have up to three commanders on the field at one time.

Unlike the other Cytrons, Missile Cytrons participate from the air, not on the battlefield. Once launched,

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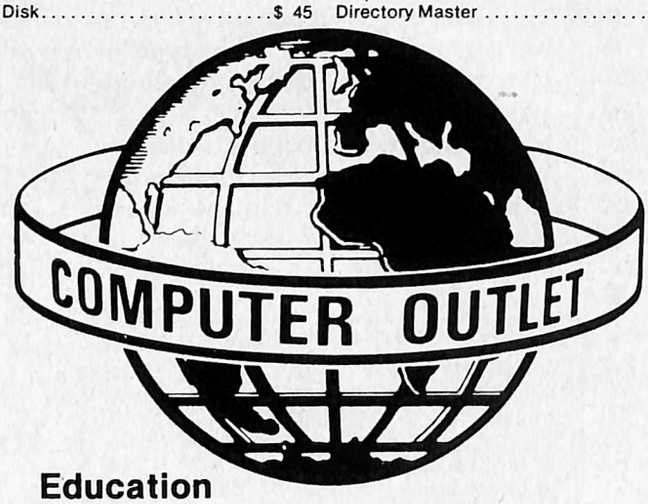

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——Software Reviews——

they may be directed by the Master to an appropriate target. All Cytrons—enemy and friendly—are destroyed within one space of the missile's detonation site.

Whenever a missile is fired, the opponent may fire an antiballistic missile; they pose no threat to Cytrons on the battlefield.

The Battle

The battle takes place in a large rectangular arena. Each Master positions his command center at one end. It is within this command center that all Cytrons are created and beamed to appropriate battle sites. All missiles and antiballistic missiles are launched from there as well.

Within the battlefield there are eight power centers—initially, four per side. The power centers provide the energy required to construct new Cytrons. As the game clock ticks, each Master is awarded an additional number of energy units according to the number of power centers controlled. They may be captured or recaptured by moving any Cytron through them. Control of the centers is obviously a critical part of the game.

All play is directed through the Master's game paddle or joystick. Creating a Cytron requires that a location, within the Master's half of the battlefield, be selected for the Cytron's placement. All Cytrons are beamed to their position on the field via a transporter beam. The construction of a Cytron expends a specific number of energy units from one (mines) to eight (missiles). Only antiballistic missiles may be created for free and only in response to an enemy missile attack.

All Cytrons are capable of receiving individual directions from the Master. These are limited to the direction of march or a command to self-destruct. The master may have up to 50 Cytrons on the battlefield at one time. Obviously, it is impossible to direct more than a few Cytrons at a time.

In solitaire mode the Apple always controls the left half of the field. You have the option of accepting a stand-

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ard battlefield setup or creating a special setup for each new game. This includes the placement of up to 15 Cytrons, the command center, the power centers on your side of the field and the initial marching orders for the Cytrons placed. If you like, these setups may be saved to a data disk for reuse at another time.

Play occurs at one of three levels: novice, master or grand master. Although not mentioned in the instruction booklet, play at the higher levels requires that you refuse the standard novice setup. At each level, the computer plays a progressively harder and more aggressive game. At the grand master level, the Apple is an exceptionally worthy opponent. Missiles are launched and detonated with accuracy and are almost impossible to defend against. In all cases, the battle ends when a mine successfully penetrates the command center. Points are then awarded to the victor according to his skill in the battle.

Special Options

Pressing any key during the course of the game suspends play. You may then press Q to quit or any other key to resume. Extensive additional instructions are provided on disk and may be reviewed at your option before each game. Because missile control is an important part of Cytron Masters, you are also offered a practice launch and detonate mode to familiarize yourself with their operation and control.

Evaluation

Other than occasional difficulty booting the disk, I have uncovered no defects in the game. Play is smooth and fast. The sound effects are appropriate, and they add excitement to the game.

Time to complete a game is seldom quick, but neither is it so long that you get bored or frustrated. Average time of completion is between 15 minutes and 1 hour, depending upon the selected skill level and your own acumen as a Master.

Cytron Masters definitely rewards practice. In the first few plays, don't be surprised if you are beaten soundly—even at the novice level! As you begin to develop playing strategies though, you will be defeated by smaller and smaller margins.

Cytron Masters has all the elements of a game with staying power. If you're looking for a game that requires more than eye-hand coordination, I think you'll be pleased with this one. In two-player mode, it should generate some exciting tournaments.

Cytron Masters is distributed on disk for a 48K Apple with Applesoft. The retail price is $39.95. It is published as part of the RapidFire line of Strategic Simulations, Inc., 465 Fairchild Drive, Suite 108, Mountain View, CA 94043. ■

Steven Schwartz
Pittsburgh, PA

Cyborg

It all started when I answered an innocent sounding ad by NASA II that offered a unique chance to help advance the human race. What they didn't bother to tell me was just exactly what a true Cyborg was: half human, half machine. You see, I now have a few added parts no other human has—including a second brain!

After I awoke from the operation and all was explained, I felt better. But no one else wanted to have anything to do with me, since I was no longer "human." Of course, my second "brain" was really nothing more than a sophisticated microcomputer. In fact, it, or rather we, became an integrated personality and learned to

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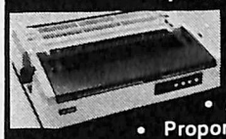

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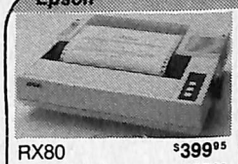

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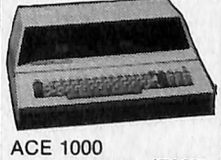

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function together. Our first mission for NASA II was supposed to be an easy introduction to life as a Cyborg. I was later to become an ace trouble-shooter for them, but something went wrong!

Thus is the introduction to the new, unique fantasy and adventure game from Sentient Software called Cyborg.

In Cyborg you start out not really knowing where you are or what you're doing there. You need to find food to keep your human half alive and must also find the right power sources for your nonhuman half. You do find that there has been an accident and your electronic partner has been damaged in transit and is not functioning at 100 percent.

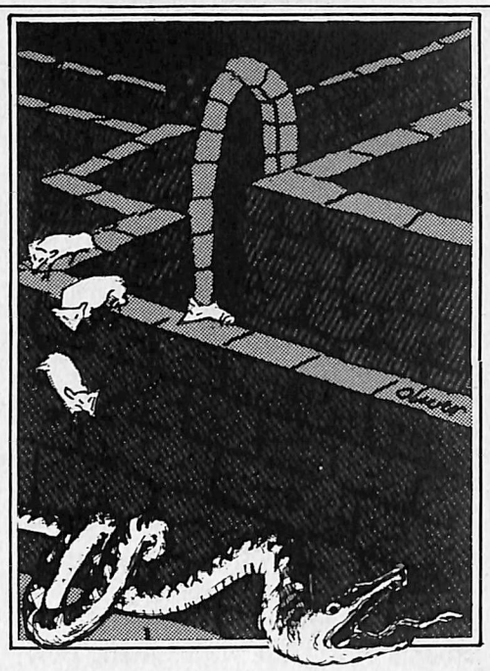
Movement is accomplished by the conventional two-word commands. You can move in ten directions and perform all other normal adventure actions such as manipulating objects and acquiring any needed articles as you proceed through the game. The real difference with Cyborg is the ability to call on your "other" brain for assistance.

If you've never played an adventure game before, one of the first things you need to do is be sure and have lots of paper and pencils handy. You can't hope to solve the puzzles you confront or remember which way is which unless you make a map of the world you're in. I normally start mapping the adventure as soon as it starts. One thing you will quickly discover is that directions can be confusing.

There is, of course, the ever present snake to dispatch, and don't forget how to map a maze! If you get in trouble, type "help" or ask for an opinion; I suspect your electronic partner knows more than either of you realize.

Michael Berlyn, the game's author, has blended in the elements of a first-rate fantasy adventure with the novel use of a partner in this game. Be sure you read the information section before starting this one! The information is necessary and will keep you out of trouble.

Now for a few brickbats. The game's parser is very good, but it is slow. The play speed is a little faster than the Apple version of Adventure,



but much slower than the Microsoft Adventure. Of course, the parser is also much more limited than what players of the Zork series are accustomed to, but I didn't find this objectionable. The one really glaring defect in this game is the presence of several misspelled words! Unfortunately, this is not the first time I have seen words misspelled in games of this type. How about checking things a little closer before releasing them for sale!

The puzzle confronting the player in this game is quite good. I spent a lot of time going back and rereading place descriptions and discovered there are many subtle clues to look for as well as obvious ones. The ability to constantly save your current game as you progress is a very nice feature of the game. In fact, it's recommended that you save your current situation *before* attempting anything dangerous. This will save a lot of time since you won't have to start all over at the beginning if you manage to get yourself (selves?) killed. In fact, the game is very nice about resurrecting you. I think I managed to get myself wiped out at least three times in the first hour I played the game!

You get the standard 90 day limited warranty on the game, but there is no mention of replacement after 90 days or what costs might be involved. Since there is such a high disk access rate on this type of game, I would hope the publisher has some sort of replacement policy available. The warranty is also only to the original purchaser, and a registration card is provided so you can notify Sentient of your purchase. Naturally the disk is copy protected, but I didn't notice any problems with the copy protection scheme and the functioning of the program. There have been occasions with some software where the copy protection method used can interfere with the normal functioning of a program.

All in all, this is a well programmed adventure and should provide many hours of entertainment. Sentient Software is located at 1280 Ute Ave., Aspen, CO 81611. Price is $34.95. ■

Peter Callamaras
New Carlisle, OH

Editor's note: According to Sentient Software, a new version of Cyborg, version number 3.2, has fill sentence and multiple sentence commands and runs at assembly-language speed. Misspelled words have been corrected and defective disks will be replaced for $5.00 after the 90-day warranty period. The older version of Cyborg will be updated for $6.00.

Boa

Micro Magic, a new software company, has slithered upon the scene with Boa, its initial entry into the Apple arcade fray. The object of Boa is to guide a giant pink boa constrictor through a series of mazes and recover the jewel stolen from your king.

Unfortunately, the mazes are populated by white mice whose duty is to prevent you from obtaining the jewel. They do this by biting off pieces of your tail. If the mice are too fast for you, you get eaten! If, on the other hand, you are quick and cunning, you may be able to eat the mice and move on to more complex mazes (with more mice) while getting closer to the jewel all the time.

The final screen of Boa pits you against roaming mice unencumbered by a maze. If you manage to eat all the mice and wrap your tail around

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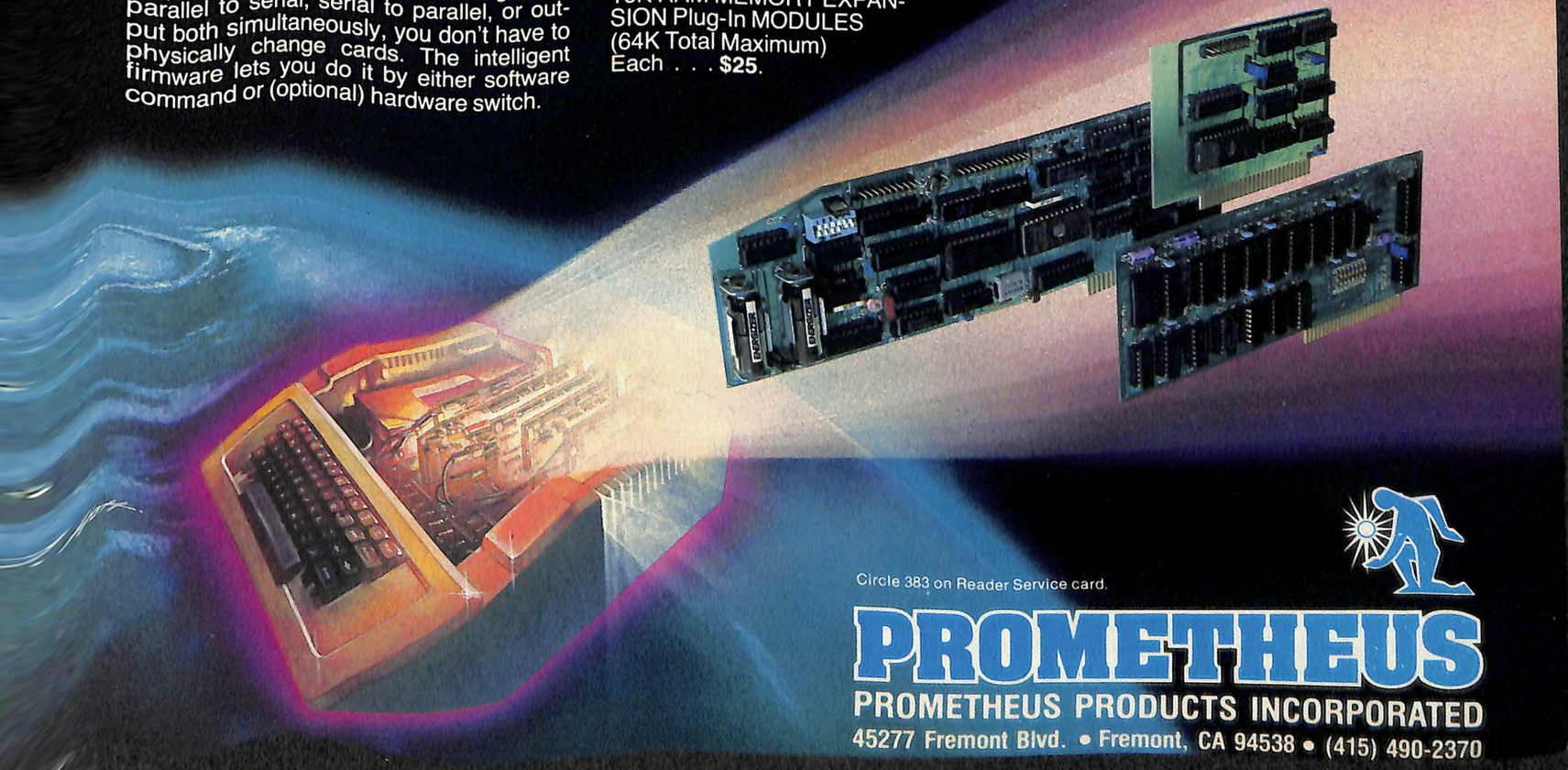

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the jewel in the center of the screen, you receive more bonus points, get to see the surprise ending, and win the game.

If the mice pass through the piece of magic cheese in the center of the maze, they become unusually large, ugly rats. Like the mice, they may only attack Boa from behind. If Boa collides with a rat head-on, 50 points are awarded and an additional tail segment is appended onto his body. Mice are worth only 10 points. Both mice and rats give an amusing little squeek as they are swallowed.

Bonus points are granted if you clear a maze quickly. The amount of points is based on a timer in the upper right hand corner of the screen, starting at 500. Hopping around the mazes is a frog named Frizzard. If you can move Boa close to Frizzard without eating him, you are instantly transported to the next maze.

Doesn't sound too difficult so far, does it? Well, Micro Magic apparently didn't think so either; they added a few more obstacles. First, both mice and rats are able to change direction whenever they like. Not so with Boa. He is too long to back up: a wrong turn can sometimes be fatal. Second, the mice are faster than you are and they're extremely hard to catch. Third, Boa occasionally gets stuck in the mazes and is unable to move. If a mouse or rat is behind you, Boa continues to lose tail segments until he is able to wiggle free. Finally, Frizzard is often more of an obstacle than a help. If you fail to "kiss" him (which happens at least 90 percent of the time), you cannot continue moving until Frizzard does. When this happens, it's not unusual to find that a rat is nibbling at your backside.

As more mazes are completed, rats and mice are added in increasing numbers. At times there are so many that they get backed up. When this happens, it is simple to move Boa in and swallow many of them. In the tighter, twisting mazes, the rats also get stuck because of their size. This too makes them easy pickin's.

In the early mazes and when you have eliminated all but one to three of the mice/rats, speed increases. In general, you should stay away from the twisting parts of the maze because they slow you down and allow the mice/rats to move in from behind. The easiest way to catch them is to pull a "change up" on them: establish a pattern that they will follow and suddenly pull out of the pattern, maneuvering Boa so he is closer to the mouse or rat than it is to you. When this happens, they tend to get confused and will often wander directly into your waiting jaws.

Since rats are the key to Boa's growth, it is often best to wait until the mice have undergone their transformation before eating them. If you fail to maintain a reasonable body length, you will be unable to circle the jewel in the final screen.

Boa may be played at any of nine difficulty levels; the higher the level, the more mazes you must clear before reaching the jewel. The game is configured for the keyboard, joystick, game paddle or the Atari joystick. A joystick is recommended.

The game is advertised as having a continuous musical background throughout the game. The sound effects may be successively toggled off by repeated presses of control-S. Features are also provided for pausing the play and for restarting the game prior to completion. The current high score is displayed on the title page.

There are several elements in Boa that could be improved. First, the continuous musical interlude could easily double as a new form of torture. Thankfully, however, it can be shut off. To get the full effect I encourage users to play at least one complete game with the music on. After my first game Janet, my wife, threatened me with divorce or dismemberment of the Apple if I ever left the music on again!

Second, it would be nice if there was some indication that shows progress towards the jewel screen. As it is, I can only tell you that many mazes must be cleared. In the upper difficulty levels, I counted over 30 completed mazes before the rats finally got me! Similarly, recording the difficulty level along with the current high score would be a plus. The difficulty level is important because it determines possible score. Completion of level 1 netted me under 10,000 points. However, losing at level 9 typically ended with about 18,000 points. By the way, if you'd like a score to shoot for, I finally completed level 9 with over 43,000 points!

Boa is a game that grows on you. Initially, I wasn't overly impressed; but after a few days of play it got to me. I found myself pushing for higher scores and becoming noticeably upset when eaten prematurely. For emotional reaction, I give it an A.

Micro Magic seems to have done the impossible. They've taken two particularly odious and real creatures (rats and snakes) and created an interesting, entertaining game. Boa requires an Apple II Plus and either version of DOS. It may be obtained from Micro Magic, Suite C, 908 Memorial Parkway, N.W., Huntsville, AL 35801. ■

Steven Schwartz
Pittsburgh, PA

Flight Planners

There is an excitement to the planning process the first few times a pilot plans a cross-country flight. He must draw lines on the sectional charts, measure distances and identify check points. But then, after the newness has worn off, the pilot longs for an easier way to do the flight planning.

The microcomputer is the answer and two programs are available for the Apple computer. I have been using them for flight planning for over a year and they have given me excellent results. The program developers have been helpful in phone conversations when I had questions and seem truly interested in backing their products and making them useful in the real world of flight.

Flight Planner

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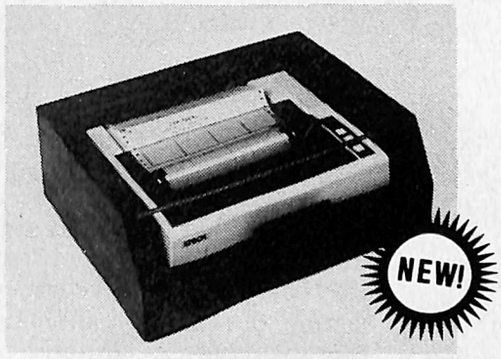

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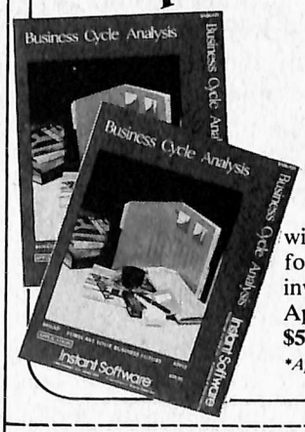

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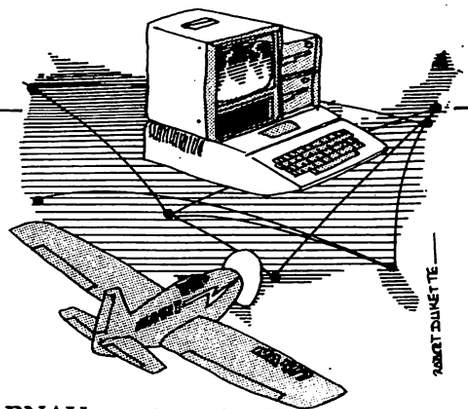

tional range radio aid to navigation). The route is planned as direct legs between VOR stations. An input altitude determines which VORs are used. Two routings are calculated—one to the left and the other to the right. Bends in the airway and restricted areas are not considered. There is also an RNAV (area navigation) option that generates the required RNAV information.

Let's go through the routine of using the Flight Planner. The first direction is to enter the approximate height above the terrain—such as 5000. Then you are prompted to enter the point of departure (the three-character airport designator) and the two letter postal abbreviation for the state. Repeat the procedure for the destination. You are asked if the entries are correct before the computer searches for those airports. If one or both are not in the encoded information, the computer will ask if you want to enter the location in latitude, longitude and magnetic variation. As many as 50 additional airports may be stored on the disk so you can enter airports that are not recorded in the airport's file of the disk.

You are asked if you want to designate the first and/or last VORs to take advantage of the preferred routes. The computer then reviews the navigational data and displays a list of states that border the flight route to help in selecting the approach plate books that you might need if you should abort.

The computer then displays the two routes that contain the VOR designator, the frequency and the distance point-to-point. You are asked if you want to compute a flight plan. If you answer yes, you will be asked to select one of the two routes and provide the wind direction, the wind velocity and the true airspeed (in nautical miles). A flight plan is computed that can be printed out. For example, you could choose to fly from Stillwater, OK, to San Antonio, TX, with the landing to be made at Stinson airport (SSF). You would then be asked if you want to plan the return flight and if you want the RNAV routing. An RNAV printout for the same flight would then be generated.

The printed copy is very useful in the cockpit to prepare several alternate routes and/or plan for a range of wind conditions. The pilot still must consult the current navigational charts as advised on the printout. An update service is available for a modest price. You can obtain this program from Jerry Kennedy, PO Box 358, Newton, IL 62448 for $59.95.

Ranchele Micro Flight Plan

The second program is the Ranchele Micro Flight Plan, distributed by AOPA, Product Sales and Service Division, 421 Aviation Way, Frederick, MD 21701 for $119.95. The program requires an Apple II with 48K, two disk drives and a printer for a hard copy.

This program is custom-made for your particular aircraft because of the use of weight and balance information, performance, the fuel capacity and the pilot's operating techniques (power settings, etc.). This data is provided by the pilot on a form then entered on a custom-made disk prepared by Ranchele (two copyable disks are provided with an example of a route and a test run). Update service is available at a modest price. The information requested, after the program is booted, includes: the departure and destination airports, the percentage power setting to be used, the desired altitude, the forecasted winds aloft for three altitudes (either individual stations or a global entry may be used), whether the flight will be VFR or IFR (and if an alternate is required), the proposed departure time (standard or daylight), the time zone of the destination, fuel on board, the number of people on board, their weights and seat locations, and how much baggage and its locations. The appropriate weight and balance calculations are done. Many pilots neglect this routine, but this program makes it so easy that using weight and balance calculations should increase.

The data for the route of flight must be entered onto a route disk. This includes entering the following data for each route segment: start-end points, route, heading, MEA (minimum enroute altitude), distance, station identifier and frequency, and wind station. This data (except for the wind stations) can be obtained from the appropriate Enroute Low Altitude chart. The Kennedy Flight Planner program can identify the shortest route and the VOR stations involved. Then the appropriate information can be obtained from the charts and entered in the Ranchele program.

Output of the Ranchele program for the same Stillwater-Stinson flight would include a flight log that is much more complete, with distances and times to go, estimated leg ground speed and MEA (minimum enroute altitude) indicated. The program calculates the fuel burn and efficiency at three altitudes (if the appropriate wind data has been entered). This allows selection of the most efficient way to fly. The other output generated is the FAA flight plan information, which allows easy filing of the flight plan.

These two programs complement each other and yield hard copies that can be used in the cockpit. They do not, however, claim to comply with the FAA required flight planning procedures, but they do make the task of flight planning much easier for the pilot. ■

Franklin Leach
Stillwater, OK

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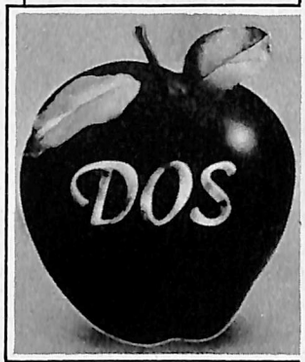

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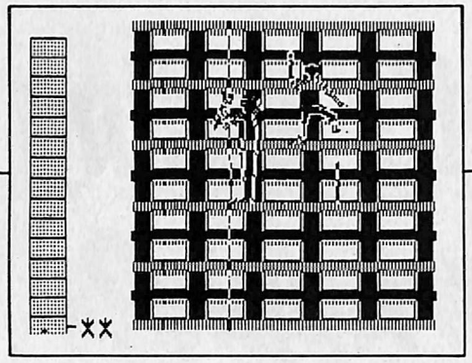

while avoiding birds that drop nasties, windows that close, a falling flower pot or two, an occasional earthquake, rising balloons, and what appears to be a window washer. All of the above can knock you from your precarious position if you're not careful.

Once you're above the twentieth floor, you have three chances for a mistake. A mistake will send you plummeting to the street where you will wind up a red, gory mess. Movement is controlled with the W, I, A and L keys and with the space bar. The W, I, S and J keys would have been more comfortable. I never did master the movement keys. You wind up with tendonitis after playing this game for an hour.

The animated figures in this game are not impressive. The climbing gorilla outline was too fast and jerky. The climber is a ghostlike figure that moves with difficulty.

On the other hand, a nice touch is the building's representation on the left side of the screen. Another cute touch is the score at the end of the game. You are given a rating depending on the level you reached. This would have been nice if it could have been saved to disk.

All in all, the game shows a lot of promise, but fails in the final analysis. The animation lacks substance and detail. If it wasn't for that, I'd recommend the game at $29.95 by Computer Programs Unlimited. ■

George M. Engel
Seymour, CT

Simple*DOS

Simple*DOS is not an addition to or a modification of the DOS commands, as you might expect. Nor is it a ready-to-use data base manager. It is a package that allows you to write simple programs in Basic—programs that can perform sophisticated file handling.

The Simple*DOS disk contains programs that define the structure of data files, enter or edit data in files, and create subroutines to access the files. You must write the programs (in Basic) that use these subroutines. There are also some programs to do other useful things, such as list and sort.

In general, Simple*DOS creates "systems" of up to three "files" and several user-written programs. A system may be totally on one disk, or the programs may be on one disk and the

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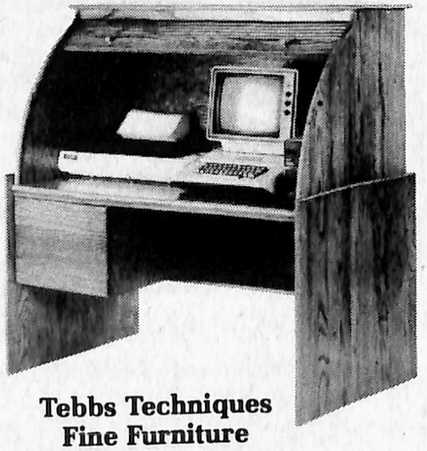

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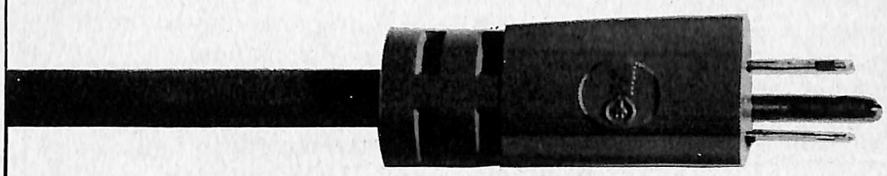

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files on another. I could not evaluate whether or not the three-file limit is a serious restriction.

The routines that Simple*DOS creates can be generated to access any file using one of three methods: sequential, random (by record number), or direct (by searching for a record in which the key field matches a value).

A record is defined as a collection of fields. Each field has a type: numeric, string, date or single character. The type will be checked at the time of data entry. A record may contain up to 80 fields.

A 32-page manual, which is the same size as a disk for convenient storage, contains a detailed tutorial example. No previous knowledge is needed, but an understanding of Apple EXEC files is useful. The tutorial is clearly written. The few confusing places can easily be deciphered if you are actually entering the data as the tutorial suggests.

The manual is not as well written for use as a reference. There is no index, and some terms are missing from a set of otherwise comprehensive definitions.

The change record procedure is not described in the book. It can be figured out if you do everything right, but the meaning of error responses is not always clear, and recovery requires starting over at the beginning. Also, this procedure waits for all the inputs before telling you that the first entry was unacceptable.

The manual assumes that you know how to describe database ideas to a computer and it describes only briefly the benefits of planning. Considering that you must start over from the beginning every time you make an error, planning may be even more important with Simple*DOS than it is normally. The Simple*DOS tutorial violates its own principle of planning by leading you through the system with no hint of where you are headed.

The producer of Simple*DOS, Softstalker, offers backup disks for 50 percent of the retail price, a high price to pay for a copy. However, the Simple*DOS disk is write protected, which may minimize the need for a backup. It is not clear if the usual copyright notice can be inferred to extend to systems created by Simple*DOS, or if it applies only to the disk provided and the manual.

One limitation of the system is, while user programs may alter the content of the records in a file, only the Simple*DOS program may be used to add records to a file. This can be overcome by inserting a sufficient number of records with blank or dummy data. But this data entry re-

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WHEN YOU'RE BAN

quires that you type in something for each field of each record.

Another limitation is the need for two disk drives to delete a record from a file. Records could be written with blank or dummy information and still appear in a listing of the file.

The change and add record program will not win an award for user-friendliness. It asks you for the content of each field, and then at the end asks if you wish to change anything. If you reply yes, it goes back to the beginning and lets you re-enter the complete record. An editor that allows individual fields to be selected and changed would be a useful addition to this package. Also, the program asks after each record if you want to add or change. This is an unnecessary step when adding many records.

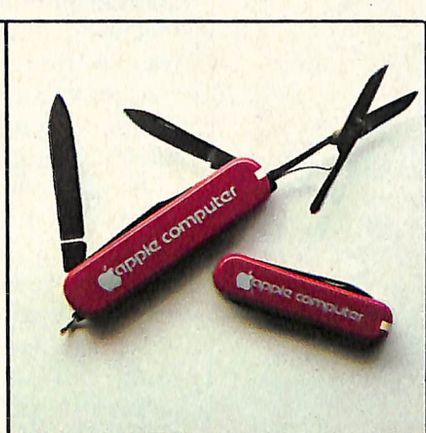
An unfriendly feature that surfaces in several places throughout the package is a lack of reasonable default assumption or entry. For example, in creating a program, if three files are not used, you have to enter NA in four places for each unused file. The program could assume that if the file name is not applicable, the parameters of the file are also not applicable. As a minimum, a return with no type-in should infer NA rather than being flagged as an invalid entry (after you have finished all the entries, not immediately, of course).

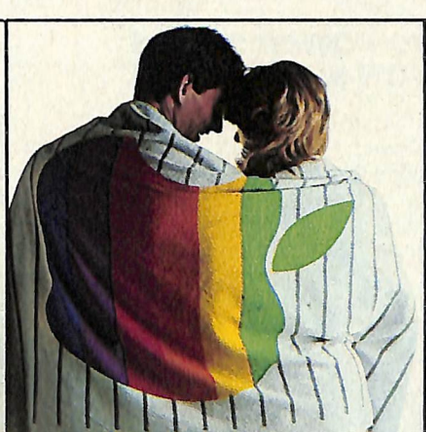
In several places Simple*DOS wastes time and effort by asking questions to which the answer can be inferred from what occurred immediately before. And it tends to confuse by asking questions that require alternate yes and no answers to get to the point where meaningful data is entered. Some of these questions are phrased so that the answer is not obvious. For example, when asked if you want to bypass instructions, you must answer no to get instructions and yes to skip them. In another case where you must answer yes, there are no more files. Also, if you do want to read the instructions, be prepared to read quickly. The program has predetermined how long you may look at each page.

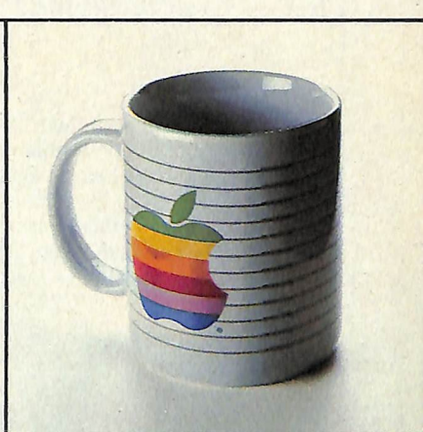
The subroutines generated by Simple*DOS have features to identify the name and structure of files and programs so that the program can access the correct file. The Simple*DOS system programs, however, do not make good use of that feature. They frequently ask you to insert a disk volume that is currently in the drive without first reading the ID information to check which disk is present.

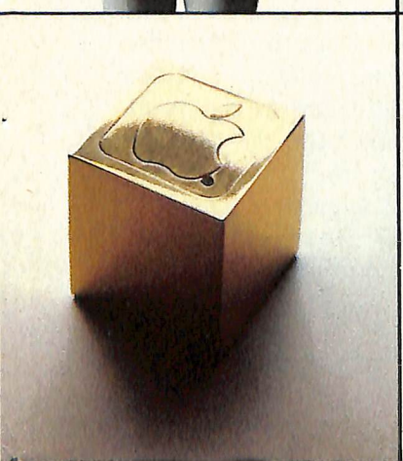
I have created files for an inventory control system. As long as the list of stock items remains fixed, the sys-

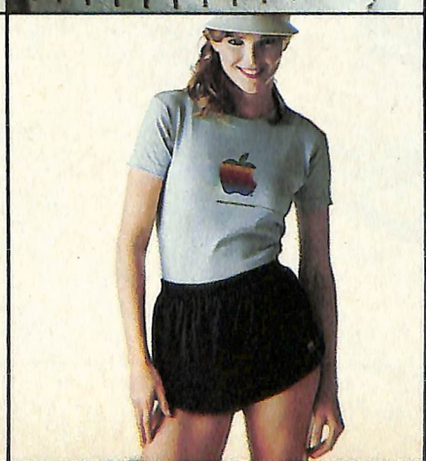
ANAS ABOUT APPLE:











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tem works properly. If I want to add a new item, however, I must use the inconvenient Simple*DOS programs.

After I do something to one file, Simple*DOS asks me if I want to work on another file in the same system. If I answer yes, it directs me to enter the system and file names. With only three files per system allowed, and information on the disk, it would be easy to display a menu of the file names defined to make the needed input more efficient.

A facility for defining blank records to be filled in by user programs or for copying data from user generated files would simplify system creation.

The program frequently asks which disk is in drive 1, slot 6. It could just as well read that itself and ask only if the required disk (or file) were not present. Files are assigned to a slot and drive for user program, but for Simple*DOS programs, the file being worked on must be moved to drive 1, slot 6.

I got one subscript error in the REORGANIZE A FILE routine, possibly because I was trying to fix an error in defining a file that had no records yet. The system does not appear to have any way of correcting a definition short of deleting the file definition and re-entering it.

I liked the idea of creating data base programs in Basic that will do exactly what I want them to do. But this package, while providing a number of useful features and concepts, has implemented them in ways that are unnecessarily difficult to use. Also, some features, such as a way to generate a file with many blank records, are missing from the package. This may prevent you from creating data entry programs with input verification and operator assistance specific to the data being entered. Simple*DOS verifies only that numeric data is entered in a numeric field. It cannot check if a number is in a certain range or has a relationship to another number.

The creation of files using data extracted from files not created by this system, and possibly from files from different systems created by Simple*DOS, may not be possible.

A more comprehensive treatment of file design would be useful to an uninitiated programmer, but this could evolve into a large book of several hundred pages. Those who know enough to design good file structures using this system may also know enough to design their own subroutines. The indexed sequential structure and direct access by key value are features that someone writing a program might desire, but probably would not take the time to implement.

Simple*DOS is produced by Softstalker, Box 689, Steamboat Springs, CO 80477 and is priced at $49.95. ■

Hub Seward
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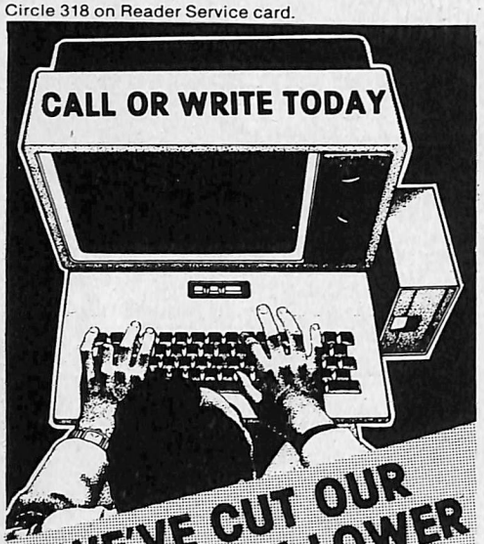
Circle 318 on Reader Service card.



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Apple-Aids Review, June

In the June issue the address of the manufacturer of Apple-Aids, Howard W. Sams and Co. Inc., was out-of-date. Their new address is 4300 W. 62nd Street, Indianapolis, IN 46268. The price of Apple-Aids was incorrectly listed as $69.95. It is actually $49.95.

According to Sams, a new version of Apple-Aids is now available free-of-charge to all Apple-Aids owners. This version corrects the shortcomings noted in the review in the Disk Copy and Edit Exec Files programs.

—the editors

Input Insult: Getting Around the Problem, May

Somebody goofed on the published listing of the No-Problem Apple Input routine in my Input Insult article in the May issue. It was the *old* version. Please include the following correct listing in your next issue. (See the Program Listing.)

Max McKee
Multi Data Service Corp.
407 Terrace St.
Ashland, OR 97520

New Products, June

In the June New Products section, it was stated that the Health-Aide nutrition and diet program contains 33 nutrient values for over 300 foods. It contains 33 nutrient values for over 800 foods.

—the editors

Indy, May

The text of my article, Indy, in the May *inCider* states that remark lines may be omitted. Because of an editorial error, it was not mentioned that unless appropriate changes in the GOTO/GOSUB line number references are made as well, the program won't run, since remark lines are used as targets.

Earl Johnson
2781 Juanipero
Medford, OR 97501

Applesoft Adviser, May

Please make note of the following corrections *inCider* inadvertently omitted from the Appointment Calendar program in the May Applesoft Adviser column.

- Lines 550 to 630 should read as follows:

```
550 FOR MM = 1 TO F - 1
560       IF F = 1 THEN 590
570       M = MM
580       X = X + FN ND(Z)
590 NEXT MM
600 X = X + FR(F)
610 X = INT (( X/7 - INT (X/7) + .05 ) * 7)
620 IF X = -1 THEN X = 6
630 RETURN
```

- Line 990 should end with J = 8 rather than J = 9.
- Line 9150 should loop from 0 TO 8 rather than from 0 TO 9.
- Line 9595 should read: 9595 RUN

If you are still having trouble getting the program to work, look for the following situations:

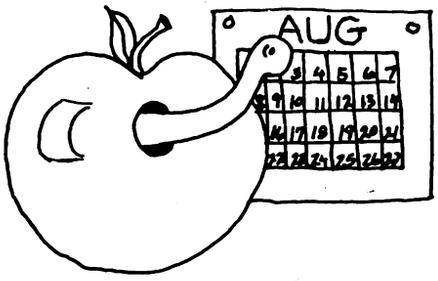
- Check to be sure that you have not used the number 1 in place of the letter I, especially in lines 9110, 9120, 9320, 9330, and 9340.
- Check to be sure you have used the word OR in lines 61 and 62. There should be only one 0 in line 61 (at the end, the number 30), and only one in line 62 (M = 10 near the end). All the rest are OR's.
- Check to be sure, in line 9460, that there is a blank space after the words READ and WRITE, before the ending quotation mark.

Dan Bishop
Custom Comp
PO Box 429
Buena Vista, CO 81211

```
52  REM SV & SH MUST BE 1 OR MORE
54  HTAB SH: VTAB SV:NN$ = ""
58  FOR I = 1 TO ML: PRINT ".";: NEXT : HTAB SH: VTAB SV
62 H =  LEN (NN$):V = SV +  INT ((H + SH - 1) / 40): VTAB V: GET N$:OV = V - 1:OH =  PEEK (36)
78  IF N$ =  CHR$ (34) THEN N$ =  CHR$ (98)
86  IF N$ =  CHR$ (21) THEN  HTAB SH + H + 1: VTAB  PEEK (37) + (H + SH < 40): GOTO 98
9065 SV = 7:SH = 13
```

Program listing. No-Problem Apple Input correction.

Calendar



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English Dept.
Montana State University
Bozeman, MT 59717
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contact:
Merryl Alber
New Alchemy Institute
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August 22–26
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Washington, DC
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American Association for Artificial Intelligence
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Second International Conference on Databases
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The British Computer Society
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September 12–14
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September 14–16
EUROMICRO 1983 Symposium
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7500 AE Enschede, The Netherlands
phone: (31) (53) 338799

September 19–23
9th World Computer Congress—IFIP '83
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contact:
IFIP '83
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F-75001 Paris, France

September 22–25
1983 Computer Showcase Expo
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Interface Group Inc.
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October 3–6
8th Data Communications Symposium (8th DataComm)
Cape Cod, MA
contact:
DATACOMM
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Silver Spring, MD 20901
(301) 589-8142

October 14–15
3rd Annual Computer Conference for Educators
Ball State University,
Muncie, IN
contact:
Dave Flowers
1230 S. Clinton St.
Fort Wayne, IN 46802
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October 17–19
8th Conference on Local Computer Networks
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contact:
Dr. Harvey Freeman
Architecture Technology Corp.
PO Box 24344
Minneapolis, MN 55424
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October 17–19
Symposium on Reliability in Distributed Software and Data Base Systems
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contact:
Dr. M. Liu
Dept. of Computer Science
Ohio State University
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Columbus, OH 43210
(614) 860-7766

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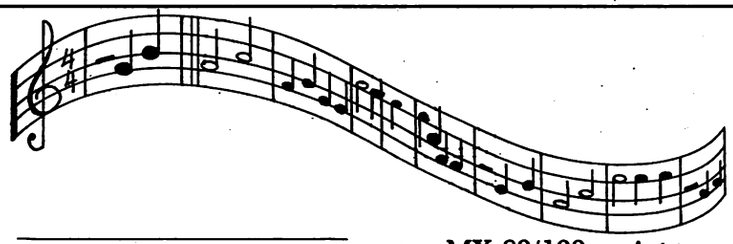
If you are organizing, or otherwise know of, an event important to Apple users, and would like it listed in the **inCider** *Calendar, please drop us a line at Pine Street, Peterborough, NH 03458. Include the name of the event, the date, the location, and the name of a contact for further information.*

—the editors

New Software



Early Games Music

Counterpoint Software Inc., Suite 140, Shelard Plaza North, Minneapolis, MN 55426, offers Early Games Music, an educational program for the Apple II Plus and IIe designed for children ages four to twelve.

Early Games Music is an introduction to the basics of music. Children are encouraged to experiment; they can play their favorite tunes or make their own music using the top rows of keys on the computer. Children can learn to perform melodies by playing Simon Says with the Melody Tutor. Guido's Quiz introduces children to the notes of the treble and bass clef staves and the keys of the piano. Price is $29.95. Reader Service number 443.

Printer Control

Pro/Pac Inc., 14925 Memorial Drive, Suite 105, Houston, TX 77079, offers a new dot matrix printer control program for Apple computers.

PCP (Printer Control Program) allows Apple users to set up their dot matrix printers to print bold face type, compressed characters and elongated characters. The program eliminates the need to enter strings of printer codes in order to change printing modes. The program is available for the Apple Dot Matrix Printer and the Epson MX-80/100 printers. Price is $24.95. Reader Service number 440.

Family Connection

Discovery Software, Box 68821, Indianapolis, IN 46268, offers The Family Connection, a genealogical program for the Apple.

The user may generate pedigree charts, family group sheets, record indices and many user-defined reports. Price is $99.50. Reader Service number 441.

Caverns of Freitag

The Caverns of Freitag is an adventure game set on enchanted islands where a dragon brings ruin and destruction.

The caverns on the islands are the dragon's castles, and loyal monsters serve as the dragon's guards. To restore peace to the islands, the player must seek out and slay the dragon. The player is armed with a sword, shield and 12 arrows at the start of the game, and he/she must combat serpents, flamebats, electric moths, burbleborts and other frightful creatures. Price is $29.95. Contact Muse Software, 347 N. Charles St., Baltimore, MD 21201. Reader Service number 448.

Jury Trial

Jury Trial is a courtroom drama game that pits the player's skill against the tactics of a scheming opponent. By questioning witnesses to a crime and objecting when your opponent tries to get favorable testimony, the player compiles points. Price is $29. Contact Navic Software, Box 14727, North Palm Beach, FL 33408. Reader Service number 445.

Sup'r Ledger

Sup'r Ledger is an accounting package that allows the Apple II and IIe to handle up to 200 separate accounts, 1400 transactions per time period and ten independent cost centers.

Sup'r Ledger generates seven reports: Working Trial Balance, Balance Sheet, Income Statement, General Ledger, Journals, Chart of Accounts and Budget Income Statement. Price is $300. Contact M&R Enterprises, 910 George St., Santa Clara, CA 95050. Reader Service number 446.

Anatomy and Physiology

Biosource Software, 2105 South Franklin, Suite B, Kirksville, MO 63501, offers Skeletal Muscle Anatomy and Physiology, a program designed for high school and college courses.

The program features illustrated text, high-resolution graphics, five tutorials with separate glossaries, multiple-choice tests and assessment of exam scores. Price is $49.95. Reader Service number 447.

Stock Portfolio

Smith Micro Software, Box 604, Sunset Beach, CA 90742, offers Stock Portfolio System for the Apple III.

The System tracks an unlimited number of stock options or bonds and maintains cash accounts such as CDs, money market or bank accounts. Optional access to the Dow Jones Retrieval Service is also provided. The system also provides record keeping, accounting and investment timing control aids. Price is $185. Reader Service number 444.

Crypto-Cube

Crypto-Cube, a word puzzle program, is a cube that rotates, each side exposing a grid similar to that found in a crossword puzzle. Players take turns uncovering letters to fill in the missing words.

Crypto-Cube encourages kids to expand their vocabulary as well as practice their spelling. They can also use the computer to create their own puzzles. Price is $39.95. Contact DesignWare Inc., 185 Berry St., San Francisco, CA 94107. Reader Service number 449.

Commodipak

Great Divide Software, Inc., 7475 West 5th Ave., Suite 303, Lakewood, CO 80226, offers Commodipak, a tool for technical analysis of the commodity futures market.

Commodipak generates charts, scaled for maximum resolution with user-defined indices. The range of these charts can be from 3 to 265 days. It utilizes technical analysis, descrip-

Circle 195 on Reader Service card.

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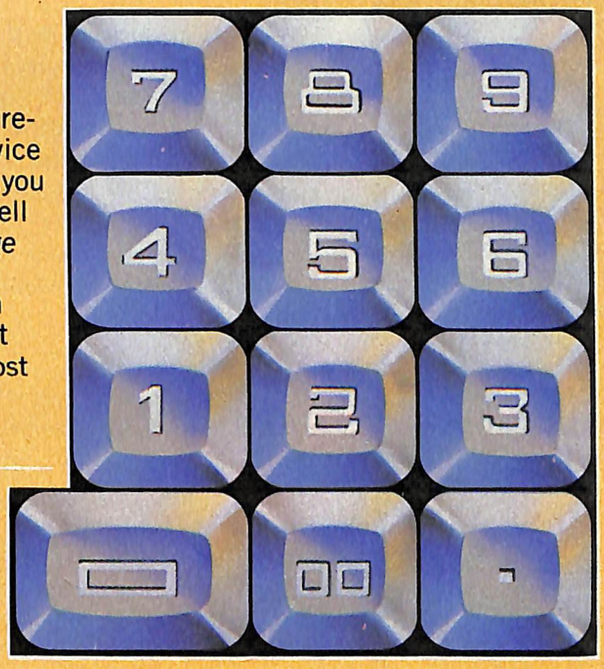

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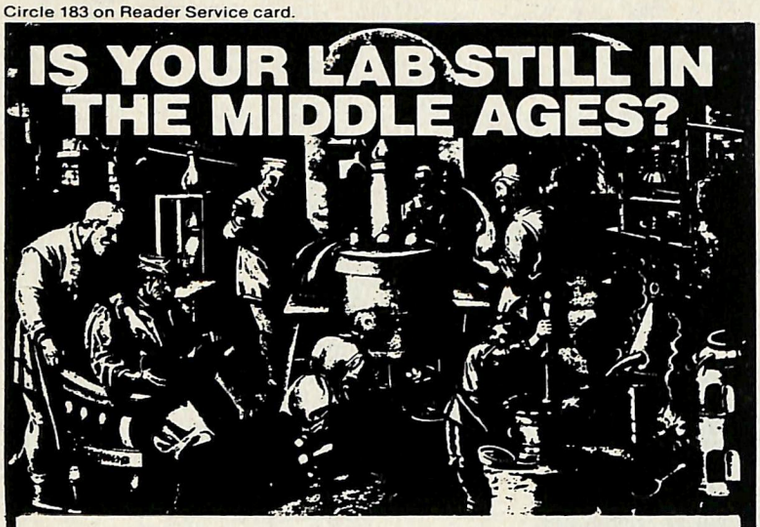

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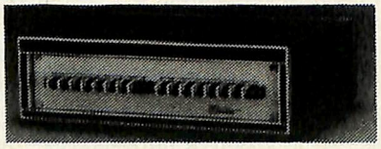

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tive statistics, differential calculus and filter theory in resolving a time series model into its component parts.

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Money Tool

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Quantitative Comparisons

Program Design Inc., 95 East Putnam Ave., Greenwich, CT 06830, offers Quantitative Comparisons, an educational game for the Apple II.

The program reviews the principles that form the basis of mathematics from beginning arithmetic through elementary algebra and plane geometry. The program is designed to help students prepare for the Scholastic Aptitude Test. Price is $26.50. Reader Service number 454.

Loan Analyzer

Simple Soft Inc., 480 Eagle Drive, Suite 101, Elk Grove, IL 60007, offers QuikCalc Loan Analyzer, a program for loan and mortgage analysis.

Calculations show complete amortization schedules, effective interest rates, interest paid between dates, the impact of loan charges and the effects of an early loan termination. The program calculates unknown variables such as loan amount, loan term and loan payment. The Loan Analyzer works in conjunction with popular spreadsheet programs, including VisiCalc. Price is $99.95. Reader Service number 455.

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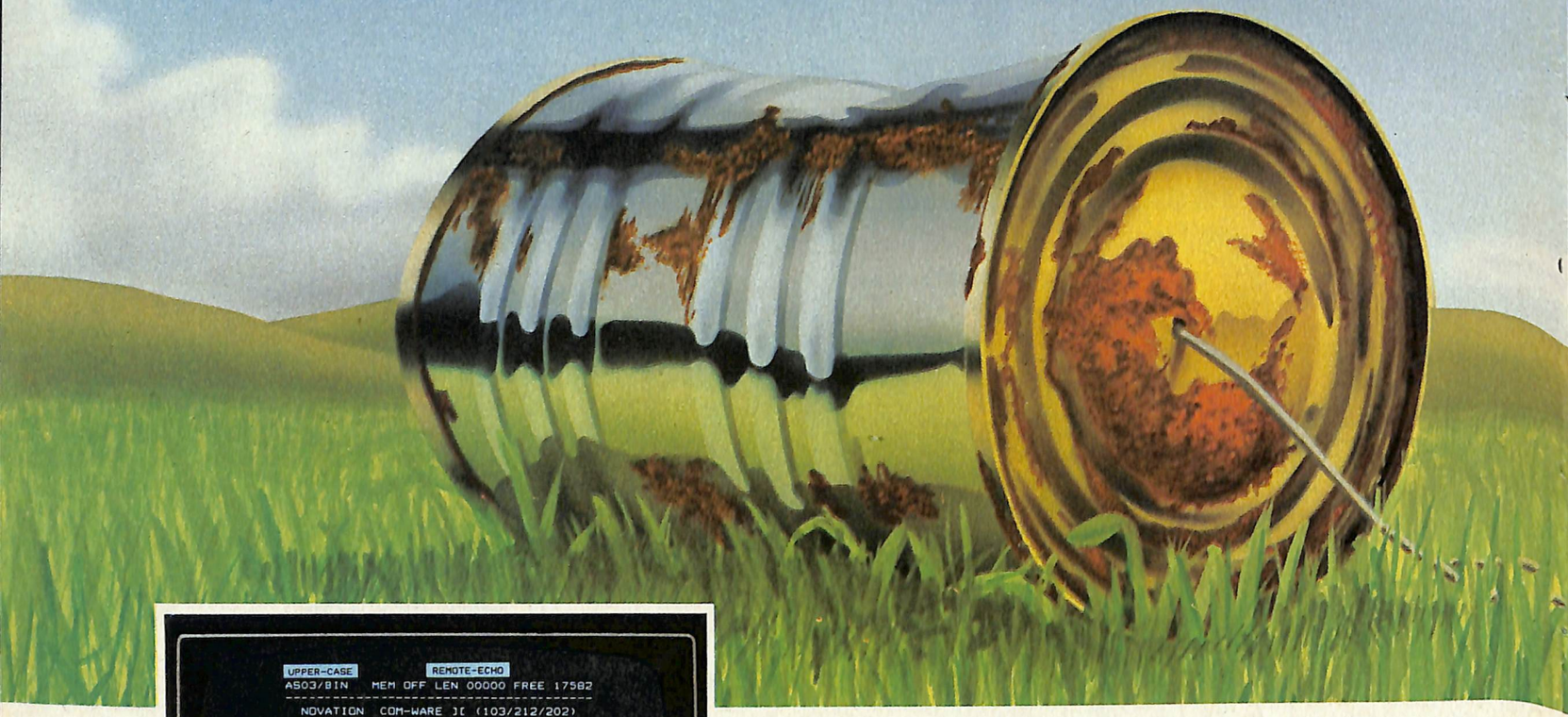
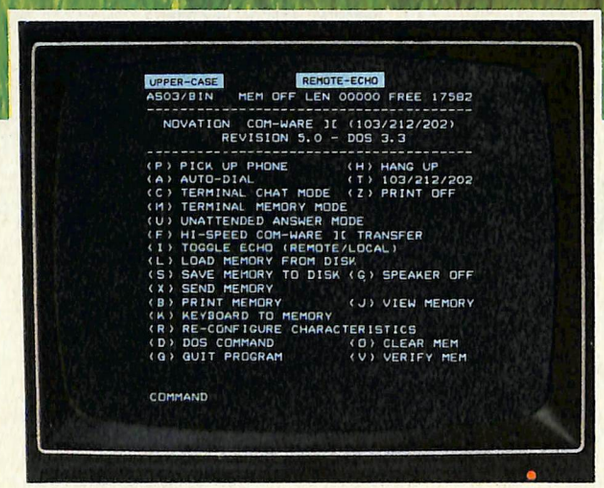
Apple®-Cat™ II

for the Apple II, Apple II Plus, and Apple *IIe*





The Cat system lets you slip something into your Apple II no other modem offers—a complete range of speeds from 110, 300 and 202 half-duplex—to full duplex 212.

Either way, you have state-of-the-art LSI technology. And it means you can start right off with the most advanced system available. Or you can trim your investment, yet always have the option to move up at any step with absolutely no compromises in quality.

Com-Ware™ software is part of the package.

Five minutes after you've booted up the Novation Com-Ware you'll have a good notion of what it's like to work with the best, most accurate, most convenient personal communication system designed for your Apple.

It makes all of the moves you need to work with another computer, swap programs, access data, whatever.

And it's simple to operate. Just follow the menu. No programming, no fussing. It's all there.

New—telephone directory.

Our engineers have done it again. They've expanded our Com-Ware. Now included: a time-saving directory of 26 telephone numbers with terminal configurations all selected and stored for auto dialing. Handy.

And some nice extras. Print-out during communication, a non-destructive memory mode, a changeable "welcome" message for automatic answer. There's more.

If you have an Apple-Cat II and our earlier Com-Ware (4.4 or earlier), you should really have the new one (5.0). As always, it's free.

It's the modem/communication system you grow into, not out of.

Just send us your old diskette and we'll send you the new one.

It can make all the moves you want.

Start with 110, 300, 202 half-duplex. *Or*—add 212 full duplex and move data four times faster with accurate, block by block verification. / Automatically send and receive anytime—including the middle of the night when line charges are lowest. / Use 80 or 40 column format. / Set for local or remote echo. And more.

Another reason to move right now.

We've added something extra to help you grow a communication system.

Packed in with every Apple-Cat II is a list of options. You get your choice of any one—and save as much as $40.

They're at your dealer.

No waiting. Your dealer has them on his shelf.

Easy installation.
In less than 10 minutes, you're talking to the world.

He also has the literature that gives you all the answers to all your questions.

See him now.

More features than any other modem.

• Full range of communication baud rates—up to 1200 (Bell System 100, 202 or 212 series compatible) • Full or half duplex operation • Complete Com-Ware system on a single diskette. Also, wide assortment of excellent software available from other sources • All automatic functions—auto dial (pulse or Touch Tone), redial, auto answer and disconnect • It's a telephone with speaker monitor—switch between data and voice. For regular use, it's a handy intelligent phone with auto-dial • Touch Tone receiver • Built-in BSR X-10 Controller • Remote control for external cassette tape recorder • Works with other Apple parallel or serial printer interface cards • Constant status display on screen • Binary or text modes • Single card installation for Apple Cat II and an additional card for the 212 upgrade • FCC certified built-in phone line interface (PLI) Module • New full Duplex 212 option.

Novation

Novation, Inc.
20409 Prairie Street
Chatsworth, CA 91311

(800) 423-5419 • In California: (213) 996-5060

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CAT is a trademark of Novation, Inc., which does not manufacture Apple computers.

Circle 272 on Reader Service card.

New Products

edited by Tom Woods

CE Software's Personal Work Station.

Personal Work Station

CE Software, 801-73rd St., Des Moines, IA 50312, offers the Personal Work Station that features a built-in file cabinet, key-lock storage area and a fold-away surface. The work station is made of heavy gauge steel with a baked enamel finish. It takes up 4.75 square feet of floor space. Price is $99.95. Reader Service number 460.

Dot Matrix Printers

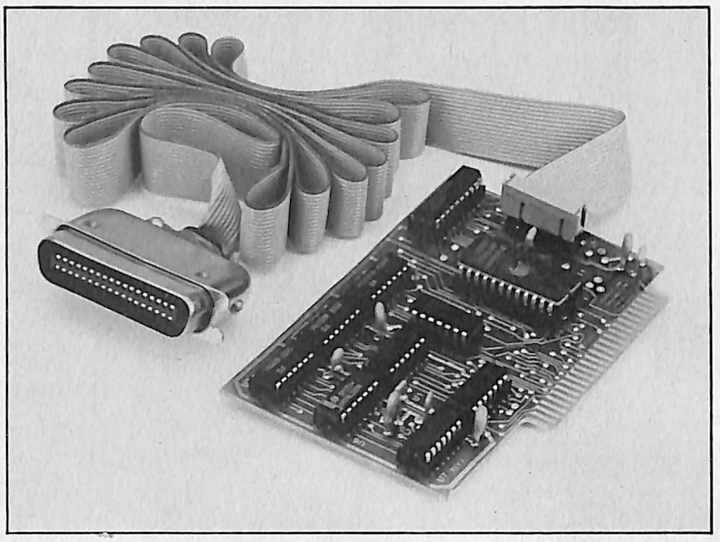
High-speed and color models of its 8510A and 1550A serial dot matrix printers have been introduced by C. Itoh Electronics Inc., 5301 Beethoven St., Los Angeles, CA 90066.

The new 8510SC and 1550SC serial dot matrix printers feature two printing speeds of 120 and 180 cps, and a three-color ribbon that provides users with a seven-color printing palette. At 120 cps, throughput speed of the 8510SC and 1550SC is 63 lpm; and at 180 cps, throughput is increased to 90 lpm on the 8510SC and 45+ lpm on the 1550SC. Price is $925 for the 8510SC and $1325 for the 1550SC. Reader Service number 461.

Amdisk-1

Amdek Corporation, 2201 Lively Blvd., Elk Grove Village, IL 60007, offers the Amdisk-1, a 3-inch floppy disk drive system with up to 286K bytes of formatted storage capacity.

The recording format, data transfer rate and disk rotation speed are compatible with Apple II standard 5¼-inch drives. The 3-inch floppy disk cartridges feature a hard plastic case, hinged cover and a write protect mechanism. Price is $299. Reader Service number 462.



The PKASO printer interface from Interactive Structures.

PKASO

Built-in text and graphics features can be added to an Apple III computer and a dot matrix printer with the PKASO interface card from Interactive Structures Inc., 146 Montgomery Ave., Bala Cynwyd, PA 19004.

Features include a Superfont system that gives the printer new characters and symbols and software that creates custom printing symbols. Price is $195. Reader Service number 463.

The PP Center

Computer Accessory Products Company, 125

The PP Center from Computer Accessory Products Company.

Disk Storage Needn't Double The Cost Of Your Apple III*™

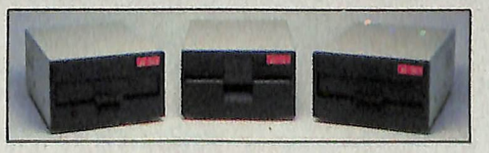
Expanding disk storage on your Apple III *™ can be an expensive proposition.

But Micro-Sci has a better proposition for you, because our disk drives for the Apple III give you greater capacity and performance for every dollar spent.

And no compatibility problems. The A3 is a direct replacement for Disk III drives, and the 70-track A73 and 140-track A143 are supplied with a driver that is easily added to the SOS driver module, affording extra storage and fast seek rates for all of the programs that run under that operating system.

All three are the same 5¼" size as your built-in drive and use the same diskettes.

They also use your Apple III's controller and



power, saving an expansion slot and no AC power cord. And they can be mixed in any combination on the daisy-chain. At 572 KBytes, the A143 makes a truly viable backup device for the ProFile Hard Disk.

At 286 KBytes, the A73 gives you a lot more capacity than a Disk III drive.

The A3 offers identical capacity — and is an excellent choice for second drive compatibility in the Apple II emulation mode.

So see your Micro-Sci dealer today.

He'll show you how to up your Apple III's performance the affordable way.

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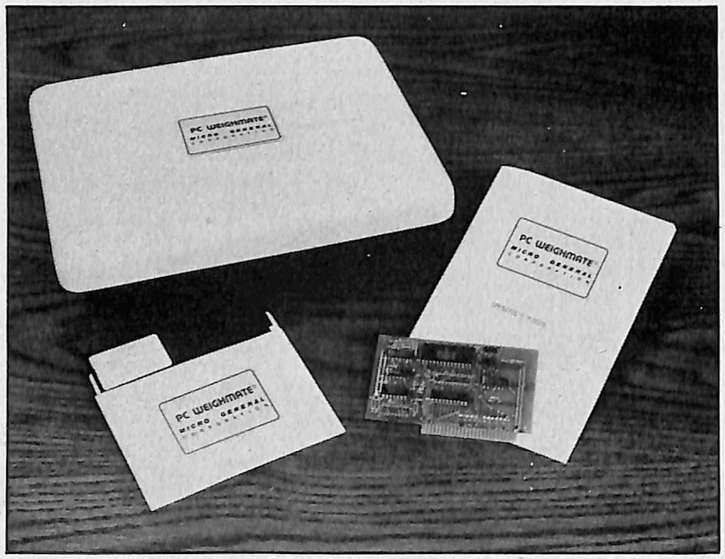
Circle 371 on Reader Service card.



The PC Weighmate converts your Apple II into an electronic postal, shipping and counting scale.

Corinthian Walk, Long Beach, CA 90803, offers the Personal/Portable Computer Center.

The unit features tilt shelves for both video monitor and printer, single switch system operation and full box paper storage. Price is $395. Reader Service number 466.

Weighmate

Micro General Corporation, 1929 SE Main St., Irvine, CA 92714, offers the PC Weighmate microcomputer scale system for the Apple II.

PC Weighmate converts the Apple II into an electronic postal, shipping and counting scale for business and office use. It consists of a 25-pound scale platform capable of weighing down to 1/32 of an ounce and a floppy disk that contains the menu-driven software, rate tables, and zone charts for all classes of USPS domestic and international mail, United Parcel Service and Federal Express.

A letter or parcel is placed on the scale platform and the correct rates are displayed for any service class and zip code. Other features include the Rate Shopper, which tells the best way to send a given package; the Counting Scale that is used for rapid counting of parts, inventory and literature; and the Transaction Summary that gives an accounting of daily postage and shipping costs. Price is $695. Reader Service number 469.

KeyTran

Price Performance Products Inc., 1928 N. Kenmore Ave., Chicago, IL 60614, offers KeyTran, a hardware device that updates the capability of the Apple II/II Plus keyboard.

KeyTran electronically alters the layout of the Apple keyboard to provide a 10-key numeric keypad with special function keys for VisiCalc users. It provides three alternative keyboard layouts for numeric data entry and text entry for word processing applications. Price is $89.95. Reader Service number 465.

PCPI 88Card

Personal Computer Products Inc., 16776 Bernardo Center Drive, San Diego, CA 92128, offers a new co-processing board, the PCPI 88Card.

The 88Card is compatible with the Apple II, II Plus and IIe and comes with 64K of memory. With the 88Card, software developers can use Apple computers to write application software under MS-DOS for the IBM PC. Price is $595. Reader Service number 467.

Bar Code Reader

The Model 232 Bar Code Reader is a hand held unit that reads bar codes and transmits them into a computer via the RS-232 port. The Bar Code Reader is a compact unit with a wand for scanning a bar code on labels and a microprocessor that translates the bar code into digital data.

Applications include shipping and receiving, inventory control, production control and pricing. Price is $595. Contact Digitronics Division of Comtec Information Systems Inc., 53 John St., Cumberland, RI 02864. Reader Service number 468.

Analog Input System

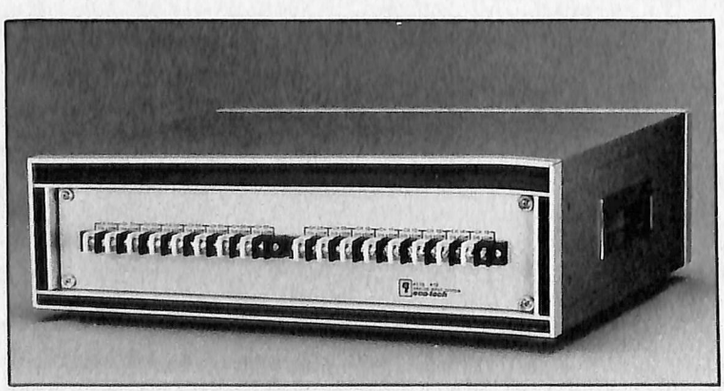
The ALIS/A12 Analog Input System simplifies laboratory and industrial automation with the Apple II. Over fifty Basic commands operate at up to 10,000 data points per second.

Tutorial documentation, model programs and on-line graphing capability ease application setup. The ALIS/A12 provides 16 channels of 12-bit analog input with ranges down to 1000mv. Price is $1517. Contact Eco-Tech Inc., 2990 Lake Lansing Road, East Lansing, MI 48823. Reader Service number 470.

DS220 Printer

The DS220 multimode printer produces business reports at 220 characters per second and can also print business correspondence in the near-letter quality mode at 40 characters per second. The DS220's high-resolution graphics capability produces business charts and graphs.

With the operator control panel, the user can configure up to 42 pro-



The ALIS/A12 Analog Input System from Eco-Tech.

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"PERCOM" HARD DISK DRIVES FOR "APPLE II"

• Works with existing floppy drives • Plug-in Adaptability • Initial Unit Contains Smart Controller, Allowing Add-Ons • *"PERCOM" QUALITY • "PERCOM" PERFORMANCE • ACCESS UNLIMITED PRICE . . .*

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Uses "Diablo" Printwheels & Ribbons, 40 CPS — Limited Quantities
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Affordable/Letter Quality/17 CPS — Limited Quantities

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Microline 83A (120 CPS/136 Col.)		**$ 799.00**
Microline 92 (160 CPS/80 Col.)		**$ 659.00**
Microline 93 (160 CPS/136 Col.)		**$1200.00**
Microline 84 (200 CPS/136 Col.)	Parallel	**$1295.00**
	Serial	**$1395.00**
Pacemark 2350 (350 CPS/136 Col.)	Parallel	**$2659.00**
	Serial	**$2800.00**
Pacemark 2410 (350 CPS/136 Col.)	Parallel	**$2959.00**
	Serial	**$3100.00**

NEW! "TRANSTAR 140" DAISY WHEEL PRINTER

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With Optional Real Time Clock Interface Display Your Price **$ 224.00**

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Four Cards On One + Two New Options Your Price **$ 179.00**

"OK12" APPLE PRINTER INTERFACE BOARD

Connects Your Apple II To "Okidata" Or "Star Gemini" Printers
Your Price **$ 94.95**

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16K To 128K Expandable RAM Card

16K	**$ 202.50**
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Lifetime Limited Warranty. Reg. $44.95 Now **$24.90** bx of 10
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Circle 330 on Reader Service card.

Rixon's R212A Intelligent Modem features an integral automatic dialer.

grammable features for forms control, communications and print characteristics. These values, which can also be set via the data stream, are stored in non-volatile memory, eliminating the need to reconfigure after powerdown. Price is $1995. Contact Datasouth Computer Corporation, Box 240947, Charlotte, NC 28224. Reader Service number 471.

Rixon Modem

The R212A Intelligent Modem is an LSI data modem that features an integral automatic dialer. It operates full duplex asynchronously at speeds up to 300 bps and synchronously or character asynchronously at 1200 bps over ordinary telephone lines.

A standard 500 pulse or tone dial telephone can be used if manual call origination or answering is desired. No special cables are required.

A six-pin modular cable is furnished with the modem for the telephone line connection. The modem operates with DTEs that have EIA RS-232-C interfaces. Price is $495. Contact Rixon, 2120 Industrial Parkway, Silver Spring, MD 20904. Reader Service number 474.

Dual Disk Drive

A dual floppy disk drive that is compatible with Apple computers is offered by Comrex International Inc., 3701 Skypark Drive, Torrence, CA 90505.

The CR-1000 ComDrive replaces two standard Apple floppy drives of 143K capacity and occupies half the space. Seek time is 40 milliseconds. Track density is 48 tracks per inch in a single-sided, single-density format. Price is $599. Reader Service number 475.

Accelerator II

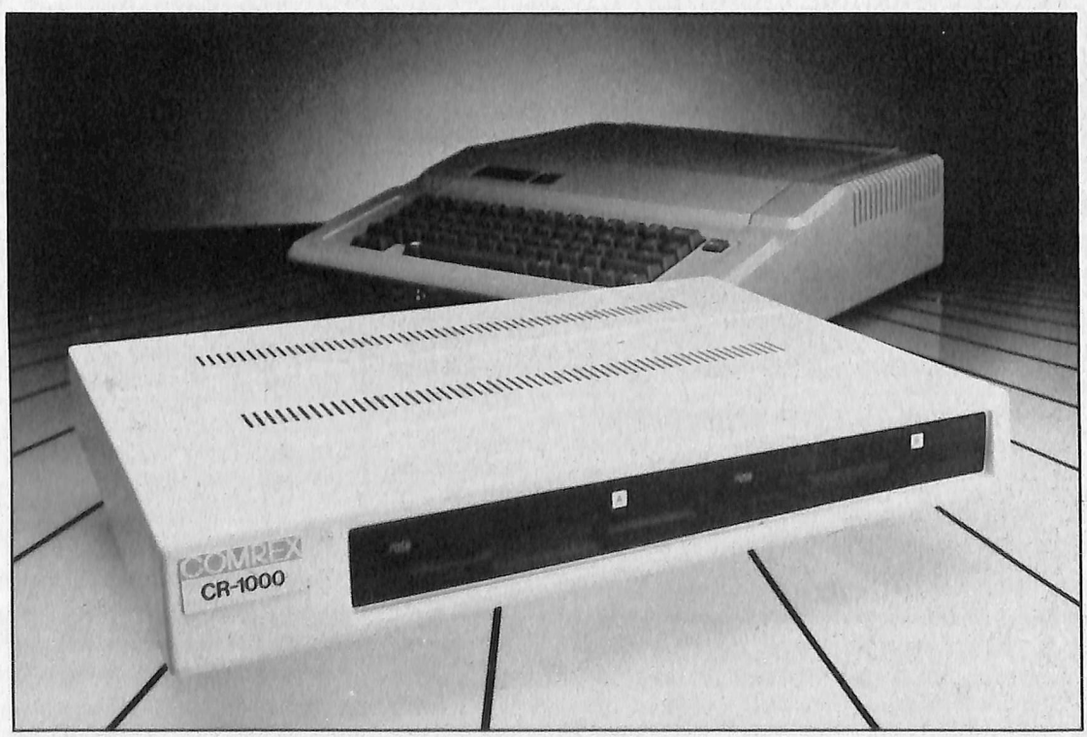
Many software programs will run 3.6 times faster than normal with the Accelerator II board from Saturn Systems, Box 8050, Ann Arbor, MI 48107.

The Accelerator II works by adding a 6502 subsystem to an Apple II/II Plus. The Apple's 6502 and memory handle the video display, and the Accelerator's processor subsystem takes over calculations. Price is $599. Reader Service number 472.

Interface Card

TSK Electronics Corporation, 18005 Cortney Court, City of Industry, CA 91748, offers a new 410-64 interface card to be used with the Apple IIe.

Features of the 410-64 include a 64K RAM memory, 80 column and RGB interface. It also has five video modes including high density display. Price is $349.95. Reader Service number 473.



The CR-1000 ComDrive dual disk drive from Comrex International Inc.

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The Bilestoad is the only thing worth living... or dying for!

Half Reality... All Nightmare

From the amazing mind of author Mangrove Earthshoe comes... A barbaric game of skill set in future time.

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Here, in an oppressive future, there is only one glory, honor and worthy achievement. When you enter THE BILESTOAD you are equipped as a gladiator of the past. Using sheer force, you battle your way from island to island, against another human opponent or computer guided robot. You make use of the hi-tech devices within the nightmarish Bilestoad to fight a game of tactics and strategy covering 39 levels and 44 battlegrounds... to finally achieve Master status!

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Introducing the most logical place to store Elephant Memory Systems® (or lesser brands of disks): The Trunk.

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