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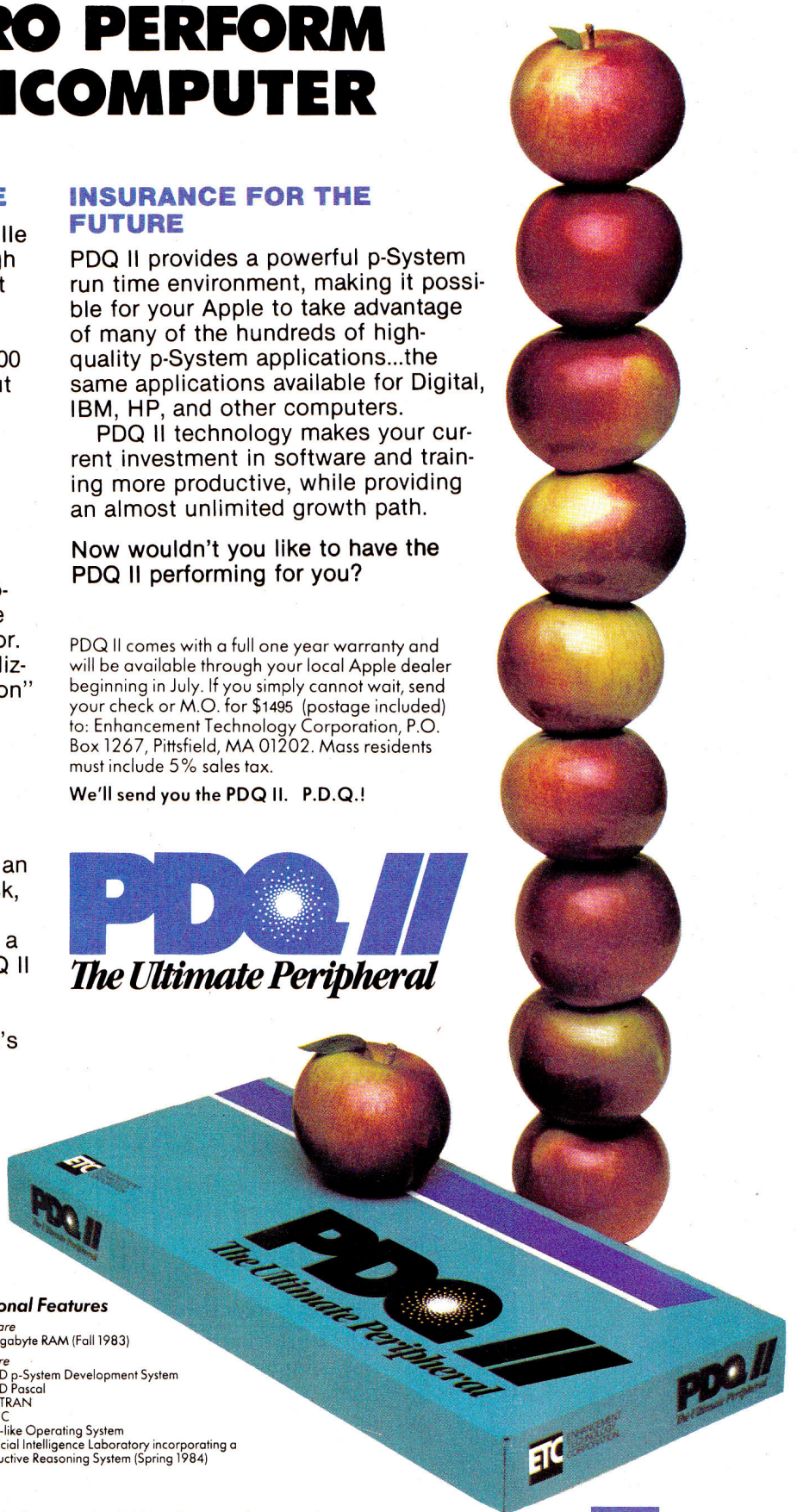

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September 1983
Vol. 1 No. 9



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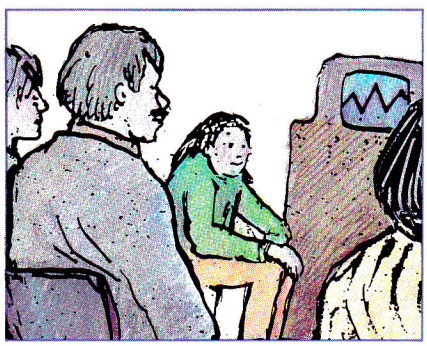

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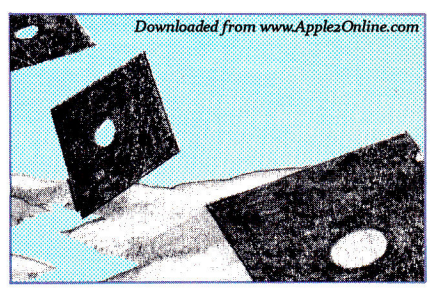
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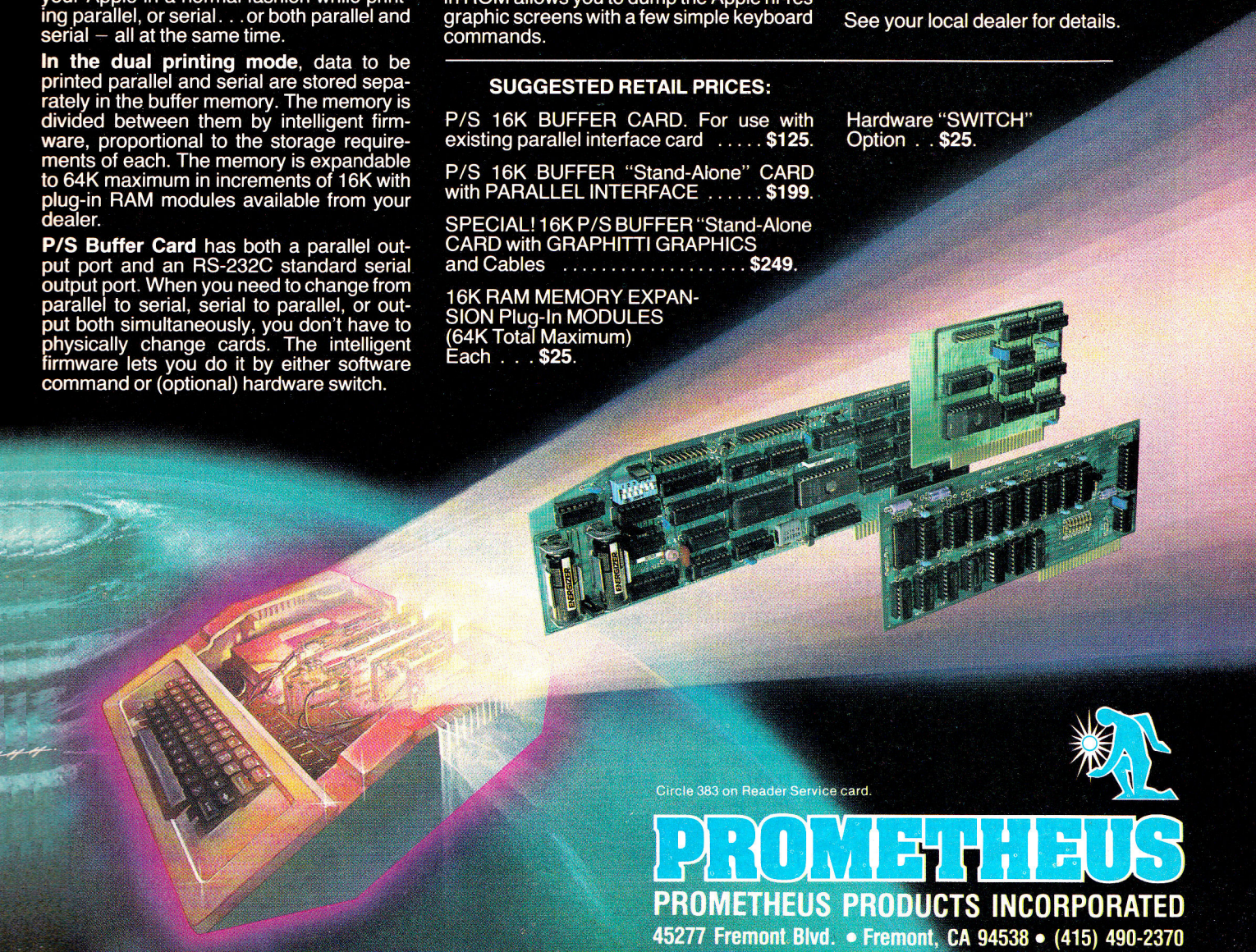

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Green Sells Out



In a way, I suppose, you might say that I sold out, but I plead guilty with an explanation. And by the way, if you're interested in joining a fast rising firm, you could do worse than read on.

It all started this last spring when some chaps from one of the bigger banks called saying they had a large foreign publisher looking to acquire something like my micro publishing empirette. I wasn't much interested because I enjoy what I'm doing more than anything else I can imagine. But what would it cost to listen, right?

So they came to visit and looked over our place. I showed them our growth in sales, which has run around 50 percent a year for the last eight years, limited only by all growth being 100 percent self-financed. They mumbled vaguely about $50 million, which I have to admit got my attention. I'd really never given much thought to what the whole mess might be worth.

The word that I was thinking of selling began to spread and new suitors started calling every few days. The more I talked with these firms the more I realized this probably was a good time to merge with a larger firm so I would have the money to invest in some new projects. I have never had much of a personal need for money, so selling out for a big bundle of cash had little attraction.

No, it would be worth merging if I could get the money to start magazines at a faster rate and thus be able to better keep up with the needs of the microcomputer industry. And I had an idea for a new type of magazine I wanted to try out. If it worked I'd have a way to get perhaps fifty more like it going, each with expected sales on the order of $5 million a year or more.

Then there was my idea for a new type of school—a business/technical institute geared to the needs of the 80s. The more I thought about it, the more ideas for new divisions of Wayne Green Inc. came to mind. With some cash available for getting these new businesses and publications going, we could step up our growth enormously. I did some sales projections and I could see us growing a billion in sales within ten years, just on the plans already in mind.

"I had an idea for a new type of magazine I wanted to try out."

As I talked with the firms interested in merging I found several of them excited about my ideas and plans. I've a good record of coming up with innovative ideas in the past, so there wasn't much skepticism about my new ideas. After all, I'd had the idea to start the first magazine for micros: *Byte*. And then I started the first system specific magazine: *80 Micro*. And I'd pioneered mass-produced software. As I talked with people I realized very few other visionaries have such good track records.

The final choice of a merger partner was most difficult. Several large firms put it bluntly: They needed me and I could name my price. Now I want to tell you, that is fantastic for the ego. I really wasn't into shopping around for the highest offer because the difference between $50 million and $100 million is a lot less than the compatibility of the merger. And numbers like that don't mean anything anyway, they're just very big numbers.

On May 22nd I signed a preliminary agreement with Pat McGovern. He's the publisher of *Computerworld*, *InfoWorld*, and so on, and his operation is several times the size of my firm in sales. The date was significant to me because it was eight years to the day from when I called the editor of a small micro newsletter to come up and discuss starting a magazine, and we agreed to give it a try. Five weeks later the first issue of *Byte* went to the printer. Those were five frantic weeks, I'll tell you.

Getting *Byte* started was ex-



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hausting work, but fun. We'd just gotten it off to a good start when the editor and my office manager moved the magazine out in the middle of the night, a stunt I still haven't gotten over.

The merger means that we'll be able to do more promotion of our current magazines. It means we'll be able to start more magazines—and I have a bunch of them all planned out. Each magazine is going to require a staff, so we'll be needing two or three hundred people to help out—editors, writers, technicians, programmers, people for advertising sales, typesetting, graphic arts, circulation, data processing, and so on.

Then there are a number of special projects, such as my planned technical/business college. We're going to need management teams to get these projects going and run them. Most of this is going to be done in New Hampshire, but eventually we'll be growing into other areas of the country.

If you are interested in getting involved with some exciting new ideas, you should get a letter off to me telling me what you think you might be able to do. I'm looking right now for nonsmokers with a history of enthusiasm and the ability to make things happen with a minimum of supervision.

There won't be any astronomical salaries when we are starting new projects, but we will plan to make it well worthwhile for those who are the most helpful in starting the new projects.

For instance, there are a number of products I'd like to have made in Asia and import for sale here. I've got the contacts in Asia to handle that end, but I need the people to handle the project from the New Hampshire end—setting up the advertising, importation and distribution of the products. This should be able to grow into a substantial business by itself.

Why New Hampshire? Well, mostly because this is one of the best places in the country to live. The quality of life is wonderful and the cost of living far less than in New York or Silicon Valley. We still don't have any state sales or personal income taxes in New Hampshire. We're in a small town with all of the advantages of a small town. The people are friendly and the crime rate low.

If you are looking for the chance of a lifetime to get in on some new projects, and if you think you can hack it, let me know. You're going to have to prove you can get things done. We have no free rides here, just a bunch of enthusiastic people all having the time of their lives working hard and turning out first rate products. We're working out of old houses, converted motels and barns, and so on. This is not IBM.

You can be old, young, black, white, red, brown, male, female, undecided, but if you smoke please don't bother me, okay? The air up here is invisible and we want it to stay that way.

"We're working out of old houses, converted motels and barns, and so on. This is not IBM."

The merger means that we have a guarantee of the money we need to move ahead on as many projects as I can find teams to work on. And if we run out of projects to get started, I'll have more. I come up with an idea for a good solid project every few days.

When you think about it, by the time you put my six magazines together with those Pat is already publishing, we're a very strong combination. I think we'll be able to parlay this group into a pilot model of the college of the future, into perhaps an educational satellite television network. . . things like that.

Pat is much like me—full of ideas and enthusiasm. I think we're going to really make things hum in the microcomputer field. Care to join us? ■



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* * *

WARNING

The Line Cleaner project described in the August issue of *inCider* (p. 108) included a wiring diagram in which the ground wire is shown ending at the EMI/RFI filter. This is incorrect and possibly dangerous. The wire must continue through to LOAD. The text and photo make this clear; please be certain to carefully check the position of the green (ground) wire.

Hi. . .

The good news in education is that teachers and parents have discarded old prejudices about computers and have begun to accept them for what they are: potent new educational tools that can enhance the curricula of the nation's schools.

In that spirit we present our own back-to-school feature section illustrating how Apple has helped to put computer power within reach of the nation's students and teachers.

Perhaps you're a grade school teacher trying to develop a specialized CAI curriculum. If so, be sure to read our review of SuperPILOT, Apple Computer's new language which helps create interactive tutorials for the classroom. For teachers and others interested in developing effective courseware, this program should be of great interest.

Laughing Bear is a well-executed spelling program that uses music and graphics to teach youngsters in a non-threatening manner. As a bonus, the listing's utilities easily can be incorporated into more sophisticated software.

Bright as the prospects are for making effective use of computers in the traditional classroom, the Apple holds even greater promise for special needs students. Look for our overview of what's going on in this sector of education, and how computers are helping all students achieve richer, fuller lives.

You won't want to miss "Logo Talks Back," by Donna Bearden and Jim Muller. Much more that a vehicle for turtle graphics, Logo's powerful list and text processing capabilities can open up new vistas of educational applications.

And speaking of new vistas, we hope you enjoy Stephen Wilson's computerized group encounter carried out in mellow California style.

Finally, just for fun, you'll enjoy our special two-page color spread of the Tasman Turtle being put through its paces.

From here we leave education and move on to other momentous topics, like games. Consider "Chase," a quick and easy amusement you'll be able to keystroke in no time flat.

In an *inCider* exclusive, details of Avant-Garde Creations' hot new SuperSprite Graphics system are disclosed publicly for the first time. A combination hardware/software package, this phenomenal new product gives Apple users the power and versatility of sprites which heretofore were available only on a few other microcomputers.

And if you like quick and dirty construction projects, you'll just love George Engel's article. This *has* to be the least expensive peripheral ever devised by man. But we'll let George speak for himself.

And Dan Bishop's column, The Applesoft Adviser, ties in nicely with our educational feature slant. Dan combines his computer expertise with his ten-year experience as a college professor to offer sage advice on designing some educational programs.

Regular readers of Hints 'n' Techniques will not be disappointed. First we serve up a soft switch for MBasic that allows the user to add Applesoft flexibility to CP/M. Next in the lineup is a program loader that cuts out much of the drudgery usually encountered during programming. Batting third is a fine little software protection program. And finally, we present a program for proper printouts that squelches some annoying idiosyncrasies common to print statements.

Now if all that doesn't hold you, we suggest you turn to our review section and immerse yourself in some hard-nosed critiques of hardware, software and other Apple-related products. And don't forget New Products. . . as usual, we've done our best to sift through the enormous crop of new offerings for the Apple.

Be sure to join us next month when we turn our attention to "Apples in Business." ■



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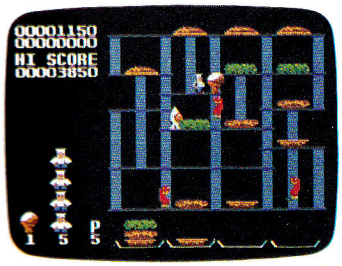

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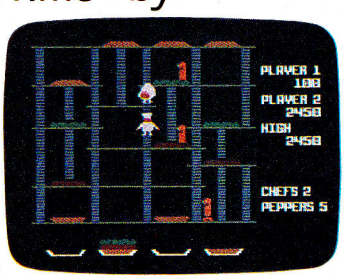

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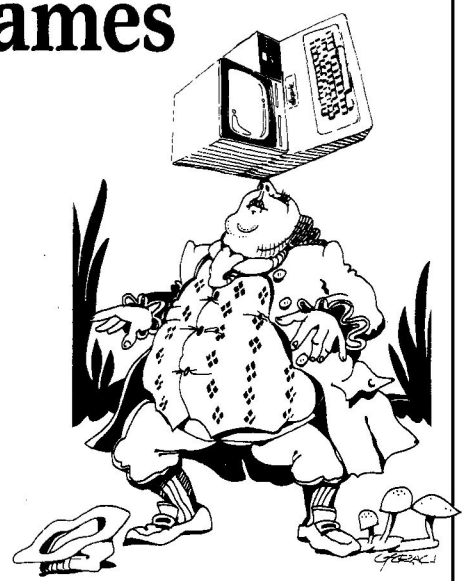
by Tom Woods

Educators Give Video Games High Marks



David N. Perkins, a Harvard University researcher in cognitive psychology and education, presented a hopeful vision—a vision that video games will revolutionize learning—at a three-day conference on video games and human behavior at Harvard's Graduate School of Education.

Perkins' vision, an educational heaven, takes place in the typical American home, perhaps in a decade. The family owns several microcomputers and a library of educational software written in different game formats. Children learn algebra, spelling, history, English composition and other subjects with enthusiasm—and without coercion! Schools are dying out like the dinosaurs.

Can such an educational heaven exist in a decade or two? It is unlikely. But there is a more important question that should be pondered right now. How can educators and the high tech industry make the best use of video games techniques for education?

Clearly, the violent shoot 'em up video games have no educational worth and may be, as a recent *Newsweek* article suggested, "extracting something more than quarters from America's youth." But on the other end of the spectrum, games like Rocky's Boots are leading the educational computer industry into exciting new territory. It is no easy task to teach *anyone*, never mind young children, to learn how to construct computer logic circuits. "Rocky's Boots," according to Judah Schwartz, Professor of Engineering Science and Education at MIT, "has helped people break prior notions of what can be taught."

The Harvard symposium was sponsored with a $40,000 grant from Atari Inc., and names of potential invitees were supplied by the Atari Institute for Educational Action Research. Skeptical opinions of the educational value of video games were scarce, and the lack of balance surely damaged the credibility of the conference.

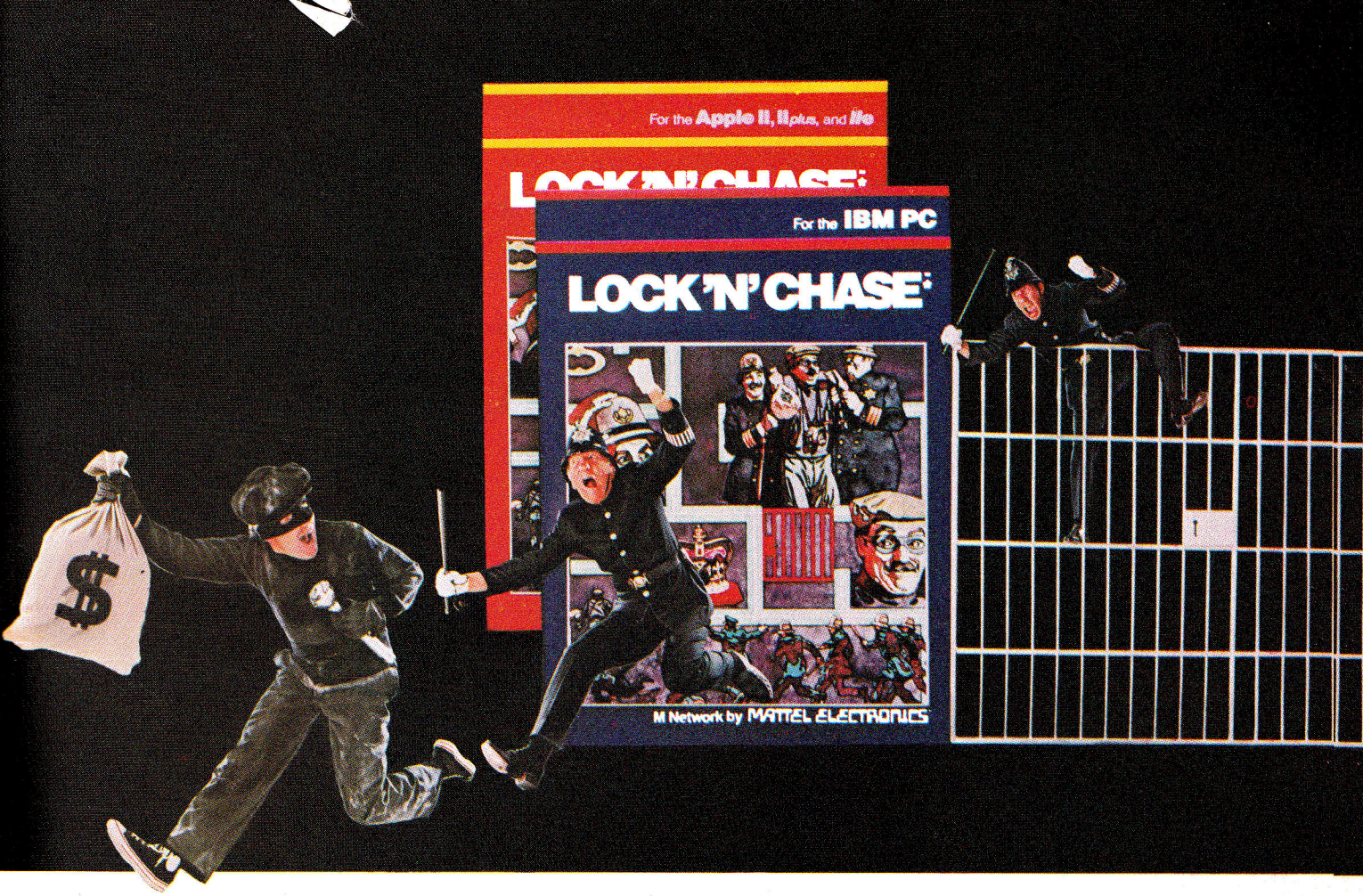
Concrete research on video games and education was scarce too, although B. David Brooks, a former high school principal, did survey 973 video game enthusiasts between the ages of 10 and 18. Poor grades, truancy and drugs and alcohol seemed not to be a problem with those surveyed.

Some educators and researchers, including David Perkins, believe that video games provide a motivation to learn that cannot be matched by textbooks or traditional classwork. Perkins pointed out that gaming formats offer immediate feedback, simulation and fantasy worlds—all of which he identified as important motivating factors. And video games can also make abstract concepts more comprehensible with the use of concrete models. Example: In Rocky's Boots, electricity is seen as a red color that flows through the circuits that the player has constructed.

Perkins also discussed some of the problems video games pose. One of the more interesting questions facing educators is the problem of contextual welding—a term that should be explained, not defined. Let's say, for instance, that a child learns some trigonometry while playing an educational video game. Will he or she then be able to recall the knowledge and apply it while building a house? Or is it possible the information learned can only be retrieved while sitting in front of a computer?

In the waning hours of the conference, Herbert Kohl, an educator and author of such books as *Thirty-Six Children* and *Math, Writing and Games in the Open Classroom*, wondered if computers and video games might become another factor dividing the rich from the poor. "While the poor pop their quarters into the arcade machines, the rich might very well be learning how to program games on their Apple IIs."

Educators and social scientists should examine the problems associated with video games and learning. And questions of social equity must also be asked. But it is foolish to deny the positive aspects of video games. Computers and video games are here to stay. Just how they will shape our lives, and the lives of our children, cannot be answered right now—not even by the experts assembled at Harvard last May. ■



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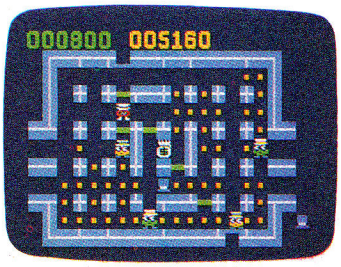

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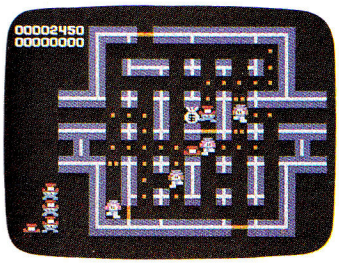

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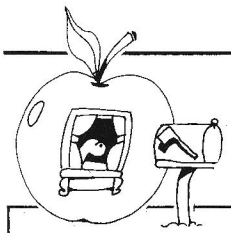

Letters

Apple's Edsel?

I am a new subscriber. . . a new owner of a computer (Apple III) and as a matter of fact, a newcomer to this entire "computer craze"!

The way I bought my Apple III this past December was that I engaged my accountants to research what I needed and they recommended the Apple III because of its memory capacity. A week later I picked it up at the store and brought it to my office.

Now that the machine has become part of our office life, all I read and hear about are the Apple IIs. When a word is said about Apple IIIs, it is usually some remark which makes me feel I have bought an. . . Edsel!

So far, I figure I have close to $10,000 in this Apple III project (including software) but that is *nothing* compared to the $30,000 to $50,000 I estimate I've lost in business because we have all had to learn computers around here instead of doing financial planning like our business used to be!

Having this tiger by the tail is frustrating me more and more every day. If I've bought a "dog" and I don't need all this extra memory after all, I'd like to know about it and dump it as soon as possible and at whatever price I can get. As I said, the original investment was peanuts compared to the expense of learning to use this machine.

Believe me, if Lisa can be learned in one-third the time, it would have been cheaper for me to buy three of them—even at $10,000 apiece—than it has been to buy this Apple III!

Your magazine is great, judging from the five back issues I've managed to borrow, and it has helped me a lot in my learning process. I now look to you for assistance.

I am sure that somewhere in your back issues there are articles about the Apple III that will help me decide if I've bought the right machine or not. Your editorial in the June issue made me think that perhaps I bought too much computer to begin with, and perhaps an Apple IIe or a Macintosh would have been just as suitable and easier to learn, as well.

I don't care if the articles are for or against Apple III, just as long as I can learn something from them. It would be great if I could find something comparing the Apple IIe and Apple III because unfortunately, I will be needing a second computer within the next six months and this one I want to make sure I choose myself!

F. Javier Banos
5837 MacArthur Blvd.
New Orleans, LA 70114

The III is not without its friends. In fact, our July issue's "Fermentations" column consisted of an eloquent and cogent defense of the machine written by inCider *columnist Bill O'Brien. Presumably, you have had a chance to read Bill's comments and thus you should now have information to help make a logical buying decision.*

Catty Remark

The CAT.FACE program (June) is written in Apple Logo. It has a BEGIN procedure that is most useful and should be a part of a Logo user's library. After changing the program to Terrapin Logo, I wanted to share my conversion of the BEGIN procedure:

```
TO BEGIN :X :Y :HEADING
PENUP
SETXY :X :Y
SETHEADING :HEADING
PENDOWN
END
```

No brackets are needed when putting in the variables; however, parentheses are used around the minus coordinates. The SETCRUNCH command used in Apple Logo is the .ASPECT command in Terrapin. The ratio decimals are the same.

Edna Mae Miller
576 S. Cole Ct.
Lakewood, CO 80228

Right! And we have resolved to treat Logo more ecumenically in the future.

Things Salesmen Don't Tell You

If you have an Apple IIe you can use your shift key just like a typewriter by using Applewriter II and a few simple keystrokes. Here's how:

1. Turn on your IIe with the caps lock key on. 2. When in the data line screen press Control and the "up arrow" key. "E," the first letter in the data line, has been changed to the desired "U." This "U" is the secret to shift key operation. 3. Release caps lock and type away just as you would on any typewriter. Upper and lower case appear on the screen and on the hard copy.

The Applewriter II manual—originally prepared for the Apple II + and not the IIe—doesn't give a clue to this super timesaver. Our "expert" computer salesman was misleading in telling us we could not get normal shift key operation using Applewriter II software without shift key modification.

Great magazine, folks. When we subscribe, how can we get back issues?

David Chui
Michelle Rousseau
2212 Metcalf
Honolulu, HI 96822

Thanks for the little "key note."

For the benefit of you and the many readers who call in asking for back issue ordering information, here's how to do it. Total cost for each issue is $4.50 (prepaid, please). This figure includes a $1 shipping/handling fee. Mail orders should be sent to inCider, *Back Issues Dept., Elm Street, Peterborough, NH 03458. Credit card orders are accepted over the phone at (800) 258-5473.*

Liberal Benefits

Wayne, I don't believe that a liberal arts education leads, as you said in a recent Hot Cider column, "nowhere." I suspect that countless liberal arts college graduates share my belief that there is real value, albeit intangible, in a broad educational experience. Some of these graduates no doubt subscribe to your magazine—are your clients or customers. Some of them are quite successful, even though they may have begun



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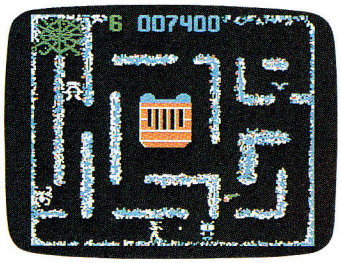
Now there's a computer game that'll leave everyone hanging from the rafters. Nightstalker™ from Mattel Electronics. Now available for your Apple® II or IBM® Personal Computer.

After all, what could be more fun than being trapped in a cave full of bats? How about being trapped in a maze as well. Underground.



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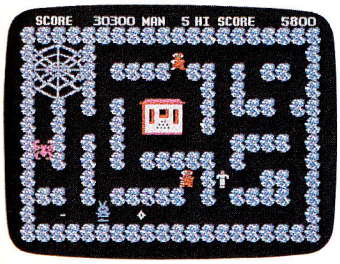

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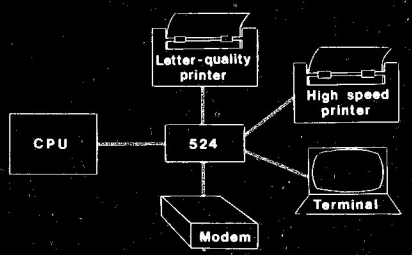

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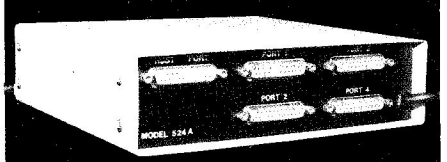

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with the initial "disadvantage" of a liberal education. This non-vocational education didn't teach these people to "put this wire here," "balance this column," "meet this quota" or "design a chemical to kill this." But, it seemingly prepared a lot of people to deal perceptively with the subtleties of living. Some were made the bigger for it. I guess what you consider to be an effective tool for living depends on your background and point of view.

K.R. Rumery
Associate Professor of Music
Northern Arizona University
Box 6040
Flagstaff, AZ 86011

Doubtless. However, if we are going to turn out the technicians and engineers we need to compete with Japan we'd better make some serious changes, and soon. We already have enough liberal arts colleges and precious few technical schools—and no colleges of the sort that I have been talking about. Our high schools, if they are doing their work, should turn out students with liberal arts training. I know that my high schools did well with this a few years back, with first-rate art courses, poetry workshops, literature appreciation and so on. I learned to read and write music in the third grade, the elements of art composition in the fourth grade, and music appreciation in the sixth grade. If the grammar and high schools have dropped liberal arts let's get them to get them back again and not load up the precious college years with 'em . . . particularly for students interested in cram courses in technology and business.

—Wayne

Sure, We're Game!

When I subscribed to your magazine I was hoping for some games as well as other types of programs. However, while you have upheld my expectations for non-game listings (especially POKE programs) I would really like to see some more games.

Jeff Bruno
436 W. Mariposa Ave.
Stockton, CA 95204

Yeah, we'd like to see more game programs too! How about writing a few for us? (The pay's not half-bad.)

Hidden Goody Revealed

This is just a short note from an old Apple user who thinks *inCider* is among the best of the Apple journals. I've only read three of your editions so far but the magazine looks like a winner.

I particularly enjoyed Greg Glau's fine review of the Magic Window II word processor in the June issue. I have owned this word processor for six months but it was not until I read Mr. Glau's review that I learned about one of the best features of the package that, somehow, I had overlooked in the instruction manual. I wrote to Mr. Glau asking for further

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information, and his response was rapid, thorough and generous.

Richard Thompson
Highway 5, Box 31
Waldorf, MD 20601

Potpourri

First, you have a fine magazine. . . it is the only one I read about my Apple II. However, it is frustrating to not see answers to some of the readers' questions you print. If they are important enough to print, they should be important enough to answer.

Second, how about a few articles that compare products in a heads-on competition a la *Consumer Reports*? A table comparing the features of each product without all the advertising hype would enable a reader to select the right peripherals for his application and price range.

Third, your last issue arrived just in time to help me decide that I would wait for the new Buffered Grappler +. Thanks.

Fourth, how about tapes or disks for each issue, similar to your Load 80 tapes for *80 Micro*?

Fifth, why do manufacturers feel it is necessary to reinvent the wheel every few years? If early television had been "improved" like this every few years we would all be watching newsreels at the Saturday matinee; improvements in that industry did not render the older equipment obsolete. Despite some rumors to the contrary, I feel that as long as Apple Computer supports the II it will be around for a long time.

Jesse T. Humple
P.O. Box 1252
Carson City, NV 89701

O.K. Jesse, from the top:

First, you're right. . . there is an unspoken obligation to not leave the reader dangling in mid-air, waiting for the answer that never comes. Look for a brand new column dedicated to reader problems in the very near future.

Second, somewhere deep in our cavernous "IN" basket is the blueprint for an ongoing series of buyer's guides which, as you suggest, compare products point-for-point in an objective format.

Third, you're welcome.

Fourth, we're closing in on that project. Trouble is, to do this thing right requires a significant amount of lead time. Moral: It is better to go slowly than half-fast.

Fifth, maybe the wheel is not being reinvented but is merely being perfected instead. (What's that old saw about he who does not advance retreats?) But rest easy, there are several hundred thousand IIs out there and it's highly unlikely that such a market will be dropped for a long time to come.

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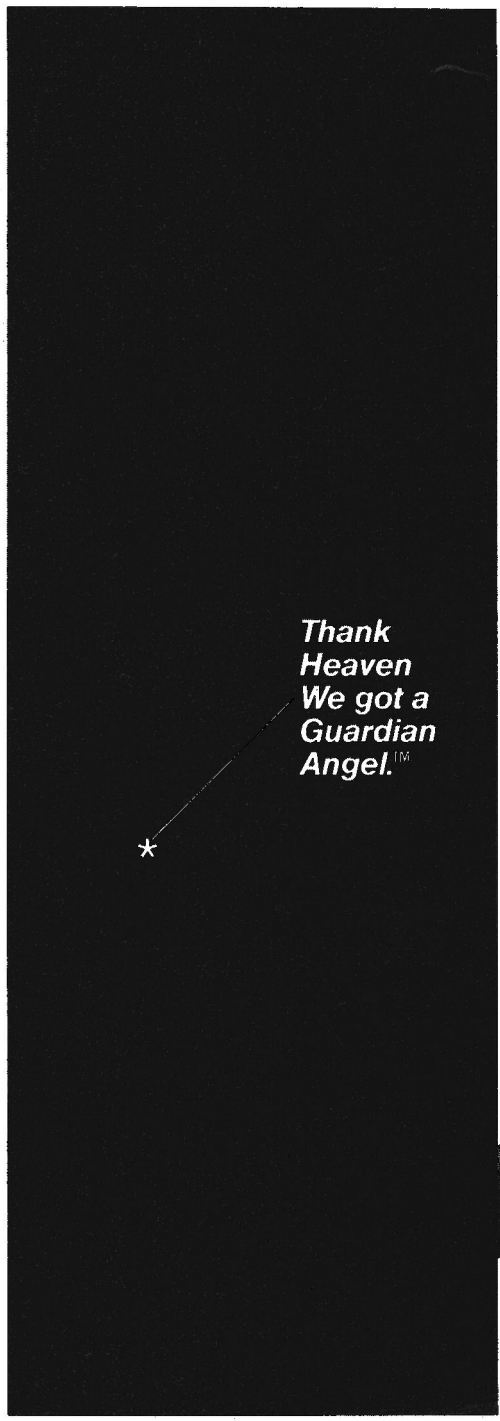

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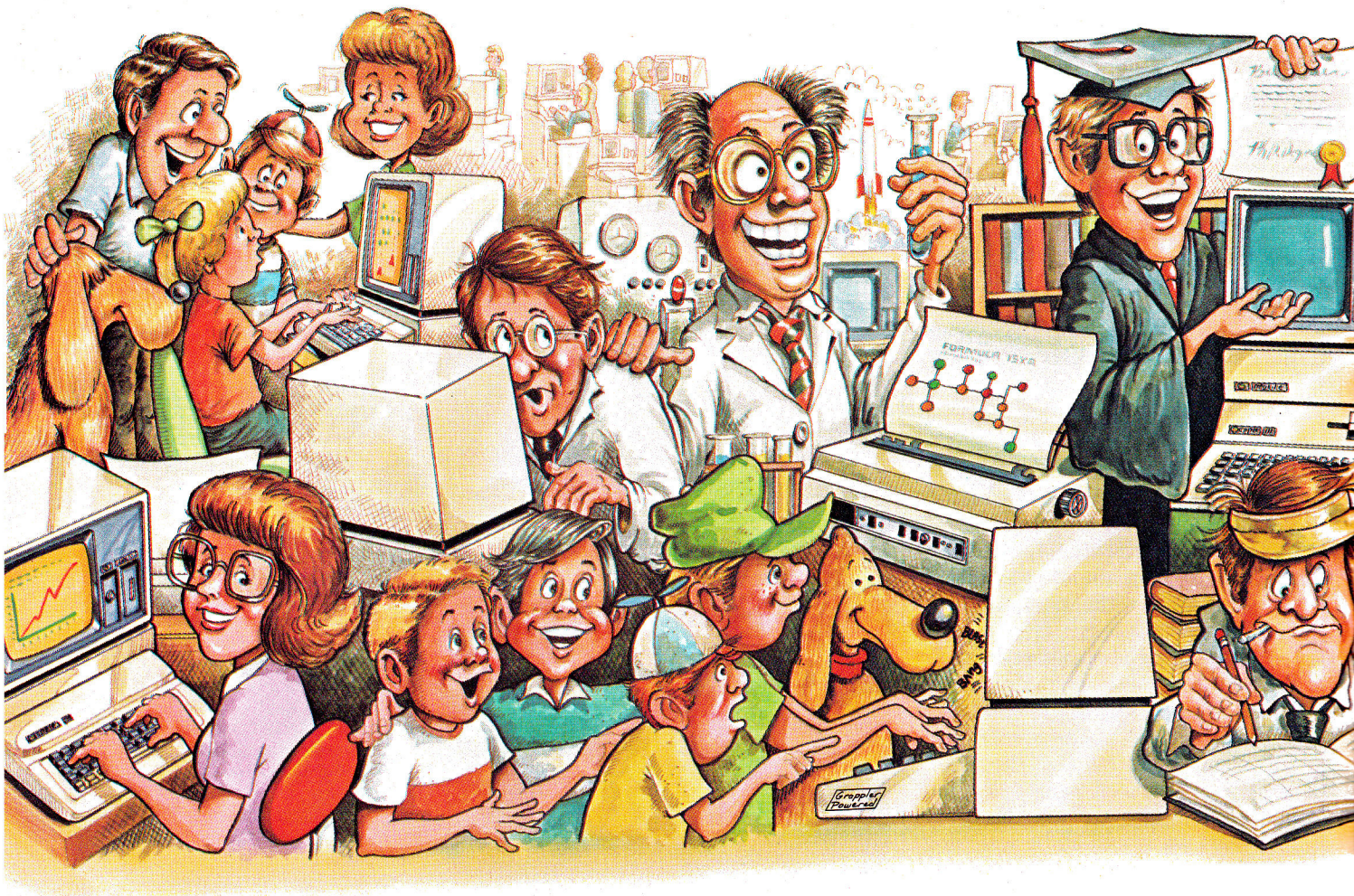

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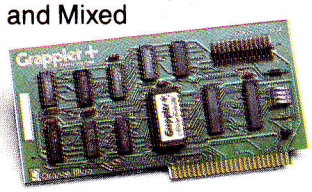

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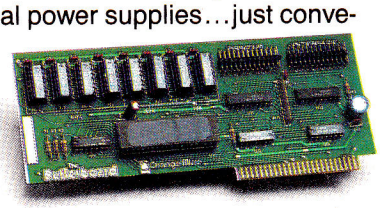

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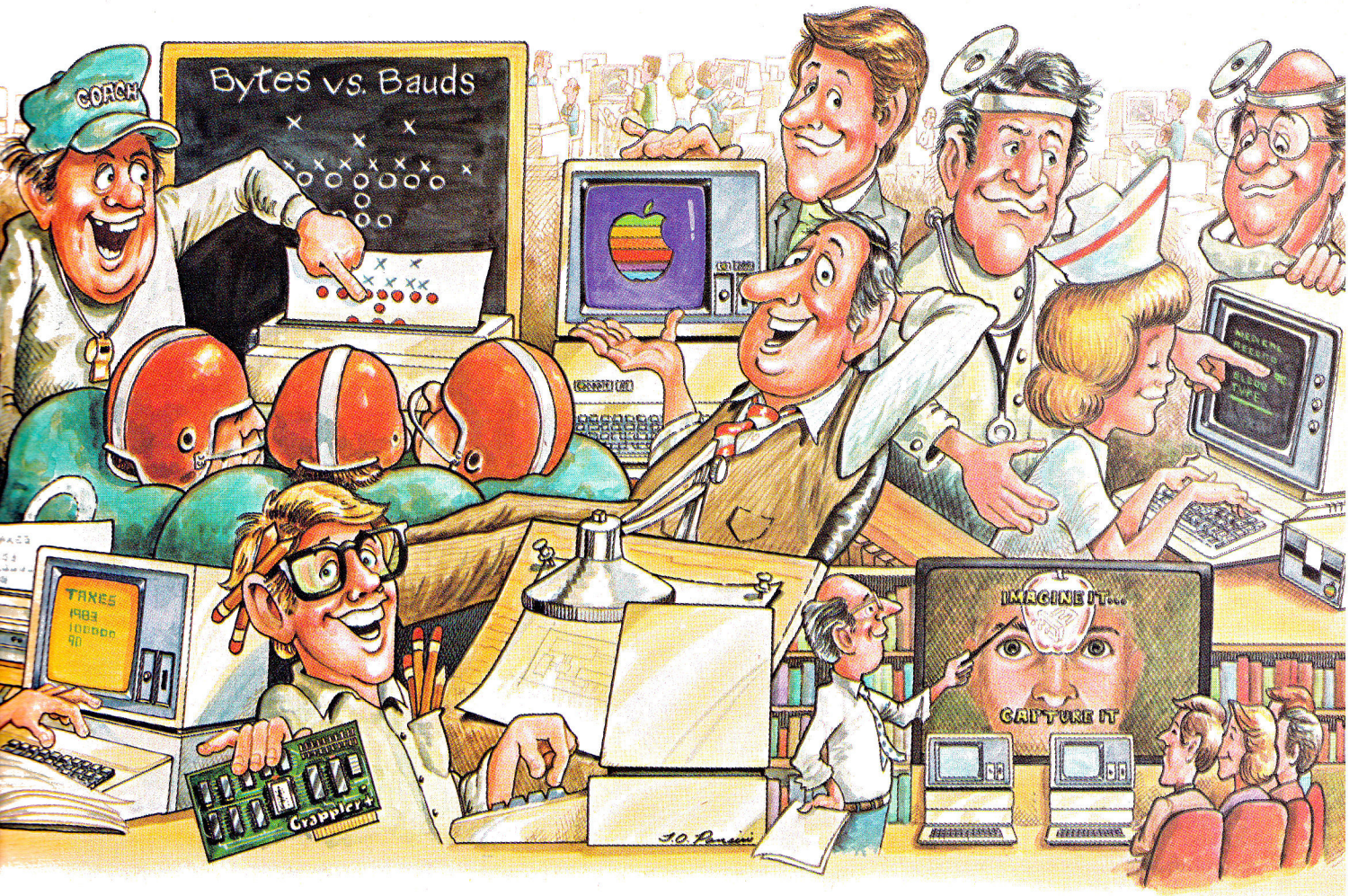

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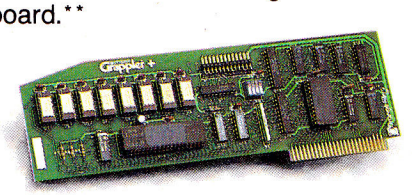

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by Dan Bishop

Techniques in Educational Program Design

Last month I mentioned I was looking forward to writing this column because *inCider* is featuring computers and education. The reason for my interest is that most of my working life has been spent in education. Before beginning my own microcomputer consulting firm, I taught science (chemistry mainly) at the college level for ten years. I introduced microcomputers as teaching tools in my courses and began writing programs to serve as additional instructional materials. Through this experience and the reactions and suggestions of my students, I developed several educational programs that I have successfully marketed nationally on a mail order basis.

Nor have I given up teaching. After leaving the college where I last worked full-time and moving to the mountains of Colorado, I found my knowledge of computers in demand by the local junior college and have been teaching evening extension courses for them. In addition, on several occasions I have taught a class for public school teachers called "Using the Microcomputer in the Classroom." It has been interesting to note how the enthusiasm for these courses has increased over the last two years.

It is with this background in educational philosophy and actual experience that I have established the set of criteria for judging educational programs and for setting goals for my own programs that I present here.

The Primary Objective

Before writing or evaluating a new program, you must determine what your particular objectives are for its use. Be very specific, and also identify precisely the student group that will be using the program. Add to your list of objectives the qualities the program must have to best meet their needs. If you do this with care, you will often discover that different groups need different programs to achieve the same educational goal. The differences between these programs will be relatively minor and easily implemented, and the effectiveness will be considerably enhanced.

For example, suppose you are designing a program to provide practice in solving simple division problems. You may have some students who already understand this material fairly well and some who are still having trouble with the multiplication tables, along with a group whose abilities are midway between these extremes. Your program objectives for the group having trouble with multiplication may include the following:

1. Simple division problems that result in whole number answers.
2. A dividend not exceeding three digits; a divisor of only a single digit.
3. Encouraging and sympathetic computer responses.
4. A "tutorial" element to review pertinent aspects of multiplication when a problem is missed.
5. Frequent use of the student's name.
6. Only the final score displayed when the student has completed the exercise.
7. The student to work 33 problems, worth 3 points each.

On the other hand, the program objectives for the more advanced students might look like these:

1. Simple division problems that result in whole number answers.
2. A dividend not exceeding five digits; a divisor of one or two digits.
3. Some funny, or even mildly sarcastic, computer responses.
4. Occasional use of the student's name.
5. A running score displayed after each problem is worked.
6. As many problems as the student desires, beyond a minimum of fifteen.

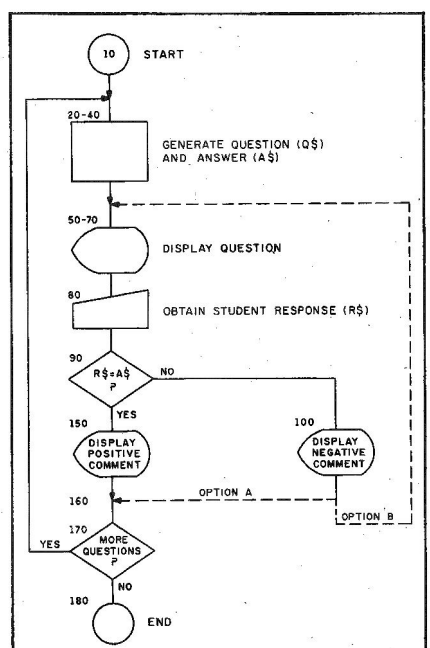

Figure 1. Basic flowchart for a drill and practice educational program.

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In both cases the educational objective, to provide drill and practice in the solution of simple division problems, is the same. The differences lie in how the program "treats" the student.

As another example, suppose the program were dealing with verb tenses as used in sentences. For a group that has reading difficulties, you may wish to make the sentences simple and the responses multiple choice. With an advanced group the same objectives may be better achieved by using more difficult sentences that involve intellectually challenging material, and by requiring the student to type in the correct response.

The Basic Program

Figure 1 shows a flowchart for the most fundamental of educational programs types, the "drill and practice" program. Here the computer merely generates and displays questions for the student to answer, accepts each response, evaluates the correctness of the response, and displays an appropriate comment before repeating the cycle.

In this form, the program has only limited use as an educational tool. Outside of the novelty of using the computer, nothing relieves the monotony of the question-answer cycle. Furthermore, the program only evaluates the response, with no instructional elements to help the student better understand the problem if the response should be wrong.

A choice between two approaches is shown in this flowchart. If the student is to retry a question until it is answered correctly, then the option B path in Figure 1 should be taken. If the program will just proceed to the next question, then option A should be used.

Listing 1 provides an example of this type of program, designed to generate simple multiplication problems. If you type this program in and use it, you will find yourself bored after a very short time. Your students will feel the same way; remember, they are human too!

As simple as this first program may

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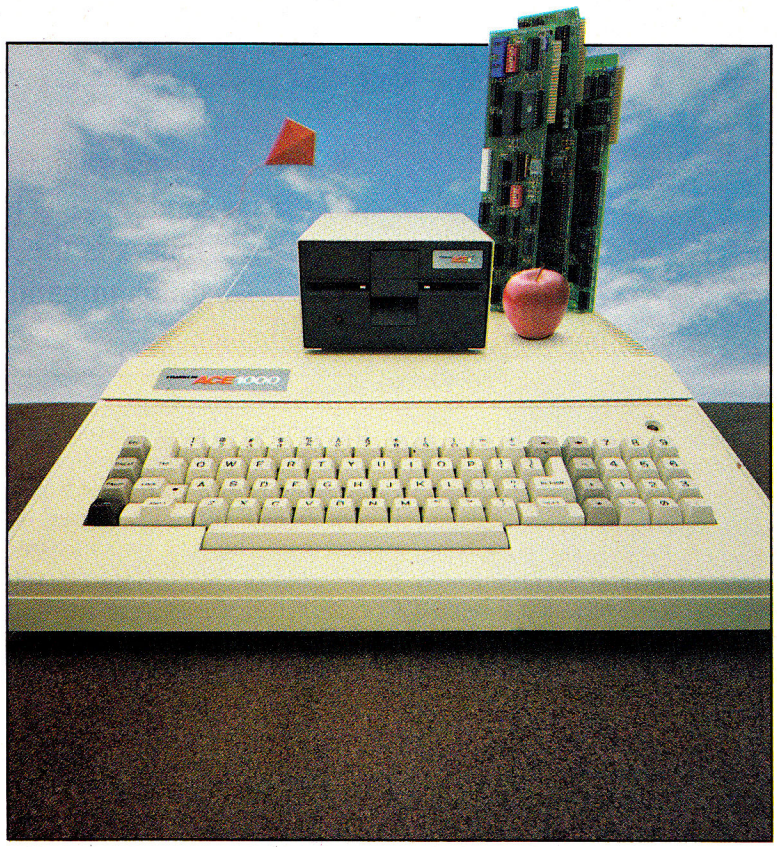

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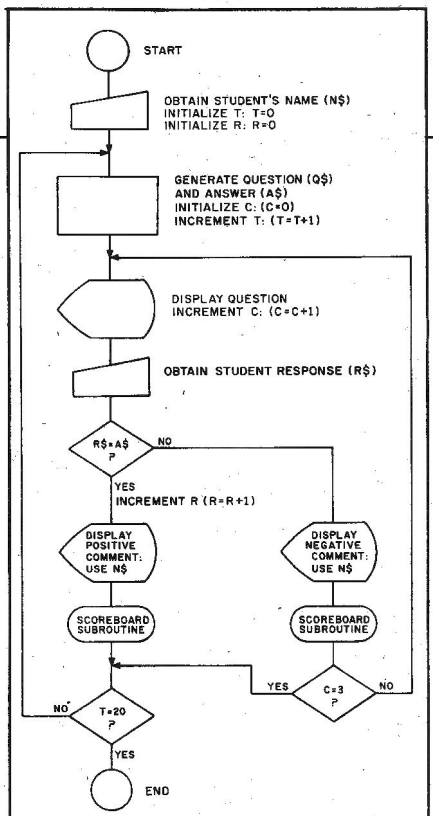

Figure 2. Flowchart for a more advanced drill and practice program. The format is the same as that used in Figure 1, with personalized comments and a scoreboard added.

be, it provides the fundamental structure for more complicated programs that have more versatility and can maintain a higher level of interest on the student's part. For example, suppose the following additions were made to increase this fundamental program's appeal:

1. Ask for the student's name at the start and use it in the program.
2. Display a running score after each response.
3. Give the student three tries at any question and then provide the correct answer.

Figure 2 is a flowchart for such a program. Notice the similarity between Figures 1 and 2. All of the elements of the first are still present in the second. The changes suggested are merely additions to the logic flow.

Listing 2 achieves the same educational objective as Listing 1, but with these new elements added. The program has been personalized by adding the student's name, and the student sees his score as he progresses through the twenty questions.

With this program, the variable T holds the total number of new questions presented, R counts the number of questions answered correctly (after up to three tries), and C keeps track of the number of attempts on each question so that any one question is never presented more than three times. The scoreboard subroutine uses only T and R so the first two incorrect responses to a question are not counted.

"The Basic instruction to use for a random selection of responses is the ON...GOSUB command."

Variety Adds Spice

Listing 2 is still a pretty dull program. As it stands, the student sees the same response each time a question is answered correctly, and for every incorrect answer, the same negative response appears. Using the technique described below and a little imagination, you can add a variety of positive and negative responses, selected randomly by the pro-

```
5  REM  BASIC EDUCATIONAL PROGRAM

6  REM  NO FRILLS
9  REM  GENERATE PROBLEM
10  HOME :T = 0
20 B =  INT ( RND (1) * 12 + 1)
30 C =  INT ( RND (1) * 12 + 1)
40 A$ =  STR$ (B * C):T = T + 1
49  REM  DISPLAY PROBLEM
50  PRINT "WHAT IS THE PRODUCT OF
    :"
60  PRINT
70  PRINT  SPC( 10);B;" TIMES ";C
    ;"?  ";
79  REM  OBTAIN STUDENT'S RESPONS
    E
80  INPUT "";R$: PRINT
89  REM  EVALUATE RESPONSE
90  IF  VAL (R$) =  VAL (A$) THEN
    150
99  REM  NEGATIVE COMMENT ROUTINE

100  PRINT "SORRY, WRONG ANSWER."

110  GOTO 160
149  REM  POSITIVE COMMENT ROUTIN
    E
150  PRINT "CORRECT.  GOOD WORK."

160  PRINT : FOR I = 1 TO 2000: NEXT
    I
169  REM  MORE QUESTIONS?
170  HOME : IF T < 20 THEN 20
180  END
```

Listing 1. Drill and practice skeleton program. This example deals with simple multiplication skills.

```
1  REM  BETTER EDUCATIONAL PROGRA
    M
2  REM          SOME FRILLS
10  HOME :T = 0:R = 0
20  VTAB 12
30  PRINT "PLEASE TYPE YOUR FIRST
     NAME"
40  PRINT "AND PRESS THE  <RETURN
    >  KEY."
50  PRINT : INPUT N$
60  GOSUB 500: REM   GENERATE PRO
    BLEM
69  REM  DISPLAY PROBLEM
70 C = 0:T = T + 1
80  HOME :C = C + 1
90  PRINT "WHAT IS THE SUM OF THE
    "
100  PRINT "FOLLOWING NUMBERS:":
    PRINT
110  PRINT W" + "X" + "Y" + "Z" =
    ";
119  REM  OBTAIN STUDENT'S RESPON
    SE
120  INPUT ";R$: PRINT
129  REM  EVALUATE RESPONSE
130  IF  VAL (R$) =  VAL (A$) THEN
    200
139  REM  NEGATIVE COMMENT ROUTIN
    E
140  PRINT "SORRY, "N$"."
150  PRINT "THAT ANSWER IS WRONG.
    "
159  REM  DISPLAY SCOREBOARD
160  GOSUB 600
170  FOR I = 1 TO 2000: NEXT I
180  IF C < 3 THEN 80
190  GOTO 310
199  REM  POSITIVE COMMENT ROUTIN
    E
200  PRINT "GOOD WORK, "N$"!"
210  PRINT "YOU GOT THAT ONE O.K.
    "
220 R = R + 1
229  REM  DISPLAY SCOREBOARD
230  GOSUB 600
299  REM  PAUSE LOOP
300  FOR I = 1 TO 2000: NEXT I
309  REM  MORE QUESTIONS?
310  IF T < 20 THEN 60
320  END
499  REM  PROBLEM GENERATING SUBR
    OUTINE
500 W =  INT ( RND (1) * 25 + 1)
510 X =  INT ( RND (1) * 99 + 1)
520 Y =  INT ( RND (1) * 25 + 1)
530 Z =  INT ( RND (1) * 50 + 1)
540 A$ =  STR$ (W + X + Y + Z)
550  RETURN
599  REM  SCOREBOARD DISPLAY SUBR
    OUTINE
600  VTAB 20
610  PRINT "==================
    ================="
620  PRINT R" CORRECT OUT OF "T"
    PROBLEMS."
630 P =  INT (100 * R / T)
640  PRINT  SPC( 15)P" %"
650  PRINT "==================
    =================";
660  RETURN
```

Listing 2. Drill and practice program that includes the student's name and a scoreboard. This example deals with the addition of four numbers.

gram. This can increase the interest level significantly.

The Basic instruction to use for a random selection of responses is the ON...GOSUB command. The three dots represent a randomly generated variable, and the word GOSUB is followed by a list of line numbers (separated by commas) that are the first lines of several subroutines. Whenever the random variable has a value of 1, the first subroutine from the list is selected. When the random variable has a value of 2, the second subroutine is selected, and so on.

For example, suppose the following line were inserted into the program just after the student's response (R$) has been accepted, but before the computer evaluates the response:

```
#### X = INT(RND (1) * 5) + 1
```

(The #### represents the actual program line number you would use in your Basic program.) This line generates a random value between 1 and 5 and assigns this value to the variable X.

Now use the following instruction in place of the PRINT line in your program:

```
#### ON X GOSUB 810, 820, 830, 840, 850
```

This command instructs the program to execute the subroutine at line 810 if the value of X is 1; if the value of X is 2, the subroutine at line 820 is executed; and so forth. Each of these subroutines is a simple PRINT command that provides a positive response, but each is different. For example, lines 810 through 850 might look like this:

```
810 PRINT "GOOD JOB, "N$". KEEP IT
    UP!": RETURN
820 PRINT "YOU GOT THAT ONE JUST
    RIGHT!!": RETURN
830 PRINT "FANTASTIC. YOU'RE HOT!":
    RETURN
840 PRINT N$", YOU'RE DOING
    GREAT!": RETURN
850 PRINT "I SEE A NOBEL PRIZE IN
    YOUR FUTURE!": RETURN
```

The response that appears on the screen will now be one of the five shown above, selected at random. Note that the use of the student's name in the responses occurs only two out of five times. This also adds variety, making the computer a little

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more "human" in its responses.

The same technique can be used to replace the negative response PRINT command in your program. In this case, the type of response displayed can range from the understanding and encouraging, particularly for younger students, to the humorous and sarcastic for older students.

I had a college senior working with me one year, developing a program to help freshman chemistry students in calculating radioactive decay rates. One day she came into my office and said she was ready to have me give the program a try. I sat down at the computer and began answering questions, noting the variety of positive responses she had included in the program. Then I answered a question incorrectly, only to be confronted with BOY, YOU REALLY BLEW THAT ONE, YOU TURKEY!.

Needless to say, I was aghast. I would never personally confront a student that way, and suggested to my assistant that she might be coming on a little strong. But she insisted there would be no problem, and persuaded me to wait and observe the students' reactions. Their response, as it turned out, was quite favorable. The students were more than willing to take insults from the machine, and in some cases would purposely miss a problem just to see what the computer would say.

The point here, of course, is that using this technique allows you not only to add variety to the program, but also to tailor the program to the type of response acceptable to your own students. No longer are you at the mercy of the textbook publishing companies and their "generic" workbooks, geared to some national standard.

```
1  REM   MATH TUTORIAL PROGRAM TO
   TINE
2  REM   TEST SIMPLE DIVISION
10 T = 0:R = 0
20  GOSUB 100
30 C = 0:T = T + 1: GOSUB 500
40  GOSUB 200
50  IF  ABS ( VAL (A$) -  VAL (R$
    )) <  = D THEN  GOSUB 300: GOTO
    80
60  GOSUB 400
70  IF C = 1 THEN 40
80  IF T < 20 THEN 30
90  HOME : VTAB 12: HTAB 17: PRINT
    "THE END": END
99  REM  INTRODUCTORY SUBROUTINE
100  HOME
110  VTAB 12
120  PRINT "PLEASE TYPE YOUR FIRS
    T NAME"
130  PRINT
140  PRINT "AND PRESS THE (RETURN
    ) KEY."
150  PRINT : HTAB 10: INPUT "";N$

160  HOME
170  VTAB 12: HTAB 6
180  PRINT "GLAD TO MEET YOU, "N$
     "!"
190  GOSUB 990: RETURN
199  REM   PROBLEM DISPLAY & INPU
    T SUBROUTINE
200  HOME :C = C + 1
205  INVERSE : VTAB 10: PRINT  SPC(
    40): NORMAL
206  PRINT
210  PRINT "WHAT IS "E" DIVIDED B
    Y "B"? ";
214  HTAB 1
215  INVERSE : VTAB 14: PRINT  SPC(
    40): NORMAL
216  HTAB 35: VTAB 12
220  INPUT "";R$: PRINT
230  RETURN
299  REM  POSITIVE COMMENT SUBROU
    TINE
300 X =  INT ( RND (1) * 5) + 1
310 R = R + .5: IF C = 1 THEN R =
    R + .5
315  VTAB 18: HTAB 1
320  ON X GOSUB 340,350,360,370,3
    80
330  GOSUB 600: GOSUB 990: RETURN

340  PRINT "GREAT JOB, "N$"!":
    RETURN
350  PRINT "KEEP UP THE GOOD WORK
    !": RETURN
360  PRINT "YOU'RE  RIGHT ON THE
    MONEY.": RETURN
370  PRINT "YOU GOT THIS ONE PERF
    ECT!": RETURN
380  PRINT N$", YOU'RE DOING FINE
    .": RETURN
399  REM  NEGATIVE COMMENT SUBROU
    TINE
400 X =  INT ( RND (1) * 5) + 1
410  IF C = 2 THEN  GOSUB 700: GOTO
    430
415  VTAB 18: HTAB 1
420  ON X GOSUB 440,450,460,470,4
    80
430  GOSUB 600: GOSUB 990: RETURN

440  PRINT "WOOPS; YOU MISSED THI
    S ONE.": RETURN
450  PRINT "THAT'S WRONG, "N$". K
    EEP TRYING.": RETURN
460  PRINT "NO, NOT CORRECT. TRY
    AGAIN.": RETURN
470  PRINT "YOU MISSED THAT ONE,
    "N$".": RETURN
480  PRINT "THAT'S NOT RIGHT, "N$
    ".": RETURN
499  REM  PROBLEM GENERATING SUBR
    OUTINE
500 A =  INT ( RND (1) * 12 + 1)
510 B =  INT ( RND (1) * 12 + 1)
520 E = A * B
530 A$ =  STR$ (A)
540 D = 0
550  RETURN
599  REM  SCOREBOARD DISPLAY ROUT
    INE
600  VTAB 20: PRINT "============
    ============================"

610  PRINT "YOU HAVE "R" CORRECT
    OUT OF "T" WORKED."
620 P =  INT (100 * R / T)
630  PRINT "     YOUR PERCENTAGE I
    S ";: FLASH : PRINT P;: NORMAL
    : PRINT " %"
640  GOSUB 990
650  RETURN
699  REM  TUTORIAL EXPLANATION
700  HOME : PRINT "SORRY, "N$". Y
    OU MISSED IT AGAIN.": PRINT

705  IF A = 0 THEN  PRINT "ZERO D
    IVIDED BY ANYTHING IS ZERO."
    : GOTO 770
710  PRINT "HERE ARE "E" STARS:":
     PRINT
720  FOR I = 1 TO A: FOR J = 1 TO
    B: PRINT " *";
730  NEXT J: PRINT : NEXT I
740  PRINT : PRINT "EACH ROW CONT
    AINS "B" STARS."
750  PRINT "THERE ARE "A" ROWS."
760  PRINT : PRINT "SO "E" DIVIDE
    D BY "B" IS "A"."
770  VTAB 22: PRINT "PRESS (RETUR
    N) TO CONTINUE...";
780  INPUT "";X$
790  RETURN
989  REM  PAUSE ROUTINE
990  FOR I = 1 TO 2000: NEXT I
995  RETURN
```

Listing 3. A math tutorial program dealing with simple division problems. This program contains multiple-response subroutines, a scoreboard, and a tutorial subroutine that is displayed whenever a given problem is missed twice.

Tutorial Enhancement

One thing I do not like about the "drill and practice" type of program presented above is that no real teaching takes place. Learning is enhanced by the practice and the repetition, but these techniques are most useful toward the middle stages of the process. The student must already be familiar with basic concepts to increase skills through such means.

At the earlier stages the student needs to receive some input with each problem missed in order to learn where he or she went wrong and how the problem should have been worked. If you add this capability to the standard "drill and practice," you expand the program's usefulness considerably, and it fits more appropriately in the category of "tutorial" programs.

It is interesting to note that adding tutorial features to a basic program can be done by merely adding a subroutine call between the negative response routine and the scoreboard routine shown in the Figure 2 flowchart. Thus, when a student misses a problem, the display communicates that, and then proceeds to show how the problem should have been worked. Then the scoreboard is displayed, and, depending on which option you have chosen, the program goes to the next problem or again presents the problem just missed.

In most cases, the tutorial is most effective if it deals with the actual question that was missed, rather than in general terms. Depending on the subject material, this may or may not be easily done. Mathematics and science problems are the easiest to han-

dle this way. The exact values used to formulate the problem are plugged into the tutorial explanation. It is also possible to add subroutines that are keyed to commonly committed errors, so that the program may be able to point out exactly what error was made.

Grammar problems may be restricted to appropriate definitions or generalized explanations during the tutorial phase, along with the correct answer (perhaps after the third try). Spelling problems might be least adaptable to the tutorial approach, with the tutorial phase being restricted to merely showing the word spelled correctly. Multiple choice questions could have an appropriate comment for each of the incorrect choices, adding information to amplify the subject material. This could help reduce the teacher's tendency to add ridiculous fillers as choices in a multiple choice test.

At this stage in the program, graphics displays may be suitable, especially if they emphasize the subject material. For example, a multiplication program might display a grid of asterisks across the screen with the number of rows and columns corresponding to the numbers being multiplied. A grammar program in which the student is to identify a noun might display the sentence on the screen with the noun in flashing mode.

Generating the Problems

I find math and science problems that deal with numbers the simplest to devise. By using randomly generated numbers the programmer can leave the specific problems up to the computer. For example, the following program sequence is all that is necessary to generate over 1000 simple multiplication problems in which the two multipliers ranged from 0 to 10 and from 0 to 100, respectively:

```
2000 M1 = INT(RND(1)*11)
2010 M2 = INT(RND(1)*101)
2020 A$ = STR$(M1* M2)
2030 HOME
2040 PRINT "WHAT IS "M1" TIMES
"M2"? ";
2050 RETURN
```

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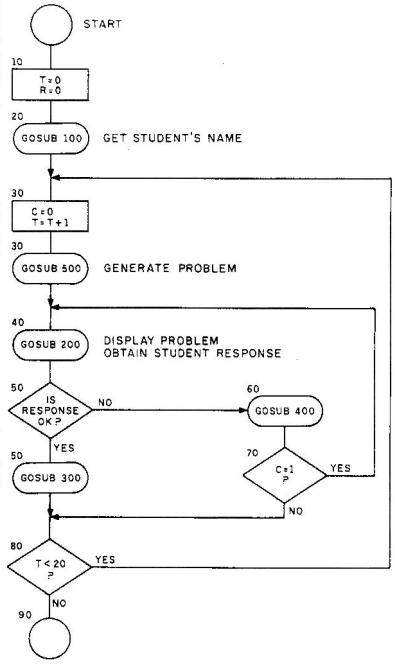

Figure 3. Flowchart for a modularized program. Compare this with Figure 1 and, after noting the similarities, compare Listing 3 with Listing 1.

A sample physics problem that requires the student to divide the mass of an object by its volume to arrive at the density can be set up as follows:

```
2000 D = INT(RND(1)*1930 + 1)/100
2010 IF D < .5 THEN 2000
2020 M = INT(RND(1)*100) + 1
2030 V = INT( 100 * M/D) / 100
2040 HOME
2050 PRINT"AN OBJECT HAS A MASS OF
"M" GRAMS"
2060 PRINT"AND A VOLUME OF "V"
CC."
2070 PRINT"WHAT IS THIS OBJECT'S
DENSITY? ";
2080 A$ = STR$(D)
2090 RETURN
```

Several aspects of this problem are important from a general point of view. First, since the problem deals with the real (terrestrial) world, it could be counter-productive to generate specifics representing a physical impossibility. Therefore, the densities generated must be restricted to values between 0.50 g/cc and 19.30 g/cc (the density of gold).

In order to generate values with two decimal places, the program produces a random number between 1 and 1930, and then divides that number by 100. As is often the case for math problems involving division, the result is generated first, and is then used to find one of the remaining numbers. Using this method, you could write a program to generate simple division problems that would always result in whole numbers.

In both examples above, although the answer is numeric in nature, the numbers have been converted to strings. This is not necessary, but the student response routine uses R$ for input so any keyboard character can be entered without causing unusual problems. For the first problem, the

WHEN YOU'RE BAN



evaluation of the student's response can be simply a comparison of A$ and R$, as follows:

```
IF A$ = R$ THEN ....
```

The second problem presents a more difficult situation, because you may want the answer to be correct only to the nearest + / − .02. If that is the case, then the evaluation should be handled like this:

```
IF ABS(VAL(A$) - VAL(R$)) =< .02
THEN...
```

Using this algorithm, you can set your own standards of accuracy on any math-oriented problem. Notice that the use of the ABS (absolute value) function takes care of the cases where VAL(A$) is larger or smaller than VAL(R$).

There are several ways of generating non-mathematical problems. The main obstacle here is that the computer cannot generate them randomly. Each problem must be entered as a unique part of the program. However, it is possible to add tremendous variety to the way that such a problem is displayed by using fairly simple techniques. Because of this, I plan to devote my next column to handling text-oriented problem generation. If your field is history, biology or language, please bear with me till then.

On Computer Literacy

One of the features of computer programs, educational programs in particular, most often neglected in program writing is the prompt that informs the user what to do next. For example, everyone knows that to get a program beyond a keyboard input routine, the user must press the return key, right? Unfortunately, that assumption is frequently wrong.

I have often seen teachers sit bewildered in front of a computer with the following simple command displayed on the screen:

```
WHAT IS YOUR NAME?
```

If a teacher can be perplexed by what appears to be a simple command, what about someone who has less experience, such as an elementary school student?

Compare the above display with the following:

```
PLEASE TYPE IN YOUR FIRST NAME
AND THEN PRESS THE <RETURN>
KEY...
```

This request leaves no room for doubt as to what is expected. Anyone who can read can follow these directions without hesitation.

Too many programs assume that when you have finished reading a display you will reach over and tap

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the return key or space bar, or whatever, to continue. But without a prompt such as:

PRESS THE SPACE BAR TO CONTINUE...

how is the first-time user of your program to know what to do or why your program has apparently stopped midstream? Be specific and clear in your instructions. Your program will cause less anxiety and be more effective.

Simple Division

Listing 3 provides an example of the type of program I have been describing in this article. Its goal is to provide drill and practice in simple division problems in which the quotient (answer) and divisor must both be whole numbers between 0 and 12. In addition, a tutorial display graphically illustrates a given problem, should that problem be missed. Please note the use of subroutines as modules to accomplish specific tasks.

Figure 3 is a flowchart of the main program. If you compare it to Figures 1 and 2, you will find the basic program still intact. However, by using a subroutine module for each function, altering the basic program to handle other tasks becomes relatively easy.

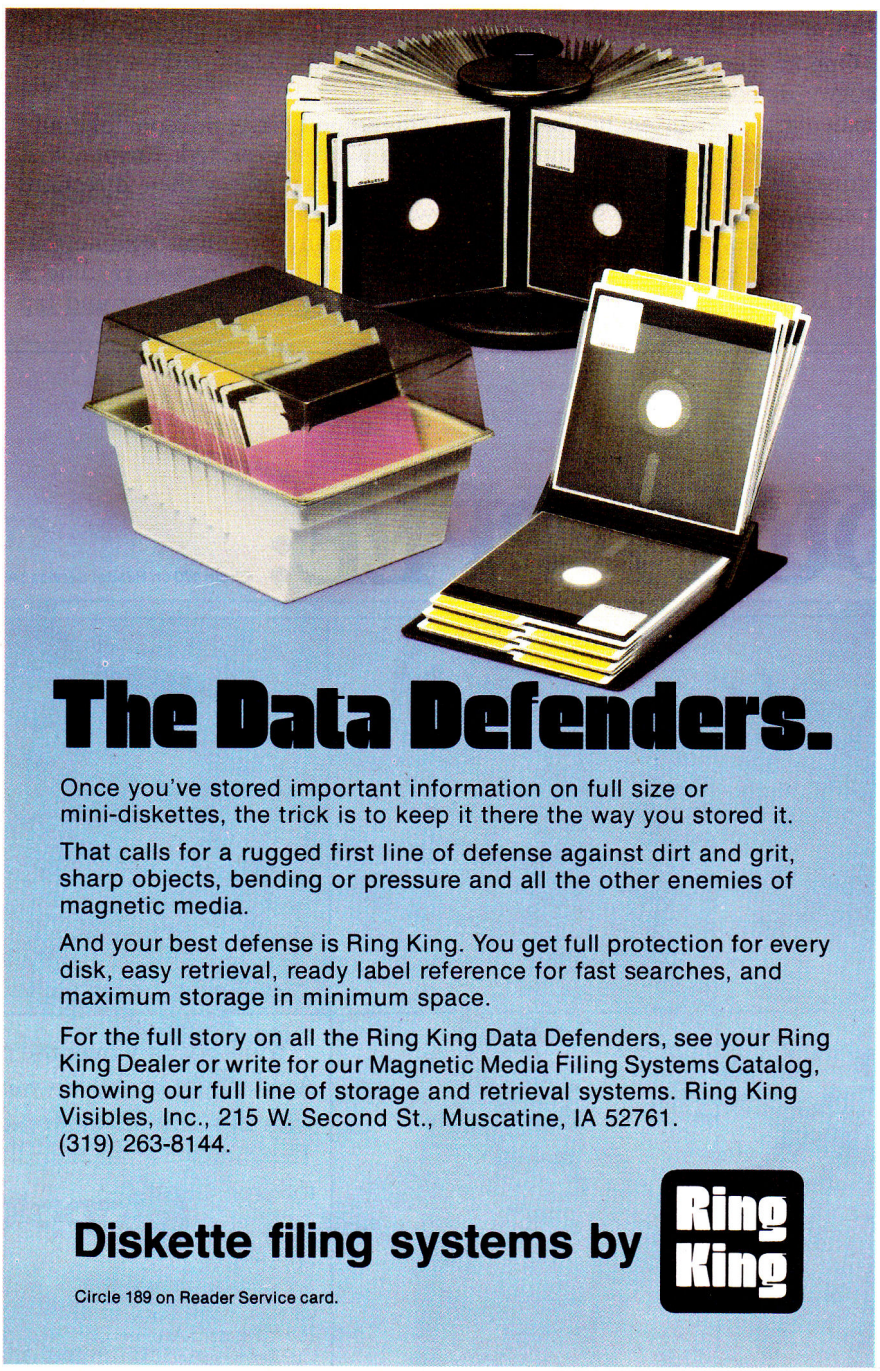
With generalization in mind, this program incorporates an additional variable, D, in the problem generation subroutine. This variable is used in the evaluation subroutine to specify the degree of precision with which the student's response must match the calculated answer. For this program that tolerance must be zero. That is, since the program deals with whole numbers, the answer must be exact. Other applications might allow more latitude.

In addition to presenting the number of correct answers, the scoreboard routine also calculates the percentage (rounded to the nearest one percent). The student is allowed two attempts on each problem, after which, if the problem still has not been worked correctly, the tutorial routine appears. If the problem is answered correctly on the second attempt, the student receives half credit for that problem.

Conclusion

The number of possibilities for educational programs is virtually limitless. Ideally the day will come when every parent, teacher and tutor will be sufficiently comfortable with the microcomputer to have a library of personally designed programs ready to use. Only then will the microcomputer have achieved its tremendous potential in the field of education.

Next month, as mentioned, I'll discuss program design features that can be incorporated into non-math-oriented educational programs. Keep this article handy, though, because I'll use the same basic program format. The main features to be changed are those relating to problem generation and response evaluation. ■



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Straight talk about printers

Call for Prices

An inconvenience? Sometimes. We post the "call for prices" because manufacturers demand it. In fact, it makes sense to call anyway since our prices do change, usually for the better. Call toll free, **(800) 343-0726**.

Dot Matrix Printers

The Apple II/II+/IIe interfaces best in parallel, period. "Smart" interface cards produce graphic screen dumps. They're prefered if you can use them.

Check on software compatability *before* you buy the hardware—it's your responsibility. Call the software vendor or manufacturer & get some recommendations.

EPSON

FX, RX & MX

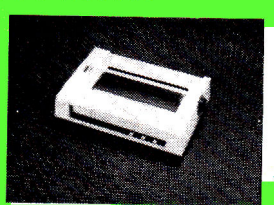


The **MX-80** is gone. In its place is the **RX-80**, which has 100 cps print speed. That's the only difference. **MX-80F/T**'s & **MX-100**s are still available, at least so far...

The **FX-80** is hard to get, but it is out there. It features 160 cps, a correspondence font & all the previous features of the old MX, including italics, emphasized print, etc... The tractor is optional. (The **FX-100** is the 136 column version).

C. ITOH

Prowriter

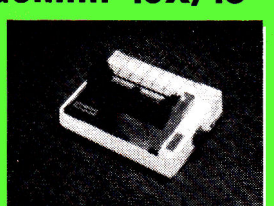


C. Itoh has produced a winner. The **Prowriter** has speed (120 cps), a buffer (1.5K), 10, 12, & 16 cpi (plus a correspondance font) and graphics (160x144 dpi). It's the printer of choice for several major OEMs (like Apple). The **Prowriter 2** has the same specs, but in a 132 column format. Popularity is its only curse: the **Prowriter** can be hard to get at times.

Prowriter **$399.88**
Prowriter 2 ..... **$719.88**

STAR MICRONICS

Gemini 10X/15



Gemini 10X is a new release of an old favorite. The 120 cps is the big change. They dropped the proportional font but kept the correspondance font. The 120x144 dpi, 5 fonts (w/italics) & 1K buffer are standard. **Gemini**'s comes with tractors & uses plain spool ribbons. The **Gemini 15** is the 132 column version. Call for the latest & greatest in prices.

OKIDATA

Microline Series



We use these printers in our offices. The **Microline 82A** (80 col) & **83A** (132 col) are data crunchers, with two interfaces (parallel or RS-232C), 120 cps, 10 & 16 cp (w/double-width) & optional dot-addressable graphics.

The **Microline 92** (80 col) & **93** (132 col) are ideal for word processing. They offer a 160 cps draft mode, a 40 cps correspondance mode & the dot-addressable graphics are included.

The **Microline 84** (132 col) combines speed (200 cps) with 10, 12, 16 cpi (w/double-width), all with a correspondance mode, plus dot addressable graphics.

Microline 80. ..... **$339.88**
Microline 82A **$419.88**
Microline 83A **$679.88**
92/82A Tractor **$59.88**
82A/83A ROMs **$49.88**
Microline 92. ..... **$524.88**
Microline 93A **$884.88**
Microline 84 ..... **$1024.88**

MANNESMANN TALLY

MT-160 L



The **MT-160 L** is the newest of the correspondence quality printers. It has speed (160 cps), 8 fonts (including a correspondance font), parallel & serial interfaces, friction/tractor feed, plus a menu-driven installation for easy set-up from the control panel—no more digging around for dip switches. It's remarkably compact & efficient, & the print quality is superior. This year's sleeper. The **MT-180 L** is the 136 column version.

MT-160 L **$689.88**
MT-180 L ..... **$CALL**

We sell other dot matrix printers, including the **Anadex WP-6000, DP-9501, DP-9620 & DP-9625** & **IDS's Prism 80, Prism 132 & MicroPrism**. You can 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.

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.)

Starwritter Parallel **$1219.88**
Printmaster Parallel **$1679.88**

DATA TERMINALS & COMMUNICATIONS

DTC 380Z



The **380Z** is a letter-quality printer that rivals and replaces the Daisywriter 2000. It has the 48K buffer, Diablo emulation & uses the Brother/Daisywriter supplies. The documentation is great, & the **380Z** even has pin-outs on the back for easy interfacing (parallel or RS-232C). Eat your heart out Daisy!

DTC 380Z (Parallel) **$1119.88**

SILVER REED

EXP-550

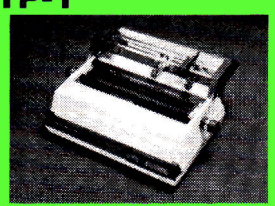


Why buy a Transtar when you can buy from the guys who make them? The Silver Reed **EXP-550** is a 16 cps, 132 column letter-quality printer with *true* Diablo emulation, making it compatible with most word processing software. It's ideal for medium duty office work. Add a buffer & you'll have a versatile printing system. If speed's not a factor, the **EXP-500** at 80 col & 12 cps is available as well.

EXP-550 (Parallel) **$719.88**
EXP-500 (Parallel) **$459.88**

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 ..... **$CALL**
TP-2 ..... **$CALL**

We sell a variety of other letter-quality printers, including the **Comrex ComRiter, Diablo 620 & 630**, the **NEC 3530, 3550 & 7730**, the **Qume 11+** & many others. Call **(603) 881-9855** for technical details. For prices, or to order, call **(800) 343-0726**.

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, but the **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

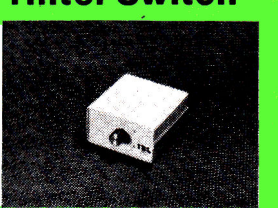
Parallel Card

We aren't stuck on a single vendor here. Tymac, Quadram or Microtek parallel cards all perform well.

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.

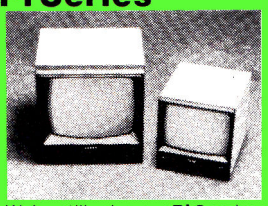
8K parallel/parallel **$154.88**
64K parallel/parallel **$219.88**
9 Volt Power Supply **$19.88**

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" ambef) **$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**

TAXAN

Monitors

A new product line that's getting raves. The RGBs are probably not for most of you. The green & amber screens are priced right. Good performers.

RGB-I (Med-res) **$319.88**
RGB-III (Hi-res) **$519.88**
KG-12N (12" green) **$129.88**
KG-12NUY (12" green) **$129.88**

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 & RS-232C cable are optional.

Smartmodem (300 baud) **$219.88**
Smartmodem (1200 baud)... **$539.88**

NOVATION

Apple Cat II

Answering the Hayes challenge, Novation swee ened 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**
(1200 baud) **$499.88**
AutoCat
(300 baud) **$229.88**
(1200 baud) **$629.88**

RS-232C Communication
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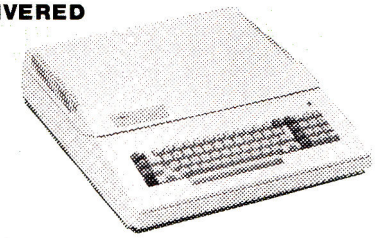
Peripherals

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.

Ace 1000 ..... **$CALL**

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**

MasterCard VISA AMERICAN EXPRESS

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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All our equipment is shipped with full manufacturer's warranty, & we sell only what we're authorized to sell to insure full warranty support. We're authorized for warranty work on a number of printers, & we also offer extended warranty plans for most printers.

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Interaction – A Child's World

by Michael A. Seeds and Kathryn Anne Seeds

Laughing Bear



Laughing Bear is a spelling game for children, but anyone might find it interesting because its utilities can be used in other programs and it illustrates certain ideas that are important in games for all ages. In particular, it contains a machine language music utility that plays short tunes and uses the two hi-res screens for animation. In case you don't have a graphics pad, a program called Plotter Zap is included that lets you draw pictures to the hi-res screen and save them to animate your own programs.

First a note about Laughing Bear (Listing 1). The program presents a child with short words selected at random from a list and invites him/her to type the word. As in any game, rewards are important, but especially when the player is a pre-schooler. The rewards in this program are a three-note phrase for each correct letter, a longer tune for a correct word and the face of a laughing bear as the player progresses. To maintain interest, the tunes become more complex after five correct words and again after ten words. After ten correct words the bear appears at random moments and winks at the child.

In addition to a carrot, the program also uses a stick—just a mildly ugly tone for a wrong letter.

One of us (K.A.S.) is three years old and thinks this game is neat, but it may not challenge *you*. Nevertheless, notice that the same structure of progressive rewards can be adapted to more sophisticated games and programs. In fact, you can use the same music program and animation methods to create alarms and blast space colonies to dust.

The music program, Tootle (Listing 2), consists of two parts. Part one begins at $30A and plays a single note whose period of vibration is stored in $306 and number of cycles in $305. Table 1 gives the data for a range of musical notes. The second part of Tootle begins at $326. It plays the list of notes stored at the address located

Note	Period(hex)	No. of Cycles in Quarter Note(hex)
D	51	3B
C	5B	34
B	60	32
A	6C	2C
G	79	27
F	88	23
E	90	21
D	A2	1D
Middle C	B6	1A
B	C0	19
A	D8	16
G	F3	14

Table 1. Musical notes data.

Address correspondence to Michael A. Seeds, Associate Professor of Astronomy, Franklin and Marshall College, PO Box 3003, Lancaster, PA 17604.



LAST NIGHT, 39 MUSICIANS HAD A COMPUSERVE CONFERENCE, SO DID 31 M.D.S, 49 SPORTS FANS AND 640 APPLE POLISHERS, AND NO ONE HAD TO LEAVE HOME.

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And besides electronic forums, they leave messages for each other on our national bulletin board, "talk" informally on our CB simulator, and communicate via CompuServe's electronic mail.

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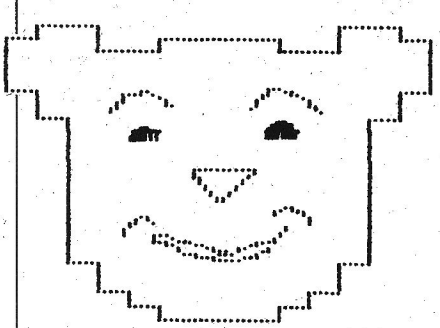
An H&R Block Company

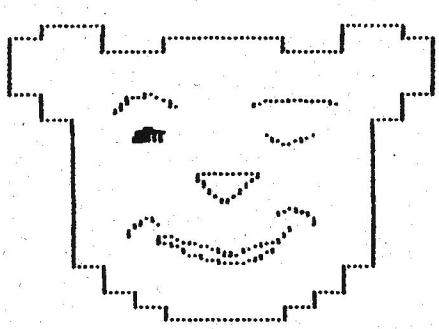
Circle 124 on Reader Service card.

```
1000  REM  ********************
1010  REM  *                  *
1020  REM  *  LAUGHING BEAR   *
1030  REM  *                  *
1035  REM  *       BY         *
1037  REM  *   MIKE SEEDS     *
1038  REM  *                  *
1040  REM  ********************
1045  REM
1050  HOME : HGR : VTAB 10: HTAB 10: PRINT "HI KATIE": TEXT
1053  PRINT  CHR$ (4);"BLOAD BEAR 1": GOSUB 6000: VTAB 24: PRINT "HOW ARE
    YOU?"
1054  PRINT  CHR$ (4);"BLOAD BEAR 2,A$4000"
1055  DIM A$(100)
1060  HOME : VTAB 10: HTAB 13: PRINT "HERE WE GO": TEXT
1065  PRINT  CHR$ (4);"BLOAD TOOTLE"
1070  READ JJ: FOR J = 1 TO JJ: READ A$(J): NEXT J
1080  DATA  28
1090  DATA   "CAT","DOG","BIG","EAT","RUN","SHE","SUN","THE","AND","GO","O
    FF","HIS","HER","YOU","FOR","WILL","NOT","WAS","RED","HAD","RUN","SEE
    "
1100  DATA  "SIT","SAW","WHY","WET","YES","COW"
1200  POKE 7,3:K = 0
1210  TEXT : HOME :K = K + 1
1220  VTAB 10: HTAB 18
1230 J =  INT (JJ *  RND (1)) + 1
1240  PRINT A$(J)
1250 I = 1:II =  LEN (A$(J))
1260  POKE 6,75: CALL 806: REM  TWEET
1265  GOSUB 5000: REM  DELAY
1270  VTAB 12: HTAB 17 + I: PRINT "?": GET B$
1280  IF B$ <  >  MID$ (A$(J),I,1) THEN 1330
1290  CALL 806: REM  TWEET
1300  VTAB 12: HTAB 17 + I: PRINT B$
1310 I = I + 1: IF I > II THEN 1360
1320  GOTO 1270: REM  NEXT WORD
1330  POKE 6,64: CALL 806: REM  WRONG!
1340  POKE 6,75
1350  GOTO 1270: REM  GET ANOTHER LETTER
1360  GOSUB 5000
1362  IF K > 10 THEN 1365
1364  IF 10 *  RND (1) + 1 > 6 THEN  GOSUB 6000: GOSUB 5000: TEXT
1365  ON K / 5 + 1 GOSUB 2000,3000,4000
1367  IF K >  = 15 THEN  GOSUB 4000
1370  GOTO 1210: REM  NEXT WORD
1997  REM
1998  REM
1999  REM  REWARD 1
2000  POKE 6,84: CALL 806: GOSUB 5000: RETURN
2997  REM
2998  REM
2999  REM  REWARD 2
3000  POKE 6,103: CALL 806: GOSUB 5000: RETURN
3997  REM
3998  REM
3999  REM  REWARD 3
4000  IF 10 *  RND (1) + 1 > 6 THEN  GOSUB 7000
4020  POKE 6,132: CALL 806: GOSUB 5000: RETURN
4997  REM
4998  REM
4999  REM  DELAY
5000  FOR L = 1 TO 300: NEXT L: RETURN
5997  REM
5998  REM
5999  REM   DISPLAY SCREEN 1
6000  POKE  - 16300,0: POKE  - 16297,0: POKE  - 16304,0: RETURN
6997  REM
6998  REM
6999  REM  WINK
7000  GOSUB 6000: GOSUB 5000: POKE 49237,1: GOSUB 5000: POKE 49236,1: RETURN
```

Listing 1. Laughing Bear program.



Bear 1



Bear 2

```
*30ALL

030A-   AD 06 03    LDA   $0306
030D-   8D 07 03    STA   $0307
0310-   CE 07 03    DEC   $0307
0313-   EE 07 03    INC   $0307
0316-   CE 07 03    DEC   $0307
0319-   D0 F5       BNE   $0310
031B-   AD 30 C0    LDA   $C030
031E-   CE 05 03    DEC   $0305
0321-   10 E7       BPL   $030A
0323-   60          RTS
0324-   00          BRK
0325-   00          BRK
0326-   A0 00       LDY   #$00
0328-   B1 06       LDA   ($06),Y
032A-   F0 10       BEQ   $033C
032C-   8D 06 03    STA   $0306
032F-   C8          INY
0330-   B1 06       LDA   ($06),Y
0332-   8D 05 03    STA   $0305
0335-   C8          INY
0336-   20 0A 03    JSR   $030A
0339-   4C 28 03    JMP   $0328
033C-   60          RTS
033D-   00          BRK
033E-   00          BRK
```

Listing 2. Music program, Tootle.

```
*340.3BF

0340- B6 1A B6 1A B6 1A B6 1A
0348- B6 1A 00 6C 2C 60 32 5B
0350- 34 51 3B 00 88 23 88 23
0358- 88 23 88 23 6C 2C 5B 34
0360- 5B 34 6C 2C 88 23 00 B6
0368- 1A B6 1A 79 27 79 27 6C
0370- 2C 6C 2C 79 4E 88 23 88
0378- 23 90 21 90 21 A2 1D A2
0380- 1D B6 34 00 B6 1A B6 1A
0388- A2 1D 90 21 B6 1A 90 21
0390- A2 3A B6 1A B6 1A A2 1D
0398- 90 21 B6 34 C0 32 B6 1A
03A0- B6 1A A2 1D 90 21 88 23
03A8- 90 21 A2 1D B6 1A C0 19
03B0- F3 14 D8 16 C0 19 B6 34
03B8- B6 34 00 00 00 00 00 00
```

Table 2. Tunes hex dump.

at $006 (low order byte) and at $007 (high order byte). The tunes for this game are located in page $03 and are shown in the hex dump (Table 2).

Notice that Tootle is loaded automatically as the main program begins and that the calls to play tunes are illustrated in lines 1260, 1330, 2000, 3000 and 4000. The subroutine at 5000 is just a short delay necessary for us humans. I've used this program to generate all kinds of sounds, including alarms in programs that run laboratory equipment. Whether the sound is an alarm or a reward depends on its audio quality and on how you use it.

The graphic rewards in this program consist of two drawings of the bear's face. Bear 1 is the face with

```
10  REM  PLOTTER ZAP
15  REM  BY MIKE SEEDS
20  REM  FRANKLIN & MARSHALL COL
25  REM  P.O.BOX 3003
30  REM  LANCASTER, PA 17604
35  REM
40  HOME
50  GOSUB 4000
100  HGR : HCOLOR= 3:X = 140:Y = 80:CH = 3:P = 0
110 C$(1) = "OFF":C$(2) = "ON "
200  GOTO 700
500  VTAB 15: GET A$: XDRAW 1 AT X,Y
510  IF A$ = "P" THEN P = 1
520  IF A$ = "N" THEN P = 0
530  IF A$ = "S" THEN  GOSUB 800
535  IF A$ = "L" THEN  GOSUB 900
540  IF A$ = "J" THEN X = X - 1
550  IF A$ = "K" THEN X = X + 1
560  IF A$ = "I" THEN Y = Y - 1
570  IF A$ = "M" THEN Y = Y + 1
580  IF A$ = " " THEN CH = CH + 1
590  IF CH > 7 THEN CH = 0
600  HCOLOR= CH: VTAB 21: PRINT "HCOLOR=";CH
610 X = X - 279 *  INT (X / 279):Y = Y - 159 *  INT (Y / 159)
700  VTAB 22: PRINT "X="X"  Y="Y"     "
710  VTAB 23: PRINT "PLOTTER IS "C$(P + 1)
720  IF P = 1 THEN  HPLOT X,Y
730  XDRAW 1 AT X,Y
740  GOTO 500
800  HOME : VTAB 24: INPUT "FILE NAME (NO COMAS)(SPACE=ESCAPE)";B$
805  HOME
810  IF B$ = " " OR B$ = "" THEN  RETURN
820  PRINT  CHR$ (4);"BSAVE ";B$;",A$2000,L$2000"
830  RETURN
900  HOME : VTAB 24: INPUT "FILE NAME (NO COMAS)(SPACE=ESCAPE)";B$
905  HOME
910  IF B$ = " " OR B$ = "" THEN  RETURN
920  PRINT  CHR$ (4);"BLOAD ";B$
930  RETURN
4000  REM  SET UP SHAPE TABLE
4010  DATA  1,0,4,0,48,57,34,43,0
4020  FOR J = 1 TO 9: READ X: POKE 767 + J,X: NEXT J
4030  POKE 232,0: POKE 233,3
4040  ROT= 0: SCALE= 1
4050  RETURN
```

Listing 3. Plotter Zap.

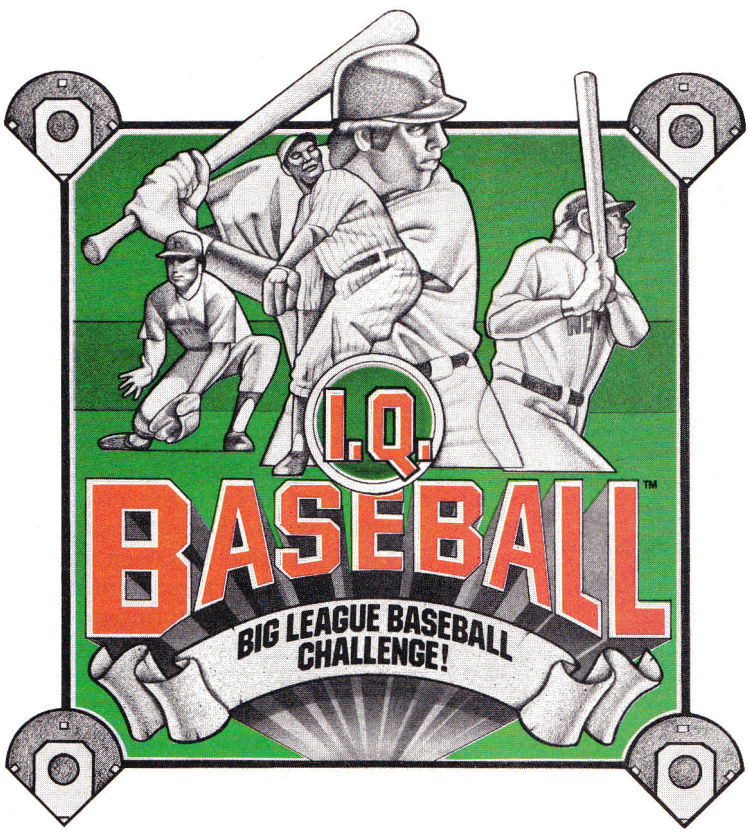
both eyes open, and Bear 2 is the face with one eye shut. Line 6000 displays Bear 1 and line 7000 switches to hi-res screen 2 to make the bear wink. Switching between pictures is a quick way to add action to simple games.

If you don't own a graphics pad, you can still draw pictures using a program like Plotter Zap shown in Listing 3. Use the I, J, K and M keys and move the cursor, turn the plotter on with the P key and off with the N key, and change colors by hitting space. You can save your picture to disk with the S key or load a previous picture with the L key. Notice how the main program loads pictures in lines 1053 and 1054.

You also can use the cursor from Plotter Zap in other programs. The subroutine beginning at line 4000 pokes the shape table into memory and you can then move a non-erasing cursor over your pictures and graphs. This is a handy feature for selecting specific data points from technical graphs.

Laughing Bear is just for kids and I hope your kids enjoy it. The programming methods behind the screen, however, are generally useful for programs of all kinds and programmers of all ages. ■

Circle 68 on Reader Service card.



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Apple Interactive Testing

The new emphasis on individualized education brings with it a new burden—individualized testing. Using the Apple to administer these tests—when the student is ready—makes good sense.

by Michael L. Waugh

Listing 1. Quiz Teacher Menu.

```
100  REM   *** PROGRAMMED BY M.WAUGH,12/82 ***
110  HOME
120  PRINT "*************************************
130  PRINT "*          TEACHER MENU             *
140  PRINT "*          ------------             *
150  PRINT "*  (1) SYSTEM INFORMATION           *
160  PRINT "*                                   *
170  PRINT "*  (2) DELETE OLD 'USERS' AND       *
180  PRINT "*            'RESULTS' FILES        *
190  PRINT "*                                   *
200  PRINT "*  (3) ENTER AUTHORIZED             *
210  PRINT "*           STUDENT LISTS           *
220  PRINT "*                                   *
230  PRINT "*  (4) CHECK STUDENT USAGE          *
240  PRINT "*                                   *
250  PRINT "*  (5) CHECK QUIZ RESULTS           *
260  PRINT "*                                   *
270  PRINT "*  (6) QUIT                         *
280  PRINT "*                                   *
290  PRINT "*************************************
300  PRINT : INPUT "YOUR CHOICE ";X
310  ON X GOTO 330,650,900,1430,1440,1650
320  GOTO 1650
330  REM  *** RTN TO CALL INFO FILE ***
340  REM   *** IF NO 'INFO' FILE USED, THEN REPLACE THIS LINE WITH A 'GOTO100' ***
350  ONERR  GOTO 610
360 D$ =  CHR$ (4)
370 R$ =  CHR$ (13)
380 CA$ =  CHR$ (11)
390  HOME
400 NF$ = "INFO"
410  PRINT D$"OPEN";NF$
420  PRINT D$;"READ";NF$
430 L$ = ""
440  GET C$
```

Listing continued.

I designed the Apple Interactive Quiz program to use a sequential text file named Quiz, which is full of test items that the teacher would like to administer to students. It will not create the test items for the file, so the burden of test creation falls on the teacher. However, once this sequential text file has been created, the Apple Interactive Quiz program does the administration and grading of the quiz.

Sequential Text Files

How can teachers create sequential text files and, specifically, what should be put in them? Here are a few references for those who might need them. Chapter 6 of the *Apple DOS Manual* is a good place to start. Also, the book *Apple Basic: Data File Programming*, authored by Finkel and Brown, is an excellent tutorial text on the subject.

One easy method of creating sequential text files is to use a word processing program. The program I use is called Superscribe, although it is now released under the name Screenwriter II. This program produces sequential text files and has excellent editing capabilities that make it ideal for creating and modifying Quiz files. If you already own a word processor pro-

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Circle 280 on Reader Service card.

Listing continued.

```
450  IF C$ = R$ THEN 480
460 L$ = L$ + C$
470  GOTO 440
480  PRINT R$;D$
490  PRINT CA$;L$
500 L = L + 1: IF L <  > 20 THEN  PRINT D$: GOTO 420
510  PRINT : INVERSE : PRINT "PRESS ANY KEY FOR MORE";: FLASH : PRINT "ESC TO QUIT";: NORMAL
520  GET X$: IF X$ = "" THEN 520
530  IF X$ =  CHR$ (27) THEN L = 0: PRINT D$"CLOSE": GOTO 100
540 L = 0: HOME : PRINT D$: GOTO 420
550  REM  *** NORMAL END OF RTN ***
560  PRINT : FLASH : PRINT "END OF INFO.": NORMAL
570  PRINT "PRESS ANY KEY.";
580  GET X$: IF X$ = "" THEN 580
590  HOME : GOTO 100
600  REM  *** ERROR HANDLING RTN ***
610 OOPS =  PEEK (222)
620  PRINT D$"CLOSE";NF$
630  IF OOPS = 5 THEN  GOTO 560
640  PRINT "ERROR NUMBER ";OOPS;" OCCURRED.": END
650  REM  *** RTN TO DEL USERS/RESULTS FILES ***
660  HOME
670  PRINT : PRINT "ARE YOU SURE YOU WANT TO"
680  PRINT "DELETE THESE FILES?"
690  PRINT : FLASH : PRINT "PRESS 'D' TO DELETE": NORMAL
700  PRINT : PRINT "PRESS ANY OTHER KEY FOR MENU";
710  GET X$: IF X$ = "" THEN 710
720  IF X$ <  > "D" THEN 100
730  HOME
740  VTAB 11: PRINT  TAB( 7)"OLD 'USERS' AND 'RESULTS'"
750  PRINT  TAB( 7)"FILES ARE BEING DELETED."
760 ZZ = 1
770  IF ZZ = 1 THEN F$ = "USERS": GOTO 790
780 F$ = "RESULTS"
790 D$ =  CHR$ (4)
800  PRINT D$;"OPEN ";F$;",D1"
810  PRINT D$;"DELETE ";F$
820  PRINT D$;"OPEN ";F$
830 N$ = ""
840  PRINT D$;"WRITE ";F$
850  PRINT N$
860  PRINT D$:ZZ = ZZ + 1
870  HOME : IF ZZ < 3 THEN  GOTO 770
880  PRINT D$;"CLOSE"
890  GOTO 100
900  REM  *** RTN TO ENTER NAMES OF AUTHORIZED STUDENTS ***
910  HOME : PRINT "THIS OPTION CREATES A SEQUENTIAL": PRINT "TEXT FILE NAMED 'QUIZAUTH'": PRINT
     "CONTAINING A LIST OF STUDENTS": PRINT "AUTHORIZED TO TAKE THIS QUIZ.": PRINT
920  PRINT "EACH TIME THIS OPTION IS CHOSEN": PRINT "IT 'RECREATES' THIS FILE, THUS"
930  PRINT "DESTROYING ANY NAMES PREVIOUSLY": PRINT "STORED IN IT.": PRINT
940  FLASH : PRINT "PRESS 'R' TO RECREATE THIS FILE": NORMAL
950  PRINT : PRINT "PRESS ANY OTHER KEY FOR MENU";
960  GET X$: IF X$ = "" THEN 960
970  IF X$ <  > "R" THEN 100
980  HOME
990  INVERSE : PRINT "ENTER STUDENT NAMES": NORMAL
1000  PRINT
1010  PRINT "WHEN PROMPTED, ENTER THE NAMES"
1020  PRINT "(LAST NAME/SPACE/FIRST INITIAL)"
1030  PRINT "OF ALL THE STUDENTS WHO WILL TAKE"
1040  PRINT "THE QUIZ  (E.G. SMITH S)."
1050 F$ = "QUIZAUTH"
1060 D$ =  CHR$ (4)
1070  PRINT D$;"OPEN ";F$;",D1"
1080  PRINT D$;"DELETE ";F$
1090  PRINT D$;"OPEN ";F$
1100  PRINT : INPUT "HOW MANY STUDENTS WILL BE ENTERED --> ";TN
1110  IF TN = 0 THEN  HOME : GOTO 1210
1120  FOR I = 1 TO TN
1130  PRINT "STUDENT ";I;" --> ";
1140  INPUT N$
```

Listing continued.

gram, check if it can create documents as text files. If your word processor writes only binary files, it will not create Quiz files for use with the Apple Interactive Quiz program.

Test Format

Whether you use a word processor or a program of your own design to create your Quiz files, you must know the format that constitutes a complete test item. Several University of Georgia associates and I have standardized our mutual programming efforts by using the following test item format. Regardless of the type of objective test item you desire to store in the Quiz files (multiple choice, matching, true/false or fill-in-the-blank) the computer will examine the contents of the files for two recurring flags. A XXX will signal the end of a question, and a STOP// will signal the end of the answer (the whole test item). In other words, each test item should possess the following four main parts:

1) question and (if appropriate) response choices
2) XXX
3) the correct answer
4) STOP//

A specific example of the correct format is shown below.

Who is buried in Grant's tomb?
A) C.S. Grant
B) U.S. Grant
C) John Jones
D) Fred Smith
XXX
B
STOP//

Each successive quiz item is simply a repetition of these four main parts. All test items should be typed in capital letters, but any necessary punctuation may be used in the questions and responses. Also, do not number the test items in the Quiz files, because the program will do this for you.

The System

When placed on a disk with your Quiz file, the two programs included here, Apple Interactive Quiz and Quiz Teacher Menu, constitute an interactive testing system.

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Listing continued.

```
1150 DU$ =  RIGHT$ (N$,2)
1160  IF DU$ =  CHR$ (32) +  CHR$ (32) THEN N$ = "": HOME : PRINT "TYPE THE ";: INVERSE : PRINT
     "LAST NAME,": NORMAL : PRINT "THEN A 'SPACE',": PRINT "THEN THE ";: INVERSE : PRINT "FIRST
     INITIAL.": NORMAL : PRINT : GOTO 1130
1170  IF  LEFT$ (DU$,1) <  >  CHR$ (32) THEN N$ = "": HOME : PRINT "TYPE THE ";: INVERSE : PRINT
     "LAST NAME,": NORMAL : PRINT "THEN A 'SPACE',": PRINT "THEN THE ";: INVERSE : PRINT "FIRST
     INITIAL.": NORMAL : PRINT : GOTO 1130
1180  PRINT D$;"WRITE ";F$
1190  PRINT N$: PRINT D$
1200  NEXT I
1210  PRINT D$: INPUT "MORE NAMES ? (Y/N) ";MN$: IF MN$ = "N" OR MN$ = "NO" THEN 1230
1220  HOME : GOTO 1100
1230  PRINT D$;"CLOSE"
1240  ONERR  GOTO 1380
1250  HOME
1260  PRINT "THE NAMES YOU HAVE ENTERED": PRINT "ARE LISTED BELOW.": INVERSE : PRINT "USE CTRL-S
     TO STOP/START SCROLL": NORMAL : PRINT : PRINT "CHECK SPELLING CAREFULLY!": PRINT
1270  PRINT D$;"OPEN ";F$
1280  PRINT D$;"READ ";F$
1290  INPUT C$
1300  PRINT D$: PRINT C$
1310  GOTO 1280
1320  REM  *** NORMAL END OF RTN ***
1330  PRINT : FLASH : PRINT "NORMAL END OF FILE DETECTED.": NORMAL
1340  PRINT : PRINT "PRESS ANY KEY";
1350  GET X$: IF X$ = "" THEN 1350
1360  GOTO 1420
1370  REM  *** ERROR HANDLING RTN ***
1380 OOPS =  PEEK (222)
1390  PRINT D$;"CLOSE ";F$
1400  IF OOPS = 5 THEN  GOTO 1330
1410  PRINT "ERROR NUMBER ";OOPS;" OCCURRED.": END
1420  GOTO 100
1430 NF$ = "USERS": GOTO 1450
1440 NF$ = "RESULTS"
1450  REM  *** RTN TO CHECK USERS & RESULTS FILES ***
1460  ONERR  GOTO 1600
1470 D$ =  CHR$ (4)
1480  INVERSE : PRINT "USE CTRL-S TO STOP/START SCROLL": NORMAL
1490  PRINT D$;"OPEN ";NF$
1500  PRINT D$;"READ ";NF$
1510  INPUT C$
1520  PRINT D$: PRINT C$
1530  GOTO 1500
1540  REM  *** NORMAL END OF RTN ***
1550  FLASH : PRINT "NORMAL END OF FILE DETECTED.": NORMAL
1560  PRINT : PRINT "PRESS ANY KEY";
1570  GET X$: IF X$ = "" THEN 1570
1580  GOTO 1640
1590  REM  *** ERROR HANDLING RTN ***
1600 OOPS =  PEEK (222)
1610  PRINT D$;"CLOSE ";NF$
1620  IF OOPS = 5 THEN  GOTO 1550
1630  PRINT "ERROR NUMBER ";OOPS;" OCCURRED.": END
1640  GOTO 100
1650  FLASH : PRINT "PROGRAM TERMINATED": NORMAL : END
```

Quiz Teacher Menu

This program offers a menu with six choice options.

- Option 1 reads a sequential text file named Info. Since no Info file is included with this article, you may either delete this option or create an Info file of your own. I find it helpful for storing critical system information that I like to keep with a disk. In this case, you might store the Quiz file item format, any essential information concerning your disk security schemes and so forth.
- Option 2 initializes sequential text files named Users and Results. This option must be executed before any students take the quiz. In effect, it creates files for the storage of student data. This choice also reinitializes or erases the previous contents of these files in preparation for collecting data on each new quiz.
- Option 3 allows a teacher to enter a list of those students who are authorized to take the quiz. The Apple Interactive Quiz program checks this list and allows authorized students to access the quiz only *once*! The program does prompt for the student's name, but teacher-assigned passwords might be more appropriate. Also, be sure to include several extra passwords in your authorized list to accommodate future needs.
- Option 4 reads and displays the contents of the sequential text file named Users. A student's name is added to the Users file when the Apple Interactive Quiz program *begins*. Therefore, it becomes a record of all students who began the quiz.
- Option 5 reads and displays the contents of the sequential text file named Results. Students' quiz results are recorded at the *end* of the program. Thus, in this option the teacher views a record of all students who complete the quiz successfully. It should be obvious that any discrepancy between the contents of the Users and Results files indicates an interrupted quiz. Should this occur, question the student carefully concerning the test circumstances.
- Option 6 terminates the program.

Apple Interactive Quiz

This program accomplishes the following major steps:

1) It warns the student not to remove the disk until the quiz is completed.
2) It presents general quiz instructions to the student.
3) It requests the student to input his/her name.
4) It records the student's name in the Users file
5) It administers the test items stored in the Quiz file.
6) It records the student's name and quiz results in the Results file.

This program possesses protection features that take effect once the program has begun to run. Line 120 disables the LIST command, and line 130 causes a reset to reboot the disk. For this reason, I recommend that the Apple Interactive Quiz program be used as the Hello program on a special quiz disk. Then, whenever the disk is booted, the program becomes unlistable.

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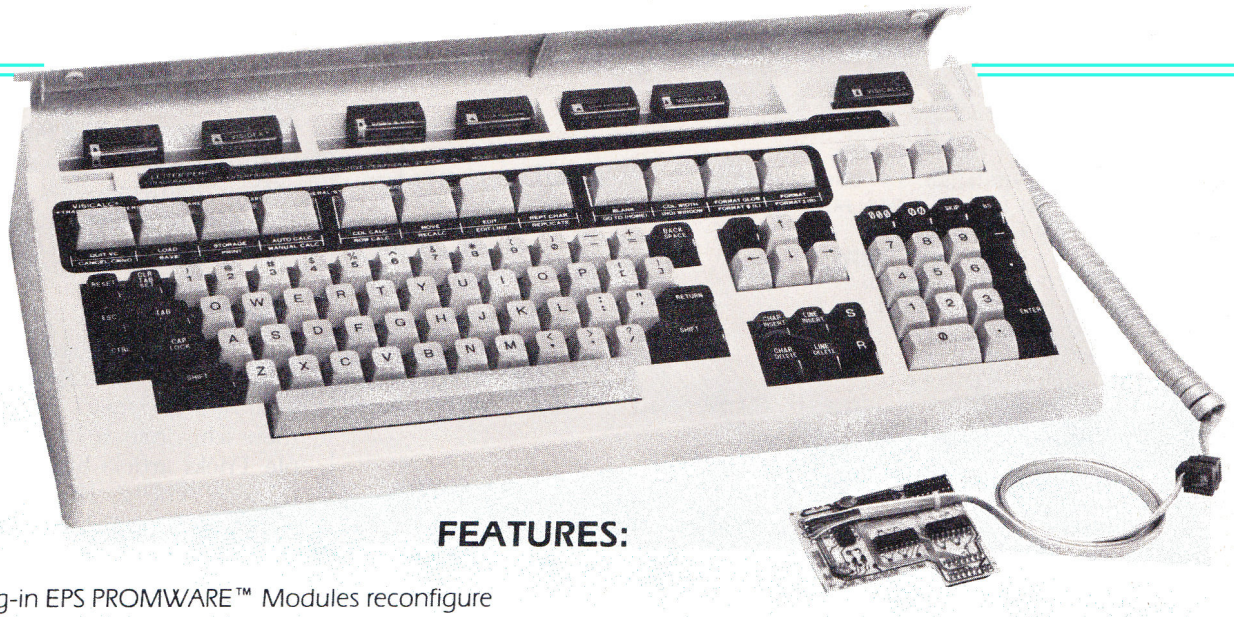

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Listing 2. Apple Interactive Quiz.

```
100  REM  *** SAVED AS INTERACTIVE ***
110  REM     *** PROGRAMMED BY M.WAUGH,12/82 ***
120  POKE 214,255: REM  *** LIST DISABLER ***
130  POKE 1011,224: REM  *** RESET REBOOTS DISK ***
140  GOTO 380
150  REM  *** SCREEN FORMATTING ROUTINE ***
160 B = 31
170 BZ = 31
180 BB = 35
190 L =  LEN (FL$)
200  IF L < BB THEN  PRINT  TAB( 4);FL$: RETURN
210  FOR I = B TO BB
220 DU$ =  LEFT$ (FL$,I)
230  IF  RIGHT$ (DU$,1) =  CHR$ (32) THEN C = I + 1:I = BB: NEXT I: GOTO 260
240  NEXT I: IF B < 0 THEN  PRINT  TAB( 4);FL$: GOTO 290
250 B = B - 5: GOTO 210
260 B = BZ: PRINT  TAB( 4);DU$
270  IF L - C > BB THEN 300
280  PRINT  TAB( 4); MID$ (FL$,C)
290  RETURN
300  FOR I = B TO BB
310 DU$ =  MID$ (FL$,C,I)
320  IF  RIGHT$ (DU$,1) =  CHR$ (32) THEN C = C + I:I = BB: NEXT I: GOTO 350
330  NEXT I
340 B = B - 5: GOTO 300
350 B = BZ: PRINT  TAB( 4);DU$
360  GOTO 270
370  REM  *** INITIALIZE VARIABLES ***
380 M = 0:Y = 0:R = 0:S = 0:P = 0:K = 1
```

Listing continued.

These two features will not totally secure the quiz system, because a student could use a control-C and CATALOG sequence to inspect and possibly wreak havoc on the disk. However, if one were to disable or change the CATALOG command, then the control-C interrupt would be of no value, because, without knowing what programs exist on a disk, it is difficult to access them for any purpose.

Quiz Security

Here again, I will not attempt to describe how to change the DOS commands, but rather offer references for those who desire to do so. Read the Apple Tricks article by Craig Crossman (*Nibble*, Vol. 2, No. 3), or the Disk Commander article by Preston Black (*Nibble*, Vol. 3, No. 6). In addition, Beagle Brothers' DOS Boss program modifies the DOS on any given disk. By modifying the CATALOG, DELETE, INIT and SAVE commands on the quiz disk, one can effectively prevent user access to the disk's catalog and several other potentially troublesome functions. This is a successful protection scheme; however, if you modify the DELETE command, you will need to change two lines in the Quiz Teacher Menu program. Lines 810 and 1080 both delete files. If you change this command then be sure to substitute the new command word in place of the word DELETE in these two lines.

"Line 120 disables the LIST command, and line 130 causes a reset."

Only one small problem remains with our altered DOS quiz protection scheme. Each time a disk is booted, a copy of the DOS on *that* disk is read into the Apple's memory. As long as the modified DOS from the quiz disk is in the Apple's memory, the quiz disk is secure. If a normal disk is booted first, then the CATALOG, DELETE, INIT and SAVE commands will function normally. In addition, since the Apple Interactive Quiz program has not run (the

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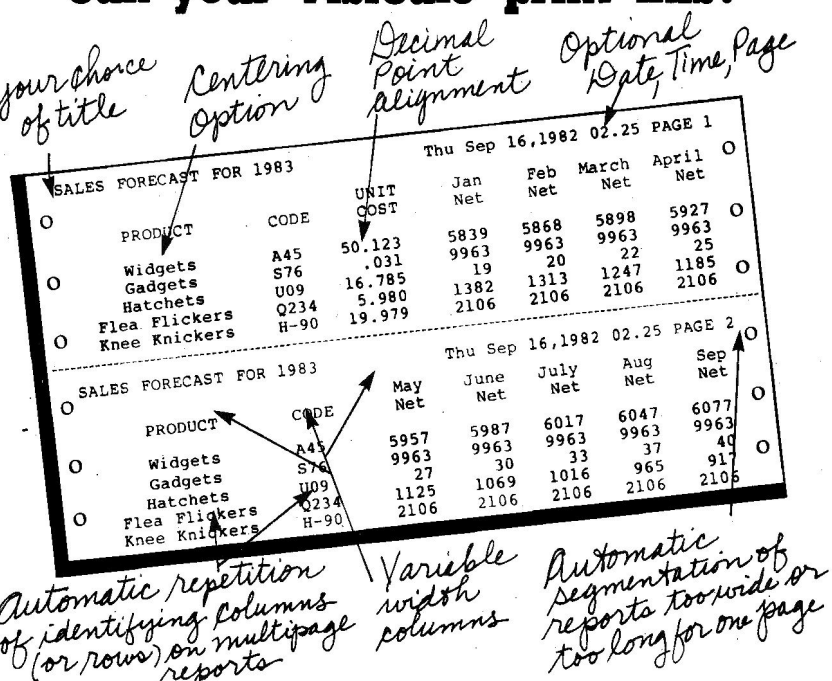

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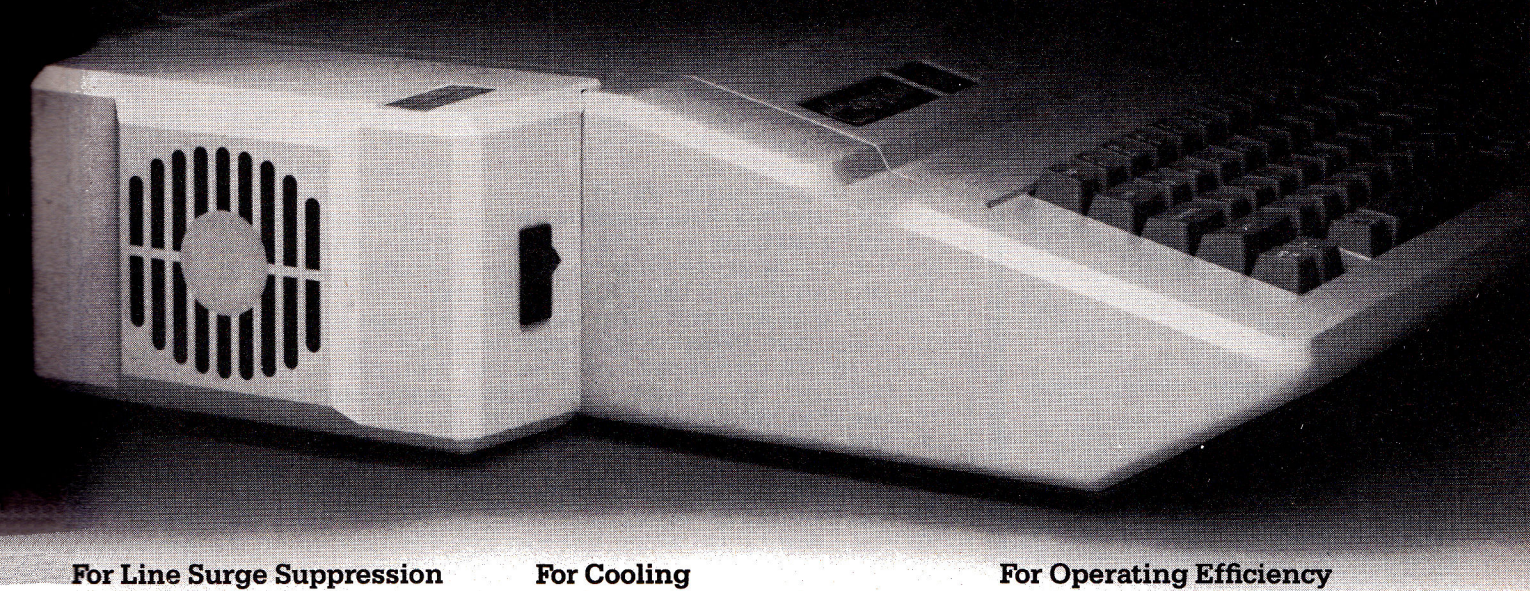

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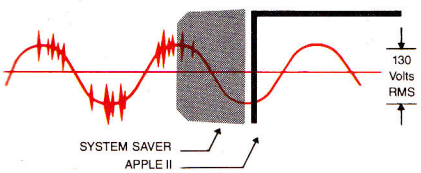

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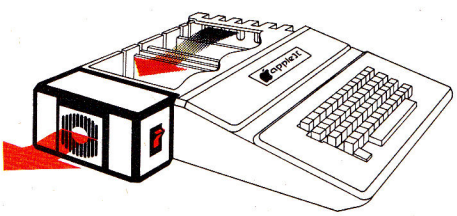

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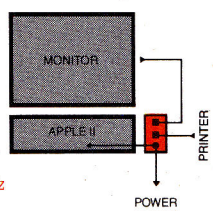

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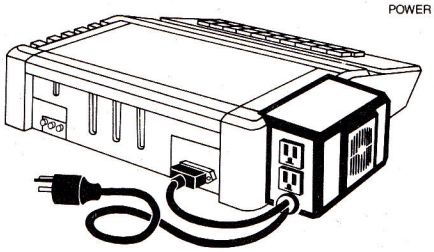

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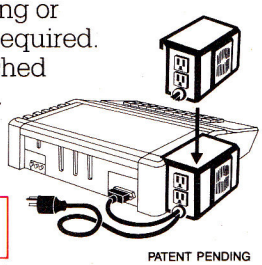

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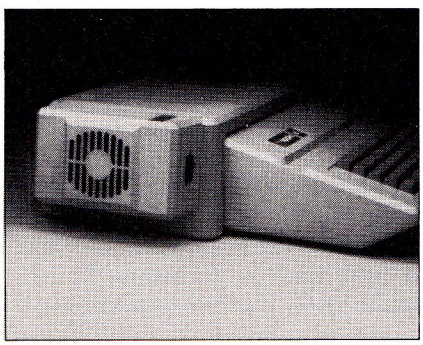

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Listing continued.

```
390 LN$ = "":FI$ = "":Z$ = ""
400 D$ = CHR$ (4)
410 DIM AN(25): DIM AN$(25): DIM QQ$(30): REM *** THIS SETS A 25 QUESTION QUIZ LIMIT ***
420 HOME : VTAB 9
430 PRINT "W   W  AA  RRR  N  N III N  N GGG
440 PRINT "W   W A  A R  R NN N  I  NN N G
450 PRINT "W W W AAAA RRR  N NN  I  N NN G GG
460 PRINT "WW WW A  A R  R N  N III N  N GGG
470 PRINT : PRINT : PRINT "DO NOT REMOVE THE QUIZ DISKETTE": PRINT "UNTIL YOU HAVE FINISHED
    TAKING": PRINT "THIS QUIZ !!"
480 FOR I = 1 TO 5000: NEXT I
490 REM *** ENTER DIRECTIONS HERE ***
500 HOME : PRINT "THIS PROGRAM WILL ASK YOU TO"
510 PRINT "ANSWER SEVERAL MULTIPLE CHOICE": PRINT "QUESTIONS.": PRINT
520 PRINT "WHEN THE QUESTION APPEARS,"
530 PRINT "TYPE IN THE ";: FLASH : PRINT "LETTER": NORMAL
540 PRINT "OF THE MOST CORRECT": PRINT "ANSWER CHOICE."
550 VTAB 22: PRINT  TAB( 13);"PRESS ANY KEY";
560 GET X$: IF X$ = "" THEN 560
570 HOME : PRINT  TAB( 3): INVERSE : PRINT "BIOLOGY II MULTIPLE CHOICE QUIZ": NORMAL : REM
     *** PUT THE NAME OF YOUR CLASS HERE ***
580 PRINT : PRINT  TAB( 8);"ENTER YOUR NAME BELOW"
590 PRINT  TAB( 8);"JUST LIKE THE SAMPLE."
600 PRINT : PRINT  TAB( 10);"LAST NAME: SMITH"
610 PRINT  TAB( 10);"FIRST INITIAL: J"
620 PRINT : PRINT : PRINT  TAB( 8);: INPUT "LAST NAME: ";LN$
630 REM *** INPUT TRAP ***
640 IF  RIGHT$ (LN$,1) =  CHR$ (32) THEN 670
650 DU$ =  RIGHT$ (LN$,2): IF  LEFT$ (DU$,1) =  CHR$ (32) THEN 670
660 GOTO 710
670 PRINT : PRINT : PRINT : FLASH : PRINT "DO NOT";: NORMAL : PRINT " TYPE   ANY   ";: INVERSE
    : PRINT "SPACES": NORMAL : PRINT "BEFORE   OR   AFTER   YOUR": PRINT "LAST NAME   OR
    FIRST INITIAL !!"
680 VTAB 22: PRINT  TAB( 13);"PRESS ANY KEY";
690 GET X$: IF X$ = "" THEN 690
700 GOTO 570
710 PRINT  TAB( 8);: INPUT "FIRST INITIAL: ";FI$
720 IF  LEN (FI$) > 1 THEN 670
730 LN$ = LN$ +  CHR$ (32) + FI$
740 DU$ =  RIGHT$ (LN$,2): IF  LEFT$ (DU$,1) <  > CHR$ (32) THEN LN$ = "": HOME : GOTO 580
750 HOME : VTAB 12: PRINT  TAB( 15);"PLEASE WAIT"
760 REM *** CHECK NAME FOR AUTHORIZATION ***
770 ONERR  GOTO 830
780 PRINT D$;"OPEN QUIZAUTH"
790 PRINT D$;"READ QUIZAUTH"
800 INPUT Z$
810 IF Z$ = LN$ THEN  PRINT D$;"CLOSE QUIZAUTH": GOTO 840
820 GOTO 800
830 PRINT D$;"CLOSE QUIZAUTH": HOME : VTAB 12: PRINT "YOU ARE NOT AUTHORIZED": PRINT " TO TAKE
    THIS QUIZ.": POKE 216,0: END
840 REM *** CHECK NAME FOR PRIOR USE ***
850 ONERR  GOTO 920
860 PRINT D$;"OPEN USERS"
870 PRINT D$;"READ USERS"
880 INPUT Z$
890 IF Z$ = LN$ THEN 910
900 GOTO 880
910 PRINT D$;"CLOSE USERS": HOME : VTAB 12: PRINT  TAB( 6);"YOU HAVE ALREADY TAKEN": PRINT
    "          THIS QUIZ!": POKE 216,0: END
920 PRINT D$;"CLOSE USERS"
930 GOSUB 1340
940 ONERR  GOTO 1260
950 PRINT D$;"OPEN QUIZ"
```

Listing continued.

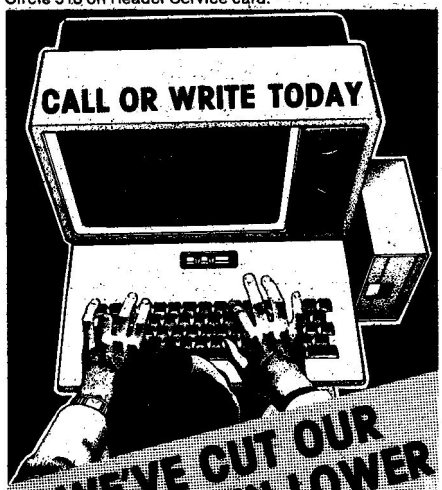
DOS altered disk wasn't booted), LIST and RESET would function normally. So. . . why bother, right? Not at all. I've used this quiz system (with the DOS modifications mentioned above) extensively with high school students and have had no problems. I don't mean to imply that this level of security is adequate protection from the curiosity of all students, but it is *usually* sufficient.

Regardless of how you choose to secure your quiz disks, the Apple Interactive Quiz and Quiz Teacher Menu programs should make it quite easy to administer and manage them. ■

Listing continued.

```
960  PRINT D$;"READ QUIZ"
970 QQ$(K) = ""
980  GET C$
990  IF C$ =  CHR$ (13) THEN K = K + 1: GOTO 970
1000 QQ$(K) = QQ$(K) + C$: IF  RIGHT$ (QQ$(K),6) = "STOP//" THEN M = M + 1: GOTO 1030
1010  GOTO 980
1020  REM  *** PRINT ITEM ON SCREEN ***
1030  PRINT  CHR$ (1): REM  *** THROW AWAY CHAR ***
1040  FOR J = 1 TO K: REM  *** K=# OF STRINGS ***
1050  IF J = 1 THEN  HOME : PRINT M;: PRINT ". ";
1060  IF QQ$(J) = "" THEN 1100
1070  IF QQ$(J) = "XXX" THEN AN$(M) = QQ$(J + 1):J = K: GOTO 1100
1080 FL$ = QQ$(J)
1090  GOSUB 150: REM  *** LINK TO SCREEN FORMATTING ROUTINE ***
1100  NEXT J
1110  REM  *** TAKE STUDENT ANSWERS ***
1120  PRINT D$: PRINT : PRINT : PRINT : INPUT "YOUR ANSWER? --> ";AA$
1130  IF  LEN (AA$) <  > 1 THEN  INPUT "PRESS ONE LETTER, PLEASE --> ";AA$: REM  *** CK FOR
      SINGLE CHAR ANSWER ***
1140  REM,  *** LINES 1150 & 1160 BYPASS STUDENT FEEDBACK--ADD '1141 GO TO 1170' TO RESTORE ***
1150  IF AA$ = AN$(M) THEN AN(M) = 1: GOTO 1210
1160  IF AA$ <  > AN$(M) THEN AN(M) = 0: GOTO 1210
1170  IF AA$ = AN$(M) THEN AN(M) = 1: PRINT : PRINT : PRINT : PRINT  TAB( 16);"CORRECT":
      GOTO 1210
1180 AN(M) = 0
1190  PRINT "THAT IS NOT THE CORRECT ANSWER."
1200  PRINT : PRINT "THE CORRECT ANSWER IS: ";: FLASH : PRINT AN$(M);: NORMAL : PRINT "."
1210  VTAB 23: PRINT  TAB( 9);: INVERSE : PRINT "PRESS ANY KEY TO CONTINUE";: NORMAL
1220  GET ZZ$: IF ZZ$ = "" THEN 1220
1230  PRINT  CHR$ (1): HOME : VTAB 12: PRINT  TAB( 15);"THINKING"
1240 K = 1: GOTO 960
1250  REM  *** CALCULATE STUDENT GRADE ***
1260  PRINT  CHR$ (1): PRINT D$;"CLOSE QUIZ": IF  PEEK (222) <  > 5 THEN 1580
1270  HOME : VTAB 12: PRINT  TAB( 15);"PLEASE WAIT": ONERR  GOTO 1560
1280  FOR J = 1 TO M
1290 S = S + AN(J)
1300  NEXT J
1310 R = S / M: REM  *** M=# OF QUESTIONS ***
1320 P = R * 100
1330  GOTO 1400
1340  REM  *** RECORD STUDENT USE OF QUIZ ***
1350  PRINT D$;"APPEND USERS"
1360  PRINT D$;"WRITE USERS"
1370  PRINT LN$
1380  PRINT D$;"CLOSE USERS"
1390  RETURN
1400  REM  *** RECORD STUDENT RESULTS ***
1410  PRINT D$;"APPEND RESULTS"
1420  PRINT D$;"WRITE RESULTS"
1430  PRINT LN$
1440  PRINT S;"/";M
1450  PRINT P
1460  PRINT D$;"CLOSE RESULTS"
1470  REM  *** SHOW RESULTS TO STUDENTS ***
1480  HOME : VTAB 9: PRINT "YOU CORRECTLY ANSWERED ";S
1490  PRINT "OUT OF ";M;" QUESTIONS."
1500  PRINT "YOUR GRADE ON THIS QUIZ IS ";P;" %."
1510  REM  *** STUDENT FEEDBACK ***
1520  IF P >  = 90 THEN  PRINT : INVERSE : PRINT "GOOD JOB! HAVE A NICE DAY.": NORMAL : GOTO
      1560
1530  IF P >  = 80 THEN  PRINT : INVERSE : PRINT "NOT TOO BAD, BUT ... NEEDS WORK.": NORMAL
      : GOTO 1560
1540  IF P >  = 70 THEN  PRINT : INVERSE : PRINT "THIS IS POOR. YOU NEED TO STUDY!": NORMAL
      : GOTO 1560
1550  PRINT : INVERSE : PRINT "YOU MUST STUDY THIS MATERIAL!": NORMAL
1560  PRINT D$;"CLOSE": VTAB 22: PRINT  TAB( 13);: FLASH : PRINT "END OF PROGRAM": NORMAL :
      POKE 216,0: END
1570  REM  *** QUIZ INTERRUPT MSG ***
1580  HOME : VTAB 9: PRINT "YOU HAVE ";: FLASH : PRINT "NOT";: NORMAL : PRINT " SUCCESSFULLY":
      FLASH : PRINT "COMPLETED";: NORMAL : PRINT " THIS QUIZ !": PRINT : PRINT "SEE YOUR TEACHER
      IMMEDIATELY !": POKE 216,0: END
```


Circle 318 on Reader Service card.



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Logo Talks Back

One of Logo's special talents is list processing, which can transform your Apple into an AI machine. You and the kids will have fun chatting with your Apple—but be prepared for some saucy back talk.

by Donna Bearden and Jim Muller

Turtle graphics is a fascinating feature of Logo. It takes you from single keystroke exercises for preschoolers through college-level solid and spherical geometry exercises, studies of Newtonian physics, dynamics, as well as Einstein's general theory of relativity.

But graphics is only part of the fun of Logo. It also has some wonderful list and text processing capabilities that open up opportunities for word games, language programs, word processing, database management and a wide range of other applications. List processing can even be combined with turtle graphics to make the language even more interactive.

Let's start with a simple interactive program that will seem like the computer is carrying on an intelligent conversation with you. This is fun for youngsters to program and try on someone who is not familiar with computers. They don't need to know that all the questions and responses are preprogrammed. It's also fun for students to try them out on each other.

You'll find references to both Apple Logo and MIT Logo (versions are available from Terrapin Inc., 380 Green St., Cambridge, MA 02139, and from Krell Software, 1320 Stony Brook Road, Stony Brook, NY 11790) in the program listings. Thus you can use these procedures with any Logo for the Apple II computer.

Commands

PRINT: The PRINT command tells the computer to print on the screen whatever is inside the square brackets. For example, if you type PRINT [I AM A COMPUTER] and press return, the computer will print I AM A COMPUTER. Try the PRINT command with a few different inputs.

Sometimes you want a blank line on the screen, perhaps between one question and response and the next question. In that case, type PRINT [ ] and press return.

SENTENCE: This command tells the computer to put lists of words together. If you type

```
PRINT SENTENCE [TURTLES ARE FUN,] [RABBITS ARE HARE-Y]
```

the computer will put those two lists together and print

```
TURTLES ARE FUN, RABBITS ARE HARE-Y.
```

Now let's put the SENTENCE and PRINT commands together to make the computer carry on an "intelligent conversation." First we'll write a procedure that makes the question WHAT IS YOUR NAME? appear on the screen. Then it will combine an input with a preprogrammed response, in this case,

```
I DON'T BELIEVE WE'VE MET, Name.
```

APPLE:

```
TO TALK
PRINT [WHAT'S YOUR NAME?]
PRINT SENTENCE [I DON'T
BELIEVE WE'VE MET,]
READLIST
END
```

READLIST is used to make the procedure wait for you to type an answer to a question and press return.

MIT:

```
TO TALK
PRINT [WHAT'S YOUR NAME?]
PRINT SENTENCE [I DON'T BELIEVE
WE'VE MET,] REQUEST
END
```

REQUEST is used to make the procedure wait for you to type an answer to a question and press return.

Have your students think up some other short procedures that will ask a question and then combine the answer with a response they make up. For now, do not use yes-no questions. We'll get to them in a minute. A few ideas to get them started:

What's your favorite color?
Who's your best friend?

This article was adapted from The Turtle's Sourcebook *by Donna Bearden, Jim Muller and Kathleen Martin, Reston Publishing Company, Reston, VA. For more information on the book and other Logo activities on or off the computer, contact the YPLA, 1208 Hillside Drive, Richardson, TX 75081. We'd love to hear from you.*



What's your favorite sport?
What kind of music do you like?

It is possible to set up a conditional in a list program. IF you write a procedure that asks a yes-no question THEN you will have to set up a conditional. Since there are two possible answers, you'll want two possible responses for the computer to make. In this case, we'll ask, "Have you ever talked to a computer before?"

APPLE:

```
TO TALK
PRINT [HAVE YOU EVER TALKED]
PRINT [TO A COMPUTER BEFORE?]
TEST READLIST = [NO]
IFT [PRINT [OH BOY! A BEGINNER!]]
IFF [PRINT [DON'T WORRY, I WON'T
TELL ANYONE.]]
```

MIT:

```
TO TALK
PRINT [HAVE YOU EVER TALKED]
PRINT [TO A COMPUTER BEFORE?]
TEST REQUEST = [NO]
IFT PRINT [OH BOY! A BEGINNER!]
IFF PRINT [DON'T WORRY, I
WON'T TELL ANYONE.]
```

To set up a conditional, we use a TEST command and IFTRUE (IFT) and IFFALSE (IFF) commands. IF it is TRUE that the user answers no, the computer will respond with, "Oh boy! A beginner!" IF it is FALSE that the user answers no (in other words, says yes), the computer will print, "Don't worry, I won't tell anyone." Notice how the double brackets are used in Apple Logo.

Have the students write a conversational procedure using all the listing commands they have learned so far. Have them try them out on each other.

Suppose you want to set up a procedure with a variety of choices. We'll combine some turtle graphics and listing for this one and write a procedure that allows students to choose a big, medium or small circle. So first we need to ask which size circle they want to see:

```
TO CIRCLE
PRINT [DO YOU WANT A BIG, MEDIUM,
OR SMALL CIRCLE?]
```

Now we need to set up a conditional that will allow for three different choices: if the answer is big, the turtle must draw a big circle; if the answer is medium, a medium circle; and if the answer is small, a small circle. (This is an excellent time to remind your students to break the problem down into smaller pieces. Rather than combining everything in one procedure,

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"You say you've got this kid who's going to try to outfox the computer—there's at least one in every class."

write "sub-procedures" for BIGCIRCLE, MEDIUMCIRCLE and SMALLCIRCLE.)

```
TO BIGCIRCLE
REPEAT 360[FD 1 RT 1]
END
TO MEDIUMCIRCLE
REPEAT 180[FD 1 RT 2]
END
TO SMALLCIRCLE
REPEAT 90[FD 1 RT 4]
END
```

READWORD: This command is already defined in the STARTUP procedures in Apple Logo. Here it is defined in both Apple Logo and MIT Logo.

APPLE:

```
TO READWORD
OUTPUT FIRST READLIST
END
```

MIT:

```
TO READWORD
OUTPUT FIRST REQUEST
END
```

```
TO CIRCLE
PRINT [DO YOU WANT A BIG, MEDIUM, OR SMALL CIRCLE?]
MAKE "ANSWER READWORD
IF :ANSWER = "BIG [BIGCIRCLE]
IF :ANSWER = "MEDIUM [MEDIUMCIRCLE]
IF :ANSWER = "SMALL [SMALLCIRCLE]
END
```

MAKE: This command requires two entries. You want to make one entry into another. In essence, you want to MAKE a variable take on the value of the second entry, or second input. For example, MAKE "ANSWER READWORD means that ANSWER should take on the value of the entry made at READWORD.

You say you've got this kid who's going to try to outfox the computer and type in GIGANTIC—there's at least one in every class! You can do one of two things. You can add lines to try to match any of the answers that a smart kid will come up with. For example:

```
IF :ANSWER = "GIGANTIC [BIGCIRCLE]
IF :ANSWER = "HUMONGOUS [BIG CIRCLE]
IF :ANSWER = "SO-SO [MEDIUMCIRCLE]
IF :ANSWER = "TEENSY [SMALLCIRCLE]
```

We could be here all day thinking up possible responses. But why not just add another line to cover all of them? If the answer doesn't match any of the choices, the computer will go down to the next line and respond, I CAN'T DO THAT!

```
TO CIRCLE
PRINT [DO YOU WANT A BIG, MEDIUM, OR SMALL CIRCLE?]
MAKE "ANSWER READWORD
IF :ANSWER = "BIG [BIGCIRCLE]
IF :ANSWER = "MEDIUM [MEDIUMCIRCLE]
IF :ANSWER = "SMALL [SMALLCIRCLE]
PRINT [I CAN'T DO THAT!]
CIRCLE
END
```

Being able to write a procedure to have the computer ask for a response

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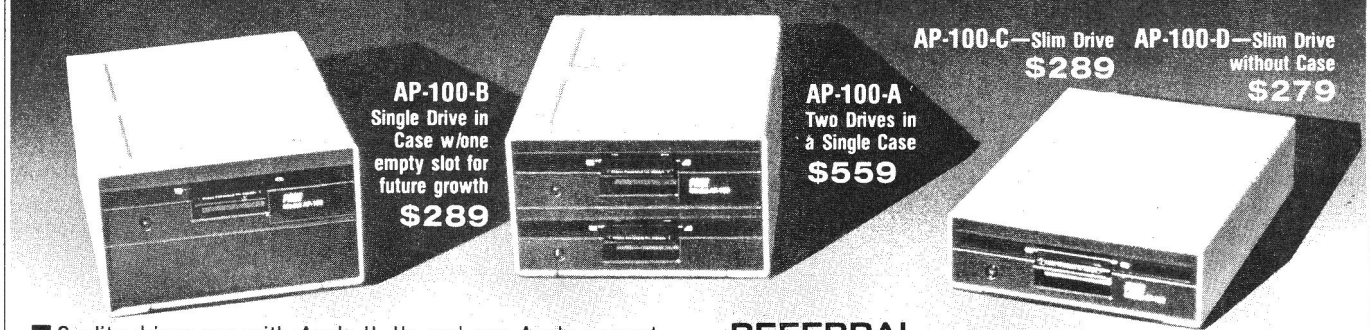

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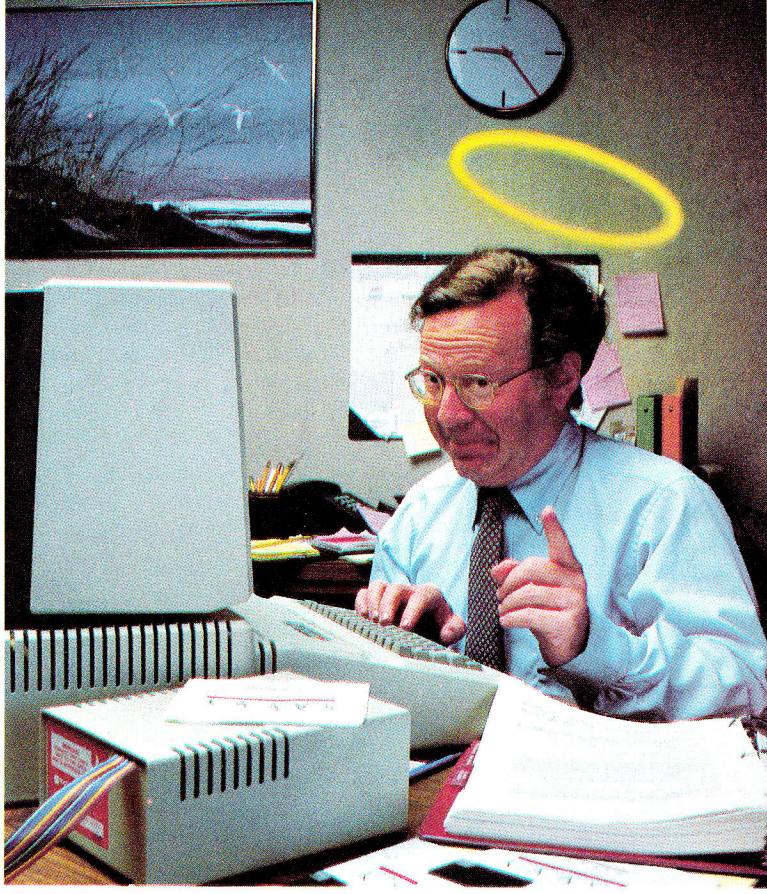

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"Sometimes, when you look at Logo commands, they seem to make no sense at all. But look again."

and then draw a circle according to the choice made suggests the possibility of writing a procedure to have the turtle draw any geometric shape the user wants. Since this is a conversational program, begin by asking the user if she or he wants to see some shapes.

TEST FIRST READWORD = "Y

Sometimes, when you look at Logo commands, they seem to make no sense at all. But look again. You know what TEST means—you want to TEST to see if something is TRUE or FALSE. READWORD means to read the word entered in response to a question.

Now! What would TEST FIRST READWORD = "Y mean?

If you said, TEST the FIRST element of the entered response to see if it begins with Y, give yourself a gold star. You're absolutely right. When FIRST is included in a command, it means to look at the first element of a word or list. In this case it means TEST the FIRST element of the entered response to see if it begins with Y. The entered response could be YES, YEAH, or just Y. The action to follow would be the same.

Not to confuse the issue of our procedure; but now that you have an idea of what FIRST does, consider what would happen if the same line read, TEST LAST READWORD = "S. What would that mean?

If you said it means TEST the LAST element of the entered response to see if it is an S, you deserve another gold star. The procedure tests the response to see if you entered YES or some other word ending in S.

Obviously, for this procedure, FIRST is the more appropriate command in that it suits a broader range of possible responses to the question. However, there are occasions when you want to test the last element of a word or a list. Why not try a few experiments to see how it can work?

VANISH is an all-purpose type of procedure written here to clear the screen at appropriate times during the procedure.

```
TO VANISH
CLEARTEXT
TEXTSCREEN
END
```

Now let's get back to the "making shapes" procedure.

APPLE:

```
TO SHAPES
VANISH
PRINT [WANT TO SEE SOME SHAPES?]
TEST FIRST READWORD = "Y
IFT [PRINT [], PRINT [WHAT
SHAPE DO YOU WANT TO SEE?]]
IFF [PRINT [], PRINT [OK, BYE
FOR NOW!] STOP]
PICK
END
```

MIT:

```
TO SHAPES
VANISH
PRINT [WANT TO SEE SOME
SHAPES?]
TEST FIRST READ WORD = "Y
IFT PRINT [WHAT SHAPE DO YOU
WANT TO SEE?]
IFF PRINT [OK. BYE FOR NOW!]
STOP
PICK
END
```

PICK is a procedure defined to tell the turtle what shape to draw.

APPLE:

```
TO PICK
MAKE "S READWORD
IF :S = "CIRCLE [CIRCLE ]
IF :S = "RECTANGLE [RECTANGLE]
PRINT [
PRINT [I DON'T KNOW HOW TO
DO THAT!]
PRINT [WILL YOU TEACH ME HOW?]
TEST FIRST READWORD = "Y
IFT [TEACH :S ]
IFF [SHAPES ]
END
```

MIT:

```
TO PICK
MAKE "S READWORD
IF "S = "CIRCLE CIRCLE
IF "S = "RECTANGLE RECTANGLE
PRINT [],
PRINT [I DON'T KNOW HOW TO DO
THAT!]
PRINT [WILL YOU TEACH ME HOW?]
TEST FIRST READWORD = "Y
IFT TEACH :S
IFF SHAPES
```

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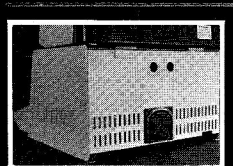

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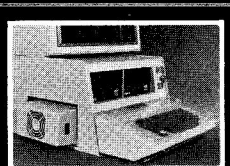

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"The Logo turtle loves to draw and can be quite a conversationalist when challenged."

END

TEACH was defined to get the user to respond with the number of sides the particular shape has and how long to make each side.

```
APPLE:
   TO TEACH :S
   VANISH
   PRINT SENTENCE [HOW MANY
   SIDES DOES A] :S
   PRINT [HAVE?]
   MAKE "R READWORD
   PRINT [],
   PRINT [HOW LONG SHOULD
   ONE SIDE BE?]
   MAKE "D READWORD
   PRINT [],
   PRINT [LET ME SEE IF I CAN
   DRAW ONE NOW.]
   WAIT 80
  .POLY :R :D
   END
```

MIT: (there is no WAIT command in MIT Logo and we must define one)

```
   TO WAIT :T
   HT
   REPEAT :T [REPEAT 4 [RT 90]]
   ST
   TO TEACH :S
   VANISH
   PRINT SENTENCE [HOW MANY SIDES
   DOES A ] :S
   PRINT [HAVE?]
   MAKE "R READWORD
   PRINT []
   PRINT [HOW LONG SHOULD ONE SIDE
   BE?]
   MAKE "D READWORD
   PRINT []
   PRINT [LET ME SEE IF I CAN DRAW
   ONE  NOW.]
   WAIT 10
   POLY :R :D
   END
```

Using the Rule of 360, we can define a polygon procedure:

```
TO POLY :R :D
REPEAT :R [FD :D RT 360 / :R]
END
```

But what about a rectangle? Another procedure will have to be defined in case someone wants to see a rectangle.

```
TO RECTANGLE
PRINT [HOW LONG SHOULD THE LONG
SIDE BE?]
PRINT []
MAKE "LONGSIDE READWORD
PRINT [HOW LONG SHOULD THE SHORT
SIDE BE?]
MAKE "SHORTSIDE READWORD
CS
REPEAT 2 [FD :SHORTSIDE RT 90 FD
:LONGSIDE RT 90]
END
```

To make the whole program repetitive and more conversational, go back to POLY, RECTANGLE, SMALLCIRCLE, MEDIUMCIRCLE and BIGCIRCLE, and add VANISH as the first command. The last three commands in each of these procedures should be:

```
APPLE:
   PRINT [HOW'S THAT?]
   WAIT 180
   SHAPES
   END
MIT:
   PRINT [HOW'S THAT?]
   WAIT 20
   SHAPES
   END
```

Now change the last command in the CIRCLE procedure to SHAPES. This will cause the procedure to keep repeating itself until stopped.

This barely scratches the surface of what can be done with Logo. The graphics are certainly spectacular. But along the way, the learning experience can be greatly enhanced by adding list processing. Word games, word processing and a wide range of other applications procedures then come to life. The Logo turtle loves to draw, and can be quite a conversationalist when challenged.

Arthur Godfrey had a well-known record from some years ago entitled, "What is a Boy?" Among the descriptions was, "The hope of the future with a frog in his pocket." Thanks to Logo and the structured, creative thinking exercises the language offers, boys and girls are fast becoming:

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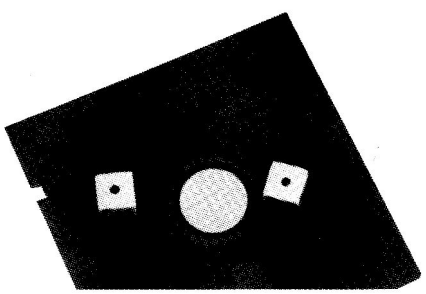

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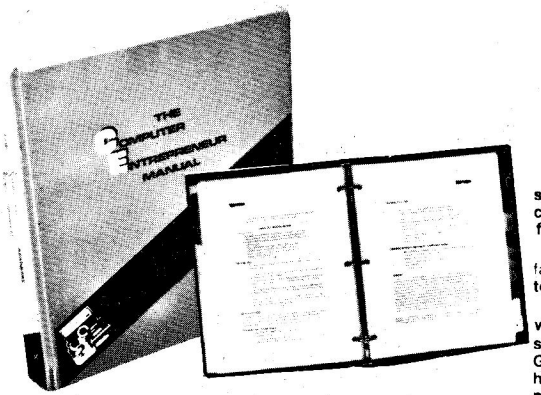

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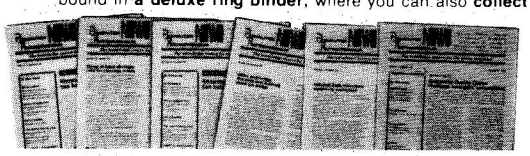

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SuperPILOT

Fasten your seat belts! Get ready for SuperPILOT, Apple's new CAI authoring language that leaves menu-driven authoring systems in the hangar.

by Stephen M. Weissmann

Okay, you've got the Apple computer in your classroom—what do you do with it? Did anyone remember to order software? If so, is it written in language too sophisticated for your second grade class? Are your students already bored with the programs you own? Perhaps you have just found an ad for the perfect program for your class, but the budget is exhausted or non-existent? Or maybe you would like the computer to review terms and concepts different from the ones on the disk you own?

Do any of these situations sound familiar? Why not create your own interactive lessons, especially designed for your curriculum and your students? You have two major options to choose from: authoring systems and an authoring language.

There are over a dozen software packages on the market designed to help educators produce their own CAI (computer aided instruction) materials. Most of them provide for presenting text on the screen, then collecting and evaluating the student's response. These authoring systems are usually menu driven and demand no special programming skills on the part of the instructor. While these systems do allow the instructor to write his or her own material, they are often severely limited by the range of formats in which information can be presented and tested.

Apple Computer Company has chosen to take a different route. SuperPILOT is an authoring language. Rather than just an outline for multiple choice tests and matching exercises (which it does provide in the Shell Games), SuperPILOT is a complete programming language.

While it is not as rich and complex a language as Basic or Logo, SuperPILOT is ideally suited for one purpose: the development of interactive tutorials for your classroom. In addition to the PILOT language, Apple's package provides an environment for creating color graphics, keeping student records, adding sound effects, and much more.

The SuperPILOT Package

SuperPILOT comes with an author disk (and backup) which contains the language and the editors; a disk of sample lessons, special characters, and sound effects; a two-disk tutorial; and two manuals. At $200, it is comparable in price to many of the authoring systems available. With the simplicity and flexibility of the PILOT language and the many built-in abilities of SuperPILOT editors, it represents quite a value.

System Requirements

SuperPILOT is designed for the Apple II with 64K of memory. According to Apple Customer Relations, although not according to Apple dealers' information, it is compatible with the Apple IIe. I have found it to be almost completely compatible with Apple's earlier software package, Apple-PILOT, when used on the Apple II.

In order to develop a lesson, two disk drives are required. However, when the student is running the lesson, only one drive is necessary.

If the cost of the package appears high, the cost of using SuperPILOT in the classroom is minimal once the lessons are developed. The entire PILOT language is written onto each student's lesson disk, which can be copied. Thus, investment in SuperPILOT involves a one-time cost of $200, blank disks and the time involved in writing the lessons. Additional options include a statistical package to analyze records of student performance (Apple SuperPILOT LOG, $50) and firmware cards to interface between SuperPILOT and other devices such as videotape and disk.

"But," you are saying, "I can't program. I don't even know Basic!" Then read on. SuperPILOT is written just for you.

Address correspondence to Dr. Stephen M. Weissmann, Associate Professor of Psychology, Plymouth State College, Plymouth, NH 03264.

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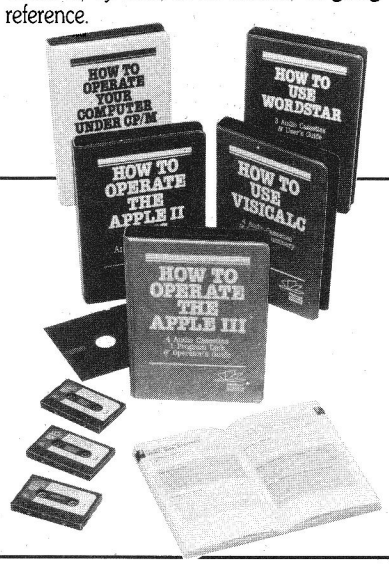

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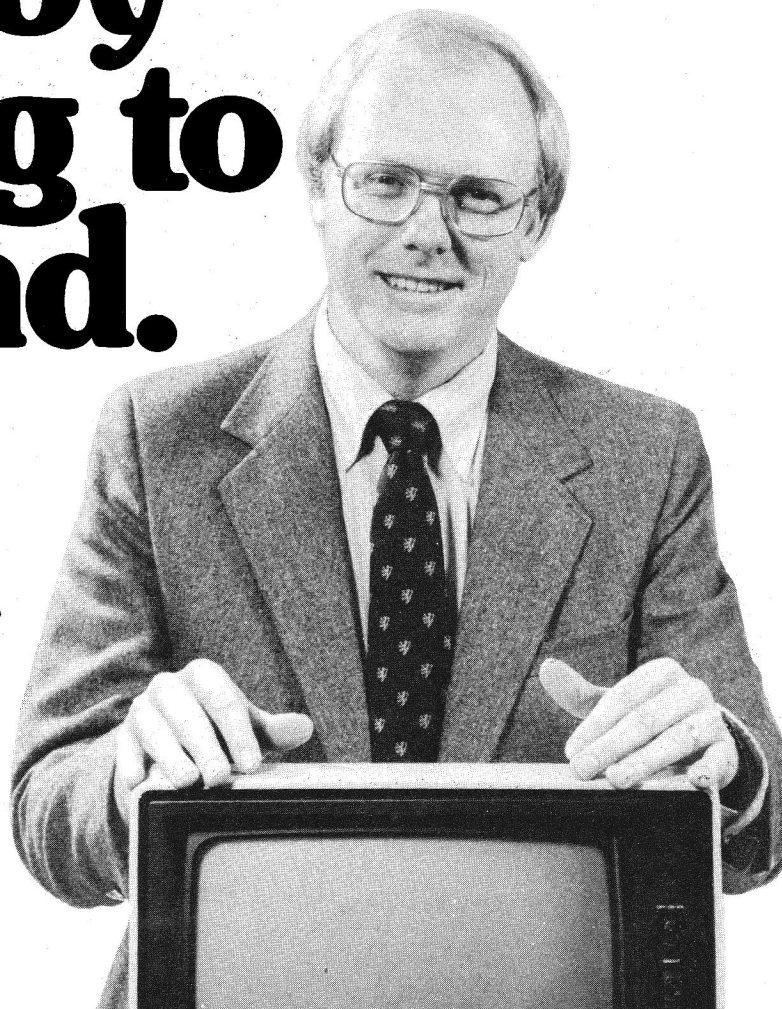

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Developing a Tutorial

SuperPILOT has only 26 commands, each consisting of one or two letters; only half a dozen are used regularly. For the most part, you spend your time typing the contents of your lesson and not a lot of program code.

All instructions in SuperPILOT consist of three parts: an operation to be performed (symbolized by one or two letters), a colon and an "object" of the operation. For example, the statement:

```
T: What is the capital of New Hampshire?
```

will result in the phrase What is the capital of New Hampshire? appearing on the screen. The type, T:, command simply displays everything written after the colon and is probably the most frequently used command in SuperPILOT.

To get the student's answer at this point, the next instruction would be:

```
A:
```

That's it—no special symbols, no variable names. The accept, A:, operator tells the computer to take whatever is typed next on the keyboard and store it as the current answer. Until SuperPILOT encounters another A:, the student's response is available for evaluation. Responses can be labeled and stored more permanently, but we'll get to that later.

The function of the match, M:, instruction is to decide whether the student answered the question correctly. SuperPILOT will search the student's answer for whatever is written after the colon. Thus, the command:

```
M: Concord
```

initiates a search for the letter sequence C-o-n-c-o-r-d in the answer. If it is found, a congratulatory message should appear and the lesson advance to the next question or to new material.

But, how does SuperPILOT know that the answer is correct? It doesn't of course. What it does is make the execution of the next command conditional on the outcome of the matching procedure. Every command in SuperPILOT can be qualified according to criteria that you determine. In this case, did the student type Concord?

The statements:

```
TY: Great!
TN: No, that is not the capital.
```

produce the appropriate feedback. Y and N (called conditioners) refer to the outcome of the matching operation. The student sees Great! only if the match is found. If a match is not found, then the material after TY: is not displayed and SuperPILOT moves on to the response for a wrong answer. The N conditioner allows the instruction to be executed only if the match is not found. The program for this lesson appears in Listing 1.

Branching

Moving to different parts of the program is accomplished with a pair of SuperPILOT instructions. The jump, J: command transfers control to a new part of the program. Unlike Basic, the destination of a jump is not a line number, but a labeled section of the program. For example, the statement:

```
JY: Quest2
```

transfers the lesson to the next question, but only if the student has correctly answered the previous question (remember the Y conditioner). Any set of symbols can serve as a destination label in SuperPILOT, but it is helpful to use some mnemonic scheme to help organize the program. For example, if this were part of a quiz on the capitals of all the states, each section might be labeled with the appropriate two-letter state abbreviation. (Labels do not appear on the screen, when the program is run.)

Error Diagnosis

One of SuperPILOT's nicest features is the ease with which you can diagnose student errors. What if the student has not typed the correct answer to our question? Rather than just say "Wrong," why not find out if the student has substituted the capital of another state. If the match statement:

```
M: Santa Fe!Trenton!Albany
```

were added to the program, it could detect the presence of the capital city of other states with "New" in their name. The ! symbol in the M: instruction enables you to detect the presence of any one of a number of different possibilities in the student's answer.

The statements:

```
TY: That is the capital of a state beginning
  : with 'New', but it is not the capital of New
  : Hampshire .
  :
 T: Let's try that state again.
 J: Quest1
```

now provide some corrective feedback, but only if the student has typed one of those three cities. Note that the Y conditioner applies only to the outcome of the most recent match (the three cities) and should not be confused with the concept of correct. Trenton is obviously a wrong answer, that can be detected and responded to with the appropriate M: and TY: instructions.

The T: and J: commands are left unqualified here, since any answer being evaluated at this point in the program must be wrong. The correct answer would have resulted in the program branching to the part labeled Quest2. The program written thus far is shown in Listing 2. In order for it to actually run in SuperPILOT, it is necessary to supply the labels Quest1 and Quest2. To be recognized as a destination for the J: command, all labels must begin with the * symbol.

Answer Counting

This lesson will continue to ask the student for the capital of New Hampshire until he or she gets it right, or stops trying. The repetitive loop was created with the J: command and a destination label, Quest1 in this case. Using a new conditioner easily allows the instructor to determine how many times this question is asked before providing feedback such as hints or prompts, or even providing the correct answer and moving on to another question.

SuperPILOT provides a built-in answer counter that calculates the number of times an A: command has been executed and can be used to qualify any SuperPILOT instruction. For example, the feedback Great! in our lesson could be reserved for the cor-

```
T: What is the capital of New Hampshire?
A:
M: Concord
TY1: Great!
TN: No, that is not the capital.
```

Listing 1. First SuperPILOT program.

```
* Quest1
T: What is the capital of New Hampshire?
A:
M: Concord
TY: Great!
JY: Quest2
TN: No, that is not the capital.
M: Sante Fe! Trenton! Albany
TY: That is the capital of a state
  :beginning with 'New', but it is
  :not the capital of New Hampshire.
  :

T: Let's try that state again.
J: Quest1
* Quest2
```

Listing 2. Expanded SuperPILOT program.

rect answer on the first try with the statements:

```
TY: That is correct.
TY1: Great!
```

The conditioner 1 allows that T: instruction to be executed only if this is the first time the question has been asked. The statement will be ignored on subsequent queries. The answer counter could also be used to provide hints and prompts after repeated errors. For example, the statement:

```
TN3: Remember, New Hamshire is a state in
  : New England.
```

may help the student to recall the correct answer more effectively than three repetitions of, "No, that is incorrect."

The counter can qualify any SuperPILOT instruction. The statements:

```
TN4: Let's look at a map of New England.
JN4: MapNE
```

would break the chain of asking for the capital of New Hampshire after the fourth incorrect response and move the student to another section of the program. (All counters and answer buffers are reset at the next new A: command.) This feature makes customizing lessons to the needs of your students and the difficulty of the material exceptionally easy.

The program of the complete lesson developed is shown in Listing 3. Note that all the labels used in the J: statements must be present for the program to run without error. Even though the parts of the program labeled Quest2 and MapNE have not yet been written, the labels must exist. This is especially useful when developing a lesson. Individual sections can be planned and labeled, but programmed separately and later inserted at the appropriate point in the lesson.

Special Features

So far we have seen the development of an interactive lesson. The program shown in Listing 3 presents information on the screen, accepts answers from the student, evaluates each answer according to criteria selected by the instructor, and provides special feedback based on the evaluation. It can ask a question again or advance to a new section of the lesson.

But this is only the beginning. SuperPILOT can do so much more. Once the techique of lesson develop-

Continued on p. 60

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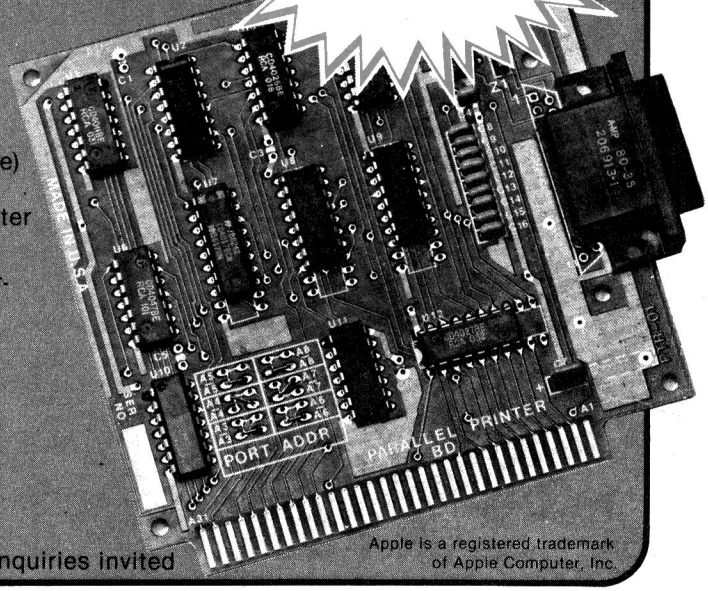

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Error Handling

An especially nice feature of SuperPILOT is its ability to tolerate most errors it encounters when running a lesson. When running in the author mode, an error message will appear on the screen and the line where the mistake occurred will be printed with the cursor placed on the first erroneous symbol. From the instructor's point of view this is a delightful aid in debugging your program.

Even more delightful is SuperPILOT's ability to recover from programming errors and continue with the lesson, instead of crashing to the Apple monitor, when in the lesson mode. For example, the following statements can detect alphabetic characters when numbers were expected in the answer:

```
T: How old are you?
A: #x
Te: Please type a numeral.
Je: @A
```

The e conditioner prevents the SuperPILOT commands from being executed, unless an error has been encountered. Such is the case here, where letters were found in the response to an A: which expected numbers only. Appropriate correction messages can be displayed and a new answer accepted. (The Je: @A command returns control to the most recent A: command.)

Co-PILOT

A very useful part of the SuperPILOT package is the tutorial provided on two disks. After each major command is presented in a colorful and clever way, the user is encouraged to try out the command. The advantage of this feature is that the commands are immediately executed, something that doesn't happen when creating your own lessons. The immediate feedback is an enormous aid in mastering the fine points of the SuperPILOT language. In addition, the gentle prompts and corrections to your mistakes provide an excellent model of a good tutorial. (Co-PILOT is available as a separate item for $35, Apple product # A2D0050.)

"The gentle prompts and corrections to your mistakes provide an excellent model of a good tutorial."

The Editors

Probably the most confusing aspect of SuperPILOT for the beginner is the environment that is created by the master, or author, disk. Unlike Basic, where commands are typed directly into the Apple computer, SuperPILOT lessons and special effects are created in a series of "editors." These editors are actually files contained on the author disk which is placed in drive 1. The disk that contains the lesson is placed in drive 2. Since the files on the author disk are large, frequent disk access is required to leave room in memory for your lesson program. This is why two drives are necessary in the author mode.

For example, the program of your lesson is written in the lesson editor which you select from the main menu. One way to approach this is as a small screen-oriented word processor. Using different keystrokes (somewhat like the ones in AppleWriter II) the text of the program is written and edited. You can easily insert and delete symbols and whole lines. Whole segments of a program may be copied and moved to another location in the lesson. When you are satisfied with the lesson, or you want to see how it is working, you "quit" the editor and only then is the program written to the disk. Just as with a word processor, it is a good idea to get into the habit of frequently saving the program to disk.

Based on my own personal experience and observing teachers learning how to program, this is the most difficult feature in SuperPILOT to master. The sequence of keys and carriage returns that must occur to leave the editor, save the program to disk, and then get it up again before running it, is not the most obvious or memorable. It is not uncommon for novice programmers in SuperPILOT to lose their first efforts. However, I can assure you that with a little practice, the sequence becomes second nature.

Graphics and special effects are also created in their own special editors. The commands to enter and leave the three special effects editors are the same as in the lesson editor, but otherwise each is a specialized environment that must be individually learned. In my opinion the effort is worth it. Once the techniques are mastered, which only comes with practice, you can easily create lessons enriched with special effects.

Strengths and Weaknesses

The best aspect of Apple's SuperPILOT package is the PILOT language itself. Based on Common PILOT developed at the University of Western Washington, it is ideally suited for creating interactive tutorials in the classroom. With creative use of the match (M:) and compute (C:) commands, student responses can be analyzed, diagnosed and specialized feedback provided. Of course, this can be done with almost any computer language. But it is the built-in features of SuperPILOT that make it so attractive as a language to develop CAI materials. Using a language such as Basic, it is generally recognized that to create an hour of quality computer interaction involves at least 200 hours in development. With SuperPILOT, that figure is closer to 20 hours.

Apple has expanded the language with the ability to create color graphics, to create and use special character sets, and to incorporate sound effects and music into your lessons. While it can be tricky to learn these editors, the extra value that they bring to a lesson is worth the effort.

Finally, Apple has included a two-disk tutorial on the features of the PILOT language. It is excellent. Those of you who were stymied by the manuals of the earlier Apple PILOT will be delighted by these friendly lessons.

Okay, now for the bad news. The problems with the manuals hinted at in the last paragraph have not been solved; if anything they are worse, since there are more features to discuss in SuperPILOT. Let's face it, the

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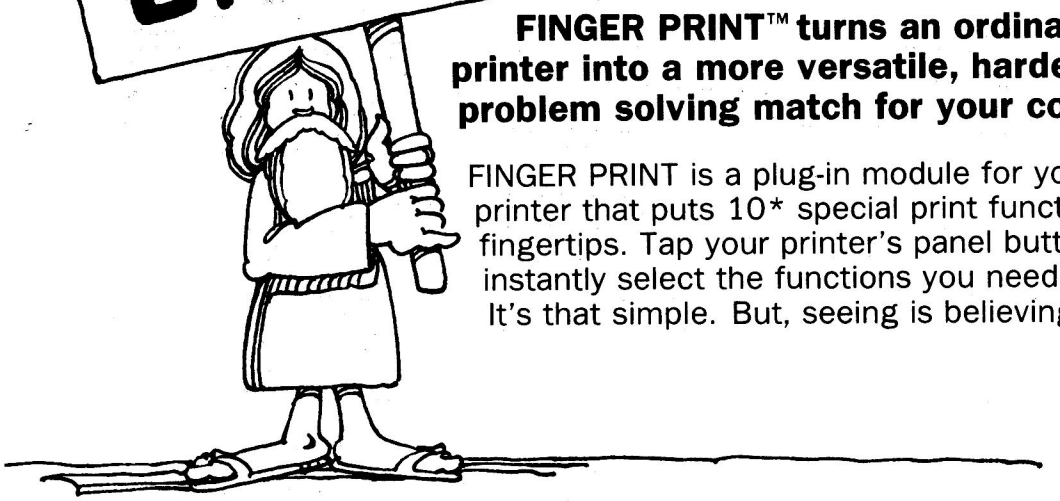

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"If a little tedium is the price to pay for those special effects and text editors, then I, for one, am willing to pay it."

SuperPILOT Language Reference Manual is not something you are going to curl up with in front of your woodstove on a cold night. It is precisely what it says it is—a reference. Once you have mastered the commands and the editors, it is an excellent source for advanced procedures, programming tips and guidelines for creating good CAI material. It is filled with excellent examples and clear descriptions of how the commands work. It is well organized into sections determined by the category of the instructions (text, compute, graphics, and so forth). And it is very well indexed. The *Editor's Manual* is similarly valuable when used as a reference.

Part of the problem with the manuals is that they are exceptionally complete. Unfortunately, when you are trying to figure out how to get your message typed on the screen, you are not terribly interested in the modifiers and conditioners or the size and color of the letters. My advice is to work through the tutorial on Co-PILOT first and try some simple programs to get used to the editors. Draw a picture or write a short melody. Then take another look at those manuals. What at first appeared strange and confusing may turn out not to be so bad after all. In fact, after some experience, you may discover, as I have, that those manuals are really a strength of the package and not a weakness at all.

The editors in SuperPILOT, in my opinion, are confusing and unintuitive to the novice. Above all, they are *slow*! Waiting while the lesson editor tells you that it is writing your lesson to the disk and then that it is compacting the disk and then getting back to your lesson to run it to see if that last change finally works is downright frustrating. There is some improvement over Apple's original PILOT. Now you can see the immediate execution of a SuperPILOT command while in the lesson editor or at an accept (A:) when running and debugging. But it still only allows you to see the outcome of a single command.

However, if a little tedium is the price to pay for those special effects and text editors, then I, for one, am more than willing to pay it. SuperPILOT allows me to create interactive tutorials that I don't have time to write in Basic. Furthermore, it lets me create color graphics (I can't draw), play music (I can't sing), and use character sets in languages that I don't even speak.

I do more than write about Apple's SuperPILOT—I use it. Starting in September, I have been granted a sabbatical leave to create a computerized, interactive study guide for my general psychology course. How will I program it? There's no question; I'm using SuperPILOT. ■

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Interactive Art

Of all the interesting uses ever found for micros, these certainly rank high. We think there's a lesson to be learned here.

by Stephen Wilson

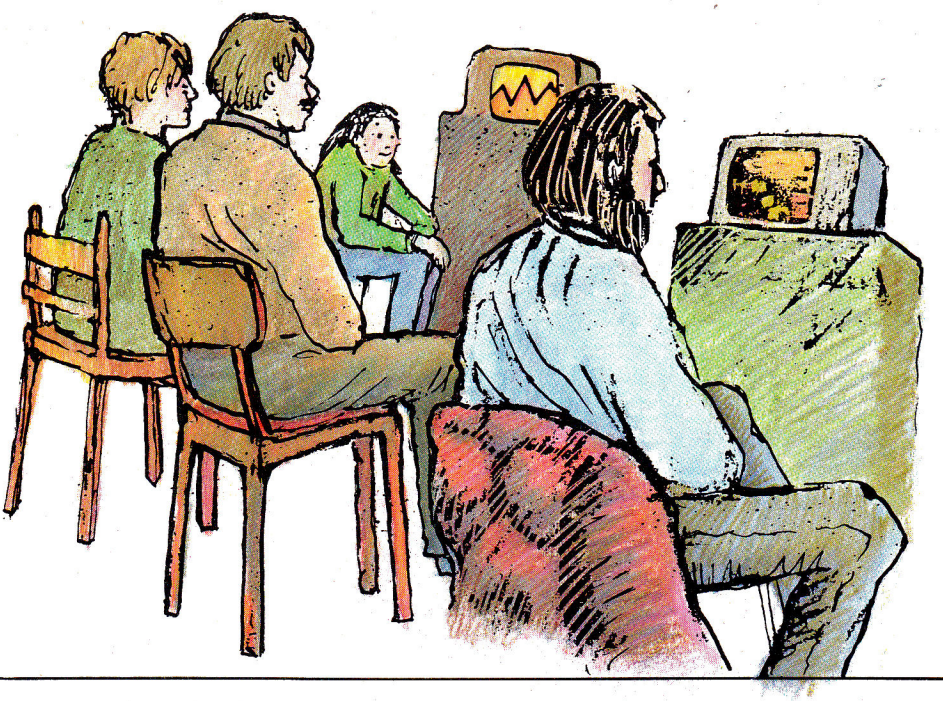
Most new applications for computers continue to speed or expand what was done in other ways before computers; occasionally computers give birth to unique applications. I have developed an innovative art form born out of the unique potentials of computers.

I call it an art form, but it's really an unusual concept that defies classification; it exists in a space somewhere connected to all of the following: conceptual art, performance arts happenings, computer graphics and music, experimental theatre, advertising display, humanistic psychology therapy and computer games. I have been developing it primarily in a visual art context, but my organization—interactive arts—is working on applications in other fields such as theatre, education and advertising. You will no doubt see many other applications.

The general framework of these events consists of individuals or groups of people interacting with sensors and TV monitors hooked up to a central microcomputer. The computer goes through interconnected cycles of giving people choices and then generating text, sound and animated video graphics in response to the choices made. Often these events are structured so that the computer focusses the participants' attention on the individual choice process or the interaction between people in addition to the video and sound generated.

The physical layouts of the events are unusual—for example, a theatre hall with people seated around sculptural objects containing switches or dials, or store windows on a busy street, with touch spots that can be activated from the street. Think of the analogy of a computerized video game, blown up in scale and scope so it involves many people over great distances, specially adapted to particular physical settings, and many-layered in content so that it has goals such as insight and emotional experience in addition to entertainment.

The audience in these events is hardly traditional. The computer creates situations where the audience must be active in making choices and responses, and thus must collaborate



Address correspondence to Stephen Wilson, Conceptual Design Area, Art Department, San Francisco State University, 1600 Holloway Ave., San Francisco, CA 94132.

with each other in creating the events. Society is at a turning point in regard to the social implications of the new computer technologies: Either their applications will accelerate the passivity that is already a tendency of mass culture, or the technologies will enable new realms of active individuality and choice. My work seeks to promote the latter.

In all of the events I used a 48K Apple II Plus with Apple Disk Drive, and the Mountain Hardware 16-channel A/D D/A board. (You can also use the game controller A/D input.) I custom built the interfaces out of parts generally available from electronics stores such as Radio Shack. Thus, for input devices I used switches and 150k pots in "Interactive Computer Theatre," photo cells in "Computerized Street Events" and "Exploring Frames of Mind," and a resistive drawing material and metal pointer in "Memory Map."

Interactive Computer Theatre

As part of the "Live Works" series of performances at the School of Art Institute of Chicago, I created an event called "Interactive Computer Theatre," which 135 people attended. In this event participants were divided into several groups. Each group had indicator devices and video monitors hooked to a microcomputer. Interactions within and between groups affected the flow in real time of a series of video events. The interactions of the groups and the potential for people to have enjoyable or insightful interchanges with strangers were a major focus of the piece.

Group Assignment: An attendant at a computer asked participants as they entered a series of questions about how they typically acted in groups—did they tend to be a team leader, act as a diplomat, stay quiet, etc.? The computer then processed this information and assigned them to one of four groups.

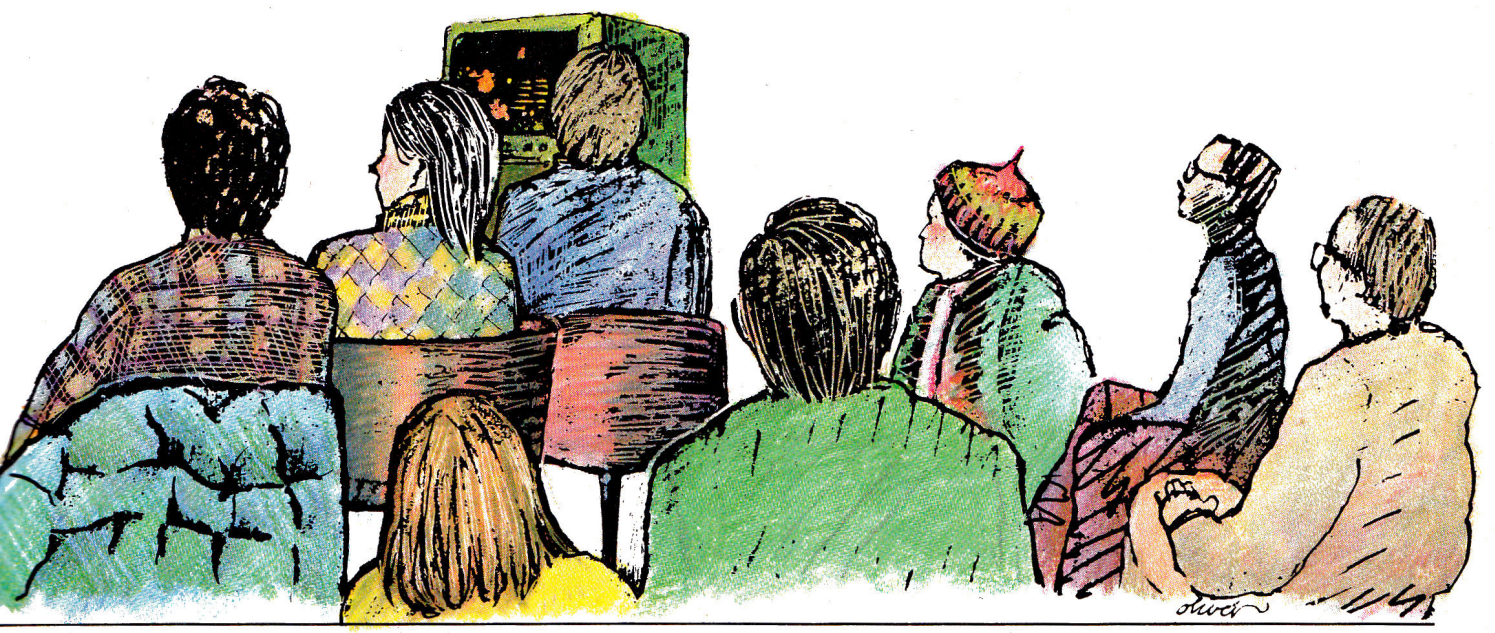
The questions were based on small-group research suggesting that people typically take on roles in small groups, and that small groups can only do their work effectively when members assume their roles. Using the computer's ability to process information in real time, I created groups made up entirely of people who saw themselves as taking the same roles.

I hoped that participants would experience, in the microcosm we'd created, a world populated by people like themselves, and that they could get to deal with their fears/hopes about the validity of the computer's categorizations of people. This section worked better than I hoped, as each group assumed a character in tune with the underlying forces of assignment.

Group 0 (the team leaders) became the noisiest, most boisterous group in the hall. There were constant debates about what decision the group should report to the computer, and fights about who should have command of the indicator device. Group 4 (the diplomats) was so easygoing that it was always the last to report its decisions as most members struggled to be sure everyone was happy with the decision.

Flower Trail Sequence: The first event was an animated color video graphic in which each group had a randomly moving color dot on the screen. Any time a group wanted they could place a graphic flower at the dot's position by throwing a switch. The size was determined by how they set their dial. I intended that the groups would develop some sensitivity to how their decisions affected a mutually constructed visual field. The flowers were remnants of their passing through the field.

Voting Rights: This sequence was a more complicated cumulative group video graphic. At each choice point there were eight options—some adding to a graphic design (for example, adding vertical lines) and some modifying the design (for example, changing colors, making mirror images on two sides, deleting the last group's con-



tribution). The first group to go was chosen randomly by the computer. Subsequent groups got the right to make the design only by guessing correctly what the previous group decided.

The computer used the following sequence: It would ask the group to choose, then ask each of the other groups to guess their choice; it showed (in real time) the guesses in a text area below the cumulative design. Thus each group had to be sensitive to the kinds of decisions other groups were making, and to develop a strategy based upon other groups' guesses.

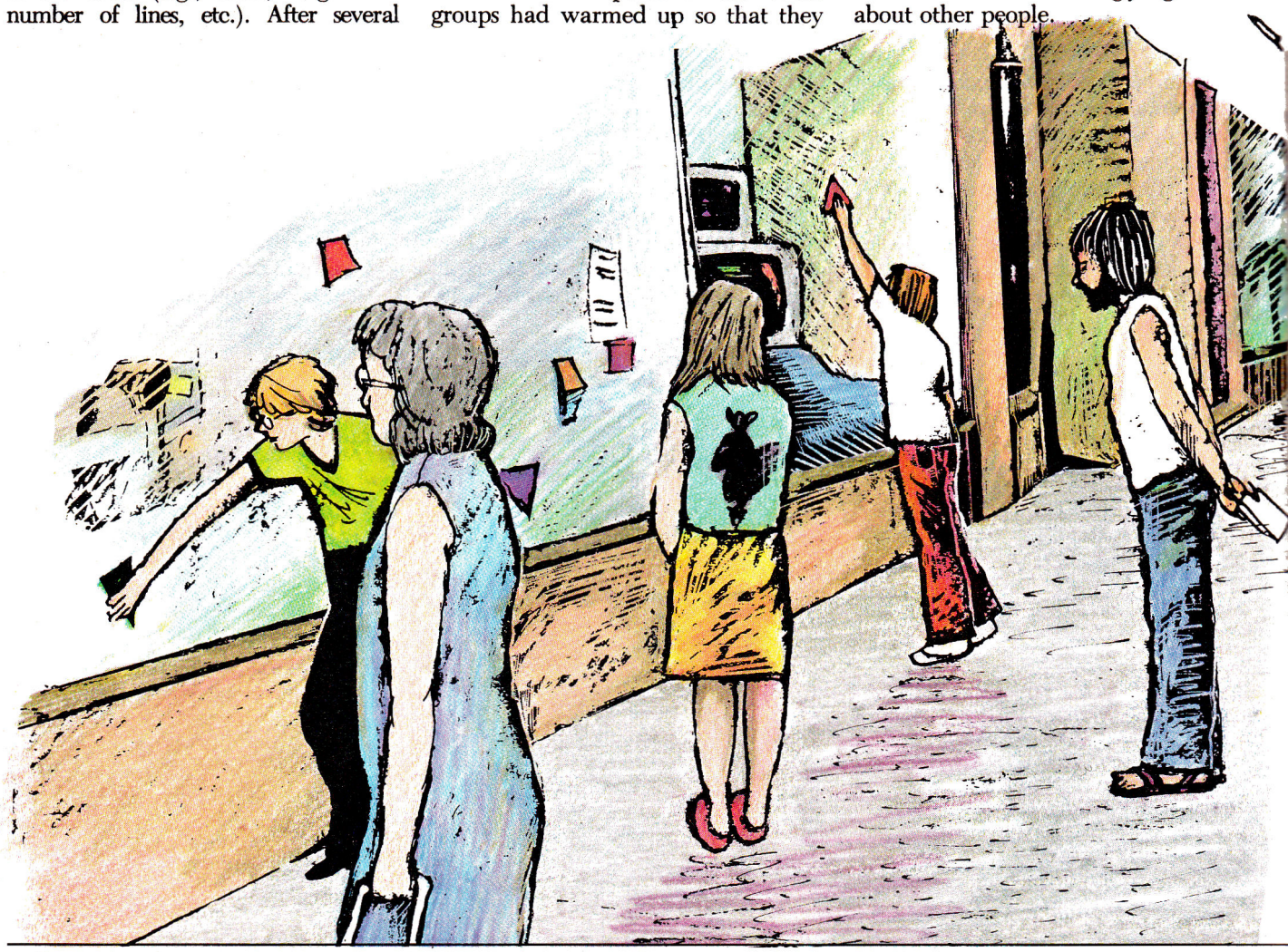
If they won by guessing correctly, they had to confer internally on what they wanted. The details of the generated graphic were determined by a combination of the option chosen, random factors, and parameters chosen by each group at the beginning of the event (e.g., color, length and number of lines, etc.). After several choice/guess responses the computer played back the growing decision from the beginning, in speeded-up fashion, so the audience could see a time-condensed record of their choices.

Life Choices: In the final sequence, "Life Choices," text on the video screen told a story. Before the story started, the computer let the audience groups vote for options such as the nature of the characters (e.g., compulsive, reflective, spaced-out) and kind of story (science fiction, political fable, pornography).

Then the story proceeded, but stopped at several decision points where the audience groups got to decide about the course of the story (e.g., should the hero respond to calls for help or ignore them?). Each group vote was displayed in real time on the screen. At this point in the event groups had warmed up so that they were yelling across the hall at each other trying to lobby for the choices they wanted.

Phantom Group: There seemed to be five groups in the event, but one was behind a curtain. People began to wonder about the fifth group as the evening progressed. This group always seemed to make choices that antagonized other groups. At the end of the evening the computer asked for applause for the participants group by group. When it got to the fifth group, I pulled back the curtain—to reveal that there was nothing there.

I had programmed the computer to generate the responses of the fifth group in reaction to what it sensed about the other four groups. I hoped this encounter would lead the audience to think about artificial intelligence and about which data and data channels we use in making judgements about other people.



"After a chance to experiment, participants were told they could contribute five notes to a community symphony."

Computerized Street Events

For decades artists have been searching for ways to broaden the audience for art—to take it out of galleries, concert halls and museums—and to engage the viewer actively and collaboratively in its realization. I used some of the special capabilities of computers to act on these intentions in the computerized street event project I undertook for the Bookspace Gallery.

I installed an interactive computer video graphic and sound event in their double store windows which look out a well traveled street. By touching sensors on the windows passersby could choose which of several video and sound events they wanted to activate, and then could interactively stage these events once underway.

Some of the events required collaboration between people in the two windows, and some remembered all previous participants' reactions to create events that accumulated over the four-week life of the event. The psychology of individual choice and the sociology of choice of the community of users were themselves important aesthetic elements of the piece.

Start-up: At 12 noon a timer turned on the computer and monitors. The text on the screen said "good afternoon" and "wait a minute while I load myself" and the computer loaded the program from disk storage. Then two eyes and a mouth placed themselves on the screen with a variety of emotional expressions and randomly-generated musical tune. The text at the bottom said "Hey you on the street I can interact with you cover spot 0 with your palm to start."

Once the passerby touched spot 0, the computer gave that person an opportunity for instructions, then proceeded to list and briefly describe four choices: "Memory Melody," "Community Standards," "Street Action" and "Life Choice."

Memory Melody: The computer explained that the participant could experiment with computer music by touching one of the six sensors on each window; each one generated a different note via the speakers aimed at the street. The computer also generated a related video line graphic (colors were determined by the note chosen, and position was determined by the number of people who had preceded the current participant).

After a chance to experiment, participants were told they could contribute five notes to a "community symphony." It ran through the notes (and associated video graphics) generated by the people before them. They could add their five notes, and then hear the symphony with their contribution added.

Several dilemmas confronted par-

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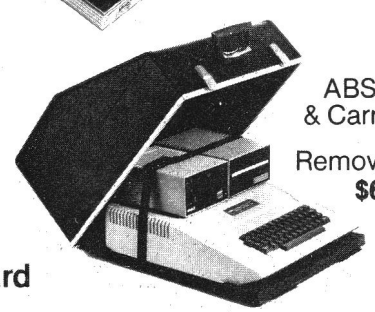

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ticipants: should they select by sound or by visual line? Why were some of the notes different from what they had been able to generate in experimentation? (Even though both windows had apparently the same sensors, each window generated notes from different octaves.) How would the next person's contribution interact with their own?

Community Standards: In this event the computer generated five very different complex video graphics and asked the participant to vote for his/her preference. Each graphic was generated from a random selection of ten different parameters (each of which could have several values); for example, color, background color, scale, straight or curved lines, number of iterations, specific figures or plots manipulated, etc. When a participant voted for a particular design, a record of each value for each parameter that went into making that design was recorded in computer memory.

The computer calculated how often each value of each parameter had been a part of the most chosen designs up to that point. It then abstracted a design from the most popular underlying choices, which it reported to represent community standards up to that point. This design was an amalgamation and may never have itself been seen before.

I hoped the piece would confront people with issues about how their desires fit into the larger context of society's values, and how the sum of individual actions/preferences in a community can constitute something unanticipated and possibly undesired.

Street Action: I used the computer in this event to induce strangers to interact on the street and to become conscious of the details of the immediate environment. First the computer asked whether the participants wanted to do a solo or a duet, and invited them to ask a stranger to join if they were alone. The solo could be run from one window while the duet required cooperation in two windows. Then the computer allowed them to draw a design using the sensors in the windows (e.g., covering sensor #1 moved design right, #2 moved it up, etc.).

After a period of this drawing, the computer suggested this might be boring if continued. It offered to give them more options in their drawing (e.g., change colors, bigger repertoire of shapes, music with drawing) if they would agree to do actions in the street. If they agreed, it asked them to take some action. If they succeeded in the action, they were given a choice of more options and allowed to continue drawing.

There were three sets of actions, each requiring greater activity. The first set required no movement from the window (e.g., touching the window sensors with a time beat set by the computer). The second required movement about the street in the near vicinity (e.g., retrieving the street light #), and the third set required more movement (checking out the mailbox names in the apartment across the street or identifying an architectural detail of a building up the block).

The scene was fascinating to watch—strangers negotiating with each other across the windows and people moving frantically in front of the store window. The scene challenges common notions of the limits of people's interactions with inanimate objects.

Life Choices: Life Choices was a modified individual version of the "Life Choices" story that was part of Interactive Computer Theatre. Here no voting was required, and individual participants could make their own choices without being limited to what the audience as a whole had selected.

Memory Map

Computer capabilities could allow even traditional "wall art" to become intelligently interactive, thus occupying a new conceptual space somewhere between performance art and more traditional plastic arts. "Memory Map" looked like a subway map of Chicago with lines drawn over it. It was connected to a computer and video monitor. The viewer could use a pointer attached to a coiled wire to touch a "decision stick" or the lines on the map.

After someone started the piece by touching the start spot, the text on the screen asked the viewers to point to the subway line they wanted to "ride" on. It then asked what kind of ride they wanted to take (aesthetic/historical,

"I hoped to help viewers consider how they typically explore photos, and to break down the distance between people and two-dimensional art."

social commentary, artist's personal reflection).

From then on, any time they pointed to a spot on the map, the program shared a comment or reflection related to that spot, and which was in the spirit of their choice (that is, something aesthetic of note about that place or something from the artist's personal life).

At the end it allowed them to pick a spot and then type in their own personal reflection, which it stored in memory. They finally could touch spots on the map to see what reflections other viewers had left. The visual map was a repository for the memories of all who had participated. People left messages such as memories of events they had witnessed, special features of the places such as good restaurants, and generalized feelings.

Exploring Frames of Mind

"Exploring Frames of Mind" was a wall piece similar to "Memory Map." I hoped to help viewers consider how they typically explore photos, and to break down the distance between people and two-dimensional art. I also hoped they would think about what constitutes significant spots in a photograph.

Viewers were invited to explore a 4×5 foot blowup of a historically significant photo (Kent State Events 1969) with their fingers. First they were asked how they wanted to look at the photo (in the spirit of aesthetic criticism or social commentary). The computer reported how many previous viewers had selected the same option.

Then, as their fingers touched spots I had preselected as significant, a musical tone sounded and the computer shared reflections in the spirit of what they had chosen. Thus kinesthetically they could rub their hands over spots they considered significant, and see if someone else also found the spot significant. The computer would then share what the other person thought significant.

Hardware and Software Lessons

I have confronted some problems in this work, and worked out some solutions. Anyone working in similar settings or with similar systems should find the lessons I've learned valuable. Most of the problems arose from my attempt to take the microcomputer out of a predictable setting and have it interact with a wide range of people, some of whom were inexperienced with computers.

Instructions, Pacing, Reading Speed: I discovered in my early work in interactive art that those of us who work with computers take a certain rhythm of interaction for granted—i.e., type, hit enter key, look at CRT, respond with typing, etc. The general public was often unfamiliar with these responses, and became lost without specific instructions.

Often the interaction could not proceed until I gave a short personal instruction session. Thus, every program I now write has explicit instruction subroutines that flash on the screen at appropriate times. Also, I have moved away from using keyboards in the direction of specially-constructed unambiguous indicator devices. The instructions on the screen explicitly tell the viewers what they have to do to indicate choices—for example, "Cover spot 5 with your palm if you want to continue."

I tried programs where the procedural reminders were dropped after the participant had gone through a few sequences. Even this didn't work, however, because in a widely varying audience many of the participants found the experience so unusual that they needed constant reminders about what to do.

Reading speed causes another similar problem. I started out trying to estimate a speed which would allow most people to read the text on a screen before a timing loop moved the program to the next event. But some people complained it was too slow and some felt it was too fast. I tried building in a periodic choice-of-speed question, so participants could speed or slow the pace of events, but this didn't work because the changes in the interactive flow of events seemed to change the amount of time necessary. I now usually build in a "go on?" subroutine to pace events. Participants are asked to indicate when they are ready, and thus they can control the pace.

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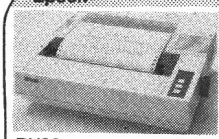

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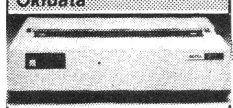

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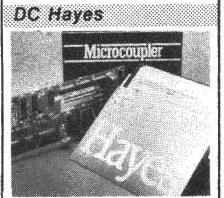

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Both of these solutions—instructions and pacing—introduce a certain awkwardness into the flow of events, but they seem necessary for interactive events for a general public. Perhaps as people gain experience with computer interactions, the need for special help will diminish.

Self Running—Anticipating the Unanticipated: Part of the beauty of these events is that they can run and interact without their human creator around. Creating "automatic" operation in that kind of setting calls for some special system features.

The Apple disk system has autostart features that make this possible. I used an appliance timer to turn the computer on in the morning (a more elegant, but more expensive, method would be to use a clock-calendar board). The Apple disk boots itself up and looks for the "Hello" program, which can be anything the programmer wants. I usually had it flash a smiling face on the screen, say good morning, inform the viewer to wait a second while it loaded itself, and then load and run the main program that was on the disk. The program then announced it was ready and went into a greeting routine. The timer turned the computer off at night. (The only danger in this could occur if the timer should by coincidence turn the computer off during one of the rare times a disk was being accessed. Luckily it never happened.)

Some of my programs needed to keep a running account of choices viewers were making over a period of several weeks. The Apple's text file facility made this easy. At first I tried having the program store choices to disk each time people made them, but this interrupted the flow. So I built in an index to update the disk after each five new people interacted. During sign-on in the morning the computer loaded in the record.

Also in the morning the computer used the disk binary file facility to load in machine-language material (shape tables, music routines, graphics routines, etc.). This was necessary only once a day, and yet the program might be run several times. I located a byte in a safe part of memory which I set after the morning load. The program then branched around this routine on subsequent runs for the day.

For these interactive events in public spaces I couldn't count on people staying with the program through entire sequences—they might get tired, bored, confused, or their friends might want to leave. I therefore needed to build in intentional and non-intentional "revert to beginning" routines.

A sensor choice subroutine was usually part of these programs. The program presented material, asked viewers to make a choice and then went out to read which choice (sensor) they had activated. I usually reserved one sensor position for "restart," which participants could use if they wanted to go back to the beginning, if they were going to leave in the middle and wanted to reset for the next participant, or if a new participant came across an abandoned event and needed to start it over.

"Part of the beauty of these events is that they can run and interact without their human creator around."

I also built a loop counter into the sensor read routines so that an abandoned event would be started over automatically (e.g., if the program went out to read unactivated sensors so many times that it concluded no one was there). I was careful to ensure that these loops were closed and that subroutines were returned so the Apple did not get cluttered with more than its memory could handle.

I needed to build in error-handling routines too. The interactive and cumulative nature of the events, the unpredictable patterns of allowed and unallowed choices, and the potential for physical accidents make it impossible to totally debug these kinds of programs.

I have found that no matter how assiduously I work to anticipate what might happen, I miss some possibilities. I have built in specific error-handling routines for the errors, the program can diagnose—for instance, instructions on the screen that "group 2 needs to reset their switch before I can read it again," or "please move back from the window—you're blocking the spots."

Applesoft has an ONERR command that let me write a routine for unanticipated errors. If an error came up in the flow, the computer announced to the user, "I'm sorry I seem to have malfunctioned," played a special malfunction "song" I composed, checked out error codes to see if it could adjust or save the event, and if it couldn't, announced that it had to start over. Viewers enjoyed these sequences because they promoted the intelligent interaction aspect of the events and they reassured the viewers that computers are fallible.

Sensors in a Rough World: Somehow the participants needed to be able to communicate with the computer. Common computer wisdom stresses the need to make sensors reliable and to control their installation carefully. Most of the settings in which I worked made this rule hard to follow.

"Interactive Computer Theatre" required devices that could be comfortably and flexibly handed around in groups. I mounted switches and potentiometers in hand-sized flexiglass sculptures. Although I tried to mount them firmly, the constant handling occasionally changed the calibration.

The resistive drawing material used in the lines in "Memory Map" wore down after repeated applications of the pointer and hence the calibration of points changed. The photocell detectors in the store window in "Computerized Street Events" and in "Exploring Frames of Mind" were subject to constantly changing light and weather conditions and to variations among cells.

Wherever possible I built in periodic calibration routines, so the programs were constantly checking and adjusting their calibrations and, where possible, alerting participants to the changes. For example, when the computer determined the setting was too dark for photocells to function correctly, the program went into a routine

that announced to viewers it was "too dark to function."

Had I not been working on a limited budget, some of these problems most likely could have been overcome—through special factory fabrication of rugged dials or special infrared source-detecting pairs. Nonetheless, work in these settings requires that you be constantly aware of the abuse that sensors will be subject to.

Laying the connecting wires from computers to sensors also posed difficulties. For example, the "Interactive Computer Theatre" event took place in a 150 × 40 foot performance theatre. Because the hall was constantly used, there was only an hour and a half to set up prior to the event. This meant that I couldn't install the wires in an ideal configuration. The length of the wires (some over 150 feet) and the realities of the setting (wires laid under rugs on the floor) meant there was considerable "noise" to deal with. When I used the game controller inputs on the Apple, I needed to install 2.2k pull-up resistors to condition the signals. The Mountain Hardware D/A A/D board seemed able to handle the noise.

Acoustical noise was also a problem—I needed to amplify the sound made by the computer. Simply taking taps off the leads from the internal Apple speaker into a live input of an amplifier worked well enough to let me fill these public spaces with sound.

Two general principles underlie most of these problems and solutions in working in less than optimum public conditions:

1. If possible, pilot test the program and installation in the actual situation in which it will be run. I extensively tested my hardware and software in my home workshop; inevitably I uncovered new problems in the real setting.

2. Count on unanticipated events and try to incorporate them into the flow of the program. Part of the magic of interactive art is its ability to grow and spontaneously surprise participants (and even the maker).

Summary

Interactive art events offer exciting new possibilities. They could not exist without the computer's unique abilities to remember, to intelligently respond, and to simultaneously handle many channels of information. The price, flexibility and accessibility of microcomputers bring these events into the scope of the independent artist or designer.

Interactive art should help the public to see that they don't need to be passive in their entertainment, art appreciation and, by extension, other activities. Technically, psychologically and artistically, the creation of these kinds of events presents significant challenges, but the rewards both for the participants and the creators make it worthwhile. ■

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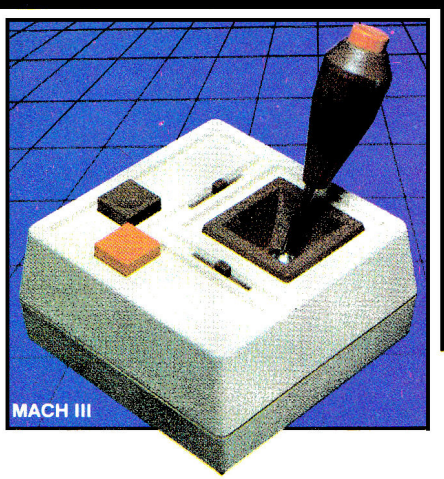

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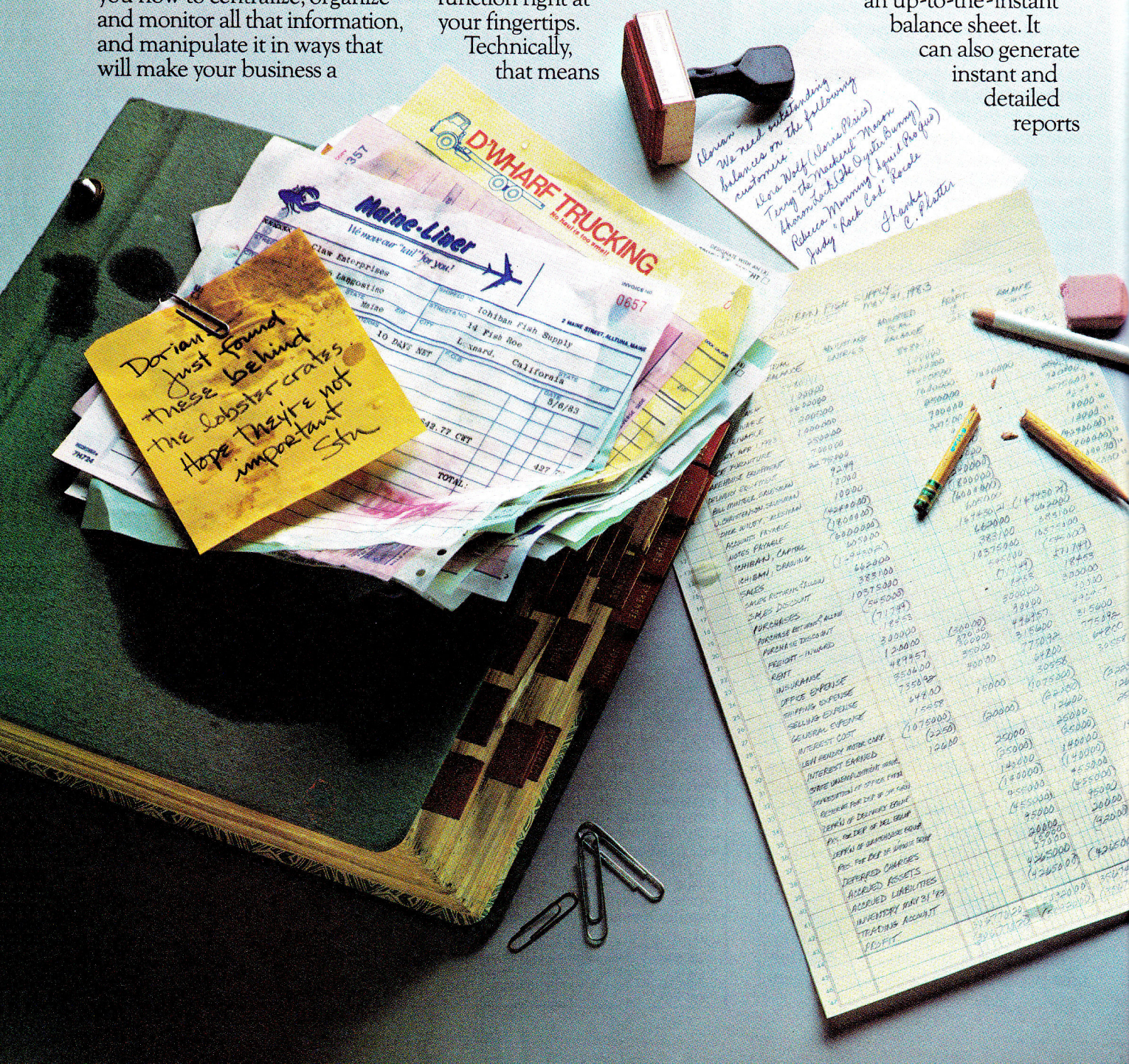

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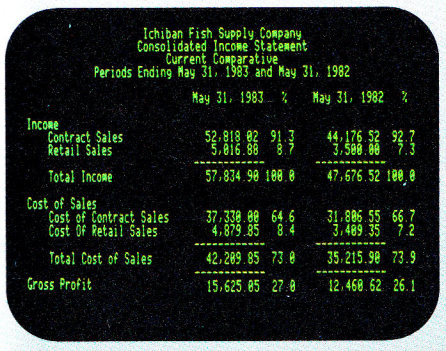

Ichiban Fish Supply Company
Consolidated Income Statement
Current Comparative
Periods Ending May 31, 1983 and May 31, 1982

	May 31, 1983	%	May 31, 1982	%
Income				
Contract Sales	52,818.02	91.3	44,176.52	92.7
Retail Sales	5,016.88	8.7	3,500.00	7.3
Total Income	57,834.90	100.0	47,676.52	100.0
Cost of Sales				
Cost of Contract Sales	37,330.00	64.6	31,886.55	66.7
Cost Of Retail Sales	4,879.85	8.4	3,489.35	7.2
Total Cost of Sales	42,209.85	73.0	35,215.90	73.9
Gross Profit	15,625.05	27.0	12,460.62	26.1

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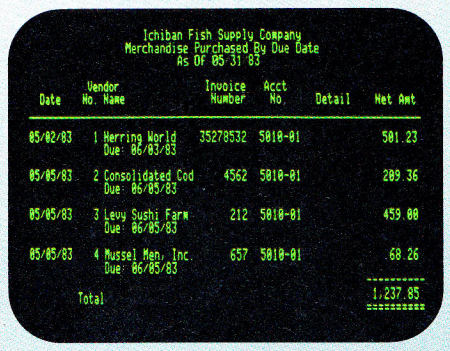

Ichiban Fish Supply Company
Merchandise Purchased By Due Date
As Of 05/31/83

Date	Vendor No.	Name	Invoice Number	Acct No.	Detail	Net Amt
05/02/83	1	Herring World Due: 06/03/83	35278532	5010-01		501.23
05/05/83	2	Consolidated Cod Due: 06/05/83	4562	5010-01		289.36
05/05/83	3	Levy Sushi Farm Due: 06/05/83	212	5010-01		459.00
05/05/83	4	Mussel Men, Inc. Due: 06/05/83	657	5010-01		68.26
		Total				1,237.85

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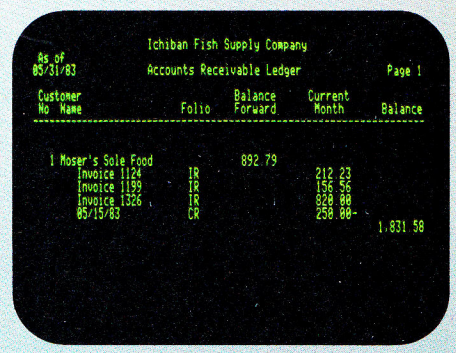

As of 05/31/83
Ichiban Fish Supply Company
Accounts Receivable Ledger
Page 1

Customer No	Name	Folio	Balance Forward	Current Month	Balance
1	Moser's Sole Food		892.79		
	Invoice 1124	IR		212.23	
	Invoice 1199	IR		156.56	
	Invoice 1326	IR		820.00	
	05/15/83	CR		250.00-	
					1,831.58

To avoid fishy transactions, you can instantly display customer's payments, charges and current balance. In this case, a few more cans of tuna would put Mr. Moser over his $2,000 limit.

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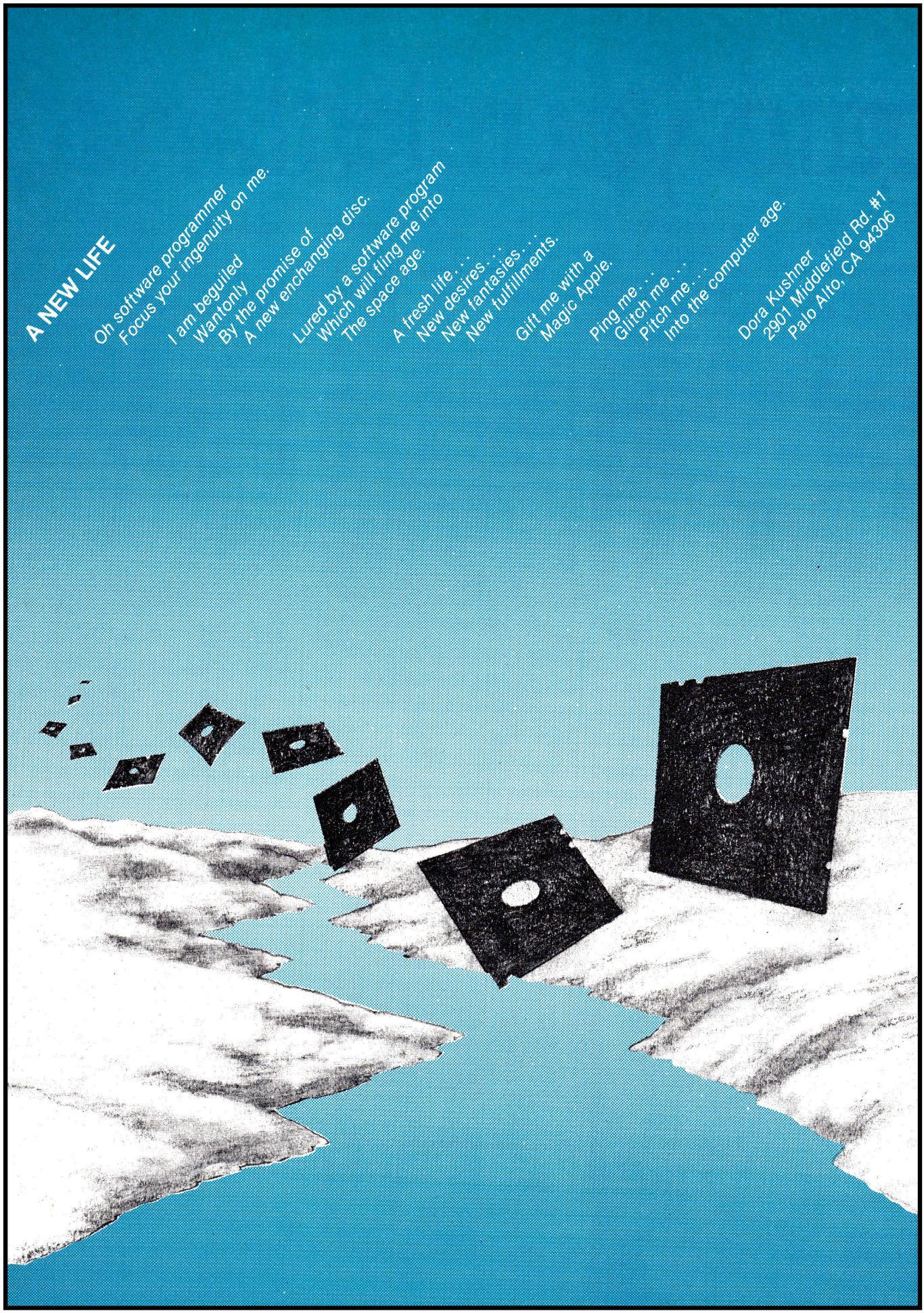
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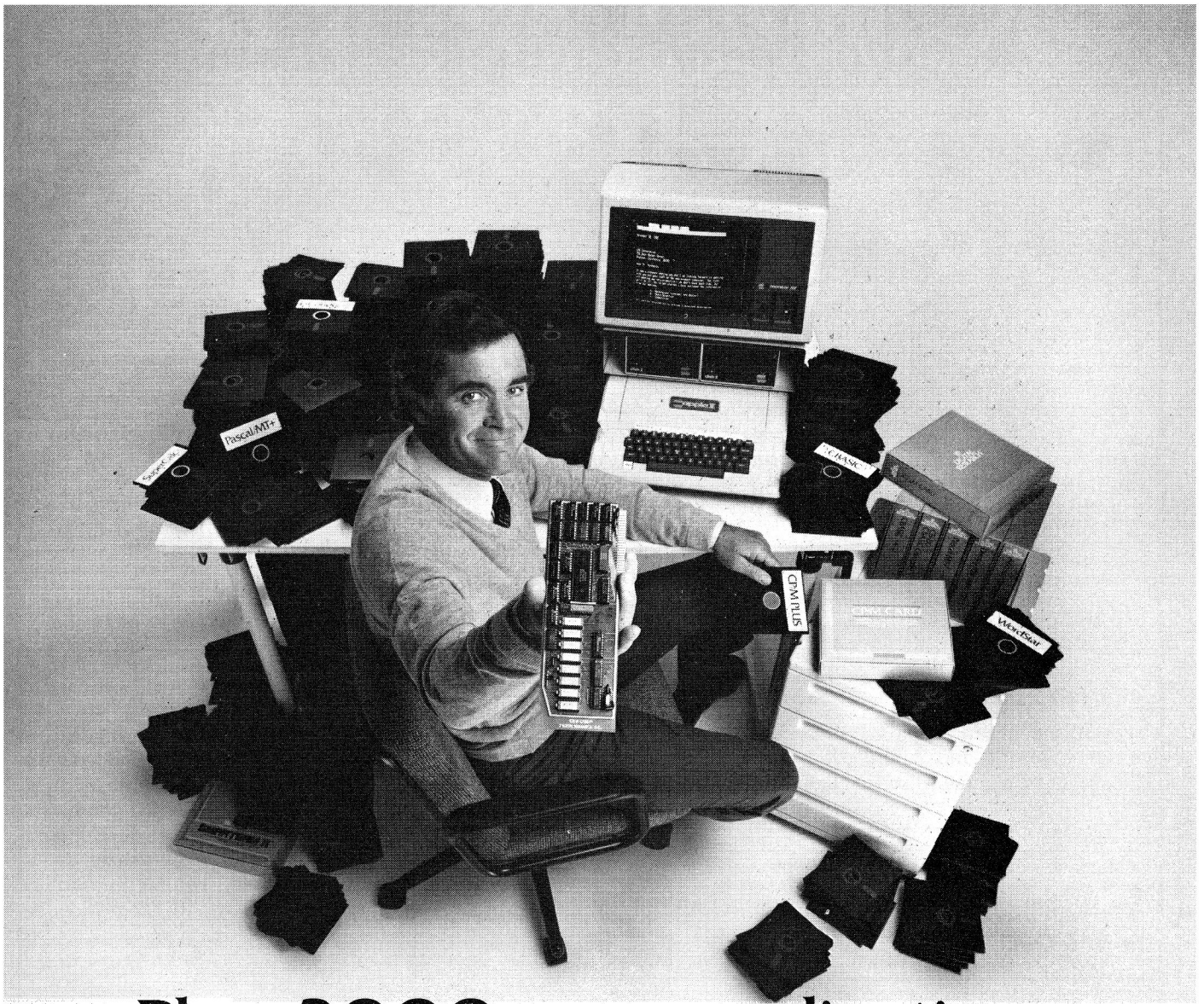

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Chase
A Creative Adventure

Killer dots on the prowl! Can you avoid them, negotiate the maze and still rack up points? There are six ways to try...

by David Phelps

I was sitting at an Apple II Plus recently, getting kind of bored, so I decided to make a game. It started out as two dots following a third dot around the screen (the third dot controlled by the person at the computer). But that soon became boring. So, to make it more interesting, I added walls that the dots could penetrate, but you could not. Furthermore, if you hit the wall you died. More development changed the walls into a maze.

After awhile, running around a maze pursued by little dots was boring, so prizes that were difficult to win, but worth points, were added.

After adding a title screen, some more options and a few sound effects, it became Chase, a creative adventure.

The instructions are simple. You are a little white dot being chased by a light blue dot and an orange dot (monsters). The arrow keys move you left and right while the A and Z keys move you up and down. If you run into the magenta walls or let the monsters catch you, the game is over. One point is received each time a monster moves and you survive. You also earn 1000 points if you touch one of the purple dots (prizes). The prizes disappear though, if the monsters run over them.

There are six variations of this game. Number one is the basic game.

Program listing.

```
160  PRINT : HTAB M: GET SK$:SK =
      VAL (SK$)
200  HTAB 8: VTAB 24: INPUT "PRES
     S RETURN TO CONTINUE";JJJ$
500  GR
501  COLOR= 3: PLOT 32,22: PLOT 3
     1,12
510  COLOR= 1: VLIN 10,30 AT 10: HLIN
     10,15 AT 10: HLIN 17,28 AT 1
     0: VLIN 10,30 AT 30: HLIN 10
     ,30 AT 30
511  VLIN 7,10 AT 28: HLIN 28,32 AT
     7: VLIN 7,13 AT 32: HLIN 30,
     32 AT 13
512  IF SK = 5 THEN 514
70  REM  ** BY DAVID PHELPS **
71  REM  ** COPYRIGHT (C) 1982 **
90 M = 14
100  HOME
105  INVERSE
110  HTAB 15: PRINT "** CHASE **"

113  NORMAL
115  HTAB 13: PRINT "BY DAVID PHE
     LPS"
116  HTAB 15: PRINT " (C) 1982"
125  PRINT
130  PRINT "AVOID HITTING THE WAL
     LS, AND DO NOT LET THE MONST
     ERS CATCH YOU"
140  PRINT "USE THE ARROW KEYS TO
      MOVE LEFT AND      RIGHT, US
     E A AND Z TO MOVE UP AND DOW
     N"
150  PRINT : PRINT : HTAB M: PRINT
     "(1) NOVICE": HTAB M: PRINT
     "(2) ADVANCED ": HTAB M: PRINT
     "(3) MASTER": HTAB M: PRINT
     "(4) IMPOSSIBLE": HTAB M: PRINT
     "(5) RND DOTS": HTAB M: PRINT
     "(6) MULTI-SCORE"
513  GOTO 515
514  FOR I = 1 TO 40:X8 =  INT ( RND
     (1) * 27) + 7:Y8 =  INT ( RND
     (1) * 27) + 7: PLOT X8,Y8: NEXT
     I
515  VLIN 7,10 AT 17: HLIN 7,17 AT
     7: VLIN 7,33 AT 7: HLIN 7,33
      AT 33: VLIN 20,33 AT 33: HLIN
     30,33 AT 20
517  IF SK = 6 THEN  HLIN 1,39 AT
     1: VLIN 1,39 AT 1: HLIN 1,39
      AT 39: VLIN 1,39 AT 39
520  HLIN 15,25 AT 15: HLIN 15,25
      AT 25: VLIN 15,25 AT 20: HLIN
     13,17 AT 20: HLIN 23,27 AT 2
     0: PLOT 20,26: PLOT 20,27: PLOT
     17,28: PLOT 17,29: PLOT 23,2
     8: PLOT 23,29
522  IF SK = 6 THEN 524
523  GOTO 530
524  COLOR= 3: FOR I = 1 TO 90:X8
      =  INT ( RND (1) * 37) + 2:
     Y8 =  INT ( RND (1) * 37) +
     2: PLOT X8,Y8: NEXT I: COLOR=
     1
530  REM  PLOT 5,16: REM PLOT 5,1
     7: REM PLOT 15,16: REM PLOT
     15,17
531  IF SK = 2 THEN  PLOT 8,18: PLOT
     9,21
532  IF SK = 3 OR SK = 4 THEN  PLOT
     8,18: PLOT 9,21: PLOT 8,24: PLOT
     9,27: PLOT 15,26: PLOT 15,27
     : PLOT 25,26: PLOT 25,27
540 OM = 1
550 MX = 29:MY = 29:P = 0: COLOR=
     7: PLOT MX,MY
560 X3 = 20:Y3 = 35:P = 0: REM  C
     OLOR= 7: REM PLOT X3,Y3
570 X2 = 15:Y2 = 20:P = 0: REM
          COLOR= 7: REM PLOT X2,Y2

580  HOME : VTAB 24: PRINT "USE A
     RROW KEYS TO MOVE DOT"
590 X = 22:Y = 20
600  COLOR= 15
610 KILL =  SCRN( X,Y): IF KILL =
     1 THEN  TEXT : HOME : PRINT
```

Listing continued.

David Phelps created this game, in his ninth grade computer class, for people who like to play maze games. It was voted the best game by all his fellow computer students at the Hyde Park High School in Austin, TX. Address correspondence to him at 8610 Robbie Drive, Austin, TX 78759.

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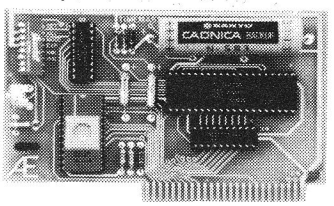

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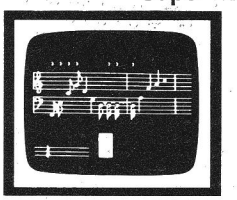

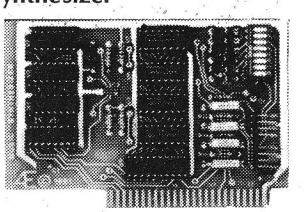

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- We give you lots of software. In addition to Compose and Play programs, 2 disks are filled with over 30 songs ready to play.
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- Four white noise generators which are great for sound effects.
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- Full control of attack, volume, decay, sustain and release.
- Will play songs written for ALF synthesizer (ALF software will not take advantage of all the features of this board. Their software sounds the same in our synthesizer.)
- Automatic shutoff on power-up or if reset is pushed.
- Many many more features.

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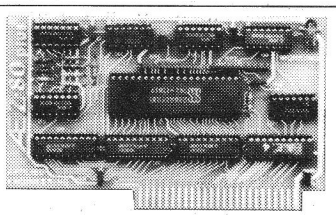

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SUP'RTERM	375	NO	YES	NO	NO	NO	YES	YES
WIZARD80	245	NO	NO	YES	YES	NO	YES	YES
VISION80	375	YES	YES	YES	YES	NO	NO	NO
OMNIVISION	295	NO	YES	NO	NO	NO	YES	YES
VIEWMAX80	219	YES	YES	YES	YES	NO	NO	YES
SMARTERM	360	YES	YES	YES	NO	NO	YES	NO
VIDEOTERM	345	NO	NO	NO	YES	YES	NO	YES

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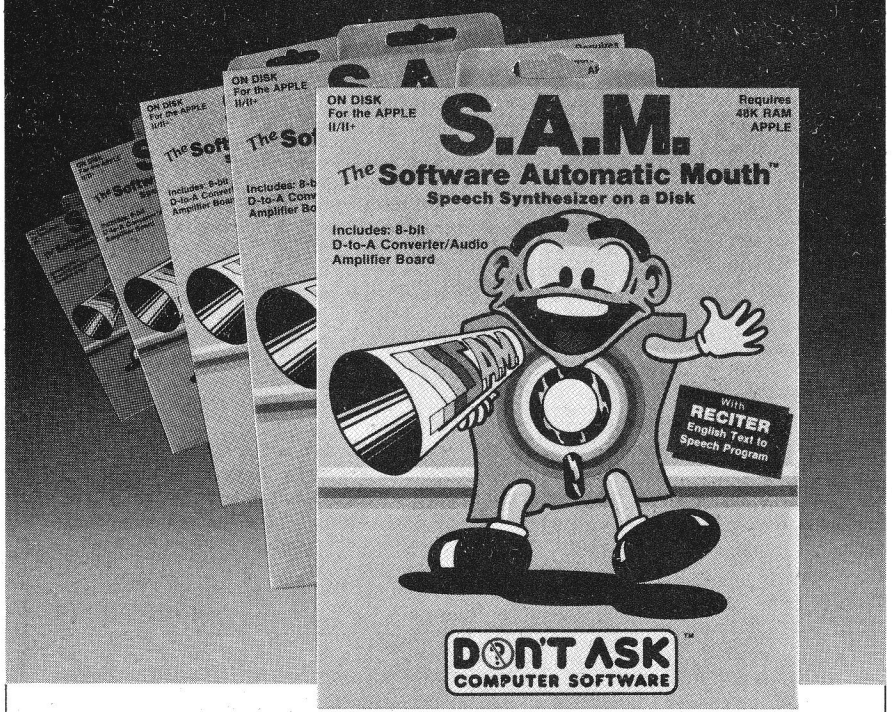

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S.A.M. for Apple is now accessible from Pascal as well as BASIC and machine language.

S.A.M. programmed by Mark Barton.

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Listing continued.

```
     "SCORE ";P: PRINT "YOU HIT T
     HE WALL!!": GOTO 1050
615  IF KILL = 3 THEN P = P + 100
     0: PRINT  CHR$ (7), CHR$ (7)

620  PLOT X,Y
630 ZZ =  PEEK ( - 16384)
640  REM  POKE  - 16368,0
645 HAHA =  PEEK ( - 16336)
650  IF ZZ = 136 THEN  COLOR= 0: PLOT
     X,Y:X = X - 1
660  IF ZZ = 149 THEN  COLOR= 0: PLOT
     X,Y:X = X + 1
670  IF ZZ = 193 THEN  COLOR= 0: PLOT
     X,Y:Y = Y - 1
680  IF ZZ = 218 THEN  COLOR= 0: PLOT
     X,Y:Y = Y + 1
730 WM = WM + 1: IF WM = 3 THEN W
     M = 1
740  ON WM GOSUB 760,870
741  IF SK = 4 THEN  ON WM GOSUB
     870,760
750  GOTO 600
760  REM  ** MOVE MONSTER **
770 E2 =  SCRN( MX,MY): IF E2 = 1
      THEN  COLOR= 1
780  IF E2 <  > 1 THEN  COLOR= 0
790  PLOT MX,MY: IF X > MX THEN M
     X = MX + 1
795 HAHA =  PEEK ( - 16336)
800  IF X < MX THEN MX = MX - 1
810  IF Y > MY THEN MY = MY + 1
820  IF Y < MY THEN MY = MY - 1
830  IF Y = MY AND X = MX THEN  TEXT
     : HOME : PRINT "THE MONSTER
     GOT YOU": PRINT : PRINT "SCO
     RE ";P: GOTO 1050
840 E1 =  SCRN( MX,MY): IF E1 = 1
      THEN  COLOR= 1
850  IF E1 <  > 1 THEN  COLOR= 7
860 P = P + 1: PRINT "SCORE ";P: PLOT
     MX,MY: RETURN
870  REM  ** MOVE MONSTER#2 **
880 E3 =  SCRN( X2,Y2): IF E3 = 1
      THEN  COLOR= 1
890  IF E3 <  > 1 THEN  COLOR= 0
900  PLOT X2,Y2: IF X > X2 THEN X
     2 = X2 + 1
905 HAHA =  PEEK ( - 16336)
910  IF X < X2 THEN X2 = X2 - 1
920  IF Y > Y2 THEN Y2 = Y2 + 1
930  IF Y < Y2 THEN Y2 = Y2 - 1
940  IF Y = Y2 AND X = X2 THEN  TEXT
     : HOME : PRINT "THE MONSTER
     GOT YOU": PRINT : PRINT "SCO
     RE ";P: GOTO 1050
950 E4 =  SCRN( X2,Y2): IF E4 = 1
      THEN  COLOR= 1
960  IF E4 <  > 1 THEN  COLOR= 9
970 P = P + 1: PRINT "SCORE ";P: PLOT
     X2,Y2: RETURN
1050  INPUT "DO YOU WANT TO PLAY
     AGAIN ";PL$
1060  IF  LEFT$ (PL$,1) = "Y" THEN
     100ELSE END
```

difficult not to run into the walls when you go for the prizes. Variation four is almost impossible because the monsters move as fast as you, and they have the advantage of moving diagonally. Game five scatters magenta dots in random positions that you must avoid, because if you hit them the game is over. This variation occasionally makes it impossible to get the prizes, so if this happens, just commit suicide and start over.

Variation six is my favorite. In this game 90 prizes are scattered around the screen, each worth 1000 points. It is possible to go outside the interior maze by running over one of the prizes in the wall. I did put a wall surrounding the whole screen so you won't run off the edge.

I hope you like this game as much as I do. ■

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TAC T.M.

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T.A.C. is a game of World War II tactical armored combat. **You** pick a nation (from among the four major combatants—Britain, U.S.A., Germany and Russia). **You** build a combat team from their most powerful tanks, assault guns and tank destroyers. **You** command the team you've created in major operations against like forces of the enemy.

All the famous vehicles of the second world war are here—Tigers, Panthers, Shermans and JS II's; Jagdpanthers, SU 152's, Fireflies and T 34's, just to name a few. They have all been thoroughly researched and their important features programmed into the game. Each vehicle is distinguished by such elements as armor thickness (rear and flanks as well as front), fire power, speed, acceleration and gun traverse. Even minor points like fuel tank location can be critical.

The computer handles all the technical details. This lets you concentrate on making the same kinds of decisions the real-life tank commanders made. You search for the enemy, set your speed, aim your gun and knock out the enemy. The computer will handle all the rest.

Here are just some of the exciting features:

- **T.A.C.** can be played solitaire against the computer or as a two player (or two team) game with the computer as mediator.
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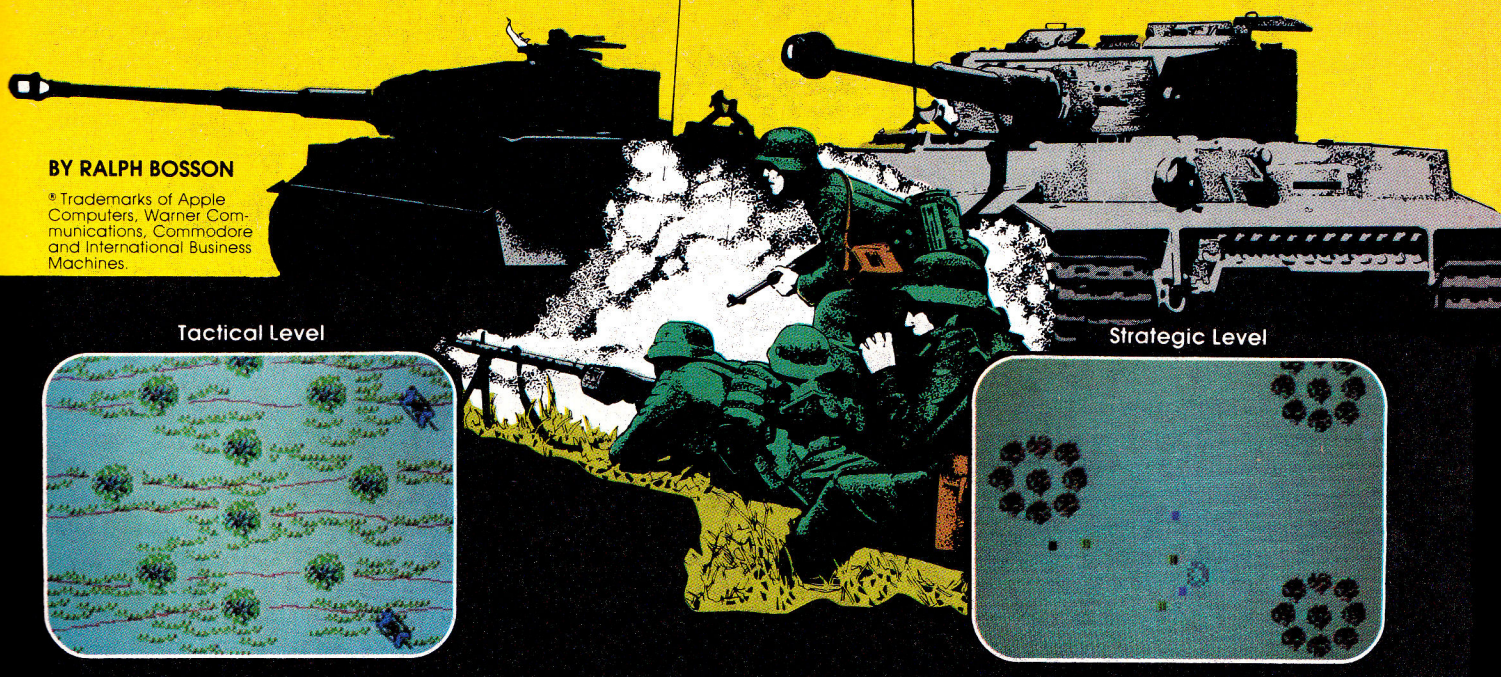
- Special options include hidden movement, improved positions, smoke mortars, minefields, close assaults, overruns and indirect fire.

T.A.C. on diskette retails for $40.00 and can be played on the following computers: Apple® II's with 48K (Mockingboard™ Sound Enhanced!), Atari's® with 48K. Commodore® & IBM® versions coming this fall.



BY RALPH BOSSON

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Sprites Break the Rules

Murmurs rising throughout the land have challenged Apple's leading role: "Newer micros have more." But now out of the West comes a system that does what everyone thought was impossible.

by Eric Grammer
inCider staff

I must have read three dozen letters to *inCider* magazine that bemoan the Apple's limitations in the area of graphics and sound. It's not that the Apple is a poor machine; it's just that a normal microprocessor is not designed to be a graphics or sound processor.

When you put a quarter in an arcade game, you get spectacular graphics and sound because the chips in the machine were designed with that specialized purpose in mind. The sounds might come from a special sound chip from General Instruments, for example, and video processing might be handled by a VDP (video display processor) from Texas Instruments or some other chip manufacturer.

Early microcomputers such as Radio Shack and Apple had graphics, but mostly as an afterthought (Radio Shack's character graphics were quite primitive). No one realized just how significant graphics would someday be. Besides, how much research and development can a couple of fellows (Apple) or a company (Radio Shack) do before getting a product to market? Eventually, research and development costs must be paid for via profits.

In other words, micros evolve. One could not expect Woz and Jobs to make an Apple IIe at first crack. There have been dozens of revisions and improvements in the history of the Apple. The IIe and Lisa are the newest steps in Apple evolution, and soon will come the Macintosh; perhaps it will be out before this article reaches the stands.

Companies such as Atari, TI and Commodore have all added specialized sound and graphics chips to their machines. Apple hasn't, and from what I gather, doesn't plan to. As nearly as can be determined, they'll let Atari and the others keep their game-playing machine market while Apple strives for a great business machine reputation. Lisa seems to be a small machine that does what the larger ones have been doing, but much more easily and cheaply. Lisa, from demos I've seen, has the ultimate user-friendliness.

Applesoft Graphics and Machine Language Graphics

Why hasn't Apple made Applesoft graphics as user-friendly as Lisa's? Why is Apple hi-res screen mapping more confusing than with any other micro? Why are Apple's sounds so primitive compared to those of cheaper competitors? And why is Apple the only major micro manufacturer that seems to be ignoring sprite graphics, a concept which has made Atari rich and can take a good deal of the credit for the early success of TI and Commodore micros?

I think the answer is that they've decided to let peripherals manufacturers deal with this area. Sound effects, voice and sprites all require specific types of peripheral boards with specialized chips mounted on them. Apple, rather than trying to cover all bases, has decided to cover a few bases well (i.e., business micros in general, business graphics, word processing, data processing and filing, printouts, and more).

This has left the field wide open for adventurous companies to develop peripherals for sprites and truly good sound. Creating hardware which actually runs sprite graphics and a sound chip is not that big a trip. But hardware that allows the use of both Apple graphics, sprite graphics, and sound simultaneously is a big deal.

And software that empowers the graphics and sound chips is also not too difficult to create. But to create a language that interfaces with the sprite graphics generator (also called the VDP) and sound chip, from Applesoft (thereby defining itself as an extremely powerful extension of Applesoft), is more of a challenge.

Well, Synetix Systems Inc., 15050 NE 95th St., Redmond, WA 98052, has accepted this challenge, and over the past months has developed a peripheral card, dubbed Supersprite, for sprite graphics, three-part music, and

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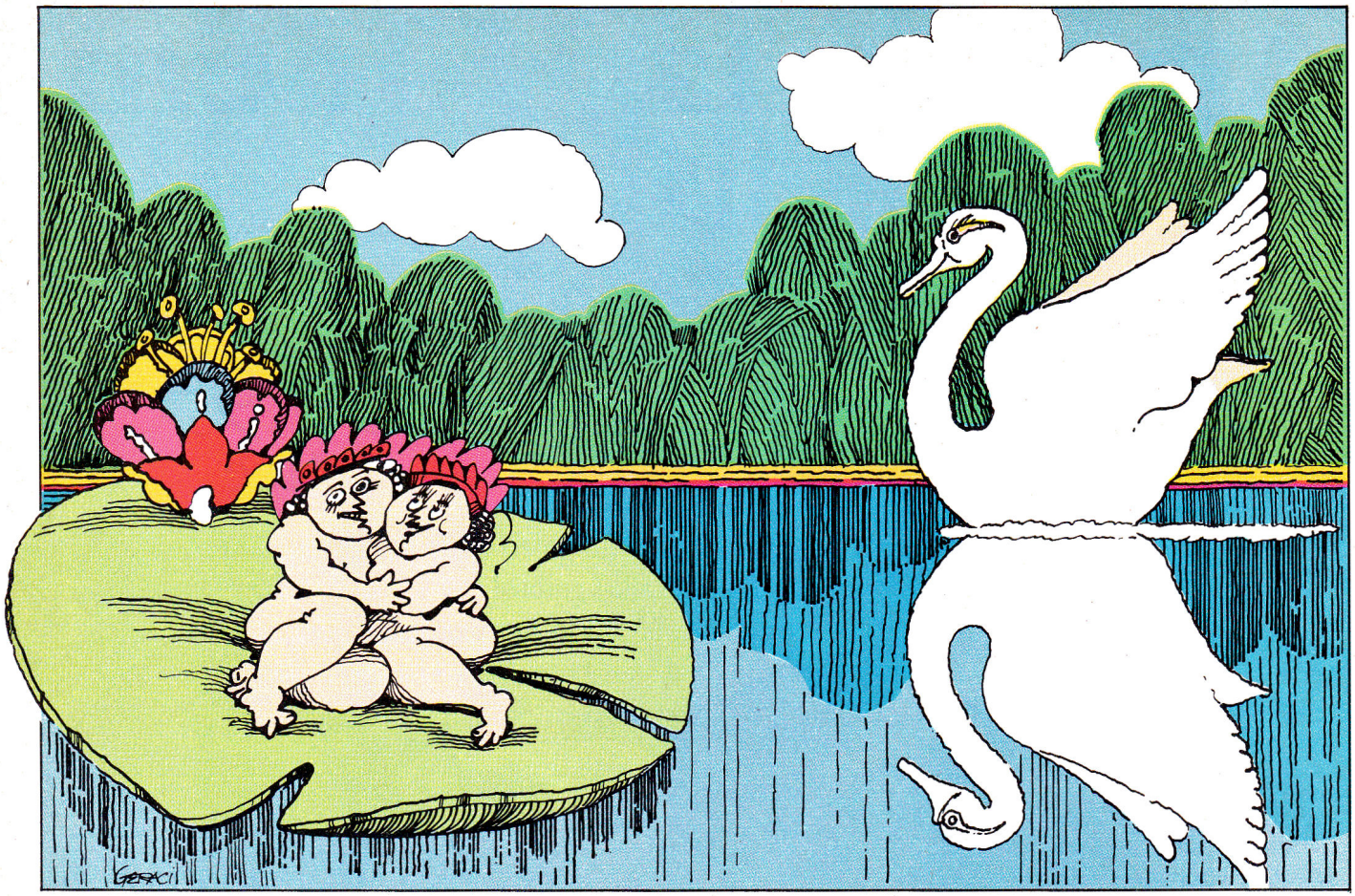

much more. This peripheral has completely changed the Apple from a computer with poor graphics to an incredible machine with unlimited graphics (and sound) potential. With the board comes a language from Avant-Garde Creations Inc., PO Box 30160, Eugene, OR 97403, that allows full sprite graphics from the world's most popular Basic language, Applesoft.

With this new language, called Ampersprite, Applesoft is transformed from a language that cannot begin to create fast, smooth, flicker-free animation (especially of larger shapes) to one that performs such feats with ease. It also places many more hi-res colors at the user's disposal. It allows scrolling by moving a mere 768 bytes, not 8K! And it has multilevel video planes, making color-clash and background erasing no longer a problem.

The Big Weaknesses Of One-Plane Graphics

To expand on that, the Apple has color-clash problems whenever color-bit-on and color-bit-off colors are used in horizontally adjacent positions. And when objects move across the screen, not only color-clash but background erasing occurs. The best way to envision why the background erases is to think of a picture (2-D) and the view out of a window (3-D). If you want a dog in your picture to be on the left side of the "screen" rather than the right side, where he now is, you erase the dog, draw in the background that the dog was covering up, erase the background at the new dog position, and draw in the dog. However, if you want the dog outside your window to move to the left, you go out and move him left, via leash, calling, chasing, or bribing with Puppy Chow. In the latter example, one step, not four, is required.

Now imagine a whole kennel-full of dogs let loose in a yard to play. If you draw them as they are at any one point, wait, and then want to draw them again, you might as well start over from scratch with a new picture. But if you're looking over the fence at this yard-full of dogs, you can imagine getting the dogs from one position to another by merely chasing them (unless one bites your leg). Notice, in this live, 3-D scene, that although dog A overlaps dog B and dog C partially overlaps dog D and dog E partially overlaps dogs B and C and dog F overlaps all of the above, because it's closer than the rest, all this causes no problem.

In the real world you do not have to erase or in any other way affect either the background or the other objects when you wish to reposition any or all objects. But in a one-plane picture, such as the Apple's high-resolution graphics screen, overlaps cause no end of problems. There can either be background screen bytes or single-object screen bytes at any one spot, with one video plane.

The dogs playing in the real-world situation above represent a multiplane situation. There can be many video planes at any one spot with Supersprite graphics. Dogs A, B, C and D may all be partially superimposed upon one another and no effect will be noticed and no erasing will be needed.

Another example is Saturday morning cartoons. Sometimes objects are walking along and the far background is moving slowly while the near background is moving more rapidly. This has 3-D effect and is sometimes called 2½-D graphics. I hardly need to tell you that the entire background is not drawn, erased and redrawn over and over as the characters move. This is another example of multiplane video. All it takes to get these great depth effects is to drag the near-background (transparent) overlay across the far-background while the moving-object-

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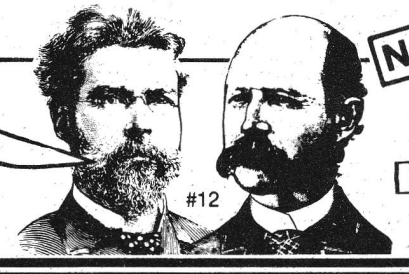

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RENAME DOS COMMANDS and Error Messages. "Catalog" can be "Cat"; "Syntax Error" can be "Oops" or *anything*. **Protect your programs**—An unauthorized Save-attempt can produce a "Not Copyable" message, or *any* message you want. Also List-Prevention and one-key program-execution from catalog.

Customize DOS. Change the Disk Volume heading to your message or title. Omit or alter catalog file codes. Fascinating documentation, tips and experiments.

ANYONE using your disks (booted or not) will be formatting DOS the way YOU designed it.

(**$24.00**: Includes Peeks/Pokes Chart & Tip Book #2)

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SAVE 60-SECTOR PROGRAM	24 sec.	9 sec.
BLOAD LANGUAGE CARD	13 sec.	4 sec.

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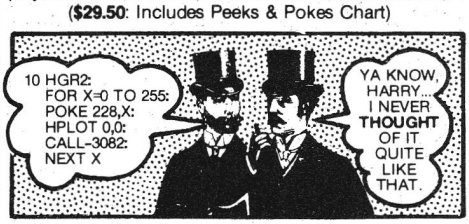

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PRINT VARIABLE-WIDTH TEXT on both hi-res screens with normal Applesoft commands (including Htab 1-70). Normal, expanded & compressed text with no hardware. 70-columns requires b/w monitor (not tv).

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HIGH-SPEED PRESENTATION UTILITY
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MAKE PROFESSIONAL PRESENTATIONS of existing hi-res, lo-res and text frames. *FAST* hi-res loads in 2½-seconds! Paddle or Keyboard-advance frames.

Unattended Shows are optional with each picture arranged and pre-programmed to display from 1 to 99 seconds. **Text Screen Editor** lets you create black-and-white text "slides" and add type "live" from the keyboard during shows. Mail copies of presentations on disk to friends and associates (or home to Mom!).

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APPLESOFT ENHANCER by MARK SIMONSEN

Requires Apple IIe (*or* II/II+ with RAM Card)

RENAME ANY APPLESOFT COMMAND or Error Message to any word, for program clarification or encryption. Plus add optional NEW COMMANDS—

ELSE follows If-Then's (as in IF X=2 THEN PRINT "Yes": *ELSE* PRINT "No"). **SWAP X,Y** exchanges 2 variables' values. Use **TONE** command to write music with no messy pokes & calls. **HSCRN** reads the color (off/on) of any hi-res dot. **SCRL** scrolls the text screen in *either* direction. **TXT2** lets Text Page 2 act like Page 1.

Also— GOTO or GOSUB may precede variables (as in "GOSUB FIX" or "GOTO 4+X". Escape-mode indicated by special ESC CURSOR. Replace Apple's awkward Graphics Screen Switch pokes with one-word commands. Change ctrl-G Beep to any tone. INVERSE REM STATEMENTS too! All GPLE® compatible.

These new functions occupy ZERO extra memory!

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BEAGLE BAG
12 APPLE GAMES by BERT KERSEY

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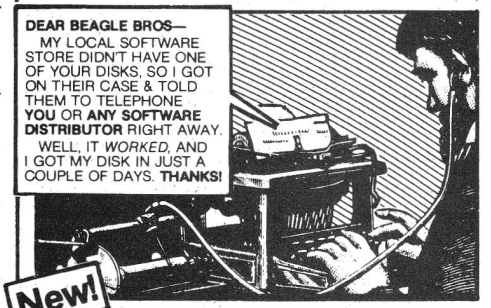
Twelve Games from the Applesoft Ace, Bert Kersey—TextTrain, Wowzo, Buzzword, Magic Pack & more...

Excellent Reviews— (see Jan-83 *Softalk,* page 148).

BEAGLE MENU too: Description under "Typefaces".

(**$29.50**: Includes Peeks & Pokes Chart)



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overlays, in front, go through their multi-picture walking sequences.

Multiplane video provides an immense advantage. Cartoon makers would be lost without it. The ease of use compared to single plane video is tremendous. And this ease translates itself into speed. Remembering the dog scenario, think about repositioning all dogs by simply moving them to new places. Now think about erasing and redrawing every dog. The second task takes many times longer to accomplish.

Refresh, XDRAW, and Masking

If you've ever tried to program a colorful game with a background, you've quickly run into the background obliteration problem. You may have decided to make the parts of the background that the objects occasionally cover up black, so there's nothing erased when a shape goes by. Or you may have decided that you'd XDRAW to erase and draw so that the background always gets restored.

The trouble with the "black" solution is that it merely avoids the problem and doesn't always look too spiffy. Strike one. The trouble with the XDRAW solution is that although the background is restored perfectly, the shape itself turns unwanted colors as it traverses the colored background. Strike two.

An alternate solution is to go through elaborate rituals where the entire screen, or a part of it, is redrawn between each frame. Sometimes "masks" are created, to handle the color interactions. What if you want the entire screen to be full of moving objects, especially large moving objects? You need to deal with upwards of 192 bytes to move a 32-by-32 spaceship with normal bit-mapped animation. With sprites you need only change the X coordinate (one byte).

It's true that Applesoft vector shapes also need only coordinate changes to make them move, but it's also true that since they draw only one or two dots at a time, they are too slow for adequate animation in most faster games. Block shape animation from Basic is too slow; assembly-language block shape animation (bit-mapped) is not only too complex for any but the most seasoned programmer, but also too slow for lots of large shapes to be animated at once. So I'll have to call, "Strike three!"

In essence, one could say that all the good programmers have been inventing all manner of elaborate crutches to make up for Apple's weakest aspects: spritelessness, limitation to six colors, only one video plane, color-clash, and slow graphics done on a jumbled-up hi-res map. In short, Apple's video performance, discounting text, is a far cry from what it could be.

Supersprite Graphics Compared To 6502 Graphics

1. Machine language and Basic Supersprite graphics (using Ampersprite) are much faster than 6502 graphics. In fact, merely using Ampersprite as an Applesoft enhancement allows a Basic programmer to program animation that will compete with current Apple assembly-language animation!

2. Machine language and Basic Supersprite graphics are much easier to do than 6502 graphics. Since there are no elaborate masking, XDRAWing, refreshing, bit-shifting, preshifted shape sequences, etc., to go through, but just coordinate changes, you could certainly program a game in assembly-language Supersprite graphics much faster than with conventional methods.

3. Most Supersprite Basic programs done so far are incomparable to the 6502 Basic equivalents. The simple fact is, the results in the Ampersprite-using Supersprite programs, easily and quickly achieved, would have been impossible in 6502 graphics.

4. Sixteen colors are standard for Supersprite sprites and patterns, certainly a refreshing change from the six standard Apple hi-res colors. Nonstandard colors can be created by mixing two or more standard colors in either type of graphics. For example, orange can be created by mixing yellow and red.

5. Nearly three dozen sprite planes let you perform wild 3-D animation effects that are depthy and quite impressive.

Now at this point I'd talk about weaknesses in Supersprite graphics—the things normal Apple graphics do that aren't so easy to do with Supersprite graphics—except for one thing. With the Supersprite Avant-Garde system, you get both VDP and 6502 graphics on the same screen at the same time, with absolutely no

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COMPUKIT

"There is no either-or situation here. You get both Apple graphics and sprite graphics."

color-clash or other interaction between them.

Am I saying that all your best Applesoft scenes, binary pictures, compressed pictures, slide-show pictures, and other 6502 based pictures and shapes can now be joined on the screen with VDP-based sprites? Yes! Impossible? I might have thought so, but when I ran this system through its paces, the evidence proved it has been done.

So what I'm saying is that there is no either-or situation here. You get both Apple graphics and sprite graphics! You needn't wonder whether to use vector shapes or sprites, Apple's six colors or VDP's 16 colors, etc. You get to have your cake and eat it too. This is truly the most important innovation in Apple history.

It's even possible to have the graphics happen while the line numbers controlling the graphics slowly scroll by on the same screen, passing behind the graphics shapes. It's possible to HPLOT and XDRAW one moment and manipulate a sprite or pattern or text character from Ampersprite the next. And it's not switching between two screens or screen flipping—it's Apple 6502 video and VDP video synchronized via complex hardware!

Now you'll have everything the competing micros have relative to sound and graphics as well as Applesoft and all it can do—all together in one place at one time. The creative program possibilities are inspiring.

The Privileged Few

As things stand, a small fraction (about 1 percent) of all Apple owners are writing commercially viable programs, games, etc., because, although lots of Apple owners can program well in Applesoft, few can program in assembly language. Of the few who can program in assembly, only a small percentage can make good graphics and animation—assembly-language animation is much harder than it ought to be.

This new sprite graphics system can help change that. Not only is assembly-language graphics much easier, but you usually don't need to use assembly language in your graphics applications! This means that you're not likely to need more speed or smoothness than accessing Supersprite from Ampersprite can provide, so you'll probably be able to program most games, utilities or other applications right from Basic using the old familiar FOR... NEXT loops and ON X GOTOs, etc. I'm talking about commercially viable programs that are in many ways superior to normal Apple assembly-language graphics programs.

Logo, Pilot, and turtle graphics of all types have not made the impact they could have because you still end up with slow, jerky graphics that are not commercially viable. GraForth is

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A REPORTING SYSTEM FOR A SPREADSHEET DATABASE
(for any VisiCalc© or Lotus 1-2-3™ User)

Most database systems consider rows of data fields as records. The 3-D concept promoted by Abacus says to consider an entire report as a record. Therefore, visualize "pages" of reports stacked-on or scattered-around your desk; these would constitute your database.

VIZ-A-MERGE™

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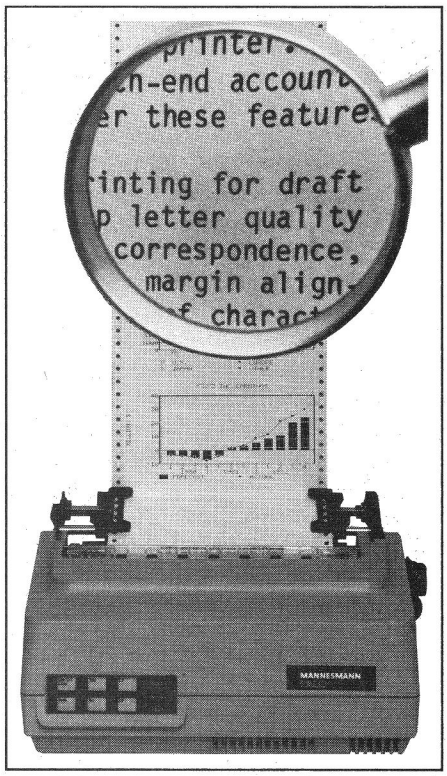

The Tally MT 160 is the one machine solution to every application. A printer for today that you won't outgrow tomorrow. It does word processing duty. . . letter quality text, proportional spacing, margin justification, auto centering. It faithfully captures your Apple graphics routines. And at 160 cps bi-directionally, it prints reports as fast as you can use them. Make it a point to see the MT 160 at your computer dealer.

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an exception here; you can use it to create acceptable games with market potential, but GraForth is difficult to use and it doesn't deal with more than one video plane, nor give you sprites, nor add ten more colors, nor increase assembly-language graphics speeds nor allow commercially viable programs to be written in a simple Basic. GraForth is a compiled language which compiles everything as you're typing it in. You cannot use it to enhance Applesoft. Unfortunately, you must use it to replace Applesoft.

I mention the above not to pick on any product or person or language—each of the above has its place. Each is good. GraForth does wonders with 3-D rotations and other such effects, for example. However, none of the above has the potential to go above and beyond current Apple assembly language. None gives you a simple Basic language that can be used from Applesoft to create graphics as good as current Apple assembly language. None give three tones and realistic sound effects all simultaneously, without stopping the action. (With the system I'm talking about here, sound processing does not interrupt graphics processing—you get simultaneous sound and graphics.)

"Easy sprite graphics will give hundreds of thousands of Apple owners a crack at the brass ring."

In short, none of the above languages has the potential to transform the Apple's graphics and sound forever, thus multiplying the number of good Apple programmers, since the "privileged few" who now write most everything have always depended upon the fact that they knew assembly graphics while the bulk of Apple programmers did not.

Easy sprite graphics will give hundreds of thousands of Apple owners a crack at the brass ring.

Supersprite Utilities

Good interface software between the Supersprite board and the Apple involves ironing out some wrinkles to create a language usable from Applesoft. And other types of utilities to convert any part of any type of shape or scene (6502 graphics or VDP graphics) into a VDP sprite must have taken a bit of doing. But sprite creation, scene creation, painting, maze creation, sprite editors and user-definable games are now complete, and you'll be seeing them in *inCider*.

Memory Use

Memory locations from $300 to $3EA and from $800 to $DFF hold the peripheral card interface program and the addressable-from-Applesoft language (Ampersprite) I've been referring to. This means that you'll start your Basic programs anywhere from $E00 to $6000, depending upon whether you plan to use hi-res Apple 6502 graphics or not and how long your program is. If you don't need the enhanced Applesoft but wish to program from assembly language instead, then you can use the peripheral card interface program ($8C long) at $300 and skip the rest. There are no other memory requirements, except keeping slot 7 reserved for the peripheral board.

It's also possible to use the card from Basic without using Ampersprite, and using only the $8C-long interface program. You merely CALL the appropriate numbers to read and write to the video RAM and video registers.

The audio can be accessed directly via POKE commands to two different I/O addresses. An easier way to create sounds is to do it from Ampersprite. Simple commands will give you any or all of the sound effects and musical chords you've been missing for so long in your Apple (three tones and sound effects all simultaneously, with no pause in animation—the sounds will continue, with no effect on graphics, until you use a command to stop or change them). You can add sound from Apple's built-in speaker for complete stereo four-part harmony!

Educational Importance

Supporting education is increasingly important in the micro industry, but no one quite knows how the teachers

can end up with all the software they want and need. One attempt at addressing this problem has been Apple Computer's support of large publishers. This may work out in the long run, but in the short run it merely will underline what we already know: there aren't that many people out there, especially teachers who already work full time, who can write viable software. Sprites for the Apple, *the* most popular computer in the schools, will surely help build good quality educational software.

These programs can incorporate speech routines using the Echo II speech synthesizer built into the Synetix Supersprite card. People who already own an Echo II, or who are not interested in speech, can buy the Synetix Supersprite, without speech chips, at lower cost.

I talked at length with the folks at Avant-Garde Creations, and they assure me they want to offer programming/user support for the Synetix Supersprite system, and be open to software ideas from teachers/administrators. They will consult with educational experts to make software of maximum impact, and be ready to create additional utilities, programmer's aids and new languages if the need arises. Enhancements to Ampersprite are another possibility. Avant-Garde will also update software, if the need arises.

They plan an ongoing program of educational software creation so that the purchase of the system is merely the beginning of the acquisition of a long, coordinated line of excellent educational software.

Next month I'll report on all the details of the Synetix Supersprite system, its accessories, utilities, manuals, users, dynamics, abilities, and specifications. You'll see how to get it, what software is available now, and what software will be available soon. Perhaps I'll even have a few sample routines to show you.

To some people a sprite is a drink. To others it's a woodland elf. To me it's the way to get my Apple to do what no Apple has ever done before, and to program easily what used to be programmed with much complexity and ritual. ■

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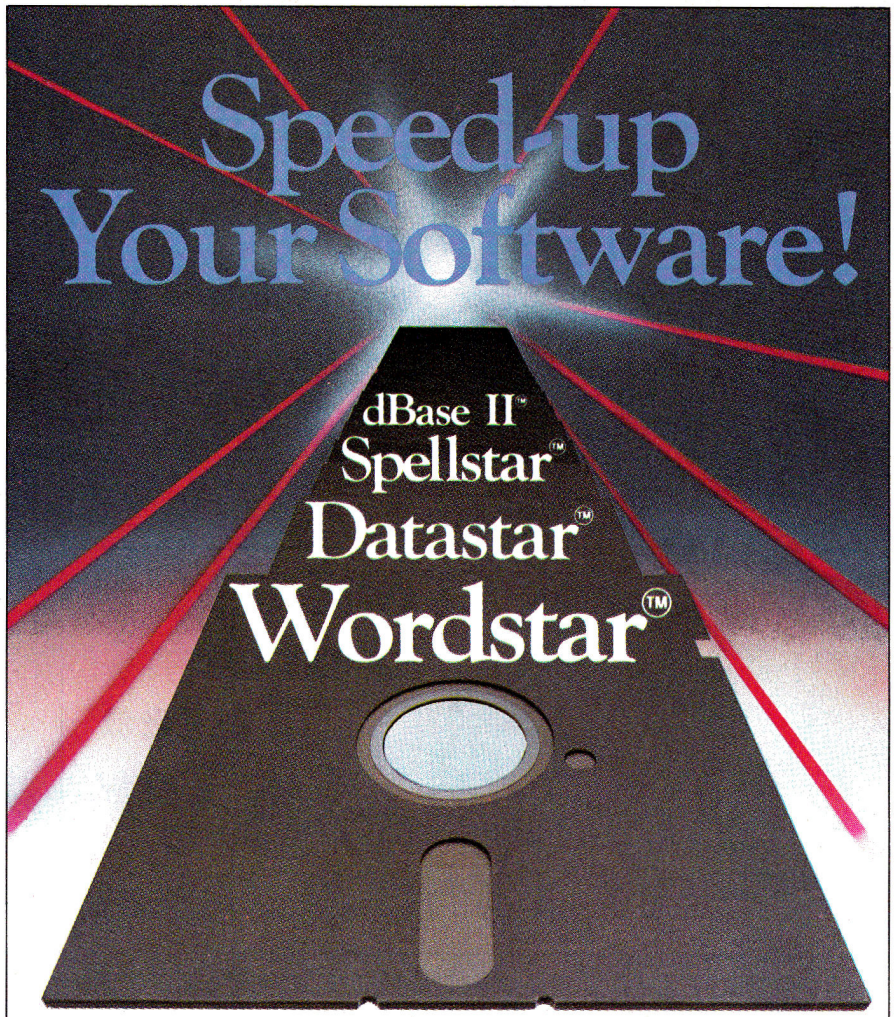

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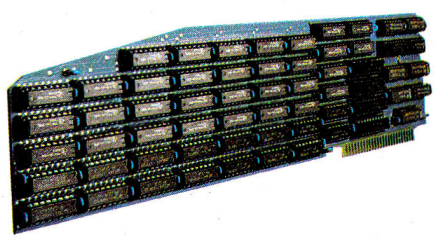

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Tasman Turtle

Tool
Tutor
Tutee
Toy

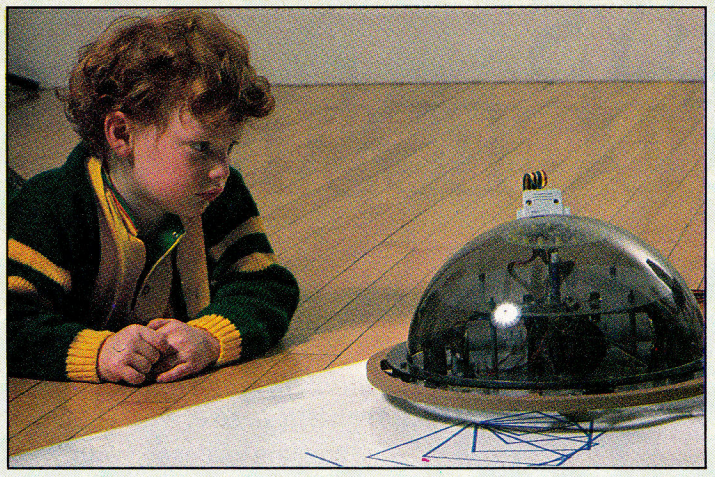


Teaching the turtle to talk required some trial and error with phonetic spelling. Mathilda apparently lost her Aussie accent in Cambridge.



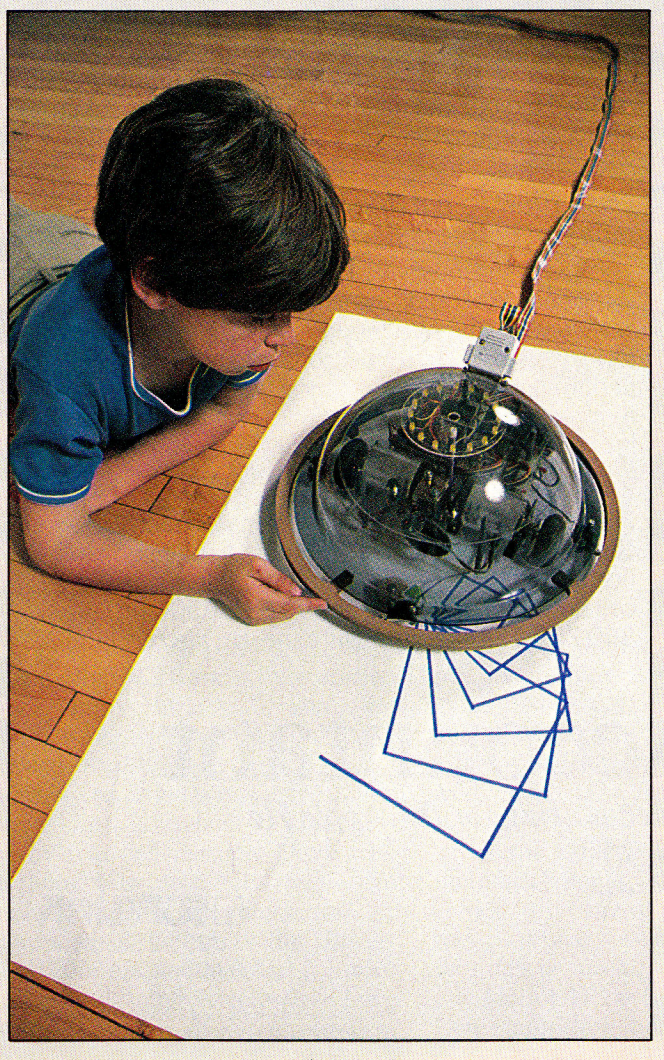
Who's in charge here? When these Monadnock youngsters met up with Mathilda, the talking programmable robot from Tasmania, they soon learned to take control. She responds to Applesoft and Logo commands, as well as turtle talk.

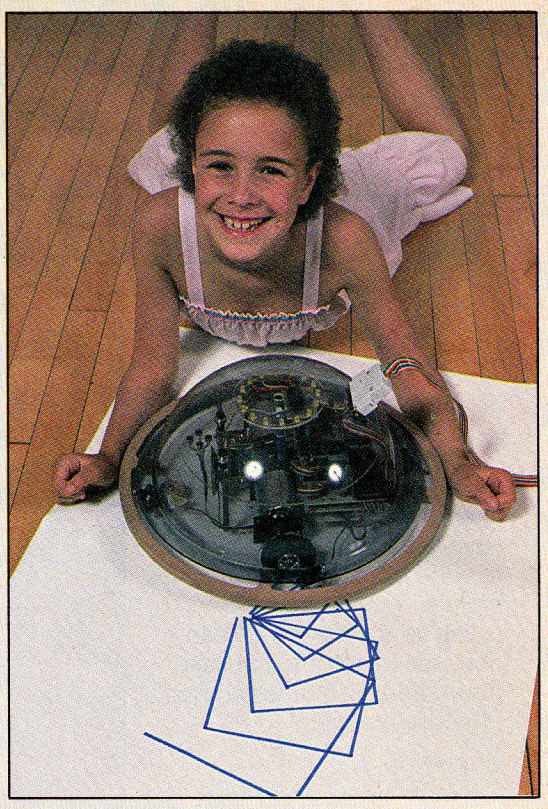
photos by Frank Cordelle



Four-year-old Ian discovered the mechanism that makes Mathilda glide and spin with breakneck (for a turtle) speed.

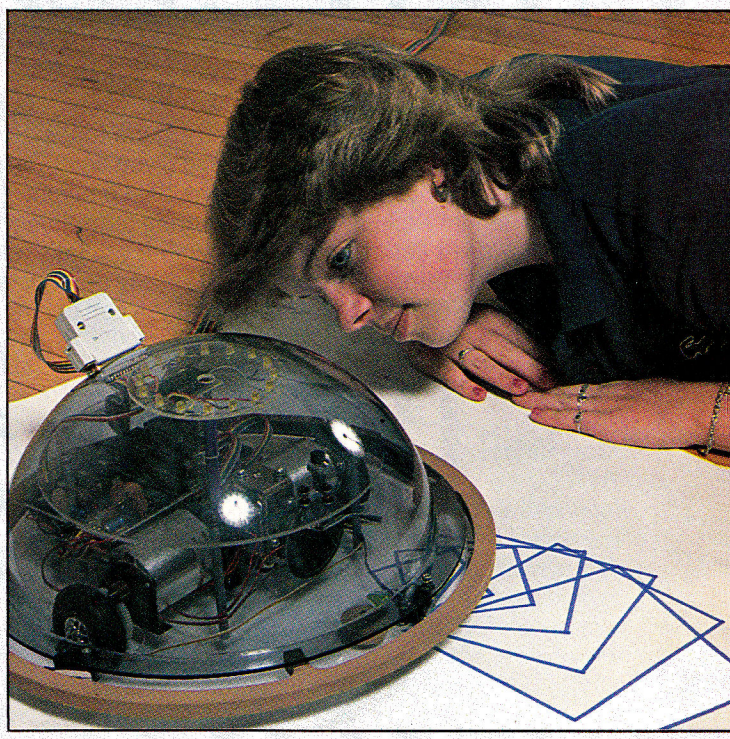
Built-in sensors enable the turtle to interact with its environment.





Kids respond creatively when they're given the tools—canvas, crayons, clay. . . or computers. Tahewa enjoyed exploring this new medium.

Like the original Terrapin turtle, Mathilda gives Logo a new dimension. She waltzes through a program with PENUP, or leaves her trail with PENDOWN.



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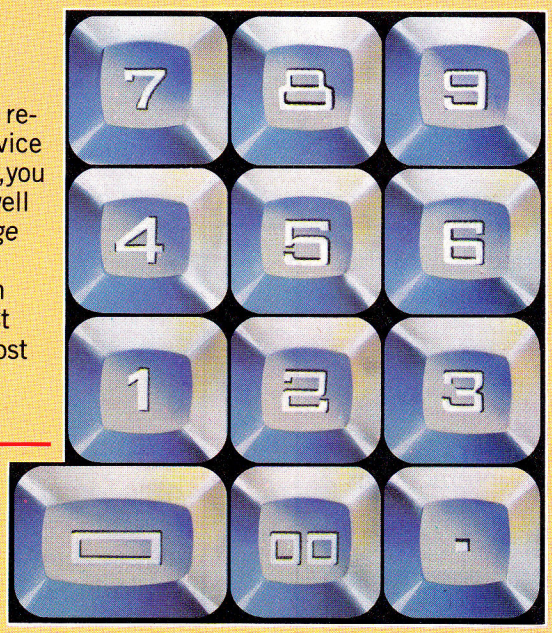
KEYS TO SUCCESS



Whether you have a small retail company, manage a service agency or run a cattle ranch, you have to do something else well to build a business—*manage money.*

You've got to analyze cash flow, see trends and forecast profitability in a time and cost effective manner.

The right fit.

A computerized accounting system makes sense, but finding the right software is important. The "home checkbook" programs are easy to use but they don't have the advanced reporting capabilities you need. And many small businesses just don't need the complexity or the cost of the modular systems.

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Practical Accountant is designed around fundamental accounting procedures. Even if you don't know much about accounting it is an ideal program.

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Practical Accountant allows you to set up your "Chart of Accounts" (income and expense categories) with up to 50 categories, 300 sub-categories and with 20 tax type definitions—all defined by you. The manual shows you how to set up an accounting system for a small business, complete with samples.

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Apples Aid Special Kids



inCider staff

Apple computers and Apple compatible software are expanding the learning possibilities for the seven million Americans who are mentally retarded. And this is true not only for the mildly retarded who can read and interact with a keyboard. Even profoundly retarded persons—those who are thought to need total care—can benefit from computer interaction.

Dr. Mary S. Wilson of the University of Vermont and Bernard J. Fox of Laureate Learning Systems Inc. have developed an animated program that can be operated by a single switch input. A pacifier is plugged into the game paddle port of the Apple, and profoundly retarded children can interact with the software by sucking. And talking software, such as the First Words program, can be used to instruct the retarded in language and mathematics.

Skills that many take for granted, such as typing, can be difficult for the retarded to master. Ruth Lambert of the Mount Hope School in Nashua, New Hampshire, has developed a one-hand touch typing program, the recipient of an honorable mention award from Johns Hopkins University, that teaches fast and accurate typing to the retarded. Users can type with one hand or with head or mouth gear.

Computers can also be used as prosthetic devices. For mentally retarded persons unable to speak, speech synthesizers can be highly effective communication systems. Even games with animation provide training for the retarded. Playing games helps develop appropriate eye tracking. Hand-eye coordination can be improved as well.

The development of communication skills is a primary goal for the retarded, and the computer can be an important tool in this process. As Dr. Leo D. Geoffrion of the State University of New York has written, "The computer acts as a patient tutor, posing questions to the student and checking each answer. The computer initiates and controls all interactions, while the student's role is primarily one of responding to questions posed by the system."

Special educators and professionals in rehabilitation programs for retarded citizens are becoming increasingly aware of microcomputer technology. But much more teacher training is needed to ensure that the retarded are not excluded from the microcomputer revolution. ■

number being converted is negative. It does this in line 5120. But first the LEN function is used to return the number of digits in QF$. For a short value like 1.2E+02 the answer is 7, but the length could be as large as 14. Numbers that are less then zero or negative have their minus sign removed in line 5140. The RIGHT$ function is used to form a new string by removing digits from the right side of the existing string. For example, if the string was SS$ = APPLE and a RIGHT$(SS$,4) was used, the new string would be PPLE, or the four rightmost digits of APPLE. In the case of line 5140, RIGHT$ removes all but the leftmost or "sign" digit.

RIGHT$ is used again in line 5150 to create QE$, the absolute value of the exponent. After converting QE$ to the numerical variable QR with the VAL function, the sign of the exponent is extracted from QF$.

The function MID$ is used since it allows any portion of the string to be returned. Using the string SS$ = APPLE again, a MID$(SS$,3,2) would return PL. After specifying the string, the first numeral indicates the first character to be returned; in this example it is the third character, P. The number 2 specifies that a total of two characters will comprise the new string. Using MID$ you can remove as little or as much of a string as you want and you don't have to start at either end as LEFT$ and RIGHT$ require. The number conversion routine uses MID$ in line 5190 to find QS$, the sign of the exponent.

LEFT$

The LEFT$ function, used in line 5210, returns a fixed number of digits starting at the left side of a string. Consider our example SS$ = APPLE. LEFT$ (SS$,3) would return the three leftmost digits, APP. In the case of line 5210, QL$ equals the first numeral in the value to be converted. We know from Figure 1 that this is the only number before the decimal place. Lines 5230–5290 use the MID$ function to create QM$, those numerals that occur after the decimal point.

At this point the routine has completed its breakdown of the value to be converted. For numbers like 7.E – 06 there is no QM$ since no numerals, other than the exponent, follow the decimal point. Creating standard form numbers is done by piecing together the various strings, along with the necessary zeros to create the final version, QF$.

Adding Zeros

When the standard version of the value is formed, it contains digits to the left of the decimal point if the number is very large or zeros to the right of the decimal point if the number is very small. The choice between these two alternatives is made in line 5310, where the QS$, the sign of the exponent, is checked. Those numbers that require additional zeros to be added to the left of the decimal point are processed in a FOR. . .NEXT loop found in lines 5320–5370. Finally, those numbers that are smaller than .01 receive leading zeros starting at line 5400.

Line 5450 checks to see if the number is negative. If it is, a minus sign is added and the routine returns to the main program with standard notation of the value stored in QF$.

The number conversion subroutine can be incorporated in existing programs; just make sure there are no conflicts in line numbers or variables. (The table lists all the variable names used in the routine.) By storing the routine as a text file you can incorporate it into a program by using the Apple's EXEC command. Before you do any merging, make sure that the number conversion part is debugged.

Listing 2 shows a short program to check the operation of the routine. If you enter values like 7.5E + 25, be prepared to do some zero counting. A number conversion routine is clearly worthwhile for anyone writing software for public consumption, but it is no substitute for many of the advantages offered by scientific notation. ■

QA	QB$
QE$	QF$
QL$	QM$
QP	QQ
QR	QS$
QW	QX
QY	QZ

Table. Variable names.

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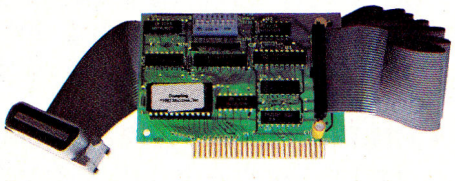

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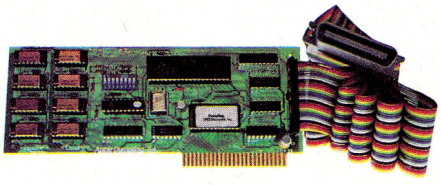

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TECHNOLOGY UPDATE

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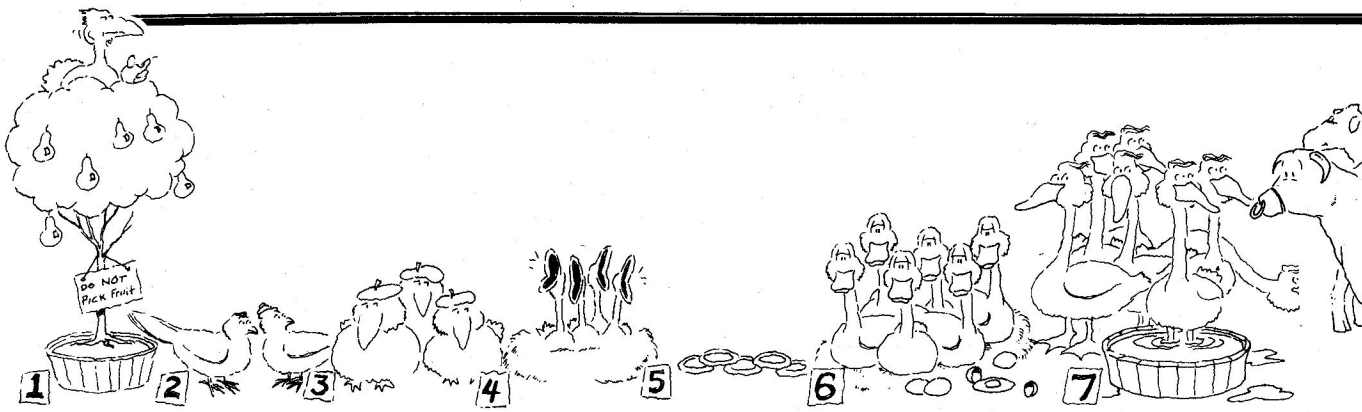

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Every Apple* user on your list can find the perfect gift in the mailbox 12 times a year. inCider is the monthly magazine packed full of the programming help, ads, and advice the Apple* user really wants. For the beginner or expert, inCider offers page after page of valuable information on:

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Green's Apple* Magazine

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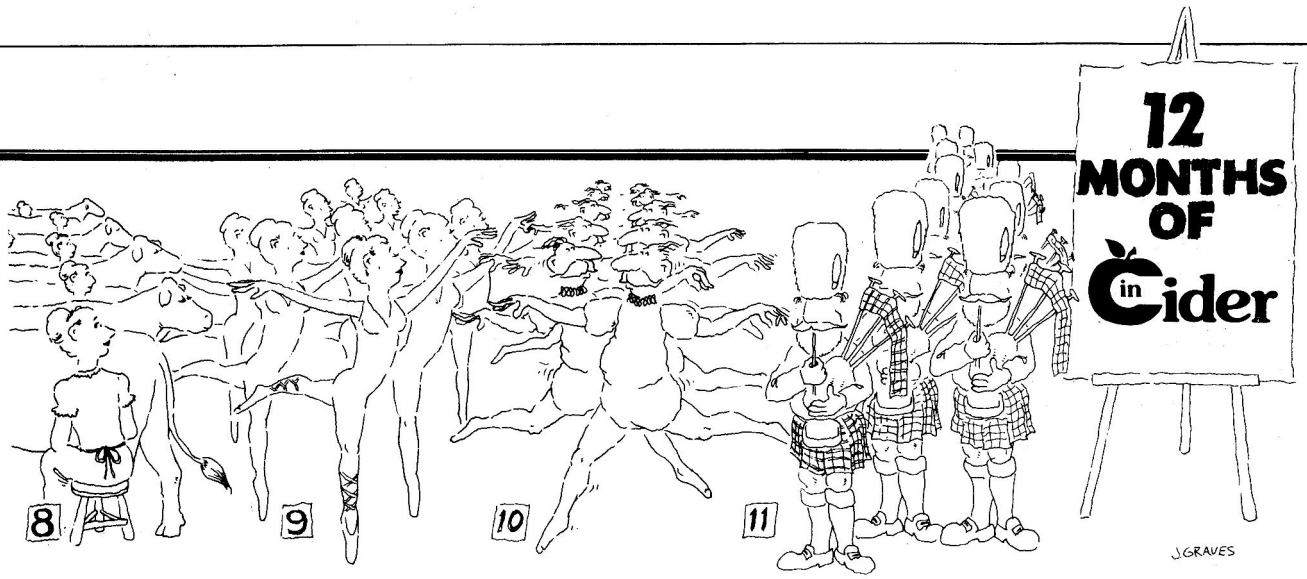

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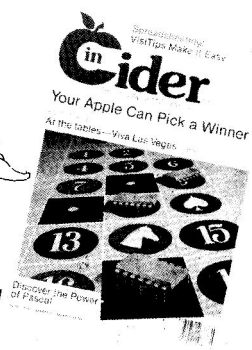
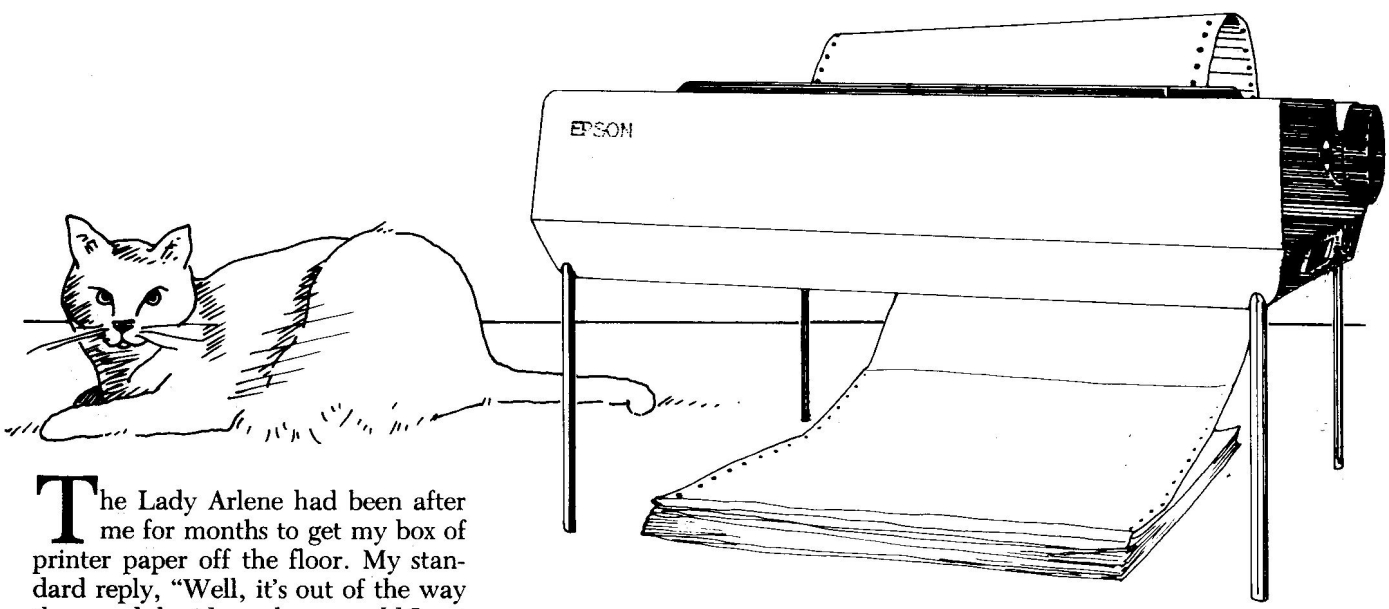


The 39¢ Printer Stand

Tangible proof that nobody's more tight-fisted than a cornered Yankee!

by George M. Engel



The Lady Arlene had been after me for months to get my box of printer paper off the floor. My standard reply, "Well, it's out of the way there and, besides, where would I put it?" was getting kind of old.

Then one day, with a look of mischievous glee in her eyes, she blissfully informed me that Sheba, our twelve-pound black Burmese cat, had used my nearly empty box of printer paper as a litter pan. Since our three cats talk to the Lady Arlene constantly, is it possible that the Lady Arlene. . . ? Nahh, that's really pushing the imagination.

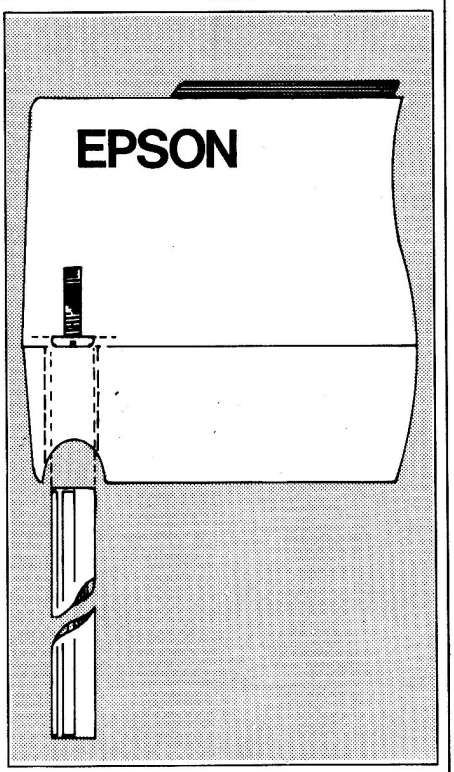
Perusing the Situation

Well, first things first. After kicking the cat, I decided that twenty to thirty dollars was too much to spend on a commercial printer stand. Being frugal by nature, I decided to build my own for as little as possible.

The bottom of the Epson MX-80 printer has four deep holes for screws that hold the top and bottom parts together. Hmmm. . . a quick measurement gave me an idea. All that would be required was a 5/16-inch wooden dowel. Two hardware stores later I was all set.

Construction

After kicking the cat again, I cut the dowel into four identical 6-inch pieces, one to fit in each hole in the printer. Then I slowly sanded approximately one inch around one end of all four pieces. I emphasize slowly because if you sand too much, the dowels will fit loosely and possibly cause vibration while printing. After all the dowels fit properly, I installed them and turned the printer on. It wobbled, so I sanded



the offending leg a little until they were all even.

The Finishing Touch

For a pleasing finish, I stained the legs to match the top of my walnut table. I numbered them and placed corresponding masking tape numbers on the Epson case. Unless you can sand wood with the precision of a Swiss craftsman, they won't fit the same in all the holes. To cap the project and ensure that the dowels won't scratch the table, I put round rubber feet on the bottom. Felt stick-ons would work just as well.

Parting Shot

After a cup of coffee and a kiss on the cheek, the Lady Arlene's parting comment was, "Now if you'd only find some way to take less room with your Apple—say a nice monitor stand. . . ." I locked my computer room door and hurried for my tools. I swear that cat gave me a malevolent grin. With the top cover off, my Apple looks a lot like a litter box. ■

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

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NUMERIC FORMATTING	292661	292,661.42
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Startup to Transaction Entry	113 sec	44 sec
Begin Printing Balance Sheet After Entering Transactions	162 sec	1 sec
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Tally Ho! Keeping Track of High Scores

The better a game-player you are, the more often your high scores change. Preserve those milestones on disk using this handy program.

by Reginald V. Blue

This program is the perfect way to keep high scores on all your favorite computer games. If you are relatively new to programming, the program structure should be useful for adaptation to your own particular programming needs.

- Lines 10–70 are just for the title.
- Lines 80–200 start the program. The routine loads up the data from the text file Game Scores that stores the scores. (Be sure you don't delete this file!) Since this routine needs a file to access, it has an ONERR GOTO routine which, if it can't find the Game Scores file, causes the program to go to line 160 to skip over loading the file. Line 160 creates the dimensioned variables that your program needs. Line 170 protects you from crashing by routing your program around lines 180–190.

After you have entered your game scores into the program and saved all changes to the data file, you will not need this ONERR GOTO routine, since there will be a game scores data file to read. Notice that line 100 is used to define your data file name. Obviously any name could be used here in conjunction with lines 130, 140 and 200.

- Lines 150 and 160 give you flexibility in how data is stored in the data file. Using z as the first data output of your

Address correspondence to Reginald Blue, 403 Glen Circle, Germansville, PA 18053.

Program listing. Scorekeeper.

```
10  HOME : VTAB 10
20  PRINT "HIGH SCORES KEEPER"
30  PRINT : PRINT
40  PRINT "(C) 1982, REGINALD V. BLUE"
50  FOR N = 1 TO 1000: NEXT
60  PRINT : PRINT
70  PRINT "COMPUTER IS LOADING DATA"
80  REM  * * * * * READ FILE * * * * * *
90  PRINT "NOMON C,I,O"
100 N$ = "GAME SCORES"
110  ONERR  GOTO 160
120 D$ =  CHR$ (4)
130  PRINT D$"OPEN "N$
140  PRINT D$"READ "N$
150  INPUT Z
160  DIM A$(Z + 20),HS(Z + 20),P1$(Z + 20),LS(Z + 20),P2$(Z + 20)
170  IF Z = 0 THEN  GOTO 200
180  FOR N = 1 TO Z: INPUT A$(N): INPUT HS(N): INPUT P1$(N)
190  INPUT LS(N): INPUT P2$(N): NEXT
200  PRINT D$"CLOSE"N$
210  ONERR  GOTO 230
220  REM  * * * * * MENU * * * * * * *
230  HOME :W = 0
240  PRINT "HIGH SCORE KEEPER"
250  PRINT : PRINT
260  PRINT "(1).GET HIGH SCORES"
270  PRINT
280  PRINT "(2).INPUT NEW HIGH SCORES"
290  PRINT
300  PRINT "(3).INPUT NEW GAME"
310  PRINT
320  PRINT "(4).SAVE ALL CHANGES TO DATA FILE"
330  PRINT
340  PRINT "(5).ALPHABETIZE GAMES"
350  PRINT
360  PRINT "(6).PRINTER ON FOR PRINT OUT"
370  PRINT : PRINT
380  PRINT "WHICH WOULD YOU LIKE TO DO? ";: GET Y$:A =  VAL (Y$): PRINT
390  IF A < 1 OR A > 6 THEN  PRINT "1 TO 6 PLEASE": GOTO 230
400  ON A GOTO 420,550,910,790,950,1100
410  REM   * * * * * HIGH SCORES * * * * * * *
420  HOME
430  PRINT "      GAME            SCORE     NAME"
440  PRINT
450  FOR N = 1 TO Z: PRINT "("N")  ";: PRINT A$(N);: HTAB (21): PRINT HS(N);
460  HTAB (30): PRINT P1$(N): HTAB (21): PRINT LS(N);: HTAB (30): PRINT P2$(N)
470  IF PT > 0 THEN  GOTO 500
480 W = W + 1
490  IF W = 9 THEN  PRINT "PRESS ANY KEY TO CONTINUE! ";: GET Y$:W = 0: HOME
500  NEXT
510  PR# 0
520  INPUT "HIT RETURN WHEN FINISHED ";A$
530 PT = 0: GOTO 230
540  REM    * * * INPUT OF NEW HIGH SCORES * * *
550  HOME
```

Listing continued.

Some Very Good Reasons to Buy an Echo Speech Synthesizer.

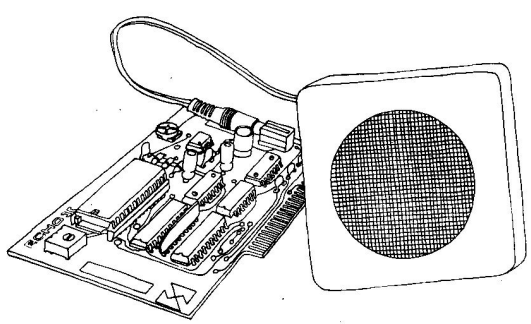
We're confident we have the most intelligible, versatile, and economical speech synthesizer on the market. Once you hear it, we're sure you'll be convinced too. All ECHOs are capable of speaking in four different voice modes which range from a robotic machine voice to natural female speech. (The fixed speech and custom modes are optional.)

It's Easy To Use

Unlike other speech systems, the ECHOs are very simple to use. It only takes a minute or two to get the ECHO talking. Any text which can be printed to the screen can be spoken. If you've written a BASIC program you can add speech with simple modifications.

Software Compatibility

Not only can you add speech to the programs you write yourself, over 25 top educational and adventure software manufacturers are currently designing programs to be compatible with the ECHO II. Be watching for details.



Value

Each ECHO comes ready to use with a speaker and tutorial-style manual. The ECHO II, priced at $149.95, also comes with a variety of demonstration and utility programs. The new ECHO GP (General Purpose), priced at $199.95 is a stand-alone unit with its own on-board microprocessor; it will interface with any computer through the serial port. All ECHOs have a two year warranty.

Bells And Whistles

If you want bells, whistles, music and sound effects, plus state-of-the-art sprite graphics capabilities, the ECHO technology is available on Synetix Systems' new Supersprite Board.

Check It Out

Most Apple dealers have the ECHO II available for demonstration as part of Street Electronics/ Orange Micro's unique Grappler+™, Bufferboard™, ECHO II™ Talking Demonstration.

Street Electronics Corporation

1140 Mark Avenue Carpinteria, CA 93013
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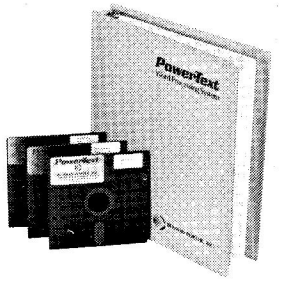

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Listing continued.

```
560  FOR N = 1 TO Z: PRINT "("N")  ";: PRINT A$(N);: HTAB (21): PRINT HS(N);
570  HTAB (30): PRINT P1$(N): HTAB (21): PRINT LS(N);: HTAB (30): PRINT P2$(N)
580 W = W + 1
590  IF W = 9 THEN  PRINT "PRESS ANY KEY TO CONTINUE! ";: GET Y$:W = 0: HOME
600  NEXT
610  PRINT "WHICH GAME DO YOU WANT TO ADD A NEW HIGHSCORE TO?    ";
620  GET Y$:N =  VAL (Y$): PRINT
630  IF N = 0 THEN  GOTO 610
640  IF N >  = 1 OR N <  = Z THEN  GOTO 660
650  GOTO 610
660  PRINT  CHR$ (7)
670  HOME
680  PRINT A$(N): PRINT
690  INPUT "INPUT NEW HIGH SCORE: ";SC
700  PRINT : PRINT
710  INPUT "NAME OF PERSON MAKING SCORE: ";R$
720  IF SC > HS(N) THEN W = HS(N):Y$ = P1$(N):HS(N) = SC:P1$(N) = R$
730  IF SC > HS(N) THEN SC = W:R$ = Y$
740  IF SC > LS(N) THEN LS(N) = SC:P2$(N) = R$: GOTO 230
750  IF SC > 0 THEN  PRINT : PRINT : PRINT SC" IS NOT A HIGH SCORE": PRINT
760  IF SC > 0 THEN  PRINT "PRESS ANY KEY TO CONTINUE ";: GET Y$: GOTO 230
770  GOTO 230
780  REM   * * * * * STORAGE OF NEW HIGH SCORES * * * *
790 N$ = "GAME SCORES"
800 D$ =  CHR$ (4): PRINT
810  PRINT D$;"OPEN"N$
820  PRINT D$;"DELETE"N$
830  PRINT D$;"OPEN"N$
840  PRINT D$"WRITE"N$
850  PRINT Z: IF Z = 0 THEN N = 5: FOR N = 1 TO 5: PRINT 0: NEXT : GOTO 880
860  FOR N = 1 TO Z: PRINT A$(N): PRINT HS(N): PRINT P1$(N)
870  PRINT LS(N): PRINT P2$(N): NEXT
880  PRINT D$"CLOSE"N$
890  PRINT "DONE": FOR X = 1 TO 1000: NEXT : GOTO 230
900  REM    * * * * * NEW GAMES * * * * *
910 Z = Z + 1
920  HOME : INPUT "WHAT IS YOUR NEW GAME? ";A$(Z)
930  GOTO 230
940  REM  * * * ALPHABETIZE GAME NAMES * * * *
950  HOME : VTAB 10: FLASH : PRINT "COMPUTER IS THINKING!": NORMAL
960 N = Z + 1
970  FOR I = 1 TO N + 1
980  FOR J = 1 TO N - 1
990 C$ = A$(J)
1000 B$ = A$(J - 1)
1010  IF B$ < C$ THEN  GOTO 1070
1020 B$ = A$(J - 1):B(1) = HS(J - 1):B(2) = LS(J - 1)
1030 B$(1) = P1$(J - 1):B$(2) = P2$(J - 1)
1040 A$(J - 1) = A$(J):HS(J - 1) = HS(J):LS(J - 1) = LS(J1)
1050 P1$(J - 1) = P1$(J):P2$(J - 1) = P2$(J)
1060 A$(J) = B$:HS(J) = B(1):LS(J) = B(2):P1$(J) = B$(1):P2$(J) = B$(2)
1070  NEXT J,I
1080 N = 0: GOTO 230
1090  REM   * * * * PRINTER ON * * * *
1100  HOME : VTAB 10: PRINT "INPUT PRINTER SLOT (DEFAULT#1) ";
1110  GET Y$:PT =  VAL (Y$): IF Y$ =  CHR$ (13) THEN PT = 1
1120  IF Y$ = "0" THEN PT = 0: GOTO 1140
1130  IF PT = 0 THEN  GOTO 1100
1140  PR# PT
1150  GOTO 410
```

Listing continued.

file tells you how many game scores you currently have in the data file.

Line 160 then lets you increase your data entries beyond what you current-

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"The total data storage in your data file is limited only by your available memory."

ly have in your data file by 20 more game names and scores. If at any time you exceed this 20, your program creates an error, which routes you back to the menu. The total data storage in your data file is limited only by your available memory.

- Lines 220–400 are your main menu section of the program. These lines offer program options. A useful programming concept occurs at line 380. The GET Y$ command is used for speedy program option selections. If a GET A command were used here and a letter were accidentally pressed, your program would crash. But when using a GET Y$ command, any key except reset may be safely input. Y$ is then safely translated into a number by the expression A = VAL (Y$).
- Line 390 assures you that a legitimate option has been selected. The options are routed to the correct locations in memory at line 400.
- Program option <1>. Get High Scores displays your current game data status and the top two scores with the scorers' names. Lines 410–530 are responsible for this.
- Program option <2>. Input New High Scores is set up at lines 540–770.

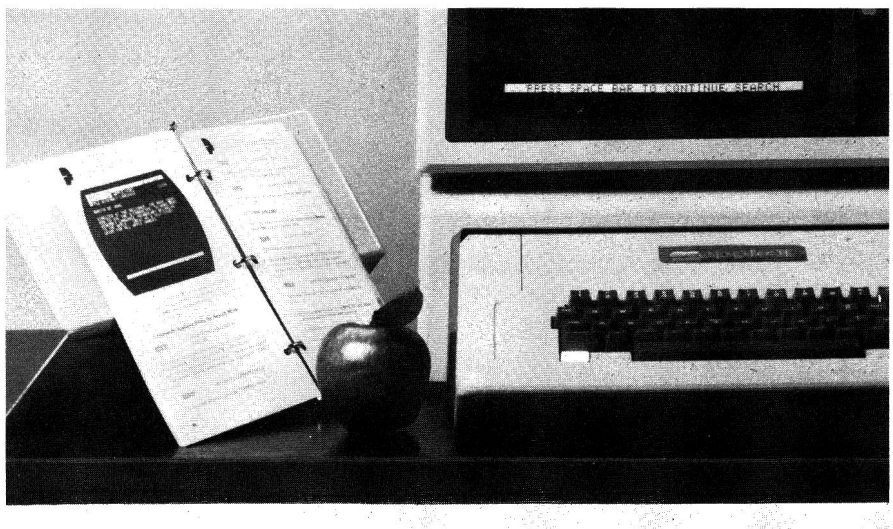
A$ (N)—game names
HS (N)—highest game score
P1$ (N)—name of high scorer
LS (N)—second highest score
P2$ (n)—name of second highest scorer

- Lines 720–740 allow automatic stacking of game scores into their relative positions.
- Program option <3>. Input New Game is accomplished by lines 900–930. Remember, never input more than 20 new games.
- Program option <4>. Save All Changes To Data File is the most important option. After you have input all new games and scores and alphabetized your data you must use this program sequence (lines 780–890) to store the data to your disk for future retrieval.
- Program option <5>. Alphabetize Games (lines 940–1080) allows you to put your games in correct alphabetical order for easy reference.
- Program option <6>. Printer On For Print Out (lines 1090–1150) turns the printer on to print your high scores. However, the routine starts to print immediately after being set, so have your printer ready! ■

	GAME	SCORE	NAME
<1>	ABM	23500	RON
		21530	REGGIE
<2>	ALIEN TYPOON	23250	RON
		19200	REGGIE
<3>	ASTROIDS	62130	RON
		29970	REGGIE
<4>	CANNONBALL	14240	REGGIE
		0	REGGIE
<5>	GORGON	11230	REGGIE
		0	RON
<6>	RED ALERT	47460	REGGIE
		29940	REGGIE
<7>	SNACK ATTACK	4435	REGGIE
		1345	RON
<8>	SPACE INVADERS	5860	REGGIE
		0	RON
<9>	TREK79	1216	REGGIE
		500	RON

Sample listing. High Scores printout.

Circle 323 on Reader Service card.



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The Graphic Solution

Do you have a restless imagination? Become your own "movie" producer with this lo-res/hi-res graphics package from Accent Software.

by Hartley G. Lesser

The Graphic Solution comes in a three-ring binder with 179 pages of well-written documentation and two double-sided disks. The manual introduces TGS, and then offers to transform the purchaser into a movie director of sorts. The "actors" you direct are bit-mapped shapes constructed through simple keyboard commands, and the program's editor and "projector" let you create the "movie film."

You build your shapes on the lo-res screen, which offers a magnified view of the shape creation, then transfers them to the hi-res screen for further refinements and animation.

Your shapes are dropped and saved in windows that are moved about the screen. These saved shapes are called frames, and several frames make the movie. Once the movie, or sequence, has been saved to disk, you can use it in your own applications through use of the projector module.

The tutorial applies a hands-on approach to learning the system. After running the demo program, you'll find it's time to dig right in. I used an Apple IIe for my investigation, and discovered that TGS does not recognize its cursor control keys. Also, to obtain the character, you have to press shift-6 instead of shift-N.

Tips for Beginners

The TGS program disk should never remain in the disk drive, even though the chances of ruining it are slight. An initialized storage disk is kept in Drive 1 after the main program has been loaded into memory. This is limiting, in that files maintained on a separate disk can't be accessed through Drive 2. You're tied into using only one drive with TGS.

The TGS menu appears on screen as shown in Table 1.

Type in the appropriate number, and the program loads the module. Item 1, LOAD SEQUENCE, loads into memory any graphic sequence that you've saved to disk, and 2 sets up a new sequence. Item 3 saves the newly created sequence on disk. Items 4 and 5 deal with saving the current hi-res picture as a background, and 6 accesses a handy module that enables you to draw perfect circles in any sequence or background. Item 8 gives you a list of all files on your disk, while 9 allows you to erase any files you no longer wish to keep. Quit is fairly obvious.

When you are processing lines, circles, text and backgrounds in the hi-res mode, information at the bottom of the screen tells you the specifics of your drawing (see Table 2).

By examining these tables, you can tell immediately what frame number is currently being worked on, the shape number involved, the amount of time the frame is being "exposed," and how much room is left in the shape table for additional shapes.

The SHOW mode is actually the built-in projector of TGS, and it is here that you watch whatever you've filmed come to life through animation. The LINE mode lets you draw long lines, rectangles or other creations too large to be drawn on the hi-res screen. TEXT mode allows you to place text anywhere on the screen, and also is considered a graphic element—which means text can be animated. You can obtain the CIRCLE mode only by accessing the program disk; CIRCLE is one of the least-used modules, and memo-

1. LOAD SEQUENCE
2. CREATE SEQUENCE
3. SAVE SEQUENCE
4. LOAD BACKGROUND
5. SAVE BACKGROUND
6. DRAW CIRCLES
7. SAVE PROJECTOR
8. CATALOG
9. DELETE FILE

Q. QUIT

SELECT OPTION #

Table 1. The Graphic Solution menu.

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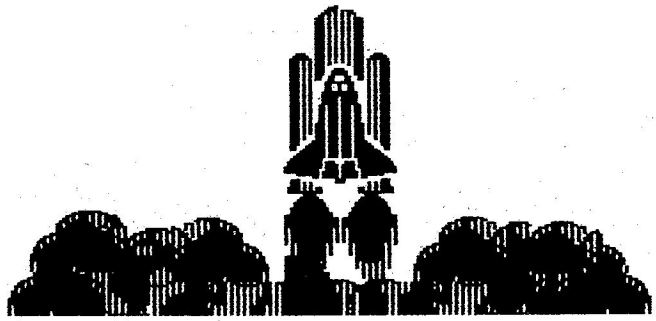


ry is saved by placing this module elsewhere.

Access the hi-res screen from lo-res simply by pressing the letter H. A window appears and may be moved anywhere on the hi-res screen. By typing P you can drop whatever was drawn in the lo-res mode inside the window of the hi-res screen.

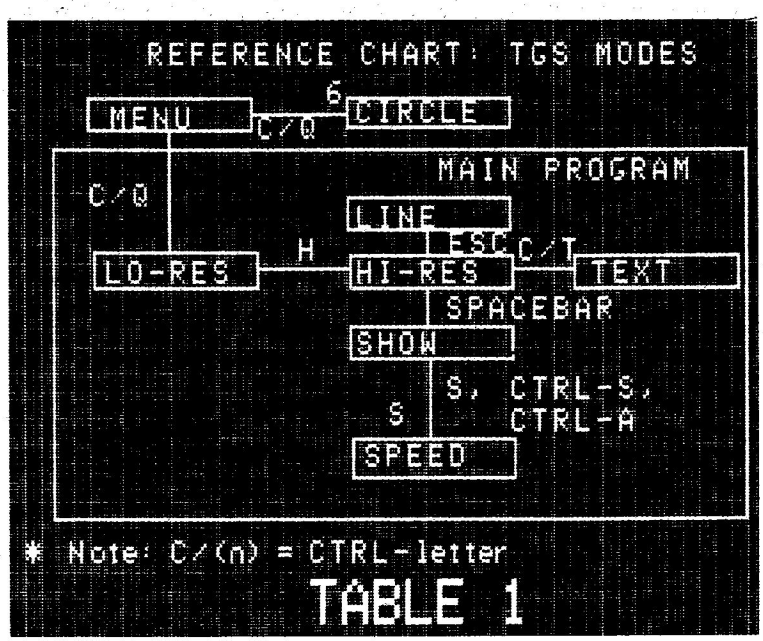
One of the most powerful capabilities of TGS is the macro command. This lets you define a repetitive task as a macro, so that a single key press will duplicate whatever steps were necessary to define the original task. For example, suppose you've drawn a square in the lo-res mode, and have dropped it inside the hi-res window. You want a nice string of squares that lead up and to the right of the hi-res screen. The normal commands to accomplish this task would be:

D—window moves to the right
W—window moves up
O—non-destruct copy of the lo-res screen (where the square is)

You can take a shortcut by creating a macro. Press control-R to start the macro, enter the commands, and press control-R again to end the macro definition. Then every time you press R, the entire command sequence executes. A macro can consist of as many as 255 key commands!

It's easy to transfer a shape from your hi-res screen into lo-res. Just position the hi-res window over the shape, and press the letter I. The hi-res shape is now magnified in lo-res, and this is where you can edit the shape to whatever definition you wish. In lo-res, gray lines at the left and right edge of the screen remind you of the area that falls outside of the hi-res window.

Once the hi-res shape is in lo-res, remove lines by positioning the cursor at any location in the RETAIN mode, then enter ERASE mode by pressing the space bar once. Cursor movement over the drawing will erase the areas specified.



Lesson 2 of the TGS tutorial requests the user to think of the screen as a camera. When the + key is pressed, a picture has been taken of the hi-res window. The picture, this shape, is added to the shape table currently in memory. Move the window anywhere on the screen and, by pressing the semicolon key, plot the current shape at its new location.

Animation

Create the first frame by using the control-Z command. Each time you access this dual keypress, the shape plotted at the current window location (as indicated by the SHAPES number information) becomes the next film frame, with an EXPOSE value (length of time shown on the screen) equal to the TIME information. By combining these keypresses into a macro, the movies build rapidly.

Inspect the entire movie or individual frames in the SHOW mode by pressing either a right or left arrow key. This halts the show, and allows you to scroll the frames of your movie. Also, you can tag a frame by pressing control-K, which displays that particular frame number in inverse video at the bottom of the screen. Tagging a frame allows you to change its exposure speed at some future time. TGS easily locates a tagged frame when you press the letter K in SHOW mode. The longer the exposure, the slower the overall movement of the movie.

You can elongate and compress shapes while in lo-res mode, and scroll the entire hi-res screen. You can also make mirror images of created shapes and add shapes to a completed shape table without disturbing its contents. Spot animation, the changing of a shape's aspect while it's inside a static window, reveals how effective and simple it is to obtain shape motion without involved programming. Combined commands built into the macro capability give extremely smooth animation. An even better way to obtain flicker-free animation, a method that requires no new shape creation at all,

FRAME 0/0	ROOM 14283	
SHAPE 0/0	MODE TABLE	HI 126 65
EXPOSE 80	SHIFT 0	

Table 2. Example of information displayed on the bottom of a hi-res screen.

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NEC 1260 12" Green Mntr	149.95	125.00
NEC 8023 Printer	645.00	475.00
NEC JC1212 Color Mntr	399.00	310.00
Pkaso Epson 80/100	175.00	145.00
Pkaso NEC 8023	175.00	145.00
Prowriter 8510 AP Printer	595.00	500.00
Prowriter 2 1550-P Printer	995.00	750.00
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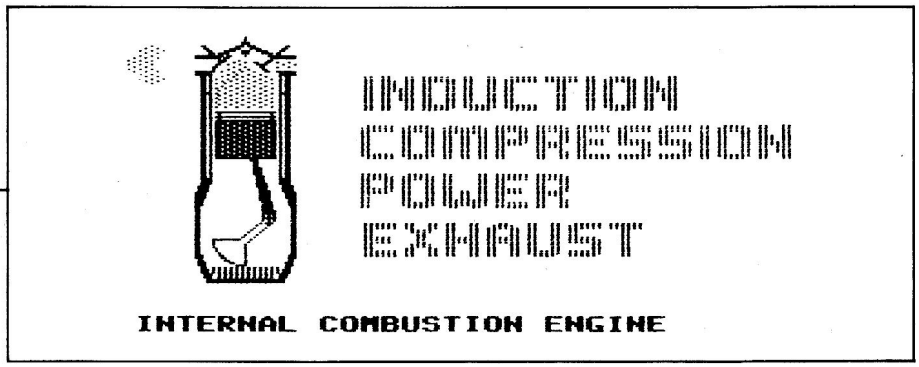

involves shifting the screen itself; the window changes position automatically as the shape moves toward a particular location.

One of the idiosyncrasies of the Apple hi-res screen is its handling of color. When a color-filled shape is moved, the color may change. This is due to the two color sets (green/purple and red/blue) peculiar to the Apple. Using color effectively in hi-res graphics demands an understanding of this quirk. You'll find help in the TGS manual.

You may insert different shapes into the film, or substitute shapes for each other, bringing different combinations of shapes into existing frames, and modifying the projected sequence to reveal new animation. This shape substitution is a powerful tool, and the sky's the limit in using this application. You may easily delete a frame, as well, while the other frames automatically adjust themselves correctly to fill the vacancy.

Multiple shape animation is also possible; dual shape animation along parallel paths creates the illusion of simultaneous movement. The effect is impressive.

The projector itself is a most necessary and integral part of TGS's success. The Sequences disk contains a program illustrating the projector's features. This section of the documentation, though not impenetrable, may be the hardest to grasp.

For straight film showings, you needn't know how to program. But for sophisticated applications, a knowledge of Basic is absolutely necessary, as a controller program must be written to use the projector in your own applications. Some help is provided in the manual. Appendix A reveals the memory locations of the TGS text file, the TGS sequences, the projector, controller variables, the hi-res screen and the controller program. The final reference section lists all of the commands used by TGS.

TGS is a well-programmed graphics package—superior when dealing with animation, far above standard for shape creation, but below average when dealing with background creation. Except for one documentation error on page 60 (CTRL-A should be CTRL-Z), the tutorials are written exceptionally well. There is little doubt in my mind that the capabilities of TGS justify the price of $149.95. Accent Software, 3750 Wright Place, Palo Alto, CA 94306. ■

Circle 386 on Reader Service card.

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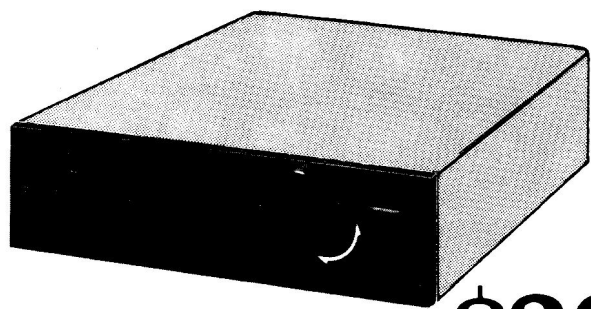

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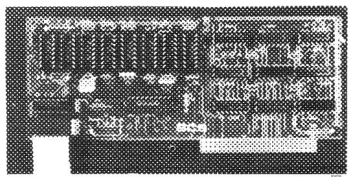

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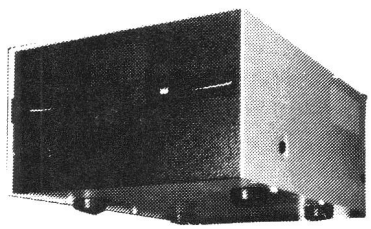

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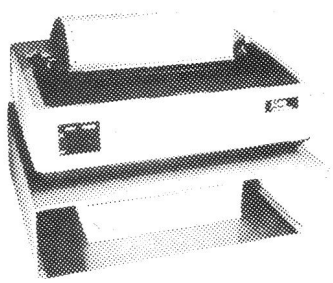

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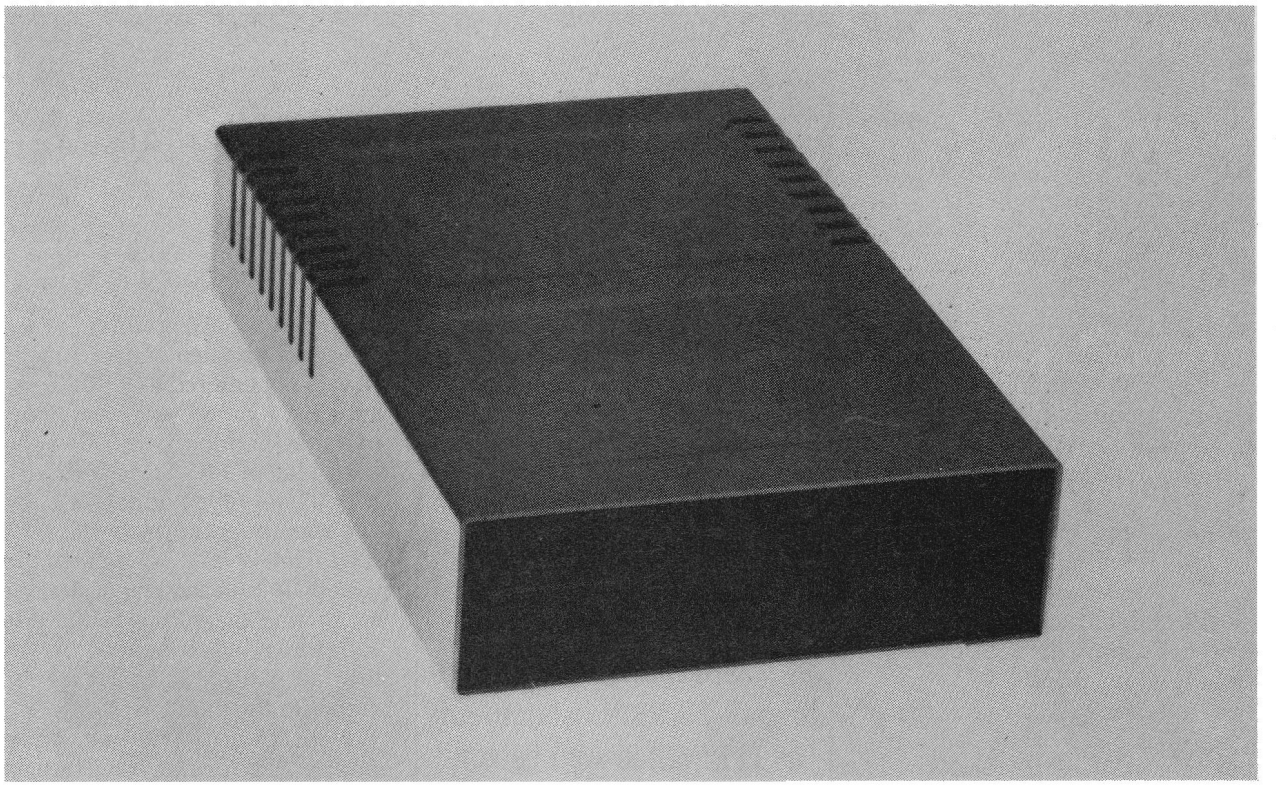

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A Soft Switch for MBasic

by Paul M. Danzer

I normally do my home programming in MBasic, which comes with the Microsoft/Softcard Z-80 processor installed in an Apple II Plus. This lets me take advantage of the editing built into the Softcard CP/M system, and fends off friends who want me to stick with Applesoft.

Recently I finished a program using 20 PRINT statements to display results on my 9-inch monitor. I realized then that I'd have trouble printing the results on my printer.

Applesoft accepts the command PR#1, used as a soft switch to route output to a printer; the corresponding PR#0 command returns output to the screen. MBasic, however, does not make such provisions.

Therefore, I was faced with reformatting all 20 PRINT statements as LPRINT, as well as conceding defeat to my pro-Applesoft friends. Curses!

Being very lazy when it comes to typing (as well as a poor loser), I took a second look at IOBYTE, tucked away by CP/M at hex location 0003. You can find IOBYTE's description in the CP/M manual section devoted to masochists who insist on using nonstandard input and output devices.

IOBYTE consists of eight digital bits, whose lowest two control the CONSOLE function. These two bits are normally set to a zero-one pattern, establishing the keyboard as input and the monitor as output. According to the manual, reversing this pattern makes the printer or LST device become the output.

"I was faced with reformatting all 20 PRINT statements as LPRINT, as well as conceding defeat to my pro-Applesoft friends. Curses!"

A quick PEEK at this location (0003) reveals a preset value of decimal 149 loaded by the CP/M master disk. Entering a command of POKE &H0003,150 adds the +1 needed to change the output routing from the monitor to the printer.

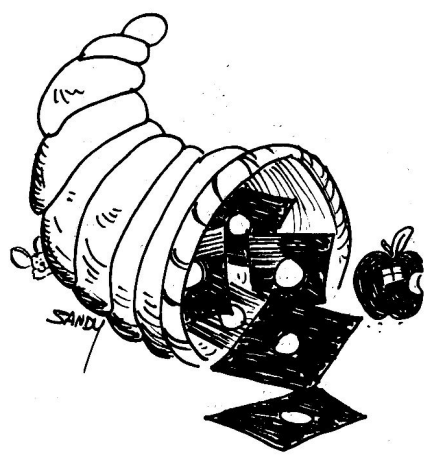
The Listing demonstrates my idea. If A$ is not entered as Y (for Yes), the letters A, B, and C are printed on the monitor, and location 0003 is poked to a value of 149. Since 0003 already was set to 149, nothing is changed and the program loops back to the start. However, if A$ is entered as Y, then 0003 is poked one decimal higher, routing the output to the printer, and the POKE command following the last PRINT statement resets the output to the monitor.

Note that depending on your printer and printer interface card, TAB and HTAB don't always appear the same on the printer and screen—so choose formats that yield more consistent results.

Now my version of MBasic includes the equivalent of PR#1 and PR#0, and my Applesoft friends have one less thing to tease me about. ■

```
10 REM ** THIS IS LISTING 1
20 REM ** THE PROGRAM TESTS THE USE OF
30 REM ** POKE TO SWITCH OUTPUT BETWEEN
40 REM ** THE MONITOR AND PRINTER
50 REM
60 REM
70 PRINT "DO YOU WANT HARD COPY? "
80 GET A$
90 IF A$="Y" THEN POKE &H3,150:REM SELECTS PRINTER
95 IF A$="S" THEN END:REM KILLS LOOP,RET TO MBASIC
100 PRINT "A"
110 PRINT "B"
120 PRINT "C"
130 POKE &H3,149:REM RESETS OUTPUT TO MONITOR
140 GOTO 70
```

Program listing. Soft Switch for MBasic.



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Program listing. Program Loader.

```
0  REM ***   PROGRAM LOADER   ***
      *** BY JEFFREY A. MILLS **

10  HOME
20  VTAB 10
30  HTAB 10
40  INVERSE : PRINT "**********
     ********"
50  HTAB 10
60  PRINT "*                    *"
70  HTAB 10
80  PRINT "*  PROGRAM LOADER  *"
90  HTAB 10
100  PRINT "*                    *"

110  HTAB 10
120  PRINT "********************"

130  NORMAL
160  PRINT : HTAB 15: PRINT "J. A
     . MILLS"
170  NORMAL
180  FOR A = 1 TO 3000: NEXT
190  HOME : VTAB 5: PRINT "THIS P
     ROGRAM WILL 'EXEC' A FILE WH
     ICH"
200  PRINT "WILL LOAD A SPECIFIED
      PROGRAM ABOVE THE"
210  PRINT "GRAPHICS AREA AND REL
     OCATE VARIALBE"
220  PRINT "STORAGE BELOW THE GRA
     PHICS AREA."
230  PRINT : PRINT "NOTE: ONCE TH
     IS IS DONE YOU MAY NOT BE"
240  PRINT "ABLE TO CHANGE THE PR
     OGRAM!"
250  VTAB 23: HTAB 4: PRINT ">";:
      FLASH : PRINT " ";: NORMAL
     : PRINT "< PRESS ANY KEY TO
     BEGIN > <": HTAB 32: VTAB 23
     : CALL  - 756
260  HOME : VTAB 4: PRINT "ARE 'P
     ROGRAM LOADER' AND THE TEXT
     FILE"
270  PRINT "'LOADER' ON THIS DISK
     ?
280  PRINT : PRINT "(A NO RESPONS
     E WILL AUTOMATICALLY SAVE"
290  PRINT "BOTH FOR YOU.)"
300  PRINT : PRINT "Y/N > ";
310  GET KB$: IF KB$ <  > "Y" AND
     KB$ <  > "N" THEN 310
320  IF KB$ = "Y" THEN  GOTO 340
330  GOSUB 1000
340  HOME : VTAB 4
350  PRINT "NAME OF PROGRAM TO BE
      LOADED": PRINT
360  PRINT : PRINT " ";: FOR A =
     1 TO 29: PRINT "-";: NEXT :
     PRINT "-"
370  VTAB 6: INPUT ">";A$
380  IF A$ = "" THEN 20
390  HOME
400  PRINT "LOAD THIS PROGRAM ABO
     VE>" +  CHR$ (91) + " ]"
410  PRINT "    (A) HI-RES GRAPHIC
     S PAGE #1"
420  PRINT "    (B) HI-RES GRAPHIC
     S PAGE #2"
430  HTAB 26: VTAB 1
440  GET KB$: IF KB$ <  > "A" AND
     KB$ <  > "B" THEN 440
450  IF KB$ = "A" THEN A = 1:B =
     64:C = 16384: GOTO 470
460 A = 1:B = 96:C = 24576
470  PRINT  CHR$ (13) +  CHR$ (4)
     ;"EXEC LOADER"
999  END
1000  REM *** MAKE LOADER ***
1010 D$ =  CHR$ (13) +  CHR$ (4)
1020  PRINT D$;"SAVE PROGRAM LOAD
     ER"
1030  PRINT D$;"OPEN LOADER"
1040  PRINT D$;"DELETE LOADER"
1050  PRINT D$;"OPEN LOADER"
1060  PRINT D$;"WRITE LOADER"
1070  PRINT "POKE103,A"
1080  PRINT "POKE104,B"
1090  PRINT "POKEC,0"
1100  PRINT "?CHR$(13)+CHR$(4)+";
      CHR$ (34);"LOAD "; CHR$ (34
     );"+A$"
1110  PRINT "POKE105,0"
1120  PRINT "POKE106,B"
1130  PRINT "POKE107,0"
1140  PRINT "POKE108,B"
1150  PRINT "POKE109,0"
1160  PRINT "POKE110,B"
1170  PRINT "POKE111,0"
1180  PRINT "POKE112,32"
1190  PRINT "POKE115,0"
1200  PRINT "POKE116,32"
1205  PRINT "RUN"
1210  PRINT D$;"CLOSE LOADER"
1220  RETURN
```

Program Loader

by Jeffrey A. Mills

In a blaze of laser fire, you attack the enemy! Your screen dissolves to a mass of random lines as the end of your program mysteriously disappears! If you have ever experienced this frustrating scene you will be pleased to know that you are not alone.

The Problem

Apple II's hi-res graphics pages reside in the middle of memory, at locations $2000–$3FFF (8192–16383) and $4000–$5FFF (16384–24575). As your program and variable storage grow, they may occupy space in memory reserved for hi-res one and hi-res two. Then when HGR or HGR2 is called—poof!—no program!

After several weeks of trial and error program splitting with my new space game, I decided to attack my reference library and do battle with Apple's memory instead of the aliens.

The Solution

The Apple II stores your program in memory starting at location $800 (2048). Your program's variables are then stored, as they are initialized, between the end of the program (LOMEM) and the end of usable memory (HIMEM). You can gain the use of memory from $2000–$3FFF (8192–16383) by using HGR2 instead of HGR. This doesn't, however, allow you to flip between the two graphics pages to create smooth animation or use the four-line text window.

Not finding this to be a viable option, I searched on. The Apple II keeps, in memory, the locations where it will load the program and store the variables. Those locations are listed in Table 1.

While attempting to decipher those pointers, I realized that changing them could trick the Apple II into relocating the program and variable storage to make better use of the total memory.

By loading the program above the graphics area, from $6000 (24576), you can free up the area from $800 (2048) to $1FFF (8191), which can then be used for variable storage. This arrangement will go completely unnoticed to you as your program runs. Tables 2 and 3 list the pokes necessary to accomplish this.

Although this series of pokes worked, it was not convenient. It also did not allow my programs to run without first performing the series of needed pokes.

To solve this, I've written a combination program/exec file (self-generating) that will do it all for you! The program is titled Program Loader and the text file is called Loader. Both programs are written in Applesoft Basic for an Apple II with 48K.

What It Does

Program Loader inputs the name of the program you want to relocate and whether you want it above hi-res one or hi-res two. It then executes the text file, Loader, which will perform

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HEX	DECIMAL	DESCRIPTION
67/68	103/104	Program Loads Here
69/6A	105/106	LOMEM - Program End
6B/6C	107/108	Numeric Var. Start
6D/6E	109/110	Array Var. Start
6F/70	111/112	String Var. Start
73/74	115/116	HIMEM

Note: The memory location preceding the start of the program must contain a zero (0).

Table 1. Memory locations.

the needed POKE commands and then run your program.

How It Works

- Lines 10–250 are the titles and instructions for the program.
- Lines 260–330 run Program Loader or save itself and create Loader on the disk currently in the drive. This is needed because the program, the text file and the program to be relocated must be on the same disk. The save/create is done in a subroutine numbered 1000–1220.

Above Hi-res 1	Above Hi-res 2
POKE 103,1	POKE 103,1
POKE 104,64	POKE 104,96
POKE 16384,0	POKE 24576,0

Table 2. Pokes needed to relocate program.

- Lines 340–380 input the name of the program to be relocated. This is done from a program, since INPUT and GET do not work from immediate mode or from an exec file.
- Lines 390–460 GET the location in memory where you want to relocate your specified program.
- Line 460 executes the text file that performs all of the pokes, and runs the program you specified.

Changes

After you run Program Loader and it executes Loader, you cannot make any changes to the program. Your system will lock up due to the fact that HIMEM is below the end of the program.

To make changes you must turn off the computer, turn it back on in order to reset all the values you have changed, load the program in as usual, make your changes, then relocate it again to run it.

If you are using a shape table, it may be loaded at the end of the relocated program by adding the following lines to your program.

```
10 CD$ = CHR$(13) + CHR$(4)
20 PRINT CD$; "BLOAD 'shape table name',
   A"; (PEEK(176)*256 + PEEK(175) + 1)
30 POKE 232, (PEEK(175) + 1):POKE
   233,(PEEK(176))
```

Program Loader makes it easy to write long programs that move from section to section smoothly. Don't hesitate any longer—make your programs grow! ■

```
Locate storage at $800 (2048)
POKE 105,1
POKE 106,64
POKE 107,0
POKE 108,8
POKE 109,0
POKE 110,8
POKE 111,0
POKE 112,32
POKE 115,0
POKE 116,32
```

Table 3. Pokes needed to relocate variable storage.

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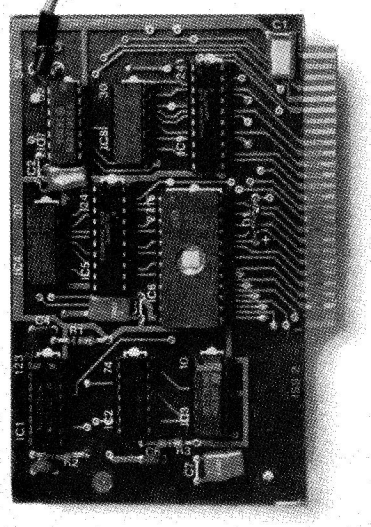

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Zip-Lock Program

by Brent Billock

I read and greatly appreciated Harry White's article on software protection, "The Apple Combination Lock" (*inCider*, April '83). I came up with a method of my own while working on a program with an optional restart, but it can be easily adapted to any other use. It may not be foolproof, but it should be pretty discouraging.

The listing is as follows:

```
5000 PRINT "WOULD YOU LIKE TO
     TRY AGAIN?"
5010 GET A$
5020 IF A$ = "Y" THEN 1
5030 PRINT "OK"
5040 INPUT "]";A$
5050 IF A$ = "LIST" THEN 5070
5060 PRINT "PLEASE RETYPE THAT":
     END
5070 PRINT CHR$(7)
5080 PRINT "?SYNTAX ERROR"
5090 GOTO 5040
```

When the user attempts to list, this method generates output exactly like they would get if they typed in nonsense. ■

Address correspondence to Brent Billock, 225 Scott St., Monroe, MI 48161.

Programming Proper Printouts

by Mark J. Yannone

The answer took 14 hours and five pounds of printer paper. The question was, "How can I write a program in Applesoft Basic to finish a printout by advancing the paper precisely to the next perforation (top of form), turn off the output to the printer and continue output to the CRT?"

```
1   REM  THIS SHORT PROGRAM DEMONS
     TRATES A LINE OF PRINT, A FO
     RM-FEED TO THE TOP OF THE NE
     XT PAGE, AND A PRINTER DISCO
     NNECT.
5   HOME
10  D$ =  CHR$ (4)
12  PRINT "DO YOU WANT A PRINTOUT
     ?": GET A$
13  IF A$ = "N" THEN  END
14  PRINT "TURN PRINTER ON AND PR
     ESS (RETURN)": GET A$
15  PRINT : PRINT D$;"PR#1"
20  PRINT "THIS IS A TEST."
30  PRINT  CHR$ (12);: REM  THIS
     LAST SEMI-COLON ALLOWS A FOR
     M FEED TO THE TOP OF FORM -
     AND NO FURTHER.
35  PR# 0: CALL 1002: REM  THIS C
     ALL RECONNECTS DOS AFTER THE
      PR# NON-DOS INSTRUCTION DIS
     CONNECTS DOS.
40  FOR A = 1 TO 6500: NEXT
50  PRINT "THE TEST IS OVER.  TO
     TEST IF THE PRINTER HAS BEEN
      'TURNED OFF,' TYPE (RUN)."
60  REM  THE THREE COMMANDS ON LI
     NES 30 AND 35 ARE THE KEYS T
     O PROPER END-OF-PAGE/TOP-OF-
     FORM OPERATION
```

Listing 1. Success.

The obvious answer seemed to be something like this:

```
PRINT CHR$(12): PRINT D$;"PR#0"
```

Wrong! No such luck.

The result of this statement was an additional line feed past the top of form. The culprit was the colon that followed PRINT CHR$(12). Realizing that, the next logical attempt was to insert a semicolon after the top-of-form command to avoid the line feed. The statement then read:

```
PRINT CHR$(12);:PRINT D$;"PR#0"
```

> **"Other print statements followed, and they, alas, went to the printer, too."**

Success! Almost.

If this had been the last statement of the program, all would have been well. As it was, other print statements followed, and they, alas, went to the printer, too. This time, the semicolon was the culprit, since it had the effect of concatenating the two commands. Apparently the DOS command PRINT D$;"PR#0" does not work if it is concatenated. On the one hand, I needed the semicolon to prevent an unwanted line feed, and on the other, the semicolon caused a vital command to be ignored. What to do?

That's where the hours and hours and rivers and rivers of paper came in. I tried dozens of combinations of these two commands with dummy print commands, double commands and the non-DOS command PR#0. I even tried to reprogram the printer to print a 65-line page rather than a

Address correspondence to Mark J. Yannone, 2202 N. Laurel Ave., Phoenix, AZ 85007.

66-line page to compensate for that inevitable extra line feed at the end. Again, no luck. Either I would get the extra line feed, or the printer would not stop printing, or the system would hang, or two of the above or all of the above. By this time, 12 hours of frustration had elapsed.

```
5  HOME
10 D$ =  CHR$ (4)
12  PRINT "DO YOU WANT A PRINTOUT
    ?": GET A$
13  IF A$ = "N" THEN  END
14  PRINT "TURN PRINTER ON AND PR
    ESS (RETURN)": GET A$
15  PRINT : PRINT D$;"PR#1"
17  PRINT "THIS IS A TEST."
20  PRINT  CHR$ (12);: REM   THIS
    FORM-FEEDS TO TOP OF NEXT P
    AGE.  THE SEMI-COLON IS A MU
    ST IF YOU WANT A FORM FEED T
    O T.O.F.
30  PRINT D$;"PR#0": REM   THIS S
    HOULD SEND OUTPUT TO THE CRT
     ONLY, BUT IT DOESN'T BECAUS
    E IT IS CONCATENATED WITH TH
    E PRIOR COMMAND.
50  PRINT "THE TEST IS OVER.  TO
    TEST IF THE PRINTER HAS BEEN
     'TURNED OFF,' TYPE (RUN)."
```

Listing 2. Typical Failure.

My next move was to study the *Apple II DOS Manual* (for the umpteenth time) to seek out a clue to what had been happening. And there it was—buried in the middle of page 105—the answer to the problem. Plain old PR#0 was the command to use, but since this partially disconnected DOS, the operating system had to be reconnected somehow. This can be accomplished by inserting the command CALL 1002 immediately after PR#0. I tried it and it worked beautifully. The paper advanced to the top of the next page and output was shunted exclusively to the CRT. What a relief!

See Listing 1 and 2, Success and Typical Failure, for illustrations of correct and incorrect programming for the printer. And I wish you more productive days than I had today! ■

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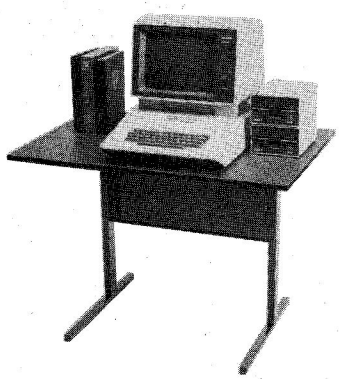

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Bent on Business

by Gregory R. Glau

Avoid a Random Mess

I was on the phone to Bob at ComputerLand about five minutes after it happened. "There's something wrong with my Apple," I told him. "This darn computer is losing data all over the place and I'm bringing it in this afternoon and you've got to fix it because I've got payroll to do in the morning and this thing's gotta work—"

When he finally calmed me down—after all, I couldn't see any smoke coming out of the system—we were able to figure out the problem.

I suppose I felt the same sense of frustration you might have felt. It *had* to be a hardware problem—something in a disk drive or one of those obscure chips inside our Apple.

Some years before, we had another brand of micro and *it* lost data, seemingly at random, whole accounts at a time. One day you'd owe our business $150 and the next you didn't even exist on our disks. Needless to say, it drove us crazy, and got worse as we watched the fight between the hardware and software people. I've never seen so many folks point so many fingers at each other.

We finally told the people from whom we'd leased that unit to take it back, but, hey—we paid cash for our Apple. We couldn't give *it* back. I argued with Bob for a time—I was sure it was a hardware problem and, once he heard what was happening to our data, he was equally positive it was a software error. I might have agreed with him, except that I was the one who wrote the software.

To put things into the right perspective, here's a bit of background. There are two kinds of data files you can use with your Apple. One is a sequential text file, which structures your data as if it all lined up in a row. When you extract data from a sequential file, it reads from the beginning of the file all the way through until it finds the data specified. Consider it similar to the DATA statement in a Basic program; when you instruct the system to read that data, it starts at the beginning and reads as many data items as it's told to. For an application where you don't have to go into your records and change them often, this type of file works fine.

While a sequential text file stores the maximum amount of data in any given space, it's hard to change a specific part, except when you add data to the very end of the file. The DOS manual recommends that you delete the old file and replace it with the new, updated record. But with a long file this can take a lot of time, and in truth it's silly to erase an entire file and resave the new one, just because you changed one or two records inside of it.

The random access file is similar to a line of, say, numbered glasses. Number 3 might be full of information, number 5 might have just a little information in it, with room for more, while the others may be empty. The random access file takes up more memory than a sequential file, as it reserves the space you specify (the amount each "glass" can possibly hold) as soon as anything, no matter what length, is written into it. With this type of text file, however, you can go to any record and change *just* that one. The other data, or "glasses," are not affected when you adjust the information in that record.

For most business applications, this approach makes sense and comes closest to what you're used to doing by hand. Your customers have account numbers, and you're familiar with looking up their accounts on ledger cards. Your inventory items have numbers, so you're accustomed to digging out information on those items based on their particular numbers. Each record in a random access structure has its own "account" number.

It's logical, then, to arrange your financial records on your Apple in the same manner. Random access files fill the bill perfectly. Well, almost. Random access files have one little quirk of their own: You must specify ahead of time how many characters of information you want them to contain—how much space you want each "glass" to hold. This isn't a problem and usually just requires a bit of planning. You total the number of characters each field in your file will require, perhaps put in a little extra room for future use, and tell the system to save that much space for each record.

To do this, you specify the length of the data you expect the file to contain with the L parameter. First, since you want to "talk" to the disk, you must have a control-D in your code. Since control-D is invisible, most programmers put this line first:

```
D$ = CHR$(4): REM CONTROL D
```

To open the file to read from it or write to it, you use a line like this:

```
PRINT D$;"OPEN<FILE NAME>,
L<RECORD LENGTH>"
```

The <FILE NAME> is, of course, the *name* of the particular file you want to access, and the RECORD LENGTH specified after the L is the *length* of the information—in characters—you want the file to contain. The name "Robert," for instance, contains six characters.

Your *Apple DOS (3.3) Manual* outlines the code to use when you want to create and access random access files (pages 81–89). Find other good information in *Basic Apple*

Address correspondence to Gregory R. Glau, P.O. Box 1627, Prescott, AZ 86302.

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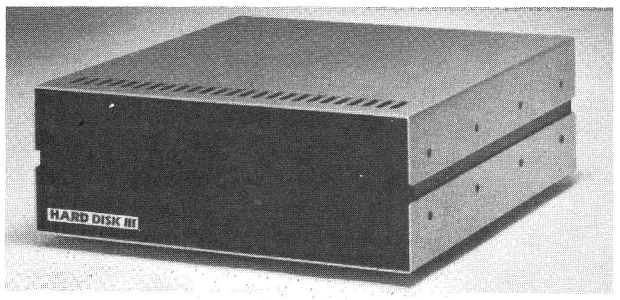

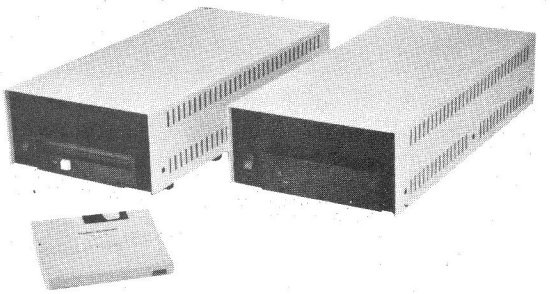

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Page 88: "Records should never be longer than the number of bytes specified by the L parameter: records may be partially over-written or combined with confusing results."

Page 126: "If you attempt to WRITE *more* characters in a random access record than you specified in the Length parameter, all the characters are stored correctly on the diskette. However, when you begin WRITING to the *next* record, , DOS calculates the new record's starting position *as if* the previous record had been within the specified length. The new record thus overwrites the last characters of the previous, over-sized record, including the end-marking RETURN character of the previous record's last field. The result is messy."

Figure. The two paragraphs from the DOS Manual *that outline what happens if you put too much information into a random access text file.*

Basic (by James S. Coan, Hayden Publishing, pages 156–168) and in *The Elementary Apple* (by William B. Sanders, Datamost Inc., pages 8.13–8.19).

But curiously, nobody explains what happens when you attempt to put more into a file than it can contain. This is probably because the possible combinations are almost endless, since each file is affected by the length of the information in the files that surround it. Oh, the DOS manual lets you know that you must always specify the length of the information (with the L parameter), but its only warning about overwriting consists of the two paragraphs in the Figure.

Well, that's exactly what happened to us, and I can tell you that the actual results are more "messy" than these paragraphs make it sound. You'd expect that if you entered too much data into a file, it either would not accept the information, or the data simply would spill over into the next record. That is, if you tried to put 550 characters into a file with only 500 "spaces," the extra 50 would be lost, or would take up the first 50 spaces in the following file.

So imagine our chagrin and confusion when neither of these things happened! Once we understood it was a software problem, we broke things down as simply as we could to see exactly what transpired.

Let's say you want to create a random access file that's ten characters long. This really allows space for only *nine* characters of information; you must allow for the carriage return (housekeeping space) at the end of the data. Your line to access this file is:

```
PRINT D$; "OPEN <FILE NAME>, L10"
```

If you work with just the first file on your disk, you can put nine characters into it and you'll be fine. If you

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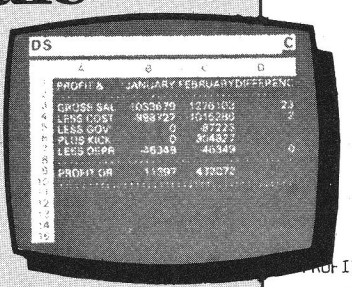

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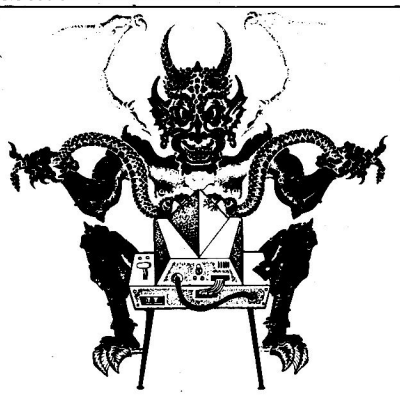

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"The amount of data in one record can affect other files down the line."

put ten or more in, you start to affect other files that follow, *if* they contain data. Let's say you put fifteen characters into the first record, and ten into the second. The first record will accept the first ten characters you enter for it, but then it will *add* the ten characters of the second record to its own. The second record itself will be fine.

For example, let's say you enter the following:

(Record 1): MRS. WILLIAM MARLOWE
(Record 2): BOB PORTER

When you pull the data from your files, here's what you'll see:

(Record 1): MRS. WILLIBOB PORTER
(Record 2): BOB PORTER

In effect, if you have the maximum number of characters in a file, your Apple will add characters from the file that immediately follows it. If that happens, the first file's information will be truncated to fit the L parameter (if L = 15 then only the first 15 characters of that first entry will be saved), but the entire following record will be appended onto the end of the first record. The second record itself will be fine. Note that a file is affected like this only if the file that immediately *follows* it contains information.

Now, what steps can you take to make sure this problem doesn't occur in your own programs? Apple's Disk Operating System (DOS) doesn't warn you if you try to put too much into a file, and how a file handles your information is dependent on the data that follows it. Bear in mind the golden rule: The amount of data in one record can affect other files down the line.

Remember that you can use the LEFT$ function to truncate string data (A$,B$, etc.) to fit the length parameter. If you leave room for 100 characters of information, you can shorten that data if it runs longer. However, while this approach will save the right number of characters of information for each file, it doesn't inform the operator what's happened to the overflow.

A better method is to measure the characters that are entered, and if their total is too long, instruct the program not to accept the information until the operator enters the data in an acceptable length.

While you can measure string characters, you can't measure the length of numerical entries unless you convert them to strings. However, to perform calculations with strings, they have to be converted back into numerals again (with the VAL function).

But while you can't measure the length of a number, you do know how many characters a numeral of any length contains. Numbers from 1 to 999 can't have more than three characters. Entries from 1000 to 9999 can't have more than four characters, and so on. So, if you have some idea of the numbers a particular program might work with, you can include lines in your program to check the numbers as they're entered, to see that their combined lengths won't overfill a record.

Since there are innumerable combinations of "full," "empty," "partial" and "overfilled" files, the Program Listing is a brief program to let you experiment with random access files. You adjust the length for each record (the L parameter) in line 20 of the program. By changing the length inside the program (rather than in response to a user query) you make sure the length requirement stays the same for all subsequent READ and WRITE actions. When you change the length parameter, make sure you WRITE some sample data to all nine sample records. Otherwise, you try to READ data that was written to with a different length parameter, altering what you see.

This little program allows only nine entries. With more than that it would have to dimension them, and nine should be a sufficient number to permit you to try a number of permutations.

How about too much data in three files in a row, with the rest empty? Or too much data in alternating files?

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5  GOSUB 1000
10  HOME : PRINT
15  REM  TO CHANGE THE LENGTH PARAMETER
16  REM  IN LINE 20 WHEN YOU WANT TO
17  REM  EXPERIMENT WITH FILES OF
18  REM  DIFFERENT LENGTHS
20 LE = 10
25  REM  LINE 20 SETS THE FILE LENGTH
30  REM  PARAMETER FOR THE TEST FILES
50  PRINT : PRINT "...ANSWER -1 TO STOP NOW...": PRINT
60  PRINT "PLEASE ENTER THE NUMBER OF"
65  PRINT "FILES YOU WISH TO WORK WITH (9"
66  INPUT "IS THE MAXIMUM NUMBER) ";F
70  IF F =  - 1 THEN  END
75  IF F > 9 THEN 60
76  IF F <  - 1 THEN 60
100  HOME
102  INVERSE
105  PRINT : PRINT "---THE FILE LENGTH IS ";LE;" ---": PRINT
106  NORMAL
110  PRINT "PLEASE ENTER YOUR DATA:"
120  FOR X = 1 TO F
130  PRINT
140  PRINT "WHAT'S THE DATA FOR RECORD # ";X;"?"
150  INPUT N$(X)
180  NEXT X
190  HOME
200  REM  WRITE TO THE FILE
210 D$ =  CHR$ (4)
220  FOR X = 1 TO F
225  PRINT "WRITING TO RECORD ";X;" NOW."
230  PRINT D$;"OPEN FILE, L";LE
240  PRINT D$;"WRITE FILE, R";X
250 A$ = N$(X)
260  PRINT A$
270  PRINT D$;"CLOSE FILE"
280  NEXT X
300  REM  PULL THE DATA FROM THE
310  REM  FILES AND DISPLAY IT
315  HOME
320  FOR X = 1 TO 9
325  PRINT "LOADING DATA FROM RECORD ";X;" NOW."
330 D$ =  CHR$ (4)
340  PRINT D$;"OPEN FILE, L";LE
350  PRINT D$;"READ FILE, R";X
355  INPUT A$
360 A$(X) = A$
370  PRINT D$;"CLOSE FILE"
380  NEXT X
400  HOME : REM  DISPLAY
430  FOR X = 1 TO 5
440  PRINT "FILE # ";X
442  PRINT "YOU ENTERED--------";N$(X)
444  PRINT "THE FILE CONTAINS--";A$(X)
448  PRINT
450  NEXT X
455  PRINT "ANSWER ANY NUMBER TO CONTINUE..."
457  INPUT Q
458  HOME : PRINT
460  FOR X = 6 TO 9
470  PRINT "FILE # ";X
480  PRINT "YOU ENTERED--------";N$(X)
490  PRINT "THE FILE CONTAINS--";A$(X)
495  PRINT
498  NEXT X
500  PRINT "HIT ANY KEY TO START OVER ";: GET S$
510  GOTO 5
1000  HOME : PRINT
1010  PRINT "THIS PROGRAM WILL LET YOU EXPERIMENT"
1020  PRINT "WITH FILE DATA IN A RANDOM-ACCESS FILE."
1040  PRINT
1050  PRINT "THIS WILL GIVE YOU AN IDEA OF WHAT"
1060  PRINT "HAPPENS TO YOUR INFORMATION IF"
1070  PRINT "YOU PUT TOO MUCH DATA INTO YOUR FILES."
1090  PRINT
1100  PRINT "YOU'LL BE ASKED TO ENTER THE"
1110  PRINT "NUMBER OF FILES - UP TO 9 -"
1130  PRINT "YOU WISH TO USE."
1140  PRINT : PRINT "..BE SURE TO HAVE A DISK IN DRIVE 1..": PRINT
1150  PRINT "REMEMBER THAT THE FILE 'LENGTH'"
1160  PRINT "PARAMETER IS SET IN LINE 20 OF THE"
1170  PRINT "PROGRAM - YOU CAN CHANGE IT THERE"
1180  PRINT "IF YOU WISH TO."
1190  PRINT
1200  PRINT "...HIT ANY KEY TO START...";: GET S$
1210  RETURN
```

Program listing. A brief program for experimenting with random access files.

Or each file filled with *exactly* the number of characters you leave room for? The idea here is to get you to discover and think about all the combinations and what will happen to the information inside your files as the situations change.

Once you enter your data, the program will display both your initial entries and what is actually in the files—so you can compare one to the other.

Why not carry things a step further and see what happens to your data when you change the program to save more than one variable in your files? This little program writes to each record in order. What do you think might happen to extra-long data you put into record #2 when #1 already has information stored in it? Why not change the program to find out?

How about inserting a hard-copy print routine after line 400 so you can have a permanent record of what happens to data under various circumstances? Use MON C,I,O to see your input and output from the disk. Experiment with this little program a bit and you'll soon know random access files inside out.

All this should not be interpreted as a statement against this type of file. On the contrary—in the real business world, the random access file is your best friend. We do all of our accounting, payroll, inventory, check writing and graphics with Apple random access text files. You can do more things with them in more ways than is possible with any other file structure. And in truth, your Apple would only be half the computer it is if it could not work with random access files.

I've tried to illustrate what happened to our own records when we tried to put too much data into them. My short program allows you to determine *yourself* what happens to data, with an almost unlimited number of possibilities. As you start to work with the random access file structure, you'll become more comfortable with it, and more effective when you use it for your own business applications. ■

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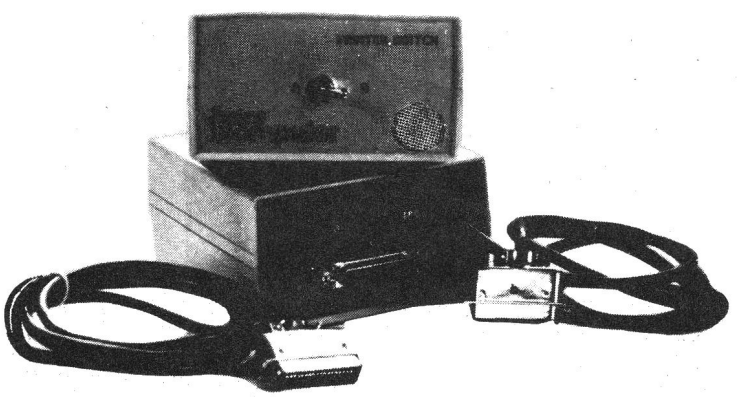

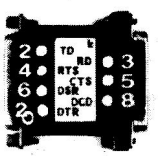

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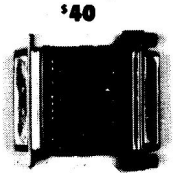

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by Bill O'Brien

WordStar Shines

Last month I reviewed Word Juggler, perhaps the best word processing program for the III running in native, nonenhanced mode. This month I'll discuss WordStar, another word processor. However, first I'd like to run through something I missed last month and should really get out front: a functional definition of *word processing*.

Word processing is the manipulation of words, phrases, or, on a grander scale, whole pages of text, without the problems of the traditional (i.e., manual) cut and paste routines. Instead of taking scissors and tape, or bottles of white-out, and remaking whole sections, a word processor enables you to do all of that electronically. Additionally, you can accomplish those little things like centering, underlining, boldface, superscripts and subscripts, headers, trailers and footnotes.

Keep in mind that, because you've found a program that deals with all of the intricacies of your "Epsokitoh" dot matrix printer, it is not necessarily a great word processing program. Conversely, just because you've found one that can't, that, in and of itself, doesn't mean it's a terrible word processor. The archetypical word processing system contains all of the features I've mentioned, *and* its primary output considerations are for state-of-the-art letter quality printers. It may deal with the lower end of the spectrum as well, but not necessarily to the same extent.

With that out of the way then, let's get on to the business at hand.

WordStar

Some things go together naturally. Sunlight and fresh air, steak and eggs, intelligence and the Apple III, and word processing and WordStar. If you imagine the harmony implied by the hands of God and Adam on the ceiling of the Sistine chapel, then you can approach an appreciation of the artistry of WordStar.

WordStar has been around for a long time, and considering the longevity of most micro-related products, that alone says something about it. Unfortunately, it was never meant to run on the Apple, or any computer that did not have an 8080/Z80 (or derivative) microprocessor. Even with that criterion circumvented, if you don't have CP/M (or MS-DOS lately), you still can't use it.

Also, while I say how much I like it—adore it, if that can be—to use it you've got to have a Softcard III. The last time I looked, the Softcard was selling for $450, and WordStar weighs in at $495. That's a lot of love to spend just to do word processing. I don't know if anything short of Nirvana is worth $1,000 if you can't see it, hear it, smell it, taste it and feel it.

Warning! At this writing (June

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

OPEN DOCUMENT FILE	[D]
RENAME FILE	[E]
FILE DIRECTORY (ON/OFF)	[F]
SET HELP LEVEL	[H]
CHANGE LOGGED DISK	[L]
RUN MAILMERGE	[M]
RUN SPELLSTAR	[S]
OPEN NON-DOCUMENT	[N]
COPY FILE	[C]
PRINT FILE	[P]
RUN PROGRAM	[R]
EXIT TO OPERATING SYSTEM	[X]
DELETE FILE	[Y]

Table 1. No File commands.

HELP MENU	[CONTROL] [J]
BLOCK MENU	[CONTROL] [K]
ONSCREEN MENU	[CONTROL] [O]
PRINT MENU	[CONTROL] [P]
QUICK MENU	[CONTROL] [Q]

Table 2. Help menus.

BIDIRECTIONAL PRINTING (ON/OFF)	.BP
MICRO-JUSTIFY (ON/OFF)	.UJ
PAGE OFFSET	.PO
CHARACTER WIDTH	.CW
COMMENT	.IG
CONDITIONAL PAGE	.CP
FOOTING	.FO
FOOTING MARGIN	.FM
HEADING	.HE
HEADING MARGIN	.HM
LINE HEIGHT	.LH
MARGIN AT BOTTOM	.MB
MARGIN AT TOP	.MT
NEW PAGE	.PA
OMIT PAGE NUMBER	.OP
PAGE NUMBER	.PN
PAGE NUMBER COLUMN	.PC
SUB/SUPERSCRIPT ROLL	.SR
PAPER LENGTH	.PL

Table 3. Dot commands.

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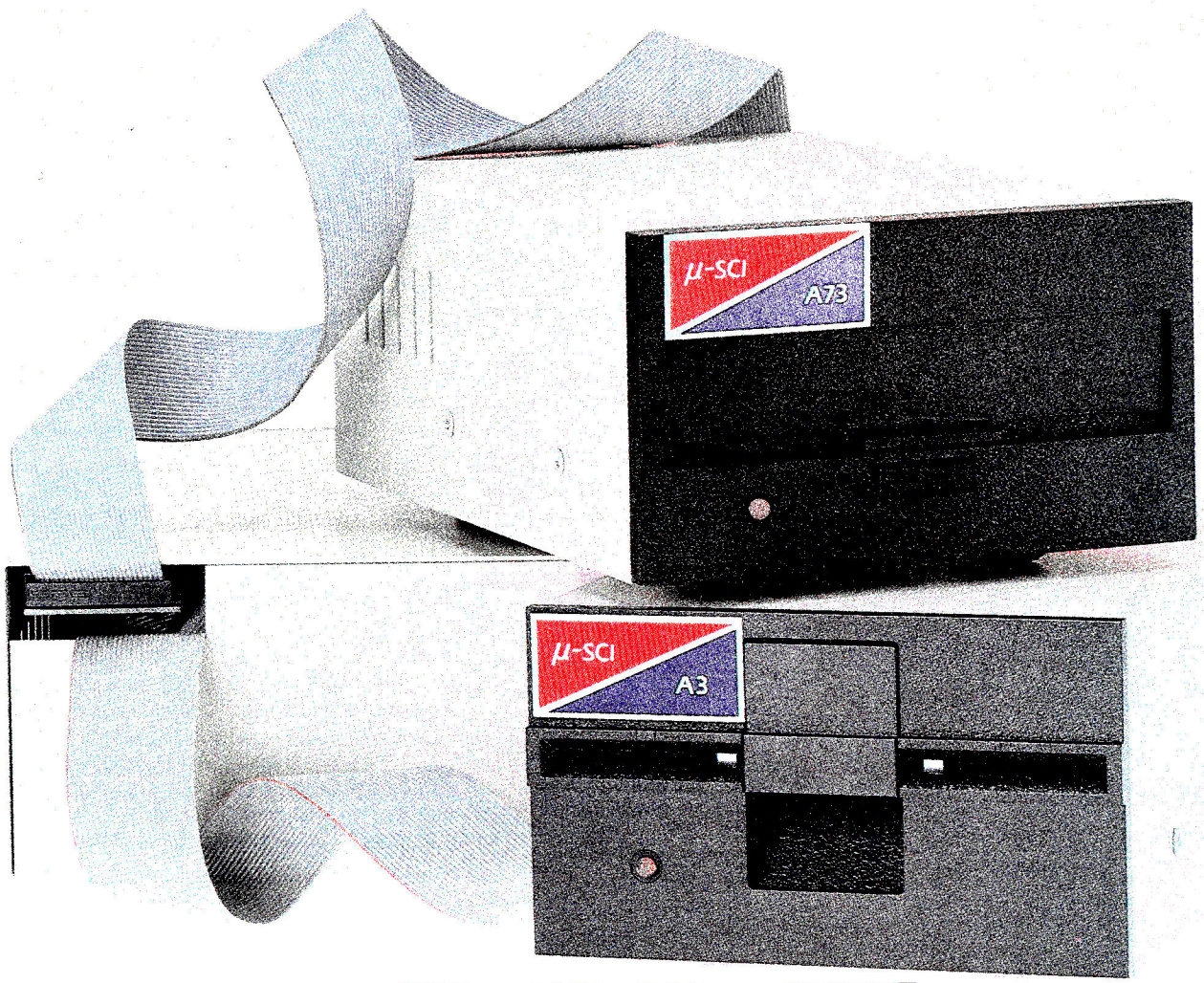

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1983), Micro-Pro has not yet released a version of WordStar specifically for the Apple III using CP/M. The version available for the Apple II runs on the III, but it must be configured to accommodate the screen and cursor control codes that the III recognizes. The installation I'm about to describe is "generic" to WordStar, and there will probably be differences when the actual III version is released. For the modifications needed to configure the terminal with the Apple II version, see the *inCider*, February 1983, III's Company column. If wishes were guesses, I'd imagine that the final III version will eliminate the terminal configuration entirely.

Set-Up and Go

The WordStar program comes basically in an unconfigured form called WSU—WordStar Unconfigured. By running another program on the disk, called Install, you configure it to your system.

This is done by first answering a series of questions regarding the type of display you have. For the Apple III, you'll need to select "other" and do some patching to make it work correctly.

Then you're asked what type of printer you have. The choices run from "any TTY without backspace," through one that can backspace, to a multitude of letter quality printers from a variety of manufacturers. If you're using a dot matrix printer, you'll probably select one of the first two. If you have nothing that even remotely resembles any of the choices, and that's *highly* unlikely, you'll have to do some modifications (ominous words!). The modifications are not simple; though they do not require a knowledge of machine language, you must understand what it is you want to do and what the correct change will be. That being the case, Install will make the change for you.

If you don't have a letter quality printer, you may not be able to do boldfacing and underlining. Notable exceptions that I'm aware of are the Anadex and the Epson, though instead of doing it on the first pass, the printer may go back a few times for the boldface and/or underline.

Finally you must indicate what type of driver you have. In the case of the Apple III version of CP/M that would probably be the CP/M list device, which is, in reality, the SOS driver you've previously selected.

Now you're done with the installation, except for any modifications. The WordStar manual includes a transcript of the terminal and printer driver selections of the configuration procedure. If any changes are to be made, find the label that corresponds to that section, note the choices that will produce the desired result, and type in the name of the location. Then Install prompts you with the current value, asking that you enter the new value. Note that WordStar wants hexadecimal (base 16) numbers.

Although I haven't seen an official copy, the tedious and moderately frightening nature of WordStar's Install is somewhat alleviated in version 3.3 (current at this writing is version 3.0). The questions in the main sections, as well as some of the nonstandard modification sections, have been re-engineered with non-computer users in mind. Apparently, someone at MicroPro decided that writers aren't necessarily programmers.

CHARACTER RIGHT	[CONTROL] [D]
CHARACTER LEFT	[CONTROL] [S]
UP LINE	[CONTROL] [E]
DOWN LINE	[CONTROL] [X]
WORD RIGHT	[CONTROL] [F]
WORD LEFT	[CONTROL] [A]
TAB RIGHT	[TAB] or [CONTROL] [I]

Table 4. Cursor commands.

DOWN LINE	[CONTROL] [W]
UP LINE	[CONTROL] [Z]
UP SCREENFUL	[CONTROL] [C]
DOWN SCREENFUL	[CONTROL] [R]
CONTINUOUS UP SCROLL	[CONTROL] [Q]/[Z]
CONTINUOUS DOWN SCROLL	[CONTROL] [Q]/[W]

Table 5. Scrolling commands.

TOP OF SCREEN	[CONTROL] [Q]/[E]
BOTTOM OF SCREEN	[CONTROL] [Q]/[X]
TOP OF DOCUMENT	[CONTROL] [Q]/[R]
BOTTOM OF DOCUMENT	[CONTROL] [Q]/[C]
END OF LINE	[CONTROL] [Q]/[D]
BEGINNING OF LINE	[CONTROL] [Q]/[S]
BLOCK BEGINNING	[CONTROL] [Q]/[B]
BLOCK END	[CONTROL] [Q]/[K]
POSITION BEFORE PREVIOUS COMMAND	[CONTROL] [Q]/[P]
START OF LAST FIND/REPLACE	[CONTROL] [Q]/[V]
TO MARKER (0-9)	[CONTROL] [Q]/[0]-[9]

Table 6. Quick screen cursor commands.

Menus

WordStar responds to the calling of its name with one of its five menus, the No File Menu (Table 1), across the top of the screen. Beneath that appears a list of files in the directory of the disk you are using. The immediate choices are to enter the edit mode, rename a file on the disk, get rid of the No File Menu (in case you don't need it), change the disk you're looking at (akin to setting the PREFIX$), run two optional programs, copy a file from one disk to another, print out a file (more on that in a moment), run a program (and if you have the CP/M program that formats a disk, you can do that too), delete a file, or exit the program.

If you choose to begin editing, or if

DELETE CHARACTER	[CONTROL] [G]
DELETE CHARACTER LEFT	[DEL]
DELETE WORD RIGHT	[CONTROL] [T]
DELETE LINE	[CONTROL] [Y]
DELETE TO END OF LINE	[CONTROL] [Q]/[Y]
DELETE TO BEGINNING OF LINE	[CONTROL] [Q]/[DEL]
INSERT (ON/OFF)	[CONTROL] [V]
INSERT BLANK LINE	[CONTROL] [N]
REFORM PARAGRAPH	[CONTROL] [B]
FIND STRING	[CONTROL] [Q]/[F]
FIND AND REPLACE	[CONTROL] [Q]/[A]

Table 7. Editing commands.

you want to do some printing, you can also do the one you didn't choose. Confusing? With WordStar you can do simultaneous printing and editing. There is some slowing of the printing to accommodate both tasks, but it works.

Upon editing a file (or opening a document), you're prompted for a file name. If WordStar finds that the file already exists, it automatically loads it in. If not, you're placed in the edit mode.

The Edit Screen

The edit screen is about 17 lines deep. The already occupied lines at the top display an editing menu that lists the more common functions: cursor movement, insert, delete, and four other menu choices. (This display can be hidden, if you like, leaving you a 22-line screen to work with.) Included in the space at the top are statistics on the row, column and page you are on, plus a ruler line showing the default tabs. The edit screen defaults to 65 characters wide.

As you type in your document, WordStar allows your letters to approach the right margin. If the word you're typing begins to exceed the margin you've set, spaces are inserted in the line and it is left and right justified (unless you've turned off the justification feature). Then the incomplete word is brought down, flush left, to the next available line. The inserted spaces are not necessarily real spaces. WordStar does microjustification of text with spaces of varying widths, if that feature is available on your printer.

Formatting

That brings us to an important item. WordStar formats your document on-screen as if you were looking at the printed page. You have complete control over the left and right margins, the tab settings (either normal or numeric), and whether or not the document is justified (flushed evenly on both sides). If you want, you can turn off the word wrap-around (the feature that keeps track of when you overflow the right margin), release the margin, and

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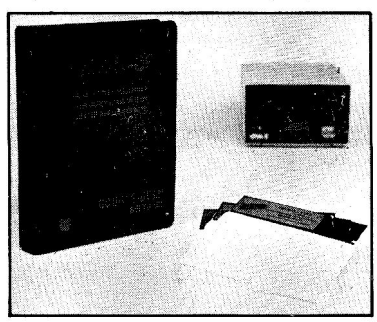

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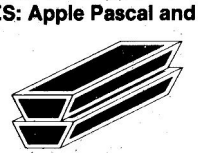

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VARIABLE TABBING (ON/OFF)	[CONTROL] [O] [V]
CENTER LINE	[CONTROL] [O] [C]
LEFT MARGIN SET	[CONTROL] [O] [L]
RIGHT MARGIN SET	[CONTROL] [O] [R]
MARGIN RELEASE	[CONTROL] [O] [X]
SET MARGIN FROM LINE OF TEXT	[CONTROL] [O] [F]
TAB SET	[CONTROL] [O] [I]
TAB CLEAR	[CONTROL] [O] [N]
JUSTIFICATION (ON/OFF)	[CONTROL] [O] [J]
SCREEN LINE SPACE SET	[CONTROL] [O] [S]
PAGE BREAK DISPLAY (ON/OFF)	[CONTROL] [O] [P]
RULER DISPLAY (ON/OFF)	[CONTROL] [O] [T]
WORD WRAP (ON/OFF)	[CONTROL] [O] [W]
PRINT CONTROL DISPLAY (ON/OFF)	[CONTROL] [O] [D]
HYPHEN HELP (ON/OFF)	[CONTROL] [O] [H]
SOFT HYPHEN ENTRY (ON/OFF)	[CONTROL] [O] [E]

Table 8. On-screen formatting commands.

COLUMN MODE (ON/OFF)	[CONTROL] [K] [N]
MARK BLOCK BEGINNING	[CONTROL] [K] [B]
MARK BLOCK END	[CONTROL] [K] [K]
HIDE/DISPLAY BLOCK	[CONTROL] [K] [H]
COPY BLOCK	[CONTROL] [K] [C]
DELETE BLOCK	[CONTROL] [K] [Y]
MOVE BLOCK	[CONTROL] [K] [V]
WRITE BLOCK TO FILE	[CONTROL] [K] [W]
SET/HIDE MARKER 0-9	[CONTROL] [K] [0]-[9]
READ FILE INTO TEXT	[CONTROL] [K] [R]
COPY FILE	[CONTROL] [K] [O]
RENAME FILE	[CONTROL] [K] [E]

Table 9. Block handling commands.

keep printing. The screen scrolls sideways with you as you type.

You can also select whether your document will be displayed on-screen with single, double or triple vertical spacing (and it will print just that way, also).

Other menus (listed in Table 2) cover the additional functions of WordStar. One of them, the Help menu, leads to the wondrous (and infamous) dot commands (Table 3). These commands affect the default printer settings and, while they will not always directly affect the screen display, some of them produce cumulative results at print time. Setting the screen display for double spacing, and then using a dot command to set the printer for the same is a good example. Each screen line you see, including the blank one, produces two printed lines—itself and another—to produce the printed double space.

Cursor Commands

Cursor commands (Table 4), in the edit mode, are a little different. WordStar does not use the arrow keys. Rather, in order to preserve its generic nature, it has its own conventions using the control key and a diamond pattern consisting of E (up one line), X (down one line), S (left one character) and D (right one character). Enhanced cursor movements are also performed using the control key, but with A (word left), F (word right), R (back toward the beginning of the document one screenful), and C (forward toward the end of the document one screenful). Alternately, control-W or control-Z scrolls the text while maintaining the cursor position.

"You can select whether your document will be displayed on-screen with single, double or triple vertical spacing."

These cursor commands are further expanded using the commands found in the quick screen menu (Table 6). As you can see, the E key, now preceded by control-Q, puts the cursor at the top of the screen. The X key, with the same control keys, drops the cursor to the bottom of the screen. It works the same for the rest of the diamond pattern.

The editing functions themselves (insertion, deletion, find and replace) are listed in Table 7. The find and replace command, part of the quick screen menu, deserves a small mention. If you select that command, after being queried for the text to be replaced and the text to replace it with, you are asked about options, including where to start looking. While it's looking, WordStar can *ignore* differences in upper- and lowercase. This is a rather important feature as far as I'm concerned.

Setting the margins of the text display, the screen line spacing and on-screen justification are all part of the on-screen menu commands (Table 8). These can be varied within the text so that part of the display is single spaced, another part double, or some of it indented (by resetting the margins), all by setting the appropriate on-screen functions, moving the cursor to where you want the changes, and pressing control-B.

Block Handling

Block handling functions—the moving or copying of sections of text, and the reading or writing of them to disk—are all listed in Table 9. Along with moving standard text segments, if you have used, for instance, a numeric tab for a column of numbers, you can also do column moves.

Almost anything that can be done to augment the printed version of your document is found among the functions in Table 10. It is, by far, the most comprehensive list I've seen. Single keystroke combinations turn the function both on and off.

Finally, Table 11 is a list of the miscellaneous commands available in the editing mode. As you can see, some provide for saving your document and leaving the mode, while others are duplicates of some of the functions available under the No File menu.

You can embed variables in a WordStar document, with the operator being queried before printing. You can even have a prompt of your choice. Both a list merger and spelling checker are available, at additional cost. Other MicroPro products, such as DataStar and InfoStar (though I haven't seen that yet),

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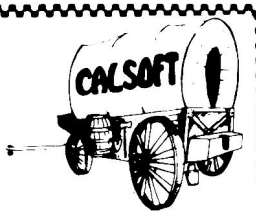

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maintain data in a WordStar compatible form, which means you can pull information out of one and insert it in a typed document.

WordStar version 3.3 will also have an optional indexing feature to produce an index and table of the contents of the document typed.

The Pros

What do I like about WordStar? Well, the menu structure for one thing. It makes a full complement of instructions about functions available without tying up more keys than necessary. If you reach the point where you don't need the menus displayed on the screen, you can remove them, or put them back, at your option.

Upon calling in sections of text, they are immediately incorporated into the body of the document you're working on. WordStar is not limited by RAM memory. The only constraint memory places on a document is in limiting the number of pages it can contain at any given time. To explain...

WordStar stores the text you're entering in two places. Part of it is in the machine's memory, but as you fill that up the text is sent out to the disk, in both forward and reverse directions. Limitations on the size of a document are the limitations of the storage capacity of the disk being written to.

"Somehow, between the two of us and the umpteen thousand other Apple III owners, we'll work it out."

That's one of the reasons you can print and edit at the same time.

I like the on-screen formatting. As a writer/typist, the ability to tell, at any time, what page I'm working on, or just how many pages are in the document, or how a table looks in relation to the body of the text, is a real necessity.

I like the fact that I can "print" my document to a disk file exactly as it will come out on the printer. That way I can send it, later on, to a station that doesn't necessarily have WordStar, or, in fact, straight to a printer at a remote site. Neat, huh?

The Cons

I don't like the cost of adding WordStar to the III, although without rewriting WordStar there's no way around it.

After finally graduating to the III and its four arrow keys, the fact that they're useless also irks me. I can only hope that the "official" III version might do something about that.

WordStar cannot handle footnotes—a serious drawback in certain kinds of document work. (Doctoral theses fall into this category.) There are, I am told, utilities produced by other companies that rectify this situation. I can't vouch for it; I've never seen one.

There is no way to index a document, either. The directory display is simply a listing of all of the programs contained on the disk. It would be nice to have some way of telling what a document is, who authored it and when, without calling it in and hoping that the information is there. Again, I'm told there is a utility available to do this, but I haven't come across it.

The only other thing I include on my wish-list is a backup request. WordStar makes a backup copy of a document automatically. Given the constraints of the Apple floppy disk drives (the small ones we all have, not the new generation of monsters), I'd prefer to be asked.

So much for another month, then. If you have anything in specific you'd like me to discuss in this column, write. Maybe you're having a problem with Basic, or just with a file handling aspect of it; it really doesn't matter. Somehow, between the two of us and the umpteen thousand other Apple III owners, we'll work it out.

Live long and program, and see you next month.

Ciao bene, AppleAmerica! ■

ALTERNATE PITCH	[CONTROL] [P] [A]
BOLDFACE (ON/OFF)	[CONTROL] [P] [B]
DOUBLE STRIKE (ON/OFF)	[CONTROL] [P] [D]
NON-BREAK SPACE	[CONTROL] [P] [O]
OVERPRINT NEXT CHARACTER	[CONTROL] [P] [H]
OVERPRINT NEXT LINE	[CONTROL] [P] [RETURN]
PRINT PAUSE	[CONTROL] [P] [C]
RIBBON COLOR CHANGE	[CONTROL] [P] [V]
STANDARD PITCH (10)	[CONTROL] [P] [N]
STRIKEOUT (ON/OFF)	[CONTROL] [P] [X]
SUBSCRIPT (ON/OFF)	[CONTROL] [P] [U]
SUPERSCRIPT (ON/OFF)	[CONTROL] [P] [T]
UNDERLINE (ON/OFF)	[CONTROL] [P] [S]
PHANTOM SPACE	[CONTROL] [P] [F]
PHANTOM RUBOUT	[CONTROL] [P] [G]
USER PRINTER CONTROLS	[CONTROL] [P] [O],[W],[E],[R]

Table 10. Printer control commands

DELETE A FILE	[CONTROL] [K] [J]
INTERUPT	[CONTROL] [U]
PRINT A FILE	[CONTROL] [K] [P]
SET HELP LEVEL	[CONTROL] [J] [H]
CHANGE LOGGED DISK	[CONTROL] [K] [L]
FILE DIRECTORY (ON/OFF)	[CONTROL] [K] [F]
REPEAT NEXT COMMAND	[CONTROL] [Q] [Q]
SAVE FILE AND RESUME	[CONTROL] [K] [S]
SAVE FILE GO TO NO-FILE MENU	[CONTROL] [K] [D]
SAVE FILE EXIT TO SYSTEM	[CONTROL] [K] [X]
ABANDON EDITED FILE	[CONTROL] [K] [Q]

Table 11. Miscellaneous commands.

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Fudge It!

by Don Fudge

Fontastic!

In this column I'll describe how to use SUPERFONT, a hi-res character generator that produces characters anywhere from 15-by-15 to 180-by-180 in size, of any color, and in seven or more styles. Included with SUPERFONT (Listing 1) are three other files: CHAR (Listing 2), SCROLL!! (Listing 3) and RETRIEVE (Listing 4).

The CHAR file produces a totally "scale-able" and rotatable vector

Listing 1. SUPERFONT.

```
0  HIMEM: 36095
1  GOTO 10
2  FOR QW = 1 TO 5:PP =  PEEK ( - 16336): NEXT :CR = 0: GOTO 46
3  DRAW 52 AT X,Y:A = 52: GOTO 45
10  ONERR  GOTO 63995
11  GOSUB 12: GOTO 25
12  POKE 768,160: POKE 769,0: POKE 770,76: POKE 771,44: POKE 772,254: RETURN

25  IF GT46 = 1 THEN 36
30  PRINT  CHR$ (4);"BLOADCHAR"
35  POKE 232,0: POKE 233,141
36  PRINT  CHR$ (4);"BLOADSCROLL!!"
40  HGR : POKE  - 16302,0: HCOLOR= 3: ROT= 64: SCALE= 1:S = 1
41  IF GT46 = 0 THEN BE = 1: GOSUB 13000:BE = 0
42 X =  - 19:Y = 20:OY = 20:OX = 1:HH = 3:CR = 1:GT46 = 0
43  HOME : IF SS = 0 THEN  DIM TF$(26): FOR WW = 1 TO 25:TF$(WW) =  CHR$ (
    64 + WW): NEXT :SS = 1
45  GOTO 10000
46 ST = S: SCALE= 1: XDRAW 51 AT X,Y:S = ST: SCALE= S: IF CR = 0 THEN ST =
    S: SCALE= 1: XDRAW 51 AT OX,OY:S = ST: SCALE= S
47 PK =  PEEK ( - 16384): IF PK > 127 THEN  POKE  - 16368,0: GOTO 49
48  GOTO 47
49  IF EE = 1 AND PK <  > 153 THEN I = I: IF PK <  > 144 AND PK <  > 155 THEN
    X = 1:Y = 120 + (S * 20):EE = 0
50 OX = X:OY = Y: SCALE= S: ROT= 64:CR = 0
59 K = PK - 154: IF K < 0 THEN KK =  ABS (K):K = 0
60  ON K GOTO 91,2,2,2,2,94,97,230,2,240,2,2,3,250,260,2,270,280,290,300,3
    10,320,330,340,350,360,370,380,390,400,410,420,430,2,440,2,450,2,460,
    470,480,490,500,510,520,530,540,550,560,570,580,590,600,610,620,630,6
    40,650,660,670,680,690,700,710
61  IF K = 0 THEN CR = 1: GOTO 70
63  IF F = 0 AND PK = 222 THEN PK = 0: GOSUB 11000: GOTO 46
64  IF PK = 221 AND F = 0 THEN F = 1:PK = 0: GOTO 46
65  IF F > 0 AND PK > 220 THEN F = 0:PK = 0: GOTO 46
70  ON KK GOTO 12000,72,2,2,86,74,76,88,2,24000,13000,2,78,2,2,2,2,80,2,82
    ,2,84
71  GOTO 2
72 ST = S: SCALE= 1: XDRAW 51 AT OX,OY: CALL 62450: CLEAR :S = 1: SCALE= S
    :CR = 1:HH = 3: HCOLOR= HH: ROT= 64:X = 1:Y = 20
73  GOTO 46
74 Y = Y - (20 * S): IF Y < 20 THEN Y = 20
75  GOTO 2000
76  GOTO 3000
78 X = 1:Y = Y + (20 * S): IF Y > 191 THEN Y = S * 20: CALL 62450:G$ =  CHR$
    (7): PRINT G$: GOTO 46
79 G$ =  CHR$ (7): PRINT G$: GOTO 2000
80 X = X - (20 * S): IF X < 1 THEN X = 281 - (20 * S):Y = Y - (20 * S): IF
    Y < (20 * S) THEN  FOR QW = 1 TO 20:PP =  PEEK ( - 16336): NEXT :G$ =
     CHR$ (7): PRINT G$:Y = Y + (20 * S):X = 1
81  GOTO 2000
82  GOSUB 4000: GOTO 2000
84 Y = Y + (20 * S): IF Y > 180 THEN Y = 180
85  GOTO 2000
86 X = X + (20 * S): IF X > 261 THEN X = 1:Y = Y + (20 * S): IF Y > 190 THEN
    EF = 1:CR = 0: GOSUB 12000: GOTO 46
87 CR = 0: GOTO 46
88  GOTO 5000
91  GOSUB 900: GOTO 46
94  GOTO 86
97  DRAW 29 AT X,Y:A = 29: GOTO 45
230  DRAW 35 AT X,Y:A = 35: GOTO 45
240  DRAW 38 AT X,Y:A = 38: GOTO 45
```

Listing 1 continued.

Listing 2. CHAR.

```
*8D00.95D0

8D00- 34 00 6E 00 A5 00 E5 00
8D08- 13 01 46 01 77 01 9C 01
8D10- CF 01 F8 01 21 02 43 02
8D18- 74 02 91 02 C1 02 F2 02
8D20- 25 03 55 03 8D 03 C6 03
8D28- 00 04 1F 04 49 04 71 04
8D30- A1 04 D2 04 F5 04 26 05
8D38- 2D 05 35 05 4B 05 76 05
8D40- 87 05 A5 05 C4 05 E1 05
8D48- F7 05 06 06 14 06 5D 06
8D50- 79 06 94 06 BB 06 F2 06
8D58- 2B 07 50 07 88 07 C4 07
8D60- E8 07 2B 08 6A 08 B6 08
8D68- B8 08 FF FF FF FF 24 24
8D70- 24 24 24 24 25 25 2D 2D
8D78- 2D 2D 2D 2E 2E 36 36 36
8D80- 36 36 36 3F 24 24 24 3F
8D88- 3F 3F 3F 3F 36 36 36 3F
8D90- 08 40 41 C0 18 20 24 25
8D98- 2D 2D 2D 2D 2E 36 3E 3F
8DA0- 3F 3F 3F 07 00 24 24 24
8DA8- 24 24 24 24 2D 2D 2D 2D
8DB0- 2D 2D 2E 2E 36 3E 3E 36
8DB8- 35 35 36 37 37 3F 3F 3F
8DC0- 3F 3F 3F 41 28 2D 2D 2D
8DC8- 2D 2C 3C 3C 3C 3F 3F 3F
8DD0- 37 36 46 40 C0 28 2D 2D
8DD8- 2D 2C 2C 3C 3C 3F 3F 3F
8DE0- 3F 36 36 05 00 09 2D 2D
8DE8- 2D 2D 2D 2C 2C 24 3F 3E
8DF0- 3E 3F 3F 3F 27 27 24 24
8DF8- 24 2C 2C 2D 2D 2D 35 35
8E00- 2D 24 27 27 3F 3F 3F 3F
8E08- 3F 3E 3E 36 36 36 36 36
8E10- 35 35 00 2D 2D 2D 2D 2D
8E18- 2D 2C 2C 24 24 24 24 24
8E20- 27 27 3F 3F 3F 3F 3F 3F
8E28- 36 36 36 36 36 36 36 40
8E30- 01 2D 2D 2D 2D 25 25 24
8E38- 24 24 3C 3C 3F 3F 3F 3F
8E40- 36 36 36 36 36 00 2D 2D
8E48- 2D 2D 2D 2D 2D 24 3F 3F
8E50- 3F 3F 3F 3F 24 24 2D 2D
8E58- 2D 2D 24 3F 3F 3F 3F 24
8E60- 24 2D 2D 2D 2D 2D 2D 24
8E68- 3F 3F 3F 3F 3F 3F 3F 36
8E70- 36 36 36 36 36 00 2D
8E78- 24 24 24 2D 2D 2D 2D 24
8E80- 3F 3F 3F 3F 24 24 2D 2D
8E88- 2D 2D 2D 2D 24 3F 3F 3F
8E90- 3F 3F 3F 3F 36 36 36 36
8E98- 36 36 36 00 09 2D 2D 2D
8EA0- 2D 2D 2C 2C 24 24 3F 3F
8EA8- 37 2E 2D 3E 3E 3F 3F 3F
```

Listing 2 continued.

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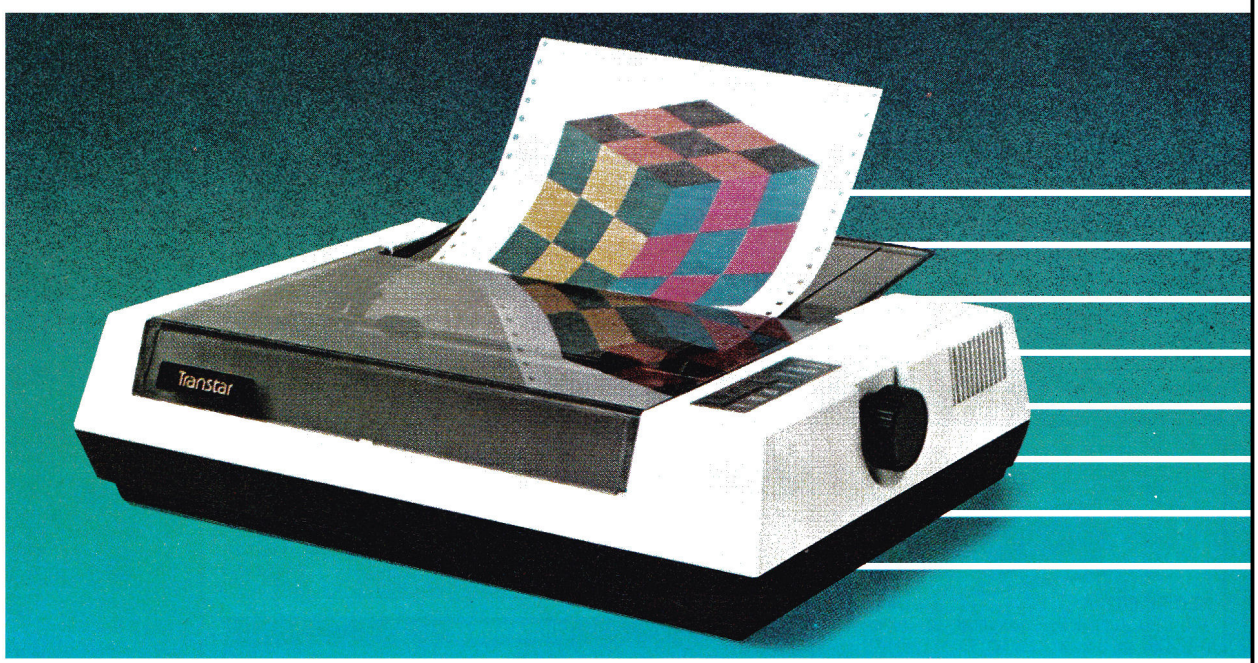

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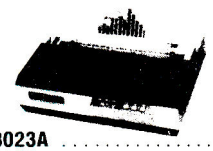

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shape table for all numbers and letters, and many symbols as well. These shapes, 52 in all, can be DRAWn, XRAWn, SCALEd, ROTated or HCOLORed in your own programs.

Vector shapes often do not scale up (increase in size) cleanly. The reason is that most people use at least a few move-only commands (without plotting) in their shapes, or, with programs like my Super Shape Draw and Animate, they use diagonal plot-

Listing 1 continued.

```
250  DRAW 39 AT X,Y:A = 39: GOTO 45
260  DRAW 40 AT X,Y:A = 40: GOTO 45
270  DRAW 33 AT X,Y:A = 33: GOTO 45
280  DRAW 28 AT X,Y:A = 28: GOTO 45
290  DRAW 31 AT X,Y:A = 31: GOTO 45
300  DRAW 27 AT X,Y:A = 27: GOTO 45
310  DRAW 34 AT X,Y:A = 34:CR = 1: GOTO 45
320  DRAW 50 AT X,Y:A = 50:CR = 1: GOTO 45
330  DRAW 41 AT X,Y:A = 41:CR = 1: GOTO 45
340  DRAW 42 AT X,Y:A = 42:CR = 1: GOTO 45
350  DRAW 43 AT X,Y:A = 43: GOTO 45
360  DRAW 44 AT X,Y:A = 44: GOTO 45
370  DRAW 45 AT X,Y:A = 45: GOTO 45
380  DRAW 46 AT X,Y:A = 46: GOTO 45
390  DRAW 47 AT X,Y:A = 47: GOTO 45
400  DRAW 48 AT X,Y:A = 48: GOTO 45
410  DRAW 49 AT X,Y:A = 49: GOTO 45
420  DRAW 37 AT X,Y:A = 37: GOTO 45
430  DRAW 36 AT X,Y:A = 36: GOTO 45
440  DRAW 32 AT X,Y:A = 32: GOTO 45
450  DRAW 30 AT X,Y:A = 30: GOTO 45
460  DRAW 1 AT X,Y:A = 1:CR = 1: GOTO 45
470  DRAW 2 AT X,Y:A = 2:CR = 1: GOTO 45
480  DRAW 3 AT X,Y:A = 3: GOTO 45
490  DRAW 4 AT X,Y:A = 4:CR = 1: GOTO 45
500  DRAW 5 AT X,Y:A = 5:CR = 1: GOTO 45
510  DRAW 6 AT X,Y:A = 6:CR = 1: GOTO 45
520  DRAW 7 AT X,Y:A = 7: GOTO 45
530  DRAW 8 AT X,Y:A = 8:CR = 1: GOTO 45
540  DRAW 9 AT X,Y:A = 9:CR = 1: GOTO 45
550  DRAW 10 AT X,Y:A = 10: GOTO 45
560  DRAW 11 AT X,Y:A = 11:CR = 1: GOTO 45
570  DRAW 12 AT X,Y:A = 12:CR = 1: GOTO 45
580  DRAW 13 AT X,Y:A = 13:CR = 1: GOTO 45
590  DRAW 14 AT X,Y:A = 14:CR = 1: GOTO 45
600  DRAW 15 AT X,Y:A = 15: GOTO 45
610  DRAW 16 AT X,Y:A = 16:CR = 1: GOTO 45
620  DRAW 17 AT X,Y:A = 17: GOTO 45
630  DRAW 18 AT X,Y:A = 18:CR = 1: GOTO 45
640  DRAW 19 AT X,Y:A = 19: GOTO 45
650  DRAW 20 AT X,Y:A = 20: GOTO 45
660  DRAW 21 AT X,Y:A = 21: GOTO 45
670  DRAW 22 AT X,Y:A = 22: GOTO 45
680  DRAW 23 AT X,Y:A = 23:CR = 1: GOTO 45
690  DRAW 24 AT X,Y:A = 24:CR = 1: GOTO 45
700  DRAW 25 AT X,Y:A = 25: GOTO 45
710  DRAW 26 AT X,Y:A = 26:CR = 1: GOTO 45
800  IF F > 0 THEN  GOSUB 1000
805 X = X + (20 * S): IF X > 281 - (20 * S) THEN X = 1:Y = Y + (20 * S): IF
     Y > 190 THEN Y = Y - (20 * S):EE = 1:EF = 1: GOTO 12000
810  GOTO 46
900  POKE  - 16303,0: POKE  - 16298,0
901  HOME : VTAB 1: PRINT "CHOOSE A COLOR OR SCALE:": PRINT : PRINT "(FOR
     SCALE, CHOOSE 1-9 AND MAKE SURE    YOU'RE POSITIONED CORRECTLY)": PRINT

902  PRINT : PRINT "'B' = BLACK 1                              'G' = GREEN
                        'V' = VIOLET                                    'W'
      = WHITE 1                          'L' = BLACK 2
           'O' = ORANGE"
903  PRINT "'U' = BLUE                                'H' = WHITE 2"
904 PE =  PEEK ( - 16384): IF PE > 127 THEN  POKE  - 16368,0: GOTO 906
905  GOTO 904
906  IF PE = 214 THEN  HCOLOR= 2:HH = 2: GOTO 990
910  IF PE = 194 THEN  HCOLOR= 0:HH = 0: GOTO 990
915  IF PE > 176 AND PE < 186 THEN S = PE - 176: SCALE= S: GOTO 990
920  IF PE = 199 THEN  HCOLOR= 1:HH = 1: GOTO 990
930  IF PE = 215 THEN  HCOLOR= 3:HH = 3: GOTO 990
940  IF PE = 204 THEN  HCOLOR= 4:HH = 4: GOTO 990
950  IF PE = 207 THEN  HCOLOR= 5:HH = 5: GOTO 990
960  IF PE = 213 THEN  HCOLOR= 6:HH = 6: GOTO 990
970  IF PE = 200 THEN  HCOLOR= 7:HH = 7: GOTO 990
980  FOR QW = 1 TO 20:PP =  PEEK ( - 16336): NEXT : FOR QW = 1 TO 20:PP =
      PEEK ( - 16336): NEXT : FOR QW = 1 TO 20:PP =  PEEK ( - 16336): NEXT
     : GOTO 900
990  POKE  - 16304,0: POKE  - 16297,0: HOME :XC =  FRE (0): RETURN
1000  ON F GOTO 1001,1003,1004,1005,1010,1015,1020
1001 TX = X:TY = Y:X = 0:Y = 0: FOR X = TX TO TX + (S + (S * (S - 1))): FOR
     Y = TY TO TY - (S + (S * (S - 1))) STEP  - 1: DRAW A AT X,Y: NEXT : NEXT
     :X = TX:Y = TY: RETURN
1003  DRAW A AT X,Y: DRAW A AT X + 2,Y - 2: RETURN
```

Listing 1 continued.

Listing 2 continued.

```
8EB0- 27 27 24 24 24 2C 2C 2D
8EB8- 2D 2D 35 35 2D 24 27 27
8EC0- 3F 3F 3F 3F 3F 3E 3E 36
8EC8- 36 36 36 36 35 35 00 2D
8ED0- 24 24 24 2D 2D 2D 2D 2D
8ED8- 36 36 36 2D 24 24 24 24
8EE0- 24 24 24 3F 36 36 36 3F
8EE8- 3F 3F 3F 3F 24 24 24 3F
8EF0- 36 36 36 36 36 36 36 00
8EF8- 2D 2D 2D 2D 2D 2D 2D 24
8F00- 3F 3F 3F 24 24 24 24 24
8F08- 2D 2D 2D 24 3F 3F 3F 3F
8F10- 3F 3F 3F 36 2D 2D 2D 36
8F18- 36 36 36 36 3F 3F 3F 36
8F20- 00 09 2D 2D 2D 2D 2D 2C
8F28- 2C 24 24 24 24 24 24 3F
8F30- 36 36 36 36 36 3E 3E 3F
8F38- 3F 3F 27 27 24 3F 36 36
8F40- 35 35 00 2D 24 24 2C 2E
8F48- 35 2D 2E 35 2D 2E 2D 24
8F50- 3F 3C 27 3F 3C 27 3F 24
8F58- 2D 2C 25 2D 2C 25 2D 24
8F60- 3F 37 3F 3E 37 3F 3E 37
8F68- 27 24 24 3F 36 36 36 36
8F70- 36 36 36 00 2D 2D 2D 2D
8F78- 2D 2D 2D 24 3F 3F 3F 3F
8F80- 3F 3F 24 24 24 24 24 24
8F88- 3F 36 36 36 36 36 36 36
8F90- 00 2D 24 24 24 24 24 35
8F98- 35 35 35 2D 2C 2C 2C 2C
8FA0- 36 36 36 36 36 2D 24 24
8FA8- 24 24 24 24 24 3F 3E 3E
8FB0- 3E 3E 3E 27 27 27 27 27
8FB8- 3F 36 36 36 36 36 36 36
8FC0- 00 2D 24 24 24 24 24 35
8FC8- 35 35 35 35 35 35 35 35
8FD0- 35 2D 24 24 24 24 24 24
8FD8- 24 3F 36 36 36 36 36 27
8FE0- 27 27 27 27 27 27 27 27
8FE8- 27 3F 36 36 36 36 36 36
8FF0- 36 00 09 2D 2D 2D 2D 2D
8FF8- 2C 2C 24 24 24 24 24 27
9000- 27 3F 3F 3F 3F 3F 3E 3E
9008- 36 36 36 36 36 35 35 40
9010- 2D 2D 2D 2D 2C 24 24 24
9018- 24 27 3F 3F 3F 3F 3E 36
9020- 36 36 36 35 00 2D 24 24
9028- 24 2C 2D 2D 2D 2D 25 25
9030- 25 24 27 27 3F 3F 3F 3F
9038- 3F 3F 36 36 36 36 36 36
9040- 36 08 48 40 C0 C0 28 2D
9048- 2D 2D 2D 2C 3C 3C 3F 3F
9050- 3F 3F 36 06 00 09 2D 2D
9058- 2D 2D 2C 2E 2D 3C 2C 24
9060- 24 24 24 24 27 27 3F 3F
9068- 3F 3F 3F 3E 3E 36 36 36
9070- 36 36 35 35 40 2D 2D 2D
9078- 3C 24 2D 2E 2E 24 24 24
9080- 24 27 3F 3F 3F 3F 3E 36
9088- 36 36 36 35 00 2D 24 24
9090- 24 2C 2D 2D 2D 35 36 36
9098- 36 2D 24 24 24 24 25 25
90A0- 24 07 3C 3C 3F 3F 3F 3F
90A8- 3F 37 36 36 36 36 36 36
90B0- 0E 40 41 C0 C0 18 08 2D
90B8- 2D 2D 2D 05 2C 3C 3C 3F
90C0- 3F 3F 3F 36 06 00 09 2D
90C8- 2D 2D 2D 2D 2C 2C 24 24
90D0- 27 27 3F 3F 3F 3F 27 27
90D8- 2C 2C 2D 2D 2D 35 35 2D
90E0- 24 27 27 3F 3F 3F 3F 3F
90E8- 3E 3E 36 36 35 35 2D 2D
90F0- 2D 2D 35 35 3E 3E 3F 3F
90F8- 3F 27 27 3F 36 35 35 00
9100- 49 49 2D 24 24 24 24 24
9108- 24 2D 2D 2D 24 3F 3F 3F
9110- 3F 3F 3F 3F 36 2D 2D 2D
9118- 36 36 36 36 36 36 00 09
9120- 2D 2D 2D 2D 2D 2C 2C 24
```

Listing 2 continued.

ting. Now, diagonal plotting is a great asset to a drawing program, as are move-only moves, but both are no-no's if you're going to be scaling up. So the CHAR characters were created (by Mary Carol Smith, president of Avant-Garde) with the plotter remaining on. Use CALL – 151 before typing in CHAR and A$8D00, L$8D0 as the BSAVE information.

The SCROLL!! routine moves everything on the hi-res screen up 64 hi-res lines once the screen fills with characters. Thus you can type forever without running out of space. Once again, use CALL – 151 before typing SCROLL!! in and A2048, L176 to BSAVE.

RETRIEVE allows you to recreate SUPERFONT compositions that have been saved as text files.

Before I discuss the SUPERFONT listing, I must mention one vital piece of information about making SUPERFONT and/or RETRIEVE work: *Before you can use either program you must do the following POKEs*:

POKE 104,96: POKE 24576,0

It doesn't matter if the POKEs are in the Hello program that runs when the disk boots (after which RUN SU

Listing 1 continued.

```
1004 Z = 0: FOR Q = 1 TO 5: DRAW A AT X + Z,Y - Z:Z = Z + 1: NEXT : RETURN
1005  DRAW A AT X,Y: DRAW A AT X + 2,Y - 2: DRAW A AT X + 4,Y - 4: RETURN
1010 TX = X:TY = Y:X = 0:Y = 0: FOR X = TX TO TX + (S + 1): FOR Y = TY TO
     TY - (S + 1) STEP  - 1: DRAW A AT X,Y: NEXT : NEXT :X = TX:Y = TY: RETURN
1015  DRAW A AT X,Y: DRAW A AT X + 1,Y: DRAW A AT X + 2,Y: RETURN
1020  DRAW A AT X,Y: DRAW A AT X + 1,Y - 1: DRAW A AT X + 2,Y - 2: RETURN
1500  POKE 103,1: POKE 104,8: POKE 2048,0
1510  HIMEM: 38400
1520  PRINT  CHR$ (4);"RUNMAILING LABEL & FILING SYSTEM"
2000 ST = S: SCALE= 1: XDRAW 51 AT OX,OY:S = ST: SCALE= S
2010  GOTO 46
3000  CLEAR :S = 1: SCALE= S:HH = 3: HCOLOR= HH: ROT= 64:X = 1:Y = 20:CR =
     1: DIM A(127),B(127),SC(127),CL(127),SH(127),F(127):SV = 1: CALL 6245
     0: GOTO 46
4000 SV = 0: GOSUB 10016: RETURN
5000 D$ =  CHR$ (4)
5010  PRINT D$"RUNRETRIEVE"
9000  HOME : TEXT : VTAB 1: PRINT "NOW TYPE THE CTRL CHARACTERS (OR WHAT-
     EVER) THAT DUMP THE HI-RES SCREEN ONTO  YOUR PRINTER. IF YOUR PRINTE
     R DOESN'T DOTHIS THEN DON'T HIT CTRL P IN THIS PROG.": PRINT
9010  PRINT "MAKE SURE YOU HIT RETURN ONCE YOU'RE    DONE TYPING ALL THE C
     TRL CHARACTERS:": PRINT :A9 = 0
9015  PRINT "IF YOU'VE NO PRINTER WITH HI-RES CAPACI-TY HIT RETURN NOW.": PRINT
9020 A9 = A9 + 1: GET CR$(A9): IF  ASC (CR$(A9)) <  > 13 THEN 9020
9030  PRINT  CHR$ (13): POKE  - 16304,0: POKE  - 16297,0: RETURN
10000  IF SV = 1 AND (PK < 219 AND PK > 160) THEN N = N + 1: GOTO 10010
10001  GOTO 800
10010 A(N) = X:B(N) = Y:SC(N) = S:CL(N) = HH:SH(N) = A:F(N) = F
10015  IF N = 126 THEN N = 0:NB = 126: GOTO 10025
10016  IF SV = 0 THEN NB = N: POKE  - 16303,0: POKE  - 16298,0: GOTO 10025
10020  GOTO 800
10025  POKE  - 16303,0: POKE  - 16298,0
10030  HOME : VTAB 1: INPUT "WHICH DO YOU WANT?(A-Y):";AN$
10031  IF  ASC (AN$) < 65 OR  ASC (AN$) > 89 THEN 10030
10032 NN =  ASC (AN$) - 64
10034  IF SS = 0 THEN  DIM TF$(26): FOR WW = 1 TO 25:TF$(WW) =  CHR$ (64 +
     WW): NEXT :SS = 1
10038 D$ =  CHR$ (4): CALL 1002: FLASH : HOME : TEXT : VTAB 1: PRINT "PLEA
     SE SWITCH NOW TO YOUR OWN INITIAL-  IZED DISK TO STORE YOUR CREATION
     ON": NORMAL : GOSUB 63000
10039  IF NN < 1 OR NN > 25 THEN 800
10040  PRINT D$"OPEN";TF$(NN)
10043  PRINT D$"DELETE";TF$(NN)
10046  PRINT D$"OPEN";TF$(NN)
10050  PRINT D$"WRITE";TF$(NN)
10055  PRINT NB
10060  FOR QW = 1 TO NB
10070  PRINT A(QW): PRINT B(QW): PRINT SC(QW): PRINT CL(QW): PRINT SH(QW):
     PRINT F(QW): NEXT
10080  PRINT D$"CLOSE"
10082  HOME
10083  VTAB 10: FLASH : PRINT "PLEASE SWITCH BACK TO THE PROGRAM DISK  NOW
     ": NORMAL : GOSUB 63000
10085  POKE  - 16304,0: POKE  - 16297,0
10088  FLASH : VTAB 1: PRINT "PLEASE SWITCH BACK TO THE PROGRAM DISK  NOW"
     : NORMAL : GOSUB 63000
10090  GOTO 805
11000  HOME : POKE  - 16303,0: POKE  - 16298,0
11010  PRINT "WHICH STYLE DO YOU WANT?": PRINT
11020  PRINT "(1-7):"
```

Listing 1 continued.

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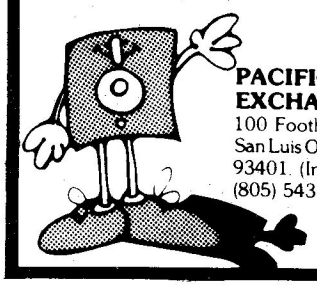

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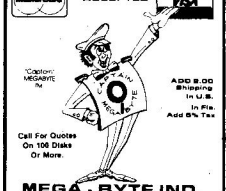

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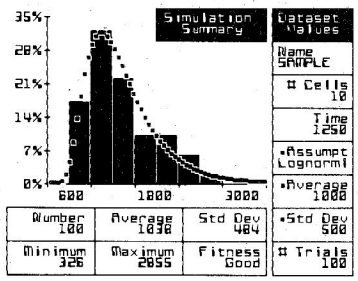

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Listing 1 continued.

```
11030 F =  PEEK ( - 16384): IF F > 176 AND F < 184 THEN F = F - 176: POKE
    - 16368,0: GOTO 11100
11040  GOTO 11030
11100  POKE  - 16304,0: POKE  - 16297,0
11200  RETURN
12000 ST = S: SCALE= 1: XDRAW 51 AT OX,OY:S = ST: SCALE= S
12002  GOSUB 12: CALL 2048
12072 EE = 0
12073  IF EF = 1 AND CR <  > 1 THEN EF = 0:ST = S: SCALE= 1: XDRAW 51 AT O
    X,OY:S = ST: SCALE= S:X = 1: GOSUB 39000: GOTO 46
12074 X = 1: GOSUB 39000: IF Y > 180 THEN Y = 180
12075  GOTO 46
13000  POKE  - 16303,0: POKE  - 16298,0
13010  HOME : VTAB 1: PRINT "HERE ARE THE COMMANDS:": PRINT
13020  PRINT "CTRL O MOVES YOU DOWN                    CTRL T MOVES YOU UP
    (TOWARDS TOP)       CTRL X ERASES & RESTARTS YOU          CTRL Y SC
    ROLLS SCREEN BY 3 LINES        CTRL S STARTS SAVING YOUR CREATION  "
13030  PRINT "(AUTOMATIC SAVE IF YOU FILL SCREEN)     CTRL F SAVES YOUR CR
    EATION (FINISHED)   CTRL R RETRIEVES A SAVED CREATION": FLASH : PRINT
    "CTRL O LETS YOU SEE THE COMMAND OPTIONS": NORMAL
13040  PRINT "(--> AND <-- AND 'SPACE' WORK AS ON A     TYPEWRITER, & SO D
    OES 'RETURN' ---      WHICH IS CARRIAGE RETURN)"
13050  PRINT "ESC LETS YOU CHANGE COLOR OR SCALE      REPT LETS YOU REPEAT
                    SHIFT M GIVES STYLE #1 LETTERS          SHIFT N L
    ETS YOU CHOOSE LETTER STYLE"
13051  PRINT "2ND HIT OF SHIFT M OR N MEANS BACK TO     REGULAR LETTERS AG
    AIN"
13052  PRINT "CTRL P MEANS PRINT OUT HI-RES SCREEN ON    A PRINTER"
13055  PRINT
13060 PW =  PEEK ( - 16384): IF PW > 127 AND PW <  > 155 THEN  POKE  - 163
    68,0: GOTO 13999
13065  IF PW = 155 THEN 13075
13070  GOTO 13060
13075  POKE 103,1: POKE 104,8: POKE 2048,0
13080  HIMEM: 38400
13082  CALL 1002
13085  PRINT  CHR$ (4);"RUNHELLO"
13999  POKE  - 16304,0: POKE  - 16297,0: HOME : IF BE = 1 THEN  RETURN
14000  GOTO 2000
24000 D$ =  CHR$ (4)
24002  POKE  - 16303,0: POKE  - 16298,0
24005  GOSUB 9000: IF  ASC (CR$(1)) = 13 THEN 2000
24010  PRINT D$"PR#1"
24020  FOR W9 = 1 TO A9: PRINT CR$(W9);: NEXT
24025  PRINT D$"PR#0"
24030  GOTO 2000
39000  IF Y < (S * 20) THEN Y = S * 20: RETURN
39002  ON S GOTO 39010,39020
39005  RETURN
39010 Y = OY - 40: GOTO 39050
39020 Y = OY - 20
39050  IF Y < (S * 20) THEN Y = S * 20
39060  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
63995 QP =  PEEK (222): POKE 216,0
63999 G$ =  CHR$ (7): PRINT G$: PRINT G$: GOTO 2000
```

PERFONT occurs immediately), or if you do them in immediate mode before running SUPERFONT, also in immediate mode. But if you try to install the POKEs in SUPERFONT, *it won't work.*

SUPERFONT

In a nutshell, SUPERFONT displays typed-in text on the screen in a large hi-res format. Many sizes, styles and colors are possible. You can save your compositions and, if RETRIEVE is on the disk, you can summon them back as well. The instructions for using SUPERFONT are right in the program and appear as soon as it starts running. Any time you forget the commands, use control-O to view them again.

Control-P directs your printer to turn out hi-res pictures. Here's how: If you have an Axiom or Silentype, or any other printer that requires only a couple of control characters to produce hi-res pictures, then, after typing control-P, enter the appropriate printer-activating codes. If non-inputtable characters are needed, stick them into line 24020 of SUPERFONT. When using a slot other than

Listing 2 continued.

```
9128- 24 24 24 24 24 3F 36 36
9130- 36 36 36 3E 3E 3E 3F 3F
9138- 27 27 24 24 24 24 24 3F
9140- 36 36 36 36 36 36 35 35
9148- 00 49 49 2D 24 25 2C 24
9150- 25 2C 24 25 2C 24 3F 3E
9158- 36 37 3E 36 37 3E 27 3C
9160- 24 27 3C 24 27 3F 36 35
9168- 2E 36 35 2E 36 35 2E 36
9170- 00 2D 2C 2C 2C 2C 2C 35
9178- 35 35 35 35 2D 24 24 24
9180- 24 24 24 24 3F 36 36 36
9188- 36 36 27 27 27 27 3F 3E
9190- 3E 3E 3E 24 24 24 24 24
9198- 3F 36 36 36 36 36 36 36
91A0- 00 2D 2C 2C 2C 2C 2C 35
91A8- 35 35 35 35 2D 24 27 27
91B0- 27 27 27 2C 2C 2C 2C 2C
91B8- 24 3F 3E 3E 3E 3E 3E 27
91C0- 27 27 27 27 3F 36 35 35
91C8- 35 35 35 3E 3E 3E 3E 3E
91D0- 36 00 49 49 2D 24 24 24
91D8- 24 25 25 25 25 25 25 3F
91E0- 37 37 37 37 3F 3C 3C 3C
91E8- 3C 3F 2E 2E 2E 2E 2E 2E
91F0- 36 36 36 36 00 24 25 25
91F8- 25 25 25 25 25 25 25 25
9200- 3F 3F 3F 3F 3F 24 2D 2D
9208- 2D 2D 2D 2D 2D 36 37 37
9210- 37 37 37 37 37 37 37 37
9218- 2D 2D 2D 2D 2D 36 3F 3F
9220- 3F 3F 3F 3F 3F 00 49 49
9228- 2D 24 3F 36 00 49 49 2E
9230- 2C 24 3F 36 00 49 49 2D
9238- 24 3F F6 40 18 08 2D 24
9240- 24 24 24 24 3F 36 36 36
9248- 36 36 00 49 49 2D 24 3F
9250- F6 40 18 08 2D 24 2C 2D
9258- 25 25 25 24 3C 3C 3F 3F
9260- 3F 3F 3F 3E 3E 36 2E 25
9268- 2C 2C 2D 2D 2D 35 35 37
9270- 3F 3F 37 36 36 00 40 C0
9278- 40 01 2D 2D 2D 2D 2D 24
9280- 3F 3F 3F 3F 3F 36 00 40
9288- 40 2D 2D 2D 2D 2D 24 3F
9290- 3F 3F 3F 3F F6 40 18 08
9298- 2D 2D 2D 2D 2D 24 3F 3F
92A0- 3F 3F 3F 36 00 49 49 2D
92A8- 24 24 24 2D 2D 2D 24 3F
92B0- 3F 3F 24 24 24 3F 36 36
92B8- 36 3F 3F 3F 36 2D 2D 2D
92C0- 36 36 36 00 2D 2C 2C 2C
92C8- 2C 2C 2C 2C 2C 2C 2C 2C
92D0- 2C 24 3F 3E 3E 3E 3E 3E
92D8- 3E 3E 3E 3E 3E 3E 3E 36
92E0- 00 40 40 40 40 18 08 2D
92E8- 24 24 3F 36 36 4A 09 28
92F0- 25 24 3C 37 36 06 00 49
92F8- 49 2E 2C 24 3F F6 40 C0
9300- 08 2D 24 3F 36 00 49 49
9308- 2D 24 3F F6 40 C0 40 2D
9310- 24 3F 36 00 49 29 25 2D
9318- 2E 25 2D 2C 2C 24 3C 3C
9320- 3C 27 24 35 35 2D 24 27
9328- 27 3F 3C 37 3F 3C 37 3F
9330- 3E 3E 36 2E 2E 2E 35 36
9338- 27 27 3F 36 35 35 2D 46
9340- 40 2D 24 3C 37 76 4A 08
9348- 25 25 27 37 F6 C0 40 18
9350- 24 3C 37 36 2D DA C3 24
9358- 3C 3E 2E 2E 00 49 49 29
9360- 2D 24 3F 24 27 3C 24 25
9368- 2C 24 2D 24 3F 37 37 3E
9370- 36 37 36 2E 36 35 2E 06
9378- 00 49 29 2D 2C 24 25 2C
9380- 24 24 27 3C 24 27 3F 37
9388- 2E 35 2E 36 35 3E 36 37
9390- 3E 37 06 00 2D 2D 2D 2D
9398- 2D 2D 2D 24 3F 3F 3F 24
93A0- 24 24 24 24 3F 3E 3E 3E
93A8- 3E 3E 3E 3E 36 2D 2C 2C
93B0- 2C 2C 36 36 36 36 3F 3F
93B8- 3F 36 00 2D 2D 2D 2D 2D
93C0- 2D 2D 24 3F 3F 3F 3F 3F
93C8- 27 25 25 25 2D 2D 2D 2C
93D0- 2C 24 24 27 27 3F 3F 3F
93D8- 3F 3F 3E 3E 36 2E 25 2C
93E0- 2C 2D 2D 2D 35 35 3E 3E
93E8- 3F 3F 37 37 37 37 37 37
93F0- 36 00 09 2D 2D 2D 2D 2D
93F8- 2C 2C 24 3C 3C 24 25 25
9400- 24 27 27 3F 3F 3F 3F 3F
9408- 3E 3E 36 2D 2C 2C 2D 2D
9410- 2D 35 35 37 37 3F 3F 3F
9418- 37 2E 2D 2D 2D 2E 2E 3E
9420- 3E 3F 3F 3F 27 27 3F 36
9428- 35 35 00 49 49 49 2D 24
9430- 24 24 2C 2D 24 3F 27 24
9438- 24 3F 36 36 3E 3F 3F 3F
9440- 24 24 3C 37 36 36 36 2D
9448- 2D 2D 2D 35 36 36 36 00
9450- 09 2D 2D 2D 2D 2D 2C 2C
9458- 24 24 3C 3C 3C 3F 3F 3F
9460- 3F 27 24 2D 2D 2D 2D 2D
9468- 2D 24 3F 3F 3F 3F 3F 3F
9470- 3F 36 36 36 2E 2D 2D 2D
9478- 2D 2D 2E 36 3E 3E 3F 3F
```

Listing 2 continued.

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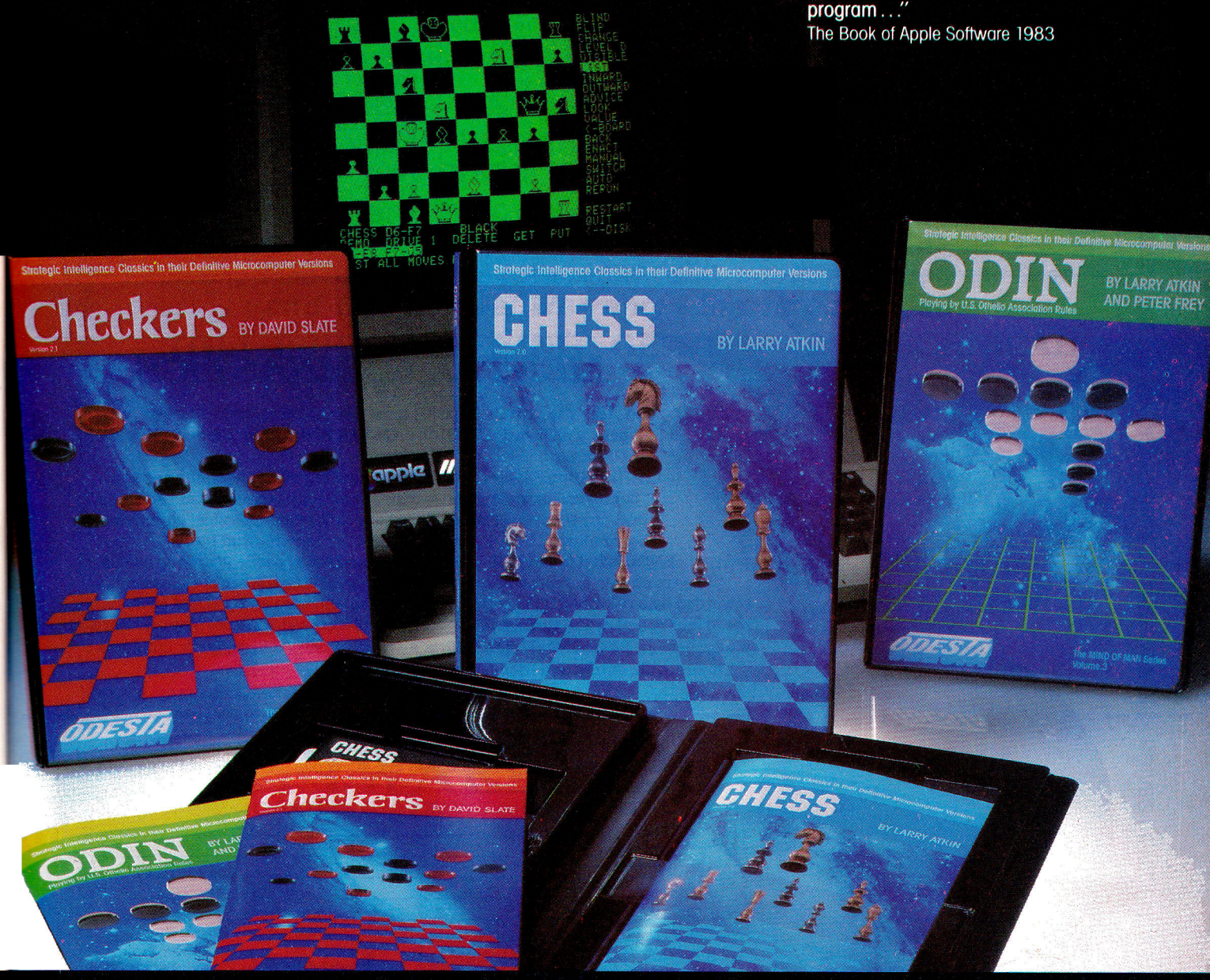

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Listing 2 continued.

```
9480- 3F 27 27 3F 36 35 35 00
9488- 09 2D 2D 2D 2D 2D 2C 2C
9490- 24 24 27 27 3F 3F 3F 3F
9498- 3E 3E 24 24 2C 2C 2D 2D
94A0- 2D 2D 2E 25 3C 3C 3F 3F
94A8- 3F 3F 3F 3E 3E 36 36 36
94B0- 36 36 35 35 40 2D 2D 2D
94B8- 2D 2C 24 27 3F 3F 3F 3E
94C0- 3E 37 35 00 49 09 2D 2C
94C8- 24 25 2C 24 25 2C 24 25
94D0- 25 3C 3F 3F 3F 3F 3F 3F
94D8- 37 2E 2D 2D 2D 2D 35 3E
94E0- 36 37 3E 36 37 3E 36 00
94E8- 09 2D 2D 2D 2D 2D 2C 2C
94F0- 24 3C 3C 24 25 25 24 27
94F8- 27 3F 3F 3F 3F 3F 3E 3E
9500- 36 2E 2E 36 37 37 36 35
9508- 35 40 2D 2D 2D 2D 2C 3C
9510- 3C 3C 3F 3F 37 37 37 75
9518- 40 C0 18 08 2D 2D 2D 2C
9520- 2C 3C 3C 3F 3F 3F 37 37
9528- 35 35 00 29 2D 2D 2D 2D
9530- 2D 2C 2C 24 24 24 24 24
9538- 27 27 3F 3F 3F 3F 3F 3E
9540- 3E 36 36 2E 2E 2E 2D 2D
9548- 2D 2D 35 3E 3E 3F 3F 3F
9550- 3F 3C 37 2E 06 41 40 C0
9558- 18 08 2D 2D 2D 2D 25 24
9560- 3C 3C 3F 3F 3F 37 37 36
9568- 35 00 2D 2C 2C 2C 2C 2C
9570- 2C 2C 2C 2C 2C 2C 2C 24
9578- 3F 3E 3E 3E 3E 3E 3E 3E
9580- 3E 3E 3E 3E 3E 36 4A 08
9588- 2D 2D 2D 2D 25 25 25 24
9590- 24 24 24 06 D3 36 36 36
9598- 37 3F 3F 3F 05 D8 C3 24
95A0- 24 24 2C 2C 2D 2D 3D 48
95A8- 08 3F 3F 3F 3F 37 37 37
95B0- 36 36 36 36 04 00 07 00
95B8- 40 40 40 40 40 40 2E 2C
95C0- 24 3F 36 00 00 87 87 87
95C8- 87 87 87 87 87 87 87 87
```

#1, make that change in line 24010.

Should you have an Epson printer, or any other requiring special dumping software, then once the screen contains what you want printed, hit control-reset and run your printer dump software. Don't worry about the screen vanishing when you hit reset. It doesn't really vanish, as POKE – 16304,0 and POKE – 16297,0 will quickly prove.

```
*800.880

0800- A9 28 85 3C A9 20 85 3D
0808- A9 FF 85 3E A9 3F 85 3F
0810- A9 00 85 42 A9 40 85 43
0818- 20 00 03 A9 50 8D 02 18
0820- 85 07 A9 40 8D 03 18 85
0828- 08 AD 02 18 C9 D1 AD 03
0830- 18 E9 43 90 26 A0 27 A9
0838- 00 99 D8 5F 88 D0 FA A9
0840- 00 85 3C A9 40 85 3D A9
0848- FF 85 3E A9 5F 85 3F A9
0850- 00 85 42 A9 20 85 43 20
0858- 00 03 60 18 AD 02 18 85
0860- 07 69 01 8D 06 18 AD 03
0868- 18 85 08 69 1C 8D 07 18
0870- A5 07 CD 06 18 A5 08 ED
0878- 07 18 90 03 4C 9A 08 A0
0880- 27 A9 00 91 07 88 D0 FB
0888- 91 07 18 A5 07 69 00 85
0890- 07 A5 08 69 04 85 08 4C
0898- 70 08 18 AD 02 18 69 80
08A0- 8D 02 18 AD 03 18 69 00
08A8- 8D 03 18 4C 29 08 00 00
```

Listing 3. SCROLL!!

To save a SUPERFONT composition, here is what you do. While in the input part of the program type control-S to start saving what you type. You can't save unless you hit control-S first. Then type until you're done or until you have a normal screenful of 126 characters —whichever comes first. When you're ready to quit, hit control-F to indicate you're finished with your SUPERFONT composition.

There are seven styles of letters to choose from. Your selection is made



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using shift-N, except for style #1, which is designated by shift-M. Escape is used for choosing color or scale.

You can go back and fix an error with the color black and the backspace key.

It's possible to create crude animation as compositions are being reproduced with the RETRIEVE program. Also, you can spell a word, go back and erase it, and then redo it in a new color—or change to a new word. This can make a rather nice display when re-created.

"It's possible to create crude animation as compositions are being reproduced."

If you want to retrieve a saved creation, control-R for RETRIEVE sends you to the program of the specified name. The file names of saved SUPERFONT creations are set up to be the letters A through Y, so only 25 compositions can be stored on one disk. However, a bit of program adjustment will make more names possible. There are two to nine sectors in each saved SUPERFONT text file.

If you want a binary picture of any of your creations, just hit control-reset while that picture is on the screen, and then type BSAVE (NAME), $2000, L$1FF8. To retrieve the picture BLOAD it, POKE -16304,0 and POKE -16297,0.

Next time we'll look at one of business graphics' neatest tools, the pie chart.

In closing, may I say I hope you will read this issue well. You'll find some news about an upcoming revolution in Apple graphics. I admit to being co-conspirator in this revolution, and I'm very excited about it. ■

```
0  PRINT  CHR$ (4);"BLOADCHAR"
1  HIMEM: 36095
8  ONERR  GOTO 63995
10  GOTO 5000
1000  ON F GOTO 1001,1003,1004,1005,1010,1015,1020
1001 TX = X:TY = Y:X = 0:Y = 0: FOR X = TX TO TX + (S + (S * (S - 1))): FOR
     Y = TY TO TY - (S + (S * (S - 1))) STEP  - 1: DRAW A AT X,Y: NEXT : NEXT
     :X = TX:Y = TY: RETURN
1003  DRAW A AT X,Y: DRAW A AT X + 2,Y - 2: RETURN
1004 Z = 0: FOR Q = 1 TO 5: DRAW A AT X + Z,Y - Z:Z = Z + 1: NEXT : RETURN

1005  DRAW A AT X,Y: DRAW A AT X + 2,Y - 2: DRAW A AT X + 4,Y - 4: RETURN

1010 TX = X:TY = Y:X = 0:Y = 0: FOR X = TX TO TX + (S + 1): FOR Y = TY TO
     TY - (S + 1) STEP  - 1: DRAW A AT X,Y: NEXT : NEXT :X = TX:Y = TY: RETURN

1015  DRAW A AT X,Y: DRAW A AT X + 1,Y: DRAW A AT X + 2,Y: RETURN
1020  DRAW A AT X,Y: DRAW A AT X + 1,Y - 1: DRAW A AT X + 2,Y - 2: RETURN

5000  POKE  - 16303,0: POKE  - 16298,0: HOME
5300  CLEAR :S = 1: SCALE= S:HH = 3: HCOLOR= HH: ROT= 64:X = 1:Y = 20
5325  CALL 62450
5350  HOME : VTAB 1: INPUT "WHICH DO YOU WANT?(A-Y):";AN$
5360  IF  ASC (AN$) < 65 OR  ASC (AN$) > 89 THEN 5350
5375 NN =  ASC (AN$) - 64
5400  IF SS = 0 THEN  DIM TF$(26): FOR HH = 1 TO 25:TF$(HH) =  CHR$ (64 +
     HH): NEXT :SS = 1
5510  IF TY = 0 THEN  DIM A(127),B(127),SC(127),CL(127),SH(127),F(127):TY =
     1
5520 D$ =  CHR$ (4)
5525  FLASH : HOME : TEXT : VTAB 1: PRINT "PLEASE SWITCH NOW TO YOUR OWN I
     NITIAL-  IZED DISK UPON WHICH YOUR CREATION IS  STORED": NORMAL : GOSUB
     63000
5530  PRINT D$"OPEN";TF$(NN)
5540  PRINT D$"READ";TF$(NN)
5545  INPUT NB
5550  FOR QW = 1 TO NB
5560  INPUT A(QW),B(QW),SC(QW),CL(QW),SH(QW),F(QW)
5565  NEXT
5570  PRINT D$"CLOSE"
5575  HOME : VTAB 1: PRINT "HIT SPACE BAR WHEN YOU'RE THROUGH       LOOKIN
     G.": FOR QQ = 1 TO 1500: NEXT
5578  POKE  - 16304,0: POKE  - 16297,0
5580  FOR QW = 1 TO NB
5590 X = A(QW):Y = B(QW): SCALE= SC(QW): HCOLOR= CL(QW):A = SH(QW): ROT= 6
     4:F = F(QW)
5591  GOSUB 7000
5592  IF F > 0 THEN  GOSUB 1000: NEXT : GOTO 5600
5595  DRAW A AT X,Y: NEXT
5600 KP =  PEEK ( - 16384): IF KP > 127 THEN  POKE  - 16368,0: GOTO 5700
5650  GOTO 5600
5700  POKE  - 16303,0: POKE  - 16298,0: HOME
5702  HOME : VTAB 1: PRINT "DO YOU WANT A PRINT-OUT OF IT?": INPUT "(Y/N):
     ";P$
5705  IF  ASC (P$) = 89 THEN  GOSUB 24000
5710  HOME : VTAB 1: INPUT "DO YOU WANT TO SEE ANOTHER?(Y/N):";RR$: IF RR$
     = "Y" THEN 5730
5720  FLASH : VTAB 1: PRINT "PLEASE SWITH BACK TO THE PROGRAM DISK   NOW":
     NORMAL : GOSUB 63000: GOTO 5990
5730  GOTO 5300
5990  POKE  - 16304,0: POKE  - 16297,0
5997 NB = 0:F = 0
5998 X = 1:Y = 20:S = 1: SCALE= S: ROT= 64: HCOLOR= 3
5999  CALL 62450:OX = 1:OY = 20:CR = 1:GT46 = 1: CALL 1002
6000 D$ =  CHR$ (4)
6010  PRINT D$"RUNSUPERFONT"
7000  IF B(QW) < B(QW - 1) THEN  CALL 62450
7010  RETURN
9000  HOME : TEXT : VTAB 1: PRINT "NOW TYPE THE CTRL CHARACTERS (OR WHAT-
     EVER) THAT DUMP THE HI-RES SCREEN ONTO  YOUR PRINTER. IF YOUR PRINTE
     R DOESN'T DOTHIS THEN DON'T HIT CTRL P IN THIS PROG.": PRINT
9010  PRINT "MAKE SURE YOU HIT RETURN ONCE YOU'RE    DONE TYPING ALL THE C
     TRL CHARACTERS:": PRINT :A9 = 0
9015  PRINT "IF YOU'VE NO PRINTER WITH HI-RES CAPACI-TY HIT RETURN NOW.": PRINT

9020 A9 = A9 + 1: GET CR$(A9): IF  ASC (CR$(A9)) <  > 13 THEN 9020
9030  PRINT  CHR$ (13): POKE  - 16304,0: POKE  - 16297,0: RETURN
24000 D$ =  CHR$ (4)
24002  POKE  - 16303,0: POKE  - 16298,0
24005  GOSUB 9000: IF  ASC (CR$(1)) = 13 AND P$ = "Y" THEN P$ = "": POKE  -
     16303,0: POKE  - 16298,0: RETURN
24010  PRINT D$"PR#1"
24020  FOR W9 = 1 TO A9: PRINT CR$(W9);: NEXT
24030  PRINT D$"PR#0"
24040  IF P$ = "Y" THEN P$ = "": POKE  - 16303,0: POKE  - 16298,0: RETURN

24999  GOTO 5000
63000  PRINT : PRINT "(HIT ANY KEY TO CONTINUE):": PRINT
63010 PP =  PEEK ( - 16384): IF PP > 127 THEN  POKE  - 16368,0: RETURN
63020  GOTO 63010
63995 QP =  PEEK (222): POKE 216,0
63996  IF QP = 6 OR QP = 5 THEN  PRINT : PRINT "SORRY---NO SUCH FILE! TRY
     AGAIN!": PRINT : FOR WQ = 1 TO 1900: NEXT
63997 CR = 0: POKE 768,104: POKE 769,168: POKE 770,104: POKE 771,166: POKE
     772,223: POKE 773,154: POKE 774,72: POKE 775,152: POKE 776,72: POKE 7
     77,96
63998  ONERR  GOTO 63995: IF QP = 5 OR QP = 6 THEN 5350
63999 G$ =  CHR$ (7): PRINT G$: PRINT G$: GOTO 5000
```

Listing 4. RETRIEVE.

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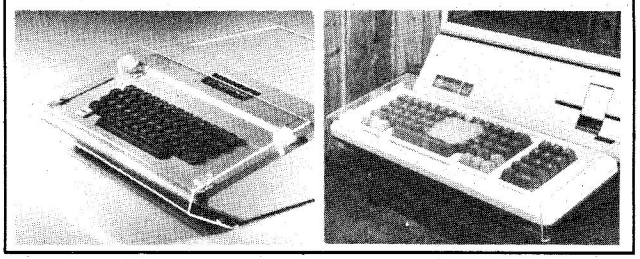

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The Assembly Advantage

by Randy Hyde

Character Strings

The previous installments of this column have described how to manipulate integer variables with the SPEED/ASM package. Now it's time to explore some additional data types supported by SPEED/ASM. For the next few months I'll discuss how you manipulate character strings, the most important non-numeric type of data.

String Variable Allocation

In part one of this series I described how to allocate storage for a string variable. For the benefit of those who don't have the April edition of *inCider*, I'll first review this procedure.

Unlike other data types in SPEED/ASM (integer, real and character), string variables require a *variable* amount of storage space. The amount of space required depends entirely on how big you wish to allow the string to grow. Strings in SPEED/ASM need n + 2 bytes, where n represents the *maximum* number of characters, up to 255, you will allow the string to contain. The first byte of a SPEED/ASM variable must contain this value. The next m bytes after that (where m < = n) must contain the characters that make up the string. Finally, the first byte following the characters making up the string must contain 0, which SPEED/ASM uses to mark the end of the character string. Figure 1 shows the SPEED/ASM format for a string variable.

Before defining a string variable you must determine its maximum possible size. If you try to store more characters into a string than you allow for, SPEED/ASM will truncate the string and return an error code. On the other hand, if you define a string using the maximum length (255 characters) when at most only 20 characters are ever required, you're wasting a lot of memory space. Obviously, some careful thought must go into deciding how much space to reserve.

The easiest way to do the reserving is to use LISA's ADR and DFS pseudo opcodes. The format for string declaration should be:

```
<label>  ADR   <maxlength>
         DFS   <maxlength>
```

where <label> is the name of the string variable you are declaring and <maxlength> is the maximum string length. <maxlength> must be in the range 1–255. This form of string declaration fulfills three functions: it stores the maximum string length into the first byte (as required), it stores 0 into the second byte (assuming <maxlength> is a value less than 255), and it reserves <maxlength> + 2 bytes as required for a SPEED/ASM string. (Two bytes are reserved by the ADR pseudo opcode, <maxlength> bytes are reserved by the DFS statement.) By storing 0 into the second byte of the string variable, this form of the string declaration initializes the variable to the empty string. The operation of this form

Randy Hyde is proprietor of Lazerwerks, creators of SPEED/ASM. Address correspondence to him at 925 Lorna St., Corona, CA 91720.

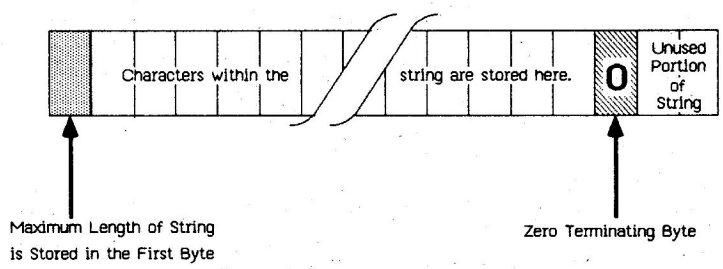
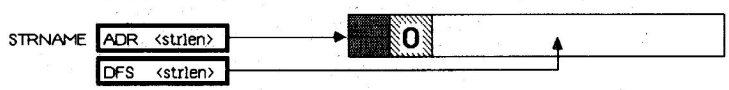


Figure 1. SPEED/ASM string format.



The ADR pseudo-opcode stores <strlen> in the first byte (this is the maximum length value required by SPEED/ASM strings) and then stores a zero into the second byte. This zero initializes the string to the empty string.
The DFS pseudo opcode reserves enough storage for the actual character string. SPEED/ASM strings require exactly <strlen>+2 bytes. By using both the ADR and DFS pseudo-ops in the fashion the required number of bytes are automatically allocated.

Figure 2. Operation of ADR/DFS pseudo opcodes for string declarations.

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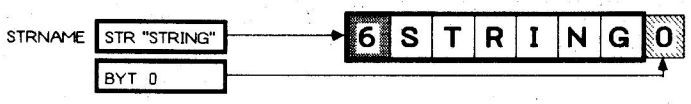
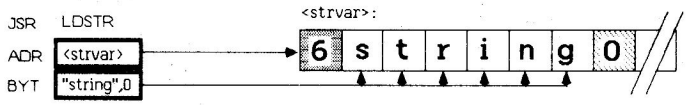


The STR pseudo-opcode stores a length byte followed by the characters in the string. In this case the STR pseudo-op emits a six followed by the six characters "STRING". The BYT pseudo-opcode emits the zero required at the end of all SPEED/ASM strings.

Figure 3. Using the STR and BYT pseudo opcodes to initialize a string variable.



The LDSTR routine copies the zero terminated string into the string variable whose address immediately follows the call to LDSTR. Note that in this example eight characters are copied: a length byte (which LDSTR computes), the six characters "string" and the zero terminating byte.

Figure 4. Operation of the LDSTR routine.

of the declaration is depicted in Figure 2.

Occasionally you may want to reserve space for a SPEED/ASM string variable and initialize the string to some fixed value. There are a couple of ways to accomplish this, depending on your requirements. If the string value will never change (i.e., you will never store another string value into the variable) then the following definition can be used:

```
<label>  STR   "<character string>"
         BYT   0
```

where <label> is the name of the string variable and <character string> is the data you wish to initialize the string to. The STR pseudo opcode emits the length of the specified string followed by the string itself. Since, in this case, the maximum possible length of the string *is* the length of the string, the STR pseudo opcode automatically emits the proper data for the maximum value. The BYT directive emits the required terminating 0 byte, since STR doesn't do so. This approach is pictured in Figure 3.

Using the STR method to declare an initial value for a string is great if the string value doesn't change during execution of the program, (or if you can guarantee that the initial string value is the largest string value). It is perfect for setting up such fixed strings as error messages and menus. If you need to initialize a string whose initial length *is not* the maximum length the string will grow to, you have to declare the string using the statements:

```
<label>  BYT   <maxlength>,"<string>"
         DFS   <maxlength> + 1 - <length
               of string>,0
```

Rather than explaining how this complicated affair works, space is better spent describing how to use SPEED/ASM routines to avoid such statements.

Initializing and Assigning Strings

The most basic string operation is the string assignment. SPEED/ASM supports two routines, LDSTR and MOVS, for this purpose. LDSTR copies a *string constant* into a string variable, and MOVS copies one *string variable* into another.

The LDSTR routine (load a string)

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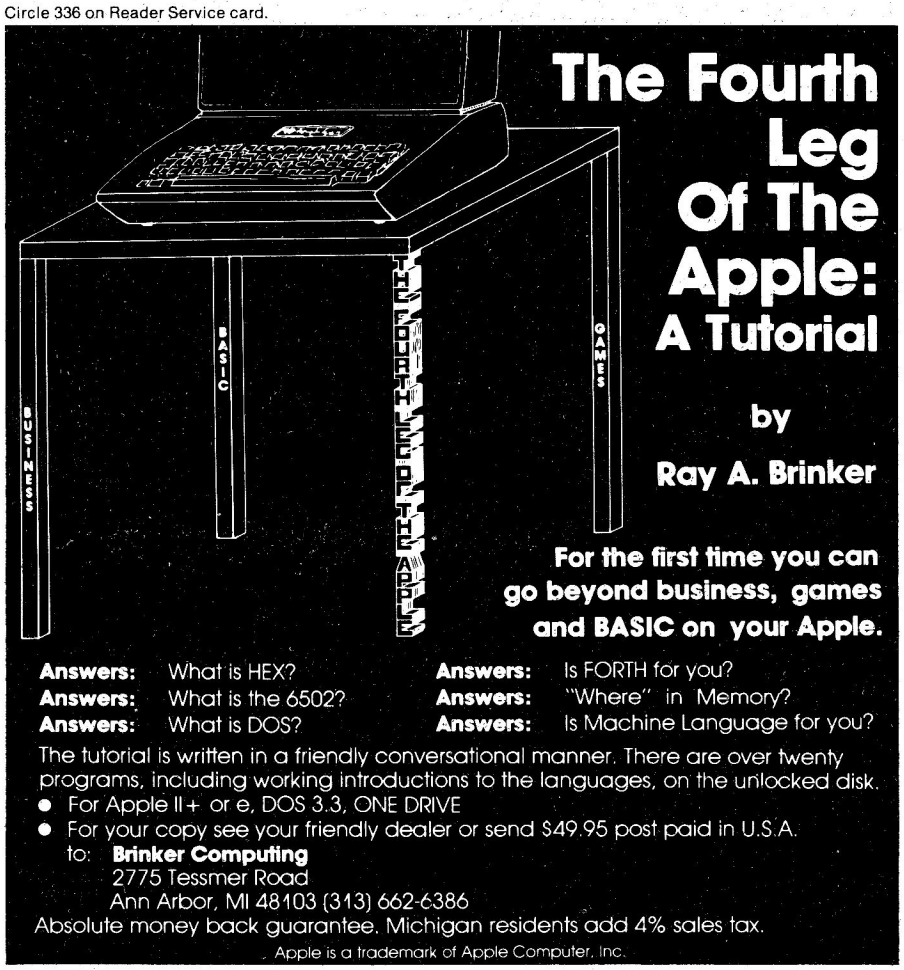

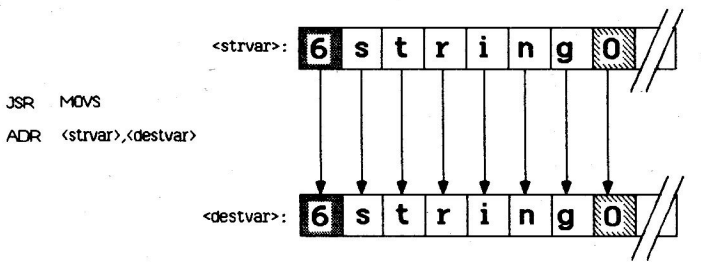

Figure 5. Operation of the MOVS routine.

replaces Basic string assignments of the form:

55 A$ = "STRING"

The syntax for the LDSTR is:

```
JSR   LDSTR
ADR   <deststr>
BYT   "<string constant>",0
```

where <deststr> is the name of the string variable into which you want to store the string <string constant>. LDSTR should be used to initialize a string variable with a string that is shorter than the maximum length. (See the problem in the last section.) The operation of LDSTR is shown in Figure 4.

The MOVS routine copies the contents of one string variable into another. This enables you to translate statements of the form:

100 A$ = B$

into SPEED/ASM. The calling sequence for the MOVS routine is:

```
JSR   MOVS
ADR   <source string>,
      <destination string>
```

where <source string> is the name of the source string and <destination string> is the name of the string you want the source string copied into. The operation of MOVS is shown in Figure 5.

The only problem with using LDSTR and MOVS occurs when you try to store a source string whose length is greater than the maximum length of the destination string. In this case LDSTR and MOVS truncate the string and store the largest string that will fit. Then LDSTR and MOVS return the 6502 overflow flag (V) set if such an error occurs. Likewise, if the error does not occur, the V flag is returned clear. So you can see if a string overflow occurred by checking the V flag (using the BVS and BVC instructions) after a JSR to LDSTR and MOVS.

String I/O

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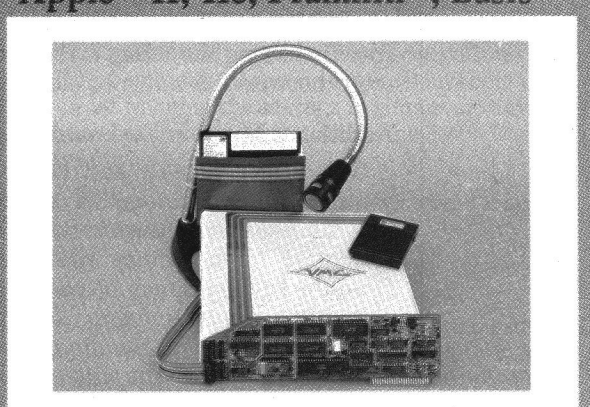

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Listing 1. SPEED/ASM equates.

```
0800                1           TTL "Listing One: SPEED/ASM Equates"
0800                2  ;
0800                3  ;
0800                4  ;
0800                5  ***********************************
0800                6  *                                 *
0800                7  *       Listing One:              *
0800                8  *       SPEED/ASM Equates         *
0800                9  *                                 *
0800               10  ***********************************
0800               11  ;
0800               12  ;
0800               13  ;
0800               14  ;
0800               15  ;
0800               16  ;
0800               17  ;
0800               18  ;
0800               19  ; GENERAL PURPOSE EQUATES
0800               20  ;
0800               21  ; The following variables are used
0800               22  ; by the SPEED/ASM package and
0800               23  ; shouldn't be used by the SPEED/ASM
0800               24  ; programmer.
0800               25  ;
0800               26  ;
0800               27  ;
0800               28  ;
0000               29  FORASAV  EPZ 0
0001               30  FORXSAV  EPZ FORASAV+1
0002               31  FORYSAV  EPZ FORXSAV+1
0003               32  FORZPG   EPZ FORYSAV+1
0005               33  DESTADR  EPZ FORZPG+2
0007               34  PTRADR   EPZ DESTADR+2
0009               35  ISIMMED  EPZ PTRADR+2
000A               36  OP       EPZ ISIMMED+1
000C               37  MAXLEN   EPZ OP+2
000D               38  VALUE    EPZ MAXLEN+1
000F               39  DIGIT    EPZ VALUE+2
0010               40  LEAD0    EPZ DIGIT+1
0011               41  JMPADR   EPZ LEAD0+1
0013               42  COUNT    EPZ JMPADR+2
0014               43  GOTLN    EPZ COUNT+1
0015               44  LINEINDX EPZ GOTLN+1
0016               45  SIGN     EPZ LINEINDX+1
0017               46  ACL      EPZ SIGN+1
0018               47  ACH      EPZ ACL+1
0019               48  XTNDL    EPZ ACH+1
001A               49  XTNDH    EPZ XTNDL+1
001B               50  AUXL     EPZ XTNDH+1
001C               51  AUXH     EPZ AUXL+1
0800               52  ;
0033               53  PROMPT   EPZ $33
004E               54  RNDL     EPZ $4E
004F               55  RNDH     EPZ $4F
0100               56  STACK    EQU $100
0200               57  INPUT    EQU $200
0800               58  ;
0800               59  ;
0800               60  ;
0800               61  ;
0800               62  ;
0800               63  ;
0800               64  ;
0800               65  *************
0800               66  * CONSTANTS *
0800               67  *************
0800               68  ;
0800               69  ;
0800               70  ;
0800               71  ; The following symbols are constants
0800               72  ; for the values "FALSE", "TRUE", and
0800               73  ; Carriage Return (respectively).
0800               74  ;
0800               75  ; These symbols should only appear
0800               76  ; as immediate operands to a 6502
0800               77  ; instruction or in the operand field
0800               78  ; of a pseudo-opcode like BYT.
0800               79  ;
0800               80  ;
0800               81  ;
0800               82  ;
0800               83  ;
0000               84  FALSE    EQU 0
0001               85  TRUE     EQU 1
008D               86  CR       EQU $8D
0800               87  ;
0800               88  ;
0800               89  ;
0800               90  ;
0800               91  ;
0800               92  ;
0800               93  ; "IF" STATEMENT EQUATES
0800               94  ;
0800               95  ; The following symbols should only
0800               96  ; be used in the ADR pseudo-opcode
0800               97  ; following a call to the SPEED/ASM
```

Listing continued.

the contents of a string variable, and print a string constant.

To print a string constant use the PRINT routine, which should be quite familiar to you. We've been employing it all along to print prompts onto the Apple's video display. PRINT needs the calling sequence:

```
JSR    PRINT
BYT    "<string>",0
```

Note that the string constant must be terminated with a 0 byte.

To print the contents of a string variable you can use the PRTSTR routine. Type the statement:

```
JSR    PRTSTR
ADR    <string variable>
```

where <string variable> is the name of the string variable you wish to print.

Reading a string from the keyboard and storing it into a string variable is done by the RDSTR routine. RDSTR reads whatever data is present in the line input buffer up until a carriage return is detected. If the line buffer pointer is already pointing at a carriage return, a new line is read from the keyboard. The syntax for RDSTR is:

```
JSR    RDSTR
ADR    <string variable>
```

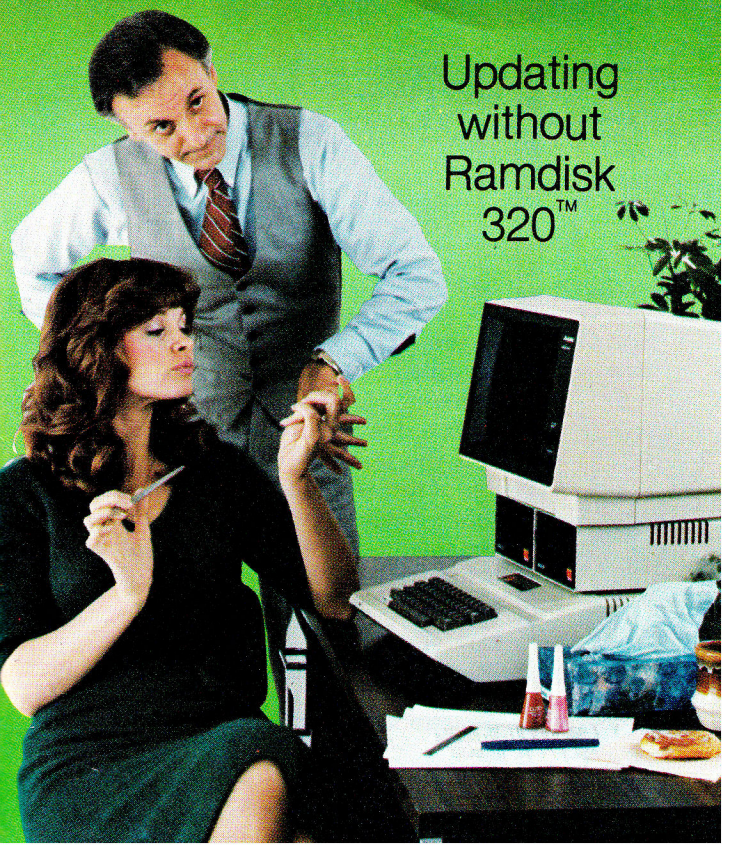
where <string variable> is the name of the string variable. If the string entered by the user is too large for the specified string the V flag is returned set; otherwise it is returned clear.

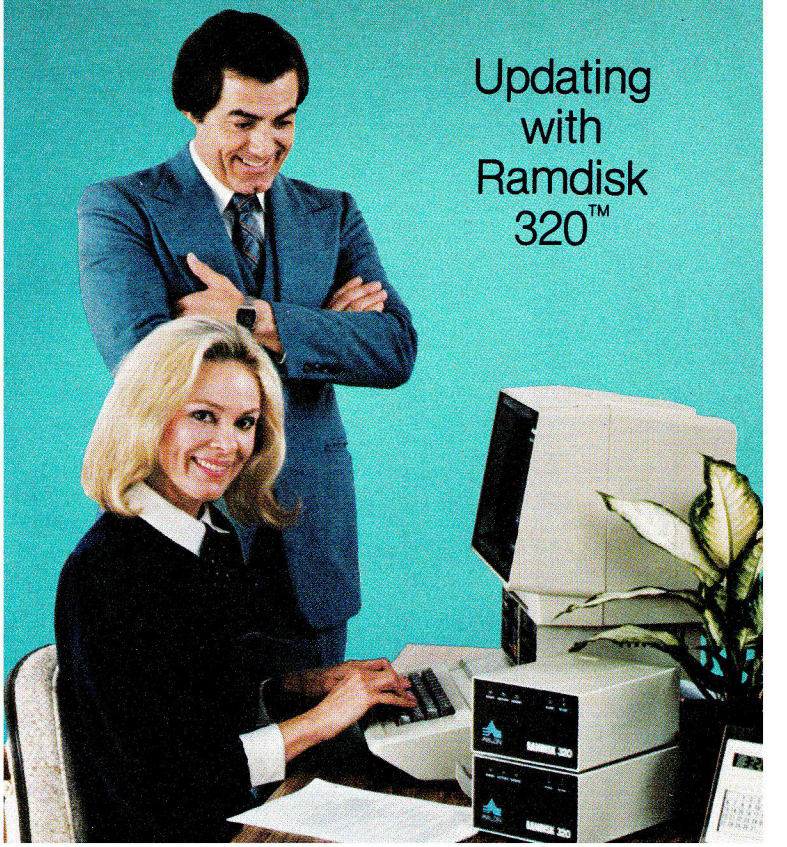
Additional Notes on Keyboard Input

The RDINT, RDSTR and READLN routines all work together in the SPEED/ASM environment. Some information on how they read data from the keyboard may be of help.

RDINT reads an integer from the current position in the line input buffer and leaves the line buffer pointer pointing at the first character beyond the integer read in. If the first character RDINT attempts to read is a carriage return, then RDINT first calls READLN to read a line of text from the keyboard.

RDSTR reads a string from the input buffer starting at the current index into the line buffer. The remainder of the line (up to the car-





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.....15 seconds

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Listing continued.

```
0800             98 ; IFx routines.
0800             99 ;
0800            100 ;
0800            101 ;
00BD            102 EQ      EQU "="
00A3            103 NE      EQU "#"
00BE            104 GT      EQU ">"
00BC            105 LT      EQU "<"
BDBE            106 GE      EQU ">"|"="*256
BDBC            107 LE      EQU "<"|"="*256
0800            108 ;
0800            109 ;
0800            110 ;
0800            111 ;
0800            112 ;
0800            113 ;
0800            114 ;
0800            115 *************************
0800            116 * SPEED/ASM ENTRY POINTS *
0800            117 *************************
0800            118 ;
0800            119 ;
0800            120 ;
0800            121 ;
0800            122 ; NOTE: THE EQUATE OF PUTC MUST
0800            123 ; BE CHANGED IF YOU RELOCATE
0800            124 ; SPEED/ASM TO SOME LOCATION
0800            125 ; OTHER THAN $7800
0800            126 ;
0800            127 ;
0800            128 ;
7800            129 PUTC    EQU $7800
7803            130 GETC    EQU PUTC+3
7806            131 SAGL    EQU GETC+3          ;FOR USE BY S/A ONLY- SEE DOC.
7809            132 SAPC    EQU SAGL+3          ; "   "   "   "   "   "   "
780C            133 HOME    EQU SAPC+3          ;HOME AND CLEAR
780F            134 READLN  EQU HOME+3
7812            135 INIT    EQU READLN+3
7815            136 FOR     EQU INIT+3
7818            137 FOR0    EQU FOR+3
781B            138 NEXT    EQU FOR0+3
781E            139 IFI     EQU NEXT+3
7821            140 IFI0    EQU IFI+3
7824            141 IFS     EQU IFI0+3
7827            142 IFS0    EQU IFS+3
782A            143 MOVE    EQU IFS0+3
782D            144 LOAD    EQU MOVE+3
7830            145 MOVS    EQU LOAD+3
7833            146 LDSTR   EQU MOVS+3
7836            147 PRINT   EQU LDSTR+3
7839            148 PRTSTR  EQU PRINT+3
783C            149 PRTINT  EQU PRTSTR+3
783F            150 RDSTR   EQU PRTINT+3
7842            151 RDINT   EQU RDSTR+3
7845            152 ONXGOTO EQU RDINT+3
7848            153 CASE    EQU ONXGOTO+3
784B            154 CASEI   EQU CASE+3
784E            155 INSET   EQU CASEI+3
7851            156 NOTINSET EQU INSET+3
7854            157 ABS     EQU NOTINSET+3
7857            158 NEG     EQU ABS+3
785A            159 MUL     EQU NEG+3
785D            160 DIV     EQU MUL+3
7860            161 MOD     EQU DIV+3
7863            162 RND     EQU MOD+3
7866            163 SUBSTR  EQU RND+3
7869            164 INDEX   EQU SUBSTR+3
786C            165 LENGTH  EQU INDEX+3
786F            166 CONCAT  EQU LENGTH+3
7872            167 GETWZPG EQU CONCAT+3        ;USED BY SPEED/ASM
7875            168 RDFP    EQU GETWZPG+3
7878            169 PRTE    EQU RDFP+3
787B            170 PRTF    EQU PRTE+3
787E            171 FADD    EQU PRTF+3
7881            172 FSUB    EQU FADD+3
7884            173 FMUL    EQU FSUB+3
7887            174 FDIV    EQU FMUL+3
788A            175 FLT     EQU FDIV+3
788D            176 FIX     EQU FLT+3
7890            177 FNEG    EQU FIX+3
7893            178 FADDIN  EQU FNEG+3
7896            179 FSUBIN  EQU FADDIN+3
7899            180 FTIMES  EQU FSUBIN+3
789C            181 FINTO   EQU FTIMES+3
789F            182 IFF     EQU FINTO+3
78A2            183 MOVFP   EQU IFF+3
0800            184 ;
0800            185 ;
0800            186 ;
0800            187         END

***** END OF ASSEMBLY

]brun sort
BRUN SORT
SYMBOL TABLE SORTED ALPHABETICALLY

  ABS     7854  ACH     0018  ACL     0017  AUXH    001C  AUXL    001B
```

Listing continued.

riage return) is read in and stored into the specified string. If the line buffer pointer was pointing at a carriage return when RDSTR was called, then a line of text is first read from the keyboard.

If you want to ensure that a fresh line of text is read from the keyboard before reading an integer or a string, you should call READLN *immediately* before calling RDSTR or RDINT. For example:

```
JSR   READLN
JSR   RDINT
ADR   INTGR
JSR   READLN
JSR   RDSTR
ADR   STRVAR
```

If it is inconvenient to call READLN immediately before calling RDINT or RDSTR (an example appears in the sample program, Listing 2), then store the value 0 into the SPEED/ASM GOTLN variable. (This variable is predefined in the SPEED/ASM equates.) By storing 0 (false) into GOTLN you can force the RDSTR and RDINT routines to read a new line of text the next time they are executed, such as:

```
LDA   #FALSE
STA   GOTLN
  .     .
  .     .
  .     .
JSR   RDSTR   ;A new line of text
              ;will automatically
ADR   STRING  ;be read from the
              ;keyboard.
```

String Comparisons Using IFS0 and IFS

The IFS and IFS0 routines compare two strings in SPEED/ASM. These routines are very similar to the IFI and IFI0 integer routines discussed earlier in this series. IFS compares two string variables, and IFS0 compares a string variable to a string constant.

Since IFS0 is used most often, I'll describe it first. The calling sequence is:

```
JSR   IFS0
ADR   <string variable>,<op>
BYT   "string constant",0
```

where <string variable> is the name of a properly declared string variable, "string constant" is the string you wish to compare the string vari-

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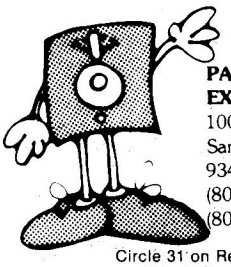

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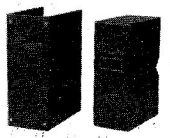

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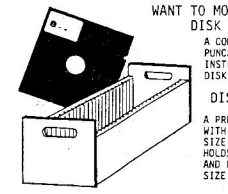

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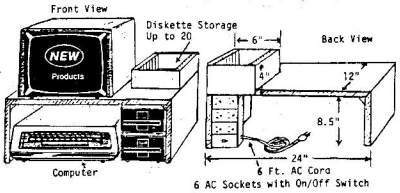

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Listing continued.

```
CASE     7848  CASEI    784B  CONCAT   786F  COUNT    0013  CR       008D
DESTADR  0005  DIGIT    000F  DIV      785D  EQ       00BD  FADD     787E
FADDIN   7893  FALSE    0000  FDIV     7887  FINTO    789C  FIX      788D
FLT      788A  FMUL     7884  FNEG     7890  FOR      7815  FOR0     7818
FORASAV  0000  FORXSAV  0001  FORYSAV  0002  FORZPG   0003  FSUB     7881
FSUBIN   7896  FTIMES   7899  GE       BDBE  GETC     7803  GETWZPG  7872
GOTLN    0014  GT       00BE  HOME     780C  IFF      789F  IFI      781E
IFI0     7821  IFS      7824  IFS0     7827  INDEX    7869  INIT     7812
INPUT    0200  INSET    784E  ISIMMED  0009  JMPADR   0011  LDSTR    7833
LE       BDBC  LEAD0    0010  LENGTH   786C  LINEINDX 0015  LOAD     782D
LT       00BC  MAXLEN   000C  MOD      7860  MOVE     782A  MOVFP    78A2
MOVS     7830  MUL      785A  NE       00A3  NEG      7857  NEXT     781B
NOTINSET 7851  ONXGOTO  7845  OP       000A  PRINT    7836  PROMPT   0033
PRTE     7878  PRTF     787B  PRTINT   783C  PRTSTR   7839  PTRADR   0007
PUTC     7800  RDFP     7875  RDINT    7842  RDSTR    783F  READLN   780F
RND      7863  RNDH     004F  RNDL     004E  SAGL     7806  SAPC     7809
SIGN     0016  STACK    0100  SUBSTR   7866  TRUE     0001  VALUE    000D
XINDH    001A  XINDL    0019

SYMBOL TABLE SORTED BY ADDRESS

FORASAV  0000  FALSE    0000  TRUE     0001  FORXSAV  0001  FORYSAV  0002
FORZPG   0003  DESTADR  0005  PTRADR   0007  ISIMMED  0009  OP       000A
MAXLEN   000C  VALUE    000D  DIGIT    000F  LEAD0    0010  JMPADR   0011
COUNT    0013  GOTLN    0014  LINEINDX 0015  SIGN     0016  ACL      0017
ACH      0018  XINDL    0019  XINDH    001A  AUXL     001B  AUXH     001C
PROMPT   0033  RNDL     004E  RNDH     004F  CR       008D  NE       00A3
LT       00BC  EQ       00BD  GT       00BE  STACK    0100  INPUT    0200
PUTC     7800  GETC     7803  SAGL     7806  SAPC     7809  HOME     780C
READLN   780F  INIT     7812  FOR      7815  FOR0     7818  NEXT     781B
IFI      781E  IPI0     7821  IFS      7824  IFS0     7827  MOVE     782A
LOAD     782D  MOVS     7830  LDSTR    7833  PRINT    7836  PRTSTR   7839
PRTINT   783C  RDSTR    783F  RDINT    7842  ONXGOTO  7845  CASE     7848
CASEI    784B  INSET    784E  NOTINSET 7851  ABS      7854  NEG      7857
MUL      785A  DIV      785D  MOD      7860  RND      7863  SUBSTR   7866
INDEX    7869  LENGTH   786C  CONCAT   786F  GETWZPG  7872  RDFP     7875
PRTE     7878  PRTF     787B  FADD     787E  FSUB     7881  FMUL     7884
FDIV     7887  FLT      788A  FIX      788D  FNEG     7890  FADDIN   7893
FSUBIN   7896  FTIMES   7899  FINTO    789C  IFF      789F  MOVFP    78A2
LE       BDBC  GE       BDBE
```

able to, and <op> is any of the following SPEED/ASM comparisons:

```
EQ    ;Equal
NE    ;Not equal
LT    ;Less than
GT    ;Greater than
LE    ;Less than or equal
GE    ;Greater than or equal
```

These symbolic values are provided in the SPEED/ASM equates, Listing 1.

Upon return from the IFS0 routine the 6502 zero flag is set and the accumulator contains 0 if the comparison was *not* true. If the comparison *was* true, the zero flag is returned clear and the accumulator contains 1. This feature allows you to use LISA's BTR and BFL branches to test the comparison.

The IFS routine is used to compare two SPEED/ASM string variables. The calling sequence is:

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JSR IFS
ADR <str1>,<op>,<str2>

where <str1> and <str2> are two SPEED/ASM variables that are to be compared to one another and <op> is any of the operators listed in the previous paragraph. Examples of IFS and IFS0 appear in Listing 2.

SPEED/ASM supports four string functions: SUBSTR, INDEX, LENGTH and CONCAT. These four functions provide the basic string manipulations required by most programs.

LENGTH determines the current *dynamic* length of a string—that is, the number of characters *currently* stored in the string variable. To call LENGTH use:

JSR LENGTH
ADR <string>

where <string> is the name of the string variable whose length you wish

Listing 2. String examples.

```
0800            1          TTL "Listing two: String Examples"
0800            2  ;
0800            3  ;
0800            4  ;
0800            5  ***********************************
0800            6  *                                 *
0800            7  *  LISTING 2: An example of      *
0800            8  *  the various SPEED/ASM string  *
0800            9  *  handling routines.            *
0800           10  *                                 *
0800           11  ***********************************
0800           12  ;
0800           13  ;
0800           14  ;
0800           15  ;
0800           16  ;
0800           17  ;
0800           18  ;
0800           19  ;
0800           20  ; GENERAL PURPOSE EQUATES
0800           21  ;
0800           22  ; The following variables are used
0800           23  ; by the SPEED/ASM package and
0800           24  ; shouldn't be used by the SPEED/ASM
0800           25  ; programmer.
0800           26  ;
0800           27  ;
0800           28  ;
0800           29  ;
0000           30  FORASAV  EPZ 0
0001           31  FORXSAV  EPZ FORASAV+1
0002           32  FORYSAV  EPZ FORXSAV+1
0003           33  FORZPG   EPZ FORYSAV+1
0005           34  DESTADR  EPZ FORZPG+2
0007           35  PTRADR   EPZ DESTADR+2
0009           36  ISIMMED  EPZ PTRADR+2
000A           37  OP       EPZ ISIMMED+1
000C           38  MAXLEN   EPZ OP+2
```

Listing continued.

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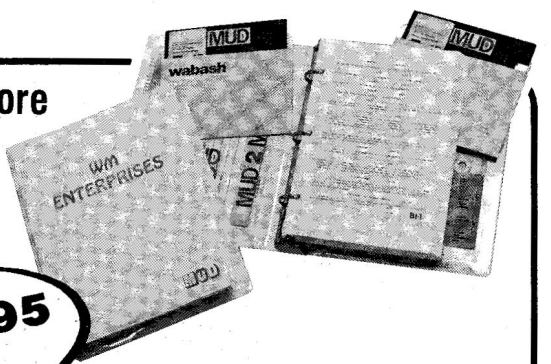

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Listing continued.

```
000D            39  VALUE    EPZ MAXLEN+1
000F            40  DIGIT    EPZ VALUE+2
0010            41  LEAD0    EPZ DIGIT+1
0011            42  JMPADR   EPZ LEAD0+1
0013            43  COUNT    EPZ JMPADR+2
0014            44  GOTLN    EPZ COUNT+1
0800            45  ;
0800            46  ;
0800            47  ;
0800            48  ;
0800            49  ;
0800            50  ;
0800            51  *************
0800            52  * CONSTANTS *
0800            53  *************
0800            54  ;
0800            55  ;
0800            56  ;
0800            57  ; The following symbols are constants
0800            58  ; for the values "FALSE", "TRUE", and
0800            59  ; Carriage Return (respectively).
0800            60  ;
0800            61  ; These symbols should only appear
0800            62  ; as immediate operands to a 6502
0800            63  ; instruction or in the operand field
0800            64  ; of a pseudo-opcode like BYT.
0800            65  ;
0800            66  ;
0800            67  ;
0800            68  ;
0800            69  ;
0000            70  FALSE    EQU 0
0001            71  TRUE     EQU 1
008D            72  CR       EQU $8D
0800            73  ;
0800            74  ;
0800            75  ;
0800            76  ;
0800            77  ;
0800            78  ;
0800            79  ; "IF" STATEMENT EQUATES
0800            80  ;
0800            81  ; The following symbols should only
0800            82  ; be used in the ADR pseudo-opcode
0800            83  ; following a call to the SPEED/ASM
0800            84  ; IFx routines.
0800            85  ;
0800            86  ;
0800            87  ;
00BD            88  EQ       EQU "="
00A3            89  NE       EQU "#"
00BE            90  GT       EQU ">"
00BC            91  LT       EQU "<"
BDBE            92  GE       EQU ">"|"="*256
BDBC            93  LE       EQU "<"|"="*256
0800            94  ;
0800            95  ;
0800            96  ;
0800            97  ;
0800            98  ;
0800            99  ;
0800           100  ;
0800           101  ************************
0800           102  * SPEED/ASM ENTRY POINTS *
0800           103  ************************
0800           104  ;
0800           105  ;
0800           106  ;
0800           107  ;
0800           108  ; NOTE: THE EQUATE OF PUTC MUST
0800           109  ; BE CHANGED IF YOU RELOCATE
0800           110  ; SPEED/ASM TO SOME LOCATION
0800           111  ; OTHER THAN $7800
0800           112  ;
0800           113  ;
0800           114  ;
7800           115  PUTC     EQU $7800
7803           116  GETC     EQU PUTC+3
7806           117  SAGL     EQU GETC+3          ;FOR USE BY S/A ONLY- SEE DOC.
7809           118  SAPC     EQU SAGL+3          ;  "   "   "   "    "   "
780C           119  HOME     EQU SAPC+3          ;HOME AND CLEAR
780F           120  READLN   EQU HOME+3
7812           121  INIT     EQU READLN+3
7815           122  FOR      EQU INIT+3
7818           123  FOR0     EQU FOR+3
781B           124  NEXT     EQU FOR0+3
781E           125  IFI      EQU NEXT+3
7821           126  IFI0     EQU IFI+3
7824           127  IFS      EQU IFI0+3
7827           128  IFS0     EQU IFS+3
782A           129  MOVE     EQU IFS0+3
782D           130  LOAD     EQU MOVE+3
7830           131  MOVS     EQU LOAD+3
7833           132  LDSTR    EQU MOVS+3
7836           133  PRINT    EQU LDSTR+3
7839           134  PRTSTR   EQU PRINT+3
783C           135  PRTINT   EQU PRTSTR+3
783F           136  RDSTR    EQU PRTINT+3
```

Listing continued.

to find. Since the maximum length of a string is 255 characters (which fits into 1 byte) the length is returned in the 6502 accumulator. This enables you to easily compare the length to an immediate value like:

```
JSR   LENGTH
ADR   STRING
CMP   #55
BGE   STRGE55
```

If you want to store this value into a SPEED/ASM variable, you should store the accumulator into the low-order byte of the SPEED/ASM variable and store 0 into the high-order byte of the SPEED/ASM variable, as in this sequence:

```
JSR   LENGTH
ADR   STRING
STA   STRLEN
LDA   #0
STA   STRLEN+1
```

> **"The SUBSTR routine extracts a portion of a string and stores this substring into another string variable."**

Note that the LENGTH routine returns the current dynamic length of the specified string. If you're interested in obtaining the maximum length of the string, simply load the accumulator with the first location of the string. For example:

```
LDA STRING ;Fetches maximum length of
           ;string.
```

The SUBSTR routine extracts a portion of a string and stores this substring into another string variable. The calling sequence for SUBSTR is:

```
JSR   SUBSTR
ADR   <source>,<index>,
      <length>,<destination>
```

where <source> is the name of the source string, <index> is the name of a SPEED/ASM integer variable containing an index into the string where the first character of the substring begins, <length> is the name

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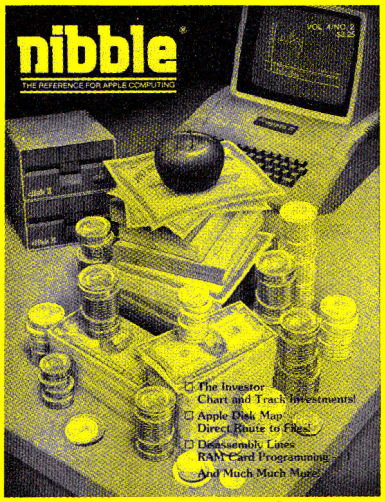

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Listing continued.

```
7842                137  RDINT     EQU RDSTR+3
7845                138  ONXGOTO   EQU RDINT+3
7848                139  CASE      EQU ONXGOTO+3
784B                140  CASEI     EQU CASE+3
784E                141  INSET     EQU CASEI+3
7851                142  NOTINSET  EQU INSET+3
7854                143  ABS       EQU NOTINSET+3
7857                144  NEG       EQU ABS+3
785A                145  MUL       EQU NEG+3
785D                146  DIV       EQU MUL+3
7860                147  MOD       EQU DIV+3
7863                148  RND       EQU MOD+3
7866                149  SUBSTR    EQU RND+3
7869                150  INDEX     EQU SUBSTR+3
786C                151  LENGTH    EQU INDEX+3
786F                152  CONCAT    EQU LENGTH+3
0800                153  ;
0800                154  ;
0800                155  ;
0800                156  ;
0800                157  ****************************
0800                158  ;
0800                159  ;
0800                160  ; Begin of program 1.2.
0800                161  ;
FF69                162  EXIT      EQU $FF69
0800                163  ;
0800                164  ;
0800 20 12 78       165  START     JSR INIT            ;Always do this first!
0803                166  ;
0803                167  ;
0803 20 0C 78       168           JSR HOME
0806 20 36 78       169           JSR PRINT
0809 8D 8D D3       170           BYT CR,CR,"SPEED/ASM String Routine Examples",CR,CR,0
080C D0 C5 C5
080F C4 AF C1
0812 D3 CD A0
0815 D3 F4 F2
0818 E9 EE E7
081B A0 D2 EF
081E F5 F4 E9
0821 EE E5 A0
0824 C5 F8 E1
0827 ED F0 EC
082A E5 F3 8D
082D 8D 00
082F                171  ;
082F                172  ;
082F                173  **********************************
082F                174  *
082F                175  * The following call to PRTSTR
082F                176  * outputs a string that was pre-
082F                177  * initialized by LISA.
082F                178  *
082F                179  **********************************
082F                180  ;
082F                181  ;
082F                182  ;
082F 20 39 78       183           JSR PRTSTR
0832 F2 0B          184           ADR STRVAR1
0834 A9 8D          185           LDA #CR
0836 20 00 78       186           JSR PUTC
0839                187  ;
0839                188  ;
0839                189  **********************************
0839                190  *
0839                191  * The following section of code
0839                192  * reads a new line of text from
0839                193  * the keyboard and stuffs it into
0839                194  * the STRVAR2 variable.  If the
0839                195  * string was too long, the V flag
0839                196  * is returned set and the user is
0839                197  * prompted to re-enter the data.
0839                198  *
0839                199  **********************************
0839                200  ;
0839                201  ;
0839 20 0F 78       202  ENTERSTR  JSR READLN          ;Force a new line from the kbd
083C 20 3F 78       203           JSR RDSTR
083F 13 0C          204           ADR STRVAR2
0841 50 28          205           BVC GOODSTR         ;If no error.
0843                206  ;
0843 20 36 78       207           JSR PRINT
0846 8D C5 F2       208           BYT CR,"Error: String too long",CR
0849 F2 EF F2
084C BA A0 D3
084F F4 F2 E9
0852 EE E7 A0
0855 F4 EF EF
0858 A0 EC EF
085B EE E7 8D
085E D2 E5 E5       209           BYT "Reenter: ",0
0861 EE F4 E5
0864 F2 BA A0
0867 00
0868 4C 39 08       210           JMP ENTERSTR
086B                211  ;
086B                212  ;
086B                213  ; Print the string the user just entered.
```

Listing continued.

of a SPEED/ASM variable that contains the length of the substring to be extracted, and <destination> is the name of the string where the substring is to be stored. It is important to reiterate that <index> and <length> are the names of SPEED/ASM variables that contain the respective values, not simply the values themselves. If you try to place the value in the position for the index or length parameters, strange things will happen.

> **"If you try to place the value in the position for the index or length parameters, strange things will happen."**

If the substring you extract from the source string is too large to fit in the destination string, SUBSTR returns the V flag set; otherwise the V flag is returned clear. An example of the SUBSTR routine appears in Listing 2.

The INDEX routine lets you check if one string can be found within a larger one. That is, if one string is a substring of another, INDEX returns a value giving you the index of the source string within the second string. The syntax for using INDEX is:

```
JSR   INDEX
ADR   <key>,<source>
```

where <key> is the string you want to search for in the <source> string. If the string is found, the index into <source> is returned in the 6502 accumulator. If <key> is not present in <source>, then 0 is returned in the accumulator. Listing 2 includes some examples of how to use INDEX.

The final SPEED/ASM string manipulation routine is CONCAT. As you will surmise, it concatenates two strings. The calling sequence is:

```
JSR   CONCAT
ADR   <SRC1>,<SRC2>,<DEST>
```

where <SRC1> and <SRC2> are the two source strings to be concatenated

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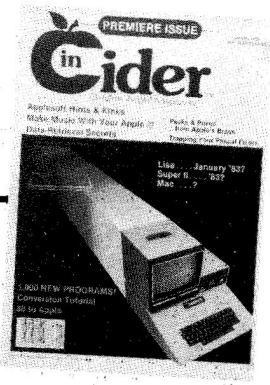

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and <DEST> is the destination string where the result is to be stored. <DEST> should not be the same string as <SRC1> or <SRC2>. If the concatenated result is too large to fit into the destination string, it is truncated and CONCAT returns with the V flag set. If the concatenation was performed correctly the V flag is returned clear. Examples of CONCAT appear in Listing 2.

Putting It All Together

This month's example program (Listing 3) is the beginning of a simple database/mailing list program using all the SPEED/ASM constructs I've presented up to this point. I'll expand on this program next month, so if it seems rather incomplete that's only because it is.

I have now surveyed all the string handling routines provided by the SPEED/ASM package. While these routines provide most of the capabilities you'll require, some "pure" 6502 code is often necessary to make a program run smoothly. Next month, I'll describe the 6502 indexed and indirect addressing modes so you'll have all the string capabilities you could possibly want. ■

Listing continued.

```
086B                    214  ;
086B 20 39 78           215  GOODSTR  JSR PRTSTR
086E 13 0C              216           ADR STRVAR2
0870                    217  ;
0870                    218  ;
0870                    219  *********************************
0870                    220  *
0870                    221  * The following section of code
0870                    222  * loads STRVAR3 with a string
0870                    223  * constant ("This is a string")
0870                    224  * and then copies the STRVAR3
0870                    225  * variable into STRVAR4.  After
0870                    226  * all the loading and copying is
0870                    227  * performed, the contents of the
0870                    228  * strings are displayed.
0870                    229  *
0870                    230  *********************************
0870                    231  ;
0870                    232  ;
0870                    233  ;
0870                    234  ; First demonstrate that the strings
0870                    235  ; contain nothing.
0870                    236  ;
0870 20 36 78           237           JSR PRINT
0873 8D D3 D3 D4        238           BYT CR,"STRVAR3 contains """,0
0876 D2 D6 C1
0879 D2 B3 A0
087C E3 EF EE
087F F4 E1 E9
0882 EE F3 A0
0885 A2 00
0887 20 39 78           239           JSR PRTSTR
088A 95 0C              240           ADR STRVAR3
088C 20 36 78           241           JSR PRINT
088F A2 8D D3           242           BYT """",CR,"STRVAR4 contains """,0
0892 D4 D2 D6
0895 C1 D2 B4
0898 A0 E3 EF
089B EE F4 E1
089E E9 EE F3
08A1 A0 A2 00
08A4 20 39 78           243           JSR PRTSTR
08A7 B5 0C              244           ADR STRVAR4
08A9                    245  ;
08A9                    246  ; Now initialize them with LDSTR and MOVS
08A9                    247  ;
08A9                    248  ;
08A9 20 36 78           249           JSR PRINT
08AC 8D D5 F3           250           BYT CR,"Using LDSTR to initialize STRVAR3",CR,0
08AF E9 EE E7
08B2 A0 CC C4
08B5 D3 D4 D2
08B8 A0 F4 EF
08BB A0 E9 EE
08BE E9 F4 E9
08C1 E1 BC E9
08C4 FA E5 A0
08C7 D3 D4 D2
08CA D6 C1 D2
08CD D3 D4 D2
08D0 D6 C1 D2
08D3 B3 8D 00
08D0 20 33 78           251           JSR LDSTR
08D3 95 0C              252           ADR STRVAR3
08D5 D4 B8 E9           253           BYT "This is a string",0
08D8 F3 A0 E9
08DB F3 A0 E1
08DE A0 F3 F4
08E1 F2 E9 EE
08E4 E7 00
08E6                    254  ;
08E6                    255  ;
08E6                    256  ; Print STRVAR3 and STRVAR4 to show
08E6                    257  ; that they are indeed different.
08E6                    258  ;
08E6 20 36 78           259           JSR PRINT
08E9 8D D3 D3 D4        260           BYT CR,"STRVAR3 contains """,0
08EC D2 D6 C1
08EF D2 B3 A0
08F2 E3 EF EE
08F5 F4 E1 E9
08F8 EE F3 A0
08FB A2 00
08FD 20 39 78           261           JSR PRTSTR
0900 95 0C              262           ADR STRVAR3
0902 20 36 78           263           JSR PRINT
0905 A2 8D D3           264           BYT """",CR,"STRVAR4 contains """,0
0908 D4 D2 D6
090B C1 D2 B4
090E A0 E3 EF
0911 EE F4 E1
0914 E9 EE F3
0917 A0 A2 00
091A 20 39 78           265           JSR PRTSTR
091D B5 0C              266           ADR STRVAR4
091F                    267  ;
```

Listing continued.

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Circle 88 on Reader Service card.

Listing continued.

```
091F                    268  ;
091F                    269  ; Now copy SIRVAR3 into SIRVAR4 and
091F                    270  ; print the two strings to show
091F                    271  ; that they are now the same.
091F                    272  ;
091F                    273  ;
091F 20 36 78           274          JSR PRINT
0922 8D 8D D5           275          BYT CR,CR,"Using MOVS to copy SIRVAR3
                                     into SIRVAR4",CR,0
0925 F3 E9 EE
0928 E7 A0 CD
092B CF D6 D3
092E A0 F4 EF
0931 A0 E3 EF
0934 F0 F9 A0
0937 D3 D4 D2
093A D6 C1 D2
093D B3 A0 E9
0940 EE F4 EF
0943 A0 D3 D4
0946 D2 D6 C1
0949 D2 B4 8D
094C B3 A0 E9
094F EE F4 EF
0952 A0 D3 D4
0955 D2 D6 C1
0958 D2 B4 8D
095B 00
094D 20 30 78           276          JSR MOVS
0950 95 0C B5           277          ADR SIRVAR3,SIRVAR4
0953 0C
0954                    278  ;
0954                    279  ;
0954 20 36 78           280          JSR PRINT
095/ 8D D3 D4           281          BYT CR,"SIRVAR3 contains """,0
095A D2 D6 C1
095D D2 E3 A0
0960 E3 EF EE
0963 F4 E1 E9
0966 EE F3 A0
0969 A2 00
096B 20 39 78           282          JSR PRTSTR
096E 95 0C              283          ADR SIRVAR3
0970 20 36 78           284          JSR PRINT
0973 A2 8D D3           285          BYT """",CR,"SIRVAR4 contains """,0
0976 D4 D2 D6
0979 C1 D2 B4
097C A0 E3 EF
097F EE F4 E1
0982 E9 EE F3
0985 A0 A2 00
0988 20 39 78           286          JSR PRTSTR
098B B5 0C              287          ADR SIRVAR4
098D                    288  ;
098D                    289  ;
098D                    290  ;
098D                    291  **********************************
098D                    292  *
098D                    293  * The following section of code
098D                    294  * demonstrates the IFS0 routine.
098D                    295  * It compares the contents of
098D                    296  * SIRVAR3 to the literal "XXXXX"
098D                    297  *
098D                    298  **********************************
098D                    299  ;
098D                    300  ;
098D 20 36 78           301          JSR PRINT
0990 A2 8D 8D           302          BYT """",CR,CR,"SIRVAR3 is ",0
0993 D3 D4 D2
0996 D6 C1 D2
0999 E3 A0 E9
099C F3 A0 00
099F 20 27 78           303          JSR IFS0
09A2 95 0C BD           304          ADR SIRVAR3,EQ
09A5 00
09A6 D8 D8 D8           305          BYT "XXXXX",0
09A9 D8 D8 00
09AC F0 08              306          BFL >0
09AE A9 BD              307          LDA #"="
09B0 20 00 78           308          JSR PUTC
09B3 4C BC 09           309          JMP TESTDONE
09B6                    310  ;
09B6 20 36 78           311  ^0      JSR PRINT
09B9 BC BE 00           312          BYT "<>",0
09BC                    313  ;
09BC 20 36 78           314  TESTDONE JSR PRINT
09BF A0 A2 D8           315          BYT " ""XXXXX""",CR,0
09C2 D8 D8 D8
09C5 D8 A2 8D
09C8 00
09C9                    316  ;
09C9                    317  ;
09C9                    318  **********************************
09C9                    319  *
09C9                    320  * This section of code demon-
09C9                    321  * strates the IFS routine.  It
09C9                    322  * loads SIRVAR4 with the string
09C9                    323  * literal "This is also a string"
09C9                    324  * and compares it to SIRVAR3.
09C9                    325  *
09C9                    326  **********************************
09C9                    327  ;
09C9                    328  ;
09C9                    329  ; Load SIRVAR4 with "This is also a string"
09C9                    330  ;
09C9                    331  ;
09C9 20 33 78           332          JSR LDSTR
09CC B5 0C              333          ADR SIRVAR4
09CE D4 E8 E9           334          BYT "This is also a string",0
09D1 F3 A0 E9
09D4 F3 A0 E1
09D7 EC F3 EF
09DA A0 E1 A0
09DD F3 F4 F2
09E0 E9 EE E7
09E3 00
09E4                    335  ;
09E4                    336  ; Print the contents of the two
09E4                    337  ; strings.
09E4                    338  ;
09E4                    339  ;
09E4 20 36 78           340          JSR PRINT
09E7 8D 8D D3           341          BYT CR,CR,"SIRVAR3 contains: """,0
09EA D4 D2 D6
09ED C1 D2 E3
09F0 A0 E3 EF
09F3 EE F4 E1
09F6 E9 EE F3
09F9 BA A0 A2
09FC 00
09FD 20 39 78           342          JSR PRTSTR
0A00 95 0C              343          ADR SIRVAR3
0A02 20 36 78           344          JSR PRINT
0A05 A2 8D D3           345          BYT """",CR,"SIRVAR4 contains: """,0
0A08 D4 D2 D6
0A0B C1 D2 B4
0A0E A0 E3 EF
0A11 EE F4 E1
0A14 E3
0A1B 20 39 78           346          JSR PRTSTR
0A1E B5 0C              347          ADR SIRVAR4
0A20                    348  ;
0A20 20 36 78           349          JSR PRINT
0A23 A2 8D 00           350          BYT """",CR,0
0A26                    351  ;
0A26                    352  ;
0A26                    353  ; Compare the two strings and see
0A26                    354  ; if they are equal.
0A26                    355  ;
0A26                    356  ;
0A26 20 24 78           357          JSR IFS
0A29 95 0C BD           358          ADR SIRVAR3,EQ,SIRVAR4
0A2C 00 B5 0C
0A2F F0 16              359          BFL >0
0A31 20 36 78           360          JSR PRINT
0A34 8D D3 D4           361          BYT CR,"SIRVAR3 = SIRVAR4",0
0A37 D2 D6 C1
0A3A D2 E3 A0
0A3D BD A0 D3
0A40 D4 D2 D6
0A43 C1 D2 B4
0A46 00
0A47                    362  ;
0A47                    363  ; Compare the two strings and see
0A47                    364  ; if they are not equal.
0A47                    365  ;
0A47                    366  ;
0A47 20 24 78           367  ^0      JSR IFS
0A4A 95 0C A3           368          ADR SIRVAR3,NE,SIRVAR4
0A4D 00 B5 0C
0A50 F0 17              369          BFL >1
0A52 20 36 78           370          JSR PRINT
0A55 8D D3 D4           371          BYT CR,"SIRVAR3 <> SIRVAR4",0
0A58 D2 D6 C1
0A5B D2 E3 A0
0A5E BC BE A0
0A61 D3 D4 D2
0A64 D6 C1 D2
0A67 B4 00
0A69                    372  ;
0A69                    373  ;
0A69                    374  ; Compare the two strings to see
0A69                    375  ; if SIRVAR3 < SIRVAR4.
0A69                    376  ;
0A69 20 24 78           377  ^1      JSR IFS
0A6C 95 0C BC           378          ADR SIRVAR3,LT,SIRVAR4
0A6F 00 B5 0C
0A72 F0 16              379          BFL >2
0A74 20 36 78           380          JSR PRINT
0A77 8D D3 D4           381          BYT CR,"SIRVAR3 < SIRVAR4",0
0A7A D2 D6 C1
0A7D D2 E3 A0
0A80 BC A0 D3
0A83 D4 D2 D6
0A86 C1 D2 B4
0A89 00
0A8A                    382  ;
0A8A                    383  ;
0A8A                    384  ; Check for SIRVAR3 <= SIRVAR4
0A8A                    385  ;
0A8A 20 24 78           386  ^2      JSR IFS
0A8D 95 0C BC           387          ADR SIRVAR3,LE,SIRVAR4
0A90 BD B5 0C
0A93 F0 17              388          BFL >3
0A95 20 36 78           389          JSR PRINT
```

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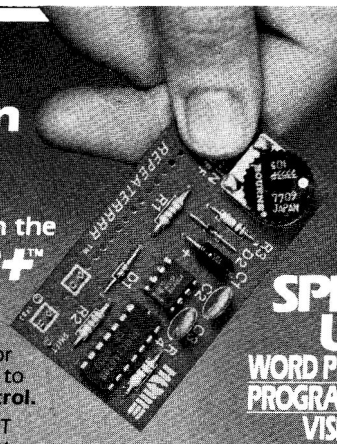

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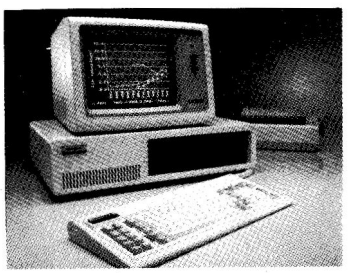

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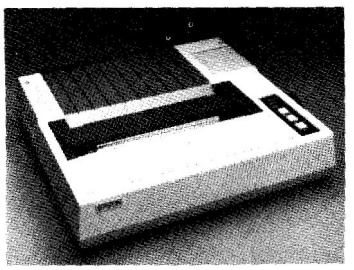

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Listing continued.

```
0A98 8D D3 D4   390          BYT CR,"SIRVAR3 <= SIRVAR4",0
0A9B D2 D6 C1
0A9E D2 B3 A0
0AA1 BC BD A0
0AA4 D3 D4 D2
0AA7 D6 C1 D2
0AAA B4 00
0AAC            391 ;
0AAC            392 ;
0AAC            393 ;
0AAC            394 ; Check to see if SIRVAR3 > SIRVAR4.
0AAC            395 ;
0AAC 20 24 78   396 ^3       JSR IFS
0AAF 95 0C BE   397          ADR SIRVAR3,GT,SIRVAR4
0AB2 00 B5 0C
0AB5 F0 16      398          BFL >4
0AB7 20 36 78   399          JSR PRINT
0ABA 8D D3 D4   400          BYT CR,"SIRVAR3 > SIRVAR4",0
0ABD D2 D6 C1
0AC0 D2 B3 A0
0AC3 BE A0 D3
0AC6 D4 D2 D6
0AC9 C1 D2 B4
0ACC 00
0ACD            401 ;
0ACD            402 ;
0ACD            403 ;
0ACD            404 ; Is SIRVAR3 >= SIRVAR4?
0ACD            405 ;
0ACD 20 24 78   406 ^4       JSR IFS
0AD0 95 0C BE   407          ADR SIRVAR3,GE,SIRVAR4
0AD3 BD B5 0C
0AD6 F0 17      408          BFL >5
0AD8 20 36 78   409          JSR PRINT
0ADB 8D D3 D4   410          BYT CR,"SIRVAR3 >= SIRVAR4",0
0ADE D2 D6 C1
0AE1 D2 B3 A0
0AE4 BE BD A0
0AE7 D3 D4 D2
0AEA D6 C1 D2
0AED B4 00
0AEF            411 ;
0AEF A9 8D      412 ^5       LDA #CR
0AF1 20 00 78   413          JSR PUTC
0AF4            414 ;
0AF4            415 ;
0AF4            416 ;
0AF4            417 ;
0AF4            418 ***********************************
0AF4            419 *
0AF4            420 * Demonstrate the LENGTH routine
0AF4            421 *
0AF4            422 ***********************************
0AF4            423 ;
0AF4            424 ;
0AF4 20 6C 78   425          JSR LENGTH
0AF7 13 0C      426          ADR SIRVAR2
0AF9 8D 17 0D   427          STA LENSIR2
0AFC A9 00      428          LDA #0
0AFE 8D 18 0D   429          STA LENSIR2+1
0B01 20 36 78   430          JSR PRINT
0B04 D4 E8 E5   431          BYT "The length of SIRVAR2 is ",0
0B07 A0 EC E5
0B0A EE E7 F4
0B0D E8 A0 EF
0B10 B6 A0 D3
0B13 D4 D2 D6
0B16 C1 D2 B2
0B19 A0 E9 F3
0B1C A0 00
0B1E 20 3C 78   432          JSR PRTINT
0B21 17 0D      433          ADR LENSIR2
0B23            434 ;
0B23            435 ;
0B23            436 ;
0B23 A9 8D      437          LDA #CR
0B25 20 00 78   438          JSR PUTC
0B28            439 ;
0B28            440 ;
0B28            441 ;
0B28            442 ;
0B28            443 ***********************************
0B28            444 *
0B28            445 * The following code demonstrates
0B28            446 * the use of the SPEED/ASM SUBSTR
0B28            447 * routine.
0B28            448 *
0B28            449 *  This code emulates the BASIC
0B28            450 * statements:
0B28            451 *
0B28            452 *
0B28            453 * 10 FOR I = 1 TO 10
0B28            454 * 20 J = 6-I
0B28            455 * 30 PRINT MID$(A$,I,J)
0B28            456 * 40 PRINT MID$(A$,1,I)
0B28            457 * 50 NEXT I
0B28            458 *
0B28 20 18 78   459          JSR FOR0
0B2B 13 0D 01   460          ADR I,1,5
0B2E 00 05 00
0B31            461 ;
0B31 38         462          SEC
0B32 A9 06      463          LDA #6
0B34 ED 13 0D   464          SBC I
```

Listing continued.

Listing continued.

```
0B37 8D 15 0D   465          STA J
0B3A A9 00      466          LDA /6
0B3C ED 14 0D   467          SBC I+1
0B3F 8D 16 0D   468          STA J+1
0B42            469  ;
0B42 20 66 78   470          JSR SUBSTR
0B45 95 0C 13   471          ADR STRVAR3,I,J,STRVAR4
0B48 0D 15 0D
0B4B B5 0C
0B4D 20 39 78   472          JSR PRTSTR
0B50 B5 0C      473          ADR STRVAR4
0B52 A9 8D      474          LDA #CR
0B54 20 00 78   475          JSR PUTC
0B57            476  ;
0B57 20 66 78   477          JSR SUBSTR
0B5A 95 0C F0   478          ADR STRVAR3,ONE,I,STRVAR4
0B5D 0B 13 0D
0B60 B5 0C
0B62 20 39 78   479          JSR PRTSTR
0B65 B5 0C      480          ADR STRVAR4
0B67            481  ;
0B67 A9 8D      482          LDA #CR
0B69 20 00 78   483          JSR PUTC
0B6C 20 1B 78   484          JSR NEXT
0B6F            485  ;
0B6F            486  ;
0B6F            487  ;
0B6F            488  **********************************
0B6F            489  *
0B6F            490  * Test the INDEX routine:  This
0B6F            491  * code loads STRVAR4 with the
0B6F            492  * string "string" and searches for
0B6F            493  * "string" within STRVAR3.
0B6F            494  *
0B6F            495  **********************************
0B6F            496  ;
0B6F            497  ;
0B6F 20 33 78   498          JSR LDSTR
0B72 B5 0C      499          ADR STRVAR4
0B74 F3 F4 F2   500          BYT "string",0
0B77 E9 EE E7
0B7A 00
0B7B            501  ;
0B7B 20 69 78   502          JSR INDEX
0B7E B5 0C 95   503          ADR STRVAR4,STRVAR3
0B81 0C
0B82            504  ;
0B82 8D 19 0D   505          STA STRINDX         ;Store L.O. index
                                                  into STRINDX
0B85 A9 00      506          LDA #0              ;Set H.O. byte of
                                                  index to zero
0B87 8D 1A 0D   507          STA STRINDX+1
0B8A            508  ;
0B8A            509  ; Print the results:
0B8A            510  ;
0B8A 20 36 78   511          JSR PRINT
0B8D 8D 8D A2   512          BYT CR,CR,""string"" was found at
                             position: ",0
0B90 F3 F4 F2
0B93 E9 EE E7
0B96 A2 A0 F7
0B99 E1 F3 A0
0B9C B6 EF F5
0B9F EE E4 A0
0BA2 E9 F4 E9
0BA5 EF EE BA
0BA8 A0 00
0BB0 20 3C 78   513          JSR PRTINT
0BB3 19 0D      514          ADR STRINDX
0BB5 A9 8D      515          LDA #CR
0BB7 20 00 78   516          JSR PUTC
0BBA            517  ;
0BBA            518  ;
0BBA            519  **********************************
0BBA            520  *
0BBA            521  * Demonstrate the CONCAT routine.
0BBA            522  *
0BBA            523  *  This code concatenates STRVAR4
0BBA            524  * (which contains "string") to
0BBA            525  * STRVAR3 and prints the result.
0BBA            526  *
0BBA            527  **********************************
0BBA            528  ;
0BBA            529  ;
0BBA 20 6F 78   530          JSR CONCAT
0BBD 95 0C B5   531          ADR STRVAR3,STRVAR4,STRVAR5
0BC0 0C D5 0C
0BC3            532  ;
0BC3 20 36 78   533          JSR PRINT
0BC6 8D C3 CF   534          BYT CR,"CONCAT(STRVAR3,STRVAR4)= """,0
0BC9 CE C3 C1
0BCC D4 A8 D3
0BCF D4 D2 D6
0BD2 C1 D2 E3
0BD5 AC D3 D4
0BD8 D2 D6 C1
0BDB D2 B4 A9
0BDE BD A0 A2
0BE1 00
0BE2 20 39 78   535          JSR PRTSTR
0BE5 D5 0C      536          ADR STRVAR5
0BE7            537  ;
0BE7 20 36 78   538          JSR PRINT
0BEA A2 8D 00   539          BYT """",CR,0
```

Listing continued.

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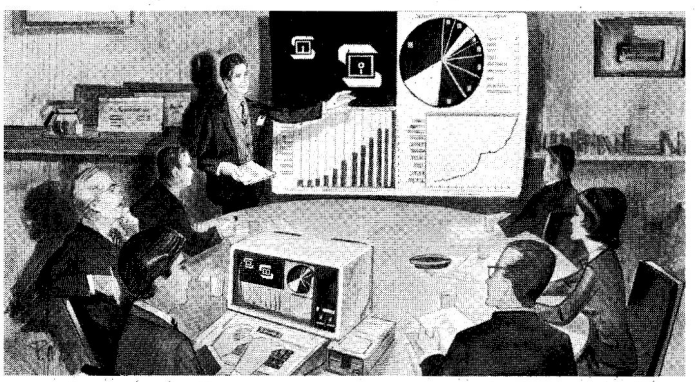

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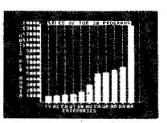

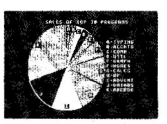

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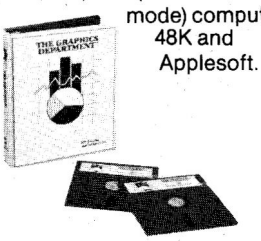

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Listing continued.

```
0BED                540  ;
0BED                541  ;
0BED                542  ;
0BED 4C 69 FF       543          JMP EXIT
0BF0                544  ;
0BF0 01 00          545  ONE     ADR 1
0BF2                546  ;
0BF2 1F D4 E8       547  STRVAR1  STR "This string was pre-initialized"
0BF5 E9 F3 A0
0BF8 F3 F4 F2
0BFB E9 EE E7
0BFE A0 F7 E1
0C01 F3 A0 F0
0C04 F2 E5 AD
0C07 E9 EE E9
0C0A F4 E9 E1
0C0D EC E9 FA
0C10 E5 E4
0C12 00             548          BYT 0
0C13                549  ;
0C13 80 00          550  STRVAR2  ADR 128
0C15                551          DFS 128
0C95                552  ;
0C95                553  ;
0C95 1E 00          554  STRVAR3  ADR 30
0C97                555          DFS 30
0CB5                556  ;
0CB5 1E 00          557  STRVAR4  ADR 30
0CB7                558          DFS 30
0CD5                559  ;
0CD5 3C 00          560  STRVAR5  ADR 60
0CD7                561          DFS 60
0D13                562  ;
0D13 00 00          563  I       ADR 0
0D15 00 00          564  J       ADR 0
0D17 00 00          565  LENSTR2 ADR 0
0D19 00 00          566  STRINDX ADR 0
0D1B                567  ;
0D1B                568  ;
0D1B                569  ;
0D1B                570          END

***** END OF ASSEMBLY

]brun sort
BRUN SORT
SYMBOL TABLE SORTED ALPHABETICALLY

  ABS      7854  CASE     7848  CASEI    784B  CONCAT   786F  COUNT    0013
  CR       008D  DESTADR  0005  DIGIT    000F  DIV      785D  ENTERSTR 0839
  EQ       00BD  EXIT     FF69  FALSE    0000  FOR      7815  FOR0     7818
  FORASAV  0000  FORXSAV  0001  FORYSAV  0002  FORZPG   0003  GE       BDBE
  GETC     7803  GOODSTR  086B  GOTLN    0014  GT       00BE  HOME     780C
  I        0D13  IFI      781E  IFI0     7821  IFS      7824  IFS0     7827
  INDEX    7869  INIT     7812  INSET    784E  ISIMMED  0009  J        0D15
  JMPADR   0011  LDSTR    7833  LE       BDBC  LEAD0    0010  LENGTH   786C
  LENSTR2  0D17  LOAD     782D  LT       00BC  MAXLEN   000C  MOD      7860
  MOVE     782A  MOVS     7830  MUL      785A  NE       00A3  NEG      7857
  NEXT     781B  NOTINSET 7851  ONE      0BF0  ONXGOTO  7845  OP       000A
  PRINT    7836  PRTINT   783C  PRTSTR   7839  PTRADR   0007  PUTC     7800
  RDINT    7842  RDSTR    783F  READLN   780F  RND      7863  SAGL     7806
  SAPC     7809  START    0800  STRINDX  0D19  STRVAR1  0BF2  STRVAR2  0C13
  STRVAR3  0C95  STRVAR4  0CB5  STRVAR5  0CD5  SUBSTR   7866  TESTDONE 09BC
  TRUE     0001  VALUE    000D

SYMBOL TABLE SORTED BY ADDRESS

  FORASAV  0000  FALSE    0000  TRUE     0001  FORXSAV  0001  FORYSAV  0002
  FORZPG   0003  DESTADR  0005  PTRADR   0007  ISIMMED  0009  OP       000A
  MAXLEN   000C  VALUE    000D  DIGIT    000F  LEAD0    0010  JMPADR   0011
  COUNT    0013  GOTLN    0014  CR       008D  NE       00A3  LT       00BC
  EQ       00BD  GT       00BE  START    0800  ENTERSTR 0839  GOODSTR  086B
  TESTDONE 09BC  ONE      0BF0  STRVAR1  0BF2  STRVAR2  0C13  STRVAR3  0C95
  STRVAR4  0CB5  STRVAR5  0CD5  I        0D13  J        0D15  LENSTR2  0D17
  STRINDX  0D19  PUTC     7800  GETC     7803  SAGL     7806  SAPC     7809
  HOME     780C  READLN   780F  INIT     7812  FOR      7815  FOR0     7818
  NEXT     781B  IFI      781E  IFI0     7821  IFS      7824  IFS0     7827
  MOVE     782A  LOAD     782D  MOVS     7830  LDSTR    7833  PRINT    7836
  PRTSTR   7839  PRTINT   783C  RDSTR    783F  RDINT    7842  ONXGOTO  7845
  CASE     7848  CASEI    784B  INSET    784E  NOTINSET 7851  ABS      7854
  NEG      7857  MUL      785A  DIV      785D  MOD      7860  RND      7863
  SUBSTR   7866  INDEX    7869  LENGTH   786C  CONCAT   786F  LE       BDBC
  GE       BDBE  EXIT     FF69
```

Listing 3. SPEED/ASM Mini-Mailer.

```
0800                1            TTL "Listing Three: S/A Mini-Mailer"
0800                2  ;
0800                3  ; Listing 3
0800                4  ;
0800                5  ;
0800                6  ;
0800                7  ; WARNING!!! This program is intended for demonstration
0800                8  ; purposes only.  It has not been tested well enough
0800                9  ; to qualify it as a commercial product.
0800               10  ; Neither Lazerware nor Randy Hyde can assume any
0800               11  ; responsibility for the use of this program.
0800               12  ;
0800               13  ;
0800               14  ;
0800               15  ;
0800               16  ***********************************
0800               17  *                                 *
0800               18  *       SPEED/ASM Equates         *
0800               19  *                                 *
0800               20  ***********************************
0800               21  ;
0800               22  ;
0800               23  ;
0800               24  ;
0800               25  ;
0800               26  ;
0800               27  *************
0800               28  * CONSTANTS *
0800               29  *************
0800               30  ;
0000               31  FALSE    EQU 0
0001               32  TRUE     EQU 1
008D               33  CR       EQU $8D
0087               34  BELL     EQU $87
0084               35  CTLD     EQU $84
0800               36  ;
0800               37  ;
00BD               38  EQ       EQU "="
00A3               39  NE       EQU "#"
00BE               40  GT       EQU ">"
00BC               41  LT       EQU "<"
BDBE               42  GE       EQU ">"|"="**256
BDBC               43  LE       EQU "<"|"="**256
0800               44  ;
0800               45  ;
0800               46  ;
0800               47  ;
0800               48  ;
0800               49  ;
0800               50  ;
0800               51  ***************************
0800               52  * SPEED/ASM ENTRY POINTS *
0800               53  ***************************
0800               54  ;
7800               55  PUTC     EQU $7800
7803               56  GETC     EQU PUTC+3
7806               57  SAGL     EQU GETC+3          ;FOR USE BY S/A ONLY-
                                                      SEE DOC.
7809               58  SAPC     EQU SAGL+3          ; "  "  "  "  "
                                                        "  "
780C               59  HOME     EQU SAPC+3          ;HOME AND CLEAR
780F               60  READLN   EQU HOME+3
7812               61  INIT     EQU READLN+3
7815               62  FOR      EQU INIT+3
7818               63  FOR0     EQU FOR+3
781B               64  NEXT     EQU FOR0+3
781E               65  IFI      EQU NEXT+3
7821               66  IFI0     EQU IFI+3
7824               67  IFS      EQU IFI0+3
7827               68  IFS0     EQU IFS+3
782A               69  MOVE     EQU IFS0+3
782D               70  LOAD     EQU MOVE+3
7830               71  MOVS     EQU LOAD+3
7833               72  LDSTR    EQU MOVS+3
7836               73  PRINT    EQU LDSTR+3
7839               74  PRTSTR   EQU PRINT+3
783C               75  PRTINT   EQU PRTSTR+3
783F               76  RDSTR    EQU PRTINT+3
7842               77  RDINT    EQU RDSTR+3
7845               78  ONXGOTO  EQU RDINT+3
7848               79  CASE     EQU ONXGOTO+3
784B               80  CASEI    EQU CASE+3
784E               81  INSET    EQU CASEI+3
7851               82  NOTINSET EQU INSET+3
7854               83  ABS      EQU NOTINSET+3
7857               84  NEG      EQU ABS+3
785A               85  MUL      EQU NEG+3
785D               86  DIV      EQU MUL+3
7860               87  MOD      EQU DIV+3
7863               88  RND      EQU MOD+3
7866               89  SUBSTR   EQU RND+3
7869               90  INDEX    EQU SUBSTR+3
786C               91  LENGTH   EQU INDEX+3
786F               92  CONCAT   EQU LENGTH+3
0800               93  ;
0800               94  ; Apple Monitor equates.
0800               95  ;
FF69               96  EXIT     EQU $FF69
0800               97  ;
0800               98  ;
0800               99  ;
0800              100  ;
0800              101  ***********************************
0800              102  ;
0800              103  ;
0800              104  ; SPEED/ASM mini-mailing list pgm.
0800              105  ;
0800              106  ;
0800              107  ;
0800              108  ; This program demonstrates a practical
0800              109  ; application of the SPEED/ASM routines
0800              110  ; running under Apple DOS.
0800              111  ;
0800              112  ;
0800              113  ;  This section of code provides the
0800              114  ; input module.  The following information
0800              115  ; is read in and written to the disk.
0800              116  ;
0800              117  ;
```

Listing continued.

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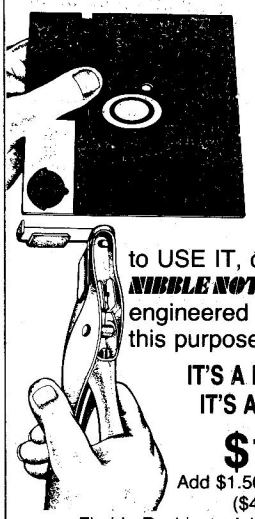

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Listing continued.

```
0800                    118  ;  First name: 13 characters.
0800                    119  ;  Last name:  13 characters.
0800                    120  ;  C/O:        25 characters.
0800                    121  ;  Street:     31 characters.
0800                    122  ;  City:       15 characters.
0800                    123  ;  State:       4 characters.
0800                    124  ;  Zipcode:    11 characters.
0800                    125  ;  Phone:      16 characters.
0800                    126  ;
0800                    127  ;
0800                    128  ;
0800                    129  **********************************
0800                    130  *
0800                    131  *
0800                    132  * SPEED/ASM initialization and
0800                    133  * title page.
0800                    134  *
0800                    135  **********************************
0800                    136  ;
0800                    137  ;
0800 20 12 78           138  BEGIN    JSR INIT            ;Always before using
                                                          SPEED/ASM
0803                    139  ;
0803                    140  ;
0803                    141  ;
0803                    142  **********************************
0803                    143  *
0803                    144  * Mini-Mailer Main Loop
0803                    145  *
0803                    146  **********************************
0803                    147  ;
0803                    148  ;
0803                    149  ;
0803                    150  ;
0803 20 36 78           151           JSR PRINT
0806 8D 8D C9           152           BYT CR,CR,"Insert disk with the MAIL.LIST",CR
0809 EE F3 E5
080C F2 F4 A0
080F E4 E9 F3
0812 E8 A0 F7
0815 E9 F4 E8
0818 A0 F4 E8
081B E5 A0 CD
081E C1 C9 CC
0821 AE CC C9
0824 D3 D4 8D
0827 A8 E9 B6           153           BYT "(if you have one) into the active drive"
                                      ,CR
082A A0 F9 EF
082D F5 A0 E8
0830 E1 F6 E5
0833 A0 EF EE
0836 E5 A9 A0
0839 E9 EE F4
083C EF A0 F4
083F E8 E5 A0
0842 E1 E3 F4
0845 E9 F6 E5
0848 A0 E4 F2
084B E9 F6 E5
084E 8D
084F E1 EE E4           154           BYT "and press return: ",0
0852 A0 F0 F2
0855 E1
0862 20 0F 78           155           JSR READLN
0865                    156  ;
0865 20 36 78           157           JSR PRINT
0868 8D 84 CF           158           BYT CR,CTLD,"OPEN MAIL.LIST,L128",CR
086B D0 C5 CE
086E A0 CD C1
0871 C9 CC AE
0874 CC C9 D3
0877 D4 AC CC
087A B1 B2 B8
087D 8D
087E 84 CE CF           159           BYT CTLD,"NOMON O,I,C",CR,0
0881 CD CF CE
0884 A0 CF AC
0887 C9 AC C3
088A 8D 00
088C                    160  ;
088C                    161  ;
088C                    162  ;
088C                    163  ;
088C 20 0C 78           164  MAINLOOP JSR HOME
088F 20 36 78           165           JSR PRINT
0892 8D 8D D3           166           BYT CR,CR,"SPEED/ASM Mini-Mailing List
                                      Program",CR,CR
0895 D0 C5 C5
0898 C4 AF C1
089B D3 CD A0
089E CD E9 EE
08A1 E9 AD CD
08A4 E1 E9 EC
08A7 E9 EE E7
08AA A0 CC E9
08AD F3 F4 A0
08B0 D0 F2 EF
08B3 E7 F2 E1
08B6 ED 8D 8D
08B9 C9 EE F0           167           BYT "Input Module:",CR,CR
08BC F5 F4 A0
08BF CD EF E4
08C2 F5 EC E5
08C5 BA 8D 8D
08C8 A0 A0 A0           168           BYT "    A) Add records",CR
08CB A0 C1 A9
08CE A0 C1 E4
08D1 E4 A0 F2
08D4 E5 E3 EF
08D7 F2 E4 F3
08DA 8D
08DB A0 A0 A0           169           BYT "    D) Delete a record",CR
08DE A0 C4 A9
08E1 A0 C4 E5
08E4 EC E5 F4
08E7 E5 A0 E1
08EA A0 F2 E5
08ED E3 EF F2
08F0 E4 8D
08F2 A0 A0 A0           170           BYT "    O) Open a new file",CR
08F5 A0 CF A9
08F8 F3
0909 A0 A0 A0           171           BYT "    P) Print file",CR
090C A0 D0 A9
090F A0 D0 F2
0912 E9 EE F4
0915 A0 E6 E9
0918 EC E5 8D
091B 8D                 172           BYT CR
091C A0 A0 A0           173           BYT "    Q) Quit",CR,CR
091F A0 D1 A9
0922 A0 D1 F5
0925 E9 F4 8D
0928 8D
0929 C3 E8 EF           174           BYT "Choice: ",0
092C E9 E3 E5
092F BA A0 00
0932                    175  ;
0932                    176  ;
0932                    177  ;
0932                    178  ;
0932                    179  ; READLN(INPUTSTR);
0932                    180  ;
0932 20 0F 78           181           JSR READLN
0935 20 3F 78           182           JSR RDSTR
0938 F6 11              183           ADR INPUTSTR
093A                    184  ;
093A                    185  ;
093A                    186  ; IF (INPUTSTR = "A") OR (INPUTSTR = "a") THEN
093A                    187  ;      GOTO ADDRECS;
093A                    188  ;
093A 20 27 78           189           JSR IFS0
093D F6 11 BD           190           ADR INPUTSTR,EQ
0940 00
0941 C1 00              191           BYT "A",0
0943 D0 0E              192           BIR ADDRECS
0945 20 27 78           193           JSR IFS0
0948 F6 11 BD           194           ADR INPUTSTR,EQ
094B 00
094C E1 00              195           BYT "a",0
094E D0 03              196           BIR ADDRECS
0950 4C 8B 0C           197           JMP TSTFORD
0953                    198  ;
0953                    199  ;
0953                    200  ;
0953                    201  ;
0953                    202           TTL "Mini-Mailing List: Add Module"
0953                    203  ;
0953                    204  ;
0953                    205  ;
0953                    206  ;
0953                    207  **********************************
0953                    208  ;
0953                    209  ;
0953                    210  ; Handle the "A" option here.
0953                    211  ;
0953 20 0C 78           212  ADDRECS  JSR HOME
0956 20 36 78           213           JSR PRINT
0959 8D 8D              214           BYT CR,CR
095B C1 E4 E4           215           BYT "Add records module:",CR,CR,0
095E A0 F2 E5
0961 E3 EF F2
0964 E4 F3 A0
0967 ED EF E4
096A F5 EC E5
096D BA 8D 8D
0970 00
0971                    216  ;
0971                    217  ;
0971                    218  ;
0971                    219  ;
0971 20 36 78           220  NOERROR  JSR PRINT
0974 8D 84 D2           221           BYT CR,CTLD,"READ MAIL.LIST,R0,B0",CR,0
0977 C5 C1 C4
097A A0 CD C1
097D C9 CC AE
0980 CC C9 D3
0983 D4 AC D2
0986 B0 AC C2
0989 B0 8D 00
098C                    222  ;
098C                    223  ; Read in the number of records in this
098C                    224  ; file into NUMRECS.
098C                    225  ;
098C 20 0F 78           226           JSR READLN
098F 20 42 78           227           JSR RDINT
0992 F2 11              228           ADR NUMRECS
```

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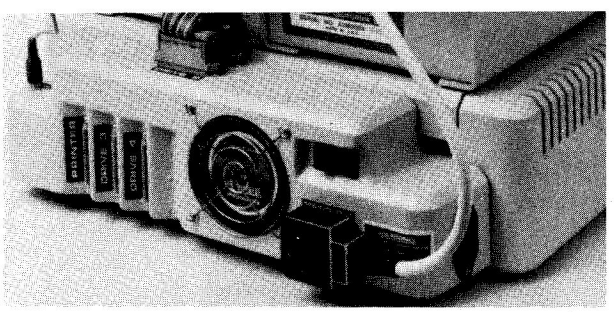

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Listing continued.

```
0994 20 36 78   229           JSR PRINT           ;Turn off read cmd.
0997 8D 84 8D   230           BYT CR,CTLD,CR,0
099A 00
099B            231  ;
099B            232  ;
099B            233  ;
099B            234  ;
099B            235  ;
099B            236  ; Get the information to write to
099B            237  ; the file.
099B            238  ;
099B 20 36 78   239  GETFNAME JSR PRINT
099E 8D C5 EE   240           BYT CR,"Enter First name: ",0
09A1 F4 E5 F2
09A4 A0 C6 E9
09A7 F2 F3 F4
09AA A0 EE E1
09AD ED E5 BA
09B0 A0 00
09B2 20 0F 78   241           JSR READLN
09B5 20 3F 78   242           JSR RDSTR
09B8 78 12      243           ADR FIRSTNAM
09BA 50 1D      244           BVC GETLNAME        ;If ok.
09BC            245  ;
09BC 20 36 78   246           JSR PRINT
09BF 8D 87 D2   247           BYT CR,BELL,"Re-enter first name",CR,0
09C2 E5 AD E5
09C5 EE F4 E5
09C8 F2 A0 E6
09CB E9 F2 F3
09CE F4 A0 EE
09D1 E1 ED E5
09D4 8D 00
09D6 4C 9B 09   248           JMP GETFNAME
09D9            249  ;
09D9            250  ;
09D9            251  ;
09D9 20 36 78   252  GETLNAME JSR PRINT
09DC 8D C5 EE   253           BYT CR,"Enter Last name: ",0
09DF F4 E5 F2
09E2 A0 CC E1
09E5 F3 F4 A0
09E8 EE E1 ED
09EB E5 BA A0
09EE 00
09EF 20 0F 78   254           JSR READLN
09F2 20 3F 78   255           JSR RDSTR
09F5 85 12      256           ADR LASTNAME
09F7 50 1C      257           BVC GETAUX
09F9            258  ;
09F9 20 36 78   259           JSR PRINT
09FC 8D 87 D2   260           BYT CR,BELL,"Re-enter last name",CR,0
09FF E5 AD E5
0A02 EE F4 E5
0A05 F2 A0 BC
0A08 E1 F3 F4
0A0B A0 EE E1
0A0E ED E5 8D
0A11 00
0A12 4C D9 09   261           JMP GETLNAME
0A15            262  ;
0A15            263  ;
0A15            264  ;
0A15 20 36 78   265  GETAUX   JSR PRINT
0A18 C5 EE F4   266           BYT "Enter auxillary info: ",0
0A1B E5 F2 A0
0A1E E1 F5 F8
0A21 E9 EC EC
0A24 E1 F2 F9
0A27 A0 E9 EE
0A2A E6 EF BA
0A2D A0 00
0A2F 20 0F 78   267           JSR READLN
0A32 20 3F 78   268           JSR RDSTR
0A35 92 12      269           ADR AUXINFO
0A37 50 28      270           BVC GETSTRT
0A39            271  ;
0A39 20 36 78   272           JSR PRINT
0A3C 8D 87 D2   273           BYT CR,BELL,"Re-enter Auxillary information"
                              ,CR,0
0A3F E5 AD E5
0A42 EE F4 E5
0A45 F2 A0 C1
0A48 F5 F8 E9
0A4B EC EC E1
0A4E F2 F9 A0
0A51 E9 EE E6
0A54 EF F2 ED
0A57 E1 F4 E9
0A5A EF EE 8D
0A5D 00
0A5E 4C 15 0A   274           JMP GETAUX
0A61            275  ;
0A61            276  ;
0A61            277  ;
0A61 20 36 78   278  GETSTRT  JSR PRINT
0A64 8D C5 EE   279           BYT CR,"Enter street address: ",0
0A67 F4 E5 F2
0A6A A0 F3 F4
0A6D F2 E5 E5
0A70 F4 A0 E1
0A73 E4 E4 F2
0A76 E5 F3 F3
0A79 BA A0 00
0A7C 20 0F 78   280           JSR READLN
0A7F 20 3F 78   281           JSR RDSTR
0A82 AB 12      282           ADR STRTADRS
0A84 50 21      283           BVC GETCITY
0A86            284  ;
0A86 20 36 78   285           JSR PRINT
0A89 8D 87 D2   286           BYT CR,BELL,"Re-enter Street Address",CR,0
0A8C E5 AD E5
0A8F EE F4 E5
0A92 F2 A0 D3
0A95 F4 F2 E5
0A98 E5 F4 A0
0A9B C1 E4 E4
0A9E F2 E5 F3
0AA1 F3 8D 00
0AA4 4C 61 0A   287           JMP GETSTRT
0AA7            288  ;
0AA7            289  ;
0AA7            290  ;
0AA7 20 36 78   291  GETCITY  JSR PRINT
0AAA 8D C5 EE   292           BYT CR,"Enter city: ",0
0AAD F4 E5 F2
0AB0 A0 E3 E9
0AB3 F4 F9 BA
0AB6 A0 00
0AB8 20 0F 78   293           JSR READLN
0ABB 20 3F 78   294           JSR RDSTR
0ABE CA 12      295           ADR CITY
0AC0 50 17      296           BVC GETSTATE
0AC2            297  ;
0AC2 20 36 78   298           JSR PRINT
0AC5 8D 87 D2   299           BYT CR,BELL,"Re-enter city",CR,0
0AC8 E5 AD E5
0ACB EE F4 E5
0ACE E1
0AD6 4C A7 0A   300           JMP GETCITY
0AD9            301  ;
0AD9            302  ;
0AD9            303  ;
0AD9 20 36 78   304  GETSTATE JSR PRINT
0ADC 8D C5 EE   305           BYT CR,"Enter state: ",0
0ADF F4 E5 F2
0AE2 A0 F3 F4
0AE5 E1 F4 E5
0AE8 BA A0 00
0AEB 20 0F 78   306           JSR READLN
0AEE 20 3F 78   307           JSR RDSTR
0AF1 D9 12      308           ADR STATE
0AF3 50 18      309           BVC GETZIP
0AF5            310  ;
0AF5 20 36 78   311           JSR PRINT
0AF8 8D 87 D2   312           BYT CR,BELL,"Re-enter State",CR,0
0AFB E5 AD E5
0AFE EE F4 E5
0B01 F2 A0 D3
0B04 F4 E1 F4
0B07 E5 8D 00
0B0A 4C D9 0A   313           JMP GETSTATE
0B0D            314  ;
0B0D            315  ;
0B0D            316  ;
0B0D 20 36 78   317  GETZIP   JSR PRINT
0B10 8D C5 EE   318           BYT CR,"Enter Zipcode: ",0
0B13 F4 E5 F2
0B16 A0 DA E9
0B19 F0 E3 EF
0B1C E4 E5 BA
0B1F A0 00
0B21 20 0F 78   319           JSR READLN
0B24 20 3F 78   320           JSR RDSTR
0B27 DD 12      321           ADR ZIPCODE
0B29 50 1A      322           BVC GETPHONE
0B2B            323  ;
0B2B 20 36 78   324           JSR PRINT
0B2E 8D 87 D2   325           BYT CR,BELL,"Re-enter zipcode",CR,0
0B31 E5 AD E5
0B34 EE F4 E5
0B37 F2 A0 FA
0B3A E9 F0 E3
0B3D EF E4 E5
0B40 8D 00
0B42 4C 0D 0B   326           JMP GETZIP
0B45            327  ;
0B45            328  ;
0B45            329  ;
0B45 20 36 78   330  GETPHONE JSR PRINT
0B48 8D C5 EE   331           BYT CR,"Enter Phone #: ",0
0B4B F4 E5 F2
0B4E A0 D0 E8
0B51 EF EE E5
0B54 A0 A3 BA
0B57 A0 00
0B59 20 0F 78   332           JSR READLN
0B5C 20 3F 78   333           JSR RDSTR
0B5F E8 12      334           ADR PHONENUM
0B61 50 1F      335           BVC WRTINFO
0B63            336  ;
0B63 20 36 78   337           JSR PRINT
0B66 8D 87 D2   338           BYT CR,BELL,"Re-enter Phone number",CR,0
0B69 E5 AD E5
0B6C EE F4 E5
0B6F F2 A0 D0
0B72 E8 EF EE
0B75 E5 A0 EE
```

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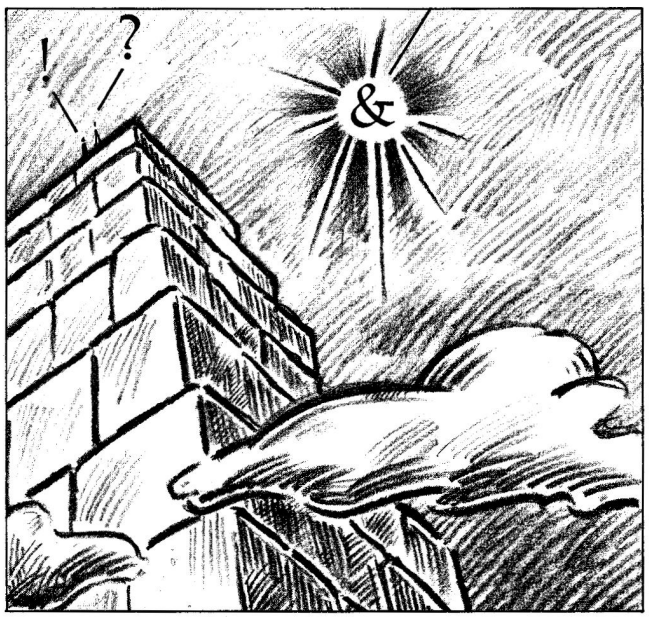

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```
0B78 F5 ED E2
0B7B E5 F2 8D
0B7E 00
0B7F 4C 45 0B   339          JMP GETPHONE
0B82            340  ;
0B82            341  ;
0B82            342  ;
0B82 18         343  WRTINFO  CLC
0B83 AD F2 11   344          LDA NUMRECS
0B86 69 01      345          ADC #1
0B88 8D F4 11   346          STA RECNUM
0B8B AD F3 11   347          LDA NUMRECS+1
0B8E 69 00      348          ADC /1
0B90 8D F5 11   349          STA RECNUM+1
0B93            350  ;
0B93            351  ;
0B93            352  ; PRINT CHR$(4);"WRITE MAIL.LIST,R";RECNUM;",B0"
0B93            353  ;
0B93 20 36 78   354          JSR PRINT
0B96 8D 84 D7   355          BYT CR,CTLD,"WRITE MAIL.LIST,R",0
0B99 D2 C9 D4
0B9C C5 A0 CD
0B9F C1 C9 CC
0BA2 AE CC C9
0BA5 D3 D4 AC
0BA8 D2 00
0BAA 20 3C 78   356          JSR PRTINT
0BAD F4 11      357          ADR RECNUM
0BAF 20 36 78   358          JSR PRINT
0BB2 AC C2 B0   359          BYT ",B0",CR,0
0BB5 8D 00
0BB7            360  ;
0BB7            361  ;
0BB7 20 39 78   362          JSR PRTSTR
0BBA 78 12      363          ADR FIRSTNAM
0BBC 20 E9 11   364          JSR WRITELN
0BBF            365  ;
0BBF 20 39 78   366          JSR PRTSTR
0BC2 85 12      367          ADR LASTNAME
0BC4 20 E9 11   368          JSR WRITELN
0BC7            369  ;
0BC7 20 39 78   370          JSR PRTSTR
0BCA 92 12      371          ADR AUXINFO
0BCC 20 E9 11   372          JSR WRITELN
0BCF            373  ;
0BCF 20 39 78   374          JSR PRTSTR
0BD2 AB 12      375          ADR STRTADRS
0BD4 20 E9 11   376          JSR WRITELN
0BD7            377  ;
0BD7 20 39 78   378          JSR PRTSTR
0BDA CA 12      379          ADR CITY
0BDC 20 E9 11   380          JSR WRITELN
0BDF            381  ;
0BDF 20 39 78   382          JSR PRTSTR
0BE2 D9 12      383          ADR STATE
0BE4 20 E9 11   384          JSR WRITELN
0BE7            385  ;
0BE7 20 39 78   386          JSR PRTSTR
0BEA DD 12      387          ADR ZIPCODE
0BEC 20 E9 11   388          JSR WRITELN
0BEF            389  ;
0BEF 20 39 78   390          JSR PRTSTR
0BF2 E8 12      391          ADR PHONENUM
0BF4 20 E9 11   392          JSR WRITELN
0BF7            393  ;
0BF7            394  ;
0BF7            395  ; Turn off output to the file.
0BF7            396  ;
0BF7 20 36 78   397          JSR PRINT
0BFA 84 8D 00   398          BYT CTLD,CR,0
0BFD            399  ;
0BFD            400  ; NUMRECS = RECNUM (Which contains NUMRECS+1)
0BFD            401  ;
0BFD 20 2A 78   402          JSR MOVE
0C00 F4 11 F2   403          ADR RECNUM,NUMRECS
0C03 11
0C04            404  ;
0C04            405  ;
0C04 20 36 78   406  GETYORNO JSR PRINT
0C07 8D 8D C1   407          BYT CR,CR,"Add another record? (Y/N): ",0
0C0A E4 E4 A0
0C0D E1 EE EF
0C10 F4 E8 E5
0C13 F2 A0 F2
0C16 E5 E3 EF
0C19 F2 E4 BF
0C1C A0 A8 D9
0C1F AF CE A9
0C22 BA A0 00
0C25 20 0F 78   408          JSR READLN
0C28 20 3F 78   409          JSR RDSTR
0C2B F6 11      410          ADR INPUTSTR
0C2D            411  ;
0C2D 20 27 78   412          JSR IFS0
0C30 F6 11 ED   413          ADR INPUTSTR,EQ
0C33 00
0C34 CE 00      414          BYT "N",0
0C36 D0 24      415          BTR EXITADD
0C38            416  ;
0C38 20 27 78   417          JSR IFS0
0C3B F6 11 ED   418          ADR INPUTSTR,EQ
0C3E 00
0C3F F9 00      419          BYT "y",0
0C41 D0 19      420          BTR EXITADD
```

Listing continued.

Listing continued.

```
0C43                    421  ;
0C43 20 27 78           422          JSR IFSO
0C46 F6 11 BD           423          ADR INPUTSTR,EQ
0C49 00
0C4A D9 00              424          BYT "Y",0
0C4C D0 0B              425          BNE DOAGAIN
0C4E                    426  ;
0C4E 20 27 78           427          JSR IFSO
0C51 F6 11 BD           428          ADR INPUTSTR,EQ
0C54 00
0C55 F9 00              429          BYT "y",0
0C57 F0 AB              430          BEQ GETYORNO
0C59                    431  ;
0C59 4C 9B 09           432  DOAGAIN JMP GETFNAME
0C5C                    433  ;
0C5C                    434  ;
0C5C                    435  ; Before exiting, update the record
0C5C                    436  ; count
0C5C                    437  ;
0C5C 20 36 78           438  EXITADD JSR PRINT
0C5F 8D 84 D7           439          BYT CR,CTLD,"WRITE MAIL.LIST,R0,B0",CR
0C62 D2 C9 D4
0C65 C5 A0 CD
0C68 C1 C9 CC
0C6B AE CC C9
0C6E D3 D4 AC
0C71 D2 B0 AC
0C74 C2 B0 8D
0C77 00                 440          BYT 0
0C78                    441  ;
0C78                    442  ;
0C78 20 3C 78           443          JSR PRTINT
0C7B F2 11              444          ADR NUMRECS
0C7D 20 36 78           445          JSR PRINT
0C80 A0 A0 A0           446          BYT "    ",CR,CTLD,CR,0
0C83 A0 8D 84
0C86 8D 00
0C88 4C 8C 08           447          JMP MAINLOOP
0C8B                    448  ;
0C8B                    449  ;
0C8B                    450  ;
0C8B                    451  ;
0C8B                    452  ;
0C8B                    453  ;
0C8B                    454          TTL "Mini-Mailer: Delete Module"
0C8B                    455  ;
0C8B                    456  ***********************************
0C8B                    457  ;
0C8B                    458  ;
0C8B 20 27 78           459  TSTFORD JSR IFSO
0C8E F6 11 BD           460          ADR INPUTSTR,EQ
0C91 00
0C92 C4 00              461          BYT "D",0
0C94 D0 0E              462          BNE ISD
0C96                    463  ;
0C96 20 27 78           464          JSR IFSO
0C99 F6 11 BD           465          ADR INPUTSTR,EQ
0C9C 00
0C9D E4 00              466          BYT "d",0
0C9F D0 03              467          BNE ISD
0CA1 4C 3D 0E           468          JMP TSTFORO
0CA4                    469  ;
0CA4 20 36 78           470  ISD     JSR PRINT
0CA7 8D 8D C4           471          BYT CR,CR,"Delete which record? ",0
0CAA E5 EC E5
0CAD F4 E5 A0
0CB0 F7 E8 E9
0CB3 E3 E8 A0
0CB6 F2 E5 E3
0CB9 EF F2 E4
0CBC BF A0 00
0CBF 20 0F 78           472          JSR READLN
0CC2 20 42 78           473          JSR RDINT
0CC5 F4 11              474          ADR RECNUM
0CC7 50 29              475          BVC GOODNUM
0CC9                    476  ;
0CC9 20 36 78           477          JSR PRINT
0CCC 8D 87 C9           478          BYT CR,BELL,"Illegal record number,
                                     re-enter",CR,0
0CCF EC EC E5
0CD2 E7 E1 EC
0CD5 A0 F2 E5
0CD8 E3 EF F2
0CDB E4 A0 EE
0CDE F5 ED E2
0CE1 E5 F2 AC
0CE4 A0 F2 E5
0CE7 AD E5 EE
0CEA F4 E5 F2
0CED 8D 00
0CEF 4C 8B 0C           479          JMP TSTFORD
0CF2                    480  ;
0CF2                    481  ;
0CF2                    482  ; See if this is a valid record number.
0CF2                    483  ;
0CF2 20 36 78           484  GOODNUM JSR PRINT
0CF5 8D 84 D2           485          BYT CR,CTLD,"READ MAIL.LIST,R0,B0",CR,0
0CF8 C5 C1 C4
0CFB A0 CD C1
0CFE C9 CC AE
0D01 CC C9 D3
0D04 D4 AC D2
0D07 B0 AC C2
0D0A B0 8D 00
0D0D 20 0F 78           486          JSR READLN              Listing continued.
```


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```
0D10 20 42 78   487          JSR RDINT
0D13 F2 11      488          ADR NUMRECS
0D15            489 ;
0D15 20 1E 78   490          JSR IFI
0D18 F4 11 BC   491          ADR RECNUM,LE,NUMRECS
0D1B BD F2 11
0D1E D0 3F      492          BTR RECOK
0D20            493 ;
0D20 20 36 78   494          JSR PRINT
0D23 8D D4 E8   495          BYT CR,"That record doesn't exist",CR
0D26 E1 F4 A0
0D29 F2 E5 E3
0D2C EF F2 E4
0D2F A0 E4 EF
0D32 E5 F3 EE
0D35 A7 F4 A0
0D38 E5 F8 E9
0D3B F3 F4 8D
0D3E 8D D0 F2   496          BYT CR,"Press return to continue:",0
0D41 E5 F3 F3
0D44 A0 F2 E5
0D47 F4 F5 F2
0D4A EE A0 F4
0D4D EF A0 E3
0D50 EF EE F4
0D53 E9 EE F5
0D56 E5 BA 00
0D59 20 0F 78   497          JSR READLN
0D5C 4C 8C 08   498          JMP MAINLOOP
0D5F            499 ;
0D5F 20 36 78   500 RECOK    JSR PRINT
0D62 8D 84 D7   501          BYT CR,CTLD,"WRITE MAIL.LIST,R",0
0D65 D2 C9 D4
0D68 C5 A0 CD
0D6B C1 C9 CC
0D6E AE CC C9
0D71 D3 D4 AC
0D74 D2 00
0D76 20 3C 78   502          JSR PRTINT
0D79 F4 11      503          ADR RECNUM
0D7B 20 36 78   504          JSR PRINT
0D7E AC C2 B0   505          BYT ",B0",CR
0D81 8D
0D82 80 8D      506          BYT $80,CR
0D84 84 8D 00   507          BYT CTLD,CR,0
0D87            508 ;
0D87 20 36 78   509          JSR PRINT
0D8A 8D 8D C4   510          BYT CR,CR,"Deleted",CR
0D8D E5 BC E5
0D90 F4 E5 E4
0D93 8D
0D94 D0 F2 E5   511          BYT "Press return to continue:",0
0D97 F3 F3 A0
0D9A F2 E5 F4
0D9D F5 F2 EE
0DA0 A0 F4 EF
0DA3 A0 E3 EF
0DA6 EE F4 E9
0DA9 EE F5 E5
0DAC BA 00
0DAE 20 0F 78   512          JSR READLN
0DB1 4C 8C 08   513          JMP MAINLOOP
0DB4            514 ;
0DB4            515 ;
0DB4            516 ;
0DB4            517          TTL "Mini-Mailer: Status Module"
0DB4            518 ;
0DB4            519 ;
0DB4            520 **********************************
0DB4            521 ;
0DB4            522 ;
0DB4 20 27 78   523 TSTFORS  JSR IFS0
0DB7 F6 11 BD   524          ADR INPUTSTR,EQ
0DBA 00
0DBB D3 00      525          BYT "S",0
0DBD D0 0E      526          BTR ISS
0DBF            527 ;
0DBF 20 27 78   528          JSR IFS0
0DC2 F6 11 BD   529          ADR INPUTSTR,EQ
0DC5 00
0DC6 F3 00      530          BYT "s",0
0DC8 D0 03      531          BTR ISS
0DCA 4C 3D 0E   532          JMP TSTFORO
0DCD            533 ;
0DCD            534 ;
0DCD 20 36 78   535 ISS      JSR PRINT
0DD0 8D 84 D2   536          BYT CR,CTLD,"READ MAIL.LIST,R0,B0",CR,0
0DD3 C5 C1 C4
0DD6 A0 CD C1
0DD9 C9 CC AE
0DDC CC C9 D3
0DDF D4 AC D2
0DE2 B0 AC C2
0DE5 B0 8D 00
0DE8 20 0F 78   537          JSR READLN
0DEB 20 42 78   538          JSR RDINT
0DEE F2 11      539          ADR NUMRECS
0DF0            540 ;
0DF0 20 36 78   541          JSR PRINT
0DF3 8D D4 E8   542          BYT CR,"There are ",0
0DF6 E5 F2 E5
0DF9 A0 E1 F2
0DFC E5 A0 00
0DFF 20 3C 78   543          JSR PRTINT
0E02 F2 11      544          ADR NUMRECS
0E04            545 ;
0E04 20 36 78   546          JSR PRINT
0E07 A0 F2 E5   547          BYT " records in the file",CR,CR
0E0A E3 EF F2
0E0D E4 F3 A0
0E10 E9 EE A0
0E13 F4 E8 E5
0E16 A0 E6 E9
0E19 EC E5 8D
0E1C 8D
0E1D D0 F2 E5   548          BYT "Press return to continue:",0
0E20 F3 F3 A0
0E23 F2 E5 F4
0E26 F5 F2 EE
0E29 A0 F4 EF
0E2C A0 E3 EF
0E2F EE F4 E9
0E32 EE F5 E5
0E35 BA 00
0E37 20 0F 78   549          JSR READLN
0E3A 4C 8C 08   550          JMP MAINLOOP
0E3D            554          TTL "Mini-Mailer: New File Module"
0E3D            555 ;
0E3D            556 ;
0E3D            557 **********************************
0E3D            558 ;
0E3D            559 ;
0E3D 20 27 78   560 TSTFORO  JSR IFS0
0E40 F6 11 BD   561          ADR INPUTSTR,EQ
0E43 00
0E44 CF 00      562          BYT "O",0
0E46 D0 0E      563          BTR ISO
0E48            564 ;
0E48 20 27 78   565          JSR IFS0
0E4B F6 11 BD   566          ADR INPUTSTR,EQ
0E4E 00
0E4F EF 00      567          BYT "o",0
0E51 D0 03      568          BTR ISO
0E53 4C D5 0F   569          JMP TSTFORP
0E56            570 ;
0E56            571 ;
0E56 20 36 78   572 ISO      JSR PRINT
0E59 8D C9 F3   573          BYT CR,"Is the previous disk still",CR
0E5C A0 F4 E8
0E5F E5 A0 F0
0B62 F2 E5 F6
0B65 E9 EF F5
0B68 F3 A0 E4
0B6B E9 F3 EB
0B6E A0 F3 F4
0E71 E9 EC EC
0E74 8D
0E75 E9 EE A0   574          BYT "in the drive? (Y/N): ",0
0E78 F4 E8 E5
0E7B A0 E4 F2
0E7E E9 F6 E5
0B81 BF A0 A8
0B84 D9 AF CE
0B87 A9 BA A0
0B8A 00
0B8B 20 0F 78   575          JSR READLN
0B8E 20 3F 78   576          JSR RDSTR
0E91 F6 11      577          ADR INPUTSTR
0E93            578 ;
0E93 20 27 78   579          JSR IFS0
0E96 F6 11 BD   580          ADR INPUTSTR,EQ
0E99 00
0E9A D9 00      581          BYT "Y",0
0E9C D0 57      582          BTR ISYES
0E9E 20 27 78   583          JSR IFS0
0EA1 F6 11 BD   584          ADR INPUTSTR,EQ
0EA4 00
0EA5 F9 00      585          BYT "y",0
0EA7 D0 4C      586          BTR ISYES
0EA9            587 ;
0EA9 20 36 78   588          JSR PRINT
0EAC 8D 87 D0   589          BYT CR,BELL,"Put the previous disk back
                             into",CR
0EAF F5 F4 A0
0EB2 F4 E8 E5
0EB5 A0 F0 F2
0EB8 E5 F6 E9
0EBB EF F5 F3
0EBE A0 E4 E9
0EC1 EB A0 E9
0EC4 EE F4 EF
0EC7 8D
0ECE F4 E8 E5   590          BYT "the active drive before continuing",
                             CR,0
0ED1 A0 E1 E3
0ED4 F4 E9 F6
0ED7 E5 A0 E4
0EDA F2 E9 F6
0EDD E5 A0 E2
0EE0 E5 B6 EF
0EE3 F2 E5 A0
0EE6 E3 EF EE
0EE9 F4 E9 EE
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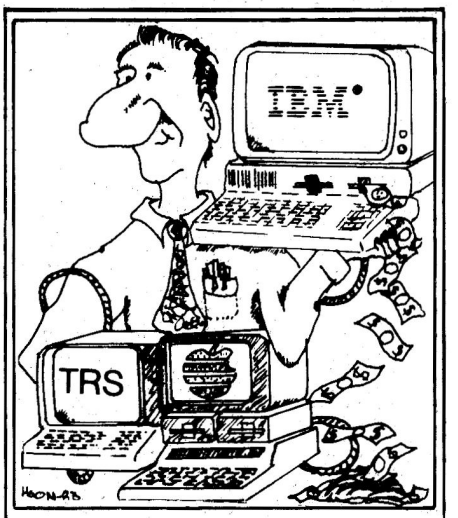

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```
0EEC F5 E9 EE
0EEF E7 8D 00
0EF2 4C 56 0E   591          JMP ISO
0EF5            592  ;
0EF5            593  ;
0EF5 20 36 78   594  ISYES   JSR PRINT
0EF8 8D 84 C3   595          BYT CR,CTLD,"CLOSE",CR,0
0EFB CC CF D3
0EFE C5 8D 00
0F01            596  ;
0F01 20 36 78   597          JSR PRINT
0F04 8D D0 EC   598          BYT CR,"Place the diskette you wish to
                             create",CR
0F07 E1 E3 E5
0F0A A0 F4 E8
0F0D E5 A0 E4
0F10 E9 F3 EB
0F13 E5 F4 F4
0F16 E5 A0 F9
0F19 EF F5 A0
0F1C F7 E9 F3
0F1F E8 A0 F4
0F22 EF A0 E3
0F25 F2 E5 E1
0F28 F4 E5 8D
0F2B E1 A0 A2   599          BYT "a ""MAIL.LIST"" file on into the active"
                             ,CR
0F2E CD C1 C9
0F31 CC AE CC
0F34 C9 D3 D4
0F37 A2 A0 B6
0F3A E9 BC E5
0F3D A0 EF EE
0F40 A0 E9 EE
0F43 F4 EF A0
0F46 F4 E8 E5
0F49 A0 E1 E3
0F4C F4 E9 F6
0F4F E5 8D
0F51 E4 E9 F3   600          BYT "disk drive",CR
0F54 EB A0 E4
0F57 F2 E9 F6
0F5A E5 8D
0F5C E1 EE E4   601          BYT "and press return: ",0
0F5F A0 F0 F2
0F62 E5 F3 F3
0F65 A0 F2 E5
0F68 F4
0F6F            602  ;
0F6F 20 0F 78   603          JSR READLN
0F72 20 36 78   604          JSR PRINT
0F75 8D 84 CF   605          BYT CR,CTLD,"OPEN MAIL.LIST,L128",CR
0F78 D0 C5 CE
0F7B A0 CD C1
0F7E C9 CC AE
0F81 CC C9 D3
0F84 D4 AC CC
0F87 B1 B2 B8
0F8A 8D
0F8B 84 D7 D2   606          BYT CTLD,"WRITE MAIL.LIST",CR
0F8E C9 D4 C5
0F91 A0 CD C1
0F94 C9 CC AE
0F97 CC C9 D3
0F9A D4 8D
0F9C B0 A0 A0   607          BYT "0      ",CR
0F9F A0 A0 A0
0FA2 A0 8D
0FA4 84 8D 00   608          BYT CTLD,CR,0
0FA7            609  ;
0FA7            610  ;
0FA7 20 36 78   611          JSR PRINT
0FAA 8D C1 EC   612          BYT CR,"All done, press return to continue:"
                             ,0
0FAD EC A0 E4
0FB0 EF EE E5
0FB3 AC A0 F0
0FB6 F2 E5 F3
0FB9 F3 A0 F2
0FBC E5 F4 F5
0FBF F2 EE A0
0FC2 F4 EF A0
0FC5 E3 EF EE
0FC8 F4 E9 EE
0FCB F5 E5 BA
0FCE 00
0FCF 20 0F 78   613          JSR READLN
0FD2 4C 8C 08   614          JMP MAINLOOP
0FD5            615  ;
0FD5            616  ;
0FD5            617  ;
0FD5            618          TTL "Mini-Mailer: Print Module"
0FD5            619  ;
0FD5            620  ;
0FD5            621  ************************************
0FD5            622  ;
0FD5            623  ;
0FD5 20 27 78   624  TSTFORP JSR IFS0
0FD8 F6 11 BD   625          ADR INPUTSTR,EQ
0FDB 00
0FDC D0 00      626          BYT "P",0
0FDE D0 0E      627          BTR ISP
0FE0            628  ;
0FE0 20 27 78   629          JSR IFS0
0FE3 F6 11 BD   630          ADR INPUTSTR,EQ
0FE6 00
0FE7 F0 00      631          BYT "p",0
0FE9 D0 03      632          BTR ISP
0FEB 4C 53 11   633          JMP TSTFORQ
0FEE            634  ;
0FEE            635  ;
0FEE 20 36 78   636  ISP     JSR PRINT
0FF1 8D D3 E5   637          BYT CR,"Send output to what slot?",CR
0FF4 EE E4 A0
0FF7 EF F5 F4
0FFA F0 F5 F4
0FFD A0 F4 EF
1000 A0 F7 E8
1003 E1 F4 A0
1006 F3 EC EF
1009 F4 BF 8D
100C A8 FA E5   638          BYT "(zero for screen): ",0
100F F2 EF A0
1012 B6 EF F2
1015 A0 F3 E3
1018 F2 E5 E5
101B EE A9 BA
101E A0 00
1020 20 0F 78   639          JSR READLN
1023 20 42 78   640          JSR RDINT
1026 F0 11      641          ADR I
1028            642  ;
1028            643  ;
1028 20 36 78   644          JSR PRINT
102B 8D 84 D2   645          BYT CR,CTLD,"READ MAIL.LIST,R0,B0",CR,0
102E C5 C1 C4
1031 A0 CD C1
1034 C9 CC AE
1037 CC C9 D3
103A D4 AC D2
103D B0 AC C2
1040 B0 8D 00
1043 20 0F 78   646          JSR READLN
1046 20 42 78   647          JSR RDINT
1049 F2 11      648          ADR NUMRECS
104B            649  ;
104B 20 36 78   650          JSR PRINT
104E 8D 84 D0   651          BYT CR,CTLD,"PR#",0
1051 D2 A3 00
1054 20 3C 78   652          JSR PRTINT
1057 F0 11      653          ADR I
1059 20 E9 11   654          JSR WRITELN
105C            655  ;
105C            656  ;
105C            657  ;
105C            658  ; FOR I = 1 TO NUMRECS STEP 1
105C            659  ;
105C 20 15 78   660          JSR FOR
105F F0 11 EE   661          ADR I,ONE,NUMRECS,ONE
1062 11 F2 11
1065 EE 11
1067            662  ;
1067 20 36 78   663          JSR PRINT
106A 84 D2 C5   664          BYT CTLD,"READ MAIL.LIST,B0,R",0
106D C1 C4 A0
1070 CD C1 C9
1073 CC AE CC
1076 C9 D3 D4
1079 AC C2 B0
107C AC D2 00
107F 20 3C 78   665          JSR PRTINT
1082 F0 11      666          ADR I
1084 20 E9 11   667          JSR WRITELN
1087            668  ;
1087 20 0F 78   669          JSR READLN
108A 20 3F 78   670          JSR RDSTR
108D 78 12      671          ADR FIRSTNAM
108F            672  ;
108F            673  ; Check to see if this is a deleted
108F            674  ; record or not.
108F            675  ;
108F 20 27 78   676          JSR IFS0
1092 78 12 BD   677          ADR FIRSTNAM,EQ
1095 00
1096 80 00      678          BYT $80,0
1098 F0 03      679          BFL NOTDLTD
109A 4C 24 11   680          JMP NEXTP
109D            681  ;
109D            682  ;
109D 20 0F 78   683  NOTDLTD JSR READLN
10A0 20 3F 78   684          JSR RDSTR
10A3 85 12      685          ADR LASTNAME
10A5            686  ;
10A5 20 0F 78   687          JSR READLN
10A8 20 3F 78   688          JSR RDSTR
10AB 92 12      689          ADR AUXINFO
10AD            690  ;
10AD 20 0F 78   691          JSR READLN
10B0 20 3F 78   692          JSR RDSTR
10B3 AB 12      693          ADR STRTADRS
10B5            694  ;
10B5 20 0F 78   695          JSR READLN
10B8 20 3F 78   696          JSR RDSTR
10BB CA 12      697          ADR CITY
10BD            698  ;
10BD 20 0F 78   699          JSR READLN
10C0 20 3F 78   700          JSR RDSTR
10C3 D9 12      701          ADR STATE
```

Listing continued.

Circle 191 on Reader Service card.

BACK-UP ALMOST ANYTHING!

Products below, when used appropriately, either singly or together, will enable you to copy virtually all software for the relevant computer. The copy-products are intended to be used for back-up purposes only! Products are Apple-compatible unless otherwise indicated.

Locksmith	75	Crack-Shot	129
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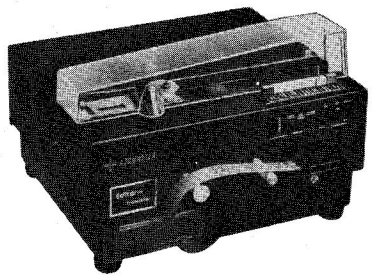


A word for this Punch/Reader Combo is .....

Speed! Model 510 punches paper tape at 110cps, reads at 150cps. This rugged machine is computer compatible offering RS232C, current loop, parallel inputs. The ASCII-to-Baudot code conversion permits direct keyboard entry for Telex/TWX transmission. Plus: 256 character storage, 75-9600 baud rate, 5-8 level tape, stock. ADDMASTER CORP. 416 Junipero Serra Dr., San Gabriel, CA 91776 ★ 213/285-1121.

Circle 56 on Reader Service card.

AMPERGRAPH

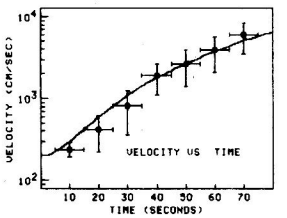
AMPERGRAPH is a powerful, easy-to-use relocatable graphics utility for the Apple II +/e. AMPERGRAPH adds twenty-two Applesoft commands that allow effortless generation of professional-looking plots of scientific or financial data. All of the necessary scaling and screen formatting is accomplished with just a few, simple Applesoft lines.

Unlike most other plotting systems for the Apple II which are stand-alone systems, the AMPERGRAPH utility provides extended BASIC graphics language macros that you can use directly in your own Applesoft programs. The additional commands are &SCALE, &LIMIT, &AXES, &GRID, &FRAME, &LOG X, &LOG Y, &LABEL AXES, &LABEL, &VLABEL, &CENTER LABEL, &CENTER VLABEL, &DRAW, &PENUP, &CROSS, &OPEN SQUARE, &CLOSED SQUARE, &OPEN CIRCLE, &CLOSED CIRCLE, &ERROR BARS, &DUMP (to dump the graph on a Silentype printer) and &*DUMP (to link with AMERDUMP, see below).

$45.00

SAMPLE AMPERGRAPH PROGRAM LISTING:

```
10 &SCALE, 0, 80, 80, 13000
15 LX$ = "TIME (SECONDS)":LY$ = "VELOCITY
   (CM/SEC)"
20 &LOG Y: &LABEL AXES, 10, 10
25 LABEL$ = "VELOCITY VS. TIME":&LABEL, 30,
   200
30 FOR T = 0 TO 80:&DRAW, T, 150 + T12:NEXT T
35 FOR T = 10 TO 70 STEP 10
40 &CLOSED SQUARE, T,
   (150 + T12)*(.8 + .4*RND(3) )
45 &ERROR BARS, 5, T12/2
50 NEXT T:&DUMP
```



AMPERDUMP

AMPERDUMP is a high-resolution graphics dump utility which can be used either in menu-driven mode, or directly from your Applesoft program, with, or without AMPERGRAPH. The following printers will work with AMPERDUMP: Epson MX-80, FX-80, MX-100; Apple DMP, NEC PC-8023A-C, C. ITOH 1550, 8510A/B, 8600. AMPERDUMP offers many features which are not available in other graphics dump routines:

- Horizontal magnifications: 3 with Epson printers (2.33 to 6.99 inches); 12 with all others (1.75 to 7.78 inches)
- Vertical magnifications: 9 with Epson printers (0.88 to 7.96 inches); 6 with all others (1.33 to 8.00 inches)
- Horizontal and vertical magnifications can be specified independently.
- Normal / Inverse dumps
- Fast
- Adjustable horizontal tab
- Easy to use
- Compatible with AMPERGRAPH
- Relocatable

$40.00

The AMPERGRAPH and AMPERDUMP graphics utilities require an Apple II +/e (or Apple II with language card). The AMPERDUMP utility requires one of the following interface cards: Epson, Apple, Grappler, Interactive Structures, Mountain Computer, Epson Type2, Tymac, or Microbuffer II.

AMPERGRAPH and AMPERDUMP are available from your dealer or order direct. Include $2.00 for shipping and handling; Wisconsin residents add 5% sales tax.

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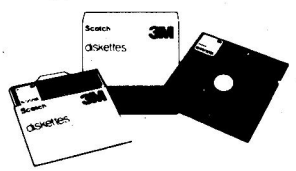
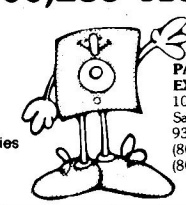


(800)235-4137

VISA



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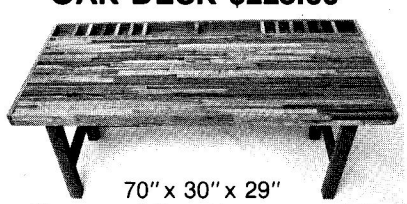

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Listing continued.

```
10C5            702  ;
10C5 20 0F 78   703          JSR READLN
10C8 20 3F 78   704          JSR RDSTR
10CB DD 12      705          ADR ZIPCODE
10CD            706  ;
10CD 20 0F 78   707          JSR READLN
10D0 20 3F 78   708          JSR RDSTR
10D3 E8 12      709          ADR PHONENUM
10D5            710  ;
10D5            711  ;
10D5 20 39 78   712          JSR PRTSTR
10D8 85 12      713          ADR LASTNAME
10DA 20 36 78   714          JSR PRINT
10DD AC A0 00   715          BYT ", ",0
10E0 20 39 78   716          JSR PRTSTR
10E3 78 12      717          ADR FIRSTNAM
10E5 20 E9 11   718          JSR WRITELN
10E8            719  ;
10E8 20 39 78   720          JSR PRTSTR
10EB 92 12      721          ADR AUXINFO
10ED 20 E9 11   722          JSR WRITELN
10F0            723  ;
10F0 20 39 78   724          JSR PRTSTR
10F3 AB 12      725          ADR STRTADRS
10F5 20 E9 11   726          JSR WRITELN
10F8            727  ;
10F8 20 39 78   728          JSR PRTSTR
10FB CA 12      729          ADR CITY
10FD 20 36 78   730          JSR PRINT
1100 AC A0 00   731          BYT ", ",0
1103 20 39 78   732          JSR PRTSTR
1106 D9 12      733          ADR STATE
1108 20 36 78   734          JSR PRINT
110B A0 A0 00   735          BYT "  ",0
110E 20 39 78   736          JSR PRTSTR
1111 DD 12      737          ADR ZIPCODE
1113 20 E9 11   738          JSR WRITELN
1116            739  ;
1116 20 39 78   740          JSR PRTSTR
1119 E8 12      741          ADR PHONENUM
111B 20 E9 11   742          JSR WRITELN
111E 20 E9 11   743          JSR WRITELN
1121 20 E9 11   744          JSR WRITELN
1124            745  ;
1124 20 1B 78   746  NEXTP   JSR NEXT
1127            747  ;
1127            748  ;
1127 20 36 78   749          JSR PRINT
112A 8D 84 D0   750          BYT CR,CTLD,"PR#0",CR
112D D2 A3 B0
1130 8D
```

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```
1131 8D 8D      751          BYT CR,CR
1133 D0 F2 E5   752          BYT "Press return to continue:",0
1136 F3 F3 A0
1139 F2 E5 F4
113C F5 F2 EE
113F A0 F4 EF
1142 A0 E3 EF
1145 EE F4 E9
1148 EE F5 E5
114B BA 00
114D 20 0F 78   753          JSR READLN
1150 4C 8C 08   754          JMP MAINLOOP
1153            755  ;
1153            756  ;
1153            757  ;
1153            758  ;
1153            759          TTL "Auxillary routines, etc."
1153            760  ;
1153            761  ;
1153 20 27 78   762  TSTFORQ  JSR IFS0
1156 F6 11 ED   763          ADR INPUTSTR,EQ
1159 00
115A D1 00      764          BYT "Q",0
115C D0 16      765          BNR QUIT
115E            766  ;
115E 20 27 78   767          JSR IFS0
1161 F6 11 ED   768          ADR INPUTSTR,EQ
1164 00
1165 F1 00      769          BYT "q",0
1167 D0 0B      770          BNR QUIT
1169            771  ;
1169 20 36 78   772          JSR PRINT
116C 8D 87 87   773          BYT CR,BELL,BELL,BELL,0
116F 87 00
1171 4C 8C 08   774          JMP MAINLOOP
1174            775  ;
1174            776  ;
1174 20 36 78   777  QUIT    JSR PRINT
1177 8D CD E1   778          BYT CR,"Make sure the disk with the
                             MAIL.LIST",CR
117A EB E5 A0
117D F3 F5 F2
1180 E5 A0 F4
1183 E8 E5 A0
1186 E4 E9 F3
1189 EB A0 F7
118C E9 F4 E8
118F A0 F4 E8
1192 E5 A0 CD
1195 C1 C9 CC
1198 AE CC C9
119B D3 D4 8D
119E B6 E9 EC   779          BYT "file is still in the active disk
                             drive",CR
11A1 E5 A0 E9
11A4 F3 A0 F3
11A7 F4 E9 EC
11AA EC A0 E9
11AD EE A0 F4
11B0 E8 E5 A0
11B3 E1 E3 F4
11B6 E9 F6 E5
11B9 A0 E4 E9
11BC F3 EB A0
11BF E4 F2 E9
11C2 F6 E5 8D
11C5 E1 EE E4   780          BYT "and press return:",0
11C8 A0 F0 F2
11CB E5 F3 F3
11CE A0 F2 E5
11D1 F4 F5 F2
11D4 EE BA 00
11D7 20 0F 78   781          JSR READLN
11DA            782  ;
11DA 20 36 78   783          JSR PRINT
11DD 8D 84 C3   784          BYT CR,CTLD,"CLOSE",CR,0
11E0 CC CF D3
11E3 C5 8D 00
11E6 4C 69 FF   785          JMP EXIT
11E9            786  ;
11E9            787  ;
11E9            788  ;
11E9            789  ;
11E9            790  ;
11E9            791  ;
11E9            792  ***********************************
11E9            793  ;
11E9            794  ; Auxillary routines.
11E9            795  ;
11E9 A9 8D      796  WRITELN  LDA #CR
11EB 4C 00 78   797          JMP PUTC
11EE            798  ;
11EE            799  ;
11EE            800  ;
11EE            801  ***********************************
11EE            802  ;
11EE            803  ;
11EE            804  ; Variable declarations.
11EE            805  ;
11EE            806  ;
11EE            807  ;
11EE            808  ;
```

Listing continued.

Listing continued.

```
11EE 01 00      809  ONE       ADR 1
11F0            810  ;
11F0            811  ;
11F0            812  ;
11F0 00 00      813  I         ADR 0
11F2 00 00      814  NUMRECS    ADR 0
11F4 00 00      815  RECNUM    ADR 0
11F6            816  ;
11F6            817  ;
11F6 80 00      818  INPUTSTR  ADR 128
11F8            819             DFS 128
1278 0B 00      820  FIRSTNAM  ADR 11
127A            821             DFS 11
1285            822  ;
1285 0B 00      823  LASTNAME  ADR 11
1287            824             DFS 11
1292            825  ;
1292 17 00      826  AUXINFO   ADR 23
1294            827             DFS 23
12AB            828  ;
12AB 1D 00      829  STRTADRS  ADR 29
12AD            830             DFS 29
12CA            831  ;
12CA 0D 00      832  CITY      ADR 13
12CC            833             DFS 13
12D9            834  ;
12D9 02 00      835  STATE     ADR 2
12DB            836             DFS 2
12DD            837  ;
12DD 09 00      838  ZIPCODE   ADR 9
12DF            839             DFS 9
12E8            840  ;
12E8 0E 00      841  PHONENUM  ADR 14
12EA            842             DFS 14
12F8            843  ;
12F8            844  ;
12F8            845             END

***** END OF ASSEMBLY
```

```
!brun sort
BRUN SORT
SYMBOL TABLE SORTED ALPHABETICALLY
```

ABS	7854	ADDRECS	0953	AUXINFO	1292	BEGIN	0800	BELL	0087
CASE	7848	CASEI	784B	CITY	12CA	CONCAT	786F	CR	008D
CTLD	0084	DIV	785D	DOAGAIN	0C59	EQ	00BD	EXIT	FF69
EXITADD	0C5C	FALSE	0000	FIRSTNAM	1278	FOR	7815	FOR0	7818
GE	BDBE	GETAUX	0A15	GETC	7803	GETCITY	0AA7	GETFNAME	099B
GETLNAME	09D9	GETPHONE	0B45	GETSTATE	0AD9	GETSTRT	0A61	GETYORNO	0C04
GETZIP	0B0D	GOODNUM	0CF2	GT	00BE	HOME	780C	I	11F0
IFI	781E	IFI0	7821	IFS	7824	IFS0	7827	INDEX	7869
INIT	7812	INPUTSTR	11F6	INSET	784E	ISD	0CA4	ISO	0E56
ISP	0FEE	ISS	0DCD	ISYES	0EF5	LASTNAME	1285	LDSTR	7833
LE	BDBC	LENGTH	786C	LOAD	782D	LT	00BC	MAINLOOP	088C
MOD	7860	MOVE	782A	MOVS	7830	MUL	785A	NE	00A3
NEG	7857	NEXT	781B	NEXTP	1124	NOERROR	0971	NOTDLTD	109D
NOTINSET	7851	NUMRECS	11F2	ONE	11EE	ONXGOTO	7845	PHONENUM	12E8
PRINT	7836	PRTINT	783C	PRTSTR	7839	PUTC	7800	QUIT	1174
RDINT	7842	RDSTR	783F	READLN	780F	RECNUM	11F4	RECOK	0D5F
RND	7863	SAGL	7806	SAPC	7809	STATE	12D9	STRTADRS	12AB
SUBSTR	7866	TRUE	0001	TSTFORD	0C8B	TSTFORO	0E3D	TSTFORP	0FD5
TSTFORQ	1153	TSTFORS	0DB4	WRITELN	11E9	WRTINFO	0B82	ZIPCODE	12DD

```
SYMBOL TABLE SORTED BY ADDRESS
```

FALSE	0000	TRUE	0001	CTLD	0084	BELL	0087	CR	008D
NE	00A3	LT	00BC	EQ	00BD	GT	00BE	BEGIN	0800
MAINLOOP	088C	ADDRECS	0953	NOERROR	0971	GETFNAME	099B	GETLNAME	09D9
GETAUX	0A15	GETSTRT	0A61	GETCITY	0AA7	GETSTATE	0AD9	GETZIP	0B0D
GETPHONE	0B45	WRTINFO	0B82	GETYORNO	0C04	DOAGAIN	0C59	EXITADD	0C5C
TSTFORD	0C8B	ISD	0CA4	GOODNUM	0CF2	RECOK	0D5F	TSTFORS	0DB4
ISS	0DCD	TSTFORO	0E3D	ISO	0E56	ISYES	0EF5	TSTFORP	0FD5
ISP	0FEE	NOTDLTD	109D	NEXTP	1124	TSTFORQ	1153	QUIT	1174
WRITELN	11E9	ONE	11EE	I	11F0	NUMRECS	11F2	RECNUM	11F4
INPUTSTR	11F6	FIRSTNAM	1278	LASTNAME	1285	AUXINFO	1292	STRTADRS	12AB
CITY	12CA	STATE	12D9	ZIPCODE	12DD	PHONENUM	12E8	PUTC	7800
GETC	7803	SAGL	7806	SAPC	7809	HOME	780C	READLN	780F
INIT	7812	FOR	7815	FOR0	7818	NEXT	781B	IFI	781E
IFI0	7821	IFS	7824	IFS0	7827	MOVE	782A	LOAD	782D
MOVS	7830	LDSTR	7833	PRINT	7836	PRTSTR	7839	PRTINT	783C
RDSTR	783F	RDINT	7842	ONXGOTO	7845	CASE	7848	CASEI	784B
INSET	784E	NOTINSET	7851	ABS	7854	NEG	7857	MUL	785A
DIV	785D	MOD	7860	RND	7863	SUBSTR	7866	INDEX	7869
LENGTH	786C	CONCAT	786F	LE	BDBC	GE	BDBE	EXIT	FF69

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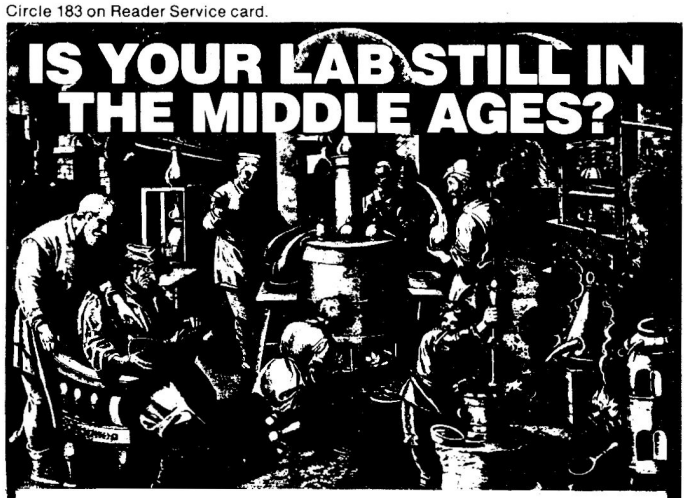

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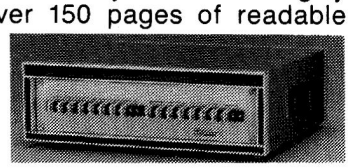

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Book Reviews

Polishing Your Apple

by Herbert M. Honig
Howard W. Sams & Co. Inc.
Indianapolis, IN 46268
Softcover, 77 pp., $4.95

As Herbert Honig says in his preface learning to program computers is not hard for people used to tackling problems in a disciplined way. If you are such a person, *Polishing Your Apple* may be for you—provided you are also a newcomer to Applesoft.

This little book introduces you to a useful subset of Applesoft Basic plus a few disk-related commands. No attention is paid to graphics or fancy sound. This is quite appropriate, given the author's clearly stated intent to provide you with a primer for quickly learning to write serviceable programs.

The author focuses on the Basic commands that appear in almost any program. The function of each is briefly shown in a program, and a line-by-line description of the program's operation is given. Too few books for beginners provide this kind of description, yet it makes learning much more efficient.

In addition to the programs, techniques for entering, debugging and editing them are concisely presented. Useful tips abound, like the handy POKE 33,33 for editing print statements. Many of us self-taught programmers have had to glean this and other good tips from all over—from Apple's own books, friends, magazines and so on. Here they are introduced when needed to make your programming job easier.

Much is packed into the short space of this book. The first program is a simple three-liner; the last is a fairly sophisticated one using files. There is even a section containing helpful hints for making good use of popular printers like the Epson.

Some may find the concentration of information and fast pace overwhelming. Others will find *Polishing Your Apple* just what they have been waiting for. ■

Barbara M. Florini
Syracuse, NY

Introduction to Computers and Data Processing

by Gary Shelly and Thomas Cashman
Anaheim Publishing Company
2623 Saturn St.
Brea, CA 92621

Certainly among the best of the myriad EDP and programming texts on the market is the series from Anaheim Publishing Company. Authors Gary Shelly and Thomas Cashman, both educators, have collaborated on some 20 textbooks to date, running the gamut from *Introduction to Programming* to *Business Systems Analysis and Design*.

Of interest to teachers of secondary school computer science, computer literacy and data processing courses will be *Introduction to Computers and Data Processing*, a magnificently planned and beautifully illustrated text (190 manufacturers supplied photographs). In some 500 pages the book examines the evolution of the computer industry, processing concepts, data input and information output, auxiliary storage and file organization, data communications, systems analysis, database processing, program design, programming languages and the future of computers in society.

This book forms the core of a complete set of support materials, a student workbook and study guide plus answer manual, transparency masters for all illustrations in the main text, instructor's guide to the text and a complete test bank (2040 questions) organized by text chapter. Also available is *Introduction to BASIC Programming*, to complement the programming coverage in the primary text. This latter book is also accompanied by a set of lesson plans and solutions to assignments, as well as a test bank with mid-term and final examinations.

Educationally sound materials are not cheap, however. The core text is priced at $18.95, the programming supplement at $14.95 and the workbook/study guide at $7.95. It is unlikely, though, that a comparable set of books is available at any price at the moment. ■

Peter L. Vogel
Vancouver, B.C.

Basic Apple BASIC

by James Coan
Hayden Book Co.
50 Essex St.
Rochelle Park, NJ 07662
$12.95

I Speak BASIC to My Apple (Teacher's Manual)

by Aubrey B. Jones, Jr.
Hayden Book Co.
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Rochelle Park, NJ 07662
$12.95

BASIC Exercises for the Apple

by J.P. Lamoitier
Sybex Inc.
2344 Sixth St.
Berkeley, CA 94710
$12.95

At one time or another, almost all personal computer users are exposed to some dialect of the Basic programming language. Applesoft is easily the most popular language in use on Apples.

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tended to provide fluency in Basic, give three different but equally effective approaches.

The first of these books, *I Speak BASIC to My Apple*, is a teacher's guide to be used in a formal class environment. To use the program as it is intended, each of the students would be provided with a student text, and have access to an Apple computer.

This book is written for computer novices and takes nothing for granted. *I Speak BASIC to My Apple* starts with a basic overview of a computer system, explaining input, output, storage and the many cornerstones of computer literacy in an easy to understand manner. The concept of a program is introduced, with appropriate examples of Basic instructions. The book is completely Apple-oriented—illustrations are always of Apple II keyboards, video displays, etc. This is far from a shortcoming; many general instructional texts on the subject give examples that may work on one machine but not another. No danger of that here.

Although the information that it covers is limited in scope, this book is is thorough with what it does discuss. The most basic of Basic commands are discussed, and examples of their use are given. Periodic quizzes and exercises along the way reinforce what is learned. The book, however, does not venture far beyond introductory low-resolution graphics commands, basic subroutines, loops and simple arrays. Disk drives are not mentioned; the book assumes none are connected to the machine in use.

While not the book for those who are already comfortable with Basic, *I Speak BASIC to My Apple* is ideal for introducing another family member to the language, as well as for its intended classroom use. It meets its goals with skill, and would be an excellent addition to the library of any computer club.

***

Also from Hayden books comes *Basic Apple BASIC*, a slightly more advanced approach to the subject, yet one that a novice can feel comfortable with right from the start. *Basic Apple BASIC* is a well-structured book, introducing commands in a logical progression. Each section is summarized with a review and a selection of problems to solve using the information learned. A nice feature is the Programmer's Corner, a small section at the end of each chapter for the more adventurous; it gives some advanced programming ideas and focuses on some of the Apple's special features. These sections are *full* of valuable tips and interesting techniques.

Some of the more difficult concepts in programming, such as random-access disk files and shape tables, are clearly presented. From the most basic of Basic to the most mind-boggling, this book covers it all. At $12.95, *Basic Apple BASIC* would have to be called a value and a must-have for any serious programmer. Mr. Coan's book has something for everyone interested in the Apple. Its valuable information, along with the author's upbeat and enjoyable writing style make this a book that I can recommend highly.

***

Another interesting book on the subject is *BASIC Exercises for the Apple*, by J.P. Lamoitier. Rather than showing what functions various Basic commands perform, as most books do, *BASIC Exercises* presents its information in an unusual form. Problems are presented, and the book shows the various steps to solve them using Basic. This is not a book for the utter novice; some knowledge of Basic is needed to get the most from the material presented. A heavy emphasis is placed on flowcharting, and the concept is covered in depth.

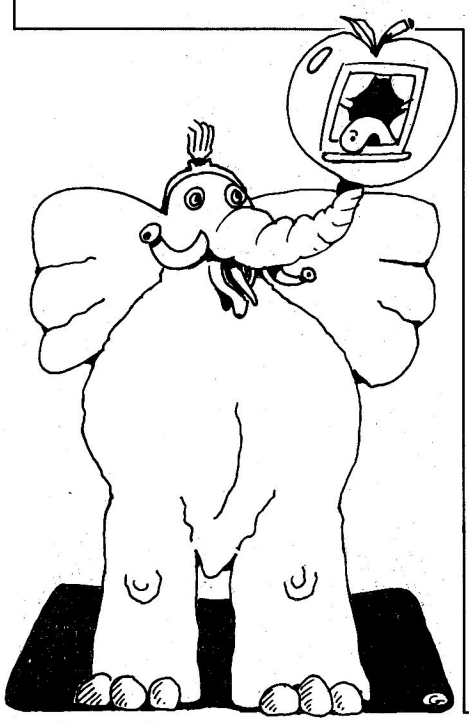
A typical example of the material in this book is an exercise to find the first N prime numbers, with N varying between 10 and 60, via a Basic program. The book concentrates on careful definition of the problem itself, the first step in solving it. An algorithm is then developed, then transferred to a flowchart and later to Basic. Improvements to the original program are added as the exercise progresses until the final result is a well-tuned, logical solution to the problem.

Many of the exercises in this book deal with concepts few of us use in everyday life, such as Armstrong numbers (numbers for which the sum of the cubes of the individual digits add up to the number itself) and linear regression. Following the steps taken in solving these difficult problems can make more common problems much easier to deal with.

While this may not be the book for the casual user of Basic, *BASIC Exercises for the Apple* is an excellent workout for any dedicated programmer. Mr. Lamoitier presents solutions for seemingly unsolvable problems, and does so with an ease that may have many readers thinking, "Why didn't I think of that?" All in all, this is an excellent book, but definitely not for everyone.

Three books, three approaches to the same subject. Each of them effective in its own way, and all of them well worth your consideration. ■

W. Charles Doherty
S. Dartmouth, MA



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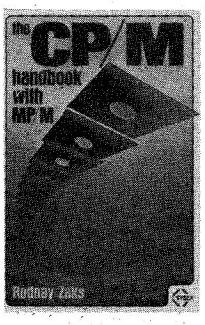

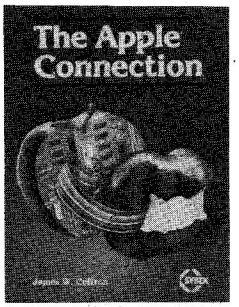

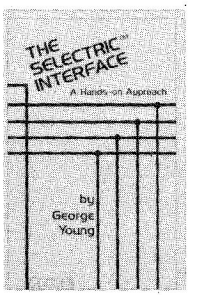

THE BOOK OF APPLE SOFTWARE—edited by Jeffrey Stanton, Robert P. Wells, Ph.D., and Sandra Rochowansky. Are you bewildered by the thousands of Apple II programs on the market? Here is the advice you need, with descriptions, ratings, and evaluations of over 500 of the most popular programs for the Apple 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

MICROBOOK: DATA BASE MANAGEMENT FOR THE APPLE II—by Ted Lewis. This book provides you with an affordable data base management system for your Apple II. These programs turn your Apple II into a combination filing cabinet, information gathering/retrieval system and data processing engine. Written in Pascal, the programs simulate a library. Information is maintained and broken down into books, chapters and pages and index to pages. Photographs of the Apple II screen are abundant, and they show you step-by-step the effect of each of your entries. Microbook can be used for almost any application involving the storage and retrieval of information. BK1261 $19.95

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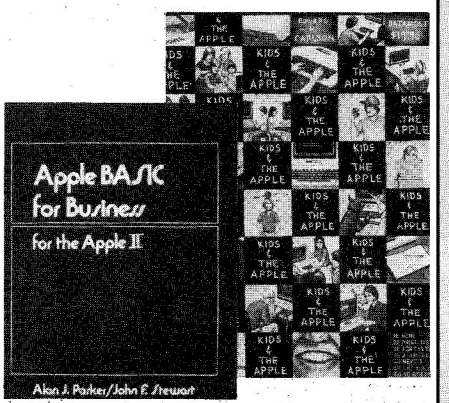

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Axlon Ramdisk 320

The Axlon Ramdisk 320 looks like an Apple disk drive in style, size and color. When you first see this unit your reaction is, "Where is the slot for the disk?" The only things visible on the front of it are a few little lights. But packed in the case is 320K of RAM, a power supply and a battery.

Hardware Description

The system is built to appear like two floppy disk drives operating from the same slot. In Basic, they would look like drive 1 and drive 2. In Pascal they can be volume numbers 4 and 5, 9 and 10 or 11 and 12. Each drive looks like 35 tracks with 16 sectors per track and 256 bytes per sector, just like the real thing. There are really 40 tracks available but you have to use some tricks to get to it. I understand that 80 tracks are available under CP/M.

Inside the box are forty 64K RAM chips giving a total capacity of 327,680 bytes. A built-in battery backup system protects the memory in the box from blackout or brownout conditions for up to three hours. The system requires no power from the Apple. The Ramdisk has its own power supply and line cord. The battery is automatically recharged from the built-in power supply while the Ramdisk is turned on. There is a light on the front of the unit to show when the battery is charging.

An interface card is used to connect the Ramdisk to the Apple. This card contains the controller chips that are used to produce timing and refresh signals. A static RAM is used as a partial storage location for the Ramdisk operating system. The interface card can work in any slot other than zero. This interface card gets its power from the Ramdisk, not the Apple. This is a big advantage for those who have a stuffed Apple. The power dissipation is very low, helping to keep the temperature down in the core of the Apple.



The Ramdisk 320 from Axlon Inc.

Operation

The Ramdisk is designed to work with Apple DOS 3.3, Apple Pascal 1.1 and CP/M simulating standard disk drives. The only difference you'll notice is the greatly increased speed in comparison with standard mechanical drives. You can boot from the Ramdisk using the PR# command, or, if the interface card is installed in a slot above the mechanical drive interface, the system will boot directly from the Ramdisk when the Apple's power is applied.

Once the system was installed, I found that all DOS commands worked exactly like they always did with one difference—speed! In an effort to illustrate this speed, I timed some DOS functions using a stopwatch. The results are in the Table.

At first glance it does not look like there is a great increase in speed. You have to experience it to really understand its speed. Since it is not a mechanical unit, it is even faster than a hard disk.

Software

Included with the system is a utility disk with a number of programs in Basic and machine language. Another utility disk is included for Pascal. One of the greatest benefits of this system is its ability to rapidly assemble and compile Pascal code. I understand WordStar becomes a completely different environment with this system because of the fast disk accesses.

The programs on the Basic utility disk are more extensive. There is a program to reconfigure the system to any slot. There is a fast copy program that will copy the Ramdisk memory onto your mechanical drive disk or vice-versa. And there is a machine language program that allows you to

FUNCTION	AXLON	STD
Assemble 68 sector source using BIG.MAC	232 sec.	285 sec.
BLOAD graphic screen	2.7 sec.	9.9 sec.
BRUN 144 sector program	12 sec.	37 sec.

Table 1. Results of the DOS functions speed test.

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use the extra 40 tracks—but not as disk space. The source code for this and other routines are in the manual.

Two programs included on the Basic utility disk are worthy of special mention. Many times a new gadget is sold with a well-written manual. But you can't grasp how to use this new accessory until you see some good examples. Axlon provides two excellent examples of how to use the Ramdisk to full advantage.

The first program is called The Directory. It offers a limited information retrieval system for a medium to large company. It can be used effectively in an office lobby as a reference tool for the company receptionist or telephone operator. With a few simple keystrokes, the user can quickly find any piece of information in The Directory's 3248 records. It also contains an editor to input information.

The other program is called Mini-Base Phone Book, an Applesoft information retrieval system similar to The Directory. This system can handle approximately 200 records in a single file with up to five files on a single Ramdisk or disk. The Mini-Base is actually several programs. The noteworthy item about this program is its use of special machine language subroutines. They include a special keyboard input routine that acts as a combination Get/Input routine. The Get/Input combination allows the program to read the keyboard looking for the escape or return key as the first key press simulating a Get statement, and then handles the remaining key presses as an Input statement.

Another routine is a text file Fast Loader routine. It greatly speeds up loading text files with a few restrictions. But it can be a very useful routine.

Finally, there is a Fast Sort routine. You can sort a list of information that is read using the Fast Loader routine described above. This routine is designed to sort variables in ascending order by ASCII code. All of these routines are called using the & vector.

"With a few simple keystrokes the user can quickly find any piece of information."

The Manual

The manual is actually three manuals in one. There is a manual for the Ramdisk, the Directory program and the Mini-Base Phone Book. It is written for someone who knows a little something about the Apple II.

Included in the manual are some assembly language listings to do such things as clear sectors, read a sector, and access the extra memory in the Ramdisk not accessible from DOS. Also included are memory locations for many routines in the modified DOS. Methods are shown for accessing the Ramdisk from assembly language routines of your own design.

There is a problem with the Ramdisk: you must use the DOS as modified by the Ramdisk utilities. Other modifications and protected software will not work with this system.

However, if you are looking for very high speed and compatibility with standard DOS 3.3, Pascal 1.1 and CP/M, then you may have a winner. It is priced between two Disk II's and a hard disk, which is right where its capabilities lie.

The Ramdisk is available from Axlon Inc., 170 N. Wolf Road, Sunnyvale, CA 94086, for $1395. ■

Lee E. Sumner
Dallastown, PA

F-10 Printer

I was impressed the minute I laid eyes on it. For those of us accustomed to the likes of popular dot matrix printers, such as Epsons and Okidatas, the size and heft of the C. Itoh Printmaster F-10 is a bit startling at first. Weighing nearly 31 pounds, it makes my Apple seem diminutive. You get the feeling that the computer is an accessory for the printer, rather than the other way around.

But with the impressive heft comes impressive performance. The F-10, first of all, is a daisywheel printer. That means it's in a different league than the more popular (and less expensive) dot matrix printers.

A dot matrix printer creates a character on paper by printing a dense pattern of dots. A daisywheel printer uses a completely different approach: it prints each character fully formed, in a single blow. The characters are molded in plastic or metal at the ends of thin, flexible petals on the daisy-shaped printing element. As this daisywheel spins, a tiny hammer strikes one of the petals at just the right moment to print the desired character on the paper.

This technique has the potential to produce print quality you simply can't match with a dot matrix printer. I am happy to report that the F-10 lives up to that potential. Its output is indistinguishable from that of an office electric typewriter.

The Printmaster is the faster of the two F-10 models and is rated at 55 characters per second. It takes just one minute to print a normal page of single-spaced text with a maximum line length of 60 characters.

Features

But fast, "plain vanilla" printing is not the only capability of the F-10. Here are some of its many features, all programmable through codes sent to the printer by the computer:

- Horizontal and verticle tab stops—both absolute and relative.
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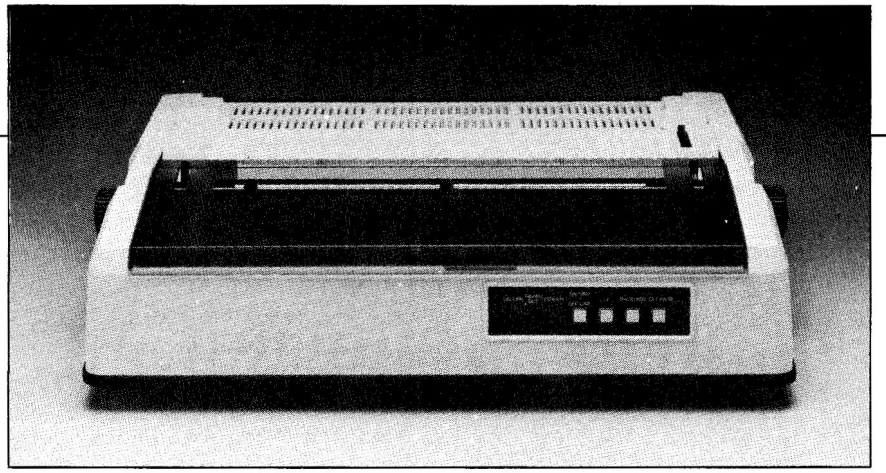

The F-10 daisywheel printer from C. Itoh and Company Inc.

- Software reset to the settings in effect when the printer was powered on (convenient when you've been doing all kinds of crazy things such as the above and want to get back to plain vanilla printing).

- An optional word processing mode (not on the model I tested) offering proportional spacing, automatic underscoring, bold printing and shadow printing.
- A graphics mode with a density of either 60 or 120 dots per inch horizontally and 48 dots per inch vertically.
- Variable hammer striking force for each character.
- Optional printwheel control for nonstandard printwheels (programmable character address, impact force, and proportional spacing pitch).

Hardware options include either serial (RS-232C) or parallel (Centronics) interfaces, and an optional paper sheet feeder mechanism for convenient printing of long documents.

Operation

The printer uses friction to feed paper through its maws. (If there is a tractor-feed option available, there was no mention of it in the manual I received.) The feeding seems quite reliable, although continuous lengths of paper eventually get off track after several pages have gone through.

Changing the ribbon is simplicity itself. The ribbon is contained in a cartridge that can be popped out and reinstalled in less than ten seconds. The daisywheel, likewise, is simple and straightforward to replace.

It's hard to find fault with the capabilities and performance of this printer. Like other daisywheel printers, it is fairly noisy. However, the pitch of the noise is less piercing than a typical dot matrix printer. The cooling fan generates a continuous windy sound as long as the printer is powered up. I can't report on the printer's longterm reliability, but I can say that it printed several hundred flawless pages for me during several weeks of testing.

Documentation

As hard as it is to find anything bad to say about the printer, it's even harder to find anything good to say about its documentation.

The user's manual accompanying the F-10 is awful. Although it does contain quite a bit of the information, it is presented neither in a logical nor clear manner.

Part of the problem is summed up by the legend on the back cover of the manual: "Printed in Japan". Awkard English phrasing is the last thing you need when trying to learn how to use such a sophisticated device.

One problem I had was trying to unravel the manner in which the manual uses the terms "serial", "par-

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READ**	42.2 sec.	12.4 sec.
WRITE**	44.6 sec.	14.9 sec.
APPEND**	21.3 sec.	2.3 sec.

* Hi-res screen ‡ 80-sector BASIC program
** 52-sector text file

Diversi-DOS, the QUADRUPLE utility, requires a 48K Apple II or II+ with DOS 3.3. A simple, menu-driven installation program is included on the un-protected disk. So what are you waiting for?

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allel" and "line." The printer can use either a serial or parallel interface, but it never really clearly conveyed that fact. The manual also said (in so many words, this time) that "both serial and line modes are switch-selectable." My conclusion? Parallel and line mean the same thing, and both interfaces are available at the touch of a switch.

I finally figured out that is not the case. Serial mode has nothing to do with the type of interface between the printer and computer. With either a serial or parallel interface, you can operate the printer in either serial or line mode.

Another example of the problems with poor documentation is my experience using the F-10's graphics mode. Naturally, I wasn't expecting great graphics with a daisywheel printer. Still, it was nice to know there was a graphics mode capable of printing up to 120 by 48 dots per square inch. That could really go a long way toward dumping a hi-res picture. Even I could probably write a little routine, in Basic, to do the trick.

"Serial mode has nothing to do with the type of interface between the printer and computer."

Unfortunately, after learning everything the manual has to say about this graphics mode, I still have only the vaguest idea how to use it. The best I've been able to do is print a couple hundred periods next to each other in a solid line a few inches long. Is it possible to do more without a special interface card or driver? I'll never find out by reading the manual. There's not a word written on how one would actually use this mode.

In summary, the C. Itoh F-10 is a terrific printer with a lousy manual. If you need high-quality printout, you should seriously consider the F-10. However, this recommendation is conditional. If you have sufficient technical knowledge already, the user-hostile documentation probably won't bother you very much. But if you need to learn how to use the printer's features, be sure to buy it from someone who knows it inside out and will give you the needed support from day one.

For more information on the Printmaster, contact C. Itoh & Co., Inc., 5301 Beethoven Street, Los Angeles, CA 90066. It retails for $1995.00. ■

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Milford, NH

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- ☐8. Other_____

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- ☐2. Apple III
- ☐3. Apple IIe
- ☐4. Lisa
- ☐5. Apple-compatible
- ☐6. Other_____
- ☐7. Don't own one

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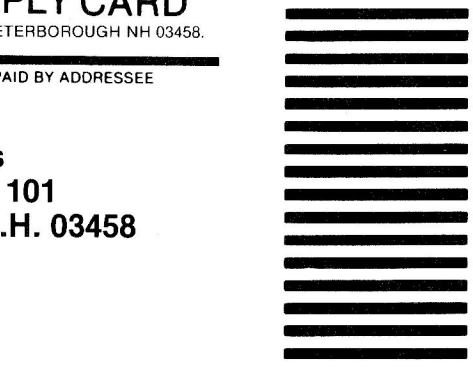



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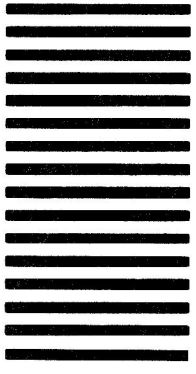

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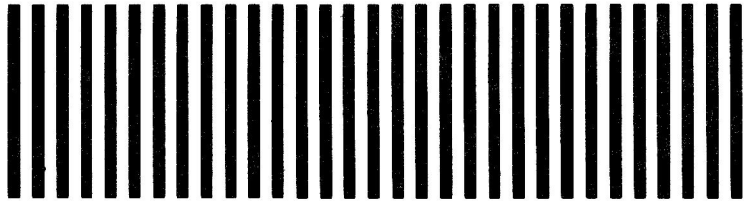

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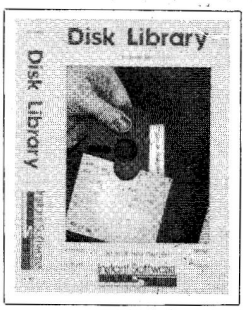

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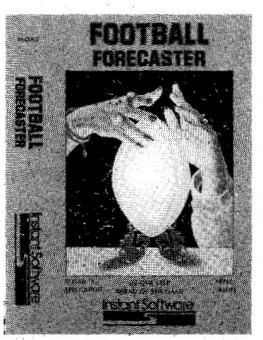

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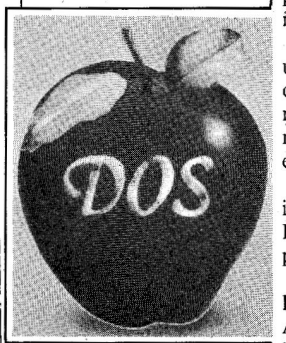

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Software Reviews

Early Games

Early Games by John Paulson of Early Games Company, Suite 140, Shelard Plaza North, Minneapolis, Minnesota, 55426, will appeal to the youngest, pre-reading computer user.

Early Games is a series of nine number, letter and shape matching games that concentrate on developing discrimination, counting and sorting skills. The games are colorful, evenly paced and varied and are very successful in holding the interest of preschool and kindergarten age children.

In the popular Draw program, the child constructs and saves a color picture of his/her own design. This enables even the youngest child to gain a sense of control over the computer while exercising his/her own creativity.

Initial adult assistance is necessary to introduce the child to the very simple mechanics of handling the menu and game play of Early Games. One 5¼-inch disk is included with an instruction/description manual in the Early Games package. The disk is guaranteed against defect for 30 days after purchase and retails for $29.95. ■

Mary Ingram
Brattleboro, VT

Epidemic

Epidemic is a complex single-player strategy game where you, as director of the Center for Disease Control, can stop various deadly viruses and save mankind.

This realistic scenario has meteorites crashing to earth with deadly alien viruses. As director, your mission is to contain and destroy an engulfing plague before it spreads and infects all 14 regions of the world. At your disposal are eight remedies to counter the disease in its early stages; four remedies to counter the disease in its pneumonic level; missiles to destory the meteorites while in the outer atmosphere; and nuclear detonation of a country when no other options are available.

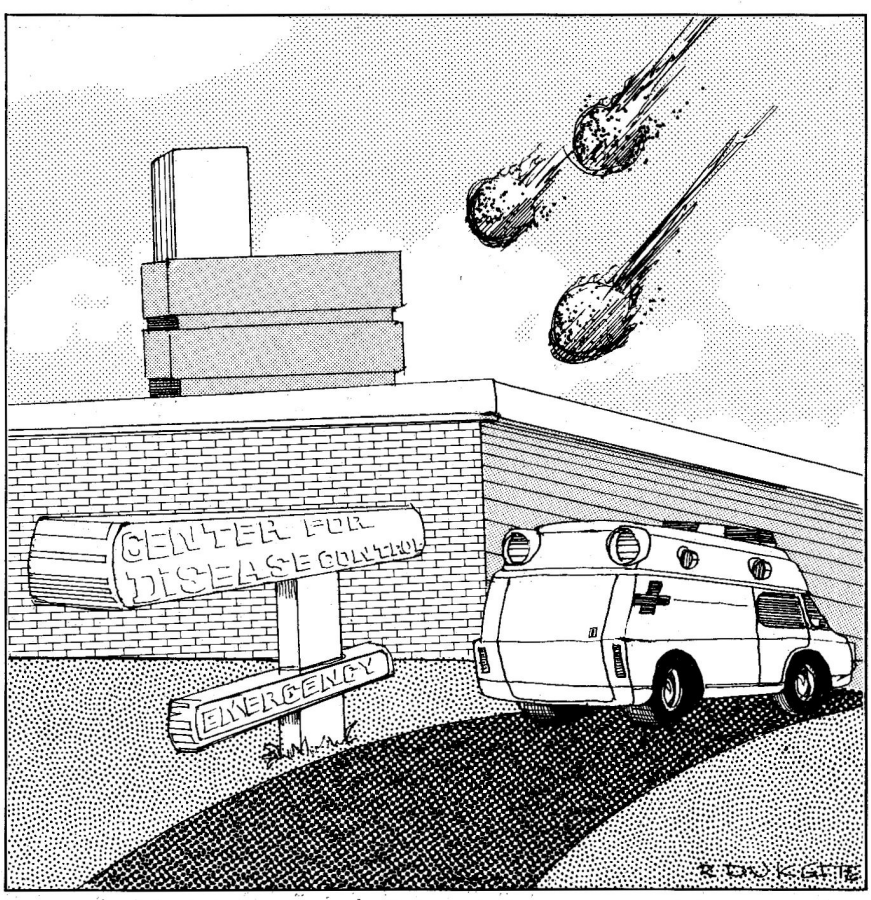
All decisions are implemented through the numerical portion of the keyboard. There are two graphics displays that assist your decision making process. One screen displays a statistical update of specific regions of interest, while the other screen displays the present global status.

The graphics in Epidemic are semi-dynamic and are reasonably well done. The statistical update is truly representative of the data a manager needs to make logical business decisions. The global status is updated each turn by reflecting the incoming meteorite's trajectory and impact data.

Unfortunately, frustration may tend to set in about halfway through the game. If you have a difficult time in handling and digesting data, the amount of dynamic data presented may cause confusion and lead to boredom. This is evident when you decide to use the nuclear detonation option and realize you missed the failsafe code word that was previously flashed on the screen during the statistical update sequence. At certain times, you are unable to logically proceed when remedies are not available. You then must go to the next day (next turn) in the adventure.

Understanding the capabilities of the remedies can be confusing at first. After applying the possibilities a few times, you eventually come to grips with the situation. Using these remedies does reflect the difficulties that a doctor or scientist must go through in a real crisis.

Beginners will find level 1 challenging, while old time players of strategy games will probably jump quickly to level 4. The main difference in the level of play is the amount of time available to defeat the disease. Each day is a turn, and the



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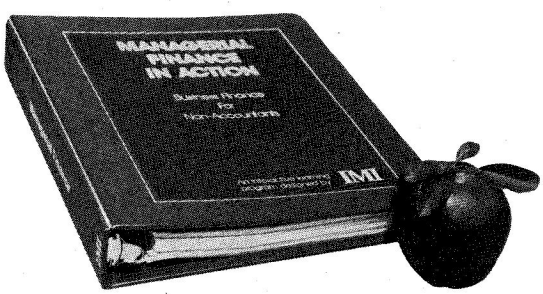

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range of the levels is 15 to 30 days. The game ends in one of three ways: time runs out, the world is destroyed or the world is saved. Your success/failure rating is given at the end of the game; the rating is based on a scale of 0 to 1000.

Epidemic is not as action packed as the seek and destroy games. The strategy is difficult to master. The younger participants who take this adventure will probably find it to be too complicated. However, for the more experienced player, this game will initially be a challenge. The challenge may become stale, however, after a few games.

Epidemic is manufactured by Strategic Simulations Inc., 883 Stierlin Rd., Building A200, Mountain View, CA 94093. Price is $34.95. ■

Miner 2049er

Let me admit, at the outset, that I have demonstrated almost no skill in playing Miner 2049er. Despite my ineptitude at this game, I am forced to confess that Miner is one of the best arcade games available for the Apple II.

If you are familiar with coin games like Donkey Kong, you already have a good handle on the basic format of Miner. As the game begins, the hi-res color screen displays four floors of a futuristic mine. On the bottom floor is a courageous little fellow, Bounty Bob. Your job is to guide Bounty Bob as he climbs all four floors. To win he must defeat or evade the mutant monsters, grab assorted apple-shaped treasures and cover every step of all four mine floors (which will fill in with color as he passes by). As you start you're provided with three Bounty Bobs to accomplish the feat.

After a half hour of Miner you'll be timing your jumps perfectly, leaping over mutant monsters and gaps in the floor, and traveling the whole mine without a fatal accident.

The first level (of which I have a wonderful knowledge, having spent so much time there) is the easiest. All Bounty Bob has to do is evade four immobile mutants, climb some simple ladders, grab five treasures and jump one little gap in the floor.

So far, I have not acquired the skill which I have displayed in other arcade games. In Miner 2049er you have to bear down and concentrate or you'll never get past the first level. When my concentration wavers, I sometimes misjudge a jump and send Bounty Bob over the edge to his death.

During my occasional excursions into the second level, I discovered many more gaps in the floor, monsters at the very bottom level and slides that abruptly deposit Bounty Bob on the next to lowest floor. On this level it has been a grim struggle. On level three Bounty Bob can barely survive; and so far, I haven't demonstrated the skill to get him into any of the higher levels.

I have been, however, reliably informed that should I ever get beyond level three, Bounty Bob will discover moving platforms, stompers, radioactive pools and harder jumps. Also waiting for Bounty Bob will be various devices that can help him. If he acquires a taste for eating TNT, Bounty Bob can even make use of a cannon to shoot himself to the top of the tenth level.

Miner is designed for play with a joystick. I found control with a Joystick II to be smooth and accurate. If you are using this or any other Apple-compatible joystick that is not self centering, you must calibrate it, using a subroutine that comes with Miner. The documentation recommends an Atari-type, self-centering joystick. You can also use a Sirius joyport with Miner.

Miner 2049er displays a high level of technical quality. The graphics are good; they offer smooth animation, pleasing designs and interesting effects. The shapes representing the monsters and Bounty Bob are adequate for the purposes of play but are not overly exciting. Most importantly, Miner 2049er holds onto your interest.

The format of the game resembles that of Donkey Kong or Apple Panic, and the game offers an exceptionally high level of challenge. Despite the frequent frustrations you'll encounter, play and enjoyment values are high enough to keep you coming back for more.

Micro Fun, a division of Micro Lab, 2669 Skokie Valley Road, Highland Park, IL 60035, lists Miner 2049er at $40. The game can be run on any Apple II or IIe system with 48K memory, a disk drive and a joystick. Miner can be played by one or two players. ■

Brian Murphy
Fairfield, CT

Galactic Gladiators

How many games do you own that were once favorites and now somehow seem a little dull? If it only were possible to expand them a bit, to add a few variations for some new excitement. Galactic Gladiators is one of those rare games that allows you so many options—including designing your own game—that boredom is very unlikely.

The program is billed as a combat simulator. Two teams of your choosing engage in battle, often to the death. Teams are composed of warriors from other planets and, occasionally, monsters like banshees, mutants and slime devils. Combat occurs on the hi-res screen and is accompanied by text messages that explain who is attacking whom and how much damage has been done.

The Main Menu

After booting the disk, you may (P)lay a new game, (R)estart an old game, (I)nitialize an SSI save disk, (C)atalog an SSI save disk, (D)elete an old team, battlefield, or game, or (V)iew species drawings. One of the many strengths of Galactic Gladiators is its provision for saving games in progress, teams you have created and game set-ups. For example, as a

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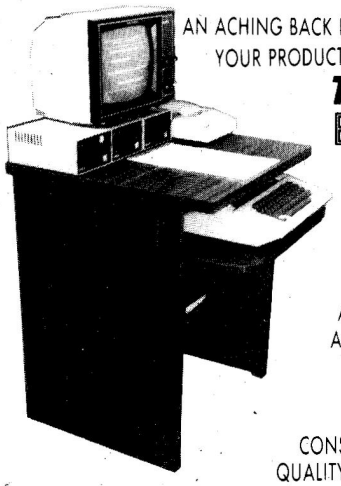

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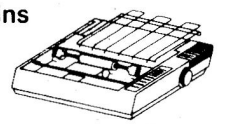

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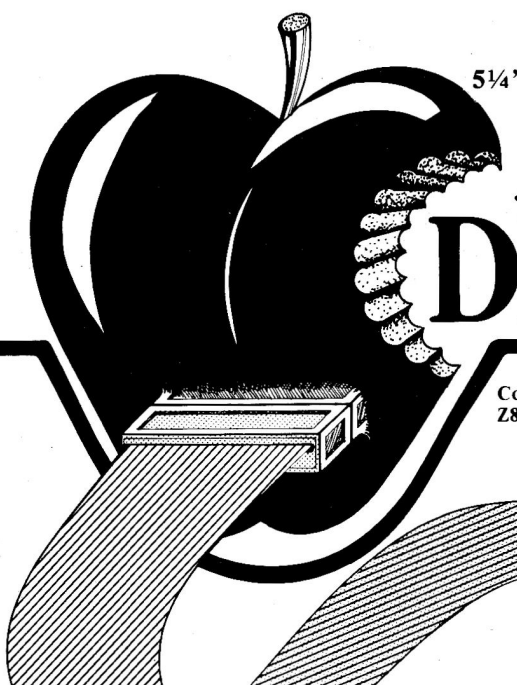

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team gains experience (through winning combats), the members become more adept at dodging attacks and directing their special weapons' fire. It is interesting to see how far they can progress by pitting them against successively more experienced teams.

The Submenus—Game Set-up

Once you have decided to play, you may select one of six possible scenarios: (1) Brawl at Cosmic Mike's Place, (2) In the Arena, (3) Hijack!, (4) Home World Combats, (5) Strange Places or (6) Create a Game. Each has its own permissible options. The higher the number, the greater the control over the set-up.

In Cosmic Mike's, you are introduced to the "standard" teams: lightweights, middleweights, heavyweights, armour team, phasor team, hand weapons and guided missiles team. As with all teams available in Galactic Gladiators, each has its special strengths and weaknesses. After selecting a team for each side, you indicate which team you would like to control. The Apple automatically guides the other team. If you like, you may even elect to captain both teams!

Next, you choose either a grid map or open map for the battlefield display. Since all movements are indicated by number (1–8 for each possible direction), the grid option makes it easier to see where you may move. The open map, however, adds realism to the game. Finally, team members are placed on the battlefield in two possible ways: (E)xperience rule or (C)hoose initial placement. With the former, the Apple places the men and, if one team is stronger, the weaker team is allowed to surprise the other by rearranging men and launching the first attack. With the latter option, you may place one team, both teams, or have placement generated randomly.

In the Arena, you are also allowed to choose the range of the combat—close, medium or long. In the close and medium options, players are represented by hi-res drawings during the combat. In long range, only the first letter of each character's name is displayed.

Hijack! adds two more options. First, teams can be all one species or mixed, and the game may be played until one team is eliminated or in defend mode. In the defend variation, one team selects a square which it elects to defend. The game continues until either team is destroyed or the attackers capture the defended square.

In Home World, you are introduced to seven standard species: Koraci, Cygnian, Human, Wodanite, Froglodyte, Dulbian and Zorcon. The team may contain three, five or seven gladiators. Team two may be an old team (from your save game disk), a regular species team, a special species team, an experienced standard species team, or a new team which you create from scratch. The special species are superior warriors and often possess unusual strength, dexterity, and/or endurance. Whereas the regular species typically have strength between 7 and 19, the special species vary on this characteristic from 10 to 99!

You may also vary the battlefield, choosing whether it is indoors or outdoors, created at random, one of seven standard battlefields, or originally designed. In designing the field, you may place full, half or partial blocks on as many squares as you like. The more complete the block, the less successful weapons will be in piercing it.

Strange Places is definitely a favorite of mine. Even the options have exciting names: Gorsai Free for All, Robot Maze, Touch of Death, Banshee Hunt, Attack of the Slime Devils, Night Stalkers and Gemstone Alley. Each option corresponds to a special species team. Generally, you

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direct the opposing team of your own creation. After selecting the team (same options as in Home World), you may add gladiators up to a total of ten; delete gladiators (if the team is too strong, for example); change an individual member's weapons, armour, or name; and/or merge the team with another from your disk. The only limitation is that certain species travel alone (like the Banshees) or only one such creature (monsters) are allowed per team. If you want an extra exciting game, try Gorsai Free for All which pits two Gorsai teams against each other.

Weapons may be selected from an array of twelve. They include several kinds of close combat weapons (stun wand, laser sword, disruptor, slicer, etc.), two types of phasors, two types of guided missiles, and a heat ray gun (for melting obstacles). Each team member may carry two. Hand weapons require endurance to operate, guided weapons may only be used once, and phasors and heat ray guns must be reloaded after each shot. Each weapon also requires a specific player strength in order to possess it. Armour may be none, light, or heavy. In addition to the protection it affords, the member's dexterity and speed will be reduced according to the armour's density.

Finally, Create a Game lets you control all of the options described above! This mode is especially useful in creating quests—a series of combats with predesignated goals and opponents. Win the first and move your men into a second contest, perhaps allowing them to rearm themselves and take on replacements for the dead or wounded.

The Play

At each turn, you must choose from the main options: (S)urrender, (M)ode, (Q)uit/save, (C)hoose, (R)eview, (E)nd options, (V)iew enemy and (P)rofile. The Mode option allows you to change teams that you control (from 1 to 2, or elect to control both). Thus, if you're losing badly, you can always change sides! Also, since the computer's men occasionally get trapped in a corridor, the Apple isn't always smart enough to find the way out. Profile displays the current status of any of your team members, what the weapon in hand is and if it is loaded, and the secondary weapon. View enemy lets you see similar information for members of the other team.

The Choose option is really the meat of the battle preparation. With it, you indicate what each combatant is to do on the next turn. You may load a weapon, change to the secondary weapon, rest (default), attack one opponent from your current position, move and attack, dodge and move, or fire a heat ray gun (destroys a single obstacle). Each member may perform only one of these per turn. If an individual is heavily stunned, he

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may only rest and recuperate.

During play combatants move in checker-like fashion, hopping from square to square. If movement is blocked at any point, they remain in the last square occupied. Phasor fire is shown by a direct line zipping towards the target and is accompanied by a sizzling sound. If a combatant is hit in any attack, a flashing diamond is drawn over the character and the degree of damage is shown via text.

Evaluation

Galactic Gladiators, although not an arcade game, has enough action to keep even the most jaded computer warrior busy. As characters gain experience, they even seem to take on a personality. Because of the myriad of options provided, no two games are alike. Each is a new adventure and poses different challenges. It definitely has my endorsement! By the way, SSI will replace free any disk that proves defective within the 30 day warranty period. This turned out to be the case with my initial copy and SSI sent the replacement via Blue Label U.P.S.!

Galactic Gladiators is distributed by Strategic Simulations Inc., 883 Stierlin Rd., Building A200, Mountain View, CA 94043 as part of the Rapid-Fire line. Price is $39.95. ■

Steven Schwartz
Pittsburgh, PA

Pandemonium

A game with the name Pandemonium ought to be an action-packed arcade game. It is, however, more of an intellectual game, a game that will interest crossword puzzle or Scrabble fans.

The name refers to the increasing tension as you work under a time limit to build up your score!

In Pandemonium you have a 5-inch by 5-inch grid. You choose a time limit and mode of play, and one by one, letters are shown that must be placed in the grid. The letters are randomly generated; their frequency follows a table given in the game booklet, and their point values are inverse to their frequency. Word values depend on the letter values, on their placement in double or triple value squares and on word lengths.

In the simplest (but actually the hardest) level of play, it is simply guesswork trying to decide where letters should go. As the grid is filled, you hope for particular letters that will complete words.

Two options are available to spice up this basic game. One is to bypass letters that are too hard to use. You may only say no to five letters. Is it wise to pass up a high-value Q or Z, or can you use it to form some long words that will boost your score?

The second option is to rearrange the letters once the grid is filled in. High scores can be gained this way; it is actually the most challenging part of the game. The first part, filling in the grid, becomes a formality of exploring likely possibilities; but when it comes time to rearrange, you know what you have to work with, and there are no more unknowns entering the picture.

After the game has been scored, the same letter sequence can be replayed. If you bypassed the wrong letters, you can choose differently. Or again, you can replay the grid, swapping letters to see if you really did get the highest possible score.

For competition, it is suggested that stronger players be handicapped with a shorter time limit. This play might create something like the tension of a chess tournament, but certainly not that of a race, or even the thrill of a strike in Apple Bowling.

Rather than competition, though, Pandemonium allows for cooperative play or for playing against one's own high score. Team play can do much to strengthen cooperation and mental alertness. And aren't there already enough competitive games?

Pandemonium comes with a booklet that includes instructions, hints on strategy and the dictionaries that are built into the program. These seem to be quite complete for three, four and five letter words, but we did manage to find some missing words. The list does include enough obscure word to satisfy the average Scrabble player.

Pandemonium has its own fast DOS system and includes instructions for using it to initialize your own disks. I have tried it out, and it does speed up disk access.

Pandemonium might have its place in a school situation, possibly at the middle school level or higher. In playing with my 10-year-old, it was the rearrangement of the grid and not the original selection and placing of letters that held his interest.

Pandemonium is manufactured by Soft Images, 200 Rt. 17, Mahwah, NJ 07430. Price is $39.95. ■

Tobi Hoffman
Ashland, MA

Stellar Astronomy/Cosmology

Stellar Astronomy's six parts use interactive computer assisted instruction, magnificent graphics, and easily understood running-narrative text.

One part, "Types of Stars," presents a colorful, animated Hertzsrung-Russell diagram as the core around which luminosity types and the evolution of stars are discussed. Of the hundreds of educational programs I have examined in the last three years, "Types of Stars" is the best educational program I have ever seen.

"Galaxies" explains the origins and shows various types of galaxies. "Constellations" demonstrates the configurations of 30 galaxies while "Sirius and the White Dwarf" teaches about binary stars. "Death of a Star" and "Doppler Effect" cover their subjects with the same excellence characterizing all the previously described programs.

On the other side of the Stellar Astronomy disk is Cosmology. Excellent graphics and CAI methods char-

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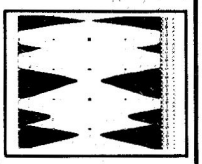

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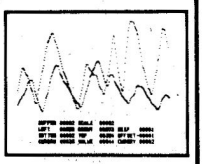

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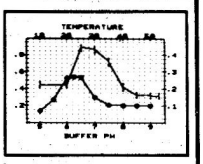

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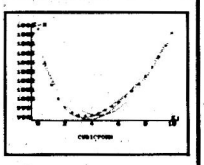

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acterize its two parts. "Cosmology and the Origin of the Elements" presents a well-illustrated explanation of Hubble's Law, why the sky is dark, background microwave radiation, the Big Bang theory and other topics. An excellent explanation of stellar nucleosynthesis is included.

"Cosmology II" is written in a less scientific and more metaphysical manner. It presents ten different philosophical models for existence. Parts are unusually well done and entertaining. Section 3 on Theistic Existentialism shows God creating the universe and then walking off and leaving it. My only criticism is that section 1 on Genesis 1 fails to list among the many explanations the possibility the Biblical account may not be factually correct. Section 10 presents a well-done lesson for students on how drugs can blow one's mind. Students and teachers of philosophy will find Cosmology rewarding and thought provoking.

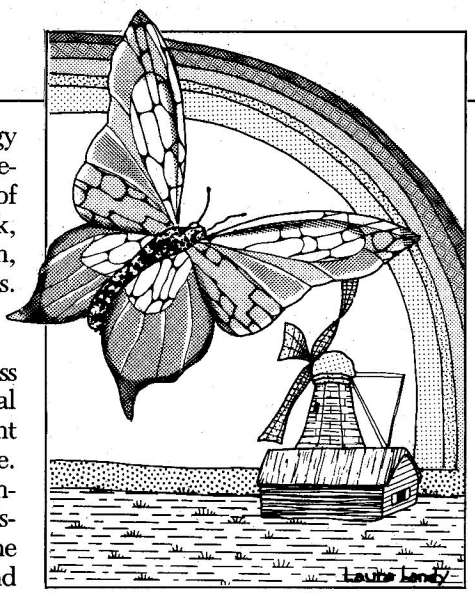
Stellar Astronomy and Cosmology are available on one disk from Cross Educational Software, P.O. Box 1536, Rustin, LA 71270 for $30. ■

John Tkach
Bozeman, MT

Juggle's Rainbow

Juggle's Rainbow is a series of nested conceptual games developed by The Learning Company, 545 Middlefield Road, Suite 170, Menlo Park, CA 94025, for beginning and pre-readers, ages 3–6.

The three interrelated games, Butterfly, Windmill and Rainbow, develop concepts of above, below, left and right, while reinforcing the limited vocabulary of the menu and game instructions. The games encourage frequent responses and guarantee high interest through use of engaging graphics and lively music. Initial adult intervention is necessary to prepare the keyboard for game play. Juggle's Rainbow comes packaged in a colorful, plastic 5¼-inch disk



jacket cover, looking much like a small picture book. Printed documentation and parents' instructions are included with the package, which sells for $29.95. ■

Mary Ingram
Brattleboro, VT

Night Falls

Run for your lives! The aliens are attacking! And attack they do—over and over again, faster and faster. It's all a pseudo-city commander can do to keep up with them.

A force of robot invaders manning UFOs attacks the Earth en masse one day in Night Falls, levelling all the major cities. Discovering that traditional weapons are useless against the invaders, the humans head underground.

After scientists succeed in capturing and analyzing one of the alien weapons (a Twilight Maker), its secrets are used to build a defensive weapon (a gravity cannon) and create a city of towering structures. For some reason, the pseudo-cities infuriate the invaders, causing them to attack repeatedly until the city is destroyed. A number of cities are constructed to act as decoys. A commander is appointed to man the gravity gun in each of the phoney cities (from a safe distance, of course), and to hold off the aliens for as long as possible. In this manner, the remaining human population is able to maintain something of a "normal" life.

All action is controlled using a game paddle or a joystick. The game is based on cycles of night and day. During the day, all is peaceful and quiet. At night, however, the aliens attack! The object is to survive as many nights as possible before the invaders finally destroy the city.

The aliens have bombs and death rays at their disposal and they use both liberally in attempting to destroy the city. The bombs do little damage to the cityscape, but they do intercept your gravity cannon fire and protect the UFOs. The death rays, on the other hand, can obliterate from 1 to 9 levels of any building they strike. Just to make things a little more difficult, every fourth or fifth wave of aliens is invisible!

Your gravity cannon can be used to destroy invading ships and falling bombs. To help position the cannon, two positional cursors are provided: one at the top of the screen and one at the bottom. The former is useful in zeroing in on invaders and the latter helps avoid craters caused by the alien attack. A cannon fired from a crater automatically self-destructs, partially filling in the hole with its own mass. Cannons somehow take energy from each UFO they destroy and use it to rebuild the city each day.

If you manage to destroy all the invaders in a wave without letting any escape, you are rewarded with an immediate end to the night. If any are missed, however, day only comes when the bombs remaining on screen have fallen or are shot by your gravity cannon.

Your destruction occurs in one of two ways. Either the Cosmic Reactor that powers the city explodes (due to successful alien hits with bombs or death rays), or a strange entity known as a stellar vortex appears and detonates. Whenever the Cosmic Reactor is damaged, the core changes color and beeps to indicate that it is overheating. Options are provided for its repair or for adding new protection in the form of more towers above it. Stellar vortexes must build

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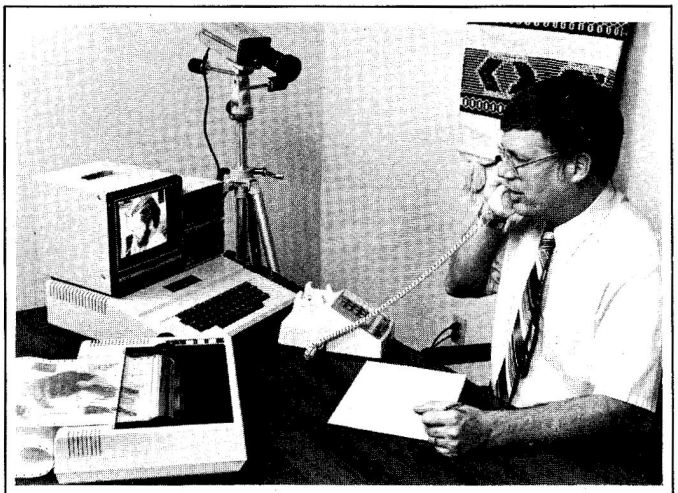

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to critical mass before detonation. The building process is indicated by changes in color and a ticking sound. Like the destruction of a UFO, shooting a stellar vortex also adds energy to the reactor—the closer to detonation, the greater the energy. If you jump the gun and shoot a stellar vortex prior to the ticking, energy is *deducted* from the reactor.

When each day dawns, you are awarded a number of units which can be used to rebuild the city. A suggested general strategy is to fill in all the craters (because of their danger to your gravity cannon) and to be sure that the reactor is well covered. At any time during the course of the game, you may freeze play and enter emergency stasis mode and use the energy points awarded so far that night to rebuild parts of the city. This is useful when the reactor has been breached by the invaders. An alternate and more drastic procedure allows you to rebuild the reactor. To do so requires that you have at least six cannons remaining.

Night Falls may be played at any of nine skill levels. At the higher levels, play is very fast, and completing even one day is difficult. If you manage to beat the existing record for a level, your initials and the new record are saved on the game disk. The sound may be toggled off or on at any time, according to the player's preference. Similarly, freezing play is also possible.

Unlike most other Apple arcade games, this one was written in Applesoft and compiled with Microsoft's TASC. It is provided on an unprotected disk. Thus, if you want to see how everything works, a simple List will do it for you. Instructions are also provided for using TASC to create modified versions of Night Falls.

The instructions for the game are fairly complex. I'm still not certain, for example, whether I should enter emergency stasis mode or rebuild the reactor after it has been hit. It is also easy to be overwhelmed by the number of informational items in the display. These difficulties aside, Night Falls is an excellent game. If it gets too simple at the lower levels of difficulty, one can always switch to a higher level. The sound effects are interesting, and if you have a color monitor, you'll be treated to a colorful light show. For those readers with black-and-white or green screen monitors, the lack of color does not hamper play in any way that I can detect.

Night Falls is sold for $29.95 by Omega Microware, Inc., 222 S. Riverside Plaza, Chicago IL 60606. It

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requires game paddles or joysticks and an Apple II with Applesoft in ROM. ■

Steven Schwartz
Pittsburgh, PA

Bag of Tricks

Bag of Tricks is a set of four utilities that are useful to the average computerist. You can examine the disk structure on disks (including copy protected ones), have control over the formatting structure of your disks, examine individual sectors on the disk, and repair many disks that are damaged and will not boot or have problem files.

The first utility is called Trax. Trax looks at the disk in terms of raw nibble data. It looks for address markers and checksums; and in most cases, it reports any abnormalities. It reads all but the most cryptic copy protected disks and also has a verify function that searches for nonstandard tracks. It then reports the data for that track.

Zap, the second utility, is a disk sector editor that allows you to look at both the ASCII and hexadecimal contents of the sector. It lets you examine, edit, and rewrite any sector on a standard disk. This is an extremely useful function with a variety of uses. One might, for example, insert or change illegal file names, insert or delete illegal program line numbers or fix programs with garbaged line numbers

Init is a utility that initializes disks. You can also change the sector skewing so that your disks will read Basic and binary files more quickly than normal. This speed improvement is obtained with normal DOS. You don't have the problems with nonstandard DOS that many of the fast-load modifications give you.

The final utility, Fixcat, is a powerful and useful program that you can use to automatically fix blown DOS disks. You load the Fixcat program and insert the problem disk. The program gives you prompts which usually supply reasonable default values covering such questions as whether the disk has DOS or not. You simply press return through this series of questions and Fixcat begins to look at the catalog track (17 or hex 11). If there are problems on the catalog track, you are informed and asked if you wish Fixcat to repair them. After several inquiries into the catalog track, it reads each file.

The display shows each file along with its track sector list. A frequent condition is that the track sector count is wrong. Fixcat tells you that it

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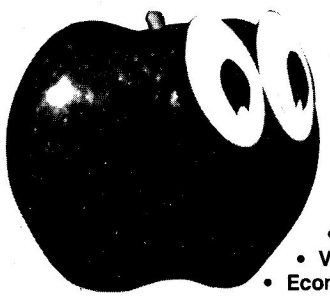

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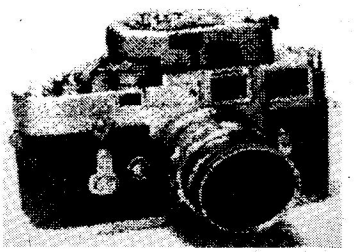

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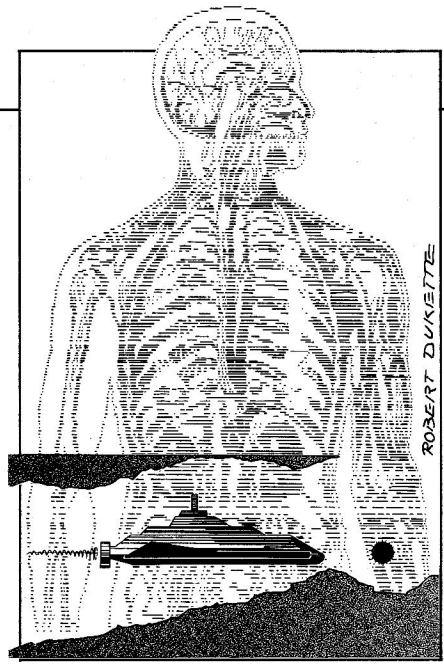
is wrong and asks if you want to fix it. Pressing return fixes it. It then asks if you wish to search for lost or deleted files. If you answer yes, you get a fairly long (about 1 minute) search of the disk. If it finds a file, it shows you a sector of the file and asks if you want to retain the file. If you do want to retain it, you are given a chance to name it. If you don't name the file, it gets the name Unknown File #00 (or the next consecutive number) which follows the track sector list for that file.

Bag of Tricks does have some disadvantages. Trax will not read some copy-protected disks, and the information you get from it is rather cryptic. Fixcat will not fix a disk that has bad track sector pointers; if the pointer says to look for track FF sector 26, you will get an unrecoverable error. Zap has many features, but I find it somewhat complicated to use.

Bag of Tricks sells list for $39.95 and is manufactured by Quality Software, 6660 Reseda Blvd., Suite 105, Reseda, CA 91335. ■

David Lowe
Lexington, KY

Microbe



You read the book. You saw the movie. Now, you'll love the computer game. Microbe is based on the 1966 novel *Fantastic Voyage* by Dr. Isaac Asimov, which was made into a movie in 1969. The book and movie were good. The computer game is better.

From one to ten people may play; I recommend one to four. You begin by selecting your patient. Microbe gives you a good emergency room history, physical exam, and sophisticated lab studies. Next comes an exciting graphic miniaturization sequence in which you and your medical submarine shrink from life size to the size of a red blood cell to be injected into the patient's femoral vein.

From this point, I had a lot of trouble. I kept running out of air before getting very far in the vein. The author, Robert Clardy, came to my rescue by mail with tips that have since been added to the new edition of Microbe. To get more air, fuel and so on type I for inventory, select your item, and type U for use. This can be used to extend air and fuel tenfold. To steer the sub, center your second game paddle and use the keyboard arrows.

Microbe is not a game you sit down and play straight through the first time. First, you must study a general instruction manual, physician manual, navigator (anatomy) manual, and submarine technical manual. Try several practice runs. You must learn about anatomy, physiology, immunity, infection, and drugs to play Microbe. Your sub's on-board computer contains the information. Use the computer library to identify the blood elements you must shoot with the laser. To do this type <, 1, and select your item. The sub's library will give you good explanations.

I urge you to detour through the organs. The kidney comes first and gives you a chance to acquire an immune cloaking device. But don't get caught in the whirlpool glomerular filtration apparatus. I did and wound up in the bladder. That's bad, but not as bad as getting caught in the bile duct and ending up in the bowels. The liver supplies glycogen, your fuel. You can pick up more air in the lungs. You have 15 seconds to get through each heart valve and get the heart beating again. It will take practice, so expect to lose a few patients. By the way, I wish the authors would refer to the patients as patients and not victims.

If you make it to the brain, you have the chance to repair hemorrhages and aneurisms and to remove blood clots and tumors. Microbe is not perfect, but it is good. As a physician, I felt it was generally correct. Some concepts are hard to convey completely in this format. The graphics for the kidney are not anatomically correct, but they give some dynamic feel for what the kidney does. Microbe does not replace medical school, but it does let you play doctor.

Microbe is the first of a new wave of educational games. It is just as much of a challenge as Wizardry, but it is a much more constructive way for users to spend their time. I look forward to more Eduventures. Microbe would be an especially good purchase for schools with gifted programs. It is well-suited for young, gifted students.

Microbe requires an Apple II, II Plus or IIe with 48K of RAM and a disk drive. It is manufactured by Synergistic Software, 830 N. Riverside Drive, Suite 201, Renton, WA 98055. Price is $44.95. ■

John R. Tkach
Bozeman, MT

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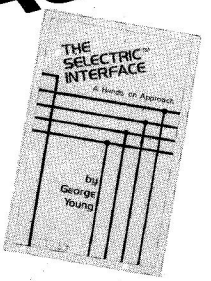

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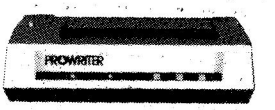

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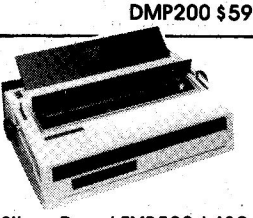

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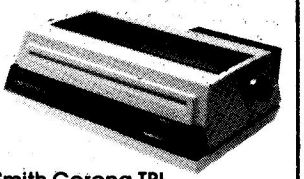

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You may forfeit the word by pressing the escape key. The word will be shown to you if you are unsuccessful.

The program comes complete with three groups of words: K–3, 4–8 and expert.

The program allows you to create your own word files, view word files, add words to existing files and delete files. Large high-resolution characters are used in the scrambled word drill. The program lets you set the time for the flashing word and the time limit for the scrambler.

The input routine for the flasher and scrambler does not eliminate leading and trailing spaces, thus allowing a user to inadvertently produce an error without realizing why. Attempting to load a word file which hasn't been loaded (possibly by mistyping the file name) hangs the program with no explanation to the user as to what is going on. Hint! Press control-C to get back to main menu.

Word Scrambler and Super Speller are manufactured by Avant-Garde Creations, Box 30160, Eugene, OR 97403. Price is $19.95. ■

Gary Leonard
Ashby, MA

Rapid Reader

Woody Allen once told a classic joke about speed reading: "I took a speed reading course. I read *War and Peace* in just two hours. It's about Russia."

Of course the point of the joke is that anyone can read quickly, but reading quickly with comprehension is not easy.

If the aesthetics of writing are a secondary consideration and if your studies or work require the absorption of large amounts of information, then speed reading is important. Rapid Reader can help you develop a fast reading speed in a logical, step-by-step manner in a relatively short period of time.

Rapid Reader trains your eyes first to take in whole words at a rapid pace, then pairs of words, then phrases, short sentences and finally long sentences. The trick to fast reading is to learn to take in more than just one word at a time as you read. Rapid Reader allows you to approach these skills gradually. You learn to read word by word and then in clusters of words.

A good first step with the Rapid Reader program is to find out your reading speed. The Speed Test option found on the main program menu will allow you to select a speed from 50 to 1500 words per minute and a difficulty level from 1 to 4. Once you've made that selection, the program will flash a series of sentences on the video screen. After each sentence appears on the screen, it will reappear with a word missing, which you must supply. The computer will monitor your answers and evaluate your performance.

This is not a real comprehension quiz; there are limits to what a personal computer can do. It cannot judge an essay you write describing the content of the test sentences, but it can determine if you have retained what you've read. At the highest level of difficulty, you are shown two complex sentences. You then fill in a blank for one word of each sentence.

The next step is to build up your speed. If you test out at 400 wpm at the start, key in the Words option from the main menu and practice reading single words at 500 wpm or faster. Once you are comfortable at a new speed, you move to the Word Pairs, Phrases, Short Sentences and Long Sentence routines. By the time you are comfortable with Long Sentences you should be reading, with comprehension, at the speed you selected.

To test yourself, select again the Speed Test option from the main menu, and going from levels 1 to 4 of difficulty at your new word speed, see if you really are reading as fast as you'd like. If you need more work, you can always go back to the tutorial options.

One of the many nice things about this software is the option to change the words used to make sentences. You can use this feature to add words from a foreign language—turning the program into a language tutorial as well as a reading program! A Spanish word list is included on the disk.

This is one of the most accessible educational software packages available. The documentation amounts to one page, but even that much is unnecessary. The system is so logical and the program is so self-explanatory that its operation can be mastered in just a few minutes.

As for Rapid Reader's adaptability to the classroom, there remains some doubt. This is not a self-checking, record-keeping or grading program. Without some outside means of evaluating progress, the program can only be used as an aid for more motivated students. For students and professionals who really want to improve their reading speed, the Rapid Reader is a most valuable aid.

Silicon Valley Systems, 1625 El Camino Real, Belmont, CA 94002 is the manufacturer of Rapid Reader, which runs on an Apple II or II Plus system with 48K of memory and a 3.3 DOS. The list price is $39.95. ■

Brian Murphy
Fairfield, CT

Dic-tio-nary

As spelling checking programs go, Dic-tio-nary does a fine job. It's reasonably priced, works at a respectable pace, has excellent documentation and its on-screen help is thorough. With a little computer savvy, you may not even have to look at the documentation.

However, since the English language is so complex, no microcomputer program can do anything more than supplement proofreading done with eye and brain. The big stumbling block is context. Many words can be spelled correctly but used incorrectly, and the various spelling checkers will whir merrily by them.

Anyone thinking of buying such a program should understand these limitations. If you type "is" and you meant "if," the error won't be detected because both words are correct. And

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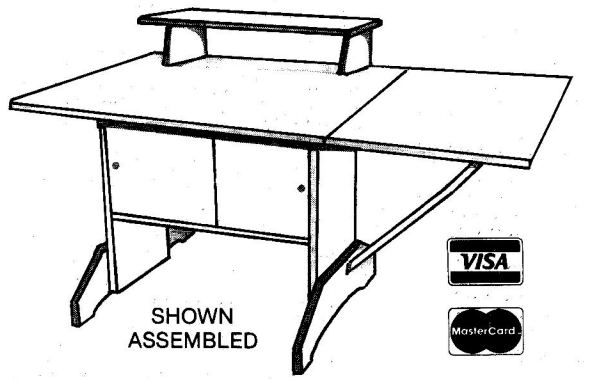

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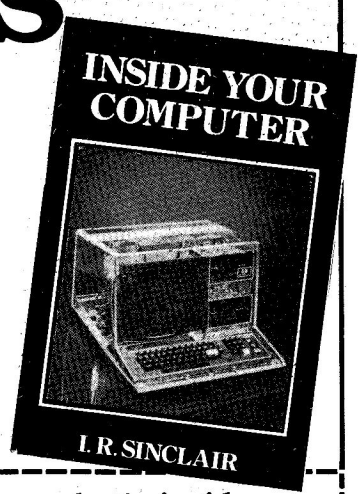

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many words won't be in a dictionary. This program contains 25,000 words —only about five percent of the words in the English language. But, most of us rarely use the other 95 percent and Dic-tio-nary does give you the option of adding unusual words particular to your needs.

With those thoughts in mind, let's take a closer look at Dic-tio-nary. As mentioned, it contains 25,000 words and you can add another 2500. It will take a text file and read through it, stopping at every word that is either misspelled or not in its word list. You can run it in an interactive or passive mode on your printer. Dic-tio-nary can replace words automatically, and you can quickly refer to the word list if you're unsure of the correct spelling. It works with files created by Apple Pie, Apple Writer, Screen-Writer, Superscribe and other word processing systems that use standard 3.3 DOS files and require 48K Apple II or II plus with DOS 3.3 and one or more disk drives.

Here's how it works in a system with two drives: When you have finished writing, boot the Dic-tio-nary program in Drive 1. It takes about 45 seconds to load. The screen offers seven options. The first and most commonly used option is processing the document.

Here you encounter one of several thoughtful features. Whenever given a choice, you can select the default (most common choice) value merely by hitting return. As you become familiar with the program, this hastens the process. In this case you hit return and are asked to insert the program disk again, and it reads the proper portion of the program in a few seconds. It then asks for the Wordbook disk, which contains the list of words. Once this is done, it asks for the file name. (Your file should be in Drive 2.) You are given the option of turning on the printer. If you do, it goes into the passive mode using your printer to indicate words it would challenge. If you leave the printer off, it directly processes the document in the interactive mode.

In the interactive mode the program moves until it finds a suspect word. Suddenly, the screen fills. At the bottom left is the word in question. At the top is the sentence in which the suspect word appears, so you can check the context. (Some other spelling programs don't provide you with the context, while some require you to ask for it.) In the center of the screen, your options are shown. The first is to ignore the word. This is the one most frequently chosen, and it can be obtained simply by hitting return.

In the interactive mode, I found myself poised with my finger on the return key. Most of the words Dic-tio-nary finds are spelled correctly, but are not part of its word list. In general, it defines a word as any string of alphabetic characters preceded by a space and followed by another space. That means it generally stops on "words" such as the middle initial of a name. It will also stop on most proper names.

When it does find a typing or spelling error, you simply type the word correctly, and the misspelling is replaced. Any time the program comes across a repeated mistake in the document, it will automatically replace it without checking with you again. This is handy if you happen to be writing to Mr. Tchirbochnick but have referred to him as Mr. Tshirbochnick throughout your letter.

If you know the word is misspelled, but you are not sure how to spell it correctly, you have another choice. You move the cursor over as much of the word you believe is correct. This could be the first letter, first three letters, or whatever. You place an asterisk at this point, then hit return. The relevant portion of the Wordbook comes up on screen, and you can quickly find the correct spelling and then make the change.

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If the word the program finds isn't in the Wordbook and you don't know if it's spelled correctly, it's back to the old-fashioned method of checking. If it's a word you may be using again soon, add it to the Wordbook.

Yet another option allows a word to be flagged for later replacement. I frequently miss the space bar when typing and thus run two words together. These can't be corrected in the interactive mode by simply putting a space between them. If this is done, then the double word is replaced by the first word. The second word is lost. The cure? Flag it. The program allows you to pick a flagging symbol that's infrequently used. I chose the percent sign. When you return to your word processor editor, search for the flag and make the corrections.

A file can also be reviewed in the passive mode. Turn the printer on at the start and the program will print out all words it challenges. You can then take this list and go back to your word processor, using the search feature to find and replace the incorrect words.

You have to live with Dic-tio-nary for a while to get used to its quirks. After it had finished reading this review, for example, some errors were still present:

- "It's" was used where the possessive, "Its" was intended. (The program does know many contractions.)
- The singular "word" was used where the plural "words" was needed, a matter of context.
- "English" appeared with a lower case "e" rather than the proper upper case. (The program is consistent about case when you change a word, a mixed blessing.)
- A lone "ar" was left in where an "are" was intended. This one really had me fooled. A check of the Wordbook disk showed it regarded "ar" as a word. A check of the dictionary showed "ar" was a seldom used form of "are" meaning the metric name for 100 square meters. It certainly didn't make sense to include such a rare word, and it took some more study of the Wordbook disk before I discovered such words as "nd," "sc," "va" and "conn" were all present. Then it dawned on me. These were abbreviations for the states. Helpful, perhaps, but sometimes programs can be too helpful.
- As reported with other programs of this sort, there are some mistakes in spelling in the Wordbook.

As is common with such programs, Dic-tio-nary does word frequency analysis. It can do this on screen—letting you know how many different words were used and how often individual words were used.

Given the various shortcomings of this type of program, is Dic-tio-nary worth the investment? For me, yes. My copy came as part of a package deal called "Screenwriter II Professional." As long as it continues to find errors, it will be a valued tool.

The Dic-tio-nary is manufactured by Sierra-On-Line Systems, 36575 Mudge Ranch Road, Coarsegold, CA 93614. Price is $99.95. ■

Greg Stone
Westport, MA

Cosmic Combat

In Cosmic Combat you and your trigger finger are pitted against a variety of space creatures. The monsters are defended by from one to three hovering, weaving malignite mines. Hit one and you lose one of your five initial fighter ships.

You may begin play at any of the first three levels. Starting at the higher levels makes getting a high score very difficult (since points are easier to obtain in the lower levels), but this approach does let you skip past those levels that you have mastered. You are awarded an extra ship for scores of 50,000 and 100,000. The game

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ends when your ships have been eliminated.

Each level consists of two parts. In the first part, creatures descend from above and scroll straight down toward the bottom of the screen. If the creatures are lower on the screen than the malignite mine(s) when shot, you receive one point. If they are higher than the mine(s), you are awarded between 15 and 55 points. Each scrolling creature must be struck five times in order to kill it. If one of them touches you, you are usually destroyed.

In the second phase of each level, the five fiends of Fantus (the galaxy in which the game is located) whip back and forth across the screen and drop atomic phasor balls at your ship. Two hits on each fiend is required for destruction.

In levels 2 and beyond, space serpents appear on one or both sides of the screen. Shots from your fighter repel the serpents but do not destroy them. If one lands on your ship, it is eaten! In level 3 a winged whizzer joins in the attack. It too cannot be destroyed, but can be repelled momentarily.

Evaluation

Evaluating Cosmic Combat is a study in confusion. It has the makings of a good game, but in its present state, it suffers from poor design and engineering, boring graphics, and an abysmal instruction booklet.

The cover design of the instruction booklet is easily its most outstanding feature. The contents, however, are a letdown. Incorrect statements abound. The instructions begin by describing the creatures to be encountered at level 1. Unfortunately, several of the creatures described do not appear at that level.

The instructions are replete with misspellings and monsters which mysteriously change names. Next time, I strongly suggest that Highlands hire a competent proofreader and someone adept at writing documentation.

With the exception of the serpents at levels 2 and above, all graphics are hollow line drawings. The serpents, on the other hand, are exceptionally well done. If the other figures were done in a similar fashion, it would add immensely to the game's appeal.

Some of the creatures suffer from a case of the flickers. This seems to happen most often when a pair of the scrolling monsters overlap one another.

The selection of the P key to place the game in Pause mode is a definite mistake. The action in this game is very fast. Searching for and hitting P while you are working a joystick or paddle is quite a task. If possible, use of escape would make things simpler (given its edge placement) and conform to virtually every other game on the market.

There is no perceptible pause between levels of play. After killing the last scrolling creature, you are immediately bombarded by the fiends' atomic phasor balls. If one of these hits you and you fail to reposition your joystick quickly, it is not unusual to find your ship destroyed again as it reappears on the screen. A simple pause loop or a chance to move your ship before each attack would be appreciated.

It is unclear what is supposed to happen when one of the scrolling creatures strikes your ship. In some instances, you are destroyed. In others, they pass harmlessly through you. I'm not certain whether this is as it should be or whether the program simply suffers from a poor collision detector.

On the plus side, Cosmic Combat does seem to have potential. By holding down the paddle/joystick button, you can fire like a machine gun. I also

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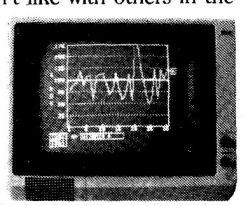

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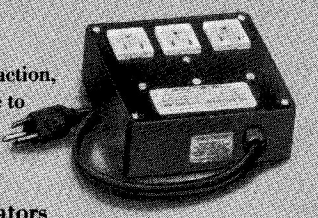

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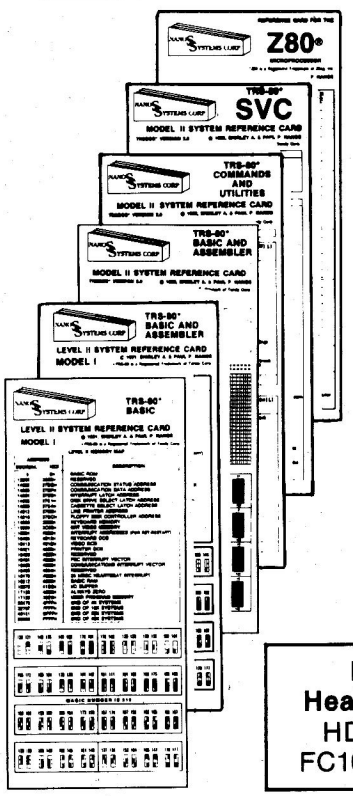

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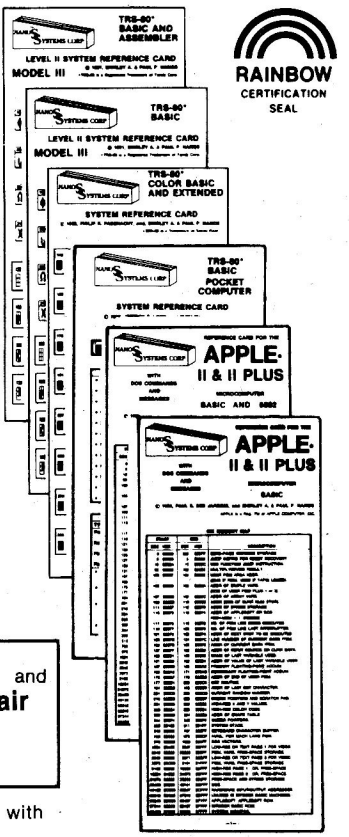

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liked the ability to start at different levels of play. Both are nice touches. On the whole, however, the game leaves one with the impression that it wasn't quite finished.

Cosmic Combat is distributed by Highlands Computer Service, 14422 S.E. 132nd, Renton, WA 98056. Price is $29.95. ■

Steven Schwartz
Pittsburgh, PA

Dragon's Keep

Dragon's Keep is a nonviolent search game whose object is to free 16 animals held captive by a dragon. The program helps develop and/or reinforce map skills, vocabulary and logical thinking.

You select high-resolution pictures of different neighborhood locations, and if the dragon appears in the picture, you cannot free any animals at that location. You must return later and hope the dragon doesn't randomly appear again.

The program offers easy space bar selection for making location selections including an option at the beginning to try out the space bar method.

With a video monitor it offers nice graphics pages with many cute animals. It allows the sound to be turned off or on, and the text is an appropriate second grade reading level.

Dragon's Keep is manufactured by Sunnyside Software, 5815 East Parkside, Fresno, CA 93727. ■

Gary Leonard
Ashby, MA

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Cider Vinegar

Harness Race Handicapper, July

There is a small error in the "Harness Race Handicapper" listing on page 82 of the July *inCider*. Unfortunately, this causes most of the screen output to appear in inverse. Please advise readers that line 90 should read:

```
90 VTAB 4:PRINT "(C) STEVEN R.
SCHWARTZ, PH.D., 1982": NORMAL:
PRINT:PRINT:PRINT
```

The last four statements (after 1982":) were omitted.

Steven A. Schwartz
9226 Vantine St.
Pittsburgh, PA 15235

Applesoft Adviser, June and July

On page 37 of my June column, I inadvertently switched a "less than" sign for a "greater than" sign, and then got carried away with myself. My thanks to Ken Kashmarek of Eldridge, IA for calling this to my attention. In the first paragraph on page 37, the three Basic lines should read:

```
1530 R = PEEK( - 16384)
1540 POKE - 16368,0
1550 IF R > 127 THEN R$ = CHR$(R - 128)
```

The four lines of text that follow this listing, to the end of the paragraph, should be obliterated.

A similar correction is needed at the end of the next paragraph, changing lines 1540 and 1550 to read:

```
1540 R = PEEK( - 16384): POKE - 16368,0
1550 IF R > 127 THEN T = 3000: R$ = CHR$
(R - 128)
```

Finally, on page 32, a similar change is required in Listing 3. Change line 150 to read as shown below, and add line 155.

```
150 R = PEEK( - 16384): POKE - 16368,0
155 IF R > 127 THEN R$ = CHR$(R - 128)
```

Two typos sneaked into my July column on page 30. Line 80 and line 85, both appearing in program segments within the text, should have the letter I instead of the number 1. Thus lines 80 and 85 should read:

```
80 PLOT I, 4 + I
85 PLOT I, 44 - I
```

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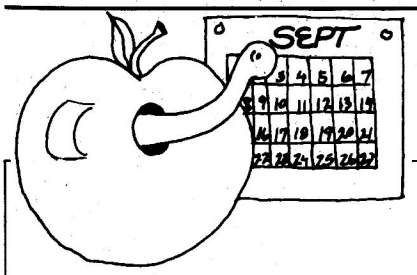

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contact:
Diane Pontisso
Phillips Publishing Inc.
7315 Wisconsin Ave.
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(301) 986-0666

September 12–14
1983 IEEE International Conference on Computer-Aided Design
Santa Clara, CA
contact: Dr. Wilham J. McCalla
Hewlett-Packard Co.
11000 Wolfe Road
Cupertino, CA 95014

September 14–16
EUROMICRO 1983 Symposium
Madrid, Spain
contact:
EUROMICRO
TH TWENTE
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phone: (31) (53) 338799

September 19–23
9th World Computer Congress—IFIP '83
Paris, France
contact:
IFIP '83
4 et 6, Place de Valois
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September 22–24
2nd Annual Rocky Mountain Computer Show and Software Exposition
Denver, CO
contact:
Northeast Expositions
822 Boylston St.
Chestnut Hill, MA 02167
(800) 841-7000
(617) 729-2000 (in Mass.)

September 22–25
1983 Computer Showcase Expo
New York, NY
contact:
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Interface Group Inc.
300 First Ave.
Needham, MA 02194
(617) 449-6600, ext. 288

September 29–October 1
CP/M '83 East
Boston, MA
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Northeast Expositions
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(617) 729-2000 (in Mass.)

October 3–6
8th Data Communications Symposium (8th DataComm)
Cape Cod, MA
contact:
DATACOMM
PO Box 639
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
(219) 425-7228

October 14–15
5th Annual FORTH Convention
Palo Alto, CA
contact:
FORTH Interest Group (FIG)
PO Box 1105
San Carlos, CA 94070
(415) 962-8653

October 15–17
Hong Kong Consumer Electronics Show 1983
Hong Kong
contact:
A.D. Adams Advertising
9 East 38th St.
New York, NY 10016
(212) 685-9060

October 17–19
8th Conference on Local Computer Networks
Minneapolis, MN
contact:
Dr. Harvey Freeman
Architecture Technology Corp.
PO Box 24344
Minneapolis, MN 55424
(612) 935-2035

October 17–19
Symposium on Reliability in Distributed Software and Data Base Systems
Palo Alto, CA
contact:
Dr. M. Liu
Dept. of Computer Science
Ohio State University
2036 Neil Ave.
Columbus, OH 43210
(614) 860-7766

October 18–20
EdCompCon '83
San Jose, CA
contact:
EdCompCon
PO Box 639
Silver Spring, MD 20901
(301) 589-3386

October 28–30
Applefest San Francisco
San Francisco, CA
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Chestnut Hill, MA 02167
(800) 343-2222
(617) 739-2000 (in Mass.)

November 17–19
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Northeast Expositions
822 Boylston St.
Chestnut Hill, MA 02167
(800) 841-7000
(617) 739-2000 (in Mass.)

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*

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New Software

Antonym Game

J & S Software, 140 Reid Ave., Port Washington, NY 11050, offers the Antonym Game, a high-resolution baseball game containing more than 600 antonym combinations.

The game is designed to improve scores on the SAT examination, and it contains a utility that allows teachers to list and change any and all words. Price is $29.50. Reader Service number 440.

Medical Billing

CMA Micro Computer, 55722 Santa Fe Trail, Yucca Valley, CA 92284, offers a new Client Medical Billing System for the Apple IIe.

The user can develop separate databases containing patient data for the daily input and reporting of billing activity, for the preparation of private patient statements and for the preparation of American Medical Association claim forms.

The package requires and Apple IIe with an 80-column card, two disk drives and a 130 column printer. Price is $1595. Reader Service number 441.

Critical Mass

Sirius Software Inc., 10364 Rockingham Drive, Sacramento, CA 95827, offers Critical Mass, an adventure game featuring color graphics, music and arcade-style sequences.

The player must find and stop a madman intent on blowing up the world. A clock adds a problem-solving dimension to the game: the player must deal with plane schedules and international time zones in his/her race to save the world. Price is $39.95. Reader Service number 443.

Telofacts 2

Telofacts 2, a software program that designs and analyzes questionnaires, is offered by dilithium Software, 11000 SW 11th St., Suite E, Beaverton, OR 97005.

It provides the user with the ability to gather opinions, resumé information, marketing data, survey data, or any other question/answer information. It then analyzes and displays responses in a variety of ways. Telofacts 2 displays results in report format and it ranks, lists, or scores respondents. Price is $199.95. Reader Service number 444.

Spare Change

Spare Change is a new game for the Apple II that depicts a comically quarrelsome relationship between the owner of an arcade (you) and your impatient partners, the Zerks. Price is $34.95. Contact Broderbund Software, 1938 4th St., San Rafael, CA 94901. Reader Service number 447.

Best Crop

A software package to help farmers manage the details of producing crops is offered by Agricultural Software Systems Inc., Suite 109, 1216 Dawson Road, Albany, GA 31707.

The Best Crop program consists of six interlocking modules. It allows the farmer to set up information for different farms and to then enter all necessary crop data. Features of Best Crop include the ability to record and analyze soil fertility and to measure how well a particular farm or field performs. Price is $895. Reader Service number 445.

Statistics and Probability

A new series of software that develops skill in the study of statistics and probability is offered by COMPress, Box 102, Wentworth, NH 03282.

The series illustrates concepts of statistics and probability with color graphics, tutorial problems and simple simulations. The series currently includes Chi-Square Analysis of Contingency Tables and Discrete Probability, Part I and II. Each program is $75. Reader Service number 448.

TermExec

Exec Software Inc., 201 Waltham St., Lexington, MA 02173, offers TermExec, a communications package for the Apple II.

TermExec turns your Apple into an intelligent workstation. It provides a backscrolling capability with a 10,000 character scrolling buffer, which allows you to review lines that have gone off the screen. Lateral scrolling allows you to unwrap lines up to 80 characters and to scroll left and right. You can talk to any host, and the program can send and receive long files unattended. Price is $49.95. Reader Service number 449.

Dr. Grafix

Dr. Grafix is a graphics utility package for beginning and intermediate programmers. Shapes can be designed on the hi-res screen. Shape tables can be custom built, edited and reorganized. Tutorial demonstrations include details for animating your programs.

Contact Micro Program Designs, 5440 Crestline Road, Wilmington, DE 19808. Price is $19.50. Reader Service number 450.

Microscreens

PMI Inc., Box 87, Buckfield, ME 04220, offers Microscreens, a screen generator package that allows the user to produce monitor screen formats.

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4-Track Editor

Passport Designs Inc., 116 North Cabrillo Highway, Half Moon Bay, CA 94019, offers 4-Track Editor, a program that allows the user to write music with or without extensive keyboard knowledge.

The user can compose directly with the Apple or work from a written score. The composition can then be edited into a standard Soundchaser TRAKS file and played back.

The program requires a Soundchaser computer

music system, an Apple II, II Plus, or IIe, a disk driver with controller and audio and video monitors. Price is $195. Reader Service number 452.

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Decision Analyst helps professional managers and businesspeople analyze complex business problems where many alternatives are present.

It takes the user through eight sections including problem definition, statement of decision purpose, calculation of criterion values, assessing possible adverse consequences and final conclusions and choice. Price is $139. Contact Executive Software Inc., Two North State St., Dover, DE 19901. Reader Service number 453.

MemoryTrainer

MemoryTrainer enables users to improve their ability to remember faces, dates, telephone numbers, lists and quotations. It is designed for those who have career oriented memory demands.

It is a fully-structured tutorial system with color graphics that includes the following instructional materials: Names and Faces, Method of Loci, Peg Word System, Important Dates, Phone Numbers and Memory Mix Game. Price is $89.95. Contact the Einstein Corp., 11340 W. Olympic Blvd., Los Angeles, CA 90064. Reader Service number 454.

dataKeyper

ESP Computer Resources, 9 Ash St., Hollis NH 03049, offers an enhanced version of dataKeyper, a database manager for the Apple II Plus.

It can be used for on-line or batch processing and includes automatic restart capability. Price is $99.95. Reader Service number 455.

Grade Manager

Classroom Grade Manager helps teachers store, compute and retrieve student grades. An entry system allows rapid recording of student data, and a name search routine provides access to individual records.

Classroom Grade Manager can handle 18 grades per quarter for up to 50 students per class. There are reports for listing and averaging both current and semester grades, for class ranking and for analyzing exam statistics over a period of years. Price is $149.95. Contact Hayden Software Company, 600 Suffolk St., Lowell, MA 01853. Reader Service number 456.

Programming Power

Programmer's Power Tools II allows programmers to perform sorts and searches, format numbers on the screen or printer and build user-friendly input routines.

The program also includes a manual with quick reference sections, commented listings of demonstration programs and customization notes. Price is $59.95. Contact CE Software, 801-73rd St., Des Moines, IA 50312. Reader Service number 442.

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Financial Management

Managerial Finance in Action is a computer assisted instruction course in financial management.

The course is divided into five sections. Subjects include: the language of finance and accounting; interpreting financial reports and statements; improving business decisions; communicating with financial specialists; measuring profit, financial condition and business performance; and using your Apple as a financial tool.

The program package includes 120 pages of documentation, 10 floppy disks, and five audio tape cassettes. Price is $375. Contact International Management Institute Inc., 34 Maple St., Summit, NJ 07901. Reader Service number 464.

Kleen Line

Electronic Specialists Inc., 171 South Main St., Natick, MA 01760, offers the Kleen Line security system, a system designed to protect modems by supressing damaging telephone line spikes. Price is $56.95. Reader Service number 475.

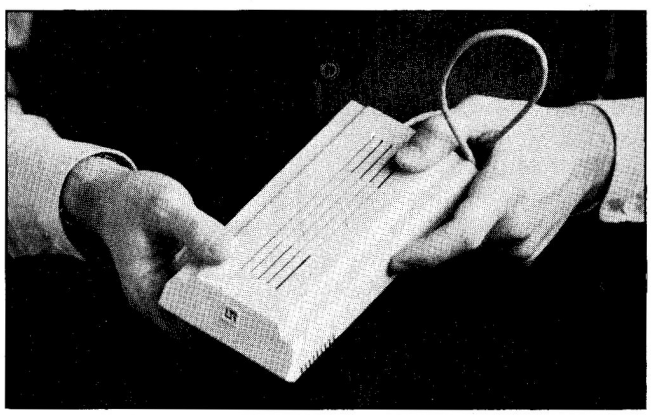
Ed. Software Directory

Sterling Swift Publishing Company, 7901 South IH-35, Austin, TX 78744, offers Swift's Educational Software Directory Apple II Edition for 1983–1984.

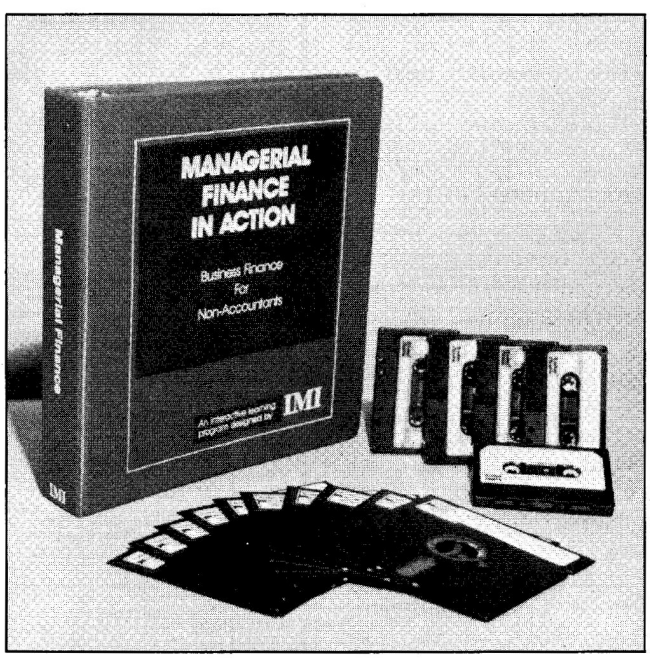
The directory is organized by subject, with a Publisher Information section and Master Index. Price is $18.95. Reader Service number 461.



The WattsOut anti-static device.



The Password modem from US Robotics Inc.



Managerial Finance in Action.

WattsOut

WattsOut Inc., 2020 S. Oneida St., #201, Denver, CO 80224, offers an anti-static device for microcomputers. When users place the device on their equipment, attach it to a ground and touch it before using the keyboard, static electricity is drawn harmlessly away. Price is $9.95. Reader Service number 473.

Special Ware

The SpecialWare Directory is a directory of courseware and software products for special education materials.

Compiled from an independent survey, the Directory lists the products of more than 100 companies. Curriculum skill areas, educational levels, hardware compatibility and warranty and preview policies are indicated for each listing. Price is $10. Contact LINC Associates Inc., 1875 Morse Rd., Suite 215, Columbus, OH 43229. Reader Service number 474.

Password

US Robotics Inc., 1123 West Washington Blvd., Chicago, IL 60607, offers a new 300/1200 baud, dial/auto answer modem, the Password.

The Password has programmable auto dial and auto answer capabilities, auto mode and auto speed select functions, and an audio phone line monitor. At 1200 baud the Password can process as many as four typewritten pages per minute. Price is $449. Reader Service number 462.

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NETMASTER™ COMMUNICATIONS SOFTWARE

For $179 we include the even more incredible **Netmaster** software for advanced users. **Netmaster** is a "communications freeway" that lets you speed any Apple file to another Apple through noisy phone lines, without errors. **Netmaster** even includes its own Disk Operating System to control the flow of information and leave you over 40K of "buffer" memory from your 64K RAM. And there's always help when you want it. On screen. Status indicators keep you fully updated.

Netmaster will let you transfer games, computer graphics, programs, sales reports, documents, any DOS 3.3 file, all directly from disk to disk, all with computer (not telephone) accuracy. **Netmaster** is completely configurable to understand any computer, even mainframes. File size is unlimited.

But **Netmaster** is not stuffy. It will talk to the other communications packages like Visiterm® or ASCII Express.® Of course they don't support **Netmaster's** superb error checking, that guarantees you won't miss even a comma. It doesn't only talk to the Networker either. It will also talk to those more expensive modems from Hayes and Novation.

And **Netmaster** is fast. It transfers information disk to disk three to five times faster than the others. Of course **Netmaster** is fully compatible with them. But if you want things to happen really fast, talk to another Netmaster.

We sell **Netmaster** by itself for $79, and even if you have another modem for your Apple, **Netmaster** is an outstanding value. It will even support auto dial and auto answer. **Netmaster** requires 48K of Apple memory, disk drive and DOS 3.3, and ZOOM's **Networker** modem or another modem. It can also be used without a modem when two Apples are hardwired together, using a 6850 or 6551-based interface card.

Networker, **Netmaster**, and **Networker/Netmaster** combo are all produced in the USA by ZOOM Telephonics, producers of the popular **DEMON DIALER.** The Networker is FCC registered, and all products come with a one-year warranty.

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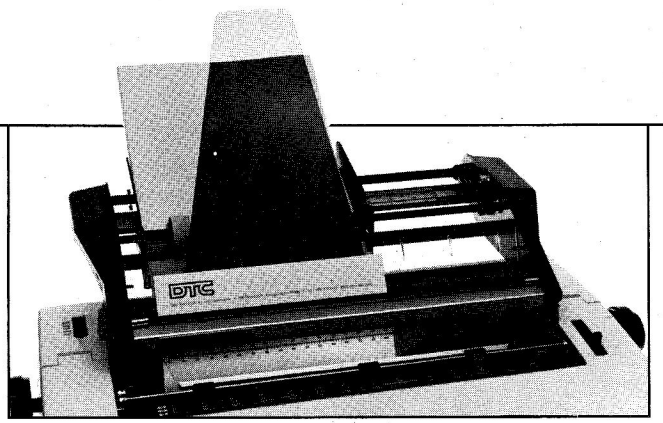
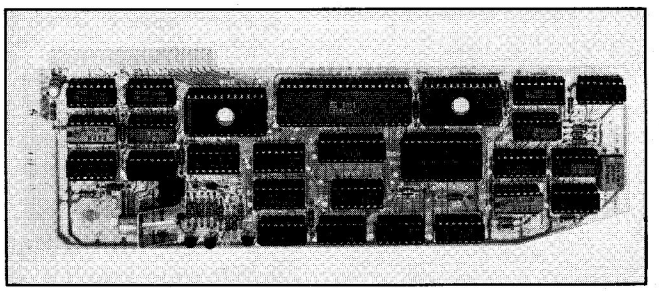


The EZ Mate sheet feeder.



Franklin Computer Inc.'s Ace Display Card.

Sheet Feeder

Data Terminals & Communications, 590 Division St., Campbell, CA 95008, offers a new sheet feeder for daisywheel printers.

The EZ Mate requires no software or hardware modifications, and it can be installed or removed in seconds. It can reverse the paper for graphic and columnar printing and can insert envelopes or individual sheets of paper without unloading the feeder. Price is $795. Reader Service number 460.

Ace Display Card

Franklin Computer Corporation, 2138 Route 38, Cherry Hill, NJ 08002, offers the Ace Display Card, a product that expands the video display capabilities of Franklin Ace 1000 and Apple II computers.

The Card provides four cursor choices: blinking block, non-blinking block, blinking line and non-blinking line. It accommodates the full upper and lowercase 128-character ASCII set, including line drawing graphics. Price is $199. Reader Service number 466.

Static RAM

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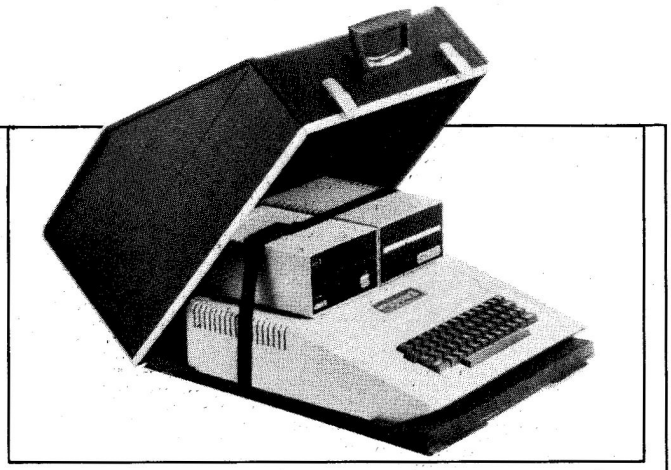

The Apple Computer case from Fiberbilt.

tiac, MI 48054, offers a new 18K static RAM card for the Apple II, II Plus and IIe.

The card contains a battery backup system to allow memory retention after power-down. A write-enable/write-protect switch allows the user to protect the information in the card or alter it at will. Price is $159.95. Reader Service number 471.

Bufferlink

Perisoft, 2084C Walsh Ave., Santa Clara, CA 95050, offers the Bufferlink add-on printer buffer.

Bufferlink accepts data as fast as your computer can accept it, then stores it and feeds it to a printer at the printer's own speed. It can be used with many popular parallel printer interfaces. Price is $159 for the 16K version. The Bufferlink is upgradeable to 64K. Reader Service number 467.

Computer Case

The Apple Computer Case serves two functions: it can be used as a security cover in the classroom to prevent unauthorized access to controller cards or software and it allows students, teachers and others to safely transport their Apples.

The case holds an Apple II with one or two disk drives and retails for $65. Contact Fiberbilt, 601 West 26th St., New York, NY 10001. Reader Service number 463.

Megaflex

Sorrento Valley Associates Inc., 11722 Sorrento Valley Rd., San Diego, CA 92121, offers Megaflex, a flexible-disk controller designed for the Apple II and III.

Megaflex is fully compatible with Apple SOS, DOS 3.3, Pascal and CP/M. It allows users to have up to four drives installed per controller. Price is $349. Reader Service number 468.

Flashcard

A new plug-in state board for Apple computers that emulates the Apple floppy disk drive but executes programs up to 10 times faster than normal is available from Synetix Systems Inc., 15050 NE 95th St., Redmond, WA 98052.

Flashcard, available in 147K and 294K versions, is compatible with most DOS, CP/M and Pascal programs that are not copy protected. A user can copy a program disk on the Flashcard.

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Flashcard reacts as a disk drive and saves wear and tear on the Apple mechanical drive and disks. A standard Flashcard package includes the board, a DOS 3.3 interface software disk and an operators manual. CP/M and Pascal interface software are offered for $50. The 147K Flashcard is priced at $395, and the 294K version costs $695. Reader Service number 472.

Circuit Judge

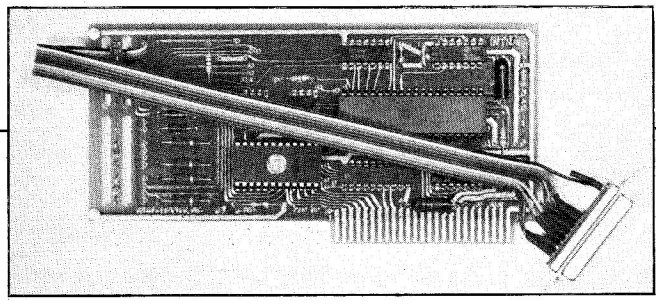
Digitronics, 53 John St., Cumberland, RI 02864, offers the Circuit Judge, an A.C. line monitoring system for use with voltage sensitive computers.

The Circuit Judge plugs into a standard 110 volt A.C. outlet and monitors the A.C. circuit for surges of 300 volts or more, high voltage in excess of 125 volts, low voltage of 100 volts or less and power loss. Price is $129.95. Reader Service number 470.

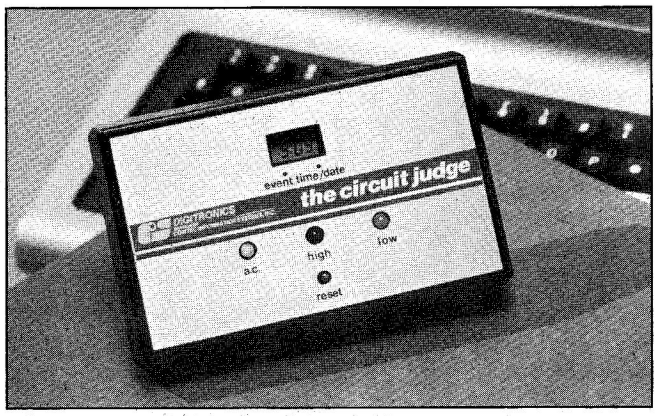
Fast Point

HEI Inc., Victoria, MN 55386, offers the Fast Point, a new light pen and controller designed for the Apple II Plus.

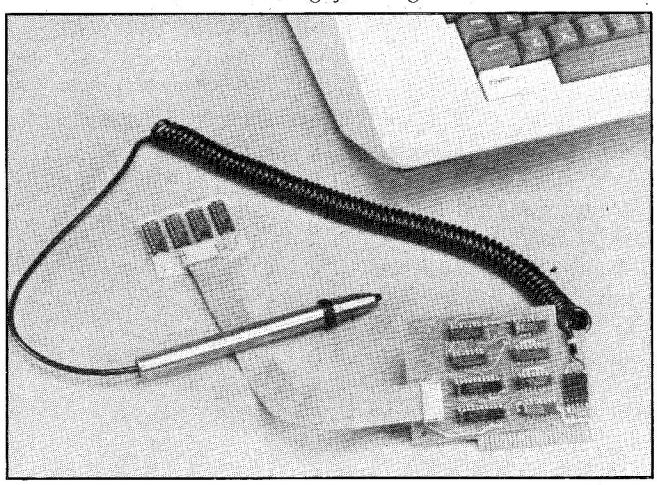
The pen can be used for cursor control and menu picking applications, as well as low-resolution graphics tasks. The pen has a touch-sensitive switch that generates a signal when the tip is placed against an unblanked spot on the CRT. The Fast Point comes with software instructions and a demonstration disk. Cost for pen and controller is $240. Reader Service number 469.



Intra Computer's Serial I/O board.



The Circuit Judge from Digitronics.



The Fast Point light pen.

Serial I/O Board

Intra Computer, 101 West 31 St., New York, NY 10001, offers the Programmable Serial I/O board that is compatible with current Apple software including Pascal 1.1, Applesoft and Integer Basic.

It provides a full EIA RS-232 DTE interface to most modems and printers. On board 1K ROM software enables user programmable printer width control, delay after carriage return, automatic line feed generation and video display. Price is $199.95. Reader Service number 465.

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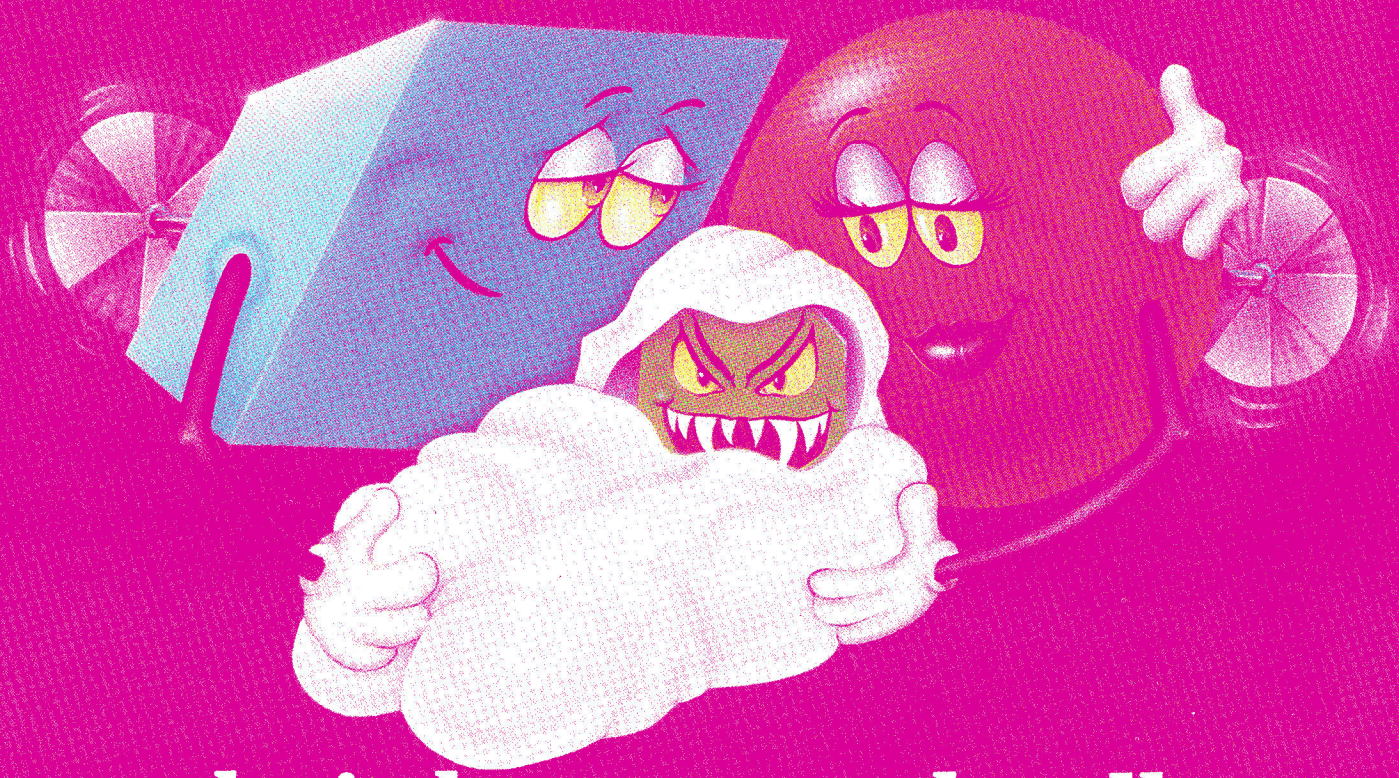

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